

# 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

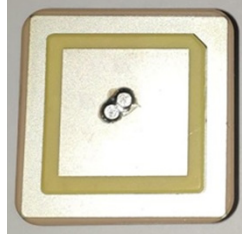


APAKM3513-SGL2

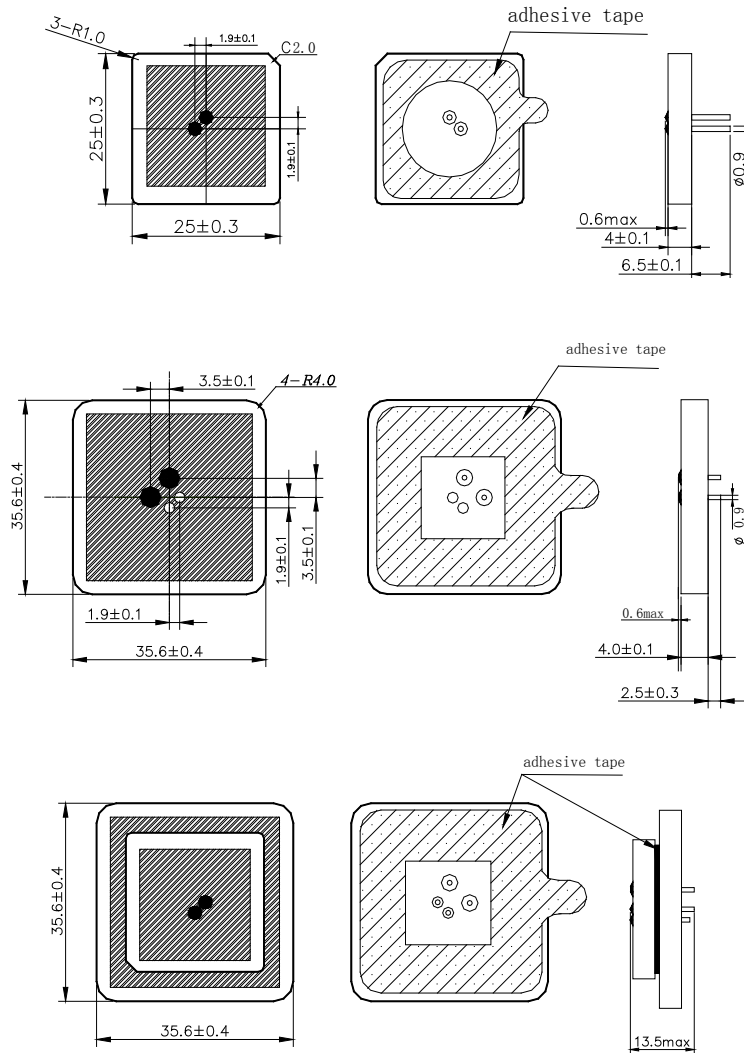


35.6 x 35.6 x 13.5 mm  
 RoHS/RoHS II Compliant  
 MSL = N/A: Not Applicable

## Product Image



## Product Dimensions



(Unit : mm)

# GPS L1 + L2 Stacked Ceramic Patch Antenna

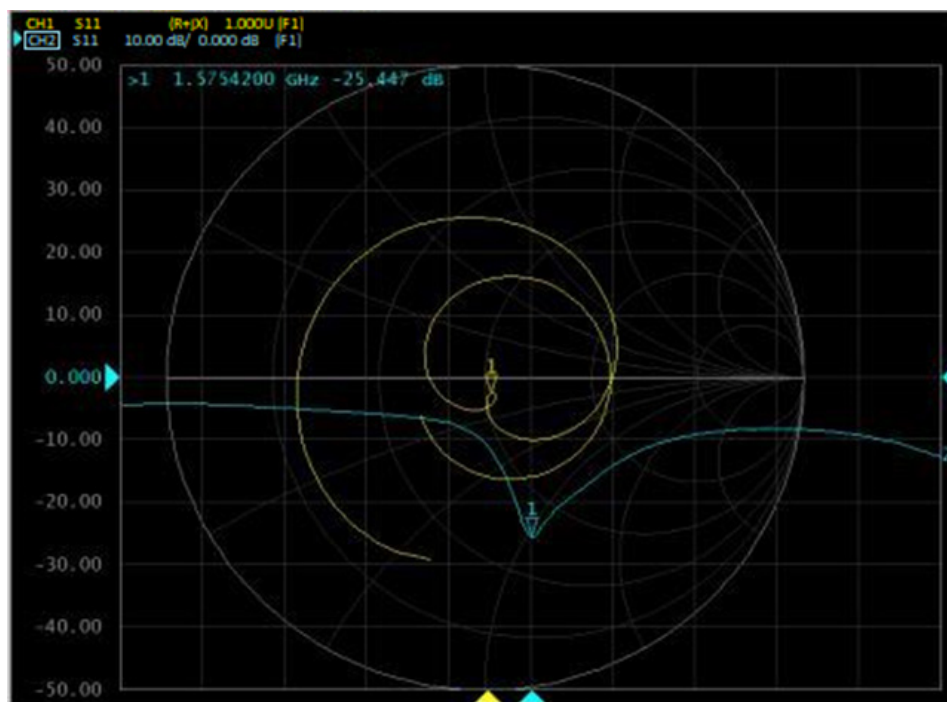
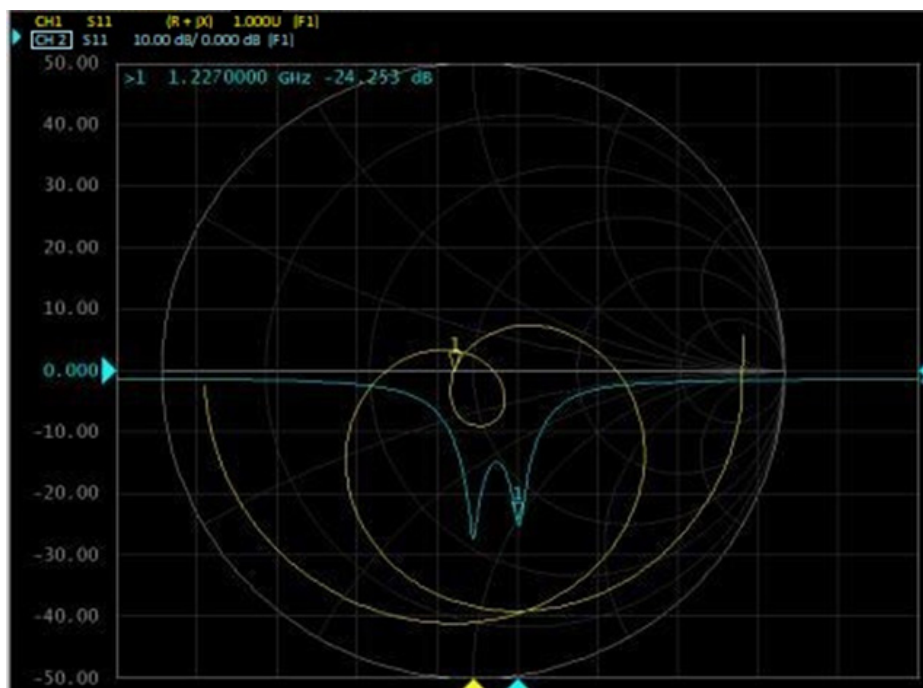


APAKM3513-SGL2



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

## Return Loss and Impedance Characteristics



# GPS L1 + L2 Stacked Ceramic Patch Antenna



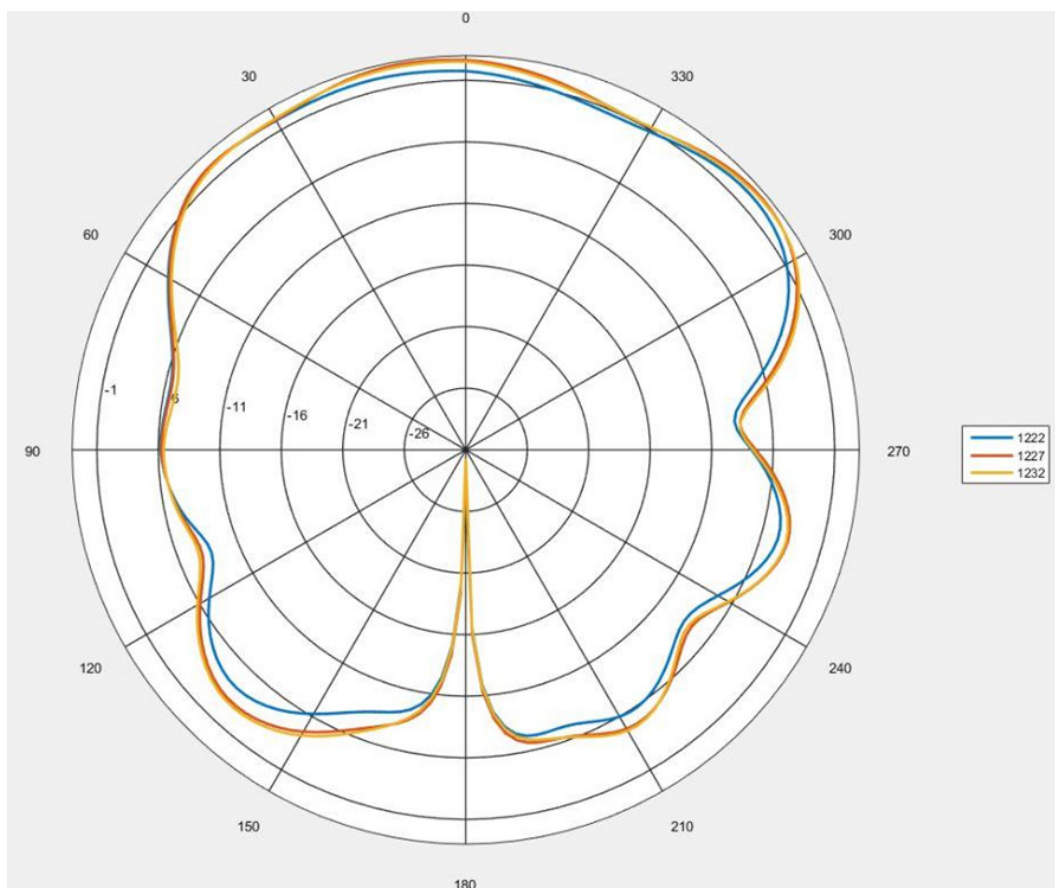
APAKM3513-SGL2



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

## Radiation Pattern

XZ Plane  
Gain @ 1227 MHz



# GPS L1 + L2 Stacked Ceramic Patch Antenna



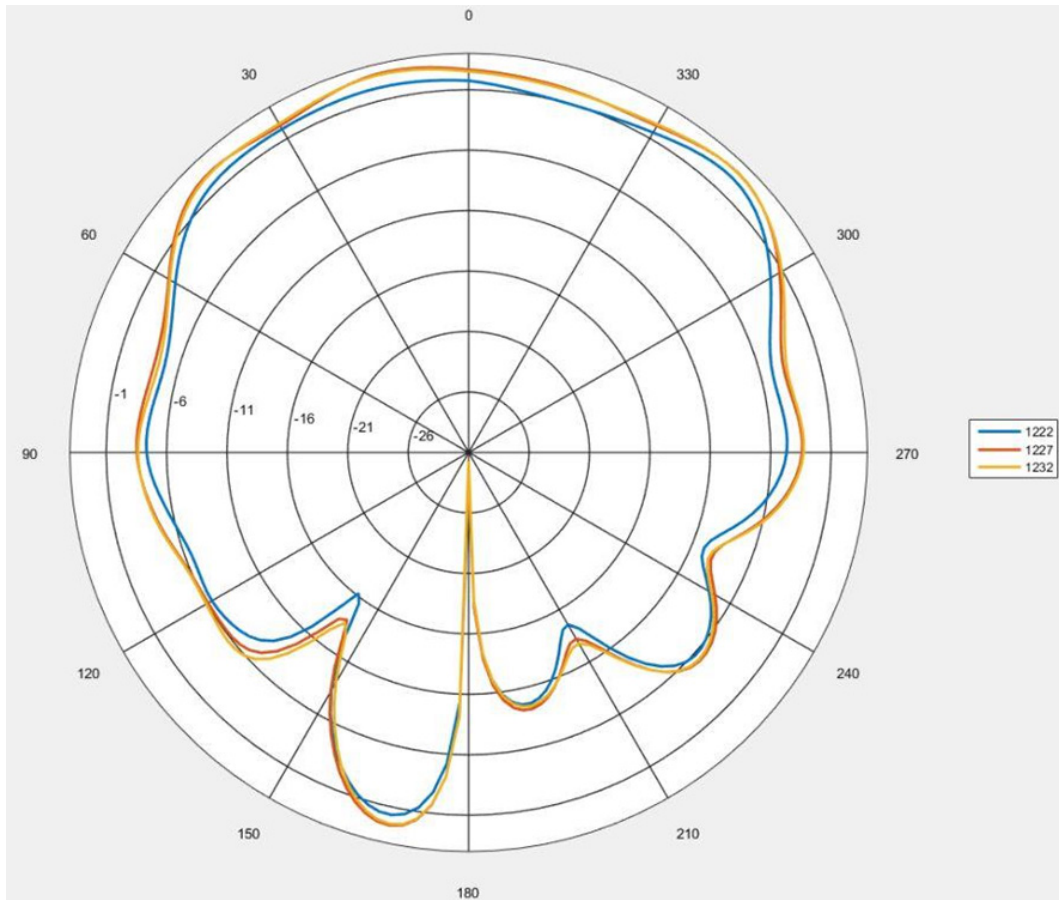
APAKM3513-SGL2



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

## Radiation Pattern

YZ Plane  
Gain @ 1227 MHz



# GPS L1 + L2 Stacked Ceramic Patch Antenna



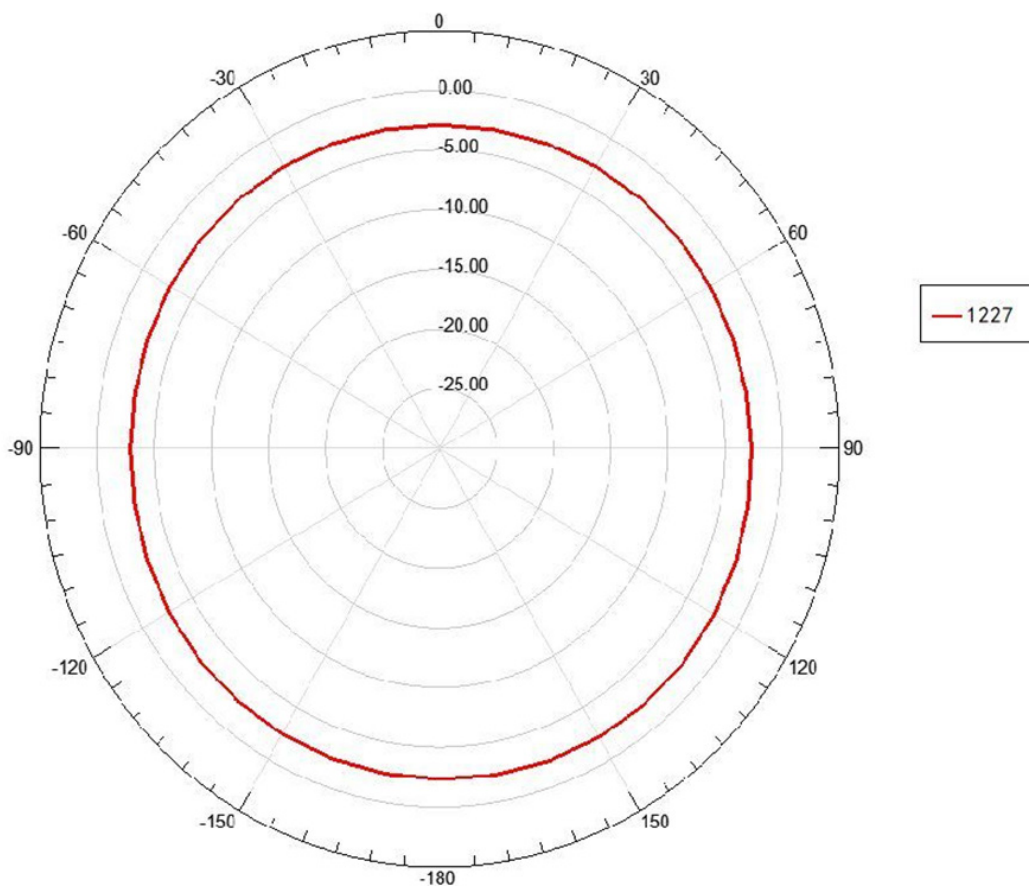
APAKM3513-SGL2



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

## Radiation Pattern

### XY Plane





# GPS L1 + L2 Stacked Ceramic Patch Antenna



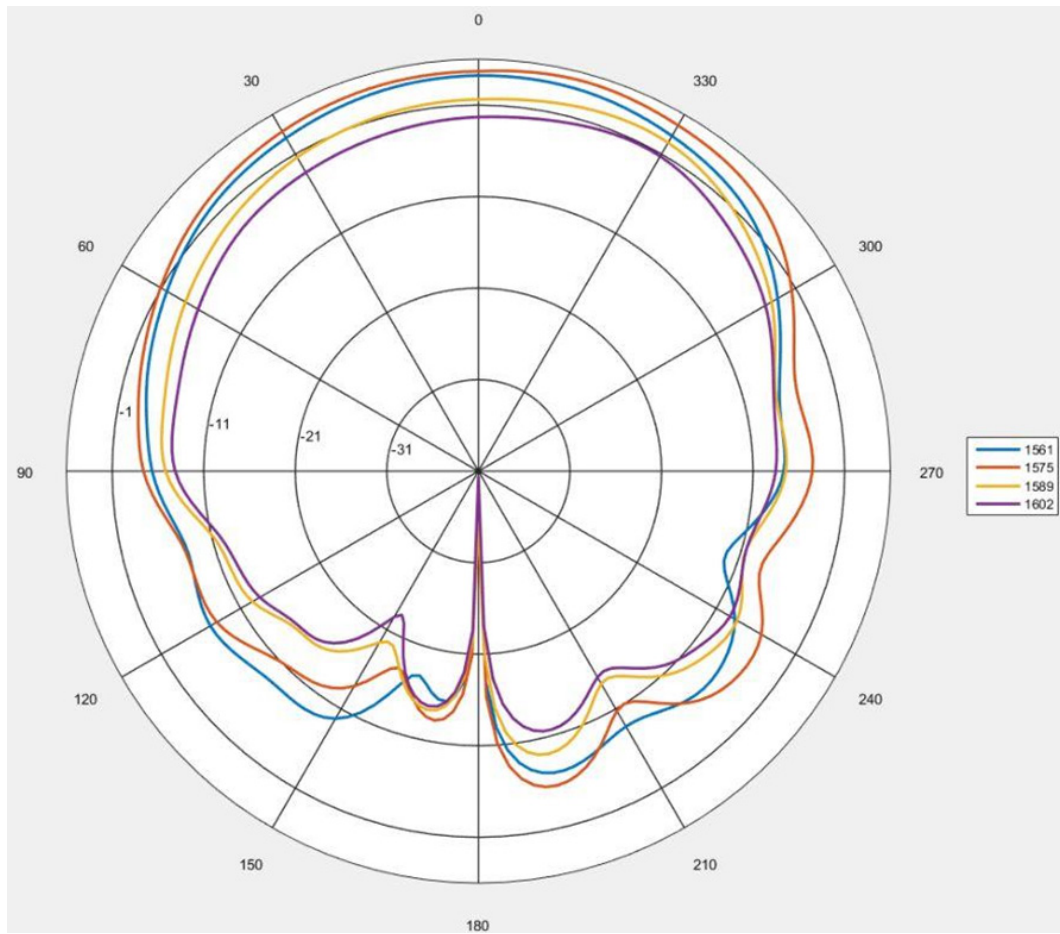
APAKM3513-SGL2



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

## Radiation Pattern

XZ Plane  
Gain @ 1575 MHz



# GPS L1 + L2 Stacked Ceramic Patch Antenna



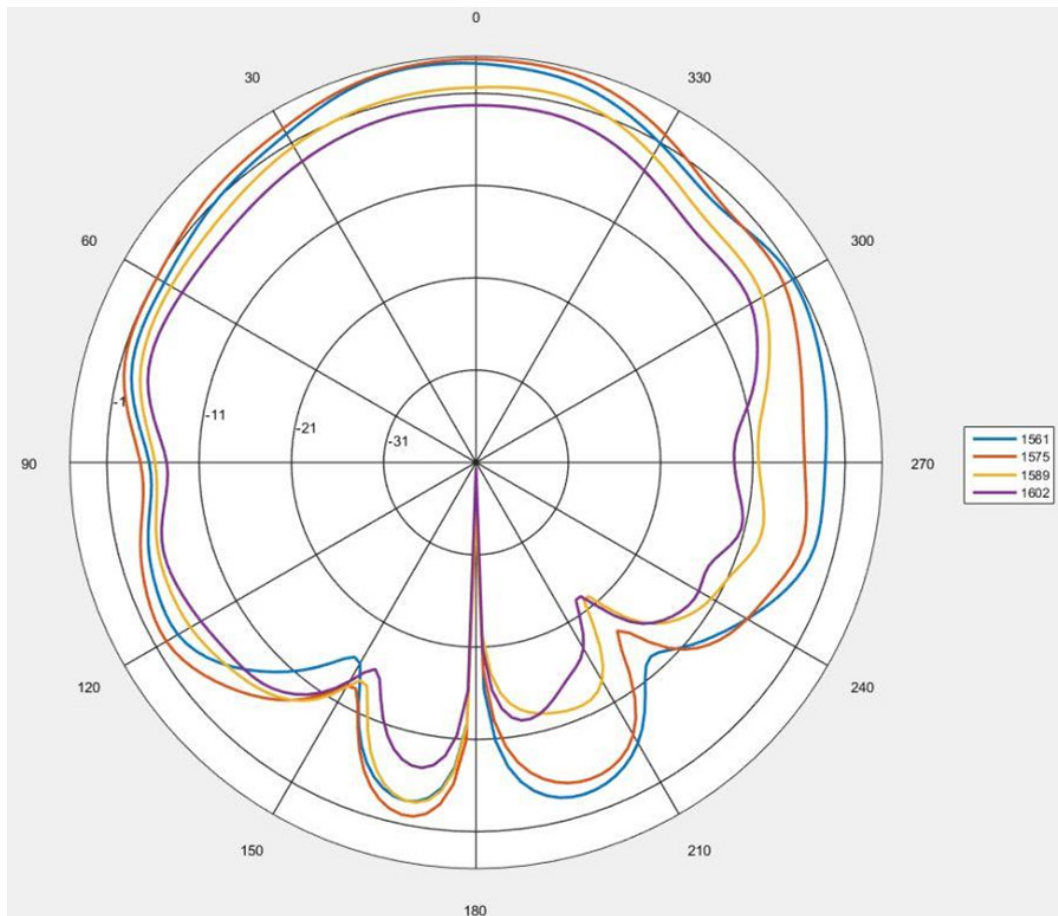
APAKM3513-SGL2



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

## Radiation Pattern

### YZ Plane





# GPS L1 + L2 Stacked Ceramic Patch Antenna



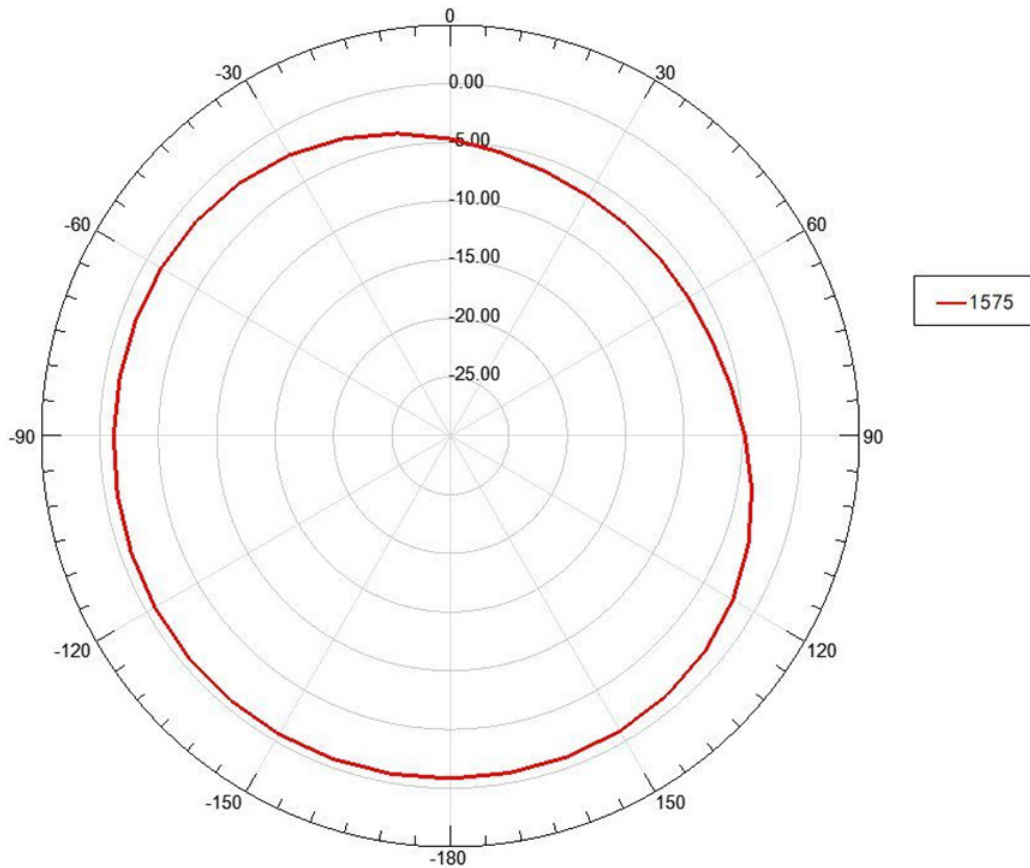
APAKM3513-SGL2



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

## Radiation Pattern

### XY Plane



# 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

## Radiation Pattern

3D Pattern  
Gain @ 1227 MHz



# GPS L1 + L2 Stacked Ceramic Patch Antenna



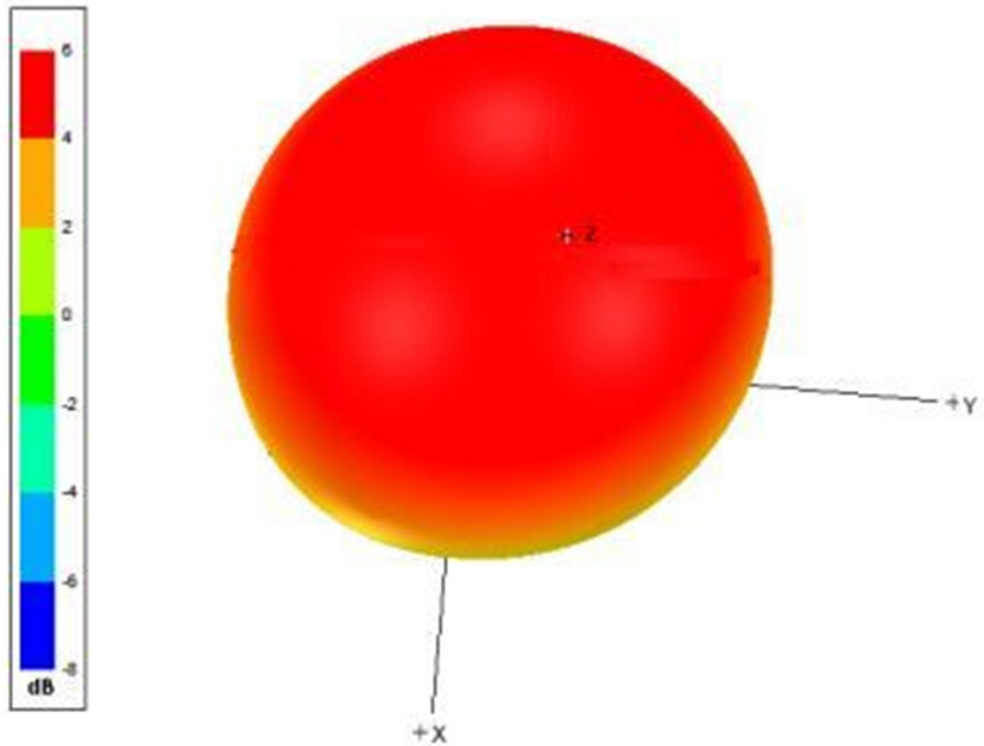
APAKM3513-SGL2



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

## Radiation Pattern

3D Pattern  
Gain @ 1575 MHz



# GPS L1 + L2 Stacked Ceramic Patch Antenna

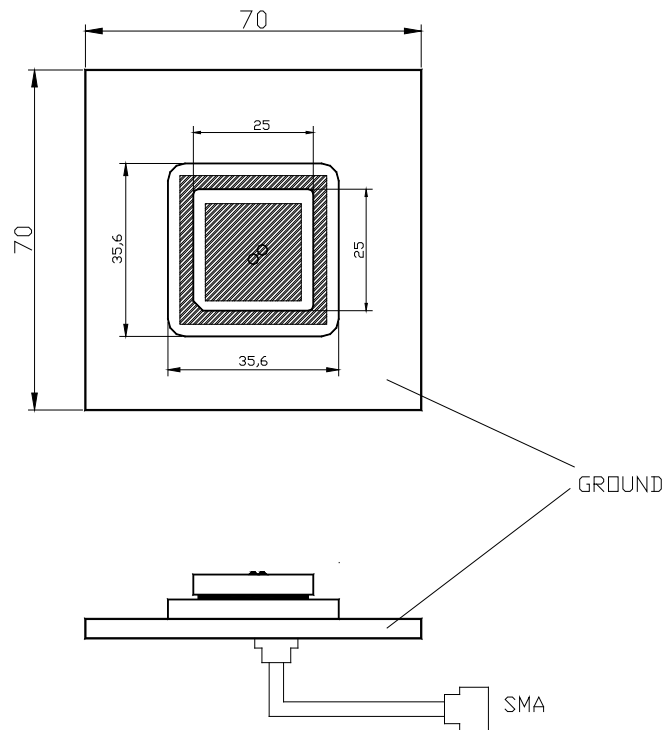


APAKM3513-SGL2



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

## Test Jig



# 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

## 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

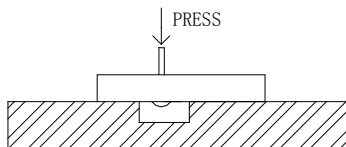


Table 1

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

# 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

## 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

**ATTENTION:** Abracon LLC's products are COTS – Commercial-Off-The-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. Abracon's products are not specifically designed for Military, Aviation, Aerospace, Life-dependent Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from Abracon LLC is required. Please contact Abracon LLC for more information.



5101 Hidden Creek Ln Spicewood TX 78669  
Phone: 512-371-6159 | Fax: 512-351-8858  
For terms and conditions of sales, please visit:  
[www.abracon.com](http://www.abracon.com)

REVISED: 06-13-19

ABRACON IS  
ISO9001-2015  
CERTIFIED