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OC-LG Series

868 MHz LPWA Antenna

The OC-LG series antennas deliver excellent performance in a ground plane independent dipole configuration. The 868-OC-LG antenna is designed for sub-1 GHz and low-power, wide-area (LPWA) applications including LoRaWAN®, Sigfox®, and other unlicensed ISM bands in the 862 MHz to 876 MHz range.

The hinged design allows for the antenna to be positioned for optimum performance and reduces the potential for damage from impact compared to a fixed whip design. The antenna is available with an SMA plug (male pin) or RP-SMA plug (female socket) connector for FCC Part 15 compliant applications.

FEATURES

- Performance at 862 MHz to 876 MHz
  - VSWR: ≤ 2.3
  - Peak Gain: 0.4 dBi
  - Efficiency: 62%
- Hinged design with detents for straight, 45 degree and 90 degree positioning
- SMA plug (male pin) or RP-SMA plug (female socket)

APPLICATIONS

- Low-power, wide-area (LPWA) applications
  - LoRaWAN®
  - Sigfox®
- ISM band applicationsl
- Internet of Things (IoT) devices
- Smart Home networking
  - Security systems
  - Industrial machinery
- Remote sensing, monitoring and control
  - Industrial machinery
  - AMR (automated meter reading)
- Hand-held devices
- Gateways

ORDERING INFORMATION

Part Number	Description
ANT-868-OC-LG-SMA	Antenna with SMA plug (male pin)
ANT-868-OC-LG-RPS	Antenna with RP-SMA plug (female socket)

Available from Linx Technologies and select distributors and representatives.

ELECTRICAL SPECIFICATIONS

ANT-868-OC-LG	868 MHz
Frequency Range	862 MHz to 876 MHz
VSWR (max)	2.3
Peak Gain (dBi)	0.4
Average Gain (dBi)	-2.3
Efficiency (%)	62
Polarization	Linear
Radiation	Omnidirectional
Max Power	10 W
Wavelength	1/2-wave
Electrical Type	Dipole
Impedance	50 Ω
Connection	SMA plug (male pin) or RP-SMA plug (female socket)
Operating Temperature Range	-20 °C to +85 °C
Weight	15.0 g (0.53 oz)
Dimensions	Length: 193.5 mm (7.62 in) Diameter: 10.0 mm (0.39 in)

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

PACKAGING INFORMATION

The OC-LG series antennas are packaged in clear plastic bags in quantities of 50, with 350 pcs packed in inner boxes, and 1,400 pcs per carton. Distribution channels may offer alternative packaging options.

PRODUCT DIMENSIONS

Figure 1 provides dimensions of the ANT-868-OC-LG. The antenna whip can be tilted 90 degrees, and has 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.

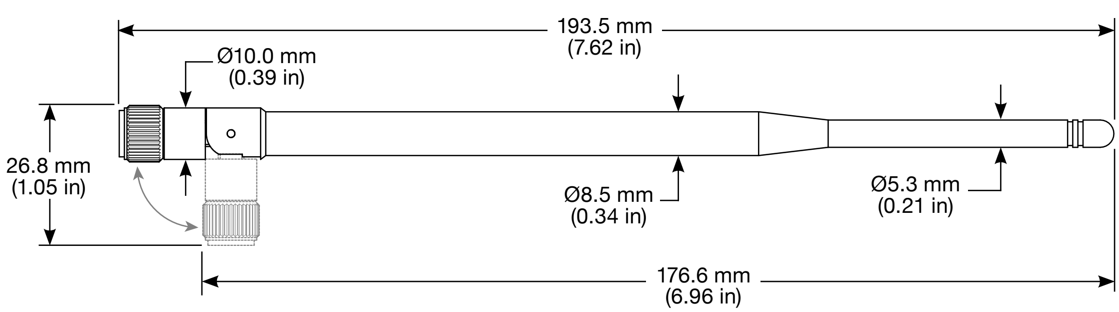


Figure 1. OC-LG Antenna Dimensions

CENTER OF GROUND PLANE, STRAIGHT

The charts on the following pages represent data taken with the antenna oriented at the center of the ground plane, straight (Center-Straight), as shown in Figure 2.

Figure 2. ANT-868-OC-LG Shown on Center of Ground Plane, Straight

VSWR

Figure 3 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.

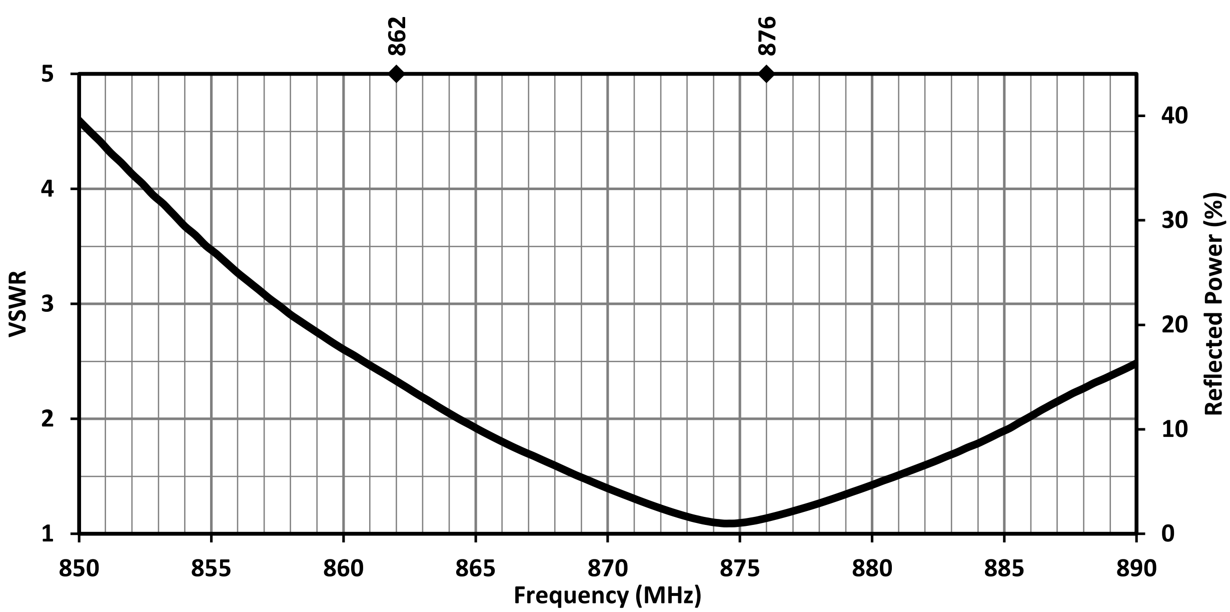


Figure 3. ANT-868-OC-LG VSWR

RETURN LOSS

Return loss (Figure 4), 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.

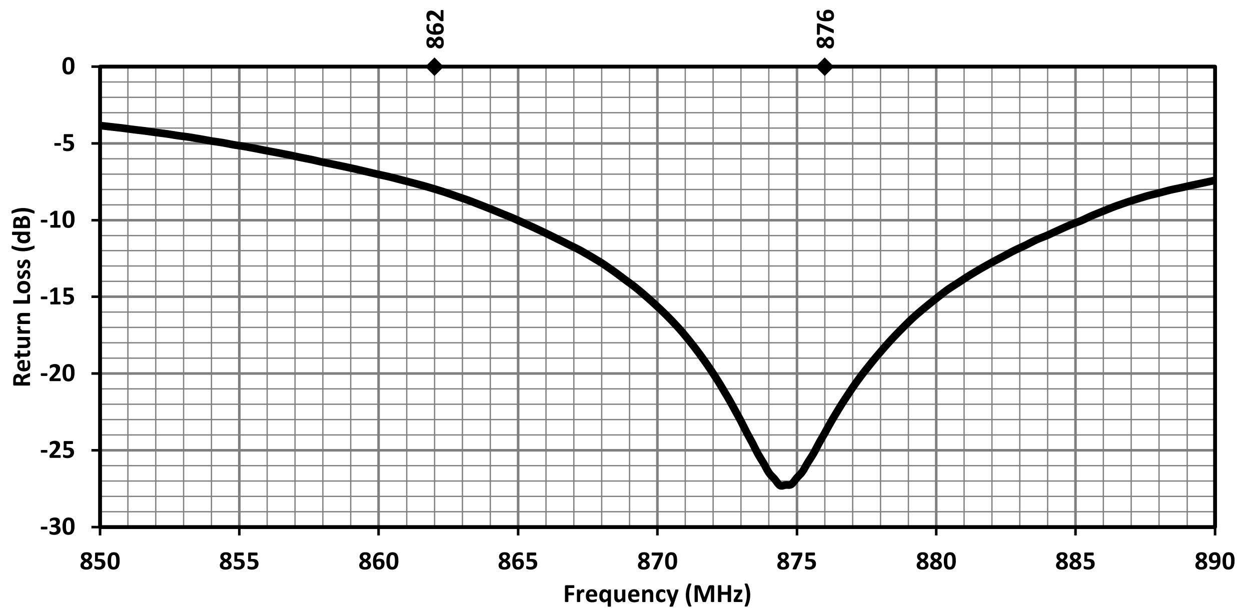


Figure 4. ANT-868-OC-LG Return Loss

PEAK GAIN

The peak gain across the antenna bandwidth is shown in Figure 5. 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.

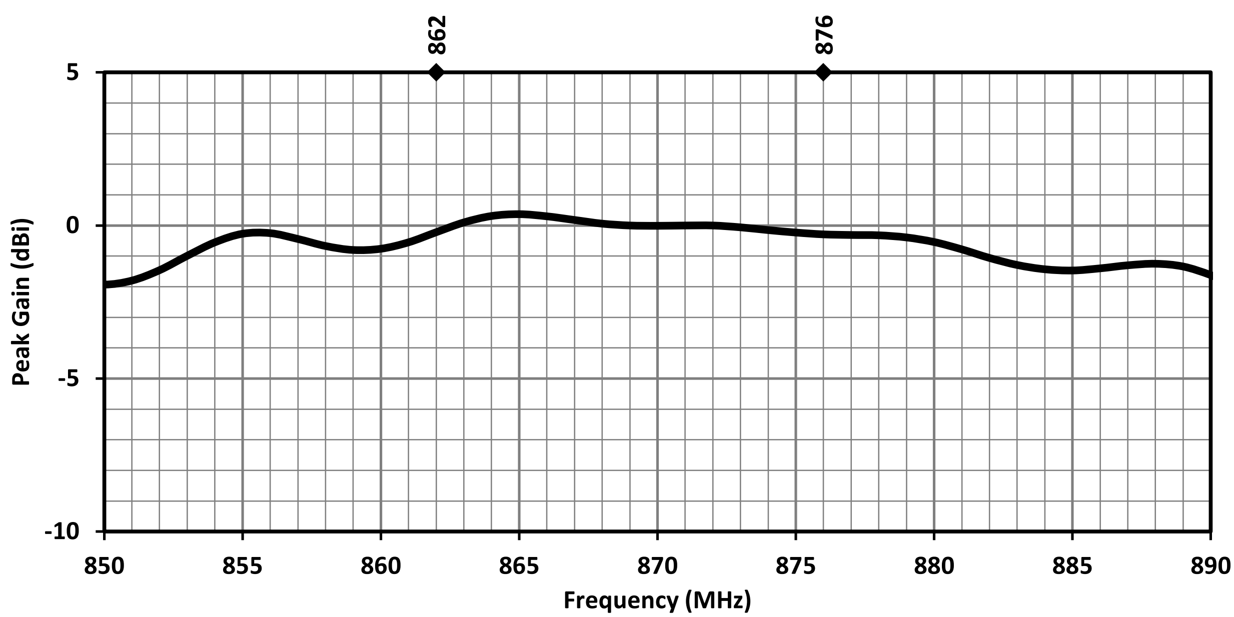


Figure 5. ANT-868-OC-LG Peak Gain

AVERAGE GAIN

Average gain (Figure 6), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

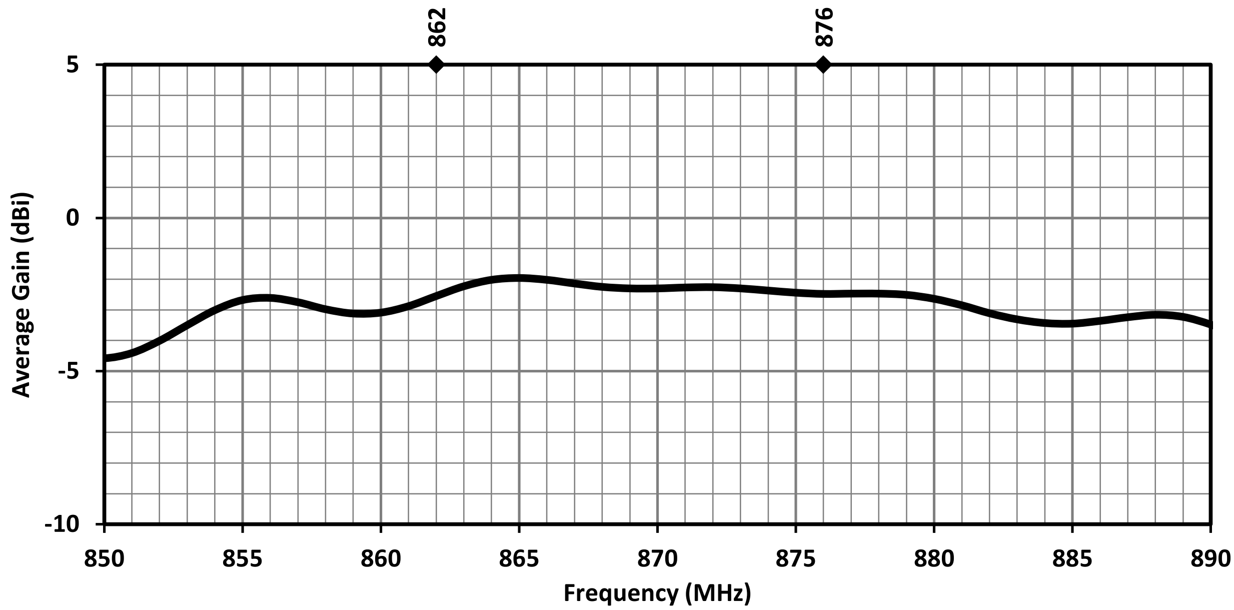


Figure 6. ANT-868-OC-LG Antenna Average Gain

RADIATION EFFICIENCY

Radiation efficiency (Figure 7), 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.

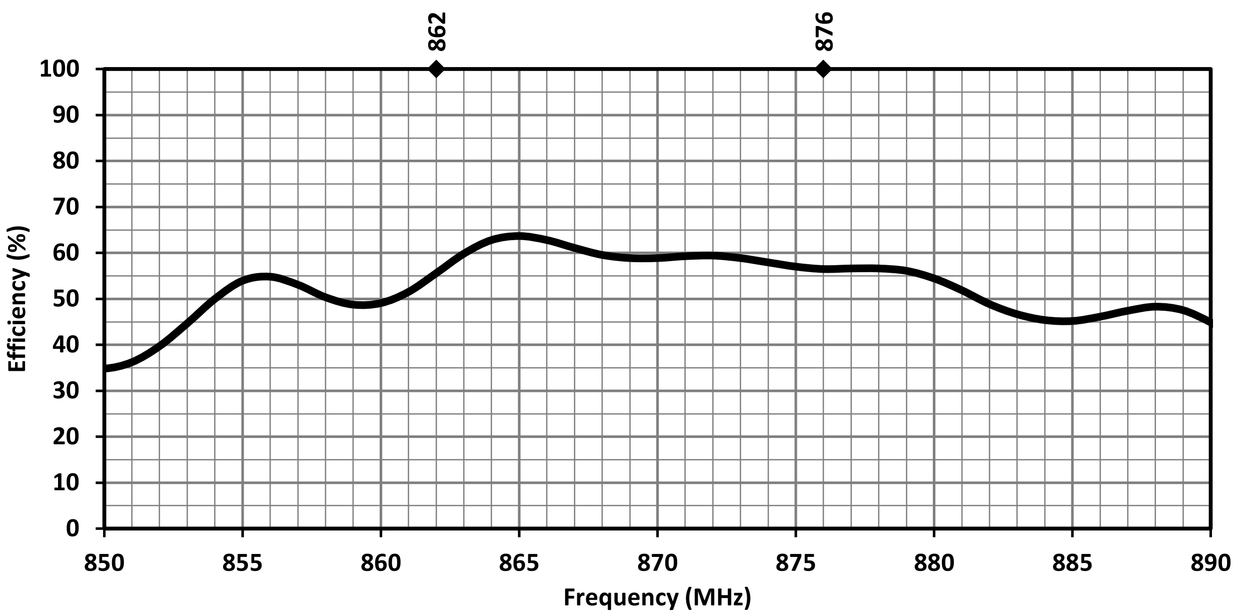
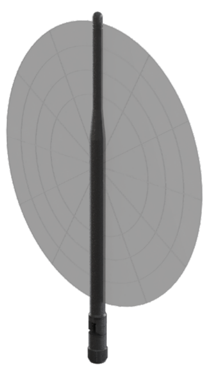


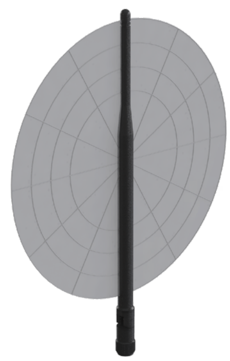
Figure 7. ANT-868-OC-LG Antenna Efficiency

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 a center straight orientation are shown in Figure 8 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.



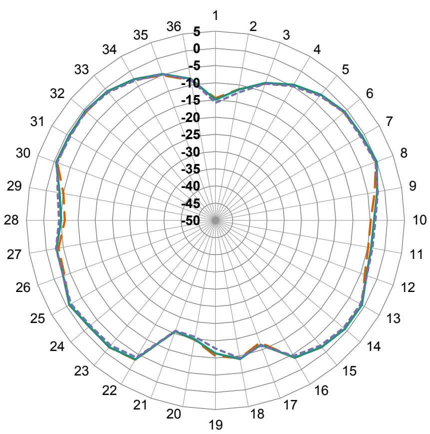
XZ-Plane Gain



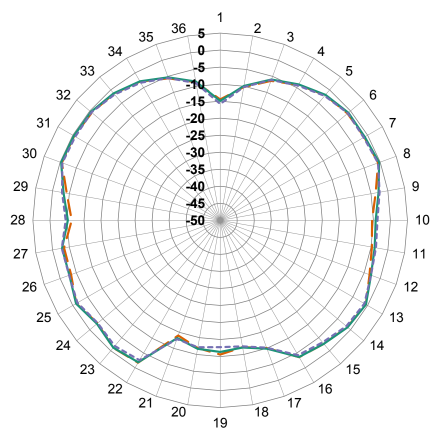
YZ-Plane Gain

XY-Plane Gain

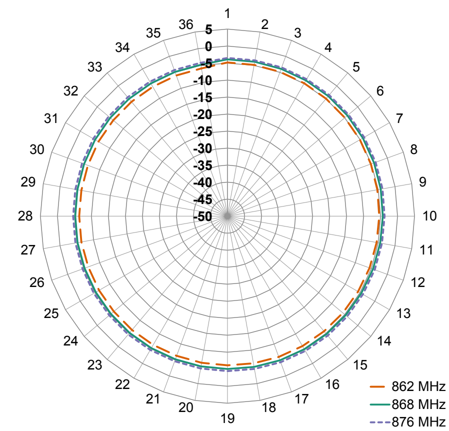
862 MHZ TO 876 MHZ (868 MHZ)



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

Figure 8. ANT-868-OC-LG Radiation Patterns

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.

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

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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