

DC Surge Protection for RRH/Integrated Antenna Radio Head **RxxDC-1064-PF-48**

Sector Model

Raycap's flexible sector protection and distribution products provide protection for up to 2 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.



Features

- Employs the Strikesorb® 30-V1-HV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V).
- The Strikesorb 30-V1-HV is a Class I SPD, certified by VDE per the IEC 61643-1 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-HV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units.
- Alarms for SPD sacrifice, Moisture detection and Intrusion.
- Fully recognized to the UL 1449 3rd Edition Safety Standard.
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents.
- Protects up to 2 Remote Radio Heads and connects up to 8 fiber pairs.
- Utilizes an IP 67 rated enclosure, allowing for indoor or outdoor installation on a roof or tower top.
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 1.7" (will fit most standard 1 1/4" coax class cables) depending upon port configuration.
- Lightweight aerodynamic design provides maximum flexibility for tower top installation.
- Companion to the RxxDC-4750-PF-48 / RxxDC-3315-PF-48 (Tower/Base/Rooftop/Rooftop Distribution) models.



Sector Model:
RxxDC-1064-PF-48

Companion Base Models:
RxxDC-4750-PF-48
RxxDC-3315-PF-48

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G02-00-235 130129

SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head RxxDC-1064-PF-48

Sector Model

Electrical

Model Numbers	RxxDC-1064-PF-48
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [I_n]	20 kA 8/20 μ s
Maximum Surge Current [I_{max}]	60 kA 8/20 μ s
Maximum Impulse (Lightning) Current per IEC 61643-1	5 kA 10/350 μ s
Maximum Continuous Operating Voltage [U_c]	75 VDC
Voltage Protection Rating (VPR) per UL 1449 3rd Edition	400V
Protection Class as per IEC 61643-1	Class I
SPD Alarm	upon sacrifice
Intrusion Sensor	microswitch
Moisture Sensor	infrared moisture detector
Strikesorb Module Type	30-V1-HV Strikesorb modules installed to protect 2 Remote Radio Heads

Mechanical

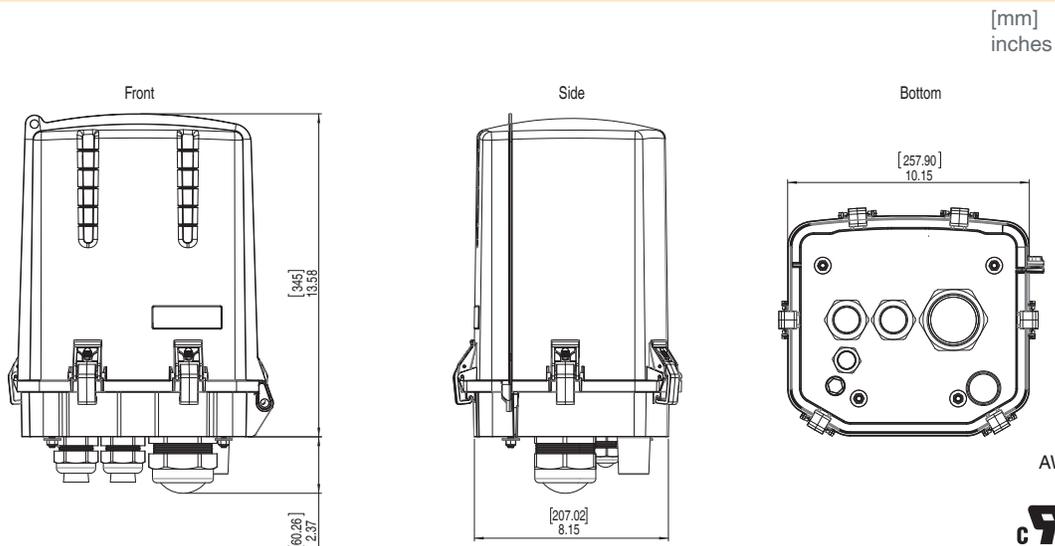
Suppression Connection Method	Compression lug, #20 - #6 AWG (0.5 mm ² - 16 mm ²)
Fiber Connection Method	LC-LC Single mode
Pressure Equalizing Vent	Gore™ Vent
Environmental Rating	IP 67
Operating Temperature	-40° C to +80° C
UV Resistant	Yes
Weight	System: 14 lbs (6.35 kg)
Combined Wind Loading	150mph (sustained): 80 lbs (356 N)

Standards Compliance

Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards

Standards	ANSI/UL 1449 3rd Edition
	IEEE C62.41
	NEMA LS-1, IEC 61643-1:2005 2nd Edition (Class I Protection)
	IEC 61643-12
	EN 61643-11:2002 (including A11:2007)

Product Diagram



AWG=American Wire Gauge



Raycap

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**DC Surge Protection for RRH/Integrated Antenna Radio Head
RxxDC-4750-PF-48 • RxxDC-3315-PF-48**

Tower / Base / Rooftop / Rooftop Distribution Models

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 6 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.



Shown with optional 90° elbow for side entry. Can be installed on left or right side of unit.

Mounting Bracket Included

Features

- Employs the Strikesorb® 30-V1-HV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V).
- The Strikesorb 30-V1-HV is a Class I SPD, certified by VDE per the IEC 61643-1 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-HV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units.
- Alarms for SPD sacrifice, Moisture detection and Intrusion.
- Fully recognized to the UL 1449 3rd Edition Safety Standard.
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents.
- Protects up to 6 Remote Radio Heads and connects up to 12 fiber pairs.
- Utilizes an IP 67 rated enclosure, allowing for indoor or outdoor installation on a roof or tower top.
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1 5/8" coax class cables) depending upon port configuration.
- Lightweight aerodynamic design provides maximum flexibility for tower top installation.
- Companion to the RxxDC-1064-PF-48 (Sector) model.



Tower / Base / Rooftop / Rooftop Distribution Models: RxxDC-4750-PF-48
RxxDC-3315-PF-48
Companion Sector Model: RxxDC-1064-PF-48



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SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head RxxDC-4750-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Electrical

Model Numbers	RxxDC-4750-PF-48	RxxDC-3315-PF-48
Nominal Operating Voltage	48 VDC	48 VDC
Nominal Discharge Current [I_n]	n/a	20 kA 8/20 μ s
Maximum Surge Current [I_{max}]	n/a	60 kA 8/20 μ s
Maximum Impulse (Lightning) Current per IEC 61643-1	n/a	5 kA 10/350 μ s
Maximum Continuous Operating Voltage [U_c]	n/a	75 VDC
Voltage Protection Rating (VPR) per UL 1449 3rd Edition	n/a	400V
Protection Class as per IEC 61643-1	n/a	Class I
SPD Alarm	n/a	upon sacrifice
Intrusion Sensor	microswitch	microswitch
Moisture Sensor	infrared moisture detector	infrared moisture detector
Strikesorb Module Type		30-V1-HV
	No Strikesorb modules installed <i>(used as Distribution Unit only)</i>	Strikesorb modules installed to protect 6 Remote Radio Heads

Mechanical

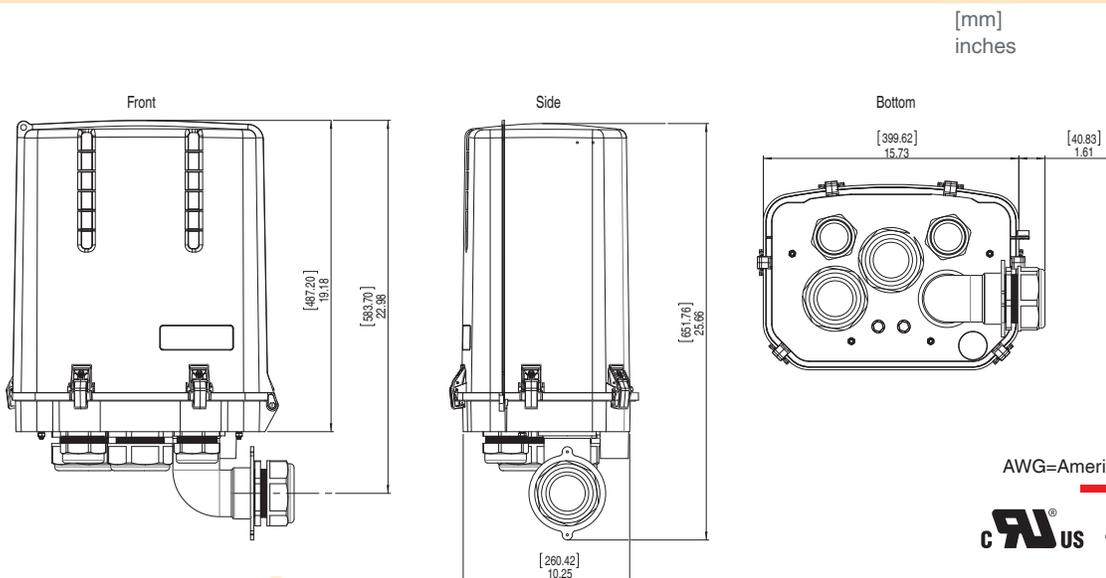
Suppression Connection Method	Compression lug, #20 - #6 AWG (0.5 mm ² - 16 mm ²)	
Fiber Connection Method	LC-LC Single mode	
Pressure Equalizing Vent	Gore™ Vent	
Environmental Rating	IP 67	
Operating Temperature	-40° C to +80° C	
UV Resistant	Yes	
Weight	System: 26 lbs (11.80 kg)	System: 32 lbs (14.51 kg)
Combined Wind Loading	150mph (sustained): 185 lbs (823 N)	

Standards Compliance

Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards

Standards	ANSI/UL 1449 3rd Edition
	IEEE C62.41
	NEMA LS-1, IEC 61643-1:2005 2nd Edition (Class I Protection)
	IEC 61643-12
	EN 61643-11:2002 (including A11:2007)

Product Diagram



AWG=American Wire Gauge



Raycap

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Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

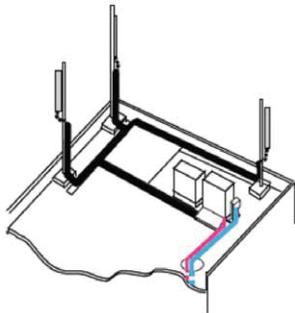
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.



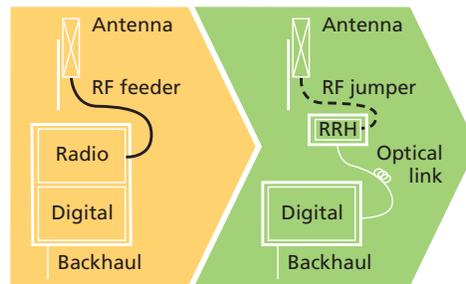
Macro

Features

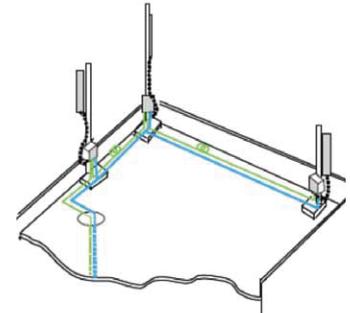
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)

- Passive convection cooling (no fans)
- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
 - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
 - Single mode dual fiber (SM/DF)
- Multi-mode variant
 - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

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X7CAP-465

Xpol, 65° H-Beams

698-896 MHz
1710-2170 MHz

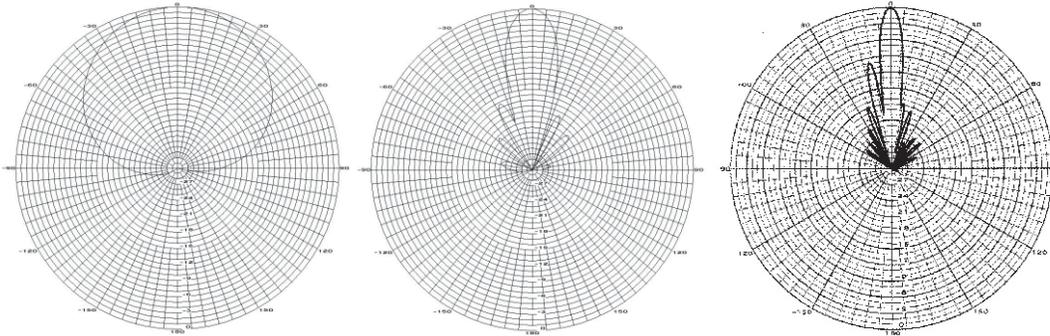
[\(Link to Mechanical Drawing\)](#)

Electrical Specifications

Frequency	698-896 & 1710-2170 MHz
Polarization	Slant +/- 45
Gain @ 698 MHz	13.8 dBi
Gain @ 896 MHz	14.4 dBi
Gain @ 1710 MHz	16.9 dBi
Gain @ 2155 MHz	17.9 dBi
Horizontal Beam (3dB Points)	65° & 65°
Vertical Beam (3dB Points)	14.5° & 7°
Elect. Downtilt Range, 2° Increments	0-10° low, 0-6° high band
VSWR / Return Loss	<1.40:1 / 15.6 dB
VSWR Opt "i" / Return Loss	<1.50:1 / 14.0 dB
Front-to-Back at Horizon	>27 dB & >27 dB
Upper Side Lobe Suppression	<-18 dB & <-18 dB
Impedance	50 Ohms
Power Input Per Connector ("i")	500 CW at 800 MHz
Power Input Per Connector (no "i")	500 CW at 800 MHz and 250 CW at 1900 MHz
Isolation	< -28 dB
Intermodulation (2x20W)	<-150 dBc

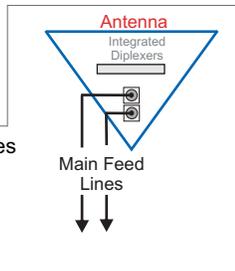
Mechanical Specifications

Input Connector (female)	Back 7/16 DIN or w/bot. opt.
Antenna Dimensions (LxWxD)	50.5 x 12.5 x 7.1 in (1282x318x180mm)
*Antenna Weight	24.2 lbs
Bracket Weight	13.2 lbs
Lightning Protection	Direct Ground
RF Distribution	Printed Microstrip Substrate
Radome	Ultra High-Strength Luran
Weatherability	UV Stabilized, ASTM D1925
Radome Water Absorption	ASTM D570, 0.45%
Environmental	MIL-STD-810E
Wind Survival	150 mph
Front Wind Load @100mph	124.4 lbf
Equivalent Flat Plate @100mph	2.53 sq-ft. (c=2)
Mounting Brackets (919011)	Fits 3.5 Inch Max. O.D. Pipe
Mechanical Downtilt Range	0-12°
Clamps/Bolts	Galvanized Steel/Stainless Steel



Available with Opt "i"

- The Opt "i" antenna option provides Integrated Diplexers that reduce mainline cables and eliminate separate external devices.



Recommended Connector Coupling Torque
7/16 DIN: 220-265 lbf-in (25-30 N-m)

Ordering Information & Options

X7CAP-465-xy "xy" is a placeholder for the built-in fixed electrical downtilt in degrees, "x" for low band, y for high band.
 X7CAP-465-xyi to add the Opt "i" option for integrated diplexers, add "i" to model number
 X7CAP-465-xyi-bot for bottom mounted connectors, add "-bot" (otherwise antenna comes standard with back mounted connectors)
 X7CAP-465-xyi-bot-# add a "j#" to add a 1/2" RF cable, where "#" is the cable length, "j2" is 2 meters, "j4" is 4 meters, "j6" is 6 meters...

*Antenna Weight may vary slightly with options.



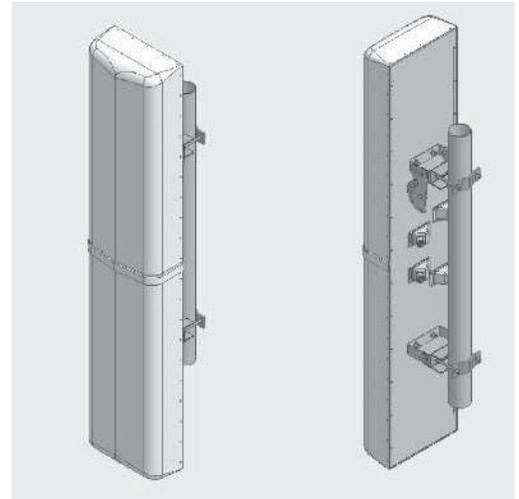
XDU04-65

Directing our energies for you.

4 in 1 Design Dual Band and Dual Polarized

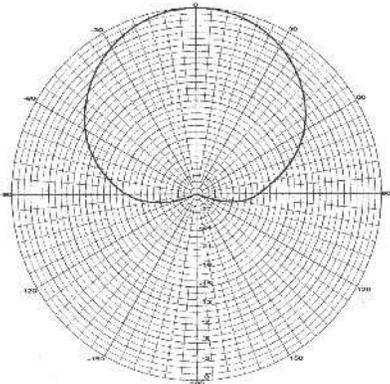
Electrical Specifications

	* 824-896 MHz	1850-1990 MHz
Gain	14.7 dBi	17.0 dBi
Horizontal Beam (1/2 power)	65°	65°
Vertical Beam (1/2 power)	15°	7°
Electrical Downtilt Options	0, 2, 4 or 6 deg	0, 2, 4 or 6 deg
VSWR	≤1.40:1	≤1.40:1
VSWR (with -i option)	≤1.50:1	≤1.50:1
Front-to-Back Ratio	>26 dB	>30 dB
Upper Side Lobe Supp.	<-17 dB	<-18 dB
Polarization	±45°	±45°
Impedance	50 ohms	50 ohms
Power Input Rating (per port)	500 CW	250 CW
Intermodulation (2x10w)	<-110 dBm	<-110 dBm
Port to Port Isolation	>30 dB	>30 dB
Cross Polar Discrimination	>17 dB	>17 dB

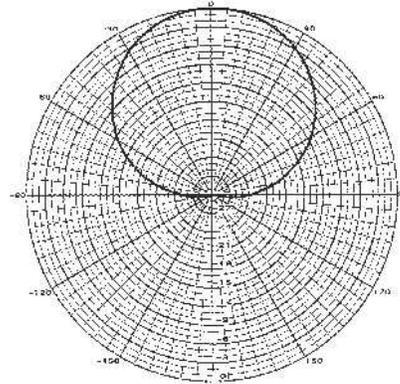


65° Horizontal Beams
15° & 7° Vertical Beams
14.7 & 17.0 dBi Gain

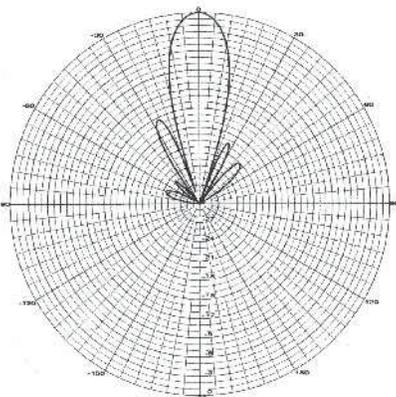
824-896 MHz
Horizontal pattern



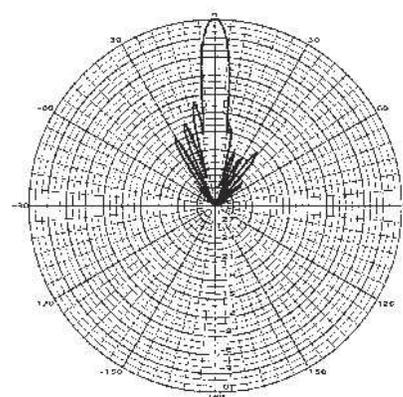
1850-1990 MHz
Horizontal pattern



Vertical pattern



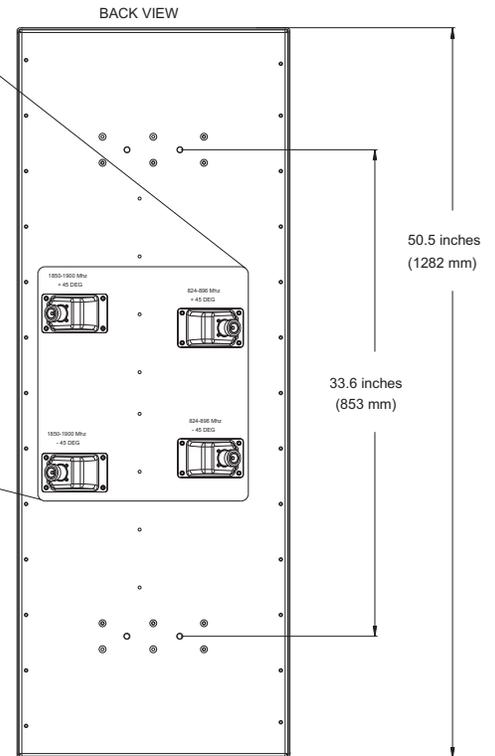
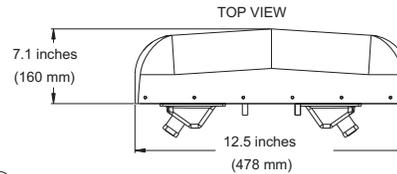
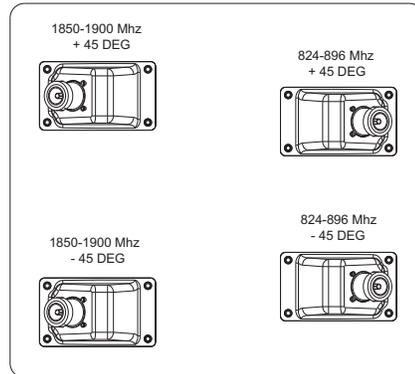
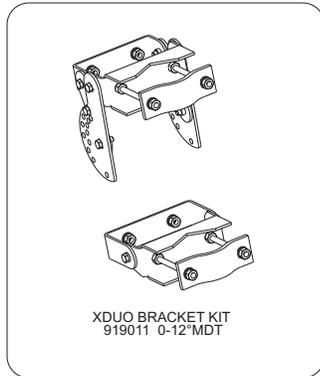
Vertical pattern





Directing our energies for you.

XDUO4-65



Mechanical Specifications

Input Connectors (female)	Four Back Mounted 7/16 DIN
Antenna Dimensions	50.5 x 12.5 x 7.1 Inches
Antenna Weight	28 lbs
Bracket Weight	13 lbs
Lightning Protection	Direct Ground
RF Distribution	Printed Microstrip Substrate
Radome	Ultra High-Strength Luran
Weatherability	UV Stabilized, ASTM D1925
Radome Water Absorption	ASTM D570, 0.45%
Environmental	MIL-STD-810E
Wind Survival	150 mph
Front Wind Load at 100 mph	124.3 lbs
Front Flat Plate Equivalent	2.53 sq-ft. (c=2)
Mounting Brackets	Fits 2.5 to 3 Inch Schedule 40 Pipe
Mechanical Downtilt Range	0-12 Degrees in 1 Degree Increments
Clamps/Bolts	Hot Dip Galvanized Steel/Stainless Steel

Model Numbers Option Descriptions

XDUO4-65-xy	x=Electrical Downtilt at 800 MHz in Degrees (0, 2, 4 or 6)
	y=Electrical Downtilt at 1900 MHz in Degrees (0, 2, 4 or 6)
XDUO4-65-xyi	Dual Band Combiner included as an internal device

Downtilt and Mounting Bracket Included.

* other frequency bands available