

Low Axial-Ratio Dual-Pin GNSS Patch Antenna



AANI-PP-0237

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25.0 x 25.0 x 4.0 mm
RoHS Compliant
MSL Level = 1

Description

This low axial-ratio GNSS patch antenna delivers exceptional circular polarization performance with maximum 2.9 dB axial ratio, ensuring superior satellite signal reception for GPS, GLONASS, Galileo, and BeiDou systems. Measuring 25.0 x 25.0 x 4.0 mm and weighing just 10.4g, it provides 4.1 dBic peak gain and 74% efficiency with right-hand circular polarization (RHCP). The dual-pin through-hole mount design ensures mechanical stability in demanding environments. This RoHS-compliant, MSL Level 1 antenna is ideal for precision applications including UAV navigation, asset tracking, intelligent transportation, and agriculture where accurate multi-constellation positioning is critical.



Features

- GPS/GLONASS/Galileo/Beidou Patch Antenna
- Low Axial Ratio: 2.9 dB Max.
- Compact Size: 25.0 x 25.0 x 4.0 mm
- Peak Gain: 4.1 dBic
- Antenna Efficiency: 74 %
- RHCP Polarization
- Dual-Pin Through-Hole Mounting
- Light Weight: 10.4 g
- [RoHS Compliant](#) | [MSL Level 1](#)

Applications

- GNSS Modules
- UAVs and Drones
- Asset Tracking & Telematics
- Intelligent Transportation
- Precision Agriculture
- Geolocation and Tracking

Ordering Information

Part Number	Description
AANI-PP-0237-1	Low Axial-Ratio Dual-Pin GNSS Patch Antenna with 2 mm pin length
AANI-PP-0237-2	Low Axial-Ratio Dual-Pin GNSS Patch Antenna with 3 mm pin length
AANI-PP-0237-3	Low Axial-Ratio Dual-Pin GNSS Patch Antenna with 5 mm pin length
AANI-PP-0237-EVB	Low Axial-Ratio Dual-Pin GNSS Patch Antenna Evaluation Board

Note: Other options not listed may be available upon request via [Abracon online support](#)



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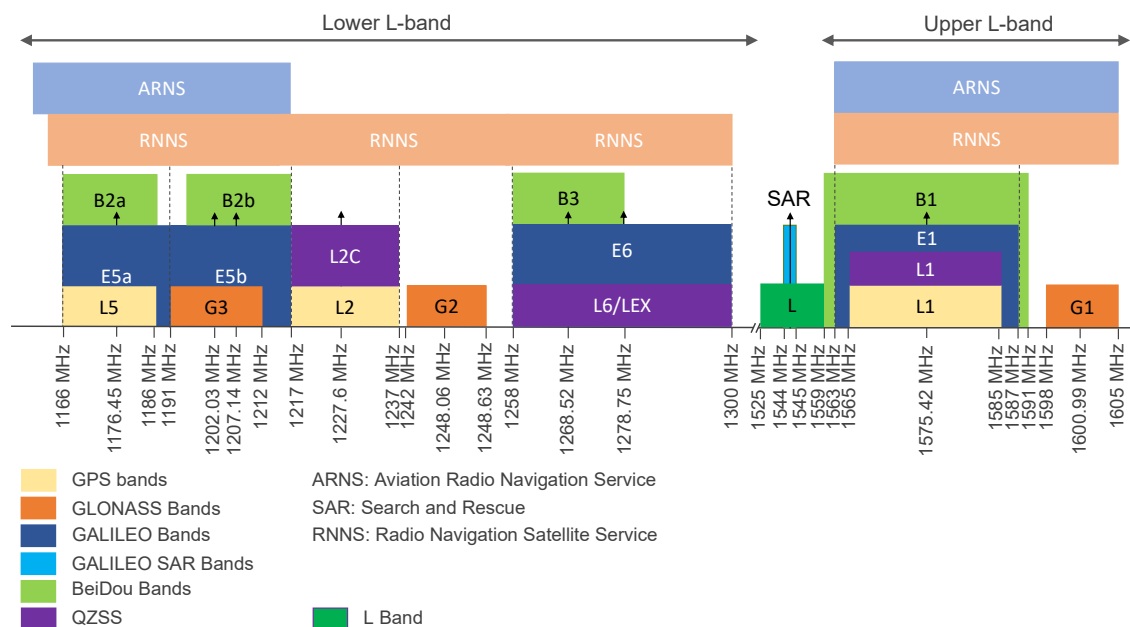
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GNSS Frequency Bands Covered

GPS	L1 1575.42MHz	L2 1227.6MHz	L5 1176.45MHz	
	■	□	□	
GLONASS	G1 1598.06-1609.31MHz	G2 1242.93-1251.68MHz	G3 1202.025MHz	
	■	□	□	
Galileo	E1 1575.42MHz	E5a 1176.45MHz	E5b 1201.5MHz	E6 1278.75MHz
	■	□	□	□
BeiDou	B1I 1561MHz	B2 1207.14MHz	B3 1268.52MHz	
	■	□	□	
QZSS	L1 1575.42MHz	L2 1227.6MHz	L5 1176.45MHz	L6 1278.75MHz
	■	□	□	□
IRNSS/NAVIC			L5 1176.45MHz	
			□	
SBAS	L1/E1/B1 1575.42MHz		L5/B2a/E5a 1176.45MHz	
	■		□	



Frequency allocation: GNSS systems, upper L bands and lower L bands



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Electrical Specification

Parameters	Typ.			Units	Note
Frequency	1561 (B1I)	1575.42 (L1/E1)	1602 (G1)	MHz	
VSWR	< 2.0			-	
Peak Gain	1.7	4.1	3.9	dBic	
Average Gain	-4.9	-2.7	-3.7	dBic	
Maximum Efficiency	46.1	74.2	61.7	%	
Average Efficiency	43.3	70.0	55.4	%	
Axial Ratio	1.9	2.9	1.7	dB	
Polarization	RHCP			-	(Right Hand Circular Polarization)
Nominal Impedance	50			Ω	

Note: All measurements were performed using the evaluation board in a free-space environment. Actual performance may vary depending on factors such as the ground plane, specific application, and surrounding environment.

Mechanical Specification

Parameter	Specification
Antenna Dimension	25.0 x 25.0 x 4.0 mm
Evaluation Board Dimension	70 x 70 mm
Mounting Type	Through Hole & Adhesive
Mounting Location	PCB Center Mounting
Material(s)	Ceramic
Weight	10.4 g
Additional Resources	Download STEP File, Package Drawing, 3D PDF

Environmental Specification

Parameter	Specification
Operating Temperature	-40°C to +105°C
Storage Temperature	-40°C to +105°C
RoHS Compliance	Yes
MSL Level	1



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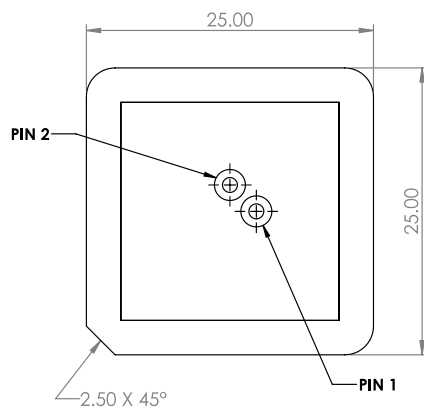


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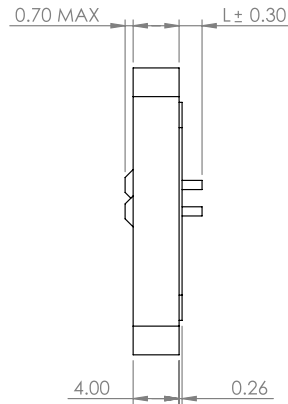


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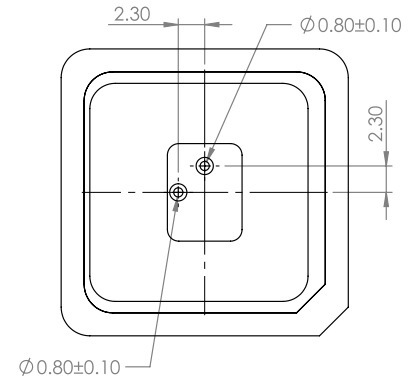
Product Dimensions



TOP VIEW

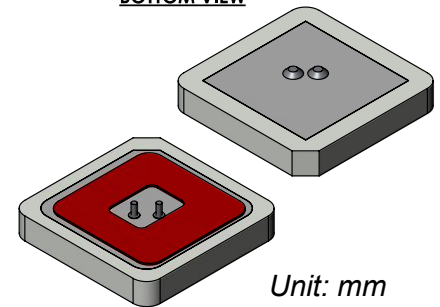


SIDE VIEW



BOTTOM VIEW

PART NUMBER	DESCRIPTION	PIN LENGTH (L)
AANI-PP-0237-1	LOW AXIAL-RATIO DUAL-PIN GNSS PATCH ANTENNA WITH 2MM PIN LENGTH	2
AANI-PP-0237-2	LOW AXIAL-RATIO DUAL-PIN GNSS PATCH ANTENNA WITH 3MM PIN LENGTH	3
AANI-PP-0237-3	LOW AXIAL-RATIO DUAL-PIN GNSS PATCH ANTENNA WITH 5MM PIN LENGTH	5



Unit: mm

Pin	Name
1	P2-L1
2	P1-L1



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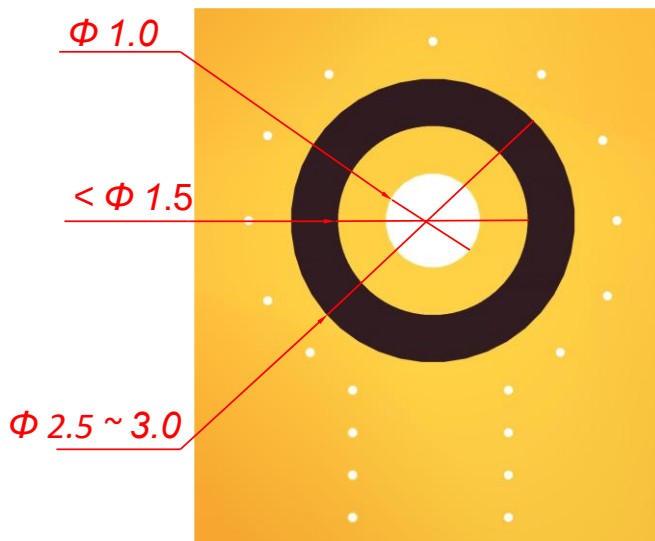
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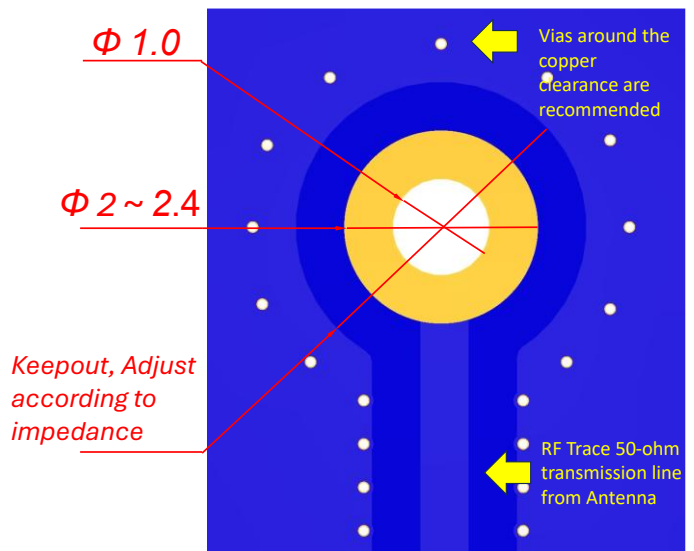
25.0 x 25.0 x 4.0 mm
RoHS Compliant
MSL Level = 1

Antenna Footprint & PCB Layout Guide

Top



Bottom



Unit: mm

Note: Antenna welding does not support reflow soldering, please use manual soldering, the recommended soldering time is $\leq 3s$, and the temperature is $390 \pm 20^\circ\text{C}$.

For technical assistance, please contact [Abracon online support](#) through our online support platform.

Transmission Line

The transmission line should be kept as short as possible and be designed to have a characteristic impedance of 50Ω. Abracon recommends using a Co-Planar Waveguide with Ground (CPWG), which dimensions can be derived by any trusted calculator, using the correct input for PCB materials and layer stack-up.



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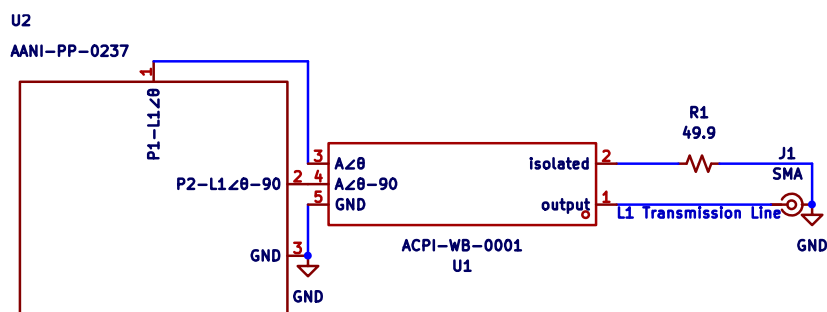
25.0 x 25.0 x 4.0 mm
RoHS Compliant
MSL Level = 1

Evaluation Board Outline & Hybrid Coupler

The evaluation board (Abracon AANI-PP-0237-EVB) is developed to simplify antenna testing and evaluation. It has a size of 70mm (L) x 70mm (W) and includes an SMA connector. The purpose is to give a reference design for an optimal antenna implementation. The evaluation board can also be used to test other implementations by cutting and soldering the PCB into any device.

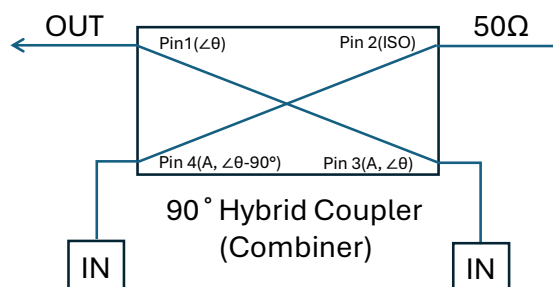
The evaluation board has two hybrid couplers implemented next to the antenna. This is aimed at enabling optimization possibilities for the user. The component positions are sized for 0603 (1608 metric) SMD components.

Schematic



Component	Description	Manufacturer	Part Number	QTY
U2 (Ant.)	Low Axial-Ratio Dual-Pin GNSS Patch Antenna	Abracon	AANI-PP-0237	1
U1	Hybrid Coupler (6.35 x 5.08 x 3.0 mm)	Abracon	ACPI-WB-0001	1
R1	49.9 ohms (0603 /1608 metric)	YAGEO	RC0603FR-0749R9L	1

Hybrid Coupler Block Diagram



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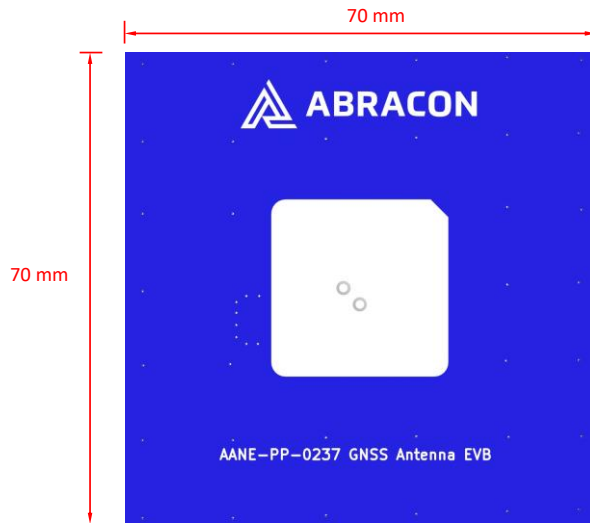


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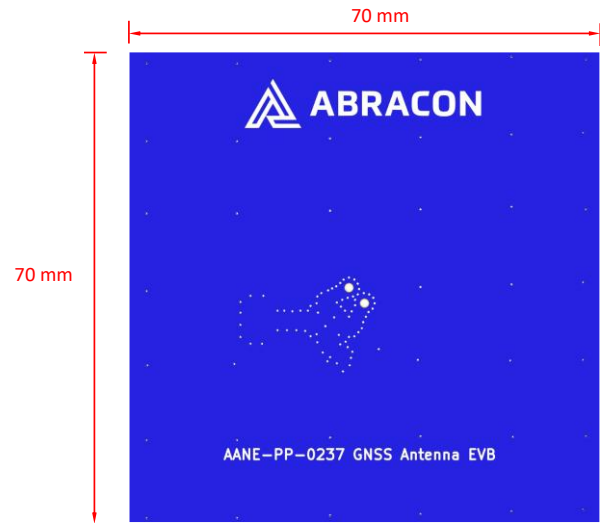


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RoHS Compliant
MSL Level = 1

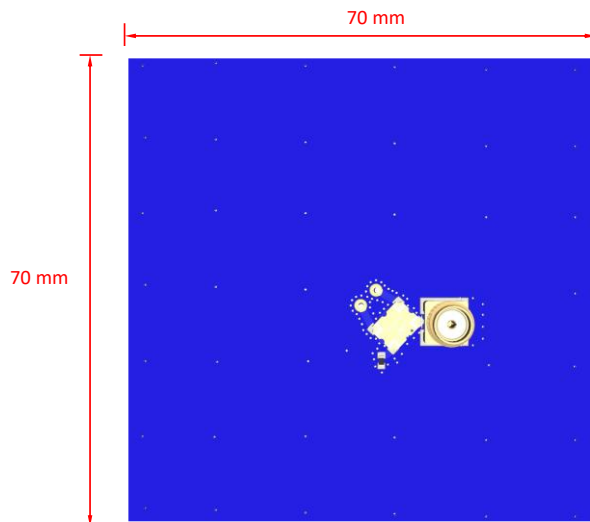
Integration Guide



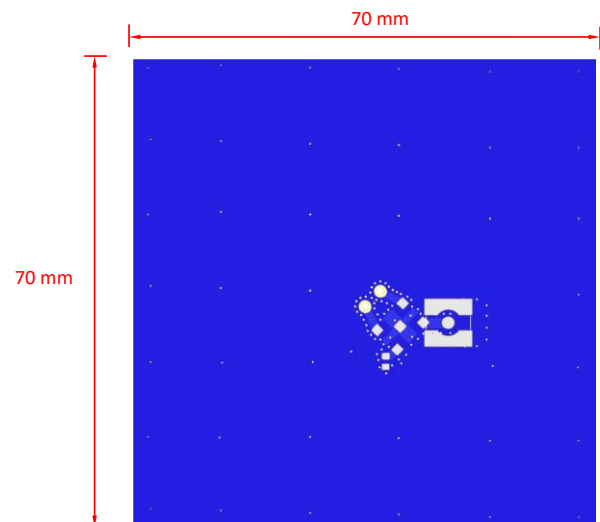
Top with Antenna



Top without Antenna



Bottom with Coupler



Bottom without Coupler

Unit: mm



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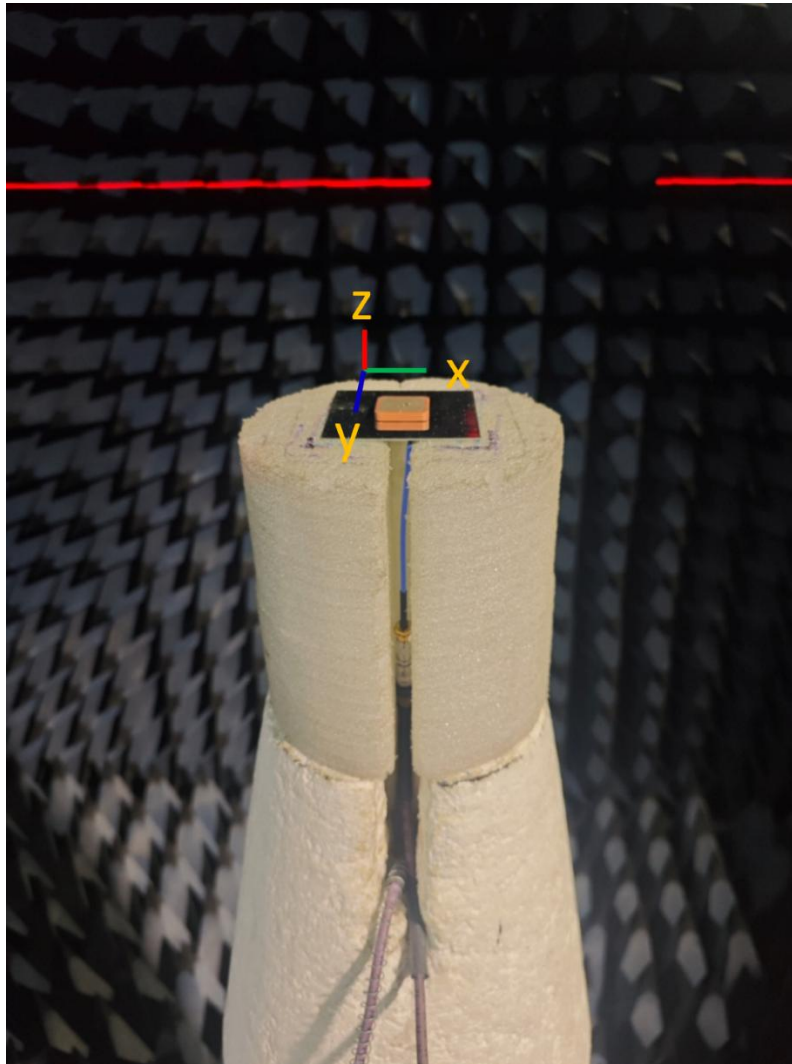


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Measurement Setup



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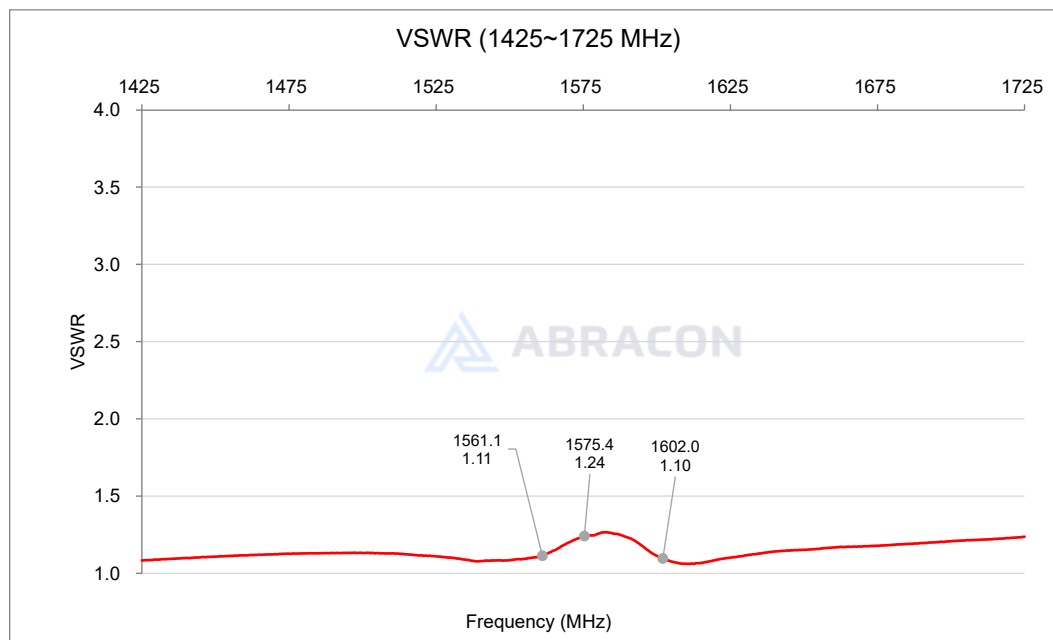
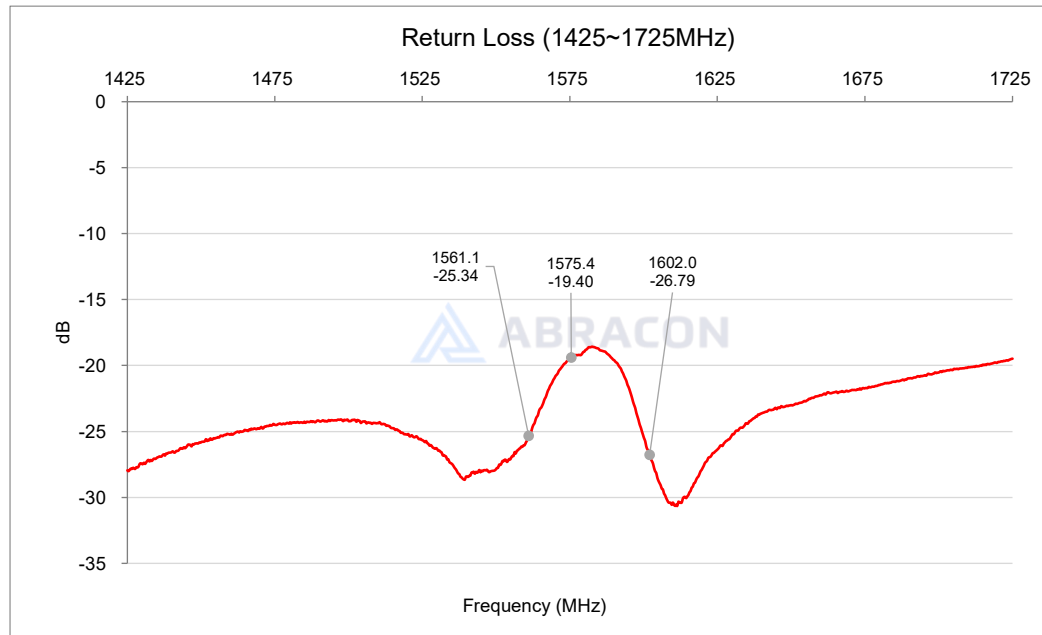


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Reflection Characteristics – Return Loss & VSWR



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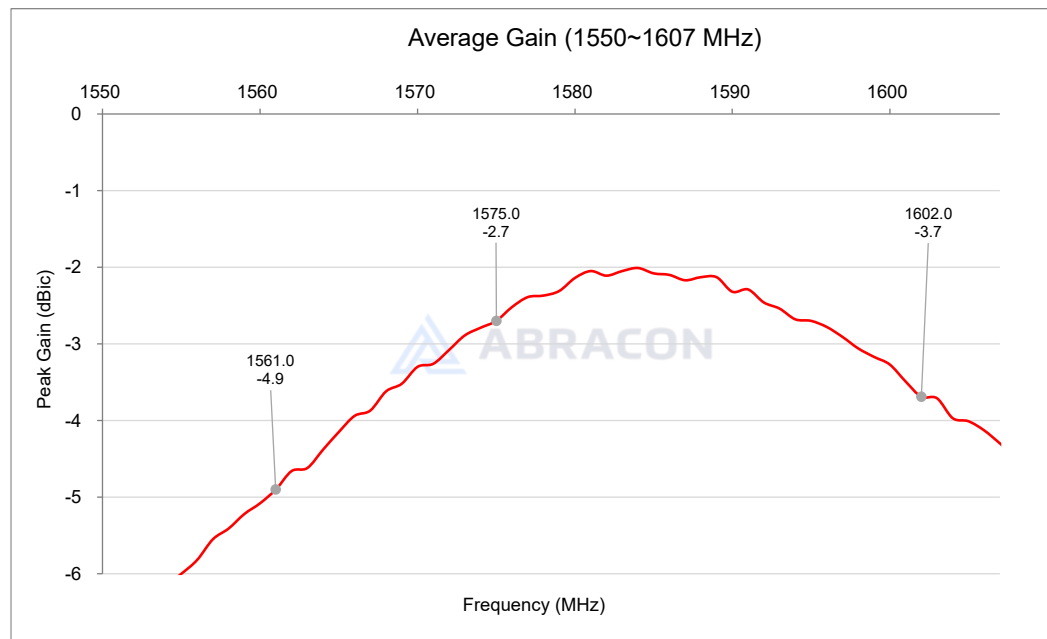
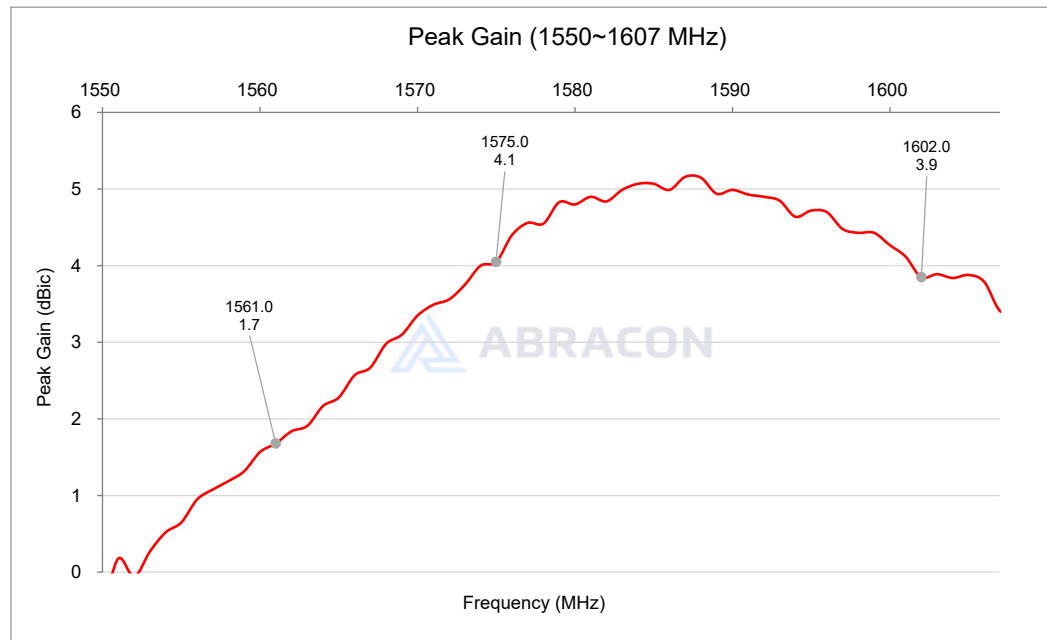


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Radiation Characteristics – Peak Gain & Average Gain



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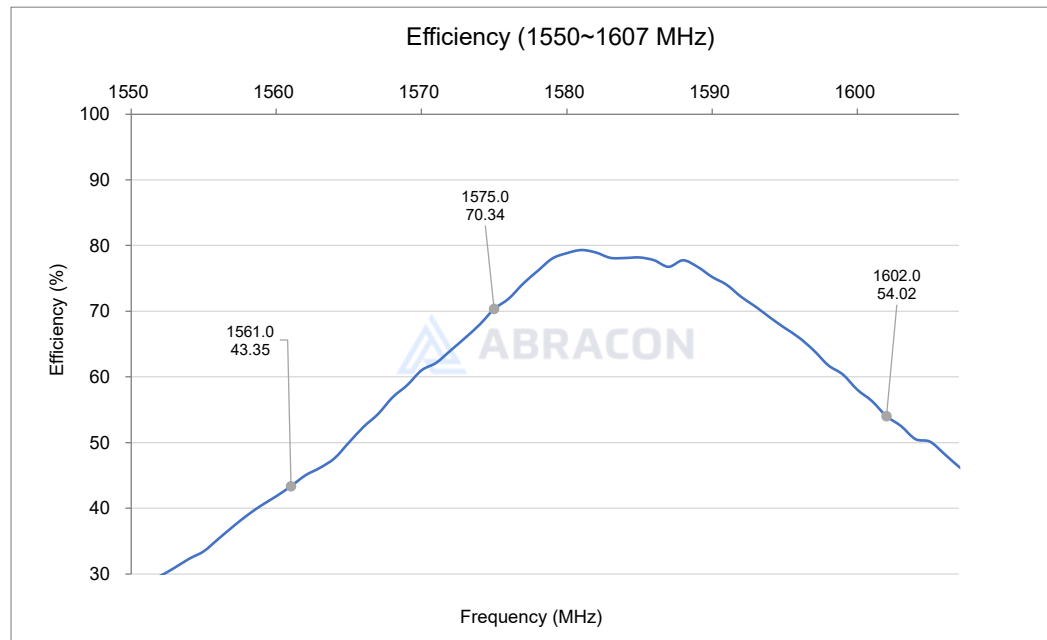


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Radiation Characteristics – Total Efficiency (%)



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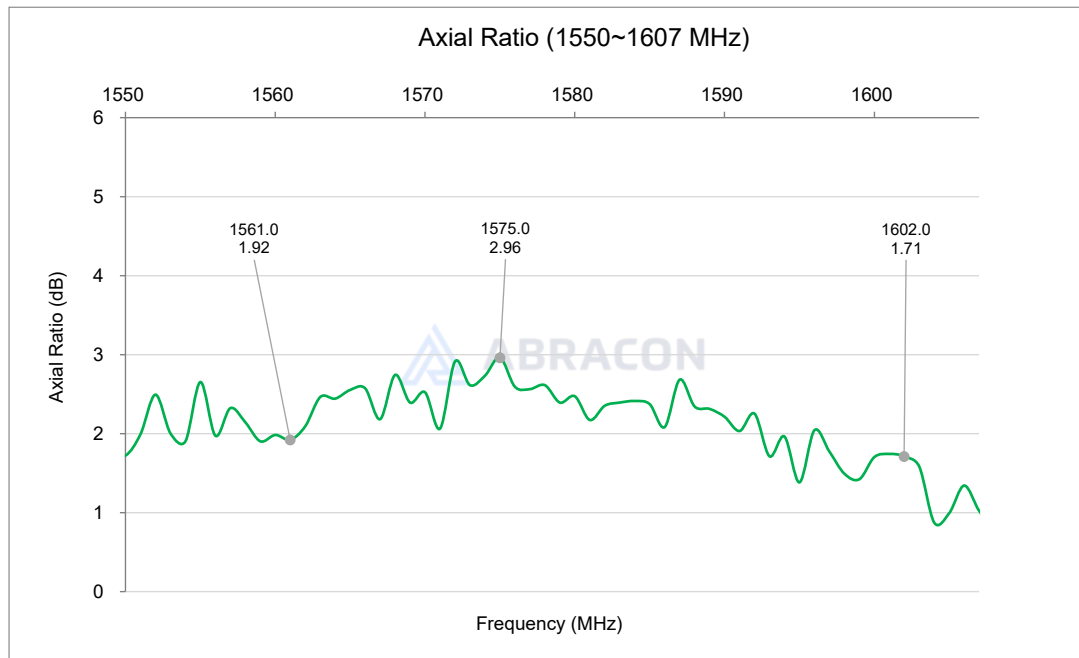


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Radiation Characteristics – Axial Ratio (dB)



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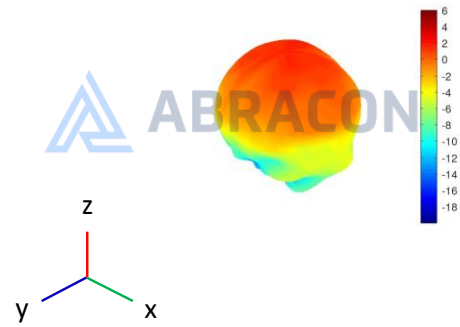
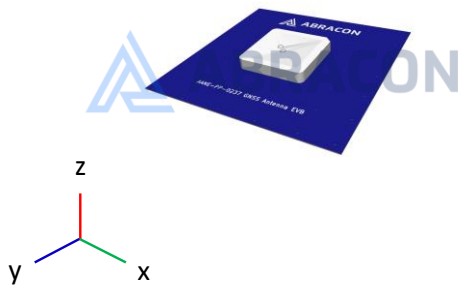
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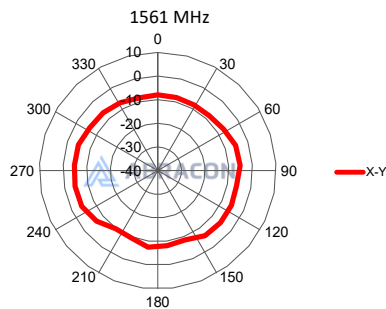
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Radiation Characteristics – 3D & 2D Pattern

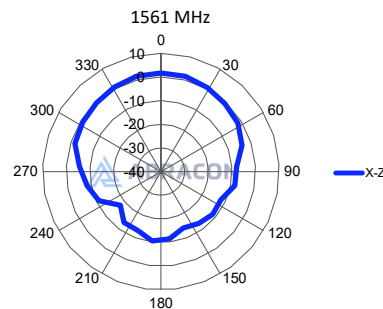
1561MHz



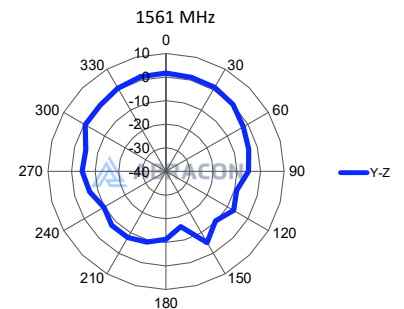
XY plane



XZ plane



YZ plane



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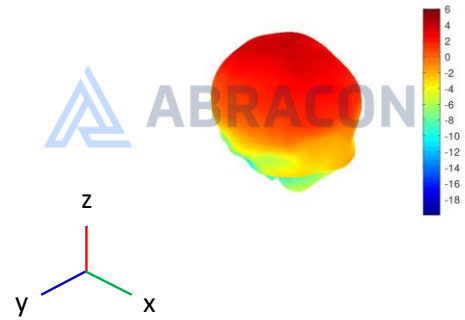
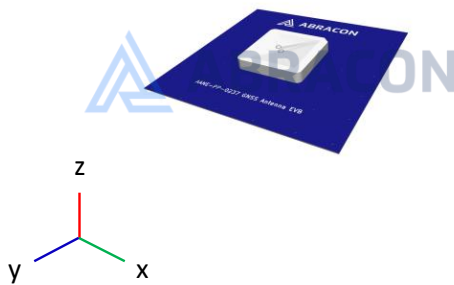


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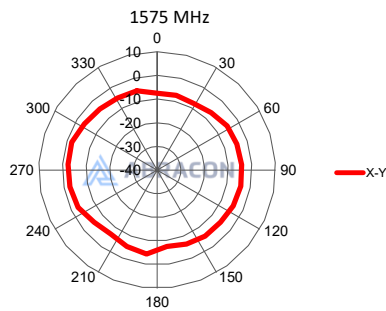


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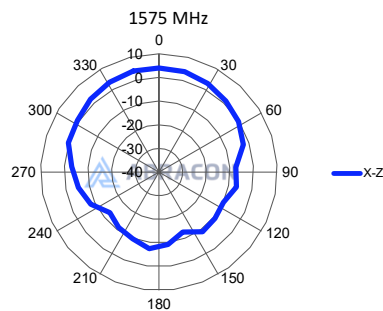
1575MHz



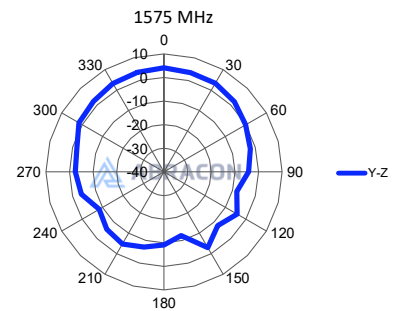
XY plane



XZ plane



YZ plane



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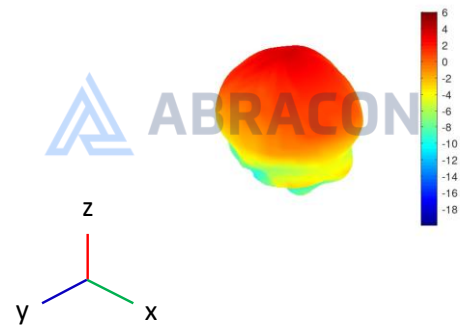
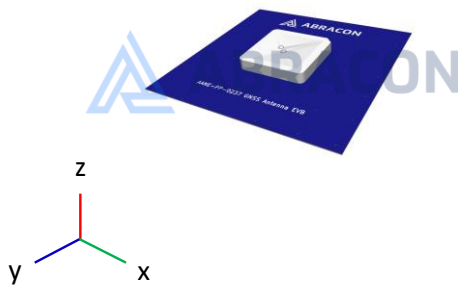


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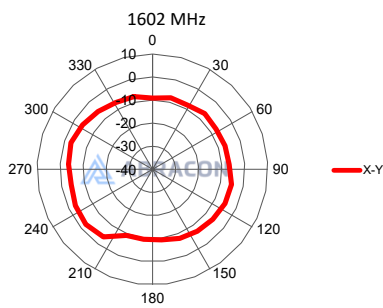


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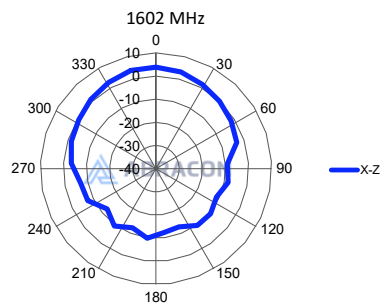
1602MHz



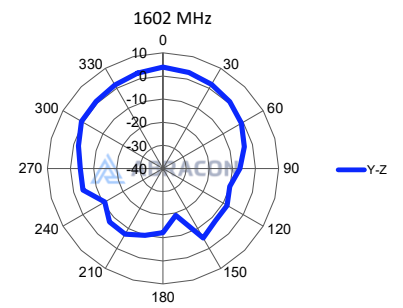
XY plane



XZ plane



YZ plane



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