



## ANT-8/9-IPW3-NP

### 450 MHz Cellular LTE Whip Antennas

The Linx ANT-450-HSW is a monopole whip-style antenna for cellular and cellular IoT (LTE-M, NB-IoT) applications in the 410 MHz and 450 MHz bands including LTE bands 31, 72, 73, 87, 88.

The ANT-450-HSW antenna exterior uses Keyflex TPE for additional UV protection in harsh environments. The ANT-450-HSW hinged design allows for the antenna to be positioned for optimum performance. The antenna connects via an N plug (male pin) or TNC plug (male pin) connector.

#### FEATURES

- Performance at 410 MHz to 427 MHz
  - VSWR:  $\leq 1.2$
  - Peak Gain: 3.1 dBi
  - Efficiency: 98%
- Performance at 450 MHz to 470 MHz
  - VSWR:  $\leq 2.1$
  - Peak Gain: -4.6 dBi
  - Efficiency: 12%
- Keyflex TPE exterior for increased UV protection
- Hinged design with detents for straight, 45 degree and 90 degree positioning
- N plug (male pin) or TNC plug (male pin) connector

#### APPLICATIONS

- Cellular IoT:
  - LTE-M (Cat-M1)
  - NB-IoT
- LTE bands 31, 72, 73, 87, 88
- Hand-held devices
- Remote control, monitoring and sensing
- Internet of Things (IoT) devices

#### ORDERING INFORMATION

Part Number	Description
ANT-450-HSW-NP	450 MHz whip antenna with N plug (male pin) connector
ANT-450-HSW-TNC	450 MHz whip antenna with TNC plug (male pin) connector

Available from Linx Technologies and select distributors and representatives.

TABLE 1. ELECTRICAL SPECIFICATIONS

Parameter	Frequency Band	
Frequency Range	410 MHz to 427 MHz	450 MHz to 467.5 MHz
VSWR (max.)	1.2	1.6
Peak Gain (dBi)	3.1	2.3
Average Gain (dBi)	-0.1	-0.9
Efficiency (%)	98	85
Impedance	50 $\Omega$	
Wavelength	1/4-wave	
Electrical Type	Monopole	
Polarization	Omnidirectional	
Radiation	Linear	
Max Power	25 W	

Electrical specifications and plots measured with the antenna, bent 90 degrees at the edge of a 200 mm x 200 mm reference ground plane.

TABLE 2. MECHANICAL SPECIFICATIONS

Parameter	Value
Connection	N plug (male pin) or TNC plug (male pin)
Antenna Color	Black
Operating Temp. Range	-40 °C to +85 °C
Weight	ANT-450-HSW-TNC = 26.0 g (0.92 oz), ANT-450-HSW-NP = 41.0 g (1.46 oz)
Dimensions	ANT-450-HSW-TNC = 201.6 mm x Ø14.4 mm (7.94 in x Ø0.57 in), ANT-450-HSW-NP = 205.2 mm x Ø20.1 mm (8.08 in x Ø0.79 in)

PACKAGING INFORMATION

The ANT-450-HSW-ccc antenna is individually placed in a plastic bag. Bagged antennas are sealed in a plastic labeled bag in quantities of 50 pcs. Bags are packaged in cartons of 400 pcs. Distribution channels may offer alternative packaging options.

PRODUCT DIMENSIONS

Figure 1 provides dimensions of the ANT-450-HSW-TNC antenna. The antenna whip can be tilted 90 degrees, with a detent at 45 degrees enabling the antenna to be oriented in any direction. The rotating base allows for continuous positioning through 360 degrees even while installed. Figure 2 shows the dimensions of the ANT-450-HSW-NP.

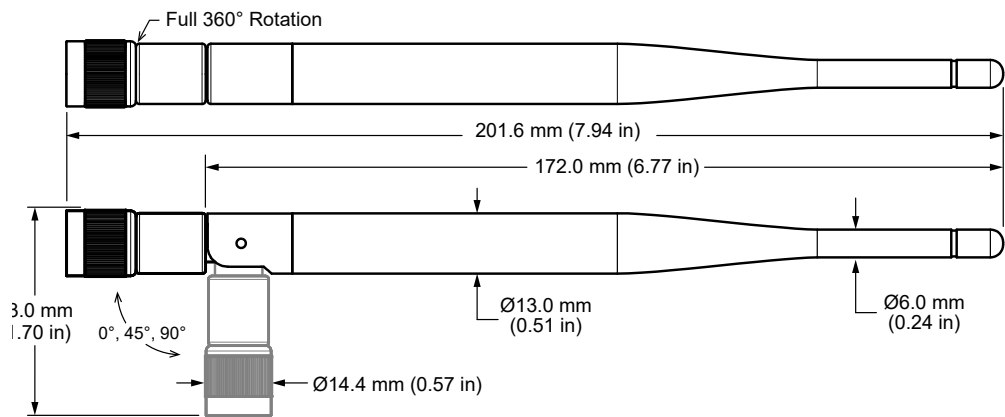
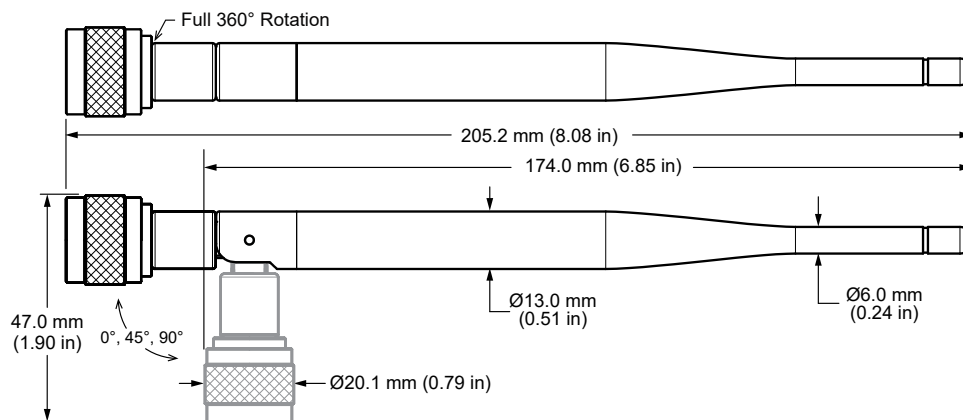


Figure 1. ANT-450-HSW-TNC Antenna Dimensions

## PRODUCT DIMENSIONS ( CONTINUED)

Figure 1 provides dimensions of the ANT-8/9-IPW3-NP.



## COUNTERPOISE

1/4-Wave monopole antennas require an associated ground plane counterpoise for proper operation. The size and location of the ground plane relative to the antenna will affect the overall performance of the antenna in the final design. When used in conjunction with a ground plane smaller than that used to tune the antenna, the center frequency typically will shift higher in frequency and the bandwidth will decrease. The proximity of other circuit elements and packaging near the antenna will also affect the final performance.

For further discussion and guidance on the importance of the ground plane counterpoise, please refer to Linx Application Note, AN-00501: Understanding Antenna Specifications and Operation.

## ANTENNA ORIENTATION

The ANT-450-HSW-ccc is characterized on the edge of a 200 mm x 200 mm ground plane as shown in Figure 3. This orientation, represents the most common orientation in end-product use.

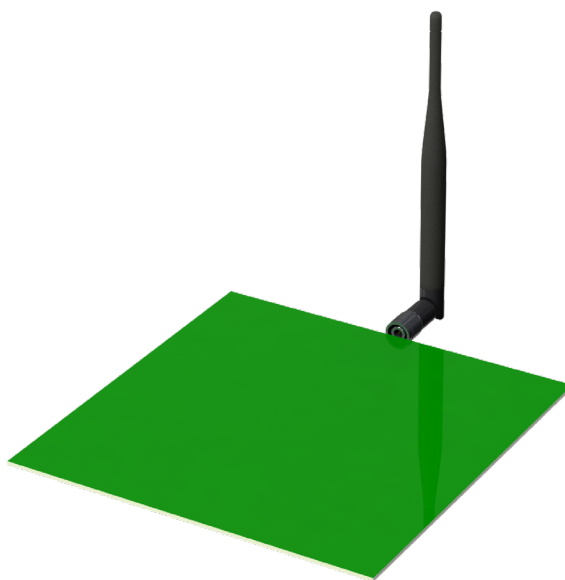


Figure 3. ANT-450-HSW-ccc on Edge of Ground Plane, Bent 90 Degrees (Edge-Bent)

## VSWR

Figure 4 provides the voltage standing wave ratio (VSWR) across the antenna bandwidth. VSWR describes the power reflected from the antenna back to the radio. A lower VSWR value indicates better antenna performance at a given frequency. Reflected power is also shown on the right-side vertical axis as a gauge of the percentage of transmitter power reflected back from the antenna.

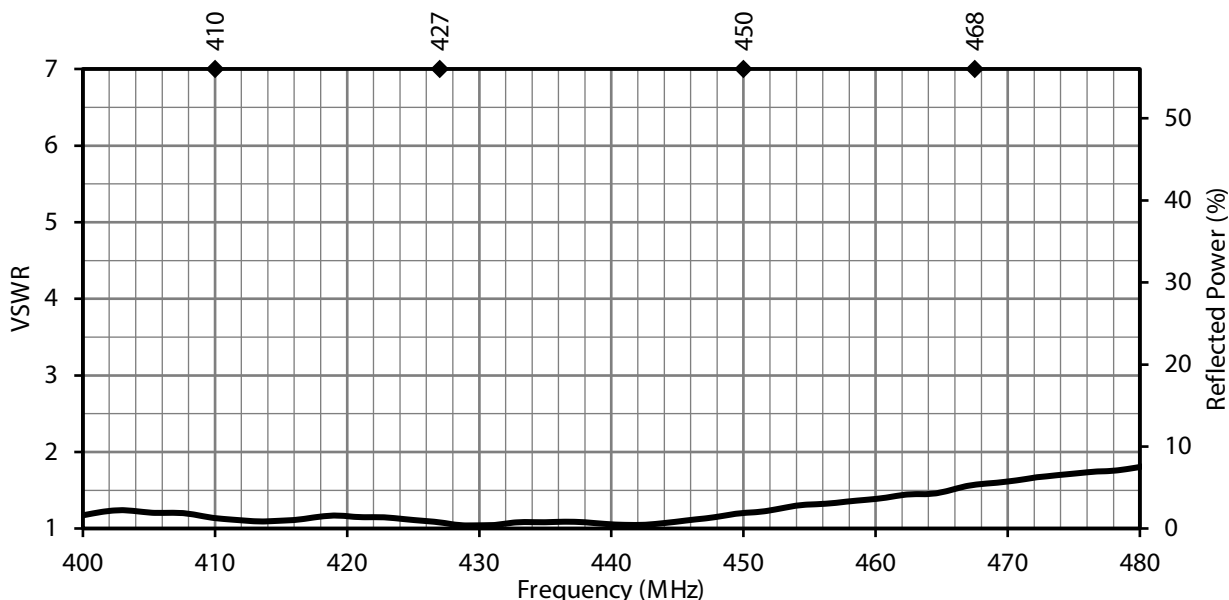


Figure 4. ANT-450-HSW-ccc VSWR, Edge-Bent

## RETURN LOSS

Return loss (Figure 5), represents the loss in power at the antenna due to reflected signals. Like VSWR, a lower return loss value indicates better antenna performance at a given frequency.

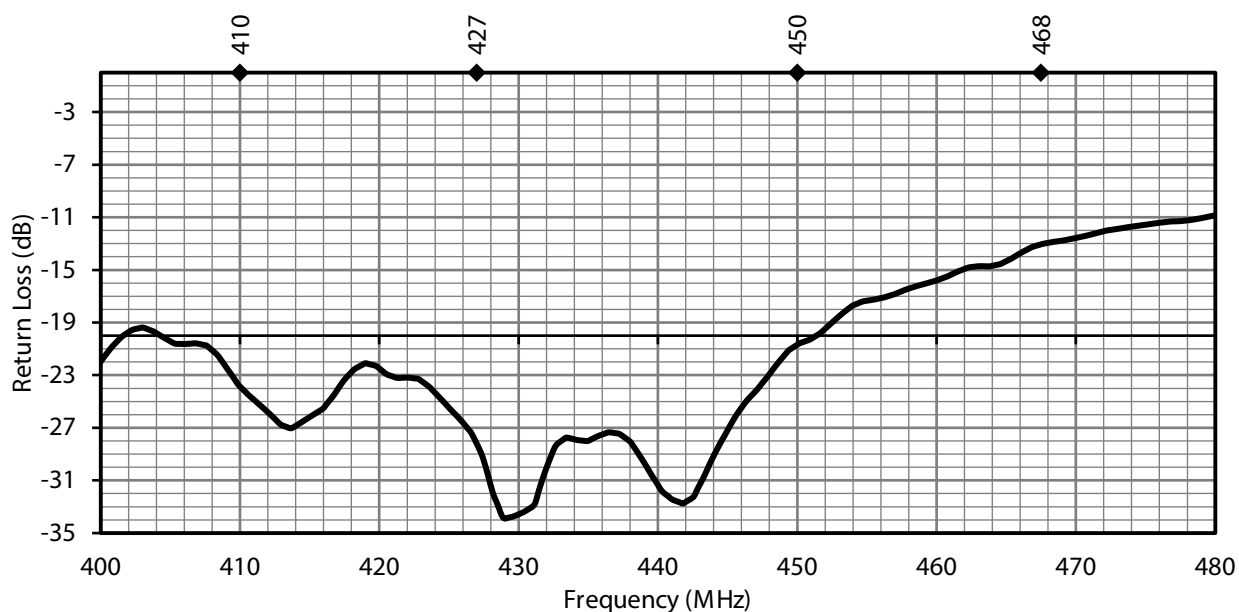


Figure 5. ANT-450-HSW-ccc Return Loss, Edge-Bent

## PEAK GAIN

The peak gain across the antenna bandwidth is shown in Figure 6. Peak gain represents the maximum antenna input power concentration across 3-dimensional space, and therefore peak performance at a given frequency, but does not consider any directionality in the gain pattern.

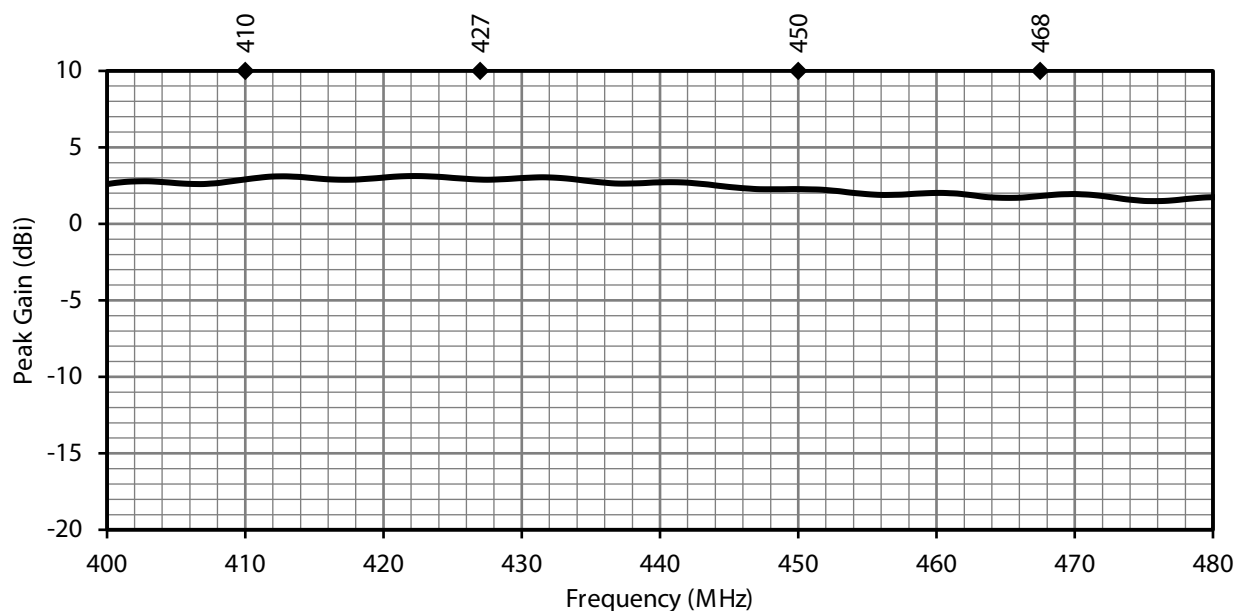


Figure 6. ANT-450-HSW-ccc Peak Gain, Edge-Bent

## AVERAGE GAIN

Average gain (Figure 7), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

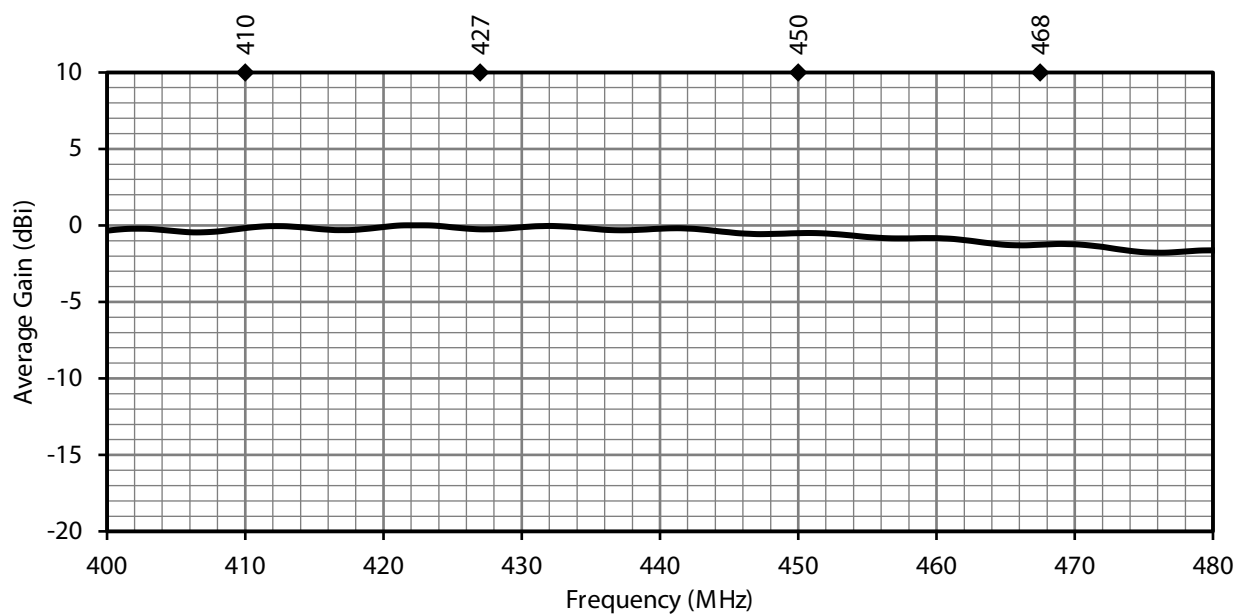


Figure 7. ANT-450-HSW-ccc Antenna Average Gain, Edge-Bent

## RADIATION EFFICIENCY

Radiation efficiency (Figure 8), shows the ratio of power delivered to the antenna relative to the power radiated at the antenna, expressed as a percentage, where a higher percentage indicates better performance at a given frequency.

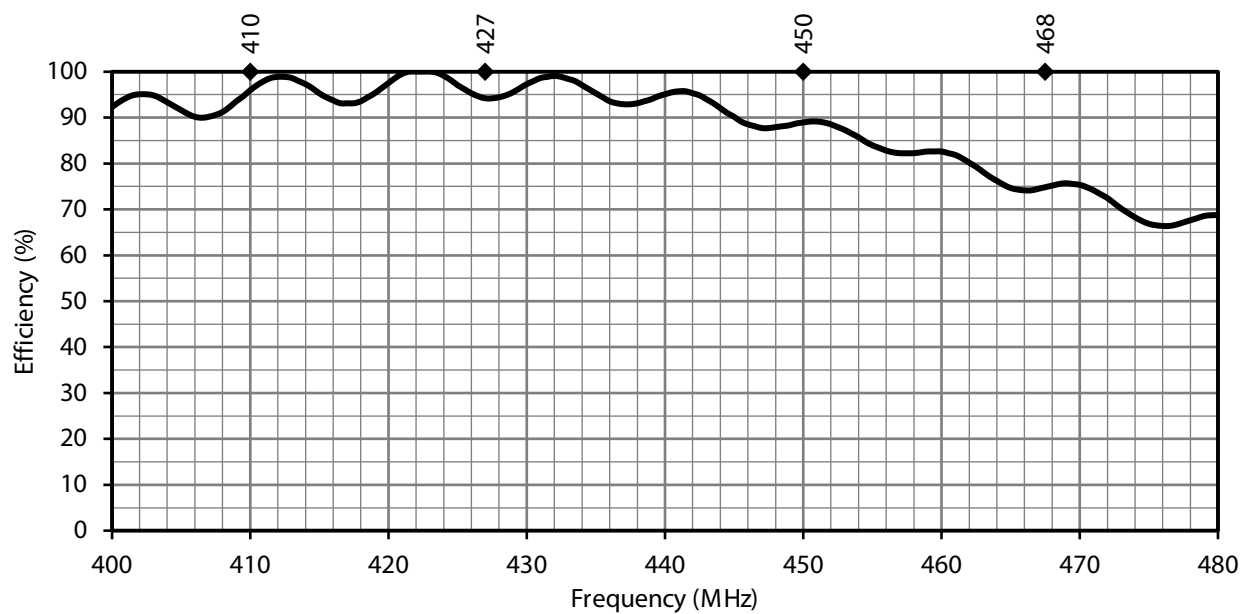


Figure 8. ANT-450-HSW-ccc Antenna Efficiency, Edge-Bent

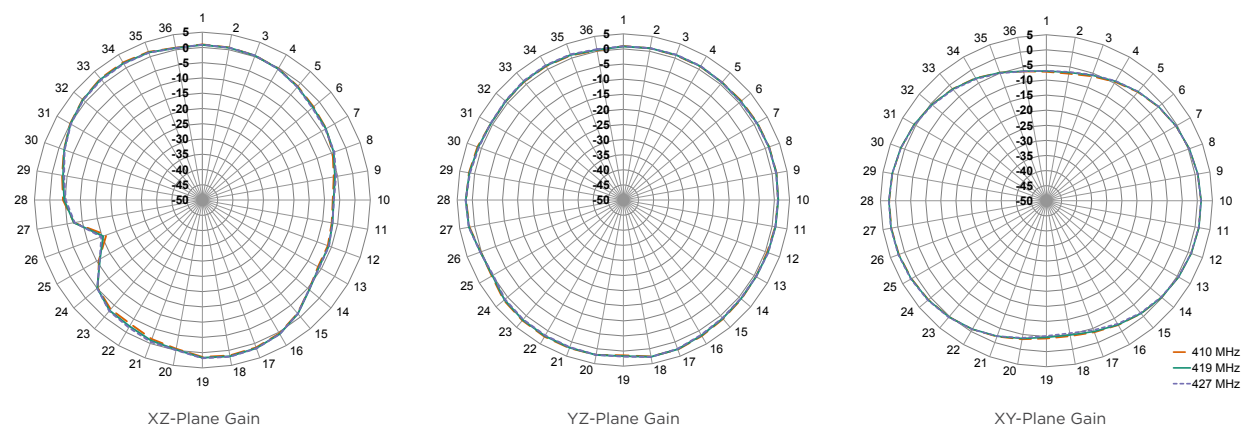
## RADIATION PATTERNS

Radiation patterns provide information about the directionality and 3-dimensional gain performance of the antenna by plotting gain at specific frequencies in three orthogonal planes. Antenna radiation patterns for an Edge-Bent orientation are shown in Figure 9 using polar plots covering 360 degrees. The antenna graphic at the top of the page provides reference to the plane of the column of plots below it. Note: when viewed with typical PDF viewing software, zooming into radiation patterns is possible to reveal fine detail.

### RADIATION PATTERNS - EDGE-BENT



### 410 MHZ TO 427 MHZ (419 MHZ)



### 450 MHZ TO 468 MHZ (459 MHZ)

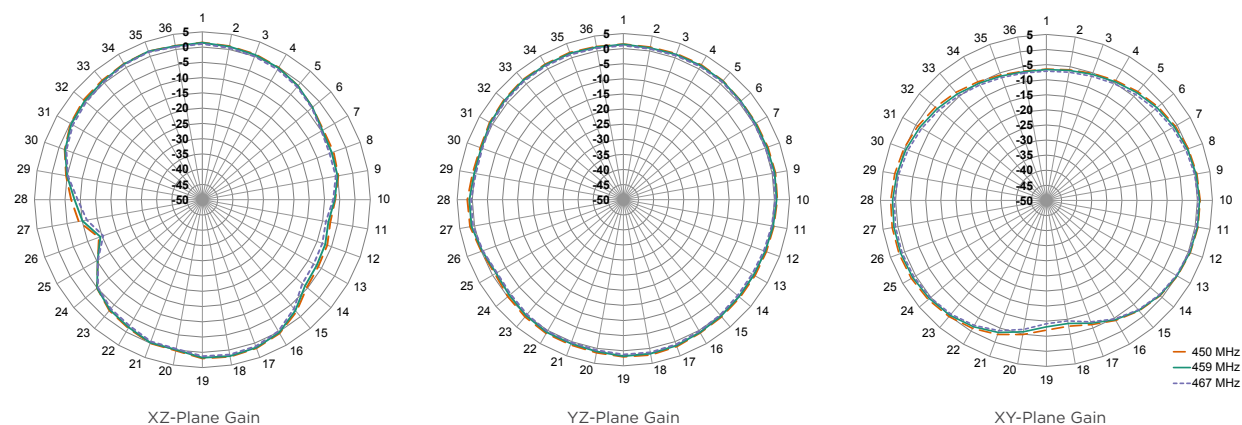


Figure 9. Radiation Patterns for ANT-450-HSW-ccc, Edge-Bent

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## TE TECHNICAL SUPPORT CENTER

USA:	+1 (800) 522-6752
Canada:	+1 (905) 475-6222
Mexico:	+52 (0) 55-1106-0800
Latin/S. America:	+54 (0) 11-4733-2200
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