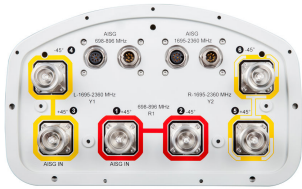


# NHH-65B-R2B



6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

## General Specifications

<b>Antenna Type</b>	Sector
<b>Band</b>	Multiband
<b>Color</b>	Light gray
<b>Effective Projective Area (EPA), frontal</b>	0.26 m <sup>2</sup>   2.799 ft <sup>2</sup>
<b>Effective Projective Area (EPA), lateral</b>	0.22 m <sup>2</sup>   2.368 ft <sup>2</sup>
<b>Grounding Type</b>	RF connector body grounded to reflector and mounting bracket
<b>Performance Note</b>	Outdoor usage   Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
<b>Radome Material</b>	Fiberglass, UV resistant
<b>Radiator Material</b>	Low loss circuit board
<b>Reflector Material</b>	Aluminum
<b>RF Connector Interface</b>	7-16 DIN Female
<b>RF Connector Location</b>	Bottom
<b>RF Connector Quantity, high band</b>	4
<b>RF Connector Quantity, low band</b>	2
<b>RF Connector Quantity, total</b>	6

## Remote Electrical Tilt (RET) Information, General

<b>RET Interface</b>	8-pin DIN Female   8-pin DIN Male
<b>RET Interface, quantity</b>	2 female   2 male

## Dimensions

<b>Width</b>	301 mm   11.85 in
<b>Depth</b>	180 mm   7.087 in

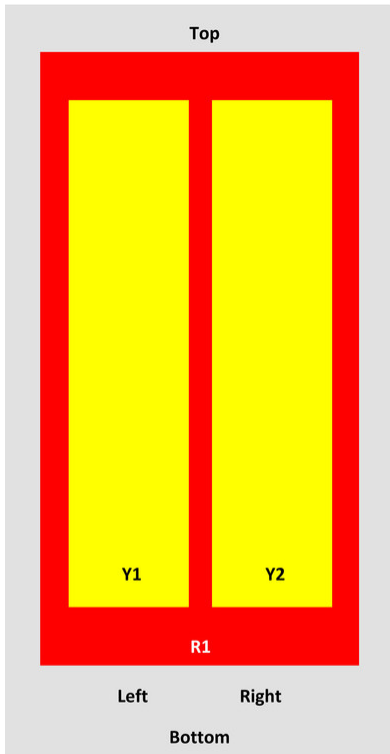
# NHH-65B-R2B

**Length**

1828 mm | 71.969 in

## Array Layout

**NHH**



Array	Freq (MHz)	Coms	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANXXXXXXXXXXXXX1
Y1	1695-2360	3-4	2	ANXXXXXXXXXXXXX2
Y2	1695-2360	5-6		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

## Electrical Specifications

**Impedance**

50 ohm

**Operating Frequency Band**

1695 – 2360 MHz | 698 – 896 MHz

**Polarization**

±45°

**Total Input Power, maximum**

900 W @ 50 °C

## Remote Electrical Tilt (RET) Information, Electrical

**Protocol**

3GPP/AISG 2.0 (Single RET)

**Power Consumption, idle state, maximum**

2 W

# NHH-65B-R2B

<b>Power Consumption, normal conditions, maximum</b>	13 W
<b>Input Voltage</b>	10–30 Vdc
<b>Internal Bias Tee</b>	Port 1   Port 3
<b>Internal RET</b>	High band (1)   Low band (1)

## Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
<b>Gain, dBi</b>	14.9	15	17.7	17.9	18.4	18.7
<b>Beamwidth, Horizontal, degrees</b>	65	60	71	69	64	57
<b>Beamwidth, Vertical, degrees</b>	12.4	11.2	5.7	5.2	4.9	4.6
<b>Beam Tilt, degrees</b>	0–14	0–14	0–7	0–7	0–7	0–7
<b>USLS (First Lobe), dB</b>	13	14	18	18	19	18
<b>Front-to-Back Ratio at 180°, dB</b>	30	29	31	30	29	31
<b>Isolation, Cross Polarization, dB</b>	25	25	25	25	25	25
<b>Isolation, Inter-band, dB</b>	30	30	30	30	30	30
<b>VSWR   Return loss, dB</b>	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0
<b>PIM, 3rd Order, 2 x 20 W, dBc</b>	-153	-153	-153	-153	-153	-153
<b>Input Power per Port at 50°C, maximum, watts</b>	300	300	300	300	300	300

## Electrical Specifications, BASTA

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
<b>Gain by all Beam Tilts, average, dBi</b>	14.5	14.5	17.3	17.7	18.1	18.5
<b>Gain by all Beam Tilts Tolerance, dB</b>	±0.6	±1.1	±0.4	±0.4	±0.5	±0.3
<b>Gain by Beam Tilt, average, dBi</b>	0° 14.4 7° 14.6 14° 14.3	0° 14.7 7° 14.7 14° 14.1	0° 17.2 4° 17.3 7° 17.3	0° 17.6 4° 17.7 7° 17.7	0° 18.0 4° 18.2 7° 18.1	0° 18.3 4° 18.5 7° 18.6
<b>Beamwidth, Horizontal Tolerance, degrees</b>	±2	±2.1	±3	±4.1	±6.5	±2.9
<b>Beamwidth, Vertical Tolerance, degrees</b>	±0.7	±0.7	±0.3	±0.2	±0.3	±0.2
<b>USLS, beampeak to 20° above beampeak, dB</b>	13	14	16	16	17	15
<b>Front-to-Back Total Power at</b>	23	22	27	27	25	25

# NHH-65B-R2B

180° ± 30°, dB

CPR at Boresight, dB	22	21	23	23	22	19
CPR at Sector, dB	10	7	16	13	11	4

## Mechanical Specifications

Wind Loading at Velocity, frontal	278.0 N @ 150 km/h   63.6 lbf @ 150 km/h
Wind Loading at Velocity, lateral	230.0 N @ 150 km/h   51.7 lbf @ 150 km/h
Wind Loading at Velocity, maximum	120.7 lbf @ 150 km/h   537.0 N @ 150 km/h
Wind Loading at Velocity, rear	282.0 N @ 150 km/h   63.4 lbf @ 150 km/h
Wind Speed, maximum	241 km/h   149.75 mph

## Packaging and Weights

Width, packed	409 mm   16.102 in
Depth, packed	299 mm   11.772 in
Length, packed	1952 mm   76.85 in
Net Weight, without mounting kit	19.8 kg   43.651 lb
Weight, gross	32.3 kg   71.209 lb

## Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
REACH-SVHC	Compliant as per SVHC revision on <a href="http://www.commscope.com/ProductCompliance">www.commscope.com/ProductCompliance</a>
ROHS	Compliant



## Included Products

BSAMNT-3	-	Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.
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## \* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance
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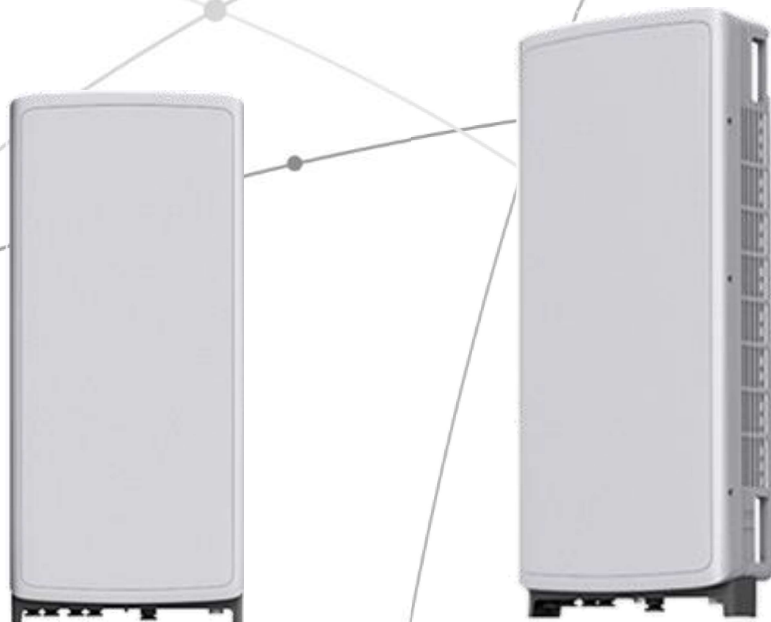
**SAMSUNG**

# **SAMSUNG** C-Band 64T64R Massive MIMO Radio

for High Capacity and Wide Coverage

Samsung C-Band 64T64R Massive MIMO Radio enables mobile operators to increase coverage range, boost data speeds and ultimately offer enriched 5G experiences to users in the U.S..

Model Code : MT6407-77A



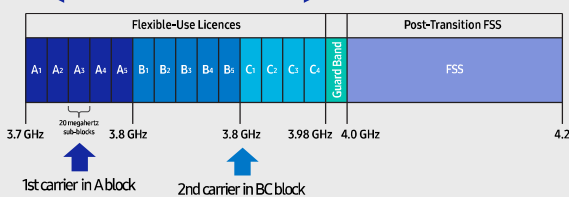
## Points of Differentiation

### Wide Bandwidth

With capability to support up to 2 CC carrier configuration, Samsung C-Band massive MIMO Radio supports 200 MHz bandwidth in the C-Band spectrum.

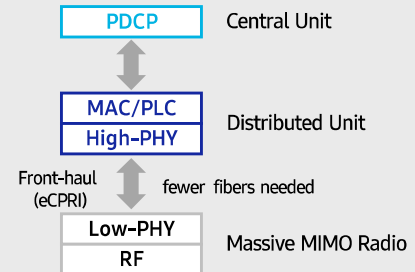
Samsung C-Band massive MIMO Radio covers the entire C-Band 280 MHz spectrum, so it can meet the operator's needs in current A block and future B/C blocks

C-Band spectrum supported by Massive MIMO Radio



### Future Proof Product

Samsung C-Band 64T64R Massive MIMO radio supports not only CPRI but also eCPRI as front-haul interface. It enables operators can cut down on OPEX/CAPEX by reducing front-haul bandwidth through low layer split and using ethernet based higher efficient line.



### Enhanced Performance

C-Band massive MIMO Radio creates sharp beams and extends networks' coverage on the critical mid-band spectrum using a large number of antenna elements and high output power to boost data speeds.

This helps operators reduce their CAPEX as they now need less products to cover the same area than before.

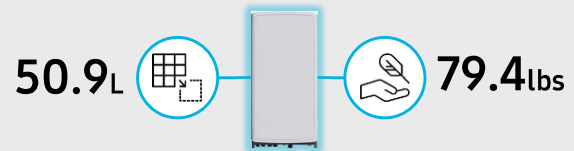
Furthermore, as C-Band massive MIMO Radio supports MU-MIMO (Multi-user MIMO), it enables to increase user throughput by minimizing interference.



### Well Matched Design

Samsung C-Band Massive MIMO radio utilizes 64 antennas, supports up to 280MHz bandwidth, and delivers a 200W output power. Despite the above advanced performance, the Radio has a compact size of 50.9L and 79.4lbs. This makes it easy to install the Radio.

It is designed to look solid and compact, with a low profile appearance so that, when installed, harmonizes well with the surrounding environment.



## Technical Specifications

Item	Specification
Tech	NR
Band	n77
Frequency Band	3700 - 3980 MHz
EIRP	78.5dBm (53.0 dBm+25.5 dBi)
IBW/OBW	280 MHz / 200 MHz
Installation	Pole/Wall
Size/ Weight	16.06 x 35.06 x 5.51 inch (50.86L)/ 79.4 lbs



# SAMSUNG



## **About Samsung Electronics Co., Ltd.**

Samsung inspires the world and shapes the future with transformative ideas and technologies. The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and memory, system LSI, foundry and LED solutions.

129 Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, Korea

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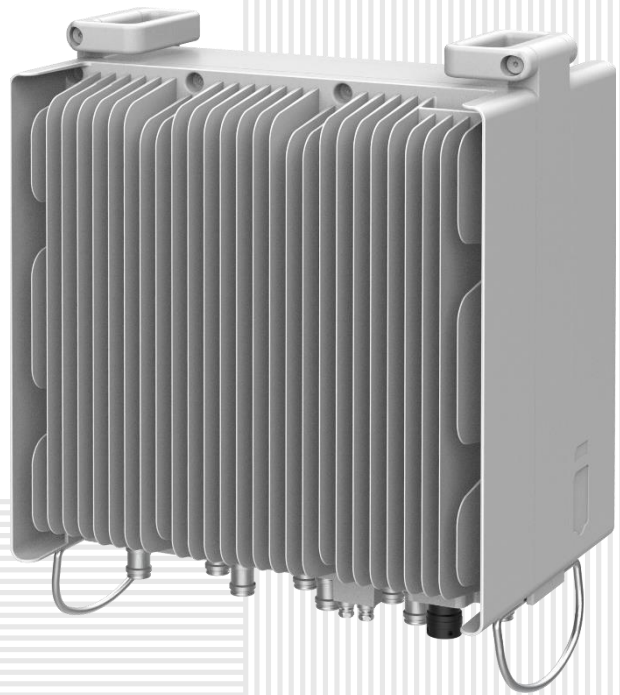
# SAMSUNG

## AWS/PCS MACRO RADIO

DUAL-BAND AND HIGH POWER  
FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This AWS/PCS 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code RF4439d-25A



Homepage  
[samsungnetworks.com](http://samsungnetworks.com)

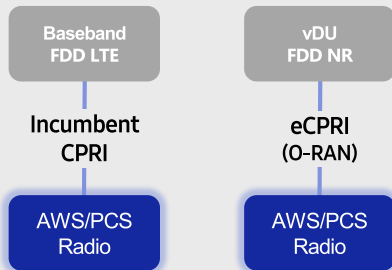


Youtube  
[www.youtube.com/samsung5g](http://www.youtube.com/samsung5g)

## Points of Differentiation

### Continuous Migration

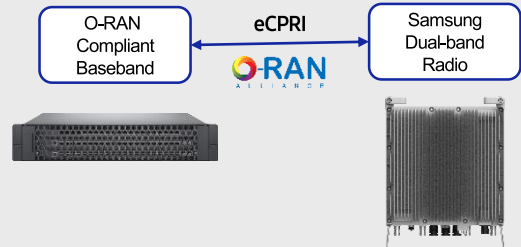
Samsung's AWS/PCS macro radio can support each incumbent CPRI interface as well as advanced eCPRI interfaces. This feature provides installable options for both legacy LTE networks and added NR networks.



### O-RAN Compliant

A standardized O-RAN radio can help in implementing cost-effective networks, which are capable of sending more data without compromising additional investments.

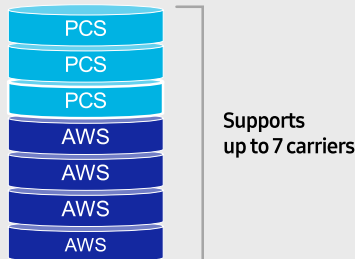
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



### Optimum Spectrum Utilization

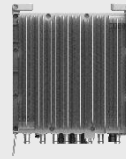
The number of required carriers varies according to site (region). Supporting many carriers is essential for using all frequencies that the operator has available.

The new AWS/PCS dual-band radio can support up to 3 carriers in the PCS (1.9GHz) band and 4 carriers in the AWS (2.1GHz) band, respectively.



### Brand New Features in a Compact Size

Samsung's AWS/PCS macro radio offers several features, such as dual connectivity for baseband for both CDU and vDU, O-RAN capability, more carriers and an enlarged PCS spectrum, combined into an incumbent radio volume of 36.8L.



- 2 FH connectivity
- O-RAN capability
- More carriers and spectrum

Same as an incumbent radio volume

## Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B25(PCS), B66(AWS)
Frequency Band	DL: 1930 – 1995MHz, UL: 1850 – 1915MHz DL: 2110 – 2200MHz, UL: 1710 – 1780MHz
RF Power	(B25) 4 × 40W or 2 × 60W (B66) 4 × 60W or 2 × 80W
IBW/OBW	(B25) 65MHz / 30MHz (B66) DL 90MHz, UL 70MHz / 60MHz
Installation	Pole, Wall
Size/Weight	14.96 x 14.96 x 10.04inch (36.8L) / 74.7lb

**SAMSUNG**

# 700/850MHZ MACRO RADIO

DUAL-BAND AND HIGH POWER  
FOR MACRO COVERAGE

Samsung's future proof dual-band radio is designed to help effectively increase the coverage areas in wireless networks. This 700/850MHz 4T4R dual-band radio has 4Tx/4Rx to 2Tx/2Rx RF chains options and a total output power of 320W, making it ideal for macro sites.

Model Code RF4440d-13A



Homepage  
[samsungnetworks.com](http://samsungnetworks.com)

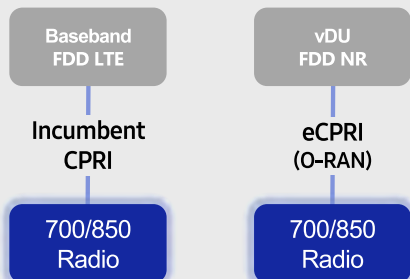


Youtube  
[www.youtube.com/samsung5g](http://www.youtube.com/samsung5g)

## Points of Differentiation

### Continuous Migration

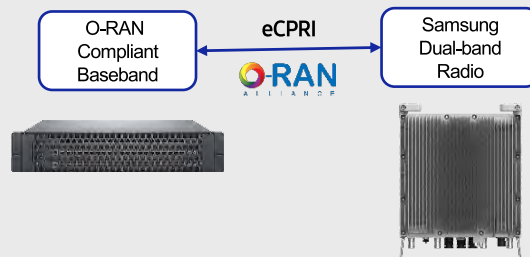
Samsung's 700/850MHz macro radio can support each incumbent CPRI interface as well as an advanced eCPRI interface. This feature provides installable options for both legacy LTE networks and added NR networks.



### O-RAN Compliant

A standardized O-RAN radio can help when implementing cost-effective networks because it is capable of sending more data without compromising additional investments.

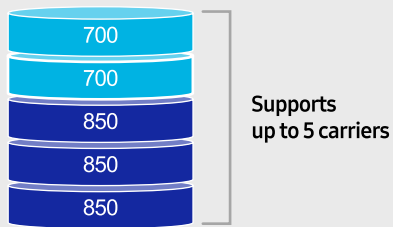
Samsung's state-of-the-art O-RAN technology will help accelerate the effort toward constructing a solid O-RAN ecosystem.



### Optimum Spectrum Utilization

The number of required carriers varies according to site (region). The ability to support many carriers is essential for using all frequencies that the operator has available.

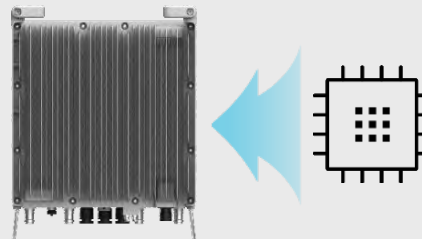
The new 700/850MHz dual-band radio can support up to 2 carriers in the B13 (700MHz) band and 3 carriers in the B5 (850MHz) band, respectively.



### Secured Integrity

Access to sensitive data is allowed only to authorized software.

The Samsung radio's CPU can protect root of trust, which is credential information to verify SW integrity, and secure storage provides access control to sensitive data by using dedicated hardware (TPM).



## Technical Specifications

Item	Specification
Tech	LTE / NR
Brand	B13(700MHz), B5(850MHz)
Frequency Band	DL: 746 – 756MHz, UL: 777 – 787MHz DL: 869 – 894MHz, UL: 824 – 849MHz
RF Power	(B13) 4 × 40W or 2 × 60W (B5) 4 × 40W or 2 × 60W
IBW/OBW	(B13) 10MHz / 10MHz (B5) 25MHz / 25MHz
Installation	Pole, Wall
Size/Weight	14.96 x 14.96 x 9.05inch (33.2L) / 70.33 lb

# DC Surge Protection for RRH/Integrated Antenna Radio Head RVZDC-6627-PF-48

Tower / Base / Rooftop

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 12 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.



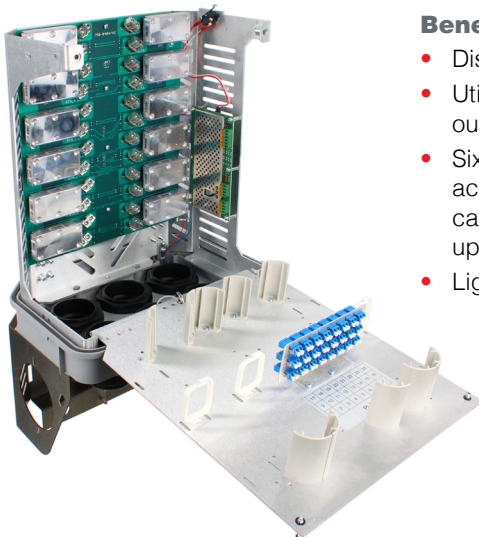
Mounting Bracket Included

## Features

- Designed for distribution to 12 RRH circuits, DC power and fiber optics.
- Alarms for moisture detection and intrusion
- Digital Voltmeter with twelve (12) position switch to monitor each DC circuit
- Power alarms for wiring anomalies and power disruptions
- Employs the Strikesorb® 30-V1-2CHV 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-V1-2CHV is a Class I SPD certified by VDE per the IEC 61643-11 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-2CHV 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
- RS485 communication link uses two (2) twisted pair (+ground) wires per hybrid cable, and communicates all voltage, boost system and alarm data
- Patent pending design

## Benefits

- Distributes DC up to 12 Remote Radio Heads and connects up to 24 LC fiber pairs
- Utilizes an IP 67 rated enclosure, also rated to NEBS and UL, allowing for indoor or outdoor installation on a roof or tower top
- Six total cable ports for cable access with custom configurable UL rated glands that accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1<sup>5</sup>/<sub>8</sub>" coax class cables), depending upon port configuration
- Lightweight aerodynamic design provides maximum flexibility for tower top installation



Strikesorb  
30-V1-2CHV

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## SPECIFICATIONS

# DC Surge Protection for RRH/Integrated Antenna Radio Head RVZDC-6627-PF-48

Tower / Base / Rooftop

### Electrical

Model Numbers	RVZDC-6627-PF-48
Nominal Operating Voltage	48 VDC
Nominal Discharge Current [ $I_n$ ]	20kA 8/20 $\mu$ s
Maximum Surge Current [ $I_{max}$ ]	60kA 8/20 $\mu$ s
Maximum Impulse (Lightning) Current per IEC 61643-11	5 kA 10/350 $\mu$ s
Maximum Continuous Operating Voltage [ $U_c$ ]	75 VDC
Voltage Protection Rating (VPR) per UL 1449 4th Edition	400V
Protection Class as per IEC 61643-11	Class I
Power Alarm	cross polarity, short circuit, or power outage
Intrusion Sensor	microswitch
Moisture Sensor	infrared moisture detector
Strikesorb Module Type	30-V1-2CHV Strikesorb modules installed to protect 12 Remote Radio Heads
Power Boost Ready	RS485 twisted pair connection available

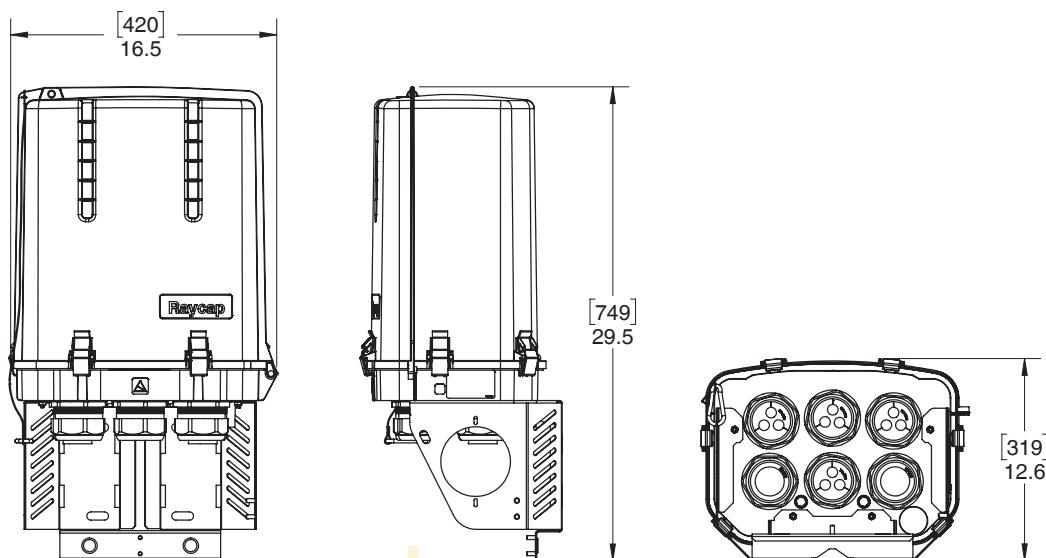
### Mechanical

Suppression Connection Method	Compression lug, #14 - #2 AWG (2 mm <sup>2</sup> - 33 mm <sup>2</sup> )
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
Dimensions (L x W x H)	12.6" x 16.5" x 29.5" [319mm x 420mm 749mm]
Weight	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	UL 1449 4 <sup>th</sup> Edition, IEC 61643-11:2011, EN 61643-11:2012, IEEE C62.11, IEEE C62.41.2, IEEE C62.45 NEBS certified to: GR-63-CORE Issue 4, GR-1089-CORE Issue 6, GR-3108-CORE Issue 3, GR-487-CORE Issue 4, GR-950-CORE Issue 1

### Product Diagram



AWG=American Wire Gauge  




**Raycap**

[www.raycap.com](http://www.raycap.com)

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