

# Base Station Antenna Systems



PRODUCT SELECTION GUIDE 2008



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## A Clear Advantage

**Around the globe, in a world being transformed by communications, people anticipate more than ever that wireless services will enhance their lives, workplaces, and communities.**

With the convergence of voice, data, and video, we experience the promise of mobility—and we experience Andrew Wireless Solutions. Andrew supports the emerging mobile society, and the companies that make this today's reality, with a comprehensive portfolio of complete wireless solutions.

Our customers represent leading wireless and broadband providers of the world. We support major operators and original equipment manufacturers (OEMs) in every region and are extremely proud of these relationships, many of which we have served for decades.

Andrew provides a one-stop source for managing the entire lifecycle of a wireless network. We provide complete solutions that serve traditional wireless networks, third generation technologies, triple-play (voice, data, video) services, and specialized applications for microwave communications systems. Many of our RF system products lead the industry. Andrew Wireless Solutions is composed of two groups—Antenna, Cable and Cabinet and Wireless Network Solutions—with businesses that cover RF site solutions, wireless infrastructure, network solutions, and coverage and capacity systems.

Our signature “flash” logo, seen on microwave tower and cellular equipment throughout the world, represents an enviable 70-year legacy of customer service. Today, Andrew is the wireless business unit of CommScope, Inc., a recognized world leader in infrastructure solutions for communications networks. Andrew supports customers from 35 countries across Asia-Pacific, Europe, and the Americas. Manufacturing plants are located in 12 countries. Our talents, expertise, and commitment are always nearby, and our local presence around the world enables cost-effective products and on-time delivery and services.

Everywhere you look, the promise of mobility is here—and we at Andrew strive to listen, anticipate, and innovate to continue to earn the trust and respect of our customers.



Products and Solutions			
WIRELESS INFRASTRUCTURE	NETWORK SOLUTIONS	BASE STATION SUBSYSTEMS	COVERAGE AND CAPACITY
<ul style="list-style-type: none"> <li>▪ Base Station Antennas and Remote Electrical Tilt Systems</li> <li>▪ Bias Tees</li> <li>▪ Cabinets</li> <li>▪ Coaxial Foam, Air, and Specialty Cables</li> <li>▪ Connectors, Surge Arrestors, and Assemblies</li> <li>▪ Microwave Antennas</li> <li>▪ Pressurization</li> <li>▪ Site Installation Products and Services</li> <li>▪ Steel Products</li> <li>▪ Towers</li> <li>▪ Waveguide</li> <li>▪ WiMAX/Broadband Antennas</li> </ul>	<ul style="list-style-type: none"> <li>▪ Mobile Location</li> <li>▪ Network Test, Measurement, and Optimization</li> <li>▪ Spectrum Management and Frequency Coordination</li> <li>▪ Wireless Network Planning and Management</li> </ul>	<ul style="list-style-type: none"> <li>▪ After-Market Services</li> <li>▪ Combiners and Duplexers</li> <li>▪ Filters</li> <li>▪ Integrated Products</li> <li>▪ Integrated BTS</li> <li>▪ Solutions</li> <li>▪ Pico Node B</li> <li>▪ Power Amplifiers</li> <li>▪ Tower Mounted Amplifiers</li> <li>▪ Transceivers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Optical Distributed Antenna Systems</li> <li>▪ RF Repeaters</li> <li>▪ RF Boosters</li> <li>▪ Mobile Repeaters</li> <li>▪ Operations and Maintenance Center</li> <li>▪ Passive Components: Indoor Antennas, Splitters, Combiners, Terminators</li> <li>▪ Radiating Coaxial Cables</li> <li>▪ Turnkey Services: Project Management, System Design, Installation, Optimization</li> </ul>





## Andrew Base Station Antenna (BSA) Systems

Andrew Wireless Solutions offers base station antenna system solutions for professional communications systems. Recognized around the world as having technically advanced professional base station antenna systems, Andrew incorporates multiple value-added features that have made them the preferred products of system managers, designers, and engineers around the globe.

Our products are developed and refined through continuous improvements of all our processes. Along with our dedication for excellence, Andrew is committed to conducting our business in a safe, legal, ethical, and moral manner, as well as to demonstrating respect for our customers and suppliers.

When you specify Andrew, you can be confident you'll receive the highest quality telecommunications products and services that will consistently meet your needs by:

- Offering superior, repeatable electrical performance to well defined specifications
- Accommodating flexible system configurations
- Meeting conditions for zoning approval
- Standing the test of time with rugged mechanical design
- Providing cost-effective solutions for coverage needs

### A Timeline of Innovative Products

**1930s – 1970s**



UHF/VHF Low Band

**1980s – 1990s**



First Commercial Cellular Installation Supported DB810, ASP977  
Omni and Vertically Polarized Antennas



Log Periodic  
w/Variable Tilts  
DB844



Air-Dielectric  
Technology



DualPol<sup>®</sup>  
Technology

**2000 – 2004**



Wide Band UMTS  
Teletilt<sup>®</sup>  
Dual Band



**2005 – 2008**



Concealment  
SmartBeam  
ANMS<sup>™</sup>





Andrew maintains a very close and cooperative relationship with wireless OEMs and operators. Wireless system requirements have led to the development of antenna technologies and products suitable for general, as well as specific applications including:

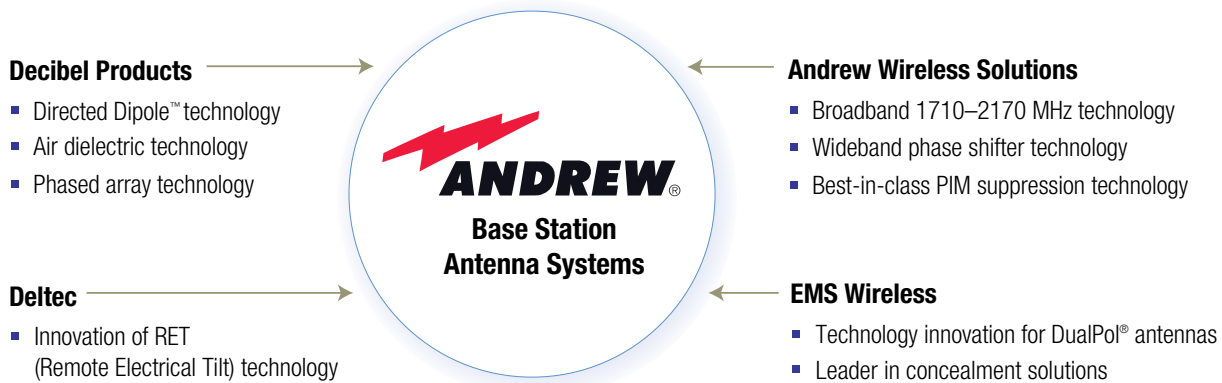
- Wide area coverage—fixed tilt
- Variable geographic coverage using remote tilt management technology
- Capacity maximization and optimization
- Dual, quad, and tri band solutions
- Agile systems optimization
- Special applications for emerging technologies such as WiMAX, MIMO, and LTE

**Why should you choose Andrew’s Base Station Antenna Systems?**

- Commitment to the industry and to our customer requirements
- Technology leadership driven by customer applications and needs
- Significant production capability and capacity worldwide
- Commitment to providing customers with high product value and economical product choices
- Easy customer interface with emphasis on customer satisfaction and customer service
- Easy access to Andrew’s information data base [www.andrew.com](http://www.andrew.com)

**Best of the Best—Brought to You Only by Andrew Corporation**

Andrew’s base station antenna portfolio is the combination of years of innovation from global leaders in RF technology. Today’s Andrew Base Station Antenna Systems offer the best core antenna technology from Andrew, Decibel Products, Deltec, and in 2006, EMS Wireless.





## Andrew Offers You a Complete Line of Base Station Antenna Systems for Virtually Every Wireless Application

- 800 MHz Cellular/Trunking
- 900 MHz GSM/ISM/Trunking
- 1800 MHz GSM
- 1900 MHz PCS
- 2100 MHz UMTS/W-CDMA
- UHF
- VHF
- 2.2–3.6 GHz WiMAX

## Application-Driven Solutions

Our mission is focused on providing customer-driven, application-oriented antenna solutions for tough RF challenges.

**High-Gain Coverage Sector Arrays**—Maximize the coverage footprint in a cellular system to enable faster user service.

**Variable Geographic Coverage**—Simplify network planning changes using our portfolio of field adjustable variable electrical downtilt antennas.

**Network Performance Optimization**—In today's digital systems, every dB of capacity counts. Using the Directed Dipole™ antenna system provides sharper azimuth plane patterns, containing RF in the planned coverage area and reducing spillover into interfering sectors.

**Site Concealment Applications**—Site selection and zoning present an additional challenge for the network planner. A number of creative solutions are available from Andrew, including the AcCELLerator™, a complete cell site of arrays in a single, easily concealed site.

## Technology for the Future, Today

Andrew's commitment to the wireless industry is easily demonstrated by our continuous drive to improve our product technology. We offer some of the most advanced arrays in today's marketplace.

**Teletilt® Remote Control Variable Electrical Downtilt Antenna System**—Andrew holds the most recognized technology-leading patents that enable remote adjustment of antenna beam tilting.

**Air-Dielectric Technology**—Used for both vertically and  $\pm 45^\circ$  polarized arrays. Air technology provides less loss per unit length and minimizes welding, soldering, and other mechanical fasteners, enabling superior passive intermodulation reduction.

**Superior Pattern Shaping**—The Andrew portfolio offers base station antenna systems with deep lower null fills, highly suppressed upper lobes, and best-in-industry azimuth roll-off and front-to-back ratio.

**Wideband/Dual Band Arrays**—Andrew's base station antenna systems' unique interwoven ARC phase shifter and corporate feed systems provide two classes of wide band arrays covering the 1710–2170 MHz and 806–960 MHz frequencies. These bands can then be combined through our patent pending Microstrip Annular Ring (MAR) and our Directed Dipole™ technology for true dual band performance.

**Advanced Multi-Beam Antenna Systems**—Andrew is a leading innovator and provider of multi-beam arrays for beam forming, steering, and tracking applications. Andrew is also the leading supplier of angle-of-arrival phased arrays for emergency and location systems.



## We Work on the Details of Product Quality and Reliability So You Don't Have To

Each base station antenna system must survive an exhaustive battery of stress tests for product qualification. Our ISO 9001 registered quality system assures all our manufacturing locations build consistent, reliable products, made to the same specifications, worldwide.

The Andrew Quality Management System is built around our philosophy of designing the highest quality products in the industry:

- Customer feedback and service
- Compliance to ISO 9001: 2000
- Quality assurance
- Product performance, reliability, and survivability
- Process and material control, product verification and testing, and supplier management
- Design control and configuration management
- Long-term strategic quality planning
- Corrective and preventive action systems

## ISO 9001 Quality

Andrew is registered as compliant to the ISO 9001 or ISO 9002 standards. This International Standard promotes the adoption of a process approach when developing, implementing, and improving the effectiveness of a quality management system. This systems approach is based upon objective measurements, the end result being enhanced customer satisfaction on a consistent basis.







## Base Station Antenna Systems Around World

### Suzhou, China

Andrew Telecommunications (Suzhou) Co., Ltd.  
68 Su Hong Xi Lu Suzhou Industrial Park,  
Suzhou Jiangsu 215021, China



### Brno, Czech Republic

Andrew Telecommunications S.R.O.  
CT Park Brno Turanka 100  
CZ – 62700 Brno – Slatina

### Reynosa, Mexico

Andrew Antenas de Reynosa  
Av. Industrial Reynosa, Lote 3  
Parque Industrial Reynosa  
Reynosa, Tamaulipas 88780, Mexico



### Goa, India

Andrew Telecommunications India Pvt. Ltd.  
Plot No. N-2, Phase IV, Verna Industrial Estate  
Verna, Salcette, Goa, 403 722 India

### Sorocaba, Brazil

Andrew do Brasil Ltda,  
Av Com Camilo Julio 1256  
Zona Industrial CP 597  
Sorocaba, SP 18086-000, Brazil



### Atlanta, Georgia

Andrew Wireless Solutions  
2850 Colonnades Court NE  
Norcross Ga. 30071-7700



## The Base Station Antenna Systems Product Qualification Program

To ensure published performance of our products, all families of Andrew's base station antenna systems are tested and must successfully complete rigorous environmental stress screening tests per IEC 68-2 standards prior to release for manufacturing.

- Antenna testing range
- Cold test at  $-40^{\circ}\text{C}$
- Dry heat at  $+70^{\circ}\text{C}$
- Temperature shock:  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ , 10 cycles
- Salt Fog:  $35^{\circ}\text{C}$  with 5% salt solution for 96 hours
- Rain simulation
- Humidity: 10 24-hour cycles at 95% relative humidity
- Vibration: 20 cycles of 10 to 150 Hz, with 1.5-hour dwell at resonant frequency on each axis
- Electrostatic discharge testing for lightning
- Single shock test (used for transportation)
- Continuous shock test (used for transportation)
- Solar radiation test (UV) at  $50^{\circ}\text{C}$  for up to 1000 hours

100% IM and Return Loss Testing On All Antennas



Competent Outdoor Antenna Ranges



Hot/Cold Test Chamber



Near Field Pattern Scanner

## Planning Software

*AASP—the first and only PCS/Cellular Systems Design Software*

# Powertools™



Design your PCS or cellular system in less time, with greater accuracy and lower costs with advanced Andrew Antenna Systems Planner software (AASP). Powerful AASP software graphically guides you through the entire design process, from the choice of frequency to the available shipping options. The program's dynamic, rule-based logic generates custom solutions by using standard Andrew

products while automatically checking component compatibility. Upon completion, AASP provides you with a customized bill of materials of the Andrew parts necessary for the system. AASP is available on the Andrew Powertools™ CD or as a download from [www.andrew.com](http://www.andrew.com).



## OnePack™ Site Kits

*The Answer for More Efficient System Build-outs*

Today's global build-out demands new solutions that speed system deployment and simplify supply chain management. To help system managers better achieve these goals, Andrew offers kits for wireless RF communications systems sites. OnePack Site Kits provide the critical components in easy to order, easy to manage packages. System designers and managers can be confident of shortened project planning and execution cycles, improved efficiency, and dependable system performance.



## Customer Support Center (CSC)

*Service Around the Clock, Around the World*

Contact the Andrew Customer Support Center for:

- Technical support
- Order status
- Coordinating product service, repairs, or replacement
- Product information
- Replacement materials

Call toll free from:

North America 1-800-255-1479  
Fax 1-800-349-5444

International:

United Kingdom 0800-250055  
Australia 1800-803 219  
New Zealand 0800-441-747  
Call from other areas: +1-708-873-2307





Andrew Institute provides technicians with the top-quality, specialized training they need to optimize communications systems performance and reliability.

- **Free training** at Andrew Wireless Solutions facilities
- Comprehensive, hands-on instruction
- The latest Andrew products, installation methods, and theories
- Shared expertise
- Sharpen your skills, learn new techniques and see the latest product innovations
- 3-Year Certification after completed Andrew Institute coursework

### Courses Offered

#### ***Teletilt® Systems — Remote Controlled Variable Electrical Downtilt Antennas***

Covering topics from antenna fundamentals, hands-on installation of actuator, data cables, and control system, attendees will walk away with a better understanding of Andrew Base Station products.

#### ***HELIAX® Connector Attachment Training***

Ideal for those who require assistance with fitting cables and connectors or would benefit from expanded technical training covering all aspects of HELIAX transmission line installation and latest techniques.

#### ***Terrestrial Microwave Systems Installation Training***

Improve the efficiency and effectiveness of your Terrestrial Microwave (TMW) systems with free specialized training on all aspects of installing and testing Andrew products.

#### ***VSWR Fundamentals***

During the VSWR Fundamentals course attendees will learn definitions, testing guidelines, and plot/sweep interpretation.


For more information visit our Web site at: [www.andrew.com](http://www.andrew.com)

Registration is available online or call: +1-779-435-6231

 Joliet, Illinois USA

 Sorocaba, Brazil

 Lochgelly, Scotland

 Suzhou, China



## Warranty Information

### Standard Warranty

Andrew Corporation warrants all base station antenna products to be free from defects in material and workmanship. Andrew's obligation under this warranty is limited to replacement or repair of such products within one year from the date of shipment to the user. The defective product must be returned to the Andrew factory, freight prepaid, for evaluation. No products will be accepted for replacement or repair without prior written approval. Replacement or repair (Andrew's option) will be made after an examination at an Andrew authorized repair facility shows defective material or workmanship. THIS WARRANTY IS THE ONLY WARRANTY MADE BY ANDREW FOR BASE STATION ANTENNAS AND IS GIVEN EXPRESSLY AND IN PLACE OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE. ANDREW IS NOT LIABLE FOR ANY OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, WITHOUT LIMITATION, INSTALLATION COSTS, INCONVENIENCE, RENTAL OF REPLACEMENT EQUIPMENT, LOSS OF PROFITS OR OTHER COSTS OF ANY NATURE AS A RESULT OF THE USE OF THE PRODUCTS MANUFACTURED BY ANDREW, WHETHER USED IN ACCORDANCE WITH INSTRUCTIONS OR NOT.

### Extended Warranty

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty. Upon verification of the extended limited warranty, a return authorization will be provided that will facilitate the return of the antenna. The antenna will be replaced on an equal exchange basis including prepaid freight. For the extended warranty to be effective, proof of dated receipt may be required.

**Prices:** All prices include domestic packing. Terms are net 30 days from date of shipment. Prices shown do not include any federal, state or local taxes. Export packing, if requested, will be an additional charge. Prices are subject to change without notice.

**Credit Approval:** Orders are subject to the approval of the Andrew credit department. Shipment of ordered equipment may be made with terms of cash in advance or cash on delivery, when applicable.

**Acceptance of Orders:** Verbal orders are valid only at the prices stated on the most current price list in effect at the time order is received. An order becomes officially accepted when acknowledgment is forwarded to the customer.

**Quotations:** Quotations are valid for 30 days maximum, unless otherwise extended in writing. Quoted shipping costs are best estimates only.

**Domestic Transportation:** Shipments are to be billed in accordance with the established prices as published by Numerex (domestic rates). Shipments will be routed by Andrew Corporation's best judgment unless a carrier specified by the buyer can be utilized. Andrew is not responsible for selecting cheapest or fastest routing.

**International Transportation:** Shipping charges will include surface transportation to forwarder, forwarding charges documentation preparation, insurance, etc., when applicable. Other arrangements may be made as needed.

**Domestic Packing:** Packing suitable for continental U.S. transportation, surface or air, is used as standard on all products. Andrew's standard domestic packing on all products is suitable for international air shipment.

**Special or International Surface Packing:** Export and/or special packing are additional charges and are estimates only. Billing, packing only, may differ from these estimates, up to 10 percent.

**Delays:** Andrew will not be liable for contractual obligations due to delays in shipments.

**Modifications:** Andrew reserves the right to modify equipment and change specifications without notice, provided the modification does not materially affect the performance of the product.

**Claims for Damaged or Lost Shipment:** Claims for damaged or lost material, while material is in transit, must be made immediately by the Buyer against the carrier. UPS shipment claims for damages or loss of material may be made by Andrew.

**Claims for Shortages:** Claims for shortages in shipments must be made within 30 days from date of shipment of material from the Andrew plant.

**Return of Material:** No material will be received or accepted by Andrew without written authorization. Andrew will not be responsible for any material returned without Andrew's prior written authorization or for material that is shipped freight collect. If due, credit not exceeding 75 percent of the original price will be allowed on unused material, provided it is returned prepaid and in new condition. Credit is issued only to the original purchaser and not to subsequent owner.

**Specials:** All nonstandard catalog items are considered special and are non-cancellable and non-returnable.

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*This catalog supersedes all previous catalogs. We reserve the right to change or alter any specifications or information at any time.*

*Please take caution during the site planning process as certain risks may arise under extraordinary operating conditions. Andrew is not responsible for the operation of any products outside of their normal testing range, as defined by Andrew Corporation.*

*Extraordinary operating conditions, such as heavy icing or extreme dynamic stress, may result in the breakage of an antenna or even cause it to fall to the ground. Details in our installation instruction sheets must be carefully followed when installing the antennas and accessories. The installation team must be properly qualified and also be familiar with the relevant national safety regulations.*

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◎ 806-960/1710-2180 MHz



● **DBXLH Series**



● **TBXLH Series**



● **QBX LH Series**

### DualPol® Dual Band Antennas

Andrew Wireless Solutions offers a wide selection of DualPol® dual band antennas, each providing an ideal solution for applications where antenna consolidation with optimal coverage is desired. Each model is packaged in an attractive, low wind load radome for ease in obtaining zoning approvals.

The Andrew portfolio of DualPol dual band antennas includes:

- DBXLH series models housing two DualPol antennas under one radome
- TBXLH series models housing one DualPol dual band antenna and one DualPol single band antenna under one radome
- QBXLH series models housing two DualPol dual band antennas under one radome

Each series of antennas features models independently capable of field adjustable electrical downtilt and fully compatible with Andrew's Teletilt® RET system.

### DualPol® Dual Band Antennas with an Internal Cross Band Coupler

The DBXGKC series antenna combines high performance technologies from the DBXLH series of dual band antennas with an internal cross band coupler, making it possible to operate with both GSM900 and GSM1800 signals over a shared feeder. Unlike the standard dual band antenna, which has four input connectors (two for low band and two for high band), the DBXGKC series antenna uses only two connectors.

### Vertically Polarized Dual Band Antennas

Andrew offers an assortment of vertically polarized dual band antennas in the 74x and 77x series with differing beamtilt options, such as:

- Fixed tilt on both frequency bands
- Fixed tilt on the high band combined with field adjustable electrical downtilt on the low band
- Field adjustable electrical downtilt on both frequency bands

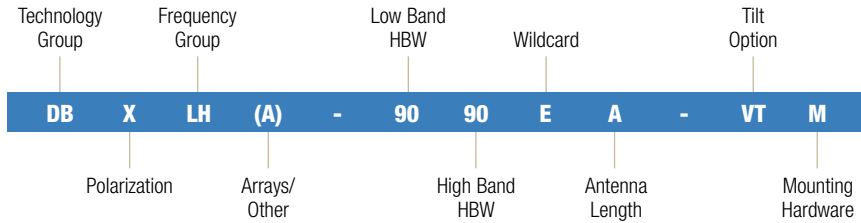
These antennas are designed to:

- Allow operators to match existing coverage, minimizing risks when new bands are overlaid
- Provide simple integration of TMA systems to improve uplink coverage
- Significantly reduce costs in deployment and operations

## Dual Band

### Multiband Sector Base Station Antenna Model Number Sequences

#### Typical Style 1 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### TECHNOLOGY GROUP

DB = Dual Band (One Dual Band)  
 TB = Tri Band (One Dual Band and One Single Band)  
 QB = Quad Band (Two Dual Bands)

#### POLARIZATION

V = Vertical Pol  
 X = DualPol®

#### FREQUENCY GROUP

(Shown in Frequency Order with Band in MHz)

C = 800 MHz (806–896)  
 L = 800/900 MHz (806–960)  
 G = GSM900 (870–960)  
 K = GSM1800 (1710–1880)  
 P = 1900 MHz (1850–1990)  
 H = Wideband UMTS (1710–2180)  
 U = UMTS (1920–2180)  
 2 = WiMAX (2300–2700, 2495–2690)  
 3 = WiMAX (3300–3600, 3400–3800)  
 5 = WiMAX (5150–5875)

#### ARRAYS/OTHER

A = Stacked  
 B = Side-By-Side  
 C = With Built-In Crossband Coupler/Diplexer

#### WILDCARD

E = Equal Gain

#### ANTENNA LENGTH

A = 51.2 in (1.3 m)  
 B = 78.7 in (2.0 m)  
 C = 102.4 in (2.6 m)  
 S = 23.6 in (0.6 m)

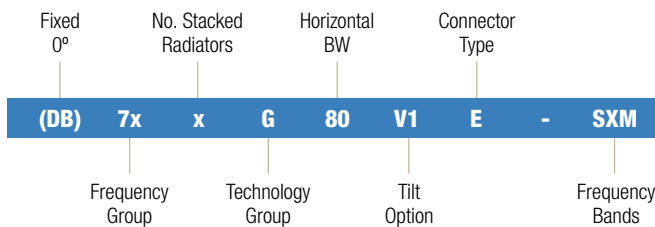
#### TILT OPTION

T# = Degree of Fixed Tilt  
 VT = Variable Electrical Tilt  
 R2 = ATC200 Teletilt® RET Ready

#### MOUNTING HARDWARE

M = Standard Downtilt Mount and Pipe Mount

#### Typical Style 2 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY GROUP

7x = Dual Band

#### NUMBER OF STACKED RADIATORS

800/900 MHz Models: Equals length of antenna (ft)  
 1710–2170 MHz Models: Equals 2x length of antenna (ft)

Vertical BW can be estimated based on the # of stacked radiators, by dividing the # of stacked radiators into 60 (Ex: 60 divided by 4 stacked radiators = 15° Vertical BW).

#### TECHNOLOGY GROUP

DD = Standard DualPol  
 G = Optimized Gain

#### TILT OPTION

None = 0° Fixed Tilt  
 V1 = Variable Electrical Tilt on L (Low) Band and Fixed Tilt on H (High) Band  
 VT = Variable Electrical Tilt on both bands

#### CONNECTOR TYPE

E = 7–16 DIN, Female (Bottom)  
 A = 7–16 DIN, Female (Back)

#### FREQUENCY BANDS (MHz)

SXM = 806–896/941/960 and 1850–1990 MHz  
 XM = 824–896 and 1850–1990 MHz

60-75° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
721DD65ESXM	DualPol® dual band	806-941	0	7.4 (9.5)	65	60.0	—	25 >30	<1.6:1	100	3.1 (6.8)	318 (12.5)	318 (12.5)	
		1850-1990	0	7.0 (9.1)	65	65.0	—	25 >30	<1.6:1	100	3.1 (6.8)	318 (12.5)	318 (12.5)	
DBXLH-6565S-T0M	DualPol dual band	806-960	0	9.1 (11.2)	65	30.5	16	22 >30	<1.5:1	250	8.5 (18.7)	701 (27.6)	269 (10.6)	
		1710-2180	0	12.2 (14.3)	65	13.5	15	30 >30	<1.5:1	250	8.5 (18.7)	701 (27.6)	269 (10.6)	
*DBXGKC-6565A-VTM	DualPol dual band with internal crossband coupler	870-960	0-15	11.9 (14.0)	65	15.0	15	25 >30	<1.5:1	250	12.7 (28.0)	1293 (50.9)	269 (10.6)	
		1710-1880	0-8	14.4 (16.5)	65	7.0	15	25 >30	<1.5:1	250	12.7 (28.0)	1293 (50.9)	269 (10.6)	
*DBXLH-6565A-VTM	DualPol dual band	806-960	0-15	12.2 (14.3)	65	15.0	18	25 >30	<1.5:1	250	12.7 (28.0)	1293 (50.9)	269 (10.6)	
		1710-2180	0-8	14.9 (17.0)	65	6.5	15	27 >30	<1.5:1	250	12.7 (28.0)	1293 (50.9)	269 (10.6)	
*QBXLH-6565A-VTM	DualPol dual band quad	824-960	0-15	11.9 (14.0)	65	15.0	15	25 >30	<1.5:1	250	33.3 (73.5)	1321 (52.0)	582 (22.9)	
		1710-2180	0-8	14.9 (17.0)	65	6.0	15	25 >30	<1.5:1	250	33.3 (73.5)	1321 (52.0)	582 (22.9)	
*TBXLHB-6565A-VTM	DualPol tri-band	824-960	0-15	11.9 (14.0)	65	15.0	15	25 >30	<1.5:1	250	20.0 (44.0)	1326 (52.2)	465 (18.3)	
		1710-2170	0-8	14.9 (17.0)	65	6.0	15	25 >30	<1.5:1	250	20.0 (44.0)	1326 (52.2)	465 (18.3)	
DBXGKC-6565B-T0M	DualPol dual band with internal crossband coupler	824-960	0	13.9 (16.0)	65	10.0	18	30 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
		1710-2180	0	15.7 (17.8)	65	5.0	18	30 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
DBXGKC-6565B-T4M	DualPol dual band with internal crossband coupler	824-960	4	13.9 (16.0)	65	10.0	18	30 >30	<1.4:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
		1710-2180	4	15.7 (17.8)	65	5.0	18	30 >30	<1.4:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
*DBXGKC-6565B-VTM	DualPol dual band with internal crossband coupler	870-960	0-10	13.9 (16.0)	65	10.0	15	25 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
		1710-1880	0-6	15.7 (17.8)	65	5.0	15	25 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
DBXLH-6565B-T0M	DualPol dual band	824-960	0	13.9 (16.0)	65	10.0	18	30 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
		1710-2180	0	16.2 (18.3)	65	4.6	18	30 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
DBXLH-6565B-T4M	DualPol dual band	824-960	4	14.2 (16.3)	65	10.5	16	30 >30	<1.4:1	250	18.6 (41.0)	1933 (76.1)	269 (10.6)	
		1710-2180	4	16.0 (18.1)	65	4.8	15	32 >30	<1.4:1	200	18.6 (41.0)	1933 (76.1)	269 (10.6)	
*DBXLH-6565B-VTM	DualPol dual band	806-960	0-10	13.9 (16.0)	65	10.0	15	25 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
		1710-2180	0-6	16.2 (18.3)	65	4.4	15	32 >30	<1.5:1	250	19.1 (42.0)	1933 (76.1)	269 (10.6)	
*DBXLH-6565D-VTM	DualPol dual band	806-960	0-11	14.0 (16.1)	65	9.0	15	25 >30	<1.5:1	250	21.5 (47.4)	2250 (88.6)	269 (10.6)	
		1710-2180	0-6	15.9 (18.0)	65	4.6	15	30 >30	<1.5:1	250	21.5 (47.4)	2250 (88.6)	269 (10.6)	
*DBXGKC-6565C-VTM	DualPol dual band with internal crossband coupler	870-960	0-8	14.9 (17.0)	65	7.5	15	26 >30	<1.5:1	250	21.8 (48.0)	2573 (101.3)	269 (10.6)	
		1710-1880	0-6	15.7 (17.8)	65	5.0	15	30 >30	<1.5:1	250	21.8 (48.0)	2573 (101.3)	269 (10.6)	
DBXLH-6565C-T0M	DualPol dual band	824-960	0	15.4 (17.5)	65	7.2	18	28 >30	<1.5:1	300	21.8 (48.0)	2573 (101.3)	269 (10.6)	
		1710-2180	0	16.0 (18.1)	65	4.7	18	30 >30	<1.5:1	250	21.8 (48.0)	2573 (101.3)	269 (10.6)	
*DBXLH-6565C-VTM	DualPol dual band	806-960	0-8	14.9 (17.0)	65	7.2	15	26 >30	<1.4:1	250	21.8 (48.0)	2573 (101.3)	269 (10.6)	
		1710-2180	0-6	16.2 (18.3)	65	4.3	15	28 >30	<1.5:1	250	21.8 (48.0)	2573 (101.3)	269 (10.6)	
*DBXGKC-6565EC-VTM	DualPol dual band with internal crossband coupler	870-960	2-10	15.0 (17.1)	65	7.2	17	25 >30	<1.5:1	250	21.8 (48.0)	2576 (101.4)	269 (10.6)	
		1710-1880	2-10	14.2 (16.3)	65	7.0	15	27 >30	<1.5:1	200	21.8 (48.0)	2576 (101.4)	269 (10.6)	
*DBXLH-6565EC-VTM	DualPol dual band	806-960	2-10	14.9 (17.0)	65	7.2	17	28 >30	<1.5:1	250	24.2 (53.4)	2576 (101.4)	269 (10.6)	
		1710-2180	2-10	14.9 (17.0)	65	6.4	16	32 >30	<1.5:1	200	24.2 (53.4)	2576 (101.4)	269 (10.6)	
*TBXLHA-6565C-VTM	DualPol tri-band	824-960	0-8	15.4 (17.5)	65	7.2	17	25 >30	<1.5:1	250	21.8 (48.0)	2576 (101.4)	269 (10.6)	
		1710-2180	2-10	14.9 (17.0)	65	6.5	15	25 >30	<1.5:1	200	21.8 (48.0)	2576 (101.4)	269 (10.6)	

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

## Dual Band

### 806-960/1710-2180 MHz

#### 80-95° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
MB72RR80VDPALQ-12	DualPol® dual band	806-896	2-10	11.4 (13.5)	80	10.5	20	25	>30	<1.35:1	500	16.1 (35.5)	1829 (72.0)	305 (12.0)
		1850-1990	1-5	14.3 (16.4)	80	4.5	15	28	>30	<1.35:1	300	16.1 (35.5)	1829 (72.0)	305 (12.0)
*DBXLH-8585A-VTM	DualPol dual band	806-960	0-16	11.4 (13.5)	85	15.0	15	28	>30	<1.4:1	500	14.1 (31.0)	1227 (48.3)	305 (12.0)
		1710-2180	0-10	14.5 (16.6)	85	7.0	17	32	>30	<1.5:1	200	14.1 (31.0)	1227 (48.3)	305 (12.0)
*DBXLH-8585B-VTM	DualPol dual band	806-960	0-10	12.9 (15.0)	85	10.5	15	26	>30	<1.4:1	300	20.0 (44.0)	1852 (72.9)	305 (12.0)
		1710-2180	0-6	15.4 (17.5)	85	4.8	15	27	>30	<1.5:1	200	20.0 (44.0)	1852 (72.9)	305 (12.0)
*DBXLH-9090A-VTM	DualPol dual band	806-960	0-16	11.2 (13.3)	90	16.0	15	26	>28	<1.4:1	300	12.7 (28.0)	1306 (51.4)	391 (15.4)
		1710-2180	0-8	14.1 (16.2)	90	6.8	15	30	>30	<1.5:1	250	12.7 (28.0)	1306 (51.4)	391 (15.4)
*DBXLH-9090B-VTM	DualPol dual band	806-960	0-8	13.1 (15.2)	90	9.0	15	30	>30	<1.5:1	300	19.1 (42.0)	2055 (80.9)	391 (15.4)
		1710-2180	0-5	15.7 (17.8)	90	4.3	15	35	>30	<1.5:1	250	19.1 (42.0)	2055 (80.9)	391 (15.4)
*DBXLH-9090C-VTM	DualPol dual band	824-960	0-8	14.0 (16.1)	90	7.0	15	30	>30	<1.5:1	300	22.0 (48.5)	2446 (96.3)	391 (15.4)
		1710-2180	0-5	15.7 (17.8)	90	4.3	15	35	>30	<1.5:1	250	22.0 (48.5)	2446 (96.3)	391 (15.4)

#### 60-75° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB774G60ESXM	Dual band	806-941	0	13.5 (15.6)	60	15.5	15	28	—	<1.33:1	500	8.2 (18.0)	1219 (48.0)	318 (12.5)
		1850-1990	0	15.7 (17.8)	60	7.0	15	23	—	<1.33:1	250	8.2 (18.0)	1219 (48.0)	318 (12.5)
DB772G65ESXM	Dual band	806-941	0	10.9 (13.0)	65	27.0	—	28	—	<1.4:1	500	4.6 (10.1)	610 (24.0)	305 (12.0)
		1850-1990	0	12.5 (14.6)	65	15.0	—	20	—	<1.4:1	250	4.6 (10.1)	610 (24.0)	305 (12.0)
744G65V1ASXM	Dual band	806-960	0-16	13.0 (15.1)	65	14.5	—	30	—	<1.45:1	500	7.3 (16.0)	1232 (48.5)	318 (12.5)
		1850-1990	1	14.7 (16.8)	65	8.0	—	35	—	<1.4:1	250	7.3 (16.0)	1232 (48.5)	318 (12.5)
DBVLH-7050-T0M	Dual band	806-960	0	4.5 (6.6)	70	60.0	—	—	—	<1.8:1	75	0.9 (2.0)	213 (8.4)	213 (8.4)
		1710-2300	0	6.5 (8.6)	47	45.0	—	—	—	<1.8:1	75	0.9 (2.0)	213 (8.4)	213 (8.4)

#### 80-95° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
774G80V1ESXM	Dual band	806-896	0-10	12.0 (14.1)	80	15.0	17	25	—	<1.4:1	500	9.5 (21.0)	1219 (48.0)	330 (13.0)
		1850-1990	2	14.2 (16.3)	80	8.0	17	25	—	<1.4:1	250	9.5 (21.0)	1219 (48.0)	330 (13.0)
DB774G90ESXM	Dual band	806-941	0	12.3 (14.4)	90	14.0	15	28	—	<1.4:1	500	6.8 (15.0)	1219 (48.0)	254 (10.0)
		1850-1990	0	14.9 (17.0)	90	7.0	15	35	—	<1.4:1	250	6.8 (15.0)	1219 (48.0)	254 (10.0)
774G90V1ESXM	Dual band	806-941	0-10	11.7 (13.8)	90	15.5	15	28	—	<1.4:1	500	9.5 (21.0)	1219 (48.0)	330 (13.0)
		1850-1990	2	14.0 (16.1)	90	8.0	17	20	—	<1.4:1	250	9.5 (21.0)	1219 (48.0)	330 (13.0)
775G90V1ESXM	Dual band	806-941	0-10	12.0 (14.1)	90	15.0	15	30	—	<1.4:1	500	11.3 (25.0)	1524 (60.0)	330 (13.0)
		1850-1990	2	15.0 (17.1)	90	6.0	15	35	—	<1.4:1	250	11.3 (25.0)	1524 (60.0)	330 (13.0)
DB778G90ASXM	Dual band	806-941	0	15.3 (17.4)	90	7.0	15	27	—	<1.33:1	500	12.7 (28.0)	2451 (96.5)	267 (10.5)
		1850-1990	0	15.3 (17.4)	90	5.8	15	27	—	<1.33:1	250	12.7 (28.0)	2451 (96.5)	267 (10.5)
778G90VTAXM	Dual band	824-896	0-9	14.0 (16.1)	90	8.0	—	25	—	<1.5:1	500	13.2 (29.0)	2449 (96.4)	264 (10.4)
		1850-1990	0-7	15.0 (17.1)	90	5.7	—	30	—	<1.5:1	250	13.2 (29.0)	2449 (96.4)	264 (10.4)

#### >105° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
778X105M85V1	Dual band	806-941	0	14.9 (17.0)	105	7.0	15	26	—	<1.4:1	500	12.2 (27.0)	2449 (96.4)	264 (10.4)
		1850-1990	0-7	15.0 (17.1)	85	5.5	15	30	—	<1.4:1	250	12.2 (27.0)	2449 (96.4)	264 (10.4)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.







- 1710–1880 MHz
- 1710–2180 MHz
- 1850–1990 MHz
- 1920–2180 MHz

Features and Benefits



HBX Series



FR65-17 Series



932LG Series

DualPol® Panel Antennas

The technology leader, Andrew's DualPol® panel antennas provide excellent RF performance with superior gain per unit length, optimal pattern shaping, and state-of-the-art construction producing consistent unit-to-unit repeatability.

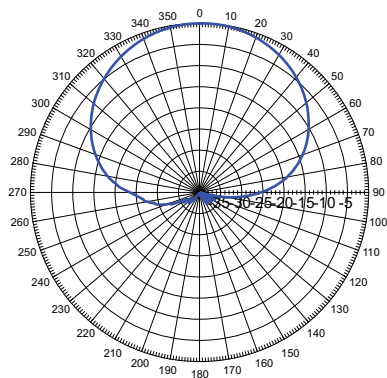
Wideband, dual DualPol, and field adjustable models in the Andrew DualPol antenna portfolio offer a wide selection of compact antenna solutions.

- Dual DualPol models in the ADFD and DR antenna series package two independent DualPol antennas under one radome
- Wideband performance models in the HBX, UMWD, and ADFD series use advanced phase shifter technology to provide excellent RF performance over the entire 1710–2170 MHz band
- DualPol technology in the RR and FR series provides exceptional upper sidelobe suppression, as well as null filling in the FR series models
- Variable electrical tilt models are independently field adjustable with a large selection of models that are fully compatible with Andrew's Teletilt® remote electrical tilt (RET) system
- Superior passive intermodulation (PIM) suppression is achieved using Andrew's unique SureFlex™ phase cable technology

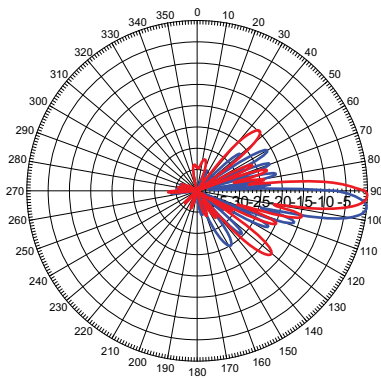
Directed Dipole™ Panel Antennas

Andrew features both vertically polarized and DualPol models in the Directed Dipole™ panel antenna family, which offers a myriad of benefits.

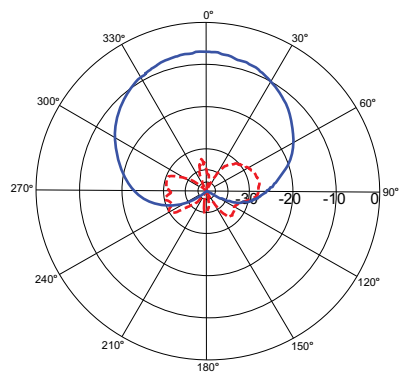
- Uniquely designed with log periodic performance, offering great pattern definition with greater than 35 dB front-to-back ratio
- Features exceptional RF control in the azimuth plane, providing the best results over front-to-back ratio and rapid roll-offs
- Constructed to provide outstanding unit-to-unit repeatability and excellent IM performance
- Packaged in an attractive, slim profile, including models designed with no wings, this family of antennas is a perfect choice for instances where facing tough zoning laws



932LG65VTE-B  
Superior roll-off and F/B ratio



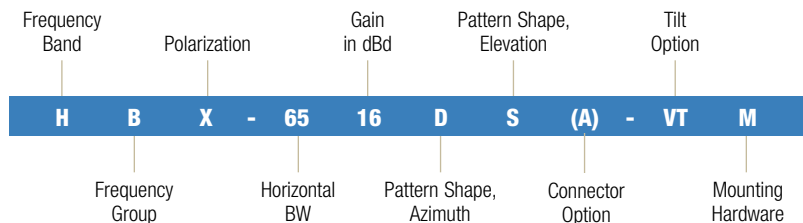
HBX-6516DS-VTM  
Provides exceptional pattern shaping



Exceptional cross polar discrimination

## Single Band Sector Base Station Antenna Model Number Sequences

### Typical Style 1 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY BAND (MHz)

(Shown in Frequency Order)

- U = 410–500
- L = 806–960
- H = 1710–2180
- W = 2300–5875

#### FREQUENCY GROUP

(Shown in Frequency Order with Band in MHz)

- B = Broadband (Covers entire U, L, or H Freq. Band)
- C = 800 MHz (806–896)
- G = GSM900 (870–960)
- K = GSM1800 (1710–1880)
- P = 1900 MHz (1850–1990)
- U = UMTS (1920–2180)
- 2 = WiMAX (2300–2700, 2495–2690)
- 3 = WiMAX (3300–3800, 3400–3600)
- 5 = WiMAX (5150–5875)

#### POLARIZATION

- H = Horizontal Pol
- V = Vertical Pol
- X = DualPol®
- XX = Dual DualPol® (Quad)
- XXX = Triple DualPol®

#### PATTERN SHAPE–AZIMUTH

- D = Standard Dipole
- L = Directed Dipole™

#### PATTERN SHAPE–ELEVATION

- F = Optimized Null Fill
- G = Optimized Gain
- S = Heavy Upper Sidelobe Suppression (USLS)

#### CONNECTOR OPTION

- A = 7–16 DIN, Female (Back)
- No Character = 7–16 DIN, Female (Bottom)

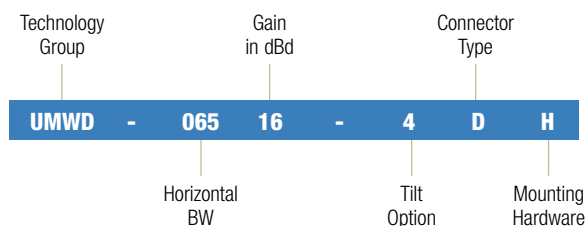
#### TILT OPTION

- T# = Degree of Fixed Tilt
- VT = Variable Electrical Tilt
- R2 = ATC200 Teletilt® RET Ready

#### MOUNTING HARDWARE

- M = Standard Downtilt Mount and Pipe Mount

### Typical Style 2 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### TECHNOLOGY GROUP

- ADFD\* = Dual DualPol® (Quad, Side-By-Side), 1710–2170 MHz
- CTSG = Optimized Gain, Vertical Pol, 806–960 MHz
- CTSDG = Optimized Gain, DualPol®, 806–960 MHz
- PCS = Vertical Pol, 1710–1990 MHz
- UMW = Vertical Pol, 1710–2170 MHz
- UMWD = DualPol®, 1710–2170 MHz

\*ADFD model numbers show the horizontal BW for both DualPol arrays and exclude the gain.

#### TILT OPTION

- # = Degree of Fixed Tilt
- XD = Variable Electrical Tilt
- R2 = ATC200 Teletilt® RET Ready

#### CONNECTOR TYPE

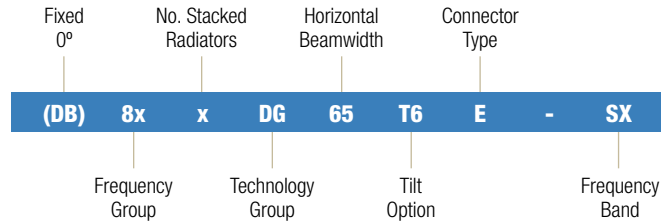
- D = 7–16 DIN, Female (Bottom)

#### MOUNTING HARDWARE

- H = High Environment Downtilt Mount and Pipe Mount
- M = Standard Downtilt Mount and Pipe Mount

## Single Band Sector Base Station Antenna Model Number Sequences

### Typical Style 3 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY GROUP (Shown in Frequency Order)

- 6x = UHF
- 8x = 800/900 MHz
- 9x = 1800/1900 MHz/UMTS/WiMAX

#### NUMBER OF STACKED RADIATORS

800/900 MHz Models: Equals length of antenna (ft)  
1710–2170 MHz Models: Equals 2x length of antenna (ft)

Vertical BW can be estimated based on the # of stacked radiators, by dividing the # of stacked radiators into 60 (Ex: 60 divided by 4 stacked radiators ≈ 15° Vertical BW).

#### TECHNOLOGY GROUP

- F = Optimized Null Fill, USLS, Vertical Pol
- G = Optimized Gain, Heavy USLS, Vertical Pol
- DG = Optimized Gain, Heavy USLS, DualPol®
- H = Conventional USLS, Vertically Polarized
- LG = Optimized Gain, Heavy USLS, DualPol®, Directed Dipole™
- QDG = Optimized Gain, Heavy USLS, Dual DualPol® (Side-By-Side)

#### TILT OPTION

- None = 0° Fixed Tilt
- T# = Degree of Fixed Tilt
- VT = Variable Electrical Tilt
- R2 = ATC200 Teletilt® RET Ready

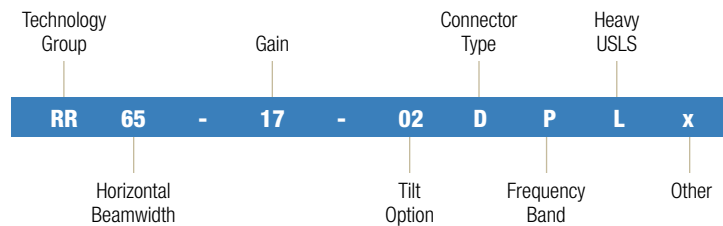
#### CONNECTOR TYPE

- E = 7–16 DIN, Female (Bottom)
- A = 7–16 DIN, Female (Back)

#### FREQUENCY BAND (MHz) (Shown in Frequency Order)

- C = 420–572
- A = 740–801
- XT = 806–869
- SX = 806–896
- XC = 824–896
- XY = 806–960
- SY = 870–960
- KL = 1710–1880
- M = 1850–1990
- B = 1710–2170
- U = 1920–2170
- SR = 2100–2700

### Typical Style 4 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### TECHNOLOGY GROUP

- DR = Dual DualPol® (Quad)
- FR = Optimized Null Fill, DualPol®
- FV = Optimized Null Fill, Vertically Polarized
- RR = Optimized Gain, DualPol®
- RV = Optimized Gain, Vertically Polarized
- TR = Triple DualPol®

#### GAIN

Shown in dBd for 800/900 MHz Models  
Shown in dBi for 1800/1900 MHz/UMTS Models

#### TILT OPTION

- ## = Degree of Fixed Tilt
- V = Variable Electrical Tilt

#### CONNECTOR TYPE

- D = 7–16 DIN, Female (Back)

#### FREQUENCY BAND (MHz) (Shown in Frequency Order)

- A = 806–896
- B = 806–960
- P = 1850–1990
- U = 1710–2180
- Y = 2500–2700

#### OTHER (A dash may precede this character)

- # = Design Revision Level
- Q = Side-By-Side
- R = Factory Installed Actuator
- 12 = 12 inch Width



1800/1900/UMTS

1710-1880 MHz

<60° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*ADFD1820-3333B-XDM	DualPol® quad	1710-2170	0-7	18.5 (20.6)	33	6.0	17	40	>30	<1.5:1	200	17.2 (38.0)	1448 (57.0)	564 (22.2)
HBX-3319DS-T0M	DualPol	1710-2180	0	18.5 (20.6)	33	6.5	20	40	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3319DS-T2M	DualPol	1710-2180	2	18.5 (20.6)	33	6.0	20	38	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
*HBX-3319DS-VTM	DualPol	1710-2180	0-9	18.2 (20.3)	33	6.2	15	35	>30	<1.5:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3318ESA-T2M	DualPol	1710-2180	2	18.3 (20.4)	33	6.2	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-3318ESA-T4M	DualPol	1710-2180	4	18.3 (20.4)	33	6.1	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-4515ESA-T4M	DualPol	1710-2180	4	15.0 (17.1)	45	12.0	20	35	>30	<1.4:1	250	5.9 (13.0)	813 (32.0)	305 (12.0)
HBX-4517ESA-T2M	DualPol	1710-2180	2	17.0 (19.1)	45	6.7	23	41	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T4M	DualPol	1710-2180	4	17.0 (19.1)	45	6.7	20	30	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T6M	DualPol	1710-2180	6	17.0 (19.1)	45	6.7	19	39	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
*HBX-4517DS-VTM	DualPol	1710-2170	0-7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*UMWD-04517-XDM	DualPol	1710-2170	0-7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*HBX-4519DS-VTM	DualPol	1710-2170	0-5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)
*UMWD-04519-XDM	DualPol	1710-2170	0-5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)

60-75° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
HBX-6511DS-T10M	DualPol®	1710-2180	10	10.5 (12.6)	65	22.0	17	32	>30	<1.4:1	100	1.9 (4.2)	384 (15.1)	173 (6.8)
*HBX-6513DS-VTM	DualPol	1710-2180	0-18	12.8 (14.9)	65	13.0	20	28	>30	<1.4:1	250	2.6 (5.7)	696 (27.4)	165 (6.5)
*HBXX-6513DS-VTM	DualPol quad	1710-2170	0-12	12.8 (14.9)	65	13.0	15	30	>30	<1.4:1	250	7.9 (17.4)	696 (27.4)	305 (12.0)
UMWD-06513-0DH	DualPol	1710-2170	0	13.1 (15.2)	65	12.2	17	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
UMWD-06513-6DH	DualPol	1710-2170	6	13.1 (15.2)	65	12.2	18	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
*931LG65VTE-B	Directed Dipole™	1710-2170	0-8	14.9 (17.0)	65	7.3	20	35	>30	<1.5:1	250	7.3 (16.0)	1219 (48.0)	208 (8.2)
HBX-6516DS-T0M	DualPol	1710-2180	0	16.0 (18.1)	65	6.7	18	34	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T2M	DualPol	1710-2180	2	16.0 (18.1)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T4M	DualPol	1710-2180	4	16.0 (18.1)	65	6.7	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
*HBX-6516DS-VTM	DualPol	1710-2170	0-10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	168 (6.6)
*HBXX-6516DS-VTM	DualPol quad	1710-2180	0-10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	13.9 (30.6)	1293 (50.9)	305 (12.0)
DB932DG65EKL	DualPol	1710-1880	0	16.0 (18.1)	65	7.0	18	30	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932DG65T2EKL	DualPol	1710-1880	2	15.9 (18.0)	65	7.0	18	30	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932DG65T4EKL	DualPol	1710-1880	4	15.9 (18.0)	65	7.0	18	30	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932DG65T6EKL	DualPol	1710-1880	6	15.9 (18.0)	65	7.0	18	30	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
*932LG65VTE-B	Directed Dipole	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932LG65VTE-B-H	Directed Dipole	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932QLG65VTEB	DualPol quad	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.35:1	250	16.8 (37.0)	1308 (51.5)	414 (16.3)
UMWD-06516-6DH	DualPol	1710-2170	6	15.5 (17.6)	65	6.0	17	25	>30	<1.5:1	250	6.0 (13.2)	1392 (54.8)	173 (6.8)
HBX-6516ESA-T2M	DualPol	1710-2180	2	15.6 (17.7)	65	6.2	20	30	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T4M	DualPol	1710-2180	4	15.6 (17.7)	65	6.6	17	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T6M	DualPol	1710-2180	6	15.6 (17.7)	65	6.5	18	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR65-18-VDUL2	DualPol	1710-2180	0-10	15.4 (17.5)	65	6.5	18	30	>30	<1.35:1	300	7.3 (16.0)	1422 (56.0)	203 (8.0)
*SBH-2D6516	SmartBeam™	1710-2180	0-10	14.9 (17.0)	65	7.0	18	32	>30	<1.5:1	250	13.6 (30.0)	1613 (63.5)	203 (8.0)
*HBX-6517DS-VTM	DualPol	1710-2180	0-6	17.1 (19.2)	65	4.4	18	30	>30	<1.4:1	250	8.5 (18.7)	1902 (74.9)	168 (6.6)
*HBXX-6517DS-VTM	DualPol quad	1710-2180	0-6	17.1 (19.2)	65	4.5	18	30	>30	<1.4:1	250	18.5 (40.7)	1902 (74.9)	305 (12.0)
*CSH-6516A-VT	DualPol tri-sector	1710-2180	2-10	15.5 (17.6)	65	6.7	16	26	>30	<1.5:1	200	21.1 (46.5)	1989 (78.3)	200 (7.9)
*936LG65VTE-B	Directed Dipole	1710-2180	0-5	16.8 (18.9)	65	4.9	15	35	>30	<1.5:1	250	13.6 (30.0)	2017 (79.4)	208 (8.2)
UMWD-06517-0DH	DualPol	1710-2170	0	17.4 (19.5)	65	4.2	17	30	>30	<1.4:1	250	7.7 (17.0)	2057 (81.0)	173 (6.8)
UMWD-06517-2DH	DualPol	1710-2180	2	17.4 (19.5)	65	4.2	18	29	>30	<1.4:1	250	7.7 (17.0)	2055 (80.9)	173 (6.8)
UMWD-06517-4DH	DualPol	1710-2170	4	17.4 (19.5)	65	4.2	16	30	>30	<1.5:1	250	7.7 (17.0)	2047 (80.6)	173 (6.8)
UMWD-06519-0DH	DualPol	1710-2170	0	18.5 (20.6)	65	3.5	15	30	>30	<1.5:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)
UMWD-06519-2DH	DualPol	1710-2170	2	18.1 (20.2)	65	3.5	16	30	>30	<1.4:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

**80-95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UMWD-09014B-ODH	DualPol*	1710-2170	0	14.9 (17.0)	90	7.5	18	29	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
UMWD-09014B-2DH	DualPol	1710-2170	2	14.5 (16.6)	90	7.0	20	30	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
*UMWD-09014B-XDH	DualPol	1710-2170	0-8	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	300	5.3 (11.7)	1306 (51.4)	173 (6.8)
*ADFD1820-9090B-XDM	DualPol quad	1710-2180	0-8	14.4 (16.5)	90	6.5	15	30	>30	<1.5:1	250	10.0 (22.0)	1311 (51.6)	307 (12.1)
UMWD-09014-4DH	DualPol	1710-2170	4	14.3 (16.4)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09014-6DH	DualPol	1710-2170	6	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09016-2DH	DualPol	1710-2170	2	16.1 (18.2)	90	5.0	20	30	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
UMWD-09016-4DH	DualPol	1710-2170	4	16.1 (18.2)	90	5.0	16	34	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
*UMWD-09016-XDH	DualPol	1710-2170	0-5	15.9 (18.0)	90	4.3	15	30	>30	<1.5:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)

**<60° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB992HG28N-B	Sector	1710-2490	0	14.9 (17.0)	28	25.0	18	35	—	<2.0:1	50	1.4 (3.0)	305 (12.0)	305 (12.0)

**60-75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
PCS-06509-ODM	Sector	1710-1990	0	8.5 (10.6)	65	40.0	15	25	—	<1.4:1	250	1.7 (3.7)	267 (10.5)	173 (6.8)
PCS-06515-ODH	Sector	1710-1990	0	15.2 (17.3)	65	7.5	17	30	—	<1.4:1	250	5.4 (12.0)	1227 (48.3)	173 (6.8)
*HBV-6516LS-VTM	Directed Dipole™	1710-2180	0-7	16.1 (18.2)	65	6.2	18	36	—	<1.4:1	300	5.5 (12.1)	1367 (53.8)	173 (6.8)
UMW-06516-ODH	Sector	1710-2170	0	16.0 (18.1)	65	6.0	17	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-2DH	Sector	1710-2170	2	16.0 (18.1)	65	6.0	17	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-4DH	Sector	1710-2170	4	15.9 (18.0)	65	6.0	16	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
950F65T2ZE-B	Directed Dipole	1710-2170	2	16.5 (18.6)	65	6.0	20	38	—	<1.4:1	250	4.5 (10.0)	1524 (60.0)	152 (6.0)
UMW-06517-2DH	Sector	1710-2170	2	16.8 (18.9)	65	4.5	14	30	—	<1.4:1	250	7.5 (16.5)	1953 (76.9)	173 (6.8)

**80-95° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
PCS-09014-ODH	Sector	1710-1990	0	14.4 (16.5)	90	8.0	15	25	—	<1.4:1	250	4.9 (10.8)	1227 (48.3)	173 (6.8)
PCS-09014-2DH	Sector	1710-1990	2	14.4 (16.5)	90	8.0	15	25	—	<1.4:1	250	4.9 (10.8)	1227 (48.3)	173 (6.8)
UMW-09015-ODH	Sector	1710-2170	0	14.4 (16.5)	90	6.0	17	30	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-2DH	Sector	1710-2170	2	14.6 (16.7)	90	6.0	16	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-4DH	Sector	1710-2170	4	14.8 (16.9)	90	6.5	16	27	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
PCS-09016-ODH	Sector	1710-1990	0	15.7 (17.8)	90	4.5	15	27	—	<1.4:1	250	7.4 (16.3)	1930 (76.0)	178 (7.0)
UMW-09016-2DH	Sector	1710-2180	2	15.5 (17.6)	90	4.3	15	30	—	<1.4:1	250	7.4 (16.3)	1953 (76.9)	173 (6.8)

**>105° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
PCS-11015-ODH	Sector	1710-1990	0	14.5 (16.6)	110	4.5	—	20	—	<1.4:1	250	8.2 (18.0)	1961 (77.2)	173 (6.8)
PCS-11015-2DH	Sector	1710-1990	2	14.3 (16.4)	110	4.5	16	22	—	<1.4:1	250	7.5 (16.5)	1953 (76.9)	173 (6.8)

**360° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
DB910CE-KL	Omni	1710-1880	0	10.0 (12.1)	360	5.0	—	—	—	<1.5:1	200	3.6 (8.0)	2108 (83.0)	50.8 (2.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

1800/1900/UMTS

1710–2180 MHz

**<60° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*ADFD1820-3333B-XDM	DualPol® quad	1710–2170	0–7	18.5 (20.6)	33	6.0	17	40	>30	<1.5:1	200	17.2 (38.0)	1448 (57.0)	564 (22.2)
HBX-3319DS-T0M	DualPol	1710–2180	0	18.5 (20.6)	33	6.5	20	40	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3319DS-T2M	DualPol	1710–2180	2	18.5 (20.6)	33	6.0	20	38	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
*HBX-3319DS-VTM	DualPol	1710–2180	0–9	18.2 (20.3)	33	6.2	15	35	>30	<1.5:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3318ESA-T2M	DualPol	1710–2180	2	18.3 (20.4)	33	6.2	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-3318ESA-T4M	DualPol	1710–2180	4	18.3 (20.4)	33	6.1	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-4515ESA-T4M	DualPol	1710–2180	4	15.0 (17.1)	45	12.0	20	35	>30	<1.4:1	250	5.9 (13.0)	813 (32.0)	305 (12.0)
HBX-4517ESA-T2M	DualPol	1710–2180	2	17.0 (19.1)	45	6.7	23	41	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T4M	DualPol	1710–2180	4	17.0 (19.1)	45	6.7	20	30	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T6M	DualPol	1710–2180	6	17.0 (19.1)	45	6.7	19	39	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
*HBX-4517DS-VTM	DualPol	1710–2170	0–7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*UMWD-04517-XDM	DualPol	1710–2170	0–7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*HBX-4519DS-VTM	DualPol	1710–2170	0–5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)
*UMWD-04519-XDM	DualPol	1710–2170	0–5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)

**60–75° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
HBX-6511DS-T10M	DualPol®	1710–2180	10	10.5 (12.6)	65	22.0	17	32	>30	<1.4:1	100	1.9 (4.2)	384 (15.1)	173 (6.8)
*HBX-6513DS-VTM	DualPol	1710–2180	0–18	12.8 (14.9)	65	13.0	20	28	>30	<1.4:1	250	2.6 (5.7)	696 (27.4)	165 (6.5)
*HBXX-6513DS-VTM	DualPol quad	1710–2170	0–12	12.8 (14.9)	65	13.0	15	30	>30	<1.4:1	250	7.9 (17.4)	696 (27.4)	305 (12.0)
UMWD-06513-0DH	DualPol	1710–2170	0	13.1 (15.2)	65	12.2	17	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
UMWD-06513-6DH	DualPol	1710–2170	6	13.1 (15.2)	65	12.2	18	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
*931LG65VTE-B	Directed Dipole™	1710–2170	0–8	14.9 (17.0)	65	7.3	20	35	>30	<1.5:1	250	7.3 (16.0)	1219 (48.0)	208 (8.2)
HBX-6516DS-T0M	DualPol	1710–2180	0	16.0 (18.1)	65	6.7	18	34	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T2M	DualPol	1710–2180	2	16.0 (18.1)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T4M	DualPol	1710–2180	4	16.0 (18.1)	65	6.7	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
*HBX-6516DS-VTM	DualPol	1710–2170	0–10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	168 (6.6)
*HBXX-6516DS-VTM	DualPol quad	1710–2180	0–10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	13.9 (30.6)	1293 (50.9)	305 (12.0)
*932LG65VTE-B	Directed Dipole	1710–2170	0–8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932LG65VTE-B-H	Directed Dipole	1710–2170	0–8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932QLG65VTEB	DualPol quad	1710–2170	0–8	15.4 (17.5)	65	6.8	18	35	>30	<1.35:1	250	16.8 (37.0)	1308 (51.5)	414 (16.3)
UMWD-06516-0DH	DualPol	1710–2170	0	16.0 (18.1)	65	6.0	20	25	>30	<1.4:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-2DH	DualPol	1710–2170	2	15.9 (18.0)	65	6.0	17	30	>30	<1.4:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-4DH	DualPol	1710–2170	4	15.8 (17.9)	65	6.0	16	25	>30	<1.5:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-6DH	DualPol	1710–2170	6	15.5 (17.6)	65	6.0	17	25	>30	<1.5:1	250	6.0 (13.2)	1392 (54.8)	173 (6.8)
HBX-6516ESA-T2M	DualPol	1710–2180	2	15.6 (17.7)	65	6.2	20	30	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T4M	DualPol	1710–2180	4	15.6 (17.7)	65	6.6	17	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T6M	DualPol	1710–2180	6	15.6 (17.7)	65	6.5	18	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR65-18-VDUL2	DualPol	1710–2180	0–10	15.4 (17.5)	65	6.5	18	30	>30	<1.35:1	300	7.3 (16.0)	1422 (56.0)	203 (8.0)
*SBH-2D6516	SmartBeam™	1710–2180	0–10	14.9 (17.0)	65	7.0	18	32	>30	<1.5:1	250	13.6 (30.0)	1613 (63.5)	203 (8.0)
*HBX-6517DS-VTM	DualPol	1710–2180	0–6	17.1 (19.2)	65	4.4	18	30	>30	<1.4:1	250	8.5 (18.7)	1902 (74.9)	168 (6.6)
*HBXX-6517DS-VTM	DualPol quad	1710–2180	0–6	17.1 (19.2)	65	4.5	18	30	>30	<1.4:1	250	18.5 (40.7)	1902 (74.9)	305 (12.0)
*CSH-6516A-VT	DualPol tri-sector	1710–2180	2–10	15.5 (17.6)	65	6.7	16	26	>30	<1.5:1	200	21.1 (46.5)	1989 (78.3)	200 (7.9)
*936LG65VTE-B	Directed Dipole	1710–2180	0–5	16.8 (18.9)	65	4.9	15	35	>30	<1.5:1	250	13.6 (30.0)	2017 (79.4)	208 (8.2)
UMWD-06517-0DH	DualPol	1710–2170	0	17.4 (19.5)	65	4.2	17	30	>30	<1.4:1	250	7.7 (17.0)	2057 (81.0)	173 (6.8)
UMWD-06517-2DH	DualPol	1710–2180	2	17.4 (19.5)	65	4.2	18	29	>30	<1.4:1	250	7.7 (17.0)	2055 (80.9)	173 (6.8)
UMWD-06517-4DH	DualPol	1710–2170	4	17.4 (19.5)	65	4.2	16	30	>30	<1.5:1	250	7.7 (17.0)	2047 (80.6)	173 (6.8)
UMWD-06519-0DH	DualPol	1710–2170	0	18.5 (20.6)	65	3.5	15	30	>30	<1.5:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)
UMWD-06519-2DH	DualPol	1710–2170	2	18.1 (20.2)	65	3.5	16	30	>30	<1.4:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)

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\*Teletilt® remote electrical tilt compatible.

**1800/1900/UMTS**

**1710–2180 MHz**

**80–95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UMWD-09014B-0DH	DualPol	1710–2170	0	14.9 (17.0)	90	7.5	18	29	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
UMWD-09014B-2DH	DualPol	1710–2170	2	14.5 (16.6)	90	7.0	20	30	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
*UMWD-09014B-XDH	DualPol	1710–2170	0–8	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	300	5.3 (11.7)	1306 (51.4)	173 (6.8)
*ADFD1820-9090B-XDM	DualPol quad	1710–2180	0–8	14.4 (16.5)	90	6.5	15	30	>30	<1.5:1	250	10.0 (22.0)	1311 (51.6)	307 (12.1)
UMWD-09014-4DH	DualPol	1710–2170	4	14.3 (16.4)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09014-6DH	DualPol	1710–2170	6	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09016-2DH	DualPol	1710–2170	2	16.1 (18.2)	90	5.0	20	30	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
UMWD-09016-4DH	DualPol	1710–2170	4	16.1 (18.2)	90	5.0	16	34	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
*UMWD-09016-XDH	DualPol	1710–2170	0–5	15.9 (18.0)	90	4.3	15	30	>30	<1.5:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)

**<60° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB992HG28N-B	Sector	1710–2490	0	14.9 (17.0)	28	25.0	18	35	—	<2.0:1	50	1.4 (3.0)	305 (12.0)	305 (12.0)

**60–75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*HBV-6516LS-VTM	Directed Dipole™	1710–2180	0–7	16.1 (18.2)	65	6.2	18	36	—	<1.4:1	300	5.5 (12.1)	1367 (53.8)	173 (6.8)
UMW-06516-0DH	Sector	1710–2170	0	16.0 (18.1)	65	6.0	17	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-2DH	Sector	1710–2170	2	16.0 (18.1)	65	6.0	17	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-4DH	Sector	1710–2170	4	15.9 (18.0)	65	6.0	16	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
950F65T2ZE-B	Directed Dipole	1710–2170	2	16.5 (18.6)	65	6.0	20	38	—	<1.4:1	250	4.5 (10.0)	1524 (60.0)	152 (6.0)
UMW-06517-2DH	Sector	1710–2170	2	16.8 (18.9)	65	4.5	14	30	—	<1.4:1	250	7.5 (16.5)	1953 (76.9)	173 (6.8)

**80–95° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UMW-09015-0DH	Sector	1710–2170	0	14.4 (16.5)	90	6.0	17	30	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-2DH	Sector	1710–2170	2	14.6 (16.7)	90	6.0	16	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-4DH	Sector	1710–2170	4	14.8 (16.9)	90	6.5	16	27	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09016-2DH	Sector	1710–2180	2	15.5 (17.6)	90	4.3	15	30	—	<1.4:1	250	7.4 (16.3)	1953 (76.9)	173 (6.8)

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\*Teletilt® remote electrical tilt compatible.

1800/1900/UMTS

1850-1990 MHz

<60° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*ADFD1820-3333B-XDM	DualPol® quad	1710-2170	0-7	18.5 (20.6)	33	6.0	17	40	>30	<1.5:1	200	17.2 (38.0)	1448 (57.0)	564 (22.2)
HBX-3319DS-T0M	DualPol	1710-2180	0	18.5 (20.6)	33	6.5	20	40	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3319DS-T2M	DualPol	1710-2180	2	18.5 (20.6)	33	6.0	20	38	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
*HBX-3319DS-VTM	DualPol	1710-2180	0-9	18.2 (20.3)	33	6.2	15	35	>30	<1.5:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3318ESA-T2M	DualPol	1710-2180	2	18.3 (20.4)	33	6.2	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-3318ESA-T4M	DualPol	1710-2180	4	18.3 (20.4)	33	6.1	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
RR33-20-VDPL4	DualPol	1850-1990	0-10	17.9 (20.0)	33	6.4	—	35	>30	<1.35:1	300	13.6 (30.0)	1524 (60.0)	305 (12.0)
RR45-17-00DPL4	DualPol	1850-1990	0	14.6 (16.7)	45	12.5	18	42	>30	<1.35:1	250	5.7 (12.6)	813 (32.0)	305 (12.0)
RR45-17-04DPL4	DualPol	1850-1990	4	14.6 (16.7)	45	12.5	18	40	>30	<1.35:1	250	5.7 (12.6)	813 (32.0)	305 (12.0)
HBX-4515ESA-T4M	DualPol	1710-2180	4	15.0 (17.1)	45	12.0	20	35	>30	<1.4:1	250	5.9 (13.0)	813 (32.0)	305 (12.0)
RR45-19-00DPL4	DualPol	1850-1990	0	16.5 (18.6)	45	6.7	18	40	>30	<1.35:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
RR45-19-02DPL4	DualPol	1850-1990	2	18.6 (20.7)	45	6.7	18	40	>30	<1.35:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T2M	DualPol	1710-2180	2	17.0 (19.1)	45	6.7	23	41	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T4M	DualPol	1710-2180	4	17.0 (19.1)	45	6.7	20	30	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T6M	DualPol	1710-2180	6	17.0 (19.1)	45	6.7	19	39	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
*HBX-4517DS-VTM	DualPol	1710-2170	0-7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*UMWD-04517-XDM	DualPol	1710-2170	0-7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*HBX-4519DS-VTM	DualPol	1710-2170	0-5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)
*UMWD-04519-XDM	DualPol	1710-2170	0-5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)

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\*Teletilt® remote electrical tilt compatible.



60-75° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
HBX-6511DS-T10M	DualPol®	1710-2180	10	10.5 (12.6)	65	22.0	17	32	>30	<1.4:1	100	1.9 (4.2)	384 (15.1)	173 (6.8)
*HBX-6513DS-VTM	DualPol	1710-2180	0-18	12.8 (14.9)	65	13.0	20	28	>30	<1.4:1	250	2.6 (5.7)	696 (27.4)	165 (6.5)
*HBXX-6513DS-VTM	DualPol quad	1710-2170	0-12	12.8 (14.9)	65	13.0	15	30	>30	<1.4:1	250	7.9 (17.4)	696 (27.4)	305 (12.0)
RR65-15-00DP	DualPol	1850-1990	0	12.4 (14.5)	65	12.0	—	38	>30	<1.35:1	250	4.1 (9.0)	762 (30.0)	203 (8.0)
UMWD-06513-0DH	DualPol	1710-2170	0	13.1 (15.2)	65	12.2	17	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
UMWD-06513-6DH	DualPol	1710-2170	6	13.1 (15.2)	65	12.2	18	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
RR65-17-00DPL2	DualPol	1850-1990	0	14.4 (16.5)	65	8.0	—	35	>30	<1.35:1	250	6.1 (13.5)	1219 (48.0)	203 (8.0)
RR65-17-02DPL2	DualPol	1850-1990	2	14.4 (16.5)	65	8.0	18	35	>30	<1.35:1	250	5.4 (12.0)	1219 (48.0)	203 (8.0)
931DG65T2E-M	DualPol	1850-1990	2	15.7 (17.8)	65	7.0	17	32	>30	<1.33:1	250	4.1 (9.0)	1219 (48.0)	178 (7.0)
*931LG65VTE-B	Directed Dipole™	1710-2170	0-8	14.9 (17.0)	65	7.3	20	35	>30	<1.5:1	250	7.3 (16.0)	1219 (48.0)	208 (8.2)
HBX-6516DS-T0M	DualPol	1710-2180	0	16.0 (18.1)	65	6.7	18	34	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T2M	DualPol	1710-2180	2	16.0 (18.1)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T4M	DualPol	1710-2180	4	16.0 (18.1)	65	6.7	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
*HBX-6516DS-VTM	DualPol	1710-2170	0-10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	168 (6.6)
*HBXX-6516DS-VTM	DualPol quad	1710-2180	0-10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	13.9 (30.6)	1295 (50.9)	305 (12.0)
DB932DG65E-M	DualPol	1850-1990	0	16.0 (18.1)	65	7.0	18	32	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
DB932DQG65EM	DualPol quad	1850-1990	0	16.0 (18.1)	65	7.0	18	32	>30	<1.33:1	250	9.3 (20.4)	1295 (51.0)	330 (13.0)
932LG65T2A-M	Directed Dipole	1850-1990	2	16.4 (18.5)	65	6.5	18	40	>30	<1.33:1	250	5.9 (13.0)	1295 (51.0)	216 (8.5)
932DG65T2E-M	DualPol	1850-1990	2	15.9 (18.0)	65	7.0	18	32	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932QDG65T2EM	DualPol quad	1850-1990	2	15.9 (18.0)	65	7.0	18	32	>30	<1.33:1	250	9.3 (20.4)	1295 (51.0)	330 (13.0)
932DG65T4E-M	DualPol	1850-1990	4	15.8 (17.9)	65	7.0	18	32	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932QDG65T4EM	DualPol quad	1850-1990	4	15.6 (17.7)	65	7.0	18	32	>30	<1.33:1	250	9.3 (20.4)	1295 (51.0)	330 (13.0)
932DG65T6E-M	DualPol	1850-1990	6	15.6 (17.7)	65	7.0	16	32	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
*932LG65VTE-B	Directed Dipole	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932LG65VTE-B-H	Directed Dipole	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932QLG65VTEB	DualPol quad	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.35:1	250	16.8 (37.0)	1308 (51.5)	414 (16.3)
DR65-18-02DPL2Q	DualPol quad	1850-1990	2	15.2 (17.3)	65	6.0	18	35	>30	<1.35:1	250	9.3 (20.5)	1372 (54.0)	305 (12.0)
UMWD-06516-0DH	DualPol	1710-2170	0	16.0 (18.1)	65	6.0	20	25	>30	<1.4:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-2DH	DualPol	1710-2170	2	15.9 (18.0)	65	6.0	17	30	>30	<1.4:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-4DH	DualPol	1710-2170	4	15.8 (17.9)	65	6.0	16	25	>30	<1.5:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-6DH	DualPol	1710-2170	6	15.5 (17.6)	65	6.0	17	25	>30	<1.5:1	250	6.0 (13.2)	1392 (54.8)	173 (6.8)
RR65-18-00DPL2	DualPol	1850-1990	0	15.7 (17.8)	65	6.0	18	34	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
FR65-17-00DP	DualPol	1850-1990	0	14.4 (16.5)	65	7.0	—	30	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T2M	DualPol	1710-2180	2	15.6 (17.7)	65	6.2	20	30	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR65-18-02DPL2	DualPol	1850-1990	2	15.7 (17.8)	65	6.0	18	34	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR65-18-04DPL2	DualPol	1850-1990	4	15.7 (17.8)	65	6.0	18	34	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
FR65-17-02DP	DualPol	1850-1990	2	14.4 (16.5)	65	7.0	—	30	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
FR65-17-04DP	DualPol	1850-1990	4	14.4 (16.5)	65	7.0	—	30	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T4M	DualPol	1710-2180	4	15.6 (17.7)	65	6.6	17	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T6M	DualPol	1710-2180	6	15.6 (17.7)	65	6.5	18	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR65-18-VDUL2	DualPol	1710-2180	0-10	15.4 (17.5)	65	6.5	18	30	>30	<1.35:1	300	7.3 (16.0)	1422 (56.0)	203 (8.0)
RR65-18-VDPL2	DualPol	1850-1990	2-7	14.5 (16.6)	65	7.0	16	35	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
*SBH-2D6516	SmartBeam™	1710-2180	0-10	14.9 (17.0)	65	7.0	18	32	>30	<1.5:1	250	13.6 (30.0)	1613 (63.5)	203 (8.0)
RR65-19-00DP	DualPol	1850-1990	0	16.4 (18.5)	65	4.5	—	34	>30	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
DR65-19-00DPQ	DualPol quad	1850-1990	0	16.4 (18.5)	65	4.5	—	35	>30	<1.35:1	250	11.4 (25.0)	1829 (72.0)	305 (12.0)
TR65-19-02DPQ	DualPol	1850-1990	2	16.4 (18.5)	65	4.5	—	38	>30	<1.35:1	250	14.5 (32.0)	1829 (72.0)	381 (15.0)
RR65-19-02DP	DualPol	1850-1990	2	16.4 (18.5)	65	4.5	—	34	>30	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
DR65-19-02DPQ	DualPol quad	1850-1990	2	16.4 (18.5)	65	4.5	15	35	>30	<1.35:1	250	11.4 (25.0)	1829 (72.0)	305 (12.0)
RR65-19-04DP	DualPol	1850-1990	4	16.4 (18.5)	65	4.5	—	34	>30	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
*HBX-6517DS-VTM	DualPol	1710-2180	0-6	17.1 (19.2)	65	4.4	18	30	>30	<1.4:1	250	8.5 (18.7)	1902 (74.9)	168 (6.6)
*HBXX-6517DS-VTM	DualPol quad	1710-2180	0-6	17.1 (19.2)	65	4.5	18	30	>30	<1.4:1	250	18.5 (40.7)	1902 (74.9)	305 (12.0)
*CSH-6516A-VT	DualPol tri-sector	1710-2180	2-10	15.5 (17.6)	65	6.7	16	26	>30	<1.5:1	200	21.1 (46.5)	1989 (78.3)	200 (7.9)
*936LG65VTE-B	Directed Dipole	1710-2180	0-5	16.8 (18.9)	65	4.9	15	35	>30	<1.5:1	250	13.6 (30.0)	2017 (79.4)	208 (8.2)
UMWD-06517-0DH	DualPol	1710-2170	0	17.4 (19.5)	65	4.2	17	30	>30	<1.4:1	250	7.7 (17.0)	2057 (81.0)	173 (6.8)
UMWD-06517-2DH	DualPol	1710-2180	2	17.4 (19.5)	65	4.2	18	29	>30	<1.4:1	250	7.7 (17.0)	2055 (80.9)	173 (6.8)
UMWD-06517-4DH	DualPol	1710-2170	4	17.4 (19.5)	65	4.2	16	30	>30	<1.5:1	250	7.7 (17.0)	2047 (80.6)	173 (6.8)
UMWD-06519-0DH	DualPol	1710-2170	0	18.5 (20.6)	65	3.5	15	30	>30	<1.5:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)
UMWD-06519-2DH	DualPol	1710-2170	2	18.1 (20.2)	65	3.5	16	30	>30	<1.4:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)
MTRR75-17-00DPL2	DualPol tri-sector	1850-1990	0	14.9 (17.0)	75	6.0	18	—	>30	<1.35:1	250	9.1 (20.0)	1448 (57.0)	159 (6.3)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

## 80-95° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
RR90-16-02DPL2	DualPol®	1850-1990	2	13.9 (16.0)	90	7.0	18	30	>30	<1.35:1	250	5.4 (12.0)	1219 (48.0)	203 (8.0)
DB932DG90E-M	DualPol	1850-1990	0	14.7 (16.8)	90	7.0	18	30	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	330 (13.0)
DB932QD90E-M	DualPol quad	1850-1990	0	14.7 (16.8)	90	7.0	15	30	>30	<1.33:1	250	8.6 (19.0)	1295 (51.0)	330 (13.0)
932DG90T2E-M	DualPol	1850-1990	2	14.6 (16.7)	90	7.0	18	30	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932QD90T2EM	DualPol quad	1850-1990	2	14.7 (16.8)	90	6.5	15	30	>30	<1.33:1	250	8.6 (19.0)	1295 (51.0)	330 (13.0)
932DG90T4E-M	DualPol	1850-1990	4	14.5 (16.6)	90	7.0	18	25	>30	<1.33:1	250	4.3 (9.5)	1295 (51.0)	178 (7.0)
932QD90T4EM	DualPol quad	1850-1990	4	14.3 (16.4)	90	7.0	15	32	>30	<1.33:1	250	8.6 (19.0)	1295 (51.0)	330 (13.0)
UMWD-09014B-0DH	DualPol	1710-2170	0	14.9 (17.0)	90	7.5	18	29	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
UMWD-09014B-2DH	DualPol	1710-2170	2	14.5 (16.6)	90	7.0	20	30	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
*UMWD-09014B-XDH	DualPol	1710-2170	0-8	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	300	5.3 (11.7)	1306 (51.4)	173 (6.8)
*ADF1820-9090B-XDM	DualPol quad	1710-2180	0-8	14.4 (16.5)	90	6.5	15	30	>30	<1.5:1	250	10.0 (22.0)	1311 (51.6)	307 (12.1)
UMWD-09014-4DH	DualPol	1710-2170	4	14.3 (16.4)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09014-6DH	DualPol	1710-2170	6	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
RR90-17-00DPL2	DualPol	1850-1990	0	14.4 (16.5)	90	6.3	18	36	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR90-17-02DPL2	DualPol	1850-1990	2	14.4 (16.5)	90	6.3	18	36	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR90-17-VDPL2	DualPol	1850-1990	2-7	13.1 (15.2)	90	6.5	15	36	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
FR90-16-00DP	DualPol	1850-1990	0	13.1 (15.2)	90	7.0	—	34	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
FR90-16-02DP	DualPol	1850-1990	2	13.1 (15.2)	90	7.0	—	34	>30	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR90-18-00DP	DualPol	1850-1990	0	15.4 (17.5)	90	4.5	—	30	>30	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
RR90-18-02DP	DualPol	1850-1990	2	15.4 (17.5)	90	4.5	—	30	>30	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
UMWD-09016-2DH	DualPol	1710-2170	2	16.1 (18.2)	90	5.0	20	30	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
UMWD-09016-4DH	DualPol	1710-2170	4	16.1 (18.2)	90	5.0	16	34	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
*UMWD-09016-XDH	DualPol	1710-2170	0-5	15.9 (18.0)	90	4.3	15	30	>30	<1.5:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)

## &lt;60° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB992HG28N-B	Sector	1710-2490	0	14.9 (17.0)	28	25.0	18	35	—	<2.0:1	50	1.4 (3.0)	305 (12.0)	305 (12.0)
DB978G30E-M	Sector	1850-1990	0	18.7 (20.8)	30	7.0	16	40	—	<1.33:1	250	7.9 (17.5)	1295 (51.0)	330 (13.0)
982G30T2E-M	Sector	1850-1990	2	20.0 (22.1)	30	4.5	—	40	—	<1.33:1	250	11.6 (25.5)	1829 (72.0)	330 (13.0)
DB950G40E-M	Directed Dipole™	1850-1990	0	18.6 (20.7)	40	6.0	—	40	—	<1.4:1	250	8.6 (19.0)	1524 (60.0)	279 (11.0)
950F40T2E-M	Directed Dipole	1850-1990	2	18.0 (20.1)	40	6.5	18	40	—	<1.33:1	250	9.5 (21.0)	1524 (60.0)	305 (12.0)
RV45-19-00DPL4	Sector	1850-1990	0	17.0 (19.1)	45	6.7	18	40	—	<1.35:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
RV45-19-02DPL4	Sector	1850-1990	2	17.0 (19.1)	45	6.7	18	40	—	<1.35:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)

## 60-75° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
PCS-06509-ODM	Sector	1710-1990	0	8.5 (10.6)	65	40.0	15	25	—	<1.4:1	250	1.7 (3.7)	267 (10.5)	173 (6.8)
948F65T2ZE-M	Directed Dipole	1850-1990	2	15.1 (17.2)	65	8.0	16	40	—	<1.33:1	250	4.3 (9.5)	1219 (48.0)	165 (6.5)
948F65T4ZE-M	Directed Dipole	1850-1990	4	15.0 (17.1)	65	8.0	20	40	—	<1.33:1	250	4.3 (9.5)	1219 (48.0)	165 (6.5)
948F65T6ZE-M	Directed Dipole	1850-1990	6	15.0 (17.1)	65	6.0	20	40	—	<1.33:1	250	4.3 (9.5)	1219 (48.0)	165 (6.5)
PCS-06515-ODH	Sector	1710-1990	0	15.2 (17.3)	65	7.5	17	30	—	<1.4:1	250	5.4 (12.0)	1227 (48.3)	173 (6.8)
*HBV-6516LS-VTM	Directed Dipole	1710-2180	0-7	16.1 (18.2)	65	6.2	18	36	—	<1.4:1	300	5.5 (12.1)	1367 (53.8)	173 (6.8)
RV65-18-00DPL2	Sector	1850-1990	0	15.7 (17.8)	65	6.0	18	34	—	<1.35:1	250	5.3 (11.6)	1372 (54.0)	152 (6.0)
RV65-18-02DPL2	Sector	1850-1990	2	15.7 (17.8)	65	6.0	18	30	—	<1.35:1	250	5.3 (11.6)	1372 (54.0)	152 (6.0)
RV65-18-04DPL2	Sector	1850-1990	4	15.7 (17.8)	65	6.0	18	30	—	<1.35:1	250	5.3 (11.6)	1372 (54.0)	152 (6.0)
UMW-06516-0DH	Sector	1710-2170	0	16.0 (18.1)	65	6.0	17	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-2DH	Sector	1710-2170	2	16.0 (18.1)	65	6.0	17	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-4DH	Sector	1710-2170	4	15.9 (18.0)	65	6.0	16	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
950F65T2ZE-B	Directed Dipole	1710-2170	2	16.5 (18.6)	65	6.0	20	38	—	<1.4:1	250	4.5 (10.0)	1524 (60.0)	152 (6.0)
*950G65VTZE-M	Directed Dipole	1850-1990	0-7	16.0 (18.1)	65	6.5	17	40	—	<1.4:1	250	4.5 (10.0)	1524 (60.0)	165 (6.5)
RV65-19-00DP	Sector	1850-1990	0	16.4 (18.5)	65	4.5	—	34	—	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
RV65-19-02DP	Sector	1850-1990	2	16.4 (18.5)	65	4.5	—	34	—	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
UMW-06517-2DH	Sector	1710-2170	2	16.8 (18.9)	65	4.5	14	30	—	<1.4:1	250	7.5 (16.5)	1953 (76.9)	173 (6.8)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

**80-95° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB948F85E-M	Directed Dipole™	1850-1990	0	14.1 (16.2)	85	8.0	18	40	—	<1.33:1	250	3.9 (8.5)	1219 (48.0)	84 (3.3)
948F85T2E-M	Directed Dipole	1850-1990	2	14.0 (16.1)	85	7.5	16	40	—	<1.33:1	250	3.9 (8.5)	1219 (48.0)	84 (3.3)
948F85T4E-M	Directed Dipole	1850-1990	4	13.9 (16.0)	85	8.0	18	40	—	<1.33:1	250	3.9 (8.5)	1219 (48.0)	84 (3.3)
948F85T6E-M	Directed Dipole	1850-1990	6	13.8 (15.9)	85	8.0	20	40	—	<1.33:1	250	3.9 (8.5)	1219 (48.0)	84 (3.3)
DB950G85E-M	Directed Dipole	1850-1990	0	15.6 (17.7)	85	6.0	—	40	—	<1.33:1	250	5.2 (11.5)	1524 (60.0)	76 (3.0)
950F85T2E-M	Directed Dipole	1850-1990	2	14.8 (16.9)	85	6.5	16	40	—	<1.33:1	250	5.2 (11.5)	1524 (60.0)	102 (4.0)
950F85T4E-M	Directed Dipole	1850-1990	4	14.6 (16.7)	85	6.5	18	40	—	<1.33:1	250	5.2 (11.5)	1524 (60.0)	102 (4.0)
950F85T6E-M	Directed Dipole	1850-1990	6	14.4 (16.5)	85	6.5	16	40	—	<1.33:1	250	5.2 (11.5)	1524 (60.0)	102 (4.0)
*950G85VTE-M	Directed Dipole	1850-1990	0-7	15.0 (17.1)	85	7.0	15	40	—	<1.4:1	250	5.4 (12.0)	1524 (60.0)	76 (3.0)
PCS-09014-0DH	Sector	1710-1990	0	14.4 (16.5)	90	8.0	15	25	—	<1.4:1	250	4.9 (10.8)	1227 (48.3)	173 (6.8)
PCS-09014-2DH	Sector	1710-1990	2	14.4 (16.5)	90	8.0	15	25	—	<1.4:1	250	4.9 (10.8)	1227 (48.3)	173 (6.8)
RV90-17-02DP	Sector	1850-1990	2	14.4 (16.5)	90	6.0	—	28	—	<1.35:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
UMW-09015-0DH	Sector	1710-2170	0	14.4 (16.5)	90	6.0	17	30	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-2DH	Sector	1710-2170	2	14.6 (16.7)	90	6.0	16	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-4DH	Sector	1710-2170	4	14.8 (16.9)	90	6.5	16	27	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
RV90-18-00DP	Sector	1850-1990	0	15.4 (17.5)	90	4.5	—	25	—	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
RV90-18-02DP	Sector	1850-1990	2	15.7 (17.8)	90	6.0	—	28	—	<1.35:1	250	7.3 (16.0)	1829 (72.0)	203 (8.0)
PCS-09016-0DH	Sector	1710-1990	0	15.7 (17.8)	90	4.5	15	27	—	<1.4:1	250	7.4 (16.3)	1930 (76.0)	178 (7.0)
UMW-09016-2DH	Sector	1710-2180	2	15.5 (17.6)	90	4.3	15	30	—	<1.4:1	250	7.4 (16.3)	1953 (76.9)	173 (6.8)
DB983G90A-M	Sector	1850-1990	0	17.0 (19.1)	90	4.5	19	27	—	<1.33:1	250	5.4 (12.0)	1981 (78.0)	165 (6.5)

**>105° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
PCS-11015-0DH	Sector	1710-1990	0	14.5 (16.6)	110	4.5	—	20	—	<1.4:1	250	8.2 (18.0)	1961 (77.2)	173 (6.8)
PCS-11015-2DH	Sector	1710-1990	2	14.3 (16.4)	110	4.5	16	22	—	<1.4:1	250	7.5 (16.5)	1953 (76.9)	173 (6.8)

**360° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
ASPP2933E	Omni	1850-1990	0	3.0 (5.1)	360	32.0	—	—	—	<1.5:1	250	1.8 (4.0)	635 (25.0)	38.1 (1.5)
ASPP2936E	Omni	1850-1990	0	6.0 (8.1)	360	12.0	—	—	—	<1.5:1	250	2.7 (6.0)	1087 (42.8)	38.1 (1.5)
DB910CE-M	Omni	1850-1990	0	10.0 (12.1)	360	5.0	—	—	—	<1.5:1	200	3.6 (8.0)	1956 (77.0)	50.8 (2.0)
DB910T3CE-M	Omni	1850-1990	3	10.0 (12.1)	360	5.0	—	—	—	<1.5:1	200	3.6 (8.0)	2032 (80.0)	50.8 (2.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

1800/1900/UMTS

1920-2180 MHz

<60° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*ADFD1820-3333B-XDM	DualPol® quad	1710-2170	0-7	18.5 (20.6)	33	6.0	17	40	>30	<1.5:1	200	17.2 (38.0)	1448 (57.0)	564 (22.2)
HBX-3319DS-T0M	DualPol	1710-2180	0	18.5 (20.6)	33	6.5	20	40	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3319DS-T2M	DualPol	1710-2180	2	18.5 (20.6)	33	6.0	20	38	>30	<1.4:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
*HBX-3319DS-VTM	DualPol	1710-2180	0-9	18.2 (20.3)	33	6.2	15	35	>30	<1.5:1	250	13.2 (29.0)	1461 (57.5)	269 (10.6)
HBX-3318ESA-T2M	DualPol	1710-2180	2	18.3 (20.4)	33	6.2	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-3318ESA-T4M	DualPol	1710-2180	4	18.3 (20.4)	33	6.1	17	35	>30	<1.4:1	250	9.1 (20.0)	1524 (60.0)	305 (12.0)
HBX-4515ESA-T4M	DualPol	1710-2180	4	15.0 (17.1)	45	12.0	20	35	>30	<1.4:1	250	5.9 (13.0)	813 (32.0)	305 (12.0)
HBX-4517ESA-T2M	DualPol	1710-2180	2	17.0 (19.1)	45	6.7	23	41	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T4M	DualPol	1710-2180	4	17.0 (19.1)	45	6.7	20	30	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
HBX-4517ESA-T6M	DualPol	1710-2180	6	17.0 (19.1)	45	6.7	19	39	>30	<1.4:1	250	7.7 (17.0)	1219 (48.0)	305 (12.0)
*HBX-4517DS-VTM	DualPol	1710-2170	0-7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*UMWD-04517-XDM	DualPol	1710-2170	0-7	17.0 (19.1)	45	6.0	15	30	>30	<1.5:1	250	12.7 (28.0)	1461 (57.5)	269 (10.6)
*HBX-4519DS-VTM	DualPol	1710-2170	0-5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)
*UMWD-04519-XDM	DualPol	1710-2170	0-5	18.5 (20.6)	45	4.4	16	32	>30	<1.5:1	250	16.3 (36.0)	1935 (76.2)	269 (10.6)

60-75° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
HBX-6511DS-T10M	DualPol®	1710-2180	10	10.5 (12.6)	65	22.0	17	32	>30	<1.4:1	100	1.9 (4.2)	384 (15.1)	173 (6.8)
*HBX-6513DS-VTM	DualPol	1710-2180	0-18	12.8 (14.9)	65	13.0	20	28	>30	<1.4:1	250	2.6 (5.7)	696 (27.4)	165 (6.5)
*HBXX-6513DS-VTM	DualPol quad	1710-2170	0-12	12.8 (14.9)	65	13.0	15	30	>30	<1.4:1	250	7.9 (17.4)	696 (27.4)	305 (12.0)
UMWD-06513-ODH	DualPol	1710-2170	0	13.1 (15.2)	65	12.2	17	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
UMWD-06513-6DH	DualPol	1710-2170	6	13.1 (15.2)	65	12.2	18	25	>30	<1.4:1	250	3.6 (8.0)	772 (30.4)	173 (6.8)
*931LG65VTE-B	Directed Dipole™	1710-2170	0-8	14.9 (17.0)	65	7.3	20	35	>30	<1.5:1	250	7.3 (16.0)	1219 (48.0)	208 (8.2)
HBX-6516DS-T0M	DualPol	1710-2180	0	16.0 (18.1)	65	6.7	18	34	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T2M	DualPol	1710-2180	2	16.0 (18.1)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
HBX-6516DS-T4M	DualPol	1710-2180	4	16.0 (18.1)	65	6.7	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	165 (6.5)
*HBX-6516DS-VTM	DualPol	1710-2170	0-10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	4.5 (9.9)	1306 (51.4)	168 (6.6)
*HBXX-6516DS-VTM	DualPol quad	1710-2180	0-10	15.9 (18.0)	65	7.0	18	30	>30	<1.4:1	250	13.9 (30.6)	1293 (50.9)	305 (12.0)
*932LG65VTE-B	Directed Dipole	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932LG65VTE-B-H	Directed Dipole	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.5:1	250	9.1 (20.0)	1308 (51.5)	208 (8.2)
*932QLG65VTEB	DualPol quad	1710-2170	0-8	15.4 (17.5)	65	6.8	18	35	>30	<1.35:1	250	16.8 (37.0)	1308 (51.5)	414 (16.3)
UMWD-06516-ODH	DualPol	1710-2170	0	16.0 (18.1)	65	6.0	20	25	>30	<1.4:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-2DH	DualPol	1710-2170	2	15.9 (18.0)	65	6.0	17	30	>30	<1.4:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-4DH	DualPol	1710-2170	4	15.8 (17.9)	65	6.0	16	25	>30	<1.5:1	250	6.0 (13.2)	1389 (54.7)	173 (6.8)
UMWD-06516-6DH	DualPol	1710-2170	6	15.5 (17.6)	65	6.0	17	25	>30	<1.5:1	250	6.0 (13.2)	1392 (54.8)	173 (6.8)
HBX-6516ESA-T2M	DualPol	1710-2180	2	15.6 (17.7)	65	6.2	20	30	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T4M	DualPol	1710-2180	4	15.6 (17.7)	65	6.6	17	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
HBX-6516ESA-T6M	DualPol	1710-2180	6	15.6 (17.7)	65	6.5	18	34	>30	<1.4:1	250	6.1 (13.5)	1422 (56.0)	203 (8.0)
RR65-18-VDUL2	DualPol	1710-2180	0-10	15.4 (17.5)	65	6.5	18	30	>30	<1.35:1	300	7.3 (16.0)	1422 (56.0)	203 (8.0)
*SBH-2D6516	SmartBeam™	1710-2180	0-10	14.9 (17.0)	65	7.0	18	32	>30	<1.5:1	250	13.6 (30.0)	1613 (63.5)	203 (8.0)
*HBX-6517DS-VTM	DualPol	1710-2180	0-6	17.1 (19.2)	65	4.4	18	30	>30	<1.4:1	250	8.5 (18.7)	1902 (74.9)	168 (6.6)
*HBXX-6517DS-VTM	DualPol quad	1710-2180	0-6	17.1 (19.2)	65	4.5	18	30	>30	<1.4:1	250	18.5 (40.7)	1902 (74.9)	305 (12.0)
*CSH-6516A-VT	DualPol tri-sector	1710-2180	2-10	15.5 (17.6)	65	6.7	16	26	>30	<1.5:1	200	21.1 (46.5)	1989 (78.3)	200 (7.9)
*936LG65VTE-B	Directed Dipole	1710-2180	0-5	16.8 (18.9)	65	4.9	15	35	>30	<1.5:1	250	13.6 (30.0)	2017 (79.4)	208 (8.2)
UMWD-06517-ODH	DualPol	1710-2170	0	17.4 (19.5)	65	4.2	17	30	>30	<1.4:1	250	7.7 (17.0)	2057 (81.0)	173 (6.8)
UMWD-06517-2DH	DualPol	1710-2180	2	17.4 (19.5)	65	4.2	18	29	>30	<1.4:1	250	7.7 (17.0)	2055 (80.9)	173 (6.8)
UMWD-06517-4DH	DualPol	1710-2170	4	17.4 (19.5)	65	4.2	16	30	>30	<1.5:1	250	7.7 (17.0)	2047 (80.6)	173 (6.8)
UMWD-06519-ODH	DualPol	1710-2170	0	18.5 (20.6)	65	3.5	15	30	>30	<1.5:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)
UMWD-06519-2DH	DualPol	1710-2170	2	18.1 (20.2)	65	3.5	16	30	>30	<1.4:1	300	8.2 (18.0)	2174 (85.6)	173 (6.8)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

**80-95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UMWD-09014B-ODH	DualPol	1710-2170	0	14.9 (17.0)	90	7.5	18	29	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
UMWD-09014B-2DH	DualPol	1710-2170	2	14.5 (16.6)	90	7.0	20	30	>30	<1.4:1	250	5.0 (11.0)	1306 (51.4)	173 (6.8)
*UMWD-09014B-XDH	DualPol	1710-2170	0-8	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	300	5.3 (11.7)	1306 (51.4)	173 (6.8)
*ADFD1820-9090B-XDM	DualPol quad	1710-2180	0-8	14.4 (16.5)	90	6.5	15	30	>30	<1.5:1	250	10.0 (22.0)	1311 (51.6)	307 (12.1)
UMWD-09014-4DH	DualPol	1710-2170	4	14.3 (16.4)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09014-6DH	DualPol	1710-2170	6	14.1 (16.2)	90	7.0	15	25	>30	<1.5:1	250	6.0 (13.2)	1387 (54.6)	173 (6.8)
UMWD-09016-2DH	DualPol	1710-2170	2	16.1 (18.2)	90	5.0	20	30	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
UMWD-09016-4DH	DualPol	1710-2170	4	16.1 (18.2)	90	5.0	16	34	>30	<1.4:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)
*UMWD-09016-XDH	DualPol	1710-2170	0-5	15.9 (18.0)	90	4.3	15	30	>30	<1.5:1	300	8.2 (18.0)	2052 (80.8)	173 (6.8)

**<60° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB992HG28N-B	Sector	1710-2490	0	14.9 (17.0)	28	25.0	18	35	—	<2.0:1	50	1.4 (3.0)	305 (12.0)	305 (12.0)

**60-75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*HBV-6516LS-VTM	Directed Dipole™	1710-2180	0-7	16.1 (18.2)	65	6.2	18	36	—	<1.4:1	300	5.5 (12.1)	1367 (53.8)	173 (6.8)
UMW-06516-ODH	Sector	1710-2170	0	16.0 (18.1)	65	6.0	17	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-2DH	Sector	1710-2170	2	16.0 (18.1)	65	6.0	17	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-06516-4DH	Sector	1710-2170	4	15.9 (18.0)	65	6.0	16	28	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
950F65T2ZE-B	Directed Dipole	1710-2170	2	16.5 (18.6)	65	6.0	20	38	—	<1.4:1	250	4.5 (10.0)	1524 (60.0)	152 (6.0)
UMW-06517-2DH	Sector	1710-2170	2	16.8 (18.9)	65	4.5	14	30	—	<1.4:1	250	7.5 (16.5)	1953 (76.9)	173 (6.8)

**80-95° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UMW-09015-ODH	Sector	1710-2170	0	14.4 (16.5)	90	6.0	17	30	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-2DH	Sector	1710-2170	2	14.6 (16.7)	90	6.0	16	26	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09015-4DH	Sector	1710-2170	4	14.8 (16.9)	90	6.5	16	27	—	<1.4:1	250	5.4 (12.0)	1473 (58.0)	173 (6.8)
UMW-09016-2DH	Sector	1710-2180	2	15.5 (17.6)	90	4.3	15	30	—	<1.4:1	250	7.4 (16.3)	1953 (76.9)	173 (6.8)

**360° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
DB909E-U	Omni	1920-2170	0	8.9 (11.0)	360	7.0	—	—	—	<1.5:1	250	5.1 (11.2)	1397 (55.0)	50.8 (2.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.









- 746–806 MHz
- 806–896 MHz
- 806–960 MHz
- 870–960 MHz



● **LBX Series**



**DualPol® Panel Antennas**

The technology leader, Andrew's DualPol® panel antennas provide excellent RF performance with superior gain per unit length, optimal pattern shaping and state-of-the-art air dielectric construction producing consistent unit-to-unit repeatability.

Wideband and field adjustable models in the Andrew DualPol antenna portfolio offer a wide selection of antenna solutions.

- Fixed tilt DualPol models feature Andrew's patented air dielectric construction, which assures consistent, repeatable RF performance and low passive intermodulation
- Models that provide full band coverage in the CTSDG, LBX, and RR series antennas
- Variable electrical tilt models that are independently field adjustable with a large selection of models that are fully compatible with Andrew's Teletilt® RET system

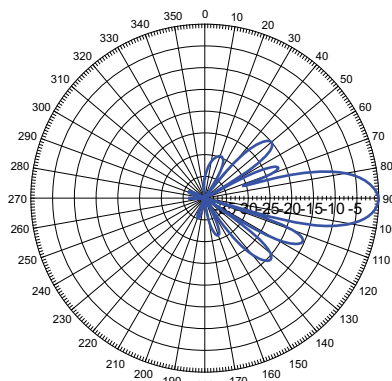
**Directed Dipole™ Vertical Panel Antennas**

Andrew features uniquely designed Directed Dipole vertical panel antennas that offer a myriad of benefits.

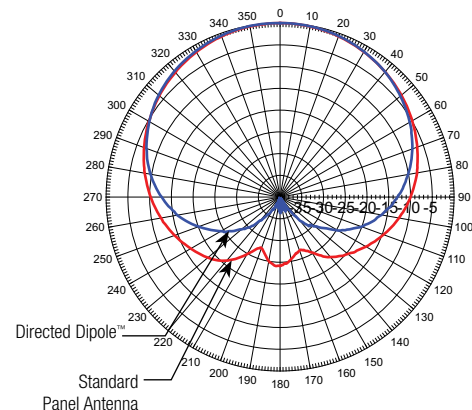
- Enhanced pattern definition greatly improves front-to-back ratio for significant reduction in interference
- Designed with direct grounds, which reduces system noise
- Constructed without welding, soldering, rivets or screws used in the RF circuit
- 100% passive intermodulation (PIM) tested



● **LBV Series**



Exceptional upper sidelobe suppression reduces interference

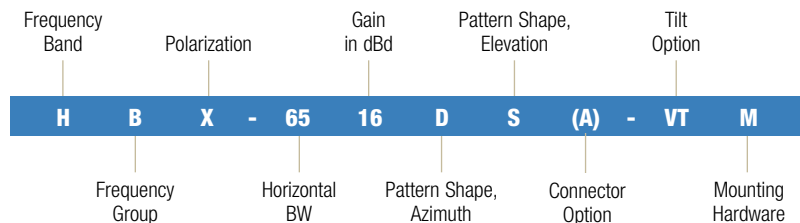


Exceptional azimuth control lowers co-channel interference and reduces soft hand-offs

700/800/900 MHz

## Single Band Sector Base Station Antenna Model Number Sequences

### Typical Style 1 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY BAND (MHz)

(Shown in Frequency Order)

- U = 410–500
- L = 806–960
- H = 1710–2180
- W = 2300–5875

#### FREQUENCY GROUP

(Shown in Frequency Order with Band in MHz)

- B = Broadband (Covers entire U, L, or H Freq. Band)
- C = 800 MHz (806–896)
- G = GSM900 (870–960)
- K = GSM1800 (1710–1880)
- P = 1900 MHz (1850–1990)
- U = UMTS (1920–2180)
- 2 = WiMAX (2300–2700, 2495–2690)
- 3 = WiMAX (3300–3800, 3400–3600)
- 5 = WiMAX (5150–5875)

#### POLARIZATION

- H = Horizontal Pol
- V = Vertical Pol
- X = DualPol®
- XX = Dual DualPol® (Quad)
- XXX = Triple DualPol®

#### PATTERN SHAPE–AZIMUTH

- D = Standard Dipole
- L = Directed Dipole™

#### PATTERN SHAPE–ELEVATION

- F = Optimized Null Fill
- G = Optimized Gain
- S = Heavy Upper Sidelobe Suppression (USLS)

#### CONNECTOR OPTION

- A = 7–16 DIN, Female (Back)
- No Character = 7–16 DIN, Female (Bottom)

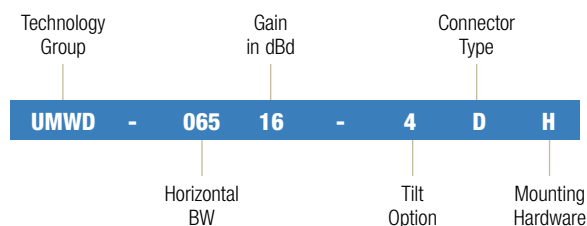
#### TILT OPTION

- T# = Degree of Fixed Tilt
- VT = Variable Electrical Tilt
- R2 = ATC200 Teletilt® RET Ready

#### MOUNTING HARDWARE

- M = Standard Downtilt Mount and Pipe Mount

### Typical Style 2 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### TECHNOLOGY GROUP

- ADFD\* = Dual DualPol® (Quad, Side-By-Side), 1710–2170 MHz
- CTSG = Optimized Gain, Vertical Pol, 806–960 MHz
- CTSDG = Optimized Gain, DualPol®, 806–960 MHz
- PCS = Vertical Pol, 1710–1990 MHz
- UMW = Vertical Pol, 1710–2170 MHz
- UMWD = DualPol®, 1710–2170 MHz

\*ADFD model numbers show the horizontal BW for both DualPol arrays and exclude the gain.

#### TILT OPTION

- # = Degree of Fixed Tilt
- XD = Variable Electrical Tilt
- R2 = ATC200 Teletilt® RET Ready

#### CONNECTOR TYPE

- D = 7–16 DIN, Female (Bottom)

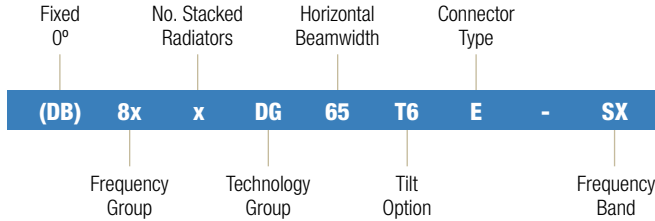
#### MOUNTING HARDWARE

- H = High Environment Downtilt Mount and Pipe Mount
- M = Standard Downtilt Mount and Pipe Mount

**700/800/900 MHz**

## Single Band Sector Base Station Antenna Model Number Sequences

### Typical Style 3 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY GROUP (Shown in Frequency Order)

6x = UHF  
8x = 800/900 MHz  
9x = 1800/1900 MHz/UMTS/WiMAX

#### NUMBER OF STACKED RADIATORS

800/900 MHz Models: Equals length of antenna (ft)  
1710–2170 MHz Models: Equals 2x length of antenna (ft)

Vertical BW can be estimated based on the # of stacked radiators, by dividing the # of stacked radiators into 60 (Ex: 60 divided by 4 stacked radiators = 15° Vertical BW).

#### TECHNOLOGY GROUP

F = Optimized Null Fill, USLS, Vertical Pol  
G = Optimized Gain, Heavy USLS, Vertical Pol  
DG = Optimized Gain, Heavy USLS, DualPol®  
H = Conventional USLS, Vertically Polarized  
LG = Optimized Gain, Heavy USLS, DualPol®, Directed Dipole™  
QDG = Optimized Gain, Heavy USLS, Dual DualPol® (Side-By-Side)

#### TILT OPTION

None = 0° Fixed Tilt  
T# = Degree of Fixed Tilt  
VT = Variable Electrical Tilt  
R2 = ATC200 Teletilt® RET Ready

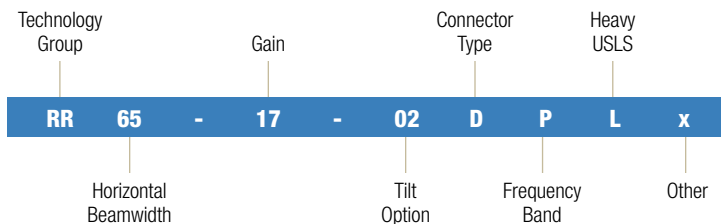
#### CONNECTOR TYPE

E = 7–16 DIN, Female (Bottom)  
A = 7–16 DIN, Female (Back)

#### FREQUENCY BAND (MHz) (Shown in Frequency Order)

C = 420–572	SY = 870–960
A = 740–801	KL = 1710–1880
XT = 806–869	M = 1850–1990
SX = 806–896	B = 1710–2170
XC = 824–896	U = 1920–2170
XY = 806–960	SR = 2100–2700
SY = 870–960	

### Typical Style 4 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### TECHNOLOGY GROUP

DR = Dual DualPol® (Quad)  
FR = Optimized Null Fill, DualPol®  
FV = Optimized Null Fill, Vertically Polarized  
RR = Optimized Gain, DualPol®  
RV = Optimized Gain, Vertically Polarized  
TR = Triple DualPol®

#### GAIN

Shown in dBd for 800/900 MHz Models  
Shown in dBi for 1800/1900 MHz/UMTS Models

#### TILT OPTION

## = Degree of Fixed Tilt  
V = Variable Electrical Tilt

#### CONNECTOR TYPE

D = 7–16 DIN, Female (Back)

#### FREQUENCY BAND (MHz) (Shown in Frequency Order)

A = 806–896  
B = 806–960  
P = 1850–1990  
U = 1710–2180  
Y = 2500–2700

#### OTHER (A dash may precede this character)

# = Design Revision Level  
Q = Side-By-Side  
R = Factory Installed Actuator  
12 = 12 inch Width

700/800/900 MHz

746-806 MHz

### 60-75° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB498-PS	Yagi	746-806	0	9.0 (11.1)	60	50.0	—	15	—	<1.5:1	100	2.3 (5.0)	622 (24.5)	191 (7.5)

### 80-95° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB844H90E-A	Directed Dipole™	746-806	0	12.0 (14.1)	90	15.0	15	40	—	<1.4:1	500	4.5 (10.0)	1219 (48.0)	152 (6.0)

### >105° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB878H120E-A	Sector	746-806	0	14.0 (16.1)	120	7.0	—	22	—	<1.5:1	500	11.3 (25.0)	2438 (96.0)	318 (12.5)

### 360° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
DB806-A	Omni	740-806	0	6.0 (8.1)	360	16.0	—	—	—	<1.5:1	400	7.3 (16.0)	1575 (62.0)	50.8 (2.0)
DB589-A	Omni	746-806	0	9.0 (11.1)	360	7.5	—	—	—	<1.5:1	500	5.2 (11.5)	4211 (165.8)	50.8 (2.0)
DB810E-PS	Omni	746-869	0	10.0 (12.1)	360	6.0	—	—	—	<1.5:1	500	17.2 (38.0)	4496 (177.0)	76.2 (3.0)
DB810KE-A	Omni	746-776	0	10.0 (12.1)	360	6.0	—	—	—	<1.5:1	500	18.1 (40.0)	4846 (190.8)	76.2 (3.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

<60° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
LBX-3316DS-TOM	DualPol®	806-960	0	16.3 (18.4)	33	15.4	18	38	>30	<1.4:1	500	13.6 (30.0)	1306 (51.4)	592 (23.3)
*LBX-3316DS-VTM	DualPol	806-960	2-12	15.9 (18.0)	33	14.0	15	37	>30	<1.4:1	500	17.9 (39.5)	1306 (51.4)	592 (23.3)
LBX-3319DS-TOM	DualPol	806-960	0	19.2 (21.3)	33	7.4	20	35	>30	<1.4:1	500	21.3 (47.0)	2578 (101.5)	592 (23.3)
*LBX-3319DS-VTM	DualPol	806-960	0-8	18.5 (20.6)	33	7.1	17	35	>30	<1.4:1	300	28.9 (63.8)	2576 (101.4)	592 (23.3)
RR45-14-00DBL2	DualPol	806-941	0	14.0 (16.1)	45	15.0	18	28	>25	<1.35:1	500	11.6 (25.5)	1219 (48.0)	381 (15.0)
RR45-14-05DBL2	DualPol	806-941	5	14.0 (16.1)	45	15.0	18	28	>25	<1.35:1	500	11.6 (25.5)	1219 (48.0)	381 (15.0)
*LBX-4517DS-VTM	DualPol	806-960	0-10	16.4 (18.5)	45	9.6	16	32	>30	<1.4:1	300	19.0 (41.9)	2012 (79.2)	389 (15.3)

60-75° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB852DG65ESX	DualPol®	806-896	0	9.5 (11.6)	65	30.0	—	30	>30	<1.33:1	500	2.9 (6.5)	620 (24.4)	315 (12.4)
RR65-12-00DBL	DualPol	806-941	0	12.0 (14.1)	65	16.0	18	23	>20	<1.28:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
RR65-12-05DBL	DualPol	806-941	5	12.0 (14.1)	65	16.0	18	25	>20	<1.28:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
RR65-12-10DBL	DualPol	806-941	10	12.0 (14.1)	65	16.0	18	25	>20	<1.28:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
DB854DG65ESX	DualPol	806-896	0	13.0 (15.1)	65	14.0	18	30	>30	<1.33:1	500	8.4 (18.5)	1219 (48.0)	318 (12.5)
854DG65T6ESX	DualPol	806-896	6	12.5 (14.6)	65	14.0	17	25	>30	<1.33:1	500	8.4 (18.5)	1219 (48.0)	318 (12.5)
CTSDG-06513-ODM	DualPol	806-960	0	12.8 (14.9)	65	14.0	15	25	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
CTSDG-06513-4DM	DualPol	806-960	4	12.7 (14.8)	65	14.5	15	30	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
CTSDG-06513-6DM	DualPol	806-960	6	12.7 (14.8)	65	14.0	15	25	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
*CTSDG-06513-XDM	DualPol	806-960	0-15	12.9 (15.0)	65	14.0	15	28	>30	<1.4:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
LBX-6513EPA-TOM	DualPol	806-941	0	13.0 (15.1)	65	12.3	25	25	>30	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FR65-13-00DBL2	DualPol	806-941	0	12.5 (14.6)	65	11.5	18	25	>20	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FR65-13-05DAL2	DualPol	806-896	5	13.3 (15.4)	65	11.5	18	25	>20	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
DB856DG65EXY	DualPol	806-960	0	14.9 (17.0)	65	10.0	18	30	>30	<1.33:1	500	11.8 (26.0)	1829 (72.0)	318 (12.5)
856DG65T2ESX	DualPol	806-896	2	14.5 (16.6)	65	9.5	18	28	>30	<1.33:1	500	11.8 (26.0)	1829 (72.0)	318 (12.5)
856DG65T6ESX	DualPol	806-896	6	13.4 (15.5)	65	10.5	18	30	>30	<1.33:1	500	11.8 (26.0)	1829 (72.0)	318 (12.5)
RR65-13-VDBL2	DualPol	806-941	0-10	13.5 (15.6)	65	10.4	16	24	>28	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
CTSDG-06515-4DM	DualPol	806-960	4	14.4 (16.5)	65	9.0	15	25	>30	<1.3:1	500	13.9 (30.6)	1930 (76.0)	269 (10.6)
CTSDG-06515-6DM	DualPol	806-960	6	14.4 (16.5)	65	9.0	15	25	>30	<1.3:1	500	13.9 (30.6)	1935 (76.2)	269 (10.6)
*CTSDG-06515-XDM	DualPol	806-960	0-10	14.4 (16.5)	65	10.0	17	25	>30	<1.4:1	250	13.9 (30.6)	1935 (76.2)	269 (10.6)
FR65-14-00DBL2	DualPol	806-941	0	13.6 (15.7)	65	9.5	18	25	>20	<1.35:1	500	11.6 (25.5)	2438 (96.0)	305 (12.0)
DR65-12-00DBL	DualPol quad	806-941	0	11.8 (13.9)	65	15.8	18	23	>20	<1.28:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)
DR65-12-05DBL	DualPol quad	806-941	5	11.8 (13.9)	65	15.8	18	23	>20	<1.28:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)
DB858DG65ESX	DualPol	806-896	0	15.3 (17.4)	65	7.5	15	30	>30	<1.33:1	500	15.9 (35.0)	2438 (96.0)	318 (12.5)
858DG65T3ESX	DualPol	806-896	3	15.3 (17.4)	65	7.5	18	30	>30	<1.33:1	500	16.8 (37.0)	2438 (96.0)	318 (12.5)
CTSDG-06516-ODM	DualPol	806-960	0	15.8 (17.9)	65	7.0	16	32	>30	<1.3:1	500	18.5 (40.8)	2565 (101.0)	269 (10.6)
*CTSDG-06516-XDM	DualPol	806-960	0-8	15.6 (17.7)	65	7.0	17	30	>30	<1.4:1	250	18.5 (40.8)	2565 (101.0)	269 (10.6)
854DG70VTRSX	DualPol tri-sector	806-941	2-14	11.5 (13.6)	70	16.0	15	25	>30	<1.4:1	500	20.0 (44.0)	1486 (58.5)	269 (10.6) OD

80-95° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
854DG85VTEXY	DualPol®	806-960	2-14	11.7 (13.8)	85	15.0	15	29	>30	<1.4:1	500	5.0 (11.0)	1232 (48.5)	229 (9.0)
RR90-11-00DBL	DualPol	806-941	0	11.0 (13.1)	90	16.0	18	32	>20	<1.28:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
DB854DG90ESX	DualPol	806-896	0	11.7 (13.8)	90	14.0	18	25	>30	<1.33:1	500	8.2 (18.0)	1219 (48.0)	318 (12.5)
854DG90T6ESX	DualPol	806-896	6	11.5 (13.6)	90	14.0	15	25	>30	<1.33:1	500	8.2 (18.0)	1219 (48.0)	318 (12.5)
RR90-11-05DBL	DualPol	806-941	5	11.0 (13.1)	90	16.0	18	32	>20	<1.28:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
*LBX-9012DS-VTM	DualPol	806-960	0-16	12.0 (14.1)	90	15.5	16	25	>30	<1.4:1	300	11.8 (26.0)	1295 (51.0)	267 (10.5)
DB856DG90ESX	DualPol	806-896	0	13.0 (15.1)	90	9.5	18	25	>30	<1.33:1	500	11.8 (26.0)	1829 (72.0)	318 (12.5)
RR90-12-VDBL2	DualPol	806-941	0-10	11.7 (13.8)	90	10.4	18	30	>28	<1.33:1	500	14.1 (31.0)	1829 (72.0)	305 (12.0)
*LBX-9013DS-VTM	DualPol	806-960	0-10	13.1 (15.2)	90	10.4	15	30	>30	<1.4:1	300	12.0 (26.5)	1831 (72.1)	224 (8.8)
*LBX-9014DS-VTM	DualPol	806-960	0-8	14.0 (16.1)	90	7.4	18	30	>30	<1.4:1	300	18.1 (39.9)	2436 (95.9)	226 (8.9)
FR90-13-00DBL2	DualPol	806-941	0	12.8 (14.9)	90	9.5	18	28	>20	<1.35:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)
FR90-13-05DBL2	DualPol	806-941	5	12.8 (14.9)	90	9.5	18	28	>20	<1.35:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)
DR90-11-00DBL	DualPol quad	806-941	0	10.3 (12.4)	90	15.8	18	30	>25	<1.28:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)
DR90-11-05DBL	DualPol quad	806-941	5	10.3 (12.4)	90	15.8	18	30	>25	<1.28:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)
DB858DG90ESX	DualPol	806-896	0	14.3 (16.4)	90	7.5	18	30	>30	<1.33:1	500	16.8 (37.0)	2438 (96.0)	318 (12.5)
858DG90T3ESX	DualPol	806-896	3	14.0 (16.1)	90	7.5	18	25	>30	<1.33:1	500	16.8 (37.0)	2438 (96.0)	318 (12.5)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

700/800/900 MHz

806-896 MHz

<60° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB874G35A-XY	Sector	806-960	0	16.5 (18.6)	35	14.5	18	25	—	<1.33:1	500	7.9 (17.5)	1232 (48.5)	470 (18.5)
DB495-A	Corner reflector	806-896	0	9.0 (11.1)	40	60.0	—	25	—	<1.5:1	150	4.5 (10.0)	305 (12.0)	457 (18.0)
DB842H40E-SX	Directed Dipole™	806-896	0	12.0 (14.1)	40	30.0	15	40	—	<1.5:1	500	6.4 (14.0)	610 (24.0)	610 (24.0)
DB848F40E-SX	Directed Dipole	806-896	0	17.5 (19.6)	40	9.0	18	40	—	<1.35:1	500	24.9 (55.0)	2438 (96.0)	610 (24.0)
DB848H40E-SX	Directed Dipole	806-896	0	18.2 (20.3)	40	8.0	15	40	—	<1.4:1	500	24.9 (55.0)	2438 (96.0)	610 (24.0)
DB872G45A-XY	Sector	806-960	0	11.5 (13.6)	45	30.0	15	20	—	<1.33:1	500	3.9 (8.5)	610 (24.0)	318 (12.5)
DB844G45ZAXY	Directed Dipole	806-960	0	15.1 (17.2)	45	15.0	20	40	—	<1.33:1	500	7.7 (17.0)	1219 (48.0)	381 (15.0)
844G45VTZASX	Directed Dipole	806-941	0-16	15.3 (17.4)	45	15.0	15	35	—	<1.5:1	500	9.1 (20.0)	1219 (48.0)	381 (15.0)
*LBV-4515LS-VTM	Directed Dipole	806-960	0-15	14.7 (16.8)	45	16.5	22	40	—	<1.4:1	300	9.1 (20.0)	1240 (48.8)	376 (14.8)
DB845N45ZAXY	Directed Dipole	806-960	0	16.0 (18.1)	45	13.0	22	40	—	<1.33:1	500	10.4 (23.0)	1537 (60.5)	381 (15.0)

60-75° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB499-C	Yagi	824-896	0	10.0 (12.1)	60	30.0	—	15	—	<1.5:1	150	2.3 (5.0)	775 (30.5)	152 (6.0)
DB499-A	Yagi	806-869	0	10.0 (12.1)	60	30.0	—	15	—	<1.5:1	150	2.3 (5.0)	787 (31.0)	152 (6.0)
DB878G60A-XY	Sector	806-960	0	16.4 (18.5)	60	7.5	18	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
878G60T2A-XY	Sector	806-960	2	16.4 (18.5)	60	7.5	18	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
878G60T4A-XY	Sector	806-960	4	16.3 (18.4)	60	8.0	20	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
DB842H65E-XY	Directed Dipole	806-960	0	10.7 (12.8)	65	30.0	15	40	—	<1.4:1	500	4.5 (10.0)	610 (24.0)	521 (20.5)
RV65-12-00DBL	Sector	806-941	0	12.3 (14.4)	65	16.0	18	32	—	<1.22:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
RV65-12-05DBL	Sector	806-941	5	12.3 (14.4)	65	16.0	18	32	—	<1.22:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
RV65-12-10DBL	Sector	806-941	10	12.3 (14.4)	65	16.0	18	32	—	<1.22:1	500	8.2 (18.0)	1219 (48.0)	305 (12.0)
DB874G65A-XY	Sector	806-960	0	14.0 (16.1)	65	15.5	18	25	—	<1.33:1	500	6.1 (13.5)	1219 (48.0)	305 (12.0)
DB844G65ZAXY	Directed Dipole	806-960	0	13.8 (15.9)	65	15.0	15	40	—	<1.33:1	500	5.4 (12.0)	1219 (48.0)	254 (10.0)
DB844H65E-XY	Directed Dipole	806-960	0	13.3 (15.4)	65	15.0	15	40	—	<1.5:1	500	9.1 (20.0)	1219 (48.0)	521 (20.5)
844G65T6ZAXY	Directed Dipole	806-960	6	13.7 (15.8)	65	15.0	15	40	—	<1.33:1	500	5.4 (12.0)	1219 (48.0)	254 (10.0)
844G65VTZASX	Directed Dipole	806-941	0-16	13.0 (15.1)	65	16.0	15	40	—	<1.4:1	500	7.3 (16.0)	1232 (48.5)	318 (12.5)
*LBV-6513LS-VTM	Directed Dipole	806-960	0-15	12.9 (15.0)	65	17.0	20	34	—	<1.4:1	300	7.9 (17.5)	1237 (48.7)	312 (12.3)
DB845N65ZAXY	Directed Dipole	806-960	0	14.5 (16.6)	65	13.0	25	40	—	<1.33:1	500	8.6 (19.0)	1524 (60.0)	254 (10.0)
LV65-13-00DB2	Sector	806-941	0	13.5 (15.6)	65	12.4	20	33	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FV65-13-00DBL2	Sector	806-941	0	13.5 (15.6)	65	12.0	—	33	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FV65-13-05DBL2	Sector	806-941	5	13.5 (15.6)	65	12.0	—	33	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FV65-13-10DBL2	Sector	806-941	10	13.5 (15.6)	65	12.0	—	33	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
DB876G65A-XY	Sector	806-960	0	15.5 (17.6)	65	11.0	—	25	—	<1.33:1	500	8.6 (19.0)	1829 (72.0)	318 (12.5)
DB846F65ZAXY	Directed Dipole	806-960	0	14.8 (16.9)	65	10.5	15	40	—	<1.33:1	500	9.5 (21.0)	1829 (72.0)	254 (10.0)
DB848F65E-SX	Directed Dipole	806-896	0	15.0 (17.1)	65	9.0	18	40	—	<1.5:1	500	17.7 (39.0)	2438 (96.0)	521 (20.5)
DB848H65E-XY	Directed Dipole	806-960	0	16.0 (18.1)	65	7.5	—	40	—	<1.4:1	500	17.7 (39.0)	2438 (96.0)	521 (20.5)
FV65-15-05DA2	Sector	806-896	5	14.7 (16.8)	65	10.0	—	25	—	<1.35:1	500	15.2 (33.5)	2438 (96.0)	305 (12.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.



700/800/900 MHz

806-896 MHz

80-95° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB842H80E-XY	Directed Dipole™	806-960	0	10.3 (12.4)	80	30.0	15	40	—	<1.5:1	500	3.2 (7.0)	610 (24.0)	165 (6.5)
DB844H80E-XY	Directed Dipole	806-960	0	12.8 (14.9)	80	15.0	15	40	—	<1.5:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844H80T6E-XY	Directed Dipole	806-960	6	12.5 (14.6)	80	15.0	15	40	—	<1.5:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844G80VTA-SX	Directed Dipole	806-896	0-16	12.5 (14.6)	80	16.0	15	35	—	<1.4:1	500	5.2 (11.5)	1219 (48.0)	165 (6.5)
DB846H80E-SX	Directed Dipole	806-896	0	14.0 (16.1)	80	10.0	15	40	—	<1.5:1	500	7.3 (16.0)	1829 (72.0)	165 (6.5)
DB848H80E-XY	Directed Dipole	806-960	0	14.7 (16.8)	80	7.5	15	40	—	<1.4:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
DB842H90E-XY	Directed Dipole	806-960	0	9.2 (11.3)	90	30.0	15	40	—	<1.5:1	500	3.2 (7.0)	610 (24.0)	165 (6.5)
DB874G90A-XY	Sector	806-960	0	12.5 (14.6)	90	14.0	18	25	—	<1.33:1	500	6.6 (14.5)	1219 (48.0)	267 (10.5)
DB844H90E-XY	Directed Dipole	806-960	0	12.4 (14.5)	90	15.0	15	40	—	<1.4:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844H90T6E-XY	Directed Dipole	806-960	6	12.3 (14.4)	90	15.0	15	40	—	<1.33:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844G90VTA-SX	Directed Dipole	806-941	0-16	11.8 (13.9)	90	16.0	15	35	—	<1.4:1	500	5.2 (11.5)	1219 (48.0)	165 (6.5)
*LBV-9012LS-VTM	Directed Dipole	806-960	0-15	11.5 (13.6)	90	17.0	20	35	—	<1.4:1	300	6.1 (13.5)	1234 (48.6)	168 (6.6)
FV90-12-00DBL2	Sector	806-941	0	11.8 (13.9)	90	12.0	18	26	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FV90-12-05DBL2	Sector	806-941	5	11.8 (13.9)	90	12.0	18	26	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
FV90-12-10DBL2	Sector	806-941	10	11.8 (13.9)	90	12.0	18	26	—	<1.35:1	500	11.6 (25.5)	1829 (72.0)	305 (12.0)
DB876G90A-XY	Sector	806-960	0	13.9 (16.0)	90	10.0	—	25	—	<1.33:1	500	9.5 (21.0)	1829 (72.0)	267 (10.5)
DB846G90A-XY	Directed Dipole	806-960	0	14.0 (16.1)	90	13.0	20	40	—	<1.33:1	500	7.0 (15.4)	1829 (72.0)	165 (6.5)
FV90-13-00DBL2	Sector	806-941	0	12.6 (14.7)	90	9.3	18	25	—	<1.35:1	500	11.6 (25.5)	2438 (96.0)	305 (12.0)
FV90-13-05DBL2	Sector	806-941	5	12.6 (14.7)	90	9.3	18	25	—	<1.35:1	500	11.6 (25.5)	2438 (96.0)	305 (12.0)
FV90-13-10DBL2	Sector	806-941	10	12.6 (14.7)	90	9.3	18	25	—	<1.35:1	500	11.6 (25.5)	2438 (96.0)	305 (12.0)
DB878G90A-XY	Sector	806-960	0	15.3 (17.4)	90	6.5	18	25	—	<1.3:1	500	11.3 (25.0)	2438 (96.0)	267 (10.5)
DB848F90E-SX	Directed Dipole	806-896	0	13.9 (16.0)	90	9.0	20	40	—	<1.4:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
DB848H90E-XY	Directed Dipole	806-960	0	14.5 (16.6)	90	7.5	—	40	—	<1.5:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
848H90T4E-XY	Directed Dipole	806-960	4	14.4 (16.5)	90	7.5	15	40	—	<1.35:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
DB493-A	Yagi	806-866	0	6.0 (8.1)	92	59.0	—	20	—	<1.5:1	100	0.3 (0.7)	330 (13.0)	191 (7.5)

>105° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB874G105AXY	Sector	806-960	0	11.7 (13.8)	105	14.0	15	23	—	<1.33:1	500	6.6 (14.5)	1219 (48.0)	267 (10.5)
DB844H105ESX	Directed Dipole™	806-896	0	11.4 (13.5)	105	15.0	—	40	—	<1.4:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
DB876G105AXY	Sector	806-960	0	13.4 (15.5)	105	10.0	15	23	—	<1.33:1	500	10.4 (23.0)	1829 (72.0)	267 (10.5)
DB846H105ESX	Directed Dipole	806-896	0	12.5 (14.6)	105	10.5	15	40	—	<1.4:1	500	6.8 (15.0)	1829 (72.0)	165 (6.5)
DB878G105AXY	Sector	806-960	0	14.9 (17.0)	105	7.5	18	25	—	<1.33:1	500	11.3 (25.0)	2438 (96.0)	267 (10.5)
DB848H105ESX	Directed Dipole	806-896	0	14.0 (16.1)	105	7.5	15	40	—	<1.4:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
DB874H120ESX	Sector	806-896	0	11.3 (13.4)	120	14.0	—	22	—	<1.4:1	500	6.4 (14.0)	1219 (48.0)	305 (12.0)
CTSG-12010-ODM	Sector	806-960	0	10.9 (13.0)	120	14.0	15	21	—	<1.3:1	500	9.1 (20.0)	1298 (51.1)	267 (10.5)
CTSG-12012-ODM	Sector	806-960	0	12.1 (14.2)	120	9.0	15	20	—	<1.3:1	500	13.6 (30.0)	1935 (76.2)	267 (10.5)
CTSG-12013-ODM	Sector	806-960	0	13.2 (15.3)	120	7.0	15	22	—	<1.3:1	500	15.4 (34.0)	2565 (101.0)	267 (10.5)

360° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
DB583-ST	Omni	806-941	0	3.0 (5.1)	360	30.0	—	—	—	<1.5:1	300	2.9 (6.3)	813 (32.0)	38.1 (1.5)
DB583-XC	Omni	824-896	0	3.0 (5.1)	360	30.0	—	—	—	<1.5:1	300	2.9 (6.3)	813 (32.0)	38.1 (1.5)
DB583-XT	Omni	806-869	0	3.0 (5.1)	360	30.0	—	—	—	<1.5:1	300	2.9 (6.3)	813 (32.0)	38.1 (1.5)
DB586-XC	Omni	824-896	0	6.0 (8.1)	360	18.0	—	—	—	<1.5:1	300	3.8 (8.3)	1499 (59.0)	38.1 (1.5)
DB586-XT	Omni	806-869	0	6.0 (8.1)	360	18.0	—	—	—	<1.5:1	500	3.8 (8.3)	1499 (59.0)	38.1 (1.5)
DB806E-XT	Omni	806-869	0	6.0 (8.1)	360	16.0	—	—	—	<1.5:1	500	7.3 (16.0)	2438 (96.0)	38.1 (1.5)
DB589-XT	Omni	806-869	0	9.0 (11.1)	360	9.0	—	—	—	<1.5:1	300	5.2 (11.5)	2654 (104.5)	38.1 (1.5)
DB809KE-XC	Omni	824-896	0	9.0 (11.1)	360	8.0	—	—	—	<1.35:1	500	12.2 (27.0)	3734 (147.0)	76.2 (3.0)
DB809KE-XT	Omni	806-869	0	9.0 (11.1)	360	8.0	—	—	—	<1.5:1	500	12.2 (27.0)	3734 (147.0)	76.2 (3.0)
DB809KT3E-XC	Omni	824-896	3	9.0 (11.1)	360	8.0	—	—	—	<1.5:1	500	12.2 (27.0)	3734 (147.0)	76.2 (3.0)
ASPD977E	Omni	824-896	3-8	8.5 (10.6)	360	7.0	—	—	—	<1.5:1	500	15.9 (35.0)	4394 (173.0)	65.3 (2.6)
DB810E-PS	Omni	746-869	0	10.0 (12.1)	360	6.0	—	—	—	<1.5:1	500	17.2 (38.0)	4496 (177.0)	76.2 (3.0)
DB810KE-XC	Omni	824-896	0	10.0 (12.1)	360	6.0	—	—	—	<1.5:1	500	16.3 (36.0)	4420 (174.0)	76.2 (3.0)
DB810KT3E-XC	Omni	824-896	3	10.0 (12.1)	360	6.0	—	—	—	<1.5:1	500	16.3 (36.0)	4420 (174.0)	76.2 (3.0)
DB810KE-XT	Omni	806-869	0	10.0 (12.1)	360	6.0	—	—	—	<1.4:1	500	16.3 (36.0)	4420 (174.0)	76.2 (3.0)
DB812KE-XC	Omni	824-896	0	12.0 (14.1)	360	3.0	—	—	—	<1.5:1	500	32.2 (71.0)	7417 (292.0)	76.2 (3.0)
DB812KE-XT	Omni	806-869	0	12.0 (14.1)	360	3.0	—	—	—	<1.5:1	500	32.2 (71.0)	7417 (292.0)	76.2 (3.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

700/800/900 MHz

806-960 MHz

**<60° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
LBX-3316DS-TOM	DualPol®	806-960	0	16.3 (18.4)	33	15.4	18	38	>30	<1.4:1	500	13.6 (30.0)	1306 (51.4)	592 (23.3)
*LBX-3316DS-VTM	DualPol	806-960	2-12	15.9 (18.0)	33	14.0	15	37	>30	<1.4:1	500	17.9 (39.5)	1306 (51.4)	592 (23.3)
LBX-3319DS-TOM	DualPol	806-960	0	19.2 (21.3)	33	7.4	20	35	>30	<1.4:1	500	21.3 (47.0)	2578 (101.5)	592 (23.3)
*LBX-3319DS-VTM	DualPol	806-960	0-8	18.5 (20.6)	33	7.1	17	35	>30	<1.4:1	300	28.9 (63.8)	2576 (101.4)	592 (23.3)
*LBX-4517DS-VTM	DualPol	806-960	0-10	16.4 (18.5)	45	9.6	16	32	>30	<1.4:1	300	19.0 (41.9)	2012 (79.2)	389 (15.3)

**60-75° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
CTSDG-06513-ODM	DualPol	806-960	0	12.8 (14.9)	65	14.0	15	25	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
CTSDG-06513-4DM	DualPol	806-960	4	12.7 (14.8)	65	14.5	15	30	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
CTSDG-06513-6DM	DualPol	806-960	6	12.7 (14.8)	65	14.0	15	25	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
*CTSDG-06513-XDM	DualPol	806-960	0-15	12.9 (15.0)	65	14.0	15	28	>30	<1.4:1	250	9.3 (20.5)	1295 (51.0)	269 (10.6)
DB856DG65EXY	DualPol	806-960	0	14.9 (17.0)	65	10.0	18	30	>30	<1.33:1	500	11.8 (26.0)	1829 (72.0)	318 (12.5)
CTSDG-06515-4DM	DualPol	806-960	4	14.4 (16.5)	65	9.0	15	25	>30	<1.3:1	500	13.9 (30.6)	1930 (76.0)	269 (10.6)
CTSDG-06515-6DM	DualPol	806-960	6	14.4 (16.5)	65	9.0	15	25	>30	<1.3:1	500	13.9 (30.6)	1935 (76.2)	269 (10.6)
*CTSDG-06515-XDM	DualPol	806-960	0-10	14.4 (16.5)	65	10.0	17	25	>30	<1.4:1	250	13.9 (30.6)	1935 (76.2)	269 (10.6)
CTSDG-06516-ODM	DualPol	806-960	0	15.8 (17.9)	65	7.0	16	32	>30	<1.3:1	500	18.5 (40.8)	2565 (101.0)	269 (10.6)
*CTSDG-06516-XDM	DualPol	806-960	0-8	15.6 (17.7)	65	7.0	17	30	>30	<1.4:1	250	18.5 (40.8)	2565 (101.0)	269 (10.6)

**80-95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
854DG85VTEXY	DualPol®	806-960	2-14	11.7 (13.8)	85	15.0	15	29	>30	<1.4:1	500	5.0 (11.0)	1232 (48.5)	229 (9.0)
*LBX-9012DS-VTM	DualPol	806-960	0-16	12.0 (14.1)	90	15.5	16	25	>30	<1.4:1	300	11.8 (26.0)	1295 (51.0)	267 (10.5)
*LBX-9013DS-VTM	DualPol	806-960	0-10	13.1 (15.2)	90	10.4	15	30	>30	<1.4:1	300	12.0 (26.5)	1831 (72.1)	224 (8.8)
*LBX-9014DS-VTM	DualPol	806-960	0-8	14.0 (16.1)	90	7.4	18	30	>30	<1.4:1	300	18.1 (39.9)	2436 (95.9)	226 (8.9)

**<60° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB874G35A-XY	Sector	806-960	0	16.5 (18.6)	35	14.5	18	25	—	<1.33:1	500	7.9 (17.5)	1232 (48.5)	470 (18.5)
DB872G45A-XY	Sector	806-960	0	11.5 (13.6)	45	30.0	15	20	—	<1.33:1	500	3.9 (8.5)	610 (24.0)	318 (12.5)
DB844G45ZAXY	Directed Dipole™	806-960	0	15.1 (17.2)	45	15.0	20	40	—	<1.33:1	500	7.7 (17.0)	1219 (48.0)	381 (15.0)
*LBV-4515LS-VTM	Directed Dipole	806-960	0-15	14.7 (16.8)	45	16.5	22	40	—	<1.4:1	300	9.1 (20.0)	1240 (48.8)	376 (14.8)
DB845N45ZAXY	Directed Dipole	806-960	0	16.0 (18.1)	45	13.0	22	40	—	<1.33:1	500	10.4 (23.0)	1537 (60.5)	381 (15.0)

**60-75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB878G60A-XY	Sector	806-960	0	16.4 (18.5)	60	7.5	18	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
878G60T2A-XY	Sector	806-960	2	16.4 (18.5)	60	7.5	18	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
878G60T4A-XY	Sector	806-960	4	16.3 (18.4)	60	8.0	20	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
DB842H65E-XY	Directed Dipole	806-960	0	10.7 (12.8)	65	30.0	15	40	—	<1.4:1	500	4.5 (10.0)	610 (24.0)	521 (20.5)
DB874G65A-XY	Sector	806-960	0	14.0 (16.1)	65	15.5	18	25	—	<1.33:1	500	6.1 (13.5)	1219 (48.0)	305 (12.0)
DB844G65ZAXY	Directed Dipole	806-960	0	13.8 (15.9)	65	15.0	15	40	—	<1.33:1	500	5.4 (12.0)	1219 (48.0)	254 (10.0)
DB844H65E-XY	Directed Dipole	806-960	0	13.3 (15.4)	65	15.0	15	40	—	<1.5:1	500	9.1 (20.0)	1219 (48.0)	521 (20.5)
844G65T6ZAXY	Directed Dipole	806-960	6	13.7 (15.8)	65	15.0	15	40	—	<1.33:1	500	5.4 (12.0)	1219 (48.0)	254 (10.0)
*LBV-6513LS-VTM	Directed Dipole	806-960	0-15	12.9 (15.0)	65	17.0	20	34	—	<1.4:1	300	7.9 (17.5)	1237 (48.7)	312 (12.3)
DB845N65ZAXY	Directed Dipole	806-960	0	14.5 (16.6)	65	13.0	25	40	—	<1.33:1	500	8.6 (19.0)	1524 (60.0)	254 (10.0)
DB876G65A-XY	Sector	806-960	0	15.5 (17.6)	65	11.0	—	25	—	<1.33:1	500	8.6 (19.0)	1829 (72.0)	318 (12.5)
DB846F65ZAXY	Directed Dipole	806-960	0	14.8 (16.9)	65	10.5	15	40	—	<1.33:1	500	9.5 (21.0)	1829 (72.0)	254 (10.0)
DB848H65E-XY	Directed Dipole	806-960	0	16.0 (18.1)	65	7.5	—	40	—	<1.4:1	500	17.7 (39.0)	2438 (96.0)	521 (20.5)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

700/800/900 MHz

806-960 MHz

**80-95° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB842H80E-XY	Directed Dipole™	806-960	0	10.3 (12.4)	80	30.0	15	40	—	<1.5:1	500	3.2 (7.0)	610 (24.0)	165 (6.5)
DB844H80E-XY	Directed Dipole	806-960	0	12.8 (14.9)	80	15.0	15	40	—	<1.5:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844H80T6E-XY	Directed Dipole	806-960	6	12.5 (14.6)	80	15.0	15	40	—	<1.5:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
DB848H80E-XY	Directed Dipole	806-960	0	14.7 (16.8)	80	7.5	15	40	—	<1.4:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
DB842H90E-XY	Directed Dipole	806-960	0	9.2 (11.3)	90	30.0	15	40	—	<1.5:1	500	3.2 (7.0)	610 (24.0)	165 (6.5)
DB874G90A-XY	Sector	806-960	0	12.5 (14.6)	90	14.0	18	25	—	<1.33:1	500	6.6 (14.5)	1219 (48.0)	267 (10.5)
DB844H90E-XY	Directed Dipole	806-960	0	12.4 (14.5)	90	15.0	15	40	—	<1.4:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844H90T6E-XY	Directed Dipole	806-960	6	12.3 (14.4)	90	15.0	15	40	—	<1.33:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
*LBV-9012LS-VTM	Directed Dipole	806-960	0-15	11.5 (13.6)	90	17.0	20	35	—	<1.4:1	300	6.1 (13.5)	1234 (48.6)	168 (6.6)
DB876G90A-XY	Sector	806-960	0	13.9 (16.0)	90	10.0	—	25	—	<1.33:1	500	9.5 (21.0)	1829 (72.0)	267 (10.5)
DB846G90A-XY	Directed Dipole	806-960	0	14.0 (16.1)	90	13.0	20	40	—	<1.33:1	500	7.0 (15.4)	1829 (72.0)	165 (6.5)
DB878G90A-XY	Sector	806-960	0	15.3 (17.4)	90	6.5	18	25	—	<1.3:1	500	11.3 (25.0)	2438 (96.0)	267 (10.5)
DB848H90E-XY	Directed Dipole	806-960	0	14.5 (16.6)	90	7.5	—	40	—	<1.5:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
848H90T4E-XY	Directed Dipole	806-960	4	14.4 (16.5)	90	7.5	15	40	—	<1.35:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)

**>105° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB874G105AXY	Sector	806-960	0	11.7 (13.8)	105	14.0	15	23	—	<1.33:1	500	6.6 (14.5)	1219 (48.0)	267 (10.5)
DB876G105AXY	Sector	806-960	0	13.4 (15.5)	105	10.0	15	23	—	<1.33:1	500	10.4 (23.0)	1829 (72.0)	267 (10.5)
DB878G105AXY	Sector	806-960	0	14.9 (17.0)	105	7.5	18	25	—	<1.33:1	500	11.3 (25.0)	2438 (96.0)	267 (10.5)
CTSG-12010-ODM	Sector	806-960	0	10.9 (13.0)	120	14.0	15	21	—	<1.3:1	500	9.1 (20.0)	1298 (51.1)	267 (10.5)
CTSG-12012-ODM	Sector	806-960	0	12.1 (14.2)	120	9.0	15	20	—	<1.3:1	500	13.6 (30.0)	1935 (76.2)	267 (10.5)
CTSG-12013-ODM	Sector	806-960	0	13.2 (15.3)	120	7.0	15	22	—	<1.3:1	500	15.4 (34.0)	2565 (101.0)	267 (10.5)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

700/800/900 MHz

870-960 MHz

**<60° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
LBX-3316DS-TOM	DualPol®	806-960	0	16.3 (18.4)	33	15.4	18	38	>30	<1.4:1	500	13.6 (30.0)	1306 (51.4)	592 (23.3)
*LBX-3316DS-VTM	DualPol	806-960	2-12	15.9 (18.0)	33	14.0	15	37	>30	<1.4:1	500	17.9 (39.5)	1306 (51.4)	592 (23.3)
LBX-3319DS-TOM	DualPol	806-960	0	19.2 (21.3)	33	7.4	20	35	>30	<1.4:1	500	21.3 (47.0)	2578 (101.5)	592 (23.3)
*LBX-3319DS-VTM	DualPol	806-960	0-8	18.5 (20.6)	33	7.1	17	35	>30	<1.4:1	300	28.9 (63.8)	2576 (101.4)	592 (23.3)
*LBX-4517DS-VTM	DualPol	806-960	0-10	16.4 (18.5)	45	9.6	16	32	>30	<1.4:1	300	19.0 (41.9)	2012 (79.2)	389 (15.3)

**60-75° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB852DG65ESY	DualPol®	870-960	0	10.0 (12.1)	65	30.0	15	30	>30	<1.33:1	500	2.9 (6.5)	620 (24.4)	315 (12.4)
DB854DG65ESY	DualPol	870-960	0	13.5 (15.6)	65	14.0	15	30	>30	<1.33:1	500	8.4 (18.5)	1295 (51.0)	318 (12.5)
854DG65T6ESY	DualPol	870-960	6	13.3 (15.4)	65	14.5	15	30	>30	<1.33:1	500	8.4 (18.5)	1313 (51.7)	318 (12.5)
CTSDG-06513-0DM	DualPol	806-960	0	12.8 (14.9)	65	14.0	15	25	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
CTSDG-06513-4DM	DualPol	806-960	4	12.7 (14.8)	65	14.5	15	30	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
CTSDG-06513-6DM	DualPol	806-960	6	12.7 (14.8)	65	14.0	15	25	>30	<1.3:1	500	9.3 (20.5)	1295 (51.0)	269 (10.6)
*CTSDG-06513-XDM	DualPol	806-960	0-15	12.9 (15.0)	65	14.0	15	28	>30	<1.4:1	250	9.3 (20.5)	1295 (51.0)	269 (10.6)
DB856DG65EXY	DualPol	806-960	0	14.9 (17.0)	65	10.0	18	30	>30	<1.33:1	500	11.8 (26.0)	1829 (72.0)	318 (12.5)
CTSDG-06515-4DM	DualPol	806-960	4	14.4 (16.5)	65	9.0	15	25	>30	<1.3:1	500	13.9 (30.6)	1930 (76.0)	269 (10.6)
CTSDG-06515-6DM	DualPol	806-960	6	14.4 (16.5)	65	9.0	15	25	>30	<1.3:1	500	13.9 (30.6)	1935 (76.2)	269 (10.6)
*CTSDG-06515-XDM	DualPol	806-960	0-10	14.4 (16.5)	65	10.0	17	25	>30	<1.4:1	250	13.9 (30.6)	1935 (76.2)	269 (10.6)
DB858DG65EXY	DualPol	870-960	0	16.0 (18.1)	65	7.0	16	30	>30	<1.33:1	500	15.9 (35.0)	2438 (96.0)	318 (12.5)
858DG65T3ESY	DualPol	870-960	3	15.8 (17.9)	65	7.0	18	30	>30	<1.33:1	500	15.4 (34.0)	2438 (96.0)	318 (12.5)
858DG65T6ESY	DualPol	870-960	6	15.7 (17.8)	65	7.0	18	30	>30	<1.33:1	500	15.4 (34.0)	2449 (96.4)	315 (12.4)
858DG65T9ESY	DualPol	870-960	9	15.7 (17.8)	65	7.5	18	30	>30	<1.33:1	500	16.8 (37.0)	2438 (96.0)	318 (12.5)
CTSDG-06516-0DM	DualPol	806-960	0	15.8 (17.9)	65	7.0	16	32	>30	<1.3:1	500	18.5 (40.8)	2565 (101.0)	269 (10.6)
*CTSDG-06516-XDM	DualPol	806-960	0-8	15.6 (17.7)	65	7.0	17	30	>30	<1.4:1	250	18.5 (40.8)	2565 (101.0)	269 (10.6)

**80-95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
854DG85VTEXY	DualPol	806-960	2-14	11.7 (13.8)	85	15.0	15	29	>30	<1.4:1	500	5.0 (11.0)	1232 (48.5)	229 (9.0)
DB854DG90ESY	DualPol	870-960	0	12.0 (14.1)	90	14.5	15	27	>30	<1.33:1	500	8.2 (18.0)	1219 (48.0)	318 (12.5)
854DG90T6ESY	DualPol	870-960	6	11.7 (13.8)	90	14.5	15	27	>30	<1.33:1	500	8.2 (18.0)	1308 (51.5)	312 (12.3)
*LBX-9012DS-VTM	DualPol	806-960	0-16	12.0 (14.1)	90	15.5	16	25	>30	<1.4:1	300	11.8 (26.0)	1295 (51.0)	267 (10.5)
DB856DG90ESY	DualPol	870-960	0	13.4 (15.5)	90	9.5	15	30	>30	<1.33:1	500	11.8 (26.0)	1842 (72.5)	318 (12.5)
*LBX-9013DS-VTM	DualPol	806-960	0-10	13.1 (15.2)	90	10.4	15	30	>30	<1.4:1	300	12.0 (26.5)	1831 (72.1)	224 (8.8)
*LBX-9014DS-VTM	DualPol	806-960	0-8	14.0 (16.1)	90	7.4	18	30	>30	<1.4:1	300	18.1 (39.9)	2436 (95.9)	226 (8.9)
DB858DG90ESY	DualPol	870-960	0	14.7 (16.8)	90	7.0	15	30	>30	<1.33:1	500	14.5 (32.0)	2438 (96.0)	318 (12.5)
858DG90T3ESY	DualPol	870-960	3	14.6 (16.7)	90	8.0	18	30	>30	<1.33:1	500	14.5 (32.0)	2438 (96.0)	318 (12.5)

**<60° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB842H35E-SY	Directed Dipole™	870-960	0	12.4 (14.5)	35	30.0	15	40	—	<1.5:1	500	6.4 (14.0)	610 (24.0)	610 (24.0)
DB844H35E-SY	Directed Dipole	870-960	0	15.5 (17.6)	35	15.0	15	40	—	<1.5:1	500	12.7 (28.0)	1219 (48.0)	610 (24.0)
DB874G35A-XY	Sector	806-960	0	16.5 (18.6)	35	14.5	18	25	—	<1.33:1	500	7.9 (17.5)	1232 (48.5)	470 (18.5)
DB848H35E-SY	Directed Dipole	870-960	0	17.9 (20.0)	35	7.5	15	40	—	<1.4:1	500	24.9 (55.0)	2438 (96.0)	610 (24.0)
DB872G45A-XY	Sector	806-960	0	11.5 (13.6)	45	30.0	15	20	—	<1.33:1	500	3.9 (8.5)	610 (24.0)	318 (12.5)
DB844G45ZAXY	Directed Dipole	806-960	0	15.1 (17.2)	45	15.0	20	40	—	<1.33:1	500	7.7 (17.0)	1219 (48.0)	381 (15.0)
*LBV-4515LS-VTM	Directed Dipole	806-960	0-15	14.7 (16.8)	45	16.5	22	40	—	<1.4:1	300	9.1 (20.0)	1240 (48.8)	376 (14.8)
DB845N45ZAXY	Directed Dipole	806-960	0	16.0 (18.1)	45	13.0	22	40	—	<1.33:1	500	10.4 (23.0)	1537 (60.5)	381 (15.0)
ASPG962	Yagi	870-960	0	10.0 (12.1)	52	43.0	—	20	—	<1.5:1	150	0.5 (1.1)	686 (27.0)	203 (8.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.

60-75° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
ASPJ810	Yagi	870-960	0	10.0 (12.1)	60	30.0	—	20	—	<1.5:1	150	0.8 (1.7)	686 (27.0)	180 (7.1)
DB499-K	Yagi	890-960	0	10.0 (12.1)	60	30.0	—	15	—	<1.5:1	150	2.3 (5.0)	762 (30.0)	137 (5.4)
DB878G60A-XY	Sector	806-960	0	16.4 (18.5)	60	7.5	18	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
878G60T2A-XY	Sector	806-960	2	16.4 (18.5)	60	7.5	18	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
878G60T4A-XY	Sector	806-960	4	16.3 (18.4)	60	8.0	20	28	—	<1.33:1	500	13.2 (29.0)	2438 (96.0)	318 (12.5)
DB842H65E-XY	Directed Dipole	806-960	0	10.7 (12.8)	65	30.0	15	40	—	<1.4:1	500	4.5 (10.0)	610 (24.0)	521 (20.5)
DB874G65A-XY	Sector	806-960	0	14.0 (16.1)	65	15.5	18	25	—	<1.33:1	500	6.1 (13.5)	1219 (48.0)	305 (12.0)
DB844G65ZAXY	Directed Dipole	806-960	0	13.8 (15.9)	65	15.0	15	40	—	<1.33:1	500	5.4 (12.0)	1219 (48.0)	254 (10.0)
DB844H65E-XY	Directed Dipole	806-960	0	13.3 (15.4)	65	15.0	15	40	—	<1.5:1	500	9.1 (20.0)	1219 (48.0)	521 (20.5)
844G65T6ZAXY	Directed Dipole	806-960	6	13.7 (15.8)	65	15.0	15	40	—	<1.33:1	500	5.4 (12.0)	1219 (48.0)	254 (10.0)
*LBV-6513LS-VTM	Directed Dipole	806-960	0-15	12.9 (15.0)	65	17.0	20	34	—	<1.4:1	300	7.9 (17.5)	1237 (48.7)	312 (12.3)
DB845N65ZAXY	Directed Dipole	806-960	0	14.5 (16.6)	65	13.0	25	40	—	<1.33:1	500	8.6 (19.0)	1524 (60.0)	254 (10.0)
DB876G65A-XY	Sector	806-960	0	15.5 (17.6)	65	11.0	—	25	—	<1.33:1	500	8.6 (19.0)	1829 (72.0)	318 (12.5)
DB846F65ZAXY	Directed Dipole	806-960	0	14.8 (16.9)	65	10.5	15	40	—	<1.33:1	500	9.5 (21.0)	1829 (72.0)	254 (10.0)
DB848H65E-XY	Directed Dipole	806-960	0	16.0 (18.1)	65	7.5	—	40	—	<1.4:1	500	17.7 (39.0)	2438 (96.0)	521 (20.5)

80-95° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB842H80E-XY	Directed Dipole™	806-960	0	10.3 (12.4)	80	30.0	15	40	—	<1.5:1	500	3.2 (7.0)	610 (24.0)	165 (6.5)
DB844H80E-XY	Directed Dipole	806-960	0	12.8 (14.9)	80	15.0	15	40	—	<1.5:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844H80T6E-XY	Directed Dipole	806-960	6	12.5 (14.6)	80	15.0	15	40	—	<1.5:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
DB848H80E-XY	Directed Dipole	806-960	0	14.7 (16.8)	80	7.5	15	40	—	<1.4:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
DB842H90E-XY	Directed Dipole	806-960	0	9.2 (11.3)	90	30.0	15	40	—	<1.5:1	500	3.2 (7.0)	610 (24.0)	165 (6.5)
DB874G90A-XY	Sector	806-960	0	12.5 (14.6)	90	14.0	18	25	—	<1.33:1	500	6.6 (14.5)	1219 (48.0)	267 (10.5)
DB844H90E-XY	Directed Dipole	806-960	0	12.4 (14.5)	90	15.0	15	40	—	<1.4:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
844H90T6E-XY	Directed Dipole	806-960	6	12.3 (14.4)	90	15.0	15	40	—	<1.33:1	500	6.4 (14.0)	1219 (48.0)	165 (6.5)
*LBV-9012LS-VTM	Directed Dipole	806-960	0-15	11.5 (13.6)	90	17.0	20	35	—	<1.4:1	300	6.1 (13.5)	1234 (48.6)	168 (6.6)
DB876G90A-XY	Sector	806-960	0	13.9 (16.0)	90	10.0	—	25	—	<1.33:1	500	9.5 (21.0)	1829 (72.0)	267 (10.5)
DB846G90A-XY	Directed Dipole	806-960	0	14.0 (16.1)	90	13.0	20	40	—	<1.33:1	500	7.0 (15.4)	1829 (72.0)	165 (6.5)
DB878G90A-XY	Sector	806-960	0	15.3 (17.4)	90	6.5	18	25	—	<1.3:1	500	11.3 (25.0)	2438 (96.0)	267 (10.5)
DB848H90E-XY	Directed Dipole	806-960	0	14.5 (16.6)	90	7.5	—	40	—	<1.5:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)
848H90T4E-XY	Directed Dipole	806-960	4	14.4 (16.5)	90	7.5	15	40	—	<1.35:1	500	12.7 (28.0)	2438 (96.0)	165 (6.5)

>105° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB874G105AXY	Sector	806-960	0	11.7 (13.8)	105	14.0	15	23	—	<1.33:1	500	6.6 (14.5)	1219 (48.0)	267 (10.5)
DB876G105AXY	Sector	806-960	0	13.4 (15.5)	105	10.0	15	23	—	<1.33:1	500	10.4 (23.0)	1829 (72.0)	267 (10.5)
DB878G105AXY	Sector	806-960	0	14.9 (17.0)	105	7.5	18	25	—	<1.33:1	500	11.3 (25.0)	2438 (96.0)	267 (10.5)
CTSG-12010-ODM	Sector	806-960	0	10.9 (13.0)	120	14.0	15	21	—	<1.3:1	500	9.1 (20.0)	1298 (51.1)	267 (10.5)
CTSG-12012-ODM	Sector	806-960	0	12.1 (14.2)	120	9.0	15	20	—	<1.3:1	500	13.6 (30.0)	1935 (76.2)	267 (10.5)
CTSG-12013-ODM	Sector	806-960	0	13.2 (15.3)	120	7.0	15	22	—	<1.3:1	500	15.4 (34.0)	2565 (101.0)	267 (10.5)

360° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBi (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
DB583-Y	Omni	890-960	0	3.0 (5.1)	360	30.0	—	—	—	<1.5:1	300	2.9 (6.3)	813 (32.0)	38.1 (1.5)
DB586-Y	Omni	890-960	0	6.0 (8.1)	360	18.0	—	—	—	<1.5:1	300	3.8 (8.3)	1499 (59.0)	38.1 (1.5)
DB586T3-Y	Omni	890-960	3	6.0 (8.1)	360	18.0	—	—	—	<1.5:1	300	3.8 (8.3)	1334 (52.5)	38.1 (1.5)
DB589-Y	Omni	890-960	0	9.0 (11.1)	360	9.0	—	—	—	<1.5:1	300	5.2 (11.5)	2794 (110.0)	38.1 (1.5)
DB589T3-Y	Omni	890-960	3	9.0 (11.1)	360	9.0	—	—	—	<1.5:1	300	5.2 (11.5)	2438 (96.0)	38.1 (1.5)
DB809KE-SY	Omni	870-960	0	9.0 (11.1)	360	8.0	—	—	—	<1.5:1	500	11.8 (26.0)	3454 (136.0)	76.2 (3.0)
DB809KT3E-Y	Omni	885-960	3	9.0 (11.1)	360	8.0	—	—	—	<1.5:1	500	12.2 (27.0)	3734 (147.0)	76.2 (3.0)
ASPJ977E	Omni	872-960	3-8	8.5 (10.6)	360	7.0	—	—	—	<1.5:1	500	15.9 (35.0)	4394 (173.0)	65.3 (2.6)
DB810KE-SY	Omni	870-960	0	10.0 (12.1)	360	4.2	—	—	—	<1.5:1	500	15.9 (35.0)	5118 (201.5)	76.2 (3.0)
DB812KE-Y	Omni	890-960	0	12.0 (14.1)	360	3.0	—	—	—	<1.5:1	500	29.5 (65.0)	6807 (268.0)	76.2 (3.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the current information.

\*Teletilt® remote electrical tilt compatible.









● 2.2-5.8 GHz

**Features and Benefits**

**Sector Antennas**

Andrew Wireless Solutions sector base station antennas are ideal for WiMAX applications in the 2.3, 2.5, 3.5, and 5.8 GHz bands. Andrew's WiMAX antennas are designed with years of innovative experience in the wireless industry. These antennas offer outstanding value and quality performance, featuring high volume, low-cost, rugged, reliable models with trouble-free performance.

Andrew has also developed a series of RET capable antennas for the WiMAX bands and is continually expanding its offerings of RET capable antennas. In addition, Andrew offers WiMAX band multicolumn arrays for use in digital beamforming applications.

Contact Andrew's Customer Support Center (CSC) to discuss these designs or other array configurations.

**Omnidirectional Antennas**

The WiMAX band omnidirectional antennas are built to endure outdoor environments, while maintaining a low profile in an aesthetically attractive package.



◉ SA3400 Series



◉ DB992HG28N-B



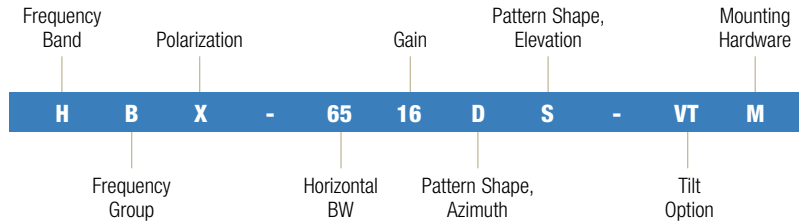
◉ W2X Series



◉ APW Series

## Single Band Sector Base Station Antenna Model Number Sequences

### Typical Style 1 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY BAND (MHz)

(Shown in Frequency Order)

- U = 410–500
- L = 806–960
- H = 1710–2180
- W = 2300–5875

#### FREQUENCY GROUP

(Shown in Frequency Order with Band in MHz)

- B = Broadband (Covers entire U, L, or H Freq. Band)
- C = 800 MHz (806–896)
- G = GSM900 (870–960)
- K = GSM1800 (1710–1880)
- P = 1900 MHz (1850–1990)
- U = UMTS (1920–2180)
- 2 = WiMAX (2300–2700, 2495–2690)
- 3 = WiMAX (3300–3800, 3400–3600)
- 5 = WiMAX (5150–5875)

#### POLARIZATION

- H = Horizontal Pol
- V = Vertical Pol
- X = DualPol®
- XX = Dual DualPol® (Quad)
- XXX = Triple DualPol®

#### PATTERN SHAPE–AZIMUTH

- D = Standard Dipole
- L = Directed Dipole™

#### PATTERN SHAPE–ELEVATION

- F = Optimized Null Fill
- G = Optimized Gain
- S = Heavy Upper Sidelobe Suppression (USLS)

#### TILT OPTION

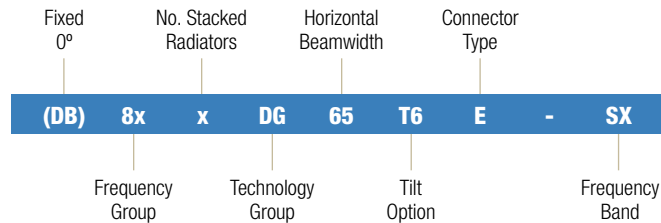
- T# = Degree of Fixed Tilt
- VT = Variable Electrical Tilt
- R2 = ATC200 Teletilt® RET Ready

#### MOUNTING HARDWARE

- M = Standard Downtilt Mount and Pipe Mount

## Single Band Sector Base Station Antenna Model Number Sequences

### Typical Style 3 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### FREQUENCY GROUP (Shown in Frequency Order)

6x = UHF  
8x = 800/900 MHz  
9x = 1800/1900 MHz/UMTS/WiMAX

#### NUMBER OF STACKED RADIATORS

800/900 MHz Models: Equals length of antenna (ft)  
1710–2170 MHz Models: Equals 2x length of antenna (ft)  
Vertical BW can be estimated based on the # of stacked radiators, by dividing the # of stacked radiators into 60 (Ex: 60 divided by 4 stacked radiators = 15° Vertical BW).

#### TECHNOLOGY GROUP

F = Optimized Null Fill, USLS, Vertical Pol  
G = Optimized Gain, Heavy USLS, Vertical Pol  
DG = Optimized Gain, Heavy USLS, DualPol®  
H = Conventional USLS, Vertically Polarized  
LG = Optimized Gain, Heavy USLS, DualPol®, Directed Dipole™  
QDG = Optimized Gain, Heavy USLS, Dual DualPol® (Side-By-Side)

#### TILT OPTION

None = 0° Fixed Tilt  
T# = Degree of Fixed Tilt  
VT = Variable Electrical Tilt  
R2 = ATC200 Teletilt® RET Ready

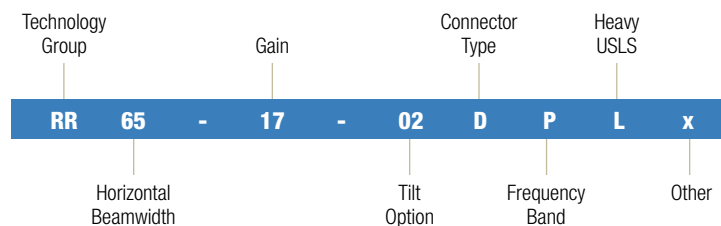
#### CONNECTOR TYPE

E = 7–16 DIN, Female (Bottom)  
A = 7–16 DIN, Female (Back)

#### FREQUENCY BAND (MHz) (Shown in Frequency Order)

C = 420–572	SY = 870–960
A = 740–801	KL = 1710–1880
XT = 806–869	M = 1850–1990
SX = 806–896	B = 1710–2170
XC = 824–896	U = 1920–2170
XY = 806–960	SR = 2100–2700

### Typical Style 4 – Model Number Sequence



#### EXTENDED WARRANTY

All Andrew sector base station antennas featuring 7–16 DIN connectors carry a 5-year extended warranty.

#### TECHNOLOGY GROUP

DR = Dual DualPol® (Quad)  
FR = Optimized Null Fill, DualPol®  
FV = Optimized Null Fill, Vertically Polarized  
RR = Optimized Gain, DualPol®  
RV = Optimized Gain, Vertically Polarized  
TR = Triple DualPol®

#### TILT OPTION

## = Degree of Fixed Tilt  
V = Variable Electrical Tilt

#### CONNECTOR TYPE

D = 7–16 DIN, Female (Back)

#### FREQUENCY BAND (MHz) (Shown in Frequency Order)

A = 806–896  
B = 806–960  
C = 1710–1880  
P = 1850–1990  
U = 1710–2180  
Y = 2500–2700

#### OTHER (A dash may precede this character.)

# = Design Revision Level  
Q = Side-By-Side  
R = Factory Installed Actuator  
12 = 12 inch Width

**60–75° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
*W2X-6516DS-VTM	DualPol®	2300–2700	0–10	15.9 (18.0)	65	6.0	18	40	>30	<1.4:1	250	4.2 (9.2)	1214 (47.8)	165 (6.5)
SA3400-065X-18	DualPol	3300–3800	2	14.3 (16.4)	65	6.8	18	34	>25	<1.5:1	50	5.8 (12.7)	711 (28.0)	157 (6.2)
SA2500-065X-18	DualPol	2300–2700	2	15.5 (17.6)	65	5.6	20	32	>30	<1.4:1	80	3.9 (8.7)	1219 (48.0)	165 (6.5)
*W2X-6514DS-VTM	DualPol	2300–2700	0–10	14.0 (16.1)	65	7.0	18	28	>30	<1.4:1	250	4.0 (8.8)	1041 (41.0)	165 (6.5)

**80–95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
SA3400-090X-16	DualPol	3300–3800	2	13.8 (15.9)	90	6.8	18	36	>25	<1.5:1	50	5.7 (12.5)	711 (28.0)	157 (6.2)
SA2500-090X-16	DualPol	2300–2700	2	14.5 (16.6)	90	5.6	18	34	>30	<1.4:1	80	3.9 (8.7)	1219 (48.0)	165 (6.5)
*W2X-9013DS-VTM	DualPol	2300–2700	0–10	13.0 (15.1)	90	7.0	18	23	>30	<1.4:1	250	3.7 (8.2)	1041 (41.0)	165 (6.5)

**<60° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB992HG28N-B	Sector	1710–2490	0	14.9 (17.0)	28	25.0	18	35	—	<2.0:1	50	1.4 (3.0)	305 (12.0)	305 (12.0)

**60–75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
SA5150-060V-17	Sector	5150–5875	0	14.9 (17.0)	60	6.0	15	25	—	<1.7:1	50	0.7 (1.5)	554 (21.8)	76 (3.0)
SA3400-065V-18	Sector	3300–3800	2	15.5 (17.6)	65	6.6	18	36	—	<1.5:1	50	5.0 (11.0)	711 (28.0)	157 (6.2)
SA2500-065V-18	Sector	2300–2700	2	15.7 (17.8)	65	5.7	18	34	—	<1.5:1	50	4.5 (9.9)	1219 (48.0)	168 (6.6)
DBVLH-7050-TOM	Dual band	1710–2300	0	6.5 (8.6)	47	45.0	—	—	—	<1.8:1	75	0.9 (2.0)	213 (8.4)	213 (8.4)
		806–960	0	4.5 (6.6)	70	60.0	—	—	—	<1.8:1	75	0.9 (2.0)	213 (8.4)	213 (8.4)

**80–95° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
SA5150-090V-16	Sector	5150–5875	0	13.9 (16.0)	90	6.0	15	25	—	<1.7:1	50	0.7 (1.5)	554 (21.8)	76 (3.0)
DB950G85E-R	Directed Dipole™	2400–2700	0	16.0 (18.1)	85	5.0	18	40	—	<1.4:1	200	5.4 (12.0)	1346 (53.0)	178 (7.0)
DB973G90-SR	Sector	2100–2700	0	9.0 (11.1)	90	34.0	15	22	—	<1.5:1	100	0.7 (1.5)	203 (8.0)	76 (3.0)
SA3400-090V-16	Sector	3300–3800	2	14.6 (16.7)	90	6.7	20	34	—	<1.5:1	50	4.8 (10.5)	711 (28.0)	157 (6.2)
SA2500-090V-16	Sector	2300–2700	2	14.8 (16.9)	90	5.7	18	34	—	<1.5:1	50	3.8 (8.4)	1219 (48.0)	168 (6.6)
APW425-12014-0N	Sector - 4 column	2300–2700	0	14.9 (17.0)	90	5.0	18	25	—	<1.5:1	20	10.0 (22.0)	1350 (53.1)	361 (14.2)
APW435-12014-0N	Sector - 4 column	3300-3800	0	14.9 (17.0)	90	5.0	18	25	—	<1.5:1	20	8.0 (17.6)	1000 (39.3)	240 (9.4)

**>105° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
SA3400-120V-15	Sector	3300–3800	2	12.8 (14.9)	120	7.0	20	32	—	<1.5:1	50	4.8 (10.5)	711 (28.0)	157 (6.2)
SA2500-120V-15	Sector	2300–2700	2	13.1 (15.2)	120	5.6	18	32	—	<1.5:1	50	3.6 (7.9)	1219 (48.0)	168 (6.6)
SA5150-120V-15	Sector	5150–5875	0	12.9 (15.0)	120	6.0	12	25	—	<1.7:1	50	0.7 (1.5)	554 (21.8)	76 (3.0)

**360° Horizontal Beamwidth (HBW), Vertical Polarization**

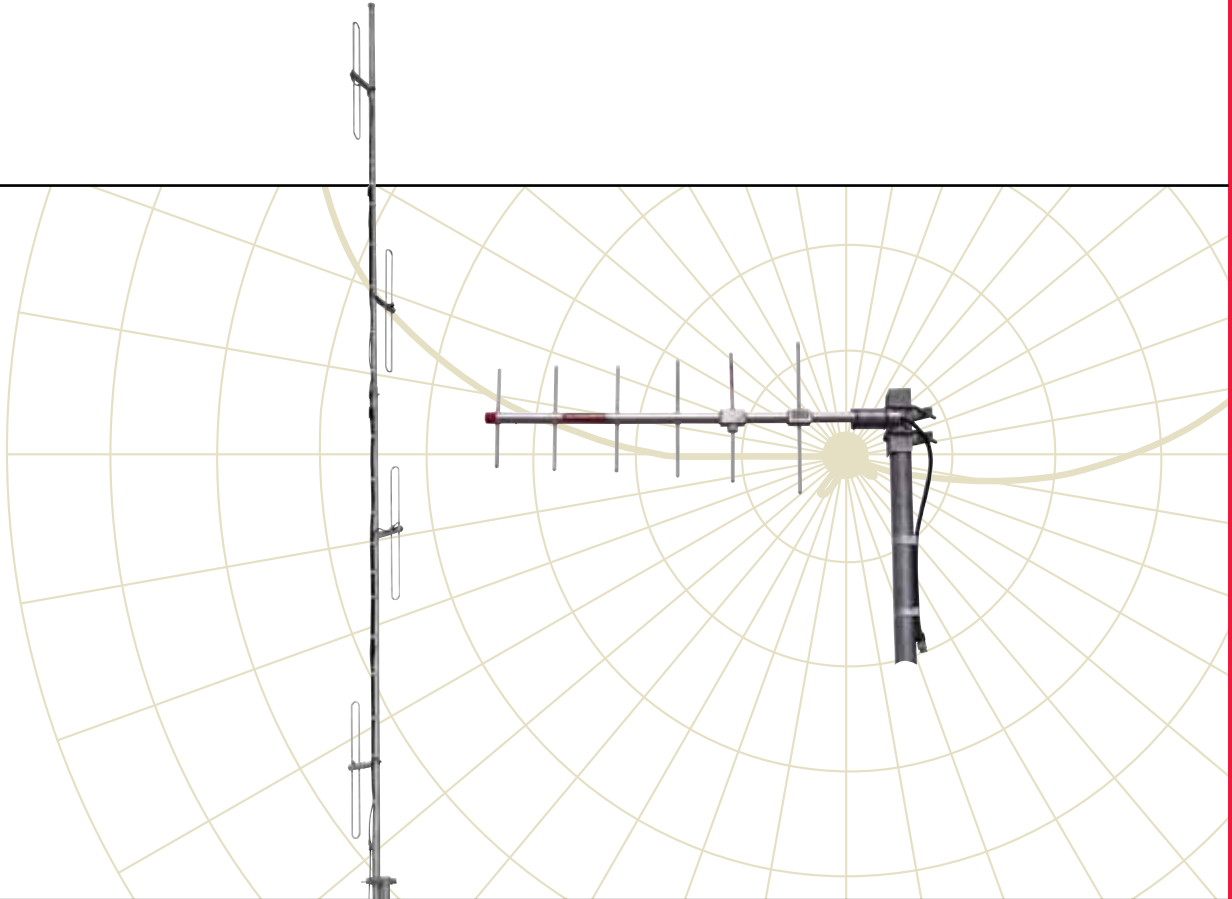
Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB910SN-W	Omni	3400–3600	0	7.9 (10.0)	360	7.0	—	—	—	<1.5:1	150	0.5 (1.0)	991 (39.0)	25 (1.0)
DB906SN-T	Omni	2400–2483	0	6.0 (8.1)	360	15.0	—	—	—	<1.5:1	200	2.3 (5.0)	762 (30.0)	38 (1.5)
AWA2500-3602-00NF	Omni	2400-2500	0	0.0 (2.2)	360	32.0	—	—	—	<1.5:1	10	0.2 (0.4)	245 (9.6)	35 (1.4)
AWA2500-3605-00NF	Omni	2400-2500	0	2.9 (5.0)	360	16.0	—	—	—	<1.5:1	10	0.4 (0.9)	432 (17.0)	35 (1.4)
AWA2500-3608-00NF	Omni	2400-2500	0	5.9 (8.0)	360	8.0	—	—	—	<1.5:1	10	0.6 (1.2)	635 (25.0)	35 (1.4)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Teletilt® remote electrical tilt compatible.







- 30–174 MHz
- 380–430 MHz
- 406–512 MHz



DB201

### Ground Plane Antennas

DB201 series ground plane omni antennas feature a moisture resistant epoxy insulator to guard against condensation and corrosion in the 50 ohm feed-through connector. The lead is protected with a field replaceable, weatherproofed male-to-female connector. These antennas are constructed of all metal and all elements operate at dc ground to protect against damage from lightning. The antennas are cut to frequency and factory tested for minimum VSWR. Optional uncut models are available with cutting charts.

The ASP7A light duty quarter wave ground plane antenna, constructed of chrome-painted brass radiators and stainless steel radials, provides long lasting, dependable performance for all general purpose applications. This antenna easily mounts in minutes on a mast up to 1.25 in (31.8 mm) OD, and is an ideal choice for economical installations.

### Exposed Dipole Quasi-Omni Antennas

Andrew's exposed dipole quasi-omni antennas feature flexibility for pattern shaping. By aligning the antenna dipoles collinearly, an offset pattern is produced offering a higher gain. Or, by positioning the dipoles evenly every 90° on opposite sides of the mast, a circular pattern is produced offering omni coverage. Each model is designed with a center splice to assure proper alignment, and can easily be field adjusted with ordinary hand tools to produce the desired pattern performance.

### Additional Features

- DB222, DB224, DB228, and DB264 antennas perform efficiently in both transmit and receive, and most models are capable of operating in either single or multi-frequency systems. Dual dipole models (DB404, DB408, DB411, DB413, and DB420) are especially suitable for duplex operation.
- Each antenna is easy to install with optional side mounts available. Order DB5001 for side mounting standard folded dipole antennas, and order DB5007 for dual folded dipole antennas.
- DB264 models are designed with the cable harness enclosed in the metal mast, and the mast and radiating elements are vented to prevent moisture accumulation.
- Dual folded dipoles are extremely rugged to resist winds up to 125 mph (201 km/h).
- Radiators operate at dc ground and each aluminum mast has a pointed cap that provides a low resistance discharge path to the tower or ground system.



DB224



**30-512 MHz**

## Features and Benefits

### Fiberglass Omni Antennas

Andrew's fiberglass omni antennas feature rugged fiberglass radomes to protect the radiating elements from harsh weather environments.

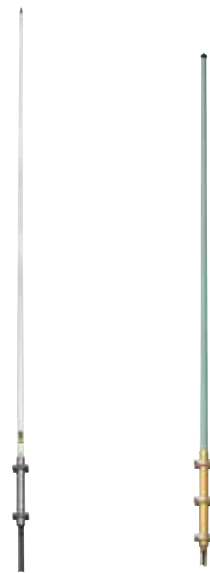
- The radome on DB616 and DB640NS is made of 0.25 in thick Aeroglass fiberglass; a material known for its use in helicopter rotor blades and racing sailboat masts, as well as Olympic vaulters' poles. The ASP omni antennas have an extra heavy radome made of Armorweave fiberglass. The DB63x series antenna radomes are made of minimum tip deflection (MTD) fiberglass. Each model is designed to withstand hostile winds.
- DB616 models are engineered to last by using all metal in the radiators, and either copper or brass is used in the feed and matching systems to minimize galvanic reaction and reduce intermodulation. These antennas are weather resistant with a gold iridated support pipe made of 6061-T6 aluminum alloys.
- Moisture resistant bulkhead connector on the bottom cap, as well as drain plugs in both the top and bottom for upright or inverted mounting provide protection against corrosion.
- Each antenna easily installs with a no-torsion mount and includes a dc ground.

### Directional Antennas

Select from Andrew's DB436 yagi or DB654/DB674 panel antenna families for directional gain advantages. The yagi models offer great front-to-back ratios. The panel antennas provide exceptional gain with 1.4:1 or better VSWR and DualPol® performance in the DB654 model.

### Additional Features

- DB436 antennas can be mounted side-by-side or vertically stacked to provide either vertical or horizontal polarization. One wavelength of vertical separation is recommended. The antennas can be mounted on opposite sides of the tower to produce a bi-directional pattern, if desired.
- DB436 models are made of high strength aluminum alloys with stainless steel mounting brackets and galvanized or stainless steel hardware used for installing the DB254 antennas.
- DB654 and DB674 antennas feature a sturdy construction with a passivated aluminum back panel, alodine finish aluminum radiating elements, and a high impact UV and weather resistant ABS plastic radome.



○ ASP685

○ DB640NS-C



○ DB674G65A-C

**30-512 MHz**

**30-174 MHz**

**60-75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	F/B dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB292-A	Yagi	150-160	0	9.5 (11.6)	62	50.0	18	<1.5:1	350	6.8 (15.0)	2134 (84.0)	965 (38.0)

**360° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	F/B dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
ASP7A	Omni, ground plane	108-512	0	0.0 (2.1)	360	60.0	—	<1.5:1	100	0.4 (0.8)	660 (26.0)	12.7 (0.5)
*DB201-L	Omni, ground plane	30-50	0	0.0 (2.1)	360	78.0	—	<1.5:1	500	10.4 (23.0)	2896 (114.0)	323 (12.7)
*DB201-M	Omni, ground plane	144-174	0	0.0 (2.1)	360	78.0	—	<1.5:1	500	4.5 (10.0)	762 (30.0)	701 (27.6)
DB220-B	Omni, exposed dipole	153-160	0	3.0 (5.1)	360	60.0	—	<1.5:1	500	5.9 (13.0)	1854 (73.0)	—
DB601E-AC	Omni	155-174	0	0.0 (2.1)	360	70.0	—	<1.5:1	500	10.0 (22.0)	2794 (110.0)	76 (3.0)
DB222-A	Omni, exposed dipole	150-158	0	3.0 (5.1)	360	36.0	—	<1.5:1	500	7.3 (16.0)	3226 (127.0)	—
DB222-B	Omni, exposed dipole	158-166	0	3.0 (5.1)	360	36.0	—	<1.5:1	500	7.3 (16.0)	3226 (127.0)	—
DB222-C	Omni, exposed dipole	166-174	0	3.0 (5.1)	360	36.0	—	<1.5:1	500	7.3 (16.0)	3226 (127.0)	—
DB222-E	Omni, exposed dipole	143-150	0	3.0 (5.1)	360	36.0	—	<1.5:1	500	7.3 (16.0)	3226 (127.0)	—
DB222-F	Omni, exposed dipole	136-143	0	3.0 (5.1)	360	36.0	—	<1.5:1	500	7.3 (16.0)	3226 (127.0)	—
DB616-BC	Omni	160-174	0	5.5 (7.6)	360	18.0	—	<1.5:1	500	23.1 (51.0)	5867 (231.0)	89 (3.5)
DB616E-BC	Omni	160-174	0	5.5 (7.6)	360	18.0	—	<1.5:1	500	23.1 (51.0)	5867 (231.0)	89 (3.5)
DB616-AB	Omni	150-164	0	5.5 (7.6)	360	18.0	—	<1.5:1	500	23.1 (51.0)	6223 (245.0)	89 (3.5)
DB616E-AB	Omni	150-164	0	5.5 (7.6)	360	18.0	—	<1.5:1	500	23.1 (51.0)	6223 (245.0)	89 (3.5)
ASPA685	Omni	151-158	0	5.3 (7.4)	360	15.0	—	<1.5:1	350	9.8 (21.5)	6401 (252.0)	89 (3.5)
ASPB685	Omni	155-163	0	5.3 (7.4)	360	15.0	—	<1.5:1	350	9.8 (21.5)	6401 (252.0)	89 (3.5)
DB224-A	Omni, exposed dipole	150-160	0	6.0 (8.1)	360	16.0	—	<1.5:1	500	15.9 (35.0)	6477 (255.0)	—
DB224-B	Omni, exposed dipole	155-165	0	6.0 (8.1)	360	16.0	—	<1.5:1	500	15.9 (35.0)	6477 (255.0)	—
DB224-C	Omni, exposed dipole	164-174	0	6.0 (8.1)	360	16.0	—	<1.5:1	500	15.9 (35.0)	6477 (255.0)	—
DB224-E	Omni, exposed dipole	138-150	0	6.0 (8.1)	360	16.0	—	<1.5:1	500	17.2 (38.0)	6858 (270.0)	—
DB224-FAA	Omni, exposed dipole	127-141	0	6.0 (8.1)	360	16.0	—	<1.5:1	500	17.2 (38.0)	7087 (279.0)	—
DB224-F	Omni, exposed dipole	160-170	0	6.0 (8.1)	360	16.0	—	<1.5:1	500	15.9 (35.0)	6477 (255.0)	—
DB224-SM	Omni, exposed dipole	139-143	0	6.0 (8.1)	360	16.0	—	<1.4:1	500	14.5 (32.0)	6477 (255.0)	51 (2.0)
DB264-A	Omni, exposed dipole	150-160	0	6.0 (8.1)	360	16.0	—	<1.5:1	300	16.3 (36.0)	6553 (258.0)	—
DB264-B	Omni, exposed dipole	155-165	0	6.0 (8.1)	360	16.0	—	<1.5:1	300	16.3 (36.0)	6553 (258.0)	—
DB264-C	Omni, exposed dipole	164-174	0	6.0 (8.1)	360	16.0	—	<1.5:1	300	16.3 (36.0)	6553 (258.0)	—
DB228-A	Omni, exposed dipole	150-160	0	9.0 (11.1)	360	8.0	—	<1.5:1	500	32.7 (72.0)	12395 (488.0)	—
DB228-B	Omni, exposed dipole	155-165	0	9.0 (11.1)	360	8.0	—	<1.5:1	500	32.7 (72.0)	12395 (488.0)	—
DB228-C	Omni, exposed dipole	164-174	0	9.0 (11.1)	360	8.0	—	<1.5:1	500	32.7 (72.0)	12395 (488.0)	—

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Bandwidth is only 2% of cut frequency.



30-512 MHz

380-430 MHz

### 60-75° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UBX-6513DS-T15M	DualPol®	410-500	15	12.0 (14.1)	65	19.0	—	22	>30	<1.33:1	500	16.8 (37.0)	1981 (78.0)	478 (18.8)
DB654DG65A-C	DualPol	410-512	0	12.9 (15.0)	65	17.0	15	28	>30	<1.4:1	600	19.0 (41.9)	1981 (78.0)	483 (19.0)

### 80-95° Horizontal Beamwidth (HBW), Dual Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB654DG90A-C	DualPol	410-512	0	12.4 (14.5)	90	15.4	16	25	>30	<1.4:1	600	19.1 (42.0)	2451 (96.5)	483 (19.0)
654DG90T3A-C	DualPol	410-500	3	12.3 (14.4)	90	15.4	16	25	>30	<1.4:1	600	19.1 (42.0)	2426 (95.5)	483 (19.0)

### 60-75° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB436-A	Yagi	400-420	0	10.0 (12.1)	60	44.0	—	16	—	<1.5:1	250	3.2 (7.0)	889 (35.0)	368 (14.5)
DB674G65A-C	Sector	420-512	0	13.1 (15.2)	65	17.0	18	25	—	<1.4:1	700	19.1 (42.0)	1981 (78.0)	483 (19.0)

### 360° Horizontal Beamwidth (HBW), Vertical Polarization

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight lb (kg)	Length in (mm)	Radome OD in (mm)
DB404-A	Omni, exposed dipole	406-420	0	3.8 (5.9)	360	27.0	—	—	—	<1.5:1	250	6.4 (14.0)	1524 (60.0)	—
*DB201-N	Omni, ground plane	406-512	0	0.0 (2.1)	360	78.0	—	—	—	<1.5:1	500	2.7 (6.0)	483 (19.0)	239 (9.4)
DB408-A	Omni, exposed dipole	406-420	0	6.6 (8.7)	360	14.0	—	—	—	<1.5:1	250	7.7 (17.0)	2870 (113.0)	—
DB420-A	Omni, exposed dipole	406-420	0	9.2 (11.3)	360	7.0	—	—	—	<1.5:1	250	15.4 (34.0)	5867 (231.0)	—

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Bandwidth is only 2% of cut frequency.

30-512 MHz

406-512 MHz

**60-75° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
UBX-6513DS-T15M	DualPol®	410-500	15	12.0 (14.1)	65	19.0	—	22	>30	<1.33:1	500	16.8 (37.0)	1981 (78.0)	478 (18.8)
DB654DG65A-C	DualPol	410-512	0	12.9 (15.0)	65	17.0	15	28	>30	<1.4:1	600	19.0 (41.9)	1981 (78.0)	483 (19.0)

**80-95° Horizontal Beamwidth (HBW), Dual Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB654DG90A-C	DualPol	410-512	0	12.4 (14.5)	90	15.4	16	25	>30	<1.4:1	600	19.1 (42.0)	2451 (96.5)	483 (19.0)
654DG90T3A-C	DualPol	410-500	3	12.3 (14.4)	90	15.4	16	25	>30	<1.4:1	600	19.1 (42.0)	2426 (95.5)	483 (19.0)

**60-75° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Width mm (in)
DB436-A	Yagi	400-420	0	10.0 (12.1)	60	44.0	—	16	—	<1.5:1	250	3.2 (7.0)	889 (35.0)	368 (14.5)
DB436-C	Yagi	450-470	0	10.0 (12.1)	60	44.0	—	16	—	<1.5:1	250	3.2 (7.0)	889 (35.0)	368 (14.5)
DB436-E	Yagi	488-512	0	10.0 (12.1)	60	44.0	—	16	—	<1.5:1	250	3.2 (7.0)	889 (35.0)	368 (14.5)
DB674G65A-C	Sector	420-512	0	13.1 (15.2)	65	17.0	18	25	—	<1.4:1	700	19.1 (42.0)	1981 (78.0)	483 (19.0)

**360° Horizontal Beamwidth (HBW), Vertical Polarization**

Model	Type	Frequency (MHz)	Tilt degrees	Gain dBd (dBi)	HBW degrees	VBW degrees	USLS dB	F/B dB	Isolation dB	VSWR	Max. Input Power, W	Weight kg (lb)	Length mm (in)	Radome OD mm (in)
*DB201-N	Omni, ground plane	406-512	0	0.0 (2.1)	360	78.0	—	—	—	<1.5:1	500	2.7 (6.0)	483 (19.0)	239 (9.4)
*DB201-P	Omni, ground plane	450-470	0	0.0 (2.1)	360	78.0	—	—	—	<1.5:1	500	2.7 (6.0)	483 (19.0)	218 (8.6)
ASP7A	Omni, ground plane	108-512	0	0.0 (2.1)	360	60.0	—	—	—	<1.5:1	100	0.4 (0.8)	660 (26.0)	12.7 (0.5)
DB630-C	Omni	450-482	0	0.0 (2.1)	360	80.0	—	—	—	<1.5:1	500	2.7 (6.0)	965 (38.0)	50.8 (2.0)
DB633-C	Omni	450-482	0	3.0 (5.1)	360	35.0	—	—	—	<1.5:1	500	3.6 (8.0)	1435 (56.5)	50.8 (2.0)
DB404-A	Omni, exposed dipole	406-420	0	3.8 (5.9)	360	27.0	—	—	—	<1.5:1	250	6.4 (14.0)	1524 (60.0)	—
DB404-B	Omni, exposed dipole	450-470	0	3.8 (5.9)	360	27.0	—	—	—	<1.5:1	250	6.4 (14.0)	1524 (60.0)	—
DB408-A	Omni, exposed dipole	406-420	0	6.6 (8.7)	360	14.0	—	—	—	<1.5:1	250	7.7 (17.0)	2870 (113.0)	—
DB408-B	Omni, exposed dipole	450-470	0	6.6 (8.7)	360	14.0	—	—	—	<1.5:1	250	7.7 (17.0)	2870 (113.0)	—
DB408-C	Omni, exposed dipole	470-488	0	6.6 (8.7)	360	14.0	—	—	—	<1.5:1	250	7.7 (17.0)	2870 (113.0)	—
DB408-D	Omni, exposed dipole	488-512	0	6.6 (8.7)	360	14.0	—	—	—	<1.5:1	250	7.7 (17.0)	2870 (113.0)	—
DB411-B	Quasi-Omni, exposed dipole	450-470	0	9.0 (11.1)	360	14.0	—	—	—	<1.5:1	250	11.3 (25.0)	2870 (113.0)	—
DB636NSE-C	Omni	450-482	0	6.0 (8.1)	360	20.0	—	—	—	<1.5:1	500	13.6 (30.0)	2870 (113.0)	76 (3.0)
DB636-C	Omni	450-482	0	6.0 (8.1)	360	20.0	—	—	—	<1.5:1	500	13.6 (30.0)	2896 (114.0)	64 (2.5)
DB638NSE-C	Omni	450-482	0	8.0 (10.1)	360	10.0	—	—	—	<1.5:1	500	18.1 (40.0)	5055 (199.0)	76 (3.0)
ASP705K	Omni	450-470	0	10.0 (12.1)	360	7.0	—	—	—	<1.5:1	500	10.0 (22.0)	5588 (220.0)	76 (3.0)
DB413-B	Quasi-Omni, exposed dipole	450-470	0	12.0 (14.1)	360	7.0	—	—	—	<1.5:1	250	14.5 (32.0)	5588 (220.0)	—
DB420-A	Omni, exposed dipole	406-420	0	9.2 (11.3)	360	7.0	—	—	—	<1.5:1	250	15.4 (34.0)	5867 (231.0)	—
DB420-B	Omni, exposed dipole	450-470	0	9.2 (11.3)	360	7.0	—	—	—	<1.5:1	250	15.6 (34.5)	5918 (233.0)	—
DB420-C	Omni, exposed dipole	470-488	0	9.2 (11.3)	360	7.0	—	—	—	<1.5:1	250	15.2 (33.5)	5766 (227.0)	—
DB420-D	Omni, exposed dipole	488-512	0	9.2 (11.3)	360	7.0	—	—	—	<1.5:1	250	14.5 (32.0)	5385 (212.0)	—
DB640NS-C	Omni	450-482	0	10.0 (12.1)	360	6.0	—	—	—	<1.5:1	500	27.2 (60.0)	7264 (286.0)	76 (3.0)

Specifications are sorted by horizontal beamwidth (HBW), length (ascending order), then tilt. All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

\*Bandwidth is only 2% of cut frequency.



- ◉ Actuator
- ◉ Controllers
- ◉ Junction Boxes
- ◉ Lightning Protection Products
- ◉ AISG Control Cables
- ◉ Grounding Kits
- ◉ Smart Bias Tees
- ◉ AISG Tower Mounted Amplifiers
- ◉ dc 2.1 Bias Tees
- ◉ Software
- ◉ RET Installation Accessories



## Teletilt® Remote Electrical Downtilt System

### Features and Benefits



● ATM200-002 Actuator



Andrew Wireless Solutions has been the world leader in engineering and deploying thousands of variable electrical downtilt base station antennas since the introduction of this technology to the wireless industry. Development of these antennas began with an innovative design known as VARI-TILT® (manual field adjustable electrical downtilt models), which evolved into today's Andrew Teletilt® remote electrical tilt (RET) antenna system.

#### Teletilt® Remote Electrical Downtilt Antenna System

Teletilt is Andrew's patented remote control system for managing AISG compatible components. Forty percent of sites audited are found to be out of specification with original site requirements on boresite and tilt angle. Using the Andrew Teletilt RET system, capacity requirements can be frequently evaluated and adjustments easily made to improve coverage. Improved network optimization translates into increased dollars on the bottom line, as well as a higher level of customer satisfaction due to better call quality.

#### Benefits Using Teletilt®

- Quickly respond to changing traffic needs and perform drive test adjustments without site downtime or costly tower climbs
- Reduce antenna inventory and decrease product obsolescence
- No specialized manpower or equipment required
- Ideal for difficult to access sites (antenna access is no longer needed)

#### Typical Applications

- Sites with a larger number of antennas, such as full three sector sites using non-duplexed antennas or multiband antennas (requiring more than one actuator per antenna)
- Customers who are specifically going to network all the control systems
- Only one cable running up the tower. Use junction boxes to break out the control cable to individual actuators
- Sites where it is desired to eliminate the AISG data cable run and utilize existing coaxial line
- Sites where operators wish to leave the controllers fixed at the cell site to allow the control system to be accessed and operated over an Ethernet connection
- Sites with AISG tower mounted amplifiers (TMAs)

#### Features

- Rugged, high performance remote control actuator
- Actuator is easily mounted onto downtilt adjustment rod below antenna; either field retrofittable or factory installed
- Male and female AISG connectors facilitate daisy chaining actuators
- Simple, easy to use control software
- Compatible with a wide selection of Andrew variable electrical downtilt antennas
- Developed in conjunction with international Antenna Interface Standards Group (AISG) guidelines
- Control system can be interfaced to a network operation center by means of Ethernet or similar connection

\*For more information contact Andrew Customer Support Center.

## Teletilt® Remote Electrical Downtilt System

### RET System Components And Complementary Products

Andrew Wireless Solutions offers a complete portfolio of Teletilt® RET system components. These products are capable of operating in either AISG 1.1 or 2.0 mode, and are compliant with both AISG and RoHS standards. Along with many next generation RET products, Andrew also carries state-of-the-art software for managing entire antenna networks remotely.



● Actuators



● Controllers



● Junction Boxes



● Lightning Protection Unit



● Cables



● Grounding Kits



● OneBase™ AISG Tower Mounted Amplifiers



● Bias Tees



● Surge Arrestors



● Software



● Diagnostic Kit

**Teletilt® Remote Electrical Downtilt System**

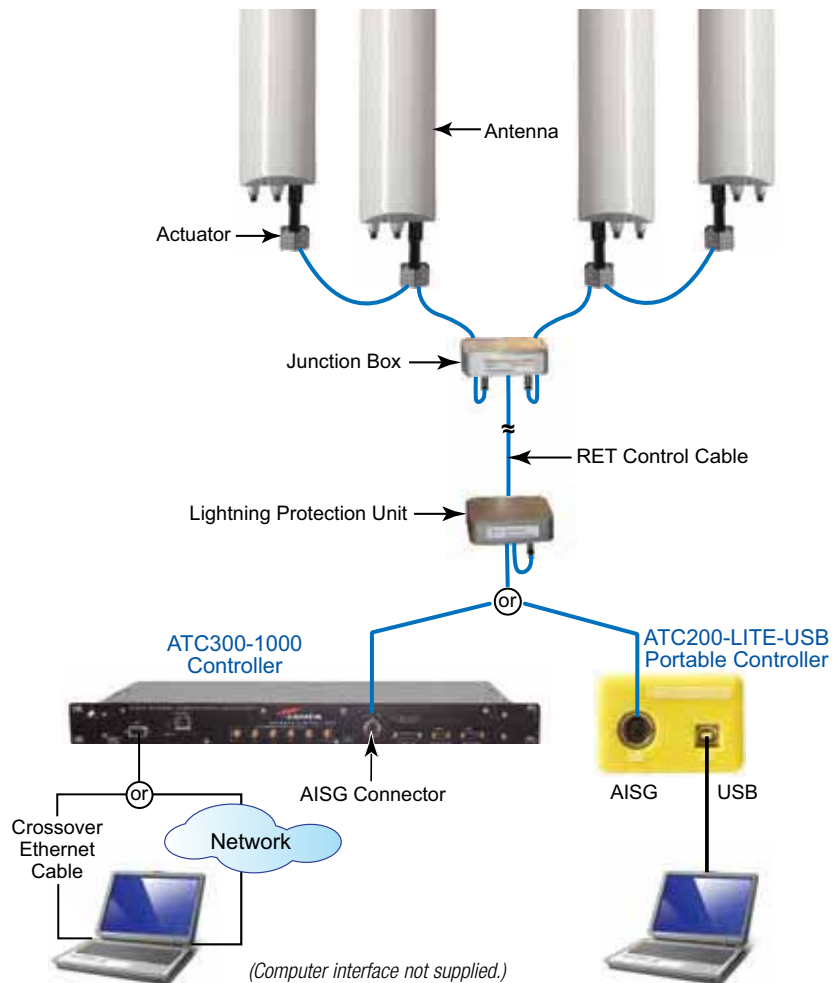
**Basic RET System**

The basic elements of a RET system are the controller and the actuator. The controller sends tilt commands to the actuators (motors) that are mounted to the bottom of an antenna. The actuator adjusts the electrical downtilt of an antenna by changing the phase shifter. RET devices, (like actuators), are connected to the controller using control cables.

Multiple actuators can be joined together either by daisy-chaining control cables or by using junction boxes.

Andrew offers both a portable and a rack mount controller for managing RET devices. The portable controller conveniently works in conjunction with a laptop for local setup and site optimization. Whereas, the rack mount controller can also be controlled locally with a laptop, it is uniquely designed for operating over a network. With the rack mount controller having access through a network, optimization adjustments can be made instantly from an office with virtually cost-free control.

**Basic RET System**



## Teletilt® Remote Electrical Downtilt System

### Actuator

#### Teletilt® ATM200-002 Actuator

The AISG-compliant ATM200-002 actuator engages the antenna downtilt rod for electrical downtilt modifications as it receives tilt commands from either the ATC300-1000 rack mount or the ATC200-LITE-USB portable controller. The controller also configures the actuator to store sector position, height, antenna type, as well as other parameters.

This actuator can be field fitted onto Andrew Teletilt RET compatible antennas that are already in service or factory fitted before delivery to the field.

With more than 200,000 actuators in service, Andrew's ATM200-002 actuator is a proven, reliable RET solution.

- Absolute position sensor eliminates calibration, enhances precision, and prevents dropped calls caused by calibration sweeps
- An LED flashes to indicate that the actuator is changing tilt
- Extensively tested and certified to contain EMI/EMC emissions, including operation near 50/60 Hz power lines
- Male and female AISG connectors facilitate daisy chaining actuators
- Operates in either AISG 1.1 or 2.0 mode

#### Electrical

Adjustment time	<15 seconds, full range
Adjustment cycles	>10,000
Power input	10–30 Vdc, compliant with AISG standard
Resolution tolerance	± 0.1° per AISG spec
Internal lightning protection	Protection rating (all lines to ground): <ul style="list-style-type: none"><li>■ IEC 61312-1 annex B current pulse profile, 10/350 µs, 10 repetitions minimum at 600 A</li></ul>
EU certification	CE, CB low voltage directive 73/23/EEC
EMC/Surge immunity	ETSI EN 300 386–V1.3.2 2003 with EN 55022 1998 schedule for class A device; GR 1089 core issue 3; FCC CFR 47 part 15 subpart B for class A; EN 61326-1, EN 55011
Safety standard	EN 60950, UL 60950

#### Connectors/Interfaces

Input port	One AISG 8-pin male, IP67, data and power
Output port	One AISG 8-pin female, IP67, data and power
Logical interface	User menu driven commands from ATC200 controller unit

#### Mechanical/Environmental

Net weight	0.53 lb (0.24 kg)
Shipping weight	0.65 lb (0.3 kg)
Dimensions	
Product—L x W x D	8 x 2.75 x 2.75 in (203 x 70 x 70 mm)
Shipping—L x W x D	9.5 x 2.5 x 2.5 in (241.3 x 63.5 x 63.5 mm)
Housing material	Durable ABS
Housing color	Black
Maximum wind speed	125 mph (201 km/h)
Temperature range	–40° C to +70° C
Humidity	Up to 100%
IP rating	IP65

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



#### ● ATM200-002

The fully AISG 2.0 compliant ATM200-002 connects to the electrical downtilt adjustment rod of a base station antenna to allow remote control downtilt.



## Teletilt® Remote Electrical Downtilt System

### Controllers

#### Teletilt® ATC300-1000 Rack Mount Controller

The ATC300-1000 controller serves as an interface between a PC or Network Control Center and remote electrical downtilt (RET) devices installed at a base station site.

This unit is equipped with an Ethernet port, as well as a 9-pin 'D' style RS-232 port. Either type of connection provides direct access to a local computer, whereas the Ethernet port allows remote access over a network or Internet connection. The controller interface is easily accessed through an Internet browser.

The ATC300-1000 Teletilt controller is uniquely designed to provide both AISG and SMB connections on the same unit. This controller supports up to 32 AISG antenna line device connections (e.g. actuators and TMAs). The SMB ports (layer one converter outputs) offer an alternative connection to transmit the AISG signals through a lower priced dc 2.1 bias tee. The ATC300-1000 is also capable of supporting new concept antennas, such as the Andrew SmartBeam™ antenna models with three types of adjustments that can be made (horizontal beamwidth, azimuth boresite, and electrical downtilt).

The ATC300-1000 controller can be mounted in a 19 in rack (only 1 rack unit), usually enclosed in an equipment cabin. When the controller is used in an outdoor environment, it must be placed in a weatherproof enclosure.

As a complimentary package, ANMS™ Site Manager software is provided with the purchase of Andrew's ATC300-1000 controller. This Antenna Network Management System (ANMS) program allows access to RET sites across the world to be managed over an Ethernet connection from any network center. With ANMS Site Manager, you have instant visual feedback of your entire network. Adjustments can be easily made to accommodate changing coverage needs to numerous RET sites at the same time without visiting the site.

Part Number	Description
ATC300-1000	Rack mount controller
Includes	1 Antenna system control unit
	1 Ethernet crossover cable
	1 RS-232 serial cable
	1 Phoenix 48 V connector, female
	1 Phoenix 24 V connector, female
	*2 Quick reference guides (User guide available online.)
	*1 Site configuration worksheet (For pads of 50 worksheets, order ATFK-Config Pad.)
	*Available at <a href="http://www.andrew.com">www.andrew.com</a> .



#### ● ATC300-1000

Communicates control signals from the bottom of the tower's base station to adjust the antenna's electrical tilt  
Visit [www.andrew.com](http://www.andrew.com) to register and receive software updates



## Teletilt® Remote Electrical Downtilt System

### Controllers

#### Electrical

Power supply	
Input	–48 Vdc; 24 Vdc
Power consumption	5 W idle state, 70 W maximum
Output	24 V, 50 W maximum
EU certification	CE, CB
EMC/Surge immunity	EN 55022, EN 55024
Safety standard	IEC 60950-1

#### Connectors/Interfaces

Serial interface	RS-232 DB9, female
LAN interface	Ethernet RJ45
AISG interface	8-pin female, IP67, data and power
dc 2.1 bias tee interface	65 SMB, female
Alarm relay	Two, normally open

#### Mechanical/Environmental

Net weight	3.5 lb (1.6 kg)
Shipping weight	4.5 lb (2.1 kg)
Dimensions	
Product—L x W x D	19 x 8.1 x 1.7 in (483 x 206.2 x 43.6 mm)
Shipping—L x W x D	21 x 12 x 6.1 in (533 x 305 x 155 mm)
Housing material	Aluminum extrusion
Housing color	Black
Mounting	19 in rack mount, 1U height
Temperature range	–20° C to +55° C, indoor use
Humidity	5 to 95%, non-condensing
IP rating	IP63, indoor and outdoor*
Altitude	–100 to +3000 m
Environmental	ETSI EN 300 019-2-2, 2-3, & 2-4; NEBS GR 63 core issue 2 2002 zone 4 Earthquake; NEBS GR 63 core issue 2 2002 § 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, & 5.7

\*Enclosure recommended for outdoor use.

#### IPV4/SNMP Command Protocol

- Read and set site tilts remotely
- Commission remote firmware upgrades
- Alarm notification, remote site maintenance, and administration web interface

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



## Teletilt® Remote Electrical Downtilt System

### Controllers

#### Teletilt® ATC200-LITE-USB Portable Controller

The ATC200-LITE-USB controller serves as an interface between a local PC and remote electrical downtilt (RET) devices, as well as SmartBeam™ antennas (with adjustable horizontal beamwidth, azimuth boresite direction, and electrical downtilt) installed at a base station site. This unit can manage up to 32 AISG device addresses, independently, with the use of multiple junction boxes. Both a USB and an RS-232 serial cable are included with this unit. With these options, the ATC200-LITE-USB controller can connect directly to a local PC through its USB or COM port (where a USB port is not available) for local access and operations.

The ATC200-LITE-USB supports AISG 1.0, 1.1, and 2.0 actuators, even in a mixed RET system.

The controller's LEDs, on the front panel of the controller, signal that power and data communication is present. The power LEDs, located nearest to the dc IN port, indicate power is supplied from the controller to the RET system. The data LED, located nearest to the RS-232 serial port, indicates data transfer between the controller and the RET devices. This unit is designed for portable use.

Part Number	Description
ATC200-LITE-USB	Portable controller
Includes	1 Antenna system control unit
	1 Power supply (3.0 A at 24 Vdc)
	4 Power adapters (Australia/Asia, Europe, UK, NA/SA)
	1 USB cable
	1 RS-232 serial cable
	*2 Quick reference guides (User guide available online.)
	*1 Site configuration worksheet (For pads of 50 worksheets, order ATFK-Config Pad.)

\*Available at [www.andrew.com](http://www.andrew.com).



#### ● ATC200-LITE-USB

Converts RS-232 signal from PC to the RS-485 signal that controls the tilt commands in a remote control actuator. Visit [www.andrew.com](http://www.andrew.com) to register and receive software updates.



A photograph showing the Teletilt Remote Electrical Downtilt System components. On the left is a gray cylindrical controller. In the center is a white electrical panel with two outlets and a cable plugged into one. On the right is a black cable with a connector. A red banner at the bottom of the image contains the text "Teletilt® Remote Electrical Downtilt System".

## Teletilt® Remote Electrical Downtilt System

### Controllers

#### Electrical

Power supply	
Input	110/240 Vac
Output	2.5 A at 24 Vdc
Approvals	
Power converter	UL, CE, FCC
Interface	CE, CB IC 60950-1:2001

#### Connectors/Interfaces

Computer interface	
USB	Cable connects to controller and USB port on PC
Serial	RS-232 9-pin D cable assembly connects between adapter and PC
Power supply interface	dc jack, 3.0A maximum
AISG interface	8-pin DIN style, female, IP67, data and power

#### Mechanical/Environmental

Net weight	0.9 lb (0.4 kg)
Shipping weight	4.85 lb (2.22 kg)
Dimensions	
Product—L x W x D	5 x 3 x 2 in (127 x 76 x 51 mm)
Shipping—L x W x D	12.625 x 8.75 x 2.5 in (321 x 222 x 64 mm)
Housing material	Aluminum
Housing color	Gray; yellow casing
Temperature range	-40° C to +55° C, portable indoor use
Humidity	Up to 95% non-condensing

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

**Teletilt® Remote Electrical Downtilt System**
**Junction Boxes**


● **ATJB200-A01-004**



● **ATJB200-A01-007**

Divides data and power on main RET cable from ATC200 series control units to additional junction boxes or ATM200 series actuators

**Teletilt® ATJB200-A01 Series Junction Boxes**

The ATJB200-A01-004 (4-way) and ATJB200-A01-007 (7-way) junction boxes serve as a hub to connect up to 32 actuators to a Teletilt controller and provide lightning protection. Various configurations can be achieved to reduce the number of RET control cables needed to provide data and power service to the RET devices on a site.

The 4-way model is equipped with four female output ports and the 7-way model is equipped with seven female output ports. Both models are equipped with one male input port. Mounting brackets are included with both models to allow these units to be mounted to either a pole or to a flat surface. Grounding is required; therefore a grounding cable is also included in each junction box.

Part Number	Description
ATJB200-A01-004	4-way junction box
ATJB200-A01-007	7-way junction box
Includes	1 Junction box
	1 Pipe bracket
	1 Band clamp
	2 Wall brackets
	2 M8 carriage bolts, stainless steel, 25 mm long
	2 M8 hex nuts, stainless steel
	2 M8 lock washers, stainless steel
	1 Ground cable (#6 AWG with lugs), 2 ft (610 mm)
	1 Installation bulletin



## Teletilt® Remote Electrical Downtilt System

### Junction Boxes

#### Electrical

Internal lightning protection	Gas discharge tube to ground protection: REA PE-80 compliant per test method IEEE C62.31 protection rating (all lines to ground): <ul style="list-style-type: none"><li>■ IEEE C62.41.2 § 6.1.2 current pulse profile, 8/20 µs, 200 repetitions minimum at 600 A</li><li>■ IEC 61312-1 annex B current pulse profile, 10/350 µs, 10 repetitions minimum at 600 A</li></ul>
EU certification	CE, CB; low voltage directive 73/23/EEC
EMC/Surge immunity	ETSI EN 300 386–V1.3.2 2003 with EN 55022 1998 schedule for class A device; GR 1089 core issue 3; FCC CFR 47 part 15 subpart B for class A; EN 61326-1, EN 55011
Safety standard	EN 60950, UL 60950

#### Connectors/Interfaces

Input port	One AISG 8-pin male, IP67, data and power
Output ports	
4-way model	Four AISG 8-pin female, IP67, data and power
7-way model	Seven AISG 8-pin female, IP67, data and power
Grounding lug	M8

#### Mounting

Mounting type	Vertical pipe mount or wall/flat surface mount, included
Pipe diameter	2 to 4.5 in (51 to 114 mm)
Mount material	Stainless steel

#### Mechanical/Environmental

Net weight	
4-way model	2.2 lb (1.0 kg)
7-way model	2.35 lb (1.07 kg)
Shipping weight	
4-way model	4 lb (1.82 kg)
7-way model	4.15 lb (1.89 kg)
Dimensions	
Product—L x W x D	7.3 x 6.2 x 2 in (185 x 158 x 51 mm)
Shipping—L x W x D	11 x 10.25 x 5.5 in (279 x 260 x 140 mm)
Housing material	Aluminum
Housing color	Gray
Maximum wind speed	125 mph (201 km/h)
Temperature range	–40° C to +65° C
Humidity	Up to 100%
IP rating	IP65
Specifications	IEC-68, ETSI 300-019
Environmental	ETSI EN 300 019-2-2, 2-3, & 2-4; NEBS GR 63 core issue 2 2002 zone 4 earthquake; NEBS GR 63 core issue 2 2002 § 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, & 5.7

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

**Teletilt® Remote Electrical Downtilt System**

**Lightning Protection Unit**



**ATLP200-001**

Lightning protection for ATC200 series remote control variable electrical downtilt system

**Teletilt® ATLP200-001 Lightning Protection Unit**

The ATLP200-001 lightning protection unit provides added protection to all Teletilt system components. This unit is designed to withstand a short circuit current level of 10/350  $\mu$ s, 16kA (line to ground; per IEC 61312-1 standard). It is equipped with a grounding nut and must be grounded (ground cable included). Its 8-pin male and female AISG interfaces feed data and power through the controller to the first junction box, actuator/RET (remote electrical downtilt) device.

Mounting brackets are included to allow the ATLP200-001 lightning protection unit to be mounted to either a pole or a flat surface.

Part Number	Description
ATLP200-001	Lightning protection unit
Includes	<ul style="list-style-type: none"> <li>1 Pipe bracket</li> <li>1 Band clamp</li> <li>2 Wall bracket</li> <li>2 M8 carriage bolt, stainless steel, 25mm long</li> <li>2 M8 hex nut, stainless steel</li> <li>2 M8 lock washer, stainless steel</li> <li>1 Ground cable (#6 AWG with lugs), 2 ft (610 mm)</li> <li>1 Installation bulletin</li> </ul>

Note: Mounting brackets are included to allow the ATLP200-001 lightning protection unit to be mounted to either a pole or a flat surface.

**Electrical**

Internal lightning protection	Gas discharge tube to ground protection: REA PE-80 compliant per test method IEEE C62.31 Transorb and varistor secondary protection stage Protection rating (all lines to ground): <ul style="list-style-type: none"> <li>■ IEEE C62.41.2 § 6.1.2 current pulse profile, 8/20 <math>\mu</math>s, 200 repetitions min. at 600 A</li> <li>■ IEC 61312-1 annex B current pulse profile, 10/350 <math>\mu</math>s, 10 repetitions min. at 600 A</li> </ul>
Overcurrent protection	PTC fuse
Circuit insertion resistance	Signal lines: under 1.0 ohm Power lines: under 0.5 ohm
Protected side clamping, nominal voltage	RS-485 lines: $\pm$ 10 V +12 V: +17 V to -0.6 V +24 V: +28 V to 0.6 V -48 V: +0.6 V to -58 V
EU certification	CE, CB; low voltage directive 73/23/EEC
EMC/Surge immunity	ETSI EN 300 386-V1.3.2 2003 with EN 55022 1998 schedule for class A device; GR 1089 core issue 3; FCC CFR 47 part 15 subpart B for class A; EN 61326-1, EN 55011
Safety standard	EN 60950, UL 60950



## Teletilt® Remote Electrical Downtilt System

### Lightning Protection Unit

#### Connectors/Interfaces

Input port	One AISG 8-pin male, IP67, data and power
Output port	One AISG 8-pin female, IP67, data and power
Grounding lug	M8

#### Mounting

Mounting type	Vertical pipe mount or wall/flat surface mount, included
Pipe diameter	2 to 4.5 in (51 to 114 mm)
Mount material	Stainless steel

#### Mechanical/Environmental

Net weight	2.05 lb (0.93 kg)
Shipping weight	3.9 lb (1.8 kg)
Dimensions	
Product—L x W x D	7.3 x 6.2 x 2 in (185 x 158 x 51 mm)
Shipping—L x W x D	11 x 10.25 x 5.5 in (279 x 260 x 140 mm)
Housing material	Aluminum
Housing color	Gray
Maximum wind speed	125 mph (201 km/h)
Temperature range	-40° C to +65° C
Humidity	Up to 100%
IP rating	IP65
Specifications	IEC-68, ETSI 300-019
Environmental	ETSI EN 300 019-2-2, 2-3, & 2-4; NEBS GR 63 core issue 2 2002 zone 4 earthquake; NEBS GR 63 core issue 2 2002 § 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, & 5.7

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

**Teletilt® ATCB-B01 Series AISG RET Control Cable**

The ATCB-B01 series control cabling is used to feed data and power from the controller to the Teletilt RET system components. These cables are available in various lengths ranging from 0.50 m to 60 m. Each cable is terminated with male and female connectors, which allows them to be linked together to meet a required length.

Andrew recommends grounding the RET control cable at the top of the tower, using the ATJB200 series junction box. An ATLP200-001 lightning protection unit should be used at the bottom of the tower to ground the RET control cable. In addition, Andrew recommends using an ATGK-001 grounding kit for runs over 60 m and at 60 m intervals. This grounding kit clamps onto the connectors, where 2 cables are joined together. As an example, the ATGK-001 would be used where a 40 m and a 30 m RET cable are joined to make a 70 m run.

Kits are available that contain two cables and one ATGK-001 grounding kit. These kits are offered with total cable lengths of 70, 80, 90, and 100 meters.

The ATCB-B01 series control cabling is compliant with AISG and RoHS standards.



● **ATCB-B01 Series**

Available in lengths ranging from 0.5 m–60 m, with flame retardant polyurethane (PUR) jacket

## Teletilt® Remote Electrical Downtilt System

### Control Cables

#### Cable Assemblies

Part Number	Description	Length, m (ft)
ATCB-B01-C50	Cable assembly	0.5 (1.6)
ATCB-B01-001	Cable assembly	1 (3.3)
ATCB-B01-002	Cable assembly	2 (6.6)
ATCB-B01-003	Cable assembly	3 (9.8)
ATCB-B01-004	Cable assembly	4 (13.1)
ATCB-B01-005	Cable assembly	5 (16.4)
ATCB-B01-006	Cable assembly	6 (19.7)
ATCB-B01-009	Cable assembly	9 (29.5)
ATCB-B01-010	Cable assembly	10 (32.8)
ATCB-B01-015	Cable assembly	15 (49.2)
ATCB-B01-020	Cable assembly	20 (65.6)
ATCB-B01-030	Cable assembly	30 (98.4)
ATCB-B01-040	Cable assembly	40 (131.2)
ATCB-B01-050	Cable assembly	50 (164.0)
ATCB-B01-060	Cable assembly	60 (196.9)

#### Electrical

Ratings:	300 V (max.)
EU certification:	CE, CB
Environmental:	ETSI EN 300 019-2-2, 2-3, & 2-4; NEBS GR 63 core issue 2 2002 zone 4 earthquake; NEBS GR 63 core issue 2 2002 § 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, & 5.7

#### Mechanical/Environmental

Standard length, m:	.5, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 9.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0, 60.0
Jacket:	Flame retardant, Polyurethane
Temperature range:	-40° C to +70° C
Humidity:	Up to 100%
IP rating:	IP67, mated and unmated

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

#### Notes:

1. The main control cable, feeding to the tower structure, should be secured at 2m intervals and 1m from either end using cableties (Andrew 40417), hangers (Andrew 68MCLICK), or similar fasteners. Control cabling feeding between junction boxes and actuators should be secured every 0.5m to avoid excessive wind vibration.
2. Connectors should only be hand tightened. Over tightening can shear pins off internal components of equipment.
3. Connectors do not require waterproofing.
4. Maximum distance from control unit to farthest AISG component in a RET system should not exceed 200m.

#### Cable Kit Assemblies

Part Number	Description	Length, m (ft)
ATCB-B01-070K	ATCB-B01-030 (1) and ATCB-B01-040 (1) cables, plus ATGK-001 grounding kit	70 (229.7)
ATCB-B01-080K	ATCB-B01-040 (2) cables, plus ATGK-001 grounding kit	80 (262.5)
ATCB-B01-090K	ATCB-B01-040 (1) and ATCB-B01-050 (1) cables, plus ATGK-001 grounding kit	90 (295.3)
ATCB-B01-100K	ATCB-B01-050 (2) cables, plus ATGK-001 grounding kit	100 (328.1)

#### Cable and Connectors

Cable spec:	4 x 0.75mm <sup>2</sup> (20 AWG) stranded (power) 2 x 0.25mm <sup>2</sup> (24 AWG) twisted pair (data) 6 conductor cable, 6.6mm (0.26") diameter
Screen:	~85% coverage, braid-type shield
Connectors/interfaces:	Terminated with AISG 8-pin socket screw lock, IP67 male and female DIN





**Teletilt® Remote Electrical Downtilt System**

**Grounding Kits**



● **ATGK-001**  
Provides grounding for RET control cable

**Teletilt® ATGK-001 RET Control Cable Grounding Kit**

The ATGK-001 grounding kit is designed to capture and ground the cables at the junction where two cables are daisy-chained. This means that for a 120 m run, you will use two 60 m cables (ATCB-B01-060) with the ATGK-001 grounding kit in the middle.

Andrew's AISG RET control cables are rated for 16 kA surge capacity, 10/350 µs profile. As part of a system, Teletilt® cabling requires grounding and line protection at the top and bottom of the tower through the use of an ATLP200-001 lightning protection unit or ATJB200-A01 series junction box. Andrew also recommends the use of the ATGK-001 grounding kit for every 60 m of AISG RET control cable run.

Part Number	Description
ATGK-001	RET control cable grounding kit
Includes	1 Grounding bracket assembly with band clamp
	1 Grounding cable with lugs
	1 DEHN grounding clamp
	1 Roll of 0.75 in x 66 ft electrical tape

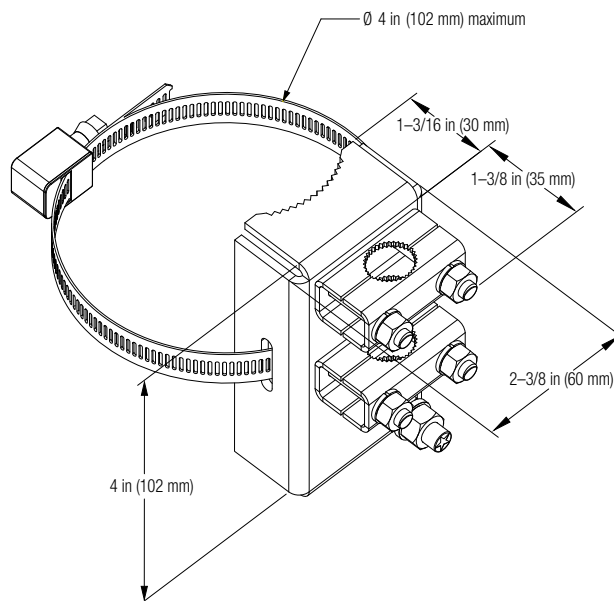
**Electrical**

Surge	>30 kA 8/20 ms
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**Mechanical/Environmental**

Net weight	0.65 lb (0.28 kg)
Shipping weight	1.75 lb (0.8 kg)
Shipping dimensions	
-L x W x D	7 x 6.75 x 6.75 in (178 x 172 x 172 mm)
Clamp diameter	
Maximum	4 in (102 mm)
Minimum	2 in (51 mm)
Grounding cable	
Nominal	0.197 in (16 mm)
Length	24 in (610 mm)

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most up-to-date information.



## Teletilt® Remote Electrical Downtilt System

### Grounding Kits

#### Teletilt® 602299 RET Component Grounding Kit

Recommended for use with RET system equipment to provide protection against lightning damage.

Part Number	Description
602299	RET component grounding kit
Includes	1 Ground cable (#6 AWG with lugs), 2 ft (610 mm)
	4 Spacers
	3 M10 split lockwashers
	1 12 in rubber mastic tape (black butyl)
	1 DEHN grounding clamp #390 259 stainless steel
	2 M10 x 1.5, 25 mm long, hex head cap screws
	2 M10 hex nuts
	1 Electrical tape
	1 Installation bulletin



#### 602299

Provides lightning protection for Teletilt® RET equipment

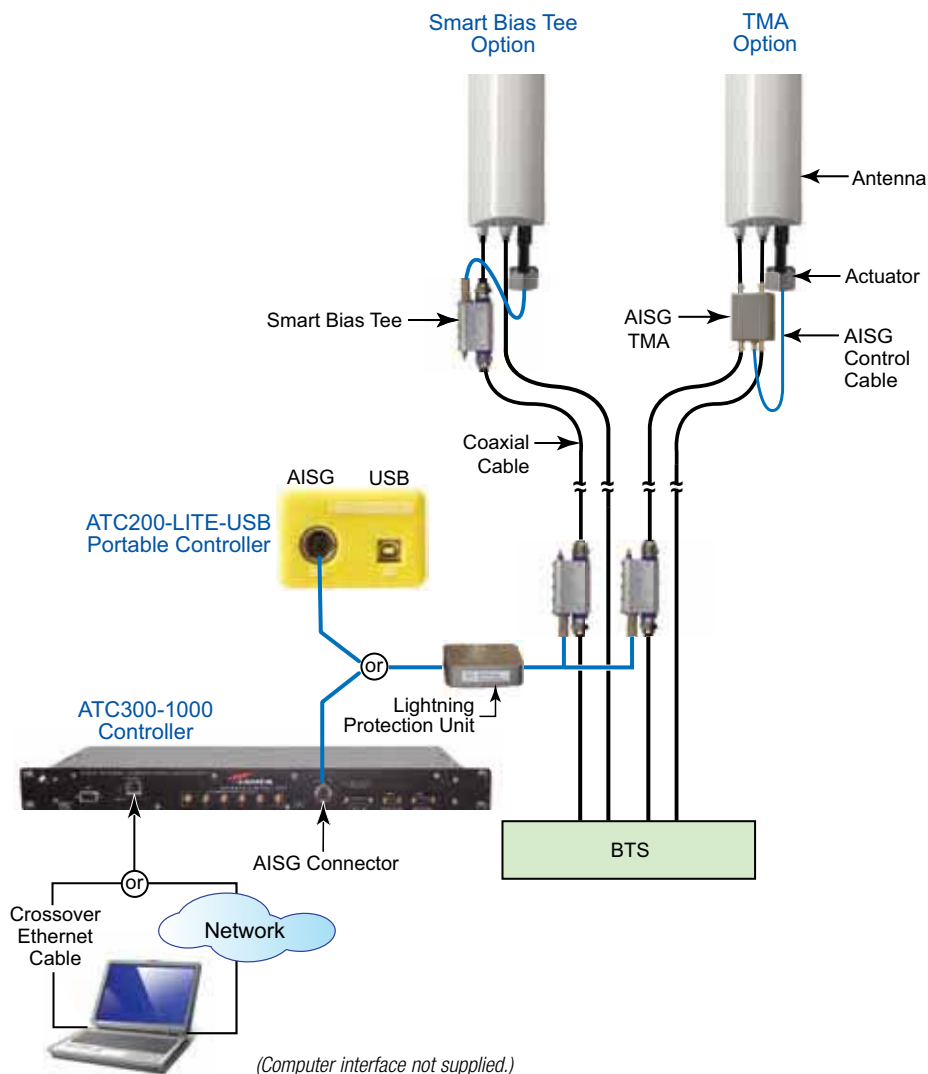
**Teletilt® Remote Electrical Downtilt System**

**RET System With Smart Bias Tees**

Instead of a home run control cable up the height of a tower or building, the AISG signals can be injected (piggy-backed) into the existing RF cable by using smart bias tees. For this to be done, a smart bias tee is installed at the bottom of the antenna line devices and modulates the AISG signals into the RF cable.

There are two options that can be used for dividing out the AISG signal from the RF cable into control cables leading to the antenna line devices at the top of the site. One option is to use a second smart bias tee at the top. The AISG port on that smart bias tee can be connected to a junction box, actuator, or any other RET device. A second option is to use an AISG tower mounted amplifier (TMA), which also has an AISG port for connecting to any RET devices.

**RET System Using AISG Port on ATC300-1000 with Either Smart Bias Tees or an AISG TMA at the Top**



## Teletilt® Remote Electrical Downtilt System

### Smart Bias Tees

#### ATBT-S Series Teletilt® Smart Bias Tees

The AISG smart bias tee is designed to eliminate the long AISG data cable run from the base to the top of a cell site tower by electronically injecting (piggy-backing) power and control signals onto an existing RF coaxial cable run.

Each unit is equipped with a grounding stud that requires a grounding kit (ordered separately, part number 602299) to provide additional lightning protection. These smart bias tees are RoHS and AISG compliant.

Part Number	Description
ATBT-S525	24 V Bottom smart bias tee
ATBT-S526	24 V Bottom smart bias tee
ATBT-S522	24 V Top smart bias tee
ATBT-S508	12 V Bottom smart bias tee
ATBT-S511	12 V Bottom smart bias tee
ATBT-S509	12 V Top smart bias tee



#### ● ATBT-S Series

Eliminates the long AISG RET control cable by feeding power and data signals along the existing RF coaxial cable

#### Electrical

Support	Up to 32 devices
Frequency range	800–960 MHz and 1710–2170 MHz
Insertion loss	
Port 1 and 2	<0.1 dB
Isolation for dc/RET data signals	Per AISG standard
Impedance	50 ohms
VSWR	≤1.15:1
Intermodulation	≤−160 dBc (3rd order; 2 x 20 W)
Surge Protection (Port 1)	10 kA (8/20 μs)
EMC	IEC 61000-6-4, IEC 61000-6-2

#### Mechanical/Environmental

Net weight	0.66 kg (1.46 lbs)
Dimensions (base), L x W x D	3.86" x 2.72" x 1.97" (98 x 69 x 50 mm)
Temperature range	−40° C to +60° C
IP rating	IP67, indoor and outdoor
Grounding lug	M6
Mounting hole	M6–7 deep

#### Connectors/Interfaces

24 V Models	ATBT-S525, Bottom Unit	ATBT-S526, Bottom Unit	ATBT-S522, Top Unit
Port 1 (RF/dc/data)	7–16 DIN, female	7–16 DIN, male	7–16 DIN, male
Port 2 (RF/dc blocked)	7–16 DIN, male	7–16 DIN, female	7–16 DIN, female
Port 3 (dc/data)	AISG 8-pin, male (IEC 60130-9-Ed.3.0)	AISG 8-pin, male (IEC 60130-9-Ed.3.0)	AISG 8-pin, female (IEC 60130-9-Ed.3.0)
Input Power (max), Ports 1 and 2	750 W at 850 MHz CW	750 W at 850 MHz CW	750 W at 850 MHz CW
Input Power (max), Port 3	10 V to 30 V (1500 mA)	19 V to 30 V (1500 mA)	10 V to 30 V (1500 mA)
12 V Models	ATBT-S 508, Bottom Unit	ATBT-S511, Bottom Unit	ATBT-S509, Top Unit
Port 1 (RF/dc/data)	7–16 DIN, female	7–16 DIN, male	7–16 DIN, female
Port 2 (RF/dc blocked)	7–16 DIN, male	7–16 DIN, female	7–16 DIN, male
Port 3 (dc/data)	AISG 8-pin, male (IEC 60130-9-Ed.3.0)	AISG 8-pin, male (IEC 60130-9-Ed.3.0)	AISG 8-pin, female (IEC 60130-9-Ed.3.0)
Input power (max.), Ports 1 and 2	750 W at 850 MHz CW	750 W at 850 MHz CW	750 W at 850 MHz CW
Input power (max.), Port 3	10 V to 15 V (3500 mA)	10 V to 15 V (3500 mA)	10 V to 15 V (3500 mA)

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



**Teletilt® Remote Electrical Downtilt System**

**OneBase™ Tower Mounted Amplifiers**



● **PCS Twin AISG TMA**



● **AWG Twin AISG TMA**



● **AWS and PCS Dual Band AISG TMA**

The OneBase™ family of Andrew Wireless Solutions AISG tower mounted amplifiers can be used at the top of an Andrew Teletilt RET system in the same way a smart bias tee is used. Similar to a smart bias tee, the AISG tower mounted amplifier (TMA) extracts the AISG signal and dc power from the coaxial cable run and delivers it to the antenna RET line devices through its AISG interface. OneBase TMAs offer several RF path advantages, such as:

- Optimizes network performance
- Enhances coverage, capacity, and signal quality with improved voice clarity and data speed
- Improves uplink performance, which ensures optimum coverage of fringe areas, weak spots, and indoor locations
- Guarantees improved sensitivity to reduce dropped calls and failed connection attempts
- Provides lower handset output to extend talk time and reduce interference in GSM/EDGE, UMTS, and CDMA systems
- Installs easily in any wireless system

Select from two full band twin AISG TMA models (E15S09P94 for PCS or E15S08P80 for AWS), as well as Andrew's dual band TMA (E15S08P78) that provides full band operation for both PCS and AWS bands. Each model is enclosed in a self-contained body that is engineered to ensure the highest reliability in severe environments, while featuring a very compact size and attractive appearance.

**Key features include:**

- 12 dB gain
- Full band operation
- AISG compatible
- RET antenna port
- Multi-stage lightning protection
- Sealed to protection class IP67
- In-line connectors
- Fail safe LNA bypass
- VSWR monitoring alarm
- Automatic dc switching
- Conventional PDU compatible
- Pole mounting hardware included
- Field upgradeable firmware

## Teletilt® Remote Electrical Downtilt System

### OneBase™ Tower Mounted Amplifiers

#### Single Band TMA

Model	E15S08P80	E15S09P94
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#### Electrical, Uplink

Frequency range	1710–1755 MHz	1850–1910 MHz
Gain	12 ± 0.6 dB	12 ± 1.0 dB
Total group delay (maximum)	40 ns	150 ns
Delay variation—any 5 MHz BW (maximum)	10 ns	50 ns
Delay variation—any 240 MHz BW (maximum)	—	10 ns
Noise figure—mid band (minimum)	1.1 dB	1.2 dB
Noise figure—full band (maximum)	1.6 dB	2.0 dB
Return loss (minimum)	18 dB	18 dB
Output IP3 (typical)	+ 22 dBm	+ 26 dBm

#### Electrical, Downlink

Frequency range	2110–2155 MHz	1930–1990 MHz
Insertion loss (typical)	0.15 dB	0.4 dB
Insertion loss (maximum)	0.3 dB	0.7 dB
Group delay (maximum)	10 ns	50 ns
Delay variation—any 5 MHz BW (maximum)	2 ns	15 ns
Return loss (minimum)	18 dB	18 dB
Intermodulation at antenna port	≤−165 dBc (3rd order; 2 x 20 W)	≤−150 dBc (3rd order; 2 x 20 W)
Power handling—operational	± 53 dBm (200 W)	± 57 dBm (500 W)
Power handling—survival	± 57 dBm (500 W)	± 67 dBm (5000 W)

#### AISG

Protocol	AISG 1.1 or 2.0	AISG 1.1 or 2.0
RET antenna support	24 Vdc and RS-485	24 Vdc and RS-485

#### VSWR Alarm

Alarm threshold—return loss	<9.54 ± 2 dB	<9.54 ± 2 dB
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#### Power

Power supply voltage	7–30 Vdc	7–30 Vdc
Operating current @ 12 V	130 ± 20 mA	130 ± 20 mA
Operating current @ 15 V	105 ± 20 mA	105 ± 20 mA
Operating current @ 24 V	70 ± 15 mA	70 ± 15 mA
Failure current consumption @ 10–18 V	190 ± 10 mA	190 ± 10 mA

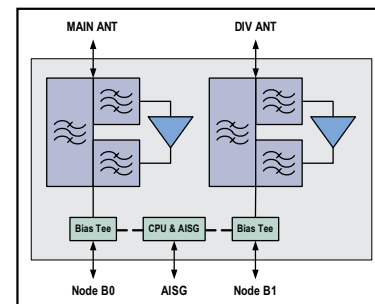
#### Mechanical

Weight without mounting brackets	5.0 kg (11.0 lb)	6.7 kg (14.8 lb)
Dimensions—H x D x W	160 x 196 x 78 mm (6.3 x 7.7 x 3.0 in)	260 x 170 x 95 mm (10.2 x 6.7 x 3.7 in)
Finish	Gray paint	Gray paint
Connectors, RF	7–16 DIN, female (longneck)	7–16 DIN, female (longneck)
Connector, AISG	8-pin circle, IEC 60130	8-pin circle, IEC 60130
Ground screw diameter	1/4 in	1/4 in
Operating temperature range	−40° C to +65° C	−40° C to +65° C
Ingress protection	IP67	IP67
Lightning protection, antenna port	dc ground	dc ground
Lightning protection, BTS port	20 kA, 8/20 waveform	20 kA, 8/20 waveform

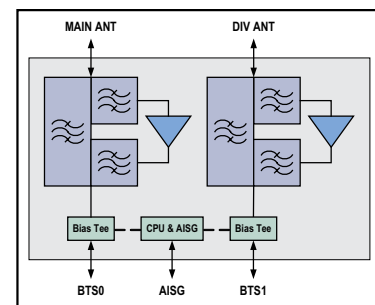
#### Ordering Option For TMA With Accessories

Model	ETW200VS12UB	ETW190VS12UB
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All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



● E15S08P80 Block Diagram



● E15S09P94 Block Diagram



## Teletilt® Remote Electrical Downtilt System

### OneBase™ Tower Mounted Amplifiers

#### Dual Band TMA

Model	E15S08P78	E15S08P78
<b>Electrical, Uplink</b>		
Frequency range	<b>1710–1755 MHz</b>	<b>1850–1910 MHz</b>
Gain	12 ± 1.0 dB	12 ± 1.0 dB
Total group delay (maximum)	40 ns	150 ns
Delay variation—any 5 MHz BW (maximum)	8 ns	55 ns
Group delay distortion—any 240 MHz BW (maximum)	–	10 ns
Noise figure—mid band (minimum)	1.2 dB	1.35 dB
Noise figure—full band (maximum)	1.6 dB	2.1 dB
Return loss (minimum)	18 dB	18 dB
Output IP3 (typical)	+ 22 dBm	+ 22 dBm

#### Electrical, Downlink

	<b>2110–2155 MHz</b>	<b>1930–1990 MHz</b>
Frequency range	<b>2110–2155 MHz</b>	<b>1930–1990 MHz</b>
Insertion loss (typical)	0.22 dB	0.6 dB
Insertion loss (maximum)	0.3 dB	0.7 dB
Group delay (maximum)	15 ns	55 ns
Delay variation—any 5 MHz BW (maximum)	8 ns	18 ns
Return loss (minimum)	18 dB	18 dB
Intermodulation at antenna port (typical)	≤–155 dBc (3rd order; 2 x 20 W)	≤–155 dBc (3rd order; 2 x 20 W)
Power handling—operational	± 53 dBm (200 W)	± 53 dBm (200 W)
Power handling—survival	± 57 dBm (500 W)	± 57 dBm (500 W)

#### AISG

Protocol	AISG 1.1 or AISG 2.0
RET antenna support	24 Vdc and RS-485

#### VSWR Alarm

VSWR alarm threshold—return loss	<9.54 ± 2 dB
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#### Power

Power supply voltage	7–30 Vdc
Operating current @ 12 V	130 ± 20 mA
Operating current @ 15 V	105 ± 20 mA
Operating current @ 24 V	70 ± 15 mA
Failure current consumption @ 10–18 V	190 ± 10 mA

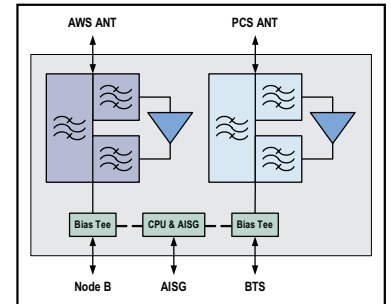
#### Mechanical

Weight without mounting brackets	6.3 kg (13.9 lb)
Dimensions—H x D x W	238 x 186 x 90 mm (9.4 x 7.3 x 3.5 in)
Finish	Gray paint
Connectors, RF	7–16 DIN, female (longneck)
Connector, AISG	8-pin circle, IEC 60130
Ground screw diameter	1/4 in
Operating temperature range	–40° C to +65° C
Ingress protection	IP67
Lightning protection, antenna port	dc ground
Lightning protection, BTS/Node B port	20 kA, 8/20 waveform

#### Ordering Option For TMA With Accessories

Model	<b>ETT19V2S12UB</b>
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All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



● E15S08P78 Block Diagram



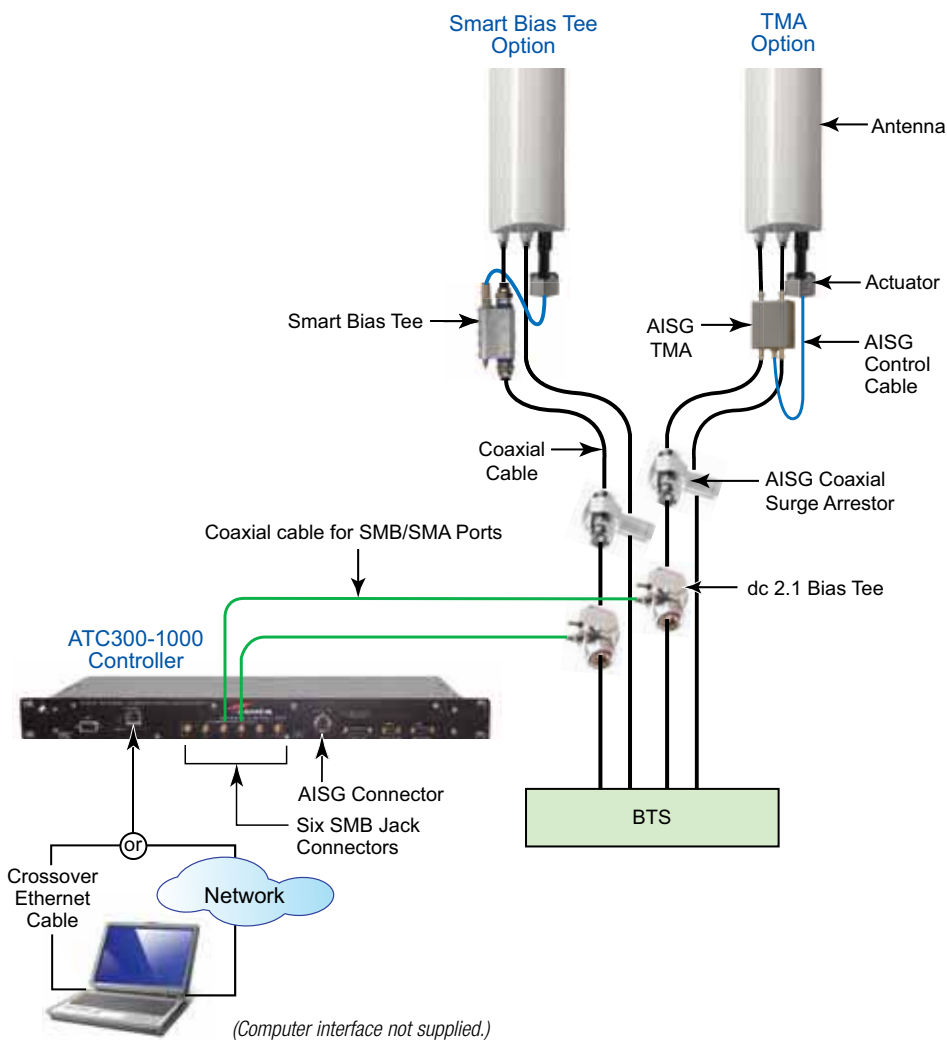
## Teletilt® Remote Electrical Downtilt System

### RET System With Smart Bias Tees Using SMB Ports

The Teletilt ATC300-1000 rack mount controller provides an additional option for injecting the AISG signal into the RF cable. The new family of dc 2.1 bias tees are used as an alternative to smart bias tees when using the SMB ports on the controller instead of the AISG connection.

There are two options that can be used for dividing out the AISG signal from the RF cable into control cables leading to the antenna line devices at the top of the site. One option is to use a smart bias tee at the top. The AISG port on that smart bias tee can be connected to a junction box, actuator, or any other RET device. A second option is to use an AISG tower mounted amplifier (TMA), which also has an AISG port for connecting to any RET devices.

### RET System Using SMB Ports on ATC300-1000 with Either a Smart Bias Tee or an AISG TMA at the Top

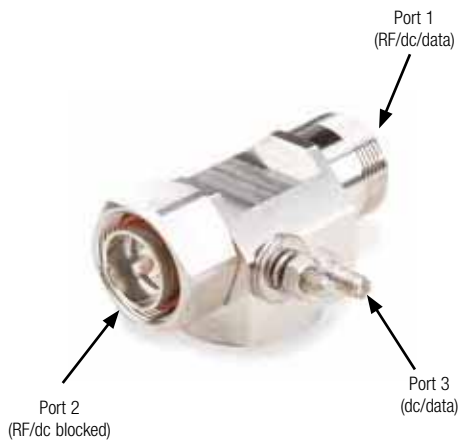


## Teletilt® Remote Electrical Downtilt System

### dc 2.1 Bias Tees

#### ABT-DMDF-ADBA and ABT-DFDM-ADBA dc 2.1 Bias Tees

AISG signals and dc power can be injected onto a coaxial cable run that feeds up a site, using a combination of the cost efficient ABT series dc 2.1 bias tees and an SMB port on the ATC300-1000 Teletilt controller. The SMB ports (also known as layer one converter connections) on the controller modulate the AISG signal, similar to what is done by a smart bias tee used at the bottom of a tower. With the signal pre-modulated by the controller connection, the ABT series dc 2.1 bias tee can be easily used in place of a smart bias tee at the bottom of the tower.



● **ABT-DFDM-ADBA**

#### Electrical

Frequency range	698–960 MHz and 1710–2180 MHz
AISG frequency	2.0–2.3 MHz
Insertion loss, typical	0.10 dB
Isolation for dc/RET data signals	50 dB
Impedance	50 ohms
Peak power, maximum	12 kW
Average power	500 W @ 883 MHz and 350 W @ 1940 MHz (combined)
Intermodulation	<–159 dBc (3rd order; 2 x 20 W)
Lightning protection capability	10 times @ 6kA

#### Connectors/Interfaces

24 V Models	ABT-DFDM-ADBA, Bottom Unit	ABT-DMDF-ADBA, Bottom Unit
Port 1 (RF/dc/data)	7–16 DIN, female	7–16 DIN, male
Port 2 (RF/dc blocked)	7–16 DIN, male	7–16 DIN, female
Port 3 (dc/data)	SMA, female	SMA, female

#### Mechanical

Net weight	0.52 kg (1.14 lb)
Dimensions, L x W x D	82 x 40 x 42 mm (3.2 x 1.6 x 1.7 in)
Temperature range	–40° C to +65° C
IP rating	IP68
Grounding lug	M6 x 1.0

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

## Teletilt® Remote Electrical Downtilt System

### Surge Arrestors

#### APTDC-BDFDF-DB and APTDC-BDFDM-DB Arrestor Plus® Surge Arrestors

APTDC series surge arrestors protect RET site components in the BTS from damage due to lightning strikes or power surges. The APTDC-BDFDF-DB and APTDC-BDFDM-DB surge arrestors are also designed to allow AISG signals to pass through the coaxial cable to a top smart bias tee or AISG tower mounted amplifier. These surge arrestors can be used with a dc 2.1 bias tee or a smart bias tee located at the bottom of the tower.

#### Electrical

Model	APTDC-BDFDF-DB	APTDC-BDFDM-DB
Regulatory compliance	AISG Compliant	AISG Compliant
Frequency range	806–960 and 1710–2170 MHz	806–960 and 1710–2170 MHz
Return loss		
1.0–5.0 MHz	22.0 dB	22.0 dB
2.0–2.3 MHz	25.0 dB	25.0 dB
806–960 MHz	26.0 dB	24.0 dB
1710–2000 MHz	26.0 dB	24.0 dB
2000–2170 MHz	26.0 dB	24.0 dB
Intermodulation	≤–150 dBc (3rd order; 2 x 20 W)	≤–150 dBc (3rd order; 2 x 20 W)
Average power	3000 W	3000 W
Connector impedance	50 ohms	50 ohms
Gas tube voltage	350 V	350 V
Lightning strike capability	10 times @ 30 kA, 8/20 waveform	10 times @ 30 kA, 8/20 waveform
Lightning strike capability test method	IEEE C62.42-1991	IEEE C62.42-1991
Peak power, maximum	40 kW	40 kW
Insertion loss, typical	0.05 dB	0.07 dB

#### Mechanical

	APTDC-BDFDF-DB	APTDC-BDFDM-DB
Interface 1	7-16 DIN female bulkhead	7-16 DIN female bulkhead
Interface 2	7-16 DIN female	7-16 DIN male
Weight	0.64 kg (1.41 lb)	0.60 kg (1.32 lb)
Height	81.03 mm (3.19 in)	87.88 mm (3.46 in)
Length	87.88 mm (3.46 in)	87.88 mm (3.46 in)
Width	41.91 mm (1.65 in)	41.91 mm (1.65 in)

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



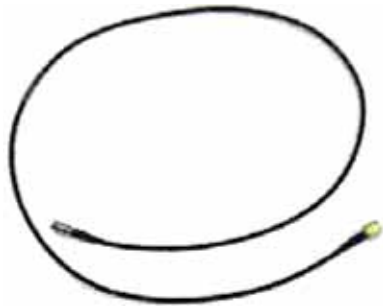
● APTDC-BDFDF-DB

**Teletilt® Remote Electrical Downtilt System**

**Coaxial Cable for SMA to SMB Connection**

**C100-PSMSB-M8**

The Andrew C100-PSMSB-M8 braided coaxial cable provides a connection between an SMB port on the ATC300-1000 Teletilt controller and the SMA port of an ABT series dc 2.1 bias tee. Please contact Andrew Wireless Solutions for additional lengths.



● C100-PSMSB-M8

**Electrical**

Model	C100-PSMSB-M8
Cable construction type	CNT-100 braided coaxial, black jacket
Connector type	SMB, male
Impedance	50 ohms
Insertion loss (typical), 824–960 MHz	0.95 dB
Insertion loss (typical), 1910–2170 MHz	1.35 dB

**Mechanical**

Dimensions, L	0.8 m
Bending radius	6.4 mm
Torque, normal	0.8–1.1 Nm
Torque, waterproof	1.7 Nm
Operating temperature range	–40° C to +85° C

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

## Teletilt® Remote Electrical Downtilt System

### Software

#### Teletilt® AISG System Configurator

The Teletilt® AISG System Configurator is an easy to use free software tool that can be downloaded from [www.andrew.com](http://www.andrew.com) to assist in planning a complete RET system. This program guides you step-by-step to custom create a RET system that is unique to your site requirements, producing a bill of material to easily place an order for the products selected.

#### Configuration Options

With the Teletilt AISG System Configurator, you are able to choose which type of site location you are working with (tower top or roof top), build sectors with desired Andrew Teletilt RET compatible antennas, select the type of controller that best fits your application, add smart bias tees, and specify data cable lengths for each location needed in the RET system.

Part Number	Description	Qty.
<b>Antennas</b>		
ATC200-1000	ATC200-1000	1
<b>Data Lines</b>		
ATC200-LITE-USB	Portable controller	1
<b>Junction Box</b>		
ATC200-1000	Lightning protection unit for ATC200	1
<b>Accessories</b>		
ATC200-LITE-USB	Portable controller	1
ATC200-1000	Lightning protection unit for ATC200	1

Ordering your Teletilt RET system components is easy with your custom configured bill of materials, electronically produced using the Teletilt® AISG Configurator

### Antenna Network Management System

ANMS™ is a Windows® based software program that allows access to multiple RET sites across the world within a network using an Ethernet connection. With this powerful tool, adjustments can be easily made to accommodate changing coverage needs and receive feedback on the entire network.

#### ANMS Scheduler Features

- Remotely changes azimuth direction, horizontal beamwidth, and electrical downtilt settings
- Provides real-time status of antenna configuration
- Remotely upgrades firmware of controller, actuators, and tower mounted amplifiers
- Schedules reoccurring antenna configuration changes
- Displays RET sites on a geographical map interface
- Automatically detects new RET sites
- Monitors alarm conditions

#### ANMS Site Manager Features

- Basic version of ANMS Scheduler, without geographical map interface or scheduling capability
- Complimentary with purchase of ATC300-1000 Teletilt controller









**Teletilt® Remote Electrical Downtilt System**

**RET Installation Accessories**



● **ATTK200-KIT**

**AISG RET Control Cable and System Test Kit**

The ATTK200-KIT includes diagnostic tools to assist in identifying problems that can occur in a RET system.

Part Number	Description
ATTKK200-KIT	Control cable and system test kit
Includes	Cable tester (ATTK-SB and ATTK-LU) 221mm (8–11/16") AISG RET control cable for verifying tester functions and battery level (in cable tester) RET system tester (ATTK-SA) Breakout box (ATTK-BB) Convenient carrying case

**Mechanical**

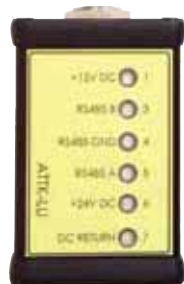
Net weight, kit:	1.8 kg (3.9 lbs)
Dimensions, kit—L x W x D:	248 x 270 x 124 mm (9.8 x 10.6 x 4.4 in)

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

The cable tester consists of a switch box and an LED unit. These components connect to each end of an AISG RET control cable to locate shorts, opens, and wiring errors. (Requires a 9 Vdc battery.)



● **ATTK-SB Switch Box**



● **ATTK-LU LED Unit**

The RET system tester checks for opens, shorts, high voltage, low voltage, and data levels. (For example, a red LED lit on +24 Vdc indicates voltage out of range.)



● **ATTK-SA RET System Tester**

The breakout box enables short or open conditions on the individual AISG RET control cable without cutting into the cable.



● **ATTK-BB Breakout Box**

## Teletilt® Remote Electrical Downtilt System

### RET Installation Accessories

#### AWE-A12 WeatherShield™ Weatherproofing

Complete your transmission line installation with Andrew's new AWE-A12 WeatherShield™ connection protection enclosure, which seals and protects connectors from the environment.

This robust, one-piece weatherproofing enclosure offers an additional measure of system protection by providing a high temperature resistant, watertight seal around the connectors while also helping to dampen vibration that can loosen connector interfaces over time.

The reusable enclosure contains an innovative trifold seal that provides complete moisture block for installed connectors. The ease of installation on hard-to-reach connections and the long-term protection provided by this enclosure make it the most cost-effective solution available today. The AWE-A12 WeatherShield connection protection enclosure takes just seconds to install. Simply place the housing around the connector and snap the tabs together.

No tapes, tools, or shrink tubes are required. The Andrew AWE-A12 WeatherShield connection protection enclosure will accommodate Type N and 7–16 DIN connections and is compatible with Andrew HELIAX® cable, SureFlex™ cable assemblies, as well as most brands of standard jumpers.

Part Number	Description
AWE-A12	Enclosure for 0.5 in antenna connection/device



● AWE-A12

#### Hoisting Grip for RET Cable

Lift and support RET cable up a tower safely and quickly, without the threat of slippage using Andrew's new 3CCGRIP hoisting grip. This one-piece grip speeds and simplifies installation by eliminating time consuming lacing. Recommended for use at 200 ft (60 m) intervals.

Part Number	Description
3CCGRIP	Hoisting grip for RET control cables



● 3CCGRIP

#### Nylon Cable Tie For RET Cable Attachment

Nylon cable ties provide support for RET cables. Typical applications include securing cables in buildings and along horizontal antenna mounting arms.

Part Number	Description
40417	Nylon cable ties, 0.3125 in (8 mm) wide 14.5 in (368 mm) long, kit of 50



● 40417



**Teletilt® Remote Electrical Downtilt System**

**RET Installation Accessories**



● **Miniature Click-On Hanger**

Shown with angle adapter and triple stack hardware

**68MCLICK Miniature Click-On Hanger**

Now installing RET control cables into hangers is accomplished in one easy click with Andrew's new 68MCLICK miniature click-on hanger.

This compact miniature click-on hanger is both cost-effective and durable. The 68MCLICK miniature click-on hanger accommodates two runs of RET cable and can be stacked to easily install several runs in confined spaces.

Specifically designed with flexible gripping ribs to provide a secure support and indexing on the hanger body to help align cables during installation.

Kit includes quantity of 10. Required attachment hardware is ordered separately in kits of 10.



● **68MCLICK**

**Part Number**

**Description**

Part Number	Description
68MCLICK	Miniature click-on hangers for RET control cable, kit of 10
Select hardware by intended hanger stack height.	
252026-10KT	Miniature angle adapters, kit of 10
252027-10KT	Single stack hardware for miniature click-on hangers, kit of 10
252028-10KT	Double stack hardware for miniature click-on hangers, kit of 10
252029-10KT	Triple stack hardware for miniature click-on hangers, kit of 10



● **252029-10KT**



● **252026-10KT**

## Teletilt® Remote Electrical Downtilt System

### RET Installation Accessories

#### Round Member Adapters

Stainless steel clamps to mount 0.5 to 4 in (13 to 102 mm) cable hangers to round support members. Two each are needed for 3 and 4 in (76 and 102 mm) cable hangers. Kit of 10.

Part Number	Diameter, in (mm)
31670-1	1–2 (25–50)
31670-2	2–3 (50–75)
31670-3	3–4 (75–100)
31670-4	4–5 (100–125)
31670-5	5–6 (125–150)
31670-6	6–8 (150–200)



● 31670 Series

#### Tower Standoff with Round Member Adapter

Adapters with round member clamps and hardware for 0.5 to 4 in (13 to 102 mm) hangers. All parts are stainless steel or galvanized. Kit of 10.

Part Number, 1 in (25 mm)	Part Number, 2.5 in (60 mm)	Diameter, in (mm)
30848-5	—	0.75–1.5 (20–40)
30848-4	—	1.5–3.0 (40–75)
30848-1	41108A-1	3–4 (75–100)
30848-2	41108A-2	4–5 (100–125)
30848-3	41108A-3	5–6 (125–150)



● 30848 Series

#### SnapStak™ Hanger with Grommet

Andrew's new SSHAK-38 SnapStak™ hanger provides a secure, robust installation for RET control cable. This hanger is especially designed to reduce vibrations caused by the wind from affecting the RET control cabling. Its unique retention tabs, located on the spring fork, highly resist pop-out occurrences and allow motion to simply be absorbed.

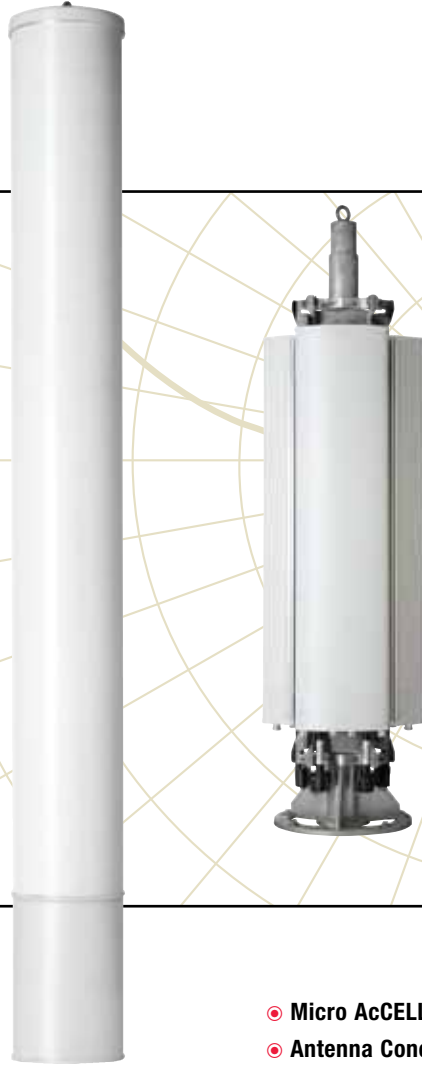
The SSHAK-38 SnapStak hanger installs in 0.75 in (19 mm) holes in support structures 0.125 in (0.120 to 0.150 in) thick. Its stainless steel construction offers exceptional integrity, even in highly corrosive environments and extreme weather conditions. No hardware is required for installation! Mounts to pre-punched 0.75 in (19 mm) holes. Kit includes ten SnapStak hangers and ten SSHA-38 grommets.

Part Number	Description
SSHAK-38	SnapStak Hangers with SSHA-38 grommets for RET control cable, kit of 10
SSHA-38	Grommets for RET control cable, kit of 10



● SSHAK-38





- **Micro AcCELLerator™ Antennas**
- **Antenna Concealment Mounting Solutions**

● **Micro AcCELLerator™ Antennas**



Andrew Wireless Solutions offers a wide variety of base station antenna concealment solutions including:

- Micro AcCELLerator™ tri-sector antennas with fixed and variable tilt models for 1800/1900/UMTS
- AcCELLerator™ antenna mounting solutions with both hardware and accessories for field installation

**Micro AcCELLerator Tri-Sector Antennas**

Andrew offers the Micro AcCELLerator antenna in a 1710–2180 MHz variable tilt design (CSH-6516A-VT/R2) and in an 1850–1990 MHz fixed tilt model (MTRR75-17-000DPL2). Both antenna types conceal three DualPol® antennas inside the same radome. The CSH-6516-VT model is Teletilt® RET-compatible, has a removable lower cover for easy installation on a flat surface or monopole, and has each sector marked on the mounting base plate to ensure accurate positioning.

**Antenna Concealment Mounting Solutions**

Field-assembled antenna concealment mounting solutions are available for both dual and wideband Andrew base station antennas. A variety of hardware and accessories are offered for flexible field installation (mounting kits and a universal telescoping mounting stand).

**Ordering Information**

See specifications and product selection information for more details about Andrew antenna concealment solution products. Use the ordering worksheets provided to help configure your customized solution and submit it to receive a quote or place an order. Contact Andrew's Customer Support Center (CSC) for more information.

*Andrew's commitment to providing the most innovative solutions in the industry includes ongoing product development—watch for additions to the Micro AcCELLerator series featuring antennas with integrated AISG OneBase™ tower mounted amplifiers.*

● **AcCELLerator™ Antenna Mounting Solutions**





**CSH-6516A-VT**  
**Micro AcCELLerator™ Wideband DualPol® Tri-Sector Antenna**

**Electrical**

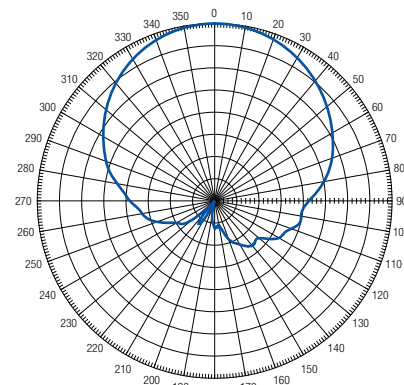
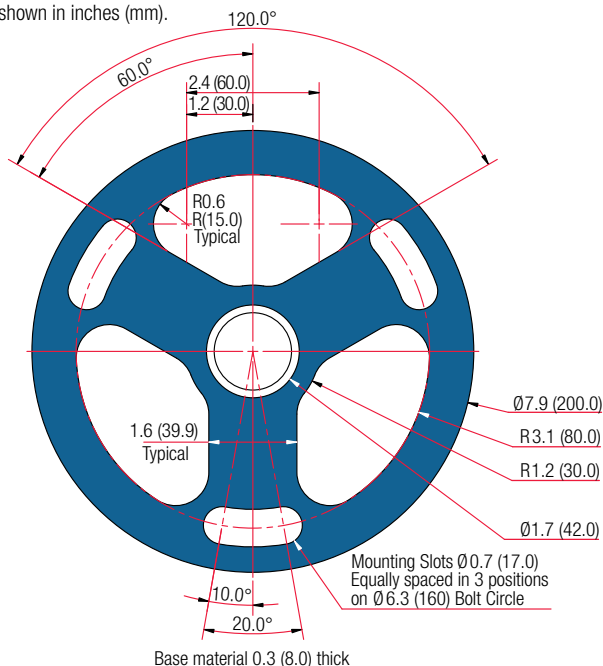
Frequency, MHz	1710–1880	1850–1990	1920–2180
Polarization	±45°	±45°	±45°
Gain, dBd (dBi)	15.0 (17.1)	15.3 (17.4)	15.5 (17.6)
Azimuth BW, degrees	65	63	61
Elevation BW, degrees	7.5	7.0	6.7
Beam tilt, degrees	2–10	2–10	2–10
USLS, dB	16	16	16
Front-to-back ratio, dB	28	28	26
Isolation, dB	>30	>30	>30
VSWR	<1.5:1	<1.5:1	<1.5:1
PIM3 at 2 x 20 W, dBc	-150	-150	-150
Max. input power, watts	200	200	200
Impedance, ohms	50	50	50
Lightning protection	dc ground	dc ground	dc ground

**Mechanical**

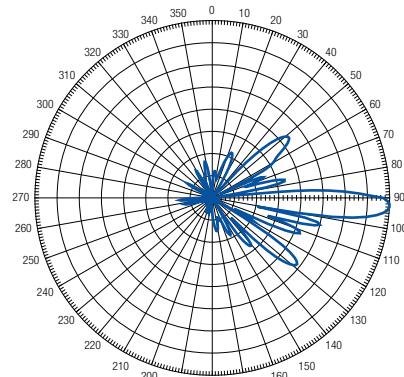
Weight, lb (kg)	46.5 (21.0)
Dimensions—L x OD, in (mm)	78.3 x 7.9 (1,989 x 201)
Max. wind area, ft² (m²)	1.4 (0.13)
Max. wind load at 100 mph, lbf (N)	78.7 (350)
Max. wind speed, mph (km/h)	125 (201)
Hardware material	Integrated flange
Connector type	7–16 DIN—female (6, bottom)
Color	Light gray

**Base Flange Dimensions**

Note: Dimensions are shown in inches (mm).



● Azimuth  
 1920 MHz, 2° Tilt



● Elevation  
 1920 MHz, 2° Tilt

Concealment Solution      Horizontal Beamwidth      EDT Option

**CS H - 65 16 - VT**

Frequency Band      Gain in dBd

**FREQUENCY BAND (MHz)**

H = 1710–2180

**ELECTRICAL DOWNTILT (EDT) OPTION**

VT = Variable EDT

R2 = Factory Installed ATM200 Teletilt® Actuator

All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.



● **MTRR Series DualPol®  
Micro AcCELLerator™ Antenna**

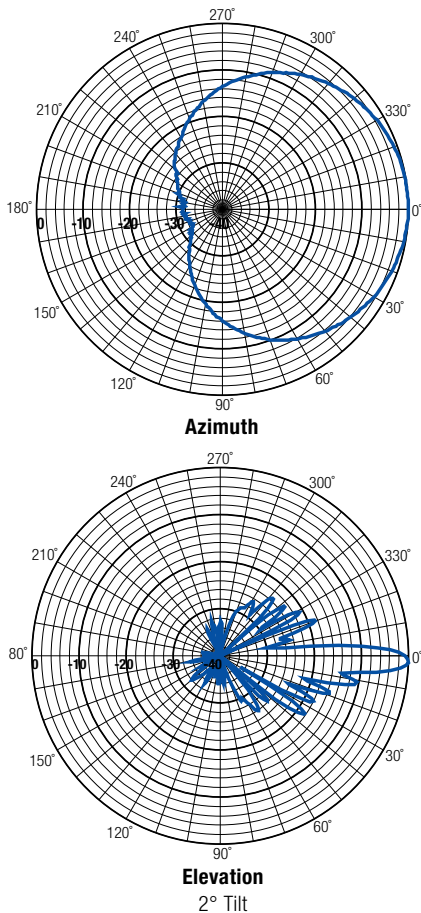
**MTRR75-17-000DPL2  
Micro AcCELLerator™ DualPol® Tri-Sector Antenna**

**Electrical**

Frequency, MHz	1850–1990
Polarization	±45°
Gain, dBd (dBi)	14.9 (17.0)
Azimuth BW, degrees	75
Elevation BW, degrees	6
Beam tilt, degrees	0°
USLS, dB	18
Isolation, dB	>30
VSWR	1.35:1 maximum
Power handling, watts	250
Passive intermodulation	≥-147 dBc at 2 x 20 W (+43 dBm)
Lightning protection	dc ground

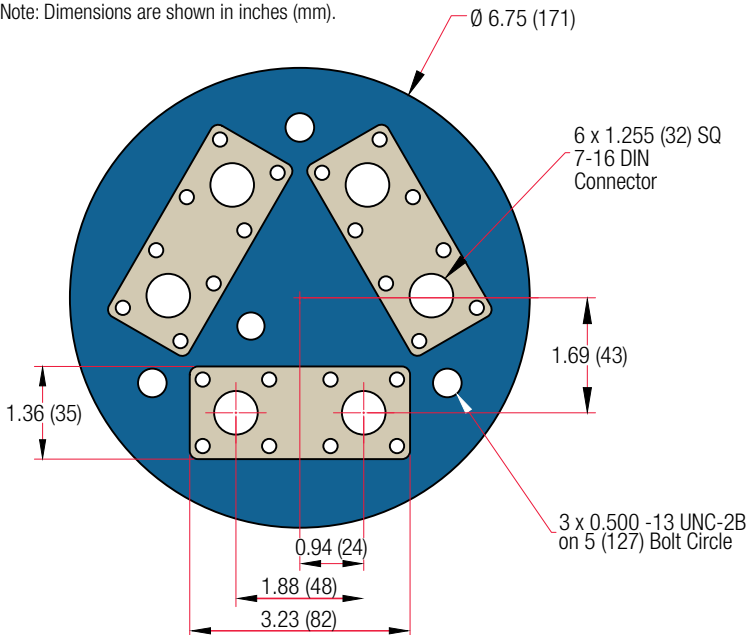
**Mechanical**

Weight, lb (kg)	20 (9.1)
Dimensions, L x OD, in (cm)	57 x 6.25 (144.7 x 15.9)
Max. wind load at 100 mph, lbf (N)	50 (220)
Max. wind speed, mph (km/h)	150 (241)
Connector type	7-16 DIN-female (6, bottom)
Mounting options	MTG-A30-02, MTG-A30-03, MTG-A30-04, MTG A40 00



**Base Flange Dimensions**

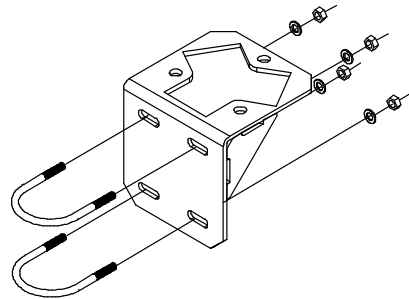
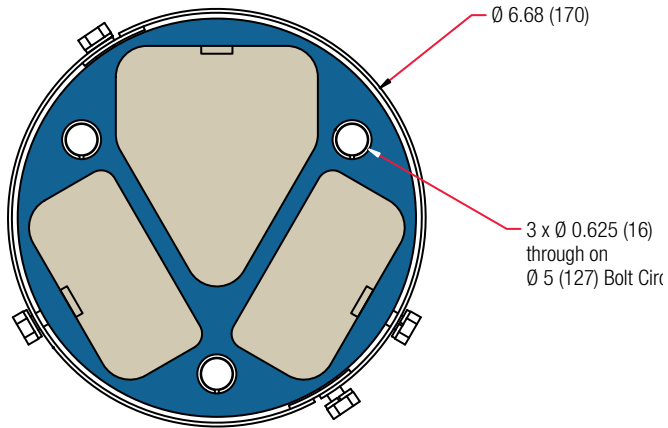
Note: Dimensions are shown in inches (mm).



All specifications are subject to change. Please see [www.andrew.com](http://www.andrew.com) for the most current information.

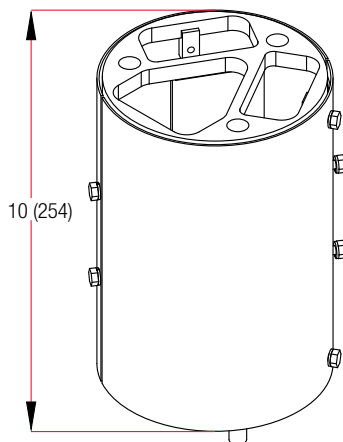
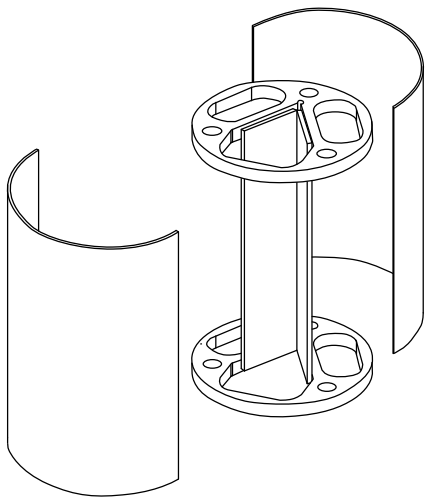
**Base Flange Dimensions**

Note: Dimensions are shown in inches (mm).



● **MTG-A30-XX U-Bolt Pipe Mount**

Pipe Mount	Pipe Diameter
MTG-A30-02	2.5 in
MTG-A30-03	3.5 in
MTG-A30-04	4.5 in



● **MTG A40 00 Pedestal Mount**

**Concealment Solutions**

**Antenna Concealment Mounting Solutions**

Hardware Selection

**AcCELLerator™ Antenna Concealment Mounting Solutions**

The AcCELLerator product family features a universal telescoping mounting stand that adjusts in increments of 6 inches ranging from 75.3 to 135 in (1,913 to 3,429 mm). Mounting kits available for use with the AcCELLerator universal mounting stand are compatible with most Andrew base station antennas.

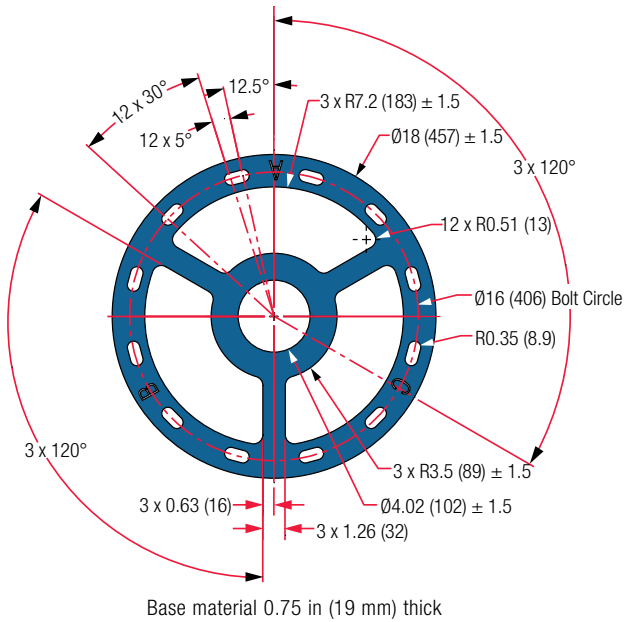
Antenna Model	Frequency (MHz)	Outer Diameter	Mounting Kit	Qty Per Configuration	Universal Tree Stand
HBXX-6516DS-VTM/R2M	1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
HBXX-6517DS-VTM/R2M	1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
CTSDG-06513-XDM/R2DM	806–960	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
CTSDG-06515-XDM/R2DM	806–960	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
CTSDG-06516-XDM/R2DM	806–960	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
LBX-9012DS-VTM/R2M	806–960	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
LBX-9013DS-VTM/R2M	806–960	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
LBX-9014DS-VTM/R2M	806–960	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXGKC-6565A-VTM	870–960/1710–1880	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXGKC-6565B-VTM	870–960/1710–1880	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXGKC-6565C-VTM	870–960/1710–1880	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXGKC-6565EC-VTM	870–960/1710–1880	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXLH-6565A-VTM/R2M	806–960/1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXLH-6565B-VTM/R2M	806–960/1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
DBXLH-6565C-VTM/R2M	806–960/1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
TBXLHA-6565C-VTM/R2M	824–960/1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
UMWD-03319-XDM/R2DM	1710–2180	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
UMWD-04517-XDM/R2DM	1710–2170	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
UMWD-04519-XDM/R2DM	1710–2170	20 in (508 mm)	800TREEKIT	1 per antenna	DB800TREE
HBX-6513DS-VTM/R2M	1710–2180	13.25 in (337 mm)	UMWD-TREEKIT	*1	DB800TREE
HBX-6516DS-VTM/R2M	1710–2170	13.25 in (337 mm)	UMWD-TREEKIT	*1	DB800TREE
HBX-6517DS-VTM/R2M	1710–2180	13.25 in (337 mm)	UMWD-TREEKIT	*1	DB800TREE
UMWD-09014B-XDH/R2DH	1710–2170	13.25 in (337 mm)	UMWD-TREEKIT	*1	DB800TREE
UMWD-09016-XDH/R2DH	1710–2170	13.25 in (337 mm)	UMWD-TREEKIT	*1	DB800TREE

\*One kit provides mounting for three antennas.

Note: If you order an 800TREEKIT mounting kit without ordering a DB800TREE mounting stand, you will need to order an 800PIPEKIT-X in order to be able to mount three antennas to a mounting pipe.

**Universal Mounting Stand Base Flange Dimensions**

Note: Dimensions are shown in inches (mm).



● AcCELLerator™  
Antenna Mounting  
Solutions with Universal  
Mounting Stand

**Universal Mounting Stand Mechanical Specifications**

<b>Model</b>	DB800TREE
<b>Description</b>	Universal Tree Stand
<b>Weight (stand only)</b>	132 lb (59.8 kg)
<b>Height (stand)</b>	
<b>Fully Retracted</b>	75.3 in (1,913 mm)
<b>Fully Extended</b>	135 in (3,429 mm)
<b>Diameter (stand only)</b>	
<b>Top</b>	3.5 in (88.9 mm)
<b>Bottom</b>	4 in (101.6 mm)



**Concealment Solutions**

**Antenna Concealment Mounting Solutions**

Ordering Worksheet

Please complete the configuration worksheet shown below and fax it to Andrew's Customer Support Center: From North America send to 1-800-349-5444 or from outside North America send to +1-779-435-8579. You will receive a written quotation containing pricing and lead time. If you have any questions about this process, please contact Andrew's Customer Support Center: From North America call 1-800-255-1479 or from outside North America call +1-708-873-2307, or contact your local Andrew Sales Office.

Company: \_\_\_\_\_ Date: \_\_\_\_\_

Contact: \_\_\_\_\_ Email: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

**AcCELLerator™ Solution**

**Antenna Models**

\_\_\_\_\_

Sector 1

\_\_\_\_\_

Sector 2

\_\_\_\_\_

Sector 3

**Stand**

DB800TREE QTY:   1  

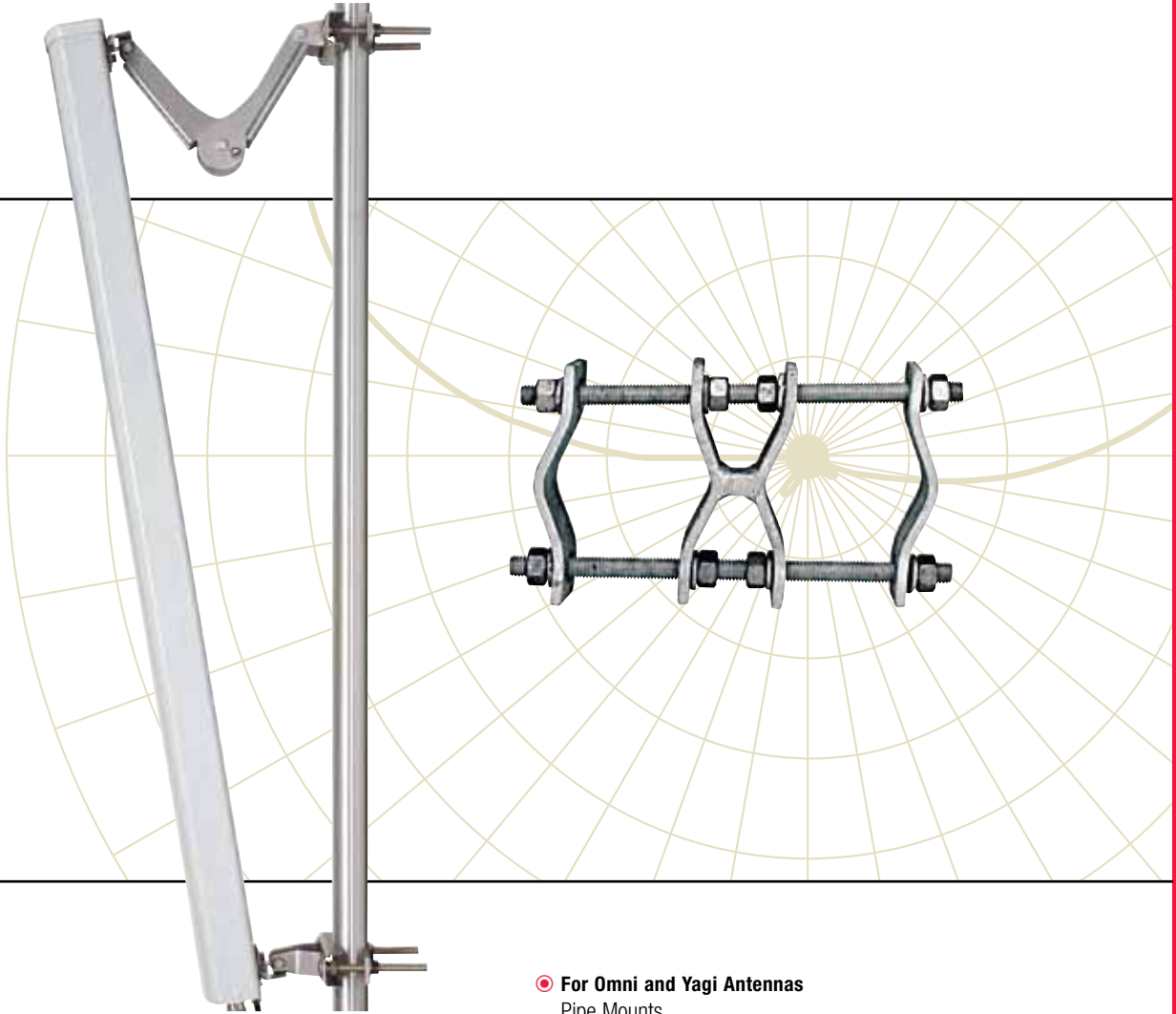
**Mounting Kits**

800TREEKIT QTY: \_\_\_\_\_

UMWD-TREEKIT QTY:   1  

**Notes:**

1. The universal stand and mounting kits are designed for Andrew antennas.
2. See Hardware Selection pages to select the type of mounting kits and quantities needed for your antennas and the concealment solution you have chosen.
3. Contact Andrew's Customer Support Center for additional information on concealment products.



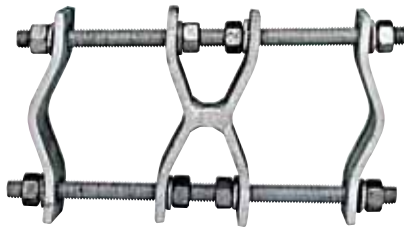
- **For Omni and Yagi Antennas**
  - Pipe Mounts
  - Side Mounts
- **For Panel Antennas**
  - Pipe Mounts
  - Downtilt Mounts
  - Special Mounts
- **For DR, FR, RR, FV, and RV Panel Antennas**
  - Pipe Mounts
  - Downtilt Mounts



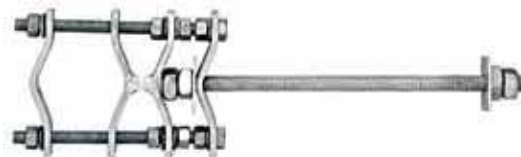
**Mounting Hardware and Accessories**

**For Omni and Yagi Antennas**

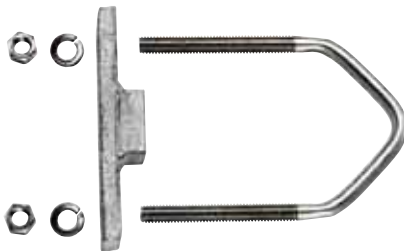
Pipe Mounts



DB365-OS



DB365W



11653

**DB365-OS Mounting Clamp Kits**

DB365-OS mounting clamp kit includes two clamps that mount antennas to round members from 1.25 to 3.5 in (31.8 to 89 mm) OD or angle members to 3 in (76 mm).

Net weight, lb (kg) 7 (3.18)  
Shipping weight, lb (kg) 8 (3.63)

Part Number	Round in (mm)	Angle, 90° in (mm)	Angle, 60° in (mm)	Net Wt. lb (kg)	Shipping Wt. lb (kg)
DB365-SP5	5 (127)	3.54 (89.9)	4.33 (109.9)	14 (6.36)	15 (6.8)
DB365-SP7	7 (177.8)	4.95 (125.7)	6.06 (153.9)	16 (7.27)	16 (7.27)
DB365-SP9	9 (228.6)	6.36 (161.54)	7.79 (197.8)	17 (7.73)	18 (8.18)

**DB365W Mounting Clamps**

For mounting antennas to a wood pole or masonry wall up to 14 in (355.6 mm) thickness; 0.625 in (15.88 mm) diameter hole required. Clamp jaws fit round members from 1.25 to 2.75 in (31.8 to 69.85 mm) OD galvanized steel. Two clamps supplied.

Net weight, lb (kg) 10 (4.54)  
Shipping weight, lb (kg) 12 (5.45)

**V-Bolt Mounting Kits**

V-bolt mounting clamp kits include stainless steel V-bolts, nuts and washers, and galvanized steel back straps. Set of two.

Part Number	Round in (mm)	Angle, 90° in (mm)	Angle, 60° in (mm)	Net Wt. lb (kg)	Shipping Wt. lb (kg)
11653	3 (76.2)	2 (50.8)	2.6 (66.0)	2 (0.91)	3 (1.36)
11653-4-IN	4 (101.6)	2.8 (71.1)	3.46 (87.8)	2 (0.91)	3 (1.36)
11653-6-IN	6 (154.4)	4.24 (107.7)	5.2 (132.0)	4 (1.82)	5 (2.27)
11653-9-IN	9 (228.6)	6.36 (161.5)	7.79 (197.8)	5 (2.27)	6 (2.73)

## Mounting Hardware and Accessories

### For Omni and Yagi Antennas

### Pipe Mounts

#### DB370 Mounting Clamp Kit

This is the same as DB365-OS except center straps are not welded. Includes four straps per clamp for spacing adjustment; galvanized steel, set of two.

Net weight, lb (kg)	7 (3.18)
Shipping weight, lb (kg)	8 (3.63)

#### DB375 Mounting Clamps

Used to mount horizontal members to vertical members—round from 1.25 to 3 in (31.8 to 76.2 mm) each piece. Set of two. Use DB375-SP5 for round tower members measuring 5 inches in diameter.

#### ASP617 Universal Crossover Clamp

Plate is 0.25 in (6.4 mm) galvanized steel. U-bolts are supplied to secure any combination of two intersecting pipes from 1 to 2.875 in (25.4 to 73 mm) OD. Accommodates up to 2.5 in (63.5 mm) angle iron or 4 in (101.6 mm) OD tower legs with up to a 2.875 in (73 mm) OD intersecting cross pipe. ASP617 can be combined with ASPA320 mounting clamp to accommodate antennas with vertical parallel mounting members. Shipping weight 6 lb (2.7 kg).

#### ASPA320 Mounting Clamp

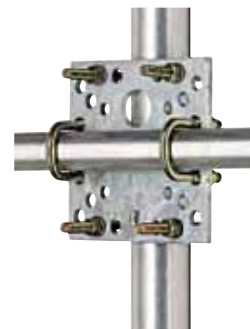
Mounting clamp for securing antenna to wooden pole, tower leg, or mast from 1 to 2.75 in (27 to 70 mm) diameter. Special feature allows jaws to be rotated 90° to clamp onto horizontal mounting bars. Clamps are gold iridite aluminum alloy. Shipping weight 3 lb (1.7 kg).

#### ASPR616 Clamp Set

Consists of two clamps for mounting base station antennas to tower or mast. Will mount on structure from 1 to 2.875 in (25.4 to 73 mm) diameter. All parts are galvanized. Shipping weight 6 lb (2.7 kg).



DB375



ASP617



ASPA320

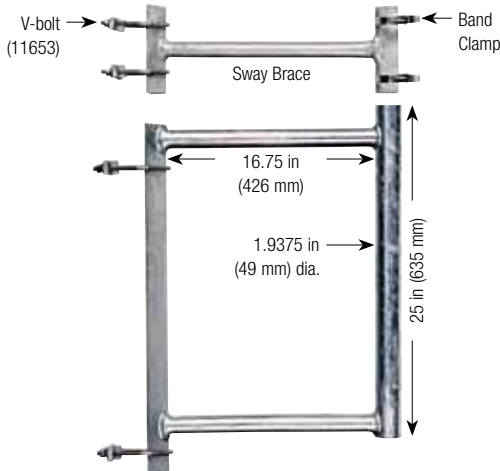


ASPR616

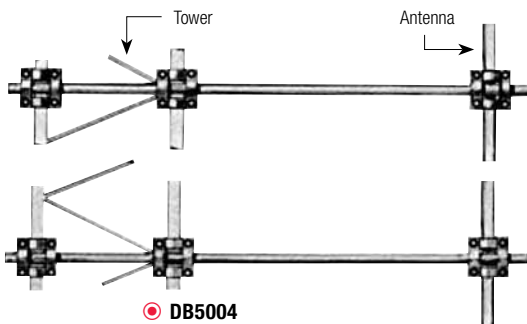
**Mounting Hardware and Accessories**

**For Omni Antennas**

Side Mounts



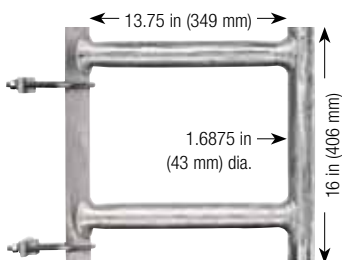
DB5001



DB5004



DB5004S-MTD



DB5007

**Base Station Antenna Side Mounting Kits**

Heavy duty side mount kits include all brackets, clamps, and hardware to mount antenna to tower leg. The main support pieces are fabricated of galvanized steel, and the stainless steel V-bolts (supplied) fit round tower members 1.25 to 3 in (31.8 to 76.2 mm) OD, angular members to 2 in (50.8 mm) 90° or 2.6 in (66.04 mm) 60°.

**DB5001 VHF Side Mounting Kit**

For DB222, DB224, and DB264. Includes top sway brace. Use DB5001 for 3 in (76.2 mm) tower members, DB5001-SP5 for 5 in (127 mm) tower members, and DB5001-SP7 for 7 in (178 mm) tower members.

Net weight, lb (kg)	21 (9.5)
Shipping weight, lb (kg)	23 (10.45)

**DB5002 Side Mounting Kit**

Similar to DB5001, the top sway brace on the DB5002 kit is designed for side mounting fiberglass antennas. Fits 3 in (76.2 mm) OD tower members.

Net weight, lb (kg)	21 (9.5)
Shipping weight, lb (kg)	23 (10.45)

**DB5004 Adjustable Side Mounting Kit**

For DB809, DB810, and DB812 antennas. Use to mount all metal mast antennas away from side of tower measuring 2 to 8 ft (0.61 to 2.44 m) across the face. Two 10 ft sections of pipe and six clamp assemblies included. Clamp assemblies are for 3 in (76.2 mm) tower member.

Net weight, lb (kg)	123 (55.9)
Shipping weight, lb (kg)	130 (59.1)

**DB5004S-MTD Fiberglass Outrigger Assembly**

Can be used on any large side-mounted MTD (minimum tip deflection) fiberglass radome to limit tip deflection in high winds, including DB616, DB638, DB809, DB810 and DB812. Opening is 3.75 in (95 mm). The outrigger is 123 in (3.1 m) in length x 3 in (76.2 mm) in diameter. Brace the outrigger to the tower legs via one set of DB375 clamps. A plastic end, fitted with neoprene lining, slips over the top of the antenna and sits about midpoint on the radome.

**DB5007 UHF Side Mounting Kit**

For DB404 and DB806 antennas. Bottom brace only, for 3 in (76.2 mm) tower member.

Net weight, lb (kg)	11 (5.00)
Shipping weight, lb (kg)	13 (5.91)

## Mounting Hardware and Accessories

### For Omni Antennas

### Side Mounts

#### DB5012 UHF Side Mounting Kit

For DB408, DB411, DB413, and DB420 antennas. Same as DB5007, but includes top sway brace.

Net weight, lb (kg)	19 (8.63)
Shipping weight, lb (kg)	21 (9.54)

#### DB5030 Fiberglass Outrigger Assembly

Designed to limit tip deflection in high winds, the DB5030 can be used on any side-mounted antenna with a small tapered Aeroglas radome. The opening is 1.875 in (47 mm). The outrigger is 123 in (3.1 m) long and attaches to the tower legs via one set of DB375 galvanized clamps. A plastic end fitting with neoprene tape lining slips over the top of the antenna and sits about midpoint on the radome.

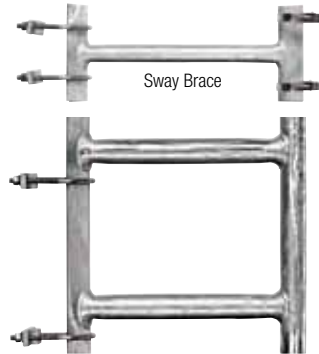
#### DB5091-3 No-Torsion Mount

The DB5091-3 utilizes three clamps on a galvanized steel tube to mount DB810 and DB812 antennas to round tower members.

Note: An extra metal bar is provided with the DB5091-3 for the bottom and middle clamps to assure good vertical alignment of the antenna.

#### ASPR614 Side Mounting Kit

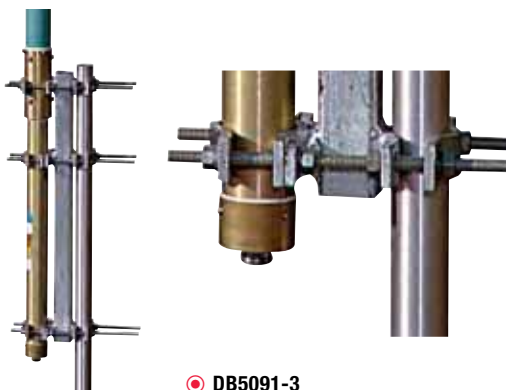
Optional side mount with a fiberglass insulated upper support arm. Used for mounting antennas from 18 in to 7 ft (457.2 to 2,133 mm) away from the tower, based on 18 in (457.2 mm) faces. May be mounted on any square or triangular tower with tubular legs up to 4 in (101.6 mm) or 2.5 in (63.5 mm) angle iron.



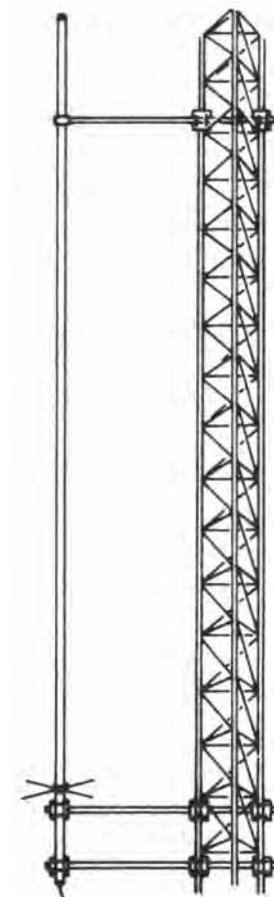
DB5012



DB5030



DB5091-3



ASPR614



601860A

**601860A Optional Fixed Tilt Pipe Mounting Kit**

Use for PCS, UMW, and UMWD 65°/90° style antennas. Designed to fit 1.7 to 4.5 in (42 to 115 mm) OD pipe.

**DB380 and DB380-3 Pipe Mounting Kits**

Use for wide panel antennas. Fits 1.25 to 4.5 in (31.8 to 115 mm) OD pipe. DB380 includes 2 pipe mounts. For antennas with 3-points, order DB380-3. For pipe diameters measuring 3 to 8 in (76.2 to 203.2 mm), order DB380-8.

**DB380-9-ADFD1820 Pipe Mounting Kit**

Use for mounting ADFD1820 style antennas to pipes measuring 3 to 9 in (76.2 to 228.6 mm) OD. This kit is compatible for use with the DB5083 downtilt mount.

**DB380-OFFSET Pipe Mounting Kit**

Use to mount antennas away from a pipe or pole. This offset feature also makes it possible to use downtilt mounting, where multiple antennas are desired on a single monopole. This kit includes three offset pipe mount brackets, and can be used with antennas that are compatible with the DB380 or DB380-3 pipe mounts. To use this kit with a CTSDG style antenna, order a DB380-CTSDG pipe mount adapter kit. Fits 1.25 to 4.5 in (31.8 to 115 mm) OD pipe.

**DB382NS Offset Pipe Mounting Kit**

Provides offset positioning for enhanced cable clearance with back-mounted connectors.

**DB380-CTSDG Pipe Mount Adapter Kit**

Use as an adapter to enable CTSDG style antennas to be compatible with the DB380 pipe mount.

**602495 Side-By-Side Mounting Kit**

Use to mount two CTSDG style antennas as a single antenna. Includes the 600899A-2 downtilt mount.

**DB390 Pipe Mounting Kit**

Use for narrow panel antennas. Fits 1.25 to 4.25 in (31.8 to 108 mm) OD pipe. Includes two pipe mounts.



DB390



DB380



DB380-OFFSET

## Mounting Hardware and Accessories

### For Panel Antennas

### Downtilt Mounts

#### 600899A-2 Downtilt Mounting Kit

Adjustable tilt mounting kit available for UMWD 33°/45°, CTSDG, CTSG, and ADFD series antennas. Designed to fit 1.3 to 4.5 in (33 to 114 mm) OD pipe.

#### 600691A-2 Downtilt Mounting Kit

Downtilt mounting kit for UMWD 65°/90°, PCS, and UMW style antennas. Designed to fit 1.7 to 4.5 in (42 to 114 mm) OD pipe.

#### 602030A Downtilt Mounting Kit

Downtilt mounting kit for PCS, UMW, and UMWD 65°/90° style antennas. Designed to fit 2 to 4.5 in (42 to 114 mm) OD pipe.

#### DB5083 Downtilt Mounting Kit

Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount and provides downtilt mounting for panel antennas that are equipped with two mounting brackets.

#### DB5083D Downtilt Mounting Kit

Consists of two DB5083 heavy-duty, galvanized steel downtilt mounting bracket assemblies and associated hardware. This kit is compatible with the DB380-3 pipe mount and provides downtilt mounting for large panel antennas, which are equipped with three mounting brackets.

#### DB5098 Downtilt Mounting Kit

The DB5098 kit includes a galvanized steel downtilt assembly and is compatible with the DB390 pipe mount and associated hardware. For antennas with 3 point brackets, order DB5098-3.

#### DB5098-WM Downtilt Mounting Kit

Downtilt mounting kit for SA3400 series antennas. This kit is compatible with the DB390 pipe mount and associated hardware. Includes two angle indicator labels for assisting in setting downtilt of antenna.



600899A-2



602030A



DB5083



DB5083D



DB5098



**Mounting Hardware and Accessories**

**For Panel Antennas**

Special Mounts



● 800PIPEKIT-X

**800PIPEKIT-X AcCELLerator™ Mounting Kit**

Use for mounting multiple wide panel antennas to a single pole or stand. One kit mounts up to three antennas. Removable spacers allow this kit to fit on poles measuring 3.5, 4.5, or 5.5 in (88.9, 114.3, or 139.7 mm OD).

**DB800TREE AcCELLerator™ Mounting Stand**

Universal telescoping stand used for mounting multiple antennas in a three sector arrangement. Adjusts in increments of 6 in (15.4 mm), ranging from 75.3 to 135 in (1,913 to 3,429 mm). See Concealment Solutions for ordering information.

**800TREEKIT AcCELLerator™ Mounting Kit**

Optional kit for mounting multiple wide panel antennas to a single pole or stand. Suitable for use with 85x, 93xQDG, CTSDG, and ADFD1820 style antennas. Order one kit for each antenna. Fits 3.5 or 4 in (88.9 or 101.6 mm) OD pole.

**UMWD-TREEKIT AcCELLerator™ Mounting Kit**

Use for mounting multiple UMWD style antennas to a single pole or stand. One kit mounts up to three antennas. Fits 3.5 or 4 in (88.9 or 101.6 mm) pole. See Concealment Solutions for ordering information.



● DB800TREE

**DB5084-AZ Variable Azimuth Wall Mount**

Optional brackets for wall mounting wide panel antennas. Provides azimuth rotation from +45° to -45°, minimizing required clearance from the wall.

**DB5094-AZ Variable Azimuth Wall Mounting Kit**

Optional brackets for wall mounting narrow panel antennas. Provides azimuth rotation from +45° to -45°, minimizing required clearance from the wall.



● UMWD-TREEKIT



● DB5084-AZ



● DB5094-AZ



## Mounting Hardware and Accessories

### For DR, FR, RR, FV, and RV Panel Antennas

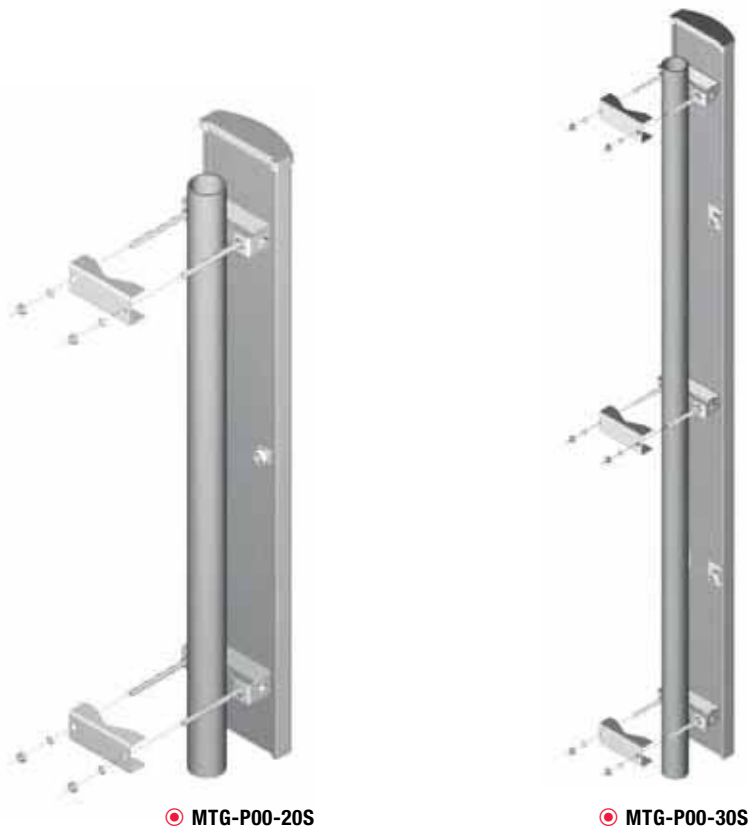
### Pipe Mounts

#### MTG-Pxx-xx Series Standard Pipe Mounts

Standard pipe mounts provide a low profile mounting arrangement that adapts to either a pole or a wall. Each mount fits poles measuring 1.5 to 5 in (38 to 127 mm) OD, and spaces antenna less than 2 inches away from the pole. When mounting to a wall, the antenna is spaced less than 3 inches away from the wall. Unless otherwise specified, an MTG-Pxx-xx standard pipe mount is supplied with each DR, FR, RR, FV, and RV style panel antenna.

Part Number	Antenna Length in (mm)	Pole OD in (mm)	Distance From Pole in (mm)	Range of Downtilt degrees	Weight lb (kg)
MTG-P00-20S	48–72 (1219–1829)	1.5–5 (38–127)	2 (51)	42 (1067)	5.75 (2.6)
MTG-P00-30S	>72 (>1829)	1.5–5 (38–127)	1.8 (46)	42 (1067)	9.5 (4.3)

\*Optional band clamp may be used to replace threaded rods and "C" bracket.



**Mounting Hardware and Accessories**
**For DR, FR, RR, FV, and RV Panel Antennas**

Downtilt Mounts

**MTG-Dxx-xx Series Mechanical Downtilt Mounts**

Downtilt kits are designed for use with the DR, FR, RR, FV, or RV panel antennas and are compatible with all MTG family of standard mounts. Easily adjusts in 1° increments, and is available in two tilt ranges. Each degree of downtilt is clearly marked on the bracket.

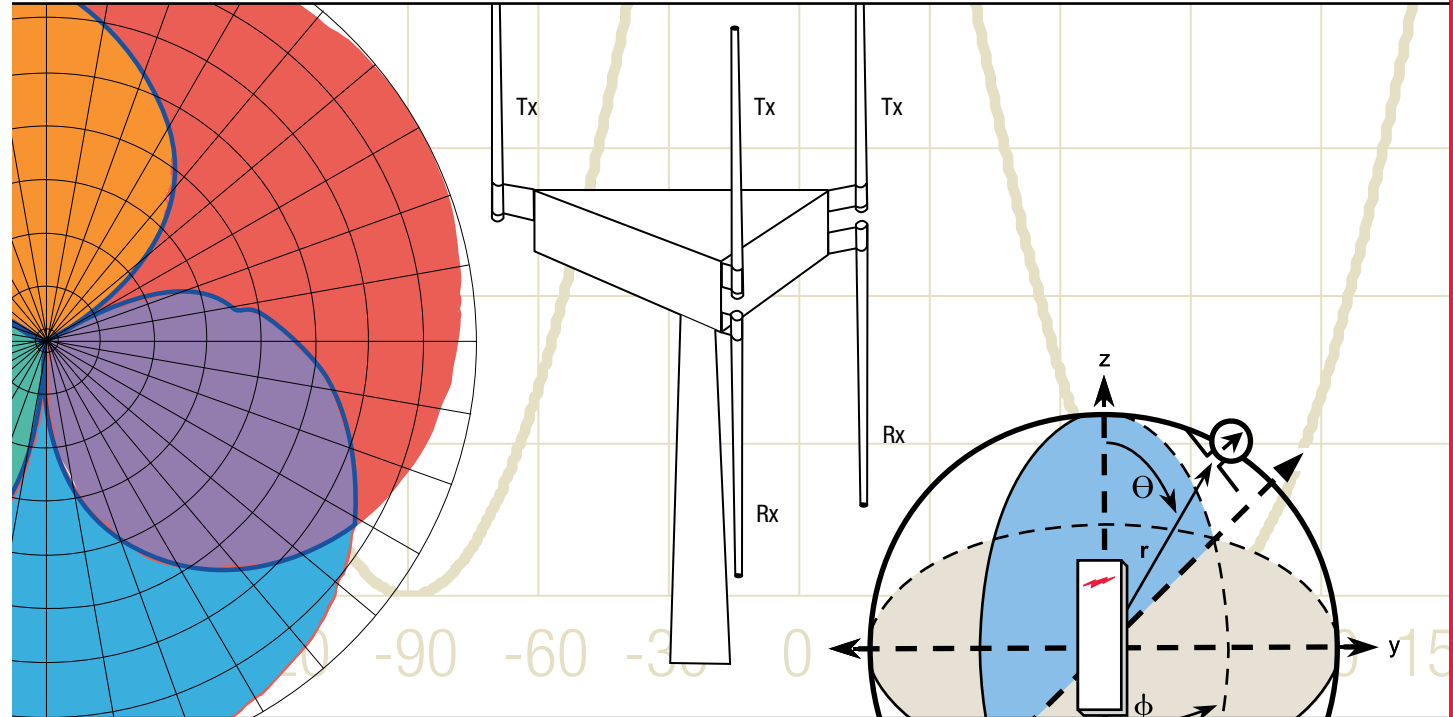
Part Number	Downtilt Range degrees	Antenna Length in (mm)	Pole OD in (mm)	Distance From Pole in (mm)	Bracket Spacing in (mm)	Weight lb (kg)
MTG-D15-20S	0–15	48–72 (1219–1829)	1.5–5 (38–127)	4 (102)	42 (1067)	4.5 (2.0)
MTG-D15-30S	0–15	>72 (>1829)	4 (102)	42 (1067)	8.0 (3.6)	



● MTG-D15-20S



● MTG-D15-30S



- Basic Antenna Types Used in Cellular Style Systems
- Antenna Fundamentals
- Base Station Antenna Materials and Mechanical Characteristics

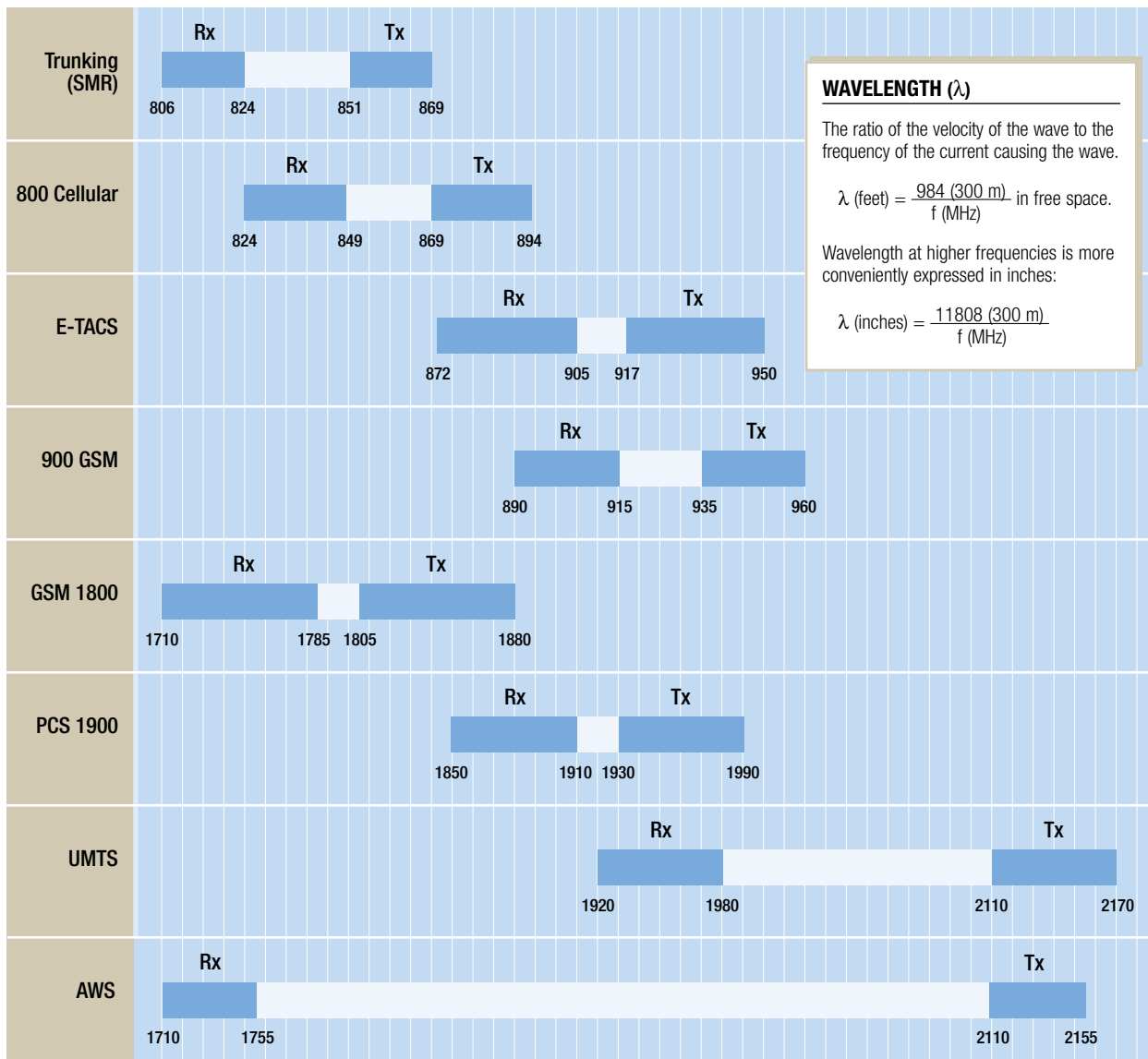
Overview

Andrew Wireless Solutions designs, manufactures, and delivers innovative and essential communications equipment and solutions for the global telecommunications infrastructure market. Our products cover virtually the entire radio frequency (RF) footprint for applications that connect the world.

Andrew offers base station antenna system solutions for professional communications systems. Recognized around the world as technically advanced professional base station antenna systems, Andrew incorporates multiple value-added features that have made them the preferred products of system managers, designers, and engineers.

The Applications/Engineering Notes are a comprehensive information guide to base station antennas. For all other Andrew product information please visit [www.andrew.com](http://www.andrew.com).

Frequency Band Reference Chart



## Basic Antenna Types Used in Cellular Style Systems

There are two basic types of base station antennas used in cellular style systems: omni-directional (omni) antennas and directional or sector antennas.

Omni antennas are generally used for low capacity sites where sectorization is not required. Typical examples are more rurally located sites.

Most sites in urban and suburban areas use sectorized antennas to achieve higher capacity. To date, the most popular option is a 3-sector (120°) solution, but 6-sector solutions are used where capacity issues are severe.

### Diversity/Air Combining

For many rural and suburban sites, diversity is accomplished using spatial diversity. To achieve spatial diversity, two uplink antennas per sector are placed far enough apart so that the signals they receive are uncorrelated.

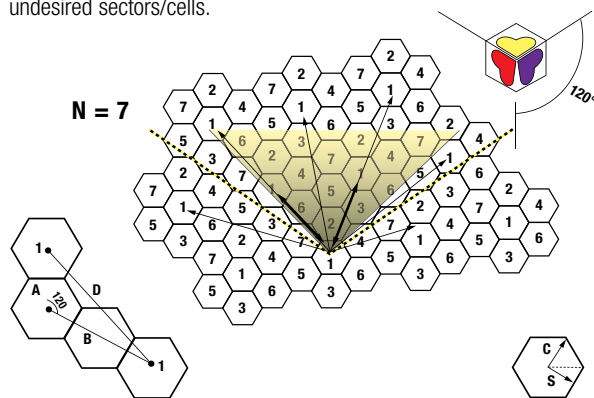
### High Density Cell Configuration Using Diversity Polarization for Diversity Gain

The use of a single antenna containing two arrays at orthogonal polarizations (horizontal/vertical or  $\pm 45^\circ$ ) is useful in dense urban areas with high multipath. Some studies note that in urban areas with high multipath, polarization diversity gain results can outperform spatial diversity. The use of a quad or four port  $\pm 45^\circ$  antenna can provide for air combining, which is useful in avoiding additional transmit combiner losses when overlaying additional frequency.

### Cell Reuse

The principles behind the cellular concept employ the reuse of frequencies over and over again throughout the network to gain capacity. Typically cells are represented as hexagons (Figure 1), which shows a reuse pattern of  $N=7$ .

Depending on the capacity requirement, these cells can have diameters measured either in miles or in hundreds of feet. Since given frequencies are reused throughout the system, the channel sensitivity becomes interference limited rather than noise limited like older non-cellular systems. Therefore it can be seen that specialized pattern shaping, both azimuth and elevation, can go a long way toward optimizing coverage inside the desired sector and minimizing interference from and into undesired sectors/cells.



$$D^2 = A^2 + B^2 - 2AB \cos(d)$$

$$D = 5.3S$$

$$C^2 = S^2 + (C/2)^2$$

$$S^2 = C^2 - (C/2)^2$$

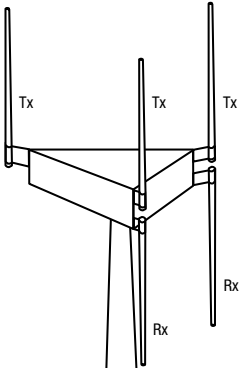
$$S^2 = 0.75C^2$$

$$S = 0.866C$$

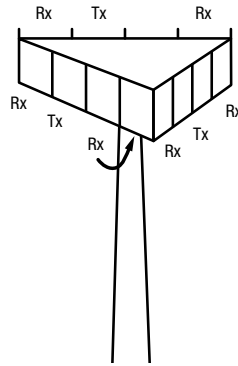
Figure 1

**Basic Antenna Types Used in Cellular Style Systems**

**Typical Antenna Installations**



● **Omni**



● **Sector/Platform**



● **Tower**



● **Concealed**



● **Building**

Shown above are typical 3-sector sites. 6-sector sites are used for additional capacity.

## Antenna Fundamentals

One of the most critical elements of a wireless communications system is the antenna. A base station antenna represents only a small part of the overall cost of a communications site, but its performance impact is enormous. Its function is to transform conduction currents (found on wires, coaxial cable, and waveguides) into displacement currents—it's this invisible phenomenon that makes radio communications possible. The antenna's impact on the radio system is determined by choosing the antenna with the appropriate characteristics defined by its specifications.

The following information describes and defines the most common parameters used to specify base station antennas.

### Radiation Pattern

The most important requirement is describing where an antenna radiates energy into the space around it. A radiation pattern is a graphical representation of where and how much energy is radiated. Every antenna should come with such a representation.

The radiation characteristics of an antenna are determined by moving a simple probe antenna, which is connected to a radio receiver, around the antenna at a constant distance, noting the received signal level as a function of angular coordinates. For a complete 3-dimensional characterization, the probe antenna would be moved over a spherical surface. See Figure 2. A typical far-field range setup is shown in Figure 3 where  $D$  is the maximum dimension of the Antenna Under Test.

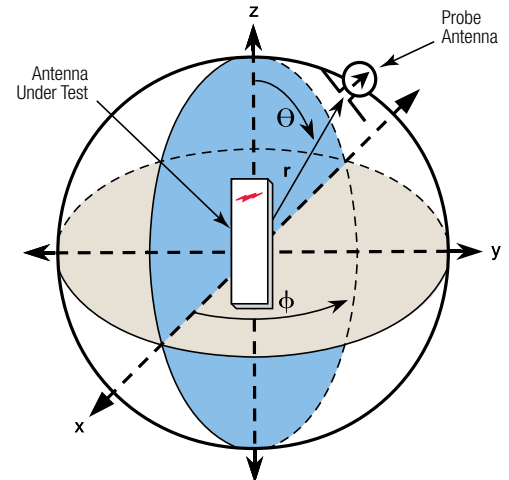


Figure 2 Measuring Radiation Patterns

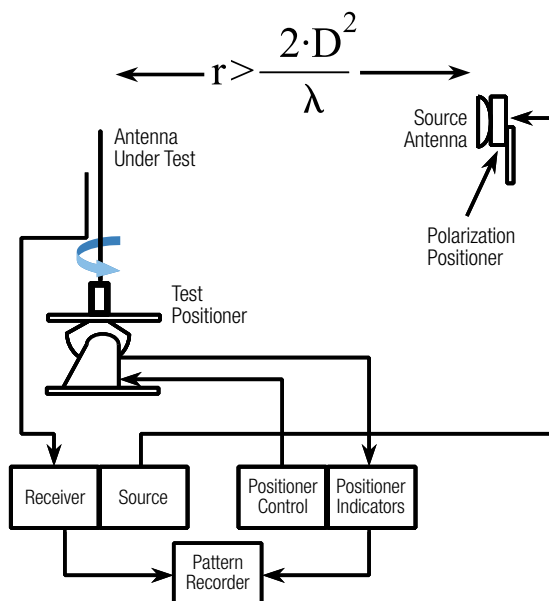
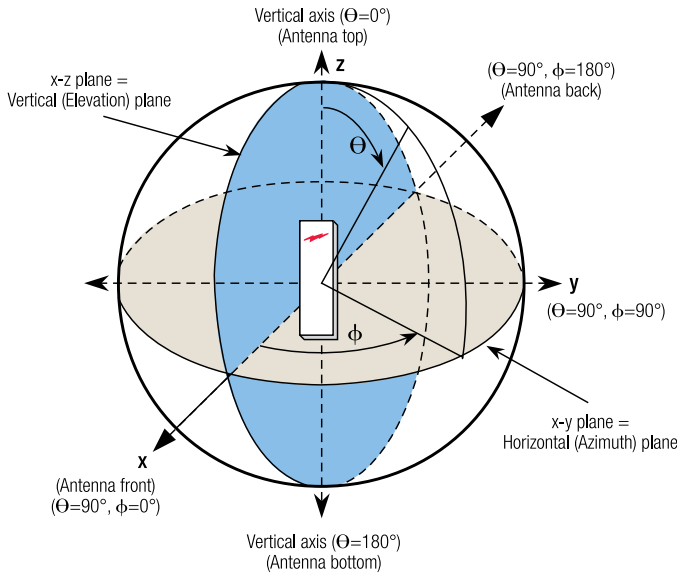


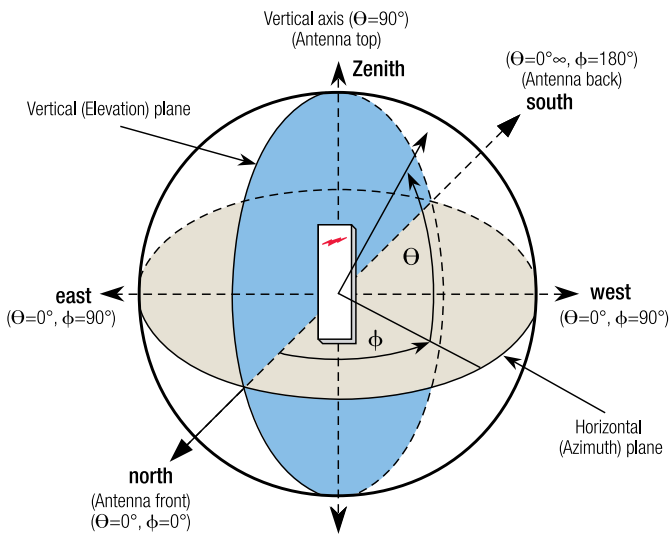
Figure 3 Typical Far-Field Range Setup



**Antenna Fundamentals**



● **Figure 4** Spherical Coordinate System



● **Figure 5** Altazimuth Coordinate System

The coordinate system used for defining antenna radiation patterns is the spherical coordinate system shown in Figure 4, while that used by surveyors and RF engineers is the altazimuth coordinate system shown in Figure 5. Pattern data supplied by Andrew Corporation is in the form that is defined by the altazimuth coordinate system.

Most antennas are physically symmetrical about the x-y and x-z planes, which means the antenna's radiation characteristics are aptly described by only two radiation patterns. These principle plane patterns are the horizontal (azimuth) radiation pattern and the vertical (elevation) radiation pattern. To measure the horizontal pattern, the probe moves in the x-y plane ( $\Theta = 90^\circ$  and  $\phi$  varies). To measure the vertical pattern, the probe moves in the x-z plane ( $\phi = 0^\circ$  and  $\Theta$  varies).

The radiation pattern can be graphically represented in two ways. One is by a rectangular plot, where angular position is defined by the x-axis and signal level by the y-axis. The second is a polar plot, where angular position is equivalent to the angular position on a circle—relative to a reference radial—and signal level is plotted relative to the center of the circle at a distance proportional to the signal level.

The signal level can be plotted as a function of linear voltage or linear power. In this case, the center of the polar plot is zero. If the levels are absolute values, the outside value of the polar plot is greater than one; for relative plots, the outside value is one. The pattern can also be plotted as a function of absolute logarithmic power level. In this case, the outside value of the polar plot is zero, and the center is not zero.

Examples of rectangular and polar plots using the altazimuth coordinate system are shown for an isotropic radiator and a half-wave dipole in Figures 6–9 (see following page). Figure 6 shows the absolute voltage elevation patterns where the peak value for the isotropic radiator is 1.00 and the dipole is 1.28. Figure 7 shows the absolute power elevation patterns where the peak value for the isotropic radiator is 1.00 and the dipole is  $1.64 = 1.28^2$ . Figure 8 shows the absolute power elevation patterns in dBi where the peak value for the isotropic radiator is 0.00 dBi =  $10 \log_{10}(1.00)$  and the dipole is 2.15 dBi =  $10 \log_{10}(1.64)$ . Figure 9 shows the relative power elevation patterns in dB where the peak value for both is 0.00 dB. Andrew uses the polar plot format, shown in Figure 9, for all Andrew base station antennas.

Antenna Fundamentals

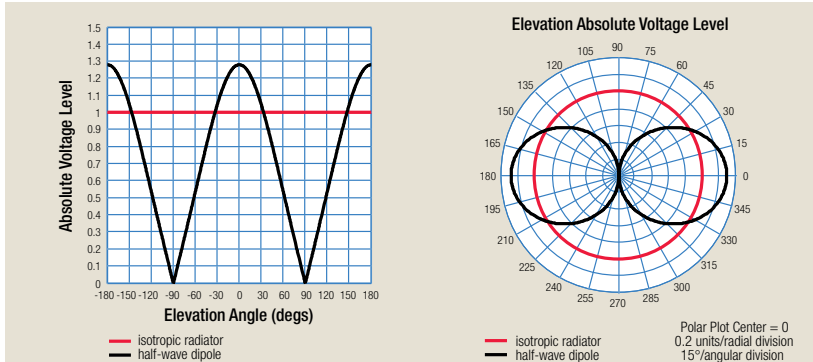


Figure 6 Rectangular and Polar Plots of Absolute Linear Voltage Levels for an Isotropic Radiator and a Half-Wave Dipole

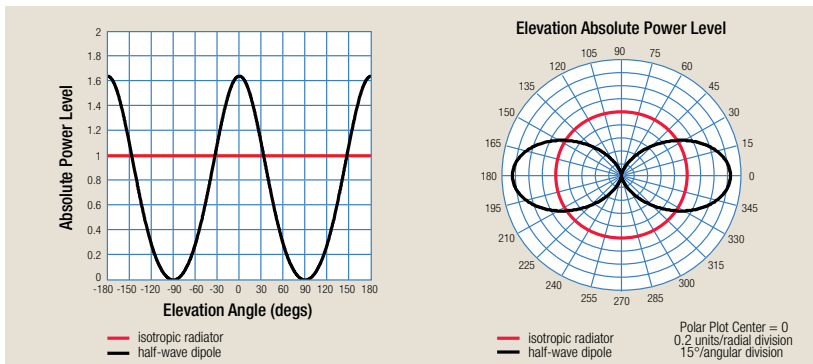


Figure 7 Rectangular and Polar Plots of Absolute Linear Power Levels for an Isotropic Radiator and a Half-Wave Dipole

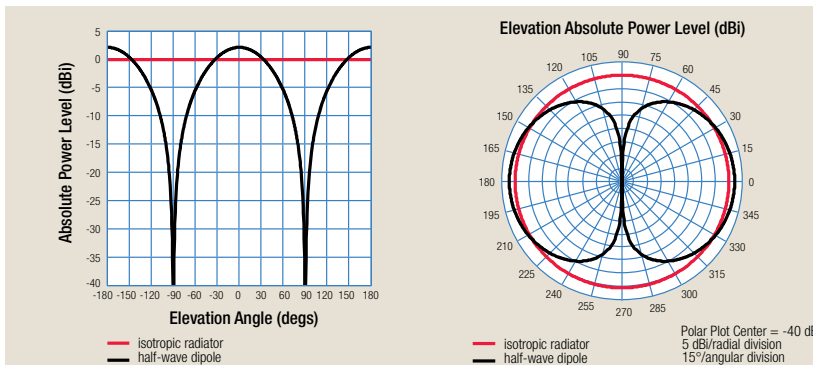


Figure 8 Rectangular and Polar Plots of Absolute Power Levels in dBi for an Isotropic Radiator and a Half-Wave Dipole

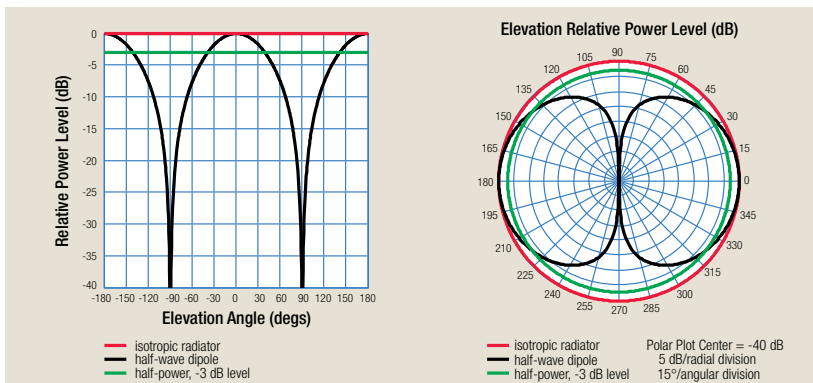


Figure 9 Rectangular and Polar Plots of Relative Power Levels in dB for an Isotropic Radiator and a Half-Wave Dipole

**Antenna Gain**

Perhaps the second most important parameter in selecting a base station antenna is gain. Gain is proportional to the product of directivity and the antenna's efficiency. Directivity is a measure of how an antenna focuses energy, while the antenna's efficiency accounts for losses associated with the antenna.

$$G = e D$$

$$G \text{ (dBi)} = 10 \log_{10} (e D)$$

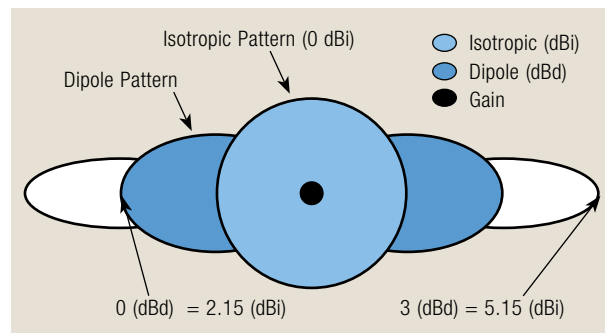
where  $G$  = antenna gain relative to an isotropic radiator  
 $e$  = antenna efficiency  
 $D$  = antenna directivity relative to an isotropic radiator

$$G \text{ (dBi)} = D \text{ (dBi)} - L \text{ (dB)}$$

where  $L$  = losses due to resistance of conductors, dielectrics, impedance mismatch, polarization

Gain is always referenced to an isotropic radiator (a device that radiates energy in all directions equally). The unit of measure is the dBi. Gain also may be referenced to a half-wave dipole, where the unit of measure is dBd. The gain of a dipole is 2.15 dBi or 0.00 dBd.

Figure 10 compares the gain of a given antenna rated in dBi (dB with respect to an isotropic radiator) to the same antenna rated in dBd (dB WRT a 1/2 wave dipole).



● **Figure 10**

Gain is a function of the frequency, as shown:

$$G = \frac{4\pi}{\lambda^2} A_e$$

where  $\lambda$  = wavelength, m  
 $A_e$  = effective aperture area, m<sup>2</sup>

$$\lambda = \frac{c}{f}$$

where  $c$  = speed of light, m/sec  
 $f$  = frequency, Hz

As aperture size increases, gain increases. For wireless sector and omni antennas, aperture size is mainly determined by the antenna's length. In general, gain doubles (3 dB increase) when the antenna length doubles. Practically, as length increases so do the losses, and a length will be reached where any increase in size will not give any substantial increase in gain, due to a matching increase in loss.

### Half Power Beamwidth

Half power beamwidth (HPBW) is a parameter that measures the shape of the radiation pattern. It is the angular width of the radiation pattern's main lobe. It is measured between the points where the power pattern is one-half (3 dB down) the main lobe's peak value. HPBW is usually specified for the horizontal and vertical radiation patterns. The exception to this is the horizontal pattern of an omnidirectional antenna that is circular.

Directivity can be estimated from the two principal plane HPBWs by using:

For sector antennas (1):

$$D \text{ (dBi)} = 10 \cdot \log_{10} \left[ \frac{41250}{(0.53 \cdot \text{HBW}_{3\text{dB}} + 0.25 \cdot \text{HBW}_{10\text{dB}} + 18) \cdot \text{VBW}_{3\text{dB}}} \right]$$

For omnidirectional antennas (2):

$$D \approx 191.0 \sqrt{0.818 + 1/\Theta_v} - 172.4$$

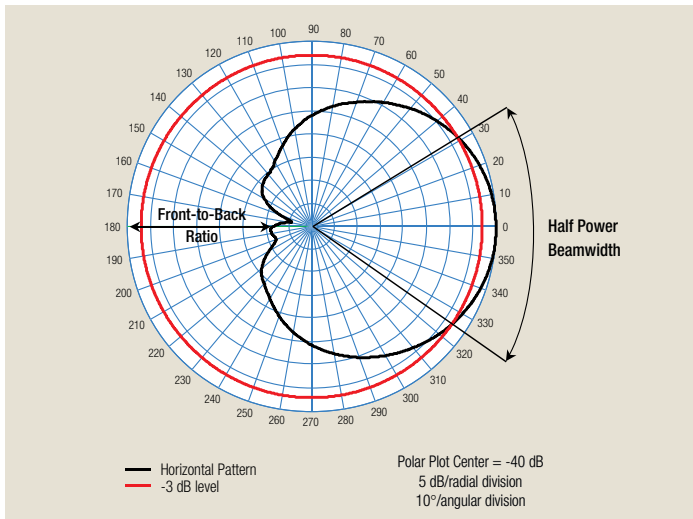
where  $\Theta_H$  = horizontal pattern half power beamwidth, degrees

$\Theta_v$  = vertical pattern half power beamwidth, degrees

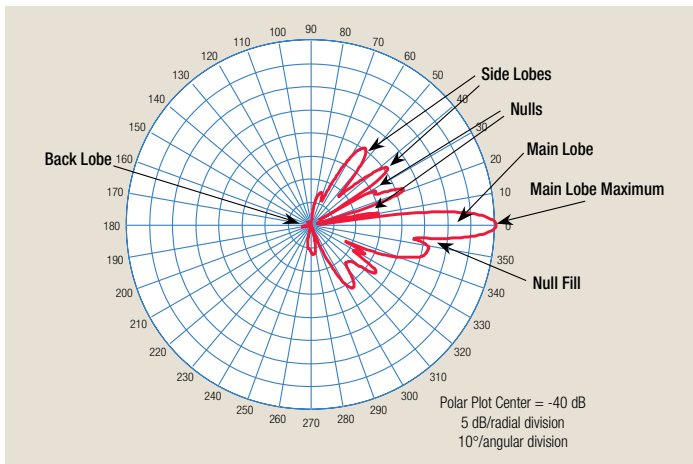
These formulas show that directivity increases as HPBW decreases.

An assumption needs to be made concerning the efficiency or the losses associated with an antenna to determine the gain. These formulas can then be used to ensure the appropriate gain has been chosen for specified horizontal and vertical HPBWs.

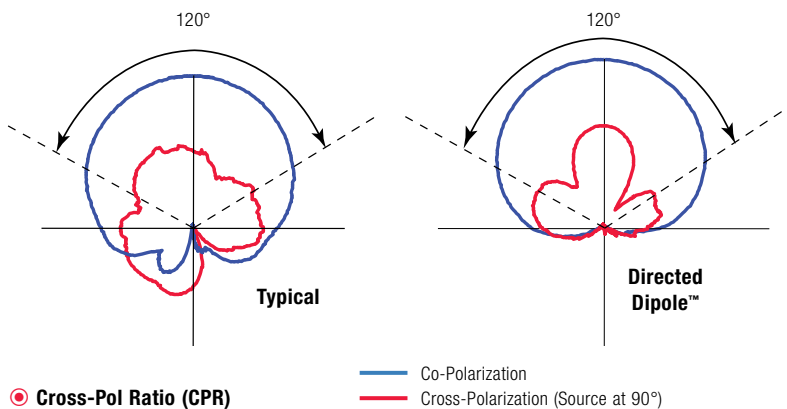
**Antenna Fundamentals**



● **Figure 11** Horizontal Pattern Polar Plot showing HPBW and Front-to-Back Ratio



● **Figure 12** Elevation Pattern Polar Plot showing Pattern Parameters



● **Cross-Pol Ratio (CPR)**

**Front-to-Back Ratio**

The front-to-back ratio is the ratio of the maximum directivity of an antenna (usually at  $\Theta = 0^\circ$ ,  $\Phi = 0^\circ$  in the altazimuth coordinate system) to its directivity in a rearward direction antenna (usually at  $\Theta = 0^\circ$ ,  $\Phi = 180^\circ$  in the altazimuth coordinate system). Figure 11 shows the HPBW and front-to-back ratio for a typical horizontal pattern.

**Side Lobes and Nulls**

A typical vertical pattern is shown in Figure 12. The main lobe (or main beam or major lobe) is the lobe in which the direction of maximum radiation occurs. A number of minor lobes are found above and below the main lobe. These are termed side lobes. Between these side lobes are directions in which little or no radiation occurs. These are termed nulls. Nulls may represent a 30 or more dB reduction (less than one-thousandth the energy of the main beam) in received signal level in that direction.

Techniques exist to lower upper side lobes and redirect some of the radiating energy and fill in nulls. This is termed null fill. Often, the consequence of doing this is to widen the main lobe and thus lower the directivity and reduce the antenna's gain.

**Cross-Polarization Ratio (CPR)**

CPR is a comparison of the co-polarized vs. cross-polarized pattern performance of a dual-polarized antenna generally over the sector of interest (alternatively over the 3 dB beamwidth).

It is a measure of the ability of a cross-polarized array to distinguish between orthogonal waves. The better the CPR, the better the performance of polarization diversity.

## Antenna Fundamentals

### Beam Squint

The amount of pointing error of a given beam referenced to mechanical boresite.

The beam squint can affect the sector coverage if it is not at mechanical boresite. It can also affect the performance of the polarization diversity style antennas if the two arrays do not have similar patterns.

### Horizontal Beam Tracking

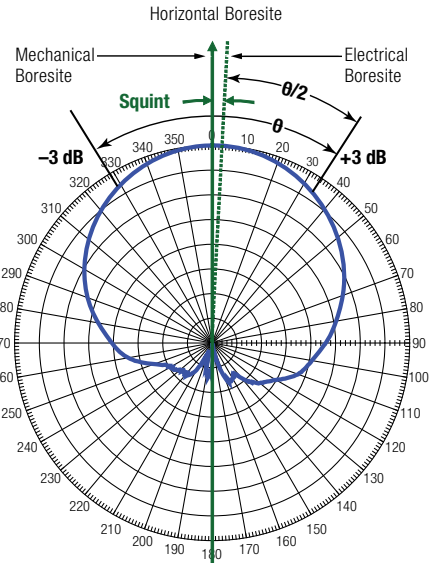
Refers to the beam tracking between the two beams of a  $\pm 45^\circ$  polarization diversity antenna over a specified angular range.

For optimum diversity performance, the beams should track as closely as possible.

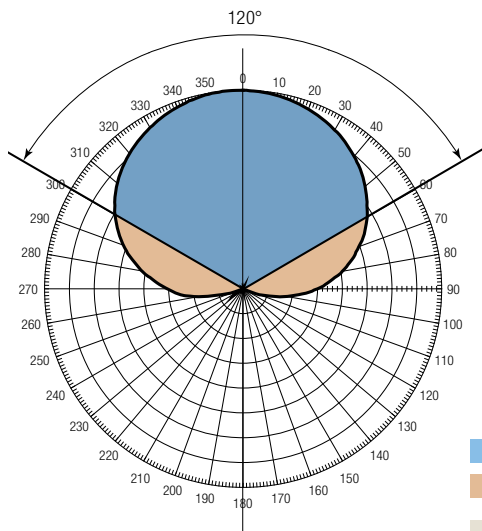
### Sector Power Ratio (SPR)

SPR is a ratio expressed in percentage of the power outside the desired sector to the power inside the desired sector created by an antenna's pattern.

It is a percentage that allows comparison of various antennas. The better the SPR, the better the interference performance of the system.



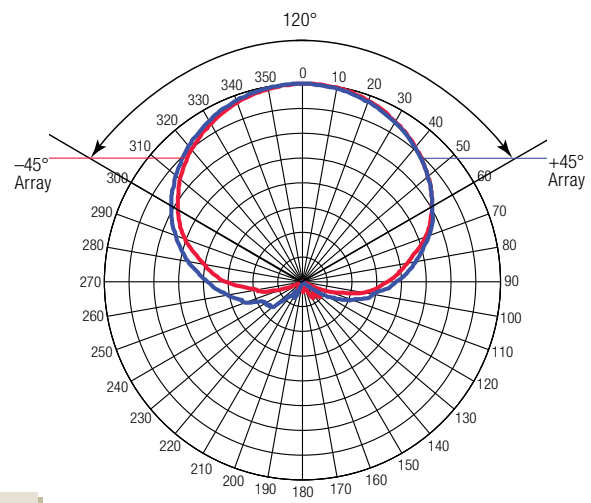
• Beam Squint



• Sector Power Ratio

■ Desired  
■ Undesired

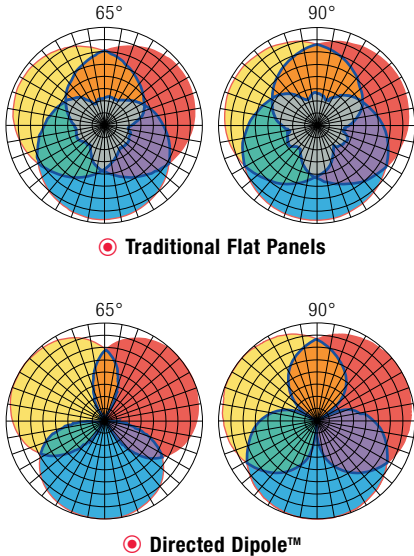
$$SPR (\%) = \frac{\sum_{300} P_{\text{Undesired}}}{\sum_{300} P_{\text{Desired}}} \times 100$$



• Horizontal Beam Tracking



**Antenna Fundamentals**



**The Impact**

**Lower Co-Channel Interference/Better Capacity and Quality**

In a three sector site, traditional antennas produce a high degree of imperfect power control or sector overlap.

Imperfect sectorization presents opportunities for:

- Increased softer hand-offs
- Interfering signals
- Dropped calls
- Reduced capacity

The rapid roll-off of the lower lobes of the Directed Dipole™ antennas create larger, better defined “cones of silence” behind the array.

- Much smaller softer hand-off area
- Dramatic call quality improvement
- 5%–10% capacity enhancement

**120° Sector Overlay Issues**

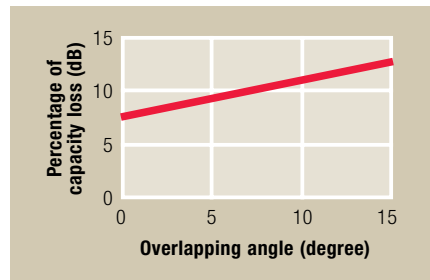
For network optimization, much emphasis has been placed on improved elevation (vertical) pattern shaping, such as downtilt, null fill and upper sidelobe suppression. References from two technical papers are shown below that support the fact that azimuth pattern shaping can also play a large role in network optimization.

“... From the numerical results, the user capacities are dramatically decreased as the imperfect power control increases and the overlap between the sectors (imperfect sectorization) increases . . .”

The quote noted above was used in the following technical paper:

“On the Capacity and Outage Probability of a CDMA Hierarchical Mobile System with Perfect/Imperfect Power Control and Sectorization”

By: Jie ZHOU et al., *IEICE TRANS FUNDAMENTALS*, VOL.E82-A, NO.7 JULY 1999



The graph shown above was used in the following technical paper:

“Effect of Soft and Softer Handoffs on CDMA System Capacity”

By: Chin-Chun Lee et al., *IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY*, VOL. 47, NO. 3, AUGUST 1998

Parameters like improved azimuth pattern rolloff beyond the 3 dB points and improved front-to-back ratio—both co-polarization and cross-polarization—are key features. The goal is to have enough sector-to-sector overlap to accommodate desired handoffs, while minimizing the excess overlap which can result in interference. In CDMA type systems this shows up as pilot pollution, while in GSM systems it can show up as unwanted coverage. The excerpt graph shown above presents a quantitative measure of how this overlapping angle can affect capacity loss in a CDMA network. Qualitatively, excessive overlay also reduces capacity of TDMA and GSM systems.



Antenna Fundamentals

**Polarization**

The polarization of an antenna is a property of the radio wave that is produced by the antenna. Polarization describes how the radio wave (displacement current, electric field vector) varies in space with time. This is an important concept because for a radio wave transmitted with a given polarization to be received by another antenna, the receive antenna must be able to receive this polarization and be oriented to do so. At a given point in space, the general shape traced by the electric field vector is an ellipse, shown in Figure 13.

The instantaneous value of the wave (blue arrows) can be written as:

$$\vec{E}(t) = E_{1m} \cos(\omega t) \vec{u}_1 + E_{2m} \cos(\omega t + \delta) \vec{u}_2$$

Where  $\delta$  is the phase by which the  $u_2$ -component leads the  $u_1$ -component.

A summary of basic polarization types and necessary component values is shown in the table below.

Polarization	$E_{1M}$	$E_{2M}$	$\delta$
Vertical	0	1	$0^\circ$
Horizontal	1	0	$0^\circ$
Slant right $45^\circ$	$1/\sqrt{2}$	$1/\sqrt{2}$	$0^\circ$
Slant left $45^\circ$	$1/\sqrt{2}$	$1/\sqrt{2}$	$180^\circ$
Right-hand circular	$1/\sqrt{2}$	$1/\sqrt{2}$	$-90^\circ$
Left-hand circular	$1/\sqrt{2}$	$1/\sqrt{2}$	$90^\circ$

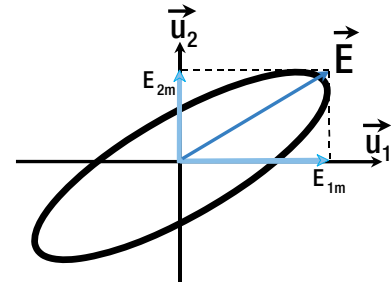


Figure 13 General Polarization Ellipse

Figure 14 illustrates these basic polarization types. Polarizations are said to be orthogonal if any arbitrary polarization can be expressed as a combination of the two orthogonal polarizations. The most common two orthogonal polarizations are vertical and horizontal. All practical antennas are composed of two orthogonal components. The cross-polarized response is the power received by the polarization orthogonal to the desired polarization (co-polarization) in a specified plane.

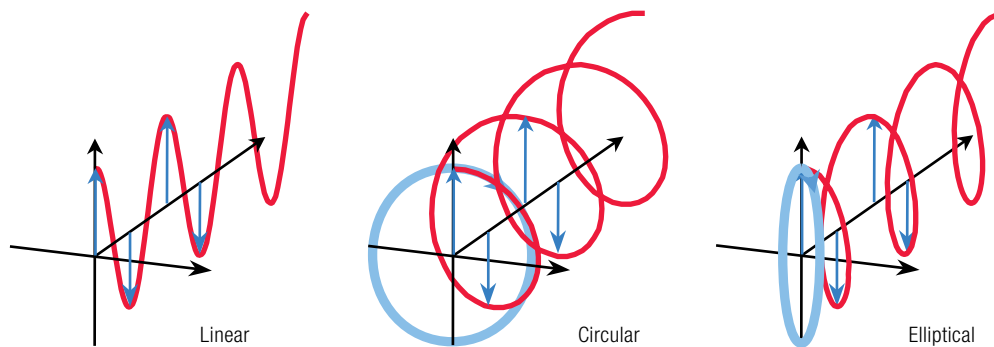
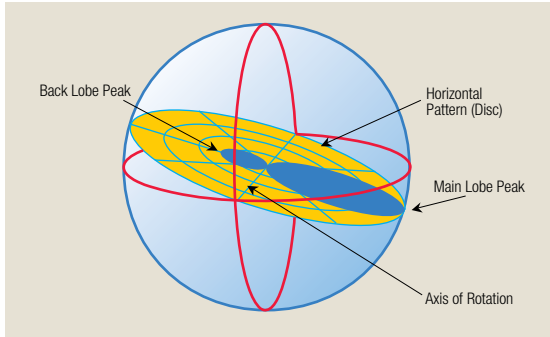


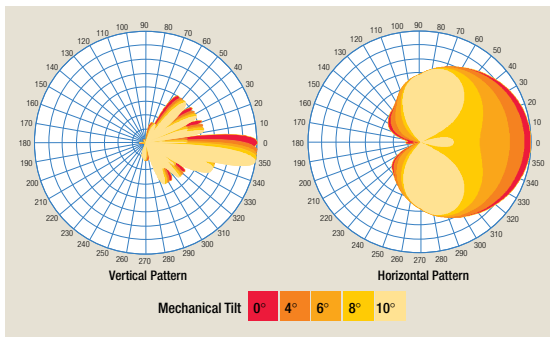
Figure 14 Polarization Types

**Antenna Fundamentals**

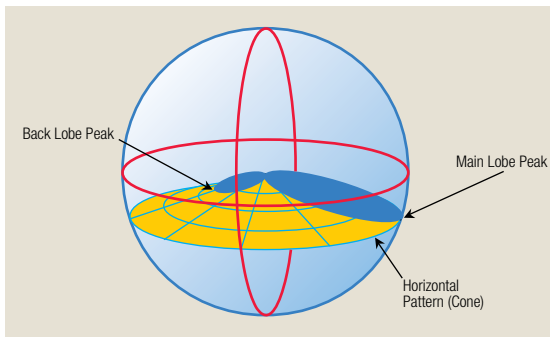
● **Figure 15**  
Mechanical  
Downtilt



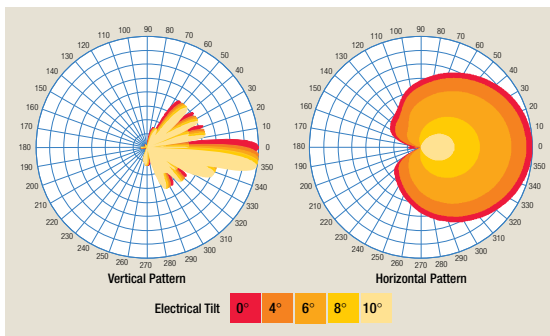
● **Figure 16**  
Patterns  
using  
Mechanical  
Downtilt



● **Figure 17**  
Electrical  
Downtilt



● **Figure 18**  
Patterns  
using  
Electrical  
Downtilt



**Beamtilt**

To reduce the coverage of a specific antenna, not only can the input power be reduced but the main lobe can be tilted below the horizon (maximum radiation does not occur in the direction of the horizon). The simplest way to achieve this is to mechanically tilt the antenna. The antenna can also be designed so that the main lobe does not point toward the horizon. This is achieved by electrical techniques associated with the antenna's feed network and is termed electrical downtilt.

When an antenna is mechanically tilted, its radiation characteristics do not change. However, the coverage on the ground is affected. This can best be explained by using Figure 15. Imagine that the horizontal pattern is a disc that is rotated about an axis that lies perpendicular to the direction of main radiation (main lobe). When the disc is rotated so that the main beam tilts down, at  $\pm 90$  degrees from the peak (axis of rotation), nothing happens, while at  $\pm 180$  degrees (back lobe), the pattern points upwards. Thus, a mechanically tilted sector antenna gives a reduced coverage footprint at the peak of the beam, but as the angle increases from this point, the effect of the beamtilt decreases.

Figure 16 shows how the horizontal radiation pattern becomes distorted as mechanical tilt increases. This is because at a constant distance, as the pattern tilts, the received signal level is not a function of the main beam peak but is a function of the slope of the main lobe or even an upper side lobe. While at  $\pm 90$  degrees, no change in the horizontal pattern occurs.

With electrical downtilt, the radiation characteristics of the antenna do change. This can be visualized by taking the horizontal pattern disc, mentioned above, and cutting into its center so that a cone can be formed. Now, the whole pattern is tilted, as shown in Figure 17.

Figure 18 shows how the horizontal radiation pattern remains the same shape as electrical tilt increases.

Andrew Corporation offers two categories of antennas with beam-tilting capabilities:

- Manual electrical tilt (MET)
- Remote electrical tilt (RET)

To adjust a Manual Electrical Tilt antenna, a person must physically adjust the antenna's tilt mechanism. The tilt mechanism allows re-configuration of the antenna while it is installed in its mounted location. This often involves the climbing of a tower while the RF equipment at the site is turned off.

## Antenna Fundamentals

As an alternative, a remote electrical tilt antenna has an actuator or motor drive attached to the antenna to allow the tilt to be adjusted remotely from the base of the tower using a local controller. Multiple antennas/sites can be controlled independently or in groups using this concept.

See the Teletilt® section of this catalog for more information.

### VSWR and Return Loss

VSWR and return loss (RL) are measures of how much energy is reflected from an antenna's input. The amount of energy reflected by the antenna depends on the antenna's input impedance. The input impedance of an antenna consists of two parts, the self-impedance and the mutual impedance. The self-impedance is that impedance determined by the antenna on its own. The mutual impedance is determined by the antenna's surroundings (energy radiated by the antenna that is reflected back into the antenna from surrounding objects). The relationships between an antenna's input impedance,  $Z$ , and its VSWR and RL,  $\Gamma$ , are:

$$\Gamma = \frac{Z - Z_0}{Z + Z_0} \quad \text{VSWR} = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

$$\text{R.L.} = 20 \log_{10} (\Gamma) = 20 \log_{10} \left( \frac{\text{VSWR} - 1}{\text{VSWR} + 1} \right)$$

where  $\Gamma$  = reflection coefficient

$Z$  = antenna's input impedance

$Z_0$  = characteristic impedance of system

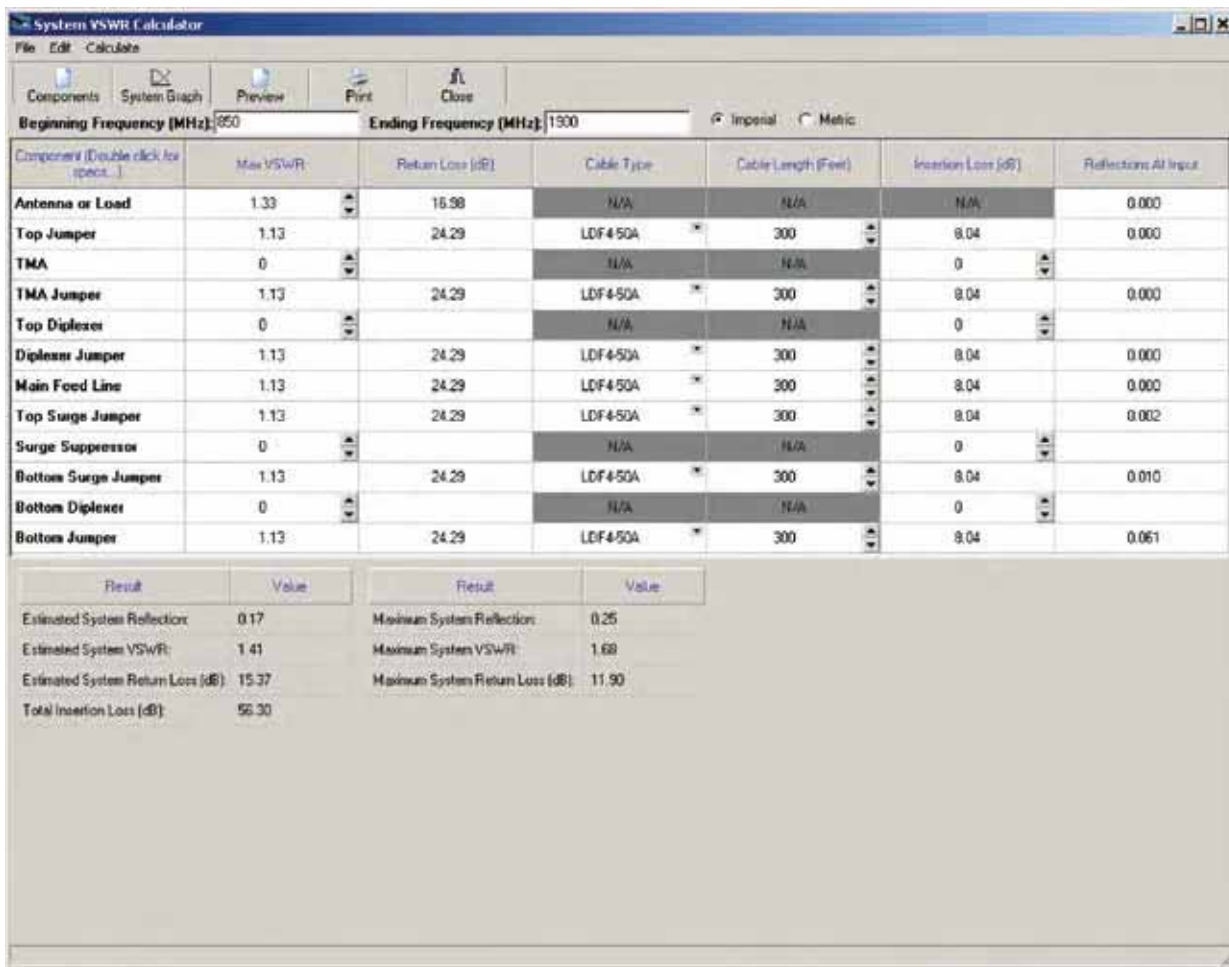
VSWR or return loss is only one component of an antenna. The table below shows how VSWR can increase (RL will decrease) without significantly increasing the antenna's overall loss (decreasing the antenna's gain).

VSWR	Return Loss, dB	Transmission Loss, dB	Power Reflected, %	Power Transmitted, %
1.0	$\infty$	0.00	0.0	100.0
1.10	26.4	0.01	0.2	99.8
1.20	20.8	0.04	0.8	99.2
1.30	17.7	0.08	1.7	98.3
1.40	15.6	0.12	2.8	97.2
1.50	14.0	0.18	4.0	96.0
2.00	9.5	0.51	11.1	88.9

**Antenna Fundamentals**

**System VSWR Calculator**

Often system VSWR (or return loss) readings are measured near the base station equipment at the base of the tower. These readings will be influenced by all the various components in the RF path. The estimated system VSWR calculator shown in Figure 19 mathematically calculates the theoretical RMS value expected for the combination of the components specified. Please visit [www.andrew.com](http://www.andrew.com) and click on Software, CableMaster™ to download the latest VSWR calculator tool and experience its capabilities.



● **Figure 19** System VSWR Calculator Shown at 850 MHz Frequency

## Antenna Fundamentals

### Intermodulation

A characteristic of passive devices used in radio systems that is becoming increasingly important is intermodulation distortion (IMD). Nonlinearities within these passive devices cause the appearance of unwanted frequencies equal to the integral multiples and sums and differences of integral multiples of the unwanted frequencies. The simplest scenario is when two carriers at frequency  $f_1$  and  $f_2$  are fed into an antenna. If a nonlinearity is present, then the following frequencies are generated:

$$f_{\text{IMD}} = n f_1 \pm m f_2$$

where  $f_{\text{IMD}}$  = frequency generated by nonlinearity

$$n = 0, 1, 2 \dots$$

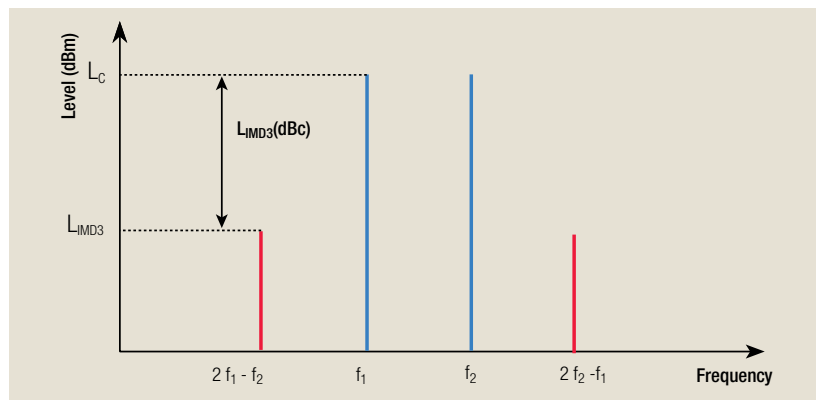
$$m = 0, 1, 2 \dots$$

when  $n$  or  $m = 0$ , then  $f_{\text{IMD}}$  is a harmonic

$n$  and  $m \neq 0$ ,  $n + m$  is the order of the  $f_{\text{IMD}}$

For passive devices, the  $f_{\text{IMD}}$  that contain the most amount of energy are the third order products,  $2 f_1 - f_2$  and  $2 f_2 + f_1$ . Although these products do not often cause problems, they are the easiest to measure and usually specified. Figure 20 is a graphical representation of the 2-carrier IMD situation.

In passive devices, significant intermodulation is usually caused by ferromagnetic components in the RF path and poor connections between metal parts. The presence of significant intermodulation can be mitigated by a combination of good design and good construction practices.



● **Figure 20** Third Order Intermodulation Distortion Representation

### Power Rating

The input power to the antenna terminals verifies that the antenna can safely handle and deliver its rated performance. Generally, it is limited to the power handling capacity of the feed line. Many digital systems will include both average power and peak power requirements.



**Base Station Antenna Materials and Mechanical Characteristics**

**Materials**

The selection of materials that will be used in an antenna or array breaks down to materials for the component parts:

- The radiating elements and support members
- Radomes
- Feed harness and connectors
- Hardware and mounting

**Radiating Elements and Support Members**

In base station antennas, where size and weight must be considered, aluminum alloys that combine high strength, low weight, good resistance to corrosion, and good conductivity are a natural choice in metals.

Pressure cast aluminum is very well suited to certain parts such as bases, sockets, mounts and clamps. It has higher resistance to corrosion than the high strength aluminum alloys while its hardness prevents metal "creep," undesirable in clamps.

Copper and brass also are frequently used where size and weight are not factors. Principal advantages are ease of plating and similar metal contacts with the feed cable.

**Radomes**

Radomes are typically fabricated from high strength, low RF loss materials such as fiberglass or ABS. Materials must be ultraviolet (UV) resistant to avoid deterioration after long exposure to sunlight.

**Mechanical Failure**

This generally occurs when wind and ice loads exceed the yield strength of the material or where metal fatigue occurs after long-term cycling back and forth of a member due to wind vibrational forces. The material shape and size should be selected so that the maximum forces imposed on it—including fatigue—will be less than the yield point of the material. Experience is the best guide for proper safety factor.

**Corrosion**

This is an important consideration in metallic members and where dissimilar metals are brought into physical contact; care must be given to the materials used in order to avoid severe galvanic corrosion. Galvanic corrosion occurs as a speed-up of corrosion where moisture is present between dissimilar metals causing electrical current flow between them similar to a battery or electroplating action.

Galvanic corrosion can be eliminated by the use of similar materials or by passivating the materials in contact by plating or chemical conversion treatment (aladine or iridite). Where dissimilar metals must be brought into contact under stress conditions where the surface of chemical conversion would be scratched or impaired, the metals should be close to each other in the galvanic series (see Table of Galvanic Series) so that galvanic action is very slow.

For example, copper or brass lugs should be zinc plated (not silver) for connection to aluminum, and steel clamps or mounts to aluminum should be hot dip galvanized (molten zinc). Copper or brass should never be placed in contact with aluminum without passivating or plating the metal surfaces in contact.

**Table of Galvanic Series**

Relative Position of Metals and Platings Commonly Used

- (1) Magnesium
- (2) Zinc
- (3) Aluminum
- (4) Aluminum Alloys
- (5) Cadmium
- (6) Steel or Iron
- (7) Stainless Steel (active)
- (8) Lead-Tin Solders
- (9) Lead
- (10) Tin
- (11) Nickel (active)
- (12) Brass
- (13) Copper
- (14) Monel
- (15) Silver
- (16) Gold
- (17) Platinum

Note: Low number is anode and high number cathode. Metal flows from low number to high number in galvanic action. Water accumulation in hollow members can be avoided with drainage holes near the low point. Not only does this reduce corrosion but it protects against freeze bursting in cold weather.

**Insulators**

These include radiator support insulators, insulated element spacers or insulated stiffeners. In general, insulators should be avoided wherever possible since they are subject to breakage or damage and can deteriorate performance. At the higher frequencies, they can introduce dielectric capacitance that produces higher antenna VSWR. Desirable qualities in such insulators are: low dielectric constant, low power factor (low loss) at the operating frequencies, low water absorption, ability to operate well within the temperature range without



## Base Station Antenna Materials and Mechanical Characteristics

undue change, resistance to ultraviolet radiation from sunlight and to certain gases, mechanical strength, mechanical impact resistance, and workability in machining or molding. Depending on the application, certain of the newer urethanes, epoxies, and synthetic resins meet most of the basic requirements at reasonable cost.

### Coaxial and Printed Circuit Feed Networks

Element feed networks are generally coaxial harnesses, printed circuits, air dielectric stripline or a hybrid combination of all three.

A feed harness or “feed” includes the transmission line (generally coaxial) from the antenna input terminal to the actual connection on the radiator(s). This includes all matching transformers and interconnections between radiators such as tees or multi-junction connections.

Mechanical strain must be avoided on the cables and connectors. The inner conductors of small cable such as RG-141 should be given relief from direct strain. Sharp bends should be avoided in all cables.

Printed circuit feed networks are more often employed above 800 MHz where they can facilitate elevation beam shaping with upper sidelobe suppression and null fill. Often the feed network and the radiating elements can occupy the same printed circuit board. Whenever printed circuit boards are employed the use of conformal coating is mandatory to protect the circuits from environmental contamination (moisture, corrosion, etc.).

### Air Dielectric Striplines

Air dielectric stripline-feed networks provide the lowest loss technology available. The feed networks are formed from a single piece of material, thus minimizing RF connection points. The use of high quality fabrication techniques yields very repeatable patterns and performance. By careful design, this technology can also facilitate the same type of beam shaping provided by printed circuit board technology.

### Mechanical Characteristics

While electrical characteristics determine antenna performance, mechanical characteristics are equally important in overall considerations of the antenna system since they largely determine the life and serviceability.

Station antennas often are mounted on tall towers where the expense of installation may equal or exceed the price of the antenna itself. It is important, therefore, that the antenna be capable of withstanding the environmental conditions of wind and ice without failure, and also be able to resist the weathering effect of atmospheres it is normally subjected to.

### Wind and Ice

Since antennas are installed in all areas under various conditions of wind and ice, it is difficult to set a value of wind and ice loading that will satisfy the maximum or severe conditions without overdesigning with unduly high cost for those areas where severe conditions of wind and ice as encountered on some mountaintops must be handled by specially rugged designs.

The force (F) or load that wind of a given velocity exerts on an antenna surface is

$$F = A \frac{\rho V^2}{2} C_d, \text{ where}$$

**A**—Antenna area projected on a surface perpendicular to the vector of wind velocity

**$\rho$** —Air density

**V**—Wind velocity

**$C_d$** —Drag coefficient, for antennas depends on cross section shape, ratio of Length/Width (Depth) and Reynolds number

Wind load can also be calculated using equivalent flat plate area ( $A_{fp}$ , see product data sheets available on the Andrew web site at [www.andrew.com](http://www.andrew.com)) per formula shown below:

$$F = A_{fp} \frac{\rho V^2}{2} C_{d_{fp}}, \text{ where}$$

drag coefficient of flat plate

$$C_{d_{fp}} = \text{constant} = 2.2$$

The minimum design criteria for wind load should be to handle true wind velocities of 100 mph (161 km/hr) without ice and when feasible the design should be capable of handling stronger winds because many hurricane areas are subjected to winds in excess of 100 mph (161 km/hr). Where icing conditions are prevalent a separate loading should be calculated for 0.5 in (12.7 mm) radial ice with maximum wind velocity reduced because with such icing it is not usual to have hurricane force winds. The area should be the maximum area that the antenna could present to the wind, figuring that the wind could come from any direction.

### Connectors and Termination

Type N and 7–16 DIN connectors are suitable for use in mobile radio communications; however, UHF connectors should not be used above 300 MHz. For the demanding intermodulation (IM) specifications required by high-capacity systems, the 7–16 DIN Family of connectors is strongly recommended.

As in the case of fittings, there are preferences for antenna termination. Some users like the connector rigidly attached to the antenna support, while others prefer a flexible cable with fittings attached to its end. In either case, some flexible lead is desirable between the antenna and most transmission lines to facilitate installation and test. Andrew offers a selection of factory fabricated jumper cables—both standard and superflexible—to interface between tower mounted components.

### Hardware and Mounting

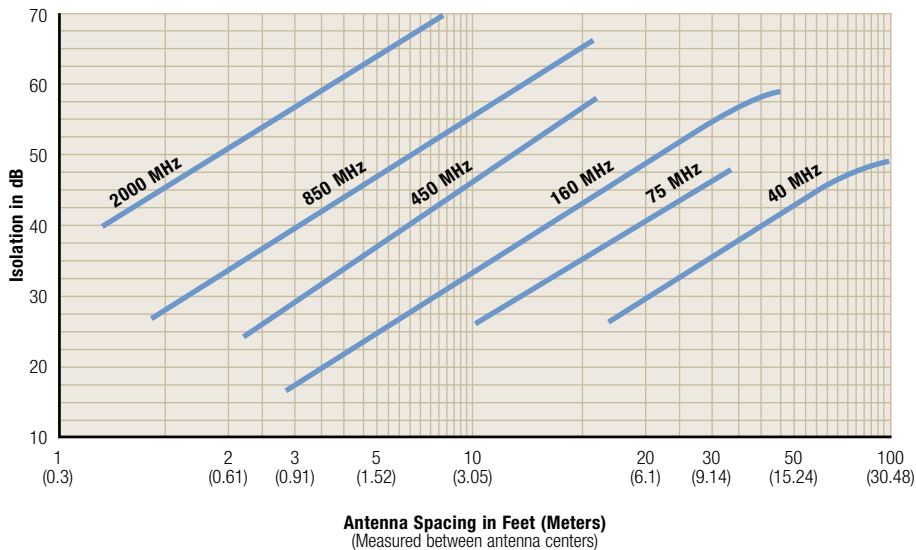
Small hardware such as bolts, nuts, and rivets used for attachment of radiating elements or support members should be of sufficient strength and resistant to corrosion. Stainless steel meets these requirements and is desirable for many applications. High strength aluminum alloys also are suitable and offer some advantage for aluminum-to-aluminum connection where galvanic corrosion is a problem.



**Base Station Antenna Materials and Mechanical Characteristics**

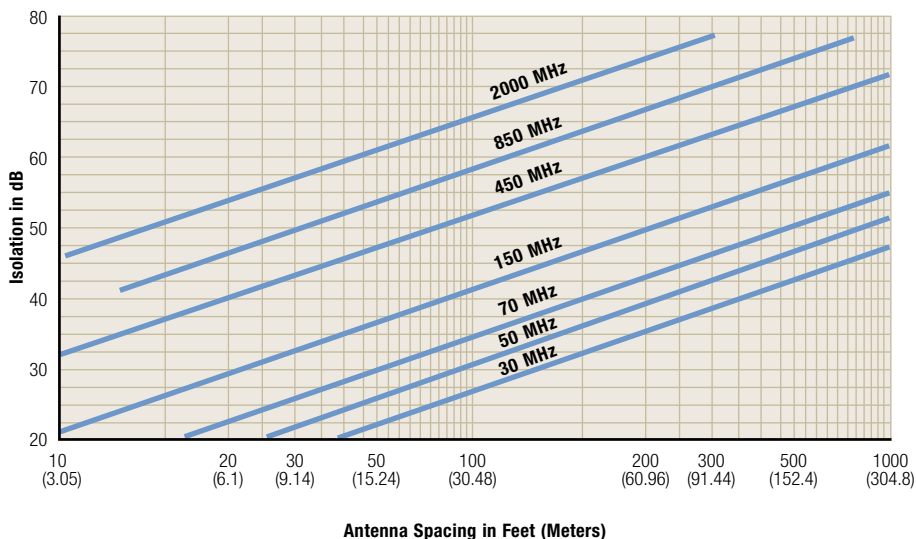
**Isolation Provided by Antenna Separation**

**ATTENUATION PROVIDED BY VERTICAL SEPARATION OF DIPOLE ANTENNAS**



The values indicated by these curves are approximate because of coupling that exists between the antenna and transmission line. Curves are based on the use of half-wave dipole antennas. The curves will also provide acceptable results for gain type antennas if (1) the spacing is measured between the physical center of the tower antennas and (2) one antenna is mounted directly above the other, with no horizontal offset (exactly collinear). No correction factor is required for the antenna gains.

**ATTENUATION PROVIDED BY HORIZONTAL SEPARATION OF DIPOLE ANTENNAS**



Curves are based on the use of half-wave dipole antennas. The curves will also provide acceptable results for gain type antennas if (1) the indicated isolation is reduced by the sum of the antenna gains and (2) the spacing between the gain antennas is at least 50 ft. (15.24 m) (approximately the far field).

Heavy hardware such as clamps, orientation mounts and offset brackets, should be steel, protected with hot dip galvanize finish, or cast aluminum—depending on the application. Heavy directive arrays should incorporate into the mount a convenient means of orientation with positive position locking. Clamps and mounts should be heavy duty in order to transfer the full antenna load to the support tower or mast.

Stainless steel locking bands of the radiator hose type are very suitable for many attachments provided that they are properly applied. The draw-up screws should always be positioned so as to draw down against a firm member (preferably round) in order to force locking and holding of the screw to the band slots. Properly applied, these clamping bands are extremely strong and will maintain clamping force indefinitely. They offer a convenient means of fastening to various sizes and shapes of towers and masts.

**Painting Base Station Antennas**

To help antennas blend into the background and make zoning easier, many customers desire to paint the entire antenna. This can be easily accomplished if a non-metallic based paint is used and smooth surfaces are slightly roughed for better adhesion. For more information please visit our website at [www.andrew.com/products/antennas/bsa](http://www.andrew.com/products/antennas/bsa) and select BSA Technical Literature.

## Base Station Antenna Materials and Mechanical Characteristics

### Performance of Commonly Used Coaxial Cables/Transmission Lines

Attenuation losses in dB/100 ft. (30.48 m) of line and maximum average power ratings in watts<sup>1</sup> coaxial transmission lines commonly used with 2-way radio antenna systems.

Frequency in MHz	30	50	88	150	450	894	960	1700	2000
RG-8/U	1 dB 1100 W	1.4 dB 900 W	1.7 dB 500 W	2.8 dB 300 W	5.2 dB	8.6 dB			
RG-58/U	2.2 dB 450 W	3.5 dB 300 W	4.4 dB 250 W	6.8 dB 170 W	12 dB 80 W	17.5 dB			
1/2" Super flexible FSJ4-50B	0.557 dB 5750 W	0.724 dB 4420 W	0.971 dB 3300 W	1.28 dB 2490 W	2.31 dB 1380 W	3.38 dB 947 W	3.52 dB 909 W	4.88 dB 656 W	5.37 dB 597 W
1/2" LDF <sup>2</sup> LDF4-50A	0.357 dB 6460 W	0.463 dB 4980 W	0.619 dB 3730 W	0.815 dB 2830 W	1.45 dB 1590 W	2.09 dB 1100 W	2.17 dB 1060 W	2.97 dB 777 W	3.25 dB 710 W
7/8" AL AL5-50	—	—	—	0.464 dB 5100 W	0.824 dB 2900 W	1.19 dB 2000 W	1.24 dB 1900 W	1.69 dB 1400 W	1.85 dB 1300 W
7/8" LDF <sup>2</sup> LDF5-50A	0.195 dB 14100 W	0.254 dB 10800 W	0.34 dB 8080 W	0.449 dB 6120 W	0.808 dB 3410 W	1.18 dB 2340 W	1.23 dB 2240 W	1.7 dB 1620 W	1.86 dB 1480 W
7/8" AVA <sup>3</sup> AVA5-50	0.183 dB 14000 W	—	—	0.417 dB 6140 W	0.744 dB 3440 W	1.08 dB 2380 W	1.12 dB 2290 W	1.54 dB 1670 W	1.68 dB 1520 W
1 1/4" LDF <sup>2</sup> LDF6-50	0.135 dB 22000 W	0.176 dB 16900 W	0.237 dB 12600 W	0.314 dB 9470 W	0.571 dB 5220 W	0.841 dB 3540 W	0.876 dB 3400 W	1.22 dB 2430 W	1.35 dB 2.21 W
1 5/8" AL AL7-50	—	—	—	0.271 dB 8090 W	0.487 dB 4500 W	0.711 dB 3090 W	0.740 dB 2970 W	1.02 dB 2140 W	1.13 dB 1950 W
1 5/8" LDF <sup>2</sup> LDF7-50A	0.109 dB 30900 W	0.142 dB 23600 W	0.191 dB 17500 W	0.254 dB 13200 W	0.467 dB 7180 W	0.694 dB 4830 W	0.724 dB 4630 W	1.02 dB 3280 W	1.13 dB 2960 W
1 5/8" AVA <sup>3</sup> AVA7-50	0.105 dB 28000 W	—	—	0.243 dB 12100 W	0.439 dB 6720 W	0.643 dB 4590 W	0.67 dB 4410 W	0.93 dB 3170 W	1.02 dB 2880 W
2 1/4" LDF <sup>2</sup> LDF12-50	0.091 dB 39800 W	0.119 dB 30400 W	0.161 dB 22500 W	0.215 dB 16800 W	0.4 dB 9060 W	0.601 dB 6030 W	0.628 dB 5780 W	0.896 dB 4050 W	0.994 dB 3650 W

<sup>1</sup>Power ratings are based on EIA standard Rs-100 for a maximum inner conductor temperature of 100°C at 40°C ambient. Ratings should be divided by VSWR as measured at the input to the transmission line to account for hot spots.

<sup>2</sup>Low density foam dielectric, copper conductors.

<sup>3</sup>Virtual air.

### Side-Mounted Omnidirectional Antennas at 450 MHz and 800 MHz

At these frequencies standard towers have dimensions of several wavelengths and therefore become complicated reflectors. It is preferable at these frequencies when side-mounting an omnidirectional antenna, to mount off the leg of the tower, rather than the face, and at a distance as far as practical. However, if the desired coverage area does not have to be circular, mounting the antenna at one quarter to five quarter wavelengths is often acceptable. Pattern nulls of 10 to 15 dB can usually be tolerated in areas where communication is not needed.

### References

Balanis, C.A. *Antenna Theory: Analysis and Design*, New York, NY: Wiley, 1982

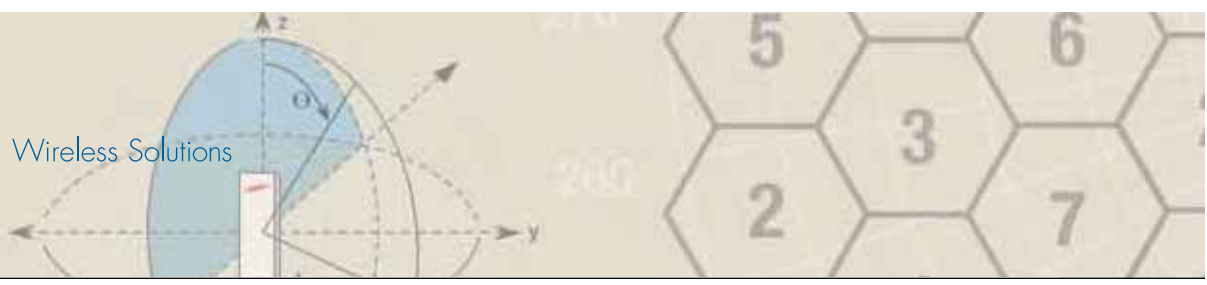
Schrank, H. 1993. *IEEE Antennas and Propagation Magazine*, 35:5, 50-1

Notes



A series of horizontal lines for writing notes.





**Notes**

Lined area for taking notes.





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