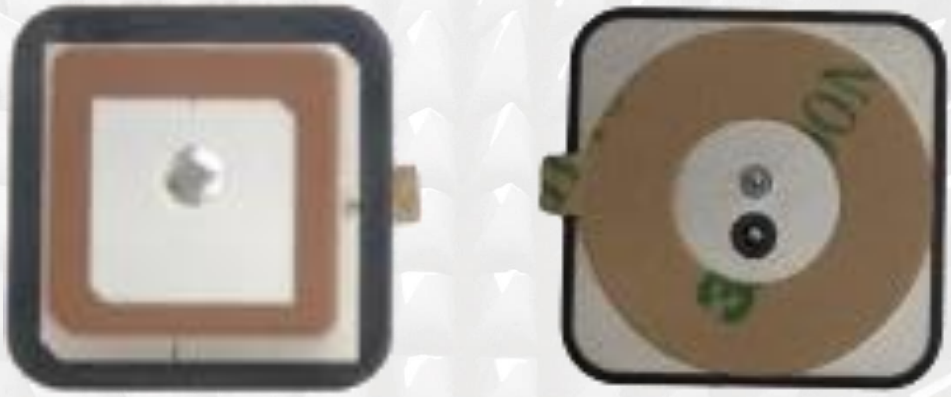


Antenna Datasheet

Product OC: YFGC225WWA
Version: 2.1
Date: 2024-12-16
Status: Released

Product Name: Passive GPS L1 & L5 Antenna
Key Features:
Frequency Band: 1559–1606 MHz; 1164–1189 MHz
Dimensions: 25 mm × 25 mm × 4 mm + 18 mm × 18 mm × 4 mm
Efficiency: Up to 60.6 %
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 also 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.

Contents

1 Specification

Test Condition: on 50 mm × 50 mm PCB

1.1. Electrical

Electrical	
Frequency Range	1559–1606 MHz; 1164–1189 MHz
Impedance	50 Ω
Polarization	RHCP
Radiation Pattern	Directional

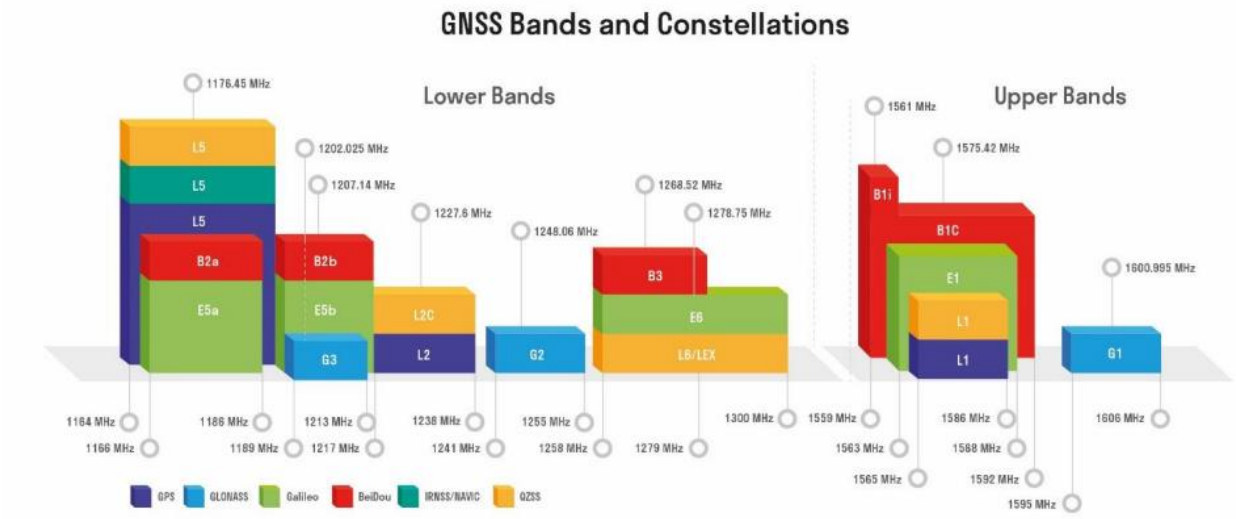
Band / Frequency (MHz)	GPS L5 GALILEO E5a BDS B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BDS B2b	GPS L2 QZSS L2C	GLONASS G2	BDS B3	BDS B1I	GPS L1 GALILEO E1 BDS B1C QZSS L1	GLONASS G1
	1176	**1207**	**1227**	**1248**	**1268**	**1561**	**1575**	**1602**
VSWR	1.3	-	-	-	-	4.9	1.2	4.7
Return Loss (dB)	-18.7	-	-	-	-	-3.6	-20.8	-3.8
Efficiency (%)	52.7	-	-	-	-	28.3	58.7	32.8
Peak Gain (dBi)	1.1	-	-	-	-	-1.9	1.2	-1.6
Axial Ratio (dB)	1.4	-	-	-	-	11.0	2.3	5.9

1.2. Mechanical & Environmental

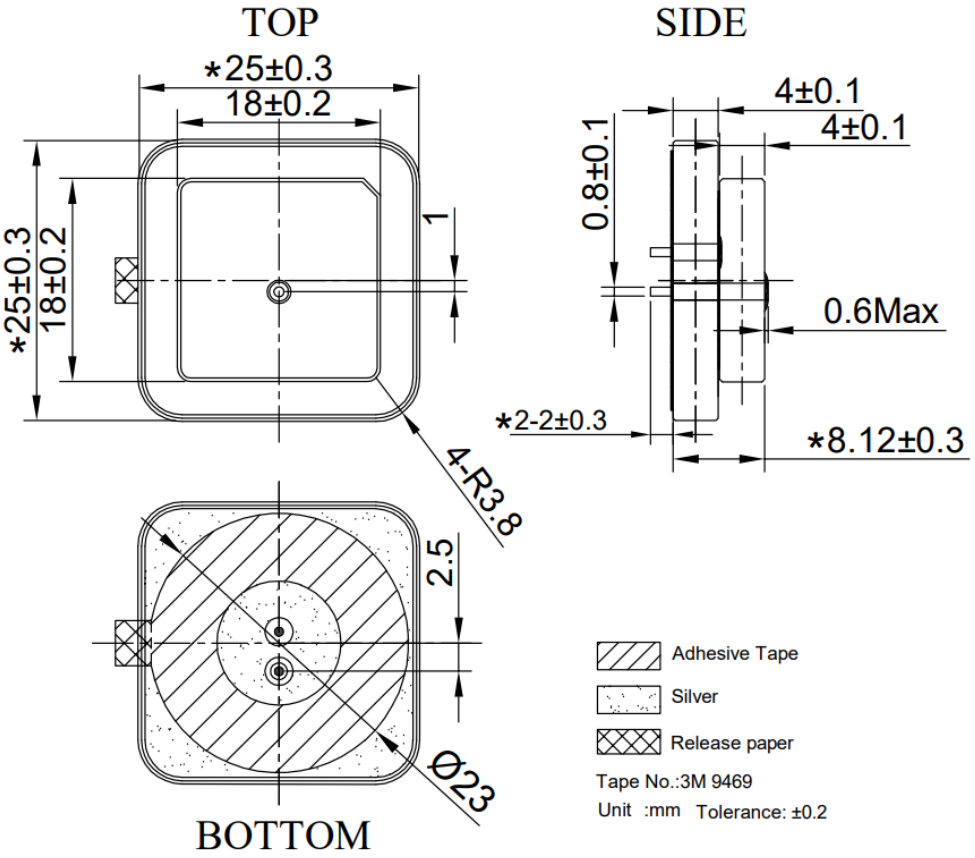
Mechanical	
Antenna Dimensions	25 mm × 25 mm × 4 mm + 18 mm × 18 mm × 4 mm
Material	Ceramic
Mounting Type	Adhesive & Soldering
Weight	Typ. 14 g
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
Recommended Reflow Temperature and Time	260 °C & 5 s
RoHS and REACH 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** Centre 1176.45 (1166–1187)	**B2b-B2I** 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
1166 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

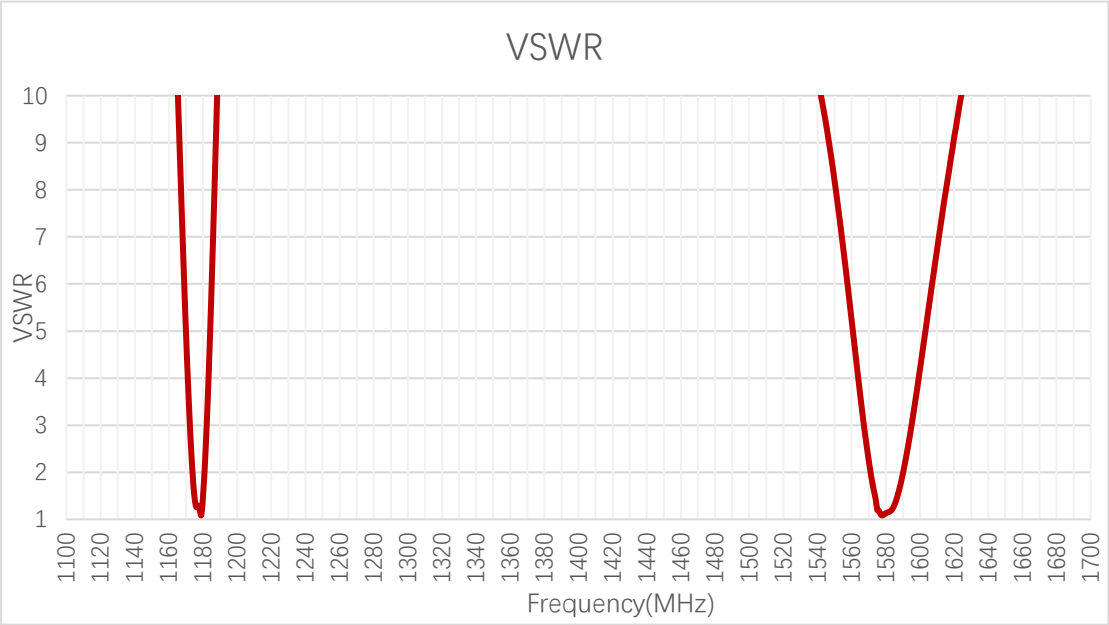
2 Drawing


TOP
SIDE
*25±0.3
18±0.2
*25±0.3
18±0.2
1
4-R3.8
4±0.1
4±0.1
0.8±0.1
0.6Max
*2-2±0.3
*8.12±0.3
2.5
Φ23
BOTTOM
Adhesive Tape
Silver
Release paper
Tape No.:3M 9469
Unit :mm Tolerance: ±0.2

3 Detailed Performance

3.1. S-Parameter Test

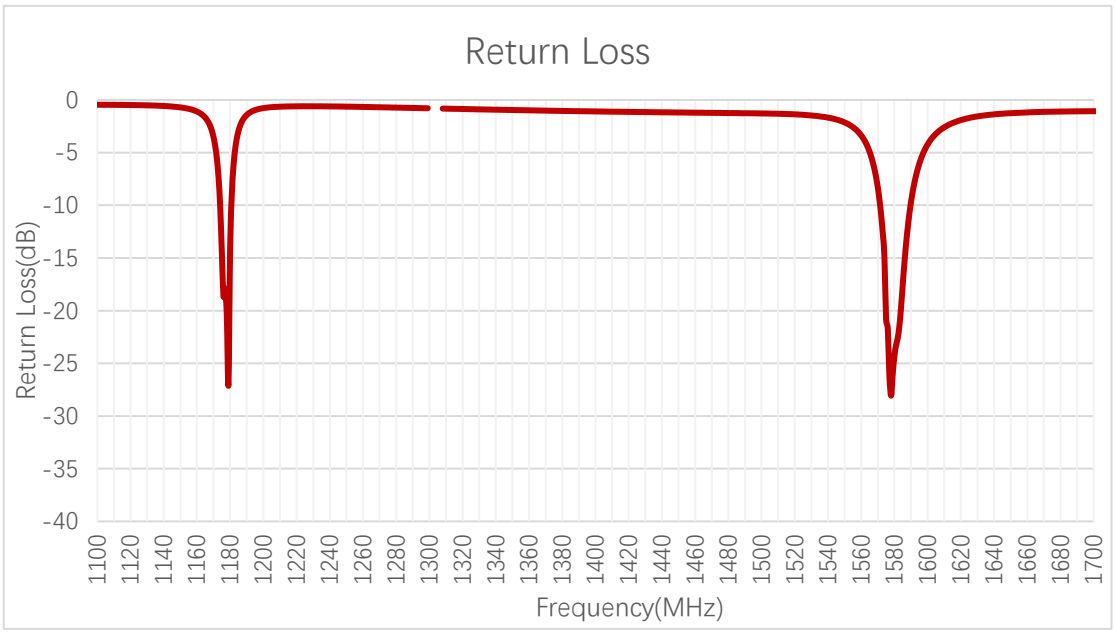
3.1.1. VSWR



VSWR

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	1.3	-	-	-	-	4.9	1.2	4.7

3.1.2. Return Loss

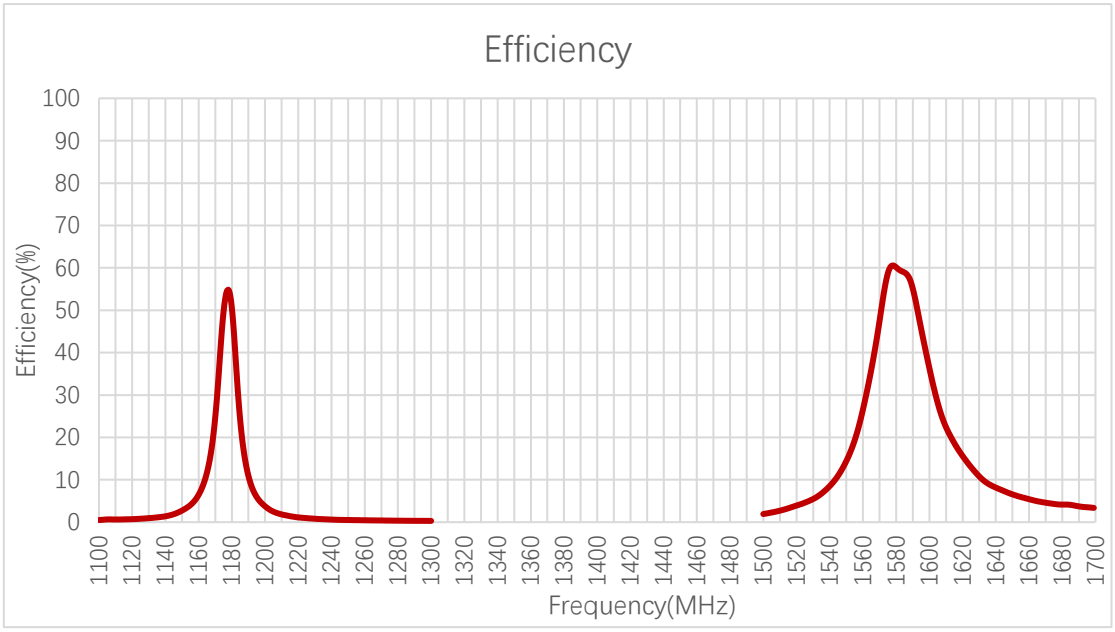


Return Loss (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-18.7	-	-	-	-	-3.6	-20.8	-3.8

3.2. Radiation Performance Test

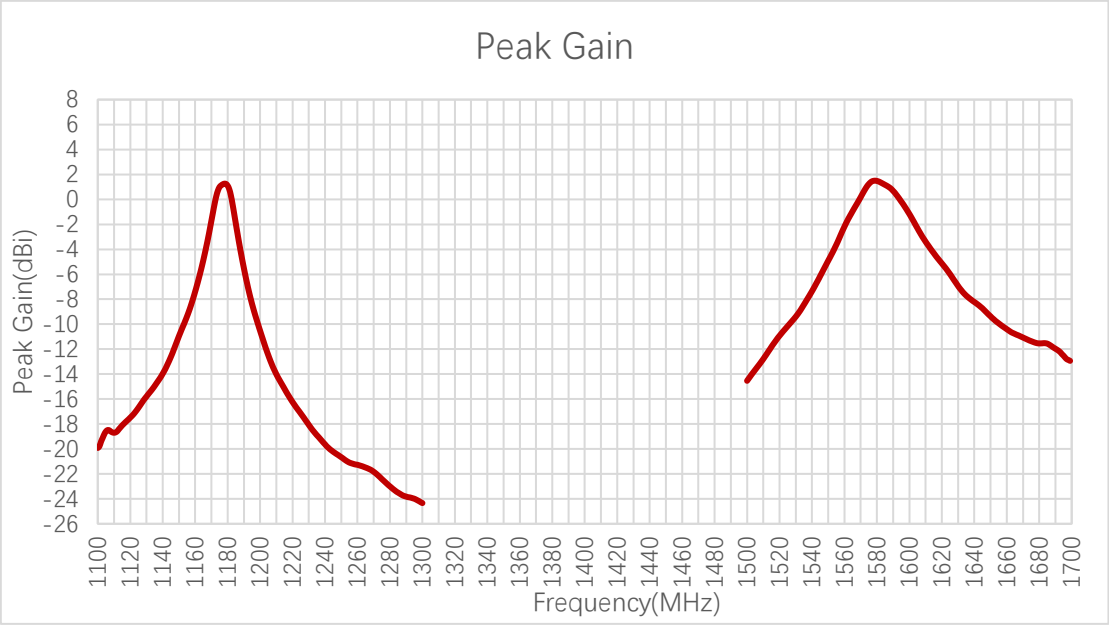
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	52.7	-	-	-	-	28.3	58.7	32.8

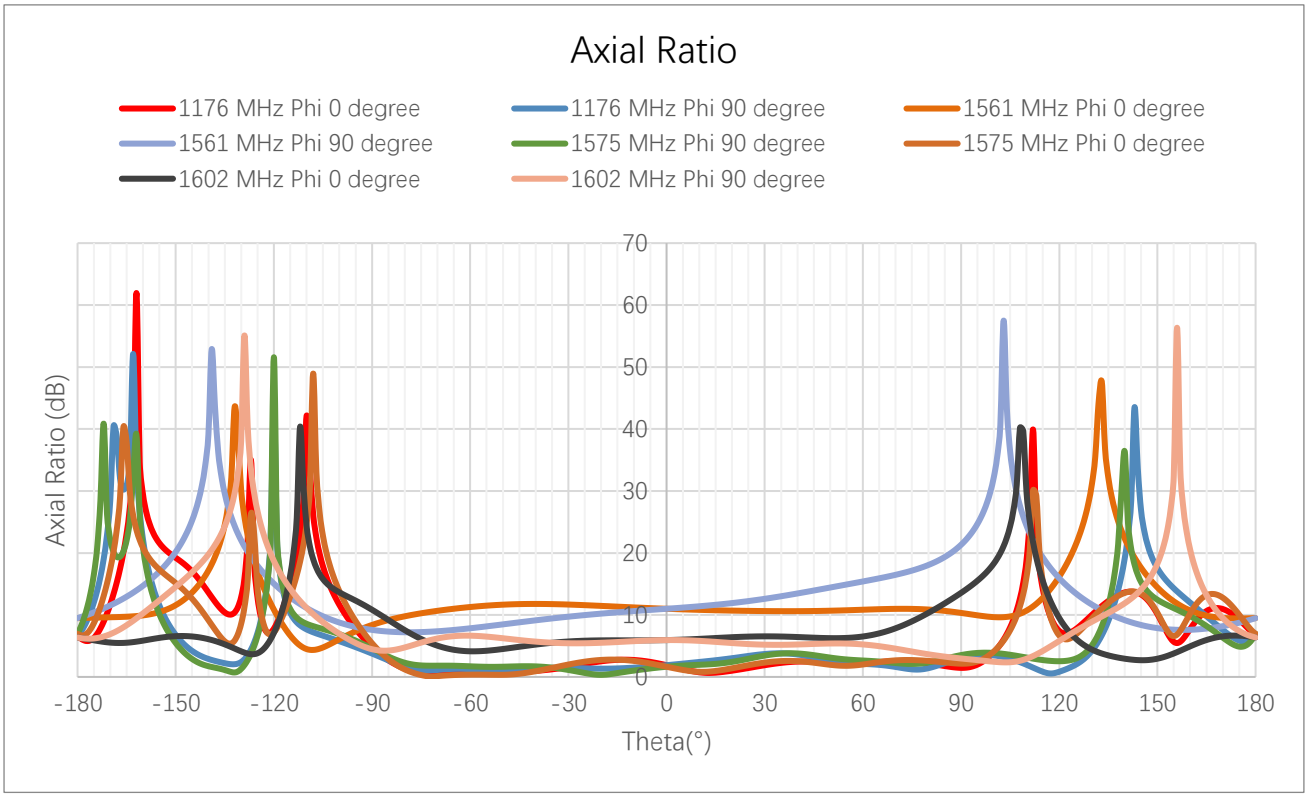
3.2.2. Peak Gain



Peak Gain (dBi)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	1.1	-	-	-	-	-1.9	1.2	-1.6

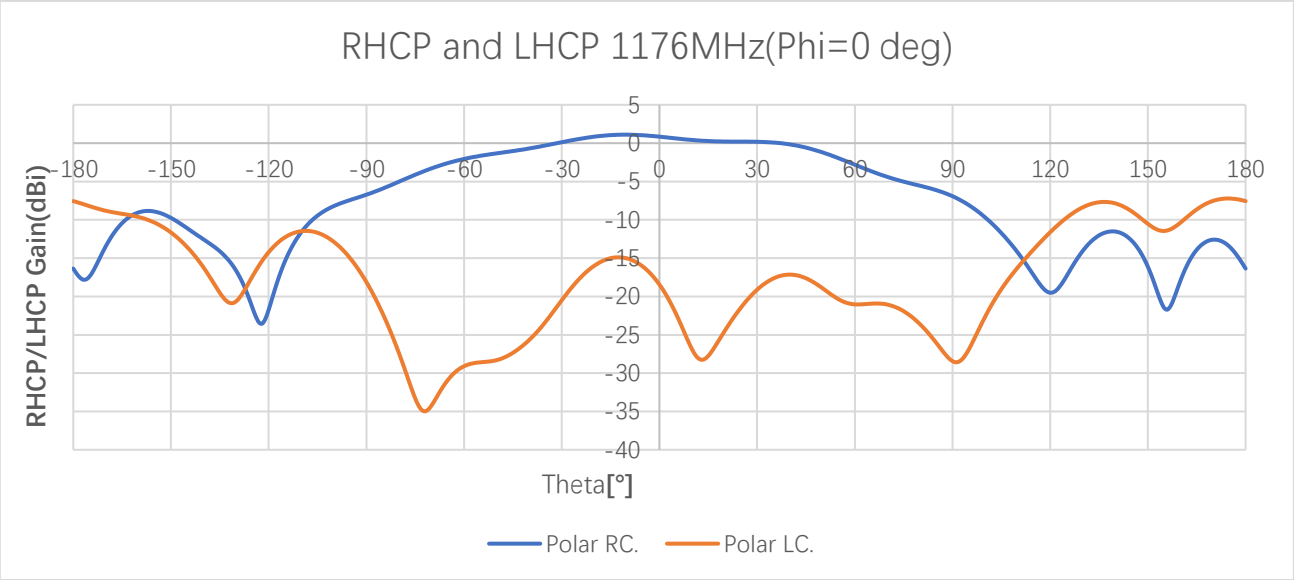
3.2.3. Axial Ratio

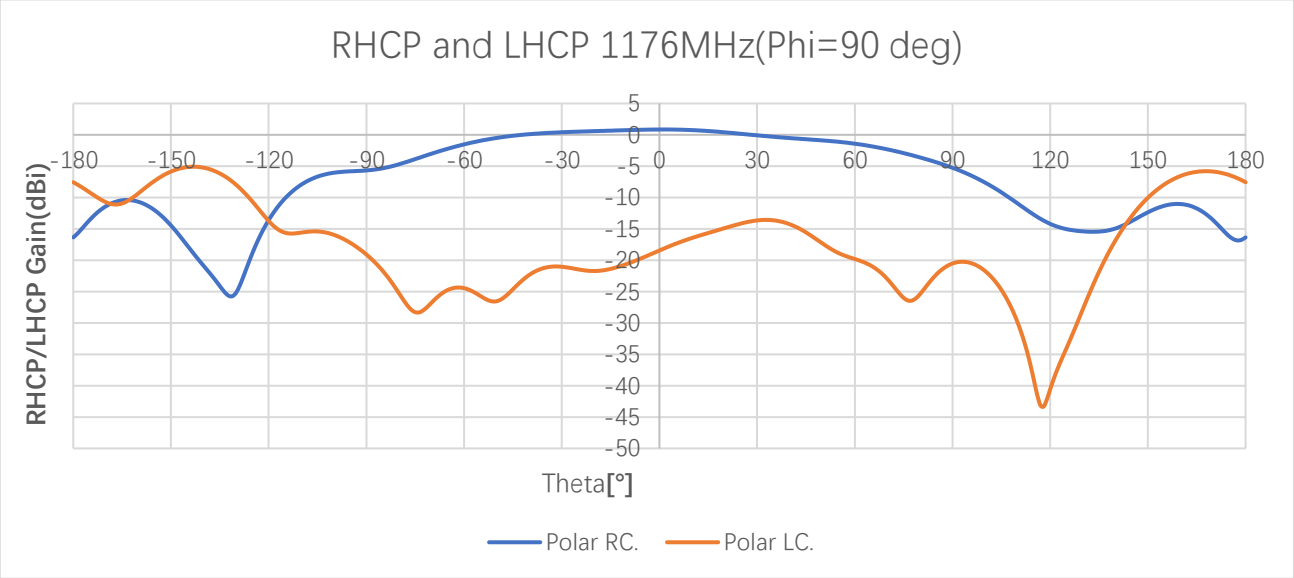


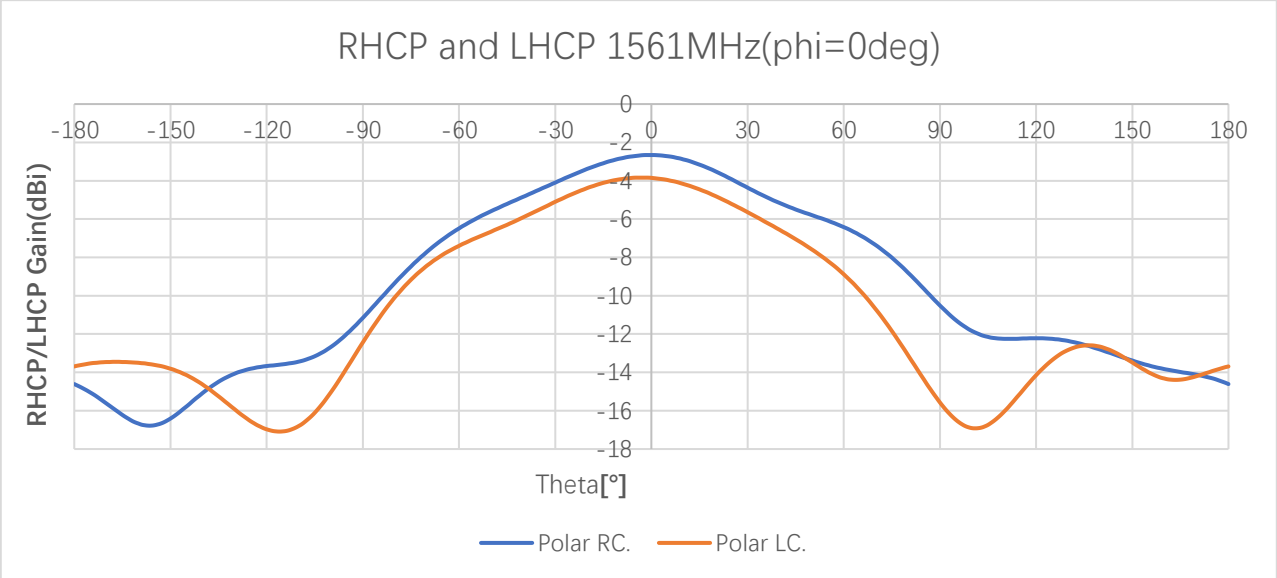
Axial Ratio (dB)

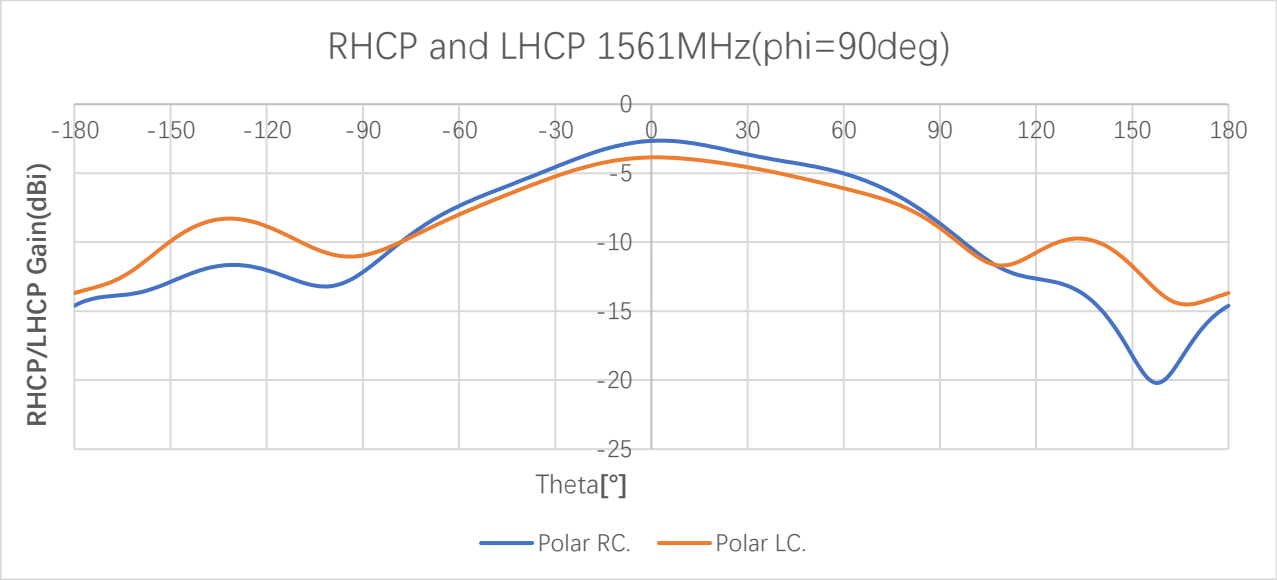
Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
Axial Ratio (dB)	Phi = 0 (deg) Theta = 0 (deg)	1.9	-	-	-	-	11.0	1.7	5.9
	Phi = 90 (deg) Theta = 0 (deg)	1.9	-	-	-	-	11.0	1.7	5.9

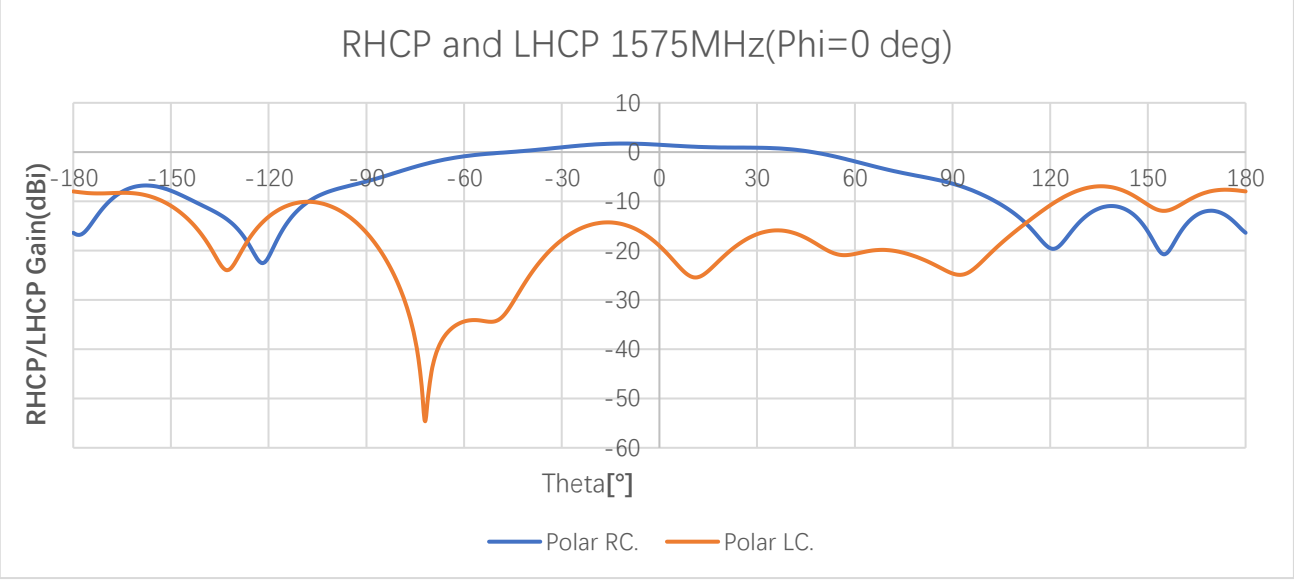
3.2.4. 2D RHCP and LHCP Gain

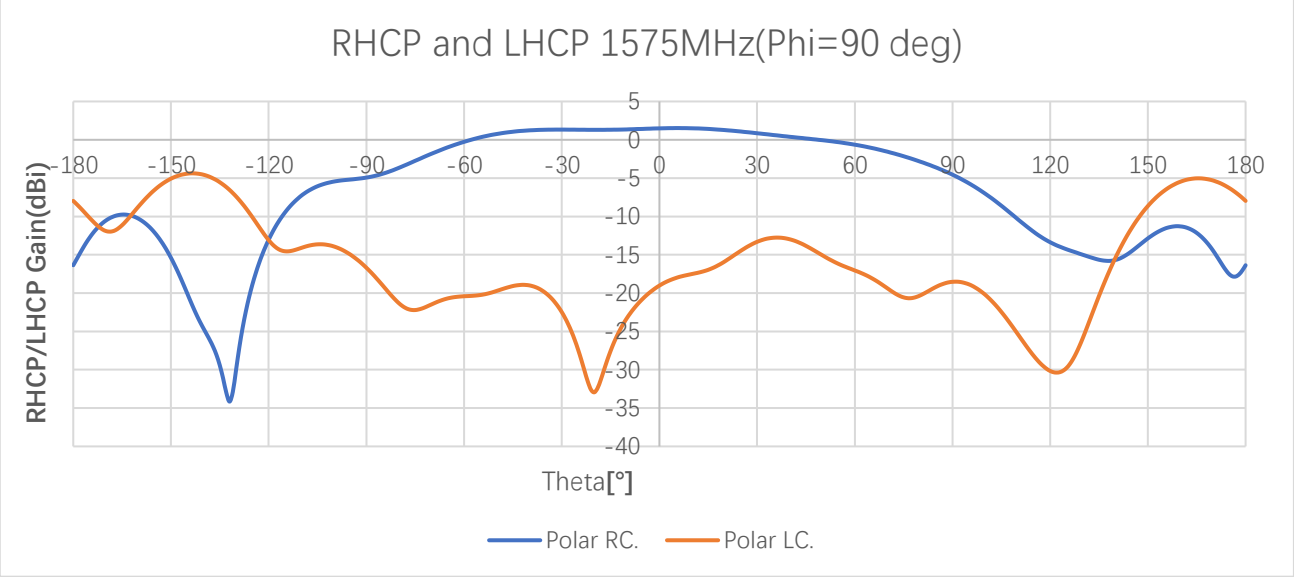


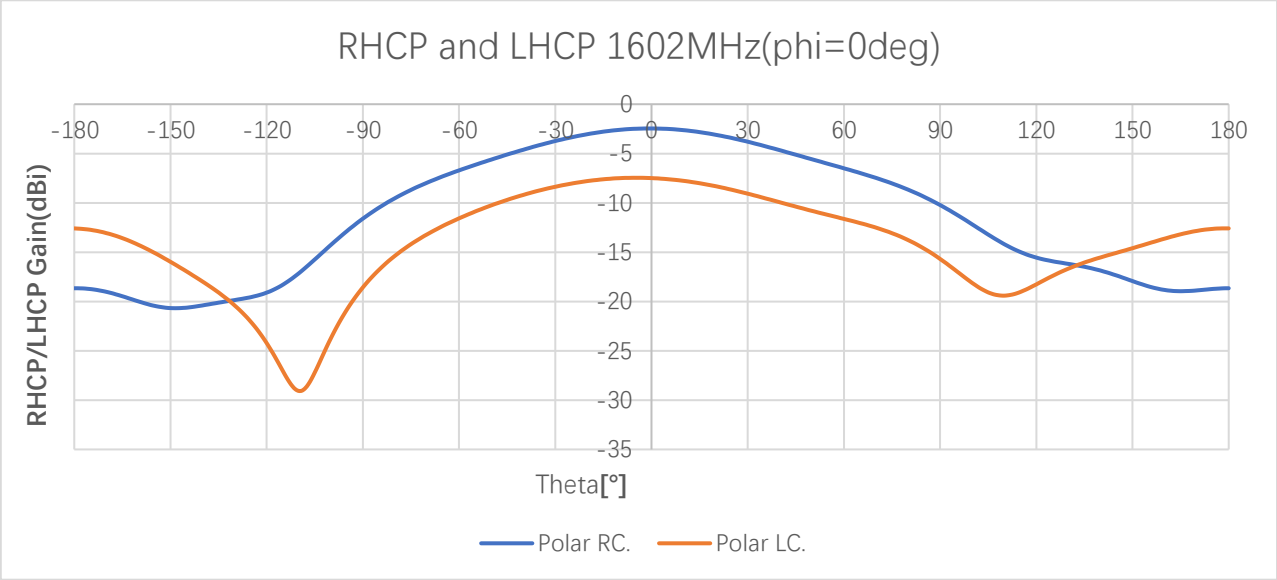


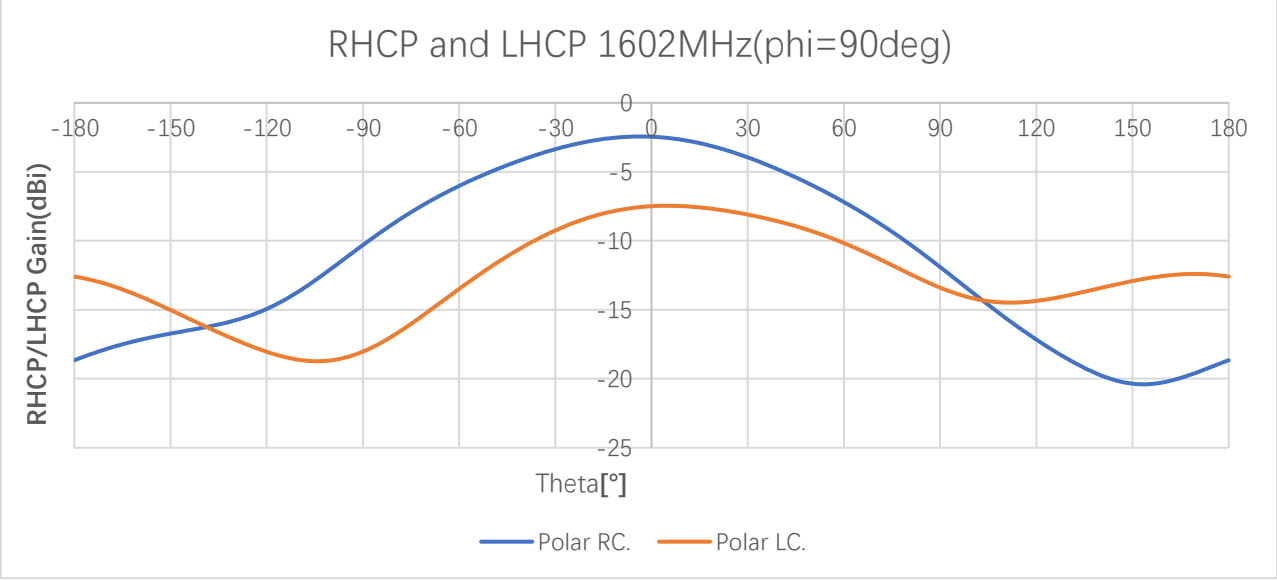



RHCP and LHCP 1561MHz(phi=90deg)
RHCP/LHCP Gain(dBi)
0
-5
-10
-15
-20
-25
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Theta[°]
Polar RC.
Polar LC.


RHCP and LHCP 1575MHz(Phi=0 deg)
RHCP/LHCP Gain(dBi)
10
0
-10
-20
-30
-40
-50
-60
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Theta[°]
Polar RC.
Polar LC.


RHCP and LHCP 1575MHz(Phi=90 deg)
RHCP/LHCP Gain(dBi)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Theta[°]
Polar RC.
Polar LC.



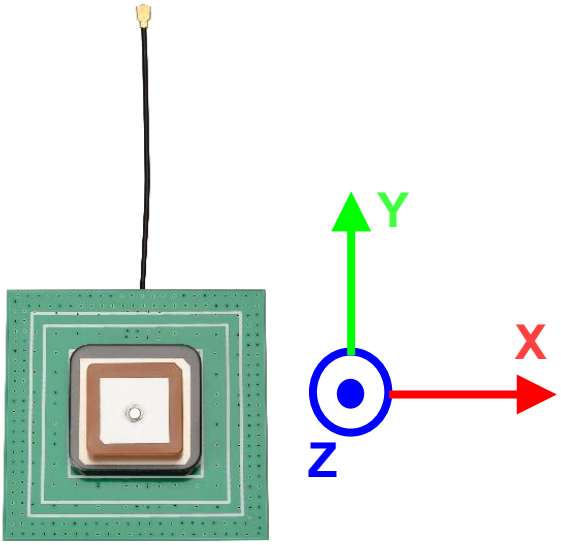


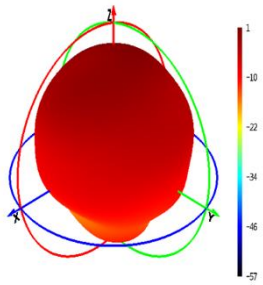
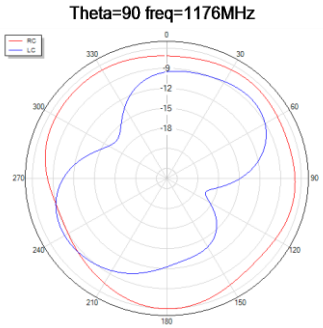
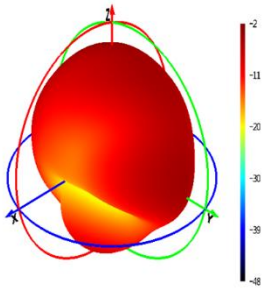
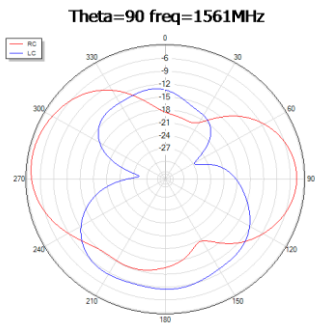
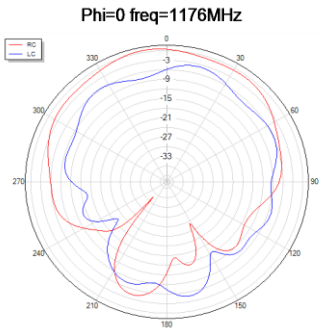
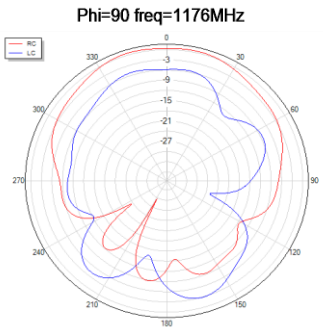
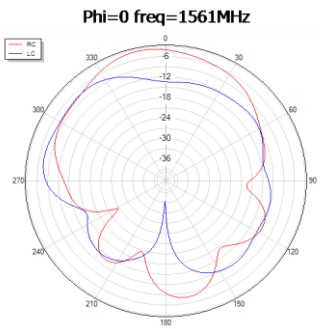
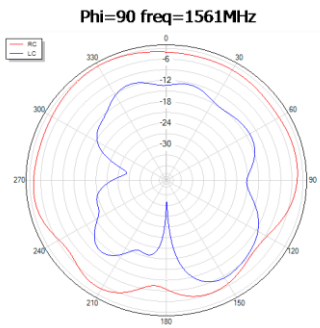
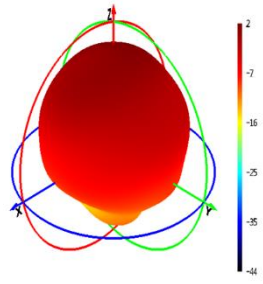
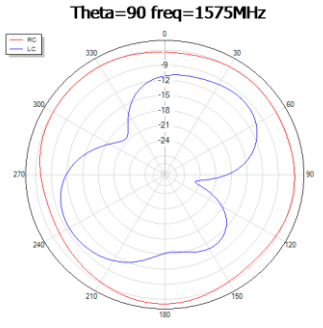
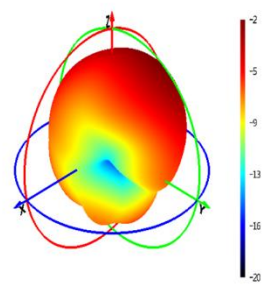
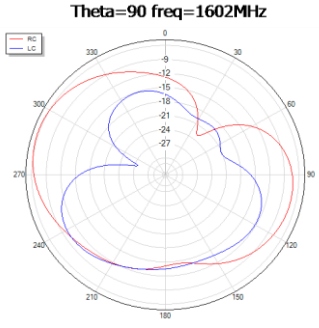
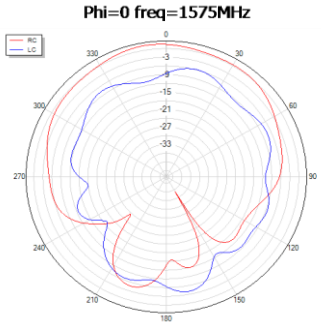
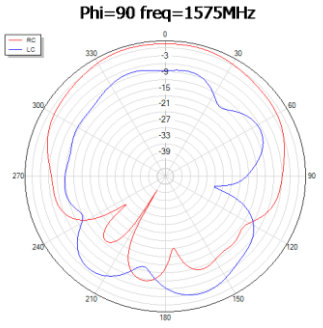
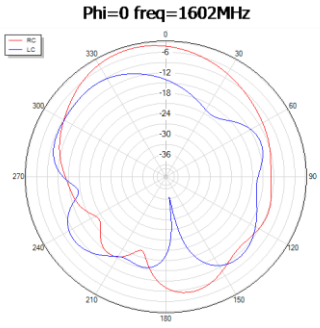
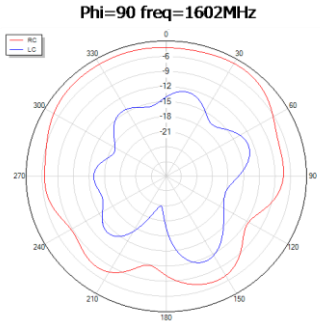
2D RHCP and LHCP Gain (dBi)

Frequency (MHz)		1176	1207	1227	1248	1268	1561	1575	1602
RHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	0.85	-	-	-	-	-2.7	1.5	-2.5
	Phi = 90 (deg) Theta = 0 (deg)	0.85	-	-	-	-	-2.7	1.5	-2.5
LHCP Gain (dBi)	Phi = 0 (deg) Theta = 0 (deg)	-18.5	-	-	-	-	-3.85	-19.0	-7.5
	Phi = 90 (deg) Theta = 0 (deg)	-18.5	-	-	-	-	-3.85	-19.0	-7.5

3.2.5. 3D & 2D Radiation Pattern

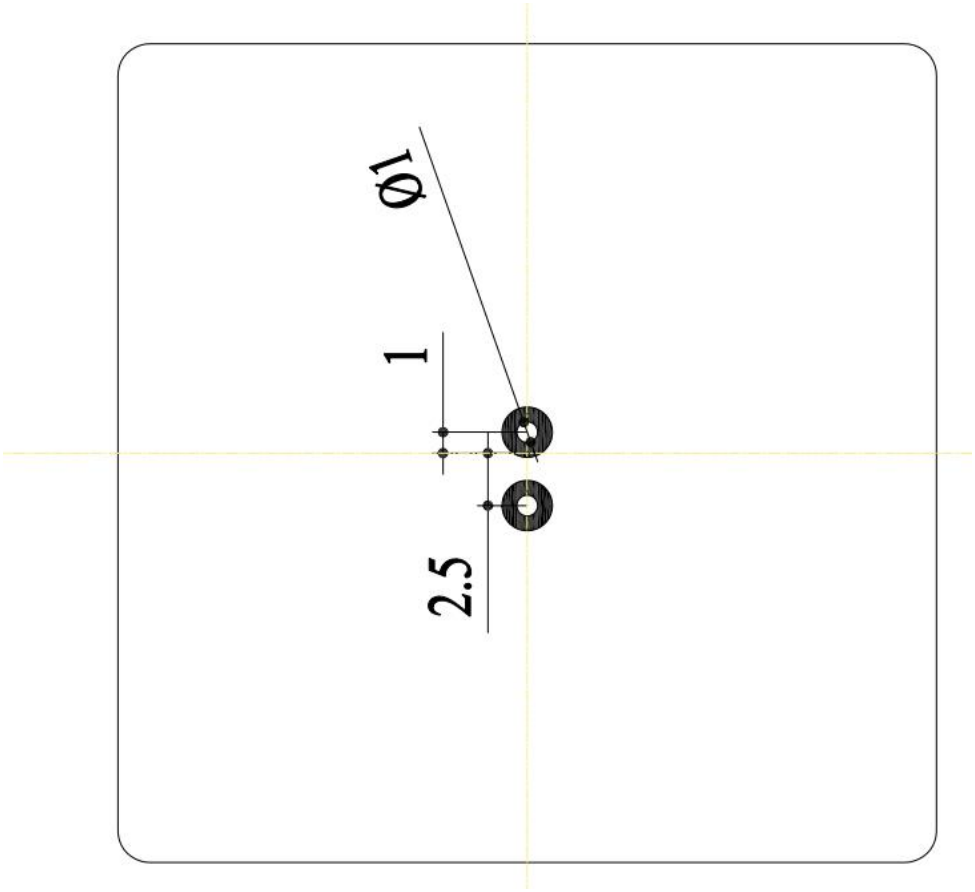
- Test Condition: on 50 mm × 50 mm PCB
- Test Chamber: GL-S-1



1176 MHz		1561 MHz	
			
			
1575 MHz		1602 MHz	
			
			

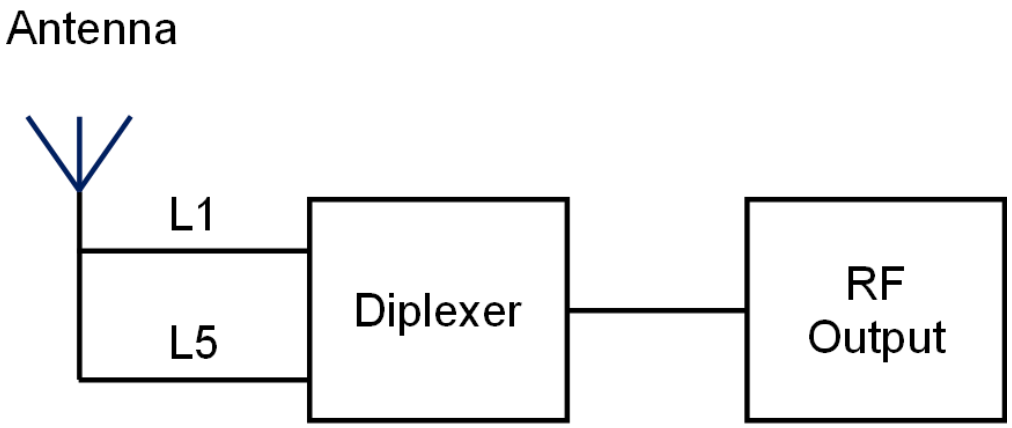
4 Pin Footprint Recommendation

As shown in the figure below, Pin L1 & Pin L5 footprints have the same design.

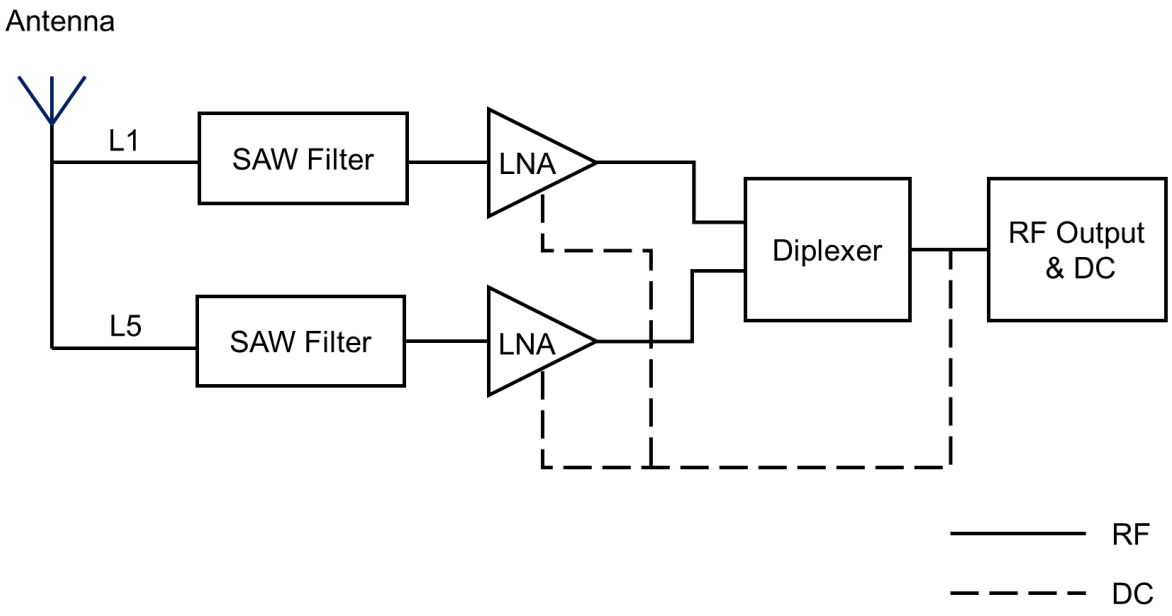


5 Schematic Design Recommendation

5.1. Passive Circuit Design Recommendation



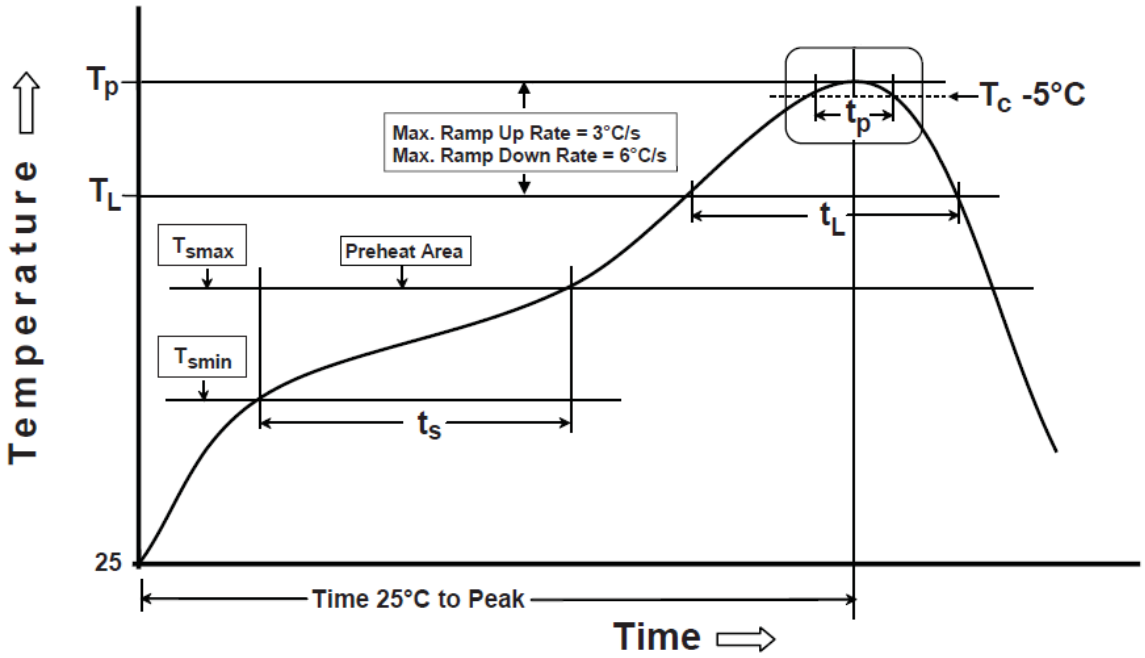
5.2. Active Circuit Design Recommendation



6 Recommended Reflow Soldering Profile

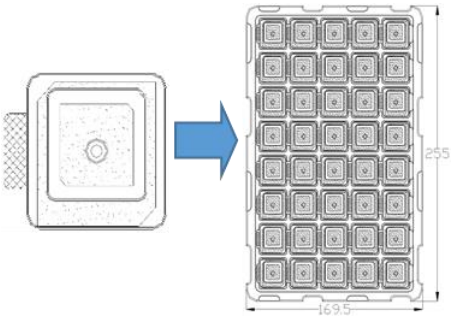
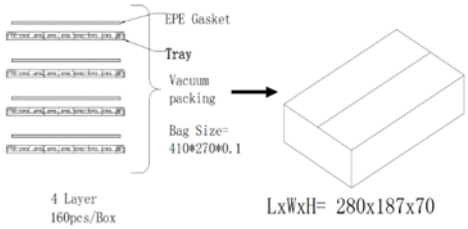
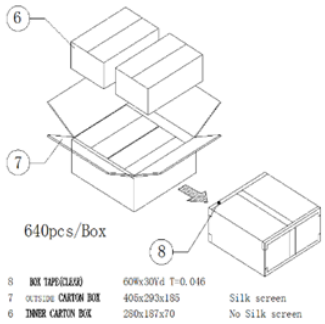
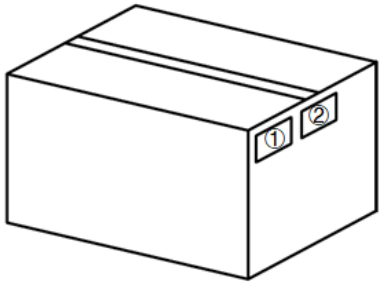
- SOLDER PASTE: Sn/Ag/Cu: 96.5/3.0/0.5
- Recommended reflow condition:

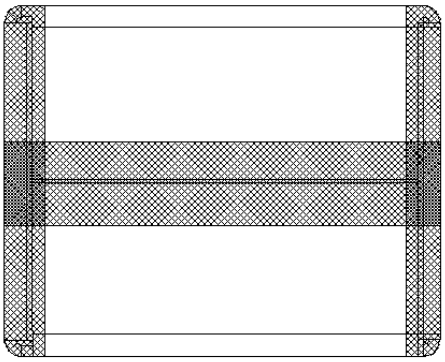
The graphic shows temperature profile for component assembly process in reflow ovens



Phase	Profile Features	Pb-Free Assembly (SnAgCu)
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.

7 Packaging

Step	Packaging Picture / 2D Picture	Description
1		(40 PCS Antennas / Tray)
2		The inner box contains 4 plastic trays. (160 PCS Antennas / Inner Box)
3		(4 Inner Boxes / Carton Box) (640 PCS Antenna / 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 = 405 × 293 × 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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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/ Lucky FENG	1. Updated the antenna picture. 2. Update the drawing (Chapter 2).
1.2	2024-10-12	Rhone WEI	1. Added the description of the pin footprint figure (Chapter 4). 2. Added Chapter 5.
2.0	2024-12-07	Rhone WEI	Numerous changes were made to this document. It should be read in its entirety.
2.1	2024-12-16	Lucky FENG	1. Updated the drawing (Chapters 2 & 4). 2. Added Chapter 6.

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