Antenna Datasheet

Product OC: YFGC009WWB
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: 18 mm × 18 mm × 4 mm
Efficiency: Up to 69.9 %
RoHS and REACH Compliant

Overview

The Quectel YFGC009WWB is a high-performance GNSS SMT mount ceramic patch passive embedded antenna, designed 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.

With dimensions of 18 mm × 18 mm × 4 mm and a typical weight of 9.2 g, it balances compactness with performance. Boasting efficiency up to 69.9 %, peak gain of 2.1 dBi, and a directional radiation pattern, it ensures reliable signal reception.

RoHS and REACH compliant, it meets environmental standards. It features a recommended 70 mm × 70 mm PCB footprint and Sn/Ag/Cu reflow soldering profile for easy integration. Packaged in blister trays (60 pcs) and cartons (1200 pcs), it suits mass deployment, making it ideal for various GNSS-enabled devices requiring robust positioning capabilities.

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.

Contents

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

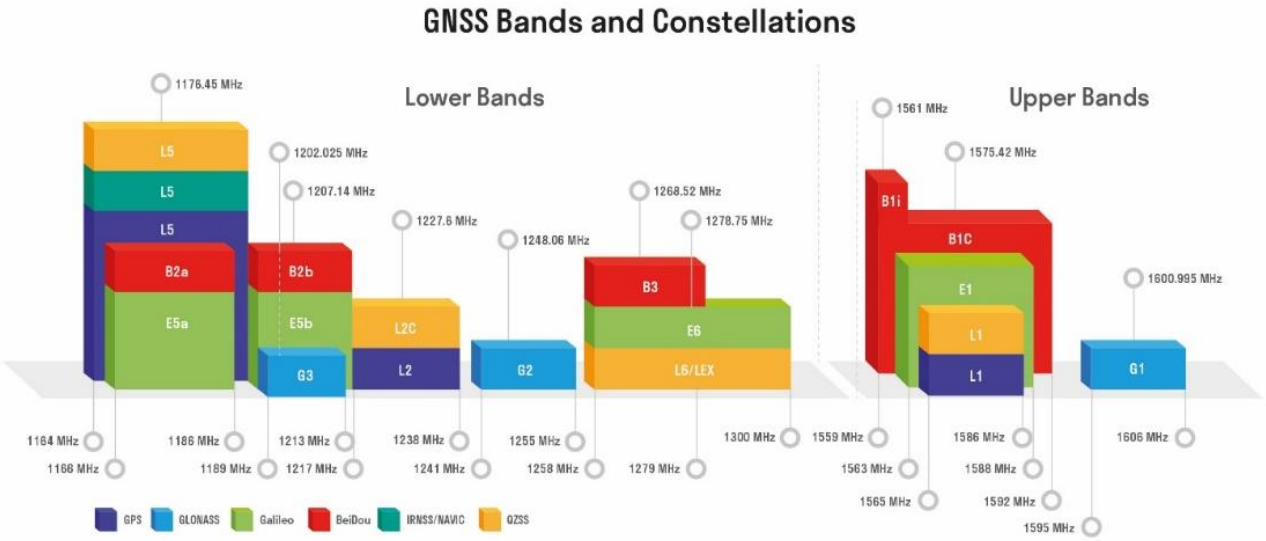
Band / Frequency (MHz)	GPS L5 GALILEO E5a BDS B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BDS B2b	GPS L2 QZSS L2C	GLONASS G2	BDS B3	BDS B1I	GPS L1 GALILEO E1 BDS B1C QZSS L1	GLONASS G1
	1176	**1207**	**1227**	**1248**	**1268**	**1561**	**1575**	**1602**
VSWR	-	-	-	-	-	4.0	1.2	1.7
Return Loss (dB)	-	-	-	-	-	-4.4	-20.0	-11.5
Efficiency (%)	-	-	-	-	-	42.0	68.1	66.7
Peak Gain (dBi)	-	-	-	-	-	-0.9	1.5	2.1
Axial Ratio (dB)	-	-	-	-	-	16.33	11.05	16.25

1.2. Mechanical & Environmental

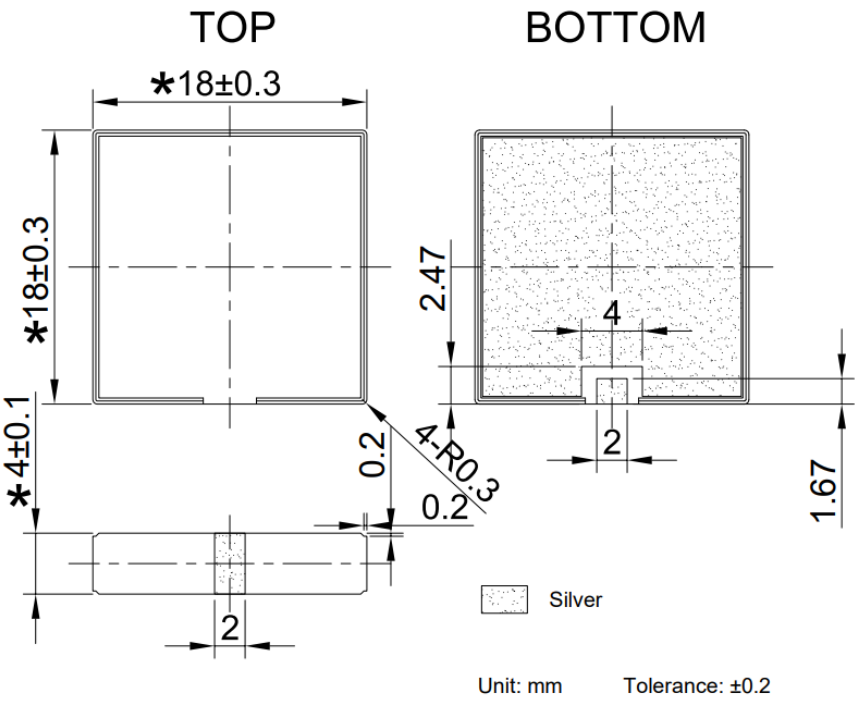
Mechanical	
Antenna Dimensions	18 mm × 18 mm × 4 mm
Material	Ceramic
Mounting Type	SMD
Weight	Typ. 9.2 g
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
Recommended Reflow Temperature and Time	260 °C & 5 s
RoHS & REACH Compliant	Yes

1.3. Supported GNSS Frequency Bands

GNSS Frequency Bands (MHz)					
GPS	**L1** Centre 1575.42 (1565–1586)	**L2** Centre 1227.6 (1217–1238)	**L5** Centre 1176.45 (1164–1189)		
	√	-	-		
GLONASS	**G1-L1OC-L1OF** Centre 1601 (1595–1606)	**G2-L2OC-L2OF** Centre 1248.06 (1241–1255)	**G3-L3OC** 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
Lower Bands
Upper Bands
1176.45 MHz
L5
L5
L5
B2a
E5a
1202.025 MHz
1207.14 MHz
B2b
E5b
G3
1227.6 MHz
L2C
L2
1248.06 MHz
G2
1268.52 MHz
1278.75 MHz
B3
E6
L6/LEX
1561 MHz
1575.42 MHz
B1i
B1C
E1
L1
L1
1600.995 MHz
G1
1164 MHz
1168 MHz
1186 MHz
1189 MHz
1213 MHz
1217 MHz
1238 MHz
1241 MHz
1255 MHz
1258 MHz
1279 MHz
1300 MHz
1559 MHz
1563 MHz
1565 MHz
1586 MHz
1588 MHz
1592 MHz
1595 MHz
1606 MHz
GPS
GLONASS
Galileo
BeiDou
IRNSS/NAVIC
QZSS

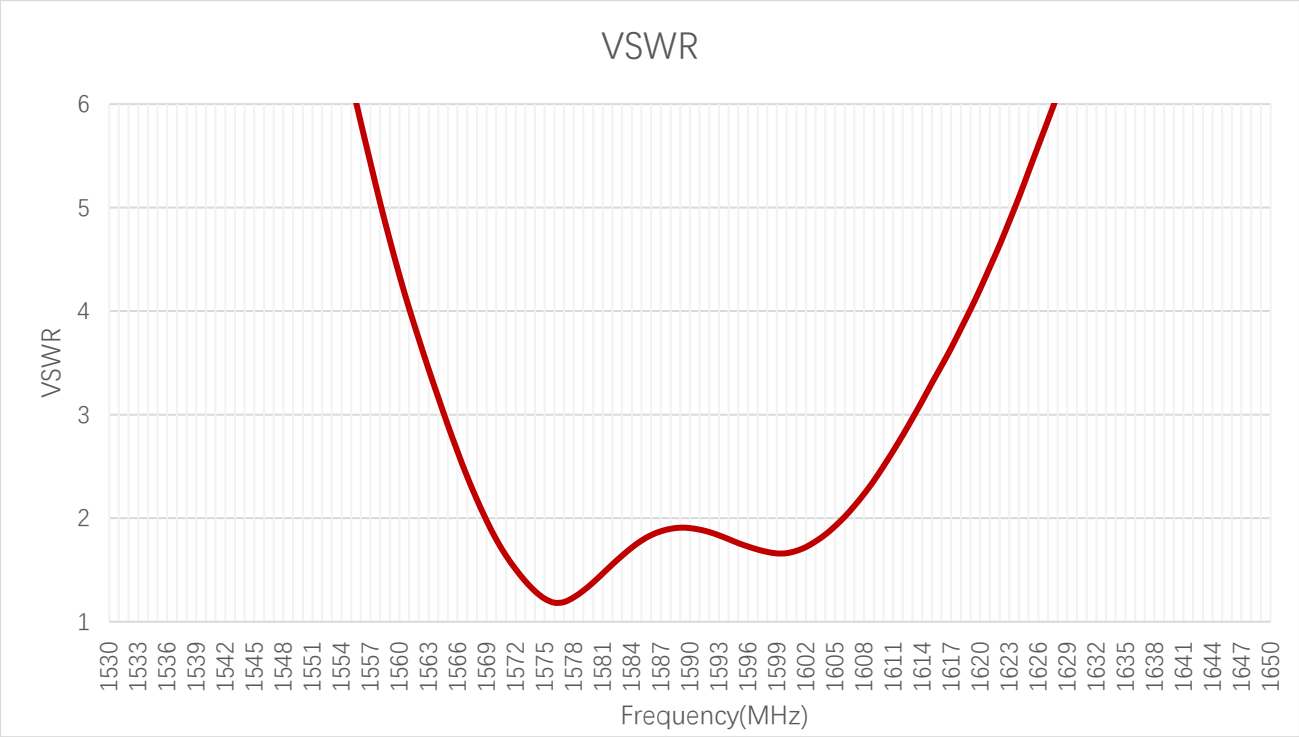
2 Drawing


TOP
BOTTOM
*18±0.3
*18±0.3
*4±0.1
2.47
4
2
1.67
0.2
0.2
4-R0.3
2
Silver
Unit: mm
Tolerance: ±0.2

3 Detailed Performance

3.1. S-Parameter Test

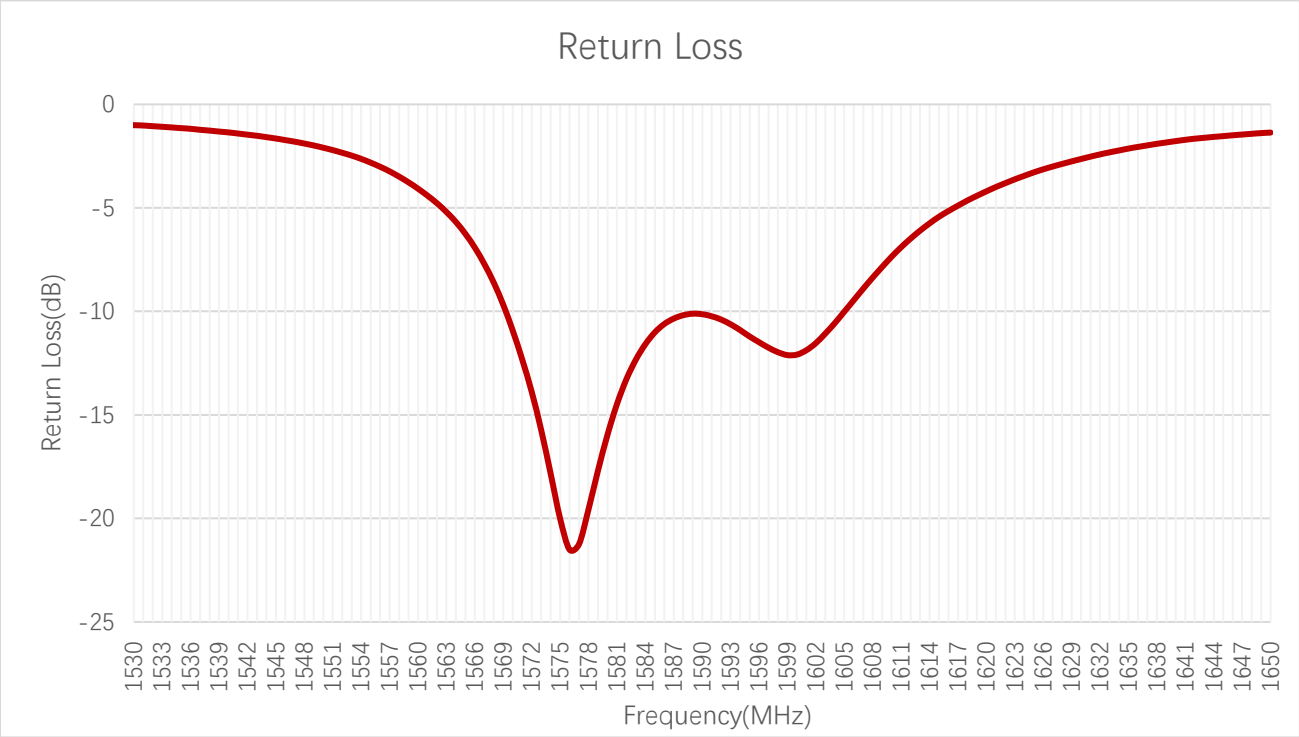
3.1.1. VSWR



VSWR

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	-	-	-	-	-	4.0	1.2	1.7

3.1.2. Return Loss

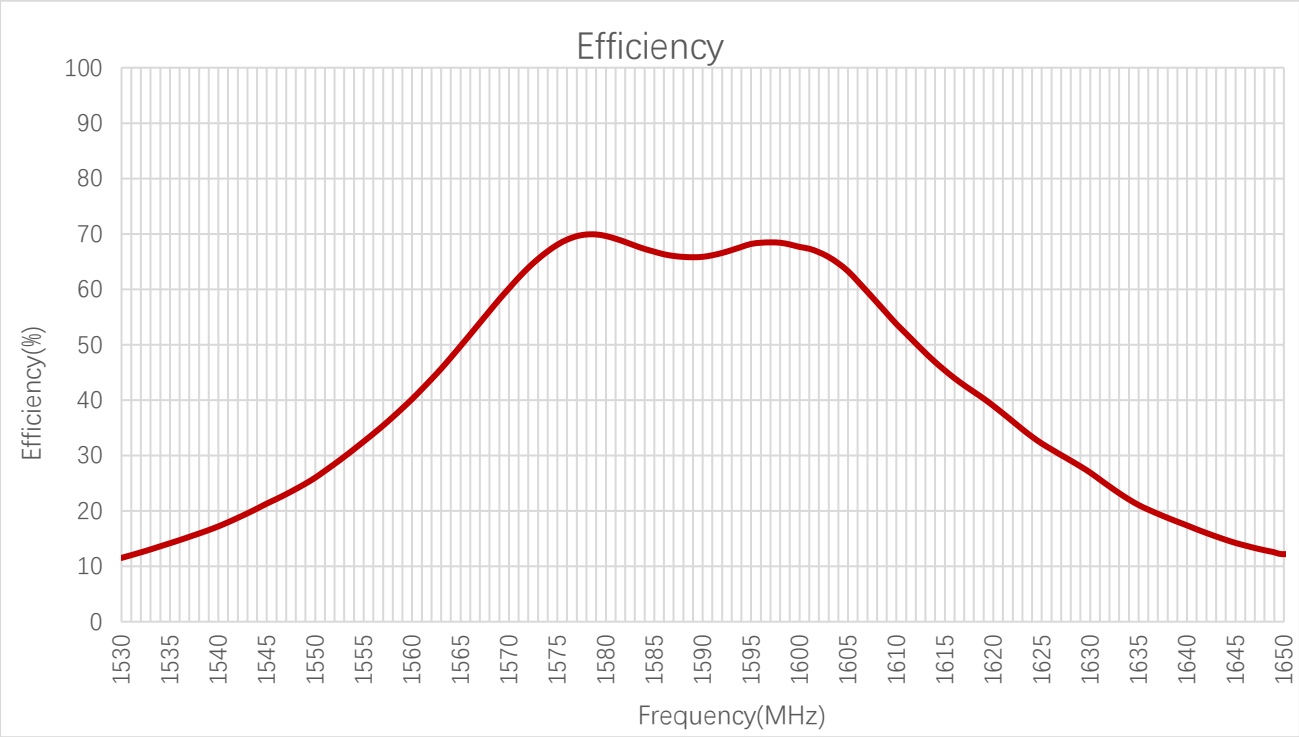


Return Loss (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-	-	-	-	-	-4.4	-20.0	-11.5

3.2. Radiation Performance Test

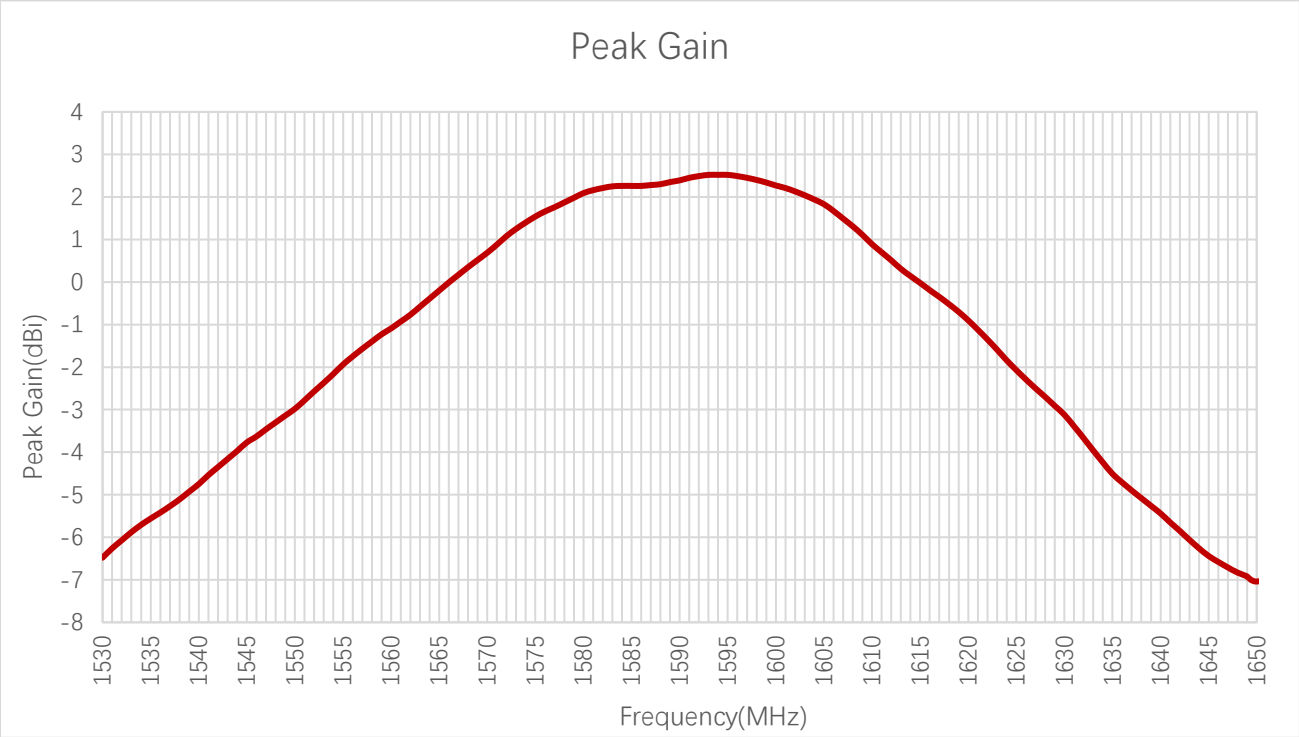
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	-	-	-	-	-	42.0	68.1	66.7

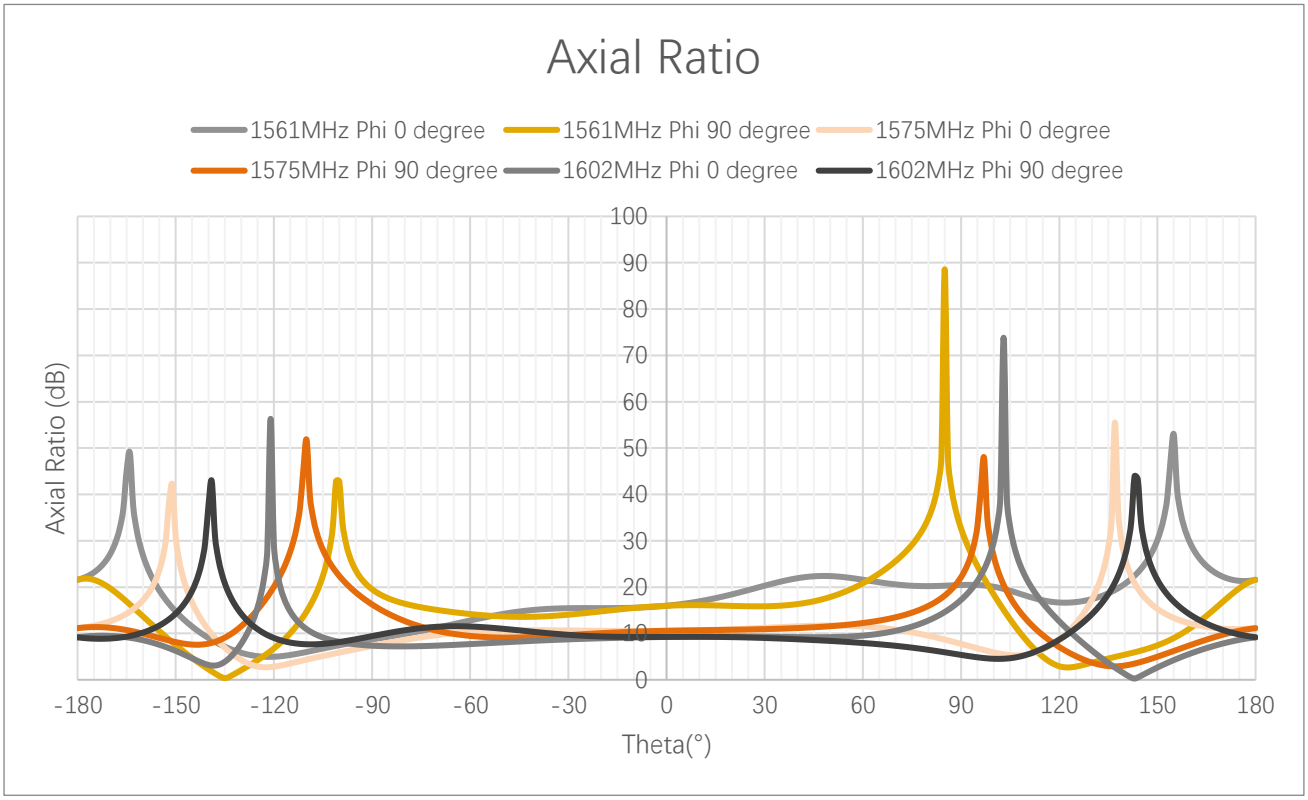
3.2.2. Peak Gain



Peak Gain (dBi)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	-	-	-	-	-	-0.9	1.5	2.1

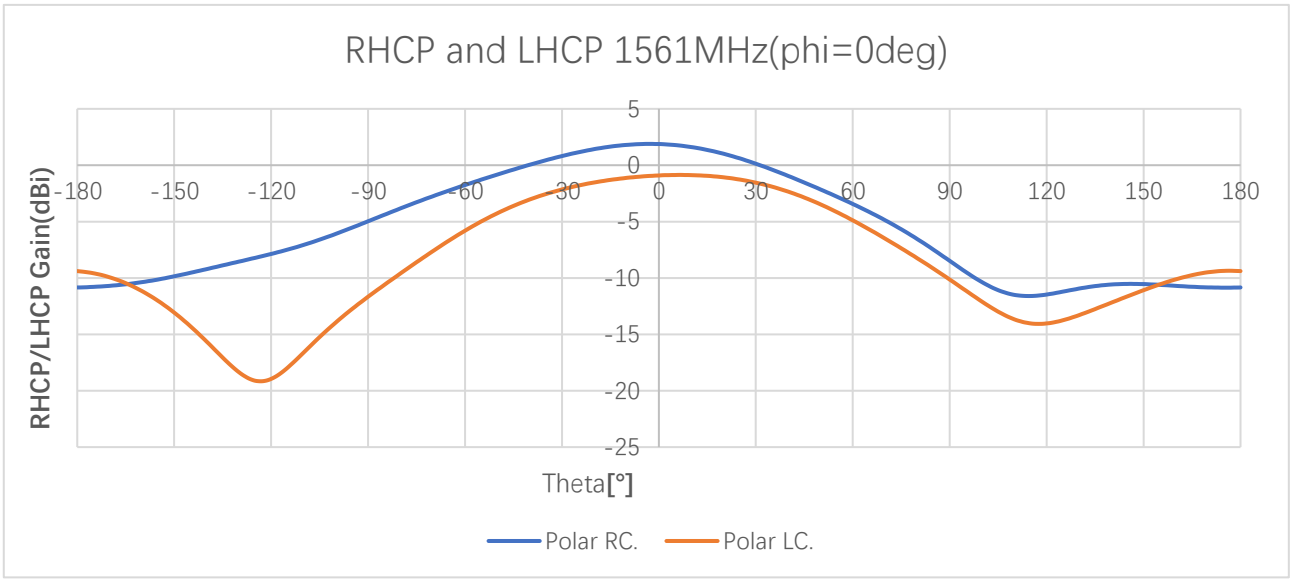
3.2.3. Axial Ratio

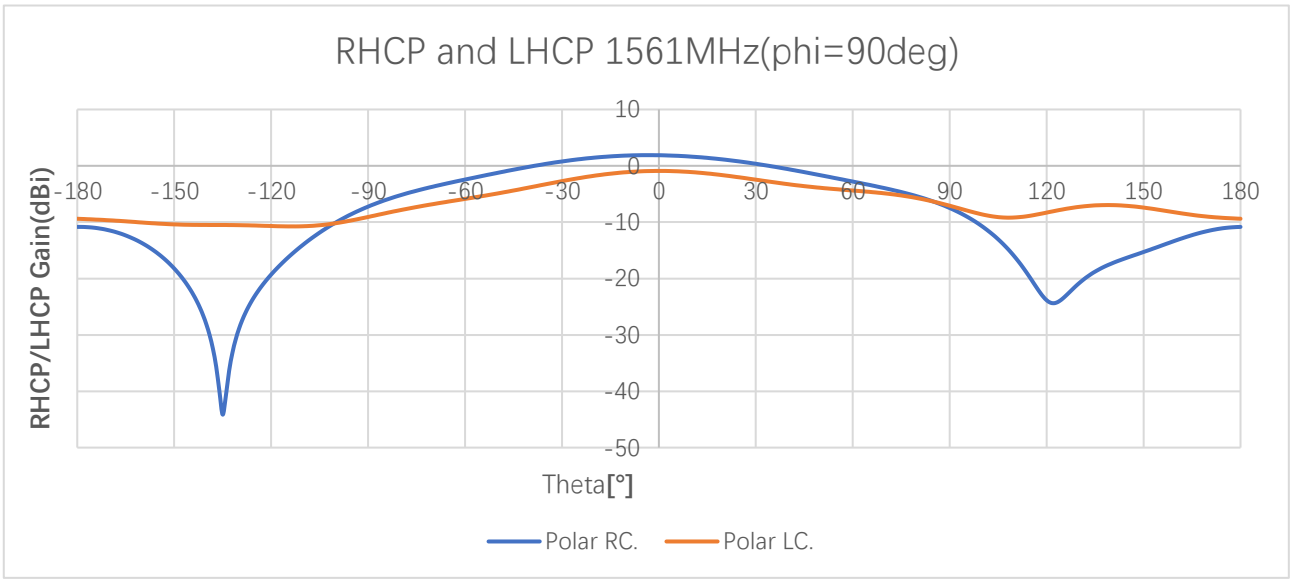


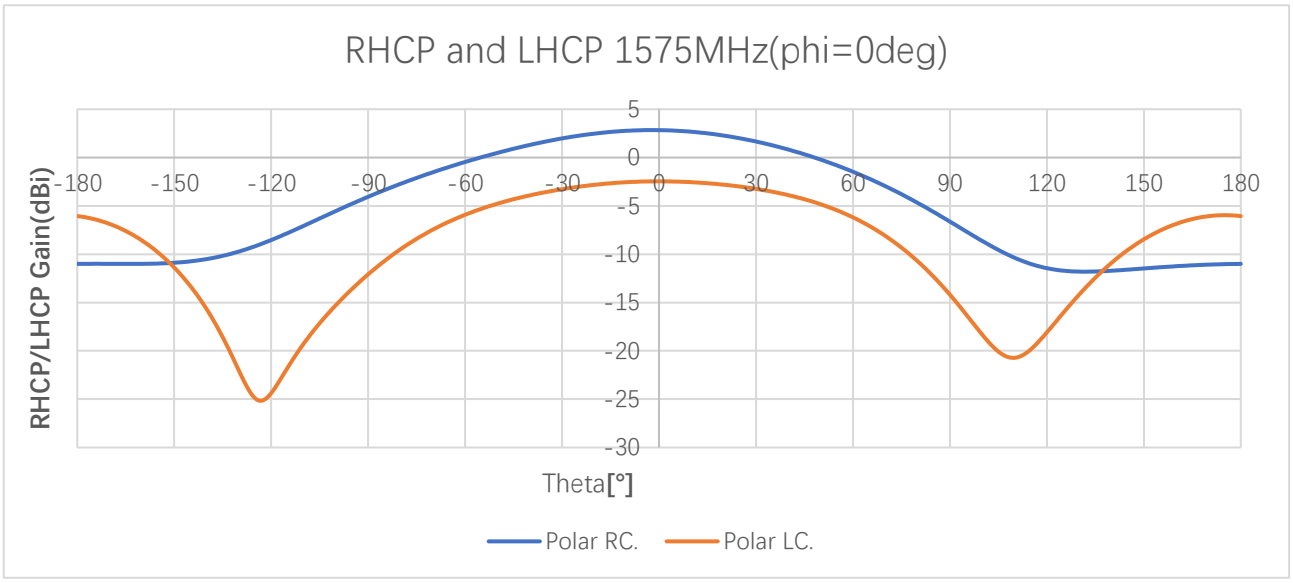
Axial Ratio (dB)

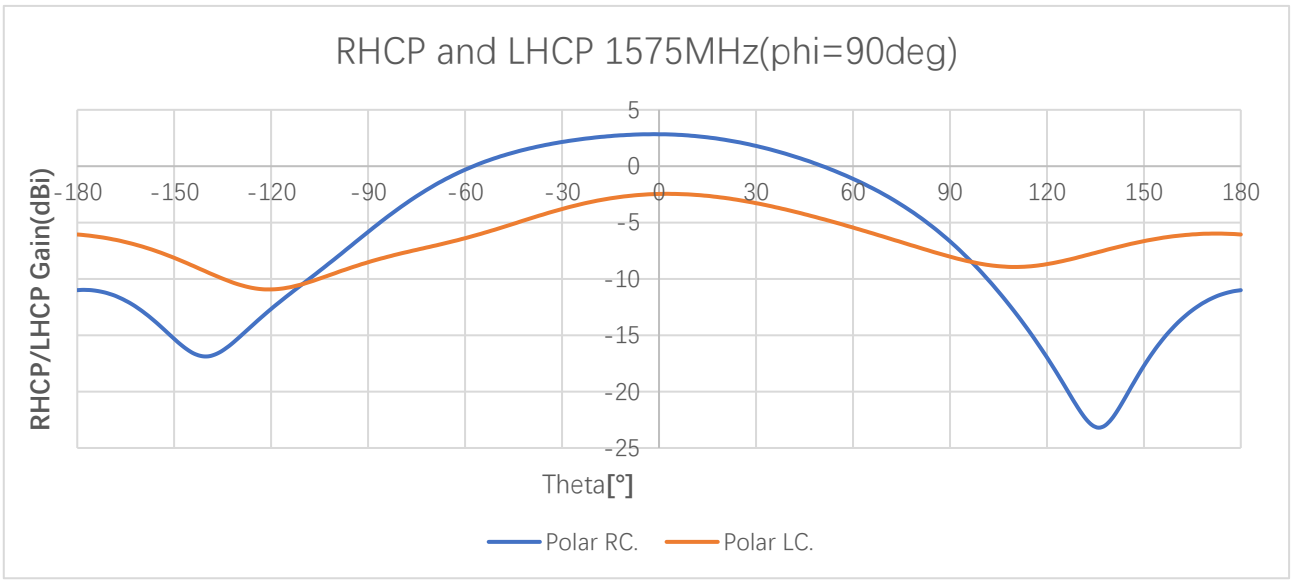
Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Axial Ratio (dB)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	16.33	11.05	16.25
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	16.33	11.05	16.25

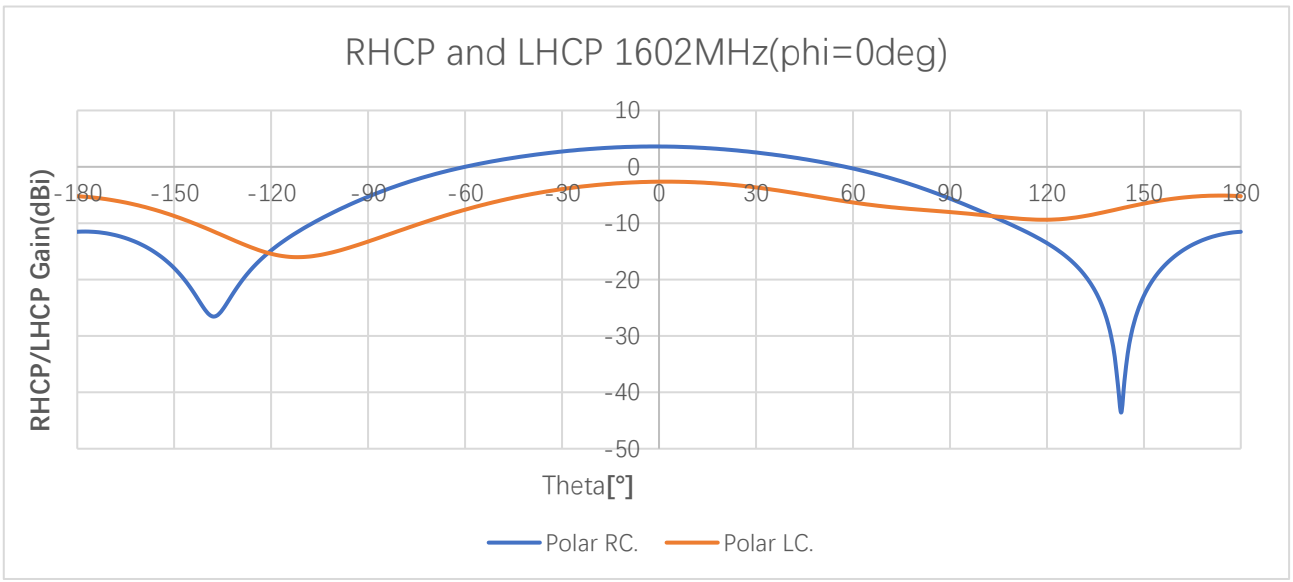
3.2.4. 2D RHCP and LHCP Gain

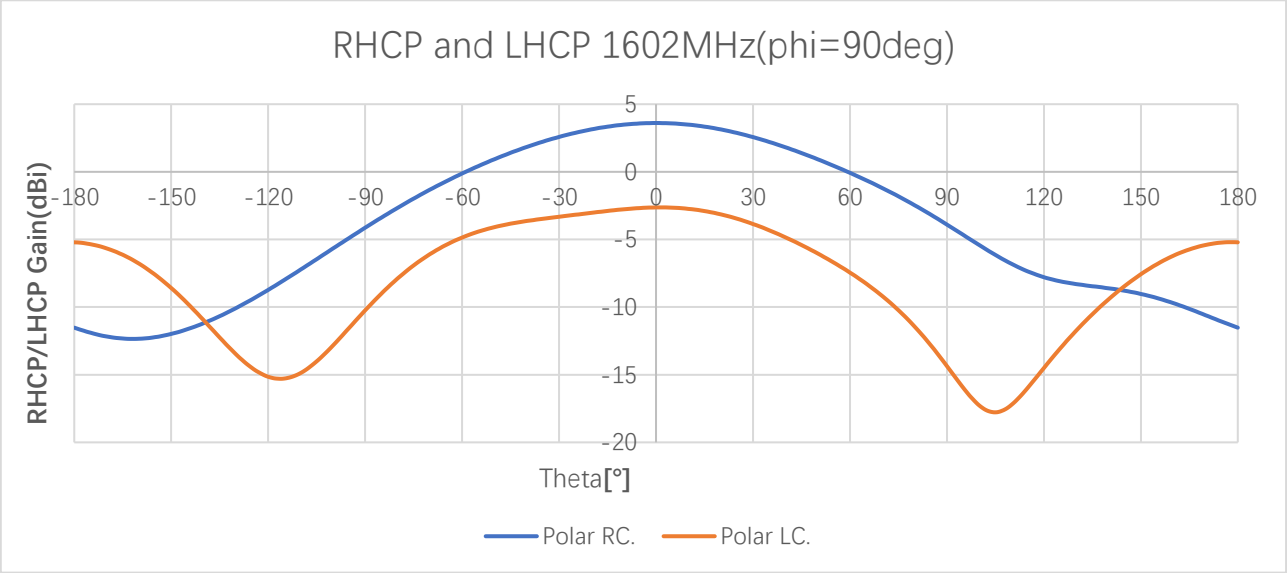





RHCP and LHCP 1575MHz(phi=0deg)
RHCP/LHCP Gain(dBi)
5
0
-5
-10
-15
-20
-25
-30
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180
Theta[°]
Polar RC.
Polar LC.


RHCP and LHCP 1575MHz(phi=90deg)
RHCP/LHCP Gain(dBi)
5
0
-5
-10
-15
-20
-25
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180
Theta[°]
Polar RC.
Polar LC.


RHCP and LHCP 1602MHz(phi=0deg)
RHCP/LHCP Gain(dBi)
10
0
-10
-20
-30
-40
-50
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180
Theta[°]
Polar RC.
Polar LC.

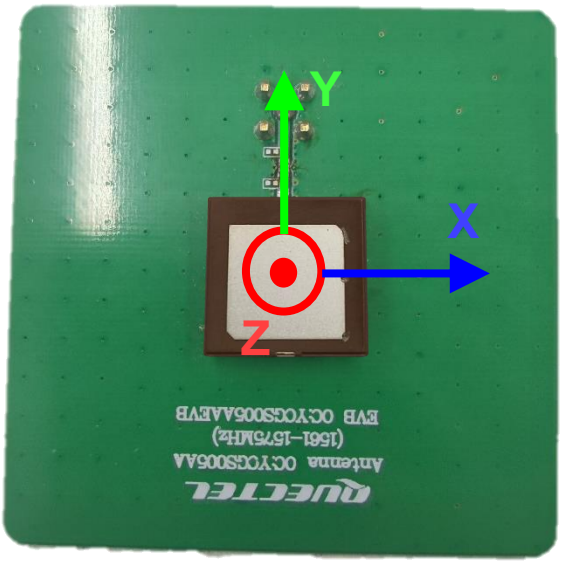


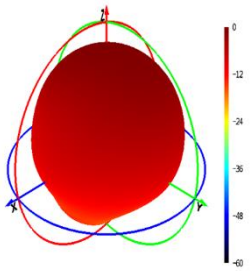
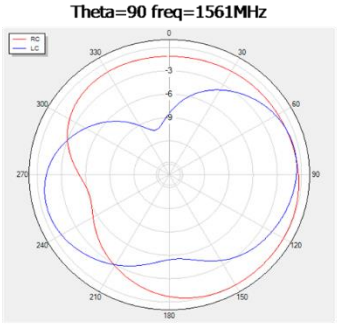
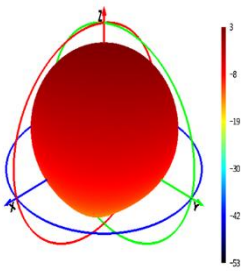
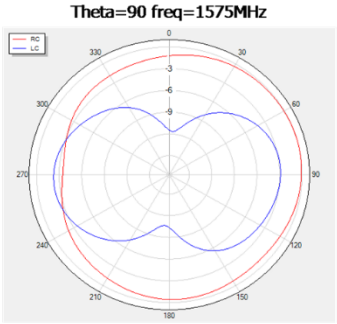
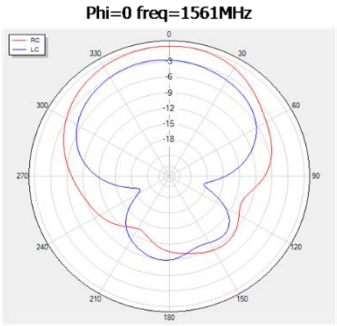
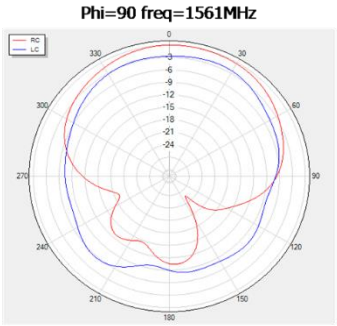
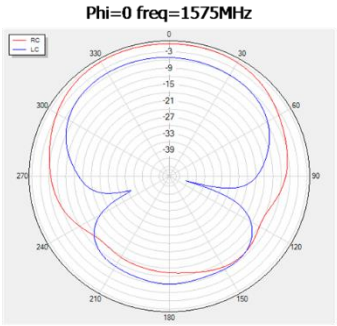
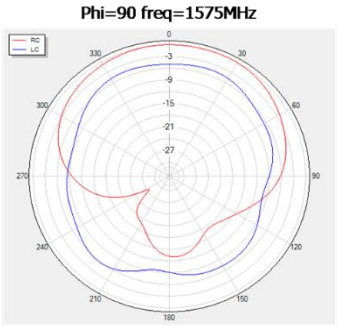
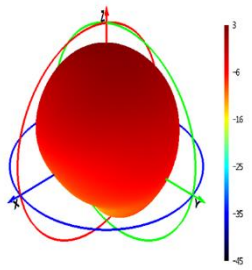
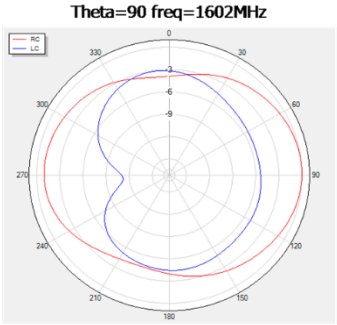
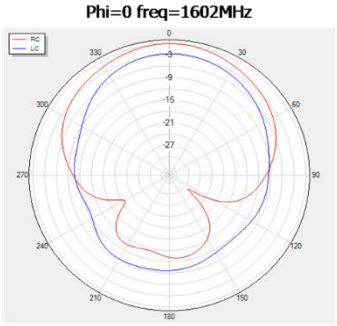
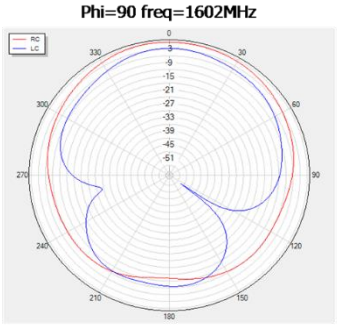
2D RHCP and LHCP Gain (dBi)

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
RHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-0.96	1.43	2.12
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-0.96	1.43	2.12
LHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-	-	-	-	-	-3.63	-3.57	-0.58
	Phi = 90 (deg) Theta = 0 (deg)	-	-	-	-	-	-3.63	-3.57	-0.58

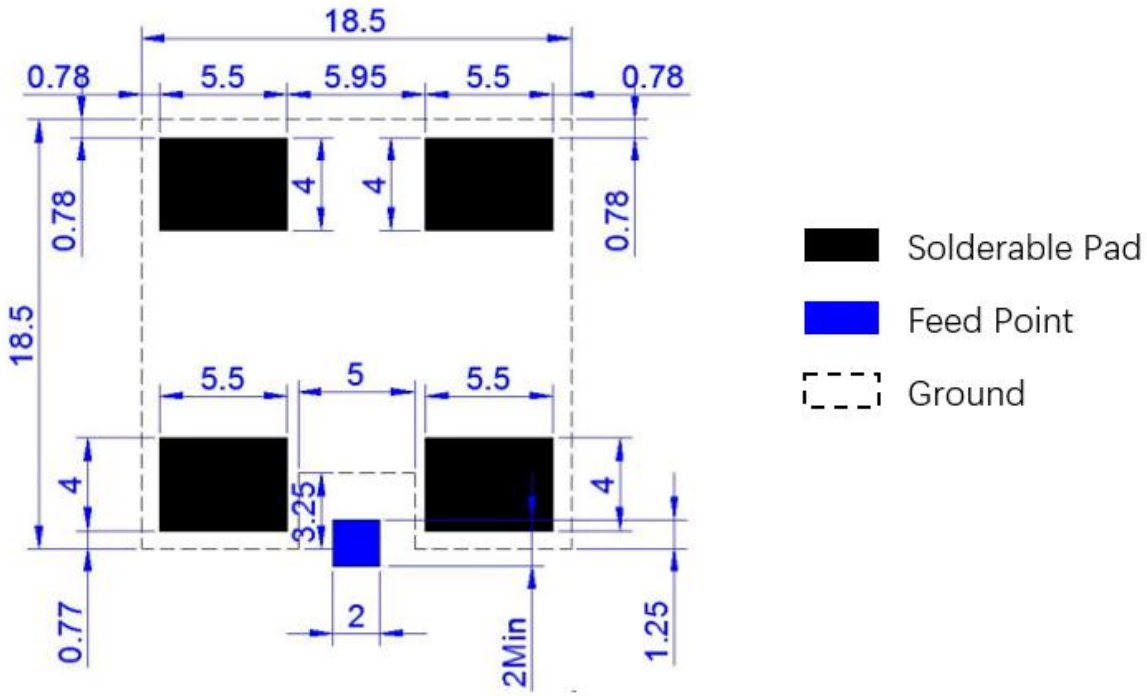
3.2.5. 3D & 2D Radiation Pattern

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



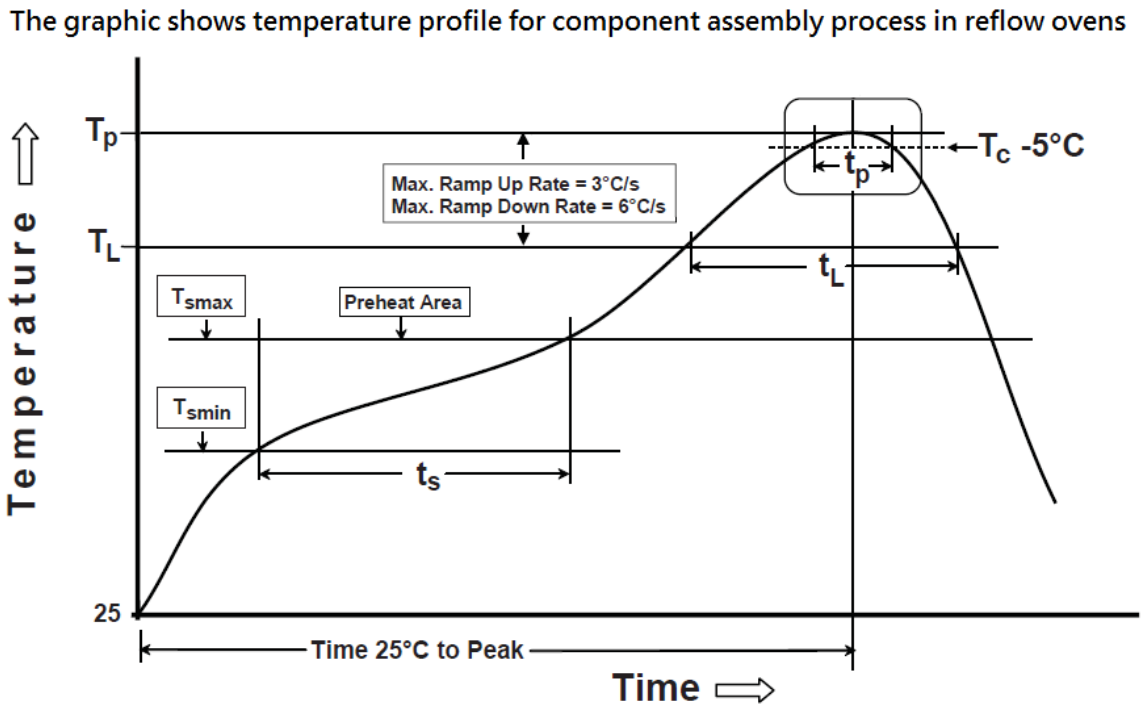
1561 MHz		1575 MHz	
			
			
1602 MHz			
			
			

4 PCB Footprint Recommendation



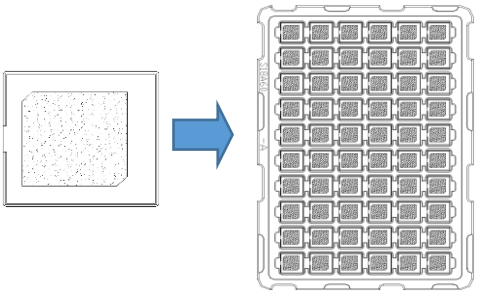
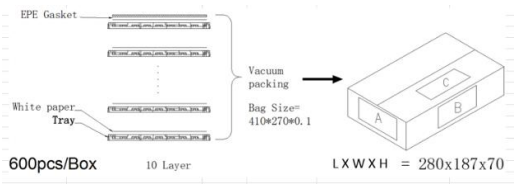
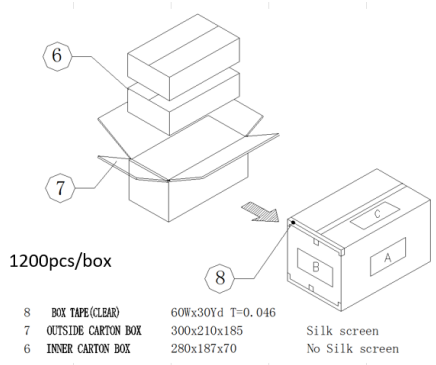
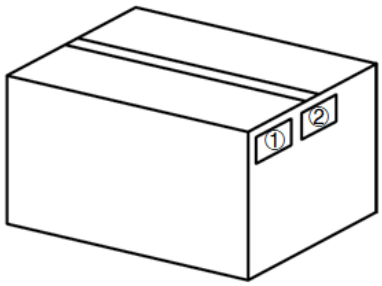
5 Recommended Reflow Soldering Profile

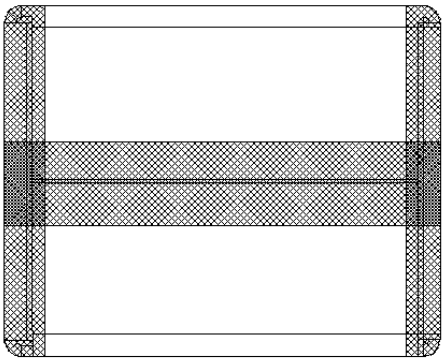
- SOLDER PASTE: Sn/Ag/Cu: 96.5/3.0/0.5
- Recommended reflow condition:



Phase	Profile Features	Pb-Free Assembly (SnAgCu)
PREHEAT	-Temperature Min (Tsmin) -Temperature Max (Tsmax) -Time(ts) form (Tsmin to Tsmax)	150 °C 200 °C 60–120 seconds
RAMP-UP	Avg. Ramp-up Rate (Tsmax to TP)	3 °C /second (max)
REFLOW	-Temperature (TL) -Total Time above TL (t L)	217 °C 30–100 seconds
PEAK	-Temperature (TP) -Time (tp)	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		60 antenna products in a Blister tray. (60 Antennas / Blister Tray)
2		10-layer blister trays in an inner box. 600 antenna products in an inner box. (600 Antennas / Inner Box)
3		(2 Inner Boxes / Carton Box) (1200 Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. Carton Size: L × W × H = 300 × 210 × 185 mm
4		**Position for Attaching Labels** ① Carton Label ② Quality Label

5		**Sealing Cartons** H-shaped sealing cartons
Note	The initial packaging method described above is for reference only, and the final actual packaging method shall be subject to the actual shipping packaging.	

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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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
-	2024-01-17	Rhone WEI/ Lucky FENG/ David LIU/ Rainey LIAO	Creation of the document
1.0	2024-01-17	Rhone WEI/ Lucky FENG/ David LIU/ Rainey LIAO	First official release
1.1	2024-04-25	Rhone WEI	1. Updated the cover image. 2. Updated PCB footprint recommendation drawing. (Chapter 2 and 4)
1.2	2025-03-06	Lucky FENG/ Riva REN	1. Added Chapter 5. 2. Updated the packaging (Chapter 6).
1.3	2025-07-14	Aria CHU	1. Updated the antenna image (Cover page). 2. Updated the overview.

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