ANT-GNFPC-SAHL1 SERIES

Flexible Embedded L1 GNSS Antennas

The ANT-GNFPC-SAHL1 series of antennas from Linx Technologies (Linx) are 13 mm x 13 mm adhesive flexible printed circuit (FPC) antennas for global navigation satellite system (GNSS), supporting GPS, Galileo, Beidou, and QZSS systems in the upper L1/E1/B1 bands. The ANT-GNFPC-SAHL1 antennas provide a ground plane independent dipole internal/embedded antenna solution. The flexibility and adhesive backing make the ANT-GNFPC-SAHL1 series easier to mount in RF transparent (e.g., plastic) enclosures, enabling environmental sealing and protection from antenna damage.

Connection is made to the radio via a coaxial cable terminated in an MHF1/U.FL-type plug (female socket), or MHF4- type plug (female socket) connector.

FEATURES

- Performance at 1559-1563 MHz
  - VSWR: ≤ 2.7
  - Peak Gain: 5.0 dBi
  - Efficiency: 60%
- Performance at 1559-1592 MHz
  - VSWR: ≤ 2.7
  - Peak Gain: 5.2 dBi
  - Efficiency: 46%
- Performance at 1598-1606 MHz
  - VSWR: ≤ 1.4
  - Peak Gain: 3.1 dBi
  - Efficiency: 39%
- Ground plane independent dipole antenna
- Linear polarization
- Compact, low-profile
- 13.0 mm x 13.0 mm x 0.1 mm
- Adhesive backing permanently adheres to non-metal enclosures using 3M 467MP/200MP adhesive
- Flexible to fit in challenging enclosures

APPLICATIONS

- Global navigation
  - GPS L1, L1C, L1C/A
  - Galileo E1
  - NavIC L5
  - Beidou B1C, B1I
  - QZSS L1
- Timing solutions

ORDERING INFORMATION

Part Number	Cable Length	Connector
ANT-GNFPC-SAHL150UF	50 mm (1.97 in)	MHF1/U.FL-type
ANT-GNFPC-SAHL1100UF	100 mm (3.94 in)	MHF1/U.FL-type
ANT-GNFPC-SAHL1150UF	150 mm (5.91 in)	MHF1/U.FL-type
ANT-GNFPC-SAHL1200UF	200 mm (7.87 in)	MHF1/U.FL-type
ANT-GNFPC-SAHL150M4	50 mm (1.97 in)	MHF4-type
ANT-GNFPC-SAHL1100M4	100 mm (3.94 in)	MHF4-type
ANT-GNFPC-SAHL1150M4	150 mm (5.91 in)	MHF4-type
ANT-GNFPC-SAHL1200M4	200 mm (7.87 in)	MHF4-type

Available from TE Connectivity and select distributors and representatives.

TABLE 1. ELECTRICAL SPECIFICATIONS

Frequency Range	GPS Bands	VSWR (max.)	Return Loss (dBi)	Peak Gain (dBi)	Average Gain (dBi)	Efficiency (%)
1559-1563 Mhz	GPS L1C, GPS L1C/A, Galileo E1, Beidou B1C, Beidou B1I, QZSS L1	2.7	-6.6	5.0	-2.3	60%
1559-1592 Mhz		2.7	-6.6	5.2	-2.3	62%
1598-1606 Mhz	L1, (FDMA) L1	2.3	-8.1	3.1	-4.4	39%

Polarization	Linear
Radiation	Omnidirectional
Impedance	50
Wavelength	1/2-wave
Max Power	2 W
Electrical Type	Dipole

Electrical specifications and plots measured with the antenna on a 2 mm (0.08 in) thick plastic sheet.

TABLE 2. MECHANICAL SPECIFICATIONS

Part Number	Connection	Coaxial Cable, minimum inside bend radius	Weight
ANT-GNFPC-SAHL150UF	MHF1/U.FL-type plug	1.13 mm: 5.0 mm (0.20 in)	0.4 g (0.01 oz)
ANT-GNFPC-SAHL1100UF	MHF1/U.FL-type plug	1. 13 mm: 5.0 mm (0.20 in)	0.6 g (0.02 oz)
ANT-GNFPC-SAHL1150UF	MHF1/U.FL-type plug	1. 13 mm: 5.0 mm (0.20 in)	0.7 g (0.03 oz)
ANT-GNFPC-SAHL1200UF	MHF1/U.FL-type plug	1.13 mm: 5.0 mm (0.20 in)	0.9 g (0.03 oz)
ANT-GNFPC-SAHL150M4	MHF4-type plug	1.13 mm: 5.0 mm (0.20 in)	0.4 g (0.01 oz)
ANT-GNFPC-SAHL1100M4	MHF4-type plug	1. 13 mm: 5.0 mm (0.20 in)	0.5 g (0.02 oz)
ANT-GNFPC-SAHL1150M4	MHF4-type plug	1. 13 mm: 5.0 mm (0.20 in)	0.7 g (0.02 oz)
ANT-GNFPC-SAHL1200M4	MHF4-type plug	1.13 mm: 5.0 mm (0.20 in)	0.8 g (0.03 oz)

Operating Temp. Range (After full cure)	-40°C to +85°C (-40°F to 185°F)
Storage Temp. Range	21ºC @ 50% relative humidity to achieve full adhesion properties
Dimensions	13.0 mm x 13.0 mm x 0.3 mm (0.512 in x 0.512 in x 0.012 in)

PACKAGING INFORMATION

The ANT-GNFPC-SAHL1 antenna is individually packaged in a plastic bag and placed in bags of 100 pcs. Distribution channels may offer alternative packaging options.

ANTENNA MOUNTING

The ANT-GNFPC-SAHL1 antenna is a flexible, adhesive backed antenna that allows it to be permanently installed onto non-metallic surfaces. The adhesive backing is 3M 467MP/200MP, which provides outstanding adhesion to high surface energy plastics. The adhesive delivers excellent shear strength to resist slippage and edge lifting, but can be repositioned before the adhesive cures, allowing for accurate positioning. Once cured, this adhesive is highly resistant to solvents, humidity, and moisture, as well as heat up to 204 °C (400 °F) for short periods.

The antenna should never be bent past a 2mm / .078” min bend radius nor should the angle of the bend be allowed to fall below 90 degrees (i.e., become acute) as this will impair function and may cause permanent damage.

PRODUCT DIMENSIONS

Figure 1 provides dimensions for the ANT-GNFPC-SAHL1 series antenna.

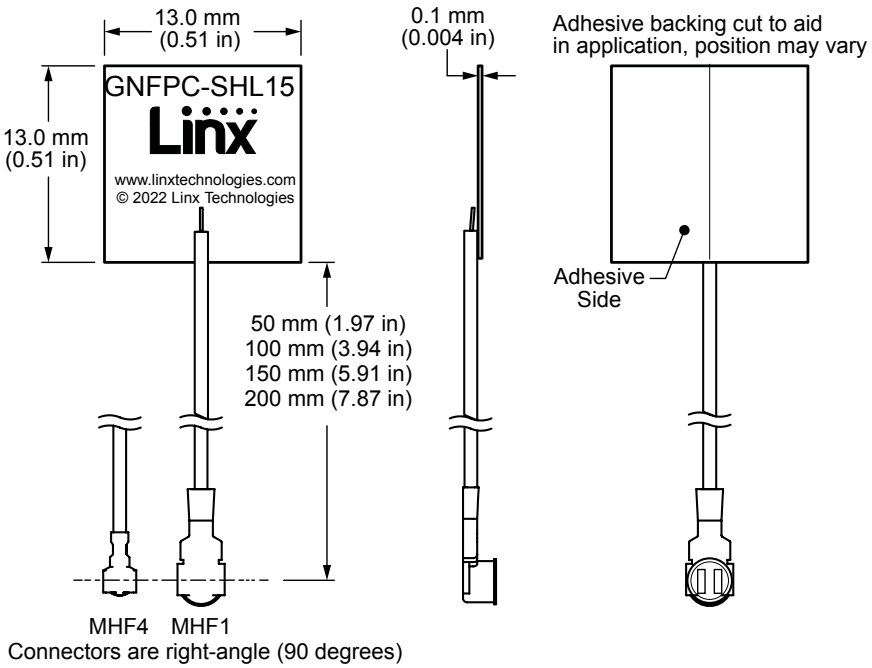


Figure 1. ANT-GNFPC-SAHL1 Product Dimensions

ADHESIVE FOR USE ON HSE (HIGH SURFACE ENERGY) SUBSTRATES

Use an appropriate primer suitable for full adhesion to Low Surface Energy or difficult plastics such as polypropylene and polyethylene.

Antenna assembly application of adhesive to surface:

1. Clean surfaces and ensure no large surface gaps are present.
2. Apply an appropriate primer to surface if dealing with a plastic or LSE material.
3. Remove backing and apply antenna using even pressure for 10 seconds.
4. Apply to surface between 21ºC and 38°C (70°F and 100°F)
5. Full adhesion properties in 24 hours.

VSWR

Figure 2 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.

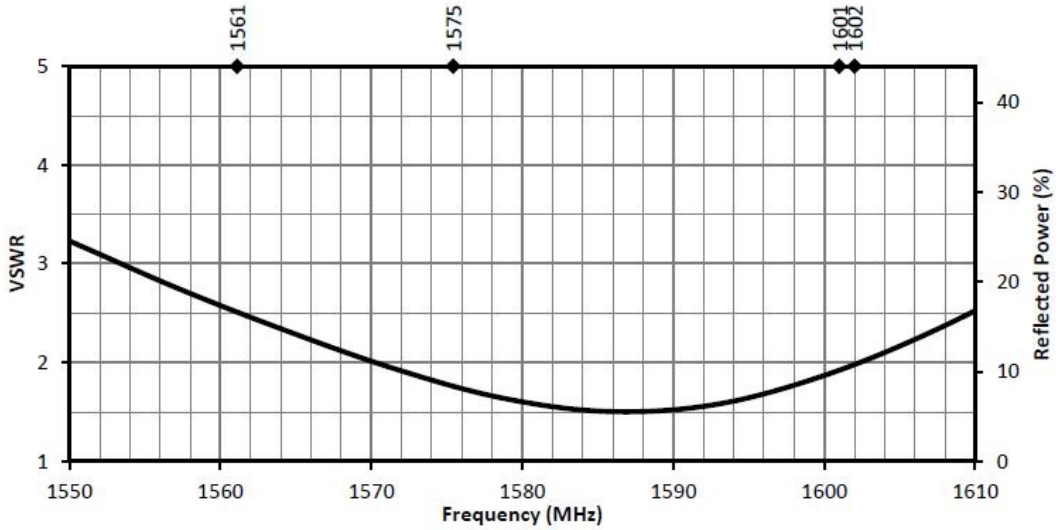


Figure 2. ANT-GNFPC-SAHL1 Antenna VSWR with Frequency Band Highlights

PEAK GAIN

The peak gain across the antenna bandwidth is shown in Figure 3. 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.

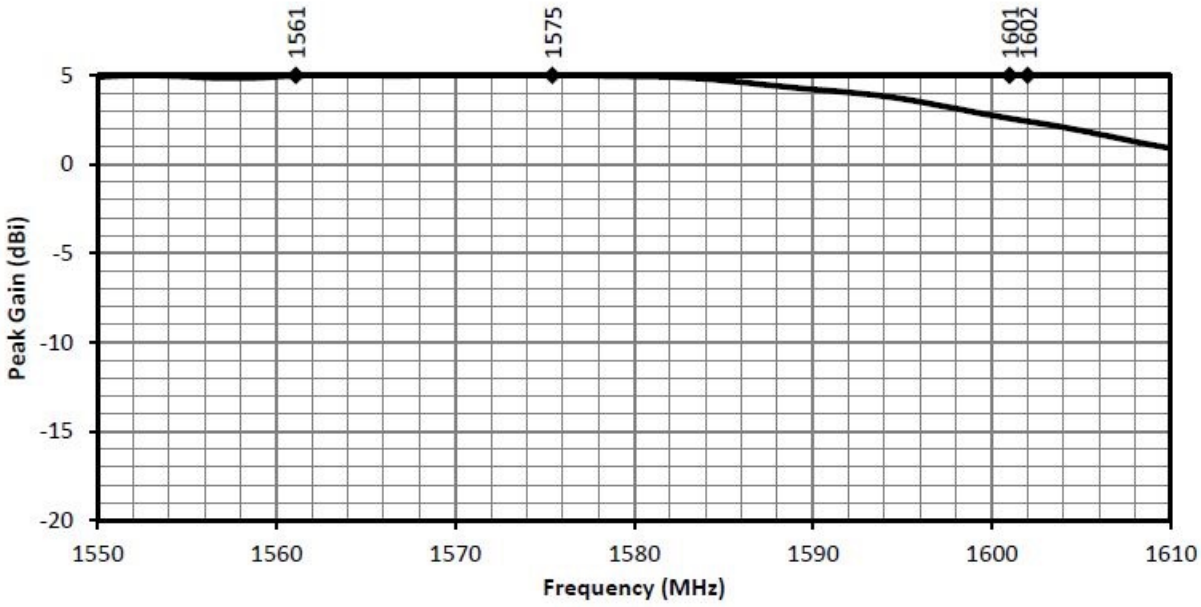


Figure 3. ANT-GNFPC-SAHL1 Antenna Peak Gain with Frequency Band Highlights

AVERAGE GAIN

Average gain (Figure 4) is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

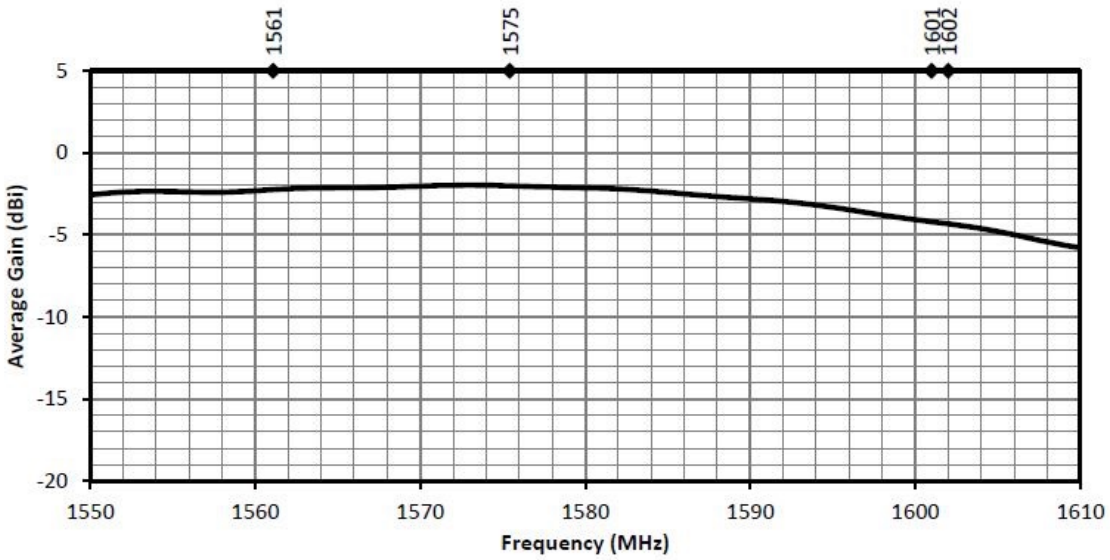


Figure 4. ANT-GNFPC-SAHL1 Antenna Average Gain with Frequency Band Highlights

RADIATION EFFICIENCY

Radiation efficiency (Figure 5), 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.

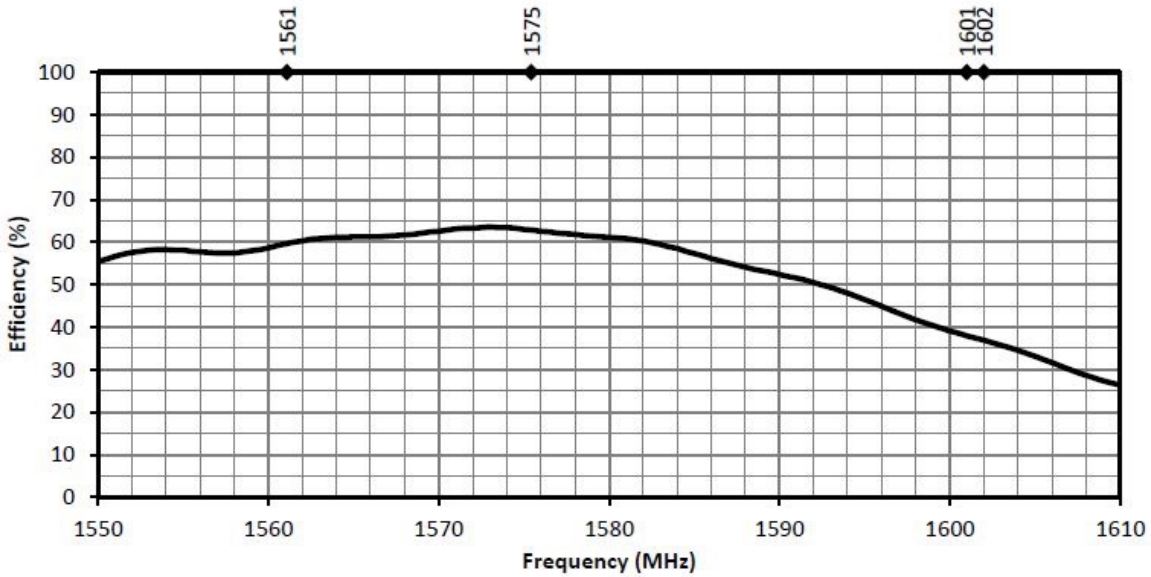
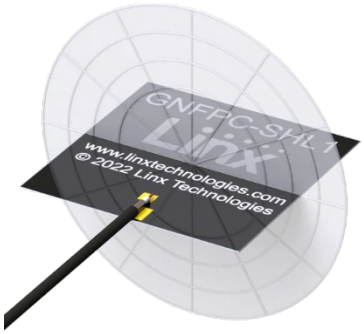


Figure 5. ANT-GNFPC-SAHL1 Antenna Radiation Efficiency with Frequency Band Highlights

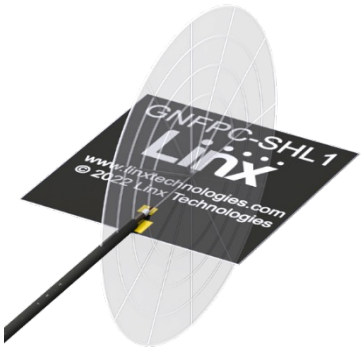
RADIATION PATTERNS

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 6) 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 - HORIZONTAL



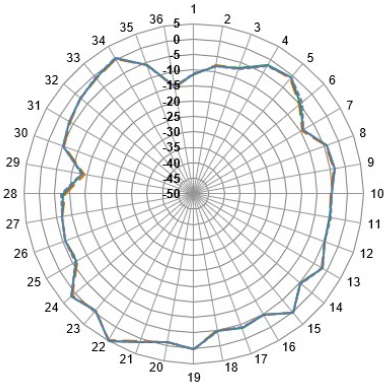
XZ-Plane Gain



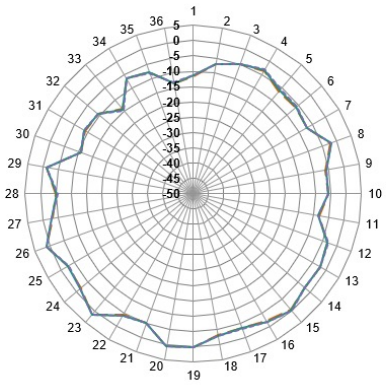
YZ-Plane Gain

XY-Plane Gain

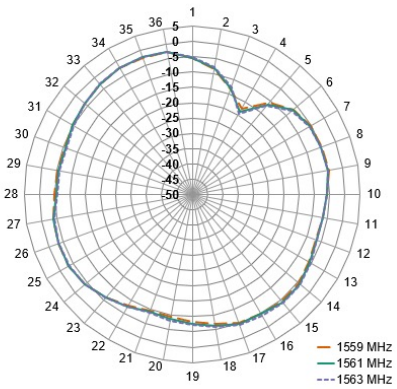
1559 MHz TO 1563 MHz (1561 MHz)



XZ-Plane Gain

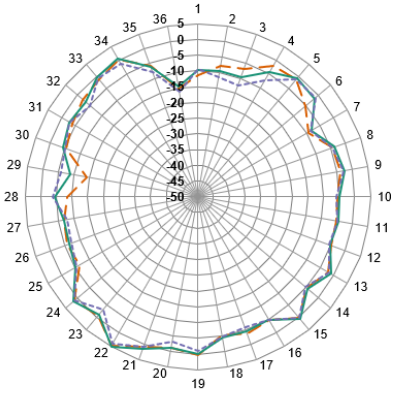


YZ-Plane Gain

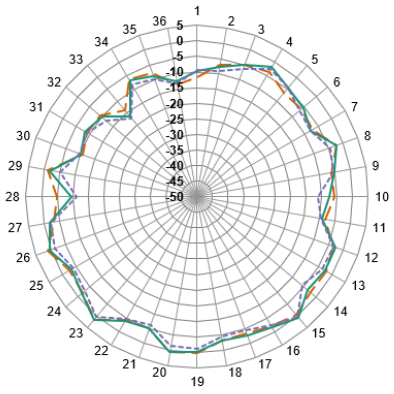


XY-Plane Gain

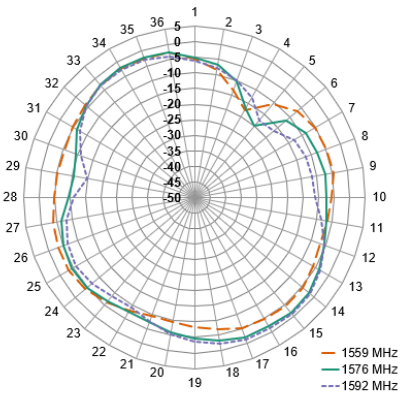
1559 MHz TO 1592 MHz (1576 MHz)



XZ-Plane Gain

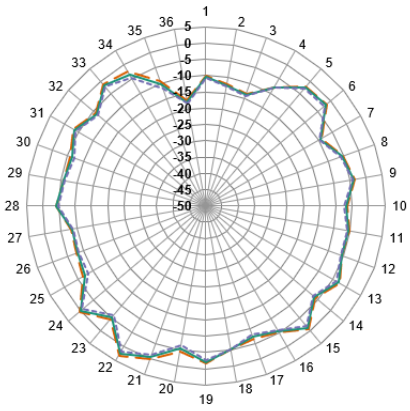


YZ-Plane Gain

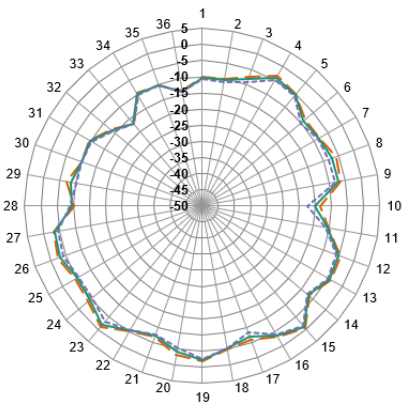


XY-Plane Gain

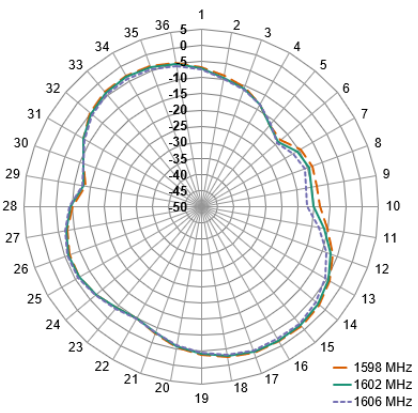
1598 MHz TO 1606 MHz (1602 MHz)



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

Figure 6. Radiation Patterns for ANT-GNFPC-SAHL1 Series Antenna

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