DATA SHEET

# Hybrid Bi-Sector™ Array

HBSA33R-KE4A

- Four foot (1.2 m), multiband, six port Hybrid Bi-Sector™ Antenna. Deploying a high performing 65° azimuth beamwidth covering 698-960 MHz and a pair of CCI's Patented Asymmetrical 33° Shaped Beams covering 1695-2690 MHz frequencies
- Four wide high band ports covering 1695-2690 MHz and two wide low band ports covering 698-960 MHz in a single antenna
- Narrow Enclosure, 13.7" (348mm) width. Narrowest Enclosure in the Industry for this type of Antenna
- Full Spectrum Compliance for 698-960 MHz / 1695-2690
- LTE Optimized Asymmetric Shaped Beams for improved LTE data throughput by minimizing beam crossover, providing for an efficient use of valuable radio capacity and frequency spectrum
- LTE Optimized FBR, SPR and Boresight/Sector XPD Performance. Essential for today's LTE Data Networks
- Exceeds minimum PIM performance requirements
- Equipped with new 4.3-10 connector, which is 40% smaller than traditional 7/16 DIN connector
- Equipped with Three Field Replaceable, integrated AISG 2.0 compliant Remote Electrical Tilt (RET)

## Overview

This CCI Hybrid Bi-Sector™ Multiband Array is a six port antenna, which is designed to provide maximum deployment flexibility. With four wide high band ports (two ports per beam) covering 1695-2690 MHz across two 33° asymmetrically shaped beams and two wide low band ports covering 698-960 MHz across a 65° HBW.
The antenna implements CCI's proven "Asymmetrical Beam for Spectrum Efficiency" patent which enables wireless operators to re-use their valuable spectrum and significantly increase capacity. The CCI Hybrid Bi-Sector™ Array provides two 33° asymmetrically shaped beams designed to maximize coverage while minimizing interference and overlap in dense LTE environments.
With this configuration, the antenna is capable of providing 2x2 Multiple-input Multiple-output (MIMO) across the 65° Low Band ports and Dual 2x2 Multiple-input Multiple-output (MIMO) across the two 33° asymmetrically shaped beams.
CCI's Hybrid Bi-Sector™ Array antennas allow operators to reduce antenna and site deployments, for either six sector or greenfield deployments, by replacing traditional 65° antennas with CCI's Patented Bi-Sector™ Array antennas containing two 33° Asymmetric Beams. This is achieved through a single panel array producing significant CAPEX and OPEX cost savings for the operator, while increasing cell site capacity and LTE data throughput.

CCI antennas are designed and produced to ISO 9001 certification standards for reliability and quality in our state-of-the-art manufacturing facilities.

## Applications

- Dual 2x2 MIMO on High Band and 2x2 MIMO on Low Band
- Ready for Network Standardization on 4.3-10 connectors
- Ideal Antenna Solution for structurally constrained sites, where data throughput, capacity and limited spectrum is a concern
- With CCI's Hybrid Bi-Sector™ Antenna, wireless operators can connect multiple platforms to a single antenna, reducing tower load, lease expense, deployment time and installation cost

## SPECIFICATIONS

# Hybrid Bi-Sector™ Array

HBSA33R-KE4A

### Electrical

| Ports | 2 x Low Band Ports for 698-960 MHz | | | |
|---|---|---|---|---|
| Frequency Range | 698-806 MHz | 790-862 MHz | 824-896 MHz | 880-960 MHz |
| Gain[1] | 13.0 dBi | 13.1 dBi | 13.2 dBi | 13.3 dBi |
| Gain (Average)[2] | 12.7 dBi | 12.7 dBi | 12.9 dBi | 13.0 dBi |
| Azimuth Beamwidth (-3dB) | 68° | 74° | 71° | 66° |
| Elevation Beamwidth (-3dB) | 19.7° | 17.7° | 17.0° | 16.0° |
| Electrical Downtilt | 0° to 14° | 0° to 14° | 0° to 14° | 0° to 14° |
| Elevation Sidelobes (1st Upper) | < -19 dB | < -19 dB | < -19 dB | < -18 dB |
| Front-to-Back Ratio @180° | > 30 dB | > 35 dB | > 35 dB | > 35 dB |
| Front-to-Back Ratio over ± 20° | > 30 dB | > 32 dB | > 32 dB | > 32 dB |
| Cross-Polar Discrimination (at Peak) | > 23 dB | > 25 dB | > 25 dB | > 24 dB |
| Cross-Polar Discrimination (at 3 dB)[2] | 20.4 dB | 20.1 dB | 18.5 dB | 17.0 dB |
| Cross-Polar Port-to-Port Isolation | > 25 dB | > 25 dB | > 25 dB | > 25 dB |
| Voltage Standing Wave Ratio (VSWR) | < 1.5:1 | < 1.5:1 | < 1.5:1 | < 1.5:1 |
| Passive Intermodulation (2x20W) | ≤ -153 dBc | ≤ -153 dBc | ≤ -153 dBc | ≤ -153 dBc |
| Input Power Continuous Wave (CW) | 500 watts | 500 watts | 500 watts | 300 watts |
| Polarization | Dual Pol 45° | Dual Pol 45° | Dual Pol 45° | Dual Pol 45° |
| Input Impedance | 50 ohms | 50 ohms | 50 ohms | 50 ohms |
| Lightning Protection | DC Ground | DC Ground | DC Ground | DC Ground |

*[1]Peak gain across sub-bands.*
*[2]Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V9.6.*

| Ports | 4 x High Band Ports for 1695-2690 MHz | | | | |
|---|---|---|---|---|---|
| Frequency Range | 1695-1880 MHz | 1850-1990 MHz | 1920-2180 MHz | 2300-2400 MHz | 2496-2690 MHz |
| Gain[1] | 18.2 dBi | 17.7 dBi | 19.0 dBi | 19.2 dBi | 19.5 dBi |
| Gain (Average)[2] | 17.3 dBi | 18.1 dBi | 18.4 dBi | 18.6 dBi | 18.9 dBi |
| Azimuth Beamwidth (-3dB) | 36° | 33° | 31° | 29° | 27° |
| Elevation Beamwidth (-3dB) | 8.0° | 7.2° | 6.7° | 6.0° | 5.7° |
| Electrical Downtilt | 0° to 10° | 0° to 10° | 0° to 10° | 0° to 10° | 0° to 10° |
| Elevation Sidelobes (1st Upper) | < -18 dB | < -17 dB | < -17 dB | < -17 dB | < -18 dB |
| Front-to-Back Ratio @180° | > 35 dB | > 35 dB | > 35 dB | > 35 dB | > 35 dB |
| Front-to-Back Ratio over ± 20° | > 32 dB | > 33 dB | > 35 dB | > 34 dB | > 34 dB |
| Cross-Polar Discrimination (at Peak) | > 25 dB | > 25 dB | > 25 dB | > 25 dB | > 25 dB |
| Cross-Polar Discrimination (at 3 dB°)[2] | 18.8 dB | 18.1 dB | 16.3 dB | 13.1 dB | 15.7 dB |
| Cross-Polar Port-to-Port Isolation | > 25 dB | > 25 dB | > 25 dB | > 25 dB | > 25 dB |
| Voltage Standing Wave Ratio(VSWR) | < 1.5:1 | < 1.5:1 | < 1.5:1 | < 1.5:1 | < 1.5:1 |
| Passive Intermodulation (2x20W) | ≤ -153 dBc | ≤ -153 dBc | ≤ -153 dBc | ≤ -153 dBc | ≤ -153 dBc |
| Input Power Continuous Wave (CW) | 300 watts | 300 watts | 300 watts | 300 watts | 300 watts |
| Polarization | Dual Pol 45° | Dual Pol 45° | Dual Pol 45° | Dual Pol 45° | Dual Pol 45° |
| Input Impedance | 50 ohms | 50 ohms | 50 ohms | 50 ohms | 50 ohms |
| Lightning Protection | DC Ground | DC Ground | DC Ground | DC Ground | DC Ground |

*[1]Peak gain across sub-bands.*
*[2]Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V9.6.*

SPECIFICATIONS

## Hybrid Bi-Sector™ Array

HBSA33R-KE4A

### Mechanical

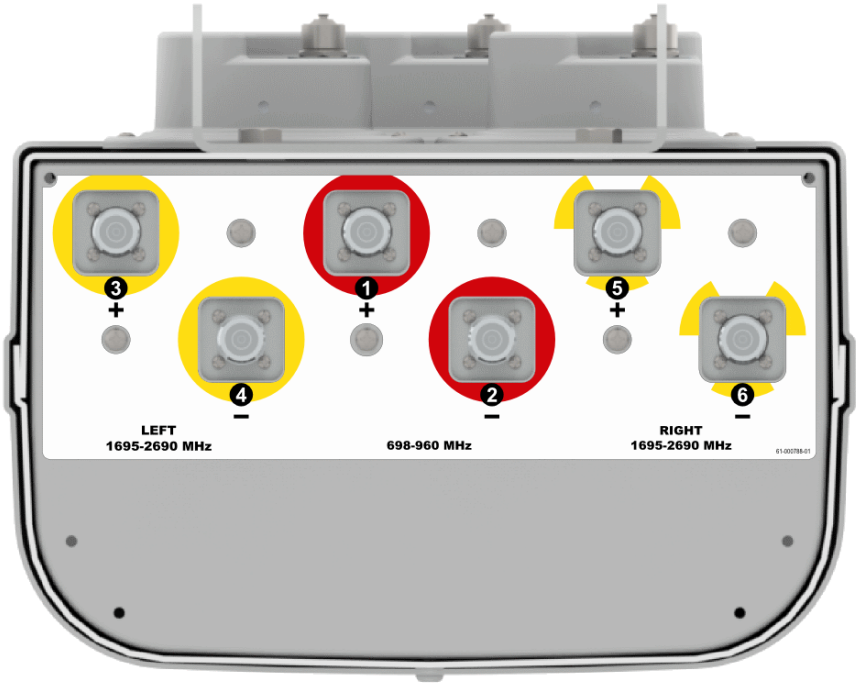
| | |
|---|---|
| Dimensions (LxWxD) | 48.3x13.7x8.5 in (1227x348x216 mm) |
| Survival Wind Speed | > 150 mph (> 241 kph) |
| Front Wind Load | 147 lbs (652 N) @ 100 mph (161 kph) |
| Side Wind Load | 98 lbs (435 N) @ 100 mph (161 kph) |
| Equivalent Flat Plate Area | 5.7 $ft^2$ (0.5 $m^2$) |
| Weight[1] | 35.2 lbs (16.0 kg) |
| RET System Weight | 5.0 lbs (2.3 kg) |
| Connector | 6 x4.3-10 female |
| Mounting Pole | 2 to 5 in (5 to 12 cm) |

*[1] Weight excludes mounting kit and RET*

## Mechanical

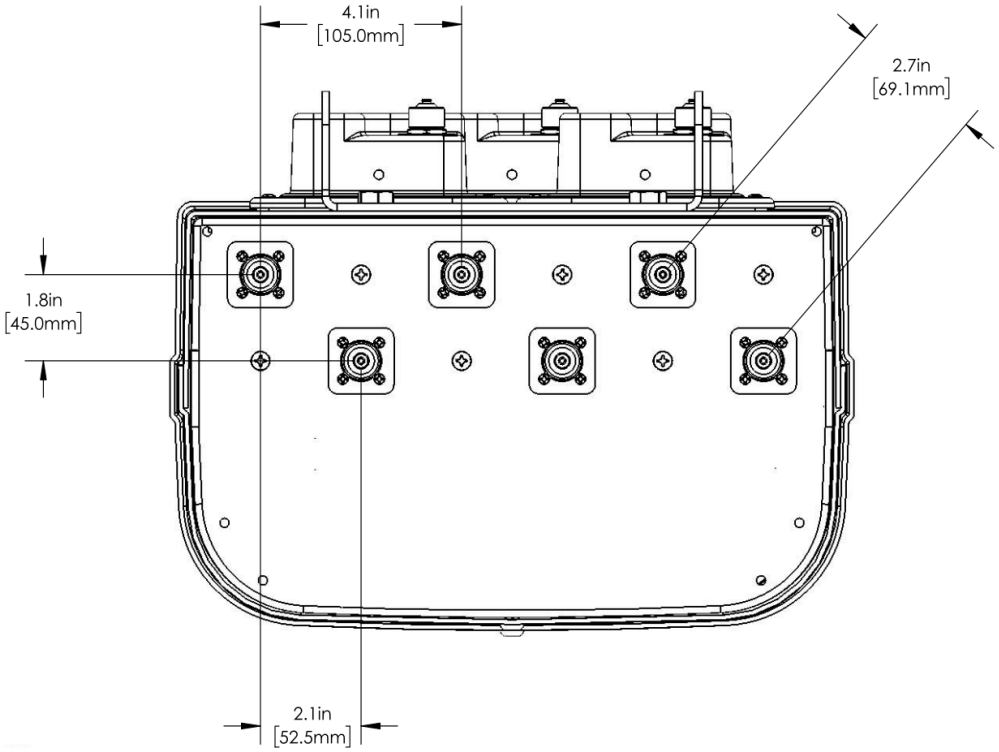
*Bottom View*

HBSA33R-KE4AA




*Connector Spacing*

HBSA33R-KE4AA

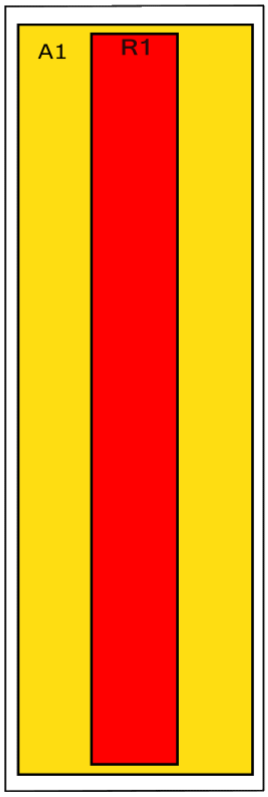


## Mechanical

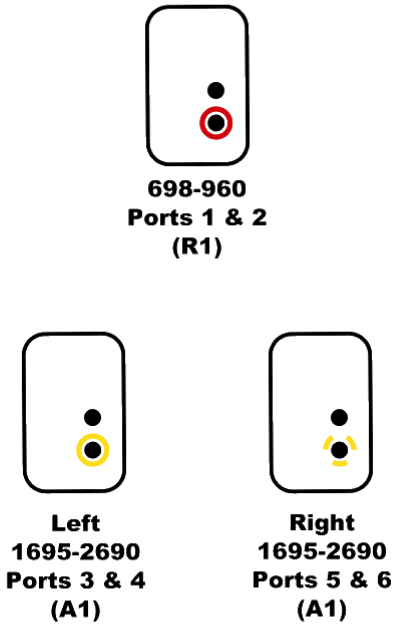
*RET to Element Configuration*

HBSA33R-KE4AA

### Element arrays as viewed from rear of antenna



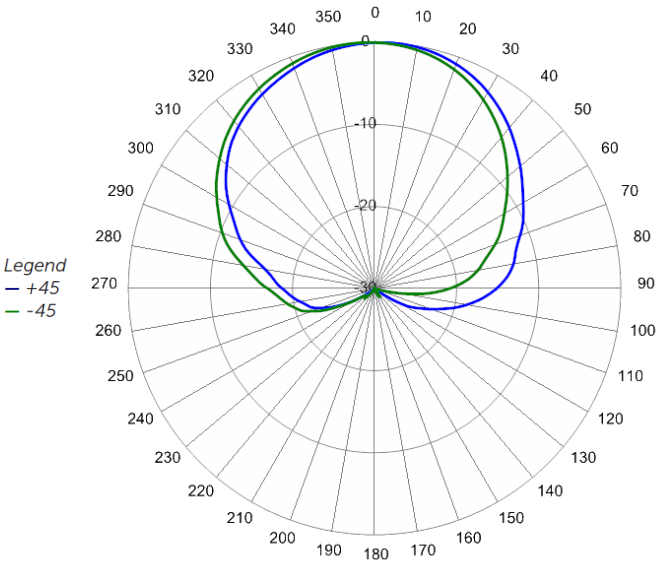

### RET placement as viewed from rear of antenna



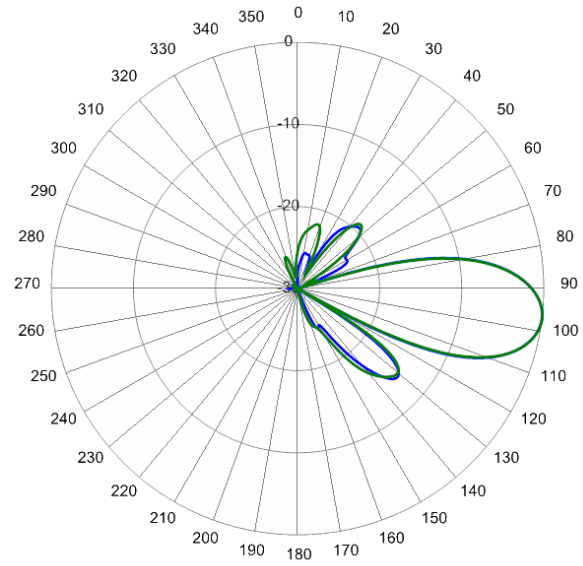

| Array | Ports | Freq (MHz) | Ports controlled by common RET |
|---|---|---|---|
| R1 | 1, 2 | 698-960 | 1, 2 |
| A1 | 3, 4 | 1695-2690 | 3, 4 |
| A1 | 5, 6 | 1695-2690 | 5, 6 |

## Typical Antenna Patterns

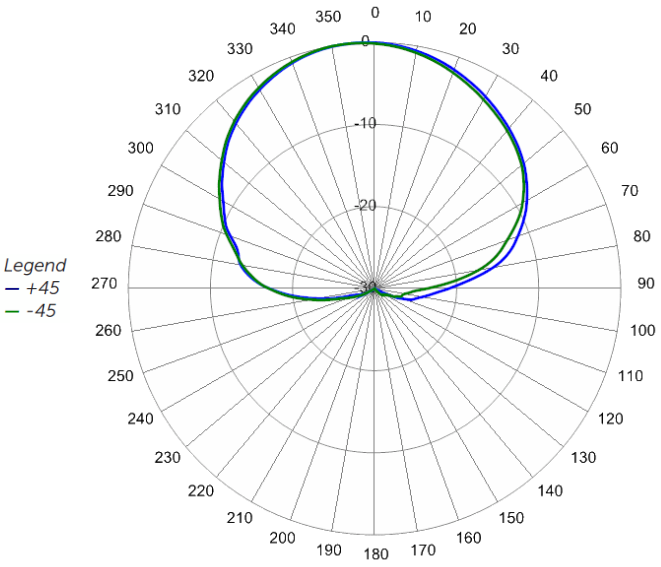
For detailed information on additional antenna patterns, contact customer support at support@cciproducts.com



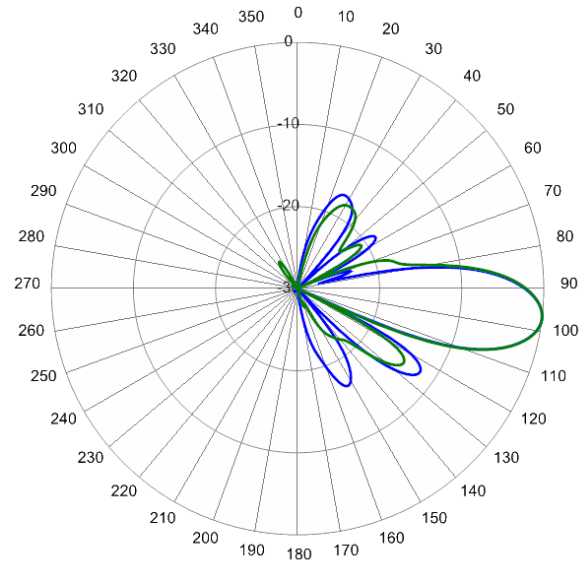

740 MHz Azimuth



740 MHz Elevation 7°




894 MHz Azimuth



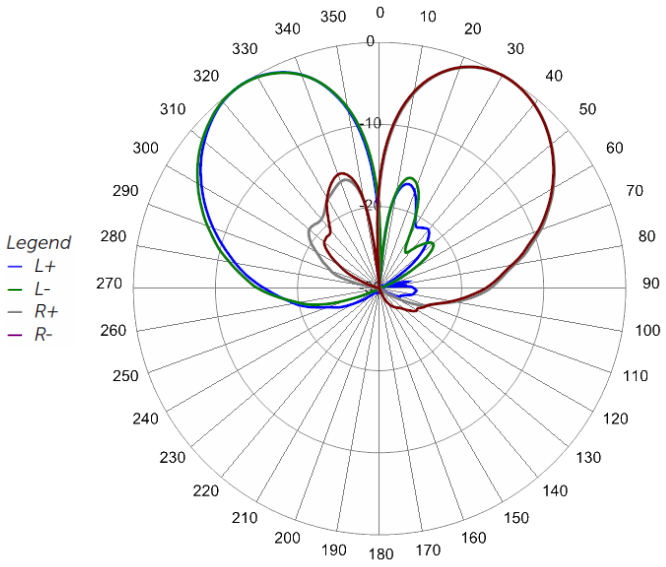
894 MHz Elevation 7°

SPECIFICATIONS

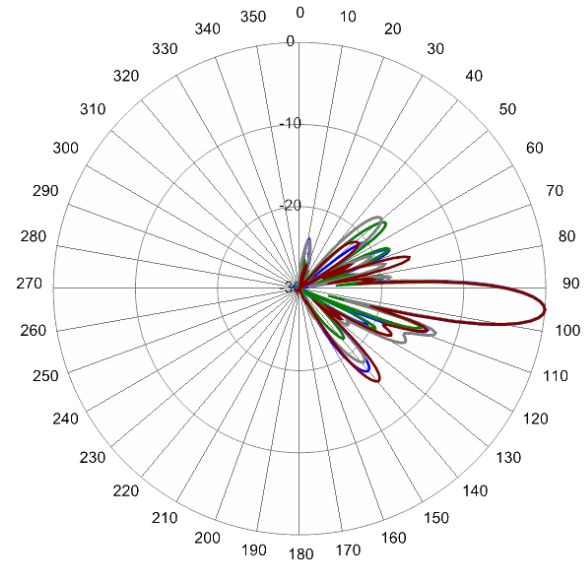
# Hybrid Bi-Sector™ Array

HBSA33R-KE4A

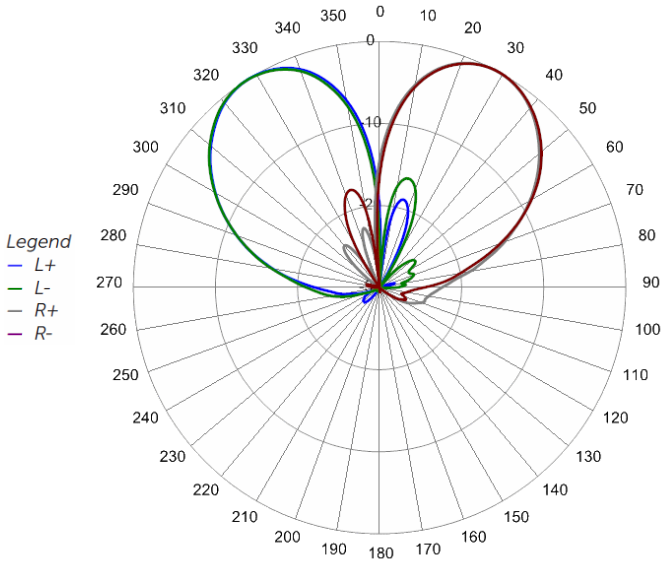
## Typical Antenna Patterns



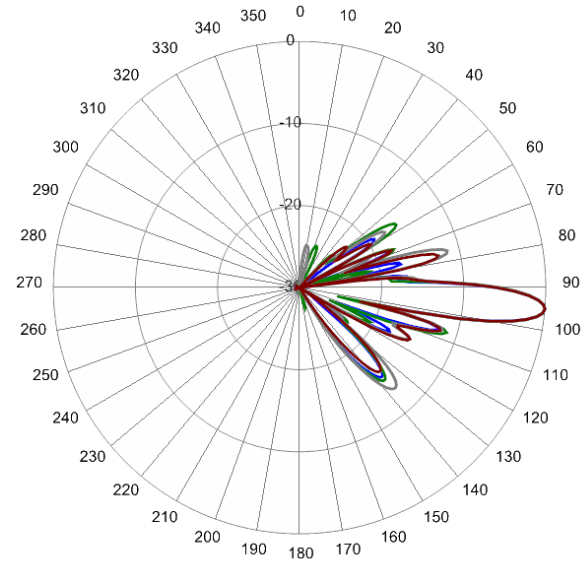

1755 MHz Azimuth Bi-Sector Ports



1755 MHz Elevation 5° Bi-Sector Ports




1930 MHz Azimuth Bi-Sector Ports



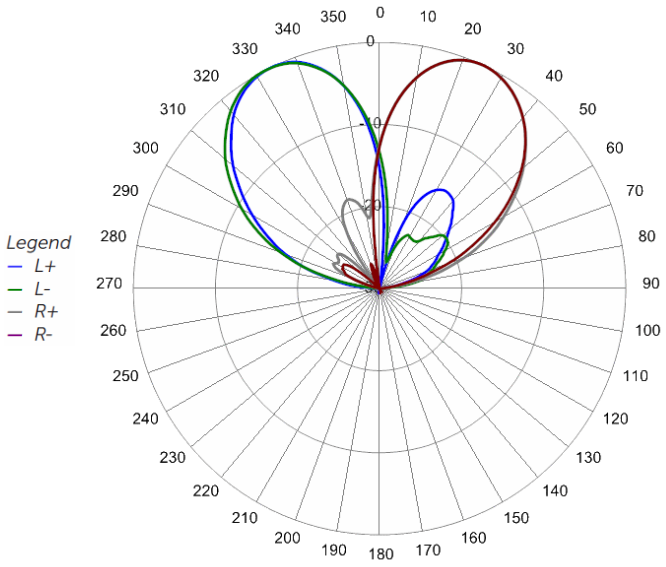
1930 MHz Elevation 5° Bi-Sector Ports

SPECIFICATIONS

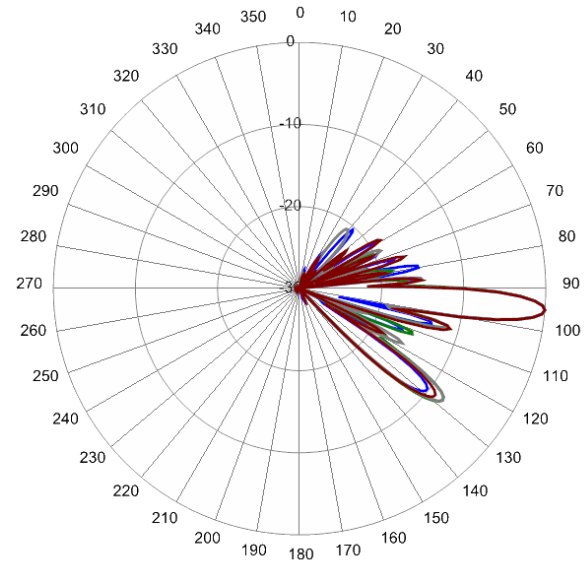
# Hybrid Bi-Sector™ Array

HBSA33R-KE4A

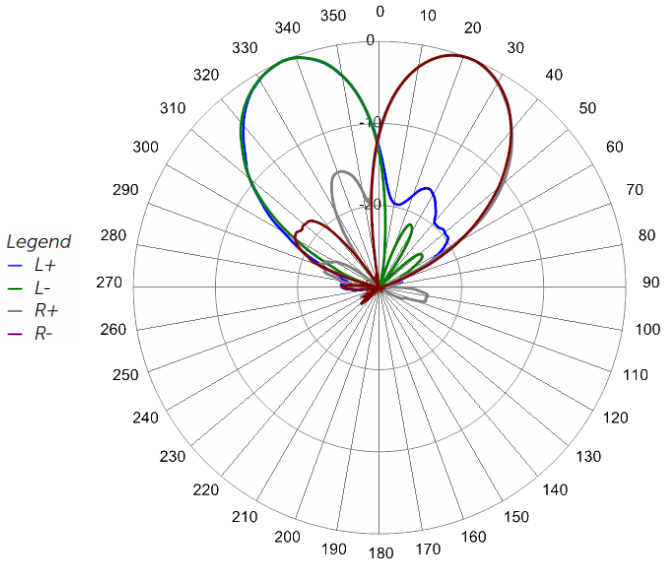
## Typical Antenna Patterns



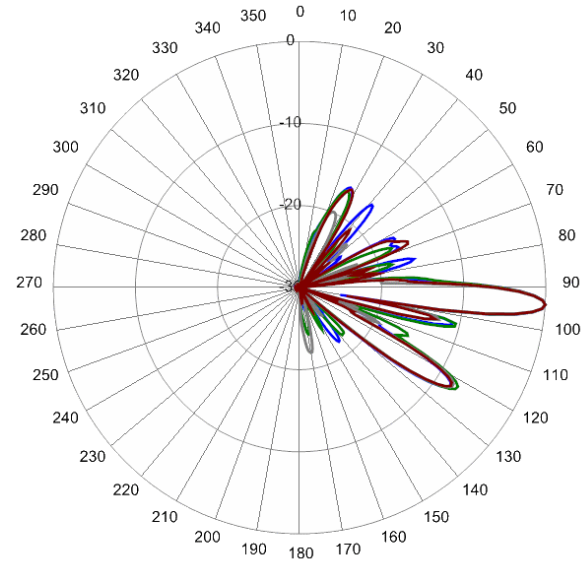

2345 MHz Azimuth Bi-Sector Ports



2345 MHz Elevation 5° Bi-Sector Ports




2650 MHz Azimuth Bi-Sector Ports



2650 MHz Elevation 5° Bi-Sector Ports

ORDERING

## Hybrid Bi-Sector™ Array

HBSA33R-KE4A

### Parts & Accessories

| | |
|---|---|
| HBSA33R-KE4AA-K | Four foot (1.2 m) Hybrid Bi-Sector™ Antenna Array with 4.3-10 female connector, 3 factory installed external BSA-RET200 RET actuators (Type 1 External) and MBK-02 mounting brackets |
| MBK-02 | Mounting bracket kit (top and bottom) with 0° to 10° mechanical tilt adjustment |
| BSA-RET200 | Remote electrical tilt actuator |
| HPA-CBK-AG-RRU | RRU AISG cable kit for three RET antenna |
| HPA-CBK-RA-AG-RRU | RRU AISG right angle cable kit for three RET antenna |

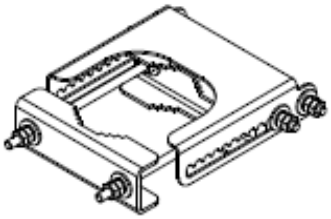
ACCESSORIES

# Mounting Bracket Kit

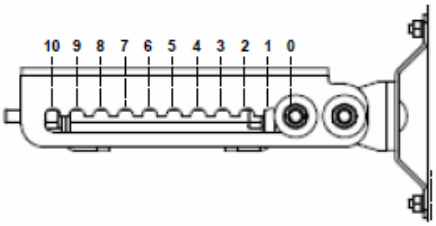
MBK-02

## Mechanical

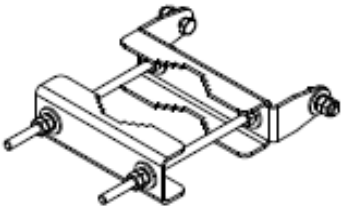
| | |
|---|---|
| Weight | 9.8 lbs (4.4 kg) |
| Hinge Pitch | 31.5 in (800 mm) |
| Mounting Pole Dimension | 2 to 5 in (5 to 12 cm) |
| Fastener Size | M10 |
| Installation Torque | 15 ft·lbs (20 N·m) |
| Mechanical Tilt Adjustment | 0° - 10° |



MBK-02 Top Adjustable Bracket




MBK-02 Top Adjustable Bracket Side View



MBK-02 Bottom Fixed Bracket

# Remote Electrical Tilt Actuator (RET)

BSA-RET200

## General Specifications

| | |
|---|---|
| Part Number | BSA-RET200 |
| Protocols | AISG 2.0 |
| RET Type | Type 1 |
| Adjustment Cycles | >10,000 cycles |
| Tilt Accuracy | ±0.1° |
| Temperature Range | -40° C to 70° C |

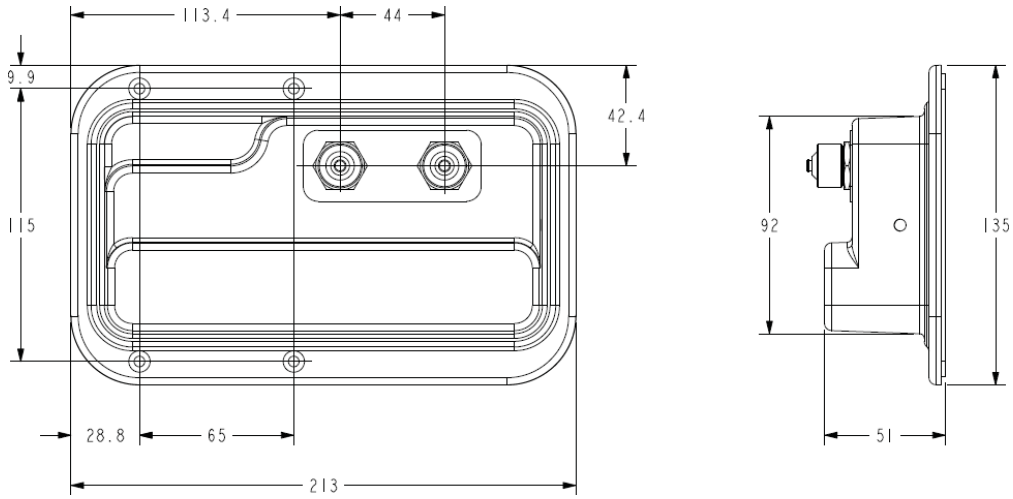
## Electrical

| | |
|---|---|
| Data Interface Signal | DC |
| Input Voltage | 10-30 Vdc |
| Current Consumption Tilt | 120 mA at $V_{in}$=24 |
| Current Consumption Idle | 55 mA at $V_{in}$=24 |
| Hardware Interface | AISG-RS 485 A/B |
| Input Connector | Male 1 x 8 pin Daisy Chain |
| Output Connector | Female 1 x 8 pin Daisy Chain |

## Mechanical

| | |
|---|---|
| Dimensions (LxWxD) | 8.0x5.0x2.0 in. (213x135x51 mm) |
| Housing | ASA/ABS/Aluminum |
| Weight | 1.7 lbs (0.75 kg) |

*ASA= Acrylic Styrene Acrylonitrile*
*ABS=Acrylanitrile Butadiene Styrene*



ACCESSORIES

# AISG Cable Kit

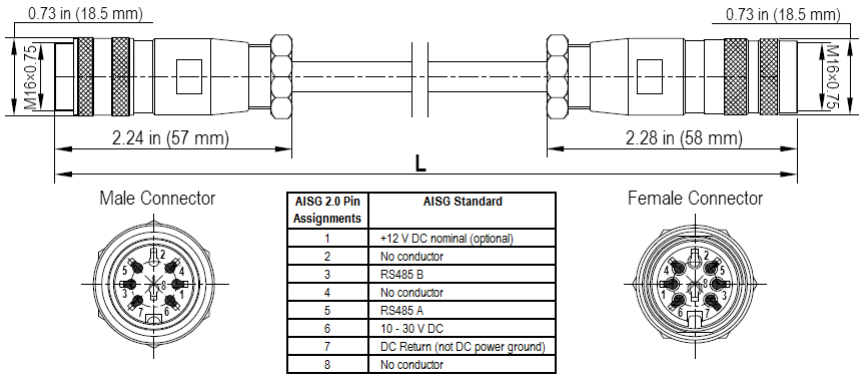
HPA-CBK-AG-RRU

## Electrical Specifications

| | | |
|---|---|---|
| Individual Cable Part Number | AISGC-M-F-18 | AISGC-M-F-10FT |
| Cable style | UL2464 | UL2464 |
| Protocol | AISG 1.1 and AISG 2.0 | AISG 1.1 and AISG 2.0 |
| Maximum voltage | 300 V | 300 V |
| Rated current | 5 A at 104° F (40° C) | 5 A at 104° F (40° C) |

## Mechanical Specifications

| | | |
|---|---|---|
| Individual Cable Part Number | AISGC-M-F-18 | AISGC-M-F-10FT |
| Cables per kit | 2 | 2 |
| Connectors | 2 x 8 pin IEC 60130-9<br>Straight male/straight female | 2 x 8 pin IEC 60130-9<br>Straight male/straight female |
| Tightening torque | Hand tighten only ≈ 1.84 ft-lbs (2.5 N·m) | Hand tighten only ≈ 1.84 ft-lbs (2.5 N·m) |
| Construction | Shielded (Tinned Copper Braid) | Shielded (Tinned Copper Braid) |
| Braid coverage | 85% | 85% |
| Jacket Material | Matte Polyurethane (Black) | Matte Polyurethane (Black) |
| Conductors | 1 twisted pair - 24 AWG<br>3 conductors - 19 AWG<br>AWM style 2464 | 1 twisted pair - 24 AWG<br>3 conductors - 19 AWG<br>AWM style 2464 |
| Cable Diameter | 0.307 in (7.8 mm) | 0.307 in (7.8 mm) |
| Length | 18 - 20 in (457 - 508 mm) | 120 in (3048 mm) |
| Weight | 0.27 lbs (0.12 kg) | 0.69 lbs (.31 kg) |
| Minimum bend radius | 3.9 in (100 mm) | 3.9 in (100 mm) |




| AISG 2.0 Pin Assignments | AISG Standard |
|---|---|
| 1 | +12 V DC nominal (optional) |
| 2 | No conductor |
| 3 | RS485 B |
| 4 | No conductor |
| 5 | RS485 A |
| 6 | 10 - 30 V DC |
| 7 | DC Return (not DC power ground) |
| 8 | No conductor |

AISG-Male to AISG-Female Jumper Cable

## Environmental Specifications

| | | |
|---|---|---|
| Individual Cable Part Number | AISGC-M-F-18 | AISGC-M-F-10FT |
| Temperature Range | -40° to 80° C | -40° to 80° C |
| Flammability | UL 1581 VW-1 | UL 1581 VW-1 |
| Ingress Protection | IEC 60529:2001, IP67 | IEC 60529:2001, IP67 |

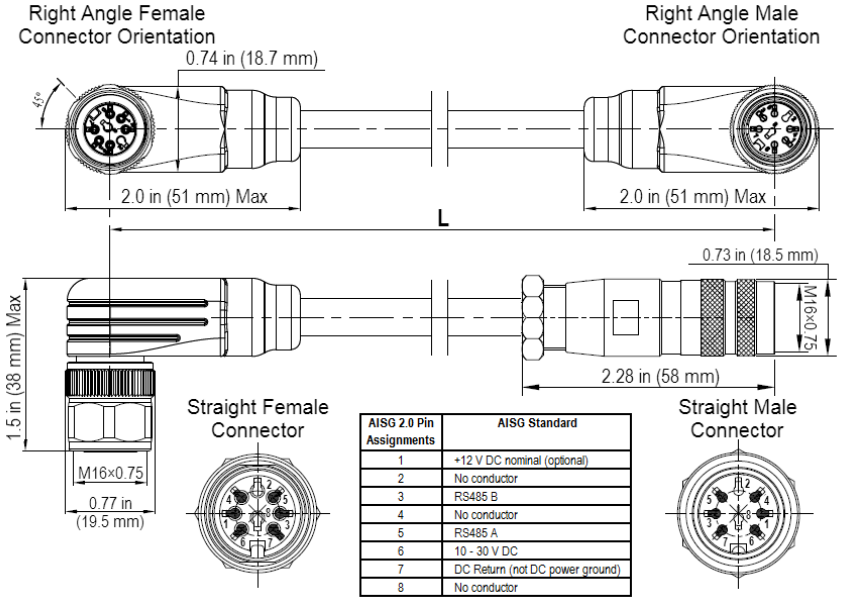
# AISG Cable Kit

HPA-CBK-RA-AG-RRU

## Electrical/Mechanical/Environmental Specifications

| | RET to RET Cables | RRU to Antenna Cables |
|---|---|---|
| Individual Cable Part Number | AISGC-MRA-FRA-20 | AISGC-M-FRA-10FT |
| Cable style | UL2464 | |
| Protocol | AISG 1.1 and AISG 2.0 | |
| Maximum voltage | 300 V | |
| Rated current | 5 A at 104° F (40° C) | |
| Temperature Range | -40° to 80° C | |
| Flammability | UL 1581 VW-1 | |
| Ingress Protection | IEC 60529:2001, IP67 | |
| Tightening torque | Hand tighten only ≈ 1.84 ft-lbs (2.5 N·m) | |
| Construction | Shielded (Tinned Copper Braid) | |
| Braid coverage | 85% | |
| Jacket Material | Matte Polyurethane (Black) | |
| Conductors | 1 twisted pair - 24 AWG<br>3 conductors - 19 AWG<br>AWM style 2464 | |
| Cable Diameter | 0.307 in (7.8 mm) | |
| Minimum bend radius | 3.9 in (100 mm) | |
| Connectors | 2 x 8 pin IEC 60130-9<br>Right angle male/right angle female | 2 x 8 pin IEC 60130-9<br>Straight male/right angle female |
| Length | 20 in (508 mm) | 120 in (3048 mm) |
| Weight | 0.23 lbs (0.10 kg) | 0.77 lbs (0.35 kg) |
| Cables per kit | 2 | 2 |

## Mechanical Specifications




| AISG 2.0 Pin Assignments | AISG Standard |
|---|---|
| 1 | +12 V DC nominal (optional) |
| 2 | No conductor |
| 3 | RS485 B |
| 4 | No conductor |
| 5 | RS485 A |
| 6 | 10 - 30 V DC |
| 7 | DC Return (not DC power ground) |
| 8 | No conductor |

Right Angle to Right Angle and Right Angle to Straight Jumper Cable

STANDARDS & CERTIFICATIONS

Hybrid Bi-Sector™ Array

HBSA33R-KE4A

## Standards & Compliance

| | |
|---|---|
| Safety | EN 60950-1, UL 60950-1 |
| Emission | EN 55022 |
| Immunity | EN 55024 |
| Environmental | IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-5, IEC 60068-2-6, IEC-60068-2-11, IEC 60068-2-14, IEC 60068-2-18, IEC 60068-2-27, IEC 60068-2-29, IEC 60068-02-30, IEC 60068-2-52, IEC 60068-2-64, GR-63-CORE 4.3.1, EN 60529, IP 24 |

## Certifications

Antenna Interface Standards Group (AISG), Federal Communication Commission (FCC) Part 15 Class B, CE, CSA US, ISO 9001