



# Antenna Datasheet

**Product OC:** YFGC040WWA

**Version:** 1.3

**Date:** 2024-12-16

**Status:** Released

**Product Name:** Passive GNSS L1 Antenna

**Key Features:**

Frequency Band: 1559–1606 MHz

Dimensions: 40 mm × 40 mm × 4 mm

Efficiency: Up to 72.6 %

RoHS and REACH Compliant

# Overview

This Quectel GNSS antenna adopts a diversity of forms to guarantee the most suitable polarization type. Quectel's positioning products support single-band or multi-band operation modes to meet various high-precision positioning requirements of customers' products. Quectel provides both passive and active antennas to satisfy the customer demand for high gain. Such antenna supports different installation or connection methods such as pin mount, surface mount, magnetic mount, internal cable, and external SMA. Customized connector type and cable length are provided according to requirements.

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# 1 Specification

Test Condition: on 70 mm × 70 mm PCB

## 1.1. Electrical

Electrical	
Frequency Range	1559–1606 MHz
Impedance	50 Ω
Polarization	RHCP
Radiation Pattern	Directional

Band Frequency (MHz)	GPS L5 GALILEO E5a BDS B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BDS B2b	GPS L2 QZSS L2C	GLONASS G2	BDS B3	BDS B1I	GPS L1 GALILEO E1 BDS B1C QZSS L1	GLONASS G1
	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	1.3	1.2	1.2
Return Loss (dB)	-	-	-	-	-	-19.1	-20.1	-20.35
Efficiency (%)	-	-	-	-	-	66.5	72.6	69.6
Peak Gain (dBi)	-	-	-	-	-	3.5	4.3	4.2
Axial Ratio (dB)	-	-	-	-	-	2.34	2.32	2.12

## 1.2. Mechanical & Environmental

Mechanical	
Antenna Dimensions	40 mm × 40 mm × 4 mm
Material	Ceramic
Mounting Type	Adhesive & Soldering
Weight	Typ. 23.2 g
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
Recommended Reflow Temperature and Time	260 °C & 5 s
RoHS & REACH Compliant	Yes

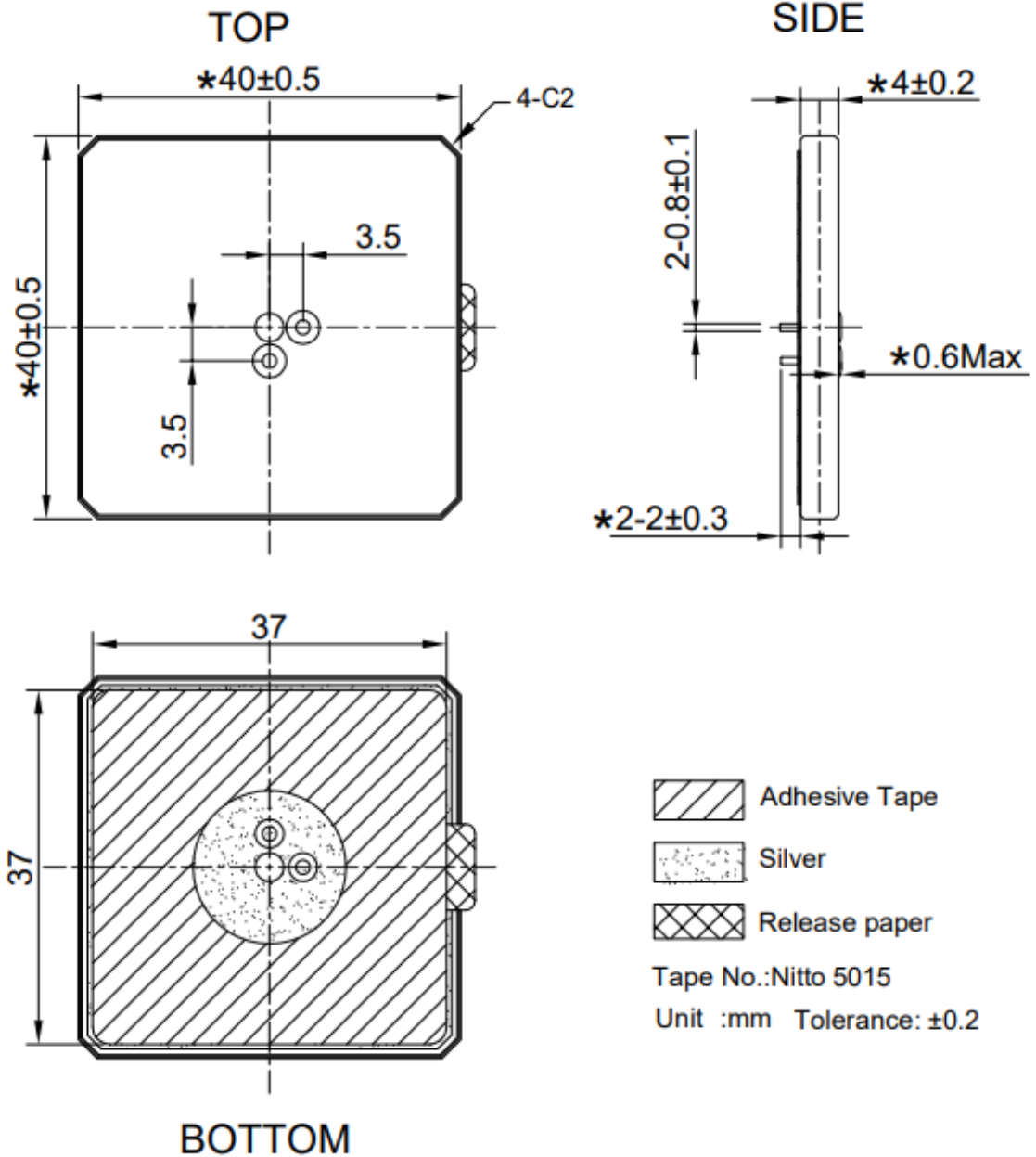
### 1.3. Supported GNSS Frequency Bands

GNSS Frequency Bands (MHz)					
<b>GPS</b>	<b>L1</b> Centre 1575.42 (1565–1586)	<b>L2</b> Centre 1227.6 (1217–1238)	<b>L5</b> Centre 1176.45 (1164–1189)		
	√	-	-		
<b>GLONASS</b>	<b>G1-L10C-L10F</b> Centre 1601 (1595–1606)	<b>G2-L20C-L20F</b> Centre 1248.06 (1241–1255)	<b>G3-L30C</b> Centre 1202.025 (1189–1213)		
	√	-	-		
<b>GALILEO</b>	<b>E1</b> Centre 1575.42 (1563–1588)	<b>E5a</b> Centre 1176.45 (1166–1187)	<b>E5b</b> Centre 1207.14 (1197–1218)	<b>E6</b> Centre 1278.75 (1258–1300)	
	√	-	-	-	
<b>BDS</b>	<b>B1I</b> Centre 1561.098 (1559–1564)	<b>B1C (BDS-3)</b> Centre 1575.42 (1559–1592)	<b>B2a-B2I</b> Centre 1176.45 (1166–1187)	<b>B2b</b> Centre 1207.14 (1197–1217)	<b>B3</b> Centre 1268.52 (1258–1279)
	√	√	-	-	-
<b>QZSS</b>	<b>L1</b> Centre 1575.42 (1573–1578)	<b>L2C</b> Centre 1227.6 (1226–1229)	<b>L5</b> Centre 1176.45 (1166–1187)	<b>L6</b> Centre 1278.75 (1257–1300)	
	√	-	-	-	
<b>IRNSS</b>	<b>L5</b> Centre 1176.45 (1164–1189)				
	-				

**GNSS Bands and Constellations**



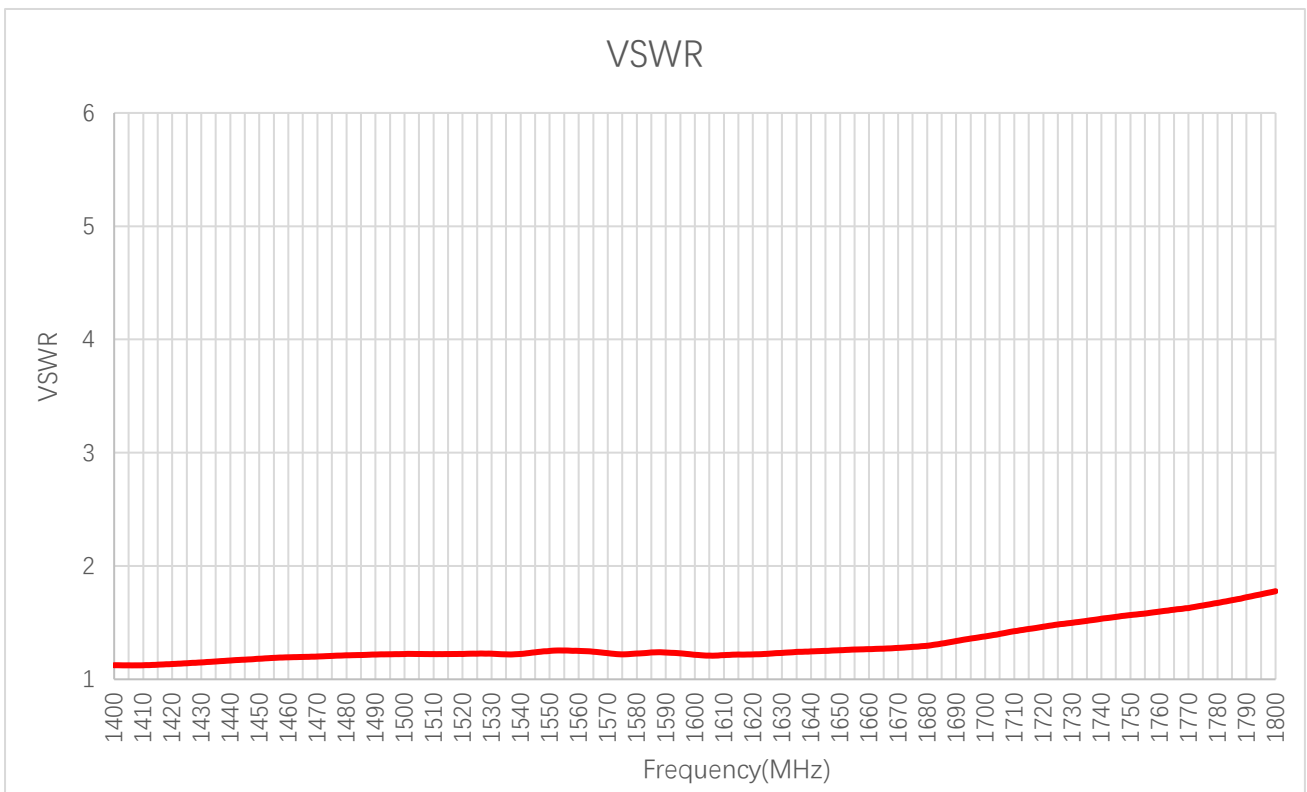
# 2 Drawing



# 3 Detailed Performance

## 3.1. S-Parameter Test

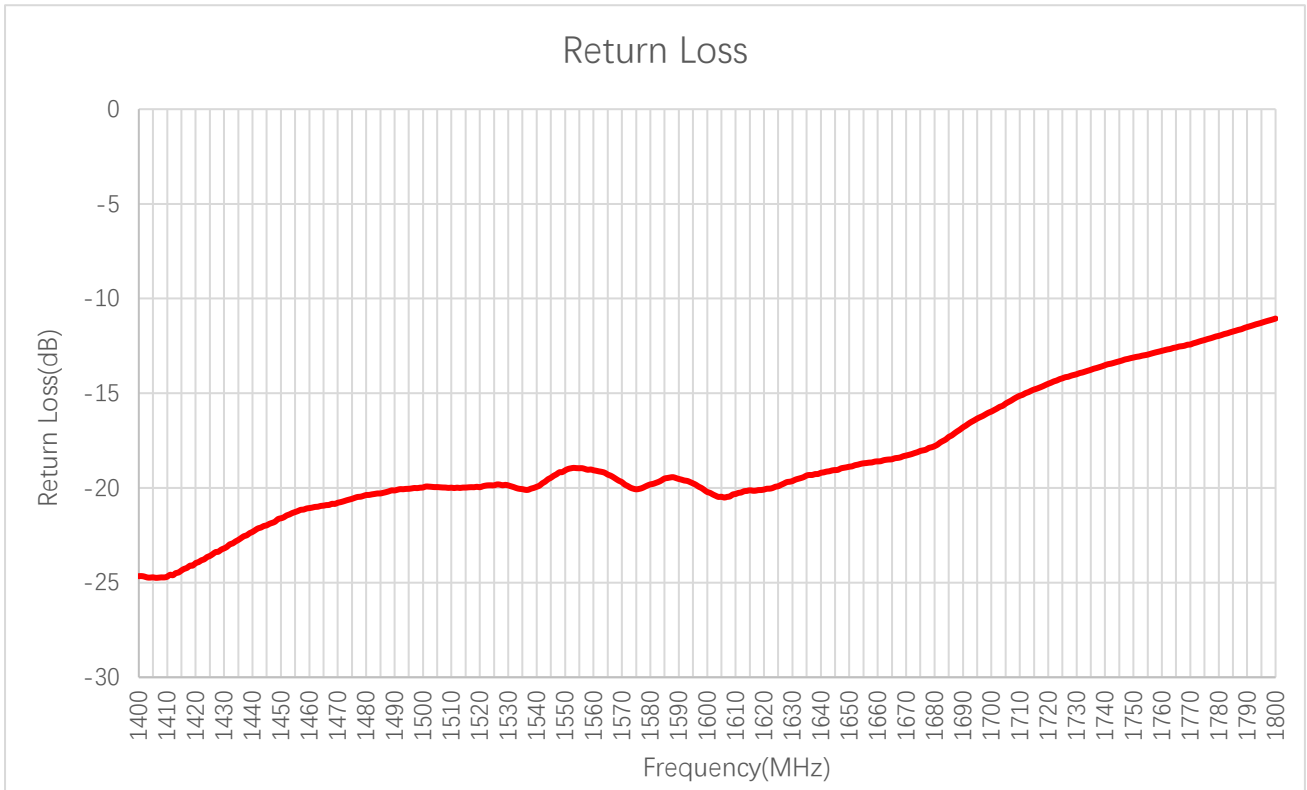
### 3.1.1. VSWR



**VSWR**

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	1.3	1.2	1.2

**3.1.2. Return Loss**

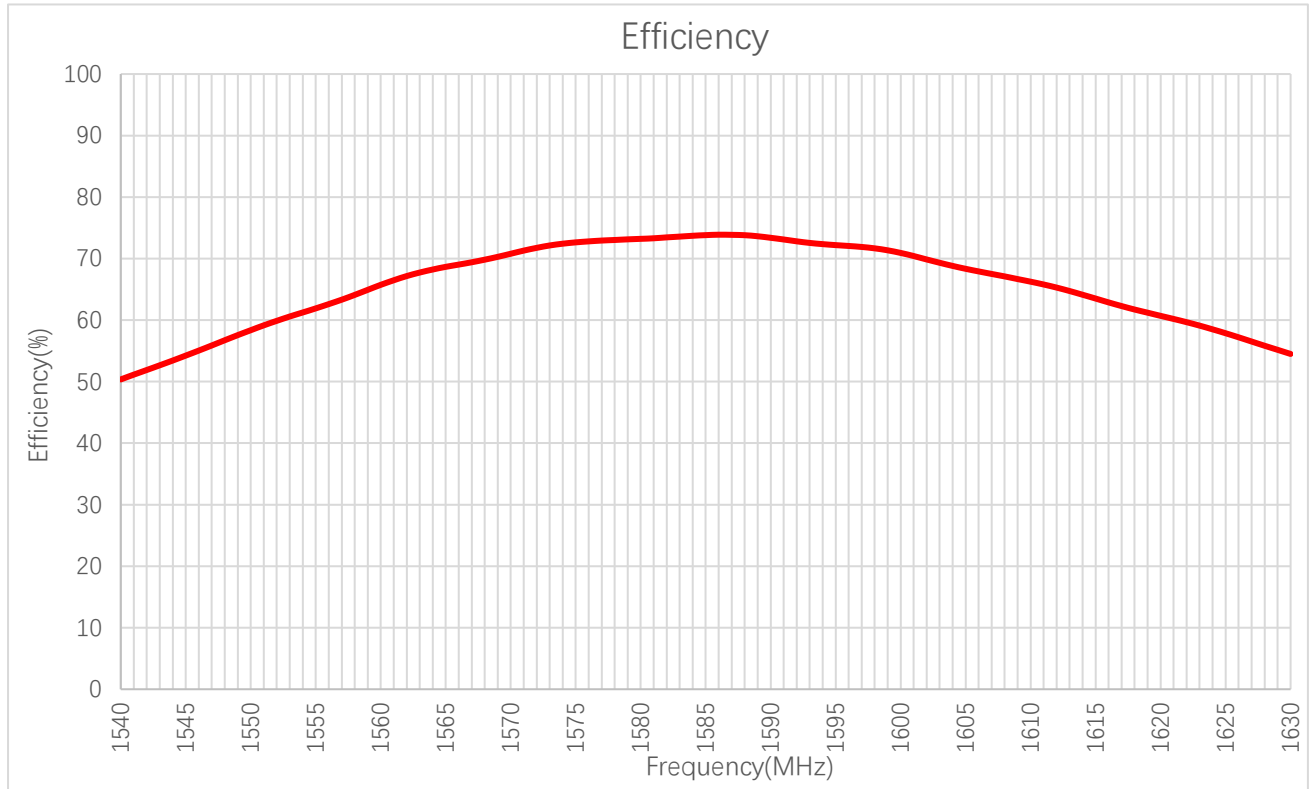


**Return Loss (dB)**

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-	-	-	-	-	-19.1	-20.1	-20.35

### 3.2. Radiation Performance Test

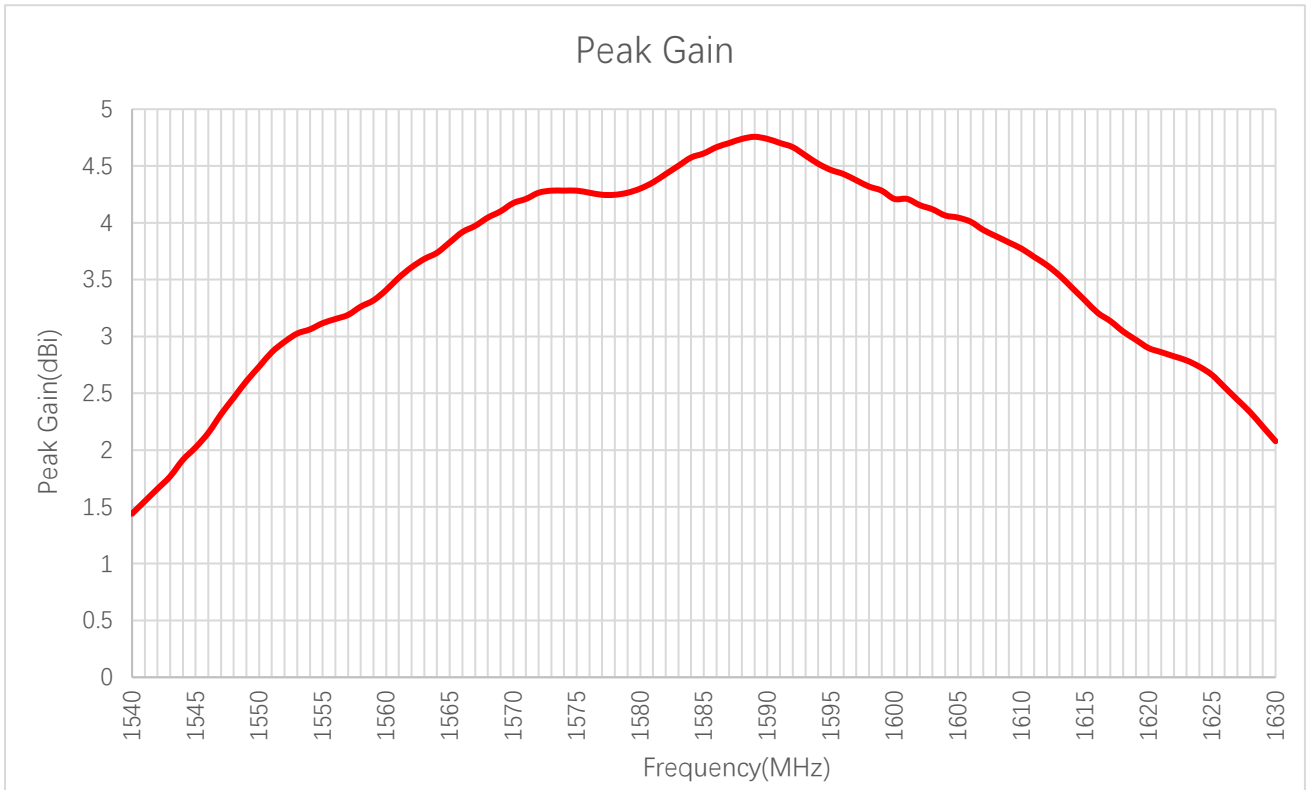
#### 3.2.1. Efficiency



**Efficiency (%)**

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	-	-	-	-	-	66.5	72.6	69.6

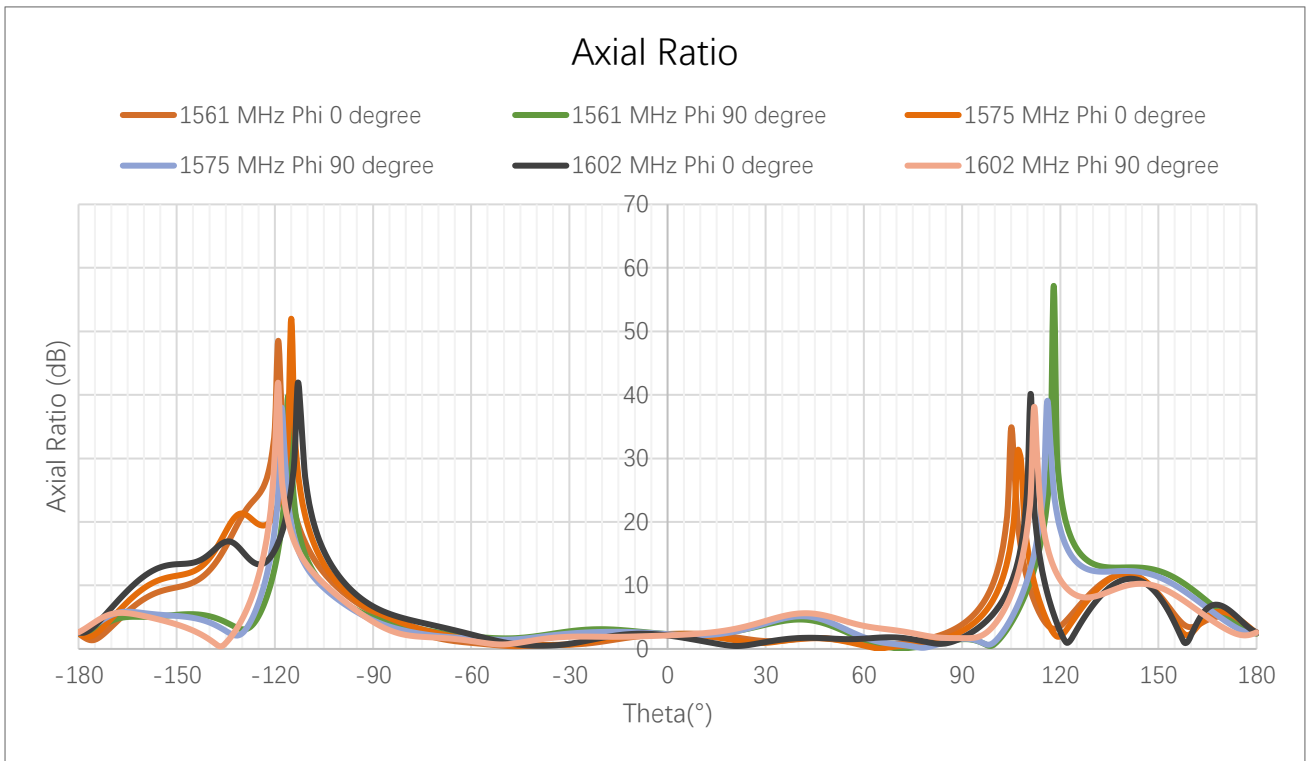
**3.2.2. Peak Gain**



**Peak Gain (dBi)**

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	-	-	-	-	-	3.5	4.3	4.2

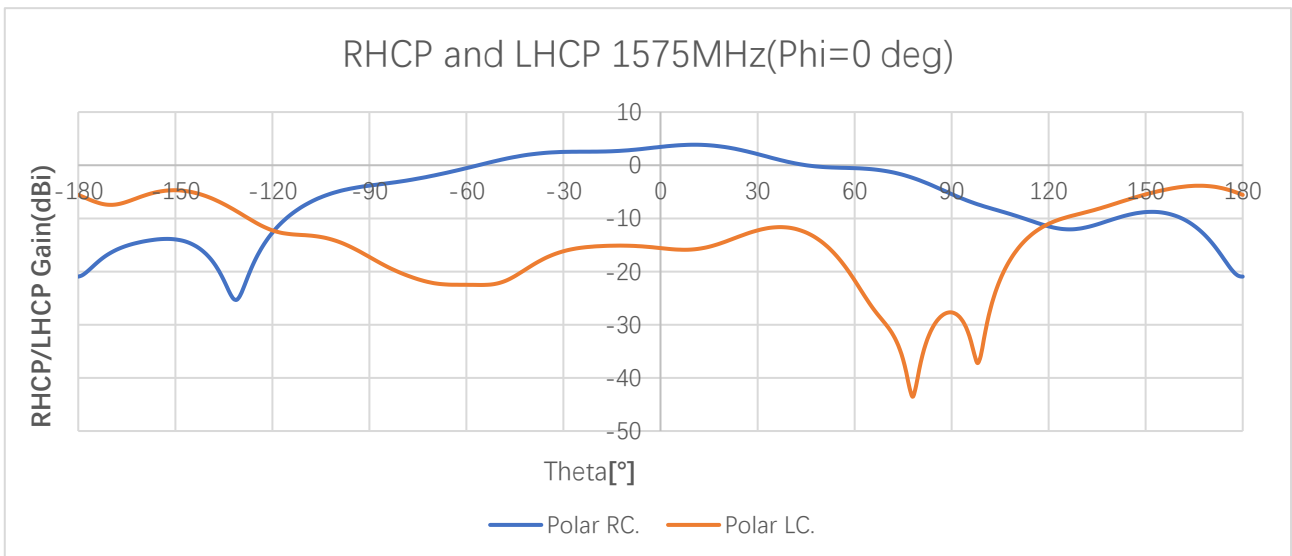
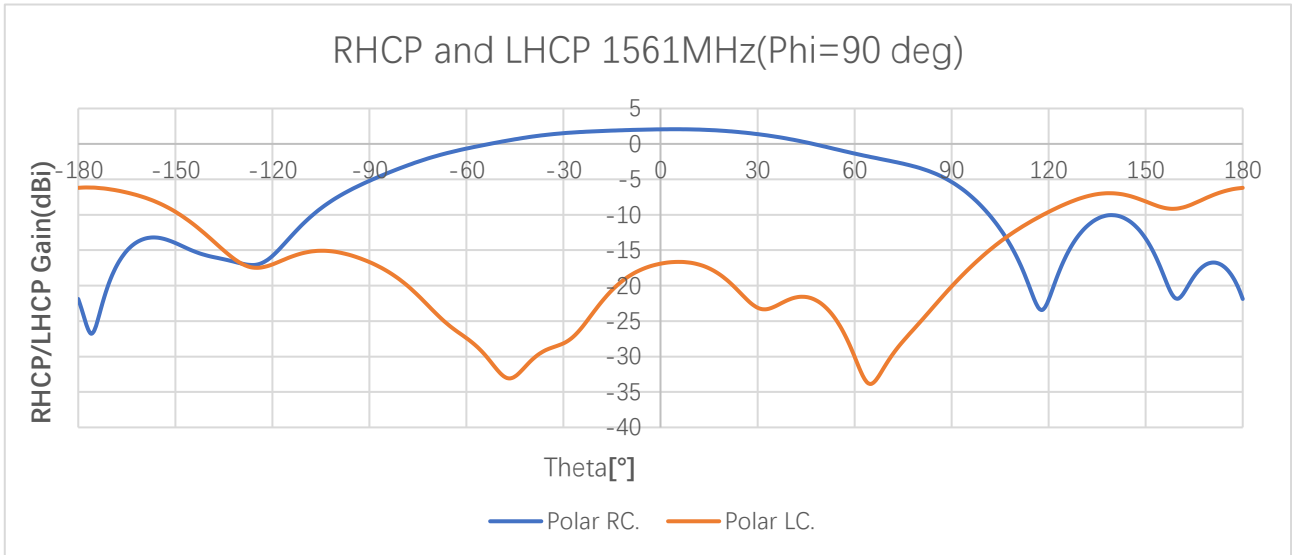
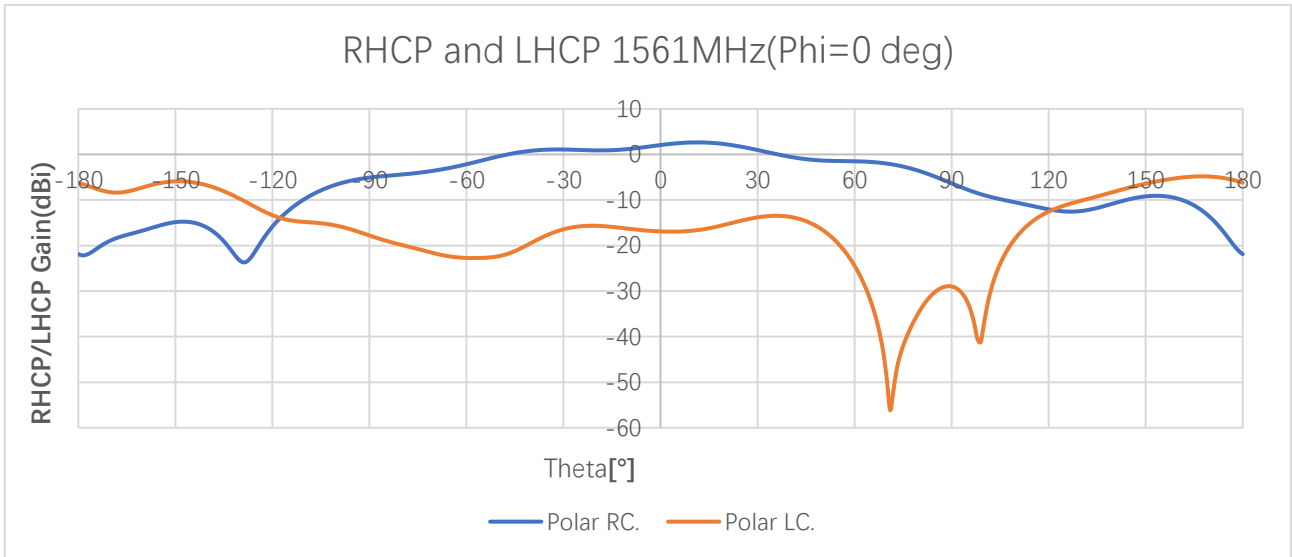
**3.2.3. Axial Ratio**

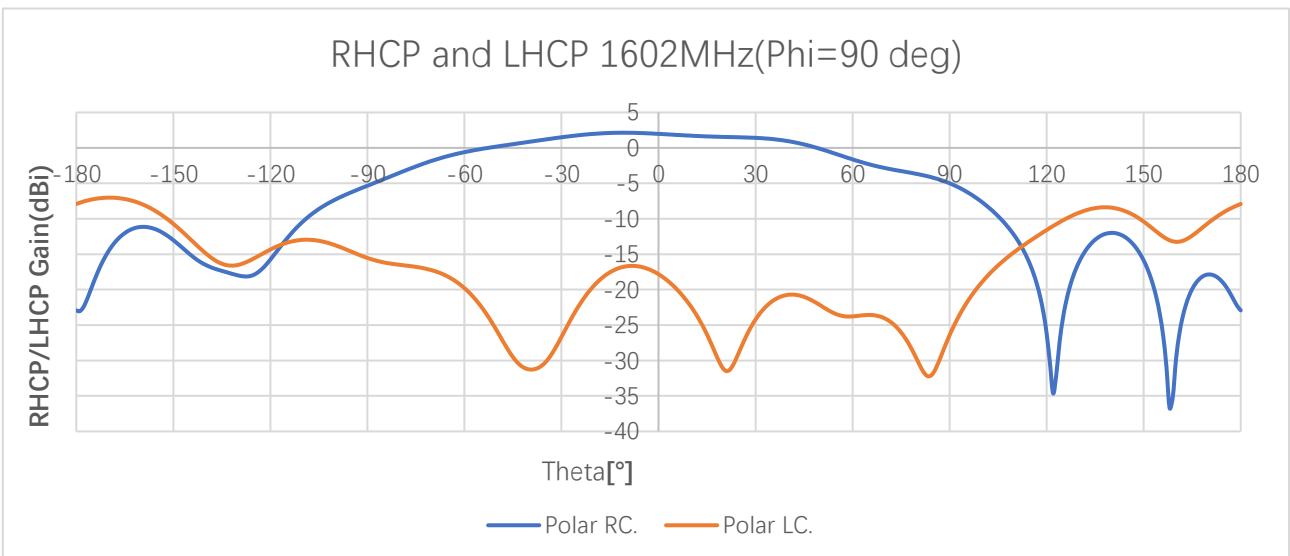
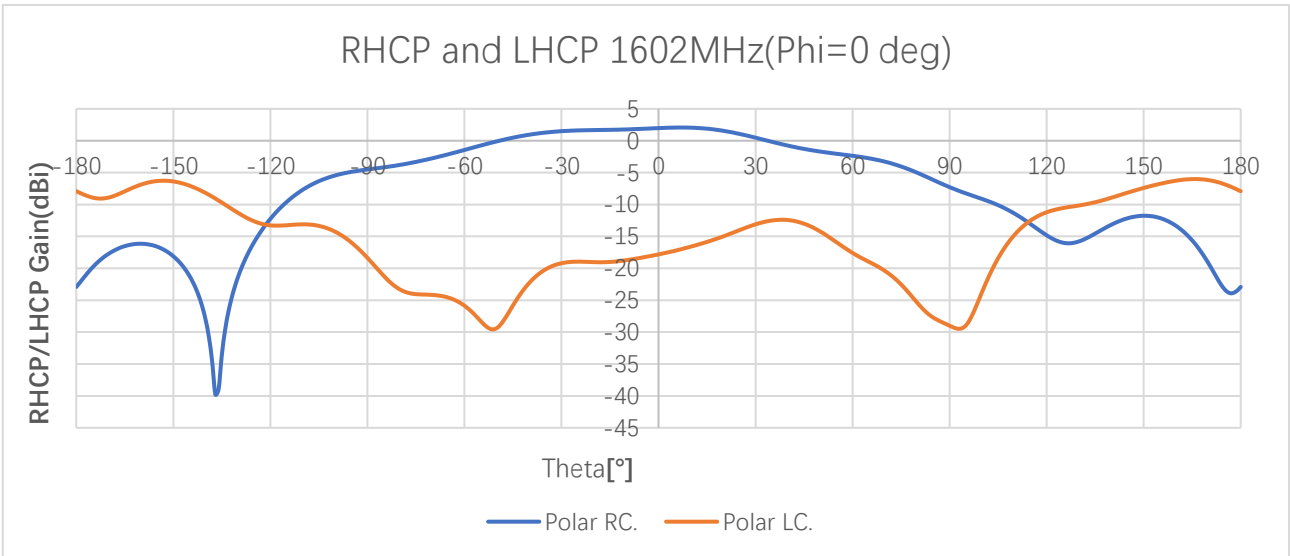
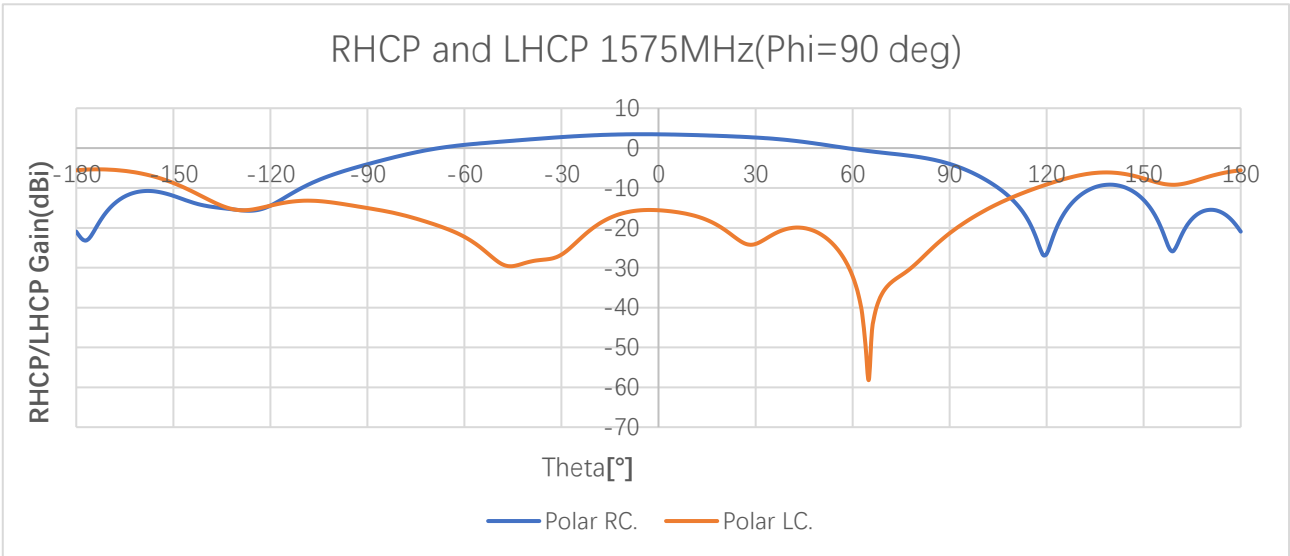


**Axial Ratio (dB)**

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Axial Ratio (dB)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	2.34	2.32	2.12
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	2.34	2.32	2.12

**3.2.4. 2D RHCP and LHCP Gain**



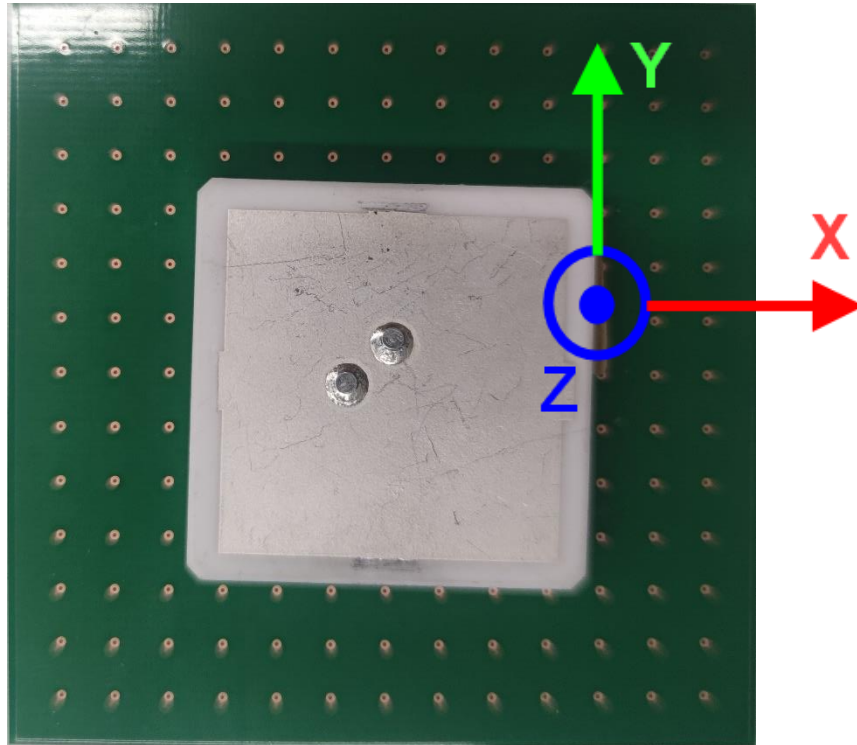


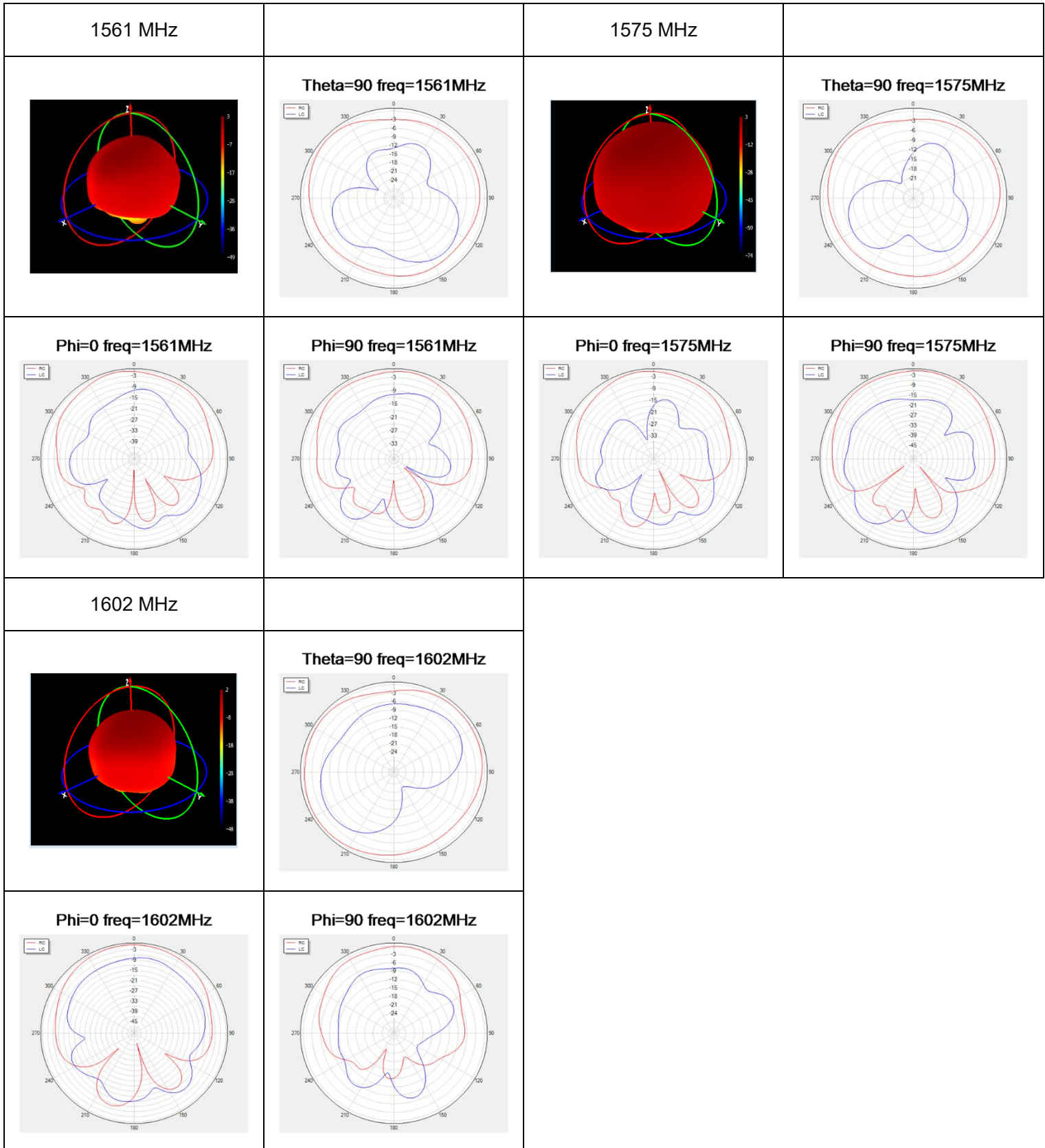
2D RHCP and LHCP Gain (dBi)

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
RHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	2.1	3.5	2.0
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	2.1	3.5	2.0
LHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-16.9	-15.9	-17.9
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-16.9	-15.9	-17.9

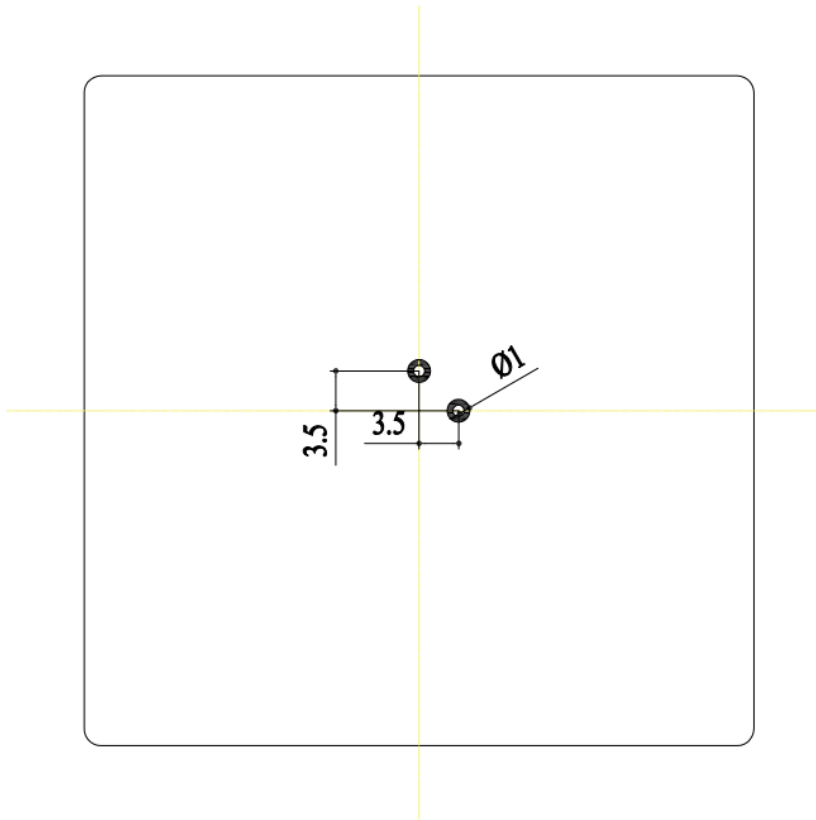
### 3.2.5. 3D & 2D Radiation Pattern

- Test Condition: on 70 mm x 70 mm PCB
- Test Chamber: GL-S-1



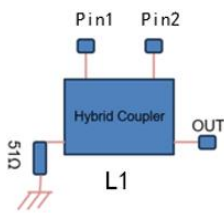


# 4 PCB Footprint Recommendation

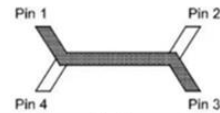


# 5 Pin Definition

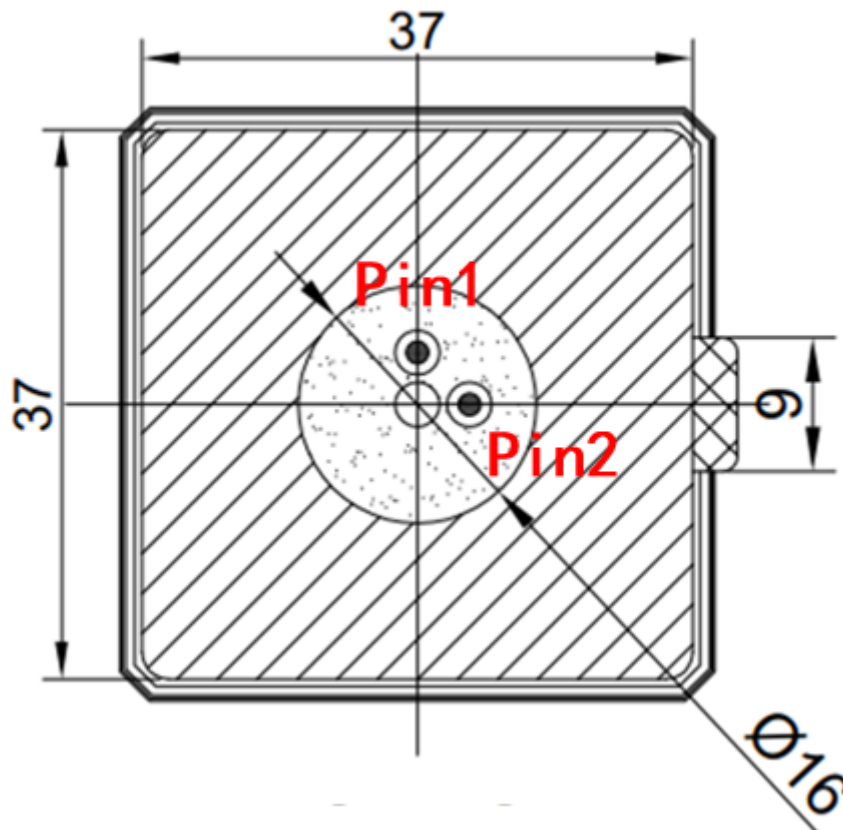
- The pin definition is used to connect the hybrid coupler to ensure Axial Ratio and RHCP.



Antenna Pin	Description
Pin1	0° degree
Pin2	-90° degree



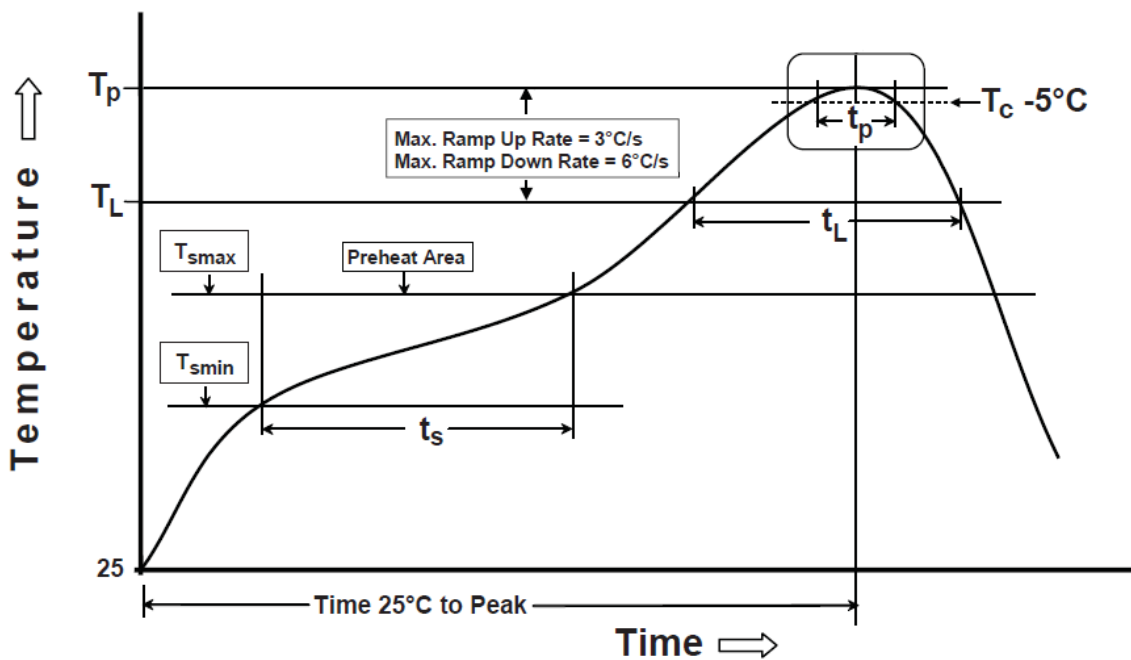
Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Splitter	Input	Isolated	-3dB $\angle\theta - 90$	-3dB $\angle\theta$
Splitter	Isolated	Input	-3dB $\angle\theta$	-3dB $\angle\theta - 90$
Splitter	-3dB $\angle\theta - 90$	-3dB $\angle\theta$	Input	Isolated
Splitter	-3dB $\angle\theta$	-3dB $\angle\theta - 90$	Isolated	Input
*Combiner	A $\angle\theta - 90$	A $\angle\theta$	Isolated	Output
*Combiner	A $\angle\theta$	A $\angle\theta - 90$	Output	Isolated
*Combiner	Isolated	Output	A $\angle\theta - 90$	A $\angle\theta$
*Combiner	Output	Isolated	A $\angle\theta$	A $\angle\theta - 90$



# 6 Recommended Reflow Soldering Profile

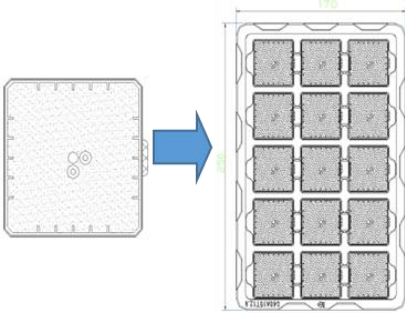
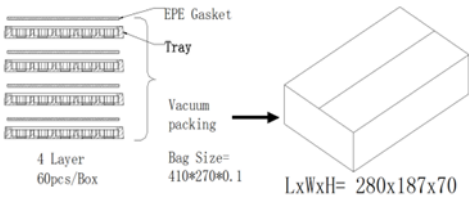
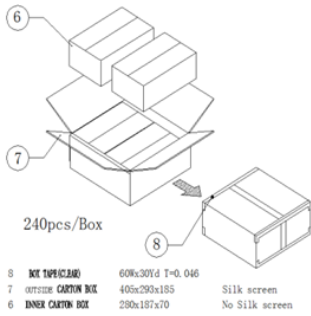
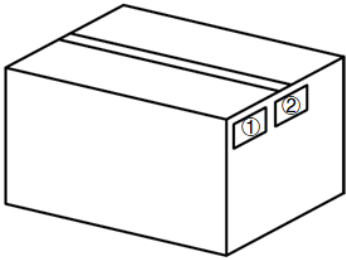
- SOLDER PASTE: Sn/Ag/Cu: 96.5/3.0/0.5
- Recommended reflow condition:

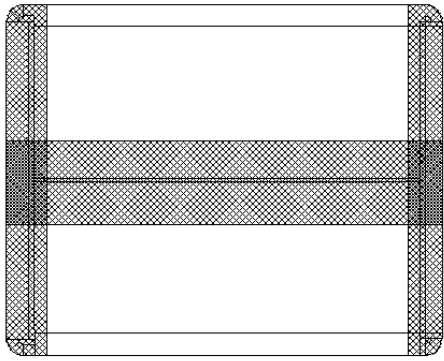
The graphic shows temperature profile for component assembly process in reflow ovens



Phase	Profile Features	Pb-Free Assembly (SnAgCu)
<b>PREHEAT</b>	-Temperature Min (T <sub>smin</sub> ) -Temperature Max (T <sub>smax</sub> ) -Time(t <sub>s</sub> ) form (T <sub>smin</sub> to T <sub>smax</sub> )	150 °C 200 °C 60–120 seconds
<b>RAMP-UP</b>	Avg. Ramp-up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3 °C /second (max)
<b>REFLOW</b>	-Temperature (T <sub>L</sub> ) -Total Time above T <sub>L</sub> (t <sub>L</sub> )	217 °C 30–100 seconds
<b>PEAK</b>	-Temperature (T <sub>p</sub> ) -Time (t <sub>p</sub> )	260 °C 3 seconds
<b>RAMP-DOWN</b>	Rate	6 °C / second max.
Time from 25 °C to Peak Temperature		8 minutes max.

# 7 Packaging

Step	Packaging Picture / 2D Picture	Description									
1		(15 PCS Antennas / Tray)									
2		The inner box contains 4 plastic trays. (60 PCS Antennas / Inner Box)									
3	 <p>240pcs/Box</p> <table border="0"> <tr> <td>8 BOX TAPES/CLAMP</td> <td>600x300d T=0.046</td> <td>Silk screen</td> </tr> <tr> <td>7 OUTSIDE CARTON BOX</td> <td>405x293x185</td> <td>No Silk screen</td> </tr> <tr> <td>6 INNER CARTON BOX</td> <td>280x187x70</td> <td></td> </tr> </table>	8 BOX TAPES/CLAMP	600x300d T=0.046	Silk screen	7 OUTSIDE CARTON BOX	405x293x185	No Silk screen	6 INNER CARTON BOX	280x187x70		(4 Inner Box / Carton Box) (240 PCS Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. <b>Carton Size:</b> <u>L x W x H = 405 x 293 x 185 mm</u>
8 BOX TAPES/CLAMP	600x300d T=0.046	Silk screen									
7 OUTSIDE CARTON BOX	405x293x185	No Silk screen									
6 INNER CARTON BOX	280x187x70										
4		<b>Position for Attaching Labels</b> ① Carton Label ② Quality Label									

5	 A technical drawing of an H-shaped sealing carton. It consists of a central horizontal band with a cross-hatched texture, flanked by two vertical bands of the same texture. The bands are connected at the top and bottom corners, forming a rectangular frame with a central opening.	<p><b>Sealing Cartons</b> H-shaped sealing cartons</p>
Note	<p>The initial packaging method described above is for reference only, and the final actual packaging method shall be subject to the actual shipping packaging.</p>	

# Contact Us

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

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Email: [info@quectel.com](mailto:info@quectel.com)

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# Revision History

Version	Date	Author	Note
-	2024-02-07	Rhone WEI/ Lucky FENG/ David LIU/ Rainey LIAO	Creation of the document
1.0	2024-02-07	Rhone WEI/ Lucky FENG/ David LIU/ Rainey LIAO	First official release
1.1	2024-02-28	Rhone WEI/ Lucky FENG	1. Update the drawing (Chapter 2). 2. Added Chapter 5.
1.2	2024-03-08	Rhone WEI/ Lucky FENG	1. Updated the drawing (Chapter 2). 2. Updated the pin definition drawing (Chapter 5).
1.3	2024-12-16	Lucky FENG	1. Updated the drawing (Chapters 2 & 4). 2. Added Chapter 6.

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