

## Datasheet

### ANT-2.4-PW-LPN 2.4 GHz Compact Helical Antenna

The ANT-2.4-PW-LPN is a compact helical antenna designed for 2.4 GHz ISM frequency band applications such as Bluetooth® and ZigBee®.

The ANT-2.4-PW-LPN is 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 ANT-2.4-PW-LPN provides a low-cost but high-performing antenna solution.



#### Features

- Performance at 2.4 GHz
  - VSWR: ≤ 2.0
  - Peak Gain: 4.5 dBi
  - Efficiency: 82%
- Compact size
  - Height 46.9 mm (1.85 in)
  - Diameter 6.0 mm (0.23 in)
- Omnidirectional radiation pattern
- Antenna mounts using provided 6-32UNC machine screw

#### Applications

- Single-band WiFi/WLAN/802.11
  - WiFi 4
- 2.4 GHz ISM applications
  - Bluetooth®
  - ZigBee®
- U-NII and ISM applications
- Internet of Things (IoT) devices
- Smart Home networking
- Sensing and remote monitoring

#### Ordering Information

Part Number	Description
ANT-2.4-PW-LPN	2.4 GHz helical antenna with 6-32UNC screw-mount connection

Available from Linx Technologies and select distributors and representatives.

Table 1. Electrical Specifications

ANT-2.4-PW-LPN	2.4 GHz		
Frequency Range	2.4 GHz to 2.5 GHz		
VSWR (max)	2.0		
Peak Gain (dBi)	4.5		
Average Gain (dBi)	-0.9		
Efficiency (%)	82		
Polarization	Linear	Radiation	Omnidirectional
Max Power	15 W	Wavelength	1/4-wave
Electrical Type	Monopole	Impedance	50 Ω

Electrical specifications and plots measured at the edge of a ground plane (40 mm x 80 mm).

Table 2. Mechanical Specifications

Parameter	Value
Connection	Screw mount 6-32UNC
Dimensions	46.9 mm x Ø6.0 mm (1.85 in x Ø0.23 in)
Weight	4.5 g (0.16 oz)
Operating Temp. Range	-40 °C to +85 °C

## Packaging Information

The ANT-2.4-PW-LPN antenna is sealed in protective trays of 90 pcs. Distribution channels may offer alternative packaging options.

## Product Dimensions

Figure 1 provides dimensions for the ANT-2.4-PW-LPN antenna.

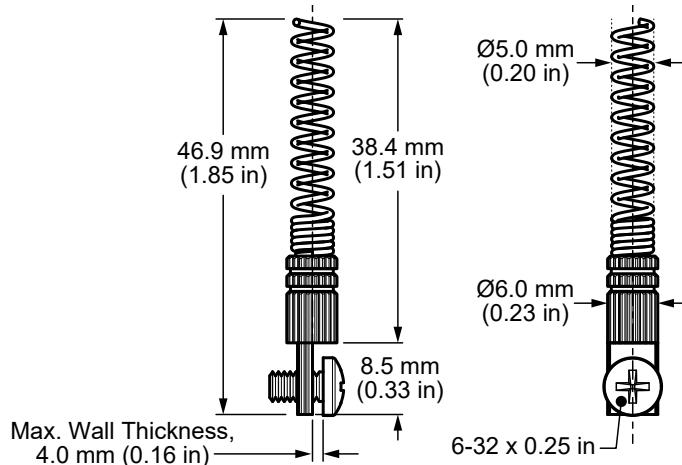


Figure 1. ANT-2.4-PW-LPN Antenna Dimensions

## Recommended Antenna Mounting and PCB Footprint

The ANT-2.4-PW-LPN attaches to a printed circuit board using the provided 6-32UNC x 0.25 in. machine screw. The maximum PCB thickness the antenna can mount to is 4.0 mm (0.16 in) and the maximum torque applied to the machine screw should not exceed 0.6 Nm (5.3 in/lbs). The recommended PCB footprint is shown in Figure 2.

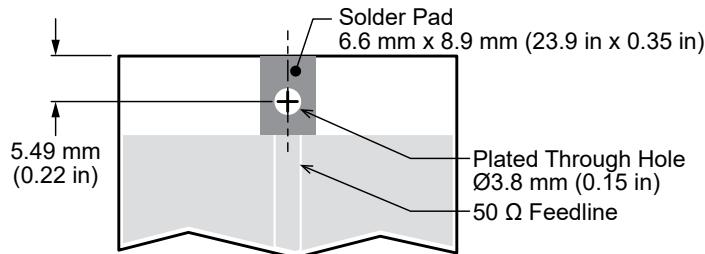


Figure 2. ANT-2.4-PW-LPN Antenna Recommended Mounting and PCB Footprint

## Counterpoise

Quarter-wave or monopole antennas require an associated ground plane counterpoise for proper operation. The size and location of the ground plane relative to the antenna will affect the overall performance of the antenna in the final design. When used in conjunction with a ground plane smaller than that used to tune the antenna, the center frequency typically will shift higher in frequency and the bandwidth will decrease. The proximity of other circuit elements and packaging near the antenna will also affect the final performance.

For further discussion and guidance on the importance of the ground plane counterpoise, please refer to Linx Application Note, *AN-00501: Understanding Antenna Specifications and Operation*.

## Antenna Orientation

The ANT-2.4-PW-LPN antenna is characterized at the edge of a ground plane (40 mm x 80 mm) as shown in Figure 3 providing insight into antenna performance when attached to a metal enclosure. The charts on the following pages represent data taken with the antenna oriented at the edge of the ground plane.



Figure 3. ANT-2.4-PW-LPN Test Orientation

## VSWR

Figure 4 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.

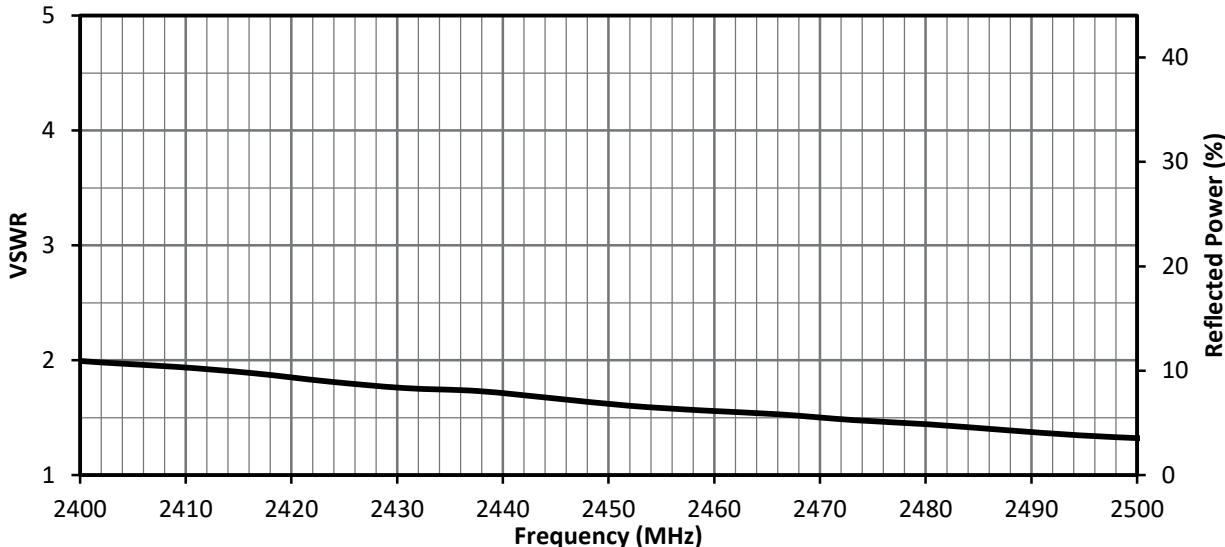


Figure 4. VSWR for ANT-2.4-PW-LPN, Edge of ground Plane

## Return Loss

Return loss (Figure 5), 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.

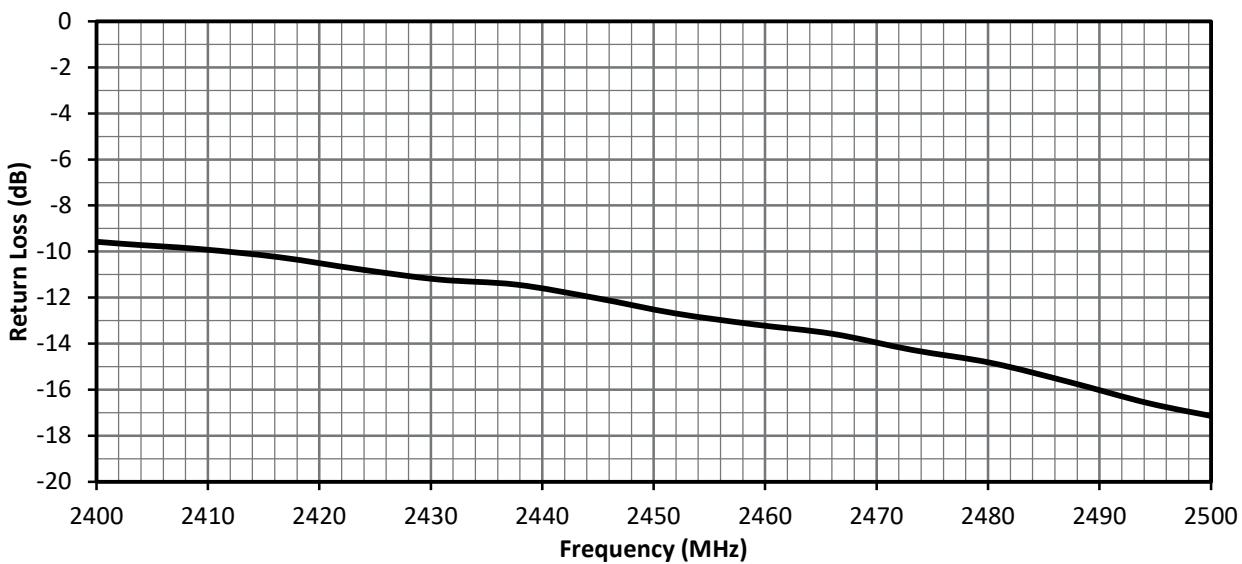


Figure 5. Return Loss for ANT-2.4-PW-LPN, Edge of ground Plane

## Peak Gain

The peak gain across the antenna bandwidth is shown in Figure 6. 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.

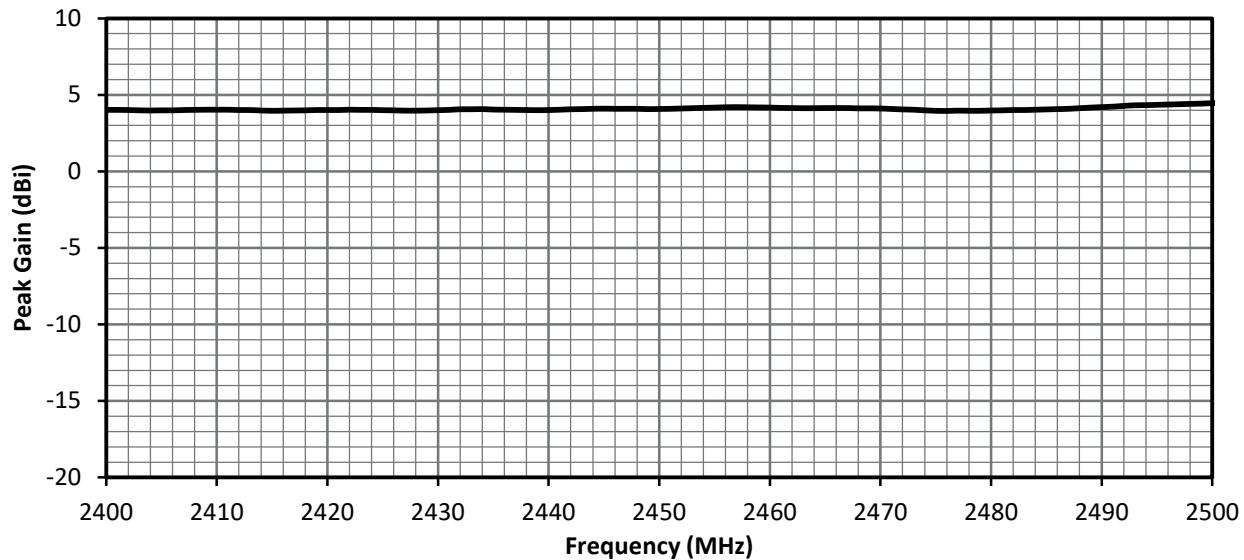


Figure 6. Peak Gain for ANT-2.4-PW-LPN, Edge of ground Plane

## 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.

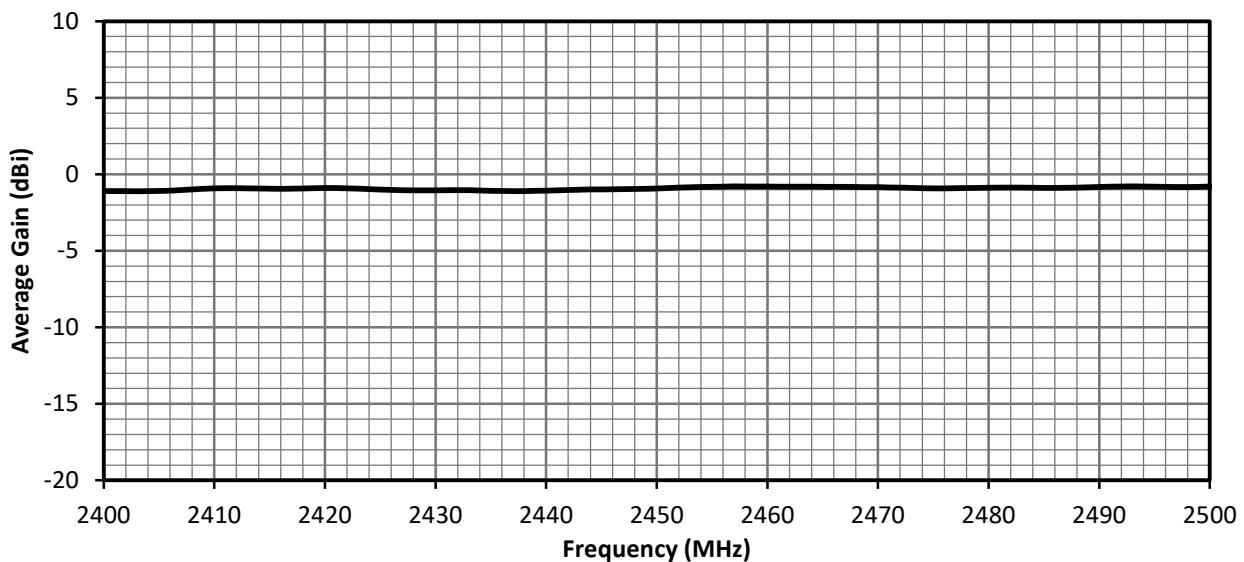


Figure 7. Antenna Average Gain for ANT-2.4-PW-LPN, Edge of ground Plane

### Radiation Efficiency

Radiation efficiency (Figure 8), 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.

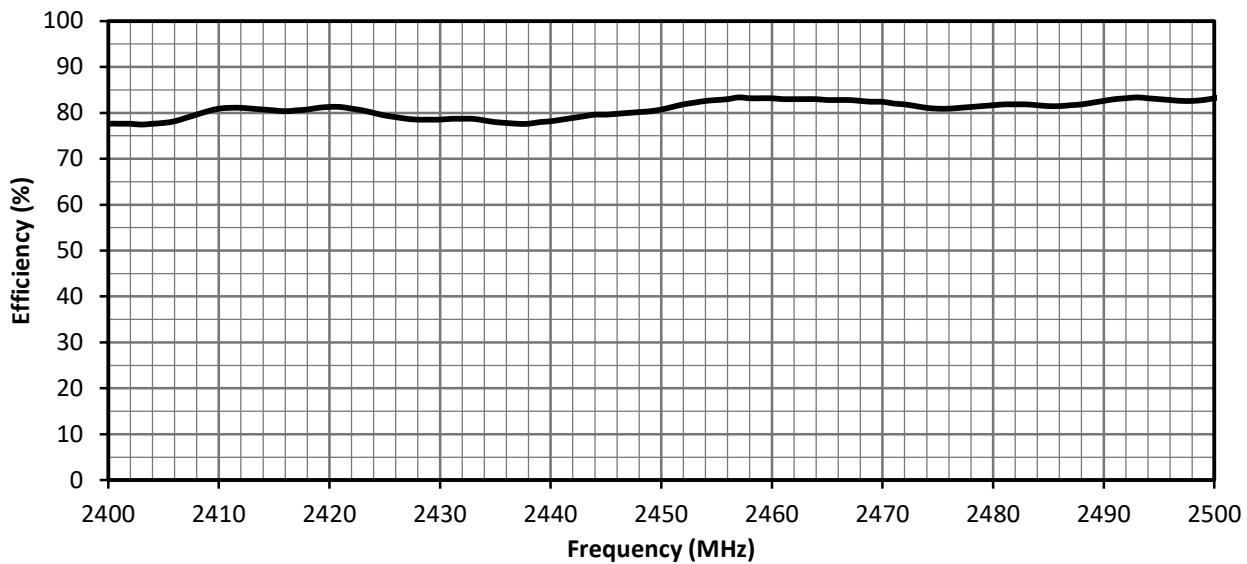
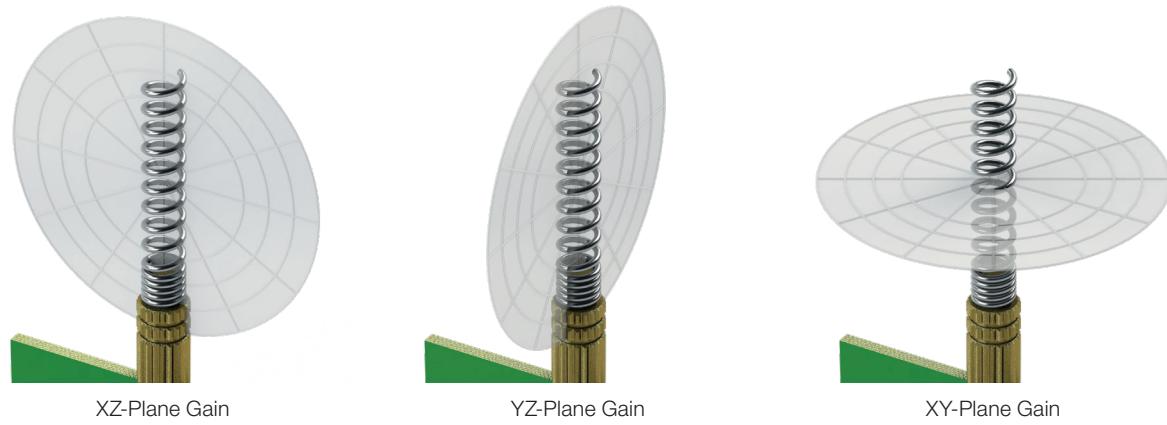


Figure 8. Antenna Radiation Efficiency for ANT-2.4-PW-LPN, Edge of ground Plane

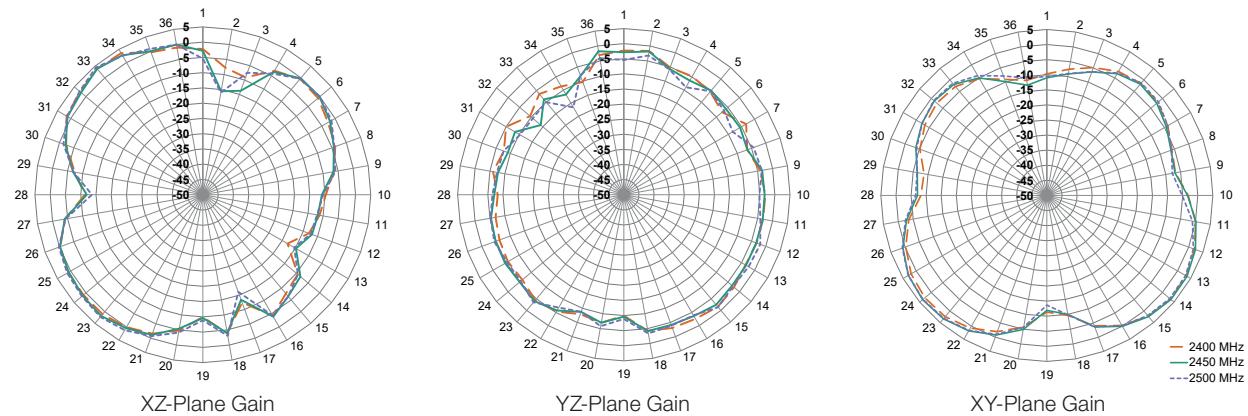
## Radiation Patterns

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 (Figure 9), 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.

### Radiation Patterns - Edge of Ground Plane



### 2400 MHz to 2500 MHz (2450 MHz)



**Figure 9. Radiation Patterns for ANT-2.4-PW-LPN Antenna, Edge of ground Plane**

---

## TE TECHNICAL SUPPORT CENTER

USA:	+1 (800) 522-6752
Canada:	+1 (905) 475-6222
Mexico:	+52 (0) 55-1106-0800
Latin/S. America:	+54 (0) 11-4733-2200
Germany:	+49 (0) 6251-133-1999
UK:	+44 (0) 800-267666
France:	+33 (0) 1-3420-8686
Netherlands:	+31 (0) 73-6246-999
China:	+86 (0) 400-820-6015

**te.com**

TE Connectivity, TE, TE connectivity (logo), Linx and Linx Technologies are trademarks owned or licensed by the TE Connectivity Ltd. family of companies. All other logos, products and/or company names referred to herein might be trademarks of their respective owners.

The information given herein, including drawings, illustrations and schematics which are intended for illustration purposes only, is believed to be reliable. However, TE Connectivity makes no warranties as to its accuracy or completeness and disclaims any liability in connection with its use. TE Connectivity's obligations shall only be as set forth in TE Connectivity's Standard Terms and Conditions of Sale for this product and in no case will TE Connectivity be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of the product. Users of TE Connectivity products should make their own evaluation to determine the suitability of each such product for the specific application.

TE Connectivity warrants to the original end user customer of its products that its products are free from defects in material and workmanship. Subject to conditions and limitations TE Connectivity will, at its option, either repair or replace any part of its products that prove defective because of improper workmanship or materials. This limited warranty is in force for the useful lifetime of the original end product into which the TE Connectivity product is installed. Useful lifetime of the original end product may vary but is not warrantied to exceed one (1) year from the original date of the end product purchase.

©2023 TE Connectivity. All Rights Reserved.

05/23    Original

---