ANT-GNRM-L1A

L1 Magnetic Mount Active GNSS Antenna

The GNRM-L1A is a magnetic-mount global navigation satellite system (GNSS) antenna with integrated low noise amplifier (LNA), supporting GPS, Galileo, GLONASS, Beidou, NavIC and QZSS systems in the L1/E1/B1 bands. The LNA provides high gain with a low noise figure. The antenna terminates in an SMA plug (male pin) connector on 1 meter, 3 meter or 5 meter lengths of RG-174/U coaxial cable.

FEATURES

- Performance at 1575.42 MHz
  - VSWR: ≤ 1.5
  - Peak Gain: 33.5 dBi
  - Axial Ratio: 3.5 dB
- Performance at 1601/1602 MHz
  - VSWR: ≤ 1.2
  - Peak Gain: 33.4 dBi
  - Axial Ratio: 11.4 dB
- 28 dB (Typ.) LNA
- IP67 rated
- Ground plane independent
- Right-hand circularly polarized (RHCP)
- Mounts to metal surfaces using integrated magnetic base

APPLICATIONS

- Global navigation
  - GPS L1C, L1C/A
  - Galileo E1
  - GLONASS L1
  - Beidou B1C, B1I
  - QZSS L1
- Timing solutions

ORDERING INFORMATION

Part Number	Description
ANT-GNRM-L1A-1	GNSS L1 band magnetic-mount antenna with SMA plug (male pin) connector on 1 meter of RG-174/U coaxial cable
ANT-GNRM-L1A-3	GNSS L1 band magnetic-mount antenna with SMA plug (male pin) connector on 3 meters of RG-174/U coaxial cable
ANT-GNRM-L1A-5	GNSS L1 band magnetic-mount antenna with SMA plug (male pin) connector on 5 meters of RG-174/U coaxial cable

Available from Linx Technologies and select distributors and representatives.

TABLE 1. ELECTRICAL SPECIFICATIONS, ANTENNA PLUS LNA

Frequency	GPS Bands	VSWR (max.)	Return Loss (dB)	Peak Gain (dBi)	Axial Ratio (dB)
1561 MHz	Beidou B1I	1.3	-19.0	32.8	6.7
1575 MHz	GPS L1C, GPS L1C/A, Galileo E1, Beidou B1C, QZSS L1	1.5	-14.5	33.5	3.5
1601/1602 MHz	GLONASS L1	1.2	-19.9	33.4	11.4

Output Impedance	50 Ω
Polarization	RHCP
Radiation	Directional radiation pattern orthogonal to antenna surface
Electrical Type	Radiating Patch plus LNA
Input Voltage	Typ. 3.3 V
Current Consumption @3.3V	Typ. 8.20 mA
Noise Figure (dB) @3.3V	1.29 @ 1561 MHz, 1.26 @ 1575.42 MHz, 1.4 @1602 MHz
ESD Sensitivity	Low ESD sensitivity. As a best practice, Linx may use ESD packaging.

Electrical specifications and plots measured with a 100 mm x 100 mm (3.94 in x 3.94 in) metal plate.

TABLE 2. MECHANICAL SPECIFICATIONS, ANTENNA PLUS LNA

Part Number	Connection	Coaxial Cable, minimum inside bend radius	Weight
ANT-GNRM-L1A-1	SMA plug (male pin)	RG-174/U: 10.2 mm (0.40 in),	1 meter = 44.6 g (1.57 oz)
ANT-GNRM-L1A-3	SMA plug (male pin)	RG-174/U: 10.2 mm (0.40 in),	3 meters = 71.4 g (2.52 oz)
ANT-GNRM-L1A-5	SMA plug (male pin)	RG-174/U: 10.2 mm (0.40 in),	5 meters = 98.2 g (3.46 oz)
Ingress Protection Rating (IP)	IP67 rated		
Operating Temp. Range	-40 °C to +85 °C		
Storage Temp. Range	-40 °C to +85 °C		
Dimensions	45.0 mm x 35.0 mm x 15.0 mm (1.77 in x 1.38 in x 0.59 in)		

GROUND PLANE INDEPENDENT OPERATION

Because of the significant signal gain provided by the antenna's LNA, the ground plane typically required for passive GNSS antenna gain performance is not required for active GNSS antennas.

MOUNTING

The ANT-GNRM-L1A series antenna has an integrated magnetic base which mounts securely to ferrous metallic surfaces. The antenna should be mounted in a location that is not obstructed by other metallic surfaces which could interfere with signal transmission and reception. The magnetic base allows for the antenna to be repositioned as needed.

PACKAGING INFORMATION

The ANT-GNRM-L1A series antenna is packaged in cartons of 100 pcs. Distribution channels may offer alternative packaging options.

PRODUCT DIMENSIONS

Figure 1 provides dimensions of the ANT-GNRM-L1A series antenna.

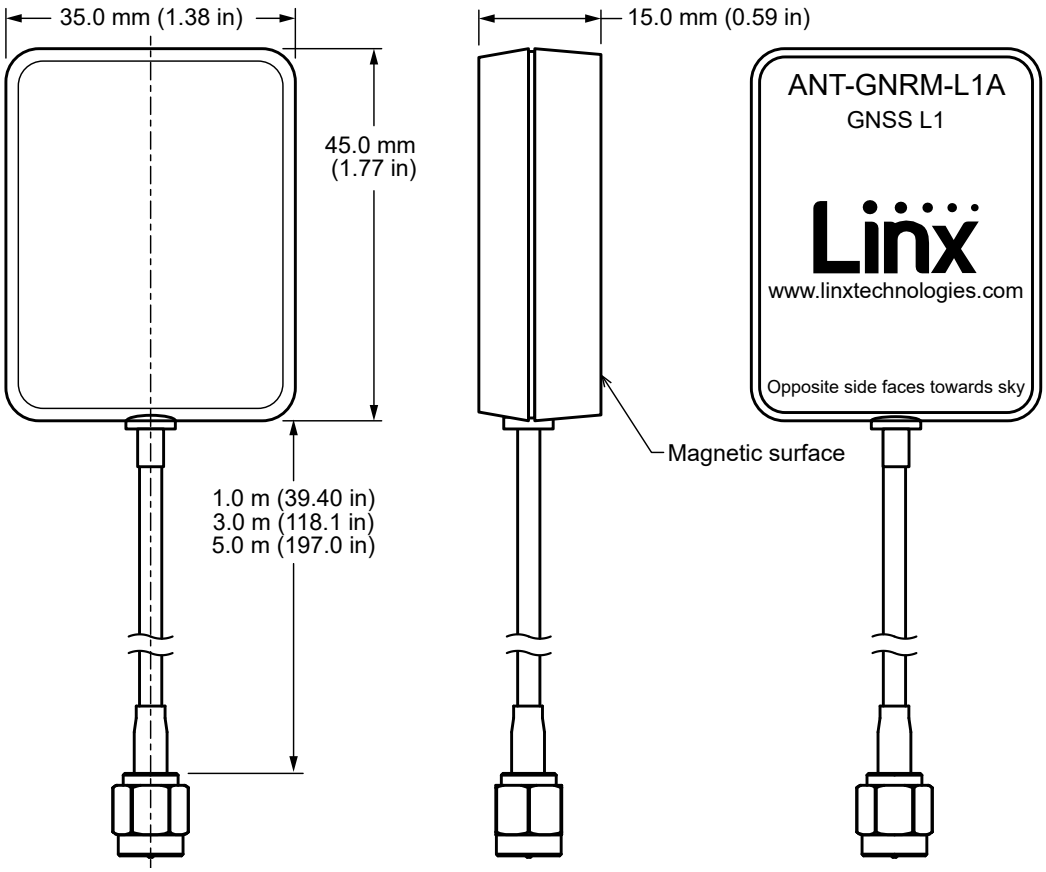


Figure 1. ANT-GNRM-L1A Series Antenna Dimensions

ANTENNA ORIENTATION

The ANT-GNRM-L1A antenna is characterized on a metal plate (100 mm x 100 mm) as shown in Figure 2 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 center of the metal plate.

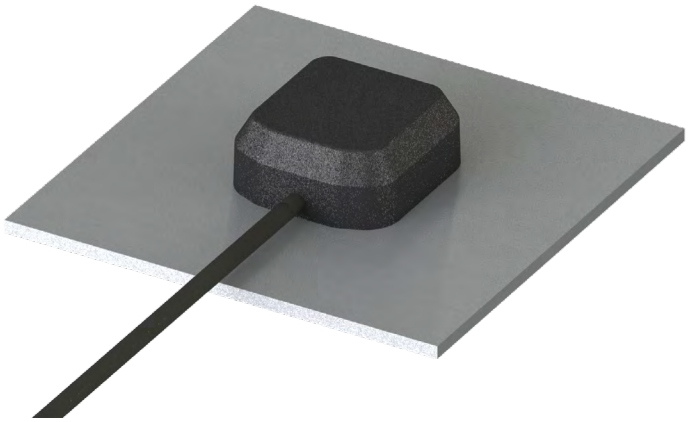


Figure 2. ANT-GNRM-L1A Test Orientation

VSWR

Figure 3 provides the voltage standing wave ratio (VSWR) across the L1 band. 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.

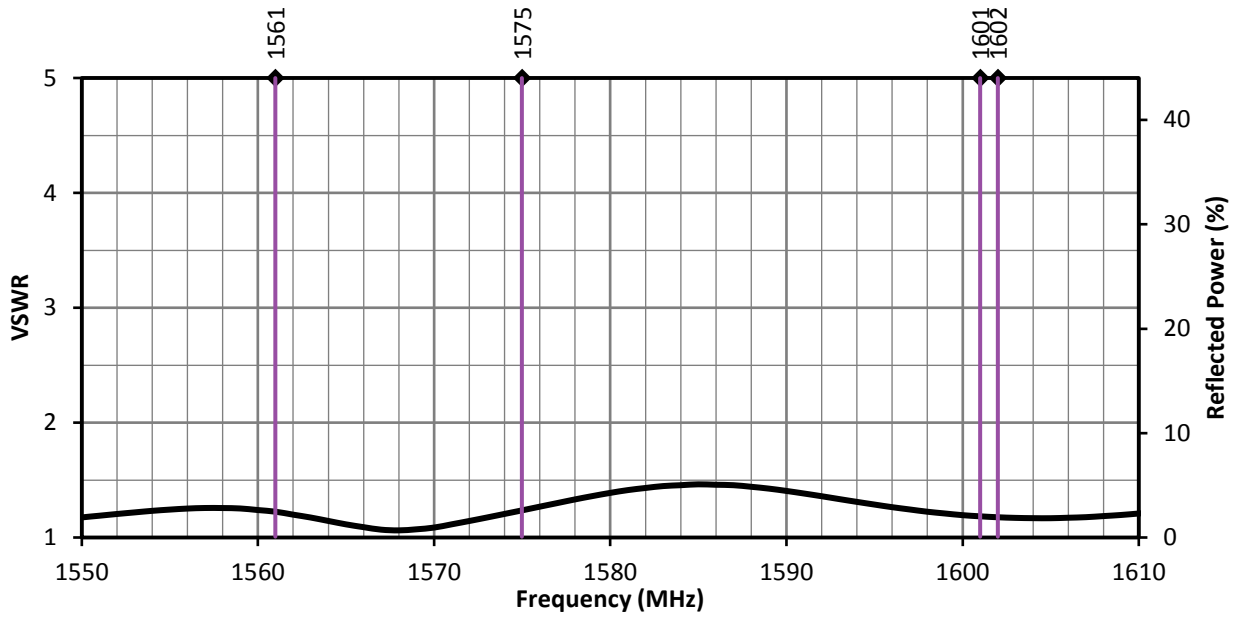


Figure 3. ANT-GNRM-L1A Series Antenna VSWR, L1 Band

RETURN LOSS

Return loss, shown in Figure 4, (L1 band) 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.

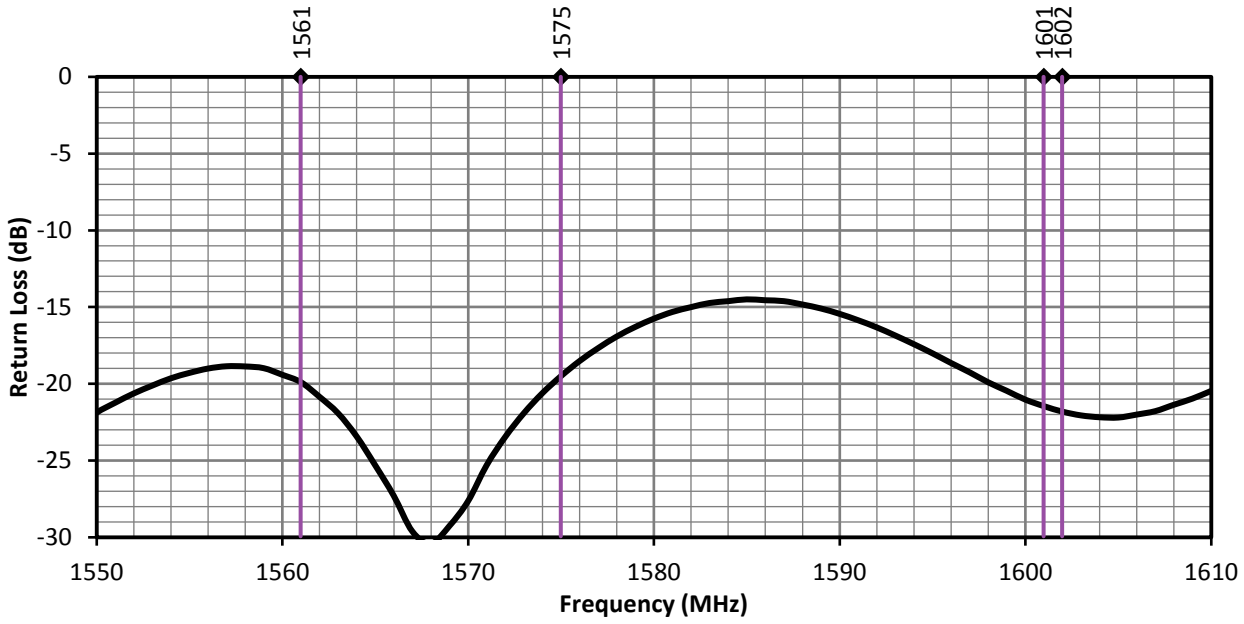


Figure 4. ANT-GNRM-L1A Series Antenna Return Loss, L1 Band

PEAK GAIN

The peak gain across the antenna bandwidth is shown in Figure 5 (L1 band). 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.

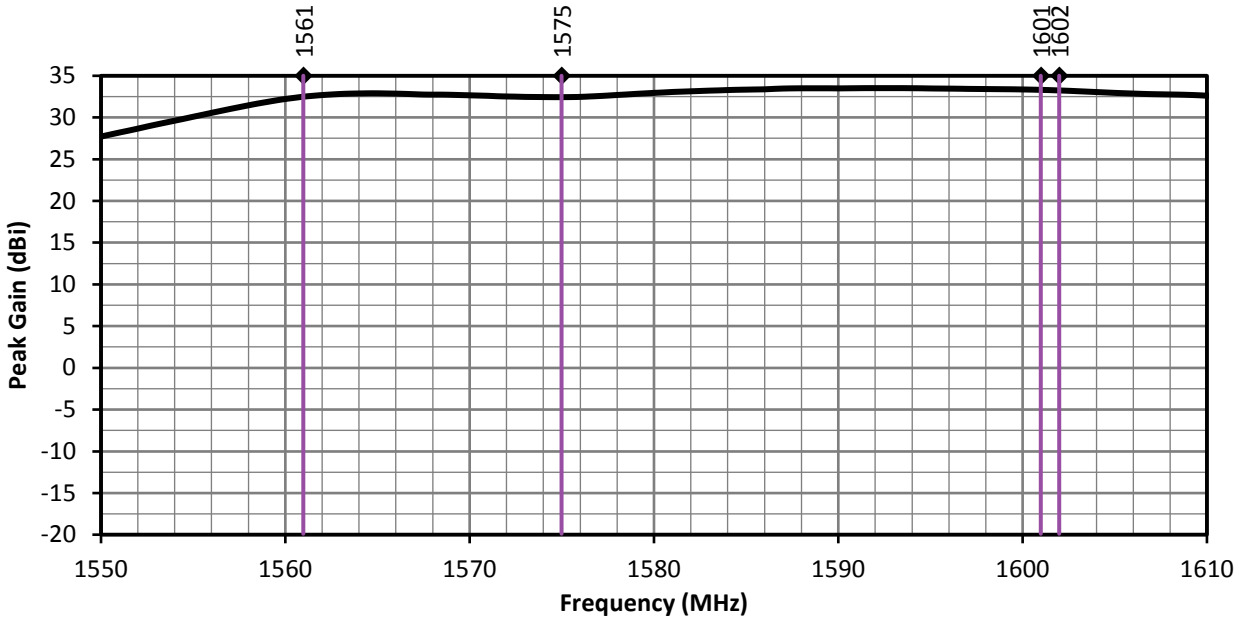


Figure 5. ANT-GNRM-L1A Series Antenna Peak Gain, L1 Band

AXIAL RATIO

Axial ratio provides a measure of the quality of circular polarization of an antenna, the lower the value (in dB), the better the circular polarization. A circularly polarized antenna field comprises two orthogonal E-field components. These fields are ideally of equal amplitude, resulting in an axial ratio equal to unity (0 dB). In practice, no antenna is perfectly circular in polarization, the polarization is elliptical as one field has larger magnitude. As the axial ratio increases the antenna gain degrades away from the main beam orthogonal to the antenna surface. The axial ratio for the ANT-GNRM-L1A antenna is shown in Figure 6 (L1 band).

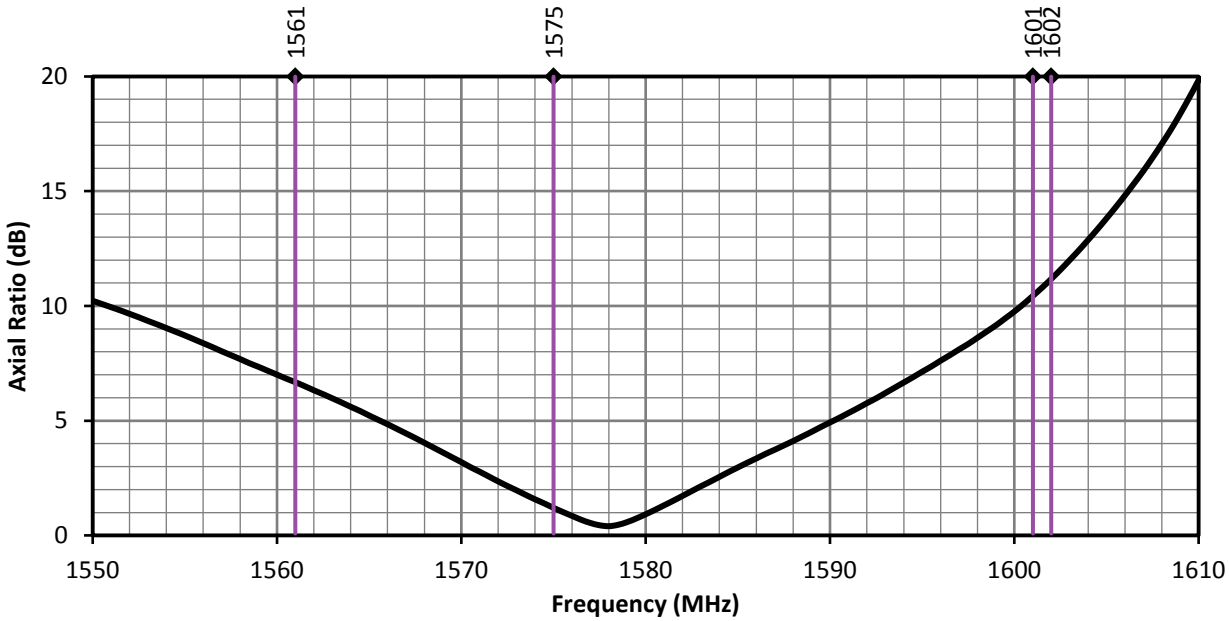
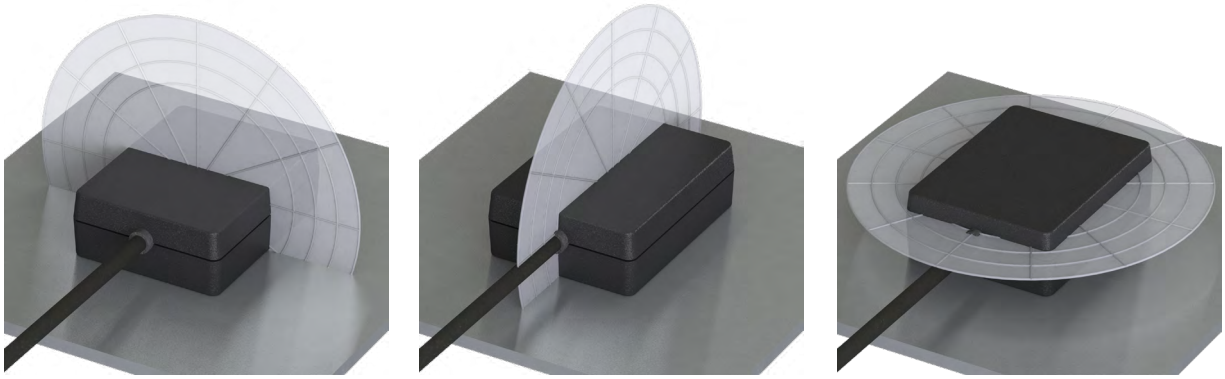


Figure 6. ANT-GNRM-L1A Series Antenna Axial Ratio, L1 Band

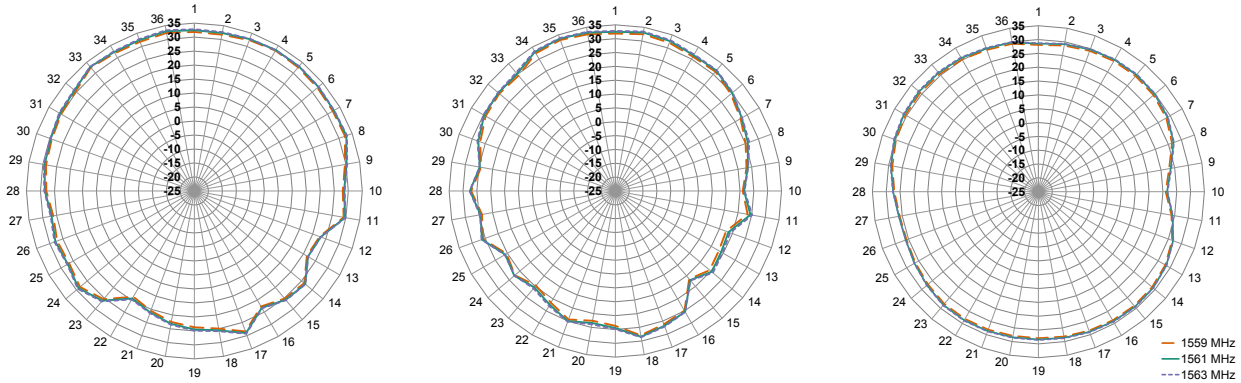
RADIATION PATTERNS

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 7 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.



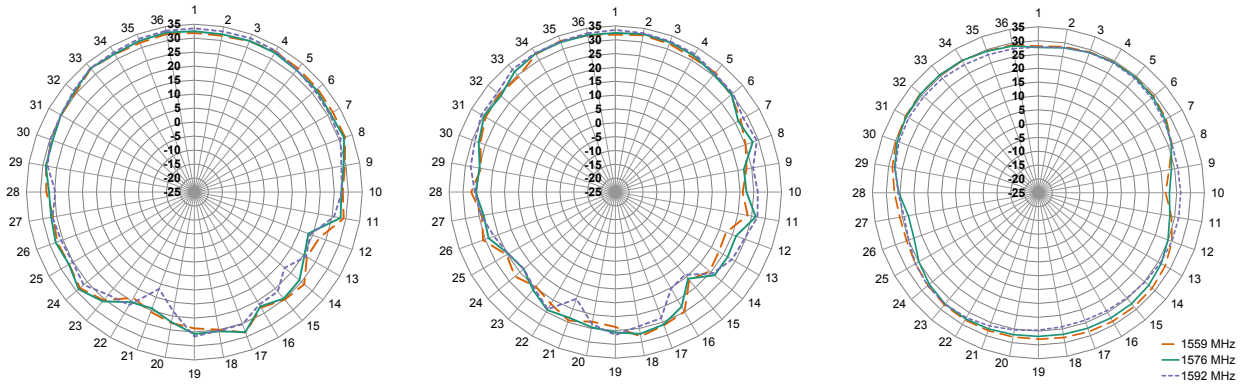
XZ-Plane Gain | YZ-Plane Gain | XY-Plane Gain

1559 MHz to 1563 MHz (1561 MHz)



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

1559 MHz to 1592 MHz (1575 MHz)



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