L000502-xx
450 MHz LTE Antenna Series

Single-Band Monopole LTE/5G Antennas

The L000502-xx (ANT-450-CW-HW-xx), 450 MHz LTE antenna series antennas are rugged, low-cost and easy to install. The antenna family is a compact antenna designed for embedded, inside-the-enclosure, applications, mounting directly to a printed circuit board (PCB) using a 6-32UNC screw. By eliminating the plastic housing and the need for an RF connector on the PCB, the Helical antenna family provides a low-cost but high- performing antenna solution.

The single frequency band of L000502-xx antennas makes the job of antenna selection simple, with better performance in the target frequency band than multiband antennas and rejection of signals from unwanted frequencies.

FEATURES

- Outperforms similar multi-band solutions
- Durable, flexible main shaft
- Wide bandwidth
- Efficiency
    - 31% at 450 MHz
    - 35% at 460 MHz
    - 35% at 467.5 MHz

APPLICATIONS

- LTE/5G NR bands 72 and 73
- Hand-held devices
- Internet of Things (IoT) devices

ORDERING INFORMATION

Part Number	Description
L000502-01	450 MHz right-angle whip antenna with SMA plug (male pin)
L000502-02	450 MHz right-angle whip antenna with RP-SMA plug (female socket)

Available from TE Connectivity and select distributors and representatives.

Notes
1. Use of an O-ring is recommended, IP-ratings cannot be guaranteed
2. With appropriate counterpoise

TABLE 1. ELECTRICAL SPECIFICATIONS

	L000503-01	L000503-02
Frequency Range	450 MHz to 467.5 MHz	
VSWR (max)	<2.4:1	
Peak Gain (dBi)	-1.4	
Average Gain (dBi)	-4.6	
Efficiency (%)	36	
Polarization	Linear	
Radiation	Omnidirectional	
Max Power (W)	5	
Wavelength	1/4-wave	
Impedance (Ohms)	50 Ω	

MECHANICAL SPECIFICATIONS

|	L000503-01	L000503-02
Connection	SMA plug (male pin)	RP-SMA plug (female socket)
Height mm (in.)		
Weight g (Oz.)		
Operating Temp. Range	-20 to +65ºC (-4 to 149 ºF)	

VSWR

Figure 1 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.
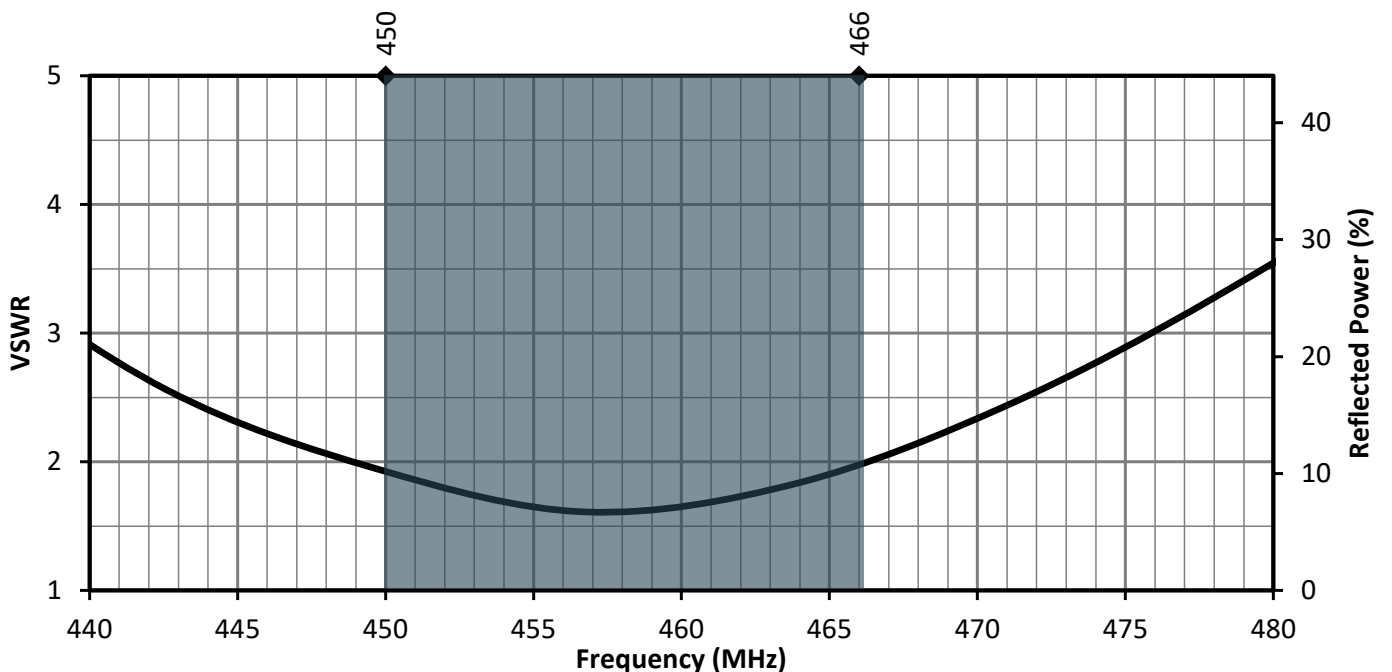
RETURN LOSS

Return loss, 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.
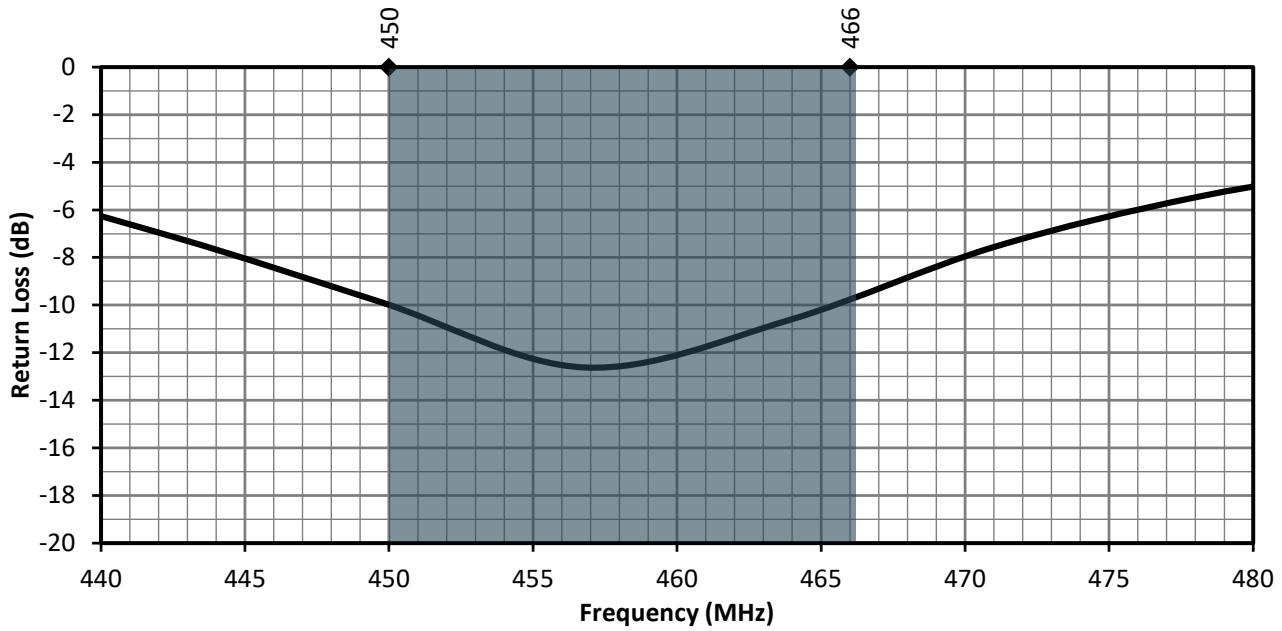

PEAK GAIN

The peak gain across the antenna bandwidth is shown below. 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.
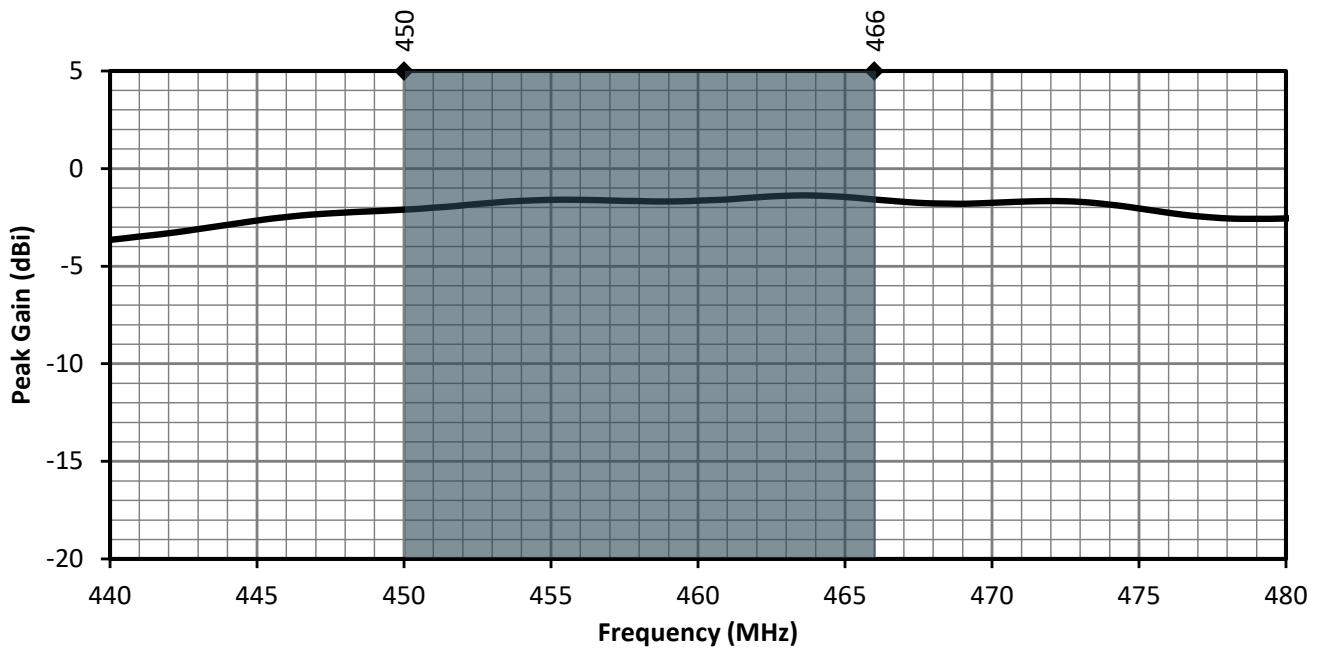
AVERAGE GAIN

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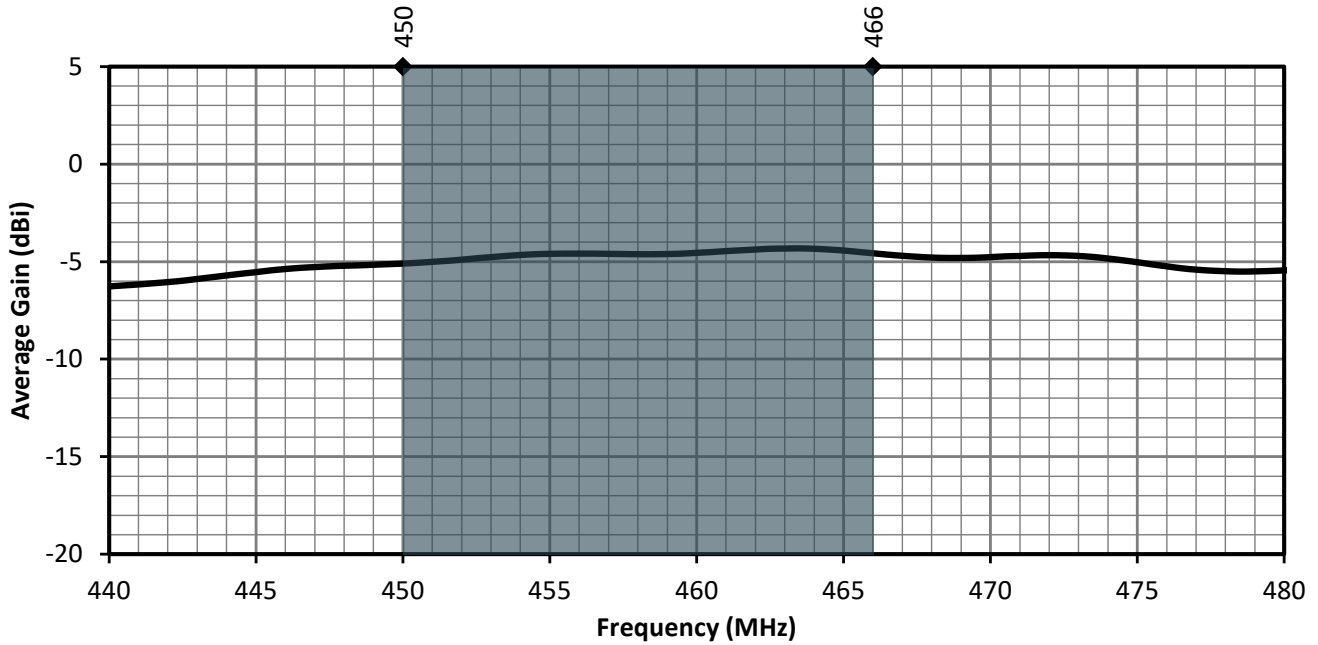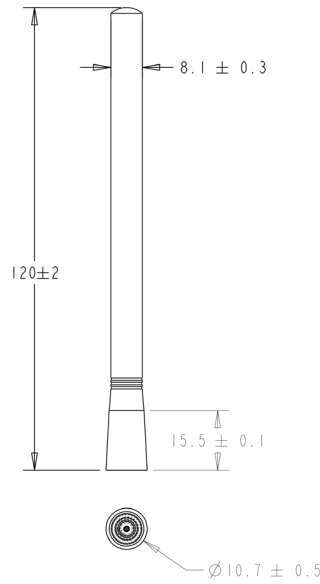

RADIATION EFFICIENCY

Radiation efficiency, 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.
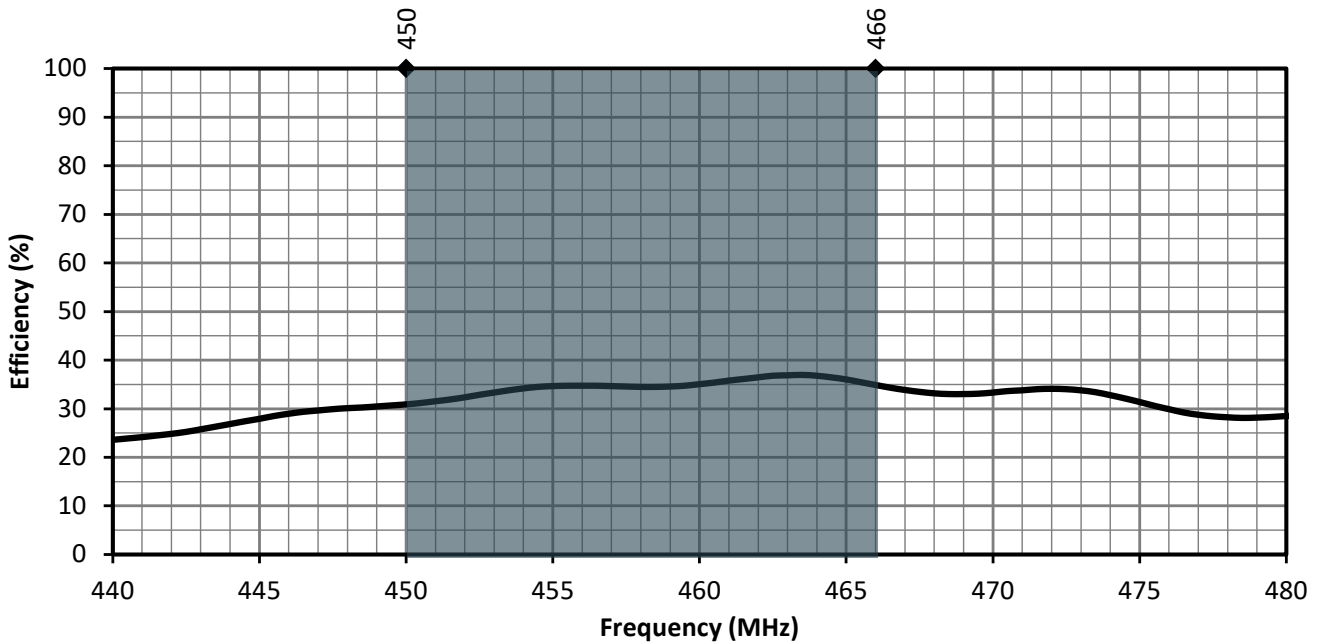
PRODUCT DIMENSIONS

8.1 ± 0.3

120±2

15.5 ± 0.1

⌀10.7 ± 0.5

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 are shown using polar plots covering 360 degrees. The antenna graphic above the plots 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.
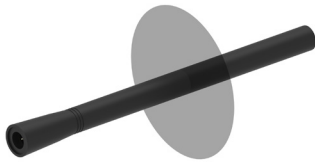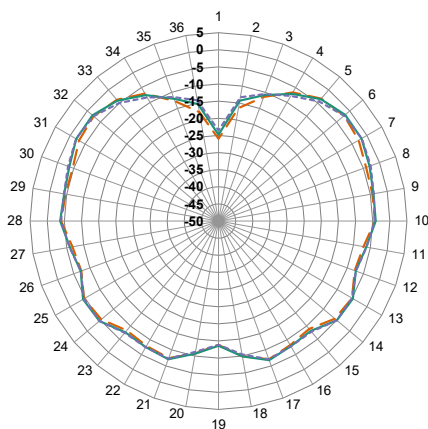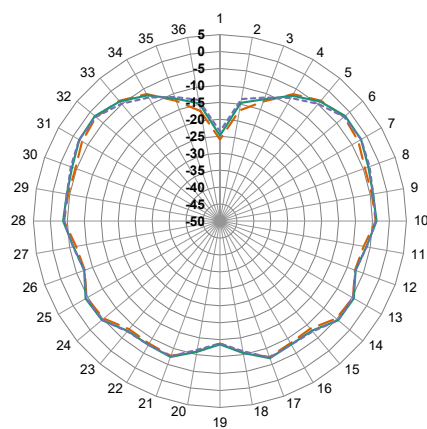

XZ-Plane Gain

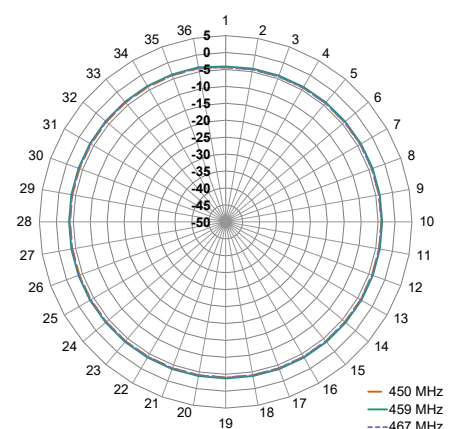
YZ-Plane Gain

XY-Plane Gain

450 MHz to 467.5 MHz

XZ-Plane Gain
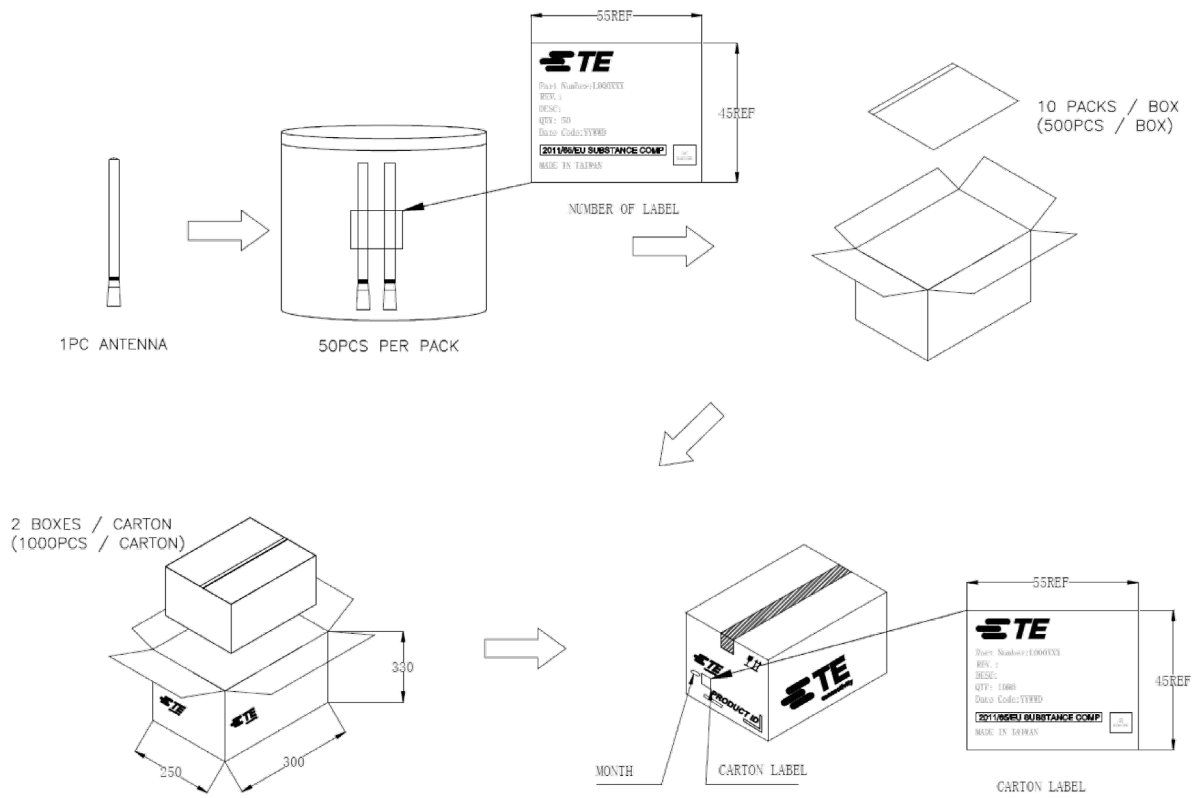

YZ-Plane Gain

XY-Plane Gain

— 450 MHz
— 459 MHz
---467 MHz

PACKAGING

1PC ANTENNA

50PCS PER PACK

55REF

45REF

NUMBER OF LABEL

10 PACKS / BOX
(500PCS / BOX)

2 BOXES / CARTON
(1000PCS / CARTON)

330

250   300

MONTH   CARTON LABEL

55REF

45REF

CARTON LABEL

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 lower 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 ratio of an antenna's efficiency in a given direction (G) to the power produced by a theoretical lossless (100% efficient) isotropic antenna. The gain of an antenna is almost always expressed in decibels.

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

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

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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