



# Antennas

DATA SHEET

## Hybrid Bi-Sector™ Array

HBSA33R-KE9B



- Nine foot (2.7 m), multiband, Twenty port Hybrid Bi-Sector™ Antenna. Deploying a high performing 65° azimuth beamwidth covering 698-960 MHz and two independent pairs of CCI's Patented Asymmetrical 33° Shaped Beams covering 1695-2690 MHz frequencies
- Sixteen wide high band ports covering 1695-2690 MHz and four wide low band ports covering 698-960 MHz in a single antenna
- Full Spectrum Compliance for 698-960 MHz /1695-2690 MHz
- Provides two independent pairs of 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 Five Field Replaceable, integrated AISG 2.0 compliant Remote Electrical Tilt (RET)

### Overview

This version of the CCI Hybrid Bi-Sector™ Multiband Array is a Twenty port antenna, with sixteen wide high band ports covering 1695-2690 MHz and four wide low band ports covering 698-960 MHz. The CCI Hybrid Bi-Sector™ array uses two independent pairs of CCI's Patented Asymmetric 33° Shaped Beams in the High Band frequencies and a high performance 65° azimuth beamwidth in the low band frequencies. The CCI Hybrid Bi-Sector Array thus provides the capability to deploy two independent sets of Dual (over split beams) 4x4 Multiple-input Multiple-output (MIMO) in the high band and Single 4x4 Multiple-input Multiple-output in the low band. The CCI Hybrid Bi-Sector™ Array utilizes five RET controllers, with a separate RET control for the Low Band ports and a separate RET control in the High Band for each LEFT and RIGHT pair of CCI's Patented Asymmetric 33° Shaped Beams.

The CCI Hybrid Bi-Sector™ Multiband Array, allow operators to reduce antenna count and replace existing 65° networks, while increasing cell site capacity and LTE data throughput by minimizing overlap between CCI's Patented Asymmetric 33° Shaped Beams. This design approach lowers interference between sectors. All of this is achieved through a single panel array, producing significant CAPEX and OPEX cost savings for the operator. CCI antennas are designed and produced to ISO 9001 certification standards for reliability and quality in our state-of-the-art manufacturing facilities.

### Applications

- Two Independent pairs of Dual (over split beams) 4x4 MIMO on High Band and 4x4 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



# Antennas

## Hybrid Bi-Sector™ Array

HBSA33R-KE9B

### SPECIFICATIONS

#### Electrical

| Ports                              | 4 x Low Band Ports for 698-960 MHz |                 |                 |                 |
|------------------------------------|------------------------------------|-----------------|-----------------|-----------------|
| Frequency Range                    | 698-806 MHz                        | 790-862 MHz     | 824-896 MHz     | 880-960 MHz     |
| Gain                               | 16.2 dBi                           | 16.5 dBi        | 16.6 dBi        | 16.6 dBi        |
| Azimuth Beamwidth (-3dB)           | 65°                                | 60°             | 58°             | 54°             |
| Elevation Beamwidth (-3dB)         | 8.3°                               | 7.4°            | 7.0°            | 6.5°            |
| Electrical Downtilt                | 2° to 10°                          | 2° to 10°       | 2° to 10°       | 2° to 10°       |
| Elevation Sidelobes (1st Upper)    | <-18 dB                            | <-18 dB         | <-18 dB         | <-18 dB         |
| Front-to-Back Ratio @180°          | > 35 dB                            | > 35 dB         | > 35 dB         | > 35 dB         |
| Cross-Polar Discrimination at Peak | > 24 dB                            | > 25 dB         | > 25 dB         | > 25 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       | 500 watts       |
| Polarization                       | Dual Linear 45°                    | Dual Linear 45° | Dual Linear 45° | Dual Linear 45° |
| Input Impedance                    | 50 ohms                            | 50 ohms         | 50 ohms         | 50 ohms         |
| Lightning Protection               | DC Ground                          | DC Ground       | DC Ground       | DC Ground       |

| BASTA Electrical Specifications            |             |             |             |             |
|--|-------------|-------------|-------------|-------------|
| Frequency Range                            | 698-806 MHz | 790-862 MHz | 824-896 MHz | 880-960 MHz |
| Gain over all Tilts (dBi)                  | 15.4        | 16.0        | 16.2        | 16.2        |
| Gain over all Tilts Tolerance (dB)         | 0.7         | 0.3         | 0.4         | 0.4         |
| Gain at Low-Tilt (dBi)                     | 15.4        | 16.1        | 16.2        | 16.2        |
| Gain at Mid-Tilt (dBi)                     | 15.5        | 16.2        | 16.4        | 16.4        |
| Gain at High-Tilt (dBi)                    | 15.2        | 15.8        | 16.0        | 15.9        |
| Azimuth Beamwidth Tolerance (°)            | 7.8         | 5.9         | 5.7         | 4.9         |
| Elevation Beamwidth Tolerance (°)          | 0.9         | 0.6         | 0.5         | 0.4         |
| Electrical Downtilt Deviation (°)          | 1.1         | 0.9         | 0.8         | 0.8         |
| First Upper Sidelobe Suppression (dB)      | 14.8        | 16.7        | 16.0        | 14.2        |
| Upper Sidelobe Suppression Peak to 20°(dB) | 14.9        | 16.8        | 16.0        | 14.8        |
| Front-to-Back Ratio over ±20° (dB)         | 21.9        | 24.6        | 25.2        | 27.2        |
| Cross-polar Discrimination at ±60° (dB)    | 7.6         | 5.7         | 5.8         | 8.4         |

\* Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V11.1.  
All specifications are subject to change without notice.



# Antennas

## SPECIFICATIONS

### Hybrid Bi-Sector™ Array

HBSA33R-KE9B

| Ports                              | 16 × High Band Ports for 1695-2690 MHz |                 |                 |                 |                 |
|------------------------------------|--|-----------------|-----------------|-----------------|-----------------|
|                                    | 1695-1880 MHz                          | 1850-1990 MHz   | 1920-2180 MHz   | 2300-2400 MHz   | 2496-2690 MHz   |
| Frequency Range                    | 1695-1880 MHz                          | 1850-1990 MHz   | 1920-2180 MHz   | 2300-2400 MHz   | 2496-2690 MHz   |
| Gain                               | 17.5 dBi                               | 17.8 dBi        | 18.3 dBi        | 18.5 dBi        | 19.0 dBi        |
| Azimuth Beamwidth (-3dB)           | 36°                                    | 34°             | 31°             | 29°             | 26°             |
| Elevation Beamwidth (-3dB)         | 7.7°                                   | 7.0°            | 6.4°            | 5.8°            | 5.5°            |
| Electrical Downtilt                | 0° to 10°                              | 0° to 10°       | 0° to 10°       | 0° to 10°       | 0° to 10°       |
| Elevation Sidelobes (1st Upper)    | <-18 dB                                | <-18 dB         | <-18 dB         | <-18 dB         | <-18 dB         |
| Front-to-Back Ratio @180°          | > 35 dB                                | > 35 dB         | > 35 dB         | > 35 dB         | > 35 dB         |
| Cross-Polar Discrimination at Peak | > 25 dB                                | > 25 dB         | > 25 dB         | > 25 dB         | > 24 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 Linear 45°                        | Dual Linear 45° | Dual Linear 45° | Dual Linear 45° | Dual Linear 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       |

| BASTA Electrical Specifications            |               |               |               |               |               |
|--|---------------|---------------|---------------|---------------|---------------|
| Frequency Range                            | 1695-1880 MHz | 1850-1990 MHz | 1920-2180 MHz | 2300-2400 MHz | 2496-2690 MHz |
| Gain over all Tilts (dBi)                  | 16.5          | 17.2          | 17.5          | 17.8          | 18.1          |
| Gain over all Tilts Tolerance (dB)         | 0.8           | 0.4           | 0.5           | 0.5           | 0.7           |
| Gain at Low-Tilt (dBi)                     | 16.4          | 17.2          | 17.6          | 17.5          | 18.0          |
| Gain at Mid-Tilt (dBi)                     | 16.5          | 17.3          | 17.6          | 18.0          | 18.5          |
| Gain at High-Tilt (dBi)                    | 16.5          | 17.2          | 17.3          | 17.8          | 17.9          |
| Azimuth Beamwidth Tolerance (°)            | 3.2           | 2.5           | 2.6           | 2.0           | 2.1           |
| Elevation Beamwidth Tolerance (°)          | 0.7           | 0.4           | 0.5           | 0.2           | 0.3           |
| Electrical Downtilt Deviation (°)          | 0.6           | 0.6           | 0.6           | 0.6           | 0.6           |
| First Upper Sidelobe Suppression (dB)      | 14.6          | 13.4          | 12.2          | 14.2          | 14.1          |
| Upper Sidelobe Suppression Peak to 20°(dB) | 14.7          | 13.3          | 12.2          | 15.7          | 14.2          |
| Front-to-Back Ratio over ±20° (dB)         | 29.1          | 30.5          | 31.3          | 30.7          | 30.9          |
| Cross-polar Discrimination at 3 dB (dB)    | 15.4          | 14.7          | 13.2          | 12.6          | 13.8          |

\* Electrical specifications follow document "Recommendation on Base Station Antenna Standards" (BASTA) V11.1. All specifications are subject to change without notice.

### Mechanical

|                            |  |
|----------------------------|--|
| Dimensions (LxWxD)         | 106.3x26.1x9.0 in (2700x662x229 mm)        |
| Survival Wind Speed        | > 150 mph (> 241 kph)                      |
| Front Wind Load            | 626 lbs (2783 N) @ 100 mph (161 kph)       |
| Side Wind Load             | 266 lbs (1182 N) @ 100 mph (161 kph)       |
| Equivalent Flat Plate Area | 24.4 ft <sup>2</sup> (2.3 m <sup>2</sup> ) |
| Weight *                   | 164.5 lbs (74.6 kg)                        |
| Connector                  | 20 × 4.3-10 female                         |
| Mounting Pole              | 3 to 5 in (7.5 to 12.7 cm)                 |

\* Weight excludes mounting



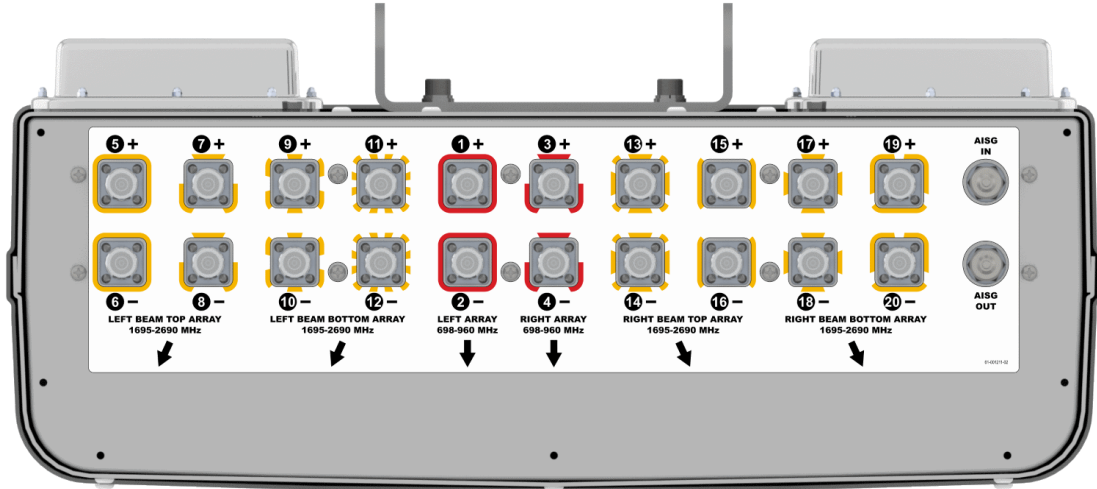
# Antennas

## Hybrid Bi-Sector™ Array

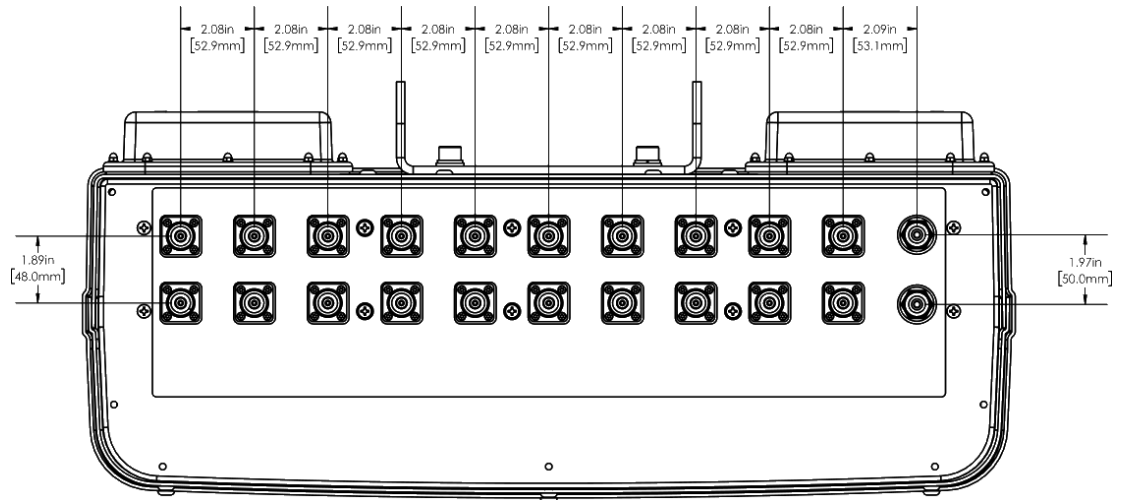
HBSA33R-KE9B

### SPECIFICATIONS

Bottom View



Connector Spacing





# Antennas

## Hybrid Bi-Sector™ Array

HBSA33R-KE9B

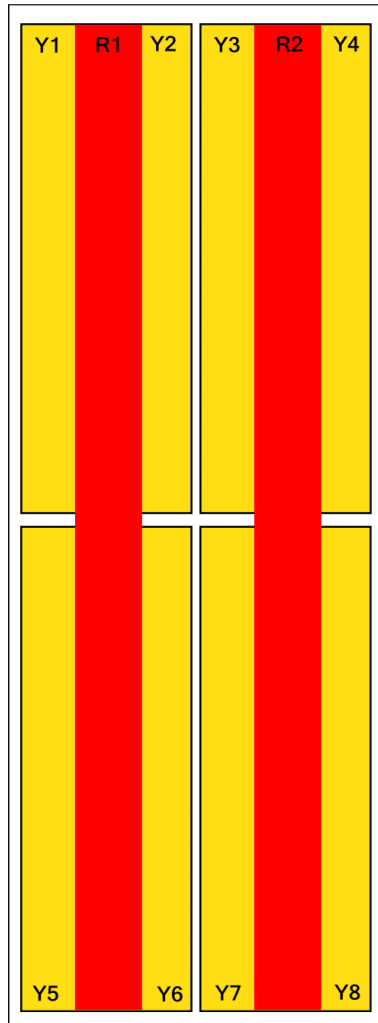
### SPECIFICATIONS

Mechanical

RET to Element Configuration

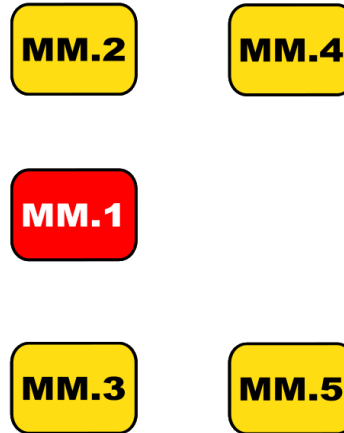
HBSA33R-KE9BA Element and RET configuration (Type 17 Internal RET)

### Top of antenna Viewed from rear



### RET placement as view from rear of antenna

Top of antenna



| Array | Ports  | Freq (MHz) | Ports controlled by common RET | AISG RET UID |
|-------|--------|------------|--------------------------------|--------------|
| R1    | 1, 2   | 698-960    | 1, 2, 3, 4                     | ClxxxxxxMM.1 |
| R2    | 3, 4   | 698-960    |                                |              |
| Y1    | 5, 6   | 1695-2690  | 5, 6, 7, 8                     | ClxxxxxxMM.2 |
| Y3    | 7, 8   | 1695-2690  | Left Beam Top                  |              |
| Y5    | 9, 10  | 1695-2690  | 9, 10, 11, 12                  | ClxxxxxxMM.3 |
| Y7    | 11, 12 | 1695-2690  | Left Beam Bottom               |              |
| Y2    | 13, 14 | 1695-2690  | 13, 14, 15, 16                 | ClxxxxxxMM.4 |
| Y4    | 15, 16 | 1695-2690  | Right Beam Top                 |              |
| Y6    | 17, 18 | 1695-2690  | 17, 18, 19, 20                 | ClxxxxxxMM.5 |
| Y8    | 19, 20 | 1695-2690  | Right Beam Bottom              |              |



# Antennas

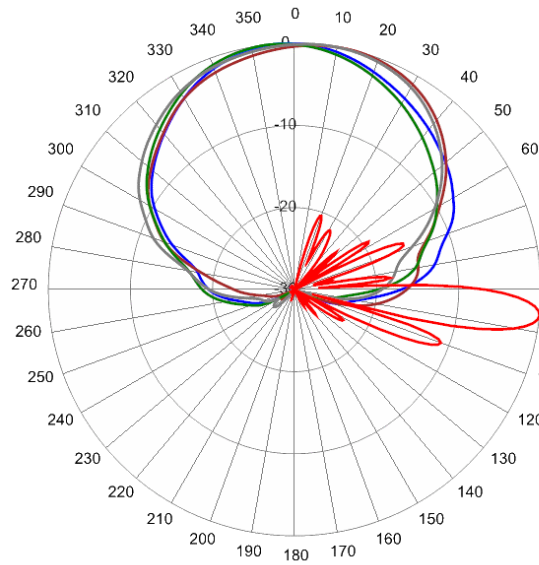
## SPECIFICATIONS

### Hybrid Bi-Sector™ Array

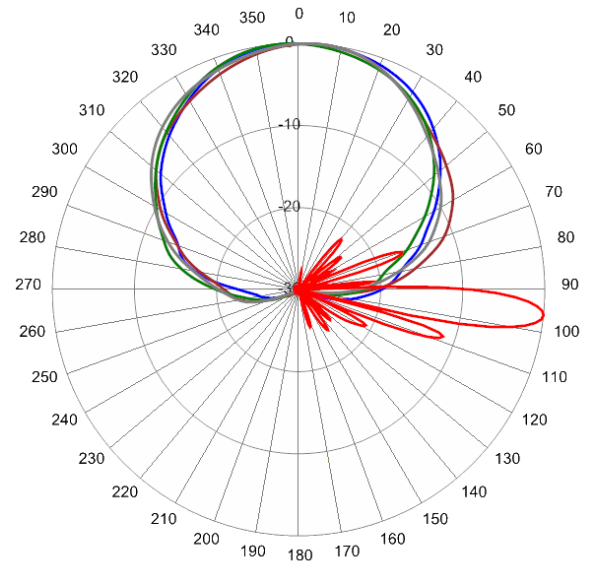
HBSA33R-KE9B

#### Typical Antenna Patterns

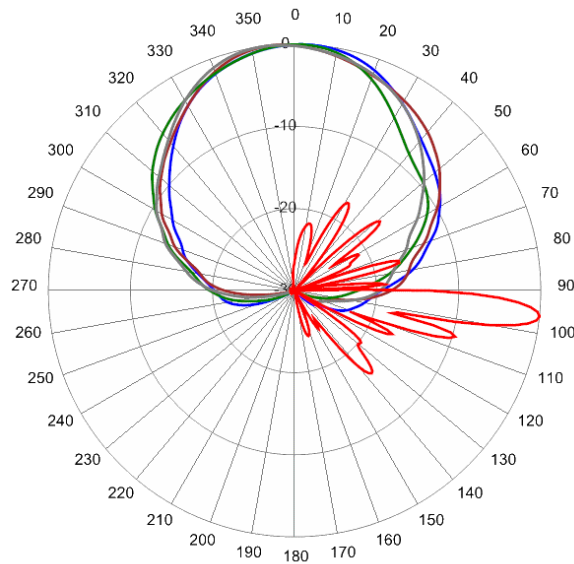
For detailed information on additional antenna patterns, contact customer support at [support@cciproducts.com](mailto:support@cciproducts.com)



740 MHz Azimuth with Elevation 6°



824 MHz Azimuth with Elevation 6°



960 MHz Azimuth with Elevation 6°

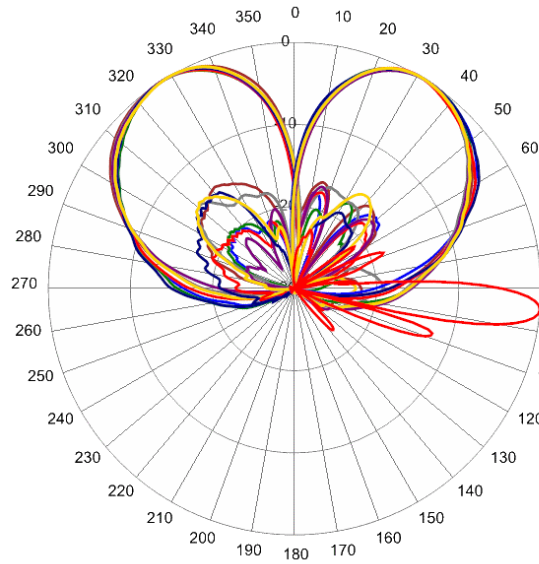


# Antennas

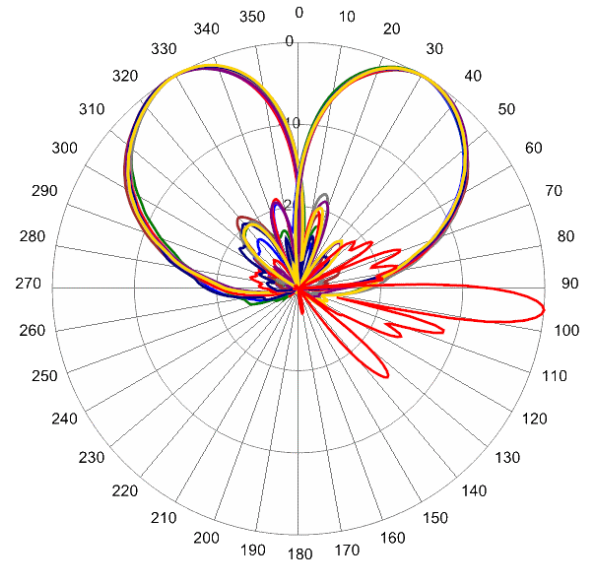
SPECIFICATIONS

Hybrid Bi-Sector™ Array

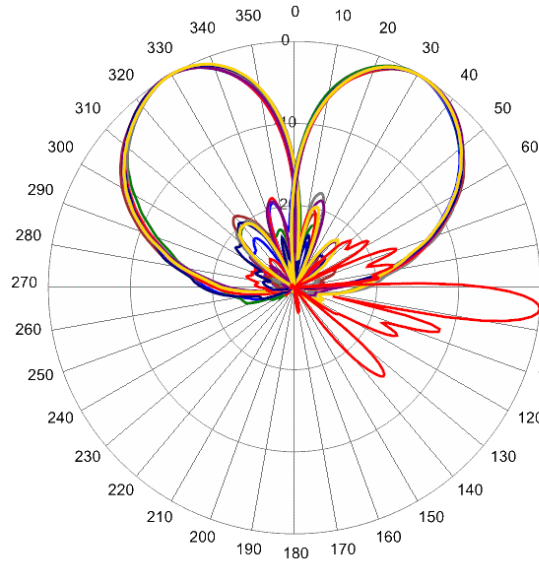
HBSA33R-KE9B



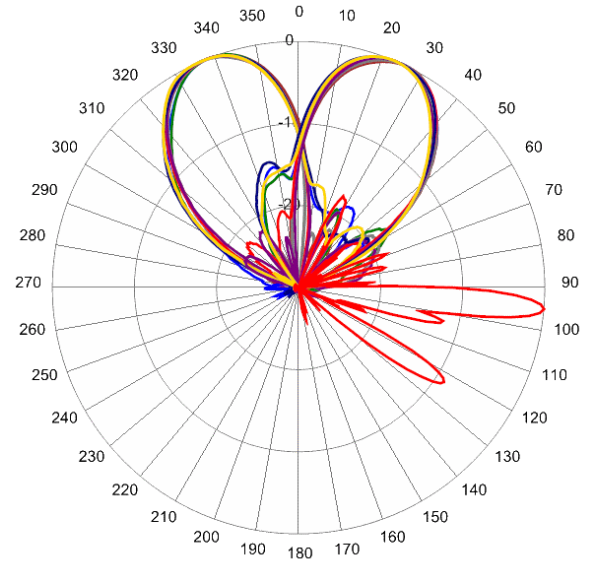
1770 MHz Azimuth with Elevation 5°



1920 MHz Azimuth with Elevation 5°



2355 MHz Azimuth with Elevation 5°



2650 MHz Azimuth with Elevation 5°



# Antennas

ORDERING

Hybrid Bi-Sector™ Array

HBSA33R-KE9B

Parts & Accessories

|                        |   |
|------------------------|---|
| <b>HBSA33R-KE9BA-K</b> | Nine foot (2.7 m) Hybrid Bi-Sector™ Antenna Array with 4.3-10 female connectors, 5 factory installed BSA-RET400 RET actuators (Type 17 internal) and MBK-22 mounting brackets |
| <b>MBK-22</b>          | Mounting bracket kit (top and bottom) with 0° to 10° mechanical tilt  |
| <b>MBK-23</b>          | Mounting bracket kit (top and bottom) with fixed 0° mechanical tilt   |
| <b>BSA-RET400</b>      | Type 17 Internal Remote Electrical Tilt System (RET)  |
| <b>AISGC-M-F-10FT</b>  | 10 Ft (3 m) Male/Female RRU to Antenna AISG cable   |





# Antennas

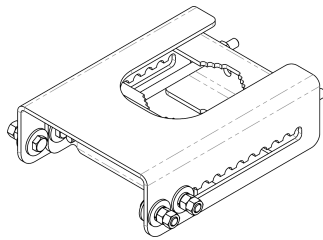
ACCESSORIES

## Mounting Bracket Kit

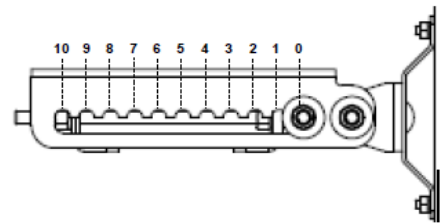
MBK-22

Mechanical

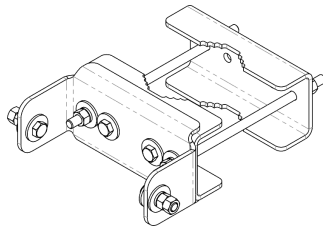
|                                   |                          |
|-----------------------------------|--------------------------|
| <b>Weight</b>                     | 39.9 lbs (18.1 kg)       |
| <b>Hinge Pitch</b>                | 47.25 in (1200 mm)       |
| <b>Mounting Pole Dimension</b>    | 3 to 5 in (7.5 to 12 cm) |
| <b>Fastener Size</b>              | M12                      |
| <b>Installation Torque</b>        | 40 ft·lb (54 N·m)        |
| <b>Mechanical Tilt Adjustment</b> | 0° - 10°                 |



MBK-22 Top Adjustable Bracket



MBK-22 Top Adjustable Bracket Side View



MBK-22 Bottom Fixed Bracket



# Antennas

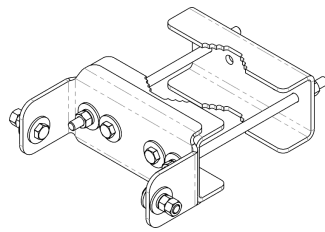
ACCESSORIES

## Mounting Bracket Kit

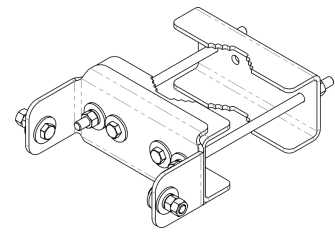
MBK-23

Mechanical

|                                |                          |
|--------------------------------|--------------------------|
| <b>Weight</b>                  | 31.7 lbs (14.4 kg)       |
| <b>Hinge Pitch</b>             | 47.25 in (1200 mm)       |
| <b>Mounting Pole Dimension</b> | 3 to 5 in (7.5 to 12 cm) |
| <b>Fastener Size</b>           | M12                      |
| <b>Installation Torque</b>     | 40 ft·lb (54 N·m)        |
| <b>Mechanical Tilt</b>         | 0°                       |



MBK-23 Top Fixed Bracket



MBK-23 Bottom Fixed Bracket



# Antennas

ACCESSORIES

## Internal Remote Electrical Tilt (iRET)

BSA-RET400

### General Specifications

|                   |                 |
|-------------------|-----------------|
| Part Number       | BSA-RET400      |
| Protocols         | AISG 2.0        |
| RET Type          | Type 17         |
| Adjustment Cycles | >10,000 cycles  |
| Tilt Accuracy     | ±0.1°           |
| Temperature Range | -40° C to 70° C |

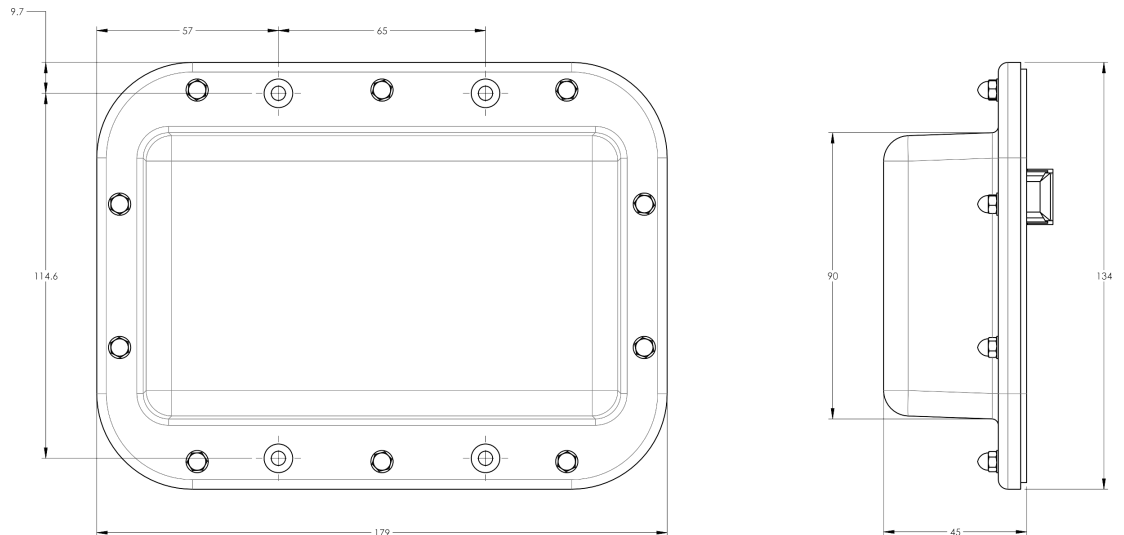
### Electrical

|                          |                                    |
|--------------------------|------------------------------------|
| Data Interface Signal    | DC                                 |
| Input Voltage            | 10-30 Vdc                          |
| Current Consumption Tilt | 100 mA at $V_{in}=24$ (500 mA MAX) |
| Current Consumption Idle | 10 mA at $V_{in}=24$               |

### Mechanical

|                    |                                 |
|--------------------|---------------------------------|
| Dimensions (LxWxD) | 7.0x5.3x1.8 in. (179x134x45 mm) |
| Housing            | ASA/ABS/Aluminum                |
| Weight             | 1.3 lbs (0.6 kg)                |

ASA= Acrylic Styrene Acrylonitrile  
ABS=Acrylonitrile Butadiene Styrene





# Antennas

ACCESSORIES

AISG Cable

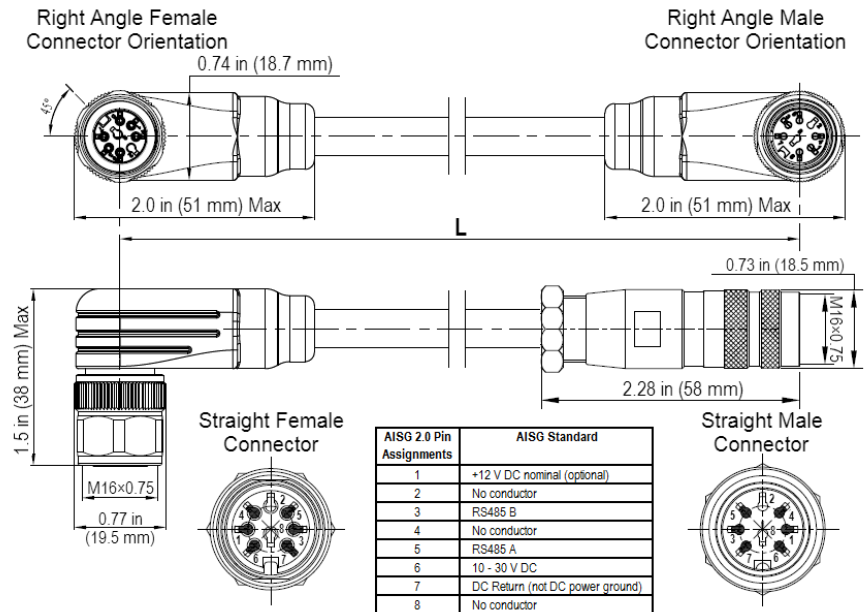
AISGC-M-F-xFT

## Electrical Specifications

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

## Mechanical Specifications

|                              |  |
|------------------------------|--|
| Individual Cable Part Number | AISGC-M-F-x(FT)  |
| Cables per kit               | 1  |
| Connectors                   | 2 x 8 pin IEC 60130-9<br>Straight male/straight female             |
| Tightening torque            | Hand tighten only $\approx$ 1.84 ft-lbs (2.5 Nm)                   |
| 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)  |
| Length                       | See order details  |
| Minimum bend radius          | 3.15 in (80 mm)  |



AISG-Male to AISG-Female Jumper Cable



# Antennas

ACCESSORIES

AISG Cable

AISGC-M-F-xFT

Environmental Specifications

|                                     |                      |
|-------------------------------------|----------------------|
| <b>Individual Cable Part Number</b> | AISGC-M-F-xFT        |
| <b>Temperature Range</b>            | -40° to 80° C        |
| <b>Flammability</b>                 | UL 1581 VW-1         |
| <b>Ingress Protection</b>           | IEC 60529:2001, IP67 |



# Antennas

## STANDARDS & CERTIFICATIONS

### Hybrid Bi-Sector™ Array

HBSA33R-KE9B

#### Standards & Compliance

|                      |  |
|----------------------|--|
| <b>Safety</b>        | EN 60950-1, UL 60950-1   |
| <b>Emission</b>      | EN 55022   |
| <b>Immunity</b>      | EN 55024   |
| <b>Environmental</b> | 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

