For More Information

Throughout this catalog there are numerous references to Andrew bulletins, special publications, and system planning software. We encourage you to make use of our primary information sources to obtain these and other Andrew publications.

Information Sources

On-Line Document Center

On-Line Document Center

This new service allows you to view, fax, e-mail, and order documents directly from the Andrew web site at www.andrew.com. The On-Line Document Center features an expanded search function, easy navigation, and allows the frequent visitor to save time by becoming a registered user. Finding information about Andrew and its products has never been easier.

Andrew Web Site

Check out our extensive web site at ***www.andrew.com***. The Andrew web site contains information on new and existing products, upcoming events, employment, press releases, corporate information, and investment information. Catalog 38 pages and a wide selection of Andrew bulletins are available from the site. You can view pages on-line and you have several options:

- *Print the page on your printer*
- *Fax the page to any fax machine worldwide*
- *Download a pdf file of the page*
- *E-mail the page to any e-mail address*

You can also download free system planning software from www.andrew.com.

Fax-On-Demand

Have product information sent to any fax machine, worldwide, without delay using our Fax-On-Demand system. All you need is a Touch-Tone phone. Call your regional Fax-On-Demand number and follow the voice prompts.

See page 753 for the Fax-On-Demand number for your region.

Customer Support Center

The Andrew Customer Support Center gives you direct access to the information and personal service you need. Toll-free telephone and fax numbers are available for many parts of the world. For other locations, contact any Andrew Sales Office.

- *Place orders*
- *Check order status*
- *Pricing information*
- *Replacement materials*
- *Product information*
- *Service*
- *Repairs*
- *Returns*
- *Technical assistance with system planning*

See pages 751-753 for telephone and fax numbers.

Information Types

Catalog Updates

Update your copy of Catalog 38 by visiting our web site, www.andrew.com. On the Andrew home page, click Catalog 38 in the Products section and follow the instructions to identify the pages you need.

You can also order pages by telephone using Fax-On-Demand, as described above.

Special Publications

Order Special Publication Bulletins from www.andrew.com. Click On-Line Document Center under the Solutions section and follow the instructions. You can also order pages by telephone using Fax-On-Demand.

Sales Brochures and Bulletins

Order printed copies of our literature from our Customer Service Center. The On-Line Document Center at www.andrew.com provides access to over 2000 documents that you can view and print, fax, e-mail, and order. You can also order by telephone using Fax-On-Demand.

System Planning Software

Order Andrew system planning software from our web site or from our Customer Service Center. You can also download the software from our web site.

Section Guide

How Do You Communicate?
How Does the World Communicate?
How Will You Communicate Tomorrow?

Communicate with Andrew!

There are many reasons you choose Andrew. For confidence that comes with quality; for delivery where and when you want it; for standard products available around the globe; for ease of use, lower costs, and long service life; and for simply unmatched customer service. All good reasons.

Perhaps the best reason of all, though, is that you know real value when you see it.

At Andrew, we're looking forward to serving you.

Andrew is a Worldwide Leader

Andrew Corporation is a worldwide leader in the design, manufacture, and supply of communications equipment, systems, and services. Andrew products and services provide proven solutions to wireless and fixed-line telecommunications operators, Internet service providers, and broadcasters. Andrew was founded in 1937. Today, it is a multimillion-dollar, multinational corporation with more than 4,500 employees in 70 locations in 27 countries on the continents of North and South America, Europe, Africa, Asia, and Australia.

Global Reach, Customer Focus

Andrew Corporation's global sales, manufacturing and distribution network is unparalleled in the industry, providing products and services where and when you need them.

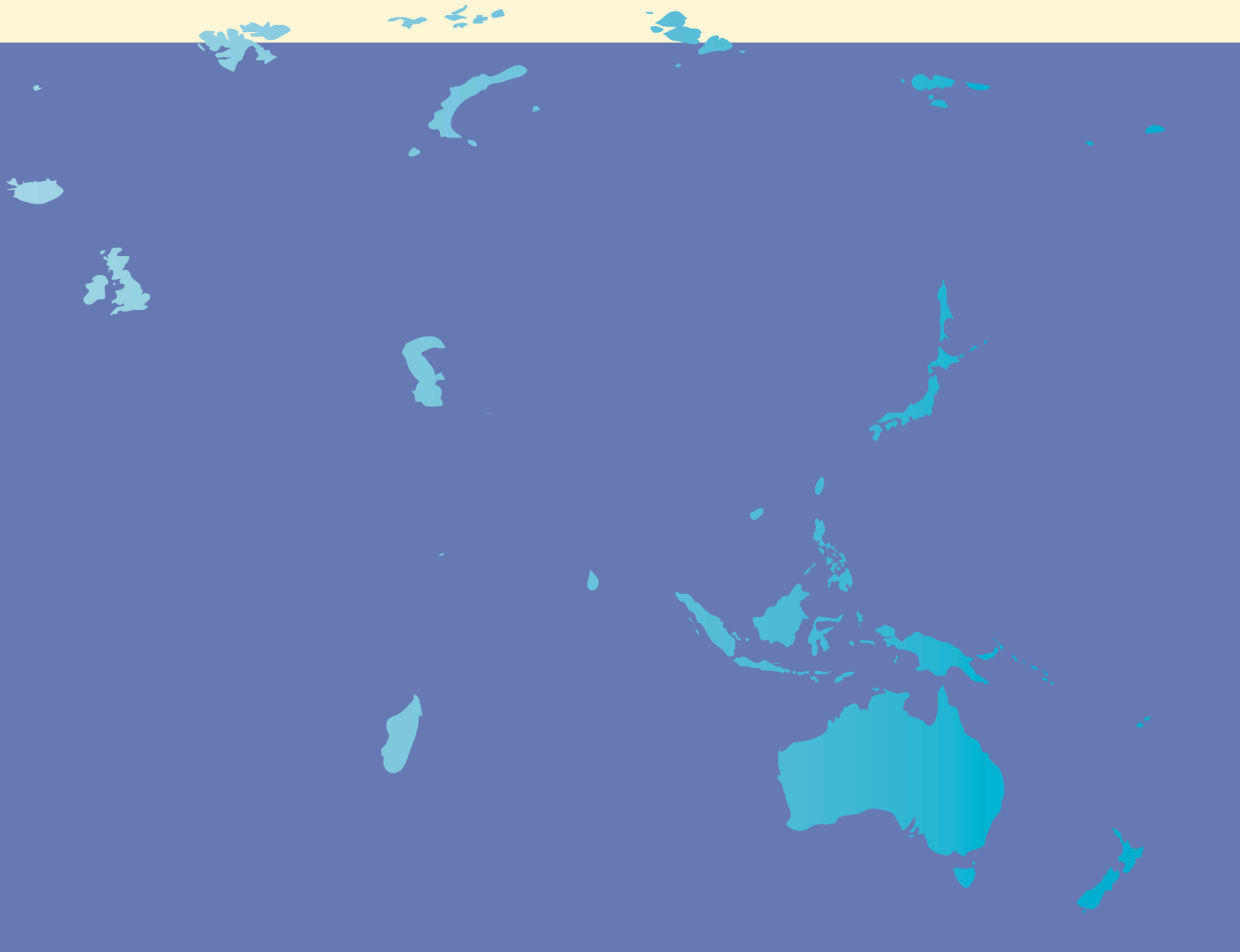
ANDREW®

The Andrew Flash

Elegant in its simplicity, yet bold in appearance, the Andrew "Flash" stands alone in its enduring power to represent Andrew Corporation's long history of technical innovation and international reputation for service excellence. For all who recognize it, the "Flash" carries unique and special meaning.

For Andrew customers, the "Flash" represents assurance that they are receiving the industry's highest quality and most reliable products, supported by a company-wide commitment to outstanding service and customer satisfaction.

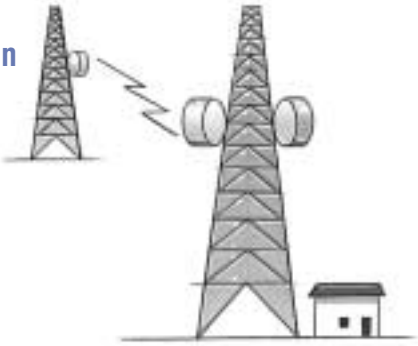
A truly international icon, the Andrew "Flash" trademark can be found on every continent, in every major communications system around the world. It is brightly emblazoned on antennas atop towers and ships, on mountaintops, derricks, platforms, and gantries, as well as on cable, consoles, equipment shelters, and wireless phone accessories. Look for it wherever you go.



Andrew at a Glance

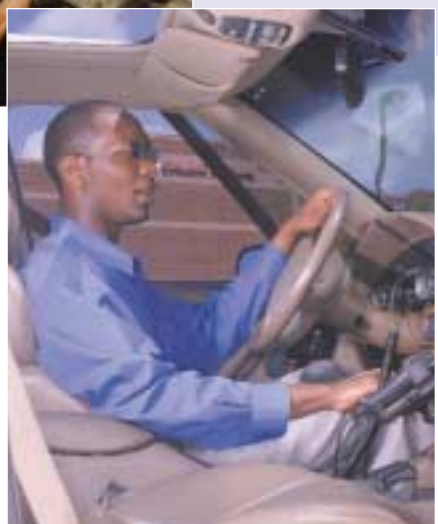
Wireless Infrastructure

Fixed-Line Telecommunication Networks



Broadcast and Government

Wireless Accessories



Wireless infrastructure equipment for cellular, personal communications services, land mobile radio, specialized mobile radio, public access mobile radio, and wireless local loop applications. Products serve analog and digital systems, including GSM, TDMA, CDMA, PHS, PDC, NMT, WCDMA, TACS, WLL, and TETRA.

- HELIAX® and RADIAX® coaxial cable
- HELIAX connectors, assemblies, and accessories
- PerforMax™ base station antennas
- Terrestrial microwave antennas
- HELIAX elliptical waveguide
- Amplifiers and repeaters
- Pressurization equipment
- Equipment shelters
- Program management

Communications systems built by public telecommunication network operators and competitive service providers for voice, data, video, or internet service, and by private operators such as utilities and railroads for their internal communications needs. Fixed broadband wireless networks, including LMDS and MMDS, provide last mile connectivity via millimeter wave radio, point-to-point or point-to-multipoint systems that bypass local networks to provide high-speed data and internet access.

- HELIAX® coaxial cable
- HELIAX connectors and accessories
- HELIAX elliptical waveguide
- Terrestrial microwave antennas
- LMDS and MMDS antennas
- Satellite communications systems
- Earth station and VSAT antennas
- Pressurization equipment
- Equipment shelters
- Program management

Infrastructure systems for radio and television broadcasting, including digital TV, multi-channel video, and satellite-delivered broadcast services, air traffic control, weather surveillance radar and HF systems for government and commercial applications.

- HELIAX® coaxial cable
- HELIAX elliptical waveguide
- UHF, VHF, LPTV, and MMDS analog and digital transmit antennas
- Rigid transmission line
- Filters and couplers
- Earth station antennas
- Satellite communications systems
- Radar and HF antenna/pedestal systems

Accessories, hands-free solutions and mobile antennas for cellular and PCS handsets and paging devices. The Company also supplies wireless antennas and global positioning system components to automotive manufacturers and their key suppliers.

- Voyager® hands-free kits
- Car adapters
- Mobile antennas
- Batteries and chargers
- Mounting hardware
- Leather cases
- Integrated vehicular cellular and GPS antennas
- Coaxial cable assemblies
- Office/home speakerphones

Andrew Products

Coaxial Cable Systems

HELIAX®
coaxial cables

OnePiece™
connectors

SureFlex™
cable
assemblies

HELIAX cable
installation
accessories

Base Station Antennas

PerforMax™
antennas

Fiber Optic Cables

Microcable™
cable

Broadcast Systems

TRASAR® broadcast
antennas and
transmission lines

Broadcast filters and
combiners

LMDS and
MMDS
antennas

Earth station and VSAT
antennas and systems

Broadband Wireless Products

Subscriber
antennas

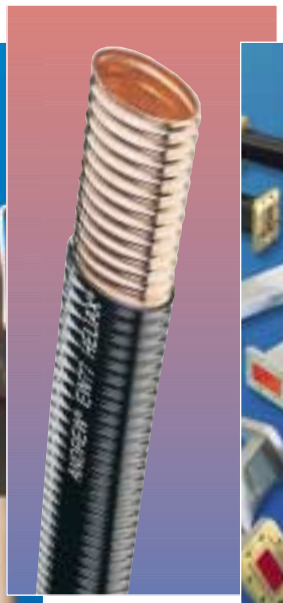
RF Power Amplifiers

Single and multi-channel
power amplifiers

Terrestrial Microwave and Millimeter Wave

Terrestrial microwave antennas

ValuLine® antennas



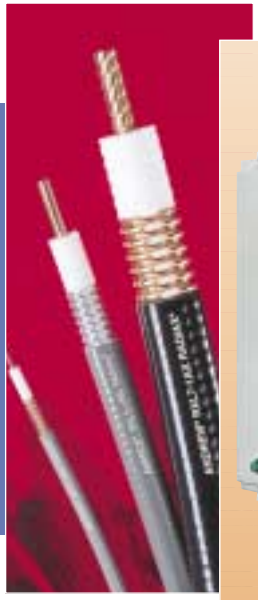
HELIAX® elliptical waveguides

Rigid and flexible waveguides

Equipment shelters

Pressurization equipment

Distributed Communications Systems



RADIAX® slotted coaxial cables

Bi-directional amplifiers

Wireless Accessories

Voyager® hands-free kits

Mobile antennas

Government and Military

Antennas and pedestals

Andrew Services

Andrew is much more than products. Andrew is also the services and backup support that help you do your job more efficiently and more cost effectively.

Software

Andrew offers free system planning software to simplify your system design task. The software guides you through the design and ordering process and performs system design calculations.

- **Terrestrial Microwave Systems.** The Andrew Microwave System Planner (AMSP) software selects microwave antennas, waveguide, accessories, and pressurization equipment. It checks component compatibility and provides you with a custom bill of materials.
- **PCS/Cellular Base Station Antenna Systems.** The Andrew Antenna System Planner (AASP) software selects system components for custom wireless repeater sites. All components are checked for compatibility. The program shows you antenna patterns and calculates transmission line insertion loss and VSWR. Upon completion, the AASP provides you with a bill of materials.
- **Broadcast Antenna Systems.** The Andrew Broadcast System Planner (ABSP) helps you to configure digital and analog television broadcast systems. It provides printed antenna patterns with tabulated data, data for power analyses, produces electronic files of antenna patterns for propagation studies, and comes pre-loaded with more than 35 popular broadcast transmission lines.
- **Earth Station Antenna Systems.** The ESA System Planner helps you with equipment selection and system planning. It generates custom solutions using standard Andrew products, and automatically checks component compatibility.
- **Rectangular Waveguide.** Our ezGuide™ software simplifies the design and ordering of rectangular waveguide components. You specify your requirements using point-and-click options. The software provides you with pictures, diagrams, and complete ordering information for each component.
- **Pressurization Systems.** The PSI Select Pressurization Planner performs air volume calculations, helps you to select the proper dehydrator, and provides all the Catalog information.

You can download the programs from ***www.andrew.com***.
Software is also available on CD ROM.
See pages 24-25.

Andrew Web Site/On-Line Document Center

Visit our extensive web site at www.andrew.com. It contains information on new and existing products, upcoming events, press releases, corporate information, and investment information. Updated Catalog 38 pages and a wide selection of Andrew Bulletins are available from the new On-Line Document Center. You can also download free system planning software from ***www.andrew.com***

See page 1.

Fax-On-Demand

Have product information sent to any fax machine, worldwide, without delay. Order product bulletins, antenna patterns, installation instructions, and Special Publications.
See page 1.

Andrew Field Services

Andrew has the engineering expertise and the field experience to perform all aspects of site construction including delivery, installation, testing, site preparation, and program management. Andrew personnel are experienced in every aspect of erecting towers and installing shelters, antennas, and feeder systems. Field services are offered individually or as complete turnkey systems.

See pages 14-19.

Andrew Institute

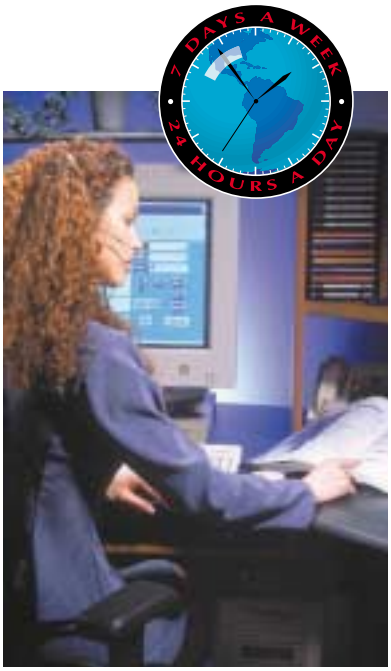
The Andrew Institute conducts hands-on workshops customized to meet any level of technical training required by microwave or wireless installers, project managers, and field engineers. The training programs are held worldwide. Primary locations are Orland Park, Illinois, U.S.A.; Whitby, Ontario, Canada; Lochgelly, Scotland; Sorocaba, Brazil; Sandton, South Africa; and Suzhou, China. Customer site training is also available.

See pages 12-13.

eBusiness

Andrew is committed to using eBusiness technologies to streamline our business practices. The company currently is servicing customers electronically using EDI, XML, the Internet, and Extranets. Andrew is also utilizing various tools to integrate our ERP system with customers and vendors. As new eBusiness technologies and portals are developed, Andrew will incorporate them into solutions for our customers.

Customer Service Center



The Andrew Customer Service Center gives you direct access to the information and personal service you need.

- Place orders.
- Check order status.
- Pricing information.
- Replacement materials.
- Service.
- Repairs.
- Returns.
- Technical assistance with system planning.

Call toll-free from many areas.

See pages 751-753.

RF Communications Technology Training

Learn the Essentials of Improved RF Communications Performance

- *New Locations!*
- *New Courses!*
- *New Ways to Register!*
- *New Schedules!*

Convenient Training Locations Around The World

Andrew Institute Training programs are held worldwide. Primary training locations are: Orland Park, IL USA; Whitby, Ontario, Canada; Lochgelly, Scotland; Sorocaba, Brazil; Sandton, South Africa; and Suzhou, China.

Who Should Attend

- *Installers*
- *Project managers*
- *Field engineers*
- *Anyone who works directly or indirectly with a communications system*

Benefits

Depending on which curriculum you choose, you will:

- *Learn to obtain the highest possible performance with every Andrew product installed.*
- *Gain an understanding of system fundamentals and how components work together.*
- *Through hands-on practice, learn to properly install cable and waveguide connectors and accessories.*
- *Learn the correct techniques of installing HELIAX® coaxial cables, waveguides, TMW antennas, and base station antennas.*
- *Learn theory of operation and installation techniques for pressurization systems.*
- *Learn proper path alignment techniques.*
- *Learn site testing techniques, including VSWR sweep testing, insertion loss, and TDR/FDR plots.*

Meeting the Demand for RF Communications Expertise Around the World

Years of experience have demonstrated how superior installation is critical to long term system performance. As the demand for wireless RF communications continues to grow, so too does the need for product knowledge and expertise to ensure quality installation, reliable coverage and peak performance. Recognizing this need, Andrew offers cutting-edge training on a continual basis to address new technologies, products, tools and improved installation methods.

The Andrew Institute has grown dramatically. Since its beginning in 1993, more than 23,000 participants have attended. Recognized around the world as the industry leader, Andrew Institute content provides quality, specialized training to customers worldwide.

Installer Registration-Documenting Technical Competence

More and more, system owners and operators are mandating that installation technicians complete technical training. Andrew Institute attendees become registered with Andrew as having completed Institute coursework and having been instructed in the proper manner of handling Andrew products.

Superior Training, Superior Performance – Anywhere Around the World

Andrew Institute training is constantly evolving to meet any level of technical support required by terrestrial microwave, broadcast, and wireless operators. Select training may be available at customer locations. Program materials include comprehensive workbooks, tools and detailed installation support documentation. A certificate of completion is presented to each participant.

Institute Instructors

The Andrew Institute is staffed by experienced, certified instructors who possess over 100 years of experience in the installation and operation of RF transmission line. Institute instructors have been selected from a variety of disciplines within Andrew, ranging from Manufacturing, Field Services, and Supervisory.

Customer Service Center - Call toll-free from: • U.S.A., Canada and Mexico 1-800-255-1479

Connector Attachment Training

Connector Attachment Training is ideal for those who could gain from training on fitting cables and connectors, or those who would benefit from expanded technical training covering all aspects of HELIAX® transmission line installation and testing.

Course Outline

Overview of Cable Concepts. *Basic RF theory, product overview, tour of manufacturing facilities.*

HELIAX® Connector Attachment. *Cable Types FSJ4, LDF4, LDF5, VXL5, LDF7, HJ5, HJ7, and waveguide Type EW52. Soldering practice. Waveguide flare tool demonstration.*

Accessory Demonstration. *Grounding Kit Tools, Sureground™ Kit, Sureground™ Plus Kit, Cable Preparation Tools, Hoisting/Support Grip, Weatherproofing Kit, Hangers.*

Terrestrial Microwave (TMW) Systems Installation Training

Covering topics that range from microwave as a communication medium to assembly and installation, to site cleanup. Our new TMW communications technology training is certain to raise the expertise and effectiveness of those who attend.

Course Outline

Overview of RF Theory and TMW Fundamentals.

Basic Installation Practices. *Rigging, knot tying, communication on the site, using the Andrew Catalog, and Installation Instructions.*

Site Survey. *Site documentation and planning.*

Hands-On Antenna Assembly, *including uncrating and material inventory.*

Hands-On Antenna Installation, *including overview of techniques.*

Transmission Line Assembly and Installation, *includes forming and hoisting elliptical waveguide and attaching connectors.*

Path Alignment *and calculation of path loss.*

Pressurization. *Theory, installation, and locating air leaks.*

Completing the Installation. *Fundamentals of VSWR and ensuring a quality installation*

Base Station Training

Base Station Training covers topics that range from base station antenna fundamentals, antenna and mount assembly, to weatherproofing and final inspection.

Course Outline

Base Station Antenna Fundamentals

Mounting Configurations

Weatherproofing

Inspection and Maintenance

VSWR Training

In this course you will determine if connectors have been properly attached, and check to make sure target return loss/VSWR and insertion loss specifications have been met. The tests determine if the line was damaged during installation.

Course Outline

Overview of a Typical Site Configuration, *including feeders, jumpers, antennas, and surge arrestors.*

Learn Definitions, *such as return loss, insertion loss, and attenuation.*

Testing Guidelines. *Test equipment, calculating insertion loss, order of testing.*

Things to Consider. *Cable diameters and lengths, calibration of test equipment.*

Plot/Sweep Interpretation. *Insertion loss, return loss,TDR/FDR.*

Troubleshooting. *Connectors, surge arrestors, grounding, hangers.*

Register on the Andrew Web site: www.andrew.com or call:

United States and Central America	708-873-2644
Canada	905-668-3348
South America	+(55) 15-238-4158
Europe	+44 (0) 1592-786-005
South Africa	+(27) 11 444-5041
Elsewhere	+1 708-873-2309
China	+(86)-512-252-0805

Microwave and Wireless Turnkey Systems

Index

Microwave, Cellular and PCS Systems

Andrew has been an industry leader in the design, manufacture and supply of telecommunications equipment since 1937. We offer a complete line of premium quality microwave, cellular and PCS equipment for all radio applications.

We know what it takes to meet today's design and installation requirements and to quickly get your system generating maximum revenue. It takes "The Andrew Advantage: Products Plus Services."

The Andrew Advantage

The Andrew Advantage is premium products backed by a team of professionals dedicated to excellence. Andrew designs, manufactures and stocks thousands of high performance components. These components are engineered to work together, giving the most cost effective solutions for your system. As a single source supplier, we provide system preplanning and design, site preparation, installation, testing, and program management.

Our involvement in your project is flexible and we will handle whatever amount of responsibility you want to give us. We can supply the individual component parts, or take your concept from a paper proposal to a complete communication system on time, to specification, and within budget. Whatever your needs might be, use the Andrew Advantage to your advantage.

Andrew Products

- *Microwave antennas*
- *Base station antennas for cellular and PCS*
- *HELIAX® coaxial cable*
- *HELIAX® elliptical waveguide*
- *Circular waveguide*
- *Rectangular waveguide*
- *Equipment shelters*
- *Transmission line support systems*
- *Pressurization equipment*

Andrew Services

- *System engineering*
- *Program management*
- *Site civil engineering*
- *Transportation*
- *Tower erection*
- *Shelter installation*
- *Electronics installation*
- *Antenna installation*
- *Transmission line installation*

When you choose Andrew for your Terrestrial Microwave, Cellular or Turnkey System, you get products and services that lead the industry in quality and reliability.

Andrew Turnkey Systems Management Teams have the proven capability and expertise to completely coordinate and manage your next project. In addition to supplying all of the materials and components, Andrew can provide people to help in preplanning and design, site preparation, installation, and testing. Since every project is unique, you can pick and choose from any or all of our services to meet your specific requirements.

Program Planning and Design

In order to have the most cost-effective system, Andrew will supply a team of experienced professionals who will assist you when you begin the initial planning stages of your project. This group will work with you so your project is completed on time and on budget.

Preplanning can help you avoid costly delays by ensuring that you have achieved the best component interface designs which will provide the highest system performance at the least cost to you. Accurate material lists are supplied which can eliminate the need for last minute shipments. And preplanning results in more efficient use of field time.

The Andrew difference begins on the drawing board. Andrew engineers have extensive experience in all aspects of system design, development and practical installation. Our laboratories are fully equipped, and the latest equipment is employed for the most effective designs possible. Computer modeling guarantees a high level of performance in actual service. Conservative design approaches provide reliable operation under extreme conditions.

Program Management

Andrew can provide a Program Manager who assumes responsibility for the implementation, installation, testing, and inspection of your project. Working with the Program Manager, experienced engineering and support personnel will integrate all services and system components supplied by Andrew or others. The Program Manager will monitor all crews and their performance and report progress to you.

We provide complete site preparation including site clearing and grading, construction of foundations for earth station antennas, towers, equipment buildings, electrical work, fence installation, construction of access roads, site clean up and debris disposal.

Ongoing inspections by our experienced field supervisors, site superintendents and field inspectors ensure that Andrew provided products and services meet our strict standards and meet your project requirements.

Andrew professionals assist you in the initial planning of your project.

Since communication with all parties is an essential part of any project, daily status reports from the field are received to monitor progress. Weekly status updates are given to you.

This total coordination saves time and money by eliminating schedule conflicts, extra personnel and material oversights.

Since Andrew can supply you with a wide range of systems management programs and capabilities, you can be assured that Andrew professionals will have your project completed on time and within your budget. You can depend on Andrew products and services for a top performing system.

Emergency Assistance

When you are faced with an emergency, Andrew is ready to help. Technical assistance is available 24 hours a day. HELIAX® coaxial cable and elliptical waveguide shipments are normally possible within hours for emergency situations.

Field Services

Andrew can provide complete field service capabilities for delivery, installation, testing, site preparation and program management for all your systems applications.

Andrew Field Service performs all aspects of site construction including:

Andrew trucks deliver all system equipment to any accessible site.

- *System engineering, installation preplanning, scheduling and program management*
- *Site civil work such as site clearing and grading, access road construction, fencing and grounding*
- *Tower and building foundation construction*
- *Delivery to site of all system equipment*
- *Tower erection*
- *Antenna and transmission line installation*
- *Factory installation of radio racks, wiring, power source equipment and other equipment in concrete shelters*
- *Installation of concrete shelters and on-site power connection*
- *System testing and guarantees*

Field services are also available individually. Antenna system installations by Andrew Field Service offer several advantages. Crews are self-contained and arrive fully equipped. Ongoing inspections and continuous field supervision help yield a maximum effort and proper installation. Field services include delivery to the site, installation, site civil work and system testing.

Site Preparation

Andrew has the engineering expertise and the field service experience to handle all details necessary for site construction. These include installation of equipment shelters, site clearing and grading, construction of tower and building foundations, tower erection, electrical work, installation of fences and construction of access roads.

Delivery

Andrew Field Service can deliver any product to any accessible site. Off-loading of equipment at the site is provided by Andrew.

Installation

Proper installation of a tower and the associated antenna and transmission lines takes experienced field service people. Andrew personnel are experienced in every aspect of erecting towers and installing shelters, antennas, and feeder systems. They are familiar with every tower member, every assembly drawing, and every procedure.

Installation crews are equipped with all the necessary tools, rigging equipment and test equipment to ensure an efficient and trouble-free installation.

Testing

After installation is completed, Andrew tests each antenna/transmission line system for VSWR across the specified operating band. A pressure integrity test is performed on pressurized systems.

System guarantees are offered when the complete system is furnished by Andrew and the installation is performed by Andrew Field Services.

Andrew products are designed to minimize the causes of inter-modulation, return loss and echo distortion.

Andrew antenna/transmission line systems can be used for fully loaded frequency plans. Optional guarantees for inter-modulation noise levels can be provided on request.

System Components

The wide range of products from Andrew promotes efficient system design. The large number of antenna/transmission line combinations allow you to design a system that meets performance objectives at minimal cost.

Shelters

When you select an Andrew concrete equipment shelter, you get custom-design at pre-engineered prices. Our computer-aided design means your custom requirements can be quickly and economically incorporated into our standard shelters. Andrew modular and multi-piece shelter designs allow for economical system expansion. All Andrew shelters are guaranteed for 10 years.

Microwave Antennas

Andrew has the industry's largest selection of microwave antennas for frequencies ranging from 335 MHz to 58.2 GHz. They are available in diameters of 1 to 15 ft (0.3 to 4.6 m) and in several performance levels. This wide variety of antennas means easier and more efficient system design.

Base Station Antennas

Andrew designs and manufactures patented base station antennas which are setting new industry standards for electrical and mechanical performance. Andrew base station antennas are the ideal choice for wireless applications, including PCS/PCN, Paging, Cellular, GSM, SMR and ESMR.

Microwave Transmission Lines

HELIAX® coaxial cable and elliptical waveguides are the standard of the industry. Both are available in a wide variety of sizes and have connectors to match all common industry standard flanges.

Andrew circular waveguide is recommended for very long vertical runs in systems where multiband capability is needed or where low attenuation is critical. A single waveguide run can carry two polarizations. By using circular waveguide, you can also use smaller antennas, which reduce tower loading and save antenna cost.

DryLine® dehydrator and line monitor.

Andrew has three sizes covering frequency bands in the 3.58 - 19.7 GHz range.

Andrew offers a full line of rectangular waveguide components for use in HELIAX® elliptical waveguide and circular waveguide systems.

Pressurization Equipment

Pressurization of your antenna system reduces your risk of damage and costly interruption of services. This means lower operating and maintenance costs over the life of the system. The wide variety simplifies system design and reduces cost. Andrew equipment includes basic dehydrators, monitors and a full line of accessories and related equipment.

Microwave and Wireless System Planning

Index

Microwave Antenna Systems

Overview

Andrew microwave and wireless systems include a wide range of product offerings including antennas, transmission line, and accessories. In addition, we offer a variety of services to help you including sales support, program management, and on-site installation. This catalog provides you with the information you need to plan and build a microwave system. It details the options available in both electrical and mechanical performance parameters.

- *Quality products*
- *Product selection assistance*
- *Certified installation*
- *System performance guarantee*
- *Single point responsibility... Andrew*

Microwave Antenna Systems

Typical microwave systems use a coaxial or waveguide transmission line between the antenna and radio. Another option, direct integrated systems, attach the radio directly to the antenna. The direct integrated antennas are options available to Andrew ValuLine Series® antennas.

Terrestrial Microwave Antennas

Terrestrial microwave (TMW) antennas produce highly directional beams that are typically used in point-to-point microwave systems. Options are available in grid or solid reflectors, single polarized, dual polarized, and multiband operation. These variations provide radiation pattern control and other performance levels to meet your requirements.

Grids are used at the low end of the spectrum (below 3.6 GHz) and where low wind loading is required. They are only available in single polarized versions and contain coaxial inputs.

Solid reflectors are used throughout the frequency spectrum. Depending upon the antenna type, antenna inputs are either coaxial or rectangular waveguide.

Dual polarized antennas can double your system's capacity or provide a solution for site coordination issues. Multiband antennas allow two different frequency bands, many with dual polarity, to be placed within one operating antenna. This reduces the occupied tower space and wind loading to the tower.

Microwave Transmission Lines

Microwave transmission line's main function is to effectively deliver as much energy from the antenna to the receiver, or from the transmitter to the antenna. The two types of transmission line are coaxial and waveguide.

Coaxial transmission line is either air or foam dielectric. Generally, air cable provides lower return loss and insertion loss than foam cable. However, foam cable does not require air pressurization.

Waveguide transmission line is available in these types: elliptical, circular, rigid rectangular, and flexible rectangular. A typical system uses elliptical waveguide (EWG) as the main feeder to the system. Elliptical waveguide varies in size based upon the frequency it carries. After the elliptical waveguide, with connectors, is routed into the building, rigid rectangular waveguide (RWG) is used. Rigid rectangular waveguide provides the required mechanical and twisting characteristics. The flex section is the final link from the transmission line to the radio. Flex sections can remove mechanical stresses placed on the (soldered) flanges and simplify final testing and assembly.

Circular Waveguide (WC) provides the best electrical performance specifications when low attenuation is critical. However, the installer is tasked with additional installation, testing and tuning challenges. The circular waveguide is typically used for the vertical portion of the feeder run, with a circular-to-rectangular transition located at the top and bottom of the vertical run. At each transition end, elliptical waveguide jumpers connect with the antenna's feed and radio.

Dehydration Pressurization Equipment

Dehydration pressurization equipment maintains the integrity of waveguide and air dielectric type microwave systems. It does so by placing dry air, on demand, through the transmission line and into the feed preventing ingress of moisture that can degrade its electrical performance. Although gaskets are provided when required within connectors and interface flanges, condensation can be drawn into a system if it is not pressurized.

It is important to provide this internal air pathway

throughout the system to the feed. This is typically interfaced through the waveguide or air dielectric transmission line. Dry air enters the transmission line through an adapter located on the RF connector.

Dehydration systems create dry air which keep the dew point within the transmission line/feed system at -40°C (- 40°F)*, which is a lower temperature than that of most microwave site locations. In addition, the air pressure provided is greater than the air outside, and will not allow the ambient moisture to be drawn into the system that can degrade both insertion and return loss (VSWR) measurements.

* operational dew point dependent on dehydrator selection

Powertools System Planning Software

The Andrew Powertools system planning CD-ROM contains an easy-to-use suite of system planning tools. Powertools software programs cut the time needed to accurately plan an RF telecommunication system.

The Powertools CD-ROM includes several system planning programs to speed the RF system design process. These programs are especially useful for the design of terrestrial microwave antenna systems, PCS and cellular systems, DTV and NTSC broadcast systems, wireless RF, broadcast and microwave transmission line systems.

The Powertools CD-ROM includes these TMW system planning tools:

- *Andrew Microwave System Planner (AMSP)*
- *ezGuide™*
- *PSI Select Pressurization Planner*

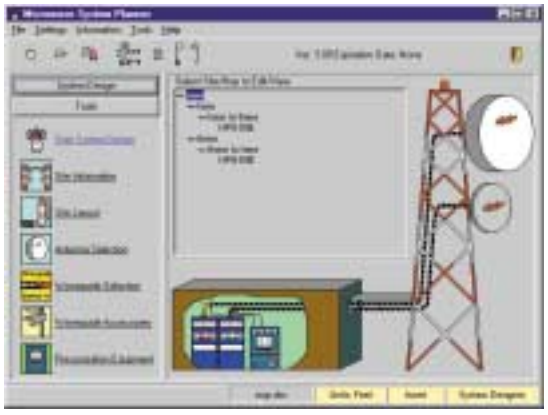
It also includes these additional system planning tools:

- *Andrew Antenna System Planner (AASP)*
- *Andrew Broadcast System Planner (ABSP)*
- *Andrew ESA System Planner*

You can request the Powertools CD-ROM (Bulletin M400) or download software tools from the Andrew web site, www.andrew.com.

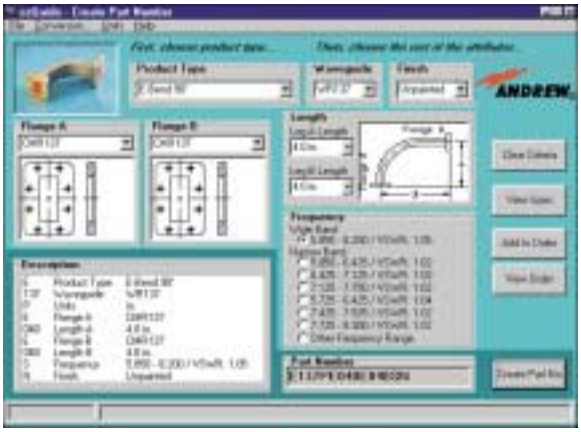
Andrew Microwave System Planner (AMSP)

The AMSP is a complete terrestrial microwave system design tool. AMSP helps you with equipment selection and system planning, including choices of terrestrial microwave antennas, waveguide, flex twists, accessories, and pressurization. The program generates custom solutions with standard Andrew products, automatically checking component compatibility and preventing the design of an incompatible system. After you complete the system design, AMSP provides you with a customized bill of materials.



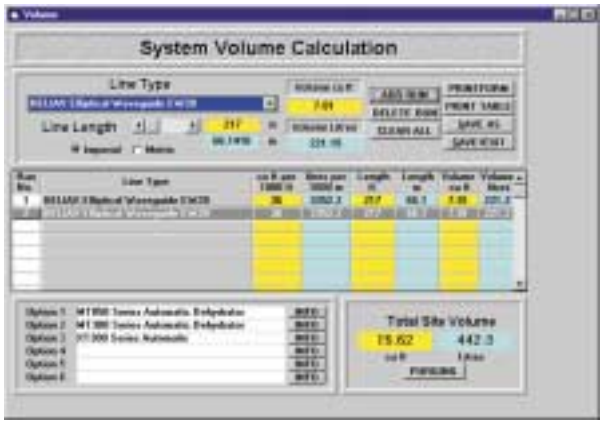
ezGuide

ezGuide software guides the design and ordering process for rectangular waveguide microwave transmission lines. The exact component type, waveguide size, flange types, component dimensions, operating frequency band, and finish can be specified with point-and-click options. Each product is pictured on the screen and diagrammed for your reference.



PSI Select Pressurization Planner

The PSI Select Pressurization Planner offers complete information on Andrew pressurization products and accessories. The program performs system calculations and dehydrator selection for either a new site or for modifying an existing site. PSI Select Pressurization Planner also provides catalog information and several pressurization presentations in Microsoft® PowerPoint®.



Andrew Antenna System Planner (AASP)

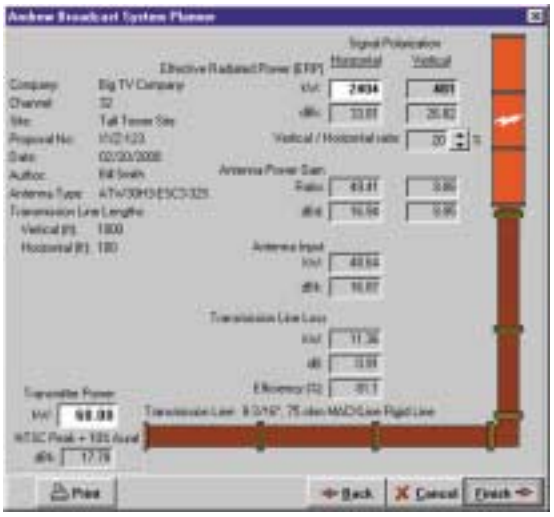
The AASP graphically guides you through the entire design process and allows you to create and save up to five of your own operating bands in any frequency range from 0 to 8 GHz. All components are checked for frequency compatibility, and electrical performance is given for each transmission line including insertion loss and VSWR for selected cables. The base station antennas selection program includes Radiation Pattern Envelopes (RPEs) and specifications for easy viewing, printing, and exporting to popular propagation software programs. The enhanced repeater program for null sites answers common scenarios and provides a list of materials for the repeater site. After you complete the system design, AASP provides you with a customized bill of materials and the Andrew parts necessary for your system.

Andrew ESA System Planner

Andrew ESA System Planner is a complete earth station antenna system design tool. The ESA System Planner helps you with equipment selection and system planning, including choices of earth station antennas and accessories. The program generates custom solutions with standard Andrew products, automatically checking compatibility and preventing the design of an incompatible system. After you complete the system design, the ESA System Planner provides you with a customized bill of materials.

Andrew Broadcast System Planner (ABSP)

The ABSP helps broadcast consultants and engineers configure digital and analog television broadcast systems. The ABSP supports H-Pol, E-Pol, and C-Pol designs; printed information and full layout of the system, including antenna patterns and tabulated date, along with data for power analyses. It also produces electronic files of antenna patterns for propagation studies. The ABSP comes preloaded with more than a dozen standard directional patterns and 35 popular broadcast transmission line selections.



Systems Using Air-Dielectric HELIAX® Coaxial Cable

Andrew offers terrestrial microwave antenna systems from 335 MHz to 3.9 GHz* in a wide range of frequency band offerings to meet your system design requirements. The details below describe each component of the terrestrial microwave antenna system shown on the following page.

1 Antenna. Many different antennas are available to meet your electrical and mechanical specifications. The types of antennas include grid, standard, focal plane, and shielded, all providing the flexible range of performance parameters required for each system design. Whether it's radiation side lobe suppression, low VSWR, dual or multiband operation, high wind, or extreme environment, Andrew provides the highest quality products in the industry. See pages 51-60.

Grid, standard, and focal plane antennas consist of three major components, the mount, reflector, and feed. Focal plane antennas further reduce side lobe and front to back levels. Most antennas feature a modular design to allow interchangeability or field upgrading. Shielded antennas add the shield around the reflector's aperture to reduce radiation side lobes. In addition, a planar radome is included to reduce the wind load effects of the shield.

Antenna Options. Most antennas have standard options for harsh environment, high wind, flange inputs, paint color, radome, and packaging. See pages 114-122.

Optional Struts. Optional struts can provide added rigidity to antennas. Bottom struts help with snow and ice loading. See page 123.

Termination Loads. Termination loads are used in a dual or multi-band antenna when all of the feed ports are not being used. They keep interport isolation levels low rather than use a shorting plate. See pages 126, 212.

2 Radome. You can reduce wind loading for standard and focal plane antennas by installing an optional molded radome. Molded radomes are either fiberglass or a thermoformed plastic material. All UHX, UHP and HSX type antennas include a TEGLAR® radome. All other shielded antennas include a Hypalon radome. Upgrades to TEGLAR® radomes are available for all shielded antennas 6 ft (2.0 m) and larger. Note: All 4 ft (1.2 m) shielded antennas include a TEGLAR® radome. See pages 115-119.

3 Mounts. All standard mounts are included with the standard antenna selections. For optional mounts such as vertical look or high tilt angle, contact Andrew. (High wind mounts request Bulletin 3511). See pages 95-110.

4 Jumpers. In most cases, transmission lines should connect directly to the back of the antenna feed flange. In cases where the mechanical limits of large diameter coaxial lines prevent this connection, the use of jumpers can provide the needed link. Smaller diameter HJ series cables, typically 1/2" or 7/8" diameter sizes, are used to provide the dry air path to the feed system. The 7/8" EIA flange provides the gas pass connection between cable diameters. See page 472.

*Spread spectrum, other unlicensed radio systems, and selected antennas are available with coaxial inputs above 3.9 GHz, where noted.

5 HELIAX® Transmission Lines. HELIAX coaxial cable is one of the most common transmission lines used to effectively connect the antenna to the radio equipment at lower microwave frequencies. Its superior electrical and mechanical characteristics make it the best overall choice for the main feeder selection. Standard and low VSWR performance versions are available. Its corrugated construction allows you to bend and twist it for routing during installation. After installation, its rigidity provides long term installation, even in harsh environments. HELIAX coaxial cable is manufactured in continuous lengths to enable one piece use from the antenna to shelter. Available with or without connector attachment. See pages 534-565.

6 HELIAX Connectors. Coaxial cable does not end with a common (or default) mating flange. Many choices are available based upon your system's demands. Andrew recommends the 7/8" EIA flanges due to their superior electrical and mechanical characteristics. All air dielectric connectors contain a 1/8" NPT fitting for pressurization interface equipment. See pages 534-565.

7 Grounding Kits/Universal Ground Bar. Grounding kits help reduce the effect of lightning strikes by providing an alternative path to ground for the outer conductor. A minimum of three grounding kits are
recommended for each transmission line run; one at the top of the (vertical) run, one at the bottom of the vertical run before it leaves the tower, and one prior to shelter entry. Other options are available. See pages 609-613.

8 Hanger Support and Attachment Accessories. Many HELIAX product accessories are available to securely fasten each transmission line type for various applications. See pages 593-608.

9 Wall/Roof Feed-Thru Plates. With or without the Arrestor Port Feed-Thru option the Wall/Roof Feed-Thru Plate allows building access for your transmission line, providing protection from the outdoor environment. Several types are available. See pages 619-620.

10 Connector. You have many options available for the connector to be used at the bottom of the run. Typically a gas barrier type is used to maintain air pressure within the air dielectric transmission line. See pages 534-565.

11 Arrestor AGS Series. Lightning surge arrestors are used between the end of the transmission line run and an inside jumper to protect the inner conductor of coaxial type transmission lines. The Arrestor allows the RF energy to pass, but restricts high voltage within the system. See pages 614-616.

12 Jumpers. Jumpers work well indoors. They provide better flexibility to make installation and transmission line testing easier. They can be either foam or air dielectric depending on individual system requirements. See pages 472.

13 Pressurization System. One pressurization system is typically required for each site. Many systems and components are available. The selection you make is based on system volume, system pressure, power requirements, and available options. The total internal transmission line and antenna volume at the site is calculated to properly size the dehydrator. The weak link in the pressure system is usually the antenna's feed window. This is particularly true of lower frequency/dual or multiband antennas with large diameter feed windows. Pressure limits rated below the standard 10 lb/in^2 are noted within the antenna specifications. The ValuLine® limit is 5 lb/in^2. Power for ac or vdc versions is available. No power is also an option. Other options, such as sound deadening, high/low pressure, and high humidity are available. See pages 642-671.

System Planning Worksheet

Duplicate this sheet.

Antennas: Shielded, Standard Parabolic, Focal Plane, and Grid.
Transmission Lines: HELIAX® Air-Dielectric Coaxial Cable

Antenna System Components

Item No.	Description	Color* (G,O,W)	Type No.	Quantity	Unit Price	Extended Price
	Antenna Equipment					
1	Antenna					
	Optional Strut					
	Termination Load					
2	Radome					
3	Mount					
	Transmission Lines and Accessories					
4	Jumper Cable Assembly (optional)					
5	HELIAX Coaxial Cable					
6	Connector, Top					
	Bottom					
7	Grounding Kit					
8	Cable Hanger Kit Hoisting Grip Hardware Kit Angle Adapter Kit Round Member Adapter Kit Ceiling Adapter Nylon Cable Tie Kit Threaded Rod Support Kit					
9	Wall-Roof Feed Thru or Plate/Boot					
10	Connector					
11	AGS Surge Arrestor					
12	Jumper					

Item No.	Description	Type No.	Quantity	Unit Price	Extended Price
	Pressurization Equipment (for Air-Dielectric Systems)				
13	Dehydrator				

Total Antenna Systems Estimate FOB Factory

Customer Name _____

Contact _____

Project _____

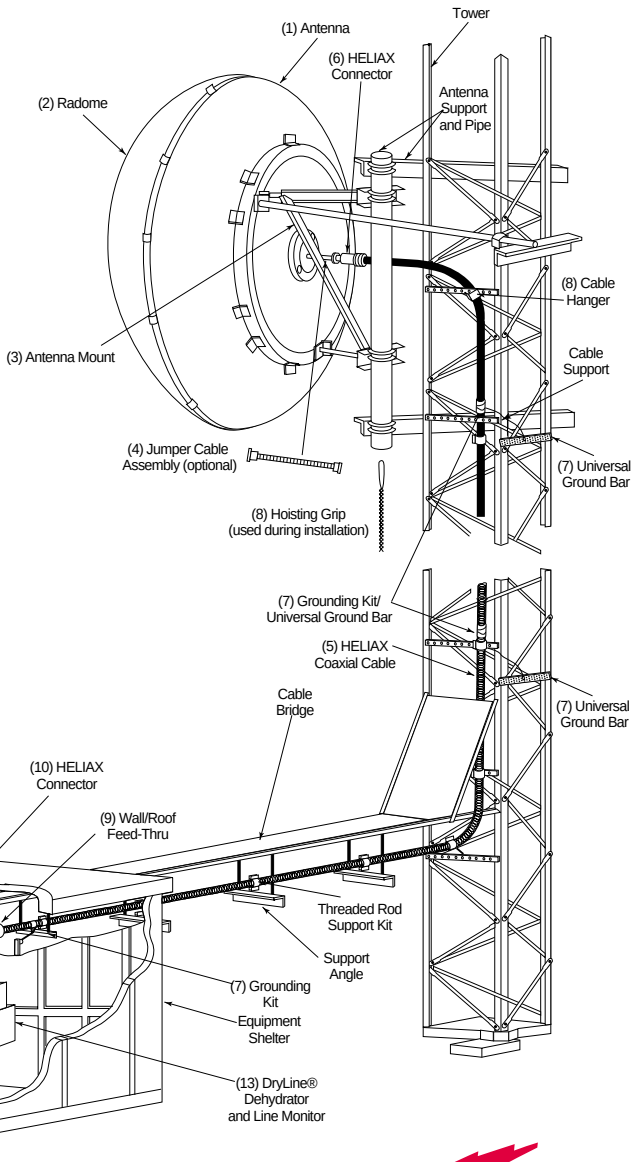
Quotation No. _____

Telephone No. _____

Customer Ref. No. _____

Site Name _____

Points to Site(s) _____



*G=Gray, O=Orange, W=White
(shielded and standard parabolic antennas)
(Continued)

Prepared By: _____

Date: _____

Telephone No.: _____

Systems Using Foam-Dielectric HELIAX® Coaxial Cable

Andrew offers terrestrial microwave antenna systems from 335 MHz to 3.9 GHz* in a wide range of frequency band offerings to meet your system design requirements. The details below describe each component of the terrestrial microwave antenna system shown on the following page.

1 Antenna. Many different antennas are available to meet your electrical and mechanical specifications. The types of antennas include grid, standard, focal plane, and shielded, all providing the flexible range of performance parameters required for each system design. Whether it's radiation side lobe suppression, low VSWR, dual or multiband operation, high wind, or extreme environment, Andrew provides the highest quality products in the industry. See pages 51-60.

Grid, standard, and focal plane antennas consist of three major components, the mount, reflector, and feed. Focal plane antennas further reduce side lobe and front to back levels. Most antennas feature a modular design to allow interchangeability or field upgrading. Shielded (or shrouded) antennas add the shield around the reflector's aperture to reduce radiation side lobes. In addition, a planar radome is included to reduce the wind load effects of the shield.

Antenna Options. Most antennas have standard options for harsh environment, high wind, flange inputs, paint color, radome, and packaging. See pages 114-122.

Optional Struts. Optional struts can provide added rigidity to antennas. Bottom struts help with snow and ice loading. See page 123.

Termination Loads. Termination loads are used in a dual or multiband antenna when all of the feed ports are not being used. They keep interport isolation levels low rather than use a shorting plate. See pages 126-212.

2 Radome. You can reduce wind loading for standard and focal plane antennas by installing an optional molded radome. Molded radomes are either fiberglass or a thermoformed plastic material. All UHX, UHP, and HSX type antennas include a TEGLAR® radome. All other shielded antennas include a Hypalon radome. Upgrades to TEGLAR radomes are available for all shielded antennas 6 ft (2.0 m) and larger. Note: All 4 ft (1.2 m) shielded antennas include a TEGLAR radome. See pages 115-119.

3 Mounts. All standard mounts are included with the standard antenna selections. For optional mounts such as vertical look or high tilt angle, contact Andrew. (High wind mounts request Bulletin 3511). See pages 95-110.

4. Jumpers. In most cases transmission lines should connect directly to the back of the antenna feed flange. In cases where the mechanical limits of large diameter coaxial lines prevent this connection, the use of jumpers can provide the needed link. Smaller diameter HJ series cables, typically 1/2" or 7/8" diameter sizes, are used to provide the dry air path to the feed system. The 7/8" EIA flange provides the gas pass connection between cable diameters. See page 472.

*Spread spectrum, other unlicensed radio systems, and selected antennas are available with coaxial inputs above 3.9 GHz, where noted.

5 HELIAX® Transmission Lines. HELIAX coaxial cable is are one of the most common transmission lines used to effectively connect the antenna to the radio equipment at lower microwave frequencies. Its superior electrical and mechanical characteristics make it the best overall choice for the main feeder selection. Standard and low VSWR performance versions are available. Its corrugated construction allows you to bend and twist it for routing during installation. After installation, its rigidity provides long term installation, even in harsh environments. HELIAX coaxial cable is manufactured in continuous lengths to enable one piece use from the antenna to shelter. Available with or without connector attachment. See pages 474-526.

6 HELIAX Connectors. Coaxial cable does not end with a common (or default) mating flange. Many choices are available based upon your system's demands. Choose a connector that correctly mates with the antenna's flange or jumper. See pages 462-470, 474-526.

7 Grounding Kits/Universal Ground Bar. Grounding kits help reduce the effect of lightning strikes by providing an alternative path to ground for the outer conductor. A minimum of three grounding kits are recommended for each transmission line run; one at the top of the (vertical) run, one at the bottom of the vertical run before it leaves the tower, and one prior to shelter entry. Other options are available. See pages 609-613.

8 Hanger Support and Attachment Accessories. Many HELIAX product accessories are available to securely fasten each transmission line type for various applications. See pages 593-608.

9 Wall/Roof Feed-Thru Plates. With or without the Arrestor Port Feed-Thru option, the Wall/Roof Feed-Thru Plate allows building access for your transmission line, providing protection from the outdoor environment. Several types are available. See pages 619-620.

10 Connector. You have many option available for the connector to be used at the bottom of the run. Larger diameter cables may require a jumper for flexibility inside equipment rooms. Choose a mating connector to fit to a jumper or directly to the equipment. See pages 462-470, 474-526.

11 Arrestor AGS Series. Lightning surge arrestors are used between the end of the transmission line run and an inside jumper to protect the inner conductor of coaxial type transmission lines. The Arrestor allows the RF energy to pass, but restricts high voltage within the system. See pages 614-616.

12 Jumpers. Jumpers work well indoors. They provide better flexibility to make installation and transmission line testing easier. They can be either foam or air dielectric depending on individual system requirements. See page 472.

System Planning Worksheet

Duplicate this sheet.

Antenna System Components

Item No.	Description	Color* (G,O,W)	Type No.	Quantity	Unit Price	Extended Price
	Antenna Equipment					
1	Antenna					
	Optional Strut					
	Termination Load					
2	Radome					
3	Mount					
	Transmission Lines and Accessories					
4	Jumper Cable Assembly (optional)					
5	HELIAX Coaxial Cable					
6	Connector, Top					
	Bottom					
7	Grounding Kit					
8	Cable Hanger Kit Hoisting Grip Hardware Kit Angle Adapter Kit Round Member Adapter Kit Ceiling Adaptor Nylon Cable Tie Kit Threaded Rod Support Kit					
9	Wall-Roof Feed Thru or Plate/Boot					
10	Connector					
11	AGS Surge Arrestor					
12	Jumper					

*G=Gray, O=Orange, W=White
(shielded and standard parabolic antennas)

Antennas: Shielded, Standard Parabolic, Focal Plane, and Grid.
Transmission Lines: HELIAX® Air-Dielectric Coaxial Cable

Customer Name _____

Contact _____

Project _____

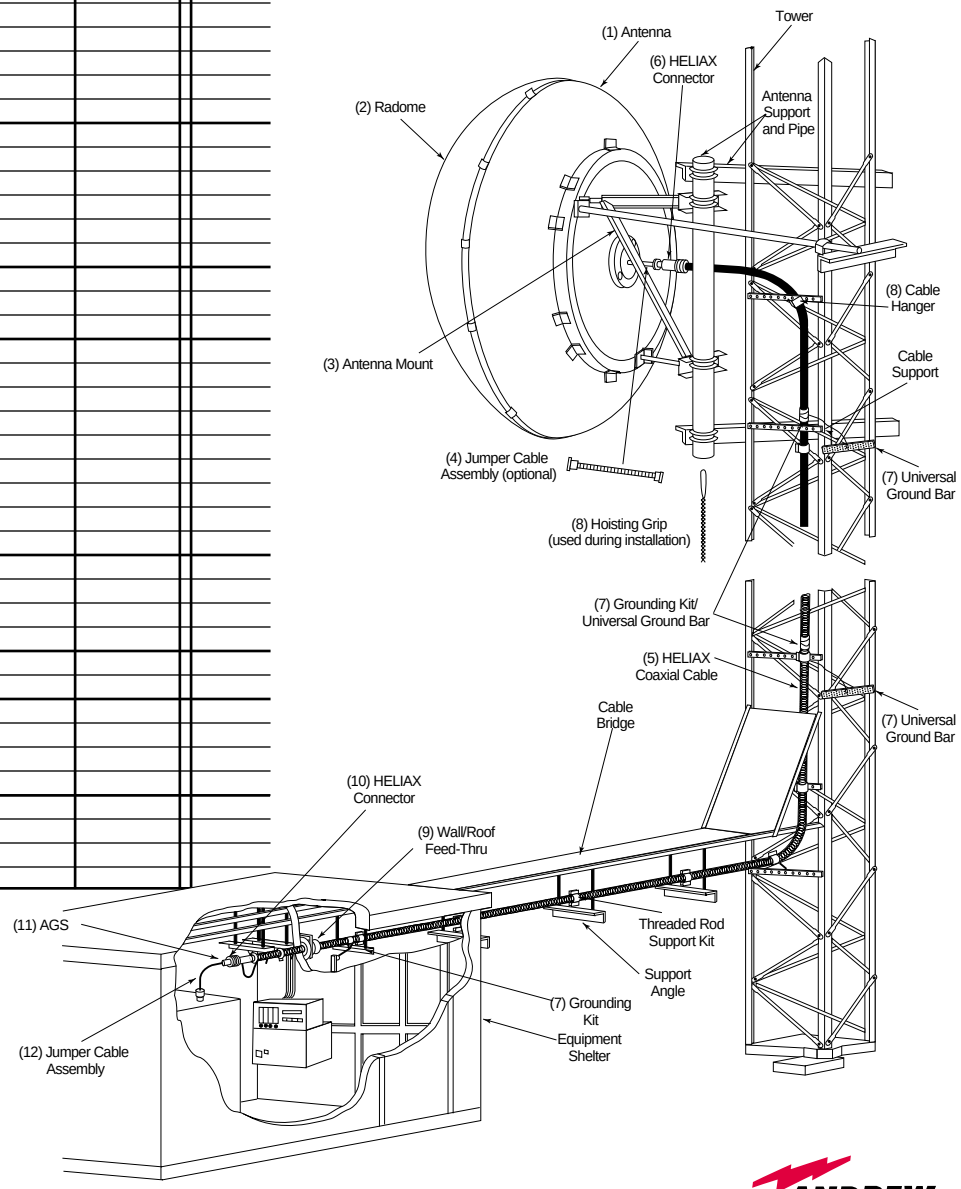
Quotation No. _____

Telephone No. _____

Customer Ref. No. _____

Site Name _____

Points to Site(s) _____



Prepared By: _____

Date: _____

Telephone No.: _____

Systems Using HELIAX® Elliptical Waveguide

Andrew offers terrestrial microwave antenna systems from 3.4 GHz to 19.7 GHz (up to 58 GHz including ValuLine® series) in a wide range of frequency band offerings to meet your system design requirements. The details below describe each component of the terrestrial microwave antenna system shown on the following page.

1 Antenna. Many different antennas are available to meet your electrical and mechanical specifications. The types of antennas include, standard, focal plane, and shielded, all providing the flexible range of performance parameters required for each system design. Whether it's radiation side lobe suppression, low VSWR, dual or multiband operation, high wind, or extreme environment, Andrew provides the highest quality products in the industry. See pages 60-94.

Standard, and focal plane antennas consist of three major components, the mount, reflector, and feed. Focal plane antennas further reduce side lobe and front to back levels. Most antennas feature a modular design to allow interchangeability or field upgrading. Shielded (or shrouded) antennas add the shield around the reflector's aperture to reduce radiation side lobes. In addition, a planar radome is included to reduce the wind load effects of the shield.

Antenna Options. Most antennas have standard options for harsh environment, high wind, flange inputs, paint color, radome, and packaging. See pages 114-122.

Optional Struts. Optional struts can provide added rigidity to antennas. Bottom struts help with snow and ice loading. See page 123.

Termination Loads. Termination loads are used in a dual or multiband antenna when all of the feed ports are not being used. They keep interport isolation levels low rather than use a shorting plate. See pages 126, 212.

2 Radome. You can reduce wind loading for standard and focal plane antennas by installing an optional molded radome. Molded radomes are either fiberglass or a thermoformed plastic material. All UHX, UHP, and HSX type antennas include a TEGLAR® radome. All other shielded antennas include a Hypalon radome. Upgrades to TEGLAR radomes are available for all shielded antennas 6 ft (2.0 m) and larger. Note: All 4 ft (1.2 m) shielded antennas include a TEGLAR radome. See pages 115-119.

3 Mounts. All standard mounts are included with the standard antenna selections. For optional mounts such as vertical look or high tilt angle, contact Andrew. (High wind mounts request Bulletin 3511). See pages 95-110.

4 Flex Sections. In most cases transmission line connects directly to the back of the antenna feed flange. When the mechanical limit of elliptical waveguide prevents this connection, use a flex section to provide the necessary link. Extra care is required to support flexible component in the outdoors. See pages 61-88, 202-208.

5. HELIAX® Elliptical Waveguide. Elliptical waveguide is the most common transmission line used to effectively connect the antenna to the radio equipment. Its superior electrical and mechanical characteristics make it the best overall choice for the main feeder selection. Standard and low VSWR performance versions are available. Elliptical waveguide's corrugated construction allows you to bend and twist it for routing during installation. Its rigidity provides long term durability, even in harsh environments. HELIAX Elliptical Waveguide is manufactured in continuous lengths to enable one piece use from the antenna to shelter. Available with or without connector attachment. See pages 160-193.

6 HELIAX Elliptical Waveguide Connectors. Elliptical waveguide does not end with a common (or default) mating flange. Many choices are available based upon your system's demands. See pages 160-193.

7 Grounding Kits/Universal Ground Bar. Grounding kits help reduce the effect of lightning strikes by providing an alternative path to ground. A minimum of three grounding kits are recommended for each transmission line run; one at the top of the (vertical) run, one at the bottom of the vertical run before it leaves the tower, and one prior to shelter entry. Other options are available. See pages 197-198.

8 Hanger Support and Attachment Accessories. Many product accessories are available to securely fasten each transmission line type for various applications. See pages 194-196.

9 Wall/Roof Feed-Thru Plates. With or without the Arrestor Port Feed-Thru option, this plate allows building access for your transmission line, providing protection from the outdoor environment. Several types are available. See page 200.

10 Pressure Windows. A pressure window is used as a gas barrier at the bottom of the transmission line run. Pressurization is required for waveguide that is not subjected to a controlled environment. After you have run and terminated the waveguide in the equipment room, the pressure window is usually placed in series between the bottom connector and the rectangular waveguide components. The pressure window allows the RF energy to pass but maintains pressure within the system. See pages 210-212.

11 Rigid Rectangular Waveguide Components. Rigid waveguide components are used within the equipment room or shelter where space is limited. They provide a much smaller bend and twist radius than that of comparable elliptical waveguide. In addition, waveguide and flange adapters can provide quick fix solutions. Rigid waveguide components are custom manufactured based upon your system requirements. Request ezGuide, the free planning software from Andrew. See pages 202-218.

12 Flex Sections. Flex sections work well at the radio interface area. They provide stress relief to the rigid rectangular waveguide flanges and also make installation and transmission line testing easier. See pages 61-88, 202-206.

13 Pressurization System. One pressurization system is typically required for each site. Many systems and components are available. The selection you make is based on system volume, system pressure, power requirements, and available options. The total internal transmission line and antenna volume at the site is calculated to properly size the dehydrator. The weak link in the pressure system is usually the antenna's feed window. This is particularly true of lower frequency/dual or multiband antennas with large diameter feed windows. Pressure limits rated below the standard 10 lb/in^2 are noted within the antenna specifications. The ValuLine® limit is 5 lb/in^2. Power for ac or vdc versions is available. No power is also an option. Other options, such as sound deadening, high/low pressure, and high humidity are available. See pages 642-671.

System Planning Worksheet

Duplicate this sheet.

Antennas: Shielded and Standard Parabolic
Transmission Lines: HELIAX® Elliptical Waveguide

Antenna System Components

Item No.	Description	Color* (G,O,W)	Type No.	Quantity	Unit Price	Extended Price
	Antenna Equipment					
1	Antenna					
	Optional Strut					
	Termination Load					
2	Radome					
3	Mount					
	Transmission Lines and Accessories					
4	Flex Section (optional)					
5	HELIAX Elliptical Waveguide					
6	Connector, Top					
	Bottom					
7	Grounding Kit					
8	Waveguide Hanger Kit Hoisting Grip Hardware Kit Angle Adapter Kit Adapter Threaded Rod Support Kit					
9	Wall-Roof Feed Thru or Plate/Boot					
10	Pressure Window					
11	Rigid Waveguide					
12	Flex Sections					

Item No.	Description	Type No.	Quantity	Unit Price	Extended Price
	Bending Tool Kit				
	Flex Hanger				
	Connector Flare Tool				
	Pressurization Equipment				
13	Dehydrator				
	Total Antenna Systems Estimate FOB Factory				

*G=Gray, O=Orange, W=White

**Request ezGuide™ software. See page 24.

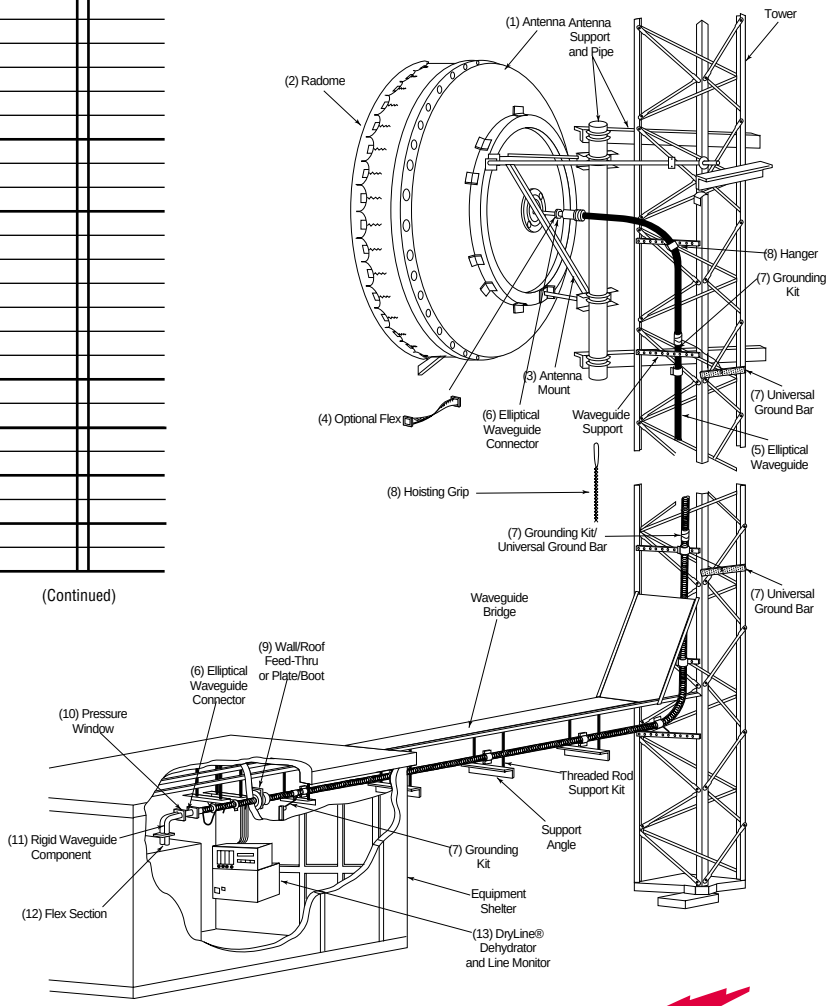
(Continued)

Prepared By: _____

Date: _____

Telephone No.: _____

Customer Name _____
Contact _____
Project _____
Quotation No. _____
Telephone No. _____
Customer Ref. No. _____
Site Name _____
Points to Site(s) _____



Revised 9/00

Systems Using Circular Waveguide

Andrew offers terrestrial microwave antenna systems from 3.54 GHz to 19.7 GHz in a wide range of frequency band offerings to meet your system design requirements. The details below describe each component of the terrestrial microwave antenna system shown on the following page.

1 Antenna. Many different antennas are available to meet your electrical and mechanical specifications. The types of antennas include, standard, focal plane, and shielded, all providing the flexible range of performance parameters required for each system design. Whether it's radiation side lobe suppression, low VSWR, dual or multiband operation, high wind, or extreme environment, Andrew provides the highest quality products in the industry. See pages 60-94.

Standard, and focal plane antennas consist of three major components, the mount, reflector, and feed. Focal plane antennas further reduce side lobe and front to back levels. Most antennas feature a modular design to allow interchangeability or field upgrading. Shielded (or shrouded) antennas add the shield around the reflector's aperture to reduce radiation side lobe activity. In addition, a planar radome is included to reduce the wind load effects of the shield.

Antenna Options. Most antennas have standard options for harsh environment, high wind, flange inputs, paint color, radome, and packaging. See pages 114-122.

Optional Struts. Optional struts can provide added rigidity to antennas. Bottom struts help with snow and ice loading. See page 123.

Termination Loads. Termination loads are used in a dual or multiband antenna when all of the feed ports are not being used. They keep interport isolation levels low rather than use a shorting plate. See pages 126, 212.

2 Radome. You can reduce wind loading for standard and focal plane antennas by installing an optional molded radome. Molded radomes are either fiberglass or a thermoformed plastic material. All UHX and UHP type antennas include a TEGLAR® radome. All other shielded antennas include a Hypalon radome. Upgrades to TEGLAR radomes are available for all shielded antennas 6 ft (2.0 m) and larger. Note: All 4 ft (1.2 m) shielded antennas include a TEGLAR radome. See pages 115-119.

3 Mounts. All standard mounts are included with the standard antenna selections. For optional mounts such as vertical look or high tilt angle, contact Andrew. (High wind mounts request Bulletin 3511). See pages 95-110.

4 Flex Sections. In most cases transmission line connects directly to the back of the antenna feed flange. When the mechanical limit of elliptical waveguide prevents this connection, use a flex section to provide the necessary link. Extra care is required to support flexible component in the outdoors. In many cases the plane of the waveguide flange is physically different than that of the transition body at the end of the circular waveguide run. The use of a flex section, in addition to elliptical waveguide, can provide an alternative flange mating solution. See pages 61-88, 202-208.

5 Elliptical Waveguide (Top Jumper). Top jumpers allow mechanical flexibility between the circular waveguide transition and the antenna. An elliptical waveguide jumper is a short section of transmission line with connectors attached at each end. Standard elliptical waveguide supports are used to secure the line. Additional rigid rectangular twist components allow waveguide plane rotation in a short length. See pages 160-193.

6 Grounding Kits/Universal Ground Bar. Grounding kits help reduce the effect of lightning strikes by providing an alternative path to ground. A grounding kits is recommended for each transmission line jumper located at the top of the system. Other options are available. See pages 197-198.

7 Circular-to-Rectangular Transition (Top Transition). The top transition is available, in most cases, in single or dual polarization. The top transition provides an interface between the circular waveguide and a common rectangular flange. Transitions include swivel flanges to ease alignment and installation. Dual polarized versions place both flanges in the same vertical plane to ease routing and installation of elliptical waveguide. See pages 221-222.

8 Circular Waveguide. Circular waveguide provides superior electrical characteristics including low insertion loss. See pages 219-220.

9 Rigid Support Hanger. The rigid support hanger securely attaches the top of the vertical run to restrict upper movement of the circular waveguide. See page 225.

10 Slide Hanger. The slide hanger provides the added side-to-side support between vertical spring hangers. See page 225.

11 Spring Hanger. The spring hanger supports the weight of the vertical (circular) waveguide run. It allows for any expansion and contraction due to temperature fluctuations. See page 225.

12 Compensation Clamp. The compensation clamp allows the electrical energy (polarity) to be aligned with the bottom transition. See page 223.

13 Circular-to-Rectangular Transition (Bottom Transition). In closed type systems, those with transitions at both the top and bottom, the added filter section is included to reduce or eliminate overmoding. See Grounding Kits, above. See pages 221-222.

14 Elliptical Waveguide Bottom Jumper. The bottom jumpers allows mechanical flexibility between the circular waveguide transition and the radio equipment. An elliptical waveguide jumper is typically a short section of transmission line with connectors attached at each end. Standard elliptical waveguide supports are used to secure the line. Additional rigid rectangular twist components allow waveguide plane rotation in a short length. See pages 160-193.

15 Sliding Hanger. As the vertical circular waveguide run expands and contracts, the sliding hanger allows slight vertical movement of the horizontal elliptical waveguide run preventing stress on soldered flanges of the transition. See page 226.

16 Grounding Kits. Grounding kits help reduce the effect of lightning strikes by providing an alternative path to ground. A grounding kit is recommended for each transmission line run before it enters the shelter. Other options are available. See pages 197-198.

17 Wall/Roof Feed-Thru Plates. The Arrestor Port Feed-Thru Plate allows building access for your transmission line, providing protection from the outdoor environment. Several types are available. See page 200.

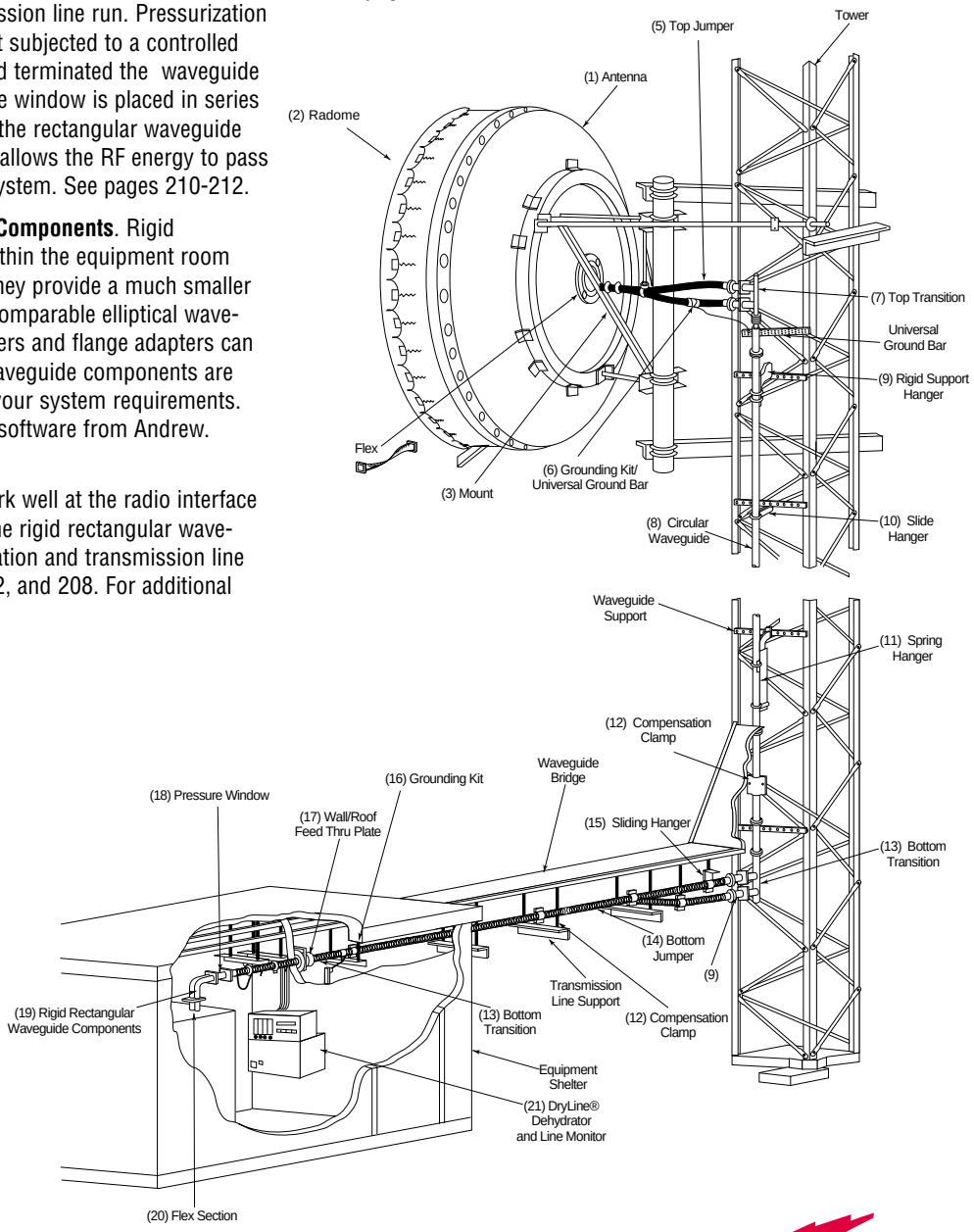
18 Pressure Windows. A pressure window is used as a gas barrier at the bottom of the transmission line run. Pressurization is required for waveguide that is not subjected to a controlled environment. After you have run and terminated the waveguide in the equipment room, the pressure window is placed in series between the bottom connector and the rectangular waveguide components. The pressure window allows the RF energy to pass but maintains pressure within the system. See pages 210-212.

19 Rigid Rectangular Waveguide Components. Rigid waveguide components are used within the equipment room or shelter where space is limited. They provide a much smaller bend and twist radius than that of comparable elliptical waveguide. In addition, waveguide adapters and flange adapters can provide quick fix solutions. Rigid waveguide components are custom manufactured based upon your system requirements. Request ezGuide, the free planning software from Andrew. See pages 202-218.

20 Flex Sections. Flex sections work well at the radio interface area. They provide stress relief to the rigid rectangular waveguide flanges and also make installation and transmission line testing easier. See pages 61-88, 202, and 208. For additional information see page 34.

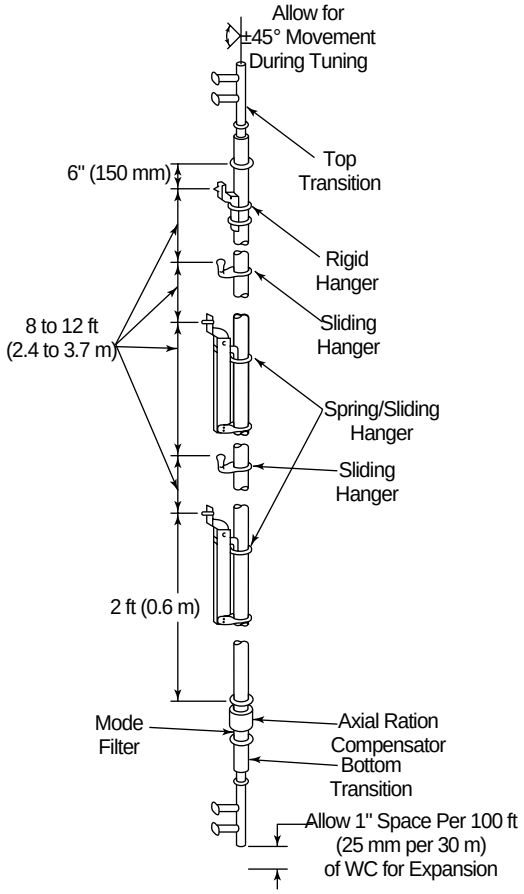
21 Pressurization System. One pressurization system is typically required for each site. Many systems and components are available. The selection you make is based on system volume, system pressure, power requirements, and available options. The total internal transmission line and antenna volume at the site is calculated to properly size the dehydrator. The weak link in the pressure system is usually the antenna's feed window. This is particularly true of lower frequency/dual or multiband antennas with large diameter feed windows. Pressure limits rated below the standard 10 lb/in^2 are noted within the antenna specifications. The ValuLine® limit is 5 lb/in^2. Power for ac or vdc versions is available.

No power is also an option. Other options, such as sound deadening, high/low pressure, and high humidity are available. See pages 642-671.



Systems Using Circular Waveguide

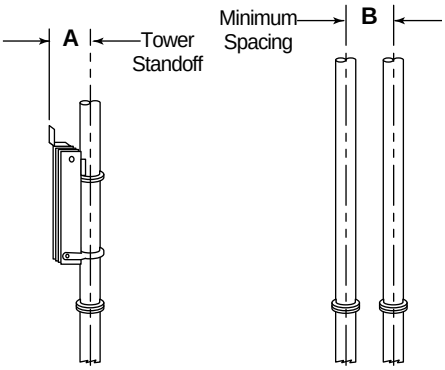
WC109 and WC166

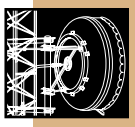


- Position hangers as illustrated above
- Attach top rigid hanger to member capable of supporting entire run
- Maximum deviation from true straight should be 1.5 in per 20 ft (38 mm per 6 m)
- Position elliptical waveguide sliding support 18-24 in (455-610 mm) from bottom transition
- Top transition must be positioned at 90° multiple of bottom transition and allow ±45° rotation during tuning
- Position first elliptical waveguide hanger 18-24 in (455-610 mm) from elliptical waveguide sliding support

Tower Standoff and Minimum Spacing

Waveguide Type	A Tower Standoff in (mm)	B Minimum Spacing in (mm)
WC109	2.9 (73)	4.9 (124)
WC166	3.1 (78)	5.8 (147)

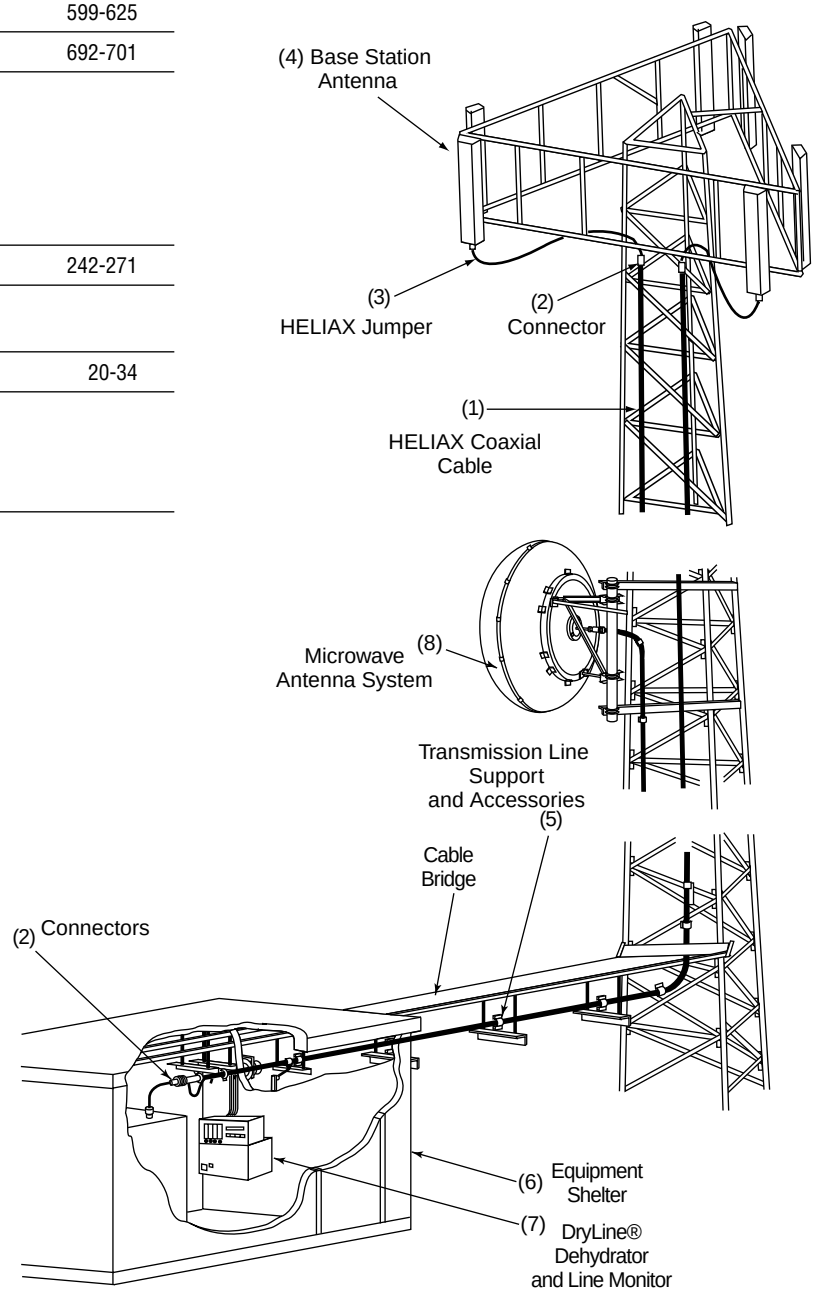




System Equipment

Description	See Pages
1 **HELIAX® Coaxial Cable**	440-635
2 **Connectors**	462-470
3 **HELIAX Jumpers**	584-587
4 **Base Station Antennas**	232-241
5 **Transmission Line Supports and Accessories**	599-625
6 **Equipment Shelters**	692-701
Concrete Structural Options Door Options Basic Electrical System Optional Electrical Equipment Environmental Control Equipment	
7 **Pressurization Equipment**	242-271
Dehydrator, automatic Pressurization equipment and accessories	
8 **Microwave Antenna System**	20-34
Antennas Waveguides Coaxial Cables System Planning	

The typical wireless system shown in the illustration may be used as a guide in planning your system.



Terrestrial Microwave Antenna System Products

Index

Terrestrial Microwave Antenna Nomenclature

Prefix	Antenna Type or Description
KP_F, KPR_F	**K**nockdown GRIDPAK® **P**arabolic
MKP	**M**ini **K**nockdown GRIDPAK **P**arabolic
P, PX, P_F	Standard **P**arabolic-Unshielded
PL, PL_F, PXL, PXL_F	Standard **P**arabolic, **L**ow VSWR-Unshielded
FP, FP_F, FPX	Standard **F**ocal Plane **P**arabolic-Unshielded
FPHP	Focal Plane High Performance
HP, HP_F, HPX	**H**igh **P**erformance Parabolic-Shielded
HSX	**H**igh Performance **S**uper High Cross Polarization Discrimination-Parabolic
UHP, UHX, UHP_F	**U**ltra **H**igh **P**erformance Parabolic
UMX	**U**ltra High Performance **M**ultiband Parabolic
HDX, HDH, HDV	**H**igh Performance **D**ual Beam-Parabolic
PDV, PDH	Standard Dual Beam Angle Diversity
KPR	**K**nockdown GRIDPAK **P**arabolic-**R**ural Telephony
PAR, PARX	**P**arabolic **A**ntenna for **R**elocation-Category A
LB, LBX	**L**ow **B**ack Lobe

Andrew uses an alphanumeric numbering system for identification and ordering of terrestrial microwave antennas. Andrew type numbers describe antenna type, size and operating frequency band. The system is known worldwide, and many governments, PTTs and OEMs use Andrew terminology such as “HSX type performance” to specify antennas within their equipment procurement documents.

Example:

1	2	3		4	5
HSX	10		-	59	
PL	8		-	71	W
KP	6	F	-	19	

1. **Antenna Type**. The prefix is one, two, three or four letters that describe the antenna type. “X” within the prefix indicates dual-polarized operation.

   For Standard Antennas, “L” indicates low VSWR antennas operating with:

   Coaxial feed systems of 1.10 (26.4) RL or better

   Waveguide feed systems of 1.06 (30.7) RL or better.

2. **Antenna Size**. The number indicates antenna diameter in feet.

3. **Pressurization**. Antennas having an “F” following the antenna size include a foam-dielectric feed and do not require pressurization. All other antennas have air-dielectric feeds and require pressurization. See pages 242-271 for pressurization equipment.

4. **Frequency Band**. The numbers following the hyphen are an abbreviated designation for the operating frequency band. For example:

Abbreviation	Frequency Band
19	**1.9** - 2.3 GHz
59	**5.9**25 - 6.425 GHz
107	**10.7**0 - 11.70

5. **Wide band**. A “W” following the frequency band designator indicates wide band operation for special applications. For example:

   PL12-71 indicates the frequency band 7.125-7.750 GHz
   PL12-71W indicates the frequency band 7.100-8.500 GHz

Shielded Antennas

Shielded antennas include a low-VSWR feed, painted reflector and shield with RF absorber, a planar radome and a mount for attachment to a vertical pipe. This series of antennas provides excellent radiation characteristics, rugged construction and high environmental survivability. Special environmental versions are available for the most difficult system locations. Many are also available with one or two-piece reflectors for efficient and less costly shipping.

Ultra Series

Ultra High Performance Antennas

UHX® and UHP® Series antennas provide high gain, low VSWR and superior radiation pattern performance for easier frequency coordination. They minimize frequency congestion problems because of a highly efficient beam-forming feed and superior pattern performance. UHX Series feature dual polarization. UHP Series are a single polarized version.

Ultra Multiband Antennas

UMX® Series antennas provide simultaneous dual-band, dual-polarized (4-port) operation in various frequency bands. These antennas can save considerable cost by reducing the installation expense and the amount of equipment required on systems with multiple frequency requirements. UMX antennas allow easy single to multi-band transition without compromising high performance.

High Performance Series

High Performance Antennas

HP and HPX Series antennas feature high performance at low lifetime cost. They are mechanically similar to the UHX ultra high performance antennas, except most models have feeds which do not include the beam-forming feature. HPX Series feature dual polarization; HP Series are a single polarized version.

Antenna Types

HSX Series Antennas - High XPD Microwave Antennas

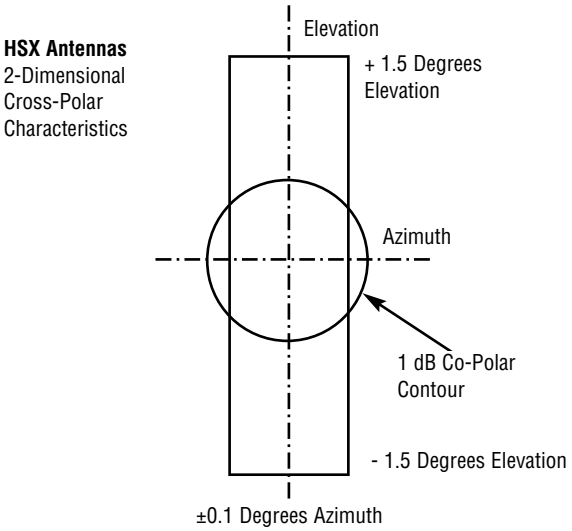
HSX Series antennas are high performance antennas which feature very high cross polarization discrimination (XPD) in both the azimuth and elevation planes. The guaranteed XPD for these antennas is 40 dB. These antennas are suitable for high capacity digital systems, utilizing transmission schemes such as Synchronous Digital Hierarchy (SDH).

This performance is achieved through the use of an antenna feed horn with a unique illuminator ring design and strict quality control measures in the manufacture of these feeds.

The cross polarization characteristics close to the boresight of the antenna are shown in the figure below. These values apply for antennas up to the 11 GHz frequency band.

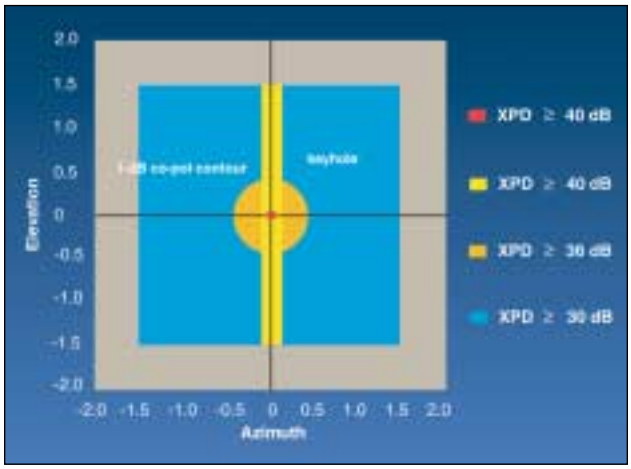
For antennas at frequency bands higher than 11 GHz, the XPD is greater than 36 dB within the circular -1 dB co-polar contour and greater than 30 dB elsewhere.

The HSX Series antennas are available for frequency bands from 3.4 to 18 GHz.



- *40 dB XPD at antenna boresight*
- *40 dB* XPD inside rectangle (±0.1 degrees Azimuth, ±1.5 degrees elevation)*
- *36 dB XPD inside the 1dB co-polar contour*
- *30 dB XPD elsewhere*

* 36 dB for 15 ft antennas



Keyhole specifications for XPD

ANDREW®

Low Back Lobe Antenna

Focal Plane High Performance Antenna

Dual Beam Angle Diversity Antenna

LB and LBX Antennas

LB and LBX antennas are special low back lobe antennas with performance similar to that of focal plane antennas. These antennas are ANATEL Brazilian Telecommunications Agency approved and shipped from the manufacturing facility in Sorocaba, Brazil.

FPHP Antennas

FPHP antennas combine the traditional focal plane reflector with the added electrical performance of narrow shielded antennas. The added performance is obtained through the use of an integrated shield located within the molded radome, included with the antenna. These antennas are available in the 1.3 GHz band and are ETSI-type approved.

Dual Beam Angle Diversity Antennas

Angle Diversity antennas are special solution antennas that provide a dual beam in either a single or dual polarized version. They can help overcome multipath fading issues when installation of two antennas is impractical due to tower space availability or wind loading.

NOTE:
See page 120 for default packing options.

Antenna Types

Standard Parabolic Antenna

Standard Focal Plane Antenna

Flat Panel Array Antenna

Standard Parabolic Antennas

P, PL, PX and PXL Series Standard Parabolic antennas are unshielded parabolic antennas that provide economical and reliable service where a high degree of back and side radiation suppression is not necessary.

- *Low-VSWR versions minimize echo distortion for less noise on the system*
- *A vertical tower mount is included. Optional mounts and radomes can be ordered separately for versatility of installation*
- *Single and dual-polarized options are available in most applicable frequencies*
- *Spun aluminum reflectors provide long term reliability and minimize environmental distortion to protect system investments*
- *Rugged, high-quality performance at low initial costs*

Standard Focal Plane Antennas

FP and FPX Series Standard Focal Plane antennas are ideal for use in higher capacity systems where improved front-to-back ratios are required.

- *Special deep reflectors and a unique beam-shaping feed or special edge geometry achieve efficient pattern performance. The antennas combine reasonable initial cost with very long-life performance, thus assuring long term economy.*
- *Single and dual-polarization options are available*
- *Includes a vertical tower mount for ease of tower interface*

NEW!

Flat Panel Array Antennas

The Flat Panel Array (FPA) Series antennas are designs that provide solutions for many applications including spread spectrum and UNII frequency band operation. The low profile has an aesthetically pleasing appearance and eases the planning and zoning process. The antennas incorporate a convenient rear mounted connector. The mount is easily assembled and readily attaches the antenna onto a vertical pipe.

The antennas are available at a variety of frequencies. Contact Andrew for more information.

NOTE:
See page 120 for default packing options.

Mini-GRIDPAK® Antenna (MKP Series)

GRIDPAK® Antenna (KP F- , KPR F-Series)

Unshielded Antenna (PAR Series)

Mini-GRIDPAK® Antennas

MKP Series Mini-GRIDPAK antennas are small, rectangular aperture antennas for low frequency applications (below 900 MHz).

GRIDPAK and Mini-GRIDPAK antennas should be considered when low wind loads onto supporting structures are required and/or when low shipping cost is important.

NOTE:
See page 120 for default packing options.

NEW!

KP F-, KPR F-Series GRIDPAK® Antennas

The KP F- and KPR F-Series Parabolic GRIDPAK antennas are solutions for low wind loading situations. Grid antennas are single polarized, either horizontal or vertical, depending on assembly configuration. Operating bands for grids are typically below 3.7 GHz. The feeds for these are foam-filled, eliminating pressurization requirements. In addition, these feeds act as a gas barrier when air dielectric transmission line is used.

The KPR F-Series antennas are suitable for low to medium capacity systems such as Rural Telephony Multi-Access Radio Systems (MARS) and incorporate a HELIAX® foam cable jumper assembly in the feed design. This jumper assembly can be terminated with any connector that can be fit onto our LDF4-50A HELIAX coaxial cable.

NEW!

PAR Series Unshielded Antennas

The PAR Series antennas are unshielded designs that meet the FCC rules for Category A under Part 101 (which has replaced Parts 21 and 94). They provide an economic solution for microwave links requiring Category A compliance. Some antennas feature a deeper reflector design than our standard P-Series antennas and exhibit a higher front-to-back ratio than the P-Series antennas, thus reducing the likelihood of adjacent system interference. To reduce wind loading, they can also be fitted with optional molded radomes.

These antennas meet the FCC requirements for the following frequency bands: 5.925-6.425 GHz, 6.425-7.125 GHz, 10.5-10.7 GHz, and 10.7-11.7 GHz.

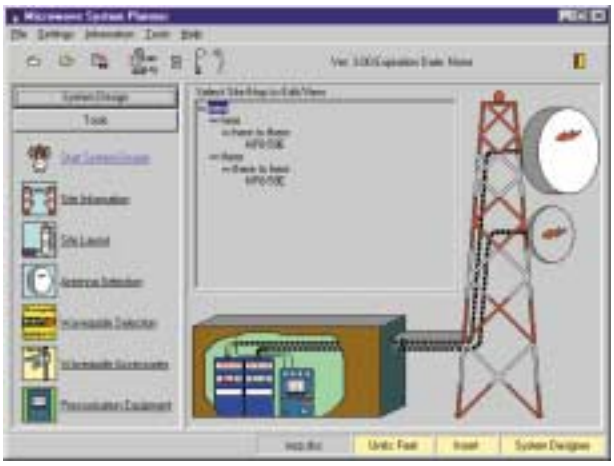
System Planning Software

Powertools System Planning Software

The Andrew Powertools system planning CD-ROM contains an easy-to-use suite of system planning tools. These programs are especially useful for the design of terrestrial microwave antenna systems:

- *Andrew Microwave System Planner (AMSP)*
- *ezGuide™*
- *PSI Select Pressurization Planner*

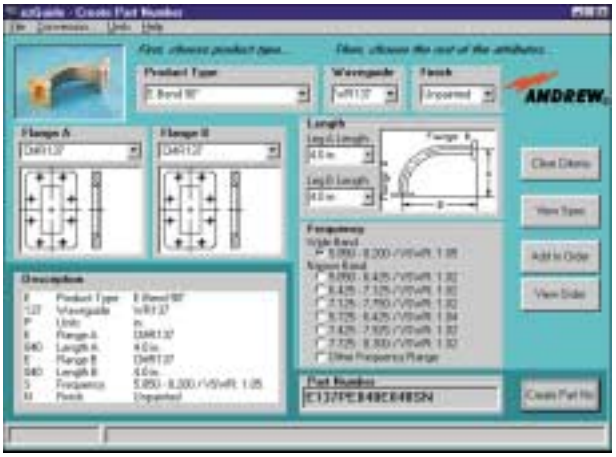
You can request the Powertools CD-ROM (Bulletin M400) or download individual software tools from the Andrew web site, www.andrew.com.



AMSP

AMSP

The AMSP is a complete terrestrial microwave system design tool. AMSP helps you with equipment selection and system planning, including choices of terrestrial microwave antennas, waveguide, flex twists, accessories, and pressurization. The program generates custom solutions with standard Andrew products, automatically checking component compatibility and preventing the design of an incompatible system. After you complete the system design, AMSP provides you with a customized bill of materials.



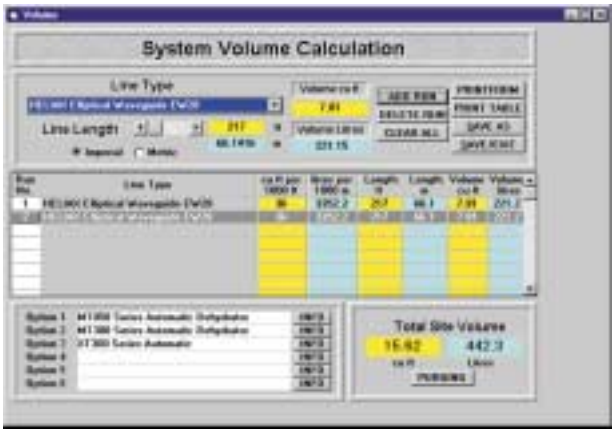
ezGuide

ezGuide

ezGuide software guides the design and ordering process for microwave transmission lines. The exact component type, waveguide size, flange types, component dimensions, operating frequency band, and finish can be specified with point-and-click options. Each product is pictured on the screen and diagrammed for your reference.

PSI Select Pressurization Planner

The PSI Select Pressurization Planner offers complete information on Andrew pressurization products and accessories. The program performs system calculations and dehydrator selection for either a new site or for modifying an existing site. PSI Select Pressurization Planner also provides catalog information and several pressurization presentations in Microsoft® PowerPoint®.



PSI Select Pressurization Planner

Reflectors

Antennas are supplied with either one-piece reflectors or two-piece reflectors for on-site assembly. All 2-10 ft reflectors are one-piece; 12 and 15 ft reflectors are two-piece. Split (two-piece) reflectors are available as an option for 8 and 10 ft antennas. Solid (one-piece) reflectors are available as an option for 12 ft antennas. KP Series GRIDPAK® antennas are supplied completely disassembled.

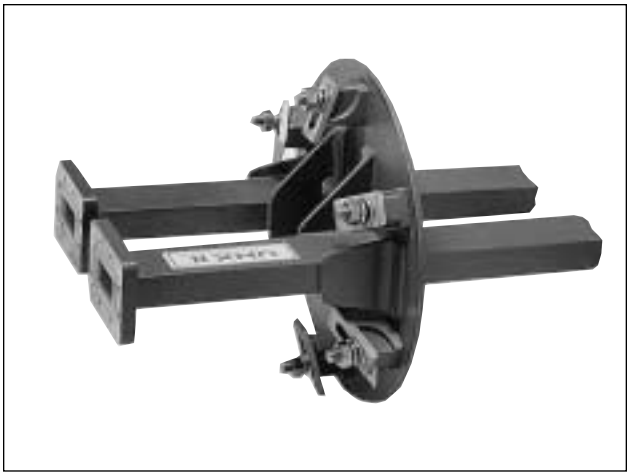
Microwave Antenna Feeds

Product improvement research has produced an innovative feed hub which provides several important advantages over previous designs. Solid reflector hubs are fully compatible with previous reflectors manufactured since 1975 and other versions having an 8.5 in (216 mm) center mounting hole in the reflector.

- ***Simplified installation***. The unique hub design allows most feeds to be installed from either side of the reflector. This feature permits easy initial installation from the front of the reflector and makes it possible to change or inspect most feeds from the rear of the antenna.
- ***Smooth, accurate polarization adjustment***. A conductive compound is used at the reflector/hub interface. The lubricating properties of this compound ensure smooth, accurate feed rotation.
- ***Enhanced electrical performance***. Positive RF seals at all critical interfaces reduce RF leakage to negligible levels and result in enhanced antenna electrical performance.
- ***Improved resistance to corrosion***. Potential corrosion in all areas critical to antenna system performance is effectively eliminated through the use of electro-chemically compatible materials and corrosion inhibiting compounds. The hub interface has been salt spray tested for more than 7500 hours and meets the corrosion resistance requirements of U.S. Military Specifications MIL-F-14072C, MIL-STD-889B and MSFC-SPEC-250A.

Feed Types

Coaxial feeds are used below 3 GHz and are air- or foam-dielectric type. F-series antennas have foam-filled feeds that are designed for use with HELIAX® foam-dielectric cable. Guy lines or rods are included with all feeds except some antennas smaller than 12 ft (3.7 m), where they are unnecessary. Most feeds above 3 GHz are terminated with rectangular waveguide flanges. Guy lines are used with all waveguide feeds.



Feed hub used on Ultra High Performance, HIgh Performance, Focal Plane and Standard Antennas, 4-ft (1.2 m) and larger, with waveguide feeds.

Standard Antenna Construction

Radomes

Radomes are used to protect microwave antennas against accumulation of ice, snow, and dirt and to reduce wind loading. All Andrew shielded antennas include a planar radome. Antennas which include a radome are indicated in the antenna specification tables on pages 116-119. Optional molded radomes, listed on page 118, are available for most other solid reflector, standard unshielded parabolic antennas.

Radomes for shielded antennas. All Andrew shielded antennas, except ValuLine® include a flexible planar radome. The radome is stretched across the opening of the shield (through tensioning springs) flexing slightly in the wind to shed ice and snow in most environments.

Two types of flexible planar radomes are used, TEGLAR® and Hypalon. Hypalon is a rubber coated nylon and is provided with HP and HPX series antennas. TEGLAR is a polymer-coated fiberglass material and is provided with HSX, UHX and UMX type antennas.

In addition, TEGLAR radomes are extremely durable, and excel in resistance to heat, rain, snow, fungus, ice accumulation, corrosive atmosphere and ultraviolet light. Upgrades to TEGLAR on HP and HPX series is optional.

Pre-tensioned radomes. Some high performance antennas are supplied with a pre-tensioned radome. Pre-tensioned radomes are made from TEGLAR® material bonded to a support ring. They replace the previously offered spring tensioned design.

Radomes for standard antennas. Molded radomes are manufactured of ABS plastic or fiberglass. They help reduce tower wind loading and are optional for most antennas.

Mounts

All microwave antennas are supplied with a vertical tower mount. Roof, vertical tilt and horizontal tilt mounts are available as options.

Shields

Cylindrical shields, attached to the reflector rim, improve the radiation pattern performance of parabolic antennas. RF absorbing material is placed at critical locations inside the shield to reduce RF energy reflections.

Antenna Finish

Standard colors for microwave antennas and radomes are listed in the table below. Other colors in compliance with U.S. FCC and U.S. FAA regulations or special applications are available on request. Unless otherwise specified, radomes supplied with special color antennas will be the standard color.

For optional TEGLAR radome colors, see page 116.

Microwave Antenna and Radome Standard Colors

Description	Standard Color
Shielded Antennas	Gray
Radomes for Shielded Antennas 4-15 ft (1.2-4.6 m)	White
Standard Antennas	Gray
Molded Radomes for Standard Antennas	Gray
GRIDPAK® and Mini-GRIDPAK® Antennas	Unpainted aluminum

Microwave Antenna Selection Criteria

Andrew offers the industry's most comprehensive line of antennas for point-to-point microwave communication. The extremely wide range of available antennas permits you to choose an antenna that is optimized for your requirements. Nearly 6000 different configurations are available from this catalog. In choosing an antenna, the following basic parameters should be considered:

Operating frequency band. The antennas on pages 51-91 are listed in order of ascending operating frequency. Antennas for simultaneous operation in two or more bands are offered on pages 93 and 94.

Radiation patterns determine an antenna's ability to discriminate against unwanted signals under conditions of radio congestion. Radiation patterns are dependent on antenna series, size, and frequency. A Radiation Pattern Envelope (RPE) comparison of various antenna series is shown at the right. For more information, see page 48.

Gain. For a given frequency band, gain is primarily a function of antenna size.

The gain of Andrew antennas is determined by either gain by comparison or by computer integration of the measured antenna patterns. The gain by integration method makes allowance for any additional signal losses such as ohmic, VSWR and cross-polarized losses. Both methods follow the recommended procedures as stated in EIA Standard 195C.

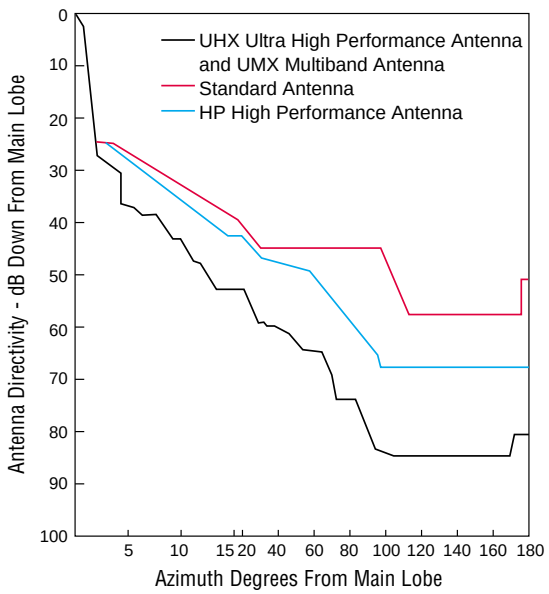
Polarization. Most antennas are available in both single- and dual-polarized versions. All can be used horizontally or vertically polarized and most have continuous polarization adjustment.

Pressurization. All antennas with air-dielectric coaxial or waveguide feeds should be pressurized. F-Series antennas eliminate the need for pressurization equipment, since the foam-filled feeds are void free and sealed to preclude the presence of moisture.

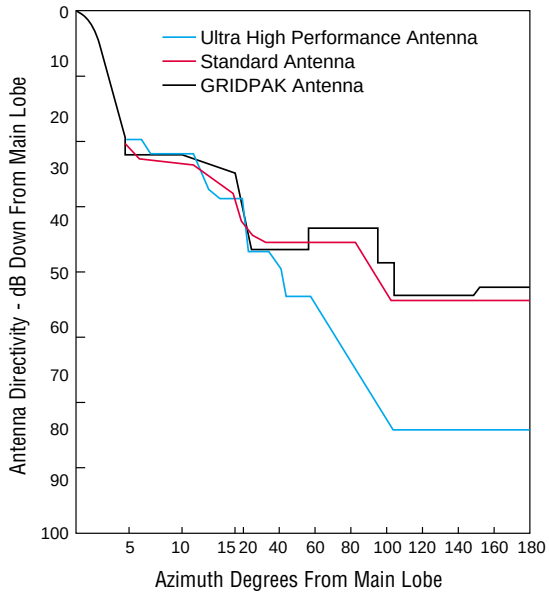
Wind load. Survival ratings are specified on page 49. Wind forces for various antenna types and sizes are tabulated on pages 111-113. GRIDPAK® antennas, available below 3.7 GHz, have significantly lower wind load than solid antenna types.

Shipping considerations. KP Series GRIDPAK® antennas are shipped disassembled, which results in very small shipping volume. Most 8 ft (2.4 m) and larger solid antennas are available in two piece versions to reduce shipping volume. Refer to the table on page 122.

RPE Comparison at 6 GHz



RPE Comparison at 2 GHz



Antenna Electrical Specifications

Radiation Pattern Envelopes

Radiation pattern envelopes (RPEs) published by Andrew present radiation pattern information in a form that is easy to use for planning radio systems. RPEs are available for all catalog microwave antennas. Copies are on file at the U.S. FCC, Industry Canada, BT, Telecom Australia, French CNET, and many other administrations throughout the world. U. S. FCC code numbers are assigned to Andrew antennas where applicable. Curves are presented in both rectangular coordinate graph and tabulated digital formats.

Andrew software, included on the Powertools CD-ROM and downloadable from www.andrew.com, allows you to view RPEs for the antennas listed in the catalog. See page 44 for more information.

Andrew RPEs represent the "worst peaks" envelope of radiation patterns, measured on selected units, which accurately represent the antenna type. Parallel and cross-polar patterns are measured for both horizontal and vertical polarizations. Close manufacturing control ensures this performance is maintained.

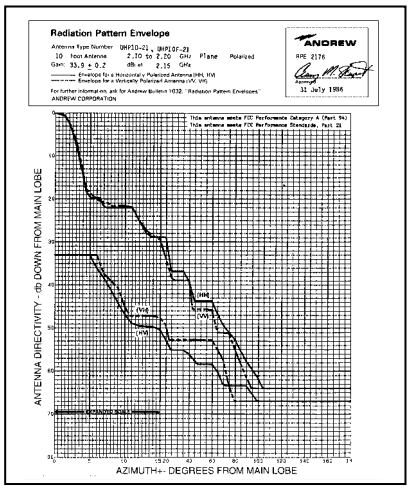
Parallel and cross-polar response are represented for both horizontal and vertical polarizations. The curves are identified as follows:

HH – Response of a horizontally polarized port to a horizontally polarized signal.

HV – Response of a horizontally polarized port to a vertically polarized signal.

VV – Response of a vertically polarized port to a vertically polarized signal.

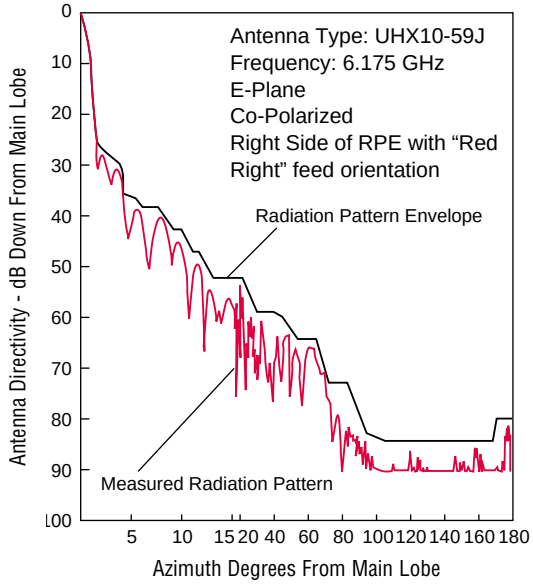
VH – Response of a vertically polarized port to a horizontally polarized signal.



Preparation of RPEs. A complete set of radiation patterns comprises twelve measurements over the full 360° of azimuth rotation measured under still, dry conditions. These cover horizontal and vertical polarizations for each of three frequencies (bottom, middle and top) in the band, each of these in turn being measured for parallel polarized as well as cross polarized responses. Each of the four curves on the RPE is derived by superimposing the right and left side patterns for all three frequencies and then drawing an envelope composed of simple straight lines so as to encompass all peaks. The probability is high that an installed antenna will have better actual response at a specific angle and frequency than indicated on the RPE.

Asymmetrical radiation patterns. HSX and UHX® high performance antennas have asymmetrical patterns with lower sidelobe levels on one side. For these antennas, RPEs are prepared for the full 360°. The superior half of the radiation pattern on either the right or left side of the antenna boresight can be used for interference evaluation to reduce potential interference. The UHX and HSX feed hubs are marked red to identify the superior side, and the hub can be rotated so as to place this side either right or left of boresight.

Guaranteed RPEs for parabolic antennas. Actual radiation patterns for production antennas, under still, dry conditions, will not have any peak exceeding the current RPE by more than 3 dB. An angular accuracy of ±1° is maintained throughout. This guarantee applies to all Andrew parabolic microwave antennas unless otherwise stated on the RPE.



Electrical Definitions

The following terms describe the electrical characteristics for Andrew microwave antennas. All rated electrical characteristics listed in the tables are guaranteed to be within the tolerances stated below. Factory measurements of these electrical characteristics are made under still, dry conditions using state-of-the art equipment and techniques ensuring high accuracy.

Frequency refers to the operating frequency band. These bands correspond with CCIR recommendations or common allocations used throughout the world. It is usually possible to tune antennas for slightly different frequency ranges while retaining the same electrical characteristics. Other ranges can be accommodated on special order.

VSWR. Maximum, is the guaranteed peak Voltage-Standing-Wave-Ratio within the operating band.

Isolation between inputs of single-band, dual-polarized antennas is 35 dB minimum unless otherwise specified.

Gain is stated in dBi (decibels over an isotropic radiator) at three frequencies: bottom, middle and top of band. Manufacturing tolerance for antenna gain is 0.2 dB unless otherwise specified. In the case of two-port, dual-polarized antennas, the specified gain refers to the average gain of the two ports, the gain of each port differing from the average gain by not more than 0.3 dB.

Front-to-back ratio in decibels. Denotes highest radiation relative to the main beam, at 180° ±40°, across the band. Production antennas do not exceed rated values by more than 2 dB unless stated otherwise.

Half-power beamwidth is the nominal total width of the main beam at the -3 dB points.

Cross-polarization discrimination, in dB, is the difference between the peak of the co-polarized main beam and the maximum cross-polarized signal over an angle twice the 3 dB beamwidth of the co-polarized main beam.

Power rating. All microwave antenna feeds are rated at 150 watts.

Antenna Environmental Ratings

Standard ratings. Microwave antennas, including mounts and radomes, where applicable, will withstand the simultaneous wind and ice conditions specified in the table below. Except where noted otherwise in the antenna listings, all antennas will remain operational within a temperature range of -50°C to 70°C (-58°F to 158°F), and meet all other requirements of EIA/TIA Standards 222E and 195C.

High wind survival. Special antenna designs with wind survival ratings up to 200 mph (320 km/h) are available. See pages 114-115.

Corrosive environments. Antennas designed for corrosive environments are also available. See pages 114-115.

Wind Survival and Deflection Characteristics

Antenna Types	Survival Ratings Wind Velocity mph (km/h)	Radial Ice, in (mm)	Max. Deflection in 70 mph (110 km/h) Wind, degrees
Standard Antennas			
Without Radome	125 (200)	1 (25)	0.1
With Standard Radome	125 (200)	1 (25)	0.1
UHX®, UMX®, UHP, HSX and HP Antennas	125 (200)	1 (25)	0.1
GRIDPAK® Antennas	125 (200)	–	–

Antenna Specifications and Ordering Information

Antenna Ordering Tables

Our line of terrestrial microwave antennas is presented in the tables on pages 51-94. The tables are arranged by operating frequency band, in ascending order. Within the tables, antennas are grouped by antenna type, and by diameter.

Basic Antenna

The type numbers listed in the tables define the basic antenna, less options and accessories. The tables also include RPE numbers and define important electrical performance parameters of the antennas.

All of the antennas in this section include a feed, reflector and vertical tower mount. Refer to the "Antenna Types" and "Antenna Construction" sections, pages 39-46 for details.

Antenna Inputs

Connector and flange options for each antenna are listed within the ordering tables. Other flanges, available as options, may effect VSWR performance where noted. Contact Andrew for more details.

Flange options are discussed in detail on pages 114 and 115.

Radomes

All shielded antennas include either a TEGLAR® long-life radome, a Hypalon coated nylon radome or a molded thermoplastic planar radome, as specified in the tables. The TEGLAR long-life radome is optional for antennas which are normally supplied with the Hypalon radome.

Molded radomes are also available as an option for most standard (non-shielded, solid reflector) antennas. Radomes are not applicable for any grid types.

Radomes are discussed in detail on pages 116-119.

Regulatory Information

Any regulatory compliance pertaining to an antenna is noted in its catalog entry.

Antenna Options

Andrew offers a variety of antenna options which allow you to choose additional features or change features from the basic antenna offerings. Options are described in detail on pages 114-122.

- *Input connectors and flanges*
- *Antenna colors*
- *Radomes*
- *Radome colors*
- *High wind survival antennas*
- *Corrosive environment antennas*
- *Packing type*
- *Packing quantity*
- *Reflector type*
- *Special purpose mounts*

Accessories

In addition to the above options, Andrew offers the following accessories to enhance your antenna selection. Accessories are described in detail on pages 119, 123-126.

- *Edge protection kits for TEGLAR® radome*
- *Port termination loads*
- *Additional side or bottom mounting struts*

Replacement Components

Contact Andrew for information on replacement components.

- *Reflectors*
- *Feeds*
- *Radomes and radome clip kits (page 119)*
- *Shield absorber kits*
- *Major hardware kits*
- *Mounts (page 96)*
- *Universal guy wire kits*
- *Shields*
- *Struts (page 96)*

335 - 365 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Horizontal	Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP6F-335	6 (2.0)	2978	–	–	–	–	–	15.0	15.2	15.4	30.5	24.2	23	19	1.3 (17.7)
KP8F-335	8 (2.4)	2119	–	–	–	–	–	15.6	15.7	15.8	21.4	19.6	17	16	1.3 (17.7)
KP10F-335	10 (3.0)	2933	–	–	–	–	–	17.7	18.1	18.5	20.6	15.5	23	22	1.3 (17.7)
KP13F-335	13 (4.0)	2952	–	–	–	–	–	20.1	20.1	20.4	15.2	13.5	25	23	1.3 (17.7)
MKP 	**Mini-GRIDPAK Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
MKP-335	6.6 x 3.3 (2 x 1)	3439	–	–	–	–	–	11.0	11.0	11.0	37	28	15	9	1.5 (14.0)

365 - 403 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Horizontal	Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP6F-365	6 (2.0)	3005	–	–	–	–	–	15.8	16.3	16.3	28.4	21.6	29	20	1.3 (17.7)
KP8F-365	8 (2.4)	2120	–	–	–	–	–	16.7	17.4	17.8	22.1	17.5	22	18	1.3 (17.7)
KP10F-365	10 (3.0)	2938	–	–	–	–	–	18.7	19.4	19.6	18.5	13.9	33	24	1.3 (17.7)
KP13F-365	13 (4.0)	2954	–	–	–	–	–	21.0	21.5	22.0	13.4	10.6	33	24	1.3 (17.7)

403 - 470 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Horizontal	Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP6F-403	6 (2.0)	3008	–	–	–	–	–	16.4	16.3	16.6	22.9	19.3	27	20	1.35 (16.5)
KP8F-403	8 (2.4)	2123	–	–	–	–	–	17.7	17.5	18.0	19.7	16.3	28	20	1.35 (16.5)
KP10F-403	10 (3.0)	2944	–	–	–	–	–	20.0	19.6	20.4	16.8	12.6	30	22	1.35 (16.5)
KP13F-403	13 (4.0)	2958	–	–	–	–	–	22.0	22.2	22.6	13.0	13.0	30	24	1.35 (16.5)
MKP 	**Mini-GRIDPAK Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
MKP-403	6.6 x 3.3 (2 x 1)	3441	–	–	–	–	–	13.5	13.5	13.5	29	22	17	19	1.35 (16.5)

820 - 960 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Horizontal	Beamwidth Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
KP4F-820	4 (1.2)	3733	–	–	–	–	–	17.5	18.2	18.8	17.2	15.9	28	24	1.4 (15.5)
KP6F-820	6 (2.0)	2994	B	–	–	–	–	21.8	22.6	23.2	10.8	9.5	30	28	1.4 (15.5)
KP8F-820	8 (2.4)	3613	A	–	–	–	–	23.4	24.1	24.7	9.0	8.0	34	25	1.35 (16.5)
KP10F-820	10 (3.0)	2996	A	–	–	–	–	25.2	25.9	26.5	8.0	6.7	30	25	1.35 (16.5)
KP13F-820	13 (4.0)	2998	A	–	–	–	–	27.3	28.0	28.6	5.8	4.9	36	30	1.35 (16.5)
MKP 	**Mini-GRIDPAK Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
MKP-820	6.6 x 3.3 (2 x 1)	3470	–	–	–	–	–	18.0	18.2	18.5	20.0	10.0	20	15	1.5 (14.0)

890 - 960 MHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Horizontal	Beamwidth Vertical	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
P 	**Standard Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female														
P4F-9	4 (1.2)	2311	B	–	–	–	–	18.1	18.4	18.7	19.5	19.5	8	21	1.3 (17.7)
P6F-9	6 (1.8)	2302	A	–	–	–	–	21.5	21.9	22.2	13.0	13.0	12	24	1.3 (17.7)
P8F-9	8 (2.4)	2306	A	–	–	–	–	24.0	24.3	24.7	9.2	9.2	15	27	1.3 (17.7)
P10F-9	10 (3.0)	2308	A	–	–	–	–	26.0	26.3	26.6	7.8	7.8	15	29	1.3 (17.7)
P12F-9	12 (3.7)	2319	A	–	–	–	–	27.7	28.0	28.3	6.7	6.7	15	30	1.3 (17.7)
P15F-9	15 (4.6)	2321	A	–	–	–	–	29.6	29.9	30.2	5.3	5.3	16	32	1.3 (17.7)

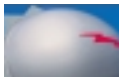
1.35 - 1.517 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP 	**GRIDPAK® Antennas - Rural Telephony** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP3F-13	3 (0.9)	4365	–	–	–	2	–	19.6	21.4	21.2	12.1	33	30	1.5 (14.0)
KP4F-13	4 (1.2)	4366	–	–	–	–	–	21.8	23.8	22.0	10.5	31	30	1.3 (17.7)
KP6F-13	6 (2.0)	4367	–	–	–	2	–	26.3	27.2	27.4	6.4	34	35	1.2 (20.8)
KP8F-13	8 (2.4)	4368	–	–	–	–	–	27.4	29.4	28.9	5.6	30	35	1.2 (20.8)
KP10F-13	10 (3.0)	4369	–	–	–	–	–	29.6	30.7	30.8	4.7	32	38	1.2 (20.8)

1.35 - 1.535 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

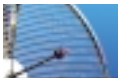
Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FPHP 	**Focal Plane High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FPHP4F-13	4 (1.2)	2590	–	–	–	2	–	21.7	22.3	22.7	11.1	30	41	1.3 (17.7)
FPHP6F-13	6 (1.8)	2592	–	–	–	2	–	25.2	25.8	26.2	7.7	30	44	1.3 (17.7)
FPHP8F-13	8 (2.4)	2827	–	–	–	2	–	28.2	28.7	29.3	6.1	30	48	1.3 (17.7)
FP 	**Focal Plane Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FP4F-13	4 (1.2)	3032	–	–	–	–	–	21.8	22.4	22.8	11.5	30	36	1.3 (17.7)
FP6F-13	6 (1.8)	3034	–	–	–	2	–	25.3	25.9	26.3	8.1	30	41	1.3 (17.7)
FP8F-13	8 (2.4)	2594	–	–	–	2	–	28.3	28.8	29.4	6.1	30	48	1.3 (17.7)
FP10F-13	10 (3.0)	2596	–	–	–	2	–	29.6	30.3	30.9	4.7	30	49	1.3 (17.7)
FP12F-13	12 (3.7)	–	–	–	–	–	–	31.0	31.8	32.1	4.2	30	50	1.3 (17.7)
KPR 	**GRIDPAK® Antennas - Rural Telephony** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KPR3F-13	3 (0.9)	3482	–	–	–	2	–	20.1	20.1	20.1	13.0*	28	23	1.35 (16.5)
KPR4F-13	4 (1.2)	3484	–	–	–	–	–	22.4	23.6	23.6	10.1	30	24	1.35 (16.5)
KPR6F-13	6 (2.0)	3486	–	–	–	2	–	25.9	27.0	27.0	6.6	30	30	1.35 (16.5)
KPR8F-13	8 (2.4)	3488	–	–	–	–	–	28.2	28.8	29.3	5.4	30	32	1.30 (17.7)
KPR10F-13	10 (3.0)	3012	–	–	–	–	–	29.9	30.5	31.0	4.7	30	32	1.30 (17.7)
KPR13F-13	13 (4.0)	3490	–	–	–	2	–	32.4	32.9	33.5	3.6	30	35	1.30 (17.7)

Reference ETSI Document EN300631 for 1 to 3 GHz.
* Horizontal = 14.9 degrees

1.427 - 1.535 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PL, P 	**Standard Antennas** – Standard and Low VSWR, Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P4F-15	4 (1.2)	1518	–	–	–	2	–	22.6	23.0	23.3	11.6	30	30	1.15 (23.1)
PL6F-15	6 (1.8)	1513	–	–	–	2	–	26.1	26.5	26.8	7.8	30	32	1.10 (26.4)
PL8F-15	8 (2.4)	1515	–	–	–	2	–	28.6	29.0	29.3	5.8	30	34	1.10 (26.4)
PL10F-15	10 (3.0)	1517	–	–	–	2	–	30.6	31.0	31.3	4.7	30	36	1.10 (26.4)
KP 	**GRIDPAK® Antennas** – F Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP4F-15	4 (1.2)	3826	–	–	–	–	–	23.1	23.4	23.7	11.0	31	28	1.30 (17.7)
KP6F-15	6 (2.0)	3978	–	–	–	2	–	26.8	27.1	27.4	7.2	32	31	1.20 (20.8)
KP8F-15	8 (2.4)	4096	–	–	–	–	–	28.4	28.7	29.0	6.2	30	32	1.20 (20.8)
KP10F-15	10 (3.0)	2969	–	–	–	2	–	30.4	30.7	31.0	4.7	34	33	1.15 (23.1)
KP13F-15	13 (4.0)	2980	–	–	–	2	–	32.8	33.1	33.4	3.8	30	40	1.15 (23.1)

1.7 - 2.11 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except FPX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HP6F-17	6 (1.8)	1370	–	–	–	2	–	27.7	28.6	29.6	6.0	25	44	1.10 (26.4)
HP8F-17	8 (2.4)	2252	A	A	–	2	–	30.2	31.1	32.0	4.5	30	50	1.10 (26.4)
HP10F-17	10 (3.0)	2254	A	A	–	2	–	32.1	33.1	34.1	3.7	34	52	1.10 (26.4)
HP12F-17	12 (3.7)	2256	A	A	–	2	–	33.7	34.6	35.6	3.0	30	56	1.10 (26.4)
HP15F-17	15 (4.6)	1381	A	A	–	2	–	35.7	36.6	37.5	2.4	30	58	1.10 (26.4)
PL, P 	**Standard Antennas** – Standard and Low VSWR, Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P2F-17	2 (1.8)	4344	–	–	–	–	–	18.2	19.7	19.9	15.3*	21	22	1.50 (14.0)
P4F-17	4 (1.2)	2298	–	–	–	2	–	23.9	24.8	25.7	9.0	30	30	1.20 (20.8)
PL6F-17	6 (1.8)	2274	B	B	–	2	–	27.7	28.6	29.5	6.0	30	36	1.10 (26.4)
PL8F-17	8 (2.4)	2276	A	A	–	2	–	30.2	31.1	32.0	4.5	30	39	1.10 (26.4)
PL10F-17	10 (3.0)	2278	A	A	–	2	–	32.1	33.1	34.0	3.7	34	42	1.10 (26.4)
PL12F-17	12 (3.7)	2280	A	A	–	2	–	33.7	34.6	35.5	3.0	30	45	1.10 (26.4)
PL15F-17	15 (4.6)	1377	A	A	–	2	–	35.7	36.6	37.5	2.4	30	48	1.10 (26.4)

Reference ETSI Document EN300631 for 1 to 3 GHz

*Horizontal = 16.9 degrees

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1.7 - 2.11 GHz

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
FPX8-17*	8 (2.4)	6210	B	B	–	2	–	29.4	30.4	31.2	4.6	28	45	1.10 (26.4)
FPX10-17*	10 (3.0)	6209	B	B	–	–	–	31.5	32.3	33.1	3.7	30	50	1.10 (26.4)
FPX12-17*	12 (3.7)	6211	B	B	–	2	–	33.3	34.0	34.8	3.2	29	52	1.10 (26.4)
	Focal Plane Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FP8F-17	8 (2.4)	6219	B	B	–	2	–	29.9	30.8	31.9	4.6	30	49	1.10 (26.4)
FP10F-17	10 (3.0)	6221	A	A	–	2	–	31.9	32.8	33.8	3.7	30	51	1.10 (26.4)
FP12F-17	12 (3.7)	6223	A	A	–	2	–	33.6	34.3	35.3	3.1	30	54	1.10 (26.4)
KP 	**GRIDPAK® Antennas** – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP4F-17	4 (1.2)	3830	–	–	–	2	–	24.6	25.5	26.4	8.6	31	32	1.20 (20.8)
KP6F-17	6 (2.0)	4077	B	B	–	–	–	28.3	29.3	30.2	5.5	33	36	1.10 (26.4)
KP8F-17	8 (2.4)	4098	B	B	–	–	–	30.1	31.1	31.7	4.8	32	36	1.10 (26.4)
KP10F-17	10 (3.0)	2971	A	A	–	2	–	31.9	32.8	33.7	3.7	38	42	1.10 (26.4)
KP13F-17	12 (3.7)	2982	A	A	–	–	–	34.3	35.3	36.2	3.0	30	40	1.10 (26.4)

*1.85 - 1.99 GHz ***

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except PXL Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHP 	**Ultra High Performance Antennas** – Single Polarized **Antenna Input:** 7/8" EIA													
UHP8-18	8 (2.4)	2168	A	–	–	2	–	30.8	31.1	31.4	4.8	33	62	1.08 (28.3)
UHP10-18	10 (3.0)	2169	A	–	–	2	–	32.6	33.0	33.3	4.2	32	62	1.08 (28.3)
UHP12-18	12 (3.7)	2170	A	–	–	2	–	34.4	34.7	35.0	3.3	32	66	1.08 (28.3)
	Ultra High Performance Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
UHP8F-18	8 (2.4)	2168	A	–	–	2	–	30.8	31.1	31.4	4.8	33	62	1.10 (26.4)
UHP10F-18	10 (3.0)	2169	A	–	–	2	–	32.6	33.0	33.3	4.2	32	62	1.10 (26.4)
UHP12F-18	12 (3.7)	2170	A	–	–	2	–	34.4	34.7	35.0	3.3	32	66	1.10 (26.4)
PXL 	**Standard Antennas** – Dual Polarized **Antenna Input:** 7/8" EIA													
PXL8-18*	8 (2.4)	2286	B	–	–	2	–	31.0	31.2	31.5	4.6	28	43	1.10 (26.4)
PXL10-18*	10 (3.0)	2288	A	–	–	2	–	32.9	33.1	33.6	3.7	28	46	1.10 (26.4)
PXL12-18*	12 (3.7)	2290	A	–	–	2	–	34.5	34.7	35.2	3.0	28	48	1.10 (26.4)

Reference ETSI Documents EN300631 for 1 to 3 GHz
* 3 lb/in^2 (20 kPa) maximum
** Multiband antennas are available in this frequency band. See page 94.

1.9 - 2.3 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except HPX, FPX, and PXL Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHP 	**Ultra High Performance Antennas** – Single Polarized **Antenna Input:** 7/8" EIA													
UHP8-19	8 (2.4)	1444	A	A	–	2	–	31.1	31.9	32.7	4.2	30	57	1.20 (20.8)
UHP10-19	10 (3.0)	1445	A	A	–	2	–	32.9	33.7	34.5	3.6	30	60	1.20 (20.8)
UHP12-19	12 (3.7)	1446	A	A	–	2	–	34.6	35.4	36.2	2.9	30	64	1.20 (20.8)
	Ultra High Performance Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
UHP8F-19	8 (2.4)	1447	A	A	–	2	–	31.1	31.9	32.7	4.2	30	57	1.20 (20.8)
UHP10F-19	10 (3.0)	1448	A	A	–	2	–	32.9	33.7	34.5	3.6	30	60	1.20 (20.8)
UHP12F-19	12 (3.7)	1449	A	A	–	2	–	34.6	35.4	36.2	2.9	30	64	1.20 (20.8)
HPX, HP 	**High Performance Antennas** – Dual Polarized **Antenna Input:** 7/8" EIA													
HPX8-19*	8 (2.4)	1430	A	A	–	1	–	31.1	32.0	32.9	4.1	28	48	1.10 (26.4)
HPX10-19*	10 (3.0)	1431	A	A	–	2	–	33.0	33.9	34.8	3.3	28	53	1.10 (26.4)
HPX12-19*	12 (3.7)	1432	A	A	–	2	–	34.6	35.5	36.4	2.8	30	55	1.10 (26.4)
HPX15-19*	15 (4.6)	1441	A	A	–	2	–	36.5	37.4	38.3	2.2	28	56	1.10 (26.4)
	High Performance Antennas – F-Series Unpressurized Dual Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HPX8F-19	8 (2.4)	2573	A	A	–	1	–	31.1	32.0	32.9	4.1	28	48	1.20 (20.8)
HPX10F-19	10 (3.0)	2575	A	A	–	2	–	33.0	33.9	34.8	3.3	28	43	1.20 (20.8)
	High Performance Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HP6F-19	6 (1.8)	1450	B	B	–	2	–	28.5	29.4	30.3	5.5	25	46	1.10 (26.4)
HP8F-19	8 (2.4)	2262	A	A	–	2	–	31.0	31.9	32.8	4.1	30	50	1.10 (26.4)
HP10F-19	10 (3.0)	2264	A	A	–	2	–	32.9	33.8	34.7	3.3	30	53	1.10 (26.4)
HP12F-19	12 (3.7)	2267	A	A	–	2	–	34.5	35.4	36.3	2.8	30	57	1.10 (26.4)
HP15F-19	15 (4.6)	1409	A	A	–	2	–	36.5	37.4	38.3	2.2	30	59	1.10 (26.4)
PXL, PL 	**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** 7/8" EIA													
PXL8-19*	8 (2.4)	1426	A	A	–	2	–	31.1	32.0	32.9	4.1	28	43	1.10 (26.4)
PXL10-19*	10 (3.0)	1427	A	A	–	2	–	33.0	33.9	34.8	3.3	28	45	1.10 (26.4)
PXL12-19*	12 (3.7)	1428	A	A	–	2	–	34.6	35.5	36.4	2.8	28	48	1.10 (26.4)
PXL15-19*	15 (4.6)	1429	A	A	–	2	–	36.5	37.4	38.3	2.2	28	48	1.10 (26.4)
	Standard Antennas – Unpressurized Dual Polarized Low VSWR **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
PXL8F-19	8 (2.4)	2563	A	A	–	2	–	31.1	32.0	32.9	4.1	28	43	1.20 (20.8)
PXL10F-19	10 (3.0)	2565	A	A	–	2	–	33.0	33.9	34.8	3.3	28	45	1.20 (20.8)
	Standard Antennas – Unpressurized Single Polarized Standard and Low VSWR **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P2F-19	2 (0.6)	4390	–	–	–	–	–	19.3	20.5	21.3	13.8	30	25	1.50 (14.0)
P4F-19	4 (1.2)	1863	–	–	–	2	–	24.8	25.7	26.6	8.2	30	33	1.20 (20.8)
PL6F-19	6 (1.8)	2202	B	B	–	2	–	28.5	29.4	30.3	5.5	30	37	1.10 (26.4)
PL8F-19	8 (2.4)	2204	A	A	–	2	–	31.0	31.9	32.8	4.1	30	40	1.10 (26.4)
PL10F-19	10 (3.0)	1403	A	A	–	2	–	32.9	33.8	34.7	3.3	30	44	1.10 (26.4)
PL12F-19	12 (3.7)	1404	A	A	–	2	–	34.5	35.4	36.3	2.8	30	46	1.10 (26.4)
PL15F-19	15 (4.6)	1405	A	A	–	2	–	36.5	37.4	38.3	2.2	30	50	1.10 (26.4)

Reference ETSI Document EN300631 for 1 to 3 GHz * 3 lb/in^2 (20 kPa) maximum

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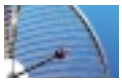
1.9 - 2.3 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except HPX, FPX, and PXL Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FPX, FP 		**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA												
FPX8-19*	8 (2.4)	6410	–	–	–	–	–	30.4	31.2	32.0	41	25	47	1.10 (26.4)
FPX10-19*	10 (3.0)	6413	A	A	–	2	–	32.3	33.1	33.9	3.3	29	52	1.10 (26.4)
FPX12-19*	12 (3.7)	6415	A	A	–	2	–	34.0	34.8	34.9	2.8	29	52	1.10 (26.4)
		Focal Plane Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female												
FP8F-19	8 (2.4)	6408	A	A	–	2	–	30.5	31.4	32.2	4.1	30	50	1.10 (26.4)
FP10F-19	10 (3.0)	6409	A	A	–	2	–	32.2	33.1	34.0	3.3	30	53	1.10 (26.4)
FP12F-19	12 (3.7)	6406	A	A	–	2	–	33.8	34.7	35.6	2.8	30	55	1.10 (26.4)
KP 		**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
KP3F-19	3 (0.9)	4391	–	–	–	2	–	23.2	24.1	24.8	10.2 **	30	30	1.30 (17.7)
KP4F-19	4 (1.2)	3834	–	–	–	2	–	25.5	26.4	27.2	7.7	29	32	1.20 (20.8)
KP6F-19	6 (2.0)	4076	B	B	–	2	–	29.3	30.2	31.0	5.0	32	36	1.10 (26.4)
KP8F-19	8 (2.4)	4100	A	A	–	2	–	31.0	31.8	32.6	4.6	32	39	1.10 (26.4)
KP10F-19	10 (3.0)	2973	A	A	–	2	–	32.8	33.7	34.5	3.3	35	41	1.10 (26.4)
KP13F-19	13 (4.0)	2984	A	A	–	–	–	35.3	36.2	37.0	2.8	30	40	1.10 (26.4)

2.1 - 2.2 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details

Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa), except UHX Series 3 lb/in^2 (20 kPa).

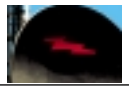
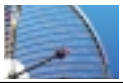
Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA												
UHX8-21*	8 (2.4)	2148 2149	A	A	-	2	-	31.9	32.1	32.3	4.2	30	58	1.10 (26.4)
UHX10-21*	10 (3.0)	2144 2145	A	A	-	2	-	33.8	34.0	34.2	3.6	32	62	1.10 (26.4)
UHX12-21*	12 (3.7)	2147 2146	A	A	-	2	-	35.4	35.6	35.8	2.8	32	67	1.10 (26.4)
		Ultra High Performance Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female												
UHX8F-21	8 (2.4)	2148 2149	A	A	-	2	-	31.9	32.1	32.3	4.2	30	58	1.20 (20.8)
UHX10F-21	10 (3.0)	2145 2144	A	A	-	2	-	33.8	34.0	34.2	3.6	32	62	1.20 (20.8)
UHX12F-21	12 (3.7)	2147 2146	A	A	-	2	-	35.4	35.6	35.8	2.8	32	67	1.20 (20.8)

Reference ETSI Document EN300631 for 1 to 3 GHz

* 3 lb/in^2 (20 kPa) maximum **Horizontal = 8.9 degrees

2.3 - 2.5 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (20 kPa), except FPX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PL, P 	**Standard Antennas** – Unpressurized Single Polarized Standard and Low VSWR **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P2F-23	2 (0.6)	3014	–	–	–	–	–	20.8	21.6	22.0	12.0**	21	24	1.50 (14.0)
P4F-23	4 (1.2)	2198	B	–	–	2	–	26.9	27.3	27.6	6.9	32	36	1.20 (20.8)
PL6F-23	6 (1.8)	2188	B	–	–	2	–	30.4	30.8	31.2	4.7	32	36	1.10 (26.4)
PL8F-23	8 (2.4)	2190	A	–	–	2	–	33.0	33.4	33.8	3.5	30	39	1.08 (28.3)
PL10F-23	10 (3.0)	2192	A	–	–	2	–	34.9	35.3	35.6	3.0	30	44	1.08 (28.3)
PL12F-23	12 (3.7)	2194	A	–	–	2	–	36.5	36.9	37.2	2.5	32	47	1.08 (28.3)
FPX, FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Input:** 7/8" EIA													
FPX6-23*	6 (1.8)	6945	–	–	–	2	–	28.9	29.2	29.6	5.5	27	41	1.15 (23.1)
FPX8-23*	8 (2.4)	6949	–	–	–	2	–	31.5	31.8	32.3	4.1	28	52	1.10 (26.4)
FPX10-23*	10 (3.0)	6917	B	–	–	2	–	33.8	33.9	34.2	3.3	29	54	1.08 (28.3)
FPX12-23*	12 (3.7)	6919	B	–	–	2	–	35.5	35.6	35.9	2.7	30	56	1.08 (28.3)
	Focal Plane Antennas – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
FP4F-23	4 (1.2)	6954	–	–	–	2	–	26.1	26.4	26.8	7.7	30	40	1.20 (20.8)
FP6F-23	6 (1.8)	6938	A	–	–	2	–	29.7	30.3	30.5	5.3	28	41	1.10 (26.4)
FP8F-23	8 (2.4)	6942	A	–	–	2	–	32.5	32.6	32.9	4.1	30	52	1.08 (28.3)
FP10F-23	10 (3.0)	6914	A	–	–	2	–	34.6	34.7	35.2	3.4	30	53	1.08 (28.3)
FP12F-23	12 (3.7)	6916	A	–	–	2	–	35.7	36.3	36.5	2.8	30	57	1.08 (28.3)
KP 	**GRIDPAK® Antennas** – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP3F-23	3 (0.9)	3394	–	–	–	–	–	24.7	25.1	25.3	8.1	38	30	1.20 (20.8)
KP4F-23	4 (1.2)	3837	–	–	–	–	–	27.2	27.5	27.8	6.9	30	30	1.20 (20.8)
KP6F-23	6 (2.0)	4082	B	–	–	–	–	31.0	31.3	31.6	4.5	30	36	1.10 (26.4)
KP8F-23	8 (2.4)	4126	B	–	–	–	–	32.6	32.9	33.1	3.4	30	35	1.08 (28.3)
KP10F-23	10 (3.0)	2975	B	–	–	–	–	34.5	34.8	35.1	3.0	30	38	1.08 (28.3)
KP13F-23	13 (4.0)	2986	B	–	–	–	–	37.0	37.2	37.5	2.4	30	38	1.08 (28.3)
KPR 	**GRIDPAK® Antennas** – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KPR3F-23	2 (0.6)	2345	–	–	–	–	–	24.2	23.6	23.6	7.9***	25	24	1.35 (16.5)
KPR4F-23	4 (1.2)	2348	–	–	–	–	–	26.9	27.3	27.6	6.2****	28	30	1.35 (16.5)
KPR6F-23	6 (2.0)	2349	–	–	–	–	–	30.8	31.3	31.2	4.2	30	35	1.35 (16.5)
KPR8F-23	8 (2.4)	2350	–	–	–	–	–	32.3	32.4	32.7	3.1*****	30	36	1.30 (17.7)
KPR10F-23	10 (3.0)	2351	–	–	–	–	–	33.5	33.7	34.0	2.9	30	38	1.30 (17.7)
KPR13F-23	13 (4.0)	2352	A	–	–	–	–	36.5	36.8	37.0	2.3	30	40	1.30 (17.7)

2.3 - 2.7 GHz

KP 	**GRIDPAK®/Antennas/Wide Band** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP4F-23W	4 (1.2)	6230	–	–	–	–	–	27.1	27.7	28.5	6.5	30	30	1.30 (17.7)
KP6F-23W	6 (2.0)	6231	–	–	–	–	–	30.9	31.5	32.3	4.2	30	35	1.25 (19.0)
KP8F-23W	8 (2.4)	6232	–	–	–	–	–	32.5	33.0	33.7	3.3	30	35	1.20 (20.8)
KP10F-23W	10 (3.0)	6233	–	–	–	–	–	34.4	35.0	35.8	2.8	30	38	1.20 (20.8)
KP13F-23W	13 (4.0)	6234	–	–	–	–	–	36.9	37.4	37.9	2.3	30	38	1.20 (20.8)

Reference ETSI Document EN300631 for 1 to 3 GHz
* 3 lb/in^2 (20 kPa) maximum ** Horizontal = 13.3 degrees *** Horizontal = 8.7 degrees **** Horizontal = 6.7 degrees ***** Horizontal = 3.4 degrees

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2.45 - 2.5 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
P 	**Standard Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P6F-24	6 (1.8)	2205	B	–	–	2	–	30.9	31.0	31.1	4.3	28	36	1.30 (17.7)
P8F-24	8 (2.4)	2207	A	–	–	2	–	33.4	33.5	33.6	3.2	28	39	1.30 (17.7)

2.48 - 2.7 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa) except FPX Series 3 lb/in^2 (20 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA and "F" Flange Female													
HP4F-25	4 (1.2)	1038	–	–	–	2	–	27	27.3	27.6	6.7	30	43	1.20 (20.8)
HP6F-25	6 (1.8)	1322E	–	–	–	2	–	31.1	31.4	31.7	4.6	28	50	1.10 (26.4)
HP8F-25	8 (2.4)	1314	–	–	–	2	–	33.7	34	34.3	3.1	30	52	1.08 (28.3)
HP10F-25	10 (3.0)	3000	–	–	–	2	–	35.6	35.9	36.2	2.7	30	55	1.08 (28.3)
HP12F-25	12 (3.7)	1318	–	–	–	2	–	37.2	37.5	37.8	2.3	30	54	1.08 (28.3)
PL,P 	**Standard Antennas** – Unpressurized Single Polarized Standard and Low VSWR **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
P4F-25	4 (1.2)	1268	–	–	–	–	–	27.6	27.9	28.2	6.3	30	32	1.20 (20.8)
PL6F-25	6 (1.8)	1308	–	–	–	–	–	31.1	31.4	31.7	4.2	28	36	1.10 (26.4)
PL8F-25	8 (2.4)	1309	–	–	–	2	–	33.6	33.9	34.2	3.1	30	39	1.08 (28.3)
PL10F-25	10 (3.0)	1310	–	–	–	2	–	35.6	35.9	36.2	2.7	30	42	1.08 (28.3)
PL12F-25	12 (3.7)	1320	–	–	–	2	–	37.1	37.4	37.7	2.2	30	44	1.08 (28.3)
FPX, FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** 7/8" EIA													
FPX6-25*	6 (1.8)	6947	–	–	–	–	–	29.6	30.0	30.3	5.0	27	42	1.15 (23.1)
FPX8-25*	8 (2.4)	6951	–	–	–	–	–	32.3	32.6	32.7	5.0	27	52	1.15 (26.4)
FPX10-25*	10 (3.0)	6909	–	–	–	2	–	34.2	34.6	34.9	3.1	30	54	1.08 (28.3)
FPX12-25*	12 (3.7)	6911	–	–	–	2	–	35.9	36.3	36.8	2.6	30	56	1.08 (28.3)
	Focal Plane Antennas – F-Series Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
FP4F-25	4 (1.2)	6956	–	–	–	2	–	26.8	27.1	27.5	7.2	30	41	1.20 (20.8)
FP6F-25	6 (1.8)	6940	–	–	–	2	–	30.5	30.6	31.0	4.9	28	44	1.10 (26.4)
FP8F-25	8 (2.4)	6944	–	–	–	2	–	32.9	33.4	33.5	3.9	30	52	1.08 (26.4)
FP10F-25	10 (3.0)	6905	–	–	–	2	–	35.2	35.5	35.8	3.2	30	55	1.08 (28.3)
FP12F-25	12 (3.7)	6908	–	–	–	2	–	36.5	36.9	37.3	2.6	30	57	1.08 (28.3)
KP 	**GRIDPAK® Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female													
KP3F-25	3 (0.9)	3395	–	–	–	–	–	25.3	25.2	25.4	7.7 **	32	30	1.20 (20.8)
KP4F-25	4 (1.2)	3841	–	–	–	–	–	27.8	28.2	28.6	6.1	30	31	1.20 (20.8)
KP6F-25	6 (2.0)	4084	–	–	–	–	–	31.6	32.0	32.4	4.0	30	35	1.10 (26.4)
KP8F-25	8 (2.4)	4128	–	–	–	–	–	33.1	33.6	33.8	3.2	30	37	1.08 (28.3)
KP10F-25	10 (3.0)	2977	–	–	–	–	–	35.1	35.5	35.9	2.7	31	38	1.08 (28.3)
KP13F-25	13 (4.0)	2988	–	–	–	–	–	37.5	37.8	38.0	2.3	30	38	1.08 (28.3)

Reference ETSI Document EN300631 for 1 to 3 GHz
* 3 lb/in^2 (20 kPa) maximum **Horizontal = 6.9 degrees

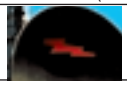
3.4 - 3.7 GHz

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
KP		**GRIDPAK® Antennas**– Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
KP2F-34	2 (0.6)	4423	–	–	–	–	–	23.6	23.7	23.6	8.7	28	22	1.35 (16.5)
KP3F-34	3 (0.9)	4424	–	–	–	–	–	27.2	27.7	27.3	6.2	28	25	1.30 (17.7)
KP4F-34	4 (1.2)	4425	–	–	–	–	–	29.2	29.8	29.7	4.3	32	26.5	1.30 (17.7)
KP6F-34	6 (2.0)	4426	–	–	–	–	–	33.8	34.2	34.5	2.9	30	31	1.35 (16.5)
KP8F-34	8 (2.4)	786	–	–	–	–	–	35.1	35.5	35.8	2.6	30	35	1.30 (17.7)

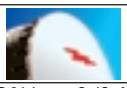
3.4 - 3.7 GHz with Coaxial Feeds*

Antenna Inputs. All antenna VSWR values are specified with 7/8" EIA connectors. Other optional inputs may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP		**High Performance Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
HP2F-34	2 (0.6)	4416	–	–	–	–	–	22.7	23	23	10.7	30	34	1.35 (16.5)
HP4F-34	4 (1.2)	4418	–	–	–	1	1	29.1	29.5	29.8	4.7	30	41	1.30 (17.7)
HP6F-34	6 (1.8)	4420	–	–	–	1	2	32.9	33.3	33.6	3.5	30	44	1.20 (20.8)
HP8F-34	8 (2.4)	4422	–	–	–	1	2	35	35.4	35.7	2.5	30	48	1.20 (20.8)
P		**Standard Antennas** – Unpressurized Single Polarized **Antenna Inputs:** 7/8" EIA, "F" Flange Female, Type N Female, and 7-16 DIN Female												
P2F-34	2 (0.6)	4415	–	–	–	–	–	24.3	24.5	25	9	30	26.5	1.35 (16.5)
P4F-34	4 (1.2)	4417	–	–	–	1	1	29.6	30	30.3	4.5	30	33	1.30 (17.7)
P6F-34	6 (1.8)	4419	–	–	–	–	–	33.7	33.6	33.6	3.3	30	36	1.20 (20.8)
P8F-34	8 (2.4)	4421	–	–	–	1	2	35.2	35.6	35.9	2.6	30	40	1.20 (20.8)

3.4 - 3.9 GHz with Waveguide Feeds*

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa), except FP Series 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance Antennas**– Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
UHX8-34**	8 (2.4)	1469 1470	–	–	–	2	2	36.2	36.9	37.5	2.4	30	62	1.06 (30.7)
UHX10-34**	10 (3.0)	1472 1471	B	–	–	2	2	38.1	38.8	39.4	1.8	30	62	1.06 (30.7)
UHX12-34**	12 (3.7)	1473 1474	B	–	–	2	2	39.6	40.4	41.0	1.5	40	65	1.06 (30.7)
UHX15-34**	15 (4.6)	1485 1486	A	–	–	2	2	41.6	42.3	42.9	1.2	30	66	1.06 (30.7)
HSX		**High Performance Antennas** – Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
HSX8-34**	8 (2.4)	1528 1530	B	–	–	3	2	36.1	36.6	37.1	2.4	40	67	1.06 (30.7)
HSX10-34**	10 (3.0)	1534 1532	B	–	–	3	2	37.7	38.2	38.7	1.8	40	69	1.06 (30.7)
HSX12-34**	12 (3.7)	1536 1538	B	–	–	3	2	39.6	40.1	40.6	1.5	40	70	1.06 (30.7)
HSX15-34**	15 (4.6)	1540 1542	A	–	–	3	2	41.6	42.1	42.6	1.2	40	72	1.06 (30.7)
FP		**Focal Plane Antennas** – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
FP10-34	10 (3.0)	6605	–	–	–	1	2	37.0	38.3	38.8	1.9	28	60	1.06 (30.7)
FP12-34	12 (3.7)	6601	B	–	–	2	2	39.3	39.8	40.3	1.6	29	62	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz *Multiband antennas are available in this frequency band. See page 93. **5 lb/in^2 (35 kPa) maximum

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Revised 5/01

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
Premium Waveguide Assemblies							
3.4-3.9	**EWP34-34**	CPR229G	**134DET**	–	**55001-229**	**F229PC0240CS**	1.10 (26.4)
3.54-4.2	**EWP34-35**	CPR229G	**134DET**	**134DEP-2**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
		PDR40	**134DEMT**	**134DEMP-2**	**223306-40**	**F229MH0600HA**	1.08 (28.3)
3.7-4.2	**EWP34-37**	CPR229G	**134DET**	**134DEP-1**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
Standard Waveguide Assemblies			**Non-Tunable**				
3.1-3.6	**EW34-31**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)
3.4-4.2	**EW34**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-15**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**26985A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-4**
Connector Reattachment Kit	**33544-43**
Wall-Roof Feed Thru	**35849A-17**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**204679-34**
5 in (127 mm) dia	**48939-34**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

*3.54 - 4.18 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
UHX8-35**	8 (2.4)	2464 2463	B	–	–	3	2	36.1	36.8	37.5	2.4	30	65	1.06 (30.7)
UHX10-35**	10 (3.0)	1465 1466	A	–	–	2	2	38.1	38.8	39.5	1.8	32	65	1.06 (30.7)
UHX12-35**	12 (3.7)	1467 1468	A	–	–	2	2	39.6	40.4	41.1	1.5	32	68	1.06 (30.7)
UHX15-35**	15 (4.6)	2483 2484	A	–	–	2	2	41.6	42.3	43.0	1.2	30	65	1.06 (30.7)

3.6 - 4.2 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in^2 (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX		**High Performance Antennas** – Super High Cross Polarization Discrimination Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
HSX6-36**	6 (1.8)	4634 4635	–	–	–	3	2	34.3	34.8	35.3	3.2	38	65	1.10 (26.4)
HSX8-36**	8 (2.4)	2382 2381	B	–	–	3	2	36.7	37.3	37.8	2.4	40	65	1.06 (30.7)
HSX10-36**	10 (3.0)	2383 2384	B	–	–	3	2	38.3	38.9	39.4	1.9	40	68	1.06 (30.7)
HSX12-36**	12 (3.7)	2385 2386	A	–	–	3	2	40.3	40.9	41.4	1.6	40	71	1.06 (30.7)
HSX15-36**	15 (4.6)	2396 2394	A	–	–	3	2	42.1	42.7	43.2	1.2	40	71	1.06 (30.7)
HPX		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
HPX8-36**	8 (2.4)	1143	–	–	–	1	2	36.4	37.1	37.7	2.5	30	59	1.10 (26.4)
HPX10-36**	10 (3.0)	1144	B	–	–	1	2	38.1	38.8	39.4	1.9	30	61	1.10 (26.4)
HPX12-36**	12 (3.7)	1145	B	–	–	2	2	39.9	40.6	41.2	1.6	30	62	1.10 (26.4)
HP		**High Performance Antennas** – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
HP6-36**	6 (1.8)	2560	–	–	–	1	2	34.0	34.6	35.2	3.0	30	59	1.10 (26.4)
HP8-36**	8 (2.4)	1138	B	–	–	1	2	36.4	37.1	37.7	2.5	30	59	1.10 (26.4)
HP10-36**	10 (3.0)	1139	B	–	–	2	2	38.1	38.8	39.4	1.9	30	61	1.10 (26.4)
HP12-36**	12 (3.7)	1140	B	–	–	2	2	39.9	40.6	41.2	1.6	30	62	1.10 (26.4)
FPX **FP**		**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
FPX10-36**	10 (3.0)	6805	–	–	–	–	–	38.6	39.1	39.6	1.7	26	62	1.06 (30.7)
FPX12-36**	12 (3.7)	6807	A	–	–	2	2	40.3	40.9	41.2	1.4	27	64	1.06 (30.7)
		Focal Plane Antennas – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
FP10-36**	10 (3.0)	6801	B	–	-	1	2	38.6	39.1	39.6	1.7	29	62	1.06 (30.7)
FP12-36**	12 (3.7)	6803	A	–	–	1	2	40.3	40.9	41.2	1.4	31	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See page 93.
**5 lb/in^2 (35 kPa) maximum

Revised 5/01

Refer to page 64 for Elliptical Waveguide ordering information

*3.7 - 4.2 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 5 lb/in² (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 		**Ultra High Performance Antennas** **Antenna Inputs:** CPR229G and PDR40												
UHX8-37**	8 (2.4)	1433 1434	A	–	–	3	2	36.8	37.4	37.6	2.4	33	66	1.06 (30.7)
UHX10-37**	10 (3.0)	1436 1435	A	–	–	3	2	38.5	39.1	39.5	1.8	33	67	1.06 (30.7)
UHX12-37**	12 (3.7)	1437 1438	A	–	–	3	2	40.4	41.0	41.2	1.5	33	73	1.06 (30.7)
UHX15-37**	15 (4.6)	1439 1440	A	–	–	3	2	42.1	42.7	43.1	1.2	33	73	1.06 (30.7)
PXL **PL** 		**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR229G and PDR40												
PXL10-37**	10 (3.0)	2411	B	–	–	–	–	38.7	39.3	39.8	1.8	30	45	1.06 (307)
PXL12-37**	12 (3.7)	2413	B	–	–	1	2	40.4	41.0	41.1	1.5	30	48	1.06 (30.7)
PXL15-37**	15 (4.6)	2415	B	–	–	1	2	42.1	42.7	43.0	1.2	30	52	1.06 (30.7)
		Standard Antennas – Single Polarized **Antenna Inputs:** CPR229G and PDR40												
PL6-37**	6 (1.8)	2402	–	–	–	–	–	34.5	35.0	35.5	3.0	30	40	1.07 (29.4)
PL8-37**	8 (2.4)	2403	–	–	–	–	–	36.7	37.3	37.8	2.4	30	42	1.06 (30.7)
PL10-37**	10 (3.0)	2405	B	–	–	–	–	38.7	39.3	39.8	1.8	30	47	1.06 (30.7)
PL12-37**	12 (3.7)	2407	B	–	–	1	2	40.4	41.0	41.5	1.5	30	50	1.06 (30.7)
PL15-37**	15 (4.6)	2408	B	–	–	1	2	42.1	42.7	43.2	1.2	30	52	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See page 93.
**5 lb/in² (35 kPa) maximum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
3.7–4.2	**EWP37S**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
		PDR40	**137DEMT**	–	**223306-40**	**F229PH0600HA**
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
3.4-3.9	**EWP37-34W*****	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CS**
3.4-3.9	**EWP37-34*****	PDR40	–	**137DEMP-3**	**223306-40**	**F229MH0600HS**
3.54-4.2	**EWP37-35**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.52-4.2	**EWP37-35W**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.6-4.2	**EWP37-36**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
3.7-4.2	**EWP37-37**	CPR229G	**137DET**	**137DEP-1**	**55001-229**	**F229PC0240CA**
Standard Waveguide Assemblies				**Non-Tunable**		**VSWR 1.15 (23.1)****
3.4–4.2	**EW37**	CPR229G	**137DE**	–	**55001-229**	**F229PC0240CS**
		PDR40	**137DEM**	–	**223306-40**	**F229MH0600HS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
*** VSWR 1.10 (26.4) † "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-4**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205869**
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-3**
Connector Reattachment Kit	**33544-24**
Wall-Roof Feed Thru	**245314-37**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-37**
5 in (127 mm) dia	**WGB5-37**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

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Refer to page 66 for Elliptical Waveguide ordering information

*4.4 - 5.0 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in² (70 kPa) except LBX 5 lb/in² (35 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** – Super High Cross Polarization Discrimination **Antenna Inputs:** CPR187G and PDR48													
HSX6-44	6 (1.8)	2398 2400	–	–	–	3	2	35.7	36.3	36.8	2.6	40	68	1.06 (30.7)
HSX8-44	8 (2.4)	2406 2404	–	–	–	3	2	38.2	38.8	39.3	1.9	40	70	1.06 (30.7)
HSX10-44	10 (3.0)	2410 2412	–	–	–	3	2	40.0	40.6	41.1	1.5	40	71	1.06 (30.7)
HSX12-44	12 (3.7)	2414 2416	–	–	–	3	2	41.7	42.2	42.8	1.2	40	74	1.06 (30.7)
HSX15-44	15 (4.6)	2420 2418	–	–	–	3	2	43.7	44.3	44.8	1.0	40	75	1.06 (30.7)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
HPX6-44	6 (1.8)	2558	–	–	–	2	2	35.8	36.3	36.8	2.5	30	60	1.06 (30.7)
HPX8-44	8 (2.4)	2544	–	–	–	–	–	38.6	39.1	39.7	1.8	30	64	1.06 (30.7)
HPX10-44	10 (3.0)	2546	–	–	–	2	2	39.8	40.3	40.9	1.5	30	66	1.06 (30.7)
HPX12-44	12 (3.7)	2548	–	–	–	2	2	41.9	42.5	43.0	1.2	30	67	1.06 (30.7)
	High Performance Antennas –Single Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
HP4-44	4 (1.2)	2523	–	–	–	2	2	30.0	32.6	33.1	3.8	30	56	1.10 (26.4)
HP6-44	6 (1.8)	2524	–	–	–	2	2	36.0	36.6	37.1	2.5	30	62	1.06 (30.7)
HP8-44	8 (2.4)	2527	–	–	–	2	2	38.7	39.3	39.8	1.8	30	65	1.06 (30.7)
HP10-44	10 (3.0)	2528	–	–	–	2	2	40.4	41.0	41.5	1.5	30	67	1.06 (30.7)
HP12-44	12 (3.7)	2540	–	–	–	2	2	42.1	42.7	43.2	1.2	30	67	1.06 (30.7)
HP15-44	15 (4.6)	2530	–	–	–	2	2	44.0	44.5	45.0	1.0	30	68	1.06 (30.7)
PXL **PL** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
PXL4-44	4 (1.2)	2495	–	–	–	–	–	32.3	32.7	33.1	3.7	30	40	1.08 (28.3)
PXL6-44	6 (1.8)	2496	–	–	–	–	–	35.9	36.4	36.9	2.5	30	43	1.06 (30.7)
PXL8-44	8 (2.4)	2497	–	–	–	–	–	38.6	39.2	39.7	1.8	30	45	1.06 (30.7)
PXL10-44	10 (3.0)	2498	–	–	–	1	2	40.3	40.9	41.2	1.5	30	50	1.06 (30.7)
PXL12-44	12 (3.7)	2499	–	–	–	1	2	42.0	42.6	43.1	1.2	30	51	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR187G, PDR48, and UG-148C/U													
PL4-44	4 (1.2)	2551	–	–	–	–	–	32.4	33.0	33.5	3.7	30	40	1.08 (28.3)
PL6-44	6 (1.8)	2552	–	–	–	1	2	36.0	36.6	37.1	2.5	30	44	1.06 (30.7)
PL8-44	8 (2.4)	2553	–	–	–	–	–	38.7	39.3	39.8	1.8	30	45	1.06 (30.7)
PL10-44	10 (3.0)	2554	–	–	–	1	2	40.4	41.0	41.5	1.5	30	49	1.06 (30.7)
PL12-44	12 (3.7)	2556	–	–	–	–	–	42.1	42.7	43.2	1.2	30	50	1.06 (30.7)
PL15-44	15 (4.6)	2557	–	–	–	–	–	44.0	44.5	45.0	1.0	29	51	1.06 (30.7)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Input:** CPR187G													
			Regulatory Compliance* **											
LBX6-44**	6 (1.8)	4636			B			35.8	36.4	36.9	2.5	33	52	1.09 (27.3)
LBX8-44**	8 (2.4)	4637			B			38.6	39.2	39.7	1.8	33	56	1.08 (28.3)
LBX10-44**	10 (3.0)	4638			B			40.1	40.7	41.2	1.5	33	62	1.08 (28.3)
LBX12-44**	12 (3.7)	4639			B			42.0	42.6	43.1	1.2	33	64	1.08 (28.3)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See pages 93-94.
**5 lb/in² (35 kPa) maximum
***ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.07 (29.4)****
4.4–5.0	**EWP43**	UG-149/U†††	**143DCT**	**143SC**	**55000A-187**	**F187PA0240BA**
		CPR187G	**143DET**	**143SE**	**55001-187**	**F187PA0240CA**
		PDR48	–	**143SEM**	**223306-48**	**F187MH0600HA1**
		PAR48	–	**143SCM**		
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
4.4–5.0	**EW43**	UG-149/U†††	–	**143SC**	**223306-48**	**F187MH0600HS**
		CPR187G	–	**143SE**	**55001-187**	**F187PA0240CS**
		PDR48	–	**143SEM**		
		PAR48	–	**143SCM**		

*Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4 ft (1.22 m)*	**42396A-16**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Hangers and Adapters	
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-43**
Splice	**143DZ**
Grounding Kit with factory attached, one-hole lug	**204989-10**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-28**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-3**
Connector Reattachment Kit	**33544-45**
Wall-Roof Feed Thru	**245314-43**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-43**
5 in (127 mm) dia.	**WGB5-43**
Feed-Thru Plate for Boots (above)	

Openings	For 4 in Boots
1	**204673-1**
1	**204673-2**
4	**204673-4**
8	**204673-8**

NEW!

5.25 - 5.85 GHz

Antenna Inputs. The standard connector is Type N Female. Contact Andrew for other options.
Pressurization. Pressurization not required.

Type Number	Side Dimension in (mm)	Gain, dBi Mid-Band	Beamwidth, degrees Mid-Band	F/B Ratio dB	VSWR max. (R.L., dB)
FPA 	**Flat Panel Array Antennas** – Single Polarized **Antenna Inputs:** Type N Female				
FPA5250D06-N	6 (150)	18.0	19.3	35	1.50 (14.0)
FPA5250D12-N	12 (300)	23.6	9.6	40	1.50 (14.0)
FPA5250D24-N	24 (600)	28.2	4.8	45	1.50 (14.0)

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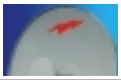
Refer to page 71 for Elliptical Waveguide ordering information

5.25 - 5.85 GHz

Antenna Inputs. All antenna VSWR values are specified with Type N Female connectors. Other optional inputs may result in equal or slightly VSWR. Contact Andrew for details.
Pressurization. Pressurization not required.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
P, PX 	**Unlicensed Radios Including Spread Spectrum, NII, and ISM** – Single and Dual Polarized **Antenna Input:** Type N Female													
P2F-52	2 (0.6)	4528	–	–	–	–	–	29.0	29.2	29.9	5.4	30	43	1.50 (14.0)
PX2F-52	2 (0.6)	4740	–	–	–	–	–	29.0	29.2	29.9	5.4	30	43	1.50 (14.0)
P3F-52	3 (0.9)	4529	–	–	–	–	–	32.3	33.0	33.3	3.8	30	44	1.50 (14.0)
PX3F-52	3 (0.9)	4741	–	–	–	–	–	32.3	33.0	33.3	3.8	30	44	1.50 (14.0)

*5.6 - 6.2 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarization **Antenna Inputs:** CPR137G and PDR70													
UHX10-56	10 (3.0)	1636, 1637	A	–	–	3	2	42.5	42.9	43.3	1.1	36	72	1.06 (30.7)
UHX12-56	12 (3.7)	1638, 1639	A	–	–	3	2	44.0	44.5	44.9	0.9	36	73	1.06 (30.7)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HPX8-56	8 (2.4)	1025	B	–	–	3	2	40.5	41.0	41.4	1.6	30	68	1.06 (30.7)
HPX10-56	10 (3.0)	1027	B	–	–	2	2	42.0	42.5	42.9	1.4	30	69	1.06 (30.7)
HPX12-56	12 (3.7)	1030	A	–	–	3	2	43.8	44.2	44.7	1.0	30	71	1.06 (30.7)

5.725 - 6.425 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance / Wide Band Antennas** – Single Polarization **Antenna Inputs:** CPR137G and PDR70													
HP4-57W	4 (1.2)	4269	–	–	–	1	2	34.6	35.0	35.4	2.9	30	52	1.10 (26.4)
HP6-57W	6 (1.8)	0817	–	–	–	–	–	38.0	38.5	39.0	2.0	30	60	1.06 (30.7)
HP8-57W	8 (2.4)	4273	B	–	–	2	2	40.7	41.2	41.7	1.6	30	64	1.06 (30.7)
HP10-57W	10 (3.0)	4275	A	–	–	2	2	42.5	42.9	43.4	1.3	30	65	1.06 (30.7)
HP12-57W	12 (3.7)	4277	A	–	–	2	2	44.2	44.6	45.0	1.0	30	70	1.06 (30.7)
HP15-57W	15 (4.6)	–	A	–	–	2	2	45.9	46.4	46.8	0.8	30	70	1.06 (30.7)
PL 	**Standard/Wide Band Antennas** – Single Polarized Standard and Low VSWR **Antenna Inputs:** CPR137G, PDR70, and Type N Female													
P2-57W	2 (0.6)	2892	–	–	–	1	1	29.2	29.3	29.9	5.8	30	40	1.10 (26.4)
P4-57W	4 (1.2)	4268	–	–	–	–	–	34.6	35.0	35.4	2.9	30	40	1.10 (26.4)
PL6-57W	6 (1.8)	4270	B	–	–	1	2	38.0	38.5	39.0	2.0	30	45	1.06 (30.7)
PL8-57W	8 (2.4)	4272	B	–	–	1	2	40.7	41.2	41.7	1.6	30	47	1.06 (30.7)
PL10-57W	10 (3.0)	4274	B	–	–	1	2	42.5	42.9	43.4	1.3	30	50	1.06 (30.7)
PL12-57W	12 (3.7)	4276	B	–	–	1	2	44.2	44.6	45.0	1.0	30	51	1.06 (30.7)
PL15-57W	15 (4.6)	–	B	–	–	1	2	46.0	46.5	47.0	0.8	30	57	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz.
*Multiband antennas are available in this frequency band. See pages 93-94.

5.850 - 5.915, 6.425 - 6.930 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70												
UHX8-58W														
5.850-5.915 GHz**8 (2.4)		3755 3753	–	–	–	3	2	40.4	40.5	40.6	1.45	34	68	1.08 (28.3)
6.425-6.930 GHz***		3772 3747	A	A	–	3	2	41.5	41.8	42.1	1.3	34	70	1.08 (28.3)
UHX10-58W														
5.850-5.915 GHz**10 (3.0)		3757 3759	–	–	–	3	2	42.0	42.1	42.2	1.25	34	71	1.08 (28.3)
6.425-6.930 GHz***		3774 3776	A	A	–	3	2	43.0	43.2	43.4	1.15	34	73	1.08 (28.3)
HPX		**High Performance/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70												
HPX8-58W														
5.850-5.915 GHz**8 (2.4)		3749	–	–	–	2	2	40.7	40.8	40.9	1.4	32	65	1.08 (28.3)
6.425-6.930 GHz***		3761	B	A	–	3	2	41.7	41.9	42.2	1.4	34	67	1.08 (28.3)
HPX10-58W														
5.850-5.915 GHz**10 (3.0)		3751	–	–	–	2	2	42.6	42.7	42.8	1.2	32	68	1.08 (28.3)
6.425-6.930***		3770	B	A	–	2	2	43.4	43.4	43.8	1.2	34	69	1.08 (28.3)

*5.925 - 6.425 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 k Pa) except LBX Series 8 lb/in^2 (56 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70												
UHX6-59	6 (1.8)	1730 1729	A	–	–	3	2	38.4	38.8	39.1	1.8	33	75	1.06 (30.7)
UHX8-59	8 (2.4)	1654 1653	A	–	–	3	2	40.9	41.3	41.6	1.4	33	77	1.06 (30.7)
UHX10-59	10 (3.0)	1667 1666	A	–	–	3	2	42.9	43.2	43.6	1.1	34	80	1.06 (30.7)
UHX12-59	12 (3.7)	1665 1664	A	–	–	3	2	44.4	44.8	45.2	0.9	35	80	1.06 (30.7)
UHX15-59	15 (4.6)	1662 1661	A	–	–	3	2	46.1	46.4	46.8	0.8	34	80	1.06 (30.7)
HSX		**High Performance Antennas**, Super High Cross Polarization Discrimination Dual Polarized – TEGLAR Long Life Radome Included **Antenna Inputs:** CPR137G and PDR70												
HSX6-59	6 (1.8)	2424 2422	B	–	–	3	2	38.4	38.8	39.1	1.8	40	72	1.07 (29.4)
HSX8-59	8 (2.4)	2428 2429	A	–	–	3	2	40.9	41.3	41.6	1.4	40	74	1.06
HSX10-59	10 (3.0)	2442 2440	A	–	–	3	2	42.5	42.9	43.2	1.1	40	76	1.06
HSX12-59	12 (3.7)	2444 2446	A	–	–	3	2	44.4	44.7	45.0	0.9	40	78	1.06
HSX15-59	15 (4.6)	2450 2448	A	–	–	3	2	46.3	46.6	46.9	0.8	40	79	1.06
HPX HP		**High Performance Antennas** – Dual Polarized – Hypalon Radome Included **Antenna Inputs:** CPR137G and PDR70												
HPX6-59	6 (1.8)	2664	B	–	–	3	2	38.4	38.8	39.1	1.8	30	65	1.07 (29.4)
HPX8-59	8 (2.4)	2678	A	–	–	3	2	40.9	41.3	41.6	1.4	30	69	1.06 (30.7)
HPX10-59	10 (3.0)	2684	A	–	–	2	2	42.7	43.1	43.5	1.1	30	71	1.06 (30.7)
HPX12-59	12 (3.7)	2682	A	–	–	2	2	44.4	44.8	45.2	0.9	30	71	1.06 (30.7)
HPX15-59	15 (4.6)	2683	A	–	–	2	2	46.1	46.4	46.8	0.8	30	71	1.06 (30.7)

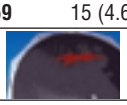
Reference ETSI Document EN300833 for 3 to 60 GHz

Continued on next page

* Multiband antennas are available in this frequency band. See pages 93-94.
** Meets Canadian DOC GL-34 Specification
*** Meets Canadian DOC SRSP 306.4 Issue #3 Specification

Refer to page 71 for Elliptical Waveguide ordering information

5.925 - 6.425 GHz, 5.725 - 5.850 GHz*

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** - Hypalon Radome Included – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
HP6-59	6 (1.8)	3302H	A	–	–	2	2	38.7	38.9	39.4	1.8	30	62	1.06 (30.7)
HP8-59	8 (2.4)	2670E	A	–	–	2	2	41.1	41.5	41.9	1.4	30	66	1.06 (30.7)
HP10-59	10 (3.0)	2672E	A	–	–	2	2	42.9	43.3	43.6	1.1	30	69	1.06 (30.7)
HP12-59	12 (3.7)	2673E	A	–	–	2	2	44.7	45.0	45.2	0.9	30	71	1.06 (30.7)
HP15-59	15 (4.6)	2675D	A	–	–	2	2	46.1	46.4	46.8	0.8	30	71	1.06 (30.7)
HDX 	**High Performance**, Dual Beam Antennas Dual Polarized - TEGLAR Long Life Radome Included – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HDX8-59	8 (2.4)	1750 1751 1752 1753	A	–	–	3	2	41.2	41.5	41.8	1.4	26	73	1.06 (30.7)
HDX10-59	10 (3.0)	1758 1759 1760 1761	A	–	–	3	2	42.9	43.2	43.4	1.1	26	74	1.06 (30.7)
HDX12-59	12 (3.7)	1766 1767 1768 1769	A	–	–	3	2	44.6	45.0	45.4	1.0	26	75	1.06 (30.7)
PARX **PAR** 	**Standard Antennas** - Similar to PL()-59 Series, Except Meet Category A – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
PARX6-59**														
5.925-6.425 GHz	6 (1.8)	4377	A	–	–	1	2	37.8	37.9	38.2	1.9	30	60	1.08 (28.3)
5.725-5.850 GHz		4331	–	–	–	1	2	37.5	37.6	37.7	2.0	30	58	1.25 (19.2)
PARX8-59**														
5.925-6.425 GHz	8 (2.4)	4378	A	–	–	1	2	40.4	40.7	40.9	1.4	30	60	1.08 (28.3)
5.725-5.850 GHz		4332	–	–	–	1	2	40.1	40.2	40.3	1.5	30	59	1.25 (19.2)
PARX10-59	10 (3.0)	4379	A	–	–	1	2	42.7	43.1	43.3	1.1	35	60	1.06 (30.7)
PARX12-59**	12 (3.7)	4380	A	–	–	1	2	43.3	44.7	45.1	0.9	34	60	1.06 (30.7)
	Standard Antennas - Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PAR6-59														
5.925-6.425 GHz	6 (1.8)	2472	A	–	–	1	2	38.0	38.2	38.4	1.9	30	55	1.06 (30.7)
5.725-5.850 GHz		4327	–	–	–	1	2	37.7	37.8	37.9	2.0	30	55	1.25 (19.2)
PAR8-59**														
5.925-6.425 GHz	8 (2.4)	2517	A	–	–	1	2	40.4	40.8	41.0	1.4	30	58	1.06 (30.7)
5.725-5.850 GHz		4328	–	–	–	1	2	40.1	40.2	40.3	1.5	30	55	1.25 (19.2)
PAR10-59	10 (3.0)	1649	A	–	–	1	2	43.0	43.2	43.4	1.1	30	62	1.06 (30.7)
PAR12-59	12 (3.7)	2366	A	–	–	1	2	44.2	44.6	44.9	0.9	30	63	1.06 (30.7)
PXL **PL** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PXL6-59	6 (1.8)	2632	–	–	–	1	2	38.4	38.7	39.1	1.8	30	46	1.07 (29.4)
PXL8-59	8 (2.4)	2616	B	–	–	1	2	40.9	41.3	41.6	1.4	30	48	1.06 (30.7)
PXL10-59	10 (3.0)	2618	B	–	–	–	–	42.7	43.1	43.5	1.1	30	49	1.06 (30.7)
PXL12-59	12 (3.7)	2620	B	–	–	1	2	44.4	44.8	45.2	0.9	30	53	1.06 (30.7)
PXL15-59	15 (4.6)	2642	B	–	–	–	–	46.1	46.4	46.8	0.8	30	54	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PL4-59	4 (1.2)	2602	–	–	–	–	–	35.0	35.4	35.7	2.7	30	41	1.08 (28.3)
PL6-59	6 (1.8)	2604D	B	–	–	1	2	38.4	38.9	39.4	1.8	30	46	1.06 (30.7)
PL8-59	8 (2.4)	2610D	B	–	–	1	2	41.1	41.5	41.9	1.4	30	48	1.06 (30.7)
PL10-59	10 (3.0)	2608D	B	–	–	1	2	42.9	43.3	43.6	1.1	30	51	1.06 (30.7)
PL12-59	12 (3.7)	2609D	B	–	–	1	2	44.7	45.0	45.2	0.9	30	52	1.06 (30.7)
PL15-59	15 (4.6)	2611D	B	–	–	1	2	46.1	46.4	46.8	0.8	30	53	1.06 (30.7)
FPX **FP** 	**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
FPX8-59	8 (2.4)	6111	B	–	–	1	2	40.1	40.4	40.6	1.4	27	64	1.07 (29.4)
FPX10-59	10 (3.0)	6113	A	–	–	2	2	42.3	42.6	42.7	1.1	28	66	1.06 (30.7)
FPX12-59	12 (3.7)	6115	B	–	–	1	2	44.0	44.4	44.5	0.9	28	68	1.06 (30.7)
	Focal Plane Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
FP8-59	8 (2.4)	6103	B	–	–	1	2	40.3	40.6	40.8	1.4	28	64	1.06 (30.7)
FP10-59	10 (3.0)	6105	A	–	–	2	2	42.5	42.8	42.9	1.1	28	66	1.06 (30.7)
FP12-59	12 (3.7)	6107	A	–	–	2	2	44.2	44.6	44.7	0.9	28	68	1.06 (30.7)

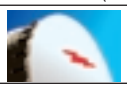
Reference ETSI Document EN300833 for 3 to 60 GHz; *Multiband antennas are available in this frequency range. See page 93-94.

*5.925 - 6.425 GHz**

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance**	Low	Gain, dBi Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
LBX 	**Low Back Lobe Antennas** - Dual Polarized **Antenna Inputs:** CPR137G and PDR70									
LBX6-59***	6 (1.8)	4640	B	38.3	38.7	39.0	1.8	33	54	1.07 (29.4)
LBX8-59***	8 (2.4)	4641	B	40.9	41.3	41.6	1.4	33	60	1.06 (30.7)
LBX10-59***	10 (3.0)	4642	B	42.6	43.0	43.3	1.1	33	65	1.06 (30.7)
LBX12-59***	12 (3.7)	4643	B	44.4	44.8	45.1	0.9	33	62	1.06 (30.7)

5.925 - 7.125 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 k Pa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	FCC 74	FCC 78	ETSI Class	ETSI Gain	Low	Gain, dBi Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX **UHP** 	**Ultra High Performance/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
UHX6-59W	6 (1.8)	1022 3303	A	A	–	3	2	37.5	38.8	39.5	1.8	36	67	1.08 (28.3)
UHX8-59W	8 (2.4)	1115 1116	A	A	–	2	2	41.0	41.7	42.3	1.4	36	68	1.08 (28.3)
UHX10-59W	10 (3.0)	1118 1117	A	A	–	2	2	42.5	43.2	43.8	1.2	36	71	1.08 (28.3)
UHX12-59W	12 (3.7)	1119 1120	A	A	–	3	2	44.1	44.8	45.4	1.0	36	74	1.08 (28.3)
	Ultra High Performance/Wide Band Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
UHP6-59W	6 (1.8)	3492 3494	A	B	–	3	2	38.4	39.3	39.9	1.8	35	75	1.06 (30.7)
UHP8-59W	8 (2.4)	3496 3506	A	A	–	3	2	40.9	41.9	42.2	1.5	35	78	1.06 (30.7)
UHP10-59W	10 (3.0)	3498 3500	A	A	–	3	2	42.4	43.3	43.7	1.3	35	78	1.06 (30.7)
UHP12-59W	12 (3.7)	3502 3508	A	A	-	3	2	44.3	45.2	45.5	1.0	35	80	1.06 (30.7)
HP 	**High Performance/Wide Band Antennas** **Antenna Inputs:** CPR137G and PDR70													
HP6-59W	6 (1.8)	4713	A	B	–	2	2	38.7	39.4	40.2	1.8	32	66	1.06 (30.7)
HP8-59W	8 (2.4)	4714	A	A	–	2	2	41.1	41.9	42.8	1.5	35	66	1.06 (30.7)
HP10-59W	10 (3.0)	4715	A	A	–	2	2	42.9	43.6	44.3	1.2	33	69	1.06 (30.7)
HP12-59W	12 (3.7)	4716	A	A	–	2	2	44.7	45.2	46.1	0.9	32	66	1.06 (30.7)
HP15-59W	15 (4.6)	4717	A	A	–	2	2	46.1	46.8	47.6	0.8	30	71	1.06 (30.7)
PARX 	**Standard/Wide Band Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U.													
PARX6-59W	6 (1.8)	4371	A	B	–	1	2	37.8	38.3	38.7	1.8	30	59	1.12 (24.9)
PARX8-59W	8 (2.4)	4372	A	A	–	1	2	40.4	40.7	40.9	1.6	30	60	1.10 (26.4)
PARX10-59W	10 (3.0)	4373	A	A	–	1	2	42.7	43.3	44.0	1.1	35	60	1.15 (23.1)
PAR 	**Standard/Wide Band Antennas** – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U.													
PAR6-59W+	6 (1.8)	2480	A	B	–	1	2	38.0	38.7	39.0	1.8	30	59	1.08 (28.3)
PAR8-59W+	8 (2.4)	2572	A	A	–	1	2	40.4	41.0	41.6	1.4	30	58	1.06 (30.7)
PAR10-59W	10 (3.0)	1279	A	A	–	1	2	43.0	43.4	43.8	1.1	30	62	1.06 (30.7)
PAR12-59W	12 (3.7)	2578	A	A	–	1	2	44.2	44.9	45.7	0.9	30	63	1.06 (30.7)
PL 	**Standard/Wide Band Antennas** – Single Polarized **Antenna Inputs:** CPR137G and PDR70.													
PL6-59W	6 (1.8)	4708	B	B	–	1	2	38.4	39.3	40.2	1.8	35	46	1.06 (30.7)
PL8-59W	8 (2.4)	4709	B	A	–	1	2	41.1	41.9	42.8	1.4	35	51	1.06 (30.7)
PL10-59W	10 (3.0)	4710	B	A	–	1	2	42.9	43.6	44.3	1	33	55	1.06 (30.7)
PL12-59W	12 (3.7)	4711	B	A	–	1	2	44.7	45.2	46.1	1	33	60	1.06 (30.7)
PL15-59W	15 (4.6)	4712	B	A	–	1	2	46.1	46.8	47.6	0.8	30	57	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz *Multiband antennas are available in this frequency band. See pages 93-94.
**ANATEL Telecommunications Agency, Regulation 1286 Category ***8 lb/in^2 (56 kPa) maximum +Uses Focal plane type reflector and feed system.

ANDREW®

Revised 5/01

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
5.925–6.425	**EWP52S**	CPR159G	**152DET*****	–	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT*****	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET*****	–	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	–	**223306-70**	**F137MH0600HA**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.6–6.2	**EWP52-56**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BG**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CG**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HG**
5.725–6.425	**EWP52-58**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BD**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CD**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HD**
5.925–6.425	**EWP52-59**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HA**
5.6-6.425	**EWP52-56W**	CPR159G	–	**152SE**	**55001-159**	**F159PC0240CS**
		CPR137G	–	**252SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**252SEM**	**223306-70**	**F137MH0600HS**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.60–6.425	**EW52**	CPR159G	**152DE**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**252DE**	**252SEM**	**55001-137**	**F137PC0240CS**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 1.036 (35.0 dB) for lengths 150 ft (46 m) and shorter. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-8**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-52**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-52**
Splice	**152DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-38**
Wall-Roof Feed Thru	**245314-52**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-52**
5 in (127 mm) dia	**WGB5-52**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

6.425 - 7.125 GHz, Dual Beam Antennas

Antenna Inputs. All antenna VSWR values are specified with CPR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HDH **HDV** 		**High Performance Dual-Beam (Angle Diversity) Antennas** - Hypalon Radome Included – Horizontal Polarization **Antenna Input:** CPR137G												
HDH6-65	6 (1.8)	1884 1885	B	B	–	–	–	39.4	39.7	40.0	1.9	30	60	1.08 (28.3)
HDH8-65	8 (2.4)	1893 1892	B	A	–	–	–	42.1	42.4	42.7	1.5	30	65	1.06 (30.7)
HDH10-65	10 (3.0)	1900 1901	B	A	–	–	–	43.6	43.9	44.2	1.2	26	66	1.06 (30.7)
HDH12-65	12 (3.7)	1908 1909	A	A	–	–	–	45.0	45.3	45.6	0.9	30	70	1.06 (30.7)
		High Performance Dual-Beam (Angle Diversity) Antennas - Hypalon Radome Included – Vertical Polarization **Antenna Input:** CPR137G												
HDV6-65	6 (1.8)	1880 1881	B	B	–	2	2	39.4	39.7	40.0	1.9	29	65	1.08 (28.3)
HDV8-65	8 (2.4)	1888 1889	B	A	–	–	–	42.1	42.4	42.7	1.5	30	62	1.06 (30.7)
HDV10-65	10 (3.0)	1896 1897	B	A	–	–	–	43.6	43.9	44.2	1.2	30	66	1.06 (30.7)
HDV12-65	12 (3.7)	1904 1905	A	A	–	–	–	45.0	45.3	45.6	0.9	30	67	1.06 (30.7)
PDH **PDV** 		**Standard, Dual-Beam (Angle Diversity) Antennas** – Horizontal Polarization **Antenna Input:** CPR137G												
PDH6-65	6 (1.8)	1778 1779	–	–	–	–	–	39.4	39.7	40.0	1.9	30	46	1.08 (28.3)
PDH8-65	8 (2.4)	1786 1787	B	B	–	–	–	42.1	42.4	42.7	1.5	30	55	1.06 (30.7)
PDH10-65	10 (3.0)	1794 1795	B	A	–	–	–	43.6	43.9	44.2	1.2	30	60	1.06 (30.7)
PDH12-65	12 (3.7)	1743 1744	B	A	–	–	–	45.0	45.3	45.6	0.9	30	53	1.06 (30.7)
		Standard, Dual-Beam (Angle Diversity) Antennas – Vertical Polarization **Antenna Input:** CPR137G												
PDV6-65	6 (1.8)	1774 1775	–	–	–	–	–	39.4	39.7	40.0	1.9	29	54	1.08 (28.3)
PDV8-65	8 (2.4)	1782 1783	B	B	–	1	2	42.1	42.4	42.7	1.5	30	55	1.06 (30.7)
PDV10-65	10 (3.0)	1790 1791	B	A	–	–	–	43.6	43.9	44.2	1.2	30	60	1.06 (30.7)
PDV12-65	12 (3.7)	1739 1740	B	A	–	–	–	45.0	45.3	45.6	0.9	30	60	1.06 (30.7)
		Standard, Dual-Beam (Angle Diversity) Antennas – Vertical/Horizontal, Sum and Difference Mode **Antenna Input:** CPR137G												
PDH8S-65	8 (2.4)	1788 1789	–	–	–	–	–	40.0	39.8	39.8	1.3	30	51	1.08 (28.3)
PDV8S-65	8 (2.4)	1784 1785	–	–	–	–	–	40.0	39.8	39.8	1.3	30	57	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz

Refer to page 75 for Elliptical Waveguide ordering information

*6.425 - 7.125 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** - TEGLAR Long Life Radome Included – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
UHX6-65	6 (1.8)	1717 1718	A	B	–	3	2	39.1	39.5	40.0	1.7	30	70	1.06 (30.7)
UHX8-65	8 (2.4)	2581 2584	A	A	–	3	2	41.6	42.0	42.4	1.3	30	76	1.06 (30.7)
UHX10-65	10 (3.0)	2582 2583	A	A	–	3	2	43.6	44.0	44.4	1.0	32	80	1.06 (30.7)
UHX12-65	12 (3.7)	1715 1716	A	A	–	3	2	45.2	45.7	46.1	0.9	38	78	1.06 (30.7)
UHX15-65	15 (4.6)	1709 1710	A	A	–	2	2	46.6	46.9	47.3	0.7	30	75	1.06 (30.7)
HSX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HSX6-64	6 (1.8)	2454 2452	A	A	–	3	2	39.1	39.6	40.0	1.7	40	70	1.07 (29.4)
HSX8-64	8 (2.4)	2456 2458	A	A	–	3	2	41.6	42.0	42.4	1.3	40	75	1.06 (30.7)
HSX10-64	10 (3.0)	2461 2459	A	A	–	3	2	43.2	43.6	44.0	1.0	40	77	1.06 (30.7)
HSX12-64	12 (3.7)	2470 2471	A	A	–	3	2	45.2	45.7	46.1	0.8	40	78	1.06 (30.7)
HSX15-64	15 (4.6)	2488 2486	A	A	–	3	2	46.9	47.4	47.8	0.7	40	79	1.06 (30.7)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
HPX4-65	4 (1.2)	2649	–	–	–	2	2	35.4	35.9	36.3	2.7	30	58	1.08 (28.3)
HPX6-65	6 (1.8)	2794	B	B	–	2	2	39.1	39.5	39.9	1.7	30	64	1.07 (29.4)
HPX8-65	8 (2.4)	2654	A	A	–	2	2	41.6	42.0	42.4	1.3	34	68	1.06 (30.7)
HPX10-65	10 (3.0)	2655	A	A	–	3	2	43.6	44.0	44.4	1.0	34	70	1.06 (30.7)
HPX12-65	12 (3.7)	2656	A	A	–	2	2	45.0	45.4	45.9	0.8	30	71	1.06 (30.7)
HPX15-65	15 (4.6)	2657	A	A	–	2	2	46.6	46.9	47.3	0.7	30	71	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR137G and PDR70													
HP4-65	4 (1.2)	1081	–	–	–	2	2	35.5	36.0	36.4	2.7	30	58	1.08 (28.3)
HP6-65	6 (1.8)	1700H	A	A	–	2	2	39.4	39.8	40.2	1.7	30	64	1.06 (30.7)
HP8-65	8 (2.4)	2696E	A	A	–	2	2	41.9	42.3	42.8	1.3	30	66	1.06 (30.7)
HP10-65	10 (3.0)	2690E	A	A	–	2	2	43.6	43.9	44.3	1.0	27	70	1.06 (30.7)
HP12-65	12 (3.7)	2691E	A	A	–	2	2	45.2	45.6	46.1	0.8	30	71	1.06 (30.7)
HP15-65	15 (4.6)	2692D	A	A	–	2	2	46.8	47.1	47.6	0.7	30	71	1.06 (30.7)
PARX **PAR** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PARX6-65**	6 (1.8)	4381	A	B	–	1	2	38.2	38.4	38.7	1.8	30	59	1.08 (28.3)
PARX8-65**	8 (2.4)	4382	A	A	–	1	2	40.9	41.2	41.3	1.3	30	60	1.08 (28.3)
PARX10-65	10 (3.0)	4383	A	A	–	1	2	43.3	43.6	44.0	1.1	35	60	1.06 (30.7)
PARX12-65	12 (3.7)	4384	A	A	–	1	2	45.1	45.5	45.9	0.9	35	60	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PAR6-65**	6 (1.8)	1290	A	B	–	1	2	38.7	38.8	39.0	1.8	30	59	1.06 (30.7)
PAR8-65**	8 (2.4)	2570	A	A	–	1	2	41.0	41.3	41.6	1.3	30	60	1.06 (30.7)
PAR10-65	10 (3.0)	1257	A	A	–	1	2	43.4	43.6	43.8	1.0	30	63	1.06 (30.7)
PAR12-65	12 (3.7)	2430	A	A	–	1	2	44.9	45.3	45.5	0.8	30	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Multiband antennas available in this frequency band. See pages 93-94.
** Uses focal plane type reflector and feed system

Continued on next page

*6.425 - 7.125 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in² (70 kPa), except LBX Series 8 lb/in² (56 kPa).

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PXL PL 	**Standard Antennas** – Dual Polarized **Antenna Input:** CPR137G, PDR70, and UG-343B/U													
PXL6-65	6 (1.8)	2634	–	–	–	–	–	39.1	39.4	39.9	1.7	30	47	1.07 (29.41)
PXL8-65	8 (2.4)	2636	B	A	–	1	2	41.6	42.0	42.4	1.3	34	52	1.06 (30.7)
PXL10-65	10 (3.0)	2638	B	A	–	1	2	43.6	44.0	44.4	1.0	34	58	1.06 (30.7)
PXL12-65	12 (3.7)	2641	B	A	–	1	2	45.0	45.4	45.9	0.8	30	62	1.06 (30.7)
PXL15-65	15 (4.6)	2640	B	A	–	1	2	46.6	46.9	47.3	0.7	30	59	1.06 (30.7)
	Standard Antennas – Single Polarized;							**Antenna Input:** CPR137G, PDR70, and UG-343B/U						
PL4-65	4 (1.2)	2622	–	–	–	1	2	35.8	36.3	36.7	2.5	30	43	1.08 (28.3)
PL6-65	6 (1.8)	2624D	B	B	–	1	2	39.3	39.8	40.2	1.7	30	47	1.06 (30.7)
PL8-65	8 (2.4)	2626D	B	A	–	1	2	41.9	42.3	42.8	1.3	30	49	1.06 (30.7)
PL10-65	10 (3.0)	2628D	B	A	–	1	2	43.6	43.9	44.3	1.0	30	52	1.06 (30.7)
PL12-65	12 (3.7)	2629E	B	A	–	1	2	45.2	45.6	46.1	0.8	30	53	1.06 (30.7)
PL15-65	15 (4.6)	2630D	B	A	–	1	2	46.8	47.1	47.6	0.7	30	54	1.06 (30.7)
FPX FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Input:** CPR137G and PDR70													
FPX6-64	6 (1.8)	6126	B	B	–	1	2	38.0	38.4	38.6	1.8	28	57	1.08 (28.3)
FPX8-64	8 (2.4)	6127	A	A	–	2	2	40.8	41.2	41.4	1.3	30	64	1.07 (29.4)
FPX10-64	10 (3.0)	6129	A	A	–	2	2	43.0	42.4	42.8	1.0	30	66	1.06 (30.7)
FPX12-64	12 (3.7)	6131	A	A	–	2	2	44.8	45.2	45.4	0.8	30	68	1.06 (30.7)
	Focal Plane Antennas – Single Polarized;							**Antenna Input:** CPR137G and PDR70						
FP6-64	6 (1.8)	6117	B	B	–	1	2	38.2	38.6	38.8	1.8	28	57	1.07 (29.4)
FP8-64	8 (2.4)	6119	A	A	–	2	2	41.1	41.5	41.8	1.3	30	64	1.06 (30.7)
FP10-64	10 (3.0)	6122	A	B	–	1	2	43.2	43.4	43.6	1.0	27	66	1.06
FP12-64	12 (3.7)	6123	A	A	–	2	2	44.9	45.3	45.5	0.8	30	68	1.06
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Input:** CPR137G													
			Regulatory Compliance* **											
LBX6-65**	6 (1.8)	4644	–	–	B	–	–	39.1	39.6	40.0	1.7	33	54	1.07 (30.7)
LBX8-65**	8 (2.4)	4645	–	–	B	–	–	41.5	42.0	42.4	1.3	33	60	1.06 (30.7)
LBX10-65**	10 (3.0)	4646	–	–	B	–	–	43.1	43.6	44.0	1.0	33	65	1.06 (30.7)
LBX12-65**	12 (3.7)	4647	–	–	B	–	–	44.8	45.3	45.7	0.8	33	63	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas available in this frequency band. See pages 93-94. **8 lb/in2 (56 kPa) maximum ***ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category 6.875-7.125 GHz, See PAR6-65

7.125 - 7.725 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in² (70 kPa) except LBX Series 8 lb/in² (56 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
FPX FP 	**Focal Plane Antennas** – Dual Polarized **Antenna Input:** PDR70													
FPX6-71	6 (1.8)	6141	–	–	–	1	2	38.8	39.2	39.5	1.5	25	58	1.08 (28.3)
FPX8-71	8 (2.4)	6143	–	–	–	2	2	41.8	42.1	42.3	1.1	26	65	1.07 (29.4)
FPX10-71	10 (3.0)	6145	–	–	–	2	2	43.9	44.2	44.3	0.9	26	67	1.06 (30.7)
FPX12-71	12 (3.7)	6147	–	–	–	2	2	45.5	45.9	46.0	0.7	28	69	1.06 (30.7)
	Focal Plane Antennas – Single Polarized;							**Antenna Input:** PDR70						
FP4-71	4 (1.2)	6132	–	–	–	1	2	34.9	35.2	35.4	2.2	25	52	1.10 (26.4)
FP6-71	6 (1.8)	6133	–	–	–	1	2	38.8	39.2	39.5	1.5	25	58	1.07 (29.4)
FP8-71	8 (2.4)	6135	–	–	–	2	2	42.0	42.3	42.4	1.1	26	65	1.06 (30.7)
FP10-71	10 (3.0)	6137	–	–	–	2	2	44.1	44.4	44.5	0.9	26	67	1.04 (34.2)
FP12-71	12 (3.7)	6139	–	–	–	2	2	45.7	46.1	46.2	0.7	28	69	1.04 (34.2)

ANDREW®

Revised 9/00 & 5/01

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
6.425–7.125	**EWP63S**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	–	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.925–6.575	**EWP63-59**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
5.800–7.125	**EWP63-59W**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
						VSWR 1.05 (32.3)*
6.525–6.875	**EWP63-65N**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
						VSWR 1.06 (30.7)**
6.425–7.125	**EWP63-65**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.925–7.125	**EW63**	UG-344/U†††	**163DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**163DE**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HS**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Low VSWR guaranteed for 5.925 to 6.425 GHz, nominal for 5.925 to 6.575 GHz.
† "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-7**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-63**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-63**
Splice	**163DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-33**
Wall-Roof Feed Thru	**245314-63**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-63**
5 in (127 mm) dia	**WGB5-63**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

7.125 - 7.750 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX HP 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
HPX4-70	4 (1.2)	2862	–	–	–	2	2	36.0	36.4	36.7	2.3	26	61	1.08 (28.3)
HPX6-70	6 (1.8)	2816	–	–	–	2	2	40.0	40.4	40.7	1.5	25	65	1.07 (29.4)
HPX8-70	8 (2.4)	2826	–	–	–	2	2	42.4	42.9	43.2	1.1	30	67	1.06 (30.7)
HPX10-70	10 (3.0)	2754	–	–	–	2	2	44.5	44.8	45.0	0.9	30	70	1.06 (30.7)
HPX12-70	12 (3.7)	2758	–	–	–	1	2	45.7	46.1	46.4	0.8	28	71	1.06 (30.7)
HPX15-70	15 (4.6)	2782	–	–	–	2	2	47.3	47.7	48.0	0.7	32	72	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
HP6-70	6 (1.8)	2796	–	–	–	2	2	40.1	40.5	40.9	1.5	28	65	1.06 (30.7)
HP8-70	8 (2.4)	2751	–	–	–	2	2	42.6	43.0	43.3	1.1	30	67	1.06 (30.7)
HP10-70	10 (3.0)	2753	–	–	–	2	2	44.3	44.7	45.0	0.9	30	70	1.06 (30.7)
HP12-70	12 (3.7)	2756	–	–	–	2	2	46.3	46.7	47.1	0.7	30	71	1.06 (30.7)
HP15-70	15 (4.6)	2757	–	–	–	2	2	47.4	48.1	48.4	0.6	30	71	1.06 (30.7)
PXL PL 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PXL6-70	6 (1.8)	2740	–	–	–	1	2	40.0	40.4	40.7	1.5	30	48	1.07 (29.4)
PXL8-70	8 (2.4)	2828	–	–	–	1	2	42.4	42.9	43.2	1.1	30	50	1.06 (30.7)
PXL10-70	10 (3.0)	2663	–	–	–	1	2	44.5	44.8	45.0	0.9	30	52	1.06 (30.7)
PXL12-70	12 (3.7)	2752	–	–	–	1	2	45.7	46.1	46.4	0.7	30	54	1.06 (30.7)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR137G, PDR70, and UG-343B/U													
PL4-70	4 (1.2)	2736	–	–	–	1	2	36.7	37.0	37.3	2.2	30	46	1.06 (30.7)
PL6-70	6 (1.8)	2658	–	–	–	1	2	40.1	40.5	40.9	1.5	30	48	1.06 (30.7)
PL8-70	8 (2.4)	2659	–	–	–	1	2	42.6	43.0	43.3	1.1	30	50	1.06 (30.7)
PL10-70	10 (3.0)	2660	–	–	–	1	2	44.3	44.7	45.0	0.9	30	52	1.06 (30.7)
PL12-70	12 (3.7)	2662	–	–	–	1	2	46.3	46.7	47.1	0.7	30	54	1.06 (30.7)
PL15-70	15 (4.6)	2745	–	–	–	1	2	47.7	48.1	48.4	0.6	30	55	1.06 (30.7)

7.125 - 7.750 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarization **Antenna Inputs:** CPR112G, PDR84, and UG-52B/U													
HSX4-71	4 (1.2)	1548 1543	–	–	–	3	2	36.4	36.7	37.0	2.3	40	64	1.08 (28.3)
HSX6-71	6 (1.8)	1550 1554	–	–	–	3	2	40.0	40.3	40.6	1.5	40	72	1.08 (28.3)
HSX8-71	8 (2.4)	1556 1566	–	–	–	3	2	42.3	42.6	42.9	1.2	40	73	1.06 (30.7)
HSX10-71	10 (3.0)	1624 1622	–	–	–	3	2	43.9	44.2	44.4	1.0	40	75	1.06 (30.7)
HSX12-71	12 (3.7)	1626 1628	–	–	–	3	2	46.1	46.5	46.9	0.8	40	78	1.06 (30.7)
HSX15-71	15 (4.6)	1852 1858	–	–	–	3	2	47.7	48.1	48.5	0.6	40	78	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz

Continued on next page

Refer to page 78 for Elliptical Waveguide ordering information

7.125 - 7.750 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa) except LBX Series 8 lb/in^2 (56 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX HP 	**High Performance Antennas** – Dual Polarization **Antenna Inputs:** CPR112G and PDR84													
HPX6-71	6 (1.8)	3771	–	–	–	2	2	39.5	39.9	40.2	1.6	30	66	1.06 (30.7)
HPX8-71	8 (2.4)	2775	–	–	–	2	2	42.1	42.5	42.8	0.9	30	67	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR112G, PDR84, and UG-52B/U													
HP4-71	4 (1.2)	2866	–	–	–	2	2	35.8	36.2	36.5	2.4	28	62	1.08 (28.3)
HP6-71	6 (1.8)	2800	–	–	–	3	2	39.7	40.0	40.3	1.5	30	66	1.06 (30.7)
HP8-71	8 (2.4)	2770	–	–	–	3	2	42.3	42.5	42.9	1.1	30	68	1.06 (30.7)
HP10-71	10 (3.0)	2772	–	–	–	3	2	44.1	44.5	44.8	0.9	28	70	1.06 (30.7)
HP12-71	12 (3.7)	2774	–	–	–	3	2	45.6	46.0	46.3	0.7	30	71	1.06 (30.7)
HP15-71	15 (4.6)	2783	–	–	–	2	2	47.5	47.8	48.2	0.6	30	71	1.06 (30.7)
PL 	**Standard Antennas** – Single Polarized Low VSWR **Antenna Inputs:** CPR112G, PDR84, and UG-52B/U													
PL4-71	4 (1.2)	3718	–	–	–	1	2	36.2	36.5	36.8	2.2	30	45	1.08 (28.3)
PL6-71	6 (1.8)	2704	–	–	–	1	2	39.7	40.0	40.3	1.5	30	48	1.06 (30.7)
PL8-71	8 (2.4)	2700	–	–	–	1	2	42.3	42.5	42.9	1.1	30	50	1.06 (30.7)
PL10-71	10 (3.0)	2699	–	–	–	1	2	44.1	44.5	44.8	0.9	30	52	1.06 (30.7)
PL12-71	12 (3.7)	3710	–	–	–	1	2	45.6	46.0	46.3	0.7	30	54	1.06 (30.7)
PL15-71	15 (4.6)	2726	–	–	–	1	2	47.5	47.8	48.2	0.6	30	57	1.06 (30.7)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Inputs:** CPR137G and PDR70													
			Regulatory Compliance**											
LBX6-71*	6 (1.8)	4648	–	–	B	–	–	40.0	40.4	40.7	1.5	33	55	1.07 (29.4)
LBX8-71*	8 (2.4)	4649	–	–	B	–	–	42.5	42.9	43.2	1.1	33	60	1.06 (30.7)
LBX10-71*	10 (3.0)	4650	–	–	B	–	–	44.4	44.8	45.1	0.9	33	66	1.06 (30.7)
LBX12-71*	12 (3.7)	4651	–	–	B	–	–	45.7	46.1	46.4	0.7	33	64	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*8 lb/in^2 (56 kPa) maximum
**ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125-7.750	**EWP64-71**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BC**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CC**
		CPR112G	**264DET**	**264SCM**	**55001-112**	**F112PC0240CA**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HC**
		PDR84	–	**264SEM**	–	**F112MH0600HA**
6.425-7.125	**EWP64-65**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
6.525-6.875	**EWP64-65N**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
6.425-7.750	**EW64**	UG-344/U†††	**164DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**164DE**	**164SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HS**
7.125-7.750	**EW64**	CPR112G	**264DE**	**264SE**	**55001-112**	**F112PC0240CC**
		PDR84	–	**264SEM**	–	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-1**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-64**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202358**
Splice	**164DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29961**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-35**
Wall-Roof Feed Thru	**245314-64**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-64**
5 in (127 mm) dia	**WGB5-64**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Refer to page 84 for Elliptical Waveguide ordering information

7.125 - 8.400 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX 	**High Performance/Wide Band Antennas** – Dual Polarization **Antenna Inputs:** CPR112G and PDR84													
HPX6-71W	6 (1.8)	2860	–	–	–	2	2	39.6	40.4	41.0	1.5	30	65	1.15 (23.1)
HPX8-71W	8 (2.4)	2825	–	–	–	2	2	42.1	42.9	43.5	1.2	30	67	1.10 (26.4)
HPX10-71W	10 (3.0)	2864	–	–	–	2	2	44.1	44.9	45.5	0.9	30	70	1.10 (26.4)
HPX12-71W	12 (3.7)	1009	–	–	–	2	2	46.1	46.7	47.5	0.8	30	70	1.10 (26.4)
HPX15-71W	15 (4.6)	697	–	–	–	2	2	47.9	48.6	49.4	0.7	30	65	1.10 (26.4)

7.125 - 8.5 GHz

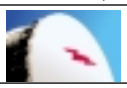
Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance/Wide Band Antennas** – Single Polarized **Antenna Inputs:** CPR112G and PDR84													
HP6-71W	6 (1.8)	2818	–	–	–	3	2	39.7	40.3	41.1	1.5	30	66	1.06 (30.7)
HP8-71W	8 (2.4)	2820	–	–	–	2	2	42.3	42.9	43.6	1.1	30	68	1.06 (30.7)
HP10-71W	10 (3.0)	2821	–	–	–	2	2	44.0	44.8	45.5	0.9	30	70	1.06 (30.7)
HP12-71W	12 (3.7)	2822	–	–	–	2	2	46.2	46.8	47.6	0.7	30	71	1.06 (30.7)
PL P 	**Standard/Wide Band Antennas** – Standard and Low VSWR **Antenna Inputs:** CPR112G and PDR84													
PL6-71W	6 (1.8)	3703	–	–	–	1	2	39.7	40.3	41.1	1.5	30	48	1.10 (26.4)
PL8-71W	8 (2.4)	1271	–	–	–	1	2	42.3	42.9	43.6	1.1	30	52	1.10 (26.4)
PL10-71W	10 (3.0)	1273	–	–	–	1	2	44.0	44.8	45.5	0.9	30	55	1.10 (26.4)
PL12-71W	12 (3.7)	1275	–	–	–	1	2	45.6	46.3	47.1	0.7	30	58	1.10 (26.4)
PL15-71W	15 (4.6)	2710	–	–	–	1	2	47.5	48.2	48.9	0.6	30	57	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz

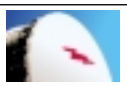
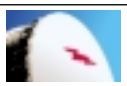
7.425 - 7.900 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HSX4-74	4 (1.2)	2157 2156	–	–	–	3	2	36.7	37.0	37.3	2.3	40	64	1.08 (28.3)
HSX6-74	6 (1.8)	1860 1864	–	–	–	3	2	40.3	40.6	40.9	1.5	40	67	1.08 (28.3)
HSX8-74	8 (2.4)	1865 1866	–	–	–	3	2	42.6	42.9	43.2	1.1	40	74	1.06 (30.7)
HSX10-74	10 (3.0)	1913 1912	–	–	–	3	2	44.0	44.3	44.6	0.9	40	75	1.06 (30.7)
HSX12-74	12 (3.7)	1914 1916	–	–	–	3	2	46.5	46.8	47.0	0.8	40	78	1.06 (30.7)
HSX15-74	15 (4.6)	1918 1920	–	–	–	3	2	48.0	48.3	48.6	0.6	40	78	1.06 (30.7)
HPX HP 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HPX4-74	4 (1.2)	3712	–	–	–	3	2	37.1	37.4	37.6	2.5	32	63	1.10 (26.4)
HPX6-74	6 (1.8)	3697	–	–	–	3	2	40.5	40.8	41.1	1.5	32	67	1.06 (30.7)
HPX8-74	8 (2.4)	3699	–	–	–	3	2	42.9	43.1	43.4	1.2	32	70	1.06 (30.7)
HPX10-74	10 (3.0)	3695	–	–	–	2	2	44.3	44.7	45.0	1.1	30	68	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR112G and PDR84													
HP4-74	4 (1.2)	4112	–	–	–	2	2	36.5	36.7	37.0	2.3	32	61	1.06 (30.7)
HP6-74	6 (1.8)	3691	–	–	–	2	2	40.1	40.4	40.6	1.5	32	64	1.06 (30.7)
HP8-74	8 (2.4)	3694	–	–	–	3	2	42.5	42.8	43.0	1.2	32	70	1.04 (34.2)
HP10-74	10 (3.0)	2792	–	–	–	3	2	43.8	44.0	44.2	1.0	32	70	1.04 (34.2)

*7.725 - 8.275 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
UHX6-77	6 (1.8)	2874 2875	–	–	–	3	2	40.5	41.0	41.2	1.5	30	67	1.06 (30.7)
UHX8-77	8 (2.4)	2833 2834	–	–	–	2	2	43.1	43.5	43.7	1.1	30	68	1.06 (30.7)
UHX10-77	10 (3.0)	2835 2836	–	–	–	2	2	44.9	45.2	45.4	0.9	30	70	1.06 (30.7)
UHX12-77	12 (3.7)	2838 2837	–	–	–	3	2	46.4	46.7	46.9	0.7	30	75	1.06 (30.7)
UHX15-77	15 (4.6)	2839 2840	–	–	–	2	2	48.4	48.7	48.9	0.6	30	70	1.06 (30.7)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HSX4-77	4 (1.2)	2588 2589	–	–	–	3	2	37.0	37.2	37.5	2.3	40	64	1.08 (28.3)
HSX6-77	6 (1.8)	1922 1924	–	–	–	3	2	40.7	41.0	41.4	1.5	40	67	1.08 (28.3)
HSX8-77	8 (2.4)	1929 1930	–	–	–	3	2	43.2	43.5	43.8	1.1	40	77	1.06 (30.7)
HSX10-77	10 (3.0)	1966 1967	–	–	–	3	2	44.8	45.2	45.6	0.9	40	79	1.06 (30.7)
HSX12-77	12 (3.7)	1968 1969	–	–	–	3	2	46.4	46.7	47.0	0.7	40	79	1.06 (30.7)
HSX15-77	15 (4.6)	1960 1962	–	–	–	–	–	48.3	48.6	48.8	0.6	40	76	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas are available in this frequency band. See pages 93-94.

Continued on next page

Revised 9/00 & 5/01

Refer to page 84 for Elliptical Waveguide ordering information

*7.725 - 8.275 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 8 lb/in^2 (56 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance***					Low	Gain, dBi Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HPX6-77*	6 (1.8)	4652	–	–	A	–	–	40.5	40.8	41.1	1.5	33	66	1.07 (29.4)
HPX8-77*	8 (2.4)	4653	–	–	A	–	–	43.2	43.5	43.8	1.1	33	68	1.06 (30.7)
HPX10-77*	10 (3.0)	4654	–	–	A	–	–	44.9	45.2	45.5	0.9	33	70	1.06 (30.7)
HPX12-77*	12 (3.7)	4655	–	–	A	–	–	46.4	46.7	47.0	0.7	33	72	1.06 (30.7)
PXL 	**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** CPR112G and PDR84													
PXL6-77**	6 (1.8)	–	–	–	B	–	–	40.3	40.6	40.9	1.5	33	48	1.07 (29.4)
PXL8-77**	8 (2.4)	–	–	–	B	–	–	42.8	43.1	43.4	1.1	33	50	1.06 (30.7)
PXL10-77**	10 (3.0)	–	–	–	B	–	–	44.7	45.0	45.3	0.9	33	54	1.06 (30.7)
PXL12-77**	12 (3.7)	–	–	–	B	–	–	46.6	46.9	47.2	0.7	33	63	1.06 (30.7)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
LBX6-77**	6 (1.8)	–		–	B	–		40.3	40.8	41.1	1.5	33	56	1.07 (29.4)
LBX8-77**	8 (2.4)	–	–	–	B	–	–	42.8	43.1	43.4	1.1	33	60	1.06 (30.7)
LBX10-77**	10 (3.0)	–	–	–	B	–	–	44.9	45.2	45.5	0.9	33	66	1.06 (30.7)
LBX12-77**	12 (3.7)	–	–	–	B	–	–	46.4	46.7	47.0	0.7	33	67	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas are available in this frequency band. See pages 93-94.
**8 lb/in^2 (56 kPa) maximum
***ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

*7.75 - 8.40 GHz**

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 		**High Performance Antennas** – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
HP4-77	4 (1.2)	2858	–	–	–	2	2	36.8	37.2	37.5	2.2	30	63	1.06 (30.7)
HP6-77	6 (1.8)	3763	–	–	–	2	2	40.3	40.8	41.1	1.5	30	68	1.06 (30.7)
HP8-77	8 (2.4)	3765	–	–	–	2	2	42.9	43.3	43.6	1.1	30	68	1.06 (30.7)
HP10-77	10 (3.0)	2868	–	–	–	2	2	44.8	45.2	45.5	0.9	30	70	1.06 (30.7)
HP12-77	12 (3.7)	3767	–	–	–	2	2	46.3	46.7	47.1	0.7	30	71	1.06 (30.7)
HP15-77	15 (4.6)	3768	–	–	–	2	2	48.2	48.5	48.9	0.6	30	71	1.06 (30.7)
PL 		**Standard Antennas** – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
PL4-77	4 (1.2)	3716	–	–	–	1	2	36.8	37.2	37.5	2.2	30	45	1.06 (30.7)
PL6-77	6 (1.8)	3721	–	–	–	1	2	40.3	40.8	41.1	1.5	30	48	1.06 (30.7)
PL8-77	8 (2.4)	2760	–	–	–	1	2	42.9	43.3	43.6	1.1	30	50	1.06 (30.7)
PL10-77	10 (3.0)	2747	–	–	–	1	2	44.8	45.2	45.5	0.9	30	58	1.06 (30.7)
PL12-77	12 (3.7)	2748	–	–	–	1	2	46.3	46.7	47.1	0.7	30	54	1.06 (30.7)
PL15-77	15 (4.6)	2763	–	–	–	1	2	48.2	48.5	48.9	0.6	30	57	1.06 (30.7)
FPX **FP** 		**Focal Plane Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84												
FPX6-77	6 (1.8)	6161	–	–	–	1	2	40.2	40.4	40.6	1.5	30	58	1.08 (28.3)
		Focal Plane Antennas – Single Polarized **Antenna Inputs:** CPR112G and PDR84												
FP6-77	6 (1.8)	6150	–	–	–	1	2	40.2	40.6	40.8	1.5	30	60	1.07 (29.4)
FP8-77	8 (2.4)	6151	–	–	–	1	2	42.9	43.3	43.5	1.1	26	64	1.06 (30.7)
FP10-77	10 (3.0)	6153	–	–	–	2	2	44.9	45.3	45.4	0.9	30	66	1.04 (34.2)
FP12-77	12 (3.7)	6155	–	–	–	1	2	46.5	46.9	47.0	0.7	28	68	1.04 (34.2)

Reference ETSI Document EN300833 for 3 to 60 GHz

*Multiband antennas are available in this frequency band. See pages 93-94.

Revised 5/01

Refer to page 84 for Elliptical Waveguide ordering information

8.2 - 8.5 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa) except LBX Series 8 lb/in^2 (56 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	U.S. FCC 74	U.S. FCC 78	ETSI Class	ETSI Gain	Gain, dBi Low	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HSX4-82	4 (1.2)	1799, 1810	–	–	–	3	2	37.5	37.6	37.7	2.3	40	63	1.08 (28.3)
HSX6-82	6 (1.8)	1222 1224	–	–	–	3	2	41.3	41.4	41.7	1.4	40	67	1.06 (30.7)
HSX8-82	8 (2.4)	1226 1228	–	–	–	3	2	43.7	43.8	43.9	1.0	40	78	1.06 (30.7)
HSX10-82	10 (3.0)	1230 1232	–	–	–	3	2	45.3	45.4	45.5	0.8	40	78	1.06 (30.7)
HSX12-82	12 (3.7)	1236 1234	–	–	–	3	2	47.1	47.2	47.3	0.7	40	79	1.06 (30.7)
HSX15-82	15 (4.6)	1238 1240	–	–	–	3	2	48.7	48.8	48.9	0.6	40	76	1.06 (30.7)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
HPX6-82	6 (1.8)	2883	–	–	–	1	2	41.0	41.1	41.2	1.3	30	58	1.08 (28.3)
HPX8-82	8 (2.4)	2863	–	–	–	2	2	43.5	43.6	43.7	1.0	30	67	1.06 (30.7)
HPX10-82	10 (3.0)	2865	–	–	–	2	2	45.5	45.6	45.7	0.8	30	70	1.06 (30.7)
HPX12-82	12 (3.7)	2867	–	–	–	2	2	47.1	47.2	47.3	0.7	30	70	1.06 (30.7)
HPX15-82	15 (4.6)	2869	–	–	–	2	2	48.7	48.8	48.9	0.6	30	70	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR112G and PDR84													
HP6-82	6 (1.8)	2882	–	–	–	2	2	40.6	40.8	41.0	1.5	30	68	1.06 (30.7)
HP8-82	8 (2.4)	2891	–	–	–	2	2	43.4	43.5	43.7	1.1	30	68	1.06 (30.7)
HP10-82	10 (3.0)	2893	–	–	–	2	2	45.3	45.5	45.7	0.9	30	70	1.06 (30.7)
HP12-82	12 (3.7)	2895	–	–	–	2	2	46.8	47.0	47.1	0.7	30	71	1.06 (30.7)
HP15-82	15 (4.6)	2889	–	–	–	2	2	48.6	48.8	48.9	0.6	30	71	1.06 (30.7)
PXL **PL** 	**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** CPR112G and PDR84													
PXL6-82	6 (1.8)	2851	–	–	–	–	–	41.0	41.1	41.2	1.3	30	48	1.06 (30.7)
PXL8-82	8 (2.4)	2853	–	–	–	1	2	43.7	43.8	43.9	1.0	30	55	1.06 (30.7)
PXL10-82	10 (3.0)	2855	–	–	–	1	2	45.7	45.8	45.9	0.8	30	57	1.06 (30.7)
PXL12-82	12 (3.7)	2857	–	–	–	1	2	47.3	47.4	47.5	0.7	30	63	1.06 (30.7)
PXL15-82	15 (4.6)	2859	–	–	–	1	2	48.5	48.6	48.7	0.6	30	65	1.06 (30.7)
	Standard Antennas – Single Polarized Low VSWR **Antenna Inputs:** CPR112G and PDR84													
PL6-82	6 (1.8)	2871	–	–	–	1	2	40.6	40.8	41.0	1.5	30	48	1.06 (30.7)
PL8-82	8 (2.4)	2897	–	–	–	1	2	43.4	43.5	43.7	1.1	30	50	1.06 (30.7)
PL10-82	10 (3.0)	2899	–	–	–	1	2	43.3	45.5	45.7	0.9	30	58	1.06 (30.7)
PL12-82	12 (3.7)	2901	–	–	–	1	2	46.8	47.0	47.1	0.7	30	54	1.06 (30.7)
PL15-82	15 (4.6)	2903	–	–	–	1	2	48.6	48.8	48.6	0.6	30	57	1.06 (30.7)
LBX 	**Low Back Lobe Antennas** – Dual Polarized **Antenna Inputs:** CPR112G and PDR84													
			Regulatory Compliance**											
LBX6-82*	6 (1.8)	786-1	–	–	B	–	–	40.9	41.1	41.2	1.5	33	58	1.07 (29.4)
LBX8-82*	8 (2.4)	787-2	–	–	B	–	–	43.6	43.8	43.9	1.1	33	60	1.06 (30.7)
LBX10-82*	10 (3.0)	788-2	–	–	B	–	–	45.6	45.8	45.9	0.9	33	63	1.06 (30.7)
LBX12-82*	12 (3.7)	789-2	–	–	B	–	–	46.9	47.1	47.2	0.7	33	65	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
*8 lb/in2 (56 kPa) maximum
**ANATEL Brazilian Telecommunications Agency, Regulation 1286 Category

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125–7.750	**EWP77-71**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BA**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CA**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KA**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HA**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HC**
7.725–8.500	**EWP77-77**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BB**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CB**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KB**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HB**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HF‡**
7.125–8.500	**EWP77-71W**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BC**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CC**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KC**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HC**
***		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HE**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
7.125–8.500	**EW77**	UG-51/U†††	**177DC**	**177SC**	**55000A-112**	**F112PA0240BC**
		PBR84	**177DCM**	**177SCM**	**243498-84**	**F112MK0600KC**
		CPR112G	**177DE**	**177SE**	**55001-112**	**F112PC0240CC**
		PDR84	**177DEM**	**177SEM**	**223306-84**	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 7.425 - 7.925 GHz ‡ 7.725 - 8.3 GHz ONLY

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-11**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-77**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202421**
Splice	**177DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**19256B**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-34**
Wall-Roof Feed Thru	**245314-77**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-77**
5 in (127 mm) dia	**WGB5-77**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Refer to page 88 for Elliptical Waveguide ordering information

10.2 - 10.7 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

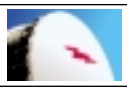
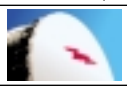
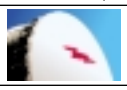
Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
UHX4-102	4 (1.2)	3758 4505	A	–	–	3	2	39.3	39.5	39.7	1.8	33	68	1.10 (26.4)
UHX6-102	6 (1.8)	3769 4494	A	–	–	3	2	42.5	42.7	42.9	1.2	33	79	1.10 (26.4)
UHX8-102	8 (2.4)	3760 4506	A	–	–	3	2	45.0	45.1	45.2	0.9	33	78	1.10 (26.4)
UHX10-102	10 (3.0)	3348 3762	A	–	–	3	2	46.7	46.8	46.9	0.8	33	80	1.10 (26.4)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
HPX4-102	4 (1.2)	3752	B	–	–	1	2	39.6	39.8	40.0	1.8	30	58	1.15 (23.1)
HPX6-102	6 (1.8)	3336	B	–	–	2	2	42.9	43.1	43.3	1.2	30	68	1.10 (26.4)
HPX8-102	8 (2.4)	3754	A	–	–	2	2	45.3	45.4	45.5	0.9	30	68	1.10 (26.4)
HPX10-102	10 (3.0)	3756	A	–	–	2	2	47.0	47.1	47.2	0.7	30	68	1.10 (26.4)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
HP2-102	2 (0.6)	3742	–	–	–	1	2	33.2	33.3	33.4	3.6	30	50	1.15 (23.1)
HP4-102	4 (1.2)	3744	B	–	–	1	2	39.7	39.9	40.1	1.8	30	58	1.10 (26.4)
HP6-102	6 (1.8)	3326	B	–	–	1	2	42.9	43.1	43.3	1.2	30	68	1.10 (26.4)
HP8-102	8 (2.4)	3746	A	–	–	2	2	45.3	45.4	45.5	0.9	30	68	1.10 (26.4)
HP10-102	10 (3.0)	3748	A	–	–	2	2	47.0	47.1	47.2	0.7	30	68	1.10 (26.4)
PX **P** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
PX4-102	4 (1.2)	3314	B	–	–	–	–	39.7	39.9	40.1	1.8	30	45	1.10 (26.4)
PX6-102	6 (1.8)	3316	B	–	–	1	2	43.1	43.2	43.3	1.2	30	50	1.10 (26.4)
PX8-102	8 (2.4)	3740	A	–	–	1	2	45.4	45.5	45.6	0.9	30	52	1.10 (26.4)
PX10-102	10 (3.0)	3320	A	–	–	1	2	47.1	47.2	47.3	0.7	30	58	1.10 (26.4)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
P4-102	4 (1.2)	3306	B	–	–	–	–	39.7	39.9	40.1	1.8	30	45	1.10 (26.4)
P6-102	6 (1.8)	3731	B	–	–	1	2	43.1	43.2	43.3	1.2	30	50	1.10 (26.4)
P8-102	8 (2.4)	3732	B	–	–	1	2	45.4	45.5	45.6	0.9	30	52	1.10 (26.4)
P10-102	10 (3.0)	3312	A	–	–	1	2	47.1	47.2	47.3	0.7	30	58	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz

Refer to page 88 for Elliptical Waveguide ordering information

10.5 - 10.7 GHz

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
UHX4-105	4 (1.2)	2013 2012	A	–	–	3	2	39.8	39.9	40.0	1.7	33	70	1.08 (28.3)
UHX6-105	6 (1.8)	2037 2038	A	–	–	3	2	43.4	43.5	43.6	1.2	33	81	1.06 (30.7)
UHX8-105	8 (2.4)	2024 2025	A	–	–	3	2	45.8	45.9	46.0	1.0	33	80	1.06 (30.7)
UHX10-105	10 (3.0)	2033 2032	A	–	–	3	2	47.8	47.9	48.0	0.8	33	83	1.06 (30.7)
UHX12-105	12 (3.7)	2034 2035	A	–	–	3	2	49.2	49.3	49.4	0.65	33	80	1.06 (30.7)
HSX 	**High Performance Antennas** – Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
HSX4-105	4 (1.2)	1972 1974	A	–	–	2	2	39.6	39.7	39.8	1.7	40	64	1.10 (26.4)
HSX6-105	6 (1.8)	1976 1980	A	–	–	3	2	43.2	43.4	43.5	1.1	40	72	1.08 (28.3)
HSX8-105	8 (2.4)	2017 2019	A	–	–	3	2	45.8	45.9	46.0	0.8	40	75	1.06 (30.7)
HSX10-105	10 (3.0)	2026 2028	A	–	–	3	2	47.6	47.7	47.8	0.7	40	75	1.06 (30.7)
HSX12-105	12 (3.7)	2253 2255	A	–	–	3	2	49.5	49.3	49.2	0.6	40	80	1.06 (30.7)
HPX **HP** 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
HPX4-105	4 (1.2)	2462	B	–	–	2	2	39.8	39.9	40.0	1.8	30	60	1.10 (26.4)
HPX6-105	6 (1.8)	3269	A	–	–	2	2	43.4	43.5	43.6	1.2	30	64	1.08 (28.3)
HPX8-105	8 (2.4)	3274	A	–	–	2	2	45.8	45.9	46.0	0.9	30	68	1.06 (30.7)
HPX10-105	10 (3.0)	3280	A	–	–	2	2	47.7	47.8	47.9	0.8	30	70	1.06 (30.7)
HPX12-105	12 (3.7)	3282	A	–	–	2	2	49.2	49.3	49.4	0.7	30	71	1.06 (30.7)
	High Performance Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
HP4-105	4 (1.2)	3472	B	–	–	2	2	39.8	39.9	40.0	1.8	30	60	1.08 (28.3)
HP6-105	6 (1.8)	3258	B	–	–	2	2	43.4	43.5	43.6	1.2	30	66	1.06 (30.7)
HP8-105	8 (2.4)	3259	A	–	–	2	2	45.8	45.9	46.0	0.9	30	68	1.06 (30.7)
HP10-105	10 (3.0)	3260	A	–	–	2	2	47.7	47.8	47.9	0.8	30	70	1.06 (30.7)
HP12-105	12 (3.7)	3261	A	–	–	1	2	49.2	49.3	49.4	0.7	30	71	1.06 (30.7)
PX **P** 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100													
PX6-105	6 (1.8)	3290	B	–	–	1	2	43.4	43.5	43.6	1.2	30	49	1.15 (23.1)
PX8-105	8 (2.4)	3291	B	–	–	1	2	45.8	45.9	46.0	0.9	30	50	1.10 (26.4)
PX10-105	10 (3.0)	3292	B	–	–	1	2	47.7	47.8	47.9	0.8	30	52	1.10 (26.4)
PX12-105	12 (3.7)	3293	B	–	–	1	2	49.2	49.3	49.4	0.7	30	55	1.10 (26.4)
	Standard Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100													
P4-105	4 (1.2)	3002	B	–	–	–	–	39.8	39.9	40.0	1.8	30	45	1.15 (23.1)
P6-105	6 (1.8)	3146	B	–	–	1	2	43.4	43.5	43.6	1.2	30	51	1.10 (26.4)
P8-105	8 (2.4)	3004	B	–	–	1	2	45.8	45.9	46.0	0.9	30	53	1.10 (26.4)
P10-105	10 (3.0)	3006	A	–	–	1	2	47.8	47.9	48.0	0.8	30	53	1.10 (26.4)
P12-105	12 (3.7)	3218	B	–	–	1	2	49.2	49.3	49.4	0.7	30	55	1.10 (26.4)
PAR 	**Standard Antennas** – Single Polarized Low VSWR **Antenna Inputs:** CPR90G and PDR100													
PAR6-105*	6 (1.8)	1646	A	–	–	1	2	43.0	43.1	43.2	1.2	30	60	1.06 (30.7)
PAR8-105*	8 (2.4)	1647	A	–	–	1	2	45.6	45.7	45.8	0.9	30	63	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Uses focal plane reflector and feed system.

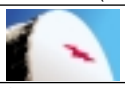
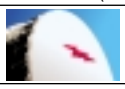
ANDREW®

Revised 7/00 & 5/01

Refer to page 88 for Elliptical Waveguide ordering information

*10.5 - 11.7 GHz**

Antenna Inputs. All antenna VSWR values are specified with CPR and PDR flanges. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 		**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100												
UHX4-107	4 (1.2)	2098 2097	A	–	–	3	2	40.0	40.4	40.8	1.6	33	70	1.08 (28.3)
UHX6-107	6 (1.8)	2141 2142	A	–	–	3	2	43.6	44.0	44.4	1.1	33	80	1.06 (30.7)
UHX8-107	8 (2.4)	2124 2125	A	–	–	3	2	46.0	46.5	46.8	0.8	33	80	1.06 (30.7)
UHX10-107	10 (3.0)	2127 2126	A	–	–	3	2	47.6	48.0	48.3	0.7	33	82	1.06 (30.7)
UHX12-107	12 (3.7)	2128 2129	A	–	–	3	2	49.4	49.8	50.2	0.5	33	80	1.06 (30.7)
HSX 		**High Performance Antennas** - Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** CPR90G and PDR100												
HSX4-107	4 (1.2)	2314 2312	A	–	–	2	2	39.8	40.2	40.6	1.6	40	64	1.10 (26.4)
HSX6-107	6 (1.8)	2316 2318	A	–	–	3	2	43.5	43.9	44.3	1.1	40	72	1.08 (28.3)
HSX8-107	8 (2.4)	2320 2322	A	–	–	2	2	46.0	46.5	46.8	0.8	40	75	1.06 (30.7)
HSX10-107	10 (3.0)	2340 2338	A	–	–	2	2	47.8	48.2	48.6	0.7	40	75	1.06 (30.7)
HSX12-107	12 (3.7)	2362 2364	A	–	–	3	2	49.2	49.6	50.3	0.5	40	80	1.06 (30.7)
HPX **HP** 		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** CPR90G and PDR100												
HPX4-107	4 (1.2)	2460	B	–	–	2	2	40.0	40.3	40.6	1.6	30	62	1.10 (26.4)
HPX6-107	6 (1.8)	3224	A	–	–	2	2	43.6	44.0	44.4	1.0	30	70	1.08 (28.3)
HPX8-107	8 (2.4)	3175	A	–	–	2	2	46.0	46.4	46.8	0.8	30	70	1.06 (30.7)
HPX10-107	10 (3.0)	3173	A	–	–	2	2	47.9	48.3	48.6	0.7	30	70	1.06 (30.7)
HPX12-107	12 (3.7)	3190	A	–	–	2	2	49.4	49.8	50.2	0.5	30	72	1.06 (30.7)
		High Performance Antennas – Single Polarized **Antenna Inputs:** CPR90G and PDR100												
HP4-107	4 (1.2)	3429	A	–	–	2	2	40.0	40.4	40.8	1.6	30	61	1.08 (28.3)
HP6-107	6 (1.8)	3222	A	–	–	3	2	43.6	44.0	44.4	1.0	30	70	1.06 (30.7)
HP8-107	8 (2.4)	3174	A	–	–	3	2	46.0	46.4	46.8	0.8	30	71	1.06 (30.7)
HP10-107	10 (3.0)	3250	A	–	–	2	2	47.9	48.3	48.6	0.7	30	70	1.06 (30.7)
HP12-107	12 (3.7)	3188	A	–	–	2	2	49.4	49.8	50.2	0.5	30	70	1.06 (30.7)
HDX 		**High Performance, Dual Beam Antennas** – Dual Polarized Angle Diversity **Antenna Input:** CPR90G												
HDX8-107	8 (2.4)	3791 3793 3787 3789	A	–	–	2	2	47.6	47.9	48.1	0.8	26	78	1.10 (26.4)
HDX10-107	10 (3.0)	4352 4353 4354 4355	A	–	–	2	2	47.6	47.9	48.1	0.8	22	78	1.10 (26.4)
PAR 		**Standard Antennas** – Single Polarized **Antenna Inputs:** CPR90G and PDR100												
PAR6-107**	6 (1.8)	3743	A	–	–	1	2	43.2	43.6	44.0	1.1	30	60	1.06 (30.7)
PAR8-107**	8 (2.4)	3745	A	–	–	1	2	45.8	46.2	46.6	0.8	30	63	1.06 (30.7)
PXL **PL** 		**Standard Antennas** – Dual Polarized Low VSWR **Antenna Inputs:** CPR90G and PDR100												
PXL6-107	6 (1.8)	3183	B	–	–	–	–	43.6	44.0	44.4	1.0	30	49	1.08 (28.3)
PXL8-107	8 (2.4)	3185	B	–	–	–	–	46.0	46.4	46.8	0.8	30	50	1.06 (30.7)
PXL10-107	10 (3.0)	3187	B	–	–	–	–	47.9	48.3	48.6	0.7	30	52	1.06 (30.7)
PXL12-107	12 (3.7)	3199	B	–	–	–	–	49.4	49.8	50.2	0.5	30	53	1.06 (30.7)
		Standard Antennas – Single Polarized Low VSWR **Antenna Inputs:** CPR90G and PDR100												
PL4-107	4 (1.2)	3214	B	–	–	–	–	40.1	40.5	40.9	1.6	30	46	1.08 (28.3)
PL6-107	6 (1.8)	3101	B	–	–	1	2	43.6	44.0	44.4	1.0	30	51	1.06 (30.7)
PL8-107	8 (2.4)	3249	B	–	–	1	2	46.0	46.4	46.8	0.8	30	53	1.06 (30.7)
PL10-107	10 (3.0)	3200	B	–	–	–	–	47.8	48.2	48.5	0.7	30	54	1.06 (30.7)
PL12-107	12 (3.7)	3116	B	–	–	1	2	49.4	49.8	50.2	0.5	30	60	1.06 (30.7)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Multiband antennas are available for this frequency band. See pages 93-94. ** Uses focal plane reflector and feed system

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
10.7-11.7	**EWP90S**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
10.2-10.7	**EWP90-105**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CA**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HA**
10.5-11.7	**EWP90-105W**	CPR90G	–	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	–	**190SEM**	**223306-100**	**F090MH0600HB**
10.7-11.7	**EWP90-107**	CPR90	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
						VSWR 1.09 (27.3)**
10.7-11.7		WR75†††	–	**290SC**	**55000A-75**	**F075PA0240BB**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
10.2-11.7	**EW90**	CPR90G	**190DE**	**190SE**	**55001-90**	**F090PC0240CS**
		PDR100	**190DEM**	**190SEM**	**223306-100**	**F090MH0600HS**
		WR75†††	–	–	**55000A-75**	**F075PA0240BS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218. ††† Pressurizable cover flange.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-5**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-90**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**204919**
Splice	**190DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-37**
Wall-Roof Feed Thru	**245314-90**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-90**
5 in (127 mm) dia	**WGB5-90**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

ANDREW®

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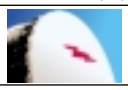
Refer to page 185 for Elliptical Waveguide ordering information

12.2 - 12.7 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
HPX6-122	6 (1.8)	3285	A	–	–	2	2	44.6	44.8	45.0	0.9	30	68	1.10 (26.4)
HPX8-122	8 (2.4)	3232	A	–	–	2	2	47.1	47.3	47.5	0.7	30	70	1.10 (26.4)
HPX10-122	10 (3.0)	3233	A	–	–	2	2	48.4	48.5	48.7	0.6	25	71	1.10 (26.4)
HPX12-122	12 (3.7)	3234	A	–	–	1	2	50.5	50.6	50.8	0.5	25	71	1.10 (26.4)
PX 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
PX4-122	4 (1.2)	3211	B	–	–	1	2	40.5	40.7	40.9	1.4	25	52	1.10 (26.4)
PX6-122	6 (1.8)	3213	A	–	–	–	–	44.6	44.8	45.0	0.9	25	51	1.10 (26.4)
PX8-122	8 (2.4)	3215	A	–	–	–	–	47.1	47.3	47.5	0.7	30	54	1.10 (26.4)
PX10-122	10 (3.0)	3217	A	–	–	–	–	48.4	48.5	48.7	0.6	30	57	1.10 (26.4)
PX12-122	12 (3.7)	3219	A	–	–	–	–	50.5	50.6	50.8	0.5	25	58	1.10 (26.4)

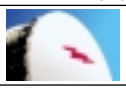
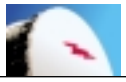
12.2 - 13.25 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Antennas** – Single Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
HP6-122	6 (1.8)	3284	A	A	A	2	2	44.7	45.1	45.4	0.9	30	70	1.08 (28.3)
HP8-122	8 (2.4)	3228	A	A	A	2	2	47.2	47.6	47.9	0.7	30	70	1.08 (28.3)
HP10-122	10 (3.0)	3270	A	A	A	2	2	48.4	48.8	49.1	0.6	28	71	1.08 (28.3)
HP12-122	12 (3.7)	3272	A	A	A	2	2	50.6	50.9	51.2	0.5	30	71	1.08 (28.3)
P 	**Standard Antennas** – Single Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
P2-122	2 (0.6)	3216	–	–	–	–	–	35.1	35.5	35.8	2.8	25	42	1.10 (26.4)
P4-122	4 (1.2)	3204	B	B	B	1	2	41.2	41.5	41.9	1.4	30	49	1.10 (26.4)
P6-122	6 (1.8)	1277	A	A	A	1	2	44.7	45.1	45.4	0.9	30	55	1.08 (28.3)
P8-122	8 (2.4)	1286	A	A	A	1	2	47.2	47.6	47.9	0.7	30	59	1.08 (28.3)
P10-122	10 (3.0)	1288	A	A	A	1	2	48.4	48.8	49.1	0.6	26	60	1.08 (28.3)
P12-122	12 (3.7)	4271	A	A	A	1	2	50.6	50.9	51.2	0.5	30	58	1.08 (28.3)

*12.7 - 13.25 GHz**

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

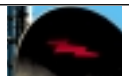
Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UHX 	**Ultra High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
UHX8-127	8 (2.4)	1255 1256	A	A	A	3	2	47.5	47.6	47.8	0.7	32	80	1.10 (26.4)
UHX10-127	10 (3.0)	1258 1259	A	A	A	3	2	48.7	48.8	49.0	0.6	30	82	1.10 (26.4)
HPX 	**High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120													
HPX6-127	6 (1.8)	3296	B	B	B	2	2	45.0	45.1	45.3	0.9	30	68	1.10 (26.4)
HPX8-127	8 (2.4)	3278	A	A	A	2	2	47.5	47.6	47.8	0.7	30	70	1.10 (26.4)
HPX10-127	10 (3.0)	3279	A	A	A	2	2	48.7	48.8	49.0	0.6	25	71	1.10 (26.4)
HPX12-127	12 (3.7)	3281	A	A	A	2	2	50.8	50.9	51.1	0.5	25	72	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz
*Multiband antennas are available in this frequency band. See page 94.

Continued on next page

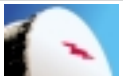
*12.7 - 13.25 GHz**

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa). **ValuLine® Antennas**. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
PX		**Standard Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120												
PX4-127	4 (1.2)	3220	B	B	B	1	2	40.9	41.0	41.2	1.4	25	52	1.10 (26.4)
PX6-127	6 (1.8)	3221	A	A	A	–	–	45.0	45.1	45.3	0.9	25	52	1.10 (26.4)
PX8-127	8 (2.4)	3223	A	A	A	–	–	47.5	47.6	47.8	0.7	30	54	1.10 (26.4)
PX10-127	10 (3.0)	3225	A	A	A	–	–	48.7	48.8	49.0	0.6	30	57	1.10 (26.4)
PX12-127	12 (3.7)	3226	A	A	A	–	–	50.8	50.9	51.1	0.5	25	58	1.10 (26.4)

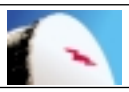
*12.75 - 13.25 GHz**

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX		**High Performance Antennas**- Super High Cross Polarization Discrimination – Dual Polarized **Antenna Input:** PDR120												
HSX4-130	4 (1.2)	2490 2492	B	B	B	3	2	41.4	41.6	41.8	1.6	40	68	1.10 (26.4)
HSX6-130	6 (1.8)	2099 2100	A	A	A	3	2	44.9	45.1	45.3	0.9	40	75	1.10 (26.4)
HSX8-130	8 (2.4)	2513 2515	A	A	A	3	2	47.4	47.6	47.8	0.7	40	76	1.10 (26.4)
HSX10-130	10 (3.0)	2566 2568	A	A	A	3	2	48.7	48.8	49.0	0.6	40	76	1.10 (26.4)
HPX **HP**		**High Performance Antennas** – Dual Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120												
HPX4-130	4 (1.2)	1254	B	B	B	3	2	40.9	41.0	41.1	1.3	28	66	1.10 (26.4)
HPX6-130	6 (1.8)	3288	A	A	A	2	2	45.0	45.1	45.2	0.9	28	68	1.10 (26.4)
HPX8-130	8 (2.4)	1033	A	A	A	3	2	47.6	47.7	47.8	0.7	32	74	1.10 (26.4)
		High Performance Antennas – Single Polarized **Antenna Inputs:** WR75 cover/gasket and PDR120												
HP4-130	4 (1.2)	1252	A	A	A	3	2	40.9	41.0	41.1	1.3	28	68	1.10 (26.4)
HP6-130	6 (1.8)	3286	A	A	A	2	2	45.1	45.2	45.3	0.9	28	70	1.08 (28.3)
HP8-130	8 (2.4)	3289	A	A	A	2	2	47.6	47.7	47.8	0.7	28	71	1.08 (28.3)

14.25 - 14.5 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX		**High Performance Antennas** – Dual Polarized **Antenna Input:** PDR140												
HSX4-142	4 (1.2)	1010 1012	–	–	–	2	2	42.5	42.6	42.7	1.2	40	68	1.10 (26.4)
HSX6-142	6 (1.8)	1014 1016	–	–	–	2	2	45.9	46.0	46.1	0.8	40	75	1.10 (26.4)
HSX8-142	8 (2.4)	1018 1020	–	–	–	2	2	48.4	48.5	48.6	0.6	40	76	1.10 (26.4)
HSX10-142	10 (3.0)	1202 1204	–	–	–	2	2	50.1	50.2	50.3	0.5	40	76	1.10 (26.4)

Reference ETSI Document EN300833 for 3 to 60 GHz
* Multiband antennas are available in this frequency band. See page 94.

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Refer to pages 187 and 189 for Elliptical Waveguide ordering information

14.4 - 15.35 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas** – Dual Polarized **Antenna Input:** UG-541A/U													
HSX4-144	4 (1.2)	1206 1208	–	–	–	2	2	42.5	42.7	43.0	1.2	40	68	1.10 (26.4)
HSX6-144	6 (1.8)	1210 1212	–	–	–	2	2	46.0	46.3	46.5	0.8	40	75	1.10 (26.4)
HSX8-144	8 (2.4)	1214 1216	–	–	–	2	2	48.5	48.8	49.1	0.6	40	76	1.10 (26.4)
HSX10-144	10 (3.0)	1218 1220	–	–	–	2	2	50.2	50.5	50.8	0.5	40	76	1.10 (26.4)
PX P 	**Standard Antennas** – Dual Polarized **Antenna Inputs:** UG-541A/U and PDR140													
PX4-144	4 (1.2)	1565	–	–	–	–	–	42.3	42.5	42.8	1.2	30	48	1.10 (26.4)
PX6-144	6 (1.8)	1567	–	–	–	1	2	45.8	46.1	46.3	0.8	30	55	1.10 (26.4)
PX8-144	8 (2.4)	1569	–	–	–	–	–	48.3	48.6	48.9	0.6	30	57	1.10 (26.4)
PX10-144	10 (3.0)	1571	–	–	–	–	–	50.2	50.5	50.8	0.5	30	58	1.10 (26.4)
		Standard Antennas – Single Polarized **Antenna Inputs:** UG-541A/U and PDR140												
P8-144	8 (2.4)	1505	–	–	–	1	2	48.3	48.6	48.9	0.6	30	57	1.10 (26.4)
P10-144	10 (3.0)	1507	–	–	–	–	–	50.2	50.5	50.8	0.5	30	58	1.10 (26.4)

17.7 - 19.7 GHz

Antenna Inputs. All antenna VSWR values are specified with PDR flange. Other optional flanges may result in equal or slightly higher VSWR. Contact Andrew for details.
Pressurization. Feeds are pressurizable to 10 lb/in^2 (70 kPa).
ValuLine® Antennas. See page 127.

Type Number	Diameter ft (m)	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HSX 	**High Performance Antennas**- Super High Cross Polarization Discrimination – Dual Polarized **Antenna Inputs:** UG-595/U and PBR220													
HSX1-180	1 (0.3)	2050 2051	–	–	–	2	2	32.4	33.0	33.5	3.6	34	60	1.135 (24.0)
HSX2-180	2 (0.6)	2052 2053	A	A	A	2	2	38.0	38.4	38.8	1.9	36	64	1.135 (24.0)
HSX4-180	4 (1.2)	2055 2054	A	A	A	2	2	44.0	44.4	44.8	1.0	36	67	1.135 (24.0)
HSX6-180	6 (1.8)	2057 2056	A	A	A	2	2	47.5	48.0	48.4	0.7	36	72	1.135 (24.0)
HP 	**High Performance Antennas** – Single Polarized **Antenna Inputs:** UG-595/U and PBR220													
HP8-180	8 (2.4)	3983	A	A	A	2	2	50.2	50.7	51.2	0.5	30	72	1.15 (23.1)
P 	**Standard Antennas** – Single Polarized **Antenna Inputs:** UG-595/U and PBR220													
P8-180	8 (2.4)	4058	B	B	B	1	2	50.2	50.7	51.2	0.5	30	59	1.15 (23.1)

Reference ETSI Document EN300833 for 3 to 60 GHz

Multiband Antennas

Multiband antennas offer very high route capacity at minimum antenna/tower system cost. They also offer great system planning flexibility, especially for upgrades of existing frequency congested routes. Multiband antennas provide a second frequency band of operation using one antenna. Maximum channel expansion, with minimum increase in tower wind load, saves system installation time and cost.

Size, weight, wind load characteristics and tower interface requirements are similar to other Andrew antennas of equivalent size. Our line of multiband antennas can, in general, be used as direct replacements for your existing single band antennas.

Andrew also offers the combining networks and circulators you need to complete your multiband antenna system.

The multiband antennas listed in this catalog are a small sampling of our total capabilities. We understand that your upgrade or expansion needs may be unique and we would like the opportunity to discuss your requirements with you. Contact Andrew for further information and help in designing your system.

Input Flange Information

Antenna Series	Antenna Input	
-3444	CPR229G	CPR229G
-3456	CPR229G	CPR137G
-459	CPR229G	CPR137G
-465	CPR229G	CPR137G
-4456	CPR187G	CPR137G
-4459	CPR187G	CPR137G
-4464	CPR187G	CPR137G
-6477	CPR137G	CPR112G
-6511	CPR137G	CPR90G
-186	7/8" EIA	CPR137G
-4477	CPR187G	CPR112G
-6812	CPR137G	WR75

Type Number	Diameter ft (m)	Band	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth Degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
UMX 	**Ultra High Performance Multiband 4-Port Antennas** **Antenna Inputs:** See page 92														
3.4-3.9 GHz and 4.4-5.0 GHz															
UMX10-3444	10	3.4	4142 4143	–	–	–	3	2	37.4	38.0	38.6	2.0	35	68	1.10 (26.4)
	(3.0)	4.4	4144 4145	–	–	–	3	2	39.7	40.2	40.7	1.6	35	71	1.15 (23.1)
UMX12-3444	12	3.4	4154 4155	B	–	–	3	2	39.0	39.6	40.2	1.7	35	71	1.10 (26.4)
	(3.7)	4.4	4156 4157	B	–	–	3	2	41.4	41.9	42.5	1.3	35	78	1.15 (23.1)
UMX15-3444	15	3.4	4166 4167	A	–	–	3	2	40.8	41.4	42.0	1.5	35	72	1.10 (26.4)
	(4.6)	4.4	4168 4169	–	–	–	3	2	42.9	43.5	44.0	1.1	35	79	1.15 (23.1)
3.4-3.9 GHz and 5.6-6.2 GHz															
UMX10-3456	10	3.4	4150 4151	–	–	–	2	2	36.6	37.2	37.8	2.1	35	70	1.15 (23.1)
	(3.0)	5.6	4152 4153	B	–	–	2	2	40.7	41.2	41.3	1.2	35	73	1.15 (23.1)
UMX12-3456	12	3.4	4162 4163	B	–	–	2	2	38.5	39.1	39.7	1.8	35	71	1.15 (23.1)
	(3.7)	5.6	4164 4165	A	–	–	2	2	42.6	43.1	43.2	1.0	35	76	1.15 (23.1)
UMX15-3456	15	3.4	4174 4175	B	–	–	2	2	40.3	40.9	41.5	1.6	35	74	1.15 (23.1)
	(4.6)	5.6	4176 4177	A	–	–	2	2	44.5	45.0	45.1	1.0	35	77	1.15 (23.1)
3.7-4.2 GHz and 5.925-6.425 GHz															
UMX10-459*	10	3.7	4102	A	–	–	3	2	38.4	39.0	39.4	1.8	30	75	1.06 (30.7)
	(3.0)	5.9	4104	A	–	–	3	2	42.8	43.1	43.5	1.1	30	80	1.06 (30.7)
UMX12-459*	12	3.7	4105	A	–	–	3	2	40.7	41.3	41.5	1.5	30	74	1.06 (30.7)
	(3.7)	5.9	4107	A	–	–	3	2	44.9	45.3	45.7	0.9	30	80	1.06 (30.7)
3.58-4.20 GHz and 6.425-7.125 GHz															
UMX10-465**	10	3.5	4357 4360	A	–	–	2	2	37.4	38.1	38.7	1.8	30	72	1.15 (23.1)
	(3.0)	6.4	4360 4361	A	A	–	2	2	42.2	42.7	42.8	1.0	30	76	1.15 (23.1)
UMX12-A465**	12	3.5	4108 4109	A	–	–	3	2	40.3	40.9	41.5	1.7	30	73	1.12 (24.9)
	(3.7)	6.4	4110 4111	A	A	–	3	2	44.5	45.0	45.4	0.95	30	78	1.12 (24.9)
4.40-5.00 GHz and 5.6-6.2 GHz															
UMX10-4456	10	4.4	4146 4147	–	–	–	2	2	39.7	40.2	40.8	1.6	35	75	1.15 (23.1)
	(3.0)	5.6	4148 4149	B	–	–	2	2	41.8	42.2	42.6	1.2	35	76	1.10 (26.4)
UMX12-4456	12	4.4	4158 4159	–	–	–	3	2	41.4	41.9	42.5	1.3	35	74	1.15 (23.1)
	(3.7)	5.6	4160 4161	B	–	–	2	2	43.4	43.8	44.2	1.0	35	77	1.10 (26.4)
UMX15-4456	15	4.4	4170 4171	–	–	–	3	2	43.1	43.7	44.2	1.2	35	75	1.15 (23.1)
	(4.6)	5.6	4172 4173	A	–	–	3	2	45.0	45.4	45.8	1.0	35	78	1.10 (26.4)
4.40-5.00 GHz and 5.925-6.425 GHz															
UMX8-4459	8	4.4	3310 3311	–	–	–	3	2	37.3	37.8	38.3	1.9	35	68	1.15 (23.1)
	(2.4)	5.9	3313 3315	A	–	–	3	2	39.8	40.0	40.7	1.4	35	69	1.15 (23.1)
UMX10-4459	10	4.4	3324 3325	–	–	–	3	2	39.7	40.2	40.7	1.6	35	73	1.15 (23.1)
	(3.0)	5.9	3327 3329	A	–	–	3	2	42.3	42.6	42.9	1.1	35	75	1.15 (23.1)
UMX12-4459	12	4.4	3330 3331	–	–	–	3	2	41.4	42.1	42.6	1.3	35	75	1.15 (23.1)
	(3.7)	5.9	3332 3333	A	–	–	3	2	43.9	44.3	44.6	1.0	35	77	1.15 (23.1)
4.40-5.00 GHz and 6.425-7.125 GHz															
UMX8-4464	8	4.4	4284 4285	–	–	–	2	2	37.3	38.0	38.4	1.9	35	68	1.15 (23.1)
	(2.4)	6.4	4286 4287	A	A	–	2	2	40.8	41.2	41.6	1.3	35	70	1.15 (23.1)
UMX10-4464	10	4.4	4288 4289	–	–	–	2	2	39.2	39.7	40.2	1.6	35	72	1.15 (23.1)
	(3.0)	6.4	4290 4291	A	A	–	2	2	42.5	42.9	43.4	1.1	35	74	1.15 (23.1)
UMX12-4464	12	4.4	4292 4293	–	–	–	3	2	41.1	41.6	42.2	1.3	35	73	1.15 (23.1)
	(3.7)	6.4	4294 4295	A	A	–	3	2	44.4	44.8	45.3	0.9	35	75	1.15 (23.1)
UMX15-4464	15	4.4	4296 4297	–	–	–	3	2	43.0	43.67	44.1	1.0	35	74	1.15 (23.1)
	(4.6)	6.4	4298 4299	A	A	–	3	2	46.3	46.7	47.2	0.7	35	76	1.15 (23.1)
6.425-7.125 GHz and 7.725-8.275 GHz															
UMX8-6477	8	6.4	4300 4301	A	A	–	3	2	41.7	42.3	42.7	1.3	35	70	1.15 (23.1)
	(2.4)	7.7	4302 4303	–	–	–	3	2	43.3	43.8	44.0	1.1	35	73	1.15 (23.1)
UMX10-6477	10	6.4	4304 4305	A	A	–	3	2	42.8	43.4	43.8	1.0	35	74	1.15 (23.1)
	(3.0)	7.7	4306 4307	A	A	–	3	2	44.6	44.8	45.0	0.8	35	76	1.15 (23.1)
UMX12-6477	12	6.4	4308 4309	A	A	–	3	2	44.9	45.5	45.9	0.7	35	75	1.15 (23.1)
	(3.7)	7.7	4310 4311	–	–	–	3	2	46.4	47.1	47.3	0.6	35	77	1.15 (23.1)
UMX15-6477	15	6.4	4312 4313	A	A	–	3	2	46.5	46.8	47.0	0.7	35	76	1.15 (23.1)
	(4.6)	7.7	4314 4315	A	A	–	3	2	47.9	48.2	48.5	0.6	35	78	1.15 (23.1)

Reference ETSI Document EN300833 for 3 to 60 GHz
* 0.5 lb/in^2 (3.5 kPa) maximum
** 5 lb/in^2 (35 kPa) maximum

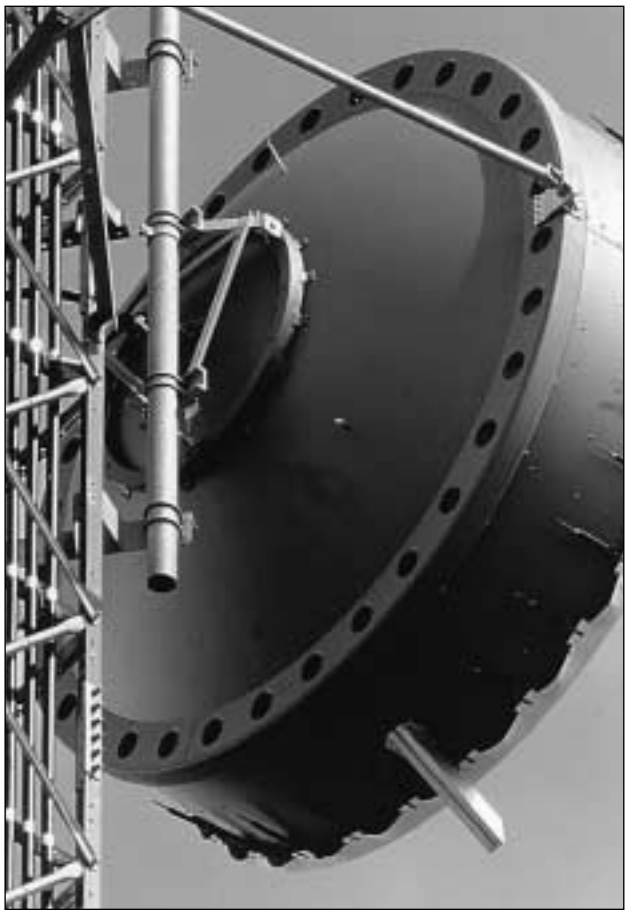
Multiband Antennas

Type Number	Diameter ft (m)	Band	RPE Number(s)	Regulatory Compliance U.S. FCC 101	74	78	ETSI Class	ETSI Gain	Gain, dBi Low	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)
HP 	**High Performance Multiband 2-Port Antennas** (Single Polarized each band, Orthogonal Polarized) **Antenna Inputs:** See page 92														
1.85-1.99 GHz and 6.425-7.125 GHz															
HP8-186**	8	1.8	3960	A	–	–	2	–	30.4	30.7	31.0	4.3	28	51	1.15 (23.1)
	(2.4)	6.4	3961 3962	B	A	–	2	2	41.5	41.9	42.4	1.3	30	69	1.10 (26.4)
HP10-186**	10	1.8	3963	A	–	–	2	–	32.4	32.7	33.0	3.7	28	54	1.15 (23.1)
	(3.0)	6.4	3964 3965	B	A	–	2	2	42.7	43.0	43.4	1.0	30	71	1.10 (26.4)
4.4-5.0 GHz and 7.725-8.5 GHz															
HP8-4477	8	4.4	815	–	–	–	2	2	38.2	38.7	39.3	2.0	35	64	1.20 (20.8)
	(2.4)	7.7	816	–	–	–	2	2	42.8	43.1	43.4	1.2	35	71	1.15 (23.1)
HP10-4477	10	4.4	811	–	–	–	2	2	40.3	40.6	41.2	1.6	35	67	1.20 (20.8)
	(3.0)	7.7	812	–	–	–	2	2	44.2	44.5	44.7	0.8	35	74	1.15 (23.1)
HP12-4477	12	4.4	813	–	–	–	2	2	42.0	42.4	43.1	1.3	35	69	1.20 (20.8)
	(3.7)	7.7	814	–	–	–	2	2	46.4	46.7	46.9	0.7	35	78	1.15 (23.1)
5.925-6.425 GHz and 10.7-11.7 GHz															
HP8-611*	8	5.9	3038	A	–	–	2	2	40.9	41.3	41.6	1.4	35	65	1.06 (30.7)
	(2.4)	10.7	3040	A	–	–	2	2	44.3	44.7	45.1	0.8	25	70	1.10 (26.4)
HP10-611*	10	5.9	3049	A	–	–	3	2	42.7	43.0	43.2	1.1	30	72	1.06 (30.7)
	(3.0)	10.7	3050	A	–	–	2	2	46.1	45.8	46.2	0.7	25	72	1.10 (26.4)
HP12-611*	12	5.9	3046	A	–	–	3	2	44.3	44.7	45.0	0.9	28	72	1.06 (30.7)
	(3.7)	10.7	3048	A	–	–	2	2	46.9	47.3	47.7	0.5	25	72	1.10 (26.4)
6.425-7.125 GHz and 10.7-11.7 GHz															
HP8-6511*	8	6.4	2387	B	A	–	2	2	41.6	41.9	42.3	1.3	32	65	1.06 (30.7)
	(2.4)	10.7	2392	A	–	–	2	2	44.3	44.7	45.1	0.8	25	70	1.10 (26.4)
P 	**Standard Multiband 3-Port Antennas** (2 GHz Single Polarized, 6 GHz Dual Polarized) **Antenna Inputs:** See page 92														
1.85-1.99 GHz and 6.425-7.125 GHz															
P8-186**	8	1.8	3945	A	–	–	–	–	30.5	30.8	31.1	4.4	18	39	1.15 (23.1)
	(2.4)	6.4	3946 3947	B	B	–	1	2	41.6	42.0	42.5	1.3	30	49	1.10 (26.4)
P10-186**	10	1.8	3950	A	–	–	–	–	32.5	32.8	33.1	3.7	20	42	1.15 (23.1)
	(3.0)	6.4	3951 3952	B	A	–	1	2	43.7	43.4	43.8	1.0	30	52	1.10 (26.4)
P 	**Standard Multiband 2-Port Antennas** (Both Bands Single Polarized, Orthogonal Polarization) **Antenna Inputs:** See page 92														
6.875-7.125 GHz and 12.70-13.25 GHz															
P8-6812	8	6.8	1093	–	A	–	1	2	42.2	42.4	42.5	1.3	30	53	1.10 (26.4)
	(2.4)	12.7	1094	B	B	B	–	–	44.6	43.1	42.2	1.1	15	54	1.15 (23.1)
P10-6812	10	6.8	1095	–	A	–	1	2	42.8	43.0	43.1	1.2	30	59	1.10 (26.4)
	(3.0)	12.7	1096	B	B	B	–	–	44.7	43.1	40.7	1.1	10	60	1.15 (23.1)

Reference ETSI Document EN300833 for 3 to 60 GHz

* 5 lb/in^2 (35 kPa) maximum

** 2 lb/in^2 (14 kPa) maximum



Mounting Information

All microwave antennas listed on pages 51-94, except UMX-459 series, include a mount for attachment to a vertical pipe. Standard mounting information is summarized in the table on page 96. Special purpose mounts are described on page 122. Dimensional information and illustrations for installation planning are presented on pages 97-110.

Mounting pipe. Vertical tower mounts attached to a tower supported vertical pipe of the diameter specified on page 96. The mounting pipe is not included with the antenna. It is normally purchased as part of the tower.

Mount construction. Structural members are hot-dip galvanized steel or aluminum.

Hardware. Fixed hardware is hot-dip galvanized steel. Adjusting hardware, including adjusting rods, is stainless steel.

Azimuth and elevation adjustments. The adjustment ranges are indicated in the table on page 96. Some mounts, as noted in the table, use a swivel clamp for azimuth adjustment. Adjustment range for these is 360 degrees. All mounts have threaded fine elevation adjustment, except those for the 4 ft (1.2 m) GRIDPAK® and the Mini-GRIDPAK® antennas.

Side struts. Some antennas include one or two side struts. The number supplied with each antenna is indicated in the table on page 96. Where one side strut is supplied, it includes a stainless steel threaded rod fine azimuth adjustment. Where two side struts are supplied, one is adjustable (has fine azimuth adjustment) and the other is fixed (adjustable but without fine azimuth adjustment). Refer to page 97 for information on side strut positioning.

Vertical Tower Mounts

The vertical tower mounts listed below are included as part of all new antennas. Mount type numbers are shown for ordering replacement mounts.

Antenna Size, ft (m)	Replacement Mount Type Number Metric Standard Hardware	Mounting Pipe Dia. in (mm)	Center Offset* in (mm)	Fine Azimuth Adjustment Degrees	Fine Elevation Adjustment Degrees	Side Struts Included
Shielded Antennas						
4 (1.2)	**T6MSB**	4.5 (115)	5.4 (137)**	±5	±5	–
6 (1.8)	**T6MSC**	4.5 (115)	5.4 (137)**	±5	±5	1
8 (2.4)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	2
10 (3.0)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	2
12 (3.7)	**T12MSA††**	4.5 (115)	8.5 (215) left*	±5	±5	2
15 (4.6)	**Integral**	4.5 (115)	8.0 (200) right*	±5	±3.6	1
Standard and Focal Plane Antennas						
4 (1.2)‡	**T6MSB**	4.5 (115)	5.4 (137)**	±5	±5	–
4 (1.2)‡‡	**46770A-2**	4.5 (115)	5.4 (137)**	***	±5	–
6 (1.8)‡	**T6MSB**	4.5 (115)	5.4 (137)**	±5	±5	–
6 (1.8)‡‡	**46770A-2**	4.5 (115)	5.4 (137)**	***	±5	–
8 (2.4)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	1
10 (3.0)	**T10MSB**	4.5 (115)	8.0 (200) left*	±5	±5	1
12 (3.7)	**T12MSA**	4.5 (115)	8.5 (215) left*	±5	±5	2
15 (4.6)	**Integral**	4.5 (115)	8.0 (200) right*	±5	±3.6	1
GRIDPAK® Antennas						
4 (1.3)	**Integral**	4.5 (115)	6.88 (175)	***	±15	–
6 (2)	**140854**	4.5 (115)	6.88 (175)	***	±5	–
8 (2.4)	**140855**	4.5 (115)	6.88 (175)	±5	±5	1
10 (3)	**140856**	4.5 (115)	6.88 (175)	±5	±5	1
13 (4)	**140857**	4.5 (115)	6.88 (175)	±5	±5	2

* With respect to the mounting pipe viewed from the rear of the antenna. Can be reversed by inverting the mount or antenna.
** Can be offset right or left without inverting the mount or antenna.
*** 360° azimuth capability, no fine adjustment.
†† UHX12-59 includes a bottom strut and requires a 10 ft (3 m) long mounting pipe.
‡ Applies to antennas 3.5 GHz and higher.
‡‡ Applies to antennas 2.7 GHz and lower, except for FP antennas which use the T6MSB mount.
Note: Integral mounts consist of multiple type numbers. Contact Andrew for type numbers.

Dimensional information and illustrations for installation planning are presented on the following pages.

Side Strut Positioning

For maximum wind load capacity, side struts should be installed straight back to the tower. When this is not possible, the following guidelines apply:

When only one side strut is supplied, its angle should not exceed ±25° in the horizontal plane and ±5° in the vertical plane. See illustration for "adjustable strut".

For antennas with two side struts, the adjustable strut can be lowered or raised 5° from horizontal. The fixed side strut can be lowered or raised 25°. In the horizontal plane, both struts can be positioned at an angle up to 25°. See illustration at right. Further, the strut closest to the mounting pipe may be positioned at an angle up to 35°, provided the sum of the angles for both struts does not exceed 50°.

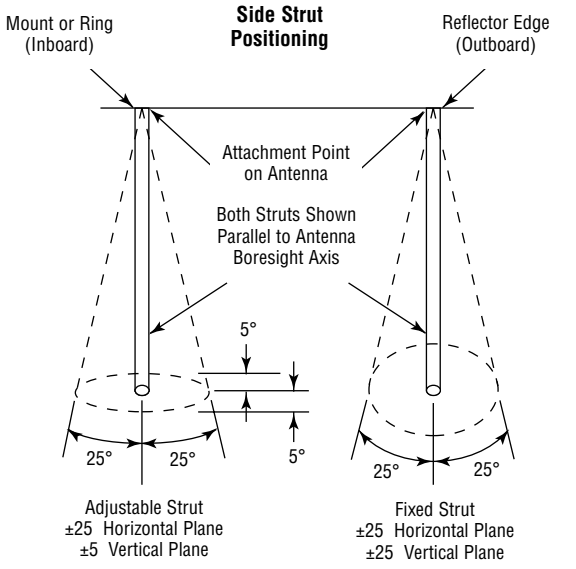
Feed Orientation

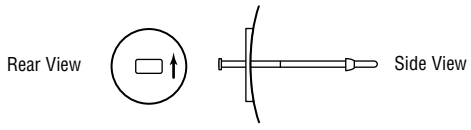
All Andrew solid parabolic antennas are fed from the center of the reflector and include polarization adjustment. The polarizations are clearly marked with arrows on the feed mounting hub. For single polarized antennas, the arrow is positioned up or down for vertical polarization and right or left for horizontal polarization. See illustrations.

Dual polarized, waveguide fed antennas have both input flanges in the same plane to ease the attachment of waveguide. One input signal is rotated 90° inside the feed horn to provide cross polarization.

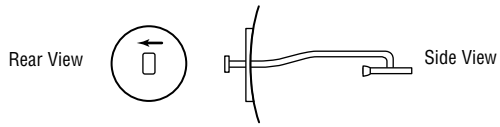
UHX® high performance antennas have asymmetrical patterns with lower sidelobe levels on one side. For these antennas, RPEs are prepared for the full 360°. The frequency coordinator can use the better half of the radiation pattern on either the right or the left side of the antenna to reduce potential interference. HSX and UHX feed hubs use red to identify the better side. This side can be placed either right or left or boresight. Therefore, it is necessary for the frequency coordinator to specify "red right" or "red left" feed position.

The installer must be advised of the proper feed orientation on all ultra high performance antennas and the proper polarization for single-polarized antennas.

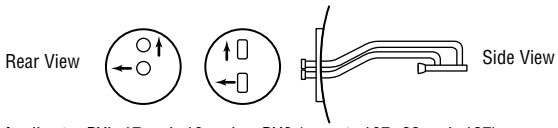




Vertically Polarized Antenna

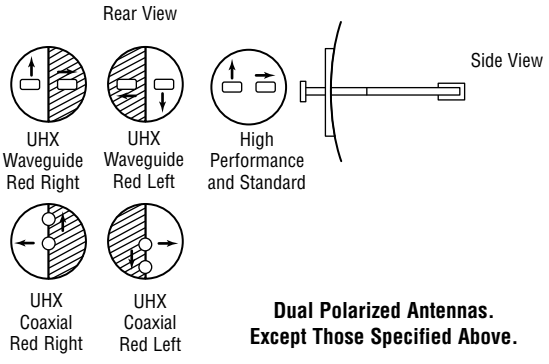


Horizontally Polarized Antenna



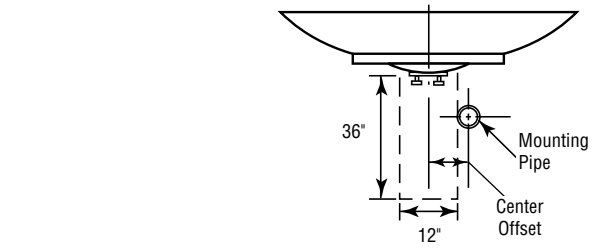
Applies to: PXL-17 and -19 series, PX6 (except -107 -22 and -127), PXL6 (except -107, -122 and -127) PXL10-37, PXL8-37

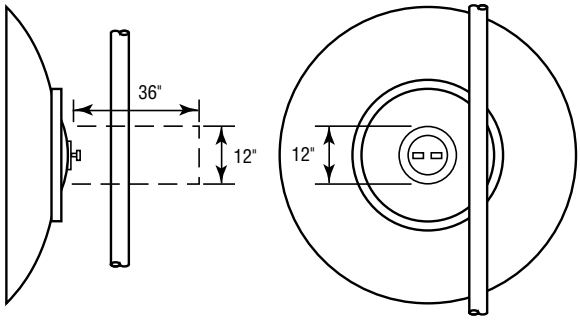
Dual Polarized Antennas. Applies to Specified Types



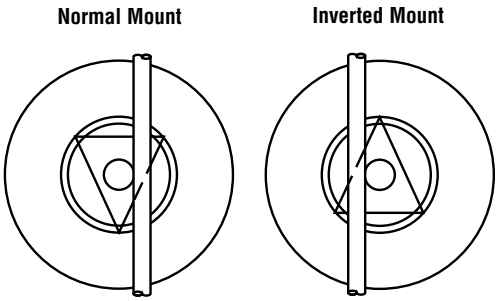
Dual Polarized Antennas. Except Those Specified Above.

Feed Installation





Clear space required behind reflector for routing and attachment of transmission line.



Normal and Inverted Mounts. Applies to all 8, 10 and 12 ft antennas.

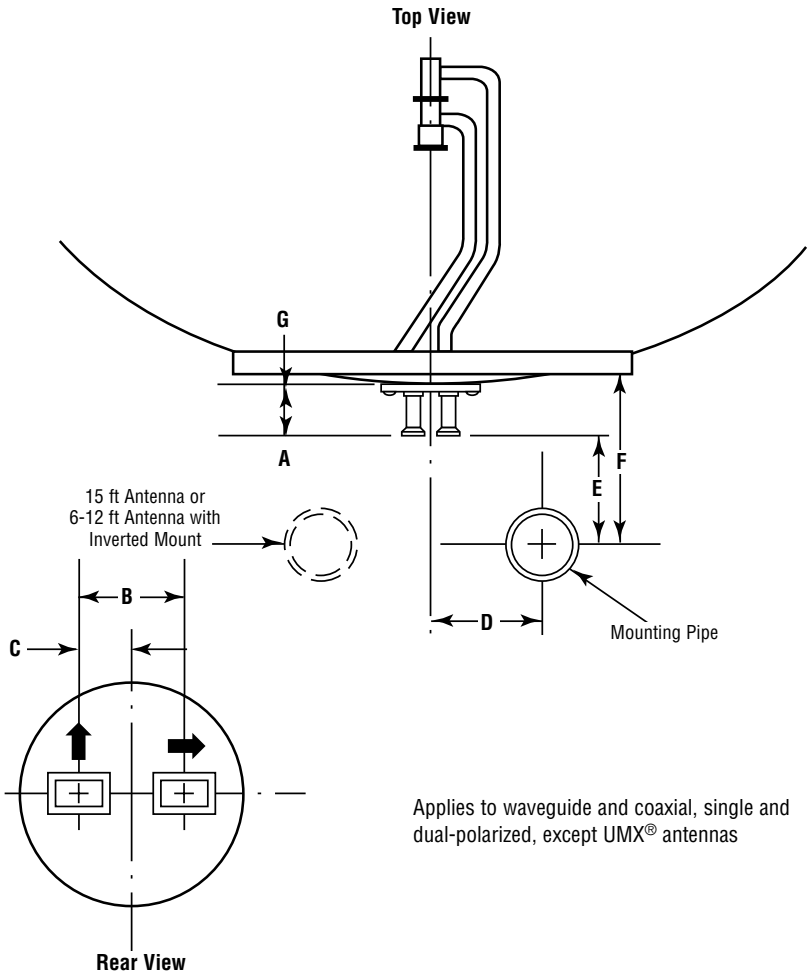
Most feeds are designed to be originally installed from the front of the antenna. However, single-polarized feeds (except -59, -65, -70, -71, -77 series) and most dual polarized -105, -107, -122, -127, -130, -144, -180, -220 series feeds (except HPX()-105A, UHX()-107 and UHX()-127H) can be replaced from the back of the antenna. All other feeds, including dual band feeds, must be inserted from the front of the antenna before the radome is attached.

Reversing the Feed Offset

It is recommended that a cylindrical clear space of 12 in (305 mm) diameter by 36 in (915 mm) long be provided behind the center of the antenna to permit proper routing and attachment of the transmission line. Tower members directly behind the feed will interfere with the routing of the HELIAX® elliptical waveguide or coaxial cable to the feed. If there are interfering members behind the center of the antenna when mounted normally, it is possible to reverse the feed offset to position the feed on the other side of the mounting pipe.

The antenna mount can be inverted to change the offset of the feed for all 8, 10 and 12-ft antennas. Reflectors used on these antennas are designed to accommodate both standard and inverted mounting. To shift the offset of 1-ft, 2-ft and 15-ft antennas, the entire antenna is inverted. The offset for 4-ft and 6-ft antennas can be shifted without inverting the mount or antenna.

The installer should be advised which antennas require inverted mounting prior to assembly and the antennas should be clearly identified prior to lifting.



Applies to waveguide and coaxial, single and dual-polarized, except UMX® antennas

The dimensions presented below are for use in planning transmission line routing for waveguide, coaxial, single-polarized and dual-polarized feeds.

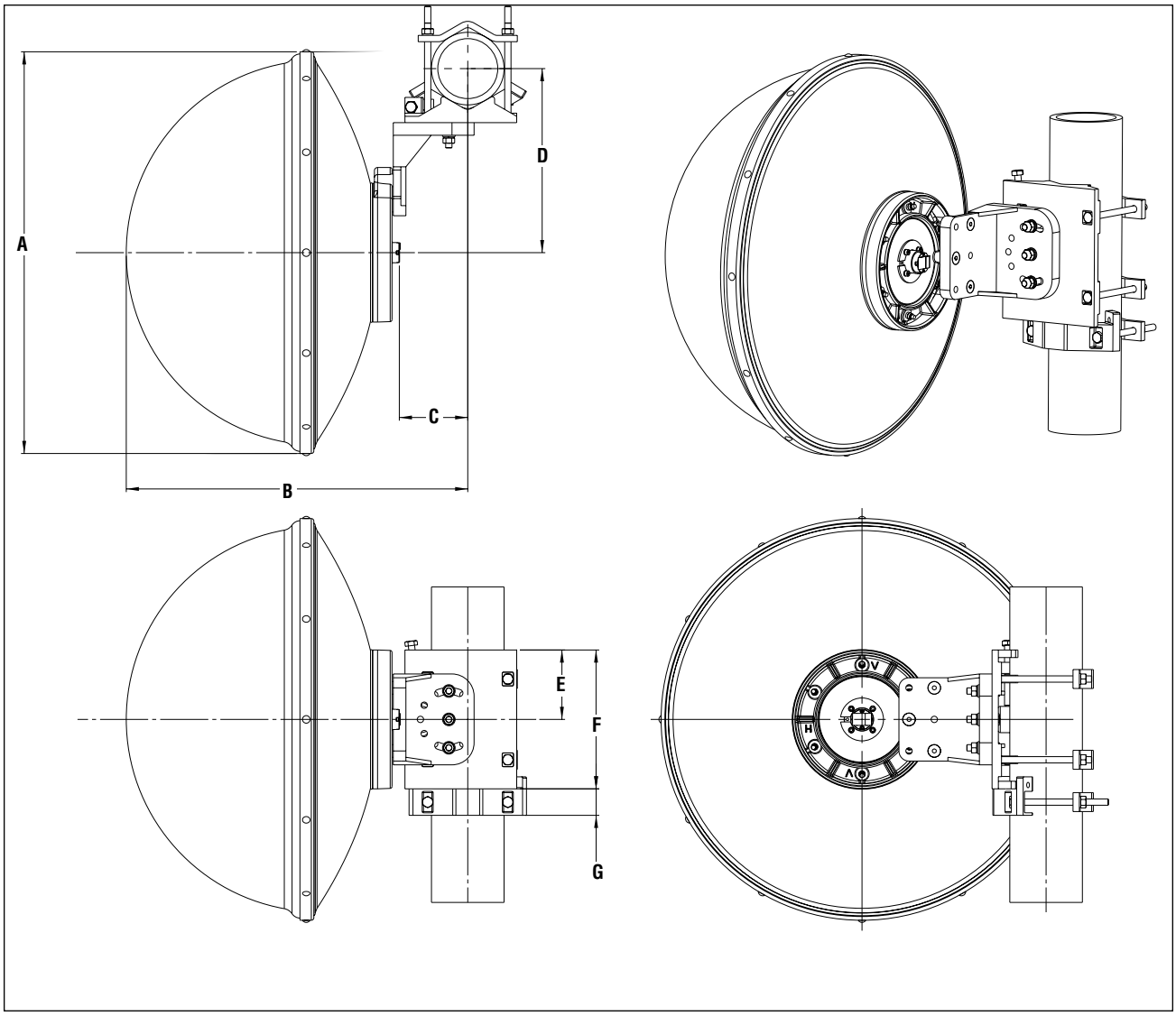
Dimensions A, B, C and E

A	= 4.5 in (115 mm)
B	= 3 in (76 mm)
C	= 1.5 in (38 mm)
E	= F - (G + A)

Dimensions D, F and G, in (mm)

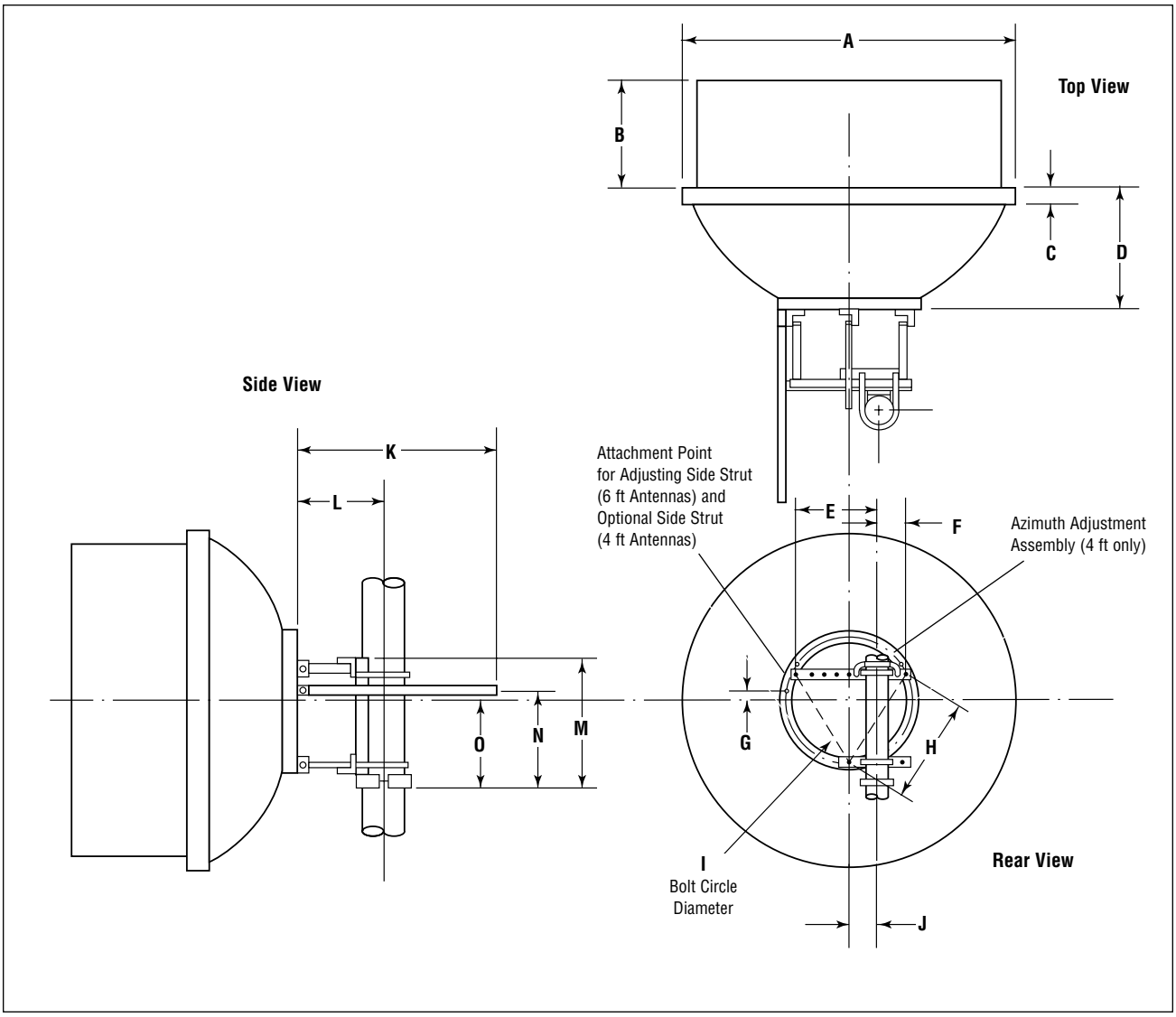
Antenna Type and Size, ft (m)	D	F	G
Shielded Antennas			
4 (1.2)	5.4 (140)	14.5 (370)	0.75 (19)
6 (1.8)	5.4 (140)	11.75 (298)	-0.6 (-15)
8 and 10 (2.4 and 3.0)	8 (205)	13 (330)	1.1 (28)
12 (3.7)	8.5 (215)	13 (330)	0.5 (13)
15 (4.6)	- 8 (-205)	15.25 (387)	8.1 (206)
Standard Antennas			
4 (1.2)	5.4 (135)	11.75 (298)	0.75 (19)
6 (1.8)	5.4 (135)	11.75 (298)	-0.6 (-15)
8 and 10 (2.4 and 3.0)	8 (205)	13 (330)	1.1 (28)
12 (3.7)	8.5 (215)	13 (330)	0.5 (-13)
15 (4.6)	-8 (-205)	15.25 (387)	8.1 (206)

2 ft Standard Antenna



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G
2 (0.6)	25.0 (637)	21.0 (541)	4.3 (108)	11.5 (292)	4.3 (110)	8.7 (220)	1.6 (42)

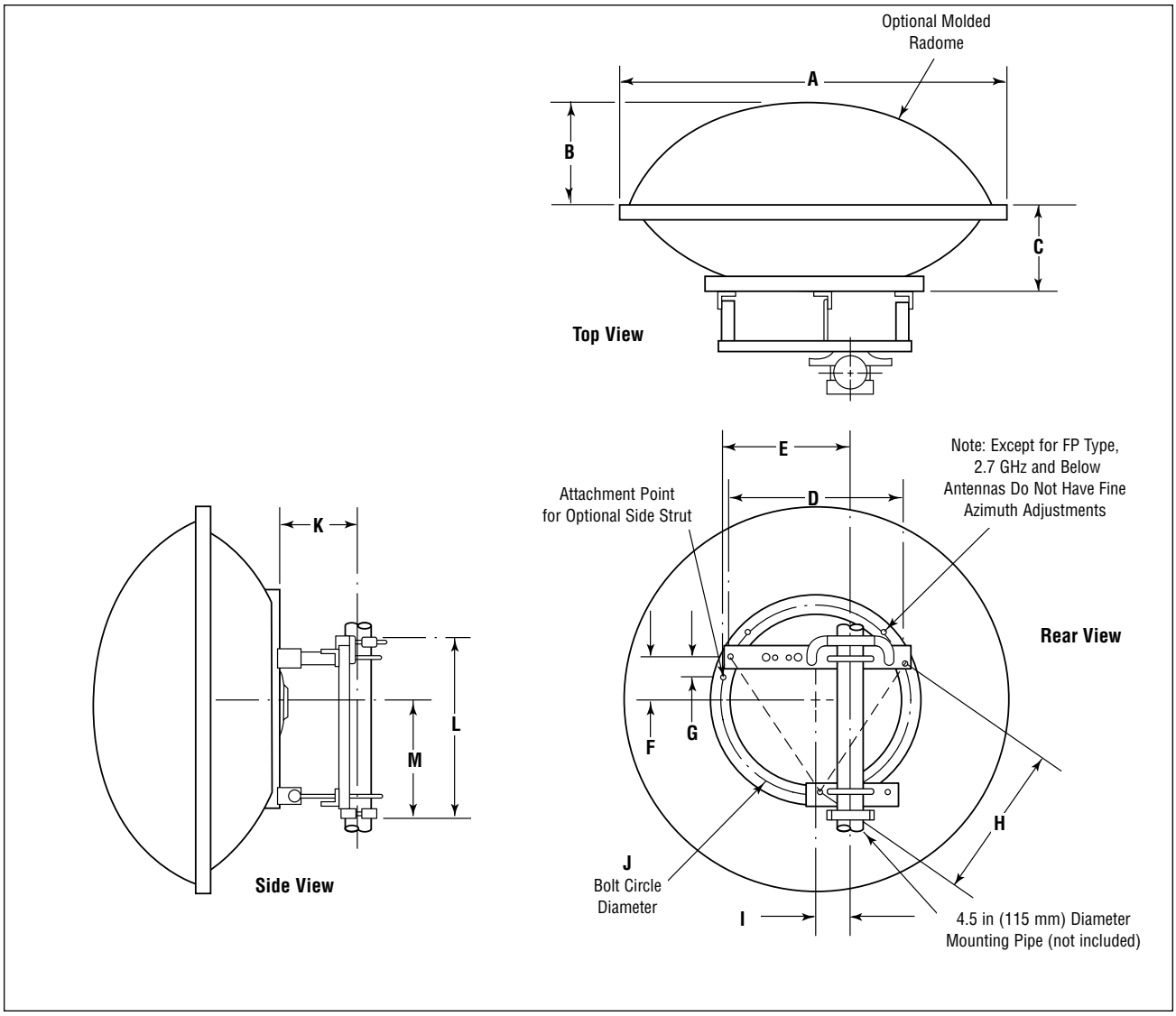


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G	H
4 (1.2)	52.4 (1330)	23.1 (585)	3.5 (90)	7.75 (195)	19.6 (500)	6.9 (175)	2.25 (55)	26.5 (675)
6 (1.8)	76.5 (1945)	35.25 (895)	3.75 (95)	13.25 (335)	19.6 (500)	6.9 (175)	2.25 (55)	26.5 (675)

	I	J	K	L	M	N	O
4 (1.2)	30.6 (780)	6.4 (160)	–	11.62 (295)	29 (735)	21.5 (545)	19.25 (490)
6 (1.8)	30.6 (780)	6.4 (160)	84.75 (2155)	11.62 (295)	29 (735)	21.5 (545)	19.25 (490)

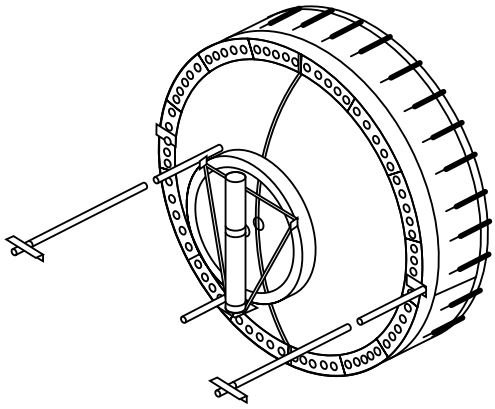
4 and 6 ft Standard and Focal Plane Antennas



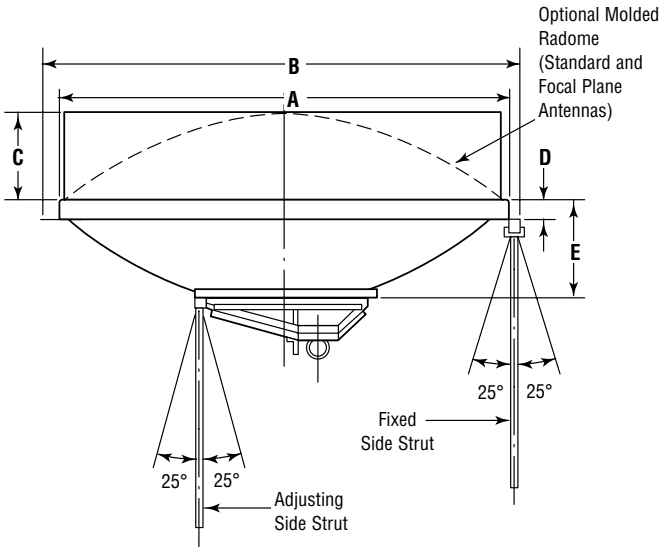
Dimensions in Inches (mm)

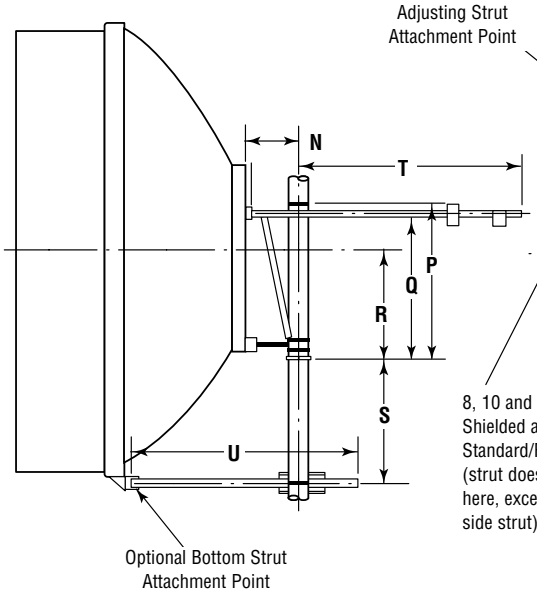
Antenna Size, ft (m)	A	B	C	D	E	F	G
Standard Antennas							
4 (1.2)	52.4 (1330)	18.5 (470)	7.75 (195)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
6 (1.8)	76.3 (1940)	27.75 (690)	13.2 (335)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
Focal Plane Antennas							
4 (1.2)	50.75 (1290)	23.3 (590)	9.5 (245)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
6 (1.8)	76 (1930)	13.46 (340)	17.5 (445)	26.5 (675)	21.5 (545)	7.75 (195)	2.25 (60)
	H	**I**	**J**	**K**	**L**	**M**	
Standard Antennas							
4 (1.2)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	
6 (1.8)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	
Focal Plane Antennas							
4 (1.2)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	
6 (1.8)	26.5 (675)	5 (137)	30.6 (780)	11.6 (295)	30.75 (780)	19 (480)	

8, 10 and 12 ft Shielded, Standard and Focal Plane Antennas

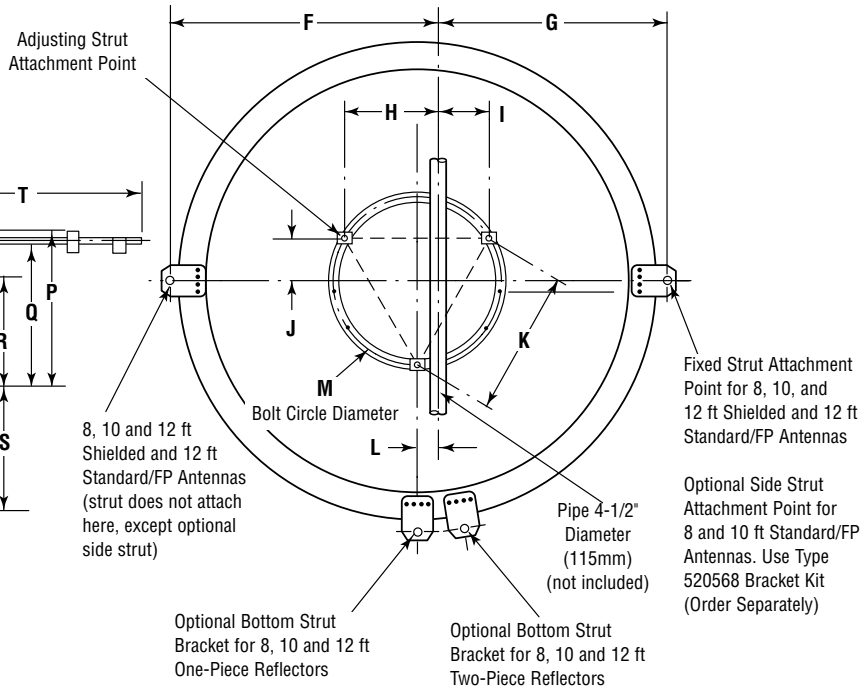


Top View





Side View



Rear View

8, 10 and 12 ft Shielded, Standard and Focal Plane Antennas

Dimensions in Inches (mm)

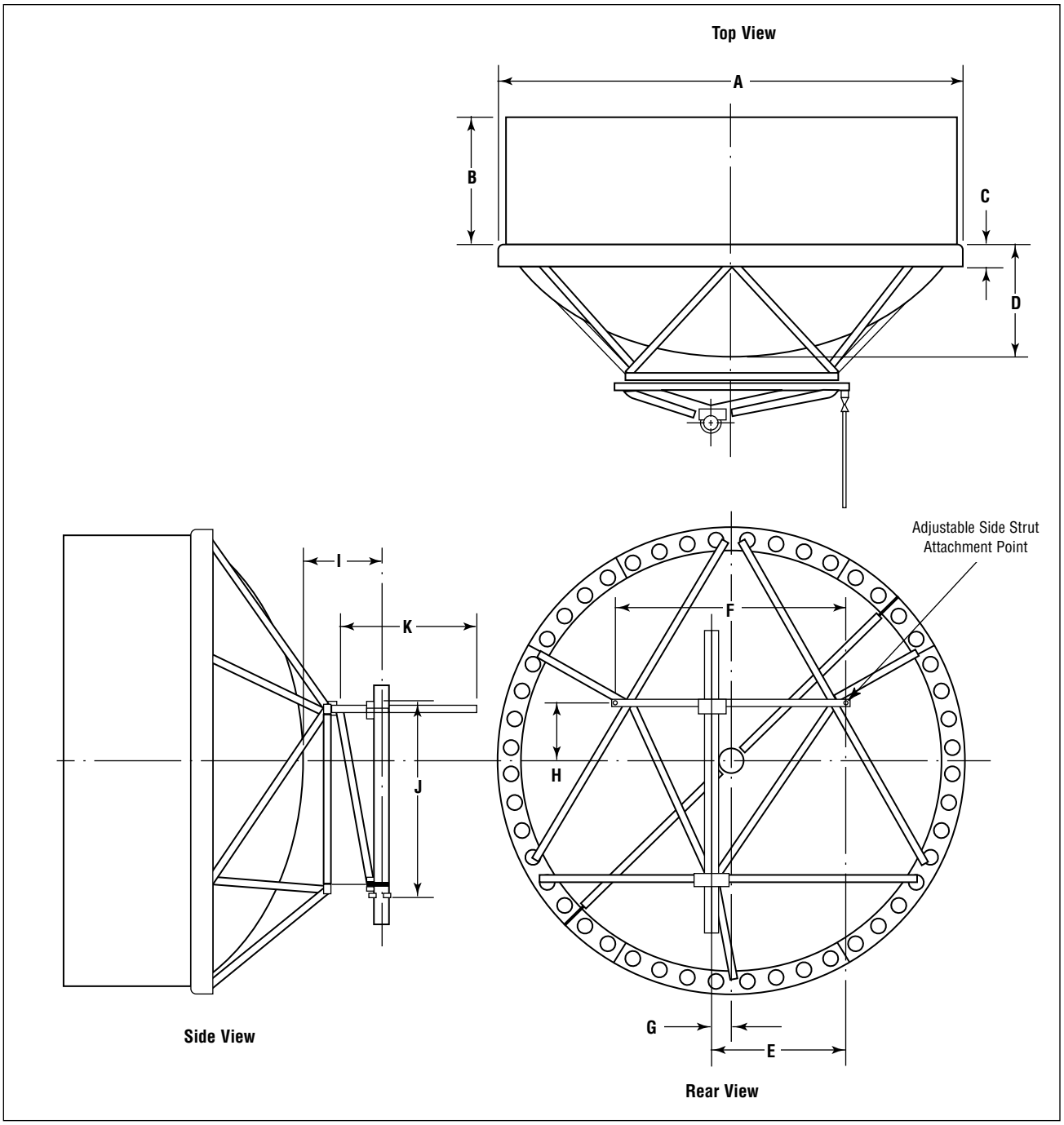
Antenna Size, ft (m)	A	B	C	D	E	F	G
Shielded Antennas (Except Dual Beam with Extended Mount)							
8 (2.4)	100.5 (2555)	106.5 (2705)	41.75 (1060)	5 (125)	15.5 (395)	59.75 (1520)	43.25 (1110)
10 (3.0)	124.5 (3160)	130.5 (3315)	31.5 (800)**	5.5 (140)	24.25 (615)	71.75 (1820)	55.75 (1415)
12 (3.7)	148.5 (3775)	154.5 (3915)	43 (1090)*	5.75 (145)	27 (685)	84.25 (2140)	67.25 (1710)
Dual Beam Antennas with Extended Mount (Sum and Difference)							
8 (2.4)	100.5 (2555)	106.5 (2705)	41.75 (1060)	5 (125)	15.5 (395)	62.75 (1595)	40.25 (1020)
10 (3.0)	124.5 (3160)	130.5 (3315)	31.5 (800)	5.5 (140)	24.25 (615)	74.75 (1900)	52.75 (1340)
12 (3.7)	148.5 (3775)	154.5 (3915)	43 (1090)	5.75 (145)	27 (685)	86.75 (2205)	64.75 (1645)
Focal Plane Antennas							
8 (2.4)	100.5 (2555)	106.5 (2705)	26.5 (670)	5 (125)	21.5 (545)	59.75 (1520)	43.25 (1110)
10 (3.0)	124.5 (3160)	130.5 (3315)	36.25 (920)	5.5 (140)	29.5 (750)	71.75 (1820)	55.75 (1415)
12 (3.7)	148.5 (3775)	154.5 (3915)	40.5 (1030)	5.75 (145)	35.5 (905)	84.25 (2140)	67.25 (1710)
Standard Antennas							
8 (2.4)	100.5 (2555)	–	36 (915)	5 (125)	15.5 (395)	–	–
10 (3.0)	124.5 (3160)	–	32.75 (830)	5.5 (140)	24.25 (615)	71.75 (1820)	–
12 (3.7)	148.5 (3775)	154.5 (3925)	36.5 (930)	5.75 (145)	27 (685)	84.25 (2140)	67.25 (1710)

Antenna Size, ft (m)	H	I	J	K	L	M
Shielded Antennas (Except Dual Beam with Extended Mount)						
8 (2.4)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)
10 (3.0)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)
12 (3.7)	32.75 (835)	15.75 (400)	14 (355)	47.5 (1205)	8.5 (215)	56.25 (1430)
Dual Beam Antennas with Extended Mount (Sum and Difference)						
8 (2.4)	29.75 (755)	7.75 (195)	10.75 (275)	37.5 (950)	11.0 (280)	43.25 (1100)
10 (3.0)	29.75 (755)	7.75 (195)	10.75 (275)	37.5 (950)	11.0 (280)	43.25 (1100)
12 (3.7)	35.25 (895)	13.25 (335)	14 (355)	47.5 (1205)	11.0 (280)	56.25 (1430)
Focal Plane Antennas						
8 (2.4)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)
10 (3.0)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)
12 (3.7)	32.75 (835)	15.75 (400)	14 (355)	47.5 (1205)	8.5 (215)	56.25 (1430)
Standard Antennas						
8 (2.4)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)
10 (3.0)	26.75 (680)	10.75 (275)	10.75 (275)	37.5 (950)	8 (200)	43.25 (1100)
12 (3.7)	32.75 (835)	15.75 (400)	14 (355)	47.5 (1205)	8.5 (215)	56.25 (1430)

Antenna Size, ft (m)	N	P	Q	R	S	T	U
Shielded Antennas (Except Dual Beam with Extended Mount)							
8 (2.4)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	13 (330)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)
Dual Beam Antennas with Extended Mount (Sum and Difference)							
8 (2.4)	20 (510)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	20 (510)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	20 (510)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)
Focal Plane Antennas							
8 (2.4)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	13 (330)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)
Standard Antennas							
8 (2.4)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	27.25 (695)	120 (3050)	60 (1525)
10 (3.0)	13 (330)	37.5 (950)	35.25 (895)	24.5 (625)	39.25 (1000)	120 (3050)	60 (1525)
12 (3.7)	13 (330)	48.25 (1225)	45 (1145)	31 (790)	44.75 (1140)	120 (3050)	60 (1525)

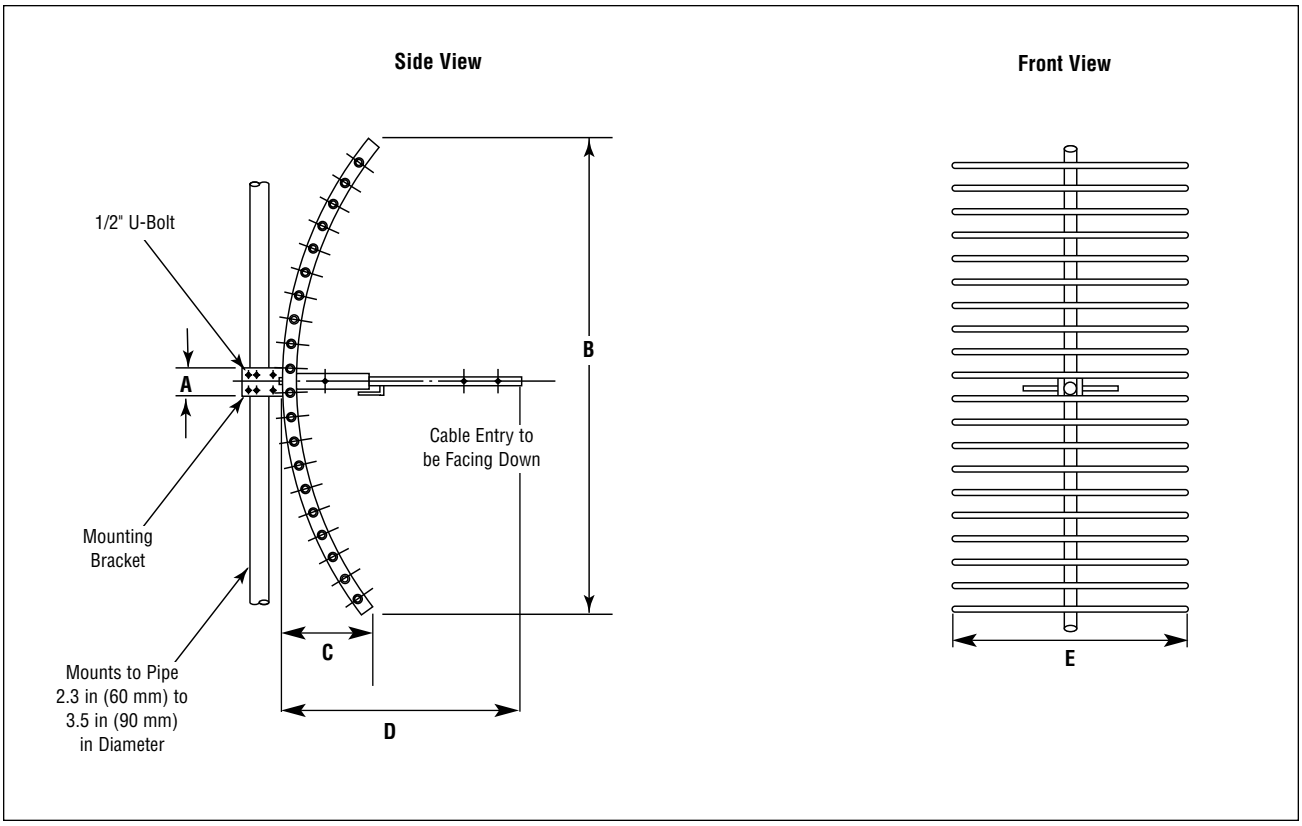
* C = 57-1/4 in (1455 mm) for UHX12-59 ** C = 37.0 in (940 mm) for HDX10-107

15 ft Shielded and Standard Antennas



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G	H	I	J	K
15 (4.6)	184.5 (4685)	49.0 (1245)	5.3 (135)	34.0 (865)	51.5 (1310)	87 (2210)	8 (200)	23.5 (595)	23.5 (595)	76.0 (1930)	108 (1240)



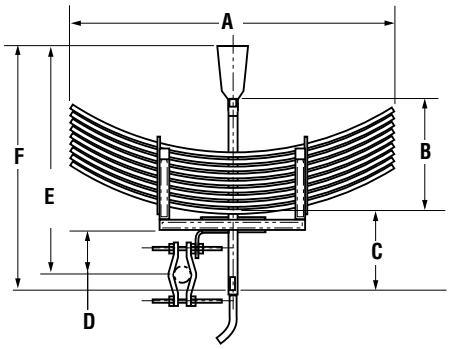
Dimensions

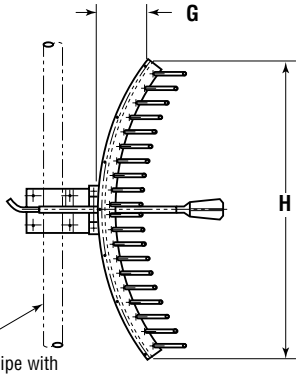
Antenna Size, ft (m)	A in (mm)	B ft (m)	C in (mm)	D in (mm)	E ft (m)
6.6 x 3.3 (2 x 1)	5 (127)	6.6 (2)	15.4 (340)	37.0 (940)	5.3 (1)

3 and 4 ft GRIDPAK® Antennas

3 ft GRIDPAK® Antennas

Top View





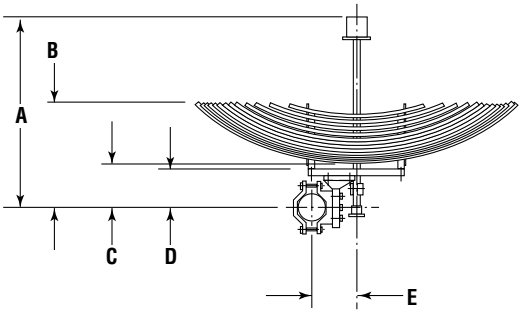
Mounts to Pipe with Outside Diameters from 1.88 in (48mm) to 4.5 in (115mm)

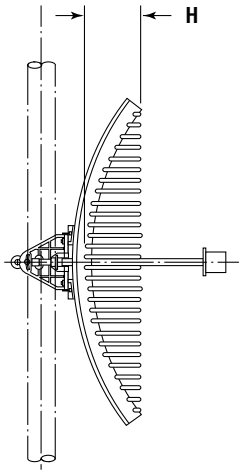
Side View

4 ft GRIDPAK® Antennas

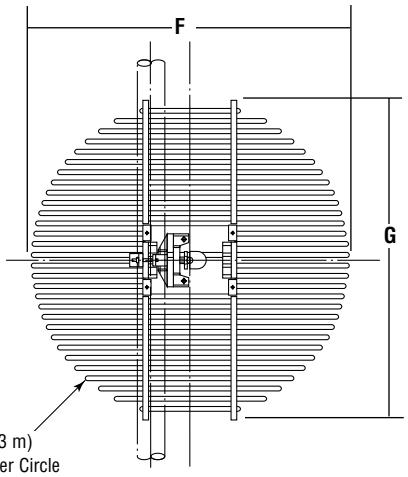
NOTE: Antenna shown is horizontally polarized and offset right

Top View





Side View

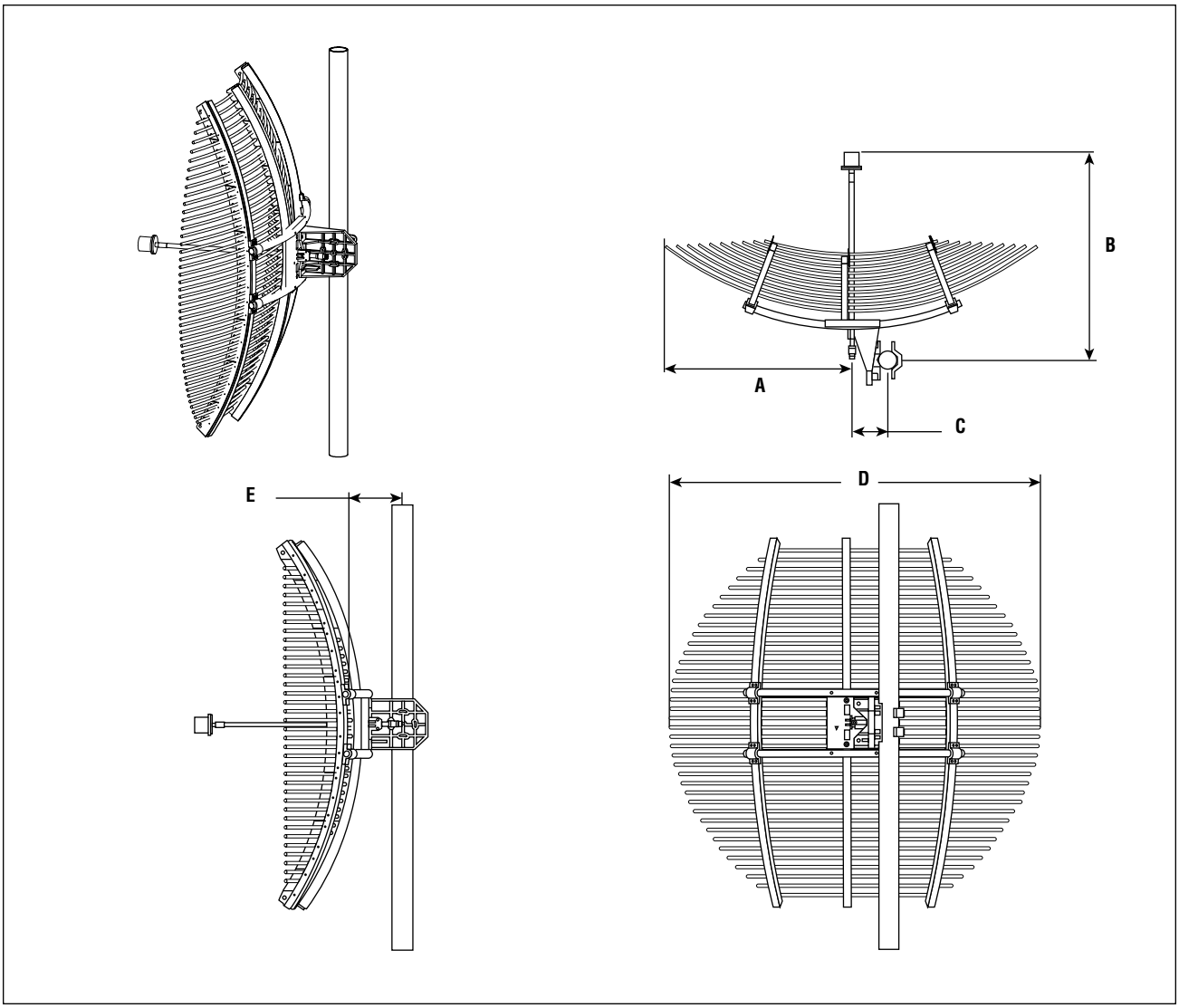


4 ft (1.3 m) Diameter Circle

Rear View

Dimensions in Inches (mm)

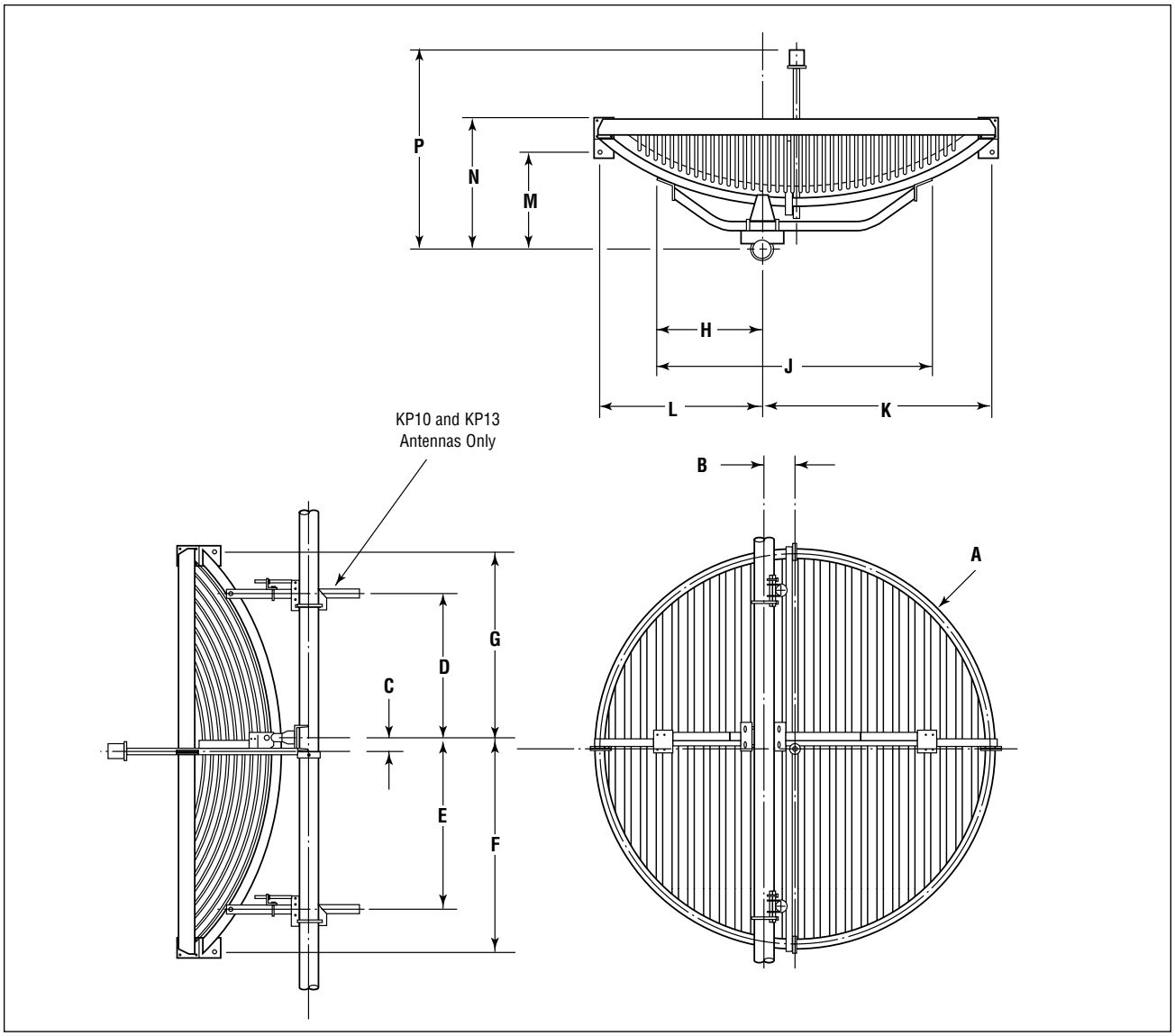
Antenna Size, ft (m)	A	B	C	D	E	F	G	H
3 (1.0)	32.3 (950)	10.9 (278)	8.1 (205)	3.6 (92)	20.5 (520)	23.1 (587)	65 (165)	37.8 (959)
4 (1.2)	29.9(772)	16.4 (416)	7.3 (185)	5.7 (146)	6.9 (175)	48.5 (1231)	51.5 (1309)	8.3 (232)



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E
6 (2.0)	41.3 (1049)	46.0 (1172)	8.0 (200)	81.0 (2061)	12.0 (304)

8, 10 and 13 ft GRIDPAK® Antennas



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G	H	J	K	L	M	N	P
8 (2.4)	99.8 (2536)	6.9 (175)	2.7 (68)	– –	40.4 (1026)	52.5 (1333)	47.1 (1197)	29.9 (760)	73.6 (1870)	56.7 (1440)	42.9 (1089)	25.6 (651)	33.0 (838)	54.8 (1392)
10 (3)	124.0 (3149)	6.9 (175)	2.7 (68)	45.9 (1167)	51.3 (1303)	64.6 (1641)	58.3 (1505)	38.4 (976)	90.6 (2302)	68.8 (1748)	55.0 (1398)	34.2 (868)	41.5 (1055)	54.3 (1378)
13 (4)	162.7 (4135)	6.9 (175)	3.0 (76)	58.7 (1491)	64.7 (1643)	84.3 (2140)	78.3 (1988)	56.4 (1433)	126.6 (3216)	88.1 (2239)	74.4 (1889)	39.7 (1008)	47.0 (1195)	71.6 (1818)

Wind Forces

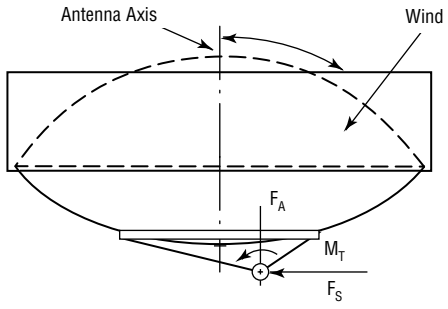
The axial, side and twisting moment forces tabulated below and on page 112 are maximum values exerted on a supporting structure. They are the result of wind from the most critical direction for each parameter. The individual maximums may not occur simultaneously. All forces are referenced to the antenna mounting pipe. The components are:

- *Axial Force, F_A*
- *Side Force, F_S*
- *Twisting Moment, M_T*

Andrew software, included on the Powertools CD-ROM and downloadable from www.andrew.com, calculates the forces produced by winds from any angle.

See page 44 for more information about Powertools.

Parabolic Antennas



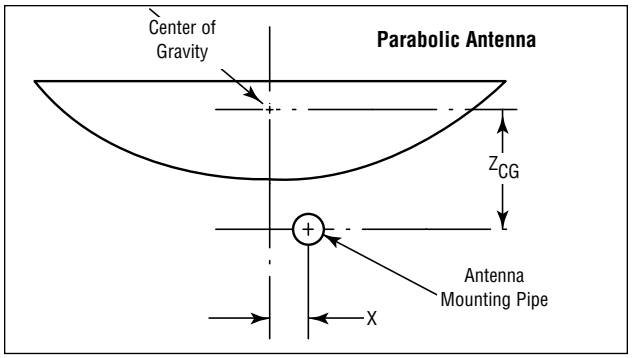
Top View

Wind Forces at 125 mph (200 km/h)

Antenna Type	Antenna Dia. ft (m)	F_A Max. lb	F_A Max. (N)	F_S Max. lb	F_S Max. (N)	M_T Max. lb-ft	M_T Max. (N•m)	α For M_T Max
Shielded Antenna	4 (1.2)	634	2821	314	1398	-632	-826	-110
With Planar Radome	6 (1.8)	1427	6348	707	3144	-1681	-2209	-110
(Except "other shielded"	8 (2.4)	2537	11284	1257	5590	-3615	-4901	-110
shown below)	10 (3.0)	3964	17632	1964	8734	-6365	-8630	-110
	12 (3.7)	5708	25390	2827	12577	-10423	-14132	-110
	15 (4.6)	8919	39672	4418	19652	22000	29828	110
Other Shielded, With Planar Radome								
UHX10-59	10 (3.0)	4000	17790	1910	8500	-6880	-9330	-105
UMX10-459	10 (3.0)	4000	17790	1970	8760	-10100	-13700	-105
HDX10-107	10 (3.0)	4040	17970	2065	9190	-7260	-9850	-105
UHX12-59	12 (3.7)	5800	25800	3020	13430	-13610	-18450	-105
UMX12-459	12 (3.7)	5760	25620	2830	12590	13400	18170	105
UMX12-465	12 (3.7)	5910	26290	3210	14280	-15590	-21140	-105
Focal Plane and PAR Series	4 (1.2)	918	4083	279	1240	-705	-937	-125
Antenna without Radome	6 (1.8)	2065	9187	625	2790	-1936	-2635	-125
	8 (2.4)	3672	16333	1115	4960	-4247	-5758	-125
	10 (3.0)	5737	25520	1742	7749	-7608	-10314	-125
	12 (3.7)	8261	36749	2509	11159	-12575	-17050	-125
Focal Plane and PAR Series	4 (1.2)	434	1930	267	1188	540	774	90
Antennas with Radome*	6 (1.8)	976	4343	685	2673	1597	2309	100
	8 (2.4)	1736	7720	1068	4751	3714	5036	99
	10 (3.0)	2712	12064	1669	7424	6883	9333	99
Standard Antenna	4 (1.2)	864	3843	236	1049	-647	-858	-130
without Radome	6 (1.8)	1944	8647	531	2360	-1597	-2425	-130
	8 (2.4)	3456	15372	943	4196	-3945	-5349	-125
	10 (3.0)	5400	24019	1474	6556	-7084	-9605	-125
	12 (3.7)	7775	34587	2122	9441	-11728	-15900	-125
	15 (4.6)	12149	54042	3316	14751	24294	32938	-125
Standard Antenna	2 (0.6)	109	483	67	297	94	128	-10
with Radome	4 (1.2)	434	1930	267	1188	540	774	90
	6 (1.8)	976	4343	685	2673	1597	2309	100
	8 (2.4)	1736	7720	1068	4751	3714	5036	99
	10 ((3.0)	2712	12064	1669	7424	6883	9333	99
	12 (3.7)	3905	17372	2403	10691	11581	15702	99
GRIDPAK® Antenna	4 (1.3)	325	1450	190	840	351	475	60
Without Ice KP Series	6 (2.0)	820	3650	430	1910	1342	1824	60
	8 (2.4)	1180	5250	600	2670	2200	2990	60
	10 (3.0)	1825	8120	1020	4540	3869	5259	60
	13 (4.0)	3135	13940	1750	7780	8022	10903	60

*PAR series use deep reflectors on 6 ft - 8 ft only.

Antenna Weight and Center of Gravity



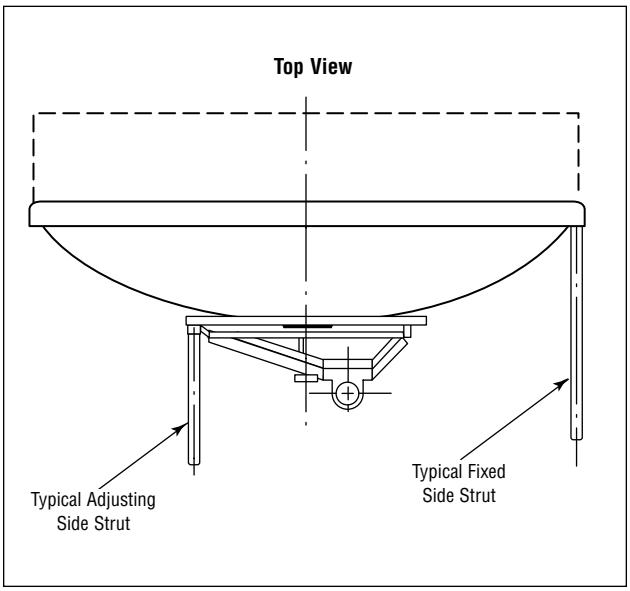
For parabolic antennas, the center of gravity is referenced to the centerline of the antenna mounting pipe as illustrated. Dimension X, the transverse offset, can be found on pages 100 to 110. Dimension Z_{CG} and antenna weights with and without ice are tabulated below.

Antenna Weight and Center of Gravity, Parabolic Antenna Including Mount and Side Struts

Antenna Type	Antenna Dia. ft (m)	Without Ice		With 1/2" (12 mm) Radial Ice	
		Weight, lb (kg)	Z_{CG}, in (mm)	Weight, lb (kg)	Z_{CG}, in (mm)
Shielded Antenna	1 (0.3)	22.9 (10.4)	3.9 (98)	30.6 (13.9)	5.1 (130)
One-Piece Reflector	2 (0.6)	41 (18.5)	9.6 (244)	77 (35)	10.7 (272)
with Planar Radome	2.5 (0.8)	78 (35.5)	6.9 (175)	96 (43.5)	8.5 (215)
(except "Other Shielded"	4 (1.2)	170 (77)	11.1 (282)	280 (127)	14.6 (371)
shown below)	6 (1.8)	281 (127)	20.0 (508)	501 (227)	22.8 (579)
	8 (2.4)	447 (203)	26.5 (673)	974 (430)	28.7 (729)
	10 (3.0)	541 (245)	30.2 (767)	1234 (560)	32.2 (818)
	12 (3.7)	850 (386)	31.2 (792)	1874 (850)	35.8 (909)
Shielded Antenna	8 (2.4)	460 (209)	27.0 (686)	989 (449)	28.8 (732)
Two-Piece Reflector	10 (3.0)	560 (254)	30.7 (780)	1254 (569)	32.3 (820)
with Planar Radome	12 (3.7)	860 (390)	31.8 (808)	1885 (855)	36.0 (914)
	15 (4.6)	1780 (807)	51.4 (1306)	2777 (1260)	54.0 (1372)
Other Shielded, with Planar Radome					
VHP1	1 (0.3)	22.9 (10.4)	3.9 (98)	30.6 (13.9)	5.1 (130)
VHP2	2 (0.6)	68 (31)	6.9 (175)	86 (39)	8.5 (215)
VHP4	4 (1.2)	140 (64)	12.5 (317)	282 (128)	16.7 (424)
VHP6	6 (1.8)	380 (173)	20.0 (508)	620 (282)	33.3 (848)
HDX8S-59	8 (2.4)	470 (213)	25.8 (655)	1010 (458)	28.2 (716)
UMX10-459	10 (3.0)	705 (320)	46.0 (1168)	1310 (594)	51.0 (1295)
HDX10-107	10 (3.0)	555 (252)	30.7 (780)	1275 (578)	32.7 (831)
HDX10S-59	10 (3.0)	560 (254)	29.6 (752)	1270 (576)	32.0 (813)
UMX12-459	12 (3.7)	895 (406)	44.0 (1118)	1660 (753)	49.0 (1245)
UMX12-465	12 (3.7)	960 (435)	29.9 (759)	2025 (919)	31.0 (787)
UHX12-59	12 (3.7)	890 (404)	33.3 (846)	1815 (823)	39.3 (998)
HDX12S-59	12 (3.7)	890 (404)	30.3 (770)	1940 (880)	35.1 (892)
Standard Antenna	2 (0.6)	14 (7)	6.5 (165)	58 (26)	7.9 (201)
One-Piece Reflector	4 (1.2)	104 (47)	7.0 (178)	175 (79)	10.9 (277)
without Radome	6 (1.8)	143 (61)	10.0 (254)	294 (133)	13.5 (343)
	8 (2.4)	251 (114)	13.5 (343)	536 (243)	16.8 (427)
	10 (3.0)	317 (144)	18.0 (457)	784 (356)	21.7 (551)
	12 (3.7)	540 (245)	19.0 (483)	1158 (525)	22.3 (566)
Other Standard, One-Piece Reflector without Radome					
VP2	2 (0.6)	49 (22.3)	3.5 (88)	54.4 (24.3)	4.3 (110)
VP4	4 (1.2)	90 (41)	2.7 (38)	194 (88)	6.2 (157)
VP6	6 (1.8)	205 (93.2)	10 (254)	363 (165)	13.5 (343)
Standard Antenna	2 (0.6)	17 (8)	8.7 (221)	81 (37)	9.9 (251)
One-Piece Reflector	4 (1.2)	119 (54)	10.0 (254)	189 (86)	14.6 (371)
with Radome	6 (1.8)	162 (73)	13.7 (348)	321 (146)	19.6 (498)
	8 (2.4)	304 (138)	19.8 (503)	621 (282)	25.0 (635)
	10 (3.0)	402 (182)	25.8 (655)	916 (415)	31.7 (805)
	12 (3.7)	654 (297)	26.9 (683)	1356 (615)	32.8 (833)
Standard Antenna	8 (2.4)	264 (120)	14.0 (356)	550 (249)	17.3 (439)
Two-Piece Reflector	10 (3.0)	336 (152)	18.5 (470)	804 (365)	22.2 (564)
without Radome	12 (3.7)	600 (272)	19.6 (498)	1219 (553)	22.9 (582)
	15 (4.6)	1240 (562)	32.3 (820)	2269 (1029)	36.4 (925)
GRIDPAK® Antenna	4 (1.3)	51 (23)	10.0 (254)	–	–
	6 (2)	198 (90)	14.5 (368)	–	–
	8 (2.4)	282 (128)	16.0 (406)	–	–
	10 (3)	418 (190)	21.5 (546)	–	–
	13 (4)	517 (235)	25.5 (648)	–	–

Side Strut Axial Forces

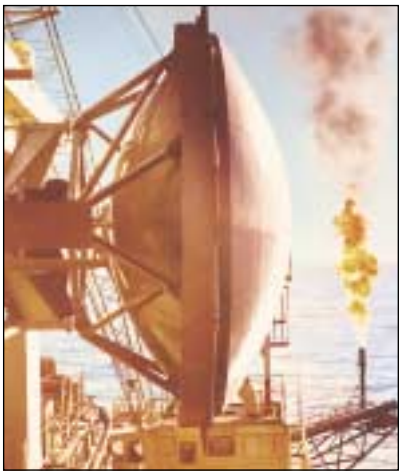
Maximum axial forces produced on support structures by antenna side struts are tabulated below. In each case, the loads are the result of a 125 mph (200 km/h) wind from the most critical direction and each side strut is positioned at the most extreme angle permitted by the specifications on page 97. The forces are components of, not in addition to, the maximum forces which are referenced to the mounting pipe on page 111.



Maximum Antenna Side Strut Axial Force, 125 mph (200 km/h) Wind

Antenna Type	Size ft (m)	Adjustable Strut Force, lb (N)	Fixed Strut Force, lb (N)
Shielded Antenna	6 (1.8)	2070 (9207)	–
(except "Other Shielded"	8 (2.4)	958 (4261)	1265 (5627)
shown below)	10 (3.0)	1320 (5871)	1987 (8838)
	12 (3.7)	1799 (8001)	2585 (11498)
	15 (4.6)	7921 (35233)	–
Other Shielded Antennas			
UHX10-59	10 (3.0)	1452 (6558)	2184 (9714)
UMX10-459	10 (3.0)	4086 (18175)	4492 (19980)
UHX12-59	12 (3.7)	2392 (10640)	3437 (15288)
UMX12-459	12 (3.7)	4137 (18401)	4545 (20216)

Antenna Options



UHX10-59	125 mph (200 km/h)
WUHX10-59	155 mph (250 km/h)
SUHX10-59	200 mph (320 km/h)

UHX10-59	Standard paint
EUHX10-59	Corrosive environment paint
WEUHX10-59	High wind and corrosive environment paint

All antenna orders require option codes to specify the details for your system. Most antennas include options for selecting feed input types, paint color, radome, packing, and environmental offerings. These option codes are unique characters placed before (prefix) or after (suffix) the base antenna type number. Prefix codes are optional. Suffix codes are required.

Prefix Option Codes

The prefix option codes include special environmental options such as high wind and corrosive environment. For additional information about special environment antennas, request Bulletin 3522.

High Wind Environment Options

High wind options that exceed the standard 125 mph (200 km/h) wind survival rating are available in 155 mph (250 km/h) and 200 mph (320 km/h) survival rating. These heavy duty antenna versions feature strong back structures for maintaining alignment accuracy in adverse and severe wind conditions.

Use the “W” prefix for 155 mph (250 km/h), and the “S” prefix for 200 mph (320 km/h) survival ratings.

Corrosive Environment Options

The corrosive environment option is available for most antennas. This option provides long term protection in marine or salt and most industrial environments including chemical and fossil fuel areas. A special epoxy paint applied at the factory provides added protection. In addition, corrosion inhibiting compounds and protective sealants are applied during installation.

Note: High wind and corrosive environment prefix codes are optional.

Suffix Option Codes

Suffix option codes are required for your antenna order. The suffix option code is made up of three characters. The first character indicates the feed input type, the second character indicates the antenna color and applicable radome information, and the third character indicates the packing options.

The option code's first character, indicating connector or flange type, has no default. You must specify a flange type for each antenna ordered. The remaining option codes, indicating antenna color, radome, and packing, are optional. If you do not specify a code for the second and third characters you will receive the default.

Note: Not all connector and flange types listed are applicable for all antennas. Refer to the antenna input options listed in each antenna ordering table. Additional options available. Contact Andrew.

Antenna Input Option Codes

Coaxial Applications	
Connector Type	**Option Code**
7/8" EIA	E
"F" Flange Female	F
7/16 DIN Female	H
Type N Female	N
Waveguide Applications	
Flange Type	**Option Code**
PBR	B
PDR	D
WR75	C
CPR	P
UG*	U

* Compatible with choke or cover

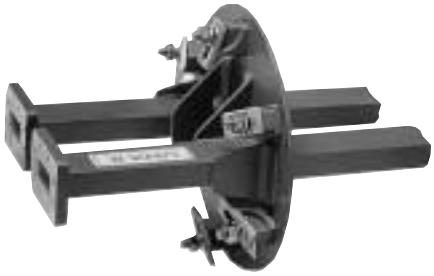
Antenna Color/Radome Option Codes

Antenna Color	Radome Type/Color*	Option Code
Gray	Hypalon/White	1
Gray	TEGLAR®/White	3
Gray	Not Available	7
Unpainted	Not Available	W (for GRIDPAK®)
Gray**	Molded/Gray	X

* All radomes listed have Andrew logo.
** UNIPAK includes the radome and antenna in a single container.
Solid reflectors available for 2 ft to 10 ft, not available for 12 ft, 15 ft or any split two piece reflectors.
For additional color information see pages 116-117.
For additional radome information see pages 116-119.

Packing Option Codes

Packing	Option Code
Standard Global Pack	A
Standard Global Pack for Two-Piece Split Reflector or GRIDPAK®	M



Type Number with Option Code:	UHX10-59-**P**
Description:	UHX10-59 antenna with CPR flange

Type Number with Option Code:	UHX10-59-**P3**
Description:	UHX10-59 antenna with CPR flange, painted gray with white TEGLAR radome

Type Number with Option Code:	UHX10-59-**P3A**
Description:	UHX10-59 antenna with CPR flange, painted gray with white TEGLAR radome, Standard Global Pack

Radomes

Radomes

Radomes are available for most Andrew antennas. Radomes reduce wind loading to the tower while providing added protection for the feed from the elements. There are two types of radomes, flexible and molded. Flexible radomes are provided on shielded antennas and molded radomes are options to standard and focal plane antennas. All radomes have a standard minimum wind survival of 125 mph (200 km/h).

Flexible Radomes

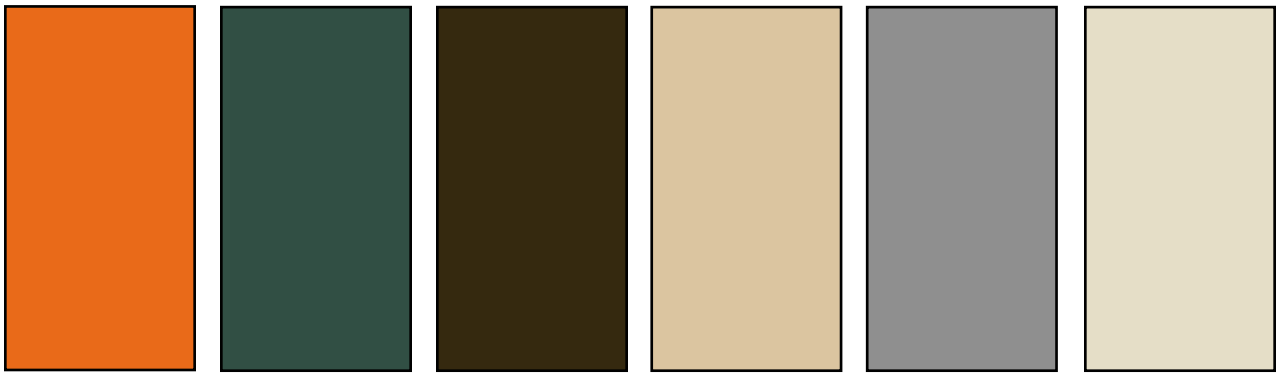
Flexible radomes are either Hypalon or TEGLAR® material. These materials are stretched and tensioned across the opening of the shield.* The radome flexes slightly in the wind, shedding ice and snow in most environments.

Hypalon is a rubber coated nylon material that is durable and suited for most normal environments. The standard color is white. Field painting is optional.

TEGLAR® is a polymer coated fiberglass material that provides the greatest protection in harsh environments. A special version of the TEGLAR radome is available with high wind series antennas. The standard color is white. Optional colors are available. TEGLAR radomes cannot be field painted.

* FPHP antennas include molded radomes. 4 ft (1.2 m) TEGLAR radome is pre-tensioned.

Optional Colors

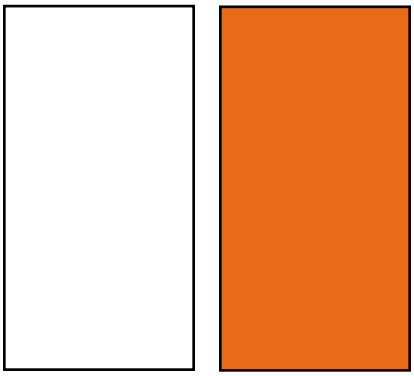


Aviation Orange | **Green** | **Brown** | **Light Tan** | **Gray** | **Beige**

Molded Radomes

Molded radomes are made from fiberglass or ABS plastic. They directly bolt to the reflector rim. The standard color is dark gray. Optional colors are available. Field painting is optional.

Optional Colors



Aviation White **Aviation Orange**

Most other colors available on request

Pre-Tensioned Radomes

The new global offering for 4 ft (1.2 m) shielded antennas includes the pre-tensioned radome. This radome, made from TEGLAR® material is bonded to a support ring. The radome and ring are directly bolted to the shield assembly. Pre-tensioned radomes replace the previously offered spring tensioned design radomes.

Radome Applications

Antenna Types	Antenna Series	Included Radome	Standard Color	Optional Radomes
Ultra High Performance	UHP®, UHX®, HDX, HSX	TEGLAR	white	–
UMX Multiband	UMX®	TEGLAR	white	–
High Performance	HP, HPX, HDH, HDV	Hypalon	white	TEGLAR
Standard	P, PX, PL, PXL, PAR	None	gray	Standard molded Extra strength molded, 10 and 12 ft (3.0 and 3.7 m)
Focal Plane	FP, FPX	None	gray	Standard molded Extra strength molded, 10 and 12 ft (3.0 and 3.7 m)

Radome Electrical Characteristics

Planar Radomes. The electrical characteristics of the planar radome are incorporated into the electrical performance specifications of the shielded antenna.

Molded Radomes. The use of a molded radome on standard (P-Series) or focal plane (FP-Series) antennas may slightly impact maximum antenna VSWR. Attenuation and system VSWR effects are listed in the table below. To determine the maximum VSWR across the band for the antenna/radome combination, add the figure from the table to the maximum antenna VSWR specification.

10 ft and 12 ft standard molded radomes are rated for 125 mph (200 km/h) while 4 ft, 6 ft and 8 ft standard radomes are rated for 150 mph (240 km/h); extra strength molded radomes for 10 ft and 12 ft which are rated for 150 mph (240 km/h) are also available.

Typical Molded Radome Attenuation and VSWR

Radome Type	Diameter ft (m)	Attenuation, dB 2 GHz	6 GHz	8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	Add to Antenna VSWR 2 GHz	6 GHz	11 GHz and above
Standard Antenna Radomes											
Standard	2 (0.6)	0.1	0.4	0.6	1.0	1.2	1.5	2.7	0.02	0.03	0.05
Standard	4 (1.2)	0.1	0.4	0.7	1.2	1.5	2.0	2.9	0.02	0.03	0.05
Standard	6 (1.8)	0.1	0.5	0.9	1.4	1.7	2.1	2.9	0.02	0.03	0.03
Standard	8 (2.4)	0.1	0.6	1.0	1.5	1.8	2.2	–	0.02	0.03	0.03
Standard	10 (3.0)	0.2	0.9	1.3	1.8	2.1	2.5	–	0.02	0.03	0.03
Standard	12 (3.7)	0.2	1.0	1.3	1.9	2.2	2.6	–	0.02	0.03	0.03
Extra Strength	10 (3.0)	0.3	1.2	1.5	2.0	2.2	2.6	–	0.02	0.03	0.03
Extra Strength	12 (3.7)	0.03	1.4	1.7	2.0	2.3	2.6	–	0.02	0.03	0.03
Focal Plane Antenna Radomes											
Standard	4 (1.2)	0.1	0.4	–	–	–	–	–	0.03	0.03	–
Standard	6 (1.8)	0.1	0.5	–	–	–	–	–	0.03	0.03	–
Standard	8 (2.4)	0.1	0.6	–	–	–	–	–	0.03	0.03	–
Standard	10 (3.0)	0.2	0.9	–	–	–	–	–	0.03	0.03	–
Standard	12 (3.7)	0.2	1.0	–	–	–	–	–	0.03	0.03	–
Extra Strength	4 (1.2)	0.1	0.4	–	–	–	–	–	0.05	0.05	–
Extra Strength	6 (1.8)	0.2	0.8	–	–	–	–	–	0.05	0.05	–
Extra Strength	8 (2.4)	0.2	0.9	–	–	–	–	–	0.05	0.05	–
Extra Strength	10 (3.0)	0.3	1.2	–	–	–	–	–	0.05	0.05	–
Extra Strength	12 (3.7)	0.3	1.4	–	–	–	–	–	0.05	0.05	–

Current Model Antennas

Shielded antennas. All shielded antennas include a Hypalon or TEGLAR® radome. Several antennas (HP and HPX) can be upgraded to TEGLAR for a minimal fee.

Standard and focal plane antennas. Standard and focal plane antennas* do not include a molded radome but in order to reduce wind loading, one can be added to the antenna crate. The radome can be shipped with the antenna using the UNIPAK shipping option. Specify the type number from the table below.

* FPHP antennas include radome

Older Model Antennas

Radome clip kits. Standard antennas (P-Series) reflector with a rolled rim manufactured prior to: September 1987 for 4 ft (1.2 m) and 10 ft (3.0 m), February 1991 for 8 ft (2.4 m), and July 1991 for 6 ft (1.8 m) diameters require the additional clip kit listed in the table below.

Pre-tensioned radomes. For shielded 4 ft (1.2 m), TEGLAR spring-type attachment radomes have been replaced by pre-tensioned TEGLAR radomes that are directly attached to the rim of the shield. Field drilling is required. **Type Number 520093-9**

Standard molded radomes. The 2 ft (0.6 m) standard molded radome has changed in design. For antennas shipped prior to June 1998, request **Type Number R2E**.

Flexible planar radome replacement kits. These kits include one radome and hardware to replace an existing Andrew planar radome. Specify the type number from the table below.

Edge protection kit for TEGLAR® radomes. This kit prevents damage to the untensioned radome edge between J-bolt anchor points caused by unusually high gusting winds. Kit includes stainless steel edge protector strips and attachment hardware. The strips are fastened in pairs to form a band around the edge of the radome. Specify the type number from the table below.

Radome Ordering Information

Reflector Diameter ft (m)	Standard Molded	Extra Strength Molded	Focal Plane Molded	Extra Strength Focal Plane Molded	Clip Kit	Hypalon	TEGLAR	Edge Protection Kit (TEGLAR)
2 (0.6)	R2E, VR2, VR2-WH	–	–	–	–	–	207105***	–
4 (1.2)	R4E	R4E	FR4	FR4-E	207844-1	–	207106** 520093-9*	–
6 (2.0)	R6E	R6E	FR6	FR6-E	207844-2	520434-1	45665-1	205866-3
8 (2.4)	R8F	R8F	FR8	FR8-E	207844-3	520434-2	45665-2	205866-4
10 (3.0)	R10G	39193B	FR10	FR10-E	207844-4	520434-3	45665-3	205866-1
12 (3.7)	R12F	39194	FR12	FR12-E	–	520434-4	45665-4	205866-2
15 (4.6)	–	–	–	–	–	520434-5	45665-5	205866-5

* Pre-tensioned radome

** Spring tensioned radome for older style antennas

***Except 2 ft is gray

Antenna Packing

Heavy Duty Export Pack

Standard Pack

Dual Pack

Packing Type

Standard Pack. In most cases, Andrew standard packing is suitable for export. Antennas are shipped as one unit. GRIDPAK® antennas and mounts are shipped in one carton or crate. 4-12 foot (1.2-3.7 m) radomes are shipped in wood crates.

Heavy Duty Export Pack. For your convenience, Andrew also offers a heavy duty export packing option, which includes plywood sheathing of the entire antenna crate. This packing is suitable for ocean, container or air shipment. Multiple packing is also available which will provide considerable savings to the customer.

Dual Pack. Two antennas are packaged together in one crate, reducing overall shipping volume.

4 ft Shielded Antenna Pack

Packing Quantity

10-foot (3.0 m) and larger antennas and molded radomes may require special handling in shipping, depending on destination and routing. For systems requiring a large number of antennas, special packs can be quoted to reduce shipping volume. For example, it is often convenient to pack all antennas for the same site in the same box. Andrew can also provide bulk transport and on-site assembly of antennas.

For more details about crate dimensions and approximate weights, consult the price list for this catalog.

4 - 6 - 8 ft Standard Radome Pack

6 ft Shielded Antenna Pack

8 - 10 ft Shielded Antenna Pack

KP Series GRIDPAK® Antenna Pack

12 ft (split) Antenna Pack

UNIPAK

GRIDPAK® disassembled

One piece reflector

Two piece reflector

Reflector Type

One and Two-Piece Antennas. Antennas are supplied with one-piece reflectors or with two-piece reflectors split through the center and bolted together at the site. GRIDPAK® and Mini-GRIDPAK antennas are supplied with reflectors that are completely disassembled. Standard and optional reflector types are dependent on antenna size and type. Refer to the table.

Special Purpose Mounts

In addition to the standard mounts listed on page 96, Andrew can provide horizontal and vertical tilt mounts and other mount options to meet most special requirements. Contact Andrew for further information.

Standard and Optional Reflectors

Antenna Diameter	Reflector Type Standard	Optional
Solid Antennas - Standard, High Performance and Ultra High Performance		
2-6 ft (0.3-1.8 m)	One-Piece	–
8-10 ft (2.4-3.0 m)	One-Piece	Two-Piece
12 ft (3.7 m)	Two-Piece	One-Piece
15 ft (4.6 m)	Two-Piece	–
GRIDPAK and Mini GRIDPAK Antennas - KP, KPR, MKP Series		
All	Reflector shipped Disassembled	–

Additional Struts for Microwave Antennas

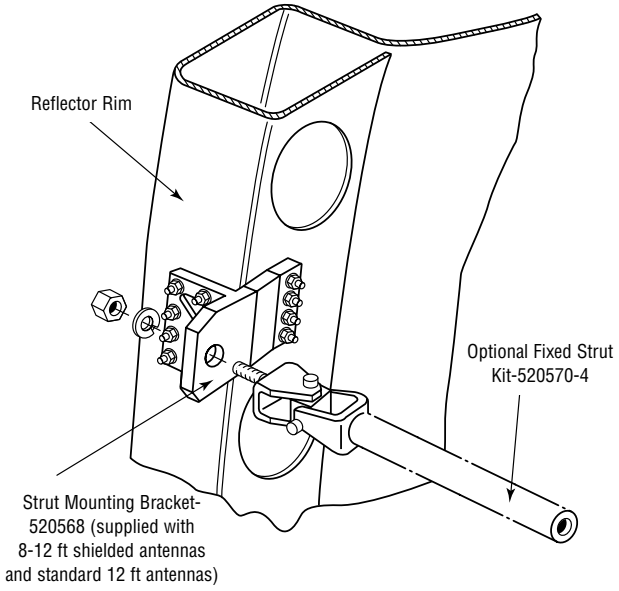
Fixed and Adjustable Side Struts provide increased rigidity. They can be added to any of the antennas, as indicated in the table, as a first or second strut.

Bottom Struts are recommended for high ice load environments. Requires mounting pipe which extends to bottom edge of antenna.

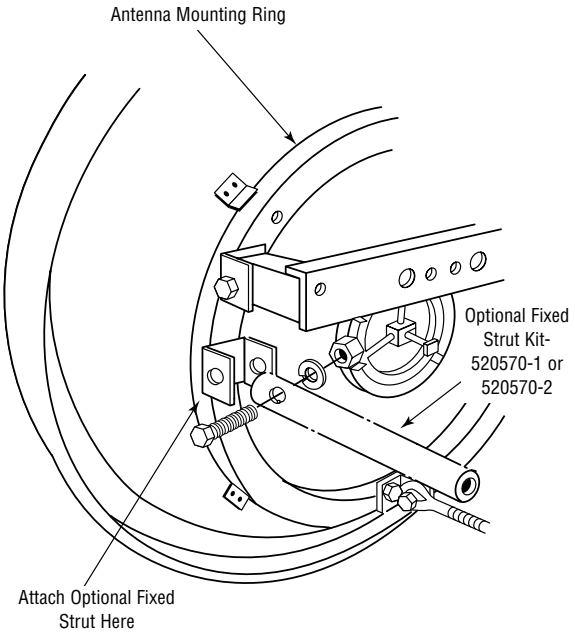
Attachment of Strut to Antenna

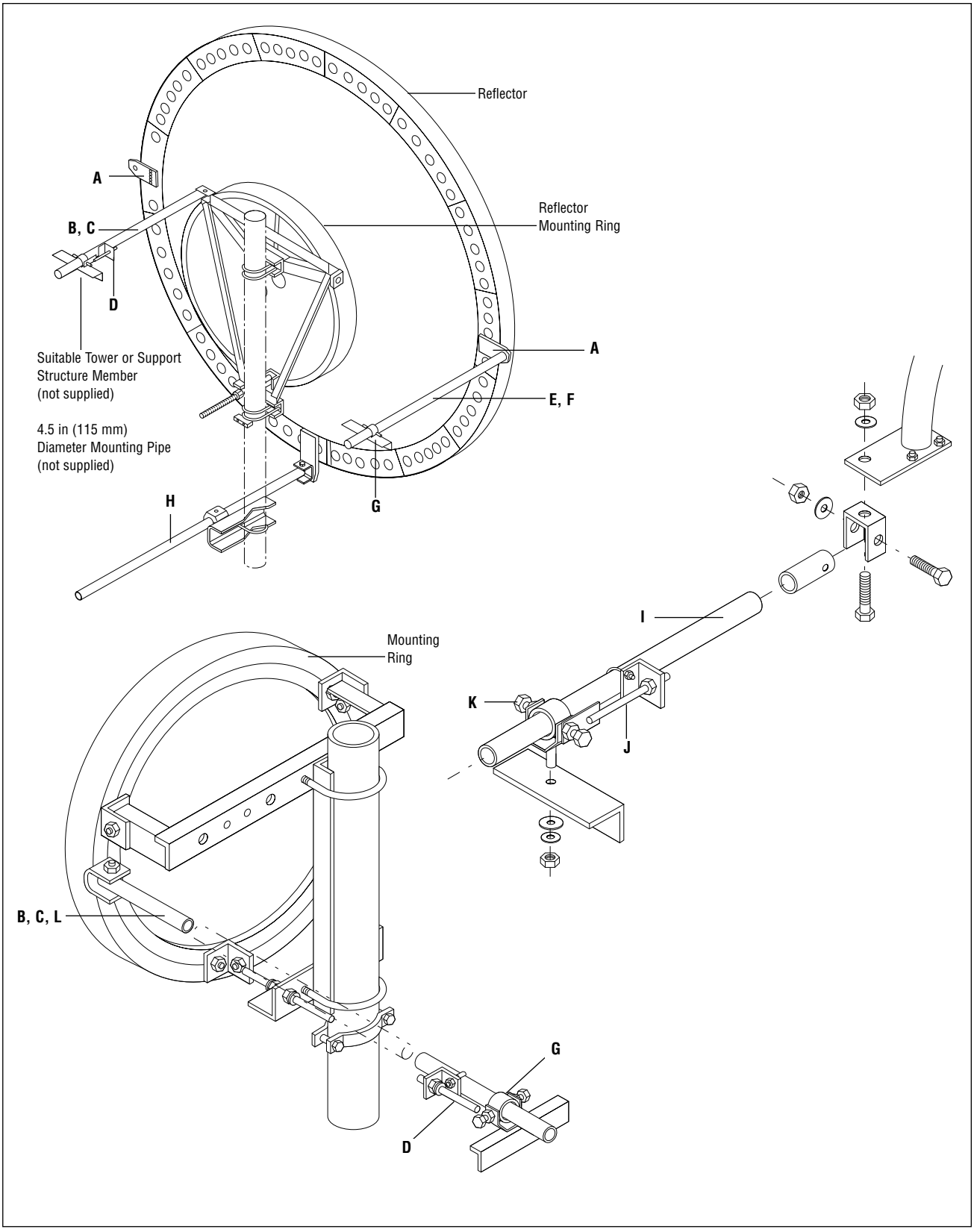
The strut attaches either to a bracket at the antenna rim or to the antenna mounting ring. See illustration.

Attachment at Antenna Rim
8 through 12 ft Sizes



Attachment at Antenna Mounting Ring
4 and 6 ft Sizes




Reflector
A
B, C
D
Reflector
Mounting Ring
A
Suitable Tower or Support
Structure Member
(not supplied)
4.5 in (115 mm)
Diameter Mounting Pipe
(not supplied)
E, F
H
G
I
Mounting
Ring
K
J
B, C, L
G
D

A Reflector Strut Brackets, Type Number 520568 (replaces 44695)

Two brackets attach to the edge of 8 ft, 10 ft, and 12 ft reflectors to provide an attachment point for the fixed side strut. Brackets are cast aluminum and the kit contains all (metric) stainless steel hardware for attachment to the reflector. Quantity: 2 per kit.

B Adjustable Inboard Strut Kit, Type Number 520570-1 (replaces 221865) Solid reflector for the 12 ft.

Azimuth wind brace with threaded rod adjustment assembly allows for fine antenna alignment and lock down. Galvanized steel pipe and brackets include all (metric) galvanized hardware for attachment to antenna mount or reflector mounting ring. Also includes item D, and G for tower end attachment. Strut pipe is schedule 80, and 10.5 ft (3.2 m) in length.

C Inboard Strut Kit (less azimuth adjustment), Type Number 520570-2

Typically used as an optional side strut for 4 ft (1.2 m) and 6 ft (1.8 m) reflectors same as B less item D. Includes strut and strut collar assembly (G).

D Azimuth Adjustment Kit, Type Number 520569 (replaces 40186-2)

Attaches to inboard side strut (and strut collar assembly) to allow fine movement of the antenna during final alignment. Straight (metric) threaded rod assembly and associated hardware included. Order strut collar clamp (G) separately.

E Outboard Strut Kit, Type Number 520570-3

Galvanized fixed side strut provides increased rigidity. Kit includes universal joint and (metric) hardware for attachment to reflector strut bracket (item A) included. Strut collar assembly (item G) also included to provide interface to tower. Strut pipe is schedule 80 and 10.5 ft (3.2m) in length.

F Outboard Strut Replacement Kit, Type Number 520570-4 (replaces 38891A)

Includes item G less item A reflector bracket.

G Strut Collar Assembly, Type Number 520477 (replaces 222944)

Provides tower interface and strut securement point. Galvanized clamp assembly includes stainless and galvanized hardware. (See tower interface options).

H Bottom Strut Kit, Type Number 520570-5 (replaces 40604)

Provides additional support to antennas due to weight of high ice loads. Reflector strut bracket, galvanized strut pipe, strut collar assembly, and (pipe mount) angle interface bracket included. All associated (metric) hardware is galvanized. Strut is schedule 80 and 5.0 ft (1.52 m) in length. Existing (extended) antenna pipe mount is required for strut attachment.

I Grid Strut Kit (KP Series only), Type Number 100232-7 (for 8, 10 and 13 ft only)

Provides added support in either the azimuth or elevation plane. Reflector strut bracket, strut pipe, strut collar assembly and hardware. All parts are galvanized including hardware. Strut is schedule 80 and 10.0 ft (3.05 m) in length. Order adjustment assembly separately, item J.

J Fine Azimuth Adjustment Assembly for Grid Strut and Collar Clamp Assembly, Type Number 100093-2

All parts galvanized including hardware.

K Grid Clamp Assembly, Type Number 100094

For replacement of item I and use with item J. All parts are galvanized including hardware.

L Short Strut Assembly, Type Number 520570-7

Short strut assembly for 6 ft (2.0 m) standard antennas allows strut packed within shipping crate. Includes hardware for attachment to antenna and tower. Strut is 83.5 in (1212 mm).

Termination Load

Attachment of Strut to Tower

Direct bolt attachment of the side strut clamp to angle members is recommended. An 11/16" (18 mm) hole should be drilled in the appropriate strut support member. Note: Holes should not be drilled without prior approval of the tower manufacturer. Type 223740 round member clamp (order separately) can be used on members having a diameter of 1 to 3 in (25-76 mm). See illustration.

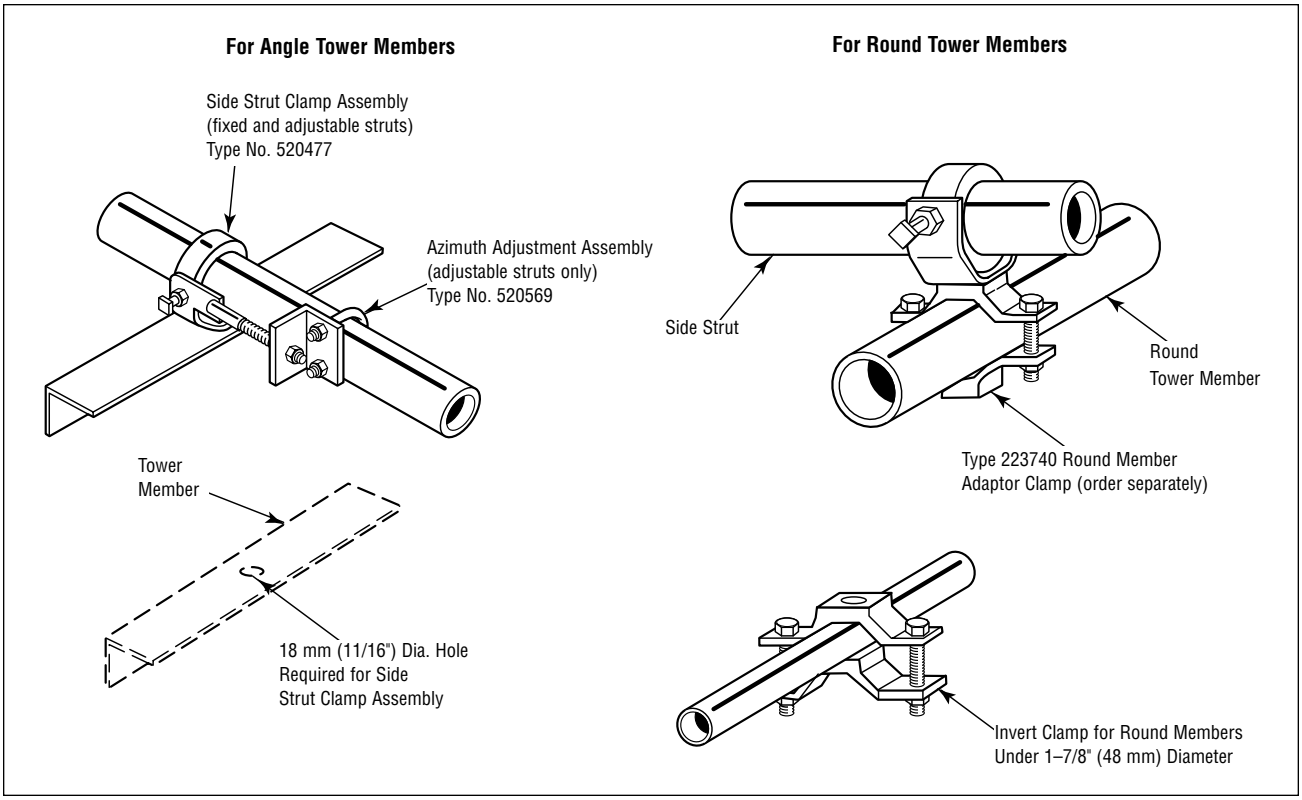
Termination Loads

When both ports of a dual polarized antenna are not being used, Andrew recommends using a termination load to ensure your antenna meets the stated Andrew specifications. Refer to page 212.

Replacement Components

Andrew can also supply the following replacement components for your Andrew antennas:

- *Reflectors*
- *Radomes (see page 119)*
- *Major hardware kits*
- *Universal guy wire kit*
- *Struts (see page 123)*
- *Feeds*
- *Shield absorber kits*
- *Mounts (see page 95)*
- *Shields*



A Cost-Effective Antenna Solution for Today's Terrestrial Microwave Systems

ValuLine® antennas provide a cost-effective solution for all terrestrial microwave systems operating at frequencies between 7 GHz and 60 GHz. The ValuLine range includes both High Performance shielded antennas (VHP Series) and Standard performance unshielded antennas (VP Series). These antennas are available in both single and dual polarized configurations and in sizes from 1 ft (0.3 m) to 6 ft (1.8 m) in diameter.

Andrew ValuLine antennas economically satisfy the requirements of the cellular, PCS/PCN, broadcast, and private user microwave applications, while still delivering the superior performance and overall quality expected of Andrew. ValuLine antennas meet the regulatory requirements of FCC, ETSI, RA, and BAPT and are qualified in many countries including Russia, Brazil, and Poland. The antennas meet the requirements of the EIA195 and 222 standards for electrical, mechanical, and structural characteristics, and are backed by a three-year warranty.

Fast, easy installation is made possible by the use of simple pole mounts, which can be attached to pipes with diameters ranging from 1.9 inches (48 mm) to 4.5 inches (115 mm), depending on antenna type. Radome installation on the 4 ft (1.2 m) and 6 ft (1.8 m) antennas is dramatically simplified by the use of rigid plastic radomes. Optionally, Andrew can supply these radomes painted to match local surroundings, minimizing their environmental impact.

Low Profile Antennas

To meet increasing demand for low visibility antenna systems, the ValuLine product range has been extended to include a new range of low profile shielded antennas (VHLP Series) offering excellent electrical performance in an antenna with minimal environmental impact. Low profile antennas are available in frequencies from 13 GHz to 38 GHz and in sizes from 1 ft (0.3 m) to 4 ft (1.2 m) in diameter.

Flat Plate Antennas

The new ValuLine Flat Plate antennas provide the ultimate solution for operators who require low visibility antennas for short haul communications in areas such as congested inner city sites. These antennas provide excellent pattern performance, normally only achieved by shielded antennas, in a package less than 2 inches (46 mm) deep. This very low profile antenna, weighing less than 8 pounds (3.6 kg), reduces tower wind loading and is a cost-effective package for worldwide shipping.

Products are available in the 23 GHz, 27 GHz and 38 GHz 136 frequency bands.

Contact Andrew for further details.

Direct Antenna Radio Integration

Andrew has worked with the world's leading radio houses to develop antennas that can be directly integrated with the radio outdoor unit. These integrated antennas are available in all frequencies from 7 GHz to 38 GHz and in sizes from 1 ft (0.3 m) to 6 ft (1.8 m) in diameter. These integrated solutions, currently available for over 20 major radio suppliers, provide a significant benefit in overall system cost.

Multiple Manufacturing Locations

In order to reduce shipping costs to sites worldwide, ValuLine antennas are available from Andrew locations in Scotland, U.S.A., Brazil, and Australia. Standard Andrew designs and process controls ensure product consistency and quality throughout the world.

ValuLine® Antenna Nomenclature

Andrew uses an alphanumeric numbering system for identifying and ordering ValuLine antennas. Andrew type numbers describe the antenna type, size, regulatory compliance, frequency band, catalog revision, and other available options including flange type and VSWR specifications, antenna and radome color, and packing and assembly information. This system is known worldwide and Andrew terminology is often used to specify antenna within procurement documents.

Example:

VHP	2	A	-	220	A	-	2	4	1
1	2	3		4	5		6	7	8

1 Antenna Type. The prefix is two, three, or four letters that describe the antenna type.

Use:	To indicate:
VHP	Shielded, Single Polarized
VHPX	Shielded, Dual Polarized
VP	Unshielded, Single Polarized
VHLP	Low Profile, Single Polarized

2 Antenna Size. The number indicates the antenna diameter in feet.

Use:	To indicate:
1	1 ft (0.3 m)
2	2 ft (0.6 m)
2.5	2.5 ft (0.8 m)
4	4 ft (1.2 m)
6	6 ft (1.8 m)

3 Regulatory Compliance.

Use:	To indicate:
A	Non-compliant to UK RA Specification
blank	Compliant to UK RA Specification

4 Frequency Band. The numbers following the first hyphen are an abbreviated designation for the operating frequency band.

Use:	To indicate:
71	7.125-7.75 GHz
71W	7.125-8.5 GHz
74	7.425-7.9 GHz
77	7.725-8.5 GHz
102	10.2-10.7 GHz
105	10.5-10.7 GHz
107	10.7-11.7 GHz
117	11.7-12.2 GHz
130	12.75-13.25 GHz
142	14.25-15.35 GHz
159	15.9-16.5 GHz
173	17.3-17.7 GHz
1823	17.7-19.7 GHz/21.2-23.6 GHz
180	17.7-19.7 GHz
220	21.2-23.6 GHz
240	24.25-26.5 GHz
240W	24.25-29.5 GHz
275	27.5-29.5 GHz
275W	27.5-29.5 GHz/31.0-31.3 GHz
310	31.0-31.8 GHz
370	37.0-40.0 GHz
490	49.2-50.2 GHz
540	54.25-57.2 GHz
570	57.2-58.2 GHz

5 Catalog Revision. This letter identifies product revisions. A change in revision letter indicates a change in electrical or mechanical specifications that affect antenna performance or the interface with other system equipment.

In addition, contact Andrew for details about these options:

6 Antenna Flange Type and VSWR Specification. See table on page 130.

7 Antenna Appearance. This number identifies the antenna color, radome color, and the presence of the Andrew flash.

8 Packing Type and Assembly Option.

In the example above, VHP2A-220A-241 is:

1. ValuLine High Performance, shielded, single polarized
2. 2 ft (0.6 m) in diameter
3. Non-compliant to UK RA specifications
4. 21.2-23.6 GHz band
5. A Revision
6. PBR220, 1.20 VSWR
7. White Antenna, white radome, no flash
8. Standard packing

E-Series ValuLine® Antennas

for Use in Extreme Environments

ValuLine® antennas are now available in upgraded versions that allow them to be used in locations subjected to high wind load or corrosive environments.

These antennas, available in diameters of 1 ft (0.3 m), 2 ft (0.6 m), 2.5 (0.8 m), 4 ft (1.2 m), and 6 ft (1.8 m), are mechanically upgraded to withstand 155 mph (250 km/h) through the use of additional struts and strengthened reflectors.

The antennas also include additional treatments that will provide long-term protection in marine, urban, and most industrial environments:

- *Factory applied epoxy painting*
- *Hot-dip galvanizing*
- *Stainless steel hardware*
- *Corrosion inhibiting compounds*

Contact Andrew for more information.

Antenna Specifications and Ordering Information

Our ValuLine® antennas are presented in the tables on pages 131-137. The tables are arranged by operating frequency band, in ascending order. Within the tables, antennas are grouped by antenna type and by diameter.

Basic Antenna

The type numbers listed in the tables define the basic antenna, less options and accessories. The numbers correspond with those appearing on the Radiation Pattern Envelopes published by Andrew (see page 48) and also define the electrical performance parameters of the antenna.

Input Flanges

ValuLine antennas can be supplied with many different EIA and IEC flange types. The recommended flanges are identified in the table below.

Contact Andrew for information about other flange options.

Radomes

Radomes are used to protect microwave antennas against accumulation of ice, snow, and dirt and to reduce wind loading. ValuLine shielded antennas are supplied with molded planar polymer radomes.

Radome Applications

Antenna Type	Antenna Series	Included Radome	Optional Radomes
ValuLine	VHP, VHPX	Polymer	–
	VP, VPX	–	Molded plastic (VR Series)

The VR Series of plastic radomes are designed to offer maximum protection to VP and VPX Series unshielded ValuLine antennas in diameters ranging from 2 ft (0.6 m) to 6 ft (1.8 m). The material is highly resistant to ultraviolet rays and provides high reliability under severe environmental conditions. Their aerodynamic shape dramatically reduces the wind loading on the tower.

These radomes are available as standard in gray or white. Bulk pack options are also available on request.

Contact Andrew for more information.

VR Series Radomes for Unshielded ValuLine Antennas

Antenna Diameter	Gray Radome with Andrew flash	Gray Radome without Andrew flash	White Radome with Andrew flash	White Radome without Andrew flash
2 ft (0.6 m)	**VR2-1**	**VR2-2**	**VR2-1-WH**	**VR2-2-WH**
4 ft (1.2 m)	**VR4-1**	**VR4-2**	**VR4-1-WH**	**VR4-2-WH**
6 ft (1.8 m)	**VR6-1**	**VR6-2**	**VR6-1-WH**	**VR6-2-WH**

Input Flanges

Frequency Band	Recommended EIA Flange	Recommended IEC Flange	Frequency Band	Recommended EIA Flange	Recommended IEC Flange
-71	CPR112G	PDR84	-1823	UG-595/U Modified	PBR220
-71W	CPR112G	PDR84	-180	UG-595/U Modified	PBR220
-74	CPR112G	PDR84	-220	UG-595/U Modified	PBR220
-77	CPR112G	PDR84	-240	UG-595/U Modified	PBR220
-102	CPR90G	PDR100	-240W	—	PBR260
-105	CPR90G	PDR100	-275	UG-599/U Modified	PBR320
-107	CPR90G	PDR100	-275W	UG-599/U Modified	PBR320
-117	WR75	PDR120	-310	UG-599/U Modified	PBR320
-130	WR75	PDR120	-370	UG-599/U Modified	PBR320
-142	UG-541A/U	PBR140	-490	UG-385-25	—
-159	—	PDR180	-540	UG-385-25	—
-173	—	PDR180	-570	UG-385-25	—

Refer to pages 177 and 179 for Elliptical Waveguide ordering information

7.125 - 7.75 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-71	2 (0.6)	30.6	31.0	31.4	4.9	30	40	1.15 (23.1)*	±15	±50	155 (250)	19 (8.5)
VP4-71	4 (1.2)	36.8	37.2	37.5	2.4	32	45	1.15 (23.1)*	±15	±20	125 (200)	79 (36.0)
VP6-71	6 (1.8)	40.5	40.9	41.3	1.6	32	49	1.15 (23.1)*	±5	±5	125 (200)	160 (72.5)
VHP2-71	2 (0.6)	29.8	30.1	30.4	4.9	30	53	1.15 (23.1)*	±15	±50	155 (250)	33 (15.0)
VHP4-71	4 (1.2)	36.0	36.4	36.7	2.4	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP6-71	6 (1.8)	39.8	40.2	40.6	1.6	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)
VHPX2-71	2 (0.6)	29.2	29.5	29.8	4.8	30	53	1.30 (17.7)**	±15	±50	155 (250)	33 (15.0)
VHPX4-71	4 (1.2)	35.9	36.3	36.6	2.4	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHPX6-71	6 (1.8)	39.7	40.1	40.5	1.6	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)

* 1.10 (26.4) available on request ** 1.25 (19.1) available on request

7.125 - 8.5 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-71W	2 (0.6)	30.6	31.4	32.1	4.8	30	40	1.20 (20.8)	±15	±50	155 (250)	19 (8.5)
VP4-71W	4 (1.2)	36.8	37.5	38.3	2.3	32	45	1.15 (23.1)	±15	±20	125 (200)	79 (36.0)
VP6-71W	6 (1.8)	40.5	41.3	42.0	1.5	32	49	1.15 (23.1)	±5	±5	125 (200)	160 (72.5)
VHP2-71W	2 (0.6)	29.8	30.4	31.1	4.9	30	54	1.15 (23.1)	±15	±50	155 (250)	33 (15.0)
VHP4-71W	4 (1.2)	36.0	36.6	37.5	2.4	32	62	1.15 (23.1)	±15	±20	125 (200)	126 (57.0)
VHP6-71W	6 (1.8)	39.7	40.5	41.2	1.7	32	66	1.15 (23.1)	±5	±5	125 (200)	347 (157.5)
VHPX2-71W	2 (0.6)	29.2	29.8	30.4	4.8	30	53	1.30 (17.7)	±15	±50	155 (250)	33 (15.0)
VHPX4-71W	4 (1.2)	35.9	36.7	37.4	2.4	32	60	1.20 (20.8)	±15	±20	125 (200)	126 (57.0)
VHPX6-71W	6 (1.8)	39.7	40.5	40.7	1.7	32	64	1.20 (20.8)	±5	±5	125 (200)	347 (157.5)

7.425 - 7.9 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-74	2 (0.6)	31.0	31.2	31.5	4.8	30	40	1.15 (23.1)*	±15	±50	155 (250)	19 (8.5)
VP4A-74	4 (1.2)	37.2	37.4	37.7	2.3	32	45	1.15 (23.1)*	±15	±20	125 (200)	79 (36.0)
VHP2-74	2 (0.6)	30.1	30.4	30.6	4.8	30	54	1.15 (23.1)*	±15	±50	155 (250)	33 (15.0)
VHP4A-74	4 (1.2)	36.4	36.6	36.9	2.3	32	62	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP4-74	4 (1.2)	36.2	36.4	36.7	2.3	32	62	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP6A-74	6 (1.8)	40.2	40.4	40.6	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)
VHPX2A-74	2 (0.6)	29.5	29.7	29.9	4.7	30	53	1.30 (17.7)**	±15	±50	155 (250)	33 (15.0)
VHPX4A-74	4 (1.2)	36.3	36.5	36.8	2.4	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHPX6A-74	6 (1.8)	40.1	40.3	40.5	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)

* 1.10 (26.4) available on request ** 1.25 (19.1) available on request

7.75 - 8.5 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-77	2 (0.6)	31.3	31.7	32.1	4.6	30	40	1.15 (23.1)*	±15	±50	155 (250)	19.0 (8.5)
VP4-77	4 (1.2)	37.5	37.9	38.3	2.2	32	45	1.15 (23.1)*	±15	±20	125 (200)	79.0 (36.0)
VP6-77	6 (1.8)	41.3	41.7	42.0	1.5	32	50	1.15 (23.1)*	±5	±5	125 (200)	160 (72.5)
VHP2-77	2 (0.6)	30.4	30.8	31.1	4.6	30	54	1.15 (23.1)*	±15	±50	155 (250)	33 (15.0)
VHP4-77	4 (1.2)	36.7	37.1	37.5	2.2	32	62	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHP6-77	6 (1.8)	40.6	40.7	40.8	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)
VHPX2-77	2 (0.6)	29.8	30.1	30.4	4.6	30	53	1.30 (17.7)**	±15	±50	155 (250)	33 (15.0)
VHPX4-77	4 (1.2)	36.6	37.0	37.4	2.2	32	60	1.15 (23.1)*	±15	±20	125 (200)	126 (57.0)
VHPX6-77	6 (1.8)	40.5	40.6	40.7	1.5	32	64	1.15 (23.1)*	±5	±5	125 (200)	347 (157.5)

* 1.10 (26.4) available on request ** 1.25 (19.1) available on request

10.2 - 10.7 GHz (WR112 / R84)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP2-102	2 (0.6)	33.5	33.7	33.9	3.5	32	59	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP4-102	4 (1.2)	39.6	39.8	40.0	1.8	32	65	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-102	6 (1.8)	42.8	43.0	43.2	1.2	32	68	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX2-102	2 (0.6)	33.2	33.4	33.6	3.5	32	59	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX4-102	4 (1.2)	39.4	39.6	39.8	1.8	32	65	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-102	6 (1.8)	42.7	42.9	43.1	1.2	32	68	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

10.5 - 10.7 GHz (WR90 / R100)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP2-105	2 (0.6)	34.0	34.1	34.2	3.4	32	55	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP4-105	4 (1.2)	39.8	39.9	40.0	1.8	32	60	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-105	6 (1.8)	43.1	43.2	43.3	1.1	32	67	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)

* 1.15 (23.1) available on request

10.7 - 11.7 GHz (WR90 / R100)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP4-107	4 (1.2)	40.1	40.5	40.9	1.8	32	60	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-107	6 (1.8)	43.3	43.6	43.9	1.1	32	67	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)

* 1.15 (23.1) available on request

11.7 - 12.2 GHz (WR75 / R120)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP4-117	4 (1.2)	40.9	41.0	41.1	1.7	32	60	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)

* 1.15 (23.1) available on request

Refer to pages 185 and 187 for Elliptical Waveguide ordering information

12.7 - 13.25 GHz (WR75 / R120)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-130	1 (0.3)	29.0	29.2	29.4	5.0	30	56	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-130	2 (0.6)	35.1	35.3	35.5	2.8	32	61	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-130	2.5 (0.8)	37.7	37.9	38.1	2.1	32	63	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-130	4 (1.2)	41.2	41.4	41.6	1.3	32	67	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP4A-130	4 (1.2)	41.2	41.4	41.6	1.3	32	63	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-130	6 (1.8)	44.8	45.0	45.1	0.9	32	70	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHP6A-130	6 (1.8)	44.8	45.0	45.1	0.9	32	66	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX2-130	2 (0.6)	34.5	34.7	34.9	2.8	32	61	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-130	2.5 (0.8)	37.2	37.5	37.7	2.1	32	63	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-130	4 (1.2)	41.0	41.2	41.3	1.3	32	67	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX4A-130	4 (1.2)	41.0	41.2	41.3	1.3	32	63	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-130	6 (1.8)	44.6	44.8	44.9	0.9	32	70	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHPX6A-130	6 (1.8)	44.6	44.8	44.9	0.9	32	66	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHLP2-130	2 (0.6)	35.3	35.5	35.7	2.5	30	61	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP2.5-130	2.5 (0.8)	37.6	37.8	38.0	2.1	30	63	1.30 (17.7)	±15	±50	125 (200)	69 (31.2)
VHLP4-130	4 (1.2)	41.3	41.5	41.7	1.3	30	67	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)
VP2A-130	2 (0.6)	35.3	35.5	35.7	2.8	32	45	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4A-130	4 (1.2)	41.4	41.6	41.8	1.3	32	52	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6A-130	6 (1.8)	45.0	45.2	45.3	0.9	32	58	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

14.25 - 15.35 GHz (WR62 / R140)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-142	1 (0.3)	30.8	31.1	31.4	4.5	30	50	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-142	2 (0.6)	36.2	36.5	36.8	2.4	32	62	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-142	2.5 (0.8)	38.8	39.1	39.4	1.8	32	64	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-142	4 (1.2)	42.2	42.5	42.8	1.2	32	68	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP4A-142	4 (1.2)	42.2	42.5	42.8	1.2	32	64	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-142	6 (1.8)	45.7	46.0	46.3	0.8	32	71	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHP6A-142	6 (1.8)	45.7	46.0	46.3	0.8	32	67	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX2-142	2 (0.6)	36.0	36.3	36.6	2.4	32	62	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-142	2.5 (0.8)	38.6	38.9	39.2	1.8	32	64	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-142	4 (1.2)	42.0	42.3	42.6	1.2	32	68	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX4A-142	4 (1.2)	42.0	42.3	42.6	1.2	32	64	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-142	6 (1.8)	45.5	45.8	46.1	0.8	32	71	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHPX6A-142	6 (1.8)	45.5	45.8	46.1	0.8	32	67	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHLP1-142	1 (0.3)	31.6	31.9	32.3	3.8	30	53	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-142	2 (0.6)	36.3	36.6	36.9	2.2	30	64	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP2.5-142	2.5 (0.8)	38.6	38.9	39.3	1.8	30	67	1.30 (17.7)	±15	±50	125 (200)	69 (31.2)
VHLP4-142	4 (1.2)	42.3	42.6	42.9	1.2	30	70	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)
VP2A-142	2 (0.6)	36.4	36.7	37.0	2.4	32	45	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4A-142	4 (1.2)	42.4	42.7	43.0	1.2	32	53	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6A-142	6 (1.8)	45.8	46.1	46.4	0.8	32	56	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

15.9 - 16.5 GHz (WR51 / R180)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VP2-159	2 (0.6)	37.6	37.8	38.0	2	32	45	1.20 (20.8)	±15	±50	155 (250)	19.0 (8.5)

17.3 - 17.7 GHz (WR51 / R180)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-173	1 (0.3)	32.4	32.5	32.6	3.8	30	58	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-173	2 (0.6)	38.0	38.1	38.2	2.3	32	64	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VP4-173	4 (1.2)	44.1	44.2	44.3	1.0	32	55	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6-173	6 (1.8)	47.5	47.6	47.7	0.8	32	58	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)

* 1.15 (23.1) available on request

17.7 - 19.7 GHz (WR42 / R220)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-180	1 (0.3)	32.6	33.1	33.5	3.6	30	58	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-180B	2 (0.6)	38.2	38.7	39.1	1.9	32	60	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-180	2.5 (0.8)	40.7	41.2	41.6	1.5	32	66	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-180A	4 (1.2)	44.1	44.6	45.1	0.9	32	65	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-180A	6 (1.8)	47.5	48.0	48.5	0.7	32	70	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX1-180	1 (0.3)	32.4	32.9	33.3	3.6	30	58	1.25 (19.1)**	±15	±50	155 (250)	21 (9.7)
VHPX2-180A	2 (0.6)	38.0	38.4	38.8	1.9	32	60	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-180	2.5 (0.8)	40.5	41.0	41.4	1.5	32	66	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-180A	4 (1.2)	44.0	44.5	45.0	0.9	32	65	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-180A	6 (1.8)	47.4	47.9	48.4	0.7	32	70	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VP2-180A	2 (0.6)	38.4	38.9	39.3	1.9	32	52	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4-180A	4 (1.2)	44.3	44.8	45.3	0.9	32	53	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VP6-180A	6 (1.8)	47.7	48.2	48.7	0.7	32	57	1.20 (20.8)*	±5	±5	125 (200)	160 (72.5)
VHLP1-180	1 (0.3)	33.5	34.0	34.4	3.0	30	55	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-180	2 (0.6)	38.2	38.7	39.1	1.8	30	67	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP2.5-180	2.5 (0.8)	40.5	41.0	41.4	1.5	30	69	1.30 (17.7)	±15	±50	125 (200)	69 (31.2)
VHLP4-180	4 (1.2)	44.2	44.7	45.1	0.9	30	73	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request * 1.20 (20.8) available on request

17.7 - 19.7 GHz / 21.2 - 23.6 GHz (WR42 / R220) Multiband Antennas

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP2-1823												
17.7 - 19.7 GHz	(0.6)	37.6	38.1	38.6	1.9	30	67	1.30 (17.7)	±15	±50	155 (250)	33 (15.0)
21.2 - 23.6 GHz	(0.6)	39.2	39.6	40.0	1.5	30	64	1.30 (17.7)				
VHP4-1823												
17.7 - 19.7 GHz	4 (1.2)	43.7	44.2	44.7	0.9	30	68	1.30 (17.7)	±15	±20	125 (200)	126 (57.0)
21.2 - 23.6 GHz	4 (1.2)	45.2	45.7	46.2	0.8	30	70	1.30 (17.7)				

Refer to pages 191 and 193 for Elliptical Waveguide ordering information

21.2 - 23.6 GHz (WR42 / R220)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-220	1 (0.3)	34.3	34.8	35.2	2.8	30	60	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-220A	2 (0.6)	39.6	40.1	40.5	1.6	32	66	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-220	2.5 (0.8)	42.1	42.6	43.1	1.4	32	68	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-220A	4 (1.2)	45.6	46.1	46.6	0.8	32	72	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP4A-220A	4 (1.2)	45.6	46.1	46.6	0.8	32	63	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHP6-220A	6 (1.8)	48.9	49.4	49.9	0.5	32	75	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHP6A-220A	6 (1.8)	48.9	49.4	49.9	0.5	32	72	1.20 (20.8)*	±5	±5	125 (200)	347 (157.5)
VHPX1-220	1 (0.3)	33.7	34.2	34.6	2.8	30	60	1.25 (19.1)**	±15	±50	155 (250)	21 (9.7)
VHPX2-220A	2 (0.6)	39.4	39.9	40.3	1.6	32	66	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-220	2.5 (0.8)	41.9	42.4	42.9	1.4	32	68	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-220A	4 (1.2)	45.5	46.0	46.5	0.8	32	72	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX4A-220A	4 (1.2)	45.5	46.0	46.5	0.8	32	63	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHPX6-220A	6 (1.8)	48.8	49.3	49.8	0.5	32	75	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VHPX6A-220A	6 (1.8)	48.8	49.3	49.8	0.5	32	72	1.25 (19.1)**	±5	±5	125 (200)	347 (157.5)
VP2-220	2 (0.6)	39.8	40.3	40.7	1.6	32	54	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP4A-220	4 (1.2)	45.8	46.3	46.8	0.8	32	58	1.20 (20.8)*	±15	±20	125 (200)	79.0 (36.0)
VHLP1-220	1 (0.3)	34.4	34.9	35.4	2.8	30	61	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-220	2 (0.6)	39.6	40.1	40.6	1.6	30	66	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-220	4 (1.2)	45.5	46.0	46.5	0.7	30	72	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

24.25 - 26.5 GHz (WR42 / R220)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-240A	1 (0.3)	35.5	35.9	36.3	2.5	30	61	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-240A	2 (0.6)	40.6	41.0	41.4	1.4	32	67	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHP2.5-240	2.5 (0.8)	43.2	43.6	44.0	1.1	32	69	1.20 (20.8)*	±15	±50	125 (200)	78 (35.5)
VHP4-240	4 (1.2)	46.5	46.9	47.2	0.7	32	73	1.20 (20.8)*	±15	±20	125 (200)	126 (57.0)
VHPX1-240A	1 (0.3)	35.3	35.7	36.1	2.5	30	61	1.25 (19.1)**	±15	±50	155 (250)	21 (9.7)
VHPX2-240A	2 (0.6)	40.4	40.8	41.2	1.4	32	67	1.25 (19.1)**	±15	±50	155 (250)	33 (15.0)
VHPX2.5-240	2.5 (0.8)	43.0	43.4	43.8	1.1	32	69	1.25 (19.1)**	±15	±50	125 (200)	78 (35.5)
VHPX4-240	4 (1.2)	46.3	46.7	47.0	0.7	32	73	1.25 (19.1)**	±15	±20	125 (200)	126 (57.0)
VHLP1-240	1 (0.3)	35.6	36.0	36.4	2.5	30	62	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-240	2 (0.6)	40.7	41.1	41.5	1.4	30	67	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-240	4 (1.2)	46.5	46.9	47.2	0.6	30	73	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)
VP2-240	2 (0.6)	40.8	41.2	41.6	1.5	32	52	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)

* 1.15 (23.1) available on request ** 1.20 (20.8) available on request

24.25 - 29.5 GHz (WR34 / R260)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-240W	1 (0.3)	35.8	36.5	37.1	2.5	30	62	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-240W	2 (0.6)	40.6	41.3	41.9	1.4	32	68	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)

* 1.15 (23.1) available on request

27.5 - 29.5 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-275	1 (0.3)	36.3	36.6	36.9	2.2	30	62	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-275	2 (0.6)	41.2	41.5	41.8	1.2	32	68	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VP2-275	2 (0.6)	42.0	42.3	42.6	1.2	32	53	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VP2A-275	2 (0.6)	42.0	42.3	42.6	1.2	32	53	1.20 (20.8)*	±15	±50	155 (250)	19.0 (8.5)
VHLP1-275	1 (0.3)	36.6	36.9	37.2	2.2	30	63	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-275	2 (0.6)	41.6	41.9	42.2	1.2	30	68	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-275	4 (1.2)	47.8	48.1	48.4	0.5	30	73	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request

27.5 - 29.5 GHz / 31.0 - 31.3 GHz (WR28 / R320) Multiband Antennas

Type Number	Diameter ft (m)	Gain, dBi Bottom	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHLP1A-275W												
27.5 - 29.5 GHz	1 (0.3)	36.6	36.9	37.2	2.2	30	63	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
31.0 - 31.3 GHz	1 (0.3)	–	37.5	–	1.7	30	63	1.40 (15.56)				
VHLP2A-275W												
27.5 - 29.5 GHz	2 (0.6)	41.6	41.9	42.2	1.2	30	68	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
31.0 - 31.3 GHz	2 (0.6)	–	43.1	–	1.0	30	68	1.40 (15.56)				

27.5 - 31.8 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-275W	1 (0.3)	36.0	36.6	37.1	1.2	30	62	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

31.0 - 31.8 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Mid-Band	Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-310	1 (0.3)	36.8	36.9	37.0	2.3	30	62	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-310	2 (0.6)	42.0	42.2	42.4	1.4	32	68	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)

* 1.15 (23.1) available on request

37.0 - 40.0 GHz (WR28 / R320)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-370A	1 (0.3)	39.2	39.5	39.8	1.7	30	60	1.20 (20.8)*	±15	±50	155 (250)	21 (9.7)
VHP2-370A	2 (0.6)	44.0	44.3	44.6	1.0	32	63	1.20 (20.8)*	±15	±50	155 (250)	33 (15.0)
VHPX2-370	2 (0.6)	44.0	44.3	44.6	1.0	32	63	1.25 (19.1)	±15	±50	155 (250)	33 (15.0)
VHLP1-370	1 (0.3)	39.4	39.7	40.0	1.7	30	60	1.30 (17.7)	±15	±50	155 (250)	18 (8.3)
VHLP2-370	2 (0.6)	44.2	44.5	44.8	1.0	30	63	1.30 (17.7)	±15	±50	155 (250)	25 (11.3)
VHLP4-370	4 (1.2)	50.4	50.7	51.0	0.4	30	71	1.30 (17.7)	±15	±20	125 (200)	115 (52.0)

* 1.15 (23.1) available on request

49.2 - 50.2 GHz (WR19 / R500)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-490	1 (0.3)	41.3	41.4	41.5	1.3	30	60	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

54.25 - 57.2 GHz (WR19 / R500)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-540	1 (0.3)	42.2	42.4	42.6	1.2	30	61	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

57.2 - 58.2 GHz (WR19 / R500)

Type Number	Diameter ft (m)	Gain, dBi Bottom	Gain, dBi Mid-Band	Gain, dBi Top	Beamwidth degrees	Cross Pol. Disc., dB	F/B Ratio dB	VSWR max. (R.L., dB)	Fine Adjustment degrees Azimuth	Fine Adjustment degrees Elevation	Survival Wind Speed mph (km/h)	Net Weight lb (kg)
VHP1-570	1 (0.3)	42.6	42.7	42.8	1.1	30	62	1.30 (17.7)	±15	±50	155 (250)	21 (9.7)

Antenna Mechanical Specifications

All ValuLine® antennas include a vertical tower mount. Standard mounting information is shown below. Dimensional information and illustrations for installation are shown on pages 139-147.

Mounting Pipe. Vertical tower mounts attached to a tower supported vertical pipe of the diameter specified in the table below. The mounting pipe is not included with the antenna. It is normally purchased as part of the tower.

Mount Construction. Structural members are hot-dip galvanized steel or aluminum.

Hardware. Fixed hardware is hot-dip galvanized steel. Adjusting hardware, including adjusting rods, is stainless steel.

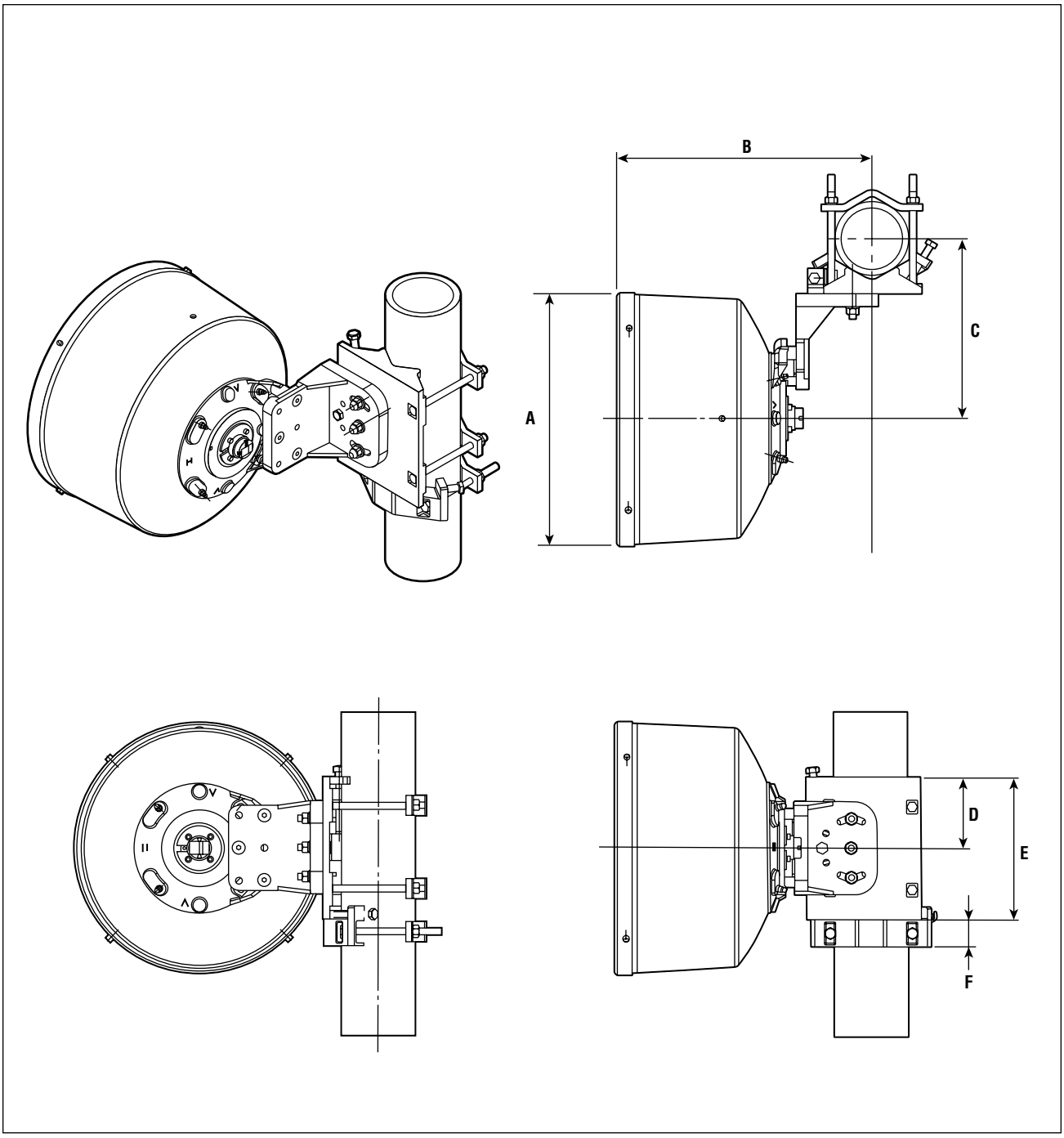
Azimuth and Elevation Adjustments. The adjustment ranges are indicated in the table below. Some mounts, as noted in the table, use a swivel clamp for azimuth adjustment. Adjustment range for these is 360 degrees. All ValuLine antenna mounts have threaded fine elevation adjustment.

Side Struts. Some ValuLine antennas include a side strut. The side strut includes a stainless steel threaded rod fine azimuth adjustment. See page 123 for information about side strut positioning.

Vertical Tower Mounts

Antenna Size ft (m)	Replacement Mount Type Number Metric Standard Hardware	Mounting Pipe Dia. in (mm)	Center Offset* in (mm)	Fine Azimuth Adjustment Degrees	Fine Elevation Adjustment Degrees	Side Struts Included
1 (0.3)	**Integral**	1.9-4.5 (48-115)	10.9 (278)	± 15°	± 50°	–
2 (0.6)	**Integral**	1.9-4.5 (48-115)	11.5 (292)	± 15°	± 50°	–
2.5 (0.8)	**Integral**	2.5-4.5 (65-115)	12.4 (315)	± 15°	± 50°	–
4 (1.2)	**Integral**	4.5 (115)	10.4 (264)	± 15°	± 20°	1
6 (1.8)	**46770A-3**	4.5 (115)	5.4 (137)	± 15°	± 5°	1

* With respect to the mounting pipe viewed from the rear of the antenna. Can be reversed by inverting the mount or antenna.
Note: Integral mounts consist of multiple type numbers. Contact Andrew for type numbers.

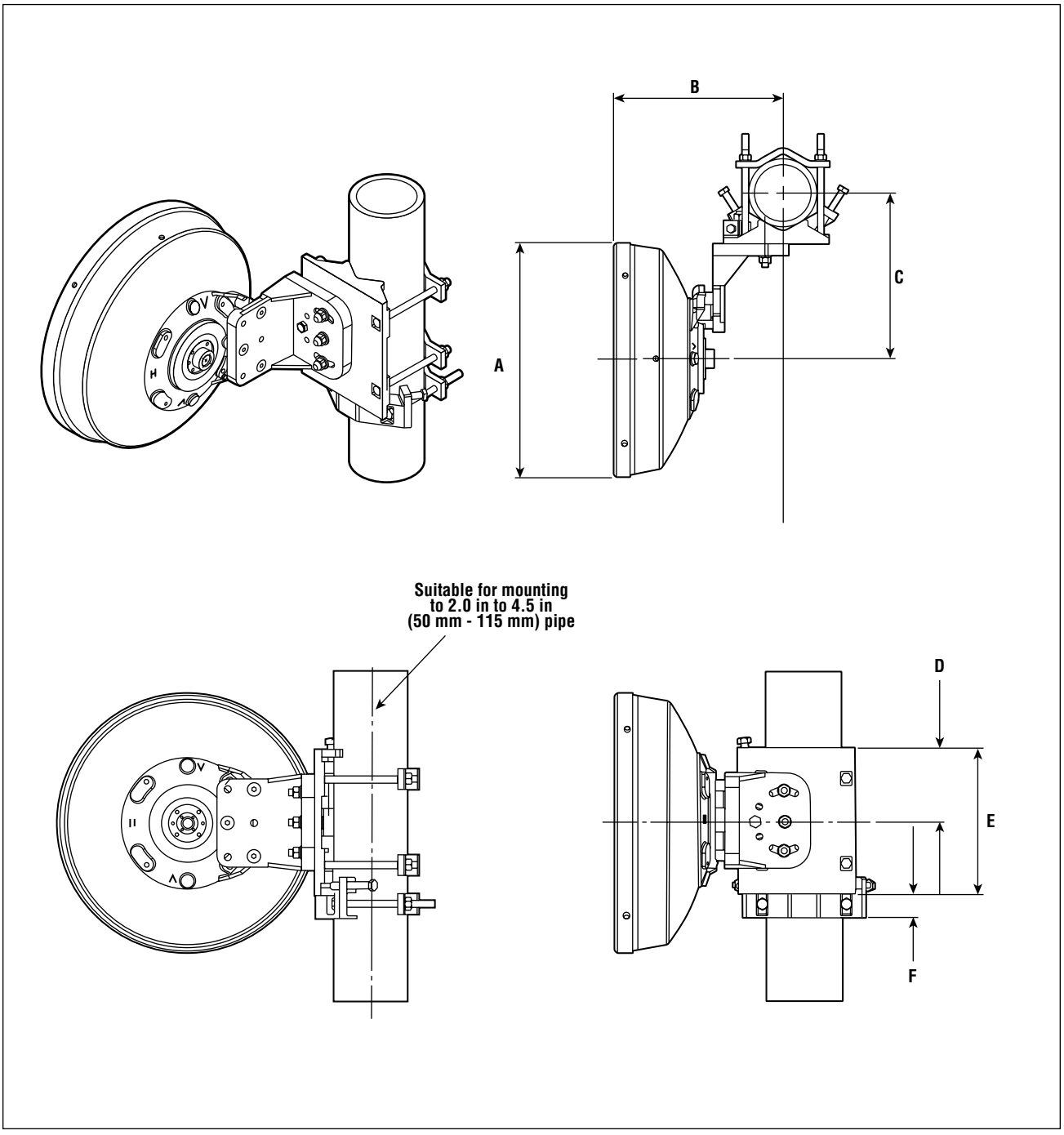


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
1 (0.3)	15.6 (398)	15.5 (393)	10.9 (278)	4.3 (110)	8.7 (220)	1.65 (42)

All dimensions based on 4.5 in (115 mm) pipe.

1-ft ValuLine® Low Profile Antenna Dimensions



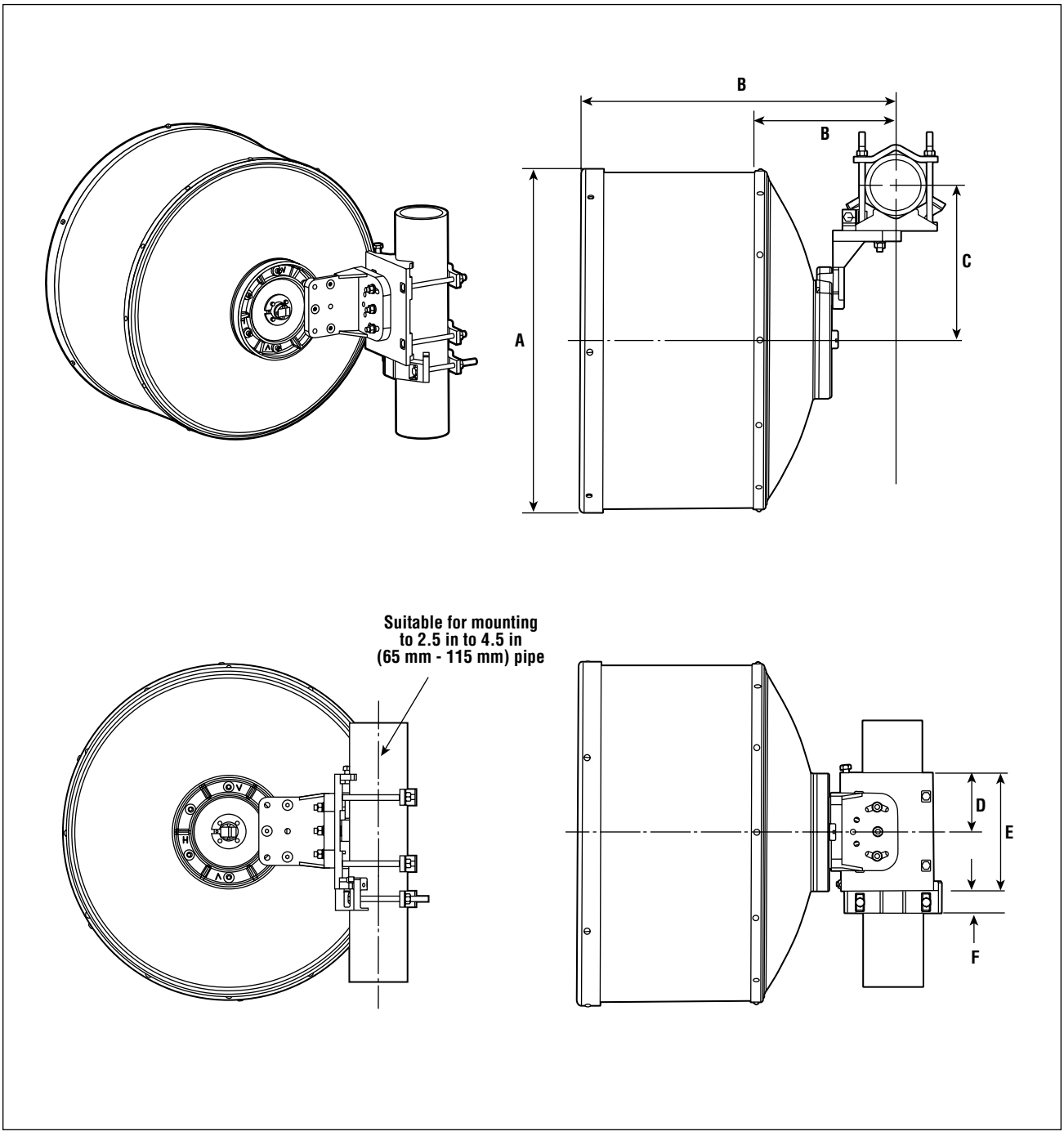
Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B*	C	D	E	F
1 (0.3)	15.6 (398)	11.4 (289)	10.9 (278)	4.3 (110)	8.7 (220)	1.65 (42)

* 12.4 (314 mm) for VHLP1-220 antenna

All dimensions based on 4.5 in (115 mm) pipe

2-ft ValuLine® Shielded and Standard Antenna Dimensions

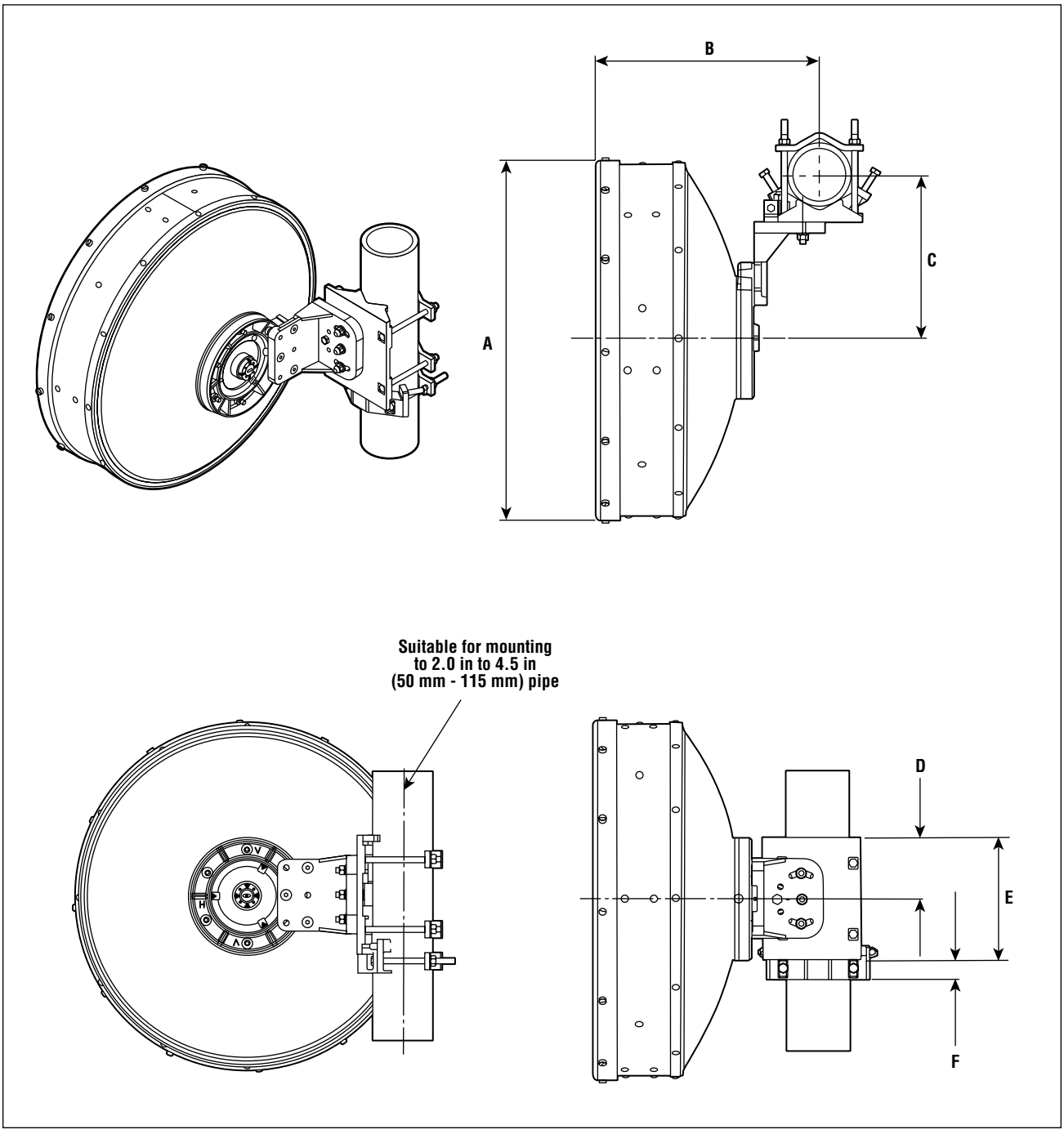


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2.0 (0.6) Shielded	25.6 (651)	27.5 (699)	11.5 (292)	4.3 (110)	8.7 (220)	1.65 (42)
2.0 (0.6) Standard	25.0 (637)	10.5 (266)	11.5 (292)	4.3 (110)	8.7 (220)	1.65 (42)

All dimensions based on 4.5 in (115 mm) pipe.

2-ft ValuLine® Low Profile Antenna Dimensions

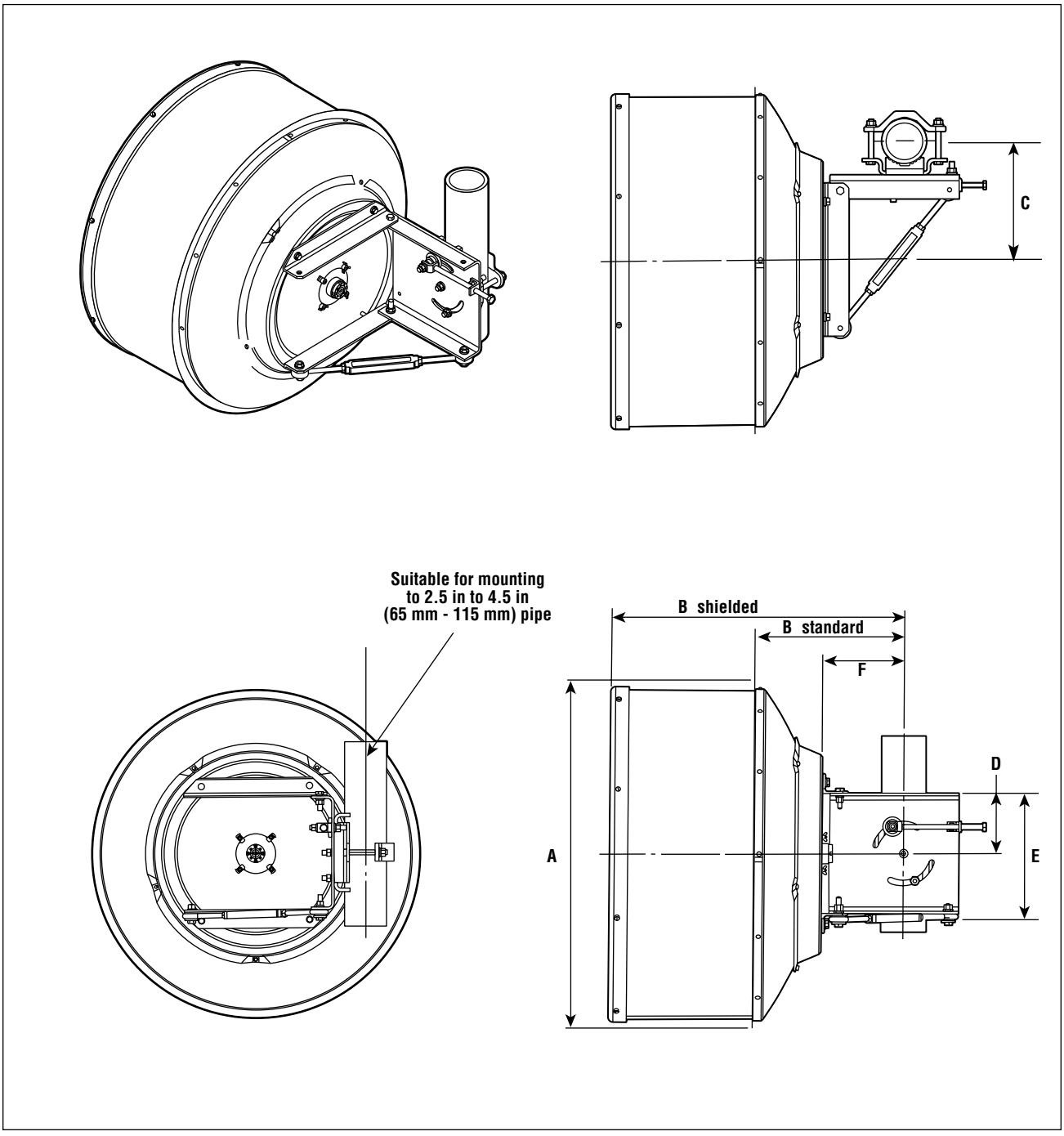


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2 (0.6)	25.6 (651)	16.1 (410)	11.5 (292)	4.3 (110)	8.7 (220)	1.65 (42)

All dimensions based on 4.5 in (115 mm) pipe

2.5-ft ValuLine® Shielded and Standard Antenna Dimensions

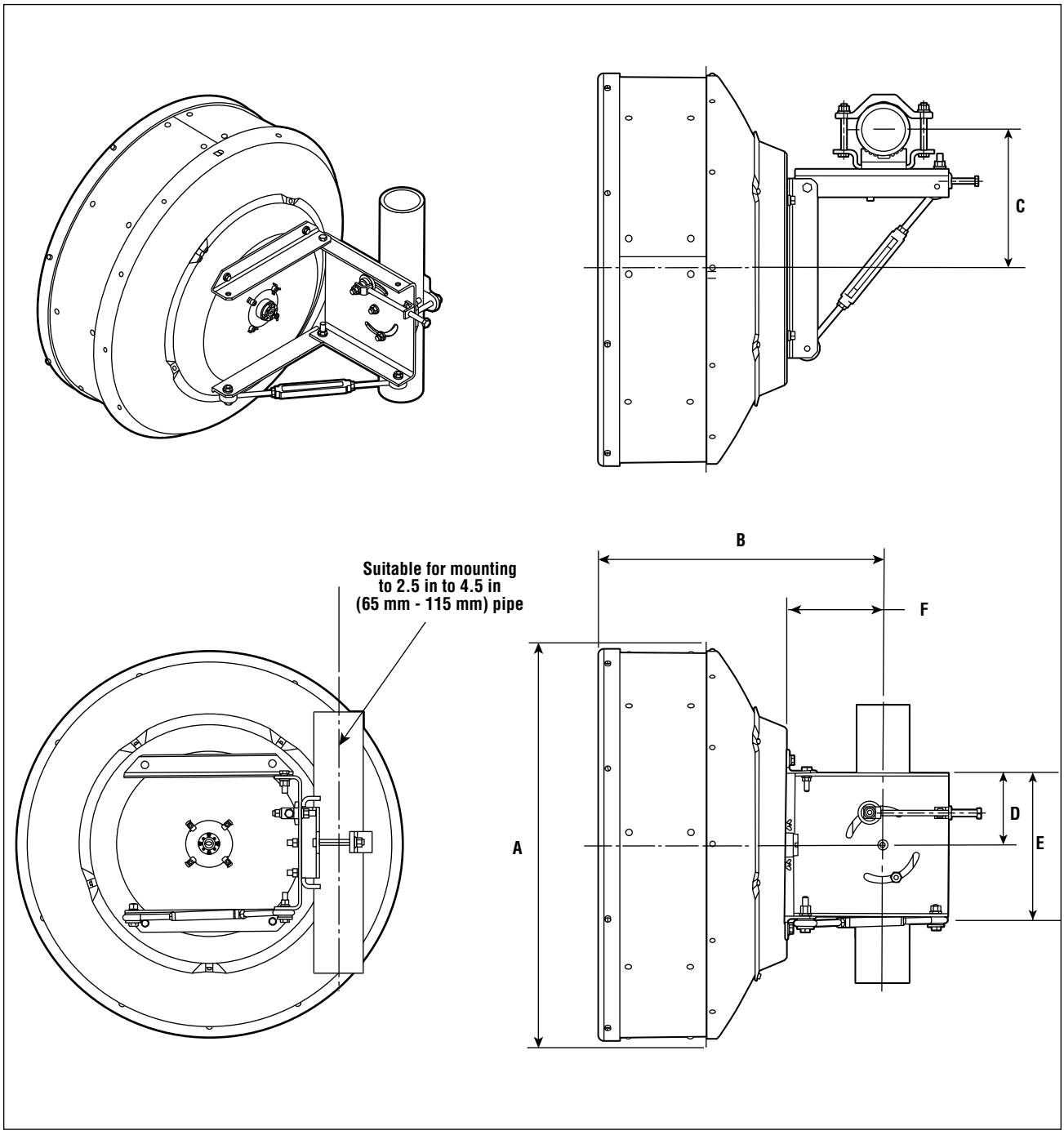


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2.5 (0.8) Shielded	35 (889)	29.6 (752)	11.9 (301)	6 (153)	13.3 (338)	8.2 (208)
2.5 (0.8) Standard	35 (889)	15.2 (385)	11.9 (301)	6 (153)	13.3 (338)	8.2 (208)

All dimensions based on 4.5 in (115 mm) pipe.

2.5-ft ValuLine® Low Profile Antenna Dimensions

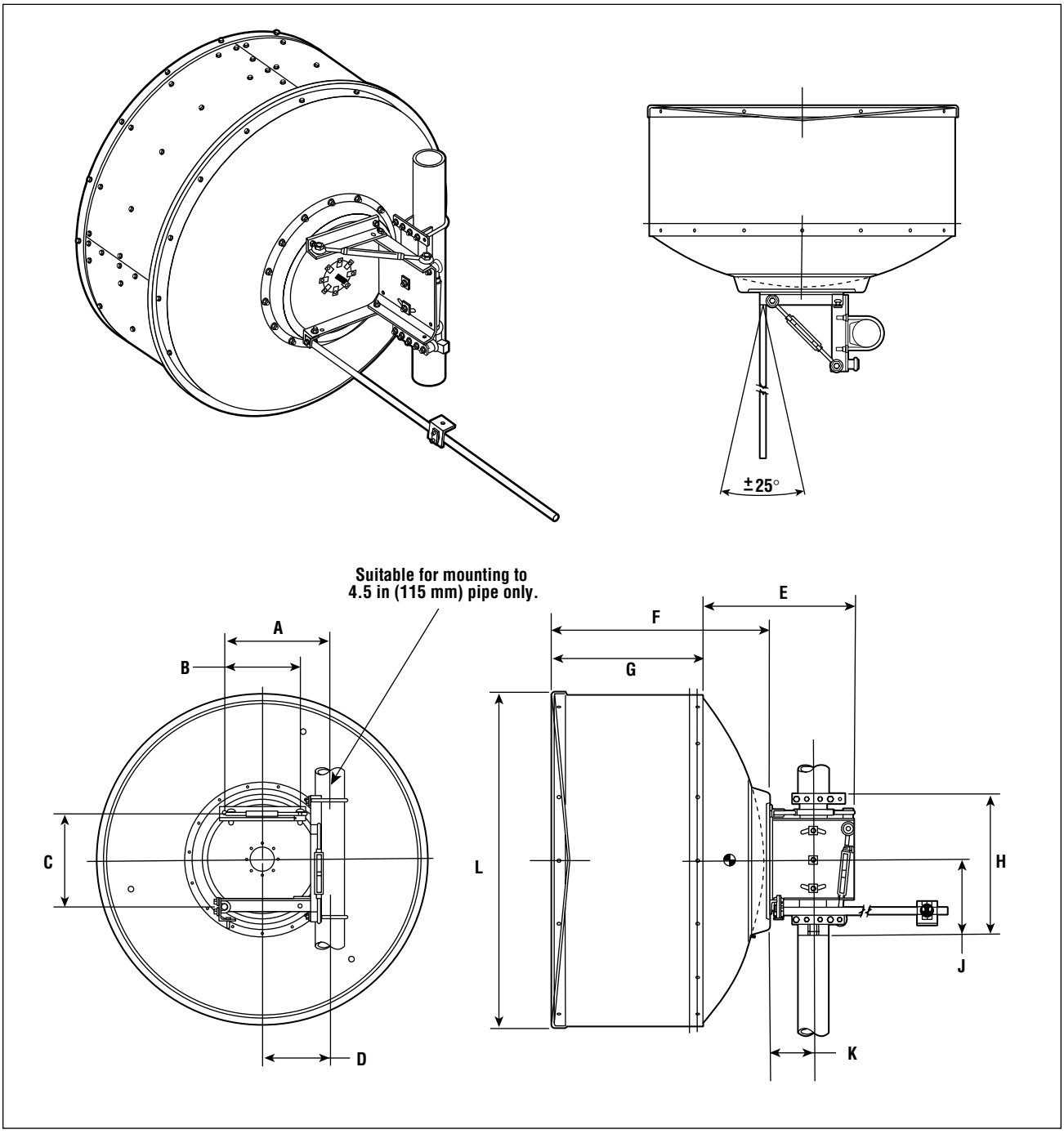


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F
2.5 (0.8)	35 (889)	24.5 (622)	11.9 (301)	6 (153)	13.3 (338)	8.2 (208)

All dimensions based on 4.5 in (115 mm) pipe.

4-ft ValuLine® Antenna Dimensions

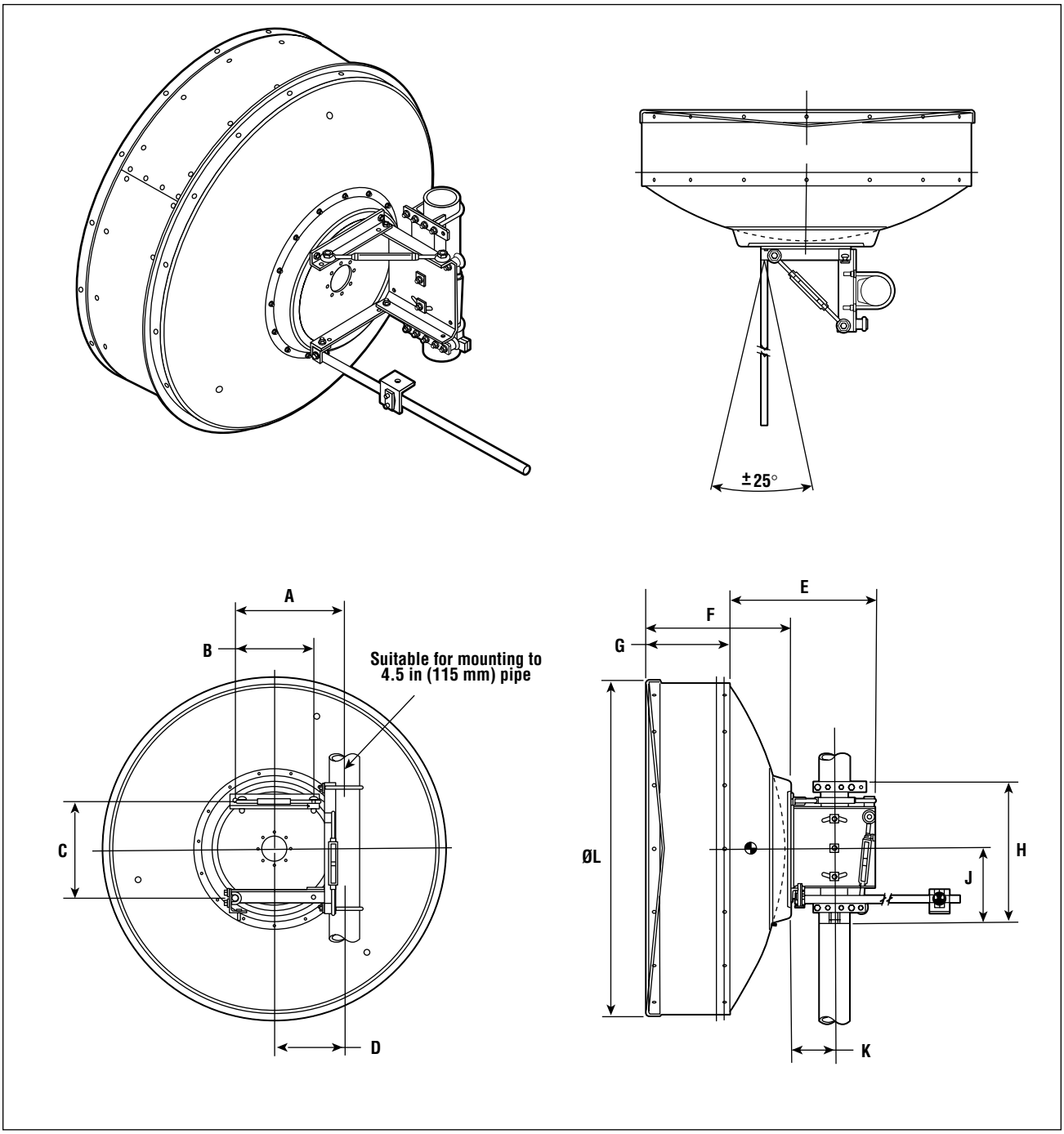


Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F*	G*
4 (1.2)	16.2 (411)	11.6 (295)	14.2 (361)	10.4 (264)	21.4 (544)	30.0 (762)	21.3 (541)
	H	J	K	L			
	20.8 (528)	11.1 (288)	6.5 (165)	49.1 (1247)			

* Applicable only for VHP Series (shielded) antennas.

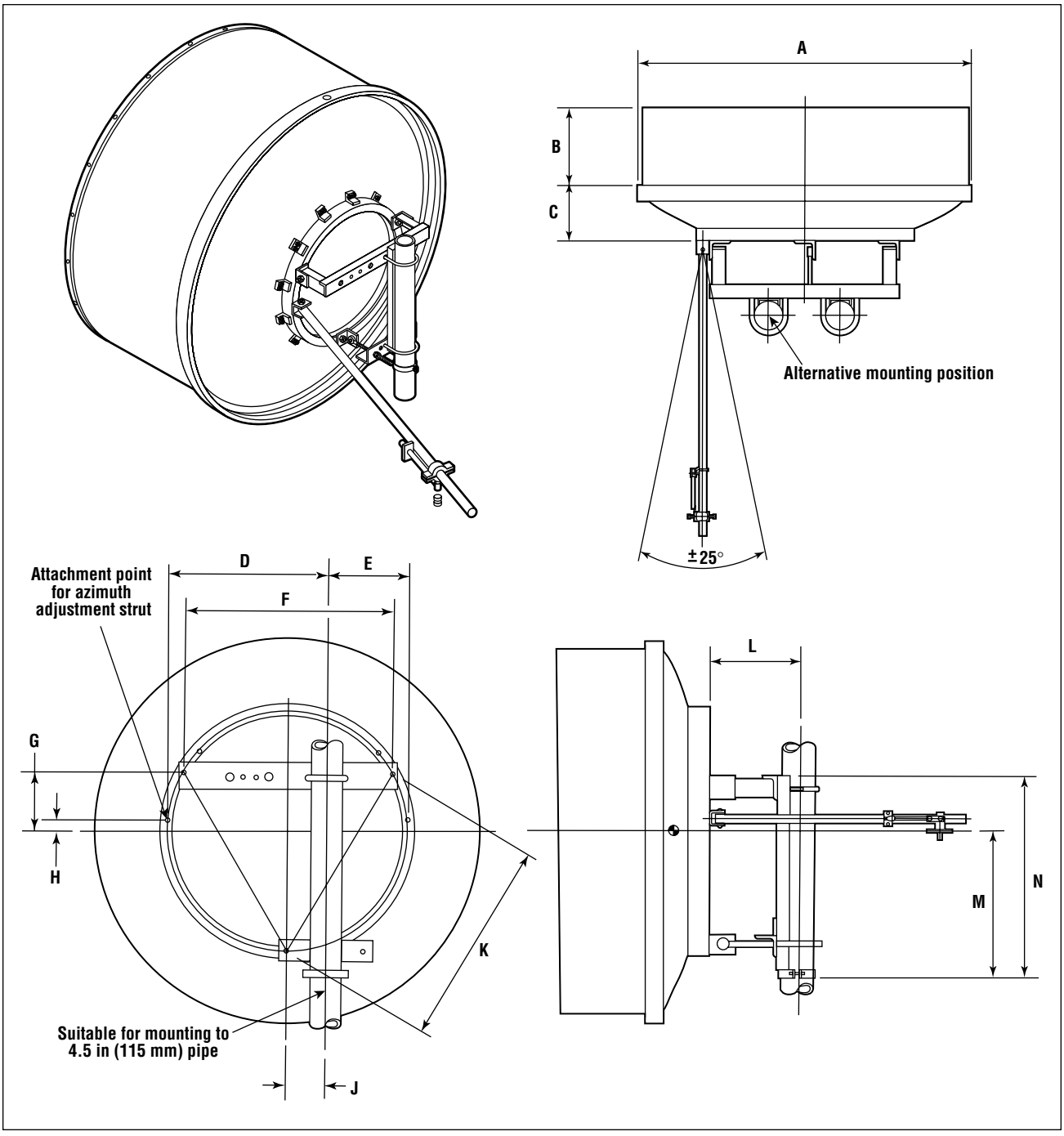
4-ft ValuLine® Low Profile Antenna Dimensions



Dimensions in Inches (mm)

Antenna Size, ft (m)	A	B	C	D	E	F	G
4 (1.2)	16.2 (411)	11.6 (295)	14.2 (361)	10.4 (264)	21.4 (544)	23.4 (594)	14.7 (373)
	H	J	K	L			
	20.8 (528)	11.1 (288)	6.5 (165)	49.1 (1247)			

6-ft ValuLine® Antenna Dimensions



Dimensions in Inches (mm)

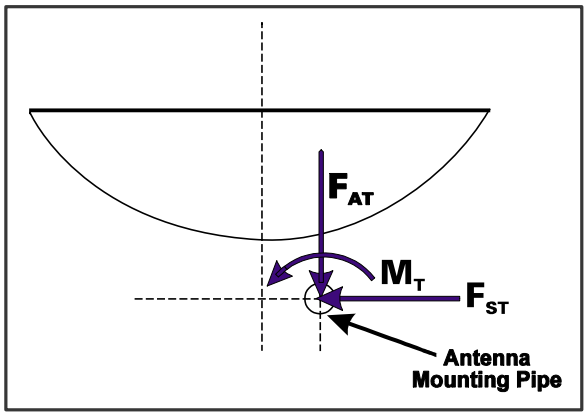
Antenna Size, ft (m)	A	B	C	D	E	F	G
6 (1.8)	76.5 (1945)	34.7 (881)	12.75 (325)	18.8 (476)	9.7 (246)	26.5 (675)	7.65 (195)
	H	J	K	L	M	N	
	2.25 (60)	5.4 (137)	26.5 (675)	11.75 (300)	19.1 (488)	29.1 (740)	

Forces and Twisting Moments Due to Wind Loads

The axial, side, and twisting moment forces shown below are maximum values exerted on a supporting structure. They are the result of wind from the most critical direction for each parameter. The individual maximums may not occur simultaneously.

Andrew Software, included on the Powertools CD-ROM and downloadable from www.andrew.com, calculates the forces produced by winds from any angle.

See page 44 for more information.



Forces and Twisting Moments Due to Wind Loads

Forces/ Moments	Wind Speed 70 mph 110 km/h 31 m/s	125 mph 200 km/h 56 m/s	150 mph 250 km/h 69 m/s
1 ft (0.3 m) VHLP, VHLPX			
F_{AT} max., lb (N)	23 (102)	75 (334)	108 (481)
F_{ST} max., lb (N)	9 (41)	30 (135)	44 (194)
M_T max., lb-ft (N•m)	18 (24)	58 (79)	84 (114)
1 ft (0.3 m) VHP, VHPX			
F_{AT} max., lb (N)	23 (102)	75 (334)	108 (481)
F_{ST} max., lb (N)	10 (46)	34 (150)	49 (216)
M_T max., lb-ft (N•m)	19 (26)	63 (85)	90 (122)
2 ft (0.6 m) VP, VPX			
F_{AT} max., lb (N)	66 (294)	216 (960)	311 (1382)
F_{ST} max., lb (N)	18 (80)	59 (262)	85 (377)
M_T max., lb-ft (N•m)	62 (84)	204 (276)	293 (397)
2 ft (0.6 m) VHLP, VHLPX			
F_{AT} max., lb (N)	51 (226)	166 (740)	240 (1066)
F_{ST} max., lb (N)	27 (121)	89 (394)	127 (567)
M_T max., lb-ft (N•m)	44 (60)	145 (196)	208 (282)
2 ft (0.6 m) VHP, VHPX			
F_{AT} max., lb (N)	51 (226)	166 (740)	240 (1066)
F_{ST} max., lb (N)	32 (141)	103 (460)	149 (662)
M_T max., lb-ft (N•m)	60 (81)	195 (264)	280 (380)
2 ft (0.6 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	33 (147)	108 (482)	156 (694)
F_{ST} max., lb (N)	20 (91)	67 (297)	96 (428)
M_T max., lb-ft (N•m)	29 (39)	94 (128)	136 (184)
2.5 ft (0.8 m) VP, VPX			
F_{AT} max., lb (N)	103 (459)	337 (1501)	–
F_{ST} max., lb (N)	28 (125)	92 (410)	–
M_T max., lb-ft (N•m)	105 (143)	345 (468)	–
2.5 ft (0.8 m) VHLP, VHLPX			
F_{AT} max., lb (N)	76 (337)	248 (1102)	–
F_{ST} max., lb (N)	34 (150)	110 (491)	–
M_T max., lb-ft (N•m)	70 (95)	229 (311)	–
2.5 ft (0.8 m) VHP, VHPX			
F_{AT} max., lb (N)	76 (337)	248 (1102)	–
F_{ST} max., lb (N)	38 (167)	123 (546)	–
M_T max., lb-ft (N•m)	78 (106)	255 (346)	–

Forces/ Moments	Wind Speed 70 mph 110 km/h 31 m/s	125 mph 200 km/h 56 m/s	150 mph 250 km/h 69 m/s
2.5 ft (0.8 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	52 (231)	170 (754)	–
F_{ST} max., lb (N)	32 (142)	104 (464)	–
M_T max., lb-ft (N•m)	49 (66)	160 (217)	–
4 ft (1.2 m) VP, VPX			
F_{AT} max., lb (N)	264 (1176)	864 (3843)	–
F_{ST} max., lb (N)	72 (321)	236 (1049)	–
M_T max., lb-ft (N•m)	194 (263)	633 (858)	–
4 ft (1.2 m) VHLP, VHLPX			
F_{AT} max., lb (N)	194 (863)	634 (2821)	–
F_{ST} max., lb (N)	86 (383)	281 (1251)	–
M_T max., lb-ft (N•m)	181 (245)	590 (800)	–
4 ft (1.2 m) VHP, VHPX			
F_{AT} max., lb (N)	194 (863)	634 (2821)	–
F_{ST} max., lb (N)	96 (428)	314 (1398)	–
M_T max., lb-ft (N•m)	202 (274)	659 (894)	–
4 ft (1.2 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	133 (591)	434 (1930)	–
F_{ST} max., lb (N)	77 (342)	251 (1118)	–
M_T max., lb-ft (N•m)	175 (237)	571 (774)	–
6 ft (1.8 m) VP, VPX			
F_{AT} max., lb (N)	595 (2646)	1944 (8647)	–
F_{ST} max., lb (N)	162 (722)	531 (2360)	–
M_T max., lb-ft (N•m)	547 (742)	1789 (2425)	–
6 ft (1.8 m) VHP, VHPX			
F_{AT} max., lb (N)	437 (1942)	1427 (6348)	–
F_{ST} max., lb (N)	216 (962)	707 (3144)	–
M_T max., lb-ft (N•m)	499 (676)	1629 (2209)	–
6 ft (1.8 m) VP, VPX with Molded Radome			
F_{AT} max., lb (N)	299 (1329)	976 (4343)	–
F_{ST} max., lb (N)	184 (818)	601 (2673)	–
M_T max., lb-ft (N•m)	521 (707)	1703 (2309)	–

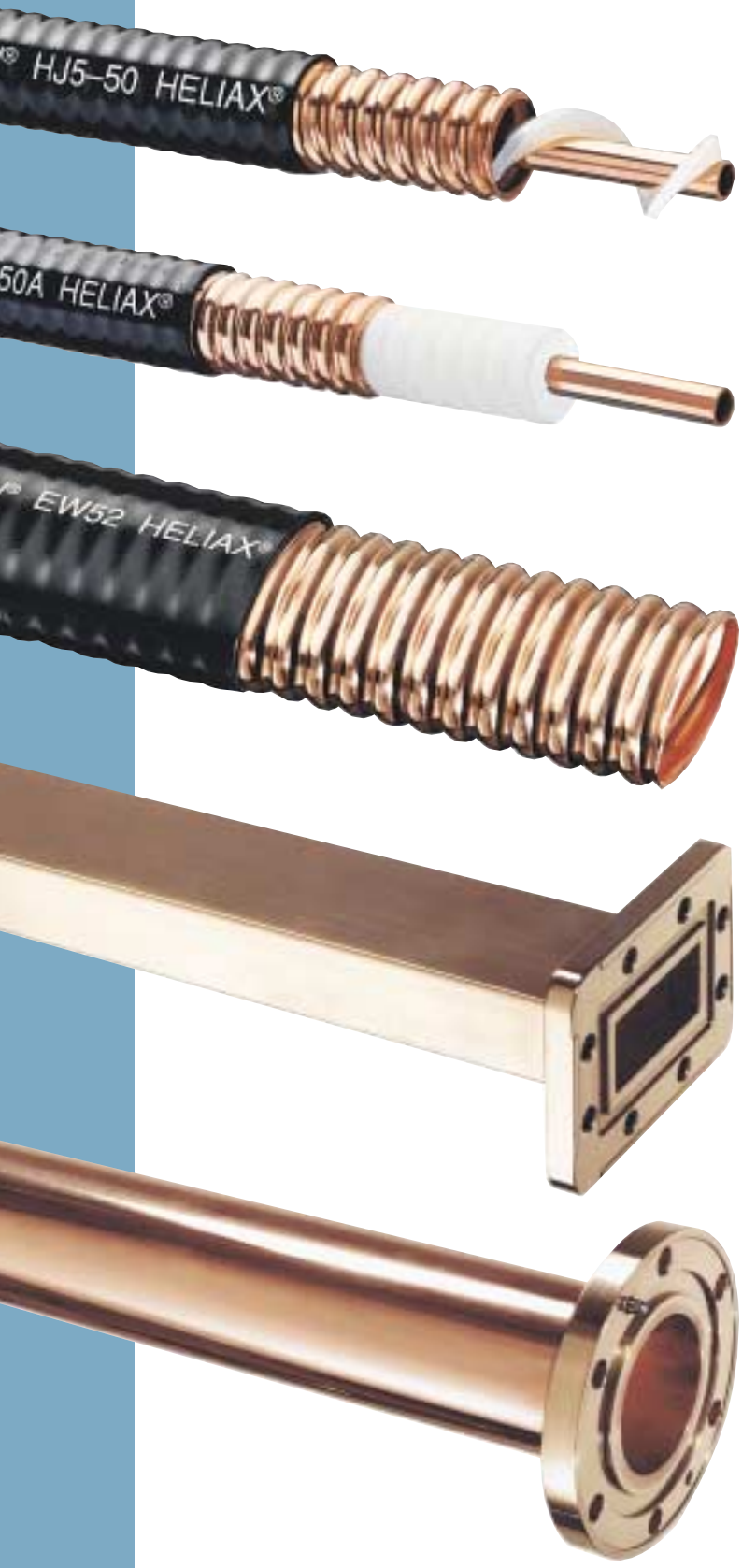
Standard VHP4 Packing

Pre-Assembled VHP4 Packing

1 ft (0.3 m), 2 ft (0.6 m), and 2.5 ft (0.8 m) ValuLine antennas are shipped as standard in totally recyclable cardboard packaging. 4 ft (1.2 m) and 6 ft (1.8 m) antennas are supplied in wire-bound crates. For shipment to more remote areas of the world, heavy duty packing is available.

Contact Andrew for details.

Standard VHP1 and VHP2 Packing



Widest Selection

of microwave transmission lines in the industry. Andrew offers sizes and types that are optimized for nearly every application.

HELIAX® Coaxial Cables and Elliptical Waveguides

have been, for many years, the standard transmission lines of the microwave industry. HELIAX cables and waveguides are proven performers in thousands of applications worldwide. Use of these products ensures the ultimate in quality, reliability and performance.

Andrew Circular Waveguides

offer lowest possible attenuation for long vertical runs and can result in antenna and tower cost savings.

Low VSWR

Andrew offers all types of microwave transmission lines in low VSWR versions for minimum group delay distortion and system noise.

How to Select Transmission Lines

Andrew offers a complete range of HELIAX elliptical, rigid rectangular and rigid circular waveguides for use in terrestrial microwave and earth station antenna systems. HELIAX coaxial cables are offered for systems operating in microwave bands below 3 GHz.

The selector chart on page 151 lists recommended transmission lines by frequency band. Several options are listed for each band. The choice is typically based on evaluation of the features of each as described below.

Low VSWR HELIAX Air-Dielectric Coaxial Cable is the recommended feeder for antennas with air-dielectric feeds for 2.7 GHz and below. HELIAX cable is available in long continuous lengths for ease of installation and maintenance-free service. 7/8", 1-5/8" and 2-1/4" are the sizes typically used. HELIAX air-dielectric cables for microwave applications are described on pages 154 and 155.

Low VSWR HELIAX Foam-Dielectric Coaxial Cable is recommended for use with antennas having unpressurized feeds. 1/2", 7/8", 1-1/4" and 1-5/8" LDF series are the sizes typically used. HELIAX foam-dielectric cables for microwave applications are described on pages 152 and 153.

HELIAX Elliptical Waveguide is the recommended feeder for most microwave antenna systems in the 3.4 to 26.5 GHz frequency range. Long, continuous, flexible lengths result in easier and less costly system planning and installation compared with rigid waveguides. The performance and reliability of HELIAX elliptical waveguide have been

proven in thousands of microwave systems. The corrugated copper walls give HELIAX® elliptical waveguide excellent crush strength and good flexibility. A rugged black polyethylene jacket provides protection during handling and installation. Assemblies consist of waveguide cut to a specified length and terminated with connectors. Alternatively, bulk lengths may be ordered and individual feeders cut to length on site prior to installation.

Low VSWR, premium (EWP Series) assemblies are recommended for long-haul or high channel density systems. Standard VSWR (EW Series) assemblies are recommended for short and medium-haul radio relay systems with low and medium channel densities and medium-haul color television microwave relay systems. Super premium versions are available for selected sizes and offer lowest VSWR. HELIAX elliptical waveguides are described on pages 156-201.

Circular Waveguide minimizes feeder attenuation and is particularly suited for long vertical waveguide runs to tower-mounted antennas. A single waveguide run can carry two polarizations with 30 dB minimum isolation. Circular waveguide is recommended for systems where lower attenuation is critical or where multiband capability is needed. The economic choice between elliptical and circular waveguides depends on total antenna and feeder system equipment, transportation, installation and tower costs. Circular waveguides are described on pages 202-218.

Rectangular Waveguide Components such as elbows, twists, pressure windows, and flex-twists are used in elliptical and circular waveguide systems for connections with the antenna and radio equipment. Rectangular waveguide also may be used for short feeder systems where space is limited. A full range of components for bands in the 3.4 - 40 GHz frequency range is offered. Rectangular waveguides are described on pages 219-230.

Transmission Line Selector Chart

Frequency Band, GHz	HELIAX Coaxial Cable Air Dielectric	HELIAX Coaxial Cable Foam Dielectric	HELIAX Elliptical Waveguide Type	Pages	Rectangular Waveguide (See Pages 202)	Circular Waveguide (See Pages 219)
Below 1.427	HJ( )-50 Series	LDF( )-50 Series	–	–	–	–
1.427-1.535	HJ( )-50 Series	LDF( )P-50 Series	–	–	–	–
1.7-2.3	HJ( )P-50 Series	LDF( )P-50 Series	EW17, EWP17	160	–	–
2.5-2.7	HJ( )P-50 Series	LDF( )P-50 Series	EW20	162	–	–
2.9-3.4			EW28	164	–	–
3.4-4.2	–	–	EW34, EWP34, EW37, EWP37	166	WR229	WC281
			& EWP37S	168	–	–
4.4-5.0	–	–	EW43 & EWP43	170	WR187	–
5.6-6.425	–	–	EW52, EWP52	172	WR159, WR137	–
5.925-6.425	–	–	EW52, EWP52 & EWP52S	172	WR159, WR137	WC281, WC166
6.425-7.125	–	–	EW63, EWP63 & EWP63S	174	WR137	WC281, WC166
7.125-7.750	–	–	EW64, EWP64	176	WR137, WR112	WC166
7.125-8.5	–	–	EW77, EWP77	178	WR112	WC166
8.5-9.8	–	–	EW85	180	WR90, WR112	–
10.5-10.7	–	–	EW90, EWP90	182	WR90	–
10.7-11.7	–	–	EW90, EWP90 & EWP90S	182	WR90	WC109
11.7-13.25	–	–	EW127A, EWP127A	184	WR75	WC109
14.0-14.5	–	–	EW132, EWP132	186	WR75	–
14.5-15.35	–	–	EW132, EWP132	186	WR62	–
17.7-19.7	–	–	EW180, EWP180	188	WR42	WC109
21.2-23.6	–	–	EW220	190	WR42	–
24.25-26.50	–	–	EW240	192	WR42	–
26.5-40	–	–	–	*	WR51, 28	–

HJ( )-50 Series Size	Type	HJ( )P-50 Series Pages	Type	Pages	LDF( )-50 Series Type	Pages	LDF( )P-50 Series Type	Pages
1/2"	**HJ4-50**	535	–	–	**LDF4-50A**	496	**LDF4P-50A**	496
7/8"	**HJ5-50**	555	**HJ5P-50**	555	**LDF5-50A**	506	**LDF5P-50A**	506
1-1/4"	–	–	–	–	**LDF6-50**	513	**LDF6P-50**	513
1-5/8"	**HJ7-50A**	560	**HJ7P-50A**	560	**LDF7-50A**	520	**LDF7P-50A**	520
			HJ7SP-50A	560				

* On request

Microwave Cables
Foam Dielectric

Low VSWR

Minimize group delay distortion and system noise.

Low Attenuation

Low loss foam for efficient signal transfer.

Long Continuous Lengths

Simplifies installation, eliminates the need for splices and provides for convenient stocking on site. Also, fewer joints mean increased reliability.

Foam-Dielectric Cables

Eliminates the need for pressurization equipment for easier installation and lower maintenance costs.

HELIAX® low-VSWR, foam-dielectric coaxial cables are the industry standard for use in unpressurized microwave radio relay systems. These cables are for use with the "F" series antennas operating from 1427 to 2700 MHz listed on pages 54-59. Type LDF6P-50 has a pressure path through the inner conductor and is also suitable for use with air-dielectric feed antennas. For applications below 1427 MHz, the standard HELIAX cables described on pages 496-526 are recommended.

Cables and fitted connectors are available for any standard U. S., Canadian, or CCIR frequency band. Other frequency bands are available on special order. Every assembly is guaranteed not to exceed the maximum VSWR specified.

Accessories described on pages 529-625 apply to low-VSWR HELIAX cable.

Low-VSWR HELIAX Jumper Assemblies

LDF series foam jumper assemblies offer low attenuation, low VSWR, complete RF shielding, flexibility, and high mechanical strength for equipment room connections. Low-VSWR, 1/2", 50 ohm HELIAX cable and connectors are used. Every assembly is guaranteed not to exceed the maximum VSWR specified. Type N Plug (male) connectors have gold-plated inner contact pins and silver-plated external surfaces. Other connectors and cable lengths are also available.

Weatherproof. Connector O-ring seals, in conjunction with the annular corrugations of the cable, provide a longitudinal moisture block. To eliminate differential expansion, the dielectric is mechanically locked to the outer conductor and bonded to the inner conductor.

Self-Flaring. This patented* innovation results in simplified assembly, excellent electrical contact and high resistance to connector pull-off and twist-off. Each connector is designed for low VSWR up to the cut-off frequency of the cable.

* U.S. Patent 4,046,451.

To Order. Specify cable type number including frequency band code, connector type numbers, "first-off" connector and cable length in feet or meters. See sample order on page 473.

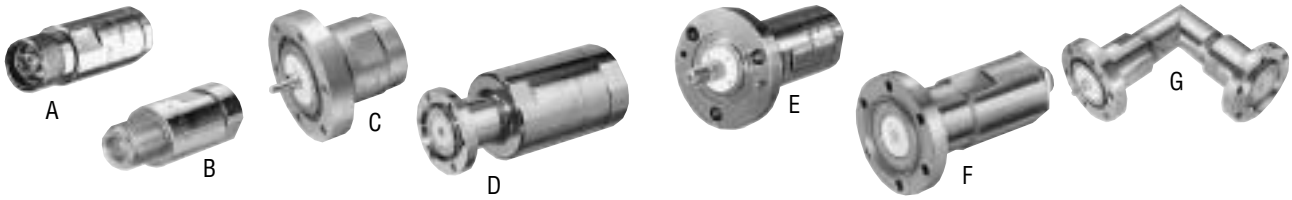
Characteristics - LDF Series Foam-Dielectric HELIAX Cable Assemblies

Size	1/2"	5/8"	7/8"	1-1/4"	1-5/8"	2-1/4"
Type No.	**LDF4P-50A**	**LDF4.5P-50**	**LDF5P-50A-(*)**	**LDF6P-50-(*)**	**LDF7P-50A-(*)**	**LDF12P-50**
Impedance, ohms	50	50	50	50	50	50
Low VSWR, Max, (RL)	Refer to Page 498	Refer to Page 501	Refer to Page 508	Refer to Page 515	Refer to Page 522	Refer to Page 525
Attenuation at 2 GHz** dB/100 ft (dB/100 m)	3.25 (10.7)	2.44 (8.02)	1.86 (6.11)	1.35 (4.43)	1.16 (3.81)	0.994 (3.26)
Velocity, percent	88	89	89	89	88	88
Diameter over Jacket, in (mm)	0.63 (16)	0.86 (21.9)	1.09 (28)	1.55 (39.4)	1.82 (46.3)	2.35 (59.7)
Minimum Bending Radius, in (mm)	5 (125)	8 (200)	10 (250)	15 (380)	20 (508)	24 (610)
Cable Weight, lb/ft (kg/m)	0.15 (0.22)	0.27 (0.40)	0.33 (0.49)	0.66 (0.98)	0.92 (1.37)	1.29 (1.91)

* Insert frequency band code in Type Number when ordering. See referenced page. ** For other frequencies, refer to pages 496-520.

Type No.	Frequency MHz	Length feet (m)	VSWR Max. (R.L.)
Type N Plug/Type N Plug Connectors			
L4P4-PNMNM-3	1427 - 1535	3 (0.9)	1.10 (26.4)
L4P4-PNMNM-6	1427 - 1535	6 (1.8)	1.10 (26.4)
L4P3-PNMNM-3	940 - 2700	3 (0.9)	1.12 (24.9)
L4P3-PNMNM-6	940 - 2700	6 (1.8)	1.12 (24.9)
48695A-3	2300 - 2700	3 (0.9)	1.10 (26.4)
48695A-6	2300 - 2700	6 (1.8)	1.10 (26.4)
L4P3-PNMNM-3	2300 - 2700	3 (0.9)	1.10 (26.4)
L4P3-PNMNM-6	2300 - 2700	6 (1.8)	1.10 (26.4)

Type No.	Frequency MHz	Length feet (m)	VSWR Max. (R.L.)
7/8" EIA Flange/N Plug Connectors			
200834A-3	1700 - 2300	3 (0.9)	1.06 (30.7)
200834A-6	1700 - 2300	6 (1.8)	1.06 (30.7)
202638A-3	2500 - 2700	3 (0.9)	1.10 (26.4)
202638A-6	2500 - 2700	6 (1.8)	1.10 (26.4)
"F" Flange Male/"F" Flange Male Connectors			
L4P3-FMFM-3	1700 - 2300	3 (0.9)	1.15 (23.1)
L4P3-FMFM-6	1700 - 2300	6 (1.8)	1.15 (23.1)



Connectors and Components

	Interface	For 1/2" LDF4P-50A	For 7/8" LDF5P-50A	For 1-1/4" LDF6P-50	For 1-5/8" LDF7P-50A	For 2-1/4" LDF12P-50A	Components
A	N Plug (male), mates with UG-23	**L4PNM-RC**	**L5PNM-RPC**	**L6PNM-RPC***	**L7PNM-RPC**	–	–
B	N Jack (female), mates with UG-21	**L4PNF-RC**	**L5PNF-RPC**	**L6PNF-RPC***	**L7PNF-RPC**	**L12PNF**	–
C	"F" Flange (male), for attachment to "F" series antennas	**L44F**	**L45F**	**L46F**	**L47F**	–	–
D	"F" Flange (female), use with jumper cables having "F" Flange (male) connectors.	**209865**	**48041**	–	**201942**	–	–
E	7/8" EIA Flange, includes inner Conductor, No gas barrier.	**L44R**	**L45R**	**L46S***	**L47S**	–	–
F	Adapter "F" Flange (female), Type N Jack (female). Allows testing of feeders terminated with "F" Flange male connectors.	–	–	–	–	–	**104300-2**
G	Elbow, "F" Flange (male), "F" Flange (female)	–	–	–	–	–	**203361**

* For pressure port and pipe plug, order type number L6PNM-PR or L6PNF-PR

Microwave Cables
Air Dielectric

Low VSWR

Minimum group delay distortion and minimum noise

Low Attenuation

Lowest loss for efficient signal transfer

Long Continuous Lengths

Simplifies installation, eliminates the need for splices and provides for convenient stocking on site. Also, fewer joints mean increased reliability.

Air-Dielectric Cables

Provide pressure path to pressurizable antenna feeds.

HELIAX® low-VSWR, air-dielectric coaxial cables are the industry standard for use in pressurized microwave antenna systems. These cables are for use with the air-dielectric feeds operating from 1700 to 2700 MHz listed on pages 54-59.

Cables and fitted connectors are available for any standard U.S., Canadian, or CCIR frequency band. Other frequency bands are available on special order. All cable assemblies are sweep tested at the factory to ensure low VSWR performance across the specified operating band.

Accessories described on pages 592-625 apply to low-VSWR HELIAX cable.

Characteristics - Air-Dielectric HELIAX Cable Assemblies

Size	Frequency Band Code	7/8"	1-5/8"	1-5/8"	2-1/4"
Type No.		HJ5P-50-(**)	HJ7SP-50A-(**)	HJ7P-50A-(**)	HJ12P-50-(**)
VSWR, (R.L.) Maximum (with recommended connectors)	–	1.08 (28.3)	1.10 (26.4)†	1.15 (23.1)	1.15 (23.1)
Attenuation at 2 GHz dB/100 ft (dB/100 m)	–	1.91 (6.26)	1.04 (3.42)	1.04 (3.42)	0.80 (2.89)
Impedance, ohms	–	50	50	50	50
Frequency, MHz,	-17L	1700 - 1900	1700 - 1900	1700 - 1900	1700 - 1900
	-18	1850 - 1990	1850 - 1990	1850 - 1990	1850 - 1990
	-21	2110 - 2200	2110 - 2200	2110 - 2200	2110 - 2200
	-17	1700 - 2110	1700 - 2110	1700 - 2110	1700 - 2110
	-19	1900 - 2300	1900 - 2300	1900 - 2300	1900 - 2300
	-23W	2300 - 2700	–	2300 - 2700	–
Velocity, percent	–	91.6	92.1	92.1	93.1
Diameter over Jacket, in (mm)	–	1.1 (28)	1.98 (50.3)	1.98 (50.3)	2.38 (60.4)
Minimum Bending Radius, in (mm)	–	10 (250)	20 (508)	20 (508)	22 (560)
Cable Weight, lb/ft (kg/m)	–	0.54 (0.80)	1.04 (1.55)	1.04 (1.55)	1.16 (1.73)

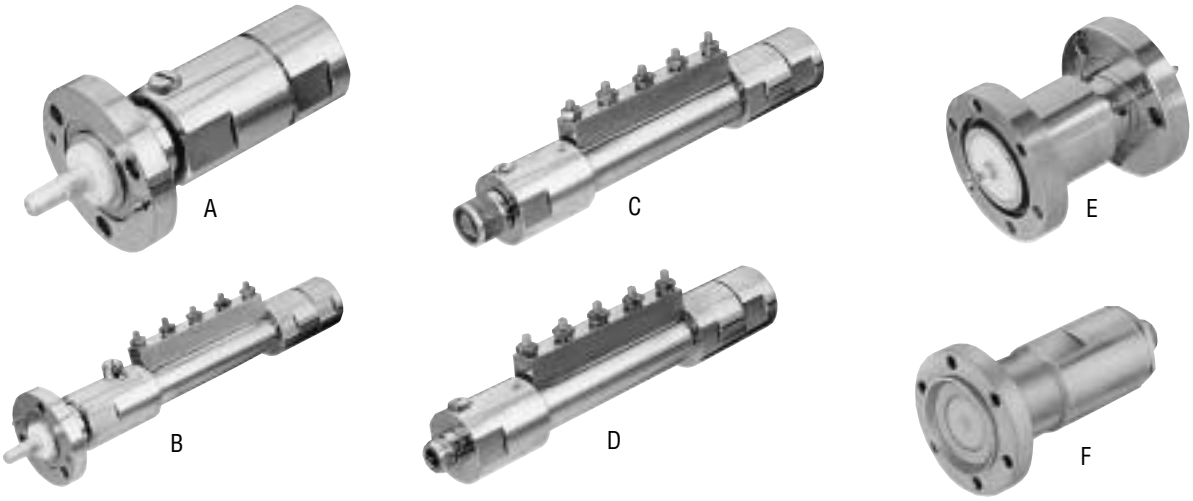
** Insert frequency band code in Type Number when ordering. † 1.12 (24.8) with H7NM-T and H7NF-T

Recommended Connectors

Cable Type	Bandwidth	7/8" EIA Flange No Gas Barrier	7/8" EIA Flange Gas Barrier	Type N Plug (male)	Type N Jack (female)
HJ5P-50	Up to 200 MHz	**75AR**	**75AG**	**H5NM-T**	**H5NF-T**
	200 - 410 MHz	**75ART**	**75AGT**	**H5NM-T**	**H5NF-T**
HJ7SP-50A	Up to 410 MHz	**87ST**	**87SGT**	**H7NM-T**	**H7NF-T**
HJ7P-50A	Up to 150 MHz	**87S**	**87SG**	**H7NM-T**	**H7NF-T**
	150 - 410 MHz	**87ST**	**87SGT**	**H7NM-T**	**H7NF-T**
HJ12P-50	Up to 410 MHz	**82S**	–	–	**H12NF**

Selection of Connectors

Some applications, depending on bandwidth and cable type, require tunable connectors to achieve the specified VSWR ratings. Refer to the table on page 154 for connector recommendations. For example, tunable Type N or non-tunable 7/8" EIA connectors are recommended for use with Type HJ5P-50 cable operating in the 1850 - 1990 MHz band (under 200 MHz bandwidth).



Connectors and Components

	Interface	For 7/8" HJ5P-50	For 1-5/8" HJ7P-50A and HJSP-50A	For 2-1/4" HJ12P-50	Components
A	7/8" EIA Flange, no gas barrier at interface	**75AR**	**87S**	**82S**	–
A	7/8" EIA Flange, gas barrier	**75AR**	**87SG**	–	–
B	Tunable 7/8" EIA Flange, no gas barrier at interface	**75ART**	**87ST**	–	–
B	Tunable 7/8" EIA Flange, gas barrier	**75AGT**	**87SGT**	–	–
C	Tunable N Plug (male), mates with UG-23	**H5NM-T**	**H7NM-T**	–	–
D	Tunable* N Jack (female), mates with UG-21	**H5NF-T**	**H7NF-T**	**H12PNF***	–
E	Adapter, 7/8" EIA, "F" Flange (male). For attaching air-dielectric HELIAX® cable with 7/8" EIA Flange to "F" Series antenna, includes gas barrier.	–	–	–	**33682**
F	Adapter, "F" Flange (female), Type N Jack (female). Allows testing of feeders terminated with "F" Flange male connectors.	–	–	–	**104300-2**

* H12PNF not tunable

To Order. Specify cable type number including frequency band code, connector type numbers, "first-off" connector and cable length in feet or meters. See sample order on page 473.

HELIAX® Elliptical Waveguide
General Information

HELIAX elliptical waveguide is the optimum choice for most microwave antenna feeder systems. HELIAX is precision-formed from corrugated high-conductivity copper and has an elliptical cross section. The corrugated wall gives the waveguide excellent crush strength, light weight and good flexibility for ease of handling. A rugged black polyethylene jacket provides protection during handling and installation. A full range of waveguide sizes is available for application from 1.7 to 26.5 GHz.

High Performance

Low Loss. HELIAX elliptical waveguides are optimized for lowest loss in specific user bands. Attenuation is significantly lower than that of standard rectangular waveguides for these bands. You get highly efficient signal transfer which optimizes overall system performance.

Low Signal Distortion. The elliptical cross section propagates the $_eTE_{11}$ dominate mode, which is similar to the TE_{10} mode in rectangular waveguide, and operates below the cutoff frequencies of higher order modes. Operating in the frequency band where only the dominant mode can exist eliminates signal distortion due to mode conversion and minimizes VSWR.

Guaranteed VSWR Performance. All factory assemblies are guaranteed to meet stated VSWR specifications. You get the performance you expect. No surprises, no risk.

Advanced Connector Design. Fixed-tuned premium connector design provides low VSWR performance, eliminating the need for field tuning.

Long Service Life Means Cost-Effective Performance

Solid Copper Corrugated Wall gives the waveguide excellent crush strength, light weight and good flexibility.

Rugged Black Polyethylene Jacket provides protection during handling and installation. The jacket is weatherproof and ultraviolet stabilized to prevent deterioration. Standard jacketing material is suitable for operation down to -54°C (-65°F) and installation down to -40°C (-40°F).

Investment Cast Silicon Brass and Forged Brass connector material, for most sizes, ensures long lasting pressure tightness and corrosion resistance. Connector hardware is stainless steel for corrosion protection and long life.

Advanced Design Accessories are integral HELIAX system components and are engineered for long term reliability.

Minimum Installation Cost and Simplified System Planning

HELIAX elliptical waveguide minimizes the cost of detailed waveguide system planning and has lower installation cost compared with other types of waveguide.

Good Flexibility of the corrugated copper construction provides ease of handling during installation. Saves time and labor.

One-Stop Shopping. A broad range of accessories and components is available from Andrew, all engineered to work together as a system. With Andrew you can avoid the costly problems of out of sequence deliveries and non-compliant material which can result from dealing with multiple vendors.

Long Continuous Length availability is a major advantage of HELIAX elliptical waveguide. It can be easily cut to length for any waveguide run eliminating the need for multiple joints and elbows of flex sections. The result: lower installation cost, easier system planning and increased reliability. Long lengths also permit convenient stocking at the site.

Connector Attachments are designed so that special tools or compounds are not required.

Easy to Use Flaring Tools are available for most sizes. Special training is not required.

Additional Services Make the Andrew Difference

Andrew offers a broad range of services including delivery, installation, and testing of antenna/transmission line systems. We are also prepared to handle all of the other details necessary for complete site construction.

Fast Delivery. Rapid product availability allows Andrew to be a real problem solver for you at installation time. With schedules to meet, you need to avoid delivery delays, contain costs and get your system operating on time. With HELIAX elliptical waveguide from Andrew, you can do it.

Applications Engineering Support. Andrew offers applications engineering support to solve system design problems and ensure that your waveguide system is properly designed. We can provide expert assistance to make sure that your waveguide investment will provide a cost-effective return.

VSWR Characteristics

Recommended waveguide and connector assemblies for the commonly used frequency bands are listed in the tables on pages 160-193. VSWR characteristics shown are guaranteed for factory assemblies within the indicated bands. They are also typical for assemblies with field-installed connectors. Performance data for other bands are available on request.

HELIAX® elliptical waveguide is available in standard VSWR, premium (low VSWR) and super premium (lowest VSWR) versions. Selection of waveguide is completed by VSWR testing which is an integral part of the manufacturing process. For this reason, standard, premium and super premium versions all carry the EW marking. Except for attainable VSWR, standard, premium and super premium waveguides have the same electrical and mechanical characteristics.

All waveguide is tested as part of the manufacturing process, and is verified to be at least 0.01 better than the published VSWR specifications. This ensures that the published specifications will be maintained upon delivery to the site. See page 201 for details of the high directivity Andrew Hybrid Reflectometer.

Cutting Tolerance

Waveguide lengths are measured from connector flange face to connector flange face. Standard cutting tolerance is +2%, -0%. Closer tolerances are available on special order.

Elliptical Waveguide Connectors

Connectors are tapered or multi-step transitions from elliptical to rectangular waveguide cross sections and mate with industry standard rectangular waveguide flanges. Each connector includes a pressure inlet with a 1/8" female pipe thread, flange gasket, flange hardware and assembly instructions. “M” suffix connectors, such as 143SEM, have IEC154 compliant flanges, and are supplied with metric flange hardware and gasket.

Connector Types Available

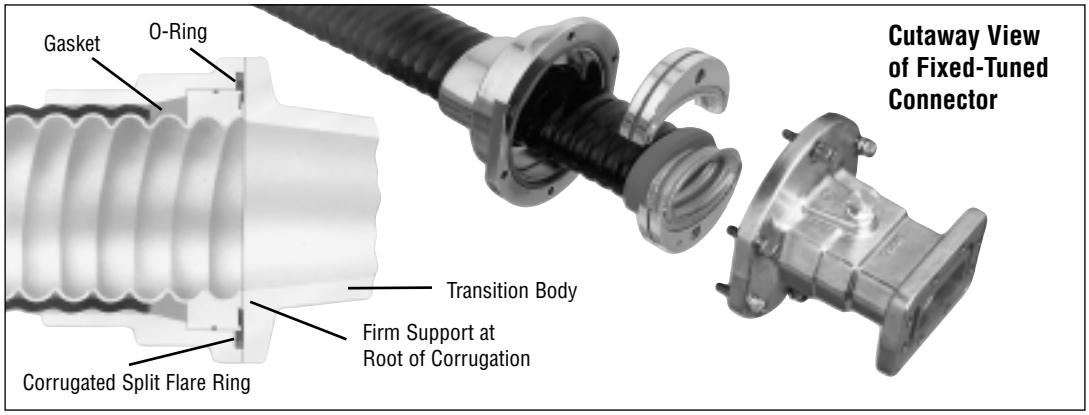
Non-Tunable Connectors are tapered transitions which do not include tuning screws. They are recommended for use with standard HELIAX elliptical waveguide and have designations such as 163DE.

Tunable Connectors are tapered transitions which include tuning screws to minimize assembly VSWR. Tunable connectors are identified by a “T” suffix. For example, 163DET is a tunable version of the 163DE non-tunable connector mentioned above.

When ordered as part of a premium or super premium factory assembly, the connectors are factory attached and tuned. Tunable connectors are suitable for field attachment when the capability for field tuning exists. Tunable connectors are recommended for use with premium and super premium HELIAX elliptical waveguide.

Fixed-Tuned Connectors have a multi-step mating section which is precisely machined to provide low VSWR over a broad bandwidth without the use of tuning screws. Fixed-tuned connectors are recommended for use with standard and premium HELIAX elliptical waveguide. The connectors have designations which include an “S” after the series number. Types are: 143SEM, 163SEM*, 164SEM*, 290SC**, 1220ASC* and 2180SEM.

* Patented United States 4,540,959; Australia 565,511; Canada 1,221,751.
** Patented United States 4,642,585; Australia 578,507; Canada 1,224,897.



Cutaway View of Fixed-Tuned Connector

HELIAX® Elliptical Waveguide
General Information

Connector Materials

All connectors except for the 117, 120 and 128 series, are constructed of brass. 117, 120 and 128 series are silicone impregnated, nickel plated aluminum. Both materials are long lasting, pressure tight and compatible with the waveguide material to prevent corrosion. A precision molded silicone rubber gasket conforms to the shape of the waveguide corrugations and provides a reusable pressure seal without the need for sealing compounds. All hardware is stainless steel for corrosion protection and long life.

Connectors Are Easy to Attach

All connectors, except those for EW17, 20, 28 and 85, incorporate a corrugated split flare ring to accurately position the elliptical waveguide relative to the transition. When used with the new compact flaring tool kit, this allows consistent VSWR to be achieved for connectors which do not require field tuning.

Saw Guide. Split flare ring connectors include a disposable plastic saw guide to assure a square cut of the waveguide and the proper length for flaring.

Integral Flare Aid. The corrugated split flare ring functions as a flare aid. This innovation results in:

- *Improved electrical performance through optimum positioning of the corrugation runout relative to the electrical axis of the waveguide.*
- *Firm support throughout the corrugation allowing high mating pressure at the point of electrical contact to eliminate intermodulation distortion.*
- *Fast, accurate field connector attachment.*
- *Field attachment with standard hand tools.*

Compact Flaring Tool

New compact flaring tool** kits are now available exclusively from Andrew with many advantages over other flaring tools. See page 198.

HELIAX Elliptical Waveguide Assemblies*

Assemblies consist of waveguide cut to length and terminated with connectors on each end. Connectors are transitions from the elliptical to rectangular cross section and are described in detail above.

Assemblies are available in standard and premium versions. Super premium (lowest VSWR) versions are available for certain sizes.

Standard Assemblies consist of standard waveguide and non-tunable, fixed tuned or pre-tuned connectors.

* HELIAX is the registered trademark under which flexible elliptical wave guides are sold by Andrew.
** Patented United States 4,590,785

Premium Assemblies consist of premium waveguide and tunable connectors or fixed-tuned premium connectors. Premium waveguide has excellent VSWR characteristics for very low group delay distortion and noise.

Super Premium Assemblies consist of super premium waveguide and tunable connectors. Super premium assemblies offer the lowest available VSWR for minimum group delay distortion and noise.

Factory or Field Assemblies

All of the above assembly types can be configured as factory or field assemblies. VSWR specifications given in this catalog are guaranteed for factory assemblies and are typical for field fitted assemblies.

For long bulk lengths of premium elliptical waveguide it is not possible to verify the return loss performance along the entire length. Therefore, when possible, premium waveguide should be ordered in the lengths in which it will be used.

Field-Fitted Assemblies. Bulk lengths may be ordered and individual feeders cut to length and connectors installed on site for minimum waste. Connectors can be attached without need of special tools or compounds. Compact flaring tools are available to ensure consistent VSWR performance. Fixed-tuned premium connectors are recommended for field-fitted applications requiring low VSWR without field tuning.

Factory Assemblies. When specific lengths are known, waveguide can be cut to the desired length and connectors factory attached and, where applicable, tuned.

Optional Fire-Retardant Jacket

Selected sizes of HELIAX elliptical waveguide are available with a fire-retardant, non-halogenated jacket to avoid the need for costly conduit.

For use in the United States, these fire-retardant jacketed elliptical waveguides are UL listed as Type CATVR and marked accordingly on the gray jacket. The Type CATVR rating permits installation in building risers.

This jacketing material is intended for installation indoors or in other confined areas where there is limited exposure to sunlight or ultra-violet radiation.

The CATVP elliptical waveguide is available in selected sizes. Products with this rating are found in ducts, plenums or other spaces used for environmental air. Types of unjacketed CATVP waveguide pass the most stringent fire resistance tests and are tagged as “UL® Type CATVP.”

Typical Systems

Example microwave antenna systems using HELIAX elliptical waveguide are described on pages 26-34. Typical components and mounting accessories are illustrated.

Pressurization

The waveguide should be maintained under dry air or dry nitrogen pressure to prevent moisture condensation. All sizes are pressurizable to 10 lb/in^2 (70 kPa) maximum.

Installation

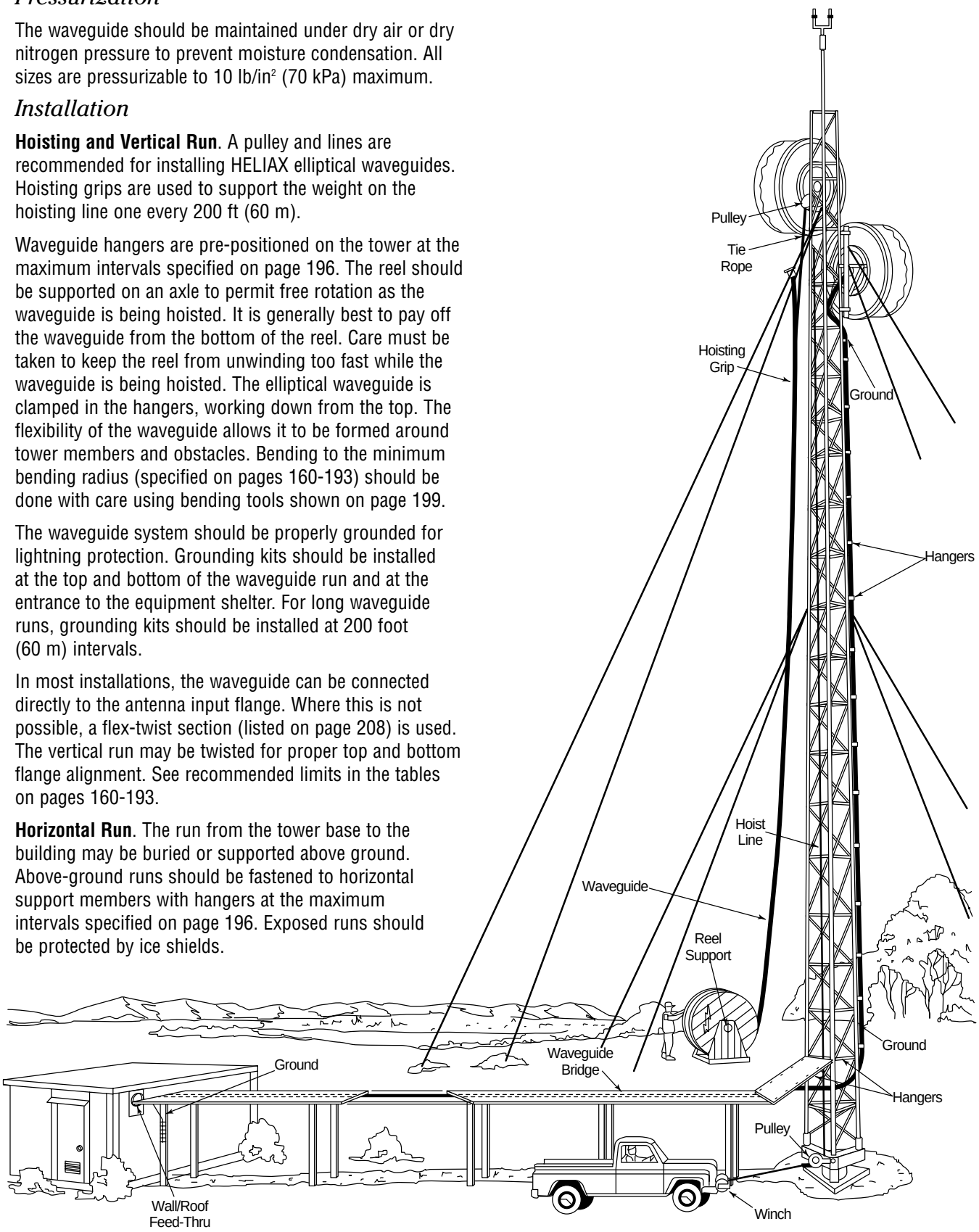
Hoisting and Vertical Run. A pulley and lines are recommended for installing HELIAX elliptical waveguides. Hoisting grips are used to support the weight on the hoisting line one every 200 ft (60 m).

Waveguide hangers are pre-positioned on the tower at the maximum intervals specified on page 196. The reel should be supported on an axle to permit free rotation as the waveguide is being hoisted. It is generally best to pay off the waveguide from the bottom of the reel. Care must be taken to keep the reel from unwinding too fast while the waveguide is being hoisted. The elliptical waveguide is clamped in the hangers, working down from the top. The flexibility of the waveguide allows it to be formed around tower members and obstacles. Bending to the minimum bending radius (specified on pages 160-193) should be done with care using bending tools shown on page 199.

The waveguide system should be properly grounded for lightning protection. Grounding kits should be installed at the top and bottom of the waveguide run and at the entrance to the equipment shelter. For long waveguide runs, grounding kits should be installed at 200 foot (60 m) intervals.

In most installations, the waveguide can be connected directly to the antenna input flange. Where this is not possible, a flex-twist section (listed on page 208) is used. The vertical run may be twisted for proper top and bottom flange alignment. See recommended limits in the tables on pages 160-193.

Horizontal Run. The run from the tower base to the building may be buried or supported above ground. Above-ground runs should be fastened to horizontal support members with hangers at the maximum intervals specified on page 196. Exposed runs should be protected by ice shields.



Elliptical Waveguide

Types EWP17 and EW17

Characteristics

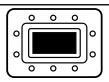
Type Numbers	
Premium Waveguide	**EWP17**
Standard Waveguide	**EW17**
Electrical	
Max. Frequency Range, GHz	1.7-2.4
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	1.364
Group Delay at 2.0 GHz, ns/100 ft (ns/100 m)	139 (456)
Peak Power Rating at 2.0 GHz, kW	
with 117E or 117ET Connectors	1036
with 117RT Connectors	90
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	20 (510)
H Plane	57 (1450)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	28 (710)
H Plane	81 (2060)
Maximum Twist, degrees/foot (m)	0.25 (0.75)
Dimensions over Jacket, in (mm)	5.65 x 2.99 (143.5 x 75.9)
Weight, pounds per foot (kg/m)	2.73 (4.06)

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
1.70	0.46 (1.51)	35.35	59.7
1.80	0.41 (1.35)	39.48	65.3
1.90	0.38 (1.25)	42.58	69.6
2.00	0.36 (1.19)	44.99	73.1
2.10	0.35 (1.14)	46.91	76.0
2.20	0.34 (1.10)	48.47	78.5
2.30	0.33 (1.07)	49.76	80.5
2.40	0.32 (1.05)	50.82	82.3

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 117E, 117ET – Figure 1				
	15.9 (404)	6.9 (175)	12.0 (305)	7.0 (3.2)
Type No. 117RT – Figure 2				
	8.9 (225)	4.6 (116)	5.0 (127)	5.0 (2.3)

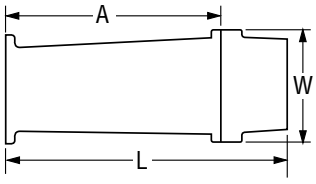


Figure 1

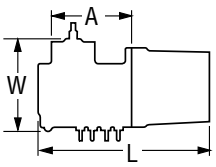


Figure 2

Connector Material: Nickel-Plated Aluminum

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Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Tunable	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
Premium Waveguide Assemblies				
1.7-2.1	**EWP17-17**	CPR430G	**117ET**	1.19 (21.2)
		7/8" EIA (gas block)	**117RT**	1.23 (19.7)
		7/8" EIA (gas pass)	**117RT-3**	1.23 (19.7)
1.9-2.3	**EWP17-19**	CPR430G	**117ET**	1.17 (22.1)
		7/8" EIA (gas block)	**117RT**	1.27 (18.5)
		7/8" EIA (gas pass)	**117RT-3**	1.27 (18.5)
Standard Waveguide Assemblies			**Non-Tunable**	
1.7-2.3	**EW17**	CPR430G	**117E**	1.25 (19.1)

* Contact Andrew for information on other frequency bands.

** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.

†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 6 ft (1.83 m)*	**31766A-9**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Two kits are required with each EW17 hanger kit. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196

Description	Type No.
Other Accessories	
Splice	**117Z**
Grounding Kit with factory attached lug	**204989-6**
Grounding Kit with field attachable crimp-on lug	**204989-26**
Grounding Kit with field attachable screw-on lug	**204989-36**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall/Roof Feed-Thru	**35849A-10**
Holsting Grip	**34759**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-5**
Connector Reattachment Kit	**33544-10**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Type EW20

Characteristics

Type Numbers	
Standard Waveguide	**EW20**
Electrical	
Max. Frequency Range, GHz*	1.9-2.7
${}_eTE_{11}$ Mode Cutoff Frequency, GHz	1.57
Group Delay at 2.6 GHz, ns/100 ft (ns/100m)	127 (418)
Peak Power Rating at 2.6 GHz, kW	
with 120E Connectors	663
with E20MB-014 and E20MP-014 Connectors	90
Mechanical	
Minimum Bending Radii, without rebending, in (mm)	
E Plane	18 (460)
H Plane	50 (1270)
Minimum Bending Radii, with rebending, in (mm)	
E Plane	26 (660)
H Plane	71 (1800)
Maximum Twist, degrees/foot (m)	0.25 (0.75)
Dimension over Jacket, in (mm)	5.02 x 2.83 (127.5 x 71.9)
Weight, pounds per foot (kg/m)	1.85 (2.76)

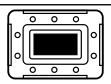
* Actual usable range is limited by the connecting rectangular waveguide

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
1.9	0.61 (2.01)	24.06	56.3
2.0	0.55 (1.81)	26.65	61.9
2.1	0.51 (1.69)	28.64	66.4
2.2	0.49 (1.60)	30.22	70.0
2.3	0.47 (1.53)	31.50	73.0
2.4	0.45 (1.48)	32.56	75.6
2.5	0.44 (1.45)	33.44	77.8
2.6	0.43 (1.41)	34.19	79.7
2.7	0.42 (1.39)	34.82	81.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 120E – Figure 1				
	5.8 (147)	6.2 (157)	1.8 (46)	3.5 (1.6)
Type No. E20MB-014, E20MP-014 – Figure 2				
	9.0 (229)	4.4 (111)	4.4 (111)	4.8 (2.2)

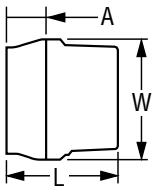


Figure 1

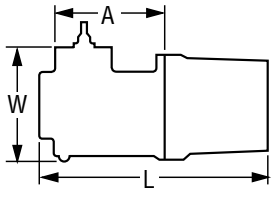


Figure 2

Connector Material: Nickel-Plated Aluminum

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Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Tunable	Pressure Window	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
2.5-2.7	**EW20-25**	mates with CPR340G	**120E**	**55001-340**	1.15 (23.0)
2.5-2.7	**EW20-25**	7/8" EIA (with gas barrier)	**E20MB-014**	***	1.15 (23.0)
		7/8" EIA (without gas barrier)	**E20MP-014**	–	1.15 (23.0)
2.1-2.7	**EW20-21W**	7/8" EIA (with gas barrier)	**E20MB-014**	***	1.15 (23.0)
		7/8" EIA (without gas barrier)	**E20MP-014**	–	1.15 (23.0)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
***Not applicable †† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 5.5 ft (1.68 m)*	**31766A-10**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Two kits are required with each EW20 hanger kit. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**120Z**
Grounding Kit with factory attached lug	**204989-6**
Grounding Kit with field attachable crimp-on lug	**204989-26**
Grounding Kit with field attachable screw-on lug	**204989-36**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall/Roof Feed-Thru	**35849A-10**
Holsting Grip	**34759**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-5**
Connector Reattachment Kit	**33544-11**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Type EW28

Characteristics

Type Numbers	
Standard Waveguide	**EW28**
Electrical	
Max. Frequency Range, GHz*	2.6-3.4
$_eTE_{11}$ Mode Cutoff Frequency, GHz	2.20
Group Delay at 3.2 GHz, ns/100 ft (ns/100m)	137 (451)
Peak Power Rating at 3.2 GHz, kW	446
Mechanical	
Minimum Bending Radii, without rebending, in (mm)	
E Plane	22 (560)
H Plane	52 (1320)
Minimum Bending Radii, with rebending, in (mm)	
E Plane	22 (560)
H Plane	52 (1320)
Maximum Twist, degrees/foot (m)	0.25 (0.75)
Dimension over Jacket, in (mm)	3.65 x 2.33 (92.5 x 59.2)
Weight, pounds per foot (kg/m)	1.37 (2.04)

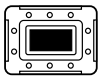
* Actual usable range is limited by the connecting rectangular waveguide

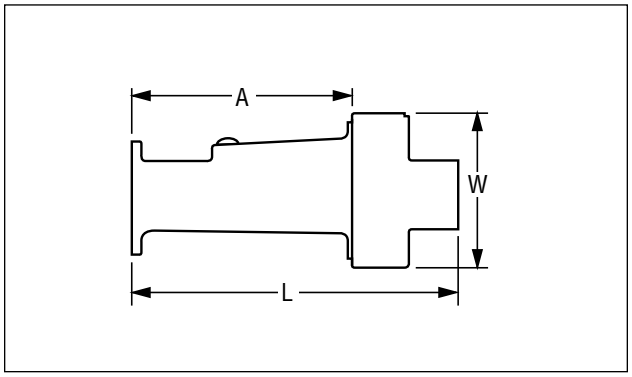
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
2.6	0.87 (2.87)	12.75	53.3
2.7	0.78 (2.56)	14.28	58.0
2.8	0.72 (2.36)	15.50	61.9
2.9	0.68 (2.22)	16.51	67.0
3.0	0.64 (2.11)	17.35	69.6
3.1	0.62 (2.03)	18.07	71.9
3.2	0.60 (1.96)	18.68	74.0
3.3	0.58 (1.90)	19.22	75.8
3.4	0.57 (1.86)	19.69	77.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 128AE				
	12.7 (322)	5.0 (127)	10.0 (254)	7.3 (3.3)



Connector Material: Nickel-Plated Aluminum

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Tunable	Pressure Window	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
2.9-3.1	**EW28**	CPR284G	**128AE**	**55001-284**	1.20 (20.8)
3.1-3.4	**EW28**	CPR284G	**128AE**	**55001-284**	1.15 (23.0)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200.

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 5 ft (1.52 m)*	**31766A-11**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196

Description	Type No.
Other Accessories	
Splice	**128AZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall-Roof Feed Thru	**35849-13**
Hoisting Grip	**26985A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-4**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Types EWP34 and EW34

Characteristics

Type Numbers	
Premium Waveguide	**EWP34**
Standard Waveguide	**EW34**
Electrical	
Max. Frequency Range, GHz*	3.1-4.2
$_eTE_{11}$ Mode Cutoff Frequency, GHz	2.376
Group Delay at 3.95 GHz, ns/100 ft (ns/100 m)	127 (417)
Peak Power Rating at 3.95 GHz, kW	306
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	17 (432)
H Plane	47 (1194)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	17 (432)
H Plane	47 (1194)
Maximum Twist, degrees/foot (m)	0.5 (1.5)
Dimensions over Jacket, in (mm)	3.27 x 1.85 (83.1 x 47.0)
Weight, pounds per foot (kg/m)	1.13 (1.68)

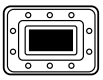
* Actual usable range is limited by the connecting rectangular waveguide.

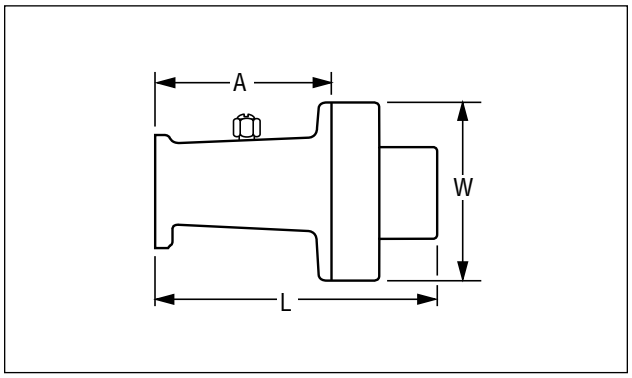
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
3.10	0.81 (2.67)	12.34	64.2
3.20	0.78 (2.55)	12.90	67.0
3.30	0.75 (2.46)	13.39	69.4
3.40	0.73 (2.38)	13.81	71.5
3.50	0.71 (2.32)	14.18	73.4
3.54	0.70 (2.30)	14.31	74.13
3.60	0.69 (2.27)	14.51	75.1
3.70	0.68 (2.23)	14.79	76.7
3.80	0.67 (2.19)	15.03	78.0
3.90	0.66 (2.16)	15.25	79.3
4.00	0.65 (2.13)	15.43	80.4
4.10	0.64 (2.11)	15.60	81.5
4.20	0.64 (2.09)	15.73	82.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 134DE, 134DET, 134DEP, 134DEMT, 134DEM, 134DEMP				
	6.8 (174)	4.3 (109)	4.3 (109)	8.0 (3.6)



Connector Material: Brass

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Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)	VSWR, max.** (R.L. dB) Up to 300 ft (90 m)
Premium Waveguide Assemblies							
3.4-3.9	**EWP34-34**	CPR229G	**134DET**	–	**55001-229**	**F229PC0240CS**	1.10 (26.4)
3.54-4.2	**EWP34-35**	CPR229G	**134DET**	**134DEP-2**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
		PDR40	**134DEMT**	**134DEMP-2**	**223306-40**	**F229MH0600HA**	1.08 (28.3)
3.7-4.2	**EWP34-37**	CPR229G	**134DET**	**134DEP-1**	**55001-229**	**F229PC0240CA**	1.08 (28.3)
Standard Waveguide Assemblies			**Non-Tunable**				
3.1-3.6	**EW34-31**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)
3.4-4.2	**EW34**	CPR229G	**134DE**	–	**55001-229**	**F229PC0240CS**	1.15 (23.1)

* Contact Andrew for information on other frequency bands.
** VSWR, max. (R.L.,dB) Up to 300 ft (90 m). The indicated maximum characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-15**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**26985A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-4**
Connector Reattachment Kit	**33544-43**
Wall-Roof Feed Thru	**35849A-17**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**204679-34**
5 in (127 mm) dia	**48939-34**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP37S, EWP37 and EW37

Characteristics

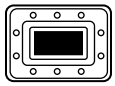
Type Numbers	
SuperPremium Waveguide	**EWP37S**
Premium Waveguide	**EWP37**
Standard Waveguide	**EW37**
Electrical	
Max. Frequency Range, GHz	3.3-4.3
$_eTE_{11}$ Mode Cutoff Frequency, GHz	2.79
Group Delay at 4.0 GHz, ns/100 ft (ns/100 m)	140 (459)
Peak Power Rating at 4.0 GHz, kW	309
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	12 (300)
H Plane	30 (760)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	17 (430)
H Plane	41 (1040)
Maximum Twist, degrees/foot (m)	0.5 (1.5)
Dimensions over Jacket, in (mm)	2.85 x 1.82 (72.4 x 46.2)
Weight, pounds per foot (kg/m)	0.84 (1.25)

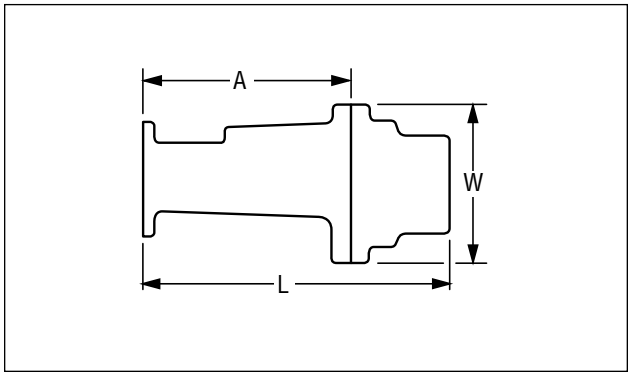
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
3.30	1.22 (4.00)	7.39	53.4
3.40	1.11 (3.63)	8.14	57.1
3.50	1.03 (3.37)	8.77	60.4
3.60	0.97 (3.18)	9.31	63.2
3.70	0.92 (3.03)	9.77	65.7
3.80	0.89 (2.91)	10.17	67.9
3.90	0.86 (2.81)	10.52	69.9
4.00	0.83 (2.73)	10.83	71.7
4.10	0.81 (2.66)	11.11	73.3
4.20	0.79 (2.60)	11.36	74.7
4.30	0.78 (2.55)	11.59	76.1

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 137DE, 137DET, 137DEP, 137DEM, 137DEMP, 137DEMT				
	6.5 (165)	4.6 (117)	4.3 (109)	6.0 (2.7)



Connector Material: Brass

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Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
3.7–4.2	**EWP37S**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
		PDR40	**137DEMT**	–	**223306-40**	**F229PH0600HA**
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
3.4-3.9	**EWP37-34W*****	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CS**
3.4-3.9	**EWP37-34*****	PDR40	–	**137DEMP-3**	**223306-40**	**F229MH0600HS**
3.54-4.2	**EWP37-35**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.52-4.2	**EWP37-35W**	CPR229G	**137DET**	**137DEP-2**	**55001-229**	**F229PC0240CA**
		PDR40	–	**137DEMP-2**	**223306-40**	**F229MH0600HA**
3.6-4.2	**EWP37-36**	CPR229G	**137DET**	–	**55001-229**	**F229PC0240CA**
3.7-4.2	**EWP37-37**	CPR229G	**137DET**	**137DEP-1**	**55001-229**	**F229PC0240CA**
Standard Waveguide Assemblies				**Non-Tunable**		**VSWR 1.15 (23.1)****
3.4–4.2	**EW37**	CPR229G	**137DE**	–	**55001-229**	**F229PC0240CS**
		PDR40	**137DEM**	–	**223306-40**	**F229MH0600HS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
*** VSWR 1.10 (26.4) † "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4.5 ft (1.37 m)*	**42396A-4**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

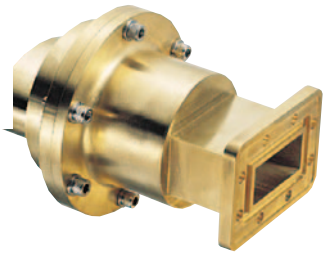
Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205869**
Splice	**134DZ**
Grounding Kit with factory attached, one-hole lug	**204989-5**
Grounding Kit with factory attached, two-hole lug	**241088-5**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-25**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-10**
Grounding Kit with field attachable screw-on lug	**204989-35**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-3**
Connector Reattachment Kit	**33544-24**
Wall-Roof Feed Thru	**245314-37**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-37**
5 in (127 mm) dia	**WGB5-37**

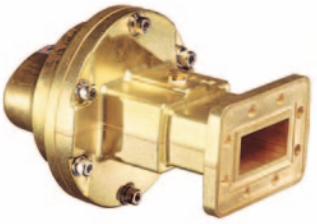
Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP43 and EW43





Characteristics

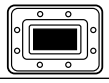
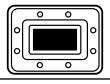
Type Numbers	
Premium Waveguide	**EWP43**
Standard Waveguide	**EW43**
Electrical	
Max. Frequency Range, GHz	4.4-5.0
$_eTE_{11}$ Mode Cutoff Frequency, GHz	2.78
Group Delay at 3.95 GHz, ns/100 ft (ns/100 m)	126 (413)
Peak Power Rating at 4.7 GHz, kW	187
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	11 (280)
H Plane	28 (711)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	15 (381)
H Plane	35 (889)
Maximum Twist, degrees/foot (m)	0.5 (1.5)
Dimensions over Jacket, in (mm)	2.81 x 1.60 (71.4 x 40.6)
Weight, pounds per foot (kg/m)	0.81 (1.2)

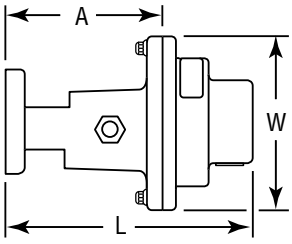
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
4.4	0.911 (2.9)	9.5	77.5
4.5	0.899 (2.9)	9.6	78.6
4.6	0.889 (2.9)	9.7	79.7
4.7	0.880 (2.8)	9.8	80.5
4.8	0.872 (2.8)	9.9	81.5
4.9	0.866 (2.8)	10.0	82.4
5.0	0.862 (2.8)	10.1	83.1

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 143SE, 143SEM				
	6.12 (155.4)	4.6 (117)	4.0 (102)	7.5 (3.4)
Type No. 143DET				
	6.4 (163)	4.6 (117)	4.3 (109)	8.6 (3.9)
Type No. 143DCT, 143SC, 143SCM				
	6.4 (163)	4.6 (117)	4.3 (109)	9 (4.1)



Connector Material: Brass

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Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Pre-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.07 (29.4)****
4.4–5.0	**EWP43**	UG-149/U†††	**143DCT**	**143SC**	**55000A-187**	**F187PA0240BA**
		CPR187G	**143DET**	**143SE**	**55001-187**	**F187PA0240CA**
		PDR48	–	**143SEM**	**223306-48**	**F187MH0600HA**
		PAR48	–	**143SCM**		
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
4.4–5.0	**EW43**	UG-149/U†††	–	**143SC**	**223306-48**	**F187MH0600HS**
		CPR187G	–	**143SE**	**55001-187**	**F187PA0240CS**
		PDR48	–	**143SEM**		
		PAR48	–	**143SCM**		

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Pre-tuned" connectors are for field attachment only. "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 4 ft (1.22 m)*	**42396A-16**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-43**
Splice	**143DZ**
Grounding Kit with factory attached, one-hole lug	**204989-10**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-28**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**31535**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-3**
Connector Reattachment Kit	**33544-45**
Wall-Roof Feed Thru	**245314-43**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-43**
5 in (127 mm) dia.	**WGB5-43**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots
1	**204673-1**
1	**204673-2**
4	**204673-4**
8	**204673-8**

Elliptical Waveguide

Types EWP52S, EWP52 and EW52

Characteristics

Type Numbers	
Super Premium Waveguide, Standard Jacket	**EWP52S**
Premium Waveguide, Standard Jacket	**EWP52**
Standard Waveguide, Standard Jacket	**EW52**
Premium Waveguide, Fire Retardant –	
Non-Halogenated Jacket	**35409-20****
Type CATVP	**222040-3**
Electrical	
Max. Frequency Range, GHz	4.6-6.425*
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	3.65
Group Delay at 6.2 GHz, ns/100 ft (ns/100 m)	124 (408)
Peak Power Rating at 6 GHz, kW	
with 152 Series Connectors	153
with 153 Series Connectors	92
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	8 (200)
H Plane	22 (560)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	12 (305)
H Plane	32 (810)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	2.21 x 1.26 (56.1 x 32.0)
Weight, pounds per foot (kg/m)	0.59 (0.88)

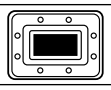
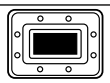
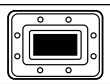
* Actual usable range is limited by the connecting rectangular waveguide.
** UL® listed Type CATVR.

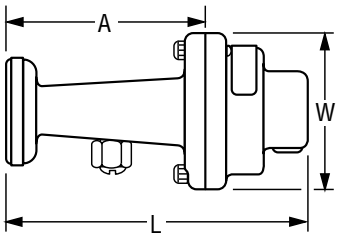
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
4.6	1.63 (5.34)	4.40	60.9
4.8	1.50 (4.92)	4.75	64.9
5.0	1.41 (4.63)	5.06	68.3
5.2	1.35 (4.42)	5.31	71.2
5.4	1.30 (4.26)	5.51	73.7
5.6	1.26 (4.13)	5.69	75.8
5.8	1.23 (4.02)	5.84	77.7
5.85	1.22 (4.00)	5.87	78.1
5.925	1.21 (3.96)	5.92	78.8
6.0	1.20 (3.93)	5.96	79.4
6.2	1.18 (3.86)	6.07	80.8
6.4	1.16 (3.80)	6.17	82.1
6.425	1.16 (3.80)	6.18	83.2

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 152DE, 152DET, 152SE, 152SEM				
	5.3 (134.6)	3.8 (97)	3.7 (94)	4.2 (1.9)
Type No. 252DC, 252DCT				
	5.8 (148)	3.8 (97)	3.9 (100)	4.1 (1.9)
Type No. 252DE, 252DET, 252DEP-1, 252DEMP, 252DEMT				
	5.8 (148)	3.8 (97)	3.9 (100)	4.0 (1.8)
Type No. 252SE, 252SEM				
	5.0 (127)	3.75 (95.3)	3.0 (76.2)	4.2 (1.9)



Connector Material: Brass

ANDREW®

Revised 7/00

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
5.925–6.425	**EWP52S**	CPR159G	**152DET*****	–	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT*****	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET*****	–	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	–	**223306-70**	**F137MH0600HA**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.6–6.2	**EWP52-56**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BG**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CG**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HG**
		PDR58		**152SEM**		
5.725–6.425	**EWP52-58**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BD**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CD**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HD**
		PDR58		**152SEM**		
5.925–6.425	**EWP52-59**	CPR159G	**152DET**	**152SE**	**55001-159**	**F159PC0240CA**
		UG-344/U†††	**252DCT**	–	**55000A-137**	**F137PA0240BA**
		CPR137G	**252DET**	**252SE**	**55001-137**	**F137PC0240CA**
		PDR70	**252DEMT**	**252SEM**	**223306-70**	**F137MH0600HA**
		PDR58		**152SEM**		
5.6-6.425	**EWP52-56W**	CPR159G	–	**152SE**	**55001-159**	**F159PC0240CS**
		CPR137G	–	**252SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**252SEM**	**223306-70**	**F137MH0600HS**
		PDR58		**152SEM**		
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.60–6.425	**EW52**	CPR159G	**152DE**	**152SE**	**55001-159**	**F159PC0240CS**
		UG-344/U†††	**252DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**252DE**	**252SE**	**55001-137**	**F137PC0240CS**
		PDR58		**152SEM**		

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 1.036 (35.0 dB) for lengths 150 ft (46 m) and shorter. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-8**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-52**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

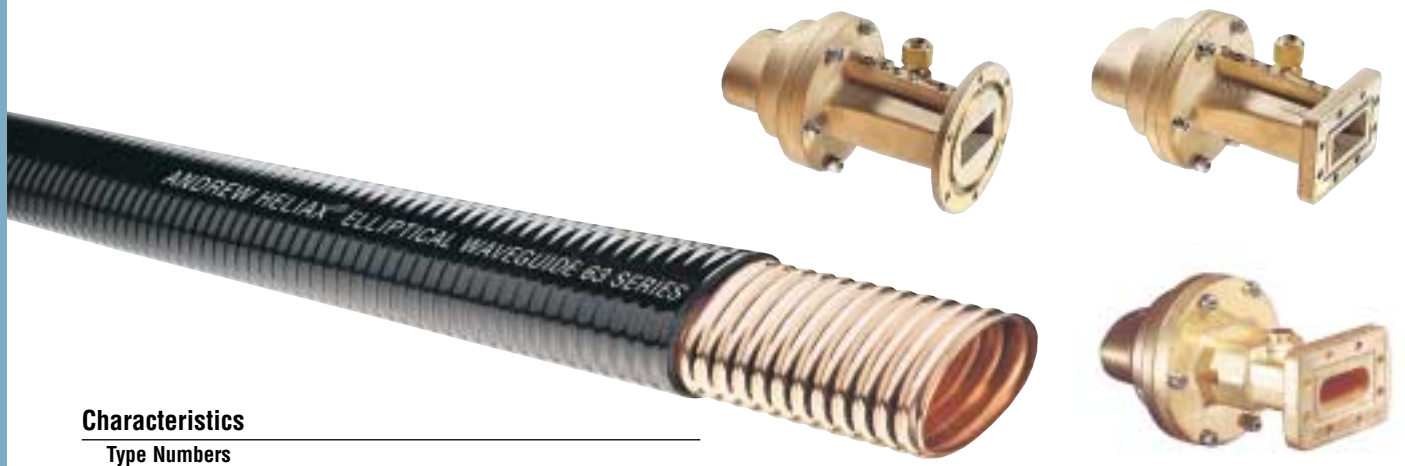
Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-52**
Splice	**152DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-38**
Wall-Roof Feed Thru	**245314-52**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-52**
5 in (127 mm) dia	**WGB5-52**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP63S, EWP63 and EW63



Characteristics

Type Numbers	
Super Premium Waveguide, Standard Jacket	**EWP63S**
Premium Waveguide, Standard Jacket	**EWP63**
Standard Waveguide, Standard Jacket	**EW63**
Premium Waveguide, Fire Retardant – Non-Halogenated Jacket	**35409-18***
Premium Waveguide, Fire Retardant – Type CATVP	**222040-1**
Standard Waveguide, Fire Retardant – Non-Halogenated Jacket	**35409-19***

Electrical	
Max. Frequency Range, GHz	5.85-7.125
$_eTE_{11}$ Mode Cutoff Frequency, GHz	4.00
Group Delay at 6.775 GHz, ns/100 ft (ns/100 m)	125 (411)
Peak Power Rating at 6.775 GHz, kW	10

Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	7 (180)
H Plane	20 (510)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	10 (260)
H Plane	29 (740)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	2.01 x 1.16 (51.1 x 29.5)
Weight, pounds per foot (kg/m)	0.51 (0.76)

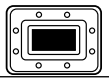
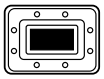
* UL® listed Type CATVR.

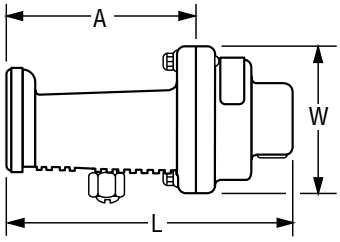
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
5.85	1.50 (4.94)	4.34	73.0
5.925	1.49 (4.88)	4.45	73.8
6.0	1.47 (4.82)	4.50	74.5
6.2	1.43 (4.70)	4.62	76.4
6.4	1.40 (4.59)	4.73	78.1
6.425	1.40 (4.58)	4.74	78.3
6.525	1.38 (4.53)	4.79	79.0
6.6	1.37 (4.50)	4.82	79.5
6.775	1.35 (4.44)	4.89	80.7
6.8	1.35 (4.43)	4.90	80.9
6.875	1.34 (4.40)	4.93	81.3
7.0	1.33 (4.37)	4.97	82.1
7.125	1.32 (4.33)	5.01	82.7

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 163DC, 163DCT, 163DCP, 163SC, 163SCM				
	5.3 (135)	3.4 (86)	3.3 (84)	3.7 (1.7)
Type No. 163DE, 163DET, 163DEP				
	5.3 (135)	3.4 (86)	3.3 (84)	3.5 (1.6)
Type No. 163SEM, 163SE				
	5.3 (135)	3.4 (86)	3.5 (89)	3.7 (1.7)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
6.425–7.125	**EWP63S**	UG-344/U†††	**163DCT**	–	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	–	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
5.925–6.575	**EWP63-59**	UG-344/U†††	**163DCT**	**163SC**	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
		PAR70	–	**163SCM**		
5.800–7.125	**EWP63-59W**	UG-344/U†††	**163DCT**	**163SCM**	**55000A-137**	**F137PA0240BA*****
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CA*****
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HA*****
		PAR70	–	**163SCM**		
						VSWR 1.05 (32.3)*
6.525–6.875	**EWP63-65N**	UG-344/U†††	**163DCT**	**163SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**163SCM**		
						VSWR 1.06 (30.7)**
6.425–7.125	**EWP63-65**	UG-344/U†††	**163DCT**	**163SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**163DET**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**163SCM**		
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
5.925–7.125	**EW63**	UG-344/U†††	**163DC**	**163SC**	**55000A-137**	**F137PA0240BS**
		CPR137G	**163DE**	**163SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**163SEM**	**223306-70**	**F137MH0600HS**
		PAR70	–	**163SCM**		

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Low VSWR guaranteed for 5.925 to 6.425 GHz, nominal for 5.925 to 6.575 GHz.
† "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-7**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-63**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**EWFTK-63**
Splice	**163DZ**
Grounding Kit with factory attached, one-hole lug	**204989-4**
Grounding Kit with factory attached, two-hole lug	**241088-4**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-24**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-9**
Grounding Kit with field attachable screw-on lug	**204989-34**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**24312A**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-33**
Wall-Roof Feed Thru	**245314-63**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-63**
5 in (127 mm) dia	**WGB5-63**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP64 and EW64

Characteristics

Type Numbers	
Premium Waveguide	**EWP64**
Premium Waveguide Type CATVP	**222040-9**
Standard Waveguide	**EW64**
Electrical	
Max. Frequency Range, GHz*	5.3-7.75
$_eTE_{11}$ Mode Cutoff Frequency, GHz	4.32
Group Delay at 7.4 GHz, ns/100 ft (ns/100 m)	124 (408)
Peak Power Rating at 7.4 GHz, kW	
with 164 series connectors	107
with 264 series connectors	60
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	10 (260)
H Plane	27 (685)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	10 (260)
H Plane	27 (685)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.88 x 1.08 (47.8 x 27.4)
Weight, pounds per foot (kg/m)	0.49 (0.73)

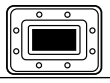
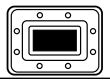
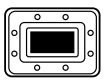
* Actual usable range is limited by the connecting rectangular waveguide.

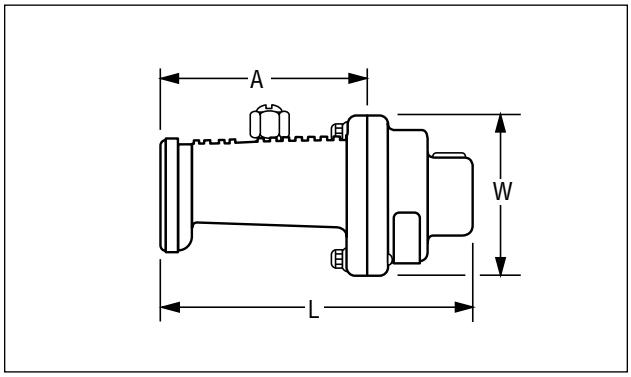
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
5.3	2.16 (7.07)	2.92	57.9
5.5	1.99 (6.50)	3.18	61.9
5.7	1.86 (6.09)	3.39	65.2
5.9	1.76 (5.79)	3.57	68.1
6.1	1.69 (5.56)	3.72	70.6
6.3	1.64 (5.37)	3.85	72.8
6.5	1.59 (5.22)	3.96	74.7
6.7	1.55 (5.10)	4.05	76.4
6.9	1.52 (5.10)	4.14	78.0
7.1	1.49 (4.90)	4.21	79.4
7.125	1.49 (4.87)	4.24	79.5
7.25	1.48 (4.85)	4.26	80.3
7.3	1.47 (4.83)	4.38	80.6
7.5	1.45 (4.76)	4.34	81.7
7.7	1.43 (4.70)	4.39	82.8
7.75	1.43 (4.69)	4.41	83.0

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 164DC, 164DCT, 164SC, 164SCM				
	5.3 (135)	3.3 (84)	3.3 (84)	3.5 (1.6)
Type No. 164DE, 164DET				
	5.3 (135)	3.3 (84)	3.3 (84)	3.5 (1.6)
Type No. 264DE, 264DET				
	5.2 (132)	3.3 (84)	3.2 (81)	3.4 (1.5)
Type No. 164SEM, 164SE, 264SE, 264SEM				
	5.3 (134.6)	3.3 (84)	3.4 (86)	3.5 (1.6)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125-7.750	**EWP64-71**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BC**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CC**
		CPR112G	**264DET**	**264SCM**	**55001-112**	**F112PC0240CA**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HC**
		PDR84	–	**264SEM**	–	**F112MH0600HA**
6.425-7.125	**EWP64-65**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
6.525-6.875	**EWP64-65N**	UG-344/U†††	**164DCT**	**164SC**	**55000A-137**	**F137PA0240BB**
		CPR137G	**164DET**	**164SE**	**55001-137**	**F137PC0240CB**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HB**
		PAR70	–	**164SCM**	–	**F137MP0600PB**
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
6.425-7.750	**EW64**	UG-344/U†††	**164DC**	–	**55000A-137**	**F137PA0240BS**
		CPR137G	**164DE**	**164SE**	**55001-137**	**F137PC0240CS**
		PDR70	–	**164SEM**	**223306-70**	**F137MH0600HS**
7.125-7.750	**EW64**	CPR112G	**264DE**	**264SE**	**55001-112**	**F112PC0240CC**
		PDR84	–	**264SEM**	–	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. † "Tunable" connectors ordered with factory assemblies are factory tuned. †† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3.5 ft (1.07 m)*	**42396A-1**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3.5 ft (1.07 m)	**EWSH-64**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

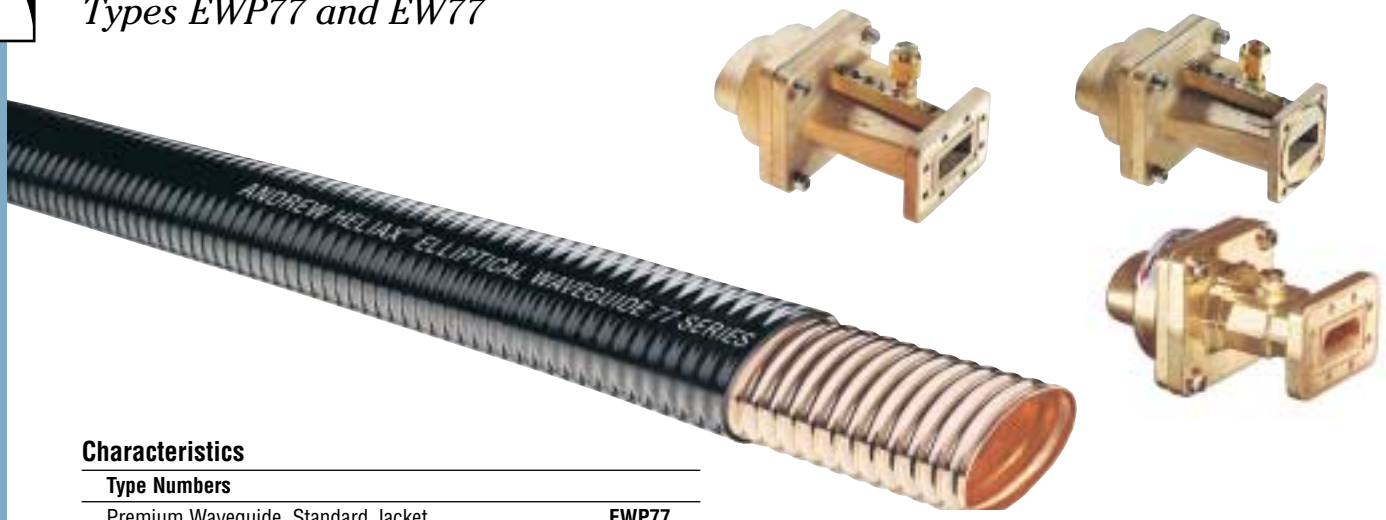
Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202358**
Splice	**164DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29961**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-35**
Wall-Roof Feed Thru	**245314-64**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-64**
5 in (127 mm) dia	**WGB5-64**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP77 and EW77



Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP77**
Standard Waveguide, Standard Jacket	**EW77**
Premium Waveguide Type CATVP	**222040-6**
Standard Waveguide, Fire Retardant Non-Halogenated Jacket	**35409-22****
Electrical	
Max. Frequency Range, GHz*	6.1-8.5
$_eTE_{11}$ Mode Cutoff Frequency, GHz	4.72
Group Delay at 7.8 GHz, ns/100 ft (ns/100 m)	128 (419)
Peak Power Rating at 7.8 GHz, kW	63
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	7 (180)
H Plane	20 (510)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	9 (230)
H Plane	25 (635)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.72 x 1.00 (43.7 x 25.4)
Weight, pounds per foot (kg/m)	0.45 (0.67)

* Actual usable range is limited by the connecting rectangular waveguide.

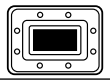
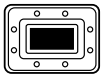
** UL® listed Type CATVR.

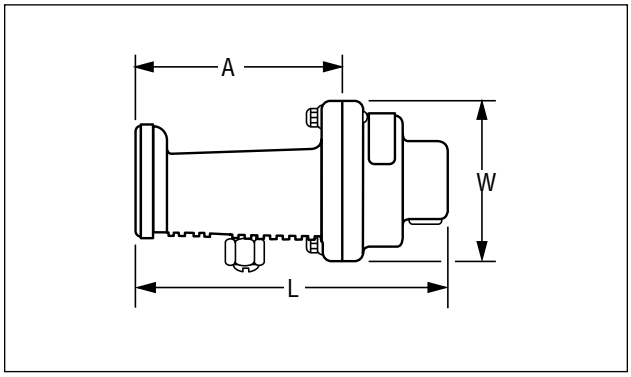
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
6.1	2.36 (7.75)	2.52	63.3
6.3	2.22 (7.30)	2.68	66.2
6.5	2.12 (6.95)	2.81	68.7
6.7	2.04 (6.68)	2.93	71.0
6.9	1.97 (6.46)	3.03	72.9
7.1	1.91 (6.28)	3.11	74.7
7.125	1.91 (6.26)	3.12	75.0
7.3	1.87 (6.13)	3.19	76.3
7.5	1.83 (6.00)	3.26	77.7
7.7	1.79 (5.89)	3.32	79.0
7.725	1.79 (5.88)	3.33	79.2
7.75	1.79 (5.86)	3.33	79.3
7.9	1.77 (5.80)	3.37	80.2
8.1	1.74 (5.71)	3.42	81.2
8.15	1.74 (5.69)	3.43	81.5
8.275	1.72 (5.65)	3.46	82.1
8.3	1.72 (5.64)	3.47	82.2
8.5	1.70 (5.58)	3.51	83.1

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 177DC, 177DCT, 177DCP, 177DCM, 177DCMT, 177SC, 177SCM				
	4.5 (115)	2.7 (69)	2.75 (69.8)	2.8 (1.3)
Type No. 177DE, 177DET, 177DEMT				
	4.8 (122)	2.7 (69)	2.75 (69.8)	2.8 (1.3)
Type No. 177SE, 177SEM				
	4.5 (115)	2.7 (69)	2.75 (69.8)	2.8 (1.3)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
7.125–7.750	**EWP77-71**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BA**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CA**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KA**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HA**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HC**
7.725–8.500	**EWP77-77**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BB**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CB**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KB**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HB**
		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HF‡**
7.125–8.500	**EWP77-71W**	UG-51/U†††	**177DCT**	**177SC**	**55000A-112**	**F112PA0240BC**
		CPR112G	**177DET**	**177SE**	**55001-112**	**F112PC0240CC**
		PBR84	**177DCMT**	**177SCM**	**243498-84**	**F112MK0600KC**
		PDR84	**177DEMT**	**177SEM**	**223306-84**	**F112MH0600HC**
***		PDR70	**277DEMT**	**–**	**223306-70**	**F137MH0600HE**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
7.125–8.500	**EW77**	UG-51/U†††	**177DC**	**177SC**	**55000A-112**	**F112PA0240BC**
		PBR84	**177DCM**	**177SCM**	**243498-84**	**F112MK0600KC**
		CPR112G	**177DE**	**177SE**	**55001-112**	**F112PC0240CC**
		PDR84	**177DEM**	**177SEM**	**223306-84**	**F112MH0600HC**

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** 7.425 - 7.925 GHz ‡ 7.725 - 8.3 GHz ONLY

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218. ††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-11**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-77**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**202421**
Splice	**177DZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-3**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-23**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-8**
Grounding Kit with field attachable screw-on lug	**204989-33**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**19256B**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-34**
Wall-Roof Feed Thru	**245314-77**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-77**
5 in (127 mm) dia	**WGB5-77**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EW85

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EW85**
Standard Waveguide, Fire Retardant Non-Halogenated Jacket	**35409-17****
Electrical	
Max. Frequency Range, GHz*	7.7-9.8
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	6.46
Group Delay at 9.2 GHz, ns/100 ft (ns/100 m)	142 (465)
Peak Power Rating at 9.2 GHz, kW	38.9
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	8 (200)
H Plane	19 (480)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	8 (200)
H Plane	19 (480)
Maximum Twist, degrees/foot (m)	1 (3)
Dimensions over Jacket, in (mm)	1.29 x 0.88 (32.8 x 22.4)
Weight, pounds per foot (kg/m)	0.33 (0.50)

* Actual usable range is limited by the connecting rectangular waveguide.

** UL® listed Type CATVR.

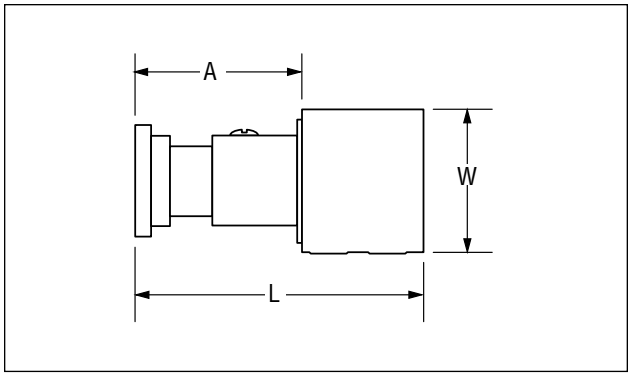
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
7.7	4.32 (14.20)	1.17	54.4
7.9	4.01 (13.10)	1.26	57.6
8.1	3.78 (12.40)	1.34	60.3
8.3	3.59 (11.80)	1.40	62.8
8.5	3.45 (11.31)	1.46	65.6
8.7	3.33 (10.92)	1.52	67.6
8.9	3.23 (10.59)	1.56	69.4
9.1	3.14 (10.31)	1.61	71.0
9.3	3.07 (10.07)	1.64	72.4
9.5	3.01 (9.86)	1.68	73.8
9.7	2.95 (9.68)	1.71	75.0
9.8	2.93 (9.60)	1.72	75.6

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 185BC				
	4.75 (121)	2.1 (52)	3.5 (89)	2.0 (0.9)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency GHz*	Waveguide Type	Flange Type††	Connector Non-Tunable	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies					**VSWR 1.17 (22.1)****
8.5-9.8	**EW85**	UG-39/U†††	**185BC**	**55000A-90**	**F090PA024BS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-5**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Splice	**185AZ**
Grounding Kit with factory attached, one-hole lug	**204989-3**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Wall-Roof Feed Thru	**245314-85**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-2**
Connector Reattachment Kit	**33544-17**

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Elliptical Waveguide

Types EWP90S, EWP90 and EW90

Characteristics

Type Numbers	
Super Premium Waveguide, Standard Jacket	**EWP90S**
Premium Waveguide, Standard Jacket	**EWP90**
Standard Waveguide, Standard Jacket	**EW90**
Premium Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-16***
Premium Waveguide Type CATVP	**222040-2**
Electrical	
Max. Frequency Range, GHz	8.3-11.7
$_eTE_{11}$ Mode Cutoff Frequency, GHz	6.50
Group Delay at 11.2 GHz, ns/100 ft (ns/100 m)	125 (410)
Peak Power Rating at 11.2 GHz, kW	
with 190 series connectors	44.9
with 290 series connectors	30.8
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	6 (150)
H Plane	13 (330)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	7 (180)
H Plane	19 (480)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	1.28 x 0.76 (32.5 x 19.3)
Weight, pounds per foot (kg/m)	0.32 (0.48)

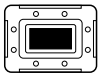
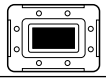
* UL® listed Type CATVR.

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
8.3	4.20 (13.8)	1.17	62.2
8.8	3.79 (12.4)	1.29	67.4
9.3	3.53 (11.6)	1.39	71.5
9.8	3.35 (11.0)	1.46	74.8
10.3	3.22 (10.6)	1.52	77.6
10.5	3.18 (10.44)	1.54	78.6
10.7	3.14 (10.31)	1.56	79.5
10.9	3.11 (10.20)	1.58	80.3
11.1	3.08 (10.10)	1.59	81.1
11.3	3.05 (10.00)	1.61	81.8
11.5	3.02 (9.92)	1.62	82.5
11.7	3.00 (9.84)	1.63	83.2

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

		L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 190DE, 190DET, 190DEM, 190DEMT					
Figure 1		4.5 (117)	2.3 (58)	2.7 (67)	1.9 (0.9)
Type No. 290SC					
Figure 2		3.6 (91)	2.3 (58)	1.8 (46)	1.9 (0.9)
Type No. 190SE, 190SEM					
Figure 2		4.16 (105.8)	2.29 (58.2)	2.44 (62.1)	2.1 (0.9)

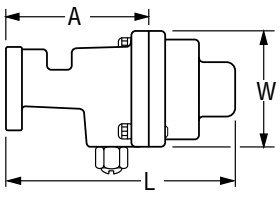


Figure 1

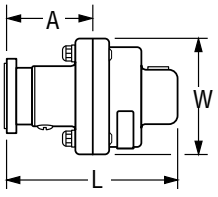


Figure 2

Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.05 (32.3)****
10.7-11.7	**EWP90S**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
Premium Waveguide Assemblies						**VSWR 1.06 (30.7)****
10.2-10.7	**EWP90-105**	CPR90G	**190DET**	**190SE**	**55001-90**	**F090PC0240CA**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HA**
10.5-11.7	**EWP90-105W**	CPR90G	–	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	–	**190SEM**	**223306-100**	**F090MH0600HB**
10.7-11.7	**EWP90-107**	CPR90	**190DET**	**190SE**	**55001-90**	**F090PC0240CB**
		PDR100	**190DEMT**	**190SEM**	**223306-100**	**F090MH0600HB**
						VSWR 1.09 (27.3)**
10.7-11.7		WR75†††	–	**290SC**	**55000A-75**	**F075PA0240BB**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
10.2-11.7	**EW90**	CPR90G	**190DE**	**190SE**	**55001-90**	**F090PC0240CS**
		PDR100	**190DEM**	**190SEM**	**223306-100**	**F090MH0600HS**
		WR75†††	–	–	**55000A-75**	**F075PA0240BS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
† "Tunable" connectors ordered with factory assemblies are factory tuned.
†† For detailed information on mating flanges, refer to pages 214-218. ††† Pressurizable cover flange.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-5**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-90**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**204919**
Splice	**190DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-37**
Wall-Roof Feed Thru	**245314-90**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-90**
5 in (127 mm) dia	**WGB5-90**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Elliptical Waveguide

Types EWP127A and EW127A

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP127A**
Standard Waveguide, Standard Jacket	**EW127A**
Premium Waveguide Type CATVP	**222040-4**
Standard Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-15***
Electrical	
Max. Frequency Range, GHz	10.0-13.25
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	7.67
Group Delay at 12.7 GHz, ns/100 ft (ns/100 m)	126 (414)
Peak Power Rating at 12.7 GHz, kW	34
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	5 (130)
H Plane	11 (280)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	6 (150)
H Plane	15 (380)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	1.11 x 0.67 (28.2 x 17.1)
Weight, pounds per foot (kg/m)	0.29 (0.43)

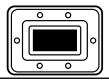
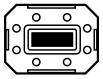
* UL® listed Type CATVR.

Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
10.0	4.46 (14.60)	1.00	64.2
10.5	4.16 (13.60)	1.07	68.3
11.0	4.95 (13.00)	1.13	71.7
11.5	3.79 (12.40)	1.18	64.5
11.7	3.74 (12.28)	1.20	75.5
11.9	3.69 (12.12)	1.21	76.5
12.1	3.65 (11.98)	1.23	77.3
12.3	3.61 (11.86)	1.24	78.2
12.5	3.58 (11.74)	1.25	79.0
12.7	3.55 (11.64)	1.26	79.7
12.9	3.52 (11.54)	1.27	80.4
13.1	3.49 (11.45)	1.28	81.1
13.25	3.47 (11.38)	1.29	81.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

		L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No.	**1127DC,1127DCT, 1127DCP, 1127DCM, 1127DCMT, 1127SC, 1127SCM**				
Figure 1		3.8 (97)	2.3 (58)	1.9 (48)	1.8 (0.8)
Type No. 1127DEM, 1127DEMT, 1127SEM					
Figure 1		3.8 (97)	2.3 (58)	1.9 (48)	1.8 (0.8)
Type No. 1127DK, 1127DKT					
Figure 2		5.0 (127)	2.3 (58)	3.1 (79)	1.8 (0.8)

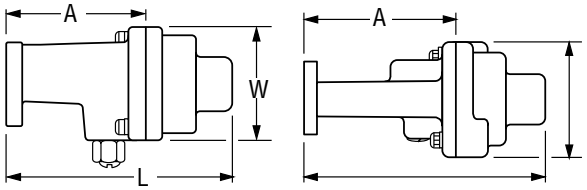


Figure 1 Figure 2

Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Super Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
11.7-12.2	**EWP127A-117**	WR75†††	**1127DCT**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCMT**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEMT**	**1127SEM**	**223306-120**	**F075MH0600HS**
		Pressurizable Contact Flange	**1127DKT**	–	***	***
12.2-12.7	**EWP127A-122**	WR75†††	**1127DCT**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCMT**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEMT**	–	**223306-120**	**F075MH0600HS**
12.7-13.25	**EWP127A-127**	WR75†††	**1127DCT**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCMT**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEMT**	**1127SEM**	**223306-120**	**F075MH0600HS**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
11.7-13.25	**EW127A**	WR75†††	**1127DC**	**1127SC**	**55000A-75**	**F075PA0240BS**
		PBR120	**1127DCM**	**1127SCM**	**110088**	**F075MK0600KS**
		PDR120	**1127DEM**	**1127SEM**	**223306-120**	**F075MH0600HS**
		Pressurizable Contact Flange	**1127DK**	–	***	***

* Contact Andrew for information on other frequency bands. ** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Not Available

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218. ††† Pressurizable cover flange.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-9**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-127**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**204960**
Splice	**1127DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-41**
Wall-Roof Feed Thru	**245314-127A**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-127**
5 in (127 mm) dia	**WGB5-127**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Elliptical Waveguide

Types EWP132 and EW132

Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP132**
Standard Waveguide, Standard Jacket	**EW132**
Premium Waveguide Type CATVP	**222040-7**
Standard Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-14***
Electrical	
Max. Frequency Range, GHz	11.0-15.35
$_{e}TE_{11}$ Mode Cutoff Frequency, GHz	9.22
Group Delay at 14.7 GHz, ns/100 ft (ns/100 m)	130 (425)
Peak Power Rating at 14.7 GHz, kW	
with 1132 series connectors	22.8
with 2132 series connectors	36.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	5 (130)
H Plane	14 (360)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	5 (130)
H Plane	14 (360)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.95 x 0.59 (24.1 x 15.0)
Weight, pounds per foot (kg/m)	0.22 (0.33)

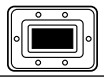
* UL® listed Type CATVR.

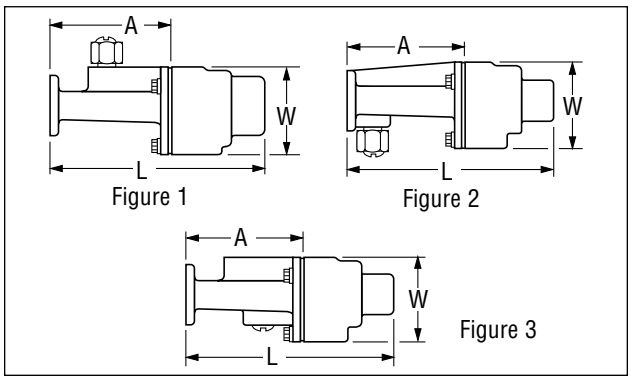
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
11.0	7.06 (23.20)	0.58	54.4
11.5	6.35 (20.80)	0.65	59.8
12.0	5.89 (19.30)	0.70	64.0
12.5	5.56 (18.30)	0.74	70.5
13.0	5.32 (17.40)	0.73	70.5
13.5	5.13 (16.80)	0.80	73.0
14.0	4.98 (16.34)	0.83	75.9
14.2	4.93 (16.17)	0.83	76.6
14.4	4.88 (16.02)	0.84	77.4
14.6	4.84 (15.87)	0.85	78.1
14.8	4.80 (15.74)	0.86	78.8
15.0	4.76 (15.62)	0.87	79.4
15.2	4.72 (15.50)	0.87	80.0
15.35	4.70 (15.42)	0.88	80.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

		L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1132DC,1132DCT, 1132DCMT					
Figure 1		4.5 (114)	2.1 (53)	2.5 (64)	2.0 (0.9)
Type No. 1132DEM, 1132DEMT					
Figure 1		4.4 (112)	2.1 (53)	2.5 (64)	1.5 (0.7)
Type No. 1132SC, 1132SCM					
Figure 1		3.67 (93.2)	1.89 (48)	1.89 (48)	1.5 (0.67)
Type No. 2132DC, 2132DCT, 2132DCMT					
Figure 2		4.1 (104)	2.0 (51)	2.2 (56)	1.5 (0.7)
Type No. 2132DEMT					
Figure 3		4.1 (104)	2.1 (53)	2.2 (56)	1.5 (0.7)
Type No. 2132DK, 2132DKT					
Figure 1		4.6 (117)	2.1 (53)	2.7 (69)	1.6 (0.7)



Connector Material: Brass

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
14.0-14.5	**EWP132-140**	WR75†††	**2132DCT**	–	**55000A-75**	**F075PA0240BS**
		PBR120	**2132DCMT**	–	**110088**	**F075MK0600KS**
		PBR140	**1132DCMT**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR120	**2132DEMT**	–	**223306-120**	**F075MH0600HS**
		PDR140	**1132DEMT**	–	**223306-140**	**F062MH0600HS**
		Pressurizable Contact Flange	**2132DKT**	–	***	***
		UG-541/U††††		**1132SC**		
14.4-15.35	**EWP132-144**	UG-541/U††††	**1132DCT**	**1132SC**	**55000-62**	**F062PA0240BS**
		PBR140	**1132DCMT**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR140	**1132DEMT**	–	**223306-140**	**F062MH0600HS**
Standard Waveguide Assemblies			**Non-Tunable**			**VSWR 1.15 (23.1)****
14.0-14.5	**EW132-140**	WR75†††	**2132DC**	–	**55000A-75**	**F075PA0240BS**
		PBR140	**1132DCM**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR140	**1132DEM**	–	**223306-140**	**F062MH0600HS**
		PBR120	**2132DCM**	–	**110088**	**F075MK0600KS**
		PDR120	**2132DEM**	–	**223306-120**	**F075MH0600HS**
		Pressurizable Contact Flange	**2132DK**	–	***	***
		UG-541/U††††		**1132SC**		
14.4-15.35	**EW132-144**	UG-541/U††††	**1132DC**	**1132SC**	**55000-62**	**F062PA0240BS**
		PBR140	**1132DCM**	**1132SCM**	**110089**	**F062MK0600KS**
		PDR140	**1132DEM**	–	**223306-140**	**F062MH0600HS**

* Contact Andrew for information on other frequency bands. **VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies. *** Not Available † "Tunable" connectors ordered with factory assemblies are factory

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**42396A-9**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-132**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

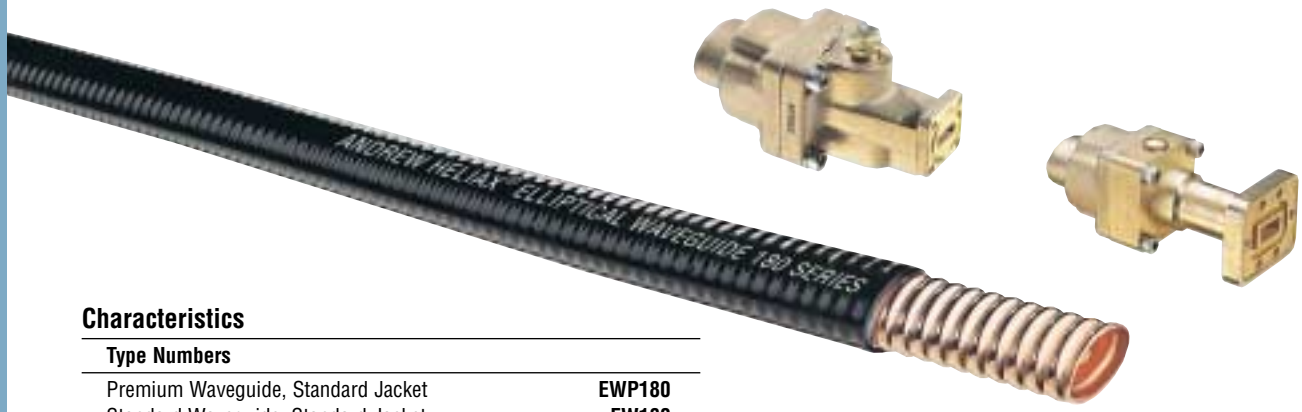
Description	Type No.
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**
Other Accessories	
Flaring Tool Kit for connector attachment	**203809**
Splice	**1132DZ**
Grounding Kit with factory attached, one-hole lug	**204989-2**
Grounding Kit with factory attached, two-hole lug	**241088-2**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-22**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-7**
Grounding Kit with field attachable screw-on lug	**204989-32**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**29958**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-39**
Wall-Roof Feed Thru	**245314-132**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-132**
5 in (127 mm) dia	**WGB5-132**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Types EWP180 and EW180



Characteristics

Type Numbers	
Premium Waveguide, Standard Jacket	**EWP180**
Standard Waveguide, Standard Jacket	**EW180**
Standard Waveguide, Fire Retardant, Non-Halogenated Jacket	**35409-21**
Premium Waveguide Type CATVP	**222040-5**
Electrical	
Max. Frequency Range, GHz*	14.0-19.7
$_eTE_{11}$ Mode Cutoff Frequency, GHz	11.15
Group Delay at 18.7 GHz, ns/100 ft (ns/100 m)	127 (416)
Peak Power Rating at 18.7 GHz, kW	7.3
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	6 (150)
H Plane	15 (380)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	6 (150)
H Plane	11 (280)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.78 x 0.48 (19.8 x 12.2)
Weight, pounds per foot (kg/m)	0.15 (0.22)

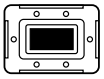
* Actual usable range is limited by the connecting rectangular waveguide.

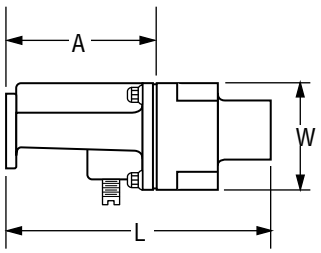
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
14	8.42 (27.63)	0.39	60.5
14.5	7.79 (25.57)	0.42	63.9
15	7.34 (24.07)	0.45	66.9
15.5	6.99 (22.95)	0.47	89.5
16	6.72 (22.06)	0.49	71.7
16.5	6.51 (21.35)	0.51	73.7
17	6.33 (20.77)	0.52	75.5
17.5	6.18(20.28)	0.53	77.1
17.7	6.13 (20.11)	0.54	77.7
17.9	6.08 (19.95)	0.54	78.2
18.1	6.03 (19.80)	0.55	78.8
18.3	5.99 (19.66)	0.55	79.3
18.5	5.95 (19.52)	0.55	79.8
18.7	5.91 (19.40)	0.56	80.3
18.9	5.88 (19.28)	0.56	80.7
19.1	5.84 (19.17)	0.56	81.2
19.3	5.81 (19.06)	0.57	81.6
19.5	5.78 (18.96)	0.57	82.0
19.7	5.75 (18.86)	0.57	82.4

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1180DCT, 1180DCP, 1180DCMT, 1180DCMP, 1180SC, 1180SCM				
	3.4 (86)	1.5 (38)	1.9 (48)	0.9 (0.4)
Type No. 2180SEM				
	4.0 (102)	1.5 (38)	1.9 (48)	0.9 (0.4)



Connector Material: Brass

ANDREW®

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector† Tunable	Connector† Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies						**VSWR 1.08 (28.3)****
17.7-19.7	**EWP180-180**	UG-595/U†††	**1180DCT**	**1180SC**	**55000A-42**	**F042PA0240BS**
		PBR220	**1180DCMT**	**118SCM**	**112587**	**F042MK0600KS**
		PDR180	–	**2180SEM**	**223306-180**	**F051MH0600HS**
Standard Waveguide Assemblies						**VSWR 1.15 (23.1)****
17.7-19.7	**EW180**	UG-595/U†††	**1180DCT**	**1180SC**	**55000A-42**	**F042PA0240BS**
		PBR220	**1180DCMT**	**1180SCM**	**112587**	**F042MK0600KS**
		PDR180	–	**2180SEM**	**223306-180**	**F051MH0600HS**

* Contact Andrew for information on other frequency bands.

** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.

† "Tunable" connectors ordered with factory assemblies are factory tuned.

†† For detailed information on mating flanges, refer to pages 214-218.

††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**43211A**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-180**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**201439**
Splice	**1180DZ**
Grounding Kit with factory attached, one-hole lug	**204989-1**
Grounding Kit with factory attached, two-hole lug	**241088-1**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-21**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-6**
Grounding Kit with field attachable screw-on lug	**204989-31**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**43094**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-42**
Wall-Roof Feed Thru	**245314-180**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-180**
5 in (127 mm) dia	**WGB5-180**

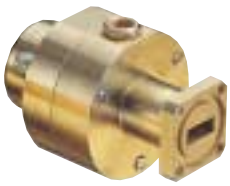
Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Elliptical Waveguide

Type EW220



Characteristics

Type Numbers	
Standard Waveguide	**EW220**
Standard Waveguide Type CATVP	**222040-8**
Electrical	
Max. Frequency Range, GHz*	17.0-23.6
$_eTE_{11}$ Mode Cutoff Frequency, GHz	13.34
Group Delay at 22.4 GHz, ns/100 ft (ns/100 m)	127 (415)
Peak Power Rating at 22.4 GHz, kW	8.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.67 x 0.41 (17.0 x 10.4)
Weight, pounds per foot (kg/m)	0.12 (0.18)

* Actual usable range is limited by the connecting rectangular waveguide.

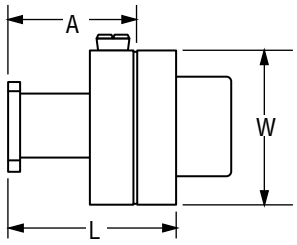
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
21	8.86 (29.08)	0.38	77.2
21.2	8.82 (28.93)	0.39	77.7
21.4	8.78 (28.80)	0.39	78.2
21.6	8.74 (28.67)	0.39	78.6
21.8	8.70 (28.54)	0.39	79.1
22.0	8.66 (28.43)	0.39	79.5
22.2	8.63 (28.32)	0.39	79.9
22.4	8.60 (28.22)	0.40	80.3
22.6	8.57 (28.13)	0.40	80.7
22.8	8.55 (28.03)	0.40	81.1
23.0	8.52 (27.95)	0.40	81.5
23.2	8.50 (27.87)	0.40	81.8
23.4	8.47 (27.80)	0.40	82.2
23.6	8.45 (27.73)	0.40	82.5

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1220ASC, 1220ASCM				
	2.4 (61)	1.57 (40)	1.3 (33)	0.7 (0.3)



Connector Material: Brass

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See “Waveguide Assemblies” table.

Specify connector Type Numbers and “attached” or “unattached”. See “Waveguide Assemblies” table. When attached connectors on an assembly are different, specify which is “first off” the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies					**VSWR 1.15 (23.1)****
21.2-23.6	**EW220**	UG-595/U†††	**1220ASC**	**55000A-42**	**F042PA0240BS**
		PBR220	**1220ASCM**	**112587**	**F042MK0600KS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218.
††† Modified cover flange with gasket groove. Mates with UG choke or cover flanges.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**43211A**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-220**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205127**
Splice	**1220DZ**
Grounding Kit with factory attached, one-hole lug	**204989-1**
Grounding Kit with factory attached, two-hole lug	**241088-1**
Grounding Kit with field attachable crimp-on, one-hole lug	**204989-21**
Grounding Kit with field attachable crimp-on, two-hole lug	**241088-6**
Grounding Kit with field attachable screw-on lug	**204989-31**
Crimping Tool to field attach lug to Grounding Kit	**207270**
Hoisting Grip	**43094**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-44A**
Wall-Roof Feed Thru	**245314-220**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-220**
5 in (127 mm) dia	**WGB5-220**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide

Type EW240

Characteristics

Type Numbers	
Standard Waveguide	**EW240**
Electrical	
Max. Frequency Range, GHz*	18.0-26.5
$_eTE_{11}$ Mode Cutoff Frequency, GHz	15.2
Group Delay at 22.4 GHz, ns/100 ft (ns/100 m)	127 (417)
Peak Power Rating at 22.4 GHz, kW	8.6
Mechanical	
Minimum Bending Radii, without rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Minimum Bending Radii, with rebending, inches (mm)	
E Plane	4 (120)
H Plane	9 (230)
Maximum Twist, degrees/foot (m)	2 (6)
Dimensions over Jacket, in (mm)	0.60 x 0.38 (15.2 x 9.65)
Weight, pounds per foot (kg/m)	0.11 (0.16)

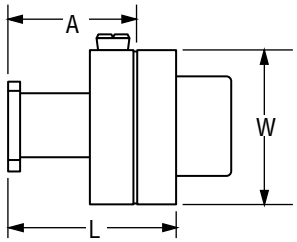
Attenuation, Average Power, Group Velocity

Frequency GHz	Attenuation dB/100 ft (dB/100 m)	Average Power Rating, kW	Group Velocity of Propagation,%
22.000	11.456 (37.586)	0.281	72.3
22.500	11.186 (36.699)	0.287	73.8
23.000	10.952 (35.932)	0.294	75.1
23.500	10.748 (35.264)	0.299	76.3
24.000	10.570 (34.677)	0.304	77.4
24.200	10.504 (34.462)	0.306	77.8
24.250	10.488 (34.410)	0.307	78.0
24.400	10.441 (34.257)	0.308	78.3
24.600	10.382 (34.061)	0.310	78.7
24.800	10.325 (33.874)	0.311	79.0
25.000	10.271 (33.696)	0.313	79.4
25.200	10.219 (33.525)	0.315	79.8
25.250	10.206 (33.484)	0.315	79.9
25.500	10.145 (33.283)	0.317	80.3
26.000	10.032 (32.912)	0.320	81.2
26.500	9.930 (32.578)	0.324	81.9

Attenuation values based on VSWR 1.0, ambient temperature 24°C (75°F) and are guaranteed within ±5%. Average power ratings based on VSWR 1.0 and 42°C (76°F) temperature rise over 40°C (104°F) ambient.

Connectors – Flange dimensions on pages 216-217

	L in (mm)	W in (mm)	A in (mm)	Weight lb (kg)
Type No. 1240SCM				
	2.4 (61)	1.57 (40)	1.3 (33)	0.7 (0.3)



Connector Material: Brass

How To Order:

A sample order is shown on page 473.

Specify complete waveguide Type Number, including frequency band code, where listed, and length in feet or meters. See "Waveguide Assemblies" table.

Specify connector Type Numbers and "attached" or "unattached". See "Waveguide Assemblies" table. When attached connectors on an assembly are different, specify which is "first off" the reel.

Further Information:

For general information on HELIAX® elliptical waveguide, see pages 156-159.

Ordering Information for Waveguide Assemblies

Frequency* GHz	Waveguide Type	Flange Type††	Connector Fixed-Tuned	Pressure Window	Flex-Twist 2 ft (0.6 m)
Premium Waveguide Assemblies					**VSWR 1.15 (23.1)****
24.0-26.5	**EW240**	PBR220	**1240SCM**	**112587**	**F042MK0600KS**

* Contact Andrew for information on other frequency bands.
** VSWR max., (R.L., dB). Up to 300 ft (90 m). The indicated maximum VSWR characteristics are guaranteed for factory assemblies and are typical for field assemblies.
†† For detailed information on mating flanges, refer to pages 214-218.

Accessories – Photos and detailed descriptions on pages 194-200

Description	Type No.
Hangers and Adapters	
Hanger Kit of 10, Recommended maximum spacing for outdoor installation is 3 ft (0.91 m)*	**43211A**
NEW! Snap-In Hanger Kit of 10. Recommended spacing for outdoor installation is 3 ft (0.91 m)	**EWSH-240**
Hardware Kit of 10, 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Angle Adapter Kit of 10. Stainless steel	**31768A**
Angle Adapter Kit of 10. Galvanized	
3/8" Hardware	**242774**
Metric Hardware	**242774-M**
Round Member Adapter Kit of 10. Stainless steel	
Member Diameter, in (mm)	
1-2 (25-50)	**31670-1**
2-3 (50-75)	**31670-2**
3-4 (75-100)	**31670-3**
4-5 (100-125)	**31670-4**
5-6 (125-150)	**31670-5**
45° Adapter Kit of 10. Galvanized steel	**42334**
Threaded Rod Support, 3/8" rod, nuts, washers, ceiling bracket	
12 in (305 mm) long, kit of 1	**31771**
12 in (305 mm) long, kit of 5	**31771-4**
24 in (610 mm) long, kit of 1	**31771-9**
24 in (610 mm) long, kit of 5	**31771-6**
Tower Standoff Kit of 10. 1 in (25 mm) standoff	
Member Diameter, in (mm)	
0.75-1.5 (20-40)	**30848-5**
1.5-3.0 (40-75)	**30848-4**
3-4 (75-100)	**30848-1**
4-5 (100-125)	**30848-2**
5-6 (125-150)	**30848-3**
Tower Standoff Kit of 10. 2.5 in (60 mm) standoff	
Member Diameter, in (mm)	
3-4 (75-100)	**41108A-1**
4-5 (100-125)	**41108A-2**
5-6 (125-150)	**41108A-3**

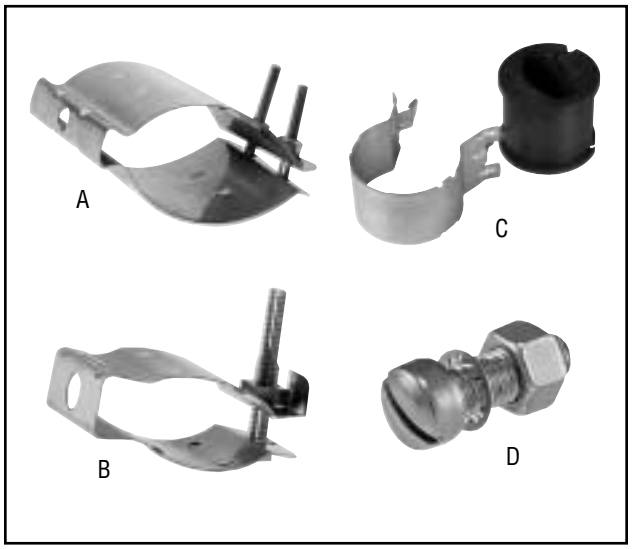
* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

Description	Type No.
Other Accessories	
Flaring Tool Kit for connector attachment	**205127**
Splice	**1240DZ**
Grounding Kit with factory attached, one-hole lug	**223158**
Hoisting Grip	**43094**
Bending Tool Kit. One each E and H Plane tool	**EWBTK-1**
Connector Reattachment Kit	**33544-47**
Wall-Roof Feed Thru	**245314-240**
Waveguide Boot for Plates (below),	
4 in (102 mm) dia.	**WGB4-240**
5 in (127 mm) dia	**WGB5-240**

Feed-Thru Plate for Boots (above)

Openings	For 4 in Boots	For 5 in Boots
1	**204673-1**	**48940-1**
1	**204673-2**	–
2	–	**48940-2**
3	–	**48940-3**
4	**204673-4**	**48940-4**
6	–	**48940-6**
8	**204673-8**	–

Elliptical Waveguide Hangers



Heavy-Gauge Stainless Steel Construction

High strength and excellent corrosion resistance for long-term reliability.

HELIAX® hangers are designed for easy installation. The clamp locking bolt and nut are preassembled and captivated to minimize installation labor. Proper tension is easy to determine. The hanger is simply tightened until there is a gap of approximately 5/16" (8 mm) between the clamp legs. The pre-drilled hole for 3/8" or 1/2" mounting hardware and slots for round member adapter clamps further simplify installation. Many accessories are available to adapt these hangers to most tower configurations.

42396A Series

Gripping Tabs

Prevent waveguide slippage without the need for a hoisting grip.

Pre-Assembled and Captivated Hardware

Eliminates the need for field assembly.

Springlike Flexibility

Makes it easy to form the hanger around the waveguide and dampens vibration for long life.

A, B Waveguide Hanger Kit of 10 stainless steel hangers. Mount with 3/8" hardware or adapters.

For Waveguide Type Numbers	Waveguide Hanger Kit	Photo Ref.	Recommended Maximum Hanger Spacing* ft (m)
EW17, EWP17	**31766A-9**	**A**	6 (1.83)
EW20	**31766A-10**	**A**	5.5 (1.68)
EW28	**31766A-11**	**A**	5 (1.52)
EW34, EWP34	**42396A-15**	**B**	4.5 (1.37)
EW37, EWP37, EWP37S	**42396A-4**	**B**	4.5(1.37)
EW43, EWP43	**42396A-16**	**B**	4 (1.22)
EW52, EWP52, EWP52S	**42396A-8**	**B**	3.5 (1.07)
EW63, EWP63, EWP63S	**42396A-7**	**B**	3 (0.91)
EW64, EWP64	**42396A-1**	**B**	3 (0.91)
EW77, EWP77	**42396A-11**	**B**	3 (0.91)
EW85	**42396A-5**	**B**	3 (0.91)
EW90, EWP90, EWP90S	**42396A-5**	**B**	3 (0.91)
EW127A, EWP127A	**42396A-9**	**B**	3 (0.91)
EW132, EWP132	**42396A-9**	**B**	3 (0.91)
EW180, EWP180	**43211A**	**B**	3 (0.91)
EW220	**43211A**	**B**	3 (0.91)
EW240	**43211A**	**B**	3 (0.91)

C Snap-In Hanger Kit of 10

For Waveguide Type Numbers	Waveguide Hanger Kit	Photo Ref.	Recommended Maximum Hanger Spacing* ft (m)
EW52	**EWSH-52**	**C**	3.5 (1.07)
EW63	**EWSH-63**	**C**	3 (0.91)
EW64	**EWSH-64**	**C**	3 (0.91)
EW77	**EWSH-77**	**C**	3 (0.91)
EW90	**EWSH-90**	**C**	3 (0.91)
EW127A	**EWSH-127A**	**C**	3 (0.91)
EW132	**EWSH-132**	**C**	3 (0.91)
EW180	**EWSH-180**	**C**	3 (0.91)
EW220	**EWSH-220**	**C**	3 (0.91)
EW249	**EWSH-240**	**C**	3 (0.91)

* Standard conditions: 125 mph (200 km/h) survival wind velocity, 0.5 in (13 mm) radial ice. For other conditions see page 196.

D Hardware Kit of 10 stainless steel fillister-head bolts, 3/8 inch lockwashers, and nuts for attachment of hangers to drilled tower members.

3/4 in (19 mm) long .....Type **31769-5**
1 in (25 mm) long .....Type **31769-1**

E **Angle Adapter Kit** of 10 stainless steel clamps to mount waveguide hangers to angle members up to 7/8" (22 mm) thick .....Type **31768A**

Angle Adapter, Galvanized, kit of 10. For mounting cable 1/2" to 2-1/4" cable hangers to angle tower members up to 3/4" (19mm) thick. Includes hanger attachment hardware.
3/8" Hardware .....Type **242774**
Metric Hardware .....Type **242774-M**

F **Round Member Adapter Kit** of 10 stainless steel clamps to mount hangers to round support members. Two kits are required for use with each EW17 and EW20 hanger kit. One kit is required for all other sizes.

Member Diameter, in (mm)	Type Number
1 - 2 (25 - 50)	**31670-1**
2 - 3 (50 - 75)	**31670-2**
3 - 4 (75 - 100)	**31670-3**
4 - 5 (100 - 125)	**31670-4**
5 - 6 (125 - 150)	**31670-5**

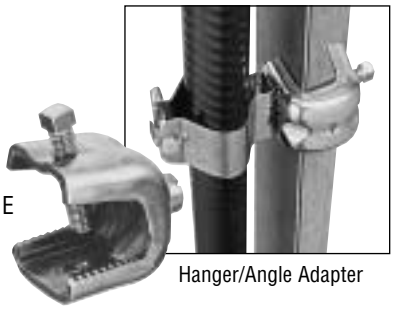
G **45° Adapter Kit** of 10. Use with angle adapter and threaded rod support kit to place a hanger at a waveguide bend. Galvanized steel .....Type **42334**

H **Threaded Rod Support Kit**. Stainless steel. Use to mount hangers away from supporting structure, under waveguide bridge, inside equipment room and to restrain waveguide bends. Includes 3/8 inch diameter threaded rod, nuts and washers. Attach to ceiling using included ceiling mounting bracket. Attach to angle tower members with 31768A angle adapters. Attach to round tower members with 30848 series tower standoffs.

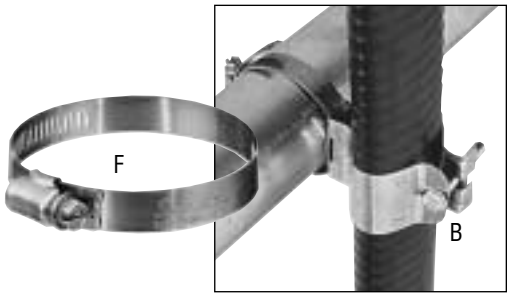
	Kit of 1	Kit of 5
12 inch (305 mm) rod	**31771**	**31771-4**
24 inch (610 mm) rod	**31771-9**	**31771-6**

I **Tower Standoff Kit** of 10 adapters with round member clamps and 3/8 inch hardware. Provides clearance for tower leg flanges.

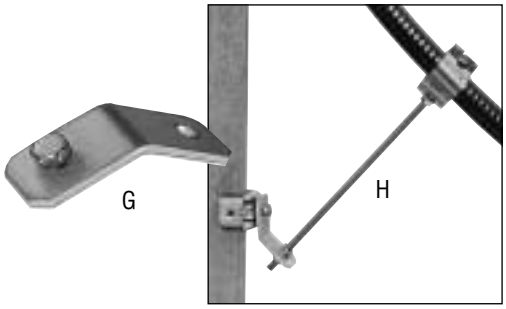
Member Diameter in (mm)	1 in (25 mm) Standoff	2.5 in (60 mm) Standoff
0.75 - 1.5 (20 - 40)	**30848-5**	–
1.5 - 3.0 (40 - 75)	**30848-4**	–
3 - 4 (75 - 100)	**30848-1**	**41108A-1**
4 - 5 (100 - 125)	**30848-2**	**41108A-2**
5 - 6 (125 - 150)	**30848-3**	**41108A-3**



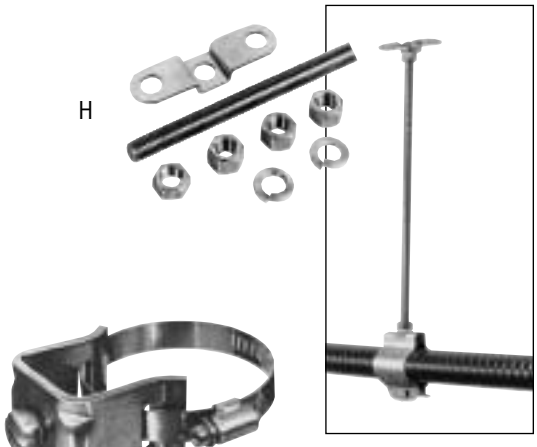
Hanger/Angle Adapter

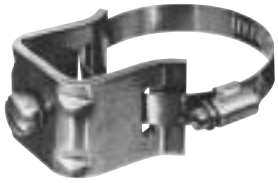


Hanger/Round Member Adapter



Hanger/45° Adapter Threaded Rod Support Kit





Hanger/Threaded Rod Support Kit

Hanger Spacing
for HELIAX® Elliptical Waveguide

Recommended maximum hanger spacings are tabulated below for various wind speed and ice conditions. The recommendations are based on guidelines stated in EIA Standard RS-222 and new wind tunnel and vibration tests. They supersede those in previous Andrew catalogs.

Installations in Typical Climates. Use the 125 mph (200 km/h), 1/2" ice conditions, highlighted in red in the table.

Severe or Mild Climates. Use the wind speed and ice conditions that most closely approximate the expected worst case conditions for the local climate.

Recommended Maximum Hanger Spacing – Standard Hangers, Outdoors for Various Wind Speed and Ice Conditions

Waveguide Type Number	Hanger Type Number	Recommended Maximum Hanger Spacing, feet (m)					
Wind Speed:			**85 mph (137 km/h)**			**100 mph (160 km/h)**	
Radial Ice:		**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**	**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**
EW17, EWP17	**31766A-9**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
EW20	**31766A-10**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
EW28	**31766A-11**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5.5 (1.68)
EW34, EWP34	**42396A-15**	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5.5 (1.68)	6 (1.83)
EW37, EWP37	**42396A-4**	6 (1.83)	6 (1.83)	5.5 (1.68)	5.5 (1.68)	5.5 (1.68)	5 (1.52)
EW43, EWP43	**42396A-16**	6 (1.83)	6 (1.83)	5.5 (1.68)	5 (1.52)	5 (1.52)	4.5 (1.37)
EW52, EWP52	**42396A-8**	5.5 (1.68)	5 (1.52)	4.5 (1.37)	4.5 (1.37)	4.5 (1.37)	4 (1.22)
EW63, EWP63	**42396A-7**	5 (1.52)	4.5 (1.37)	4 (1.22)	4 (1.22)	4 (1.22)	3.5 (1.07)
EW64, EWP64	**42396A-11**	5 (1.52)	5 (1.52)	4 (1.22)	4.5 (1.37)	4 (1.22)	3.5 (1.07)
EW77, EWP77	**42396A-1**	5 (1.52)	5 (1.52)	4 (1.22)	4.5 (1.37)	4 (1.22)	3.5 (1.07)
EW85	**42396A-5**	5.5 (1.68)	5 (1.52)	4 (1.22)	4.5 (1.37)	4 (1.22)	3.5 (1.07)
EW90, EWP90	**42396A-5**	5.5 (1.68)	4.5 (1.37)	4 (1.22)	4.5 (1.37)	4 (1.22)	3 (0.91)
EW127A, EWP127A	**42396A-9**	5.5 (1.68)	4.5 (1.37)	3.5 (1.07)	4.5 (1.37)	4 (1.22)	3 (0.91)
EW132, EWP132	**42396A-9**	5.5 (1.68)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
EW180, EWP180	**43211A**	6 (1.83)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
EW220	**43211A**	6 (1.83)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
EW240	**43211A**	6 (1.83)	4.5 (1.37)	3.5 (1.07)	5 (1.52)	4 (1.22)	3 (0.91)
Wind Speed:			**125 mph (200 km/h)**			**150 mph (240 km/h)**	
Radial Ice:		**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**	**No Ice**	**1/2 in (13 mm)**	**1 in (25 mm)**
EW17, EWP17	**31766A-9**	6 (1.83)	**6 (1.83)**	5.5 (1.68)	5 (1.52)	5 (1.52)	4.5 (1.37)
EW20	**31766A-10**	5.5 (1.68)	**5.5 (1.68)**	5 (1.52)	4.5 (1.37)	4.5 (1.37)	4 (1.22)
EW28	**31766A-11**	5 (1.52)	**5 (1.52)**	4.5 (1.37)	4 (1.22)	4 (1.22)	3.5 (1.07)
EW34, EWP34	**42396A-15**	4.5 (1.37)	**4.5 (1.37)**	4 (1.22)	4 (1.22)	3.5 (1.07)	4 (1.22)
EW37, EWP37	**42396A-4**	4.5 (1.37)	**4.5 (1.37)**	4 (1.22)	3.5 (1.07)	3.5 (1.07)	3 (0.91)
EW43, EWP43	**42396A-16**	4 (1.22)	**4 (1.22)**	3.5 (1.07)	3.5 (1.07)	3.5 (1.07)	3 (0.91)
EW52, EWP52	**42396A-8**	3.5 (1.07)	**3.5 (1.07)**	3 (0.91)	3 (0.91)	3 (0.91)	2.5 (0.76)
EW63, EWP63	**42396A-7**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	2.5 (0.76)	2.5 (0.76)	2 (0.61)
EW64, EWP64	**42396A-1**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW77, EWP77	**42396A-11**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW85	**42396A-5**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW90, EWP90	**42396A-5**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW127A, EWP127A	**42396A-9**	3.5 (1.07)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW132, EWP132	**42396A-9**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3 (0.91)	2.5 (0.76)	2 (0.61)
EW180, EWP180	**43211A**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3.5 (1.07)	2.5 (0.76)	2 (0.61)
EW220	**43211A**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3.5 (1.07)	2.5 (0.76)	2 (0.61)
EW240	**43211A**	4 (1.22)	**3 (0.91)**	2.5 (0.76)	3.5 (1.07)	2.5 (0.76)	2 (0.61)

Definitions and Assumptions

1. Per EIA-222 Standard:
   - Coefficient of drag for elliptical waveguide is 1.6 (average of 1.2 for cylindrical and 2.0 for flat members).
   - Ice forms completely around member (360 degrees).
   - Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simultaneously.
2. Wind speeds are maximum, which includes gust factors and exposure factors.

A well designed system uses grounding kits to provide a bond between the elliptical waveguide and the tower/earth ground system. One grounding kit is recommended at tower top, tower bottom, at 200 ft (60 m) intervals (where applicable), and at the entrance to the equipment shelter.

- Solid copper construction for high current handling capability, compatibility with copper cable outer conductors, and long life.
- Meet military standards at commercial prices.
- Provide certainty of continued operation.

Andrew 204989 and 241088 series solid copper grounding kits have passed United States Air Force lightning simulation tests and meet MIL-STD-188-124A. The non-braided solid copper construction of all Andrew grounding kits eliminates corrosion caused by moisture retention and "wicking". A heat-shrink tube, either factory or field installed, protects the cable terminal connection.

Easy Installation

Standard Grounding Kits (204989 and 241088 series) require few steps to install and include easy to follow instructions. Proper tensioning is ensured by an expansion section which provides visual indication that the strap is secured.

Grounding Cable Length Options. The kit with factory attached lug includes a 24 inch (610 mm) grounding cable. Two optional versions are offered with 36 inch (915 mm) grounding cables, field attachable grounding lugs and shrink jackets for custom fitting. One has a screw-on lug; the other has a crimp-on lug.

Grounding Lugs. Grounding Kits are now available with two grounding lug configurations. The 204989 series feature a one-hole lug. The 241088 series feature a two-hole lug. The hole spacing on the two-hole lug is 0.815 in (20.7 mm). All Andrew bus bars will accept both types of lugs.

Continued on next page

Grounding Kit Type Numbers

For Waveguide	With Factory Attached One-Hole Lug	With Factory Attached Two-Hole Lug	With Field Attachable One-Hole Crimp-On Lug	With Field Attachable Two-Hole Crimp-On Lug	With Field Attachable Screw-on Lug
Grounding Wire Length	**24"**	**24"**	**36"**	**36"**	**36"**
EW17, EWP17	**204989-6**	–	**204989-26**	–	**204989-36**
EW20	**204989-6**	–	**204989-26**	–	**204989-36**
EW28	**204989-5**	**241088-5**	**204989-25**	**241088-10**	**204989-35**
EW34, EWP34	**204989-5**	**241088-5**	**204989-25**	**241088-10**	**204989-35**
EW37, EWP37, EWP37S	**204989-5**	**241088-5**	**204989-25**	**241088-10**	**204989-35**
EW43, EWP43	**204989-10**	–	**204989-28**	–	**204989-34**
EW52, EWP52, EWP52S	**204989-4**	**241088-4**	**204989-24**	**241088-9**	**204989-34**
EW63, EWP63, EWP63S	**204989-4**	**241088-4**	**204989-24**	**241088-9**	**204989-34**
EW64, EWP64	**204989-3**	**241088-3**	**204989-23**	**241088-8**	**204989-33**
EW77, EWP77	**204989-3**	**241088-3**	**204989-23**	**241088-8**	**204989-33**
EW85	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW90, EWP90, EWP90S	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW127A, EWP127A	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW132, EWP132	**204989-2**	**241088-2**	**204989-22**	**241088-7**	**204989-32**
EW180, EWP180	**204989-1**	**241088-1**	**204989-21**	**241088-6**	**204989-31**
EW220	**204989-1**	**241088-1**	**204989-21**	**241088-6**	**204989-31**
EW240	**223158**	–	–	–	–

Grounding Kits / Flaring Tools

Kits Include

Standard Grounding Kits for Elliptical Waveguide. Series 204989 and 241088 kits include a solid copper strap riveted to the grounding wire, a coil tool for proper tightening, tower attachment hardware, and a two-part tape weatherproofing system. Field attachable, crimp-on grounding lugs require the use of a crimping tool (not included, described below).

Standard Grounding Kits for EW220 and Smaller Waveguide. Includes a solid copper strap, connection hardware, tower attachment hardware, and a two-part tape weatherproofing system .....Type **223158**

Lug and Wire Length Options for Standard Grounding Kits

Kits are available with either factory attached lugs or field attachable lugs. Field attachable lugs are either crimp-on or screw-on. One or two-hole lugs are available as indicated in the table.

Grounding wire length is 36 in (915 mm) for field attachable lugs and 24 or 36 in (610 or 915 mm) for factory attached lugs, as indicated in the table.

Crimping Tool. Used to attach crimp-on lugs for standard grounding kits. Not required for kits having factory-attached lugs or field-attachable screw-on lugs.....Type **207270**

Flaring Tool Kits*

New 2-in-1 Design

Kits for EW43, EW52, and EW63. Major and minor axis flaring tool combined into one unit.

Fast and Accurate Connector Attachment Compact Design

Small, lightweight and easy to use in crowded areas above radio bays. Can be easily carried to top of tower.

Reliable, Low VSWR Waveguide Flares Easy to Use

Consistent results with no special training. No tab flares to cut.

Saw Guide Included

Ensures proper cut-off length for flare.

Andrew flaring tool kits for HELIAX® elliptical waveguide consistently produce high accuracy waveguide flares for connector and splice installation.

The kits include one major and one minor axis flaring tool, a saw guide and a rugged carrying case.

Flaring tools are especially recommended for field installation of pre-tuned connectors on premium waveguide. They are required to achieve the stated VSWR specifications when using pre-tuned or fixed-tuned connectors on EWP90 and smaller premium waveguides.

The fast, two-step flaring technique forms the waveguide accurately every time. The tools are attached and the flare made without disturbing the connector assembly. The waveguide can be trimmed and the flare completed in three to five minutes.

Each tool makes contact with the waveguide just once. The precision with which the tools form the flare ensures a contact face that has not been shaved, compressed or work hardened.

*Patented United States 4,590,785

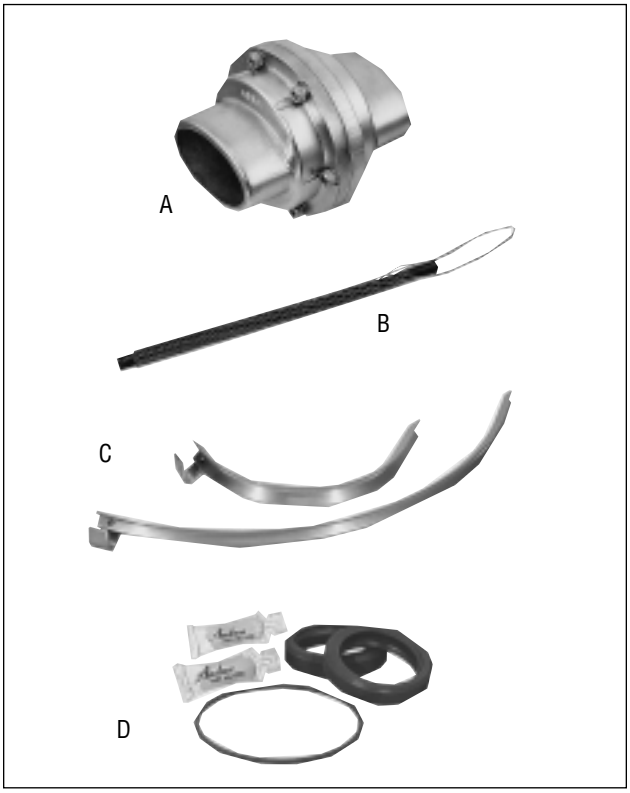
For Waveguide Types	Type Number
EW37, EWP37, EWP37S	**205869**
EW43, EWP43	**EWFTK-43**
EW52, EWP52, EWP52S	**EWFTK-52**
EW63, EWP63, EWP63S	**EWFTK-63**
EW64, EWP64	**202358**
EW77, EWP77	**202421**
EW90, EWP90, EWP90S	**204919**
EW127A, EWP127A	**204960**
EW132, EWP132	**203809**
EW180, EWP180	**201439**
EW220, EW240	**205127**

A Splice.

B Hoisting Grip used at 200 ft (60 m) intervals to raise waveguide on tower.

C Bending Tool Kit for elliptical waveguide installation. One each E- and H-plane form included.

D Connector Reattachment Kit includes rubber gasket parts (except flange gaskets) which may need replacing during removal and subsequent reattachment of connectors.

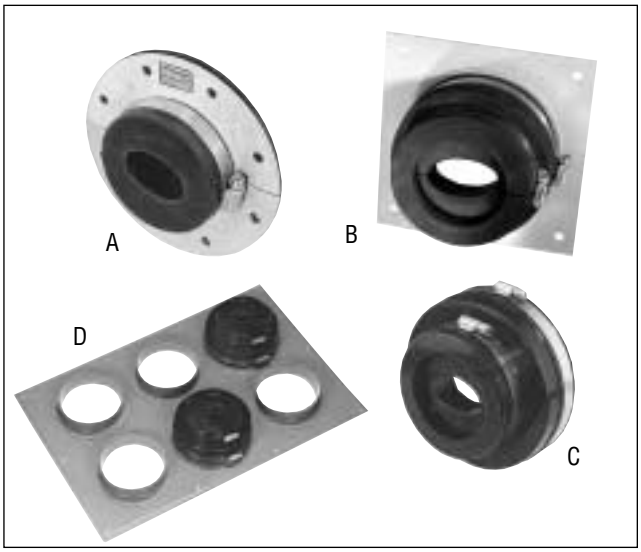


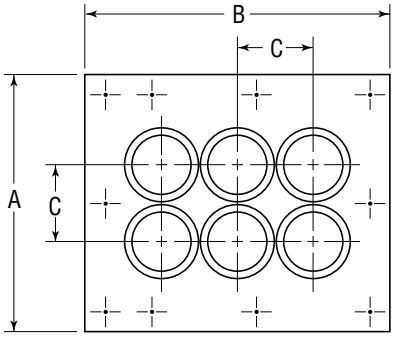
Accessories

For Waveguide Type Numbers	Splice	Hoisting Grip	Bending Tool Kit	Connector Reattachment Kit
EW17, EWP17	**117Z**	**34759**	**EWBTK-5**	**33544-10**
EW20	**120Z**	**34759**	**EWBTK-5**	**33544-11**
EW28	**128AZ**	**26985A**	**EWBTK-4**	–
EW34, EWP34	**134DZ**	**26985A**	**EWBTK-4**	**33544-43**
EW37, EWP37, EWP37S	**137DZ**	**31535**	**EWBTK-3**	**33544-24**
EW43, EWP43	**143Z**	**31535**	**EWBTK-3**	**33544-45**
EW52, EWP52, EWP52S	**152DZ**	**24312A**	**EWBTK-2**	**33544-38**
EW63, EWP63, EWP63S	**163DZ**	**24312A**	**EWBTK-2**	**33544-33**
EW64, EWP64	**164DZ**	**29961**	**EWBTK-2**	**33544-35**
EW77, EWP77	**177DZ**	**19256B**	**EWBTK-2**	**33544-34**
EW85	**185AZ**	**29958**	**EWBTK-2**	**33544-17**
EW90, EWP90, EWP90S	**190DZ**	**29958**	**EWBTK-1**	**33544-37**
EW127A, EWP127A	**1127DZ**	**29958**	**EWBTK-1**	**33544-41**
EW132, EWP132	**1132DZ**	**29958**	**EWBTK-1**	**33544-39**
EW180, EWP180	**1180DZ**	**43094**	**EWBTK-1**	**33544-42**
EW220	**1220DZ**	**43094**	**EWBTK-1**	**33544-44A**
EW240	**1240DZ**	**43094**	**EWBTK-1**	**33544-47**

Revised 12/00 & 5/01

Accessories





A Single Entrance Wall/Roof Feed-Thru Assembly. Includes rubber boot, clamp, and galvanized steel plate. Order from table below.

B Single Entrance Wall/Roof Feed-Thru Assembly for EW37-EW240. Includes rubber boot, clamps, and aluminum plate. Similar to D but Single Entry. Order from table below.

C Waveguide Boot for use with multiple entrance wall/roof feed-thru plate (Item D). Boot diameter of 4 in or 5 in (102 or 127 mm) is available to match plate. Order individually from table below.

D Multiple Entrance Wall/Roof Feed-thru Plate. (Aluminum) Use with waveguide boots (Item B). Order from table below.

D Multiple Entrance Wall/Roof Feed-Thru Plate

Type	Number of Openings	Dimen. A in (mm)	Dimen. B in (mm)	Dimen. C in (mm)
4 in (102 mm) Diameter Entry Opening				
204673-1	1	7 (178)	7 (178)	–
204673-2	1	5 (127)	5 (127)	–
204673-4	4	9.5 (241)	25.5 (648)	5.5 (140)
204673-8	8	17.5 (444)	25.5 (648)	5.5 (140)
5 in (127 mm) Diameter Entry Opening				
48940-1	1	9.5 (241)	9.5 (241)	–
48940-2	2	9.5 (241)	17.5 (444)	7 (178)
48940-3	3	9.5 (241)	25.5 (648)	7 (178)
48940-4	4	17.5 (444)	17.5 (444)	7 (178)
48940-6	6	17.5 (444)	25.5 (648)	7 (178)

C Waveguide Boots

For Waveguide Type Numbers	Waveguide Boots 4 in (102 mm) Diameter	Waveguide Boots 5 in (127 mm) Diameter
EW17, EWP17	–	–
EW20	–	–
EW28	–	–
EW34, EWP34	**204679-34**	**48939-34**
EW37, EWP37, EWP37S	**WGB4-37**	**WGB5-37**
EW43, EWP43	**WGB4-43**	**WGB5-43**
EW52, EWP52, EWP52S	**WGB4-52**	**WGB5-52**
EW63, EWP63, EWP63S	**WGB4-63**	**WGB5-63**
EW64, EWP64	**WGB4-64**	**WGB5-64**
EW77, EWP77	**WGB4-77**	**WGB5-77**
EW85	**WGB4-85**	**WGB5-85**
EW90, EWP90, EWP90S	**WGB4-90**	**WGB5-90**
EW127A, EWP127A	**WGB4-127**	**WGB5-122**
EW132, EWP132	**WGB4-132**	**WGB5-132**
EW180, EWP180	**WGB4-180**	**WGB5-180**
EW220	**WGB4-220**	**WGB5-220**
EW240	**WGB4-240**	**WGB5-240**

A, B Single Entrance Wall/Roof Feed-Thru Assemblies

For Waveguide Type Numbers	Single Entrance Wall/Roof Feed-Thru Assembly
EW17, EWP17	**35849A-10**
EW20	**35849A-9**
EW28	**35849A-13**
EW34, EWP34	**35849A-17**
EW37, EWP37, EWP37S	**245314-37**
EW43, EWP43	**245314-43**
EW52, EWP52, EWP52S	**245314-52**
EW63, EWP63, EWP63S	**245314-63**
EW64, EWP64	**245314-64**
EW77, EWP77	**245314-77**
EW85	**245314-85**
EW90, EWP90, EWP90S	**245314-90**
EW127A, EWP127A	**245314-127A**
EW132, EWP132	**245314-132**
EW180, EWP180	**245314-180**
EW220	**245314-220**
EW240	**245314-240**

The Andrew hybrid T reflectometer is a unique and highly directive test component useful for measuring return loss or VSWR in waveguide systems. The reflectometer utilizes a precision hybrid T junction to separate the incident and reflected waves at the input of the system under test.

In addition to the reflectometer, a signal generator and equipment to detect and display return loss or VSWR are necessary. For information on operation of the Andrew hybrid T reflectometer, request Bulletin 37260.

To order, specify Type Number from the table. A calibration load, a termination load and carrying case are included.

Elliptical Waveguide Sliding Load. Spear type termination load used at far end of bulk reels to terminate waveguide without attaching a connector and calibration load.

Elliptical Waveguide Sliding Loads

Waveguide Type	Type No.	Frequency Band, GHz	VSWR, Max. (R.L., dB)
EW37	**40502-37**	3.4-4.2	1.052 (32)
EW44	**40502-44**	4.4-5.0	1.02 (40)
EW52	**40502-52**	5.925-6.425	1.02 (40)
EW63	**40502-63**	6.425-7.125	1.02 (40)
EW90	**40502-90**	10.5-11.7)	1.02 (40)

Rectangular Waveguide Components

Long Life, Maximum Performance

High conductivity copper or 90/10 bronze construction, chemically cleaned and coated to prevent corrosion.

Wide Selection

Broad range of components and flanges simplifies system planning. All elements are designed to work together, maximizing system performance.

Custom Components

All custom components are available for quick delivery. To order these components you can:

- *Use the information on pages 203 to 206 to construct a type number for ordering*
- *Use our ezGuide™ software to construct a type number for ordering*
- *Call Andrew and describe your requirements*

Andrew custom components can accommodate almost any flange and length combination. Please note that each component is custom made to meet your specific requirements and is not returnable. Use our ezGuide™ software for correct ordering.

Finish. All Andrew stocked rigid rectangular components are now supplied unpainted (natural), painted components are available as an option. Every component is chemically cleaned and coated for corrosion resistance.

Standard and Low VSWR Waveguides. Andrew offers rectangular waveguides for standard and low VSWR applications. Standard waveguide components cover the entire recommended frequency ranges, while low VSWR components are generally only available over narrow frequency ranges.The Size and Frequency Codes table on page 204 gives details of standard frequency ranges, and commonly requested low VSWR details. Other low VSWR frequency ranges are available on request. Attenuation curves for rectangular waveguide are presented on pages 230 and 231.

ezGuide™ Software

For Rectangular Waveguide Components

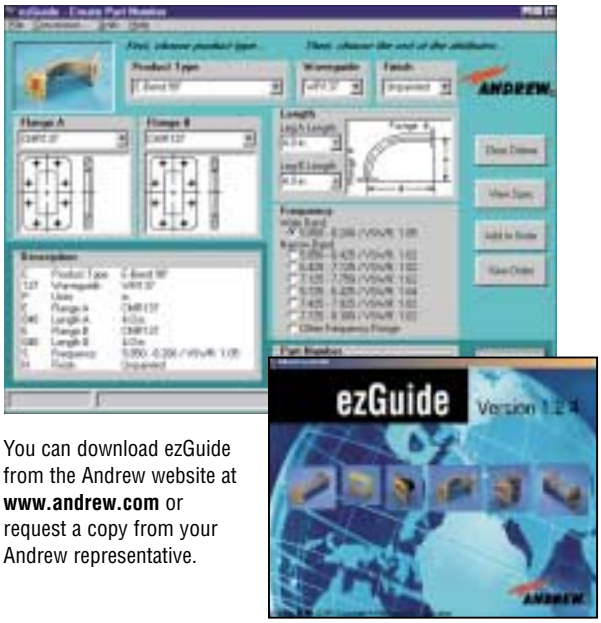
Rectangular waveguide components are an integral part of any transmission line system for private microwave, cellular, and PCS/PCN installations.

Andrew offers self-directed ezGuide software to simplify the designing and ordering of rectangular waveguide components to meet the requirements of a transmission line system.

This functional type numbering system uses Windows®-based software which guides the design and ordering process. The exact component type, waveguide size, flange types, component dimensions, operating frequency band, and finish can be specified with point-and-click options. Each product is pictured on your screen and diagrammed for your reference.

Each rectangular waveguide component and its flanges are identified by a type number that is automatically created as you specify how each section should be configured.

Windows is a registered trademark of Microsoft Corporation.



You can download ezGuide from the Andrew website at **www.andrew.com** or request a copy from your Andrew representative.

The ezGuide™ Numbering System identifies each custom component with alphanumeric codes that provide detailed ordering information for that component. The type number describes the component, waveguide size, flanges, and where applicable, the units of measure used, dimensions, frequency, and finish.

ezGuide Numbering System Example:

R	062	P	A	0240	B	S	N
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

1 **Component Code**. A one letter code that identifies the component type. See Table 1.

2 **Waveguide Size Code**. A three number code that identifies the waveguide size. Use Table 2 (page 204) to identify the code for your waveguide size. For taper transition sections, refer to the Taper Transition Size Codes table (page 208) for the waveguide-to-waveguide size code.

3 **Units of Measure**. A one letter code that identifies the units of measure used. Use P for imperial (inches) or M for metric (millimeters).

4 **Flange Code 1**. A one letter code that identifies the first flange. Flange Code 1 and Flange Code 2 must be sequenced alphabetically (except for taper transition sections, see below). Use Table 3 (page 204) to determine the appropriate flange code for your application.

5 **Dimension 1.** A customer-specified numeric code that indicates the length of the component in the unit of measure specified previously (imperial or metric). Bends require three numbers, flex-twist and straight sections require four numbers. See page 204.

6 **Flange Code 2**. A one letter code that identifies the second flange. Flange Code 1 and Flange Code 2 must be sequenced alphabetically (except for tapered transition sections, see below). Use Table 3 (page 204) to determine the appropriate flange code for your application.

7 **Frequency Code**. A one letter code that identifies the frequency specification. See Table 2 (page 204).

8 **Finish**. A one letter code that indicates the finish choice. Use N for unpainted or G for gray.

In the example at left, **R062PA0240BSN** is:

1 a straight section

2 waveguide size WR62

3 Imperial measurement (inches)

4 UG-Choke flange on one end

5 24 inches long

6 UG-Cover flange on other end

7 12.40 - 18.0 GHz band

8 unpainted finish

Table 1
Overview of ezGuide Numbering System Codes

Component Name	Component Code (1 alpha)	Waveguide Size Code (3 numeric)	Units of Measure (1 alpha)	Flange 1 Code (1 alpha)	Dimension 1 Code (3 or 4 numeric)*	Flange 2 Code (1 alpha)	Dimension 2 Code (3 or 4 numeric)*	Frequency Code (1 alpha)	Finish Code (1 alpha)	Required Characters
Straight Section	R	Table 2	P or M	Table 3	Customer specified	Table 3	–	Table 2	N or G	13
90° E Plane Swept Bend	E	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
90° H Plane Swept Bend	H	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
90° H Plane Miter Bend	M	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
90° E Plane Miter Bend	N	Table 2	P or M	Table 3	Customer specified	Table 3	Customer specified	Table 2	N or G	15
Flexible Twist	F	Table 2	P or M	Table 3	Customer specified	Table 3	–	Table 2	–	12
90° Rigid Twist	D	Table 2	–	Table 3	–	Table 3	–	Table 2	N or G	8
Taper Transition	T	page 208	–	Table 3	–	Table 3	–	–	N or G	7
Flange Adapter	A	Table 2	–	Table 3	–	Table 3	–	–	N or G	7
Waveguide/Coax Transition	C	Table 2	–	Table 3	–	S or N**	–	Table 2	G only	8

* Bends require 3 numbers, flex-twist and straight sections require 4 numbers. See pages 207-208.
** Use S for SMA female or N for N-type female.

Flange Codes

For straight sections, flex-twists, E and H-plane bends, twists, and flange adapters, enter the flange codes in alphabetical order (for example, F042P**A**0240**B**).

For taper transitions, the flange code sequence is not entered alphabetically. The first flange following the waveguide size code is the smaller of the two waveguide sizes.

For asymmetric bends, specify the correct leg length/flange combination. The flange specified first (flange 1) is attached to the leg length specified first (dimension 1).

Dimensions

Straight sections and flex-twists require four characters. All four characters must be used, including leading zeros, if necessary. For imperial (inch) dimensions, the code is made up of three characters to the left of the decimal point and one character to the right. 24 inches is denoted 0240. Flex-twist sections are only available in whole inch increments. For metric dimensions, enter the length in millimeters. 600 millimeters is denoted 0600.

Bends require three characters. All three characters must be used, including leading zeroes, if necessary. For imperial (inch) dimensions, the code is made up of two characters to the left of the decimal point and one character to the right. 5.0 inches is denoted 050. For metric dimensions, enter the length in millimeters. 75 millimeters is denoted 075.

Table 2
Size and Frequency Codes

EIA	RCSC	IEC	Waveguide Size Code	Frequency Code	Frequency (GHz)
WR28	WG22	R320	028	S	26.50 - 40.00
				A	37.00 - 40.00
WR42	WG20	R220	042	S	17.70 - 26.50
WR51	WG19	R180	051	S	15.00 - 22.00
WR62	WG18	R140	062	S	12.40 - 18.00
WR75	WG17	R120	075	S	10.00 - 15.00
WR90	WG16	R100	090	S	8.20 - 12.4
				A	10.2 - 10.7
				B	10.7 - 11.7
WR112	WG15	R84	112	S	7.050 - 10.00
				A	7.125 - 7.750
				B	7.725 - 8.500
				C	7.125 - 8.500
WR137	WG14	R70	137	S	5.850 - 8.200
				A	5.850 - 6.425
				B	6.425 - 7.125
				C	7.125 - 7.750
				D	5.725 - 6.425
				E	7.425 - 7.925
				F	7.725 - 8.300
				G	5.600 - 6.200
WR159	WG13	R58	159	S	4.900 - 7.050
				A	5.725 - 6.425
WR187	WG12	R48	187	S	3.95 - 5.85
				A	4.40 - 5.00
WR229	WG11	R40	229	S	3.30 - 4.90
				A	3.54 - 4.20

Table 3
Flange Codes, Descriptions and Availability

Code	Flange Type *	Description	Available for Waveguide Size Codes
A	UG-Choke	Tapped Holes, Gasket Groove, Choke Groove, Square Flange	028, 042, 062, 075, 090, 112
A	UG-Choke	Tapped Holes, Gasket Groove, Choke Groove, Circular Flange	137, 187
B	UG-Cover	Through Holes, No Gasket or Choke Grooves, Square Flange	028, 042, 062, 075, 090, 112
B	UG-Cover	Through Holes, No Gasket or Choke Grooves, Circular Flange	137, 187
C	CPR( )G	Through Holes, Gasket Groove, Rectangular Flange	090, 112, 137, 159, 187, 229
D	CPR( )F	Through Holes, No Gasket Groove, Rectangular Flange	090, 112, 137, 159, 187, 229
E	CMR	Alternate Tapped Holes, No Gasket Groove, Rectangular Flange	090, 112, 137, 159 , 187
F	CMR Through	All Through Holes, No gasket groove, Rectangular Flange	137
G	CMR Tapped	All Tapped Holes, No gasket Groove, Rectangular Flange	137
H	PDR	Through Holes, Gasket Groove, Rectangular Flange	051, 062, 075, 090, 112, 137, 187, 229
K	PBR	Through Holes, Gasket Groove, No Choke, Square Flange	028, 042, 062, 075, 090, 112
L	UDR	Through Holes, No Gasket Groove, Rectangular Flange	062, 075, 090, 137, 112, 187
M	UBR	Through Holes, No Gasket Groove, No Choke, Square Flange	028, 042, 062, 075, 112
P	PAR	Through Holes, Gasket Groove, No Choke, Circular Flange	137, 187
–	CBR	Through Holes, Gasket Groove, Choke Groove, Square Flange	On Request
–	BRJ		On Request
T	UER	Through Holes, No Gasket Groove, Rectangular Flange	137
–	UAR	Through Holes, No Gasket Groove, Circular Flange	On Request
Y	UG Cover/Gasket	Through Holes, Gasket Groove, No Choke, Square Flange	028, 042, 062, 075, 090, 112
Y	UG Cover/Gasket	Through Holes, Gasket Groove, No Choke, Circular Flange	137, 187

* All other flange options on request, if you have a requirement, not listed, please contact your Andrew representative.

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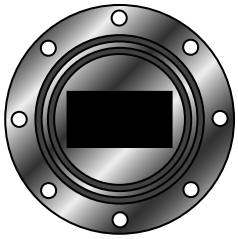
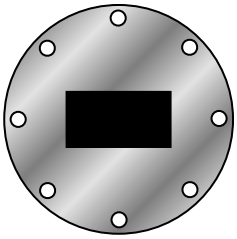
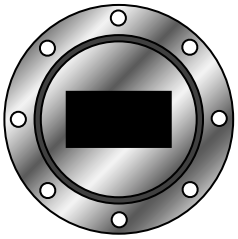
Revised 5/01



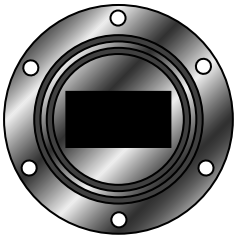
UG-148C/U, UG-54B/U



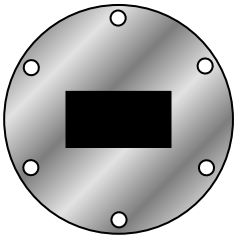
UG-149A/U, UG-53/U*



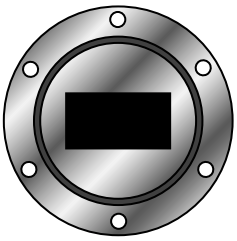
Pressure Cover 187



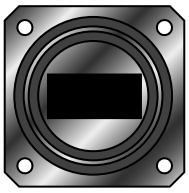
UG-343B/U



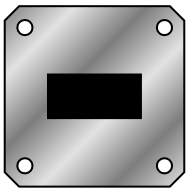
UG-344/U



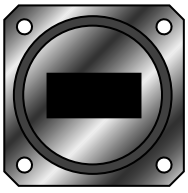
Pressure Cover 137



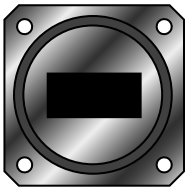
UG-52B/U, UG-40B/U
WR75 Choke
UG-541A/U
UG-596A/U



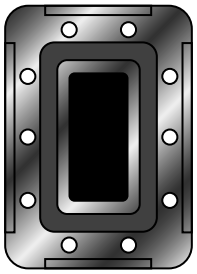
UG-51/U, UG-39/U
WR75 Cover
UG-419/U
UG-595/U



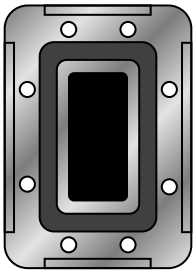
Pressure Cover 28,
42, 62, 75, 90, 112



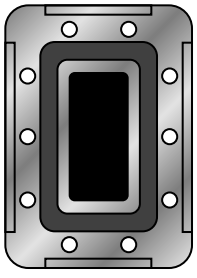
PBR84, PBR100
PBR120, PBR140
PBR220, PBR320



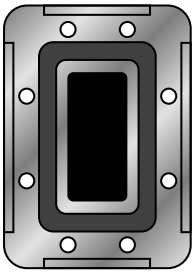
CPR229G



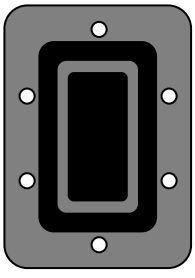
CPR187G, CPR159G
CPR137G, CPR112G
CPR90G



PDR40



PDR40, PDR70
PDR84, PDR100



PDR120, PDR140
PDR180

Creating Type Numbers
for Custom Components

The examples below describe ezGuide™ Numbering for each custom component:

Flex Twist Ordering Information - F137PC0360CS (11 characters in product code)

Product Code	Waveguide Size	Measurement P = Inches M = Millimeters	Flange A Code	Length	Flange B Code	Frequency Code
F	**137**	**P**	**C**	**0360**	**C**	**S**

Description: Flex Twist, WR137, Measurement in Inches, Flange A is a CPR137G, Length is 36 inches, Flange B is a CPR137G, Frequency of 5.850-8.200 GHz.

Straight Section Ordering Information - R112MH0600HSN (13 characters in product code)

Product Code	Waveguide Size	Measurement P = Inches M = Millimeters	Flange A Code	Length	Flange B Code	Frequency Code	Finish Code
R	**112**	**M**	**H**	**0600**	**H**	**S**	**N**

Description: Straight Section, WR112, Measurement in Millimeters, Flange A is a PDR112, Length is 600 Millimeters, Flange B is a PDR112, Frequency of 7.050-10.00 GHz, Natural (unpainted) finish.

90° Swept and Miter Bend Ordering Information - H090PC036C036SN (15 characters in product code)

Product Code	Waveguide Size	Measurement P = Inches M = Millimeters	Flange A Code	Leg Length A	Flange B Code	Leg Length B	Frequency Code	Finish Code
H	**090**	**P**	**C**	**036**	**C**	**036**	**S**	**N**

Description: 90° H-Bend, WR90, Measurement in Inches, Flange A is a CPR90G, Leg Length A is 3.6 Inches, Flange B is a CPR90G, Leg Length B is 3.6 Inches, frequency of 8.20-12.40 GHz, Natural (unpainted) finish.

90° Rigid Twist Section Ordering Information - D159CAEAG (8 characters in product code)

Product Code	Waveguide Size	Flange A Code	Flange B Code	Frequency Code	Finish Code
D	**159**	**C**	**E**	**A**	**G**

Description: 90° Rigid Twist Section, WR159, Flange A is a CPR159G, Flange B is a CMR159, Frequency of 5.725-6.425 GHz, Gray (painted) finish.

Tapered Transition Ordering Information -T137DCN (7 characters in product code)

Product Code	Waveguide Size	WR137 Flange	WR159 Flange	Finish Code
T	**137**	**D**	**C**	**N**

Description: Tapered Transition section, transitioning from WR137 to WR159, WR137 Flange is a CPR137F, WR159 Flange is a CPR159G, Natural (unpainted) finish.

Flange Adapter Ordering Information - A075AHN (7 characters in product code)

Product Code	Waveguide Size	Flange A Code	Flange B Code	Finish Code
A	**075**	**A**	**H**	**N**

Description: Flange Adapter, WR75, UG Choke Flange to a PDR120 Flange, Natural (unpainted) finish.

Waveguide to Coax Transition Ordering Information - C062H5SG (8 characters in product code)

Product Code	Waveguide Size	Waveguide Flange	Coax Flange	Frequency Code	Finish Code
C	**062**	**H**	**S**	**S**	**G**

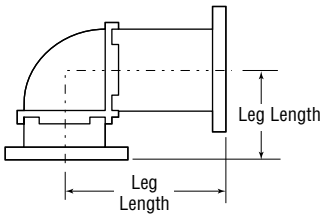
Description: Waveguide to Coax Transition Section, Waveguide flange is a PDR140, Coax flange is an SMA Female, Frequency of 12.4-18.00 GHz, Gray (painted) finish.

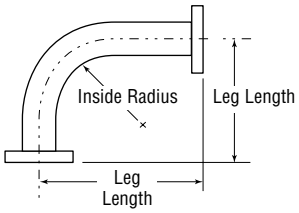
Straight Sections are offered in lengths up to 10 feet (3.1 meters).

90° E Bends, 90° H Bends , and Rigid Twist Sections are available with custom leg lengths and the following flange combinations: CPR( )G/CPR( )G, UG Choke/UG Cover, PDR/PDR, and PBR/PBR. See page 211.

Taper Transitions have VSWR 1.05 and fixed length of 6" (152 mm).

Flex-twist Sections include brass flanges chemically cleaned and coated for corrosion resistance. Each section is jacketed with rugged black Neoprene, UV stabilized for outdoor use. The silver plated wound brass core assures highest flexibility and low attenuation.





90° E-Plane Elbow

CPR137G Flanges Shown

90° H-Plane Elbow

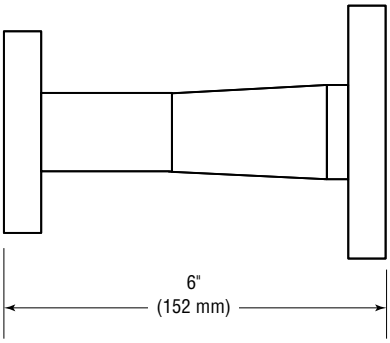
CPR137G Flanges Shown

Straight Sections, H and E Plane Bends and Twists

EIA	RCSC	IEC	Operating Frequency Twists (GHz)	Length	VSWR	Straight Sections VSWR	Swept H and E Plane Bends Std Leg Length	Radius E	Radius H	VSWR Swept Bends/ Miter Bends	Miter E and H-Plane Bends Min Leg Lengths** E-Plane	H-Plane
WR28	WG22	R320	26.50 - 40.00	4.00 (102)	1.30	1.30	2.0 (51)	0.75 (19)	0.75 (19)	1.30	*	*
			37.00 - 40.00		1.12	1.12				1.12	*	*
WR42	WG20	R220	17.70 - 26.50	3.00 (76)	1.05	1.05	2.3 (58)	1.0 (25)	1.0 (25)	1.05	*	*
WR51	WG19	R180	15.00 - 22.00	†	–	–	†	†	†	–	*	*
WR62	WG18	R140	12.40 - 18.00	5.00 (127)	1.05	1.05	2.6 (66)	1.50 (38)	1.50 (38)	1.05	1.1 (28)	1.4 (36)
WR75	WG17	R120	10.00 - 15.00	6.00 (152)	1.05	1.05	3.6 (91)	1.75 (44)	1.75 (44)	1.05	1.5 (38)	1.6 (41)
WR90	WG16	R100	8.20 - 12.4	8.00 (203)	1.05	1.05	3.6 (91)	1.75 (44)	1.75 (44)	1.05	1.5 (38)	1.8 (46)
			10.2 - 10.7		1.02	1.02				1.02		
			10.7 - 11.7		1.02	1.02				1.02		
WR112	WG15	R84	7.050 - 10.00	10.00 (254)	1.05	1.05	4.0 (102)	2.68 (68)	2.68 (68)	1.05	1.6 (41)	2.00 (52)
			7.125 - 7.750		1.02	1.02				1.02		
			7.750 - 8.500		1.02	1.02				1.02		
			7.125 - 8.500		1.02	1.02				1.02		
WR137	WG14	R70	5.850 - 8.200	12.00 (305)	1.05	1.05	4.0 (102)	2.62 (67)	2.62 (67)	1.05	1.8 (46)	2.3 (58)
			5.850 - 6.425		1.02	1.02				1.02		
			6.425 - 7.125		1.02	1.02				1.02		
			7.125 - 7.750		1.02	1.02				1.02		
			5.725 - 6.425		1.02	1.02				1.02		
			7.425 - 7.925		1.02	1.02				1.02		
WR159	WG13	R58	4.900 - 7.050	12.00 (305)	1.05	1.05	7.0 (178)	3.25 (83)	3.25 (83)	1.05	2.0 (52)	2.5 (64)
			5.725 - 6.425		1.02	1.02				1.02		
WR187	WG12	R48	3.95 - 5.85	12.00 (305)	1.05	1.05	7.0 (178)	5.0 (127)	5.0 (127)	1.05	2.3 (58)	2.6 (67)
			4.40 - 5.00		1.02	1.02				1.02		
WR229	WG11	R40	3.30 - 4.90	18.00 (457)	1.05	1.05	7.8(198)	6.0 (152)	6.0 (152)	1.05	2.5 (64)	3.0 (76)
			3.54 - 4.20		1.02	1.02				1.02		

* Not available. ** Maximum Leg Length 24" (610 mm) for all waveguide sizes, for either Swept or Miter bends. † Available on request.

Taper Transitions



Flange	Flange	Type Number
CPR159G	CPR137G	**T137CCN**
CPR159G	UG Cover/Gasket (WR137)	**T137YCN**
CMR159	CMR137	**T137EEN**
CMR159	CPR137G	**T137CEN**
CPR137G	CPR112G	**T112CCN**
CPR137G	UG Cover/Gasket (WR112)	**T112YCN**
UG Cover/Gasket (WR137)	UG Cover/Gasket (WR112)	**T112YYN**
UG Cover/Gasket (WR112)	UG Cover/Gasket (WR90)	**T090YYN**
CPR90G	UG Cover/Gasket (WR75)	**T075YCN**
UG Cover/Gasket (WR90)	UG Cover/Gasket (WR75)	**T075YYN**

Taper Transition Size Codes

EIA	RCSC	IEC	Size Code	Frequency (GHz)	Type Number*
WR42 to WR51	WG20 to WG19	R220 to R180	042	17.70 - 20.00	**T042** (WR42 flange) (WR51 flange) (Finish)
WR51 to WR62	WG19 to WG18	R180 to R140	051	15.00 - 18.00	**T051** (WR51 flange) (WR62 flange) (Finish)
WR62 to WR75	WG18 to WG17	R140 to R120	062	12.40 - 15.00	**T062** (WR62 flange) (WR75 flange) (Finish)
WR75 to WR90	WG17 to WG16	R120 to R100	075	10.00 - 12.40	**T075** (WR75 flange) (WR90 flange) (Finish)
WR90 to WR112	WG16 to WG15	R100 to R84	090	8.20 - 10.00	**T090** (WR90 flange) (WR112 flange) (Finish)
WR112 to WR137	WG15 to WG14	R84 to R70	112	7.05 - 8.20	**T112** (WR112 flange) (WR137 flange) (Finish)
WR137 to WR159	WG14 to WG13	R70 to R58	137	5.85 - 7.05	**T137** (WR137 flange) (WR159 flange) (Finish)
WR159 to WR187	WG13 to WG12	R58 to R48	159	4.90 - 5.85	**T159** (WR159 flange) (WR187flange) (Finish)
WR187 to WR229	WG12 to WG11	R48 to R40	187	3.95 - 4.90	**T187** (WR187 flange) (WR229 flange) (Finish)

* Insert flange code from Table 3, page 204 and the finish code: N for Natural (unpainted) or G for Gray (painted)

Flex-Twist Sections

EIA	RCSC	IEC	Frequency (GHz)	VSWR 12-36" (300-915 mm)	VSWR 36-48" (915-1200 mm)	Attenuation dB/ft (dB/m)	Average Power watts	Peak Power kW	Max Twist deg/ft (deg/m)	Min E-Bend Radius in (mm)	Min H-Bend Radius in (mm)	Pressure lb/in (kPa)
WR28	WG22	R320	26.50 - 40.00	On Request	On Request	1.00 (3.28)	75	20	155 (510)	1.5 (38)	3.0 (76)	45 (310)
			37.00 - 40.00	1.20	1.25	1.00 (3.28)	75	20	155 (510)	1.5 (38)	3.0 (76)	45 (310)
WR42	WG20	R220	17.70 - 26.50	1.25	1.35	0.80 (2.62)	100	39	155 (510)	1.5 (38)	3.0 (76)	45 (310)
WR51	WG19	R180	15.00 - 22.00	1.20	1.20	0.55 (1.80)	140	60	135 (445)	1.5 (38)	3.0 (76)	45 (310)
WR62	WG18	R140	12.40 - 18.00	1.10	1.20	0.30 (0.99)	400	100	135 (445)	2.0 (52)	4.0 (102)	45 (310)
WR75	WG17	R120	10.00 - 15.00	1.10	1.13	0.18 (0.59)	750	140	110 (360)	2.5 (64)	4.5 (115)	45 (310)
WR90	WG16	R100	8.20 - 12.4	1.10	1.13	0.13 (0.43)	960	180	95 (310)	2.5 (64)	5.0 (127)	45 (310)
			10.2 - 10.7	1.03	1.05							
			10.7 - 11.7	1.03	1.05							
WR112	WG15	R84	7.050 - 10.00	1.10	1.13	0.12 (0.40)	1,260	315	80 (264)	3.0 (76)	6.0 (152)	35 (240)
			7.125 - 7.750	1.03	1.05							
			7.750 - 8.500	1.03	1.05							
			7.125 - 8.500	1.04	1.05							
WR137	WG14	R70	5.850 - 8.200	1.10	1.10	0.09 (0.30)	2,000	500	65 (214)	4.0 (102)	8.0 (204)	30 (205)
			5.850 - 6.425	1.03	1.05							
			6.425 - 7.125	1.03	1.05							
			7.125 - 7.750	1.03	1.05							
			5.725 - 6.425	1.03	1.05							
			7.425 - 7.925	1.03	1.05							
WR159	WG13	R58	4.900 - 7.050	1.10	1.10	0.08 (2.63)	2,500	1,100	55 (180)	5.0 (127)	10.0 (254)	30 (205)
			5.725 - 6.425	1.03	1.05							
WR187	WG12	R48	3.95 - 5.85	1.10	1.10	0.05 (0.17)	3,000	1,250	50 (165)	6.5 (165)	13.0 (330)	30 (205)
			4.40 - 5.00	1.03	1.05							
WR229	WG11	R40	3.30 - 4.90	1.10	1.10	0.04 (0.13)	4,000	1,550	40 (132)	6.5 (165)	13.0 (330)	30 (205)
			3.54 - 4.20	1.03	1.05							

ANDREW®

Revised 5/01

Common Flange Adapters

Flange Type	FlangeType	Adapter Type Number
UG-51/U	CPR112G	**R112PB0040CSN**
UG-52B/U	CPR112G	**R112PA0040CSN**
UG Cover/Gasket	CPR137G	**R137PC0040YSN**
CMR90	CPR90G	**R090PC0040ESN**
CMR112	CPR112G	**R112PC0040ESN**
CMR137	CPR137G	**R137PC0040ESN**
CMR159	CPR159G	**R159PC0040ESN**
CMR187	CPR187G	**R187PC0040ESN**
CMR229	CPR229G	**R229PC0040ESN**

All above flange adapters have VSWR 1.05 (32.3 dB)

Transition to Type N Female

Flange Adapters are available in many commonly used configurations, and when used with standard components, provide a quick solution to almost any interconnection requirement. All Andrew standard flange adapters are 4 inches (102 mm) in length.

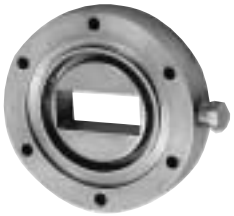
Waveguide to Coaxial Adapters. Other coaxial interfaces (for example, N-type male) are available. Where immediate availability is a consideration, you may choose to order the standard product and use a coaxial adapter to convert the interface. Other waveguide flange options are available on request.

Waveguide to Coaxial Adapters

						Waveguide to Coax Adapters	
EIA	RCSC	IEC	Size Code	Frequency Code	Frequency (GHz)	Type N VSWR	SMA VSWR
WR28	WG22	R320	028	S	26.50 - 40.00	**	**
				A	37.00 - 40.00	**	**
WR42	WG20	R220	042	S	17.70 - 26.50	**	1.35
WR51	WG19	R180	051	S	15.00 - 20.00	**	1.05
WR62	WG18	R140	062	S	12.40 - 18.00	1.25	1.25
WR75	WG17	R120	075	S	10.00 - 15.00	1.20	1.25
WR90	WG16	R100	090	S	8.20 - 12.4	1.20	On Request
				A	10.2 - 10.7	1.10	On Request
				B	10.7 - 11.7	1.10	On Request
WR112	WG15	R84	112	S	7.050 - 10.00	1.20	On Request
				A	7.125 - 7.750	1.10	On Request
				B	7.750 - 8.500	1.10	On Request
				C	7.125 - 8.500	1.15	On Request
WR137	WG14	R70	137	S	5.850 - 8.200	1.15	On Request
				A	5.850 - 6.425	1.10	On Request
				B	6.425 - 7.125	1.10	On Request
				C	7.125 - 7.750	1.10	On Request
				D	5.725 - 6.425	1.10	On Request
				E	7.425 - 7.925	1.10	On Request
WR159	WG13	R58	159	S	4.900 - 7.050	1.15	On Request
				A	5.725 - 6.425	1.10	On Request
WR187	WG12	R48	187	S	3.95 - 5.85	1.20	On Request
				A	4.40 - 5.00	1.10	On Request
WR229	WG11	R40	229	S	3.30 - 4.90	1.10	On Request

** The frequency range for these components is too high for normal operation of Type N or SMA coaxial interfaces.
Coaxial interface Codes: Type N Female (N), SMA Female (S).

Rectangular Waveguide Components

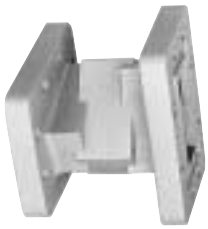


Pressure Inlet

Pressure Window

Field Flange

Silver Solder Flange



Premium 90º Step-Twist

Pressure Inlet is 0.62-1.00 inches (16-25 mm) thick, depending on waveguide size, machined brass section with 1/8" female pipe thread and plug. Unit does not have a pressure window.

Pressure Window. Maximum pressure for window is 10 lb/in^2 (70 kPa). Unit does not have a pressure inlet. High power versions for earth station applications are presented on page 212.

Thickness of standard pressure windows:

All except 55000A-42, -75, -90, -137, -187, 112587, 110088 .....0.06 in (1.5 mm)

55000A-75, -137, -187, 110088: ....0.229 in (5.8 mm)

55000A-42, 112587: .....0.375 in (9.5 mm)

Pressure Window/Inlet. Combination of above pressure window and pressure inlet.

Field Flanges are for field fabrication of waveguide sections for use on interior waveguide runs. Flange hardware and pressure gasket are included. Use soft solder to attach.

Silver Solder Flanges are manufactured to EIA or MIL specifications. The flanges are not intended for field installation. Hardware is not included. Material is brass.

Flange Gaskets and Hardware. Andrew waveguide components are supplied with hardware and flange sealing gasket. Waveguide components with identical or compatible flange (for example, choke and cover), are supplied with one flange hardware kit. If the flanges differ or are incompatible (for example, PDR and PBR), one hardware kit for each flange is supplied.

Andrew IEC hardware kits do not include shouldered bolts (according to IEC154-2), however the set screws provided allow these kits to be cost effective while minimizing flange misalignment VSWR. The quoted VSWR for all IEC flanged components for all Andrew waveguide components are achievable using the hardware kits supplied.

Premium 90° Step-Twist. Recommended for very high channel density systems. The Step-Twist can be used when space is limited.

Other Components with UG Choke/UG Cover, U.S. MIL Standard Flanges

Waveguide Size	**WR187**	**WR137**	**WR112**	**WR90**	**WR75**	**WR62**	**WR42**
Choke Flange	**UG-148C/U**	**UG-343B/U**	**UG-52B/U**	**UG-40B/U**	**WR75**	**UG-541A/U**	**UG-596A/U**
Cover Flange	**UG-149A/U**	**UG-344/U**	**UG-51/U**	**UG-39/U**	**WR75**	**UG-419/U**	**UG-595/U**
Pressure Inlet	**55675-187**	**55675-137**	**55675-112**	**55675-90**	**55675-75**	**55675-62**	**55675-42**
Pressure Window	**55000A-187**	**55000A-137**	**55000-112**	**55000A-90**	**55000A-75**	**55000-62**	**55000A-42**
Pressure Window / Inlet	**–**	**53648-137**	**–**	**53648-90**	**53648-75**	**–**	**53648-42**
Field Choke Flange	**53015-187**	**53015-137**	**53015-112**	**53015-90**	**53015-75**	**53015-62**	**53015-42**
Field Cover Flange	**53025-187**	**53025-137**	**53025-112**	**53025-90**	**53025-75**	**53025-62**	**53025-42**
Silver Solder Choke Flange	**52084**	**17690**	**52153**	**22534**	**51752**	**53238**	**53558**
Silver Solder Cover Flange	**52086-2**	**19048-3**	**52152-2**	**19056-2**	**51745-2**	**53239-2**	**53559-2**
Flange Hardware Kit	**55224-187**	**55224-137**	**55224-112**	**55224-90**	**55224-75**	**55224-62**	**55224-42**
Flange Gasket	**10683-307**	**10683-304**	**10683-305**	**10683-329**	**10683-312**	**10683-319**	**10683-328**

Other Components with PBR Series, IEC Standard Flanges

Waveguide Size	**R84**	**R100**	**R120**	**R140**	**R220**	**R320**
Both Flanges	**PBR84**	**PBR100**	**PBR120**	**PBR140**	**PBR220**	**PBR320**
Pressure Inlet	**–**	**–**	**243495-120**	**243495-140**	**243495-220**	**243495-320**
Pressure Window	**243498-84**	**243498-100**	**110088**	**110089**	**112587**	**112626**
Silver Solder Flange	**–**	**–**	**108671-2**	**110107**	**110037**	**110079**
Flange Hardware Kit	**100845-12**	**100845-13**	**100845-8**	**100845-11**	**106838**	**107031**
Flange Gasket	**114111**	**10683-75**	**10683-74**	**114110**	**10683-71**	**10683-451**

Other Components with CPR Series, EIA Standard Flanges

Waveguide Size	**WR229**	**WR187**	**WR159**	**WR137**	**WR112**	**WR90**
Both Flanges	**CPR229G**	**CPR187G**	**CPR159G**	**CPR137G**	**CPR112G**	**CPR90G**
90° Step Twist	**65230-229**	**–**	**65230-159**	**65230-137†**	**–**	**–**
Pressure Inlet	**55674-229**	**55674-187**	**55674-159**	**55674-137**	**55674-112**	**55674-90**
Pressure Window	**55001-229**	**55001-187**	**55001-159**	**55001-137**	**55001-112**	**55001-90**
Pressure Window/Inlet	**–**	**–**	**55463-159**	**55463-137**	**55463-112**	**55463-90**
Field Flange	**56045-229**	**56045-187**	**56045-159**	**56045-137**	**56045-112**	**56045-90**
Silver Solder Flange	**55456-1**	**56309-1**	**54754-1**	**62137-3**	**54560-1**	**54681-2**
Flange Hardware Kit	**55219-229**	**55219-187**	**55219-159**	**55219-137**	**55219-112**	**55219-90**
Full Thickness Flange Gasket	**31619**	**55688**	**54769**	**28030**	**32349**	**31861**
Half Thickness Gasket	**55072-229**	**55072-187**	**55072-159**	**55072-137**	**55072-112**	**55072-90**

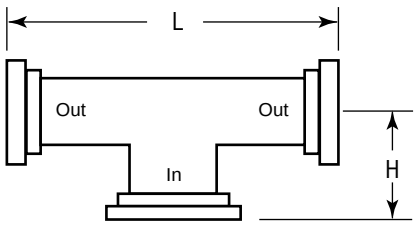
Other Components with PDR Series, IEC Standard Flanges

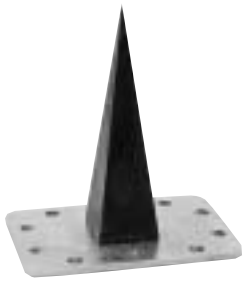
Waveguide Size	**R40**	**R48**	**R70**	**R84**	**R100**	**R120**	**R140**	**R180**
Both Flanges	**PDR40**	**PDR48**	**PDR70**	**PDR84**	**PDR100**	**PDR120**	**PDR140**	**PDR180**
Pressure Inlet	**114112-40**	**114112-48**	**114112-70**	**114112-84**	**114112-100**	**114112-120**	**114112-140**	**On Request**
Pressure Window	**223306-40**	**223306-48**	**223306-70**	**223306-84**	**223306-100**	**223306-120**	**223306-140**	**223306-180**
Silver Solder Flange	**110066**	**221715-48**	**221715-70**	**221715-84**	**221715-100**	**221715-120**	**221715-140**	**110181**
Flange Hardware Kit	**100899-5**	**107709**	**106803**	**100845-6**	**107132**	**100845-3**	**100845-7**	**107681**
Flange Gasket	**106945**	**107710**	**104246**	**107192**	**107144**	**106337**	**107206**	**107682**

† Specify 5.925-6.425, 6.425-7.125, or 7.125-7.750 GHz

High Power Components for Earth Station Applications

Waveguide Size	Frequency Band, GHz	Flex Twist and Flex (No Twist) 1 ft (0.3 m)	2 ft (0.6 m)	3 ft (0.9 m)	Pressure Window Type No.	Average Power watts	Flange Mates with	VSWR max. (R.L., dB)
Flex-Twist Section								
WR137	5.925-6.425	**162047-12**	**162047-24**	**162047-36**	–	2900	CRP137G	1.10 (26.4)
WR75	10.95-14.5	**163228-12**	**163228-24**	**163228-36**	–	1000	Cover and Cover/Gasket	1.10 (26.4)
Flex (No Twist) Section								
WR137	5.850-8.200	**162048-12**	**162048-24**	**162048-36**	–	4400	CPR137G	1.10 (26.4)
Pressure Window								
WR137	5.850-6.425	–	–	–	**202378**	1000	CPR137G	1.10 (26.4)
					202378-2	5000	CPR137G	1.10 (26.4)
WR159	5.850-6.425	–	–	–	**202378-5**	5000	CPR159G	1.10 (26.4)
WR75	14.0-14.5	–	–	–	**202378-3**	2000	Choke and cover	1.10 (26.4)
					202378-4	500	Choke and cover	1.10 (26.4)





Power Dividers have 1.03 maximum VSWR, within the operating band stated in the table below. Insertion loss is 3 ±0.25 dB for each port. Power divides from "In" port to "Out" ports. Refer to diagram. Power dividers cannot be used as combiners.

Standard Termination Loads for unused rectangular waveguide port of dual polarized microwave antennas. Maximum VSWR is 1.10. Low VSWR loads for use with circular waveguide transitions are listed on page 223. Flange blanking plates, and termination loads used with IEC flange types are available on request.

Two-Way Power Dividers

Waveguide Type	Frequency Band, GHz	Flanges Mate With	Dimensions in (mm) L	H	Type No.
WR75	12.7-13.2	WR75 Choke or Cover**	5.00 (127)	1.38 (33)	**62832-127**
WR137	5.925-6.425	UG-344/U, UG-343B/U**	5.00 (127)	1.69 (43)	**62835-59**
WR137	6.425-7.125	UG-344/U, UG-343B/U**	5.00 (127)	1.69 (43)	**62835-64**
WR137	6.425-7.125	CPR137G	5.00 (127)	1.69 (43)	**62844-64**

**Compatible cover/gasket flanges mate with either choke or cover flanges.

Standard Termination Loads

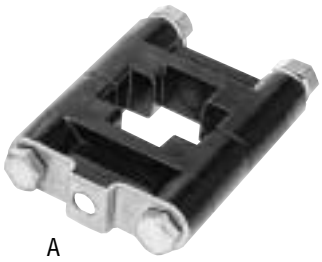
Mates with Flange Type	Load Type No.
CPR229G	**39099-229**
CPR187G	**39099-187**
UG-148C/U	**39098-187**
CPR159G	**39099-159**
CPR137G	**39099-137**
UG-343B/U	**39098-137**
CPR112G	**39099-112**
UG-52B/U	**39098-112**
CPR90G	**39099-90**
UG-40B/U	**39098-90**
WR75 Choke	**39098-75**
UG-596A/U	**39098-42**
7/8" EIA Flange	**43734**

Hangers. Hardware is stainless steel. Attach using angle adapter or threaded rod support kit described below.

A Rigid Hanger .....Type **19007-(*)**

A Sliding Hanger .....Type **19008-(*)**

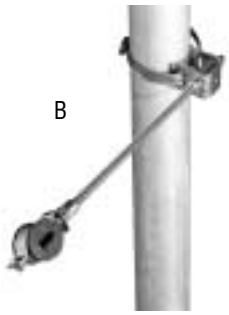
*Insert numeral portion of EIA waveguide designation, for example, 19007-137 is rigid hanger for WR137 waveguide.



A

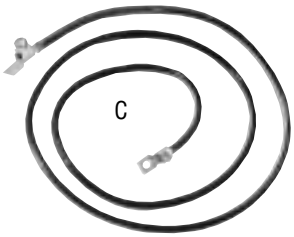
B **Flex-Twist Hanger Assembly**. Use to improve stability and protect flexible waveguide. Includes stainless steel clamp, rod, and form-it rubber grommet.

Waveguide	Type Number
WR28	**244106-320**
WR42	**244106-220**
WR62	**244106-140**
WR75	**244106-120**
WR90	**244106-100**
WR112	**244106-84**
WR137	**244106-70**
WR159	**244106-58**
WR187	**244106-48**
WR229	**244106-40**



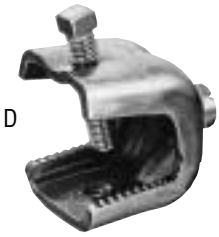
B

C **Current By-Pass Kit**. Five feet (1.5 m) of No. 6 copper wire and lugs to provide a low-loss current path around flexible waveguide sections .....Type **49486**



C

D **Angle Adapter Kit**. Includes 10 stainless steel clamps to mount hangers to angle support members up to 7/8 in (22 mm) thick.....Type **31768A**



D

E **Threaded Rod Support Kit**. Stainless steel. Use to mount hangers away from supporting structure, under waveguide bridge and inside equipment room. Includes 3/8" diameter threaded rod, nuts and washers. Attach to ceiling using included ceiling mounting plate.
12 in (305 mm) rod .....Type **31771**
12 in (305 mm) rod, kit of 5 .....Type **31771-4**
24 in (610 mm) rod .....Type **31771-9**
24 in (610 mm) rod, kit of 5 .....Type **31771-6**

E

Rectangular Waveguide Flanges

A majority of Andrew standard flanges utilized in North America are based on EIA (Electronic Industry Association) or U. S. Military (MIL) standards. IEC (International Electrotechnical Commission) standards are utilized throughout other parts of the world. EIA, MIL and IEC flanges are compatible but not identical. Variations in equivalent flanges include slight differences in nominal dimensions, tolerances, gasket style and thickness, and addition or deletion of alignment pins and holes or alignment bolts. Compatible flanges are listed in the tables on the following pages. The three basic types of flanges utilized throughout the industry are unpressurizable contact, pressurizable contact, and choke/cover flanges. It should be noted that these three flange types are not interchangeable.

Unpressurizable Contact Flanges

CMR and UER Series Contact Flanges are not pressurizable and do not require gaskets. CMR flanges are always rectangular in shape, have alternate tapped and clear holes and are secured with bolts only. The IEC equivalents have all clear holes and are secured with bolts, nuts and lock washers.

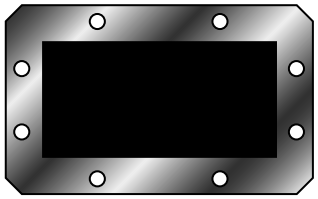


Figure 1
Unpressurizable Contact Flange – Always Rectangular

Unpressurizable Contact Flanges

Waveguide Type, EIA	Flange Series Equivalents EIA	IEC	Fig. No.	Dimensions, Inches (Millimeters)
WR90	CMR90	UER100	1	1.77 x 1.27 (45.0 x 32.3)
WR112	CMR112	UER84	1	2.02 x 1.38 (51.3 x 35.1)
WR137	CMR137	UER70	1	2.28 x 1.53 (57.9 x 38.9)
WR159	CMR159	UER58	1	2.50 x 1.75 (63.5 x 44.5)
WR187	CMR187	UER48	1	2.78 x 1.78 (70.6. x 45.2)
WR229	CMR229	UER40	1	3.16 x 2.00 (80.3 x 50.8)

Flange Availability

Flange Type	Waveguide Size										
	WR28	WR42	WR51	WR62	WR75	WR90	WR112	WR137	WR159	WR187	WR229
Choke	●	●		●	●	●	●	●		●	
Cover	●	●		●	●	●	●	●		●	
CPR( )G						●	●	●	●	●	●
CPR( )F						●	●	●	●	●	●
CMR						●	●	●	●	●	●
CMR Through								●			
CMR Tapped								●			
PDR		●	●	●	●	●	●	●	●	●	●
PBR	●	●		●	●	●	●				
UDR				●	●	●	●			●	
UBR	●	●	●	●	●	●	●				
PAR								●		●	
CBR	Available upon request										
BRJ	Available upon request										
UER								●			
UAR	Available upon request										
Cover/Gasket	●	●		●	●	●	●	●		●	

Choke, Cover and Cover/Gasket Flanges

Choke, cover and cover/gasket flanges are square or round, depending on waveguide size. U. S. MIL and IEC versions are interchangeable. The flanges are pressurizable and require gaskets to ensure proper sealing. The flanges mate as explained below and as specified in the Mating Information table.

Choke Flanges - CBR, CAR and Equivalent UG Series include a gasket groove, choke, and tapped holes for mating with cover flanges. Two choke flanges cannot be mated.

Cover Flanges - UBR, UAR and Equivalent UG Series are flat, without a gasket groove, and have clear holes for mating with choke flanges and other cover flanges. Use of a special seal is required for pressurization of two mating cover flanges.

Cover/Gasket Flanges - PBR and PAR Series are flat, include a gasket groove, and have clear holes for mating with cover, choke, or other cover/gasket flanges. Cover/gasket flanges use a single gasket when mated with cover flanges and a double gasket when mated with choke flanges or other cover/gasket flanges.

C-Series HELIAX® Elliptical Waveguide Connectors (for example, 252DCT) are functionally identical to PAR/PBR (cover gasket) series and the above mating information applies.


Figure 2

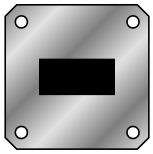


Figure 3

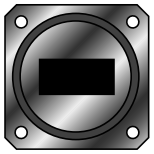


Figure 4

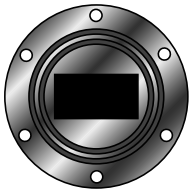


Figure 5

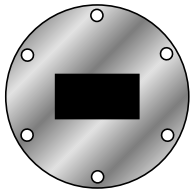


Figure 6

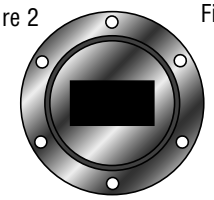


Figure 7

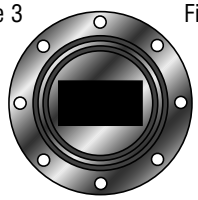


Figure 8

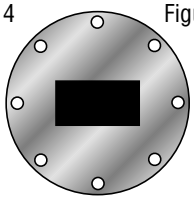


Figure 9

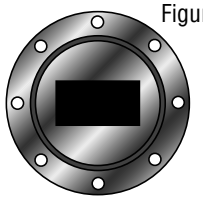


Figure 10

Choke, Cover and Cover/Gasket Flanges

Waveguide Type, EIA	Choke Flanges U.S. MIL	IEC	Fig No.	Cover Flanges U.S. MIL	IEC	Fig No.	Cover/Gasket Flanges IEC	Fig No.	Flange Dimensions Inches (Millimeters)
WR42	UG-596A/U	CRR220	2	UG-595/U	UBR220	3	PBR220	4	0.88 (22.4) sq.
WR62	UG-541A/U	CBR140	2	UG-419/U	UBR140	3	PBR140	4	1.31 (33.3) sq.
WR75	51752*	CBR120	2	51745*	UBR120	3	PBR120	4	1.50 (38.1) sq.
WR90	UG-40B/U	CBR100	2	UB-39/U	UBR100	3	PBR100	4	1.63 (41.4) sq.
WR112	UG-52B/U	CBR84	2	UG-51/U	UBR84	3	PBR84	4	1.88 (47.8) sq.
WR137	UG-343B/U	CAR70	5	UG-344/U	UAR70	6	PAR70	7	3.13 (79.5) dia.
WR159	–	CAR58	5	–	UAR58	6	PAR58	7	3.38 (85.9) dia.
WR187	UG-148C/U	CAR48	8	UG-149A/U	UAR48	9	PAR48	10	3.63 (92.2) dia.
WR284	UG-54B/U	CAR32	8**	UG-53/U	UAR32	9**	PAR32	10**	5.31 (134.9) dia.

*Andrew type numbers for WR75 flanges. **Bolt hole positions are rotated 22.5° from the positions shown.

CPR and PDR series contact flanges are rectangular in shape and have clear holes secured with bolts and nuts. The flanges are pressurizable and require gaskets to ensure proper sealing. The flanges mate as explained below and as specified in the Mating Information table.

CPR( )G Series include a gasket groove and mate with another CPR( )G using the supplied full thickness gasket and U. S. hardware.

PDR Series include a gasket groove and mate with another PDR using the supplied two gaskets and metric hardware. Compared with CPR( )G, PDR flanges have deeper gasket grooves and use different gaskets.

CPR( )F Series do not include a gasket groove and, when mated with another CPR( )F, require a special seal. CPR( )F mates with CPR( )G using a CPR half gasket (order separately from table below).

To Mate CPR( )G with PDR use one CPR half thickness gasket (order separately from table below) and the gasket supplied with the PDR flange. Except where noted otherwise in the table, either U.S. (CPR) or metric (PDR) hardware can be used. Small tolerance differences between U. S. and metric hardware to mate CPR/PDR flanges result in negligible VSWR contributions.

"E-Series" HELIAX Elliptical Waveguide Connectors (for example, 252DET) are functionally identical to CPR( )G series and the above mating information applies.

Pressure Windows normally do not have gasket grooves and include one CPR half-thickness gasket for mating with CPR( )G series flanges.

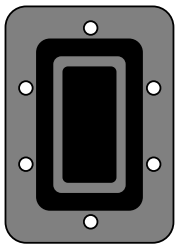


Figure 1

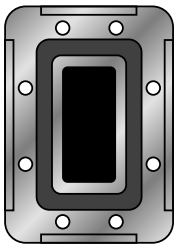


Figure 2

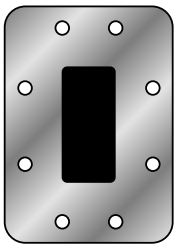


Figure 3

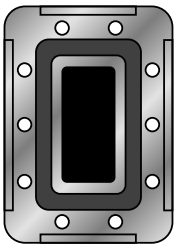


Figure 4

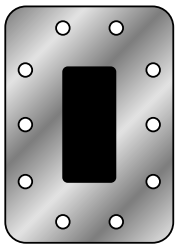


Figure 5

Various Contact Flanges – Always Rectangular

Pressurizable Contact Flanges

Waveguide Type, EIA	With Groove EIA	With Groove MIL Type	With Groove IEC	With Groove Fig. No.	Without Groove EIA	Without Groove MIL Type	Without Groove Fig. No.	Dimensions, Inches (Millimeters)
WR75	–	–	PDR120	1	–	–	–	1.94 x 1.57 (49.2 x 39.9)
WR90	CPR90G	UG-1360/U	PDR100*	2	CPR90F	UG-1736/U	3	2.09 x 1.59 (53.1 x 40.4)
WR112	CPR112G	UG-1358/U	PDR84*	2	CPR112F	UG-1734/U	3	2.50 x 1.75 (63.5 x 44.5)
WR137	CPR137G	UG-1356/U	PDR70**	2	CPR137F	UG-1732/U	3	2.69 x 1.94 (68.3 x 49.3)
WR159	CPR159G	UG-1354/U	PDR58	2	CPR159F	UG-1730/U	3	3.19 x 2.44 (81.0 x 62.0)
WR187	CPR187G	UG-1352/U	PDR48	2	CPR187F	UG-1728/U	3	3.50 x 2.50 (88.9 x 63.5)
WR229	CPR229G	UG-1350/U	PDR40	4	CPR229F	UG-1726/U	5	3.88 x 2.75 (98.6 x 69.9)
WR284	CPR284G	UG-1348/U	PDR32	4	CPR284F	UG-1724/U	5	4.50 x 3.00 (114 x 76.2)
WR340	CPR340G	UG-1346/U	PDR26	4	CPR340F	UG-1712/U	5	5.44 x 3.75 (138 x 95.3)
WR430	CPR430G	UG-1344/U	PDR22	4	CPR430F	UG-1716/U	5	6.34 x 4.19 (161 x 106)

*Mates with equivalent CPR series flange with 4 mm hardware only. **Mates with equivalent CPR series flange with U.S. #10 hardware only.

Mating Information

Choke/Cover Flanges (Square or Round)

	Choke UG	Choke CBR, PBR	Cover UG	Cover UBR,UAR	Cover/Gasket PBR, PAR
Choke UG	Does NOT Mate	Does NOT Mate	Mates	Mates	Mates
Choke CBR, CAR	Does NOT Mate	Does NOT Mate	Mates	Mates	Mates
Cover UG	Mates	Mates (NOT pressurizable)	Mates (NOT pressurizable)	Mates	Mates
Modified UG Cover w/ Gasket Groove	Mates	Mates	Mates	Mates	Mates
Cover UBR, UAR	Mates	Mates (NOT pressurizable)	Mates (NOT pressurizable)	Mates	Mates
Cover/Gasket PBR, PAR, #	Mates	Mates	Mates	Mates	Mates

Also applies to "C-series " and "M-series" (Metric) HELIAX® elliptical waveguide connectors (for example, 252DCT, 252DCMT).

Contact Flanges (Rectangular)

	CPR( )G	CPR( )F	PDR
CPR90G†	Mates	Mates using Half Thickness Gasket 55072-90*	Mates using Half Thickness Gasket 55072-90* and 4 mm Hardware**
CPR112G†	Mates	Mates using Half Thickness Gasket 55072-112*	Mates using Half Thickness Gasket 55072-112 * and 4 mm Hardware**
CPR137G†	Mates	Mates using Half Thickness Gasket 55072-137*	Mates using Half Thickness Gasket 55072-137 *and #10 Hardware***
CPR159G†	Mates	Mates using Half Thickness Gasket 55072-159*	Mates using Half Thickness Gasket 55072-159* and Either Hardware Supplied
CPR187G†	Mates	Mates using Half Thickness Gasket 55072-187*	Mates using Half Thickness Gasket 55072-187* and Either Hardware Supplied
CPR229G†	Mates	Mates using Half Thickness Gasket 55072-229*	Mates using Half Thickness Gasket 55072-229* and Either Hardware Supplied
CPR284G†	Mates	Mates using Half Thickness Gasket 55072-284*	Mates using Half Thickness Gasket 55072-284* and Either Hardware Supplied
CPR90F	Mates using Half Thickness Gasket 55072-90*	Mates (NOT Pressurizable)	Mates using 4 mm Hardware**
CPR112F	Mates using Half Thickness Gasket 55072-112*	Mates (NOT Pressurizable)	Mates using 4 mm Hardware**
CPR137F	Mates using Half Thickness Gasket 55072-137*	Mates (NOT Pressurizable)	Mates using #10 Hardware***
CPR159F	Mates using Half Thickness Gasket 55072-159*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
CPR187F	Mates using Half Thickness Gasket 55072-187*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
CPR229F	Mates using Half Thickness Gasket 55072-229*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
CPR284F	Mates using Half Thickness Gasket 55072-284*	Mates (NOT Pressurizable)	Mates using Either Hardware Supplied
PDR180†	Does NOT Mate	Does NOT Mate	Mates
PDR140†	Does NOT Mate	Does NOT Mate	Mates
PDR120†	Does NOT Mate	Does NOT Mate	Mates
PDR100†	Mates using Half Thickness Gasket 55072-90* and 4mm Hardware**	Mates using 4 mm Hardware**	Mates
PDR84†	Mates using Half Thickness Gasket 55072-112 * and 4mm Hardware**	Mates using 4 mm Hardware**	Mates
PDR70†	Mates using Half Thickness Gasket 55072-137 * and #10 Hardware***	Mates using #10 Hardware***	Mates
PDR48†	Mates using Half Thickness Gasket 55072-187* and Either Hardware Supplied	Mates using Either Hardware Supplied	Mates
PDR40†	Mates using Half Thickness Gasket 55072-229* and Either Hardware Supplied	Mates using Either Hardware Supplied	Mates
CMR	Mates with CMR and UER "ONLY"		
UER	Mates with CMR and UER "ONLY"		

* Purchase separately ** Supplied in PDR Hardware Kit *** Supplied in CPR Hardware Kit

† Also applies to "E-series" and "M-series" (Metric) HELIAX® elliptical waveguide connectors (for example, 252DET , 252DEMT).

Lowest Attenuation

Circular waveguide offers substantially lower attenuation than elliptical or rectangular waveguide. This can result in the use of smaller antennas, reducing tower loading and saving antenna cost.

Dual Polarization Capability

A single waveguide run can carry two polarizations with 30 dB minimum isolation, eliminating the need for a second waveguide run.

Full Range of Transitions and Components

Simplifies system planning. All elements are designed to work together, maximizing system performance.

General

Circular waveguide is used for long vertical feeder runs in systems where multiband capability is needed or where low attenuation is critical. The axial symmetry of circular waveguide allows the simultaneous propagation of two orthogonal TE_{11} modes. A single waveguide run can carry two polarizations with 30 dB minimum isolation.

Electrical Characteristics

Closed and Open Systems. Circular waveguide systems which have circular-to-rectangular transitions at both ends are considered “closed” systems. Horn-reflector antennas fed directly with circular waveguide have only one circular-to-rectangular transition (at the bottom) and are considered “open”.

Attenuation curves are illustrated on pages 230 and 231. Add 0.3 dB to allow for the transitions in a “closed” system and 0.15 dB in an “open” system.

VSWR (Return Loss, dB) for a complete single-polarized system, of any length, including straight sections and transitions (except 17.7 - 19.7 GHz), is guaranteed 1.04 (34.2) maximum and is typically 1.03 (36.6) maximum. A similar dual-polarized system is guaranteed 1.06 (30.7) maximum and is typically 1.04 (34.2) maximum. A single or dual polarized 17.7 - 19.7 GHz system is guaranteed 1.15 (23.1) maximum.

RML (reconverted mode level) is the level of higher order mode energy reconverted to the dominant mode in a circular waveguide system. In a closed system, higher modes become trapped within the circular waveguide because they cannot propagate in the connecting rectangular waveguide. Ground delay distortion and noise result when a portion of this energy, delayed in time, is reconverted to the dominant mode. Andrew circular waveguide systems are designed for minimum RML. Each circular-to-rectangular transition includes a non-linear tapered circular-to-circular transition section to minimize the generation of unwanted modes and prevent their propagation into the circular-to-rectangular transition section. In addition, Andrew offers a circular-to-rectangular transition with a built-in mode filter (for TM_{01} and TE_{21}) for use at the bottom of a closed system. These unwanted modes are not trapped in an “open” system and the bottom mode filter is, therefore, not needed. However, depending on the operating frequency, the TM_{11} mode can sometimes be generated in an “open” system and a TM_{11} mode filter (described on page 223) may be required.

Circular Waveguide Straight Sections

Andrew circular waveguide is made of heavy-wall high conductivity copper tubing, specially coated to prevent corrosion and deterioration of attenuation characteristics. Stainless steel hardware and flange gaskets are included. Order straight sections from table below.

Frequency Band Codes

Operating Band, GHz	Circular Waveguide Frequency Band Code	Antenna Frequency Band Code
5.925-6.425	-3	-59
6.425-7.125	-4	-65
7.125-7.7	-5	-71
7.725-8.500	-7	-77
10.7-11.7	-8	-107
12.2-12.7	-9	-122
12.7-13.25	-10	-127
17.7-19.7	-23	-180

Straight Section Ordering Information

Length	Flanges	WC166	WC109
Recommended Operating Bands, GHz*** (Specify Operating Band)		5.925-6.425 6.425-7.125 7.125-7.750 7.725-8.500 10.7-11.7	10.7-11.7 12.2-12.7 12.7-13.25 17.7-19.7
20 ft*	**Fixed**	**57458-240-(†)**	**54346-240-(†)**
Special Length	Fixed Swivel/Fixed	57458-(**)-(†) 244923-(**)-(†)	54346-(**)-(†) 54345-(**)-(†)
Weight, lb/ft (kg/m)		2.8 (4.2)	1.2 (1.8)

* Standard straight sections shipped from Scotland are 6 meters.
** Specify length in inches or millimeters.
*** For other bands, contact Andrew.
† Insert frequency band code from table.

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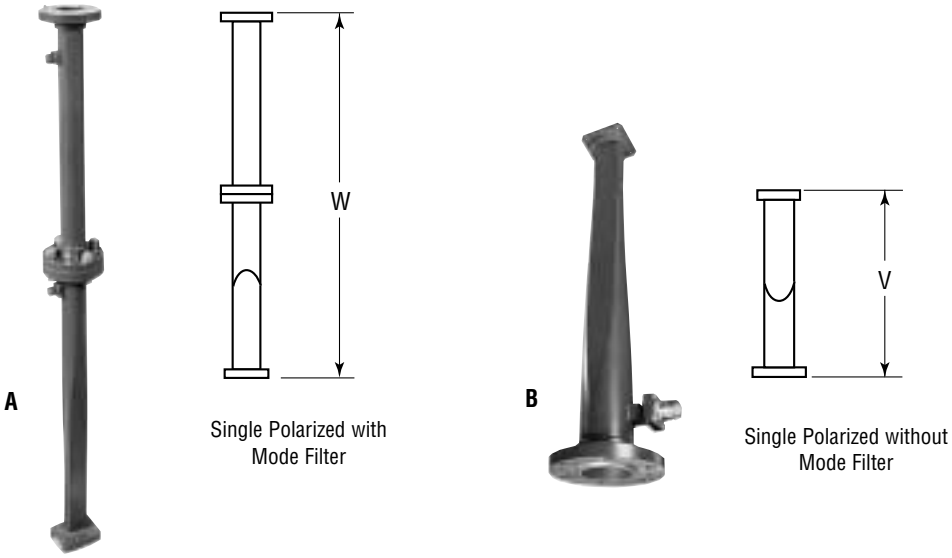
These transitions convert from circular-to-rectangular waveguides at one or both ends of the vertical run. Transitions include swivel flanges to simplify installation and polarization alignment. Both rectangular waveguide inputs on dual-polarized transitions enter the circular waveguide in the same plane†. This simplifies installation and routing. Alignment pins, flange hardware, pressure gaskets, and circular waveguide taper sections are included with the transition.

"Open" horn-reflector antenna systems use one transition without a mode filter at the bottom of the circular waveguide run. All other antenna systems use transitions at the top and bottom of the circular waveguide run. For these, a transition without a mode filter is used at the top and a transition with a mode filter is used at the bottom.

† Patented United States 3,924,205; Canada 965,852; United Kingdom 1,394,334; Italy 984,278 and pending in other countries.



Single Polarized with Mode Filter

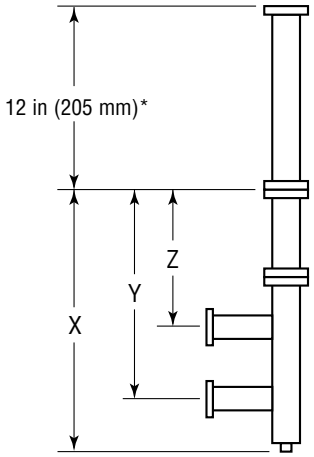
Single Polarized without Mode Filter

Single Polarized Circular-to-Rectangular Waveguide Transitions**

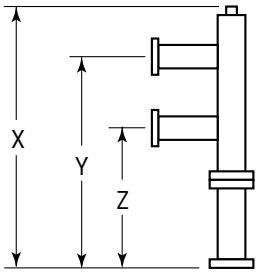
Frequency Band, GHz	Rectangular Flange Mates with EIA or Mil	IEC***	With Mode Filter (A)	No Mode Filter (B)	Dimensions, in (mm) V	W
WC166						
5.925-6.425	CPR137G	PDR70	**65239-3**	**58016A-3**	18.0 (457)	30.0 (762)
6.425-7.125	CPR137G	PDR70	**65240-1**	**64157A-1**	18.0 (457)	30.0 (762)
7.125-7.750	CPR137G	PDR70	**65322-1**	**65321A-1**	18.0 (457)	30.0 (762)
7.725-8500	CPR112G	PDR84	**65323-3**	**57459A-3**	18.5 (470)	30.5 (775)
WC109						
10.700-11.700	CPR90G	PDR100	**65242-107**	**57222A-107**	13.6 (345)	25.6 (650)
12.200-12.700	WR75 Cover/Gasket*	–	**65242-122**	**57222A-122**	13.8 (351)	25.8 (655)
12.700-13.250	WR75 Cover/Gasket*	–	**67550**	**67549**	13.8 (351)	25.8 (655)

* Andrew "Cover/Gasket" flanges mate with either choke or cover flanges or the corresponding HELIAX® elliptical waveguide connectors.
** Not applicable for horn-reflector antenna systems. Use dual polarized transition with one port terminated with load. (page 223)
*** For detailed information on mating flanges refer to pages 214-218.

Circular-to-Rectangular Waveguide Transitions



Dual Polarized with Mode Filter



Dual Polarized without Mode Filter

* Except 160515-177 is 18 in (457 mm)

Dual Polarized Circular-to-Rectangular Waveguide Transitions

Frequency Band, GHz	Rectangular Flange Mates with EIA or Mil	IEC**	With Mode Filter (C)	No Mode Filter (D)	Dimensions, in (mm) X	Y	Z
WC166							
5.925-6.425	CPR137G	PDR70	**65236-1**	**62866A-1**	19.9 (505)	16.9 (429)	11.4 (190)
5.925-6.425	CPR159G	PDR58	**65237-1**	**64159A-1**	19.9 (505)	16.9 (429)	11.4 (190)
6.425-7.125	CPR137G	PDR70	**65238-1**	**64147A-1**	19.9 (505)	16.9 (429)	11.4 (190)
7.125-7.750	CPR137G	PDR70	**65324-1**	**64848A-1**	17.3 (439)	14.3 (363)	9.8 (249)
7.725-8.500	CPR112G	PDR84	**65316-1**	**64703A-1**	19.1 (485)	16.1 (409)	12.0 (305)
10.700-11.700	CPR90G	PDR100	–	**69383**	23.0 (584)	22.0 (559)	17.6 (447)
WC109							
10.700-11.700	CPR90G	PDR100	**65241-107**	**64100A-107**	14.1 (358)	11.1 (282)	8.6 (218)
12.200-12.700	WR75 Cover/Gasket*	–	**65241-122**	**64100A-122**	12.6 (320)	9.6 (244)	7.4 (188)
12.700-13.250	–	PDR120	**69876**	**69877**	10.5 (267)	9.6 (244)	7.4 (188)
12.700-13.250	WR75 Cover/Gasket*	–	**68999**	**68998**	12.6 (320)	9.6 (244)	7.4 (188)
17.700-19.700	UG-596A/U, UG-595U	CBR220, UBR220, PBR220	**160515-177††**	**160516-177††**	16.8 (427)	15.6 (396)	14.0 (356)

• Andrew "Cover/Gasket" flanges mate with either choke or cover flanges or the corresponding HELIAX® elliptical waveguide connectors.
** For detailed information on mating flanges refer to pages 214-218.
†† Includes termination load for single polarized applications.

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A Termination Load for unused rectangular waveguide port of dual-polarized transitions. Maximum VSWR is 1.02 within the operating bands specified for transitions. Pressurizable.

Flange Type	Type Number*	Type Number*
CPR90G	**R090PC0040CSN**	**39099-90**
CPR112G	**R112PC0040CSN**	**39099-112**
CPR137G	**R137PC0040CSN**	**39099-137**
CPR159G	**R159PC0040CSN**	**39099-159**
CPR229G	**R229PC0040CSN**	**39099-229**
WR75 Cover/Gasket	**R075PY0040YSN**	**39098-75**
WR112 Cover/Gasket	**R112PY0040YSN**	**39098-112**
WR137 Cover/Gasket	**R137PY0040YSN**	**39098-137**

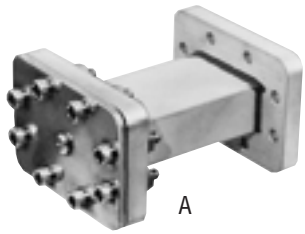
*Order both type numbers

B Axial Ratio Compensator. Rotatable clamp installed at the bottom of the circular waveguide run and adjusted to provide maximum polarization isolation. One required for single-polarized run. One, two, or three are required (see table) for dual-polarized runs.

For	Photo Ref.	Clamp Type No.	Maximum Length of Waveguide, ft (m) 1 Clamp	2 Clamps	3 Clamps
WC281	**B**	**64271**	200 (60)	400 (120)	600 (180)
WC166	**B**	**57568**	200 (60)	400 (120)	600 (180)
WC109	**B**	**54348**	150 (45)	300 (90)	450 (135)

Horn-Reflector System Mode Filter. Reduces group delay ripple by TM_{11} higher order mode to less than 3 nanoseconds per hop. Recommended for dual-band systems and single-band systems operating in the higher of the two frequency bands listed in the table. Not required for waveguide runs shorter than 25 feet (7.6 m). Top flange is WC281.

Bottom Flange	Frequency Bands, GHz	Type No.	Length in (mm)
WC281	3.6-4.2, 5.925-6.425	**69907**	42 (1067)
WC281	3.6-4.2, 6.425-7.125	**69908**	72 (1829)
WC281	5.925-6.425, 10.7-11.7	**162240**	78 (1981)
WC269	3.6-4.2, 5.925-6.425	**69485**	42 (1067)
WC166	5.925-6.425, 10.7-11.7	**69910**	57 (1448)

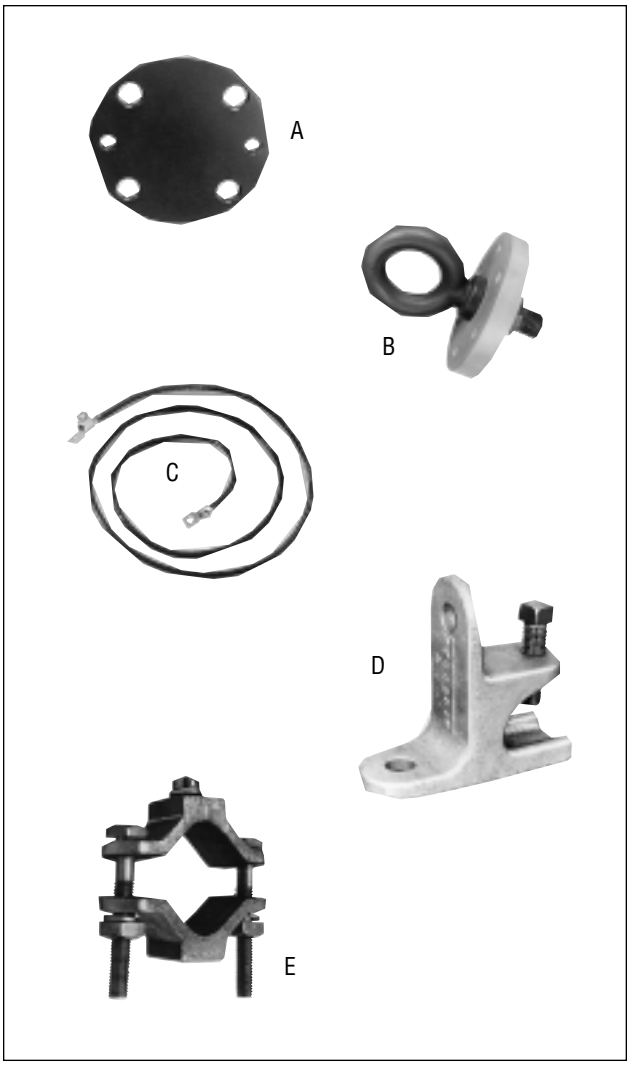

A


B

Taper Transitions convert from one circular waveguide size to another or from circular to square waveguide. Stainless steel hardware and flange gaskets are included.

From	To	Transition Type No.	Length in (mm)
Circular-to-Circular Waveguide			
WC281 Swivel	WC269	**69273**	6 (152)
WC281 Swivel	WC212	**49545**	18 (457)
WC281 Swivel	WC205	**69272**	18 (457)
WC281 Swivel	WC166	**69271**	18 (457)
WC281 Swivel	WC109	**69269**	18 (457)
WC269 Swivel	WC212	**69492**	18 (457)
WC166	WC109	**69277**	11 (279)
WC166	WC75	**69382**	17 (432)
WC109	WC75	**55648**	6 (152)
Circular-to-Square Waveguide			
WC281	WS176	**202559**	30 (762)
WC166	WS108	**205137**	19 (483)

Accessories



A **Alignment Shorting Plate**. A brass plate used during initial alignment. It is installed at the top of the run while the axial ratio compensator is adjusted. See table below.

B **Pulling Head**. Attaches to top waveguide section flange. Waveguide sections can be assembled at ground level and the entire assembly lifted into place on the tower (not required if sections are to be lifted individually and assembled on the tower). See table below.

C **Current By-Pass Kit**. Five feet of No. 6 copper wire and lugs to provide a low-loss current path around flexible waveguide sections .....Type **49486**

Flange Hardware Kit (Not shown) Includes a set of hex-head bolts, nuts, lock washers, and pressure gaskets, sufficient to join two circular waveguide flange units. This hardware kit is provided with each section of circular waveguide and is also available individually. All hardware is stainless steel. See table below.

Adapters

D **Angle Member Adapter Kit** of 1 for mounting sliding or spring/sliding hangers to angle or flat tower members up to 7/8 in (22 mm) thick.....Type **13555A**

E **Round Member Adapter Kit** of 10. Includes two cast iron clamp halves with stainless steel hardware for mounting hangers to round tower members 1-3 in (25-75 mm) in diameter .....Type **65500**

Accessory Type Numbers

	WC166	WC109
Alignment Shorting Plate	**57569**	**56207**
Pulling Head	**64775-166**	**64775-109**
Flange Hardware Kit	**57570-1**	**54109**

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Circular Waveguide Support Systems

The Andrew standard support system uses the rigid, spring/sliding, and sliding hangers. This system is available for all sizes except WC281. Typical system planning information is presented on pages 219 and 220. A second method, for horn-reflector antennas, is KS compatible and uses sliding restrainers. It is available for WC281 and WC166.

Andrew Standard Circular Waveguide Support System Components

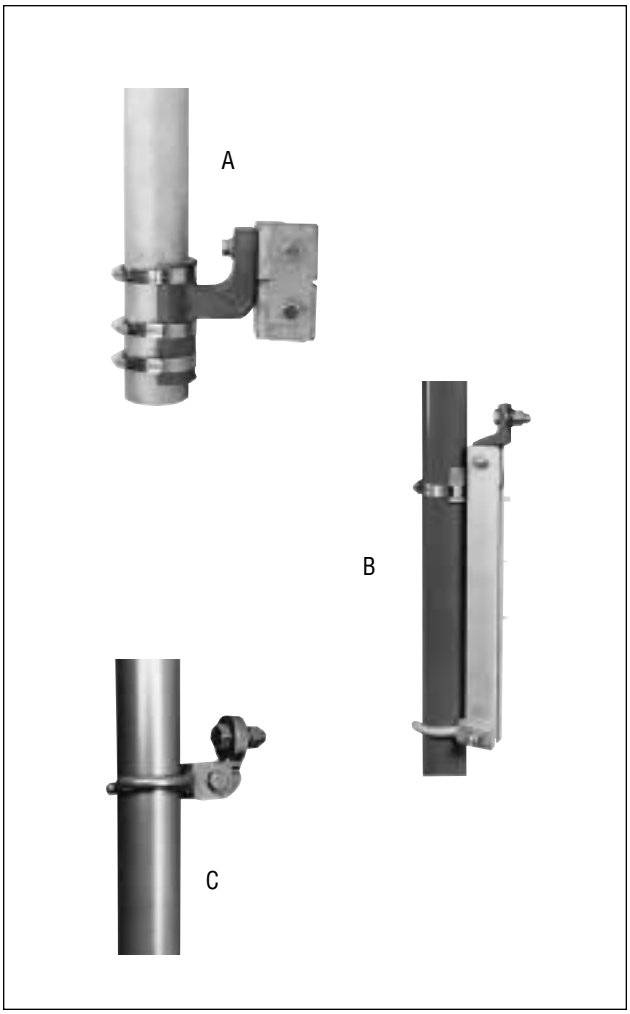
Hangers are used to mount circular waveguide in a spring-suspended system on a tower or other support structure and to accommodate the differential expansion and between between the waveguide and the tower or support structure. Hangers are brass with 3/8" stainless steel mounting hardware.

Tower members should be drilled only with the consent of the tower manufacturer because of possible weakening of the structure. If holes are not provided and cannot be drilled, angle members or round member adapters are used to attach the hangers to the tower.

A **Rigid Hangers** anchor the circular waveguide to the tower at the top of the waveguide run. Includes one heavy-duty angle adapter. See table below.

B **Spring/Sliding Hangers** support the waveguide, limit lateral motion, and accommodate differential expansion and contraction. See table below.

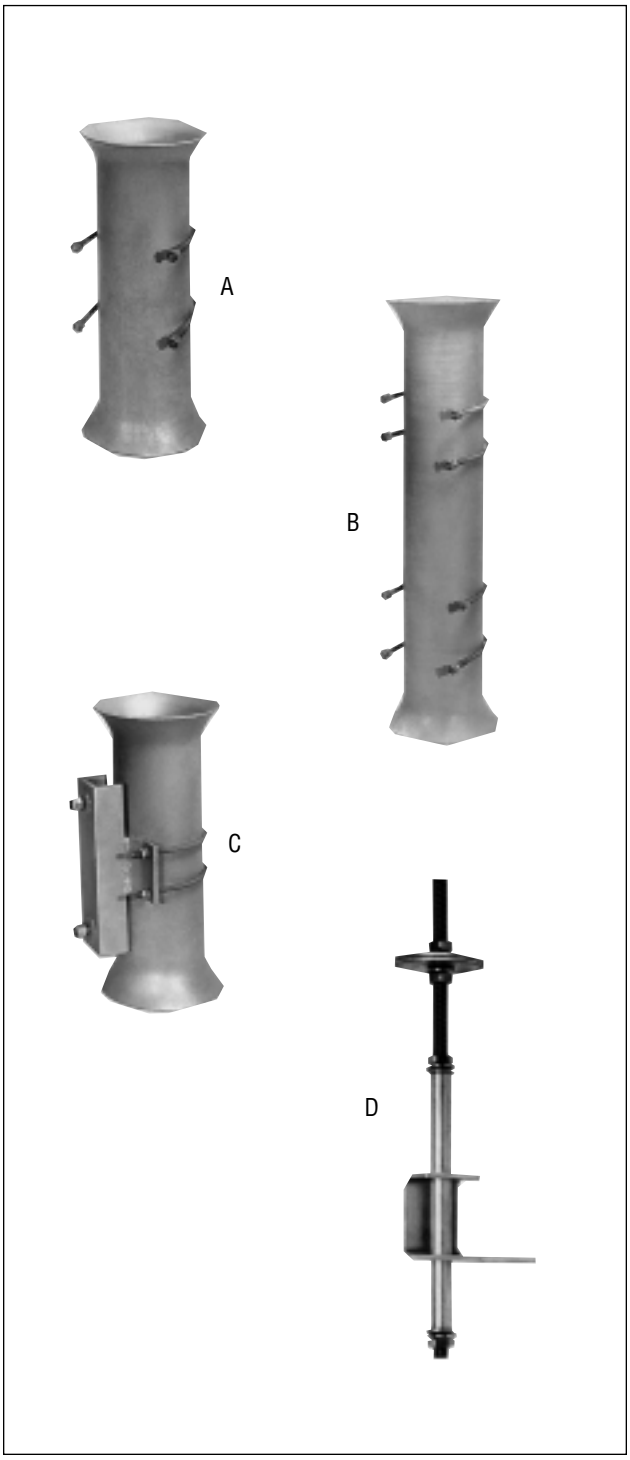
C **Sliding Hangers** limit lateral motion. See table below.



Hangers

Waveguide	Rigid	Sliding	Spring/Sliding
WC166	**69932**	**69933**	**69934**
WC109	**19007A-109**	**19008A-109**	**19009A-109**

Hanger Placement. One rigid hanger is required 6 to 12 in (150 to 300 mm) below the top waveguide section flange. For horn-reflector antenna systems, the rigid hanger is used only during installation. It is replaced with a spring/sliding hanger after the waveguide run is in place. For WC109 and WC166, sliding hangers and spring/sliding hangers are used alternately at 8 to 12 ft (2.4 to 3.7 m) intervals.



KS Compatible Circular Waveguide Support System Components

In this system the entire weight of the circular waveguide run is supported at the mounting frame assembly of the horn-reflector antenna using the waveguide support assembly and support plate. The Wilson bolt assembly allows precision height adjustment of the waveguide run and sliding restrainers restrict the lateral movement of the waveguide.

A **Sliding Restrainer**, 18 in (460 mm). Position every 12 ft 6-1/4 in at all circular waveguide flange joints. Includes two 3/8" x 6" on-center U-bolts and hardware to interface with customer-supplied support brackets. See table below.

B **Sliding Restrainer**, 30 in (760 mm). Position every 12 ft 6-1/4 in at all circular waveguide flange joints. Used in place of item A (above) beyond 175 ft (55 m) below the support plate for certain KS tower applications. Includes four 3/8" x 6" on-center U-bolts and hardware to interface with customer-supplied support brackets. See table below.

C **Sliding Restrainer, Bottom**. Use on flange joint at the bottom of the circular waveguide run. Includes bracket and hardware for attachment to network slot angles. See table below.

Sliding Restrainer Type Numbers

Size	18 in (460 mm)	30 in (760 mm)	Bottom
WC166	**49008**	**49009**	**49010**

Connecting Waveguides

The circular waveguide run is connected to the antenna and the radio equipment using HELIAX® elliptical waveguide and/or rectangular waveguide components. These are described in detail on pages 156-218.

D **Elliptical Waveguide Sliding Support**. For use with 4-port combiner or dual polarized circular-to-rectangular transition to eliminate the requirement for flexible waveguide sections. Accommodates vertical movement and provides support to the elliptical waveguide near the network end of the run. Use with elliptical waveguide hangers described on page 194 .....Type **200970**

Pressurization

Microwave waveguides should be maintained under dry air or dry nitrogen pressure to prevent moisture condensation. All sizes are pressurizable to 10 lb/in^2 (70 kPa). Check antenna pressurization limits to ensure antenna limits are not being exceeded. Pressurization equipment is described on pages 242-271.

dB and dBm

The dB is a logarithmic unit comparing two power levels.

$$dB = 10 \log_{10} \frac{P_1}{P_2}$$

Where P_1 is the larger power
If P_1 = 10 watts and P_2 = 1 watt, then

$$dB = 10 \log_{10} \frac{10}{1} = 10 \text{ dB}$$

The dBm is a comparison to a reference power of 1 milliwatt (0.001 watt).

$$dBm = 10 \log_{10} \frac{P_1}{0.001}$$

Free Space Propagation Attenuation (Isotropic)

Imperial Units:

$$L_{fs} = 96.6 + 20 \log_{10} D + \log_{10} f$$

Where L_{fs} = loss in free space in dB
D = path length in miles
f = frequency in GHz

Metric Units:

$$L_{fs} = 92.5 + 20 \log_{10} D + 20 \log_{10} f$$

Where L_{fs} = loss in free space in dB
D = path length in kilometers
f = frequency in GHz

Calculating Receive Signal Level and Antenna Gain

When transmitter power is expressed in dBm and all other units are expressed in dB, receive power in dBm can be calculated using the following formula:

$$P_r = P_t - L_{w1} - L_{f1} + G_{a1} - L_{fs} + G_{a2} - L_{w2} - L_{f2}$$

Where: P_r = receive power level (dBm)
P_t = transmit power (dBm)
L_w = transmission line losses
L_f = filter losses
L_{fs} = free space path loss
G_{a1} = transmit antenna gain
G_{a2} = receive antenna gain

Thus for a 6.175 GHz system with a transmit power of 5 watts (37 dBm) and 200 feet of Type EWP52 HELIAX® elliptical waveguide (attenuation 1.2 dB/100 feet) at each end, filter losses of 0.5 dB at each end, and Andrew UHX8-59, UHX8-59 antennas at each end (Mid-band Gain 41.3 dB) over a path 30 miles long (L_{fs} = 141.9 per preceding example).

P_r = 37- 2.4 -.5 + 41.3 - 141.9 + 41.3 - 2.4 - .5 = 28.1dBm

When the minimum receive signal level required to meet performance objectives (C) is known and the necessary fade margin (FM) is added, the total antenna gain (Gt) required can be calculated using the following expression:

$$G_t = P_t - L_{w1} - L_{f1} - L_{fs} - L_{w2} - L_{f2} - FM\ 96\ C$$

In the above system with a transmit power of 5 watts (37 dBm), 200 feet of EWP52 elliptical waveguide (attenuation of 1.2 dB/100 ft) at each end, filter losses of 0.5 dB at each end, operating over a 30 mile path, assuming a receive signal threshold level requirement (C) of -70 dBm and a desired fade margin of 38 dB, the total antenna gain (G_t) required is:

G_t = 37 - 2.4 - .5 - 141.9 - 2.4 - .5 - 38 - (-70) = -78.7

To achieve the system performance goal, a negative gain (loss) of 78.76 dB must be made up by the gain of the antennas. If antennas with equal gain are used at each end of the path, each antenna must then have a gain of 39 dB. Andrew UHX8-59 antennas with a mid-band gain of 41.3 dB will, therefore, satisfy the requirement.

Calculation of System Return Loss

Resultant system return loss is governed by the phase relations between the standing waves of individual components and cannot be precisely calculated. The resultant return loss can be estimated, however, using the procedure described below. The 0.7 multiplication factor, mentioned in Step 5, is based on data taken by Andrew on thousands of antenna systems. Properly installed transmission systems will typically measure well within the calculated resultant return loss. Andrew specifications include safety margins and components are typically better than the published return loss specifications. For this reason, systems using all Andrew components will usually ensure much better system return loss performance than the calculated values.

Step 1. Convert VSWR or RL to reflection coefficients, in decimal form, for all components in the system.

Step 2. Divide components into three groups:

Top (antenna, radome, flex, etc.)

Transmission Line (waveguide or cable feeder)

Bottom (flex, elbow, pressure window, etc.)

Step 3. Add the reflection coefficient of all top components and convert the total to RL. Double the calculated attenuation in dB of the transmission line feeder and add this to the previous figure. Then convert the total back to a reflection coefficient.

Step 4. To the final reflection coefficient obtained in Step 3, add the reflection coefficient of the transmission line and all bottom components.

Step 5. Multiply the total reflection coefficient from Step 4 by 0.7 and convert the result to VSWR or return loss.

Example

Steps 1 and 2:

Antenna/Transmission Line System

		VSWR	Reflection Coefficient
Top Components	Antenna	1.06	0.029
	Flex Section	1.03	0.015
Transmission Line	Waveguide, Attenuation: 2.36 dB	1.06	0.029
Bottom Components	Flex Section	1.03	0.015
	Pressure Window	1.01	0.005

Step 3:

(1) Add top components [0.029 + 0.015 = 0.044]

(2) Convert to return loss [27.1 dB]

(3) Double Transmission Line attenuation [2 x 2.36 = 4.72 dB]

(4) Add (2) and (3) [27.1 + 4.72 = 31.8 dB]

(5) Convert 31.8 dB to reflection coefficient = 0.026

Step 4:

(6) Add (5) and transmission line and bottom component [0.026 + 0.029 + 0.015 + 0.005 = 0.075]

Step 5:

(7) Multiply (6) by 0.7 [0.075 x 0.7 = 0.0525] Convert to VSWR = 1.1 [1.1 is est. peak system VSWR] Convert to Return Loss = 25.5 [25.5 dB is estimated peak system return loss]

Definitions

Return loss, RL, is the decibel ratio of the incident voltage to the reflected voltage.

Reflection coefficient, $|\Gamma|$ is the numerical ratio of the reflected voltage to the incident voltage.

Voltage Standing Wave Ratio, VSWR, is the numerical ratio of the maximum voltage to the minimum voltage that would exist on the uniform reference transmission line.

Conversion Formulas

The following formulas can be used for determining values not listed in the table below.

$$RL = -20 \log_{10} (|\Gamma|)$$

$$|\Gamma| = \frac{VSWR - 1}{VSWR + 1}$$

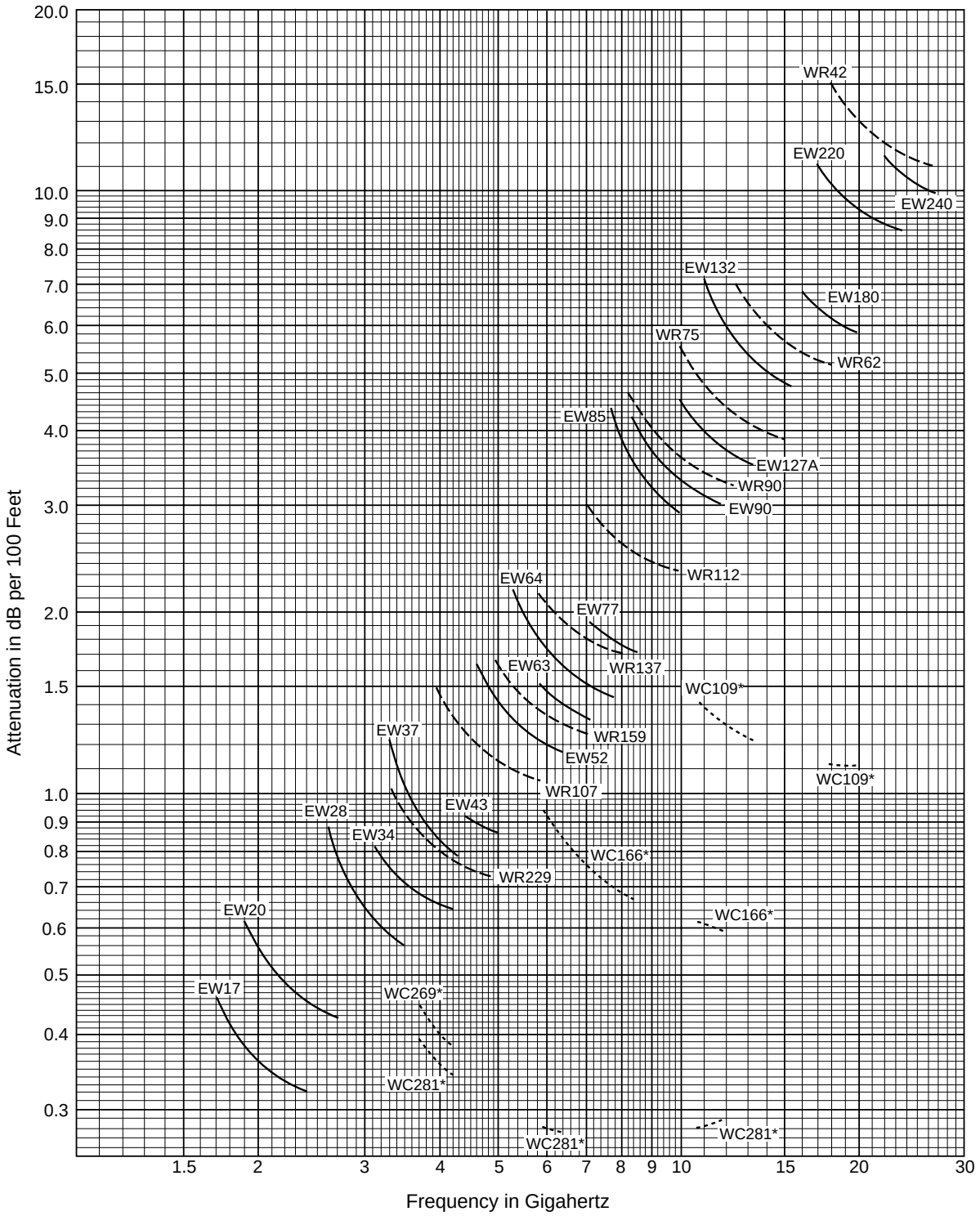
$$|\Gamma| = \text{antilog}_{10} \frac{(-RL)}{20}$$

$$VSWR = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

Conversion Table

Return Loss, dB	Reflection Coefficient, %	VSWR	Return Loss, dB	Reflection Coefficient, %	VSWR	Return Loss, dB	Reflection Coefficient, %	VSWR	Return Loss, dB	Reflection Coefficient, %	VSWR
14.0	19.95	1.50	22.0	7.943	1.173	30.0	3.162	1.065	38.0	1.259	1.025
14.2	19.50	1.48	22.2	7.762	1.168	30.2	3.090	1.064	38.2	1.230	1.025
14.4	19.05	1.47	22.4	7.586	1.164	30.4	3.020	1.062	38.4	1.202	1.024
14.6	18.62	1.46	22.6	7.413	1.160	30.6	2.951	1.061	38.6	1.175	1.024
14.8	18.20	1.44	22.8	7.244	1.156	30.8	2.884	1.059	38.8	1.148	1.023
15.0	17.78	1.43	23.0	7.079	1.152	31.0	2.818	1.058	39.0	1.122	1.023
15.2	17.38	1.42	23.2	6.918	1.149	31.2	2.754	1.057	39.2	1.096	1.022
15.4	16.98	1.41	23.4	6.761	1.145	31.4	2.692	1.055	39.4	1.072	1.022
15.6	16.60	1.40	23.6	6.607	1.141	31.6	2.630	1.054	39.6	1.047	1.021
15.8	16.22	1.39	23.8	6.457	1.138	31.8	2.570	1.053	39.8	1.023	1.021
16.0	15.85	1.38	24.0	6.310	1.135	32.0	2.512	1.052	40.0	1.000	1.020
16.2	15.49	1.37	24.2	6.166	1.131	32.2	2.255	1.050	40.2	0.9772	1.020
16.4	15.14	1.36	24.4	6.026	1.128	32.4	2.399	1.049	40.4	0.9550	1.019
16.6	14.79	135	24.6	5.888	1.125	32.6	2.344	1.048	40.6	0.9333	1.019
16.8	14.45	1.34	24.8	5.754	1.122	32.8	2.291	1.047	40.8	0.9210	1.018
17.0	14.13	1.33	25.0	5.563	1.119	33.0	2.239	1.046	41.0	0.8913	1.018
17.2	13.80	1.32	25.2	5.495	1.116	33.2	2.188	1.045	41.2	0.8710	1.018
17.4	13.49	1.31	25.4	5.370	1.114	33.4	2.138	1.044	41.4	0.8710	1.017
17.6	13.18	1.30	25.6	5.248	1.111	33.6	2.089	1.043	41.6	0.8318	1.017
17.8	12.88	1.30	25.8	5.129	1.108	33.8	2.042	1.042	41.8	0.8128	1.016
18.0	12.59	1.29	26.0	5.012	1.106	34.0	1.995	1.041	42.0	0.7943	1.016
18.2	12.30	1.28	26.2	4.898	1.103	34.2	1.950	1.040	42.2	0.7762	1.016
18.4	12.02	1.27	26.4	4.786	1.101	34.4	1.905	1.039	42.4	0.7586	1.015
18.6	11.75	1.27	26.6	4.677	1.098	34.6	1.862	1.038	42.6	0.7413	1.015
18.8	11.48	1.26	26.8	4.571	1.096	34.8	1.820	1.037	42.8	0.7244	1.015
19.0	11.22	1.25	27.0	4.467	1.094	35.0	1.778	1.036	43.0	0.7079	1.014
19.2	10.96	1.25	27.2	4.365	1.091	35.2	1.738	1.035	43.2	0.6918	1.014
19.4	10.72	1.24	27.4	4.266	1.089	35.4	1.698	1.035	43.4	0.6761	1.014
19.6	10.47	1.234	26.7	4.169	1.087	35.6	1.660	1.034	43.6	0.6607	1.013
19.8	10.23	1.228	27.8	4.074	1.085	35.8	1.622	1.033	43.8	0.6457	1.013
20.0	10.00	1.222	28.0	3.981	1.083	36.0	1.585	1.032	44.0	0.6310	1.013
20.2	9.772	1.217	28.2	3.890	1.081	36.2	1.549	1.031	44.2	0.6166	1.012
20.4	9.550	1.211	28.4	3.802	1.079	36.4	1.514	1.031	44.4	0.6026	1.012
20.6	9.333	1.206	28.6	3.715	1.077	36.6	1.479	1.030	44.6	0.5888	1.012
20.8	9.120	1.201	28.8	3.631	1.075	36.8	1.445	1.029	44.8	0.5754	1.012
21.0	8.931	1.196	29.0	3.548	1.074	37.0	1.413	1.029	45.0	0.5623	1.011
21.2	8.710	1.191	29.2	3.467	1.072	37.2	1.380	1.028	45.2	0.5495	1.011
21.4	8.511	1.186	29.4	3.388	1.070	37.4	1.349	1.027	45.4	0.5370	1.011
21.6	8.318	1.181	29.6	3.311	1.068	37.6	1.318	1.027	45.6	0.5248	1.011
21.8	8.128	1.177	29.8	3.236	1.067	37.8	1.288	1.026	45.8	05129	1.010

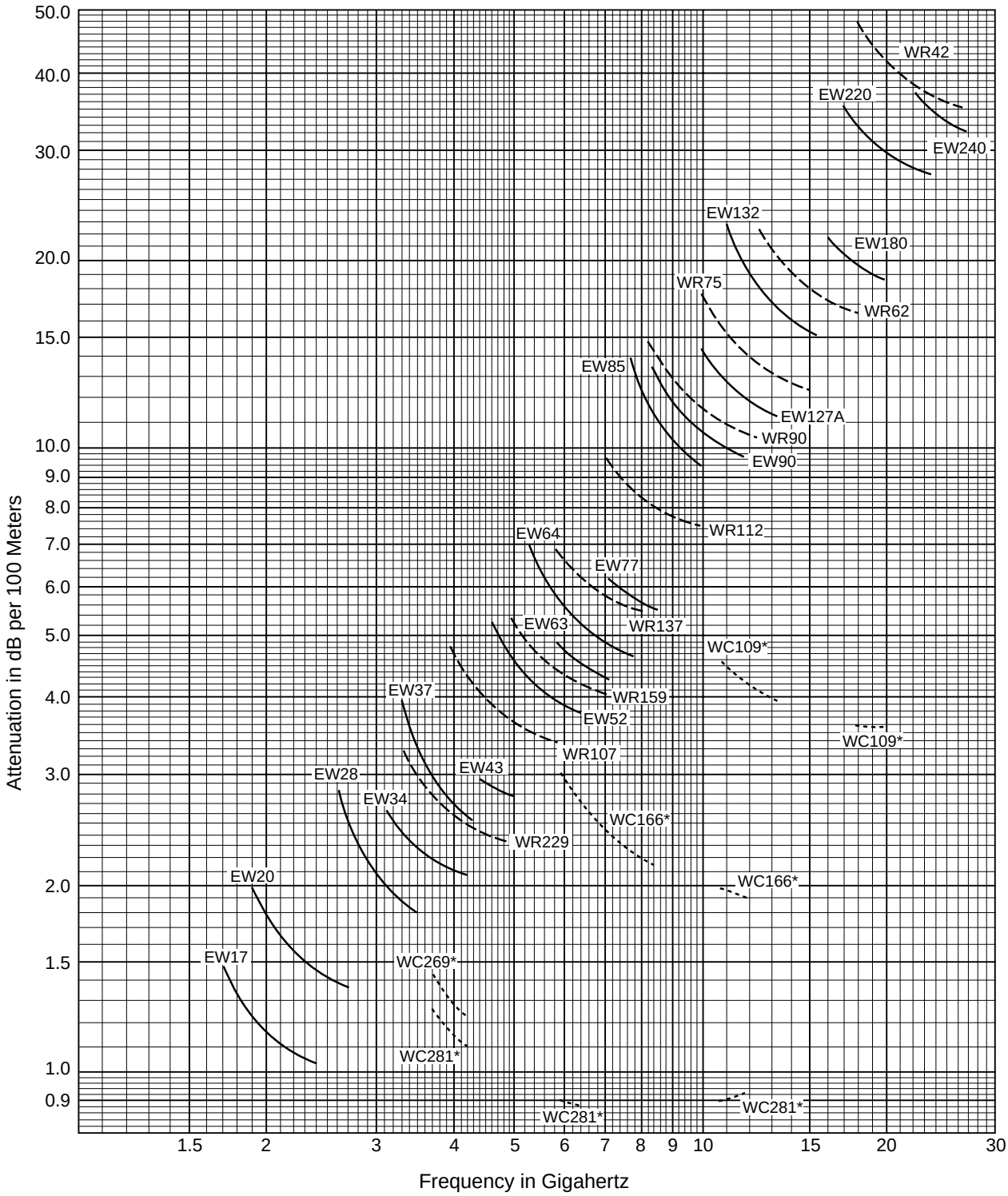
Waveguide Attenuation
(Imperial Units)



Attenuation curves based on:
- VSWR 1.0
- Ambient Temperature 24° C (75° F)
- High Conductivity Copper

The above attenuation curves are guaranteed within ±5%

*Does not include transition or network losses. See page 219.



Attenuation curves based on:
- VSWR 1.0
- Ambient Temperature 24° C (75° F)
- High Conductivity Copper

The above attenuation curves are guaranteed within ±5%

*Does not include transition or network losses. See page 219.

PerforMax™ Base Station Antennas

Index

Superior Performance

Maximum Performance is integral to PerforMax™ antennas and to Andrew.

Commitment to Customer Needs

Andrew is committed to delivering a full line of durable, reliable, competitively priced PerforMax™ base station antenna and RF path products. As a global supplier, Andrew is committed to meeting your schedule anywhere in the world.

Complete RF Path Supplier

Andrew brings you everything you need to connect the air interface to your radio equipment. Our products are designed for compatibility, so when you upgrade or replace, what you order today will work with Andrew products you already have.

Global Manufacturing and Distribution

PerforMax™ antennas and transmission line products are manufactured in facilities around the world. Andrew products can be shipped quickly and cost effectively to sites anywhere.

PerforMax™ Applications

PerforMax™ sector antennas are available for UMTS, PCS, cellular, and SMR applications in single- or dual-polarized configurations.

PerforMax™ vertically-polarized omni-directional antennas are available for both PCS and cellular applications.

In addition, Andrew offers PerforMax™ vertically-polarized omnidirectional antennas for Rural Telephony applications as well as paging applications.

Rapid Product Availability

These antennas are ready for rapid deployment from Andrew worldwide facilities to make these antennas available and easy to order.

Features:

High Performance

- *Excellent Pattern Performance*
- *Low Intermodulation Distortion (IMD)*
- *100% VSWR Testing*
- *Guaranteed Specifications*

Reliable and Durable

- *Fewer Components and Connections*
- *Fewer Solder Joints*
- *Internal Grounding*
- *High Strength, UV-Resistant, Field-Paintable Radomes*
- *Virtually Maintenance-Free Operation*

Easy Installation

- *Saves Time and Installation Costs*
- *Easy to Follow Instructions Prevent Errors*
- *Instructions Can be Re-ordered Via Andrew Fax-On-Demand or Web Site*

Fully Warrantied

- *All PerforMax™ Antennas Include a 3-Year Warranty*

Comprehensive Testing

- *Outdoor Pattern Range Testing*
- *Azimuth/Elevation Beamwidths are Measured and Recorded*
- *Extensive Environmental Testing*

  Gain, VSWR, and IMD measurements are made before and after testing to ensure performance stability.

  Test antennas are disassembled and inspected for internal mechanical damage or wear resulting from testing performed by an outside, accredited test lab.
- *Each Antenna is VSWR Tested/Recorded and Assigned a Unique Serial Number which Andrew Maintains in a Test Data Base for Every Antenna*
- *Antenna Manufacturing Facilities are ISO 9001 Certified*

Single-/Dual-Polarized Sector and Omni Antennas

PerforMax™ Base Station Antennas:

UMTS:

1920 - 2170 MHz

PCS/PCN:

1710 - 1880 MHz and 1850 - 1990 MHz

Cellular Systems:

824 - 894 MHz and 870 - 960 MHz

Specialized Mobile Radio - SMR/ESMR:

806 - 869 MHz

Wireless Markets	Polarizations	Gains
Personal Communication Systems: 1850 - 1990 MHz and 1710 - 1880 MHz	Single-Polarized Sector Dual-Polarized Sector Omni	11 - 22 dBi 14 - 18 dBi 2 - 11 dBi
Cellular: 870 - 960 MHz and 824 - 894 MHz	Single-Polarized Sector Dual-Polarized Sector Omni	12 dBi 14 - 18 dBi 9 - 12 dBi
Specialized Mobile Radio SMR and ESMR: 806 - 869 MHz	Single Polarized Sector Omni	12 - 18 dBi 12 dBi

Other Applications

In addition, Andrew offers PerforMax™ vertically-polarized omnidirectional antennas for Rural Telephony applications as well as paging applications.

Call our Customer Service Center for more information.

For specific models, specifications, and patterns, ask for PerforMax™ Antenna Bulletin 10138.

PerforMax™ Single-Polarized Sector Antennas:

UMTS:

1920 - 2170 MHz

PCS/PCN:

1710 - 1880 MHz and 1850 - 1990 MHz

Cellular Systems:

824 - 896 MHz and 870 - 960 MHz

SMR/ESMR:

806 - 869 MHz

Gains:

11 dBi to 22 dBi

Horizontal Beamwidths:

33- to 120-degrees

Includes extended connector that aids installation

Optional integral jumper

Features:

- *High Performance Elevation Patterns*
- *Low IMD*
- *Many Models Include Null Fill and Upper Side Lobe Suppression; Others are Optimized for Maximum Gain*
- *Guaranteed Performance*
- *Comprehensive Range of Electrical Downtilt Options*

PerforMax™ Sector Antennas are designed with an aesthetically pleasing appearance, low weight and low wind loading. With broadband frequency ranges, they are well suited for transmit or receive applications.

For specific models, specifications, and patterns, ask for PerforMax™ Antenna Bulletin 10138.

Dual-Polarized Sector Antennas

PerforMax™ Dual-Polarized Sector Antennas:

UMTS:

1920 - 2170 MHz

PCS/PCN:

1710 - 1880 MHz and 1850 - 1990 MHz

Cellular Systems:

824 - 896 MHz and 870 - 960 MHz

SMR/ESMR:

806 - 869 MHz

Gains:

14 to 18 dBi

Horizontal Beamwidths:

60- to 90-degrees

Features:

- *High Performance Elevation Patterns*
- *Low IMD*
- *Many Models Include Null Fill and Upper Side Lobe Suppression; Others are Optimized for Maximum Gain*
- *Guaranteed Performance*
- *Comprehensive Range of Electrical Downtilt Options*
- Replaces Two Single-Polarized Antennas in a Space Diversity Configuration. Replaces Three Single-Polarized Antennas when a Diplexer is Used
- Reduces Tower Space and Infrastructure Costs. Speeds Zoning Approvals
- Includes Extended Connector that aides Installation

PerforMax™ Dual-Polarized Sector Antennas from Andrew are designed for modern base station applications. New technology brings high performance in a trim profile that enhances antenna aesthetics.

Polarization diversity is a proven attractive alternative to space diversity techniques. Dual-polarization allows for receive diversity without the need for large structures on top of the tower.

For specific models, specifications, and patterns, ask for PerforMax™ Antenna Bulletin 10138.

ANDREW®

Revised 6/01

PerforMax™ Omni Antennas:

PCS/PCN:

1710 - 1880 MHz and 1850 - 1990 MHz

Cellular Systems:

824 - 896 MHz and 870 - 960 MHz

SMR/ESMR:

806 - 869 MHz

Rural Telephony:

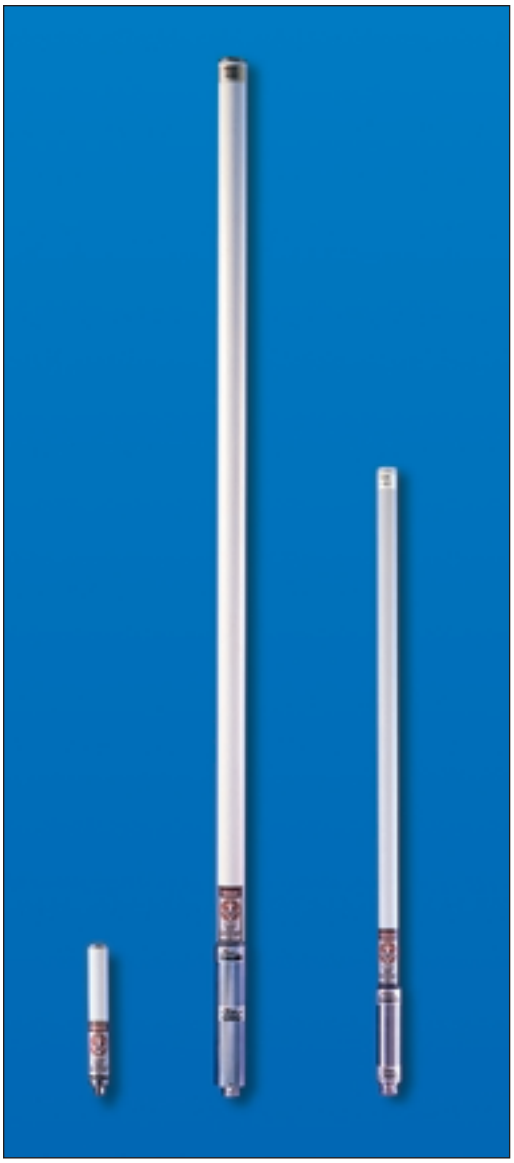
2.3 - 2.485 GHz

Paging:

901–902 MHz, 901–944 MHz

Gains:

2 dBi to 12 dBi



Features:

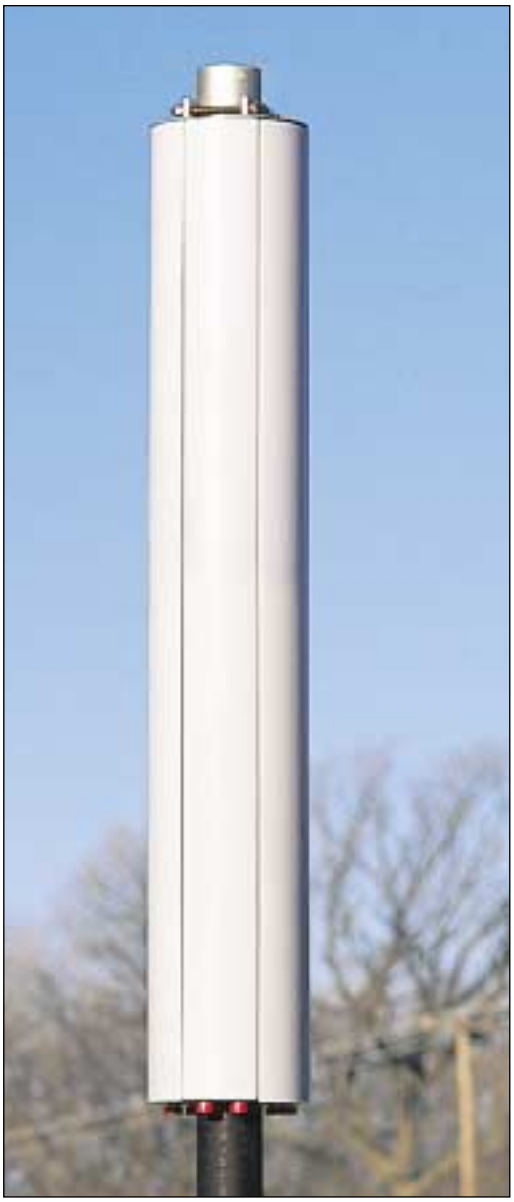
- *Weather-Tight, High-Strength Radome Minimizes Beam Deflection, Maintains Beam Integrity and Provides Peak Performance in Even the Harshest Environments*
- *Patented Radiating Element with Fewer Internal Components for Low IMD and Superior Reliability in Wind and Vibration Conditions*

Based on patented technology, Andrew PerforMax™ Omni Antennas have superior performance, outstanding reliability and excellent durability.

PerforMax™ Omni Antennas are designed for an aesthetically pleasing appearance and low wind loading.

For specific models, specifications, and patterns, ask for PerforMax™ Antenna Bulletin 10138.

Microsite Antenna Mounts



Complete 3-Sector Antenna Site in One, Trim Cylinder for PCS/PCN 1800/1900 MHz

The Microsite system is the innovative answer to zoning concerns regarding the appearance of your base station.

Features:

- *Pipe-Mounted Microsite System Installs Virtually Anywhere – on Towers, Billboards, Buildings*
- *No Secondary Radome is Needed – No Performance Degradation*
- *Easy Zoning Board Approval – Most Aesthetically Pleasing Mounting System Available*

The Microsite antenna mounting system holds three Andrew PerforMax™ dual-polarized PCS/PCN 1800/1900 antennas in a compact 12-inch (305 mm) diameter. Its low visual profile is the trimmest in the industry and readily meets with residential and zoning board approval.

One Microsite system with three PerforMax™ dual-polarized antennas can replace up to nine single-polarized antennas mounted on a triangular platform. One-third as many antennas, clean, pleasing appearance and dual-polarization technology is a proven alternative to costly and ungainly space diversity techniques for designing a PCS/PCN base station.

The lightweight Microsite mount system is as easy to install as a standard mount. No special tools are needed. Access to the top of the mounting pipe is not required to install the Microsite system, significantly simplifying installation and reducing costs. Antennas are mounted 120-degrees apart and can be individually accessed if service is required. Color matched “filler” panels eliminate the gaps between antennas and create a neat, unobtrusive cylinder.

For specific models, specifications, and patterns, ask for PerforMax™ Antenna Bulletin 10138.

Complete 3-Sector Antenna Site in One, Trim Cylinder for Cellular 800/900 MHz

The Cluster Mount system is the innovative answer to zoning concerns regarding the appearance of your base station.

Features:

- *Pipe-Mounted Cluster Mount System Installs Virtually Anywhere – on Towers, Billboards, Buildings*
- *No Secondary Radome is Needed – No Performance Degradation*
- *Easy Zoning Board Approval – Aesthetically Pleasing Mounting System*
- *Dramatically Reduces Tower and Site Costs*
- *Lightweight*
- *Clean, Pleasing Appearance*
- *Easy to Install – No Special Tools Needed*
- *Easy to Service*

The Cluster Mount system holds three PerforMax™ dual-polarized cellular 800/900 MHz antennas in a compact 26-inch (660 mm) cylinder when no mechanical downtilt is applied. Its low visual profile reduces visible antenna hardware and eases residential and zoning board approval.

One Cluster Mount system with three PerforMax™ dual-polarized antennas can replace up to nine single-polarized antennas mounted on a triangular platform. Only one-third as many antennas are needed. Dual-polarization technology is a proven alternative to costly and ungainly space diversity techniques for designing a cellular base station.

The lightweight Cluster Mount installs as easily as a standard mount. Access to the top of the mounting pipe is not required to install the Cluster Mount system, significantly simplifying installation and reducing costs. Antennas are mounted 120-degrees apart and can be individually serviced.

A Cluster Mount system permits independent, continuous mechanical downtilt of each antenna from 0 to 12-degrees. The Cluster Mount is also available with no mechanical downtilt adjustment when the absolute lowest profile is required.

For specific models, specifications, and patterns, ask for PerforMax™ Antenna Bulletin 10138.

Antenna Tilt Mounts

For Sector Antennas in PCS, Cellular, or SMR/ESMR Systems

Features:

- *Continuous Tilt Adjustment*
- *Easy to Install*
- *Simple to Set or Change in the Field*
- *Provides Maximum Flexibility in Network Design*

Andrew omnidirectional base station antennas for Rural Telephony applications are available in vertical polarization with gains of 8 dBi and 13 dBi.

The omnidirectional antennas feature low VSWR characteristics, low intermodulation distortion and can be optimized with electrical downtilt and null fill based upon the gain configuration to optimize total coverage.

Pressurization

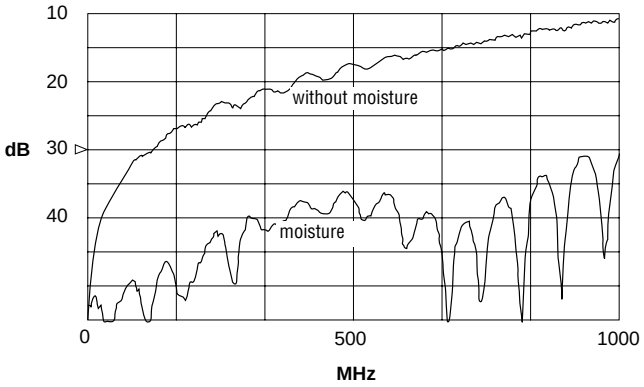
Index

General Information

Pressurize Your Antenna System for Better Performance and Greater Protection

Maintain System Performance, Save Money

Andrew pressurization equipment can maintain the performance of your premium antenna system components and save you money. A constant supply of dry air under pressure to your transmission lines assures you of high signal quality, low VSWR, and reduced risk of component damage from the effects of moisture.



Transmission Line Return Loss with and without moisture.

Operating costs are less because of lower maintenance costs. As a result, lower total costs are realized over the life of your system. You supply a better product for your customers and achieve more market coverage per dollar.

Reduce Risk of Damage, Interruption of Service

Pressurization of your transmission line and antenna system reduces your risk of damage and costly interruption of service. Corrosion caused by accumulated moisture and voltage breakdown (arcing) can be eliminated through positive pressure on the transmission lines.

Over 60 years of Andrew experience and thousands of installations assures you of dependability. Andrew dehydrators are built under high quality standards and each unit is individually tested for eight hours to verify operation. The wide variety of Andrew pressurization equipment available assures you of a dehydrator compatible with your system and design flexibility to meet your future needs.

Minimize Down Time, Protect Revenue

Protection of your revenue stream is important to us because we know that in your business, every minute counts. That's why in the U.S.A. we provide emergency loaner equipment whenever you need it - 24 hours a day, 365 days a year. Our dehydrator alarm options provide sensing of pressure and high humidity and automatic switching of remote units. These alarms quickly alert you to the possible onset of electrical performance degradation so that you can take action.

Simplify Installation, Save Time

Choosing Andrew as a single source for both your pressurization system and antenna system saves you time. There's no need to manage several suppliers. Our wide selection of products, extensive documentation and quick response to your technical questions assure you of proper installation. You'll also save time with our rapid response to price and delivery inquiries and simplified order entry.

Tailored to Your Needs

The Andrew dedicated pressurization R&D department and environmental laboratory can provide you with custom design and manufacturing. When you inquire about special systems requirements, you will receive a quick response. We have a variety of monitoring and alarm feature sets. We'll design, build, and test to satisfy military or other unique requirements.

Moisture in a transmission line can cause corrosion that increases attenuation and reduces system performance.

Burned PTFE shows the conductive path formed by dust-laden moisture. As the path arcs over, the transmission line fails.

World Class Pressurization

Regulations

Andrew dehydrators described in this catalog, except 40525A Series, have been tested and qualified to meet the following worldwide regulatory electrical safety and interference requirements, where applicable, based upon voltage and power frequency.

Conforms to UL 508, Industrial Control Equipment and UL 1995, Refrigeration and AC Compressor Units as tested by ETL Testing Laboratories, Inc., Cortland, New York, a Nationally Recognized Testing Laboratory (NRTL).

Certified to CSA 22, Heating and Cooling Equipment as tested by ETL Testing Laboratories, Inc., Cortland, New York, a Nationally Recognized Testing Laboratory (NRTL).

FCC Class A, Part 15, Sub-part B and DOC Regulations CRC, C.1374

IEC 801-2	Electrostatic Discharge Susceptibility – Immune to ESA from Severity Level 1 (2 kV) through Severity Level 3 (8 kV).
IEC 801-3	Radiated Susceptibility – Electric Field Immune to RFI at 3 V/m from 27 to 500 MHz.
IEC 801-4	Conducted Transients Susceptibility – Immune to conducted line voltage bursts.
EN50082-1	European Community Generic Immunity
CISPR 11	Group 1, Class A EN55011
CISPR 14	(EN55014)
EN60204-1	European Safety

Types of Dry Gas Supply

Pressurization systems can be classified as static or dynamic.

Static Systems: In a non-pressurized system, a breathing static desiccator may be utilized. As the system pressure increases, air is forced out through the desiccator. As pressure decreases, make-up air passes through the desiccator which absorbs the moisture before allowing dry air to enter the system. A static desiccator will last many months on a very small, tight system of 1 ft^3 (28 liters) or less.

In a pressurized static system, the transmission line is pressured by an external source such as a hand pump or other means and the source removed. Since the system is not hermetically sealed, it will require frequent inspection for recharging. The gas inlet valve must be readily accessible, and the system operation is very labor intensive.

Dynamic Systems: A dynamic system incorporates a pressurizing source that provides dry gas on demand. The pressurizing source may be nitrogen tanks with a regulator, or an automatic dehydrator. The source is permanently connected to the transmission line system and recharges it to a preset positive pressure as required to compensate for leakage losses. Nitrogen tanks are used for small tight systems where ac power is unavailable. There are no moving parts and they provide a low dewpoint, but the hidden costs of monitoring and tank replacement can be expensive. They are recommended only for systems having low internal and purge volumes. System leaks bleed down tanks rapidly and delivery of nitrogen tanks to site can be undependable.

Manual regenerative dehydrators, which use moisture adsorptive desiccant that can be regenerated by baking in an oven, are also ideal for small, tight systems and are economical. They require small amounts of electrical power and the desiccant must be inspected and regenerated periodically, but they are extremely reliable in operation in many locations and applications.

The newer, fully automatic membrane dehydrators are recommended for low to high system and purge volumes. They are designed to cycle on and off, or run continuously in an emergency, providing a maintenance-free dry air system. Older “pressure swing” automatic dehydrators perform a similar function, but they do not provide the same trouble-free performance, low noise and vibration, and continuous drying capability the membrane units do.

Replace your old or obsolete pressurization system with a state-of-the-art DryLine® dehydrator from Andrew.

Dehydrator Selection Considerations

Total System Volume
System Pressure Rating
Availability of Maintenance
Availability of Electric Power

Total System Volume. System volume is determined by adding up the volume of each air dielectric transmission line component for a given installation. For an earth station antenna, the system volume may consist of less than one cubic foot inside the feed and combiner. For a large microwave or broadcast system, it may consist of many cubic feet of air contained in several hundred feet of air dielectric cable or waveguide.

The selected dehydrator must be capable of supplying this volume plus an anticipated leak rate of 1%, and provide sufficient capacity to maintain pressure during a 19°C (35°F) temperature drop in 60 minutes.

These variables have been taken into account in the dehydrator sizing, which can be calculated using the worksheet on pages 264 and 265.

System Pressure Rating. The pressure inside a transmission line system must be maintained at a positive level and below the maximum pressure rating of the components in the system. See “Caution” at the top of calculation page 265.

Availability of Maintenance. Hand pumps, nitrogen, static desiccators and manual regenerative dehydrators are best suited to low volume tight systems at readily accessible sites. However, the monitoring and changing of the desiccator or nitrogen tanks are labor intensive. Remote and unattended sites are best suited for the fully automatic membrane dehydrator, which is virtually maintenance-free. All Andrew dehydrators can be changed out in less than 10 minutes without losing system pressure.

Availability of Electric Power. Dehydrators are available in multiple voltages. The selection must be compatible with the available Mains power, taking into account proper wire size to prevent voltage drop from the building Mains to the dehydrator, and proper Mains circuit breaker size. Dehydrators are available for 115 Vac/60 Hz and 220 Vac/50 Hz operation and for 21 to 68 Vdc operation. Some units operate over wider ac and dc ranges. Detailed descriptions, features and characteristics follow on pages 247 through 256.

Alarm Options and Benefits

Alarms are available to alert you to system status. These contacts are brought to a chassis-mounted terminal strip (for dehydrators) or to a rear-mounted terminal strip (for XH line monitors). The low pressure alarm on MT-600/1700 is on a cable, instead of at the terminal strip.

Low Pressure Alarm. Standard on all dehydrators. When pressure drops below a set point, dry contacts will close or the switch will operate to signal an alarm to the customer provided system. For the XT series dehydrators, the alarm setting is user programmable; for all other units it is factory set. A low pressure alarm can alert you to a power failure, (the dehydrator is not being activated), waveguide damage by projectiles or a lightning strike (the dehydrator runs, but cannot provide the minimum pressure), or a dehydrator malfunction.

High Pressure Alarm. Option available on XH series line monitors, 40004 pressurization monitors and selected MT050 dehydrators. When pressure increases above a set point, dry contacts operate to signal an alarm. The XH setting is user programmable; the 40004 and MT050 are factory set. Dehydrators typically do not require a high pressure alarm. All except 40525A series include an overpressure relief valve.

Excessive Run Alarm. Option for most dehydrators. Adjustable by the user to indicate continuous running of the dehydrator. When the unit reaches the preset excess run time, a contact will close or a switch will operate to signal the alarm. The excess run alarm will alert you to system degradation due to failure or vandalism, or a dehydrator that fails to shut off in the normal time. The unit should be preset for a few minutes above the normal dehydrator run time.

High Humidity Alarm. Option for most dehydrators. The alarm is factory set to operate at 7.5% relative humidity. When the dewpoint of the dehydrator reaches the set point, a dry contact switch will operate and signal the alarm.

Power Fail Alarm. A dry contact switch operates when power is removed from the unit or the circuit breaker opens.

Flow Meters

Flow meters, available with the multiple output line monitors, are useful in monitoring a system. Two scales are provided for observation depending on dehydrator output. A black ball measures flow from 0 to 7 ft^3/hr (0 to 200 l/hr) and a silver ball from 8 to 28 ft^3/hr (225 to 790 l/hr). They are used to check the integrity of the various lines. The red arrow indicator is placed at the location of the ball while the system is being pressurized to establish a base value. A positive deviation from this initial setting is an indication of degradation of that particular line.

Dehydrator Selection Chart – U.S. Customary Units

Model Number	Flow Rate SCFM*	Pressure PSIG*	Dew Point °F	Recom. Volume ft³	Type**	Desiccant Capacity ft³	Voltage	Freq. Hz	Power Watts	Alarms Provided*	Operating Temp. °F	Power Cord	Meets Regulatory Requirements of
40525A													
40525A	0.9	3-8	-33	0-10	D	200	115 Vac	60	230	none	32 to 90	US	None
40525A-3	0.9	3-8	-33	0-10	D	200	230 Vac	50	230	none	32 to 90		None
40525A-4	0.9	1-5	-33	0-10	D	200	115 Vac	60	230	none	32 to 90	US	None
40525A-5	0.9	1-5	-33	0-10	D	200	230 Vac	50	230	none	32 to 90		None
MR050													
MR050-31045	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	US	ETL/CETL/CE
MR050-31046	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	Export	ETL/CETL/CE
MR050-31037	0.05	0.3-0.5	-40	0-10	D	200	10-72 Vdc	dc	11	LP	-16 to 104	DC cable	ETL/CETL/CE
MR050-31345	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	US	ETL/CETL/CE
MR050-31346	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	Export	ETL/CETL/CE
MR050-31337	0.05	0.3-0.5	-40	0-10	D	200	10-72 Vdc	dc	11	Full	-16 to 104	DC cable	ETL/CETL/CE
MR050-81045	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	US	ETL/CETL/CE
MR050-81046	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	Export	ETL/CETL/CE
MR050-81037	0.05	3-5	-40	0-10	D	200	10-72 Vdc	dc	11	LP	-16 to 104	DC cable	ETL/CETL/CE
MR050-81345	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	US	ETL/CETL/CE
MR050-81346	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	Export	ETL/CETL/CE
MR050-81337	0.05	3-5	-40	0-10	D	200	10-72 Vdc	dc	11	Full	-16 to 104	DC cable	ETL/CETL/CE
MRS050													
MRS050-31045	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	US	CE
MRS050-31046	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	Export	CE
MRS050-31037	0.05	0.3-0.5	-40	0-10	D	200	10-72 Vdc	dc	11	LP	-16 to 104	DC cable	CE
MRS050-31345	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	US	CE
MRS050-31346	0.05	0.3-0.5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	Export	CE
MRS050-31337	0.05	0.3-0.5	-40	0-10	D	200	10-72 Vdc	dc	11	Full	-16 to 104	DC cable	CE
MRS050-81045	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	US	CE
MRS050-81046	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	LP	-16 to 104	Export	CE
MRS050-81037	0.05	3-5	-40	0-10	D	200	10-72 Vdc	dc	11	LP	-16 to 104	DC cable	CE
MRS050-81345	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	US	CE
MRS050-81346	0.05	3-5	-40	0-10	D	200	85-264 Vac	47-400	11	Full	-16 to 104	Export	CE
MRS050-81337	0.05	3-5	-40	0-10	D	200	10-72 Vdc	dc	11	Full	-16 to 104	DC cable	CE
MT050													
MT050-81015	0.05	5	-50	0-20	M	N/A	115 Vac	50/60	184	LP	34 to 104	US	ETL/CETL/CE
MT050-81026	0.05	5	-50	0-20	M	N/A	230 Vac	50/60	184	LP	34 to 104	Export	ETL/CETL/CE
MT050-81037	0.05	5	-50	0-20	M	N/A	21-28/42-68 Vdc	dc	230	LP	34 to 104	None	ETL/CETL/CE
MT050-81315	0.05	5	-50	0-20	M	N/A	115 Vac	50/60	184	Full	34 to 104	US	ETL/CETL/CE
MT050-81326	0.05	5	-50	0-20	M	N/A	230 Vac	50/60	184	Full	34 to 104	Export	ETL/CETL/CE
MT050-81337	0.05	5	-50	0-20	M	N/A	21-28/42-68 Vdc	dc	230	Full	34 to 104	None	ETL/CETL/CE
MT050-81526	0.05	5	-50	0-20	M	N/A	230 Vac	50/60	184	Full+ HP	34 to 104	Export	ETL/CETL/CE
MT300													
MT300-81015	0.3	3-8	-50	2-80	M	N/A	115 Vac	50/60	390	LP	34 to 120	US	ETL/CETL/CE
MT300-81026	0.3	3-8	-50	2-80	M	N/A	230 Vac	50/60	390	LP	34 to 120	Export	ETL/CETL/CE
MT300-82015	0.3	3-8	-50	2-80	M	N/A	115 Vac	50/60	390	LP	34 to 120	US	ETL/CETL/CE
MT300-82026	0.3	3-8	-50	2-80	M	N/A	230 Vac	50/60	390	LP	34 to 120	Export	ETL/CETL/CE
MT300-81315	0.3	3-8	-50	2-80	M	N/A	115 Vac	50/60	390	Full	34 to 120	US	ETL/CETL/CE
MT300-81326	0.3	3-8	-50	2-80	M	N/A	230 Vac	50/60	390	Full	34 to 120	Export	ETL/CETL/CE
MT300-82315	0.3	3-8	-50	2-80	M	N/A	115 Vac	50/60	390	Full	34 to 120	US	ETL/CETL/CE
MT300-82326	0.3	3-8	-50	2-80	M	N/A	230 Vac	50/60	390	Full	34 to 120	Export	ETL/CETL/CE
XT300													
XT300-91015	0.3	P 0.3-15	-50	2-80	M	N/A	115 Vac	50/60	390	Note 1	34 to 120	US	ETL/CETL/CE
XT300-91026	0.3	P 0.3-15	-50	2-80	M	N/A	230 Vac	50/60	390	Note 1	34 to 120	Export	ETL/CETL/CE
XT300-92015	0.3	P 0.3-15	-50	2-80	M	N/A	115 Vac	50/60	390	Note 1	34 to 120	US	ETL/CETL/CE
XT300-92026	0.3	P 0.3-15	-50	2-80	M	N/A	230 Vac	50/60	390	Note 1	34 to 120	Export	ETL/CETL/CE
MT-600													
MT-600-201	0.6	3-8	-50	50-150	M	N/A	115 Vac	50/60	780	LP	34 to 120	US	ETL/CETL/CE
MT-600-202	0.6	3-8	-50	50-150	M		230 Vac	50/60	720	LP	34 to 120	Export	ETL/CETL/CE
XT-600													
XT-600-201	0.6	P 0.3-15	-50	50-150	M	N/A	115 Vac	50/60	780	Note 1	34 to 120	US	ETL/CETL/CE
XT-600-202	0.6	P 0.3-15	-50	50-150	M	N/A	230 Vac	50/60	720	Note 1	34 to 120	Export	ETL/CETL/CE
MT-1700													
MT-1700-201	1.7	3-8	-50	110-400	M	N/A	115 Vac	50/60	1580	LP	34 to 120	US	ETL/CETL/CE
MT-1700-202	1.7	3-8	-50	110-400	M	N/A	230 Vac	50/60	1430	LP	34 to 120	Export	ETL/CETL/CE
XT-1700													
XT-1700-201	1.7	P 0.3-15	-50	110-400	M	N/A	115 Vac	50/60	1580	Note 1	34 to 120	US	ETL/CETL/CE
XT-1700-202	1.7	P 0.3-15	-50	110-400	M	N/A	230 Vac	50/60	1430	Note 1	34 to 120	Export	ETL/CETL/CE
XT4500													
XT4500-91325	4.5	P 0.3-5	-50	100-2500	M	N/A	230 Vac	50/60	2645	Full	34 to 104	US	ETL/CETL/CE
XT4500-01325	4.5	P 0.3-5	-50	100-2500	M	N/A	230 Vac	50/60	2645	Full	34 to 104	US	ETL/CETL/CE

* SCFM = standard cubic feet per minute at standard altitude (sea level), temperature (70°F) and pressure (14.7 psig). PSIG = gauge pressure in lb/in^2.
P = programmable. LP = low pressure. HP = high pressure.

** M = Membrane DryLine type dehydrator. D = Desiccant type dehydrator requires manual regeneration of desiccant after 200 cubic feet of air is used.
LP = Low pressure alarm. Full = Full alarm option includes low pressure, high humidity, power fail and excess run provided on terminal strip.
Note 1: Alarms for XT dehydrators provided by XH monitor (required for all XT series dehydrators, except XT4500).

Dehydrator Selection Chart – International Standard (SI) Units

Model Number	Flow Rate SLPM*	Pressure kPa*	Dew Point °C	Recom. Vol. Liters	Desiccant Type**	Desiccant Capacity Liters	Voltage	Freq. Hz	Power Watts	Alarms Provided*	Operating Temp. °C	Power Cord	Meets Regulatory Requirements of
40525A													
40525A	25	21-55	-36	0-283	D	5660	115 Vac	60	230	none	0 to 32	US	None
40525A-3	25	21-55	-36	0-283	D	5660	230 Vac	50	230	none	0 to 32		None
40525A-4	25	7-34	-36	0-283	D	5660	115 Vac	60	230	none	0 to 32	US	None
40525A-5	25	7-34	-36	0-283	D	5660	230 Vac	50	230	none	0 to 32		None
MR050													
MR050-31045	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	US	ETL/CETL/CE
MR050-31046	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	Export	ETL/CETL/CE
MR050-31037	1.4	2.1-3.5	-40	0-283	D	5660	10-72 Vdc	dc	11	LP	-10 to 40	DC cable	ETL/CETL/CE
MR050-31345	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	US	ETL/CETL/CE
MR050-31346	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	Export	ETL/CETL/CE
MR050-31337	1.4	2.1-3.5	-40	0-283	D	5660	10-72 Vdc	dc	11	Full	-10 to 40	DC cable	ETL/CETL/CE
MR050-81045	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	US	ETL/CETL/CE
MR050-81046	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	Export	ETL/CETL/CE
MR050-81037	1.4	21-35	-40	0-283	D	5660	10-72 Vdc	dc	11	LP	-10 to 40	DC cable	ETL/CETL/CE
MR050-81345	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	US	ETL/CETL/CE
MR050-81346	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	Export	ETL/CETL/CE
MR050-81337	1.4	21-35	-40	0-283	D	5660	10-72 Vdc	dc	11	Full	-10 to 40	DC cable	ETL/CETL/CE
MRS050													
MRS050-31045	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	US	CE
MRS050-31046	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	Export	CE
MRS050-31037	1.4	2.1-3.5	-40	0-283	D	5660	10-72 Vdc	dc	11	LP	-10 to 40	DC cable	CE
MRS050-31345	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	US	CE
MRS050-31346	1.4	2.1-3.5	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	Export	CE
MRS050-31337	1.4	2.1-3.5	-40	0-283	D	5660	10-72 Vdc	dc	11	Full	-10 to 40	DC cable	CE
MRS050-81045	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	US	CE
MRS050-81046	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	LP	-10 to 40	Export	CE
MRS050-81037	1.4	21-35	-40	0-283	D	5660	10-72 Vdc	dc	11	LP	-10 to 40	DC cable	CE
MRS050-81345	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	US	CE
MRS050-81346	1.4	21-35	-40	0-283	D	5660	85-264 Vac	47-400	11	Full	-10 to 40	Export	CE
MRS050-81337	1.4	21-35	-40	0-283	D	5660	10-72 Vdc	dc	11	Full	-10 to 40	DC cable	CE
MT050													
MT050-81015	1.4	35	-45	0-566	M	N/A	115 Vac	50/60	184	LP	1 to 40	US	ETL/CETL/CE
MT050-81026	1.4	35	-45	0-566	M	N/A	230 Vac	50/60	184	LP	1 to 40	Export	ETL/CETL/CE
MT050-81037	1.4	35	-45	0-566	M	N/A	21-28/42-68 Vdc	dc	230	LP	1 to 40	None	ETL/CETL/CE
MT050-81315	1.4	35	-45	0-566	M	N/A	115 Vac	50/60	184	Full	1 to 40	US	ETL/CETL/CE
MT050-81326	1.4	35	-45	0-566	M	N/A	230 Vac	50/60	184	Full	1 to 40	Export	ETL/CETL/CE
MT050-81337	1.4	35	-45	0-566	M	N/A	21-28/42-68 Vdc	dc	230	Full	1 to 40	None	ETL/CETL/CE
MT050-81526	1.4	35	-45	0-566	M	N/A	230 Vac	50/60	184	Full+ HP	1 to 40	Export	ETL/CETL/CE
MT300													
MT300-81015	8.5	21-55	-45	56-2264	M	N/A	115 Vac	50/60	390	LP	1 to 49	US	ETL/CETL/CE
MT300-81026	8.5	21-55	-45	56-2264	M	N/A	230 Vac	50/60	390	LP	1 to 49	Export	ETL/CETL/CE
MT300-82015	8.5	21-55	-45	56-2264	M	N/A	115 Vac	50/60	390	LP	1 to 49	US	ETL/CETL/CE
MT300-82026	8.5	21-55	-45	56-2264	M	N/A	230 Vac	50/60	390	LP	1 to 49	Export	ETL/CETL/CE
MT300-81315	8.5	21-55	-45	56-2264	M	N/A	115 Vac	50/60	390	Full	1 to 49	US	ETL/CETL/CE
MT300-81326	8.5	21-55	-45	56-2264	M	N/A	230 Vac	50/60	390	Full	1 to 49	Export	ETL/CETL/CE
MT300-82315	8.5	21-55	-45	56-2264	M	N/A	115 Vac	50/60	390	Full	1 to 49	US	ETL/CETL/CE
MT300-82326	8.5	21-55	-45	56-2264	M	N/A	230 Vac	50/60	390	Full	1 to 49	Export	ETL/CETL/CE
XT300													
XT300-91015	8.5	P 2-105	-45	56-2264	M	N/A	115 Vac	50/60	390	Note 1	1 to 49	US	ETL/CETL/CE
XT300-91026	8.5	P 2-105	-45	56-2264	M	N/A	230 Vac	50/60	390	Note 1	1 to 49	Export	ETL/CETL/CE
XT300-92015	8.5	P 2-105	-45	56-2264	M	N/A	115 Vac	50/60	390	Note 1	1 to 49	US	ETL/CETL/CE
XT300-92026	8.5	P 2-105	-45	56-2264	M	N/A	230 Vac	50/60	390	Note 1	1 to 49	Export	ETL/CETL/CE
MT-600													
MT-600-201	17	21-55	-45	1415-4245	M	N/A	115 Vac	50/60	780	LP	1 to 49	US	ETL/CETL/CE
MT-600-202	17	21-55	-45	1415-4245	M		230 Vac	50/60	72	LP	1 to 49	Export	ETL/CETL/CE
XT-600													
XT-600-201	17	P 2-105	-45	1415-4245	M	N/A	115 Vac	50/60	780	Note 1	1 to 49	US	ETL/CETL/CE
XT-600-202	17	P 2-105	-45	1415-4245	M	N/A	230 Vac	50/60	72	Note 1	1 to 49	Export	ETL/CETL/CE
MT-1700													
MT-1700-201	48	21-55	-45	3113-11320	M	N/A	115 Vac	50/60	1580	LP	1 to 49	US	ETL/CETL/CE
MT-1700-202	48	21-55	-45	3113-11320	M	N/A	230 Vac	50/60	1430	LP	1 to 49	Export	ETL/CETL/CE
XT-1700													
XT-1700-201	48	P 2-105	-45	3113-11320	M	N/A	115 Vac	50/60	1580	Note 1	1 to 49	US	ETL/CETL/CE
XT-1700-202	48	P 2-105	-45	3113-11320	M	N/A	230 Vac	50/60	1430	Note 1	1 to 49	Export	ETL/CETL/CE
XT4500													
XT4500-91325	127	P 2-105	-45	2830-70750	M	N/A	230 Vac	50/60	2645	Full	1 to 40	US	ETL/CETL/CE
XT4500-01325	127	P 2-105	-45	2830-70750	M	N/A	230 Vac	50/60	2645	Full	1 to 40	US	ETL/CETL/CE

* SLPM = standard liters per minute at standard altitude (sea level), temperature (21°C) and pressure (101 kPa). kPa = gauge pressure in kilopascals.
P = programmable. LP = low pressure. HP = high pressure.

** M = Membrane DryLine type dehydrator. D = Desiccant type dehydrator requires manual regeneration of desiccant after 5660 cubic liters of air is used.
LP = Low pressure alarm. Full = Full alarm option includes low pressure, high humidity, power fail and excess run provided on terminal strip.

Note 1: Alarms for XT dehydrators provided by XH monitor (required for all XT series dehydrators, except XT4500).

Static desiccators are compact and economical, disposable devices which eliminate moisture in very small transmission lines and antenna feeds. The units have no moving parts and no electrical connections, yet they are capable of providing many months of protection.

Typical service life, of an SD-001, in a very small system of 0.1-ft^3 (2.8 liters) volume, experiencing a temperature change of 22° C (40° F) per day, at 40% RH, is one year.

Similarly, the service life of an SD-002A in a larger system having 1-ft^3 volume and experiencing a temperature change of 10°C (30°F) per day, at 40% RH, is also one year.

Static desiccators mount directly to any convenient pressure inlet having a 1/8" NPT female fitting. Mount them in a location that is easily accessible for viewing and replacement.

The clear plastic body of the SD-001 and the translucent polyethylene container of the SD-002A allow visual inspection of the indicating desiccant as the color turns from blue to pink/white and the material becomes exhausted.

When the desiccant has changed to the pink/white color in 80% of the viewing area, the unit should be replaced.

System volumes up to 0.1 ft^3 (2.8 liters)

SD-001 Static Desiccator for Small Systems

Applications – A single unit is recommended for small feeds and very small and short waveguide runs having internal volumes of less than 0.1 ft^3. This unit is ideal for antenna feeds that are fed by foam-dielectric cable where conventional pressurization is not possible. The SD-001 mounts directly to the feed's 1/8" NPT female pressure fitting.

SD-001 Static Desiccator Characteristics

Dimensions	4.75 in (121 mm) long by 1.0 in (25 mm) diameter
Net Weight	0.2 lb (0.09 kg)
Temperature Range	-50°C (-58°F) to +50°C (122°F)
Interface	1/8" NPT male threads

System volumes up to 1 ft^3 (28 liters)

SD-002A Static Desiccator

Applications – In general, one unit is recommended for feed and combiners having less than 1 ft^3 (28 l) volume. If a 1/8" NPT fitting is not available, use a pressure inlet (Pressure inlets are not included with the static desiccator.)

Microwave Applications – Ideal for rooftop applications at any frequency with waveguide up to 10 ft (3 m) in length.

ESA Applications – Typical applications are shown on page 263. The recommendations are for antennas without air dielectric feeder systems (for example, connected using foam dielectric cable or having radio equipment mounted inside the antenna hub). Actual requirements should be based on total system volume, but most ESA antennas can be covered with one SD-002A.

Note: If the volume consists of a long run of waveguide (in excess of 10 ft), a dehydrator is recommended.

SD-002A Static Desiccator Characteristics

Dimensions	4 in (102 mm) long, excluding the 1/8" NPT fitting by 2 in (51 mm) diameter
Net Weight	0.4 lb (0.18 kg)
Temperature Range	-50°C (-58°F) to +50°C (122°F)
Interface	1/8" NPT male threads

Note: the SD-002A is not recommended for applications where there is direct exposure to sunlight. Use an SD-001 or a dehydrator instead.

860G
Hand Pump

System Volumes up to 10 ft³ (283 liters)

Hand pumps are lightweight portable air drying systems capable of pressurizing up to 30 lb/in² (210 kPa). Removal of moisture is accomplished by passing ambient air through a cylinder of color indicating silica gel desiccant. The pump contains a sight glass to view the moisture condition of the desiccant. When the dark blue color changes to amber, it is time to replace or regenerate the desiccant. Do not use the pump after the desiccant turns amber.

The desiccant may be regenerated by baking in an oven at 177°C (350°F) for approximately four hours until it returns to a dark blue color. Allow to cool in a sealed container before returning it to the pump.

Initial system purging is recommended. It takes 80 strokes to purge a 1 ft³ volume with one air change. To pressurize the same volume, it requires 5.5 strokes per 1.0 lb/in².

Applications – Hand pumps are suitable for use in pressurizing any small, tight, electromechanical apparatus requiring dry air to protect against the ingress of moisture, and can supply approximately 135 ft³ (3857 liters) of dry air under ambient conditions of 40% relative humidity and 21°C (70°F) before regeneration is required.

Each pump comes with a 7 ft (2 m) hose to easily reach a gas inlet valve. If the system does not contain a pressure gauge, the Model 860G hand pump contains a 0-30 lb/in² (207 kPa) gauge and fittings.

860G Hand Pump Characteristics

Dimensions	8 in (203 mm) base, 2.5 in (64 mm) diameter housing, 26 in (660 mm) total height
Net Weight	9.0 lb (4.1 kg)
Temperature range	-15°C to +50°C (5°F to 122°F)
Hose Length	7 feet (2.1 m)
Interface	gas inlet valve

40525A
Basic Manual Regenerative Dehydrator

System Volumes up to 10 ft³ (283 liters)

Manual regenerative dehydrators provide an economical automatic drying system. "Automatic" for the 40525A is defined as automatically responding to the pressure requirements of the system, not automatic regeneration of the desiccant. The color indicating desiccant is easily viewed through the canister attached to the unit, providing for programmed replacement. You can replace the desiccant with new desiccant or you can regenerate it.

To regenerate the desiccant, remove it from the canister and bake it in an oven at 177°C (350°F) for approximately four hours, until it returns to a dark blue color. Allow it to cool in a sealed container. Then return the desiccant to the canister. These dehydrators can supply 200 ft³ (5665 liters) of -40°C (-40°F) dewpoint air under the ambient conditions of 40% RH and 21°C (70°F) before regeneration is needed. They are quiet, vibration-free and come in low and high pressure versions, as well as various voltages.

Applications – The 40525 series dehydrators are ideal where economy is the greatest consideration. These units contain a compressor, pressure switch and a desiccant container. The output is provided with a shut off valve to allow a desiccant change without a system pressure loss.

They are available in ac versions only and are equipped with a 10 ft (3 m) long power cable with a U.S.A. plug which can be replaced with a proper in-country plug.

Each dehydrator comes supplied with a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tubing and a 1/8" NPT to 3/8" poly tube connector and a 1/8" NPT street elbow.

40525A Dehydrator Characteristics

Dimensions	12 x 15.75 x 5 in (305 x 401 x 127 mm)
Net Weight	21 lb (9.5 kg)

MR050/MRS050 Series

Advanced Manual Regenerative Dehydrators

Manual regenerative dehydrators provide an economical automatic drying system. "Automatic" for the MR050 and MRS050 series is defined as automatically responding to the pressure requirements of the system, not automatic regeneration of the desiccant.

The color indicating desiccant is easily viewed through the canister attached to the unit, providing for programmed replacement. You can replace the desiccant with new desiccant or you can regenerate it.

To regenerate the desiccant, remove it from the canister and bake it in an oven at 177°C (350°F) for approximately four hours, until it returns to a dark blue color. Allow it to cool in a sealed container. Then return the desiccant to the canister.

These dehydrators can supply 200 ft^3 (2800 liters) of -40°C (-40°F) dewpoint air under ambient conditions of 40% RH and 21°C (70°F) before regeneration is required. Capacity can be doubled by adding a second desiccant canister in the airpath. They are quiet, vibration-free and come in low and high pressure versions, as well as various voltages.

Each dehydrator comes supplied with a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tubing and a 1/8" NPT to 3/8" poly tube connector and a 1/8" NPT street elbow.

System volumes up to 10 ft^3 (283 liters)

The MR050 series dehydrators are designed to meet the North American and new European N-3 Standards for complete front access for installation and maintenance. The desiccant container and associated connections are readily accessible from the front of the unit. Front mounted controls and status indicators provide system pressure, visual (desiccant color) indication, illuminated on/off switch, circuit breaker and the system shut off valve. Each dehydrator contains a low pressure alarm with Form C dry contacts on a terminal strip for connection to an alarm system. High humidity, excess run, and power fail alarms are provided in a single, add-in alarm option. The MR050 may be rack mounted, wall mounted or self supported and is available in ac and dc versions.

The 220 Vac unit includes IEC power connectors and an International harmonized, 10 ft (3 m) long power cable with stripped leads for installation of a proper in-country plug. The 115 Vac version is equipped with a standard UL/CSA cord and plug. DC units include a dc power connector and a 10 ft (3 m) wired power cable with stripped leads.

MR050 Dehydrator Characteristics

Dimensions	7 x 19 x 8.6 in (178 x 483 x 218 mm)
Net Weight	26 lb (11.8 kg)

For more information **F A X** Bulletin **1 8 4 6** See page 1

System volumes up to 10 ft^3 (283 liters)

The MRS050 series dehydrators are especially designed to meet the European 7R Standards for mounting in slimline racks, providing complete front access for installation and maintenance. The desiccant container and connections are readily accessible from the front of the unit. Front mounted controls and status indicators provide system pressure, visual humidity indication, illuminated on/off switch, circuit breaker and the system shut off valve. Each dehydrator contains a low pressure alarm with Form C dry contacts on a terminal strip for connection to an alarm system. High humidity, excess run, and power fail alarms are provided in a single, add-in alarm option. The MRS050 may be rack mounted or wall mounted and is available in ac and dc versions.

The ac unit includes IEC power connectors and an International harmonized, 10 ft (3 m) long power cable with stripped leads for installation of a proper in-country plug for 220 Vac units and a UL/CSA cord and plug for 115 Vac units. DC units include a dc power connector and a 10 ft (3 m) wired power cable with stripped leads.

MRS050 Dehydrator Characteristics

Dimensions	17.6 x 4.5 x 8.5 in (447 x 115 x 216 mm)
Net Weight	17 lb (7.7 kg)

For more information **F A X** Bulletin **3 5 5 1** See page 1

MT050 DryLine®
Small Automatic Membrane Dehydrator

System Volumes up to 20 ft³ (560 liters)

This small compact fully automatic membrane dehydrator is ideal for earth station, small microwave and cellular systems from 0.1 to 20 ft³ (560 liters) in volume. It requires only 4 RUs, 7 in (178 mm) of space in a 19-inch rack and meets the new European N-3 standards for complete front access for installation and routine maintenance.

The MT050 series are fixed pressure units, factory set at 5 lb/in² (35 kPa). They also include as standard a built in pressure storage tank, low pressure alarm, pressure gauge, lighted On/Off switch and resettable circuit breaker. High humidity, excess run, and power fail alarms are provided in a single, add-in alarm option.

North American domestic 115 V, 60 Hz units are shipped with a UL/CSA approved power cable and plug. International 230 V, 50 Hz units are shipped with an international harmonized power cable with stripped leads for application of in-country Mains plug. DC units require direct wiring from a terminal strip to the user's dc source. All ac cables connect to the dehydrator with a captivated IEC plug.

All MT050s contain a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tubing, a shut-off valve and 1/8" NPT to 3/8" polyethylene tubing connector and a 1/8" NPT street elbow.

Low pressure operation is possible through the addition of a wall-mount regulator. Pressure of 0.4 lb/in² (fixed) or 1 to 5 lb/in² (user adjustable) are available. See page 266.

The MT050 is designed for rack mount or free standing operation. A wall mount shelf is available separately, see page 266.

MT050 Dehydrator Characteristics

Dimensions (ac units)	7.25 x 19 x 14 in (182 x 475 x 356 mm)
Dimensions (dc unit)	7.25 x 19 x 18.25 in (182 x 475 x 464 mm)
Net Weight (ac units)	42 lb (19 kg)
Net Weight (dc units)	47 lb (21 kg)

For more information FAX Bulletin 3550 See page 1

MT300 DryLine®
Medium Automatic Membrane Dehydrator

System Volumes from 2 ft³ (57 liters) to 80 ft³ (2264 liters)

The MT300 series automatic membrane dehydrators are equipped with the unique Andrew uni-mount system allowing for rack, wall or free-standing mounting without additional parts. They are designed to supply dry air at a dewpoint of -45°C (-50°F), or better, under the ambient conditions of 95% RH at 49°C (120°F).

Each MT300 dehydrator contains a low pressure alarm with Form C dry contacts (see page 246) for connection to an alarm system. The MT300 is also available in a sound deadened version. MT300 series are factory set to come on at 3 lb/in² (21 kPa) and to turn off at 8 lb/in² (55 kPa).

An alarm option adds excess run, high humidity, and power fail alarms to the MT300. Units at 115 Vac are shipped with a UL/CSA power cord and plug. 230 Vac units have a harmonized power cable with stripped leads.

All MT300 dehydrators are supplied with a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tube, a shut-off valve and a 1/8" NPT to 3/8" polyethylene connector and a 1/8" NPT street elbow.

Front covers are supplied only on sound deadened units.

Applications – The MT300 series dehydrators are for medium volume microwave, cellular and broadcast systems.

MT300 Dehydrator Characteristics

Dimensions	12.2 x 16.8 x 10.25 in (310 x 428 x 260 mm)
Net Weight	46 lb (21 kg)

For more information FAX Bulletin 1660 See page 1

MT-600 DryLine®
Large Automatic Membrane Dehydrator

System Volumes from 50 ft³ (1415 liters) to 150 ft³ (4245 liters)

The MT-600 series automatic membrane dehydrators are designed to provide the same features and benefits to large microwave and broadcast applications as the smaller MT300. They are equipped with the unique Andrew uni-mount system allowing for rack, wall or free-standing mounting without additional parts and are designed to supply dry air at a dewpoint of -45°C (-50°F), or better, under the ambient conditions of 95% RH at 49°C (120°F).

Each MT-600 dehydrator contains a low pressure alarm with Form C dry contacts (see page 246) for connection to an alarm system. The MT-600 is also available in a sound deadened version. MT-600 series are factory set to come on at 3 lb/in² (21 kPa) and to turn off at 8 lb/in² (55 kPa).

Units at 115 Vac are shipped with a UL/CSA power cord and plug. 230 Vac units have a harmonized power cable with stripped leads.

All dehydrators contain a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tube, a shut-off valve and a 1/8" NPT to 3/8" polyethylene connector and a 1/8" NPT street elbow.

Front covers are supplied only on sound deadened units.

Applications – The MT600 series dehydrators are for large volume microwave, cellular and broadcast systems, where lengthy and large diameter transmission lines are used.

MT-600 Dehydrator Characteristics

Dimensions	15.7 x 16.8 x 13.5 in (399 x 428 x 343 mm)
Net Weight	68 lb (31 kg)

For more information **FAX** Bulletin **1660** See page 1

MT-1700 DryLine®
Jumbo Automatic Membrane Dehydrator

System Volumes from 110 ft³ (3113 liters) to 410 ft³ (11320 liters)

The MT-1700 series automatic membrane dehydrators are the largest rack-mountable units offered by Andrew. They are equipped with the unique Andrew uni-mount system allowing for rack, or free-standing mounting without additional parts. They are designed to supply dry air at a dewpoint of -45°C (-50°F), or better, under the ambient conditions of 95% RH at 49°C (120°F).

Each MT-1700 dehydrator contains a low pressure alarm with Form C dry contacts (see page 246) for connection to an alarm system. The MT-1700 is only available in a sound deadened version. MT-1700 series are factory set to come on at 3 lb/in² (21 kPa) and to turn off at 8 lb/in² (55 kPa).

Units at 115 Vac are shipped with a UL/CSA power cord and plug. 230 Vac units have a harmonized power cable with stripped leads.

All dehydrators contain a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tube, a shut-off valve and a 1/8" NPT to 3/8" polyethylene connector and a 1/8" NPT street elbow.

Front covers are supplied on all MT-1700 units.

Applications – The MT-1700 series dehydrators are intended for large volume microwave and broadcast systems.

MT-1700 Dehydrator Characteristics

Dimensions	15.7 x 16.8 x 22 in (399 x 428 x 559 mm)
Net Weight	116 lb (53 kg)

For more information **FAX** Bulletin **1660** See page 1

XT-Series DryLine®
Programmable Automatic Membrane Dehydrators

The XT-series programmable automatic membrane dehydrators bring a new level of sophistication and convenience to the supply of pressurized dry air. The dehydrator units are designed for microprocessor control and all operations are fully programmable. With the exception of the XT-4500, the microprocessor is contained in a separate line monitor, which may be separated from the dehydrator unit by up to 100 ft, for convenience in station layout. Extension control cables are offered in 50-ft and 100-ft lengths and are offered separately, see page 267.

The photograph above shows an XT-Dehydrator with an XH-4 Line Monitor mounted above. Line monitors are covered on page 259, where the various options are described in greater detail. Basic features offered by programmability are:

- *Compressor ON/OFF, 0.3 - 15 lb/in^2 (2.1 - 105 kPa)*
- *Remote sense line for compressor control (recommended be used on 2 separate gas inlet ports)*
- *Covers most requirements for a low pressure tank and regulator*
- *Programmable low pressure alarm, starting at 0.1 lb/in^2 (0.7 kPa)*
- *Programmable high pressure alarm*
- *Programmable excess run alarm (0-99 minutes)*
- *High humidity alarm fixed at 7.5% RH*
- *LCD display for all functions*
- *Four languages; French, German, Spanish and English*
- *Readout in imperial or metric units*
- *Lightning surge protection*

The programmable function can also be used to control two dehydrators in a redundant configuration, where one unit serves as a master and the second operates as a slave. The units alternate in supplying air to the transmission line, but in an emergency, such as a breach in the line, both units will come on to maintain pressure by doubling output airflow.

XT300 DryLine®
Medium Programmable Automatic Membrane Dehydrators

System Volumes from 2 ft^3 (57 liters) to 80 ft^3 (2264 liters)

The XT300 series programmable automatic membrane dehydrators are equipped with the unique Andrew uni-mount system allowing for rack, wall or free-standing mounting without additional parts. They are designed to supply dry air at a dewpoint in excess of -45°C (-50°F) under the ambient conditions of 95% RH at 49°C (120°F).

Each XT300 dehydrator operates under the control of a microprocessor contained in a companion XH-1, XH-4 or XH-8 line monitor (see page 259) and requires the line monitor to function. The XT300 series is designed to program between 0.3 lb/in^2 (2.1 kPa) and 15 lb/in^2 (55 kPa). The XT300 is also available in a sound deadened version.

Units at 115 Vac are shipped with a UL/CSA power cord and plug. 230 Vac units have a harmonized power cable with stripped leads.

All dehydrators contain a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tube, a shut-off valve and a 1/8" NPT to 3/8" polyethylene connector and a 1/8" NPT street elbow.

Front covers are supplied only on sound deadened units.

Applications – The XT300 series dehydrators are for medium volume microwave, cellular and broadcast systems.

XT300 Dehydrator Characteristics

Dimensions	12.2 x 16.8 x 10.25 in (310 x 428 x 260 mm)
Net Weight	46 lb (21 kg)

For more information

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Bulletin
1660
See page 1

XT-600 DryLine®
Large Programmable Automatic Membrane Dehydrators

System Volumes from 50 ft³ (1415 liters) to 150 ft³ (4245 liters)

The XT-600 series programmable automatic membrane dehydrators are designed to provide the same features and benefits to large microwave and broadcast applications as the smaller XT300. They are equipped with the unique Andrew uni-mount system allowing for rack, wall or free-standing mounting without additional parts and are designed to supply dry air at a dewpoint better than -45°C (-50°F) under the ambient conditions of 95% RH at 49°C (120°F).

Each XT-600 dehydrator operates under the control of a microprocessor contained in a companion XH-1, XH-4 or XH-8 line monitor (see page 259) and requires the line monitor to function. The XT-600 series is designed to program between 0.3 lb/in² (21 kPa) and 15 lb/in² (55 kPa). The XT-600 is also available in a sound deadened version.

Units at 115 Vac are shipped with a UL/CSA power cord and plug. 230 Vac units have a harmonized power cable with stripped leads.

All dehydrators contain a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tube, a shut-off valve and a 1/8" NPT to 3/8" polyethylene connector and a 1/8" NPT street elbow.

Front covers are supplied only on sound deadened units.

Applications – The XT-600 series dehydrators are for large volume microwave, cellular and broadcast systems, where lengthy and large diameter transmission lines are used.

XT600 Dehydrator Characteristics

Dimensions	15.7 x 16.8 x 13.5 in (399 x 428 x 343 mm)
Net Weight	68 lb (31 kg)

XT-1700 DryLine®
Jumbo Programmable Automatic Membrane Dehydrators

System Volumes from 110 ft³ (3113 liters) to 410 ft³ (11320 liters)

The XT-1700 series automatic membrane dehydrators are the largest rack-mountable units offered by Andrew. They are equipped with the unique Andrew uni-mount system allowing for rack, or free-standing mounting without additional parts. They are designed to supply dry air at a dewpoint better than -45°C (-50°F) under the ambient conditions of 95% RH at 49°C (120°F).

Each XT-1700 dehydrator operates under the control of a microprocessor contained in a companion XH-1, XH-4 or XH-8 line monitor (see page 259)) and requires the Line Monitor to function. The XT-1700 series is designed to program between 0.3 lb/in² (2.1 kPa) and 15 lb/in² (55 kPa). The XT-1700 is only available in the sound deadened version.

Units at 115 Vac are shipped with a UL/CSA power cord and plug. 230 Vac units have a harmonized power cable with stripped leads.

All dehydrators contain a single line installation kit consisting of 25 ft (7 m) of 3/8" poly tube, a shut-off valve and a 1/8" NPT to 3/8" polyethylene connector and a 1/8" NPT street elbow.

Front covers are supplied on all XT-1700 units.

Applications – The XT-1700 series dehydrators are intended for large volume microwave and broadcast systems.

XT-1700 Dehydrator Characteristics

Dimensions	15.7 x 16.8 x 22 in (399 x 428 x 559 mm)
Net Weight	116 lb (53 kg)

For more information

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XT4500 DryLine®
Large Broadcast Programmable Automatic Membrane Dehydrators

System Volumes from 100 ft³ (2832 liters) to 2500 ft³ (70800 liters)

The XT4500 is our newest addition to the world-class line of DryLine pressurization equipment. This fully automatic membrane dehydrator is designed specifically for broadcast systems with large volumes. It is perfect for remote sites and minimizes the maintenance associated with nitrogen tanks.

XT4500 units have an adjustable output pressure from 0.3 to 5 lb/in² (2.1 to 34 kPa). Other basic features include full alarms, a pressure indicator, a lighted on/off switch, a resettable breaker, and a run-time meter. The unit includes alarms for low pressure, high pressure, high humidity, excess run, and power fail. An over pressure valve protects the system from high pressure.

The XT4500 unit operates at 230 Vac, 50/60 Hz.

A single line installation kit with all materials required for a typical installation comes with each XT4500 dehydrator, including a remote sense and air feed tubing

The XT4500 produces a dew point better than -45° C (-50° F). Pressurized air is forced through its patented membrane drying cartridge where moisture is separated from the system and vented to the outside, eliminating the 60-plus parts associated with pressure swing or heat regenerative dehydrators.

It's Automatic – The XT4500 dehydrator uses remote sensing of system pressure to activate and deactivate the compressor. The dehydrator operates only when needed, reducing wear and the need for maintenance. This feature allows precise control of system pressure.

For more information

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See page 1

Stand-Alone Unit – The DryLine XT4500 is designed as a stand-alone unit that can be placed directly against the wall or in a corner.

Easy Access – The power, air, and alarm connections of the XT4500 are readily accessible from the top of the unit.

Front-Mounted Controls and Status Indicators

- *Keyboard for setting adjustable parameters*
- *Pressure indicator that registers both metric and imperial units*
- *Illuminated power on/off switch*
- *Compressor run-time meter*

Standard Alarms the DryLine XT4500 includes:

- *Low pressure alarm adjustable from 0.1 to 3 lb/in² (0.7 to 21 kPa)*
- *High pressure alarm adjustable from 3 to 6 lb/in² (21 to 42 kPa)*
- *High humidity alarm (>7.5% RH)*
- *Excess run alarm adjustable to 255 minutes*
- *Power fail alarm*

Terminal blocks are provided for the alarm outputs.

Electrical Connections – Units designed for use in the U.S.A. operate at 230 Vac, 50/60 Hz and are shipped with UL/CSA approved power cable that uses a U.S.A. plug.

Redundant Dehydrator Options – Master and slave units are available to configure hot standby redundant systems. This option is used for extremely large volume systems, or systems where backup redundancy is required.

Multipressure Applications – With the XT4500, for multiple low pressure applications, a wall mounted low pressure regulator can be added to the system by using an external tank or a large waveguide run as a supply of dry air at a higher pressure.

Fixed regulator, 0.4 lb/in² (2.8 kPa)
.....Type No. **42996A**

Adjustable regulator, 1 to 5 lb/in² (7 to 34 kPa)
.....Type No. **AE01A-D1339-001**

Multiline Applications – When other waveguide or cables need to be pressurized, any of the standard distribution devices may be added to the system. By using the primary waveguide as an air source, any combination of distribution panels, manifolds, or MH type line monitors may be used to distribute the dry air to other equipment.

XT4500 Dehydrator Characteristics

Dimensions	45.25 x 16.5 x 17.5 in (1150 x 420 x 445 mm)
Net Weight	130 lb (59 kg)

DP-4A
Distribution Panel

Multiport Manifold for MR- and MT- Series Dehydrators

DP-4A-001 Four-Port Rack-Mount Distribution Panel

Type DP-4A-001 is a compact and economical distribution panel that provides four output ports. The unit is equipped with a shut-off valve per port. The unit is designed to mount in a standard 19" equipment rack or directly on top of an MR050 or MT-Series dehydrator.

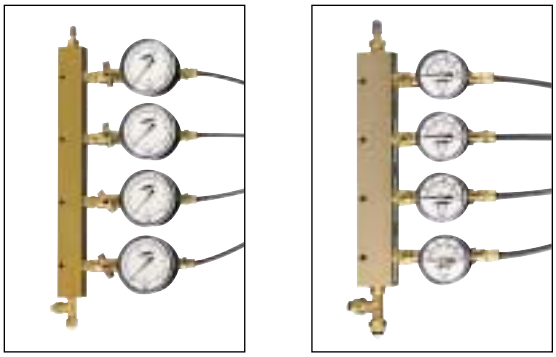
It may be used with any dehydrator except the DryLine® XT-series and comes with a complete four-port installation kit consisting of 100 ft (30.5 m) of 3/8" polyethylene tubing, four tubing mounting racks, 24 nylon ties, four 1/8" NPT to 3/8" tubing male connectors, four 1/8" NPT street elbows, four 3/8" connector sleeves, one roll Teflon† tape, eight plastic inserts and one 3/8" tubing tee.

Panels can be connected together to provide additional outputs above four.

† Teflon® is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

6600-Series
Gas Distribution Manifolds

Multiport Manifolds with Gauges for MR and MT Series Dehydrators



6600-Series Manifolds

The 6600-series manifolds are compact economical manifolds that provide up to six outlet ports. The units are equipped with shut-off valves and pressure gauges. Two or more may be combined using the included hex nipple.

6600D-series can be used with any dehydrator.

L6600D-series are limited to use with low pressure dehydrators which do not exceed 5 lb/in^2 (35 kPa).

Includes installation accessories, 25 feet (7.6m) of 3/8" polyethylene tubing, 1/8" NPT to 3/8" tubing male connector, 1/8" NPT street elbow and compression sleeve per line. Also, 24 nylon ties, 4 tubing mounting racks and one roll of Teflon† tape are supplied.

6600D Manifold – Features a dual scale pressure gauge 0-15 lb/in^2 (0-100 kPa)

Two ports .....Type **6600D-2**
Four ports .....Type **6600D-4**
Six ports .....Type **6600D-6**

L6600D Manifold – Features a dual scale pressure gauge 0-5 lb/in^2 (0-35 kPa)

Two ports .....Type **L6600D-2**
Four ports .....Type **L6600D-4**

6600-Series Gas Distribution Manifolds

Model Number	6600D-2	6600D-4	6600D-6	L6600D-2	L6600D-4
Number of Ports	2	4	6	2	4
Dimensions, in (mm)	6.8 x.4.6 x 2.25 (173 x 117 x 57)	10.8 x 4.6 x 2.25 (274 x 117 x 57)	14.8 x 4.6 x 2.25 (376 x 117 x 57)	8.8 x 6.9 x 3 (224 x 175 x 76)	14.8 x 6.9 x 3 (376 x 175 x 76)
Net Weight, lb (kg)	2 (0.9)	4 (1.8)	6 (2.7)	5 (2.3)	7 (3.2)

ML/MH Line Monitors

Multiport Gas Distribution Monitors for MT Series Dehydrators

ML-1

ML-4A-001

MH-4B-001

MH-8B-001

MH-12B-001

For multiple line MT dehydrator applications the ML- and MH-series of Line Monitors offer a convenient and complementary method of dry air distribution, control and monitoring. The monitors may be used in any combination, with the maximum number of lines to be pressurized limited only to the actual dehydrator capacity.

The monitoring function includes three items: a front panel gauge that displays the individual line pressure in lb/in^2 and kPa; an in-line flow meter; and a push-type shutoff valve. These functions are grouped in blocks of four interconnected at the rear of the unit to the main air inlet. The installation kit includes a tubing "tee" that allows monitors to be ganged together in various combinations.

The ML-1 Line Monitor (not shown) contains a low pressure tank and regulator which is adjustable from 0-2 lb/in^2 (0-14 kPa) and a 0-2 lb/in^2 (0-14 kPa) pressure gauge. The ML-4 Line Monitor contains the same, plus flow meters. ML- Line Monitors are intended primarily for use on low-pressure systems and require additional air volume between the MT DryLine® dehydrator (MT300 and larger) and the line monitor. For some applications, an additional external tank may be required to provide the additional volume. MT050 dehydrators have their own internal volume tank.

The MH series contains 0-15 lb/in^2 (0-105 kPa) pressure gauges and flow meters, but not regulators or tanks. Flow meters contain shut-off valves.

Installation Kits – Each four-port line monitor includes one four-line installation kit. Eight-port monitors include two four-line kits; twelve-port monitors include three four-line kits. The four-line kit contains 100 ft (30.5 m) of 3/8" polyethylene tubing, four tubing mounting racks, 24 nylon ties, four 1/8" NPT to 3/8" male tubing connectors, four 1/8" NPT street elbows, four 3/8" connector sleeves, one roll Teflon† tape, eight plastic inserts and one 3/8" tubing tee.

Mounting – Line monitors are equipped with uni-mounts for rack or wall mounting.

† Teflon® is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

Series	ML-1-001	ML-4A-001	MH-4B-001	MH-8B-001	MH-12B-001
Number of Ports	1	4	4	8	12
Dimensions, in (mm)	10.5 x.16.7 x 7.6 (266 x 425 x 194)	10.5 x.16.7 x 7.6 (266 x 425 x 194)	8.72 x.16.7 x 7.6 (222 x 425 x 194)	8.72 x.16.7 x 7.6 (222 x 425 x 194)	10.5 x.16.7 x 7.6 (266 x 425 x 194)
Rack Units, RUs	6	6	5	5	6
Net Weight, lb (kg)	20 (9)	25 (11)	14 (6)	16 (7)	21 (10)

ANDREW®

Revised 12/00

Multiport Control/Gas Distribution Monitors for XT Series Dehydrators

Applications – Each XT300/-600/-1700 dehydrator must have an XH line monitor for microprocessor control. The XT4500 dehydrator includes a built-in microprocessor control.

Multiple Lines – The XH line monitors are available in one, four and eight port versions. Distribution panels (DP-4), manifolds (6600 series) and M series monitors (page 257) may be used in combination with the required XH line monitor to provide lines in addition to those provided by the XH line monitor.

Features – The XT series dehydrator/line monitor combination includes advanced features, in addition to the features listed for the MT series on pages 252-253.

All models feature LCD display for total run time and system pressure for each line. Four and eight line models include a built-in manifold and flow meters. External regulators and tanks can be used if multiple pressures are required. See page 266. They may also be programmed in English (factory set), Spanish, French, German and metric or imperial units.

Installation Kits – Each four-port line monitor includes one four-line installation kit. Eight-port monitors include two four-line kits. The four-line kit contains 100 ft (30.5 m) of 3/8" polyethylene tubing, four tubing mounting racks, 24 nylon ties, four 1/8" NPT to 3/8" male tubing connectors, four 1/8" NPT street elbows, four 3/8" connector sleeves, one roll Teflon† tape, eight plastic inserts and one 3/8" tubing tee. Note: When installing the air lines to the line monitor, they must be installed in order beginning with the number 1 port.

† Teflon® is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

XH-1

XH-4A

XH-8A

All models feature LCD display for total run time and system pressure for each line.

Standard Units 115 Vac 60 Hz	Standard Units 220 Vac 50 Hz	Redundant Hot Standby Units 115 Vac 60 Hz	Redundant Hot Standby Units 220 Vac 50 Hz	Low Pressure Alarm	Excess Run Alarm	High Humidity Alarm	High Pressure Alarm
XH-1-101	**XH-1-102**	**XH-1-111**	**XH-1-112**	•	•		
XH-1-701	**XH-1-702**	**XH-1-711**	**XH-1-712**	•	•	•	•
XH-4A-101	**XH-4A-102**	**XH-4A-111**	**XH-4A-112**	•	•		
XH-4A-701	**XH-4A-702**	**XH-4A-711**	**XH-4A-712**	•	•	•	•
XH-8A-101	**XH-8A-102**	**XH-8A-111**	**XH-8A-112**	•	•		
XH-8A-701	**XH-8A-702**	**XH-18A-711**	**XH-8A-712**	•	•	•	•

Series	XH-1	XH-4A	XH-8A
Number of Ports	1	4	8
Power Consumption, Watts	6	6	6
Dimensions, in (mm)	8.72 x.16.7 x 7.6 (222 x 425 x 194)	8.72 x.16.7 x 7.6 (222 x 425 x 194)	8.72 x.16.7 x 7.6 (222 x 425 x 194)
Rack Units, RUs	5	5	5
Net Weight, lb (kg)	15 (7)	17 (8)	20 (9)

For more information

F A X
Bulletin
1 6 6 0
See page 1

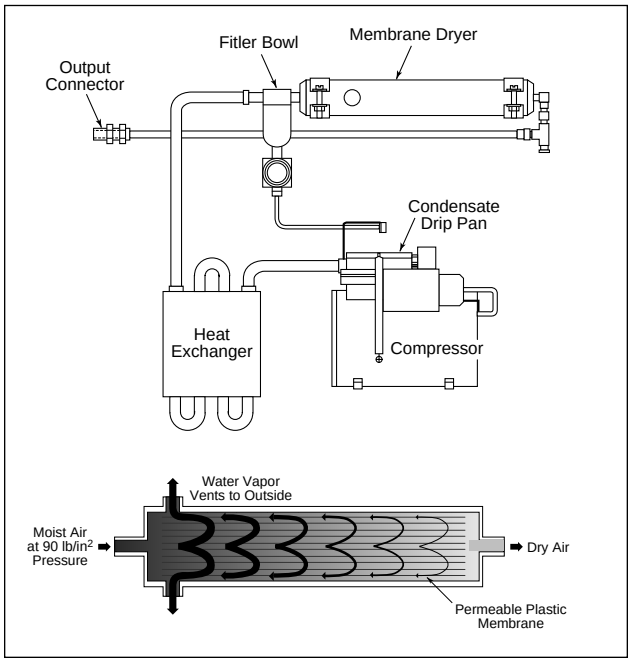
DryLine® MT/XT Series

Advanced, Automatic Regeneration, World Class Dehydrators

The DryLine dehydrator is the industry's most advanced system for pressurizing transmission lines. It sets new standards for drying performance. MTBF is as high as 55,000 hours (per MIL-HDBK-217F), double the industry standard. Units are warranted for three years or 3000 hours of compressor run time.

Great Convenience – A complete pressurization system is available in a convenient, two chassis DryLine package - the dehydrator and the line monitor. The package contains all of the components typically needed to pressurize an antenna/transmission line system. Depending on the options selected, these include the dehydrator compressor, output pressure regulator, pressure tank, manifold, alarm sensors and contacts, pressure gauges and flow meters. In other systems, these components typically have to be ordered separately and pieced together on site. A unique feature permits you to mount the line monitor panel in your equipment rack and locate the dehydrator/compressor in a remote area.

Low Noise and Vibration – All DryLine dehydrators are carefully balanced and custom isolated to minimize noise. In addition, a factory installed sound deadening option is offered which further reduces noise levels to as low as 82 dBA, on some models and 67 dBA on the MT050. That is less than the sound emitted by a computer dot matrix printer. The low noise and vibration now make it practical to mount DryLine dehydrators directly into radio equipment racks, even in attended systems.



State-of-the-Art Monitoring and Control Features – Even the basic DryLine dehydrators include a built-in low pressure alarm, a pressure gauge and a total run time meter. Optional features include adjustable output pressure, low pressure tank and regulator, a full range of programmable alarms, microprocessor control and LCD displays. Displays on programmable units are in four languages and in both imperial and metric units.

Easy Installation – The uni-mount chassis design permits rack, floor or wall mounting with included hardware for the larger units. No additional parts are required. MT-050 requires a shelf for wall mounting.

Membrane dryers offer exceptional reliability and a dew-point better than -45°C (-50°F). They are fully "automatic" in that they automatically respond to the pressure requirements of the system and do not require regeneration due to use of a patented membrane and feedback system.

Importance of Open System Concept – The feedback system utilizes a small amount of the dry air to flow back through the dryer cartridge until the compressor again responds to the system. The advantages are (1) continual system drying; (2) elimination of moisture stratification in the system; and (3) elimination of the saturated towers found on small systems using pressure swing adsorption dehydrators. The low volume MT050 contains an internal feedback path that operates independently of the volume of the transmission line.

Applications – Membrane dryers are ideal for use on any system requiring fully automatic dehydration from 0.1 ft^3 (3 liters) to 2,500 ft^3 (70,800 liters) in volume. They will supply dry air at a dewpoint better than -45°C (-50°F) under the ambient conditions of 95% RH at 49°C (120°F).

Referring to the top diagram, the patented drying system begins when filtered ambient air is compressed. Afterwards, it flows through a heat exchanger which condenses some of the moisture, then it is separated out of the air stream by a filter. The separated water is evaporated in a pan on the head of the compressor.

The saturated air then passes into the membrane (bottom diagram) where moisture is separated by a permeation process through an inert, maintenance-free fiber material. The separated moisture is purged from the membrane into the atmosphere.

The specific patented membrane is constructed to allow the wet purge air to be somewhat enriched in oxygen and the dry output air to be somewhat depleted in oxygen. As the feed air contains only trace amounts of hydrogen, neither purge nor output air can contain a significant amount of hydrogen. The heat of compression and a 0.05 micron filter also prevent the growth or passage of bacteria.

Typical Systems Using Dehydrators
(Except XT Series)

(MT300 non-sound deadened unit shown)

MT300 / 600 / 1700

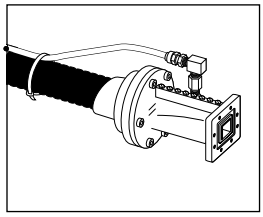
MTH-050

MR050 or 40525A

MRS050

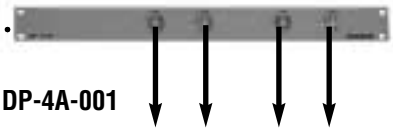
Dehydrators

Single Line



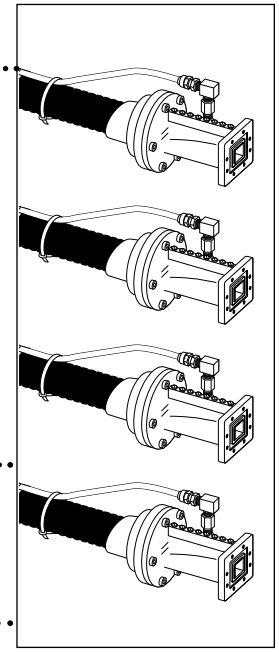
Distribution System

Distribution Panel, Rack Mount

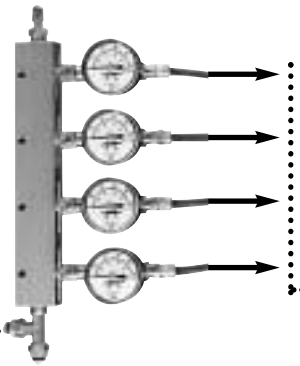


DP-4A-001

Multiple Lines



Manifold



6600D or L6600D Series

Manifolds may be ganged for additional lines.

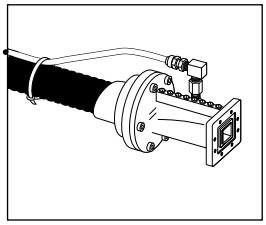
Line Monitor

(MH-4A Shown)

MH-4B, 8B, 12B

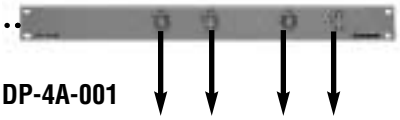
Dehydrator Systems Using Programmable XT-Series

Single Line



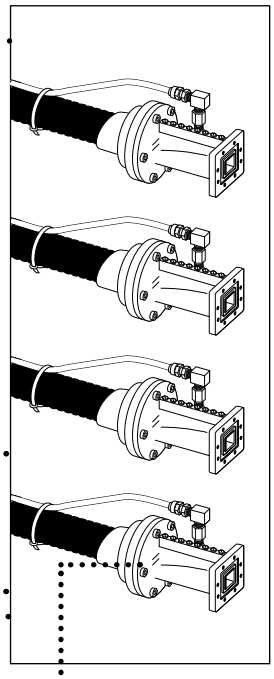
Distribution System

Distribution Panel, Rack Mount



DP-4A-001

Multiple Lines



Dehydrator and Line Monitor

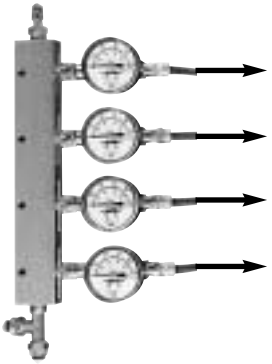
(An XH Line Monitor is required)

Dehydrator

(XT-300 non-sound deadened unit shown)

XT-300 / 600 / 1700

Manifold



6600D or L6600D Series

Manifolds may be ganged for additional lines.

Line Monitor

(XH-4A Shown)

XH-1, XH-4A or XH-8A

Line Monitor

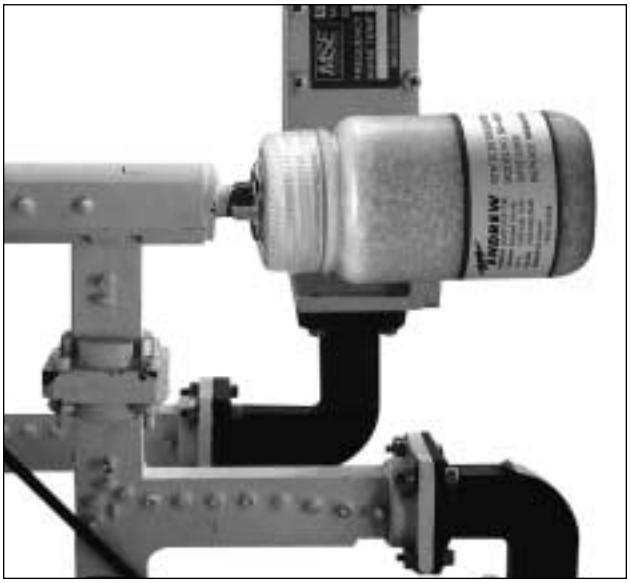
(MH-4 Shown)

Note: 2 inlet ports are recommended to maintain separation of the main air input and the remote sense line.

Remote Sense

Typical Applications of a Static Desiccator

Static Desiccator SD-001 attached to Microwave Antenna Feed.



Static Desiccator SD-002A attached to 2 Port Combiner of 4.5 m ESA.

Static Desiccator SD-002A attached to HELIAX® Elliptical Waveguide Connector.

Dehydrator Selection
Pressurization Worksheet

Protection of your transmission line system depends on the proper selection of your dehydrator. The following steps make it easy. ***Visit the Andrew web site at www.andrew.com to download PSI Select software, which automates the calculations described below.***

1 Calculate Total Site Transmission Line Volume

Using the following equation and the table to the right, determine the volume of each transmission line. Add the volumes to obtain the total site volume.

Site #_____

Example: Data from column to the right $\frac{\text{Volume x Length}}{1000}$ = cubic feet (liters)

Line # 1 , Size 7/8" , Length 450 ft ; $\frac{\text{Vol } 3.5 \text{ ft}^3 \text{ x L } 450 \text{ ft}}{1000}$ = 1.57 cu ft (liters)

2 Select Optimum Dehydrator Based Upon Total Site Volume

3 Calculate Purge, Pressurizing and Cycle Times

Purging the System

Before putting your transmission line system into service, purge each line to remove the moist air that was trapped inside during installation. Leave a flange(s) open at the antenna end and operate the dehydrator until the volume has been changed at least three times. Secure the flange(s).

If the above method is not possible, create a leak in the tubing fitting prior to the manifold/line monitor so that the dehydrator pressurizes the system every 60 minutes. Allow the dehydrator to run overnight and then retighten the fitting.

Purge time (in minutes) can be estimated by dividing the total system volume by the dehydrator flow rate from page 247 and 248 and then multiplying the result by 3.

Pressurizing the System

Once the system has been purged, dehydrator run time becomes a function of the start and stop pressures used in the system and the flow rate of the dehydrator. PSI Select software automatically performs a cycle time calculation during the dehydrator selection process.

For a copy of the software, please visit our web site at www.andrew.com for a free download or contact Andrew.

Cycle Time

Cycle time will vary by the type of dehydrator and the quality (tightness) of the system. Continuous length flexible transmission lines, such as HELIAX® air-dielectric coaxial cable and elliptical waveguide form the tightest systems, since there is a flange only at each end of a line. Rigid line, rectangular waveguide and other multiple flanged systems have more opportunity for air to release to the outside and they will exhibit higher leak rates.

Performance of the transmission line can be verified after purging and initial pressurization, by shutting off the air supply for 24 hours with a main air valve and observing changes in pressure. A general rule is that pressure should not drop more than 1 psi (7 kPa) during the 24-hour period. [Most systems will exhibit much lower leak rates in the range of 2 to 8% of air volume, which would register as less than a 0.4 psi (2.8 kPa) drop on a 5 psi (35 kPa) system]. After a leak test, restore the system to normal operation by opening the system air valve. On membrane systems, disconnect the output line and run the dehydrator into the room for 60 minutes before reconnecting to the system.

Dehydrator duty cycle can be used to quantify leak performance of the transmission line. Time the compressor on time of a typical cycle and the total time between cycles. The ratio of run time to total time should be less than 4% for MR/MRS and 40525A dehydrators and 8% for MT and XT dehydrators. The longer duty cycles for the membrane units is due to a controlled bleedback from the system into the membrane tube, which is a characteristic of the unique design of these units.

Transmission Line Data

Line Type		Volumes ft³ / 1000 ft	Volumes liters / 1000 m
HELIAX® Pressurizable Coaxial Cable			
1/2"	HJ4-50	0.68	63
5/8"	HJ4.5-50	1.92	178
7/8"	HJ5-50	3.5	325
1-1/4"	LDF6-50	1.7	158
1-5/8"	HJ7-50A	14.0	1301
2-1/4"	HJ12-50	21.5	1997
3"	HJ8-50B	36.7	3410
4"	HJ11-50	69.9	6494
5"	HJ9-50	117.0	10870
SCL-950		512	47570
HELIAX Elliptical Waveguide			
EW220	21.2-23.6 GHz	0.8	74
EW180	17.7-19.7 GHz	1.2	111
EW132	14.0-15.35 GHz	1.8	167
EW127A	11.7-13.25 GHz	2.7	251
EW90	10.5-11.7 GHz	3.6	334
EW85	8.5-9.8 GHz	4.2	390
EW77	7.125-8.5 GHz	6.3	585
EW64	7.125-7.750 GHz	7.8	725
EW63	6.425-7.125 GHz	9.2	855
EW52	5.6-4.25 GHz	11.3	1045
EW43	4.4-5.0 GHz	18.2	1690
EW37	3.58-4.26 GHz	21.1	1960
EW34	3.58-4.26 GHz	25.0	2323
EW28	2.9-3.4 GHz	36.0	3345
EW20	2.5-2.7 GHz	60.5	5621
EW17	1.7-2.3 GHz	71.0	6596
Circular Waveguide			
WC109		6.5	604
WC166		15.0	1394
WC205		22.9	2127
WC269		39.5	3670
WC281		43.1	4002
Rigid Transmission Line			
7/8"		3.36	312
1-5/8"		12.6	1171
3-1/8"		48.7	4524
6-1/8"		194.0	18023
GUIDELine® Waveguide			
GLW-1350		994	92343
GLW1500		1227	113988
GLW1700		1576	146410
GLW1750		1670	155143
Rectangular Waveguide			
WR42	17.7-26.5 GHz	0.5	46
WR62	12.4-18.0 GHz	1.3	124
WR75	10.0-15.0 GHz	2.0	181
WR90	8.2-12.4 GHz	2.5	232
WR112	7.05-10.0 GHz	3.9	362
WR137	5.85-8.2 GHz	6.0	551
WR159	4.9-7.05 GHz	8.8	817
WR187	3.95-5.85	11.3	1053
WR229	3.3-4.9	18.2	1691

Antenna Feed Pressure Ratings

Caution: UMX-459,-465,-611; UHX-34,-35,-36,-37; HPX12-6511C; FP/FPX-34,-36; and P-186 antennas have lower pressure ratings than standard antennas as indicated in the chart below.

Antenna	Max. Pressure Rating, lb/in² (kPa)
UMX-459	0.5 (3.5)
UMX-465	5 (35)
UMX-611	5 (35)
UHX-34,-35,-36,-37	5 (35)
FP/FPX-34,-36	5 (35)
HPX12-6511C	5 (35)
P-186	2 (14)
2 GHz Dual Polarized UHX	3 (21)

Commonly Used Conversion Factors

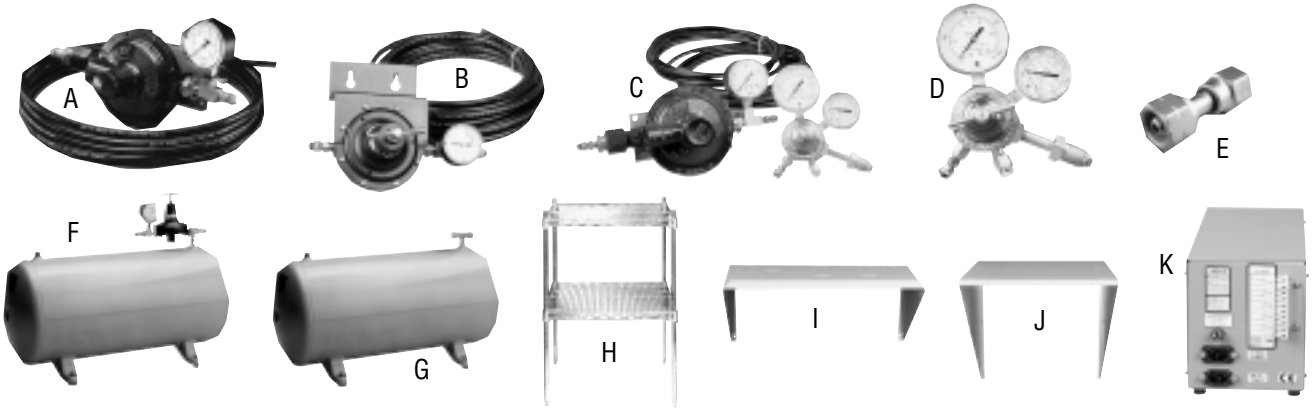
U.S. Customary Units (Imperial)

1 lb/in^2 = 69 mbar = 6.9 kPa
1 in H_2O = 0.04 lb/in^2 = 25.4 mm H_2O = 0.25 kPa
1 SCFM = 60 SCFH = 1670 l/hr
1 gal = 0.134 ft^3 = 3.78 liters
1 ft^3 = 7.48 gal = 28.32 liters = 0.028 m^3
1 in = 25.4 mm = 2.54 cm

SI Units (Metric)

10 kPa = 100 mbar = 1.45 lb/in^2
100 mm H_2O = 1 kPa = 0.14 lb/in^2 = 4.01 in H_2O
100 l/hr = 3.53 SCFH = 0.059 SCFM
1 liter = 0.26 gal = 0.04 ft^3
1 m^3 = 1,000 liters = 35.3 ft^3 = 259.7 gal
1 cm = 10 mm = 0.39 in

Pressurization Accessories



Low Pressure Components

A **Low-Pressure, Fixed, Wall-Mount Regulator**, is factory set to reduce the pressure of microwave pressurization systems (typically 3-8 lb/in^2), to 0.4 lb/in^2 (3 kPa). The regulator is supplied with a wall mounting bracket, 20 feet (6 m) of 3/8" polyethylene tubing and a 1/8" NPT male connector for attachment to the HELIAX® coaxial cable or waveguide. Not to be used directly from any dehydrator except 40525A and MT050. .....Type **42996A**

B **Low-Pressure, Adjustable, Wall-Mount Regulator**, is user set to reduce the pressure of microwave pressurization systems (typically 3-8 lb/in^2), to any value between 1 and 5 lb/in^2 (7 to 34 kPa). The regulator is supplied with a wall mounting bracket, 25 ft (7m) of 3/8" polyethylene tubing and a 1/8" NPT male connector for attachment to coaxial cable or waveguide. Not to be used directly on any dehydrator except 40525A and MT050. .....Type **AE01A-D1339-001**

C **Nitrogen Regulator with fixed Low-Pressure Assembly**. Includes a wall-mount regulator, Type 42996A (described above) factory set at 0.4 lb/in^2 and a Nitrogen regulator assembly, factory set to 10 lb/in^2 (70 kPa), with high and low-pressure gauges for direct attachment to a nitrogen tank with a CGA 580 (0.965" right hand internal) connection. It is supplied with 25 feet (7 m) of 3/8" tubing and 1/8" NPT male pipe connector for attachment to the HELIAX coaxial cable or waveguide connectors. .....Type **42969**

D **Nitrogen Regulator**. Adjustable 0-15 lb/in^2 (0-103 kPa) includes a pressure regulator, high- and low-pressure gauges, and 25 feet (7 m) of 3/8" polyethylene tubing and 1/8" NPT male connector.

Fits CGA580 (0.965" right-hand internal) connection. .....Type **858C**

Fits British 5/8" BSPP connection .....Type **858C-3**

E **Adapter** to fit a CGA555 (0.903" left-hand external) nitrogen tank connection and mates to CGA 580 connection .....Type **35751**

F **Regulating Tank**, 1-5 lb/in^2 (7-34 kPa). Use with small dehydrators to increase system volume. Prevents excessive cycling in low volume systems. Also used in 2 or 4 GHz systems to reduce maximum pressure to 5 lb/in^2 (34 kPa). The tank has a 1.5 ft^3 (42 liter) capacity and is supplied with a 0-5 lb/in^2 gauge. The regulator can be adjusted down to 1.0 lb/in^2 (7 kPa) output pressure. Includes 25 feet (7 m) of 3/8" polyethylene tubing and one 1/8" NPT male connector. 20 H x 12 W x 27 L inches (510 x 305 x 685 mm). Net weight 33 lb (15 kg).....Type **31614-3**

G **Air Tank**. Use with any dehydrator to increase system volume by 1.5 ft^3 (42 liters). Includes 3/8" tubing tee to prevent excessive cycling when pressurizing low volume systems, such as 1/2" and 7/8" cables. 17 H x 12 W x 27 L inches (432 x 305 x 685 mm). Net weight 30 lb (14kg).....Type **31614-4**

H **Floor Stand**. For 40525A, MT and XT series dehydrators and regulating tanks. Includes two shelves 17.75 in by 23.3 in (450 x 590 mm). Allows for convenient placement of dehydrator above regulating tanks. .....Type **30900**

I **Dehydrator Wall Shelf**. For MT300, 40525A, and 1930 series. Can also be mounted to a 19" equipment rack.....Type **AE01D-D1661-100**

J **Dehydrator Wall Shelf.** For MT050, MT/XT300, and MT/XT-600 series.....Type **AE01D-D1658-100**

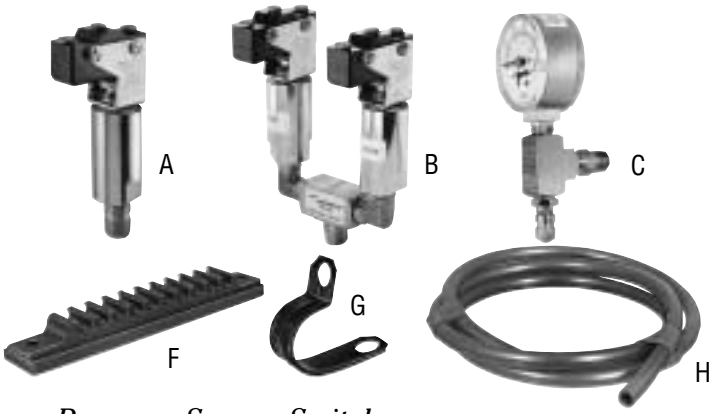
Alarm Monitors

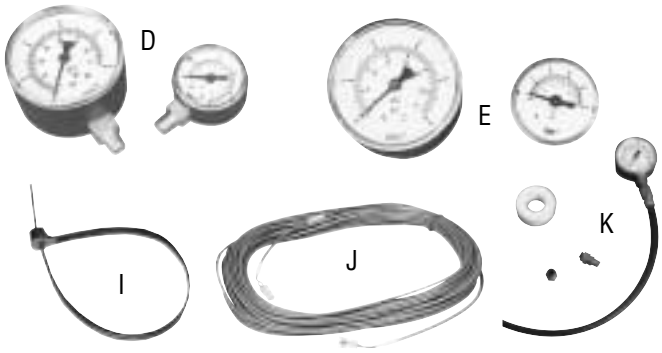
Low pressure, high pressure, high humidity, power failure, and excess run pressurization monitors activate remote warning light or alarm (not supplied) when system pressure, humidity or run time goes beyond specified limits.

K **40004 Series Monitors** are for use with 40525A Dehydrators or where full alarms are needed if not included in dehydrator.

The **40004C-015** is for use on 115 Vac.
The **40004C-026** is for use on 230 Vac.

Pressurization Accessories





Pressure Sensor Switches

Can be used to activate remote warning lights or alarms when system pressure goes beyond specified low or high limits. Pressure activated, normally open, Form C, dry contacts, 3 amps resistive.

A **Single Switch**. Low or high-pressure limit, adjustable 0-20 lb/in^2 (0-140 kPa).

Low-Pressure Limit factory set at 1.25 lb/in^2 (8.6 kPa). Includes 3/8" poly tube tee fitting for line insertion. .....Type **31618-1**

High-Pressure Limit factory set at 10 lb/in^2 (70 kPa). Includes 3/8" poly tube tee fitting for line insertion. .....Type **31618-2**

Low-Pressure Limit factory set at 1.25 lb/in^2 (8.6 kPa). Includes 1/4" NPT fitting for mounting on top of manifold. .....Type **31618-4**

B **Dual Switch**. Low and high-pressure limits, adjustable 0-20 lb/in^2 (0-140 kPa). Pressure activated, normally open, Form C, dry contacts, 15 amps resistive.

High-Pressure Limit factory set at 3 lb/in^2 (21 kPa). *Low-Pressure Limit* factory set at 1.25 lb/in^2 (8.6 kPa). Includes 1/4" NPT fitting for mounting on top of manifold.....Type **165046**

High-Pressure Limit factory set at 10 lb/in^2 (70 kPa). *Low-Pressure Limit* factory set at 1.25 lb/in^2 (8.6 kPa). Includes 1/4" NPT fitting for mounting on top of manifold. .....Type **165046-2**

Pressure Gauges

C **Gauge Assembly**. Indoor use only. Includes pressure gauge with steel case, gas inlet valve and tee with 1/8" NPT male pipe thread. Dual scale graduated in lb/in^2 and kPa.

0-30 lb/in^2 and 0-200 kPa. .....Type **18991A-1**

0-15 lb/in^2 and 0-100 kPa .....Type **18991A-2**

D **Pressure Gauge**. Indoor use only. Steel case. Bottom fitting. Male pipe thread. Dual scale graduated in lb/in^2 and kPa.

0-15 lb/in^2 and 0-100 kPa with 1/8" NPT thread. .....Type **3500A**

0-5 lb/in^2 and 0-35 kPa with 1/8" NPT thread. .....Type **33117-2**

E **Pressure Gauge**. Indoor use only. Steel case. Back Fitting. Male pipe thread. Dual scale graduated in lb/in^2 and kPa.

0-15 lb/in^2 and 0-100 kPa with 1/8" NPT thread. .....Type **3500A-2**

0-5 lb/in^2 and 0-35 kPa with 1/4" NPT thread. .....Type **33117-5**

Installation Accessories

F **Mounting Rack**, UV resistant, for polyethylene tubing. Hardware for wall mounting not included.

For 1/4" tubes (package of 10)Type **AE01K-B0523-001**
For 3/8" tubes (package of 10)Type **AE01K-B0523-002**
For 1/2" tubes (package of 10)Type **AE01K-B0523-003**

G **Mounting Strap**, UV resistant, for polyethylene tubing.

For 1/4" tubes (package of 10) .....Type **164004-3**
For 3/8" tubes (package of 10) .....Type **164004-1**
For 1/2" tubes (package of 10) .....Type **164004-2**

H **Polyethylene Tubing**, UV resistant, for indoor/outdoor applications. Specify length in feet or meters.

1/4" tubing. Maximum length 1000 ft (305 m); minimum length 20 ft (6 m).....Type **25435-4**

3/8" tubing. Maximum length 500 ft (150 m); minimum length 20 ft (6 m).....Type **25435-5**

1/2" tubing. Maximum length 250 ft (75 m); minimum length 20 ft (6 m).....Type **25435-8**

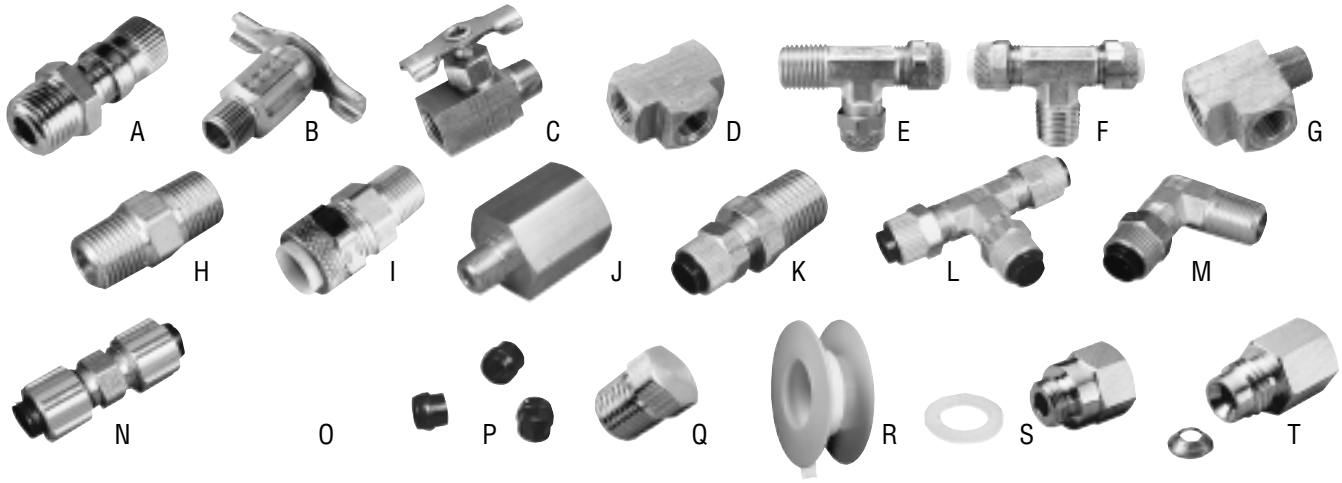
I **Nylon Tie Kit**, UV resistant, for securing polyethylene tubing directly to interior or exterior waveguide. Package of ten .....Type **164027**

J **Signal Extension Cable for XT Pressurization System**. Install XT Series dehydrator up to 100 ft from XH Series line monitors.

50 ft (15 m) length.....Type **AE01C-D0534-050**
100 ft (30 m) length .....Type **AE01C-D0534-100**

K **Back Pressure Regulator Test Gauge.** Testing/setting for MT/XT300/600/1700 units ...Type **AE01A-D1402-001**

Pressurization Accessories



Fittings

A **Gas Inlet Valve**. Has male threads and cap.
1/8" NPT thread .....Type **3017**
1/4" NPT threads .....Type **3017-2**

B **Gas Release Valve**. Has male threads.
1/8" NPT threads .....Type **3027**

C **Gas Shut-Off Valve**. Has male thread one end and female thread other end.
1/8" NPT threads .....Type **4949**
3/8" poly tube to 1/4" male NPT (40525A)
.....Type **25436-73**
3/8" poly tube to 3/8" poly tube (install kits)
.....Type **AE01J-A0133-040**

D **Pipe Tee**. Has female threads each outlet.
1/8" NPT threads .....Type **3028**
1/4" NPT threads .....Type **3028-2**

E **Male Run Pipe Tee** has 1/4" NPT pipe threads and two 3/8" poly tube outlets .....Type **25436-69**

F **Male Branch Tee** has one 1/4" NPT male outlet and two 3/8" poly tube outlets .....Type **25436-62**

G **Street Tee** has one 1/8" NPT male and two 1/8" NPT female outlets .....Type **3022**

H **Hex Pipe Nipple** has male threads both ends.
1/8" NPT threads .....Type **25436-42**
1/4" NPT threads .....Type **25436-52**

I **Male Connector** for polyethylene tubing.
For 1/4" tubing 1/8" NPT male pipe thread.
.....Type **25436-20**
For 3/8" tubing 1/8" NPT male pipe thread.
.....Type **25436-68**
For 1/2" tubing 3/8" NPT male pipe thread.
.....Type **25436-84***

J **Reducing bushing**
3/8" female NPT to 1/8" Male NPT .....Type **25436-83**

K **Male Connector** for polyethylene tubing. 1/4" NPT male pipe thread.
For 1/4" tubing .....Type **25436-61**
For 3/8" tubing .....Type **25436-63**

L **Tee** for polyethylene tubing.
For 1/4" tubing .....Type **25436-519**
For 3/8" tubing .....Type **25436-81**

M **Elbow** for polethylene tubing to NPT male pipe thread.
For 1/4" tubing 1/8" NPT male pipe thread
.....Type **25436-21**
For 3/8" tubing 1/8" NPT male pipe thread
.....Type **25436-4**
For 3/8" tubing 1/4" NPT male pipe thread
.....Type **25436-64**
For 1/2" tubing 3/8" NPT male pipe thread
.....Type **25436-85***

N **Splice Union** for polyethylene tubing.
For 1/4" tubing .....Type **25436-522**
For 3/8" tubing .....Type **25436-32**
For 1/2" tubing .....Type **25436-526**

O **Bulkhead Union** for poly tubing
3/8" poly tube to 3/8" poly tube .....Type **25436-71**

P **Compression sleeve**
For 1/4" poly tube bag of 10 .....Type **25436-75-10**
For 3/8" poly tube bag of 10 .....Type **25436-50-10**
For 1/2" poly tube bag of 10 .....Type **25436-33-10**

Q **Pipe Plug**. Has 1/8" NPT male threads
.....Type **EFTGP-27720**

R **Teflon† Tape** for sealing threaded joints.
7.5 ft (2.2 m) of tape on spool.....Type **3012A**

S **Metric Gas Inlet Adapter**. M10X 0.75-6G male and 1/8" female threads. Use to attach 1/8" male NPT fittings to connectors having metric threads, such as H4PDM, H5PDM-T, and H4.5PDM
.....Type **AE01K-C0677-001**

T **Metric Gas Inlet Adapter**. M12X 1.5-6G male and 1/8" female threads. Use to attach 1/8" male NPT fittings to connectors having metric threads, such as H12PDM-T, H7PDM-T, H7PDF, and L6PDM.
.....Type **AE01K-C0678-001**

*Use with 25436-83, 3/8" to 1/8" reducer. Order separately.

† Teflon® is a registered trademark of E.I. du Pont de Nemours & Co., Inc.

ANDREW®

Revised 2/01

Pressurization Accessories

Maintenance Components

Replacement Air Filter Cartridge, includes filter

A For 1920/1930 and XT4500 series dehydrators .....Type **46173**

B For MT/XT300 series.....Type **EFLTR-20201**

C For MT/XT -600, -1700 series.....Type **EFLTR-20202**

D For MR/MRS050 series dehydrators .....Type **AE01J-A0196-001**

E For MR-052 (AC only) early units .....Type **AE01J-A0132-003**

Replacement Air Filters (Element Only)

F For 1920/1930 and XT4500 series units. Package of six. .....Type **46173-1**

G For MT/XT300 series units. Package of six. .....Type **AE01K-B0518-001**

H For MT/XT-600, -1700 series units. Package of six .....Type **AE01K-B0518-002**

I **Color Indicating Silica Gel Refill**. For all sight glasses on 1920/1930, 65630B/163903. 1 ounce package per sight glass...Type **AE01K-B0214**

J **Color Indicating Silica Gel Refill**. For Type 860A/878A hand pump (requires one can) or Type 40525A dehydrator (requires two cans) .....Type **210**

K **Color Indicating Calcium Sulfate** for MR-50 series dehydrators. Use one 1.25 lb (0.56 kg) package per canister.....Type **AE01K-C0561-001**

L **Color Indicating Calcium Sulfate** for MR/MRS050 series dehydrators, 2.5 lb (1.2 kg) .....Type **AE01K-C0561-002**

M **Color Indicating Calcium Sulfate** for MR/MRS050 series dehydrators. Six bags, 2.5 lb (1.2 kg) each. .....Type **AE01A-D1266-004**

N **Replacement Canister with Desiccant and Hose** for MRS050 series dehydrators. Two complete canisters per box .....Type **AE01A-D1266-003**

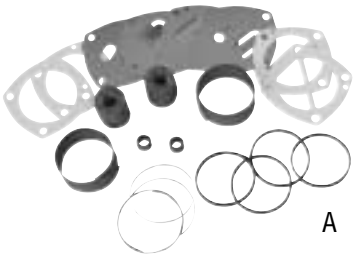
Replacement Canister with Desiccant without Hose for MR050 series dehydrators .....Type **AE01K-D0817-001**

O **Second Canister with Desiccant includes Hose** for MR050 series dehydrators to increase capacity .....Type **AE01K-D0817-002**

P **Non-Color Indicating Sorbead Refill** for Type 65630B/163903 dehydrators. Requires one package. 5 lb (2.27 kg) .....Type **52665-2**

Q **Pressure Swing Tower Overhaul Kit** for one 1920/1930 series dehydrator. Includes molecular sieve, O rings, perforated disk and filter pads. Solenoid valve not included.....Type **AE01K-B0187**

Pressurization Accessories



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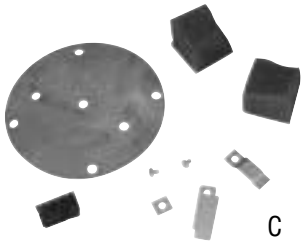

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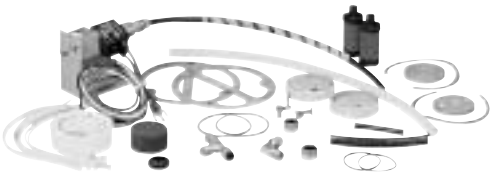
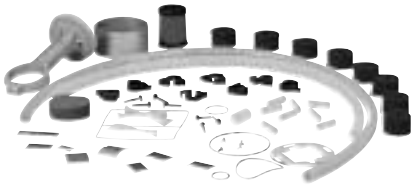


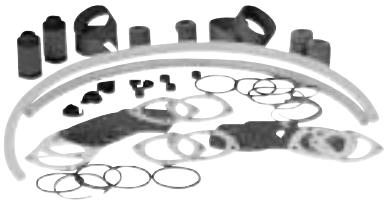
D

F



H

J



K

L

Pressure Swing Dehydrator Compressor Overhaul Kit. Includes gaskets, rings, seals and valves:

A For 1920/1921/1924 series .....Type **39878**

B For 1930/1931/1934C series .....Type **40486** (Not illustrated)

Includes gasket, valves and muffler:

C For 40525A series .....Type **39795-2**

Membrane Dehydrator Overhaul Kits. Includes compressor overhaul kit, high temperature hose, clamps, isolators, water filter element and coalescent filter element.

D For MT050 series 115 Volt solenoid upgrade .....Type **AE01K-D0820-001**

D For MT050 series 230 Volt solenoid upgrade .....Type **AE01K-D0820-002**

E For MT050 series .....Type **AE01K-C0398-007** (Not Shown)

F For MT/XT300 series. For units equipped with green WILKERSON filters .....Type **AE01K-C0398-001**

F For MT/XT300 series. For units with compressor model No. 627CEGH .....Type **AE01K-C0398-013**

G For MT/XT-600-( )( )1 series blue bowl .....Type **AE01K-C0398-002** (Not Shown)

G For MT/XT-600-( )( )2 series blue bowl .....Type **AE01K-C0398-003** (Not Shown)

H For MT/XT-1700-( )( )1 series blue bowl .....Type **AE01K-C0398-004**

H For MT/XT-1700-( )( )2 series blue bowl .....Type **AE01K-C0398-005**

I For MT/XT-1700-( )( )1 series black bowl .....Type **AE01K-C0398-008** (Not Shown)

I For MT/XT-1700-( )( )2 series black bowl .....Type **AE01K-C0398-009** (Not Shown)

J For MT/XT-600-( )( )1 series black bowl .....Type **AE01K-C0398-011**

J For MT/XT-600-( )( )2 series black bowl .....Type **AE01K-C0398-012**

K For XT4500 .....Type **AE01K-C0398-010**

L **Spare Hose** for 860G and 878A series hand pump dehydrators. 7 feet (2.13 m) long .....Type **10025**

For More Information . . .

Bulletin 1660


Bulletin 3550


Bulletin 10232


Bulletin 3551

Bulletin 1557

Bulletin 1845
Article reprint

Bulletin 10206
Article reprint

Bulletin 3579
Article reprint


Bulletin 3851
Article reprint

Literature

DryLine® Dehydrators

MT and XT series dehydrators. 8 pages. **Bulletin 1660**

MT050 data sheet. **Bulletin 3550**

XT4500 data sheet. **Bulletin 10232**

Dehydrators

MR050 data sheet. **Bulletin 1845**

MRS050 data sheet. **Bulletin 3551**

Use Pressurization to Protect RF Feedlines.
Magazine article reprint. 6 pages. **Bulletin 1845**

Nitrogen vs. Air Pressurization.
Magazine article reprint. **Bulletin 10206**

Pressurization Fundamentals.
Magazine article reprint. **Bulletin 3579**

Selecting dry air systems.
Magazine article reprint. **Bulletin 3851**

The Care and Feeding of your older Andrew Dehydrator. **Bulletin 1557**

Computer Software

PSI Select
Pressurization planner performs air volume calculations, helps you to select the proper dehydrator, and provides all of the catalog information. A single source for Andrew pressurization information. Download PSI Select from www.andrew.com. It is also available on the "Andrew Powertools" CD.
CD format. **Bulletin M400**

Dehydrator Repair and Free Loaner Program

Andrew maintains a repair center for pressurization equipment. Free loaner units are available for use while your equipment is being repaired by Andrew.
Call Andrew Customer Service for details.

Repairable Dehydrators: Series, 40525A, 65630B, 163903, 78200-24/48, MT/XT300/600/1700/4500 Series, MT050 Series and MR/MRS-050 Series.

Broadcast Antenna Systems

Index

Broadcast Antenna Systems

KWBP Channel 32/31, Salem, Oregon
The side-mounted, dual adjacent, TRASAR antenna operates both NTSC & DTV signals simultaneously.

Full Size antenna section undergoing azimuth pattern test in one of two Andrew anechoic chambers dedicated to broadcast products.

The Andrew Broadcast System Planner (ABSP) helps you to configure digital and analog television broadcast systems. It provides printed antenna patterns with tabulated data, data for power analyses, produces electronic files of antenna patterns for propagation studies, and comes pre-loaded with more than 35 popular broadcast transmission lines. Download ABSP from www.andrew.com or ask for our Powertools CD-ROM.

Andrew has been providing broadcast antennas, systems and services for more than 60 years. Broadcasters worldwide have learned that Andrew technology is cost-effective and provides the highest level of performance, quality and reliability.

Full Range of Antennas for DTV and NTSC

High Power Television Broadcast Antennas

- *TRASAR® traveling wave antennas for both UHF and high band VHF applications*
  - *Choice of full radome or slot covered design*
  - *Choice of stacked antenna designs*
- *PANAR™ broadband panel antennas for UHF-TV application*
- *GUIDELINER® waveguide antennas for UHF-TV applications*
- *G-Series emergency and standby antennas for UHF-TV and high-band VHF-TV applications, designed for permanent installation*
- *STACKER™ optimized mounting structure for TRASAR antennas*

Low to Medium Power Television Broadcast Antennas

- *ALP Series II antennas for UHF applications*
- *AL8 Series antennas for UHF translator and low power DTV applications*

MMDS/ITFS Antennas

- *HMD Series trasmit antennas for global wireless cable applications*
- *DATAMASTER™ Series sector antennas for 2-way MMDS applications*

Widest Variety of Broadcast Transmission Lines in the Industry

Rigid Coaxial Transmission Lines

- *MACXLine® rigid line featuring unique bellows inner conductor*
- *WIDELine™ broadband rigid line for multiplexing broadcast applications*
- *DUALine™ rigid line for optimized transmission of multiple channels*

Waveguide Transmission Line

- *GUIDELine® high efficiency waveguide features advanced design for superior efficiency and stability*

Air and Foam-Dielectric Coaxial Cables

- *HELIAX® coaxial cables widely used for broadcast systems, including 5" high power coaxial cable*

Providing System Solutions in the Era of Digital Television

As the Recognized Leader in UHF Antenna Systems and a Pioneer in DTV Technology, Andrew is Uniquely Positioned.

No other supplier can offer the combination of UHF technical expertise, DTV experience, field-tested solutions, and price competitive, proven products and services that Andrew provides to the broadcast industry.

Andrew offers the highest quality antennas, filters, combiners, transmission line products, and RF components/accessories in the business – everything from the transmitter to the beacon with a five or ten-year system warranty.

When You Choose Andrew, You are Assured of Optimum Coverage for Your Market Area

Our broad product line and experienced broadcast personnel promote efficient system design. The number of antenna and transmission line combinations allows you to design a system that provides the best possible market coverage at minimum cost.

Experienced engineers and antenna technicians use state-of-the-art software tools and test equipment. Andrew pioneered and perfected the near-field measurement techniques now employed by all broadcast antenna manufacturers. Our flexibility in design, combined with the use of innovative software and anechoic chamber testing, offers broadcasters custom system solutions - providing optimum coverage for their markets.

Comprehensive Technical Assistance and Support

Our commitment doesn't end when the antenna is shipped. Andrew TRASAR® antennas include a ground check to ensure proper antenna performance after transportation to the transmitter site. Also, if the transmission line includes GLW circular waveguide, a system check is included with the equipment purchased. Additional field services are available on application.

Dedicated to supporting our customers, technical assistance is available to you by calling **1-800-DIAL-4RF**.

The Andrew professional support staff provides a complete line of troubleshooting information, installation and testing procedures, replacement parts, return material support and all other general technical support services.

We also provide:

- *Toll Free Emergency Technical Support 24/7*
- *Toll-Free Fax-on-Demand Document Support*
- *Catalog/Product information on our web site*

Broadcast Antenna Systems

Performance Features of Andrew Broadcast Antennas

Top and Side Mounts Available

Andrew broadcast antennas come in both top and side mounted versions for optimizing tower design and coverage considerations.

Choice of Azimuth and Elevation Patterns for Optimum Market Coverage

A wide variety of standard patterns are offered, as shown on the following pages. In addition, Andrew can customize both horizontal and vertical patterns to ensure optimum signal penetration.

Heavy Null Fill Standard with Andrew Antennas

Heavy null fill is a standard feature with Andrew antennas. This produces maximum signal levels where you need it – in your viewers' home.

Optimized Beamtilt

Substantially increase signal strength by optimizing your antenna beamtilt. Andrew antennas are designed for optimized beamtilt at the radio horizon, increasing the field strength to the majority of viewing areas by as much as 3-8 dB.

Radome Enclosed for Long, Trouble-Free Life

Andrew broadcast antennas feature full radomes or slot covers to ensure reliable performance under all environmental conditions.

Horizontal, Elliptical, or Circular Polarization for Ideal Viewer Reception

Andrew design concepts allow you to tailor your signal to your market conditions. In many urban and suburban areas, horizontal-only polarization reception can be affected by buildings, airplanes, receiving antenna position, or even the weather.

A vertically polarized component can greatly enhance the probability of improved reception. Andrew antennas are available in both horizontally and elliptically polarized versions. If appropriate, the V-Pol azimuth pattern can be shaped differently than the H-Pol pattern.

Elliptical polarization allows you to transmit a vertically polarized signal in addition to your licensed horizontal ERP. Any vertical to horizontal power ratio of one or less can be provided with the appropriate power split designed into the antenna.

Built-In Reliability/Maintainability

- *Factory tests using advanced computer aided techniques confirm specific gain and pattern characteristics.*
- *Direct slotted line measurement of antenna VSWR at the input flange ensures very low reflected power and top quality signal*
- *Four lightning rods project 3 ft above the top plate of the antenna to protect the beacon on all top-mounted antennas*
- *Heavy internal dc ground across the internal feed line protects against lightning damage*
- *Climbing ladders or pegs, included with all top mounted antennas, facilitate inspection and maintenance*
- *A fully illustrated operation and inspection manual is included with every antenna to ensure efficient inspection programs*

Specifications

VSWR, maximum (6 MHz Channel)	
Visual Carrier +0.5 MHz	1.05
Color Subcarrier	1.08
Remainder of Channel	1.10

Deicing. Full radome enclosure.

Antenna Selection. Antennas are selected on the following parameters:

- *Azimuth pattern*
- *Elevation gain*
- *Input power rating 240, 120 or 60 kW nominal*
- *Beam tilt 0.75, 1.0 or 1.25° typical, others available*
- *Horizontal or elliptical polarization*
- *Top or side mount*

Specify channel number and, for elliptically polarized antennas, specify ERP split. Other patterns, gains and beam tilts are available on request. Note that patterns shown are typical free space patterns and will vary depending on channel, structural design criteria and tower mounting configuration.

The Andrew Broadcast Sales Team is prepared to help meet your needs wherever you are located. Call for complete information on **Andrew Broadcast Antenna Products at 1-800-DIAL-4-RF.**

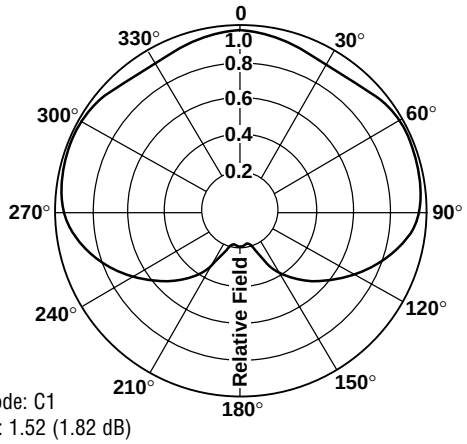
Elevation patterns are shown on page 281.

Typical mechanical characteristics are shown on page 280.

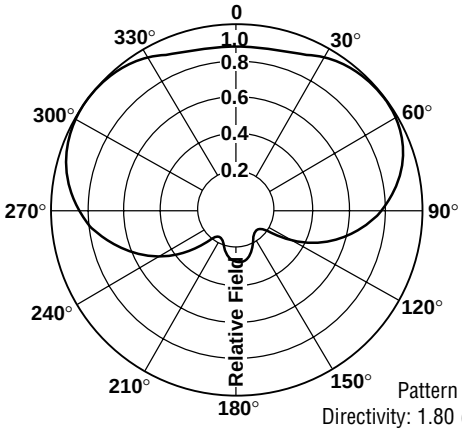
Elliptically polarized TRASAR antenna custom designed with trilobe pattern for WJYS channel 62, Hammond, Indiana.

TRASAR® Antennas
Typical Azimuth Patterns

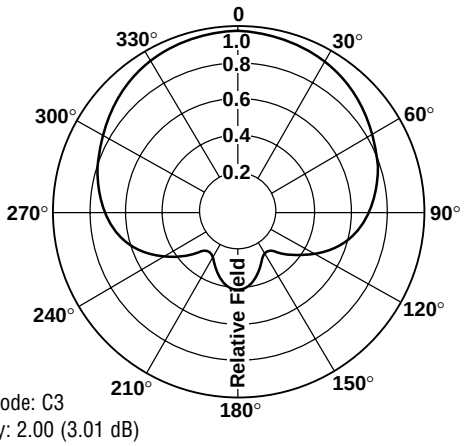
As shown below, a wide variety of Azimuth patterns can be selected or customized for TRASAR® antennas. **Note:** These are typical free space patterns and will vary depending on channel, structural design criteria and tower mounting configuration. For specific requests, call our **Broadcast Systems Department directly at 1-800-DIAL-4-RF.**



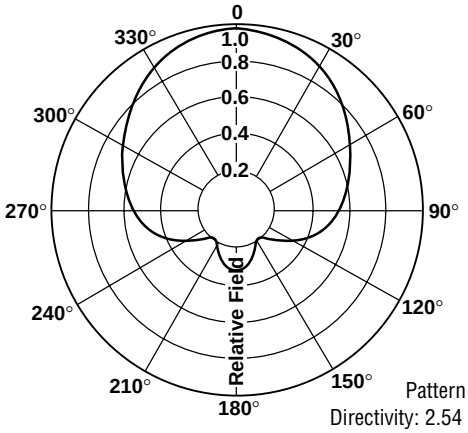
Pattern Code: C1
Directivity: 1.52 (1.82 dB)



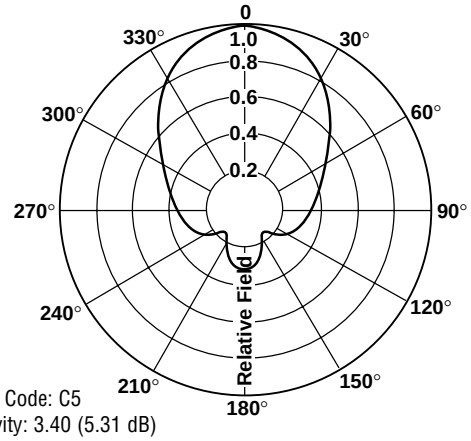
Pattern Code: C2
Directivity: 1.80 (2.55 dB)



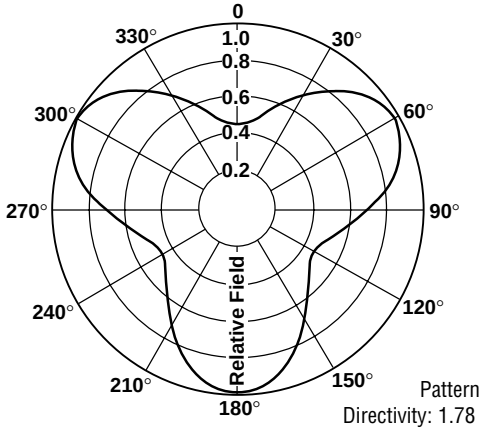
Pattern Code: C3
Directivity: 2.00 (3.01 dB)



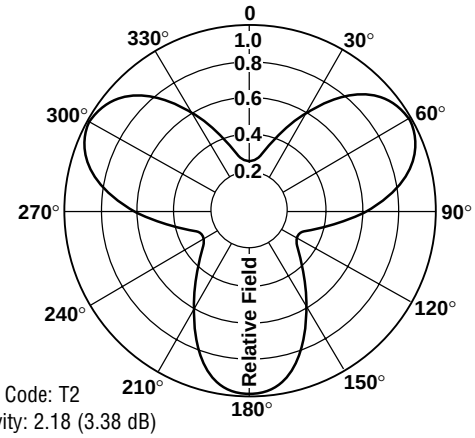
Pattern Code: C4
Directivity: 2.54 (4.05 dB)



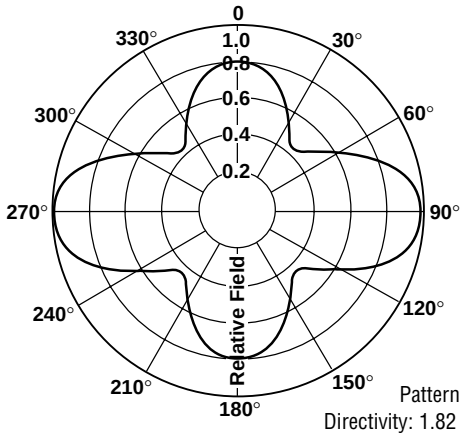
Pattern Code: C5
Directivity: 3.40 (5.31 dB)



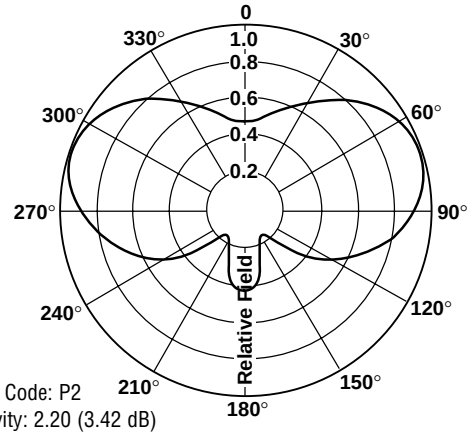
Pattern Code: T1
Directivity: 1.78 (2.50 dB)



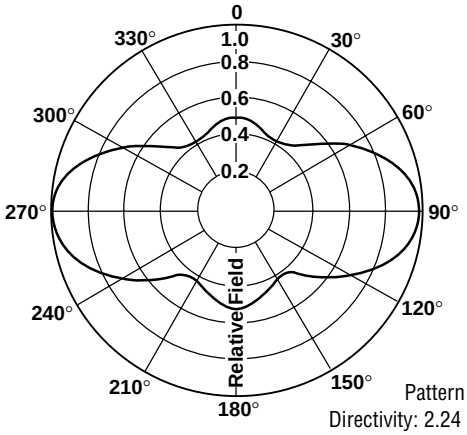
Pattern Code: T2
Directivity: 2.18 (3.38 dB)



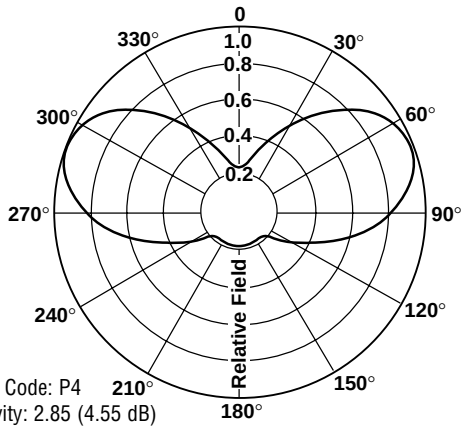
Pattern Code: P1
Directivity: 1.82 (2.83 dB)



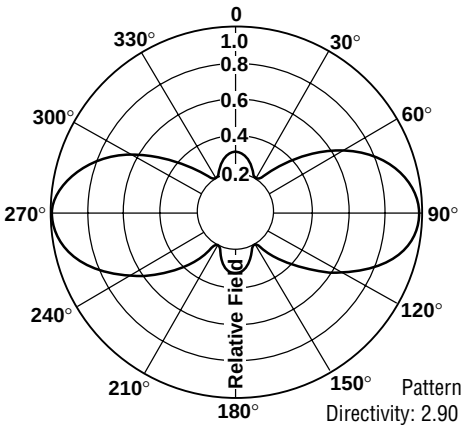
Pattern Code: P2
Directivity: 2.20 (3.42 dB)



Pattern Code: P3
Directivity: 2.24 (3.50 dB)



Pattern Code: P4
Directivity: 2.85 (4.55 dB)



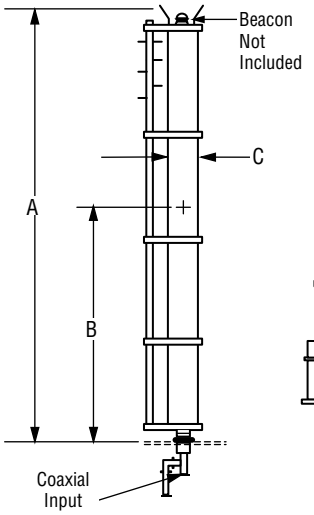
Pattern Code: P5
Directivity: 2.90 (4.62 dB)

TRASAR® Horizontally Polarized Antennas

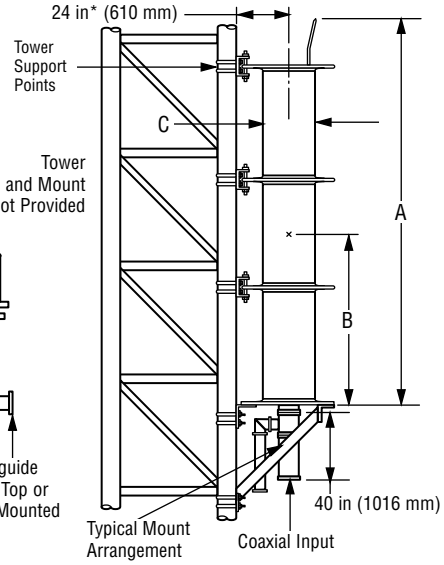
Typical Mechanical Data

The mechanical data presented below apply to the UHF TRASAR® transmitting antennas described on page 277. Loads are typical for 50 lb/ft² (2.4 kPa) for flat surfaces and 33 lb/ft² (1.6 kPa) for cylindrical surfaces. For loading per other criteria, contact our **Broadcast Systems Department at 1-800-DIAL-4-RF.**

Top Mounted



Side Mounted



* May vary depending on pattern requirements

Typical Mechanical Data - TRASAR Horizontally Polarized Antennas

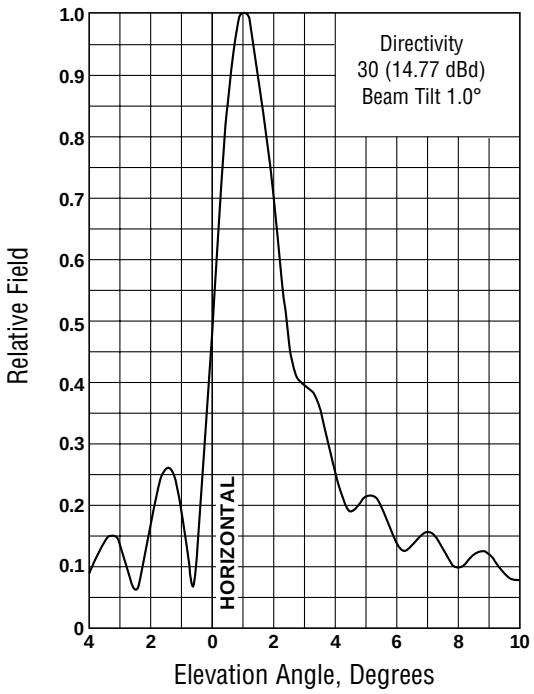
Channel Number	A Antenna Height* ft (m)	B Radiation Center Above Base ft (m)	C Radome Diameter in (mm)	Nominal Antenna Weight lb (kg)	Wind Load Shear** lb (N)	Overturning Moment lb-ft (N•m)
Top Mounted Antenna - Elevation Gain of 30						
14	73.0 (22.3)	35.0 (10.7)	16 (407)	12100 (5500)	4400 (19600)	154000 (209500)
22	66.7 (20.4)	31.9 (9.8)	16 (407)	11000 (5000)	4000 (17800)	127400 (173300)
30	61.5 (18.8)	29.3 (9.0)	16 (407)	10100 (4600)	3700 (16500)	108300 (147300)
38	57.1 (17.5)	27.1 (8.3)	16 (407)	9400 (4300)	3500 (15600)	94700 (128800)
46	53.3 (16.3)	25.2 (7.7)	14 (356)	6300 (2900)	2900 (12900)	73000 (99300)
54	50.1 (15.3)	23.6 (7.2)	14 (356)	5900 (2700)	2800 (12500)	66000 (89800)
62	47.3 (14.5)	22.2 (6.8)	14 (356)	5600 (2600)	2600 (11600)	57600 (78400)
69	45.1 (13.8)	21.1 (6.5)	14 (356)	5300 (2500)	2500 (11200)	52700 (71700)
Top Mounted Antenna - Elevation Gain of 25						
14	62.8 (19.2)	29.9 (9.2)	16 (407)	10300 (4700)	3800 (17000)	113620 (154600)
22	57.4 (17.5)	27.2 (8.3)	16 (407)	9400 (4300)	3500 (15600)	95200 (129500)
30	53.0 (16.2)	25.0 (7.7)	16 (407)	8600 (4000)	3200 (14300)	80000 (108800)
38	49.3 (15.1)	23.2 (7.1)	16 (407)	8000 (3700)	3000 (13400)	69450 (94500)
46	46.1 (14.1)	21.6 (6.6)	14 (356)	5400 (2500)	2600 (11600)	56030 (76300)
54	43.3 (13.2)	20.2 (6.2)	14 (356)	5100 (2400)	2400 (10700)	48360 (65800)
62	40.9 (12.5)	19.0 (5.8)	14 (356)	4800 (2200)	2300 (10300)	43585 (59300)
69	39.0 (11.9)	18.0 (5.5)	14 (356)	4500 (2100)	2200 (9800)	39600 (53900)
Side Mounted Antenna - Elevation Gain of 30						
14	71.7 (21.9)	34.4 (10.5)	18 (458)	2200 (1000)	4200 (18700)	–
22	65.5 (20.0)	31.3 (9.6)	18 (458)	2000 (1000)	3800 (17000)	–
30	60.3 (18.4)	28.7 (8.8)	18 (458)	1800 (900)	3600 (16100)	–
38	55.9 (17.1)	26.5 (8.1)	18 (458)	1700 (800)	3300 (14700)	–
46	52.2 (16.0)	24.6 (7.5)	18 (458)	1600 (800)	3100 (13800)	–
54	49.0 (15.0)	23.0 (7.1)	18 (458)	1500 (700)	2900 (12900)	–
62	46.2 (14.1)	21.6 (6.6)	18 (458)	1400 (700)	2800 (12500)	–
69	44.0 (13.50	20.5 (6.3)	18 (458)	1300 (600)	2700 (12100)	–
Side Mounted Antenna - Elevation Gain of 25						
14	61.5 (18.8)	29.3 (9.0)	18 (458)	1900 (900)	3600 (16100)	–
22	56.2 (17.2)	26.6 (8.2)	18 (458)	1700 (800)	3300 (14700)	–
30	51.8 (15.8)	24.4 (7.5)	18 (458)	1600 (800)	3100 (13800)	–
38	48.1 (14.7)	22.6 (6.9)	18 (458)	1400 (700)	2900 (12900)	–
46	44.9 (13.7)	21.0 (6.4)	18 (458)	1300 (600)	2700 (12100)	–
54	42.2 (12.9)	19.6 (6.0)	18 (458)	1300 (600)	2600 (11600)	–
62	39.8 (12.2)	18.4 (5.7)	18 (458)	1200 (600)	2400 (10700)	–
69	37.9 (11.6)	17.5 (5.4)	18 (458)	1100 (500)	2300 (10300)	–

* Typical height including 3-foot long (1 m) lightning rods.

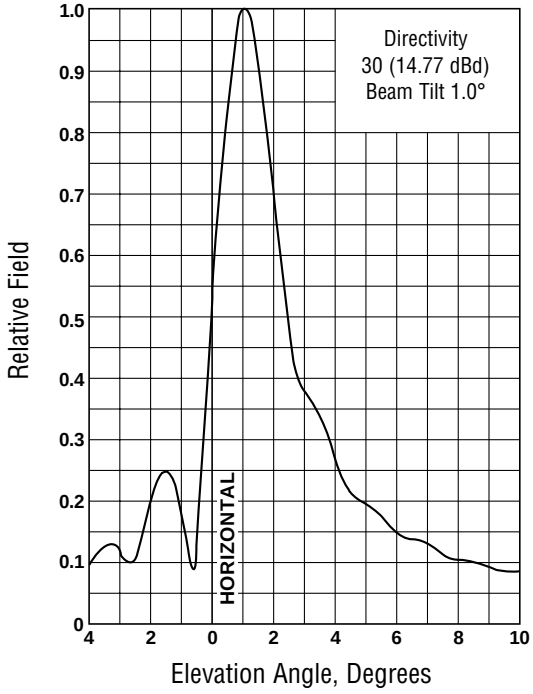
** 50 lb/ft² (2.4 kPa) for flat surfaces and 33 lb/ft² (1.6 kPa) for cylindrical surfaces.

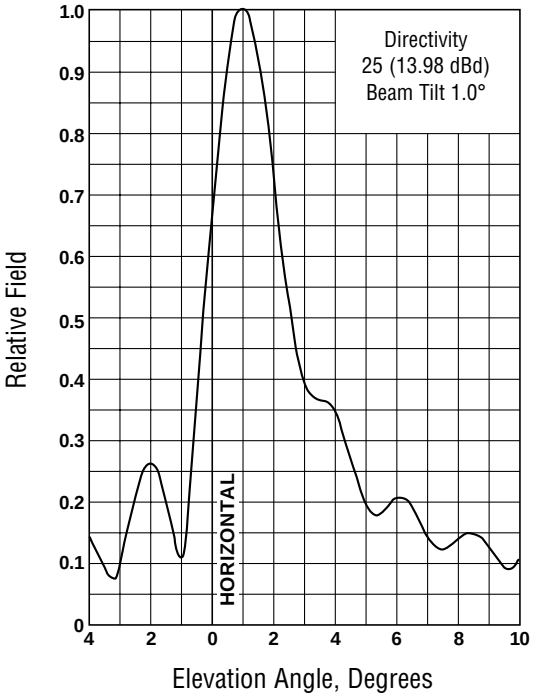
The patterns on this page apply to the TRASAR® and GUIDELINER® UHF-TV transmitting antennas described on pages 277 and 285. The patterns are typical; other Directivities, Beam tilts and Null Fills are available.

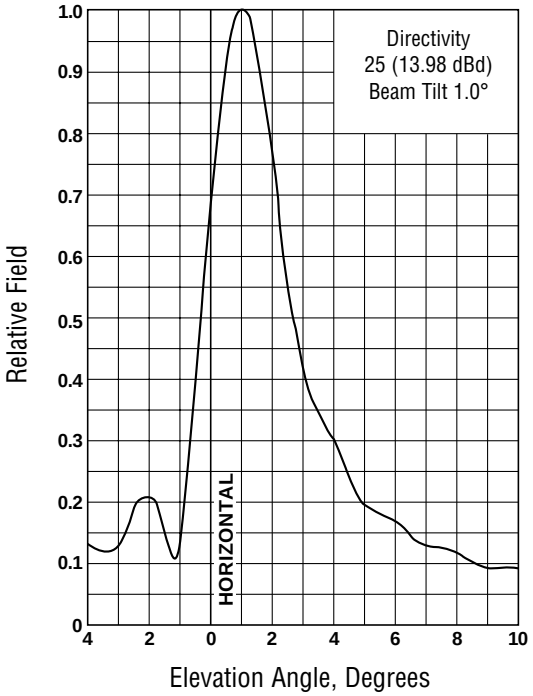
Standard Elevation Patterns



Smooth Elevation Patterns







Products Discontinued

Products Discontinued

Products Discontinued

GUIDELINER® UHF Waveguide Antennas

GUIDELINER UHF television transmitting antennas are offered for U.S. FCC Channels 14 through 69 and CCIR Bands IV and V.

Specifications

VSWR, maximum, 6 MHz Channel	
Visual Carrier +0.5 MHz	1.05
Color Subcarrier	1.08
Remainder of Channel	1.10

Power Rating. 240 kW, nominal.

Deicing. Full radome enclosure.

Antenna Selection. Antennas are selected on the basis of:

- *Azimuth pattern*
- *Elevation gain*
- *Beam tilt 0.75, 1.0 or 1.25° typical, others available*
- *Horizontal or elliptical polarization, See Table*
- *Top or side mount*

GUIDELINER antenna for WTIU channel 30 undergoing inspection.

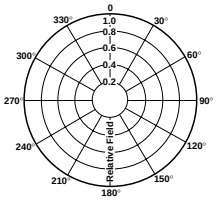
Type numbers are listed in the table for top mounted omnidirectional antennas. Specify channel number and, for elliptically polarized antennas, specify ERP split. Other patterns, gains and beam tilts are available.

Typical elevation patterns are shown on page 281.

Weights, dimensions and wind loading data are available upon request.

Call our Broadcast Systems Department at 1-800-DIAL-4-RF.

Top Mounted Omnidirectional Antennas

Azimuth Pattern Relative Field	Beam tilt Degrees	Pol.	25 Elevation Gain Antennas† Type No.	25 Elevation Gain Antennas† Peak Power Gain	15 Elevation Gain Antennas† Type No.	15 Elevation Gain Antennas† Peak Power Gain
Omnidirectional ±1 dB (Top Mount Only)						
	0.75	Horiz.	**AGW25H3-HTO1- (*)**	25.0 (13.98 dBd)	**AGW15H3-HTO1- (*)**	15.0 (11.76 dBd)
	0.75	Ellipt.	**AGW25H3-ETO1- (*)**	**	**AGW15H3-ETO1- (*)**	**
	1.00	Horiz.	**AGW25H4-HTO1- (*)**	25.0 (13.98 dBd)	**AGW15H4-HTO1- (*)**	15.0 (11.76 dBd)
	1.00	Ellipt.	**AGW25H4-ETO1- (*)**	**	**AGW15H4-ETO1- (*)**	**
	1.25	Horiz.	**AGW25H5-HTO1- (*)**	25.0 (13.98 dBd)	**AGW15H5-HTO1- (*)**	15.0(11.76 dBd)
	1.25	Ellipt.	**AGW25H5-ETO1- (*)**	**	**AGW15H5-ETO1- (*)**	**
Directivity 1.00 (0.00 dB)						

* Specify UHF-TV channel number.

** Horizontal and vertical gains depend on power split. Specify power split.

† Elevation patterns are shown on page 281.

TRASAR® VHF-TV Transmitting Antennas

Specifications

Channel Range:	7-13, one 6 MHz channel (174-216 MHz)
VSWR:	1.05 Visual +0.5 MHz 1.08 Color Sub-Carrier 1.10 Remainder of Channel
Deicing:	Fiberglass Radome Enclosed
Input Power:	100 kW, Peak Visual +20% Aural
Input Type:	Specify 50 or 75 ohm 6-1/8" EIA

Antenna Selection

Antennas are selected on the basis of:

- *Azimuth Pattern*
- *Elevation gain 6, 9, 12 or 16 are typical*
- *Beam tilt 0.75, 1.0 or 1.5° are typical*
- *Horizontal, elliptical or circular polarization*
- *Top or side mount*

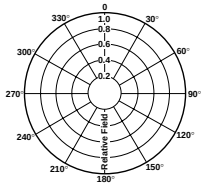
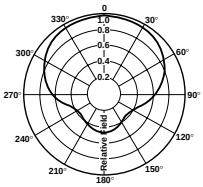
Standard Type Numbers are listed in the table. Specify channel number and, for elliptically/circularly polarized antennas, the desired power split. Other patterns, gains and beam tilts are available on request.

Azimuth Patterns

As shown in the table, omnidirectional and skull patterns are standard. Cardioid patterns are also available.

Note that these are typical free space patterns and may vary slightly depending on channel, structural design criteria and tower mounting configuration.

Top-Mounted Antennas

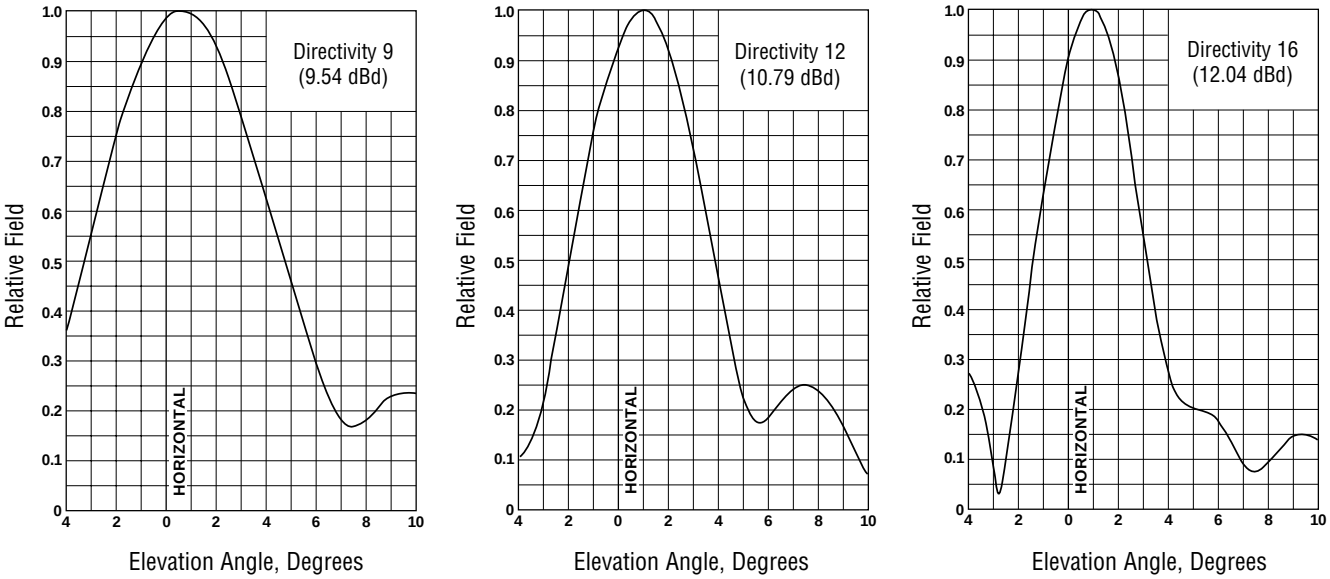
Azimuth Pattern Relative Field	Pol.	Peak Power Gain	Standard Type No.
Omnidirectional ±1 dB			
	Horiz.	6.00 (7.78 dBd)	**ATW6V3-HTO- (*)**
	Ellipt.	**	**ATW6V3-ETO- (*)**
	Horiz.	9.00 (9.54 dBd)	**ATW9V3-HTO- (*)**
	Ellipt.	**	**ATW9V3-ETO- (*)**
	Horiz.	12.00 (10.79 dBd)	**ATW12V3-HTO- (*)**
	Ellipt.	**	**ATW12V3-ETO- (*)**
	Horiz.	16.00 (12.04 dBd)	**ATW16V3-HTO- (*)**
	Ellipt.	**	**ATW16V3-ETO- (*)**
Directivity: 1.00 (0.00 dB)			
Skull			
	Horiz.	11.40 (10.57 dBd)	**ATW6V3-HTS-(*)**
	Ellipt.	**	**ATW6V3-ETS-(*)**
	Horiz.	17.10 (12.33 dBd)	**ATW9V3-HTS-(*)**
	Ellipt.	**	**ATW9V3-ETS-(*)**
	Horiz.	22.80 (13.58 dBd)	**ATW12V3-HTS-(*)**
	Ellipt.	**	**ATW12V3-ETS-(*)**
	Horiz.	30.40 (14.83 dBd)	**ATW16V3-HTS-(*)**
	Ellipt.	**	**ATW16V3-ETS-(*)**
Directivity: 1.90 (2.79 dB)			

* Specify VHF-TV channel number.

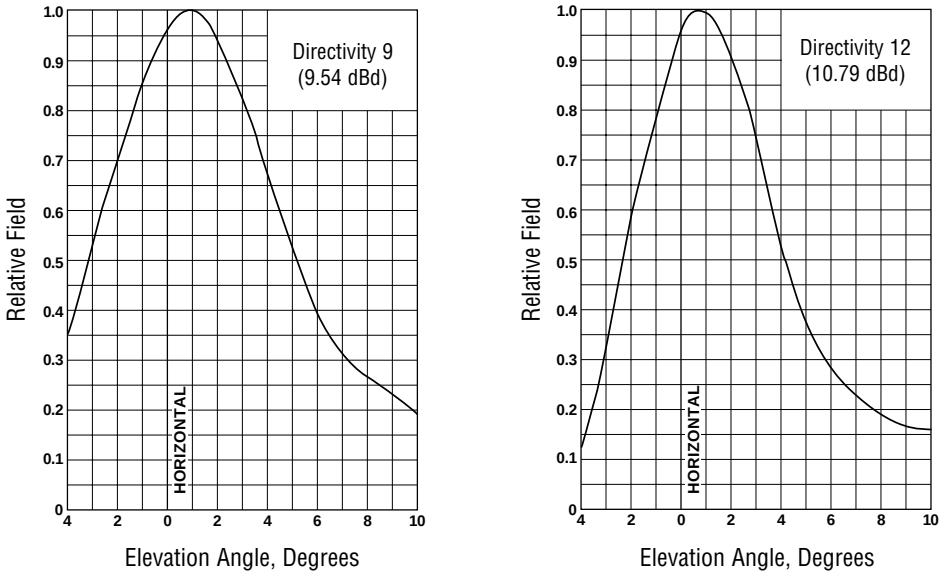
** Horizontal and vertical gains depend on power split. Specify power split.

Shown below are typical elevation patterns for 9, 12 and 16 gain V-series antennas with 0.75° beam tilt.

Standard Elevation Patterns



Smooth Elevation Patterns

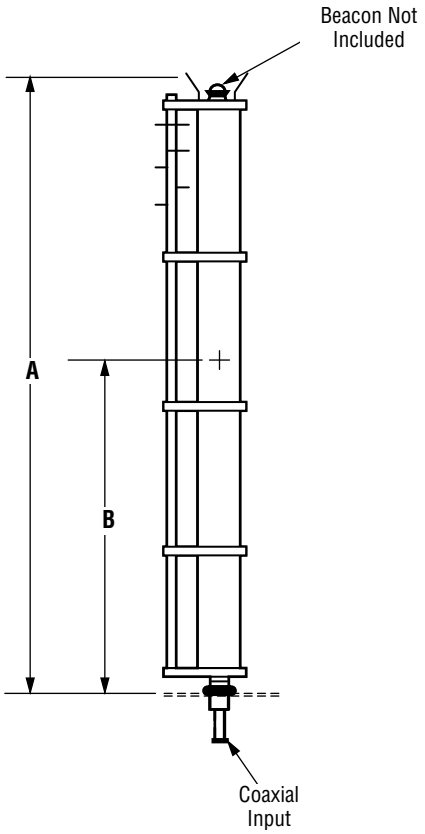


TRASAR® VHF-TV Antennas
Mechanical Data

TRASAR® V-Series antenna KNTV for channel 11 features pressurizable radome to withstand salt air coastal environment.

Mechanical data presented on this page are typical and may vary depending on specific channel, pattern required and structural design criteria. For further information, call our **Broadcast Systems Department at 1-800-DIAL-4-RF.**

Top Mounted



Typical Mechanical Data for Horizontally Polarized Antennas

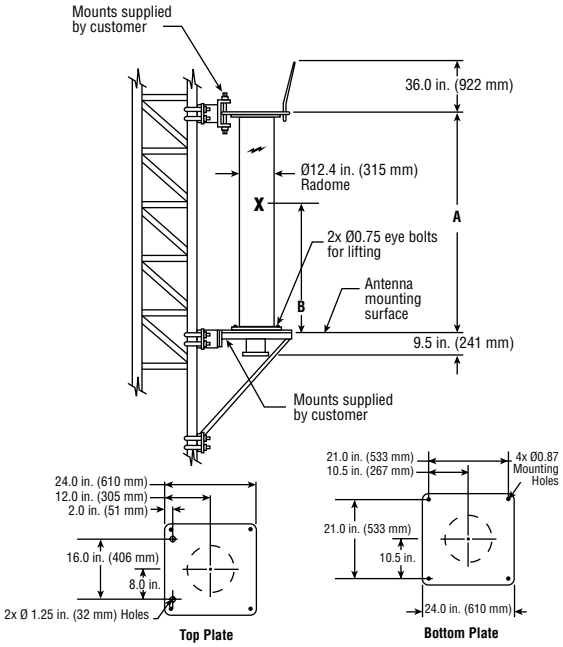
Antenna Series	Channel No.	A Antenna Height* ft (m)	B Radiation Center Above Base ft (m)	Nominal Weight lb (kg)	Wind Load** (Shear) lb (N)	Overturning Moment** lb-ft (N-m)
ATW6V3	7	41.11 (12.53)	19.05 (5.81)	5600 (2600)	2700 (12000)	56400 (76400)
	13	34.67 (10.57)	15.83 (4.82)	4800 (2200)	2300 (10000)	39600 (53700)
ATW9V3	7	57.45 (17.51)	27.22 (8.30)	7600 (3200)	3800 (16900)	112200 (152100)
	13	48.25 (14.71)	22.62 (6.89)	6500 (3000)	3200 (14100)	78400 (106300)
ATW12V3	7	73.79 (22.49)	35.35 (10.79)	9600 (4400)	4900 (21700)	187500 (254100)
	13	61.82 (18.84)	29.41 (8.96)	8100 (3700)	4100 (18200)	130400 (176800)
ATW16V3	7	95.57 (29.13)	46.28 (14.11)	19100 (8700)	6400 (28300)	316500 (429100)
	13	79.93 (24.36)	38.46 (11.72)	12200 (5500)	5300 (23600)	220100 (298400)

* Total height including 3 ft (1 m) lightning rods.

** Loads and weights are typical for wind pressure of 50 lb/ft^2 (2.4 kPa) for flat surfaces and 33 lb/ft^2 (1.6 kPa) for cylindrical surfaces. Other design criteria are available.

Andrew offers a line of lower gain (G-Series) TRASAR antennas for standby and emergency service. The antennas feature a full 60 kW power handling capability and provide excellent assurance against revenue losses in the event of catastrophic main antenna failure.

Antenna Dimensions



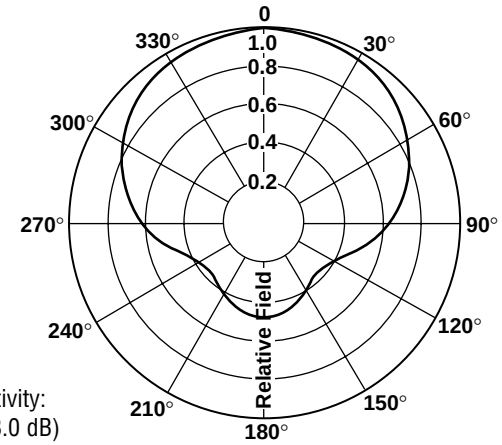
Electrical and Mechanical Characteristics

Type Number	ATW2G1(†)-HSS-(*)	ATW8G4(†)-HSS-(*)	ATW16G4(†)-HSS-(*)	ATW24G4(†)-HSS-(*)
Number of Bays	2	8	16	24
Peak Power Gain (dBd)	4 (6.02)	16 (12.04)	32 (15.05)	48 (16.8)
Standard Beam tilt, degrees	0	1.0	1.0	1.0
Input Power, kW (dBk), Peak Visual +20% Aural: 60 kW Nominal				
Antenna Height, Less Lightning Rods, ft (m) - Dimen. A				
Channel 14	5.1 (1.6)	17.6 (5.4)	33.7 (10.3)	50.0 (15.2)
Channel 69	5.1 (1.6)	11.5 (3.5)	21.0 (6.4)	30.0 (9.1)
Radiation Center Above Base, ft (m) - Dimen. B				
Channel 14	2.5 (0.8)	8.8 (2.7)	16.9 (5.1)	25.0 (7.6)
Channel 69	2.5 (0.8)	5.7 (1.7)	10.5 (3.2)	15.0 (4.5)
Antenna Weight, lb (kg)				
Channel 14	300 (140)	500 (230)	800 (370)	1200 (544)
Channel 69	300 (140)	400 (190)	600 (280)	900 (408)
Wind Load (Shear), lb (N)**				
Channel 14	200 (890)	700 (3200)	1300 (5800)	2000 (9000)
Channel 69	200 (890)	500 (2300)	800 (3600)	1200 (5400)

* Specify channel number. ** Loads are typical for 50 lb/ft^2 (2.4 kPa) for flat surfaces and 33 lb/ft^2 (1.6 kPa) for cylindrical surfaces.
† Specify 50 (50 ohm input) or 75 (75 ohm input).

TRASAR® Emergency and Standby Antennas

Azimuth Pattern - Skull



Directivity:
2.0 (3.0 dB)

High Reliability and Dependable Service

The antennas are fully radome enclosed for maximum environmental protection. Lightning rods are standard.

The skull-shaped azimuth pattern provides coverage appropriate for nearly all emergency situations. The broad elevation pattern ensures a good signal throughout the market area.

Built for Permanent Installation

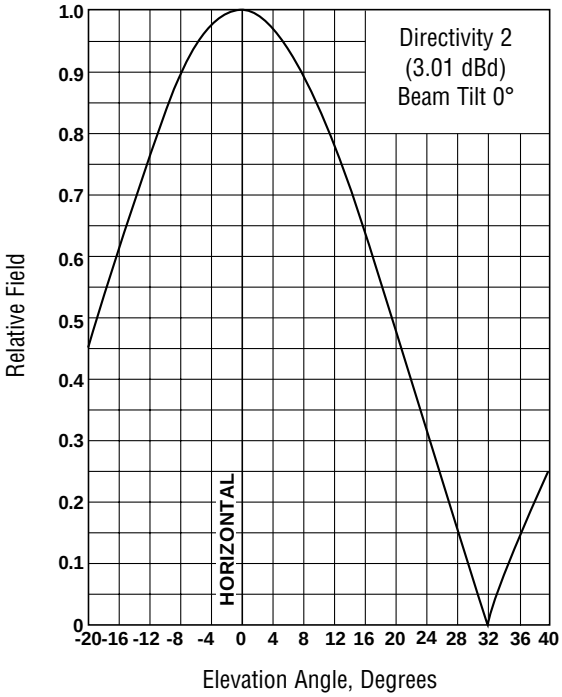
G-Series antennas can be permanently mounted to the tower for use during emergencies or during routine maintenance of the main antenna system. They are designed and manufactured to the same high standards as the high gain TRASAR antennas featured on page 277.

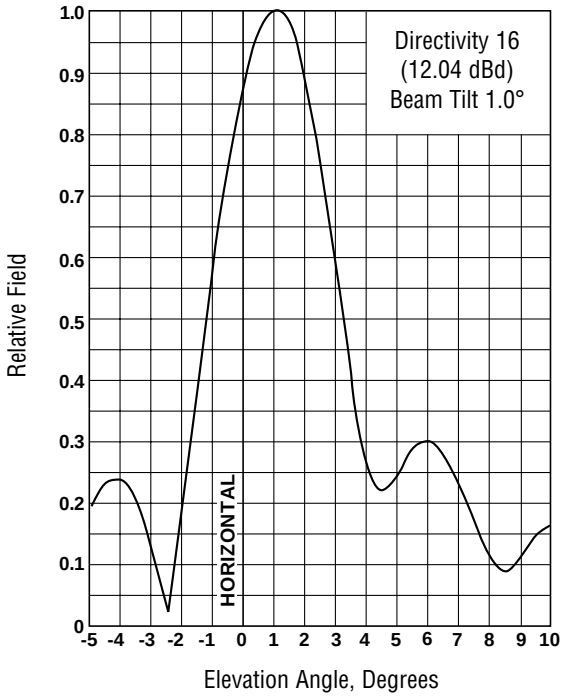
Input is 6-1/8" EIA, 50 or 75 ohm. Specify in Type Number per table on page 289.

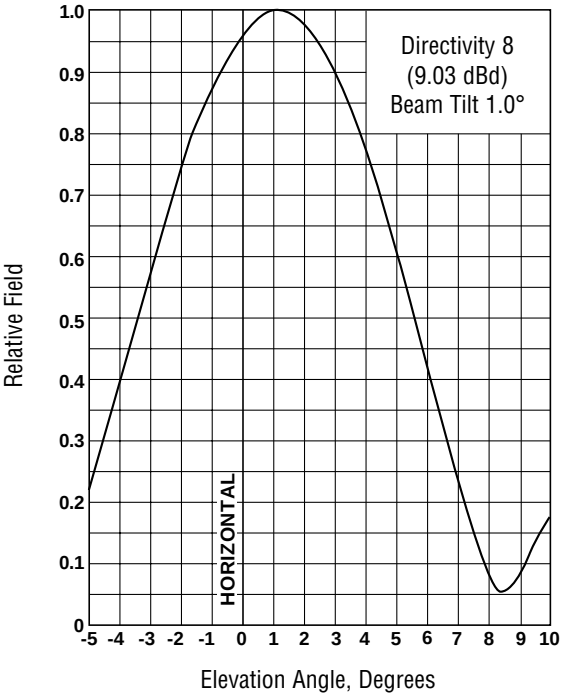
VSWR is maximum of 1.05 at the visual carrier and 1.10 across the channel.

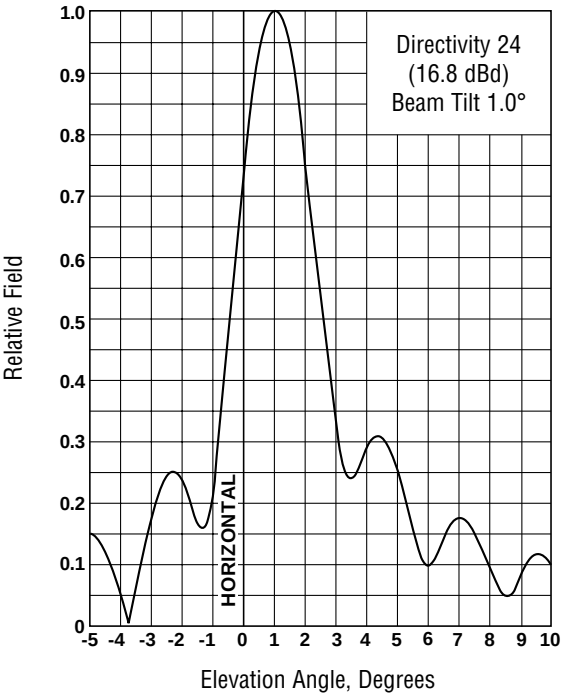
24 Hour emergency service available.

In the U.S.A., Type ATW2G antenna can normally be provided within 24 hours.


Directivity 2
(3.01 dBd)
Beam Tilt 0°
HORIZONTAL
Relative Field
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0
-20 -16 -12 -8 -4 0 4 8 12 16 20 24 28 32 36 40
Elevation Angle, Degrees


Directivity 16
(12.04 dBd)
Beam Tilt 1.0°
HORIZONTAL
Relative Field
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0
-5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Elevation Angle, Degrees


Directivity 8
(9.03 dBd)
Beam Tilt 1.0°
HORIZONTAL
Relative Field
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0
-5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Elevation Angle, Degrees


Directivity 24
(16.8 dBd)
Beam Tilt 1.0°
HORIZONTAL
Relative Field
1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0
-5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Elevation Angle, Degrees

STACKER™ Optimized Antenna Structure
for Television Broadcast Applications

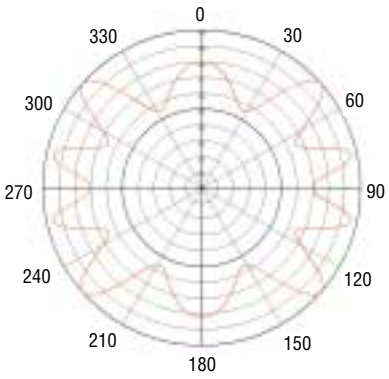
Now Andrew offers a unique solution (patent pending) to the problem of diminishing tower top real estate. The STACKER offers high antenna density without the tradeoffs of in-line stack designs or the expense of a Candelabra or T-Bar.

The "secret" to STACKER's success is the careful integration of the lower antenna(s) into the support structure. Using advanced computer modeling tools, Andrew engineers optimize the structure mechanically without compromising the electrical performance of each antenna.

Service access to each antenna is preserved, as there is no mechanical interconnection between antennas. In fact, the STACKER design is so flexible that any antenna may be replaced while the structure remains on the tower and other stations remain on the air.

- *Maximize antenna density at the tower top*
- *Independent operation, service & replacement of each antenna*
- *Superior azimuth pattern performance*
- *Lowest wind load per antenna*
- *Avoid the tradeoffs of other stack designs*
- *Performance of a Candelabra without the price*

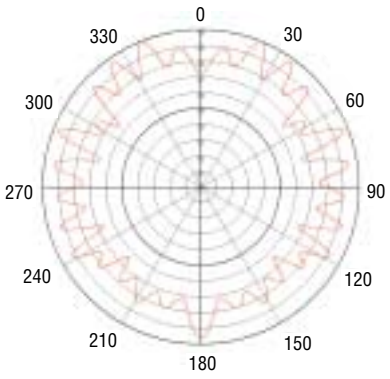
Typical Azimuth Patterns



Lower Antenna of In-line Stack (External 6" Rigid Coax for Top Antenna)

The pattern above shows one of the shortcomings of an in-line stack. If the transmission line for the upper antenna is routed up the outside of the lower antenna, it can impact the azimuth pattern.

If the transmission line for the upper antenna is routed through the lower antenna, power handling and pattern control are compromised. This also complicates the mechanical design (and increases the cost) of the lower antenna.



Lower Antenna(s) of STACKER

Every element of the STACKER mechanical design is chosen to minimize scattering and re-radiation. Transmission line for the upper antenna is routed behind the non-radiating leg – effectively disappearing from the view of the lower antenna(s).

ALP Series II Antennas

New Andrew ALP Series II antennas deliver the versatility, power, and reliability that are the keys to success in today's competitive broadcast marketplace.

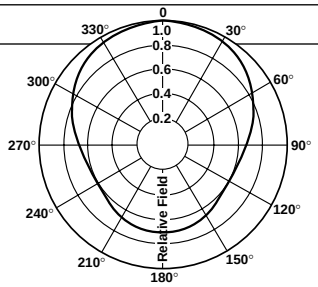
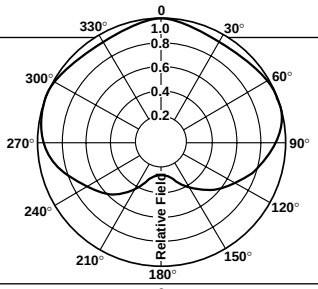
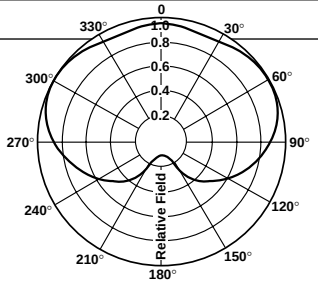
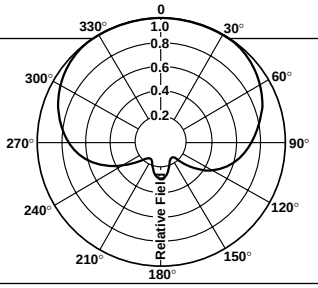
For full-power stations transitioning to DTV, ALP Series II antennas offer field-proven solutions. Broadcasters with medium power requirements can benefit from this antenna's lightweight, low windloads, and easy installation which provide reductions in installation time and costs.

For Low Power Television (LPTV) stations the new, higher power handling capabilities of the ALP Series II UHF antennas make them the ideal choice for the higher ERPs now allowed for LPTV stations and translator facilities. The ALP Series II antennas offer the quality and performance needed to improve coverage and maintain competitiveness in today's broadcast marketplace.

- *Available for immediate implementation of DTV channels*
- *All CCIR bands IV/V channels available*
- *Lightweight/low wind load*
  - *Easy to install with less expense*
  - *Easier to lease tower space*
- *Radome enclosed for environmental protection*
  - *Long Life*
  - *Low maintenance*
  - *Reliable*
- *Power ratings up to 28 kW (peak) available*
- *Customized patterns*
  - *Optimize coverage for your market area*
- *Wide selection of "off the shelf" patterns*
  - *Simplified application process*
- *Patterns measured at factory*
  - *Reliable performance in the field*
  - *Superior coverage*
- *Special designs available*
  - *Circular polarization (low and medium power)*
  - *Broadband versions available*

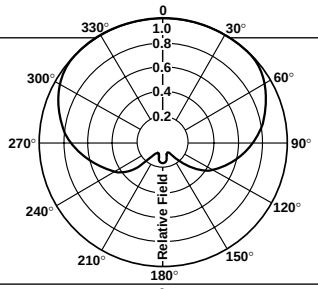
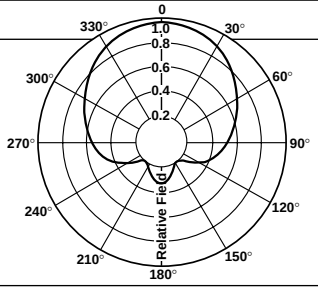
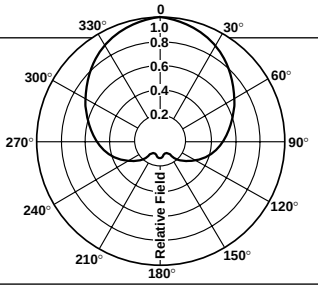
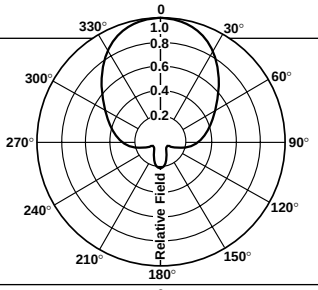
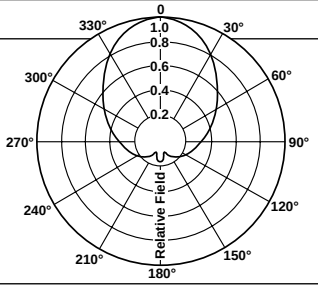
ALP Series II Antennas
Azimuth Patterns

UHF Low and Medium Power Antenna Systems

Number of Bays	Antenna Type Number	Power Gain (dBd)		
Omnioid™ (Omnidirectional)				
4	ALP4†1-HSOC- (*)	7.79 (8.91)		Directivity 1.70 (2.30 dB) Pattern: OC
8	ALP8†1-HSOC- (*)	15.39 (11.87)		
12	ALP12†2-HSOC- (*)	21.49 (13.32)		
16	ALP16†2-HSOC- (*)	28.20 (14.50)		
24	ALP24†3-HSOC- (*)	42.86 (16.32)		
32	ALP32†3-HSOC- (*)	54.28 (17.35)		
Wide Cardioid				
4	ALP4†1-HSW- (*)	7.14 (8.54)		Directivity 1.56 (1.93 dB) Pattern: W
8	ALP8†1-HSW- (*)	14.12 (11.50		
12	ALP12†2-HSW- (*)	19.72 (12.95)		
16	ALP16†2-HSW- (*)	25.88 (14.13)		
24	ALP24†3-HSW- (*)	39.33 (15.95)		
32	ALP32†3-HSW- (*)	49.81 (16.97)		
Wide Cardioid - Reduced Rear (H-pol only)				
4	ALP4†1-HSWR- (*)	7.74 (8.89)		Directivity 1.69 (2.28 dB) Pattern: WR
8	ALP8†1-HSWR- (*)	15.29 (11.85)		
12	ALP12†2-HSWR- (*)	21.36 (13.30)		
16	ALP16†2-HSWR- (*)	28.04 (14.48)		
24	ALP24†3-HSWR- (*)	42.60 (16.30)		
32	ALP32†3-HSWR- (*)	53.96 (17.32)		
Extended Cardioid				
4	ALP4†1-HSE- (*)	8.52 (9.30)		Directivity 1.86 (2.70 dB) Pattern: E
8	ALP8†1-HSE- (*)	16.83 (12.26)		
12	ALP12†2-HSE- (*)	23.51 (13.71)		
16	ALP16†2-HSE- (*)	30.86 (14.89)		
24	ALP24†3-HSE- (*)	46.89 (16.71)		
32	ALP32†3-HSE- (*)	59.39 (17.74)		

† Insert "L" for low power or "M" for medium power.
* Insert channel number (14 to 69).
Note: C-Pol antenna azimuth patterns only available in E, M, N, OC, P, and W.

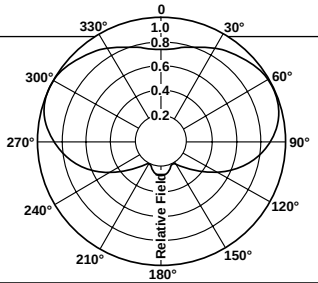
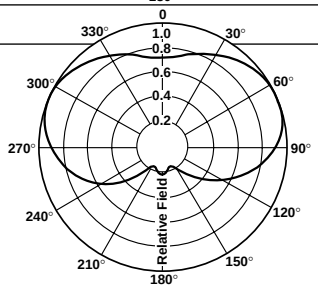
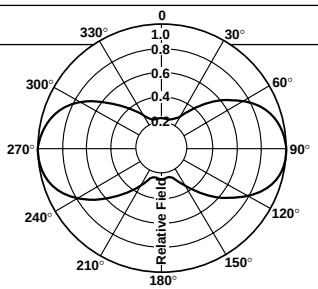
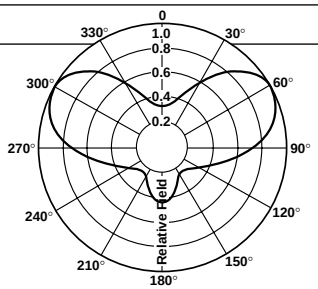
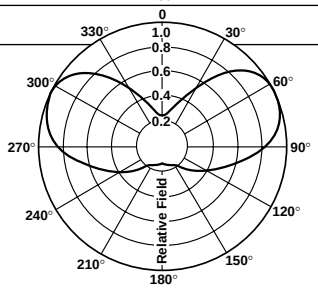
UHF Low and Medium Power Antenna Systems

Number of Bays	Antenna Type Number	Power Gain (dBd)		
Extended Cardioid - Reduced Rear (H-pol only)				
4	ALP4†1-HSER- (*)	8.84 (9.46)		Directivity 1.93 (2.86 dB)
8	ALP8†1-HSER- (*)	17.47 (12.42)		Pattern: ER
12	ALP12†2-HSER- (*)	24.40 (13.87)		
16	ALP16†2-HSER- (*)	32.02 (15.05)		
24	ALP24†3-HSER- (*)	48.66 (16.87)		
32	ALP32†3-HSER- (*)	61.62 (17.90)		
Medium Cardioid				
4	ALP4†1-HSM- (*)	11.63 (10.66)		Directivity 2.54 (4.05 dB)
8	ALP8†1-HSM- (*)	22.99 (13.61)		Pattern: M
12	ALP12†2-HSM- (*)	32.11 (15.07)		
16	ALP16†2-HSM- (*)	42.14 (16.25)		
24	ALP24†3-HSM- (*)	64.03 (18.06)		
32	ALP32†3-HSM- (*)	81.10 (19.09)		
Medium Cardioid - Reduced Rear (H-pol only)				
4	ALP4†1-HSMR- (*)	12.92 (11.11)		Directivity 2.82 (4.50 dB)
8	ALP8†1-HSMR- (*)	25.52 (14.07)		Pattern: MR
12	ALP12†2-HSMR- (*)	35.64 (15.52)		
16	ALP16†2-HSMR- (*)	46.78 (16.70)		
24	ALP24†3-HSMR- (*)	71.09 (18.52)		
32	ALP32†3-HSMR- (*)	90.04 (19.54)		
Narrow Cardioid				
4	ALP4†1-HSN- (*)	17.27 (12.37)		Directivity 3.77 (5.76 dB)
8	ALP8†1-HSN- (*)	34.12 (15.33)		Pattern: N
12	ALP12†2-HSN- (*)	47.65 (16.78)		
16	ALP16†2-HSN- (*)	62.54 (17.96)		
24	ALP24†3-HSN- (*)	95.04 (19.78)		
32	ALP32†3-HSN- (*)	120.38 (20.81)		
Narrow Cardioid - Reduced Rear (H-pol only)				
4	ALP4†1-HSNR- (*)	17.40 (12.41)		Directivity 3.80 (5.80 dB)
8	ALP8†1-HSNR- (*)	34.39 (15.36)		Pattern: NR
12	ALP12†2-HSNR- (*)	48.03 (16.82)		
16	ALP16†2-HSNR- (*)	63.04 (18.00)		
24	ALP24†3-HSNR- (*)	95.80 (19.81)		
32	ALP32†3-HSNR- (*)	121.33 (20.84)		

† Insert "L" for low power or "M" for medium power.
* Insert channel number (14 to 69)
Note: C-Pol antanna azimuth patterns only available in E, M, N, OC, P, and W.

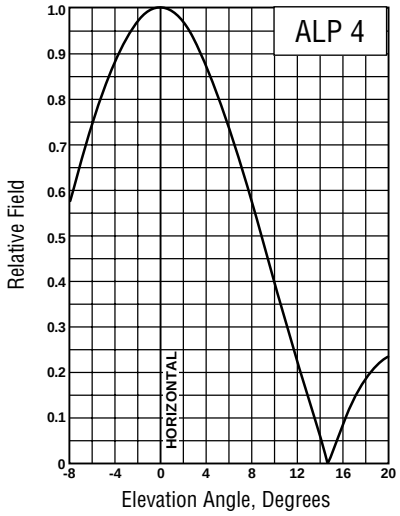
ALP Series II Antennas
Azimuth Patterns

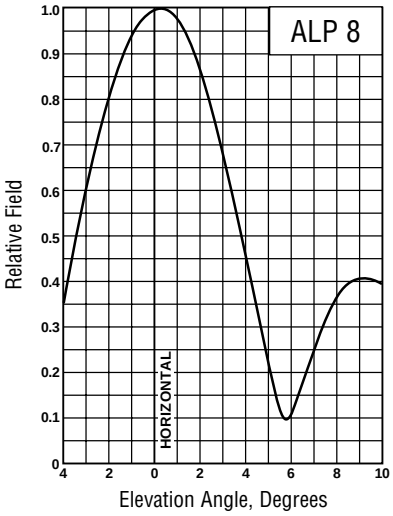
UHF Low and Medium Power Antenna Systems

Number of Bays	Antenna Type Number	Power Gain (dBd)		
Peanut				
4	ALP4†1-HSP- (*)	8.61 (9.35)		Directivity 1.88 (2.74 dB)
8	ALP8†1-HSP- (*)	17.01 (12.31)		Pattern: P
12	ALP12†2-HSP- (*)	23.76 (13.76)		
16	ALP16†2-HSP- (*)	31.19 (14.94)		
24	ALP24†3-HSP- (*)	47.39 (16.76)		
32	ALP32†3-HSP- (*)	60.03 (17.78)		
Peanut - Reduced Rear (H-pol only)				
4	ALP4†1-HSPR- (*)	8.79 (9.44)		Directivity 1.92 (2.83 dB)
8	ALP8†1-HSPR- (*)	17.38 (12.40)		Pattern: PR
12	ALP12†2-HSPR- (*)	24.27 (13.85)		
16	ALP16†2-HSPR- (*)	31.85 (15.03)		
24	ALP24†3-HSPR- (*)	48.40 (16.85)		
32	ALP32†3-HSPR- (*)	61.31 (17.88)		
H-Pattern Peanut (H-pol only)				
4	ALP4†1-HSH- (*)	11.27 (10.52)		Directivity 2.46 (3.91 dB)
8	ALP8†1-HSH- (*)	22.26 (13.48)		Pattern: H
12	ALP12†2-HSH- (*)	31.09 (14.93)		
16	ALP16†2-HSH- (*)	40.81 (16.11)		
24	ALP24†3-HSH- (*)	62.02 (17.93)		
32	ALP32†3-HSH- (*)	78.55 (18.95)		
Butterfly (H-pol only)				
4	ALP4†1-HSB- (*)	12.23 (10.87)		Directivity 2.67 (4.27 dB)
8	ALP8†1-HSB- (*)	24.16 (13.83)		Pattern: B
12	ALP12†2-HSB- (*)	33.75 (15.28)		
16	ALP16†2-HSB- (*)	44.30 (16.46)		
24	ALP24†3-HSB- (*)	67.31 (18.28)		
32	ALP32†3-HSB- (*)	85.25 (19.31)		
Butterfly - Reduced Rear (H-pol only)				
4	ALP4†1-HSBR- (*)	12.60 (11.00)		Directivity 2.75 (4.39 dB)
8	ALP8†1-HSBR- (*)	24.89 (13.96)		Pattern: BR
12	ALP12†2-HSBR- (*)	34.76 (15.41)		
16	ALP16†2-HSBR- (*)	45.62 (16.59)		
24	ALP24†3-HSBR- (*)	69.33 (18.41)		
32	ALP32†3-HSBR- (*)	87.81 (19.44)		

† Insert "L" for low power or "M" for medium power.
* Insert channel number (14 to 69).
Note: C-Pol antenna azimuth patterns only available in E, M, N, OC, P, and W.

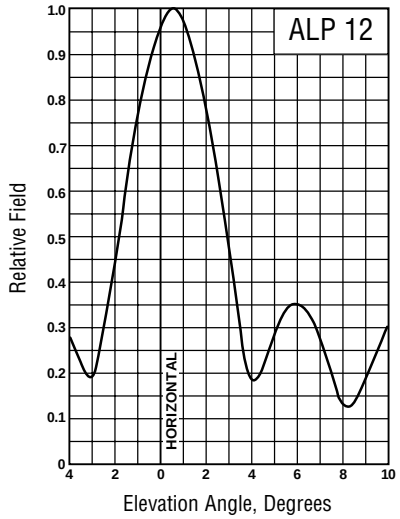
4 Bay
Directivity 4.58
(6.61 dBd)
Beam Tilt 0°

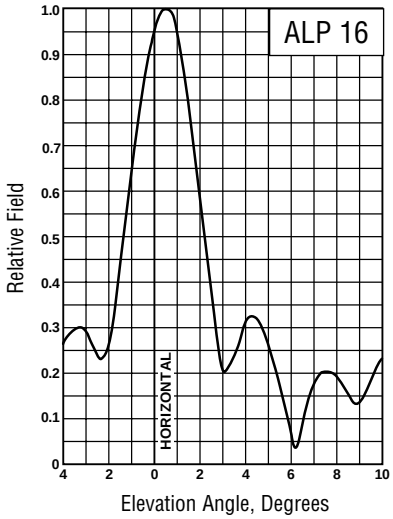




8 Bay
Directivity 9.05
(9.57 dBd)
Beam Tilt 0.25°

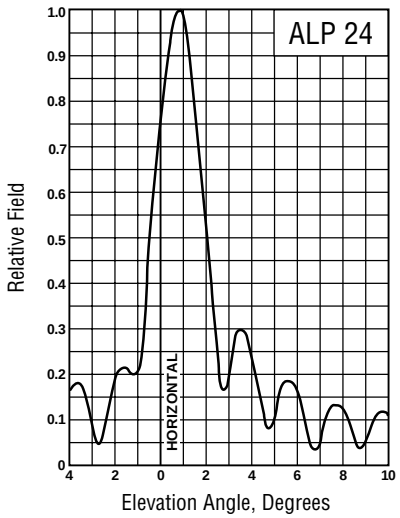
12 Bay
Directivity 12.64
(11.02 dBd)
Beam Tilt 0.5°

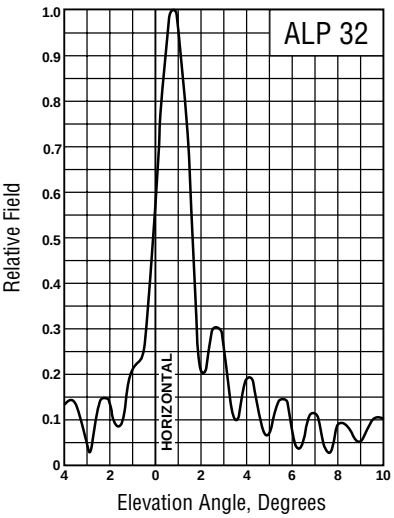




16 Bay
Directivity 16.59
(12.20 dBd)
Beam Tilt 0.5°

24 Bay
Directivity 25.21
(14.02 dBd)
Beam Tilt 0.75°



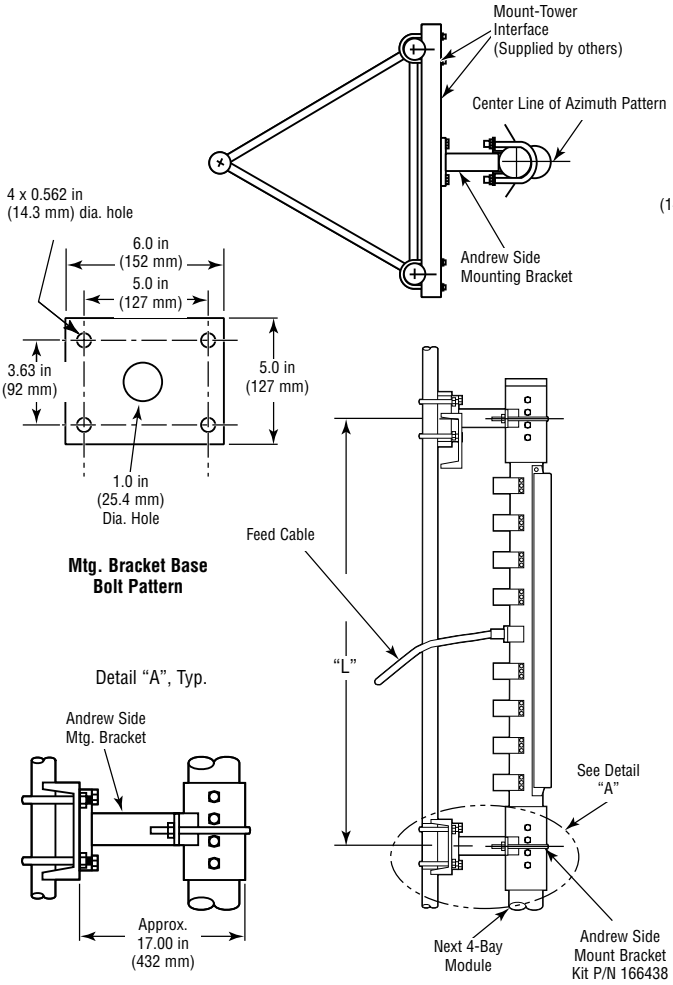


32 Bay
Directivity 31.93
(15.04 dBd)
Beam Tilt 0.75°

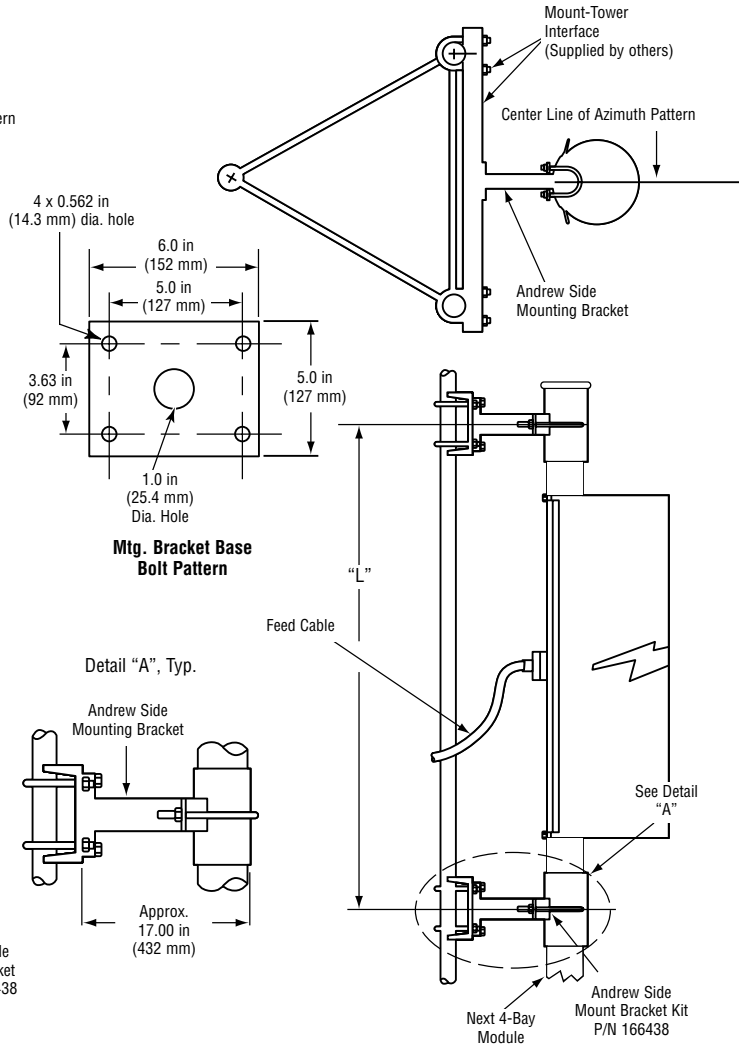
Note: Standard beamtilts are shown for each antenna model. Additional beamtilt up to 3.0° is available at an extra charge. See ordering information on page 299.

ALP Series II Antennas
Mechanical Drawings

H-Pol Side Mounting Details



C-Pol Side Mounting Details

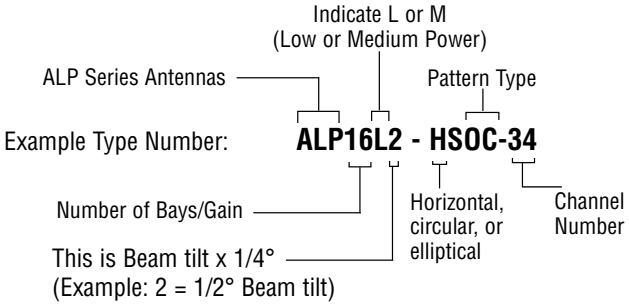


VSWR. All single channel antennas listed meet the following maximum VSWR specifications:

Visual Carrier + 0.5 MHz	1.05:1
Color Subcarrier	1.08:1
Remainder of channel	1.10:1

Mounting. Andrew does not supply the interface between mount and tower.

To Order:



The example antenna is a low power version of a 16 bay, horizontally polarized, omnidirectional antenna, with a beam tilt of 1/2°, for channel 34.

Bays	Mounting Brackets Required
4	2
8	3
12	4
16	5
24	7
32	9

Channel	"L" in (mm)
14-24	120.0 (3048)
25-30	114.0 (2896)
31-37	108.0 (2743)
38-45	102.0 (2591)
46-53	96.0 (2438)
54-61	90.0 (2286)
62-69	84.0 (2134)

Wide band antennas are specified similar to standard single channel antennas, except the applicable channels and bandwidth of the antenna are specified in the final three digits as follows:

The first two digits represent the number of the UHF channel at the bottom of the band requested.

The third digit represents the number of 6 MHz channels covered (5 for 30 MHz bandwidth or 3 for 18 MHz bandwidth).

For example: **ALP16L2-HSOC-425**

The example antenna is a low power version of a 16 bay omnidirectional antenna, with a beam tilt of 1/2°, which covers channels 42 through 46 (30 MHz).

For complete specifications on wide band versions, **call 1-800-DIAL-4RF.**

ALP Series II Antennas
Mechanical Data

H-pol Specifications

Channel Number	Diameter Inches (mm)	Height ft (m)	Weight lb (kg)	Wind Load† lb (N)	L-Series Peak Power Rating**	L-Series Input (50 ohm)	M-Series Peak Power Rating**	M-Series Input (50 ohm)
4 Bay								
14-24	3.5 (89)	10.8 (3.3)	60 (27)	200 (890)	3 kW	7/8" EIA	3 kW	7/8" EIA
25-30	3.5 (89)	10.3 (3.1)	60 (27)	200 (890)	3 kW	7/8" EIA	3 kW	7/8" EIA
31-37	3.5 (89)	9.8 (2.9)	60 (27)	190 (845)	3 kW	7/8" EIA	3 kW	7/8" EIA
38-45	3.5 (89)	9.3 (2.8)	55 (25)	190 (845)	3 kW	7/8" EIA	3 kW	7/8" EIA
46-53	3.5 (89)	8.8 (2.7)	55 (25)	180 (800)	3 kW	7/8" EIA	3 kW	7/8" EIA
54-61	3.5 (89)	8.3 (2.5)	55 (25)	180 (800)	3 kW	7/8" EIA	3 kW	7/8" EIA
62-69	3.5 (89)	7.8 (2.4)	50 (23)	170 (755)	3 kW	7/8" EIA	3 kW	7/8" EIA
8 Bay								
14-24	3.5 (89)	20.8 (6.3)	120 (55)	390 (1730)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
25-30	3.5 (89)	19.8 (6.0)	120 (55)	390 (1730)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
31-37	3.5 (89)	18.8 (5.7)	120 (55)	370 (1645)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
38-45	3.5 (89)	17.8 (5.4)	110 (50)	370 (1645)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
46-53	3.5 (89)	16.8 (5.1)	110 (50)	350 (1555)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
54-61	3.5 (89)	15.8 (4.8)	110 (50)	350 (1555)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
62-69	3.5 (89)	14.8 (4.5)	100 (45)	330 (1465)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
12 Bay								
14-24	3.5 (89)	30.8 (9.4)	175 (80)	580 (2580)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
25-30	3.5 (89)	29.3 (8.9)	175 (80)	570 (2535)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
31-37	3.5 (89)	27.8 (8.5)	170 (75)	550 (2445)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
38-45	3.5 (89)	26.3 (8.0)	170 (75)	540 (2400)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
46-53	3.5 (89)	24.8 (7.6)	165 (75)	520 (2310)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
54-61	3.5 (89)	23.3 (7.1)	164 (75)	510 (2265)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
62-69	3.5 (89)	21.8 (6.6)	160 (70)	490 (2180)	3 kW	1-5/8" EIA	17 kW	3-1/8" EIA
16 Bay								
14-24	3.5 (89)	40.8 (12.4)	240 (110)	780 (3470)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
25-30	3.5 (89)	38.8 (11.8)	235 (105)	760 (3380)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
31-37	3.5 (89)	36.8 (11.2)	230 (105)	740 (3290)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
38-45	3.5 (89)	34.8 (10.6)	225 (100)	720 (3200)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
46-53	3.5 (89)	32.8 (10.0)	220 (100)	700 (3110)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
54-61	3.5 (89)	30.8 (9.4)	215 (100)	680 (3025)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
62-69	3.5 (89)	28.8 (8.8)	210 (95)	660 (2935)	4 kW	1-5/8" EIA	22 kW	3-1/8" EIA
24 Bay								
14-24	3.5 (89)	60.8 (18.5)	350 (160)	1160 (5160)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
25-30	3.5 (89)	57.8 (17.6)	340 (155)	1130 (5025)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
31-37	3.5 (89)	54.8 (16.7)	330 (150)	1100 (4890)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
38-45	3.5 (89)	51.8 (15.8)	320 (145)	1070 (4760)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
46-53	3.5 (89)	48.8 (14.9)	310 (140)	1040 (4625)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
54-61	3.5 (89)	45.8 (14.0)	300 (135)	1010 (4490)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
62-69	3.5 (89)	42.8 (13.0)	290 (130)	980 (4360)	6 kW	1-5/8" EIA	28 kW	3-1/8" EIA
32 Bay								
14-24	3.5 (89)	80.8 (24.6)	440 (200)	1550 (6895)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
25-30	3.5 (89)	76.8 (23.4)	430 (195)	1510 (6715)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
31-37	3.5 (89)	72.8 (22.2)	420 (190)	1470 (6535)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
38-45	3.5 (89)	68.8 (21.0)	410 (185)	1430 (6360)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
46-53	3.5 (89)	64.8 (19.8)	400 (180)	1390 (6180)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
54-61	3.5 (89)	60.8 (18.5)	390 (175)	1350 (6005)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
62-69	3.5 (89)	56.8 (17.3)	380 (170)	1310 (5825)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA

Notes: † Loads are typical for 50 lb/ft^2 (2.4 kPa) for flat surfaces and 33 lb/ft^2 (1.6 kPa) for cylindrical surfaces.

* For wide Cardioid, Butterfly and all "Reduced Rear" azimuth patterns, multiply weight values by 1.05 and windload values by 1.25

** For average power rating, multiply (peak power x 0.7)

C-pol Specifications - C-pol Antenna azimuth patterns only available in E, M, N, OC, P, and W.

Channel Number	Diameter Inches (mm)	Height ft (m)	Weight lb (kg)	Wind Load† lb (N)	L-Series Peak Power Rating**	L-Series Input (50 ohm)	M-Series Peak Power Rating**	M-Series Input (50 ohm)
4 Bay								
14-24	3.5 (89)	10.8 (3.3)	75 (34)	850 (3780)	3 kW	7/8" EIA	3 kW	7/8" EIA
25-30	3.5 (89)	10.3 (3.1)	75 (34)	830 (3690)	3 kW	7/8" EIA	3 kW	7/8" EIA
31-37	3.5 (89)	9.8 (2.9)	75 (34)	810 (3600)	3 kW	7/8" EIA	3 kW	7/8" EIA
38-45	3.5 (89)	9.3 (2.8)	70 (32)	790 (3515)	3 kW	7/8" EIA	3 kW	7/8" EIA
46-53	3.5 (89)	8.8 (2.7)	70 (32)	770 (3425)	3 kW	7/8" EIA	3 kW	7/8" EIA
54-61	3.5 (89)	8.3 (2.5)	70 (32)	750 (3335)	3 kW	7/8" EIA	3 kW	7/8" EIA
62-69	3.5 (89)	7.8 (2.4)	65 (29)	730 (3245)	3 kW	7/8" EIA	3 kW	7/8" EIA
8 Bay								
14-24	3.5 (89)	20.8 (6.3)	140 (64)	1810 (8050)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
25-30	3.5 (89)	19.8 (6.0)	140 (64)	1770 (7875)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
31-37	3.5 (89)	18.8 (5.7)	140 (64)	1730 (7695)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
38-45	3.5 (89)	17.8 (5.4)	130 (59)	1690 (7520)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
46-53	3.5 (89)	16.8 (5.1)	130 (59)	1650 (7340)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
54-61	3.5 (89)	15.8 (4.8)	130 (59)	1610 (7160)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
62-69	3.5 (89)	14.8 (4.5)	120 (54)	1570 (6985)	2 kW	1-5/8" EIA	7 kW	1-5/8" EIA
12 Bay								
14-24	3.5 (89)	30.8 (9.4)	200 (91)	2670 (11875)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
25-30	3.5 (89)	29.3 (8.9)	200 (91)	2610 (11610)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
31-37	3.5 (89)	27.8 (8.5)	195 (88)	2550 (11345)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
38-45	3.5 (89)	26.3 (8.0)	195 (88)	2490 (11075)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
46-53	3.5 (89)	24.8 (7.6)	190 (86)	2430 (10810)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
54-61	3.5 (89)	23.3 (7.1)	190 (86)	2370 (10540)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
62-69	3.5 (89)	21.8 (6.6)	185 (84)	2310 (10275)	3 kW	1-5/8" EIA	12 kW	3-1/8" EIA
16 Bay								
14-24	3.5 (89)	40.8 (12.4)	270 (122)	3530 (15700)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
25-30	3.5 (89)	38.8 (11.8)	265 (120)	3450 (15345)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
31-37	3.5 (89)	36.8 (11.2)	260 (118)	3370 (14990)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
38-45	3.5 (89)	34.8 (10.6)	255 (116)	3300 (14680)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
46-53	3.5 (89)	32.8 (10.0)	250 (113)	3220 (14325)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
54-61	3.5 (89)	30.8 (9.4)	245 (111)	3140 (13970)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
62-69	3.5 (89)	28.8 (8.8)	240 (109)	3060 (13610)	4 kW	1-5/8" EIA	16 kW	3-1/8" EIA
24 Bay								
14-24	3.5 (89)	60.8 (18.5)	390 (177)	5270 (23440)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
25-30	3.5 (89)	57.8 (17.6)	380 (172)	5150 (22910)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
31-37	3.5 (89)	54.8 (16.7)	370 (168)	5030 (22375)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
38-45	3.5 (89)	51.8 (15.8)	360 (163)	4910 (21840)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
46-53	3.5 (89)	48.8 (14.9)	350 (159)	4790 (21310)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
54-61	3.5 (89)	45.8 (14.0)	340 (154)	4670 (20775)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
62-69	3.5 (89)	42.8 (13.0)	330 (150)	4550 (20240)	6 kW	1-5/8" EIA	24 kW	3-1/8" EIA
32 Bay								
14-24	3.5 (89)	80.8 (24.6)	490 (222)	6990 (31095)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
25-30	3.5 (89)	76.8 (23.4)	480 (218)	6830 (30380)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
31-37	3.5 (89)	72.8 (22.2)	470 (213)	6670 (29670)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
38-45	3.5 (89)	68.8 (21.0)	460 (209)	6510 (28960)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
46-53	3.5 (89)	64.8 (19.8)	450 (204)	6350 (28245)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
54-61	3.5 (89)	60.8 (18.5)	440 (200)	6190 (27535)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA
62-69	3.5 (89)	56.8 (17.3)	430 (195)	6040 (26870)	8 kW	1-5/8" EIA	28 kW	3-1/8" EIA

Notes:† Loads are typical for 50 lb/ft^2 (2.4 kPa) for flat surfaces and 33 lb/ft^2 (1.6 kPa) for cylindrical surfaces.
** For average power rating, multiply (peak power x 0.7)

ALP Series II Antennas

System Planning Worksheet

Use this worksheet to plan your material list for an efficient, cost-effective ALP antenna and HELIAX® coaxial cable system. Duplicate this page or call **Broadcast Systems at 1-800-DIAL-4-RF** for additional copies of the worksheet.

Item No.	Description	Type No.	Qty.	Unit Price	Extended Price
	Antenna and Accessories				
1	Antenna				
	Other				
	Transmission Line System				
2	HELIAX Coaxial Cable				
3	HELIAX Connector, Top				
4	HELIAX Connector, Bottom				
5	Hanger Kit of 10				
	Hardware Kit of 10				
	Adaptor Kit of 10				
	Threaded Rod Support				
6	Grounding Kit				
7	Wall/Roof Feed-Thru				
8	Miter Elbow				
9	Hoisting Grip				
	Pressurization Equipment				
10	Dehydrator (if required)				
11					
	Total Antenna System Estimate				

Channel(s)_____

Location_____

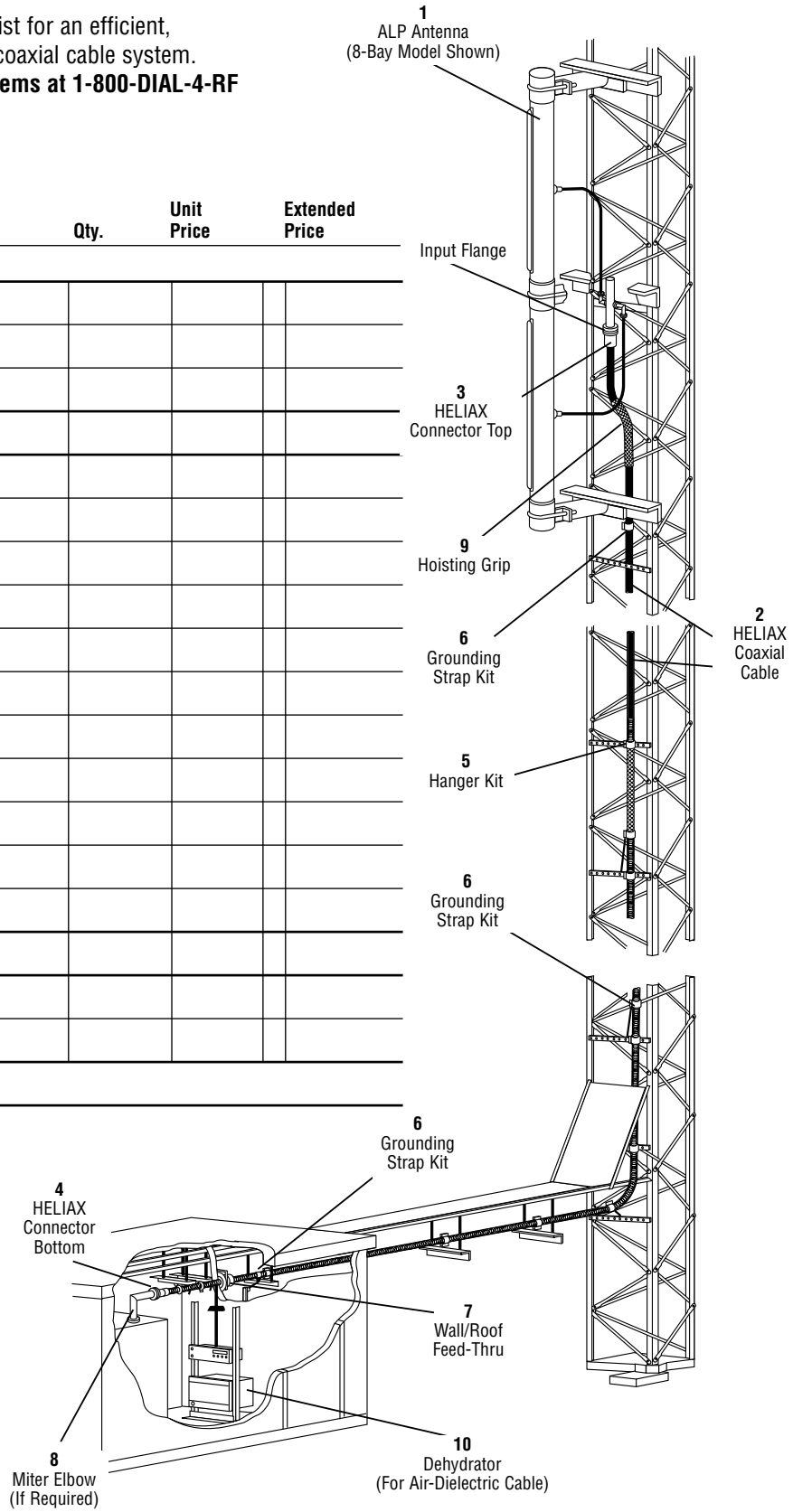
Owner_____

Prepared By_____

Date_____

Telephone_____

Notes_____



The Andrew AL8-Series Television Transmit Antenna will Give the Clear Picture

The Andrew Low-Power AL8 Series (CCIR Band IV/V) television transmitting antenna designed for UHF translator and low power applications offers a combination of quality, reliability, performance and economy.

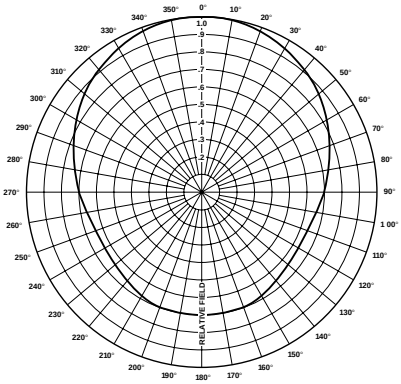
Our engineering staff uses a state-of-the-art manufacturing and testing facility for the development of antenna designs and the production of broadcast antennas. Every Andrew antenna has been individually designed and engineered to meet or exceed customer specifications.

Here are some of the outstanding features that make the AL8-Series antennas from Andrew the very best.

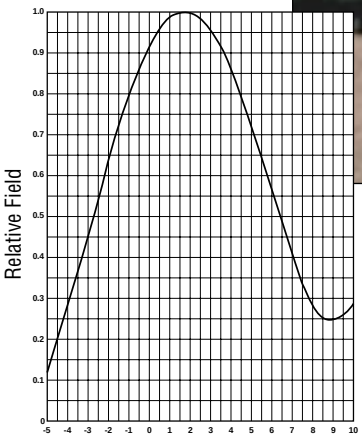
- *8-Bay (one module) antenna*
- *Single channel and wideband antennas available for U.S., Australia and European frequencies*
- *Omnioid pattern standard (directional patterns also available)*
- *3 kW peak power rating standard (10 kW version available on application)*
- *7/8" EIA flange standard*
- *1.75 degrees of electrical beam tilt standard*
- *Structural survival rating of 125 mph (201 km/h) plus 1/4 in (6.4 mm) radial ice*
- *Hardware furnished for pipe or flush mounting*
- *Slot cover radome for environmental protection*
- *Lightweight, cost effective shipping containers. Wood crate export packing available.*

Standard Patterns

Azimuth



Elevation



AL8 Series Antennas
Mechanical Specifications

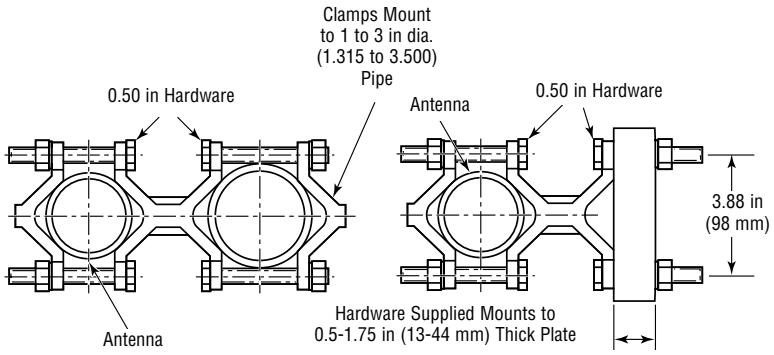
H-Pol, OC Pattern, 3 kW Peak Power Rating*

U.S, 6 MHz	European Channels, 8 MHz	Australian, 7 MHz	Diameter, in (mm)	Length, ft (m)	Weight, lb (kg)	Wind Load*, lb (N)
14-19	21E-24E	–	3.5 (89)	20.0 (6.1)	110 (49.9)	230 (1025)
20-25	25E-29E	28A-29A	3.5 (89)	18.6 (5.7)	105 (47.7)	215 (960)
26-31	30E-33E	30A-34A	3.5 (89)	17.6 (5.4)	100 (45.4)	205 (915)
32-38	34E-38E	35A-40A	3.5 (89)	16.6 (5.1)	95 (43.1)	195 (870)
39-49	39E-47E	41A-49A	2.875 (73)	15.6 (4.8)	90 (40.9)	160 (715)
50-60	48E-55E	50A-59A	2.875 (73)	14.6 (4.5)	85 (38.6)	150 (670)
61-69	56E-62E	60A-67A	2.875 (73)	13.6 (4.2)	80 (36.3)	140 (625)
70-83	63E-69E	68A-69A	2.875 (73)	12.6 (3.9)	75 (34.0)	130 (580)

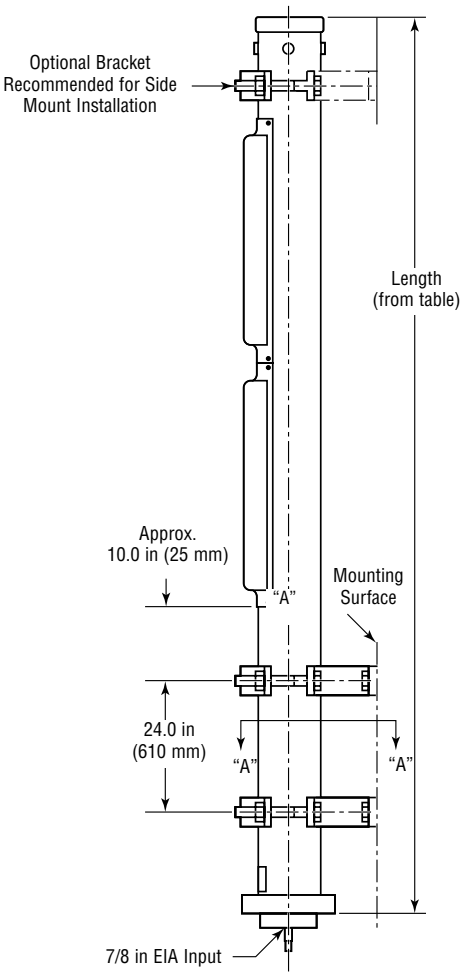
* Wind Load specifications = 50/33 psf.

AL8-Series Electrical Specifications

- *Frequency range: 470 - 890 MHz (channels 14 - 83)*
- *Operating frequency: Specify by channel or bandwidth*
- *Peak gain: 14.06 (11.48 dBd)*
- *Input Impedance: 50 ohms*
- *Input type: 7/8" EIA (standard)*
- *Input power rating: 3 kW maximum*
  **(10 kW available on application)*
- *Polarization: Horizontal*
- *VSWR:6 MHz bandwidth: 1.10:1 max., e.g., AL8-21 (ch 21)*
  18 MHz bandwidth: 1.25:1 max., e.g., AL8-213 (ch 21-23)
  30 MHz bandwidth: 1.35:1 max., e.g., AL8-215 (ch 21-26)
- *Electrical beam tilt: 1.75 degrees*
- *Vertical 3 dB beamwidth: 6.8 degrees*
- *Null fill: Standard*



Section "A-A" Circular Mounting **Section "A-A" Flush Mounting**



Replacement Mounting Kit

AL8 Single Mount Type No. **167623**
AL8 Double Mount Type No. **168790**
SL8 Mount Adapter Plate (2 required) Type No. **167478**

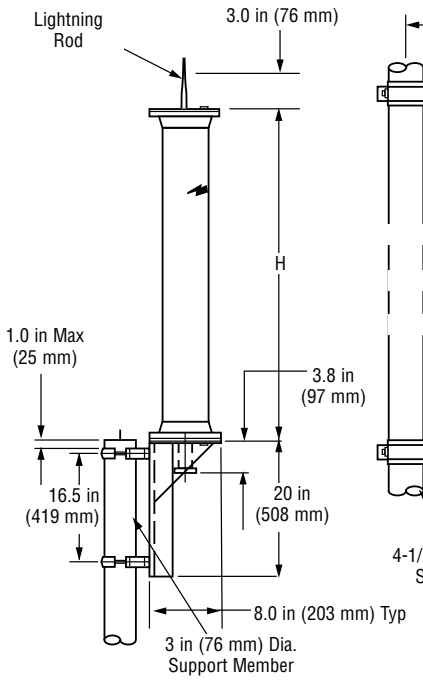
HMD Series
Antenna Systems
For Global MMDS/ITFS Systems and Wireless Cable Applications

HMD Series Antennas for MMDS/ITFS and Wireless Cable Applications

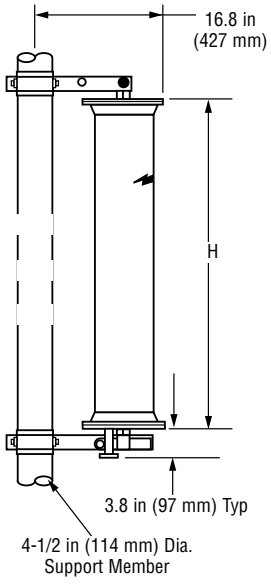
Features

- *Pressurizable, radome enclosed for long, trouble-free life*
- *Excellent VSWR performance*
  - *1.35:1 max for W-Band*
  - *1.5:1 max for other bands*
- *Optimized beam tilt*
  - *0.5° Standard for 8, 12, and 16 bay*
  - *0.75° Standard for 24 and 32 bay*
  - *Others available on request*
- *High power handling - 800 watts typical*
- *Wide selection of frequency bands and patterns*
- *Horizontal or vertical polarization*
- *Suitable for analog or digital transmission*
- *Null fill for excellent coverage*

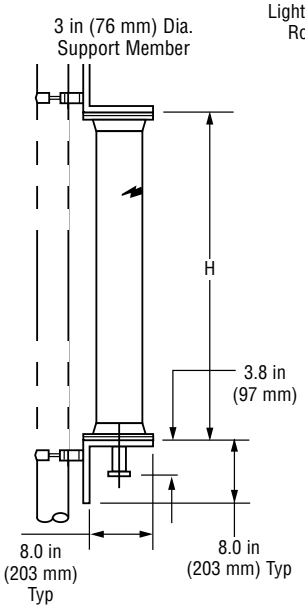
Standard Mounting Configurations



Mount Type A
Side Mounted at Top of Tower

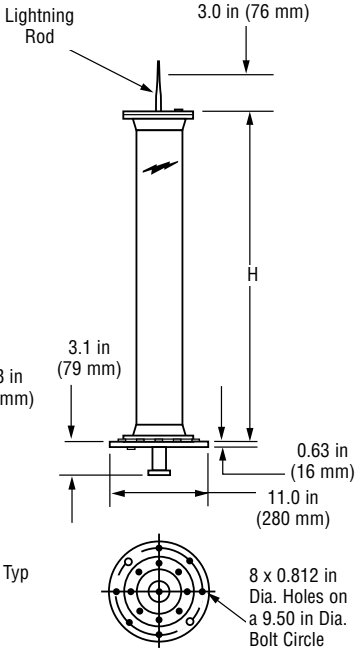


Mount Type B
Side Mounted at Side of Tower

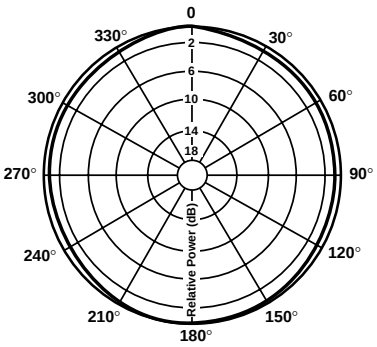


Mount Type C5
Side Mounted at Side of Tower

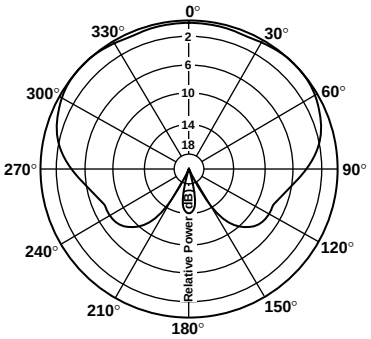
Mount Type C8
Has Bracket at Top and Bottom of Mount for Additional Support



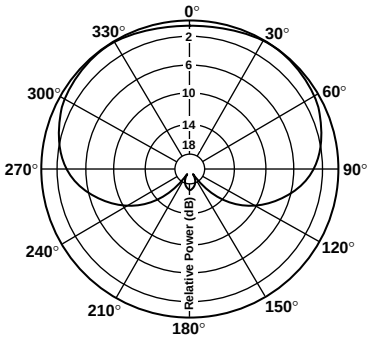
Mount Type D
Top Mounted at Top of Tower



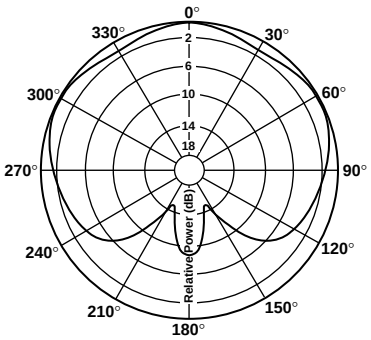
Omnidirectional



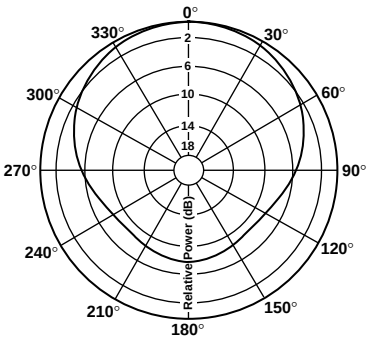
Horizontal Cardioid



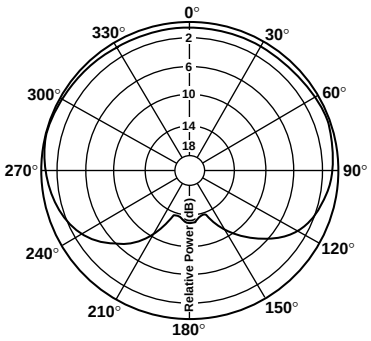
Vertical Cardioid



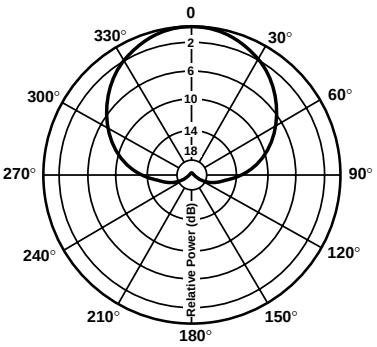
Wide Horizontal Cardioid



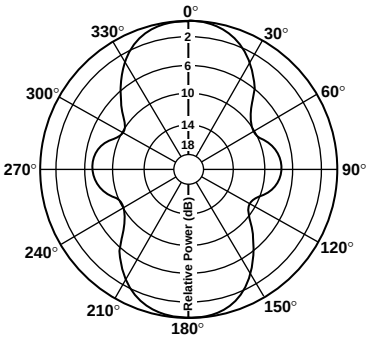
Narrow Horizontal Cardioid



Wide Vertical Cardioid



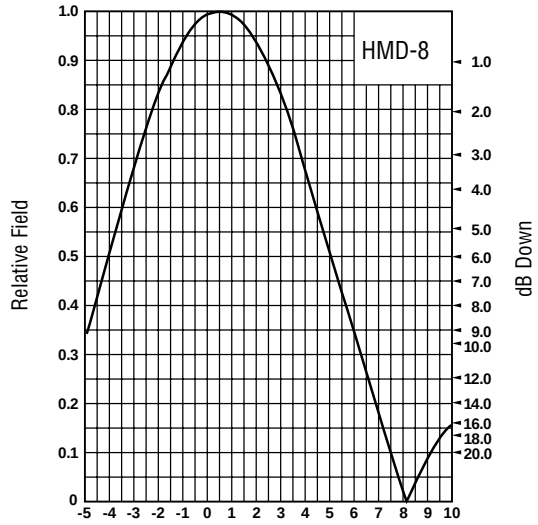
Narrow Vertical Cardioid

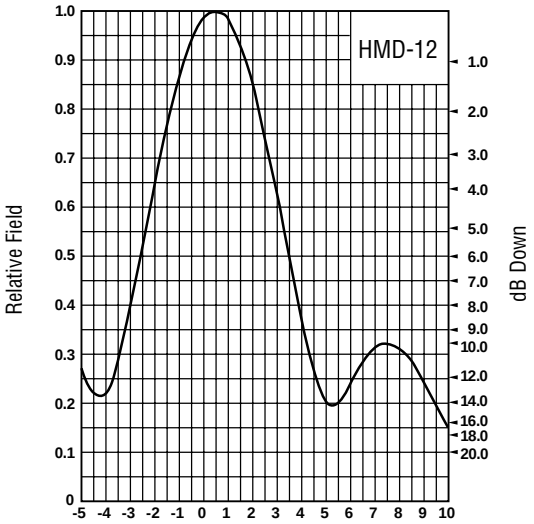


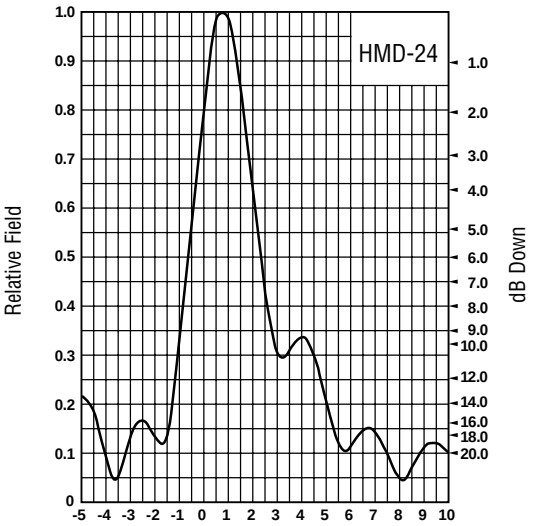
Horizontal Peanut

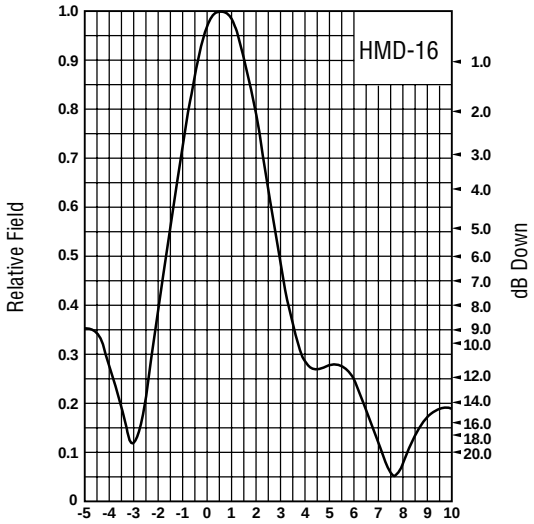
HMD Series Antennas

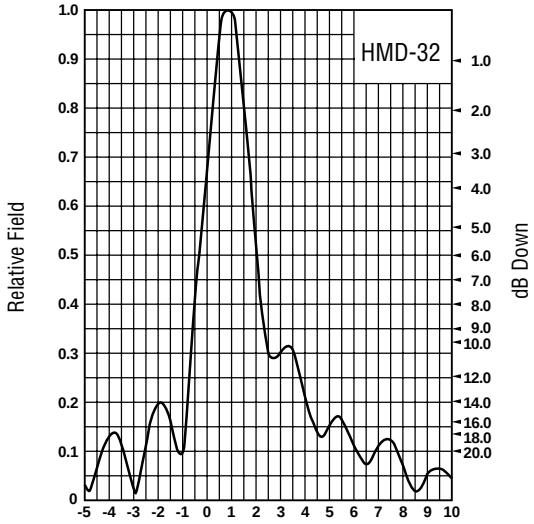
Elevation Patterns











Standard Single W-Band Antennas
2500 to 2700 MHz

Type Number: **HMDxxpa-Wzz**

xx = Number of bays (8, 12, 16, 24,or 32)

p = Polarization (H or V)

a = Azimuth pattern type (O, C, W, N, or P; see page 307)

zz = Beam tilt in tenths of a degree

Electrical Specifications

Frequency Band, MHz	2500 - 2700
Polarization	Vertical or Horizontal
Input Power (Watts)	
8-Bay	500**
12, 16, 24, or 32-Bay	800**
Input VSWR	1.35:1 Maximum
Beam Tilt	
8, 12, 16 Bay	0.5° Standard
24, 32 Bay	0.75° Standard
Input Type	7/8" EIA
Gain	(See Table)

** Peak of sync for analog systems (NTSC, PAL, etc.)

Gain Data (dBi) at W Band

Antenna Type	8-Bay	12-Bay	16-Bay	24-Bay	32-Bay
Omni (HO, VO)	11.5	13.0	14.0	16.0	–
Cardioid (HC, VC)	14.5	16.0	17.0	19.0	20.0
Wide Cardioid (HW)	13.8	15.3	16.3	18.3	–
Wide Cardioid (VW)	13.7	15.2	16.2	–	–
Narrow Cardioid (HN)	15.1	16.6	17.6	19.6	–
Narrow Cardioid (VN)	17.5	19.5	20.5	21.5	23.5
Peanut (HP)	15.7	17.2	18.2	20.2	–

Mechanical Data

Antenna Type	Mount Type	Shear lb (N)	Overturning Moment lb-ft (N-m)	Height (H) in (cm)	Radome Dia. in (cm)	Weight lb (kg)
HMD8HO-W	A	135 (600)	343 (466)	41 (104)	5 (13)	45 (20)
HMD12HO-W	A	155 (689)	504 (685)	58 (147)	5 (13)	55 (25)
HMD16HO-W	A	180 (801)	757 (1030)	81 (206)	5 (13)	60 (27)
HMD24HO-W	D*	140 (623)	676 (920)	116 (295)	5 (13)	45 (20)
HMD8HC-W	B	80 (356)	–	39 (99)	8 (20)	70 (32)
HMD12HC-W	B	115 (212)	–	61 (155)	8 (20)	80 (36)
HMD16HC-W	B	155 (689)	–	73 (185)	8 (20)	95 (43)
HMD24HC-W	B	205 (912)	–	108 (274)	8 (20)	110 (50)
HMD32HC-W	B	275 (1223)	–	145 (368)	8 (20)	130 (59)
HMD12HN-W	A	115 (212)	–	61 (155)	8 (20)	80 (36)
HMD16HN-W	A	155 (689)	–	73 (185)	8 (20)	95 (43)
HMD8VO-W	A	135 (600)	343 (466)	41 (104)	5 (13)	45 (20)
HMD12VO-W	A	155 (689)	343 (466)	58 (147)	5 (13)	55 (25)
HMD16VO-W	A	180 (801)	757 (1030)	81 (206)	5 (13)	60 (27)
HMD24VO-W	D*	140 (623)	676 (920)	116 (295)	5 (13)	45 (20)
HMD8VC-W	C5	92 (409)	–	41 (104)	5 (13)	40 (18)
HMD12VC-W	C5	112 (498)	–	58 (147)	5 (13)	45 (20)
HMD16VC-W	C5	138 (613)	–	81 (206)	5 (13)	55 (25)
HMD24VC-W	C5	179 (796)	–	116 (295)	5 (13)	65 (30)
HMD32VC-W	B	275 (1223)	–	145 (368)	5 (13)	110 (50)
HMD12VN-W	A	112 (498)	–	58 (147)	5 (13)	45 (20)
HMD16VN-W	A	138 (613)	–	81 (206)	5 (13)	55 (25)

* Mounting hardware not included with "D" mount.

Notes: 1) Wind loads are based on 50/33 psf loading. 2) For Mount Type A, overturning moments are taken about the center of the mounting bracket. 3) HC parameters cover the HW and HN patterns. 4) VC parameters cover VW and VN patterns. 5) 44.5 lb (198 N) included in shear for Type C mount. 6) Other mount types available on request.

Standard Single P, Q, and R-Band Antennas

Type Number: **HMDxxpa-bzz**

xx = Number of bays (8, 12, 16, 24, or 32)

p = Polarization (H or V)

a = Azimuth pattern type (O, C, W, or N; see page 307)

zz = Beam tilt in tenths of a degree

b = P, Q, or R

P = 1900 - 2100 MHz

Q = 2100 - 2300 MHz

R = 2300 - 2500 MHz

Electrical Specifications

Frequency Band, MHz	P, Q, R at left
Polarization	Vertical or Horizontal
Input Power (watts) 8-Bay 12, 16, 24, or 32-Bay	 500** 800**
Input VSWR	1.5:1 Maximum
Beam Tilt	0.5° Standard (8, 12, 16 Bay) 0.75° Standard (24, 32 Bay)
Input Type	7/8" EIA
Gain	See Gain Data for W-band antennas for reference. Contact Andrew for gain in a specific band.

** Peak of sync for analog systems (NTSC, PAL, etc.)

Mechanical Data

Antenna Type	Mount Type	Shear lb (N)	Overturning Moment lb-ft (N-m)	Height (H) in (cm)	Radome Dia in (cm)	Weight lb (kg)
1900 - 2100 MHz (P Band)*						
HMD8VO-P	A	175 (779)	488 (664)	47 (119)	8 (20)	55 (25)
HMD12VO-P	A	212 (943)	768 (1044)	67 (170)	8 (20)	65 (30)
HMD16VO-P	A	260 (1157)	1224 (1665)	93 (236)	8 (20)	75 (34)
* When specifying the Australian Band 2076-2111 MHz use P Band.						
2100 - 2300 MHz (Q Band)						
HMD8HO-Q	A	148 (659)	321 (436)	52 (132)	5 (13)	50 (23)
HMD12HO-Q	A	173 (770)	533 (725)	74 (188)	5 (13)	55 (25)
HMD16HO-Q	A	204 (908)	859 (1168)	101 (257)	5 (13)	60 (27)
HMD8HC-Q	B	115 (512)	–	61 (155)	8 (20)	50 (23)
HMD12HC-Q	B	155 (689)	–	73 (185)	8 (20)	55 (25)
HMD16HC-Q	B	260 (1157)	–	92 (234)	8 (20)	70 (32)
HMD8VO-Q	A	175 (779)	488 (664)	47 (119)	8 (20)	55 (25)
HMD12VO-Q	A	212 (943)	768 (1044)	67 (170)	8 (20)	60 (27)
HMD16VO-Q	A	260 (1157)	1224 (1665)	93 (236)	8 (20)	65 (30)
HMD8VC-Q	C5	112 (498)	–	52 (132)	5 (13)	45 (20)
HMD12VC-Q	C5	129 (573)	–	74 (188)	5 (13)	50 (23)
HMD16VC-Q	C5	162 (720)	–	101 (257	5 (13)	55 (25)
2300 - 2500 MHz (R Band)						
HMD8HO-R	A	138 (614)	367 (495)	44 (112)	5 (13)	50 (23)
HMD12HO-R	A	157 (699)	523 (711)	60 (152)	5 (13)	55 (25)
HMD16HO-R	A	187 (832)	826 (1123)	86 (218)	5 (13)	60 (27)
HMD8VO-R	A	138 (614)	367 (495)	44 (112)	5 (13)	55 (25)
HMD12VO-R	A	157 (699)	523 (711)	60 (152)	5 (13)	60 (27)
HMD16VO-R	A	187 (832)	826 (1123)	86 (218)	5 (13)	65 (30)
HMD8HW-R	B	80 (356)	–	39 (99)	8 (20)	70 (32)
HMD12HW-R	B	115 (212)	–	61 (155)	8 (20)	80 (36)
HMD16HW-R	B	155 (689)	–	73 (185)	8 (20)	95 (43)
HMD24HW-R	B	205 (912)	–	108 (274)	8 (20)	110 (50)
HMD8HN-R	B	80 (356)	–	39 (99)	8 (20)	70 (32)
HMD12HN-R	B	115 (212)	–	61 (155)	8 (20)	80 (36)
HMD16HN-R	B	155 (689)	–	73 (185)	8 (20)	95 (43)
HMD24HN-R	B	205 (912)	–	108 (274)	8 (20)	110 (50)

Notes: 1) Wind loads are based on 50/33 psf loading. 2) For Mount Type A, overturning moments are taken about the center of the mounting bracket. 3) HC parameters cover the HW and HN patterns. 4) VC parameters cover VW and VN patterns. 5) 44.5 lb (198 N) included in shear for Type C mount. 6) Other mount types available on request.

Standard Single Broadband Antennas

WNQ Band 2500-2700 (W)/2150-2163 (NQ)

Type Number: **HMDxxpa-WNQzz**

xx = Number of bays (8, 12, 16, or 24)

p = Polarization (H or V)

a = Azimuth pattern type (O, C, or N; see page 307)

zz = Beam tilt in tenths of a degree

Electrical Specifications

Frequency Band, MHz	2150 - 2163 and 2500 - 2700
Polarization	Vertical or Horizontal
Input Power (Watts)	
8-Bay	500**
12, 16,or 24-Bay	800**
Input VSWR	1.35:1 Maximum "W' Band 1.5:1 Maximum 'NQ' Band
Beam Tilt	
8, 12, 16 Bay	0.5° Standard
24, 32 Bay	0.75° Standard
Input Type	7/8" EIA
Gain	See Table

** Peak of sync for analog systems (NTSC, PAL, etc.)

Gain Data (dBi) at W Band/NQ Band

Antenna Type	8-Bay	12-Bay	16-Bay	24-Bay
Omni (HO, VO)	10.6/8.8	12.4/10.6	13.6/11.8	15.4/13.6
Cardioid (HC, VC)	13.4/11.6	15.2/13.4	16.4/14.6	18.2/16.4
Narrow Cardioid (HN)	–	–	–	–
Narrow Cardioid (VN)	–	–	–	–
Wide Cardiod (VN)	–	–	16.0/14.2	–

Mechanical Data

Antenna Type	Mount Type	Shear lb (N)	Overturning Moment lb-ft (N-m)	Height in (cm)	Radome in (cm)	Weight lb (kg)
HMD8HO-WNQ	A	135 (600)	386 (525)	41 (104)	5 (13)	45 (20)
HMD12HO-WNQ	A	155 (689)	553 (752)	58 (147)	5 (13)	55 (25)
HMD16HO-WNQ	A	180 (801)	814 (1108)	81 (206)	5 (13)	65 (30)
HMD24HO-WNQ	D*	140 (623)	676 (920)	116 (295)	5 (13)	50 (23)
HMD8HC-WNQ	C8	130 (579)	–	46 (116)	8 (20)	55 (25)
HMD12HC-WNQ	C8	167 (743)	–	66 (167)	8 (20)	60 (27)
HMD16HC-WNQ	C8	215 (957)	–	92 (233)	8 (20)	65 (30)
HMD24HC-WNQ	C8	258 (1148)	–	115 (292)	8 (20)	70 (32)
HMD8VO-WNQ	A	135 (600)	386 (525)	41 (104)	5 (13)	45 (20)
HMD12VO-WNQ	A	155 (689)	553 (752)	58 (147)	5 (13)	55 (25)
HMD16VO-WNQ	A	180 (801)	814 (1108)	81 (206)	5 (13)	60 (27)
HMD24VO-WNQ	D*	140 (623)	676 (920)	116 (295)	5 (13)	45 (20)
HMD8VC-WNQ	C5**	92 (409)	–	41 (104)	5 (13)	40 (18)
HMD12VC-WNQ	C5**	112 (498)	–	58 (147)	5 (13)	45 (20)
HMD16VC-WNQ	C5**	138 (613)	–	81 (206)	5 (13)	55 (25)
HMD24VC-WNQ	C5**	179 (796)	–	116 (295)	5 (13)	65 (30)
HMD12VN-WNQ	C5**	112 (498)	–	58 (147)	5 (13)	45 (20)
HMD16VN-WNQ	C5**	138 (613)	–	81 (206)	5 (13)	55 (25)
HMD24VN-WNQ	C5**	179 (796)	–	116 (295)	5 (13)	65 (30)

* Mounting hardware not included with "D" mount.

Notes: 1) Wind loads are based on 50/33 psf loading. 2) For Mount Type A, overturning moments are taken about the center of the mounting bracket. 3) HC parameters cover the HW and HN patterns. 4) VC parameters cover VW and VN patterns. 5) 44.5 lb (198 N) included in shear for Type C mount. 6) Other mount types available on request.

High Power Single W-Band Antennas

2500-2700 MHz

Type Number: **HMDxxpa-Wzz-H**

xx = Number of bays (8, 12, 16, or 24)

p = Polarization (H or V)

a = Azimuth pattern type (O or C; see page 307)

zz = Beam tilt in tenths of a degree

Electrical Specifications

Frequency Band, MHz	2500 - 2700
Polarization	Vertical or Horizontal
Input Power (Watts)	1000**
Input VSWR	1.35:1 Maximum
Beam Tilt	
8, 12, 16 Bay	0.5° Standard
24 Bay	0.75° Standard
Input Type	7/8" EIA
Gain	See Table

** Peak of sync for analog systems (NTSC, PAL, etc.)

Gain Data (dBi) at W Band/NQ Band

Antenna Type	8-Bay	12-Bay	16-Bay	24-Bay
Omni (HO, VO)	11.5	13.0	14.0	16.0
Cardioid (HC, VC)	14.5	16.0	17.0	19.0

Mechanical Data

Antenna Type	Mount Type	Shear lb (N)	Overturning Moment lb-ft (N-m)	Height in (cm)	Radome in (cm)	Weight lb (kg)
HMD8HO-W-H	A	135 (600)	386 (525)	41 (104)	5 (13)	45 (20)
HMD12HO-W-H	A	155 (689)	553 (752)	58 (147)	5 (13)	55 (25)
HMD16HO-W-H	A	180 (801)	814 (1108)	81 (206)	5 (13)	65 (30)
HMD24HO-W-H	D*	140 (623)	676 (920)	116 (295)	5 (13)	50 (23)
HMD8HC-W-H	B	80 (356)	–	39 (99)	8 (20)	70 (32)
HMD12HC-W-H	B	115 (212)	–	61 (155)	8 (20)	80 (36)
HMD16HC-W-H	B	155 (689)	–	73 (185)	8 (20)	95 (43)
HMD24HC-W-H	B	205 (912)	–	108 (274)	8 (20)	110 (50)
HMD8VO-W-H	A	135 (600)	386 (525)	41 (104)	5 (13)	45 (20)
HMD12VO-W-H	A	155 (689)	553 (752)	58 (147)	5 (13)	55 (25)
HMD16VO-W-H	A	180 (801)	814 (1108)	81 (206)	5 (13)	60 (27)
HMD24VO-W-H	D*	140 (623)	676 (920)	116 (295)	5 (13)	45 (20)
HMD8VC-W-H	C5	92 (409)	–	41 (104)	5 (13)	40 (18)
HMD12VC-W-H	C5	112 (498)	–	58 (147)	5 (13)	45 (20)
HMD16VC-W-H	C5	138 (613)	–	81 (206)	5 (13)	55 (25)
HMD24VC-W-H	C5	179 (796)	–	116 (295)	5 (13)	65 (30)

* Mounting hardware not included with "D" mount.

Notes: 1) Wind loads are based on 50/33 psf loading. 2) For Mount Type A, overturning moments are taken about the center of the mounting bracket. 3) HC parameters cover the HW and HN patterns. 4) VC parameters cover VW and VN patterns. 5) 44.5 lb (198 N) included in shear for Type C mount. 6) Other mount types available on request.

Super High Power Single W-Band Antennas

2500-2700 MHz

Type Number: **HMDxxpO-Wzz-V**

xx = Number of bays (8, 12, or 16)

p = Polarization (H or V)

zz = Beam tilt in tenths of a degree

Electrical Specifications

Frequency Band, MHz	2500 - 2700
Polarization	Vertical or Horizontal
Input Power (Watts)	
8-Bay	1200**
12 and 16-Bay	1600**
Input VSWR	1.35:1 Maximum
Beam Tilt	0.5° Standard
Input Type	1 5/8" EIA
Gain	See Table

** Peak of sync for analog systems (NTSC, PAL, etc.)

Gain Data (dBi) at W Band

Antenna Type	8-Bay	12-Bay	16-Bay
Omni (HO, VO)	11.5	13.0	14.0

Mechanical Data

Antenna Type	Mount Type	Shear lb (N)	Overturning Moment lb-ft (N-m)	Height in (cm)	Radome in (cm)	Weight lb (kg)
HMD8HO-W-V	A	148 (659)	386 (525)	52 (132)	5 (13)	50 (23)
HMD12HO-W-V	A	173 (770)	553 (752)	74 (188)	5 (13)	55 (25)
HMD16HO-W-V	A	180 (801)	757 (1030)	81 (206)	5 (13)	65 (30)
HMD8VO-W-V	A	148 (600)	321 (436)	52 (132)	5 (13)	50 (23)
HMD12VO-W-V	A	173 (689)	533 (725)	74 (188)	5 (13)	60 (27)
HMD16VO-W-V	A	180 (623)	757 (1030)	81 (206)	5 (13)	70 (30)

Notes: 1) Wind loads are based on 50/33 psf loading. 2) For Mount Type A, overturning moments are taken about the center of the mounting bracket. 3) HC parameters cover the HW and HN patterns. 4) VC parameters cover VW and VN patterns. 5) Other mount types available on request.

Dual Input Antennas

The HMD Dual Input series of antennas provide two omni-directional antennas enclosed in a single radome. These antennas provide:

- *Reduced tower space and wind load*
- *Lower installation cost*
- *Lower weight*

Type Number: **DHMDxxVO-bzz**

xx = Number of bays (8, 12, 16, or 24) in each antenna

b = Band desigantor

P = 1900-2100

Q = 2100-2300

R = 2300-2500

W = 2500-2700

zz = Beam tilt in tenths of a degree

Electrical Specifications

Frequency Band, MHz	See P, Q, R, W above
Polarization	Vertical
Input Power (Watts)	
8-bay	500**
12 and 16-bay	800**
Input VSWR, maximum	
W Band	1.35:1
P, Q, and R Bands	1.5:1 Maximum
Beam Tilt	0.5° Standard
Input Type	7/8" EIA
Gain	See Table

** Peak of sync for analog systems (NTSC, PAL, etc.)

Gain Data (dBi) at W Band

Antenna Type	8-Bay	12-Bay
Omni (VO)	11.5	13.0

Mechanical Data 8/12 Bay Dual Input

Antenna Type	Mount Type	Shear lb (N)	Overturning Moment lb-ft (N-m)	Height in (cm)	Radome in (cm)	Weight lb (kg)
DHMD8VO-W	A	180 (801)	757 (1022)	81 (206)	5 (13)	45 (20)
DHMD12VO-W	D*	135 (600)	653 (885)	116 (295)	5 (13)	45 (20)
DHMD8VO-R	A	260 (1157)	1224 (1665)	93 (236)	5 (13)	40 (18)
DHMD12VO-R	A	222 (986)	1257 (1698)	116 (295)	5 (13)	45 (20)
DHMD8VO-Q	A	260 (1157)	1224 (1665)	93 (236)	8 (20)	50 (23)
DHMD12VO-Q	A*	326 (1452)	2024 (2732)	129 (328)	8 (20)	65 (30)
DHMD8VO-P	A	260 (1157)	1224 (1665)	93 (236)	8 (20)	50 (23)
DHMD12VO-P	A*	326 (1452)	2024 (2732)	129 (328)	8 (20)	65 (30)

* Includes guy wires (customer to supply anchor points).

Notes: 1) Wind loads are based on 50/33 psf loading. 2) For Mount Type A, overturning moments are taken about the center of the mounting bracket. 3) HC parameters cover the HW and HN patterns. 4) VC parameters cover VW and VN patterns. 5) 44.5 lb (198 N) included in shear for Type C mount. 6) Other mount types available on request.

SHADOWMASTER™ Booster Antennas

2.5 to 2.7 GHz

This antenna is designed to enhance signal penetration for the wireless cable systems. It provides the improved quality and coverage wireless operators need to sustain and increase subscribership in their markets.

The SHADOWMASTER™ antenna is ideal for improving and increasing coverage in regions challenged by rugged terrain or other factors that result in shadowed or blocked areas. The sleek, lightweight design minimizes wind loading, and is exceptionally easy to install.

The SHADOWMASTER provides 16 or 18 dBi of signal gain as well as improved patterns with null fill for coverage at all angles. Both vertically and horizontally polarized models are available.

Type number: **HMDxxSM-p**

xx = 16 or 18 (gain in dBi)

p = H (horizontal) or V (vertical) polarization

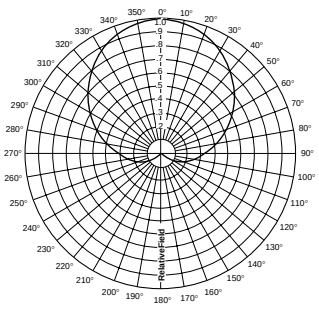
Electrical Specifications

Frequency, MHz	**2500 - 2700**
Gain, dBi	
Type HMD16SM	16
Type HMD18SM	18
VSWR	1.5:1 maximum
Polarization	Horizontal or Vertical
Half-power Beamwidth	
HMD16SM-H (V)	Azimuth: 100° (90°) typical Elevation: 5° typical
HMD18SM	Azimuth: 50° typical Elevation: 5° typical
Front-to-Back Ratio	20 dB typical
Input Power Rating, W	100
Input Connector	Type N female

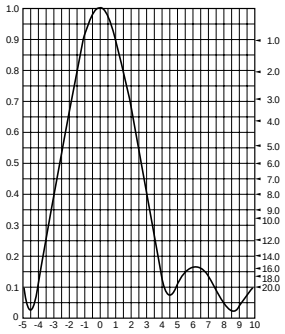
Mechanical Specifications

Wind Load at 112 mph (180 km/hr), lb (N)	100 (445)
Length, in (mm)	60 (1525)
Weight, lb (kg)	13 (5.9)

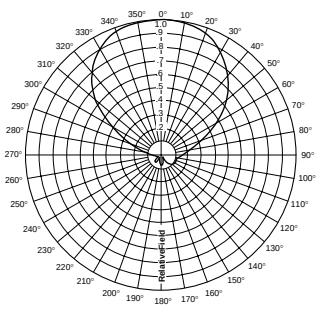
Azimuth Pattern-Vertical



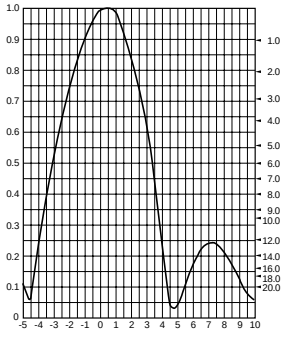
Elevation Pattern-Vertical



Azimuth Pattern-Horizontal

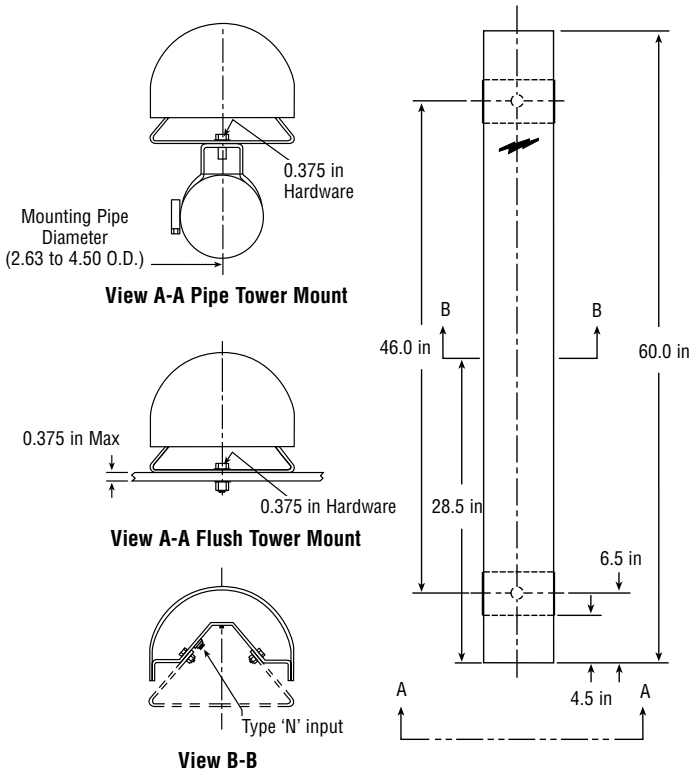


Elevation Pattern-Horizontal

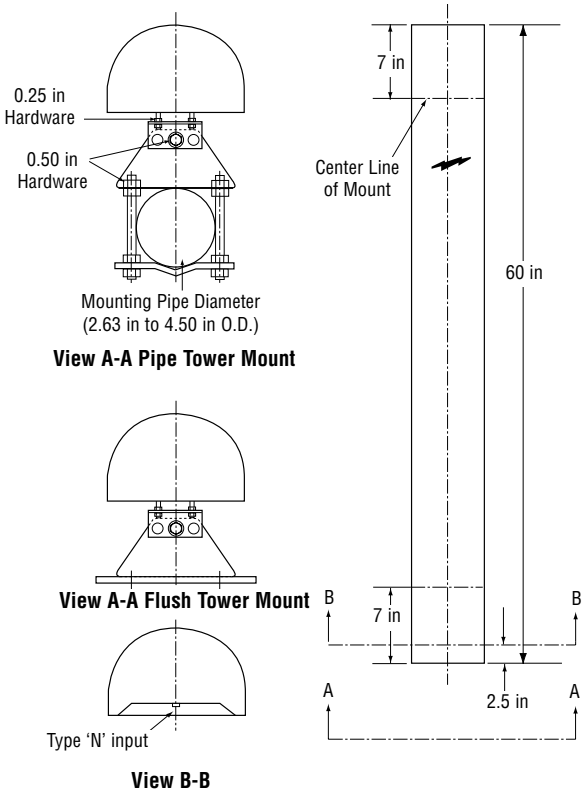


SHADOWMASTER™ Booster Antennas
for Wireless Cable

For V-POL installation



For H-POL installation



Coverage of the Same Area by Two Antennas

When programming requirements necessitate the use of two antennas in close proximity, they should be mounted to minimize interference between them.

Dual, side-mounted cardioids should be mounted one above the other.

Two antennas may be used:

- *For coverage of the same area, with additional programming, from a single location.*
- *To provide omnidirectional coverage when a single antenna cannot be used because of building or tower obstructions*

Recommended Antenna Spacings

Condition 1

Dual, top mounted omnidirectional antennas

Polarization of one or both of the antennas:

Vertical:	10 feet (3 m) apart
Horizontal:	5 feet (1.5 m) apart

Condition 2

Omnidirectional antenna mounted to side of tower.

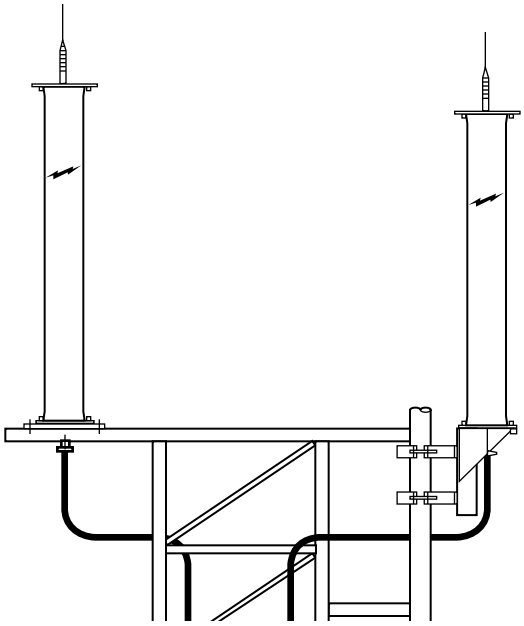
Polarization:

Vertical:	Not recommended for omnidirectional requirements
Horizontal:	Minimum of 3.5 feet (1 m) with base of antenna located at tower horizontal member.

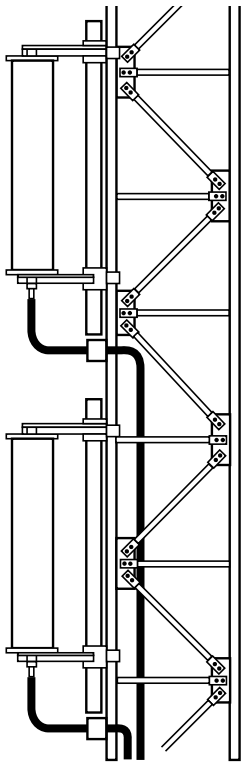
Note

These suggestions are general in nature. Basis for the spacing is to prevent nulls greater than 5 dB in azimuth pattern. For specific cases, model studies can be performed to determine optimum location for antenna mounting. Andrew accepts no responsibility for antenna performance other than those specifications stated in this catalog.

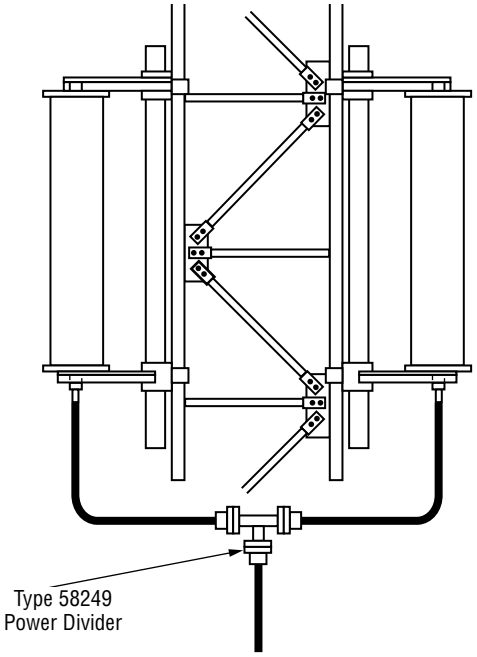
Dual Top Mounted Omni Antennas



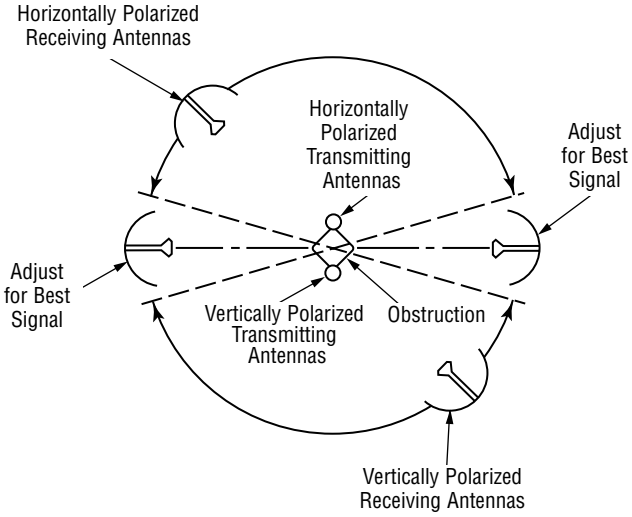
Dual Side Mounted Antennas



Dual Side Mounted Cardioid Antennas
for Omnidirectional Coverage



Side View



Top View

To Provide Omnidirectional Coverage

When an omnidirectional antenna cannot be used because of building or tower obstructions, two directional antennas can be used as shown.

Andrew pioneered the concept of using antennas with opposite polarizations to minimize deep nulls and interference at the pattern crossover points. The phase relationship between transmitting antennas is not important when opposite polarizations are used. Receive antennas positioned in the crossover areas can be adjusted on-site for maximum receive signal. A power divider is used to feed both transmitting antennas.

Power Dividers

Power dividers allow two antennas to be fed from one transmitter with equal or unequal power division as required. The units are air dielectric, have 7/8" EIA flanges, and are designed for operation over the 2.5 - 2.686 GHz band with 1.1 maximum input VSWR. Units for other bandwidths are also available (see detail letters below).

Type Number	Power Division-%	Insertion Loss, dB
58247 - (*)	10/90	10.0/0.5
58248 - (*)	25/75	6.0/1.2
58249 - (*)	50/50	3.0/3.0

* Insert detail letter:

-P	1.9 - 2.1 GHz
-Q	2.1 - 2.3 GHz
-R	2.3 - 2.5 GHz
-T	2.2 - 2.4 GHz
-W	2.5 - 2.7 GHz
-WNQ**	2.15 - 2.7 GHz

** Types 58247 and 58249 only.

DATAMASTER™ Sector Antennas
for 2-way MMDS Applications

Now Andrew offers an alternative to wireline access for providing data (including Internet) and voice services to multiple dwelling units and small businesses.

DATAMASTER sector antennas are specifically designed to meet the demands of the new 2-way MMDS marketplace created by recent FCC rulemaking.

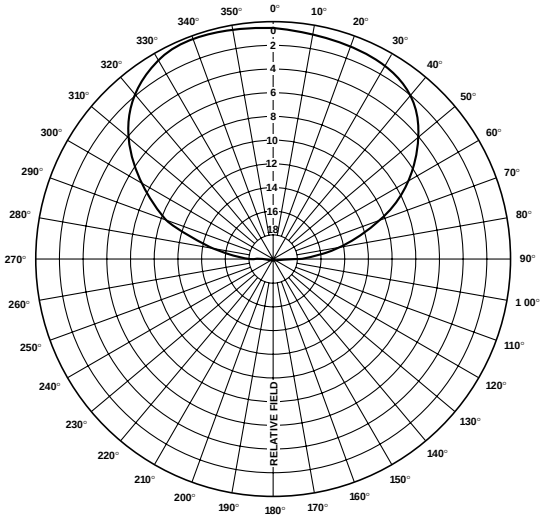
DATAMASTER antennas are optimized for sectorized data transmission and efficient use of the MMDS spectrum for data applications. Two versions are available: 90° sector transmit for the 2500 – 2700 MHz band; and 90° sector antennas for the 2150 – 2360 MHz band.

These new sector antennas are the latest addition to the Andrew market-leading family of internationally acclaimed HMD Series antennas for MDS and MMDS applications.

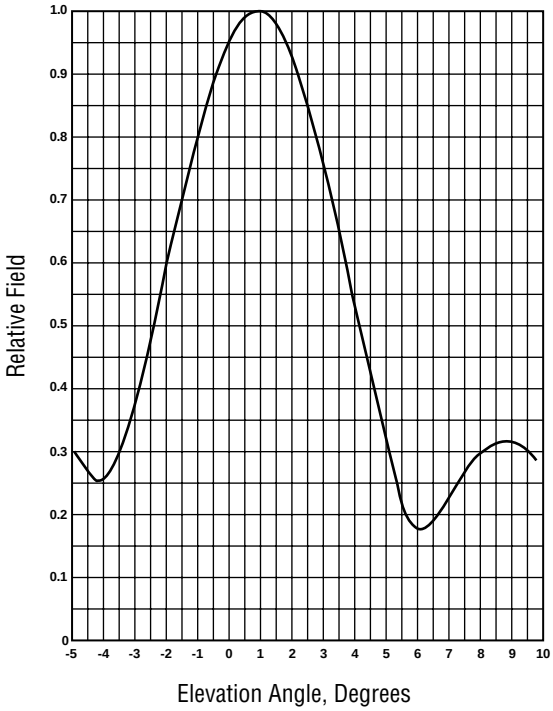
- *Efficient spectrum utilization – antenna pattern performance features excellent front to back ratios*
- *Available in horizontal polarization*
- *Comprehensive three year warranty*
- *For availability of other sector sizes and V-Pol models, contact Andrew at 1-800-DIAL-4RF.*

DATAMASTER™ Sector Antennas
for 2-way MMDS Applications

H-Pol Azimuth Pattern



H-Pol Elevation Pattern



Electrical Specifications

Gain, dBi	18
Frequency Band, Transmit, MHz	
Type **DMA18W090-H**	2500-2700
Type **DMP18NQ090-H**	2150-2360
Azimuth Beamwidth, degrees	90
Polarization	Horizontal
Impedance, ohms	50
Front-to-Back Ratio (180°), dB	>28
Input Power Rating, Average, W	200
Lightning Protection	dc ground
Return Loss, dB (VSWR)	>14 (1.5:1)
Cross Polarization Rejection, dB	25

Mechanical Specifications

Type No.	**DMA18W090-H**	**DMP18NQ090-H**
Mounting	Side Mount	Side Mount
Input Connector	7-16 DIN	7-16 DIN
Dimensions, in (mm)	62 x 15.25 x 22 (1575 x 388 x 559)	60 x 13.5 x 7 (1524 x 343 x 178)
Weight, lb (kg)	58 (26)	41 (19)
Radome Material	ABS	ABS
Radome Color	Gray	Gray
Environmental		
Survival Wind Speed, mph (km/hr)	125 (200)	
Temperature Range, °C (°F)	-40 to +70 (-40 to 158)	
Humidity	0 to 100% Condensing	

Largest Selection of Transmission Lines Available to the Broadcast Industry

Whatever your needs for broadcast transmission lines – thermally compensated, circular waveguide, or coaxial cable, Andrew can supply them.

MACXLine® rigid coaxial line is thermally compensated to provide twice the life of standard rigid lines. It is available in sizes from 3-1/8" to 8-3/16". MACXLine uses a bellows in the inner conductor to compensate for thermal expansion and contraction. Though standard bullet-type connections are used, they do not slide once put in service and never wear out.

New WIDELine™ broadcast rigid transmission line offers good VSWR performance across the entire width of the UHF band. New DUALine™ rigid coaxial line is ideal for combining both DTV and NTSC signals for a single station into one line. Both are thermally compensated the same as MACXLine.

In addition to these products, Andrew supplies standard rigid line in 8-3/16", 6-1/8" (50 ohm), 3-1/8", and 1-5/8" sizes. Some 7/8" rigid line components and accessories are also available.

GUIDELine® circular waveguide is an ideal choice for high power broadcast, with its cross-polarization cancellation rods, for lowest attenuation and highest power.

Reliable HELIAX® air-dielectric coaxial cable is available in sizes up to 5". New, high power Type HJ9HP-50, 5" cable has an average power rating higher than 6-1/8" cable. See pages 572 and 573.

All of our transmission lines are conservatively rated. One of them is the right choice to optimize the performance of your broadcast system!

For more information on any Andrew rigid transmission line products call our **Broadcast Systems Department at 1-800-DIAL-4-RF.**

WIDELine™ Rigid Transmission Line

NEW!

High Performance, Long Service Life Solution for Multiplexing Broadcast Applications

Now broadcast system engineers and designers can multiplex DTV and NTSC television signals and minimize VSWR spikes, while extending the life of their transmission line. WIDELine wideband transmission line is made up of different length sections to minimize the addition of reflections.* The result is excellent VSWR performance of a maximum of 1.1:1 over all UHF-TV channels in the U.S. FCC core spectrum.

For example, a 1,480-foot run of WIDELine transmission line (8-3/16", 75 ohm) was calculated to have a maximum VSWR of slightly more than 1.08. Actual field results may vary, but VSWR will not exceed 1.1:1 for any UHF-TV channel 14 through 51.

Andrew WIDELine transmission line also protects your investment by eliminating problems caused by sliding bullet-type connections found in conventional rigid transmission line. Conventional rigid line is capable of accepting future changes in frequency assignments, with acceptable VSWR performance, however, its service life is limited by the rubbing of its connection points, which can ultimately lead to bullet burnout or arc-over. WIDELine transmission line incorporates a unique, patented** bellows section into each inner conductor that compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is thus eliminated. The result is extremely long life. Since 1984, more than 75 broadcasters have selected transmission line using this technology, without a single failure due to bullet burnout.

WIDELine is available in 3-1/8" 50-ohm, 6-1/8" 75-ohm, 7-3/16" 75-ohm, and 8-3/16" 75-ohm sizes.

* Patent applied for

**United States Patent No. 4,543,548

DUALine™ Custom-Length, Dual-Band, Rigid Transmission Line

NEW!

If full wideband performance is not required, Andrew will calculate the optimum rigid line section length to minimize VSWR, by using a proprietary computer program. Sections would normally be 20 feet long, or somewhat shorter, and would all be the same length to simplify installation. This solution is ideal for applications where the DTV and NTSC signals are combined in a single line, as it typically results in outstanding VSWR performance (depending on which channels are combined).

Inners Only™ Inner Conductors

The Inexpensive Alternative to Transmission Line Replacement

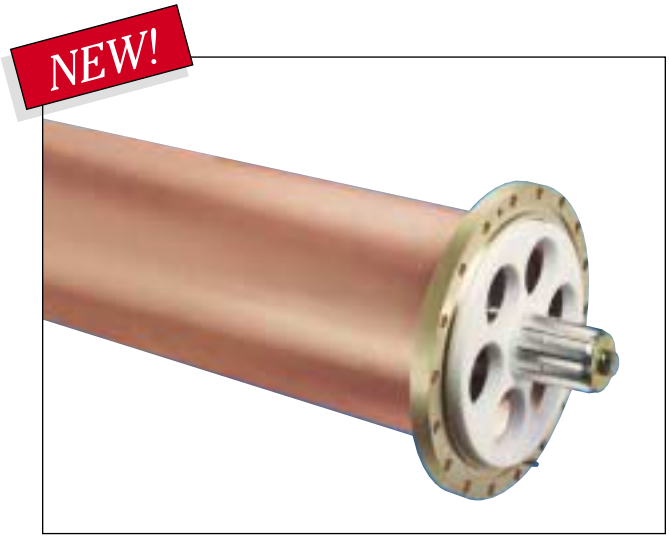
MACXLine® transmission lines are available as Inners Only replacements. Since MACXLine lengths are identical to those of standard rigid line, it is an excellent choice for any application.

Despite tight capital budgets, you can't afford to go off the air! Conventional rigid transmission line systems require maintenance after just ten years to avoid premature burnout of bullet-style connectors. By upgrading with Andrew Inners Only before your existing transmission line fails, you avoid the disaster of dead air.

MACXLine Inners Only replacements provide the ultimate in operational dependability at about half the cost of a new installation. You swap your worn-out, failure-prone bullets and inner conductors for the most dependable components in the industry while reusing your expensive outer conductors, which are normally good for many more years of service.

8-3/16" MACXLine® Rigid Transmission Line

For High Power UHF Broadcasting



Thermally Compensated for Dependable Transmission – Twice the Life of Standard Rigid Lines

Now UHF-TV system designers and engineers have a new choice for 8-3/16" 75 ohm rigid transmission line from Andrew. Thermally compensated for dependable transmission, MACXLine® rigid line features patented technology that can more than double the life of a transmission line system.

MACXLine incorporates a unique patented* bellows section into each inner conductor that compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is thus eliminated. This means no shaving dust to arc at the flange and insulator areas. The result is an extremely long life.

*U.S. Patent 4,543,548

Specifications

Type Number MACX875B	8-3/16" 75-ohm
Impedance, ohms	75 ± 0.5
Max. Channel	51
Velocity, Percent	99.8
Attenuation, see page 326	
Average power rating, see page 326	
Peak Power Rating, kW*	1800
Dimensions	
Outer Conductor,	
Outside dia., in (mm)	8.150 (207)
Inside dia., in (mm)	8.000 (203)
Inner Conductor	
Outside dia., in (mm)	2.293 (58)
Inside dia., in (mm)	2.229 (57)
Flange Dimensions	
Flange, Overall Diameter, in (mm)	11.000 (279)
Bolt Circle Diameter, in (mm)	10.312 (262)
Number of Bolts	18
Bolt Size	3/8"
Net Weight, lb/ft (kg/m)	7.46 (11.10)
MACX875B-1 Channels	
18, 19, 23, 24, 27, 28, 31, 32, 35, 36, 39, 40, 43, 44, 47, 48	
MACX875B-2 Channels	
15, 16, 17, 20, 45, 49, 50	
MACX875B-3 Channels	
14, 21, 22, 25, 26, 29, 30, 33, 34, 38, 41, 42, 46, 51	

*Based on production test voltage of 47 kV

Note: Channels listed are preferred channels; others may also be acceptable. Contact Andrew for more information. Specifications subject to change without notice.

MACX875B Premium Rigid Line Sections

	8-3/16" 75-ohm
20 ft	**MACX875B-1**
19.75 ft	**MACX875B-2**
19.5 ft	**MACX875B-3**

Straight sections with bellows, flanged both ends. Includes captivated inner connector, hardware kit, disk insulators and instructions. Standard tolerance is ± 0.050 in (1.3 mm)

MACX875B Field Cut Section Kits

	8-3/16" 75-ohm
Field Cut Straight Section, 5 to 20 ft	**MACX875B-39**
Includes bellows, captivated Inner connector, swivel field flange kit, hardware kit and installation instructions	
Field Cut Straight Section, up to 5 ft	**MACX875B-41**
No bellows. Includes captivated inner connector, field flange kit, hardware kit and installation instructions	

MACX875 Variable Length Sections

	8-3/16" 75-ohm
Variable Length, 5 to 20 ft	**MACX875B-42-VAR**
Variable Length, up to 5 ft	**MACX875B-40-VAR**

Specify length in inches.

8-3/16" 75-ohm MACXLine® Rigid Line
Typical System

MACXLine Rigid Line System Components

Item No.	Description	8-3/16" 75-ohm
1	Straight Section	**MACX875B Series**
2	90° Miter Elbow	**ACX875B-10SE-(*)**
3	Rigid Hanger††	**RLA800B-13**
4	Hinged Vertical Spring Hanger†	**RLA800-11-H**
5	Lateral Brace	**RLA800-14**
6	3-Point Suspension Hanger	**RLA800-12**
7	Wall Feed Thru	**RLA800B-15**
8	Gas Barrier	**RLA875-16**
9	Fine Matching Section (UHF)	**STD875B-FT**
–	Fixed Field Flange Kit	**RLA800B-28**
–	Hardware Kit	**RLA800-21**
–	Captivated Inner Connector	**ACX875-19**
–	Inner Connector	**ACX875-20**
–	End Cap (to seal line)	**RLA800B-50**
–	Reducer, 8-3/16" to 6-1/8"	**RLA875-675**
–	Reducer, 8-3/16" to 7-3/16"	**RLA875-775**
–	Soft Solder Swivel Field Flange Kit	**RLA800B-37**
–	Fixed Flange Kit	**RLA800B-28**
–	Installation Tool Kit Contains all tools necessary to assemble MACXLine	**MACX875-TK**

* Specify television channel or frequency.

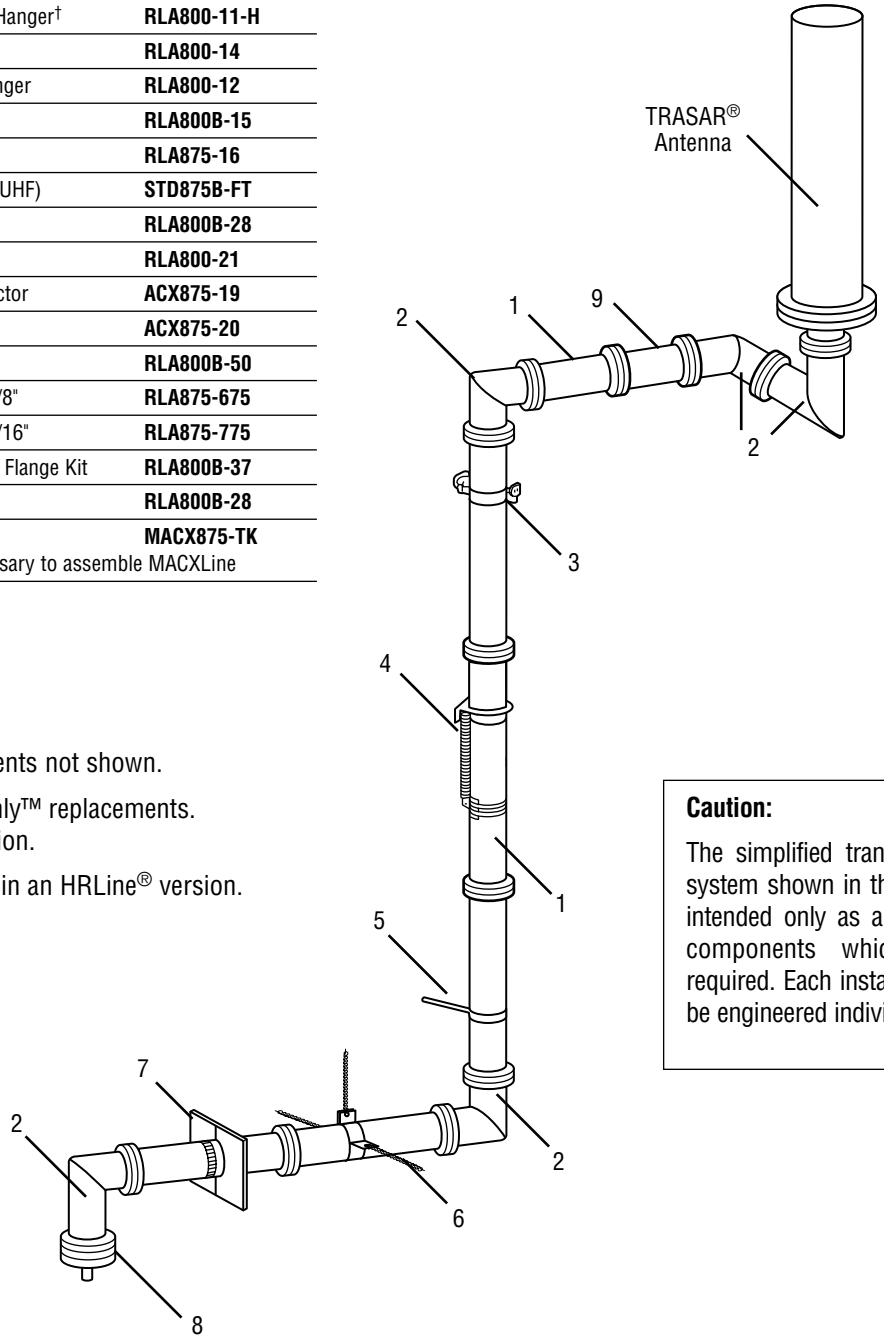
† Use at 10 ft (3 m) intervals.

†† One for every 1000 ft (300 m).

Contact Andrew for other components not shown.

MACX875 is available as Inners Only™ replacements. Contact Andrew for more information.

8-3/16" rigid coax is also available in an HRLine® version. Contact Andrew for details.



Caution:

The simplified transmission line system shown in this diagram is intended only as a guide to the components which may be required. Each installation should be engineered individually.

Attenuation and Average Power Ratings for 8-3/16"

75-ohm, MACXLine®, Type MACX875B

Television Channel No. (MHz)	Attenuation dB/100 ft (100 m)	Average Power kW
2 (55.25)	0.025 (0.082)	344
3 (61.25)	0.026 (0.086)	327
4 (67.25)	0.027 (0.090)	312
5 (77.25)	0.029 (0.097)	291
6 (83.25)	0.031 (0.100)	280
7 (175.25)	0.045 (0.147)	192
8 (181.25)	0.045 (0.149)	188
9 (187.25)	0.046 (0.152)	185
10 (193.25)	0.047 (0.154)	182
11 (199.25)	0.048 (0.156)	180
12 (205.25)	0.048 (0.159)	177
13 (211.25)	0.049 (0.161)	174
14 (471.25)	0.074 (0.243)	116
15 (477.25)	0.075 (0.245)	115
16 (483.25)	0.075 (0.246)	114
17 (489.25)	0.076 (0.248)	113
18 (495.25)	0.076 (0.250)	113
19 (501.25)	0.077 (0.251)	112
20 (507.25)	0.077 (0.253)	111
21 (513.25)	0.077 (0.254)	111
22 (519.25)	0.078 (0.256)	110
23 (525.25)	0.078 (0.257)	109
24 (531.25)	0.079 (0.259)	109
25 (537.25)	0.079 (0.260)	108
26 (543.25)	0.080 (0.262)	107
27 (549.25)	0.080 (0.263)	107
28 (555.25)	0.081 (0.265)	106
29 (561.25)	0.081 (0.266)	106
30 (567.25)	0.082 (0.268)	105
31 (573.25)	0.082 (0.269)	104
32 (579.25)	0.082 (0.271)	104
33 (585.25)	0.083 (0.272)	103
34 (591.25)	0.083 (0.273)	103
35 (597.25)	0.084 (0.275)	102
36 (603.25)	0.084 (0.276)	102
37 (609.25)	0.085 (0.278)	101
38 (615.25)	0.085 (0.279)	101
39 (621.25)	0.086 (0.281)	100
40 (627.25)	0.086 (0.282)	99.7
41 (633.25)	0.086 (0.283)	99.2
42 (639.25)	0.087 (0.285)	98.7
43 (645.25)	0.087 (0.286)	98.2
44 (651.25)	0.088 (0.287)	97.8
45 (657.25)	0.088 (0.289)	97.3
46 (663.25)	0.088 (0.290)	96.8
47 (669.25)	0.089 (0.292)	96.4
48 (675.25)	0.089 (0.293)	95.9
49 (681.25)	0.090 (0.294)	95.5
50 (687.25)	0.090 (0.296)	95.1
51 (693.25)	0.091 (0.297)	94.6

Standard conditions: For Attenuation – VSWR 1.0, Ambient Temperature 20°C (68°F), Atmospheric Pressure, Dry Air. For Average Power – VSWR 1.0, Ambient Temperature 40°C (140°F), Inner Conductor Temperature 102°C (216°F), Atmospheric Pressure, Dry Air. Attenuation and average power data guaranteed within ±5%.

All flanged items are EIA standard and include inner connector, "O" ring, silicone lubricant and hardware, except when noted. All inner connectors are silver-plated.

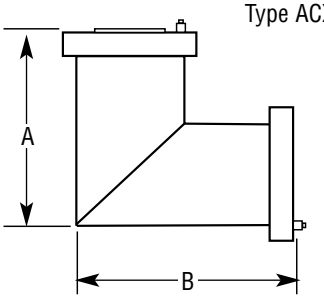
90° Miter Elbow

Swivel flanges, brass construction, reinforced outer.

Type	A in (mm)	B in (mm)	Weight lb (kg)
ACX875B-10SE-(*)	12.00 (305)	12.00 (305)	50 (22.68)

* Specify television channel or frequency

Type ACX875B-10ASE



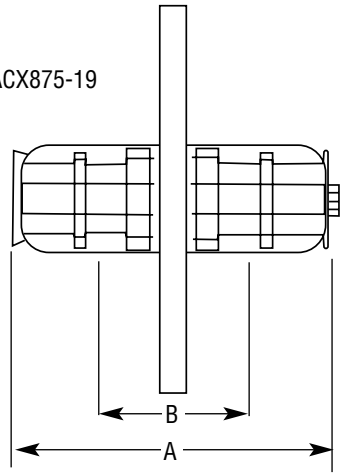
Inner Connector

Includes electrically compensated PTFE anchor disk.

Type	A in (mm)	B in (mm)	Weight lb (kg)
ACX875-20	6.5 (165)	3.12 (79)	5.25 (2.4)
ACX875-19†	6.5 (165)	3.12 (79)	5.25 (2.4)

† Captivated

Type ACX875-19



Gas Barrier (not pictured)

Fixed male inner connectors both ends. Both sides have a pressure port.

Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA875-16	8.19 (208)	4.81 (122)	8 (3.6)

"O" Ring Gasket (not pictured) For EIA flange.

Type
10683-10

Soft Solder Swivel Field Flange (not pictured)

For use on interior runs. Includes soft solder, swivel flange and sleeve with fixed ring. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA800B-37	4.4 (2.00)

Swivel Flange (not pictured)

Includes fixed ring, sliding ring, silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA800B-27	3.34 (1.52)

Fixed Flange (not pictured)

Includes silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA800B-28	3.75 (1.70)

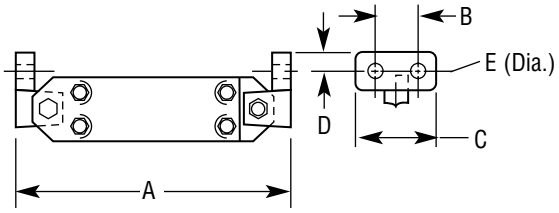
Hardware Kit (not pictured)

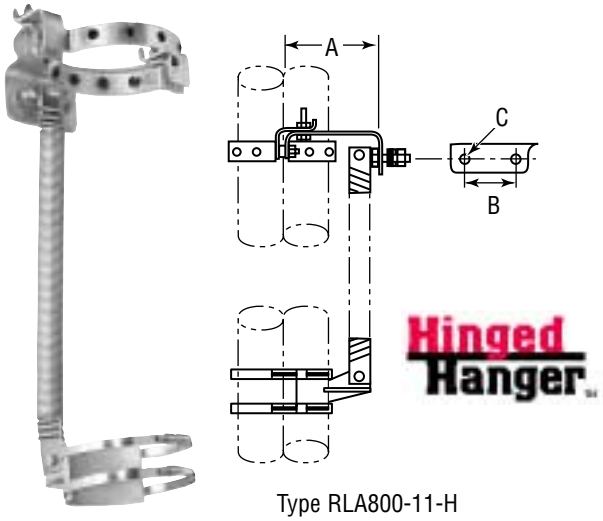
Includes "O" ring, silicone lubricant, nuts, bolts and lock-washers for one flange joint.

Type	Weight, lb (kg)
RLA800-21	1.13 (0.52)

8-3/16" Hangers

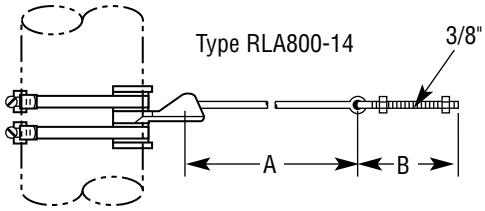
Type RLA800B-13

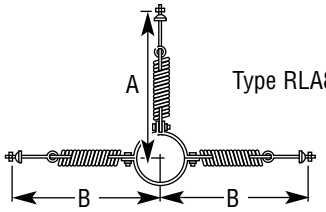




Type RLA800-11-H

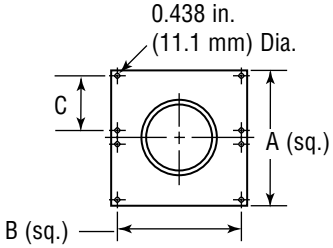
Type RLA800-14





Type RLA800-12

Type RLA800-15



8-3/16" Rigid Hanger

Hangers attach to top section. Use for up to 1000 ft (300 m) of line. Use two for up to 2000 ft (600 m) of line. Mounts to 11/16" (18 mm) diameter holes with included 5/8" diameter hardware.

Type	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E (Dia.) in (mm)	Weight lb (kg)
RLA800B-13	16.7 (424)	2.25 (57)	4.30 (109)	1.0 (25.6)	0.688 (17.5)	27.4 (12.46)

Vertical Spring Hanger

Use at 10 ft (3 m) intervals. Supports the transmission line. Prevents lateral motion, and accommodates differential expansion and contraction. Mounting hardware for "C" holes are included. Hardware for 5/8" diameters. Hinged to open from left or right side - saves installation labor.

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA800-11-H	8.0 (203)	3.0 (76)	0.656 (16.7)	13 (5.9)

Lateral Brace

Mounts through single 7/16" (11 mm) hole. Use one near bottom to restrict lateral motion of line while permitting vertical and horizontal movement.

Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA800-14	40.0 (1016)	6.50 (165)	5.0 (2.28)

3-Point Suspension Hanger

Accommodates vertical movement in the horizontal run caused by differential expansion and contraction of the vertical run. Use at 10 ft (3 m) intervals.

Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA800-12	26.7 (678)	22.3 (566)	9.5 (4.3)

Wall Feed Thru

Includes split mounting plate. Uses 3/8" mounting hardware (not included).

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA800B-15	16.0 (406)	14.0 (356)	6.0 (152)	17.5 (7.95)

7-3/16" MACXLine® Rigid Transmission Line

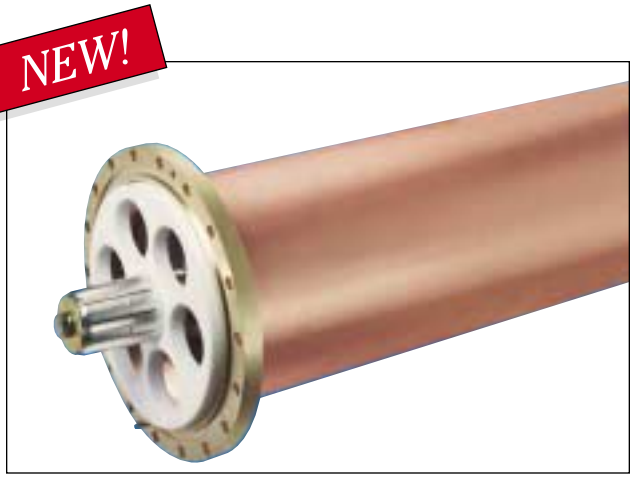
For High Power UHF Broadcasting

Thermally Compensated for Dependable Transmission – Twice the Life of Standard Rigid Lines

Now UHF-TV system designers and engineers have a new choice for 7-3/16" 75 ohm rigid transmission line from Andrew. Thermally compensated for dependable transmission, MACXLine® rigid line features patented technology that can more than double the life of a transmission line system.

MACXLine incorporates a unique patented* bellows section into each inner conductor that compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is thus eliminated. This means no shaving dust to arc at the flange and insulator areas. The result is an extremely long life.

*U.S. Patent 4,543,548.



MACX775 Premium Rigid Line Sections

	7-3/16" 75-ohm
20 ft	**MACX775-1**
19.75 ft	**MACX775-2**
19.5 ft	**MACX775-3**

Straight sections with bellows, flanged both ends. Includes captivated inner connector, hardware kit, disk insulators and instructions.

Standard tolerance is ± 0.050 in (1.3 mm).

MACX775 Field Cut Section Kits

	7-3/16" 75-ohm
Field Cut Straight Section, 5 to 20 ft	**MACX775-39**
Includes bellows, swivel field flange kit, hardware kit and installation instructions	
Field Cut Straight Section, up to 5 ft	**MACX775-41**
No bellows. Includes captivated inner connector, field flange kit, hardware kit and installation instructions	

MACX775 Variable Length Sections

	7-3/16" 75-ohm
Variable Length, 5 to 20 ft	**MACX775-42-VAR**
Variable Length, up to 5 ft	**MACX775-40-VAR**

Specify length in inches.

Specifications

Type Number MACX775	**7-3/16" 75-ohm**
Impedance, ohms	75 ± 0.5
Max. Channel	69
Velocity, percent	99.8
Attenuation†	
Average power rating†	
Peak Power Rating, kW*	1400
Dimensions	
Outer Conductor,	
Outside dia., in (mm)	7.150 (182)
Inside dia., in (mm)	7.000 (178)
Inner Conductor	
Outside dia., in (mm)	2.000 (51)
Inside dia., in (mm)	1.920 (49)
Flange Dimensions	
Flange, overall diameter, in (mm)	9.50 (241)
Bolt circle diameter, in (mm)	8.75 (222)
Number of bolts	14
Bolt size	3/8"
Net Weight, lb/ft (kg/m)	8.15 (12.15)
MACX775-1 Channels	
2, 3, 4, 5, 6, 7, 8, 11, 12, 14, 15, 18, 19, 22, 23, 27, 31, 35, 39, 43, 44, 47, 48, 51, 52, 55, 56, 60, 64, 68	
MACX775-2 Channels	
16, 20, 24, 28, 32, 36, 40, 41, 45, 49, 53, 57, 65, 66, 69	
MACX775-3 Channels	
9, 10, 13, 17, 21, 25, 26, 29, 30, 33, 34, 37, 38, 42, 46, 50, 54, 58, 59, 62, 63, 67	

*Based on production test voltage of 47 kV.

† Ask for Bulletin 10429

Note: Channels listed are preferred channels; others may also be acceptable. Contact Andrew for more information. Specifications subject to change without notice.

7-3/16" 75-ohm MACXLine® Rigid Line

Typical System

MACXLine Rigid Line System Components

Item No.	Description	7-3/16" 75-ohm
1	Straight Section	**MACX775 Series**
2	90° Miter Elbow	**ACX775-10ASE-(*)**
3	Rigid Hanger††	**RLA700-13**
4	Hinged Vertical Spring Hanger†	**RLA700-11-H**
5	Lateral Brace	**RLA700-14**
6	3-Point Suspension Hanger	**RLA700-12**
7	Wall Feed Thru	**RLA700-15**
8	Gas Barrier	**RLA775-16**
9	Fine Matching Section (UHF)	**STD775-FT**
–	Fixed Field Flange Kit	**RLA700-28**
–	Hardware Kit	**RLA700-21**
–	Captivated Inner Connector	**ACX775-19**
–	Inner Connector	**ACX775-20**
–	End Cap (to seal line)	**RLA700-50**
–	Reducer, 7-3/16" to 6-1/8"	**RLA775-675**
–	Reducer, 8-3/16" to 7-3/16"	**RLA875-775**
–	Soft Solder Swivel Field Flange Kit	**RLA700-37**
–	Fixed Flange Kit	**RLA700-28**
–	Installation Tool Kit Contains all tools necessary to assemble MACXLine	**MACX775-TK**

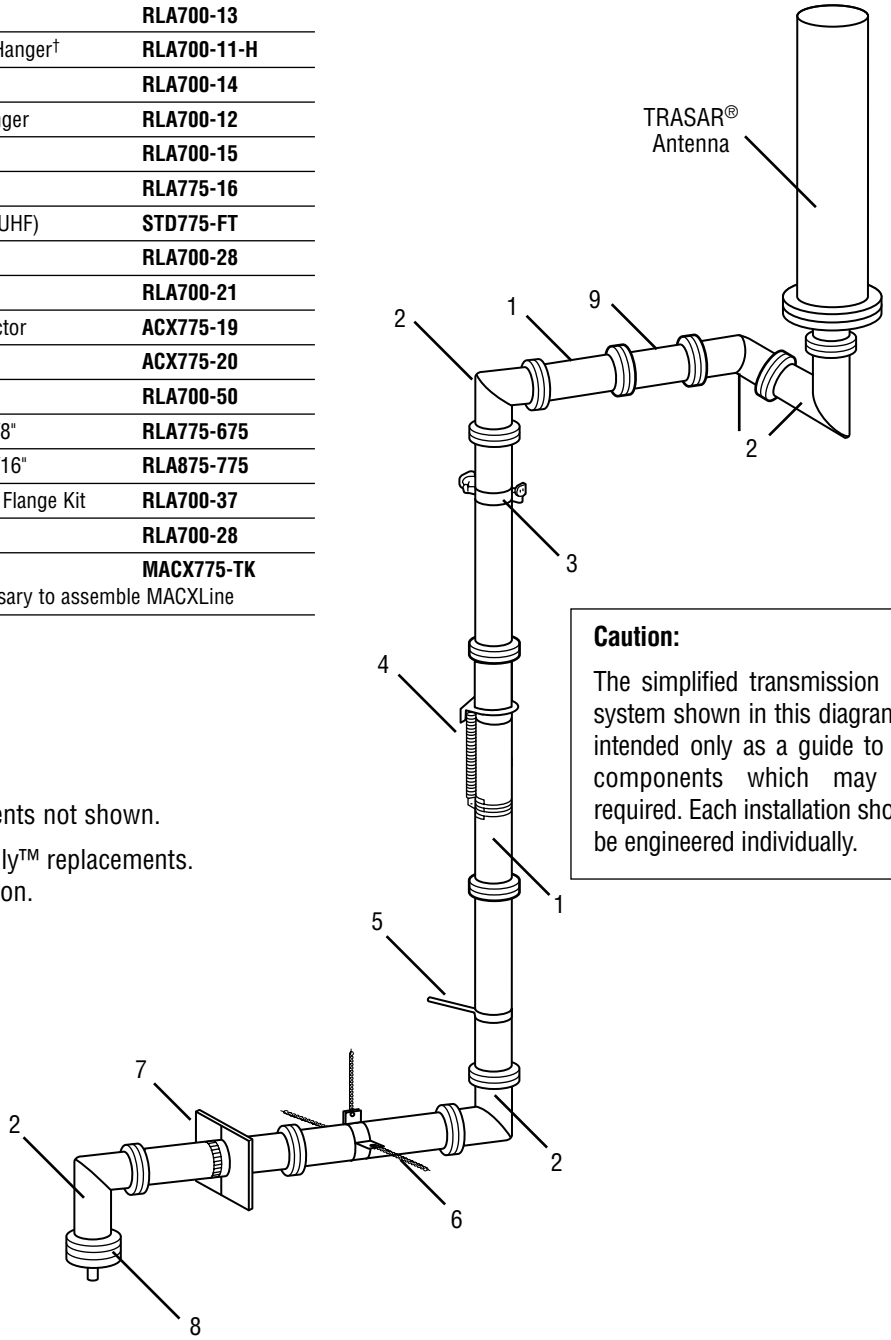
* Specify television channel or frequency.

† Use at 10 ft (3 m) intervals.

†† One for every 1000 ft (300 m).

Contact Andrew for other components not shown.

MACX775 is available as Inners Only™ replacements. Contact Andrew for more information.



Caution:

The simplified transmission line system shown in this diagram is intended only as a guide to the components which may be required. Each installation should be engineered individually.

All flanged items are EIA standard and include inner connector, "O" ring, silicone lubricant and hardware, except when noted. All inner connectors are silver-plated.

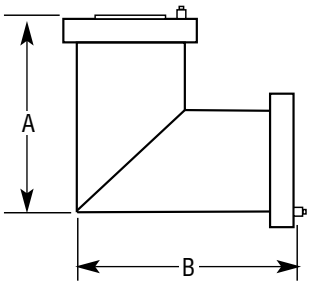
90° Miter Elbow

Swivel flanges, brass construction, reinforced outer.

Type	A in (mm)	B in (mm)	Weight lb (kg)
ACX775-10SE-(*)	12.0 (305)	16.125 (410)	50 (22.68)

* Specify television channel or frequency.

Type ACX775-10SE



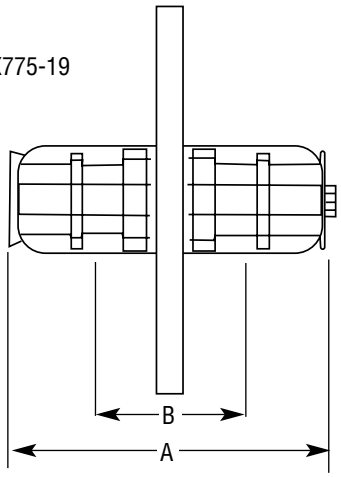
Inner Connector

Includes electrically compensated PTFE anchor disk.

Type	A in (mm)	B in (mm)	Weight lb (kg)
ACX775-20	6.5 (165)	3.12 (79)	5.25 (2.4)
ACX775-19†	6.5 (165)	3.12 (79)	5.25 (2.4)

† Captivated

Type ACX775-19



Gas Barrier (not pictured)

Fixed male inner connectors both ends. Both sides have a pressure port.

Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA775-16	8.19 (208)	4.81 (122)	8 (3.6)

"O" Ring Gasket (not pictured) For EIA flange.

Type
RLA700-51

Soft Solder Swivel Field Flange (not pictured)

For use on interior runs. Includes soft solder, swivel flange and sleeve with fixed ring. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA700-37	4.4 (2.00)

Swivel Flange (not pictured)

Includes fixed ring, sliding ring, silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA700-27	3.34 (1.52)

Fixed Flange (not pictured)

Includes silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA700-28	3.75 (1.70)

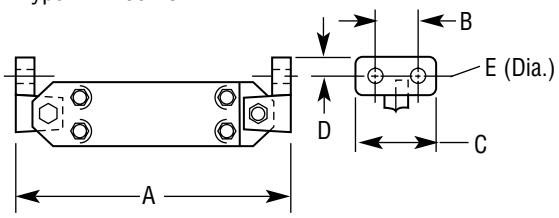
Hardware Kit (not pictured)

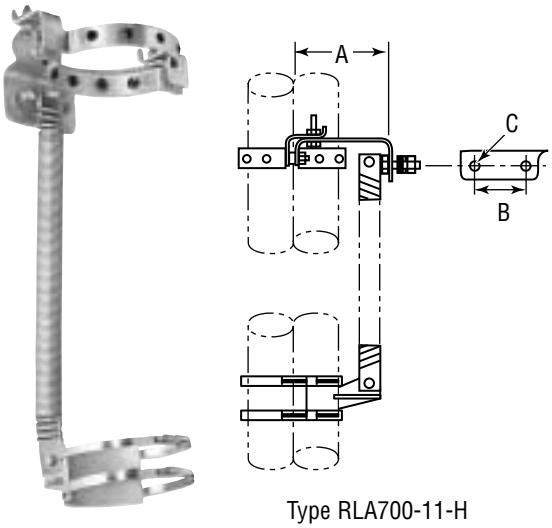
Includes "O" ring, silicone lubricant, nuts, bolts and lock-washers for one flange joint.

Type	Weight, lb (kg)
RLA700-21	1.13 (0.52)

7-3/16" Hangers

Type RLA700-13





Type RLA700-11-H

Hinged Hanger™

7-3/16" Rigid Hanger

Hangers attach to top section. Use for up to 1000 ft (300 m) of line. Use two for up to 2000 ft (600 m) of line. Mounts to 11/16" (18 mm) diameter holes with included 5/8" diameter hardware.

Type	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E (Dia.) in (mm)	Weight lb (kg)
RLA700-13	16.7 (424)	2.25 (57)	4.30 (109)	1.0 (25.6)	0.688 (17.5)	27.4 (12.46)

Vertical Spring Hanger

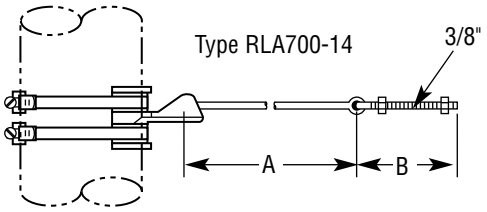
Use at 10 ft (3 m) intervals. Supports the transmission line. Prevents lateral motion, and accommodates differential expansion and contraction. Mounting hardware for “C” holes are included. Hardware for 5/8" diameters. Hinged to open from left or right side - saves installation labor.

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA700-11-H	8.0 (203)	3.0 (76)	0.656 (16.7)	13 (5.9)

Lateral Brace

Mounts through single 7/16" (11 mm) hole. Use one near bottom to restrict lateral motion of line while permitting vertical and horizontal movement.

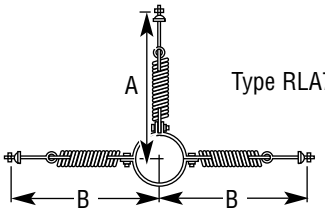
Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA700-14	40.0 (1016)	6.50 (165)	5.0 (2.28)



3-Point Suspension Hanger

Accommodates vertical movement in the horizontal run caused by differential expansion and contraction of the vertical run. Use at 10 ft (3 m) intervals.

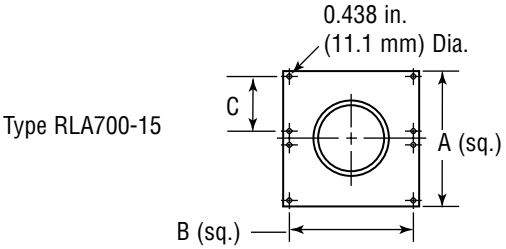
Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA700-12	26.7 (678)	22.3 (566)	9.5 (4.3)



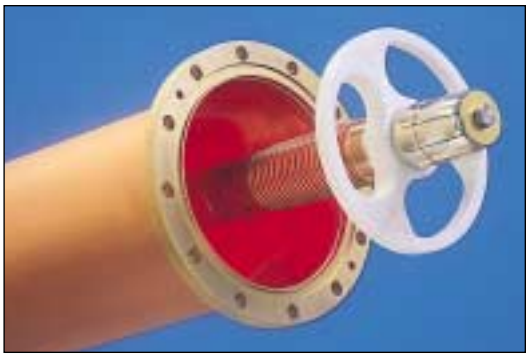
Wall Feed Thru

Includes split mounting plate. Uses 3/8" mounting hardware (not included).

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA700-15	16.0 (406)	14.0 (356)	6.0 (152)	17.5 (7.95)



6-1/8" 75-ohm MACXLine® Rigid Line



High Reliability and Long Life

MACXLine rigid line is a high performance coaxial line designed for exceptional reliability and long life. It is ideal for high power VHF and UHF television transmit applications.

Bellows Inner Conductor. A unique patented* bellows section incorporated into each inner conductor compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is thus eliminated. This means no shaving dust to arc at the flange and insulator areas. The result is extremely long life, no routine maintenance, and no planned replacement cycles. Also, the need for a redundant run or space for a backup run is eliminated.

PTFE Disk Insulators. Extra-strength, custom PTFE dielectric disk insulators maintain precise mechanical alignment between inner and outer conductors at the high operating temperatures involved. This ensures minimum VSWR and maximum power transfer to your antenna, resulting in full utilization of transmitted power in high ambient temperature environments.

Inner Connectors are captivated and use tension springfingers for maximum contact force. This ensures efficient transmission of power and eliminates overheating which can lead to catastrophic failure. The result is longer life and increased cost effectiveness of the system.

Description

MACXLine rigid line is manufactured from high conductivity copper tubing for low attenuation. Electrical and mechanical characteristics are listed on pages 335 and 338.

All sections come complete with one captivated inner connector, a set of stainless steel flange hardware and a pressure sealing gasket. They are packed in easy to handle cardboard containers.

* Patented United States 4,543,548.

Selection Criteria

Attenuation of a transmission line varies with frequency, temperature and load VSWR. A table of attenuation versus frequency is given on page 338. Values shown are based on an ambient temperature of 20˚C (68˚F) and unity VSWR. The values obtained from this table can be corrected for other temperatures and load VSWRs using Figures 1 and 2 on page 631.

Power Handling. Average power ratings are dependent on frequency, pressurization and VSWR. A table of power ratings is shown on page 338. Peak power ratings do not vary with frequency, but can be significantly increased by pressurization as described on page 633.

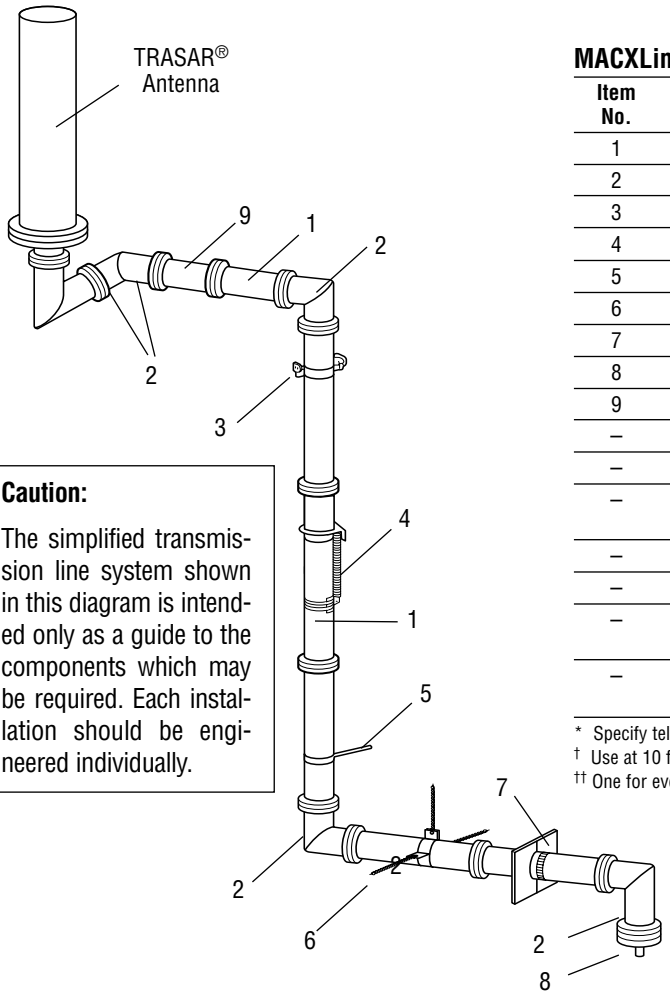
VSWR. MACXLine rigid line features excellent VSWR, typically 1.02 maximum per component. Contact Andrew for information on guaranteed VSWR ratings for your application.

6-1/8" Rigid Coax is also available in an HRLine® Version. Contact Andrew for details.

Recommended MACXLine Section Lengths

Television Channels
20 ft (6.096 m) Sections
2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 18, 19, 23, 27, 31, 35, 39, 40, 43, 44, 47, 48, 52, 56, 60, 64, 68
19.75 ft (6.020 m) Sections
16, 20, 24, 28, 32, 33, 36, 41, 45, 49, 53, 57, 58, 61, 62, 65, 66, 69
19.5 ft (5.944 m) Sections
4, 9, 10, 13, 17, 21, 22, 25, 26, 29, 30, 34, 38, 42, 46, 50, 51, 54, 55, 59, 63, 67
FM Radio Frequencies
20 ft (6.096 m) Sections
88.1 - 95.9 MHz 100.3 - 107.9 MHz
19.5 ft (5.944 m) Sections
96.1 - 98.3 MHz
19.0 ft (5.791 m) Sections
98.5 - 100.1 MHz

6-1/8" 75-ohm MACXLine® Rigid Coax
Typical System



Caution:

The simplified transmission line system shown in this diagram is intended only as a guide to the components which may be required. Each installation should be engineered individually.

MACXLine Rigid Line System Components

Item No.	Description	6-1/8" 75-ohm
1	Straight Section	**MACX675B Series**
2	90° Miter Elbow	**ACX675B-10SE-(*)**
3	Rigid Hanger ††	**RLA600B-13**
4	Vertical Spring Hanger †	**RLA600-11-H**
5	Lateral Brace	**RLA600-14**
6	3-Point Suspension Hanger	**RLA600-12**
7	Wall Feed Thru	**RLA600-15**
8	Gas Barrier	**RLA675-16**
9	Fine Matching Section (UHF)	**STD675B-FT**
–	Fixed Field Flange Kit	**RLA600B-28**
–	Hardware Kit	**RLA600-21**
–	75, 50-ohm Impedance Transformer	**ACX675B-17-(*)**
–	Captivated Inner Connector	**ACX675-19**
–	6-1/8" Bellows Bullet Assembly	**MACX650A-20**
–	Installation Tool Kit Contains all tools necessary to assemble MACXLine®	**MACX675A-TK**
–	Stub Field Adapter, rosin core solder and Emery Cloth for MACXLine® field cuts	**MACX675A-TK-2**

* Specify television channel or frequency.
† Use at 10 ft (3 m) intervals.
†† One for every 1000 ft (3000 m).

Specifications

Type Number	6-1/8" 75-ohm MACX675B
Impedance, ohms	75 ± 0.5
Velocity, percent	99.8
Attenuation, see page	
Average power rating, see page	
Peak Power Rating, kW	1060
Dimensions	
Outer Conductor,	
Outside dia., in (mm)	6.125 (156)
Inside dia., in (mm)	5.981 (152)
Inner Conductor	
Outside dia., in (mm)	1.711 (43)
Inside dia., in (mm)	1.631 (41)
Flange Dimensions	
Flange, Overall Diameter, in (mm)	8.12 (206.2)
Bolt Circle Diameter, in (mm)	7.375 (187)
Number of Bolts	12
Bolt Size	3/8"
Net Weight, lb/ft (kg/m)	4.52 (6.73)

Contact Andrew for other components not shown. "Quick Patch" coaxial patch panels are available for 6-1/8", 75-ohm rigid line. See page 380
Specifications subject to change without notice.

MACXLine Premium Rigid Line Sections

	6-1/8" 75-ohm
20 ft	**MACX675B-1**
19.75 ft	**MACX675B-2**
19.5 ft	**MACX675B-3**
19.0 ft	**MACX675B-6**

Straight sections with bellows, flanged both ends. Includes captivated inner connector, hardware kit, disk insulators and instructions.
Standard tolerance is ± 0.050 in (1.3 mm)

MACXLine Field Cut Section Kits

	6-1/8" 75-ohm
Field Cut Straight Section, 5 to 20 ft	**MACX675B-39**
Includes bellows, fixed field flange kit, hardware kit and installation instructions	
Field Cut Straight Section, up to 5 ft	**MACX675B-41**
No bellows. Includes captivated inner conductor, fixed field flange kit, hardware kit and installation instructions.	

MACXLine Variable Length Sections

	6-1/8" 75-ohm
Variable Length, 5 to 20 ft	**MACX675B-42-VAR**
Variable Length, up to 5 ft	**MACX675B-40-VAR**

Specify length in inches.

6-1/8" 50-ohm Standard Rigid line

Standard Coaxial Transmission Line, available in 6-1/8", 50-ohm size, is used as a component in HRLine® systems and in shorter systems where thermal expansion and contraction are less significant. It has PTFE dielectric insulators and welded flanges.

All flanged sections come complete with one inner connector, a set of stainless steel flange hardware and a pressure sealing gasket.

Electrical Characteristics

Attenuation of a transmission line varies with frequency, temperature, and load VSWR. A table of attenuation versus frequency is given on page 337.

Power Handling. Peak power ratings do not vary with frequency, but can be significantly increased by pressurization. Average power ratings are dependent on frequency, pressurization and VSWR. Average power ratings are given on page 337.

"Quick Patch" coaxial patch panels are available for 6-1/8" 50-ohm line. See page 380.

Recommended STD650B Rigid Line Section Lengths

Television Channels
20 ft (6.096 m) Sections
2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 18, 19, 23, 27, 31, 35, 39, 40, 43, 44, 47, 48, 52, 56, 60, 64, 68
19.75 ft (6.020 m) Sections
16, 20, 24, 28, 32, 33, 36, 41, 45, 49, 53, 57, 58, 61, 62, 65, 66, 69
19.5 ft (5.944 m) Sections
4, 9, 10, 13, 17, 21, 22, 25, 26, 29, 30, 34, 38, 42, 46, 50, 51, 54, 55, 59, 63, 67
FM Radio Frequencies
20 ft (6.096 m) Sections
88.1 - 95.9 MHz 100.3 - 107.9 MHz
19.5 ft (5.944 m) Sections
96.1 - 98.3 MHz
19.0 ft (5.791 m) Sections
98.5 - 100.1 MHz

Specifications

Type No. STD650B	**6-1/8" 50-ohm**
Impedance, ohms	50 ±0.5
Velocity, percent	99.8
Attenuation, see page 337	
Peak Power Rating, kW	1500
Dimensions	
Outer Conductor	
Outside dia., in (mm)	6.125 (156)
Inside dia., in (mm)	5.981 (152)
Inner conductor	
Outside dia., in (mm)	2.6 (66)
Inside dia., in (mm)	2.52 (64)
Net Weight, lb/ft (kg/m)	4.97 (7.40)

STD650B Rigid Line Sections

	6-1/8" 50-ohm
20 ft	**STD650B-1**
19.75 ft	**STD650B-2**
19.5	**STD650B-3**
19.0 ft	**STD650B-6**

STD650B Field Cut Section Kit

	6-1/8" 50-ohm
Field Cut Straight Section, 20 ft	**STD650B-39**

STD650B Variable Length Section

	6-1/8" 50-ohm
Variable Length, 2-20 ft, flanged both ends	**STD650B-40-VAR**

Specify length in inches. Standard tolerance is ± 0.050 in (1.3 mm)

STD650B Flange Dimensions

	6-1/8" 50-ohm
Flange, Overall Diameter, in (mm)	8.12 (206.2)
Bolt Circle Diameter, in (mm)	7.375 (187.3)
Number of Bolts	12
Bolt Size	3.8"

Specifications subject to change without notice.

6-1/8" Rigid Line
Attenuation and Average Power Ratings

50-ohm Standard Line Type or STD650

Television Channel No. (MHz)	Attenuation dB/100 ft (100 m)	Average Power kW
2 (55.25)	0.036 (0.120)	231
3 (61.25)	0.038 (0.126)	219
4 (67.25)	0.040 (0.132)	209
5 (77.25)	0.043 (0.142)	195
6 (83.25)	0.045 (0.147)	187
7 (175.25)	0.066 (0.215)	129
8 (181.25)	0.067 (0.219)	126
9 (187.25)	0.068 (0.222)	124
10 (193.25)	0.069 (0.226)	122
11 (199.25)	0.070 (0.229)	121
12 (205.25)	0.071 (0.233)	119
13 (211.25)	0.072 (0.236)	117
14 (471.25)	0.108 (0.356)	77.7
15 (477.25)	0.109 (0.358)	77.2
16 (483.25)	0.110 (0.360)	76.7
17 (489.25)	0.111 (0.363)	76.3
18 (495.25)	0.111 (0.365)	75.8
19 (501.25)	0.112 (0.367)	75.3
20 (507.25)	0.113 (0.369)	74.9
21 (513.25)	0.113 (0.372)	74.4
22 (519.25)	0.114 (0.374)	74.0
23 (525.25)	0.115 (0.376)	73.5
24 (531.25)	0.115 (0.378)	73.1
25 (537.25)	0.116 (0.380)	72.7
26 (543.25)	0.117 (0.383)	72.3
27 (549.25)	0.117 (0.385)	71.9
28 (555.25)	0.118 (0.387)	71.5
29 (561.25)	0.119 (0.389)	71.1
30 (567.25)	0.119 (0.391)	70.7
31 (573.25)	0.120 (0.393)	70.3
32 (579.25)	0.121 (0.395)	69.9
33 (585.25)	0.121 (0.398)	69.6
34 (591.25)	0.122 (0.400)	69.2
35 (597.25)	0.122 (0.402)	68.9
36 (603.25)	0.123 (0.404)	68.5
37 (609.25)	0.124 (0.406)	68.2
38 (615.25)	0.124 (0.408)	67.8
39 (621.25)	0.125 (0.410)	67.5
40 (627.25)	0.126 (0.412)	67.1
41 (633.25)	0.126 (0.414)	66.8
42 (639.25)	0.127 (0.416)	66.5
43 (645.25)	0.127 (0.418)	66.2
44 (651.25)	0.128 (0.420)	65.9
45 (657.25)	0.129 (0.422)	65.6
46 (663.25)	0.129 (0.424)	65.2
47 (669.25)	0.130 (0.426)	64.9
48 (675.25)	0.130 (0.428)	64.6
49 (681.25)	0.131 (0.430)	64.4
50 (687.25)	0.132 (0.432)	64.1
51 (693.25)	0.132 (0.434)	63.8
52 (699.25)	0.133 (0.436)	63.5
53 (705.25)	0.133 (0.437)	63.2
54 (711.25)	0.134 (0.439)	62.9
55 (717.25)	0.134 (0.441)	62.7
56 (723.25)	0.135 (0.443)	62.4
57 (729.25)	0.136 (0.445)	62.1
58 (735.25)	0.136 (0.447)	61.9
59 (741.25)	0.137 (0.449)	61.6
60 (747.25)	0.137 (0.451)	61.4
61 (753.25)	0.138 (0.453)	61.1
62 (759.25)	0.138 (0.454)	60.9
63 (765.25)	0.139 (0.456)	60.6
64 (771.25)	0.140 (0.458)	60.4
65 (777.25)	0.140 (0.460)	60.1
66 (783.25)	0.141 (0.462)	59.9
67 (789.25)	0.141 (0.464)	59.7
68 (795.25)	0.142 (0.465)	59.4
69 (801.25)	0.142 (0.467)	59.2

Standard conditions: For Attenuation – VSWR 1.0, Ambient Temperature 20°C (68°F), Atmospheric Pressure, Dry Air. For Average Power – VSWR 1.0, Ambient Temperature 40°C (140°F), Inner Conductor Temperature 102°C (216°F), Atmospheric Pressure, Dry Air.Attenuation and average power data guaranteed within ±5%.

6-1/8" Rigid Line

Attenuation and Average Power Ratings

75-ohm MACXLine®, Type MACX675B

Television Channel No. (MHz)	Attenuation dB/100 ft (100 m)	Average Power kW
2 (55.25)	0.033 (0.109)	201
3 (61.25)	0.035 (0.114)	191
4 (67.25)	0.036 (0.120)	182
5 (77.25)	0.039 (0.129)	170
6 (83.25)	0.040 (0.134)	164
7 (175.25)	0.060 (0.195)	112
8 (181.25)	0.061 (0.199)	110
9 (187.25)	0.062 (0.202)	109
10 (193.25)	0.063 (0.205)	107
11 (199.25)	0.064 (0.209)	105
12 (205.25)	0.065 (0.212)	104
13 (211.25)	0.066 (0.215)	102
14 (471.25)	0.099 (0.324)	67.8
15 (477.25)	0.099 (0.326)	67.4
16 (483.25)	0.100 (0.328)	66.9
17 (489.25)	0.101 (0.330)	66.5
18 (495.25)	0.101 (0.332)	66.1
19 (501.25)	0.102 (0.334)	65.7
20 (507.25)	0.102 (0.336)	65.3
21 (513.25)	0.103 (0.338)	64.9
22 (519.25)	0.104 (0.340)	64.5
23 (525.25)	0.104 (0.342)	64.1
24 (531.25)	0.105 (0.344)	63.8
25 (537.25)	0.106 (0.346)	63.4
26 (543.25)	0.106 (0.348)	63.0
27 (549.25)	0.107 (0.350)	62.7
28 (555.25)	0.107 (0.352)	62.3
29 (561.25)	0.108 (0.354)	62.0
30 (567.25)	0.109 (0.356)	61.7
31 (573.25)	0.109 (0.358)	61.3
32 (579.25)	0.110 (0.360)	61.0
33 (585.25)	0.110 (0.362)	60.7
34 (591.25)	0.111 (0.364)	60.4
35 (597.25)	0.111 (0.366)	60.0
36 (603.25)	0.112 (0.368)	59.7
37 (609.25)	0.113 (0.369)	59.4
38 (615.25)	0.113 (0.371)	59.1
39 (621.25)	0.114 (0.373)	58.8
40 (627.25)	0.114 (0.375)	58.5
41 (633.25)	0.115 (0.377)	58.3
42 (639.25)	0.115 (0.379)	58.0
43 (645.25)	0.116 (0.380)	57.7
44 (651.25)	0.117 (0.382)	57.4
45 (657.25)	0.117 (0.384)	57.2
46 (663.25)	0.118 (0.386)	56.9
47 (669.25)	0.118 (0.388)	56.6
48 (675.25)	0.119 (0.389)	56.4
49 (681.25)	0.119 (0.391)	56.1
50 (687.25)	0.120 (0.393)	55.9
51 (693.25)	0.120 (0.395)	55.6
52 (699.25)	0.121 (0.397)	55.4
53 (705.25)	0.121 (0.398)	55.1
54 (711.25)	0.122 (0.400)	54.9
55 (717.25)	0.122 (0.402)	54.5
56 (723.25)	0.123 (0.404)	54.4
57 (729.25)	0.124 (0.405)	54.2
58 (735.25)	0.124 (0.407)	53.9
59 (741.25)	0.125 (0.409)	53.7
60 (747.25)	0.125 (0.410)	53.5
61 (753.25)	0.126 (0.412)	53.3
62 (759.25)	0.126 (0.414)	53.1
63 (765.25)	0.127 (0.415)	52.8
64 (771.25)	0.127 (0.417)	52.6
65 (777.25)	0.128 (0.419)	52.4
66 (783.25)	0.128 (0.420)	52.2
67 (789.25)	0.129 (0.422)	52.0
68 (795.25)	0.129 (0.424)	51.8
69 (801.25)	0.130 (0.425)	51.6

Standard conditions: For Attenuation – VSWR 1.0, Ambient Temperature 20°C (68°F), Atmospheric Pressure, Dry Air. For Average Power – VSWR 1.0, Ambient Temperature 40°C (140°F), Inner Conductor Temperature 102°C (216°F), Atmospheric Pressure, Dry Air. Attenuation and average power data guaranteed within ±5%.

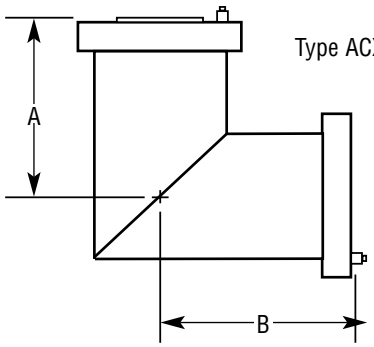
All flanged items are EIA standard and include inner connector, “O” ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

90° Miter Elbow

Swivel flanges, brass construction, reinforced outer.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
ACX675B-10SE-(*)	75	7.00 (178)	14.00 (356)	29.0 (13.2)
ACX650B-10SE	50	5.50 (140)	5.50 (140)	25.0 (11.4)

* Specify television channel or frequency.



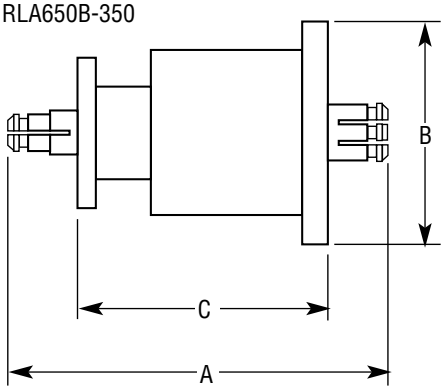
Type ACX675B-10SE

Reducer 50-ohm

Includes two inner connectors. Not a gas barrier.

Line Size	Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
6-1/8" to 3-1/8"	**RLA650B-350**	11.69 (297)	8.13 (207)	7.13 (181)	20.0 (9.1)

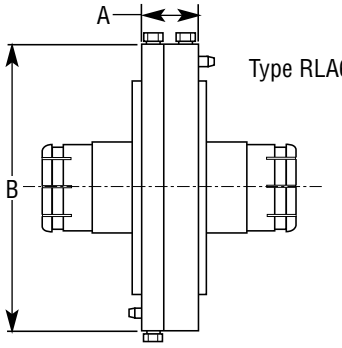
Type RLA650B-350



Gas Barrier

Fixed male inner connectors both ends. Pressure port both sides.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
RLA650-16	50	1.63 (41)	8.13 (206)	19.4 (8.8)
RLA675-16	75	2.00 (51)	8.13 (206)	19.4 (8.8)



Type RLA650-16

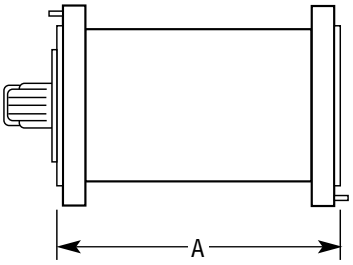
6-1/8" Impedance Transformer

Connects 6-1/8", 75-ohm line to 6-1/8", 50-ohm line. Includes inner connector for 50-ohm. Not a gas barrier.

Type	Channel No.	A in (mm)	Weight lb (kg)
ACX675B-17-2	2	56.28 (1430)	45 (20.0)
ACX675B-17-3	3	51.35 (1304)	42 (19.1)
ACX675B-17-4	4	47.28 (1201)	40 (18.2)
ACX675B-17-5	5	43.86 (1114)	38 (17.3)
ACX675B-17-6	6	40.95 (1040)	36 (16.4)
ACX675B-17-7	7	21.19 (538)	25 (11.4)
ACX675B-17-8	8	20.64 (524)	25 (11.4)
ACX675B-17-9	9	20.13 (511)	25 (11.4)
ACX675B-17-10	10	19.65 (499)	25 (11.4)
ACX675B-17-11	11	19.20 (488)	25 (11.4)
ACX675B-17-12	12	18.77 (477)	25 (11.4)
ACX675B-17-13	13	18.37 (467)	25 (11.4)
ACX675B-17-(*)	14 thru 26	13.22 (336)	22 (10.0)
ACX675B-17-(*)	27 thru 39	11.65 (296)	20 (9.1)
ACX675B-17-(*)	40 thru 53	10.46 (266)	19 (8.7)
ACX675B-17-(*)	54 thru 69	9.52 (242)	18 (8.2)

* Specify channel number

Type ACX675B-17



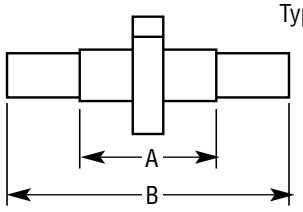
Fine Matcher

6-1/8" fine matching selection, seven tuners, 18 inches face to face (UHF only). Includes one inner connector and one flange hardware kit.

	Type
6-1/8" 50-ohm	**STD650B-FT**
6-1/8" 75-ohm	**ACX675B-FT**

Accessories for 6-1/8" Rigid Line

Type ACX675-20



Type RLA600-21

Type 10683-10

Type RLS600B-37

Type RLA600B-27

Type RLA600B-28

Male-to-Male Adapter

Joins two components having captivated inner connectors. 6 in (150 mm) length. No inner connectors. Includes hardware. (Not illustrated).

Type	Weight, lb (kg)
31472	18 (8.16)

Inner Connector

Includes electrically compensated PTFE anchor disk.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
ACX650-20	50	2.44 (62)	5.50 (140)	2.10 (0.96)
ACX675-20	75	2.40 (61)	5.40 (137)	2.10 (0.96)
ACX675-19†	75	2.40 (61)	5.40 (137)	2.10 (0.96)

† Captivated.

Hardware Kit

Includes “O” ring, silicone lubricant, nuts, bolts and lockwashers for one flange joint.

Type	Weight, lb (kg)
RLA600-21	1.13 (0.52)

“O” Ring Gasket

For EIA flange.

Line Size	Type
6-1/8"	**10683-10**

Soft Solder Swivel Field Flange

For use on interior runs. Includes soft solder, swivel flange and sleeve with fixed ring. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA600B-37	4.4 (2.00)

Swivel Flange

Includes fixed ring, sliding ring, silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
RLA600B-27	3.34 (1.52)

Fixed Flange

Includes silver solder and flux. Order inner connector and hardware kit seperately.

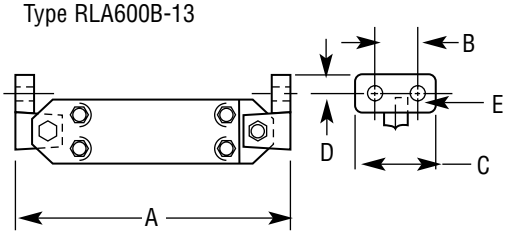
Type	Weight, lb (kg)
RLA600B-28	3.75 (1.70)

6-1/8" Rigid Hanger

Hangers attach to top section. Use one for up to 1000 ft (300 m) of line. Use two for up to 2000 ft (600 m) of line. Mounts to 11/16 in (18 mm) diameter holes with included 5/8" diameter hardware.

Type	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	Weight lb (kg)
RLA600B-13	14.50 (368)	2.25 (57)	4.25 (108)	1.0 (25.6)	0.688 (17.5)	21.6 (9.82)

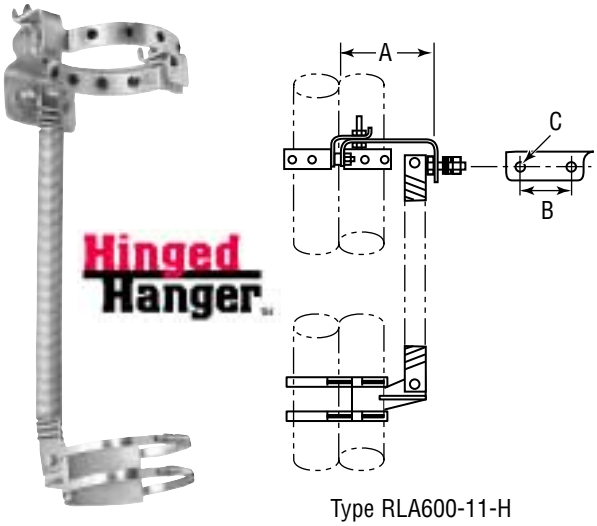
Type RLA600B-13



Vertical Spring Hanger

Use at 10 ft (3 m) intervals. Supports the transmission line. Prevents lateral motion, and accommodates differential expansion and contraction. Mounting hardware for "D" holes are included. Hardware for 5/8" diameters. Hinged to open from left or right side - saves installation labor.

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA600-11-H	6.25 (159)	2.38 (60)	0.656 (16.7)	12.5 (5.7)



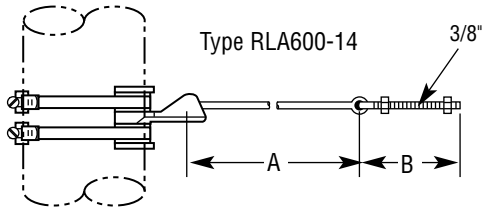
Type RLA600-11-H

Lateral Brace

Mounts through single 7/16 in (11 mm) hole. Use one near bottom to restrict lateral motion of line while permitting vertical and horizontal movement.

Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA600-14	40.0 (1016)	6.50 (165)	4.13 (1.88)

Type RLA600-14

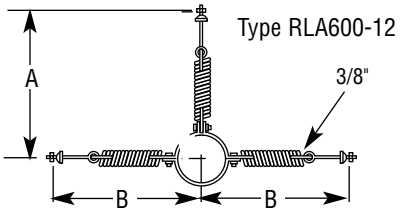


3-Point Suspension Hanger

Accommodates vertical movement in the horizontal run caused by differential expansion and contraction of the vertical run. Use at 10 ft (3 m) intervals.

Type	A in (mm)	B in (mm)	Weight lb (kg)
RLA600-12	26.0 (660)	20.9 (531)	9.38 (4.26)

Type RLA600-12

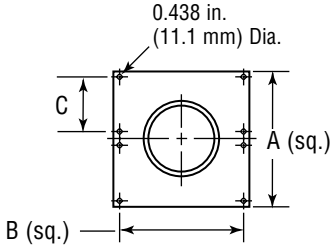


Wall Feed Thru

Includes split mounting plate. Uses 3/8" mounting hardware (not included).

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA600-15	14.0 (356)	12.8 (325)	5.8 (147.3)	17.5 (7.95)

Type RLA600-15



6-1/8" Inners Only™

Inner Conductor Replacement Systems

Retrofit Your Existing Rigid Line with Inners Only at Half the Cost!

Despite tight capital budgets, you can't afford to go off the air! Transmission line systems require maintenance after just ten years to avoid premature burnout of bullet-style connectors. By upgrading with Inners Only before your transmission line fails, you avoid the disaster of dead air.

Andrew Inners Only connector replacement systems are available for other manufacturers' rigid lines. Contact Andrew for details.

MACXLine® Inners Only Replacement Systems (75 ohms)

MACXLine Inner Only inner conductors are preferred for two reasons: MACXLine lengths are identical to those of standard 6-1/8", 75-ohm rigid line, assuring that MACXLine can be used for every application. MACXLine inner conductors install quickly since they are similar to your old ones, except for the bellows; this allows retro-fitting to be done in stages during the interval a station is off the air every night.

All Inners Only replacement sections include captivated inner connector, hardware kit for EIA flange, and installation instructions.

Inner Conductors for Straight Sections

Type Number	
Full Length Section	**MACX675A-25-(*)**
Field-Cut Section, 5 to 20 ft (Includes bellows)	**MACX675A-26**
Field-Cut Section, up to 5 ft (No bellows)	**MACX675A-24**
Installation tool kit	**MACX675A-TK**
Field cut tool kit	**MACX675A-TK-2**

* Insert length of outer conductor, flange face to flange face in inches.

3-1/8" 50-ohm MACXLine® Rigid Coaxial Line

Dependable 3-1/8", 50-ohm Transmission Line for Television and AM/FM Radio. . .

Only from Andrew!

- *High Reliability*
- *Long Life*
- *Bellows Prevents Sliding of Bullet*
- *Ideal Inners Only™ Replacement*

MACXLine rigid line is a designed for exceptional performance and long life. It is ideal for high power VHF and UHF television transmit applications.

3-1/8" MACXLine flanges and inner connectors are fully compatible with both EIA Standard RS-225 and IEC Recommendations.

Bellows Inner Conductor

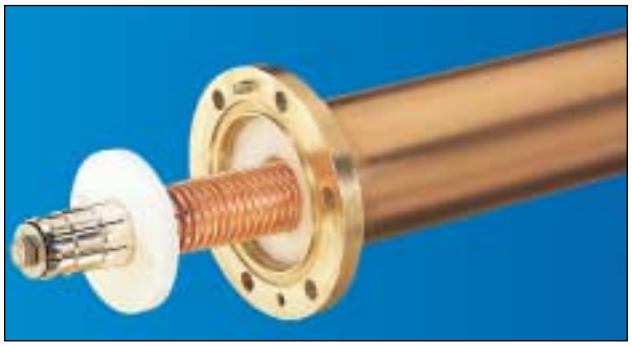
A unique patented bellows section incorporated into each inner conductor compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is thus eliminated. This means no shaving dust to arc at the flange and insulator areas. The result is extremely long life, no routine maintenance, and no planned replacement cycles.

VSWR. MACXLine rigid line features excellent VSWR, typically 1.02 maximum per component and 1.07 maximum per system. Optimized systems having 1.05 or better VSWR across the operating channel are usually available. Contact Andrew for information on guaranteed VSWR ratings for your application. Attenuation and average power ratings are on page 345.

3-1/8" rigid coax is also available in an HRLine® version. Contact Andrew for details.

Recommended Rigid Line Section Lengths

Television Channels
20 ft (6.096 m) Sections
2, 3, 5, 6, 7, 8, 11, 12, 14, 15, 18, 19, 23, 27, 31, 35, 39, 40, 43, 44, 47, 48, 52, 56, 60, 64, 68
19.75 ft (6.020 m) Sections
16, 20, 24, 28, 32, 33, 36, 41, 45, 49, 53, 57, 58, 61, 62, 65, 66, 69
19.5 ft (5.944 m) Sections
4, 9, 10, 13, 17, 21, 22, 25, 26, 29, 30, 34, 38, 42, 46, 50, 51, 54, 55, 59, 63, 67
FM Radio Frequencies
20 ft (6.096 m) Sections
88.1 - 95.9 MHz 100.3 - 107.9 MHz
19.5 ft (5.944 m) Sections
96.1 - 98.3 MHz
19.0 ft (5.791 m) Sections
98.5 - 100.1 MHz



Specifications

Type Number	MACX350
Impedance, ohms	50 ± 0.5
Max. Frequency, MHz	1600
Velocity, percent	99.7
Peak Power Rating, kW*	440
Net Weight, lb/ft (kg/m)	2.22 (3.30)

*Based on production test voltage of 19 kV.

Ordering Information

Straight Line Sections	Type Numbers
20 ft *	**MACX350A-1**
19.75 ft *	**MACX350A-2**
19.5 ft *	**MACX350A-3**
19.0 ft *	**MACX350A-6**
Variable Length, up to 5 ft***	**MACX350A-40-VAR**
Variable Length, 5 to 20 ft **	**MACX350A-42-VAR**
90° Miter Elbow	**ACX350-10SE**
Inner Conductor Assembly	**MACX350A-25-VAR**
Field Cut Straight Section, 5 to 20 ft **	**MACX350A-39**
Field Cut Straight Section, up to 5 ft ***	**MACX350A-41**
Accessories	
Captivated Inner Connector	**ACX350-19**
Fixed Field Flange Kit	**15840**
Hardware Kit	**69226-2**
Hinged Vertical Spring Hanger †	**RLA300-11-H**
3-Point Suspension Hanger	**RLA300-12**
Rigid Hanger ††	**13927**
Lateral Brace	**RLA300-14**
Wall Feed Thru	**RLA300-15**
Gas Barrier	**RLA350-16**

* Straight Sections with bellows, flanged both ends. Includes captivated inner connector, hardware kit, disk insulators and instructions.

** Includes bellows, captivated inner connector, fixed field flange kit, hardware kit and installation instructions.

***No bellows. Fixed field flange kit, hardware kit and installation instructions.

† Use at 10 ft (3 m) intervals.

†† One for every 300 ft (90 m).

3-1/8" 50-ohm Standard Rigid Line

Standard Rigid Coaxial Transmission Line is Available in 3-1/8", 50-ohm Size

All flanged sections come complete with one inner connector, a set of stainless steel flange hardware and a pressure sealing gasket.

Standard Rigid Line Components – 3-1/8" 50-ohm	
20 ft, flanged both ends	**STD350-1**
19.75 ft, flanged both ends	**STD350-2**
19.5 ft, flanged both ends	**STD350-3**
19.0 ft, flanged both ends	**STD350-6**
20 ft, unflanged	**STD350-31**
Field Cut, 20 ft, flanged one end*	**STD350-39**
Field Cut, 20 ft, unflanged	**STD350-29- (**)**
Variable Length, flanged both ends	**STD350-40- (**)**
Variable Length, flanged one end*	**STD350-45- VAR**
Specifications – STD350	
Impedance, ohms	50
Max. Frequency, MHz	1588
Velocity, percent	99.8
Attenuation, see table	
Average Power Rating, see table	
Peak Power Rating, kW	440
Dimensions	
Outer Conductor,	
outside dia. in (mm)	3.125 (79)
inside dia., in (mm)	3.027 (77)
Inner Conductor,	
outside dia., in (mm)	1.315 (33)
inside dia, in (mm)	1.231 (31)
Net Weight, lb/ft (kg/m)	3.0 (4.5)
Standard Flange Dimensions	
Flange, overall diameter, in (mm)	5.19 (131.8)
Bolt Circle Diameter, in (mm)	4.375 (111.1)
Number of bolts	6
Bolt size	3/8"

* Order one flange or coupling separately.

** Specify length in inches. Standard tolerance is ± 1/8 in (3 mm).

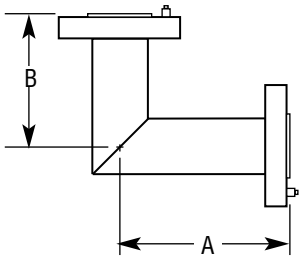
Attenuation and Average Power Ratings for 3-1/8" 50-ohm, Rigid Line, Type MACX350A or STD350

Television Channel No. (MHz)	Attenuation dB/100 ft (100 m)	Average Power kW
* (1.00)	0.010 (0.033)	440
2 (55.25)	0.071 (0.235)	66.7
3 (61.25)	0.075 (0.247)	63.3
4 (67.25)	0.079 (0.259)	60.4
5 (77.25)	0.084 (0.278)	56.4
6 (83.25)	0.088 (0.288)	54.3
7 (175.25)	0.128 (0.420)	37.3
8 (181.25)	0.130 (0.427)	36.7
9 (187.25)	0.132 (0.434)	36.1
10 (193.25)	0.134 (0.441)	35.5
11 (199.25)	0.137 (0.448)	35.0
12 (205.25)	0.139 (0.455)	34.5
13 (211.25)	0.141 (0.461)	34.0
14 (471.25)	0.211 (0.692)	22.7
15 (477.25)	0.212 (0.696)	22.5
16 (483.25)	0.214 (0.701)	22.4
17 (489.25)	0.215 (0.705)	22.2
18 (495.25)	0.218 (0.710)	22.1
19 (501.25)	0.218 (0.714)	22.0
20 (507.25)	0.219 (0.718)	21.8
21 (513.25)	0.220 (0.723)	21.7
22 (519.25)	0.222 (0.727)	21.6
23 (525.25)	0.223 (0.731)	21.4
24 (531.25)	0.224 (0.735)	21.3
25 (537.25)	0.225 (0.739)	21.2
26 (543.25)	0.227 (0.744)	21.1
27 (549.25)	0.228 (0.748)	21.0
28 (555.25)	0.229 (0.752)	20.9
29 (561.25)	0.230 (0.756)	20.7
30 (567.25)	0.232 (0.760)	20.6
31 (573.25)	0.233 (0.764)	20.5
32 (579.25)	0.234 (0.768)	20.4
33 (585.25)	0.235 (0.772)	20.3
34 (591.25)	0.237 (0.766)	20.2
35 (597.25)	0.238 (0.780)	20.1
36 (603.25)	0.239 (0.784)	20.0
37 (609.25)	0.240 (0.788)	19.9
38 (615.25)	0.241 (0.792)	19.8
39 (621.25)	0.243 (0.796)	19.7
40 (627.25)	0.244 (0.800)	19.6
41 (633.25)	0.245 (0.804)	19.5
42 (639.25)	0.246 (0.807)	19.4
43 (645.25)	0.247 (0.811)	19.3
44 (651.25)	0.248 (0.815)	19.2
45 (657.25)	0.250 (0.819)	19.1
46 (663.25)	0.251 (0.823)	19.1
47 (669.25)	0.252 (0.826)	19.0
48 (675.25)	0.253 (0.830)	18.9
49 (681.25)	0.254 (0.834)	18.8
50 (687.25)	0.255 (0.838)	18.7
51 (693.25)	0.256 (0.841)	18.6
52 (699.25)	0.258 (0.845)	18.6
53 (705.25)	0.259 (0.849)	18.5
54 (711.25)	0.260 (0.852)	18.4
55 (717.25)	0.261 (0.856)	18.3
56 (723.25)	0.262 (0.860)	18.2
57 (729.25)	0.263 (0.863)	18.2
58 (735.25)	0.264 (0.867)	18.1
59 (741.25)	0.265 (0.870)	18.0
60 (747.25)	0.267 (0.874)	17.9
61 (753.25)	0.267 (0.878)	17.9
62 (759.25)	0.269 (0.881)	17.8
63 (765.25)	0.270 (0.885)	17.7
64 (771.25)	0.271 (0.888)	17.7
65 (777.25)	0.272 (0.892)	17.6
66 (783.25)	0.273 (0.895)	17.5
67 (789.25)	0.274 (0.899)	17.4
68 (795.25)	0.275 (0.902)	17.4
69 (801.25)	0.276 (0.906)	17.3

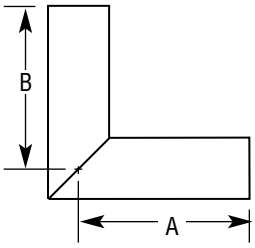
* Broadcast Radio Band

Standard conditions: For Attenuation – VSWR 1.0, Ambient Temperature 20°C (68°F), Atmospheric Pressure, Dry Air. For Average Power – VSWR 1.0, Ambient Temperature 40°C (140°F), Inner Conductor Temperature 102°C (216°F), Atmospheric Pressure, Dry Air. Attenuation and average power data guaranteed within ±5%.

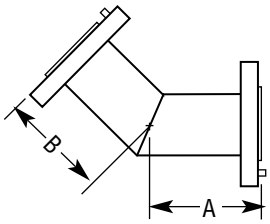
Accessories for 3-1/8" Rigid Line



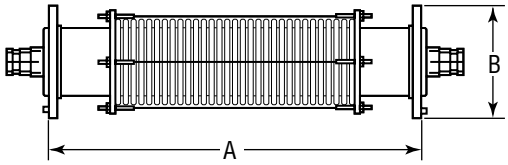
Type ACX350-10SE



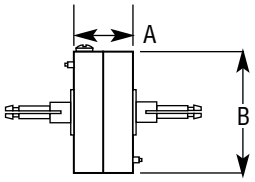
Type ACX350-10SE-3



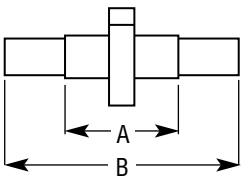
Type 1162



Type 19209C



Type RLA350-16



Type ACX350-20

All flanged items are EIA standard and include inner connector, "O" ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

90° Miter Elbow

Swivel flanges, brass construction.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
ACX350-10SE	50	4.19 (106)	4.19 (106)	10.7 (4.86)

90° Miter Elbow

Unflanged. Does not include inner connector. Unpressurized.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
ACX350-10SE-3	50	4.00 (102)	4.00 (102)	2.63 (1.20)

45° Miter Elbow

Swivel Flanges, brass construction.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
1162	50	4.50 (114)	4.50 (114)	9.0 (4.09)

Flexible Section

Accommodates movement and angles up to 30° (± 15°). Maximum offset 0.5 in (13 mm). Captivated inner conductor. Includes two inner connectors.
A = 18 in (457 mm) B = 5.19 in (132 mm)

Swivel Flanges, unplated, has retaining cables to prevent expansion beyond 18 in (457 mm) under pressurization, while permitting compression and bending.
Weight 13 lb (6 kg). .....Type **19209C**

Gas Barrier

Fixed male inner connectors both ends. Both sides have a pressure port.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
RLA350-16	50	1.00 (25)	5.19 (132)	4.75 (2.2)

Inner Connector

Includes electrically compensated PTFE anchor disk.

Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
ACX350-20	50	1.69 (43)	4.13 (105)	0.63 (0.29)
ACX350-19*	50	1.69 (43)	4.13 (105)	0.63 (0.29)

* Captivated

"Quick Patch" Coaxial Patch Panels and Directional Couplers are available for 3-1/8" 50 ohm line. See pages 378 and 380.

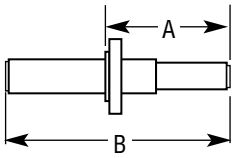
All flanged items are EIA standard and include inner connector “O” ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

Adapter Inner Connector

50-51.5 ohm.

Type	A in (mm)	B in (mm)	Weight lb (kg)
4852	2.16 (55)	3.62 (92)	0.31 (0.141)

Type 4852



End Terminal

For strap connection. Gas tight with pressure port.

Type	Weight, lb (kg)
2062	6.3 (2.86)

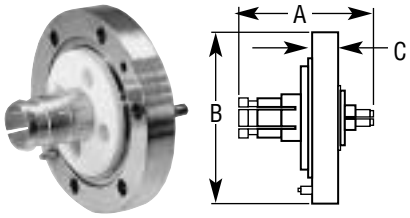
Type 2062

Reducer, 50-ohm

Includes two inner connectors. Not a gas barrier.

Line Size	Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
3-1/8" to 1-5/8"	**1861**	4.15 (105)	5.19 (132)	0.88 (22)	5.6 (2.6)

Type 1861



Type N Female Adapter

Mates with UG-21. Gas tight with pressure port. Includes inner connector and hardware.

Type	Weight, lb (kg)
2262	5.6 (2.55)

Type 2262

Male-to-Male Adapter

Joins two components having captivated inner connectors. 6 in (150 mm) length. No inner connectors. Includes hardware.

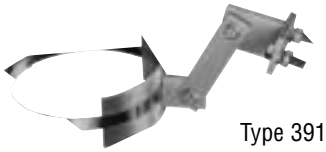
Type	Weight, lb (kg)
23187	6 (2.72)

Type 23187

Horizontal Hanger

Permits axial movement caused by expansion and contraction. Includes clamps and hardware. Use at 10 ft (3 m) intervals.

Type	Weight, lb (kg)
3912	0.8 (0.36)



Type 3912

Accessories for 3-1/8" Rigid Line

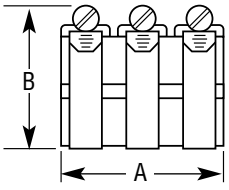
Type 69226-2

Type 10683-405

Type ACX350-37

Type 18200

Type 15840



Type 4862A

All flanged items are EIA standard and include inner connector, “O” ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

Hardware Kit

Includes “O” ring, silicone lubricant, nuts, bolts and lockwashers for one flange joint.

Type	Weight, lb (kg)
69226-2	0.50 (0.23)

“O” Ring Gasket

For EIA flange.

Type
10683-405

Soft Solder Swivel Field Flange

For use on interior runs. Includes soft solder, swivel flange and sleeve with fixed ring. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
ACX350-37	2.9 (1.32)

Swivel Flange

Includes fixed ring, sliding ring, silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
18200	2.00 (0.91)

Fixed Flange

Includes silver solder and flux. Order inner connector and hardware kit separately.

Type	Weight, lb (kg)
15840	2.00 (0.91)

Unpressurized Coupling

Connects unflanged lines and fittings. Includes supported inner connector and sleeve outer connector with clamps.

Type	A in (mm)	B in (mm)	Weight, lb (kg)
4862A	3.50 (89)	3.56 (90)	1.5 (0.68)

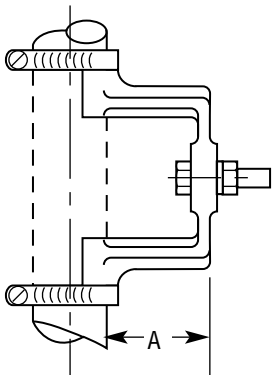
Accessories for 3-1/8" Rigid Line

3-1/8" Rigid Hanger

Hangers attach to top section. Use one for up to 300 ft (90 m) of line and one for each additional 300 ft (90 m) of line. Mounts to 9/16 in (14 mm) diameter hole with included 1/2" diameter hardware.

Type	A in (mm)	Weight lb(kg)
13927	2.25 (57.2)	6.3 (2.86)

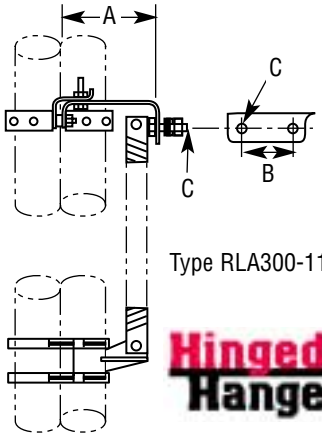
Type 13927



Vertical Spring Hanger

Use at 10 ft (3 m) intervals. Supports the transmission line. Prevents lateral motion, and accommodates differential expansion and contraction. Mounting hardware for "D" holes is included. Hardware is 1/2".

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA300-11-H	4.13 (104.9)	2.25 (57.2)	0.53 (13.5)	6.0 (2.73)



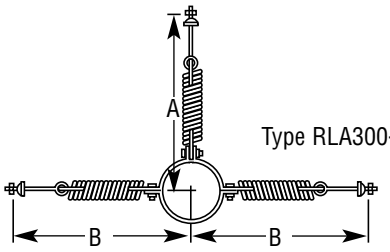
Type RLA300-11-H

Hinged Hanger™

3-Point Suspension Hanger

Accommodates vertical movement in the horizontal run caused by differential expansion and contraction of the vertical run. Use at 10 ft (3 m) intervals.

Type	A in (mm)	B in (mm)	Weight lb(kg)
RLA300-12	26.0 (660)	19.0 (483)	9.38 (4.26)



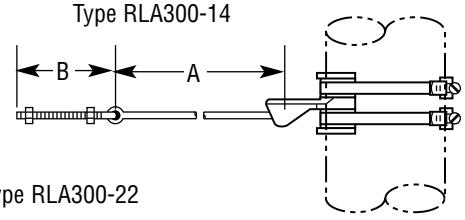
Type RLA300-12

Lateral Brace

Mounts through single 7/16 in (11mm) hole. Use one near bottom to restrict lateral motion of line while permitting vertical and horizontal movement.

Type	A in (mm)	B in (mm)	Weight lb(kg)
RLA300-14	40.0 (1016)	6.50 (165.1)	2.25 (102)

Type RLA300-14

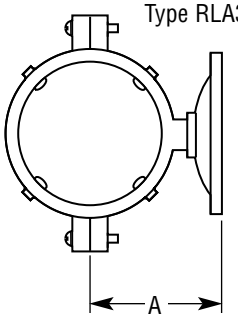


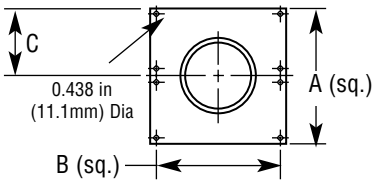
Wall Feed Thru

Includes split mounting plate. Uses 3/8" mounting hardware (not included).

Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
RLA300-15	8.0 (203.2)	6.87 (174.5)	2.80 (71.1)	8.2 (3.73)

Type RLA300-22





Type RLA300-15

Slip Hanger

For indoor use. Flange mounted. Supports the transmission line, and accommodates lateral motion due to expansion and contraction.

Type	A in (mm)	Weight lb (kg)
RLA300-22	3-3/16 (81)	2.0 (0.9)

3-1/8" Inners Only™

Inner Conductor Replacement Systems

Retrofit Your Existing Rigid Line with Inners Only at Half the Cost!

Despite tight capital budgets, you can't afford to go off the air! Transmission line systems require maintenance after just ten years to avoid premature burnout of bullet-style connectors. By upgrading with Inners Only before your transmission line fails, you avoid the disaster of dead air.

Andrew Inners Only connector replacement systems are available for other manufacturers' rigid lines.

MACXLine® Inners Only Replacement Systems

MACXLine Inners Only inner conductors are preferred for two reasons: MACXLine lengths are identical to those of standard 3-1/8", 50-ohm, assuring that MACXLine can be used for every application. MACXLine inner conductors install quickly since they are similar to your old ones, except for the bellows; this allows retrofitting to be done in stages during the interval a station is off the air every night.

MACXLine Inners Only replacement sections include captivated inner connector, hardware kit for EIA flange, and installation insrtuctions.

Standard Inners Only Replacement Components

Standard rigid line Inners Only components for applications for which thermal compensation is not necessary. The inner conductor and captivated inner connector are included. Order EIA flange hardware kit separately.

MACXLine Inner Conductors for Straight Sections

	Type Number
Full Length Section	**MACX350A-25-(*)**
Field Cut Section, 5 to 20 ft (Includes bellows)	**MACX350A-26**
Field Cut Section, up to 5 ft (No bellows)	**MACX350A-24**
Installation tool kit	**MACX350A-TK**
Field cut tool kit	**MACX350A-TK-2**

Standard Inner Conductors for Straight Sections

	Type Number
Full Length Sections (Also used for field cut sections)	**STD350-25-(*)**

* Insert length of outer conductor, flange face to flange face in inches.

Standard Rigid Coaxial Transmission Line is Available in 1-5/8", 50-ohm Size

- *Uses PTFE dielectric peg insulators and silver soldered flanges*
- *Fully compatible with EIA standard RS-225 and IEC recommendations.*

All flanged sections come complete with one inner connector, a set of stainless steel flange hardware and a pressure sealing gasket.

Section	1-5/8" 50-ohm
Standard Rigid Line Components	**Type No.**
20 ft flanged both ends	**561**
20 ft flanged one end	**561-11**
20 ft unflanged	**561-21**
**flanged both ends	**2761-VAR-1**
**flanged one end	**2761-VAR-11**
**unflanged	**2761-VAR-21**

** Specify length, in inches.
Standard tolerance is ± 1/8 in (3 mm).

Characteristics	
Type No.	**561**
Impedance, ohms	50 ± 0.5
Max. Frequency, MHz	3000
Velocity, percent	99.8
Attenuation, see table	
Average Power Rating, see table	
Peak Power Rating, kW	150
Dimensions	
Outer Conductor,	
Outside dia. in (mm)	1.625 (41)
Inside dia., in (mm)	1.527 (38)
Inner Conductor,	
Outside dia., in (mm)	0.664 (17)
Inside dia, in (mm)	0.588 (15)
Net Weight, lb/ft (kg/m)	1.35 (2.0)
Standard Flange Dimensions	
Flange, overall diameter, in (mm)	3.50 (88.9)
Bolt Circle Diameter, in (mm)	2.810 (71.37)
Number of bolts	4
Bolt size	5/16"

1-5/8" 50-ohm Standard Rigid Line

Attenuation and Average Power Ratings for 1-5/8" 50-ohm Rigid Line, Type 561

Television Channel No. (MHz)	Attenuation db/100 ft (100 m)	Average Power kW
* (1.00)	0.017 (0.056)	148
2 (55.25)	0.1405 (0.4609)	19.8
3 (61.25)	0.1479 (0.4854)	18.8
4 (67.25)	0.1550 (0.5086)	18.0
5 (77.25)	0.1662 (0.5452)	16.8
6 (83.25)	0.1725 (0.5660)	16.2
7 (175.25)	0.251 (0.822)	11.1
8 (181.25)	0.255 (0.836)	10.9
9 (187.25)	0.259 (0.850)	10.8
10 (193.25)	0.263 (0.864)	10.6
11 (199.25)	0.267 (0.877)	10.4
12 (205.25)	0.271 (0.890)	10.3
13 (211.25)	0.275 (0.903)	10.1
14 (471.25)	0.412 (1.351)	6.77
15 (477.25)	0.415 (1.360)	6.72
16 (483.25)	0.417 (1.369)	6.68
17 (489.25)	0.420 (1.377)	6.64
18 (495.25)	0.422 (1.386)	6.60
19 (501.25)	0.425 (1.394)	6.56
20 (507.25)	0.427 (1.402)	6.52
21 (513.25)	0.430 (1.411)	6.48
22 (519.25)	0.433 (1.419)	6.44
23 (525.25)	0.435 (1.427)	6.41
24 (531.25)	0.438 (1.435)	6.37
25 (537.25)	0.440 (1.444)	6.33
26 (543.25)	0.442 (1.452)	6.30
27 (549.25)	0.445 (1.460)	6.26
28 (555.25)	0.447 (1.468)	6.23
29 (561.25)	0.450 (1.476)	6.20
30 (567.25)	0.452 (1.484)	6.16
31 (573.25)	0.455 (1.492)	6.13
32 (579.25)	0.457 (1.499)	6.10
33 (585.25)	0.459 (1.507)	6.07
34 (591.25)	0.462 (1.515)	6.04
35 (597.25)	0.464 (1.523)	6.00
36 (603.25)	0.466 (1.530)	5.97
37 (609.25)	0.469 (1.538)	5.94
38 (615.25)	0.471 (1.546)	5.92
39 (621.25)	0.473 (1.553)	5.89
40 (627.25)	0.476 (1.561)	5.86
41 (633.25)	0.478 (1.568)	5.83
42 (639.25)	0.480 (1.576)	5.80
43 (645.25)	0.482 (1.583)	5.78
44 (651.25)	0.485 (1.590)	5.75
45 (657.25)	0.487 (1.598)	5.72
46 (663.25)	0.489 (1.605)	5.70
47 (669.25)	0.491 (1.612)	5.67
48 (675.25)	0.494 (1.620)	5.64
49 (681.25)	0.496 (1.627)	5.62
50 (687.25)	0.498 (1.634)	5.60
51 (693.25)	0.500 (1.641)	5.57
52 (699.25)	0.502 (1.648)	5.55
53 (705.25)	0.505 (1.656)	5.52
54 (711.25)	0.507 (1.663)	5.50
55 (717.25)	0.509 (1.670)	5.48
56 (723.25)	0.511 (1.677)	5.45
57 (729.25)	0.513 (1.684)	5.43
58 (735.25)	0.515 (1.691)	5.41
59 (741.25)	0.517 (1.698)	5.39
60 (747.25)	0.520 (1.705)	5.36
61 (753.25)	0.522 (1.711)	5.34
62 (759.25)	0.524 (1.718)	5.32
63 (765.25)	0.526 (1.725)	5.30
64 (771.25)	0.528 (1.732)	5.28
65 (777.25)	0.530 (1.739)	5.26
66 (783.25)	0.532 (1.745)	5.24
67 (789.25)	0.534 (1.752)	5.22
68 (795.25)	0.536 (1.759)	5.20
69 (801.25)	0.538 (1.766)	5.18

* Broadcast Radio Band

Standard conditions:

For Attenuation	For Average Power
VSWR 1.0	VSWR 1.0
Ambient Temperature 20°C (68°F)	Ambient Temperature 40°C (140°F)
Atmospheric Pressure, Dry Air	Inner Conductor Temperature 102°C (216°F)
Atmospheric Pressure, Dry Air	Atmospheric Pressure, DryAir

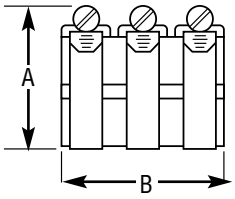
Attenuation and average power data guaranteed within ±5%.

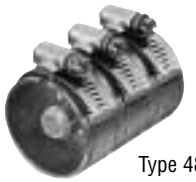
All flanged items are EIA standard and include inner connector, "O" ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

Unpressurized Coupling

Connects unflanged lines and fittings. Includes supported inner connector and sleeve outer connector with clamps.

Line Size	Type	A in (mm)	B in (mm)	Weight lb(kg)
1-5/8"	**4861A**	2.19 (56)	2.50 (64)	0.5 (0.23)





Type 4861A

Soft Solder Swivel Field Flange

For use on interior runs. Includes soft solder swivel flange and sleeve with fixed ring. Order inner connector and hardware kit separately.

Line Size	Type	Weight, lb (kg)
7/8"	**1560A**	0.7 (0.32)
1-5/8"	**1561A**	1.3 (0.59)

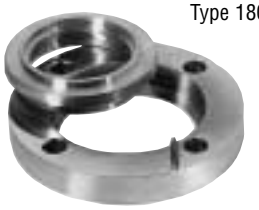
Type 1561A

Swivel Flange

Includes fixed ring, sliding ring, silver solder and flux. Order inner connector and hardware kit separately.

Line Size	Type	Weight, lb (kg)
7/8"	**18096**	0.44 (0.20)
1-5/8"	**18041**	0.94 (0.43)

Type 18041



Fixed Flange

Includes sliver solder and flux. Order inner connector and hardware kit separately.

Line Size	Type	Weight, lb (kg)
7/8"	**18630**	0.38 (0.18)
1-5/8"	**18631**	0.94 (0.43)

Type 18631

Hardware Kit

Includes "O" ring, silicone lubricant, nuts bolts and lock-washers for one flange joint.

Line Size	Type	Weight, lb (kg)
7/8"	**66748-6**	0.03 (0.02)
1-5/8"	**69225-2**	0.25 (0.12)

Type 69225-2

"O" Ring Gasket

For EIA flange.

Line Size	Type
7/8"	**10683-197**
1-5/8"	**10683-406**

Type 10683-406

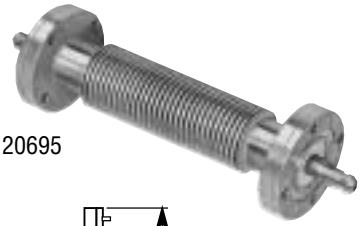
Accessories for 1-5/8" Rigid Line and 7/8" Components

Type 2260B

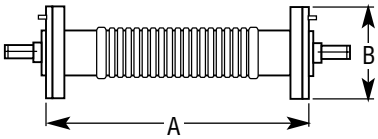
Type 2361A

Type 30452

Type 2061



Type 20695



All flanged items are EIA standard and include inner connector, “O” ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

Type N Female Adapter

Mates with UG-21. Gas tight with pressure port. Includes inner connector and hardware.

Line Size	Type	Weight, lb (kg)
7/8"	**2260B**	1.2 (0.55)
1-5/8"	**2261A**	3.4 (1.55)

Type LC Female Adapter

Mates with UG-154. Gas tight with pressure port. Includes inner connector and hardware.

Line Size	Type	Weight, lb (kg)
7/8"	**2360A**	1.2 (0.55)
1-5/8"	**2361A**	3.4 (1.55)

Male-to-Male Adapter

Joins two components having captivated inner connectors. 6 in (150 mm) length. No inner connectors. Includes hardware.

Line Size	Type	Weight, lb (kg)
1-5/8"	**30452**	3.0 (1.36)

End Terminal

For strap connection. Gas tight with pressure port.

Line Size	Type	Weight, lb (kg)
1-5/8"	**2061**	2.3 (1.04)

Flexible Section

Accommodates vibration and angles up to 30°. Maximum offset 0.25 in (6mm) for 1-5/8" line. Includes two inner connectors.

Line Size	Type	Inpendance ohms	A in (mm)	B in (mm)	Weight lb (kg)
1-5/8”	**20695**	50	10.0 (254)	3.5 (89)	4.2 (1.91)

Standard Flange Dimensions

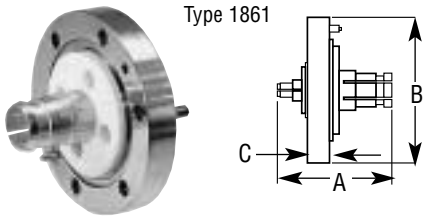
Line Size	1-5/8"	7/8"
Flange, Overall Diameter, in (mm)	3.50 (88.9)	2.25 (57.1)
Bolt Circle Diameter, in (mm)	2.810 (71.37)	1.750 (44.45)
Number of Bolts	4	3
Bolt Size	5/16"	1/4"

All flanged items are EIA standard and include inner connector, "O" ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

Reducer 50-ohm

Includes two inner connectors. Not a gas barrier.

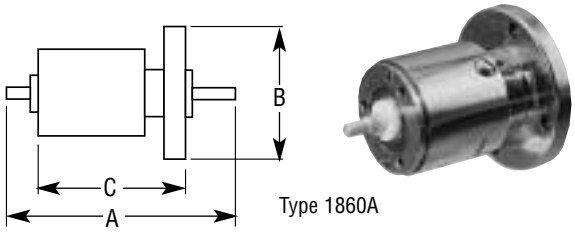
Line Size	Type	A in (mm)	B in (mm)	C in (mm)	Weight lb (kg)
1-5/8" to 7/8"	**1860A**	5.46 (139)	3.50 (89)	3.34 (85)	2.3 (1.1)
3-1/8" to 1-5/8"	**1861**	4.15 (105)	5.19 (132)	0.88 (22)	5.6 (2.6)



Gas Barrier

Heavy duty. Fixed male inner connectors both ends. Both sides have a pressure port.

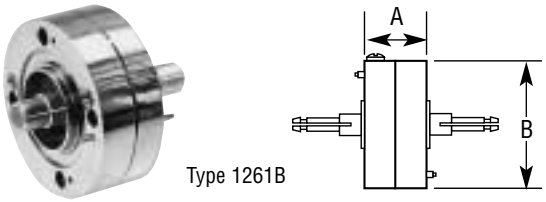
Line Size	Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
7/8"	**1260A**	50	1.13 (29)	2.25 (57)	1.2 (0.55)
1-5/8"	**1261B**	50	1.66 (42)	3.50 (89)	3.6 (1.7)



Inner Connector

Includes PTFE anchor disk.

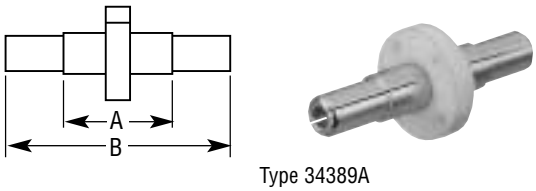
Line Size	Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
7/8"	**25385**	75	0.93 (24)	1.94 (49)	0.05 (0.02)
7/8"	**34389A**	50	0.93 (24)	1.94 (49)	0.06 (0.03)
1-5/8"	**34660**	50	1.17 (30)	2.30 (58)	0.13 (0.06)



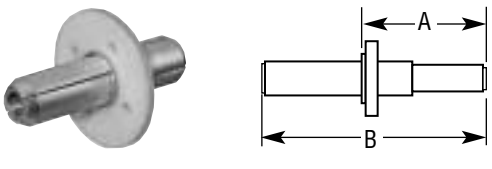
Adapter Inner Connector

50-51.5 ohm.

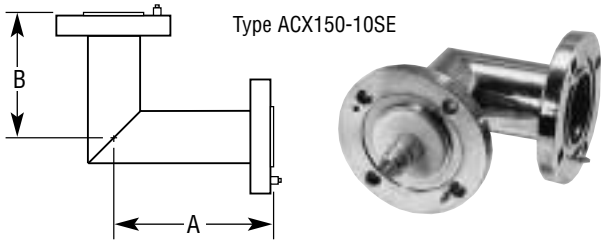
Line Size	Type	A in (mm)	B in (mm)	Weight lb(kg)
7/8"	**4850A**	1.31 (33)	2.31 (59)	0.03 (0.014)
1-5/8"	**4851**	1.18 (30)	2.34 (59)	0.16 (0.073)



"Quick Patch" Coaxial Patch Panels are available for 1-5/8" 50-ohm line. See page 380.

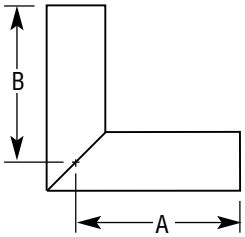


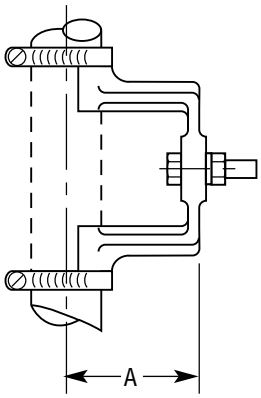
Accessories for 1-5/8" Rigid Line and 7/8" Components



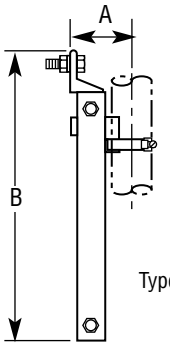
Type ACX150-10SE

Type ACX150-10SE-3



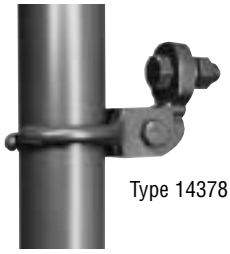


Type 13924



Type 14379

Type 13555A



Type 14378

Type 13550

All flanged items are EIA standard and include inner connector, “O” ring, silicone grease and hardware, except when noted. All inner connectors are silver-plated.

90° Miter Elbow

Swivel flanges, brass construction.

Line Size	Type	Impedance ohms	A in (mm)	B in (mm)	Weight lb (kg)
7/8"	**1060A**	50	3.08 (78)	2.44 (62)	1.4 (0.64)
1-5/8"	**ACX150-10SE**	50	2.89 (73)	2.89 (73)	3.5 (1.59)

90° Miter Elbow

Unflanged. Does not include inner connector.

Line Size	Type	A in (mm)	B in (mm)	Weight lb (kg)
1-5/8"	**ACX150-10SE-3**	2.65 (67)	2.65 (67)	0.69 (0.32)

1-5/8" Hangers

Rigid Hanger

Hangers attach top section. Use one for up to 300 ft (90 m) of line and one for each additional 300 ft (90 m) of line. Mounts to 9/16 in (14 mm) diameter hole with included 1/2" diameter bolt or to angle adapters.

Line Size	Type	A in (mm)	Weight lb (kg)
1-5/8"	**13924**	3.06 (77.7)	1.4 (0.64)

Spring Hanger

Accommodates line expansion and contraction. Use at 50 ft (15 m) intervals. Mounts to 9/16 in (14 mm) diameter hole with included 1/2" diameter bolt or to angle adapters.

Line Size	Type	A in (mm)	B in (mm)	Weight lb (kg)
1-5/8"	**14379**	3.06 (77.7)	14.0 (355.6)	3.2 (1.45)

Sliding Hanger

Use at 10 ft (3 m) intervals. Mounts to 9/16 in (14 mm) diameter hole with 1/2" diameter bolt, or to angle adapter.
1-5/8" line .....Type **14378**

Angle Adapter

For attaching hangers to tower angle members up to 7/8" (22 mm) thick .....Type **13555A**

Round Member Adapter

For attaching hangers to round tower members, up to 3 in (75 mm) diameter. Includes 1/2" x 1-1/4" hanger attachment bolt and nut .....Type **13550**

GUIDELine low attenuation waveguide is the premier transmission line for use in UHF television transmitting antenna systems. It offers highest possible efficiency, handles maximum power and has lower windload than rectangular waveguides. The unique design offers superior polarization stability and eliminates the need for on-site compensation tuning. Complete system layout drawings and detailed installation instructions are provided with every GUIDELine system.

Low Attenuation for High Efficiency

GUIDELine circular waveguide is the most efficient transmission line available for UHF broadcast frequencies. Attenuation is up to 50% lower than corresponding rectangular waveguides. This reduces electrical power consumption and, in some cases, may reduce the size and cost of the transmitter needed to provide maximum ERP. Attenuation tables are shown on page 358.

High Power Handling

GUIDELine waveguide will handle television transmitter power levels up to 360 kW. For higher power applications, contact Andrew.

Low Wind Load

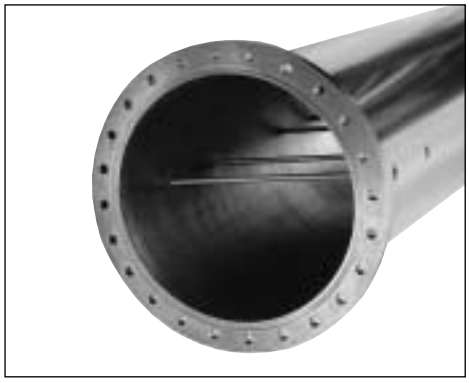
The cylindrical shape of GUIDELine waveguide reduces tower wind loading by one-third compared with rectangular waveguide and allow pressurization without risk or distortion and performance degradation. The shape and construction also resist distortion in high winds, icing and other severe environmental conditions. The result is stable and consistent performance proven under all weather conditions.

GUIDELine® System Components

Waveguide Sections are all aluminum construction, including flanges. The unique cross-polarization cancelers provide increased rigidity. The flanges are also a unique Andrew design. A flange gasket prevents entry of moisture at the flange junction. The flange facing up contains the gasket groove and the mating flange is flat for easy installation without concern for "pinching." Flange hardware and gaskets are included for every section. Select by channel number from table.

The horizontal run is comprised of heavy-wall rectangular waveguide allowing a constant pressurization of the system up to 2 lb/in^2, while permitting the flexibility of routing the waveguide using typical WR elbow configurations.

Advanced design of GUIDELine waveguide provides highest efficiency and eliminates cross polarization loads and field compensation even at power levels of 240 kW and above. Smooth, round cross section reduces tower loading.



GUIDELine Characteristics

Waveguide Size	Length in (mm)	Weight lb (kg)	Wind load Shear lb (N)
GLW1750	102.86 (2612.4)	95 (43)	480 (2135)
GLW1700	102.85 (2612.4)	87 (39)	440 (1957)
GLW1500	108.00 (2743.2)	75 (34)	397 (1766)
GLW1350	112.00 (2844.8)	69 (31)	371 (1650)

GUIDELine® Waveguide Electrical Performance

VSWR is 1.08 or better over the channel. Optimization to 1.05 or better at visual carrier is usually possible. And, GUIDELine waveguide does not exhibit band reject spikes associated with coaxial and rectangular waveguide transmission lines because of the extremely small mismatch of the circular flange junction.

System Planning Information

Andrew offers GUIDELine waveguide on a system basis. **FAX inquiry directly to our Broadcast Systems Department at 1-800-554-2204** and specify the following information:

- *Operating channel*
- *Waveguide size – GLW1750, GLW1700, GLW1500 or GLW1350*
- *Length of vertical run in feet or meters*
- *Length of horizontal run in feet or meters*
- *Input connection required – WR1800; WR1500; WR1150; 8-3/16", 75 ohm; 6-1/8" 75 ohm or 6-1/8" ,50 ohm*
- *Antenna input flange 8-3/16", 75 ohm; 6-1/8", 75 ohm or 6-1/8", 50 ohm or waveguide*

To Determine Efficiency

Select the attenuation in dB/100 feet from the table to the right. Multiply by the length of the waveguide run to find total attenuation. Use the formula below to determine efficiency.

$$\text{Efficiency in percent} = \frac{100}{10^{(\alpha/10)}}$$

where α is total waveguide attenuation

Example: For channel 30 and 1000 feet of GLW1750

$0.035 \times 10 = 0.35$ dB

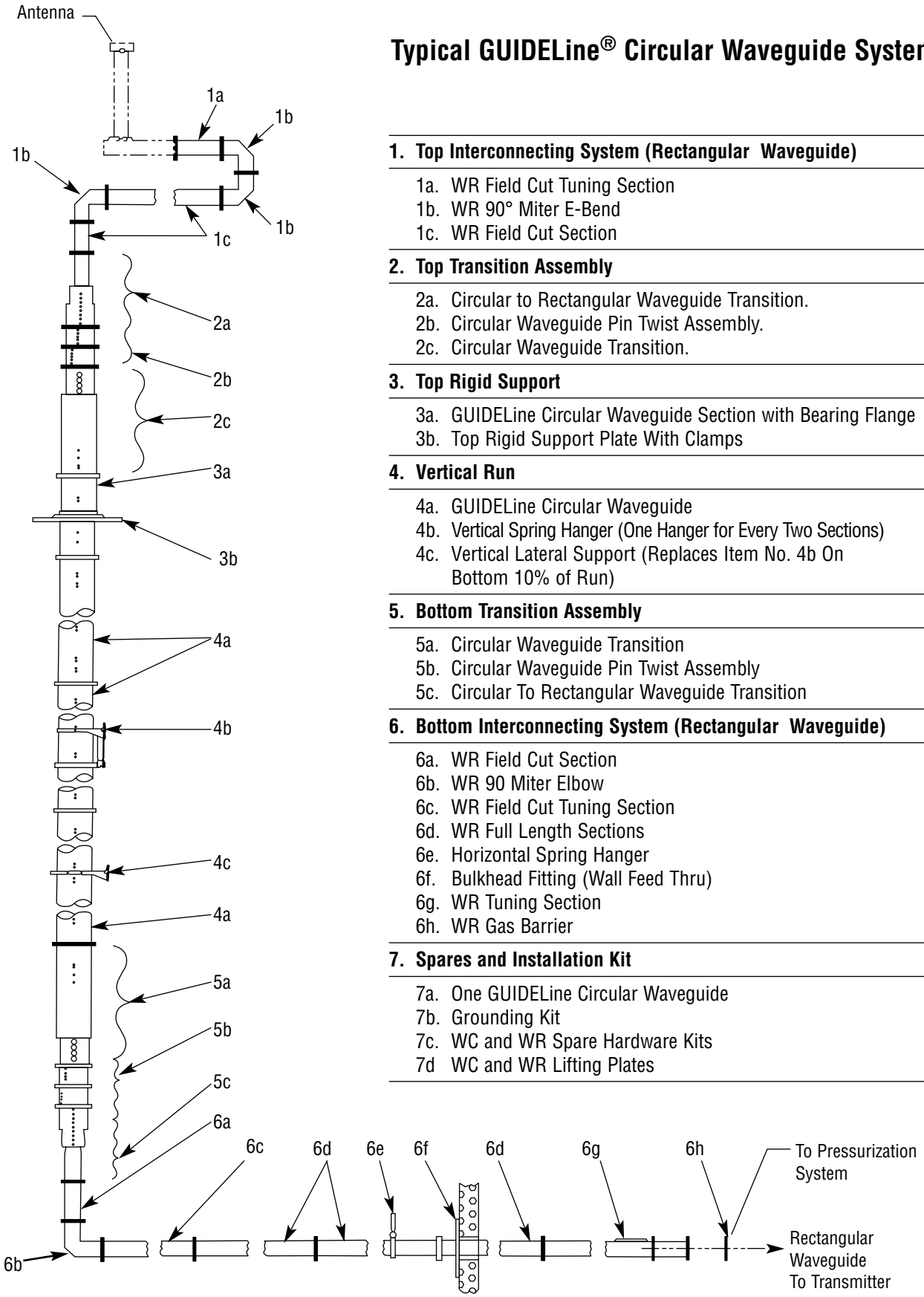
$$\text{Efficiency} = \frac{100}{10^{(0.35/10)}} = 92.3\%$$

GUIDELine® Attenuation Ratings

Channel Number	Visual Carrier MHz	Attenuation dB/100 ft
GLW1750		
14	471.25	0.0521
15	477.25	0.0502
16	483.25	0.0484
17	489.25	0.0469
18	495.25	0.0454
19	501.25	0.0441
GLW1700		
20	507.25	0.0430
21	513.25	0.0419
22	519.25	0.0409
23	525.25	0.0399
GLW1750		
24	531.25	0.0391
25	537.25	0.0383
26	543.25	0.0375
27	549.25	0.0368
28	555.25	0.0362
29	561.25	0.0356
30	567.25	0.0350
31	573.25	0.0344
32	579.25	0.0339
33	585.25	0.0334
34	591.25	0.0330
35	597.25	0.0325
36	603.25	0.0321
37	609.25	0.0317
38	615.25	0.0314
39	621.25	0.0310
40	627.25	0.0307
41	633.25	0.0303
GLW1500		
39	621.25	0.0490
40	627.25	0.0482
41	633.25	0.0474
42	639.25	0.0466
43	645.25	0.0459
44	651.25	0.0452
45	657.25	0.0445
46	663.25	0.0439
47	669.25	0.0433
48	675.22	0.0428
49	681.25	0.0423
50	687.25	0.0418
51	693.25	0.0413
52	699.25	0.0408
53	705.25	0.0404
54	711.25	0.0399
55	717.25	0.0395
GLW1350		
56	723.25	0.0530
57	729.25	0.0523
58	735.25	0.0516
59	741.25	0.0510
60	747.25	0.0504
61	753.25	0.0498
62	659.25	0.0493
63	765.25	0.0488
64	771.25	0.0483
65	777.25	0.0478
66	783.25	0.0473
67	789.25	0.0469
68	795.25	0.0464
69	801.25	0.0460

Standard Conditions
For Attenuation: VSWR 1.0 Ambient Temperature 24°C (75°F).
For Average Power: VSWR 1.0 Ambient Temperature 24°C (75°F).
Waveguide Temperature 64°C (147°F).

Typical GUIDELine® Circular Waveguide System



1. Top Interconnecting System (Rectangular Waveguide)

- 1a. WR Field Cut Tuning Section
- 1b. WR 90° Miter E-Bend
- 1c. WR Field Cut Section

2. Top Transition Assembly

- 2a. Circular to Rectangular Waveguide Transition.
- 2b. Circular Waveguide Pin Twist Assembly.
- 2c. Circular Waveguide Transition.

3. Top Rigid Support

- 3a. GUIDELine Circular Waveguide Section with Bearing Flange
- 3b. Top Rigid Support Plate With Clamps

4. Vertical Run

- 4a. GUIDELine Circular Waveguide
- 4b. Vertical Spring Hanger (One Hanger for Every Two Sections)
- 4c. Vertical Lateral Support (Replaces Item No. 4b On Bottom 10% of Run)

5. Bottom Transition Assembly

- 5a. Circular Waveguide Transition
- 5b. Circular Waveguide Pin Twist Assembly
- 5c. Circular To Rectangular Waveguide Transition

6. Bottom Interconnecting System (Rectangular Waveguide)

- 6a. WR Field Cut Section
- 6b. WR 90 Miter Elbow
- 6c. WR Field Cut Tuning Section
- 6d. WR Full Length Sections
- 6e. Horizontal Spring Hanger
- 6f. Bulkhead Fitting (Wall Feed Thru)
- 6g. WR Tuning Section
- 6h. WR Gas Barrier

7. Spares and Installation Kit

- 7a. One GUIDELine Circular Waveguide
- 7b. Grounding Kit
- 7c. WC and WR Spare Hardware Kits
- 7d WC and WR Lifting Plates

For Andrew Types GLW1350, GLW1500, GLW1700, GLW1750

Andrew Passive Power Products

Andrew Passive Power Products works in close collaboration with manufacturers and broadcasters to produce high quality RF systems in frequency ranges from 30 kHz to 3 GHz and at power levels from watts to megawatts.

Our product line covers all RF components (waveguide and coaxial) for combiners, filters, hybrids, diplexers, couplers, switches, loads, and more. We have the ability to call upon many years of design experience and fast-turn-around prototyping, which equates to dramatically reduced system development times and cost.

Andrew Passive Power Products often develops products for major OEMs to meet their stringent specifications. Whether the application is broadcast TV, DTV, radio, or DAB, Andrew Passive Power Products can provide the most cost-effective solution for your needs. High quality manufacturing and leading edge technology increase the product value to you, the customer.

Andrew Passive Power Products' strength is in our ability to bring state of the art design expertise and experienced product management to the development process. By working closely with our customers and involving everyone in the process, from designers to production personnel, test personnel, suppliers, end users, and consultants, Andrew Passive Power Products is able to produce quality products quickly and effectively.

The components and systems include but are not limited to:

Filters

- *Waveguide and Coax*
- *Low Pass (Harmonic)*
- *High Pass*
- *Band Pass (Intermodulation)*
- *Band Rejects*

Switches

- *Waveguide*
- *Coaxial*
- *Open Wire*

Hybrids

- *Waveguide*
- *Coaxial*
- *π / 2*
- *π (Magic Tee)*

Loads

- *Water Cooled*
- *Air Cooled*
- *Waveguide*
- *Coaxial*

Diplexers

- *Coaxial*
- *Dual Aural*
- *Waveguide*

Directional Couplers

- *Waveguide*
- *Coaxial*
- *Precision*
- *Adjustable*

Power Combiners

- *Waveguide*
- *Coaxial*
- Switchless Combiners

Channel Combiners

- *Constant Impedance*
- *Waveguide*
- *Coaxial*
- *Starpoint*

Andrew Passive Power Products provides a wide range of OEM products. We maintain customer specific designs and offer brand labeling on request.

Application Worksheet

Use this form to describe your custom application.
Return the form to the address shown.
Attach any additional specifications, sketches, masks, or other materials.

Page **of**

Attention: Applications Engineering
Andrew Passive Power Products
97 Shaker Road, PO Box 1176
Gray, ME U.S.A. 04039
Phone: (207) 657-2600
Fax: (207) 657-2632

Contact _____ **Company** _____

Address _____

_____

City _____ **State** _____

Country _____ **Phone** _____

Zip _____ **Fax** _____

Email _____ **Date** _____

Application (TV, Sat., Radio, etc.): _____

Country/System(s) (NTSC, Nicam, etc.) _____

Transmitter(s) (Type, Mfr.): _____

Filter Requirement(s): _____

Frequency Band/Channel(s): _____

Power Level(s): _____

Analog/Digital: _____

Combiner Type (If applicable): _____

System/Subsystem Description: _____

_____

System/Subsystem Specifications (Insertion Loss, VSWR, Isolation, Group Delay, etc.):

_____

_____

_____

_____

Other Requirements (I/O Connectors, Couplers, Test Load, Calorimetry, ac Power, etc.):

_____

_____

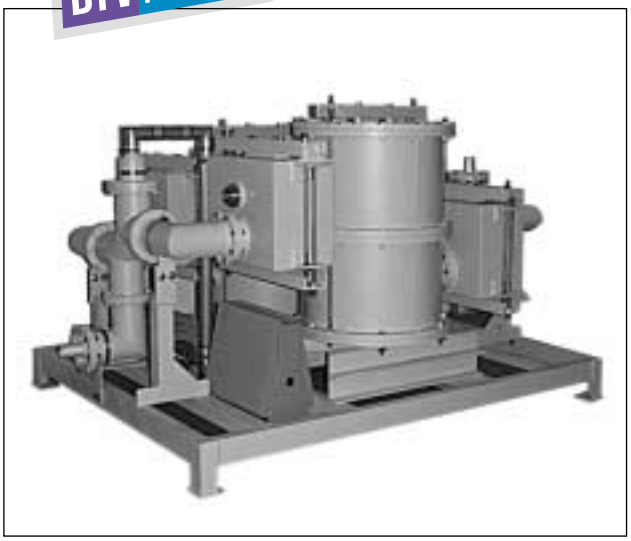
_____

Sketch/Block Diagram/Other:

D-MasK™ Series

DTV READY!

NEW!



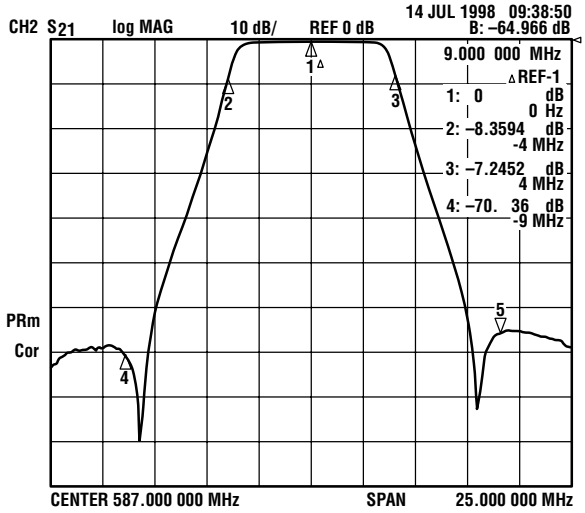
These patent pending filters are the most practical solution for single amplifier installations. Modular system design economically preserves your expansion options.

30 kW UHF Band-pass D-MasK™ Filters for DTV Broadcast

- *Multi-Mode*
- *Low Insertion Loss*
- *Superior Rejection*
- *Temperature Compensated*
- *Lightweight Aluminum Construction*
- *Compact Size*
- *Low VSWR*
- *Average Powers to 30 kW*

D-MasK Series DTV Bandpass Filters

Andrew has recently revolutionized the DTV filter market with a temperature compensated, mixed mode, band-pass filter to meet the latest FCC performance specifications. This filter uses patented technology to suppress unwanted spurious signals to desirable levels while compensating for drifts in temperature due to RF heating and ambient changes.



Specifications

Average Power Rating, kW	30
Frequency	UHF-TV
Passband VSWR	1.08 or better
Insertion Loss, dB, max.	0.3
Rejection, dB at Fc ± 9.0 MHz	-64
Group Delay Variation, ns, max.	150
Impedance, ohms	50
Connections	4-1/16" EIA
Dimensions, in (mm)	72 x 54 x 54 (1829 x 1372 x 1372)

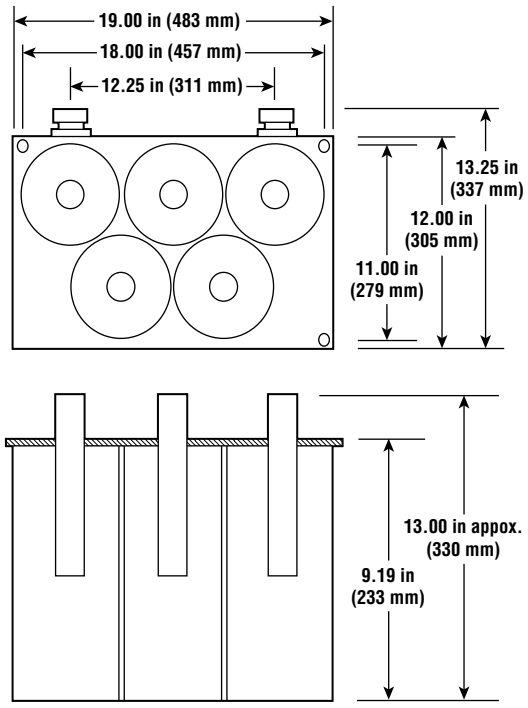
ANDREW®

UHF Band-Pass Filters for Digital Television

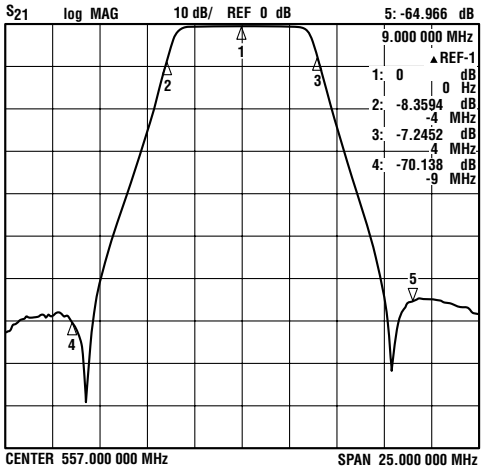
CF500 Series Tunable DTV/DVB Band-pass Filters

Andrew has developed a series of optimal performance, coaxial band-pass filters to meet the latest digital performance specifications in both Europe and the U.S. (European units shown). The U.S. version has six resonators; the European version has five. The filter suppresses unwanted spurious signals from the pass band edge through the third harmonic including the critical GPS band (1.5 GHz-1.7 GHz). You get all of this in addition to tunability and a range of power levels to 2.5 kW. Fixed tuned units are also available.

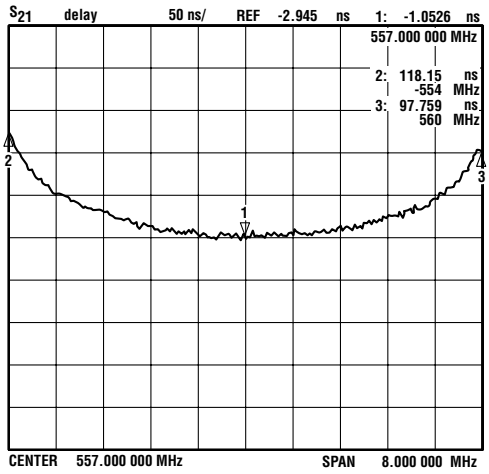
DTV READY!



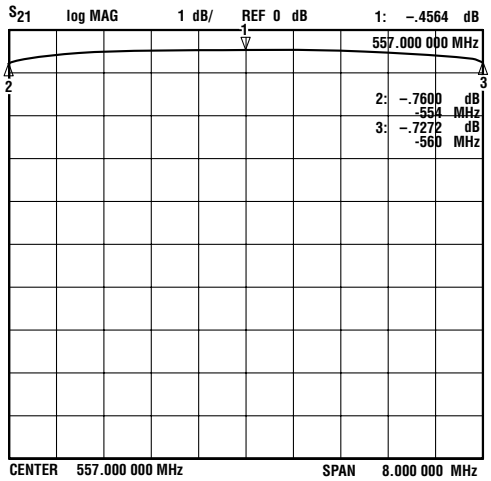
CF500 Series



Typical Rejection



Typical Group Delay



Typical Insertion Loss

Specifications

Average Power Rating, kW	2.5
Frequency	UHF-TV
Passband VSWR	1.12 or better
Insertion Loss, dB, max. at Fc	0.6
Rejection	to comply with DTV or DVB requirements
Group Delay Variation, ns, max.	150
Impedance, ohms	50
Connections	7-16 DIN, Type N, or 1-5/8" EIA
Dimensions, in (mm), 1 kW unit	13 x 9 x 18 (330 x 229 x 457)

NEW!

DTV READY!

Dual-Mode Band-Pass Filters for DVB Applications

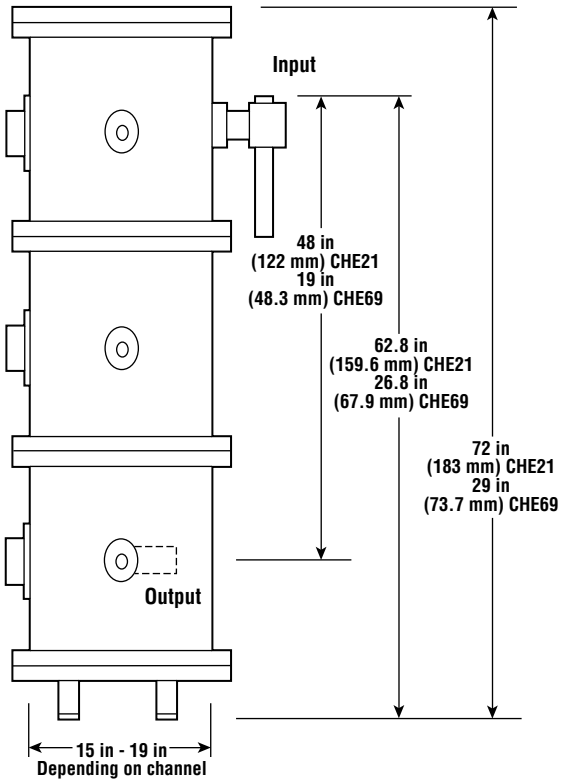
Features

- *Low VSWR*
- *Very Low Insertion Loss*
- *Excellent Rejection*
- *Rugged Aluminum Construction*
- *Average Powers to 10 kW*
- *2nd Harmonic Suppression*
- *Low Cost*

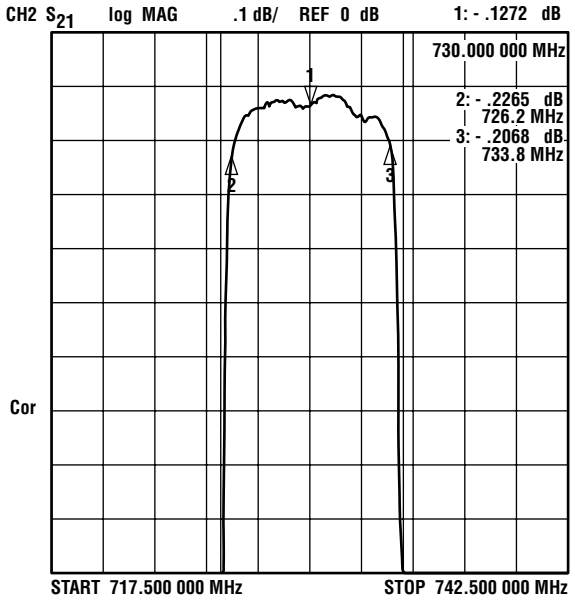
CF510 Series DVB Band-Pass Filters

Andrew has recently developed a new series of optimal performance DVB band-pass filters of dual mode construction to meet the latest digital performance specifications in Europe. The filter response suppresses unwanted spurious signals in the reject band.

Continued on next page



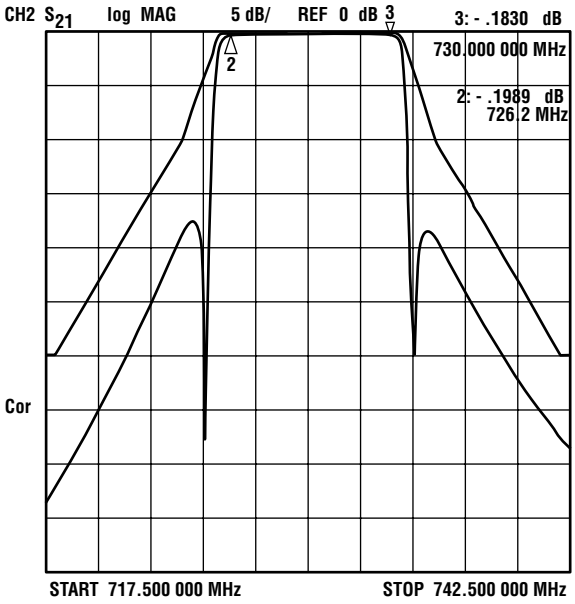
CF510 Series



Typical Insertion Loss

Specifications

Average Power, kW	10
Frequency	UHF
Passband Return Loss, dB	-24 or better
Insertion Loss, dB, max. at Fc	0.15
Rejection	
Fc ± 6 MHz	-10 dB or more
Fc ± 12 MHz	-30 dB or more
Group Delay, ns, max.	± 230
Impedance, ohms	50
Connections	DIN 13-30 or 1-5/8"
2nd Harmonic Rejection, dB	40 or more



Typical Rejection

NEW!

UHF Tunable EVA™ Band-Pass Filters for DTV Broadcast

DTV READY!

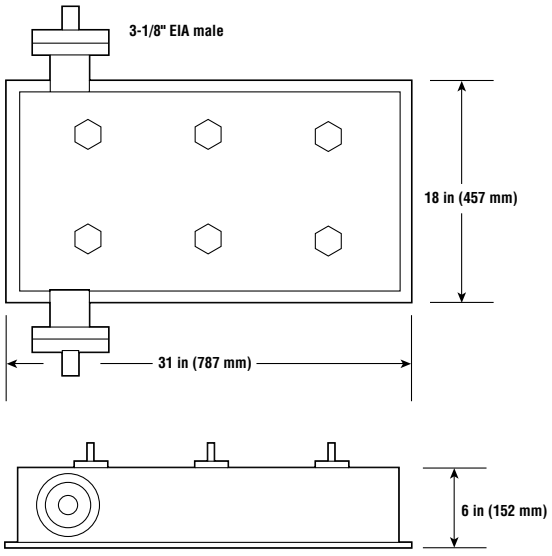
Features

- *Band IV/V Tunability*
- *Low Insertion Loss*
- *Superior Rejection*
- *Temperature Compensated*
- *Lightweight Aluminum Construction*
- *Compact Size*
- *Low VSWR*
- *Average Powers to 3 kW*

EVA Series Tunable DTV Band-Pass Filters

Andrew has recently developed an optimal performance temperature compensated coaxial band-pass filter to meet the latest FCC performance specifications. The filter suppresses unwanted spurious signals to acceptable levels, while compensating for drifts in temperature due to RF heating and ambient changes.

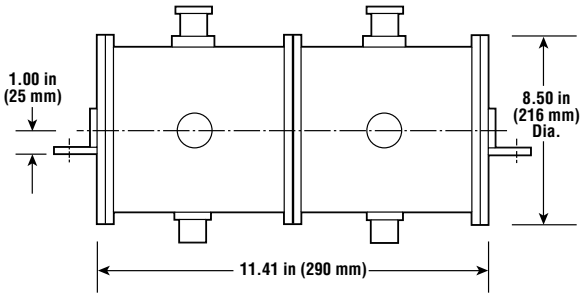
All of this, in addition to UHF full band tunability (2 bands), make this filter unique in the industry.

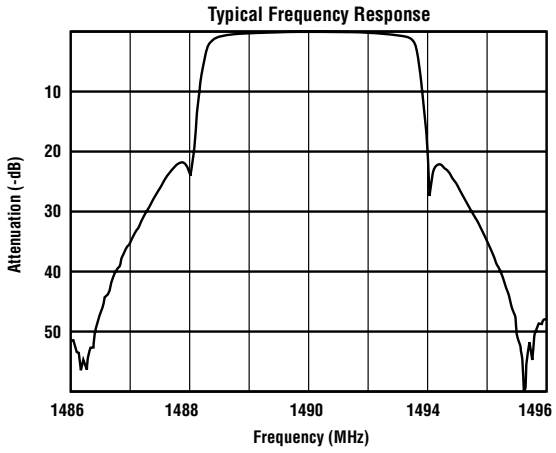


Specifications

Average Power Rating, kW	2.5
Frequency	UHF-TV
Passband VSWR	1.1 or better
Insertion Loss, dB, max. at Fc	0.3
Rejection, dB at Fc ± 9.0 MHz	-64
Group Delay, ns, max.	150
Impedance, ohms	50
Connections	1-5/8" EIA or 3-1/8" EIA
Dimensions, in (mm)	31 x 18 x 6 (787 x 457 x 152)

DAB 2000 Series





Dual-Mode Band-Pass Filters for L-Band DAB Applications

Features

- *Low VSWR*
- *Low Insertion Loss*
- *Excellent Rejection*
- *Precision Design*
- *Compact Size*
- *Pseudo-Elliptic Response*

DAB Band-Pass Filters for L-Band

Andrew offers a wide range of filters for L-band DAB requirements. Custom designs meet your electrical and mechanical performance specifications, for various L-band applications.

The cavities are fabricated from low-loss, temperature stable, metal tubing. The diameters depend on the Q requirements of the application.

Specifications

Average Power Handling, W	250
Frequency Band	L-band
Insertion Loss, dB	0.60 dB or less
Rejection, (see graph)	
at fc ± 2.00 MHz	-15 dB or more
at fc ± 3.00 MHz	-30 dB or more
Impedance, ohms	50

NEW!

Band-Pass Filters For Digital-Audio-Broadcasting

Features

- *Low VSWR*
- *Very Low Insertion Loss*
- *Superior Rejection*
- *Precision Design*
- *Temperature Compensated*
- *Pseudo-Elliptic Response*

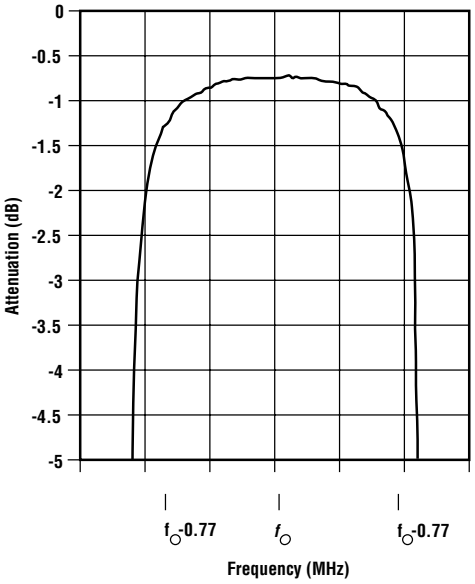
DAB 2000 Series Band-Pass Filters

Andrew has developed an optimal performance coaxial band pass filter for the Digital Audio Broadcasting industry. Advanced design parameters optimize insertion loss while minimizing size.

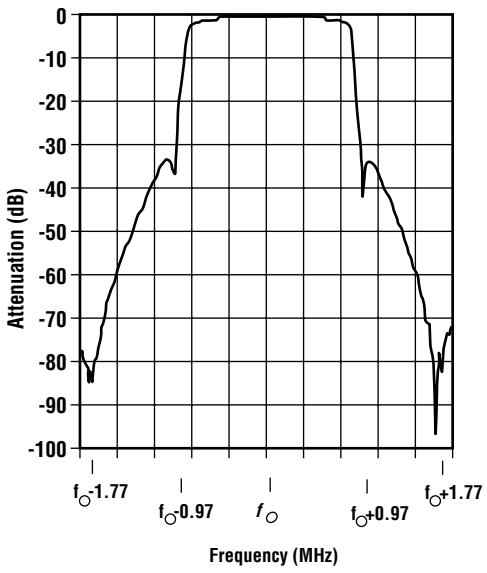
Specifications

Average Power, kW	2
Frequency	High Band VHF
Pass Band VSWR	1.10:1 or better
Insertion Loss	See graph
Rejection	See graph
Impedance, ohms	50
Connections	EIA
Dimensions, in (mm)	18 x 21 x 48 (460 x 530 x 1220)

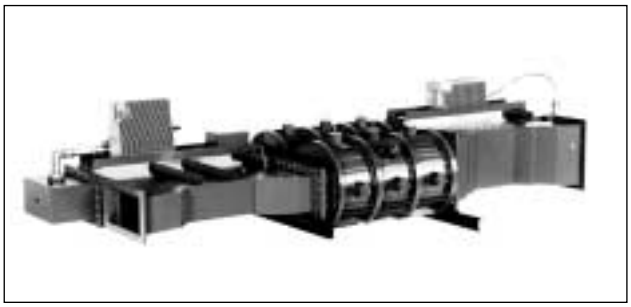
Typical Insertion Loss

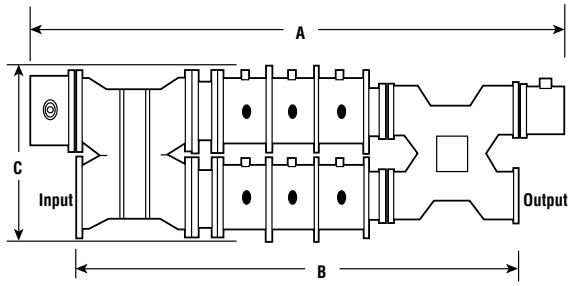


Typical Frequency Response



WF Series





High Power Band-Pass Filter Systems for UHF-TV

Features

- *Very Low Insertion Loss*
- *Excellent Rejection*
- *Low VSWR*
- *Proven Performance*
- *Unique Design*
- *Dual Mode Filters*
- *Rugged Aluminum Construction*

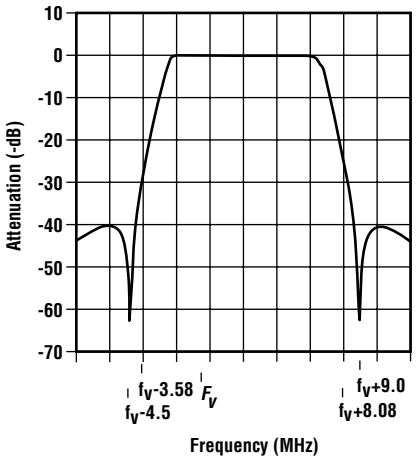
WF Series UHF Filter Systems

High power band-pass filter systems are designed to suppress spurious intermodulation products generated by the transmitters. High power band-pass filter systems are typically used with common amplification transmitter systems operating at combined powers up to 240 kW.

Ordering Information

Type No.	Frequency MHz	Channels	Waveguide Size	Dimension A, in (mm)	Dimension B, in (mm)	Dimension C, in (mm)
WF104	632-806	41-69	WR1150	126-139 (3200-3530)	105-118 (2667-2997)	35 (889)
WF504	470-632	14-40	WR1500	147-179 (3734-4547)	126-158 (3200-4013)	39 (990)

Typical Response



Specifications

Peak Sync Power Rating, kW	Up to 240
Frequency Range	UHF-TV Band
Input VSWR	
fv -0.75 to fv +4.75 MHz	1.05:1 or better
Over Channel Bandwidth	1.08:1 or better
Insertion Loss, dB, max.	
fv -0.75 to fv +4.75 MHz	0.15
Over Channel Bandwidth	0.20
Rejection	See graph
Input Isolation	
to Reject Load	-25 dB or more
to Ballast Load	-35 dB or more

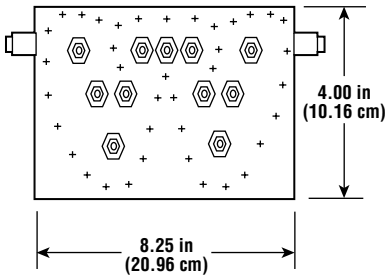
Band-Pass Filters for Digital Cellular Transmitter Systems

Features

- *Low VSWR*
- *Low Insertion Loss*
- *Excellent Rejection*
- *Precision Design*
- *Compact Size*

CELF 200 Series Band-pass Filters

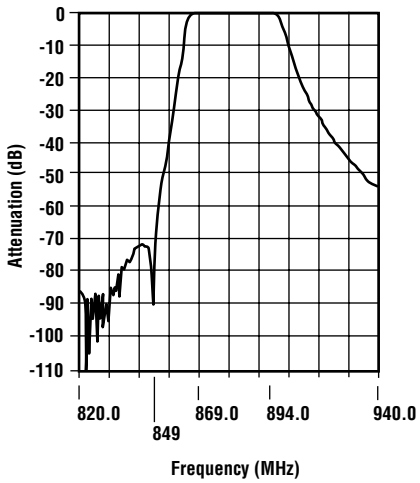
CELF 200 series low power band-pass filters are designed to conform to current electrical and mechanical performance specifications for transmitter base station systems within the digital cellular phone industry.



Specifications

Average Power, W	200
Peak Power, kW	1.5
Frequency Range, MHz	869-894
Return Loss, dB	22 or better
Insertion Loss, dB	< 0.50
Intermodulation Suppression, dB	>130
Attenuation, dB (See graph)	
824 MHz and Below	75 or more
Below 849 MHz	70 or more
849 MHz	80 or more
915 MHz	35 or more
940 MHz and above	56 or more
Number of channels	20 @10 watts each
Spacing, kHz	30
Modulation	s/4 DQPSK
Impedance, ohms	50
Connectors	Type N

Typical Frequency Response



Combiners

Andrew manufactures a wide range of combiners for the broadcast industry. Channel combiners of constant impedance or starpoint design, switchless combiners for transmitter amplification, switching combiners for main/alternate antenna feeds, power combiners and various diplexers for the TV and radio markets have been supplied to many locations throughout the world including the USA, Britain, Australia, South America, Mexico, Malaysia, China, Kuwait, the Netherlands, and other countries in Europe. Andrew has many decades of combined expertise and experience in filter design, combiner implementations and combiner system design. We have supplied many multi-channel digital/analog UHF and VHF channel combiners (including adjacent channel designs) for the demanding USA digital market as well as Europe.

Coaxial Low-Pass Harmonic Filters For UHF-TV Transmitters

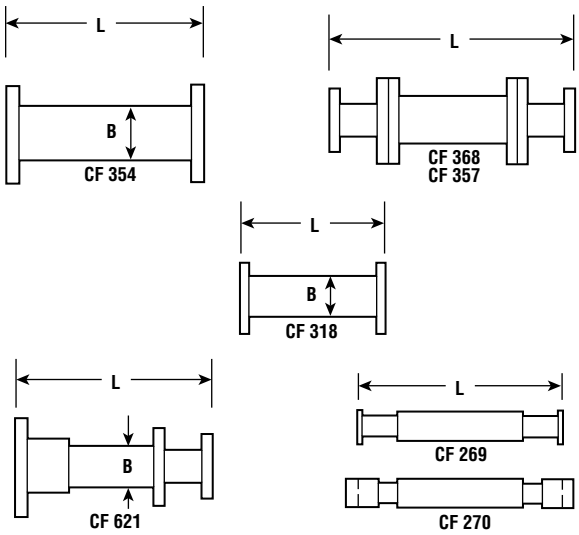
DTV READY!

Features

- *High Rejection 2nd and 3rd Harmonic*
- *Extremely Low Insertion Loss and VSWR*
- *Minimized Length*
- *Wide Range of Power Levels*
- *Built-in Couplers Available*
- *Alternative Connectors Available*
- *Rugged Construction*

CF Series UHF Harmonic Filters

CF series high rejection UHF low-pass harmonic filters are designed for transmitter power levels up to 60 kW. Chebishev design parameters define element values that provide 40 dB or greater rejection at the second harmonic and 30 dB or greater rejection at the third harmonic.



Specifications

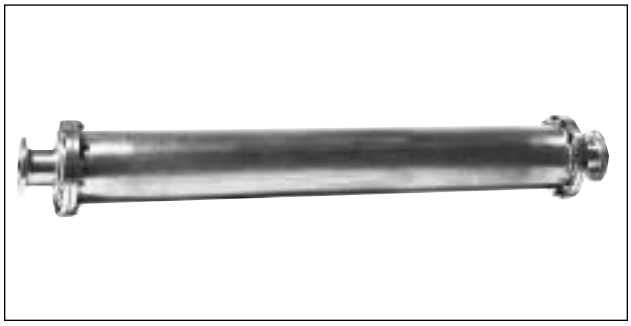
Frequency	UHF Band
VSWR, max.	<1.05 (Individual channel)
Insertion Loss, dB, max.	<0.1
Rejection, dB	
2nd harmonic	>40 dB
3rd Harmonic	>30 dB

Ordering Information

Type No.*	Average Power, kW	Connections	Frequency MHz	Length, in (mm)	Diameter (B)
CF269-0XX	5	1-5/8" EIA	470-860	22 (559)	1-5/8"
CF270-0XX	5	1-5/8", non-flanged	470-860	22.5 (572)	1-5/8"
CF318-0XX	15	3-1/8" EIA	470-860	18 (458)	3-1/8"
CF357-0XX	30	3-1/8" EIA	470-626	24 (610)	4-1/16"
CF368-0XX	30	3-1/8" EIA	626-860	24 (610)	4-1/16"
CF621-0XX	30	3-1/8" (IP), 6-1/8" (OP)	698-860	20 (508)	4-1/16"
CF354-0XX	60	6-1/8" EIA	470-650	24 (610)	6-1/8"
CF354-0XX	60	6-1/8" EIA	650-698	24 (610)	6-1/8"

* XX indicates channel number.

CF Series



VHF Coaxial Low-Pass Harmonic Filters

Features

- *High Rejection through 5th Harmonic*
- *Low Insertion Loss and VSWR*
- *Minimized Length*
- *Copper or Aluminum Construction*
- *Built-in Couplers Available*
- *Broadband Design*

Specifications

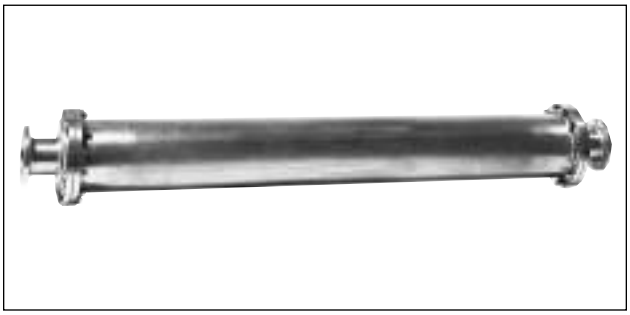
Frequency, MHz	174-230
VSWR	<1.08
Insertion Loss, dB	<0.1
Rejection, dB	
2nd Harmonic	>40
3rd through 5th Harmonic	>30
Connections	EIA or non-flanged

CF Series VHF Harmonic Filters

Andrew offers a series of high rejection, low-pass harmonic filters for transmitter power levels up to 60 kW for both high band and low band VHF applications. Chebishev design parameters define element values which, when synthesized, provide 40 dB or greater rejection at the 2nd harmonic and greater than 30 dB to the 5th harmonic. The oversized center section ensures optimal power handling capability. Each filter is individually tested and tuned for optimum electrical and mechanical performance. Measured test data is supplied with each filter.

The low band filters are 116 in (2946 mm) in length; high band units are 48 in (1219 mm).

High Rejection FM Low-Pass Harmonic Filters

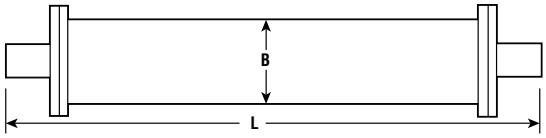


Features

- *High Rejection through 10th Harmonic*
- *Extremely Low Insertion Loss and VSWR*
- *Minimized Length*
- *Entire FM Band Coverage*
- *Rugged Built-in Couplers Available*
- *Wide Range of Power Ratings*

CF Series Harmonic Filters

Andrew offers a series of remarkable high rejection, FM, low-pass, harmonic filters for transmitter power levels up to 40 kW. A unique design provides 50 dB or greater rejection from the second to the tenth harmonic and beyond. This yields filters with overall lengths 30% to 50% shorter than typical FM harmonic filters.



FM Harmonic Filter

Specifications

Frequency, MHz	87.5 to 108 MHz
VSWR	<1.10
Insertion Loss, dB	<0.10
Rejection, 2nd through 10th harmonic, dB	>50

Ordering Information

Type No.	Average Power, kW	Connections	Length (L), in (mm) without Couplers*	Diameter (B)
CFH211-OFM	5	1-5/8" EIA	54 (1372)	3-1/8"
CFH221-OFM	5	1-5/8" non-flanged	54 (1372)	3-1/8"
CFH312-OFM	10	3-1/8" EIA	54 (1372)	4-1/16"
CFH322-OFM	10	3-1/8" non-flanged	54 (1372)	4-1/16"
CFH314-OFM	20	3-1/8" EIA	60 (1524)	6-1/8"
CFH324-OFM	20	3-1/8" non-flanged	60 (1524)	6-1/8"
CFH316-OFM	40	3-1/8" EIA	60 (1524)	9-3/16"
CFH326-OFM	40	3-1/8" non-flanged	60 (1524)	9-3/16"

* For single, dual, or quad directional couplers, add 6 in (152 mm) to length.

CL Series

DTV READY!

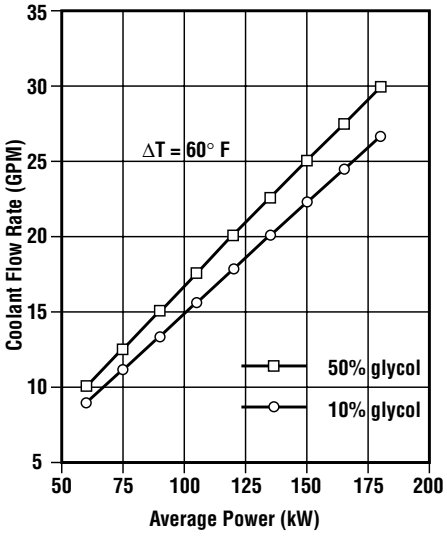
High Power UHF Coaxial Water Loads

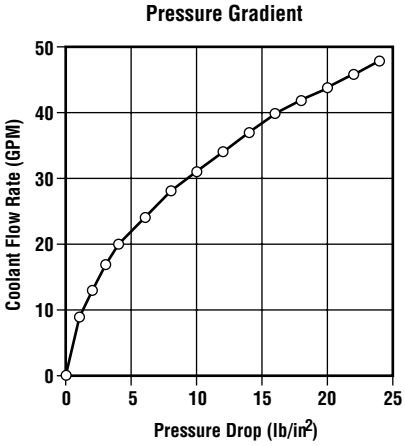
Features

- *Low Cost per kW*
- *Low In-channel VSWR*
- *Low Coolant Pressure Drop*
- *Failure Resistant Design*
- *Temperature Stable*
- *Wide Range of Power Levels*

CL Series Coaxial Loads

CL series UHF coaxial loads offer a proven design for handling high power at low cost. The load employs a solution of antifreeze and water as both coolant and resistive material. The power dissipated by the load heats the solution and is removed by the constant flow.



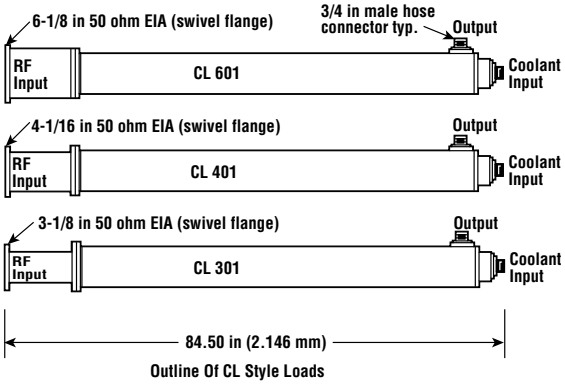


Ordering Information and Specifications

Type No.	CL 301	CL401	CL601
Average Power, kW	50	70	100
Peak Power, kW	500	1500	2000
Connector	3-1/8" EIA	4-1/16" EIA	6-1/8" EIA
VSWR			
Any TV Channel	1.05:1	1.05:1	1.05:1
470-860 MHz	1.2:1	1.2:1	1.2:1

Coolant

Connections	3/4" NGH or 3/4" NPT
Pressure, lb/in² (kPa)	80 (552)
Mixture	20% to 50% solution of antifreeze and water
Pressure Gradient	See Graph
Coolant flow Rate	See Graph

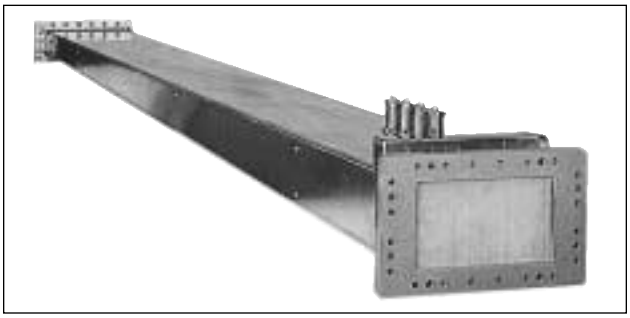


Outline Of CL Style Loads

Waveguide Loads for UHF-TV Systems

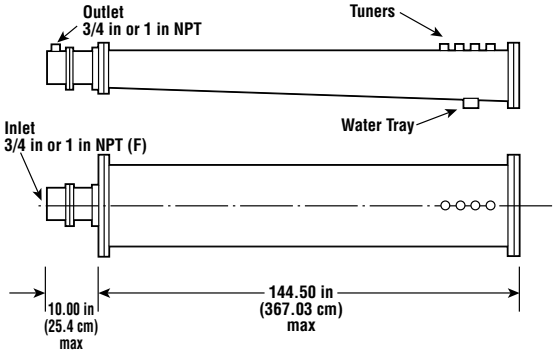
Features

- *High Power*
- *Very Low Cost per kW*
- *Low VSWR*
- *Rugged Construction*
- *Simple Design*
- *Fine Tuner Provided*
- *Efficient*



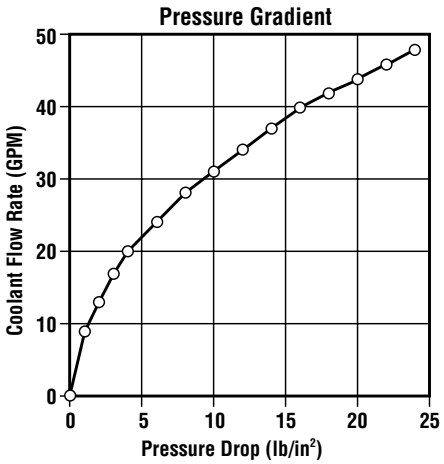
WL Series Waveguide Loads

These unique, tapered-waveguide water loads utilize two coaxial dielectric tubes to carry the water/glycol solution. The solution functions as both a heat dissipater and RF absorber.



Ordering Information

Type No.	Waveguide Size	Peak Synch Power, kW	UHF-TV Channels (U.S.A.)
WL-811	WR1800	240	14-19
WL-511	WR1500	240	14-19
WL-512	WR1500	240	20-29
WL-513	WR1500	240	30-39
WL-514	WR1500	240	40-49
WL-111	WR1150	240	41-69

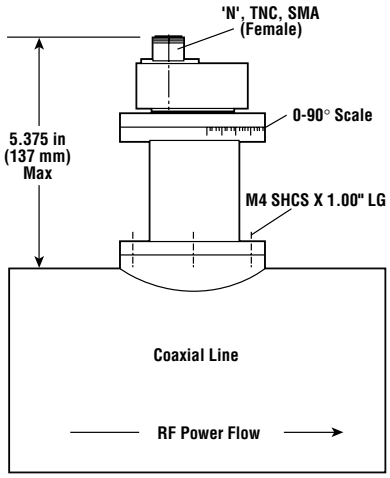


Specifications

Peak Sync Power VSWR (See table above)	
Channel BW	1.05:1
470-860 MHz	1.20:1
Input Connection	Rectangular waveguide
Coolant Connection	
Inlet	3/4" or 1" NPTF
Outlet	3/4" or 1" NPTM
Coolant Pressure, lb/in² (kPa)	80 (552)
Coolant Temperature, °C (°F)	27 (160)
Flow Rate	Contact Andrew
Pressure Gradient	See graph
Coolant Range, %	10 - 50

CD Series

DTV READY!



Forward Coupler Shown

VHF-UHF Coaxial Adjustable Directional Couplers

Features

- *32 dB+ Directivity*
- *Broad Frequency Range*
- *Reversible*
- *30-70 dB Coupling Range*
- *Low VSWR*
- *Field Replaceable Resistor*
- *Very Compact Design*
- *All Brass Probe Assembly*
- *Multiple Construction*
- *1-5/8", 3-1/8", 4-1/16", 6-1/8" Sizes*

CD Series Coaxial Adjustable Directional Couplers

CD series coaxial adjustable directional couplers are designed and manufactured to cover 50 MHz to 860 MHz with a broad coupling range and correspondingly high directivity, all within one of the smallest packages in the Broadcast industry. The highly directive coupling loop provides high accuracy in forward and/or reflected power measurements necessary for determining VSWR on the line, component or system losses, line power, or other operations.

Ordering Information

Type No.	Connections	Number of Couplers
CD308-N	3-1/8", N Female	1
CD309-N	3-1/8", N Female	2
CD310-N	3-1/8", N Female	3
CD408-N	4-1/16", N Female	1
CD409-N	4-1/16", N Female	2
CD410-N	4-1/16", N Female	3
CD608-N	6-1/8", N Female	1
CD609-N	6-1/8", N Female	2
CD610-N	6-1/8", N Female	3
CD314-N	3-1/8" Field Installable (w/saddle)	1
CD414-N	4-1/16" Field Installable (w/saddle)	1
CD614-N	6-1/8" Field Installable (w/saddle)	1

Specifications

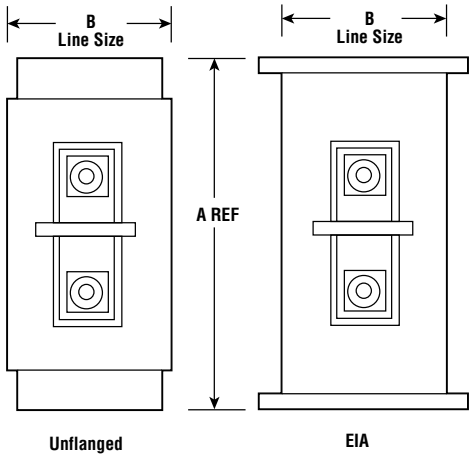
Coupling Range, dB	-30 to -70
Frequency Range, MHz	50-860
VSWR	1.03 or better
Directivity, dB	32 or greater
Connectors	
Coupler	N, TNC, SMA
Line	EIA, IEC, Unflanged
Impedance, ohms	50

ANDREW®

Coaxial Directional Couplers for UHF-VHF

Features

- *Low VSWR*
- *Broad Frequency Range*
- *High Directivity*
- *Broad Coupling Range*
- *Field Replaceable*
- *Compact Design*
- *Light Weight*
- *Any Coax Line Size*



CD Series Coaxial Directional Couplers

These loop couplers are designed, manufactured, and laboratory compensated for any coupling value between -30 dB and -60 dB for any channel in the VHF-FM-UHF bands. The highly directive coupling loops provide high accuracy in forward and/or reflected power measurements necessary for determining VSWR on the line or other operations.

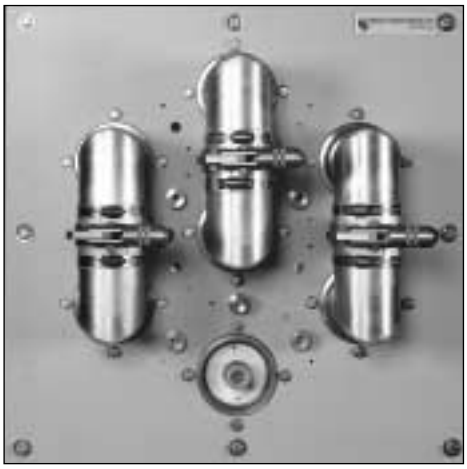
Specifications

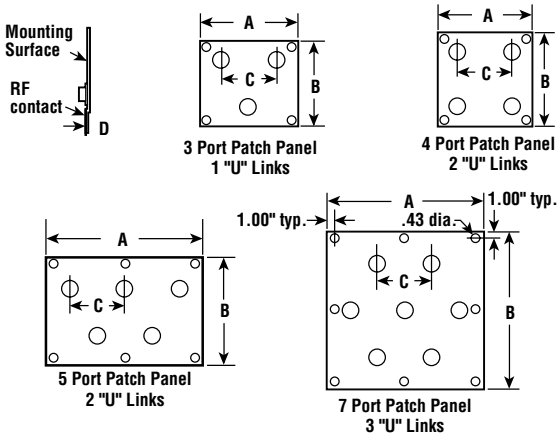
Coupling Range, dB	-30 to -60
Frequency Range, MHz	50-4000
VSWR	1.03 or better
Directivity, dB	30 or greater
Connectors	
Coupler	N, SMA, BNC
Line	EIA, IEC, unflanged
Impedance, ohms	50

Ordering Information

Type No.	Line Size	Flange Type	Number of Directional Couplers	Length, L in (mm)
CD103 (1-2 GHz)	7/8"	7/8" EIA	1	6 (152)
CD104 (2-4 GHz)	7/8"	7/8" EIA	1	6 (152)
CD201	1-5/8"	Unflanged	4	7 (178)
CD202	1-5/8"	Unflanged	2	7 (178)
CD203	1-5/8"	1-5/8" EIA	2	14.5 (368)
CD204	1-5/8"	Unflanged	1	7 (178)
CD205	1-5/8"	Unflanged	3	7 (178)
CD301	3-1/8"	Unflanged	2	6.75 (171)
CD302	3-1/8"	Unflanged	4	6.75 (171)
CD303	3-1/8"	3-1/8" EIA	2	8 (203)
CD304	3-1/8"	Unflanged	1	7.5 (191)
CD305	3-1/8"	3-1/8" EIA	3	8 (203)
CD401	4-1/16"	4-1/16" EIA	3	8 (203)
CD402	4-1/16"	4-1/16" EIA	1	8 (203)
CD403	4-1/8"	IEC50-105	2	8 (203)
CD404	4-1/16"	Unflanged	2	10 (254)
CD405	4-1/16"	4-1/16" EIA	2	8 (203)
CD603	6-1/8"	6-1/8" EIA	1	10 (254)
CD604	6-1/8"	Unflanged	1	10 (254)
CD605	6-1/8"	6-1/8" EIA	2	10 (254)
CD606	6-1/8"	6-1/8" EIA	3	10 (254)

CP Series





Quick Patch Coaxial Patch Panels

Features

- *Quick Connect*
- *Auto Locking*
- *Reduced Weight*
- *Various Port Arrangements*
- *Positive Pre-removal Interlocks*
- *Replaceable Contacts*

CP Series Patch Panels

Quick Patch coaxial patch panels are a new and unique design that allows for quick and positive change-over of any number of system inputs and outputs. This, combined with a positive pre-removal interlock system, provides ease of use with high reliability.

All patch links employ a positive locking handle with a lightweight aluminum outer and a high conductivity copper inner.

Specifications

Frequency	Contact Andrew
Power	90% of line rating
VSWR	1.04:1 max
Interlocks	DPDT

Ordering Information

Type Number	Number of Ports	Line Size	Impedance ohms	Dimensions, in (mm) A	B	C	D	Rear Connector
CP235	3	1-5/8"	50	15 (381)	15 (381)	6 (152)	0.81 (21)	Unflanged
CP245	4	1-5/8"	50	15 (381)	15 (381)	6 (152)	0.81 (21)	Unflanged
CP255	5	1-5/8"	50	20 (508)	15 (381)	6 (152)	0.81 (21)	Unflanged
CP275	7	1-5/8"	50	20 (508)	20 (508)	6 (152)	0.81 (21)	Unflanged
CP335	3	3-1/8"	50	15.5 (394)	15.5 (394)	7 (178)	0.88 (22)	Unflanged
CP345	4	3-1/8"	50	16 (406)	16 (406)	7 (178)	0.88 (22)	Unflanged
CP355	5	3-1/8"	50	23 (584)	16 (406)	7 (178)	0.88 (22)	Unflanged
CP375	7	3-1/8"	50	23 (584)	23 (584)	7 (178)	0.88 (22)	Unflanged
CP435	3	4-1/16"	50	22 (559)	22 (559)	11 (279)	0.88 (22)	Unflanged
CP445	4	4-1/16"	50	22 (559)	22 (559)	11 (279)	0.88 (22)	Unflanged
CP455	5	4-1/16"	50	32 (813)	22 (559)	11 (279)	0.88 (22)	Unflanged
CP475	7	4-1/16"	50	32 (813)	32 (813)	11 (279)	0.88 (22)	Unflanged
CP635	3	6-1/8"	50	26 (660)	26 (660)	13 (330)	1.12 (28)	6-1/8" EIA
CP645	4	6-1/8"	50	26 (660)	26 (660)	13 (330)	1.12 (28)	6-1/8" EIA
CP655	5	6-1/8"	50	38 (965)	26 (660)	13 (330)	1.12 (28)	6-1/8" EIA
CP675	7	6-1/8"	50	38 (965)	38 (965)	13 (330)	1.12 (28)	6-1/8" EIA
CP637	3	6-1/8"	75	26 (660)	26 (660)	13 (330)	1.12 (28)	6-1/8" EIA
CP647	4	6-1/8"	75	26 (660)	26 (660)	13 (330)	1.12 (28)	6-1/8" EIA
CP657	5	6-1/8"	75	38 (965)	26 (660)	13 (330)	1.12 (28)	6-1/8" EIA
CP677	7	6-1/8"	75	38 (965)	38 (965)	13 (330)	1.12 (28)	6-1/8" EIA

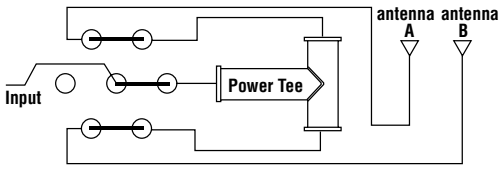
Patch Panel/Power Divider for Dual Antenna Systems

Features

- *Any Standard Line Size*
- *Auto Locking U-Links*
- *Positive Pre-removal Interlocks*
- *Quick Connect*
- *Low VSWR*
- *Multi-channel Bandwidth*
- *Bypass to Either Antenna*

PPD Series Output Patch Panel/Power Divider Systems

These patch panel/power divider systems integrate a unique combination of quality components to produce a unit that is normally used with dual antenna feed line systems. The input to the power combiner may be single channel or multi-channel (i.e., the output of a channel combiner). Contact Andrew for specific applications.

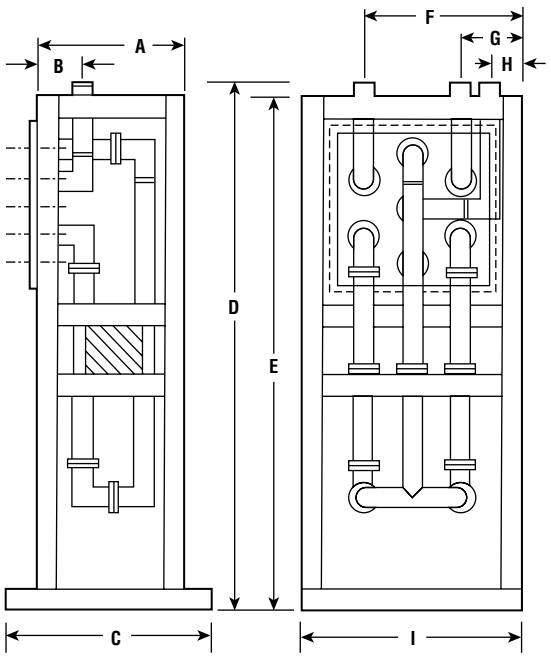


RF Diagram

Typical Dimensions

Line Size	Dimensions, in (mm) A	B	C	D	E
1-5/8"	16.00 (406)	3.63 (92)	24.00 (610)	61.50 (1562)	62.00 (1575)
3-1/8"	18.00 (457)	4.88 (124)	26.00 (660)	68.00 (1727)	70.38 (1788)
6-1/8"	28.00 (711)	10.15 (258)	28.00 (711)	72.00 (1829)	67.00 (1702)

Line Size	Dimensions, in (mm) F	G	H	I
1-5/8"	18.69 (475)	8.30 (211)	4.50 (114)	27.00 (686)
3-1/8"	21.07 (535)	8.93 (227)	4.63 (118)	30.00 (762)
6-1/8"	32.25 (819)	9.75 (248)	21.00 (533)	42.00 (1067)



Typical Dimensions

Specifications

Power Handling	Determined by line size
Frequency Range	VHF-UHF
VSWR	1.10:1 max.
Insertion Loss, dB	0.10
Power Split	3.0 dB ± 0.1 dB
Impedance, ohms	50
Connections	Unflanged (typical)

CS Series

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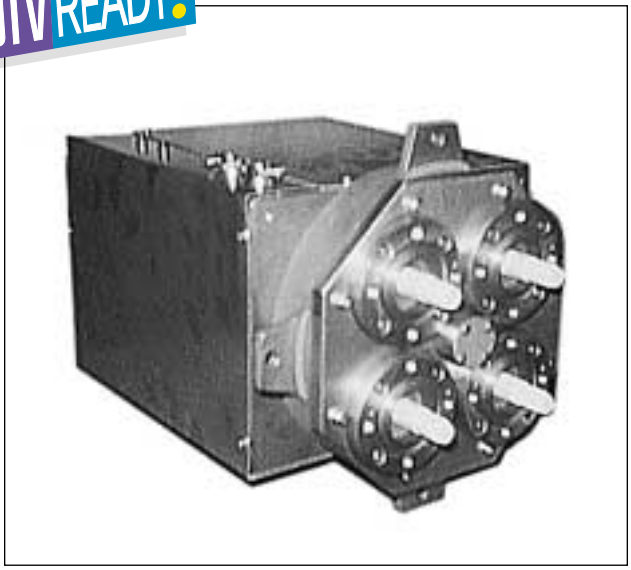


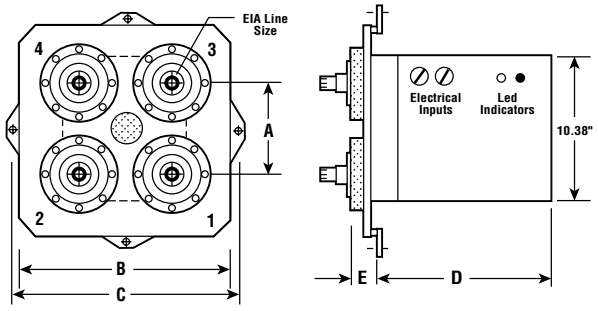
Coaxial Motorized Transfer Switches

Features

- *3 or 4 port Configuration*
- *Non-volatile Memory*
- *Low VSWR*
- *Manual Operation*
- *Mount in any Orientation*
- *Low Insertion Loss*
- *Very High Isolation*
- *Rugged Design*

CS Series Coaxial Switches

CS series coaxial switches are designed for operation within VHF television and FM radio broadcast transmitter systems. The switches utilize a unique, flat plane, silver plated, dual-contact design to provide high power capability and long life. The switch drive can be either 115 Vac or 230 Vac with control voltages of 12 Vdc or 24 Vdc.



Typical Dimensions

Specifications

Switch Size	1-5/8"	3-1/8"	4-1/16"	6-1/8"
Power Handling				
Peak, kW	165	300	500	1000
Average @ 25 MHz, kW	30	55	90	180
Average @ 250 MHz, kW	9	18	30	60
Frequency Range	dc to 250 MHz			
VSWR	1.03:1 (max)			
Insertion Loss	0.06 dB (max)			
Isolation, dB, max.	60 or more			
Impedance, ohms	50			
Switching Time, seconds	3 or less			
Connections	EIA (standard) or unflanged			

Ordering Information

			Typical Dimensions, in (mm)				
Type No.	Line Size	Ports	A	B	C	D	E
CS250-XYY*	1-5/8"	4	3.75 (95.3)	9.00 (228.6)	10.75 (273.1)	12.75 (323.9)	1.50 (38.1)
CS251-XYY*	1-5/8"	3	3.75 (95.3)	9.00 (228.6)	10.75 (273.1)	12.75 (323.9)	1.50 (38.1)
CS350-XYY*	3-1/8"	4	5.50 (139.7)	13.00 (330.2)	15.00 (381.0)	12.88 (327.2)	1.63 (41.4)
CS351-XYY*	3-1/8"	3	5.50 (139.7)	13.00 (330.2)	15.00 (381.0)	12.88 (327.2)	1.63 (41.4)
CS450-XYY*	4-1/16"	4	6.50 (165.1)	15.00 (381.0)	16.50 (419.1)	13.41 (340.6)	1.72 (43.7)
CS451-XYY*	4-1/16"	3	6.50 (165.1)	15.00 (381.0)	16.50 (419.1)	13.41 (340.6)	1.72 (43.7)
CS650-XYY*	6-1/8"	4	9.38 (283.3)	20.00 (508.0)	23.00 (584.2)	13.84 (351.5)	1.72 (43.7)
CS651-XYY*	6-1/8"	3	9.38 (283.3)	20.00 (508.0)	23.00 (584.2)	13.84 (351.5)	1.72 (43.7)

* X indicates first number in drive voltage; YY indicates two numbers in control voltage.
ie: CS350-212 designates a 3-1/8" switch with 230 Vac drive and 12 Vdc control voltage.

ANDREW®

UHF Waveguide Motorized Transfer Switches

Features

- *H or E-plane Configuration*
- *Non-Volatile Memory*
- *Low VSWR*
- *Manual Operation*
- *Mount in any Orientation*
- *Low Insertion Loss*
- *Very High Isolation*
- *Rugged Design*

WS Series Waveguide Switches

WS series waveguide switches are designed for operation within UHF television broadcast transmitter systems. The switches utilize a unique, flat, rotating vane to ensure high power capability and long life.

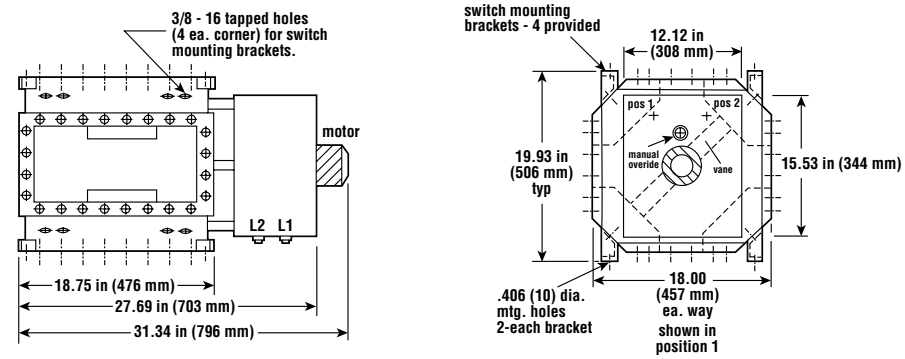
Specifications

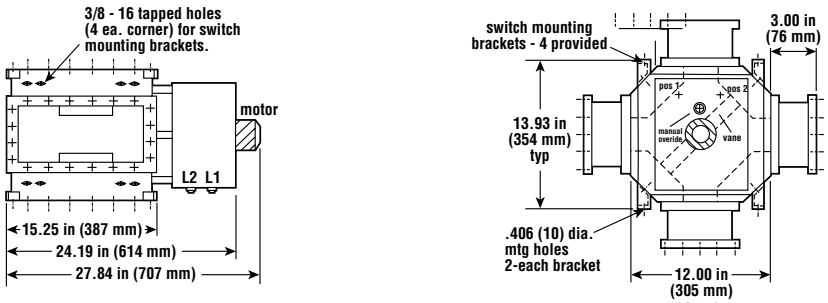
Peak Power Handling, kW	Up to 300
Frequency Range	UHF (specify channel)
VSWR	1.03:1 (single channel)
Insertion Loss, dB max	0.06
Isolation, dB	70 or more
Impedance, ohms	50
Switching Time, seconds	5 or less

Ordering Information

Type No.	Waveguide Type	Configuration
WS104	WR1150	E-Plane
WS503	WR1500	E-Plane
WS801	WR1800	E-Plane
WS106	WR1150	H-Plane
WS507	WR1500	H-Plane

WR 1500 Outline





WR 1150 Outline

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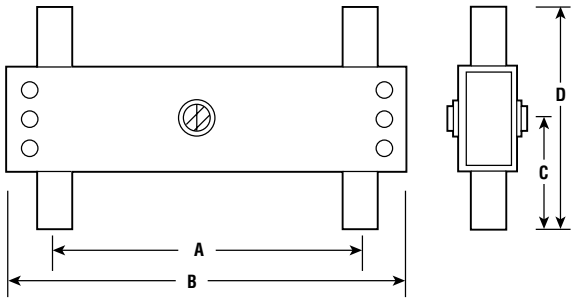


Low Power Coaxial Hybrids for VHF-TV and FM

Features

- *High Isolation*
- *Low VSWR*
- *Light Weight*
- *Broadband*
- *Compact Size*
- *Low Insertion Loss*

CH Series Coaxial Hybrids

Our coaxial hybrids are most often used as power dividers and power combiners in diplexers, switchless combiners, and channel combiners. The hybrid may also be used as a transmitter power combiner or power divider. Hybrids of different power splits may be cascaded to provide varying power combining and dividing configurations.

Ordering Information

		Dimensions, in (mm)			
Type No.	CH	A	B	C	D
CH203-002	2	56 (1422)	60 (1524)	6 (152)	12 (305)
CH203-003/6	3-6	42 (1067)	46 (1168)	6 (152)	12 (305)
CH203-007/13	7-13	14 (356)	18 (457)	6 (152)	12 (305)

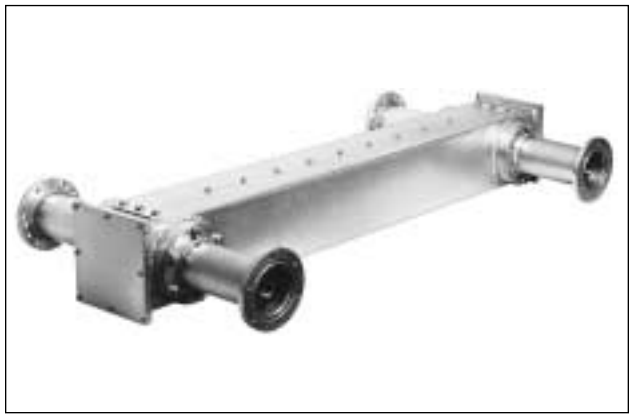
Specifications

Peak Power Range, kW	up to 10
Frequency, MHz	45-250
Power Split	to within ± 0.1 dB
Isolation, dB	35 or more
VSWR	1.03 or better (passband)
Insertion loss, dB	0.05 or less
Impedance, ohms	50
Phase shift	90° ± 1°
Connections	N, 7/8", 1-5/8" EIA or unflanged

FM Coaxial Hybrids

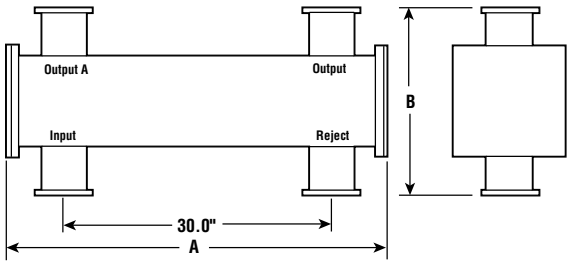
Features

- *Wholeband Quadrature Performance*
- *Used as Power Combiners or Dividers*
- *Compact Crossover Design*
- *Each Individually Tested*
- *Non-corroding Chromate Conversion Finish*
- *Exceptionally Low VSWR and Insertion Loss*
- *Low-loss Copper Inner Components*



CH Series FM Hybrid

Our high-power quadrature crossover coaxial hybrids are designed for optimum performance. The shielded tube design allows for a small cross section without sacrificing power handling. The design also ensures whole band operation with low VSWR and insertion loss.



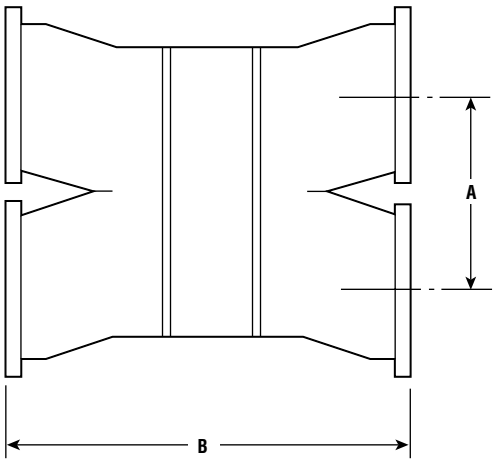
Specifications

Frequency, MHz	87.5 to 108
VSWR	<1.06:1
Insertion Loss, dB	<0.05
Power Split, dB	-3.0 ± 0.1
Isolation, dB	>32
Phase Split	90 ± 2 degrees

Ordering Information, FM 90° Hybrids

Type No. Power, kW	Combined Interface	Connector in (mm)	Dimension A in (mm)	Dimension B in (mm)	Case Dimensions
CH250-OFM	10	3-1/8" EIA, female	34.00 (863.6)	8.88 (225.6)	1.75 x 4.00 (44.5 x 101.6)
CH251-OFM	10	Unflanged	34.00 (863.6)	8.50 (215.9)	1.75 x 4.00 (44.5 x 101.6)
CH350-OFM	20	3-1/8" EIA, female	37.00 (939.8)	14.00 (355.6)	5.40 x 5.40 (137.2 x 137.2)
CH351-OFM	20	Unflanged	40.00 (1016)	13.50 (342.9)	5.40 x 5.40 (137.2 x 137.2)
CH450-OFM	40	3-1/8" EIA, female	40.00 (1016)	18.00 (457.2)	8.64 x 8.64 (219.5 x 219.5)
CH451-OFM	40	Unflanged	40.00 (1016)	17.50 (444.5)	8.64 x 8.64 (219.5 x 219.5)
CH650-OFM	80	3-1/8" EIA, female	40.00 (1016)	18.00 (457.2)	8.64 x 8.64 (219.5 x 219.5)

WH Series



Ordering Information

Type No.	Waveguide Size	Frequency Band, MHz	Dimension A in (mm)	Dimension B in (mm)
WH801	WR1800	470-540	22 (559)	42 (1067)
WH503	WR1500	540-736	19 (483)	42 (1067)
WH510	WR1500	500-674	19 (483)	36 (914)
WH110	WR1500	644-806	15.5 (394)	36 (914)

Waveguide Short-Slot Hybrids for UHF-TV

Features

- *High Power*
- *Low VSWR*
- *All Aluminum*
- *Broadband*
- *High Isolation*
- *Compact Size*
- *Low Insertion Loss*

WH Series Waveguide Hybrids

WH series broadband waveguide hybrids are most often used as power dividers and power combiners in high power waveguide UHF diplexers, switchless combiners, and channel combining systems. They may also be used as a transmitter power divider (four outputs) or combiner.

Specifications

Power Handling, kW (WR1500)	up to 300
Frequency	UHF band
Power Split	to within ± 0.1 dB
Isolation, dB, min.	30
VSWR	1.02 or better (channel)
Insertion Loss, dB	0.1 or less
Impedance, ohms	50
Phase Shift	90° ± 1°
Sizes Available	WR1150, WR1500, WR1800

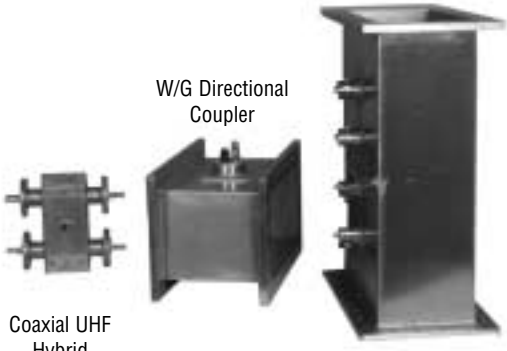
DTV READY!

Coaxial Fine Matcher

Coaxial Elbows

Coaxial Fixed Couplers

W/G Directional Coupler



Coaxial UHF Hybrid

W/G Fine Matcher

WR1150 E-Plane Miter
WE106

WR1500 H-Plane Miter
WE505

WR1800 H-Plane Miter

Andrew manufactures a wide variety of RF components for FM radio, VHF-TV, UHF-TV, and DTV systems. Our product line of coaxial elbows includes line sizes up to 8-3/16" and frequency ranges from AM to 2 GHz. Standard features include copper or aluminum construction and EIA flanged or unflanged with fully supported inner conductors.

E-Plane and H-Plane waveguide elbows are available in WR1150, WR1500 and WR1800 sizes. Waveguide and coaxial fixed couplers are located in almost all RF Andrew systems, where required. Our new coaxial adjustable couplers are widely accepted and rapidly becoming an industry standard due to their small package and high performance characteristics. The adjustable probe unit is interchangeable with any of the coaxial line sizes for frequency ranges from low-band VHF to UHF and will soon be easily adaptable to waveguide.

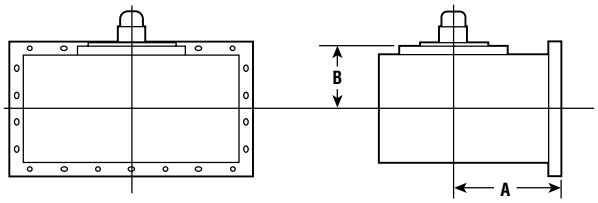
Fine matchers, a necessity for large RF systems, are available in coaxial line sizes from 1-5/8" to 8-3/16" and also in waveguide sizes WR1150, WR1500, and WR1800. Andrew also manufactures many different sizes and constructions of hybrids, including 3-way and 5-way power combiners. Contact Andrew for a quotation.

WX Series

High Power Waveguide to Coax Transitions

Features

- *Lightweight aluminum outer housing*
- *Rugged, welded construction*
- *Precision-machined flanges*
- *High-power, cross-bar design*
- *Non-corroding, chromate-conversion finish*
- *Low-loss copper inner components*
- *Exceptionally low VSWR and insertion loss*
- *Male EIA coaxial connectors supplied*



Waveguide to Coax Transition

WX-Series Transitions

Our high-powered rectangular waveguide-to-coax transitions are available in a wide range of waveguide and coax line sizes to match the required frequency range and power level. Superior materials, rugged construction, and plenty of reserve power-handling capability provide a lifetime of worry-free performance.

Specifications

Power Handling	Determined by the coaxial line size
VSWR	1.03:1 for any 2% band 1.10:1 for any 10% band
Flanges	
Coaxial port	EIA Male
Waveguide port	Rectangular waveguide to EIA RS-271

Ordering Information

Coaxial Line Size	Transition Type Number To WR1800	WR1500	WR1150	Dimension A in (mm)
1-5/8", 50-ohm	**WX820-0XX**	**WX520-0XX**	**WX120-0XX**	–
3-1/8", 50-ohm	**WX830-0XX**	**WX530-0XX**	**WX130-0XX**	–
4-1/16", 50-ohm	**WX840-0XX**	**WX540-0XX**	**WX142-0XX**	–
6-1/8", 50-ohm	**WX860-0XX**	**WX562-0XX**	**WX162-0XX**	–
6-1/8", 75-ohm	**WX865-0XX**	**WX565-0XX**	**WX167-0XX**	–
7-3/16", 75-ohm	**WX875-0XX**	**WX575-0XX**	**WX175-0XX**	–
8-3/16", 75-ohm	**WX885-0XX**	**WX585-0XX**	**WX185-0XX**	12.00 (305)
Dimension B in (mm)	5.50 (139.7)	4.75 (120.7)	3.88 (98.6)	–

* Specify 6 in or 12 in (152.4 mm or 304.8 mm) **-0XX** . XX designates a TV channel.

Earth Station Antenna Products and Systems

Index

Complete Satellite Communication Systems and Service

Applications

Andrew has been known as a world leader in communications equipment for over half a century. The Andrew Earth Station Antenna products have become a standard by which all other ESAs are evaluated. Andrew ESAs are available in a wide range of sizes for diverse applications such as:

- *Corporate Networks*
- *Independent Broadcast*
- *Broadcast Network Distribution*
- *Satellite Carrier Services*
- *State and Local Governments*
- *International Communications*
- *Distance Learning*

Variety

Andrew offers a wide variety of standard communication systems.

- *C-, UC, X-, Ku-, Ka-Band Systems*
- *R/T Antennas from 2.4- to 9.3-Meters and R/O Antennas from 1.2- to 9.3- Meters*
- *Simultaneous C-/Ku-Band Receive Systems*
- *Transportable Antenna Systems*
- *Digital and Analog Receive/Transmit Systems*
- *Satellite Networks*

Andrew continues to develop and design new products for our customer's opportunities. Contact your Andrew account representative regarding your special needs.

Enduring Design

Precision formed aluminum reflectors, extensive use of hot-dipped galvanized steel, stainless steel and high tensile friction-type hardware ensures extended system operational life, increased antenna pointing accuracy under extreme climatic conditions and continued system reliability with minimum maintenance.

Performance

Andrew earth station antenna systems are guaranteed to perform to published specifications. This performance guarantee ensures that specified standards of performance are met or exceeded.

All Andrew earth station antennas include a three-year limited warranty which is the longest in the industry.

Single-Source

Andrew offers a complete line of earth station antenna products and systems from a single-source. This single point of contact saves time, money and simplifies system implementation. Comprehensive system design, installation and testing from one source assures total system compatibility, ultimate operational performance and complete adaptability for future system expansion.

Expandability, Compatibility, Flexibility

A variety of electronic equipment has been tested and verified for quality and performance. This equipment, when pulled together by the Andrew ESA Systems Team, assures that the system provides the performance you expect from Andrew.

Modular options and accessories increase system flexibility and operational capability. We can configure your system to provide transmit, receive, receive/transmit, video, audio, or data capabilities, in single or in combination, digital or analog.

Services

Round out your system package with full service program management, design, documentation, installation, and testing. The Andrew comprehensive service philosophy guarantees the final turnkey system solution meets or exceeds specified requirements.

Satisfaction

Andrew designs each system individually, engineering, installing and testing to meet or exceed customer requirements and system specifications. Andrew ESA satellite communications systems deliver the ultimate in performance and dependability in a single cost-effective package.

Customer Support Services

Every Andrew ESA is backed by more than a quarter century of technical experience and expertise. More importantly, Andrew offers its customers a toll-free technical support number that operates 24 hours a day, 7 days a week.

Faster, Easier Installation

Andrew antennas are specifically engineered to simplify and quicken installation, resulting in significant cost savings to our customers.

Complete Satellite Communication Systems and Service

3.7-Meter Pipe Mount – E-2 Type Approved, Eutelsat and Asiasat

4.9-Meter – Pedestal Mount

7.3-Meter – F-3 Type Approved

APT

AsiaSat

INTELSAT TYPE APPROVED

EUTELSAT TYPE APPROVED

Earth Station Antenna Quick-Reference Guide

2.4-Meter
Ku-Band
Transportable SNG Antenna

3.7-Meter
C-, X- or Ku-Band
Transportable Antenna

4.5-Meter
C-, X- or Ku-Band
Transportable Antenna

1.2- thru 3.6-Meter
C-, UC or Ku-Band
ValuStar™ Earth Station Antenna

3.7-Meter
C-, X-, Ku-, K- or Ka-Band
Pedestal Mount

3.7-Meter
C-, X-, Ku-, K- or Ka-Band
Pipe Mount

4.6-Meter
C-, Ku-, or X-Band

4.5-Meter
C-, X- or Ku-Band

4.9-Meter
C-, X-, Ku- or K-Band

5.6-Meter
Ku-, K- or Ka-Band

6.5-Meter
C-, X-, Ku- or K-Band

7.3-Meter
C- and/or Ku-Band

7.6-Meter
C-, X-, Ku- or K-Band

9.3-Meter
C-Band

ANDREW®

Revised 7/00 & 12/00

Customer Service Center - Call toll-free from: • U.S.A., Canada and Mexico 1-800-255-1479

Earth Station Antenna Quick-Reference Guide

Size	Band	Tx Gain, dBi †	Rx Gain, dBi †	G/T*	Type Approval	Meets or Exceeds the Following Standards
1.2 m	C/UC/Ku	On Application	Refer to following pages	–	–	ITU-R, S.580-5 and S.465-5
1.8 m	C/UC/Ku	On Application	Refer to following pages	–	–	ITU-R, S.580-5 and S.465-5
2.4 m	C/UC/Ku	On Application	Refer to following pages	–	–	ITU-R, S.580-5 and S.465-5
3.0 m	C/UC/Ku	On Application	Refer to following pages	–	–	ITU-R, S.580-5 and S.465-5
3.6 m	C/UC/Ku	On Application	Refer to following pages	–	–	ITU-R, S.580-5 and S.465-5
3.6 m	C	44.5	42.0	22.9	–	INTELSAT E-1, G; ITU-R
	X	47.5	46.7	25.1**	–	
	Ku	52.0	50.7	28.9	–	INTELSAT, E-1, G; ITU-R
	C/Ku	–	50.4 Ku 41.8 C	–	–	
3.7 m	C	46.3	42.5	23.6	–	INTELSAT F-1, G; ITU-R, Russian Homologation
	X	48.4	47.9	26.6**	–	
	Ku	53.0	51.6	30.3	INTELSAT E-2, E-1 G,	INTELSAT E-2, E-1, G; FCC,
	K	55.0	51.8	30.3	ASIASAT and APSTAR	ITU-R, EUTELSAT,
	Ka	On Application	On Application	On Application	–	Russian Homologation
4.5 m	C	46.3	43.9	25.0	–	INTELSAT F-1, G; FCC, ITU-R,
	UC	46.5	44.2	25.0	–	Russian Homologation
	X	49.5	48.7	27.2**	–	
	Ku	53.6	52.4	30.8	–	INTELSAT E-2, E-1, G; FCC, ITU-R, Russian Homologation
4.6 m	C	48.4	44.3	24.7	INTELSAT F-1, D-1 & G	INTELSAT F-1, D-1, G; ITU-R, Russian Homologation
	X	50.4	49.9	28.7**	–	
	Ku	55.1	53.8	30.8	INTELSAT E-2, E-1 & G	INTELSAT E-2, E-1, G; FCC, ITU-R, EUTELSAT, Russian Homologation
4.9 m	C	48.2	44.3	24.0	F-1 Pending	INTELSAT F-1, G; FCC,
	X	50.2	49.7	29.7**	–	ITU-R
	Ku	55.2	53.9	33.0	E-2 Pending	INTELSAT E-2, E-1, G;
	K	57.2	54.0	33.0	–	ITU-R
5.6 m	Ku	57.0	55.5	34.0	–	INTELSAT E-3, E-2, E-1, G;
	K	58.0	56.0	34.0	–	FCC, ITU-R,
	Ka	On Application	On Application	On Application	–	EUTELSAT, Russian Homologation
6.5 m	C	51.0	47.4	29.0	F-2 Pending	INTELSAT E-3, F-2, FCC, ITU-R,
	UC	52.0	48.0	30.0	–	EUTELSAT, Russian Homologation
7.3 m	C	51.8	48.6	30.3	INTELSAT F-3,	INTELSAT F-3, F-2, G;
	UC	52.8	49.2	30.9	F-2, F-1, and G	FCC, ITU-R, EUTELSAT, Russian Homologation
	C	–	48.0	28.2	–	Receive-Only
	Ku	–	55.0	33.0	–	Receive-Only
7.6 m	C	52.7	48.7	29.7	–	INTELSAT F-3, F-2, F-1, D, G;
	UC	53.7	49.3	30.3	–	FCC, ITU-R, EUTELSAT, RussianHomologation
	X	54.7	54.2	33.1**	–	
	Ku	59.4	57.8	36.1	–	INTELSAT E-3, E-2, E-1, G;
	K	60.4	57.8	36.1	–	FCC, ITU-R, EUTELSAT, Russian Homologation
9.3 m	C	54.0	51.5	32.4	–	INTELSAT B, F-3, F-2, F-1, D-2; G;
	UC	55.0	52.1	33	–	FCC, ITU-R, EUTELSAT

All designs, specifications and availabilities of products and services presented are subject to change without notice.

ValuStar™ Earth Station Antennas

1.2-Meter ValuStar™ Antenna with Optional MNT18 Mount

ValuStar™ 1.2-/1.8-/2.4-/3.0-/3.6-Meter Earth Station Antennas

Features:

- *C 3.625-4.2 GHz*
  UC 4.5-4.8 GHz
  Ku 10.7-12.75 GHz
- *Dual-Polarized, High Gain*
- *R/T Version on Application*
- *125 mph (200 km/h) Wind Survival in any Position*
- *Anti-icing Options*
- *Fast, Simple Installation*

ValuStar™ antennas from Andrew are small-diameter, superior quality, earth station antennas for professional services where reliability and durability are essential. They are ideal for broadcast distribution applications.

ValuStar antennas are available in sizes from 1.2- to 3.6-meters and feature an interchangeable, high performance, dual-polarized receive-only feed system that provides optimum gain.

To reduce overall project costs and allow local product manufacture and labor content, the basic antenna is provided with a high-quality azimuth/elevation mount. This mount can be connected to either an Andrew provided (vertical) pipe, or a customer provided (vertical) pipe, and can be held in the vertical position by casting it into a concrete foundation. An optional mount can be offered to bolt to a foundation or other suitable mounting structure.

The antennas use rugged, high accuracy, spun aluminum reflectors which are conversion coated and painted white.

Hot-dip galvanizing of the steel mount parts and careful choice of all materials ensure reliable performance and long life in adverse environments.

Electrical

Antenna Type Diameter, meters	ES12 1.2	ES18 1.8	ES24 2.4	ES30 3.0	ES36 3.6
Gain, dBi with 2-port combiner					
3.625	30.7	34.3	37.0	38.8	39.6
4.000	31.4	35.0	37.7	39.5	40.3
4.200	31.8	35.4	37.8	40.0	41.3
4.500	32.4	36.0	38.7	40.5	41.9
4.650	32.7	36.3	39.0	40.8	42.2
4.800	33.0	36.6	39.3	41.1	42.5
10.70	40.0	43.6	46.3	48.2	49.4
10.95	40.2	43.8	46.5	48.4	49.6
11.95	40.8	44.4	47.2	49.0	50.2
12.75	41.6	45.1	48.0	49.8	50.9
VSWR, maximum	1.3	1.3	1.3	1.3	1.3
Cross Polar Discrimination (linear), dB	30	30	30	30	30
Voltage Axial Ratio (circular)	1.3	1.3	1.3	1.3	1.3
3 dB Beamwidth, degrees	C UC Ku 4.7 4.0 1.7	C UC Ku 3.1 2.7 1.0	C UC Ku 2.4 2.0 0.75	C UC Ku 1.9 1.6 0.60	C UC Ku 1.6 1.3 0.50
ES12 - Noise Temperature, K	**C-Band 2-Port Linear/Circular**		**UC 2-Port Linear**		**Ku-Band 2-Port Linear**
at 10 degrees elevation	42K		43K		58K
at 30 degrees elevation	33K		34K		49K
at 50 degrees elevation	29K		30K		45K
ES18 - Noise Temperature, K	**C-Band 2-Port Linear/Circular**		**UC 2-Port Linear**		**Ku-Band 2-Port Linear**
at 10 degrees elevation	36K		37K		50K
at 30 degrees elevation	29K		30K		42K
at 50 degrees elevation	25K		26K		38K
ES24 - Noise Temperature, K	**C-Band 2-Port Linear/Circular**		**UC 2-Port Linear**		**Ku-Band 2-Port Linear**
at 10 degrees elevation	31K		32K		43K
at 30 degrees elevation	24K		25K		35K
at 50 degrees elevation	20K		21K		31K
ES30 - Noise Temperature, K	**C-Band 2-Port Linear/Circular**		**UC 2-Port Linear**		**Ku-Band 2-Port Linear**
at 10 degrees elevation	25K		26K		35K
at 30 degrees elevation	18K		19K		26K
at 50 degrees elevation	14K		15K		22K
ES36 - Noise Temperature, K	**C-Band 2-Port Linear/Circular**		**UC 2-Port Linear**		**Ku-Band 2-Port Linear**
at 10 degrees elevation	29K		30K		41K
at 30 degrees elevation	22K		23K		32K
at 50 degrees elevation	18K		19K		28K

All of the above models include an az/el mount that interfaces to a customer-provided pipe or the MNT series of pipe.

Mechanical

Antenna Type	ES12	ES18	ES24	ES30	ES36
Survival Wind Rating, mph (km/h)	125 (200)	125 (200)	125 (200)	125 (200)	125 (200)
Mount Adjustment Range **Elevation, degrees**					
Coarse	0-90	0-90	0-90	0-90	0-90
Fine	± 7.5	± 7.5	± 7.5	± 7.5	± 7.5
Azimuth, degrees					
Coarse	360	360	360	360	360
Fine	± 7.5	± 7.5	± 7.5	± 7.5	± 7.5
Net Weight, lb (kg)	122 (55)	136 (62)	616 (280)	682 (310)	1067 (485)
Standard Reflector – Vertical Configuration	One-Piece	One-Piece	One-Piece	Two-Piece	Two-Piece
Mounting Pipe Size Needed, Nominal	4.5"	4.5"	6.625"	6.625"	6.625"

Surface anti-Icing options: Antenna reflector surface anti-icing systems are available to prevent snow and ice from forming that would otherwise accumulate on the antenna reflector and affect the signal quality. These systems heat a 360 degree region of the reflector and come supplied with a precipitation sensing device, a temperature sensing control unit and all inter-connecting cables. In addition, a dish center heater is available, for use where ice and snow conditions may be severe.

Antenna Accessories

- Factory Feed System Testing and Documentation
- Ocean Transport Packing
- Anti-Icing and Deicing
- Grounding Kit
- LNA Support Kits

3.7-Meter Dual-Reflector C-, X-, or Ku-Band

3.7-Meter Pipe Mount

3.7-Meter Pedestal Mount

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Gregorian Optics*
- *Self-Aligning Main Reflector – No Field Alignment*
- *Field Changeable Feed System, C-Band, Circular to Linear*
- *3-Year Warranty on All Structural Components*
- *High Wind (180 mph - 288 km/h) Option*
- *MPJ Versions Supplied with 20,000 Pound Jacks for Both Az and El Axis*

Compliances and Type Approvals:

- *APSTAR*
- *ASIASAT*
- *BRASILSAT*
- *INTELSAT (IA012A00) or (IA012B00), E2, G*
- *EUTELSAT (EA-A002 or EA-A014)*
- *ITU-R, S.580-5 and S.465-5*
- *U. S. FCC Regulation 25.209*
- *Approved for use in the Territory of Russia by the Ministry of Communications of the Russian Federation (Reference: Homologation Certificate No OC/I-A -f-1)*

Now communications system integrators and designers can bring their systems on line faster, more economically, and with superior performance with Andrew 3.7-meter Earth Station Antenna (ESA). The Andrew 3.7-meter ESA features advanced dual-reflector technology together with a two-piece precision spun aluminum reflector assembly. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics.

Our wide selection of type approved antennas speeds system commissioning. The Andrew 3.7 Type Approved ESA can be deployed in the field with minimal testing of G/T to become fully certified as an INTELSAT standard E-2, E-1 station.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance. The easily installed pedestal or pipe mount allows for non-critical foundation orientation.

The 2-port C-Band Circular R/T feed system is manually field switchable from circular to linear polarization. The 48 inch (1219 mm) diameter by 24 inch (610 mm) equipment enclosure with doors allows hub mounting of LNA systems.**

For cost effective system expansion, modular equipment options include 2- or 4-port* combining network configurations, dual-speed motor drive systems for worldwide applications, feed rotation systems*, anti-icing equipment, and pressurization systems. Microprocessor steptrack control and motorizable mount options are also available.

* Ku-Band Only.
** Enclosure Available on Pedestal Mounts Only.

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Grounding Kit
Foundation Kit
Lightning Rod Kit
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits
Hub Ventilation Kit

ANDREW®

Revised 9/00 & 2/01

3.7-Meter Dual-Reflector C-, X- or Ku-Band

Electrical Specifications

Operating Frequency Band	
C-Band Receive	3.625-4.2 GHz
C-Band Transmit	5.850-6.425 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz
Ku-Band Receive	10.7-13.25 GHz
Ku-Band Transmit	13.75-14.8 GHzz

Gain, with 2 port linear combiner (dBi, ±0.2 dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.625 GHz	41.6	5.850 GHz	45.9
4.000 GHz	42.7	6.175 GHz	46.4
4.200 GHz	43.1	6.425 GHz	46.6
7.250 GHz	47.7	7.90 GHz	48.2
7.500 GHz	47.9	8.15 GHz	48.4
7.750 GHz	48.1	8.40 GHz	48.6
10.700 GHz	50.6	13.75 GHz	52.5
10.950 GHz	50.8	14.00 GHz	52.7
11.950 GHz	51.6	14.25 GHz	52.8
12.750 GHz	52.1	14.50 GHz	53.0
		14.80 GHz	53.2

Polarization
C-Band is circular, (switchable to linear) or linear only;
X-Band is circular; Ku-Band is linear

Polarization Discrimination, (Linearly-Polarized):
>35 dB across 1 dB beamwidth - C- or Ku-Band

Voltage Axial Ratio, (Circularly-Polarized) across the 1 dB beamwidth
C-Band, <1.09:1 Tx
<1.20:1 Rx
X-Band, <1.20:1 Tx and Rx

Beamwidth, Mid-band, Degrees

	C-Band	Ku-Band	X-Band
3 dB Receive (Transmit)	1.20 (0.80)	0.42 (0.36)	0.65 (0.60)
15 dB Receive (Transmit)	2.0 (1.40)	0.85 (0.69)	1.19 (1.09)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port combiner.

Elevation	Kelvin (C-Band)	Kelvin (X-Band)	Kelvin (Ku-Band)
10°	43	48	52
30°	38	35	39
50°	36	33	37

Antenna VSWR, Transmit and Receive	<1.3:1

G/T Performance (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES37 G/T at 10° EL (dB/K)	22.3	23.2	24.0

Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

G/T Performance (X-Band)

LNA/LNB Noise Temperature	100K	75K	50K
ES37 G/T at 10° EL (dB/K)	25.9	26.6	27.6

Based on a 2-port, circularly-polarized antenna configuration at 7.5 GHz and at 10° elevation under clear sky conditions.

G/T Performance (Ku-Band)

LNA/LNB Noise Temperature	165K	125K	90K
ES37 G/T at 10° EL (dB/K)	28.2	29.1	30.1

Based on a 2-port, linearly-polarized antenna configuration at 12 GHz and at 10° elevation under clear sky conditions.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	2
Mount Type	El over Az, Pedestal or pipe mount
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	360° (180°)
Hub/Enclosure Dimensions (when applicable) Pedestal mount only	
Diameter	48 in (1.2 m)
Depth	24 in (0.6 m)
Wind Loading, Survival (standard)	125 mph (200 km/h) in any position of operation
Wind Loading, Survival (optional high wind)	180 mph (288 km/h) in any position of operation
Wind Loading, Operational (motor drives)	45 mph (66 km/h), gusting to 65 mph (97 km/h)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Typical Pedestal Mount Slab Foundation

Soil Bearing Capacity	2000 lb/ft^2 (14,646 kg/m^2)
Reinforcing Steel	194 lb (88 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	REF: 203340
Length	9.0 ft (2.74 m)
Width	9.0 ft (2.74 m)
Depth	1.0 ft (0.3 m)
Concrete Volume	3.0 yd^3 (2.3 m^3)

Typical Pipe Mount Slab Foundation

Soil Bearing Capacity	2000 lb/ft^2 (14,646 kg/m^2)
Reinforcing Steel	353 lb (160 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	REF: 240165
Length	10.0 ft (2.74 m)
Width	10.0 ft (2.74 m)
Depth	1.0 ft (0.3 m) to 2.5 ft (0.76 m)
Concrete Volume	5.3 yd^3 (4.3 m^3)

Shipping Information

Weight, Net	1750 lb (800 kg)
Shipping Weight	2670 lb (1220 kg)
Shipping Volume	530 ft^3 (15.0 m^3)
Shipping Container:	
Quantity, 2	Standard 20 ft land/sea container
Quantity, 4	Standard 40 ft land/sea container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

Revised 9/00 & 2/01

4.6-Meter Dual-Reflector C-, Ku- or X-Band

X-Band option now available

Electrical Performance Meets or Exceeds:

- *INTELSAT E-2 Type Approved:*
  Type Number: ES46( )-4124W
  Registration Number: IA021B00
  Type Number: ES46( )-4124W-24
  Registration Number: IA021BA0
  Type Number: ES46( )-124W
  Registration Number: IA021A00
  Type Number: ES46( )-124W-24
  Registration Number: IA021AA0
- *INTELSAT, Requirements for standard F-1, D-1 and G (C-band) and E-1 or E-2 (Ku-band).*
- *EUTELSAT requirements for pattern and polarization discrimination.*
- *U. S. FCC regulation 25.209, for mandatory pattern requirements for 2° satellite spacing (Ku-band).*
- *Approved for use in the territory of Russia by the Ministry of Communications of the Russian Federation. (Reference: Homologation Certificate No. OC/1-AΦ-1).*

Control Options
Microprocessor or Steptrack Control Options Available for Motorized Antennas.

Equipment Enclosure
A 48 inch (1219 mm) Diameter by 24 inch (610 mm) Deep Equipment Enclosure with Doors for Hub Mounting of LNA Systems.

Field Changeable Feed System
C-Band Feed System is Field Switchable from Circular to Linear Polarization.

No Field Alignment
Self-Aligning Main Reflector Requires No Field Alignment.

High Performance Dual-Reflector Feed System.
The Andrew 4.6-meter earth station antenna incorporates a uniquely formed dual-reflector Gregorian system, coupled with close-tolerance manufacturing techniques, resulting in extremely accurate surface contours and providing superior electrical performance characteristics.

Economical Shipping Costs. The segmented aluminum reflector panels are precisely cut from a single piece, precision spun reflector to minimize shipping costs.

Horizon-To-Horizon Coverage. The elevation-over-azimuth pedestal ground mount enables horizon-to-horizon coverage from virtually any worldwide location.

Non-Critical Pedestal Mount Installation. The easily installed pedestal mount allows from non-critical foundation orientation and is capable of 180° of azimuth travel via three 120° continuous ranges with 30° overlap. Elevation travel is continuous from 0 to 90°.

Manual Or Motorizable Mount Configurations. Multiple mount configurations provide a wide variety of options to enable custom system designs to meet initial and future optional requirements.

Motorizable Mount Enables Future Motorized Operation. The motorizable pedestal mount features self-aligning bearings for the elevation pivots, resulting in “zero” backlash and the ability to upgrade the antenna for motorized operation, including steptracking or program-tracking applications.

Minimal Field Testing. These antennas can be deployed in the field with minimal testing of G/T to become fully certified as an INTELSAT standard E-2,E-1, or F-1 station. Coordination with the local signatory is required on INTELSAT Type Accepted antennas.

ANDREW®

Revised 7/00 & 12/00

4.6-Meter Dual-Reflector C-, X-, or Ku-Band

Electrical Specifications

Operating Frequency Band*	
C-Band Receive	3.625-4.2 GHz
C-Band Transmit	5.850-6.425 GHz
Ku-Band Receive	10.95-12.75 GHz
Ku-Band Transmit	14.0-14.5 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz

Gain*, at circular waveguide flange of feed. (dBi, ±0.2dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.625 GHz	43.2	5.850 GHz	48.0
4.000 GHz	44.3	6.175 GHz	48.4
4.200 GHz	44.8	6.425 GHz	48.8
7.250 GHz	49.7	7.90 GHz	50.2
7.500 GHz	49.9	8.15 GHz	50.4
7.750 GHz	50.1	8.40 GHz	50.6
10.950 GHz	53.0	14.00 GHz	55.0
11.950 GHz	53.8	14.25 GHz	55.1
12.750 GHz	54.3	14.50 GHz	55.2

Polarization*
Circular, switchable to linear in the field (C-Band) Linear (Ku-Band)

Polarization Discrimination*, (Linearly-Polarized):
>35 dB across 1 dB beamwidth - (C- or Ku-Band)

Voltage Axial Ratio*, C-Band, circularly-polarized with 4-port combiner
<1.06:1 on axis; X-Band, <1.20:1 on axis, Tx and Rx

Beamwidth, Mid-band, Degrees	C-Band	Ku-Band	X-Band
3 dB Receive (Transmit)	0.92 (0.63)	0.34 (0.29)	0.51 (0.47)
15 dB Receive (Transmit)	1.82 (1.21)	0.67 (0.54)	1.01 (0.93)

Antenna Noise Temperature* - under clear sky conditions, at 68°F (20°C), at the circular waveguide flange of the feed.

Elevation	Kelvin (C-Band)	Kelvin (Ku-Band)	Kelvin (X-Band)
10°	32	42	37
30°	27	32	27
50°	25	29	24

Antenna VSWR*, Transmit and Receive <1.25:1

* Actual antenna specifications are amended by the choice of feed/combiner options. For further feed/combiner option information, ask for Andrew Bulletin 1669 (C-Band), Bulletin 1670 (Ku-Band) and Bulletin 3653A (X-Band).

Typical Slab Foundation Information

Soil Bearing Capacity	3000 lb/ft² (14.646 kg/m²)
Reinforcing Steel	284 lb (129 kg)
Concrete Compressive Strength	3000 lb/in² (211 kg/cm²)
Foundation Size:	
Length	10.0 ft (3.05 m)
Width	10.0 ft (3.05 m)
Depth	1.5 ft (0.5 m)
Concrete Volume	5.56 yd³ (4.25 m³)

Note: Other typical foundation designs are available.

G/T Performance* (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES46 G/T at 10° EL (dB/K)	23.3	24.1	24.7

* Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

G/T Performance* (Ku-Band)

LNA/LNB Noise Temperature	165K	125K	90K
ES46 G/T at 10° EL (dB/K)	30.2	31.1	32.0

*Based on a 2-port, linearly-polarized antenna configuration at 12 GHz and at 10° elevation under clear sky conditions.

G/T Performance* (X-Band)

LNA/LNB Noise Temperature	50K	75K	100K
ES46 G/T at 10° EL (dB/K)	29.7	28.7	27.9

*Based on a 2-port, linearly-polarized antenna configuration at 7.50 GHz and at 10° elevation under clear sky conditions.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	8
Mount Type	El over AZ, Pedestal
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	48 in (1.22 m)
Depth	24 in (0.61 m)
Wind Loading, Survival	125 mph (200 km/h) in any position of operation
Wind Loading, Operational (motor drives)	45 mph (72 km/h), gusting to 65 mph (105 km/h)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft² (1135 Watts/m²)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

The 4.6 m antenna motorized version can be equipped with manual struts or jackscrews which can be upgraded to motorized operation with the addition of optional motorization drive packages. The drive speed characteristics of these motor drive systems are summarized below:

Motor Drive Speed Summary

Drive System Type	Speed Summary High	Medium	Low
HS	Fast	Slow	–
MS	–	Fast	Slow
STHS	Fast	–	Slow

Note: All motorization drive packages are comprised of dual-speed motors, yielding a "fast" and "slow" speed for each speed range per the above chart. All 50 Hz motor drive speeds are approximately .83 the speed of the 60 Hz motor.

For antenna series: ES46MPJ- equipped with the MK5HS- series drive systems with 60 Hz motors.
Nominal Speed, (degrees/second)

Elevation, Slow/Fast	0.22°/1.03°
Azimuth, Slow/Fast	0.37°/1.6°
Polarization	1.5°

For antenna series: ES46MPJ- equipped with the MK5MS- series drive systems with 60 Hz motors.
Nominal Speed, (degrees/second)

Elevation, Slow/Fast	0.015°/.065°
Azimuth, Slow/Fast	0.025°/0.1°
Polarization	1.5°

For antenna series: ES46MPJ- equipped with the MK5STHS- series drive systems with 60 Hz motors.
Nominal Speed, (degrees/second)

Elevation, Slow/Fast	0.014°/0.98°
Azimuth, Slow/Fast	0.023°/1.5°
Polarization	1.5°

Uplink EIRP Capability* (C-Band)

HPA Output (Watts)	50	300	1000
Uplink EIRP (dBW)	65.0	72.8	78.0

* Based on a 2-port antenna configuration at 6.175 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Uplink EIRP Capability* (Ku-Band) and X-Band

HPA Output (Watts)	(50) 25	(300) 100	(600) 400
Uplink EIRP (dBW)	(72.0) 64.2	(79.8) 70.2	(82.8) 76.2

* Based on a 2-port antenna configuration at 14.25 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

4.5-Meter C-, X- or Ku-Band

4.5-Meter Pedestal Mount

4.5-Meter Tripod Mount

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Grounding Kit
Foundation Kit
Lightning Rod Kit
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Main Reflector – No Special Field Alignment*
- *3-Year Warranty on All Structural Components*
- *MPJ Versions Supplied with 20,000 Pound Jacks for Both Az and El Axis*

Compliances:

- *APSTAR*
- *ASIASAT*
- *BRASILSAT*
- *INTELSAT E-2, E-1, F-1, G*
- *U.S. FCC Regulation 25.209*
- *ITU-R, S.580-5 and S.465-5*
- *Approved for use in the Territory of Russia by the Ministry of Communications of the Russian Federation (Reference: Homologation Certificate No OC/I-A -f-1)*

Now communications system integrators and designers can bring their systems on line faster, more economically, and with superior performance with the Andrew 4.5-meter Earth Station Antenna (ESA). In use around the world in high-density data, voice, communications networks, and broadcast applications, the Andrew 4.5-meter ESA features an exclusively designed 2- or 4-port prime focus, beam-shaping feed and ground plane configuration. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics. The antenna is versatile, and can be configured for transmit/receive as well as receive-only, and for either linearly- or circularly-polarized C-Band, linearly-polarized Ku-Band, Hybrid C-/Ku-Band, or X-Band operation. Both pedestal and tripod mount types are available (motorization for pedestal only).

Andrew 4.5-meter ESAs feature exceptionally easy and accurate assembly. When using our optional hoisting kit no crane is necessary for installation. Additionally, the main reflector requires no special field alignment.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance. For cost effective system expansion, available modular equipment options include anti-icing equipment and pressurization systems. Microprocessor steptrack control and motorizable mount options are also available.

4.5-Meter C-, X- or Ku-Band

Electrical Specifications

Operating Frequency Band	
C-Band Receive	3.4-4.2 GHz
C-Band Transmit	5.850-6.725 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz
Ku-Band Receive	10.7-13.25 GHz
Ku-Band Transmit	13.75-14.8 GHz

Gain, with 2 port linear combiner (dBi, ±0.2dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.400 GHz	42.4	5.850 GHz	46.0
3.625 GHz	42.8	6.175 GHz	46.3
4.000 GHz	43.9	6.425 GHz	46.6
4.200 GHz	44.2	6.725 GHz	47.0
7.250 GHz	48.4	7.90 GHz	49.2
7.500 GHz	48.7	8.15 GHz	49.5
7.750 GHz	49.0	8.40 GHz	49.8
10.700 GHz	51.4	13.75 GHz	53.2
10.950 GHz	51.6	14.00 GHz	53.4
11.950 GHz	52.4	14.25 GHz	53.6
12.750 GHz	52.9	14.50 GHz	53.7
13.25 GHz	53.2	14.80 GHz	53.8

Polarization
Linearly- or Circularly-Polarized

Polarization Discrimination, (Linearly-Polarized):
>35 dB on axis

Voltage Axial Ratio, C-Band, circularly-polarized with 2-port combiner

C-Band,	<1.09:1 on axis, Tx
	<1.20:1 on axis, Rx
X-Band,	<1.20:1 on axis, Tx and Rx

Beamwidth, Mid-band, Degrees

	C-Band	X-Band	Ku-Band
3 dB Receive (Transmit)	1.22 (0.85)	0.66 (0.60)	0.40 (0.35)
15 dB Receive (Transmit)	2.47 (1.90)	1.40 (1.29)	0.84 (0.67)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), at the circular waveguide flange of the feed.

Elevation	Kelvin (C-Band)	Kelvin (X-Band)	Kelvin (Ku-Band)
10°	44	45	53
30°	32	34	41
50°	28	29	38

Antenna VSWR, Transmit and Receive	<1.3:1

G/T Performance (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES45 G/T at 10° EL (dB/K)	23.4	24.3	25.0

Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

G/T Performance (X-Band)

LNA/LNB Noise Temperature	100K	75K	50K
ES45 G/T at 10° EL (dB/K)	26.5	27.2	28.1

Based on a 2-port, circularly-polarized antenna configuration at 7.5 GHz and at 10° elevation under clear sky conditions.

G/T Performance (Ku-Band)

LNA/LNB Noise Temperature	165K	125K	90K
ES45 G/T at 10° EL (dB/K)	29.1	29.9	30.8

Based on a 2-port, circularly-polarized antenna configuration at 12 GHz and at 10° elevation under clear sky conditions.

Uplink EIRP Capability (C-Band)

HPA Output (watts)	25	125	500
Uplink EIRP (dBW)	60.5	67.5	73.5

Based on a 2-port antenna configuration at 6.175 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Uplink EIRP Capability (X-Band)

HPA Output (watts)	25	125	500
Uplink EIRP (dBW)	63.3	69.3	75.3

Based on a 2-port antenna configuration at 8.15 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Uplink EIRP Capability (Ku-Band)

HPA Output (watts)	25	125	500
Uplink EIRP (dBW)	60.5	67.5	73.5

Based on a 2-port antenna configuration at 6.175 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Mechanical Specifications

Feed Type	Prime Focus
Reflector Material	Precision-Formed Aluminum
Reflector Segments	6
Mount Type	El over Az, Manual Tripod or Pedestal
Antenna Pointing Range, Pedestal Mount Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Antenna Pointing Range, Tripod Mount Coarse/(Continuous)	
Elevation (Standard)	2-62° (15°)
Elevation (Extended)	33-90° (15°) optional
Azimuth	164° (15°)
Wind Loading, Survival	
125 mph (200 km/h) in any position of operation	
Wind Loading, Operational (pedestal motorized)	
45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)	
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Pedestal/Tripod Slab Foundation

Soil Bearing Capacity	2000 lb/ft^2 (9770 kg/m^2)
Reinforcing Steel	284 lb (129 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	10.0 ft (3.05 m)
Width	10.0 ft (3.05 m)
Depth	18 in (0.5 m)
Concrete Volume	5.56 yd^3 (4.25 m^3)

Shipping Information

Shipping Weight	
4.5 m (P, MP, MPJ Types)	6000 lb (2722 kg)
4.5 m (T Types) Tripod	5600 lb (2540 kg)
Shipping Volume	690 ft^3 (19.5 m^3)
Shipping Container	
4.5 m (P, MP, MPJ Types)	
Quantity 2	Standard 20 ft land/sea container
Quantity 5	Standard 40 ft land/sea container
4.5 m (T Types)	
Quantity 2	Standard 20 ft land/sea container
Quantity 5	Standard 40 ft land/sea container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

4.9-Meter Dual-Reflector C-, X-, Ku- or K-Band

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Grounding Kit
Foundation Kit
Lightning Rod Kit
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Gregorian Optics*
- *3-Year Warranty on All Structural Components*
- *Self-Aligning Main Reflector – No Field Alignment*
- *Field Changeable Feed System, C-Band, Circular to Linear*

Compliances:

- *APSTAR*
- *ASIASAT*
- *INTELSAT F-1**
- *INTELSAT E-2**
- *EUTELSAT*
- *ITU-R, S.580-5 and S.465-5*
- *U. S. FCC Regulation 25.209 at Ku-Band*

Now communications system integrators and designers can bring their systems on line faster, more economically, and with superior performance with Andrew 4.9-meter Earth Station Antenna (ESA). The Andrew 4.9-meter ESA features uniquely formed dual reflector Gregorian system coupled with close-tolerance manufacturing techniques. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics.

Our wide selection of type approved antennas speeds system commissioning.

The 2-port C-Band Circular R/T feed system is manually field switchable from circular to linear polarization. The 48 inch (1219 mm) diameter by 32 inch (813 mm) equipment enclosure with doors allows hub mounting of LNA systems.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance. For cost effective system expansion, available modular equipment options include anti-icing equipment and pressurization systems. Microprocessor steptrack control and motorizable mount options are also available.

* Type Approval Pending

4.9-Meter Dual-Reflector C-, X-, Ku- or K-Band

Electrical Specifications

Operating Frequency Band	
C-Band Receive	3.4-4.2 GHz
C-Band Transmit	5.850-6.725 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz
K- and Ku-Band Receive	10.7-13.25 GHz
Ku-Band Transmit	13.75-14.8 GHz
K-Band Transmit	17.3-18.4 GHz

Gain, with 2 port linear combiner (dBi, ±0.2 dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.400 GHz	43.0	5.850 GHz	47.8
3.625 GHz	43.7	6.175 GHz	48.2
4.000 GHz	44.3	6.425 GHz	48.6
4.200 GHz	44.7	6.725 GHz	48.7
7.250 GHz	49.5	7.90 GHz	50.0
7.500 GHz	49.7	8.15 GHz	50.2
7.750 GHz	49.9	8.40 GHz	50.6
10.700 GHz	52.9	13.75 GHz	54.9
10.950 GHz	53.1	14.00 GHz	55.0
11.950 GHz	53.9	14.25 GHz	55.2
12.750 GHz	54.4	14.50 GHz	55.3
		14.80 GHz	55.5
		17.30 GHz	57.0
		18.40 GHz	57.5

Polarization
C-Band is circular, (switchable to linear) or linear only;
X-Band is circular; Ku-Band is linear; K-Band is linear or circular

Polarization Discrimination, (Linearly-Polarized):
>35 dB across 1 dB beamwidth - C- or Ku-Band or K-Band

Voltage Axial Ratio, (Circularly-Polarized) across the 1 dB beamwidth
C-Band, <1.09:1 Tx
<1.20:1 Rx
X-Band, <1.20:1 Tx and Rx

Beamwidth, Mid-band, Degrees

	C-Band	Ku-Band	X-Band	K-Band
3 dB Receive (Transmit)	0.98 (0.63)	0.32 (0.29)	0.51 (0.47)	0.32 (0.23)
15 dB Receive (Transmit)	1.90 (1.26)	0.64 (0.54)	1.01 (0.93)	0.64 (0.40)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port combiner..

Elevation	Kelvin (C-Band)	Kelvin (X-Band)	Kelvin (Ku-Band)
10°	43	45	49
30°	35	35	38
50°	33	33	36

Antenna VSWR, Transmit and Receive <1.25:1

G/T Performance (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES49 G/T at 10° EL (dB/K)	23.3	24.1	24.7

Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

G/T Performance (X-Band)

LNA/LNB Noise Temperature	100K	75K	50K
ES49 G/T at 10° EL (dB/K)	27.9	28.7	29.7

Based on a 2-port, circularly-polarized antenna configuration at 7.5 GHz and at 10° elevation under clear sky conditions.

G/T Performance (Ku-Band)

LNA/LNB Noise Temperature	165K	125K	90K
ES49 G/T at 10° EL (dB/K)	30.2	31.1	32.0

Based on a 2-port, circularly-polarized antenna configuration at 12 GHz and at 10° elevation under clear sky conditions.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	12
Mount Type	El over Az
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	48 in (1.22 m)
Depth	32 in (0.81 m)
Wind Loading, Survival	125 mph (200 km/h) in any position of operation
Wind Loading, Operational	45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Slab Foundation Information

Soil Bearing Capacity	2000 lb/ft^2 (9770 kg/m^2)
Reinforcing Steel	688 lb (312 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	11.6 ft (3.5 m)
Width	11.6 ft (3.5 m)
Depth	18 in (0.5 m)
Concrete Volume	7.35 yd^3 (5.62 m^3)

Shipping Information

Shipping Weight	
4.9 m	4700 lb (2132 kg)
Shipping Volume	720 ft^3 (20.4 m^3)
Shipping Container	
4.9 m	4 per 40 ft standard container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

5.6-Meter
Ku-, K- or Ka-Band

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Hub Ventilation Kit
Grounding Kit
Foundation Kit
Lightning Rod Kit
Maintenance Platform and Ladder
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Advanced Gregorian Optics*
- *Self-Aligning Main Reflector—No Field Alignment*
- *Deep Equipment Enclosure*
- *3-Year Warranty on All Structural Components*

Compliances:

- *APSTAR*
- *ASTRA*
- *ASIASAT*
- *BRASILSAT*
- *INTELSAT E-3, E-2, E-1, G*
- *EUTELSAT*
- *FCC Regulation 25.209*
- *ITU-R, S.580-5 and S.465-5*
- *Approved for use in the Territory of Russia by the Ministry of Communications of the Russian Federation (Reference: Homologation Certificate No OC/I-A -f-1)*

Communications system integrators and designers can bring their systems on line faster, more economically, and with superior performance with the Andrew 5.6-meter Earth Station Antenna (ESA). In use worldwide in high-density data and voice communications networks and television broadcast video distribution applications, the Andrew 5.6-meter ESA features a uniquely formed dual reflector Gregorian system coupled with close-tolerance manufacturing techniques. This combination provides extremely accurate surface contour, high gain, superior efficiency, and exceptional pattern characteristics.

Our wide selection of Type Approved antennas speeds system deployment. Type Approved Andrew ESAs can be deployed in the field with minimal testing and decreased administrative and approval requirements.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance. For cost effective system expansion, available modular equipment options include anti-icing equipment and pressurization systems. Microprocessor steptrack control and motorizable mount options are also available.

5.6-Meter
Ku-, K- or Ka-Band

Electrical Specifications

Operating Frequency Band	
Ku-Band Receive	10.7-13.25 GHz
Ku-Band Transmit	12.75-14.8 GHz
K-Band Transmit	17.3-18.9 GHz
Ka-Band Receive	17.7-21.2 GHz
Ka-Band Transmit	27.5-30.0 GHz

Gain, with 2-port combiner (dBi, ±0.2 dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
10.700 GHz	54.5	12.750 GHz	56.1
10.950 GHz	54.7	13.250 GHz	56.3
11.950 GHz	55.5	13.75 GHz	56.6
19.250 GHz	59.2	14.25 GHz	57.0
		14.50 GHz	57.1
		18.000 GHz	58.6
		29.00 GHz	62.0

Polarization	
K-/Ku-Band	Linear
Ka-Band	Circular
Polarization Discrimination	
K/Ku	>35 dB across beamwidth 19 - 25 log Ø from 1.8° to 9.2°
Ka	1.09:1 VAR

Beamwidth, Mid-band, Degrees

	Ku- & K-Band	Ka-Band
3 dB Receive (Transmit)	0.28 (0.23)	0.21 (0.15)
15 dB Receive (Transmit)	0.52 (0.44)	0.47 (0.34)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port linear combiner.

Elevation	Ku- & K-Band Kelvin	Ka-Band Kelvin
10°	49	96
30°	38	64
50°	35	59

Antenna VSWR, Transmit and Receive	<1.3:1

G/T Performance

LNA/LNB Noise Temperature	165K	125K	90K
ES56 G/T at 10° EL (dB/K)	32.2	33.0	34.0

Based on a 2-port, linearly-polarized antenna configuration at 12 GHz under clear sky conditions.

LNA/LNB Noise Temperature		220K	150K
ES56 G/T at 10° EL (dB/K)		33.0	35.0

Based on a 2-port, circularly-polarized antenna configuration at 19.25 GHz under clear sky conditions.

Uplink EIRP Capability

HPA Output (watts)	75	300	2000
Uplink EIRP (dBW)	75.7	81.7	90.0

Based on a 2-port antenna configuration at 14.25 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

HPA Output (watts)	50	200	500
Uplink EIRP (dBW)	79.0	85.0	89.0

Based on a 2-port antenna configuration at 29.0 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	16
Mount Type	El over Az, Tripod (Ku- and K-band) Pedestal (Ka-band)
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	52 in (1.32 m)
Depth	46 in (1.17 m)
Wind Loading, Survival	125 mph (200 km/h) in any position of operation (tripod) 150 mph (240 km/h) in any position of operation (pedestal)
Wind Loading, Operational	45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Typical Slab Foundation Information

Soil Bearing Capacity	2000 lb/ft^2 (9,764 kg/m^2)
Reinforcing Steel	1308 lb (593 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	14 ft (4.5 m)
Width	14 ft (4.5 m)
Depth	1.5 ft (0.5 m)
Concrete Volume	12.1 yd^3 (9.3 m^3)

Note: Other typical foundation designs are available.

Typical Shipping Information

Net Weight	3035 lb (1785 kg)
Gross Shipping Weight	5600 lb (2450 kg)
Shipping Volume	690 ft^3 (19.5 m^3)
Shipping Container	
Quantity 1	Standard 20 ft land/sea container
Quantity 3	Standard 40 ft land/sea container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

6.5-Meter Dual-Reflector C-Band

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Hub Ventilation Kit
Grounding Kit
Foundation Kit
Lightning Rod Kit
Maintenance Platform and Ladder
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Advanced Gregorian Optics*
- *Self-Aligning Main Reflector – No Field Alignment*
- *Field Switchable Rx/Tx Combiner, 2-Port C-Band Circular*
- *Rugged Aluminum and Steel – 125 mph (200 kph) Wind Survival*
- *3-Year Warranty on All Structural Components*

Compliances:

- *APSTAR*
- *ASIASAT*
- *BRAZILSAT*
- *EUTELSAT*
- *INTELSAT F-2, F-1 at C-Band*
- *FCC Regulation 25.209, from 1° to 180°*

Communications system integrators and designers can now bring their systems on line faster, more economically, and with superior performance with Andrew 6.5-meter Earth Station Antennas.

Excellent for high-density data, voice, communications networks, and broadcast applications, the Andrew 6.5-meter ESA features a uniquely formed dual-reflector Gregorian system coupled with close-tolerance manufacturing techniques. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics.

The 6.5-meter antenna is fully compliant with the FCC 25.209 specifications from 1° to 180° at C-band. Waivers are not required for routine licensing of the 6.5 meter at C-band.

The 2-port circular Rx/Tx combiners are field switchable from circular to linear polarization.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance.

For cost effective system expansion, available modular equipment options include anti-icing equipment and pressurization systems. Microprocessor steptrack control and two mount options – manual only and motorizable – are also available.

ANDREW®

Revised 2/01

6.5-Meter Dual-Reflector C-Band

Electrical Specifications

Operating Frequency Band			
C-Band Receive	3.400-4.2 GHz		
C-Band Transmit	5.850-6.725 GHz		
Gain, with 2-port combiner (dBi, ±0.2 dB)			
Rx Frequency	**Rx Gain**	**Rx Frequency**	**Rx Gain**
3.400 GHz	45.9	5.850 GHz	50.6
3.625 GHz	46.5	6.175 GHz	50.9
4.000 GHz	47.4	6.425 GHz	51.1
4.200 GHz	47.8	6.725 GHz	51.4
Polarization			
C-Band	Linearly- or Circularly-Polarized		
Polarization Discrimination (Linearly Polarized)			
>35 dB across 1 dB beamwidth	19 - 25 log ø from 1.8° to 9.2°		
Voltage Axial Ratio, C-Band, circularly-polarized with 4-port combiner <1.06:1 across the 1 dB beamwidth <1.09 and 1.2 with 2-port			
Beamwidth, Mid-band, Degrees	**C-Band**		
3 dB Receive (Transmit)	0.74 (0.45)		
15 dB Receive (Transmit)	1.46 (0.87)		
Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port linear combiner.			
Elevation	**Kelvin (C-Band)**		
10°	39		
30°	29		
50°	26		
Antenna VSWR, Transmit and Receive	<1.3:1		

G/T Performance (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES65 G/T at 10° EL (dB/K)	27.2	28.1	29.0

Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

Uplink EIRP Capability (C-Band)

HPA Output (watts)	125	500	3000
Uplink EIRP (dBW)	72.0	78.0	85.8

Based on a 2-port antenna configuration at 6.175 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	16
Mount Type	El over Az, Tripod, Manual or Motorized
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	52 in (1.32 m)
Depth	48.5 in (1.17 m)
Wind Loading, Survival	
125 mph (200 km/h) in any position of operation	
Wind Loading, Operational	
45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)	
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Typical Slab Foundation Information

Soil Bearing Capacity	2000 lb/ft^2 (9,764 kg/m^2)
Reinforcing Steel	1708 lb (807 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	15.5 ft (4.7 m)
Width	15.5 ft (4.7 m)
Depth	2.0 ft (0.6 m)
Concrete Volume	17.8 yd^3 (13.6 m^3)

Typical Shipping Information

Net Weight	6400 lb (2903 kg)
Gross Shipping Weight	8101 lb (3675 kg)
Shipping Volume	780 ft^3 (22.1 m^3)

All designs, specifications and availabilities of products and services presented are subject to change without notice.

7.3-Meter
C- and/or Ku-Band

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Hub Ventilation Kit
Grounding Kit
Foundation Kit
Lightning Rod Kit
Maintenance Platform and Ladder
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Advanced Gregorian Optics*
- *3-Year Warranty on All Structural Components*
- *Self-Aligning Main Reflector – No Field Alignment*
- *Field Switchable Rx/Tx Combiner, 2-Port C-Band Circular*
- *Rugged Aluminum and Steel – 125 mph (200 kph) Wind Survival*

Compliances and Type Approvals:

- *INTELSAT F-3, F-2, F-1, G, (IA032A00 & IA032B00)*
- *FCC Regulation 25.209*
- *ITU-R, S.580-5 and S.465-5*
- *Approved for use in the Territory of Russia by the Ministry of Communications of the Russian Federation*

Communications system integrators and designers can bring their systems on line faster, more economically, and with superior performance with Andrew 7.3-meter Earth Station Antennas (ESAs). Excellent for high-density data, voice, communications networks, and broadcast applications, the Andrew 7.3-meter ESA features a uniquely formed dual reflector Gregorian system coupled with close-tolerance manufacturing techniques. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics.

Our wide selection of Type Approved antennas speeds system deployment. Type Approved Andrew ESAs can be deployed in the field with minimal testing and decreased administrative and approval requirements. Exceptional performance and versatility enables multiple band operation. The 2-port circular Rx/Tx combiners are field switchable from circular to linear polarization.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance. For cost effective system expansion, available modular equipment options include anti-icing equipment and pressurization systems. Microprocessor steptrack control and motorizable mount options are also available.

7.3-Meter C- and/or Ku-Band

Electrical Specifications

Operating Frequency Band			
C-Band Receive	3.400-4.2 GHz		
C-Band Transmit	5.850-6.725 GHz		
Ku-Band Receive	10.7-12.75 GHz		

Gain, with 2-port combiner (dBi, ±0.2 dB)

Rx Frequency	Rx Gain	Rx Frequency	Rx Gain
3.400 GHz	47.1	5.925 GHz	51.3
3.700 GHz	47.6	6.175 GHz	51.7
4.000 GHz	48.3	6.425 GHz	52.0
4.200 GHz	48.7	6.725 GHz	52.4
10.950 GHz	55.2	–	–
11.950 GHz	56.0	–	–
12.750 GHz	56.5	–	–

Polarization	
C-Band	Linearly- or Circularly-Polarized
Ku-Band	Linearly-Polarized
Polarization Discrimination (Linearly-Polarized)	
>35 dB across 1 dB beamwidth	19 - 25 log ø from 1.8° to 9.2°

Voltage Axial Ratio, C-Band, circularly-polarized with 4-port combiner <1.06:1 across the 1 dB beamwidth <1.09 and 1.2 with 2-port

Beamwidth, Mid-band, Degrees	**C-Band**	**Ku-Band**
3 dB Receive (Transmit)	0.66 (0.44)	0.22 (0.18)
15 dB Receive (Transmit)	1.30 (0.83)	0.39 (0.31)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port linear combiner.

Elevation	Kelvin (C-Band)	Kelvin (Ku-Band)
10°	42	48
30°	31	34
50°	29	29

Antenna VSWR, Transmit and Receive	<1.3:1

G/T Performance (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES73 G/T at 10° EL (dB/K)	28.3	29.4	30.3

Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

G/T Performance (Ku-Band)

LNA/LNB Noise Temperature	165K	125K	90K
ES73 G/T at 10° EL (dB/K)	32.5	33.3	34.2

Based on a 2-port, linearly-polarized antenna configuration at 12 GHz and at 10° elevation under clear sky conditions.

Uplink EIRP Capability* (C-Band)

HPA Output (watts)	125	500	3000
Uplink EIRP (dBW)	72.6	78.7	86.4

Based on a 2-port antenna configuration at 6.175 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

* Optional extended AZ range of 160° continuous.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	16
Mount Type	El over Az, Tripod
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	52 in (1.32 m)
Depth	48.5 in (1.17 m)
Wind Loading, Survival	125 mph (200 km/h) in any position of operation
Wind Loading, Operational	45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Typical Slab Foundation Information

Soil Bearing Capacity	2000 lb/ft^2 (9,764 kg/m^2)
Reinforcing Steel	1708 lb (807 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	15.5 ft (4.7 m)
Width	15.5 ft (4.7 m)
Depth	2.0 ft (0.6 m)
Concrete Volume	17.8 yd^3 (13.6 m^3)

Note: Other typical foundation designs are available.

Typical Shipping Information

Net Weight	6500 lb (2948 kg)
Gross Shipping Weight	8200 lb (3720 kg)
Shipping Volume	780 ft^3 (22.1 m^3)
Shipping Container	Standard 20 ft land/sea container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

7.6-Meter
C-, X-, Ku- or K-Band

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Hub Ventilation Kit
Grounding Kit
Foundation Kit
Lightning Rod Kit
Maintenance Platform and Ladder
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Advanced Gregorian Optics*
- *Rugged Aluminum and Steel – 125 mph (200 kph) Wind Survival*
- *No Field Alignment (C-Band)*
- *3-Year Warranty on All Structural Components*

Compliances:

- *APSTAR*
- *ASIASAT*
- *BRASILSAT*
- *INTELSAT E-3, F-3, D, G*
- *EUTELSAT*
- *ITU-R, S.580-5 and S.465-5*
- *US FCC Regulation 25.209*
- *Approved for use in the Territory of Russia by the Ministry of Communications of the Russian Federation (Reference: Homologation Certificate No OC/I-A -f-1)*

Television broadcasters and telecommunications system operators, integrators, and designers can bring their systems on line faster, more economically, and with superior performance with the Andrew 7.6-meter Earth Station Antenna (ESA). In use worldwide in broadcast applications and high-density data, voice, communications networks, the Andrew 7.6-meter ESA features a computer-optimized dual-reflector Gregorian system and close-tolerance manufacturing techniques. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics.

Our wide selection of Type Approved antennas speeds system deployment. Type Approved Andrew ESAs can be deployed in the field with minimal testing and decreased administrative and approval requirements. Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximize corrosion resistance. For cost effective system expansion, available modular equipment options include anti-icing equipment and pressurization systems. Microprocessor steptrack control and motorizable mount options are also available.

7.6-Meter
C-, X-, Ku- or K-Band

Electrical Specifications

Operating Frequency Band	
C-Band Receive	3.4-4.2 GHz
C-Band Transmit	5.850-6.725 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz
Ku-Band Receive	10.7-13.25 GHz
Ku-Band Transmit	14.0-14.8 GHz
K-Band Transmit	17.3-18.4 GHz

Gain, with 2-port linear combiner (dBi, ±0.2dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.400 GHz	47.2	5.850 GHz	52.1
3.625 GHz	47.8	6.175 GHz	52.6
4.000 GHz	48.7	6.425 GHz	52.9
4.200 GHz	49.1	6.725 GHz	53.2
7.250 GHz	54.0	7.90 GHz	54.6
7.500 GHz	54.2	8.15 GHz	54.7
7.750 GHz	54.4	8.40 GHz	54.9
10.700 GHz	56.7	13.75 GHz	58.9
10.950 GHz	57.0	14.00 GHz	59.1
11.950 GHz	57.8	14.25 GHz	59.3
12.750 GHz	58.3	14.50 GHz	59.4
		14.80 GHz	59.6
		17.30 GHz	60.2
		18.40 GHz	60.7

Polarization
Linearly- or Circularly-Polarized

Polarization Discrimination (Linearly-Polarized)
>35 dB across 1 dB beamwidth 19 - 25 log ø from 1.8° to 9.2°

Voltage Axial Ratio, C-Band, circularly-polarized with 4-port combiner <1.06:1 across the 1 dB beamwidth X-Band, <1.20:1 on axis, Tx and Rx

Beamwidth, Mid-band, Degrees

	C-Band	Ku-Band	X-Band
3 dB Receive (Transmit)	0.58 (0.39)	0.22 (0.18)	0.33 (0.30)
15 dB Receive (Transmit)	1.18 (0.75)	0.39 (0.31)	0.62 (0.57)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port combiner.

Elevation	Kelvin (C-Band)	Kelvin (X-Band)	Kelvin (K- and Ku-Band)
10°	45	45	55
30°	36	36	41
50°	32	32	36

Antenna VSWR, Transmit and Receive <1.3:1

G/T Performance (C-Band)

LNA/LNB Noise Temperature	65K	45K	30K
ES76 G/T at 10° EL (dB/K)	28.2	29.0	29.7

Based on a 2-port, linearly-polarized antenna configuration at 4 GHz and at 10° elevation under clear sky conditions.

G/T Performance (X-Band)

LNA/LNB Noise Temperature	100K	75K	50K
ES76 G/T at 10° EL (dB/K)	32.3	33.1	34.1

Based on a 2-port, circularly-polarized antenna configuration at 7.5 GHz and at 10° elevation under clear sky conditions.

G/T Performance (Ku-Band)

LNA/LNB Noise Temperature	165K	125K	90K
ES76 G/T at 10° EL (dB/K)	34.4	35.3	36.1

Based on a 2-port, circularly-polarized antenna configuration at 12 GHz and at 10° elevation under clear sky conditions.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	8
Mount Type	El over Az, Tripod
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	52 in (1.32 m)
Depth	46 in (1.17 m)
Wind Loading, Survival	125 mph (200 km/h) in any position of operation
Wind Loading, Operational	45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Slab Foundation Information

Soil Bearing Capacity	2000 lb/ft^2 (9770 kg/m^2)
Reinforcing Steel	1681 lb (764 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	19.5 ft (5.94 m)
Width	19.5 ft (5.94 m)
Depth	2.5 ft (0.76 m)
Concrete Volume	35.2 yd^3 (27 m^3)

Note: Other typical foundation designs are available.

Typical Shipping Information

Net Weight	6500 lb (2948 kg)
Gross Shipping Weight	8200 lb (3720 kg)
Shipping Volume	780 ft^3 (22.1 m^3)
Shipping Container	Standard 20 ft land/sea container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

9.3-Meter C-Band

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
Motorization Kits
Geostationary Indoor Antenna Positioner with 40 Satellite Memory
Inclined Orbit Tracking Indoor Antenna Positioner (steptrack)
Anti-Icing and Deicing
LNA Support Kits
Ocean Transport Packing
Hub Ventilation Kit
Grounding Kit
Foundation Kit
Lightning Rod Kit
Maintenance Platform and Ladder
Obstruction Warning Light Kit
Cable-Mounting Kit
Major Subsystem Spare Part Kits
Az/El Vernier Kits

Features:

- *High Gain, Excellent Pattern Characteristics*
- *Advanced Gregorian Optics*
- *3-Year Warranty on All Structural Components*
- *Horizon-to-Horizon Coverage with Elevation-over-Azimuth Mount*
- *Rugged Aluminum and Steel – 125 mph (200 kph) Wind Survival in any Position*

Compliances:

- *APSTAR*
- *ASIASAT*
- *BRASILSAT*
- *INTELSAT B, F-3, F-2, F-1, D-2, G*
- *ITU-R, S.580-5 and S.465-5*
- *FCC Regulation 25.209*
- *Approved for use in the Territory of Russia by the Ministry of Communications of the Russian Federation (Reference: Homologation Certificate No OC/I-A -f-1)*

Now telecommunications and television system operators, integrators and designers can bring their systems on line faster, more economically, and with superior performance with the Andrew 9.3-meter Earth Station Antenna (ESA). In use around the world in broadcast applications and high-density data, voice, communications networks, the Andrew 9.3-meter ESA features a computer-optimized dual reflector Gregorian system coupled with independently adjustable reflector panels and trusses and close-tolerance manufacturing techniques. This combination provides extremely accurate surface contour, exceptionally high gain, superior efficiency, and closely controlled pattern characteristics. Additionally, the elevation-over-azimuth mount enables horizon-to-horizon coverage from any worldwide location.

Our wide selection of Type Approved antennas speeds system deployment. Type Approved Andrew ESAs can be deployed in the field with minimal testing and decreased administrative and approval requirements.

Andrew ESAs provide maximum durability with minimal maintenance. The hot-dipped galvanized steel ground mount assembly ensures extended product life. Galvanized and stainless steel hardware maximizes corrosion resistance.

A variety of options are available for cost effective system expansion, including 2- or 4-port linearly- or circularly-polarized combining networks, programmable control systems, feed rotation systems, maintenance platforms, professionally designed and documented cross-axis waveguide kits, and pressurization systems. Microprocessor and steptrack controls are also available for motorized antennas.

Electrical Specifications

Operating Frequency Band			
C-Band Receive	3.4-4.2 GHz		
C-Band Transmit	5.850-6.725 GHz		

9.3m Series, with 2-port linear combiner

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.400 GHz	49.2	5.850 GHz	53.5
3.625 GHz	49.6	6.175 GHz	53.9
4.000 GHz	50.4	6.425 GHz	54.1
4.200 GHz	50.8	6.725 GHz	54.6

9.3m Series, with 4-port circular combiner

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.625 GHz	50.0	5.850 GHz	53.1
4.000 GHz	50.9	6.175 GHz	53.5
4.200 GHz	51.3	6.425 GHz	53.8

Polarization
Linearly- or Circularly-Polarized

Polarization Discrimination (Linearly-Polarized)
>35 dB across 1 dB beamwidth 19 - 25 log ø from 1.8° to 9.2°

Voltage Axial Ratio, C-Band, circularly-polarized with 4-port combiner
<1.06:1 across the 1 dB beamwidth <1.09 and 1.2 with 2-port

Beamwidth, Mid-band, Degrees	C-Band
3 dB Receive (Transmit)	0.51 (0.34)
15 dB Receive (Transmit)	1.00 (0.65)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), with 2-port combiner..

Elevation	Kelvin
10°	39
30°	29
50°	27

Antenna VSWR, Transmit and Receive <1.3:1

G/T Performance

LNA/LNB Noise Temperature	65K	45K	30K
ES93 G/T at 10° EL (dB/K)	30.0	30.9	31.8

Based on a 4-port, linearly-polarized antenna configuration at 4 GHz.

Uplink EIRP Capability

HPA Output (watts)	125	500	3000
Uplink EIRP (dBW)	74.8	79.8	88.6

Based on a 2-port antenna configuration at 6.175 GHz and 0 dB allowance for waveguide (IFL) loss between the HPA and the antenna.

Mechanical Specifications

Feed Type	Dual-Reflector, Gregorian
Reflector Material	Precision-Formed Aluminum
Reflector Segments	20
Mount Type	El over Az, Tripod
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180° (180°)
Hub/Enclosure Dimensions	
Diameter	84 in (2.31 m)
Depth	46 in (1.17 m)
Wind Loading, Survival	125 mph (200 km/h) in any position of operation
Wind Loading, Operational	45 mph (72 km/h), gusting to 65 mph (105 km/h) (motor drives)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.

Slab Foundation Information

Soil Bearing Capacity	2000 lb/ft^2 (9770 kg/m^2)
Reinforcing Steel	2946 lb (1339 kg)
Concrete Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Foundation Size:	
Length	19.5 ft (5.94 m)
Width	19.5 ft (5.94 m)
Depth	2.5 ft (0.76 m)
Concrete Volume	35.2 yd^3 (27 m^3)

Note: Other typical foundation designs are available.

Typical Shipping Information

Net Weight	8000 lb (3629 kg)
Gross Shipping Weight	11,154 lb (5059 kg)
Shipping Volume	1280 ft^3 (36.3 m^3)
Shipping Container	Standard 40 ft land/sea container

All designs, specifications and availabilities of products and services presented are subject to change without notice.

ESA Options

Additional Options to Complement Your Andrew Earth Station Antenna

- ***Motorization*** *– Low/Medium, High-Speed or Steptracking Available*
- ***Local Motor Control Options***
- ***Remote Control Options*** *– Standard and Steptracking Available*
- ***LNA/LNB Subsystems***
- ***Testing and Installation Services***
- ***EZM&C Monitor and Control System***

Contact your Andrew account manager for additional information on the options available for your earth station antenna.

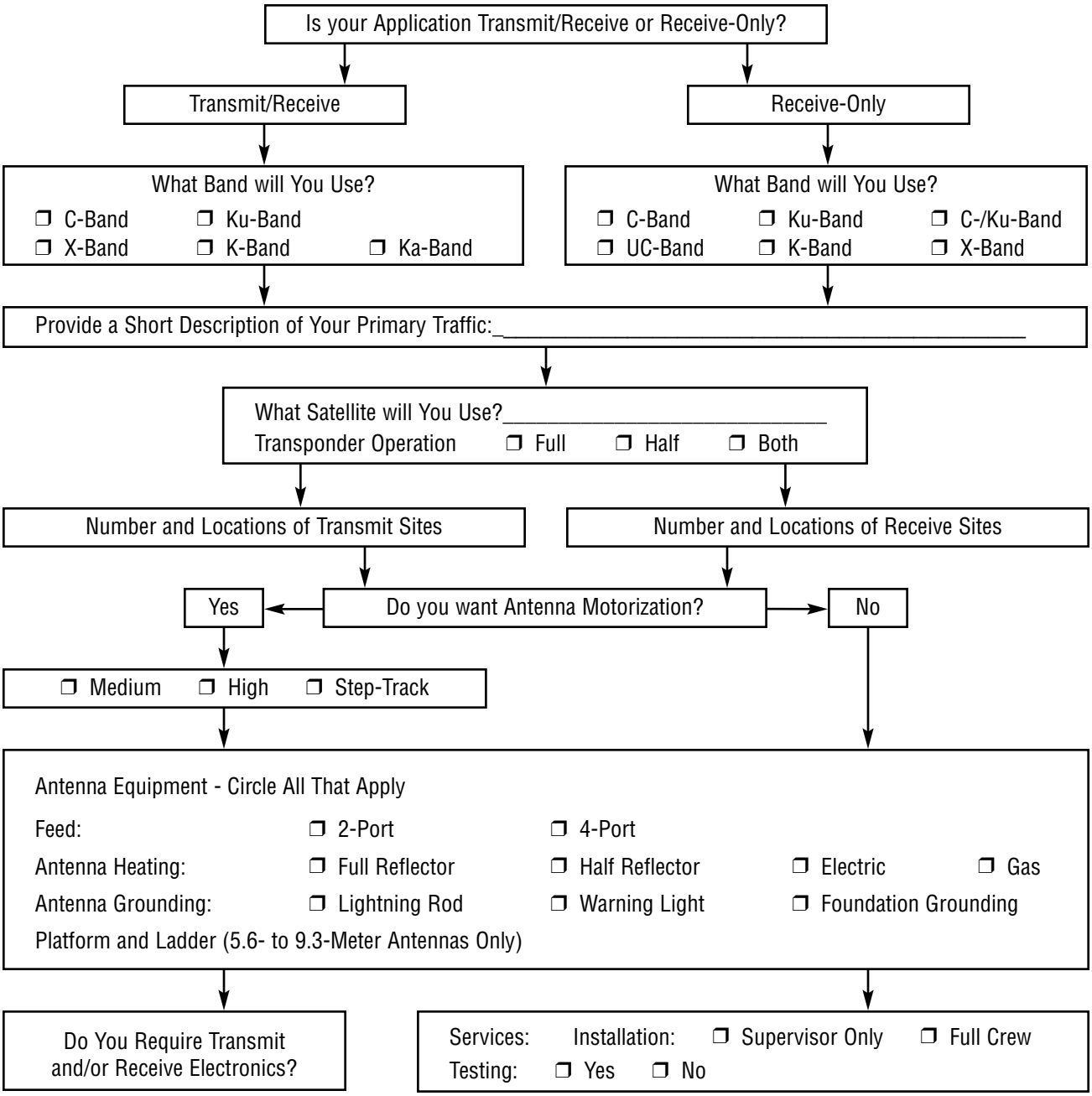
Earth Station Antenna
Customer Definition Check List

Project:_____Contact Name(s): _____

Company Name:_____Street Address: _____

City:_____ State/Province:_____ Zip Code:_____ Country:_____

Telephone Number:_____ FAX Number:_____



Use in conjunction with "Customer Definition Checklist" at http://www.andrew.com

2.4-Meter Transportable SNG Antennas

2.4-Meter Transportable SNG Antenna

Electrical Performance Meets or Exceeds:

- *INTELSAT E-1 and G requirements.*
- *U. S. FCC regulation 25.209, for mandatory pattern requirements for 2° satellite spacing at Ku-band frequency.*
- *ITU-R S.580-4 and S.465-5 recommendations for pattern performance for 2° satellite spacing.*
- *Approved for use in the territory of Russia by the Ministry of Communications of the Russian Federation (Reference: Homologation Certificate No OC/1-AΦ-1).*

Prime Focus Offset Feed System

- *Zero Aperture Blockage Enables Superior Pattern Characteristics.*

Motorized Control

- *Motorized Cable Drive System Allows for Reliable, Smooth Running System.*

Control Options

- *Antenna Controller Combines Encoders and Remote/Local Controls into an Easy to Operate Package.*

Compact/Lightweight Design. This design reduces wind-loading, is easier to install and is less costly to ship. The stow height is at 24" for more overall clearance for the truck.

Antenna. The vehicle mountable 2.4-meter prime focus offset fed antennas from Andrew incorporate performance and optional characteristics particularly suited for television broadcast industry satellite news gathering applications. These high performance antennas are specifically designed for mobile transmit/receive systems requiring versatile frequency reuse capability and are currently being utilized as the integral component of major television broadcasting network systems worldwide.

Feed System. The exclusively designed prime focus, beam-shaping feed configuration, together with the precision spun aluminum reflector assembly, produces extremely high gain, superior efficiency and closely controlled pattern characteristics.

Full Integration and Factory Pre-Testing. Each SNG antenna is fully integrated and pretested before leaving the factory to reduce vehicle installation time and costs.

Control System. A motorized cable drive system replaces jackscrews for a reliable, precise and smooth running system. The SNG controller combines encoders and remote/local controls into a small, easy to operate package.

2.4-Meter
Transportable SNG Antennas

Electrical Specifications

Operating Frequency Band*	
Ku-Band Receive	10.95-12.75 GHz
Ku-Band Transmit	14.0-14.5 GHz

Gain*, at circular waveguide flange of feed.

Rx Frequency	*Rx Gain*	*Tx Frequency*	*Tx Gain*
11.950 GHz	47.6	14.25 GHz	49.4

Polarization	Linear
Polarization Discrimination*	
(Linear Polarization)	>35 dB on axis

Beamwidth, at Midband	**Ku-Band**
3 dB Receive (Transmit)	0.72° (0.61°)
15 dB Receive (Transmit)	1.42° (1.33°)

Antenna Noise Temperature* under clear sky conditions, at 68°F (20°C), at the circular waveguide flange of the feed.

Elevation	*Kelvin (Ku-Band)*
10°	35°K
30°	26°K

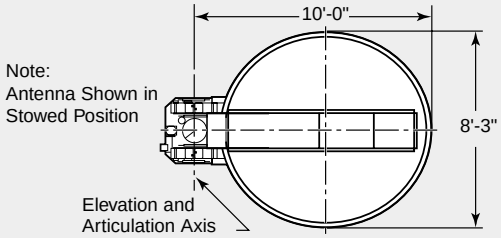
Antenna VSWR*, Transmit and Receive	<1.3:1

* Actual antenna specifications are amended by the choice of feed/combiner options. Contact Andrew for further feed/combiner option information.

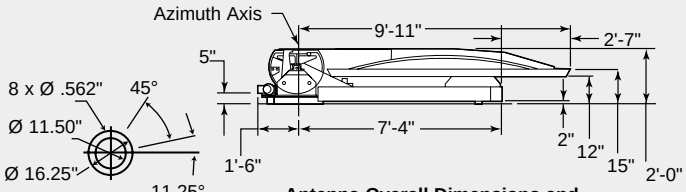
Mechanical Specifications

Feed Type	Prime Focus, Offset
Reflector Material	Precision-Formed Aluminum
Reflector Segments	1
Mount Type	El over AZ, Pedestal
Antenna Pointing Range, Continuous	
Elevation	66°
Azimuth	±180°
Polarization	±90°
Wind Loading, Survival	65 mph (105 km/h) in any position of operation
Wind Loading, Operational (motor drives)	45 mph (72 km/h), gusting to 65 mph (105 km/h)
Temperature, Operational	-40° to 125°F (-40° to 52°C)
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft² (1135 Watts/m²)
Relative Humidity	100%
Shock and Vibration	As encountered by commercial air, rail and truck shipment
Atmospheric Conditions	Moderate coastal/industrial areas. Severe conditions require additional protection.
Positioner Travel Rates**	
Elevation	0.05° to 1°/second
Azimuth	0.05° to 1°/second
Polarization	1.8°/second

**Final specifications subject to change with verification testing.
All designs, specifications and availabilities of products and services presented are subject to change without notice.

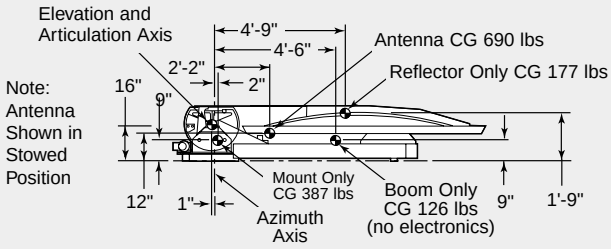


Antenna Overall Dimensions - Top View

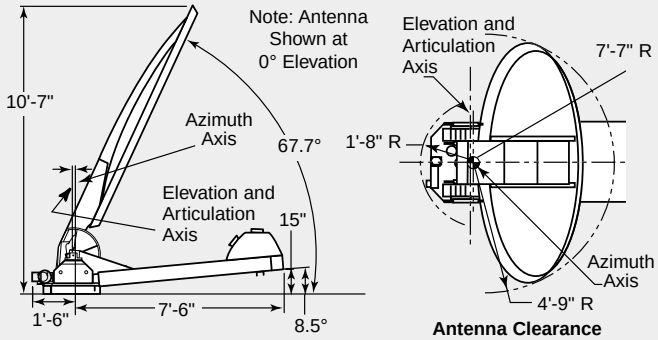


Mounting Pattern on Truck

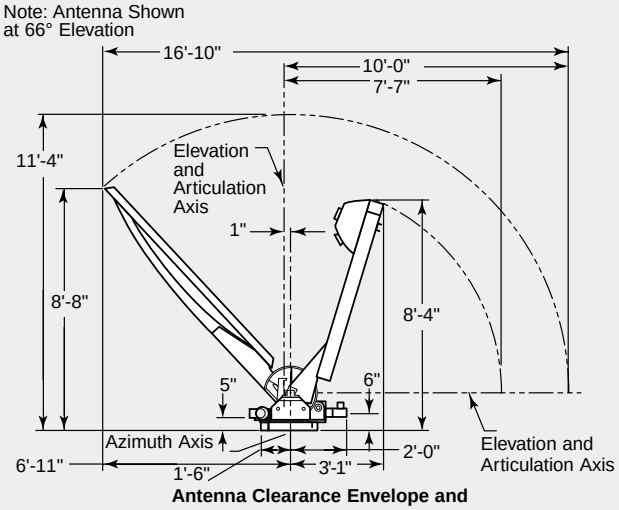
Antenna Overall Dimensions and Mounting Pattern - Side View



Approximate Antenna Weight Distribution



Antenna Clearance Envelope - Top View



Antenna Clearance Envelope and Center of Gravity - Side View

3.7-/4.5-Meter C-, X- or Ku-Band Transportable Antennas

3.7-Meter Transportable Antenna

4.5-Meter Transportable Antenna

Antenna Accessories

Factory Feed System Testing and Documentation
Transmit Waveguide Kits, Cross-Axis Az/El/Pol
LNA Support Kits

Features

- *Exceptional Electrical Performance*
- *Available in Three Modular Types*
- *Outstanding Wind Survival*
- *Complete Line of Control Options*
- *Versions Supplied with 20,000 Pound Jack for El Axis*

Now system designers and operators can benefit from an exceptional combination of high gain, excellent pattern performance, and extensive versatility from the 2- and 4-port feed system designs in the 3.7-/4.5-meter C-, X-, and Ku-Band transportable earth station antennas from Andrew Corporation. The antennas' aluminum trifold reflector panels are cut from a single-piece precision spinning. Panel design and manufacture provide excellent thermal expansion characteristics and ensures the extremely accurate surface contour.

The antennas meet or exceed ASIASAT, EUTELSAT, PANAMSAT, APSTAR, BRAZILSAT and INTELSAT requirements. They also meet or exceed US FCC regulation 25-209, for mandatory pattern requirements for 2° satellite spacing based on off-satellite measurements. This applies to the 3.7-meter (Ku-band) and 4.5-meter (C- or Ku-Band). The antennas meet or exceed ITU-R S.580-5 and S.465-5 recommendations for pattern performance for 2° satellite spacing.

Three modular types are available: antenna only, antenna with manual/motorizable elevation-over-azimuth positioner, and antenna with manual/motorizable positioner and heavy duty tandem axle trailer.

The unique Trifold® antenna design enables one-person deployment in less than 30 minutes. A large range of adjustment provides non-critical positioner/trailer orientation and the ability to view geostationary satellites, horizon-to-horizon, from any location world wide. The aluminum back structure and hot-dipped galvanized steel positioner maintain pointing accuracy and ensure durability and reliability.

ANDREW®

3.7-/4.5-Meter C-, X- or Ku-Band Transportable Antennas

Electrical Specifications – 3.7m

Operating Frequency Band	
C-Band Receive	3.625-4.2 GHz
C-Band Transmit	5.850-6.425 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz
Ku-Band Receive	10.95-12.75 GHz
Ku-Band Transmit	14.0-14.8 GHz

Gain, with 2-port combiner (dBi, ±0.2 dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.625 GHz	41.0	5.850 GHz	45.6
4.000 GHz	42.5	6.175 GHz	46.1
4.200 GHz	43.0	6.425 GHz	46.3
7.250 GHz	47.7	7.90 GHz	48.2
7.500 GHz	47.9	8.15 GHz	48.4
7.750 GHz	48.1	8.40 GHz	48.6
10.950 GHz	50.9	14.00 GHz	52.7
11.950 GHz	51.6	14.25 GHz	52.8
12.750 GHz	52.1	14.50 GHz	53.0

Polarization Discrimination (Linearly-Polarized)
C-/Ku-Band >35 dB on axis Ku >35 within 1 dB contour

Voltage Axial Ratio, circularly-polarized with 2-port combiner
C-Band, <1.09:1 on-axis, Tx <1.20:1 on-axis, Rx
X-Band, <1.20:1 on-axis, Tx <1.20:1 on-axis, Rx

Beamwidth, Mid-band, Degrees

	C-Band	X-Band	Ku-Band
3 dB Receive (Transmit)	1.20 (0.80)	0.65 (0.60)	0.42 (0.36)
15 dB Receive (Transmit)	2.00 (1.40)	1.19 (1.09)	0.85 (0.69)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), at the circular waveguide flange of the feed.

Elevation	Kelvin (C-Band)	Kelvin (X-Band)	Kelvin (Ku-Band)
10°	36	39	39
30°	23	27	26
50°	21	24	24

Antenna VSWR, Transmit and Receive <1.3:1

Mechanical Specifications – 3.7m and 4.5m

Feed Type	
3.7 m	Dual-Reflector
4.5 m	Prime Focus
Reflector Material	Precision-Formed Aluminum
Reflector Segments	3-Pieces, Hinged Transportable
Mount Type, when applicable	El over AZ, Positioner
Antenna Pointing Range, Coarse/(Continuous)	
Elevation	5-90° (85°)
Azimuth	330° (330°)
Polarization	360° (90°)
Wind Loading, Survival	125 mph (200km/h) in stow position, 65 mph (105 km/h) gusting to 80 mph (125 km/h) in any position of operation with proper anchoring
Wind Loading, Operational (motor drives)	45 mph (72 km/h), gusting to 65 mph (105 km/h)
Trailer Size:	
Length	289 in (7.34 m)
Width	96 in (2.44 m)

All designs, specifications and availabilities of products and services presented are subject to change without notice.

Electrical Specifications – 4.5m

Operating Frequency Band	
C-Band Receive	3.625-4.2 GHz
C-Band Transmit	5.850-6.425 GHz
X-Band Receive	7.25-7.75 GHz
X-Band Transmit	7.90-8.40 GHz
Ku-Band Receive	10.95-12.75 GHz
Ku-Band Transmit	14.0-14.8 GHz

Gain, with 2 port combiner (dBi, ±0.2dB)

Rx Frequency	Rx Gain	Tx Frequency	Tx Gain
3.625 GHz	43.0	5.925 GHz	46.2
4.000 GHz	44.0	6.175 GHz	46.7
4.200 GHz	44.4	6.425 GHz	47.0
7.250 GHz	48.4	7.90 GHz	49.2
7.500 GHz	48.7	8.15 GHz	49.5
7.750 GHz	49.0	8.40 GHz	49.8
10.950 GHz	51.6	14.00 GHz	53.4
11.950 GHz	52.4	14.25 GHz	53.6
12.750 GHz	52.9	14.50 GHz	53.7
		14.80 GHz	53.8

Polarization Discrimination (Linearly Polarized)
C-/Ku-Band>35 dB on axis

Voltage Axial Ratio, circularly-polarized with 2-port combiner
C-Band, <1.09:1 on axis, Tx <1.20:1 on axis, Rx
X-Band, <1.20:1 on axis, Tx <1.20:1 on axis, Rx

Beamwidth, Mid-band, Degrees

	C-Band	X-Band	Ku-Band
3 dB Receive (Transmit)	1.22 (0.85)	0.66 (0.61)	0.41 (0.33)
15 dB Receive (Transmit)	2.47 (1.90)	1.40 (1.29)	0.86 (0.69)

Antenna Noise Temperature – under clear sky conditions, at 68°F (20°C), at the circular waveguide flange of the feed.

Elevation	Kelvin (C-Band)	Kelvin (X-Band)	Kelvin (Ku-Band)
10°	32	45	45
30°	20	34	33
50°	16	29	30

Antenna VSWR, Transmit and Receive <1.3:1

Height, with Trifold® Antenna	
3.7 m	112.1 in (2.85 m), with subreflector/supports 102.1 in (2.59 m), without subreflector/supports
4.5 m	118 in (3.0 m) with feed support 108 in (2.75 m) without feed support
Weight, with Trifold® Antenna	
3.7 m	7200 lb (3266 kg)
4.5 m	7600 lb (3447 kg)
Trailer Wheels	4, with 1 spare
Tandem Axle Assembly Capacity	12,000 lb (5455 kg) tandem with axle with 4 in (102 mm) drop
Wheel Size	14.5 in (368 mm)
Tires	G78 x 15 Nylon Bias, 8 ply, 8 x 14.5LT
Trailer Hitch Interface	2.312 in ball hitch (standard) Pintel hook is available as special order
Trailer Tongue Weight	650 lb (295 kg) nominal
Outrigger Jacks	4, each with 7000 lb (3282 kg) capacity
Front Leveling Jack	5000 lb (2273 kg) capacity
12 Vdc Electrical Connector	6-way, includes both male and female

Revised 9/00

VALULink™ II
Ku-Band Uplink System

Products Discontinued

ANDREW®

Revised 5/01

Products Discontinued

Products Discontinued

System Program Management. Each customer order is assigned a program manager to take full control of the project execution. The program manager is the single point of contact, providing unified project implementation. The program manager ensures that the correct equipment is ordered, tested and integrated as required so the system when shipped works the first time, every time.

System Design Engineering. Engineering services available for each system project extend from feasibility studies and preliminary conceptual design to final acceptance and performance verification testing.

System design is a direct result of customer requirements, signal quality parameters, regulations, operating frequency band and space segment performance.

System Documentation. Each system is documented so that installation, implementation and maintenance are a simple process. Documentation may include assembly, installation drawings, as-built drawings and equipment operation and maintenance manuals.

System Installation. Andrew provides qualified installers who are competent and knowledgeable about all types of installation requirements. Whether it is ground-mount, rooftop or any nonstandard installation, an Andrew crew performs the installation efficiently, in a minimum amount of time. This saves money and allows you to be on-the-air in record time. Andrew can also provide an installation supervisor to assist your crew in the antenna erection.

System Testing. The time tested Andrew method of ESA and electronics testing assures that any regulatory requirement, INTELSAT, EUTELSAT, PANAMSAT, U.S. FCC, etc. are met with minimum inconvenience.

Andrew Earth Station Antenna Turnkey System Capabilities

Uplinks

- *Modulators*
- *Upconverters*
- *High Power Amplifiers*
- *Custom Designed Switching and Combining Networks*

Downlinks

- *LNAs/LNBs*
- *Downconverters*
- *Demodulators/Receivers*
- *Signal Distribution*

Packaged Systems

- *VALULink™*
- *GoStation™*

Site

- *Standard and Customized Redundance Schemes*
- *Individually Designed Monitor and Control Solutions*
- *Turnkey Shelter Installations*
- *Power Distribution*
- *UPS Systems*

Services

- *Complete Turnkey Design*
- *Factory Integration and Test*
- *Program Management*
- *Site Installation*
- *Field Test and Commissioning*
- *Traffic Analysis and Network Design*
- *Assistance with Link Analysis*
- *Assistance with Space Segment and Licensing*

ComTier™ * Satellite Network Products

System Solutions for:

- *Internet-Based Virtual Private Networks (I-VPNs) or I-VPN Overlay*
- *Two-Way Digital Video Broadcast Networks*
- *Interactive Networks*
- *Corporate/Government Enterprise Networks*
- *National/International Telephony/Data Networks*
- *Restoral/Emergency Service/Diversity Networks*

Freedom Family of VSAT Network Products

ComTier has developed several new VSAT systems that use its superior Time Division Multiple Access (TDMA) modem technology to facilitate the deployment and operation of broadband communication satellite networks at a lower total cost of ownership. ComTier's family of VSAT products is called Freedom because of its flexible and scaleable architecture, and its advanced features, which liberate the user from having to accept the performance of traditional VSAT systems. Instead, Freedom VSAT networks provide a whole new array of advanced features that elevate its performance over competitive solutions that are available today.

* An affiliate of Andrew Corporation

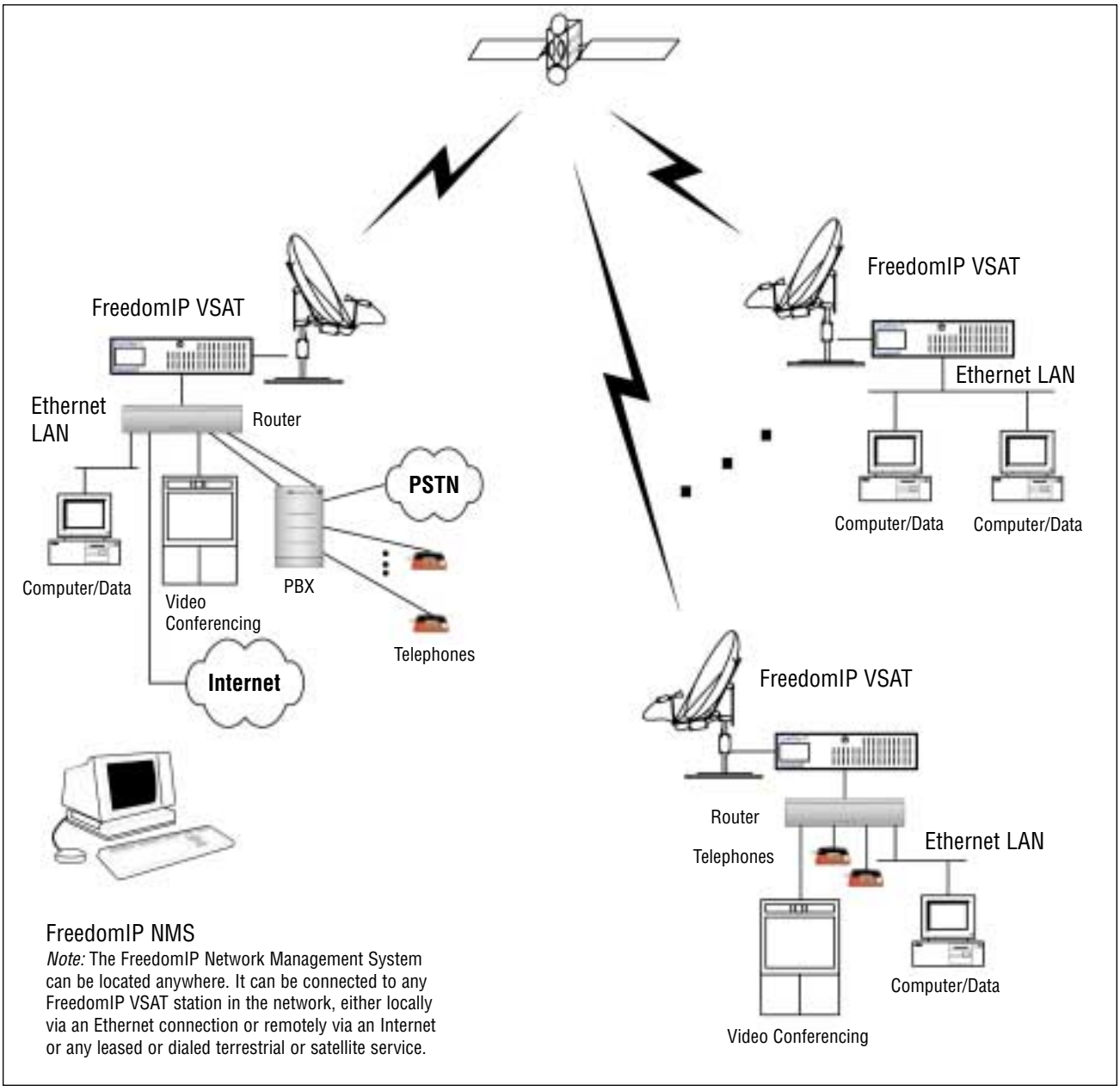
Primary Network Products:

- *FreedomIP™ VSAT*
- *Digital Video Broadcast FreedomIP™ VSAT*

In addition to the two primary network products, there is also the Freedom NMS, which offers a full set of Network Management System features for networks composed of these two products.

Advanced Technology

All Freedom VSAT systems use symbol synchronous Time Division Multiple Access (TDMA) to provide an extremely high burst and frame efficiency–up to 20% better than competitive products. They include an advanced Continuous Phase, Frequency Shift Keyed (CPFSK) modem that enables the use of power amplifiers one half the size of other VSAT systems, greatly reducing system costs. They include advanced bandwidth on demand algorithms to achieve more users per carrier and hence a lower cost per user. These Freedom product lines use existing C-band, Ku-band and Ka-band satellites to provide broadband networking anywhere in the world. This advanced technology provides the user with a lower total cost of ownership.



FreedomIP NMS

Note: The FreedomIP Network Management System can be located anywhere. It can be connected to any FreedomIP VSAT station in the network, either locally via an Ethernet connection or remotely via an Internet or any leased or dialed terrestrial or satellite service.

FreedomIP™ (Internet Protocol) VSAT provides a Wide Area Network (WAN) Internet and Intranet access solution based on the IP protocol suite. It is designed to effectively serve two-way Internet Services (ISPs), Intranet/Internet applications, including corporate networks (see above), e-commerce, tele-medicine, financial transactions, SCADA, etc.

FreedomIP™ VSAT can be configured to support Mesh, Star, Broadcast network topologies or any combination as needed to best serve the customer's traffic. Because of its advanced technology, FreedomIP VSAT outperforms conventional VSATs by providing integrated data, video and voice services using less satellite bandwidth. FreedomIP VSAT also uses advanced Bandwidth On Demand (BOD) algorithms to support more users per carrier.

FreedomIP™ VSAT

Features:

- *Transmission Bit Rates of 235 kbps to 3,750 kbps*
- *Supports all Standard IP Applications*
- *Bandwidth On Demand (BOD)*
- *Single- and Multiple-Carrier Operation*
- *Lower Total Cost of Ownership*

A FreedomIP™ VSAT system consists of two primary assemblies: Indoor Unit (IDU) and Outdoor Unit (ODU). The IDU consists of a Windows NT based server that hosts the FreedomIP User Terminal Modem, Ethernet interface and system software. The ODU consists of a very small aperture antenna and RF transceiver (e.g., 0.9-m to 2.4-meter antennas and 1 watt to 16 watt power amplifiers for Ku-band, and 2.4-meter to 4.6-meter antennas and 5 watt to 20 watt power amplifiers for C-band).

DVB FreedomIP™ VSAT

The DVB FreedomIP VSAT uses a broadcast standard that has gained widespread acceptability, called Digital Video Broadcast (DVB). In Europe, for example, DVB is an ETSI standard for digital TV broadcasting based on MPEG-2 compression for satellite, cable and microwave. Its purpose is to provide wide bandwidth video and Internet data to many remote users.

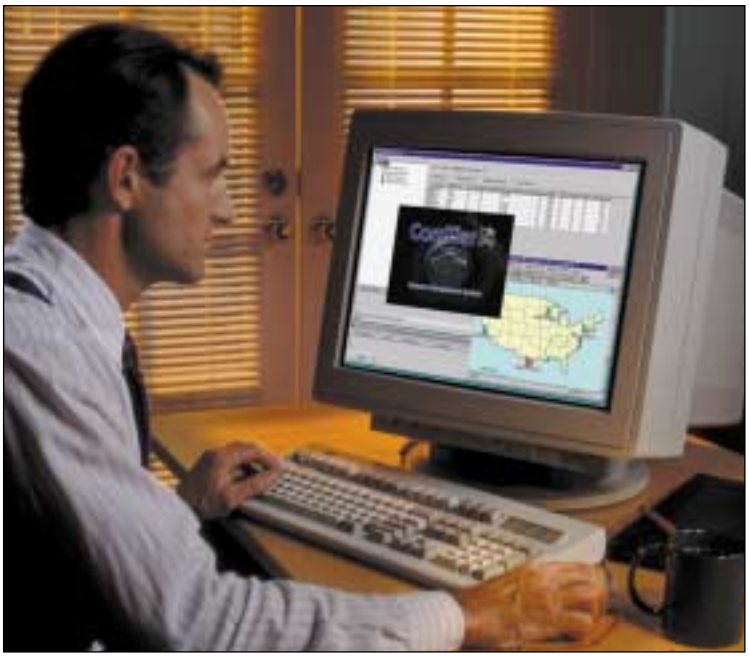
The ComTier™ DVB FreedomIP VSAT offers an integrated solution for serving these new two-way DVB applications. It uses standard wide bandwidth DVB outward broadcast channels integrated with its advanced Time Division Multiple Access (TDMA) system, FreedomIP, that operates via one or more inward channels.

DVB FreedomIP™ Features:

- *Outward Information Rates up to 45 Mbps*
- *Two-Way, Wide Bandwidth Interactive System*
- *Supports all Standard IP Applications*
- *Outward Video Channels using Standard Digital Video Broadcast/MPEG-2 Format*
- *Inward Channel using Multiple Carrier Bandwidth-on-Demand Time Division Multiple Access*
- *Inward Information Rates within the Range of 200 kbps to 3 Mbps*

Some of the typical new broadcasting and interactive multimedia applications that are served by the two-way DVB FreedomIP network solution are:

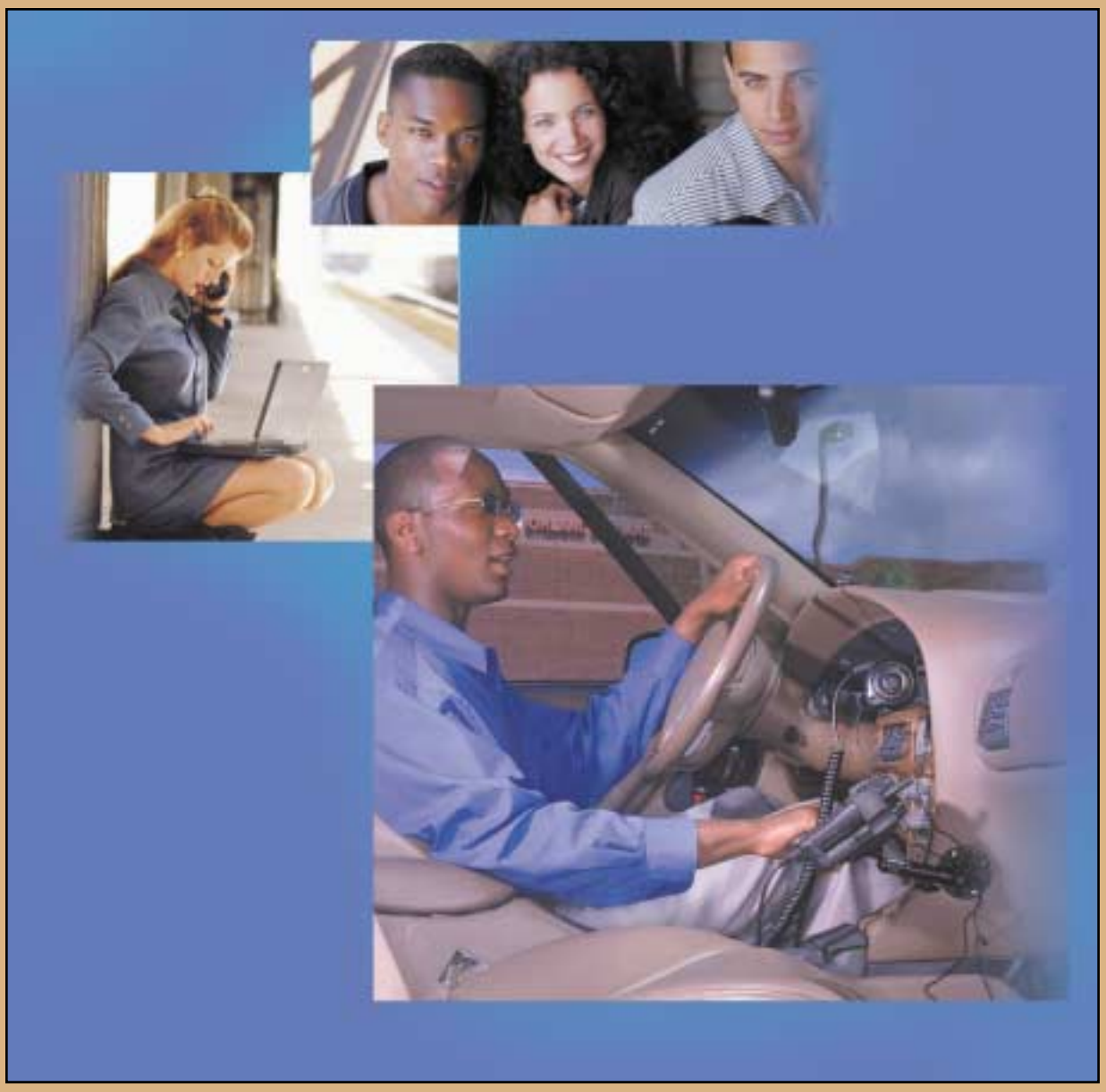
Data Request/Delivery	E-Commerce	Distance Collaboration
Television Broadcasts	Pay-per-view Television	Distance Learning
On-line Internet Services	Home Shopping	Tele-Medicine
Drag-and-Drop File Transfers	Home Banking	Two-Way Paging
Interconnect of LANs	Direct Market Transactions	Net Meetings
E-mail		Video Conferences



Freedom NMS

The Freedom Network Management System (NMS) will support all types of Freedom network system solutions. The Freedom NMS is an integrated hardware/software package that runs on a Windows NT platform and allows the service desk operator to control, monitor, diagnose and operate the entire Freedom VSAT network from one (or more) convenient locations. The Freedom NMS components include the desktop computer with software and optional printer.

The advanced Freedom family architecture allows the Freedom NMS to be located anywhere. The Freedom NMS may be connected directly to any FreedomIP VSAT node or it can be remoted via a dialup modem, Internet connection, etc. It is important to note, that the operation of the network is not dependent on the Freedom NMS; i.e., the network will operate even when the Freedom NMS is disconnected. Therefore, there is no single-point of failure in the Freedom VSAT network architecture.



Wireless Accessory Products

Index

Introduction

Andrew Wireless Products is an industry leader in the design, manufacture and distribution of high quality, high performance wireless antennas and accessories for the wireless communications markets. Our focus on quality accessory products and support programs enables us to supply the top 20 carriers in the Nation.

When You Add Andrew, You Add. . .

. . .Quality

When you add Andrew Wireless Products, you add a commitment to providing high quality products and services. A commitment which has earned two coveted awards; ISO 9001 Certification and Ford's Q1 Award. In earning ISO 9001 Certification, a quality system recognized worldwide, the company implemented quality processes influencing every facet of the organization. Ford's Q1 Award recognizes organizations that have sustained levels of excellence in systems and performance resulting in customer satisfaction. We are also currently pursuing our QS9000 certification.

. . . Success

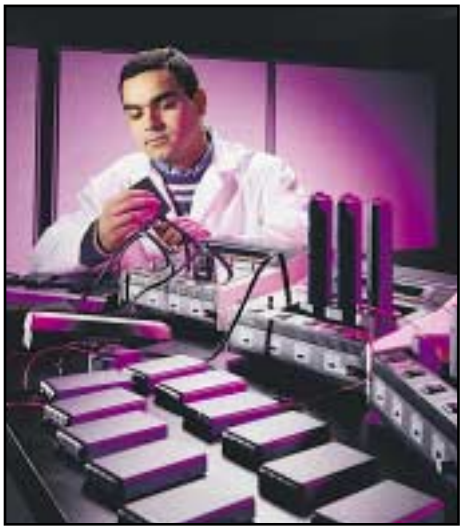
Add customized promotions, literature, display and point of purchase materials created by Andrew Wireless Product's in-house Marketing department and you'll add up accessory sales. Our Graphic Design team can provide private label packaging and branding to increase brand awareness and enhance the look of your stores. Our patented Andrew Academy®, a customized training program, provides sales representatives with the knowledge and confidence they need to be successful in selling accessories.

For more information

Ask for our Wireless Products Catalog 2000, Lit-111

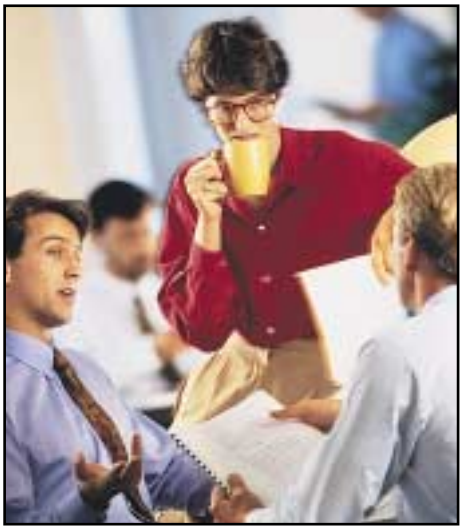
. . . *Performance*

In-house design capabilities add up to the highest performance standards and reduce the amount of time it takes to bring the product to market. With the use of time compression technologies, our engineers can create prototypes in just days instead of weeks. In-house rapid prototype machines can create molds which, in turn, create the actual product allowing engineers to test product material prior to production. These advanced capabilities accelerate production and delivery times without compromising our unending commitment to quality.



. . .*Teamwork*

Adding Andrew Wireless Products means adding extensive program services that include support teams dedicated to fulfilling the needs of each customer. In addition to corporate and field sales forces, support teams consist of technical, training and marketing support teams. The main focus of our account management system is to ensure complete and total customer service. Our goal is to help you achieve your goals through teamwork.



NEW!

Hands-Free Headset

Lightweight and simple to use, the Hands-Free headset provides convenient hands free conversations anytime, anywhere. Comfortable over the ear design provides exceptional sound quality.

Manufacturer's Limited Lifetime Warranty

NEW!

Phone/Pager Belt Clip

The belt clip is designed for use with most portable phones allowing convenient carrying of your portable phone.

Manufacturer's Limited Lifetime Warranty

ANDREW

Extended Life Batteries

Batteries that create the performance standard

A battery's quality is only as good as the internal components used to build it. Andrew Wireless Product's industry-leading quality standards guarantee that these batteries will outperform all others.

Rugged case withstands the most abusive day-to-day conditions.

Top-quality cells are individually tested to give you maximum talk time.

Built-in temperature sensor protects the battery from overheating.

Welded nickel strips ensure maximum current flow between cells.

Custom molded cavities provide a tight, custom fit for each phone model.

Rapid Charger/Conditioners

Complete charging control

Pulse technology conditions the battery to dramatically increase battery life.

Pulse technology exercises the battery to prevent memory effect in NiCd and NiMH batteries.

Manufacturer's Limited Lifetime Warranty

Built-in temperature sensor protects the battery from overcharging.

Restores battery power in one hour or less.

Two power sources provide flexibility for use at home or on the road.

"Maintenance free" mode allows the battery to be left in the charger indefinitely without fear of overcharging or overheating.

Genuine Leather Cases

Personalize and protect portable phones

A leather case adds protection and personality to a portable phone. Each case is made with only the finest quality glove leather.

Manufacturer's Limited Lifetime Warranty

LYCRA® elastic in strategic stress points ensures a secure, tailored fit.

Genuine, glove quality leather cushions against impact and provides a sure grip.

Leather covered clip on back allows easy attachment to belts, purses and portfolios.

Nylon stitching provides tear-resistant construction.

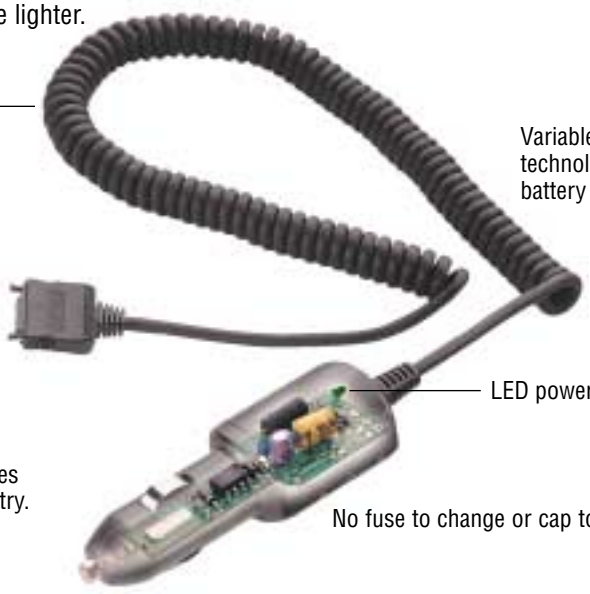
LYCRA is a registered trademark of the DuPont Company

Battery Saver/Chargers

Power to keep your customers talking

Battery saver/chargers offer unlimited talk and stand by times by connecting the phone to the vehicle's cigarette lighter.

Manufacturer's Limited Lifetime Warranty



Rugged cable won't stretch out of shape over time.

Variable rate charging technology protects the battery from overheating.

Phone connector is custom molded for precise fit and latching.

LED power indicator.

Rapid charger quickly restores power to any battery chemistry.

No fuse to change or cap to replace.

ANDREW®

Installed Hands Free Car Kits

Give your customers safety and convenience while driving

Voyager installed hands-free car kits promote safety and convenience by allowing the portable phone user to focus their attention on the road, not the phone.

Manufacturer's Limited 3 year Warranty

Voyager

SmartBox logic system reduces installation time with modular jack connections.

External speaker provides high performance audio amplification.

High quality microphone for superior sound pick-up.

Convenient cradle holds phone securely with one hand operation.

Compact design can be used with a choice of mounting options.

Portable Hands-Free

The safety and convenience of hands-free in a portable design

A high quality, hands-free system that requires no permanent installation.

Manufacturer's Limited Lifetime Warranty

Voyager

DriveTime® Kits

DriveTime kits dramatically improve FlipPhone® performance

A car's steel body panels and tinted windows can reduce a phone's signal strength up to 90% when used without an external antenna. The DriveTime Kit's external antenna eliminates the car's shielding effects to dramatically improve in-car performance.

Manufacturer's Limited Lifetime Warranty

External antenna expands calling range and reduces static and dropped calls.

Innovative adapter allows easy connection to both the external antenna and rubber spike antenna.

Included rubber spike attaches quickly when the phone is taken out of the car and provides excellent portable performance.

FlipPhone is a registered trademark of Motorola, Inc.

DriveTime® Cable Kits

Custom cable connects phone to an external antenna

With the DriveTime cable kit, you'll enjoy greater calling range and experience fewer dropped calls. Simple to use and easy to install.

Manufacturer's Limited Lifetime Warranty

Can be used with a variety of external antenna options.

Compact size allows for easy storage.

Custom cable provides connection to an external antenna.

ANDREW

NEW!

Products

Dual Band Glass Mount Antenna

Dual band antennas operate on both PCS and cellular frequencies for increased flexibility. With the rapid growth of wireless communications, dual band products are the wave of the future. Andrew Wireless Products has conducted extensive research and has designed a performance enhancing glass mount antenna.

Unique antenna design offers the best performance in both frequencies

- Distinct foot shape fits all vehicle window designs without interference.
- Ultra-thin brass coupling elements that allow the foot and coupling box to conform to curved glass.
- Thermo-Flex foot design offers greater adhesion and stability when applied to glass.

Antennas for Portable Phones

The Critical Link to the Wireless System

A car's steel body panels and tinted windows can reduce a phone's signal strength up to 90% without an external antenna. Andrew antennas eliminate the car's shielding effects to expand calling range while reducing static and dropped calls.

Add Style and Protection to Your Pager

Keep Your Pager Secure

Prevent the loss of your pager with safety chains, sport cords and bungee cords.

Protect Your Pager

Protect and personalize your pager with leather cases and housings.

Mounts and Cradles

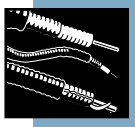
Provide Safe, Convenient Placement of Portable Phones

The Andrew line includes a complete selection of mount and cradle kits for all new phone models.

Cradle offers easy accessibility to phone at the touch of a button.

Mount options offer flexibility to adapt to various angles without loosening.

HELIAX®
Coaxial Cables



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General Information

Ordering Information and Specifications

Applications and Technical Information

Coaxial Cable Selection Guide

HELIAX® Coaxial Cable Selection Guide - 50-ohm, Foam Dielectric

	Superflexible, FSJ Series			Extraflexible, EFX Series	Foam Dielectric, VXL Series
Nominal Size	**1/4"**	**3/8"**	**1/2"**	**3/8"**	**7/8"**
Catalog Pages	**474**	**480**	**485**	**489**	**503**
Standard Cables					
Standard Black Jacket	FSJ1-50A	FSJ2-50	FSJ4-50B	EFX2-50	VXL5-50
Fire Retardant Cables					
CATVX, VW-1, IEC 332-1	FSJ1RN-50B	FSJ2RN-50	FSJ4RN-50B	EFX2RN-50	VXL5RN-50
CATV, UL1581, IEC 332-3, IEEE 383	FSJ1RN-50B	FSJ2RN-50	FSJ4RN-50B	EFX2RN-50	VXL5RN-50
CATVR, UL1666 (Riser)	FSJ1RN-50B	FSJ2RN-50	FSJ4RN-50B	EFX2RN-50	VXL5RN-50
Low VSWR Cables, Specially Tested					
Standard Black Jacket	FSJ1P-50A-(**)	FSJ2P-50-(**)	FSJ4P-50B-(**)	EFX2P-50-(**)	VXL5P-50-(**)
Special Application Cables					
Phase Stabilized; Phase Measured	p. 590	p. 590	p. 590	–	–
Characteristics					
Maximum Operating Frequency, MHz	20400	13400	10200	13500	4900
Peak Power Rating, kW	6.4	13.2	15.6	15.6	90
Relative Propagation Velocity, %	84	83	81	85	88
Minimum Bend Radius, in (mm)	1 (25)	1 (25)	1.25 (32)	1.75 (45)	5 (125)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20° C (68° F).					
30 MHz	0.973 (3.19)	0.649 (2.13)	0.557 (1.83)	0.584 (1.92)	0.214 (0.702)
100 MHz	1.79 (5.89)	1.20 (3.94)	1.04 (3.41)	1.08 (3.56)	0.397 (1.3)
450 MHz	3.91 (12.8)	2.64 (8.66)	2.31 (7.59)	2.39 (7.83)	0.878 (2.88)
1000 MHz	5.96 (19.6)	4.06 (13.3)	3.60 (11.8)	3.68 (12.1)	1.36 (4.46)
2000 MHz	8.67 (28.5)	5.97 (19.6)	5.37 (17.6)	5.41 (17.8)	2.01 (6.59)
6000 MHz	16.1 (52.7)	11.3 (37.2)	10.5 (34.4)	10.3 (33.8)	–
10000 MHz	21.7 (71.2)	15.5 (50.8)	14.6 (47.9)	14.1 (46.3)	–
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40 °C (104° F); inner conductor temperature 100°C (212°F); no solar loading.					
30 MHz	2.28	3.97	5.76	3.99	12.3
100 MHz	1.23	2.14	3.09	2.15	6.62
450 MHz	0.567	0.975	1.38	0.978	2.99
1000 MHz	0.372	0.634	0.889	0.635	1.93
2000 MHz	0.256	0.431	0.598	0.431	1.31
6000 MHz	0.138	0.228	0.307	0.227	–
10000 MHz	0.102	0.166	0.220	0.165	–

** Insert suffix number from specific cable Catalog page. † See specific Catalog page.

HELIAX® Coaxial Cable Selection Guide - 50-ohm, Foam Dielectric

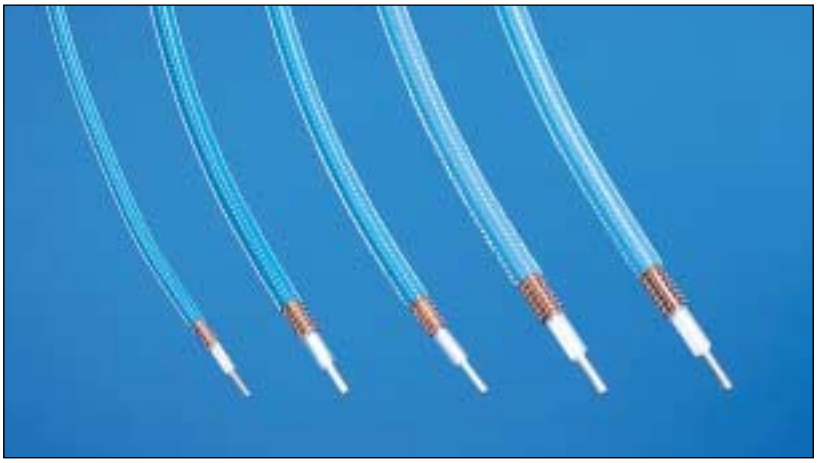
			Foam Dielectric, LDF Series				
1/4" 491	**3/8" 493**	**1/2" 496**	**5/8" 500**	**7/8" 506**	**1-1/4" 513**	**1-5/8" 520**	**2-1/4" 524**
Standard Cables							
LDF1-50	LDF2-50	LDF4-50A	LDF4.5-50	LDF5-50A	LDF6-50	LDF7-50A	LDF12-50
Fire Retardant Cables							
LDF1RN-50	LDF2RN-50	LDF4RN-50A	LDF4.5RN-50	LDF5RN-50A	LDF6RN-50	LDF7RN-50A	LDF12RN-50
LDF1RN-50	LDF2RN-50	LDF4RN-50A	LDF4.5RN-50	LDF5RN-50A	LDF6RN-50	LDF7RN-50A	LDF12RN-50
LDF1RN-50	LDF2RN-50	LDF4RN-50A	LDF4.5RN-50	LDF5RN-50A	LDF6RN-50	LDF7RN-50A	LDF12RN-50
Low VSWR Cables, Specially Tested							
LDF1P-50-(**)	LDF2P-50-(**)	LDF4P-50A-(**)	LDF4.5P-50-(**)	LDF5P-50A-(**)	LDF6P-50-(**)	LDF7P-50A-(**)	LDF12P-50-(**)
Special Application Cables							
p. 590	p. 590	p. 590	–	p. 590	–	–	–
Characteristics							
15800	13500	8800	6100	5000	3300	2500	2200
12.1	15.6	40	62	91	205	315	425
86	88	88	89	89	89	88	88
3 (76)	3.75 (95)	5 (125)	8 (200)	10 (250)	15 (380)	20 (510)	24 (610)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20°C (68°F).							
0.667 (2.19)	0.563 (1.85)	0.357 (1.17)	0.254 (0.834)	0.195 (0.641)	0.135 (0.444)	0.109 (0.356)	0.091 (0.299)
1.23 (4.05)	1.04 (3.42)	0.661 (2.17)	0.473 (1.55)	0.364 (1.19)	0.254 (0.832)	0.205 (0.671)	0.173 (0.566)
2.71 (8.88)	2.29 (7.51)	1.45 (4.75)	1.05 (3.46)	0.808 (2.65)	0.571 (1.87)	0.467 (1.53)	0.400 (1.31)
4.16 (13.6)	3.52 (11.6)	2.22 (7.28)	1.64 (5.38)	1.25 (4.12)	0.897 (2.94)	0.742 (2.43)	0.644 (2.11)
6.10 (20)	5.17 (17)	3.25 (10.7)	2.44 (8.02)	1.86 (6.11)	1.35 (4.43)	1.13 (3.71)	0.994 (3.26)
11.5 (37.7)	9.79 (32.1)	6.11 (20.1)	4.76 (15.6)	–	–	–	–
15.7 (51.5)	13.4 (43.9)	–	–	–	–	–	–
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40°C (104°F); inner conductor temperature 100°C (212°F); no solar loading.							
3.32	4.14	6.46	9.57	14.1	22.0	30.9	39.8
1.79	2.24	3.49	5.14	7.56	11.7	16.4	21.0
0.818	1.02	1.59	2.31	3.41	5.22	7.18	9.06
0.533	0.663	1.04	1.48	2.19	3.32	4.52	5.64
0.363	0.451	0.710	0.996	1.48	2.21	2.96	3.65
0.193	0.239	0.378	0.511	–	–	–	–
0.141	0.175	–	–	–	–	–	–

Coaxial Cable Selection Guide

HELIAX® Coaxial Cable Selection Guide - 50-ohm, Foam and Air Dielectric

	High Power, High Temp, Superflexible, ETS Series		High Power, High Temp, Superflexible, HST Series
Nominal Size	**1/4"**	**3/8"**	**1/4"**
Catalog Pages	**477**	**483**	**529**
Standard Cables			
Fire Retardant Cables			
CATVP, UL910 PLENUM, jacketed	ETS1-50T	ETS2-50T	HST1-50
Special Application Cables			
Phase Stabilized; Phase Measured	p. 591	p. 591	–
Characteristics			
Maximum Operating Frequency, MHz	20000	13400	18000
Peak Power Rating, kW	6.4	13.2	6.4
Relative Propagation Velocity, %	82	83	82
Minimum Bend Radius, in (mm)	1 (25)	1 (25)	1 (25)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20° C (68° F).			
30 MHz	0.97 (3.19)	0.653 (2.14)	0.911 (2.99)
100 MHz	1.79 (5.86)	1.22 (3.99)	1.68 (5.51)
450 MHz	3.86 (12.7)	2.71 (8.89)	3.65 (12)
1000 MHz	5.86 (19.2)	4.22 (13.8)	5.57 (18.3)
2000 MHz	8.46 (27.7)	6.28 (20.6)	8.10 (26.6)
6000 MHz	15.4 (50.6)	12.2 (40.1)	15.0 (49.1)
10000 MHz	20.6 (67.5)	17 (55.8)	20.2 (66.2)
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40 °C (104° F); inner conductor temperature (as noted); no solar loading.			
Inner Conductor Temperature, C° (F°)	200 (392)	200 (392)	250 (482)
30 MHz	5.48	9.89	3.60
100 MHz	2.98	5.31	1.95
450 MHz	1.38	2.38	0.897
1000 MHz	0.909	1.53	0.588
2000 MHz	0.629	1.03	0.405
6000 MHz	0.345	0.529	0.219
10000 MHz	0.259	0.381	0.163

** Insert suffix number from specific cable Catalog page. † See specific Catalog page.



HELIAX® Coaxial Cable Selection Guide - 50-ohm, Foam and Air Dielectric

	High Power, High Temp., Superflexible, HST Series		Plenum, Superflexible, HS-RP Series		
	3/8"	1/2"	1/4"	3/8"	1/2"
	533	549	527	531	546
Standard Cables					
Fire Retardant Cables					
	HST2-50	HST4-50	HS1RP-50A	HS2RP-50	HS4RP-50
	–	–	–	–	–
Special Application Cables					
	–	–	–	–	–
Characteristics					
	13400	10200	10000	13400	10200
	13.2	15.6	6.4	13.2	15.6
	83	81	84	83	81
	1 (25)	1.25 (32)	1 (25)	1 (25)	1.25 (32)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20°C (68°F).					
	0.667 (2.19)	0.586 (1.92)	0.941 (3.09)	0.650 (2.13)	0.512 (1.68)
	1.23 (4.05)	1.09 (3.58)	1.73 (5.69)	1.20 (3.94)	0.947 (3.11)
	2.70 (8.85)	2.42 (7.93)	3.75 (12.3)	2.61 (8.56)	2.07 (6.78)
	4.13 (13.6)	3.74 (12.3)	5.70 (18.7)	3.98 (13.0)	3.16 (10.4)
	6.04 (19.8)	5.55 (18.2)	8.24 (27.0)	5.78 (19.0)	4.62 (15.2)
	11.3 (37.2)	10.7 (35.1)	15.1 (49.5)	10.7 (35.1)	8.63 (28.3)
	15.4 (50.5)	14.8 (48.6)	20.2 (66.2)	14.4 (47.2)	11.7 (38.4)
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40°C (104°F); inner conductor temperature (as noted); no solar loading.					
	200 (392)	200 (392)	100 (212)	100 (212)	100 (212)
	9.98	15.6	1.56	2.69	3.31
	5.40	9.29	0.850	1.46	1.79
	2.47	4.19	0.393	0.670	0.821
	1.61	2.71	0.259	0.439	0.537
	1.10	1.83	0.179	0.302	0.368
	0.588	0.947	0.098	0.164	0.197
	0.433	0.685	0.073	0.121	0.145

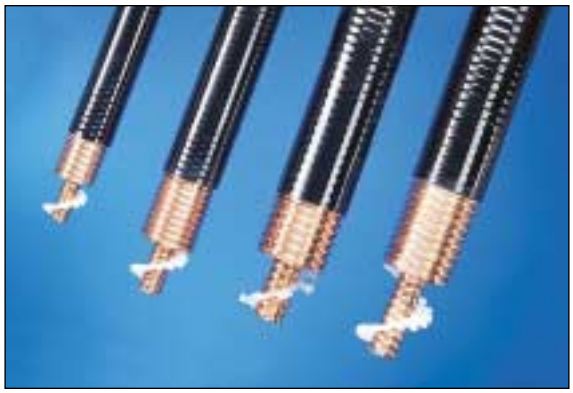
** Insert suffix number from specific cable Catalog page. † See specific Catalog page.

Coaxial Cable Selection Guide

HELIAX® Coaxial Cable Selection Guide - 50-ohm, Air Dielectric

	Air Dielectric, HJ Series				
Nominal Size	**1/2"**	**5/8"**	**7/8"**	**1-5/8"**	**2-1/4"**
Catalog Pages	**535**	**552**	**555**	**560**	**563**
Standard Cables					
Standard Black Jacket	HJ4-50	HJ4.5-50	HJ5-50	HJ7-50A	HJ12-50
Fire Retardant Cables					
CATVX, VW-1, IEC 332-1	HJ4RN-50	HJ4.5RN-50	HJ5RN-50	HJ7RN-50A	HJ12RN-50
CATV, UL1581, IEC 332-3, IEEE 383	HJ4RN-50	HJ4.5RN-50	HJ5RN-50	HJ7RN-50A	HJ12RN-50
CATVR, UL1666 (Riser)	HJ4RN-50	HJ4.5RN-50	HJ5RN-50	HJ7RN-50A	HJ12RN-50
CATVP, UL910 PLENUM, jacketed	41690-85	–	HJ5RP-50	HJ7RP-50A	–
Low VSWR Cables, Specially Tested					
Standard Black Jacket	HJ4P-50-(**)	HJ4.5P-50-(**)	HJ5P-50-(**)	HJ7P-50A-(**)	HJ12P-50-(**)
	–	–	–	HJ7SP-50A-(**)	–
Fire Retardant (CATVR), 824-894 MHz, 1.20 VSWR max.		–	41690-78	41690-79	–
Special Application Cables					
High Power/High Temperature				27591-101	
Phase Stabilized; Phase Measured	p. 591	–	p. 591	p. 591	–
Characteristics					
Maximum Operating Frequency, MHz	10900	6600	5200	2700	2300
Peak Power Rating, kW	21	40	90	305	425
Relative Propagation Velocity, %	91.4	92	91.6	92.1	93.1
Minimum Bend Radius, in (mm)	5 (125)	7 (180)	10 (250)	20 (510)	22 (560)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20° C (68° F).					
30 MHz	0.442 (1.45)	0.264 (0.867)	0.198 (0.651)	0.109 (0.358)	0.0906 (0.297)
100 MHz	0.821 (2.69)	0.488 (1.60)	0.369 (1.21)	0.203 (1.666)	0.169 (0.555)
450 MHz	1.82 (5.96)	1.07 (3.51)	0.823 (2.70)	0.451 (1.48)	0.378 (1.24)
1000 MHz	2.81 (9.23)	1.64 (5.37)	1.28 (4.20)	0.701 (2.30)	0.589 (1.93)
2000 MHz	4.17 (13.7)	2.40 (7.86)	1.91 (6.26)	1.04 (3.42)	0.880 (2.89)
6000 MHz	8.03 (26.3)	4.49 (14.8)	–	–	–
10000 MHz	11.1 (36.4)	–	–	–	–
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40° C (104° F); inner conductor temperature (as noted); no solar loading.					
Inner Conductor Temperature, C° (F°)	100 (212)	100 (212)	100 (212)	100 (212)	100 (212)
30 MHz	4.40	8.94	14.0	30.8	43.1
100 MHz	2.37	4.84	7.53	16.5	23.1
450 MHz	1.07	2.20	3.38	7.44	10.3
1000 MHz	0.690	1.43	2.17	4.79	6.63
2000 MHz	0.466	0.986	1.46	3.22	4.44
6000 MHz	0.242	0.525	–	–	–
10000 MHz	0.175	–	–	–	–

** Insert suffix number from specific cable Catalog page. † See specific Catalog page.



HELIAX® Coaxial Cable Selection Guide - 50-ohm, Air Dielectric

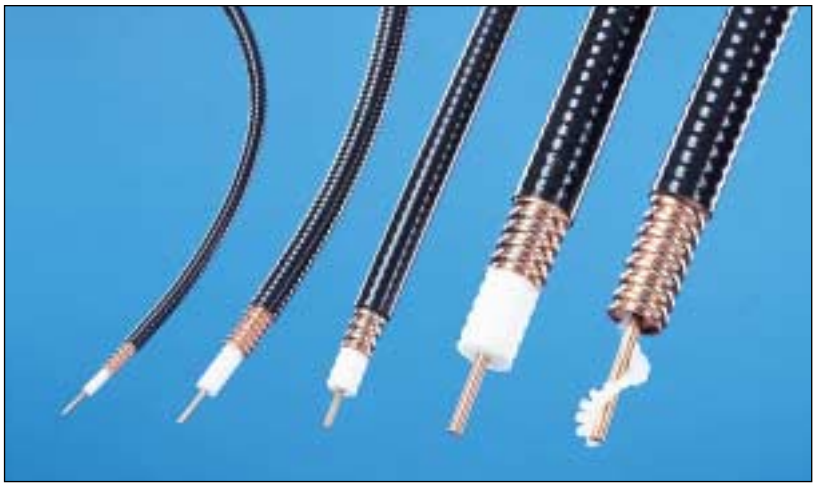
	Air Dielectric, HJ Series			5" High Power
	3"	4"	5"	5"
	566	568	570	572
Standard Cables				
	HJ8-50B	HJ11-50	HJ9-50	HJ9HP-50
Fire Retardant Cables				
	–	–	–	–
	–	–	–	–
	–	–	–	–
	–	–	–	–
Low VSWR Cables, Specially Tested				
	42141†	42144†	42142†	–
	209227†	–	–	–
	–	–	–	–
Special Application Cables				
	–	–	–	–
	–	–	–	–
Characteristics				
	1640	1220	960	960
	640	1100	1890	1690
	93.3	92	93.1	96.4
	30 (760)	40 (1015)	50 (1270)	50 (1270)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20°C (68°F).				
	0.0732 (0.240)	0.0601 (0.197)	0.0419 (0.138)	0.0381 (0.125)
	0.141 (0.464)	0.114 (0.376)	0.0789 (0.259)	0.0748 (0.245)
	0.340 (1.12)	0.268 (0.879)	0.180 (0.590)	0.186 (0.612)
	0.563 (1.85)	0.434 (1.42)	–	–
	–	–	–	–
	–	–	–	–
	–	–	–	–
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40° C (104° F); inner conductor temperature (as noted); no solar loading.				
	121 (250)	121 (250)	100 (212)	150 (302)
	81.9	123	159	335
	0.141	64.7	84.5	172
	0.340	27.6	37.1	70.8
	10.6	17.1	–	–
	–	–	–	–
	–	–	–	–
	–	–	–	–

** Insert suffix number from specific cable Catalog page. † See specific Catalog page.

Coaxial Cable Selection Guide

HELIAX® Coaxial Cable Selection Guide - 50-ohm, Air Dielectric

	Air Dielectric, High Power HT Series		Air Dielectric, High Power High Temp., HLT Series	Air Dielectric, Plenum HL Series
Nominal Size	**1/2"**	**7/8"**	**1/2"**	**1/2"**
Catalog Pages	**538**	**558**	**543**	**540**
Standard Cables				
Standard Black Jacket	–	–	–	–
Fire Retardant Cables				
CATVX, VW-1, IEC 332-1	–	–	–	–
CATV, UL1581, IEC 332-3, IEEE 383	–	–	–	–
CATVR, UL1666 (Riser)	–	–	–	–
CATVP, UL910 PLENUM, jacketed	–	–	HLT4-50T	HL4RP-50
CATVP, UL910 PLENUM, unjacketed	HT4-50	HT5-50	–	–
Special Application Cables				
High Power/High Temperature	HT4-50	HT5-50	HLT4-50T	HL4RP-50
Characteristics				
Maximum Operating Frequency, MHz	10900	5200	4000	6000
Peak Power Rating, kW	21	90	21.4	40.0
Relative Propagation Velocity, %	92	92.5	93	88
Minimum Bend Radius, in (mm)	5 (125)	10 (250)	5 (125)	5(125)
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20° C (68° F).				
30 MHz	0.468 (1.54)	0.198 (0.651)	0.377 (1.24)	0.389 (1.28)
100 MHz	0.888 (2.91)	0.369 (1.21)	0.718 (2.35)	0.725 (2.38)
450 MHz	2.06 (6.75)	0.823 (2.70)	1.67 (5.48)	1.61 (5.28)
1000 MHz	3.31 (10.9)	1.28 (4.20)	2.7 (8.85)	2.5 (8.19)
2000 MHz	5.10 (16.7)	1.91 (6.26)	4.18 (13.7)	3.71 (12.2)
6000 MHz	10.7 (35.1)	–	–	7.18 (23.6)
10000 MHz	15.5 (50.7)	–	–	–
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40° C (104° F); inner conductor temperature 100° C (212° F); no solar loading.				
Inner Conductor Temperature, C° (F°)	200 (392)	200 (392)	200 (392)	100 (212)
30 MHz	11.8	32.7	12.7	6.78
100 MHz	6.21	16.6	6.70	3.64
450 MHz	2.68	6.65	2.88	1.64
1000 MHz	1.67	3.92	1.78	1.06
2000 MHz	1.08	1.51	1.15	0.713
6000 MHz	0.516	–	–	0.368
10000 MHz	0.357	–	–	–

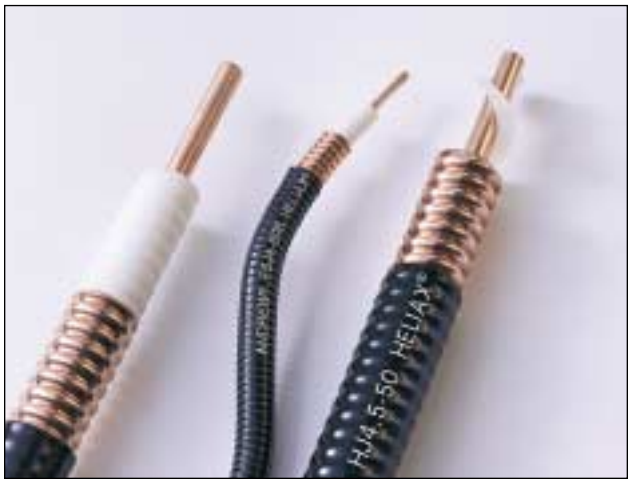


HELIAX® Coaxial Cable Selection Guide - 75-ohm, Foam and Air Dielectric

Superflexible, FSJ Series		Foam Dielectric, LDF Series		Air Dielectric, HJ Series
1/4"	1/2"	1/2"	7/8"	7/8"
574	576	578	580	582
Standard Cables				
FSJ1-75	FSJ4-75A	LDF4-75A	LDF5-75	HJ5-75
Fire Retardant Cables				
FSJ1RN-75A	FSJ4RN-75A	LDF4RN-75A	–	HJ5RN-75
FSJ1RN-75A	FSJ4RN-75A	LDF4RN-75A	–	HJ5RN-75
FSJ1RN-75A	FSJ4RN-75A	LDF4RN-75A	–	HJ5RN-75
–	–	–	–	–
–	–	–	–	–
Special Application Cables				
–	–	–	–	–
Characteristics				
22000	11500	10000	5300	5600
6.7	10.0	26	70	60
78	81	88	89	90
1 (25)	1.25 (32)	5 (125)	10 (250)	10 (250
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20° C (68° F).				
0.999 (3.28)	0.514 (1.68)	0.333 (1.09)	0.195 (0.639)	0.209 (0.686)
1.86 (6.12)	0.958 (3.14)	0.618 (2.03)	0.366 (1.2)	0.388 (1.27)
4.17 (13.7)	2.14 (7.02)	1.37 (4.5)	0.834 (2.74)	0.850 (2.79)
6.51 (21.4)	3.34 (11)	2.12 (6.97)	1.32 (4.34)	1.29 (4.23)
9.73 (31.9)	4.98 (16.4)	3.15 (10.3)	2.01 (6.6)	1.92 (6.30)
19.1 (62.7)	9.78 (32.1)	6.09 (20)	–	–
26.7 (87.6)	13.6 (44.7)	8.42 (27.6)	–	–
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40° C (104° F); inner conductor temperature 100° C (212° F); no solar loading.				
100 (212)	100 (212)	100 (212)	100 (212)	100 (212)
1.06	3.30	3.10	5.65	9.31
0.570	1.77	1.67	3.00	5.01
0.255	0.794	0.753	1.32	2.25
0.163	0.509	0.486	0.832	1.49
0.109	0.341	0.328	0.548	0.977
0.056	0.174	0.170	–	–
0.040	0.125	0.123	–	–

HELIAX® Coaxial Cable

Accept No Substitute



Service Guarantee

At Andrew, we're committed to exceeding our customers' highest expectations by offering the best products backed by the most responsive service in the industry. So whatever our customers need, whenever and wherever they need it, we will deliver.

HELIAX® is the Andrew brand name that stands for the most complete, cost-effective, high performance coaxial cable systems in the world.

For more than 40 years, Andrew Corporation has led the industry in meeting the need for semi-flexible RF transmission line. In land mobile, broadcast, cellular, military, terrestrial microwave, HF, earth station, personal communication, and many other applications, HELIAX coaxial cable products, including air and foam-dielectric cable, are the industry standard of excellence. The unique feature that makes HELIAX coaxial cable the best in the world is a solid copper, corrugated outer conductor which gives it strength, durability, flexibility, and complete shielding. These outstanding coaxial cables are complemented by our compatible connectors, hangers, grounding systems and other installation accessories to form a complete RF transmission line system. This broad range of coaxial cable and cable products means that Andrew can provide the right fit for any application you may have, from a single component to a complete, integrated cable system. It also means that all of your transmission line needs can be met by just one vendor — Andrew.

When you purchase HELIAX coaxial cable from Andrew, you're buying more than just cable. You're buying quality and performance that will save you money over the life of your system investment. You receive:

- *Outstanding Electrical Performance*
- *Long Service Life*
- *Simplified System Planning*
- *Lower Installation Cost*
- *ISO 9001 Certified*

Here's a closer look at the benefits:

Outstanding Electrical Performance

HELIAX coaxial cable, connectors and accessories are designed to provide optimum electrical performance for a wide range of RF applications. You can be certain that HELIAX coaxial cable systems will perform as you expect with no surprises.

HELIAX connectors are designed exclusively for use with HELIAX coaxial cables to provide excellent electrical performance for the complete transmission line system.

Low Attenuation

The low attenuation of HELIAX coaxial cable results in highly efficient signal transfer which maximizes overall system performance.

Complete Shielding

Because HELIAX cable has a solid copper outer conductor, you get continuous RFI/EMI shielding to minimize interference and maximize system security.

HELIAX® Coaxial Cable
Accept No Substitute

Low VSWR
HELIAX feeder cables, LDF4 - LDF7 and VXL series cables, now feature a maximum VSWR of 1.13:1 in the cellular and PCS bands. This specification applies to bulk length cable and includes straight DIN or N-type connectors.

Also available are lower VSWR options, or low VSWR in other frequency bands. Refer to the Low VSWR Specifications tables for each cable type.

Excellent Intermodulation Performance
The solid inner and outer conductors of HELIAX cable virtually eliminate intermodulation generation. Connectors minimize intermodulation by ensuring high contact pressure at the connector to cable interface.

High Power Rating
The low attenuation and excellent heat transfer properties of HELIAX cables combined with temperature stabilized dielectric materials result in safe long term operation at the high average power levels often required for broadcast, military and other transmit applications.

Long Service Life

When it comes to reliability, HELIAX coaxial cables have built-in quality features to protect your investment and provide long term cost-effective performance. Service and maintenance costs are avoided because HELIAX cable systems are designed to last.

All HELIAX coaxial cables are jacketed for direct burial or for corrosive environmental conditions. Standard jacketing material is weather-resistant polyethylene suitable for use in extreme climates. Operational fire retardant CATVX, CATVR and CATVP rated jacketed cables are available to meet safety regulations for indoor installations. The fire retardant cables are UV stabilized and do not require additional UV protection during outdoor storage. See page 631 for information on cable and connector temperature ratings.

Strong and Flexible
HELIAX cable's solid copper, corrugated outer conductor gives it great strength, durability and flexibility. This assures long life as well as ease of installation.

Weatherproof and Durable

HELIAX cable's standard black polyethylene jacketing is weatherproof and ultraviolet stabilized making it suitable for outdoor applications. HELIAX cable is directly buriable and highly resistant to crushing. It is exceptionally corrosion resistant, helping to provide a long term, trouble-free cable system. Many users have been in operation for more than 20 years with the same HELIAX cable.

HELIAX® is the registered trademark under which semi-flexible coaxial cables are sold by Andrew. HELIAX cables, connectors and accessories are proprietary products of Andrew manufactured under patents issued and pending.

Reliable

The availability of HELIAX cable in long, continuous lengths eliminates the need for joints which can affect reliability.

Simplified System Planning

Selecting a HELIAX cable system will make system planning easy and cost-effective. With Andrew, you have the advantage of our outstanding engineering resources and comprehensive product line. Look at the system planning benefits you receive when you purchase HELIAX coaxial cable:

One-Stop Shopping
With Andrew "one-stop" shopping, all of your transmission line needs – quality cable, connectors, accessories and service – are available from one vendor. You avoid the problems of delivery delays, out-of-sequence deliveries, and non-compliant materials which are frequently the result of dealing with multiple vendors. At Andrew, all of our cable components are engineered to work together as a HELIAX cable system.

HELIAX® Coaxial Cable

Accept No Substitute

Fast Delivery
Product availability is critical when you have a weather emergency or last minute design change that could result in downtime and lost revenue. In such situations, we respond quickly to get you on-the-air. Rapid product availability allows Andrew to be a real problem solver for you at installation time. With schedules to meet, you need to avoid delivery delays, contain costs, and get your system operating on time. With HELIAX coaxial cable from Andrew, you can do it.

Large Variety of Sizes and Types
The wide variety of HELIAX cable sizes and types lets you select the best cable for your specific application allowing more cost-effective planning. Optional fire-retardant, non-halogenated jacketing is available to meet safety regulations for indoor installations.
See Cable Selection Guide on pages 442 - 449.

Factory Connector Attachment
For your convenience, HELIAX cables can be ordered cut to length and factory fitted with connectors per your specifications. This service helps you avoid field assembly and testing.

Free Software and Product Information
To help plan your system, Andrew provides a number of helpful software packages. In addition, you can obtain Installation Instruction Bulletins, Special Publications and Product Specifications via Fax-On-Demand and the Andrew web site.

Snap-Clean Foam Dielectric
Snap-Clean foam dielectric sets a new standard for quick, easy connector installation. With a simple twist, the foam dielectric snaps free of the inner conductor, leaving the solid inner conductor ready for connector attachment with no foam or adhesive residue. Additional cleaning and scraping of the cable are not required. This saves time, money and results in superior electrical performance of the cable and connector. Snap-Clean is featured on HELIAX foam cables with a solid inner conductor.

Lower Installation Cost

The HELIAX cable product line helps lower your field installation costs.

Long Continuous Lengths
This simplifies installation and eliminates the cost of splicing. Cable lengths can be conveniently stocked on site and cut to required lengths.

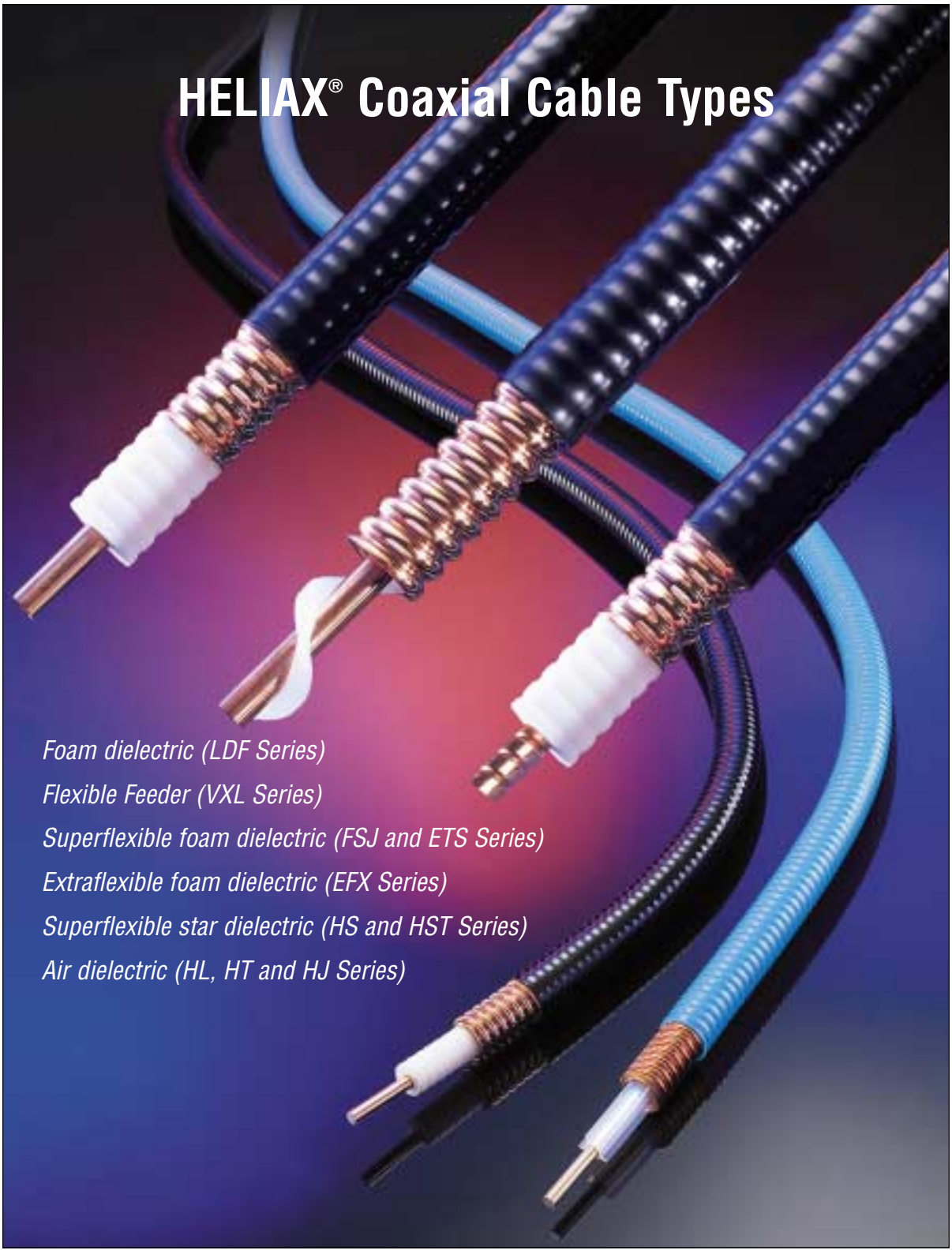
Flexibility
HELIAX cable's corrugated copper outer conductor gives it flexibility which makes shipping, handling and installation easier and more cost-effective than rigid line.

Ease of Connector Attachment
Connectors for HELIAX coaxial cable can be easily attached in the field with standard hand tools. HELIAX connectors provide high resistance to connector pull-off and twist-off as well as excellent electrical contact.

Whatever your transmission line needs may be, HELIAX coaxial cables, connectors and accessories made exclusively by Andrew consistently provide you with outstanding electrical performance, long service life, simplified system planning, and lower installation costs.

ISO 9001 Certified

ISO 9001 is the internationally recognized standard for quality systems. It was designed to provide a thorough, yet flexible model for quality systems design and implementation. Andrew facilities have successfully completed the requirements of ISO 9001, the most stringent portion of the standard. This certification resulted from a consistent quality system that involves everyone in the organization in improving both internal and external quality.


HELIAX® Coaxial Cable Types
Foam dielectric (LDF Series)
Flexible Feeder (VXL Series)
Superflexible foam dielectric (FSJ and ETS Series)
Extraflexible foam dielectric (EFX Series)
Superflexible star dielectric (HS and HST Series)
Air dielectric (HL, HT and HJ Series)

Superflexible and Extraflexible Cables

Superflexible and Extraflexible Cables

HELIAX® superflexible and extraflexible cables are designed for ease of installation in tight wiring spaces in shelters, radio rooms, and plenums. These cables are perfect for antenna and equipment room jumpers. Like all HELIAX cables, superflexible cables feature a solid outer conductor for unsurpassed electrical and mechanical performance. A polyethelene foam dielectric offers excellent electrical performance and prevents water migration.

Flexibility

Andrew HELIAX superflexible cables are manufactured with deep, helical corrugations in the outer conductor. Extraflexible cables are manufactured with deep, annular corrugations. These exclusive corrugating processes permit Andrew cables and assemblies to be bent on very tight radii, without any degradation in performance. In addition, numerous reverse bends can be made, again without loss in performance.

Superior Electrical Performance

HELIAX cables and assemblies offer specifiers and users superior electrical performance in smaller sized cables. HELIAX cables and assemblies provide excellent attenuation and superior power handling and shielding versus comparably sized braided cables.

Excellent Intermodulation Performance

The solid inner and outer conductors found in all HELIAX cables minimize intermodulation generation. The braided outer conductors and stranded inner conductors that are common in other cables form numerous contacts in the electrical path, which are sources of intermodulation.

Complete Product Range

Andrew now offers a complete range of cables to meet every application and budget requirement. HELIAX superflexible and extraflexible cables are available in a wide range of sizes and constructions for general use, plenum, and flame retardant applications. The HS series cables feature a star-shaped dielectric and superflexible construction. They are for use in plenum applications. The HST superflexible cables are for high power applications. These new cables feature a star-shaped dielectric which offers higher power handling at higher temperatures than any other flexible cable. A wide selection of connectors and factory manufactured assemblies in both standard and custom jumper configurations is available, to complement Andrew cable and make system planning easy and simple.

New VXL Series of Flexible Feeder Cables

HELIAX® flexible feeder cables are designed for use in difficult areas. They are more flexible than LDF series, while maintaining similar attenuation characteristics. 7/8" VXL5-50 is suitable for use as a one-piece feeder line from radio equipment to antenna, thus eliminating the need for jumper cables.

Superior Performance

New VXL series flexible feeder cable uses advanced processing technology to provide a lower cost/higher performance solution that is ideal for wireless applications. System designers and engineers can eliminate the need for jumper cables when VXL5-50, a 7/8" feeder cable, is specified. It is suitable for continuous cable runs from the base station cabinet to the antenna. When used as one-piece feeder line, VXL5-50 requires no jumper cable from feeder to antenna. This eliminates extra connectors, lowering insertion loss, and minimizing installation time. Versatile and flexible, VXL series cable is also suitable for installation in difficult areas such as lift shafts, monopoles, and co-located sites.

Lower Site Costs

VXL5, VXL6, and VXL7 cables are lighter weight than standard series cables. The cable's reduced weight and tighter bending radius minimize installation time and lower site costs. Jumper cables are not required with VXL5-50. This means fewer connectors, less weatherproofing, and lower costs. The lighter weight of VXL series cable also reduces shipping costs.

Outstanding Electrical Performance

All VXL series cables have a closed-cell, foam polyethylene dielectric that prevents water migration and maintains its characteristics over time. The low-density foam provides low attenuation characteristics similar to LDF series cables. When used as a combined feeder/jumper solution, both system attenuation and system VSWR are optimized.

Flexibility

The VXL5 cable exhibits the tight bend radius of a 1/2" jumper. It, therefore, requires no jumpers when used as a main feeder. When the cable is used as a stand-alone jumper, it is the lowest-loss jumper solution in the industry.

LDF Series Foam Dielectric Cables

Foam Dielectric Cables

Superior Electrical Performance

Like the FSJ and EFX cables, LDF cables have a closed-cell, foam-polyethylene dielectric that prevents water migration and maintains its characteristics over time.

LDF cables are designed for low loss. Their lower density foam allows higher velocities and provides lower attenuation than FSJ cables. Attenuation characteristics approach those of air dielectric cables.

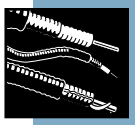
Flexibility
HELIAX foam dielectric cables feature an annularly corrugated outer conductor that provides excellent shielding while offering flexibility.

Complete Product Range
LDF cables are available in sizes from 1/4" to 2-1/4" to meet application requirements for cellular and personal communications, land mobile radio, earth station antenna jumpers, equipment room and antenna jumpers, CATV, HF communications, VLF, military data links, AM and FM broadcast, terrestrial microwave, and CCTV. Phase stabilized versions are available.

Weatherproof
Closed cell dielectric prevents water penetration. Connector O-rings seal out moisture.

Excellent Intermodulation Performance
Solid inner and outer conductors eliminate IM generated by numerous moving contacts in the current path that are found with stranded inner conductors and braided outer conductors.

Quick and Easy Connector Attachment
A range of self flaring connectors are available for easy field attachment requiring no special tools.



Air Dielectric Cables

HELIAX® air dielectric cables from Andrew, available in 1/4" to 5" sizes, are designed to give you the lowest attenuation and highest average power rating. When these cables are equipped with the proper pressurization systems, they may be used in any indoor/outdoor environment. Air cables, if used indoors in a controlled environment, do not require pressurization.

The HJ air cables have a polyethylene or polypropylene spacer, and different jacketing materials dependent on fire retardancy requirements. High power HJ series cables use a special fluoropolymer spacer for maximum power handling with excellent attenuation. The cables are ideal for antenna feeder applications such as AM and FM radio, UHF and VHF TV, terrestrial microwave and earth station antenna systems, land mobile and cellular radio, ITFS, MMDS and MDS antenna systems, HF communications, military communications and radar.

The HL air cables utilize a polyethylene spiral to space the inner conductor from the outer conductor, and a fluoropolymer jacket to provide fire retardancy. These cables are intended for indoor plenum type applications.

The HT air cables use a fluoropolymer spiral to space the inner from the outer, and are unjacketed. These cables are for high temperature and/or high power applications.

The Outstanding Features of HELIAX® Air-Dielectric Cables are:

Low Attenuation
Low loss dielectric materials combined with high conductivity copper conductors result in low attenuation for efficient signal transfer and maximum system performance.

Solid Copper Corrugated Outer Conductor
Results in low loss, continuous RFI/EMI shielding to minimize interference and maximize system security. Corrugated outer conductor allows for ease of installation.

High Power Handling
Results from low attenuation and excellent heat transfer characteristics.

Weatherproof/Pressure Tight
HJ type cables have silicone gasketed connectors with 1/8" NPT pressure inlets. Connectors are designed to be pressure tight for maximum protection against water entry.

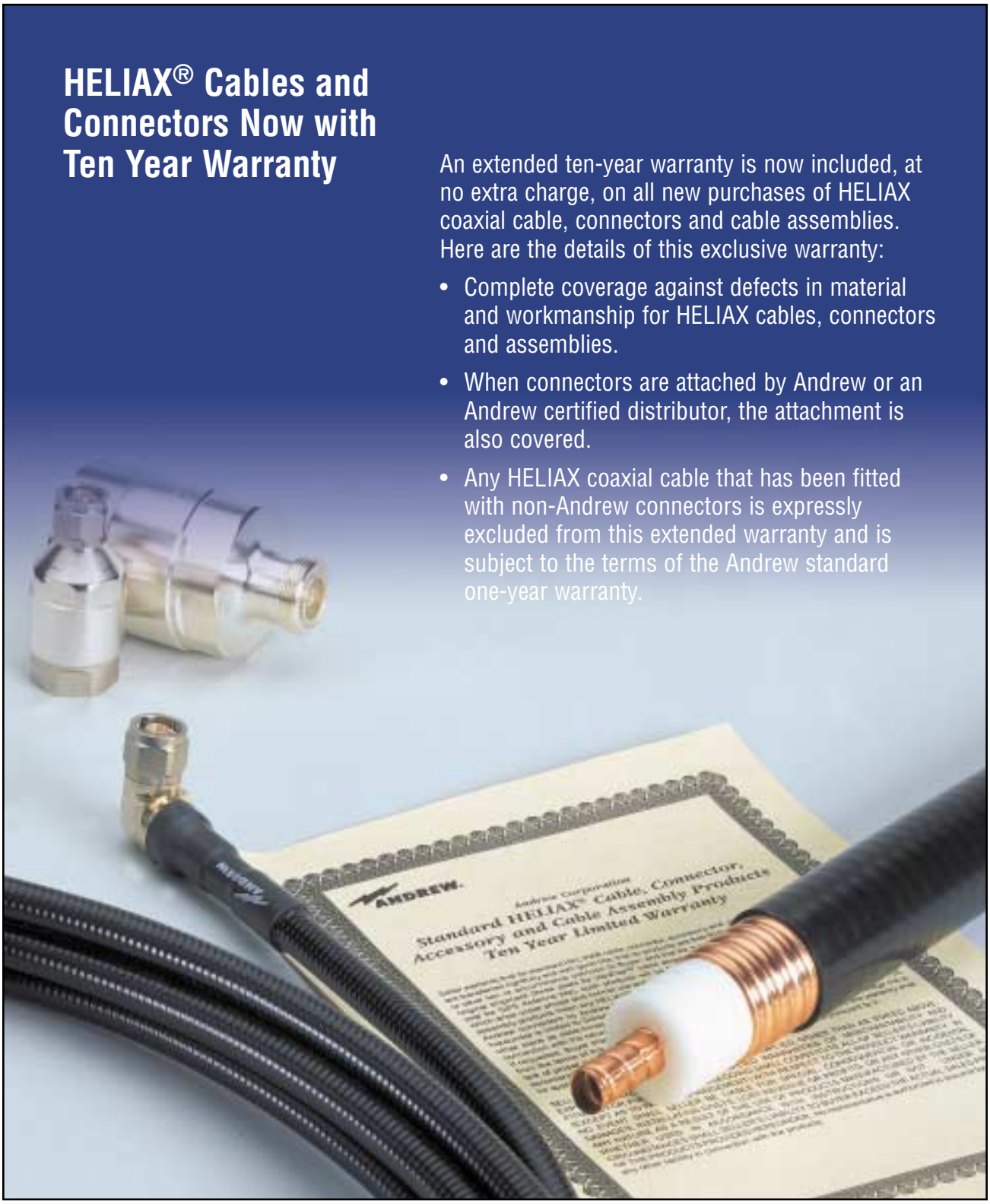
System Integrity
If a pressurized air-dielectric cable should be damaged, the pressurization system will alarm so that the leak can be corrected before water enters the cable and degrades performance.

Rugged Construction
HELIAX HJ cables are made with the strongest dielectric spacer in the industry, to withstand the stress of installation.

HELIAX® Cables and Connectors Now with Ten Year Warranty

An extended ten-year warranty is now included, at no extra charge, on all new purchases of HELIAX coaxial cable, connectors and cable assemblies. Here are the details of this exclusive warranty:

- Complete coverage against defects in material and workmanship for HELIAX cables, connectors and assemblies.
- When connectors are attached by Andrew or an Andrew certified distributor, the attachment is also covered.
- Any HELIAX coaxial cable that has been fitted with non-Andrew connectors is expressly excluded from this extended warranty and is subject to the terms of the Andrew standard one-year warranty.



HELIAX® Coaxial Cable…
Today's Alternative to Braided Cable

Excellent Intermodulation Performance
HELIAX coaxial cables and connectors minimize intermodulation generation by using solid conductors. Stranded inner conductors and braided outer conductors, used in many other cables, form numerous contacts within the current path which are a source of intermodulation.

Complete RF Shielding
Unlike braided cables, HELIAX coaxial cables have a solid corrugated copper outer conductor to protect against electromagnetic interface and radio frequency interference (EMI and RFI).

Phase Stability
HELIAX coaxial cables offer excellent phase stability over temperature variations and with bending. This makes them an excellent choice for phase-critical applications such as delay lines and matched feeders in phased-array antennas.

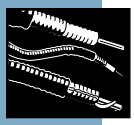
Low Attenuation
The continuous outer conductor and low loss polyethylene foam dielectric of HELIAX cables result in much lower losses than comparably sized braided cables.

High Power Capability
The excellent thermal conductivity and the low attenuation of HELIAX cables provide for higher average power handling capability when compared to comparably sized braided cables.

Flexibility
HELIAX coaxial cables have excellent flexibility for ease of installation. These cables can be bent on small radii and will withstand repeated bends without degrading performance.

Weatherproof and Durable for Outdoor Applications
HELIAX coaxial cables are protected with a rugged black polyethylene jacket which provides abrasion resistance and complete environmental protection. Unlike braided cables, they can be used outdoors without the fear of water migration.

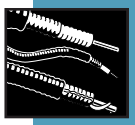
Fire Retardancy
HELIAX coaxial cables are available with special jacketing to meet relevant fire retardance standards. See page 626.



HELIAX® Coaxial Cable vs Coventional Braided Cables*

HELIAX Coaxial Cables

	Standard Superflexible			Extraflexible	LDF Series			Plenum Rated		
	FSJ1-50A	FSJ2-50	FSJ4-50B	EFX2-50	LDF1-50	LDF2-50	LDF4-50A	HS1RP-50	HS2RP-50	HS4RP-50
Nominal Size	1/4"	3/8"	1/2"	3/8"	1/4"	3/8"	1/2"	1/4"	3/8"	1/2"
Impedance, ohms	50	50	50	50	50	50	50	50	50	50
Electrical Characteristics										
Relative Propagation Velocity, %	84	83	81	85	86	88	88	84	83	81
Maximum Operating Frequency, MHz	20400	13400	10200	13500	15800	13500	8800	10000	13400	10200
Attenuation, dB/100 ft (dB/100 m) Standard conditions: VSWR 1.0; ambient temperature 20° C (68° F).										
150 MHz	2.21 (7.25)	1.48 (4.86)	1.28 (4.21)	1.34 (4.39)	1.52 (4.99)	1.29 (4.24)	0.815 (2.67)	2.13 (6.99)	1.48 (4.84)	1.17 (3.83)
450 MHz	3.91 (12.8)	2.64 (8.66)	2.31 (7.59)	2.39 (7.83)	2.71 (8.88)	2.29 (7.51)	1.45 (4.75)	3.75 (12.3)	2.61 (8.56)	2.07 (6.78)
824 MHz	5.38 (17.6)	3.66 (12.0)	3.23 (10.6)	3.31 (10.8)	3.74 (12.3)	3.17 (10.4)	2.00 (6.56)	5.14 (16.9)	3.59 (11.8)	2.85 (9.35)
960 MHz	5.38 (19.1)	3.97 (13.0)	3.52 (11.6)	3.59 (11.8)	4.07 (13.3)	3.44 (11.3)	2.17 (7.12)	5.58 (18.3)	3.89 (12.8)	3.09 (10.2)
1500 MHz	7.41 (24.3)	5.08 (16.7)	4.54 (14.9)	4.60 (15.1)	5.19 (17.0)	4.40 (14.4)	2.77 (9.09)	7.06 (23.2)	4.94) (16.2)	3.94 (12.9)
2000 MHz	8.67 (28.5)	5.97 (19.6)	5.37 (17.6)	5.41 (17.8)	6.1 (20)	5.17 (17)	3.25 (10.7)	8.24 (27.0)	5.78 (19.0)	4.62 (15.2)
4000 MHz	12.8 (41.8)	8.90 (29.2)	8.15 (26.7)	8.08 (26.5)	9.06 (29.7)	7.70 (25.3)	4.82 (15.8)	12.0 (39.5)	8.49 (27.8)	6.8 (22.4)
6000 MHz	16.1 (52.7)	11.3 (37.2)	10.5 (34.4)	10.3 (33.8)	11.5 (37.7)	9.79 (32.1)	6.11 (20.1)	15.1 (49.5)	10.7 (35.1)	8.63 (28.3)
10000 MHz	21.7 (71.2)	15.5 (50.8)	14.6 (47.9)	14.1 (46.3)	15.7 (51.5)	13.4 (43.9)	– –	20.2 (66.2)	14.4 (47.2)	11. (38.4)
Average Power Rating, kW Standard conditions: VSWR 1.0; ambient temperature 40° C (104° F); inner conductor temperature 100° C (212° F), except HST Series 200° C (392° F).										
150 MHz	1.00	1.74	2.49	1.74	1.45	1.81	2.83	0.691	1.18	1.46
450 MHz	0.567	0.975	1.38	0.978	0.818	1.02	1.59	0.393	0.670	0.821
824 MHz	0.412	0.704	0.991	0.706	0.592	0.736	1.15	0.286	0.487	0.595
960 MHz	0.380	0.648	0.909	0.649	0.545	0.678	1.06	0.264	0.449	0.549
1500 MHz	0.299	0.507	0.705	0.507	0.426	0.530	0.833	0.209	0.354	0.431
2000 MHz	0.256	0.431	0.597	0.431	0.363	0.451	0.710	0.179	0.302	0.368
4000 MHz	0.174	0.289	0.394	0.289	0.245	0.303	0.479	0.123	0.206	0.249
6000 MHz	0.138	0.228	0.306	0.227	0.193	0.239	0.378	0.098	0.164	0.197
10000 MHz	0.102	0.166	0.220	0.165	0.141	0.175	–	0.073	0.121	0.145
Mechanical Characteristics										
Diameter over jacket										
in	0.29	0.415	0.52	0.45	0.345	0.44	0.63	0.29	0.415	0.518
(mm)	(7.4)	(10.5)	(13.2)	(11.3)	(8.8)	(11.2)	(15.9)	(7.37)	(10.5)	(13.16)
Weight										
lb/ft	0.045	0.078	0.14	0.09	0.06	0.08	0.15	0.063	0.076	0.138
(kg/m)	(0.067)	(0.12)	(0.21)	(0.13)	(0.09)	(0.12)	(0.22)	(0.093)	(0.113)	(0.205)
Min. Bending Radius										
in	1	1	1.25	1.75	3	3.75	5	1	1	1.25
(mm)	(25)	(25)	(32)	(45)	(76)	(95)	(125)	(25)	(25)	(32)

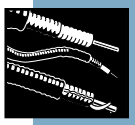


Standard Superflexible FSJ1-75 1/4" 75	FSJ4-75A 1/2" 75	LDF Series LDF4-75A 1/2" 75	Conventional Braided Cables M17/74 RG-213/U	M17/75 RG-214/U	Commercial Version of RG-213/U	M17/60 RG-142B/U	M17/127 RG-393/U	M17/2 RG-6/U	M17/6 RG-11/U
78	81	88	65.9	65.9	84	69.5	69.5	65.9	65.9
22000	11500	10000	1000	11000	–	12400	11000	3000	1000
2.31 (7.57)	1.19 (3.89)	0.764 (2.51)	2.6 (8.5)	2.9 (9.5)	1.5 (4.9)	4.6 (15.1)	2.7 (8.8)	3.6 (11.8)	2.7 (8.8)
4.17 (13.7)	2.14 (7.02)	1.37 (4.50)	5.0 (16.4)	5.5 (18.0)	2.8 (9.2)	8.4 (27.6)	4.9 (16.1)	6.7 (22.0)	5.1 (16.7)
5.83 (19.1)	2.99 (9.82)	1.91 (6.26)	7.4 (24.3)	7.8 (25.6)	4.0 (13.1)	11.8 (38.7)	7.0 (23.0)	9.6 (31.5)	7.5 (24.6)
6.36 (20.9)	3.26 (10.7)	2.08 (6.81)	8.5 (27.9)	8.6 (28.2)	4.4 (14.4)	13.0 (42.7)	7.6 (24.9)	10.6 (34.8)	8.6 (28.2)
8.22 (27.0)	4.21 (13.8)	2.67 (8.76)	– –	11.3 (37.1)	5.8 (19.0)	16.9 (55.4)	10.0 (32.8)	14.0 (45.9)	– –
9.73 (31.9)	4.98 (16.4)	3.15 (10.3)	– –	13.6 (44.6)	7.0 (23.0)	20.2 (66.3)	11.9 (39.0)	16.9 (55.4)	– –
14.8 (48.6)	7.58 (24.9)	4.75 (15.6)	– –	21.6 (70.9)	11.1 (36.4)	31.4 (103)	18.5 (60.7)	– –	– –
19.1 (62.7)	9.78 (32.1)	6.09 (20.0)	– –	28.6 (93.8)	14.7 (48.2)	41.1 (135)	24.2 (79.4)	– –	– –
26.7 (87.6)	13.6 (44.7)	8.42 (27.6)	– –	41.4 (136)	– –	58.5 (192)	34.5 (113)	– –	– –
0.460	1.43	1.35	0.91	0.91	1.2	2.1	5.4	0.42	0.57
0.255	0.794	0.753	0.44	0.44	0.58	1.1	2.9	0.19	0.26
0.182	0.568	0.541	0.29	0.29	0.39	0.79	2.0	0.13	0.17
0.167	0.521	0.497	0.26	0.26	0.35	0.73	1.8	0.11	0.15
0.129	0.403	0.387	–	0.19	0.26	0.56	1.4	0.083	–
0.109	0.341	0.328	–	0.16	0.21	0.47	1.2	0.068	–
0.072	0.224	0.218	–	0.096	0.12	0.29	0.76	–	–
0.056	0.174	0.170	–	0.070	0.088	0.22	0.58	–	–
0.040	0.125	0.123	–	0.046	–	0.14	0.40	–	–
0.29 (7.4)	0.52 (13.2)	0.63 (16)	0.405 (10.29)	0.425 (10.79)	0.405 (10.29)	0.195 (4.95)	0.390 (9.91)	0.332 (8.43)	0.405 (10.29)
0.046 (0.068)	0.14 (0.21)	0.14 (0.21)	0.11 (0.164)	0.13 (0.193)	0.089 (0.132)	0.043 (0.064)	0.175 (0.260)	0.082 (0.122)	0.098 (0.146)
1 (25)	1.25 (32)	5 (125)	5 (125)	6 (150)	6 (150)	2 (50)	4 (102)	3 (75)	4.5 (115)

* Braided cables not supplied by Andrew. Listing is for comparative purposes only.

Premium Performance Connectors Complement HELIAX Coaxial Cables

Andrew offers an extensive line of connectors for HELIAX coaxial cables. Used together, HELIAX cables and connectors produce the highest quality transmission line available. HELIAX connectors are designed and manufactured by Andrew. Using HELIAX cable and connectors ensures exceptional electrical and mechanical performance. Only HELIAX connectors are designed to be completely compatible with HELIAX cable. With many interfaces and attachment styles available, you can be sure you will get the characteristics you want and the performance you can rely on.



HELIAX Connectors Offer Multiple Design Advantages

Easy Attachment
HELIAX connectors are designed for fast, accurate installation. Features like pre-set pin depths and self-flaring mechanisms ensure performance and reduce costly installation errors. The connectors can be attached with the most basic hand tools. Attachment time can be reduced, even further, with EASIAX® cable preparation tools. Each connector is shipped with easy to read instructions to assist with installation.

Weatherproof Integrity
HELIAX connectors are designed to ensure system integrity in the harshest of outdoor environments. Our connectors are relied on around the world for their ability to withstand heat, humidity, ice, and rain. We design to the toughest environmental standards, such as IP68, to ensure the connectors are waterproof without additional weatherproofing. We test before and after thermal cycling, shock, and vibration testing. We guarantee that, whatever the environment, you can rely on HELIAX connectors.

Low Intermodulation
HELIAX connectors are designed to keep unwanted intermodulation to a minimum. Andrew is one of a few companies, worldwide, that understands and has the ability to measure intermodulation accurately. Couple this with engineers skilled in minimizing intermodulation and you get connectors with some of the lowest recorded intermodulation levels in the industry. For a more detailed explanation of intermodulation see page 630.

Low VSWR
HELIAX connectors give you unrivalled VSWR performance. They are designed for a minimum mismatch between cable and connector. This is especially important in today's systems where performance expectations are more stringent.

Electrical, mechanical, and environmental testing of all HELIAX connectors ensure lasting performance that can be measured in decades. Data sheets are available on request for all HELIAX connectors.

Excellent RF Shielding
Outer conductor attachments clamp or solder 360° around the cable resulting in virtually complete shielding.

HELIAX connectors for air dielectric cables are not interchangeable with those for foam dielectric cables. HS and HST series cables use corresponding FSJ connectors.

Differences include:

- *Air dielectric connectors are equipped with gas ports to allow pressurization of the cable.*
- *Most air dielectric connectors are available in both gas barrier and gas pass versions. The gas barrier prevents air flow to the mating connector.*
- *Air dielectric cables have a helical corrugated outer conductor. LDF foam cables have annular corrugations and thus use a different clamping nut to secure the connector to the cable.*
- *Most air dielectric connectors are attached using a snip flare. LDF foam connectors are self flaring.*

OnePiece™

New OnePiece™ Connectors

- *Installation is fast and reliable*
- *Performance is excellent and dependable*
- *Connectors are completely tested and proven*

New one-piece connectors speed installation, insure attachment consistency, and provide unparalleled protection for your transmission line and system.

Speed and Reliability
With the combination of the EASIAX® Plus automated prep tools and one-piece connectors, attaching connectors to transmission lines couldn't be easier or more reliable.

The automated prep tool consistently and completely prepares the cable for connector attachment in less than 15 seconds.

With only one piece to the connector, attachment is as easy as sliding the connector on the cable and tightening the back nut. You can be assured that field attachment is consistent and gives you outstanding performance every time!

More importantly, the new one-piece connectors also have outstanding electrical characteristics!

Completely Waterproof, Mated and Unmated
The new one-piece connector is not only waterproof when mated, it is also waterproof when it is *unmated* and completely submerged in water. This moisture seal provides unparalleled protection from the elements! Exceeds IP66 and IP68 Standards.

New Version 2 Connectors for FSJ4-50B
The newest connectors for FSJ4-50B have a reduced number of components and incorporate our new "crush-flare" technology. Installation is fast, reliable, and dependable. EASIAX Plus automated cable prep tools are also available for the new version 2 connectors.

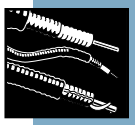
New SureFlex™ Connectors

New SureFlex jumper assemblies incorporate a 360 degree solder attachment on both the inner conductor and the outer conductor. Factory made assemblies remove the risks sometimes encountered with assemblies made in the field. Return loss, insertion loss and intermodulation values are optimized with our new SureFlex assemblies.

Proven
All Andrew components go through a strict qualification process to the toughest Military and International standards before being released. Test procedures are available on the Andrew web site or contact Andrew.

In all ways electrically, mechanically, and environmentally you can be sure with Andrew.

Value
All of the new designs offer price savings as well as outstanding performance.



Connector Numbering System

This catalog features a functional, connector type numbering system that installation, purchasing and receiving personnel should find easy to understand. Here are three examples and the functional type number cable, connector, and suffix keys.

Type Number: **L2PNM**

L2 denotes it is used with LDF2-50 cable
PNM denotes it is a plated N Male

Type Number: **L4PNF**

L4 denotes it is used with LDF4-50 cable
PNF denotes it is a Plated N Female

Type Number: **F4PDM-C**

F4 denotes it is used with FSJ4-50B cable
PDM denotes it is a Plated 7-16 DIN Male
C denotes it features a captivated pin

Cable Keys		
E2	EFX2-50	3/8"
F1	FSJ1-50A	1/4"
F2	FSJ2-50	3/8"
F4	FSJ4-50B	1/2"
H4	HJ4-50	1/2"
H4.5	HJ4.5-50	5/8"
H5	HJ5-50	7/8"
H7	HJ7-50A	1-5/8"
H8	HJ8-50B	3"
H11	HJ11-50	4"
H9	HJ9-50	5"
H9HP	HJ9HP-50	5" (High Power)
H12	HJ12-50	2-1/4"
L1	LDF1-50	1/4"
L2	LDF2-50	3/8"
L4	LDF4-50A	1/2"
L4.5	LDF4.5-50	5/8"
L5	LDF5-50A	7/8"
L6	LDF6-50	1-1/4"
L7	LDF7-50A	1-5/8"
L12	LDF12-50	2-1/4"
V5	VXL5-50	7/8"
V6	VXL6-50	1-1/4"
V7	VXL7-50	1-5/8"

Connector Keys	
PNM	Plated N Male
PNR	Plated N Male Right Angle
PNF	Plated N Female
PBM	Plated BNC Male
PSM	Plated SMA Male
PSF	Plated SMA Female
PSR	Plated SMA Male Right Angle
PDM	Plated 7-16 DIN Male

Connector Keys (Continued)	
PDF	Plated 7-16 DIN Female
PDR	Plated 7-16 DIN Male Right Angle
PKM	Plated 4.1-9.5 DIN Male
PKR	Plated 4.1-9.5 DIN Male Right Angle
PTM	Plated TNC Male
PTF	Plated TNC Female
SM	SMA Male
SF	SMA Female
UM	UHF Male
UF	UHF Female
MU	Mini UHF Male
FM	CATV F Male
M	EIA Flange Male
F	EIA Flange Female

Suffix Keys	
HF	High Frequency
BH	Bulkhead
7550	75-Ohm Cable, 50-Ohm Mating Pin
7570	75-Ohm Cable, 70-Ohm Mating Pin
C	Captivated Pin Inner Attachment (solderless)
PM	Panel Mount
PMC	Panel Mount, Captivated Pin
H	Hex Coupling Nut
BHC	Bulkhead, Captivated Pin
PMC	Panel Mount, Captivated Pin
T	Tunable
HC	Hex Coupling Nut, Captivated Pin Inner Contact Attachment
PR	Pressure Port
RC	Ring Flare, Captivated Pin Inner contact Attachment
RPC	One-Piece Connector, Captivated Pin
B	Gas Barrier
P	Gas Pass

Connector Data

Coupling Torque for All Type N and 7-16 DIN Connectors	
Type N lbf-in (N•m)	**7-16 DIN lbf-in (N•m)**
15-20 (1.7-2.3)	220-265 (25-30)

Pin Depth for Type N and 7-16 DIN Connectors	
Connector	**Pin Depth, in (mm)***
N Male	0.210-0.230 (5.28-5.84)
N Female	0.187-0.207 (4.75-5.26)
7-16 DIN Male	0.058-0.070 (1.47-1.78)
7-16 DIN Female	0.070-0.082 (1.78-2.08)

* High frequency performance may be enhanced by adjusting pin depth to minimize the gap between male and female connectors.

HELIAX® Connectors

The pictures below and on pages 467-470 show the various connector interfaces and body styles available for HELIAX® cables. In many cases, a single picture is used to represent several similar connectors. See the connector ordering information charts for details.

N Males


For FSJ1, FSJ2, FSJ4 Cables


For LDF1, EFX2 Cables


For LDF2, LDF4, HLT4, FSJ4 Cables


For LDF5, LDF6, LDF7 Cables


For HJ4, HT4, HJ5, Cables

Right Angle N Males


For FSJ1 Cable


For LDF4 Cable


For FSJ4 Cable

Bulkhead N Females


For FSJ1 Cable


For LDF1, LDF2, LDF4 Cables


For FSJ2, FSJ4 Cables

N Females


For FSJ2,FSJ4 Cables


For HJ4, HT4, HJ5, HT5, HJ7, HJ12 Cables


For LDF1, LDF2, LDF4, EFX2, HLT4 Cables

Mini UHF Male

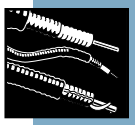

For FSJ1 Cable

UHF Males


For FSJ1 Cable


For LDF2, EFX2, LDF4, HLT4, FSJ4 Cables


For LDF5, Cable



UHF Females

For FSJ1 Cable

For LDF2, EFX2, LDF4, HLT4, FSJ4 Cables

For LDF5 Cable

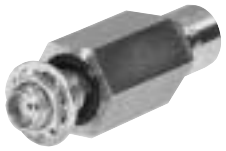
For HJ4, HT4, HJ5 Cables

SMA Males

For FSJ1 Cable

For FSJ1 Cable

SMA Females



For FSJ1 Cable

4.1-9.5 DIN Males

For LDF2, FSJ4 Cables

For LDF2, EFX2 Cables

Right Angle 7-16 DIN Males

For FSJ2, FSJ4 Cables

For LDF4, LDF5 Cables

7-16 DIN Males

For FSJ1, FSJ4, FSJ2, LDF2 Cables

For LDF4, HLT4 Cables

For LDF5, LDF6, and LDF7 Cables

For LDF5, LDF6, and LDF7 Cables

For LDF7, LDF12 Cables

7-16 DIN Females

For FSJ1, FSJ2, FSJ4, LDF2 , EFX2 Cables

Bulkhead for FSJ4 Cable

For LDF5 Cable

Panel Mount for FSJ1, FSJ4 Cables

For LDF4, HLT4 Cables

For LDF6, LDF7, LDF12 Cables

HELIAX® Connectors

SC Male

For LDF4, FSJ4 Cables

LC Males

For LDF4,HLT4, LDF5, Cables

For LDF6, LDF7 Cables

BNC Male

For FSJ1 Cable

For HJ5 Cable

TNC Males

For FSJ1 Cable

For LDF2, EFX2 Cables

LC Females

For LDF5, LDF7 Cables

For HJ7, LDF6 Cables

TNC Females

For FSJ1 Cable

For LDF2, EFX2, LDF4 Cables

HN Males

For FSJ4 Cable

For LDF4, HLT4, LDF5, Cables

CATV Type “F” Males

For FSJ1 Cable

For FSJ4 Cable

CATV Equipment Housing

For LDF4 Cable

7/8" EIA Flanges

For FSJ4, LDF4, LDF5 Cables

For LDF6, LDF7 Cables

For HJ4, HJ5 Cables

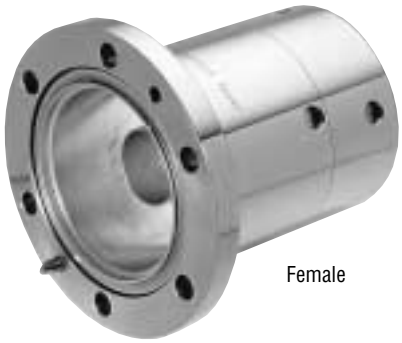
For HJ7, HJ12 Cables

1-5/8" EIA Flanges

For LDF6, LDF7 Cables

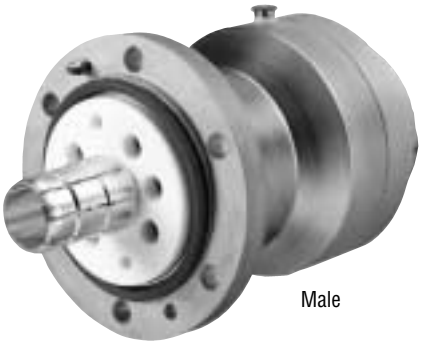
For HJ7, HJ12 Cables

3-1/8" EIA Flanges



Female

For HJ12, HJ8, HJ11, LDF12 Cables



Male

For HJ8, HJ11 Cables

HELIAX® Connectors

4-1/2" IEC Flanges

For HJ11, H9 Cables

For HJ11, H9 Cables

"F" Flanges, Male

For LDF4, LDF5 Cables

6-1/8" EIA Flanges

For HJ11 Cable

For HJ9, HJ9HP Cables

For LDF6, LDF7 Cables

Splices

For LDF4, LDF5 Cables

For HJ4, HJ5, HJ7 Cables

For LDF6, LDF7, LDF12 Cables

For HJ8, HJ9, HJ11, HJ12 Cables

End Terminals

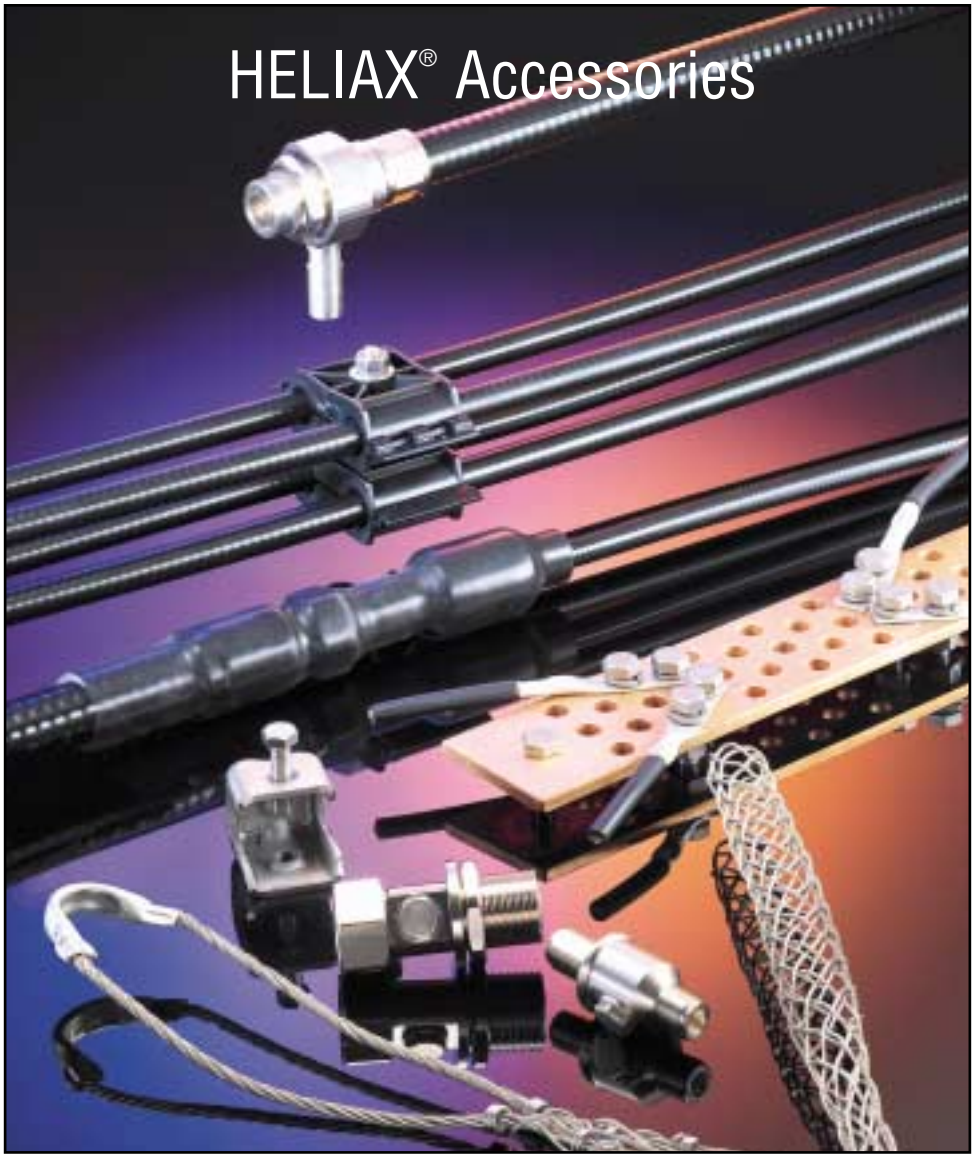
For LDF5 Cable

For HJ4, HT4, HJ5, HT5 Cables

For LDF4 Cable

For HJ7 Cable

HELIAX® Accessories



Andrew offers the industry's widest range of accessories, which are designed to be compatible with HELIAX cable. Together, HELIAX cables and accessories form a lasting and effective transmission line system. System designers and installation crews can rely on Andrew for high quality, easy to install components and reliable maintenance-free performance.

Some of Our Key Accessories Are:

Arrestor Plus Surge Protectors. Lightning surge protectors incorporate quarterwave stub technology. Designed to deliver optimum system performance and reliable equipment protection you can count on, strike after strike. Arrestor Plus is available in the slim profile universal (APM series) or the Integrated versions (APTL series) that attach directly onto LDF series HELIAX cable. Arrestor Plus gas tube arrestors (APG series) give you broadband performance and feature dc pass capability through the center conductor to the active tower top electronics. The unit's removable cap makes periodic maintenance fast and easy.

All versions incorporate silver plated components and high-pressure components throughout to ensure low levels of intermodulation and excellent VSWR performance. Arrestor Plus surge protectors are also fully weatherproof, making them suitable for a variety of outdoor applications.

Grounding Kits. All Andrew grounding kits are designed to withstand 99% of all possible lightning strikes for certainty of continued operation. The non-braided, solid copper construction of our grounding kits eliminates corrosion caused by moisture retention and "wicking". The new SureGround™ kits offer even greater installation ease than standard grounding kits. The new grounding kits are factory assembled into one component and feature a pre-formed, clip-on ground strap for easy snap-on installation. A standard weatherproofing kit (tape) is provided with SureGround versions and a weather-proofing boot is supplied with the SureGround™ Plus versions.

Entry Port Systems. Andrew offers entry port systems to meet your every need. The ArrestorPort™ II integrates your cable entry and grounding systems into a single integrated system and cuts installation time and component costs. It is designed to work with the Arrestor Plus® Surge Protectors. The new, low cost, SNAP-IN Entry port quickly and easily snaps into a hole in a cabinet or metal plate. It's used in combination with our one-piece entry boot to adapt to your requirements. For traditional installations consider our standard entry port products.

Hangers. Stainless steel construction of both the standard and our new Snap-in hangers ensures corrosion resistance and long life. The new Snap-In hangers feature an ergonomic design that provides easy attachment with no hardware required. Our Click-On hanger products are stackable and install in minutes to provide a perfect fit for applications where space is tight. Click-On hangers are manufactured from tough, UV-resistant material and set the standard for durability, simplicity, and cost effectiveness.

Weatherproofing. The WeatherShield™ Connection Protection Housing provides you with security against water. WeatherShield easily installs in seconds, to complete your transmission line system and protect against the environment. WeatherShield provides an additional measure of system protection by providing a water-tight seal around the cable and dampening the vibration that can loosen connector interfaces. The WeatherShield takes just seconds to install. Simply place the WeatherShield around your connection and snap in place. No tapes, heat guns or shrink tubes are required.

EASIAX® Plus Cable Preparation Tools. Our EASIAX Plus Cable Prep tools provide you with all you need to install HELIAX connectors on HELIAX Cable. EASIAX Plus automated tools dramatically reduce cable preparation time and expense while improving overall system performance. Fit the EASIAX Plus tool to any standard drill and the tool does the rest. You will be able to fit your connector in about 15 seconds and your connector attachments will be consistent, reliable, and repeatable. For greatest accuracy, when installing connectors, we recommend that you use our pre-set torque wrenches. This will ensure the high quality protection and performance that you expect from Andrew.

Andrew Factory Made Cable Assemblies

Andrew has cable assembly facilities all over the world to provide you with the best jumper quality and service. Our local assembly locations can provide you with fast delivery, often in 24 hours.

Making assemblies in the field can be difficult and expensive. Proper training, tools and environmental conditions can all impact the cost and quality of a cable assembly. As you know, a poorly made cable assembly can affect system performance.

When you specify or purchase a jumper from Andrew, you can rest assured that the product has been manufactured by highly trained individuals utilizing factory automated processes. We are so confident in our quality that we guarantee it!

Check out all the advantages of the Andrew factory made cable assembly program:

- *Fast delivery...When and where you want it*
- *Popular jumpers are in stock for immediate delivery...No waiting*
- *100% testing...Ensures performance*
- *10 year warranty...Cable, connectors, and attachment are guaranteed*
- *Attachment performed by highly trained personnel... We do the job right*
- *Special lengths per your specifications*
- *Select from the wide variety of Andrew cables and connectors... One-stop-shopping simplifies sourcing*
- *Jumpers are available for flame retardant, high power/high temperature, and plenum applications*

Ordering Information

HELIAX® coaxial cables are available with connectors attached at one or both ends or with both connectors unattached.

To order, please specify the following:

1. Specify cable or waveguide Type Number and length in feet or meters.
2. For low-VSWR cables and for elliptical waveguides, specify the operating frequency band when requested. VSWR specifications for various frequency bands are presented on the product information pages.

   Frequency band codes, which are included in the identifying Andrew Type Number, are used with most standard bands of low VSWR cable and premium elliptical waveguide. For example, the -59 suffix for EWP52-59 designates a frequency band of 5.925 - 6.425 GHz. Please use these codes, where applicable.
3. Specify connector Type Numbers and "attached" or "unattached". When attached connectors on an assembly are different, specify which is "first off" the reel.
4. Specify any special requirements:
   - Special marking on packages
   - Packaging requirements (standard, export or special)
   - Special inspection requirements, such as customer, government, certificate of compliance
5. Specify mode of shipment (surface, air or ocean) and requested ship date.

Sample orders are illustrated below.

Sample Orders

	Andrew Type Number	Description	Frequency (where) applicable)	Quantity	Length Each	Total Length	Unit or Per Foot Price	Extended Price
Cable, Factory Assembly	LDF5P-50A-18	HELIAX Coaxial Cable Assembly 1850 -1990 MHz		1	290 ft	290 ft		
	L5PDM	Connector, attached, first off		1				
	L5PNM	Connector, attached, last off		1				
Bulk Cable and Connectors	LDF5-50A	HELIAX Coaxial Cable		2	700 ft	1400 ft		
	L5PNM	Connector, unattached		8				
Cable with One Attached Connector	LDF5-50A	HELIAX Coaxial Cable		1	310 ft	310 ft		
	L5PNM	Connector, attached, first off		1				
	L5PNM	Connector, unattached		1				
Elliptical Waveguide Factory Assembly	EWP52-59	Elliptical Waveguide 5.925 - 6.425 GHz		1	290 ft	290 ft		
	252DET	Connector, attached, first off		1				
	152DET	Connector, attached, last off		1				
Bulk Elliptical Waveguide and Connectors	EWP52-59	Elliptical Waveguide 5.925 - 6.425 GHz		2	700 ft	1400 ft		
	252DET	Connector, unattached		8				
Elliptical Waveguide with One Attached Connector	EWP52-59	Elliptical Waveguide 5.925 - 6.425 GHz		1	310 ft	310 ft		
	252DET	Connector, attached, first off		1				
	152DET	Connector, unattached		1				

*For cables and waveguides, specify whether connectors should be factory attached or shipped loose. When attached connectors on an assembly are different, specify which is first off the reel. For microwave antennas, specify any desired options.

Special marking on packages: _____

Packing requirements: ☒ Standard ☐ Export

Special (specify) _____

Ship by: ☒ Surface ☐ Air ☐ Ocean

Requested ship date: _____

OK to ship early?

Requested Carrier _____

(If none specified, we will use the most economical method)

☒ Yes ☐ No Partials OK? ☒ Yes ☐ No

Shipping charges: ☐ Collect ☒ Prepay and bill ☐ Quoted fixed freight amount

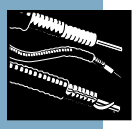
Sales: ☐ Applicable ☐ Not Applicable

Resale no.

Specify special inspection requirements, such as customer, government, certificate of compliance.

_____

ANDREW®



1/4" Superflexible Foam Dielectric, FSJ Series – *50-ohm*

FSJ1-50A

Description	Type No.
Cable Ordering Information	
Standard Superflexible Cable	
1/4" Standard Cable, Standard Jacket	**FSJ1-50A**
Fire Retardant Cables	
1/4" Fire Retardant Jacket (CATVX)	**FSJ1RN-50B**
1/4" Fire Retardant Jacket (CATVR)	**FSJ1RN-50B**
Low VSWR and Specialized Cables	
1/4" Low VSWR, specify operating band	**FSJ1P-50A-(**)**
Phase Stabilized and Phase Measured Cable	See page 590
Jumper Cable Assemblies – See page 584	

** Insert suffix number from "Low VSWR Specifications" table, page 476.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	20.4
Velocity, percent	84
Peak Power Rating, kW	6.4
dc Resistance, ohms/1000 ft (1000 m)	
Inner	3.0 (9.8)
Outer	2.0 (6.5)
dc Breakdown, volts	1600
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	24.2 (79.4)
Inductance, µH/ft (m)	0.061 (0.200)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Cu-Clad Al
Diameter over Jacket, standard jacket, in (mm)	0.29 (7.4)
Diameter over Jacket, fire-retardant jacket, in (mm)	0.29 (7.4)
Diameter Copper Outer Conductor, in (mm)	0.25 (6.4)
Diameter Inner Conductor, in (mm)	0.075 (1.9)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	0.8 (1.1)
Cable Weight, lb/ft (kg/m)	0.045 (0.067)
Tensile Strength, lb (kg)	150 (68)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power

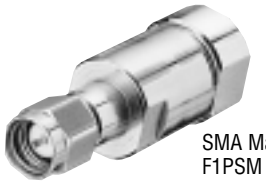
Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.124	0.407	6.40
1	0.176	0.577	6.40
1.5	0.215	0.707	6.40
2	0.249	0.816	6.40
10	0.559	1.83	3.97
20	0.792	2.60	2.80
30	0.973	3.19	2.28
50	1.26	4.14	1.76
88	1.68	5.52	1.32
100	1.79	5.89	1.23
108	1.87	6.13	1.19
150	2.21	7.25	1.00
174	2.39	7.82	0.929
200	2.56	8.41	0.865
300	3.16	10.4	0.701
400	3.67	12.1	0.603
450	3.91	12.8	0.567
500	4.13	13.5	0.537
512	4.18	13.7	0.530
600	4.54	14.9	0.488
700	4.93	16.2	0.450
800	5.29	17.4	0.419
824	5.38	17.6	0.412
894	5.61	18.4	0.395
960	5.83	19.1	0.380
1000	5.96	19.6	0.372
1250	6.72	22.0	0.330
1500	7.41	24.3	0.299
1700	7.94	26.0	0.279
1800	8.19	26.9	0.271
2000	8.67	28.5	0.256
2100	8.91	29.2	0.249
2200	9.14	30.0	0.243
2300	9.37	30.7	0.237
3000	10.9	35.6	0.204
3400	11.6	38.2	0.191
4000	12.8	41.8	0.174
5000	14.5	47.5	0.153
6000	16.1	52.7	0.138
8000	19.0	62.4	0.117
10000	21.7	71.2	0.102
12000	24.2	79.4	0.092
14000	26.6	87.2	0.084
16000	28.8	94.6	0.077
18000	31.0	101.7	0.072
19000	32.1	105.2	0.069
20000	33.1	108.6	0.067
20400	33.5	110.0	0.066

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.

N Male
F1PNMV2-H

N Male
Right Angle
F1PNR-HC

N Female
Bulkhead
F1PNF-BH



SMA Male
F1PSM

SMA Male
Right Angle
F1PSR

SMA Female
Bulkhead
F1PSF

BNC Male
F1PBM

TNC Male
F1PTM-HF

UHF Male
41SP

Connectors

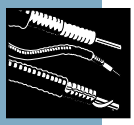
Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F1PNMV2-H**	Solder	Self-Clamping	SG	2.1 (53)	0.95 (24.1)
N Male	High Freq.	**F1PNM-HF**	Solder	Tab Flare	SG	1.3 (33)	0.81 (20.5)
N Male	Right Angle Hex Head	**F1PNR-HC**	Captivated	Self-Clamping	SG	1.7/1.3 (43/33)	0.95 (24.1)
N Female		**F1PNF**	Solder	Self-Clamping	SG	2.2 (55.2)	0.58 (14.8)
N Female	Bulkhead	**F1PNF-BH**	Solder	Self-Clamping	SG	2.3 (58)	0.94 (23.9)
BNC Male		**F1PBM**	Solder	Self-Clamping	SS	2.0 (50)	0.69 (17.5)
UHF Male		**41SP**	Solder	Solder	BB	1.8 (46)	0.77 (19.6)
UHF Female		**41U**	Solder	Solder	BS	2.1 (53)	0.77 (19.6)
SMA Male	Up to 6 GHz	**F1PSM**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Right Angle	**F1PSR**	Solder	Self-Clamping	PG	1.6/0.75 (41/19)	0.50 (12.7)
SMA Female	Up to 6 GHz, Bulkhead	**F1PSF**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Up to 18 GHz	**41EWS**	Solder	Tab Flare	G	0.94 (23.9)	0.40 (10.2)
TNC Male	11 GHz and Below	**F1PTM**	Solder	Self-Clamping	SG	1.68 (43)	0.57 (14.5)
TNC Female	Bulkhead	**41AENT**	Captivated	Tab Flare	NG	1.5 (38)	0.70 (17.8)
TNC Male	Hi Freq, Above 11 GHz	**F1PTM-HF**	Captivated	Tab Flare	NG	1.9 (48.8)	0.70 (17.8)
Mini-UHF Male		**F1MU**	Captivated	Crimp	NS	1.53 (39)	0.47 (11.9)
7-16 DIN Male		**F1PDM**	Solder	Self-Clamping	SS	1.82 (46.3)	1.25 (31.75)
7-16 DIN Female		**F1PDF**	Solder	Self-Clamping	SS	1.85 (47)	0.551 (14)
7-16 DIN Female	Panel Mount	**F1PDF-PM**	Solder	Self-Clamping	SS	1.85 (47)	1.26 (32)
7-16 DIN Female	Bulkhead	**F1PDF-BH**	Solder	Self Clamping	SS	1.85 (47)	1.62 (41)

* Stainless steel body

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, NG - Nickel Plated Body and Gold Plated Pin, NS- Nickel Plated Body and Silver Plated Pin, PG - Passivated Body and Gold Plated Pin+A135, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, G - Stainless Steel Body and Gold Plated Pin.

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Low VSWR Specifications, Type FSJ1P-50A-( )

Frequency Band, GHz	Type No.	Using Connector Type No.**	Assembly VSWR, Maximum (R.L., dB) to 10 ft (3 m)	10-20 ft (3-6 m)	20-200 ft (6-60 m)
0.01- 2.3*	**FSJ1P-50A-1A**	N Male	1.07 (29.4)	1.13 (24.3)	1.27 (18.5)
		N Male†	1.12 (24.9)	1.15 (23.1)	1.35 (16.5)
		N Female	1.15 (23.1)	1.20 (20.8)	1.40 (15.6)
		Right Angle N Male	1.31 (17.4)	1.35 (16.5)	1.40 (15.6)
		SMA Male	1.12 (24.9)	1.25 (19.1)	1.35 (16.5)
		Right Angle SMA Male	1.30 (17.7)	1.30 (17.7)	1.40 (15.6)
		SMA Female	1.12 (24.9)	1.25 (19.1)	1.35 (16.5)
		TNC Male	1.15 (23.1)	1.20 (20.8)	1.40 (15.6)
		7-16 DIN Male	1.12 (24.9)	1.18 (21.6)	1.40 (15.6)
		7-16 DIN Female	1.17 (22.1)	1.22 (20.1)	1.40 (15.6)
0.01- 4.2*	**FSJ1P-50A-2A**	N Male	1.15 (23.1)	1.18 (21.6)	1.31 (17.4)
		N Female†	1.40 (15.6)	1.45 (14.7)	1.50 (14.0)
		Right Angle N Male	1.38 (16.0)	1.40 (15.6)	1.50 (14.0)
		SMA Male	1.17 (22.1)	1.40 (15.6)	1.45 (14.7)
		Right Angle SMA Male	1.40 (15.6)	1.45 (14.7)	1.50 (14.0)
		SMA Female	1.17 (22.1)	1.40 (15.6)	1.45 (14.7)
		TNC Male	1.30 (17.7)	1.35 (16.5)	1.45 (14.7)
		7-16 DIN Male	1.25 (19.1)	1.30 (17.7)	1.45 (14.7)
		7-16 DIN Female	1.25 (19.1)	1.30 (17.7)	1.45 (14.7)
0.01-10.2*	**FSJ1P-50A-3A**	N Male	1.40 (15.6)	1.45 (14.7)	1.50 (14.0)
		SMA Male	1.35 (16.5)	1.40 (15.6)	1.45 (14.7)
		SMA Female	1.40 (15.6)	1.45 (14.7)	1.50 (14.0)
		TNC Male	1.45 (14.7)	1.50 (14.0)	1.63 (12.4)
0.01-18.0*	**FSJ1P-50A-4A**	N Male	1.55 (13.3)	1.55 (13.3)	1.63 (12.4)
		SMA Male	1.50 (14.0)	1.55 (13.3)	1.55 (13.3)
		SMA Female	1.50 (14.0)	1.55 (13.3)	1.55 (13.3)
0.806-0.960	**FSJ1P-50A-40**	N	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)
0.806-0.960 and 1.7- 2.2	**FSJ1P-50A-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7- 2.2	**FSJ1P-50A-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)

* Specify frequency band. ** Connectors ordered separately. VSWR values apply to straight connectors only (except where noted otherwise), are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed. † High frequency version.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**F1SGRIP**
Support clamp kit of 10	**F1SGRIP-1IK**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink™ Weatherproofing Kit	
5/8" Coax to 1/4" Coax	**241475-13**
7/8" Coax to 1/4" Coax	**241475-12**
1-1/4" or 1-5/8" Coax to 1/4" Coax	**241475-11**
1/4" to 1-1/2" Omni/Panel base Type N or DIN	**241548-10**
1/4" to 2" Omni/Panel base Type N or DIN	**241548-11**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-17**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Cutting Tool FSJ1/FSJ4	**207865**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

Cold Shrink is a trademark of Minnesota Mining and Manufacturing Co.

1/4" Superflexible High Power, High Temperature, Plenum, Fluoropolymer Foam Dielectric, ETS Series – *50-ohm*

ETS1-50T

Description	Type No.

Cable Ordering Information

High Power, Plenum Cables	
1/4" Fire Retardant Jacket (CATVP, UL910)	**ETS1-50T**
1/4" Unjacketed, Fire Retardant (CATVP, UL910)	**ETS1-50**

Jumper Cable Assemblies – See page 584

Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	20.0
Velocity, percent	82
Peak Power Rating, kW	6.4
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.9 (6.2)
Outer	2.0 (6.5)
dc Breakdown, volts	1600
Jacket Spark, volts RMS	4000
Capacitance, pF/ft (pf/m)	24.6 (80.6)
Inductance, µH/ft (µH/m)	0.063 (0.205)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Silver plated copper
Diameter over Jacket, in (mm)	0.29 (7.4)
Diameter over Copper Outer Conductor, in (mm)	0.25 (6.4)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	0.6 (0.8)
Cable Weight, lb/ft (kg/m)	0.066 (0.098)
Tensile Strength, lb (kg)	150 (68)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	ETS1-50T[1] Avg. Power kW	ETS1-50[2] Avg. Power kW
0.5	0.124	0.408	6.40	6.40
1	0.176	0.577	6.40	6.40
1.5	0.216	0.707	6.40	6.40
2	0.249	0.817	6.40	6.40
10	0.56	1.83	6.40	6.40
20	0.79	2.60	6.40	6.40
30	0.97	3.19	5.48	6.13
50	1.26	4.12	4.23	4.73
88	1.67	5.49	3.18	3.55
100	1.79	5.86	2.98	3.33
108	1.86	6.09	2.86	3.20
150	2.20	7.21	2.42	2.71
174	2.37	7.77	2.25	2.51
200	2.54	8.35	2.09	2.34
300	3.13	10.3	1.70	1.90
400	3.63	11.9	1.46	1.64
450	3.86	12.7	1.38	1.54
500	4.08	13.4	1.30	1.46
512	4.13	13.5	1.29	1.44
600	4.48	14.7	1.19	1.33
700	4.86	15.9	1.10	1.22
800	5.21	17.1	1.02	1.14
824	5.29	17.4	1.01	1.12
894	5.52	18.1	0.964	1.08
960	5.73	18.8	0.928	1.04
1000	5.86	19.2	0.909	1.02
1250	6.59	21.6	0.808	0.904
1500	7.25	23.8	0.733	0.82
1700	7.75	25.4	0.686	0.768
1800	7.99	26.2	0.666	0.745
2000	8.46	27.7	0.629	0.704
2100	8.68	28.5	0.613	0.686
2200	8.90	29.2	0.598	0.669
2300	9.12	29.9	0.584	0.653
3000	10.5	34.5	0.506	0.566
3400	11.3	37.0	0.472	0.529
4000	12.3	40.4	0.432	0.484
5000	13.9	45.7	0.382	0.428
6000	15.4	50.6	0.345	0.386
8000	18.1	59.5	0.294	0.329
10000	20.6	67.5	0.259	0.289
12000	22.9	75.0	0.233	0.261
14000	25.0	82.0	0.213	0.238
16000	27.0	88.7	0.197	0.220
18000	29.0	95.1	0.184	0.206
19000	29.9	98.2	0.178	0.199
20000	30.9	101.3	0.173	0.193

Standard Conditions: For Attenuation: VSWR 1.0, ambient temperature 20°C (68°F).

1. For Average Power, Type ETS1-50T (jacketed): VSWR 1.0 ambient temperature 40°C (104°F), inner conductor temperature 200°C (392°F).
2. For Average Power, Type ETS1-50 (unjacketed): VSWR 1.0 ambient temperature 40°C (104°F), inner conductor temperature 250°C (482°F); no solar loading.


N Male
F1PNMV2-H


N Male
Right Angle
F1PNR-HC


N Female
Bulkhead
F1PNF-BH


SMA Male
F1PSM


SMA Male
Right Angle
F1PSR


SMA Female
Bulkhead
F1PSF


BNC Male
F1PBM


TNC Male
F1PTM-HF


UHF Male
41SP

Connectors

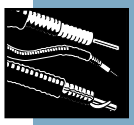
Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F1PNMV2-H**	Solder	Self-Clamping	SG	2.1 (53)	0.95 (24.1)
N Male	High Freq.	**F1PNM-HF**	Solder	Tab Flare	SG	1.3 (33)	0.81 (20.5)
N Male	Hex Head Right Angle	**F1PNR-HC**	Captivated	Self-Clamping	SG	1.7/1.3 (43/33)	0.95 (24.1)
N Female		**F1PNF**	Solder	Self-Flare	SG	2.2 (55.2)	0.58 (14.8)
N Female	Bulkhead	**F1PNF-BH**	Solder	Self-Clamping	SG	2.3 (58)	0.94 (23.9)
BNC Male		**F1PBM**	Solder	Self-Clamping	SS	2.0 (50)	0.69 (17.5)
UHF Male		**41SP**	Solder	Solder	BB	1.8 (46)	0.77 (19.6)
UHF Female		**41U**	Solder	Solder	BS	2.1 (53)	0.77 (19.6)
SMA Male	Up to 6 GHz	**F1PSM**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Right Angle	**F1PSR**	Solder	Self-Clamping	PG	1.6/0.75 (41/19)	0.50 (12.7)
SMA Female	Up to 6 GHz, Bulkhead	**F1PSF**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Up to 18 GHz	**41EWS**	Solder	Tab Flare	G	0.94 (23.9)	0.40 (10.2)
SMA Female	Up to 18 GHz	**41ENS**	Solder	Tab Flare	G	1.00 (25.4)	0.40 (10.2)
TNC Male	11 GHz and Below	**F1PTM**	Solder	Self-Clamping	SG	1.68 (43)	0.57 (14.5)
TNC Female	Bulkhead	**41AENT**	Captivated	Tab Flare	NG	1.5 (38)	0.70 (17.8)
TNC Male	Hi Freq, Above 11 GHz	**F1PTM-HF**	Captivated	Tab Flare	NG	1.9 (48.8)	0.70 (17.8)
Mini-UHF Male		**F1MU**	Captivated	Crimp	NS	1.53 (39)	0.47 (11.9)
7-16 DIN Male		**F1PDM**	Solder	Self-Clamping	SS	1.82 (46.3)	1.25 (31.75)
7-16 DIN Female		**F1PDF**	Solder	Self-Clamping	SS	1.85 (47)	0.551 (14)
7-16 DIN Female	Panel Mount	**F1PDF-PM**	Solder	Self-Clamping	SS	1.85 (47)	1.26 (32)
7-16 DIN Female	Bulkhead	**F1PDF-BH**	Solder	Self Clamping	SS	1.85 (47)	1.62 (41)

* Stainless steel body

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, NG - Nickel Plated Body and Gold Plated Pin, NS- Nickel Plated Body and Silver Plated Pin, PG - Passivated Body and Gold Plated Pin+A135, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, G - Stainless Steel Body and Gold Plated Pin.

Connector Accessories – See page 624.

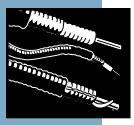
Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
5/8" Coax to 1/4" Coax	**241475-13**
7/8" Coax to 1/4" Coax	**241475-12**
1-1/4" or 1-5/8" Coax to 1/4" Coax	**241475-11**
1/4" to 1-1/2" Omni/Panel base Type N or DIN	**241548-10**
1/4" to 2" Omni/Panel base Type N or DIN	**241548-11**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-17**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Cutting Tool FSJ1/FSJ4	**207865**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



3/8" Superflexible Foam Dielectric, FSJ Series – *50-ohm*

FSJ2-50

Description	Type No.
Cable Ordering Information	
Standard Superflexible Cable	
3/8" Standard Cable, Standard Jacket	**FSJ2-50**
Fire Retardant Cables	
3/8" Fire Retardant Jacket (CATVX)	**FSJ2RN-50**
3/8" Fire Retardant Jacket (CATVR)	**FSJ2RN-50**
Low VSWR and Specialized Cables	
3/8" Low VSWR, specify operating band	**FSJ2P-50-(**)**
Phase Stabilized and Phase Measured Cable	See page 590
Jumper Cable Assemblies – See page 584	

** Insert suffix number from "Low VSWR Specifications" table, page 481

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	13.4
Velocity, percent	83
Peak Power Rating, kW	13.2
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.29 (4.23)
Outer	1.52 (4.99)
dc Breakdown, volts	2300
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	24.3 (79.7)
Inductance, µH/ft (m)	0.061 (0.200)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, standard jacket, in (mm)	0.415 (10.5)
Diameter over Jacket, fire-retardant jacket, in (mm)	0.425 (10.8)
Diameter over Copper Outer Conductor, in (mm)	0.375 (9.5)
Diameter Inner Conductor, in (mm)	0.110 (2.8)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	20 (50)
Bending Moment, lb-ft (N•m)	1.7 (2.3)
Cable Weight, lb/ft. (kg/m)	0.078 (0.12)
Tensile Strength, lb (kg)	210 (95)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.082	0.270	13.2
1	0.117	0.383	13.2
1.5	0.143	0.469	13.2
2	0.165	0.542	13.2
10	0.372	1.22	6.92
20	0.528	1.73	4.87
30	0.649	2.13	3.97
50	0.842	2.76	3.06
88	1.13	3.69	2.29
100	1.20	3.94	2.14
108	1.25	4.10	2.06
150	1.48	4.86	1.74
174	1.60	5.25	1.61
200	1.72	5.65	1.49
300	2.13	6.99	1.21
400	2.48	8.14	1.04
450	2.64	8.66	0.975
500	2.79	9.17	0.921
512	2.83	9.28	0.910
600	3.08	10.1	0.836
700	3.35	11.0	0.769
800	3.60	11.8	0.715
824	3.66	12.0	0.704
894	3.82	12.5	0.673
960	3.97	13.0	0.648
1000	4.06	13.3	0.634
1250	4.59	15.1	0.580
1500	5.08	16.7	0.507
1700	5.45	17.9	0.472
1800	5.63	18.5	0.457
2000	5.97	19.6	0.431
2100	6.14	20.1	0.419
2200	6.30	20.7	0.409
2300	6.47	21.2	0.398
3000	7.53	24.7	0.342
3400	8.09	26.6	0.318
4000	8.90	29.2	0.289
5000	10.2	33.3	0.254
6000	11.3	37.2	0.228
8000	13.5	44.3	0.191
10000	15.5	50.8	0.166
12000	17.4	57.0	0.148
13400	18.6	61.1	0.138

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
F2PNM-H

7-16 DIN Female
F2PDF

7-16 DIN Male
F2PDM-C

N Female
F2PNF

7-16 DIN Male
Right Angle
F2PDR-C

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F2PNM-H**	Solder	Self-Flare	SG	1.9 (48)	0.94 (23)
N Male	Hex Head	**F2PNM-HC**	Captivated	Self-Flare	SG	1.9 (48)	0.94 (23)
N Female		**F2PNF**	Solder	Self-Flare	SG	2.1 (53)	0.67 (17)
N Female		**F2PNF-C**	Captivated	Self-Flare	SG	2.1 (53)	0.64 (16)
N Female	Bulkhead	**F2PNF-BH**	Solder	Self-Flare	SG	2.1 (53)	0.95 (24)
7-16 DIN Male		**F2PDM**	Solder	Self-Flare	SS	2.2 (57)	1.4 (36)
7-16 DIN Male		**F2PDM-C**	Captivated	Self-Flare	SS	2.1 (53)	1.4 (36)
7-16 DIN Female		**F2PDF**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Female		**F2PDF-C**	Captivated	Self-Flare	SS	2.1 (51.6)	0.79 (20)
7-16 DIN Female	Panel Mount	**F2PDF-PM**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Male	Right Angle	**F2PDR-C**	Captivated	Self-Flare	SS	1.7/1.3 (43/34)	1.4 (36)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, BS - Brass Body and Silver Plated Pin.

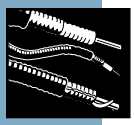
Low VSWR Specifications, Type FSJ2P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) to 10 ft (3 m)	10-20 ft (3-6 m)	20-200 ft (6-60 m)
0.806-0.960	**FSJ2P-50-40**	N	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)
0.806-0.960	**FSJ2P-50-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
and 1.7- 2.2		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7- 2.2	**FSJ2P-50-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
Up to 2.3 *	**FSJ2P-50-1**	N Male	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)
Up to 5.0 *	**FSJ2P-50-2**	N Male	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
Up to 8.5 *	**FSJ2P-50-3**	N Male	1.40 (15.6)	1.40 (15.6)	1.40 (15.6)
Up to 13.4 *	**FSJ2P-50-4**	N Male	1.50 (14.0)	1.50 (14.0)	1.50 (14.0)

* Specify operating band. ** Connectors ordered separately.
VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**F2SGRIP**
Support clamp kit of 10	**F2SGRIP-2IK**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
3/8" Coax to 3/8" Coax with N Connector	**241475-10**
5/8" Coax to 3/8" Coax	**241475-13**
7/8" Coax to 3/8" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 3/8" Coax	**241475-5A**
2-1/4" Coax to 3/8" Coax	**241475-8**
3/8" Coax to 1-1/2" Omni Panel Base type N or DIN	**241548-8**
3/8" to 2" Omni Panel Base type N or DIN	**241548-9**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-19**
5" Boots – One Hole:	**48939A-16**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Cutting Tool FSJ2/FSJ4	**241372**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

3/8" Superflexible High Power, High Temperature, Expanded PTFE Foam Dielectric, ETS Series – *50-ohm*

ETS2-50T

Description	Type No.

Cable Ordering Information

High Power, Plenum Cables	
3/8" Fire Retardant Jacket (CATVP)	**ETS2-50T**
3/8" Unjacketed, Fire Retardant (CATVP)	**ETS2-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	13.4
Velocity, percent	83
Peak Power Rating, kW	13.2
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.29 (4.23)
Outer	1.52 (4.99)
dc Breakdown, volts	2300
Jacket Spark, volts RMS	4000
Capacitance, pF/ft (m)	24.3 (79.7)
Inductance, µH/ft (m)	0.061 (0.200)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Silver Plated, Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.415 (10.5)
Diameter over Copper Outer Conductor, in (mm)	0.375 (9.5)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	20 (50)
Bending Moment, lb-ft (N•m)	1.7 (2.3)
Cable Weight, lb/ft. (kg/m)	0.087 (0.13)
Tensile Strength, lb (kg)	210 (95)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	ETS2-50T[1] Avg. Power kW	ETS2-50[2] Avg. Power kW
0.5	0.083	0.271	13.2	13.2
1	0.117	0.383	13.2	13.2
1.5	0.143	0.470	13.2	13.2
2	0.166	0.543	13.2	13.2
10	0.373	1.22	13.2	13.2
20	0.531	1.74	12.2	13.2
30	0.653	2.14	9.89	11.3
50	0.849	2.79	7.61	8.67
88	1.14	3.73	5.68	6.47
100	1.22	3.99	5.31	6.05
108	1.27	4.16	5.10	5.82
150	1.51	4.94	4.29	4.89
174	1.63	5.34	3.97	4.52
200	1.75	5.75	3.69	4.20
300	2.18	7.14	2.97	3.39
400	2.54	8.34	2.54	2.90
450	2.71	8.89	2.39	2.72
500	2.87	9.41	2.25	2.57
512	2.91	9.54	2.22	2.53
600	3.17	10.4	2.04	2.32
700	3.45	11.3	1.87	2.13
800	3.72	12.2	1.74	1.98
824	3.78	12.4	1.71	1.95
894	3.96	13.0	1.63	1.86
960	4.12	13.5	1.57	1.79
1000	4.22	13.8	1.53	1.75
1250	4.78	15.7	1.35	1.54
1500	5.31	17.4	1.22	1.39
1700	5.71	18.7	1.13	1.29
1800	5.90	19.4	1.10	1.25
2000	6.28	20.6	1.03	1.17
2100	6.46	21.2	1.00	1.14
2200	6.64	21.8	0.975	1.11
2300	6.81	22.4	0.950	1.08
3000	7.98	26.2	0.811	0.924
3400	8.61	28.2	0.752	0.847
4000	9.50	31.2	0.681	0.776
5000	10.9	35.8	0.593	0.676
6000	12.2	40.1	0.529	0.603
8000	14.7	48.2	0.441	0.502
10000	17.0	55.8	0.381	0.434
12000	19.2	62.9	0.338	0.385
13400	20.7	67.8	0.314	0.358

Standard Conditions: For Attenuation: VSWR 1.0, ambient temperature 20°C (68°F).

1. For Average Power, Type ETS2-50T (jacketed): VSWR 1.0 ambient temperature 40°C (104°F), inner conductor temperature 200°C (392°F).
2. For Average Power, Type ETS2-50 (unjacketed): VSWR 1.0 ambient temperature 40°C (104°F), inner conductor temperature 250°C (482°F); no solar loading.


N Male
F2PNM-H


7-16 DIN Female
F2PDF


7-16 DIN Male
F2PDM-C


N Female
F2PNF


7-16 DIN Male
Right Angle – F2PDR-C

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F2PNM-H**	Solder	Self-Flare	SG	1.9 (48)	0.94 (23)
N Male	Hex Head	**F2PNM-HC**	Captivated	Self-Flare	SG	1.9 (48)	0.94 (23)
N Female		**F2PNF**	Solder	Self-Flare	SG	2.1 (53)	0.67 (17)
N Female		**F2PNF-C**	Captivated	Self-Flare	SG	2.1 (53)	0.64 (16)
N Female	Bulkhead	**F2PNF-BH**	Solder	Self-Flare	SG	2.1 (53)	0.95 (24)
7-16 DIN Male		**F2PDM**	Solder	Self-Flare	SS	2.2 (57)	1.4 (36)
7-16 DIN Male		**F2PDM-C**	Captivated	Self-Flare	SS	2.1 (53)	1.4 (36)
7-16 DIN Female		**F2PDF**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Female		**F2PDF-C**	Captivated	Self-Flare	SS	2.1 (51.6)	0.79 (20)
7-16 DIN Female	Panel Mt.	**F2PDF-PM**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Male	Right Angle	**F2PDR-C**	Captivated	Self-Flare	SS	1.7/1.3 (43/34)	1.4 (36)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, BS - Brass Body and Silver Plated Pin.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-19**
5" Boots – One Hole:	**48939A-16**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Cutting Tool FSJ2/FSJ4	**241372**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

1/2" Superflexible Foam Dielectric, FSJ Series – *50-ohm*

FSJ4-50B

Description	Type No.

Cable Ordering Information

Standard Superflexible Cable	
1/2" Standard Cable, Standard Jacket	**FSJ4-50B**
Fire Retardant Cables	
1/2" Fire Retardant Jacket (CATVX)	**FSJ4RN-50B**
1/2" Fire Retardant Jacket (CATVR)	**FSJ4RN-50B**
Low VSWR and Specialized Cables	
1/2" Low VSWR, specify operating band	**FSJ4P-50-(**)**
Phase Stabilized and Phase Measured Cable	See page 590
Jumper Cable Assemblies – See page 584	

** Insert suffix number from "Low VSWR Specifications" table, page 487

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	10.2
Velocity, percent	81
Peak Power Rating, kW	15.6
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.82 (2.69)
Outer	1.00 (3.28)
dc Breakdown, volts	2500
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	25.2 (82.7)
Inductance, µH/ft (m)	0.0625 (0.205)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, standard jacket, in (mm)	0.52 (13.2)
Diameter over Jacket, fire-retardant jacket, in (mm)	0.53 (13.5)
Diameter over Copper Outer Conductor, in (mm)	0.48 (12.2)
Diameter Inner Conductor, in (mm)	0.142 (3.6)
Minimum Bending Radius, in (mm)	1.25 (32)
Number of Bends, minimum (typical)	20 (50)
Bending Moment, lb-ft (N•m)	2.0 (2.7)
Cable Weight, lb/ft. (kg/m)	0.14 (0.21)
Tensile Strength, lb (kg)	175 (80)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (1.9)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.070	0.231	15.6
1	0.100	0.327	15.6
1.5	0.122	0.401	15.6
2	0.141	0.463	15.6
10	0.318	1.04	10.1
20	0.453	1.49	7.07
30	0.557	1.83	5.75
50	0.724	2.38	4.42
88	0.971	3.19	3.30
100	1.04	3.41	3.08
108	1.08	3.55	2.96
150	1.28	4.21	2.49
174	1.39	4.56	2.30
200	1.50	4.91	2.14
300	1.86	6.09	1.72
400	2.17	7.12	1.48
450	2.31	7.59	1.38
500	2.45	8.04	1.31
512	2.48	8.15	1.29
600	2.71	8.89	1.18
700	2.95	9.68	1.09
800	3.18	10.4	1.01
824	3.23	10.6	0.991
894	3.38	11.1	0.947
960	3.52	11.6	0.909
1000	3.60	11.8	0.889
1250	4.09	13.4	0.783
1500	4.54	14.9	0.705
1700	4.88	16.0	0.656
1800	5.05	16.6	0.634
2000	5.37	17.6	0.597
2100	5.53	18.1	0.580
2200	5.68	18.6	0.564
2300	5.83	19.1	0.549
3000	6.84	22.4	0.469
3400	7.38	24.2	0.435
4000	8.15	26.7	0.394
5000	9.35	30.7	0.343
6000	10.5	34.4	0.306
8000	12.6	41.4	0.254
10000	14.6	47.9	0.220
10200	14.8	48.5	0.217

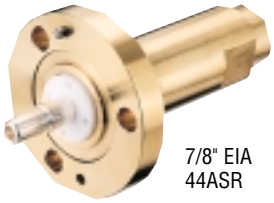
Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
F4PNMV2-H

N Female
Bulkhead
F4PNF-BH

UHF Male
44ASP

N Male
Right Angle
F4PNR-H



7/8" EIA
44ASR

7-16 DIN Female
F4PDF-C

7-16 DIN Male
F4PDMV2-C

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F4PNMV2-H**	Solder	Crush-Flare	SG	2.13 (54.0)	0.94 (23.8)
N Male	Hex Head	**F4PNMV2-HC**	Captivated	Crush-Flare	SG	2.13 (54.0)	0.94 (23.8)
N Male	Rt Angle, Hex Hd	**F4PNR-H**	Solder	Tab-Flare	SG	3.3/1.5 (84/38)	0.86 (21.8)
N Male		**F4PNR-HC**	Captivated	Crush-Flare	SG	2.8 (71.9)/1.6 (41.5)	1 (25.7)
N Female	–	**F4PNF**	Solder	Self-Flare	SG	2.3 (53.3)	0.88 (22.4)
N Female	–	**F4PNF-C**	Captivated	Self-Flare	SG	2.3 (53.3)	0.88 (22.4)
N Female	Bulkhead	**F4PNF-BH**	Solder	Self-Flare	SG	2.3 (58)	0.95 (24.1)
4.1/9.5 DIN Male	–	**F4PKM-C**	Captivated	Self-Flare	SS	2.0 (50)	0.95 (24.1)
4.1/9.5 DIN Male	Rt Angle, Outdoor Use	**F4PKR-C**	Captivated	Self-Flare	SS	2.3/1.5 (57/38)	0.95 (24.1)
7-16 DIN Male	–	**F4PDMV2-C**	Captivated	Crush Flare	SS	1.98 (50.2)	1.05 (26.7)
7-16 DIN Male	–	**F4PDMV2**	Solder	Crush Flare	SS	2.10 (53.4)	1.05 (26.7)
7-16 DIN Male	Right Angle	**F4PDR**	Solder	Self-Flare	SS	2.4.1.8 (61/46)	1.4 (35.6)
7-16 DIN Male	Right Angle	**F4PDR-C**	Captivated	Self-Flare	SS	2.1/2.0 (53/50)	1.4 (35.6)
7-16 DIN Female	–	**F4PDF-C**	Captivated	Self-Flare	SS	2.0 (50)	1.1 (27.9)
7-16 DIN Female	–	**F4PDF**	Solder	Self-Flare	SS	2.0 (50)	1.1 (27.9)
7-16 DIN Female	Bulkhead	**F4PDF-BH**	Solder	Self-Flare	SS	2.01 (51.1)	1.50 (38)
7-16 DIN Female	Panel Mount	**F4PDF-PM**	Solder	Self-Flare	SS	2.01 (51.1)	1.26 (32)
7-16 DIN Female	Bulkhead	**F4PDF-BHC**	Captivated	Self-Flare	SS	2.0 (50)	1.8 (45.7)
7-16 DIN Female	Panel Mount	**F4PDF-PMC**	Captivated	Self-Flare	SS	2.0 (50)	1.3 (33)
7/8" EIA Flange	–	**44ASR**	Solder	Tab-Flare	BS	3.3 (84)	1.4 (35.6)
UHF Male	–	**44ASP**	Solder	Tab-Flare	BS	2.1 (53)	0.84 (21.3)
UHF Female	–	**44ASU**	Solder	Tab-Flare	BS	2.3 (58)	0.84 (21.3)
HN Male	–	**44ASJ**	Solder	Tab-Flare	BB	2.4 (61)	0.84 (21.3)
SC Male	–	**44SPCW**	Solder	Tab-Flare	SG	2.7 (69)	0.88 (22.4)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

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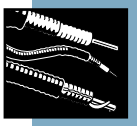
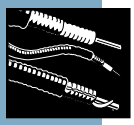


Low VSWR Specifications, Type FSJ4P-50B-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 0-10 ft (0-3 m)	10-20 ft (3-6 m)	20-100 ft (6-30 m)	Above 100 ft (Above 30 m)
0.01-2.3*	**FSJ4P-50B-1**	N Male	1.10 (26.4)	1.10 (26.4)	1.15 (23.1)	1.15 (23.1)
		N Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		7-16 DIN Male	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		7-16 DIN Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		Rt. Angle N Male	1.15 (23.1)	1.18 (21.6)	1.30 (17.7)	1.50 (14.0)
0.01-4.2*	**FSJ4P-50B-2**	N Male	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		N Female	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.30 (17.7)
		7-16 DIN Male	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.30 (17.7)
		7-16 DIN Female	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.30 (17.7)
		Rt. Angle N Male	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)	1.50 (14.0)
0.01-7.1*	**FSJ4P-50B-3**	N Male	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)
		N Female	1.35 (16.5)	1.35 (16.5)	1.40 (15.6)	1.50 (14.0)
		7-16 DIN Male	1.35 (16.5)	1.35 (16.5)	1.40 (15.6)	1.50 (14.0)
		7-16 DIN Female	1.35 (16.5)	1.35 (16.5)	1.40 (15.6)	1.50 (14.0)
0.806-0.960	**FSJ4P-50B-40**	N	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)	–
		7-16 DIN	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)	–
0.806-0.960 and 1.7- 2.2	**FSJ4P-50B-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	–
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	–
1.7- 2.2	**FSJ4P-50B-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	–
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	–
0.3-1.7*	**FSJ4P-50B-6**	N Male	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		N Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		7-16 DIN Male	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		7-16 DIN Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		Rt. Angle N Male	1.20 (20.8)	1.20 (20.8)	1.30 (17.7)	1.40 (15.6)
1.7-2.7	**FSJ4P-50B-7**	N Male	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		N Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		7-16 DIN Male	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		7-16 DIN Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)
		Rt. Angle N Male	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
4.0-8.0*	**FSJ4P-50B-8**	N Male	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)	1.40 (15.6)
		N Female	1.50 (14.0)	1.50 (14.0)	1.50 (14.0)	1.40 (15.6)
		7-16 DIN Male	1.50 (14.0)	1.50 (14.0)	1.50 (14.0)	1.40 (15.6)
		7-16 DIN Female	1.50 (14.0)	1.50 (14.0)	1.50 (14.0)	1.40 (15.6)

* Specify operating band. ** Connectors ordered separately.
VSWR values apply to straight connectors only (except where noted otherwise), are guaranteed for factory fit assemblies and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**43211A**
Snap-in Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706A-1**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**F4SGRIP**
Support clamp kit of 10	**F4SGRIP-4IK**
Standard Hoisting Grip	**43094**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kits	
Factory attached one-hole lug 24"	**204989-1**
Factory attached two-hole lug 24"	**241088-1**
Field attached one-hole lug 36"	**204989-21**
Field attached two-hole lug 36"	**241088-6**

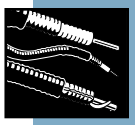
Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
LDF5 to FSJ4	**WS-L5F4**
LDF6 to FSJ4	**WS-L6F4**
LDF7 to FSJ4	**WS-L7F4**
Cold Shrink Weatherproofing Kit	
1/2" Coax N Connector to 1/2" Coax N Connector	**241474-4**
5/8" Coax to 1/2" Coax	**241475-13**
7/8" Coax to 1/2" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 1/2" Coax	**241475-5A**
2-1/4" Coax to 1/2" Coax	**241475-8**
1/2" to 1-1/2" Omni/Panel base Type N or DIN	**241548-8**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623

EASIAX® Plus Automated Cable Prep Tool (V2 connectors only)	**CPT-F4B**
EASIAX® Cutting Tool FSJ4/FSJ1	**207865**
EASIAX® Cutting Tool FSJ4/FSJ2	**241372**
Cable Flare Tool	**224363**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



3/8" Extraflexible Foam Dielectric, EFX Series – *50-ohm*

EFX2-50

Description	Type No.
Cable Ordering Information	
Extraflexible Cable	
3/8" Extraflexible Cable, Standard Jacket	**EFX2-50**
Fire Retardant Cables	
3/8" Fire Retardant Jacket (CATVX)	**EFX2RN-50**
3/8" Fire Retardant Jacket (CATVR)	**EFX2RN-50**
Low VSWR Cables	**EFX2P-50-(**)**
Jumper Cable Assemblies – See page 584	

** Insert suffix number from "Low VSWR Specifications" table, page 490

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	13.5
Velocity, percent	85
Peak Power Rating, kW	15.6
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.1 (3.6)
Outer	0.92 (3.0)
dc Breakdown, volts	2500
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	24.1 (79.0)
Inductance, µH/ft (m)	0.06 (0.20)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.45 (11.3)
Diameter over Copper Outer Conductor, in (mm)	0.38 (9.7)
Minimum Bending Radius, in (mm)	1.75 (45)
Number of Bends, minimum (typical)	15
Bending Moment, lb-ft (N•m)	1.7 (2.3)
Cable Weight, lb/ft (kg/m)	0.09 (0.13)
Tensile Strength, lb (kg)	175 (79)
Flat Plate Crush Strength, lb/in (kg/mm)	120 (2.1)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.074	0.244	15.6
1	0.105	0.345	15.6
1.5	0.129	0.423	15.6
2	0.149	0.488	15.6
10	0.335	1.10	6.97
20	0.476	1.56	4.90
30	0.584	1.92	3.99
50	0.759	2.49	3.07
88	1.01	3.33	2.30
100	1.08	3.56	2.15
108	1.13	3.70	2.07
150	1.34	4.39	1.74
174	1.44	4.74	1.61
200	1.55	5.10	1.50
300	1.92	6.31	1.21
400	2.24	7.35	1.04
450	2.39	7.83	0.978
500	2.52	8.28	0.924
512	2.56	8.39	0.913
600	2.78	9.13	0.838
700	3.03	9.93	0.771
800	3.25	10.7	0.717
824	3.31	10.8	0.706
894	3.46	11.3	0.675
960	3.59	11.8	0.649
1000	3.68	12.1	0.635
1250	4.16	13.6	0.561
1500	4.60	15.1	0.507
1700	4.94	16.2	0.473
1800	5.10	16.7	0.458
2000	5.41	17.8	0.431
2100	5.57	18.3	0.419
2200	5.71	18.7	0.408
2300	5.86	19.2	0.398
3000	6.83	22.4	0.342
3400	7.35	24.1	0.318
4000	8.08	26.5	0.289
5000	9.23	30.3	0.253
6000	10.3	33.8	0.227
8000	12.3	40.3	0.190
10000	14.1	46.3	0.165
12000	15.9	52.0	0.147
13500	17.1	56.1	0.137

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

E2PNM-H
N Male

E2PNR-HC
N Male Right Angle

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**E2PNM-H**	Solder	Self-Flare	SG	2.0 (52)	0.94 (23.9)
N Male		**E2PNM-HC**	Captivated	Self-Flare	SG	2.16 (54.8)/0.89 (17.6)	0.89 (17.6)
N Male	Right Angle	**E2PNR-HC**	Captivated	Self-Flare	SG	2.4/1.5 (60.4/37.7)	0.91 (23.1)
N Female	–	**E2PNF-C**	Captivated	Self-Flare	SG	–	–
N Female	–	**E2PNF**	Solder	Self-Flare	SG	2.4 (61)	0.69 (17.6)
N Female	Bulkhead	**E2PNF-BH**	Solder	Self-Flare	SG	2.5 (63.7)	0.86 (21.4)
7-16 DIN Male	–	**E2PDM-C**	Captivated	Self-Flare	SS	2.1 (53)	1.41 (35.9)
7-16 DIN Male	Right Angle	**E2PDR-C**	Captivated	Self-Flare	SS	2.9 (74.4)/45.5 (1.8)	1.4 (35.9)
7-16 DIN Female	–	**E2PDF-C**	Captivated	Self-Flare	SS	2.1 (53)	1.10 (27.9)
TNC Male	–	**E2PTM**	Solder	Self-Flare	SG	2.2 (56)	0.63 (16.1)
TNC Female	–	**E2PTF**	Solder	Self-Flare	NG	1.9 (49)	0.63 (16.1)
UHF Male	–	**E2UM**	Solder	Self-Flare	BB	2.2 (56)	0.77 (19.6)
UHF Female	–	**E2UF**	Solder	Self-Flare	BS	2.1 (53)	0.68 (17.3)
SMA Male	–	**E2SM**	Solder	Self-Flare	BG	2.2 (56)	0.68 (17.3)

Plating Codes: BG - Brass Body and Gold Plated Pin, BS - Brass Body and Silver Plated Pin, NG - Nickel Plated Body and Gold Plated Pin, SG - SIlver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Low VSWR Specifications, Type EFX2P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 0-10 ft (0-3 m)	10-20 ft (3-6 m)
0.806-0.960	**EFX2P-50-40**	N 7-16 DIN	1.08 (28.3) 1.08 (28.3)	1.10 (26.4) 1.10 (26.4)
0.806-0.960 and 1.7- 2.2	**EFX2P-50-42**	N 7-16 DIN	1.10 (26.4) 1.10 (26.4)	1.10 (26.4) 1.10 (26.4)
1.7- 2.2	**EFX2P-50-41**	N 7-16 DIN	1.10 (26.4) 1.10 (26.4)	1.10 (26.4) 1.10 (26.4)

**Connectors ordered separately. VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**E2SGRIP**
Support clamp kit of 10	**E2SGRIP-2IK**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
3/8" Coax to 3/8" Coax with N Connector	**241475-10**
5/8" Coax to 3/8" Coax	**241475-13**
7/8" Coax to 3/8" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 3/8" Coax	**241475-5A**
2 1/4" Coax to 3/8" Coax	**241475-8**
3/8" Coax to 1-1/2" Omni Panel Base type N or DIN	**241548-8**
3/8" Coax to 2" Omni Panel Base type N or DIN	**241548-9**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-19**
5" Boots – One Hole:	**48939A-16**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool for:	
DIN Connectors	**CPT-E2L2DIN**
N Connectors	**CPT-E2L2N**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

ANDREW®

Revised 9/00 & 3/01

1/4" Foam Dielectric, LDF Series – *50-ohm*

LDF1-50

Description	Type No.

Cable Ordering Information

Standard Cable	
1/4" Standard Cable, Standard Jacket	**LDF1-50**
Fire Retardant Cables	
1/4" Fire Retardant Jacket (CATVX)	**LDF1RN-50**
1/4" Fire Retardant Jacket (CATVR)	**LDF1RN-50**
Jumper Cable Assemblies – See page 584	

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	15.8
Velocity, percent	86
Peak Power Rating, kW	12.1
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.57 (5.15)
Outer	1.02 (3.33)
dc Breakdown, volts	2200
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	23.4 (76.8)
Inductance, µH/ft (m)	0.059 (0.19)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.345 (8.8)
Diameter over Copper Outer Conductor, in (mm)	0.31 (7.7)
Diameter Inner Conductor, in (mm)	0.102 (2.6)
Minimum Bending Radius, in (mm)	3.0 (76)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	0.98 (1.33)
Cable Weight, lb/ft (kg/m)	0.06 (0.09)
Tensile Strength, lb (kg)	200 (91)
Flat Plate Crush Strength, lb/in (kg/mm)	80 (1.4)

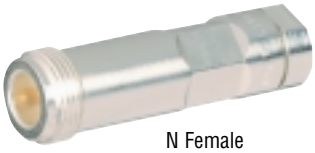
Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.085	0.278	12.1
1	0.120	0.394	12.1
1.5	0.147	0.483	12.1
2	0.170	0.558	12.1
10	0.382	1.25	5.79
20	0.543	1.78	4.08
30	0.667	2.19	3.32
50	0.865	2.84	2.56
88	1.16	3.79	1.92
100	1.23	4.05	1.79
108	1.28	4.21	1.72
150	1.52	4.99	1.45
174	1.64	5.39	1.35
200	1.77	5.80	1.25
300	2.18	7.17	1.01
400	2.54	8.34	0.871
450	2.71	8.88	0.818
500	2.86	9.39	0.773
512	2.90	9.51	0.764
600	3.15	10.4	0.702
700	3.43	11.2	0.646
800	3.68	12.1	0.601
824	3.74	12.3	0.592
894	3.91	12.8	0.566
960	4.07	13.3	0.545
1000	4.16	13.6	0.533
1250	4.70	15.4	0.471
1500	5.19	17.0	0.426
1700	5.57	18.3	0.398
1800	5.75	18.9	0.385
2000	6.10	20.0	0.363
2100	6.27	20.6	0.353
2200	6.43	21.1	0.344
2300	6.60	21.6	0.336
3000	7.67	25.2	0.289
3400	8.24	27.0	0.269
4000	9.06	29.7	0.245
5000	10.3	33.9	0.215
6000	11.5	37.7	0.193
8000	13.7	44.9	0.162
10000	15.7	51.5	0.141
12000	17.6	57.7	0.126
14000	19.4	63.5	0.114
15800	20.9	68.6	0.106

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
L1PNR-HC

N Male
L1PNM-H



N Female
L1PNF

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**L1PNM-H**	Solder	Self-Flare	SG	1.9 (49)	0.94 (23.9)
N Male	Hex Head	**L1PNM-HC**	Captivated	Self-Flare	SS	2 (52)	0.89 (17.6)
N Male	Right Angle	**L1PNR-HC**	Captivated	Self-Flare	SG	2.3/1.3 (58.3/32.7)	0.91 (23.1)
N Female		**L1PNF**	Solder	Self-Flare	SG	2.1 (52)	0.62 (15.7)
N Female		**L1PNF-C**	Captivated	Self-Flare	SG	–	–
N Female	Bulkhead	**L1PNF-BH**	Solder	Self-Flare	SG	2.1 (52)	0.88 (22.4)

Plating Codes: SG - SIlver Plated Body and Gold Plated Pin

Low VSWR Specifications, Type LDF1P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 0-10 ft (0-3 m)	10-20 ft (3-6 m)
0.806-0.960	**LDF1P-50-40**	N	1.08 (28.3)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.10 (26.4)
0.806-0.960 and 1.7- 2.2	**LDF1P-50-42**	N	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)
1.7- 2.2	**LDF1P-50-41**	N	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)

**Connectors ordered separately. VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L1SGRIP**
Support clamp kit of 10	**L1SGRIP-1IK**

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
5/8" Coax to 1/4" Coax	**241475-13**
7/8" Coax to 1/4" Coax	**241475-12**
1-1/4" or 1-5/8" Coax to 1/4" Coax	**241475-11**
1/4" to 1-1/2" Omni/Panel base Type N or DIN	**241548-10**
1/4" to 2" Omni/Panel base Type N or DIN	**241548-11**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-17**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool	**CPT-L1**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

3/8" Foam Dielectric, LDF Series – *50-ohm*

LDF2-50

Description	Type No.

Cable Ordering Information

Standard Cable	
3/8" Standard Cable, Standard Jacket	**LDF2-50**
Fire Retardant Cables	
3/8" Fire Retardant Jacket (CATVX)	**LDF2RN-50**
3/8" Fire Retardant Jacket (CATVR)	**LDF2RN-50**
Low VSWR and Specialized Cables	
3/8" Low VSWR, specify operating band Phase Stabilized and Phase Measured Cable	**LDF2P-50-(**)** See page 590
Jumper Cable Assemblies – See page 584	

** Insert suffix number from "Low VSWR Specifications" table, page 495

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	13.5
Velocity, percent	88
Peak Power Rating, kW	15.6
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.06 (3.48)
Outer	0.87 (2.85)
dc Breakdown, volts	2500
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	23.0 (75.5)
Inductance, µH/ft (m)	0.058 (0.19)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.44 (11)
Diameter over Copper Outer Conductor, in (mm)	0.38 (9.7)
Diameter Inner Conductor, in (mm)	0.122 (3.1)
Minimum Bending Radius, in (mm)	3.75 (95)
Number of Bends, minimum (typical)	15 (60)
Bending Moment, lb-ft (N•m)	1.4 (1.9)
Cable Weight, lb/ft (kg/m)	0.08 (0.12)
Tensile Strength, lb (kg)	250 (113)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (2.0)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.072	0.235	15.6
1	0.101	0.332	15.6
1.5	0.124	0.407	15.6
2	0.143	0.471	15.6
10	0.323	1.06	7.23
20	0.458	1.50	5.09
30	0.563	1.85	4.14
50	0.730	2.40	3.19
88	0.976	3.20	2.39
100	1.04	3.42	2.24
108	1.08	3.56	2.15
150	1.29	4.22	1.81
174	1.39	4.56	1.68
200	1.49	4.90	1.56
300	1.85	6.06	1.26
400	2.15	7.06	1.08
450	2.29	7.51	1.02
500	2.42	7.95	0.963
512	2.45	8.05	0.951
600	2.67	8.76	0.874
700	2.90	9.52	0.804
800	3.12	10.2	0.748
824	3.17	10.4	0.736
894	3.31	10.9	0.704
960	3.44	11.3	0.678
1000	3.52	11.6	0.663
1250	3.98	13.1	0.586
1500	4.40	14.4	0.530
1700	4.72	15.5	0.494
1800	4.87	16.0	0.479
2000	5.17	17.0	0.451
2100	5.32	17.4	0.439
2200	5.46	17.9	0.428
2300	5.60	18.4	0.417
3000	6.52	21.4	0.358
3400	7.00	23.0	0.333
4000	7.70	25.3	0.303
5000	8.78	28.8	0.266
6000	9.79	32.1	0.239
8000	11.7	38.2	0.200
10000	13.4	43.9	0.175
12000	15.0	49.2	0.156
13500	16.2	53.0	0.145

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.


N Male
L2PNM-H


N Female
L2PNF


7-16 DIN Male
L2PDM-C


UHF Male
L2P


TNC Male
L2PTM


SMA Male
L42WS

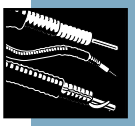
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**L2PNM-H**	Solder	Self-Flare	SG	2.1 (53)	0.94 (23.9)
N Male	Hex Head	**L2PNM-HC**	Captivated	Self-Flare	SG	2.1 (53)	0.94 (23.9)
N Female	–	**L2PNF**	Solder	Self-Flare	SG	2.4 (61)	0.63 (16.0)
N Female	Bulk Head	**L2PNF-BH**	Solder	Self-Flare	SG	2.4 (61)	0.88 (22.4)
4.1/9.5 DIN	–	**L2PKM-C**	Captivated	Self-Flare	SS	1.9 (48)	0.95 (24.1)
4.1/9.5 DIN	–	**L2PKM**	Solder	Self-Flare	SS	1.9 (48)	0.95 (24.1)
4.1/9.5 DIN	Right Angle	**L2PKR-C**	Captivated	Self-Flare	SS	2.0/1.5 (50/38)	0.95 (24.1)
7-16 DIN Male	–	**L2PDM-C**	Captivated	Self-Flare	SS	1.9 (48)	1.1 (27.9)
7-16 DIN Female	–	**L2PDF-C**	Captivated	Self-Flare	SS	1.9 (48)	1.4 (35.6)
7-16 DIN Female	Panel Mount	**L2PDF-PMC**	Captivated	Self-Flare	SS	1.9 (48)	1.25 (31.8)
UHF Male	–	**L42P**	Solder	Self-Flare	BB	2.3 (58)	0.68 (17.3)
UHF Female	–	**L42U**	Solder	Self-Flare	BB	2.3 (58)	0.91 (23.1)
SMA Male	–	**L42WS**	Solder	Self-Flare	BG	2.2 (56)	0.68 (17.3)
TNC Male	–	**L42EWT**	Solder	Self-Flare	NG	2.1 (53)	0.68 (17.3)
TNC Female	–	**L42ENT**	Solder	Self-Flare	NG	1.9 (48)	0.68 (17.3)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, NG - Nickel Plated Body and Gold Plated Pin, SG - SIlver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Low VSWR Specifications, Type LDF2P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 0-10 ft (0-3 m)	10-20 ft (3-6 m)
0.806-0.960	**LDF2P-50-40**	N 7-16 DIN	1.08 (28.3) 1.08 (28.3)	1.10 (26.4) 1.10 (26.4)
0.806-0.960 and 1.7- 2.2	**LDF2P-50-42**	N 7-16 DIN	1.10 (26.4) 1.10 (26.4)	1.10 (26.4) 1.10 (26.4)
1.7- 2.2	**LDF2P-50-41**	N 7-16 DIN	1.10 (26.4) 1.10 (26.4)	1.10 (26.4) 1.10 (26.4)
Up to 2.3 *	**LDF2P-50-1**	N Male N Female TNC Male	1.15 (23.1) 1.15 (23.1) 1.20 (20.8)	1.20 (20.8) 1.25 (19.9) 1.30 (17.7)
Up to 4.2 *	**LDF2P-50-2**	N Male N Female	1.20 (20.8) 1.35 (16.6)	1.35 (16.6) 1.45 (14.7)
Up to 8.5 *	**LDF2P-50-3**	N Male	1.25 (19.9)	1.35 (16.6)
Up to 13.5 *	**LDF2P-50-4**	N Male: L2PNM	1.30 (17.7)	1.35 (16.6)

* Specify operating band. ** Connectors ordered separately.
VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L2SGRIP**
Support clamp kit of 10	**L2SGRIP-2IK**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
3/8" Coax to 3/8" Coax with N Connector	**241475-10**
5/8" Coax to 3/8" Coax	**241475-13**
7/8" Coax to 3/8" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 3/8" Coax	**241475-5A**
2 1/4" Coax to 3/8" Coax	**241475-8**
3/8" Coax to 1-1/2" Omni Panel Base type N or DIN	**241548-8**
3/8" Coax to 2" Omni Panel Base type N or DIN	**241548-9**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-19**
5" Boots – One Hole:	**48939A-16**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool for:	
DIN Connectors	**CPT-E2L2DIN**
N Connectors	**CPT-E2L2N**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1/2" Foam Dielectric, LDF Series – *50-ohm*

LDF4-50A

Description	Type No.
Cable Ordering Information	
Standard Cable	
1/2" Standard Cable, Standard Jacket	**LDF4-50A**
Fire Retardant Cables	
1/2" Fire Retardant Jacket (CATVX)	**LDF4RN-50A**
1/2" Fire Retardant Jacket (CATVR)	**LDF4RN-50A**
Low VSWR and Specialized Cables	
1/2" Low VSWR, specify operating band Phase Stabilized and Phase Measured Cable	**LDF4P-50A-(**)** See page 590
Jumper Cable Assemblies – See page 584	

** Insert suffix number from "Low VSWR Specifications" table, page 498

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	8.8
Velocity, percent	88
Peak Power Rating, kW	40
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.45 (1.48)
Outer	0.58 (1.90)
dc Breakdown, volts	4000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	23.1 (75.8)
Inductance, µH/ft (m)	0.058 (0.19)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.63 (16)
Diameter over Copper Outer Conductor, in (mm)	0.55 (14)
Diameter Inner Conductor, in (mm)	0.189 (4.6)
Nominal Inside Transverse Dimensions, cm	1.11
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (N•m)	2.8 (3.8)
Cable Weight, lb/ft (kg/m)	0.15 (0.22)
Tensile Strength, lb (kg)	250 (113)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (2.0)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.045	0.149	40.0
1	0.064	0.211	35.8
1.5	0.079	0.259	29.2
2	0.091	0.299	25.3
10	0.205	0.672	11.3
20	0.291	0.954	7.93
30	0.357	1.17	6.46
50	0.463	1.52	4.98
88	0.619	2.03	3.73
100	0.661	2.17	3.49
108	0.688	2.26	3.36
150	0.815	2.67	2.83
174	0.880	2.89	2.62
200	0.946	3.10	2.44
300	1.17	3.83	1.97
400	1.36	4.46	1.70
450	1.45	4.75	1.59
500	1.53	5.02	1.51
512	1.55	5.08	1.49
600	1.69	5.53	1.37
700	1.83	6.01	1.26
800	1.97	6.46	1.17
824	2.00	6.56	1.15
894	2.09	6.85	1.10
960	2.17	7.12	1.06
1000	2.22	7.28	1.04
1250	2.51	8.23	0.921
1500	2.77	9.09	0.833
1700	2.97	9.74	0.777
1800	3.07	10.1	0.753
2000	3.25	10.7	0.710
2100	3.34	11.0	0.691
2200	3.43	11.2	0.673
2300	3.52	11.5	0.657
3000	4.09	13.4	0.565
3400	4.39	14.4	0.526
4000	4.82	15.8	0.479
5000	5.49	18.0	0.421
6000	6.11	20.1	0.378
8000	7.26	23.8	0.318
8800	7.69	25.2	0.300

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

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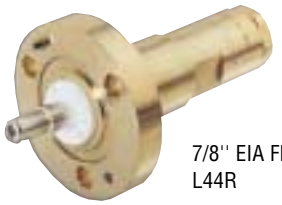
N Male
L4PNM-RC

N Female
L4PNF-RC

7-16 DIN Male
L4PDM-RC

7-16 DIN Female
L4PDF-RC



7/8'' EIA Flange
L44R

UHF Male
L44P

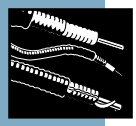
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**L4PNM-H**	Solder	Self-Flare	SG	2.6 (66)	0.95 (24.1)
N Male	RingFlare	**L4PNM-RC**	Captivated	RingFlare	SG	3.0 (75.7)	0.86 (21.8)
N Male	Right Angle, Hex	**L4PNR-H**	Solder	Self-Flare	SG	3.2/1.5 (81/38)	0.95 (24.1)
N Male	Right Angle, Hex	**L4PNR-HC**	Captivated	Self-Flare	SG	3.2/1.5 (81/38)	0.91 (23.1)
N Female	–	**L4PNF**	Solder	Self-Flare	SG	2.6 (66)	0.94 (23.9)
N Female	Bulk Head	**L4PNF-BH**	Solder	Self-Flare	SG	2.6 (66)	0.96 (24.4)
N Female	Panel Mount	**L4PNF-PM**	Solder	Self-Flare	SG	2.6 (66)	1.0 (25.4)
N Female	RingFlare	**L4PNF-RC**	Captivated	RingFlare	SG	2.8 (71)	0.86 (21.8)
7-16 DIN Male	–	**L4PDM**	Solder	Self-Flare	SS	2.6 (66)	1.4 (35.6)
7-16 DIN Male	Right Angle	**L4PDR**	Solder	Self-Flare	SS	1.8/2.8 (46/72)	1.41 (35.9)
7-16 DIN Male	Right Angle	**L4PDR-C**	Captivated	Self-Flare	SS	1.8/2.8 (46/72)	1.41 (35.9)
7-16 DIN Male	RingFlare	**L4PDM-RC**	Captivated	Ring-Flare	SS	2.64 (67.1)	0.86 (21.8)
7-16 DIN Female	–	**L4PDF**	Solder	Self-Flare	SS	2.7 (69)	1.1 (27.9)
7-16 DIN Female	Bulk Head	**L4PDF-BH**	Solder	Self-Flare	SS	2.73 (69.4)	1.62 (41.1)
7-16 DIN Female	Bulk Head	**L4PDF-BHC**	Captivated	Self-Flare	SS	2.9 (74)	1.63 (41.4)
7-16 DIN Female	Panel Mount	**L4PDF-PM**	Solder	Self-Flare	SS	2.7 (69)	1.2 (29.4)
7-16 DIN Female	RingFlare	**L4PDF-RC**	Captivated	RingFlare	SS	2.8 (71)	0.86 (21.8)
7/8" EIA Flange	–	**L44R**	Solder	Self-Flare	BB	3.2 (81)	2.25 (57.2)
7/8" EIA Flange	Right Angle	**124990-1**	Solder	Self-Flare	BB	2.3/1.6 (58/41)	2.25 (57.2)
F Flange Male	–	**L44F**	Solder	Self-Flare	BB	2.3 (58)	2.25 (57.2)
F Flange Female	–	**209865**	Solder	Self-Flare	BS	2.3 (58)	2.25 (57.2)
UHF Male	–	**L44P**	Solder	Self-Flare	BB	2.3 (58)	0.91 (23.1)
UHF Female	–	**L44U**	Solder	Self-Flare	BS	2.3 (58)	0.91 (23.1)
HN Male	–	**L44J**	Solder	Self-Flare	BB	2.5 (64)	0.91 (23.1)
LC Male	–	**L44M**	Solder	Self-Flare	BB	3.6 (91)	0.91 (23.1)
TNC Female	–	**L44NT**	Solder	Self-Flare	BB	2.8 (71)	0.94 (23.9)
End Terminal	–	**L44T**	Solder	Self-Flare	BB	4.0 (102)	0.91 (23.1)
Splice	–	**L44Z**	Solder	Self-Flare	BB	3.2 (81)	1.1 (27.9)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Standard VSWR Specifications

Frequency Band, GHz	Type No.	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960 and 1.7-2.0	**LDF4-50A**	1.09 (27.3)*	1.11 (25.7)*	1.13 (24.3)*	1.13 (24.3)*	1.13 (24.3)**
	LDF4RN-50A	1.09 (27.3)*	1.11 (25.7)*	1.13 (24.3)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

Low VSWR Specifications, Type LDF4P-50A-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**LDF4P-50A-40**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
0.806–0.960 and 1.7-2.2	**LDF4P-50A-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.427-1.535	**LDF4P-50A-4**	N	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		F Flange, 7/8" EIA	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		SC Male, TNC Female	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		LC Male	1.35 (16.5)	1.35 (16.5)	1.32 (17.2)	1.30 (17.7)	1.30 (17.7)
		Right Angle N Male	1.35 (16.5)	1.35 (16.5)	1.32 (17.2)	1.30 (17.7)	1.30 (17.7)
1.6-2.3	**LDF4P-50A-10**	N	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)
		F Flange	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)
		F Flange Female	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		SC Male	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		Right Angle N Male	1.35 (16.5)	1.35 (16.5)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		TNC Female	1.35 (16.5)	1.35 (16.5)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		LC Male	1.35 (16.5)	1.35 (16.5)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
1.7-2.2	**LDF4P-50A-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
0.940-2.7	**LDF4P-50A-3**	N	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.20 (20.8)
		F Flange, 7/8" EIA	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.20 (20.8)
		7-16 DIN Male	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.20 (20.8)
		7-16 DIN Female	1.20 (20.8)	1.20 (20.8)	1.22 (20.1)	1.22 (20.1)	1.22 (20.1)
		SC Male	1.20 (20.8)	1.20 (20.8)	1.22 (20.1)	1.22 (20.1)	1.22 (20.1)
		LC Male	1.40 (15.6)	1.40 (15.6)	1.35 (16.5)	1.35 (16.5)	1.30 (17.7)
		Right Angle N Male	1.40 (15.6)	1.40 (15.6)	1.35 (16.5)	1.35 (16.5)	1.30 (17.7)
		TNC Female	1.40 (15.6)	1.40 (15.6)	1.35 (16.5)	1.35 (16.5)	1.30 (17.7)
0.01-0.806	**LDF4P-50A-6**	N Male	1.06 (30.7)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7/8" EIA	1.06 (30.7)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN	1.06 (30.7)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		SC Male	1.06 (30.7)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		LC Male, TNC Female	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.30 (17.7)	1.30 (17.7)
		Right Angle N Male	1.25 (19.1)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.32 (17.2)
0.01-2.7*	**LDF4P-50A-7**	N Male	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.25 (19.1)
		N Female	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
		7/8" EIA	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
		SC Male	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)
		Right Angle N Male	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		TNC Female	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		LC Male	1.35 (16.5)	1.32 (17.2)	1.32 (17.2)	1.32 (17.2)	1.32 (17.2)
3.6-6.5*	**LDF4P-50A-5**	N Male	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)
		7/8" EIA	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)
		SC Male	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
0.1-4.2*	**LDF4P-50A-8**	N Male	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN Male	1.15 (23.1)	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
		SC Male	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		TNC Female	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
0.1-8.4*	**LDF4P-50A-9**	N Male	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		N Female	1.40 (15.6)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)

* Specify operating band. ** Connectors ordered separately.
VSWR values apply to straight connectors only (except when noted otherwise), are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

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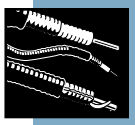

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706-1**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L4CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L4SGRIP**
Support clamp kit of 10	**L4SGRIP-4IK**
Standard Hoisting Grip	**43094**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL4-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL4-15B4**
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
LDF5 to LDF4	**WS-L5L4**
LDF6 to LDF4	**WS-L6L4**
LDF7 to LDF4	**WS-L7L4**
Cold Shrink Weatherproofing Kit	
1/2" Coax N Connector to 1/2" Coax N Connector	**241474-4**
5/8" Coax to 1/2" Coax	**242475-13**
7/8" Coax to 1/2" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 1/2" Coax	**241475-5A**
2 1/4" Coax to 1/2" Coax	**241475-8**
1/2" to 1-1/2" Omni/Panel base Type N or DIN	**241548-8**
1/2" to 2" Omni/Panel base Type N or DIN	**241548-9**
1/2" LDF4 to Antenna Type N interface	**241548-4**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623

EASIAX® Plus Automated Cable Prep Tool	**CPT-L4ARC**
EASIAX® Cutting Tool	**207866**
Cable Flare Tool	**224363**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

5/8" Foam Dielectric, LDF Series – *50-ohm*

LDF4.5-50

Description	Type No.
Cable Ordering Information	
Standard Cable	
5/8" Standard Cable, Standard Jacket	**LDF4.5-50**
Fire Retardant Cables	
5/8" Fire Retardant Jacket (CATVX)	**LDF4.5RN-50**
5/8" Fire Retardant Jacket (CATVR)	**LDF4.5RN-50**
Low VSWR and Specialized Cables	
5/8" Low VSWR, specify operating band	**LDF4.5P-50-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 501.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	6.1
Velocity, percent	89
Peak Power Rating, kW	62
dc resistance, ohms/1000 ft (1000 m)	
Inner	0.15 (0.49)
Outer	0.42 (1.37)
dc Breakdown, volts	5000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	23.2 (76.1)
Inductance, µH/ft (m)	0.057 (0.187)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.865 (21.97)
Diameter over Copper Outer Conductor, in (mm)	0.777 (19.74)
Diameter Inner Conductor, in (mm)	0.277 (7.04)
Minimum Bending Radius, in (mm)	8 (200)
Number of Bends, minimum (typical)	15 (40)
Bending Moment, lb-ft (N•m)	2.8 (3.8)
Cable Weight, lb/ft (kg/m)	0.27 (0.402)
Tensile Strength, lb (kg)	800 (363)
Flat Plate Crush Strength, lb/in (kg/mm)	70 (1.3)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.032	0.105	62.0
1	0.045	0.149	53.5
1.5	0.056	0.183	43.6
2	0.064	0.211	37.7
10	0.145	0.476	16.7
20	0.207	0.678	11.8
30	0.254	0.834	9.57
50	0.330	1.08	7.36
88	0.443	1.45	5.49
100	0.473	1.55	5.14
108	0.493	1.62	4.93
150	0.586	1.92	4.15
174	0.633	2.08	3.84
200	0.682	2.24	3.57
300	0.847	2.78	2.87
400	0.989	3.24	2.46
450	1.05	3.46	2.31
500	1.12	3.66	2.18
512	1.13	3.71	2.15
600	1.23	4.05	1.97
700	1.34	4.41	1.81
800	1.45	4.75	1.68
824	1.47	4.83	1.65
894	1.54	5.05	1.58
960	1.60	5.26	1.52
1000	1.64	5.38	1.48
1250	1.86	6.11	1.31
1500	2.07	6.78	1.18
1700	2.22	7.29	1.10
1800	2.30	7.54	1.06
2000	2.44	8.02	0.996
2100	2.51	8.25	0.968
2200	2.58	8.48	0.942
2300	2.65	8.70	0.918
3000	3.11	10.2	0.783
3400	3.35	11.0	0.726
4000	3.70	12.1	0.658
5000	4.25	13.9	0.573
6000	4.76	15.6	0.511
6100	4.81	15.8	0.506

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.

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Revised 9/00

N Male
L4.5PNM-RC

N Female
L4.5PNF-RC

7-16 DIN Male
L4.5PDM-RC

7-16 DIN Female
L4.5PDF-RC

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Ring Flare	**L4.5PNM-RC**	Captivated	Self Flare	SG	3.2 (81.5)	1.42 (36)
N Female	Ring Flare	**L4.5PNF-RC**	Captivated	Self Flare	SG	3.0 (76)	1.32 (33.5)
7-16 DIN Male	Ring Flare	**L4.5PDM-RC**	Captivated	Self Flare	SS	3.1 (78)	1.17 (29.8)
7-16 DIN Female	Ring Flare	**L4.5PDF-RC**	Captivated	Self Flare	SS	3.25 (82)	1.17 (29.8)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624.

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Standard VSWR Specifications

Frequency Band, GHz	Type Number	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**LDF4.5-50**	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)*	1.13 (24.3)*	1.13 (24.3)**
and 1.7-2.0	**LDF4.5RN-50**	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)*	1.13 (24.3)*	1.13 (24.3)**

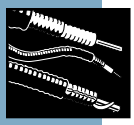
* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

Low VSWR Specifications, Type LDF4.5P-50-( )

Frequency Band, GHz	Type Number	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**LDF4.5P-50-40**	N	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)
1.7-2.2	**LDF4.5P-50-41**	7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
0.806-0.960 and 1.7-2.2	**LDF4.5P-50-42**	7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)

* Connectors ordered separately

VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-9**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706A-6**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L45CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L45SGRIP**
Support clamp kit of 10	**L45SGRIP-4IK**
Standard Hoisting Grip	**29958**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL45-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL45-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL45-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL45-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL45-06B2**
Field attached one-hole lug, 600 mm (24") lead	**SGPL45-06B3**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL45-15B4**
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
5/8" Coax to 1/4", 3/8" or 1/2" Coax	**241475-13**
5/8" Coax to 5/8" Coax	**241474-7**
5/8" Coax to Antenna Type N or DIN interface	**241548-7**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-13**	**48939A-14**
Three Hole:	**204679A-14**	**48939A-15**

Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool	**CPT-L45**
5/8" Connector Torque Wrench	**244376**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

7/8" Flexible Feeder, Foam Dielectric VXL Series – *50-ohm*

VXL5-50

Description	Type No.

Cable Ordering Information

Standard Cable	
7/8" Standard Cable, Standard Jacket	**VXL5-50**
Fire Retardant Cable	
7/8" Fire Retardant Jacket (CATVR)	**VXL5RN-50**
Low VSWR Cables	
7/8" Low VSWR, specify operating band	**VXL5P-50-(**)**
Jumper Cable Assemblies - See page 584	

**Insert suffix number from "Low VSWR Specifications" table, page 504

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	4.9
Velocity, percent	88
Peak Power Rating, kW	90
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.82 (2.70)
Outer	0.36 (1.19)
dc Breakdown, volts	6000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	22.6 (74.2)
Inductance, µH/ft (m)	0.06 (0.197)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper Tube
Diameter over Jacket, in (mm)	1.08 (27.5)
Diameter over Copper Outer Conductor, in (mm)	0.98 (24.9)
Diameter Inner Conductor, in (mm)	0.371 (9.42)
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	15 (40)
Bending Moment, lb-ft (N•m)	12 (16.3)
Cable Weight, lb/ft (kg/m)	0.29 (0.43)
Tensile Strength, lb (kg)	225 (102)
Flat Plate Crush Strength, lb/in (kg/mm)	80 (1.4)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.027	0.089	90.0
1	0.038	0.126	68.5
1.5	0.047	0.154	55.9
2	0.054	0.178	48.4
10	0.122	0.402	21.5
20	0.174	0.571	15.1
30	0.214	0.702	12.3
50	0.278	0.911	9.47
88	0.372	1.22	7.07
100	0.397	1.30	6.62
108	0.413	1.36	6.36
150	0.491	1.61	5.36
174	0.530	1.74	4.96
200	0.571	1.87	4.61
300	0.707	2.32	3.72
400	0.825	2.71	3.19
450	0.878	2.88	2.99
500	0.930	3.05	2.83
512	0.942	3.09	2.79
600	1.03	3.37	2.56
700	1.12	3.66	2.36
800	1.20	3.94	2.19
824	1.22	4.01	2.16
894	1.28	4.19	2.06
960	1.33	4.36	1.98
1000	1.36	4.46	1.94
1250	1.54	5.05	1.71
1500	1.71	5.60	1.54
1700	1.83	6.01	1.44
1800	1.89	6.21	1.39
2000	2.01	6.59	1.31
2100	2.07	6.78	1.27
2200	2.12	6.97	1.24
2300	2.18	7.15	1.21
3000	2.54	8.35	1.04
3400	2.74	8.99	0.961
4000	3.02	9.90	0.873
4900	3.41	11.2	0.772

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
V5PNM-RPC

N Female
V5PNF-RPC

7-16 DIN Male
V5PDM-RPC

7-16 DIN Female
V5PDF-RPC

Connectors

Interface	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male One-Piece	**V5PNM-RPC**	Captivated	Self-Flare	SG	2.9 (74)	1.46 (37.2)
N Female One-Piece	**V5PNF-RPC**	Captivated	Self-Flare	SG	2.7 (69)	1.46 (37.2)
7-16 DIN Male One-Piece	**V5PDM-RPC**	Captivated	Self-Flare	SS	2.7 (69)	1.46 (37.2)
7-16 DIN Female One-Piece	**V5PDF-RPC**	Captivated	Self-Flare	SS	2.33 (59)	1.46 (37.2)
7/8" EIA Flange	**V5E78**	Captivated	Self-Tapping	BB	3.38 (86)	2.27 (56.7)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Standard VSWR Specifications

Frequency Band, GHz	Type Number	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**VXL5-50**	1.09 (27.3)*	1.10 (26.4)*	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)**
and 1.7-2.0	**VXL5RN-50**	1.09 (27.3)*	1.10 (26.4)*	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

Low VSWR Specifications, Type VXL5P-50-( )

Frequency Band, GHz	Type Number	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**VXL5P-50-40**	N	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)
0.806-0.960	**VXL5P-50-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
and 1.7-2.2		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7-2.2	**VXL5P-50-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)

* Connectors ordered separately
VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

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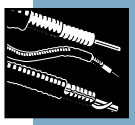
Revised 9/00, 12/00 & 3/01



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-5**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-in Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706A-2**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L5CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L5SGRIP**
Support clamp kit of 10	**L5SGRIP-5IK**
Standard Hoisting Grip	**19256B**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL5-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL5-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL5-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL5-15B4**
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
VXL5 to LDF4	**WS-L5L4**
VXL5 to FSJ4	**WS-L5F4**
Cold Shrink Weatherproofing Kit	
7/8" Coax to 7/8" Coax N Connectors	**241474-5**
1-5/8" Coax to 7/8" Coax N Connectors	**241475-3**
7/8" Coax to 1/4" Coax	**241475-12**
7/8" Coax to 3/8" or 1/2" Coax	**241475-9**
7/8" Coax to Antenna Type N or DIN interface	**241548-5**
7/8" to APTL5 Arrestors	**241474-5**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-2**	**48939A-1**
Two Hole:	**204679A-18**	–
Three Hole:	**204679A-15**	**48939A-2**

Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool	**CPTL5A**
EASIAX® Cutting Tool	**222951**
Cable Flaring Tool	**224368**
7/8" Connector Torque Wrench	**244378**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

7/8" Foam Dielectric, LDF Series – *50-ohm*

LDF5-50A

Description	Type No.

Cable Ordering Information

Standard Cable	
7/8" Standard Cable, Standard Jacket	**LDF5-50A**
Fire Retardant Cable	
7/8" Fire Retardant Jacket (CATVR)	**LDF5RN-50A**
Low VSWR and Specialized Cables	
7/8" Low VSWR, specify operating band	**LDF5P-50A-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 508.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	5.0
Velocity, percent	89
Peak Power Rating, kW	91
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.32 (1.05)
Outer	0.36 (1.18)
dc Breakdown, volts	6000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	22.8 (75.0)
Inductance, µH/ft (m)	0.057 (0.187)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	1.09 (28)
Diameter over Copper Outer Conductor, in (mm)	0.98 (24.9)
Diameter Inner Conductor, in (mm)	0.355 (9.0)
Nominal Inside Transverse Dimensions, cm	2.11
Minimum Bending Radius, in (mm)	10 (250)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (N•m)	12 (16.3)
Cable Weight, lb/ft (kg/m)	0.33 (0.49)
Tensile Strength, lb (kg)	325 (147)
Flat Plate Crush Strength, lb/in (kg/mm)	80 (1.4)

* A 75-ohm 7/8" diameter cable is available. Contact Andrew for further information.

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.025	0.081	91.0
1	0.035	0.115	78.6
1.5	0.043	0.141	64.1
2	0.050	0.163	55.5
10	0.112	0.366	24.6
20	0.159	0.521	17.3
30	0.195	0.641	14.1
50	0.254	0.833	10.8
88	0.340	1.12	8.08
100	0.364	1.19	7.56
108	0.378	1.24	7.26
150	0.449	1.47	6.12
174	0.486	1.59	5.66
200	0.523	1.72	5.26
300	0.649	2.13	4.24
400	0.758	2.49	3.63
450	0.808	2.65	3.41
500	0.855	2.81	3.22
512	0.866	2.84	3.17
600	0.945	3.10	2.91
700	1.03	3.37	2.67
800	1.11	3.63	2.48
824	1.13	3.69	2.44
894	1.18	3.87	2.34
960	1.23	4.02	2.24
1000	1.25	4.12	2.19
1250	1.42	4.67	1.93
1500	1.58	5.18	1.74
1700	1.70	5.56	1.62
1800	1.75	5.75	1.57
2000	1.86	6.11	1.48
2100	1.92	6.29	1.44
2200	1.97	6.46	1.40
2300	2.02	6.63	1.36
3000	2.37	7.76	1.16
3400	2.55	8.37	1.08
4000	2.81	9.23	0.978
5000	3.23	10.6	0.853

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.

7-16 DIN Female
L5PDF-RPC

7-16 DIN Male
L5PDM-RPC

N Male
L5PNM-RPC

N Female
L5PNF-RPC

7/8" EIA Flange
L45R

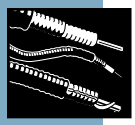
F Flange Male
L45F

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	OnePiece	**L5PNM-RPC**	Captivated	Self-Flare	SG	2.9 (74)	1.46 (37.2)
N Male	RingFlare	**L5PNM-RC**	Captivated	Self-Flare	SG	3.0 (76)	1.35 (34.3)
N Female	OnePiece	**L5PNF-RPC**	Captivated	Self-Flare	SG	2.7 (69)	1.46 (37.2)
N Female	RingFlare	**L5PNF-RC**	Captivated	Self-Flare	SG	2.9 (74)	1.35 (34.3)
7-16 DIN Male	OnePiece	**L5PDM-RPC**	Captivated	Self-Flare	SS	2.7 (69)	1.46 (37.2)
7-16 DIN Male	RingFlare	**L5PDM-RC**	Captivated	Self-Flare	SS	3.1 (79)	1.34 (34.0)
7-16 DIN Female	OnePiece	**L5PDF-RPC**	Captivated	Self-Flare	SS	2.33 (59.1)	1.46 (37.2)
7-16 DIN Female	RingFlare	**L5PDF-RC**	Captivated	RingFlare	SS	2.9 (74)	1.36 (34.5)
7-16 DIN Female	Panel Mount	**L5PDF-PM**	Self-Tapping	Self-Flare	SS	2.7 (69)	1.35 (34.4)
7-16 DIN Female	Bulkhead	**L5PDF-BH**	Self-Tapping	Self-Flare	SS	2.7 (69)	1.9 (48.3)
7-16 DIN Male	Right Angle	**L5PDR**	Self-Tapping	Self-Flare	SS	3.3/2.5 (85/64)	1.4 (35.6)
7/8" EIA Flange	–	**L45R**	Self-Tapping	Self-Flare	BB	3.3 (84)	2.25 (57)
7/8" EIA Flange	Right Angle	**124800-1**	Self-Tapping	Self-Flare	BB	3.9/1.3 (99/33)	2.25 (57)
F Flange Male	–	**L45F**	Self-Tapping	Self-Flare	BB	1.8 (46)	2.25 (57)
F Flange Female	–	**48041**	Self-Tapping	Self-Flare	BB	1.8 (46)	2.25 (57)
Splice	–	**L45Z**	Self-Tapping	Self-Flare	BB	3.3 (84)	1.5 (38)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624



Standard VSWR Specifications

Frequency Band, GHz	Type Number	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960 and 1.7-2.0	**LDF5-50A**	1.09 (27.3)*	1.10 (26.4)*	1.11 (25.7)*	1.13 (24.3)*	1.13 (24.3)**
	LDF5RN-50A	1.09 (27.3)*	1.10 (26.4)*	1.11 (25.7)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

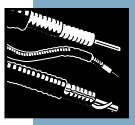
Low VSWR Specifications, Type LDF5P-50A-( )

Frequency Band, GHz	Type Number	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.780-0.960	**LDF5P-50A-10A**	N	1.07 (29.4)	1.07 (29.4)	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.07 (29.4)	1.07 (29.4)	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)
0.824-0.960	**LDF5P-50A-40**	N	1.06 (30.7)	1.07 (29.4)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
		7-16 DIN	1.06 (30.7)	1.07 (29.4)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
0.806-0.960 and 1.7-2.2	**LDF5P-50A-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
0.01-1.0*	**LDF5P-50A-5A**	N	1.10 (26.4)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)
		7/8" EIA	1.10 (26.4)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)
		LC	1.10 (26.4)	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)
1.38-1.540	**LDF5P-50A-11A**	N	10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7/8" EIA	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		F Flange	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
1.7-2.2	**LDF5P-50A-41**	N	1.10 (26.4)	1.10 (26.4))	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.60-2.3	**LDF5P-50A-12A**	N Male	1.08 (28.3)	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		N Female	1.12 (24.9)	1.12 (24.9)	1.12 (24.9)	1.12 (24.9)	1.12 (24.9)
		7/8" EIA	1.08 (28.3)	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		F Flange	1.08 (28.3)	1.08 (28.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
2.3-2.7	**LDF5P-50A-13A**	N Male	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		N Female	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)	1.18 (21.6)	1.18 (21.6)
		7/8" EIA	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		F Flange	1.10 (26.4)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
1.7-4.2	**LDF5P-50A-7A**	N Male	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		N Female	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)
		7/8" EIA	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)
		7-16 DIN Male	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		7-16 DIN Female	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)
0.01-4.2*	**LDF5P-50A-14A**	N Male	1.10 (26.4)	1.20 (20.8)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)
		N Female	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)
		7/8" EIA	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)
		7-16 DIN Male	1.10 (26.4)	1.20 (20.8)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)
		7-16 DIN Female	1.15 (23.1)	1.20 (20.8)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)
		LC	1.25 (19.1)	1.30 (17.7)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)
0.01-5.0*	**LDF5P-50A-15A**	N	1.15 (23.1)	1.20 (20.8)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)
		7/8" EIA	1.30 (17.7)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)
		7-16 DIN Male	1.15 (23.1)	1.20 (20.8)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)
		7-16 DIN Female	1.30 (17.7)	1.30 (17.7)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)

* Connectors ordered separately
VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

ANDREW®

Revised 9/00 & 3/01



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-5**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19 mm) holes on tower member or adapters. Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706A-2**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L5CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L5SGRIP**
Support clamp kit of 10	**L5SGRIP-5IK**
Standard Hoisting Grip	**19256B**

Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616

SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL5-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL5-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL5-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL5-15B4**
Arrestor Plus Integrated T-Series Arrestors – see page 614	
Bulkhead N Female	**APTL5-BNF-(*)**
Bulkhead 7-16 DIN Female	**APTL5-BDF-(*)**

*Frequency band. See page 614.

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
LDF5 to LDF4	**WS-L5L4**
LDF5 to FSJ4	**WS-L5F4**
Cold Shrink Weatherproofing Kit	
7/8" Coax to 7/8" Coax N Connectors	**241474-5**
1-5/8" Coax to 7/8" Coax N Connectors	**241475-3**
7/8" Coax to 1/4" Coax	**241475-12**
7/8" Coax to 3/8" or 1/2" Coax	**241475-9**
7/8" Coax to Antenna Type N or DIN interface	**241548-5**
7/8" to APTL5 Arrestors	**241474-5**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-2**	**48939A-1**
Two Hole:	**204679A-18**	–
Three Hole:	**204679A-15**	**48939A-2**

Tools – for additional tool offerings see pages 620-623

EASIAX® Plus Automated Cable Prep Tool	**CPTL5A**
EASIAX® Cutting Tool	**222951**
Cable Flaring Tool	**224368**
7/8" Connector Torque Wrench	**244378**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1-1/4" Flexible Feeder, Foam Dielectric VXL Series - *50-ohm*

VXL6-50

Description	Type No.
Cable Ordering Information	
Standard Cable	
1-1/4" Standard Cable, Standard Jacket	**VXL6-50**
Fire Retardant Cable	
1-1/4" Fire Retardant Jacket (CATVR)	**VXL6RN-50**
Low VSWR and Specialized Cables	
1-1/4" Low VSWR, specify operating band	**VXL6P-50-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 511

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	3.3
Velocity, percent	88
Peak Power Rating, kW	180
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.54 (1.77)
Outer	0.25 (0.82)
dc Breakdown, volts	8500
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.6 (74.2)
Inductance, µH/ft (m)	0.05 (0.194)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper Tube
Diameter over Jacket, in (mm)	1.55 (39.4)
Diameter over Copper Outer Conductor, in (mm)	1.41 (35.8)
Diameter Inner Conductor, in (mm)	0.536 (13.6)
Minimum Bending Radius, in (mm)	8 (200)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (Nïm)	22 (30.4)
Cable Weight, lb/ft (kg/m)	0.5 (0.74)
Tensile Strength, lb (kg)	400 (181)
Flat Plate Crush Strength, lb/in (kg/mm)	75 (1.3)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power kW
0.5	0.018	0.060	154.35
1	0.026	0.085	108.94
1.5	0.032	0.104	88.83
2	0.037	0.121	76.84
10	0.083	0.273	34.00
20	0.119	0.389	23.85
30	0.146	0.479	19.36
50	0.190	0.625	14.86
88	0.256	0.840	11.05
100	0.274	0.899	10.33
108	0.285	0.936	9.9
150	0.340	1.12	8.32
174	0.368	1.21	7.69
200	0.397	1.30	7.13
300	0.495	1.62	5.72
400	0.580	1.90	4.88
450	0.619	2.03	4.57
500	0.657	2.15	4.31
512	0.666	2.18	4.25
600	0.728	2.39	3.89
700	0.795	2.61	3.56
800	0.858	2.81	3.30
824	0.872	2.86	3.25
894	0.914	3.00	3.10
960	0.953	3.13	2.97
1000	0.976	3.20	2.90
1250	1.11	3.65	2.55
1500	1.24	4.07	2.29
1700	1.34	4.38	2.12
1800	1.38	4.54	2.05
2000	1.47	4.83	1.92
2100	1.52	4.98	1.87
2200	1.56	5.12	1.81
2300	1.61	5.27	1.76
3000	1.89	6.21	1.50
3300	2.01	6.59	1.41

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

ANDREW®

Revised 9/00

N Male
V6PNM-RPC

N Female
V6PNF-RPC

7-16 DIN Male
V6PDM-RPC

7-16 DIN Female
V6PDF-RPC

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max.Length in (mm)	Max.Dia. in (mm)
N Male	OnePiece	**V6PNM-RPC**	Captivated	Self-Flare	SG	3.3 (84)	2.03 (51.6)
N Female	OnePiece	**V6PNF-RPC**	Captivated	Self-Flare	SG	4.0 (102)	2.03 (51.6)
7-16 DIN Male	OnePiece	**V6PDM-RPC**	Captivated	Self-Flare	SS	3.6 (91)	2.03 (51.6)
7-16 DIN Female	OnePiece	**V6PDF-RPC**	Captivated	Self-Flare	SS	3.5 (89)	2.03 (51.6)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin. SS - Silver Plated Body and Pin.

Connector Accessories - See page 624

Standard VSWR Specifications

Frequency Band, GHz	Type No.	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150m)	Above 500 ft (150 m)
0.806-0.960	**VXL6-50**	1.10 (26.4)*	1.11 (25.7)*	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)**
and 1.7-2.0	**VXL6RN-50**	1.10 (26.4)*	1.11 (25.7)*	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.

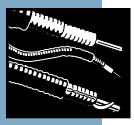
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

Low VSWR Specifications, Type VXL6P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1 to 25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**VXL6P-50-40**	N	1.08 (28.3)	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
		7-16 DIN	1.08 (28.3)	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
0.806-0.960	**VXL6P-50-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
and 1.7-2.2		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7-2.2	**VXL6P-50-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)

* Connectors ordered separately.

VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-1**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706-3**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L6CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L6SGRIP**
Support clamp kit of 10	**L6SGRIP-6IK**
Standard Hoisting Grip	**29961**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL6-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL6-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL6-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL6-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL6-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL6-15B4**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
VXL6 to LDF4	**WS-L6L4**
VXL6 to FSJ4	**WS-L6F4**
Cold Shrink Weatherproofing Kit	
1-1/4" Coax to 1-1/4" Coax N Connectors	**241474-6**
1-1/4" Coax to 1/4" Coax	**241475-11**
1-1/4" Coax to 3/8" or 1/2" Coax	**241475-5A**
1-1/4" to APTL6 Arrestors	**241474-6**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-3**	**48939A-2**

Tools – for additional tool offerings see pages 620-623

EASIAX® Plus Automated Cable Prep Tool	**CPTL6**
1-1/4" Connector Torque Wrench	**244375**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1-1/4" Foam Dielectric, LDF Series – *50-ohm*

LDF6-50

Description	Type No.
Cable Ordering Information	
Standard Cable	
1-1/4" Standard Cable, Standard Jacket	**LDF6-50**
Fire Retardant Cable	
1-1/4" Fire Retardant Jacket (CATVR)	**LDF6RN-50**
Low VSWR and Specialized Cables	
1-1/4" Low VSWR, specify operating band	**LDF6P-50-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 515

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	3.3
Velocity, percent	89
Peak Power Rating, kW	205
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.22 (0.72)
Outer	0.19 (0.62)
dc Breakdown, volts	9000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.9 (75.1)
Inductance, µH/ft (m)	0.056 (0.184)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	1.55 (39.4)
Diameter over Copper Outer Conductor, in (mm)	1.41 (35.8)
Diameter Inner Conductor, in (mm)	0.516 (13.1)
Nominal Inside Transverse Dimensions, cm	3.11
Minimum Bending Radius, in (mm)	15 (380)
Number of Bends, minimum (typical)	15 (40)
Bending Moment, lb-ft (N•m)	36 (49)
Cable Weight, lb/ft (kg/m)	0.63 (0.94)
Tensile Strength, lb (kg)	1300 (590)
Flat Plate Crush Strength, lb/in (kg/mm)	125 (2.2)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.017	0.056	175.0
1	0.024	0.079	123.0
1.5	0.030	0.097	101.0
2	0.034	0.112	87.1
10	0.077	0.253	38.6
20	0.110	0.361	27.1
30	0.135	0.444	22.0
50	0.176	0.579	16.9
88	0.237	0.778	12.6
100	0.254	0.832	11.7
108	0.264	0.867	11.3
150	0.314	1.03	9.47
174	0.340	1.12	8.75
200	0.367	1.20	8.12
300	0.457	1.50	6.52
400	0.535	1.76	5.57
450	0.571	1.87	5.22
500	0.606	1.99	4.92
512	0.614	2.01	4.86
600	0.671	2.20	4.44
700	0.732	2.40	4.07
800	0.789	2.59	3.78
824	0.803	2.63	3.71
894	0.841	2.76	3.54
960	0.876	2.87	3.40
1000	0.897	2.94	3.32
1250	1.02	3.35	2.92
1500	1.14	3.73	2.62
1700	1.22	4.02	2.43
1800	1.27	4.16	2.35
2000	1.35	4.43	2.21
2100	1.39	4.56	2.14
2200	1.43	4.69	2.08
2300	1.47	4.82	2.03
3000	1.73	5.68	1.72
3300	1.84	6.02	1.62

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.

N Male
L6PNM-RPC

N Female
L6PNF-RPC

1-5/8" EIA Flange
L46R

7/8" EIA Flange
L46S

7-16 DIN Male
L6PDM-RPC

7-16 DIN Female
L6PDF-RPC

F Flange Male
L46F

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	OnePiece	**L6PNM-RPC**	Captivated	Self-Flare	SG	3.8 (96)	2.03 (51.6)
N Female	OnePiece	**L6PNF-RPC**	Captivated	Self-Flare	SG	3.1 (79)	2.03 (51.6)
N Female	RingFlare	**L6PNF-RC**	Captivated	Self-Flare	SG	3.4 (86)	2.0 (50.8)
7-16 DIN Male	OnePiece	**L6PDM-RPC**	Captivated	Self-Flare	SS	3.4 (86)	2.03 (51.6)
7-16 DIN Female	OnePiece	**L6PDF-RPC**	Captivated	Self-Flare	SS	3.4 (86)	2.03 (51.6)
7-16 DIN Female	Bulkhead	**L6PDF-BH**	Self-Tapping	Self-Flare	SS	4.1 (104)	2.0 (50.8)
7-16 DIN Female	RingFlare	**L6PDF-RC**	Captivated	Self-Flare	SS	3.2 (81)	2.0 (50.8)
7/8" EIA Flange	–	**L46S**	Self-Tapping	Self-Flare	BB	4.6 (117)	2.25 (57)
1-5/8" EIA Flange	–	**L46R**	Self-Tapping	Self-Flare	BB	5.1 (130)	3.5 (89)
F Flange Male	–	**L46F**	Self-Tapping	Self-Flare	BB	4.0 (102)	2.25 (57)
Splice	–	**L46Z**	Self-Tapping	Self-Flare	BB	3.0 (76)	2.0 (50.8)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

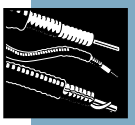
Standard VSWR Specifications

Frequency Band, GHz	Type Number	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150m)	Above 500 ft (150 m)
0.806-0.960	**LDF6-50**	1.10 (26.4)*	1.11 (25.7)*	1.12 (24.97)*	1.13 (24.3)*	1.13 (24.3)**
and 1.7-2.0	**LDF6RN-50**	1.10 (26.4)*	1.11 (25.7)*	1.12 (24.97)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

ANDREW®

Revised 7/00

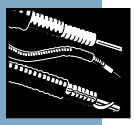


Low VSWR Specifications, Type LDF6P-50-( )

Frequency Band, GHz	Type Number	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**LDF6P-50-40**	N	1.07 (29.4)	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
		7-16 DIN	1.07 (29.4)	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
0.806–0.960 and 1.7–2.2	**LDF6P-50-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.427-1.535	**LDF6P-50-4A**	7/8" EIA	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.17 (22.1)	1.20 (20.8)
		N Male	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN Male	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN Female	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Female	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		LC Male	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.30 (17.7)
		LC Female	1.20 (20.8)	1.25 (19.1)	1.30 (17.7)	1.30 (17.7)	1.30 (17.7)
		1-5/8" EIA	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)
1.7-2.2	**LDF6P-50-41**	N	1.09 (27.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.09 (27.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7-2.11	**LDF6P-50-6A**	7/8" EIA	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		N Male	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		7-16 DIN Male	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		7-16 DIN Female	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		N Female	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		LC	1.20 (20.8)	1.22 (20.1)	1.24 (19.3)	1.25 (19.1)	1.25 (19.1)
		1-5/8" EIA	1.10 (26.4)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.20 (20.8)
1.85-2.2	**LDF6P-50-7A**	7/8" EIA	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		N Male	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		"F" Flange	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Male	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Female	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		N Female: L6PNF	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		LC	1.20 (20.8)	1.22 (20.1)	1.24 (19.3)	1.25 (19.1)	1.25 (19.1)
		1-5/8" EIA	1.10 (26.4)	1.12 (24.9)	1.14 (23.7)	1.18 (21.6)	1.20 (20.8)*
1.9-2.3	**LDF6P-50-8A**	7/8" EIA	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Male	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		7-16 DIN Male	1.12 (24.9)	1.22 (20.1)	1.24 (19.3)	1.25 (19.1)	1.25 (19.1)
		7-16 DIN Female	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Female	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.25 (19.1)	1.25 (19.1)
		LC Male	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
		LC Female	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.35 (16.6)
		1-5/8" EIA	1.20 (20.8)	1.22 (20.1)	1.24 (19.4)	1.25 (19.1)	1.25 (19.1)
2.3-2.7	**LDF6P-50-9A**	7/8" EIA	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Male	1.08 (28.3)	1.10 (26.4)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		"F" Flange	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN Male	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7-16 DIN Female	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Female	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		LC Female	1.30 (17.7)	1.30 (17.7)	1.32 (17.2)	1.35 (16.6)	1.35 (16.6)
		LC Male	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
		1-5/8" EIA	1.20 (20.8)	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)	1.25 (19.1)
0.010-2.7*	**LDF6P-50-10A**	7/8" EIA	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	2.10 (9.0)	2.10 (9.0)
		N	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	2.10 (9.0)	2.10 (9.0)
		"F" Flange	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	2.10 (9.0)	2.10 (9.0)
		7-16 DIN	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	1.80 (10.9)	2.10 (9.0)
		LC Female	1.30 (17.7)	1.35 (16.6)	1.40 (15.6)	1.80 (10.9)	2.10 (9.0)
		LC Male	1.20 (20.8)	1.25 (19.1)	1.35 (16.6)	1.80 (10.9)	2.10 (9.0)
		1-5/8" EIA	1.20 (20.8)	1.30 (17.7)	1.35 (16.6)	1.80 (10.9)	2.10 (9.0)
0.010-3.3*	**LDF6P-50-11A**	7/8" EIA	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	1.80 (10.9)	2.10 (9.0)
		N Male	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	2.10 (9.0)	2.10 (9.0)
		"F" Flange	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	1.80 (10.9)	2.10 (9.0)
		7-16 DIN	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	1.80 (10.9)	2.10 (9.0)
		N Female	1.10 (26.4)	1.20 (20.8)	1.35 (16.6)	2.10 (9.0)	2.10 (9.0)
		LC	1.30 (17.7)	1.40 (15.6)	1.50 (14.0)	1.80 (10.9)	2.10 (9.0)

* Connectors ordered separately

VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-1**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706-3**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L6CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L6SGRIP**
Support clamp kit of 10	**L6SGRIP-6IK**
Standard Hoisting Grip	**29961**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL6-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL6-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL6-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL6-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL6-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL6-15B4**
Arrestor Plus Integrated T-Series Arrestors – see page 614	
Bulkhead N Female	**APTL6-BNF-(*)**
Bulkhead 7-16 DIN Female	**APTL6-BDF-(*)**

* Frequency band. See page 614

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
LDF6 to LDF4	**WS-L6L4**
LDF6 to FSJ4	**WS-L6F4**
Cold Shrink Weatherproofing Kit	
1-1/4" Coax to 1-1/4" Coax N Connectors	**241474-6**
1-1/4" Coax to 1/4" Coax	**241475-11**
1-1/4" Coax to 3/8" or 1/2" Coax	**241475-5A**
1-1/4" to APTL6 Arrestors	**241474-6**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-3**	**48939A-2**

Description	Type No.
Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool	**CPTL6**
1-1/4" Connector Torque Wrench	**244375**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1-5/8" Flexible Feeder, Foam Dielectric VXL Series - *50-ohm*

VXL7-50

Description	Type No.

Cable Ordering Information

Standard Cable	
1-5/8" Standard Cable, Standard Jacket	**VXL7-50**
Fire Retardant Cable	
1-5/8" Fire Retardant Jacket (CATVR)	**VXL7RN-50**
Low VSWR and Specialized Cables	
1-5/8" Low VSWR, specify operating band	**VXL7P-50-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 518

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	2.5
Velocity, percent	88
Peak Power Rating, kW	275
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.42 (1.39)
Outer	0.16 (0.52)
dc Breakdown, volts	10500
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.5 (73.8)
Inductance, µH/ft (m)	0.05 (0.194)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper Tube
Diameter over Jacket, in (mm)	1.98 (50)
Diameter over Copper Outer Conductor, in (mm)	1.825 (46.3)
Diameter Inner Conductor, in (mm)	0.688 (17.5)
Minimum Bending Radius, in (mm)	15 (375)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (Nïm)	35 (48.4)
Cable Weight, lb/ft (kg/m)	0.75 (1.12)
Tensile Strength, lb (kg)	550 (249)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (2.0)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.014	0.044	247.0
1	0.019	0.063	175.0
1.5	0.024	0.077	142.0
2	0.027	0.089	123.0
10	0.062	0.202	54.3
20	0.088	0.289	38.1
30	0.109	0.356	30.9
50	0.142	0.465	23.6
88	0.191	0.627	17.5
100	0.205	0.671	16.4
108	0.213	0.699	15.7
150	0.254	0.834	13.2
174	0.276	0.904	12.2
200	0.297	0.976	11.3
300	0.372	1.22	9.01
400	0.437	1.43	7.67
450	0.467	1.53	7.18
500	0.496	1.63	6.76
512	0.503	1.65	6.67
600	0.550	1.81	6.09
700	0.602	1.97	5.57
800	0.650	2.13	5.15
824	0.662	2.17	5.06
894	0.694	2.28	4.83
960	0.724	2.38	4.63
1000	0.742	2.43	4.52
1250	0.848	2.78	3.95
1500	0.947	3.11	3.54
1700	1.02	3.35	3.28
2000	1.13	3.71	2.96
2300	1.23	4.05	2.72
2500	1.30	4.27	2.58

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
V7PNM-RPC

N Female
V7PNF-RPC

7-16 DIN Female
V7PDF-RPC

7-16 DIN Male
V7PDM-RPC

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max.Length in (mm)	Max.Dia. in (mm)
N Male	OnePiece	**V7PNM-RPC**	Captivated	Self-Flare	SG	4.6 (117)	2.47 (62.7)
N Female	OnePiece	**V7PNF-RPC**	Captivated	Self-Flare	SG	4.7 (119)	2.47 (62.7)
7-16 DIN Male	OnePiece	**V7PDM-RPC**	Captivated	Self-Flare	SS	4.3 (109)	2.46 (62.5)
7-16 DIN Female	OnePiece	**V7PDF-RPC**	Captivated	Self-Flare	SS	4.3 (109)	2.46 (62.5)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin. SS - Silver Plated Body and Pin.

Connector Accessories - See page 624

Standard VSWR Specifications

Frequency Band, GHz	Type No.	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**VXL7-50**	1.10 (26.4)*	1.10 (26.4)*	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)**
and 1.7-2.0	**VXL7RN-50**	1.10 (26.4)*	1.10 (26.4)*	1.12 (24.9)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

Low VSWR Specifications, Type VXL7P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1 to 25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**VXL7P-50-40**	N	1.07 (29.4)	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
		7-16 DIN	1.07 (29.4)	1.08 (28.3)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
0.806-0.960	**VXL7P-50-42**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
and 1.7-2.2		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7-2.2	**VXL7P-50-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)

* Connectors ordered separately.
VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

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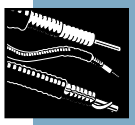
Revised 7/00 & 3/01



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-2**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706-4**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L7CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L7SGRIP**
Support clamp kit of 10	**L7SGRIP-7IK**
Standard Hoisting Grip	**24312A**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL7-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL7-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL7-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL7-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL7-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL7-15B4**

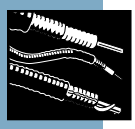
Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
VXL7 to LDF4	**WS-L7L4**
VXL7 to FSJ4	**WS-L7F4**
Cold Shrink Weatherproofing Kit	
1-5/8" Coax to 1-1/4" Coax N Connectors	**241474-6**
1-5/8" Coax to 1/4" Coax	**241475-11**
1-5/8" Coax to 3/8" or 1/2" Coax	**241475-5A**
1-5/8" to APTL7 Arrestors	**241474-6**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-4**	**48939A-4**

Tools – for additional tool offerings see pages 620-623

EASIAX® Plus Automated Cable Prep Tool	**CPTL7**
1-5/8" Connector Torque Wrench	**244374**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



1-5/8" Foam Dielectric, LDF Series – *50-ohm*

LDF7-50A

Description	Type No.

Cable Ordering Information

Standard Cable	
1-5/8" Standard Cable, Standard Jacket	**LDF7-50A**
Fire Retardant Cable	
1-5/8" Fire Retardant Jacket (CATVR)	**LDF7RN-50A**
Low VSWR and Specialized Cables	
1-5/8" Low VSWR, specify operating band	**LDF7P-50A-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 522.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	2.5
Velocity, percent	88
Peak Power Rating, kW	315
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.25 (0.83)
Outer	0.16 (0.52)
dc Breakdown, volts	11000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	23.1 (75.8)
Inductance, µH/ft (m)	0.058 (0.190)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper Tube
Diameter over Jacket, in (mm)	1.98 (50)
Diameter over Copper Outer Conductor, in (mm)	1.825 (46.3)
Diameter Inner Conductor, in (mm)	0.681 (17.3)
Nominal Inside Transverse Dimensions, cm	4.05
Minimum Bending Radius, in (mm)	20 (510)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (N•m)	40 (54.2)
Cable Weight, lb/ft (kg/m)	0.82 (1.2)
Tensile Strength, lb (kg)	800 (363)
Flat Plate Crush Strength, lb/in (kg/mm)	120 (2.1)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.014	0.044	247.0
1	0.019	0.063	175.0
1.5	0.024	0.077	142.0
2	0.027	0.089	123.0
10	0.062	0.202	54.3
20	0.088	0.289	38.1
30	0.109	0.356	30.9
50	0.142	0.465	23.6
88	0.191	0.627	17.5
100	0.205	0.671	16.4
108	0.213	0.699	15.7
150	0.254	0.834	13.2
174	0.276	0.904	12.2
200	0.297	0.976	11.3
300	0.372	1.22	9.01
400	0.437	1.43	7.67
450	0.467	1.53	7.18
500	0.496	1.63	6.76
512	0.503	1.65	6.67
600	0.550	1.81	6.09
700	0.602	1.97	5.57
800	0.650	2.13	5.15
824	0.662	2.17	5.06
894	0.694	2.28	4.83
960	0.724	2.38	4.63
1000	0.742	2.43	4.52
1250	0.848	2.78	3.95
1500	0.947	3.11	3.54
1700	1.02	3.35	3.28
2000	1.13	3.71	2.96
2300	1.23	4.05	2.72
2500	1.30	4.27	2.58

Standard Conditons:
For Attenuation, VSWR 1.0, ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.

N Male
L7PNM-RPC

N Female
L7PNF-RPC

7-16 DIN Female
L7PDF-RPC

7-16 DIN Male
L7PDM-RPC

1-5/8" EIA Flange
L47R

7/8" EIA Flange
L47S

F Flange Male
L47F

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	OnePiece	**L7PNM-RPC**	Captivated	Self-Flare	SS	4.4 (112)	2.47 (62.7)
N Female	OnePiece	**L7PNF-RPC**	Captivated	Self-Flare	SG	4.5 (114)	2.47 (62.7)
N Female	RingFlare	**L7PNF-RC**	Captivated	Self-Flare	SG	4.2 (107)	2.36 (59.9)
7-16 DIN Male	OnePiece	**L7PDM-RPC**	Captivated	Self-Flare	SS	4.2 (107)	2.46 (62.5)
7-16 DIN Female	OnePiece	**L7PDF-RPC**	Captivated	Self-Flare	SS	4.1 (104)	2.45 (62.2)
7-16 DIN Female	RingFlare	**L7PDF-RC**	Captivated	Self-Flare	SS	3.4 (86)	2.36 (59.9)
7/8" EIA Flange	–	**L47S**	Tab Flare	Self-Flare	BB	5.1 (130)	2.25 (57)
1-5/8" EIA Flange	–	**L47R**	Tab Flare	Self-Flare	BB	5.1 (130)	3.5 (89)
F Flange Flange Male	–	**L47F**	Tab Flare	Self-Flare	BB	5.9 (150)	2.25 (57)
F Flange Flange Female	–	**201942**	Tab Flare	Self-Flare	BB	5.5 (140)	2.25 (57)
Splice	–	**L47Z**	Tab Flare	Self-Flare	BB	5.1 (130)	2.9 (74)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

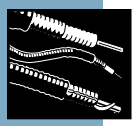
Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Standard VSWR Specifications

Frequency Band, GHz	Type Number	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**LDF7-50A**	1.10 (26.4)*	1.10 (26.4)*	1.12 (24.97)*	1.13 (24.3)*	1.13 (24.3)**
and 1.7-2.0	**LDF7RN-50A**	1.10 (26.4)*	1.10 (26.4)*	1.12 (24.97)*	1.13 (24.3)*	1.13 (24.3)**

* Expected typical values based on guaranteed 1.13 VSWR for bulk cable and Type N or DIN straight connectors. If guaranteed values are required, contact Andrew.
** 1.13 VSWR guaranteed for bulk standard cable lengths 500 ft and above.

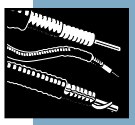


Low VSWR Specifications, Type LDF7P-50A-( )

Frequency Band, GHz	Type Number	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.780-0.960	**LDF7P-50A-13A**	N	1.07 (29.4)	1.07 (29.4)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)
		7-16 DIN Male	1.07 (29.4)	1.07 (29.4)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)
		7-16 DIN Female	1.08 (28.3)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.12 (24.9)
0.806-0.960	**LDF7P-50A-40**	N	1.06 (30.7)	1.07 (29.4)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
		7-16 DIN	1.06 (30.7)	1.07 (29.4)	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)
0.800-0.960 and 1.85-1.99	**LDF7P-50A-17A**	N	1.09 (27.3)	1.09 (27.3)	1.10 (26.4)	1.12 (24.9)	1.12 (24.9)
		7-16 DIN	1.09 (27.3)	1.09 (27.3)	1.10 (26.4)	1.12 (24.9)	1.12 (24.9)
0.806-0.960 and 1.7-2.2	**LDF7P-50A-42**	N:	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.427-1.535	**LDF7P-50A-4A**	N	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		7-16 DIN Male	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		N Female Bulkhead	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		7/8" EIA	1.06 (30.7)	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)
		"F" Flange Female	1.10 (26.4)	1.18 (21.6)	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)
		7-16 DIN Female	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)
		LC Female	1.10 (26.4)	1.12 (24.9)	1.18 (21.6)	1.20 (20.8)	1.22 (20.1)
		1-5/8" EIA	1.10 (26.4)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.22 (20.1)
		"F" Flange Male	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
		LC Male	1.30 (17.7)	1.32 (17.2)	1.35 (16.5)	1.38 (15.9)	1.40 (15.6)
1.7-2.2	**LDF7P-50A-41**	N	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
1.7-2.11	**LDF7P-50A-6A**	N	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Male	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Female Bulkhead	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7/8" EIA	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange Female	1.30 (17.7)	1.32 (17.2)	1.35 (16.5)	1.38 (15.9)	1.40 (15.6)
		7-16 DIN Female	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		LC Female	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
		1-5/8" EIA	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		"F" Flange Male	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.25 (19.1)
1.85-2.11	**LDF7P-50A-7A**	N	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Male	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)
		N Female Bulkhead	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		7/8" EIA	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange Female	1.20 (20.8)	1.22 (20.1)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
		7-16 DIN Female	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		LC Female	1.30 (17.7)	1.32 (17.2)	1.35 (16.5)	1.38 (15.9)	1.40 (15.6)
		1-5/8" EIA	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)
		"F" Flange Male	1.12 (24.9)	1.15 (23.1)	1.18 (21.6)	1.20 (20.8)	1.25 (19.1)
1.9-2.3	**LDF7P-50A-8A**	N	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Male	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)
		N Female Bulkhead	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.32 (17.2)	1.35 (16.5)
		7/8" EIA	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange Female	1.30 (17.7)	1.35 (16.5)	1.40 (15.6)	1.45 (14.8)	1.50 (14.0)
		7-16 DIN Female	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.35 (16.5)
		LC Female	1.25 (19.1)	1.30 (17.7)	1.35 (16.5)	1.40 (15.6)	1.40 (15.6)
		1-5/8" EIA	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.35 (16.5)
		"F" Flange Male	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
2.1-2.2	**LDF7P-50A-9A**	N	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Male	1.10 (26.4)	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)
		N Female Bulkhead	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.32 (17.2)	1.35 (16.5)
		7/8" EIA	1.08 (28.3)	1.10 (26.4)	1.12 (24.9)	1.15 (23.1)	1.15 (23.1)
		"F" Flange Female	1.30 (17.7)	1.35 (16.5)	1.40 (15.6)	1.45 (14.8)	1.50 (14.0)
		7-16 DIN Female	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.35 (16.5)
		LC Female	1.25 (19.1)	1.30 (17.7)	1.35 (16.5)	1.40 (15.6)	1.40 (15.6)
		1-5/8" EIA	1.15 (23.1)	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)
		"F" Flange Male	1.20 (20.8)	1.25 (19.1)	1.28 (18.2)	1.30 (17.7)	1.35 (16.5)
0.01-2.5*	**LDF7P-50A-10A**	N	1.10 (26.4)	1.20 (20.8)	1.30 (17.7)	1.55 (13.3)	1.65 (12.2)
		7-16 DIN Male	1.10 (26.4)	1.20 (20.8)	1.30 (17.7)	1.60 (12.7)	1.65 (12.2)
		7/8" EIA	1.10 (26.4)	1.20 (20.8)	1.30 (17.7)	1.55 (13.3)	1.65 (12.2)
		7-16 DIN Female	1.15 (23.1)	1.25 (19.1)	1.35 (16.5)	1.65 (12.2)	1.75 (11.3)
		1-5/8" EIA	1.15 (23.1)	1.25 (19.1)	1.35 (16.5)	1.65 (12.2)	1.75 (11.3)
		"F" Flange Male	1.10 (26.4)	1.20 (20.8)	1.30 (17.7)	1.55 (13.3)	1.65 (12.2)

* Connectors ordered separately

VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-2**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Snap-in Hangers Kit of 10. For prepunched 3/4" (19 mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706-4**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605	**L7CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L7SGRIP**
Support clamp kit of 10	**L7SGRIP-7IK**
Standard Hoisting Grip	**24312**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL7-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL7-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL7-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL7-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL7-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL7-15B4**
Arrestor Plus Integrated T-Series Arrestors – see page 614	
Bulkhead N Female	**APTL7-BNF-(*)**
Bulkhead 7-16 DIN Female	**APTL7-BDF-(*)**

* Frequency band. See page 614.

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
WeatherShield™ Connector Protection Housing	
LDF7 to LDF4	**WS-L7L4**
LDF7 to FSJ4	**WS-L7F4**
Cold Shrink Weatherproofing Kit	
1-5/8" Coax to 1-5/8" Coax N Connectors	**241474-6**
1-5/8" Coax to 1/4" Coax	**241475-11**
1-5/8" Coax to 3/8" or 1/2" Coax	**241475-5A**
1-5/8" to APTL7 Arrestors	**241474-6**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-4**	**48939A-4**

Tools – for additional tool offerings see pages 620-623	
EASIAX® Plus Automated Cable Prep Tool	**CPTL7**
1-5/8" Connector Torque Wrench	**244374**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

2-1/4" Foam Dielectric, LDF Series – *50-ohm*

LDF12-50

Description	Type No.
Cable Ordering Information	
Standard Cable	
2-1/4" Standard Cable, Standard Jacket	**LDF12-50**
Fire Retardant Cable	
2-1/4" Fire Retardant Jacket (CATVR)	**LDF12RN-50**
Low VSWR Cable	
2-1/4" Low VSWR, specify operating band	**LDF12P-50-(**)**

** Insert suffix number from "Low VSWR Specifications" table, page 525.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	2.2
Velocity, percent	88
Peak Power Rating, kW	425
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.21 (0.68)
Outer	0.09 (0.29)
dc Breakdown, volts	13000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.7 (74.6)
Inductance, µH/ft (m)	0.058 (0.189)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper Tube
Diameter over Jacket, in (mm)	2.35 (60)
Diameter over Copper Outer Conductor, in (mm)	2.2 (55.9)
Diameter Inner Conductor, in (mm)	0.835 (21.2)
Minimum Bending Radius, in (mm)	22 (560)
One-Time Bending Radius, in (mm)	9.5 (240)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (N•m)	70 (95)
Cable Weight, lb/ft (kg/m)	1.22 (1.82)
Tensile Strength, lb (kg)	1500 (681)
Flat Plate Crush Strength, lb/in (kg/mm)	150 (2.7)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.011	0.037	321.0
1	0.016	0.052	227.0
1.5	0.020	0.064	185.0
2	0.023	0.074	160.0
10	0.052	0.169	70.3
20	0.074	0.242	49.2
30	0.091	0.299	39.8
50	0.119	0.391	30.4
88	0.161	0.529	22.5
100	0.173	0.566	21.0
108	0.180	0.591	20.1
150	0.215	0.707	16.8
174	0.234	0.767	15.5
200	0.253	0.829	14.4
300	0.317	1.04	11.4
400	0.374	1.23	9.7
450	0.400	1.31	9.06
500	0.426	1.40	8.52
512	0.432	1.42	8.40
600	0.474	1.55	7.66
700	0.519	1.70	6.99
800	0.562	1.84	6.45
824	0.572	1.88	6.34
894	0.601	1.97	6.03
960	0.628	2.06	5.78
1000	0.644	2.11	5.64
1250	0.739	2.42	4.91
1500	0.828	2.72	4.38
1700	0.896	2.94	4.05
1800	0.929	3.05	3.91
2000	0.994	3.26	3.65
2100	1.03	3.37	3.54
2200	1.06	3.47	3.43

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.

ANDREW®

Revised 9/00

7-16 DIN Female
L12PDF

3-1/8" EIA Flange
L12FB-302

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Female	–	**L12PNF**	Self-Tapping	Self-Flare	SS	5.1 (130)	2.75 (69.9)
7-16 DIN Male	–	**L12PDM**	Self-Tapping	Self-Flare	SS	5.8 (147)	2.75 (69.9)
7-16 DIN Female	–	**L12PDF**	Self-Tapping	Self-Flare	SS	5.5 (139)	2.75 (69.9)
3 1/8" EIA Flange	Gas Pass	**L12FP-302**	Self-Tapping	Self-Flare	BS	7.6 (192)	5.19 (131.8)
3 1/8" EIA Flange	Gas Barrier	**L12FB-302**	Self-Tapping	Self-Flare	BS	7.6 (192)	5.19 (131.8)
Splice	–	**L12Z**	Self-Tapping	Self-Flare	BB	5.8 (147)	3.00 (76.2)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

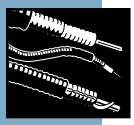
Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Low VSWR Specifications, Type LDF12P-50A-( )

Frequency Band, GHz	Type Number	Using Connector Type*	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.806-0.960	**LDF12P-50-1**	N Female	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN Female	1.08 (28.3)	1.09 (27.3)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
0.806-0.96 and 1.7-2.2	**LDF12P-50-2**	N Female	1.13 (24.2)	1.14 (23.7)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)
		7-16 DIN Female	1.13 (24.2)	1.14 (23.7)	1.15 (23.1)	1.15 (23.1)	1.15 (23.1)
1.7-1.9	**LDF12P-50-3**	N Female	1.13 (24.2)	1.13 (24.2)	1.14 (23.7)	1.14 (23.7)	1.15 (23.1)
		7-16 DIN Female	1.13 (24.2)	1.13 (24.2)	1.14 (23.7)	1.14 (23.7)	1.15 (23.1)

* Connectors ordered separately
VSWR values apply to straight connectors only, are guaranteed for factory fit assemblies, and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**42396A-4**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-in Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters. Standard tower configuration spacing is 3-4 feet. (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**206706-5**
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L12SGRIP**
Support clamp kit of 10	**L12SGRIP-12IK**
Standard Hoisting Grip	**31535**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL12-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL12-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL12-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL12-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL12-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL12-15B4**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
2-1/4" Coax - to 3/8" or 1/2" Coax	**241475-8**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – One Hole:	**204679A-8**
5" Boots – One Hole:	**48939A-9**
Tools – for additional tool offerings see pages 620-623	
LDF12 Connector Torque Wrench	**244373**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1/4" Air Dielectric, Plenum Rated (CATVP), HS Series – *50-ohm*

HS1RP-50A

Description	Type No.

Cable Ordering Information

Plenum Cable	
1/4" Fire Retardant Cable, 1/4" Fire Retardant Jacket (CATVP)	**HS1RP-50A**

Characteristics

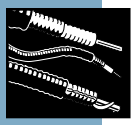
Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	10
Velocity, percent	84
Peak Power Rating, kW	6.4
dc Resistance, ohms/1000 ft (1000 m)	
Inner	2.1 (6.8)
Outer	2.0 (6.5)
dc Breakdown, volts	1600
Jacket Spark, volts RMS	4000
Capacitance, pF/ft (m)	23.8 (78.0)
Inductance, µH/ft (m)	0.061 (0.202)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	0.29 (7.4)
Diameter over Copper Outer Conductor, in (mm)	0.25 (6.4)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	1.9 (2.6)
Cable Weight, lb/ft (kg/m)	0.063 (45)
Tensile Strength, lb (kg)	100 (45)
Flat Plate Crush Strength, lb/in (kg/mm)	80 (1.4)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.120	0.395	6.40
1	0.170	0.559	6.40
1.5	0.209	0.685	6.40
2	0.241	0.792	6.10
10	0.541	1.78	2.72
20	0.767	2.52	1.92
30	0.941	3.09	1.56
50	1.22	4.00	1.21
88	1.62	5.33	0.907
100	1.73	5.69	0.850
108	1.80	5.91	0.817
150	2.13	6.99	0.691
174	2.30	7.54	0.640
200	2.47	8.10	0.596
300	3.04	9.98	0.484
400	3.53	11.6	0.417
450	3.75	12.3	0.393
500	3.96	13.0	0.372
512	4.01	13.2	0.367
600	4.36	14.3	0.338
700	4.72	15.5	0.312
800	5.07	16.6	0.291
824	5.14	16.9	0.286
894	5.37	17.6	0.274
960	5.58	18.3	0.264
1000	5.70	18.7	0.259
1250	6.41	21.0	0.230
1500	7.06	23.2	0.209
1700	7.55	24.8	0.195
1800	7.79	25.5	0.189
2000	8.24	27.0	0.179
2100	8.46	27.8	0.174
2200	8.68	28.5	0.170
2300	8.89	29.2	0.166
3000	10.3	33.7	0.144
3400	11.0	36.1	0.134
4000	12.0	39.5	0.123
5000	13.6	44.7	0.108
6000	15.1	49.5	0.098
8000	17.7	58.2	0.083
10000	20.2	66.2	0.073

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F); no solar loading.




N Male
F1PNMV2-H


N Male
Right Angle
F1PNR-HC


N Female
Bulkhead
F1PNF-BH


SMA Male
F1PSM


SMA Male
Right Angle
F1PSR


SMA Female
Bulkhead
F1PSF


BNC Male
F1PBM


TNC Male
F1PTM-HF


UHF Male
41SP

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F1PNMV2-H**	Solder	Self-Clamping	SG	2.1 (53)	0.95 (24.1)
N Male	High Freq.	**F1PNM-HF**	Solder	Tab Flare	SG	1.3 (33)	0.81 (20.5)
N Male	Right Angle Hex Head	**F1PNR-HC**	Captivated	Self-Clamping	SG	1.7/1.3 (43/33)	0.95 (24.1)
N Female		**F1PNF**	Solder	Self-Flare	SG	2.2 (55.2)	0.58 (14.8)
N Female	Bulkhead	**F1PNF-BH**	Solder	Self-Clamping	SG	2.3 (58)	0.94 (23.9)
BNC Male	–	**F1PBM**	Solder	Self-Clamping	SS	2.0 (50)	0.69 (17.5)
UHF Male	–	**41SP**	Solder	Solder	BB	1.8 (46)	0.77 (19.6)
UHF Female	–	**41U**	Solder	Solder	BS	2.1 (53)	0.77 (19.6)
SMA Male	Up to 6 GHz	**F1PSM**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Right Angle	**F1PSR**	Solder	Self-Clamping	PG	1.6/0.75 (41/19)	0.50 (12.7)
SMA Female	Up to 6 GHz, Bulkhead	**F1PSF**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Up to 18 GHz	**41EWS**	Solder	Tab Flare	G	0.94 (23.9)	0.40 (10.2)
SMA Female	Up to 18 GHz	**41ENS**	Solder	Tab Flare	G	1.00 (25.4)	0.40 (10.2)
TNC Male	11 GHz and Below	**F1PTM**	Solder	Self-Clamping	SG	1.68 (43)	0.57 (14.5)
TNC Female	Bulkhead	**41AENT**	Captivated	Tab Flare	NG	1.5 (38)	0.70 (17.8)
TNC Male	Hi Freq, Above 11 GHz	**F1PTM-HF**	Captivated	Tab Flare	NG	1.9 (48.8)	0.70 (17.8)
Mini-UHF Male	–	**F1MU**	Captivated	Crimp	NS	1.53 (39)	0.47 (11.9)
7-16 DIN Male	–	**F1PDM**	Solder	Self-Clamping	SS	1.82 (46.3)	1.25 (31.75)
7-16 DIN Female	–	**F1PDF**	Solder	Self-Clamping	SS	1.85 (47)	0.551 (14)
7-16 DIN Female	Panel Mount	**F1PDF-PM**	Solder	Self-Clamping	SS	1.85 (47)	1.26 (32)
7-16 DIN Female	Bulkhead	**F1PDF-BH**	Solder	Self Clamping	SS	1.85 (47)	1.62 (41)

* Stainless steel body **Plating Codes:** BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, NG - Nickel Plated Body and Gold Plated Pin, NS- Nickel Plated Body and Silver Plated Pin, PG - Passivated Body and Gold Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, G - Stainless Steel Body and Gold Plated Pin.

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
5/8" Coax to 1/4" Coax	**241475-13**
7/8" Coax to 1/4" Coax	**241475-12**
1-1/4" or 1-5/8" Coax to 1/4" Coax	**241475-11**
1/4" to 1-1/2" Omni/Panel base Type N or DIN	**241548-10**
1/4" to 2" Omni/Panel base Type N or DIN	**241548-11**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-17**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Cutting Tool FSJ1/FSJ4/HS1	**207865**
N Connector Coupling Torque Wrench	**244379**

ANDREW®

Revised 7/00

1/4" High Power, High Temperature, Air Dielectric, HST Series – *50-ohm*

HST1-50

Description	Type No.

Cable Ordering Information

High Power, High Temperature Cable	
1/4" Cable	**HST1-50**

Characteristics

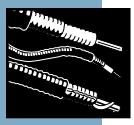
Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	18
Velocity, percent	82
Peak Power Rating, kW	6.4
dc Resistance, ohms/1000 ft (1000 m)	
Inner	2.05 (6.71)
Outer	2.0 (6.5)
dc Breakdown, volts	1600
Jacket Spark, volts RMS	4000
Capacitance, pF/ft (m)	25.1 (82.4)
Inductance, µH/ft (m)	0.061 (0.202)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Silver Plated Copper
Diameter over Jacket, in (mm)	0.29 (7.4)
Diameter over Copper Outer Conductor, in (mm)	0.25 (6.4)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	1.7 (2.3)
Cable Weight, lb/ft (kg/m)	0.057 (0.085)
Tensile Strength, lb (kg)	100 (45)
Flat Plate Crush Strength, lb/in (kg/mm)	80 (1.4)

Attenuation and Average Power

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.116	0.382	6.40
1	0.165	0.540	6.40
1.5	0.202	0.662	6.40
2	0.233	0.764	6.40
10	0.523	1.72	6.26
20	0.742	2.43	4.41
30	0.911	2.99	3.60
50	1.18	3.87	2.77
88	1.57	5.16	2.08
100	1.68	5.51	1.95
108	1.75	5.73	1.87
150	2.07	6.78	1.58
174	2.23	7.32	1.47
200	2.40	7.87	1.37
300	2.96	9.70	1.11
400	3.43	11.3	0.954
450	3.65	12.0	0.897
500	3.86	12.7	0.849
512	3.91	12.8	0.838
600	4.25	13.9	0.771
700	4.61	15.1	0.711
800	4.95	16.2	0.662
824	5.02	16.5	0.652
894	5.25	17.2	0.624
960	5.45	17.9	0.601
1000	5.57	18.3	0.588
1250	6.28	20.6	0.522
1500	6.92	22.7	0.473
1700	7.41	24.3	0.442
1800	7.64	25.1	0.429
2000	8.10	26.6	0.405
2100	8.31	27.3	0.394
2200	8.53	28.0	0.384
2300	8.74	28.7	0.375
3000	10.1	33.2	0.324
3400	10.9	35.6	0.302
4000	11.9	39.0	0.276
5000	13.5	44.3	0.243
6000	15.0	49.1	0.219
8000	17.7	58.0	0.185
10000	20.2	66.2	0.163
12000	22.5	73.8	0.146
14000	24.7	81.0	0.133
16000	26.8	87.8	0.123
18000	28.8	94.4	0.114

Standard Conditons:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power. VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 200°C (392°F); no solar loading.




N Male
F1PNMV2-H


N Male
Right Angle
F1PNR-HC


N Female
Bulkhead
F1PNF-BH


SMA Male
F1PSM


SMA Male
Right Angle
F1PSR


SMA Female
Bulkhead
F1PSF


BNC Male
F1PBM


TNC Male
F1PTM-HF


UHF Male
41SP

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F1PNMV2-H**	Solder	Self-Clamping	SG	2.1 (53)	0.95 (24.1)
N Male	High Freq.	**F1PNM-HF**	Solder	Tab Flare	SG	1.3 (33)	0.81 (20.5)
N Male	Right Angle Hex Head	**F1PNR-HC**	Captivated	Self-Clamping	SG	1.7/1.3 (43/33)	0.95 (24.1)
N Female		**F1PNF**	Solder	Self-Flare	SG	2.2 (55.2)	0.58 (14.8)
N Female	Bulkhead	**F1PNF-BH**	Solder	Self-Clamping	SG	2.3 (58)	0.94 (23.9)
BNC Male	–	**F1PBM**	Solder	Self-Clamping	SS	2.0 (50)	0.69 (17.5)
UHF Male	–	**41SP**	Solder	Solder	BB	1.8 (46)	0.77 (19.6)
UHF Female	–	**41U**	Solder	Solder	BS	2.1 (53)	0.77 (19.6)
SMA Male	Up to 6 GHz	**F1PSM**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Right Angle	**F1PSR**	Solder	Self-Clamping	PG	1.6/0.75 (41/19)	0.50 (12.7)
SMA Female	Up to 6 GHz, Bulkhead	**F1PSF**	Solder	Self-Clamping	PG	1.7 (43)	0.49 (12.5)
SMA Male	Up to 18 GHz	**41EWS**	Solder	Tab Flare	G	0.94 (23.9)	0.40 (10.2)
SMA Female	Up to 18 GHz	**41ENS**	Solder	Tab Flare	G	1.00 (25.4)	0.40 (10.2)
TNC Male	11 GHz and Below	**F1PTM**	Solder	Self-Clamping	SG	1.68 (43)	0.57 (14.5)
TNC Female	Bulkhead	**41AENT**	Captivated	Tab Flare	NG	1.5 (38)	0.70 (17.8)
TNC Male	Hi Freq, Above 11 GHz	**F1PTM-HF**	Captivated	Tab Flare	NG	1.9 (48.8)	0.70 (17.8)
Mini-UHF Male	–	**F1MU**	Captivated	Crimp	NS	1.53 (39)	0.47 (11.9)
7-16 DIN Male	–	**F1PDM**	Solder	Self-Clamping	SS	1.82 (46.3)	1.25 (31.75)
7-16 DIN Female	–	**F1PDF**	Solder	Self-Clamping	SS	1.85 (47)	0.551 (14)
7-16 DIN Female	Panel Mount	**F1PDF-PM**	Solder	Self-Clamping	SS	1.85 (47)	1.26 (32)
7-16 DIN Female	Bulkhead	**F1PDF-BH**	Solder	Self Clamping	SS	1.85 (47)	1.62 (41)

* Stainless steel body **Plating Codes:** BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, NG - Nickel Plated Body and Gold Plated Pin, NS- Nickel Plated Body and Silver Plated Pin, PG - Passivated Body and Gold Plated Pin+A135, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, G - Stainless Steel Body and Gold Plated Pin.

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**

Description	Type No.
Grounding and Surface Protection – for additional grounding kits and our surge protection offerings, see pages 609-616	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**
Weatherproofing – for additional weatherproofing information see pages 617-618	
Cold Shrink Weatherproofing Kit	
5/8" Coax to 1/4" Coax	**241475-13**
7/8" Coax to 1/4" Coax	**241475-12**
1-1/4" or 1-5/8" Coax to 1/4" Coax	**241475-11**
1/4" to 1-1/2" Omni/Panel base Type N or DIN	**241548-10**
1/4" to 2" Omni/Panel base Type N or DIN	**241548-11**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-17**
Tools – for additional tool offerings see pages 620-623	
EASIAX® Cutting Tool FSJ1/FSJ4/HS1/HST1	**207865**
N Connector Coupling Torque Wrench	**244379**

ANDREW®

Revised 7/00

3/8" Air Dielectric, Plenum Rated (CATVP), HS Series – *50-ohm*

HS2RP-50

Description	Type No.

Cable Ordering Information

Plenum Cable	
3/8" Fire Retardant Cable	**HS2RP-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	13.4
Velocity, percent	83
Peak Power Rating, kW	13.2
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.41 (4.64)
Outer	1.52 (4.99)
dc Breakdown, volts	2300
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	23.61 (77.47)
Inductance, µH/ft (m)	0.064 (0.208)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.415 (10.5)
Diameter over Copper Outer Conductor, in (mm)	0.375 (9.5)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum	20 (50)
Bending Moment, lb-ft (N•m)	1.8 (2.45)
Cable Weight, lb/ft. (kg/m)	0.076 (0.113)
Tensile Strength, lb (kg)	210 (95)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.083	0.273	13.2
1	0.118	0.386	13.2
1.5	0.144	0.473	12.1
2	0.166	0.546	10.5
10	0.374	1.23	4.67
20	0.530	1.74	3.30
30	0.650	2.13	2.69
50	0.843	2.76	2.07
88	1.12	3.69	1.55
100	1.20	3.94	1.46
108	1.25	4.09	1.40
150	1.48	4.84	1.18
174	1.59	5.23	1.10
200	1.71	5.62	1.02
300	2.11	6.93	0.827
400	2.45	8.05	0.712
450	2.61	8.56	0.670
500	2.76	9.04	0.634
512	2.79	9.16	0.626
600	3.03	9.95	0.576
700	3.29	10.8	0.531
800	3.53	11.6	0.495
824	3.59	11.8	0.487
894	3.75	12.3	0.466
960	3.89	12.8	0.449
1000	3.98	13.0	0.439
1250	4.48	14.7	0.390
1500	4.94	16.2	0.354
1700	5.29	17.4	0.330
1800	5.46	17.9	0.320
2000	5.78	19.0	0.302
2100	5.94	19.5	0.294
2200	6.09	20.0	0.287
2300	6.24	20.5	0.280
3000	7.23	23.7	0.242
3400	7.75	25.4	0.226
4000	8.49	27.8	0.206
5000	9.63	31.6	0.182
6000	10.7	35.1	0.164
8000	12.6	41.4	0.138
10000	14.4	47.2	0.121
12000	16.1	52.7	0.109
13400	17.2	56.3	0.102

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
F2PNM-H

7-16 DIN Female
F2PDF

7-16 DIN Male
F2PDM-C

N Female
F2PNF

7-16 DIN Male
Right Angle
F2PDR-C

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F2PNM-H**	Solder	Self-Flare	SG	1.9 (48)	0.94 (23)
N Male	Hex Head	**F2PNM-HC**	Captivated	Self-Flare	SG	1.9 (48)	0.94 (23)
N Female		**F2PNF**	Solder	Self-Flare	SG	2.1 (53)	0.67 (17)
N Female		**F2PNF-C**	Captivated	Self-Flare	SG	2.1 (53)	0.64 (16)
N Female	Bulkhead	**F2PNF-BH**	Solder	Self-Flare	SG	2.1 (53)	0.95 (24)
7-16 DIN Male		**F2PDM**	Solder	Self-Flare	SS	2.2 (57)	1.4 (36)
7-16 DIN Male		**F2PDM-C**	Captivated	Self-Flare	SS	2.1 (53)	1.4 (36)
7-16 DIN Female		**F2PDF**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Female		**F2PDF-C**	Captivated	Self-Flare	SS	2.1 (51.6)	0.79 (20)
7-16 DIN Female	Panel Mt.	**F2PDF-PM**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Male	Right Angle	**F2PDR-C**	Captivated	Self-Flare	SS	1.7/1.3 (43/34)	1.4 (36)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, BS - Brass Body and Silver Plated Pin.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Accessories

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620.	
Standard Cable Entry Boots	
4" Boots – One Hole:	**204679A-19**
5" Boots – Three Hole:	**48939A-16**
Tools – for additional tool offerings see pages 620-623.	
EASIAX® Cutting Tool FSJ2/FSJ4	**241372**
N Connector Coupling Torque Wrench	**244379**

3/8" High Power, High Temperature Plenum Rated, Air Dielectric, HST Series – *50-ohm*

HST2-50

Description	Type No.

Cable Ordering Information

High Power, High Temperature, Plenum Cable	
3/8" Cable	**HST2-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	13.4
Velocity, percent	83
Peak Power Rating, kW	13.2
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.41 (4.64)
Outer	1.52 (4.99)
dc Breakdown, volts	2300
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	23.61 (77.47)
Inductance, µH/ft (m)	0.064 (0.208)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Silver Plated, Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.415 (10.5)
Diameter over Copper Outer Conductor, in (mm)	0.375 (9.5)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum	20 (50)
Bending Moment, lb-ft (N•m)	1.8 (2.45)
Cable Weight, lb/ft. (kg/m)	0.094 (0.140)
Tensile Strength, lb (kg)	210 (95)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.085	0.279	13.2
1	0.120	0.395	13.2
1.5	0.147	0.484	13.2
2	0.170	0.559	13.2
10	0.383	1.26	13.2
20	0.543	1.78	12.3
30	0.667	2.19	9.98
50	0.865	2.84	7.70
88	1.16	3.79	5.76
100	1.23	4.05	5.40
108	1.28	4.21	5.19
150	1.52	4.99	4.38
174	1.64	5.39	4.06
200	1.76	5.79	3.77
300	2.18	7.15	3.06
400	2.54	8.32	2.63
450	2.70	8.85	2.47
500	2.85	9.36	2.34
512	2.89	9.48	2.31
600	3.14	10.3	2.12
700	3.41	11.2	1.95
800	3.66	12.0	1.82
824	3.72	12.2	1.79
894	3.89	12.8	1.71
960	4.04	13.3	1.65
1000	4.13	13.6	1.61
1250	4.67	15.3	1.43
1500	5.16	16.9	1.29
1700	5.52	18.1	1.21
1800	5.70	18.7	1.17
2000	6.04	19.8	1.10
2100	6.21	20.4	1.07
2200	6.37	20.9	1.05
2300	6.53	21.4	1.02
3000	7.59	24.9	0.878
3400	8.15	26.7	0.818
4000	8.95	29.4	0.745
5000	10.2	33.4	0.655
6000	11.3	37.2	0.588
8000	13.4	44.1	0.496
10000	15.4	50.5	0.433
12000	17.2	56.5	0.387
13400	18.4	60.5	0.362

Standard Conditions:
For attenuation. VSWR 1.0, ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 200°C (392°F), no solar loading.

N Male
F2PNM-H

7-16 DIN Female
F2PDF

7-16 DIN Male
F2PDM-C

N Female
F2PNF

7-16 DIN Male
Right Angle
F2PDR-C

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F2PNM-H**	Solder	Self-Flare	SG	1.9 (48)	0.94 (23)
N Male	Hex Head	**F2PNM-HC**	Captivated	Self-Flare	SG	1.9 (48)	0.94 (23)
N Female		**F2PNF**	Solder	Self-Flare	SG	2.1 (53)	0.67 (17)
N Female		**F2PNF-C**	Captivated	Self-Flare	SG	2.1 (53)	0.64 (16)
N Female	Bulkhead	**F2PNF-BH**	Solder	Self-Flare	SG	2.1 (53)	0.95 (24)
7-16 DIN Male		**F2PDM**	Solder	Self-Flare	SS	2.2 (57)	1.4 (36)
7-16 DIN Male		**F2PDM-C**	Captivated	Self-Flare	SS	2.1 (53)	1.4 (36)
7-16 DIN Female		**F2PDF**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Female		**F2PDF-C**	Captivated	Self-Flare	SS	2.1 (51.6)	0.79 (20)
7-16 DIN Female	Panel Mt.	**F2PDF-PM**	Solder	Self-Flare	SS	2.2 (56)	1.1 (28)
7-16 DIN Male	Right Angle	**F2PDR-C**	Captivated	Self-Flare	SS	1.7/1.3 (43/34)	1.4 (36)

Plating Codes: SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin, BS - Brass Body and Silver Plated Pin.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.

Accessories

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620.	
Standard Cable Entry Boots	
4" Boots – One Hole:	**204679A-19**
5" Boots – Three Hole:	**48939A-16**
Tools – for additional tool offerings see pages 620-623.	
EASIAX® Cutting Tool FSJ2/FSJ4	**241372**
N Connector Coupling Torque Wrench	**244379**

1/2" Air Dielectric, HJ Series – *50-ohm*

HJ4-50

Description	Type No.

Cable Ordering Information

Standard and Fire Retardant Cables	
1/2" Standard Cable, Standard Jacket	**HJ4-50**
1/2" Fire Retardant Jacket (CATVR)	**HJ4RN-50**
Low VSWR and Specialized Cables	
1/2" Low VSWR, specify operating band	**HJ4P-50-(**)**
Cable for Cellular, standard jacket 824-960 MHz, 1.20 VSWR, max.	**HJ4P-50-5**

** Insert suffix number from "Low VSWR Specifications" table, page 537.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	10.9
Velocity, percent	91.4
Peak Power Rating, kW	21.0
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.45 (1.48)
Outer	0.40 (1.31)
dc Breakdown, volts	2900
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	22.2 (73.0)
Inductance, µH/ft (m)	0.056 (0.182)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	0.58 (14.7)
Diameter over Copper Outer Conductor, in (mm)	0.50 (12.7)
Diameter Inner Conductor, in (mm)	0.165 (4.2)
Nominal Inside Transverse Dimensions, cm	0.90
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	8 (10.9)
Cable Weight, lb/ft (kg/m)	0.25 (0.37)
Tensile Strength, lb (kg)	700 (320)
Flat Plate Crush, lb/in (kg/mm)	250 (4.5)

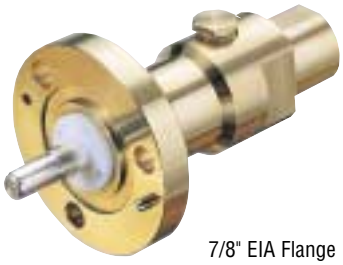
Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0560	0.184	21.0
1	0.0792	0.260	21.0
1.5	0.0971	0.319	20.0
2	0.112	0.37	17.3
10	0.253	0.83	7.69
20	0.359	1.18	5.41
30	0.442	1.45	4.40
50	0.574	1.88	3.38
88	0.768	2.52	2.53
100	0.821	2.69	2.37
108	0.854	2.80	2.27
150	1.01	3.33	1.91
174	1.10	3.60	1.77
200	1.18	3.87	1.65
300	1.46	4.80	1.33
400	1.71	5.60	1.14
450	1.82	5.96	1.07
500	1.92	6.31	1.01
512	1.95	6.39	1.00
600	2.12	6.97	0.914
700	2.31	7.58	0.840
800	2.49	8.16	0.781
824	2.53	8.29	0.768
894	2.64	8.68	0.734
960	2.75	9.03	0.706
1000	2.81	9.23	0.690
1250	3.19	10.5	0.609
1500	3.53	11.6	0.549
1700	3.80	12.5	0.512
2000	4.17	13.7	0.466
2300	4.52	14.8	0.430
3000	5.28	17.3	0.368
4000	6.27	20.6	0.310
5000†	7.17	23.5	0.271
6000	8.03	26.3	0.242
8000	9.61	31.5	0.202
10000	11.1	36.4	0.175
10900	11.7	38.4	0.166

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.
† Operation of this cable in the 5350-5500 MHz band is not recommended because of VSWR spikes produced by the dielectric section spacing.

N Male
H4PNM

N Female
H4PNF



7/8" EIA Flange
H4MPB-014

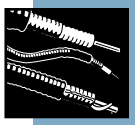
Connectors

Interface	Description	Type Number	Reference*	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male		**H4PNM**		Solder	Self-Flare	SG	2.8 (71)	1.0 (25)
N Female		**H4PNF**		Solder	Self-Flare	SG	2.8 (71)	1.0 (25)
7-16 DIN Male		**H4PDM**		Spring Finger	Self-Flare	SS	2.6 (66)	1.3 (33)
7/8" EIA Flange	Gas Pass/ Barrier Option	**H4MPB-014**	74ARG	Solder	Self-Flare	BB	3.3 (84)	2.25 (57)
End Terminal		**74T**		Solder	Self-Flare	BB	4.6 (117)	0.9 (23)
Splice		**74Z**		Solder	Self-Flare	BB	4.9 (124)	1.1 (28)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin
* Previous Type Number.

Connector Accessories

	Type Number
Connector Reattachment Kit for H4PNF, H4PNM, 74PN, 74PW	**34767A-22**
Bulkhead Adapter, for N Females	**26016-2**
7/8" EIA Gas Barrier	**1260A**



Low VSWR Specifications, Type HJ4P-50-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 1-20 ft (0.3-6 m)	Above 20 ft (6 m)
0.94-1.45 *	**HJ4P-50-1**	N Male: **H4PNM**, N Female: **H4PNF**	1.20 (20.8)	1.25 (19.9)
1.7-2.3	**HJ4P-50-4**	N Male: **H4PNM**	1.10 (26.4)	1.15 (23.1)
		N Female: **H4PNF**	1.15 (23.1)	1.20 (20.8)
		7/8" EIA: **H4MPB-014**	1.10 (26.4)	1.15 (23.1)
3.625-4.2 *	**HJ4P-50-2**	N Male: **H4PNM**, N Female: **H4PNF**	1.30 (17.7)	1.35 (16.6)

* Specify operating band ** Connectors ordered separately.
VSWR values are guaranteed for factory fit assemblies and are typical for cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Snap-In Hangers Kit of 10. For pre-punched 3/4" (19mm) holes on tower member or adapters. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**206706-1**
Standard Hoisting Grip	**43094**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**204989-1**
Factory attached two-hole lug, 600 mm (24") lead	**241088-1**
Field attached two-hole lug, 1500 mm (60") lead	**241545**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-6**	**48939A-7**
Three Hole:	**204679A-1**	**48939A-5**

1/2" High Power, High Temperature, Air Dielectric, HT Series – *50-ohm*

HT4-50

Description	Type No.

Cable Ordering Information

Standard Cable	
1/2" Standard Cable, Unjacketed	**HT4-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	10.9
Velocity, percent	92.0
Peak Power Rating, kW	21.0
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.45 (1.48)
Outer	0.40 (1.31)
dc Breakdown, volts	2900
Capacitance, pF/ft (m)	22.0 (72.2)
Inductance, µH/ft (m)	0.056 (0.182)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Copper Conductor, in (mm)	0.50 (12.7)
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	7.3 (9.9)
Cable Weight, lb/ft (kg/m)	0.21 (0.31)
Tensile Strength, lb (kg)	830 (380)
Flat Plate Crush, lb/in (kg/mm)	290 (5.3)

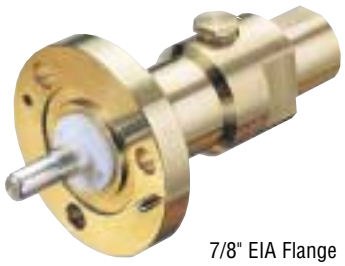
Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0580	0.190	21.0
1	0.0822	0.270	21.0
1.5	0.101	0.331	21.0
2	0.117	0.383	21.0
10	0.265	0.870	20.8
20	0.379	1.24	14.5
30	0.468	1.54	11.8
50	0.613	2.01	9.00
88	0.829	2.72	6.65
100	0.888	2.91	6.21
108	0.926	3.04	5.96
150	1.11	3.63	4.98
174	1.20	3.94	4.59
200	1.30	4.26	4.25
300	1.63	5.35	3.38
400	1.92	6.31	2.87
450	2.06	6.75	2.68
500	2.19	7.18	2.52
512	2.22	7.28	2.49
600	2.43	7.99	2.27
700	2.67	8.75	2.07
800	2.89	9.48	1.91
824	2.94	9.65	1.88
894	3.09	10.1	1.79
960	3.23	10.6	1.71
1000	3.31	10.9	1.67
1250	3.79	12.4	1.45
1500	4.25	13.9	1.30
1700	4.60	15.1	1.20
2000	5.10	16.7	1.08
2300	5.59	18.3	0.987
3000	6.65	21.8	0.829
4000	8.07	26.5	0.683
5000†	9.41	30.9	0.586
6000	10.7	35.1	0.516
8000	13.1	43.1	0.420
10000	15.5	50.7	0.357
10900	16.5	54.0	0.335

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 200°C (392°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.
† Operation of this cable in the 5400-5600 MHz band is not recommended because of VSWR spikes produced by the dielectric section spacing.

N Male
H4PNM

N Female
H4PNF



7/8" EIA Flange
H4MPB-014

Connectors

Interface	Description	Type Number	Reference*	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male		**H4PNM**		Solder	Self Flare	SG	2.8 (71)	1.0 (25)
N Female		**H4PNF**		Solder	Self Flare	SG	2.8 (71)	1.0 (25)
7-16 DIN Male		**H4PDM**		Spring Finger	Self Flare	SS	2.6 (66)	1.3 (33)
7/8" EIA Flange	Gas Pass/ Barrier Option	**H4MPB-014**	74ARG	Solder	Self Flare	BB	3.3 (84)	2.25 (57)
End Terminal		**74T**		Solder	Self Flare	BB	4.6 (117)	0.9 (23)
Splice		**74Z**		Solder	Self Flare	BB	4.9 (124)	1.1 (28)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin
* Previous Type Number.

Connector Accessories

	Type Number
Connector Reattachment Kit for H4PNF, H4PNM, 74PN, 74PW	**34767A-22**
Bulkhead Adapter, for N Females	**26016-2**
7/8" EIA Gas Barrier	**1260A**

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Standard Hoisting Grip	**43094**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**204989-1**
Factory attached two-hole lug, 600 mm (24") lead	**241088-1**
Field attached two-hole lug, 1500 mm (60") lead	**241545**
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-6**	**48939A-7**
Three Hole:	**204679A-1**	**48939A-5**

1/2" Air Dielectric, Plenum Rated (CATVP), HL Series – *50-ohm*

HL4RP-50

Description	Type No.
Cable Ordering Information	
Plenum Cable	
1/2" Fire Retardant Cable, Fire Retardant Jacket (CATVP)	**HL4RP-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	6.0
Velocity, percent	88.0
Peak Power Rating, kW	21.0
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.45 (1.48)
Outer	0.58 (1.90)
dc Breakdown, volts	4000
Capacitance, pF/ft (m)	23.0 (75.3)
Inductance, µH/ft (m)	0.058 (0.191)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.61 (15.5)
Diameter over Copper Outer Conductor, in (mm)	0.55 (14)
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	10 (15)
Bending Moment, lb-ft (N•m)	3.0 (4.1)
Cable Weight, lb/ft (kg/m)	0.18 (0.27)
Tensile Strength, lb (kg)	250 (114)
Flat Plate Crush, lb/in (kg/mm)	80 (1.4)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.049	0.162	40.0
1	0.070	0.229	37.8
1.5	0.086	0.281	30.9
2	0.099	0.324	26.7
10	0.223	0.730	11.9
20	0.317	1.04	8.34
30	0.389	1.28	6.78
50	0.506	1.66	5.22
88	0.678	2.22	3.89
100	0.725	2.38	3.64
108	0.754	2.47	3.50
150	0.896	2.94	2.95
174	0.968	3.18	2.73
200	1.04	3.42	2.53
300	1.29	4.24	2.04
400	1.51	4.95	1.75
450	1.61	5.28	1.64
500	1.70	5.59	1.55
512	1.73	5.66	1.53
600	1.88	6.17	1.40
700	2.05	6.72	1.29
800	2.20	7.23	1.20
824	2.24	7.35	1.18
894	2.34	7.69	1.13
960	2.44	8.00	1.08
1000	2.50	8.19	1.06
1250	2.83	9.29	0.933
1500	3.14	10.3	0.841
1700	3.37	11.1	0.783
1800	3.49	11.4	0.758
2000	3.71	12.2	0.713
2100	3.81	12.5	0.693
2200	3.92	12.9	0.675
2300	4.02	13.2	0.657
3000	4.70	15.4	0.562
3400	5.07	16.6	0.521
4000	5.59	18.3	0.473
5000	6.41	21.0	0.412
6000	7.18	23.6	0.368

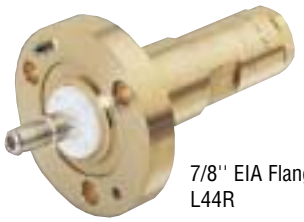
Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
L4PNM-RC

N Female
L4PNF-RC

7-16 DIN Male
L4PDM-RC

7-16 DIN Female
L4PDF-RC



7/8'' EIA Flange
L44R

UHF Male
L44P

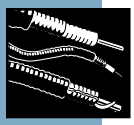
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**L4PNM-H**	Solder	Self-Flare	SG	2.6 (66)	0.95 (24.1)
N Male	RingFlare	**L4PNM-RC**	Captivated	RingFlare	SG	3.0 (75.7)	0.86 (21.8)
N Male	Right Angle, Hex	**L4PNR-H**	Solder	Self-Flare	SG	3.2/1.5 (81/38)	0.95 (24.1)
N Male	Right Angle, Hex	**L4PNR-HC**	Captivated	Self-Flare	SG	3.2/1.5 (81/38)	0.91 (23.1)
N Female	–	**L4PNF**	Solder	Self-Flare	SG	2.6 (66)	0.94 (23.9)
N Female	Bulk Head	**L4PNF-BH**	Solder	Self-Flare	SG	2.6 (66)	0.96 (24.4)
N Female	Panel Mount	**L4PNF-PM**	Solder	Self-Flare	SG	2.6 (66)	1.0 (25.4)
N Female	RingFlare	**L4PNF-RC**	Captivated	RingFlare	SG	2.8 (71)	0.86 (21.8)
7-16 DIN Male	–	**L4PDM**	Solder	Self-Flare	SS	2.6 (66)	1.4 (35.6)
7-16 DIN Male	Right Angle	**L4PDR**	Solder	Self-Flare	SS	1.8/2.8 (46/72)	1.41 (35.9)
7-16 DIN Male	Right Angle	**L4PDR-C**	Captivated	Self-Flare	SS	1.8/2.8 (46/72)	1.41 (35.9)
7-16 DIN Male	RingFlare	**L4PDM-RC**	Captivated	RingFlare	SS	2.64 (67.1)	0.86 (21.8)
7-16 DIN Female	–	**L4PDF**	Solder	Self-Flare	SS	2.7 (69)	1.1 (27.9)
7-16 DIN Female	Bulk Head	**L4PDF-BH**	Solder	Self-Flare	SS	2.73 (69.4)	1.62 (41.1)
7-16 DIN Female	Bulk Head	**L4PDF-BHC**	Captivated	Self-Flare	SS	2.9 (74)	1.63 (41.4)
7-16 DIN Female	Panel Mount	**L4PDF-PM**	Solder	Self-Flare	SS	2.7 (69)	1.2 (29.4)
7-16 DIN Female	RingFlare	**L4PDF-RC**	Captivated	RingFlare	SS	2.8 (71)	0.86 (21.8)
7/8" EIA Flange	–	**L44R**	Solder	Self-Flare	BB	3.2 (81)	2.25 (57.2)
7/8" EIA Flange	Right Angle	**124990-1**	Solder	Self-Flare	BB	2.3/1.6 (58/41)	2.25 (57.2)
F Flange Male	–	**L44F**	Solder	Self-Flare	BB	2.3 (58)	2.25 (57.2)
F Flange Female	–	**209865**	Solder	Self-Flare	BS	2.3 (58)	2.25 (57.2)
UHF Male	–	**L44P**	Solder	Self-Flare	BB	2.3 (58)	0.91 (23.1)
UHF Female	–	**L44U**	Solder	Self-Flare	BS	2.3 (58)	0.91 (23.1)
HN Male	–	**L44J**	Solder	Self-Flare	BB	2.5 (64)	0.91 (23.1)
LC Male	–	**L44M**	Solder	Self-Flare	BB	3.6 (91)	0.91 (23.1)
TNC Female	–	**L44NT**	Solder	Self-Flare	BB	2.8 (71)	0.94 (23.9)
End Terminal	–	**L44T**	Solder	Self-Flare	BB	4.0 (102)	0.91 (23.1)
Splice	–	**L44Z**	Solder	Self-Flare	BB	3.2 (81)	1.1 (27.9)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19mm) long	**31769-5**
1" (25mm) long	**31769-1**
Standard Hoisting Grip	**43094**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL4-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL4-15B4**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Cold Shrink Weatherproofing Kit	
1/2" Coax N Connector to 1/2" Coax N Connector	**241474-4**
5/8" Coax to 1/2" Coax	**242475-13**
7/8" Coax to 1/2" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 1/2" Coax	**241475-5A**
2-1/4" Coax to 1/2" Coax	**241475-8**
1/2" to 1-1/2" Omni/Panel base Type N or DIN	**241548-8**
1/2" LDF4 to Antenna Type N interface	**241548-4**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623.	
EASIAX® Cutting Tool	**207866**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1/2" Air Dielectric, High Power High Temperature, HLT Series – *50-ohm*

HLT4-50T

Description	Type No.

Cable Ordering Information

Plenum Cable	
1/2" Fire Retardant Cable, Fire Retardant Jacket (CATVP, UL910)	**HLT4-50T**

Characteristics

Electrical	
Impedance, ohms	52.5 ± 2
Maximum Frequency, GHz	4.0
Velocity, percent	93.0
Peak Power Rating, kW	21.4
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.45 (1.48)
Outer	0.58 (1.90)
dc Breakdown, volts	3000
Capacitance, pF/ft (m)	20.4 (66.8)
Inductance, µH/ft (m)	0.058 (0.191)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.61 (15.5)
Diameter over Copper Outer Conductor, in (mm)	0.55 (14)
Diameter Inner Conductor, in (mm)	0.189 (4.8)
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	10 (15)
Bending Moment, lb-ft (N•m)	3.0 (4.1)
Cable Weight, lb/ft (kg/m)	0.18 (0.27)
Tensile Strength, lb (kg)	250 (114)
Flat Plate Crush, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.047	0.153	21.4
1	0.066	0.217	21.4
1.5	0.081	0.266	21.4
2	0.094	0.308	21.4
10	0.213	0.700	21.4
20	0.305	1.00	15.7
30	0.377	1.24	12.7
50	0.494	1.62	9.72
88	0.669	2.20	7.18
100	0.718	2.35	6.70
108	0.748	2.45	6.42
150	0.896	2.94	5.36
174	0.973	3.19	4.94
200	1.05	3.45	4.57
300	1.32	4.34	3.64
400	1.56	5.12	3.08
450	1.67	5.48	2.88
500	1.78	5.83	2.70
512	1.80	5.91	2.67
600	1.98	6.50	2.43
700	2.17	7.12	2.22
800	2.35	7.72	2.04
824	2.40	7.86	2.01
894	2.52	8.26	1.91
960	2.63	8.63	1.83
1000	2.70	8.85	1.78
1250	3.10	10.2	1.55
1500	3.48	11.4	1.38
1700	3.77	12.4	1.28
1800	3.91	12.8	1.23
2000	4.18	13.7	1.15
2100	4.32	14.2	1.11
2200	4.45	14.6	1.08
2300	4.58	15.0	1.05
3000	5.47	17.9	0.881
3400	5.95	19.5	0.809
4000	6.65	21.8	0.724

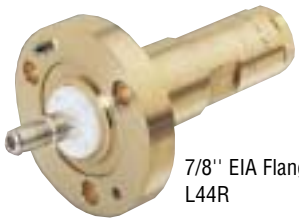
Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 200°C (392°F), no solar loading.

N Male
L4PNM-RC

N Female
L4PNF-RC

7-16 DIN Male
L4PDM-RC

7-16 DIN Female
L4PDF-RC



7/8'' EIA Flange
L44R

UHF Male
L44P

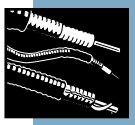
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**L4PNM-H**	Solder	Self-Flare	SG	2.6 (66)	0.95 (24.1)
N Male	RingFlare	**L4PNM-RC**	Captivated	RingFlare	SG	3.0 (75.7)	0.86 (21.8)
N Male	Right Angle, Hex	**L4PNR-H**	Solder	Self-Flare	SG	3.2/1.5 (81/38)	0.95 (24.1)
N Male	Right Angle	**L4PNR-HC**	Captivated	Self-Flare	SG	3.2/1.5 (81/38)	0.91 (23.1)
N Female	–	**L4PNF**	Solder	Self-Flare	SG	2.6 (66)	0.94 (23.9)
N Female	Bulk Head	**L4PNF-BH**	Solder	Self-Flare	SG	2.6 (66)	0.96 (24.4)
N Female	Panel Mount	**L4PNF-PM**	Solder	Self-Flare	SG	2.6 (66)	1.0 (25.4)
N Female	RingFlare	**L4PNF-RC**	Captivated	RingFlare	SG	2.8 (71)	0.86 (21.8)
7-16 DIN Male	–	**L4PDM**	Solder	Self-Flare	SS	2.6 (66)	1.4 (35.6)
7-16 DIN Male	Right Angle	**L4PDR**	Solder	Self-Flare	SS	1.8/2.8 (46/72)	1.41 (35.9)
7-16 DIN Male	Right Angle	**L4PDR-C**	Captivated	Self-Flare	SS	1.8/2.8 (46/72)	1.41 (35.9)
7-16 DIN Male	RingFlare	**L4PDM-RC**	Captivated	RingFlare	SS	2.64 (67.1)	0.86 (21.8)
7-16 DIN Female	–	**L4PDF**	Solder	Self-Flare	SS	2.7 (69)	1.1 (27.9)
7-16 DIN Female	Bulk Head	**L4PDF-BH**	Solder	Self-Flare	SS	2.73 (69.4)	1.62 (41.1)
7-16 DIN Female	Bulk Head	**L4PDF-BHC**	Captivated	Self-Flare	SS	2.9 (74)	1.63 (41.4)
7-16 DIN Female	Panel Mount	**L4PDF-PM**	Solder	Self-Flare	SS	2.7 (69)	1.2 (29.4)
7-16 DIN Female	RingFlare	**L4PDF-RC**	Captivated	RingFlare	SS	2.8 (71)	0.86 (21.8)
7/8" EIA Flange	–	**L44R**	Solder	Self-Flare	BB	3.2 (81)	2.25 (57.2)
7/8" EIA Flange	Right Angle	**124990-1**	Solder	Self-Flare	BB	2.3/1.6 (58/41)	2.25 (57.2)
F Flange Male	–	**L44F**	Solder	Self-Flare	BB	2.3 (58)	2.25 (57.2)
F Flange Female	–	**209865**	Solder	Self-Flare	BS	2.3 (58)	2.25 (57.2)
UHF Male	–	**L44P**	Solder	Self-Flare	BB	2.3 (58)	0.91 (23.1)
UHF Female	–	**L44U**	Solder	Self-Flare	BS	2.3 (58)	0.91 (23.1)
HN Male	–	**L44J**	Solder	Self-Flare	BB	2.5 (64)	0.91 (23.1)
LC Male	–	**L44M**	Solder	Self-Flare	BB	3.6 (91)	0.91 (23.1)
TNC Female	–	**L44NT**	Solder	Self-Flare	BB	2.8 (71)	0.94 (23.9)
End Terminal	–	**L44T**	Solder	Self-Flare	BB	4.0 (102)	0.91 (23.1)
Splice	–	**L44Z**	Solder	Self-Flare	BB	3.2 (81)	1.1 (27.9)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Standard Hoisting Grip	**43094**

Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.

SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL4-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL4-15B4**

Accessories

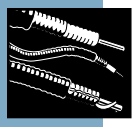
Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Cold Shrink Weatherproofing Kit	
1/2" Coax N Connector to 1/2" Coax N Connector	**241474-4**
5/8" Coax to 1/2" Coax	**242475-13**
7/8" Coax to 1/2" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 1/2" Coax	**241475-5A**
2-1/4" Coax to 1/2" Coax	**241475-8**
1/2" to 1-1/2" Omni/Panel base Type N or DIN	**241548-8**
1/2" LDF4 to Antenna Type N interface	**241548-4**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623.

EASIAX® Cutting Tool	**207866**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



1/2" Air Dielectric, Plenum Rated (CATVP), HS Series – *50-ohm*

HS4RP-50

Description	Type No.
Cable Ordering Information	
Plenum Cable	
1/2" Fire Retardant Cable	**HS4RP-50**

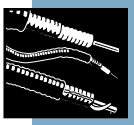
Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	10.2
Velocity, percent	81
Peak Power Rating, kW	15.6
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.87 (2.85)
Outer	1.00 (3.28)
dc Breakdown, volts	2500
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	25.04 (82.16)
Inductance, µH/ft (m)	0.063 (0.206)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.52 (13.2)
Diameter over Copper Outer Conductor, in (mm)	0.48 (12.2)
Minimum Bending Radius, in (mm)	1.25 (32)
Number of Bends, minimum	20 (50)
Bending Moment, lb-ft (N•m)	4.5 (6.12)
Cable Weight, lb/ft (kg/m)	0.138 (0.205)
Tensile Strength, lb (kg)	175 (80)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (1.9)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.065	0.214	15.6
1	0.092	0.303	15.6
1.5	0.113	0.372	15.0
2	0.131	0.429	13.0
10	0.294	0.965	5.77
20	0.417	1.37	4.07
30	0.512	1.68	3.31
50	0.664	2.18	2.55
88	0.887	2.91	1.91
100	0.947	3.11	1.79
108	0.985	3.23	1.72
150	1.17	3.83	1.46
174	1.26	4.13	1.35
200	1.35	4.44	1.25
300	1.67	5.48	1.02
400	1.94	6.37	0.874
450	2.07	6.78	0.821
500	2.19	7.17	0.777
512	2.21	7.26	0.767
600	2.41	7.90	0.705
700	2.61	8.57	0.650
800	2.81	9.21	0.605
824	2.85	9.35	0.595
894	2.98	9.77	0.570
960	3.09	10.2	0.549
1000	3.16	10.4	0.537
1250	3.57	11.7	0.476
1500	3.94	12.9	0.431
1700	4.22	13.9	0.402
1800	4.36	14.3	0.390
2000	4.62	15.2	0.368
2100	4.75	15.6	0.358
2200	4.87	16.0	0.349
2300	4.99	16.4	0.340
3000	5.79	19.0	0.293
3400	6.22	20.4	0.273
4000	6.82	22.4	0.249
5000	7.76	25.5	0.219
6000	8.63	28.3	0.197
8000	10.2	33.6	0.166
10000	11.7	38.4	0.145
10200	11.8	38.8	0.144

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

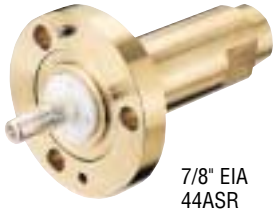


N Male
F4PNMV2-H

N Female Bulkhead
F4PNF-BH

UHF Male
44ASP

N Male Right Angle
F4PNR-H



7/8" EIA
44ASR

7-16 DIN Female
F4PDF-C

7-16 DIN Male
F4PDMV2-C

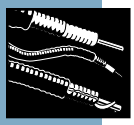
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F4PNMV2-H**	Solder	Crush-Flare	SG	2.13 (54.0)	0.94 (23.8)
N Male	Hex Head	**F4PNMV2-HC**	Captivated	Crush-Flare	SG	2.13 (54.0)	0.94 (23.8)
N Male	Rt Angle, Hex Hd	**F4PNR-H**	Solder	Tab-Flare	SG	3.3/1.5 (84/38)	0.86 (21.8)
N Male		**F4PNR-HC**	Captivated	Crush-Flare	SG	2.8 (71.9)/1.6 (41.5)	1 (25.7)
N Female	–	**F4PNF**	Solder	Self-Flare	SG	2.3 (53.3)	0.88 (22.4)
N Female	–	**F4PNF-C**	Captivated	Self-Flare	SG	2.3 (53.3)	0.88 (22.4)
N Female	Bulkhead	**F4PNF-BH**	Solder	Self-Flare	SG	2.3 (58)	0.95 (24.1)
4.1/9.5 DIN Male	–	**F4PKM-C**	Captivated	Self-Flare	SS	2.0 (50)	0.95 (24.1)
4.1/9.5 DIN Male	Rt Angle, Outdoor Use	**F4PKR-C**	Captivated	Self-Flare	SS	2.3/1.5 (57/38)	0.95 (24.1)
7-16 DIN Male	–	**F4PDMV2-C**	Captivated	Crush-Flare	SS	1.98 (50.2)	1.05 (26.7)
7-16 DIN Male	–	**F4PDMV2**	Solder	Crush-Flare	SS	2.10 (53.4)	1.05 (26.7)
7-16 DIN Male	Right Angle	**F4PDR**	Solder	Self-Flare	SS	2.4.1.8 (61/46)	1.4 (35.6)
7-16 DIN Male	Right Angle	**F4PDR-C**	Captivated	Self-Flare	SS	2.1/2.0 (53/50)	1.4 (35.6)
7-16 DIN Female	–	**F4PDF-C**	Captivated	Self-Flare	SS	2.0 (50)	1.1 (27.9)
7-16 DIN Female	–	**F4PDF**	Solder	Self-Flare	SS	2.0 (50)	1.1 (27.9)
7-16 DIN Female	Bulkhead	**F4PDF-BH**	Solder	Self-Flare	SS	2.01 (51.1)	1.50 (38)
7-16 DIN Female	Panel Mount	**F4PDF-PM**	Solder	Self-Flare	SS	2.01 (51.1)	1.26 (32)
7-16 DIN Female	Bulkhead	**F4PDF-BHC**	Captivated	Self-Flare	SS	2.0 (50)	1.8 (45.7)
7-16 DIN Female	Panel Mount	**F4PDF-PMC**	Captivated	Self-Flare	SS	2.0 (50)	1.3 (33)
7/8" EIA Flange	–	**44ASR**	Solder	Tab-Flare	BS	3.3 (84)	1.4 (35.6)
UHF Male	–	**44ASP**	Solder	Tab-Flare	BS	2.1 (53)	0.84 (21.3)
UHF Female	–	**44ASU**	Solder	Tab-Flare	BS	2.3 (58)	0.84 (21.3)
HN Male	–	**44ASJ**	Solder	Tab-Flare	BB	2.4 (61)	0.84 (21.3)
SC Male	–	**44SPCW**	Solder	Tab-Flare	SG	2.7 (69)	0.88 (22.4)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Accessories

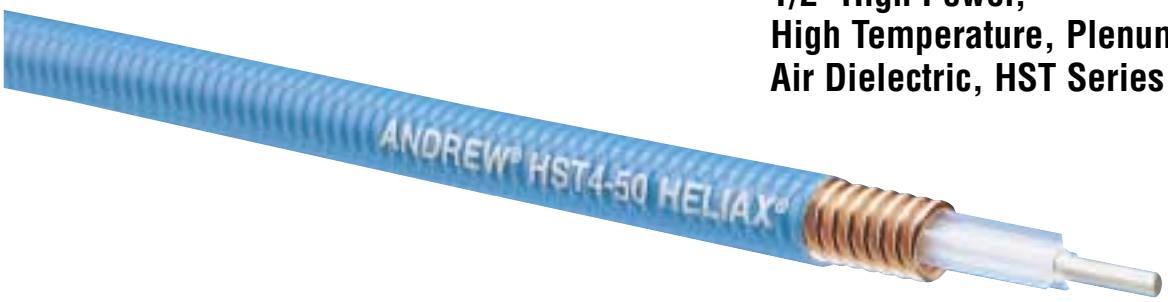
Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Standard Hoisting Grip	**43094**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kits	
Factory attached one-hole lug 24"	**204989-1**
Factory attached two-hole lug 24"	**241088-1**
Field attached two-hole lug 60"	**241545**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619-620.	

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole:	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623.	
EASIAX® Cutting Tool FSJ4/FSJ1	**207865**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

1/2" High Power, High Temperature, Plenum Rated Air Dielectric, HST Series – *50-ohm*



HST4-50

Description	Type No.

Cable Ordering Information

High Power, High Temperature, Plenum Cable	
1/2" Cable	**HST4-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 2
Maximum Frequency, GHz	10.2
Velocity, percent	81
Peak Power Rating, kW	15.6
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.87 (2.85)
Outer	1.00 (3.28)
dc Breakdown, volts	2500
Jacket Spark, volts RMS	4000
Capacitance, pF/ft (m)	25.04 (82.16)
Inductance, µH/ft (m)	0.063 (0.206)

Mechanical	
Outer Conductor	Copper
Inner Conductor	Silver Plated, Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.52 (13.2)
Diameter over Copper Outer Conductor, in (mm)	0.48 (12.2)
Minimum Bending Radius, in (mm)	1.25 (32)
Number of Bends, minimum	20 (50)
Bending Moment, lb-ft (N•m)	4.57 (6.22)
Cable Weight, lb/ft (kg/m)	0.165 (0.245)
Tensile Strength, lb (kg)	175 (80)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (1.9)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.074	0.244	15.6
1	0.105	0.345	15.6
1.5	0.129	0.423	15.6
2	0.149	0.489	15.6
10	0.335	1.10	15.6
20	0.477	1.56	15.6
30	0.586	1.92	15.6
50	0.762	2.50	13.3
88	1.02	3.35	9.92
100	1.09	3.58	9.29
108	1.13	3.72	8.92
150	1.35	4.42	7.52
174	1.46	4.78	6.95
200	1.57	5.14	6.46
300	1.94	6.38	5.21
400	2.27	7.44	4.47
450	2.42	7.93	4.19
500	2.56	8.39	3.96
512	2.59	8.50	3.91
600	2.82	9.27	3.59
700	3.07	10.1	3.30
800	3.31	10.9	3.06
824	3.36	11.0	3.01
894	3.52	11.5	2.88
960	3.66	12.0	2.77
1000	3.74	12.3	2.71
1250	4.24	13.9	2.39
1500	4.71	15.4	2.15
1700	5.05	16.6	2.00
1800	5.22	17.1	1.94
2000	5.55	18.2	1.83
2100	5.71	18.7	1.78
2200	5.86	19.2	1.73
2300	6.02	19.7	1.68
3000	7.04	23.1	1.44
3400	7.58	24.9	1.34
4000	8.36	27.4	1.21
5000	9.57	31.4	1.06
6000	10.7	35.1	0.947
8000	12.8	42.1	0.790
10000	14.8	48.6	0.685
10200	15.0	49.2	0.676

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 200°C (392°F), no solar loading.

N Male
F4PNMV2-H

N Female Bulkhead
F4PNF-BH

UHF Male
44ASP

N Male Right Angle
F4PNR-H

7/8" EIA
44ASR

7-16 DIN Female
F4PDF-C

7-16 DIN Male
F4PDMV2-C

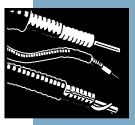
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Hex Head	**F4PNMV2-H**	Solder	Crush-Flare	SG	2.13 (54.0)	0.94 (23.8)
N Male	Hex Head	**F4PNMV2-HC**	Captivated	Crush-Flare	SG	2.13 (54.0)	0.94 (23.8)
N Male	Rt Angle, Hex Hd	**F4PNR-H**	Solder	Tab-Flare	SG	3.3/1.5 (84/38)	0.86 (21.8)
N Male		**F4PNR-HC**	Captivated	Crush-Flare	SG	2.8 (71.9)/1.6 (41.5)	1 (25.7)
N Female	–	**F4PNF**	Solder	Self-Flare	SG	2.3 (53.3)	0.88 (22.4)
N Female	–	**F4PNF-C**	Captivated	Self-Flare	SG	2.3 (53.3)	0.88 (22.4)
N Female	Bulkhead	**F4PNF-BH**	Solder	Self-Flare	SG	2.3 (58)	0.95 (24.1)
4.1/9.5 DIN Male	–	**F4PKM-C**	Captivated	Self-Flare	SS	2.0 (50)	0.95 (24.1)
4.1/9.5 DIN Male	Rt Angle, Outdoor Use	**F4PKR-C**	Captivated	Self-Flare	SS	2.3/1.5 (57/38)	0.95 (24.1)
7-16 DIN Male	–	**F4PDMV2-C**	Captivated	Crush-Flare	SS	1.98 (50.2)	1.05 (26.7)
7-16 DIN Male	–	**F4PDMV2**	Solder	Crush-Flare	SS	2.10 (53.4)	1.05 (26.7)
7-16 DIN Male	Right Angle	**F4PDR**	Solder	Self-Flare	SS	2.4.1.8 (61/46)	1.4 (35.6)
7-16 DIN Male	Right Angle	**F4PDR-C**	Captivated	Self-Flare	SS	2.1/2.0 (53/50)	1.4 (35.6)
7-16 DIN Female	–	**F4PDF-C**	Captivated	Self-Flare	SS	2.0 (50)	1.1 (27.9)
7-16 DIN Female	–	**F4PDF**	Solder	Self-Flare	SS	2.0 (50)	1.1 (27.9)
7-16 DIN Female	Bulkhead	**F4PDF-BH**	Solder	Self-Flare	SS	2.01 (51.1)	1.50 (38)
7-16 DIN Female	Panel Mount	**F4PDF-PM**	Solder	Self-Flare	SS	2.01 (51.1)	1.26 (32)
7-16 DIN Female	Bulkhead	**F4PDF-BHC**	Captivated	Self-Flare	SS	2.0 (50)	1.8 (45.7)
7-16 DIN Female	Panel Mount	**F4PDF-PMC**	Captivated	Self-Flare	SS	2.0 (50)	1.3 (33)
7/8" EIA Flange	–	**44ASR**	Solder	Tab-Flare	BS	3.3 (84)	1.4 (35.6)
UHF Male	–	**44ASP**	Solder	Tab-Flare	BS	2.1 (53)	0.84 (21.3)
UHF Female	–	**44ASU**	Solder	Tab-Flare	BS	2.3 (58)	0.84 (21.3)
HN Male	–	**44ASJ**	Solder	Tab-Flare	BB	2.4 (61)	0.84 (21.3)
SC Male	–	**44SPCW**	Solder	Tab-Flare	SG	2.7 (69)	0.88 (22.4)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories – See page 624

Factory Attached Connectors – For factory made cable assemblies and jumper cables, see pages 584-587.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Standard Hoisting Grip	**43094**

Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.

Standard Grounding Kits	
Factory attached one-hole lug 24"	**204989-1**
Factory attached two-hole lug 24"	**241088-1**
Field attached one-hole lug 36"	**204989-21**
Field attached two-hole lug 60"	**241545**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole:	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623.

EASIAX® Cutting Tool FSJ4/FSJ1	**207865**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

5/8" Air Dielectric, HJ Series – *50-ohm*

HJ4.5-50

Description	Type No.
Cable Ordering Information	
Standard and Fire Retardant Cables	
5/8" Standard Cable, Standard Jacket	**HJ4.5-50**
5/8" Fire Retardant Jacket (CATVR)	**HJ4.5RN-50**
Low VSWR and Specialized Cables	
5/8" Low VSWR, specify operating band	**HJ4.5P-50-(**)**
Cable for Cellular, standard jacket	
824-960 MHz, 1.20 VSWR, max.	**HJ4.5P-50-1**
880-960 MHz, 1.10 VSWR, max.	**HJ4.5P-50-2**

** Insert suffix number from "Low VSWR Specifications" table.

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	6.6
Velocity, percent	92
Peak Power Rating, kW	40
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.41 (1.35)
Outer	0.23 (0.75)
dc Breakdown, volts	4000
Jacket Spark, volts RMS	5500
Capacitance, pF/ft (m)	22.3 (73.2)
Inductance, µH/ft (m)	0.056 (0.182)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	0.875 (22.2)
Diameter over Copper Outer Conductor, in (mm)	0.775 (19.7)
Diameter Inner Conductor, in (mm)	0.272 (6.9)
Nominal Inside Transverse Dimensions (cm)	1.51
Minimum Bending Radius, in (mm)	7 (180)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	16 (21.7)
Cable Weight, lb/ft (kg/m)	0.40 (0.59)
Tensile Strength, lb (kg)	750 (340)
Flat Plate Crush Strength, lb/in (kg/mm)	250 (4.5)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.034	0.110	40.0
1	0.048	0.156	40.0
1.5	0.058	0.192	40.0
2	0.067	0.221	35.30
10	0.152	0.497	15.64
20	0.215	0.706	10.98
30	0.264	0.867	8.94
50	0.343	1.12	6.90
88	0.457	1.50	5.17
100	0.488	1.60	4.84
108	0.508	1.67	4.65
150	0.602	1.98	3.92
200	0.699	2.29	3.38
300	0.863	2.83	2.73
400	1.00	3.29	2.35
450	1.07	3.51	2.20
500	1.13	3.71	2.09
600	1.24	4.09	1.89
700	1.35	4.43	1.74
800	1.45	4.76	1.62
824	1.47	4.85	1.59
894	1.54	5.05	1.52
960	1.60	5.25	1.47
1000	1.64	5.37	1.43
1250	1.85	6.07	1.27
1500	2.04	6.70	1.16
2000	2.40	7.86	0.986
3000	3.01	9.89	0.784
4000*	3.55	11.6	0.665
5000	4.04	13.3	0.585
6000	4.49	14.8	0.525
6600	4.75	15.6	0.496

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power. VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.
* Operation of this cable in the 4250-4400 MHz band is not recommended because of VSWR spikes produced by the dielectric spacing.

N Male
H4.5PNM

7-16 DIN Male
H4.5PDM

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	–	**H4.5PNM**	Spring Finger	Self Flare	SG	2.6 (66)	1.3 (33)
7-16 DIN Male	–	**H4.5PDM**	Spring Finger	Self Flare	SS	2.8 (71)	1.3 (33)
Splice	–	**85Z**	Self-tapping	Self Flare	BB	3.1 (79)	1.6 (41)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin.

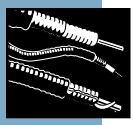
Connector Accessories

	Type Number
Bulkhead Adapter, for N or UHF Females	**26016-2**

Low VSWR Specifications, Type HJ4.5-50-( )

Frequency Band, GHz	Type No.	Using Connector Type**	Assembly VSWR, Maximum (R.L., dB) 1-25 ft (0.3-8 m)	25-100 ft (8-30 m)	100-200 ft (30-60 m)	200-500 ft (60-150 m)	Above 500 ft (150 m)
0.824-0.960	**HJ4.5P-50-1**	N Plug: **H4.5PNM**	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
		7-16 DIN male: **H4.5PDM**	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)	1.20 (20.8)
0.880-0.960	**HJ4.5P-50-2**	N Plug: **H4.5PNM**	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
		7-16 DIN male: **H4.5PDM**	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)	1.10 (26.4)
0.940-2.7	**HJ4.5P-50-3**	N Plug: **H4.5PNM**	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)
		7-16 DIN male: **H4.5PDM**	1.20 (20.8)	1.20 (20.8)	1.25 (19.1)	1.25 (19.1)	1.25 (19.1)
0.010-0.806	**HJ4.5P-50-4**	N Plug: **H4.5PNM**	1.25 (19.1)	1.25 (19.1)	1.30 (17.6)	1.30 (17.6)	1.30 (17.6)
		7-16 DIN male: **H4.5PDM**	1.25 (19.1)	1.25 (19.1)	1.30 (17.6)	1.30 (17.6)	1.30 (17.6)
0.010-2.7	**HJ4.5P-50-5**	N Plug: **H4.5PNM**	1.25 (19.1)	1.25 (19.1.)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)
		7-16 DIN male: **H4.5PDM**	1.25 (19.1)	1.25 (19.1.)	1.35 (16.5)	1.35 (16.5)	1.35 (16.5)
0.010-4.2	**HJ4.5P-50-6**	N Plug: **H4.5PNM**	1.30 (17.6)	1.35 (16.5)	1.40 (15.6)	1.50 (19.9)	1.50 (19.9)
		7-16 DIN male: **H4.5PDM**	1.30 (17.6)	1.35 (16.5)	1.40 (15.6)	1.50 (19.9)	1.50 (19.9)
4.4-6.6	**HJ4.5P-50-7**	N Plug: **H4.5PNM**	1.30 (17.6)	1.35 (16.5)	1.40 (15.6)	1.50 (19.9)	1.50 (19.9)
		7-16 DIN male: **H4.5PDM**	1.30 (17.6)	1.35 (16.5)	1.40 (15.6)	1.50 (19.9)	1.50 (19.9)

* Connectors ordered separately.
VSWR values are guaranteed for factory fit assemblies and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.



Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3 ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**42396A-9**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Snap-in Hangers Kit of 10. For prepunched 3/4" (19 mm) holes on tower member or adapters. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, page 593-598.	**206706-6**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft. Mounting Hardware see page 605	**L45CLICK**
Standard Hoisting Grip	**29958**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL45-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL45-06B2**
Field attached two hole lug, 1500 mm (59") lead	**SGL45-15B4**
Standard Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 24" (610 mm) lead	**204989-2**
Factory attached two-hole lug, 24" (610 mm) lead	**241088-2**
Field attached two hole lug, 59" (1500 mm) lead	**220497**
Weatherproofing – for additional weatherproofing information see pages 617-618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619-620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-13**	**48939A-14**
Three Hole:	**204679A-14**	**48939A-15**

7/8" Air Dielectric, HJ Series – *50-ohm*

HJ5-50

Description	Type No.

Cable Ordering Information

Standard and Fire Retardant Cables	
Maximum VSWR 1.20 (824-960 and 1850-1990 MHz)	
7/8" Standard Cable, Standard Jacket	**HJ5-50***
7/8" Fire Retardant Jacket (CATVP)	**HJ5RP-50***
7/8" Fire Retardant Jacket (CATVR)	**HJ5RN-50***
Low VSWR and Specialized Cables	
7/8" Low VSWR, specify operating band	**HJ5P-50-(**)**
Cable for Cellular, standard jacket	
824-960 or 1850-1990 MHz, 1.10 VSWR, max.	**25831-7**

* For broadcast applications, specify channel and frequency.
**Insert suffix number from "Low VSWR Specifications" table, page 557.

Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	5.2
Velocity, percent	91.6
Peak Power Rating, kW	90
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.25 (0.82)
Outer	0.20 (0.66)
dc Breakdown, volts	6000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	22.2 (72.8)
Inductance µH/ft (m)	0.055 (0.180)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	1.11 (28.2)
Diameter over Copper Out Conductor, in (mm)	1.01 (25.7)
Diameter Inner Conductor, in (mm)	0.359 (9.1)
Nominal Inside Transverse Dimensions (cm)	2.02
Minimum Bending Radius, in (mm)	10 (250)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	25 (34)
Cable Weight, lb/ft (kg/m)	0.54 (0.80)
Tensile Strength, lb (kg)	800 (360)
Flat Plate Crush Strength, lb/in (kg/mm)	250 (4.5)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0250	0.0822	90.0
1	0.0355	0.116	78.4
1.5	0.0435	0.143	63.9
2	0.0503	0.165	55.3
10	0.113	0.372	24.5
20	0.161	0.529	17.3
30	0.198	0.651	14.0
50	0.258	0.846	10.8
88	0.346	1.13	8.05
100	0.369	1.21	7.53
108	0.385	1.26	7.23
150	0.457	1.50	6.09
174	0.494	1.62	5.63
200	0.532	1.75	5.23
300	0.661	2.17	4.21
400	0.772	2.53	3.60
450	0.823	2.70	3.38
500	0.871	2.86	3.19
512	0.883	2.90	3.15
600	0.963	3.16	2.89
700	1.05	3.44	2.65
800	1.13	3.71	2.46
824	1.15	3.77	2.42
894	1.20	3.94	2.31
960	1.25	4.11	2.22
1000	1.28	4.20	2.17
1250	1.45	4.77	1.91
1500	1.61	5.29	1.72
1700	1.73	5.69	1.60
2000	1.91	6.26	1.46
2300	2.07	6.79	1.34
3000†	2.43	7.96	1.15
4000	2.89	9.48	0.963
5000	3.32	10.9	0.839
5200	3.40	11.2	0.818

Standard Conditions:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For average Power. VSWR 1.0 inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.
† Contact Andrew for information on operation in the 3050-3200 MHz band.

N Female
H5PNF

N Female
H5NF-T

7/8" EIA Flange
75AR

7-16 DIN Male
H5PDM

7-16 DIN Female
H5PDF

N Male
H5PNM

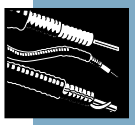
Connectors

Interface	Description	Type Number	Reference*	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	–	**H5PNM**	–	Self-tapping	Tab Flare	SG	3.5 (89)	1.4 (36)
N Male	Tunable	**H5NM-T**	–	Self-tapping	Tab Flare	BB	8.5 (216)	1.4 (36)
N Female	–	**H5PNF**	–	Self-tapping	Tab Flare	SG	3.4 (86)	1.4 (36)
N Female	Tunable	**H5NF-T**	–	Self-tapping	Tab Flare	BB	8.2 (208)	1.4 (36)
7-16 DIN Male	–	**H5PDM**	–	Spring Finger	Tab Flare	SS	2.8 (71)	1.4 (36)
7-16 DIN Female	–	**H5PDF**	–	Spring Finger	Tab Flare	SS	2.8 (71)	1.4 (36)
7/8" EIA Flange	Gas Pass	**75AR**	–	Self-tapping	Tab Flare	BB	3.7 (94)	2.25 (57)
7/8" EIA Flange	Gas Pass, Tunable	**75ART**	–	Self-tapping	Tab Flare	BB	5.9 (150)	2.25 (57)
7/8" EIA Flange	Gas Barrier	**H5MB-014**	75AG	Self-tapping	Tab Flare	BB	3.7 (94)	2.25 (57)
7/8" EIA Flange	Gas Barrier, Tunable	**75AGT**	–	Self-tapping	Tab Flare	BB	5.9 (150)	2.25 (57)
1-5/8" EIA Flange	Gas Pass/Barrier	**H5MPB-110**	–	Self-tapping	Tab Flare	BS	5.2 (132)	3.5 (89)
UHF Female		**75AU**	–	Self-tapping	Tab Flare	BS	3.4 (86)	1.4 (36)
LC Male		**75AM**	–	Self-tapping	Tab Flare	BB	5.0 (127)	1.4 (36)
End Terminal		**75AT**	–	Self-tapping	Tab Flare	BB	5.1 (130)	1.4 (36)
Splice		**75AZ**	–	Self-tapping	Tab Flare	BB	4.2 (107)	1.4 (36)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin
* Previous Type Number.

Connector Accessories

	Type Number
Connector Reattachment Kit	
For H5PNF, H5PNM, 75AR, 75PN, 75PW	**34767A-3**
For 75AG, 75AU	**34767A-5**
For 75ART, 75AGT	**34767A-44**
For H5NF-T, 75NT	**34767A-18**
Bulkhead Adapter, for N or UHF Females	**26016-2**
90°, 7/8" EIA Miter Elbow, includes one inner connector	**1060A**



Terrestrial Microwave – Low VSWR Specifications

Frequency Band, GHz	Type Number	Recommended Connectors 7/8" EIA No Gas Barrier	7/8" EIA Gas Barrier	Type N Plug	Type N Jack	VSWR, max. (R.L.)
1.7-1.9	**HJ5P-50-17L**	75ART	75AGT	H5NM-T	H5NF-T	1.08 (28.3)
1.85-1.99	**HJ5P-50-18**	75ART	75AGT	H5NM-T	H5NF-T	1.08 (28.3)
2.11-2.2	**HJ5P-50-21**	75ART	75AGT	H5NM-T	H5NF-T	1.08 (28.3)
1.7-2.11	**HJ5P-50-17**	75ART	75AGT	H5NM-T	H5NF-T	1.08 (28.3)
1.9-2.3	**HJ5P-50-19**	75ART	75AGT	H5NM-T	H5NF-T	1.08 (28.3)
2.3-2.7	**HJ5P-50-23W**	75ART	75AGT	H5NM-T	H5NF-T	1.08 (28.3)
3.625-4.2	**HJ5P-50-36**	–	–	H5PNM	H5PNF	1.20 (20.8)

VSWR values are guaranteed for factory fit assemblies and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

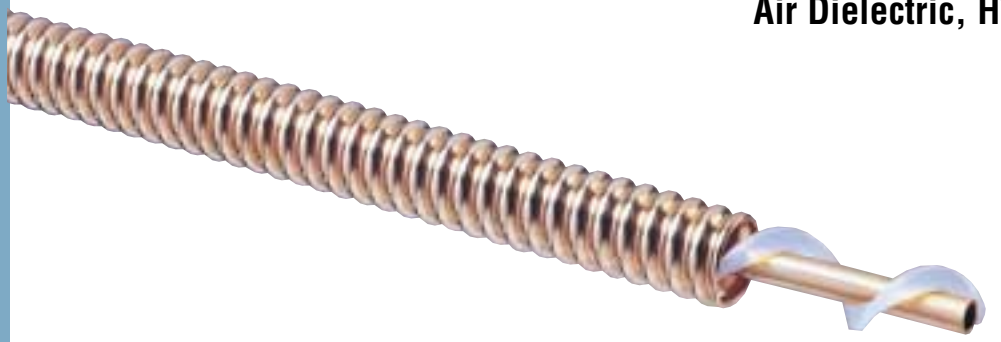
Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3 ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**42396A-5**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). Mounting Hardware see page 605.	**L5CLICK**
Standard Hoisting Grip	**19256B**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600mm (24") lead	**SGL5-06B1**
Factory attached two-hole lug, 600mm (24") lead	**SGL5-06B2**
Field attached two hole lug, 2000mm (79") lead	**SGL5-20B4**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619, 620.	

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-2**	**48939A-1**
Two Hole:	**204679A-18**	–
Three Hole:	**204679A-15**	**48939A-2**

7/8" High Power, High Temperature, Air Dielectric, HT Series – *50-ohm*



HT5-50

Description	Type No.
Cable Ordering Information	
Standard Cable	
7/8" Standard Cable, Unjacketed	**HT5-50**

Characteristics

Electrical	
Impedance, ohms	50 ± 1
Maximum Frequency, GHz	5.2
Velocity, percent	92.5
Peak Power Rating, kW	90
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.25 (0.82)
Outer	0.20 (0.66)
dc Breakdown, volts	6000
Capacitance, pF/ft (m)	21.7 (71.2)
Inductance, µH/ft (m)	0.055 (0.182)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper Tube
Diameter over Copper Outer Conductor, in (mm)	1.01 (25.5)
Minimum Bending Radius, in (mm)	10 (250)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	29 (39.3)
Cable Weight, lb/ft (kg/m)	0.45 (0.67)
Tensile Strength, lb (kg)	800 (360)
Flat Plate Crush Strength, lb/in (kg/mm)	240 (4.3)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0253	0.0829	90.0
1	0.0360	0.118	90.0
1.5	0.0442	0.145	90.0
2	0.0512	0.168	90.0
10	0.118	0.387	59.2
20	0.171	0.561	40.8
30	0.213	0.698	32.7
50	0.282	0.925	24.7
88	0.389	1.28	17.9
100	0.419	1.38	16.6
108	0.438	1.44	15.9
150	0.532	1.75	13.1
174	0.581	1.91	11.9
200	0.632	2.07	11.0
300	0.813	2.67	8.59
400	0.972	3.19	7.18
450	1.05	3.44	6.65
500	1.12	3.69	6.21
512	1.14	3.74	6.11
600	1.26	4.15	5.52
700	1.40	4.59	4.99
800	1.53	5.03	4.55
824	1.56	5.13	4.47
894	1.65	5.42	4.23
960	1.73	5.69	4.03
1000	1.78	5.85	3.92
1250	2.08	6.84	3.34
1500	2.37	7.77	2.94
1700	2.59	8.50	2.20
2000	2.91	9.56	1.51
2300	3.24	10.6	1.49
3000†	3.95	13.0	1.46
4000	4.91	16.1	1.42
5000	5.84	19.2	1.19
5200	6.02	19.8	1.16

Standard Conditions:
For Attenuation. VSWR 1.0, ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For average power, VSWR 1.0 inner temperature 200°C (392°F), ambient temperature 40°C (104°F) atmospheric pressure, dry air, no solar loading.
† Operation of this cable in the 3550-3700 MHz band is not recommended because of VSWR spikes produced by the dielectric section spacing.

N Female
H5PNF

7-16 DIN Male
H5PDM

7-16 DIN Female
H5PDF

7/8" EIA Flange
75AR

N Male
H5PNM

Connectors

Interface	Description	Type Number	Reference*	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	–	**H5PNM**	–	Self-tapping	Tab Flare	SG	3.5 (89)	1.4 (36)
N Female	Tunable	**H5NF-T**	–	Self-tapping	Tab Flare	BB	8.2 (208)	1.4 (36)
7-16 DIN Male	–	**H5PDM**	–	Spring Finger	Tab Flare	SS	2.8 (71)	1.4 (36)
7-16 DIN Female	–	**H5PDF**	–	Spring Finger	Tab Flare	SS	2.8 (71)	1.4 (36)
7/8" EIA Flange	Gas Pass	**75AR**	–	Self-tapping	Tab Flare	BB	3.7 (94)	2.25 (57)
7/8" EIA Flange	Gas Barrier	**H5MB-014**	75AG	Self-tapping	Tab Flare	BB	3.7 (94)	2.25 (57)
UHF Female		**75AU**	–	Self-tapping	Tab Flare	BS	3.4 (86)	1.4 (36)
LC Male		**75AM**	–	Self-tapping	Tab Flare	BB	5.0 (127)	1.4 (36)
End Terminal		**75AT**	–	Self-tapping	Tab Flare	BB	5.1 (130)	1.4 (36)
Splice		**75AZ**	–	Self-tapping	Tab Flare	BB	4.2 (107)	1.4 (36)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin
* Previous Type Number.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3 ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**42396A-5**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Standard Hoisting Grip	**19256B**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL5-06B2**
Field attached two hole lug, 1500 mm (59") lead	**SGL5-15B4**

Connector Accessories

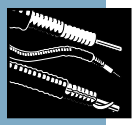
	Type Number
Connector Reattachment Kit	
For H5PNF, H5PNM, 75AR, 75PN, 75PW	**34767A-3**
For 75AG, 75AU	**34767A-5**
For 75ART, 75AGT	**34767A-44**
For H5NF-T, 75NT	**34767A-18**
Bulkhead Adapter, for N or UHF Females	**26016-2**
90°, 7/8" EIA Miter Elbow, includes one inner connector	**1060A**

Accessories

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-2**	**48939A-1**
Two Hole:	**204679A-18**	–
Three Hole:	**204679A-15**	**48939A-2**



1-5/8" Air Dielectric, HJ Series – *50-ohm*

HJ7-50A

Description	Type No.

Cable Ordering Information

Standard and Fire Retardant Cables	
Maximum VSWR 1.20 (824-960 and 1850-1990 MHz)	
1-5/8" Standard Cable, Standard Jacket	**HJ7-50A**
1-5/8" Fire Retardant Jacket (CATVP)	**HJ7RP-50A**
1-5/8" Fire Retardant Jacket (CATVR)	**HJ7RN-50A**
Enhanced Power Cable	
1-5/8" Cable with Polyolefin Dielectric for 25% increase in power ratings	**27591-101**
Low VSWR and Specialized Cables	
1-5/8" Low VSWR, specify operating band	**HJ7P-50A-(**)**
1-5/8" Low VSWR, specify operating band	**HJ7SP-50A-(**)**
Cable for Cellular, standard jacket	
824-960 or 1850-1990 MHz, 1.10 VSWR, max.	**25816A-33**
Broadcast, Low VSWR	
54-216 MHz, 1.05 VSWR, max. over broadcast channel	
470-740 MHz, 1.08 VSWR, max. over broadcast channel	
740-856 MHz, 1.10 VSWR, max. over broadcast channel	**42140***

* For broadcast applications, specify channel and frequency.
**Insert suffix number from "Low VSWR Specifications" table.

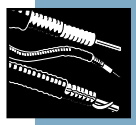
Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	2.7
Velocity, percent	92.1
Peak Power Rating, kW	305
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.22 (0.72)
Outer	0.10 (0.33)
dc Breakdown, volts	11000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.1 (72.4)
Inductance, µH/ft (m)	0.055 (0.181)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	1.98 (50.3)
Diameter over Copper Outer Conductor, in (mm)	1.83 (46.5)
Diameter Inner Conductor, in (mm)	0.713 (18.1)
Nominal Inside Transverse Dimensions (cm)	3.99
Minimum Bending Radius, in (mm)	20 (510)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	30 (40.7)
Cable Weight, lb/ft (kg/m)	1.04 (1.55)
Tensile Strength, lb (kg)	750 (340)
Flat Plate Crush Strength, lb/in (kg/mm)	175 (3.1)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0138	0.0452	243
1	0.0195	0.0641	171.8
1.5	0.0239	0.0785	140.2
2	0.0277	0.0908	121.3
10	0.0623	0.205	53.8
20	0.0887	0.291	37.8
30	0.109	0.358	30.8
50	0.142	0.465	23.7
88	0.190	0.623	17.7
100	0.203	0.666	16.5
108	0.211	0.693	15.9
150	0.251	0.823	13.4
174	0.271	0.890	12.4
200	0.292	0.958	11.5
300	0.363	1.19	9.25
400	0.423	1.39	7.93
450	0.451	1.48	7.44
500	0.478	1.57	7.02
512	0.484	1.59	6.93
600	0.528	1.73	6.36
700	0.575	1.89	5.84
800	0.619	2.03	5.42
824	0.629	2.06	5.33
894	0.658	2.16	5.10
960	0.685	2.25	4.90
1000	0.701	2.30	4.79
1250	0.795	2.61	4.22
1700	0.948	3.11	3.54
2000	1.04	3.42	3.22
2300	1.13	3.71	2.97
2700	1.24	4.08	2.70

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.



N Female
H7PNF

7-16 DIN Male
H7PDM

1-5/8" EIA Flange
87G

7/8" EIA Flange
H7MP-014

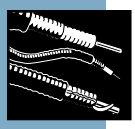
Connectors

Interface	Description	Type Number	Reference*	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	Tunable	**H7NM-T**	–	Tab Flare	Tab Flare	BB	11.6 (295)	2.4 (61)
N Female	–	**H7PNF**	–	Tab Flare	Tab Flare	SG	4.1 (104)	2.4 (61)
N Female	Tunable	**H7NF-T**	–	Tab Flare	Tab Flare	BB	11.4 (290)	2.4 (61)
7-16 DIN Male	–	**H7PDM**	–	Tab Flare	Tab Flare	SS	4.2 (107)	2.7 (69)
7-16 DIN Female	–	**H7PDF**	–	Tab Flare	Tab Flare	SS	4.2 (107)	2.7 (69)
1-5/8" EIA Flange	Gas Pass†	**87R**	–	Tab Flare	Tab Flare	BS	4.8 (122)	3.5 (89)
1-5/8" EIA Flange	Gas Block†	**87G**	–	Tab Flare	Tab Flare	BS	5.7 (145)	3.5 (89)
7/8" EIA Flange	Gas Pass†	**H7MP-014**	**87S**	Tab Flare	Tab Flare	BS	5.6 (142)	2.4 (61)
7/8" EIA Flange	Gas Pass, Tunable†	**87ST**	–	Tab Flare	Tab Flare	BS	11.8 (300)	2.4 (61)
7/8" EIA Flange	Gas Block†	**H7MB-014**	**87SG**	Tab Flare	Tab Flare	BS	5.6 (142)	2.4 (61)
7/8" EIA Flange	Gas Block, Tunable†	**87SGT**	–	Tab Flare	Tab Flare	BS	12.2 (310)	2.4 (61)
LC Female	–	**87L**	–	Tab Flare	Tab Flare	BB	4.9 (124)	2.4 (61)
End Terminal	–	**87T**	–	Tab Flare	Tab Flare	BB	7.0 (178)	2.4 (61)
Splice	–	**87Z**	–	Tab Flare	Tab Flare	BB	5.9 (150)	2.4 (61)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin (inner connector), SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin
* Previous Type Number. † Includes inner.

Connector Accessories

	Type Number
Connector Reattachment Kit	
For 87G, 87R	**34767A-6**
For H7PNF, 87PN, H7MP-014, H7MB-014	**34767A-7**
For 87SGT, 87ST	**34767A-20**
For H7NF-T, H7NM-T, 87NT, 87WT	**34767A-19**
For 87Z	**34767A-13**
7/8" EIA Gas Barrier	**1260A**
1-5/8" EIA Gas Barrier	**1261B**
1-5/8" EIA End Terminal, for strap connection to center conductor, includes inner connector. Use with 87R	**2061**
1-5/8" Inner Connector, with anchor bead	**34660**
1-5/8" EIA 90° Miter Elbow, includes one inner connector	**1061A**



Terrestrial Microwave – Low VSWR Specifications

Frequency Band, GHz	Type Number	Recommended Connectors: 7/8" EIA No Gas Barrier	7/8" EIA Gas Barrier	Type N Plug	Type N Jack	VSWR, max. (R.L.)
P Series						
1.7-1.9	**HJ7P-50A-17L**	87ST	87SGT	H7NM-T	H7NF-T	1.15 (23.1)
1.85-1.99	**HJ7P-50A-18**	H7MP-014*	H7MB-014*	H7NM-T	H7NF-T	1.15 (23.1)
2.11-2.2	**HJ7P-50A-21**	H7MP-014*	H7MB-014*	H7NM-T	H7NF-T	1.15 (23.1)
1.7-2.11	**HJ7P-50A-17**	87ST	87SGT	H7NM-T	H7NF-T	1.15 (23.1)
1.9-2.3	**HJ7P-50A-19**	87ST	87SGT	H7NM-T	H7NF-T	1.15 (23.1)
2.3-2.7	**HJ7P-50A-23W**	87ST	87SGT	H7NM-T	H7NF-T	1.15 (23.1)
SP Series						
1.7-1.9	**HJ7SP-50A-17L**	87ST	87SGT	–	–	1.10 (26.4)
		–	–	H7NM-T	H7NF-T	1.12 (24.8)
1.85-1.99	**HJ7SP-50A-18**	87ST	87SGT	–	–	1.10 (26.4)
		–	–	H7NM-T	H7NF-T	1.12 (24.8)
2.11-2.2	**HJ7SP-50A-21**	87ST	87SGT	–	–	1.10 (26.4)
		–	–	H7NM-T	H7NF-T	1.12 (24.8)
1.7-2.11	**HJ7SP-50A-17**	87ST	87SGT	–	–	1.10 (26.4)
		–	–	H7NM-T	H7NF-T	1.12 (24.8)
1.9-2.3	**HJ7SP-50A-19**	87ST	87SGT	–	–	1.10 (26.4)
		–	–	H7NM-T	H7NF-T	1.12 (24.8)

* Tunable connector may be used.

VSWR values are guaranteed for factory fit assemblies and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3 ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**42396A-2**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). Mounting Hardware see page 605.	**L7CLICK**
Standard Hoisting Grip	**24312A**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL7-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL7-06B2**
Field attached two hole lug, 1500 mm (59") lead	**SGL7-15B4**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619, 620.	

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-4**	**48939A-4**

2-1/4" Air Dielectric, HJ Series – *50-ohm*

HJ12-50

Description	Type No.

Cable Ordering Information

Standard and Fire Retardant Cables	
Maximum VSWR 1.20 (824-960 and 1850-1990 MHz)	
2-1/4" Standard Cable, Standard Jacket	**HJ12-50**
2-1/4" Fire Retardant Jacket (CATVR)	**HJ12RN-50**
Low VSWR and Specialized Cables	
2-1/4" Low VSWR, specify operating band	**HJ12P-50-(**)**
Cable for Cellular, standard jacket	
824-960 MHz 1.10 VSWR, max.	**207760-3**
Broadcast, Low VSWR	
54-216 MHz, 1.05 VSWR, max. over broadcast channel	
470-740 MHz, 1.08 VSWR, max. over broadcast channel	
740-856 MHz, 1.10 VSWR, max. over broadcast channel	**207761***

* For broadcast applications, specify channel and frequency.
**Insert suffix number from "Low VSWR Specifications" table.

Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	2.3
Velocity, percent	93.1
Peak Power Rating, kW	425
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.17 (0.56)
Outer	0.075 (0.25)
dc Breakdown, volts	13000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	21.8 (71.5)
Inductance, µH/ft (m)	0.055 (0.180)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	2.38 (60.4)
Diameter over Copper Outer Conductor, in (mm)	2.23 (56.6)
Diameter Inner Conductor, in (mm)	0.890 (22.6)
Nominal Inside Transverse Dimension (cm)	4.96
Minimum Bending Radius, in (mm)	22 (560)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (N•m)	55 (75)
Cable Weight, lb/ft (kg/m)	1.16 (1.73)
Tensile Strength, lb (kg)	980 (445)
Flat Plate Crush Strength, lb/in (kg/mm)	145 (2.6)

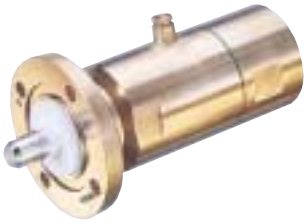
Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0114	0.0375	342
1	0.0162	0.0531	241.2
1.5	0.0198	0.0651	196.8
2	0.0229	0.0752	170.2
10	0.0517	0.170	75.5
20	0.0736	0.242	53.0
30	0.0906	0.297	43.1
50	0.118	0.387	33.1
88	0.158	0.519	24.7
100	0.169	0.555	23.1
108	0.176	0.577	22.2
150	0.209	0.686	18.7
174	0.226	0.743	17.2
200	0.244	0.800	16.0
300	0.303	0.994	12.9
400	0.354	1.16	11.0
450	0.378	1.24	10.3
500	0.400	1.31	9.76
512	0.405	1.33	9.63
600	0.442	1.45	8.82
700	0.482	1.58	8.10
800	0.519	1.70	7.52
824	0.528	1.73	7.39
894	0.553	1.81	7.06
960	0.576	1.89	6.78
1000	0.589	1.93	6.63
1250	0.669	2.20	5.83
1500	0.744	2.44	5.25
1700	0.800	2.62	4.88
2000	0.880	2.89	4.44
2300	0.956	3.14	4.08

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.

N Female
H12PNF

3-1/8" EIA Flange
82GF



1-5/8" EIA Flange
82R

7/8" EIA Flange
82S

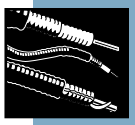
Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Female	–	**H12PNF**	Tab Flare	Tab Flare	SG	4.4 (112)	2.8 (71)
7-16 DIN Male	–	**H12PDM**	Tab Flare	Tab Flare	SS	4.5 (114)	3.1 (79)
3-1/8" EIA Flange	Gas Pass, Female	**82RF**	Tab Flare	Tab Flare	BB	6.9 (175)	5.2
3-1/8" EIA Flange	Gas Barrier, Female	**82GF**	Tab Flare	Tab Flare	BB	6.9 (175)	5.2
1-5/8" EIA Flange	Gas Pass, Male	**82R**	Tab Flare	Tab Flare	BB	4.8 (122)	3.5 (89)
7/8" EIA Flange	Gas Pass, Male	**82S**	Tab Flare	Tab Flare	BB	5.7 (145)	2.8 (71)
Splice	–	**82Z**	Tab Flare	Tab Flare	BB	5.9 (150)	3.4 (86)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin, SS - Silver Plated Body and Pin

Connector Accessories

	Type Number
Connector Reattachment Kit	
For H12PNF, 82PN	**34767A-46**
For 82R	**34767A-47**
For 82RF	**34767A-49**
For 82GF	**34767A-50**
1-5/8" EIA Gas Barrier	**1261B**
1-5/8" EIA End Terminal, for strap connection to center conductor, includes inner connector. Use with 82R	**2061**
1-5/8" Inner Connector, with anchor bead	**34660**
3-1/8" Inner Connector, with anchor bead	**ACX350-20**
3-1/8" EIA 90° Miter Elbow, includes inner conductor	**ACX350-10SE**
1-5/8" EIA 90° Miter Elbow	**ACX150-10SE**
7/8" EIA 90° Miter Elbow	**1060A**



Terrestrial Microwave – Low VSWR Specifications

Frequency Band, GHz	Type Number	Recommended Connectors 7/8" EIA No Gas Barrier	Type N Jack	VSWR, max. (R.L.)
1.7-1.9	**HJ12P-50-17L**	82S	H12PNF	1.15 (23.1)
1.85-1.99	**HJ12P-50-18**	82S	H12PNF	1.15 (23.1)
2.11-2.2	**HJ12P-50-21**	82S	H12PNF	1.15 (23.1)
1.7-2.11	**HJ12P-50-17**	82S	H12PNF	1.15 (23.1)
1.9-2.3	**HJ12P-50-19**	82S	H12PNF	1.15 (23.1)

VSWR values are guaranteed for factory fit assemblies and are typical for field cut lengths. If two different connector interfaces are selected, the higher VSWR value is guaranteed.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**42396A-4**
Hardware Kit of 10. 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Snap-In Hangers Kit of 10. For pre-punched 3/4" (19 mm) holes on tower member or adapters. Standard tower configuration spacing is 3-4 feet. (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**206706-5**
Standard Hoisting Grip	**31535**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL12-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL12-06B2**
Field attached two hole lug, 1500 mm (59") lead	**SGL12-15B4**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-8**	**48939A-9**

3" Air Dielectric, HJ Series – *50-ohm*

HJ8-50B

Description	Type No.

Cable Ordering Information

Standard Cable	
3" Standard Cable, Standard Jacket	**HJ8-50B**
Low VSWR and Specialized Cables	
Cable for Cellular, standard jacket 824-894 MHz, 1.20 VSWR, max.	**209227**
Broadcast, Low VSWR 54-216 MHz, 1.05 VSWR, max. over broadcast channel 470-740 MHz, 1.08 VSWR, max. over broadcast channel 740-856 MHz, 1.10 VSWR, max. over broadcast channel	**42141***
Cable with Polyethylene Dielectric (12% lower attenuation at 800 MHz)	**27591-6**

* For broadcast applications, specify channel and frequency.

Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	1.64
Velocity, percent	93.3
Peak Power Rating, kW	640
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.15 (0.49)
Outer	0.07 (0.23)
dc Breakdown, volts	16000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	21.7 (71.2)
Inductance, µH/ft (m)	0.055 (0.18)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	3.01 (76.6)
Diameter over Copper Outer Conductor, in (mm)	2.85 (72.4)
Diameter Inner Conductor, in (mm)	1.14 (29.0)
Nominal Inside Transverse Dimensions, (cm)	6.35
Minimum Bending Radius, in (mm)	30 (760)
Number of Bends, minimum (typical)	15 (25)
Bending Moment, lb-ft (N•m)	30 (41)
Cable Weight, lb/ft (kg/m)	1.78 (2.6)
Tensile Strength, lb (kg)	750 (340)
Flat Plate Crush Strength, lb/in (kg/mm)	175 (3.1)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0089	0.0291	640
1	0.0126	0.0414	476
1.5	0.0155	0.0508	387
2	0.0179	0.0588	334
10	0.0410	0.135	146
20	0.0590	0.194	102
30	0.0732	0.240	81.9
50	0.0964	0.316	62.2
88	0.132	0.432	45.6
100	0.141	0.464	42.4
	0.136*	0.448*	33.4*
108	0.148	0.484	40.6
150	0.178	0.583	33.7
174	0.194	0.635	31.0
200	0.210	0.688	28.6
300	0.266	0.874	22.5
400	0.317	1.04	18.9
450	0.340	1.12	17.6
	0.309*	1.01*	14.7*
500	0.363	1.19	16.5
512	0.368	1.21	16.3
600	0.407	1.33	14.7
700	0.448	1.47	13.4
800	0.488	1.60	12.3
	0.429*	1.41*	10.6*
824	0.497	1.63	12.1
894	0.524	1.72	11.4
960	0.548	1.80	10.9
1000	0.563	1.85	10.6
1250	0.652	2.14	9.19
1500	0.737	2.42	8.14
1640	0.782	2.57	7.66

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 121°C (250°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.
* These values are for 27591-6 cable with polyethylene dielectric available on special order.

3-1/8" EIA Flange
H8MP-302

1-5/8" EIA Flange
78AS

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
3-1/8" EIA Flange	Gas pass, includes inner connector	**H8MP-302**	Tab Flare	Tab Flare	BB	8.06 (204.7)	5.19 (131.7)
3-1/8" EIA Flange	Gas block, includes inner connector**	**H8MB-302**	Tab Flare	Tab Flare	BB	8.06 (204.7)	5.19 (131.7)
3-1/8" EIA Flange	Gas pass, no inner connector	**H8FP-302**	Tab Flare	Tab Flare	BB	6.0 (152.4)	5.19 (131.7)
3-1/8" EIA Flange	Gas block, no inner connector	**H8FB-302**	Tab Flare	Tab Flare	BB	6.0 (152.4)	5.19 (131.7)
1-5/8" EIA Flange	Gas Pass, inner connector	**78AS**	Tab Flare	Tab Flare	BB	3.9 (99)	3.6 (91)
Splice	–	**78BZ**	Tab Flare	Tab Flare	BB	6.1 (155)	5.3 (135)

Plating Codes: BB - Brass Body and Pin ** Universal application - designed so that all connector variations of same flange size can be accommodated by modifying this connector, using instructions provided.

Connector Accessories

	Type Number
Connector Reattachment Kit	
For H8MP-302, H8MB-302, H8FP-302, H8FB-302	**34767A-60**
For 78AGF, 78ARM, 78ARF, 78AGM, 78AS	**34767A-10**
For 78BZ	**34767A-30**
3-1/8" EIA End Terminal, for strap connection to center conductor, includes inner connector. Use with H8FP-302.	**2062**
3-1/8" Inner Connector, with anchor bead	**ACX350-20**
1-5/8" Inner Conductor, with anchor bead	**34660**
3-1/8" EIA 90° Miter Elbow, includes one inner connector	**ACX350-10SE**
1-5/8" EIA 90° Miter Elbow	**ACX150-10SE**
1-5/8" Gas Barrier	**1261B**

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**31766A-11**
Hardware Kit of 10. 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Standard Hoisting Grip	**26895A**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**204989-5**
Field attached screw-on lug, 915 mm (36") lead	**204989-35**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-9**	**48939A-10**

4" Air Dielectric, HJ Series – *50-ohm*

HJ11-50

Description	Type No.

Cable Ordering Information

Standard Cable	
4" Standard Cable, Standard Jacket	**HJ11-50**
Low VSWR and Specialized Cables	
Broadcast, Low VSWR	
54-216 MHz, 1.05 VSWR, max. over broadcast channel	
470-740 MHz, 1.08 VSWR, max. over broadcast channel	
740-856 MHz, 1.10 VSWR, max. over broadcast channel	**42144***

* For broadcast applications, specify channel and frequency.

Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	1.22
Velocity, percent	92
Peak Power Rating, kW	1100
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.11 (0.36)
Outer	0.04 (0.13)
dc Breakdown, volts	21000
Jacket Spark, volts RMS	10000
Capacitance, pF/ft (m)	22.0 (72.2)
Inductance, µH/ft (m)	0.055 (0.18)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	4.00 (102)
Diameter over Copper Outer Conductor, in (mm)	3.84 (97)
Diameter Inner Conductor, in (mm)	1.55 (39.4)
Nominal Inside Transverse Dimensions, (cm)	8.55
Minimum Bending Radius, in (mm)	40 (1015)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	191 (259)
Cable Weight, lb/ft (kg/m)	2.50 (3.72)
Tensile Strength, lb (kg)	900 (408)
Flat Plate Crush Strength, lb/in (kg/mm)	280 (5.0)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0074	0.0243	1000
1	0.0105	0.0345	705
1.5	0.0129	0.0423	574.
2	0.0149	0.0489	496
10	0.0339	0.111	218
20	0.0486	0.159	152
30	0.0601	0.197	123
50	0.0788	0.258	94.0
88	0.107	0.350	69.3
100	0.114	0.376	64.7
108	0.119	0.392	62.0
150	0.143	0.469	51.7
174	0.155	0.510	47.6
200	0.168	0.551	44.0
300	0.212	0.694	35.0
400	0.250	0.820	29.6
450	0.268	0.879	27.6
500	0.285	0.935	26.0
512	0.289	0.948	25.6
600	0.318	1.04	23.3
700	0.349	1.14	21.2
800	0.378	1.24	19.6
824	0.385	1.26	19.2
894	0.405	1.33	18.3
960	0.423	1.39	17.5
1000	0.434	1.42	17.1

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 121°C (250°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.

6-1/8" EIA Flange
H11FP-602

3-1/8" EIA Flange
H11FB-302

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
6-1/8" EIA Flange	Gas pass, includes inner connector	**H11MP-602**	Tab Flare	Tab Flare	BB	11.3 (288)	8.13 (207)
6-1/8" EIA Flange	Gas block, includes inner connector**	**H11MB-602**	Tab Flare	Tab Flare	BB	11.3 (288)	8.13 (207)
6-1/8" EIA Flange	Gas pass, no inner connector	**H11FP-602**	Tab Flare	Tab Flare	BB	8.5 (216)	8.13 (207)
6-1/8" EIA Flange	Gas block, no inner connector	**H11FB-602**	Tab Flare	Tab Flare	BB	8.5 (216)	8.13 (207)
4-1/2" IEC Flange	Gas pass, includes inner connector	**H11MP-M408**	Tab Flare	Tab Flare	BB	9.4 (240)	6.36 (162)
4-1/2" IEC Flange	Gas block, includes inner connector**	**H11MB-M408**	Tab Flare	Tab Flare	BB	9.4 (240)	6.36 (162)
4-1/2" IEC Flange	Gas pass, no inner connector	**H11FP-M408**	Tab Flare	Tab Flare	BB	7.0 (178)	6.36 (162)
4-1/2" IEC Flange	Gas block, no inner connector	**H11FB-M408**	Tab Flare	Tab Flare	BB	7.0 (178)	6.36 (162)
3-1/8" EIA Flange	Gas pass, includes inner connector	**H11MP-302**	Tab Flare	Tab Flare	BB	9.1 (230)	5.2 (132)
3-1/8" EIA Flange	Gas block, includes inner connector**	**H11MB-302**	Tab Flare	Tab Flare	BB	9.1 (230)	5.2 (132)
3-1/8" EIA Flange	Gas pass, no inner connector	**H11FP-302**	Tab Flare	Tab Flare	BB	7.0 (178)	5.2 (132)
3-1/8" EIA Flange	Gas block, no inner connector	**H11FB-302**	Tab Flare	Tab Flare	BB	7.0 (178)	5.2 (132)
Splice		**81Z**	Tab Flare	Tab Flare	BB	7.0 (178)	6.0 (152)

Plating Codes: BB - Brass Body and Pin ** Universal application - designed so that all connector variations of same flange size can be accommodated by modifying this connector, using instructions provided.

Connector Accessories

	Type Number
Connector Reattachment Kit	
For H11( )-602	**34767A-57**
For H11( )-M408	**34767A-58**
For H11( )-302	**34767A-59**
For 81RF	**34767A-15**
For 81GF	**34767A-16**
For 42826	**34767A-40**
For 42896	**34767A-41**
For 81Z	**34767A-17**
3-1/8" End Terminal, for strap connection to center conductor, includes inner connector. Use with H11FB-302.	**2062**
6-1/8" End Terminal, for strap connection to center conductor, includes inner connector. Use with H11FB-602.	**RLA650-80**
6-1/8" EIA Inner Connector, with anchor bead	**ACX650-20**
3-1/8" EIA Inner Connector, with anchor bead	**ACX350-20**
4-1/2" IEC Inner Connector, with anchor bead	**241252**
3-1/8" EIA 90° Mitre Elbow, includes one inner connector	**ACX350-10SE**
Reducer, 3-1/8" to 1-5/8", captivated 3-1/8" inner connector	**1861**
6-1/8" EIA 90° Miter Elbow, includes one inner connector	**ACX650B-10SE**

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**31766A-10**
Hardware Kit of 10. 3/8" bolts, lock washers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Standard Hoisting Grip	**34759**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**204989-6**
Field attached screw-on lug, 915 mm (36") lead	**204989-36**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619, 620.	

5" Air Dielectric, HJ Series – *50-ohm*

HJ9-50

Description	Type No.

Cable Ordering Information

Standard Cable	
5" Standard Cable, Standard Jacket	**HJ9-50**
Low VSWR and Specialized Cables	
Broadcast, Low VSWR	
54-216 MHz, 1.05 VSWR, max. over broadcast channel	
470-740 MHz, 1.08 VSWR, max. over broadcast channel	
740-856 MHz, 1.10 VSWR, max. over broadcast channel	**42142***

* For broadcast applications, specify channel and frequency.

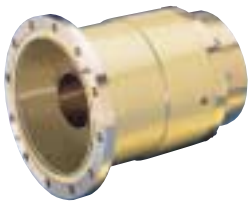
Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	0.96
Velocity, percent	93.1
Peak Power Rating, kW	1890
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.1 (0.3)
Outer	0.04 (0.13)
dc Breakdown, volts	27500
Jacket Spark, volts RMS	12000
Capacitance, pF/ft (m)	21.7 (71.2)
Inductance, µH/ft (m)	0.055 (0.18)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	5.20 (133)
Diameter over Copper Outer Conductor, in (mm)	5.00 (127)
Diameter Inner Conductor, in (mm)	2.02 (51.3)
Nominal Inside Transverse Dimensions, (cm)	11.3
Minimum Bending Radius, in (mm)	50 (1270)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	200 (271)
Cable Weight, lb/ft (kg/m)	3.3 (4.9)
Tensile Strength, lb (kg)	1000 (454)
Flat Plate Crush Strength, lb/in (kg/mm)	275 (4.9)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0052	0.0172	1272
1	0.0074	0.0244	898
1.5	0.0091	0.0299	732
2	0.0105	0.0346	633
10	0.0238	0.0782	280
20	0.0340	0.112	196
30	0.0419	0.138	159
50	0.0547	0.180	122
88	0.0738	0.242	90.4
100	0.0789	0.259	84.5
108	0.0822	0.270	81.1
150	0.0981	0.322	68.0
174	0.106	0.349	62.7
200	0.115	0.376	58.1
300	0.143	0.470	46.5
400	0.168	0.552	39.6
450	0.180	0.590	37.1
500	0.191	0.626	34.9
512	0.193	0.635	34.5
600	0.212	0.695	31.5
700	0.231	0.760	28.8
800	0.250	0.821	26.6
824	0.255	0.835	26.2
894	0.267	0.876	25.0
960	0.278	0.913	23.9

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.



6-1/8" EIA Flange
H9FP-602

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
6-1/8" EIA Flange	Gas pass, includes inner connector	**H9MP-602**	Tab Flare	Tab Flare	BB	12.3 (313)	8.13 (207)
6-1/8" EIA Flange	Gas block, includes inner connector**	**H9MB-602**	Tab Flare	Tab Flare	BB	12.3 (313)	8.13 (207)
6-1/8" EIA Flange	Gas pass, no inner connector	**H9FP-602**	Tab Flare	Tab Flare	BB	9.5 (241)	8.13 (207)
6-1/8" EIA Flange	Gas block, no inner connector	**H9FB-602**	Tab Flare	Tab Flare	BB	9.5 (241)	8.13 (207)
4-1/2" IEC Flange	Gas pass, includes inner connector	**H9MP-M408**	Tab Flare	Tab Flare	BB	10.7 (272)	6.6 (168)
4-1/2" IEC Flange	Gas block, includes inner connector**	**H9MB-M408**	Tab Flare	Tab Flare	BB	10.7 (272)	6.6 (168)
4-1/2" IEC Flange	Gas pass, no inner connector	**H9FP-M408**	Tab Flare	Tab Flare	BB	8.3 (211)	6.6 (168)
4-1/2" IEC Flange	Gas block, no inner connector	**H9FB-M408**	Tab Flare	Tab Flare	BB	8.3 (211)	6.6 (168)
Splice	–	**79AZ**	Tab Flare	Tab Flare	BB	6.2 (157)	7.6 (193)

Plating Codes: BB - Brass Body and Pin ** Universal application - designed so that all connector variations of same flange size can be accommodated by modifying this connector, using instructions provided.

Connector Accessories

	Type Number
Connector Reattachment Kit	
For 79AG, 79AR	**34767A-45**
For H9( )-602	**34767A-55**
For H9( )-M408	**34767A-56**
For 79AZ	**34767A-31**
6-1/8" End Terminal, for strap connection to center conductor, includes inner connector. Use with H9FB-602.	**RLA650-80**
6-1/8" EIA Inner Connector, with anchor bead	**ACX650-20**
4-1/2" IEC Inner Connector, with anchor bead	**241252**
Reducer, 6-1/8" to 3-1/8" includes two inner connectors	**RLA650-350**
6-1/8" EIA 90° Miter Elbow, includes one inner connector	**ACX650-10SE**

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**33598-5**
Hardware Kit of 10. 1/2" x 1-1/4" bolts, lock washers, nuts	**31769-4**
Standard Hoisting Grip	**31031-1**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**204989-7**
Field attached screw-on lug, 915 mm (36") lead	**204989-37**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619, 620.	

5" Air Dielectric, High Power
HJ( )HP Series – *50-ohm*

HJ9HP-50

Description	Type No.

Cable Ordering Information

High Power Cable	
5" Standard High Power Cable 45 – 70 MHz, 1.06 VSWR, max. 87 – 108 MHz, 1.06 VSWR, max. over broadcast channel 170 – 230 MHz, 1.08 VSWR, max. over broadcast channel 470 – 860 MHz, 1.10 VSWR, max. over broadcast channel	**HJ9HP-50**

* For broadcast applications, specify channel and frequency.

Characteristics

Electrical	
Impedance, ohms	50 ± 0.5
Maximum Frequency, GHz	0.96
Velocity, percent	96.4
Peak Power Rating, kW	1690
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.1 (0.33)
Outer	0.04 (0.13)
dc Breakdown, volts	26000
Jacket Spark, volts RMS	12000
Capacitance, pF/ft (m)	20.8 (68.1)
Inductance, µH/ft (m)	0.054 (0.176)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	5.20 (132)
Diameter over Outer Conductor, in (mm)	5.00 (127)
Diameter Inner Conductor, in (mm)	2.07 (52.7)
Nominal Inside Transverse Dimensions, (cm)	11.3
Minimum Bending Radius, in (mm)	50 (1270)
Number of Bends, minimum (typical)	15 (30)
Bending Moment, lb-ft (N•m)	200 (271)
Cable Weight, lb/ft (kg/m)	3.4 (4.9)
Tensile Strength, lb (kg)	1000 (454)
Flate Plate Crush Strength, lb/in (kg/mm)	240 (4.29)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0045	0.0148	1690
1	0.0064	0.0211	1690
1.6	0.0081	0.0267	1540
2	0.0092	0.0300	1375
10	0.0211	0.0693	599
20	0.0306	0.100	416
30	0.0381	0.125	335
50	0.0505	0.166	254
88	0.0695	0.228	185
100	0.0748	0.245	172
108	0.0782	0.257	165
150	0.0948	0.311	137
174	0.104	0.340	125
200	0.113	0.369	116
300	0.144	0.474	90.8
400	0.173	0.568	76.2
450	0.186	0.612	70.8
500	0.200	0.655	66.3
512	0.203	0.665	65.3
600	0.225	0.737	59.1
700	0.249	0.816	53.6
800	0.272	0.893	49.1
824	0.278	0.910	48.2
860	0.286	0.937	48.9
894	0.293	0.962	45.7
960	0.308	1.010	43.6

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 150°C (302°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.

United States Patent No. 5,742,002

6-1/8" EIA Flange
H9HPFP-602

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
6-1/8" EIA Flange	Gas pass, includes inner connector	**H9HPMP-602**	Tab Flare	Tab Flare	BB	12.4 (315)	8.13 (207)
6-1/8" EIA Flange	Gas block, includes inner connector**	**H9HPMB-602**	Tab Flare	Tab Flare	BB	12.4 (315)	8.13 (207)
6-1/8" EIA Flange	Gas pass, no inner connector	**H9HPFP-602**	Tab Flare	Tab Flare	BB	9.5 (242)	8.13 (207)
6-1/8" EIA Flange	Gas block, no inner connector	**H9HPFB-602**	Tab Flare	Tab Flare	BB	9.5 (242)	8.13 (207)
Splice	–	**H9HPZ**	Tab Flare	Tab Flare	BB	6.19 (158)	7.57 (193)

Plating Codes: BB - Brass Body and Pin ** Universal application - designed so that all connector variations of same flange size can be accommodated by modifying this connector, using instructions provided.

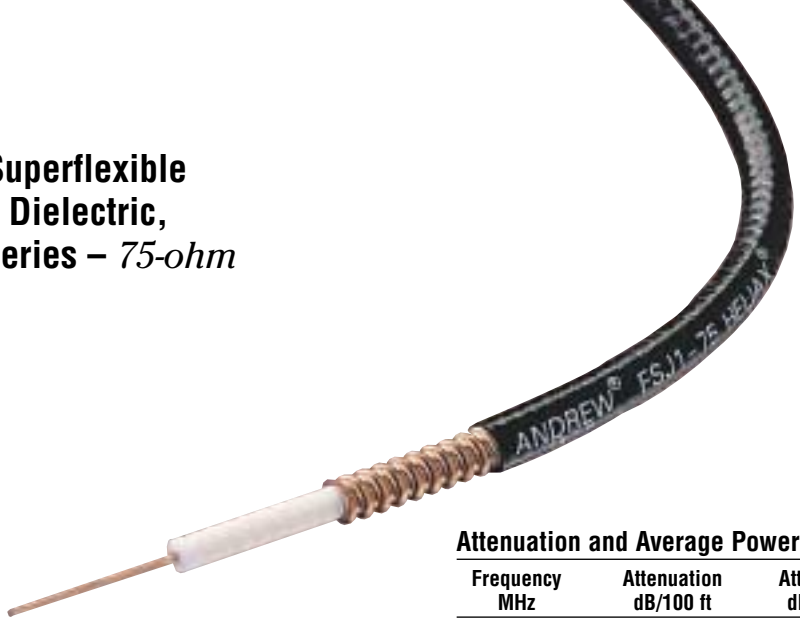
Connector Accessories

	Type Number
Connector Reattachment Kit	
For H9 ( ) HP-602	**34767A-55**
For H9HPZ	**34767A-31**
6-1/8" End Terminal, for strap connection to center conductor, includes inner connector. Use with H9HPFB-602.	**RLA650-80**
6-1/8" EIA Inner Connector, with anchor bead	**ACX650-20**
4-1/2" IEC Inner Connector, with anchor bead	**241252**
Reducer, 6-1/8" to 3-1/8" includes two inner connectors	**RLA650-350**
6-1/8" EIA 90° Miter Elbow, includes one inner connector	**ACX650B-10SE**

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Standard tower configuration spacing is 3-4 feet (1-1.2m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**33598-5**
Hardware Kit of 10. 1/2" x 1-1/4" bolts, lock washers, nuts	**31769-4**
Standard Hoisting Grip	**31031-1**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**204989-7**
Field attached screw-on lug, 915 mm (36") lead	**204989-37**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619, 620.	

1/4" Superflexible Foam Dielectric, FSJ Series – *75-ohm*



FSJ1-75

Description	Type No.

Cable Ordering Information

Standard Cable	
1/4" Standard superflexible	**FSJ1-75**
Fire Retardant Cables	
1/4" Fire Retardant Jacket (CATVX)	**FSJ1RN-75A**
1/4" Fire Retardant Jacket (CATVR)	**FSJ1RN-75A**

Characteristics

Electrical	
Impedance, ohms	75 ± 3
Maximum Frequency, GHz	22.0
Velocity, percent	78
Peak Power Rating, kW	6.7
dc Resistance, ohms/1000 ft (1000 m)	
Inner	15 (49.2)
Outer	1.8 (5.9)
dc Breakdown, volts	2000
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	17.4 (57.0)
Inductance, µH/ft (m)	0.098 (0.321)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Steel
Diameter over Jacket, in (mm)	0.29 (7.4)
Diameter over Copper Outer Conductor, in (mm)	0.25 (6.4)
Minimum Bending Radius, in (mm)	1 (25)
Number of Bends, minimum (typical)	15 (50)
Bending Moment, lb-ft (N•m)	0.5 (0.68)
Cable Weight, lb/ft. (kg/m)	0.046 (0.068)
Tensile Strength, lb (kg)	150 (68)
Flat Plate Crush Strength, lb/in (kg/mm)	100 (1.8)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.126	0.413	8.43
1	0.178	0.585	5.95
1.5	0.219	0.718	4.85
2	0.253	0.830	4.20
10	0.570	1.87	1.86
20	0.812	2.66	1.31
30	0.999	3.28	1.06
50	1.30	4.27	0.817
88	1.74	5.72	0.609
100	1.86	6.12	0.570
108	1.94	6.37	0.547
150	2.31	7.57	0.460
174	2.50	8.19	0.425
200	2.69	8.82	0.395
300	3.34	11.0	0.318
400	3.91	12.8	0.272
450	4.17	13.7	0.255
500	4.42	14.5	0.241
512	4.48	14.7	0.237
600	4.89	16.0	0.217
700	5.32	17.5	0.200
800	5.74	18.8	0.185
824	5.83	19.1	0.182
894	6.11	20.0	0.174
960	6.36	20.9	0.167
1000	6.51	21.4	0.163
1250	7.40	24.3	0.144
1500	8.22	27.0	0.129
1700	8.84	29.0	0.120
1800	9.14	30.0	0.116
2000	9.73	31.9	0.109
2100	10.0	32.9	0.106
2200	10.3	33.8	0.103
2300	10.6	34.7	0.101
3000	12.4	40.7	0.086
3300	13.2	43.1	0.081
3400	13.4	43.9	0.079
4000	14.8	48.6	0.072
4900	16.8	55.2	0.063
6000	19.1	62.7	0.056
8000	23.0	75.6	0.046
10000	26.7	87.6	0.040
12000	30.2	99.0	0.035
14000	33.5	110.0	0.032
16000	36.8	120.7	0.029
18000	39.9	131.0	0.027
19000	41.5	136.1	0.026
20000	43.0	141.1	0.025
22000	46.0	151.0	0.023

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 40°C (104°F), inner conductor temperature 1000°C (212°F), no solar loading.

N Male
F1NM-7550

Connectors

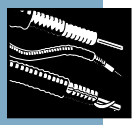
Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	50 Ohm Mating Pin	**F1NM-7550-H**	Solder	Solder	SG	1.85 (47)	0.92 (23.4)
N Male	70 Ohm Mating Pin	**F1NM-7570**	Solder	Solder	NS	2.2 (56)	0.79 (20.1)
N Female	70 Ohm Mating Pin	**F1NF-7570**	Solder	Solder	BS	1.9 (48)	0.70 (17.8)
BNC Male	50 Ohm Mating Pin	**49651**	Solder	Tab Flare	BS	1.2 (30)	0.56 (14.2)
UHF Male	50 Ohm Mating Pin	**41SP**	Solder	Tab Flare	BB	1.5 (38)	0.72 (18.3)
TNC Male	50 Ohm Mating Pin	**41SWT-75**	Solder	Tab Flare	SS	1.1 (28)	0.63 (16.0)
CATV Type F	–	**F1FM-75**	Captivated	Crimp	BB	1.42 (36)	0.56 (14.2)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin, NS - Nickel Plated Body and Silver Plated Pin, SS - Silver Plated Body and Pin, SG - Silver Plated Body and Gold Plated Pin

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Insulated Hanger, single. Recommended maximum spacing is 2.5 ft (0.76 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598	**11662-3**
Angle Adapter, for insulated hanger	**40430-1**
Nylon Cable Tie Kit of 50, Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**40417**
Nylon Cable Tie Kit in plastic box. 100 each 4, 5.5 and 7.5 inch ties. Indoor use, Recommended maximum spacing is 1.5 ft (0.5 m)	**CT-K350**
Velcro Cable Ties, Black, 8 inch. Indoor Use	
Kit of 10	**VCT8-10**
Kit of 50	**VCT8-50**
Kit of 100	**VCT8-100**
Support/Hoisting Grip. Use at 200-ft (60 m) intervals.	
Grip with one clamp	**F1SGRIP**
Support clamp kit of 10	**F1SGRIP-1IK**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kit	
Factory attached one-hole lug, 24" lead	**223158**
Factory attached two-hole lug, 24" lead	**223158-2**
Field attached one-hole lug, 36" lead	**223158-3**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Cold Shrink Weatherproofing Kit	
5/8" Coax to 1/4" Coax	**241475-13**
7/8" Coax to 1/4" Coax	**241475-12**
1-1/4" or 1-5/8" Coax to 1/4" Coax	**241475-11**
1/4" to 1-1/2" Omni/Panel base Type N or DIN	**241548-10**
1/4" to 2" Omni/Panel base Type N or DIN	**241548-11**
Connector/Splice Weatherproofing Kit	**221213**
Entry Systems – For entry systems offerings see pages 619, 620.	
Standard Cable Entry Boots	
4" Boots – Three Hole:	**204679A-17**
Tools – for additional tool offerings see pages 620-623.	
EASIAX® Cutting Tool FSJ1/FSJ4	**207865**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



1/2" Superflexible Foam Dielectric, FSJ Series – *75-ohm*

FSJ4-75A

Description	Type No.

Cable Ordering Information

Standard Cable	
1/2" Standard Superflexible	**FSJ4-75A**
Fire Retardant Cables	
1/2" Fire Retardant Jacket (CATVX)	**FSJ4RN-75A**
1/2" Fire Retardant Jacket (CATVR)	**FSJ4RN-75A**

Characteristics

Electrical	
Impedance, ohms	75 ± 2
Maximum Frequency, GHz	11.5
Velocity, percent	81
Peak Power Rating, kW	10.0
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.50 (4.9)
Outer	1.00 (3.28)
dc Breakdown, volts	2500
Jacket Spark, volts RMS	5000
Capacitance, pF/ft (m)	16.7 (54.9)
Inductance, µH/ft (m)	0.094 (0.309)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	0.52 (13.2)
Diameter over Copper Outer Conductor in (mm)	0.48 (12.2)
Diameter Inner Conductor, in (mm)	0.118 (3.0)
Minimum Bending Radius, in (mm)	1.25 (32)
Number of Bends, minimum (typical)	20 (50)
Bending Moment, lb-ft (N•m)	2.0 (2.7)
Cable Weight, lb/ft (kg/m)	0.14 (0.21)
Tensile Strength, lb (kg)	140 (63.5)
Flat Plate Crush Strength, lb/in (kg/mm)	105 (1.9)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.065	0.213	26.2
1	0.092	0.301	18.5
1.5	0.112	0.369	15.1
2	0.130	0.427	13.1
10	0.293	0.962	5.79
20	0.417	1.37	4.07
30	0.514	1.68	3.30
50	0.668	2.19	2.54
88	0.896	2.94	1.89
100	0.958	3.14	1.77
108	0.997	3.27	1.70
150	1.19	3.89	1.43
174	1.28	4.21	1.32
200	1.38	4.53	1.23
300	1.72	5.63	0.989
400	2.01	6.58	0.846
450	2.14	7.02	0.794
500	2.27	7.44	0.749
512	2.30	7.53	0.739
600	2.51	8.22	0.677
700	2.73	8.96	0.622
800	2.94	9.65	0.577
824	2.99	9.82	0.568
894	3.13	10.3	0.542
960	3.26	10.7	0.521
1000	3.34	11.0	0.509
1250	3.79	12.4	0.448
1500	4.21	13.8	0.403
1700	4.53	14.9	0.375
1800	4.68	15.4	0.363
2000	4.98	16.4	0.341
2100	5.13	16.8	0.331
2200	5.27	17.3	0.322
2300	5.42	17.8	0.314
3000	6.35	20.8	0.268
3300	6.73	22.1	0.252
3400	6.86	22.5	0.248
4000	7.58	24.9	0.224
4900	8.60	28.2	0.198
6000	9.78	32.1	0.174
8000	11.8	38.6	0.144
10000	13.6	44.7	0.125
11500	15.0	49.1	0.114

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Male
F4NM-7570

N Female
F4NF-7570

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	50 Ohm Mating Pin	**F4NM-7550**	Solder	Tab Flare	BB	2.3 (58)	0.84 (21.3)
N Male	70 Ohm Mating Pin	**F4NM-7570**	Solder	Tab Flare	BB	2.2 (56)	0.84 (21.3)
N Male	50 Ohm Mating Pin, Right Angle	**F4NR-7550**	Solder	Tab Flare	BB	3.3/1.5 (84/38)	0.84 (21.3)
N Female	50 Ohm Mating Pin	**F4NF-7550**	Solder	Tab Flare	BS	2.2 (56)	0.84 (21.3)
N Female	70 Ohm Mating Pin	**F4NF-7570**	Solder	Tab Flare	BS	2.1 (53)	0.84 (21.3)
UHF Male	50 Ohm Mating Pin	**44ASP-75**	Solder	Tab Flare	BS	2.3 (58)	0.84 (21.3)
UHF Female	50 Ohm Mating Pin	**44ASU-75**	Solder	Tab Flare	BS	2.3 (58)	0.84 (21.3)
CATV Type F	–	**44ASCM**	Solder	Tab Flare	BB	2.5 (64)	0.84 (21.3)

Plating Codes: BB - Brass Body and Pin, BS - Brass Body and Silver Plated Pin.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**43211A**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**206706-1**
Support/Hoisting Grip. Use at 200-ft (60 m) intervals.	
Grip with one clamp	**F4SGRIP**
Support clamp kit of 10	**F4SGRIP-4IK**
Standard Hoisting Grip	**43094**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
Standard Grounding Kits	
Factory attached one-hole lug 24"	**204989-1**
Factory attached two-hole lug 24"	**241088-1**
Field attached two-hole lug 60"	**241545**

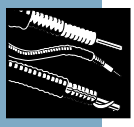
Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
WeatherShield™ Connector Protection Housing	
LDF5 to FSJ4	**WS-L5F4**
LDF6 to FSJ4	**WS-L6F4**
LDF7 to FSJ4	**WS-L7F4**
Cold Shrink Weatherproofing Kit	
1/2" Coax N Connector to 1/2" Coax N Connector	**241474-4**
5/8" Coax to 1/2" Coax	**241475-13**
7/8" Coax to 1/2" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 1/2" Coax	**241475-5A**
2 1/4" Coax to 1/2" Coax	**241475-8**
1/2" to 1-1/2" Omni/Panel Base Type N or DIN	**241548-8**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623.

EASIAX® Plus Automated Cable Prep Tool	**CPT-F4B**
EASIAX® Cutting Tool FSJ4/FSJ1	**207865**
EASIAX® Cutting Tool FSJ4/FSJ2	**241372**
Cable Flare Tool	**224363**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



1/2" Foam Dielectric, LDF Series – *75-ohm*

LDF4-75A

Description	Type No.

Cable Ordering Information

Standard Cable	
1/2" Standard superflexible	**LDF4-75A**
Fire Retardant Cables	
1/2" Fire Retardant Jacket (CATVX)	**LDF4RN-75A**
1/2" Fire Retardant Jacket (CATVR)	**LDF4RN-75A**

Characteristics

Electrical	
Impedance, ohms	75 ± 3
Maximum Frequency, GHz	10
Velocity, percent	88
Peak Power Rating, kW	26
dc Resistance, ohms/1000 ft (1000 m)	
Inner	1.15 (3.77)
Outer	0.58 (1.90)
dc Breakdown, volts	4000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	15.4 (50.5)
Inductance, µH/ft (m)	0.087 (0.284)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-Clad Aluminum
Diameter over Jacket, in (mm)	0.63 (16)
Diameter over Copper Outer Conductor, in (mm)	0.55 (14)
Minimum Bending Radius, in (mm)	5 (125)
Number of Bends, minimum (typical)	15 (40)
Bending Moment, lb-ft (N•m)	2.8 (3.8)
Cable Weight, lb/ft (kg/m)	0.14 (0.21)
Tensile Strength, lb (kg)	200 (90.7)
Flat Plate Crush Strength, lb/in (kg/mm)	110 (2.0)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.042	0.138	24.5
1	0.060	0.196	17.3
1.5	0.073	0.240	14.1
2	0.084	0.277	12.2
10	0.190	0.624	5.43
20	0.270	0.887	3.82
30	0.333	1.09	3.10
50	0.432	1.42	2.39
88	0.579	1.90	1.78
100	0.618	2.03	1.67
108	0.644	2.11	1.60
150	0.764	2.51	1.35
174	0.826	2.71	1.25
200	0.889	2.92	1.16
300	1.10	3.62	0.937
400	1.29	4.22	0.803
450	1.37	4.50	0.753
500	1.45	4.76	0.712
512	1.47	4.82	0.702
600	1.60	5.26	0.644
700	1.74	5.72	0.592
800	1.88	6.16	0.550
824	1.91	6.26	0.541
894	2.00	6.55	0.517
960	2.08	6.81	0.497
1000	2.12	6.97	0.486
1250	2.41	7.90	0.429
1500	2.67	8.76	0.387
1700	2.87	9.41	0.360
1800	2.96	9.73	0.348
2000	3.15	10.3	0.328
2100	3.24	10.6	0.319
2200	3.33	10.9	0.310
2300	3.42	11.2	0.302
2500	3.59	11.8	0.288
3300	4.23	13.9	0.244
3400	4.30	14.1	0.240
4000	4.75	15.6	0.218
4900	5.37	17.6	0.192
6000	6.09	20.0	0.170
8000	7.29	23.9	0.142
10000	8.42	27.6	0.123

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

ANDREW®

N Male
L4NM-7570

N Female
L4NF-7570

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	50 Ohm Mating Pin	**L4NM-7550-H**	Solder	Self Flare	BB	2.5 (64)	0.94 (23.8)
N Male	70 Ohm Mating Pin	**L4NM-7570-H**	Solder	Self Flare	BB	2.5 (64)	0.94 (23.8)
N Male	50 Ohm Mating Pin, Right Angle	**L4NR-7550**	Solder	Self Flare	NB	3.2/1.5 (81/38)	0.95 (24.1)
N Female	50 Ohm Mating Pin	**L4NF-7550**	Solder	Self Flare	BB	2.5 (64)	0.91 (23.1)
N Female	70 Ohm Mating Pin	**L4NF-7570**	Solder	Self Flare	BB	2.3 (58)	0.91 (23.1)
UHF Male	–	**L44P-75**	Solder	Self Flare	BB	2.3 (58)	0.91 (23.1)
UHF Female		**L44U-75**	Solder	Self Flare	BB	2.3 (58)	0.91 (23.1)
CATV Equipment Housing	–	**48070**	–	Self Flare	BB	2.0 (50)	0.91 (23.1)
Splice	–	**L44Z-75**	Solder	Self Flare	BB	3.2 (81)	1.1 (27.9)

Plating Codes: BB - Brass Body and Pin, NB - Nickel Plated Body and Brass Pin.

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**43211A**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Snap-In Hangers Kit of 10. For prepunched 3/4" (19mm) holes on tower member or adapters, Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**206706-1**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605.	**L4CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L4SGRIP**
Support clamp kit of 10	**L4SGRIP-4IK**
Standard Hoisting Grip	**43094**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL4-15B4**

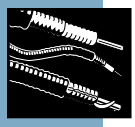
Description	Type No.
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL4-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL4-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL4-15B4**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Cold Shrink Weatherproofing Kit	
1/2" Coax N Connector to 1/2" Coax N Connector	**241474-4**
5/8" Coax to 1/2" Coax	**242475-13**
7/8" Coax to 1/2" Coax	**241475-9**
1-1/4" or 1-5/8" Coax to 1/2" Coax	**241475-5A**
2 1/4" Coax to 1/2" Coax	**241475-8**
1/2" to 1-1/2" Omni/Panel base Type N or DIN	**241548-8**
1/2" to 2" Omni/Panel base Type N or DIN	**241548-9**
1/2" LDF4 to Antenna Type N interface	**241548-4**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-5**	**48939A-6**
Three Hole:	**204679A-7**	**48939A-8**
Four Hole	**204679A-16**	**48939A-17**

Tools – for additional tool offerings see pages 620-623.

EASIAX® Plus Automated Cable Prep Tool	**CPT-L4ARC**
EASIAX® Cutting Tool	**207866**
Cable Flare Tool	**224363**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**



7/8" Foam Dielectric, LDF Series – *75-ohm*

LDF5-75

Description	Type No.

Cable Ordering Information

Standard Cable	
7/8" Standard Cable	**LDF5-75**

Characteristics

Electrical	
Impedance, ohms	75 ± 3
Maximum Frequency, GHz	5.3
Velocity, percent	89
Peak Power Rating, kW70	
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.34 (1.11)
Outer	0.32 (1.05)
dc Breakdown, volts	6500
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	15.1 (49.5)
Inductance, µH/ft (m)	0.087 (0.284)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper-clad aluminum
Diameter over Jacket, in (mm)	1.082 (27.48)
Diameter over Copper Outer Conductor, in (mm)	0.980 (24.89)
Minimum Bending Radius, in (mm)	10 (250)
Number of Bends, minimum (typical)	15 (40)
Bending Moment, lb-ft (Nïm)	12 (16.3)
Cable Weight, lb/ft (kg/m)	0.30 (0.45)
Tensile Strength, lb (kg)	325 (147)
Flat Plate Crush Strength, lb/in (kg/mm)	80 (1.4)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.024	0.080	45.2
1	0.034	0.113	31.9
1.5	0.042	0.139	26.0
2	0.049	0.160	22.5
10	0.111	0.363	9.94
20	0.158	0.518	6.96
30	0.195	0.639	5.65
50	0.254	0.833	4.33
88	0.342	1.12	3.21
100	0.366	1.20	3.00
108	0.382	1.25	2.88
150	0.455	1.49	2.42
174	0.493	1.62	2.23
200	0.532	1.75	2.07
300	0.665	2.18	1.65
400	0.781	2.56	1.41
450	0.834	2.74	1.32
500	0.885	2.90	1.24
512	0.897	2.94	1.23
600	0.982	3.22	1.12
700	1.07	3.52	1.03
800	1.16	3.81	0.949
824	1.18	3.87	0.933
894	1.24	4.06	0.889
960	1.29	4.24	0.853
1000	1.32	4.34	0.832
1250	1.51	4.95	0.729
1500	1.69	5.53	0.653
1700	1.82	5.97	0.605
1800	1.88	6.18	0.584
2000	2.01	6.60	0.548
2100	2.07	6.80	0.531
2200	2.13	7.00	0.516
2300	2.19	7.20	0.502
3000	2.59	8.51	0.425
3400	2.81	9.23	0.392
4000	3.12	10.3	0.353
5000	3.62	11.9	0.304
5300	3.76	12.3	0.293

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F).
For Average Power, VSWR 1.0, ambient temperature 40°C (104°F), inner conductor temperature 100°C (212°F), no solar loading.

N Female
L5PNF-7570-BH

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	70-Ohm Mating Pin	**L5PNM-7570**	Solder	Self-Flare	SG	2.9 (74)	1.36 (34.5)
N Male	50-Ohm Mating Pin	**L5PNM-7550**	Solder	Self-Flare	SG	3.1 (78.7)	1.36 (34.5)
N Female	70-Ohm Mating Pin	**L5PNF-7570**	Solder	Self-Flare	SG	2.9 (74)	1.36 (34.5)
N Female	70-Ohm Mating Pin Bulkhead	**L5PNF-7570-BH**	Solder	Self Flare	BB	3.1 (78.7)	1.36 (34.5)

Plating Codes: BB - Brass Body and Pin, SG - Silver Plated Body and Gold Plated Pin

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**42396A-5**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Snap-in Hangers Kit of 10. For prepunched 3/4" (19 mm) holes on tower member or adapters. Recommended maximum spacing is 3-ft. For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**206706-2**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft Mounting Hardware see page 605.	**L5CLICK**
Kwik-Clamps Kit of 10. See page 607 for hanger options	
Support/Hoisting Grip. Use at 200-ft (60m) intervals.	
Grip with one clamp	**L5SGRIP**
Support clamp kit of 10	**L5SGRIP-5IK**
Standard Hoisting Grip	**19256B**
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL5-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGL5-15B4**
SureGround Plus Grounding Kit with weatherproofing boot	
Factory attached one-hole lug, 600 mm (24") lead	**SGPL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGPL5-06B2**
Field attached two-hole lug, 1500 mm (59") lead	**SGPL5-15B4**

Description	Type No.
Weatherproofing – for additional weatherproofing information see pages 617-618.	
WeatherShield™ Connector Protection Housing	
LDF5 to LDF4	**WS-L5L4**
LDF5 to FSJ4	**WS-L5F4**
Cold Shrink Weatherproofing Kit	
7/8" Coax to 7/8" Coax N Connectors	**241474-5**
1-5/8" Coax to 7/8" Coax N Connectors	**241475-3**
7/8" Coax to 1/4" Coax	**241475-12**
7/8" Coax to 3/8" or 1/2" Coax	**241475-9**
7/8" Coax to Antenna Type N or DIN interface	**241548-5**
7/8" to APTL5 Arrestors	**241474-5**
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-2**	**48939A-1**
Two Hole:	**204679A-18**	–
Three Hole:	**204679A-15**	**48939A-2**

Tools – for additional tool offerings see pages 620-623.

EASIAX® Plus Automated Cable Prep Tool	**CPTL5A**
EASIAX® Cutting Tool	**222951**
Cable Flaring Tool	**224368**
7/8" Connector Torque Wrench	**244378**
DIN Connector Coupling Torque Wrench	**244377**
N Connector Coupling Torque Wrench	**244379**

7/8" Air Dielectric, HJ Series – *75-ohm*

HJ5-75

Description	Type No.

Cable Ordering Information

Standard and Fire Retardant Cables	
7/8" Standard Cable, Standard Jacket	**HJ5-75**
7/8" Fire Retardant Jacket (CATVR)	**HJ5RN-75**

Characteristics

Electrical	
Impedance, ohms	75 ± 1
Maximum Frequency, GHz	5.6
Velocity, percent	90
Peak Power Rating, kW	60
dc Resistance, ohms/1000 ft (1000 m)	
Inner	0.25 (0.82)
Outer	0.20 (0.66)
dc Breakdown, volts	6000
Jacket Spark, volts RMS	8000
Capacitance, pF/ft (m)	15.1 (49.4)
Inductance, µH/ft (m)	0.085 (0.278)
Mechanical	
Outer Conductor	Copper
Inner Conductor	Copper
Diameter over Jacket, in (mm)	1.11 (28.2)
Diameter over Copper Outer Conductor, in (mm)	1.01 (25.7)
Minimum Bending Radius, in (mm)	10 (250)
Number of Bends, minimum (typical)	15 (20)
Bending Moment, lb-ft (N•m)	25 (34)
Cable Weight, lb/ft (kg/m)	0.52 (0.79)
Tensile Strength, lb (kg)	800 (360)
Flat Plate Crush Strength, lb/in (kg/mm)	250 (4.5)

Attenuation and Average Power Ratings

Frequency MHz	Attenuation dB/100 ft	Attenuation dB/100 m	Average Power, kW
0.5	0.0250	0.0819	60.0
1	0.0355	0.116	54.7
1.5	0.0436	0.143	44.6
2	0.0505	0.166	38.5
10	0.116	0.381	16.4
20	0.168	0.552	11.4
30	0.209	0.686	9.31
50	0.272	0.892	7.13
88	0.363	1.19	5.34
100	0.388	1.27	5.01
108	0.404	1.33	4.80
150	0.480	1.58	4.02
174	0.517	1.70	3.71
200	0.555	1.82	3.45
300	0.687	2.26	2.79
400	0.800	2.63	2.40
450	0.850	2.79	2.25
500	0.898	2.95	2.14
512	0.909	2.98	2.10
600	0.988	3.24	1.93
700	1.07	3.51	1.78
800	1.15	3.77	1.66
824	1.17	3.82	1.64
894	1.22	3.99	1.57
960	1.26	4.14	1.52
1000	1.29	4.23	1.49
1250	1.46	4.78	1.31
1500	1.61	5.28	1.17
1700	1.74	5.70	1.08
2000	1.92	6.30	0.977
2300	2.10	6.89	0.898
3000†	2.49	8.18	0.763
4000	3.00	9.84	0.640
5000	3.40	11.2	0.565
5600	3.65	12.0	0.526

Standard Conditions:
For Attenuation. VSWR 1.0 ambient temperature 20°C (68°F), atmospheric pressure, dry air.
For Average Power, VSWR 1.0, inner temperature 100°C (212°F), ambient temperature 40°C (104°F), atmospheric pressure, dry air, no solar loading.
† Operation of this cable in the 3500-3650 MHz band is not recommended because of VSWR spikes produced by the dielectric section spacing.

N Female
H5NF-7550

7/8" EIA Flange
75AR-75

N Male
H5NM-7550

Connectors

Interface	Description	Type Number	Inner Contact Attachment	Outer Contact Attachment	Plating Code	Max. Length in (mm)	Max. Dia. in (mm)
N Male	50 Ohm Mating Pin	**H5NM-7550**	Self-tapping	Tab Flare	BB	3.5 (89)	1.4 (36)
N Female	50 Ohm Mating Pin	**H5NF-7550**	Self-tapping	Tab Flare	BB	3.9 (99)	1.4 (36)
7/8" EIA Flange	Gas Pass	**75AR-75**	Self-tapping	Tab Flare	BB	4.3 (109)	2.25 (57)
UHF Female	50 Ohm Mating Pin	**75AU-75**	Self-tapping	Tab Flare	BB	4.3 (109)	1.4 (36)
LC Male	50 Ohm Mating Pin	**75AM-75**	Self-tapping	Tab Flare	BB	5.0 (127)	1.4 (36)
End Terminal	–	**75AT-75**	Self-tapping	Tab Flare	BB	5.8 (147)	1.4 (36)
Splice	–	**75AZ-75**	Self-tapping	Tab Flare	BB	4.2 (107)	1.4 (36)

Plating Codes: BB - Brass Body and Pin

Accessories

Description	Type No.
Hangers – For more hangers, adapters and mounting hardware see pages 599-607.	
Standard Hangers Kit of 10. Recommended maximum spacing is 3 ft (1 m). For different spacing recommendations, refer to Cable Hanger Spacing, pages 593-598.	**42396A-5**
Hardware Kit of 10. 3/8" bolts, lockwashers, nuts	
3/4" (19 mm) long	**31769-5**
1" (25 mm) long	**31769-1**
Click-On Hangers Kit of 10. Recommended maximum spacing is 3-ft (1 m). Mounting Hardware see page 605.	**L5CLICK**
Standard Hoisting Grip	**19256B**

Description	Type No.
Grounding and Surge Protection – for additional grounding kits and our surge protection offerings, see pages 609-616.	
SureGround Grounding Kit with standard weatherproofing	
Factory attached one-hole lug, 600 mm (24") lead	**SGL5-06B1**
Factory attached two-hole lug, 600 mm (24") lead	**SGL5-06B2**
Field attached two hole lug, 1500 mm (59") lead	**SGL5-15B4**
Weatherproofing – for additional weatherproofing information see pages 617, 618.	
Connector/Splice Weatherproofing Kit	**221213**

Entry Systems – For entry systems offerings see pages 619, 620.

Standard Cable Entry Boots	4" Boots	5" Boots
One Hole:	**204679A-2**	**48939A-1**
Two Hole:	**204679A-18**	–
Three Hole:	**204679A-15**	**48939A-2**

Factory Made Cable Assemblies

SureFlex™

Andrew has state-of-the-art cable assembly facilities all over the world. You no longer have to deal with expensive and labor intensive cable preparation and connector attachment on site. Andrew will do it for you. Our factory automated processes allow us to produce cable assemblies that will meet your specifications, your delivery requirements, and your budget.

HELIAX® cable assemblies are ideal for rack-to-rack and radio OEM applications. They are also commonly used for connecting antennas to transmission lines and transmission lines to radios.

Here are the advantages of the Andrew factory made cable assembly program:

- ***Competitive pricing.*** *Low attachment charges.*
- ***Guaranteed quality.*** *Assemblies are 100% tested prior to shipment and include a ten year warranty.*
- ***Fast delivery.*** *Global manufacturing and inventory.*
- ***Complete product offering.*** *Any cable, any length, any connector.*
- ***Low VSWR assemblies.*** *For high performance applications.*

Delivering a Decade of Confidence

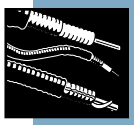
We are proud to continue our new 10-year warranty on our HELIAX standard and SureFlex™ cable assembly products, foam-dielectric and air-dielectric coaxial cables, waveguides, connectors, and accessories.

This “repair or replace” warranty covers any defects in material and workmanship that may arise under normal use and service and is available on products sold directly by Andrew and its authorized distributors.

It's all part of our long tradition of commitment to customers. Install Andrew products and receive unsurpassed performance, uncompromising quality, and unmatched durability and reliability - all backed by a ten-year warranty to keep systems operational, not just tomorrow, but well into the future.

Genuine HELIAX Cable

For transmission line systems requiring jumpers, genuine HELIAX cable, 7/8" and under, can provide a high-performance, high-reliability alternative.



SureFlex™ Cable Assemblies Seal in Performance

Providing excellent performance and an integral weather seal, our new patented, factory automated, SureFlex cable assemblies use an innovative, completely soldered connector attachment to seal in performance and seal out the elements. These new assemblies allow you to benefit from our unparalleled HELIAX® cable.

SureFlex cable assemblies' unique connector attachment includes a solder connection to both the inner and the outer conductors. The automated attachment process employs an induction soldering technique that ensures 360 degrees of electrical contact and a reliable weather seal. This process ensures a consistent, robust attachment every time.

SureFlex Cable Assemblies provide:

- *Stable IMD*
- *Consistent VSWR*
- *Complete weatherproofing*
- *Tightly controlled pin depth*
- *High pull-off strength*

Andrew SureFlex cable assemblies are ideal for wireless systems such as PCS, cellular, and paging.

New SureFlex Arrestor Plus® Cable Assemblies

These SureFlex cable assemblies include all the benefits described plus the protection of an integrated Arrestor Plus surge arrestor. The one-piece surge arrestor/connector delivers premium lightning protection in a single component that is completely soldered to seal in performance and seal out the elements.

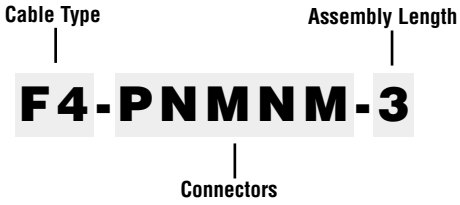
The assemblies are offered with both Quarter Wave Shorting Stub (QWS) surge arrestors and broadband replaceable gas tube arrestors. They include bulkhead mounting and will fit into your base station cabinet or in building applications.

Other Available Cable Assemblies

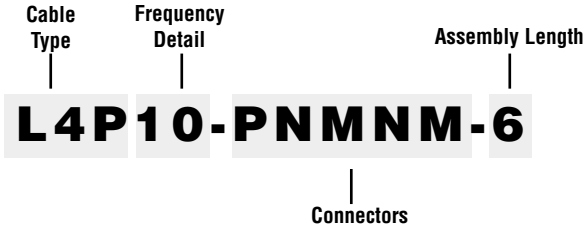
Any connector and length can be made to order.

Contact Andrew to have an assembly designed for your application.

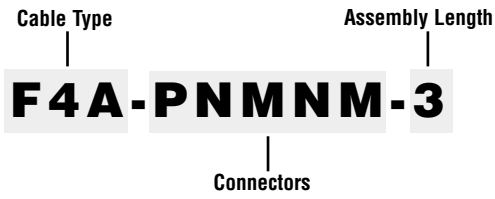
Standard Cable Assemblies



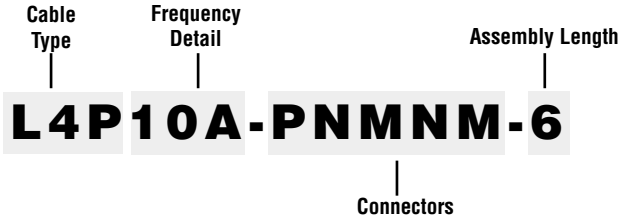
Premium Cable Assemblies

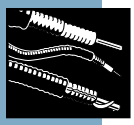


SureFlex Cable Assemblies



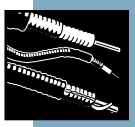
Premium SureFlex Cable Assemblies





SureFlex™ and Standard Cable Assemblies – Ordering Information

Connectors	SureFlex Type Number	Standard Type Number
FSJ1-50A		
N Male/N Male	**F1A-PNMNM-(*)**	**F1-PNMNM-(*)**
N Male/Right Angle N Male	**F1A-PNMNR-(*)**	**F1-PNMNR-(*)**
N Male/N Female	–	**F1-PNMNF-(*)**
N Male/UHF Male	–	**F1-PNMUM-(*)**
N Male/BNC Male	–	**F1-PNMBM-(*)**
N Male/SMA Male	–	**F1-PNMSM-(*)**
N Male/Right Angle SMA Male	–	**F1-PNMSR-(*)**
7-16 DIN Male/7-16 DIN Male	**F1A-PDMDM-(*)**	–
SMA Male/SMA Male	–	**F1-SMSM-(*)**
SMA Male/SMA Female	–	**F1-SMSF-(*)**
SMA Male/Right Angle SMA Male	–	**F1-SMSR-(*)**
FSJ2-50		
N Male/N Male	**F2A-PNMNM-(*)**	**F2-PNMNM-(*)**
N Male/Right Angle N Male	**F2A-PNMNR-(*)**	–
N Male/7-16 DIN Male	**F2A-PNMDM-(*)**	**F2-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**F2A-PDMDM-(*)**	**F2-PDMDM-(*)**
7-16 DIN Male/Right Angle 7-16 DIN Male	**F2A-PDMDR-(*)**	–
N Male/N Female	**F2A-PNMNF-(*)**	**F2-PNMNF-(*)**
FSJ4-50B		
N Male/N Male	**F4A-PNMNM-(*)**	**F4-PNMNM-(*)**
N Male/N Female	**F4A-PNMNF-(*)**	**F4-PNMNF-(*)**
7-16 DIN Male/7-16 DIN Male	**F4A-PDMDM-(*)**	**F4-PDMDM-(*)**
7-16 DIN Male/7-16 DIN Female	**F4A-PDMDF-(*)**	**F4-PDMDF-(*)**
N Male/7-16 DIN Male	**F4A-PNMDM-(*)**	**F4-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Female	**F4A-PDMDF-(*)**	**F4-PDMDF-(*)**
7-16 DIN Female/Right Angle 7-16 DIN Male	**F4A-PDFDR-(*)**	**F4-PDFDR-(*)**
7-16 DIN Male/Right Angle 7-16 DIN Male	**F4A-PDMDR-(*)**	**F4-PDMDR-(*)**
7-16 DIN Male/4.1-9.5 DIN Male	**F4A-PDMKM-(*)**	**F4-PDMKM-(*)**
N Female/Right Angle N Male	**F4A-PNFNR-(*)**	**F4-PNFNR-(*)**
N Male/7-16 DIN Female	**F4A-PNMDF-(*)**	**F4-PNMDF-(*)**
N Male/Right Angle 7-16 DIN Male	**F4A-PNMDR-(*)**	**F4-PNMDR-(*)**
N Male/4.1-9.5 DIN Male	–	**F4-PNMKM-(*)**
N Male/Right Angle 4.1-9.5 DIN Male	–	**F4-PNMKR-(*)**
N Male/Right Angle N Male	**F4A-PNMNR-(*)**	**F4-PNMNR-(*)**
Right Angle N Male/7-16 DIN Female	**F4A-PNRDF-(*)**	**F4-PNRDF-(*)**
UHF Male/UHF Male	–	**F4-UMUM-(*)**
7-16 DIN Female/7-16DIN Female	**F4A-PDFDF-(*)**	**F4-PDFDF-(*)**
N Female/7-16 DIN Male	**F4A-PNFDM-(*)**	**F4-PNFDM-(*)**
EFX2-50		
7-16 DIN Male/7-16 DIN Female	**EFX2A-PDMDF-(*)**	**EFX2-PDMDF-(*)**
7-16 DIN Male/7-16 DIN Male	**EFX2A-PDMDM-(*)**	**EFX2-PDMDM-(*)**
N Male/7-16 DIN Male	**EFX2A-PNMDM-(*)**	**EFX2-PNMDM-(*)**
N Male/N Female	–	**EFX2-PNMNF-(*)**
N Male/N Male	**EFX2A-PNMNM-(*)**	**EFX2-PNMNM-(*)**
N Male/N Male Right Angle	–	**EFX2-PNMNR-(*)**
N Male Right Angle/7-16 DIN Male Right Angle	–	**EFX2-PNRDR-(*)**
ETS2-50		
7-16 DIN Male/7-16 DIN Male	–	**ETS2-PDMDM-(*)**
N Male/7-16 DIN Male	–	**ETS2-PNMDM-(*)**
N Male/N Male	–	**ETS2-PNMNM-(*)**
HST4-50		
7-16 DIN Male/7-16 DIN Male	–	**HST4-PDMDM-(*)**
N Male/N Male	–	**HST4-PNMNM-(*)**
N Male/7-16 DIN Male	–	**HST4-PNMDM-(*)**
LDF2-50		
N Male/N Male	–	**L2-PNMNM-(*)**
7-16 DIN Male/7-16 DIN Male	–	**L2-PDMDM-(*)**
N Male/7-16 DIN Male	–	**L2-PNMDM-(*)**
SMA Male/SMA Male	–	**L2-SMSM-(*)**



SureFlex™ and Standard Cable Assemblies – Ordering Information

Connectors	SureFlex Type Number	Standard Type Number
LDF4-50A		
N Male/N Male	**L4A-PNMNM-(*)**	**L4-PNMNM-(*)**
N Male/N Female	**L4A-PNMNF-(*)**	**L4-PNMNF-(*)**
7-16 DIN Male/7-16 DIN Male	**L4A-PDMDM-(*)**	**L4-PDMDM-(*)**
7-16 DIN Male/7-16 DIN Female	**L4A-PDMDF-(*)**	**L4-PDMDF-(*)**
N Male/7-16 DIN Male	**L4A-PNMDM-(*)**	**L4-PNMDM-(*)**
N Male/Right Angle 7-16 DIN Male	**L4A-PNMDR-(*)**	**L4-PNMDR-(*)**
7-16 DIN Male/Right Angle 7-16 DIN Male	**L4A-PDMDR-(*)**	**L4-PDMDR-(*)**
UHF Male/UHF Male	–	**L4-UMUM-(*)**
UHF Male/UHF female	–	**L4-UMUF-(*)**
N Male/N Female	**L4A-PNMNF-(*)**	**L4-PNMNF-(*)**
Right Angle N Male/7-16 DIN Male	**L4A-PNRDM-(*)**	**L4-PNRDM-(*)**
VXL5-50		
7-16 DIN Male/7-16 DIN Male	–	**V5-PDMDM-(*)**
N Male/N Male	–	**V5-PNMNM-(*)**
N Male/7-16 DIN Male	–	**V5-PNMDM-(*)**
N Female/N Female	–	**V5-PNFNF-(*)**
7-16 DIN Female/7-16 DIN Female	–	**V5-PDFDF-(*)**

Premium SureFlex Cable Assemblies - Ordering Information

Connectors	Type Number
EFX2P-50-40 Low VSWR Cable (0.806-0.960 GHz), see page 490 for specifications.	
N Male/N Male	**EFX2P40A-PNMNM-(*)**
N Male/7-16 DIN Male	**EFX2P40A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**EFX2P40A-PDMDM-(*)**
EFX2P-50-41 Low VSWR Cable (1.7-2.3 GHz), see page 490 for specifications.	
N Male/N Male	**EFX2P41A-PNMNM-(*)**
N Male/7-16 DIN Male	**EFX2P41A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**EFX2P41A-PDMDM-(*)**
EFX2P-50-42 Low VSWR Cable (0.806-0.960 and 1.7-2.3 GHz), see page 490 for specifications.	
N Male/N Male	**EFX2P42A-PNMNM-(*)**
N Male/7-16 DIN Male	**EFX2P42A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**EFX2P42A-PDMDM-(*)**
FSJ4P-50B-40 Low VSWR Cable (0.806-0.960 GHz), see page 487 for specifications.	
N Male/N Male	**F4P40A-PNMNM-(*)**
N Male/7-16 DIN Male	**F4P40A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**F4P40A-PDMDM-(*)**
FSJ4P-50B-41 Low VSWR Cable (1.7-2.3 GHz), see page 487 for specifications.	
N Male/N Male	**F4P41A-PNMNM-(*)**
N Male/7-16 DIN Male	**F4P41A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**F4P41A-PDMDM-(*)**
FSJ4P-50B-42 Low VSWR Cable (0.806-0.960 and 1.7-2.3 GHz), see page 487 for specifications.	
N Male/N Male	**F4P42A-PNMNM-(*)**
N Male/7-16 DIN Male	**F4P42A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**F4P42A-PDMDM-(*)**
LDF4P-50A-40 Low VSWR Cable (0.806-0.960 GHz), see page 498 for specifications.	
N Male/N Male	**L4P40A-PNMNM-(*)**
N Male/7-16 DIN Male	**L4P40A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**L4P40A-PDMDM-(*)**
LDF4P-50A-41 Low VSWR Cable (1.7-2.3 GHz), see page 498 for specifications.	
N Male/N Male	**L4P41A-PNMNM-(*)**
N Male/7-16 DIN Male	**L4P41A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**L4P41A-PDMDM-(*)**
LDF4P-50A-42 Low VSWR Cable (0.806-0.960 and 1.7-2.3 GHz), see page 498 for specifications.	
N Male/N Male	**L4P42A-PNMNM-(*)**
N Male/7-16 DIN Male	**L4P42A-PNMDM-(*)**
7-16 DIN Male/7-16 DIN Male	**L4P42A-PDMDM-(*)**

* Insert length in feet or use M suffix to designate meters. For example, -3 = 3 feet, -2M = 2 meters, and -1M5 = 1.5 meters.

Phase Measured Cable Assemblies

HELIAX® phase measured cable assemblies are excellent for applications where signals arrive in phase such as phased array radar, or for delay lines cut to precision electrical length. Both phase matched and delay lines are available with precision or standard length tolerances and are referred to collectively as phase measured assemblies.

Phase measured assemblies are manufactured from phase stabilized versions of HELIAX coaxial cables and connectors. HELIAX coaxial cables exhibit excellent phase stability with temperature changes and with bending.

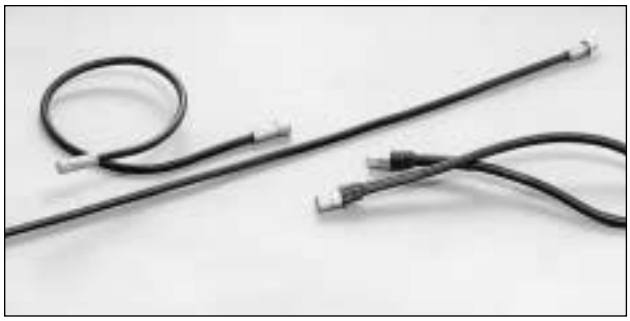
Phase Stability with Temperature Change

As temperature changes, the physical length of the metallic conductors of coaxial cable increase causing an increase in the electrical length and transmission delay time. The dielectric constant of materials, such as the low-loss foam dielectric of HELIAX cable, decreases with increasing temperature. This causes an increase in the velocity of propagation of the cable, which results in a decrease in electrical length and transmission delay time. In HELIAX cable, these two effects are of similar magnitude, causing little change in the overall electrical length of the cable. In cables with solid dielectrics, such as RG-214/U, the decrease in electrical length caused by the dielectric constant change is greater than the increase caused by the conductors. Therefore, these cables exhibit larger changes in electrical length. Figures 1 and 2 display this effect.

Phase Stabilized Cable

When foam cable is subjected to temperature changes, its electrical length undergoes a permanent change which cannot be removed by restoring it to the initial temperature. However, this hysteresis effect can be eliminated by temperature cycling the cable until it returns to the same electrical length after each heating (not the same as the initial electrical length). Temperature cycling is used to produce phase stabilized HELIAX cables.

Figures 3 through 6 show the typical behavior of phase stabilized cable with temperature.



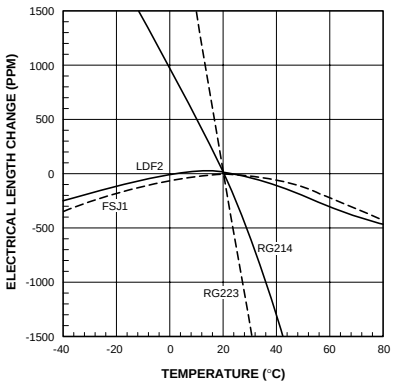


Figure 1

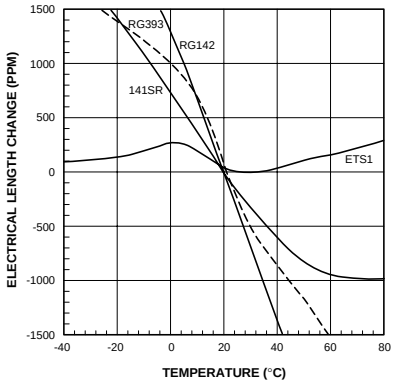


Figure 2

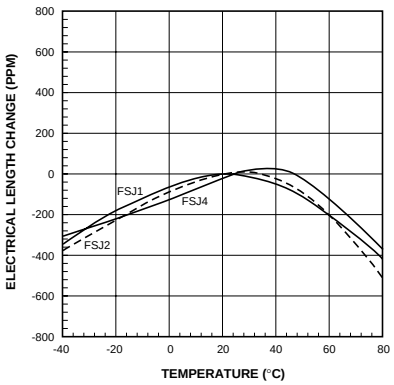
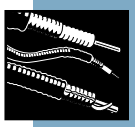


Figure 3 – Electrical Length Change vs. Temperature FSJ1-50A, FSJ2-50, FSJ4-50B



Converting PPM to Degrees for Specific Applications

Phase Change (Degrees) = 3.66×10^{-7} (ΔPPM) (L•F/V)
Where: ΔPPM = Total Electrical Length Change in PPM Over Temperature Range of Interest (From Figures 3, 4, 5 and 6)

L = Cable Length, Feet

F = Frequency, MHz

V = Cable's Relative Velocity

Sample Calculation

Using the formula above, the change in phase for a system operating at 10 GHz using a 12 ft FSJ4-50B superflexible HELIAX® cable over a temperature range of -40 to 80˚C (-40 to 176˚F) is calculated as follows:

$$\text{Phase Change} = \frac{3.66 \times 10^{-7} (400) \times 12 \times 10^{4}}{0.81}$$

$$= 21.69° \text{ maximum phase change}$$

At 1 GHz this equates to just over 2° maximum phase change.

Phase Stability with Bending

When cable is bent during installation, it is important to maintain a constant cable phase length. Stability in bending is enhanced by locking all the cable components together such that the cable bends on its neutral axis.

The foam dielectric in HELIAX cables is bonded to the center conductor, while the outer conductor corrugations mechanically lock the outer conductor to the dielectric. This locking results in excellent stability.

Typical phase change with bending data for HELIAX coaxial cables is given below:

Cable	Bending Radius In (mm)	Test Frequency GHz	Typical Phase Change, 360 Bend, Electrical Degrees/GHz
ETS1-50	1.0 (25)	18.0	0.8
FSJ1-50A	1.0 (25)	18.0	0.2
FSJ2-50	1.0 (25)	13.0	0.4
ETS2-50	1.0 (25)	13.0	0.8
FSJ4-50B	1.25 (32)	10.2	0.5
LDF2-50	3.75 (95)	13.0	0.5
LDF4-50A	5.0 (125)	8.0	0.6
LDF5-50A	10.0 (250)	5.0	0.3
HJ4-50	5.0 (125)	10.0	1.0
HJ5-50	10.0 (250)	5.0	0.8

Phase change with bending is not as repeatable or predictable as phase change with temperature. Results obtained will vary depending on exactly how the cable is bent. The above numbers are intended as a guide to the order of magnitude of change to be expected during installation if bending is required.

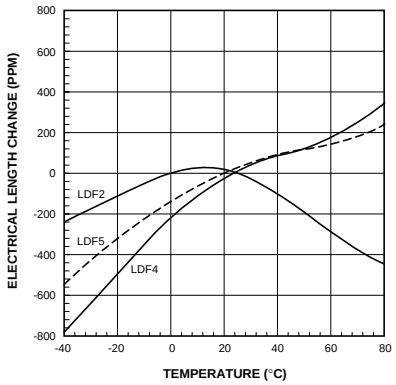


Figure 4 – Electrical Length Change vs. Temperature
LDF1-50, LDF2-50, LDF4-50A, LDF5-50A

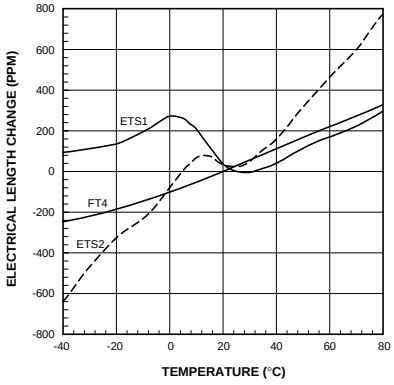


Figure 5 – Electrical Length Change vs. Temperature
ETS1-50, ETS2-50, FT4-50

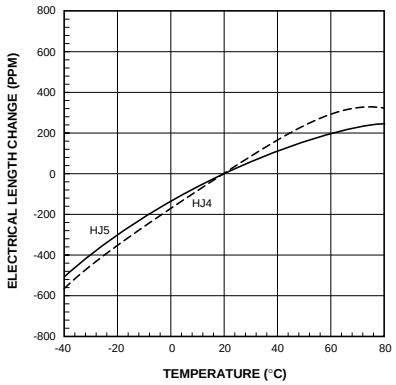
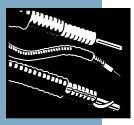


Figure 6 – Electrical Length Change vs. Temperature
HJ4-50, HJ5-50



Phase Measured Cable Assemblies

Phase Measured Assemblies

Two types of phase measured assemblies are available from Andrew:

Delay Lines. These are assemblies cut to a specific electrical length, specified either in nanoseconds or degrees, at a specified frequency. When several are ordered, their physical length can be expected to vary somewhat.

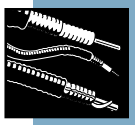
Phase Matched Assemblies. These are assemblies which are matched in electrical length to each other at a specified frequency. When phase matched assemblies are ordered, their minimum acceptable physical length must be specified, as well as an operating frequency. Andrew will supply assemblies matched in electrical length of this physical length and longer.

Phase Measured Cable – Characteristics and Ordering Information

(Larger sizes also available; contact Andrew.)

	1/4" Superflexible FSJ1-50A	3/8" Superflexible FSJ2-50	1/2" Superflexible FSJ4-50B	1/4" LDF LDF1-50	3/8" LDF LDF2-50	1/2" LDF LDF4-50A	7/8" LDF LDF5-50A
For cable/connector technical information see page:	474	480	485	491	493	496	506
Type Numbers							
Phase Stabilized	**35422-33**	**35422-42**	**35422-24**	**35422-50**	**35422-23**	**35422-25**	**35422-26**
Delay Line Cut to Electrical Length ±0.1 ns tolerance (36° /GHz)	**42394-133**	**42394-142**	**42394-124**	**42394-150**	**42394-122**	**42394-114**	**42394-115**
Delay Line, Precision Tolerence ±deg/GHz (ns)	**42394-333** 1.906 (0.0053)	**42394-342** 2.021 (0.0056)	**42394-324** 2.222 (0.0062)	**42394-350** 2.56 (0.0072)	**42394-322** 2.946 (0.0082)	**42394-314** 3.466 (0.0096)	**42394-315** 4.627 (0.0129)
Phase Matched ±0.1 ns (36° /GHz)	**42394-33**	**42394-42**	**42394-24**	**42394-50**	**42394-22**	**42394-14**	**42394-15**
Precision Phase Matched ±deg/GHz (ns)	**42394-233** 1.906 (0.0053)	**42394-242** 2.021 (0.0056)	**42394-224** 2.222 (0.0062)	**42394-250** 2.56 (0.0072)	**42394-222** 2.946 (0.0082)	**42394-214** 3.466 (0.0096)	**42394-215** 4.627 (0.0129)
Characteristics							
Velocity ±2% ft/ns (m/ns) ±2%* Phase/Temp Coefficient over temp. range -22 to + 104° F (-30 to +40°C) PPM/ °F (PPM/ °C)	84 0.83 (0.25) -4 to +5 (-7 to +9)	83 0.82 (0.25) -5 to +5 (-9 to +9)	81 0.8 (0.24) -1 to +3 (-2 to +6)	86 0.85 (0.26) -6 to +5 (-10 to +8)	88 0.87 (0.26) -4 to +3 (-8 to +6)	88 0.87 (0.26) +4 to +9 (+7 to +16)	89 0.88 (0.27) +3 to +7 (+5 to +12)

* For delay lines, the approximate length can be determined by multiplying delay in nanoseconds by the ft/ns factor for the appropriate cable type.



Two levels of cutting accuracy are available for both delay lines and phase matched assemblies:

Standard Cutting Accuracy. ±0.1 nanoseconds or 36/GHz. This cutting accuracy is not available for some combinations of test frequency and cable assembly lengths.

Precision Cutting Accuracy. Tolerance per table below. This varies by cable type and is based on one half of the corrugation pitch of the cable. This is as close as the cables can be fit on a production basis. This cutting accuracy is not available for some combinations of test frequency and cable assembly lengths.

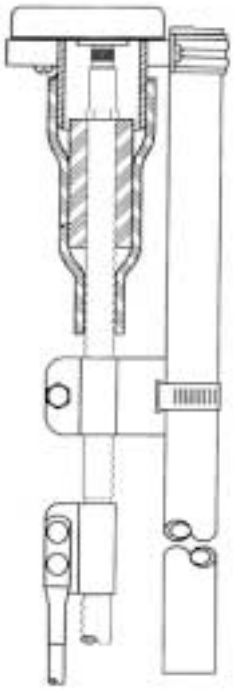
Phase Measured Cable – Characteristics and Ordering Information

(Larger sizes also available; contact Andrew.)

	1/4" High Power Superflexible ETS1-50T	3/8" High Power Superflexible ETS2-50T	1/2" Air HJ4-50	7/8" Air HJ5-50	1-5/8" Air HJ7-50A	3" Air HJ8-50B
For cable/connector technical information see page:	477	483	535	555	560	566
Type Numbers						
Phase Stabilized	**35422-46**	**35422-45**	**35422-8**	**35422-5**	**35422-1**	**35422-41**
Delay Line Cut to Electrical Length ±0.1 ns tolerance (36° /GHz)	**42394-146**	**42394-145**	**42394-108**	**42394-105**	**42394-141**	–
Delay Line, Precision Tolerence ±deg/GHz (ns)	**42394-346** 1.935 (0.0054)	**42394-345** 2.021 (0.0056)	**42394-308** 4.121 (0.0114)	**42394-305** 4.712 (0.0131)	**42394-341** –	– –
Phase Matched ±0.1 ns (36° /GHz)	**42394-46**	**42394-45**	**42394-8**	**42394-5**	–	–
Precision Phase Matched ±deg/GHz (ns)	**42394-246** 1.935 (0.0054)	**42394-245** 2.021 (0.0056)	**42394-208** 4.121 (0.0114)	**42394-205** 4.712 (0.0131)	**42394-241** –	– –
Characteristics						
Velocity ±2% ft/ns (m/ns) ±2%* Phase/Temp Coefficient over temp. range -22 to + 104° F (-30 to +40°C) PPM/ °F (PPM/ °C)	82 0.81 (0.25) -9 to +6 (-16 to +10)	83 0.82 (0.25) -5 to +7 (-8 to +13)	91.4 0.9 (0.27) +3 to +6 (+5 to +11)	91.6 0.9 (0.27) +3 to +6 (+5 to +11)	92.1 – – –	93.3 – – –

* For delay lines, the approximate length can be determined by multiplying delay in nanoseconds by the ft/ns factor for the appropriate cable type.

System Timing



Andrew GPS Antenna Kits Speed Installation, Simplify Ordering

Obtain a complete GPS antenna system packaged in a single comprehensive kit. The GPS Antenna System Kit features everything required to establish GPS capabilities for PCS applications. This weatherproof system is designed for outdoor use. It has been tested to meet the following specifications:

Test	Test Specifications
Thermal shock	MIL-STD-202, method 107, condition A-1, -55OC to +85OC
Moisture resistance	IEC 529, Class IPX4S

Kits Include:

- *GPS antenna integrated with a 26 dB low-noise amplifier with a Type N female connector. A 5-volt dc bias is required, via the center conductor, to power the integrated low-noise pre-amplifier.*
- *HELIAX® connectors. (1/2" LDF4, 1/2" FSJ4 or 7/8" LDF5 HELIAX cable is ordered separately to length)*
- *HELIAX cable hangers, grounding kit, and 3M™ Cold Shrink™ self-applicating weatherproofing kit..*
- *Antenna mounting plate and mast shroud.*

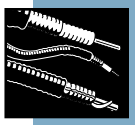
Ordering Information	
GPS-KIT12	GPS Antenna Kit for 1/2” LDF4 HELIAX Cable
GPS-KITF4	GPS Antenna Kit for 1/2” FSJ4 HELIAX Cable
GPS-KIT78	GPS Antenna Kit for 7/8” LDF5 HELIAX Cable

Hanger Spacing Considerations

Hanger Spacing Tables. Recommended hanger spacing is tabulated, on the following pages, for various HELIAX® hangers and cable types. The recommended hanger spacing is tabulated as a function of wind speed and ice conditions. These recommendations have been derived from extensive mechanical, environmental, and wind tunnel testing. They are based on the guidelines stated in EIA Standard RS-222 (Structural Standards for Steel Antenna Towers and Antenna Supporting Structures) and BSI CP3: Chapter V: Part 2 (Code of Basic Data for the Design of Buildings, Wind Loading). The recommendations assume that proper structural mounting arrangements and installation procedures are adhered to.

The recommended hanger spacings are tabulated as a function of wind speed and radial ice only. However, there are many other factors that must be taken into consideration when determining hanger spacing.

Geographical Considerations. Geographical location may have a significant impact on installation conditions. Coastal installations may be in the path of hurricanes producing high values of sustained wind. Mountainous regions may experience extreme wind gusts. Geographical location also dictates the "design basic wind speed", which is the highest wind speed, at a height of 10 meters, over open terrain. Published values of basic wind speed are compiled for various counties and states and are found in EIA TIA-222-E.



Structural Considerations. Andrew hangers are designed for severe mechanical and environmental conditions. However, the mounting arrangement and structural integrity of the tower or structure, to which the hangers are attached, must be taken into account. A poorly designed mounting structure may result in excessive vibration, subjecting the hanger to extreme stress and fatigue. In such cases, the mounting geometry should be re-evaluated and the hanger spacing reduced.

Height Considerations. The height of the tower, to which the hangers are attached, as well as the height above average ground level, must be considered when calculating hanger spacing. For towers and structures exceeding 150 feet, it is important to review the requirements and guidelines stated in EIA Standard RS-222 (Structural Standards for Steel Antenna Towers and Antenna Supporting Structures). Wind loading results in horizontal forces being applied to hangers. The horizontal force applied to each hanger and tower section can be approximated by (see EIA TIA-222-E):

F = Wind Load Applied to Hanger = $q_z C_f A_p G_H$.

qz = Velocity Pressure = 0.00256 K_z $(V)^2$

Kz = Velocity Pressure Exposure Coefficient = $(Z/33)^{0.286}$ (for z in feet and $1< K_z < 2.58$)

Z = Height Above Average Ground Level to Midpoint of the Section

V = Basic Wind Speed

GH = Gust Response Factor = (see EIA-222)

Cf = Structure Force Coefficient (1.2 for cable)

Ap = Projected Area (Cable Diameter x Hanger Spacing)

Combining the above variables, we see that the force, applied to a hanger due to wind loading, is equal to the following:

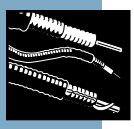
F = Wind Load Applied to Hanger = 0.00256 $(Z/33)^{0.286}$ $(V)^2$ C_f G_H (Cable Diameter x Hanger Spacing)

From the above equations we can see that the velocity pressure exposure coefficient and the gust response factor introduce some height dependence when considering the amount of force subjected to an individual hanger.

Icing Considerations. A large accumulation of radial ice will dramatically increase the projected area, resulting in a significant increase in loading. It is important to know if, for the given geographic area, significant icing and high wind loading are occurring simultaneously. However, the probability of an extreme ice loading occurring simultaneously with an extreme wind load is low allowing some reduction in overall wind loading.

Wind Loading. The loads experienced by a hanger transmitted through the cable arise from various phenomena. However, the above equation states, the very important relationship, that the force subjected to an individual hanger is proportional to the square of the wind velocity. Therefore, for extreme wind loading environments, it is critical to carefully review hanger spacing considerations and adhere to proper mounting procedures. Aside from the weight of the cable and ice accumulation, the hanger's holding integrity is impacted predominantly by the static drag load, vortex shedding, and atmospheric turbulence induced from wind, as well as the natural resonating frequencies of the structure.

Surviving Severe Conditions. Andrew hangers are designed and extensively tested for their mechanical integrity, their ability to survive severe environmental conditions, and their ability to support transmission lines, without creating electrical discontinuities. Laboratory testing includes wind tunnel testing, ice loading, axial loading, vibration, static side loading, normal loading, thermal cycling, salt spray (corrosion), UV exposure, metallurgical evaluation, time domain reflectometry and VSWR. Proper selection of hanger type, hanger spacing, and hanger installation will ensure that these hangers will withstand the most demanding requirements for your wireless system.

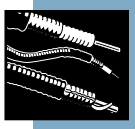


The maximum spacing recommendations assume that all hangers are properly installed and tightened. Recommendations for a 150 ft (46 m) tower with 125 mph (200 km/h) wind speed and 1/2" radial ice (typical conditions) are highlighted in red. See "Hanger Spacing Considerations," page 593 for further information.

Standard Hangers – Recommended Maximum Hanger Spacing

Cable Size	Cable Type Number	Hanger Type Number	Recommended Maximum Hanger Spacing, feet (meters)					
Wind Speed:			**85 mph (137 km/h)**			**100 mph (160 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/2"	LDF4-50A	43211A	5 (1.5)	4 (1.2)	3 (0.9)	5 (1.5)	4 (1.2)	3 (0.9)
1/2"	LDF4-75A	43211A	5 (1.5)	4 (1.2)	3 (0.9)	5 (1.5)	4 (1.2)	3 (0.9)
1/2"	HL4RP-50	43211A	5 (1.5)	4 (1.2)	3 (0.9)	5 (1.5)	4 (1.2)	3 (0.9)
1/2"	HJ4-50	43211A	5 (1.5)	4 (1.2)	3 (0.9)	5 (1.5)	4 (1.2)	3 (0.9)
1/2"	HLT4-50	43211A	5 (1.5)	4 (1.2)	3 (0.9)	5 (1.5)	3 (0.9)	2 (0.6)
1/2"	HT4-50	43211A	5 (1.5)	4 (1.2)	3 (0.9)	5 (1.5)	4 (1.2)	3 (0.9)
1/2"	HST4-50	43211A	5 (1.5)	3 (0.9)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
1/2"	HS4RP-50	43211A	5 (1.5)	3 (0.9)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
1/2"	FSJ4-50B	43211A	5 (1.5)	3 (0.9)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
1/2"	FSJ4-75A	43211A	5 (1.5)	3 (0.9)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
5/8"	LDF4.5-50	42396A-9	5 (1.5)	5 (1.5)	4 (1.2)	5 (1.5)	5 (1.5)	4 (1.2)
5/8"	HJ4.5-50	42396A-9	5 (1.5)	5 (1.5)	4 (1.2)	5 (1.5)	5 (1.5)	4 (1.2)
7/8"	LDF5-50A	42396A-5	5 (1.5)	5 (1.5)	4 (1.2)	5 (1.5)	5 (1.5)	4 (1.2)
7/8"	HJ5-50	42396A-5	5 (1.5)	5 (1.5)	4 (1.2)	5 (1.5)	5 (1.5)	4 (1.2)
7/8"	HJ5-75	42396A-5	5 (1.5)	5 (1.5)	4 (1.2)	5 (1.5)	5 (1.5)	4 (1.2)
7/8"	HT5-50	42396A-5	5 (1.5)	5 (1.5)	4 (1.2)	5 (1.5)	5 (1.5)	4 (1.2)
1-1/4"	LDF6-50	42396A-1	4 (1.2)	4 (1.2)	4 (1.2)	4 (1.2)	4 (1.2)	3 (0.9)
1-5/8"	LDF7-50A	42396A-2	4 (1.2)	4 (1.2)	4 (1.2)	4 (1.2)	3 (0.9)	3 (0.9)
1-5/8"	HJ7-50A	42396A-2	4 (1.2)	4 (1.2)	4 (1.2)	4 (1.2)	3 (0.9)	3 (0.9)
2-1/4"	LDF12-50	42395A-4	4 (1.2)	4 (1.2)	4 (1.2)	4 (1.2)	3 (0.9)	3 (0.9)
2-1/4"	HJ12-50	42396A-4	4 (1.2)	4 (1.2)	4 (1.2)	4 (1.2)	3 (0.9)	3 (0.9)
3"	HJ8-50B	31766A-11	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
4"	HJ11-50B	31766A-10	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
5"	HJ9HP-50	33598-5	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
5"	HJ9-50	33598-5	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
Wind Speed:			**125 mph (200 km/h)**			**150 mph (240 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/2"	LDF4-50A	43211A	4 (1.2)	3 (0.9)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	LDF4-75A	43211A	4 (1.2)	3 (0.9)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	HL4RP-50	43211A	4 (1.2)	3 (0.9)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	HJ4-50	43211A	4 (1.2)	3 (0.9)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	HLT4-50	43211A	4 (1.2)	3 (0.9)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	HT4-50	43211A	4 (1.2)	3 (0.9)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	HST4-50	43211A	3 (0.9)	2 (0.6)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	HS4RP-50	43211A	3 (0.9)	2 (0.6)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	FSJ4-50B	43211A	3 (0.9)	2 (0.6)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
1/2"	FSJ4-75A	43211A	3 (0.9)	2 (0.6)	2 (0.6)	3 (0.9)	2 (0.6)	1 (0.3)
5/8"	LDF4.5-50	42396A-9	5 (1.5)	4 (1.2)	3 (0.9)	4 (1.2)	3 (0.9)	3 (0.9)
5/8"	HJ4.5-50	42396A-9	5 (1.5)	4 (1.2)	3 (0.9)	4 (1.2)	3 (0.9)	3 (0.9)
7/8"	LDF5-50A	42396A-5	5 (1.5)	4 (1.2)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
7/8"	HJ5-50	42396A-5	5 (1.5)	4 (1.2)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
7/8"	HJ5-75	42396A-5	5 (1.5)	4 (1.2)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
7/8"	HT5-50	42396A-5	5 (1.5)	4 (1.2)	3 (0.9)	4 (1.2)	3 (0.9)	2 (0.6)
1-1/4"	LDF6-50	42396A-1	4 (1.2)	4 (1.2)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)
1-5/8"	LDF7-50A	42396A-2	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	2 (0.6)
1-5/8"	HJ7-50A	42396A-2	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	2 (0.6)
2-1/4"	LDF12-50	42395A-4	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)
2-1/4"	HJ12-50	42396A-4	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)	3 (0.9)
3"	HJ8-50B	31766A-11	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
4"	HJ11-50B	31766A-10	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
5"	HJ9HP-50	33598-5	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)
5"	HJ9-50	33598-5	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)	5 (1.5)

Definitions and Assumptions 1. Per EIA-222 Standard: Coefficient of drag for coaxial cable is 1.2 (cylindrical members). Ice forms completely around member (360 degrees). Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simutaneously. 2. Wind speeds are maximum, which includes gust factors and exposure factors.

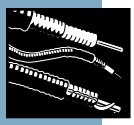


The maximum spacing recommendations assume that all hangers are properly installed and tightened. Recommendations for a 150 ft (46 m) tower with 125 mph (200 km/h) wind speed and 1/2" radial ice (typical conditions) are highlighted in red. See "Hanger Spacing Considerations," page 593 for further information.

Snap-In Hangers – Recommended Maximum Hanger Spacing

Cable Size	Cable Type Number	Hanger Type Number	Recommended Maximum Hanger Spacing, feet (meters)					
Wind Speed:			**85 mph (137 km/h)**			**100 mph (160 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/2"	LDF4-50A	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	LDF4-75	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	FSJ4-50B	206706A-1	4 (1.22)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	2 (0.61)
1/2"	FSJ4-75A	206706A-1	4 (1.22)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	2 (0.61)
1/2"	HL4RP-50	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	HLT4-50	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	HS4RP-50	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	HST4-50	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	HT4-50	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
1/2"	HJ4-50	206706A-1	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
5/8"	LDF4.5-50	206706A-6	4 (1.22)	4 (1.22)	3 (0.91)	4 (1.22)	3 (0.91)	2 (0.61)
7/8"	LDF5-50A	206706A-2	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
7/8"	HJ5-50	206706A-2	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
7/8"	HJ5-75	206706A-2	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
7/8"	HT5-50	206706A-2	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
7/8"	FT5-50T	206706A-2	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
1-1/4"	LDF6-50	206706A-3	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
1-5/8"	LDF7-50A	206706A-4	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
1-5/8"	HJ7-50A	206706A-4	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)
2-1/4"	LDF12-50	206706A-5	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)
Wind Speed:			**125 mph (200 km/h)**			**150 mph (240 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/2"	LDF4-50A	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	LDF4-75	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	FSJ4-50B	206706A-1	3 (0.91)	2 (0.61)	1 (0.30)	2 (0.61)	2 (0.61)	1 (0.30)
1/2"	FSJ4-75A	206706A-1	3 (0.91)	2 (0.61)	1 (0.30)	2 (0.61)	2 (0.61)	1 (0.30)
1/2"	HL4RP-50	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	HLT4-50	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	HS4RP-50	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	HST4-50	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	HT4-50	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
1/2"	HJ4-50	206706A-1	3 (0.91)	3 (0.91)	2 (0.61)	3 (0.91)	2 (0.61)	1 (0.30)
5/8"	LDF4.5-50	206706A-6	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)	1 (0.30)
7/8"	LDF5-50A	206706A-2	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
7/8"	HJ5-50	206706A-2	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
7/8"	HJ5-75	206706A-2	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
7/8"	HT5-50	206706A-2	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
7/8"	FT5-50T	206706A-2	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
1-1/4"	LDF6-50	206706A-3	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
1-5/8"	LDF7-50A	206706A-4	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
1-5/8"	HJ7-50A	206706A-4	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	1 (0.30)	1 (0.30)
2-1/4"	LDF12-50	206706A-5	2 (0.61)	2 (0.61)	1 (0.30)	2 (0.61)	1 (0.30)	1 (0.30)

Definitions and Assumptions 1. Per EIA-222 Standard: Coefficient of drag for coaxial cable is 1.2 (cylindrical members). Ice forms completely around member (360 degrees). Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simutaneously. 2. Wind speeds are maximum, which includes gust factors and exposure factors.

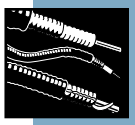


The maximum spacing recommendations assume that all hangers are properly installed and tightened. Recommendations for a 150 ft (46 m) tower with 125 mph (200 km/h) wind speed and 1/2" radial ice (typical conditions) are highlighted in red. See “Hanger Spacing Considerations,” page 593 for further information.

Insulated Hangers – Recommended Maximum Hanger Spacing

Cable Size	Cable Type Number	Hanger Type Number	Recommended Maximum Hanger Spacing, feet (meters)					
Wind Speed:			85 mph (137 km/h)			100 mph (160 km/h)		
Radial Ice:			No Ice	1/2" (13 mm)	1" (25 mm)	No Ice	1/2" (13 mm)	1" (25 mm)
1/4"	FSJ1-75A	11662-3	3.5 (1.07)	2 (0.61)	1.5 (0.46)	3 (0.91)	1.5 (0.46)	1 (0.30)
1/4"	HST1-50	11662-3	4.5 (1.37)	2.5 (0.76)	2 (0.61)	4 (1.22)	2 (0.61)	1.5 (0.46)
1/4"	LDF1-50	11662-3	4.5 (1.37)	2.5 (0.76)	2 (0.61)	4 (1.22)	2.5 (0.76)	1.5 (0.46)
3/8"	EFX2-50	11662-3	5.5 (1.68)	3.5 (1.07)	2.5 (0.76)	4.5 (1.37)	3 (0.91)	2 (0.61)
3/8"	ETS2-50	11662-3	5.5 (1.68)	3.5 (1.07)	2.5 (0.76)	5 (1.52)	3 (0.91)	2 (0.61)
3/8"	FSJ2-50	11662-3	5.5 (1.68)	3.5 (1.07)	2.5 (0.76)	5 (1.52)	3 (0.91)	2 (0.61)
3/8"	HS2RP-50	11662-3	5.5 (1.68)	3.5 (1.07)	2.5 (0.76)	5 (1.52)	3 (0.91)	2 (0.61)
3/8"	HST2-50	11662-3	5.5 (1.68)	3.5 (1.07)	2.5 (0.76)	5 (1.52)	3 (0.91)	2 (0.61)
3/8"	LDF2-50	11662-3	5 (1.52)	3 (0.91)	2.5 (0.76)	4 (1.22)	2.5 (0.76)	2 (0.61)
1/2"	FSJ4-50B	11662-3	5.5 (1.68)	3.5 (1.07)	3 (0.91)	4.5 (1.37)	3 (0.91)	2.5 (0.76)
1/2"	FSJ4-75A	11662-3	5.5 (1.68)	3.5 (1.07)	3 (0.91)	4.5 (1.37)	3 (0.91)	2.5 (0.76)
1/2"	LDF4-50A	11662-3	6 (1.83)	4 (1.22)	3.5 (1.07)	5 (1.52)	3.5 (1.07)	2.5 (0.76)
1/2"	LDF4-75A	11662-3	6 (1.83)	4 (1.22)	3.5 (1.07)	5 (1.52)	3.5 (1.07)	2.5 (0.76)
1/2"	HL4RP-50	11662-3	6 (1.83)	4 (1.22)	3.5 (1.07)	5 (1.52)	3.5 (1.07)	2.5 (0.76)
1/2"	HLT4-50	11662-3	6 (1.83)	4 (1.22)	3.5 (1.07)	5 (1.52)	3.5 (1.07)	2.5 (0.76)
1/2"	HS4RP-50	11662-3	5.5 (1.68)	3.5 (1.07)	3 (0.91)	4.5 (1.37)	3 (0.91)	2.5 (0.76)
1/2"	HST4-50	11662-3	5.5 (1.68)	3.5 (1.07)	3 (0.91)	4.5 (1.37)	3 (0.91)	2.5 (0.76)
1/2"	HT4-50	11662-3	6 (1.83)	6 (1.83)	5.5 (1.68)	6 (1.83)	6 (1.83)	4.5 (1.37)
1/2"	HJ4-50	11662-3	6 (1.83)	6 (1.83)	5.5 (1.68)	6 (1.83)	6 (1.83)	5 (1.52)
7/8"	LDF5-50A	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5.5 (1.68)
7/8"	HJ5-50	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
7/8"	HJ5-75	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
7/8"	HT5-50	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
1-1/4"	LDF6-50	33948-5	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
1-5/8"	HJ7-50A	33948-3	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
1-5/8"	LDF7-50A	33948-3	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
2-1/4"	HJ12-50	33948-6	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
2-1/4"	LDF12-50	33948-6	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
3"	HJ8-50B	33948-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
4"	HJ11-50	33948-4	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
5"	HJ9-50	33948-1	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
5"	HJ9HP-50	33948-1	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)

Definitions and Assumptions 1. Per EIA-222 Standard: Coefficient of drag for coaxial cable is 1.2 (cylindrical members). Ice forms completely around member (360 degrees). Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simutaneously. 2. Wind speeds are maximum, which includes gust factors and exposure factors.

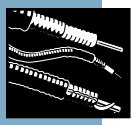


The maximum spacing recommendations assume that all hangers are properly installed and tightened. Recommendations for a 150 ft (46 m) tower with 125 mph (200 km/h) wind speed and 1/2" radial ice (typical conditions) are highlighted in red. See "Hanger Spacing Considerations," page 593 for further information.

Insulated Hangers – Recommended Maximum Hanger Spacing

Cable Size	Cable Type Number	Hanger Type Number	Recommended Maximum Hanger Spacing, feet (meters)					
Wind Speed:			**125 mph (200 km/h)**			**150 mph (240 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/4"	FSJ1-75A	11662-3	2.5 (0.76)	1 (0.30)	1 (0.30)	2 (0.61)	1 (0.30)	0.5 (0.15)
1/4"	HST1-50	11662-3	3 (0.91)	1.5 (0.46)	1 (0.30)	2.5 (0.76)	1.5 (0.46)	1 (0.30)
1/4"	LDF1-50	11662-3	3 (0.91)	2.5 (0.76)	1.5 (0.46)	2.5 (0.76)	1.5 (0.46)	1 (0.30)
3/8"	EFX2-50	11662-3	3.5 (1.07)	2 (0.61)	1.5 (0.46)	3 (0.91)	2 (0.61)	1.5 (0.46)
3/8"	ETS2-50	11662-3	4 (1.22)	2.5 (0.76)	1.5 (0.46)	3 (0.91)	2 (0.61)	1.5 (0.46)
3/8"	FSJ2-50	11662-3	4 (1.22)	2.5 (0.76)	1.5 (0.46)	3 (0.91)	2 (0.61)	1.5 (0.46)
3/8"	HS2RP-50	11662-3	4 (1.22)	2 (0.61)	1.5 (0.46)	3 (0.91)	2 (0.61)	1.5 (0.46)
3/8"	HST2-50	11662-3	4 (1.22)	2 (0.61)	1.5 (0.46)	3 (0.91)	2 (0.61)	1.5 (0.46)
3/8"	LDF2-50	11662-3	3.5 (1.07)	2 (0.61)	1.5 (0.46)	2.5 (0.76)	1.5 (0.46)	1 (0.30)
1/2"	FSJ4-50B	11662-3	3.5 (1.07)	2.5 (0.76)	2 (0.61)	3 (0.91)	2 (0.61)	1.5 (0.46)
1/2"	FSJ4-75A	11662-3	3.5 (1.07)	2.5 (0.76)	2 (0.61)	3 (0.91)	2 (0.61)	1.5 (0.46)
1/2"	LDF4-50A	11662-3	4 (1.22)	3 (0.91)	2 (0.61)	3 (0.91)	2.5 (0.76)	1.5 (0.46)
1/2"	LDF4-75A	11662-3	4 (1.22)	3 (0.91)	2 (0.61)	3 (0.91)	2.5 (0.76)	1.5 (0.46)
1/2"	HL4RP-50	11662-3	4 (1.22)	3 (0.91)	2 (0.61)	3 (0.91)	2.5 (0.76)	1.5 (0.46)
1/2"	HLT4-50	11662-3	4 (1.22)	3 (0.91)	2 (0.61)	3 (0.91)	2.5 (0.76)	1.5 (0.46)
1/2"	HS4RP-50	11662-3	3.5 (1.07)	2.5 (0.76)	2 (0.61)	3 (0.91)	2 (0.61)	1.5 (0.46)
1/2"	HST4-50	11662-3	3.5 (1.07)	2.5 (0.76)	2 (0.61)	3 (0.91)	2 (0.61)	1.5 (0.46)
1/2"	HT4-50	11662-3	6 (1.83)	5 (1.52)	3.5 (1.07)	6 (1.83)	4 (1.22)	3 (0.91)
1/2"	HJ4-50	11662-3	6 (1.83)	6 (1.83)	4 (1.22)	6 (1.83)	6 (1.83)	3 (0.91)
7/8"	LDF5-50A	11662-2	6 (1.83)	5.5 (1.68)	4.5 (1.37)	5 (1.52)	4.5 (1.37)	3.5 (1.07)
7/8"	HJ5-50	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5 (1.52)
7/8"	HJ5-75	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5 (1.52)
7/8"	HT5-50	11662-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	5.5 (1.68)
1-1/4"	LDF6-50	33948-5	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
1-5/8"	HJ7-50A	33948-3	6 (1.83)	6 (1.83)	5.5 (1.68)	6 (1.83)	6 (1.83)	4.5 (1.37)
1-5/8"	LDF7-50A	33948-3	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
2-1/4"	HJ12-50	33948-6	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
2-1/4"	LDF12-50	33948-6	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
3"	HJ8-50B	33948-2	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)	6 (1.83)
4"	HJ11-50	33948-4	6 (1.83)	6 (1.83)	6 (1.83)	5 (1.52)	5 (1.52)	4.5 (1.52)
5"	HJ9-50	33948-1	4.5 (1.37)	4.5 (1.37)	4.5 (1.37)	3 (0.91)	3.(0.91)	3 (0.91)
5"	HJ9HP-50	33948-1	4.5 (1.37)	4.5 (1.37)	4.5 (1.37)	3 (0.91)	3.(0.91)	3 (0.91)

Definitions and Assumptions 1. Per EIA-222 Standard: Coefficient of drag for coaxial cable is 1.2 (cylindrical members). Ice forms completely around member (360 degrees). Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simutaneously. 2. Wind speeds are maximum, which includes gust factors and exposure factors.



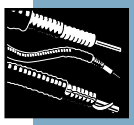
The maximum spacing recommendations assume that all hangers are properly installed and tightened. Recommendations for a 150 ft (46 m) tower with 125 mph (200 km/h) wind speed and 1/2" radial ice (typical conditions) are highlighted in red. See “Hanger Spacing Considerations,” page 593 for further information.

Click-On Hangers – Recommended Maximum Hanger Spacing

Cable Size	Cable Type Number	Hanger Type* and Stack Configuration	Recommended Maximum Hanger Spacing, feet (meters)					
Wind Speed:			**85 mph (137 km/h)**			**100 mph (160 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/2"	LDF4-50A	L4CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
1/2"	LDF4-50A	L4CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
1/2"	LDF4-50A	L4CLICK, 3-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
Note: These same hanger spacing recommendations apply for the other following 1/2" cable types: LDF4-75A, HL4RP-50, HLT4-50, HS4RP-50, HST4-50, HT4-50, HJ4-50								
5/8"	LDF4.5-50	L45CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
5/8"	LDF4.5-50	L45CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
5/8"	LDF4.5-50	L45CLICK, 3-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
Note: These same hanger spacing recommendations apply for the other following 5/8" cable types: HJ4.5-50								
7/8"	LDF5-50A	L5CLICK, 1-Stack	4 (1.22)	4 (1.22)	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)
7/8"	LDF5-50A	L5CLICK, 2-Stack	4 (1.22)	4 (1.22)	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)
7/8"	LDF5-50A	L5CLICK, 3-Stack	4 (1.22)	4 (1.22)	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)
Note: These same hanger spacing recommendations apply for the other following 7/8" cable types: VXL5-50, HJ5-50, HJ5-75, HT5-5.								
1-1/4"	LDF6-50	L6CLICK, 1-Stack	4 (1.22)	4 (1.22)	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)
1-1/4"	LDF6-50	L6CLICK, 2-Stack	4 (1.22)	4 (1.22)	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)
1-1/4"	LDF6-50	L6CLICK, 3-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
1-5/8"	LDF7-50A	L7CLICK, 1-Stack	4 (1.22)	4 (1.22)	4 (1.22)	3 (0.91)	3 (0.91)	3 (0.91)
1-5/8"	LDF7-50A	L7CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
1-5/8"	LDF7-50A	L7CLICK, 3-Stack	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)	3 (0.91)
Note: These same hanger spacing recommendations apply for the other following 1 5/8" cable types: HJ7-50A								
Wind Speed:			**125 mph (200 km/h)**			**150 mph (240 km/h)**		
Radial Ice:			**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**	**No Ice**	**1/2" (13 mm)**	**1" (25 mm)**
1/2"	LDF4-50A	L4CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
1/2"	LDF4-50A	L4CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
1/2"	LDF4-50A	L4CLICK, 3-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
Note: These same hanger spacing recommendations apply for the other following 1/2" cable types: LDF4-75A, HL4RP-50, HLT4-50, HS4RP-50, HST4-50, HT4-50, HJ4-50								
5/8"	LDF4.5-50	L45CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
5/8"	LDF4.5-50	L45CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
5/8"	LDF4.5-50	L45CLICK, 3-Stack	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)
Note: These same hanger spacing recommendations apply for the other following 5/8" cable types: HJ4.5-50								
7/8"	LDF5-50A	L5CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
7/8"	LDF5-50A	L5CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
7/8"	LDF5-50A	L5CLICK, 3-Stack	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)
Note: These same hanger spacing recommendations apply for the other following 7/8" cable types: VXL5-50, HJ5-50, HJ5-75, HT5-50								
1-1/4"	LDF6-50	L6CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
1-1/4"	LDF6-50	L6CLICK, 2-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
1-1/4"	LDF6-50	L6CLICK, 3-Stack	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)
1-5/8"	LDF7-50A	L7CLICK, 1-Stack	3 (0.91)	3 (0.91)	3 (0.91)	2 (0.61)	2 (0.61)	2 (0.61)
1-5/8"	LDF7-50A	L7CLICK, 2-Stack	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)
1-5/8"	LDF7-50A	L7CLICK, 3-Stack	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)	2 (0.61)
Note: These same hanger spacing recommendations apply for the other following 1 5/8" cable types: HJ7-50A.								

* These hanger spacings have been specified based on using the Click-On hangers with Andrew specified hardware kits.

Definitions and Assumptions 1. Per EIA-222 Standard: Coefficient of drag for coaxial cable is 1.2 (cylindrical members). Ice forms completely around member (360 degrees). Combined wind and ice loading is reduced by 25% to reflect lower probability of wind and ice occuring simutaneously. 2. Wind speeds are maximum, which includes gust factors and exposure factors.

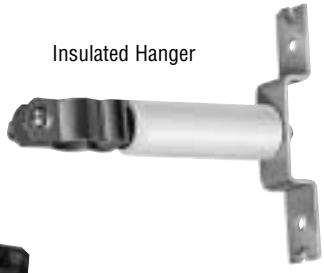


Andrew offers a wide variety of hangers and cable ties for reliable and convenient support of HELIAX® coaxial cables.

- ***Standard Hangers*** *feature great strength and long term reliability. They are ideal for general purpose use.*
- ***Insulated Hangers*** *are for use on insulated towers.*
- ***Snap-In Hangers*** *offer quickest and easiest installation for cable sizes 1/2" to 2-1/4".*
- ***Click-On Hangers*** *support two cables and are stackable up to three high (six cables). They are easy to install and are ideal for towers with limited space.*
- ***KwikClamp™ Hangers*** *attach one, two or three cable runs to a tower without the need for adapters or drilling holes.*
- ***Nylon Cable Ties*** *are lowest cost for cables 1/2" and smaller. They are ideal for 1/4" and 3/8" cable and for temporary installations.*
- ***Velcro* Cable Ties*** *are the easiest way to organize jumpers within and between radio cabinets.*

* Velcro is a registered trademark of Velcro Industries.

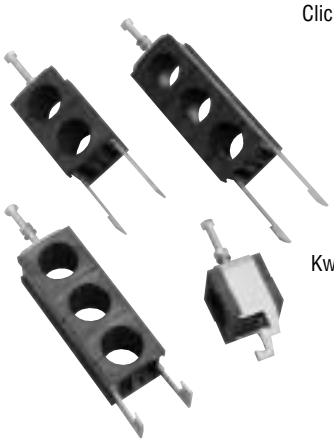
Standard Hanger



Insulated Hanger

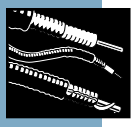
Snap-In Hanger

Click-On Hangers



KwikClamp Hangers

Cable Ties



Standard Hangers and Adapters

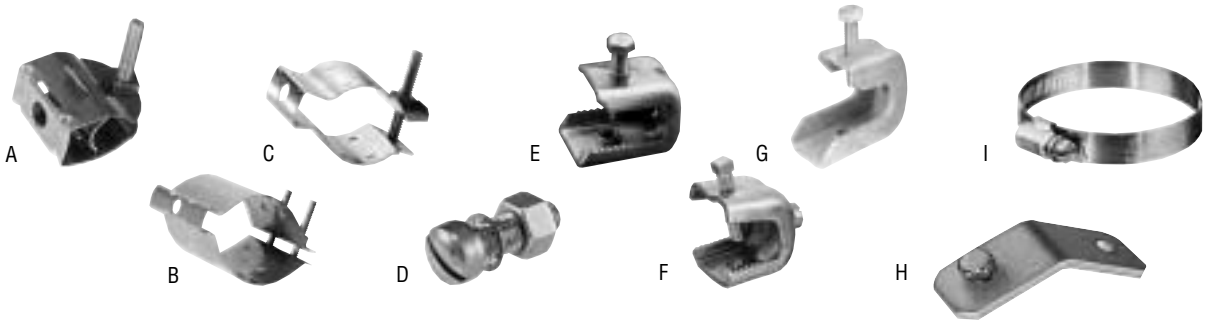
Cable Gripping Tabs – Prevent cable slippage without the need for a permanently installed hoisting grip.

Pre-Assembled and Captivated Hardware – Eliminates the need for field assembly.

Springlike Flexibility – Makes it easy to form the hanger around the cable and dampens vibration for long life.

Heavy Gauge Stainless Steel Construction – High strength and excellent corrosion resistance for long-term reliability.

Standard HELIAX hangers are designed for easy installation. The clamp locking bolt and nut are preassembled and captivated to minimize installation labor. Proper tension is easy to determine. The hanger is simply tightened until there is a 5/16" gap between the clamp legs. The pre-drilled hole for 3/8" or 1/2" mounting hardware and slots for round member adapter clamps further simplify installation. Many accessories are available to adapt these hangers to most tower configurations.



Standard Hangers and Adapters for 1/2" to 4" Cables

Hangers for 1/2" to 4" HELIAX® cables use 3/8" hardware for attachment to towers or adapters.

Hanger Kit of 10 pieces. Stainless steel. 3/8" mounting hardware not included.

Cable Size	Maximum Spacing	Photo Ref.	Type Number
1/2"	Refer to	A	**43211A**
5/8"	table	B	**42396A-9**
7/8"	on	B	**42396A-5**
1-1/4"	page 594	B	**42396A-1**
1-5/8"		B	**42396A-2**
2-1/4"		B	**42396A-4**
3"		C	**31766A-11**
4"		C	**31766A-10**

D **Hardware Kit** of 10 sets. 3/8" fillister-head bolts, lock washers and nuts for attachment of hangers to drilled tower members.
3/4" (19 mm) long .....Type **31769-5**
1" (25 mm) long .....Type **31769-1**

E **Compact Angle Adapters, Stainless Steel**. The adapters are suitable for use with single runs of HELIAX cable up to 2-1/4" diameter. When used with our stackable, Click-On hangers, they can accommodate up to six runs of LDF6 (1-1/4") or smaller and up to four runs of LDF7 (1-5/8") HELIAX cables.
3/8" Hardware .....Type **243684**
Metric Hardware .....Type **243684-M**

F **Angle Adapter, Stainless Steel,** kit of 10 pieces. For mounting cable 1/2" to 4" cable hangers to angle tower members up to 7/8" (22mm) thick. Includes hanger attachment hardware. See page 570 for bulk packs
3/8" Hardware .....Type **31768A**
Metric Hardware .....Type **31768A-M**

G **Angle Adapter, Galvanized,** kit of 10 pieces. For mounting cable 1/2" to 2-1/4" cable hangers to angle tower members up to 3/4" (19 mm) thick. Includes hanger attachment hardware.
3/8" Hardware, kit of 10 .....Type **242774**
Metric Hardware, kit of 10 .....Type **242774-M**

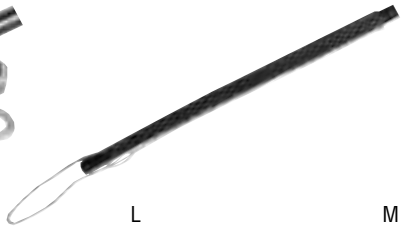
H **45° Adapter Kit** of 10. Use with angle adapter and threaded rod support kit to place a hanger at a waveguide bend. Galvanized steel .....Type **42334**

I **Round Member Adapter Kit** of 10 pieces. Stainless steel clamps to mount 1/2" to 4" cable hangers to round support members. Two each are needed for 3" and 4" cable hangers.

Member Diameter, in (mm)	Type Number
1 - 2 (25 - 50)	**31670-1**
2 - 3 (50 - 75)	**31670-2**
3 - 4 (75 - 100)	**31670-3**
4 - 5 (100 - 125)	**31670-4**
5 - 6 (125 - 150)	**31670-5**
6 - 8 (150 - 200)	**31670-6**

J

K



L

M

J Tower Standoff Kit of 10 pieces. Adapters with round member clamps and hardware for 1/2" to 4" hangers. All parts are stainless steel or galvanized.

Member Diameter in (mm)	1 in (25 mm) Standoff	2.5 in (60 mm) Standoff
0.75 - 1.5 (20 - 40)	**30848-5**	–
1.5 - 3.0 (40 - 75)	**30848-4**	–
3 - 4 (75 - 100)	**30848-1**	**41108A-1**
4 - 5 (100 - 125)	**30848-2**	**41108A-2**
5 - 6 (125 - 150)	**30848-3**	**41108A-3**

K Threaded Rod Support Kit. Use to mount hangers away from supporting structure, under cable bridge and inside equipment room. Includes 3/8" diameter threaded rod, galvanized ceiling mounting plate, nuts and washers. Attach to angle tower members with 31768A angle adapters. Attach to round tower members with 30848 series tower standoffs. All components are stainless steel, except ceiling mounting plate.

Rod Length in (mm)	Kit of 1	Kit of 5
12 (305)	**31771**	**31771-4**
24 (610)	**31771-9**	**31771-6**
36 (915)	–	**31771-10**

L Hoisting Grip. Use at 200 ft (60 m) intervals to raise cable on tower. Use with optional support clamp to achieve optimum cable grip.

Cable Size	Hoisting Grip Type Number	Optional Support Clamp Type Number
1/2"	**43094**	**F4SGRIP-4IK**
5/8"	**29958**	**L45SGRIP-45IK**
7/8"	**19256B**	**L5SGRIP-5IK**
1-1/4"	**29961**	**L6SGRIP-6IK**
1-5/8"	**24312A**	**L7SGRIP-7IK**
2-1/4"	**31535**	**L12SGRIP-12IK**
3"	**26985A**	–
4"	**34759**	–
5"	**31031-1**	–

M Support/Hoisting Grip. Use at 200 ft (60 m) intervals to raise cable and provide permanent cable support. Basic kit includes one grip and one support clamp. Support clamps are also available in kits of 10. Installation tool is required .....Type **SG-IT**

For Cable Type	Grip with One Clamp	Support Clamp Kit of 10
1/4" FSJ1	**F1SGRIP**	**F1SGRIP-1IK**
1/4" LDF1	**L1SGRIP**	**L1SGRIP-1IK**
3/8" EFX2	**E2SGRIP**	**E2SGRIP-2IK**
3/8" LDF2	**L2SGRIP**	**L2SGRIP-2IK**
3/8" FSJ2	**F2SGRIP**	**F2SGRIP-2IK**
1/2" FSJ4	**F4SGRIP**	**F4SGRIP-4IK**
1/2" LDF4	**L4SGRIP**	**L4SGRIP-4IK**
5/8" LDF4.5	**L45SGRIP**	**L45SGRIP-45IK**
7/8" LDF5/VXL5	**L5SGRIP**	**L5SGRIP-5IK**
1-1/4" LDF6/VXL6	**L6SGRIP**	**L6SGRIP-6IK**
1-5/8" LDF7/VXL7	**L7SGRIP**	**L7SGRIP-7IK**
2-1/4" LDF12	**L12SGRIP**	**L12SGRIP-12IK**

Standard Hangers and Adapters for 5" Cables

Hangers for 5" HELIAX® cables use 1/2" hardware for attachment to towers or adapters.

Hanger Kit of 10 pieces. Galvanized steel. 1/2" mounting hardware not included. Refer to page 594 for maximum spacing .....Type **33598-5**

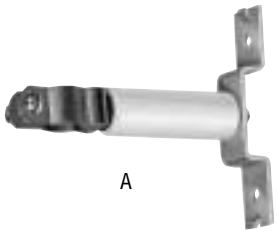
A Hardware Kit of 10 pieces 1/2" x 1-1/4" (32 mm) bolts, lockwashers, and nuts for attachment of 5" hangers to drilled tower members .....Type **31769-4**

B Angle Adapter Kit of 10 pieces. Stainless steel. For mounting 5" cable hangers to angle tower members up to 7/8" (22 mm) thick .....Type **33981A-1**

A

B

Insulated Hangers and Adapters


A


B

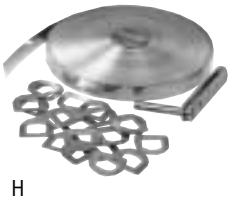

C


D


E


F


G


H

A **Insulated Hanger** for 1/4" to 7/8" Cables, Single. For use on insulated tower. Refer to tables on pages 596 and 597 for maximum spacing.
For 1/4", 3/8" and 1/2" cables .....Type **11662-3**
For 7/8" cable .....Type **11662-2**

B **Insulated Hanger** for 1-1/4" - 5" Cables Single. For use on insulated tower.

Cable Size	Max. Spacing	Type Number
1-1/4"	Refer to	**33948-5**
1-5/8"	tables on pages 596 and 597.	**33948-3**
2-1/4"		**33948-6**
3"		**33948-2**
4"		**33948-4**
5"		**33948-1**

C **Round Member Adapter/Tower Standoff Kit** of 10 pieces. For mounting 5" cable hangers to round support members. HELIAX® cable to clear tower leg flanges. Provides 2.5 in (60 mm) standoff. All parts are stainless steel or galvanized.

Member Diameter, in (mm)	Type Number
3 - 4 (75 - 100)	**43130-1**
4 - 5 (100 - 125)	**43130-2**
5 - 6 (125 - 150)	**43130-3**

D **Threaded Rod Support Kit** of 5 pieces. 1/2" x 12" (305 mm) threaded rods, ceiling mounting plates, nuts and washers for suspending 5" cable hangers. All parts are stainless steel except galvanized ceiling mounting plate .....Type **31771-5**

Angle Adapter Single. For insulated hangers. Maximum member thickness 7/8 in (22 mm).
E For 1/2" and 7/8" cable .....Type **40430-1**
F For 1-1/4" - 5" cable .....Type **13555A**

G **Round Member Adapter Single**. For use with Type 33948 series (1-1/4"-5" cables) insulated hangers. Fits member diameters 1-3 in (25 - 75 mm). .....Type **13550**

H **Stainless Steel Wraplock** 100 feet complete with fasteners. Use to attach 1/4" - 7/8" insulated hangers to round members. Not to be used to attach cable or waveguide directly to towers.....Type **12395-1**

Snap-In Hangers and Adapters

Snap-In Hangers

Attach Without Hardware

Quick and easy attachment in all types of weather. The hangers snap directly into holes in the tower support members (patents pending). Installation time and cost are substantially reduced.

Heavy Gauge Stainless Steel Construction

High strength and excellent corrosion resistance for long-term reliability.

Snap-In hangers are ideal for microwave, cellular, PCS/PCN, and land mobile radio systems. They are available for 1/2" to 2-1/4" size coaxial cables.

The hanger is designed to be installed into 3/4" holes in support structures 0.120 to 0.150 inch thick. Ergonomically designed for easy installation, the hanger's retention tabs make the hanger highly resistant to pull. The hanger is mounted directly to tower support members by inserting its retention tabs into pre-punched holes in cable support systems.

Snap-In hangers can be used on any tower, by using the specially designed adapters described below. Guyed tower transmission support systems can also accommodate Snap-In hangers, when specified. Made of heavy gauge stainless steel. For hanger spacing recommendations, refer to page 595.

Kit of 10 Hangers

Cable Size	Type Number
1/2"	**206706-1**
5/8"	**206706A-6**
7/8"	**206706-2**
1-1/4"	**206706-3**
1-5/8"	**206706-4**
2-1/4"	**206706-5**

Snap-In Adapters

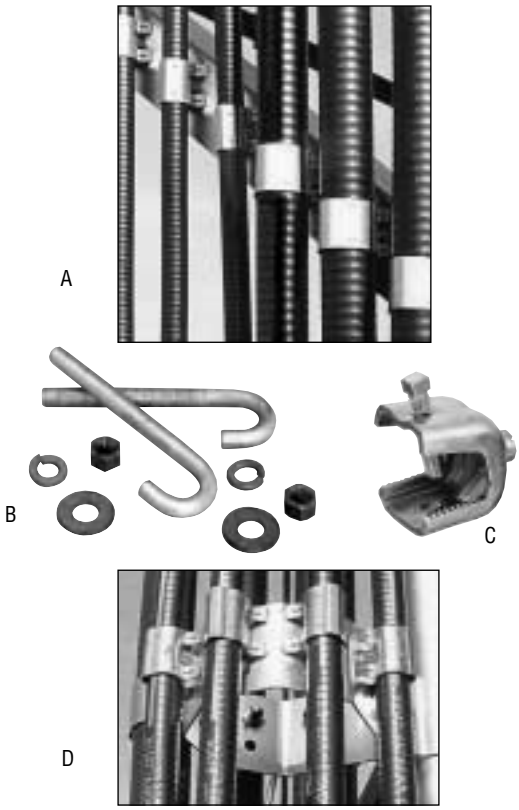
A Tower/Hanger Adapter cable support attaches to existing angle tower members. Includes angle support pre-punched with 3/4" and 7/16" holes to accommodate Snap-In hanger, and standard hanger.

Number of Cable Runs	J-Bolt or Angle Adapter Connections Required	Type No.
1	1	**206929-1**
4	2	**206929-4**
8	3	**206929-8**

B J-Bolt Hardware, Kit of 10 for attaching Tower/Hanger Adapter to 1-1/4" to 2-3/4" (32-70 mm) angle tower members. Includes J-bolt, flat washers, lock washers and nuts .....Type **206930**

C Angle Adapter, Kit of 10. For attaching Tower/Hanger Adapter to angle tower members. Stainless Steel, 3/8" hardware .....Type **31768A**

D Cluster Mount**. Octagonal cable support for one to seven cable runs attaches to 1-1/2" nominal steel pipe or 1.90" (48 mm) round tower members. Pre-punched with 3/4" and 7/16" holes to accommodate snap-in hangers and standard hangers. Supplied mounting hardware kit includes 3/8" plated bolts, flat washers, lock washers and nuts.
Kit of 1 .....Type **207030**
Kit of 10 .....Type **207030-2**

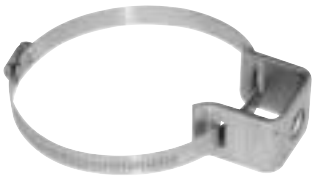


** Patented United States 4,813,639

Snap-In Adapters

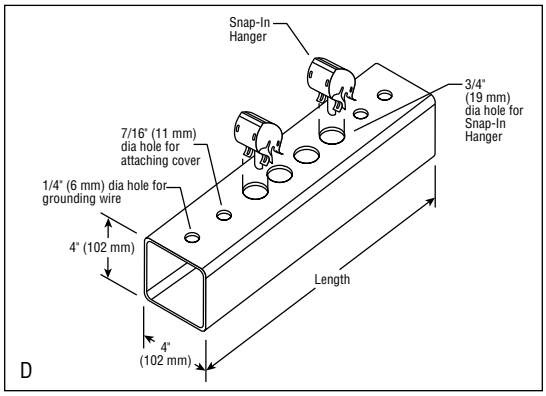
A

B

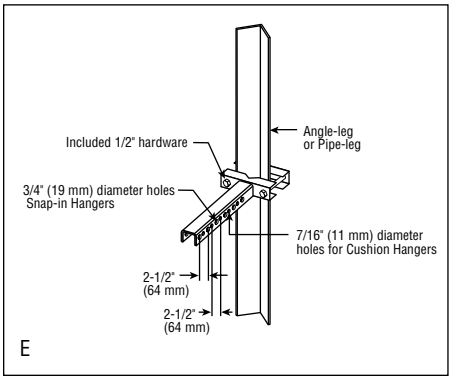


C

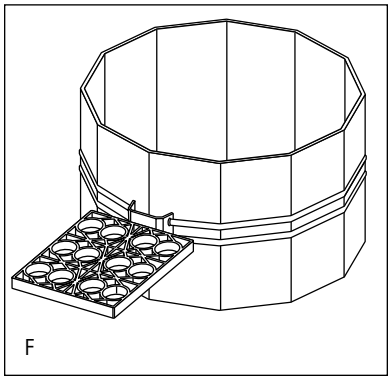
G



D



E



F

A Snap-In Angle Adapter Kit of 10 pieces. Includes 3/4" pre-punched hole for mounting snap-in hangers to angle tower members. Stainless steel, 3/8" hardware .....Type **SAA**

B Snap-In Adapter Block Kit of 10 pieces. Mounts up to three snap-in hangers. Attach to tower using Type 31768A angle adapter or tower standoffs. Mechanically galvanized hardware .....Type **SHA3**

C Snap-In Tower Standoffs Kit of 10 pieces. Mounts snap-in hangers to round tower members and provides 2-1/2 in (64 mm) standoff. Includes 3/4" pre-punched hole. All parts stainless steel or galvanized.

Member Diameter, in (mm)	Type
1-2 (25-50)	**STS-12**
2-3 (50-75)	**STS-23**
3-4 (75-100)	**STS-34**
4-5 (100-125)	**STS-45**

D PVC Roof Sleeper, supports rooftop coax runs. Constructed of gray, UV resistant PVC. 4 in x 4 in (102 mm x 102 mm).

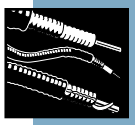
Number of Cable Runs	Dimensions, in (mm)	Type No.
4	22 (559)	**RTA-B1598**
8	31.9 (810)	**RTA-B1599**
12	43.4	**RTA-B1600**

E Universal Snap-In Brackets for both angle and round tower members. Pre-punched with 3/4" holes to mount up to twelve snap-in hangers. Galvanized steel.

Angle Member	Round Member Diameter	Type No.
2-1/2" to 4"	1-1/2" to 5-9/16"	**HAA-B2249**
5" to 6"	6" to 8-5/8"	**HAA-B2250**
8"	10-3/4" to 12-3/4"	**HAA-B2251**

F Snap-In Adapter Brackets for large round members, water towers, or on the outside of a monopole. Mount up to three cable runs and are compatible with both snap-in and standard hangers. Use multiple brackets for additional runs. Use in conjunction with wraplock. The brackets slide on the wraplock. .....Type **HAA-B2391**

G Stainless Steel Wraplock 100 feet complete with fasteners. Use to attach 1/4" - 7/8" insulated hangers to round members. Not to be used to attach cable or waveguide directly to towers.....Type **12395-1**



Install Cable with One Easy "Click"

Click-on Hangers* are specifically designed to support HELIAX® coaxial cable. They are stackable, install in just minutes, and provide a perfect fit that gives your PCS/PCN, cellular, microwave, rural telephony, GSM, or other telecommunications system a professional appearance, especially in confined spaces. The hangers are made of tough, UV-resistant material and set the standard for durability, simplicity of installation, and cost-effectiveness. Only two wrenches are required for installation. Refer to table on page 598 for maximum spacing.

*Patented United States No, 5794897

Click-On Hangers Ordering Information – Kits of 10

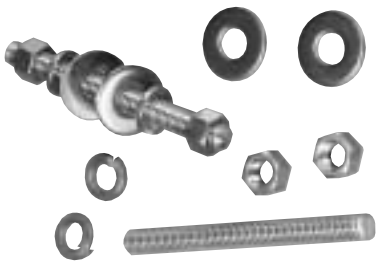
Cable Size	Cable Type	Hanger Type Number
1/2"	**LDF4-50A**	**L4CLICK**
5/8"	**LDF4.5-50A**	**L45CLICK**
7/8"	**LDF5-50A**	**L5CLICK**
1-1/4"	**LDF6-50**	**L6CLICK**
1-5/8"	**LDF7-50A**	**L7CLICK**

Click-On Hanger Hardware Kits

Click-On hanger attachment hardware is available in 3/8" or M10 sizes. Constructed of stainless steel for durability. Select hardware length according to planned hanger stack height.

Hardware Kit Ordering Information

Cable Size	Stack Height (Hangers)	Type Number M10 Kit	Type Number 3/8" Kit
1/2", 5/8" or 7/8" Cable			
	1	**243095-11**	**243095-9**
	2	**243095-7**	**243095-5**
	3	**243095-3**	**243095-1**
1-1/4" or 1-5/8" Cable			
	1	**243095-12**	**243095-10**
	2	**243095-8**	**243095-6**
	3	**243095-4**	**243095-2**



Tower and Pole Adapters

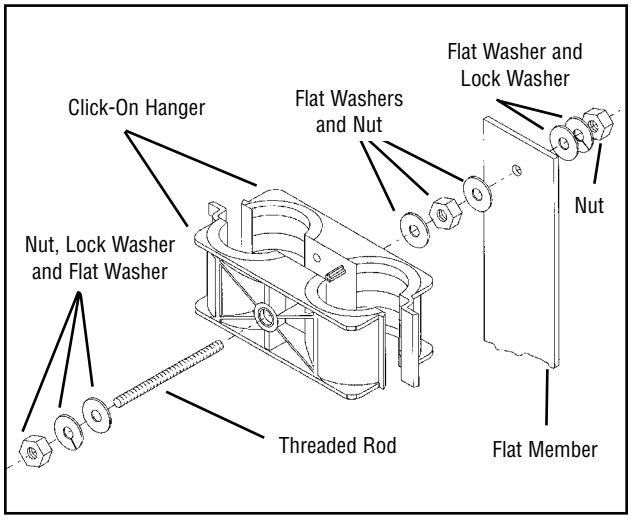
The round pole adapter attaches Click-On hangers to round member diameters 7-1/2 to 10 in (190-250 mm). Attachment hardware is sold separately. For wood poles, use lag screws. For metal poles, use Wraplock.

Adapter Ordering Information

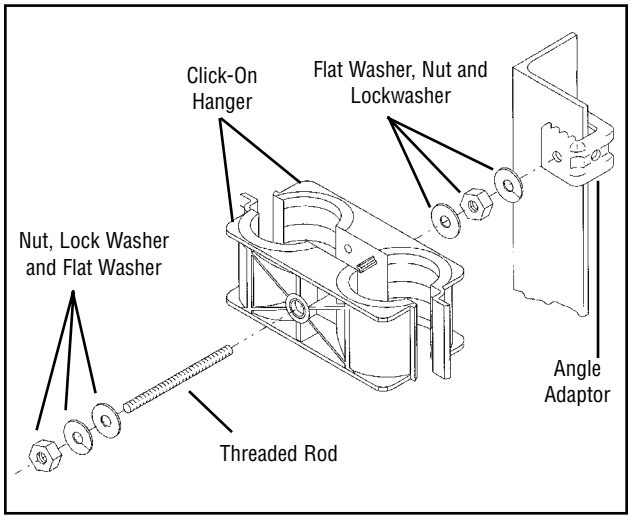
Description	Type No.
Round Member Adapter, universal, kit of 10	**244338**
Compact Angle Adapter, kit of 10	
3/8" Hardware	**243684**
M10 Hardware	**243684-M**
Ceiling Adapter	**244350**
Stainless Steel Wraplock, 100 ft (305 m)	**12395-1**

Click-On Hangers and Adapters

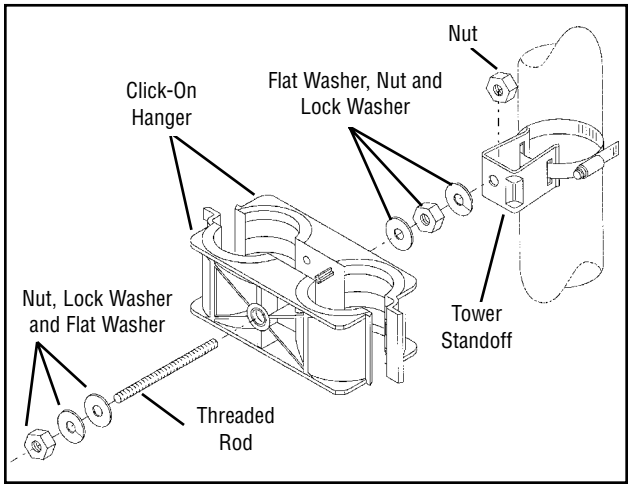
Flat Member Attachment

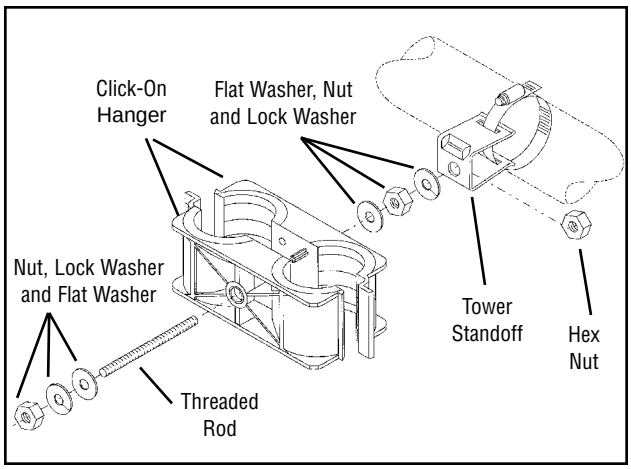


Angle Adapter Attachment

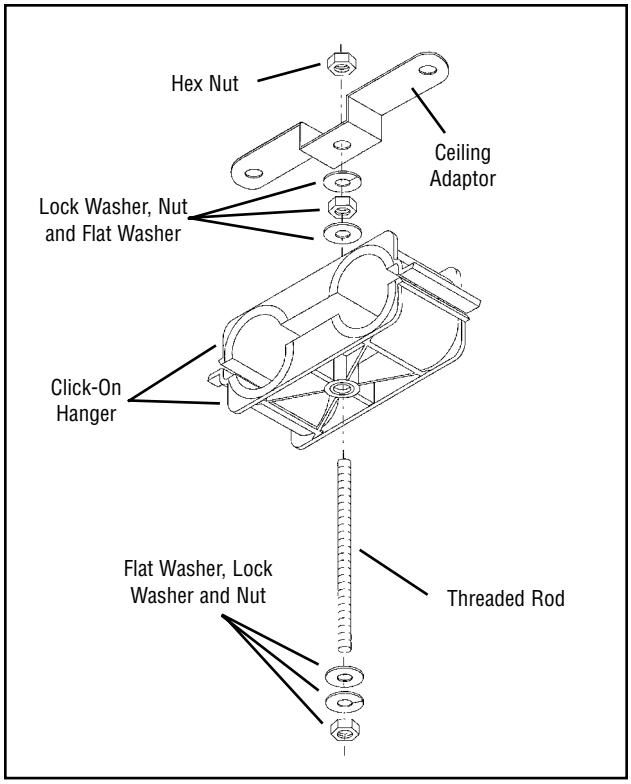


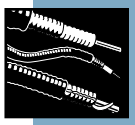
Round Adapter Attachment





Ceiling Adapter Attachment

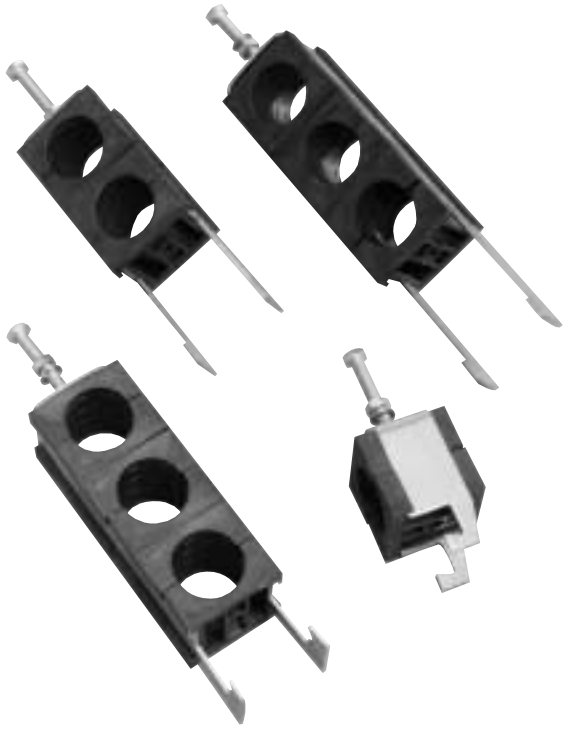


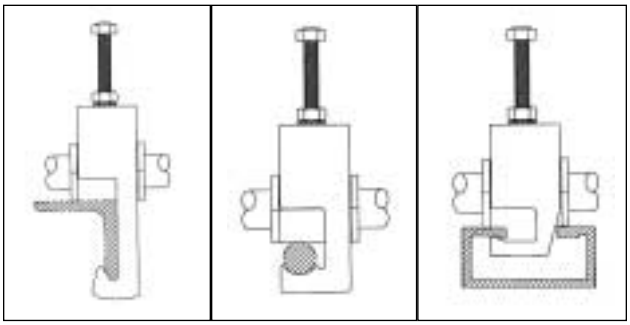


Install Multiple Cable Runs in a Limited Space.

KwikClamp hangers attach one, two or three cable runs to a tower without the need for adapters or drilling holes.

They are ideal for use on crowded towers. These self-clamping hangers attach directly to angle, round, flat, or channel tower members, providing sturdy, reliable, long-term support.





Angle KwikClamp | Round/Flat KwikClamp | Channel KwikClamp

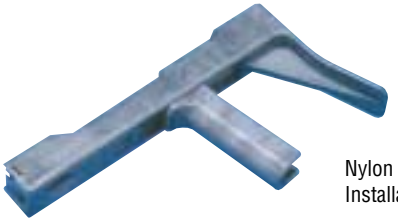
KwikClamp Hanger Ordering Information

Tower Member Type	Number of Runs	1/2" LDF Type No.	5/8" LDF Type No.	7/8" LDF/VXL Type No.	1-1/4" LDF Type No.	1-5/8" LDF Type No.
8-23 mm Round or 2-23 mm Flat Plate	1	L4CLAMP-RDN-1	L45CLAMP-RDN-1	L5CLAMP-RDN-1	L6CLAMP-RDN-1	L7CLAMP-RDN-1
	2	L4CLAMP-RDN-2	L45CLAMP-RDN-2	L5CLAMP-RDN-2	L6CLAMP-RDN-2	L7CLAMP-RDN-2
	3	L4CLAMP-RDN-3	L45CLAMP-RDN-3	L5CLAMP-RDN-3	L6CLAMP-RDN-3	L7CLAMP-RDN-3
40 mm Angle	1	L4CLAMP-ANG40-1	L45CLAMP-ANG40-1	L5CLAMP-ANG40-1	L6CLAMP-ANG40-1	L7CLAMP-ANG40-1
	2	L4CLAMP-ANG40-2	L45CLAMP-ANG40-2	L5CLAMP-ANG40-2	L6CLAMP-ANG40-2	L7CLAMP-ANG40-2
	3	L4CLAMP-ANG40-3	L45CLAMP-ANG40-3	L5CLAMP-ANG40-3	L6CLAMP-ANG40-3	L7CLAMP-ANG40-3
50 mm Angle	1	L4CLAMP-ANG50-1	L45CLAMP-ANG50-1	L5CLAMP-ANG50-1	L6CLAMP-ANG50-1	L7CLAMP-ANG50-1
	2	L4CLAMP-ANG50-2	L45CLAMP-ANG50-2	L5CLAMP-ANG50-2	L6CLAMP-ANG50-2	L7CLAMP-ANG50-2
	3	L4CLAMP-ANG50-3	L45CLAMP-ANG50-3	L5CLAMP-ANG50-3	L6CLAMP-ANG50-3	L7CLAMP-ANG50-3
Channel Section 40 x 22 x 1.5 mm	1	L4CLAMP-CNL-1	L45CLAMP-CNL-1	L5CLAMP-CNL-1	L6CLAMP-CNL-1	L7CLAMP-CNL-1
	2	L4CLAMP-CNL-2	L45CLAMP-CNL-2	L5CLAMP-CNL-2	L6CLAMP-CNL-2	L7CLAMP-CNL-2
	3	L4CLAMP-CNL-3	L45CLAMP-CNL-3	L5CLAMP-CNL-3	L6CLAMP-CNL-3	L7CLAMP-CNL-3

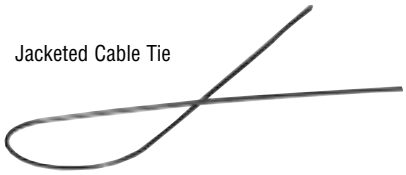
Cable Ties

Nylon Cable Tie

Nylon Cable Tie Kit in Plastic Box



Nylon Cable Tie Installation Tool



Jacketed Cable Tie

Velcro Cable Ties

Nylon Cable Tie Kit of 50 pieces. Weather-resistant straps for attaching 1/4" to 1/2" cables. Maximum spacing 3 ft (1 m) for HJ and LDF series and 18" (457 mm) for FSJ series cables. .....Type **40417**

Nylon Cable Tie Kit in Plastic Box. Black, weather-resistant cable ties. Kits are packaged in a reusable plastic box and organized for quick selection.
Includes:

Quantity 100, 4" (101 mm) cable ties, 18 lb (80 N) tensile strength
Quantity 100, 5.5" (140 mm) cable ties, 40 lb (178 N) tensile strength
Quantity 100, 7.5" (190 mm) cable ties, 50 lb (222 N) tensile strength
50 adhesive-backed black mounts .....Type **CT-K350**

Nylon Cable Tie Installation Tool. For use with Type CT-K350, above. Tightens and trims cable tie in one process with one hand. Cuts ties flush with a simple 1/4 turn downward twist. Top loading for right or left hand users .....Type **CT-IT**

Jacketed Cable Tie Kit of 20 pieces. Weather-resistant ties for attaching FSJ Series cable directly to tower members. Maximum spacing 18" (457 mm)
.....Type **27290A**

Velcro* Cable Ties. The easiest way to organize inter-rack cabling. Secure in high-vibration areas. No special tying procedure required. Can be reused to accommodate future expansion. Black, 8" (203 mm) length. Maximum bundle diameter, 2" (51 mm). Minimum bundle diameter, 0.25" (6.4 mm). Tensile strength, 40 lb (178 N). For indoor use only.

Kit of 10.....Type **VCT8-10**
Kit of 50 .....Type **VCT8-50**
Kit of 100 .....Type **VCT8-100**

* Velcro is a registered trademark of Velcro Industries.

Standard Grounding Kit

SureGround™ Kit

SureGround Plus™ Kit

A well designed system uses grounding kits to provide a bond between the cable and the tower/earth ground system. One grounding kit is recommended at tower top, tower bottom, at 200 ft (60 m) intervals (where applicable), and at the entrance to the equipment shelter.

SureGround™ and SureGround Plus™ Series and 204989 and 241088 Series Grounding Kits offer:

- *Solid copper construction for high current handling capability, compatibility with copper cable outer conductors, and long life.*
- *Meet military standards at commercial prices.*
- *Provide certainty of continued operation. Tested at an independent laboratory to withstand 200,000 amps.*

Andrew 204989 and 241088 series solid copper grounding kits have passed United States Air Force lightning simulation tests and meet MIL-STD-188-124A. The non-braided solid copper construction of all Andrew grounding kits eliminates corrosion caused by moisture retention and "wicking." A heat shrink tube protects the cable terminal connection.

SureGround Plus Grounding kits

Transmission line grounding has never been easier. With only four parts, SureGround Plus grounding kits combine the exclusive wraparound SureGround grounding strap with a preformed rubber weatherproofing boot for fast, sure installation and neat appearance.

Heavy Duty Ground Lead

Andrew grounding kits utilize heavy duty 16 mm^2 ground leads to maximize performance. The IEC 1024-1 compliant copper ground lead reduces dc resistance. The extremely pliable jacket provides protection and makes it easy to maneuver the lead into position for attachment to the down conductor.

Easy Installation

Standard Grounding Kits (204989 and 241088 series) require few steps to install and include easy to follow instructions. Proper tensioning is ensured by an expansion section which provides visual indication that the strap is secured.

SureGround Grounding Kits install in less than half the time required for standard grounding kits. Factory assembled into one component, they feature a pre-formed clip-on grounding strap for easy, snap-on installation.

SureGround Plus Grounding Kits are even easier to install. Simply remove a short length of cable jacketing, snap the wraparound strap in place, slip the rubber boot into place and secure with clamps.

Kits Include

Standard Grounding Kits for 1/2" and Larger Cables. Series 204989 and 241088 kits include a solid copper strap riveted to the grounding wire, a coiling tool for proper tightening, tower attachment hardware, and a two-part tape weatherproofing system. Field-attachable, crimp-on grounding lugs require the use of a crimping tool (not included, described below).

Standard Grounding Kit for 1/4" and 3/8" Cables. Includes a solid copper strap, connection hardware, tower atachment hardware, and a two-part tape weatherproofing system .....Type **223158**

SureGround Grounding Kit is a one-piece factory assembled ground strap which includes a two-part tape weatherproofing system.

SureGround Plus Grounding Kits include a factory assembled ground strap, a preformed rubber boot and two clamps.

Standard Grounding Kits

Lug and Wire Length Options for Grounding Kits

Kits are available with either factory attached lugs or field attachable lugs. Standard grounding kits feature field attachable lugs that are either crimp-on or screw-on. SureGround™ grounding kits have crimp-on field attachable lugs.

One or two-hole lugs are available as indicated in the table. The holes on the two-hole lug fit common bus bar configurations with spacings of 0.750, 8.815 or 1.0 inch. All Andrew bus bars will accept both types of lugs.

Universal Grounding Lug Kit of 10.....Type **244456**

Grounding wire is available in a variety of lengths as indicated in the table.

Crimping Tool. Used to attach crimp-on lugs for standard and SureGround series. Not required for kits having factory-attached lugs. .....Type **207270**

Standard Grounding Kits

Cable Size	With Factory Attached One-Hole Lug Type No.	With Factory Attached Two-Hole Lug Type No.	With Field-Attachable Crimp-On Two-Hole Lug Type No.	Attachable Screw-On One-Hole Lug Type No.
Grounding Wire Length:	24 in (610 mm)	24 in (610 mm)	36 in (915 mm)	36 in (915 mm)
1/4" and 3/8"	**223158**	**223158-2**	–	–
1/2"	**204989-1**	**241088-1**	**241088-6**	**204989-31**
5/8" and 7/8"	**204989-2**	**241088-2**	**241088-7**	**204989-32**
1-1/4"	**204989-3**	**241088-3**	**241088-8**	**204989-33**
1-5/8"	**204989-4**	**241088-4**	**241088-9**	**204989-34**
2-1/4" and 3"	**204989-5**	**241088-5**	**241088-10**	**204989-35**
4"	**204989-6**	–	–	**204989-36**
5"	**204989-7**	–	–	**204989-37**

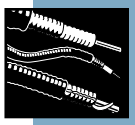
SureGround™ Grounding Kits

Cable Type	Factory Attached One-Hole Lug Type No.	Factory Attached Two-Hole Lug Type No.	Field-Attachable Crimp-On One-Hole Lug Type No.	Field-Attachable Crimp-On Two-Hole Lug Type No.
600 mm (24 in) Grounding Wire				
LDF4	**SGL4-06B1**	**SGL4-06B2**	–	–
LDF45	**SGL45-06B1**	**SGL45-06B2**	–	–
LDF5	**SGL5-06B1**	**SGL5-06B2**	–	–
LDF6	**SGL6-06B1**	**SGL6-06B2**	–	–
LDF7	**SGL7-06B1**	**SGL7-06B2**	–	–
LDF12	**SGL12-06B1**	**SGL12-06B2**	–	–
1000 mm (39 in) Grounding Wire				
LDF4	**SGL4-10B1**	**SGL4-10B2**	–	–
LDF45	**SGL45-10B1**	**SGL45-10B2**	–	–
LDF5	**SGL5-10B1**	**SGL5-10B2**	–	–
LDF6	**SGL6-10B1**	**SGL6-10B2**	–	–
LDF7	**SGL7-10B1**	**SGL7-10B2**	–	–
LDF12	**SGL12-10B1**	**SGL12-10B2**	–	–
1500 mm (59 in) Grounding Wire				
LDF4	–	–	**SGL4-15B3**	**SGL4-15B4**
LDF4	–	–	**SGL45-15B3**	**SGL45-15B4**
LDF5	–	–	**SGL5-15B3**	**SGL5-15B4**
LDF6	–	–	**SGL6-15B3**	**SGL6-15B4**
LDF7	–	–	**SGL7-15B3**	**SGL7-15B4**
LDF12	–	–	**SGL12-15B3**	**SGL12-15B4**

SureGround Plus™ Grounding Kits

SureGround Plus™ Grounding Kits

Cable Type	Factory Attached One-Hole Lug Type No.	Factory Attached Two-Hole Lug Type No.	Field-Attachable Crimp-On One-Hole Lug Type No.	Field-Attachable Crimp-On Two-Hole Lug Type No.
600 mm (24 in) Grounding Wire				
LDF4	**SGPL4-06B1**	**SGPL4-06B2**	–	–
LDF4.5	**SGPL45-06B1**	**SGPL45-06B2**	–	–
LDF5	**SGPL5-06B1**	**SGPL5-06B2**	–	–
LDF6	**SGPL6-06B1**	**SGPL6-06B2**	–	–
LDF7	**SGPL7-06B1**	**SGPL7-06B2**	–	–
LDF12	**SGPL12-06B1**	**SGPL12-06B2**	–	–
1000 mm (39 in) Grounding Wire				
LDF4	**SGPL4-10B1**	**SGPL4-10B2**	–	–
LDF4.5	**SGPL45-10B1**	**SGPL45-10B2**	–	–
LDF5	**SGPL5-10B1**	**SGPL5-10B2**	–	–
LDF6	**SGPL6-10B1**	**SGPL6-10B2**	–	–
LDF7	**SGPL7-10B1**	**SGPL7-10B2**	–	–
LDF12	**SGPL12-10B1**	**SGPL12-10B2**	–	–
1500 mm (59 in) Grounding Wire				
LDF4	–	–	**SGPL4-15B3**	**SGPL4-15B4**
LDF4.5	–	–	**SGPL45-15B3**	**SGPL45-15B4**
LDF5	–	–	**SGPL5-15B3**	**SGPL5-15B4**
LDF6	–	–	**SGPL6-15B3**	**SGPL6-15B4**
LDF7	–	–	**SGPL7-15B3**	**SGPL7-15B4**
LDF12	–	–	**SGPL12-15B3**	**SGPL12-15B4**



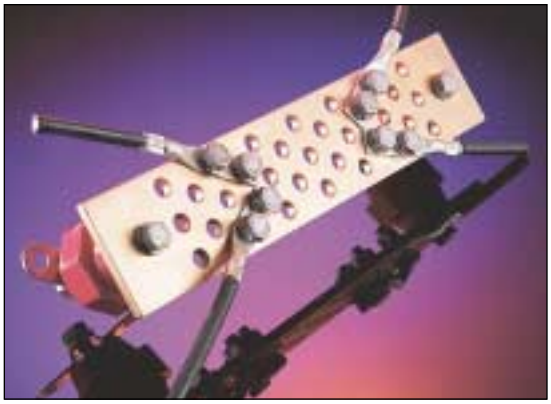
Universal Ground Bar

Mounting flexibility and central collecting point for grounding leads

This competitively priced universal ground bar offers the mounting flexibility so often needed at wireless communications sites. The solid copper bar accommodates vertical and 90 degree mounting configurations and provides a central point to collect grounding leads. It is ideal for all grounding applications, including towers and building rooftops.

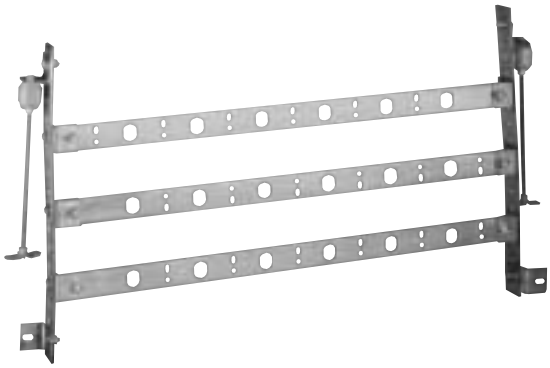
Ground Bar,1/4 x 2-1/2 x 19-1/2 in .....Type **UGBKIT**

Ground Bar,1/4 x 2-1/2 x 12-1/2 in .....Type **UGBKIT-2**



Universal Arrestor Ground Bar Assembly

This pre-punched solid copper ground bar assembly simplifies mounting and grounding of surge arrestors inside the building. Instead of relying on individual wires or field-fabricated trapeze setups, the Andrew universal arrestor ground bar assembly provides a uniform mounting and grounding point for surge arrestors and grounding leads. The 1/8" copper ground bar assembly uses three horizontal members that can be oriented flat or upright, and adjusted vertically as needed to accommodate various surge arrestor types. Also included is a mounting kit which includes ceiling brackets, insulators, threaded rod, and hardware.



- *Compatible with standard entry port sizes.*
- *Height adjustable bars.*
- *Solid copper construction.*
- *Accepts bulkhead or bolt grounded surge arrestors*
- *Accommodates one and two-hole grounding lugs.*
- *Eliminates the need for an internal buss bar.*

Universal Arrestor Ground Bar Assembly Ordering Information

Number of Grounding Bars	Grounding Positions Per Bar	Punched for Arrestor Types	Type Number
3	6	All APTL Series, 7-16 DIN or Bolt Grounded	**UGBA-DIN-36**
3	6	APG and APM Series, 7-16 DIN or Bolt Grounded	**UGBA-DINU-36**
3	6	N Bulkhead or Bolt Grounded	**UGBA-N-36**
3	4	All APTL Series, 7-16 DIN or Bolt Grounded	**UGBA-DIN-34**
3	4	APG and APM Series, 7-16 DIN or Bolt Grounded	**UGBA-DINU-34**
3	4	N Bulkhead or Bolt Grounded	**UGBA-N-34**

Lightning Surge Arrestors

Ordering Information

Interface Type	Type Number
For LDF5-50A, 7/8" Foam-Dielectric Cable	
Bulkhead N Female	**APTL5-BNF-(*)**
Bulkhead 7-16 DIN Female	**APTL5-BDF-(*)**
For LDF6-50, 7/8" Foam-Dielectric Cable	
Bulkhead N Female	**APTL6-BNF-(*)**
Bulkhead 7-16 DIN Female	**APTL6-BDF-(*)**
For LDF7-50A, 7/8" Foam-Dielectric Cable	
Bulkhead N Female	**APTL7-BNF-(*)**
Bulkhead 7-16 DIN Female	**APTL7-BDF-(*)**

* Frequency band. Insert Detail Number from Operating Frequencies table.

Operating Frequencies – Contact Andrew for current availability of specific frequency bands.

Frequency Band, MHz	Insertion Loss, dB	Return Loss dB, Typical	Detail Number
800-870	< 0.1	28.0	-6
824-900	< 0.1	28.0	-2
824-960	< 0.1	28.0	-1
870-960	< 0.1	28.0	-3
1700-1900	< 0.1	28.0	-11
1850-1990	< 0.1	28.0	-9

90° Mounting Bracket for APTL Series Arrestor Plus .....Type **244847**

Arrestor Plus® Integrated, T-Series Lightning Surge Arrestors

The Arrestor Plus† Integrated, T-Series Lightning Surge Arrestor is a one-piece surge arrestor/HELIAX® connector. It uniquely combines the reliability of quarter-wave shorting stub technology with the proven performance of HELIAX connectors to deliver premium lightning protection in a single component.

The integrated design of the Arrestor Plus reduces the number of components resulting in improved system performance and reduced system cost. Silver plating and high contact pressures throughout maintain low intermodulation levels – a definite plus for today's wireless systems.

Arrestor Plus is available for 7/8", 1-1/4", and 1-5/8" LDF cables as specified in the table.

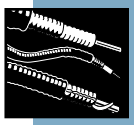
† U.S. and international patents pending.

Integrated Arrestor/Connector Design

- *Insertion loss less than 0.1 dB*
- *Improved system performance*
- *Reduced component costs*
- *Easy installation*
- *Completely weatherproof*
- *RingFlare™ connector design automatically flares the cable as the connector is tightened.*

Quarter-Wave Shorting Stub Technology

- *Provides true "multi-strike" capability. Tests performed by independent laboratories verify that Arrestor Plus withstands in excess of 50 impulse current surges of 50 kA without product degradation.*
- *Reliable equipment protection*
- *Maintenance free*



Arrestor Plus®
T-Series, Lightning Surge Arrestors

- *Compact profile ideal for installation in tight spaces*
- *Reliable equipment protection*
- *Excellent microwave performance. Low VSWR, low insertion loss*
- *Fully weatherproof*
- *Easy installation*
- *Available with Type N or DIN interfaces*

The new Arrestor Plus T-Series surge arrestor provides excellent lightning protection and outstanding RF performance, in a compact design, that is ideal for confined applications, indoors or outdoors.

Using quarter-wave surge protection technology, this T-shaped arrestor offers true multistrike protection. For an applied current impulse at 20 kA (8 x 20 waveform), the throughput energy is less than 1 mJ. Silver plated components and high pressure contacts throughout also ensure low levels of intermodulation and excellent VSWR performance. The slim profile easily fits inside equipment enclosures. It it also fully weatherproof and is suitable for a variety of outdoor applications.

The Arrestor Plus T-Series is supplied with a grounding stud which allows direct attachment to a ground lead or bus bar. Mounting flexibility is further enhanced by the variety of through hole configurations provided in the body of the arrestor.

The T-Series is complemented with a full line of mounting adapters and accessories.

Ordering Information

Interface Type	Type Number
N Male/N Male	**APT-NMNM-(*)**
N Female/N Female	**APT-NFNF-(*)**
N Female/N Male, Hex	**APT-NFNM-(*)**
7-16 DIN Female/7-16 DIN Female	**APT-DFDF-(*)**
7-16 DIN Female/7-16 DIN Male	**APT-DFDM-(*)**

* Frequency band. Insert Detail Number from Operating Frequencies table.

Operating Frequencies

Frequency Band, MHz**	Insertion Loss, dB	VSWR Max.	Detail Number
824-960	< 0.1	1.10	-1
824-900	< 0.1	1.07	-2
870-960	< 0.1	1.07	-3
800-870	< 0.1	1.07	-6
1700-1900	< 0.1	1.07	-11
1850-1990	< 0.1	1.07	-9

** Additional frequencies available. Contact Andrew for availability.

APT Mounting Hardware

Type N .....Type **243394**
DIN.....Type **243396**

Replaceable Gas Tube Surge Arrestors

New SureFlex™ Arrestor Plus® Cable Assemblies

Both the Quarter Wave Shorting Stub (QWS) surge arrestors and broadband replaceable gas tube arrestors are available in combination with the new Sureflex cable assemblies. These cable assemblies include all the benefits of SureFlex plus the protection of an integrated Arrestor Plus surge arrestor.

SureFlex cable assemblies' unique connector attachment includes a solder connection to both the inner and the outer conductors. The automated attachment process employs an induction soldering technique that ensures 360 degrees of electrical contact and a reliable weather seal. This process ensures a consistent, robust attachment every time.

The one-piece surge arrestor/connector delivers premium lightning protection in a single component that is completely soldered to seal in performance and seal out the elements. SureFlex Arrestor Plus assemblies include bulkhead mounting and will fit into your base station cabinet or in building applications.

Contact Andrew to have an assembly designed for your application.

Arrestor Plus® Replaceable Gas Tube Surge Arrestors

Offering broadband performance from 0-2500 MHz and excellent electrical characteristics, Arrestor Plus Replaceable Gas Tube Surge Arrestors are easy to install and feature a dc pass capability through the center conductor to power tower-top electronics. The unit's removable cap makes periodic maintenance fast and easy.

Ordering Information

Interface Type	Gas Tube Static Sparkover Voltage	Type Number
Bulkhead 7-16 DIN Female and 7-16 DIN Female	90	**APG-BDFDF-090**
	230	**APG-BDFDF-230**
	350	**APG-BDFDF-350**
Bulkhead 7-16 DIN Female and 7-16 DIN Male	90	**APG-BDFDM-090**
	230	**APG-BDFDM-230**
	350	**APG-BDFDM-350**
Bulkhead Type N Female and Type N Female	90	**APG-BNFNF-090**
	230	**APG-BNFNF-230**
	350	**APG-BNFNF-350**
Bulkhead Type N Female and Type N Male	90	**APG-BNFNM-090**
	230	**APG-BNFNM-230**
	350	**APG-BNFNM-350**
	1000	**APGHP-BNFNM-1000**

Gas Tube Replacement Kit of 10

Static Sparkover Voltage	Type Number
90	**GASTUBE-090**
230	**GASTUBE-230**
350	**GASTUBE-350**
1000	**GASTUBE-1000**

90 Degree Mounting/Grounding Bracket

Interface Type	Type Number
Type N	**243951**
7-16 DIN	**243950**

Connector/Splice Weatherproofing Kit

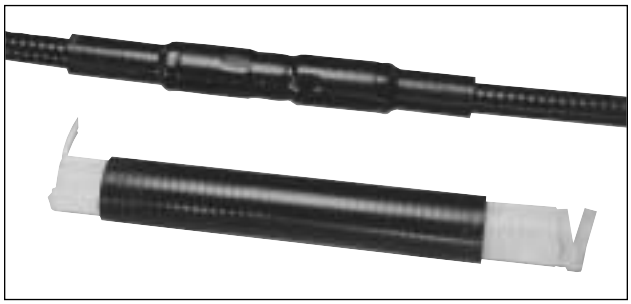
Includes butyl rubber tape and plastic tape to provide additional moisture protection on exposed and buried connectors and splices. It also prevents loosening of connectors at jumper cable interfaces caused by vibration.

.....Type **221213**

Cable Size	Connections Per Kit
For Connector Interface	
1-5/8" to 1/2"	**2**
For Splices	
3", 4" and 5"	**1**
1-5/8" and 2-1/4"	**2**
1-1/4"	**6**
7/8"	**8**
1/2"	**12**

Connector/Splice Weatherproofing Kit

Weatherproofing



3M™ Cold Shrink™ Weatherproofing Kit

Fast, Effective Connector Weatherproofing in Three Minutes.

Cold Shrink

This weatherproofing product seals and protects connectors, splices and jumper-to-antenna interfaces from the environment.

No Tools Required

Cold Shrink slips over the connection and compresses around the interface. Tapes or heat guns are not required for sealing or shrinking. Simply place the Cold Shrink kit over the cable, make the cable connection, and unwind the pull-tab applicator. Once it is collapsed, its continuous compression design forms a water tight seal around the cable.

Fits up to 2-1/4" HELIAX® Cable

The kits are available for transitions from larger to smaller diameter cable, such as 1-5/8" to 1/2", or for same diameter cable, such as 1/2" to 1/2". See the table for Type Numbers.

Available for Antenna-Jumper Interface

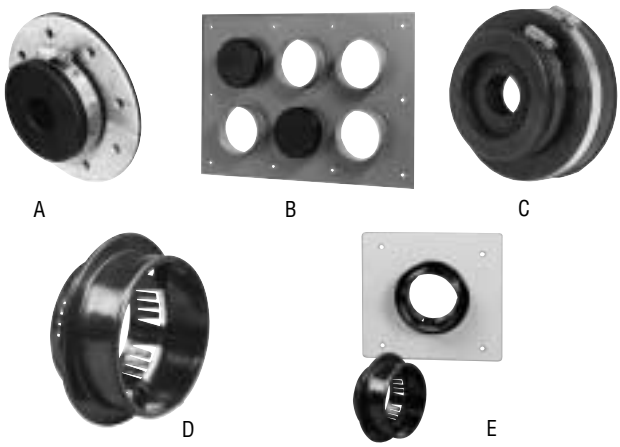
The kits are also ideal for weatherproofing the antenna-to-jumper interface, which is typically quite difficult to reach. Cold Shrink eliminates the needs for shrink tubes or weatherproofing tapes.

Ordering Information – Cold Shrink

Kit Coverage Cable Size to Cable Size	Min. Application Diameters* in (mm)	Type Number
Kits for Type N Connectors		
1-5/8"-7/8"	1.20-0.84 (30-12)	**241475-3**
1/2"-1/2"	0.48 (12)	**241474-4**
7/8"-7/8"	0.84 (21)	**241474-5**
1-1/4"-1-1/4"	1.20 (30)	**241474-6**
1-5/8"-1-5/8"	1.20 (30)	**241474-6**
Kits for Type N and 7-16 DIN Connectors		
5/8"-3/8"	0.80-0.41 (20-10)	**241475-13**
5/8"-1/2"	0.80-0.63 (20-16)	**241475-13**
5/8"-5/8"	0.80-0.80 (20-20)	**241474-7**
7/8"-1/4"	0.84-0.29 (21-7.4)	**241475-12**
7/8"-3/8"	0.84-0.41 (21-10)	**241475-9**
7/8"-1/2"	0.84 0.63 (21-16)	**241475-9**
1-1/4"-1/4"	1.20-0.29 (30-7.4)	**241475-11**
1-1/4"-3/8"	1.20-0.41 (30-10)	**241475-5A**
1-1/4"-1/2"	1.20-0.63 (30-16)	**241475-5A**
1-5/8"-1/4"	1.20-0.29 (30-7.4)	**241475-11**
1-5/8"-3/8"	1.20-0.41 (30-10)	**241475-5A**
1-5/8"-1/2"	1.20-0.63 (30-16)	**241475-5A**
2-1/4"-3/8"	1.40-0.41 (36-10)	**241475-8**
2-1/4"-1/2"	1.40-0.63 (36-16)	**241475-8**
Kits for Antenna Interfaces**		
1/4"-1-1/2" Omni/Panel base or Type N or DIN	0.29 (7.4) - ***	**241548-10**
3/8"-1-1/2" Omni/Panel base or Type N or DIN	0.41 (10) - ***	**241548-8**
1/2"-1-1/2" Omni/Panel base or Type N or DIN	0.41 (10) - ***	**241548-8**
1/4"-2" Omni/Panel base or Type N or DIN	0.29 (7.4) - ***	**241548-11**
3/8"-2" Omni/Panel base or Type N or DIN	0.41 (10) - ***	**241548-9**
1/2"-2" Omni/Panel base or Type N or DIN	0.41 (10) - ***	**241548-9**
1/2" LDF4 - Type N interface	0.49 (12) - ***	**241548-4**
5/8"-Type N or DIN interface	0.80 (20) - ***	**241474-7**
7/8"-Type N or DIN interface	0.49 (12) - ***	**241548-5**
Kits for Arrestor Plus® Surge Protectors		
7/8" LDF5 – APTL5	0.84	**241474-5**
1-1/4" LDF6 – APTL6	1.20	**241474-6**
1-5/8" LDF7 – APTL7	1.20	**241474-6**

* Minimum application diameter is the fully compressed diameter of each tube in the kit.

** Andrew Cold Shrink weatherproofing is completely compatible with Andrew base station antennas. Request bulletin 10138 for complete details.



A **Single Entrance Wall/Roof Feed Thru Assembly**. Includes rubber boot, clamp and galvanized steel plate. Order from table.

B **Multiple Entrance Wall/Roof Feed Thru Plate**.Plate with one or more 4 or 5-inch entry holes. Use with the corresponding size rubber cable boots (sold separately).

C **Cable Entry Boot**. Use with above feed thru plate, with the corresponding size entry hole.

NEW!

D **SNAP-IN Entry Port**. Patent Pending. Snaps into a cabinet or metal plate, 0.06 to 0.14 in (1.5 to 3.5 mm) thick, with a 3.5 in (89 mm) diameter hole. If your cabinet or metal plate has a 4 in (100 mm) hole, use adapter plate below. Constructed from a weather-resistant engineering plastic. Use with One-Piece cable entry boot (Item C) for a durable, low cost alternative to fabricated metal entry ports.

SNAP-IN Entry Port ..... Type **SEP-4**
SNAP-IN Entry Port, kit of 10 ..... Type **SEP-4-10**
Blank Cap, 4 in (100 mm)..... Type **CAP-4**
Blank Cap, 4 in (100 mm), kit of 10.... Type **CAP-4-10**

E **Adapter Plate**. Mounts SNAP-IN entry port (Item D) to an existing 4 in (100 mm) opening in a cabinet or metal plate, 0.06 to 0.14 in (1.5 to 3.5 mm) thick. .....Type **SEPA-4**

Wall/Roof Feed Thru Assembies, Single Entrance

Cable Size	Type Number
1/2"	**40656A-3**
5/8"	**40656A-7**
7/8"	**40656A-1**
1-1/4"	**40656A-5**
1-5/8"	**40656A-2**
2-1/4"	**40656A-6**
3"	**40394-2**
4"	**40394-1**
5"	**33938-5**

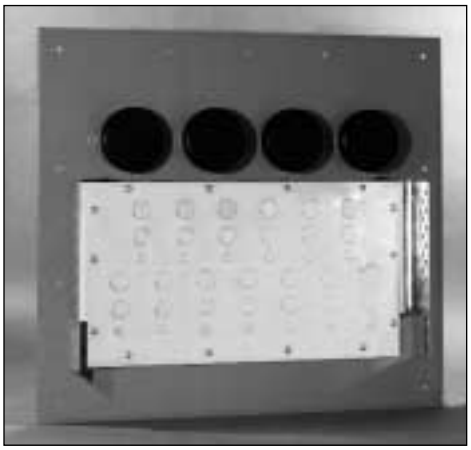
Multiple Entrance Wall/Roof Feed Thru Plates

Number of Openings	Height in (mm)	Width in (mm)	Opening Distance Center to Center in (mm)	Type No.
4" (102 mm) Entry Opening, Multiple Entrance Plate				
1	7 (178)	7 (178)	–	**204673-1**
1	5 (127)	5 (127)	–	**204673-2**
4	9.5 (241)	25.5 (648)	5.5 (139)	**204673-4**
8	17.5 (444)	25.5 (648)	5.5 (139)	**204673-8**
12	25.5 (648)	25.5 (648)	5.5 (139)	**204673-12**
16	25.5 (648)	25.5 (648)	5.5 (139)	**204673-16**
5" (127 mm) Entry Opening, Multiple Entrance Plate				
1	9.5 (241)	9.5 (241)	–	**48940-1**
2	9.5 (241)	17.5 (444)	7 (178)	**48940-2**
3	9.5 (241)	25.5 (648)	7 (178)	**48940-3**
4	17.5 (444)	17.5 (444)	7 (178)	**48940-4**
6	17.5 (444)	25.5 (648)	7 (178)	**48940-6**

One-Piece Cable Entry Boots

Cable Size	Number of Holes in Boots	Cable Boot Type No.
4" (102 mm) Cable Boots		
1/4" Foam	3	**204679A-17**
3/8" Foam	1	**204679A-19**
1/2" Foam	1	**204679A-5**
1/2" Foam	3	**204679A-7**
1/2" Foam	4	**204679A-16**
1/2" Air	1	**204679A-6**
1/2" Air	3	**204679A-1**
5/8"	1	**204679A-13**
5/8"	3	**204679A-14**
7/8"	1	**204679A-2**
7/8"	2	**204679A-18**
7/8"	3	**204679A-15**
1-1/4"	1	**204679A-3**
1-5/8"	1	**204679A-4**
2-1/4"	1	**204679A-8**
3"	1	**204679A-9**
5" (127 mm) Cable Boots		
3/8" Foam	3	**48939A-16**
1/2" Foam	1	**48939A-6**
1/2" Foam	3	**48939A-8**
1/2" Foam	4	**48939A-17**
1/2" Air	1	**48939A-7**
1/2" Air	3	**48939A-5**
5/8"	1	**48939A-14**
5/8"	3	**48939A-15**
7/8"	1	**48939A-1**
7/8"	3	**48939A-2**
1-1/4"	1	**48939A-3**
1-5/8"	1	**48939A-4**
2-1/4"	1	**48939A-9**
3"	1	**48939A-10**

Cable Entry Systems



ArrestorPort™ II

The ArrestorPort™ II is the latest design offering the greatest cost savings and installation ease for wireless systems using surge arrestors.

ArrestorPort™ II Integrated Transmission Line Entry/Ground System

The ArrestorPort II integrated building entry/ground system redefines the way you achieve cable shelter entry and grounding. Traditional installations rely on a piecemeal approach that steals time and increases costs. ArrestorPort II unifies the installation of entry ports, Arrestor Plus surge protectors, and transmission line grounding into an integrated entry/ground system. Arrestor Plus cuts costs, saves valuable interior space and protects your revenues and personnel from the damaging effects of lightning strikes.

ArrestorPort™ II Kit

Wall entry and grounding system in one. Kit consists of an entry panel and a 1/8" solid copper ground bar assembly with assembly hardware, weatherstripping and weatherproof sealing caps for all entry ports. Use with Arrestor Plus® surge arrestors (page 614, order separately) and standard cable boots (page 619, order separately).

Type APORT-13-4

Provides mounting positions for 13 bulkhead mount surge arrestors and includes four 4 in holes for waveguide entry.

Type APORT-26N-4

Provides mounting positions for 26 N bulkhead mount surge arrestors and includes four 4 in holes for waveguide entry.

Cable Prep Tools

EASIAX® Cable Prep Tool

EASIAX® precision cutting tool is the only cutting tool made exclusively for HELIAX® coaxial cable.

It's Accurate – Cuts precisely at crest of copper corrugation at the exact distance required for easy connector attachment. Clean cut makes flaring easier than ever. Precise blade depth makes it impossible to cut inner conductor.

It's Consistent – Every cut by every technician on every interface of any cable will be exactly the same. It's one more way to ensure consistent electrical performance for your cable system.

See ordering information on page 621.

EASIAX® Plus Automated Cable Prep Tool

Now cable installers and system designers can dramatically reduce cable preparation time and expense while improving overall system performance with the EASIAX® Plus Automated Cable Preparation Tool. Fit the EASIAX Plus Tool to any standard power drill and it removes the cable jacket, outer conductor, and foam, then cuts back and chamfers the inner conductor to the correct dimensions for connector attachment – all in less than 15 seconds. The EASIAX Plus automated method of cable preparation provides cable connections that are more consistent, more reliable, and more repeatable.

EASIAX® Plus Automated Cable Preparation Tool Ordering Information

Cable Type	Connector Type	Tool Type Number	Replacement Blades Type No.
LDF1-50	Standard	CPTL1	CPT-BKS
EFX2-50	Standard N and DIN	CPT-E2L2N, CPT-E2L2DIN	CPT-BKS
LDF2-50	Standard N and DIN	CPT-E2L2N, CPT-E2L2DIN	CPT-BKS
FSJ4-50B	FSJ4 Version 2	CPT-F4*	CPT-BK
LDF4-50 A	RingFlare™	CPT-L4ARC1	CPT-BKS
LDF4.5-50	RingFlare	CPT-L45ARC	CPT-BKS
LDF5-50A	Standard, RingFlare, OnePiece	CPTL5A	CPT-BK5
LDF6-50	Standard	CPTL6	CPT-BK6
LDF7-50A	Standard, RingFlare, OnePiece	CPTL7	CPT-BK7

* For discontinued tool CPT-F4A use CPT-BKS1 blade kit
For discontinued tool CPT-F4B use CPT-BKSF4 blade kit

Manual EASIAX® Cable Preparation Tool Ordering Information

Cable Type	Connector Type	Tool Type Number	Replacement Blades Kit of 5, Type No.
FSJ4-50B	FSJ4 version 2 and standard connectors	207865 & 241372	209874
LDF4-50A	RingFlare™ connectors, and standard connectors	MCPT-L4	MCPT-BK5
LDF5-50A	Standard, RingFlare, and OnePiece™	MCPT-78	MCPT-BK5
VXL5-50	Standard, RingFlare, and OnePiece	MCPT-78	MCPT-BK5

For standard connectors, additional tools are required.

Connector Attachment Tool Kits

The connector interface is one of the most critical factors affecting transmission line operation. Even experienced technicians can make mistakes when equipped with makeshift devices or an inadequate array of simple hand tools, and it only takes a single faulty connection to degrade performance and threaten your operation's revenues.

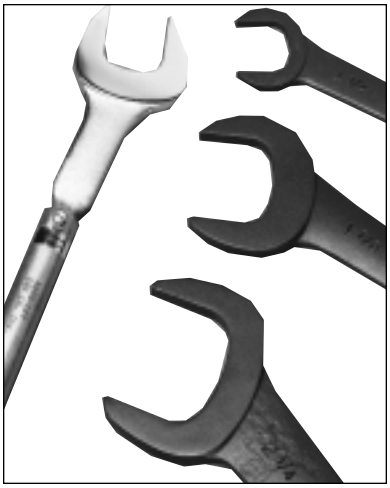
With the HELIAX® connector attachment tool kit, workmanship is no longer compromised by tools never meant for the job. The kit contains the same specialized tools used by our factory technicians that make connector attachment faster and easier and produces a reliable assembly that matches the quality of the HELIAX cable system serving the operation.

Tool can be ordered individually by type number or in kits. Kit type numbers are listed in the top row and include the tools indicated with an "X".

Type Numbers for Individual Tools	Description	Complete Tool Box	Basic Tool Box	DIN	N	FSJ1/FSJ4/ LDF4 Kit	LDF5 Kit	LDF6 Kit	Air Cable and Waveguide Kit
Kit Type Numbers:		TB-COMP-KIT	TB-BASIC-KIT	TB-DIN-KIT	TB-N-KIT	TB-F14L4-KIT	TB-L5-KIT	TB-L6-KIT	TB-AW-KIT
224351	Tool Box	x	x						
224352	Safety Knife	x	x						
224353	Wire Snips	x	x						
224354	Inch/Millimeter Rule	x	x						
224355	Greasing Brush	x	x						
224356	Point File	x							
224390	Leather Buffing Strap	x				x			
224391	Emery Cloth - 1 ft (30 cm)	x				x			
224392	Flare Hammer	x							x
224393	Flat Hammer	x							x
224394	Beveled Hammer Tip	x							x
MCPT-78	7/8" EASIAX® Tool	x					x		
MCPT-L4	1/2" EASIAX® Tool	x				x			
207865	FSJ1/FSJ4 EASIAX® Cable Tool	x				x			
224358	Tapered Drill Punch 3/4"	x							x
224360	Pin Alignment Tool	x							
224361	Cutoff Guide 7/32" (5.5mm) LDF4/FSJ4	x				x			
224362	Cutoff Guide 8/32" (6.3mm)	x							
244494	Cutoff Guide 9/32" (7.1mm)	x							
224363	Cable Flare Tool LDF4	x				x			
224368	Cable Flare Tool LDF5	x					x		
224373	Cable Flare Tool LDF6	x						x	
224377	Soldering Pliers	x				x			
224380	Pin Depth Gauge N-Male	x			x				
224395	Pin Depth Gauge N-Female	x			x				
114468	Pin Depth Gauge DIN Male	x		x					
114469	Pin Depth Gauge Female	x		x					
241953	Chamfer Tool FSJ4	x				x			
243398	Chamfer Tool FSJ2 (not included in tool box)								

ANDREW®

Revised 5/01



Wrenches

Crimping Tool

Grounding Kit Preparation Tool

Connector Attachment Torque Wrenches

Andrew torque wrenches attach any type HELIAX® connectors to HELIAX LDF4.5, LDF5, LDF6, LDF7, and LDF12 coaxial cables. All are designed with a mechanism to audibly notify the installer that the proper torque has been reached and release the pressure.

Type Number	Description	Application
244373	2-5/8" torque wrench	LDF12 connectors
244374	2-1/4" torque wrench	LDF7 connectors
244375	1-7/8" torque wrench	LDF6 connectors
244376	21mm torque wrench	LDF4.5 connectors
244377	1-1/4" torque wrench	Coupling torque DIN connectors
244378	1-1/4" torque wrench	LDF5 connectors
244379	13/16" torque wrench	Coupling torque N connectors

Wrench Kit

Kit includes the three wrenches listed below.
.....Type **244372**

Type **244459-7**, wrench for LDF7 (1-5/8") connectors
Type **244459-6**, wrench for LDF6 (1-1/4") connectors
Type **244459-5**, wrench for LDF5 (7/8") connectors

Crimping Tool for Crimp-On Grounding Kits

Crimping Tool. Used to attach crimp-on lugs for standard and SureGround™ series grounding kits described on pages 610-612. Not required for kits having factory-attached lugs .....Type **207270**

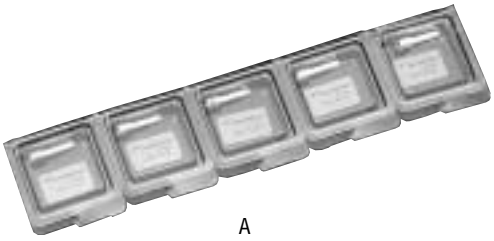
Grounding Kit Preparation Tool

This tool removes the exact amount of jacketing necessary to attach a grounding strap in one simple, precise step, without the use of knives. The tool takes just seconds to use. Simply snap it in place around the cable and rotate. The tool is ideal for use on cables mounted close to structures and other cable runs. It will not scrape or damage the cable's outer conductor.

Grounding Kit Preparation Tool Ordering Information

Cable Type	Tool Type No.	Replacement Blade Kit Type No.
FSJ4-50B	**GKT-F4**	-
LDF4-50A	**GKT-L4**	**GKT-BKU**
LDF4.5-50	**GKT-58**	**GKT-BKU**
LDF5-50A	**GKT-78**	**GKT-BKU**
LDF5-50A	**GKT-78**	**GKT-BKU**
VXL5-50	**GKT-78**	**GKT-BKU**
LDF6-50	**GKT-114**	**GKT-BKU**
VXL6-50	**GKT-114**	**GKT-BKU**
LDF7-50A	**GKT-158**	**GKT-BKU**
VXL7-50	**GKT-158**	**GKT-BKU**

Connector Accessories



A

B

A Connector PIN-PAKS. Replacement connector center pins individually packaged in sets (quantities shown below). Each pin can be easily separated from the set. PIN-PAKS for 7/8" cable and smaller include five replacement pins: PIN-PAKS for 1-1/4" and 1-5/8" cable include two replacement pins.

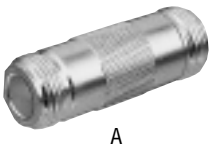
For Connector Type	PIN-PAK Type No.	Quantity Per Kit
F1PNM-H	**242881**	5
C41SW	**241051-3**	5
F2NM, F2NM-H	**242075-3**	5
F2PNM, F2PNM-H	**242075-4**	5
F2PDM	**114402-2**	5
F4NM, F4NM-H	**241455-3**	5
F4NMV2	**243640-2**	5
F4PNM, F4PNM-H	**241455-4**	5
F4PNMV2	**243472-2**	5
F4NF	**241496-3**	5
F4PNF	**241496-4**	5
F4PDM	**114417-2**	5
F4PDMV2	**243465-2**	5
L2NM, L2NM-H	**48335-3**	5
L2PNM, L2PNM-H	**48335-4**	5
L4NM, L4NM-H	**241730-3**	5
L4PNM, L4PNM-H	**241730-4**	5
L4PDM	**222483-2**	5
L4NF	**242855**	5
L4PNF	**242855-2**	5
L5NM	**43158-5**	5
L5PNM, L5PNM-H	**241495**	5
L5NF	**43157-2**	5
L5PNF	**241092**	5
L5PDM	**114105**	5
L5PDF, L5PDF-BH	**114105-2**	5
L6PNM, L6PNM-H	**243370**	2
L6PNF	**241057**	2
L6PDF, L6PDF-BH	**114105-4**	2
L6PDM	**114105-3**	2
L7PNF	**241056**	2
L7PNM	**243371**	2
L7PDM	**242960**	1
V5PNF	**244985-2**	5
V5PNM	**244983-2**	5
V5PDF	**244989-2**	5
V5PDM	**244987-3**	5

Contact Andrew for other replacement pins.

B Bulkhead Adapter. For use with type N or UHF jacks for 1/4", 3/8", 1/2" or 7/8" HELIAX® cable. Includes faceplate and mounting hardware.....Type **26016-2**

Connector Reattachment Kit includes rubber O-ring and gasket parts to replace those which may be damaged during disassembly and subsequent reattachment of connectors. Does not include interface O-rings or gaskets.

Cable Types	For Connector Types	Reattachment Kit Type No.
Foam-Dielectric Cables		
LDF2-50	L2 and L42 Series	**34767A-38**
LDF4-50A	L44 Series, except L4NM, L44PCW, L44PCN,	**34767A-27**
	L4NM, L44PCW, L44PCN	**34767A-51**
FSJ4-50B	F4 and 44AS Series	**34767A-39**
	F4V2 Series	**34767A-66**
LDF5-50A	L5 and L45 Series	**34767A-28**
LDF6-50	L6 and L46 Series	**34767A-43**
LDF7-50A	L7 and L47 Series	**34767A-35**
Air-Dielectric Cables		
HJ4-50,HT4-50	H4PNM, H4PNF, 74PN, 74PW	**34767A-22**
HJ5-50	H5PNF, H5PNM, 75PN, 75AR, 75PW	**34767A-3**
	75AG, 75AU	**34767A-5**
	75ART, 75AGT	**34767A-44**
	H5NF-T, 75NT	**34767A-18**
HJ7-50A	87G, 87R	**34767A-6**
	H7PNF, 87PN, 87S, 87SG	**34767A-7**
	87SGT, 87ST	**34767A-20**
	H7NF-T, H7NM-T, 87NT, 87WT	**34767A-19**
	87Z	**34767A-13**
HJ12-50	H12PNF, 82PN	**34767A-46**
	82GF	**34767A-50**
	82RF	**34767A-49**
	82R	**34767A-47**
HJ8-50B	H8( )-302	**34767A-60**
	78AGF, 78ARM, 78ARF, 78AGM, 78AS	**34767A-10**
	78BZ	**34767A-30**
HJ11-50	H11( )-602	**34767A-57**
	H11( )-M408	**34767A-58**
	H11( )-302	**34767A-59**
	81RF	**34767A-15**
	81GF	**34767A-16**
	42826	**34767A-40**
	42896	**34767A-41**
	81Z	**34767A-17**
HJ9-50, HJ9HP-50	H9( )-602, H9HP( )-602	**34767A-55**
	H9( )-M408, H9HP( )-M408	**34767A-56**
	79AG, 79AR	**34767A-45**
	79AZ, H9HPZ	**34767A-31**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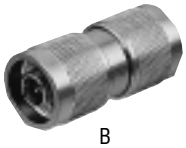
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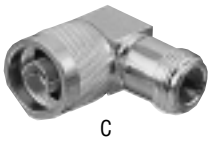
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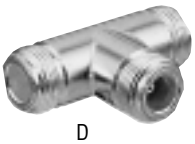
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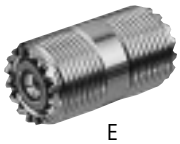
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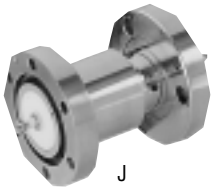
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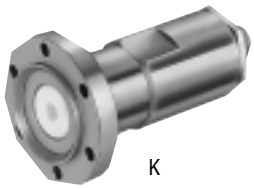
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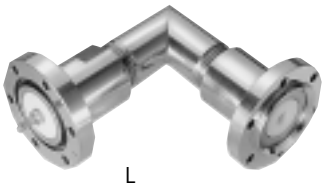
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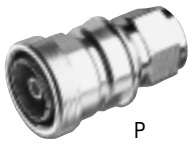
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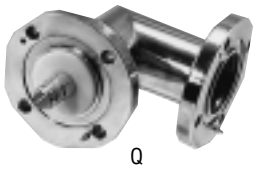
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V

Ordering Information

	Description	Type No.
A	N Junction, female-female, UG-29B/U	**10804-11**
B	N Junction, male-male, UG-57B	**10804-9**
C	N Right Angle, male-female, UG-27D/U	**10804-66**
D	N Tee, female-female-female, UG-28A/U	**10804-17**
E	UHF Junction, female-female, PL-258	**10805-6**
F	UHF Right Angle, male-female, M-359A	**10805-5**
G	UHF Tee, female-male-female, M-358	**10804-4**
H	N female-UHF male	**10805-12**
I	N male-UHF female	**10805-11**
J	Flange Adapter, F flange, male-7/8" EIA, 50 ohm	**33682**
K	F Flange, female-N female	**104300-2**
L	F Flange Elbow, F Flange, male-F Flange, female	**203361**
M	7-16 DIN male-N female	**CA-PNFDM**
N	7-16 DIN male-N male	**CA-PNMDM**
O	7-16 DIN female-N female	**CA-PNFDF**
P	7-16 DIN female-N male	**CA-PNMDF**
Q	90° Miter Elbow, 7/8" EIA, 50 ohm 90° Miter Elbow, 1-5/8" EIA, 50 ohm 90° Miter Elbow, 3-1/8" EIA, 50 ohm	**1060A** **ACX150-10SE** **ACX350-10SE**
R	N female-7/8" EIA, 50 ohm N female-1-5/8" EIA, 50 ohm N female-3-1/8" EIA, 50 ohm	**2260B** **2261A** **2262**
S	LC female-7/8" EIA, 50 ohm LC female-1-5/8" EIA, 50 ohm	**2360A** **2361A**
T	N Male-TNC Male	**CA-NMTM**
U	N Female-TNC Male	**CA-NFTM**
V	N Male-N Male, hex head	**CA-NMNM-H**

Fire Retardant Cables and Waveguides

Fire Retardance Requirements

Cable and waveguide installed inside a building usually must meet fire retardance requirements. In the United States, the National Electrical Code (NEC)1 sets the standard for coaxial cable used within buildings and normally has the force of law, as most local electrical codes in the U.S. are based on it. In addition, most building codes cover cable, and other local requirements may exist such as the Fire Gas Toxicity Standards of New York State.

Somewhat similar requirements are provided by the Canadian Electrical Code (CEC), issued by the Canadian Standards Association (CSA). Other countries' requirements often reference the International Electrotechnical Commission (IEC) standards.

Definitions

Some terms used in building construction are referred to in fire-retardant cable regulations. They are defined below:

Conduit. A tube or duct for enclosing electrical wires and cable. Conduit may be metallic or nonmetallic.

Duct. A closed channel, tube, or pipe used to transport air, dust, vapors, etc.

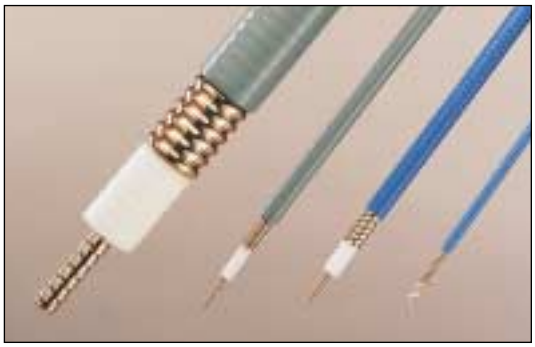
Plenum. A compartment or chamber to which one or more air ducts are connected and forms part of the air distribution system of a building.

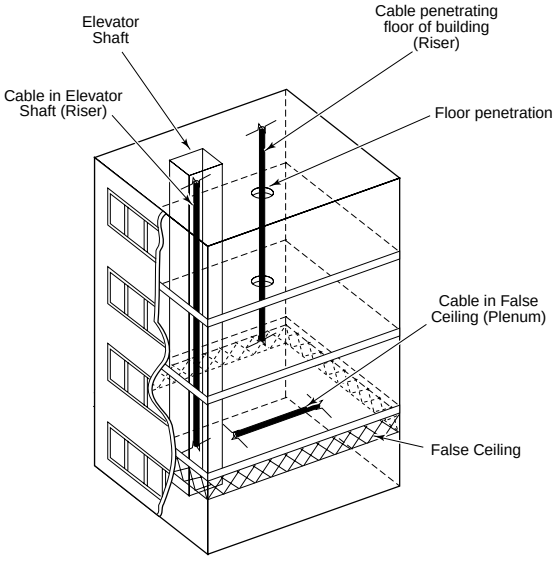
Raceway. An enclosed channel designed expressly for holding wires, cables, or bus bars, with additional functions as permitted in the National Electrical Code. Raceway may be metallic or nonmetallic.

Riser. A vertical shaft passing from floor to floor. Risers may or may not be fireproof or have firestops at each floor.

Coaxial Cable Applications Defined by the NEC

In the National Electrical Code, coaxial cable falls under the Community Antenna Television Systems (CATV) category. The NEC provides requirements for coaxial cable installed within buildings in Article 820. These requirements cover all installations except where the cable enters the building from the outside, does not pass through a plenum or riser, and is (a) of any length, but runs throughout in a properly grounded metal conduit (rigid or intermediate) or (b) no longer than 50 feet (15.2 m), within the building, and terminated at a grounding block. The requirements state that these cables shall be listed as being resistant to the spread of fire as specified in the code, listed as being suitable for the purpose, and properly marked.





Riser and Plenum Applications in Multi-Story Building

Four categories of listed coaxial cable are defined (in descending order of fire-resistance rating): Type CATVP, plenum cable; Type CATVR, riser cable; Type CATV, general purpose coaxial cable; and Type CATVX, limited use coaxial cable.

1. National Electrical Code® and NEC® are registered trademarks of the National Fire Protection Association.

Wiring In Ducts, Plenums and Other Air-Handling Spaces

Only Type CATVP listed cables, which have extremely high fire resistance coupled with low smoke emission, are permitted by the NEC to be installed in ducts, plenums or other spaces used for environmental air (such as above a false ceiling) without additional protection. All other cables, which must be listed as Type CATVX or higher, must be contained within rigid metal conduit, flexible metallic tubing or similar barrier, depending on the application. (These conditions preclude use of RADIAX® cables, so these cables must be CATVP listed to be installed in a plenum or duct).

Wiring In Vertical Runs

Type CATVR listed cables are required for installation in risers or any other floor penetration connecting more than one floor. Type CATVP cables, which have even higher fire resistance, can be substituted for Type CATVR cables. CATV or CATVX listed cables can also be installed in risers provided that they are encased in noncombustible tubing (not applicable to RADIAX cables) or are located in a fireproof shaft having firestops at each floor.

General Purpose Wiring Within Buildings

All coaxial cables to be installed within buildings in locations other than plenums and risers, as defined above, must be at least Type CATV listed for fire resistance unless one of the following exceptions applies:

- Type CATVX cable enclosed in raceway.
- Type CATVX cable in nonconcealed spaces where the exposed length does not exceed 10 ft (3.05 m).
- Small diameter Type CATVX cables installed in dwellings.

Type CATVR and Type CATVP cables, which have passed more stringent tests, are permitted to be substituted for Type CATV cables.

Acceptable cables are summarized on the chart on page 629.

Model Building Code Requirements for Coaxial Cable

Some model building and mechanical codes also include fire retardance requirements for coaxial cable. Generally, they stipulate that exposed cables in concealed spaces over suspended ceilings, and other spaces used for environmental air handling purposes as defined in the particular code, be listed and labeled as plenum cable per NEC requirements.

Fire Gas Toxicity

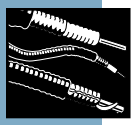
Fire Retardant Jacketing Characteristics. Some coaxial cables use halogenated polymeric jacketing to provide fire retardance. (Halogens are chemically related elements such as fluorine, chlorine, and bromine.) The drawback to such materials is increased levels of smoke and toxic gases under fire.

All HELIAX® Coaxial Cables rated Type CATVR achieve fire retardance by using non-halogenated jacketing. While such a jacketing has low toxicity characteristics when burned, it is somewhat less effective at high temperatures than halogenated jacketing. Presently, it is not possible to achieve the highest fire retardance rating, CATVP, without either employing halogenated jacketing or omitting the jacket entirely; consequently, Type CATVP listed HELIAX cables presently use halogenated fire retardant jacketing.

New York State Requirements. The New York State Department of State (DOS) Office of Fire Prevention and Control publishes a Fire Gas Toxicity Data File for products covered by Article 15, Part 1120 of the New York State Uniform Fire Prevention and Building Code. Only products listed in this directory are permitted to be used in the construction of some buildings in New York State.

All of Andrew Corporation's cable and waveguide products are listed in the Fire Gas Toxicity Data File, as follows:

New York State DOS File Number	Listed Manufacturer	Market Name	Listed Cables
16120-880602-2007	Andrew	RADIAX Slotted Coaxial Cable - Foam Dielectric	All Codes
16120-880602-2008	Andrew	HELIAX Coaxial Cable - Foam Dielectric	All Codes
16120-871217-1058	Andrew	HELIAX Coaxial Cable - Air Dielectric	All Codes
16120-880602-2006	Andrew	HELIAX Elliptical Waveguides	All Codes



Fire Retardant Cables and Waveguides

Caution: Since local requirements may vary, check with your local building inspector to make certain that a proposed installation conforms with all applicable electrical codes, building codes, mechanical codes and fire protection codes.

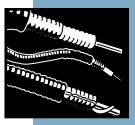
Andrew Fire Retardant Cables - Indoors or Outdoors

Andrew offers a full line of fire retardant products for HELIAX® coaxial cable, RADIAX® radiating coaxial cable and HELIAX elliptical waveguide. A listing of these products appears on page 629.

Fire retardant cables are suitable for indoor/outdoor use. Outdoor service life is 10 years, minimum, for HELIAX cables with CATVR (RN) rated jacketing. CATVP (RP) rated cables have an even longer outdoor service life. Refer to the table on page 629 for HELIAX and RADIAX fire retardant cable temperature ratings.

Acceptable Cables and Waveguides by Application - United States

Application Within Building	Type CATVP	Type CATVR	Type CATV	Type CATVX	Unlisted	NEC 1999 Section
Ducts, Plenums and Other Environmental Air Spaces, Exposed	√					820-53(a)
Ducts, Plenums and Other Environmental Air Spaces, in Metal Tubing or Conduit	√	√	√	√		820-53(a), Exception
Vertical Runs penetrating more than 1 floor, or in a shaft, exposed	√	√				820-53(b), (Non-residental)
Vertical Runs penetrating more than 1 floor, or in a shaft, encased in Metal Raceway or in a Fireproof Shaft having Firestops at each floor	√	√	√	√		820-53 (b), Exception No. 1
All other locations except those given above, exposed for more than 10 ft (3.05m)	√	√	√			820-53 (c), (Non-residental)
All other locations except those given above, exposed for 10 ft (3.05m) or less, nonconcealed	√	√	√	√		820-53 (c), Exception No. 2
All other locations except those given above, enclosed in Raceway	√	√	√	√		820-53 (c), Exception No. 1
All other locations except those given above, cable enters from outside, in Grounded Metal Conduit	√	√	√	√	√	820-50, Exception No. 2
All other locations except those given above, cable enters from outside, less than 50 ft (15.2m) within building, grounded.	√	√	√	√	√	820-50, Exception No. 3



Andrew Fire Retardant Coaxial Cables and Elliptical Waveguides

Product	Type CATVP (UL 910) Type No.	Refer to Page	Type CATVR (UL1666) Type No.	Refer to Page	Type CATV (UL 1581, Flame Test 1160) Type No.	Refer to Page	Type CATVX Type No.	Refer to Page
RADIAX® Cable								
1/4"	–	–	**RXL1-1RNT**	663	–	–	–	–
3/8"	–	–	**RXL2-2RNT**	663	–	–	–	–
1/2" - 3	–	–	**RXL4-3RNT**	664	–	–	–	–
1/2" - 2	**RXP4-2**	665	**RXL4-2RNT**	663	–	–	–	–
1/2" - 1	**RXP4-1**	665	**RXL4-1RNT**	663	–	–	–	–
7/8"	–	–	**RXL5-1RNT**	664	**RXL5-1RNT1**	664	–	–
1-1/4"	–	–	**RXL6-1RNT**	664	**RXL6-1RNT1**	664	–	–
1-5/8"	–	–	**RXL7-1RNT**	664	**RXL7-1RNT1**	664	–	–
HELIAX® Cable								
Superflexible								
1/4", 50Ω	**ETS1-50T**	477	**FSJ1RN-50B**	474	**FSJ1RN-50B**	474	**FSJ1RN-50B**	474
1/4", 75Ω	–	–	**FSJ1RN-75A**	574	**FSJ1RN-75A**	574	**FSJ1RN-75A**	574
3/8", 50Ω	**ETS2-50T**	483	**FSJ2RN-50**	480	**FSJ2RN-50**	480	**FSJ2RN-50**	480
1/2", 50Ω	–	–	**FSJ4RN-50B**	485	**FSJ4RN-50B**	485	**FSJ4RN-50B**	485
1/2", 75Ω	–	–	**FSJ4RN-75A**	576	**FSJ4RN-75A**	576	**FSJ4RN-75A**	576
Extraflexible								
3/8", 50Ω	–	–	**EFX2RN-50**	489	**EFX2RN-50**	489	**EFX2RN-50**	489
Foam Dielectric								
1/4", 50Ω	–	–	**LDF1RN-50**	491	**LDF1RN-50**	491	**LDF1RN-50**	491
3/8", 50Ω	–	–	**LDF2RN-50**	493	**LDF2RN-50**	493	**LDF2RN-50**	493
1/2", 50Ω	–	–	**LDF4RN-50A**	496	**LDF4RN-50A**	496	**LDF4RN-50A**	496
1/2", 75Ω	–	–	**LDF4RN-75A**	578	**LDF4RN-75A**	578	**LDF4RN-75A**	578
5/8", 50Ω	–	–	**LDF4.5RN-50**	500	**LDF4.5RN-50**	500	**LDF4.5RN-50**	500
7/8", 50Ω	–	–	**LDF5RN-50A**	506	**LDF5RN-50A**	506	**LDF5RN-50A**	506
7/8", 50Ω	–	–	**VXL5RN-50**	503	**VXL5RN-50**	503	**VXL5RN-50**	503
1-1/4", 50Ω	–	–	**LDF6RN-50**	513	**LDF6RN-50**	513	**LDF6RN-50**	513
1-1/4", 50Ω	–	–	**VXL6RN-50**	510	**VXL6RN-50**	510	**VXL6RN-50**	510
1-5/8", 50Ω	–	–	**LDF7RN-50A**	520	**LDF7RN-50A**	520	**LDF7RN-50A**	520
1-5/8", 50Ω	–	–	**VXL7RN-50**	517	**VXL7RN-50**	517	**VXL7RN-50**	517
2-1/4", 50Ω	–	–	**LDF12RN-50**	524	**LDF12RN-50**	524	**LDF12RN-50**	524
Air Dielectric								
1/4", 50Ω	**HS1RP-50A**	527	–	–	–	–	–	–
1/4", 50Ω	**HST1-50**	529	–	–	–	–	–	–
3/8", 50Ω	**HS2RP-50**	531	–	–	–	–	–	–
3/8", 50Ω	**HST2-50**	533	–	–	–	–	–	–
1/2", 50Ω	**HS4RP-50**	546	–	–	–	–	–	–
1/2", 50Ω	**HL4RP-50**	540	**HJ4RN-50**	535	–	–	–	–
1/2", 50Ω	**HST4-50**	549	–	–	–	–	–	–
1/2", 50Ω	**HLT4-50T**	543	–	–	–	–	–	–
5/8", 50Ω	–	–	**HJ4.5RN-50**	552	–	–	–	–
7/8", 50Ω	**HJ5RP-50**	555	**HJ5RN-50**	555	–	–	–	–
7/8", 75Ω	–	–	**HJ5RN-75**	582	–	–	–	–
1-5/8", 50Ω	**HJ7RP-50A**	560	**HJ7RN-50A**	560	–	–	–	–
2-1/4", 50Ω	–	–	**HJ12RN-50**	563	–	–	–	–
HELIAX Elliptical Waveguide* **								
Type EWP52	–	–	**35409-20**	172	-	-	-	-
Type EWP63	–	–	**35409-18**	174	-	-	-	-
Type EW63	–	–	**35409-19**	174	-	-	-	-
Type EWP77	–	–	**35409-22**	178	-	-	-	-
Type EW85	–	–	**35409-17**	180	-	-	-	-
Type EWP90	–	–	**35409-16**	182	-	-	-	-
Type EW127A	–	–	**35409-15**	184	-	-	-	-
Type EW132	–	–	**35409-14**	186	-	-	-	-
Type EWP180	–	–	**35409-21**	188	-	-	-	-

** High temperature foam dielectric. *** Type CATVP elliptical waveguides are available on request.
All cables meet standards BS4066 Part 1 and IEC332 Part 1. Type CATVP, CATVR and CATV cables meet BS4066 Part 3 and IEC332 Part 3, Catagory C.
All type CATVP air-dielectric cables are also listed by the Canadian Standards Association (CSA) as Communications Cable, Type CXC-FT4, FT6. They carry dual UL/CSA markings.
All type CATVR, CATV, and CATVX RADIAX, superflexible, and foam-dielectric cables listed comply with equivalent Canadian Standards Association (CSA) requirements and are CSA marked.

Temperature Ratings for HELIAX® Fire Retardant Coaxial Cables

	Recommended Temperature Range ˚C (˚F) Installation	Storage	Operation
Types CATVR, CATVX, and CATV Jacketed Cable, Foam and Air	-25 to 60 (-13 to 140)	-30 to 80 (-22 to 176)	-30 to 80 (-22 to 176)
Type CATVP Jacketed Cable, Foam and Air			
Polyethylene Dielectric	-40 to 60 (-40 to 140)	-40 to 85 (-40 to 185)	-40 to 85 (-40 to 185)
PTFE Dielectric	-40 to 60 (-40 to 140)	-40 to 150 (-40 to 302)	-40 to 150 (-40 to 302)

Intermodulation Generation

Figure 1 — Bulk Length of LDF4-50A

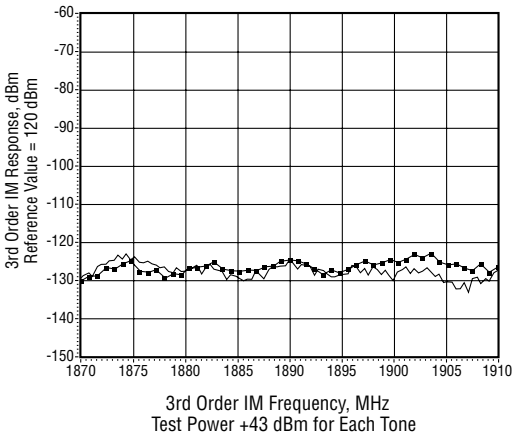
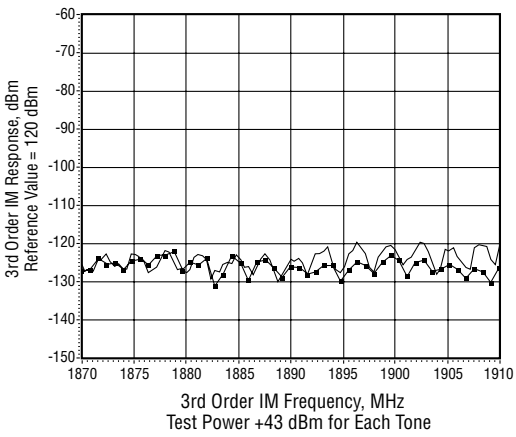


Figure 2 — 15 ft Assembly of FSJ4-50B



Intermodulation (IM), the intermixing of fundamental signal frequencies in a nonlinear circuit, has been a problem in multichannel communication systems for years. IM produces additional spurious signals at frequencies close to the operating frequencies, which can create additional noise in the system or even swamp the channel and make it unavailable for traffic. The many channels in modern wireless communications systems are typically arranged into base station transmit and receive frequency bands. Depending on the particular generating signal frequencies, IM products can fall into these receive frequencies. It therefore becomes desirable to keep the IM level low enough to prevent additional noise at the receivers.

Any deviation from linearity in a circuit will cause some IM. Nonlinearity is present when the voltage is not exactly proportional to the current or if output power is not exactly proportional to input power. Imperfect contacts at conductor junctions and the presence of ferromagnetic materials in or near the current path are the two main causes of nonlinearity in passive circuits. Measured passive IM levels are not very dependent on frequency, but do depend on the signal amplitude. Thus, when measuring or specifying IM performance of a component, the power levels of the carriers must be specified. Typically, testing is performed using two tones fairly closely spaced in frequency, the power level of each being 20 W (+43 dBm).

Low IM vs. Inferior Designs

	dBm
Large number of components	-95
Low pressure contact, outer	-96
Low pressure contact, inner	-85
Nickel plating	-83
Low IM design	-120 to -130

HELIAX cables, constructed from a single inner and single outer conductor deliver the best IM performance. Because current flow in coaxial cables is longitudinal, designs with many individual conductors require the current to cross numerous boundaries, each boundary being capable of producing IM products. It is not possible to apply high pressure between the individual conductors of a braided or foil-braid cable, for example, to improve IM performance. IM levels for braided cables are typically -80dBm or worse at a test power level of +43 dBm.

By contrast, Figure 1 and Figure 2 show the excellent IM performance of HELIAX cables. Figure 1 is the IM characteristic for a bulk length (approximately 5,000 feet) of LDF4-50A, swept in frequency through the PCS band, and Figure 2 is a similar plot for an assembly length (15 feet) of FSJ4-50B. Levels for both are -120 dBm or better at the test power level of +43 dBm for each tone.

HELIAX connectors are also designed and manufactured for the lowest IM. Three factors are important in connector design to minimize IM generation. First, the number of individual contact surfaces must be a few as possible. Second, where contact surfaces are necessary, they must be designed for excellent contact by using means to generate high pressure or by using soldering. Third, base materials, platings, and underplatings at RF current-carrying surfaces must not be made of ferromagnetic materials. The table shows measured IM levels for various RF connectors fitted to short lengths of cable. Andrew connectors, designed and constructed using these principles for low IM generation outperform other manufacturers' designs that deviate from these principles in one way or another.

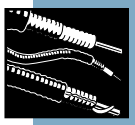


Figure 1 – Variation of Attenuation with Ambient Temperature

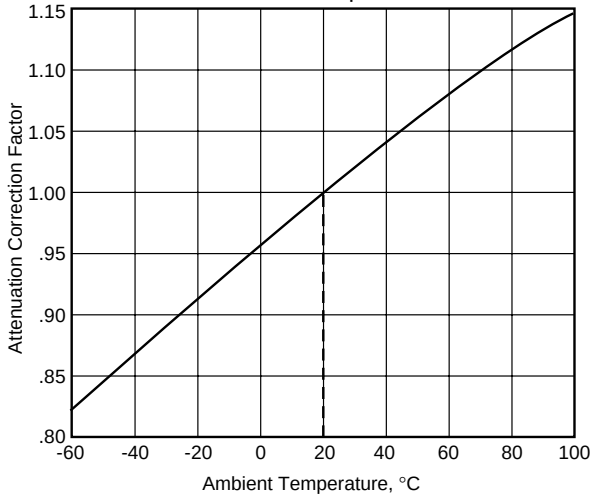
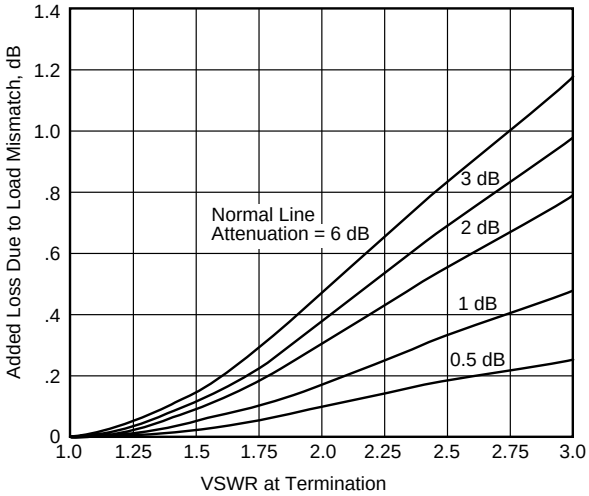


Figure 2 – Effect of Load VSWR on Transmission Loss



Attenuation

The attenuation versus frequency characteristics of HELIAX coaxial cables are provided as part of the data for each cable in this catalog. The figures are guaranteed to within ±5%. The values provided are for 20°C (68°F) ambient and increase slightly with higher temperature or applied power, up to approximately 15% above the curves at 100°C (212°F) ambient temperature. Figure 1 shows this relationship.

Effect of Connector on Transmission Line Loss

Usually, connector insertion loss is negligible compared with the attenuation of the cable. Connector insertion loss depends on the frequency of operation. You can easily calculate the total transmission line insertion loss (the sum of cable attenuation and insertion loss of the connectors) using our AASP software available on our web site at www. andrew.com. To approximate insertion loss for two connectors, add 0.1 dB to the transmission line loss.

Temperature Ratings for HELIAX® Coaxial Cables

		Storage	Installation	Operation
Standard Black Polyethylene Jacketed Cables				
Up to 2-1/4" Cables	°C	-70 to 85*	-40 to 60	-55 to 85
	°F	-94 to 185*	-40 to 140	-67 to 185
3" and Larger Cables	°C	-70 to 85*	-40 to 60	-40 to 85
	°F	-94 to 185*	-40 to 140	-40 to 185
Connectors				
	°C	-70 to 100**	-40 to 60	-55 to 150***
	°F	-94 to 212**	-40 to 140	-67 to 302***
CATVX Rated Cables				
	°C	-30 to 80	-25 to 60	-30 to 80
	°F	-22 to 176	-13 to 140	-22 to 176
CATVR Rated Cables				
	°C	-30 to 80	-25 to 60	-30 to 80
	°F	-22 to 176	-13 to 140	-22 to 176
CATVP Rated Cables				
Polyethylene Dielectric	°C	-40 to 85	-40 to 60†	-40 to 85
	°F	-40 to 185	-40 to 140†	-40 to 185
High Temperature Dielectric	°C	-40 to 100	-40 to 60†	-40 to 150
	°F	-40 to212	-40 to 140†	-40 to 302

* Cable with connectors attached rated to -40°C (-40°F).

** Upper temperature limited by connector package material. Storage defined as packaged connectors, not connectors installed on cable.

*** If connectors are operated above 100°C (212°F) and then separated, interface seals (gaskets or O-rings) should be replaced before remating. Air cable and connectors will operate below -40°C (-40°F), but may experience air pressure loss exceeding 1lb/in^2 (7kPa) in 24 hours.

† For CATVP air cables, 7/8" and larger, the installation temperature is -20° to 60°C (-4° to 140°F)

Coaxial Transmission Line Technical Data

Load VSWR Effect on Total Transmission Loss

When the transmission line is attached to a load, such as an antenna, the VSWR of the load increases the total transmission loss of the system. This effect is quite small for normal conditions. Figure 2 on page 631, shows the minimum increase in loss with load VSWR, assuming a VSWR of 1.0 at the input of the transmission line. This requires use of an input matching device.

Power Rating Considerations

Both peak- and average-power ratings are required to fully describe the capabilities of a given transmission line. Typically, peak-power ratings limit usage with amplitude modulation at medium frequencies (530-1610 kHz) or pulsed usage, while average-power ratings limit the high frequency usage.

Peak-Power Rating

The peak-power rating of a transmission line is limited by voltage breakdown between the inner and outer conductors.

Voltage breakdown is essentially independent of RF frequency, but varies with line pressure and type of pressurizing gas. Peak-power ratings are, therefore, generally stated for the following standard conditions: VSWR = 1.0, zero modulation and one atmosphere absolute dry air pressure (0 lb/in^2 or 0 kPa gauge) at sea level.

The peak-power rating of the selected cable must be derated for modulation technique and VSWR, as follows:

Peak Power Derating for Modulation and VSWR

Modulation	Peak Power Derating Calculation
AM	$P_{MAX} = \frac{P_{PK}}{(1+M)^2\ VSWR}$
FM and DTV	$P_{MAX} = \frac{P_{PK}}{VSWR}$
Analog TV	$P_{MAX} = \frac{P_{PK}}{(1+AU+2\sqrt{AU})\ VSWR} = \frac{P_{PK}}{(2.09)\ VSWR}$

Where:

P_{MAX} = Derated peak power
P_{PK} = Peak power rating of cable
M = Amplitude modulation index (100% = 1.0)
VSWR = Voltage standing wave ratio
AU = Aural to visual ratio (20% Aural: AU = 0.2)
2.09 = Modulation derating factor for TV, for AU=0.2

Rated transmitter power must be less than calculated derated peak power of the cable for safe operation. For digital TV (DTV), peak power is typically 7dB higher than average power.

From derating expressions, it can be seen that 100% amplitude modulation increases the peak power in the transmission line by a factor of 4. Also, the peak power in the transmission line increases directly with VSWR.

The transmission line peak-power rating can be significantly increased by pressurization. See page 633 for details.

An adequate safety factor on peak power is necessary to safeguard against voltage breakdown which can result in permanent damage to the transmission line. All HELIAX semiflexible coaxial cables are high-voltage tested to the equivalent of 200% of their rated peak powers (safety factor of 1.4 on voltage), and all rigid coaxial lines to the equivalent of 400% of rated peak powers (safety factor of 2.0 on voltage). These safety factors are intended as a provision for transmitter transients, lightning induced transients, and high voltage excursions due to other unforeseen causes. Andrew is known for its conservative specifications that insure long term, reliable performance. We continue to hold this commitment to our customers by maintaining the highest level of quality and performance.

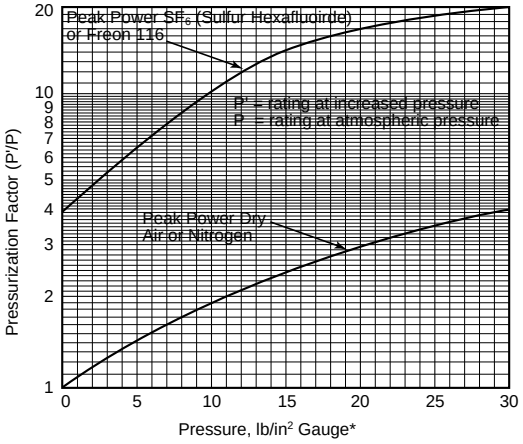
HELIAX® peak-power ratings are determined according to the relation:

$$P_{PK} = \frac{\left(\frac{E_P \times 0.707 \times 0.7}{SF}\right)^2}{Z_C}$$

Where:

P_{PK} = Cable power rating, standard conditions
E_P = dc production test voltage
0.707 = RMS factor
0.7 = dc to RF factor (empirically verified)
SF = Safety factor on voltage
  = 1.4 for HELIAX semiflexible cables
  = 2.0 for rigid coaxial lines
Z_C = Characteristic impedance

Figure 3 – Pressurization Factors



* For kPa, multiply by 6.895

Typical dc production test voltages for various sizes of semiflexible coaxial cable and rigid line are shown below.

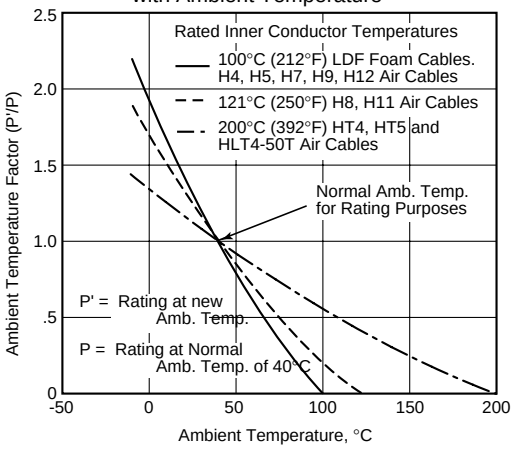
Nominal size	Impedance ohms	Ep, kV Flexible cables	Ep, kV Rigid lines
7/8"	50	6	–
1-1/4"	50	9	–
1-5/8"	50	11	11
2-1/4"	50	13	–
3"	50	16	–
3-1/8"	50	–	19
4"	50	21	–
5"	50	27.5	–
6-1/8"	50, 75	–	36
7-3/16"	75	–	41.8
8-3/16"	75	–	47

Foam-dielectric cables have a greater dielectric strength than air-dielectric cables of similar size. For this reason they might be expected to have higher peak-power ratings than air cables. Higher peak-power ratings usually can not be realized, however, because the commonly used connectors for foam cables have air spaces at the cable/connector interface which limit the allowable RF voltage to "air cable" values. Andrew rates similar size foam- and air-dielectric cables alike for this reason.

Effect of Connector on Power Rating

The peak power handling capability of a cable assembly is the smaller of the values for the cable and the connectors. The following table shows power ratings for common connectors at standard conditions of VSWR = 1.0, zero modulation and one atmosphere dry air pressure (0 lb/in^2 or 0 kPa gauge) at sea level.

Figure 4 – Variation of Average Power Rating with Ambient Temperature



Connector Power Ratings

Connector Type	DC Test Voltage kV	Average Power kW*	Peak Power kW
SMA	1.0	0.1	2.5
BNC	1.5	0.1	5.6
TNC	1.5	0.3	5.6
UHF	2.0	0.3	10
N	2.0	0.6	10
HN	4.0	0.6	40
SC	4.2	1.2	44
7-16 DIN	4.0	1.3	40
4.1/9.5 DIN	2.5	1.2	16
LC	5.0	3.5	63
7/8" EIA	6.0	1.7	90
1-5/8" EIA	11	4.9	300
3-1/8" EIA	19	16	902
4-1/2" IEC	21	27	1100
6-1/8" EIA	27.5	57	1890

* Average power ratings of the connector interfaces are based on an operating frequency of 900 MHz. The values shown in this table are typical for most applications.

Increased Peak Power Ratings

Pressurization and/or the use of high-density gases with high dielectric strength can be used to increase peak-power ratings. These effects are shown in Figure 3.

For a given transmission line pressure, the increase in peak-power rating is significant. For example, a line pressure of 10 lb/in^2 (70 kPa) dry air increases the peak-power rating by a factor of 1.9. Pressurization above 30 lb/in^2 (207 kPa) is not recommended.

Average Power Rating

Average power ratings for semiflexible cables are determined by the maximum permissible inner conductor temperature. This maximum temperature depends on the type of dielectric, and is governed by considerations of the long-term life of the dielectric. Average power ratings for rigid coaxial lines are also determined by the maximum inner conductor temperature. For rigid lines this maximum temperature is set primarily by considerations of differential expansion of inner and outer conductors, and the maximum movement permissible at the joints (inner connectors).

Figure 5 – Derating Factor for Average Power Due to VSWR

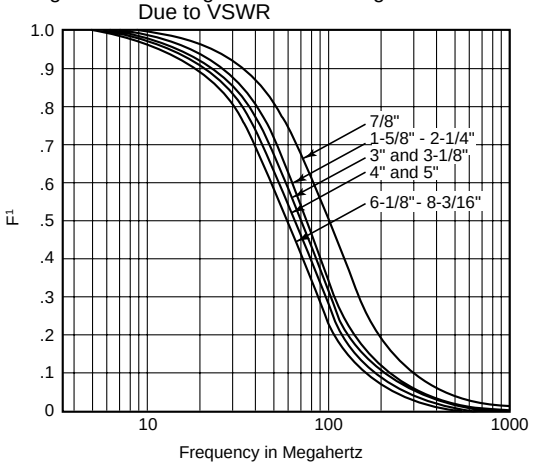
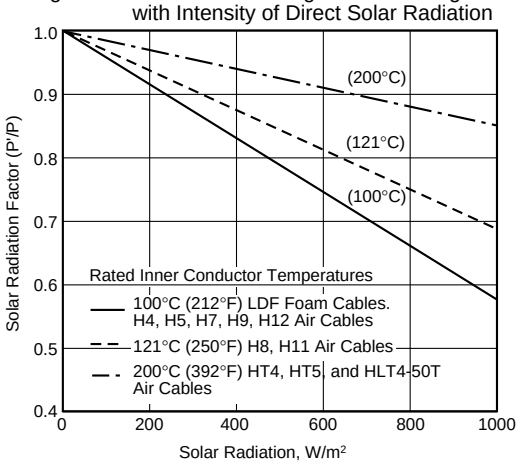


Figure 6 – Variation of Average Power Rating with Intensity of Direct Solar Radiation



Andrew average power ratings are based on a VSWR of 1.0, atmosphere pressure and ambient temperature of 40˚C (104˚F).

Derating Average Power for Modulation Condition

To convert rated transmitter power to average power for analog television transmission, multiply by 0.8 (totally black picture + aural signal). For FM radio and digital television (DTV), the factor is 1.0. Transmission lines for AM radio at MF frequencies (530-1610 kHz) are usually peak power limited. At higher (HF) frequencies, the limitation is average power capability and the required derating factor, D.F., is:

$$D.F. = 1 + \frac{M^2}{2}$$

where M is the modulation depth (100% = 1.0), expressed decimally.

Average Power Rating Adjustment for Ambient Temperature

The baseline power rating can be adjusted to meet the actual usage conditions. Figure 4 shows the variation of average power rating with ambient temperature.

Derating Average Power for VSWR

The derating factor (D.F) is calculated from the following formula:

$$D.F. = \frac{2\ (VSWR)}{VSWR^2\ (1 + F^1) + 1 - F^1}$$

where F^1 is a factor that varies with frequency and line size. This calculation of derating factor is conservative in that it assumes all reflected power is re-reflected at the transmitter and absorption of the reflected signal by the line attenuation is small. Select the factor from the applicable curve in Figure 5, calculate factor D.F., and multiply by the average power from the cable characteristics table.

For example: Calculate power rating for 3" HJ8-50B cable operating at 100 MHz with VSWR = 1.1, F1 (from Figure 5) = 0.33:

$$D.F. = \frac{2 \times 1.1}{1.1^2 \times (1 + 0.33) + 1 - 0.33} = 0.965$$

Average Power Rating at 1.00 VSWR = 42.4 kW (from page 566)

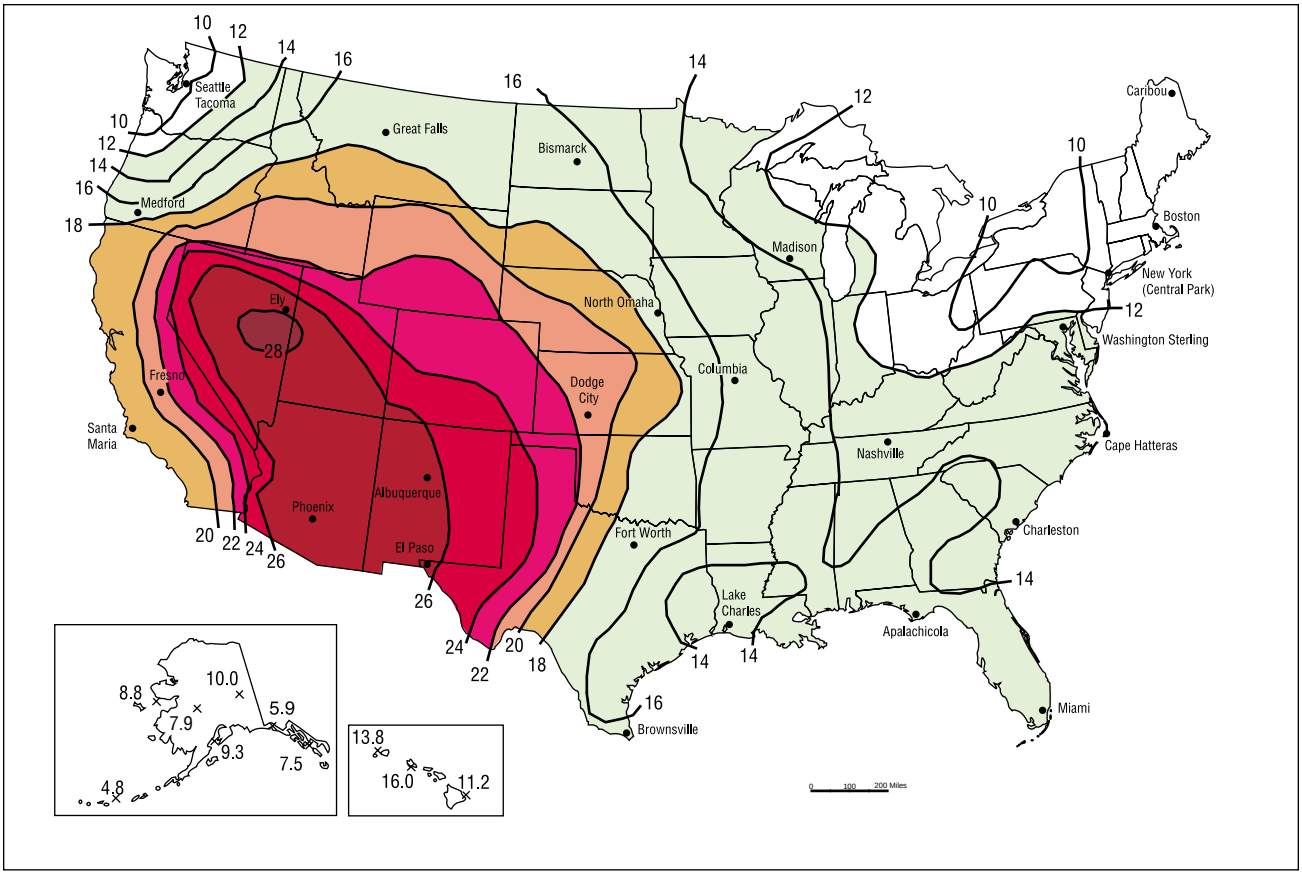
Average Power Rating at 1.1 VSWR = 42.4 x 0.965 = 41.0 kW

Derating Average Power for Direct Solar Radiation

The average power handling capability of a cable exposed to direct solar radiation will be reduced. The appropriate derating factors for the different cable types are shown in Figure 6.

The average radiation intensity for moderate climates is 200 W/m^2 or less. Hot, dry climates give solar radiation intensities which at the hottest time of the day can be 1,000 W/m^2 or higher. The mean value over the day, which is applicable to average power derating calculations provided absolute maximum temperatures are not exceeded, is up to 400 W/m^2. These hot, dry locations are also subject to elevated ambient temperatures, which must also be considered (Figure 4).

Figure 7 — Average Daily Direct Normal Solar Radiation (MJ/m²), Annual



Values for average direct solar radiation for locations in the USA are shown in Figure 7. For conversion purposes, to determine a derating factor from Figure 6 from the information by location from Figure 7, 1 MJ/m^2 over a 24-hour period is equivalent to 11.6 W/m^2.

Derating Average and Peak Powers for Altitude

Derating factors for average and peak powers with altitude are shown in the following table. These factors have been determined assuming just nominal overpressure inside the transmission line. Both average and peak powers must be derated because the lower atmospheric pressure with increasing altitude reduces both heat transfer from inner and outer conductors, and the dielectric strength of the air inside the line.

Derating Average and Peak Powers for Altitude

Altitude above Sea Level ft (m)	P1/P Average Power	P1/P Peak Power
0 (0)	1.00	1.00
5000 (1524)	0.92	0.69
8000 (2438)	0.87	0.53
10500 (3200)	0.84	0.44
15000 (4572)	0.78	0.30

Efficiency

The efficiency of a transmission line depends on its length and attenuation. The efficiency is defined as the percent of transmitter power which reaches the antenna. It can be calculated as:

$$\text{Efficiency} = \frac{100\%}{10^{\left(\frac{dB}{10}\right)}}$$

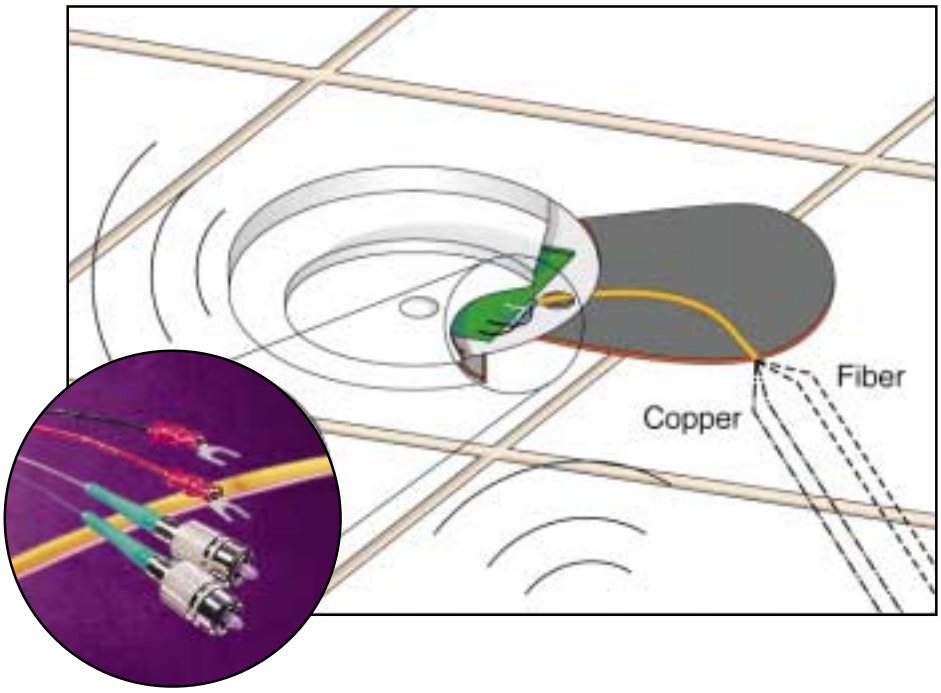
where dB is the total attenuation of the transmission line at the frequency of interest.

The remaining power is lost in the transmission line and is dissipated as heat.

Fiber Optic Cables

Index

Composite Cable Systems



For PCS and Cellular Premise Antennas

Andrew premise antenna cables, featuring a unique blend of copper and fiber optic elements in one cable, simplify the design and decrease the installation costs of premise PCS and cellular systems. Andrew fully tests these assemblies to ensure electrical and optical performance. This testing reduces the risk of system installation defects due to inherent problems with field installation of fiber optic connectors.

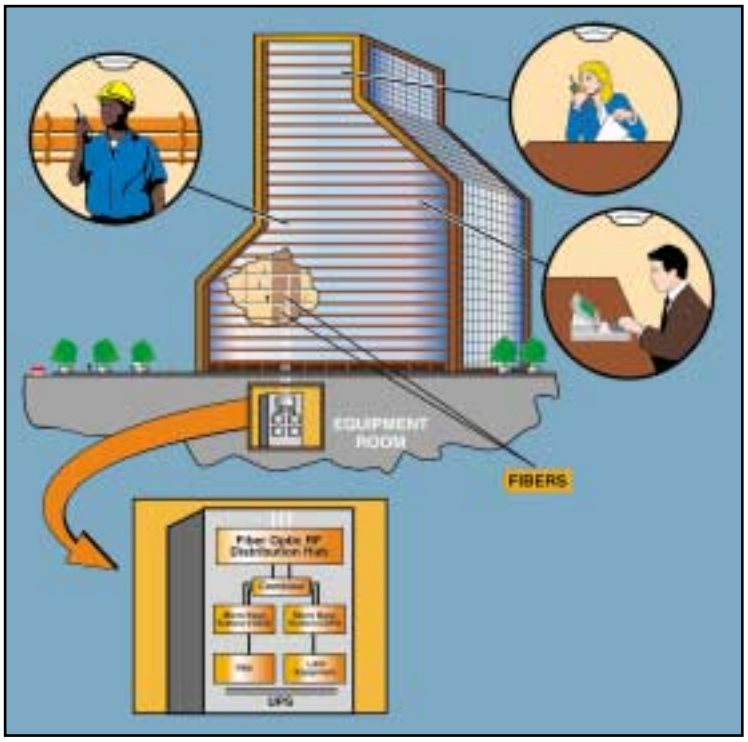
Unique Composite Design. Andrew premise cables are specifically engineered for use within buildings in self-supporting cellular and PCS systems. The composite design runs electrical power and optical fiber together in one cable to each base station antenna, so there are no ac power or stepdown transformers to install. And there's no bulky ductwork*, because Andrew protects the cable with a unique sheathing design. Best of all, when you incorporate an integrated uninterruptible power supply at the head end you're assured of a reliable, completely independent communication system, even in power outages.

A Full Range of Options. For your convenience we maintain an inventory of the most common cable products and standard assembly lengths. We will also prepare complete fiber optic cable assemblies made to customer system requirements. Different wire gauges and single mode, dispersion shifted single mode, and multimode fiber types are all available. Finally, when field connectorization is desired, Andrew provides pigtail cords with connectors that can be spliced on cable assemblies for easy installation.

Lower Life Cycle Costs. The Andrew composite fiber optic solution minimizes installed and long-term costs. With the composite electro/optical cable designed specifically for these applications, the need for conduits and the associated maintenance costs is significantly reduced. And as your system expands the fiber optic cable can be accessed directly and easily to upgrade antenna system infrastructure or redirect cables.

Andrew composite premise antenna cables are another in a series of innovations from Andrew Corporation, a global provider of communications technologies that cover the entire spectrum of voice, data, and video transmission. Bringing reliability, flexibility, and lower costs to your premise PCS and cellular systems, Andrew composite premise antenna cables are the value-added solution to your antenna installation challenges.

*Subject to local codes



Cut Installation Time and Costs with Andrew Composite Cables

Installation (Typical)

- Site Survey
- Install Ductwork
- Install Power & Transformer at Each Antenna Site
- Install Fiber Optic Cable
- Install Antenna & Base Station Equipment
- Commissioning

Simplified Installation with Andrew Composite Cables

- Site Survey
- Install Composite Cable
- Install Antenna & Base Station Equipment
- Commissioning

Savings:
TIME & COST
Ductwork and Local Power are Not Required with Andrew Composite Cables†

† Subject to local building codes.

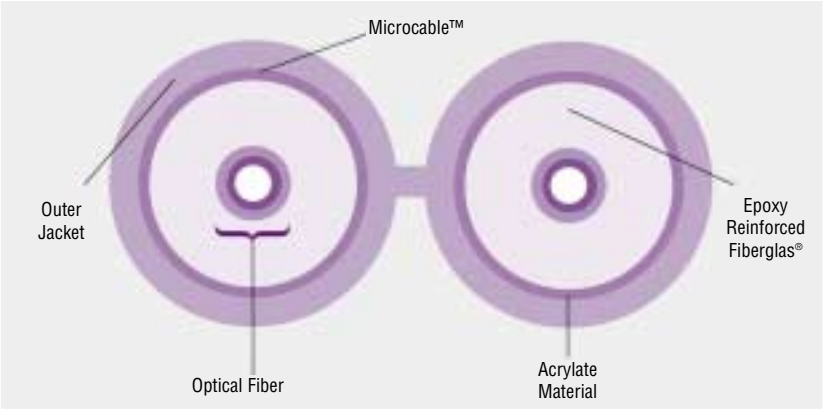
Duplex Optical Fiber Cable

Plenum Rated

Andrew indoor duplex cables combine two Andrew Microcable™ elements in one cable encapsulated in a figure-8 jacket. A plenum rated cable, it is ideally suited to indoor antenna remoting for cellular and PCS systems, in-building applications, and in industrial environments for communication and sensor systems.

Andrew Microcable is a unique product consisting of a single mode or dispersion shifted single mode optical fiber, encased in a reinforcing Fiberglas® epoxy matrix for high tensile strength and crush resistance in a lightweight, compact package. The two single mode or dispersion shifted single mode Microcable elements provide the duplex cable with a tensile strength of 180 lb (81.7 kg) and allow easy and robust ST®, SC, FC, and other connector attachment. The duplex cable is also suitable for riser applications, and can be easily divided into two single cables.

All Andrew fiber optic cables meet strict performance standards, ensuring quality and reliability, and follow in the tradition of HELIAX® and RADIAX® cables, offering the best value for your investment.



Mechanical Characteristics

Cable Type Numbers	**242750-1**	**242750-2**
Number of Fibers	2	2
Fiber Type	Single Mode	Dispersion Shifted Single Mode
Fiber Buffer Type	Tight, Fiberglas® Epoxy	Tight, Fiberglas Epoxy
Fiber Buffer Diameter, in (mm)	0.032 (0.8)	0.032 (0.8)
Cable Diameter, in (mm)	0.095 X 0.180 (2.4 X 4.6)	0.095 X 0.180 (2.4 X 4.6)
Cable Weight, lb/1000 ft (kg/km)	11 (16)	11 (16)
Tensile Strength		
Installation, Short Term, lb (N)	180 (800)	180 (800)
Operational, Long Term, lb (N)	60 (267)	60 (267)
Minimum Bend Radius,		
Installation, Short Term, in (mm)	2 (50)	2 (50)
Operational, Long Term, in (mm)	1.5 (38)	1.5 (38)
Operating Temperature Range, °F (°C)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)
Storage Temperature Range, °F (°C)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
UL Listing	OFNP	OFNP
Jacket Material	PVDF	PVDF
Cable Assembly Type Numbers		
FC/APC	**242761-1**	**242761-5**
FC	**242761-2**	**242761-6**
ST®	**242761-3**	**242761-7**
SC	**242761-4**	**242761-8**

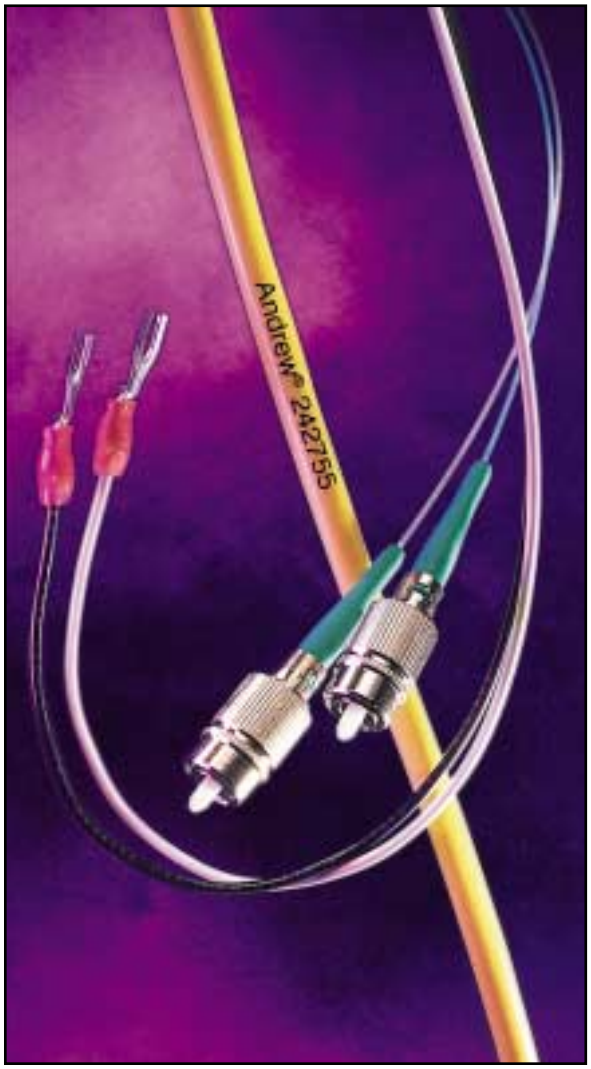
Optical Characteristics

Fiber Type	**Single Mode**	**Dispersion Shifted Single Mode**
Maximum Attenuation at 1310 nm, dB/km	0.5	0.5
Maximum Attenuation at 1550 nm, dB/km	0.6	0.35
Cable Cutoff Wavelength (nm)	<1260	<1260
Mode-Field Diameter at 1310 nm (µm)	9.3 ± 0.5	–
Mode-Field Diameter at 1550 nm (µm)	10.5 ± 1.0	8.1 ± 0.7
Zero Dispersion Wavelength (nm)	1301.5–1321.5	1535–1565
Cladding Diameter (µm)	125.0 ± 1.0	125.0 ± 1.0
Core-Clad Concentricity (µm)	≤0.8	≤0.8
Cladding Non-Circularity (%)	≤1.0	≤1.0
Coating Diameter (µm)	245 ± 10	245 ± 10
FC/APC Maximum Insertion Loss (dB)	0.5	0.5
FC, ST®, SC Maximum Insertion Loss (dB)	0.4	0.4
FC/APC Minimum Return Loss (dB)	60	60
FC, ST, SC Minimum Return Loss (dB)	50	50

ST is a registered trademark of AT&T.

Composite Optical Fiber Cable

Riser Rated

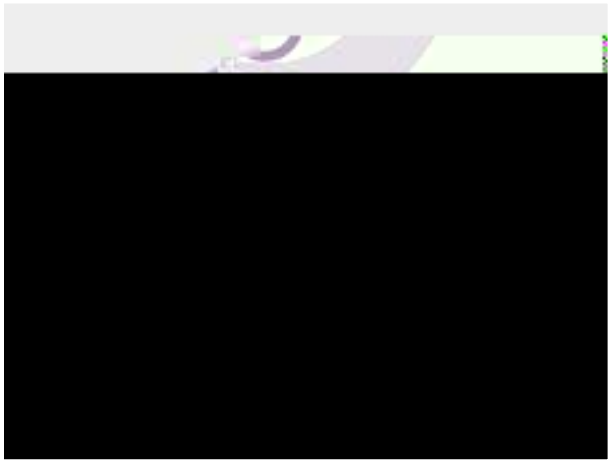


Andrew indoor composite cables combine two Andrew Microcable™ elements with two insulated copper conductors to provide electrical current and fiber optic capability in one cable. This riser rated cable is ideally suited to indoor antenna remoting for cellular and PCS systems and for communication and sensor systems in industrial environments.

Several configurations of composite cable are available, including single mode and dispersion shifted single mode fibers with 18 or 14 AWG copper conductors. Andrew Microcable is a unique product consisting of a single mode or dispersion shifted single mode optical fiber, encased in a reinforcing Fiberglas® epoxy matrix for high tensile strength and crush resistance in a lightweight, compact package. The Microcable elements provide easy and robust connector attachment, while the copper conductors can be terminated with any standard electrical wire termination. A No. 6 spade terminal is installed on the copper conductor in the cable assemblies. A rip cord provides fast and efficient access to the cable's optical and electrical elements.

All Andrew fiber optic cables meet strict performance standards, ensuring quality and reliability, and follow in the tradition of HELIAX® and RADIAX® cables, offering the best value for your investment.

Fiberglas is a registered trademark of Owens-Corning Fiberglas Technology, Inc.



Mechanical Characteristics

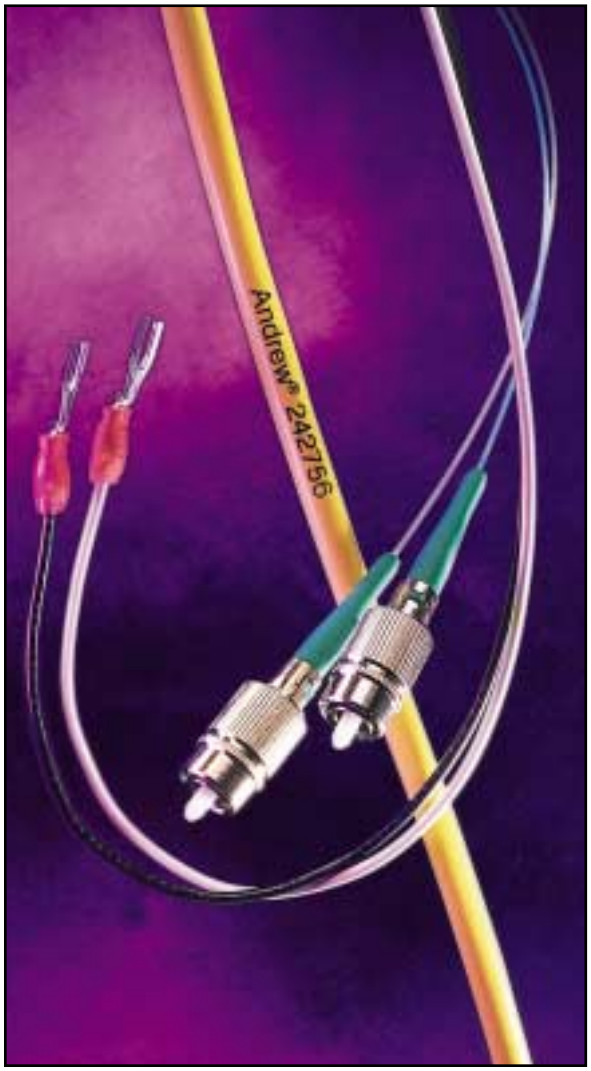
Cable Type Numbers	**242748-1**	**242748-2**	**242748-4**	**242748-5**
Number of Fibers	2	2	2	2
Fiber Type	Single Mode	Single Mode	Dispersion Shifted Single Mode	Dispersion Shifted Single Mode
Fiber Buffer Type	Tight, Fiberglas® Epoxy	Tight, Fiberglas Epoxy	Tight, Fiberglas Epoxy	Tight, Fiberglas Epoxy
Fiber Buffer Diameter, in (mm)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)
Cable Diameter, in (mm)	0.21 (5.3)	0.27 (6.9)	0.21 (5.3)	0.27 (6.9)
Cable Weight, lb/1000 ft (kg/km)	27 (40)	52 (78)	27 (40)	52 (78)
Tensile Strength				
Installation, Short Term, lb (N)	180 (800)	180 (800)	180 (800)	180 (800
Operational, Long Term, lb (N)	60 (267)	60 (267)	60 (267)	60 (267)
Minimum Bend Radius				
Installation, Short Term, in (mm)	4 (100)	5.4 (135)	4 (100)	5.4 (135)
Operational, Long Term, in (mm)	3 (75)	4 (100)	3 (75)	4 (100)
Operating Temperature Range, °F (°C)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)
Storage Temperature Range, °F (°C)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Number of Copper Conductors	2	2	2	2
Copper Conductor, AWG (Stranding)	18 (7 X 26)	14 (41 X 30)	18 (7 X 26)	14 (41 X 30)
Nominal DCR, ohms/1000 ft (ohms/km)	5.86 (19.2)	2.53 (8.30)	5.86 (19.2)	2.53 (8.30)
Nominal Maximum Current (amperes)	10	17	10	17
UL Listing	CL2R-OF	CL2R-OF	CL2R-OF	CL2R-OF
Jacket Material	PVC	PVC	PVC	PVC
Cable Assembly Type Numbers				
FC/APC	**242755-1**	**242757-1**	**242755-5**	**242757-5**
FC	**242755-2**	**242757-2**	**242755-6**	**242757-6**
ST®	**242755-3**	**242757-3**	**242755-7**	**242757-7**
SC	**242755-4**	**242757-4**	**242755-8**	**242757-8**

Optical Characteristics

Fiber Type	**Single Mode**	**Dispersion Shifted Single Mode**
Maximum Attenuation at 1310 nm, dB/km	0.5	0.5
Maximum Attenuation at 1550 nm, dB/km	0.6	0.35
Cable Cutoff Wavelength (nm)	<1260	<1260
Mode-Field Diameter at 1310 nm (µm)	9.3 ± 0.5	–
Mode-Field Diameter at 1550 nm (µm)	10.5 ± 1.0	8.1 ± 0.7
Zero Dispersion Wavelength (nm)	1301.5–1321.5	1535–1565
Cladding Diameter (µm)	125.0 ± 1.0	125.0 ± 1.0
Core-Clad Concentricity (µm)	≤0.8	≤0.8
Cladding Non-Circularity (%)	≤1.0	≤1.0
Coating Diameter (µm)	245 ± 10	245 ± 10
FC/APC Maximum Insertion Loss (dB)	0.5	0.5
FC, ST®, SC Maximum Insertion Loss (dB)	0.4	0.4
FC/APC Minimum Return Loss (dB)	60	60
FC, ST, SC Minimum Return Loss (dB)	50	50

Composite Optical Fiber Cable

Plenum Rated



Andrew indoor composite cables combine two Andrew Microcable™ elements with two insulated copper conductors to provide electrical current and fiber optic capability in one cable. This plenum rated cable is ideally suited to indoor antenna remoting for cellular and PCS systems and for communication and sensor systems in industrial environments.

Several configurations of composite cable are available, including single mode and dispersion shifted single mode fibers with 18 or 14 AWG copper conductors. Andrew Microcable is a unique product consisting of a single mode or dispersion shifted single mode optical fiber, encased in a reinforcing Fiberglas® epoxy matrix for high tensile strength and crush resistance in a lightweight, compact package. The Microcable elements provide easy and robust connector attachment, while the copper conductors can be terminated with any standard electrical wire termination. A No. 6 spade terminal is installed on the copper conductor in the cable assemblies. A rip cord provides fast and efficient access to the cable's optical and electrical elements.

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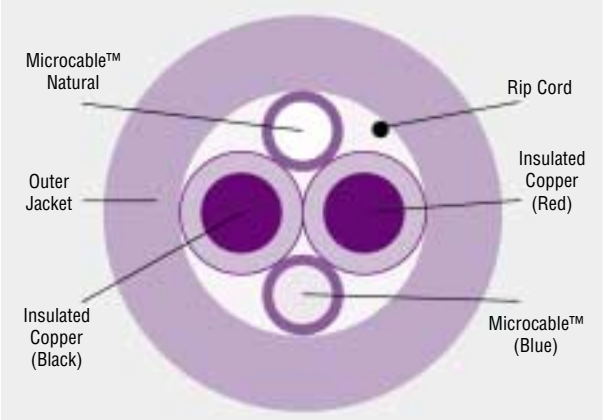


Mechanical Characteristics

Cable Type Numbers	**242749-1**	**242749-2**	**242749-4**	**242749-5**
Number of Fibers	2	2	2	2
Fiber Type	Single Mode	Single Mode	Dispersion Shifted Single Mode	Dispersion Shifted Single Mode
Fiber Buffer Type	Tight, Fiberglas® Epoxy	Tight, Fiberglas Epoxy	Tight, Fiberglas Epoxy	Tight, Fiberglas Epoxy
Fiber Buffer Diameter, in (mm)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)
Cable Diameter, in (mm)	0.21 (5.3)	0.27 (6.9)	0.21 (5.3)	0.27 (6.9)
Cable Weight, lb/1000 ft (kg/km)	27 (40)	52 (78)	27 (40)	52 (78)
Tensile Strength				
Installation, Short Term, lb (N)	180 (800)	180 (800)	180 (800)	180 (800)
Operational, Long Term, lb (N)	60 (267)	60 (267)	60 (267)	60 (267)
Minimum Bend Radius				
Installation, Short Term, in (mm)	4 (100)	5.4 (135)	4 (100)	5.4 (135)
Operational, Long Term, in (mm)	3 (75)	4 (100)	3 (75)	4 (100)
Operating Temperature Range, °F (°C)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)
Storage Temperature Range, °F (°C)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Number of Copper Conductors	2	2	2	2
Copper Conductor, AWG (Stranding)	18 (7 X 26)	14 (41 X 30)	18 (7 X 26)	14 (41 X 30)
Nominal DCR, ohms/1000 ft (ohms/km)	5.86 (19.2)	2.53 (8.30)	5.86 (19.2)	2.53 (8.30)
Nominal Maximum Current (amperes)	10	17	10	17
UL Listing	CL2R-OF	CL2R-OF	CL2R-OF	CL2R-OF
Jacket Material	PVDF	PVDF	PVDF	PVDF
Cable Assembly Type Numbers				
FC/APC	**242756-1**	**242758-1**	**242756-5**	**242758-5**
FC	**242756-2**	**242758-2**	**242756-6**	**242758-6**
ST®	**242756-3**	**242758-3**	**242756-7**	**242758-7**
SC	**242756-4**	**242758-4**	**242756-8**	**242758-8**

Optical Characteristics

Fiber Type	**Single Mode**	**Dispersion Shifted Single Mode**
Maximum Attenuation at 1310 nm, dB/km	0.5	0.5
Maximum Attenuation at 1550 nm, dB/km	0.6	0.35
Cable Cutoff Wavelength (nm)	<1260	<1260
Mode-Field Diameter at 1310 nm (µm)	9.3 ± 0.5	–
Mode-Field Diameter at 1550 nm (µm)	10.5 ± 1.0	8.1 ± 0.7
Zero Dispersion Wavelength (nm)	1301.5–1321.5	1535–1565
Cladding Diameter (µm)	125.0 ± 1.0	125.0 ± 1.0
Core-Clad Concentricity (µm)	≤0.8	≤0.8
Cladding Non-Circularity (%)	≤1.0	≤1.0
Coating Diameter (µm)	245 ± 10	245 ± 10
FC/APC Maximum Insertion Loss (dB)	0.5	0.5
FC, ST®, SC Maximum Insertion Loss (dB)	0.4	0.4
FC/APC Minimum Return Loss (dB)	60	60
FC, ST, SC Minimum Return Loss (dB)	50	50

Composite Optical Fiber Cable

Outdoor Rated

Outdoor composite cables from Andrew Corporation combine one to six optical fibers with two insulated copper conductors to provide electrical and fiber optic capability in one cable. This cable can be terminated with standard optical and electrical connectors in a variety of lengths to provide cable assemblies. These outdoor products are ideally suited to outdoor antenna remoting for cellular, PCS, VSAT, and SATCOM systems, and for communication, process control, and sensors in industrial environments.

The cable consists of a central gel-filled, water-blocked, loose buffer tube flanked by two parallel insulated 18- or 10-gauge stranded copper conductors. Each buffer tube contains one to six color-coded single mode optical fibers. Two rip cords provide fast and efficient access to the cable's optical and electrical elements. The copper conductors, buffer tube, and rip cords are surrounded by a water blocking tape that provides longitudinal water blocking. The entire core, along with a GRP strength member on either side, is surrounded by a UV stabilized polyethylene jacket.

Several configurations of composite cable and assemblies are available, all using single mode optical fiber. The optical fibers provide easy and robust FC/APC, ST®, SC, FC, and other connector attachment, while the copper conductors can be terminated with any standard electrical wire termination.

All Andrew fiber optic cables meet strict performance standards, ensuring quality and reliability, and follow in the tradition of HELIAX® and RADIAX® cables, offering the best value for your investment.

ST is a registered trademark of AT&T.

Mechanical Characteristics

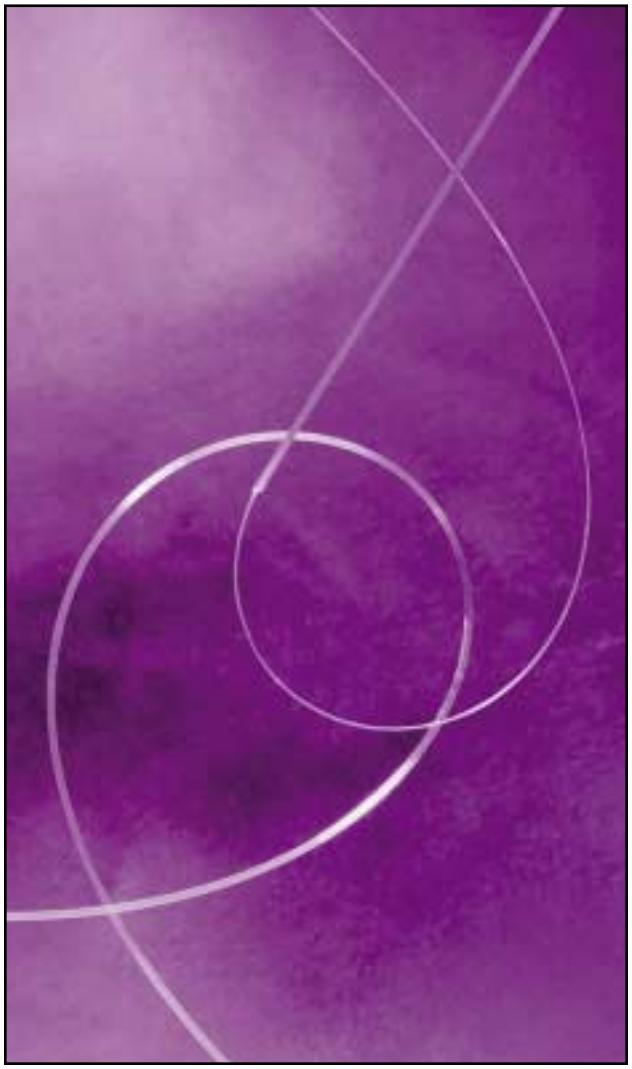
Cable Type Numbers	**242949-(*)**	**242951-(*)**	**242953-(*)**
Number of Fibers	1,2,4 or 6	1,2,4 or 6	1,2,4 or 6
Fiber Type	Single Mode	Single Mode	Single Mode
Fiber Buffer Type	Loose, Gel Filled	Loose, Gel Filled	Loose, Gel Filled
Fiber Buffer Diameter, in (mm)	0.118 (3.0)	0.118 (3.0)	0.118 (3.0)
Cable Diameter, in (mm)	0.30 X 0.62 (7.6 X 15.7)	0.30 X 0.62 (7.6 X 15.7)	0.24 X 0.45 (6.1 X 11.4)
Cable Weight, lb/1000 ft (kg/km)	78 (116)	140 (209)	42 (61)
Tensile Strength			
Installation, Short Term, lb (N)	500 (2200)	600 (2700)	400 (1800)
Operational, Long Term, lb (N)	112 (500)	135 (600)	90 (400)
Minimum Bend Radius			
Installation, Short Term, in (mm)	6 (150)	6 (150)	5 (125)
Operational, Long Term, in (mm)	4.5 (115)	4.5 (115)	3.6 (90)
Operating Temperature Range, °F (°C)	-40 to 140 (-40 to 60)	-40 to 185 (-40 to 85)	-40 to 140 (-40 to 60)
Storage Temperature Range, °F (°C)	-40 to 140 (-40 to 60)	-40 to 185 (-40 to 85)	-40 to 140 (-40 to 60)
Number of Copper Conductors	2	2	0
Copper Conductor, AWG (Stranding)	18 (7 X 26)	10 (105 X 30)	–
Nominal DCR, ohms/1000 ft (ohms/km)	5.86 (19.2)	.99 (3.24)	–
Nominal Maximum Current (amperes)	10	25	–
Jacket Material	LLDPE	HDPE	LLDPE
Cable Assembly Type Numbers			
FC/APC	**242950-(*)1**	**242952-(*)1**	**242954-(*)1**
FC	**242950-(*)2**	**242952-(*)2**	**242954-(*)2**
ST®	**242950-(*)3**	**242952-(*)3**	**242954-(*)3**
SC	**242950-(*)4**	**242952-(*)4**	**242954-(*)4**

* Please specify number of fibers 1, 2, 4 or 6. ST is a registered trademark of AT&T.

Optical Characteristics

Fiber Type	**Single Mode**
Maximum Attenuation at 1310 nm, dB/km	0.45
Maximum Attenuation at 1550 nm, dB/km	0.35
Cable Cutoff Wavelength (nm)	<1260
Mode-Field Diameter at 1310 nm (µm)	9.3 ± 0.5
Mode-Field Diameter at 1550 nm (µm)	10.5 ± 1.0
Zero Dispersion Wavelength (nm)	1301.5–1321.5
Cladding Diameter (µm)	125.0 ± 1.0
Core-Clad Concentricity (µm)	≤0.8
Cladding Non-Circularity (%)	≤1.0
Coating Diameter (µm)	245 ± 10
FC/APC Maximum Insertion Loss (dB)	0.5
FC, ST®, SC Maximum Insertion Loss (dB)	0.4
FC/APC Minimum Return Loss (dB)	60
FC, ST, SC Minimum Return Loss (dB)	50

Ruggedized Microcable™ Tether Cable

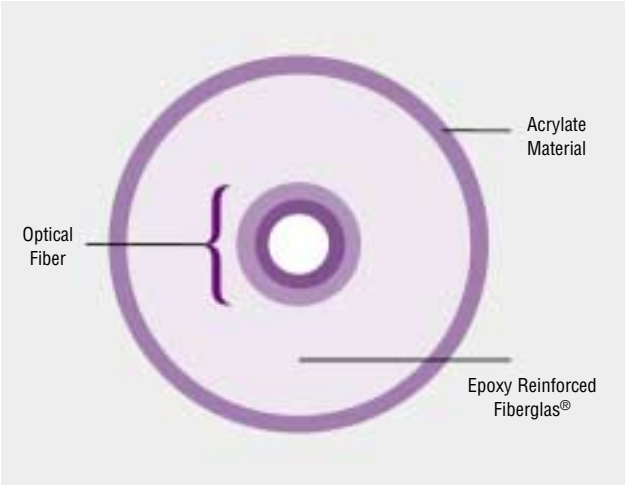


Andrew ruggedized Microcable™ tether cable is a high quality cable available at low cost, making it ideal for expendable applications. A lightweight and durable optical data link, it is intended for use in both wet and dry locations within moderate temperature ranges. Continuous lengths range from a few meters up to 20,000 meters.

The Microcable tether cable is ideal for use as a patch cord with ST®, SC, FC, and other connectors, and can be used as a fiber optic element in various all-fiber or composite cable configurations. Andrew Microcable is a unique product consisting of a single mode or dispersion shifted single mode optical fiber, encased in a reinforcing Fiberglas® epoxy matrix for high tensile strength and crush resistance in a lightweight, compact package.

All Andrew fiber optic cables meet strict performance standards, ensuring quality and reliability, and follow in the tradition of HELIAX® and RADIAX® cables, offering the best value for your investment.

Fiberglas is a registered trademark of Owens-Corning Fiberglas Technology, Inc.
ST is a registered trademark of AT&T.



Mechanical Characteristics

Cable Type Numbers	241106-3*	241106-4	241106-5	241106-6
Number of Fibers	1	1	1	1
Fiber Type	Dispersion Shifted Single Mode	Multimode	Single Mode	Dispersion Shifted Single Mode
Fiber Buffer Type	Tight, Fiberglas® Epoxy	Tight, Fiberglas Epoxy	Tight, Fiberglas Epoxy	Tight, Fiberglas Epoxy
Fiber Buffer Diameter, in (mm)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)
Cable Diameter, in (mm)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)	0.032 (0.8)
Cable Weight, lb/1000 ft (kg/km)	0.61 (0.9)	0.61 (0.9)	0.61 (0.9)	0.61 (0.9)
Tensile Strength Ultimate, lb (N) Working, lb (N)	 90 (400) 30 (133)	 60 (266) 20 (89)	 90 (400) 30 (133)	 80 (355) 30 (133)
Minimum Bend Radius Working, in (mm)	 0.7 (18)	 1.5 (38)	 0.7 (18)	 0.7 (18)
Operating Temperature Range, °F (°C)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)
Storage Temperature Range, °F (°C)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Crush Resistance, ft•lb/in (N/cm)	12.5 (22)	10 (17)	12.5 (22)	12.5 (22)
Hydrostatic Pressure Resistance, lb/in2 (kPa)	5000 (34,500)	–	–	5000 (34,500)
Specific Gravity	1.74	1.74	1.74	1.74

* Product complies with NOSC Specification 946-0004-91, 3 Feb 1992.

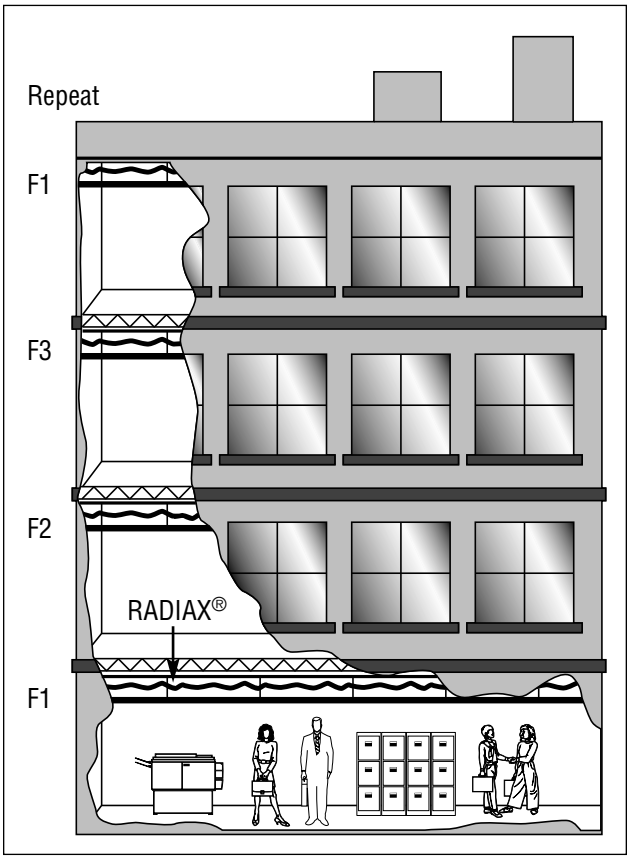
Optical Characteristics

Fiber Type	Single Mode	Dispersion Shifted Single Mode	Multimode
Maximum Attenuation at 850 nm, dB/km	–	–	5.0
Maximum Attenuation at 1300 nm, dB/km	–	–	1.75
Maximum Attenuation at 1310 nm, dB/km	0.5	0.5 (0.4*)	–
Maximum Attenuation at 1550 nm, dB/km	0.6	0.35 (0.25*)	–
Minimum Bandwidth at 850 nm (MHz•km)	–	–	160
Minimum Bandwidth at 1300 nm (MHz•km)	–	–	500
Cable Cutoff Wavelength (nm)	<1260	<1260	–
Core Diameter (µm)	–	–	62.5 ± 3.0
Core Non-Circularity (%)	–	–	≤5.0
Mode-Field Diameter at 1310 nm (µm)	9.3 ± 0.5	–	–
Mode-Field Diameter at 1550 nm (µm)	10.5 ± 1.0	8.1 ± 0.7	–
Zero Dispersion Wavelength (nm)	1301.5–1321.5	1535–1565	1332–1354
Cladding Diameter (µm)	125.0 ± 1.0	125.0 ± 1.0	125.0 ± 2.0
Core-Clad Concentricity (µm)	≤0.8	≤0.8	≤3.0
Cladding Non-Circularity (%)	≤1.0	≤1.0	≤2.0
Numerical Aperture	–	–	0.275 ± 0.015
Coating Diameter (µm)	245 ± 10	245 ± 10	245 ± 10

* Specification applies to product 241106-3 only.

Distributed Communications Systems

Index

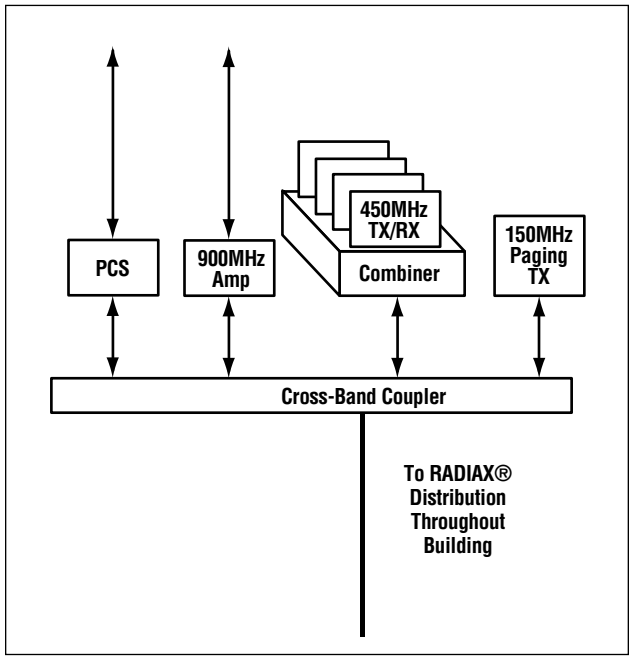


Frequency re-use scheme with RADIAX® Cable

RADIAX® Wireless Solutions

RADIAX slotted coaxial cables solve wireless communication problems in confined areas, such as buildings and tunnels, functioning as a continuous distributed antenna. RADIAX is a coaxial cable with carefully controlled slots in the outer conductor which allows RF signals to be coupled from and into the cable uniformly along the entire length of the cable.

RADIAX is simple to use and easy to install. Simply mount it wherever coverage is required. Our new Flat Strip RADIAX on page 655 helps to make in-building installations quicker and easier than ever before.



Multiple Service Distribution

RADIAX® Cable Benefits

Uniform Coverage

RADIAX cable gives the radio systems engineer the ability to distribute the available signal power uniformly throughout the area to be covered, eliminating the hot-spots caused by antennas. A good analogy is the difference between a fluorescent light bulb and a spot light. The fluorescent bulb (RADIAX cable) evenly distributes the available candlepower along its length while the spotlight (antenna) radiates the same candlepower from a point source.

Multiple Services

RADIAX RXL series cables are broadband by design which enables them to operate from AM (500 kHz) to cellular to wireless LAN (2.4 GHz) and beyond. Multiple services can be employed on a single RADIAX cable system, eliminating the need for individual cables and antennas for each required frequency band. Examples of systems employing multiple services include the MTRC in Hong Kong (200/800/900 MHz) and the Ville Marie Road Tunnel in Montreal, Canada (450/800 MHz).

New Radiating Mode (RCT Series) Cables

Andrew is proud to introduce the new RCT series of RADIAX cables. The new series is optimized for specific frequency bands and operates in the “radiating mode” (the RXL series operates in the “coupled mode”).

RADIAX® Cable and In-Building Systems

General

RADIAX cable is an excellent tool for communications in buildings where the potential for RF blockage of point-source antennas due to obstructions is high and where multiple services such as cellular, PCS, paging, and safety/emergency communications are required. RADIAX cable has been tested and proven effective in building environments for all current modulation schemes, from narrow-band FM to digital GSM to CDMA.

Small cables that meet stringent fire safety codes and are flexible enough to bend around corners and over walls, such as the RXP4 and RXL4-1RNT1 series, are generally used in these environments. Methods of using RADIAX are outlined below.

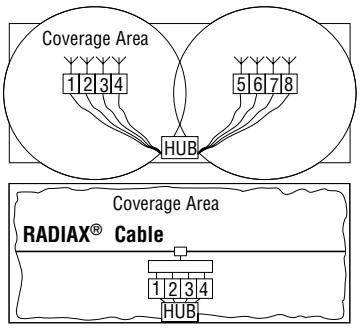
RADIAX Backbone

Since RADIAX cable can be a distributed antenna for multiple frequency bands, its use as a backbone solution for multiple services can be very enticing. For example, consider a building under construction, where a RADIAX antenna system is installed throughout. Attached to this, either in the center or at one end, is a combining network consisting of cross-band couplers.

What has been created is a multi-service highway for wireless services, allowing their distribution throughout the building. Filtering in the combining network prevents interference from one service to another.

It is feasible that a system could carry, for example, 450 MHz emergency services (fire, police etc), 800 MHz cellular, 900 MHz ISM Wireless LAN, and 1900 MHz PCS services all over the same backbone RADIAX antenna. Of course, care must be exercised when combining multiple carrier/multiple band services to prevent the generation of unwanted intermodulation distortion. But there are systems of this kind, using RADIAX cable, in reliable service today.

Trunking Efficiency of RADIAX Cable



Trunking Efficiencies

Many wireless telephone systems use multiple base stations with discrete antenna connections to provide RF coverage. Typically, these base stations can accommodate one-to-four channels and have a limited radius of coverage. Thus, to accommodate multiple areas of coverage and traffic flow (for example, lunchtime at the cafeteria), an excess number of base stations may be required at significant additional expense. RADIAX eliminates the need for additional base stations by combining all base stations at one location and allowing the cable to provide full coverage.

Underground Systems

RADIAX cable was developed with tunnels in mind. Long, narrow corridors require the continous coverage RADIAX provides.

The world's metros have long used RADIAX cables for communications to fill the need for efficient RF coverage with emergency services. As commercial services become more prevalent, the desire to extend cellular, paging, and PCS into metros becomes a challenge due to the minimal amount of space available to expand within the tunnels. The wideband nature of RADIAX solves this problem by permitting multiple services to be provided over a single or dual-cable system. Andrew has successfully demonstrated multiple services on its radiating mode and coupled mode RADIAX in a multitude of road and rail systems, such as the Hong Kong Metro Transit and the Vienna, Austria Metro.

Wireless LANs

Some of the inherent benefits of RADIAX cable particularly for containment and uniform coverage, lend themselves well to the architecture required for wireless local area networks. LANs are usually arranged in sub-nets, smaller groups of users that are formed within the total user environment, all ultimately connected to the same network.

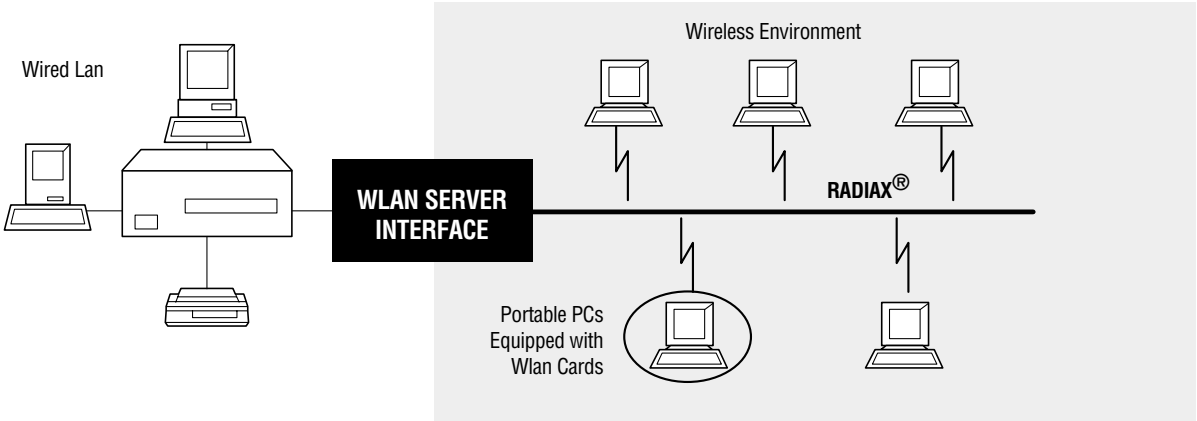
This topology improves the efficiency of data transfer times as opposed to every user operating from the same network server.

RADIAX cable provides a convenient means of segregating these groups, by customizing the coverage. This is demonstrated below, in a simple WLAN/RADIAX scheme.

Because the RADIAX cable coverage is tailored to the specific area, interference between sub-nets and other WLAN networks is minimized. A multiple point-source antenna configuration would suffer the same hot-spots described previously, increasing the chances for interference.

Wireless LAN applications in hospitals use RADIAX to transmit patient information to laptop computers via 900 MHz and 2.4 GHz unlicensed bands. Nurses record and store information on the LAN directly via the wireless network, eliminating the need for multiple chart records.

The continous coverage and insensitivity to shadowing/blockage make RADIAX an excellent choice for RF distribution in warehouses that use wireless data terminals for stock control, where changes in stock levels and shelving configurations can have a dramatic effect on the placement of point source antennas.



RADIAX® Cable Types

Fire Retardant
RNT1 Suffix

Fire Retardant
RN Suffix

Radiating Mode Series (RCT)

This new series of RADIAX cable is designed for single or dual-band RF systems. Radiating mode series RADIAX cable is made from a foil wrapped outer conductor over a low-density-foam covering the inner conductor. The cable has specific slots punched in the outer conductor, which launch specific bands from the cable. RCT series cable is designed for specific applications, where minimal bands are required in the overall system. It is ideally suited for single or dual-band systems containing the following bands: TETRA, Cellular, GSM, PCN, PCS, UMTS/3 Generation, and Spread Spectrum. Since the cable is optimized for specific bands, it offers improved RF link performance, compared with coupled mode cables. Another benefit of this cable is its ability to pass wide band channels, such as video and high-rate data. RCT series cable is successfully used in tunnels, metros, and outdoor environments.

Applications:

- *Single or Multiband Systems*
- *Tunnels, Buildings*
- *Outdoors*
- *TETRA, Cellular, GSM, PCN, PCS, UMTS*
- *High Rate Data, Spread Spectrum*

Coupled Mode Series (RXL)

Based on the familiar HELIAX® coaxial cable, coupled mode RADIAX cable is made from corrugated, welded copper outer conductor over a low-density foam covering the inner conductor. Holes milled in the corrugation peaks of the outer conductor produce the radiation from the cable. RXL series cable is designed for applications that require multiple RF bands. It is designed to handle frequency bands from 50 MHz to 2.4 GHz. RXL series cable is successfully used in tunnels, metros, and outdoor environments.

Applications:

- *Multiband Systems*
- *Tunnels, Buildings*
- *Outdoors*
- *AM to WLAN Bands*

Plenum Series

Based on the familiar HELIAX® coaxial cable, Plenum RADIAX cable is made from a corrugated, welded outer conductor with holes milled in its peaks to produce the radiation from the cable. In order to meet the strict Steiner Tunnel test (UL 910), high temperature materials, called Fluoro Ethyl Polymers (FEPs), are required. To keep cost at a minimum, Andrew Plenum cables utilize a tubular FEP spacer to support the outer conductor about the inner. This improves the electrical performance and minimizes the use of CFC producing materials during manufacturing. This cable is designed specifically for in-building applications where fire codes mandate plenum-rated, fire-retardant cables.

Plenum Rated
RXP Series

Applications:

- *Multiband Systems*
- *Buildings*
- *Mines*

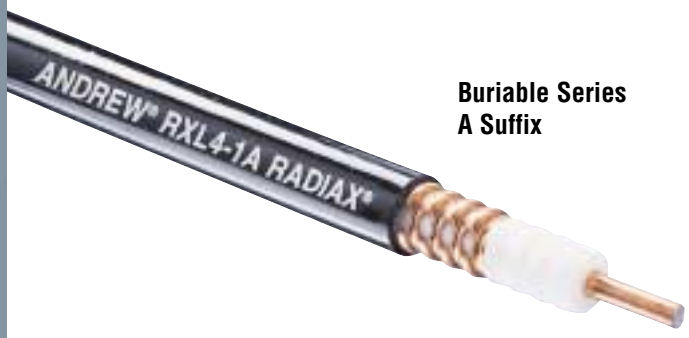
Flat Strip Series

This new series of RADIAX cable is designed specifically for the in-building market to reduce the cost of installation. The cable utilizes a unique peel-and-stick design, which contains a copper foil conductor attached to a low-density foam dielectric. Flat strip series also utilizes solderless, quick-fit connectors to speed the installation. The cable has an unobtrusive design, which allows mounting below false ceilings or other visible areas. This unique design can lead to 25-45 percent cost savings, while providing the superior electrical performance associated with RADIAX cables. Flatstrip series cables are available in flame retardant and non-halogen flame retardant versions.

Applications:

- *Multiband Systems*
- *Buildings*

RADIAX® Levels of Fire Retardancy



Buriable Series
A Suffix

Outdoor Series
AX Suffix

Six Cable Versions with Five Levels of Fire Retardant Properties

Buriable Series, A Suffix (Not Fire Retardant). This is the standard version of RADIAX radiating cable to be used when the cable will be buried and fire retardant properties are not required. The jacketing is UV stabilized and halogen free.

Outdoor Series, AX Suffix (Not Fire Retardant). This is also the standard version of RADIAX radiating cable but it is used when the cable will be installed outdoors (not buried) and fire retardant properties are not required. The jacketing is UV stabilized and halogen free.

Fire Retardant, RNT1 Suffix. These cables meet fire retardancy requirements of UL, NEC , IEC, and IEEE. They also meet Naval Engineering Standards (NES) requirements for low smoke and low toxicity levels, and have a non-halogenated jacket.

Fire Retardant, RNT Suffix. These cables also meet fire retardancy requirements of UL, NEC, IEC, and IEEE but pass the more stringent qualifications. They also meet NES requirements for low smoke and low toxicity levels, and have a non-halogenated jacket.

Fire Retardant, RN Suffix. These cables meet less stringent fire retardancy requirements than the RNT1 or RNT series above but meet NES requirements for low smoke and low toxicity levels, and have a non-halogenated jacket.

Plenum Rated RXP Series. These cables meet the highest level of fire retardancy in the National Electric Code and are used where fire codes require a plenum rated cable.

Buriable Series
(Not Fire Retardant), A Suffix

The Buriable series is used in applications where the cable will be buried and fire retardant properties are not required.

Flooding Compound is a petroleum based gel applied to the outer conductor of the cable. It keeps moisture from entering through the slots if the jacket is punctured during or after burial.

Jacket. The cable is protected by a polyethylene jacket that is black in color.

Outdoor Series
(Not Fire Retardant), AX Suffix

The outdoor series is used in outdoor applications where the cable will not be buried (outdoor series does not include flooding compound) and fire retardant properties are not required.

Jacket. The cable is protected by a polyethylene jacket that is black in color.

Note: All A and AX Suffix cables have standard **Black** jacketing. All RN, RNT1, and RNT cables have standard **Gray** megalon jacketing. RN, RNT1, and RNT cables are available with **Black** megalon on special request.

Fire Retardant, RNT1 Suffix

The RNT1 series have been tested and meet fire retardancy requirements of UL, NEC, IEC, and IEEE shown below.

Test / NEC Category	Description
IEC 332-3C	Vertical Bunched Cable Test
IEC 332-1	Vertical Single Cable Test
UL 1581 / CATV	Vertical Tray Flame Test
IEEE 383	Vertical Tray Flame Test
UL VW1 / CATVX	Vertical Wire Flame Test

Non-Halogenated Fire Retardant Jacket. The non-halogenated jacket is made of a non-halogenated formulation which meets the fire retardancy requirements described above and is gray in color for easy identification. It also meets the following requirements of Naval Engineering Standards for low smoke and low toxicity levels.

Standard	Description	Level
NES 711	Smoke Index Test	50-55
NES 713	Toxicity Index Test	0.5

Barrier Tape. RNT1 suffix cables include a single mica barrier tape under the jacketing. The tape is an inert material that does not burn or melt. In the event of a fire, the tape prevents molten dielectric material from flowing out of the slots and igniting.

Fire Retardant
RNT1 Suffix

Fire Retardant, RNT Suffix

The RNT series have been tested and meet fire retardancy requirements of UL, NEC, IEC, and IEEE shown below.

Test / NEC Category	Descrlption
IEC 332-3C	Vertical Bunched Cable Test
IEC 332-1	Vertical Single Cable Test
UL 1666 / CATVR	Riser Cable Test
UL 1581 / CATV	Vertical Tray Flame Test
IEEE 383	Vertical Tray Flame Test
UL VW1 / CATVX	Vertical Wire Flame Test

Non-Halogenated Fire Retardant Jacket. The non-halogenated jacket is made of a non-halogenated formulation which meets the fire retardancy requirements described above and is gray in color for easy identification. It also meets the following requirements of Naval Engineering Standards for low smoke and low toxicity levels.

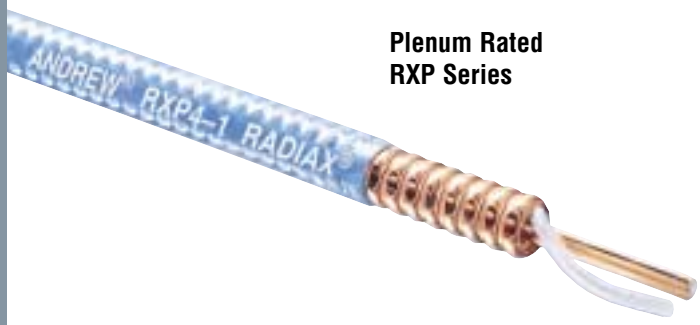
Standard	Description	Level
NES 711	Smoke Index Test	50-55
NES 713	Toxicity Index Test	0.5

Fire Retardant
RNT Suffix

Barrier Tape. RNT suffix cables include a double mica barrier tape under the jacketing. This gives additional protection over the RNT1 suffix type cables. The tape is an inert material that does not burn or melt. In the event of a fire, the tape prevents molten dielectric material from flowing out of the slots and igniting.

RADIAX® Levels of Fire Retardancy

Fire Retardant
RN Suffix



Plenum Rated
RXP Series

Fire Retardant, RN Suffix

The RN suffix RADIAX radiating cables make use of the fire retardant non-halogenated jacket. They are similar in construction to the RNT1 and RNT series cables but do not include the mica barrier tape and do not meet the most stringent NEC or UL fire retardancy requirements. Shown below are the fire retardant codes that RN suffix cables do meet.

Test / NEC Category	Description
IEC 332-1	Vertical Single Cable Test
UL VW1 / CATVX	Vertical Wire Flame Test

Non-Halogenated Fire Retardant Jacket. Like the RNT1 and RNT cables, the non-halogenated jacket is made of a non-halogenated formulation which meets the fire retardancy requirements described above and is gray in color for easy identification. It also meets the following requirements of Naval Engineering Standards for low smoke and low toxicity levels.

Standard	Description	Level
NES 711	Smoke Index Test	50-55
NES 713	Toxicity Index Test	0.5

Plenum Rated, RXP Series

RADIAX radiating cables are used in applications where fire codes require plenum rated fire retardant cables. They have been tested and meet the following requirements of the Underwriters' Laboratories, Inc. (UL) and the National Electric Code (NEC). Jacketing is only available in blue.

Test / NEC Category	Description
UL 910 / CATVP	Steiner Tunnel Test

The Steiner Tunnel Test is the highest level of fire retardancy in the National Electric Code. Therefore, cables meeting this requirement can also be used in the following lower level categories.

Test I NEC Category	Description
UL 1666 / CATVR	Riser Cable Test
UL 1581 / CATV	Vertical Tray Flame Test
UL VW1 / CATVX	Vertical Wire Flame Test

RXP cables also meet the fire retardancy requirements of the International Electrical Code - IEC-332-2 and the Institute Of Electrical and Electronic Engineers - IEEE 383.

High Temperature Materials are utilized for both the air dielectric section and the jacket. For the air dielectric section, it is a high temperature fluorocarbon material with a melting point in excess of 200°C (392°F). For the jacket, a fluoropolymer material suitable for temperatures up to 150°C (302°F) is used. Together, they provide the capability to meet the fire retardancy and low level smoke requirements of the Steiner Tunnel Test.

Both the fluorocarbon air dielectric section and the fluoropolymer jacket use halogenated formulations. While these formulations exhibit higher toxicity levels than non-halogenated formulations, the halogenated formulation is needed in order to meet the fire retardancy and low smoke requirements of the Steiner Tunnel Test. These cables are easily identifiable by their blue color.

Exposure to Sunlight. While the fire retardant jackets have a UV stabilizer added to the jacketing material, it is not recommended that these cables be stored or installed where they will be exposed to direct sunlight for an extended period of time.

RCT Radiating Mode Series RADIAX® Cables

RADIAX® cables are identified by an alpha-numeric type numbering system as described below.

Example:

RCT 5 - LTC - 1- RN

RN **Indicates the level of fire retardancy**

Options:

AX	For outdoor installations with no fire retardant properties
RN	Fire retardant, Low Smoke and Fume (LSF), halogen free
RNT1	Fire retardant, Low Smoke and Fume (LSF), halogen free with single mica tape
RNT	Fire retardant, Low Smoke and Fume (LSF), halogen free with double mica tape

NOTE: See pages 656-658 for details regarding the various fire retardant jackets.

1 **Represents the version released**

LTC **Indicates the frequency bands that the cable is intended for use in**

L	Low Band (70-300 MHz)
T	TETRA Band (300-500 MHz)
C	Cellular/GSM Band (800-1000 MHz)
P	PCN/PCS Bands (1700-2000 MHz)
U	UMTS/3G Bands (2000-2300 MHz)
S	Spread Spectrum Band (2300-2400 MHz)

5 **Indicates cable nominal size, excluding the jacket**

Size Indicator:

5	7/8" (22.2 mm)
6	1-1/4" (31.8 mm)
7	1-5/8" (41.3 mm)

RCT **Indicates the type of RADIAX cable (Radiating Mode)**

Alpha-Numeric
Type Number Identification

RXL Coupled Mode Series and RXP (Plenum Rated Series) RADIAX® Cables

RADIAX® cables are identified by an alpha-numeric type numbering system as described below.

Example:

RXL 6 - 1 RNT

RNT **Indicates the level of fire retardancy**

Options:

A	Buriable with no fire retardant properties, halogen free
AX	For outdoor installations with no fire retardant properties, halogen free
RN	Fire retardant, Low Smoke and Fume (LSF), halogen free
RNT1	Fire retardant, Low Smoke and Fume (LSF), halogen free with single mica tape
RNT	Fire retardant, Low Smoke and Fume (LSF), halogen free with double mica tape

NOTE: See pages 656-658 for details regarding the various fire retardant jackets.

1 **Indicates radiated signal level**

Options:

1	Standard coupling loss and attenuation
2	Stronger coupling loss and higher attenuation
3	Strongest coupling loss and highest attenuation

NOTE: Not all cable types are available as -2 or -3

Cables of a certain size can be designed to radiate higher or lower levels by changing the dimension of the slots in the outer conductor. 1/2" RXL4 cables are available in -1, -2, or -3 grades; the -1 has the smallest slots and therefore couples less while the -3 has the biggest slots. When designing systems using radiating cables, it is important to note that while the cables with the larger slots couple a higher amount of energy, their attenuation is also higher.

6 **Indicates cable nominal size, excluding the jacket**

Size Indicator:

1	1/4" (6.4 mm)
2	3/8" (9.5 mm)
4	1/2" (12.7 mm)
5	7/8" (22.2 mm)
6	1-1/4" (31.8 mm)
7	1-5/8" (41.3 mm)

RXL **Indicates the type of RADIAX cable**

Options:

RXL	Coupled Mode Series
RXP	Plenum Rated Coupled Mode Series

Radiating Mode Cables
RCT Series

	Nominal Size				
Cable Types	**7/8"**	**1-1/4"**	**1-5/8"**	**7/8"**	**1 -5/8"**
Standard Jacketing, Not Buriable, Not Fire Retardant	**RCT5-LTC-1-AX**	**RCT6-LTC-1-AX**	**RCT7-LTC-1-AX**	**RCT5-LT-1-AX**	**RCT7-TC-1-AX**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1)	**RCT5-LTC-1-RN**	**RCT6-LTC-1-RN**	**RCT7-LTC-1-RN**	**RCT5-LT-1-RN**	**RCT7-TC-1-RN**
"Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323)"	**RCT5-LTC-1-RNT1**	**RCT6-LTC-1-RNT1**	**RCT7-LTC-1-RNT1**	**RCT5-LT-1-RNT1**	**RCT7-TC-1-RNT1**
"Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323, UL1600 Compliant)"	**RCT5-LTC-1-RNT**	**RCT6-LTC-1-RNT**	**RCT7-LTC-1-RNT**	**RCT5-LT-1-RNT**	**RCT7-TC-1-RNT**
Electrical Characteristics					
Impedance, ohms	50	50	50	50	50
Velocity, percent	88	89	88	88	88
Typical VSWR	1.3	1.3	1.3	1.3	1.3
75 MHz					
Attenuation, dB/100 ft (dB/100 m)	0.34 (1.1)	0.27 (0.9)	0.18 (0.6)	–	–
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	64	62	67	–	–
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	76	71	78	–	–
1 km System Loss, dB	75	71	78	–	–
150 MHz					
Attenuation, dB/100 ft (dB/100 m)	0.58 (1.9)	0.40 (1.3)	0.27 (0.9)	0.52 (1.7)	–
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	68	67	74	68	–
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	80	80	86	78	–
1 km System Loss, dB	87	80	83	85	–
350 MHz					
Attenuation, dB/100 ft (dB/100 m)	0.88 (2.9)	0.64 (2.1)	0.52 (1.7)	0.95 (3.1)	0.43 (1.4)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	72	72	72	62	78
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	80	78	79	74	87
1 km System Loss, dB	101	93	89	93	92
450 MHz					
Attenuation, dB/100 ft (dB/100 m)	1.0 (3.3)	0.67 (2.2)	0.55 (1.8)	1.04 (3.4)	0.52 (1.7)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	69	70	69	69	71
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	77	80	80	79	77
1 km System Loss, dB	102	92	87	103	88
800 MHz					
Attenuation, dB/100 ft (dB/100 m)	1.49 (4.9)	1.19 (3.9)	0.88 (2.9)	–	0.95 (3.1)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	63	62	63	–	53
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	71	68	67	–	56
1 km System Loss, dB	112	101	92	–	84
900 MHz					
Attenuation, dB/100 ft (dB/100 m)	1.6 (5.3)	1.33 (4.37)	0.91 (3.0)	–	0.98 (3.2)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	63	62	60	–	55
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	73	68	63	–	58
1 km System Loss, dB	116	106	90	–	87
Mechanical Characteristics					
Diameter over Jacket, in (mm)	1.07 (27.2)	1.54 (39.1)	1.9 (48.3)	1.07 (27.2)	1.9 (48.3)
Minimum Bending Radius, in (mm)	10 (254)	15 (380)	20 (508)	10 (254)	20 (508)
Cable Weight, lb/ft (kg/m)	0.41 (0.61)	0.53 (0.79)	0.88 (1.31)	0.41 (0.61)	0.88 (1.31)

Frequency Bands (Field 2 of Type Number)

L = 70-300 MHz	C = 800-1000 MHz	U = 2000-2300 MHz
T = 300-500 MHz	P = 1700-2000 MHz	S = 2300-2400 MHz

* = Tuned cables for specific customer frequency

Note: All coupling loss and attenuation specifications were measured on an outdoor test range per IEC 1196-4 Standard.

Radiating Mode Cables

RCT Series

Cable Types	Nominal Size 1-1/4"	1-5/8"	1-5/8"
Standard Jacketing	**RCT6-PUS-1-AX**	**RCT7-CPUS-1-AX**	**RCT7-CPUS-2-AX**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1)	**RCT6-PUS-1-RN**	**RCT7-CPUS-1-RN**	**RCT7-CPUS-2-RN**
"Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323)	**RCT6-PUS-1-RNT1**	**RCT7-CPUS-1-RNT1**	**RCT7-CPUS-2-RNT1**
"Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323, UL1600 Compliant)	**RCT6-PUS-1-RNT**	**RCT7-CPUS-1-RNT**	**RCT7-CPUS-2-RNT**
Electrical Characteristics			
Impedance, ohms	50	50	50
Velocity, percent	89	88	88
Typical VSWR	1.3	1.3	1.3
800 MHz			
Attenuation, dB/100 ft (dB/100m)	–	0.61 (2.0)	0.61 (2.0)
50% Coupling Loss at 6 ft (2 m), dB ± 10 dB	–	68	68
95% Coupling Loss at 6 ft (2 m), dB ± 10 dB	–	75	70
1 km System Loss, dB	–	88	88
900 MHz			
Attenuation, dB/100 ft (dB/100m)	–	0.67 (2.2)	0.67 (2.2)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	–	62	62
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	–	67	64
1 km System Loss, dB	–	84	84
1800 MHz			
Attenuation, dB/100 ft (dB/100m)	1.25 (4.1)	1.68 (5.5)	1.68 (5.5)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	79	56	56
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	83	62	59
1 km System Loss, dB	120	111	111
1900 MHz			
Attenuation, dB/100 ft (dB/100m)	1.31 (4.3)	1.52 (5.0)	1.59 (5.2)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	75	58	58
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	79	59	60
1 km System Loss, dB	118	108	110
2100 MHz			
Attenuation, dB/100 ft (dB/100m)	1.43 (4.7)	1.49 (4.9)	1.55 (5.1)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	69	62	61
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	74	66	66
1 km System Loss, dB	116	111	112
2400 MHz			
Attenuation, dB/100 ft (dB/100m)	1.74 (5.7)	1.52 (5.0)	1.55 (5.1)
50% Coupling Loss at 6 ft (2 m), dB ± 5 dB	64	65	63
95% Coupling Loss at 6 ft (2 m), dB ± 5 dB	69	69	70
1 km System Loss, dB	121	115	114
Mechanical Characteristics			
Diameter over Jacket, in (mm)	1.54 (39.1)	1.9 (48.3)	1.9 (48.3)
Minimum Bending Radius, in (mm)	15 (380)	20 (508)	20 (508)
Cable Weight, lb/ft (kg/m)	0.53 (0.79)	0.88 (1.31)	0.88 (1.31)

Frequency Bands (Field 2 of Type Number)

L = 70-300 MHz	C = 800-1000 MHz	P = 1700-2000 MHz
T = 300-500 MHz	U = 2000-2300 MHz	S = 2300-2400 MHz

* = Tuned cables for specific customer frequency

Note: All coupling loss and attenuation specifications were measured on an outdoor test range per IEC 1196-4 Standard.

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Revised 9/00 & 6/01

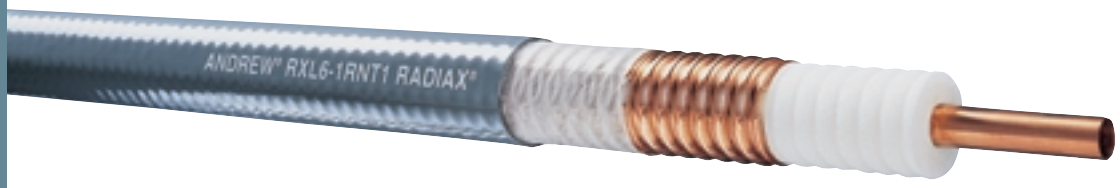
Coupled Mode Cables
RXL Series

Cable Types	Nominal Size 1/4"	3/8"	1/2"	1/2"	1/2"
Standard Jacketing, Buriable, Not Fire Retardant	**RXL1-1A**	**RXL2-2A**	**RXL4-1A**	**RXL4-2A**	**RXL4-3A**
Standard Jacketing, Not Buriable, Not Fire Retardant	**RXL1-1AX**	**RXL2-2AX**	**RXL4-1AX**	**RXL4-2AX**	**RXL4-3AX**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1)	**RXL1-1RN**	**RXL2-2RN**	**RXL4-1RN**	**RXL4-2RN**	**RXL4-3RN**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323)"	–	**RXL2-2RNT1**	**RXL4-1RNT1**	–	–
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323, UL1600 Compliant)"	**RXL1-1RNT**	**RXL2-2RNT**	**RXL4-1RNT**	**RXL4-2RNT**	**RXL4-3RNT**
Electrical Characteristics					
Impedance, ohms	50	50	50	50	50
Velocity, percent	78	88	88	88	88
Typical VSWR	1.3	1.3	1.3	1.3	1.3
150 MHz					
Attenuation,* dB/100 ft	2.71	1.49	1.01	1.10	1.7
Attenuation,* dB/100 m	8.9	4.9	3.3	3.6	5.6
50% Coupling Loss* at 6 ft (2m), dB ± 10 dB	58	56	58	52	46.0
1 km System Loss, dB	147	105	91	88	102.0
450 MHz					
Attenuation, dB/100 ft	5.09	2.59	2.01	2.50	4.1
Attenuation, dB/100 m	16.7	8.5	6.6	8.2	13.5
50% Coupling Loss* at 6 ft (2m), dB ± 10 dB	62	61	63	57	50.0
1 km System Loss, dB	229	146	129	139	185.0
900 MHz					
Attenuation,* dB/100 ft	7.10	3.69	2.90	3.60	5.5
Attenuation,* dB/100 m	23.3	12.1	9.5	11.8	18.1
50% Coupling Loss* at 6 ft (2m), dB ± 10 dB	69	68	68	63	62.0
1 km System Loss, dB	302	189	163	181	243.0
1800 MHz					
Attenuation,* dB/100 ft	9.7	5.3	4.0	4.9	6.8
Attenuation,* dB/100 m	31.8	17.4	13.1	16.1	22.3
50% Coupling Loss* at 6 ft (2m), dB ± 10 dB	71	74	73	69	66
1 km System Loss, dB	389	248	204	230	289
2400 MHz					
Attenuation,* dB/100 ft	–	–	4.8	5.8	7.5
Attenuation,* dB/100 m	–	–	15.7	19	24.9
50% Coupling Loss* at 6 ft (2m), dB ± 10 dB	–	–	73	69	66
1 km System Loss, dB	–	–	230	259	349
Mechanical Characteristics					
Diameter over Jacket, in (mm)	0.30 (7.6)	0.44 (11)	0.73 (19)	0.73 (19)	0.73 (19)
Minimum Bending Radius, in (mm)	1 (25)	3.75 (95)	5 (125)	5 (125)	5 (125)
Cable Weight, lb/ft (kg/m)	0.055 (0.082)	0.08 (0.12)	0.22 (0.33)	0.22 (0.33)	0.22 (0.33)
* Cable Spacing from Wall, in (mm)	2 (51)	2 (51)	2 (51)	2 (51)	2 (51)

Note: To obtain 95% coupling loss data, use Raleigh fading statistics for coupled mode cables.
Note: Attenuation and coupling loss data are based on averaged measurements taken in an actual customer tunnel.

Coupled Mode Cables

RXL Series



Cable Types	Nominal Size 5/8"	7/8"	1-1/4"	1-5/8"	1-5/8"
Standard Jacketing	–	**RXL5-1A**	**RXL6-1A**	**RXL7-1A**	**RXL7-3A**
Standard Jacketing, Not Buriable, Not Fire Retardant	**RXL4.5-1AX**	**RXL5-1AX**	**RXL6-1AX**	**RXL7-1AX**	**RXL7-3AX**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1)	**RXL4.5-1RN**	**RXL5-1RN**	**RXL6-1RN**	**RXL7-1RN**	**RXL7-3RN**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323)	**RXL4.5-1RNT1**	**RXL5-1RNT1**	**RXL6-1RNT1**	**RXL7-1RNT1**	**RXL7-3RNT1**
Fire-Retardant, Non-Halogenated Jacketing (IEC 332-1, IEC 332-3, IEEE 323, UL1600 Compliant)	–	**RXL5-1RNT**	**RXL6-1RNT**	**RXL7-1RNT**	**RXL7-3RNT**
Electrical Characteristics					
Impedance, ohms	50	50	50	50	50
Velocity, percent	89	89	89	88	88
Typical VSWR	1.3	1.3	1.3	1.3	1.3
75 MHz					
Attenuation,* dB/100 ft	0.5	–	–	–	–
Attenuation,* dB/100 m	1.7	–	–	–	–
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	63.0	–	–	–	–
1 km System Loss, dB	80.0	–	–	–	–
150 MHz					
Attenuation,* dB/100 ft	0.7	0.5	0.4	0.2	0.3
Attenuation,* dB/100 m	2.3	1.8	1.3	0.8	1.0
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	70.0	62.0	64.0	71.0	60.0
1 km System Loss, dB	93.0	80.0	77.0	78.6	69.8
450 MHz					
Attenuation,* dB/100 ft	1.3	1.1	0.9	0.6	0.8
Attenuation,* dB/100 m	4.1	3.6	3.0	2.0	2.5
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	74.0	72.0	75.0	80.0	67.0
1 km System Loss, dB	115.0	108.0	105.0	100.0	92.0
900 MHz					
Attenuation,* dB/100 ft	1.9	1.6	1.2	0.8	1.0
Attenuation,* dB/100 m	6.2	5.1	4.0	2.7	3.3
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	76.0	72.0	77.0	79.0	68.0
1 km System Loss, dB	138.0	123.0	117.0	106.0	101.0
1800 MHz					
Attenuation,* dB/100 ft	2.9	2.3	1.7	1.3	1.6
Attenuation,* dB/100 m	9.4	7.6	5.6	4.4	5.1
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	68.0	84.0	84.0	89.0	78.0
1 km System Loss, dB	162.0	160.0	140.0	133.0	129.0
2200 MHz					
Attenuation,* dB/100 ft	3.2	–	–	–	–
Attenuation,* dB/100 m	10.5	–	–	–	–
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	73.0	–	–	–	–
1 km System Loss, dB	178.0	–	–	–	–
2400 MHz					
Attenuation,* dB/100 ft	–	2.8	2.1	1.7	2.4
Attenuation,* dB/100 m	–	9.2	6.9	5.6	7.83
Coupling Loss* at 6 ft (2 m), dB ± 10 dB	–	76	76	89	79
1 km System Loss, dB	–	168	145	145	157.7
Mechanical Characteristics					
Max. Diameter over Jacket, in (mm)	0.865 (22)	1.15 (29)	1.60 (41)	2.02 (51)	2.02 (51)
Minimum Bending Radius, in (mm)	8 (200)	10 (254)	15 (380)	20 (508)	20 (508)
Max. Cable Weight, lb/ft (kg/m)	0.15 (0.22)	0.41 (0.61)	0.73 (1.09)	1.02 (1.52)	1.02 (1.52)
* Cable Spacing from Wall, in (mm)	2 (51)	2 (51)	2 (51)	2 (51)	4 (102)

Note: To obtain 95% coupling loss data, use Raleigh fading statistics for coupled mode cables.
Note: Attenuation and coupling loss data are based on averaged measurements taken in an actual customer tunnel.

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Plenum Cables *RXP Series*

Cable Types	Nominal Size 1/2"	1/2"
Plenum-Rated, Fire Retardant Cables	**RXP4-1**	**RXP4-2**
Electrical Characteristics		
Impedance, ohms	50	50
Velocity, percent	94	94
Typical VSWR	1.3	1.3
150 MHz		
Attenuation, dB/100 ft	1.1	1.4
Attenuation, dB/100 m	3.6	4.6
Coupling Loss at 6 ft (2 m), dB ± 10 dB	56	50
450 MHz		
Attenuation, dB/100 ft	2.01	2.50
Attenuation, dB/100 m	6.6	8.2
Coupling Loss at 6 ft (2 m), dB ± 10 dB	63	57
900 MHz		
Attenuation, dB/100 ft	2.90	3.60
Attenuation, dB/100 m	9.5	11.8
Coupling Loss at 6 ft (2 m), dB ± 10 dB	68	63
1700 MHz		
Attenuation, dB/100 ft	7.3	11.0
Attenuation, dB/100 m	24	36.1
Coupling Loss at 6 ft (2 m), dB ± 10 dB	68	60
2400 MHz		
Attenuation, dB/100 ft	9.4	13.8
Attenuation, dB/100 m	30.8	44.3
Coupling Loss at 6 ft (2 m), dB ± 10 dB	70	64
Mechanical Characteristics		
Diameter over Jacket, in (mm)	0.62 (16)	0.62 (16)
Minimum Bending Radius, in (mm)	5 (125)	5 (125)
Cable Weight, lb/ft (kg/m)	0.16 (0.23)	0.16 (0.23)

Flat Strip RADIAX® Cables *RDXF Series*

Flat Strip RADIAX Cable Kits	
100 ft, 2 connectors, 1 jumper assembly (24"), 1 termination load	**RDXF10-1FR-100**
250 ft, 4 connectors, 2 jumper assemblies (24"), 2 termination loads	**RDXF10-1FR-250**
500 ft, 8 connectors, 4 jumper assemblies (24"), 4 termination loads	**RDXF10-1FR-500**
Flat Strip RADIAX Cable	
Fire Retardant	**RDXF10-1001FR**
Fire Retardant, Non Halogenated	**RDXF10-1001NHFR**
SMA Female Connector	**SRF10SF**
SMA Male Termination Load	**243635**
Jumper Assembly, SMA Male/N Male, 1.5 ft (0.5 m)	**243848-24**
* Length in feet or meters, minimum 30 feet (10 meters).	
Electrical Characteristics	
Impedance, ohms	50
Typical VSWR	1.3
150 MHz	
Attenuation, dB/100 ft	2.0
Attenuation, dB/100 m	6.6
Coupling Loss at 6 ft (2m), dB ± 10 dB	64
1 km System Loss, dB	130
450 MHz	
Attenuation, dB/100 ft	3.0
Attenuation, dB/100 m	9.8
Coupling Loss at 6 ft (2m), dB ± 10 dB	62
1 km System Loss, dB	160
900 MHz	
Attenuation, dB/100 ft	5.0
Attenuation, dB/100 m	16.4
Coupling Loss at 6 ft (2m), dB ± 10 dB	60
1 km System Loss, dB	224
1700 MHz	
Attenuation, dB/100 ft	7.5
Attenuation, dB/100 m	24.6
Coupling Loss at 6 ft (2m), dB ± 10 dB	72
1 km System Loss, dB	320
2000 MHz	
Attenuation, dB/100 ft	8.0
Attenuation, dB/100 m	26.2
Coupling Loss at 6 ft (2m), dB ± 10 dB	72
1 km System Loss, dB	334
2200 MHz	
Attenuation, dB/100 ft	9.1
Attenuation, dB/100 m	29.8
Coupling Loss at 6 ft (2m), dB ± 10 dB	72
1 km System Loss, dB	370
2400 MHz	
Attenuation, dB/100 ft	11.0
Attenuation, dB/100 m	36.1
Coupling Loss at 6 ft (2m), dB ± 10 dB	70
1 km System Loss, dB	431
Mechanical Characteristics	
Minimum Bending Radius, in (mm)	6 (153)
Cable Weight, lb/ft (kg/m)	0.25 (0.37)

RADIAX® Connectors and Accessories


SR5PNM


SR5PNF


L5PNF-RPC


L5PDM-RPC


L6PDF-RPC

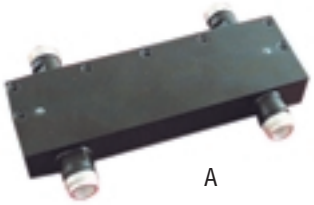
Connectors for RCT Series Cables - Type Numbers

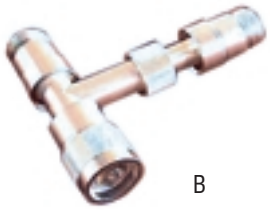
Cable Type	N-Male	N-Female	7-16 DIN Male	7-16 DIN Female
RCT5	**SR5PNM**	**SR5PNF**	**SR5PDM**	**SR5PDF**
RCT6	**SR6PNM**	**SR6PNF**	**SR6PDM**	**SR6PDF**
RCT7	**SR7PNM**	**SR7PNF**	**SR7PDM**	**SR7PDF**

Connectors for RXL and RXP Series Cables

Cable Type	N-Male	N-Female	7-16 DIN Male	7-16 DIN Female	See Page*
RXL1	**F1PNMV2-H**	**F1PNF-BH**	**F1PDM**	**F1PDF**	475
RXL2	**L2PNM-H**	**L2PNF**	**L2PDM-C**	**L2PDF-C**	495
RXL4, RXP4	**L4PNM-H**	**L4PNF**	**L4PDM**	**L4PDF**	497
RXL4.5	**L4.5PNM-RC**	**L4.5PNF-RC**	**L4.5PDM-RC**	**L4.5PDF-RC**	501
RXL5	**L5PNM-RPC**	**L5PNF-RPC**	**L5PDM-RPC**	**L5PDF-RPC**	507
RXL6	**L6PNM-RPC**	**L6PNF-RPC**	**L6PDM-RPC**	**L6PDF-RPC**	514
RXL7	**L7PNM-RPC**	**L7PNF-RPC**	**L7PDM-RPC**	**L7PDF-RPC**	521

* For specifications and additional connectors.


A


B

Dual-Band Hybrid Coupler Combiners

Combine signals from different sources onto the same RADIAX cable. Loss feeding a single cable is 3 dB, however, using both independent outputs to feed two RADIAX cables, the aggregate loss due to dissipative losses is minimal (<0.2 dB). Suitable for indoor and outdoor use.

Ordering Information

Ref.	Frequency Band MHz	Isolation dB	Connectors	Type Number
A	800 - 2,200	>30	N female	**245566**
A	800 - 2,200	>30	7-16 DIN female	**245567**

Adjustable Signal Tap/Sampler

Taps off a portion of the main line energy with a capacitive probe from 380 - 2200 MHz. The coupling between probe and main line is continuously adjustable from -90 dBc and -10dBc and may be locked in any selected position.

Ordering Information

Reference	Power Watts	VSWR	Connectors All Ports	Type Number
B	500	1.3	N	**245572**

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A


B


C


D

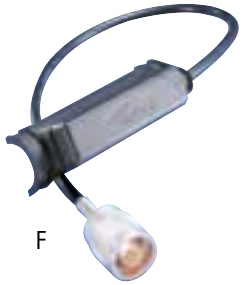
50-Ohm Loads/Terminations

Coaxial Loads for dc - 2,500 MHz.

Ordering Information

Reference	Power watts	VSWR Max.	Connectors	Type Number
A	10	1.15	N male	**245573**
-	10	1.15	N female	**245574**
B	20	1.05	7-16 DIN male	**245575**
-	20	1.05	7-16 DIN female	**245576**


E


F

Dual-Band 2-Way Reactive Power Splitters

Use in single or multi-band RADIAX systems or antennas. Weatherproof. Supplied with spring clip or bracket for simple attachment to pole or wall.

Ordering Information

Ref.	Frequency Band MHz	Input VSWR max.	Splitter Loss dB, Nom.	Dissipative Loss dB Max.	Power Watts	Connectors	Length in (mm)	Type Number
C	380 to 960	1.15	3	0.1	500	N female	10 (250)	**245568**
C	800 to 2,200	1.15	3	0.1	500	N female	7.5 (190)	**245570**
D	380 to 960	1.15	3	0.1	700	7-16 DIN female	10 (250)	**245569**
D	800 to 2,200	1.15	3	0.1	700	7-16 DIN female	10 (250)	**245571**

Directional Couplers/Unequal Power Splitters

Operate in both the 806 - 960 MHz and 1710 - 1990 MHz bands. May be used to couple off a defined fraction of the main line signal with minimal reflections or loss.

Ordering Information

Ref.	Coupling dB nom.	VSWR all ports, max.	Directivity dB	Coupled Loss dB	Dissipative Loss, dB max.	Power Watts	Connectors	Type Number
E	6	1.20	25	1.26	0.1	200	N female	**245577**
E	10	1.20	25	0.45	0.1	200	N female	**245578**
E	20	1.20	25	0.05	0.1	200	N female	**245579**

10 dB Broadband Tap for RXP4 and LDF4 Cables

This low cost tap can be installed easily with one hand. Attachment is self-sealing and waterproof. It includes a cable pigtail and jumpers are not required. Insertion loss is less than a standard 10 dB coupler with jumpers.

Specifications

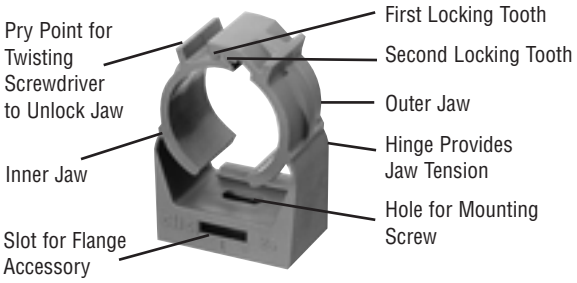
Ref.	Frequency MHz	Thru Loss, dB	Coupled Loss, dB
F	1700-2000	1.0 ± 0.4	10.8 ± 1.0
F	800-960	1.1 ± 0.4	9.7 ± 1.0
F	380-500	1.4 ± 0.4	10.5 ± 2

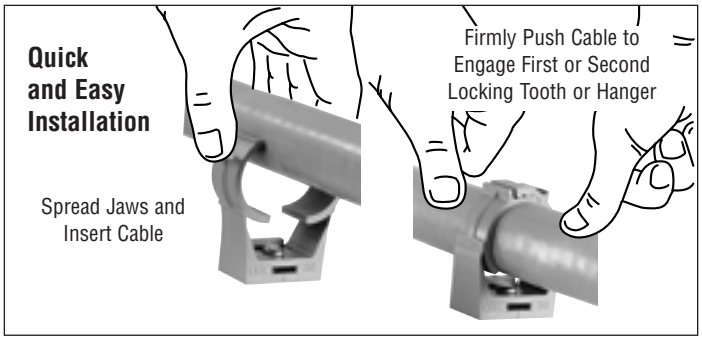
Ordering Information

	0.5 m Cable	1.0 m Cable
Type Number	**245580**	**245581**
Insertion Loss, max., dB		
1700-2000 MHz	0.4	0.7
800-960 MHz	0.4	0.6
380-500 MHz	0.3	0.4

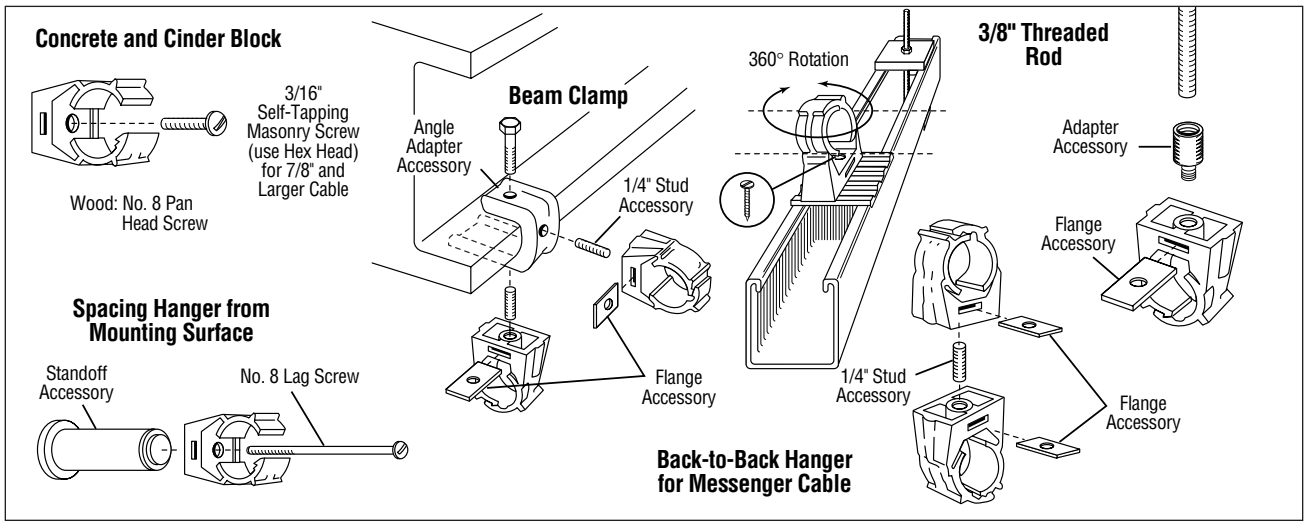
RADIAX® Mounting

Self-Locking Hanger





Typical Mounting Configurations



Mounting

Several alternative mounting methods are available for RADIAX® slotted coaxial cable. The choice depends on mounting surface, environmental considerations, cable size and cost.

- *Self-locking hangers for quick and easy cable attachment*
- *Metal hangers for environmental extremes*
- *Messenger cable straps*
- *Nylon cable ties*

Self-Locking Hangers

- *One-Piece automatic locking design reduces installation time... no clamp hardware*
- *Made from Nylon 12 for strength and corrosion resistance*
- *Mount to a wide variety of surfaces. Many hanging configurations possible using available accessories*
- *Electrical gray color*
- *Provide 45 or 85 mm standoff*
- *Made from non-halogenated material*

Self-Locking Hanger Kit of 10. Select hanger from table based on cable size and jacket type. Surface mounting hardware is not included. See illustrations above for recommended mounting hardware and accessories.

Temperature Range:

Continuous Operation, -40 to 82°C (-40 to 180°F)
Installation, -21 to 82°C (-5 to 180°F)

Available Hanger Types by Cable Size

		Metal Hangers			
Self-Cable Size	Locking Hangers	Stainless	Plated	Messenger Cable Strap	Nylon Cable Ties
1/4"	X			X	X
3/8"	X			X	X
1/2"	X	X	X	X	X
5/8"		X		X	X
7/8"	X	X	X	X	X
1-1/4"	X	X	X	X	
1-5/8"	X	X	X	X	

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Self-Locking Hanger Kits

Photo Reference A

Cable Size	Type Number Kit of 10	Type Number Kit of 500	Clamping Range Diameter, in (mm)
For Buriable, RXT and RN Series Jacketing			
1/4"	**209800-8**	–	0.290-0.374 (7.37-9.50)
3/8"	**209800-10**	–	0.374-0.465 (9.50-11.81)
1/2"	**209800-15**	–	0.563-0.661 (14.30-16.79)
7/8"	**209800-25**	**209800-25-IP**	0.969-1.094 (24.61-27.79)
1-1/4"	**209800-36**	**209800-36-IP**	1.398-1.555 (35.51-39.50)
1-5/8"	**209800-47**	**209800-47-IP**	1.813-1.988 (46.05-50.50)
For RNT and RNT1 Series Jacketing			
1/4"	**209800-10**	–	0.374-0.465 (9.50-11.81)
3/8"	**209800-12**	–	0.465-0.563 (11.81-14.30)
1/2"	**209800-17**	–	0.661-0.768 (16.79-19.51)
7/8"	**209800-28**	**209800-28-IP**	1.094-1.228 (27.79-31.19)
1-1/4"	**209800-40**	**209800-40-IP**	1.555-1.713 (39.5-43.5)
1-5/8"	**209800-47**	**209800-47-IP**	1.813-1.988 (46.05-50.50)

Accessories for Self-Locking Hangers

B **Flange Kit**. Inserts into hanger slot. Tapped 1/4"- 20. Use with 1/4" threaded rod or stud.
Kit of 10 .....Type **209797**
Installer Pax Kit of 500 .....Type **209797-IP**

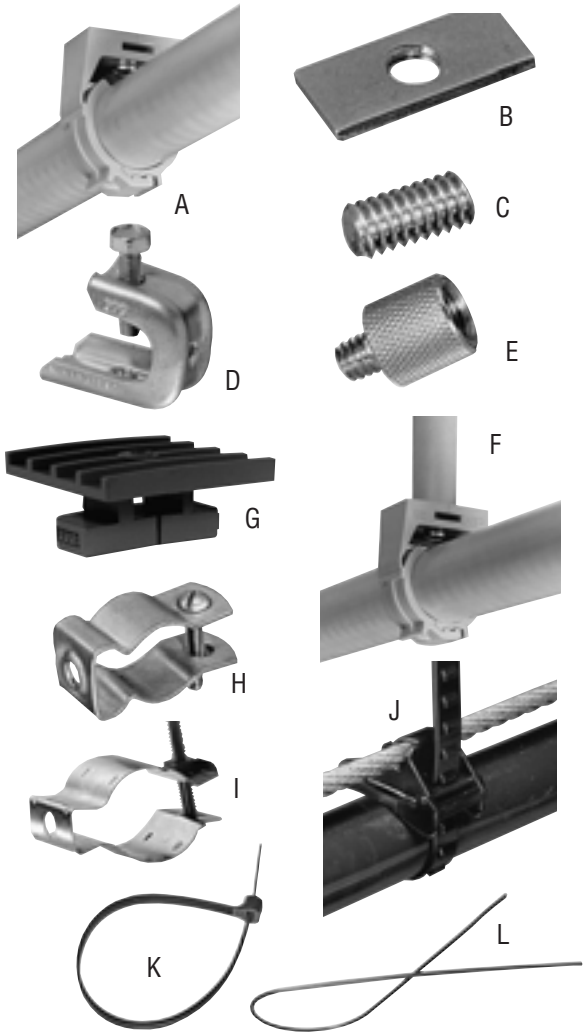
C **1/4" Stud Kit**. 1/4"-20 x 1/2" long. For mounting hanger. Attaches to flange (item B).
Kit of 10 .....Type **209799**
Installer Pax Kit of 500 .....Type **209799-IP**

D **Angle Adapter Kit** of 10. 1/4"- 20 hardware. For mounting hanger to angle member. Use with 1/4" stud (item C) and flange (item B) .....Type **209821**

E **Adapter Kit** of 10. 1/4"- 20 male and 3/8"- 16 female threads. Use to mount hanger with 3/8" threaded rod. Attaches to flange (item B) .....Type **209798**

F **Standoff Kit**. Provides 2" (50 mm) standoff. Includes 3 in long No. 8 lag screw. Hanger not included.
Kit of 10.....Type **209795**
Installer Pax Kit of 500 .....Type **209795-IP**

G **Strut Adaptor Kit** of 10. For attaching Type **209800-17** through - 47 self-locking hangers to strut sizes:
12 gauge, 1-5/8" x 1-5/8" (41.3 x 41.3 mm)
12 gauge, 1" x 1-5/8" (25.4 x 41.3 mm)
12 gauge, 13/16" x 1-5/8" (20.6 x 41.3 mm)
14 gauge, 13/16" x 1-5/8" (20.6 x 41.3 mm)
Includes ten #10 stainless steel screws...Type **223160**



Metal Hanger Kits of 10, plated steel or stainless steel, surface mounting hardware not included.

Cable Size	Photo Ref.	Mounting Hardware	Plated Type No.	Stainless Steel Type No.
1/2"	**H**	1/4"	**40954-2**	–
5/8"	**I**	3/8"	–	**42396A-9**
7/8"	**H**	1/4"	**40785-2**	–
1-1/4"	**I**	3/8"	–	**42396A-1**
1-5/8"	**I**	3/8"	–	**42396A-2**

Other Mounting Accessories

J **Messenger Cable Strap Kit** of 10 for mounting all sizes of RADIAX® cable, except Type RXL4-3, to 1/4"- 5/16" messenger cable. Insulated.
Easy installation .....Type **209820**

Note: To mount Type RXL4-3 cable to messenger cable, use two self-locking hangers back to back. Use Types 209800-15 or 209800-17 for attachment to the RADIAX cable and Type 209800-8 for attachment to the messenger cable.

K **Nylon Cable Tie Kit** of 50 for mounting 1/4", 3/8", 1/2", 5/8", and 7/8" cable.....Type **40417**

L **Jacketed Cable Tie Kit** of 20 for mounting 1/4", 3/8", and 1/2" cable .....Type **27290A**

Revised 9/00, 12/00 & 6/01

System Design with Radiating Cables

When Designing a System, it is Important to Consider Certain Concepts:

System Architecture

The system architecture selected for any specific application will depend on the overall objectives and will be dictated in large part by the geometry and area that is required for coverage. For tunnel applications, the length of the tunnel, the construction of the tunnel, and the size of the tunnel will establish the basic parameters. Other key factors include the number of services, providers, and channels required to meet the objectives. Consideration of the degree of coverage, accessibility of electronic equipment (base stations and/or amplifiers) will also drive the basic design.

For tunnel applications, the two primary architectures used are:

- A series of cascaded amplifiers or
- Using a T-feed configuration.

In certain system implementations, it is prudent to use a combination of these two techniques. The T-feed structure is appropriate when feeding from multiple base stations or when using amplifiers that are connected to a common base station using fiber optic cables.

The T-feed structure has the advantage that an amplifier can drive a longer length of cable than can be achieved with the cascaded architecture. The T-feed structure generates less downlink intermodulation since the amplifiers are not cascaded. The cascaded configuration has a higher dynamic range on the uplink and is useful for communication systems that do not use uplink power control. The cascade configuration has been used effectively on a number of tunnels where the communication system employs conventional or trunk radio techniques. The T-feed configuration has been particularly well suited for cellular and PCS applications.

Cable Parameters

Key parameters for radiating cable are:

- *Insertion Loss*
- *Coupling Loss*
- *Fading Characteristic*
- *Coherent Bandwidth*
- *Launch Angle*

Insertion Loss

The insertion loss of the cable is a measure of the attenuation that occurs in the coaxial cable and is measured in dB per unit length. The attenuation is primarily a result of the copper losses and the amount of power that is radiated from the cable. The loss due to radiation is somewhat effected by the proximity of the cable to other surfaces. This effect is more pronounced for cables having low coupling loss, however, significant changes will typically not occur until the spacing is less than 1 inch.

Coupling Loss

Coupling loss is defined as the ratio between the power in the cable and the amount of power received by a dipole antenna at a specified distance from the cable. For example, if the power in the cable were 0 dBm and the power received by the antenna was -65 dBm, then the coupling loss would be 65 dB. Typically Andrew will use distances of 2 meters (6.6 feet) or 6 meters (20 feet). The value specified is the median value measured as the dipole travels parallel to the cable.

Typically, the radiated energy from the radiating cables is polarized. The degree of polarization is measured for all Andrew cables. The majority of the Andrew radiating cables have a dominant vertical polarization, however, this may be frequency dependant.

Fading Characteristic

Radiating cables exhibit a fading characteristic that is a result of the multipath nature of the cable. Typically, a fade will occur approximately every wavelength. The depth of the fade is dependant not only on the design of the cable but also on the multipath environment. Andrew quantifies the depth of fading by calculating the ratio between the median value of the coupling loss (50%) to the coupling loss that occurs at least 5%. This produces a ratio of the 50 to 95% values. For coupled mode RADIAX (RXL), the fading factor is typically 11 dB. For RADIAX utilizing the array construction, radiating mode RADIAX (RCT), this value can be as low as 2 to 3 dB. In a majority of systems applications, the low fading characteristic is somewhat negated by the environment.

Coherent Bandwidth

Coherent bandwidth of radiating cables is a measure of instantaneous bandwidth of the signal that can reliably be transmitted from the cable. This parameter is significant for wide bandwidth signals, especially third generation systems. All Andrew cables have sufficient coherent bandwidth to handle GSM and CDMA (1.25 MHz) signals. For applications involving wider bandwidths, the radiating mode cables (RCT) are designed to handle third generation signals.

Launch Angle

For coupled mode RADIAX®, there is no dominant launch angle as RF energy emits from the cable at all angles. For the radiating mode series of cables there is a dominant launch angle. It is this dominant launch angle that contributes to the low fading characteristic and the wider coherent bandwidth. The launch angle for any particular cable varies as a function of frequency and will typically be (45 degrees relative to a perpendicular line from the cable.

Cable Orientation

For the majority of the cables, the orientation of the slots is not critical. This is because the dominant radiation is not directly from the slots, but rather is caused by the current that flows in the outer jacket of the cable. Directivity of the cable is related to the frequency and the size of the cable. That is, a 1-5/8 inch cable at 2400 MHz will be more directive than at 900 MHz, further the 1-5/8 inch cable will have a higher directivity than a 7/8" cable.

Link Budget

The basic elements of a link budget can be demonstrated by considering an example that involves a dual-bore road tunnel that is 800 meters (2620 feet) in length that is to be configured to handle cellular signals (824 MHz-894 MHz). The power per channel available for the downlink is 1 watt (+30 dBm). Following is an example link budget:

Downlink (Base to Mobile) Link Budget for 95% Coverage

Available Power/Channel	30 dBm
Distribution Loss, Power divider feeds both bores	3.5 dB
Feeder Cable Loss, 30 m (100 ft) LDF5-50	1.6 dB
Insertion Loss, 800 m (2620 ft) RCT7-TC-1	18.4 dB
Coupling Loss @ 2 m	53.0 dB
Antenna Loss, relative to dipole	3 dB
Wide Tunnel Factor, tunnel width 10 m (33 ft), Wide Tunnel Factor = 20 Log (Width/2)	14 dB
Vehicle Penetration Loss	6 dB
Raleigh Fading, $Z(\Sigma(\sigma_{il}^2+\sigma_{cl}^2+\sigma_{ant}^2+\sigma...)^{1/2}$	11 dB
Statistical Variation	3 dB
Tunnel Factors	0 dB
Received Signal Power (Level that will be achieved at least 95% of the time at the terminated end of the cable)	-83.5 dBm

Uplink performance can be computed in a very similar manner.

Tunnel Effects on Design

Coupling loss is dependent on the construction and shape of the tunnel. Typically, steel tunnels will perform appreciably better than concrete tunnels. Another factor that modifies the performance of the system is the placement of the cable in the tunnel. The cable should be mounted in the manner, which provides the best line-of-sight and proximity to the mobile/portable antenna.

RF Amplifiers

Index

Revised 12/00

Introduction

RF Amplifiers

Andrew offers a wide range of RF Amplifier products. The amplifiers range from 0.5 to 10 watts of output power, 806 to 1990 MHz, and broadband to channel selective. If you have a coverage problem, Andrew has a solution.

In-Building

Uninterrupted wireless communications in buildings is a necessity for essential services such as police and fire, and is now demanded by the rapidly expanding commercial services market. Andrew has a variety of products to extend coverage into hospitals, hotels, factories, convention centers, and other buildings. Our RF Amplifiers provide the power and gain required to overcome the losses in distributed RF systems installed in facilities of all sizes.

The RF Amplifier group offers four products for the in-building application, they are the RADIAMP 1200 series, ACE 1000 series, SelectAmp CDMA 1900-1, and the SelectAmp NBPCS series amplifiers.

Null Fill

Dense urban environments, man-made structures, foliage, and varying terrain often work together to create holes or nulls in RF coverage areas above ground. Andrew air interface amplifiers are ideally suited for extracting low level signals, amplifying them to a useable level and retransmitting them to cover null areas.

The air interface amplifier utilizes rugged materials and passive cooling to provide reliable operation under extreme environmental conditions.

The RF Amplifier group offers three products for the null fill application; they are the SelectAmp CDMA 1900-1 series, SelectAmp CDMA 1900-1H/1HD and the ACE 1300 Series amplifiers. Andrew offers these complete solutions in the form of Repeater Kits. These kits contain all the necessary equipment to solve your null fill problem.

Cell Extension

When coverage areas are exceedingly directional, such as highways or long corridors, the amplifier you need is the Cell Extender. The Cell Extender is higher in output power enabling it to provide coverage down a long, narrow area.

The RF Amplifier group offers two products for the cell extension application; they are the SelectAmp CDMA 1900-1H/1HD series and the ACE 1300 series amplifiers. Repeater Kits solve the coverage problem by supplying all the equipment necessary to install the system at the repeater site.

Reverse Link Limited

The RF Amplifier group offers the TMA 1900-DD amplifier system to support reverse link limited system problems.

As mobile telephones get smaller and their output power gets lower, the signal from the mobile may be too weak at the base station antenna. The Tower Mounted Amplifier system solves this problem by improving system sensitivity by as much as 5 dB, thus increasing the base station sector range by as much as 40%.

General

Andrew RF Amplifier Products consist of band selective and channelized RF repeaters, and supporting products such as mounting kits, filters, power supplies, and remote monitoring and control equipment.

The ACE and RADIAMP™ series amplifiers represent the band selective products in the RF Amplifier Group. These products are bidirectional amplifiers that provide coverage in the 800 MHz ESMR, Cellular, and 900 MHz Trunk/European GSM frequency ranges.

The SelectAmp series amplifiers represent the channelized products in the RF Amplifier group. These products are also bidirectional and provide channel selectivity in a variety of bandwidths ranging from 12.5 kHz for pagers to 1.25 MHz for CDMA in the 900 and 1900 MHz PCS frequency spectrums.

The TMA series amplifiers are low noise amplifiers that are mounted at the top of the base station tower in close proximity to the base station antenna. These products increase sensitivity of the reverse link to improve reception of weak signals.

Distribution Amplifiers

RADIAMP 1200 Series – 800 MHz ESMR, 800 MHz US Cellular, 900 MHz Trunk/European GSM, and UHF.

RADIAMPs are small, low power (0.5 watt), rugged, bidirectional and unidirectional distribution amplifiers designed to operate in virtually any environment. The low-cost RADIAMP is primarily used to make up for losses in distributed antenna systems. See pages 676 and 677.

ACE 1000 Series – 800 MHz ESMR, 800 MHz US Cellular, 900 MHz Trunk/European GSM

The low power (1 watt) and medium gain characteristics of the ACE 1000 series amplifier makes it a cost-effective solution for the small, in-building, null applications. This amplifier is primarily used to cover small, in-building areas. See pages 678 and 679.

Repeaters

ACE 1300 Series – 800 MHz ESMR, 800 MHz US Cellular, 900 MHz Trunk/European GSM

This line of air interface, bidirectional amplifiers provides high gain and output power with remote monitor and control options. Feed forward error correction techniques are used in the ACE 1300 series for low intermodulation products in the presence of multiple carriers. See page 681.

SelectAmp CDMA 1900 Series – 1900 MHz PCS Services

SelectAmp CDMA 1900 is a channel selective, bidirectional amplifier that provides signal level enhancement and increased coverage. It provides remote access and monitoring via wireline connection using the Andrew SMARTpc™ graphical user interface. See pages 682 and 683.

SelectAmp NBPCS 900 Series – 900 MHz Narrowband PCS Paging Bands

This bidirectional, channelized, paging receiver makes it possible for Narrowband PCS providers to provide service to subscribers in RF-obstructed areas that would otherwise be unreachable. See page 684.

Tower Mounted Amplifiers

TMA 1900-DD – 1900 MHz PCS Services

Tower mounted amplifiers extend cell sites and improve system coverage while lowering capital expenses. The TMA 1900-DD increases sensitivity of the base station and extends mobile battery life. See pages 686 and 687.

RADIAMP™ 1200 Series

Distribution Amplifiers

Band-Selective, Bidirectional Amplifier

General

The RADIAMP 1200 series is a broadband RF distribution amplifier designed to be small, rugged and easily utilized by system designers. It is suitable for use with in-building and tunnel environments.

RADIAMP 1210 Paging Amplifier

The 1210 series RADIAMP is a 10-20 dB gain unidirectional unit operating in the 172 or 280 MHz paging bands. The 1210 series can be used as a line amplifier to overcome HELIAX® cable attenuation losses for small RF distribution systems or as a booster amplifier to maintain signal coverage for small sections of a larger system utilizing RADIAX® radiating cable or point-source antennas.

RADIAMP 1212, 1213, and 1216

The 1212, 1213 and 1216 Series RADIAMPs are bidirectional band-selective distribution amplifiers with variable gain from 10 to 20 dB. Specific bands of operation include AMPS Cellular, 800 MHz ESMR and 900 MHz Mobile Radio/European ESM. Uses include line amplification to overcome attenuation losses in HELIAX® cable and as a booster amplifier to improve RF signal levels in RF distribution systems utilizing RADIAX or point source antennas. The unit is available with an option for automatic gain control, which limits output RF power to a customer-specified level.

Application Information

Supplying Power to the RADIAMP 1200 Series

DC Power can be supplied to the RADIAMP by one of two ways: via the external dc input connector or via the RF cable. If the external connector is used, the unit must be supplied with 1 amp (min) @ +15 Vdc by using a power supply such as the Andrew ac-dc Power Supply shown on page 690.

The alternative is to apply dc power to coaxial cable such as RADIAX or HELIAX. The RADIAMP will then draw its needed dc power from the RF connector. In this case, the following points must be addressed by the user:

- *The coaxial cable center conductor is dc positive (between +16 and +20 Vdc).*
- *Typically, a maximum of three RADIAMP series units can be cascaded.*
- *The user must determine the dc voltage drop along the coaxial cable to ensure that proper dc input voltages exist at the RF port of each RADIAMP.*
- *The user can use devices such as the Andrew Bias-Tee and dc block to apply and terminate direct current on the coaxial cable.*

Mounting the RADIAMP with RADIAMP Hangers

Although several options for mounting RADIAMP exist, many users find the Andrew RADIAMP mounting hanger (a variety of our self-locking hanger) ideal to provide reliable and easy installation of the amplifiers. Two RADIAMP mounting hangers, when properly mounted, secure a single RADIAMP to concrete, drywall or wood. Each RADIAMP mounting hanger requires two 1/4", 5/16" or 3/8" lag bolts and four flat washers for mounting. Anchors should be used when securing the hangers to concrete, masonry or drywall.

Typical Electrical Specifications and Ordering Information

Unidirectional Amplifiers - 1210 Paging Amplifiers

Description	Band 1	Band 2
Frequency of Operation, MHz	171 - 173	279 - 281
Model No., Basic Amplifier	**651210-32UU-001**	**651210-32UU-002**
Model No., With AGC	**651210-32UU-003**	**651210-32UU-004**
Gain, dB	10 - 20	10 - 20
3rd Order Intercept Point, dBm	≥37	≥37
1 dB Compression Point, dBm	≥27	≥27
Noise Figure, dB	≤ 9	≤ 9
Power Consumption, watts	< 10 @ +15 Vdc	< 10 @ +15 Vdc

Bidirectional Amplifiers - 1212, 1213, and 1216, Typical Specifications

	800 MHz Trunked Radio		AMPS Cellular		900 MHz Trunked Radio/GSM	
Description	Downlink	Uplink	Downlink	Uplink	Downlink	Uplink
Frequency of Operation, MHz	851 - 869	806 - 824	869 - 894	824 - 849	935 - 960	890 - 910
Model No., Basic Amplifier	**651212-3212-000**		**651213-3212-000**		**651216-3212-000**	
Model No., With AGC	**651212-3212-001**		**651213-3212-001**		**651216-3212-001**	
Gain, dB	10 - 20	10 - 20	10-20	10 - 20	10 - 20	10 - 20
3rd Order Intercept Point, dBm	≥35	≥26	≥35	≥26	≥35	≥26
1 dB Compression Point, dBm	≥27	≥17	≥27	≥17	≥27	≥17
Noise Figure, dB	≤ 12	≤ 9	≤ 12	≤ 9	≤ 12	≤ 9
Power Consumption, watts at 15+Vdc	< 15	< 15	< 15	< 15	< 15	< 15

RADIAMP Mechanical Specifications

Description	1210 Paging Amplifier	1212, 1213 and 1216 Amplifiers
Enclosure Type	**NEMA 4 (IP66)**	**NEMA 4 (IP66)**
Length, in (mm)	6 (152)	12 (305)
Diameter, in (mm)	3.5 (90)	3.5 (90)
Weight, lb (kg)	2.5 (1.1)	5.4 (2.5)
Max. Operating Temperature, °C (°F)	50 (122)	50 (122)
Min. Operating Temperature, °C (°F)	-20 (-4)	-20 (-4)
RF Connectors	Type N Female	
DC Input Connector	Switchcraft® 712A Series, center pin ground or Type N connector, center pin positive	
Input Voltage	+15 Vdc, center pin ground using 712A connector +16 Vdc to +21 Vdc, center pin positive using coax connector	

Accessories

Description	Type Number
Power Supplies	
Desk Top, 90 - 265 Vac, IEC receptacle	**EPWSP-00018**
Wall Mount, 120 Vac	**EPWSP-00019**
Desk Top, 90 - 265 Vac, with integral power cord	**EPWSP-00023**
Connector, dc Power, pack of five	**EJKPW-50004**
Bias Tee, Type N, female connectors	**EBAST-10001**
Hanger, Self-Locking, RADIAMP mounting, quantity 2	**ECLMP-70032**

ACE 1000 Series

Distribution Amplifiers

Band-Selective Bidirectional Amplifier

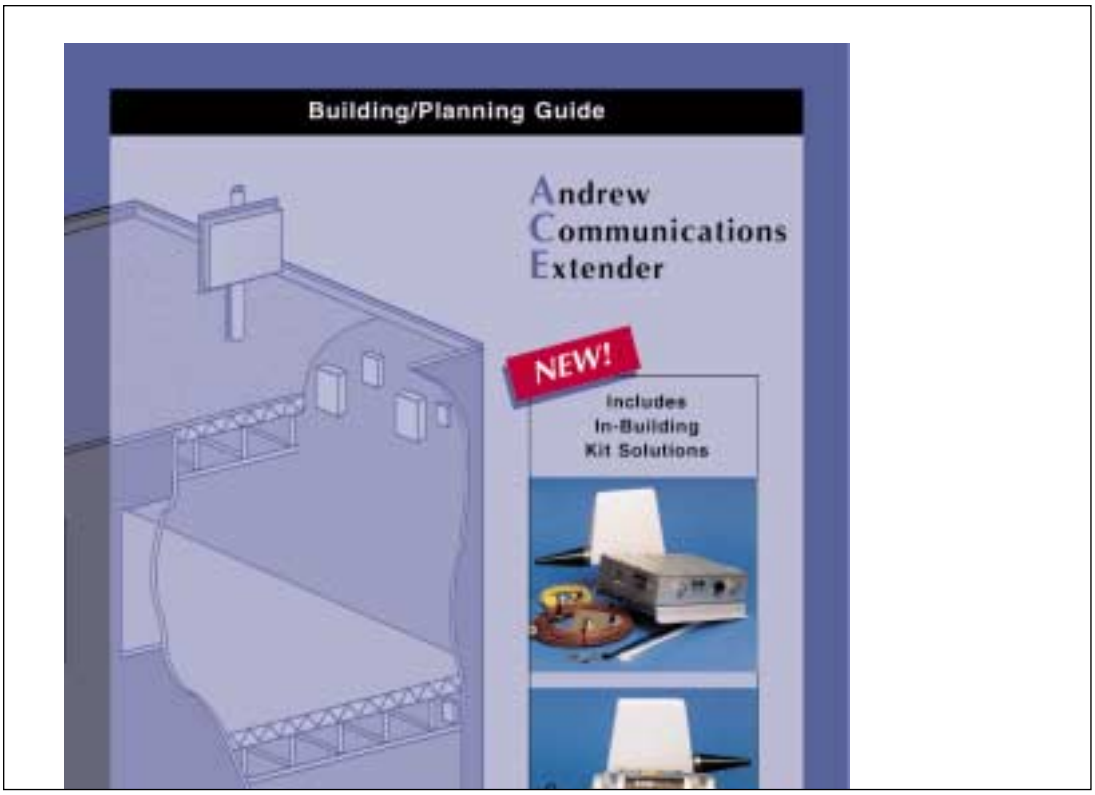
The ACE 1000 series amplifier is a bidirectional amplifier designed specifically for in-building RF coverage extension for cellular or two-way trunked radio services. The small package can mount almost anywhere. Each ACE amplifier provides 30 - 40 dB of gain in each direction. An ACE pair can be used in off-air interface or a single ACE in distribution applications, along with RADIAX® or HELIAX® cables.

Ordering Information

	Amplifier No. 1	Amplifier No. 2
800 MHz Trunked Radio		
Basic Amplifier	**651012-1444-100**	**651012-4414-200**
With AGC Only	**651012-1444-101**	**651012-4414-201**
With SMART Only	**651012-1444-102**	**651012-4414-202**
With SMART/AGC	**651012-1444-103**	**651012-4414-203**
800 MHz Cellular A&B Bands		
Basic Amplifier	**651013-1444-100**	**651013-4414-200**
With AGC Only	**651013-1444-101**	**651013-4414-201**
With SMART Only	**651013-1444-102**	**651013-4414-202**
With SMART/AGC	**651013-1444-103**	**651013-4414-203**
GSM/900 MHz Trunked Radio		
Basic Amplifier	**651016-1444-100**	**651016-4414-200**
With AGC Only	**651016-1444-101**	**651016-4414-201**
With SMART Only	**651016-1444-102**	**651016-4414-202**
With SMART/AGC	**651016-1444-103**	**651016-4414-203**

Electrical Specifications – Typical

	800 MHz Trunked Radio		AMPS Cellular		900 MHz Trunked Radio/GSM	
Description	**Downlink**	**Uplink**	**Downlink**	**Uplink**	**Downlink**	**Uplink**
Frequency of Operation, MHz	851 - 869	806 - 824	869 - 894	824 - 849	935 - 960	890 - 915
Gain, dB	30 - 40	30 - 40	30 - 40	30 - 40	30 - 40	30 - 40
Amplifier No. 1						
3rd Order Intercept, dBm	+27	+40	+27	+40	+27	+40
1 dB Compression Point, dBm	+17	+30	+17	+30	+17	+30
Noise Figure, dB	11	9	10	10	–	–
Amplifier No. 2						
3rd Order Intercept Point, dBm	+40	+27	+40	+27	+40	+27
1 dB Compression Point, dBm	+30	+17	+30	+17	+30	+17
Noise Figure, Amp No. 2, dB	9	11	–	–	10	10
Pass Band Ripple, dB	<4	<4	<4	<4	<4	<4
VSWR	2:1	2:1	2:1	2:1	2:1	2:1
Input Voltage, Vac, 47 - 70 Hz	90 - 260	90 - 260	90 - 260	90 - 260	90 - 260	90 - 260
Power Consumption, watts	50	50	50	50	50	50
Enclosure Type	NEMA4 (IP66)	NEMA4 (IP66)	NEMA4 (IP66)	NEMA4 (IP66)	NEMA4 (IP66)	NEMA4 (IP66)
Size, in (mm)	13 x 9.9 x 4.8 (330 x 251x 122)	13 x 9.9 x 4.8 (330 x 251x 122)	13 x 9.9 x 4.8 (330 x 251x 122)	13 x 9.9 x 4.8 (330 x 251x 122)	13 x 9.9 x 4.8 (330 x 251x 122)	13 x 9.9 x 4.8 (330 x 251x 122)
ac Power Inlet	TURCK® RSF30	TURCK® RSF30	TURCK® RSF30	TURCK® RSF30	TURCK® RSF30	TURCK® RSF30
RF Connectors	Type N Female	Type N Female	Type N Female	Type N Female	Type N Female	Type N Female
Operating Temperature Range, °C (°F)	-20 to 50 (-4 to 122)	-20 to 50 (-4 to 122)	-20 to 50 (-4 to 122)	-20 to 50 (-4 to 122)	-20 to 50 (-4 to 122)	-20 to 50 (-4 to 122)



Application Information

ACE Amplifiers can be used as off-air interface or as line distribution amplifiers. When used as off-air, two ACE amplifiers in tandem can be used to provide 60-80 dB of gain. In the downlink path, ACE No. 1 provides pre-amplification and ACE No. 2 provides power amplification. In the uplink path, the opposite occurs, with ACE No. 2 providing pre-amplification and ACE No. 1 providing power amplification.

ACE No. 2 can also be used as a line distribution amplifier to continue coverage along a length of HELIAX® or RADIAX® as an alternative to RADIAMP™ when additional gain (> 20 dB) or output power is required over that of the RADIAMP.

The ACE amplifier can be provided with a variety of options, including automatic gain control and remote monitoring. The NEMA enclosure ensures operation in harsh environments.

Details on how to install your own ACE in-building system are provided in the Andrew Building Planning Guide. This guide provides system designers the information necessary to design, install, and operate an in-building system.

Ask for
Bulletin 1947

Null Kits

Distribution Amplifiers

Kiosk Kit

Moderate Building Kit

Fill in Shielded Pockets within Your Coverage Area

Null kits include all the material required to fill a coverage null in one easy kit. The kits extend wireless coverage inside kiosks and small buildings. Determining the need for a null kit is simple. If you can successfully communicate outside of a building, but not inside, you need an Andrew null kit.

Kits include an RF amplifier, HELIAX® coaxial cable assemblies, a small, directional antenna (for communication with the base station), an omnidirectional stub antenna (for within the null area), and mounting hardware.

Two Types of Null Kits Are Offered

Kiosk Kit

The Kiosk kit is designed for small areas, such as demonstration kiosks in shopping malls, guard booths, security personnel shelters, and industrial process control rooms. It utilizes a RADIAMP™ 1200 series RF amplifier.

Moderate Building Kit

The moderate building kit is for larger areas, such as restaurants, small office spaces, stores, and indoor parking areas. It utilizes an ACE 1000 series RF amplifier. Additional amplifiers and cables can be added to further extend the coverage.

Ordering Information

Description	RF Amplifier Type	Model No.
Kiosk Kit		
800 MHz AMPS Cellular	RADIAMP 1200 Series	**65NULL-AMP2-000**
800 MHz ESMR	RADIAMP 1200 Series	**65NULL-TRK2-000**
900 MHz Trunked Radio/GSM	RADIAMP 1200 Series	**65NULL-GSM2-000**
Moderate Building Kit		
800 MHz AMPS Cellular	ACE 1000 Series	**65NULL-AMP1-000**
800 MHz ESMR	ACE 1000 Series	**65NULL-TRK1-000**
900 MHz Trunked Radio/GSM	ACE 1000 Series	**65NULL-GSM1-000**

Band-Selective, Bidirectional Amplifier

The ACE 1300 series amplifiers are broadband bidirectional amplifiers that provide sufficient gain to overcome free space losses experienced by RF signals. These units provide high RF output power capabilities. The units are housed in rugged NEMA 4X enclosures for use in harsh outdoor environments.

Each unit provides 60 to 80 dB of gain, and adjustment for each path is independently controlled. Automatic gain control allows the unit to be easily used in systems requiring large dynamic ranges. Pass-band filters accommodate the standard AMPS US Cellular, GSM Cellular, 800 MHz Mobile Radio and 900 MHz Mobile Radio Bands.

The unit is equipped with visual indicators for local diagnostics and fault isolation. Remote monitoring and control is achieved with the SMART interface. Communication with the SMART interface is via two wire connection or the optional dial-up modem.

Frequency Bands, MHz

	Downlink	Uplink	Model No.
800 MHz Trunked Radio	851-869	806-824	**ACE1312**
AMPS Cellular, A Band	869-880	824-835	**ACE1314**
	890-892	845-847	–
AMPS Cellular, B Band	880-894	835-849	**ACE1315**
900 MHz Trunked Radio, GSM	935-960	890-915	**ACE1316**

Ordering Information

Model Number	Type No.
Basic Amplifier	
ACE1312	**651312-5858-000**
ACE1314	**651314-5858-000**
ACE1315	**651315-5858-000**
ACE1316	**651316-5858-000**
With SMART Monitoring and Hayes Compatible Modem	
ACE1312	**651312-5858-001**
ACE1314	**651314-5858-001**
ACE1315	**651315-5858-001**
ACE1316	**651316-5858-001**

For applications information

F A X
Bulletin
AB32-06
(91815)
See page 1

Electrical Specifications

Gain (dB)	60 - 80 dB (Potentiometer Adjustable) with AGC
3rd Order Intercept Point, dBm	≥52
1 dB Compression Point, dBm	≥38
Pass-band Ripple, dB	≤4
Noise Figure, dB	≤9
Input/Output VSWR	≤2:
Power Dissipation, W	≤150

Mechanical Specifications

Enclosure Type	NEMA 4X
H x W x D, in (mm)	24 x 20 x 12 (610 x 508 x 305)
Weight, typical, lb (kg)	70 (32)
Operating Temperature Range, °C (°F)	-30 to 50 (-22 to 122)
RF Connectors	Type N
Power Input, Vac	110 (220 optional)

SelectAmp CDMA 1900 Series

Repeaters

SelectAmp CDMA 1900 with Battery Backup.

Channelized, Bidirectional Amplifier

PCS systems can now be enhanced, distributed and/or extended using a SelectAmp CDMA 1900 series repeater. The SelectAmp CDMA 1900 repeater is a channel selective, bidirectional amplifier that provides signal level enhancement in the 1900 MHz PCS frequency spectrum.

The SelectAmp CDMA 1900 repeater line is available in three basic configurations:

SelectAmp CDMA 1900-1 features 2 watts of output power in both the forward and reverse directions. This repeater has the gain and output power range required to boost RF signal levels in a variety of in-building and outdoor null fill applications.

SelectAmp CDMA 1900-1H provides 8 watts of output power in both the forward and reverse directions. This repeater has the gain and output power range necessary for large outdoor null fill sites as well as cell extension applications.

SelectAmp CDMA 1900-1HD combines the output power and performance of the SelectAmp CDMA 1900-1H with receive diversity.

Features and Advantages

Channel Selective:	Immunity to interfering signals
High Output Power:	Increased coverage and capacity
Low Group Delay:	Reduces PN search windows
Receive Diversity:	Increased uplink traffic capacity and call quality

Additional features include:

- *Remote access and monitoring via wireline connection is standard through use of the Andrew SMARTpc™ graphical user interface. A customer-supplied handset may be integrated for a wireless connectivity option.*
- *Battery back-up for service up to 2 hours (see photo).*
- *Complete solutions include the repeater, antennas, cable and all ancillary equipment required to install a repeater site.*

Specifications

Electrical	
Gain, dB	65 - 95, 2 dB step adjust
Noise Figure, dB Max	8
Input Power Requirements	90 - 260 Vac, 240 watts
Mechanical	
Enclosure	NEMA 4 (IP65)
Dimensions, H x W x D, in (mm)	16 x 12 x 12 (406 x 305 x 305)
Weight, lb (kg)	45 (20)
Temperature, Operating, °C (°F)	-40 to 60 (-40 to 140)

Ordering Information

Model	Frequency Band	Downlink Output Power, watts	Uplink Output Power, watts	Type No.
SelectAmp CDMA 1900-1	PCS Band A/D	2	2	**651931-4949-111**
SelectAmp CDMA 1900-1	PCS Band B/E	2	2	**651932-4949-111**
SelectAmp CDMA 1900-1	PCS Band C/F	2	2	**651933-4949-111**
SelectAmp CDMA 1900-1H	PCS Band A/D	8	8	**651931-6969-111**
SelectAmp CDMA 1900-1H	PCS Band B/E	8	8	**651932-6969-111**
SelectAmp CDMA 1900-1H	PCS Band C/F	8	8	**651933-6969-111**
SelectAmp CDMA 1900-1HD	PCS Band A/D	8	8	**651931-6969-113**
SelectAmp CDMA 1900-1HD	PCS Band B/E	8	8	**651932-6969-113**
SelectAmp CDMA 1900-1HD	PCS Band C/F	8	8	**651933-6969-113**

For applications information

F A X
Bulletin
AB50106
(50106)
See page 1

SelectAmp NBPCS 900 Series

Repeaters

Bidirectional, Channelized Paging Repeater

The SelectAmp NBPCS 900 paging repeater makes it possible for narrowband PCS providers to provide service to subscribers in RF-obstructed areas that were previously unreachable.

The SelectAmp NBPCS 900 is a bidirectional, channelized, paging repeater. It provides selective amplification of user specified frequencies in the 929-932, 940-941, and 901-902 MHz narrowband PCS paging bands. The unit can be configured with up to three channelizers in addition to the broadband reverse channel.

Andrew offers two versions of the channelizer. The 930 MHz unit supports the POCSAG/FLEX paging protocol; the 940 MHz unit supports the ReFLEX protocol. The 898-904 MHz reverse link provides an RF connection from the pager back to the base station.

Features

Channel Selective. *Eliminates competing and interfering signals.*

Repeater Output Power. *Linear power covers large interior areas.*

Adjustable Power Gain. *90-dB power gain allows use of small off-air antennas.*

Short Group Delay. *Compatible with tight simulcast delay spread and adjacent site constraints.*

Specifications

Electrical		
Forward Path	**930 MHz**	**940 MHz**
Frequency Range, MHz	929-932	939-941
Channel Bandwidth, kHz	12.5	50.0
Gain, dB	60 - 90	60 - 90
Noise Figure, dB Max	6.0	6.0
Output Power, watts, PEP	1	1
Group Delay, µs	<70	<30
Reverse Path		
Frequency Range, MHz		898-904
Channel Bandwidth, MHz		6
Gain, dB		60 - 90
Noise Figure, dB Max		6.0
Output Power, mW, PEP		500
Group Delay, µs		<2
Adjacent Channel Rejection, dB		>35
RF Connectors		Type N, Female
Input Power Requirements		90 - 260 Vac
Mechanical		
Enclosure		NEMA 2 (IP 30)
Dimensions, H x W x D, in (mm)		19 x 5.5 x 18 (483 x 140 x 458)
Weight, lb (kg)		40 (18)
Temperature, Operating, °C (°F)		0 to 60 (-32 to 140)
Temperature, Storage, °C (°F)		-40 to 85 (-40 to 185)
Mounting		19" Rack or Table Top

Ordering Information

Model	Number of Channels	Channel Configuration	Type No.
SelectAmp NBPCS 900	3	1, 930 MHz 2, 940 MHz	**650937-5949-310**
SelectAmp NBPCS 900	3	2, 930 MHz 1, 940 MHz	**650937-5949-320**
SelectAmp NBPCS 900	3	3, 930 MHz	**650937-5949-330**
SelectAmp NBPCS 900	3	3, 940 MHz	**650937-5949-340**
SelectAmp NBPCS 900	2	1, 930 MHz 1, 940 MHz	**650937-5949-350**
SelectAmp NBPCS 900	2	2, 930 MHz	**650937-5949-360**
SelectAmp NBPCS 900	2	2, 940 MHz	**650937-5949-370**
SelectAmp NBPCS 900	1	1, 930 MHz	**650937-5949-380**
SelectAmp NBPCS 900	1	1, 940 MHz	**650937-5949-390**

1900 MHz PCS CDMA
Repeater Kits

Andrew repeater kits are designed to take the worry out of antenna selection, cable options, connector compatibility, surge suppression, and grounding network design. Repeater kits utilize all Andrew products and provide you with a system that is pre-designed.

The major components of the repeater kits are:

- *Repeater*
- *Donor Antenna*
- *Null Antenna*
- *Interconnecting Cable*
- *Surge Arrestors*
- *Grounding Bars*
- *Mounting Hardware*

Ordering Information

For In-Building and Small Exterior Null Fill Applications		
Included Donor Antenna Type:	P2F-17-N7A	KP4F-18-NWM
Included Null Antenna Type:	PCS19SA-06316-0NG	PCS19SA-06316-0NG
Included LDF4-50A Cable Length:	150 ft (45 m)	300 ft (91 m)
A Band PCS 1900 MHz	**65KITC-5A12-111**	**65KITC-5A12-212**
B Band PCS 1900 MHz	**65KITC-5B12-111**	**65KITC-5B12-212**
C Band PCS 1900 MHz	**65KITC-5C12-111**	**65KITC-5C12-212**
D Band PCS 1900 MHz	**65KITC-5D12-111**	**65KITC-5D12-212**
E Band PCS 1900 MHz	**65KITC-5E12-111**	**65KITC-5E12-212**
F Band PCS 1900 MHz	**65KITC-5F12-111**	**65KITC-5F12-212**
For Large Exterior Null Fill and Cell Extension Applications		
Included Donor Antenna Type:	P2F-17-N7A	KP4F-18-NWM
Included Null Antenna Type:	PCS19SA-06316-0NG	PCS19SA-06316-0NG
Included LDF4-50A Cable Length:	150 ft (45 m)	300 ft (91 m)
A Band PCS 1900 MHz	**65KITC-5A18-111**	**65KITC-5A18-212**
B Band PCS 1900 MHz	**65KITC-5B18-111**	**65KITC-5B18-212**
C Band PCS 1900 MHz	**65KITC-5C18-111**	**65KITC-5C18-212**
D Band PCS 1900 MHz	**65KITC-5D18-111**	**65KITC-5D18-212**
E Band PCS 1900 MHz	**65KITC-5E18-111**	**65KITC-5E18-212**
F Band PCS 1900 MHz	**65KITC-5F18-111**	**65KITC-5F18-212**
For Large Exterior Null Fill and Cell Extension Applications with Diversity Receive		
Included Donor Antenna Type:	KP4F-18-NWM	KP4F-18-NWM
Included Null Antenna Type:	PCSD19SA-06516-0D	PCSD19-06516-0D
Included LDF4-50A Cable Length:	225 ft (69 m)	450 ft (137 m)
A Band PCS 1900 MHz	**65KITD-5A18-225**	**65KITD-5A18-226**
B Band PCS 1900 MHz	**65KITD-5B18-225**	**65KITD-5B18-226**
C Band PCS 1900 MHz	**65KITD-5C18-225**	**65KITD-5C18-226**
D Band PCS 1900 MHz	**65KITD-5D18-225**	**65KITD-5D18-226**
E Band PCS 1900 MHz	**65KITD-5E18-225**	**65KITD-5E18-226**
F Band PCS 1900 MHz	**65KITD-5F18-225**	**65KITD-5F18-226**

TMA 1900-DD

Tower Mounted Amplifiers

The TMA 1900-DD tower mounted amplifiers, described on original issue pages 686 and 687, are discontinued. They are replaced by the products described on new pages 687.11 - 687.82. Specific page numbers are listed below. The pages are also available as New Product Announcement Bulletins and are available on our On-Line Document Center.

Tower Mounted Amplifiers

Model	Description	Type Numbers	Bulletin No.	Catalog 38 Pages
TMA 800	AMPS, TDMA 800 MHz	TMA 659080-0000-120 TMA 659080-0000-110	10536	687.01, 687.02
TMA 900	GSM 900, Dual Duplex	TMA 659080-0000-330	10548	687.03, 687.04
TMA 1800	GSM 1800	TMA 659180-0000-240 TMA 659280-0000-240 TMA 659380-0000-240 TMA 659480-0000-240	10530	687.05, 687.06
TMA 1800	GSM 1800, Dual Duplex	TMA 659180-0000-340 TMA 659280-0000-340 TMA 659380-0000-340	10537	687.07, 687.08
TMA 1900	GSM 1900	TMA 659180-0000-250 TMA 659280-0000-250 TMA 659380-0000-250 TMA 659480-0000-250	10531	687.09, 687.10
TMA 1900	GSM 1900, Dual Duplex	TMA 659180-0000-350 TMA 659280-0000-350 TMA 659380-0000-350	10535	687.11, 687.12
TMA 1900	TDMA 1900	TMA 659180-0000-250 TMA 659280-0000-250 TMA 659380-0000-250 TMA 659480-0000-250	10539	687.13, 687.14
TMA 1900	TDMA 1900, Dual Duplex	TMA 659180-0000-350 TMA 659280-0000-350 TMA 659380-0000-350	10540	687.15, 687.16

The TMA 1900-DD tower mounted amplifiers, described on original issue pages 686 and 687, are discontinued. They are replaced by the products described on new pages 687.11 - 687.82. Specific page numbers are listed below. The pages are also available as New Product Announcement Bulletins and are available on our On-Line Document Center.

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TMA 900	GSM 900, Dual Duplex	TMA 659080-0000-330	10548	687.03, 687.04
TMA 1800	GSM 1800	TMA 659180-0000-240 TMA 659280-0000-240 TMA 659380-0000-240 TMA 659480-0000-240	10530	687.05, 687.06
TMA 1800	GSM 1800, Dual Duplex	TMA 659180-0000-340 TMA 659280-0000-340 TMA 659380-0000-340	10537	687.07, 687.08
TMA 1900	GSM 1900	TMA 659180-0000-250 TMA 659280-0000-250 TMA 659380-0000-250 TMA 659480-0000-250	10531	687.09, 687.10
TMA 1900	GSM 1900, Dual Duplex	TMA 659180-0000-350 TMA 659280-0000-350 TMA 659380-0000-350	10535	687.11, 687.12
TMA 1900	TDMA 1900	TMA 659180-0000-250 TMA 659280-0000-250 TMA 659380-0000-250 TMA 659480-0000-250	10539	687.13, 687.14
TMA 1900	TDMA 1900, Dual Duplex	TMA 659180-0000-350 TMA 659280-0000-350 TMA 659380-0000-350	10540	687.15, 687.16

NEW

TMA 800
Tower Mounted Amplifier

AMPS 800, TDMA 800 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 800 tower mounted low-noise amplifier from Andrew. Tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance by significantly improving the uplink noise figure.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

Featuring lightning protection, dual amplifiers and functional alarm system. Upon request, Andrew can provide a control module as an option to add power and alarm handling support.

Features:

- ***Stronger signal, wider coverage***
- ***Significantly improves uplink noise figures***
- ***Up to 50% higher ROI in new networks***
- ***Generates additional traffic, reduces site requirements***
- ***High MTBF rate***
- ***Extensive alarm functions, built-in lightning protection***
- ***Optimized for base stations***
- ***Fewer dropped calls, increased talk time***

A Tower Mounted Amplifier:
an efficient, effective way to increase coverage and enhance network performance

ANDREW®

NEW

Specifications for Tower Mounted Amplifier 800 for TDMA/AMPS 800 MHz

Electrical Specifications

Passband:	824 - 849 MHz
Band edge rejection:	65 dB
Noise figure:	2.5 dB
Input 3rd order intercept point:	10 dBm
Return loss, input:	14 dB
Return loss, output:	17 dB
DC/Alarm:	Bias-tee on co-ax center
Functional indicator:	LED, on

Mechanical Specifications

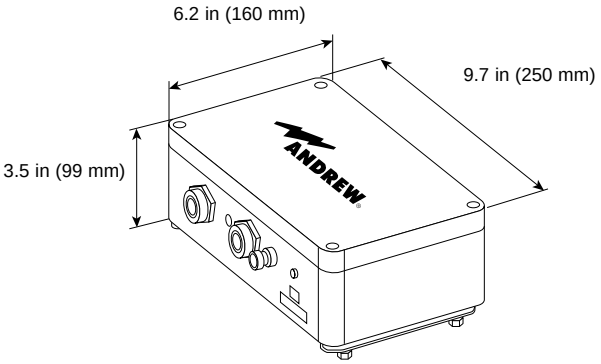
RF connectors:	7/16 female
Sealing:	IP 65
Weight:	11 lb (5 kg)
Mounting:	Pole or wall

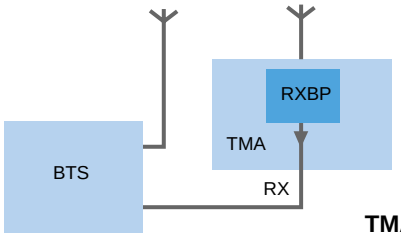
Environmental Specifications

Operating temperature:	-31° to +149°F (-35° to +65°C)
Lightning protection:	IEC 1024
Relative humidity:	5-100%, non-condensing

Ordering Information

TMA 659080-0000-120 (824-849 MHz)
TMA 659080-0000-110 (806-824 MHz)
Contact Andrew for more detailed information





TMA Simplex

ANDREW®

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Orland Park, IL 60462 USA

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Fax: 1-800-349-5444

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http://www.andrew.com

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From North America:
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NEW

EDGE Technology Compatible

TMA 900 Dual Duplex Tower Mounted Amplifier

GSM 900 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 900 Dual Duplex tower mounted low-noise amplifier from Andrew. Tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance. The Dual Duplex TMA 900 also enables use of a common Rx/Tx feeder.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

Featuring lightning protection, dual amplifiers and functional alarm system, the TMA 900 Dual Duplex for GSM 900 offers continuous dependability, even under severe environmental conditions.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Fewer dropped calls, increased talk time***
- ***Significantly improves uplink noise figures***
- ***Generates additional traffic, reduces site requirements***
- ***High MTBF rate***
- ***Extensive alarm functions, built-in lightning protection***
- ***Field-proven technical performance***
- ***Compact, easy to install***

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

ANDREW®

NEW

Specifications for Tower Mounted Amplifier 900 for Dual Duplex GSM 900 MHz

Electrical Specifications

Bandwidth:	25MHz
Receive passband:	890-915 MHz or 880-905 MHz
Transmit passband:	935-960 MHz or 925-950 MHz
Noise figure (max at 12 dB gain):	2.0 dB
Noise figure (typical at 25°C and 12 dB gain)	1.6 dB
Gain adjustable in nine steps:	6-15 dB
Input 3rd order intercept pt:	>13 dB
Tx loss:	0.5 dB
Return loss, input:	16 dB
Return loss, output:	16 dB
Max Tx input power:	200 W
DC/Alarm:	Bias-tee on co-ax center

Environmental Specifications

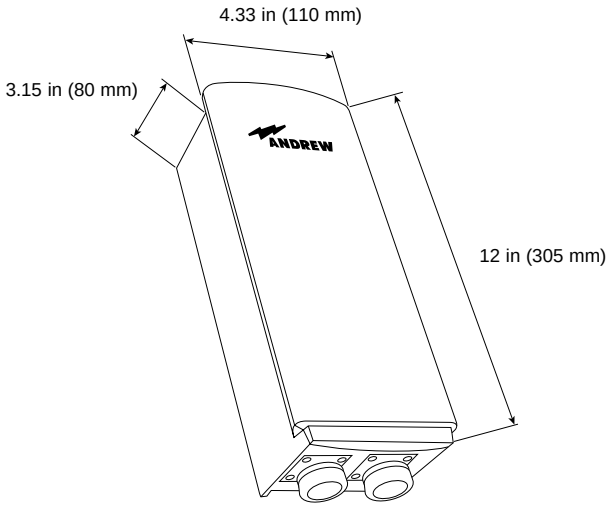
Operating temperature:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024

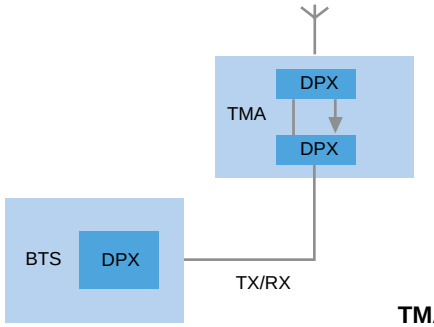
Mechanical Specifications

RF connectors:	7/16 female
Sealing:	IP 65
Volume:	0.66 gallon (3 litres)
Weight:	5.5 kg (12.1 lbs)
Mounting:	Pole or wall

Ordering Information

TMA 659080-0000-330 (890-915 MHz)
Contact Andrew for more detailed information





TMA Dual Duplex

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NEW

EDGE Technology Compatible

TMA 1800
Tower Mounted Amplifier
GSM 1800 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 1800 tower mounted low-noise amplifier from Andrew. Tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance by significantly improving the uplink noise figure.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

The TMA 1800 offers superior MTBF, and includes lightning protection, dual amplifiers and functional alarm system.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Significantly improves uplink noise figures***
- ***Up to 50% higher ROI in new networks***
- ***Generates additional traffic, reduces site requirements***
- ***High MTBF rate***
- ***Extensive alarm functions, built-in lightning protection***
- ***Optimized for radio base stations***
- ***Fewer dropped calls, increased talk time***
- ***Easy installation***
- ***Compact size***

ANDREW®

NEW

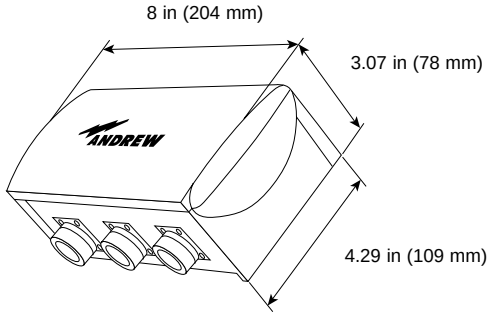
Specifications for Tower Mounted Amplifier 1800 for GSM 1800 MHz

Electrical Specifications

Bandwidth:	25 MHz (filter slotted within)
Receive passband:	1710 MHz to 1785 MHz
Transmit passband:	1895 MHz to 1880 MHz
Stopband rejection:	>85 dB
Noise figure:	1.7 dB
Gain:	12 dB
Input 3rd order intercept point:	> +10 dBm
Tx loss:	0.3 dB
Uplink IM:	<-120 dBm
Return loss, input:	>14 dB
Return loss, output:	>17 dB
Max Tx input power:	140 W
MTBF:	900,000 hrs
DC/Alarm:	Bias-tee on co-ax center

Mechanical Specifications

RF connectors:	7/16 female
Sealing:	IP 659
Volume:	0.37 gal (1.7 litre)
Weight:	4.0 lb (1.8 kg)
Mounting:	Pole or wall



Environmental Specifications

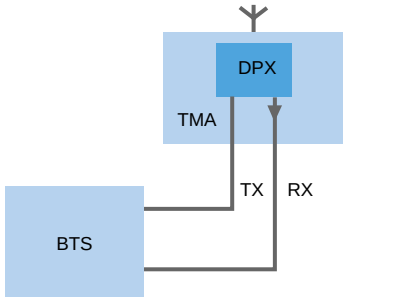
Operating temperature:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024

Options

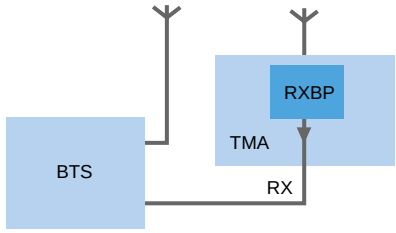
- Duplex is standard with Simplex as option
- By-pass of amplifiers when both fails

Ordering Information

TMA 659180-0000-240 (1710-1785 MHz)
TMA 659280-0000-240 (1710-1735 MHz)
TMA 659380-0000-240 (1735-1760 MHz)
TMA 659480-0000-240 (1755-1785 MHz)
Contact Andrew for more detailed information



TMA Duplex



TMA Simplex

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NEW

EDGE Technology Compatible

TMA 1800 Dual Duplex Tower Mounted Amplifier

GSM 1800 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 1800 Dual Duplex tower mounted low-noise amplifier from Andrew. Tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance, and the Dual Duplex version of the TMA 1800 allows the benefit of using a common Rx/Tx feeder.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

The TMA 1800 has been field-tested for superior MTBF, and includes lightning protection, dual amplifiers and functional alarm system. Upon request, Andrew can also provide an external duplex filter with integrated bias to properly interface base stations.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Superior reliability***
- ***Optimized for base stations***
- ***Field-proven results***
- ***Control Module available***
- ***Easy installation***
- ***Fewer dropped calls, increased talk time***
- ***Higher MTBF rate***

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

ANDREW®

NEW

Specifications for Tower Mounted Amplifier 1800 Dual Duplex for GSM 1800 MHz

Electrical Specifications

Bandwidth:	30 MHz (filter slotted within)
Receiving passband:	1710 MHz to 1785 MHz
Transmitting passband:	1805 MHz or 1880 MHz
Noise figure (typical at 25°C and 12 dB gain):	1.5 dB
Gain:	12 dB
Input 3rd order intercept pt.	>11 dBm
Tx loss:	0.5 dB
Return loss, input:	>17 dB
Return loss, output:	>17 dB
Max Tx input power:	200 W
MTBF:	900,000 hrs
DC/Alarm:	Bias-tee on co-ax center

Environmental Specifications

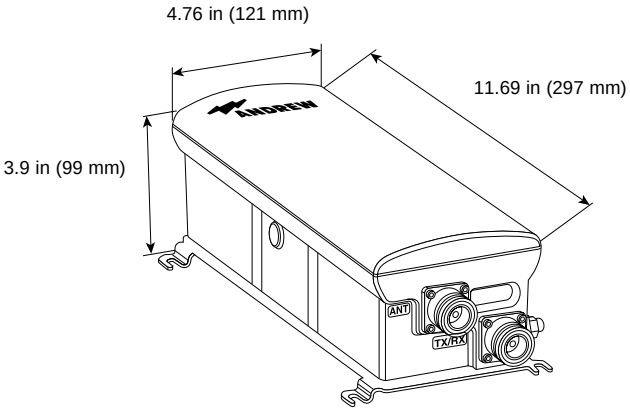
Operating temperature:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024

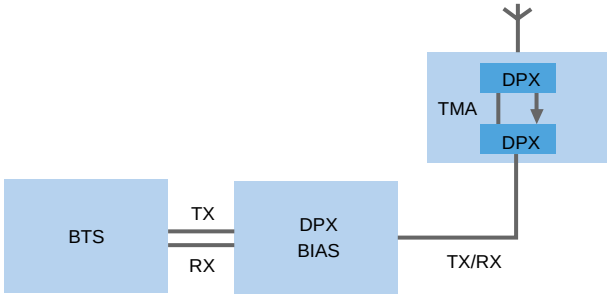
Mechanical Specifications

RF connector:	7/16 female
Sealing:	IP 65
Volume:	0.66 gal (3 litre)
Weight:	11 lb (5 kg)
Mounting:	Pole or wall

Ordering Information

TMA 659180-0000-340 (1710-1740 MHz)
TMA 659280-0000-340 (1730-1760 MHz)
TMA 659380-0000-340 (1755-1785 MHz)
Contact Andrew for more detailed information





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NEW

EDGE Technology Compatible

TMA 1900
Tower Mounted Amplifier
GSM 1900 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 1900 tower mounted low-noise amplifier from Andrew. Tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

The TMA 1900 has been field-tested for superior MTBF, and includes lightning protection, dual amplifiers and functional alarm system.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Superior reliability***
- ***Optimized for GSM 1900 base stations***
- ***Field-proven results***
- ***Control Module available***
- ***Higher MTBF rate***
- ***Fewer dropped calls, increased talk time***
- ***Easy installation***
- ***Super compact size***

ANDREW®

NEW

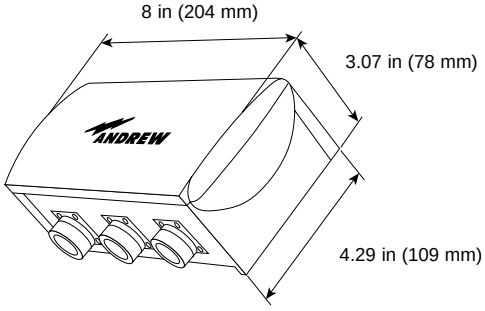
Specifications for Tower Mounted Amplifier 1900 for GSM 1900 MHz

Electrical Specifications

Bandwidth:	20 or 25 MHz (filter slotted within)
Receiving passband:	1850 MHz to 1910 MHz
Transmitting passband:	1930 MHz to 1990 MHz
Stopband rejection:	>85 dB
Noise figure:	1.7 dB
Gain:	12 dB
Input IP3:	>+10 dBm
Tx loss:	0.3 dB
All IM products in receiving band:	<-120 dBm
Input return loss:	>14 dB
Output return loss:	>17 dB
Max Tx input power:	140 W
MTBF:	900,000 hrs
DC/Alarm:	Bias-tee on co-ax center Supports dual alarms

Environmental Specifications

Temperature range:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024



Mechanical Specifications

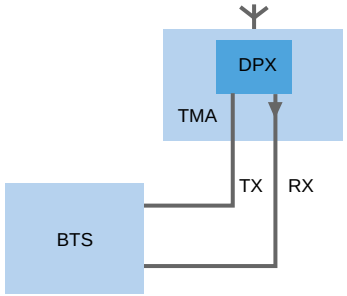
RF connectors:	7/16 female
Sealing:	IP 65
Volume:	0.37 gal (1.7 litre)
Weight:	4.0 lb (1.8 kg)
Mounting:	Pole or wall

Options

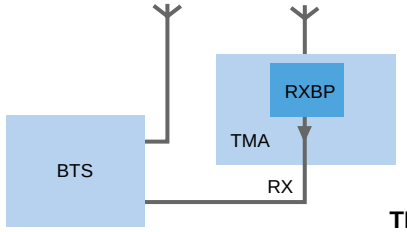
- Duplex is standard with Simplex as option
- By-pass of amplifiers when both fail

Ordering Information

TMA 659180-0000-250 (1850-1910 MHz)
TMA 659280-0000-250 (1850-1875 MHz)
TMA 659380-0000-250 (1865-1900 MHz)
TMA 659480-0000-250 (1885-1910 MHz)
Contact Andrew for more detailed information



TMA Duplex



TMA Simplex

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NEW

EDGE Technology Compatible

TMA 1900 Dual Duplex Tower Mounted Amplifier

GSM 1900 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 1900 Dual Duplex tower mounted amplifier from Andrew. These low-noise tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance. The Dual Duplex version of the TMA 1900 allows the benefit of using a common Rx/Tx feeder.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

The TMA 1900 has been field-tested for superior MTBF, and includes lightning protection, dual amplifiers and functional alarm system. Upon request, Andrew can also provide an external duplex filter with integrated bias to properly interface the base stations.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Superior reliability***
- ***Optimized for GSM 1900 base stations***
- ***Field-proven results***
- ***Control Module available***
- ***Easy installation***
- ***Fewer dropped calls, increased talk time***
- ***Higher MTBF***

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

ANDREW®

NEW

Specifications for Tower Mounted Amplifier 1900 Dual Duplex for GSM 1900 MHz

Electrical Specifications

Bandwidth:	30 MHz (filter slotted within)
Receiving passband:	1850–1919 MHz
Transmitting passband:	1930–1990 MHz
Noise figure (max at 12 dB gain):	2.0 dB
Noise figure (typical at 25°C and 12 dB gain):	1.5 dB
Gain:	12 dB
Input 3rd order intercept pt:	>+11 dBm
Tx loss:	0.5 dB
Return loss, input:	17 dB
Return loss, output:	17 dB
Max Tx input power:	200 W

Environmental Specifications

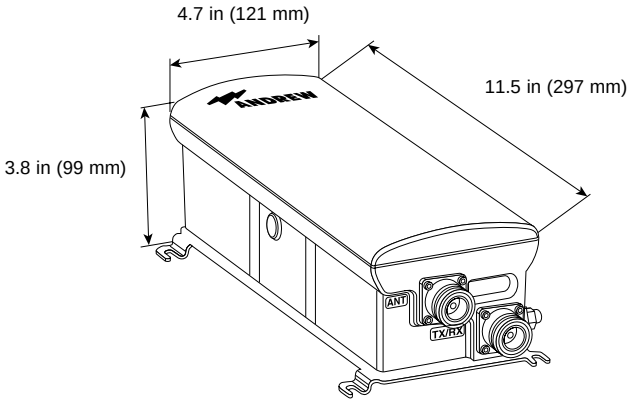
Operating temperature:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024

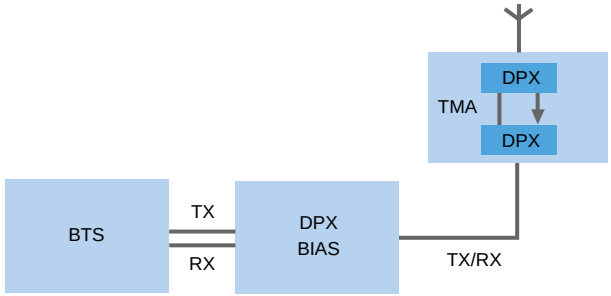
Mechanical Specifications

RF connector:	7/16 female
Sealing:	IP 65
MTBF:	900,000 hrs
Volume:	0.66 gal (3 litre)
Weight:	11 lb (5 kg)
DC/Alarm:	Bias-tee on co-ax center
Mounting:	Pole or wall

Ordering Information

TMA 659180-0000-350 (1850-1880 MHz)
TMA 659280-0000-350 (1865-1895 MHz)
TMA 659380-0000-350 (1880-1910 MHz)
Contact Andrew for more detailed information





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TDMA 1900 MHz

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A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

The TMA 1900 for TDMA 1900 has been field-tested for superior MTBF, and includes lightning protection, dual amplifiers and functional alarm system. The TMA 1900 also provides high MTBF well above the required level.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Significantly improves uplink noise figures***
- ***Up to 50% higher ROI in new networks***
- ***Generates additional traffic, reduces site requirements***
- ***High MTBF rate***
- ***Extensive alarm functions, built-in lightning protection***
- ***Optimized for base stations***
- ***Fewer dropped calls, increased talk time***
- ***Easy installation***
- ***Super compact size***

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

ANDREW®

Product Announcement

NEW

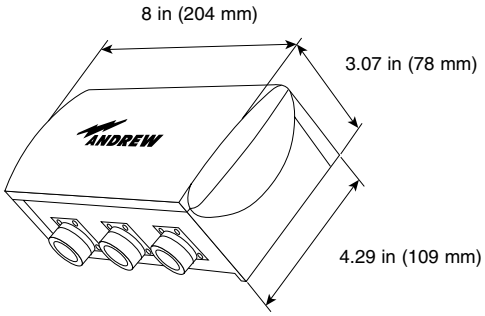
Specifications for Tower Mounted Amplifier 1900 for TDMA 1900 MHz

Electrical Specifications

Bandwidth:	20 or 25MHz (filter slotted within)
Receive passband:	1850 MHz to 1910 MHz
Transmit passband:	1930 MHz to 1990 MHz
Stopband rejection:	>90 dB
Noise figure:	1.7 dB
Gain:	13 +/- 1 dB
Input 3rd order intercept pt.	> +10 dBm
Tx loss:	0.3 dBm
All IM products in receiving band	<-120 dBm
Return loss, input:	>14 dB
Return loss, output:	>17 dB
Max Tx input power:	140 W
MTBF:	900,000 hrs
DC/Alarm:	Superimposed on RF signal

Environmental Specifications

Operating temperature:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024



Mechanical Specifications

RF connectors:	7/16 female
Sealing:	IP 65
Volume:	0.37 gal (1.7 litre)
Weight:	4.0 lbs (1.8 kg)
Mounting:	Pole or wall

Options

- Duplex is standard with Simplex as option
- By-pass of amplifiers when both fails

Ordering Information

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TMA 659280-0000-250 (1850-1875 MHz)
TMA 659380-0000-250 (1865-1900 MHz)
TMA 659480-0000-250 (1885-1910 MHz)
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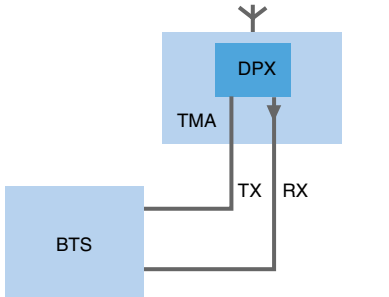
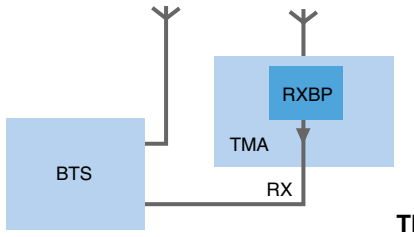


TMA Duplex



TMA Simplex

ANDREW®

Andrew Corporation

10500 W. 153rd Street
Orland Park, IL 60462 USA

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NEW

EDGE Technology Compatible

TMA 1900 Dual Duplex Tower Mounted Amplifier

TDMA 1900 MHz

Boost coverage, reduce system noise, and improve uplink sensitivity by installing a TMA 1900 Dual Duplex tower mounted low-noise amplifier from Andrew. Tower mounted amplifiers (TMA's) are an effective way to increase coverage and enhance network performance, and the Dual Duplex version of the TMA 1900 for TDMA 1900 allows the benefit of using a common Rx/Tx feeder.

In new networks, a TMA can reduce initial investment by simplifying site requirements. This means faster roll-out and improved return on investment—often as high as 50% in as little as three years.

A TMA can enhance quality and coverage by improving system performance, creating the potential to generate extra traffic and increase net revenue. In existing networks, the amplifer can pay for itself within the first few months.

Field-proven results

Your customers count on accessibility and reliability, and nothing improves the performance of your network like a boosted signal. In fact, operator statistics show that a stronger signal can reduce the amount of dropped calls by as much as 50% as it increases total talk time by up to 10%.

The TMA 1900 has been field-tested for superior MTBF, and includes lightning protection, dual amplifiers and functional alarm system. Upon request, Andrew can also provide an external duplex filter with integrated bias to properly interface radio base stations.

Features:

- ***For EDGE Applications***
- ***Stronger signal, wider coverage***
- ***Significantly improves uplink noise figures***
- ***High MTBF rate***
- ***Extensive alarm functions, built-in lightning protection***
- ***Optimized for radio base stations***
- ***Fewer dropped calls, increased talk time***
- ***Easy installation***

A Tower Mounted Amplifier: an efficient, effective way to increase coverage and enhance network performance

ANDREW®

NEW

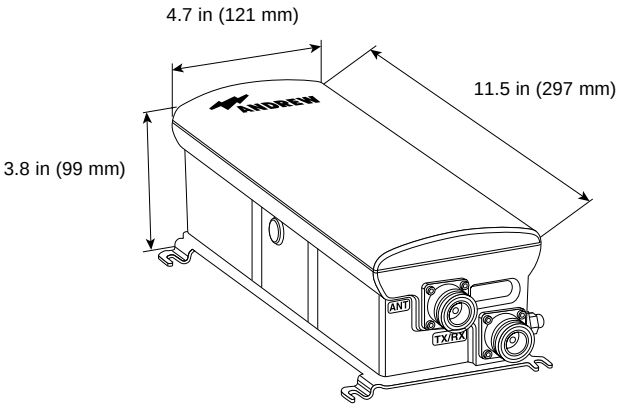
Specifications for Tower Mounted Amplifier 1900 Dual Duplex for TDMA 1900 MHz

Electrical Specifications

Bandwidth:	30 MHz (filter slotted within)
Receive passband:	1850 - 1910 MHz
Transmit passband:	1930 - 1990 MHz
Noise figure (max at 12 dB gain)	1.5 dB
Gain:	13 dB
Input 3rd order intercept pt:	>11dBm, minimum
Tx loss:	0.5 dB
Return loss, input:	>17 dB
Return loss, output:	>17 dB
Max Tx input power:	200 W
DC/Alarm:	Bias-tee on co-ax center

Mechanical Specifications

RF connectors:	7/16 female
Sealing:	IP 65
Volume:	0.66 gal (3 litre)
Weight:	11 lb (5.1 kg)
Mounting:	Pole or wall

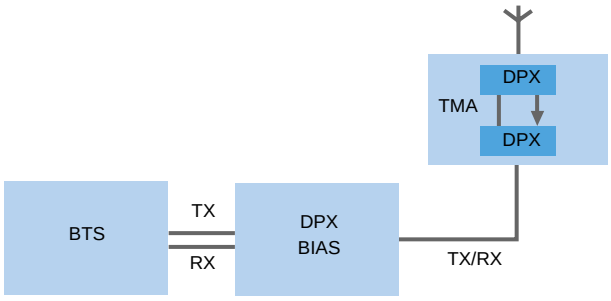


Environmental Specifications

Operating temperature:	-31° to +149°F (-35° to +65°C)
Relative humidity:	5-100%, non-condensing
Lightning protection:	IEC 1024
MTBF:	900,000 hrs

Ordering Information

TMA 659180-0000-350 (1850-1880 MHz)
TMA 659280-0000-350 (1865-1895 MHz)
TMA 659380-0000-350 (1880-1910 MHz)
Contact Andrew for more detailed information



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System Monitoring and Remote Tuning (SMART)

Supporting Products

SMARTpc Software

SMARTsentry

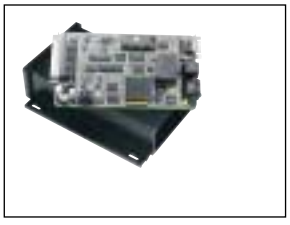
The Ultimate in Low-cost Flexibility

Description

SMART is the Andrew low-cost integrated solution to all your monitoring and control needs. It consists of SMARTpc control software that runs on any IBM-compatible PC capable of running Windows® 3.1 or subsequent upgrades, and a SMARTsentry™ in each monitored device. The SMARTsentry can be mounted internally or externally.
It is easy to add to the ACE and air interface families of boosters, as well as other devices.

Summary of Features

- *Can be configured and customized by user*
- *Uses standard telephone lines for status and control*
- *Automatic call-in from SMARTsentry upon fault occurrence*
- *Programmable call-out interval from SMARTpc*
- *SMARTpc automatically sends text paging messages to support personnel*
- *User-definable auxiliary monitoring points for entry alarm, room temperature, etc.*
- *Supports RADIAMP, ACE, and other devices*



IBM is a registered trademark of International Business Machines Corporation.
Windows is a registered trademark of Microsoft Corporation.

System Requirements

- *SMARTpc: any IBM®-compatible PC capable of running Windows® 3.1 or subsequent upgrades. A Hayes-compatible modem.*
- *SMARTsentry: 17.5 - 25 Vdc (supplied by all Andrew RF equipment) and ground. RJ-11 phone jack.*

SMARTsentry Interfaces

- *Digital: 16 inputs, 8 outputs (TTL)*
- *4 user-definable digital inputs (TTL)*
- *Analog: 4 inputs, 4 outputs (0-13V)*
- *RJ-11 modular connector for modem*
- *Optional RS-232/RS-422 interface*
- *RJ-45 modular connector for local connection*

Summary Status Display

- *Customized top-level status of all monitored devices or sites*
- *Automatically arranged from text configuration file*
- *User-definable intervals between outbound status phone calls*
- *User-initiated phone calls on demand for status or command initiation*

Detail Status Display

- *Displays all readable and set parameters in the device*
- *User ID and password protection for all changes to equipment*

Ordering Information

	Model Number
SMARTsentry™	**385615-8001-021**
SMARTpc™ Software	**385615-9001-001**

Antennas

Panel Antenna. The panel antenna is a highly directive antenna with 12 dB of gain that operates from 805 - 960 MHz. The unit offers a cost-effective solution for off-air applications .....**Type EANTT-00004**

Radiating Termination. This broadband stub antenna provides an omnidirectional radiation pattern in the 804 - 946 MHz range and is used in RADIAX® or HELIAX® applications to provide a launch for the signal from the end of the cable or through a RADIAX tap. ....**Type EANTT-00003**

Panel Antenna

Radiating Termination

Attenuators

The attenuators are used to adjust the signal level within the dynamic range of common test equipment. They operate from dc to 18 GHz at 50-ohms impedance and can handle up to 2 watts of input power. The connectors are Type N male/female.

Attenuation	Type Number
3 dB	**EATTN-09032**
6 dB	**EATTN-09062**
10 dB	**EATTN-09102**
20 dB	**EATTN-09202**

Attenuator

Bias-Tees

Used to add dc power to any coaxial cable. Ideal for use with RADIAMP™ to take advantage of using a single dc power supply to power several amplifiers. Has two RF connectors and one circular dc power connector. Direct current passes between the power connector and one RF connector while the other RF connector is isolated from the dc. The mating power cable connector is supplied with this product.

Frequency	Connectors	Type Number
200 MHz-1 GHz	7-16 DIN	**EBAST-10000**
200 MHz-1 GHz	Type N	**EBAST-10001**
1700-2000 MHz	Type N	**65ACCE-BIAS-190**

Bias-Tee

Power Dividers

The power dividers are used to separate a single signal path into multiple signal paths. The power dividers operate at 50-ohms impedance and utilize Type N female connectors.

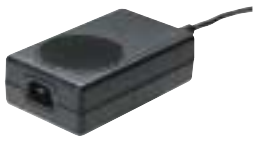
Frequency	Division	Type Number
2 - 2000 MHz	4 - Way	**EPWDV-22503**
10 - 1000 MHz	2 - Way	**EPWDV-22506**

Power Divider

RADIAMP™ Power Supplies

These small, cost-effective ac-dc power supplies accept a wide range of ac voltage inputs and provide suitable regulated dc power for RADIAMP™ amplifiers.

Description	Type Number
Desk Top, 120/220 Vac, IEC receptacle (no cord)	**EPWSP-00018**
Desk Top, 120/220 Vac, with ac power cord	**EPWSP-00023**
Wall Mount, 120 Vac	**EPWSP-00019**



Power Supply

Accessories

Filters

When broadband amplifiers are used in coverage solutions, filtering is often needed to prevent the unwanted signals from being distributed throughout the system. These band-pass filters are designed to pass certain frequency ranges in the cellular bands.

Frequency Range, MHz	Description	Type Number
870 - 880/825 - 835	A Band Cellular	**EFLTB-00400**
880 - 890/835 - 845	B Band Cellular	**EFLTB-00401**
866 - 869/821 - 824		**EFLTB-00410**
861 - 866/816 - 821		**EFLTB-00411**

Filter

dc Blocks

A high pass-filter that prevents the flow of dc on a coaxial cable. Operates from 200 MHz to 2 GHz.

Frequency Range	Connectors	Type Number
200 MHz - 2 GHz	Type N	**EBLOK-00005**
200 MHz - 2 GHz	7-16 DIN	**EBLOK-00003**

dc Block

Battery Back-up

To avoid the worry of supply power going down, extend your life with a battery back-up system. This battery back-up is for the SelectAmp CDMA family only and supplies up to 2 hours of continuous power over a wide temperature range. When a battery back-up is ordered, the power cables are supplied with the system.

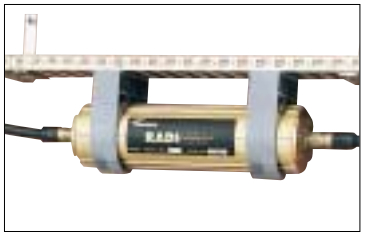
	Type Number
Battery Back-Up	**65ACCE-1800-000**
Cable	**AE02C-D3626-001**

Battery Back-up

RADIAMP™ Mounting Hangers

Two of these self-locking hangers securely mount a RADIAMP to walls and ceilings. Easily attached to concrete, drywall or wood using lag bolts and anchors for concrete or drywall. Each package contains two hangers.

Pair Self-Locking Hangers .....**Type ECLMP-70032**



RADIAMP™ Mounting Hangers

Power Cables

Power cables are supplied with each repeater or amplifier that you order, but if a replacement is needed, they are available.

Product	Type Number
RADIAMP Power Supply, SelectAmp NBPCS	**ECABL-31112**
ACE 1000	**AE02C-D0178-001**
SelectAmp CDMA, SelectAmp GSM	**AE02C-D3300-001**

Power Cables

RF Power by Andrew™

Single and Multi-Carrier Power Amplifiers

- Single Carrier Amplifiers for all wireless telecommunications and data systems.
- Low to Mid-Power Multi-Carrier Amplifiers for repeaters, microcells and wireless base stations.
- High Power Multi-Carrier Amplifiers for wireless telephony, WLL, and wireless IP systems.

Andrew offers a complete line of state-of-the-art, high performance, single and multi-carrier linear power amplifiers. These products are cost effective and meet the demanding requirements of the next generation wireless telecommunications and data system build-outs.

Low to Mid-Power Multi-Carrier Amplifiers

These amplifiers are designed to meet the most demanding modulation formats and offer versatile performance and cost savings that give system providers an added edge. Low-cost linearization techniques, such as pre-distortion, are utilized to insure optimum performance in applications where a limited number of carriers are needed.

High Power Multi-Carrier Amplifiers

These amplifiers incorporate feed forward loops to improve linearization. This approach provides a very cost competitive solution and maintains stringent system level performance criteria.

Innovative amplifier design and manufacturing is based on high power GaAs (Gallium Arsenide) and silicon power transistor technology for high performance and increased efficiency.

GaAs technology offers significant advantages for cellular, PCS, and GSM markets by allowing the design of high linearity, reliable, RF microwave amplifiers. It is the best technology for outdoor applications.

Wireless applications include: DCS, PCS, CELLULAR, WLL/WLAN, UMTS/IMT-2000, GSM, GSM/EDGE, TDMA, CDMA, and WCDMA.

Andrew Designs Provide:

- **Excellent reliability - fewer connectors, no thermal loading/expansion problems.**
- **Cost-effective installation - ease-of-use.**
- **Great linearity and efficiency - exceeds all comparable solutions in the market today.**

Equipment Shelters

Index

General Information

When You Select an Andrew Concrete Equipment Shelter

- *You decrease installation time.*
- *You prevent scheduling conflicts.*
- *You minimize installation costs.*
- *You receive consistent quality.*
- *You decrease operating expenses over the life of your system.*
- *You safeguard your valuable electronic equipment.*
- *You guarantee the success of your project now and in the future.*
- *Your customers enjoy reliable, uninterrupted service.*

Newnan, Georgia

Burlington, Kansas

Andrew Leads the Industry

Andrew leads the industry again with our shelter manufacturing facilities. Andrew offers the flexibility, time and cost savings of regionalized shelter manufacturing locations. Keep your projects on schedule when your fully integrated shelters are shipped from our facilities.

Two Manufacturing Locations to Serve You

Our shelter headquarters in Newnan, Georgia serves the Eastern and Midwest communications markets with world-class, state-of-the-art manufacturing techniques and equipment. Our Burlington, Kansas facility serves the West Coast and Midwest markets with same world-class, state-of-the-art manufacturing techniques and equipment. We invite you to visit either of our manufacturing facilities to see how Andrew offers you a total solution for your communication shelter needs.

Budget Savings

Custom design at pre-engineered prices

The Andrew computer-aided design system means that your custom requirements can be quickly and economically incorporated into our standard, pre-engineered shelters. Standard wall and door openings can be easily modified to interface with site conditions.

Eliminate extras during on-site construction

You receive shelter drawings stamped by an in-house Registered Professional Engineer, eliminating the costs and coordination problems of outside engineers, contractors, and other vendors required for on-site construction.

Andrew also provides typical foundation design recommendations at no additional charge.

Schedule Savings

Andrew pre-manufactured shelters, minimize on-site installation time and costs for electrical systems, environmental control systems, and even customer-supplied electronics. All systems are fully tested at our factory and arrive completely assembled and ready for use. Using Andrew to pre-manufactured shelters also provides an extra measure of security.

Codes, Regulations and Zoning

Andrew shelters arrive at your site compliant with state regulations and national codes.

The expense and delay in modifying the appearance of your shelter to meet local zoning regulations can be minimized with an Andrew shelter. In addition to standard exposed aggregate exterior, Andrew shelters can be delivered with fractured fin, lap siding, brick, wood panel, slump stone, or broom finishes.

Fast Coordination for Multisite Systems

Your specifications are incorporated into each shelter at our factory. Andrew provides Project Management as a single point contact for your projects. We coordinate the engineering, manufacturing, shipping, delivery and offload so that shelter fabrication, customer site acquisition, and site preparation occur in parallel.

Highly Secure

Tested Structural Integrity

Andrew concrete shelters provide secure protection for your equipment. They are fabricated with 4-inch panels of lightweight, structural reinforced concrete, making them fire, bullet, and vandal resistant. The result is an ultrasecure space for your electronic equipment, providing you and your customers with the assurance of constant on-air service.

The step-joint design makes Andrew shelters weatherproof. Each panel joint is constructed to channel water away from the building and your equipment.

In addition, our in-house concrete batch-testing equipment offers immediate results to verify the structural integrity of each shelter. The shelter's construction protects your operations from interruptions due to gale-force winds or seismic disturbances.

Protection from lightning also can be provided by equipping your shelter with suitable grounding systems.

Andrew shelters are quickly and easily off-loaded. They also allow more flexibility when selecting crane size because they're so light.

Virtually Maintenance Free

The sealed-joint construction of an Andrew shelter makes it virtually maintenance free. Positive compression seals make exterior doors weather resistant and keeps your sensitive equipment in a secure environment.

With the selection of interior climate control components, damage to your valuable equipment from temperature extremes and excessive humidity can be avoided, safeguarding operations and revenues for years to come.

Safe and Sure Delivery

To ensure that your shelter arrives on schedule, our transportation department carefully reviews each state's weight and dimensional restrictions, along with permit and escort requirements. Each shelter also includes cast-in-place lifting points to facilitate off-loading and positioning.

Andrew Added Value

After-sale support - 24 hours a day/7days a week

Our after-sales support service includes 24-hour telephone assistance. The Customer Support Center can be reached toll-free at **1-800-255-1479.**

Equipment installers are certified at the Andrew Institute.

Installed radio and dc power racks.

Installed fiber optic distribution frames and splice cabinets.

Installed telco cabinet.

Radio and Telco Equipment Integration

Andrew offers factory installation of customer-supplied radio and telco equipment. Compared with traditional on-site installation, the result is higher quality, lower costs and greatly simplified logistics.

Our certified technicians install your equipment in your shelter at the Andrew shelter facility. Before the shelter leaves the factory, we perform prescribed tests, thoroughly clean and inspect the interior of the shelter, and provide final packing to ensure your shelter arrives on site in excellent condition.

Consistently High Quality

Andrew uses experienced installers. They all have Andrew Institute certification. They also have OEM certification, as required.

Our Quality Control experts conduct thorough inspections during the installation and a final inspection at the time of shipment. RF cables are return loss tested, alarm terminations are verified, and an initial power up test is performed. Optional tests include battery float and ATP/optimization.

Consistent Installation Detail

Equipment racks are positioned consistently, shelter after shelter. Power wiring, RF jumpers, and alarm wires are always positioned the same way on the cable ladder, and equipment grounds are installed uniformly. Labels have a consistent appearance and are installed in the same locations.

Consolidation Means Lower Costs

Your shelters, with OEM equipment installed, are shipped to the site. Shipping, warehousing, and handling are all consolidated, and total costs are reduced.

Get On the Air Faster

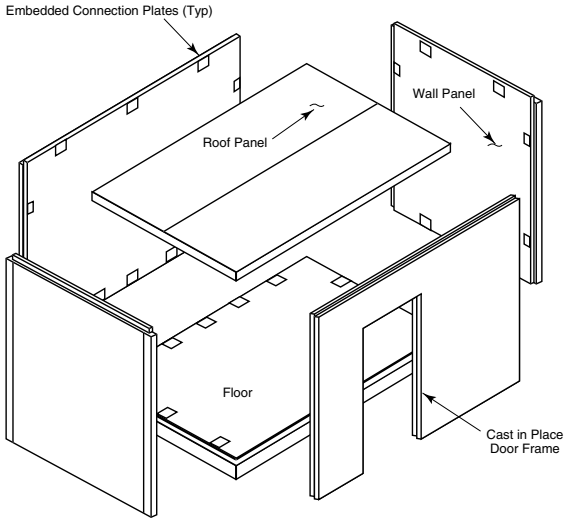
Before your shelter leaves our factory, it is thoroughly cleaned. The floor is mopped and waxed, equipment is wiped down, and a thick protective paper is installed on the floor.

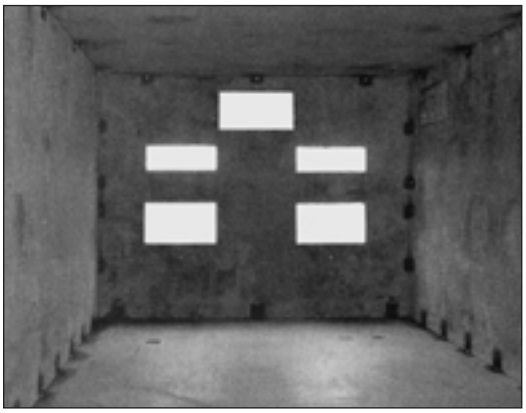
When your shelter arrives at the site, it is ready to go. Time for field installation of equipment and cleaning is eliminated.

Typical Equipment Integrated

- *Analog and digital cellular control, RF and auxiliary racks*
- *IDEN systems control, RF and power frames*
- *ESMR control, RF and power frames*
- *Fiber optic distribution frames and splice cabinets*
- *Fiber optic OC-192 frames*
- *DC power plants—rectifier, battery and PDF cabinets*
- *HELIAX® RF jumpers and connectors*
- *Entry port trapeze and hardware*
- *RF surge suppressors and telco entry surge suppressors*
- *Alarm blocks and associated wiring*
- *Miscellaneous racks*

Structural Options





Connection plates are cast into the concrete panels. All panel connections are welded together.

Shelter Construction Details

Roof Panels. The roof is a flat panel of reinforced concrete 4 inches thick, with a 1/8-inch per foot pitch for drainage. Reinforcement consists of #4 rebar and welded wire fabric (WWF) throughout. The roof panels of an Andrew concrete equipment shelter will resist penetration from falling objects, such as a block of ice weighing up to 100 pounds dropped from a height of 200 feet.

Wall Panels. The walls are flat panels of reinforced concrete 4 inches thick. Reinforcement consists of #4 rebar and welded wire fabric (WWF). Each wall has a 2-hour fire rating and a 30.06 bullet resistance in accordance with UL752-LEVEL IV. Andrew also offers a 3" thick wall with a 1-hour fire rating. Door frames are cast into the concrete wall panels to prevent vandalism and water leakage around the frames.

Insulated Floor Panel. The floor is a 6-inch deep ribbed slab of reinforced concrete. The transverse ribs are spaced every 30 inches maximum, on center. Reinforcement consists of #6 rebar through each rib and around the edges of the panel. The floor deck is reinforced with welded wire fabric (WWF).

Panel Connections. Headed stud connection plates are cast into the roof, wall, and floor panels and are welded together after panel alignment.

Weatherproofing. All wall panels are protected by the use of an acrylic concrete sealer that resists/inhibits water absorption and freeze/thaw damage. Shelters are fabricated by using solid, one-piece panels with no seams. All joints between panels (wall-to-ceiling, wall-to-wall, and wall-to-floor) are sealed with an expanded foam sealant tape. Additionally, horizontal joints feature a step-joint, and vertical joints are caulked with urethane sealant.

All doorways include a step-joint threshold and a drip cap over the top of the jamb to prevent water from entering the shelter.

Earthquake-Resistant. Andrew shelters, with the proper foundation and four tie-down locations, offer protection from damage caused by earthquakes. Andrew shelters meet the requirements of the Seismic Zone 4 classification, the most stringent structural standard specified for buildings located in areas subject to frequent and major seismic activity.

Foundations

Foundation design recommendations are provided at no charge upon request with each Andrew concrete shelter. We offer recommendations for slab, grade beam and pier type foundation designs.

Structural Openings

All openings for the options you order are cast into the shelter panels at the time of manufacture and are included in the price. Steel rebar is added to strengthen the perimeter of each opening.

Standard Shelter Sizes

The standard shelter has and exterior dimension of 10 feet, 4 inches in height and are available in sizes ranging from 6-feet wide to 12-feet wide and in single piece lengths of up to 40-feet long. Multiple piece shelter designs are also available.

Architectural Considerations

Andrew shelters meet or exceed specified state and nationally recognized building codes, minimizing the expense of modifications required to obtain your permits.

The basic Andrew shelter complies with the following list of building codes. Andrew can also provide designs to accommodate nonstandard structural or code-specific requirements.

- *National Electrical Code (NEC)*
- *Uniform Building Code (UBC)*
- *Building Officials and Code Administrators (BOCA)*
- *Standard Building Code (SBCCI)*
- *American Concrete Institute (ACI)*
- *American National Standard Institute (ANSI)*
- *American Standard Testing Materials (ASTM)*
- *National Fire Protection Association (NFPA)*
- *Ohio Basic Building Code (OBBC)*
- *International Building Code (IBC)*

Careful selection of optional architectural details of the shelter may simplify the zoning and installation permit processes.

Attractive textures in exposed aggregate, fractured fin, lap siding, brick, broom, wood panel, or slump stone, stucco, and other custom finishes can be provided to promote community acceptance of your shelter. Exterior door frames are cast in place as the wall panels are manufactured. Standard doors are equipped with security hinges and non-removable pins. High-security lock options are also available. Security screens can also be cast in place to prevent entry through ventilation openings.

State Laws and Regulations

More and more states are now regulating, by law, the transportable equipment shelter industry. Failure to adhere to these laws can result in fines to the building owner and manufacturer, or worse, the removal of non-approved buildings by the state or local jurisdictions.

Andrew is a recognized, certified shelter manufacturer and meets or exceeds the toughest state certification standards. To facilitate state approval of specific installations, Andrew submits shelter design drawings that are stamped by a Registered Professional Engineer along with any necessary forms and fees to the appropriate state agency. Each building goes through an extensive quality control inspection process and may also receive additional inspections by either state inspectors or their third party agency inspectors.

All shelters produced for these states are clearly labeled as approved units per the specific state laws. These steps by Andrew will ensure that your permit process goes smoothly and will also eliminate the risk of fines or other unpleasant consequences for using unapproved building systems.

Architectural Options

Shelter Aesthetics

Exterior Finishes. An exposed aggregate finish is standard with the basic shelter. The aggregate is an integral part of the concrete mix when the shelter panel is poured. The aggregate is poured not glued or seeded to the surface. This provides the strength and durability of solid concrete. Some of the optional exterior finishes available are:

- *Brick*
- *Fractured Fin*
- *Stucco*
- *Slump Stone*
- *Wood Panel*
- *Lap Siding*
- *Broom Finish*

Exterior Paint/Sealer. A variety of exterior colors are available when an optional exterior finish is specified. The paints are made specifically for concrete. In addition to enhancing the appearance of the shelter, painting protects the concrete from weather.

Door Types

Standard steel doors and optional bullet-resistant doors are available for Andrew concrete shelters.

Interior Options

A variety of wall panels, insulation values, flooring and partition walls are also available for your Andrew concrete shelter.

Insulation with Paneling. Shelter insulation reduces heating and air conditioning operating costs. A variety of insulation values and wall panels are available. The finished walls provide a durable finish. All seams are finished with trim and mopboard at floor. The standard, unfinished shelter has an R value of 2.

Floor Tile. Standard shelters include 1/8-inch thick, 12 inch square floor tile, Other colors are available upon request. Tile is applied directly to the concrete floor.

Partition Walls and Doors. A two-room shelter can be created by using optional partition walls and doors or fencing. You can separate, for example, the generator and the electronic equipment. Walls are 2 x 4 stud construction, 24 inches on center, coverd by wall panels. One and two-hour fire construction are available. All seams are trimmed. Partition wall doors include hardware, passage knob and white painted finish.

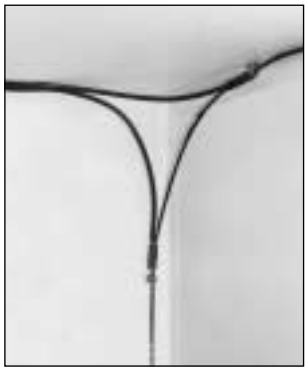
The Andrew Electrical System

Andrew shelters have an electrical system that is specifically tailored to your requirements. Andrew uses only standard, commercially available components for the ultimate in reliability and ease of equipment connection. Your system is designed to meet National Electrical Code (NEC).

When your shelter's electrical system is installed by Andrew, you:

- *Ensure a custom-designed system at pre-engineered prices*
- *Safeguard your personnel*
- *Provide for all necessary grounding to protect the investment in your equipment*
- *Ensure expedited permit approval*
- *Get trouble-free, factory installation and testing to minimize the expense of on-site technicians*

Grounding/Lightning Protection Systems



Grounding Systems

Andrew equipment shelter grounding systems are designed according to particular customer needs and applications. While the halo grounding system can serve the minimum needs of most installations, certain sites may require a more rigorous system due to increase lightning susceptibility. The Andrew engineering staff can provide such systems with a variety of options to increase lightning protection and electromagnetic interference attenuation.

Surge Arrestors

The interior-mounted surge arrestor is designed to protect against transients caused by lightning or power switching surges. It is wired on the line side before the main breaker unless otherwise specified by the manufacturer or customer.

HVAC Systems

Exerior Wall Units

Andrew offers a variety of standard, field-proven HVAC components. This selection allows you to customize the shelter's equipment configuration according to the level of protection you choose to optimize the shelter's environment.

Environmental Considerations

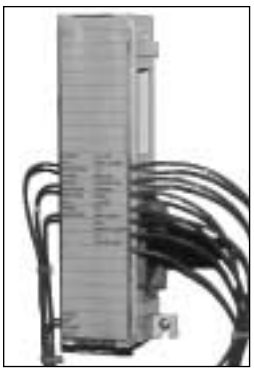
Installing an HVAC system that is tailored to your requirements ensures you of the most cost-effective management of temperature and humidity. An effective HVAC system can extend the service life of your electronic equipment. A fully redundant air conditioning system, for example, offers unmatched reliability, lowers maintenance costs, and improves system life. Pre-installed HVAC systems are fully tested and provide fast field commissioning and reliable operation.

Cable Ladder and Wireway Safety/Security Options

The cable ladder and wireway offer flexibility and maximum labor efficiency for field-wired circuits. The Andrew enclosed wireway is UL listed and conforms to the National Electrical Manufacturers Association (NEMA) Type 1 requirements. All cable ladder layouts must be grounded per the National Electric Code (NEC), Section 250-75. The wireway features hinged side covers that provide the convenience of lay-in installation of conductors throughout the run.

The security and safety options available for Andrew concrete shelters provide protection for both your equipment and operating personnel. Remote alarm systems provide operations personnel located at off-site monitoring stations with instantaneous notification of unusual or hazardous conditions. Fire suppression systems and personnel safety equipment minimize damage to operational components and the risk of injury.

Cable Ladder

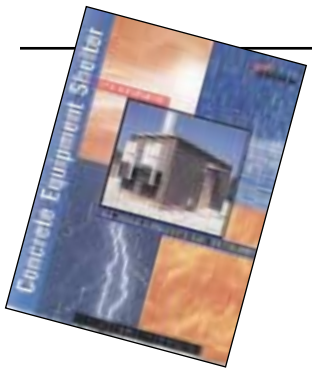


66 Punch Block

Smoke Alarm

Your 10-year guarantee from Andrew

All Andrew shelters include this 10-year guarantee: We will repair or replace your shelter at the option of Andrew Corporation at no cost to you if its structural integrity fails when used within the specified loads and conditions. For complete details on the Andrew Corporation Ten-Year Limited Concrete Shelter Warranty, contact the Shelter Product Line at (770) 251-8777 and request Bulletin 1545. Andrew shelters for international applications may carry a different warranty.



For More Information

Our “Concrete Equipment Shelter” planner, Bulletin 1520E, provides all the information you need to design a shelter.

Broadband Antenna Products

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Broadband Antenna Products

Andrew Broadband Communications Antennas (BCA) deliver high performance and offer field proven reliability. They are the innovative and cost effective solution for customers of tomorrow's global broadband point-to-multipoint networks. BCA series antennas are optimized for hub site applications, for frequencies from 10 to 40 GHz.

Backed by a tradition of customer service, performance, and reliability, BCA series antennas offer a wide range of solutions that address the needs of many Broadband Wireless Access (BWA) technologies and services.

Flexibility. The BCA series antennas are offered in a wide range of patterns, sector sizes, frequency bands, mounting configurations, and gains. Andrew gives you the flexibility to select the antenna that provides the optimal performance for your system.

Performance. BCA series antennas combine the excellent pattern performance, null fill, gain, and VSWR performance that you need to maximize your coverage and revenues.

Reliability. Why gamble on your antenna selection? Andrew antennas are backed by a reputation for quality developed over more than 60 years in the wireless communications industry.

Customization. BCA series antennas can be tailored to meet your specific system requirements. Contact Andrew for details.

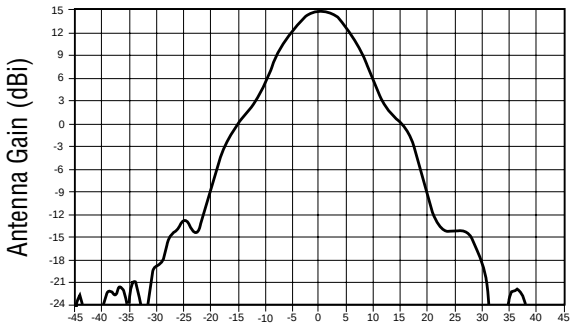
BCA Compact Sector Antennas

Compact sector antennas provide a solution for customers who need to integrate to an existing radio or who desire a low cost solution without sacrificing performance.

Product Features

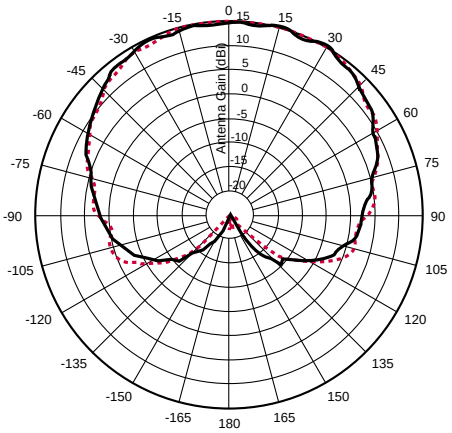
- *Compact size*
- *15 dBi gain*
- *Excellent broadband pattern performance*
- *Low VSWR across frequency band*
- *Excellent intermodulation (IM) performance*
- *Easily integrated to existing radio platforms*
- *ETSI Class 1 compliant*

Elevation Pattern



Elevation Angle (degrees below horizontal)

Azimuth Pattern



Horizontal and Vertical Polarization

Electrical Specifications

Polarization (specify at time of order)	Horizontal or Vertical
Polarization discrimination, dB	>24
Input power rating, watts	50
VSWR max. (R.L., dB)	1.5 (14)
Input connector	Waveguide cover flange See Antenna Gain table.

Mechanical Specifications

Survival wind velocity, mph (km/h)	125 (200)
Operating temperature °F (°C)	-40 to +140 (-40 to +60)
Size, approx. H x W x D, in (mm)	4.8 x 3.5 x 9.5 (122 x 89 x 241)
Color	Gray per PMS420
Weight, lb (kg)	1.1 (0.51)

Antenna Gain

Antenna Type Number	Frequency Band, GHz	Sector Size Degrees (HPBW)	Gain, dBi, Nominal	Waveguide Type
BCAC090-285(*)	26.35 - 31.3	90	15	WR28
BCAC090-250(*)	24.25 - 26.5	90	15	WR42

* Specify H for horizontal polarization or V for vertical polarization

High gain sector antennas provide superior pattern and gain performance in an efficient size and weight. Available azimuth sizes include 45°, 60°, 90°, and 180° in either horizontal or vertical polarization.

Product Features

- *High gain performance - 21 dBi @ 90°*
- *Extensive null fill for uniform coverage*
- *Equivalent pattern performance in both horizontal and vertical polarizations*
- *Broadband performance 26.35 - 31.3 GHz*
- *Low VSWR across frequency band*
- *Excellent intermodulation (IM) performance*
- *Side-entry waveguide for easy integration*
- *Optional mount available with elevation vernier for downtilt adjustment of up to ±5°*

Electrical Specifications

Polarization (specify at time of order)	Horizontal or Vertical
Polarization discrimination, dB	>24
Input power rating, watts	50
VSWR max. (R.L., dB)	1.5 (14)
Input connector	Waveguide cover flange See Antenna Gain table.

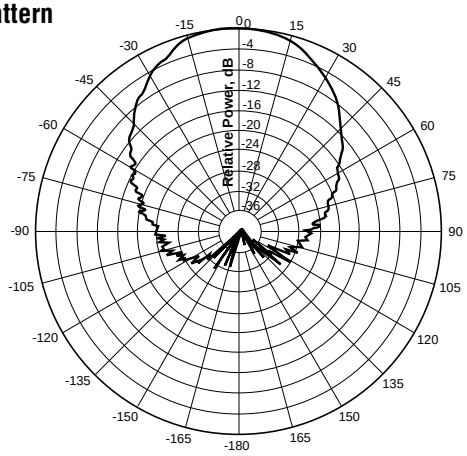
Mechanical Specifications

Survival wind velocity, mph (km/h)	125 (200)
Operating temperature °F (°C)	-40 to +140 (-40 to +60)
Size, approx. H x W x D, in (mm)	See outline drawings
Color	Gray per PMS420
Weight, lb (kg)	7.4 (3.4)

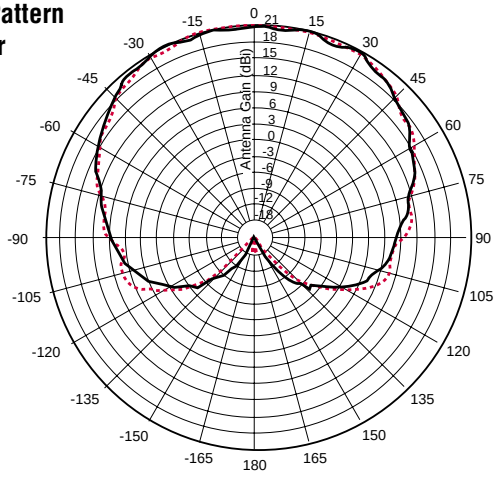
BCA High Gain Sector Antenna

Typical Patterns

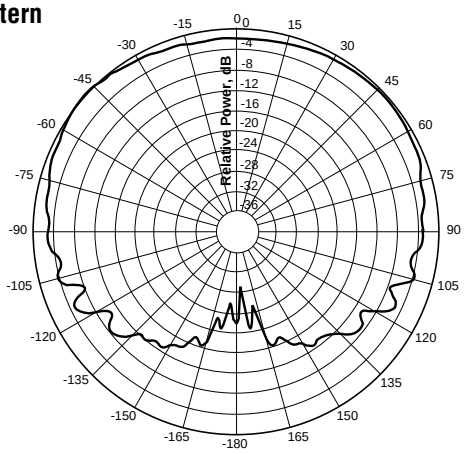
Azimuth Pattern
45° Sector



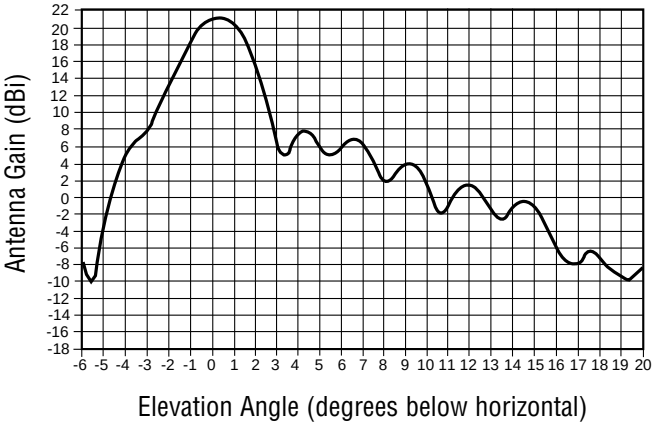
Azimuth Pattern
90° Sector



Azimuth Pattern
180° Sector



Elevation Pattern



Antenna Gain

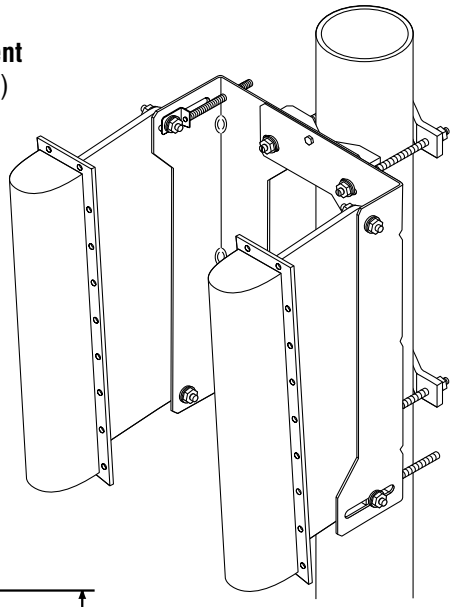
Antenna Type Number	Frequency Band, GHz	Sector Size Degrees (HPBW)	Gain, dBi, Nominal	Waveguide Type
BCAH045-285(*)-(**)	26.35 - 31.3	45	23.8	WR28
BCAH060-285(*)-(**)	27.5 - 30.0	60	22.5	WR28
BCAH090-285(*)-(**)	26.35 - 31.3	90	21	WR28
BCAH180-275(*)-(**)	26.35 - 28.5	180	18	WR28
BCAH180-300(*)-(**)	28.25 - 31.3	180	18	WR28
BCAH090-250(*)-(**)	24.25 - 26.5	90	20.5	WR42

* Specify H for horizontal polarization or V for vertical polarization
** Specify Ø - for no mount. S - for single antenna mount (shown in picture on page 705) D - for dual antenna mount

BCA High Gain Sector Antenna

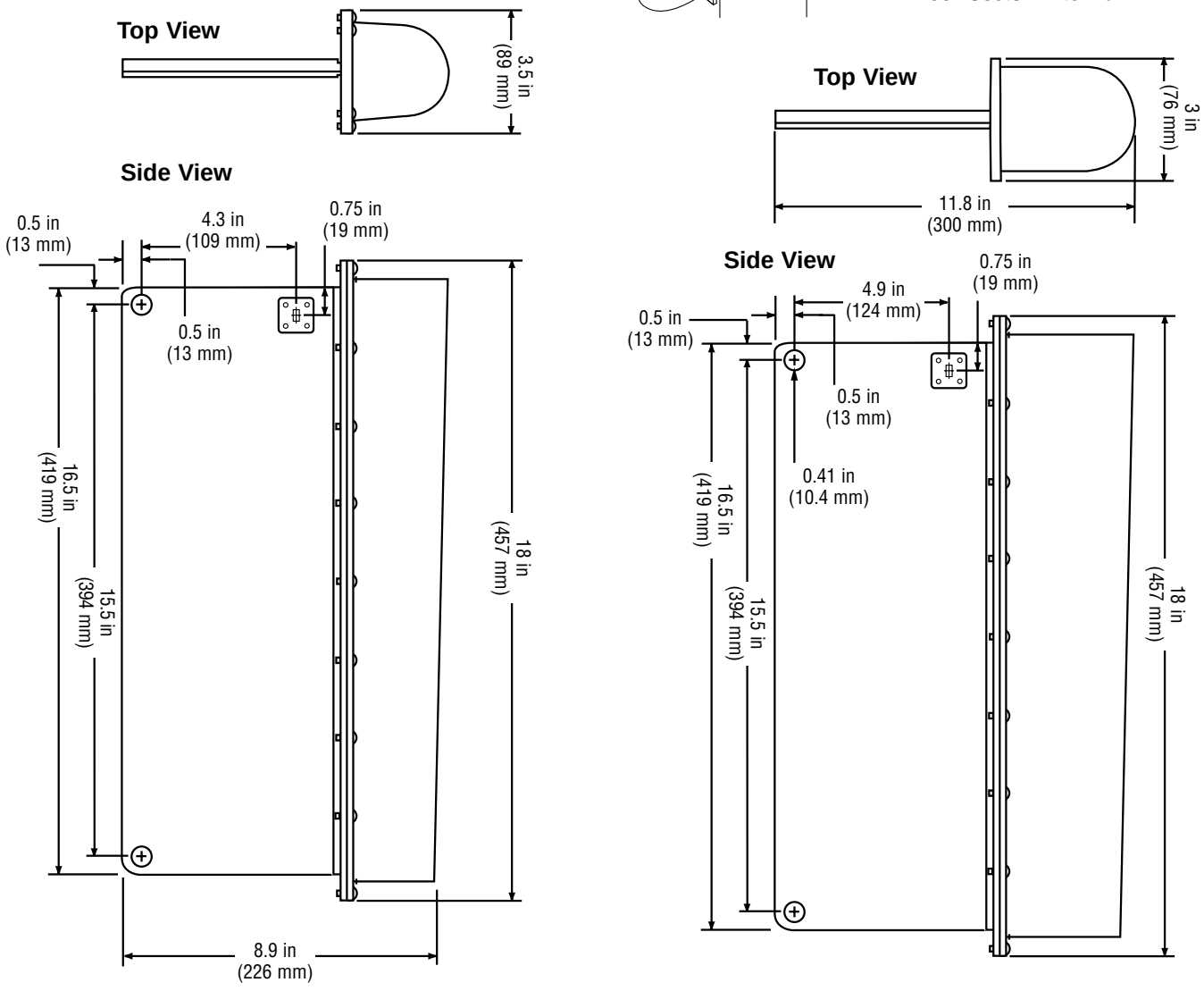
Mount and Outline Dimensions

Typical Mounting Arrangement
(Dual Antenna Configuration)



Antenna mounts to support pipe sizes from 2.375" (60 mm) to 4.5" (114 mm) diameter.

45° and 90° Sector Antennas



180° Sector Antenna

BCA Ultra-High Gain Sector Antennas

Ultra-high gain sector antennas provide unmatched gain performance and superior pattern control in an efficient size and weight. Available azimuth sizes include 45°, 60°, 90°, and 180° in either horizontal or vertical polarization.

Product Features

- *Ultra-high gain performance - 24 dBi @ 90°*
- *Extensive null fill for uniform coverage*
- *Equivalent pattern performance in both horizontal and vertical polarizations*
- *Broadband performance, 26.35 - 31.3 GHz*
- *Low VSWR across frequency band*
- *Excellent intermodulation (IM) performance*
- *Side entry waveguide for easy integration*
- *Optional mount available with elevation vernier for downtilt adjustment of up to ±5°*

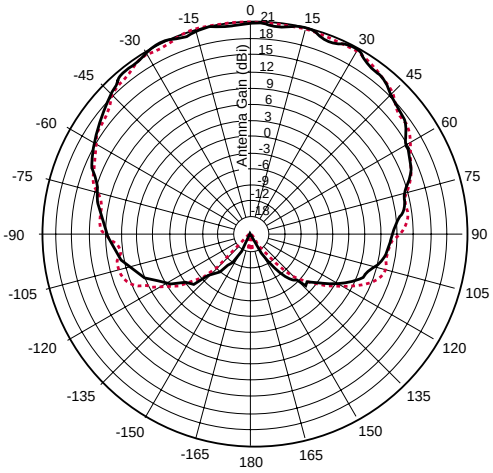
Electrical Specifications

Polarization (specify at time of order)	Horizontal or Vertical
Polarization discrimination, dB	>24
Input power rating, watts	50
VSWR max. (R.L., dB)	1.5 (14)
Input Connector	Waveguide cover flange See Antenna Gain table.

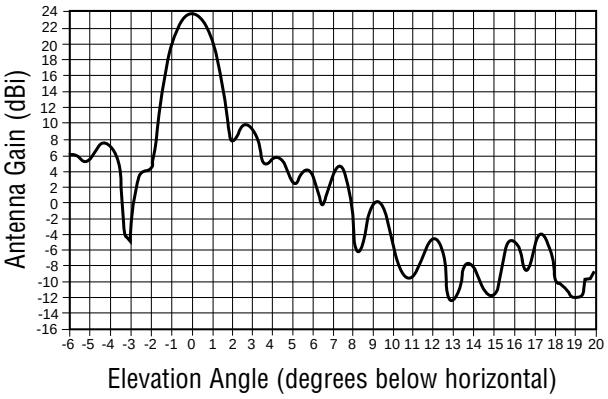
Mechanical Specifications

Survival wind velocity, mph (km/h)	125 (200)
Operating temperature °F (°C)	-40 to +140 (-40 to +60)
Size, approx. H x W x D, in (mm)	See outline drawing
Color	Gray per PMS420
Weight, lb (kg)	18.4 (8.4)

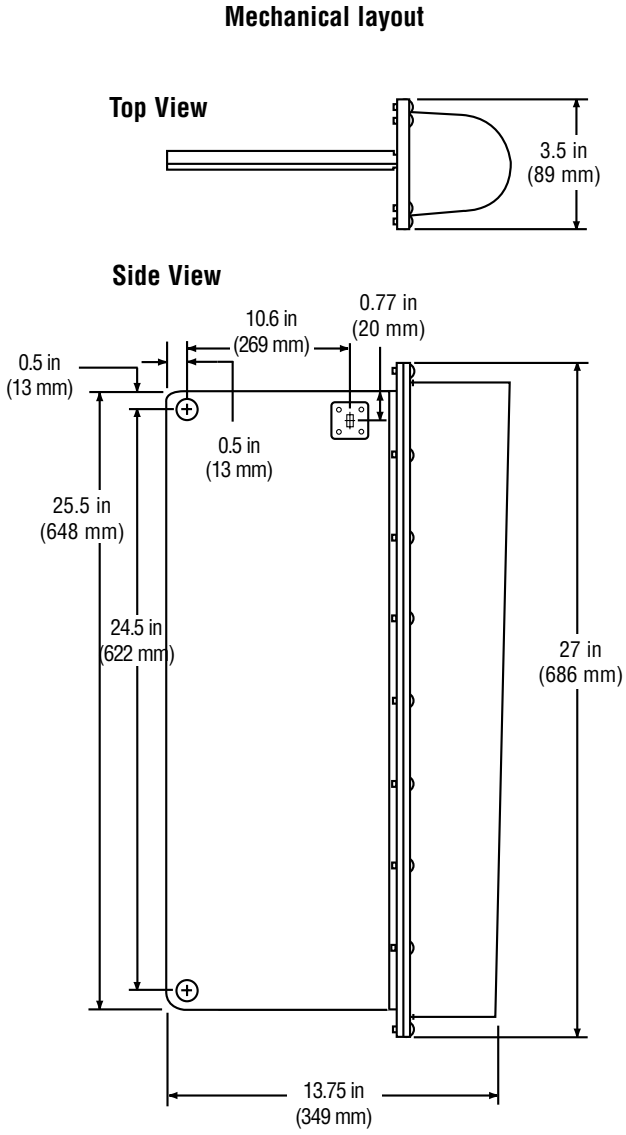
Azimuth Pattern



Elevation Pattern



Mechanical layout



Antenna Gain

Antenna Type Number	Frequency Band, GHz	Sector Size Degrees (HPBW)	Gain, dBi, Nominal	Waveguide Type
BCAX045-285(*) - (**)	26.35 - 31.3	45	26.8	WR28
BCAX090-285(*) - (**)	26.35 - 31.3	90	24	WR28
BCAX090-250(*) - (**)	24.25 - 26.5	90	24	WR42

* Specify H for horizontal polarization or V for vertical polarization

** Specify Ø - for no mount. S - for single antenna mount

BCA Mark II High Gain Sector Antennas

Introducing the newest member of the Andrew BCA series family, the Mark II high gain sector antennas. These antennas incorporate new technology that significantly improves pattern performance over previous designs. They are available in a 90° sector size for 28 and 38 GHz applications. Other sector sizes are available on request.

Product Features

- *High gain performance - 21 dBi @ 90°*
- *Improved null fill for optimized coverage*
- *Improved azimuth patterns for higher sector-to-sector and transmit/receive isolation*
- *Equivalent pattern performance in both horizontal and vertical polarizations*
- *Broadband performance, 27.35 - 28.5 GHz or 37 - 40 GHz*
- *Low VSWR across frequency band*
- *Excellent intermodulation (IM) performance*
- *Side entry waveguide for easy integration*
- *Optional mount available with elevation vernier for downtilt adjustment of up to ±5°*

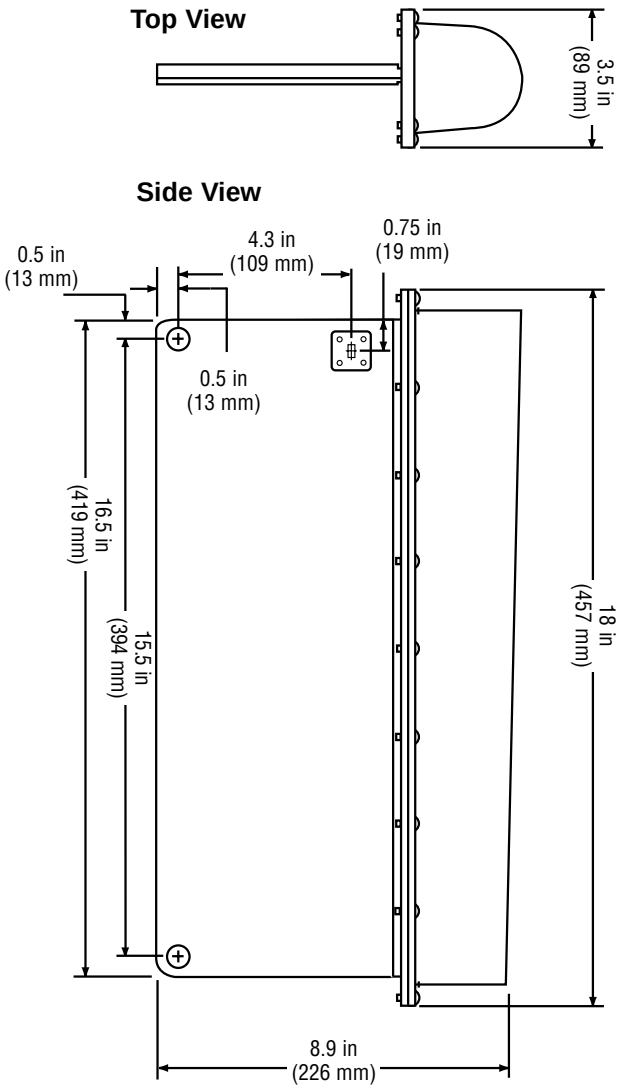
Electrical Specifications

Polarization (specify at time of order)	Horizontal or Vertical
Polarization discrimination, dB	>30
Input power rating, watts	50
VSWR max. (R.L., dB)	1.5 (14)
Input connector	WR28 cover flange

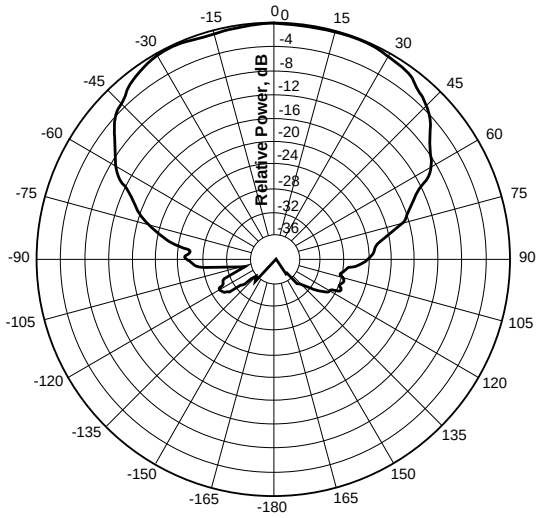
Mechanical Specifications

Survival wind velocity, mph (km/h)	125 (200)
Operating temperature °F (°C)	-40 to +140 (-40 to +60)
Size, approx. H x W x D, in (mm)	See outline drawing
Color	Gray per PMS420
Weight, lb (kg)	7.4 (3.4)

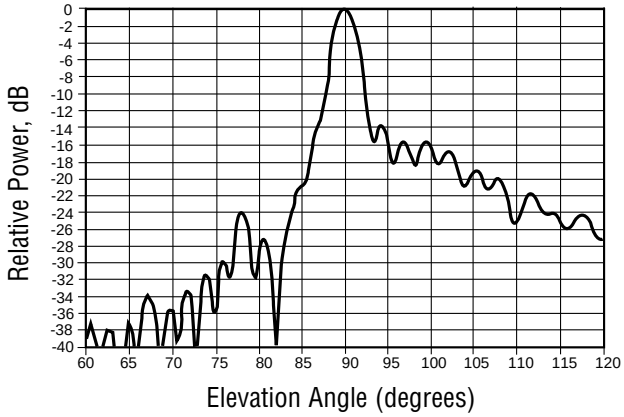
45° and 90° Sector Antennas



Azimuth Pattern (90° Sector)



Elevation Pattern (90° Sector)



Antenna Gain

Antenna Type Number	Frequency Band, GHz	Sector Size Degrees (HPBW)	Gain, dBi, Nominal	Waveguide Type
BCAH090A-285(*)-(**)	27.25 - 28.5	90	21	WR28
BCAH090A-385(*)-(**)	37.0 - 40.0	90	24	WR28

* Specify H for horizontal polarization or V for vertical polarization
** Specify Ø - for no mount. S - for single mount. D - for dual mount.

Government Antenna Systems

Index

Utilizing its broad design and manufacturing experience, Andrew has developed a wide range of antennas and antenna/pedestal systems to satisfy needs in:

- Air traffic control radar systems
- Weather radar systems
- Low and medium earth orbit satellite ground tracking systems
- Ground and airborne tracking and intercept systems
- HF communication systems
- Tactical communication antenna systems

Andrew uses its accumulated knowledge and experience to provide efficient, cost-effective solutions for special application antenna requirements.

Diverse requirements can be addressed with a wide variety of antenna configurations including parabolic reflector, log periodic, helical, bifilar, arrays, conical, discone and helicone. These antenna designs cover a broad range of frequencies from 2 MHz to 50 GHz.

L- and S-Band Air Traffic Control Antenna/Pedestal

S- and C-Band Weather Radar Antenna/Pedestal

Gear Drive Pedestal

Direct Drive Pedestal

L- and S-Band Air Traffic Control Antenna/Pedestal

- High gain and low sidelobes
- Enhanced high elevation angle performance
- High and low radiating beams with weather channel
- Dual helical gearbox
- Versatile servo amplifier
- Selectable rotation speed
- Control unit
- Rotary joint and slip rings

S- and C-Band Weather Radar Antenna/Pedestal

- Lightweight aluminum reflector design
- Proprietary NEXRAD feed system for high gain and low sidelobes
- Single and optional dual polarization
- Continuous azimuth scan and incremental stepping or sector scan in elevation
- Feed forward servo compensation
- Utility junction box
- Oil level sensor
- Local and remote controller
- Rotary joint and slip rings

Gear Drive Pedestal

- Single or dual axes
- Single or dual drives
- Inside or optional outside radome operation
- ASTM grade ductile iron casting for strength and durability
- Over torque slip clutch protection
- Interlock stow pin
- Oil lubrication bearing
- Oil level sensor
- Rotary joint and slip rings
- Controller and servo amplifier

Direct Drive Pedestal

- Post or yoke configuration
- Lightweight aluminum construction
- Precision four point contact bearing
- Environmentally sealed
- Dual motors
- Data package with pancake resolver
- Stow pin for storage and transportation
- Digital controller and servo amplifier

S-Band Air Traffic Control Radar Antenna/Pedestal System

Specifications

Electrical

Frequency Band	2.7-2.9 GHz
Gain, min	
High Beam	34 dBi
Low Beam	32 dBi
Polarization	Switchable Circular/Linear
VSWR	1.3 to 1
Beamwidth, degrees	
Elevation, nominal	7.7
Azimuth, nominal	1.4

Mechanical

Feed Type	Prime focus offset feed system aluminum chromate converted per MIL-C-5541C
Flange Type	CPR284G at output
Reflector Type	Three pieces formed aluminum mesh chromate converted per MIL-C-5514C
Wind Loading Operational	88 mph (140 km/hr) with 0.4 in (10 mm) ice on non-radiating surface
Survival	150 mph (240 km/hr) with 1.5 in (38 mm) ice

Environmental

Temperature	-50°C to +50°C
Rain	4 in (102 mm) per hour
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Relative Humidity	100%

Shipping Information

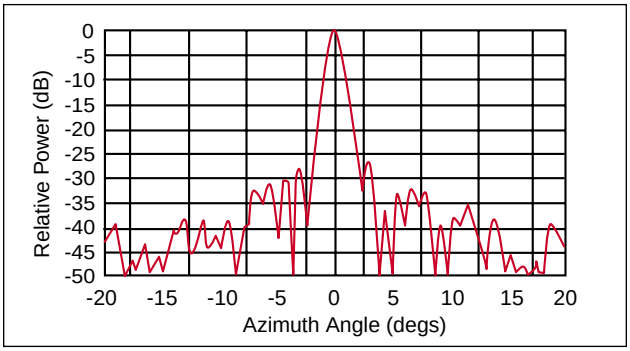
Weight, net	3,520 lb (1,597 kg)
Dimensions	13.3 ft x 13.8 ft x 16.6 ft (4.05 m x 4.20 m x 5.06 m)

Transportable via a single closed ISO container

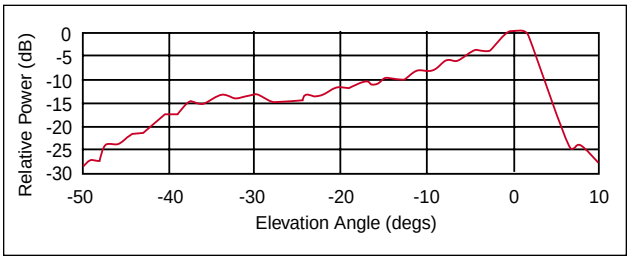
Available Options

Pedestals
Rotary Joints and Slip Rings

The Andrew S-band radar antenna was designed with the latest state-of-the-art software to generate the reflector profiles, and uses the latest technology for the feed system. These antennas are manufactured to stringent specifications and perform to the exacting standards demanded of them. Andrew has invested in extensive manufacturing tooling to ensure repeatability in production.



Typical Low Beam Azimuth Pattern at 2.8 GHz



Typical Low Beam Elevation Pattern at 2.8 GHz

S- and C-Band Weather Radar Antenna/Pedestal System

The S-band and C-band weather radar systems are the first in a family of advanced weather radar antenna/pedestal systems from Andrew. They are high quality products designed and manufactured in accordance with ISO 9001 quality assurance to stringent specifications. The family consists of a variety of antenna diameters and pedestals operating in C-band or S-band applications, including the antenna system used for the FAA/NEXRAD program.

Antenna Performance

Antenna Diameter, meters	4.5	4.5	6.1	6.1	8.5
Operating Frequency, GHz	2.7-2.9	5.4-5.9	2.7-2.9	5.6-5.65	2.7-3.0
Polarization	linear	linear	linear	linear	linear
3 dB Beamwidth, nominal	1.7°	0.95°	1.25°	0.65°	0.99°
Gain, min.	39.8 dBi	45 dBi	42.3 dBi	47.5 dBi	44.5 dBi
First Sidelobe Level	-25 dB	-30 dB	-26 dB	-26 dB	-26 dB
Cross-Polarization Discrimination	-27 dB	-27 dB	-27 dB	-27 dB	-27dB
Boresight Accuracy, max. with calibration	0.2°	0.2°	0.33°	0.1°	0.33°
Peak Power, max.	800 kW	350 kW	1 MW	250 kW	1 MW
Average Power, max.	1600 W	700 W	2 kW	125 W	2 kW
VSWR, max.	1.4	1.4	1.45	1.2	1.45
Weight, lb (kg)	880 (400)	880 (400)	1309 (595)	1309(595)	2244 (1020)

Positioner Performance for 8.5-meter Antennas

Travel		
Azimuth	Continuous	
Elevation	-3° to +92°	
Velocity		
Azimuth	0.05°/sec to 36°/sec	
Elevation	0.05°/sec to 15°/sec	
Acceleration	Rated	Max.
Azimuth	18°/sec^2	20°/sec^2
Elevation	12°/sec^2	20°/sec^2
Drive Capacity	Continuous	Peak
Azimuth	3097 ft-lb	8817 ft-lb
Elevation	3858 ft-lb	10984 ft-lb
Position Accuracy		
Azimuth	0.10°	
Elevation	0.10°	

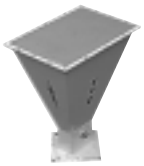
Positioner Performance for 6.1 meter and 4.5-meter Antennas

Travel		
Azimuth	continuous	
Elevation	-3° to +92°	
Velocity		
Azimuth	0.05°/sec to 36°/sec	
Elevation	0.05°/sec to 36°/sec	
Acceleration	Rated	Max.
Azimuth	18°/sec^2	20°/sec^2
Elevation	18°/sec^2	20°/sec^2
Drive Capacity	Continuous	Peak
Azimuth	1983 ft-lb	8050 ft-lb
Elevation	1983 ft-lb	8050 ft-lb
Position Accuracy		
Azimuth	0.10°	
Elevation	0.10°	

Temperature

Operating -40° C to +49° C
Non-operating -62° C to +60° C

58135 Horn Antenna



- Capable of working over a frequency range of 1400 - 2300 MHz
- Linear polarization, vertical or horizontal; input power 100 watts, CW
- 1.75 to 1 VSWR
- Gain of 13.3 to 15.8 dBi
- 150 mph (240 km/h) wind survival

55070 Airborne Antenna

- Available in specific bandwidths covering frequency ranges from 0.8 to 13 GHz
- Vertical polarization; average power rating 50 watts CW
- Gain of 5 dBi; omnidirectional radiation pattern
- Low silhouette design minimizes drag to withstand high air speeds

58200, 19050 Discone Antenna

- Frequency coverage in specific bandwidths from 215 to 2600 MHz
- Vertical polarization; input power 400 to 1500 watts CW
- 2 to 1 VSWR
- Nominal gain at 2.0 dBi
- 150 mph (240 km/h) wind survival

58700 Omnidirectional Antenna

- Available in various bands from 1400 to 3000 MHz
- Vertically polarized; input power 50 watts CW
- 1.5 to 1 VSWR
- Nominal gain at 8 dBi
- 150 mph (240 km/h) wind survival

55305, 60116, 60117 Helical Antenna

- Available in two frequency ranges: 1600 to 2000 MHz and 2100 to 2300 MHz
- Circular polarization
- 1.5 to 1 VSWR
- Gain ranging from 13 to 15 dBi
- Enclosed in a rugged radome for protection from environmental elements

63305A-5 and 63305A-6 Bifilar Helical Antenna

- Operates in the 245 to 315 MHz band
- Right hand or left hand circular polarization
- 1.5 to 1 VSWR
- Rugged, field transportable
- Collapsible tripod mount
- Optional motorized polar ground mount

171888 and 172315X Direction Finding Antennas

- 171888-Adcock array for VHF/UHF in 3 sub-bands, 20 - 100 MHz
- 172315X-Linear and slant linear polarization in 2 sub-bands, 0.5 - 2 GHz and 2 - 18 GHz
- Sector scan and variable rotation speed of up to 200 rpm for microwave DF system
- Environmentally protected in an integral radome

172601 through to 172608 Broadband High Power Antennas

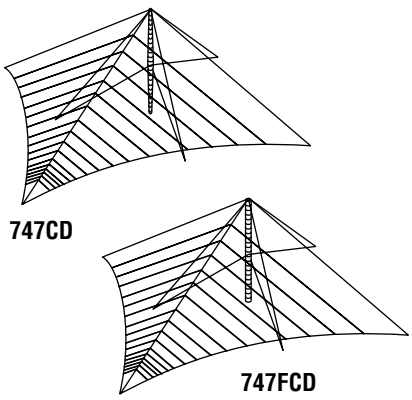
- Available in various bands from 120 MHz to 18 GHz
- Peak power rating of 4 kW at 120 MHz to 2.5 kW at 18 GHz
- Nominal gain from 12 dBi at 120 MHz to 31 dBi at 12 GHz
- Selectable LH and RH circular polarization

Revised 7/00 and 12/00

Type No.	Gain Freq GHz	Polarization	Wind Nom. dBi	VSWR	Survival mph (km/h)	Input	Dimensions, in (mm) Length	Width	Height
Horn									
58135	1.4-2.3	Lin., V/H	13.3	1.75	125(200)	N Jack	20 (508)	16 (406)	11 (279)
Airborne									
55070-03	0.39-0.40	Lin., V	5.0	1.3	600 (965)	N Jack	7.23 (184)	3.13 (80)	0.69 (18)
55070-09	0.880-0.920	Lin., V	5.0	1.3	600 (965)	N Jack	3 (76)	3.13 (80)	0.69 (18)
55070-10	1.01-1.125	Lin., V	5.0	1.5	600 (965)	N Jack	2.63 (67)	3.13 (80)	0.69 (18)
55070-13	1.27-1.37	Lin., V	5.0	1.3	600 (965)	N Jack	2.16 (55)	3.13 (80)	0.69 (18)
55070-14	1.435-1.54	Lin., V	5.0	1.3	600 (965)	N Jack	1.84 (46)	3.13 (80)	0.69 (18)
55070-15	1.575	Lin., V	5.0	2.0	600 (965)	N Jack	2.06 (52)	3.13 (80)	0.69 (18)
55070-17	1.70-1.85	Lin., V	5.0	1.3	600 (965)	N Jack	1.78 (45)	3.13 (80)	0.69 (18)
55070-17A	1.7-2.3	Lin., V	5.0	1.3	600 (965)	N Jack	1.78 (45)	3.13 (80)	0.69 (18)
55070-18	1.8-2.1	Lin., V	5.0	1.5	600 (965)	N Jack	1.78 (45)	3.13 (80)	0.69 (18)
55070-21	2.1-2.3	Lin., V	5.0	1.3	600 (965)	N Jack	1.78 (45)	3.13 (80)	0.69 (18)
55070-23	2.335-2.385	Lin., V	5.0	1.3	600 (965)	N Jack	1.78 (45)	3.13 (80)	0.69 (18)
55070-25	2.5-2.7	Lin., V	5.0	1.3	600 (965)	N Jack	1.75 (44)	3.13 (80)	0.69 (18)
55070-27	2.7-3.0	Lin., V	5.0	1.3	600 (965)	N Jack	1.28 (33)	3.13 (80)	0.69 (18)
55070-44	4.4-5.0	Lin., V	5.0	1.3	600 (965)	N Jack	0.91 (23)	3.13 (80)	0.69 (18)
55070-50	5.0-5.4	Lin., V	5.0	1.3	600 (965)	N Jack	0.91 (23)	3.13 (80)	0.69 (18)
55070-54	5.4-6.0	Lin., V	5.0	1.3	600 (965)	N Jack	0.91 (23)	3.13 (80)	0.69 (18)
55070-64	6.4-7.0	Lin., V	5.0	1.3	600 (965)	N Jack	1.03 (26)	3.13 (80)	0.69 (18)
55070-66	6.6-7.3	Lin., V	5.0	1.5	600 (965)	N Jack	0.91 (23)	3.13 (80)	0.69 (18)
55070-121	12.1-13.2	Lin., V	5.0	1.5	600 (965)	N Jack	0.38 (10)	3.13 (80)	0.69 (18)
Discone									
58200-14	1.435-2.3	Lin., V	2.0	2.0	125 (200)	N Jack	12.5 (318)	3 (76) diameter	
19050-2	0.215-0.420	Lin., V	2.0	2.0	100 (160)	7/8" EIA	13 (330)	16 (406) diameter	
19050-3	0.4-1.0	Lin., V	2.0	2.0	100 (160)	7/8" EIA	14 (356)	10.5 (267) diameter	
19050-4	0.5-1.55	Lin., V	2.0	2.0	100 (160)	7/8" EIA	14 (356)	9 (229) diameter	
Omnidirectional									
58700-14	1.435-1.54	Lin., V	8.0	1.5	125 (200)	N Jack	36 (914)	3.5 (89) diameter	
58700-21	2.1-2.3	Lin., V	8.0	1.5	125 (200)	N Jack	27 (686)	3.5 (89) diameter	
58700-25	2.5-2.7	Lin., V	8.0	1.5	125 (200)	N Jack	23 (584)	3.5 (89) diameter	
Helical									
55305-1,-3,-5	2.1-2.3	RH circ.	15	1.5	125 (200)	N Jack	17 (432)	3.4 (86) diameter	
55305-2,-4,-6	2.1-2.3	LH circ.	15	1.5	125 (200)	N Jack	17 (432)	3.4 (86) diameter	
60112-1,-3,-5	0.70-0.85	RH circ.	12	2.1	125 (200)	N Jack	30 (762)	6 (152) diameter	
60112-2,-4,-6	0.70-0.85	LH circ.	12	2.1	125 (200)	N Jack	30 (762)	6 (152) diameter	
60114-1,-3,-5	1.06-1.44	RH circ.	12	1.5	125 (200)	N Jack	27 (686)	5 (127) diameter	
60114-2,-4,-6	1.06-1.44	LH circ.	12	1.5	125 (200)	N Jack	27 (686)	5 (127) diameter	
60115-1,-3,-5	1.4-1.55	RH circ.	13	1.5	125 (200)	N Jack	16 (406)	3.4 (86) diameter	
60115-2,-4,-6	1.4-1.55	LH circ.	13	1.5	125 (200)	N Jack	16 (406)	3.4 (86) diameter	
60116-1,-3,-5	1.6-2.0	RH circ.	13	1.5	125 (200)	N Jack	16 (406)	3.4 (86) diameter	
60116-2,-4,-6	1.6-2.0	LH circ.	13	1.5	125 (200)	N Jack	16 (406)	3.4 (86) diameter	
60117-1,-3,-5	2.1-2.3	RH circ.	13	1.5	125 (200)	N Jack	12 (305)	3.4 (86) diameter	
60117-2,-4,-6	2.1-2.3	LH circ.	13	1.5	125 (200)	N Jack	12 (305)	3.4 (86) diameter	
60118-1,-3,-5	2.5-3.0	RH circ.	14	1.5	125 (200)	N Jack	12 (305)	3.4 (86) diameter	
60118-2,-4,-6	2.5-3.0	LH circ.	14	1.5	125 (200)	N Jack	12 (305)	3.4 (86) diameter	
(-1 and -2 no mount, -3 and -4 13550 mounting adaptor, -5 and -6 51930A manual mount, 2" IPS pipe, mounting adaptor.)									
Bifilar Helical									
63305A-1,-3,-5	0.245-0.315	RH circ.	12.5	1.5	100 (160)	N Jack	122 (3099)	39 (991) diameter	
63305A-2,-4,-6	0.245-0.315	LH circ.	12.5	1.5	100 (160)	N Jack	122 (3099)	39 (991) diameter	
(-1 and -2 no mount, -3 and -4 54157 mount for 4" IPS pipe, -5 and -6 51930 manual mount with 62280 tripod)									
DF Antenna									
171888	0.02-0.1	Lin., V	-	11.0	100 (160)	N Jack	78 (1980)	60 (1524) diameter	
(4 array	0.1-0.5	Lin., V	-	7.0	100 (160)	N Jack	18 (457)	12 (305) diameter	
element)	0.5-1.0	Lin., V	-	7.0	100 (160)	N Jack	8 (203)	6 (152) diameter	
172315X	0.5-2.0	Lin., Slant	4	3.0	100 (160)	N Jack	17 (432)	19 (483) diameter	
	2.0-18.0	Lin., Slant	15	3.0	100 (160)	N Jack	17 (432)	19 (483) diameter	

GRANGER® HF Antennas

Andrew manufactures the complete range of GRANGER HF antennas. These include fixed, transportable and rotatable log-periodic antennas, conical monopoles, broadband dipoles, baluns and multicouplers.



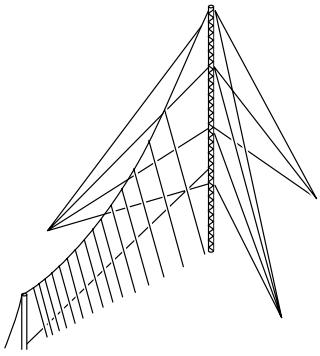
747CD

747FCD

747 Horizontally Polarized Log-Periodic

- 2 - 30 MHz or 4 - 30 MHz Frequency Range with Single Input
- Up to 20 kW Average 40 kW Peak Power Rating
- Horizontal Polarization
- 2.0:1 Nominal. 2.5:1 Maximum VSWR (2.0 MHz Version)
- Short-, Medium-, and Long-Range Communications

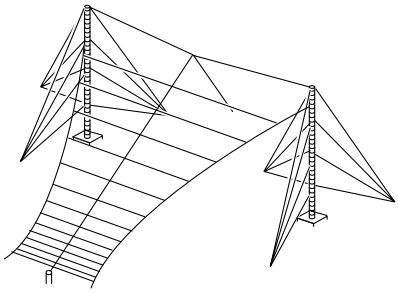
Bulletins 1410 (747CD), 1411 (747FCD)



1703 Long-Haul, Log-Periodic

- Choice of Frequency Range: 4.0 - 32, 4.6 - 32, 5.4 - 32, 6.5 - 32 MHz
- Up to 20 kW Average, 40 kW Peak Power Rating
- Vertical Polarization
- 2.0:1 Maximum VSWR
- Low Angle Radiation at All Frequencies
- Low Sensitivity to Off-Path Signals
- Minimum Space Required
- Short-Range Communications (Groundwave)
- Long-Range Communications (Skywave)

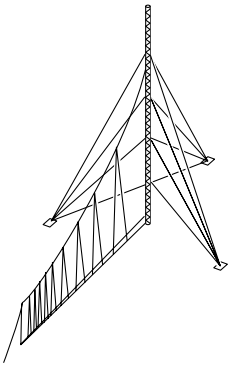
Bulletin 1417



2701/2702 Horizontally Polarized, Log-Periodic

- 2 - 32 MHz Frequency Range
- Up to 20 kW Average, 40 kW Peak Power Rating
- Horizontal Polarization
- 2.0:1 Maximum VSWR
- Short- to Medium-Range and Medium-to-Long-Range Communications
- Minimum Space Required

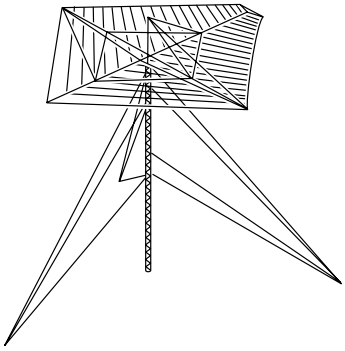
Bulletin 1424



2726 Vertically Polarized, Log-Periodic

- 2.5 - 32 MHz Frequency Range
- Up to 10 kW Average, 20 kW Peak Power Rating
- Vertical Polarization
- 2.0:1 Maximum VSWR
- Long-Range HF Communications
- Minimum Tower Height
- Minimum Space Required

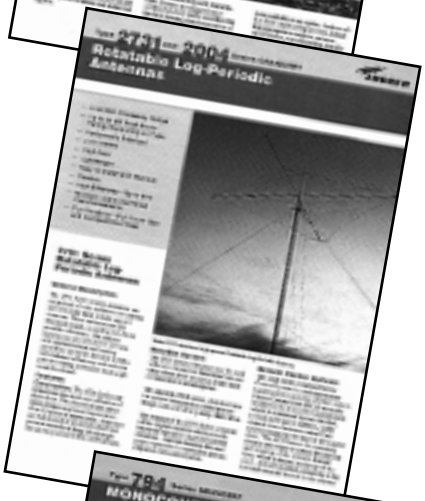
Bulletin 1426

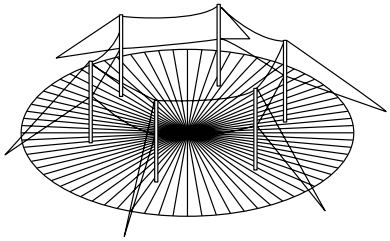


2731/2004 Rotatable Log-Periodic

- 2 - 30 MHz Frequency Range
- Up to 25 kW Peak Power Rating, Depending on Type
- Horizontally Polarized
- 2.0:1 VSWR
- High Gain
- Easy to Install and Maintain
- High Efficiency - Up to 98%
- Medium- and Long-Range Communications
- Two Versions - Full Tower Size and Compact Roof Size

Bulletin 1423

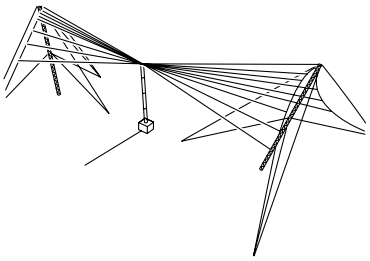




794 Monocone™

- Wide Range of Frequencies: 2 - 30, 2.5 - 32, 3 - 32 MHz
- Up to 40 kW Average, 160 kW Peak Power Rating
- Vertical Polarization
- 2.0:1 Maximum VSWR
- Low-Angle Radiation Patterns
- Short-Range Communications (Groundwave)
- Long-Range Communications (Skywave)

Bulletin 1416



1765 Broadband Dipole

- 1.6 - 30 MHz Frequency Range
- Up to 10 kW Average, 20 kW Peak Power Rating
- Horizontal Polarization
- Omnidirectional
- 2.0:1 Nominal, 2.5:1 Maximum VSWR
- Short-to-Medium Range Communications
- No Resistive Loading, Switching or Tuning

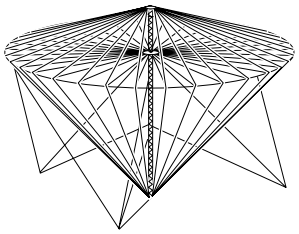
Bulletin 1420

ANDREW®

Revised 7/00 and 12/00

Patented SPIRA-CONE®

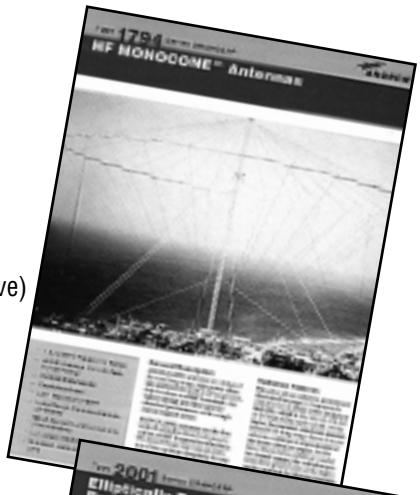
The unique patented SPIRA-CONE antenna, which is a GRANGER® HF type, permits simultaneous radiation in high-and low-angle modes without frequency restriction.

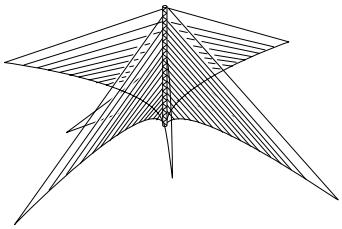


1794 Monocone™

- 1.6 - 32 MHz Frequency Range
- 40 kW Average 160 kW Peak Power Rating
- Vertical Polarization
- Omnidirectional
- 2.0:1 Maximum VSWR
- Long-Range Communications (Skywave)
- Short-Range Communications (Groundwave)
- Low Angle Radiation Patterns
- Minimum Installation Ground Area

Bulletin 1421

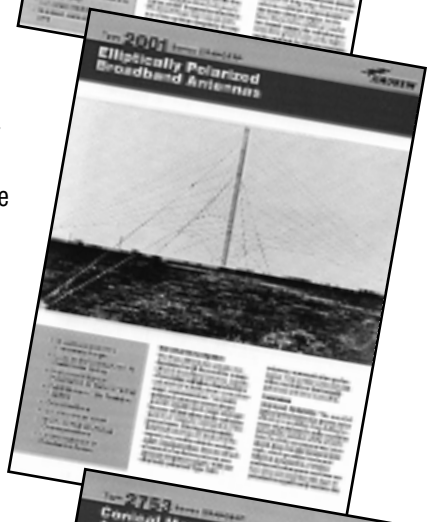


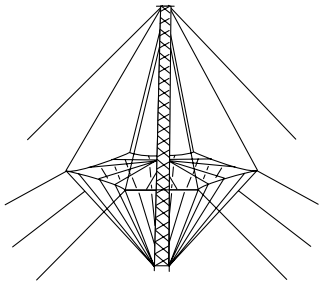


2001 Elliptically Polarized Broadband

- Broadband 2 - 30 MHz Frequency Range
- Up to 25 kW Average, 50 kW Peak Power Rating
- Horizontal-Elliptical Polarization to Reduce Fading
- Full Efficiency - No Resistive Loading
- 2.0:1 Maximum VSWR
- Short- to Medium-Range Communications
- On-Site Selection of Polarization Sense

Bulletin 1422

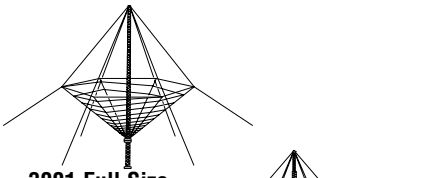




2753 Conical Monopole

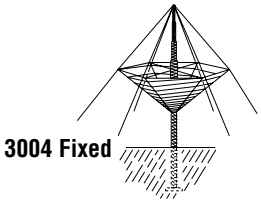
- 6:1 Bandwidth Permits Frequency Change without Antenna Tuning
- Up to 50 kW Peak Power Rating
- 50-ohm Input Provides 2.0:1 VSWR without Impedance Transformers
- A Space Saving Antenna for Ground-to-Air and Shore-to-Ship Transmission
- Short-, Medium-, and Long-Range Communications

Bulletin 1531

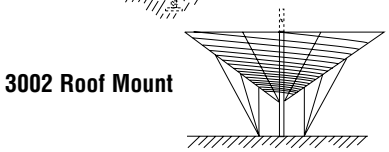


3001 Full Size

3003MT Transportable



3004 Fixed

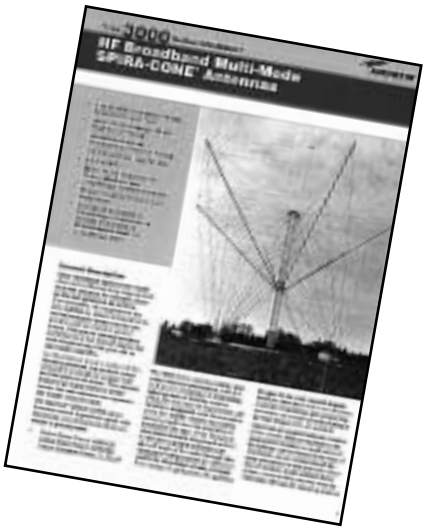


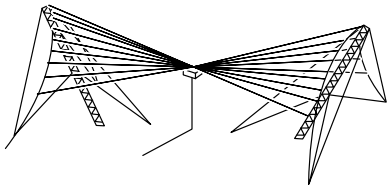
3002 Roof Mount

3000 Broadband Multi-Mode SPIRA-CONE ®

- 2 to 30 MHz Frequency Range, Dependent Upon Type
- Up to 25 kW Average, 50 kW Peak Power Rating
- Horizontal-Elliptical Polarization to Reduce Fading
- Omnidirectional Log-Periodic
- 2.0:1 VSWR
- Multi-Mode Capability for Short-, Medium-, and Long-Range Communications
- Single Tower for Simplicity of Installation
- Innovative Switching or Combining of Radiators to Provide Switchable or Simultaneous Short- or Long-Range Mode

Bulletin 1405

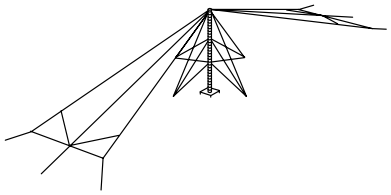




3065 Broadband Dipole

- 1.6 - 30 MHz Frequency Range
- Up to 2.5 kW Average, 5 kW Peak Power Rating
- Horizontal Polarization
- Omnidirectional
- 2.3:1 Maximum VSWR
- Short-to-Medium Range Communications
- No Resistive Loading, Switching or Tuning
- Minimum Installation Ground Area

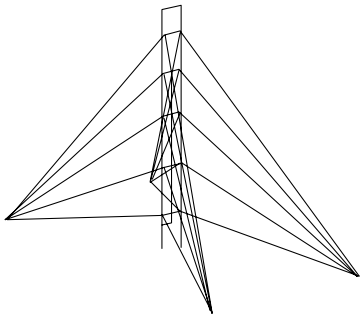
Bulletin 1430



4065 Horizontally Polarized, Transportable

- 2 - 30 MHz Frequency Range
- 1 kW Average, 2 kW Peak Power Rating
- Horizontally Polarized
- Omnidirectional
- 2.0:1 VSWR
- Short- to Medium-Range Communications
- Tactical

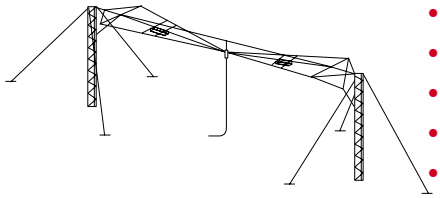
Bulletin 1532



4094 Omnidirectional

- 2 - 30 MHz Frequency Range
- 1 kW Average, 2 kW Peak Power Rating
- Vertical Polarization
- 2.5:1 Nominal, 3.0:1 Maximum VSWR
- Short-, Medium-, and Long-Range Communications
- Deployable or Fixed Versions

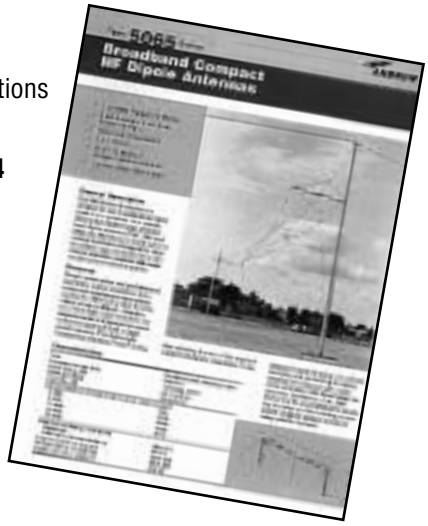
Bulletin 1431



5065 Broadband Compact Dipole

- 2 - 30 MHz Frequency Range
- 1 kW average, 2 kW Peak Power Rating
- Horizontal Polarization
- 2.5:1 Nominal VSWR
- Short- to Medium-Range Communications
- Compact Roof Mountable

Bulletin 1534



ISM, MMDS, and UNII Band Passive Products

Index

23T-5800

18T-2400

26T-2400

PD Series Parabolic Dish Antennas

- *Durable antenna offers excellent performance at low cost.*
- *Spun aluminum reflector.*
- *Lightweight, stacked packaging minimizes freight and handling costs.*
- *RG8 pigtail, 13 in (330 mm) long.*
- *Up to 60° tilt adjustment.*

MAG GRID Antennas

- *Patented grid reflector design provides excellent reliability plus easy handling and installation.*
- *Lightweight and durable. Materials include magnesium alloy, aluminum, and stainless steel.*
- *RG8 pigtail, 24 in (610 mm) long.*
- *Up to 60° tilt adjustment.*
- *Antenna ships disassembled for minimum freight costs. Factory assembly is available as an option.*

Ordering Information

Frequency Band MHz	Type Number*	Gain dBi	3 dB Beamwidth Degrees	VSWR, MAX (R.L., dB)
PD Series Antennas				
1700-2100	**19T-1940**	19	16	1.5
2100-2700	**19T-2127**	19	16	1.5
2400-2500	**19T-2440**	19	16	1.7
5725-5875	**23T-5800**	23	7	1.4
MAG GRID Antennas				
1700-2100	**18T-1900**	18	14	1.5
1700-2100	**26T-1900**	24	8	1.5
2100-2700	**18T-2127**	18	14	1.5
2100-2700	**26T-2127**	24	8	1.5
2400-2500	**18T-2400**	18	14	1.5
2400-2500	**26T-2400**	24	8	1.5

* N male connector is standard. To order optional N female connector, add F to end of Type Number.

DL-2400

QD-2400

MICROCEPTOR® Antennas

- *Patented feed design offers excellent directivity in a low profile package.*
- *Small, aesthetically pleasing.*
- *Excellent cross-polarization discrimination and front-to-back ratio.*
- *Low wind load.*
- *Up to 60° tilt adjustment.*
- *Cosmetic covers are available.*
- *Premise mounts are available.*

The MICROCEPTOR antenna was designed to fill the need for high performance radiation patterns together with a smaller, more attractive look.

Ordering Information

Frequency Band MHz	Type Number*	Gain dBi	3 dB Beamwidth E-Plane, Degrees	3dB Beamwidth H-Plane, Degrees
2100-2700	**DL-2122**	13	47	27
2100-2700	**QD-2122**	16	27	27
2400-2500	**DL-2412**	11	27	75
2400-2500	**DL-2402**	13	47	27
2400-2500	**QD-2402**	16	27	27

*Standard mount provides 60° tilt adjustment. Direct quick mount available.

Cosmetic Cover
For DL Series Type **DC-1000**
For QD Series Type **QC-1000**

Micro-Mount
Universal low premise mount Type **UM-1200**
Micro-Mount extension bracket Type **EX-1000**

Right Angle Adapter
N male to N male Type **363030**

ISM Protector
Lightning and Surge Protector,
Band-pass Filter

- *Reliable protection of your microwave equipment.*
- *Low VSWR; low insertion loss.*
- *Fully weatherproof. Mounts outdoors to a flat surface or inside an outdoor microwave unit.*

The ISM protector uses multiple quarter-wave stub technology. It eliminates potential interference from near band signals and strips away harmful surges and proximity induced lightning pulses. A grounding stud allows direct attachment of a ground lead.

Ordering Information

Type Number	**LA-5000**
Frequency Band, MHz	2400-2500
Interface Type	N Female/N Female
Insertion Loss, dB	<1
VSWR, max.	1.2
Reject Frequency Attenuation, dB	
1930 MHz	>80
1990 MHz	>70
2300 MHz	>35
2360 MHz	>7
2520 MHz	>2.5
2550 MHz	>15
2700 MHz	>50
Mounting	Bulkhead or in-line with coax

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Cold Shrink is a trademark of Minnesota Mining and Manufacturing Company

Andrew Sales Locations

Indicates Customer Service Center Number

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Telephone: **(708) 873-2307**
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Andrew Wireless Products
1200-A Greenbriar Drive
Addison, IL 60101
Telephone: (630) 705-6500
Fax: (800) 345-0515 Toll Free
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Fax: **(630) 705-6677**

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Revised 7/00 & 2/01

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Andrew Sales Agents and Distributors

Andrew has Sales Agents and Distributors throughout the world. Contact our Customer Service Center or one of the listed Sales Offices for further information.

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Australia: 1-800-141317
Belgium: 0800-7-2790
China: 10-800-110-0080
Hong Kong: 800-933117
Ireland: 1-800-55-9433
Netherlands: 06-0225949
United Kingdom: 0800-96-2197
Other Regions: 708-873-3614

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http://www.andrew.com