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ANT-916-WRT-ccc

915 MHz External Panel-Mount Antenna

The ANT-916-WRT is a low-profile, panel-mount dipole antenna designed for low-power, wide-area (LPWA) applications including LoRaWAN®, remote controls, and ISM band applications in the 902 MHz to 930 MHz range. The ANT-916-WRT antenna's compact size allows it to be mounted in applications requiring a low profile and external antenna performance, such as wireless vending and traffic control equipment.

The ANT-916-WRT antenna is designed with an integrated counterpoise that eliminates the need for additional ground plane in the product, making it ideal for applications with non-conductive or RF transparent enclosures. Connector options for the ANT-916-WRT antenna are: SMA plug (male pin), RP-SMA plug (female socket) or MHF1/U.FL-type plug (female socket).

FEATURES

- Performance at 915 MHz
  - VSWR: ≤ 1.5
  - Peak Gain: 4.4 dBi
  - Efficiency: 50%
- Low-profile
  - Height: 10.0 mm (0.40 in)
  - Diameter: 19.0 mm (0.75 in)
- Mounts permanently with pressure sensitive adhesive ring and provided nut

APPLICATIONS

- Low-power, wide-area (LPWA) applications
  - LoRaWAN®, ITU-T Y.4480
- ISM applications
- Remote control, sensing and monitoring
  - Security systems
  - Industrial machinery
  - Automated equipment
  - AMR (automated meter reading)
- Internet of Things (IoT) devices
- Smart Home networking

ORDERING INFORMATION

Part Number	Description
ANT-916-WRT-UFL-150	Antenna, 150 mm (5.91 in) of 1.32 mm coaxial cable, MHF1/U.FL-type plug (female socket)
ANT-916-WRT-UFL	Antenna, 216 mm (8.50 in) of 1.32 mm coaxial cable, MHF1/U.FL-type plug (female socket)
ANT-916-WRT-UFL-300	Antenna, 300 mm (11.81 in) of 1.32 mm coaxial cable, MHF1/U.FL-type plug (female socket)
ANT-916-WRT-RPS	Antenna, 216 mm (8.50 in) of RG-174 coaxial cable, RP-SMA plug (female socket)
ANT-916-WRT-SMA	Antenna, 216 mm (8.50 in) of RG-174 coaxial cable, SMA plug (male pin)
ANT-916-WRT-SMA-300	Antenna, 300 mm (11.81 in) of RG-174 coaxial cable, SMA plug (male pin)
L000945-01	Antenna, 500 mm (19.69 in) of RG-174 coaxial cable, RP-SMA plug (female socket)

Available from TE Connectivity and select distributors and representatives.

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TABLE 1. ELECTRICAL SPECIFICATIONS

ANT-916-WRT	915 MHz
Frequency Range	902 MHz to 930 MHz
VSWR (max)	1.5
Peak Gain (dBi)	4.4
Average Gain (dBi)	-3.2
Efficiency (%)	50
Polarization	Linear
Impedance	50 Ω
Wavelength	1/2-wave
Radiation	Omnidirectional
Max Power	5 W
Electrical Type	Dipole

Electrical specifications and plots measured with a 102 mm x 102 mm (4.0 in x 4.0 in) reference ground plane.

TABLE 2. MECHANICAL SPECIFICATIONS

Parameter	Connection	Coaxial Cable, minimum inside bend radius	Weight
ANT-916-WRT-UFL	MHF1/U.FL-type plug	1.32 mm: 6.0 mm (0.24 in)	150 mm = 6.6 g (0.23 oz) 216 mm = 6.9 g (0.24 oz) 300 mm = 7.3 g (0.26 oz)
ANT-916-WRT-RPS	RP-SMA plug	RG-174: 10.2 mm (0.40 in)	216 mm = 12.5 g (0.44 oz)
ANT-916-WRT-SMA	SMA plug	RG-174: 10.2 mm (0.40 in)	216 mm = 12.5 g (0.44 oz) 300 mm = 13.5 g (0.48 oz)
Operating Temp. Range	-40 °C to +90 °C		
Dimensions	Height: 10.0 mm (0.40 in), Diameter: 19.0 mm (0.75 in)		

PACKAGING INFORMATION

The ANT-916-WRT antenna is placed in a clear plastic sleeve and sealed in clear plastic bags in quantities of 50 pcs. Bags are packaged in cartons of 250 (5 bags). Distribution channels may offer alternative packaging options.

PRODUCT DIMENSIONS

Figure 1 provides dimensions for the ANT-916-WRT antenna.

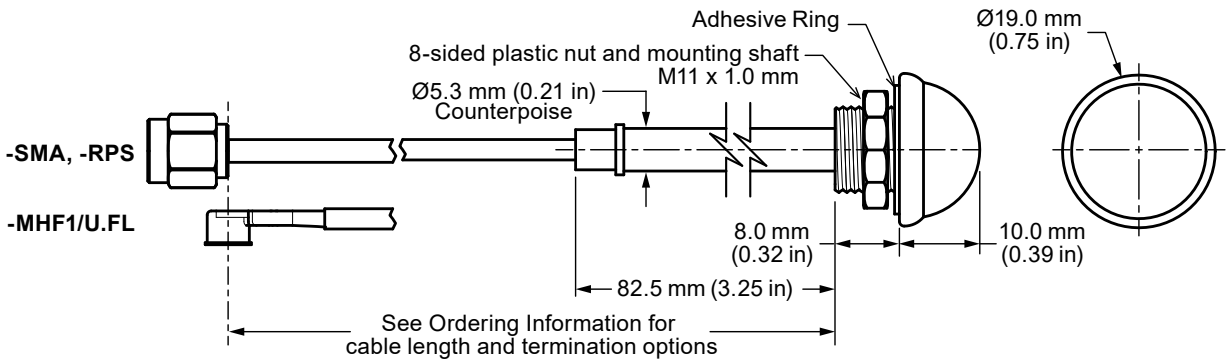


Figure 1. ANT-916-WRT Antenna Dimensions

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RECOMMENDED MOUNTING

The recommended enclosure mounting dimensions are shown in Figure 2. The ANT-916-WRT series antenna is supplied with an integrated closed-cell pressure sensitive adhesive ring which helps seal enclosures against external elements. The adhesive ring has a protective plastic backing that must be removed prior to installation. A pull tab has been provided for easy removal of the protective backing. The antenna can be permanently mounted using the provided nut which should be tightened to 4.0 kgf/cm (5 in/ lbs) max. The recommended maximum enclosure wall thickness is 4.70 mm (0.188 in).

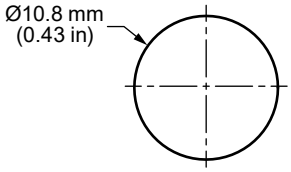
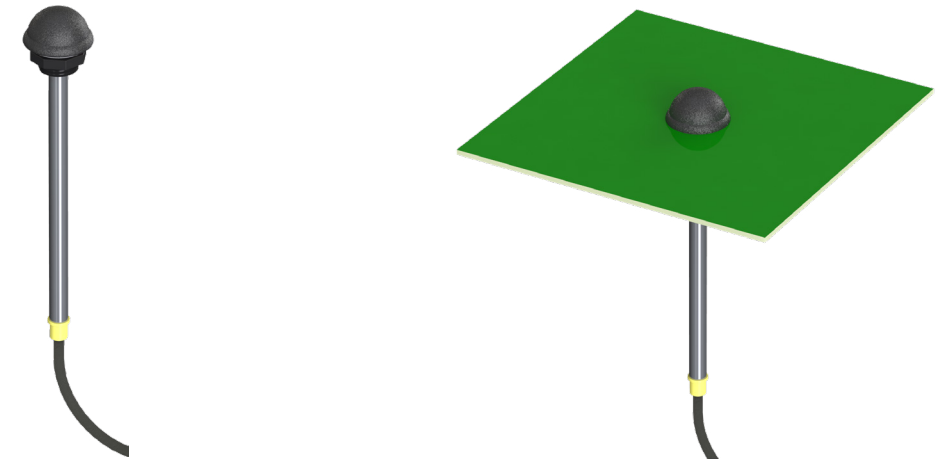


Figure 2. ANT-916-WRT Series Antenna Recommended Enclosure Mounting Dimensions

ANTENNA ORIENTATION

The ANT-916-WRT series antenna is characterized in two antenna orientations as shown in Figure 3. The antenna in free space characterizes use of an antenna attached to an enclosure-mounted connector which is connected by cable to a printed circuit board. Although the antenna is a dipole not requiring a ground plane for function, characterization with an adjacent ground plane (102 mm x 102 mm) provides insight into antenna performance when attached directly to a printed circuit board mounted connector. The two orientations represent the most common end-product use cases.



Free Space **Center of Ground Plane**

Figure 3. ANT-916-WRT Test Orientations

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FREE SPACE, NO GROUND PLANE

The charts on the following pages represent data taken with the antenna oriented in free space without a ground plane, as shown in Figure 4.



Figure 4. ANT-916-WRT in Free Space, No Ground Plane

VSWR

Figure 5 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.

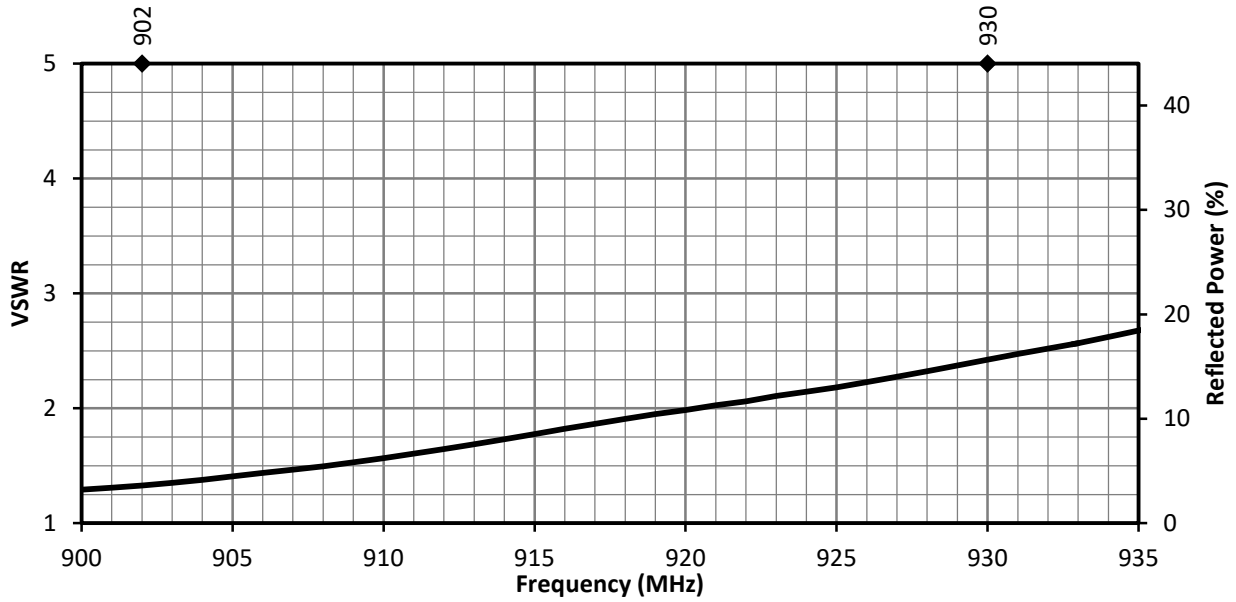


Figure 5. ANT-916-WRT VSWR, Free Space

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RETURN LOSS

Return loss (Figure 6), 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.

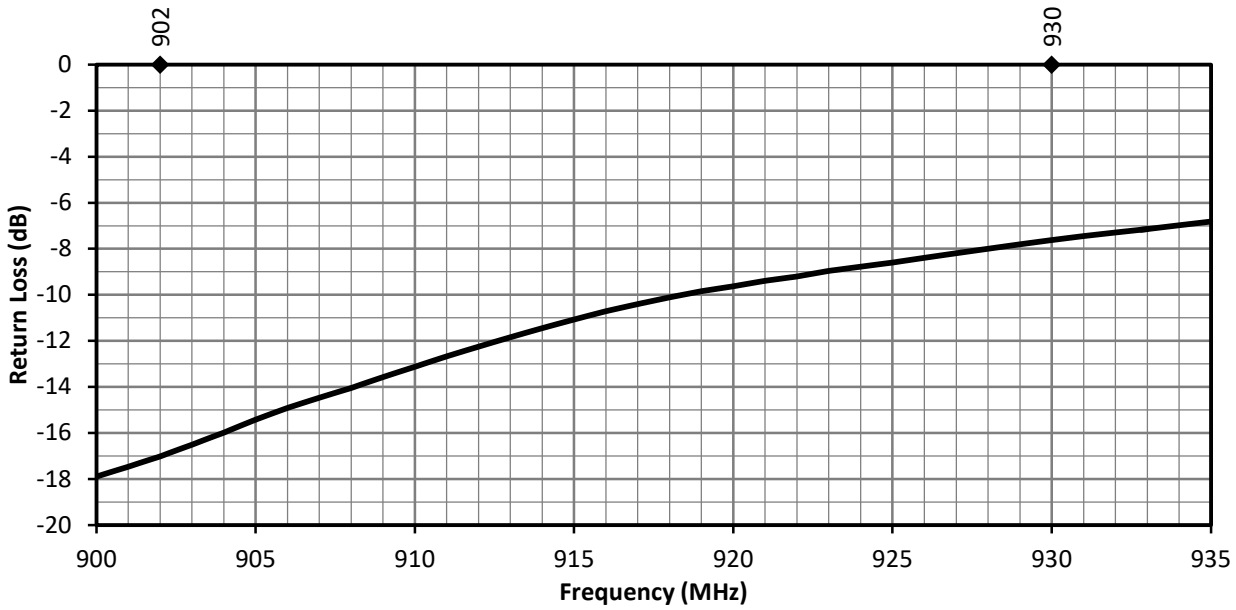


Figure 6. ANT-916-WRT Return Loss, Free Space

PEAK GAIN

The peak gain across the antenna bandwidth is shown in Figure 7. 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.

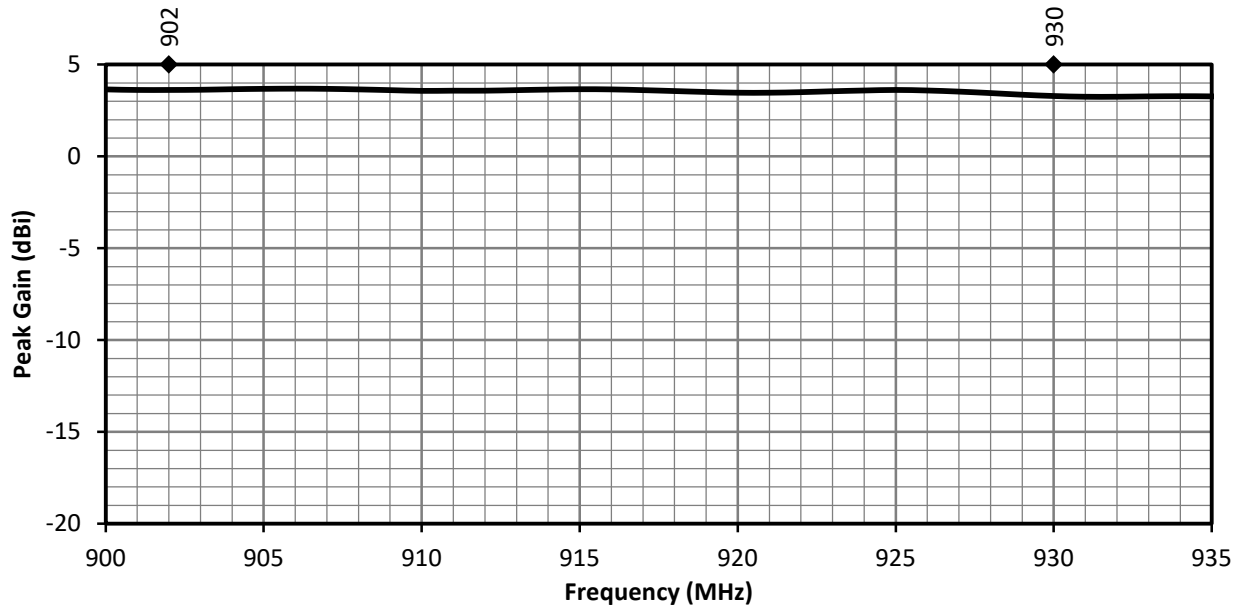


Figure 7. ANT-916-WRT Peak Gain, Free Space

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AVERAGE GAIN

Average gain (Figure 8), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

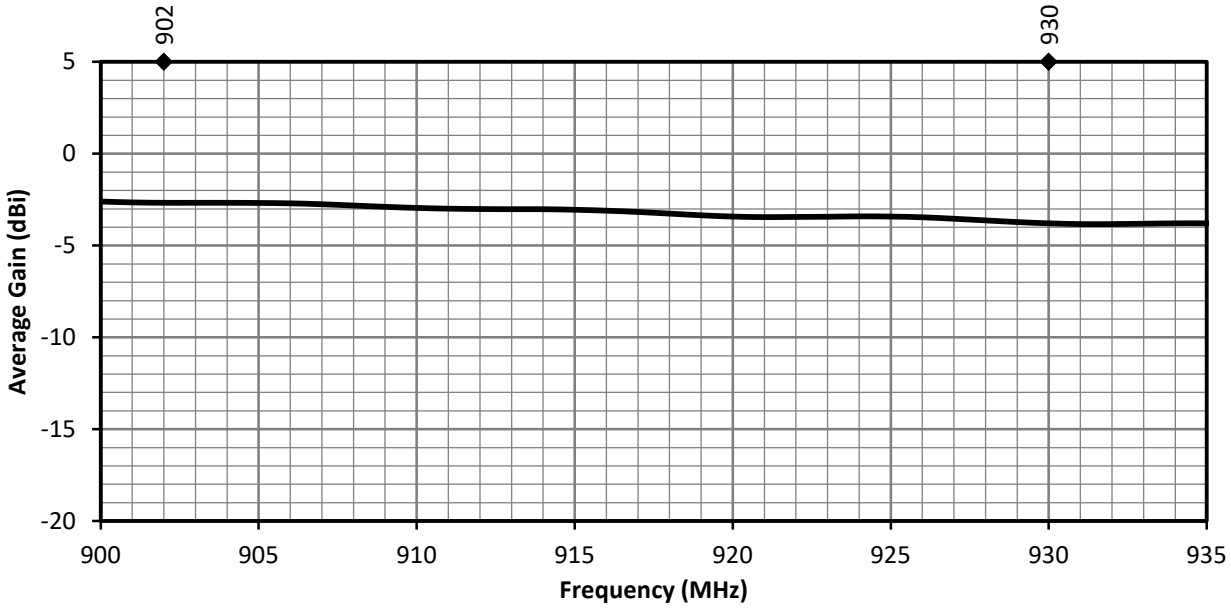


Figure 8. ANT-916-WRT Antenna Average Gain, Free Space

RADIATION EFFICIENCY

Radiation efficiency (Figure 9), 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.

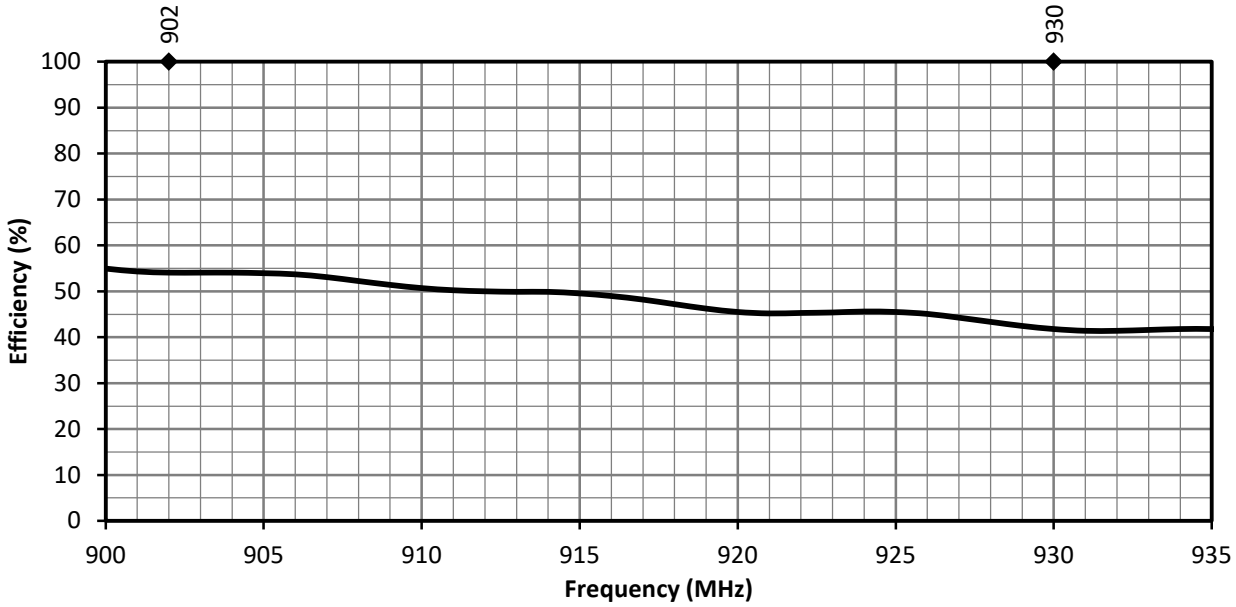


Figure 9. ANT-916-WRT Antenna Radiation Efficiency, Free Space

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RADIATION PATTERNS

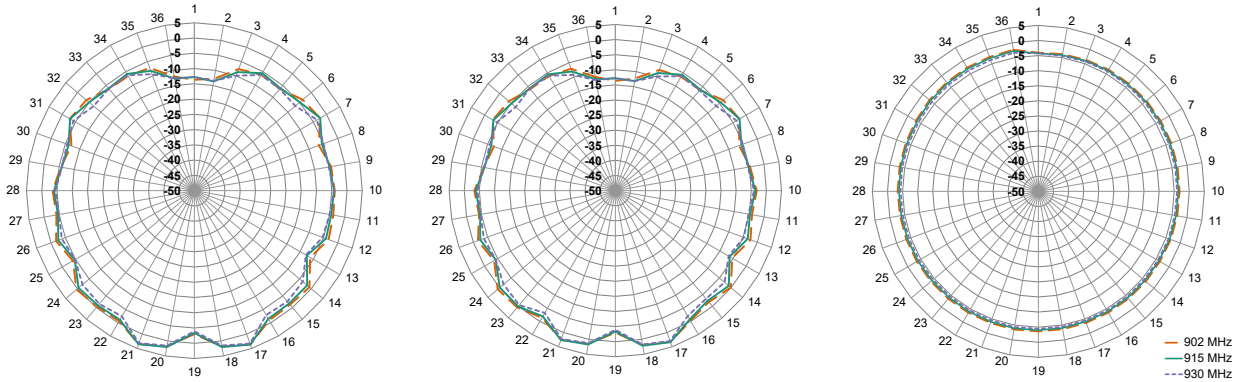
Radiation patterns provide information about the directionality and 3-dimensional gain performance of the antenna by plotting gain at specific frequencies in three orthogonal planes. Antenna radiation patterns are shown in Figure 10 using polar plots covering 360 degrees. The antenna graphic at the top 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 - FREE SPACE



XZ-Plane Gain | YZ-Plane Gain | XY-Plane Gain

902 MHZ TO 930 MHZ (915 MHZ)



XZ-Plane Gain | YZ-Plane Gain | XY-Plane Gain

Figure 10. ANT-916-WRT Radiation Patterns, Free Space

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CENTER OF GROUND PLANE

The charts on the following pages represent data taken with the antenna oriented at the center of the ground plane, as shown in Figure 11.

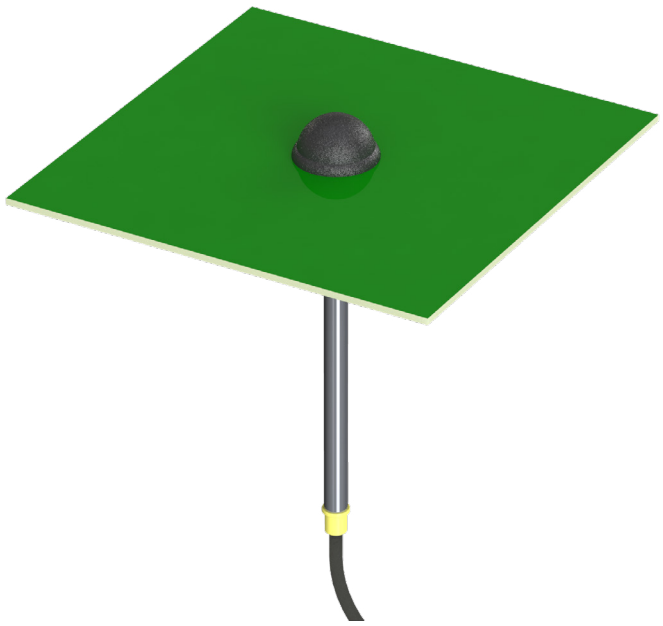


Figure 11. ANT-868-WRT at Center of Ground Plane

VSWR

Figure 12 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.

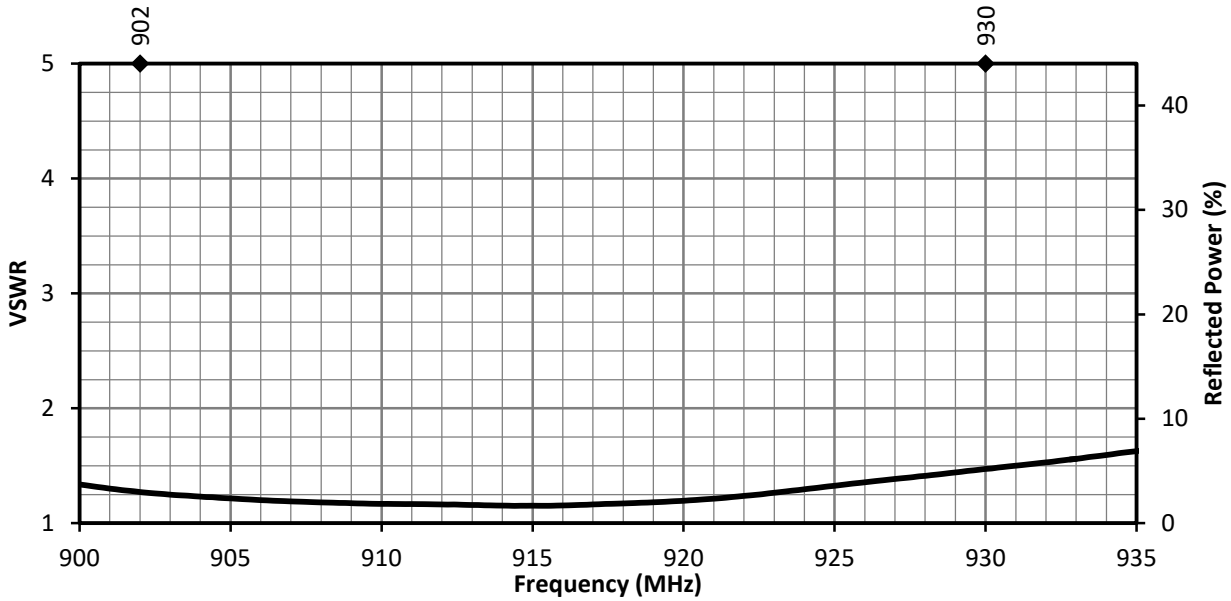


Figure 12. ANT-916-WRT VSWR, Center of Ground Plane

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RETURN LOSS

Return loss (Figure 13), 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.

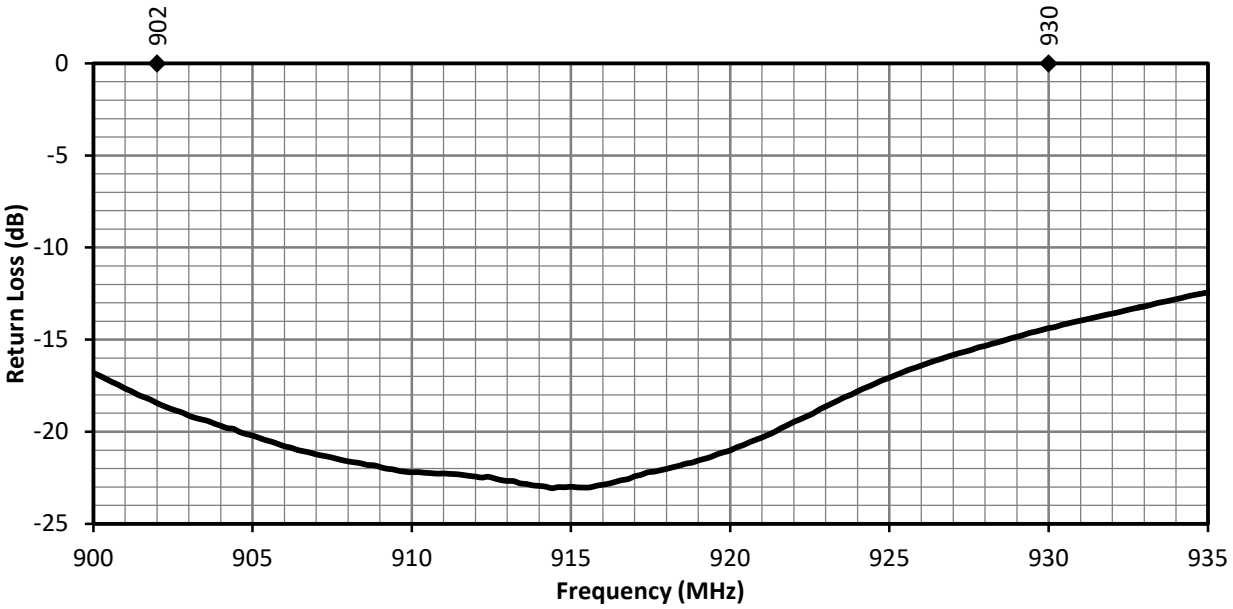


Figure 13. ANT-916-WRT Return Loss, Center of Ground Plane

PEAK GAIN

The peak gain across the antenna bandwidth is shown in Figure 14. 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.

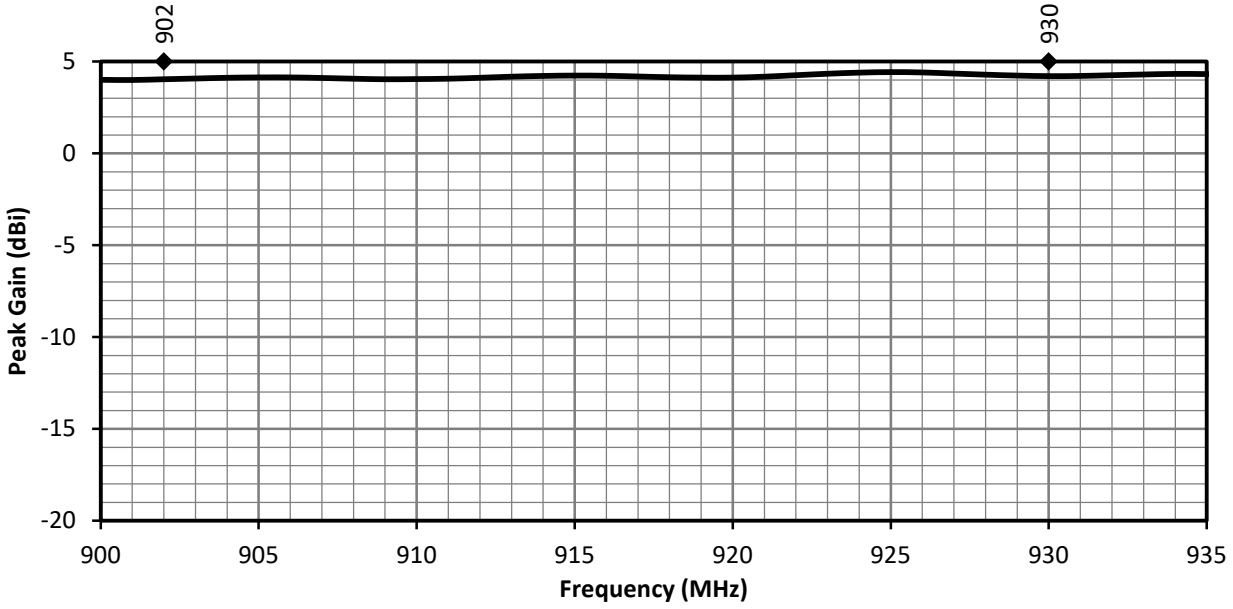


Figure 14. ANT-916-WRT Peak Gain, Center of Ground Plane

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AVERAGE GAIN

Average gain (Figure 15), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

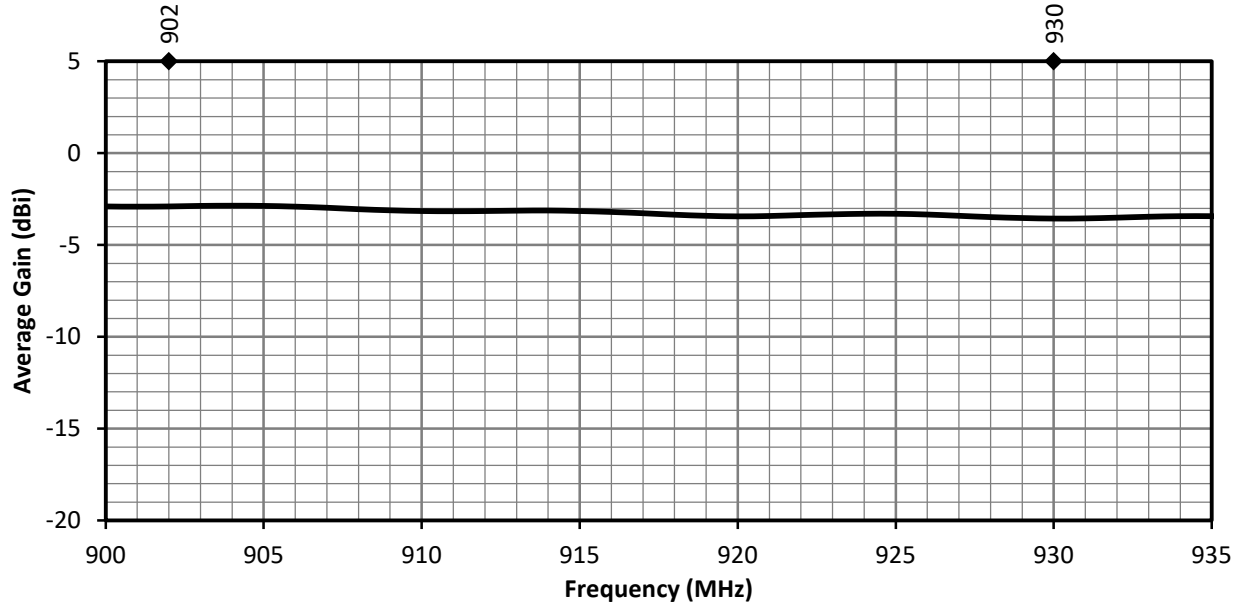


Figure 15. ANT-916-WRT Antenna Average Gain, Center of Ground Plane

RADIATION EFFICIENCY

Radiation efficiency (Figure 16), 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.

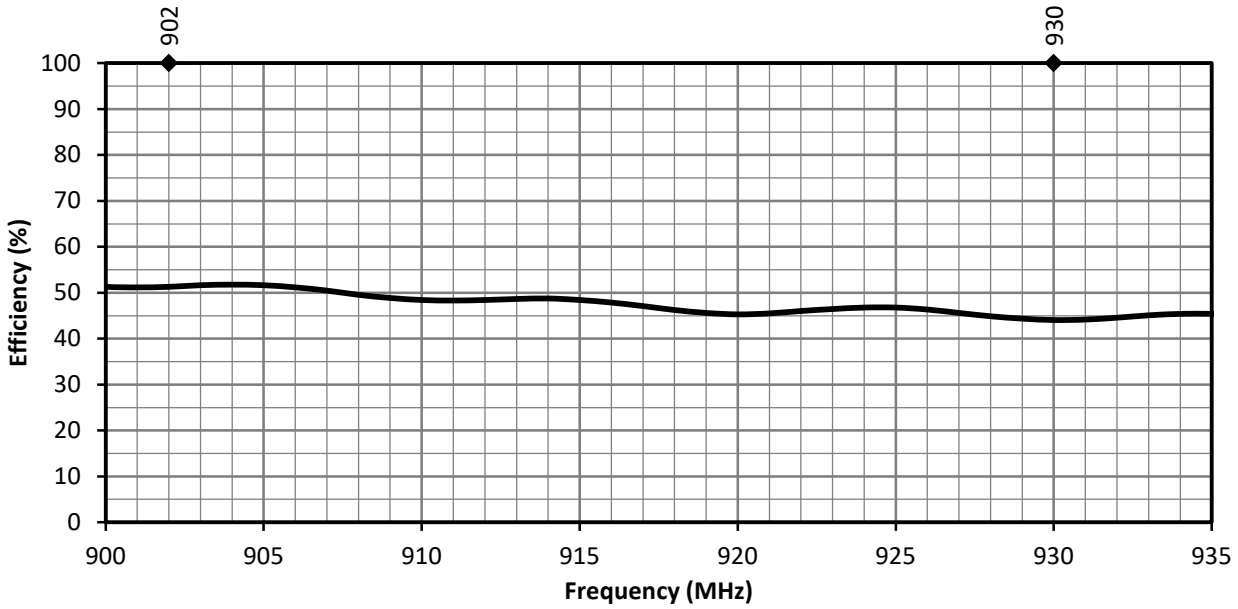


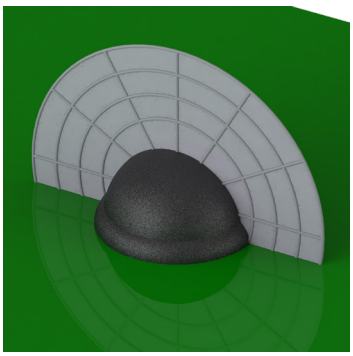
Figure 16. ANT-916-WRT Antenna Radiation Efficiency, Center of Ground Plane

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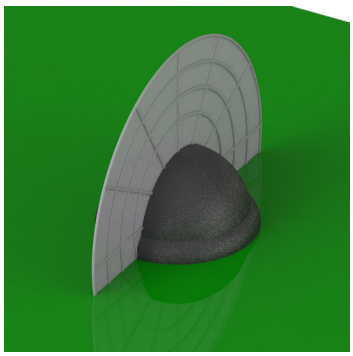
RADIATION PATTERNS

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 in Figure 17 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.

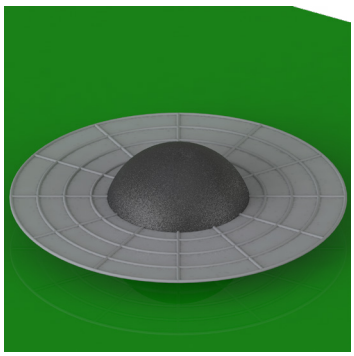
RADIATION PATTERNS - CENTER OF GROUND PLANE



XZ-Plane Gain

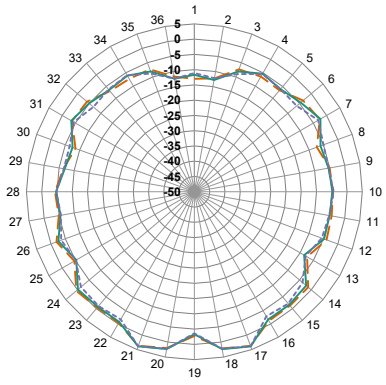


YZ-Plane Gain

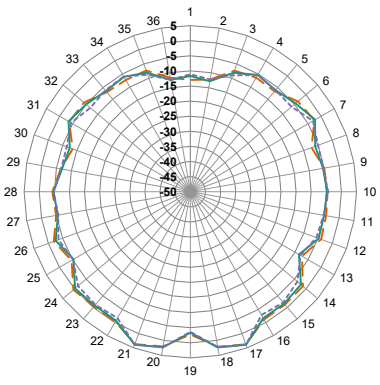


XY-Plane Gain

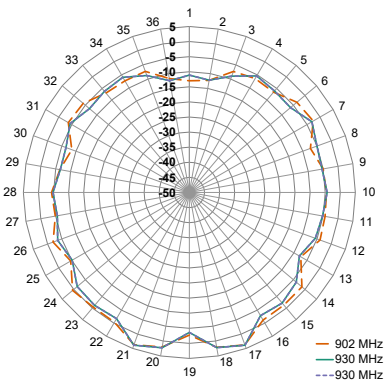
902 MHZ TO 930 MHZ (915 MHZ)



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

Figure 17. ANT-916-WRT Radiation Patterns, Center of Ground Plane

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