

# GPS L1 + L2 Stacked Ceramic Patch Antenna



APAKM3513-SGL2



35.6 x 35.6 x 13.5 mm  
RoHS/RoHS II Compliant  
MSL = N/A: Not Applicable

## Features

- Stacked patch for GPS L1 and L2
- Low VSWR
- Circular polarization
- Gain of 3.1 dBi (L1), 1.2 dBi (L2)

## Applications

- GPS L1 and L2 applications
- Remote technology monitoring
- Geofencing
- Navigation
- Surveying and mapping systems
- Logistics
- UAVs and Drones
- Transportation

## Electrical Specifications

Parameters	L2			L1			Units	Notes
	Min.	Typ.	Max.	Min.	Typ.	Max.		
Operating Frequency		1227.60 ±1.023			1575.42 ±1.023		MHz	
VSWR	2.0							
Gain		1.2			3.1		dBi	
Axial Ratio			7.0			5.0	dB	@ ±40°
			10.0			8.6		@ 40° < q < 90° & @ -90° < q < -40°
Impedance	50						Ω	

\*Above mentioned values are for the ground plane size of 70 x 70 mm with an adhesive tape on it

## Environmental Specifications

Parameters	Description
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +105 °C
Frequency Temperature Coefficient	20ppm/deg. °C
Humidity	90 % to 95 % R.H.

# GPS L1 + L2 Stacked Ceramic Patch Antenna

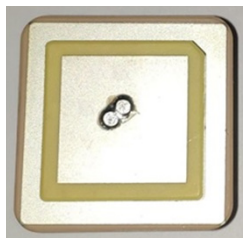


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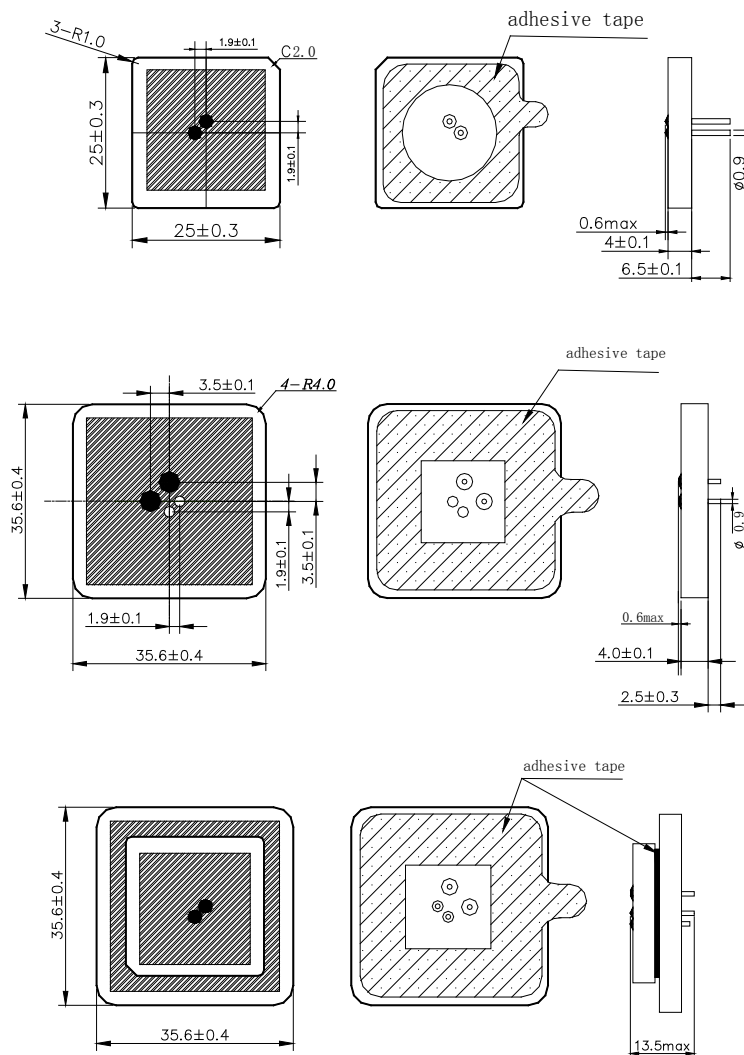


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## Product Image



## Product Dimensions



(Unit : mm)

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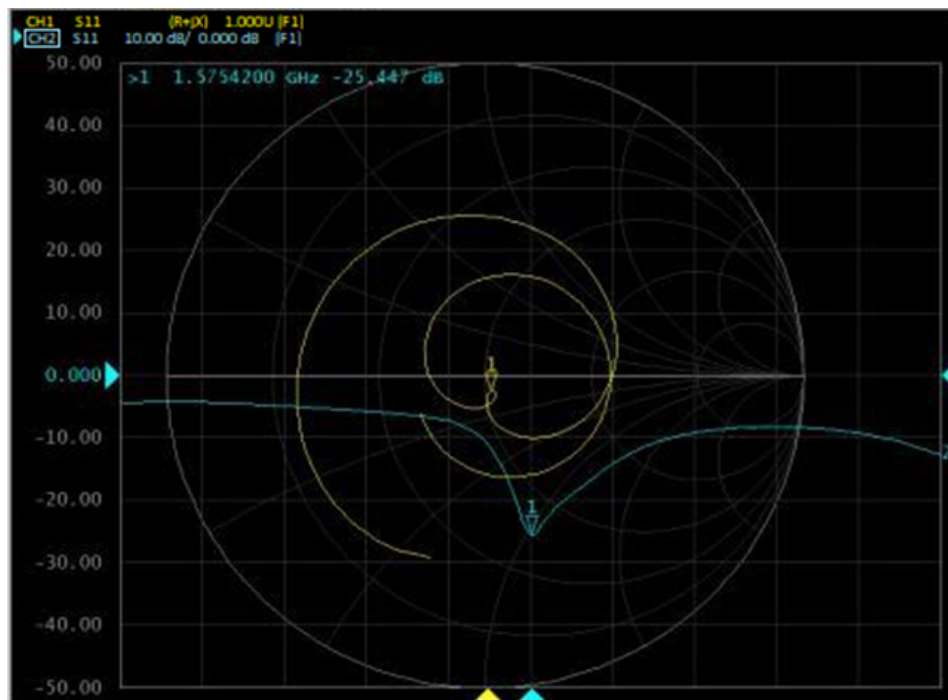
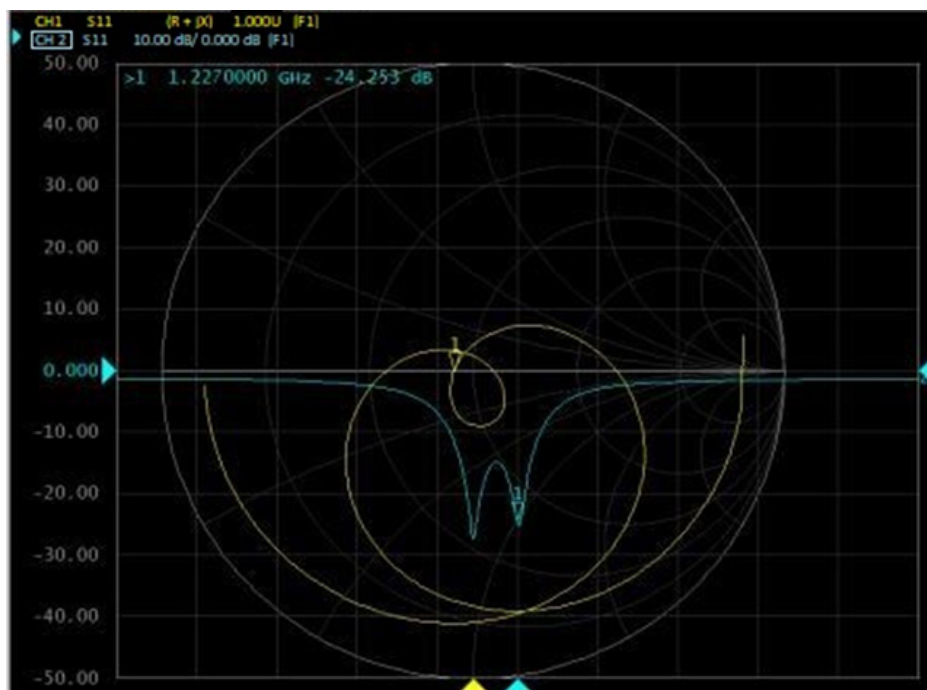


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## Return Loss and Impedance Characteristics



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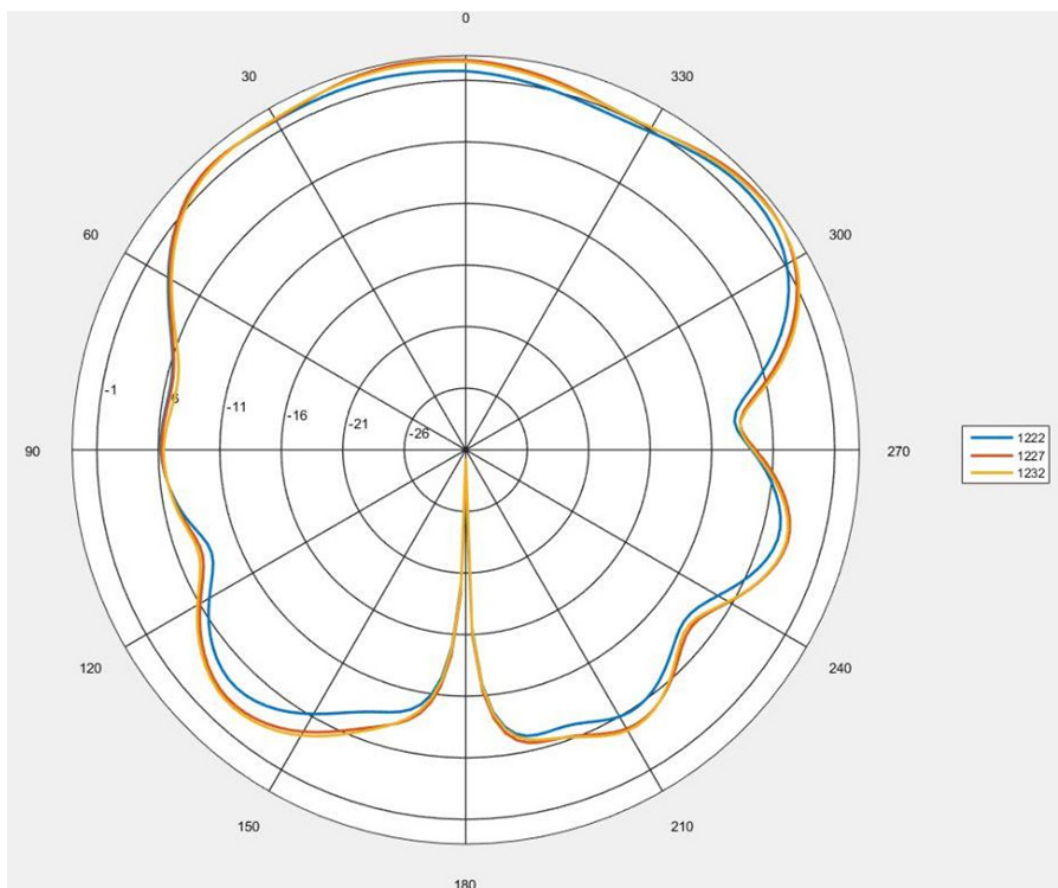
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## Radiation Pattern

XZ Plane  
Gain @ 1227 MHz



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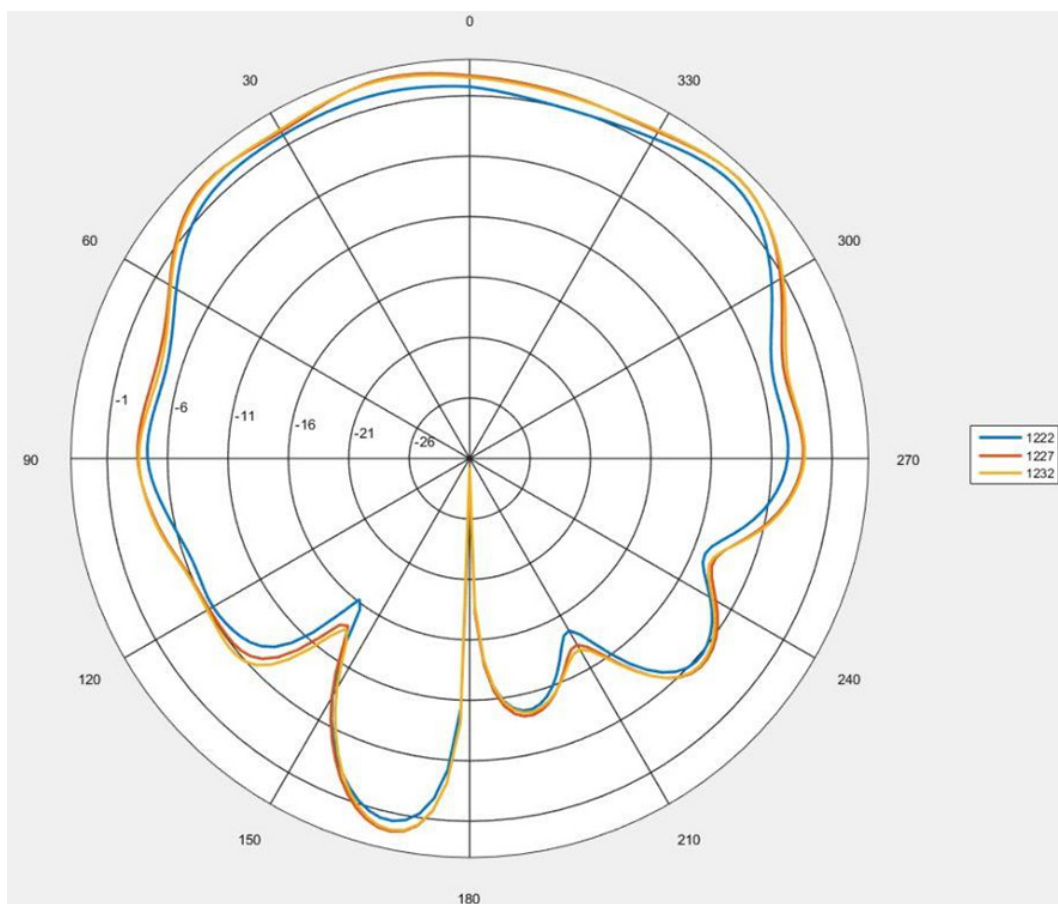
APAKM3513-SGL2



35.6 x 35.6 x 13.5 mm  
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## Radiation Pattern

YZ Plane  
Gain @ 1227 MHz



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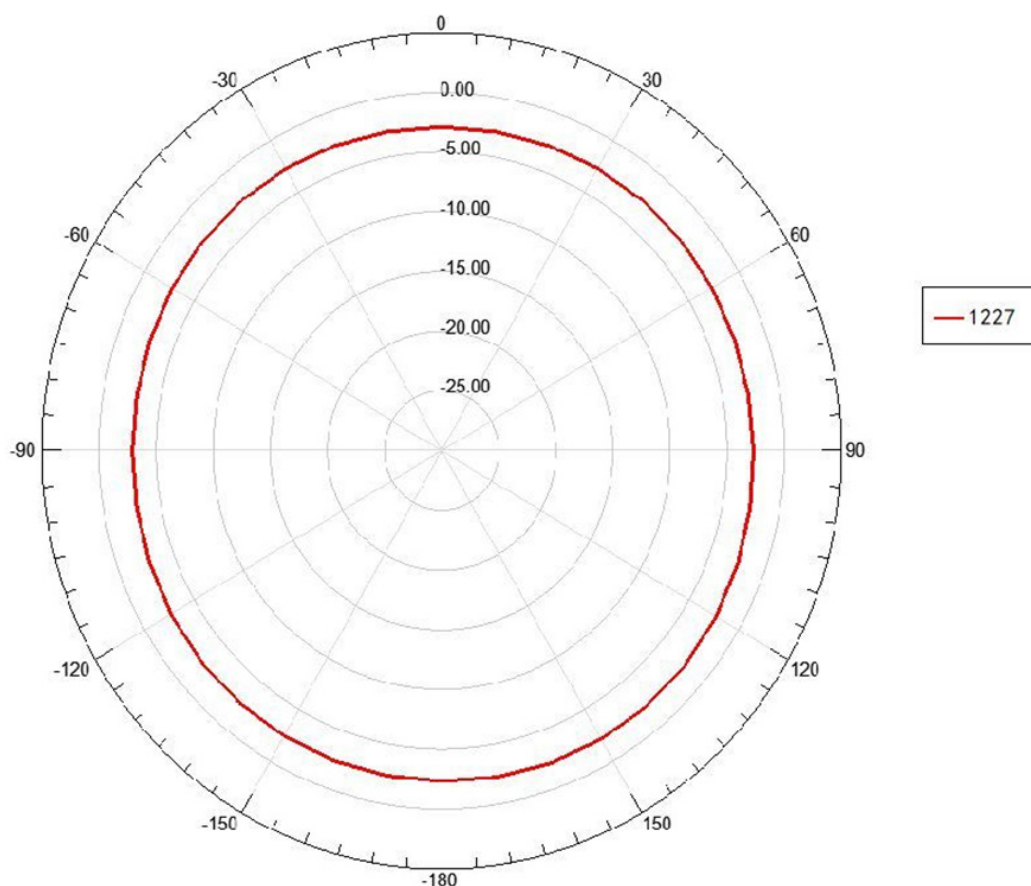
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## Radiation Pattern

XY Plane





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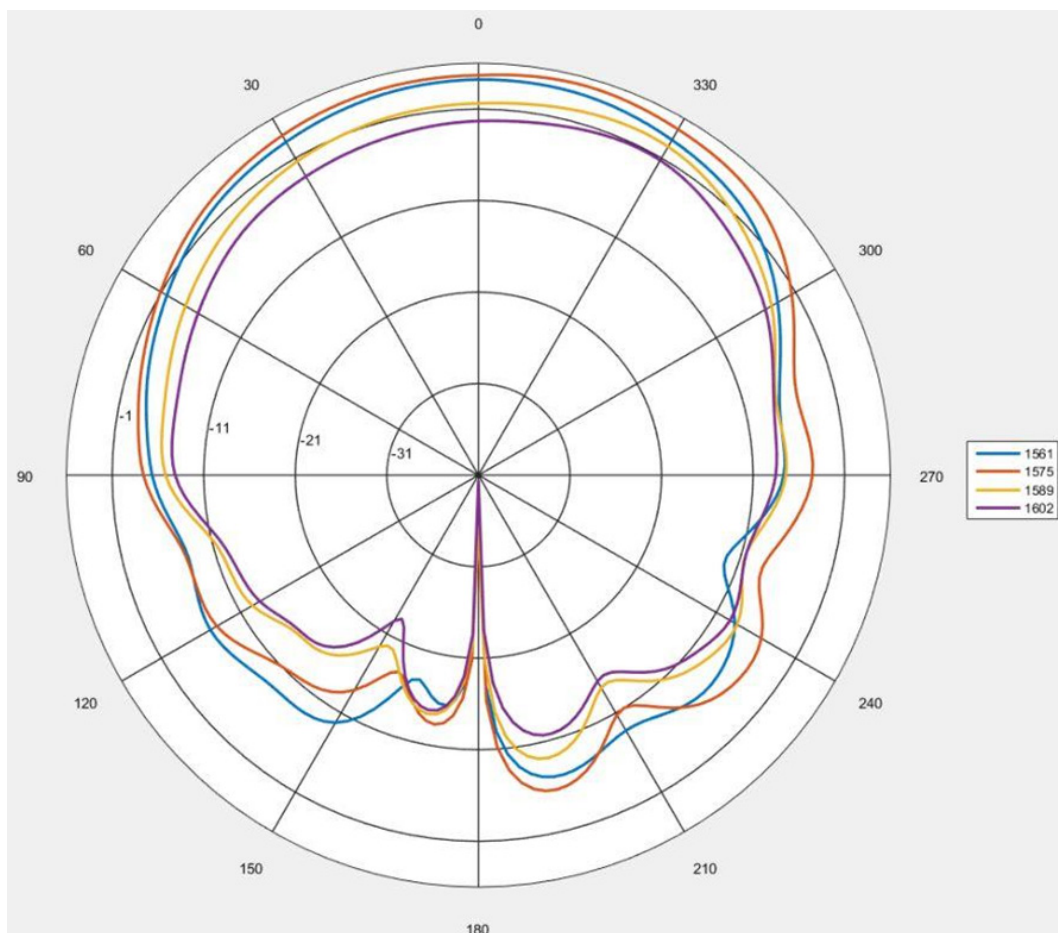
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35.6 x 35.6 x 13.5 mm  
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## Radiation Pattern

XZ Plane  
Gain @ 1575 MHz



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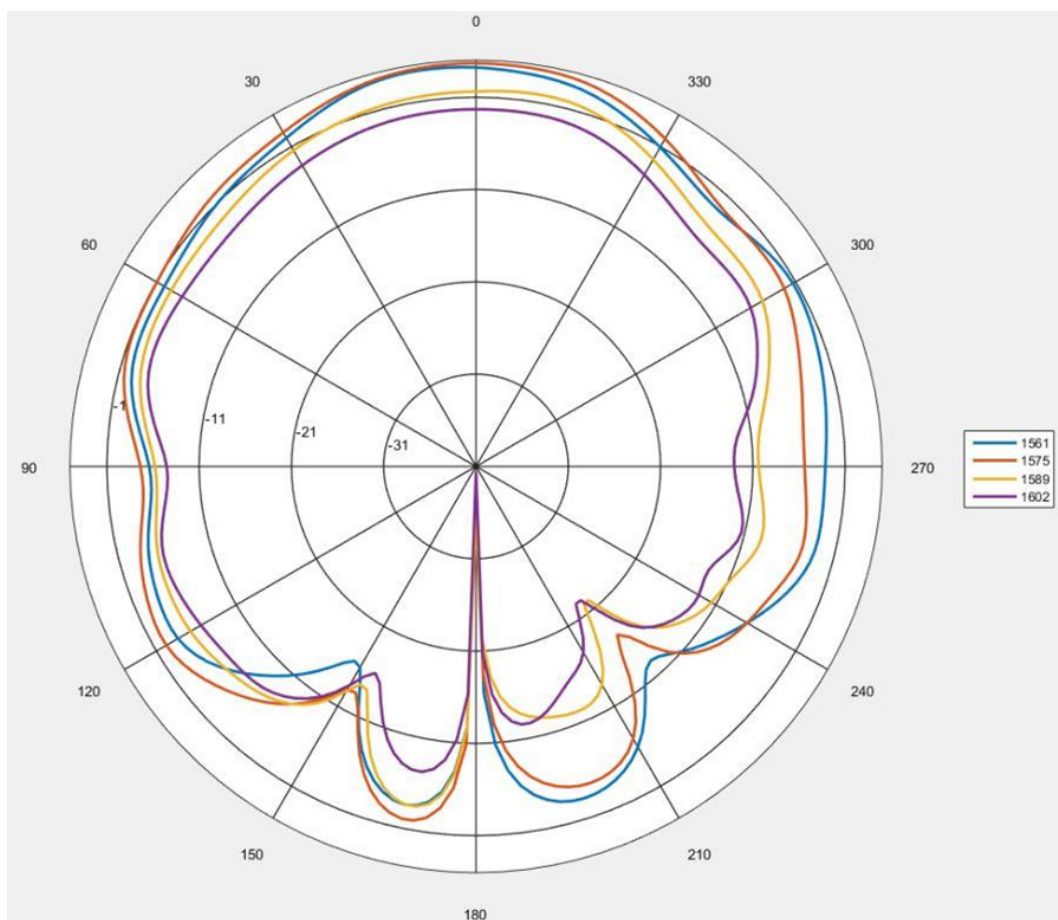
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## Radiation Pattern

YZ Plane





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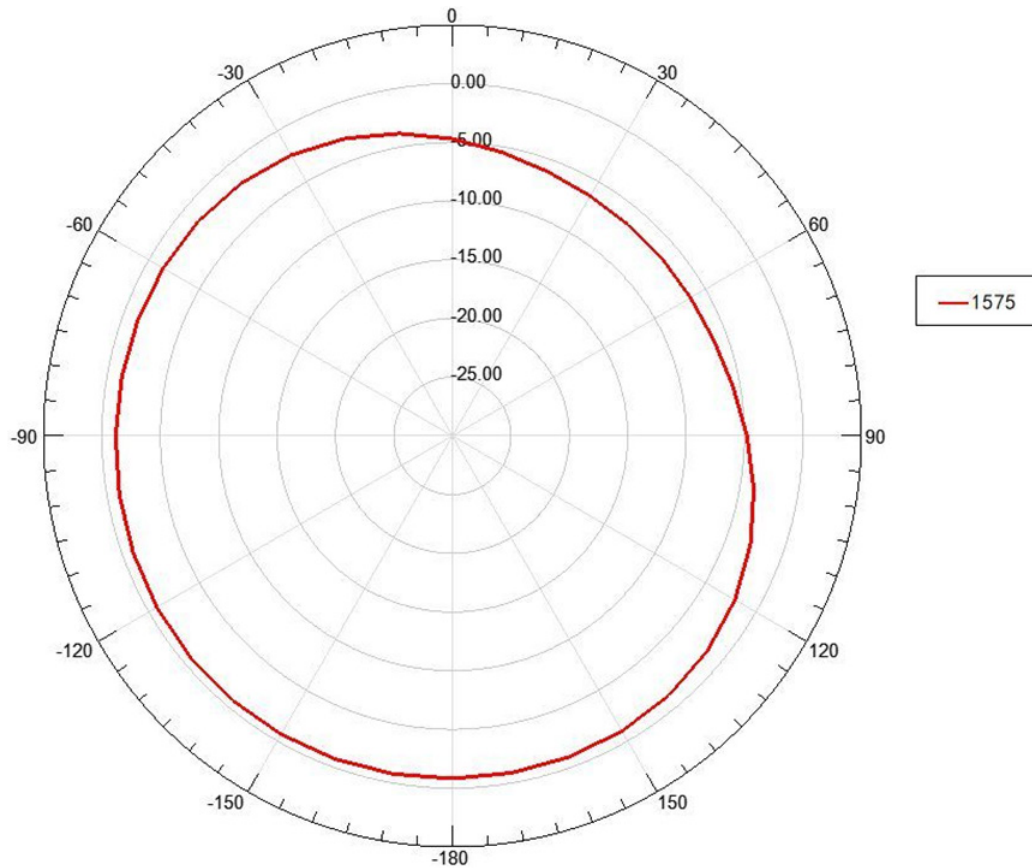
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## Radiation Pattern

XY Plane



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## Radiation Pattern

3D Pattern  
Gain @ 1227 MHz



# GPS L1 + L2 Stacked Ceramic Patch Antenna



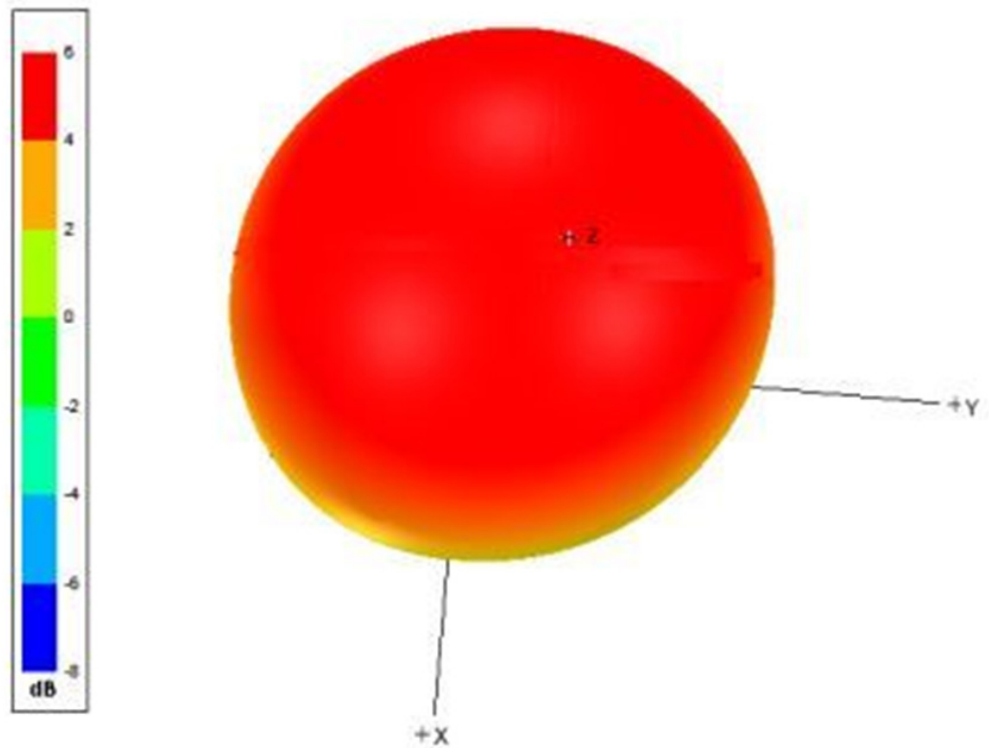
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## Radiation Pattern

3D Pattern  
Gain @ 1575 MHz



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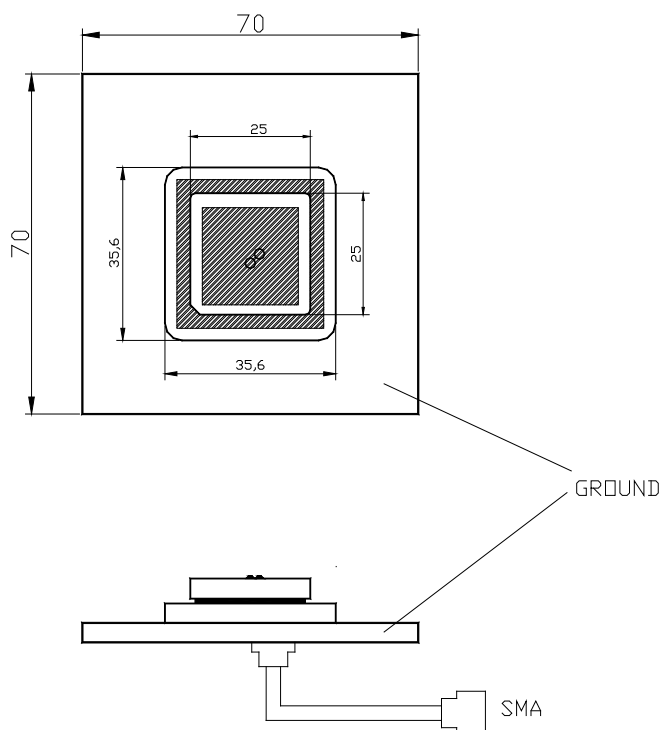


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## Test Jig



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## Reliability Test

Item	Test Condition	Remark
Humidity Test	The device is subjected to 90% to 95% relative humidity $60^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 96 h to 98 h, then dry out at $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and less than 65% relative humidity for 2 h to 4 h. After drying out, the device shall satisfy the specification in Table.1.	It shall fulfill the specifications in Table.1.
High Temperature Exposure	The device shall satisfy the specification in Table.1. after leaving at $105^{\circ}\text{C}$ for 96 h to 98 h, provided it would be measured after 2 h to 4 h leaving in $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and less than 65% relative humidity.	It shall fulfill the specifications in Table.1.
Low Temperature Exposure	The device shall satisfy the specification in Table.1. after leaving at $-40^{\circ}\text{C}$ for 96 h to 98 h, provided it would be measured after 2 h to 4 h leaving in $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and less than 65% relative humidity.	It shall fulfill the specifications in Table.1.
Temperature Cycle	Subject the device to $-40^{\circ}\text{C}$ for 30 min followed by a high temperature of $105^{\circ}\text{C}$ for 30 min cycling shall be repeated 5 times. At the room temperature for 1 h prior to the measurement.	It shall fulfill the specifications in Table.1.
Vibration	Subject the device to vibration for 2 h each in x, y and z axis with the amplitude of 1.5 mm, the frequency shall be varied uniformly between the limits of 10 Hz to 55 Hz.	It shall fulfill the specifications in Table.1.
Soldering Test	Lead terminals are heated up to $350^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for $5 \pm 0.5$ s with brand iron and then element shall be measured after being placed in natural conditions for 1 h. No visible damage and it shall fulfill the specifications in Table.1.	It shall fulfill the specifications in Table.1.
Solder ability	Lead terminals are immersed in soldering bath of $260^{\circ}\text{C}$ to $290^{\circ}\text{C}$ for $3 \pm 0.5$ s. More than 95% of the terminal surface of the device shall be covered with fresh solder.	The terminals shall be at least 95% covered by solder.
Terminal Pressure Strength	A force of 2 kg is applied to each lead in axial direction for $10 \pm 1$ s (see drawing). No visible damage and it shall fulfill the specifications in Fig.1.	Mechanical damage such as breaks shall not occur.

Fig. 1

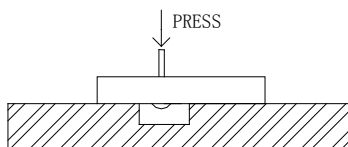


Table 1

Item	Specification After Test (MHz)
Center Frequency change	$\pm 2.0$

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## Packaging

A package has 144 antenna elements.

Package Type	Quantity
1 Package base	18 Antennas
1 Vacuum bag	2 Package bases
1 Inner box	1 Vacuum bag
1 Package	4 Inner boxes

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