**Datasheet**

# AC15101-NM
# 2.4 GHz Compact Dome Panel-Mount Antenna

The AC15101-NM NMO-connector dome antennas provide robust compact, outdoor, omnidirectional 2.4 GHz antenna solutions for all ISM applications including Bluetooth®, BLE and ZigBee®.

Each antenna supports IP67 and IP65 ingress protection as well as IK-10 impact resistance, all under an attractive, UV-resistant, dome. The 82 mm x 40 mm mounted size combines excellent antenna performance with a compact low-profile that fits in many applications from mobile/vehicular roof-mount to fixed vending machine use, and supports use on both metal enclosures or in free space including non-metallic enclosures.

The AC15101-NM NMO compact dome antennas are available in two colors, black and white, with fine matte finish. Similar-performing N-jack connector terminated (AC15101-NJ) and cabled (AC17101) compact dome antennas are also available.

AC15101-NMB Compact Dome NMO-Mount Antenna

## Features

- Very high efficiency
- Performance at 2.4 GHz to 2.5 GHz
  - VSWR: 1.6
  - Peak Gain: 3.5 dBi
  - Efficiency: 81%
- IP67/IP65 ingress protection
- IK10 impact resistance
- O-ring mounting seal
- UV resistance
- Salt spray resistance
- Ground plane independent
- Dimensions: 82 mm x 40 mm

## Applications

- 2.4 GHz ISM applications
  - Bluetooth®
  - Bluetooth Low Energy (BLE)
  - ZigBee®
- WLAN Gateways/Routers
- Automotive/vehicular/OHV
- Internet of Things (IoT) devices

## Ordering Information

| Part Number | Description |
|---|---|
| **AC15101-NMB** | Black NMO connector, 2.4 GHz compact dome antenna |
| **AC15101-NMW** | White NMO connector, 2.4 GHz compact dome antenna |

See the AC17101 compact dome antennas for cabled options and AC15101-NJ for N connector termination options.
Available from The Antenna Company (sales@antennacompany.com) and select distributors and representatives.

## Electrical Specifications

| AC15101-NMO | ISM/WiFi |
|---|---|
| Parameter | 2400 MHz to 2500 MHz |
| VSWR (max) | 1.6 |
| Peak Gain (dBi) | 3.5 |
| Average Gain (dBi) | -0.9 |
| Average Efficiency (%) | 81 |
| Impedance | 50 Ω |
| Polarization | Linear |
| Radiation Pattern | Omnidirectional |
| Wavelength | ½-wave |
| Maximum Input Power | 10W |
| Electrical Type | Dipole |

Electrical specifications and plots measured with the antenna mounted at the center of a 300 mm x 300 mm ground plane using NMO to N-connector test adapter.

## Mechanical Specifications

| Parameter | Value |
|---|---|
| Antenna Connection (Termination) | NMO |
| Mounting Torque | Hand tighten, 2.0 Nm typical |
| Mating Connector | Commercially available NMO connectors vary widely. An NMO connector designed for high frequency (i.e. > 700 MHz) is recommended |
| Weight | AC15101-NMx = 56.7 g (2.0 oz) |
| Dimensions (mounted) | 82.0 mm x Ø40.0 mm<br>(3.23 in x Ø1.57 in) |

## Environmental Specifications

| Parameter | Value |
|---|---|
| Operating Temp. Range | -40 °C to +85 °C (-104 °F to 185 °F) |
| Operating Relative Humidity | ≤ 98% |
| Ingress Protection | IP67, IP65 |
| Impact Resistance | IK10 |
| Flammability Rating | UL 94-HB |
| Salt Spray | MIL-STD 810F/STM B117 |
| Wind Resistance (max.) | 300 km/hr (186 mi/hr) |

## Antenna Dimensions

The dimensions for the AC15101-NM are shown below in Figure 1.

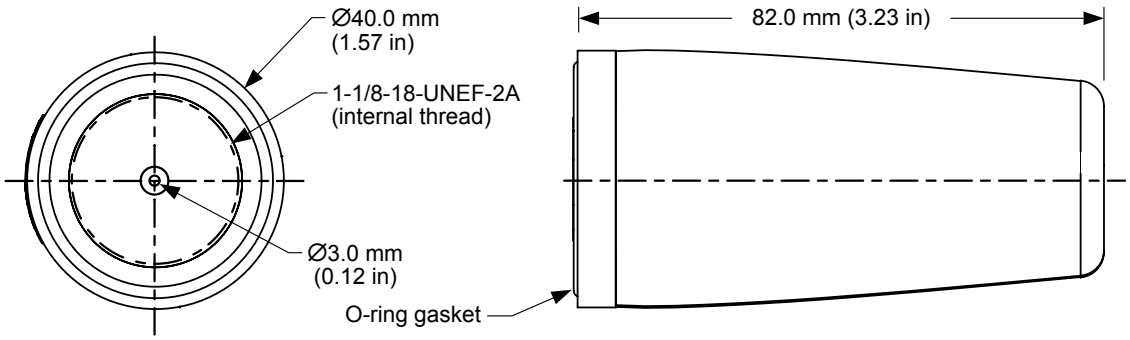
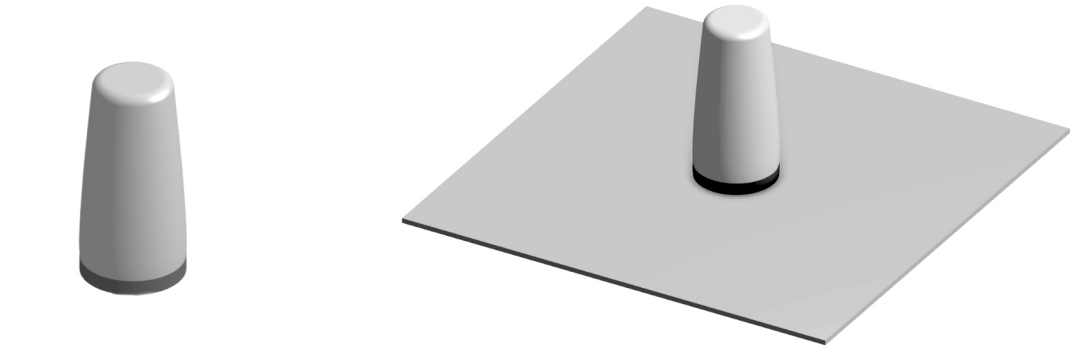



Figure 1. AC15101 Antenna Dimensions

## Antenna Test Orientations

The AC15101-NM antenna is characterized in two antenna orientations as shown in Figure 2. Although the antenna does not require a ground plane to function, characterization on an adjacent ground plane (300 mm x 300 mm) provides insight into antenna performance when attached directly on a metal enclosure. The antenna free space orientation characterizes use of an antenna attached to a non-metallic enclosure. These two orientations represent common end-product use cases.



Antenna in Free space Antenna on Ground Plane

Figure 2. AC15101-NM Antenna Test Orientations

## On Ground Plane

The charts on the following pages represent data taken with the antenna oriented at the center of the 300 mm x 300 mm metal plate as shown in Figure 3.

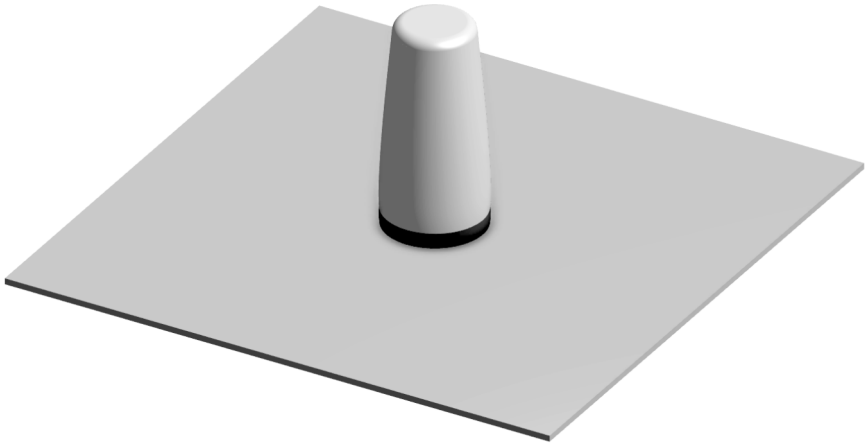


Figure 3. AC15101-NM Antenna On Ground Plane

## VSWR

Figure 4 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.

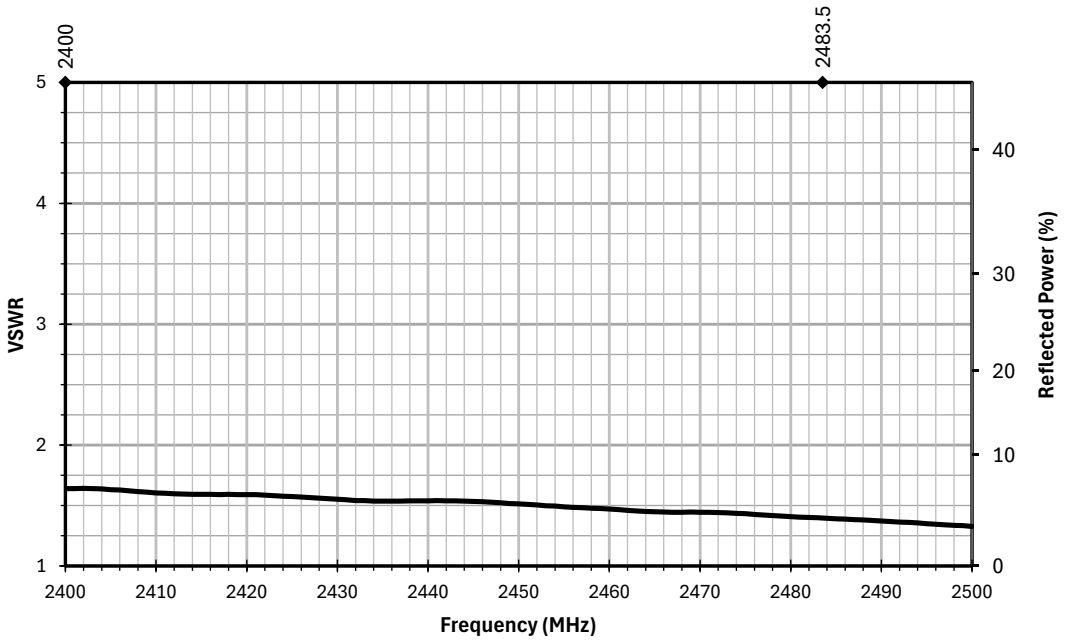



Figure 4. AC15101-NM Antenna VSWR on Ground Plane

## Return Loss

Return loss (Figure 5) 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 the input reflection coefficient in decibels (dB), and the two values are often used interchangeably.

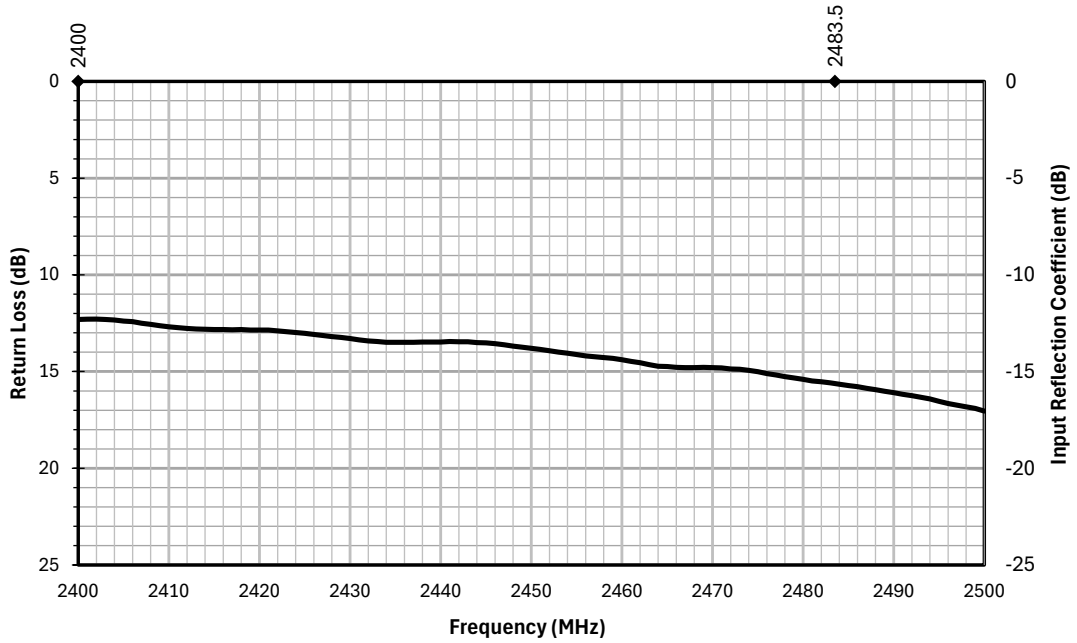



Figure 5. AC15101-NM Antenna Return Loss on Ground Plane

## Peak Gain

Peak gain (Figure 6) 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.

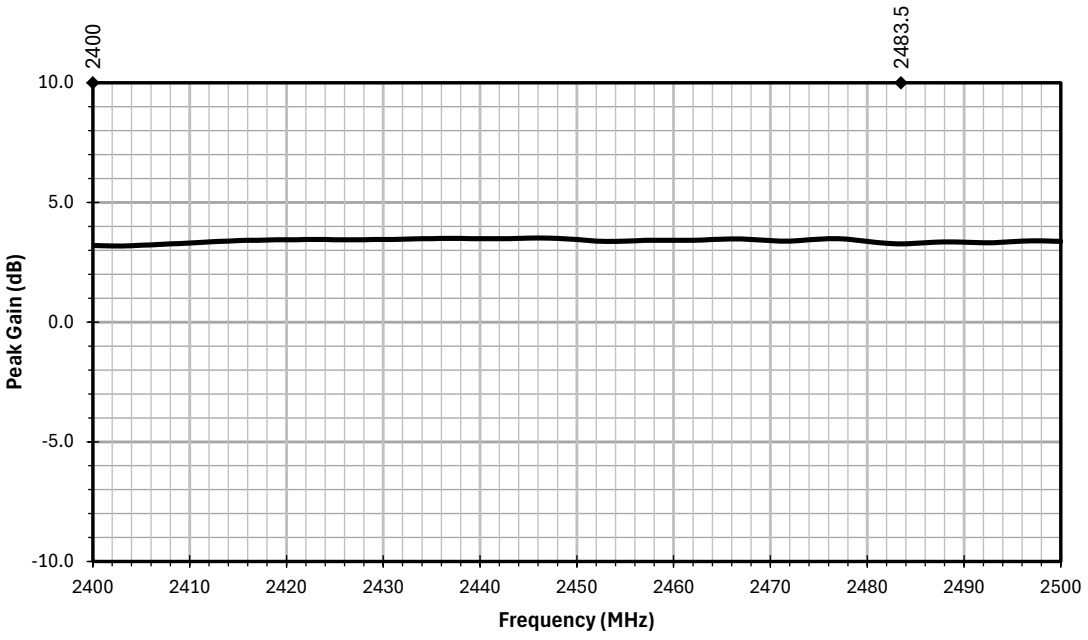



Figure 6. AC15101-NM Antenna Peak Gain on Ground Plane

## 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.

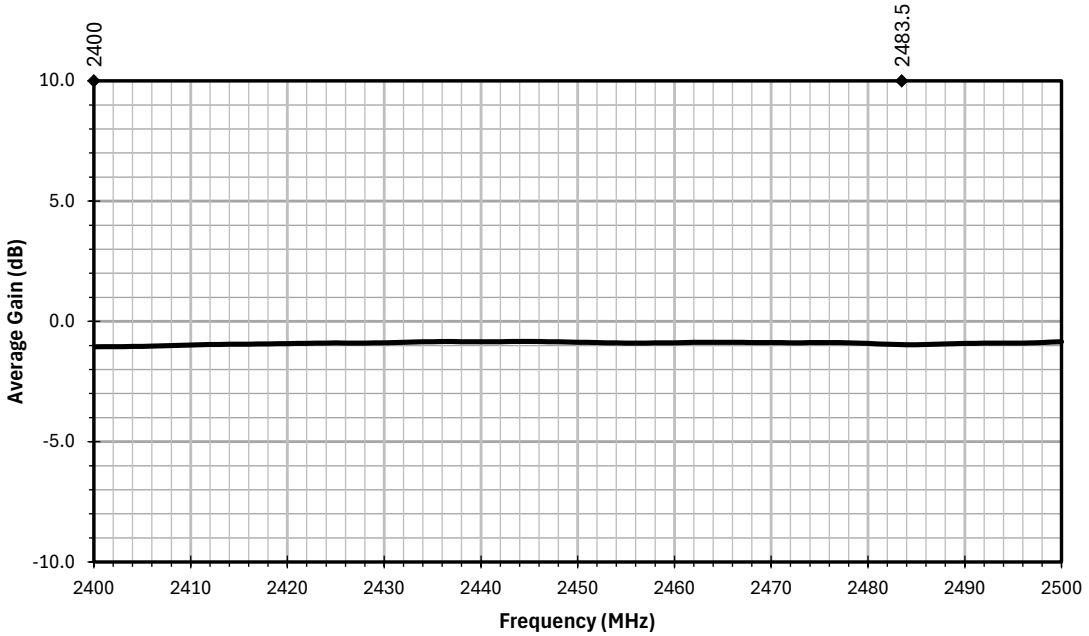



Figure 7. AC15101-NM Antenna Average Gain on Ground Plane

## Efficiency

Efficiency (Figure 8) is 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.

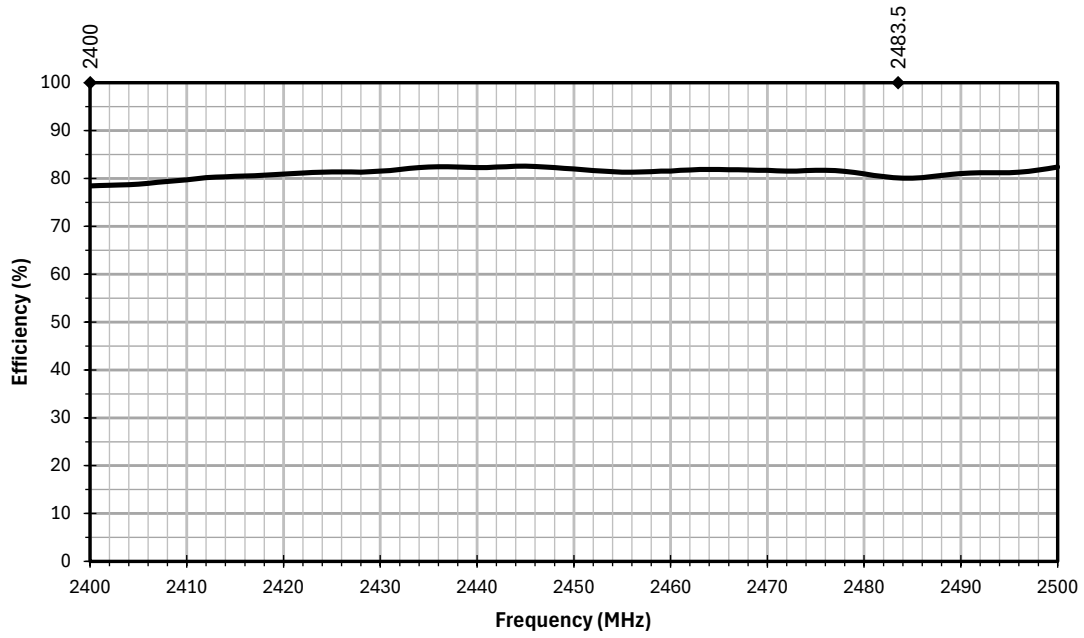
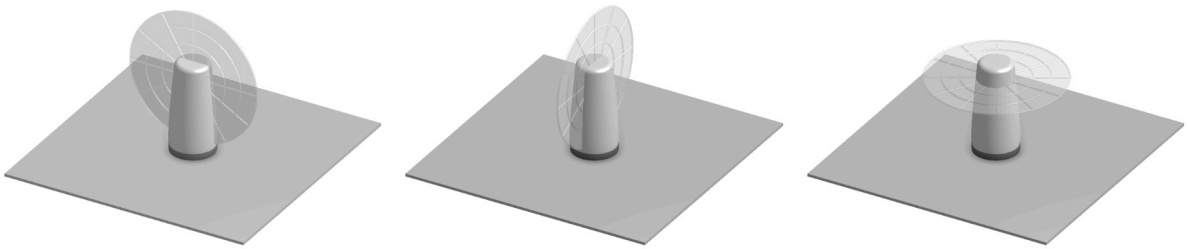



Figure 8. AC15101-NM Antenna Efficiency on Ground Plane

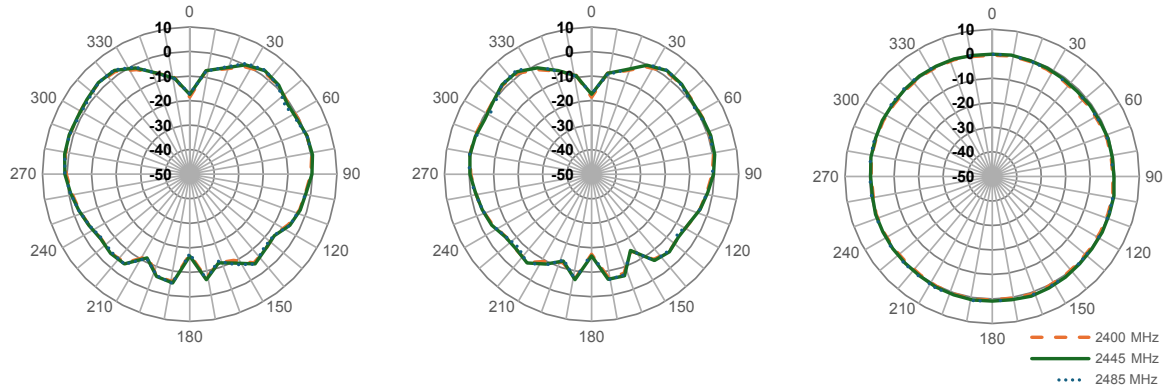
## Radiation Patterns - On Ground Plane

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 9) 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**

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




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

**Figure 9. Radiation Patterns for AC15101-NM Antenna on Ground Plane**

## Free Space, No Ground Plane

The charts on the following pages represent data taken with the antenna in free space as shown in Figure 10.

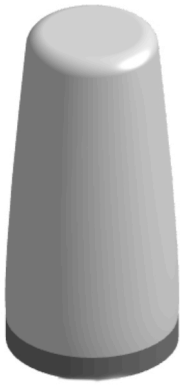


Figure 10. AC15101-NM Antenna, Free Space, no Ground Plane

## VSWR

Figure 11 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.

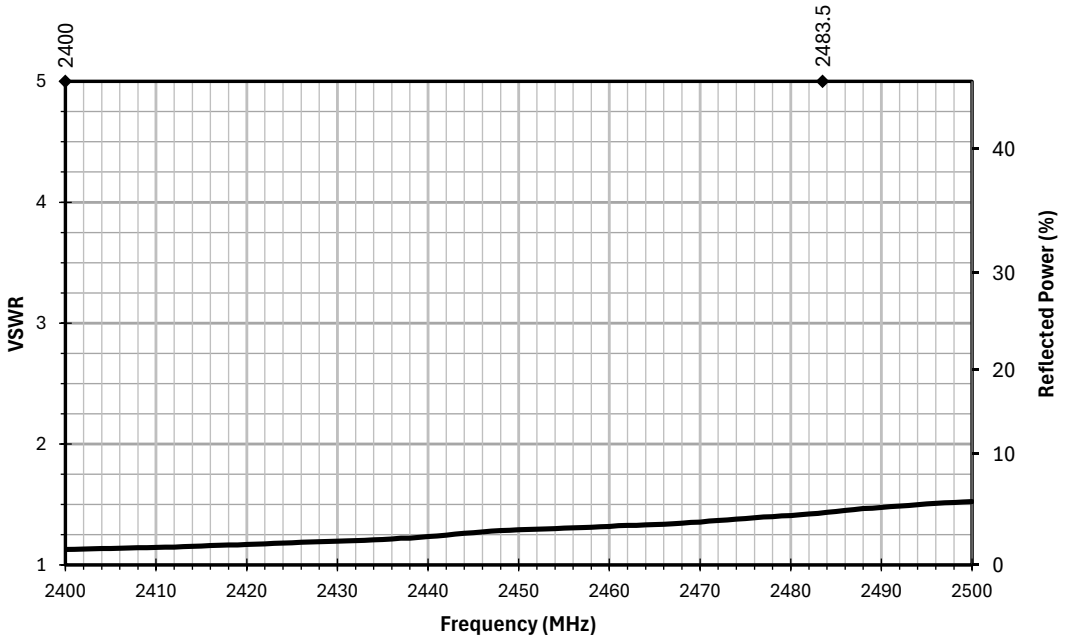



Figure 11. AC15101-NM Antenna VSWR, Free Space

## Return Loss

Return loss (Figure 12) 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.

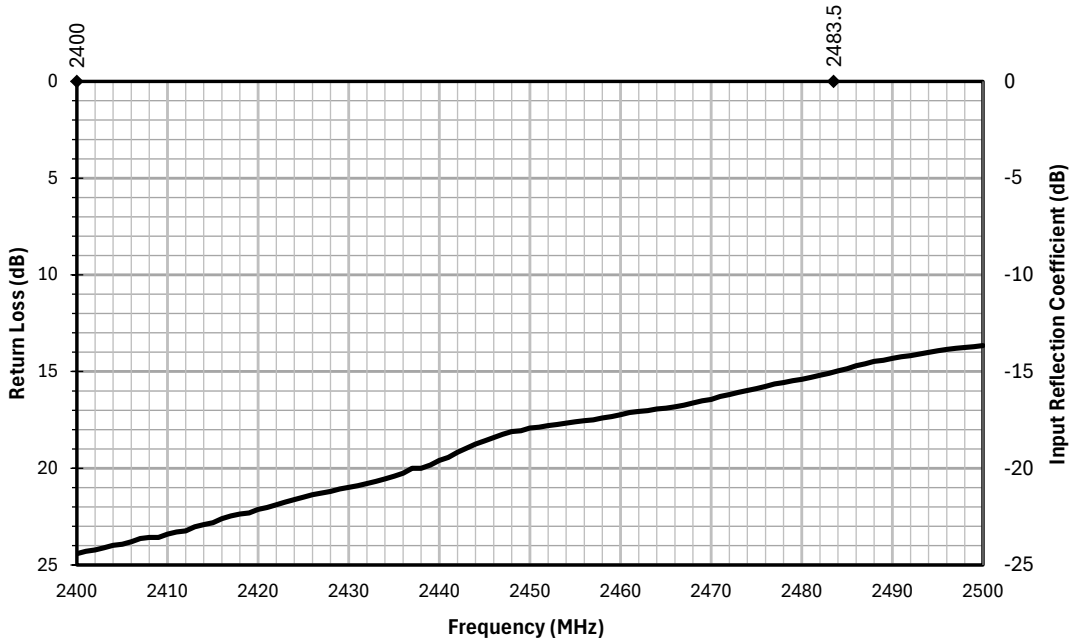



Figure 12. AC15101-NM Antenna Return Loss, Free Space

## Peak Gain

Peak gain (Figure 13) 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.

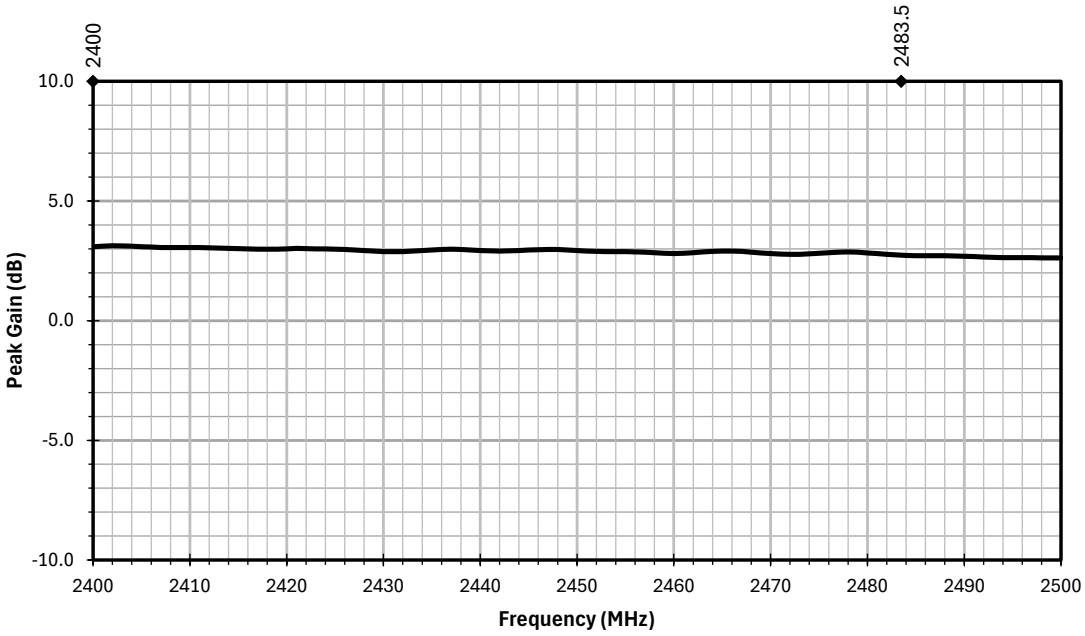



Figure 13. AC15101-NM Antenna Peak Gain, Free Space

## Average Gain

Average gain (Figure 14) is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

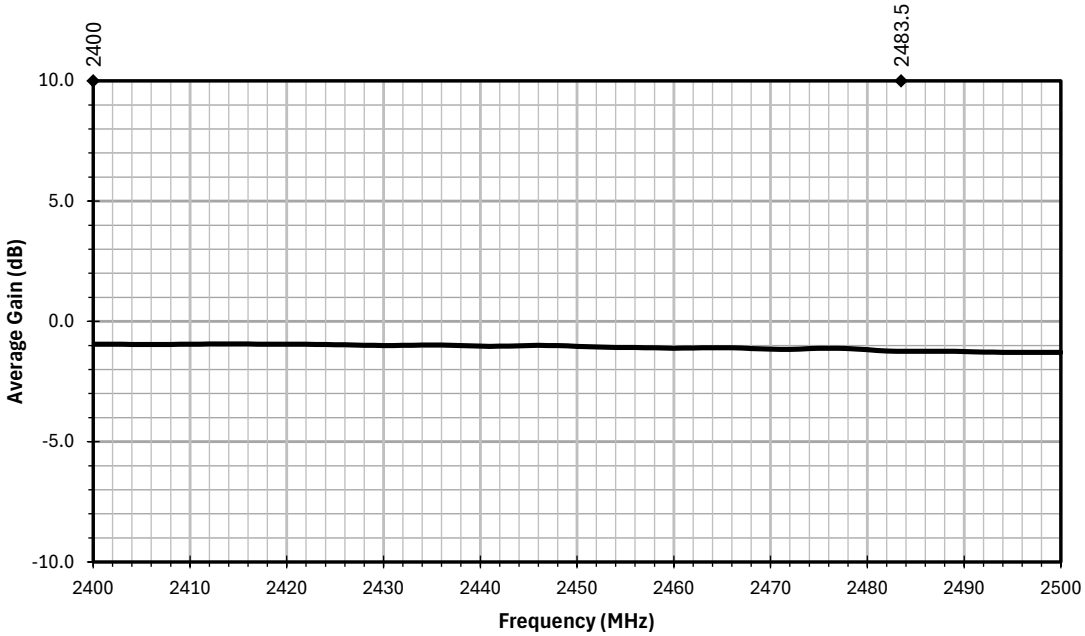



Figure 14. AC15101-NM Antenna Average Gain, Free Space

## Efficiency

Efficiency (Figure 15) is 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.

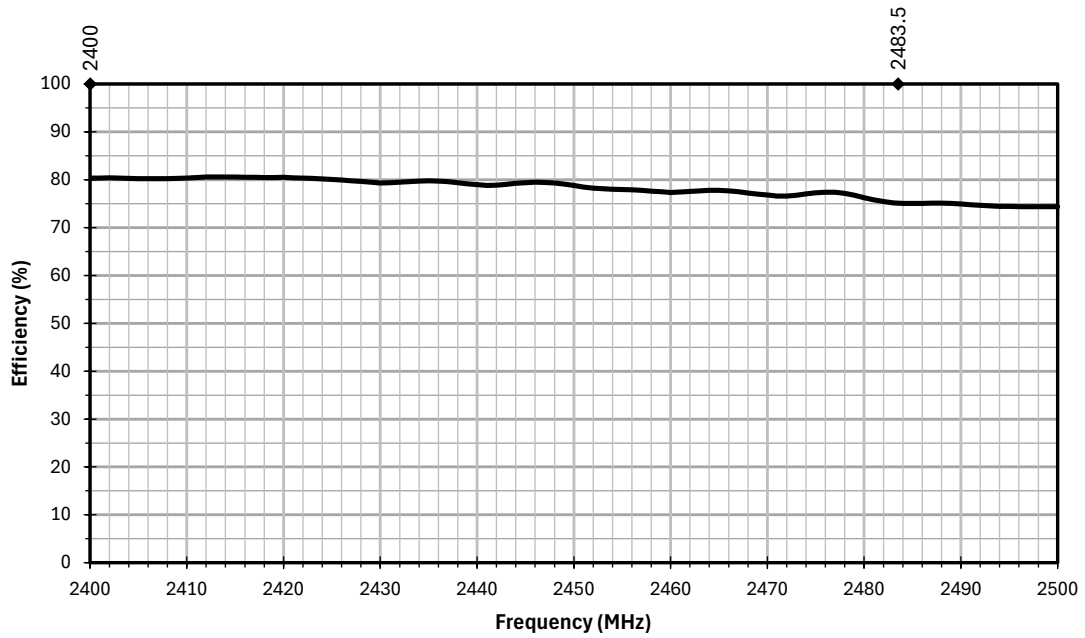


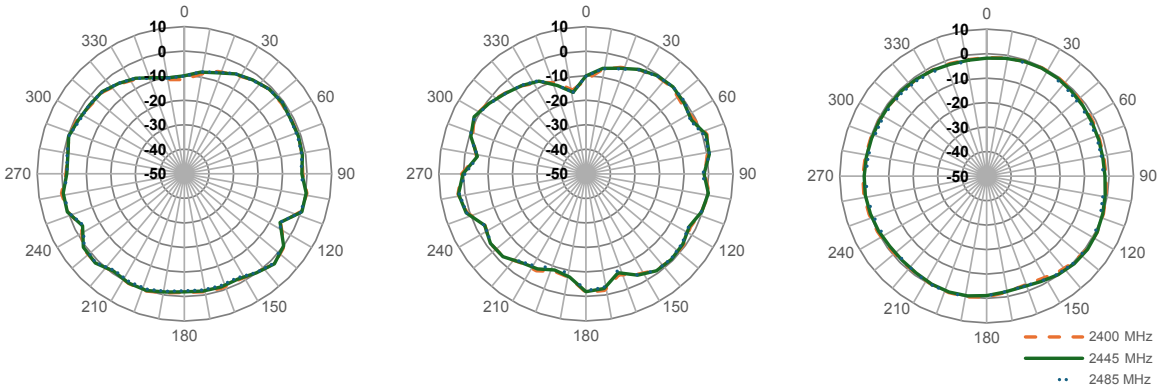

Figure 15. AC15101-NM Antenna Efficiency, Free Space

## Radiation Patterns - Free Space

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 16) 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

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

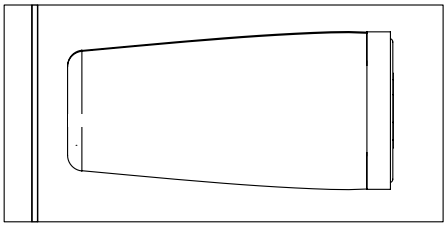



XZ-Plane Gain YZ-Plane Gain XY-Plane Gain

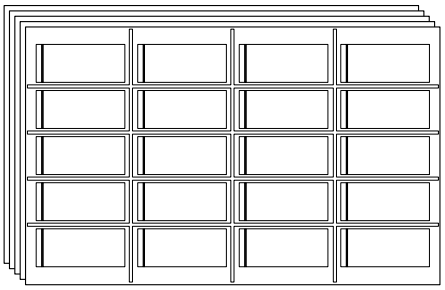
**Figure 16. Radiation Patterns for AC15101-NM Antenna in Free Space**

## Packaging Information

The AC15101 antennas are individually packaged in a resealable polyethylene bag. Bagged antennas are placed in “honeycomb” divided pockets in a carton at 100 antennas per carton. 5 layers of 20 antennas per layer. Layers are separated by protective sheets. Carton dimensions are 590 mm x 290 mm x 270 mm (23.2 in x 11.4 in x 10.6 in).



Antenna in resealable bag



Antennas arranged in layers

**Figure 17. Packing Materials and Specifications**

## Regional Environmental Regulation Compliance

| Region | Regulation | Reference |
|---|---|---|
| **United States** | US EPA Toxic Substances Control Act amended December 2020 Declaration | TSCA Section 6(h) |
| **United States** | California Proposition 65 Safe Drinking Water & Toxic Enforcement Act of 1986 Declaration | HSC division 20 chapter 6.6 |
| **European Union** | RoHS 3 | EU 2015/863 |
| **European Union** | EU REACH | EU 1907/2006 |
| **Worldwide** | Responsible Minerals Initiatives | Dodd Frank act 1502; EU 2017/821 |
| **European Union** | Persistent Organic Pollutants | (EU) 2019/1021 |
| **European Union** | Packaging Directive | 94/62/EC |
| **European Union** | PFOA Free | 2006/122/ECOF |

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EMAIL: sales@antennacompany.com



Series: Compact Dome.

Patent Pending.



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