



Antenna Datasheet

Product OC: YFGC009WWA

Version: 1.3

Date: 2025-07-14

Status: Released

Product Name: GNSS SMT Mount Ceramic Patch Passive Embedded
Antenna

Key Features:

Frequency Band: 1559–1606 MHz

Dimensions: 15 mm × 15 mm × 4 mm

Efficiency: Up to 57.1 %

RoHS and REACH Compliant

Overview

The Quectel YFGC009WWA is a high-performance GNSS SMT mount ceramic patch passive embedded antenna, ideal for precise positioning applications. Operating in the 1559–1606 MHz frequency range with 50 Ω impedance and RHCP polarization, it supports key GNSS bands including GPS L1, GLONASS G1, GALILEO E1, BDS B1I/B1C, and QZSS L1.

Boasting a compact 15 mm × 15 mm × 4 mm size and 4.6 g weight, it fits seamlessly into space-constrained designs. With efficiency up to 57.1 %, peak gain of 0.86 dBi, and directional radiation, it delivers reliable signal reception.

RoHS and REACH compliant, it ensures environmental safety. The antenna features a recommended 70 mm × 70 mm PCB footprint and Sn/Ag/Cu reflow soldering profile, simplifying integration. Packaged in blister trays (70 pcs) and cartons (1400 pcs), it's designed for easy handling and mass deployment, making it a top choice for various GNSS-enabled devices.

Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs. We have regional R & D centers to offer quick response to meet your requirements. Please contact our sales & FAEs if you have any requests.

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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	-	-	-	-	-	8.8	1.8	1.6
Return Loss (dB)	-	-	-	-	-	-1.9	-10.6	-13.2
Efficiency (%)	-	-	-	-	-	23.4	53	57.1
Peak Gain (dBi)	-	-	-	-	-	-3.9	0.2	0.86
Axial Ratio (dB)	-	-	-	-	-	24.1	14.8	13.6

1.2. Mechanical & Environmental

Mechanical	
Antenna Dimensions	15 mm × 15 mm × 4 mm
Material	Ceramic
Mounting Type	SMD
Weight	Typ. 4.6 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

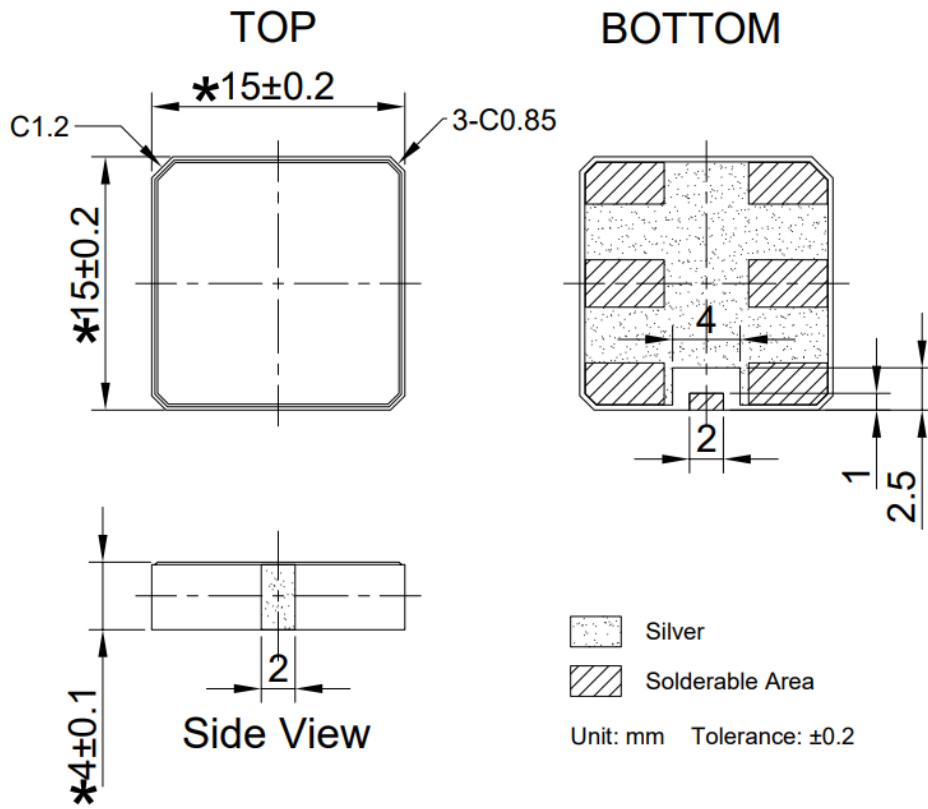
1.3. Supported GNSS Frequency Bands

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

GNSS Bands and Constellations



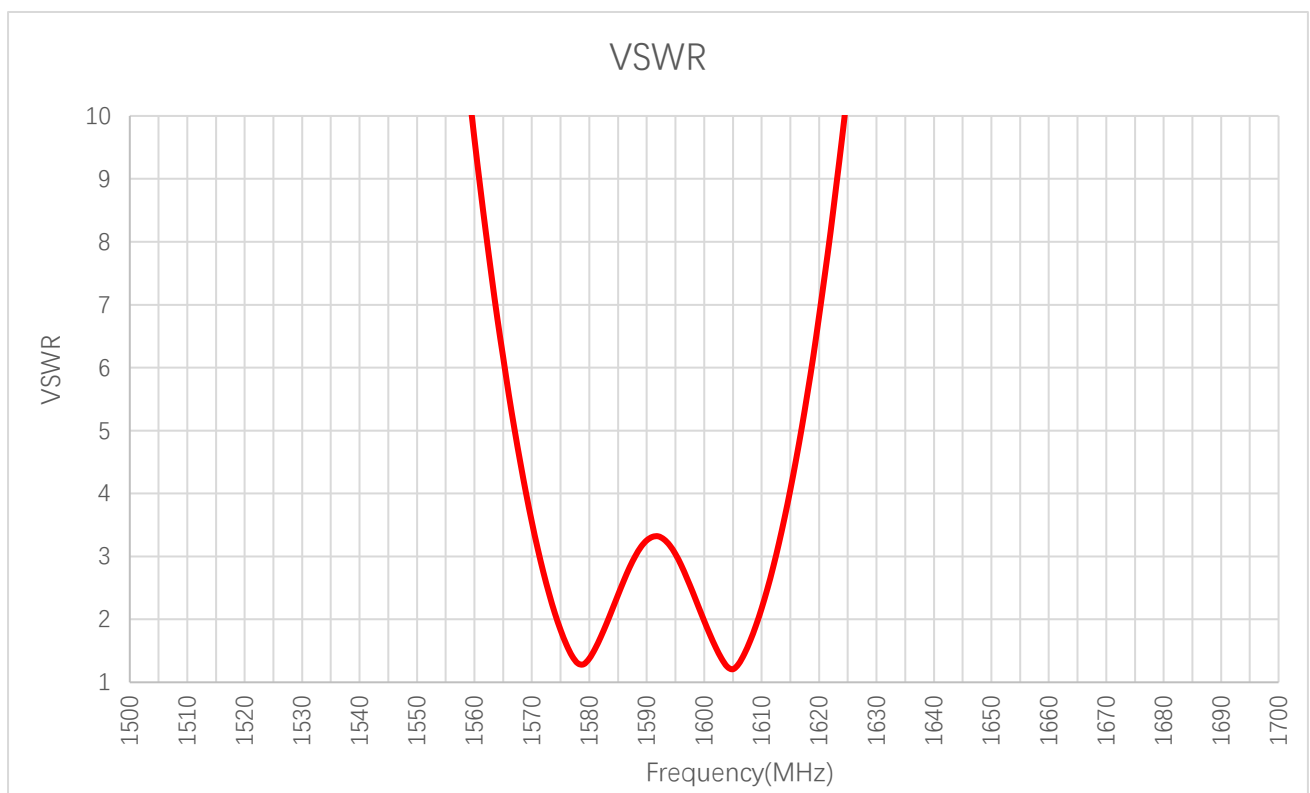
2 Drawing



3 Detailed Performance

3.1. S-Parameter Test

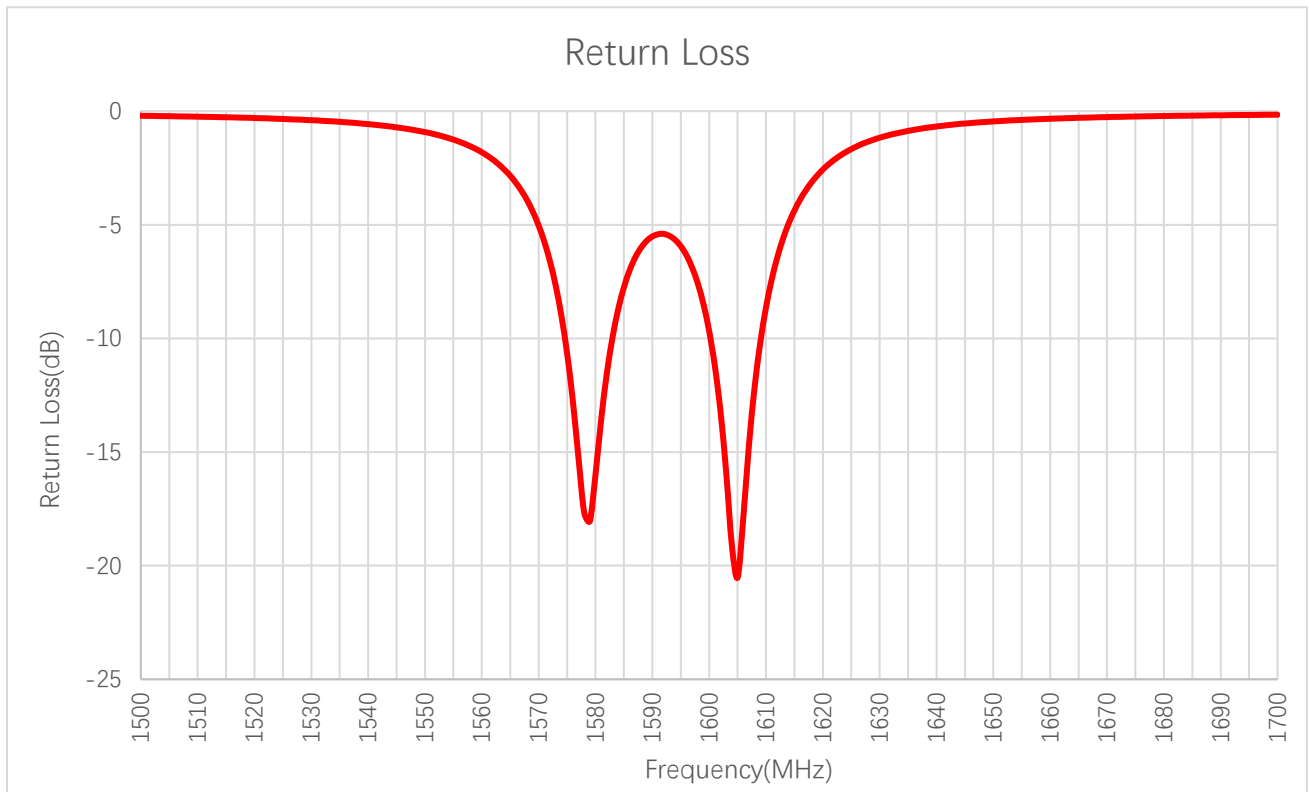
3.1.1. VSWR



VSWR

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	8.8	1.8	1.6

3.1.2. Return Loss

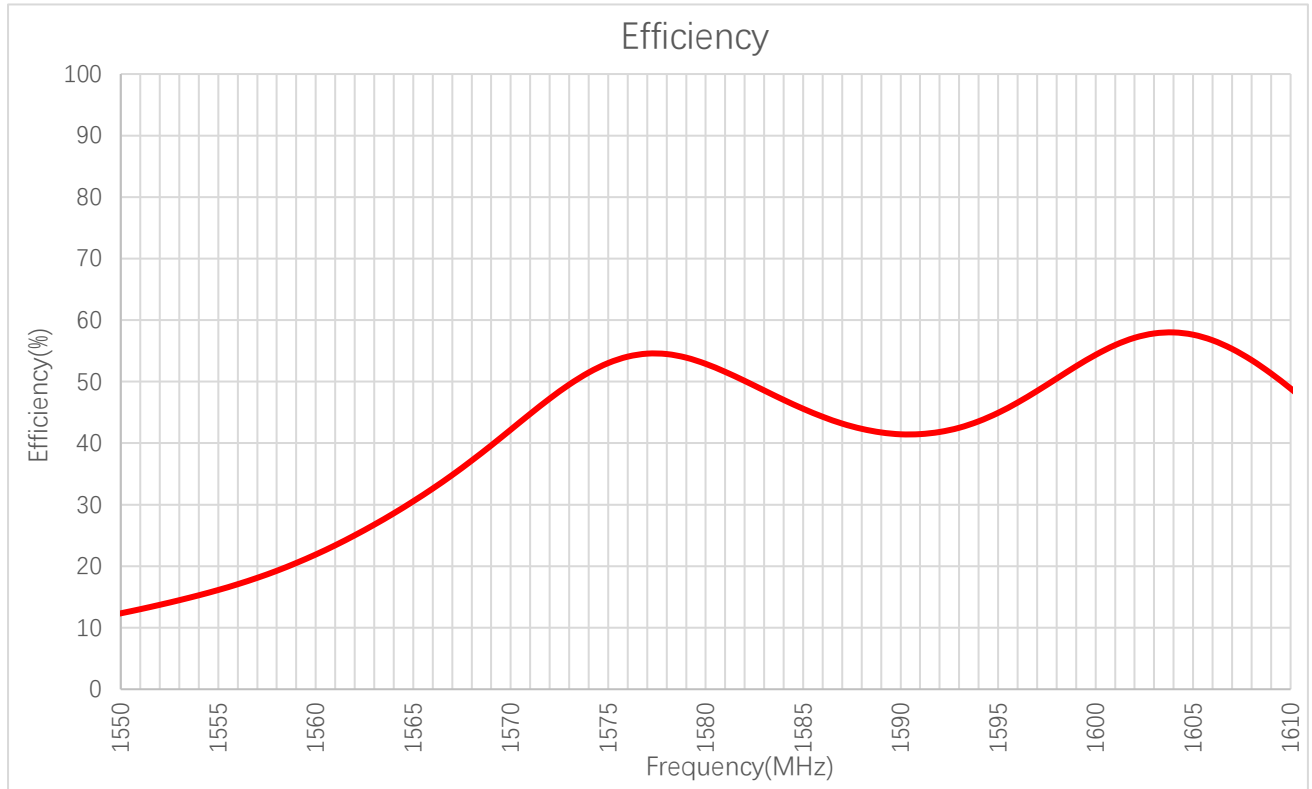


Return Loss (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-	-	-	-	-	-1.9	-10.6	-13.2

3.2. Radiation Performance Test

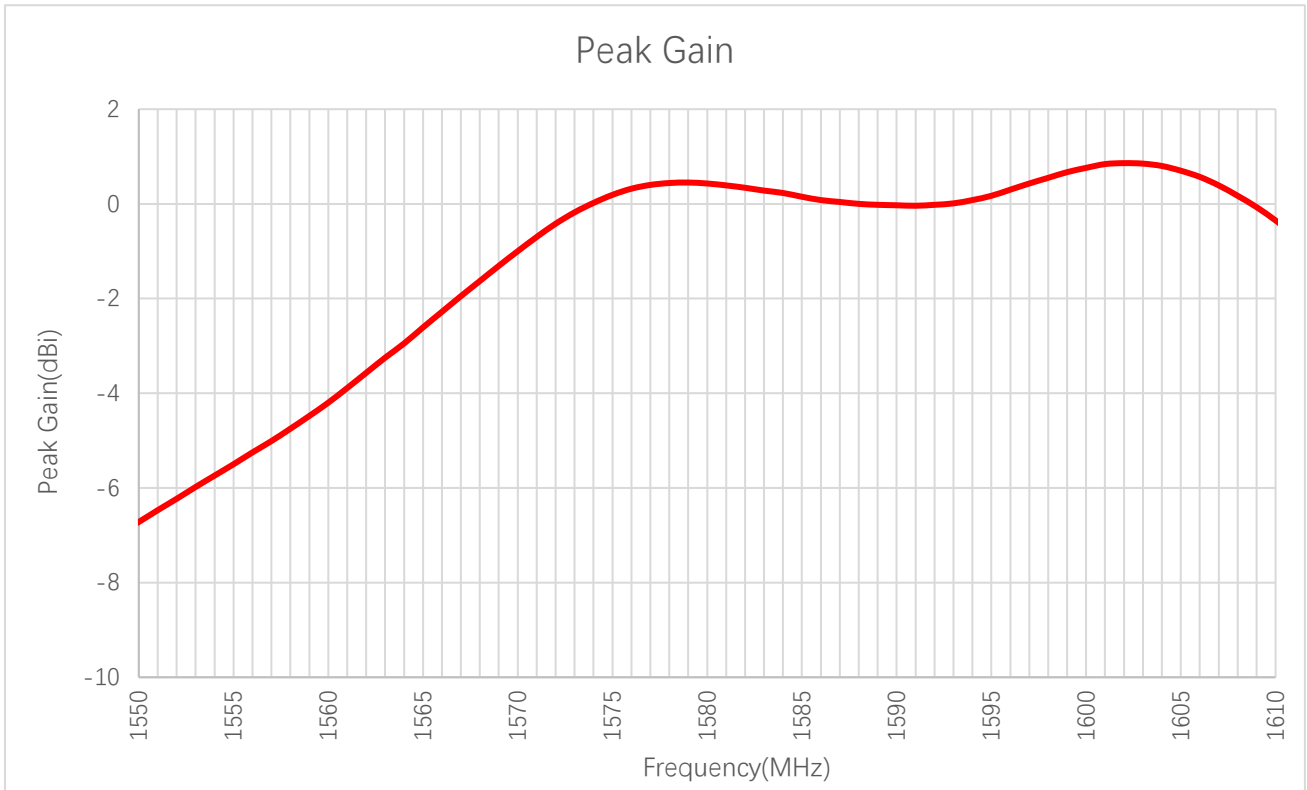
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	-	-	-	-	-	23.4	53	57.1

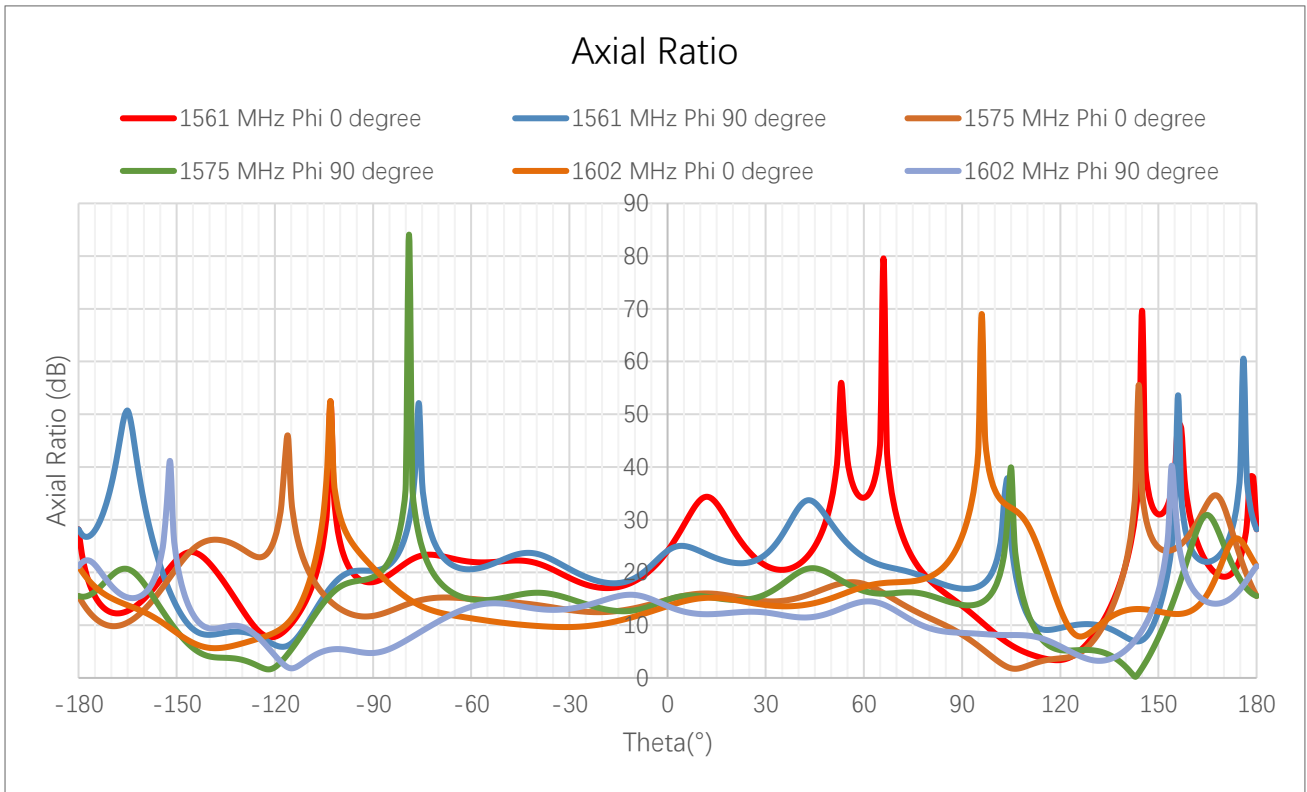
3.2.2. Peak Gain



Peak Gain (dBi)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	-	-	-	-	-	-3.9	0.2	0.86

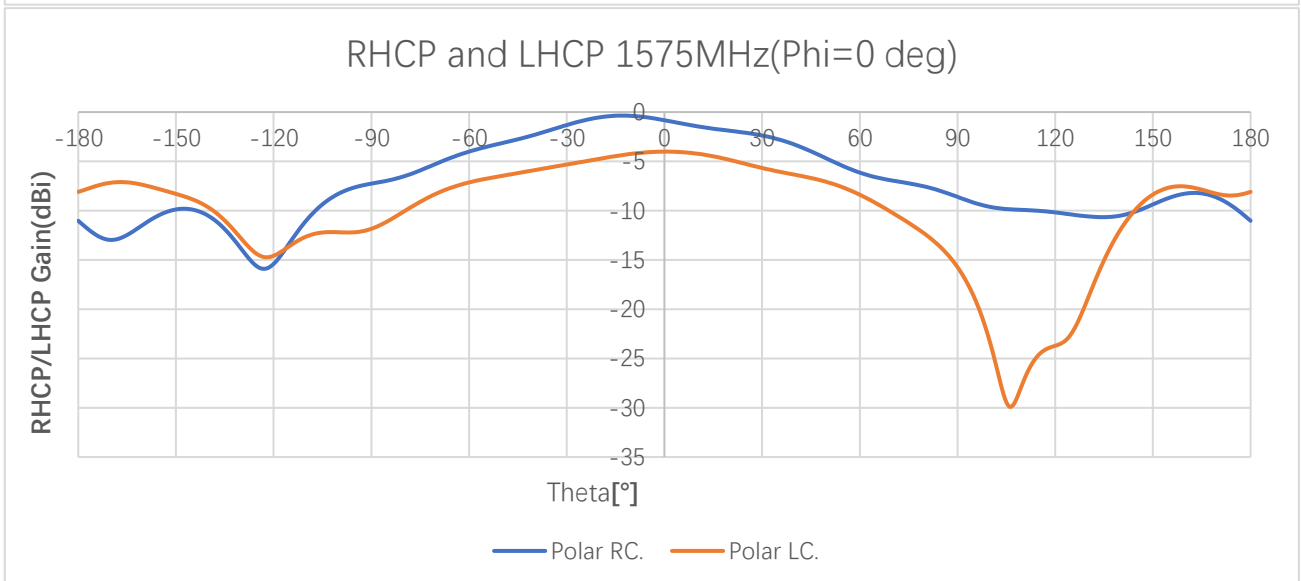
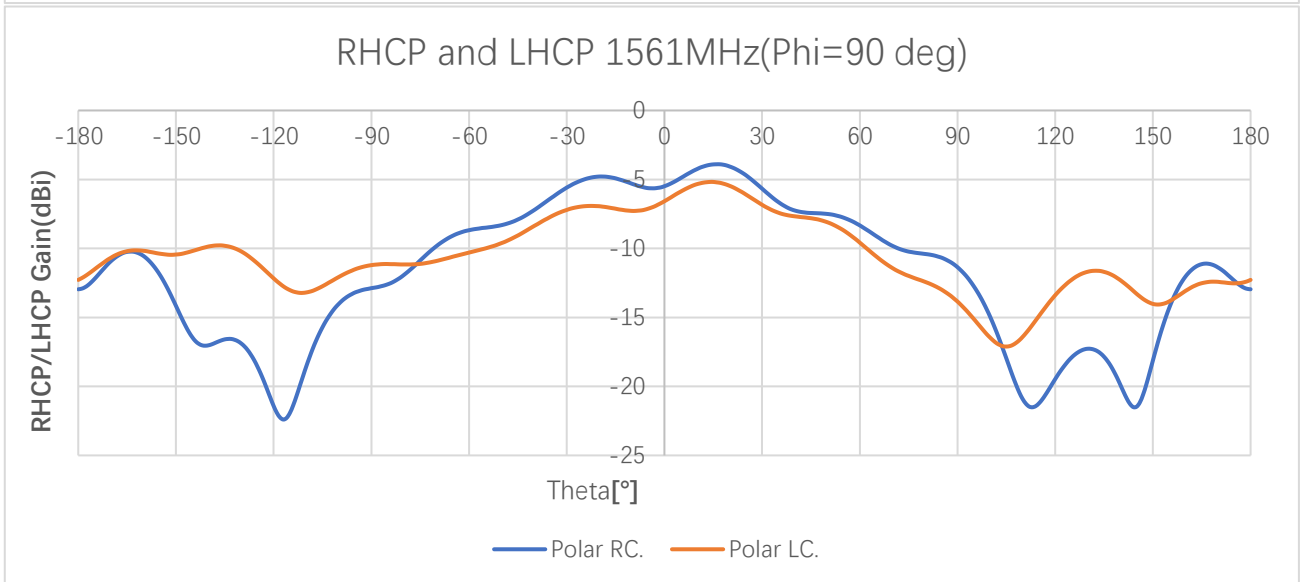
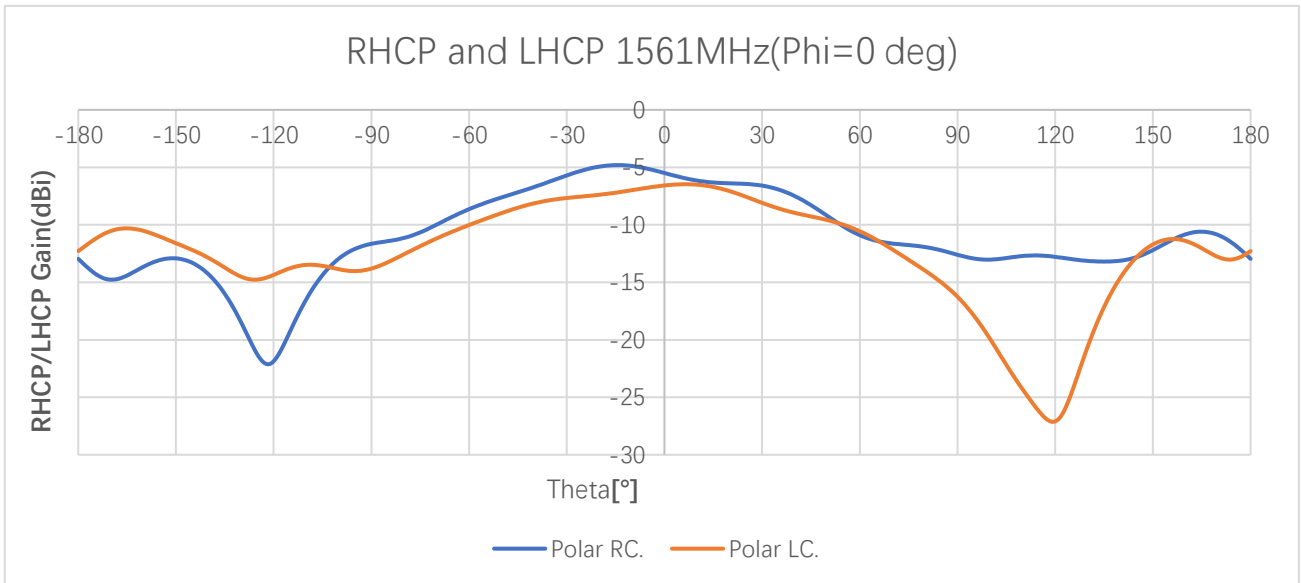
3.2.3. Axial Ratio



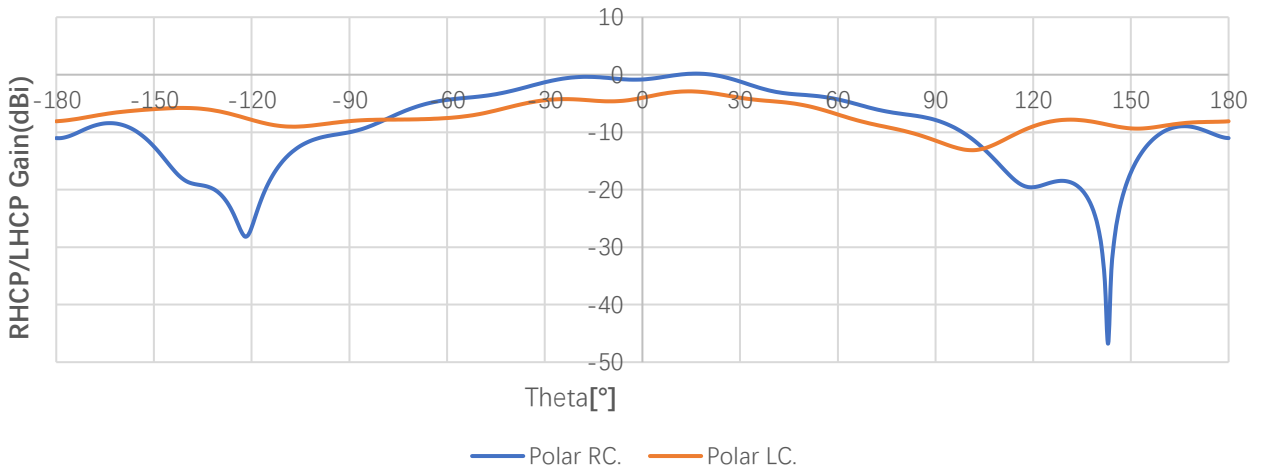
Axial Ratio (dB)

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Axial Ratio (dB)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	24.1	14.8	13.6
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	24.1	14.8	13.6

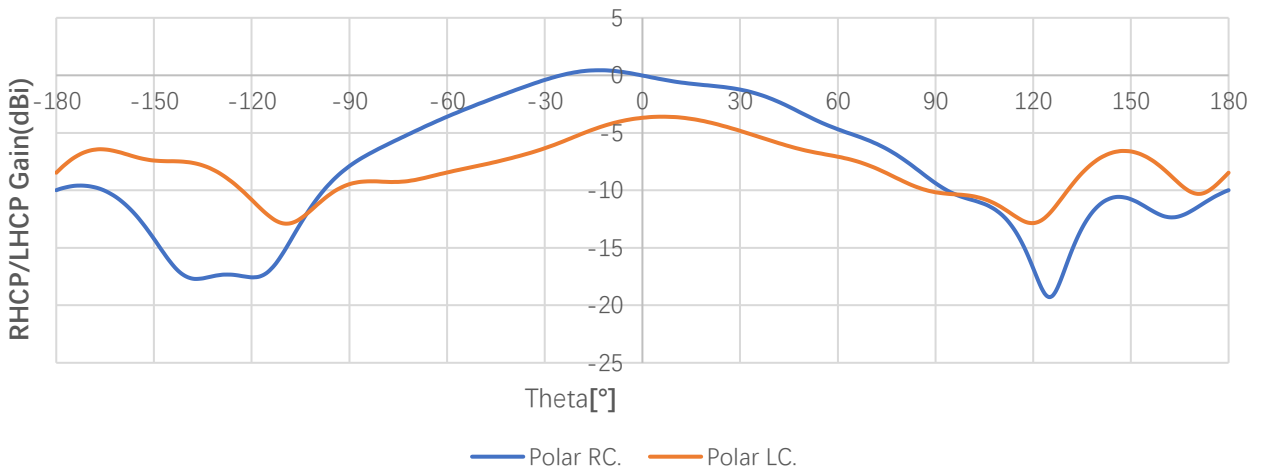
3.2.4. 2D RHCP and LHCP Gain



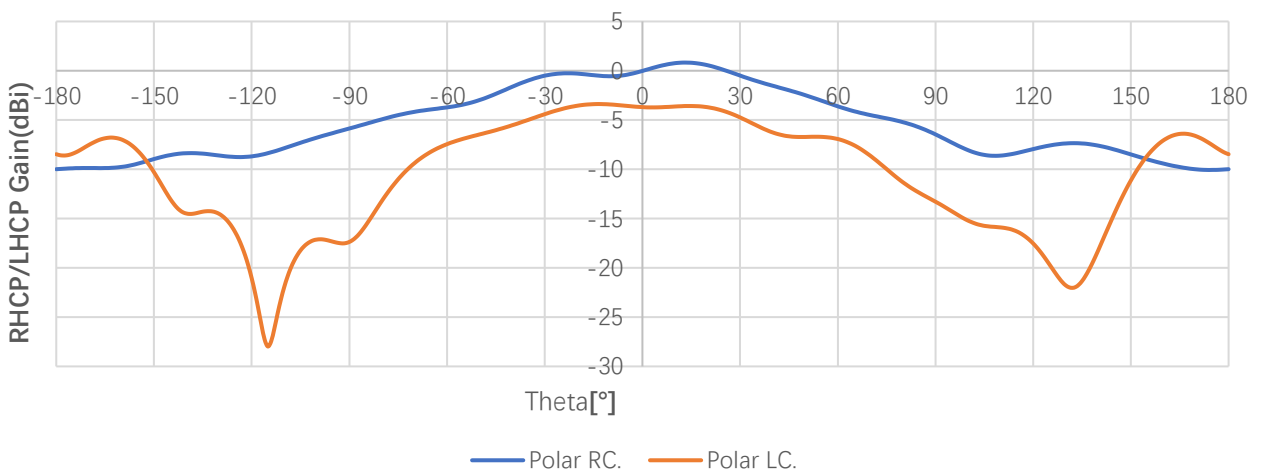
RHCP and LHCP 1575MHz(Phi=90 deg)



RHCP and LHCP 1602MHz(Phi=0 deg)



RHCP and LHCP 1602MHz(Phi=90 deg)

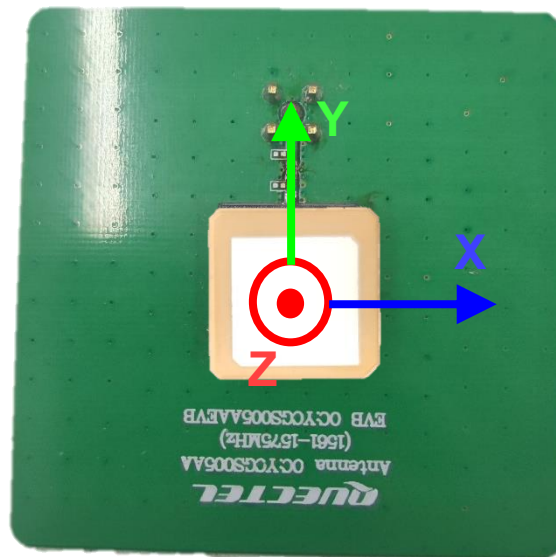


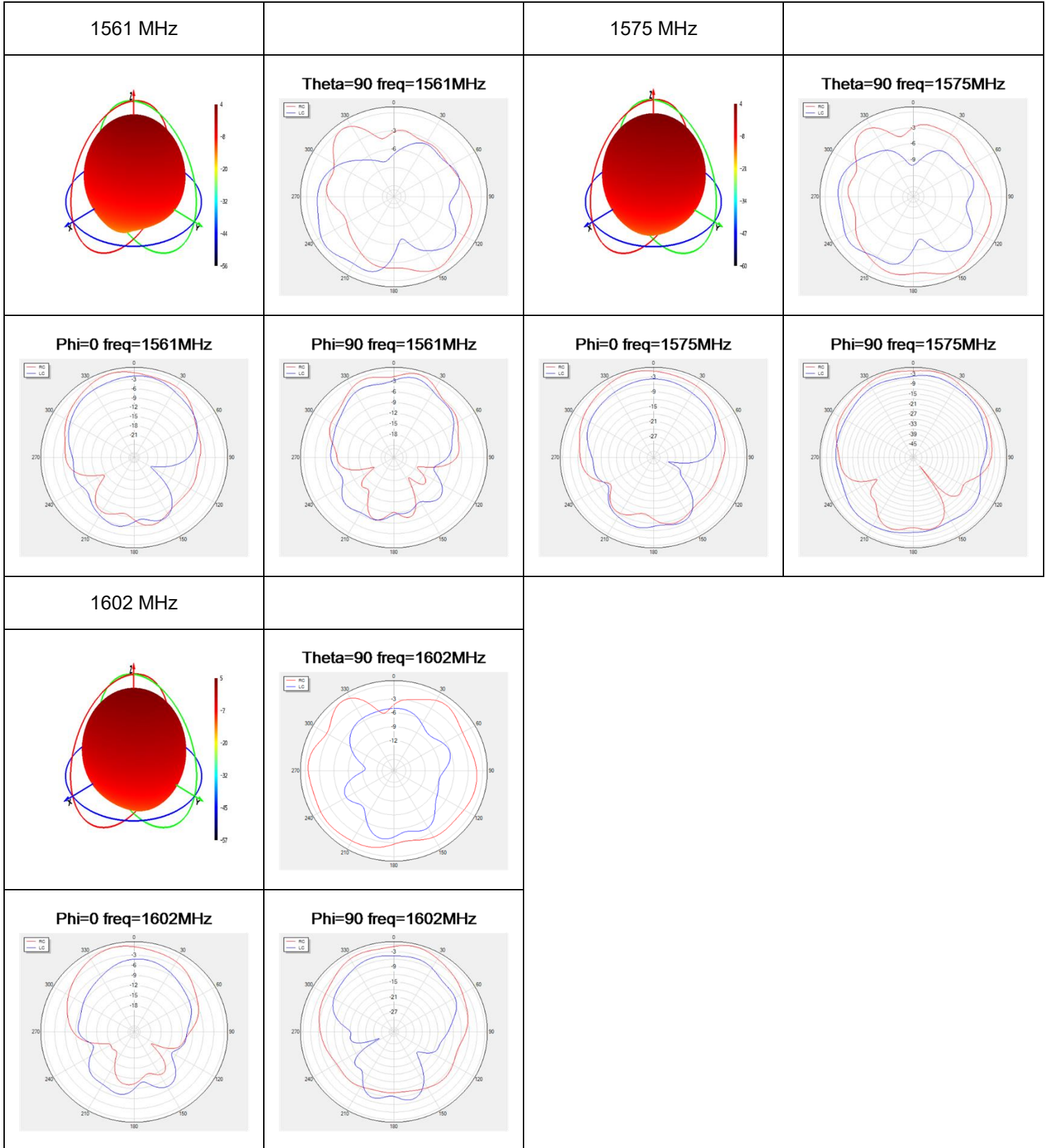
2D RHCP and LHCP Gain (dBi)

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
RHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-5.5	-0.82	-0.02
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-5.5	-0.82	-0.02
LHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-6.6	-4.0	-3.7
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-6.6	-4.0	-3.7

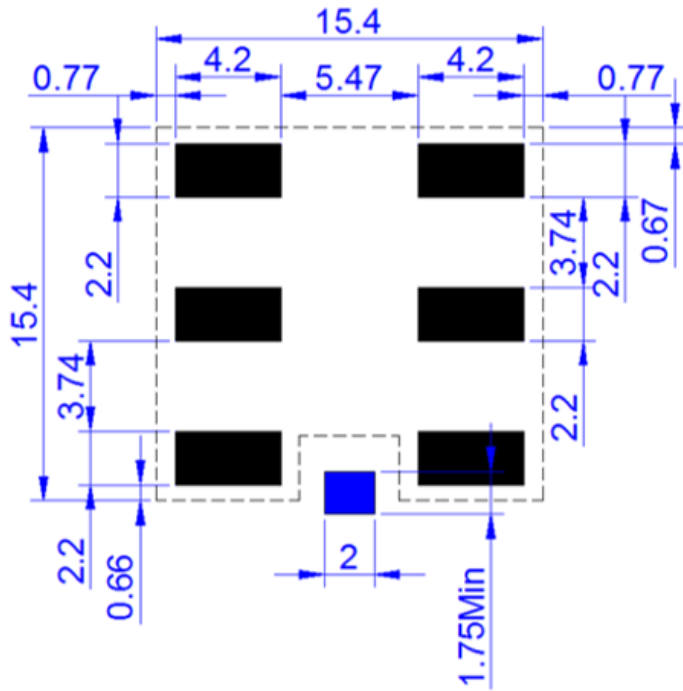
3.2.5. 3D & 2D Radiation Pattern

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





4 PCB Footprint Recommendation

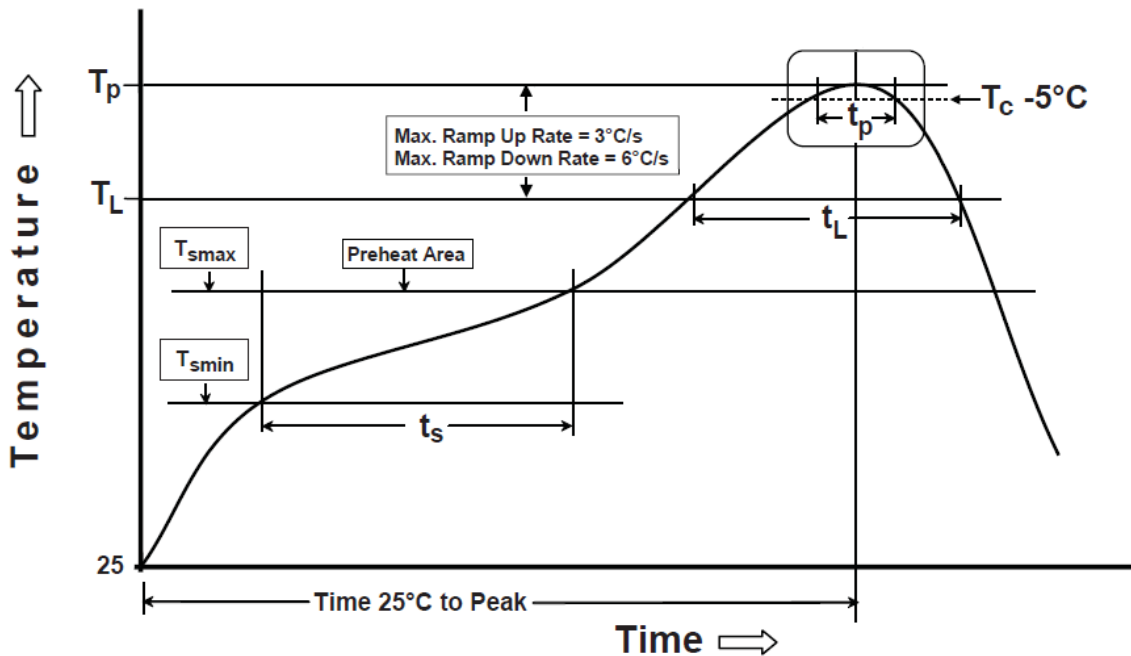


- Solderable Pad
- Feed Point
- Ground

5 Recommended Reflow Soldering Profile

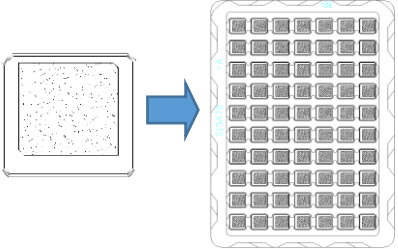
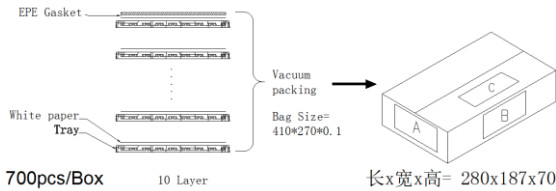
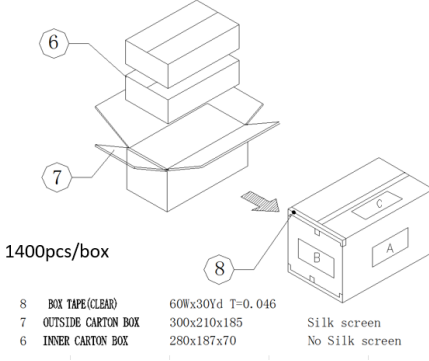
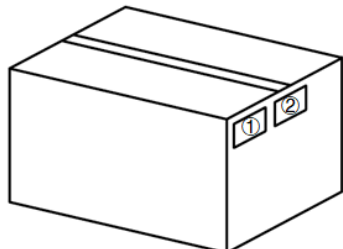
- SOLDER PASTE: Sn/Ag/Cu: 96.5/3.0/0.5
- Recommended reflow condition:

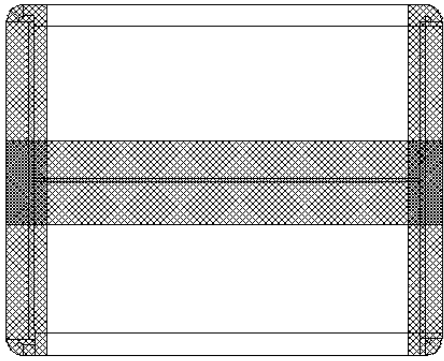
The graphic shows temperature profile for component assembly process in reflow ovens



Phase	Profile features	Pb-Free Assembly (SnAgCu)
PREHEAT	-Temperature Min (T _{smin}) -Temperature Max (T _{smax}) -Time(t _s) form (T _{smin} to T _{smax})	150 °C 200 °C 60–120 seconds
RAMP-UP	Avg. Ramp-up Rate (T _{smax} to T _p)	3 °C /second (max)
REFLOW	-Temperature (T _L) -Total Time above T _L (t _L)	217 °C 30–100 seconds
PEAK	-Temperature (T _p) -Time (t _p)	260 °C 3 seconds
RAMP-DOWN	Rate	6 °C / second max.
Time from 25 °C to Peak Temperature		8 minutes max.

6 Packaging

Step	Packaging Picture / 2D Picture	Description												
1		<p>70 antenna products in a blister tray. (70 Antennas / Blister Tray)</p>												
2	 <p>700pcs/Box 10 Layer 长x宽x高= 280x187x70</p>	<p>10-layer blister trays in an inner box. 400 antenna products in an inner box. (700 Antennas / Inner Box)</p>												
3	 <p>1400pcs/box</p> <table border="0"> <tr> <td>8</td> <td>BOX TAPE(CLEAR)</td> <td>60Wx30Yd T=0.046</td> <td></td> </tr> <tr> <td>7</td> <td>OUTSIDE CARTON BOX</td> <td>300x210x185</td> <td>Silk screen</td> </tr> <tr> <td>6</td> <td>INNER CARTON BOX</td> <td>280x187x70</td> <td>No Silk screen</td> </tr> </table>	8	BOX TAPE(CLEAR)	60Wx30Yd T=0.046		7	OUTSIDE CARTON BOX	300x210x185	Silk screen	6	INNER CARTON BOX	280x187x70	No Silk screen	<p>(2 Inner Boxes / Carton Box) (1400 Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. <u>Carton Size:</u> <u>L × W × H = 300 × 210 × 185 mm</u></p>
8	BOX TAPE(CLEAR)	60Wx30Yd T=0.046												
7	OUTSIDE CARTON BOX	300x210x185	Silk screen											
6	INNER CARTON BOX	280x187x70	No Silk screen											
4		<p>Position for Attaching Labels</p> <p>① Carton Label ② Quality Label</p>												

5		<p>Sealing Cartons 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:

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local offices. For more information, please visit:

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Revision History

Version	Date	Author	Note
-	2024-01-31	Rhone WEI/ Lucky FENG/ David LIU/ Rainey LIAO	Creation of the document
1.0	2024-01-31	Rhone WEI/ Lucky FENG/ David LIU/ Rainey LIAO	First official release
1.1	2024-04-28	Rhone WEI	<ol style="list-style-type: none">1. Updated the cover image.2. Updated PCB footprint recommendation drawing (Chapter 4).
1.2	2024-12-16	Lucky FENG	<ol style="list-style-type: none">1. Updated the drawing (Chapter 2).2. Added Chapter 5.3. Updated the package (Chapter 6).
1.3	2025-07-09	Aria CHU	<ol style="list-style-type: none">1. Updated the antenna image (Cover page).2. Updated the overview.

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