Datasheet

AC10567
WiFi 6E 5GHz/6GHz FPC Antenna

The AC10567 flexible embedded WiFi 6E antenna supports the 5 GHz and 6 GHz WiFi bands (5.15-7.125 GHz). The flexibility and peel-and-stick adhesive backing make the AC10567 antenna easy to mount in unique and custom enclosures. Connection is made to the radio via a 1.13 mm coaxial cable terminated in a U.FL-type plug connector. Various cable length options are available (See Ordering Information).

AC10567 embedded FPC antenna

Features

- Very high efficiency
- Ground plane independent
- Compact
  - 16.5 mm x 11.0 mm x 0.27 mm
- Performance at 5.15 GHz to 5.85 GHz
  - VSWR: 1.5
  - Peak Gain: 5.1 dBi
  - Efficiency: 81%
- Performance at 5.925 GHz to 7.125 GHz
  - VSWR: 1.4
  - Peak Gain: 6.6 dBi
  - Efficiency: 88%
- MHF1/U.FL compatible plug termination

Applications

- WiFi/WLAN Coverage
  - WiFi 6E (802.11ax)
  - WiFi 5 (802.11ac)
  - WiFi 2 (802.11a)
- U-NII bands 1-8
- Internet of Things (IoT) devices

Ordering Information

Part Number	Cable Length	Connector
AC10567-050	50 mm (1.97 in)	MHF1/U.FL-type plug (male)
AC10567-100	100 mm (3.94 in)	MHF1/U.FL-type plug (male)
AC10567-200	200 mm (7.87 in)	MHF1/U.FL-type plug (male)
AC10567-300	300 mm (11.80 in)	MHF1/U.FL-type plug (male)

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

Table 1. RF/Electrical Specifications

AC10567	WiFi/U-NII 1-4	WiFi 6E/U-NII 5-8
Parameter	5150 MHz to 5895 MHz	5900 MHz to 7125 MHz
VSWR (max)	1.5	1.4
Peak Gain (dBi)	5.1	6.6
Average Gain (dBi)	-1.0	-0.9
Average Efficiency (%)	79	82
Impedance	50 Ω	
Polarization	Linear	
Radiation Pattern	Omnidirectional	
Wavelength	½-wave	
Max Power	2 W	
Electrical Type	Dipole	

Electrical specifications and plots measured with the AC10567-100 mounted on a 2 mm (0.08 in) thick sheet of ABS plastic.

Table 2. Mechanical Specifications

Part Number	Connection	Coaxial cable; minimum inside bend radius	Weight
AC10567-050	MHF1/U.FL-type plug (male)	1.13 mm: 5.0 mm (0.20 in)	0.4 g (0.02 oz)
AC10567-100	MHF1/U.FL-type plug (male)	1.13 mm: 5.0 mm (0.20 in)	0.4 g (0.02 oz)
AC10567-200	MHF1/U.FL-type plug (male)	1.13 mm: 5.0 mm (0.20 in)	0.5 g (0.02 oz)
AC10567-300	MHF1/U.FL-type plug (male)	1.13 mm: 5.0 mm (0.20 in)	0.5 g (0.02 oz)
Dimensions	16.5 mm x 11.0 mm x 0.27 mm (0.65 in x 0.43 in x 0.01 in)		
Operating Temp. Range	-40 °C to +85 °C (-40 °F to 185 °F)		

Antenna Mounting

The AC10567 antenna is a flexible antenna with adhesive backing that allows it to be permanently installed onto non-metallic surfaces. The adhesive backing is 3M 467MP™, which provides outstanding adhesion to high surface energy plastics. The adhesive delivers excellent shear strength to resist slippage and edge lifting, but can be repositioned before the adhesive cures, allowing for accurate positioning. This adhesive is highly resistant to solvents, humidity and moisture, as well as heat up to 204 °C (400 °F) for short periods.

The antenna should never be bent to the point of creating a crease or allowing the angle of the bend to fall below 90 degrees (i.e. become acute) as this will impair function and may cause permanent damage.

Antenna Dimensions

The dimensions for the AC10567 are shown below in Figure 1.

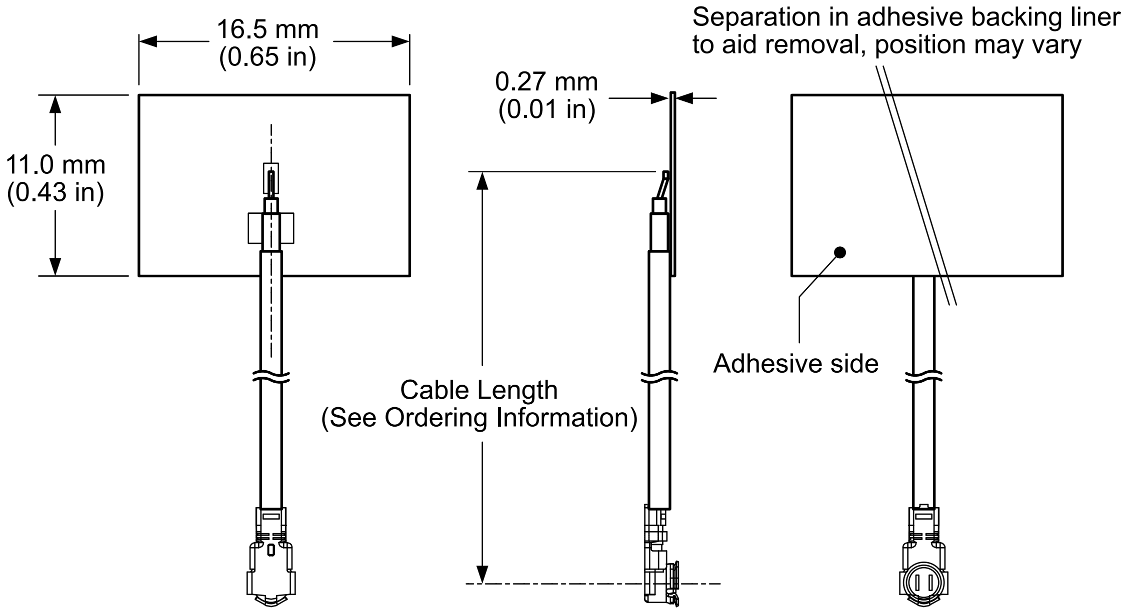


Figure 1. AC10567 Antenna Dimensions

VSWR

Figure 2 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.

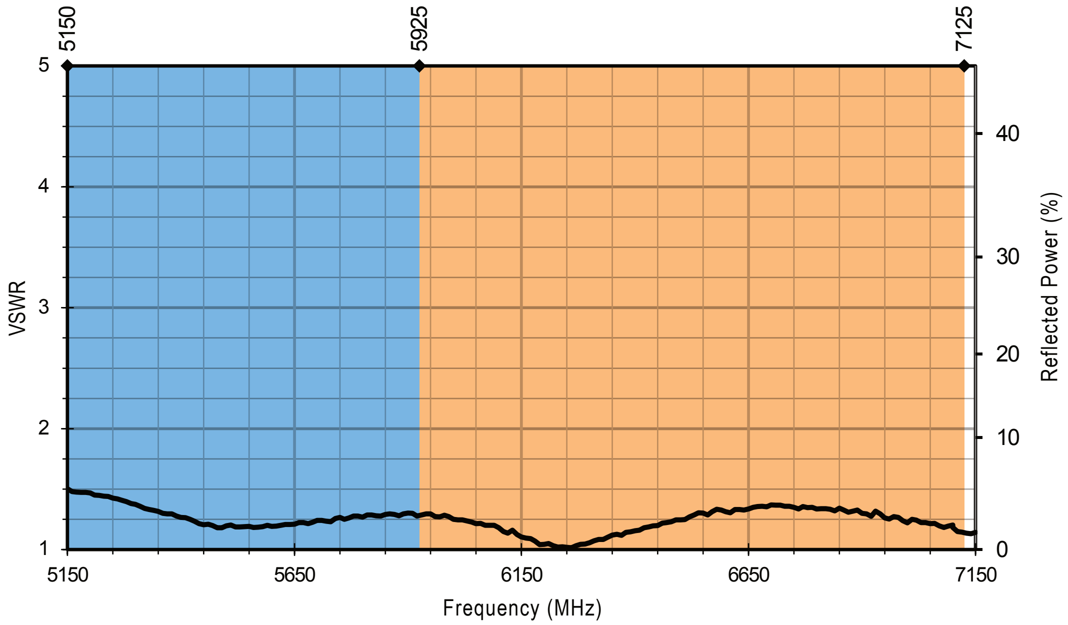


Figure 2. AC10567 Antenna VSWR with Frequency Band Highlights

Return Loss

Return loss (Figure 3), 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.

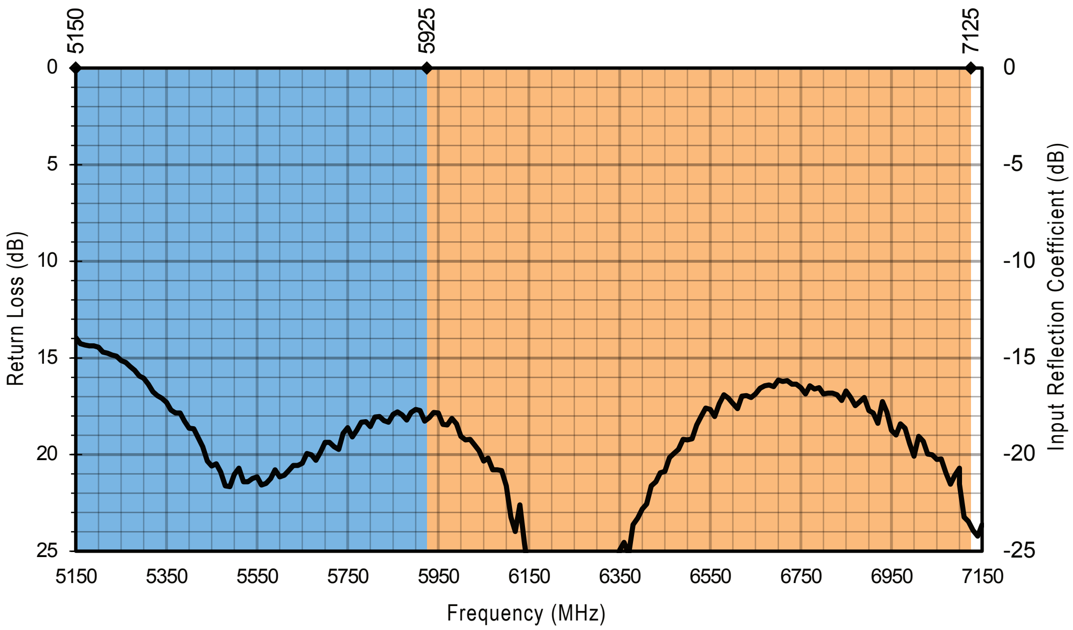


Figure 3. AC10567 Antenna Return Loss with Frequency Band Highlights

Peak Gain

Peak gain, (See Figure 4) 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.

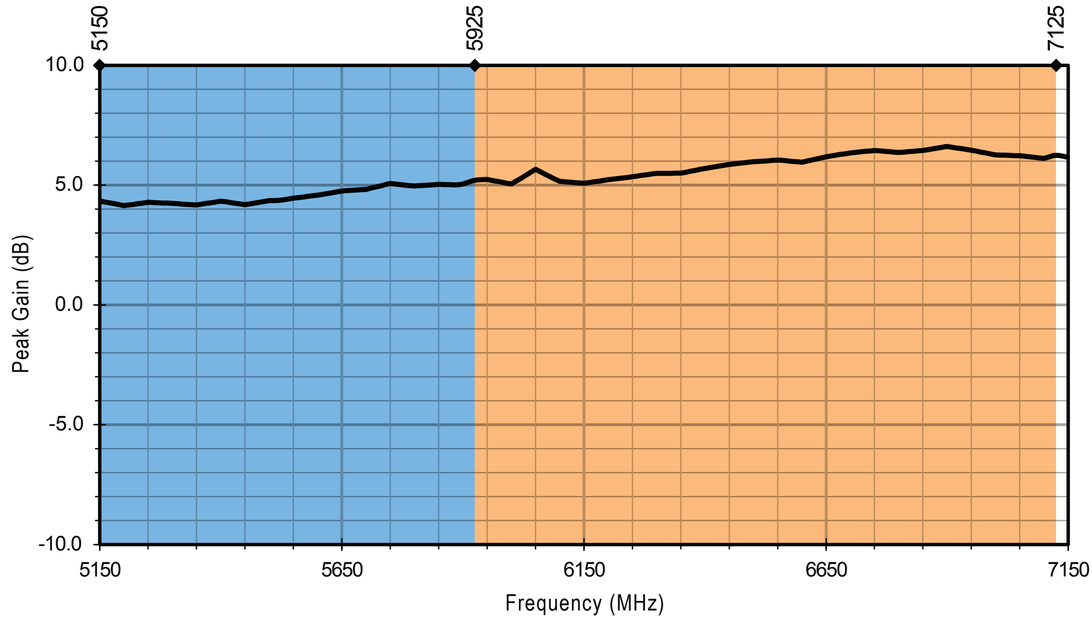


Figure 4. AC10567 Antenna Peak Gain with Frequency Band Highlights

Average Gain

Average gain (Figure 5), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

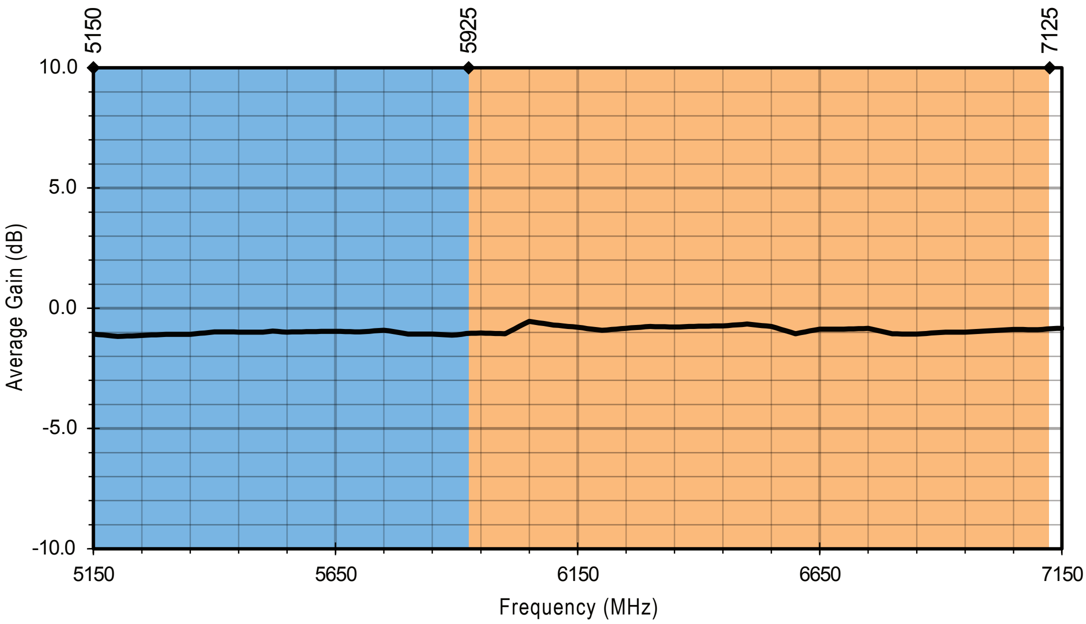


Figure 5. AC10567 Antenna Average Gain with Frequency Band Highlights

Radiation Efficiency

Radiation efficiency (Figure 6) is the ratio of power radiated by the antenna to the power delivered to the antenna terminals, expressed as a percentage, where a higher percentage indicates better performance at a given frequency.

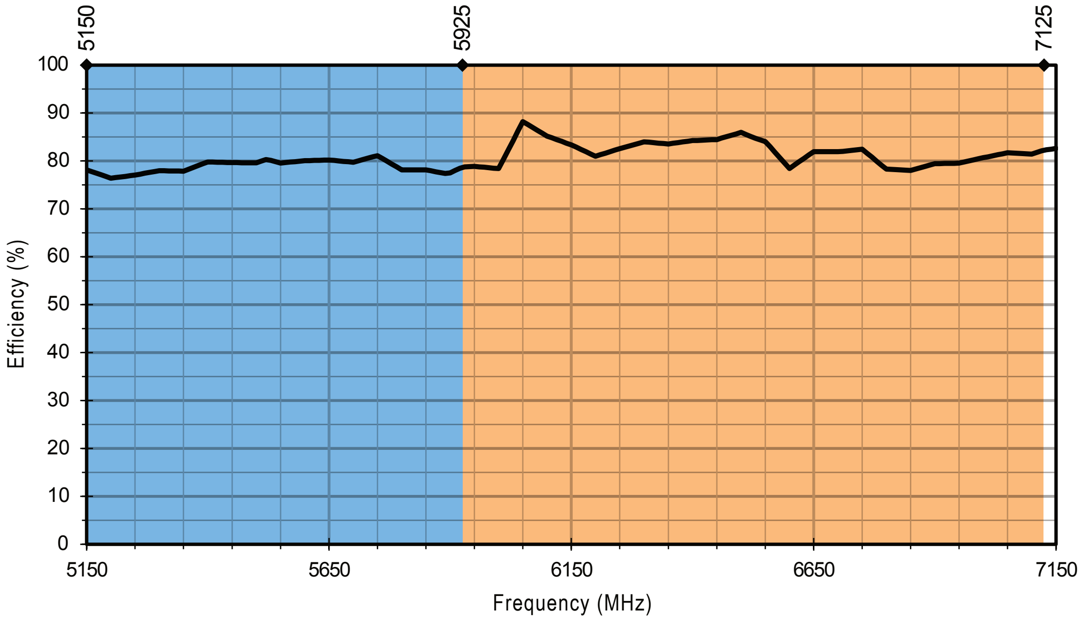
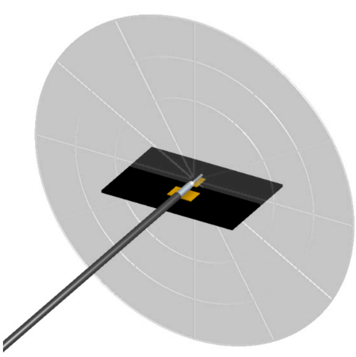


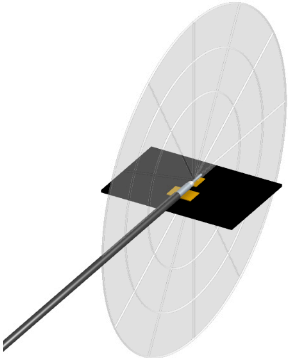
Figure 6. AC10567 Antenna Radiation Efficiency with Frequency Band Highlights

Radiation Patterns

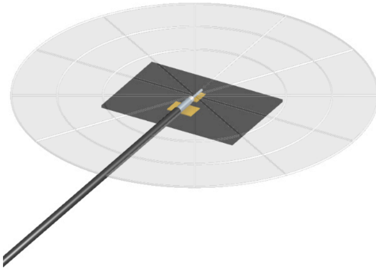
Radiation patterns provide information about the directional performance of the antenna by plotting gain in three orthogonal planes at the high-, low- and center-frequencies of an antenna frequency band. Antenna radiation patterns (Figure 7), are shown using polar plots covering 360 degrees with the 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.



XZ-Plane Gain

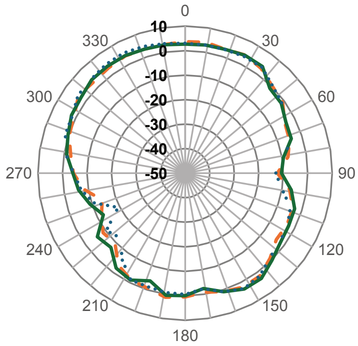


YZ-Plane Gain

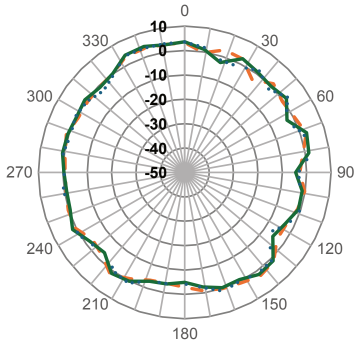


XY-Plane Gain

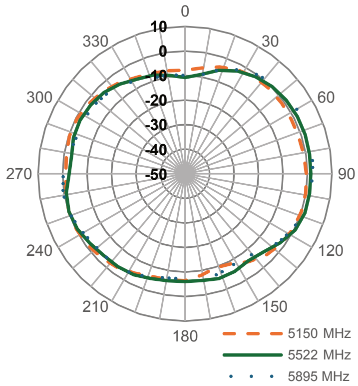
5150 MHz to 5895 MHz (5522 MHz)



XZ-Plane Gain

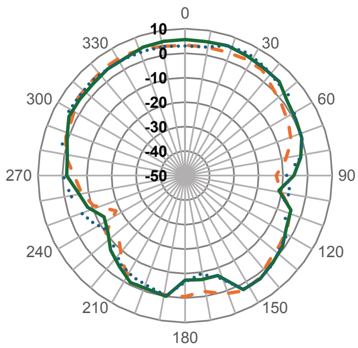


YZ-Plane Gain

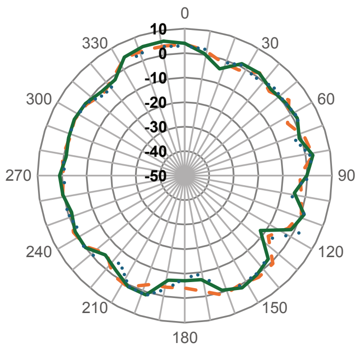


XY-Plane Gain

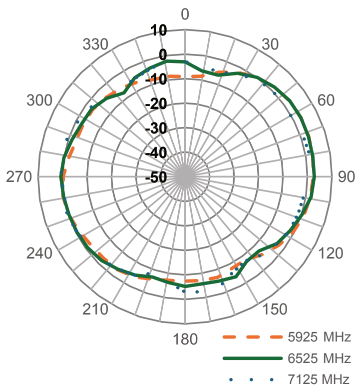
5925 MHz to 7125 MHz (6525 MHz)



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

Figure 7. Radiation Patterns for AC10567 Antenna

Packaging Information

The AC10567 antenna is individually packaged in a labeled polyethylene bag and then bulk packaged in a polyethylene bag in quantities of 100 pcs. Sealed bulk polyethylene bags are packed in cartons in quantities of 20 yielding 2000 pieces per carton. Carton dimensions are 340 mm x 340 mm x 200 mm (13.4 in x 13.4 in x 7.9 in).

Antenna Definitions and Useful Formulas

VSWR - Voltage Standing Wave Ratio. VSWR is a unitless ratio that describes the power reflected from the antenna back to the radio. A lower VSWR value indicates better antenna performance at a given frequency. VSWR is easily derived from Return Loss.

$$\text{VSWR} = \frac{10^{\left[\frac{\text{Return Loss}}{20}\right]} + 1}{10^{\left[\frac{\text{Return Loss}}{20}\right]} - 1}$$

Return Loss - Return loss represents the loss in power at the antenna due to reflected signals, measured in decibels. A larger magnitude return loss value indicates better antenna performance at a given frequency. Return Loss is easily derived from VSWR.

$$\text{Return Loss} = -20 \log_{10} \left[\frac{\text{VSWR} - 1}{\text{VSWR} + 1}\right]$$

Efficiency (η) - The total power radiated from an antenna divided by the input power at the feed point of the antenna as a percentage.

Total Radiated Efficiency - (TRE) The total efficiency of an antenna solution comprising the radiation efficiency of the antenna and the transmitted (forward) efficiency from the transmitter.

$$\text{TRE} = \eta \cdot \left(1 - \left(\frac{\text{VSWR} - 1}{\text{VSWR} + 1}\right)^2\right)$$

Gain - The gain of an antenna is the ratio of its radiation intensity in a given direction (G) to the radiation intensity that would be obtained if the total power accepted by the antenna were radiated isotropically (identically in all directions). Realized gain is antenna gain accounting for input reflection and mismatch losses. Realized gain is typically labeled simply as “gain” in antenna datasheets.

$$G_{db} = 10 \log_{10}(G)$$

$$G_{dBd} = G_{dBi} - 2.51\text{dB}$$

Peak Gain - The highest antenna gain across all directions for a given frequency range. A directional antenna will have a very high peak gain compared to average gain.

Average Gain - The average gain across all directions for a given frequency range.

Maximum Power - The maximum signal power which may be applied to an antenna feed point, typically measured in watts (W).

Reflected Power - A portion of the forward power reflected back toward the amplifier due to a mismatch at the antenna port.

$$\left(\frac{\text{VSWR} - 1}{\text{VSWR} + 1}\right)^2$$

decibel (dB) - A logarithmic unit of measure of the power of an electrical signal.

decibel isotropic (dBi) - A comparative measure in decibels between an antenna under test and an isotropic radiator.

decibel relative to a dipole (dBd) - A comparative measure in decibels between an antenna under test and an ideal half-wave dipole.

Dipole - An ideal dipole comprises a straight electrical conductor measuring 1/2 wavelength from end to end connected at the center to a feed point for the radio.

Isotropic Radiator - A theoretical antenna which radiates energy equally in all directions as a perfect sphere.

Omnidirectional - Term describing an antenna radiation pattern that is uniform in all directions. An isotropic antenna is the theoretical perfect omnidirectional antenna. An ideal dipole antenna has a donut-shaped radiation pattern and other practical antenna implementations will have less perfect but generally omnidirectional radiation patterns which are typically plotted on three axes.

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