Datasheet

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KPX-052ANFXW

5G n79 Directional Flat Panel Antenna

The Joymax KPX-052ANFXW antenna is a flat panel style, multi-input multi-output (MIMO) 4x4 outdoor directional radiating patch antenna designed for use in 4400 MHz to 5000 MHz frequency bands supporting 5G New Radio FR1 n79 applications. The antenna also supports Public Safety networks (4940 MHz to 4990 MHz) applications.

The antenna terminated with 4 N-Type Jack (female socket) connectors, is shipped with a U-bracket mounting kit, and screw accessories for outdoor mast/pole mount installation.

Features

- Bandwidth 4000 MHz to 5000 MHz
- Performance at 4400 to 5000 MHz
  - VSWR: ≤ 2.2
  - Peak Gain: 13.2 dBi
  - Efficiency: 73%
- Bracket mount on a mast
- Directional Radiation
- N-Type Jack (female socket) connector

Applications

- 5G NR FR1 band n79
- Public Safety networks (4940 to 4990MHz)
- Small Base Station

Ordering Information

Part Number	Description
KPX-052ANFXW	MIMO 4x4 Outdoor 5G n79 Directional Flat Panel Antenna, N Jack connector

Available from Joymax Inc. and select distributors and representatives.

Table 1: Electrical Specifications

KPX-052ANFXW	5G NR Bands (MHz)
Frequency Range	4400 ~ 5000
VSWR (Max)	2.2
Peak Gain (dBi)	13.2
Average Gain (dBi)	-1.4
Efficiency (%)	73
Polarization	Linear
Radiation	Directional
Max Power	5 W
Wavelength	½-λ
Electrical Type	Radiating Patch
Impedance	50 Ω

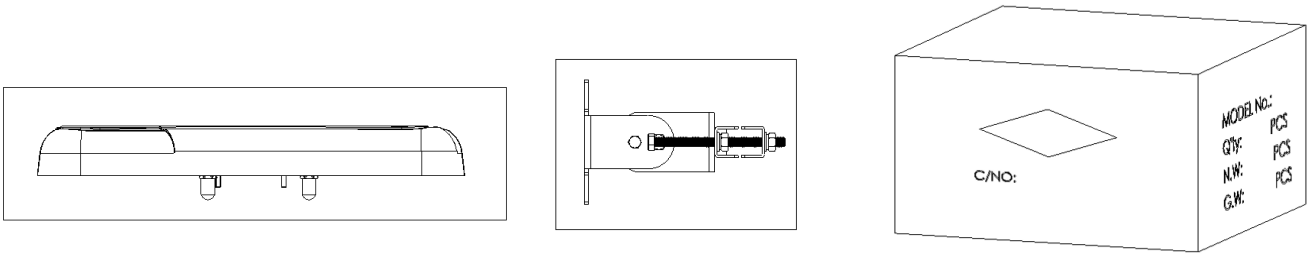
Electrical specifications and plots measured with the antenna hanging free in the space without ground plane.

Table 2: Mechanical Specifications

Parameter	Value
Connection	N-Type Jack (female socket)
Operating Temp.	-40℃ to +85℃
Weight	2876 g
Dimension	521 mm x 302 mm x 50 mm
Antenna Color	Light Gray
Ingress Protection	IP67
Storage Temp.	-40℃ to +85℃

Packaging Information

The KPX-052ANFXW antennas are individually packed in a bubble bag and packed together with bracket, mounting kit accessories into a flat box as shown in **Figure 1**. 4 pcs per carton, 700 mm x 440 mm x 367 mm (27.6 in x 17.3 in x 14.4 in), total weight 11.6 kgs (25.6 lb). Distribution channels may offer alternative packaging options.



1 pce antenna + mounting kit accessories / flat box

4 pcs antenna/1 Carton

Figure 1. Antenna Packaging

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Product Dimensions

Figure 2 provides dimensions of the KPX-052ANFXW in mm measurement unit. The antenna is shipped with a U-shape bracket and screw accessories for mast mount installation.

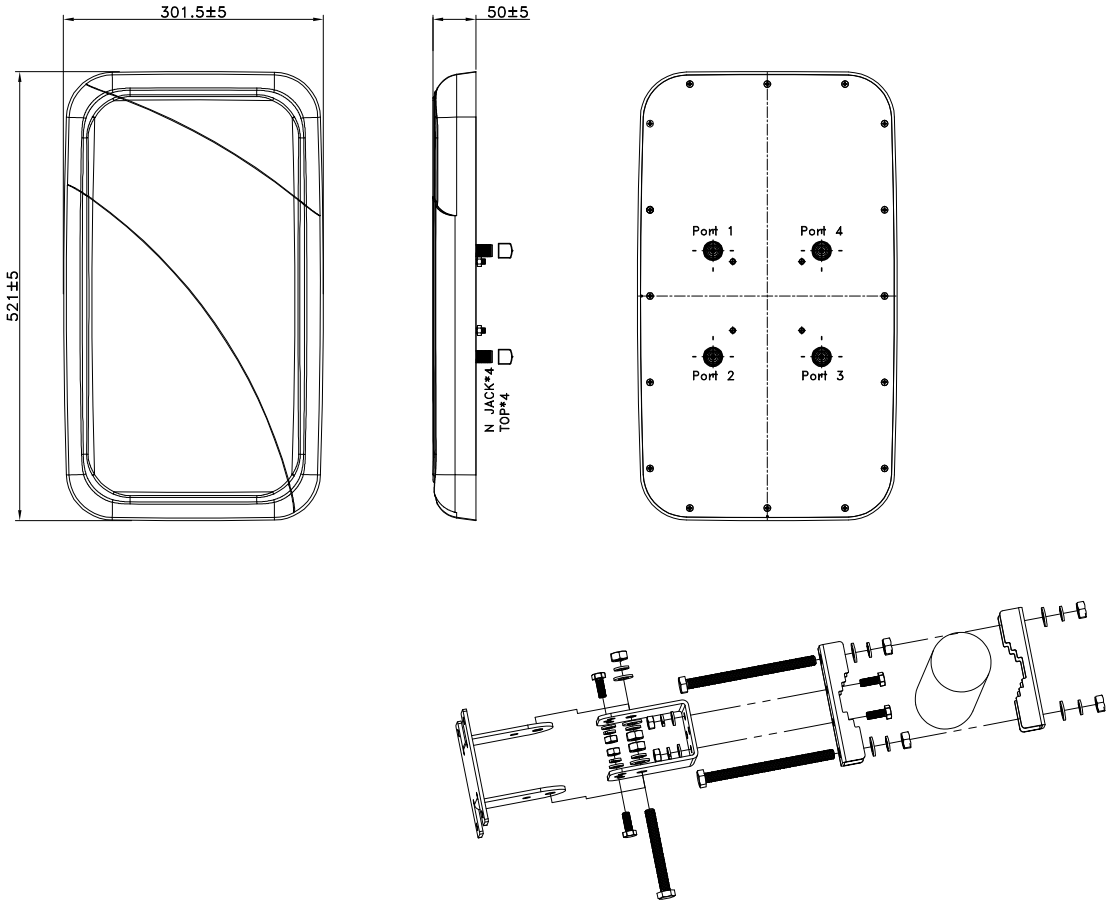

Figure 2. Antenna Dimensions

Antenna Test Setup

The KPX-052ANFXW antenna is tested with the antenna hanging free in the space as shown in **Figure 3**. The charts on the following pages represent data taken without ground plane .

Figure 3. Antenna Test Setup

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VSWR

Figure 4 provides the voltage standing wave ratio (VSWR) across the antenna bandwidth. VSWR is a function of the reflection coefficient, which 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.

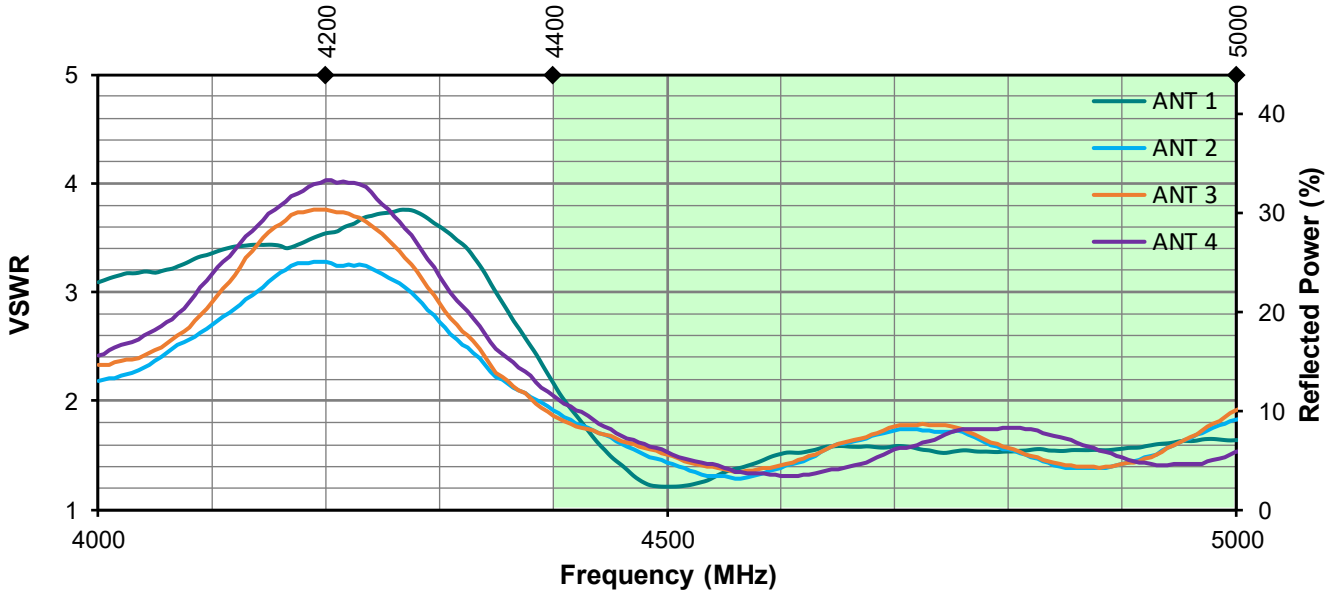


Figure 4. Antenna VSWR

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.

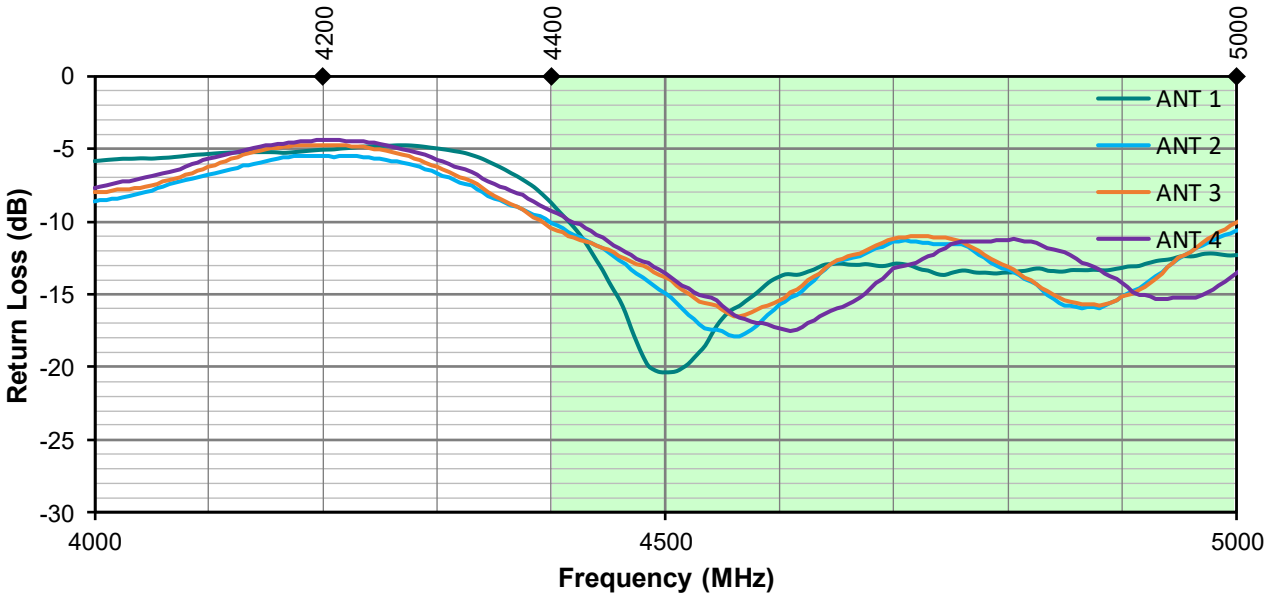


Figure 5. Antenna Return Loss

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.

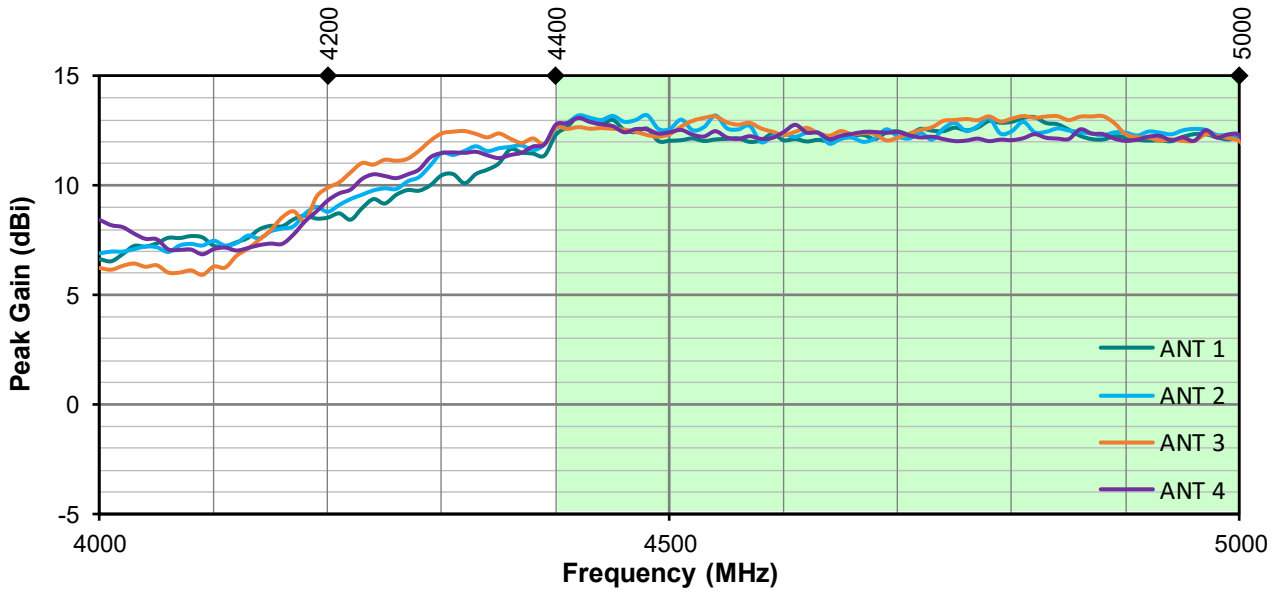


Figure 6. Antenna Peak Gain

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.

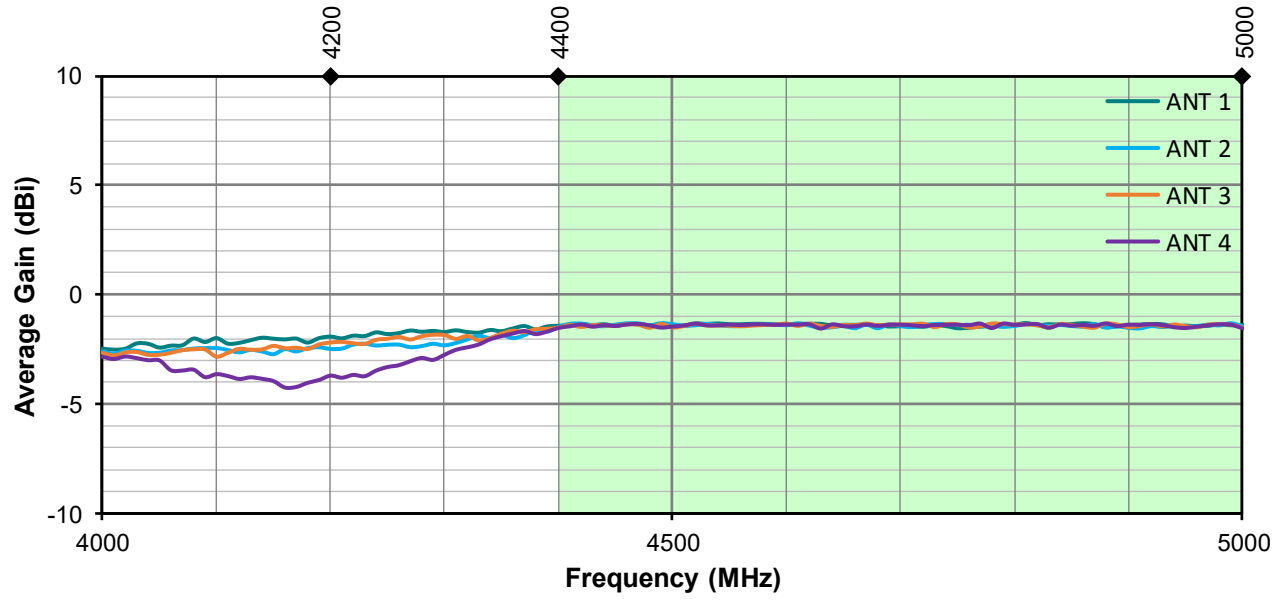


Figure 7. Antenna Average Gain

Radiation Efficiency

Radiation efficiency (**Figure 8**), shows the ratio of power radiated by the antenna relative to the power supplied to the antenna, expressed as a percentage, where a higher percentage indicates better performance at a given frequency. An ideal antenna has 100% efficiency. But in really world, usually an external antenna radiates only 50~60% of power supplied to it.

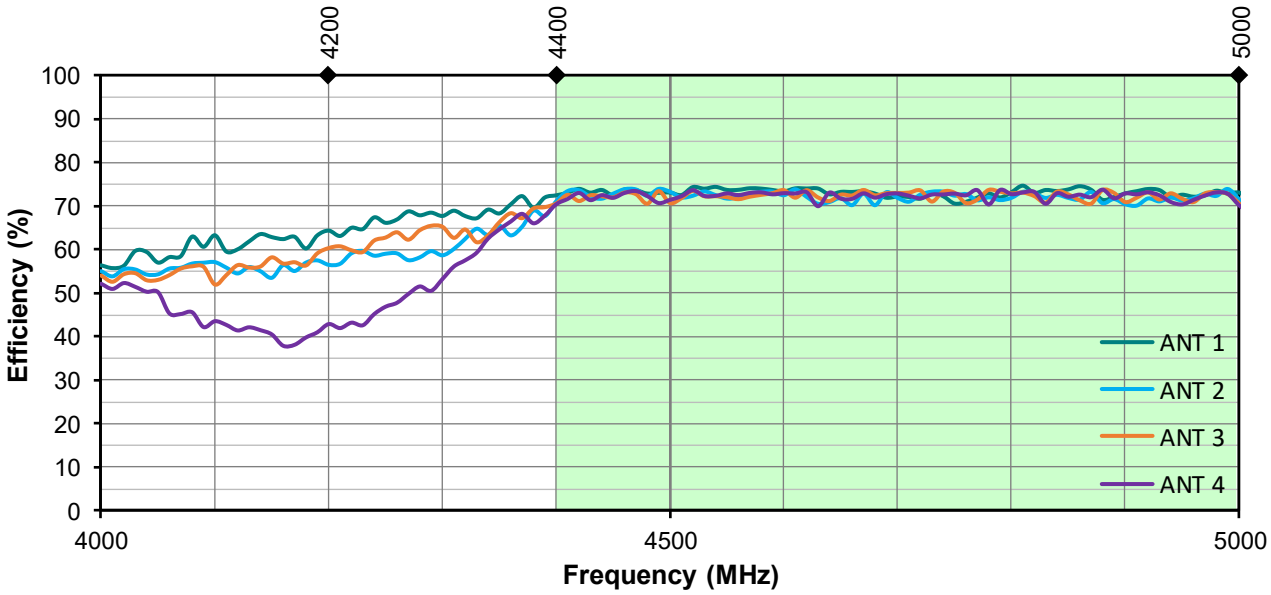


Figure 8. Antenna Efficiency

Antenna Isolation

Antenna isolation (**Figure 9**), is a measure of how easily one antenna will pick up radiation from another antenna. It provides information about power transfer between adjacent antennas. A lower antenna isolation value indicates lower interaction of adjacent antennas.

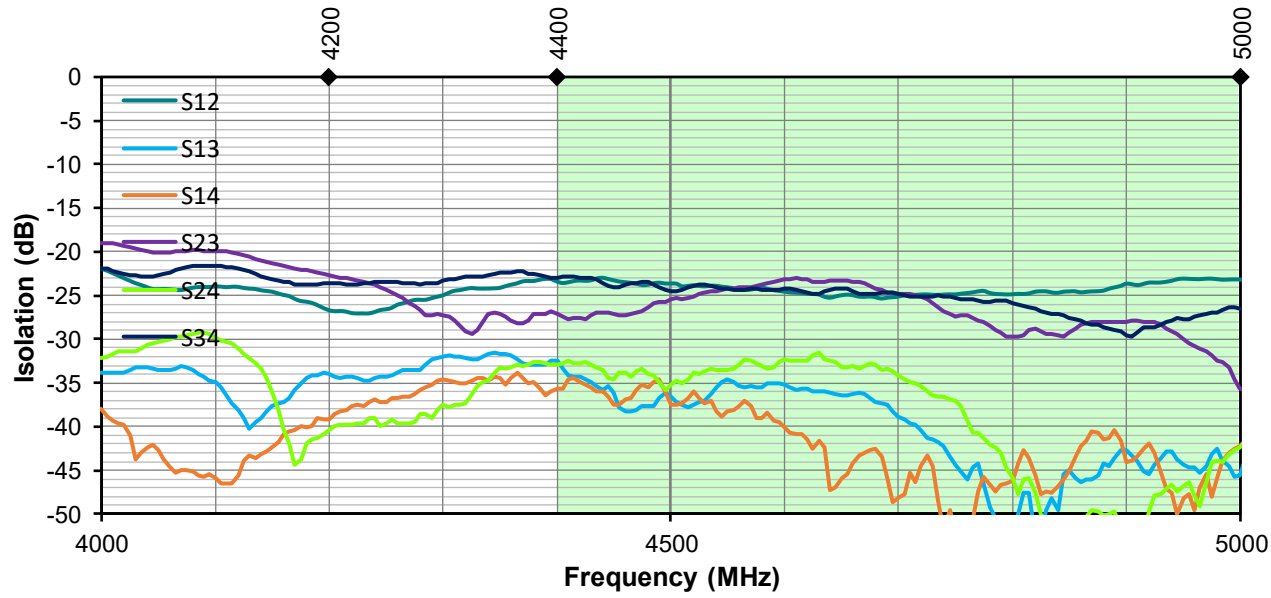
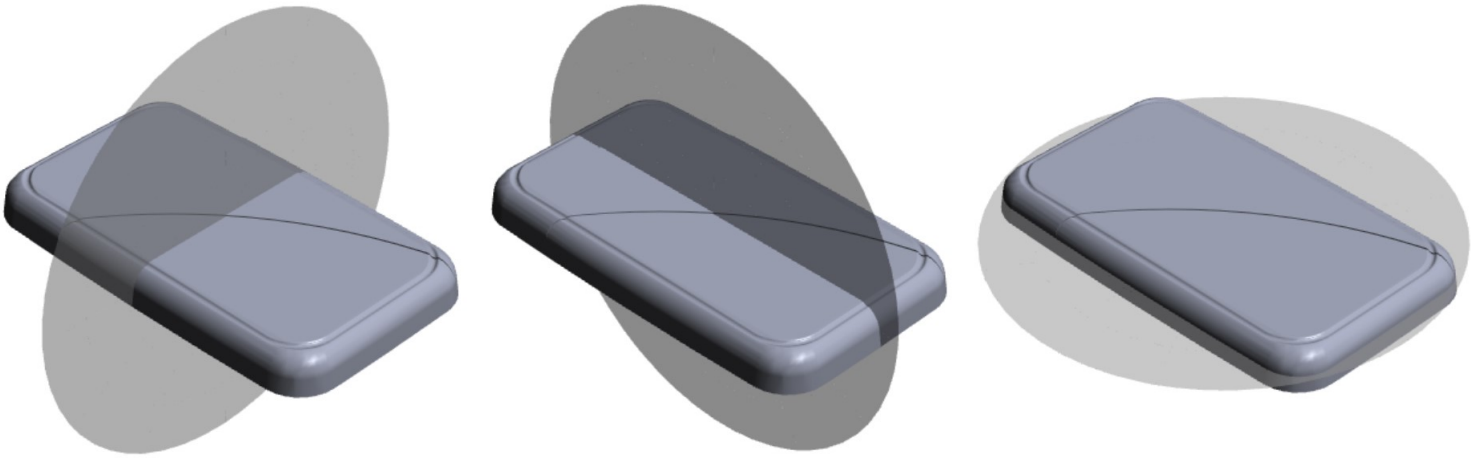


Figure 9. Antenna Isolation

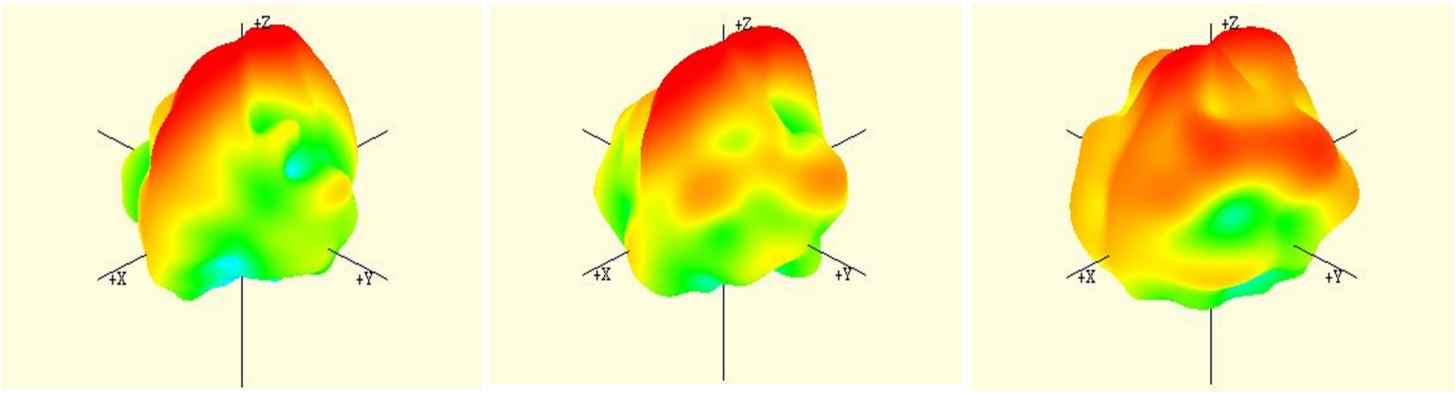
Radiation Patterns

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 10** 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.

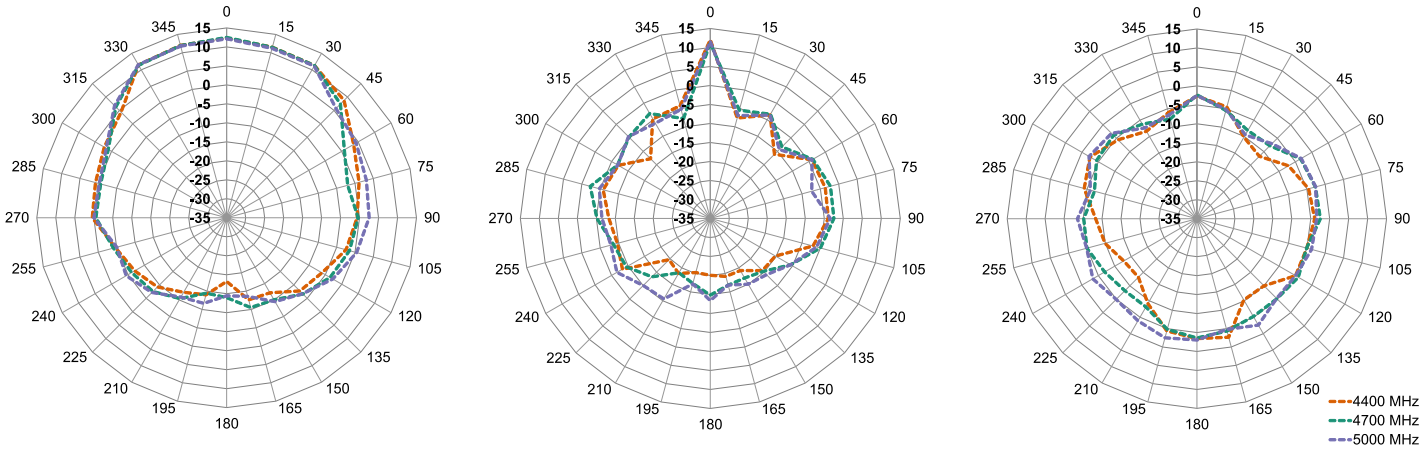


XZ-Plane Gain YZ-Plane Gain XY-Plane Gain

4400 MHz to 5000 MHz (4700 MHz) Port 1



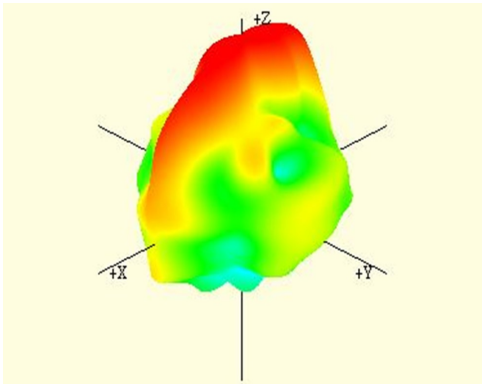
4000 MHz 4700 MHz 5000 MHz



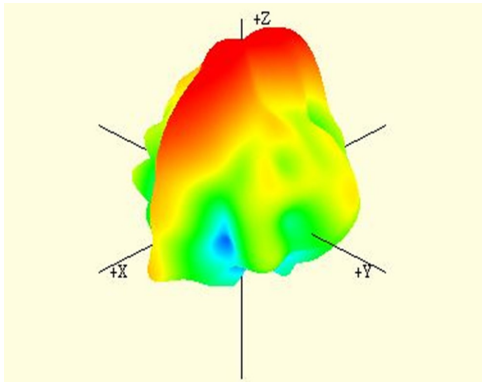
XZ-Plane Gain YZ-Plane Gain XY-Plane Gain

Figure 10. Antenna Radiation Patterns

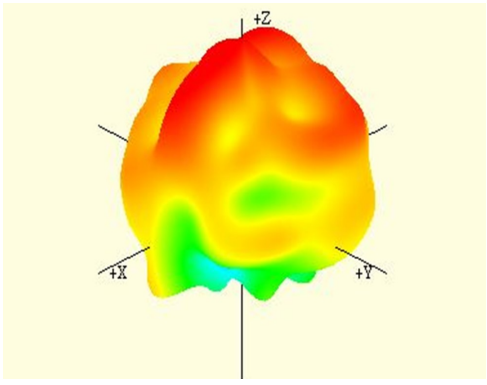
4400 MHz to 5000 MHz (4700 MHz) Port 2



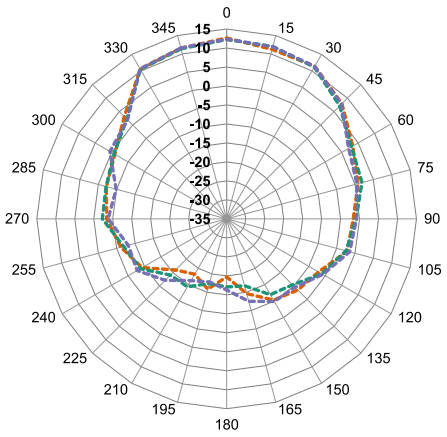
4400 MHz



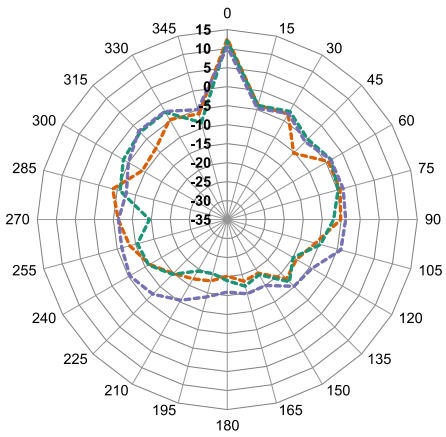
4700 MHz



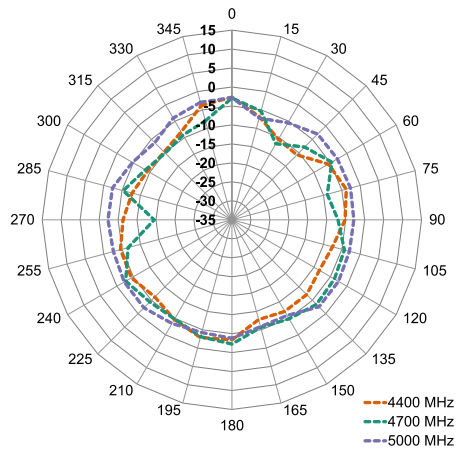
5000 MHz



XZ-Plane Gain

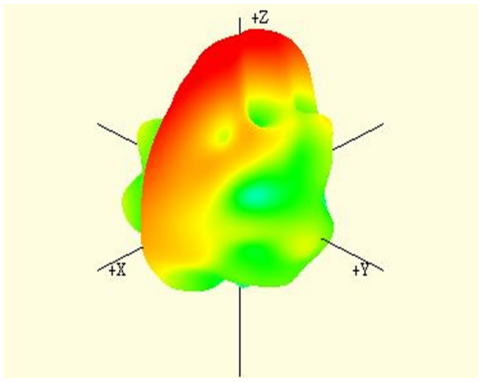


YZ-Plane Gain

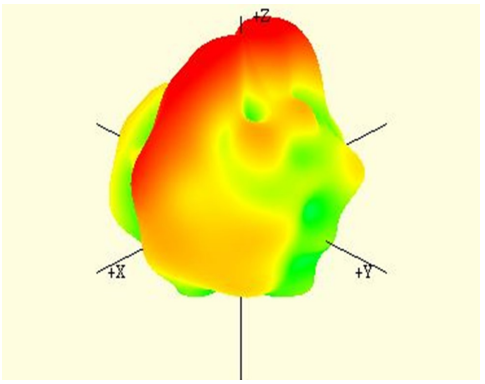


XY-Plane Gain

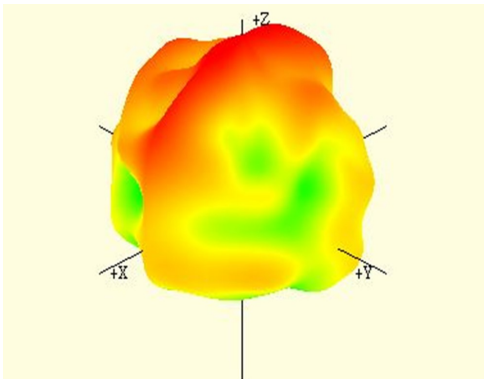
4400 MHz to 5000 MHz (4700 MHz) Port 3



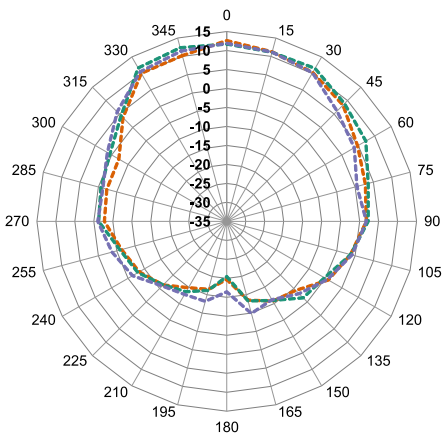
4400 MHz



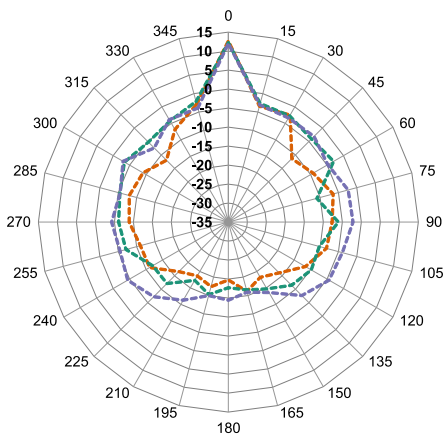
4700 MHz



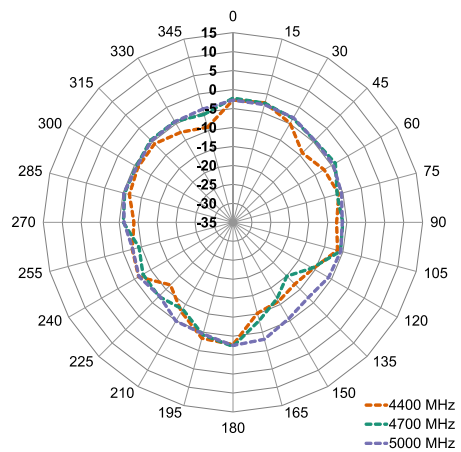
5000 MHz



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

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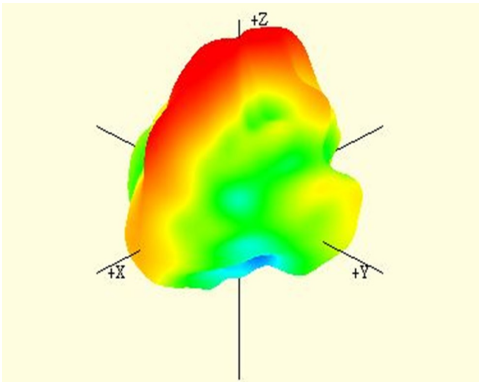
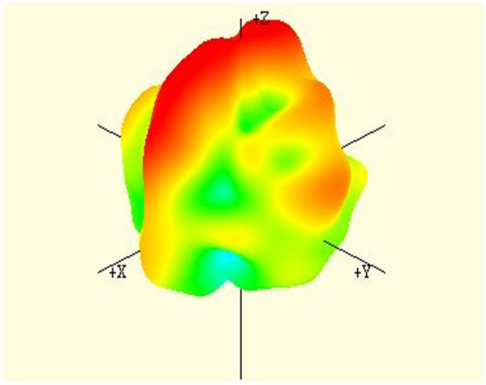
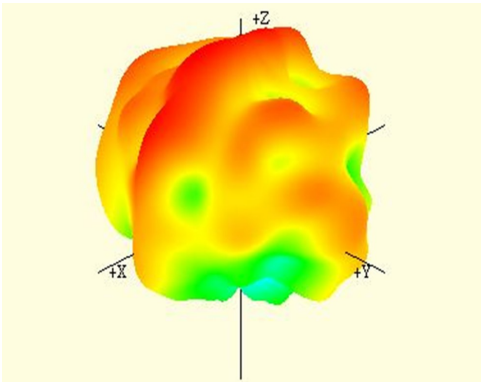
4400 MHz to 5000 MHz (4700 MHz) Port 4



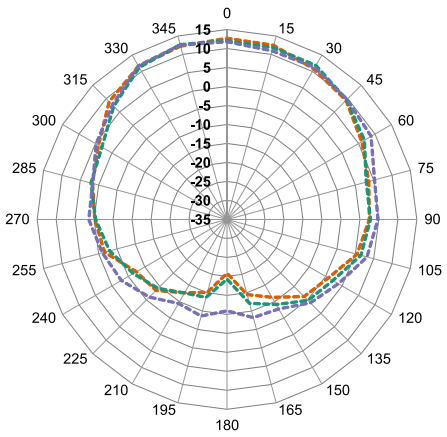
4400 MHz



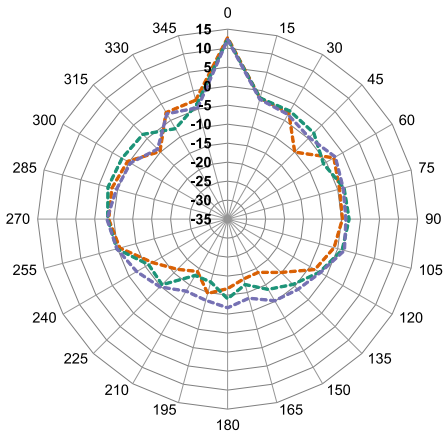
4700 MHz



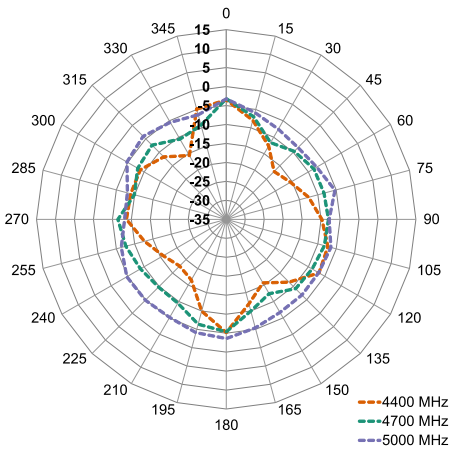
5000 MHz



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

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Antenna FAQs

Q: What is an antenna?

An antenna is used for transmission or reception of radio signals in wireless communication.

Q: How do antennas work?

Electricity flowing into the transmitter antenna makes electrons vibrate up and down it, producing radio waves. The radio waves travel through the air at the speed of light. When the waves arrive at the receiver antenna, they make electrons vibrate inside it.

Q: Does antenna size matter?

A bigger antenna, properly designed, will always have more **gain** than a smaller one. And it will be the best kind of **gain**, much better than using a small antenna and simply over-amplifying it, because a small antenna just won't pull in truly weak signals like this gigantic one will.

Q: What is the advantage of external antennas?

External antennas usually offer **better bandwidth** and **high performance** due to the nature of their larger size. This often results in a higher rated **gain** (dBi) than their internal counterparts. Due to its smaller size, an internal antenna would not function well to support lower frequencies.

Ease of integration – an external antenna requires fewer design resources and shorter time to integrate to allow for a more rapid time-to-market. An internal antenna's performance is influenced by device environment – PCB ground plane, nearby metal part, and enclosure. That would require much more effort such as impedance matching network to complete antenna design.

Q: Why is most antenna impedance 50 Ohm?

50 Ohm is an industry standard of coax cables and power amplifiers. It was chosen as a tradeoff between maximum power handling for the transmit coax and the copper losses. The optimum would have been anyway in the range of **30 to 100 ohm** with average at 50 Ohm.

Q: Why does GNSS require RHCP (Right-hand-circularly-polarized) antennas?

Satellite's signal has a low power density, especially after propagating through the **atmosphere** (**ionosphere** affect radio wave). Polarized waves oscillate in more than one direction, which deliver satellite's signal to receiver on Earth surface more effectively.

MATING COMPONENTS: RF COAXIAL CONNECTOR AND CABLE ASSEMBLY

Part Number	Image	Connector 1 (Receptacle)	Connector 2 (Plug)	Cable Length		Cable Diameter (mm)
				mm	Inch	
CX-NXE0SAC0B0300-BM		N-type Plug	RP-SMA Plug	3000	120	5
AD-NXESAH-001M		N-type Plug	RP-SMA Jack	N/A	N/A	
AD-NXESAF-001M		N-type Plug	SMA Jack	N/A	N/A	

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08/26 RevA

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