

AC86500 450 MHz Straight Whip Antenna

The Antenna Company AC86500 straight whip antenna provides a compact omnidirectional 450 MHz band antenna solution for 450 LTE cellular applications.

The 60 mm long straight whip antenna performs adjacent to a ground plane and supports IP65 ingress protection for wet and dusty applications.

The AC86500 whip antenna is available with SMA plug (male) connector.



AC86500-SMA 450 MHz
Straight Whip Antenna

Features

- Very high efficiency
- IP65 ingress protection
- Dimensions: 60.0 mm x 8.0 mm
- Performance at 450 MHz to 466 MHz
 - VSWR: 2.4
 - Peak Gain: 2.8 (dBi)
 - Efficiency: 72%
- SMA termination

Applications

- 450 LTE applications
 - Band 31
 - Band 72
 - Band 73
- Internet of Things (IoT) devices
- Smart Metering

Ordering Information

Part Number	Description
AC86500-SMA	450 MHz Cellular 60 mm straight whip antenna with SMA connector

Available from The Antenna Company (sales@antennacompany.com) and select distributors and representatives.

RF/Electrical Specifications

Parameter	Value
Frequency	450 MHz to 466 MHz
VSWR (max)	2.4
Peak Gain (dBi)	2.8
Average Gain (dBi)	-1.8
Average Efficiency (%)	67
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omnidirectional
Wavelength	$\frac{1}{2}$ -wave
Max Power	10 W
Electrical Type	Dipole

Electrical specifications and plots measured with the antenna at the edge of a 100 mm x 100 mm ground plane.

Mechanical Specifications

Parameter	Value
Connection	SMA plug (male)
Operating Temp. Range	-40 °C to +85 °C (-104 °F to 185 °F)
Operating Relative Humidity	10-95%
Ingress Protection	IP65
Weight	5.4 g (0.19 oz)
Dimensions	60.0 mm x 8.0 mm (2.36 in x 0.31 in)

Antenna Dimensions

Figure 1 provides dimensions of the AC86500 antenna.

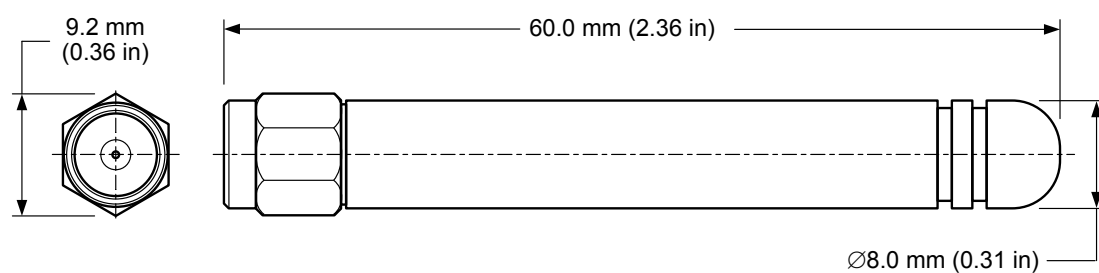


Figure 1. AC86500 Antenna Dimensions

Antenna Test Orientation

The AC86500 antenna is characterized in the orientation shown in Figure 2. Characterization on an adjacent ground plane (100 mm x 100 mm) provides insight into antenna performance when attached to a printed circuit board with ground plane which is a common use case.

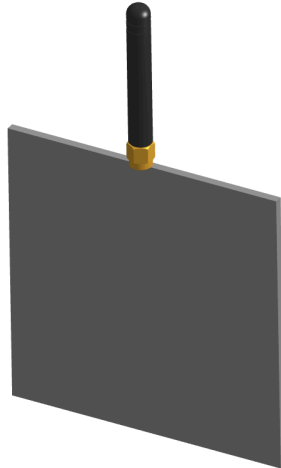


Figure 2. AC86500 Test Orientation

Edge of Ground Plane

The charts on the following pages represent data taken with the antenna at the edge of a 100 mm x 100 mm ground plane as shown in Figure 3.

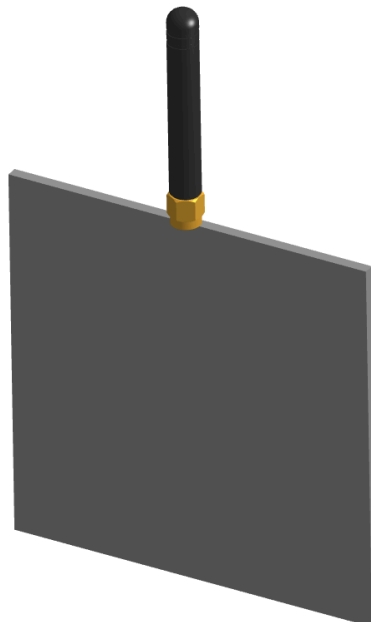


Figure 3. AC86500 Antenna at Edge of Ground Plane

VSWR

Figure 4 provides the voltage standing wave ratio (VSWR) across the antenna bandwidth. VSWR characterizes the power reflected from the antenna back to the transmitter. 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 measure of the percentage of transmitter power reflected back from the antenna.

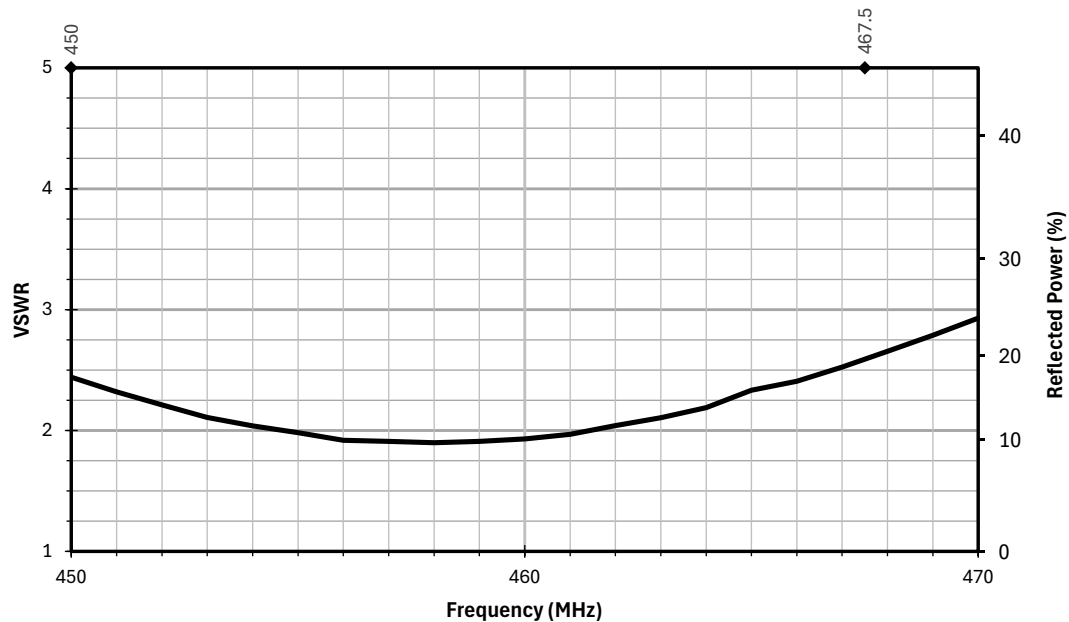


Figure 4. AC86500 Antenna VSWR, Free Space at Edge of Ground Plane

Return Loss

Return loss (Figure 5) represents the loss in power at the antenna due to reflected signals. A higher magnitude return loss indicates better performance. Return loss is the negative of input reflection coefficient, in decibels (dB), and the two values are often used interchangeably.

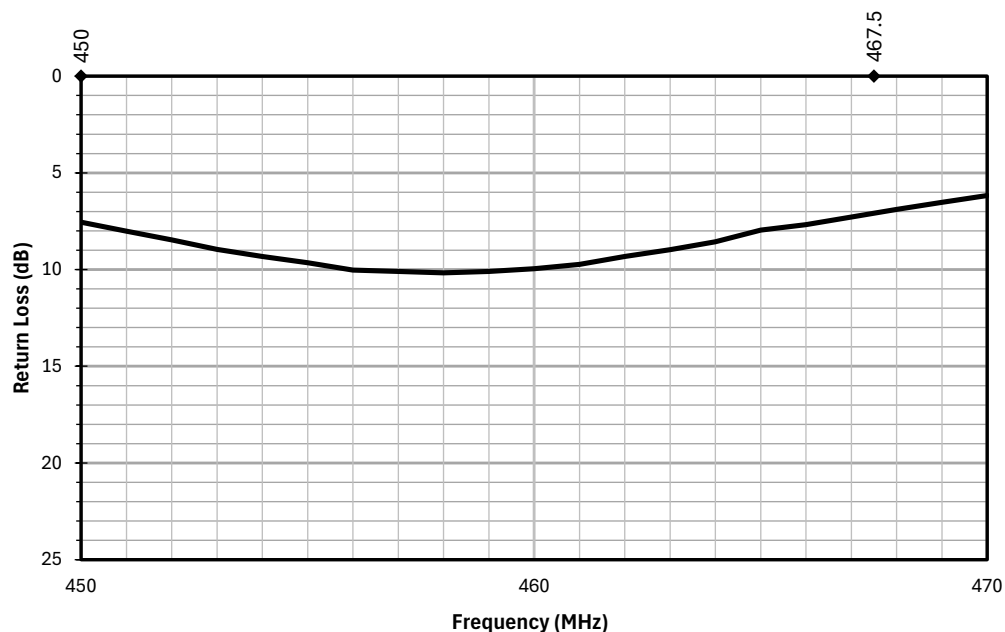


Figure 5. AC86500 Antenna Return Loss at Edge of Ground Plane

Peak Gain

Peak gain (Figure 6) provides a measure of the maximum conversion of antenna input power to radio waves at a given frequency. Peak gain does not account for the directionality of gain in 3-dimensional space.

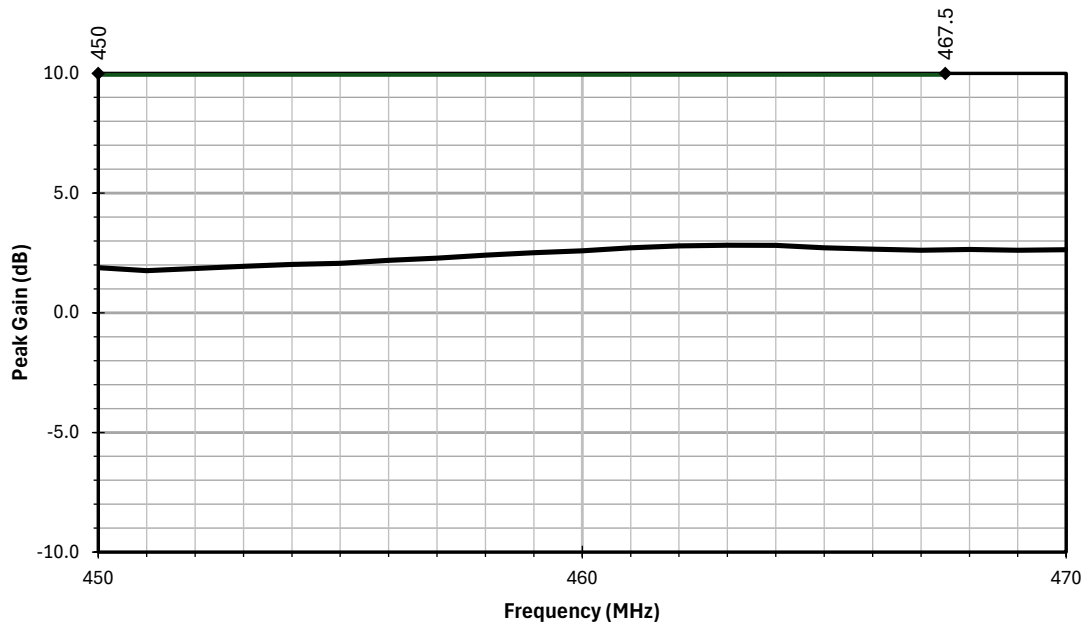


Figure 6. AC86500 Antenna Peak Gain at Edge of Ground Plane

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.

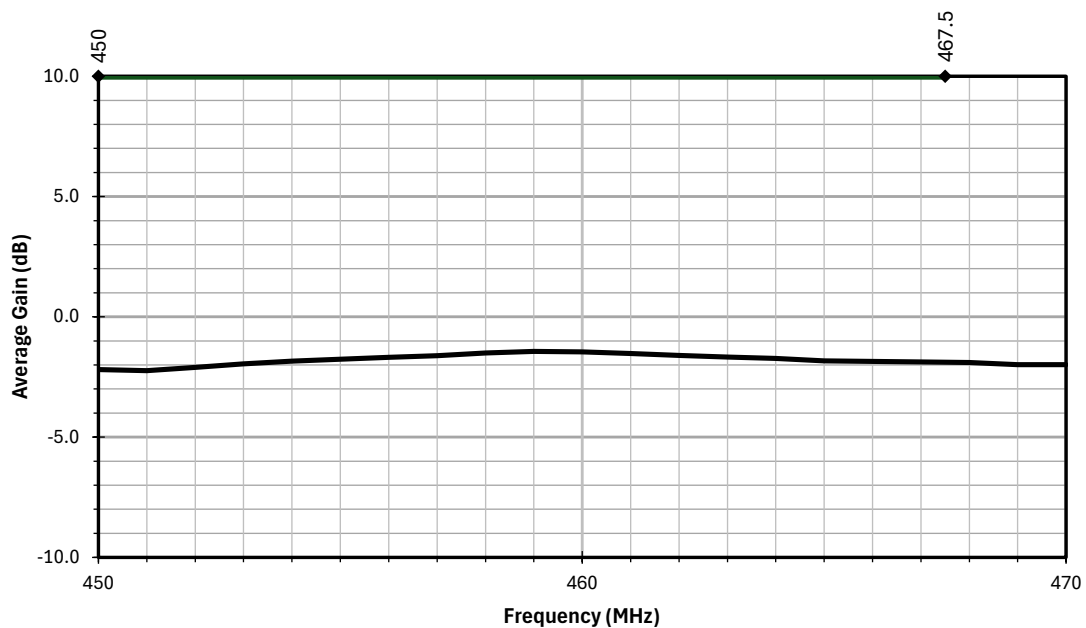


Figure 7. AC86500 Antenna Average Gain at Edge of Ground Plane

Efficiency

Efficiency (Figure 8) is 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.

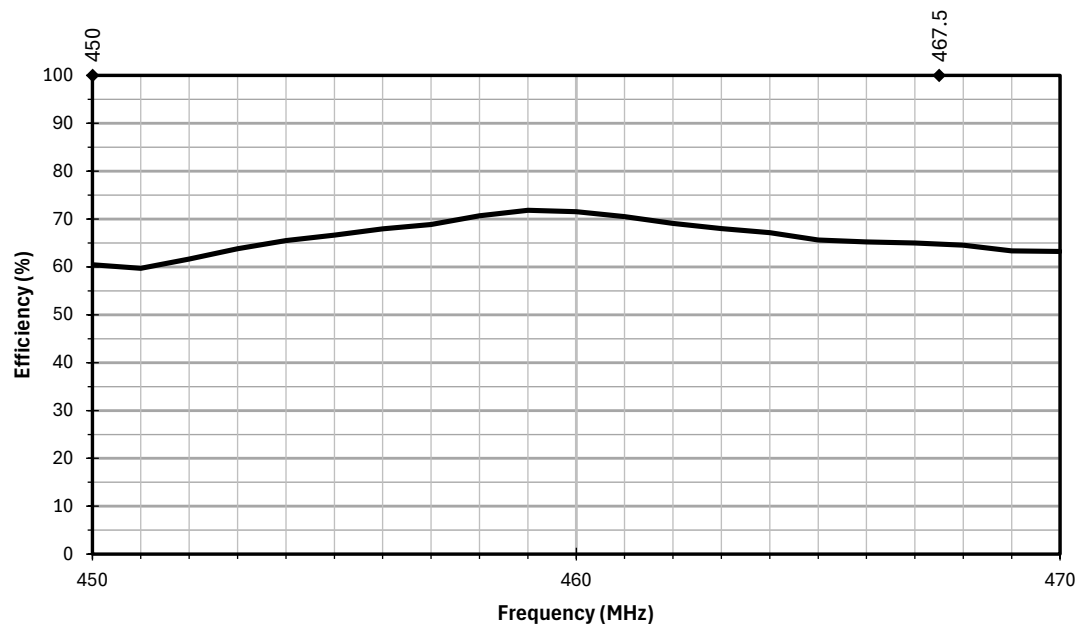
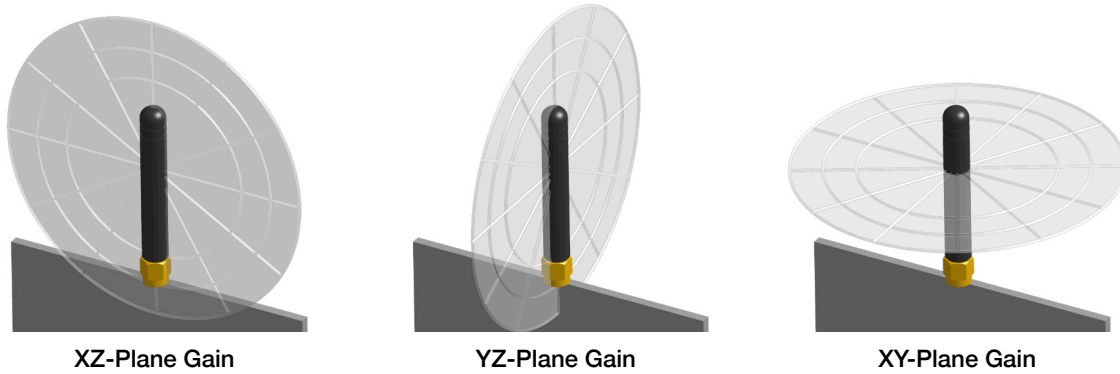


Figure 8. AC86500 Antenna Efficiency at Edge of Ground Plane

Radiation Patterns - At Edge of Ground Plane

Radiation patterns provide information about the directional performance of the antenna by plotting gain in three orthogonal planes at the high-, low- and center-frequencies of an antenna frequency band. Antenna radiation patterns (Figure 9) are shown using polar plots covering 360 degrees with the plane of reference depicted above the plots. Note: when viewed with typical PDF viewing software, zooming into radiation patterns is possible to reveal fine detail.



450 MHz to 470 MHz (460 MHz)

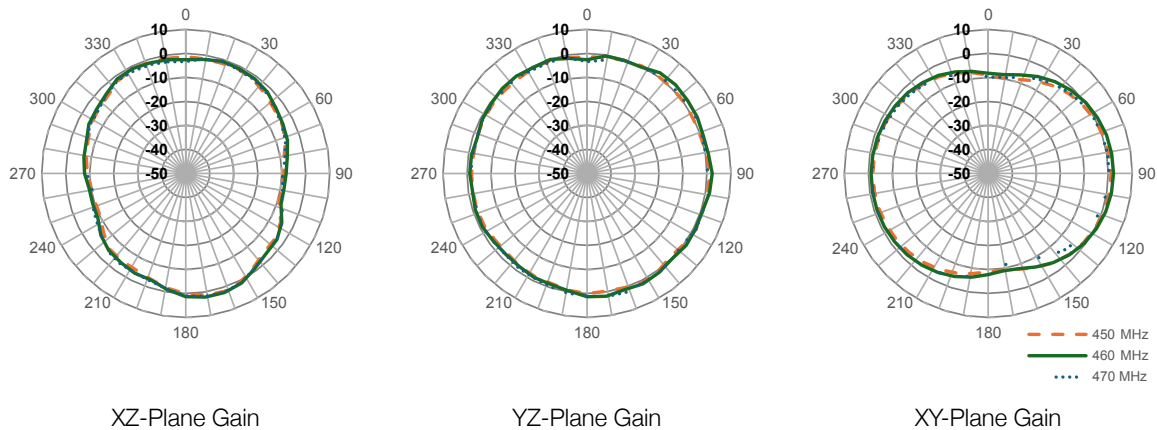


Figure 9. Radiation Patterns for the AC86500 Antenna at Edge of Ground Plane

Packaging Information

The AC86500 antenna is individually packaged in a sealed polyethylene bag. 200 antennas in bags are placed in a large, sealed polyethylene bag. 10 sealed polyethylene bags are packaged in a carton totalling 2000 antennas. Carton dimensions are 360 mm x 280 mm x 260 mm (14.2 in x 11.0 in x 10.2 in).

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DOC# DS26203-093ANT

