



# Antenna Datasheet

**Product OC:** YEGM011BA

**Version:** 2.0

**Date:** 2023-09-05

**Status:** Released

**Product Name:** Active GNSS L1/L2/L5

**Key Features:**

Frequency Band: 1164–1238 MHz, 1559–1606 MHz

RG58 (SMA to TNC Male) length: 4000 ±50 mm

Magnetic and suction cup support (bracket length: 75 ±1 mm)

Dimensions:  $\Phi$  146.41 mm × 65.03 mm

Efficiency: Up to 65 %

RoHS Compliant

LNA Gain: 30 ±3 dB

IP67

# 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.

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# 1 Specification

Test Condition: Free Space

## 1.1. Electrical

| Electrical        |                              |
|-------------------|------------------------------|
| Frequency Range   | 1164–1238 MHz, 1559–1606 MHz |
| Impedance         | 50 Ω                         |
| Polarization      | RHCP                         |
| Radiation Pattern | Directional                  |

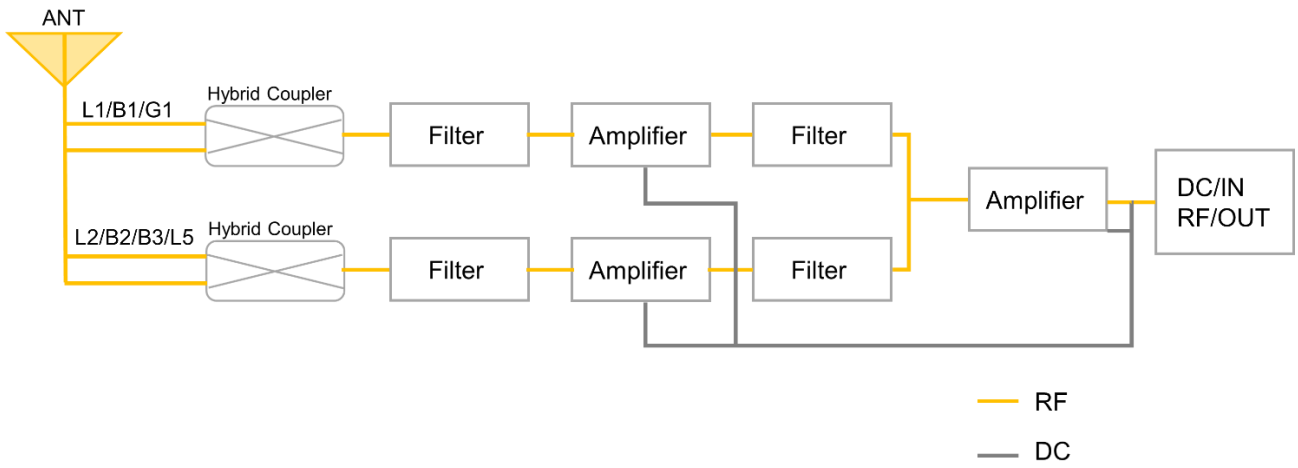
| Band             | GPS L5         | GALILEO    | GPS L2   | GLONASS | BEIDOU | BEIDOU | GPS L1     |         |
|------------------|----------------|------------|----------|---------|--------|--------|------------|---------|
|                  | E5a            | E5b        | QZSS L2C | G2      | B3     | B1I    | E1         | GLONASS |
| Frequency (MHz)  | BEIDOU B2a-B2I | BEIDOU B2b |          |         |        |        | BEIDOU B1C | G1      |
|                  | QZSS L5        |            |          |         |        |        | QZSS L1    |         |
|                  | IRNSS L5       |            |          |         |        |        |            |         |
|                  | 1176           | 1207       | 1227     | 1248    | 1268   | 1561   | 1575       | 1602    |
| VSWR             | 1.15           | 1.1        | 1.12     | -       | -      | 1.16   | 1.17       | 1.18    |
| Return Loss (dB) | -23            | -26.1      | -25.0    | -       | -      | -22.4  | -22.1      | -21.7   |
| Efficiency (%)   | 60             | 72         | 62       | -       | -      | 66     | 67         | 58      |
| Peak Gain (dBi)  | 4.47           | 5.7        | 5.25     | -       | -      | 5.64   | 5.74       | 5.14    |
| Axial Ratio (dB) | 1.03           | 0.35       | 0.53     | -       | -      | 1.12   | 0.99       | 0.61    |

| LNA Electrical                 |                                                                       |
|--------------------------------|-----------------------------------------------------------------------|
| LNA Gain                       | 30 ±3 dB                                                              |
| Noise Figure                   | ≤ 1.5 dB                                                              |
| Output VSWR                    | < 2.0                                                                 |
| Filter Out-of-Band Attenuation | ≥ 30 dB f0 ± 100 MHz<br>f0 (1164 MHz, 1278 MHz) & (1525MHz, 1606 MHz) |
| Working Voltage                | DC 3–12 V                                                             |
| Working Current                | 17.6 ±4 mA                                                            |
| Impedance                      | 50 Ω                                                                  |

## 1.2. Mechanical & Environmental

| Mechanical                     |                                                    |
|--------------------------------|----------------------------------------------------|
| Antenna Dimensions             | Φ 146.41 mm × 65.03 mm                             |
| Material & Color               | ASA & White                                        |
| Cable Type & Length            | RG58 & Black & 4000 mm                             |
| Connector Type                 | Antenna: TNC Female<br>Cable: SMA Male to TNC Male |
| Mounting Type                  | Thread and Magnet                                  |
| Weight                         | Typ. 1258 g                                        |
| Environmental                  |                                                    |
| Operation Temperature          | -40 °C to +85 °C                                   |
| Storage Temperature            | -40 °C to +85 °C                                   |
| Ingress Protection (IP) Rating | IP67                                               |
| RoHS Compliant                 | Yes                                                |

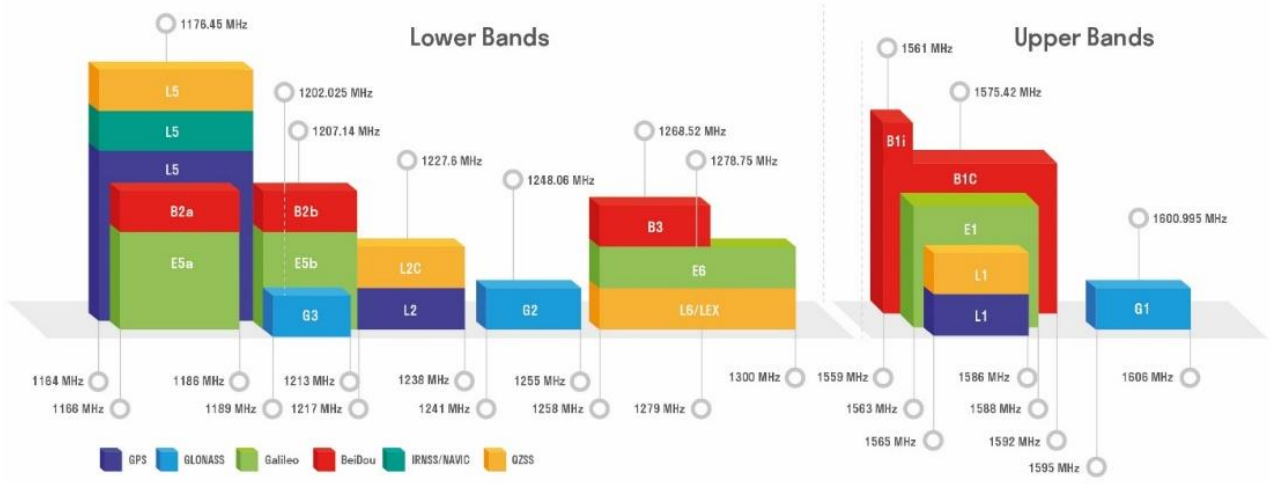
### 1.3. Block Diagram (Active Antenna)



## 1.4. Supported GNSS Frequency Bands

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

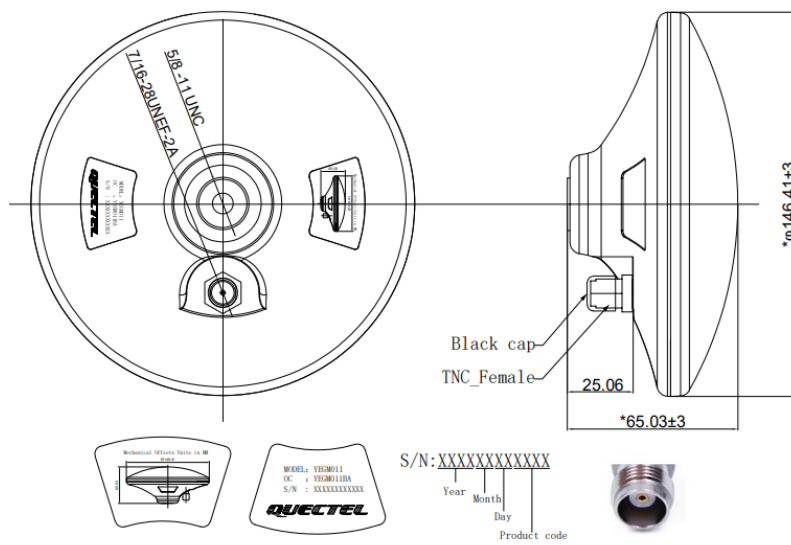
**GNSS Bands and Constellations**



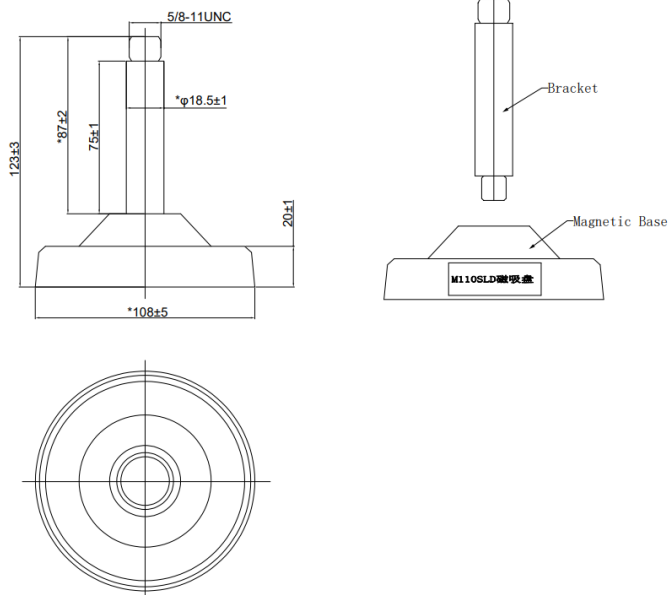


# 2 Drawing

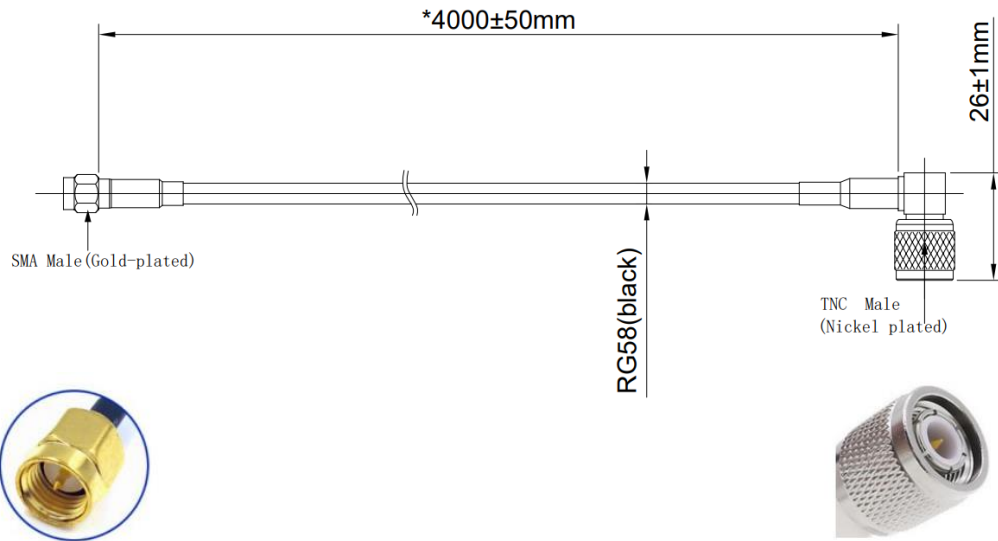
## Antenna



## Magnetic and suction cup support



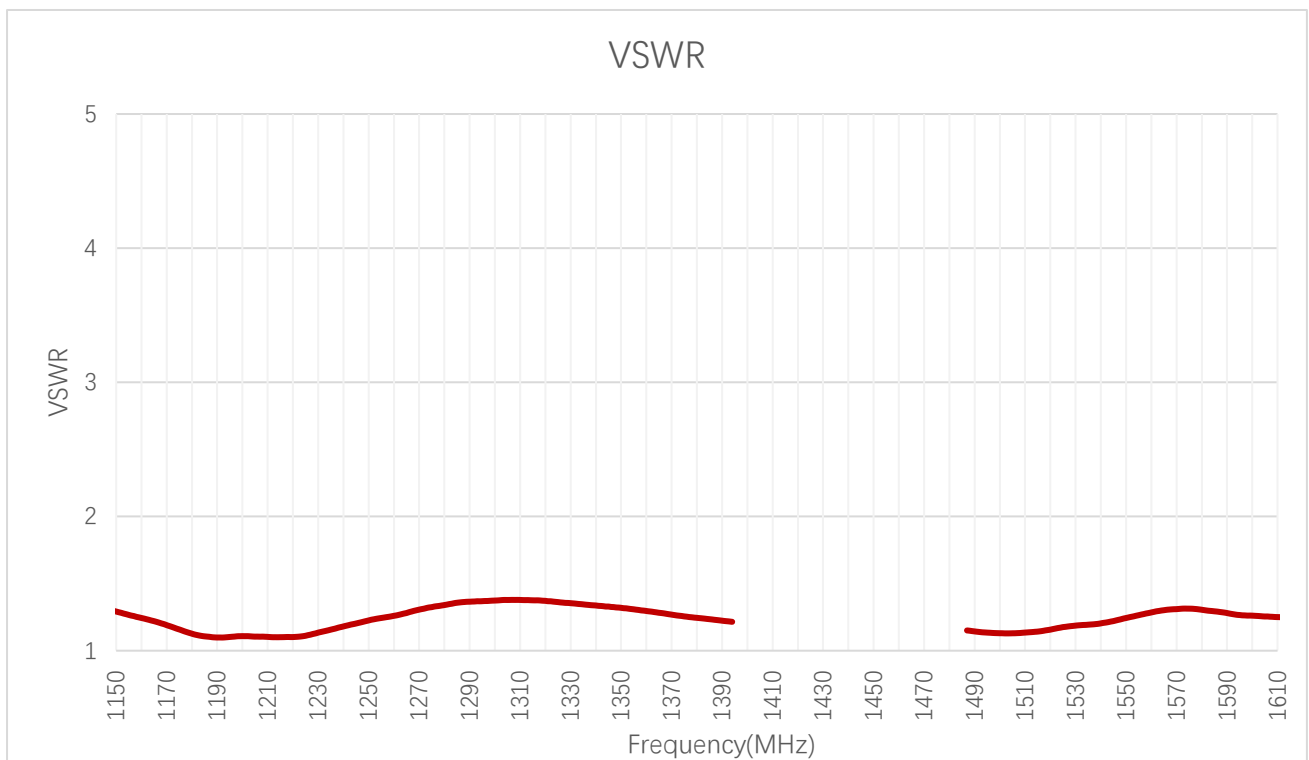
# Cable



# 3 Detailed Performance

## 3.1. S-Parameter Test

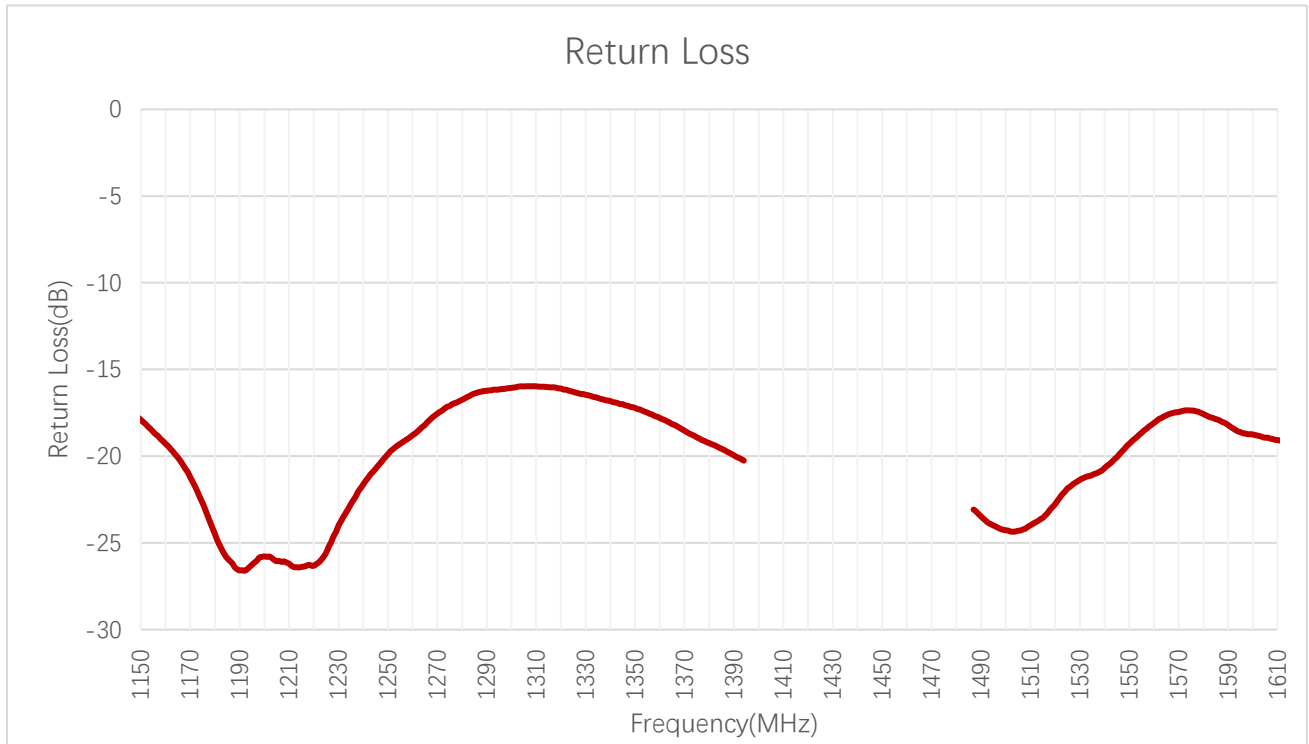
### 3.1.1. VSWR



**VSWR**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| VSWR            | 1.15 | 1.1  | 1.12 | -    | -    | 1.16 | 1.17 | 1.18 |

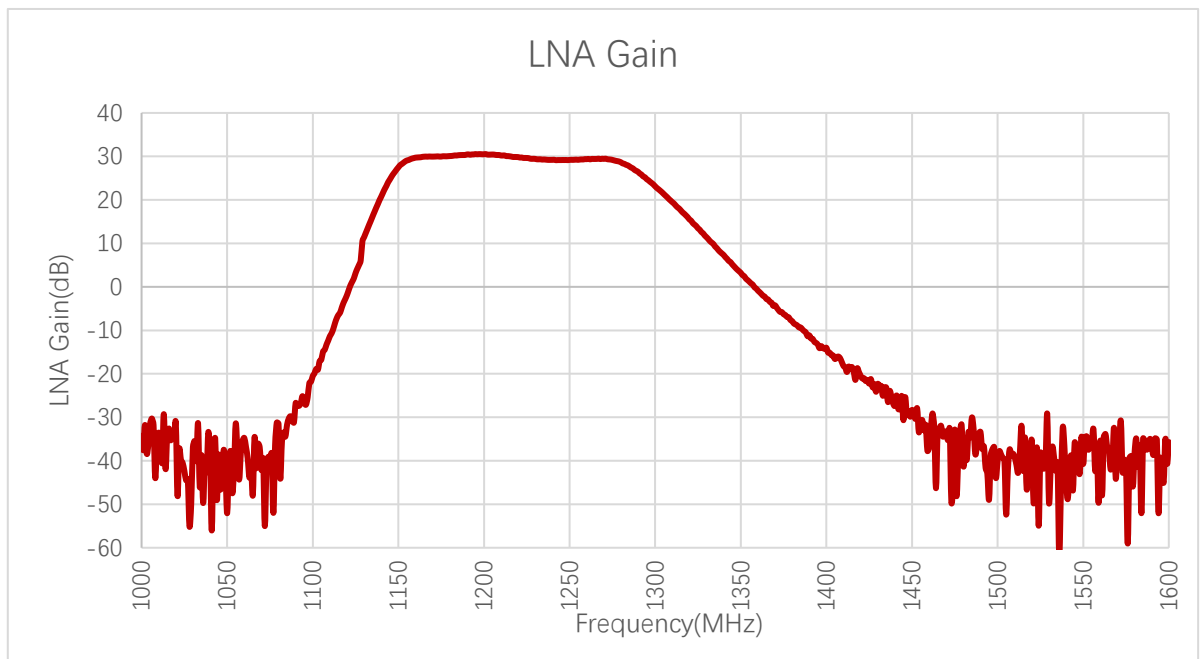
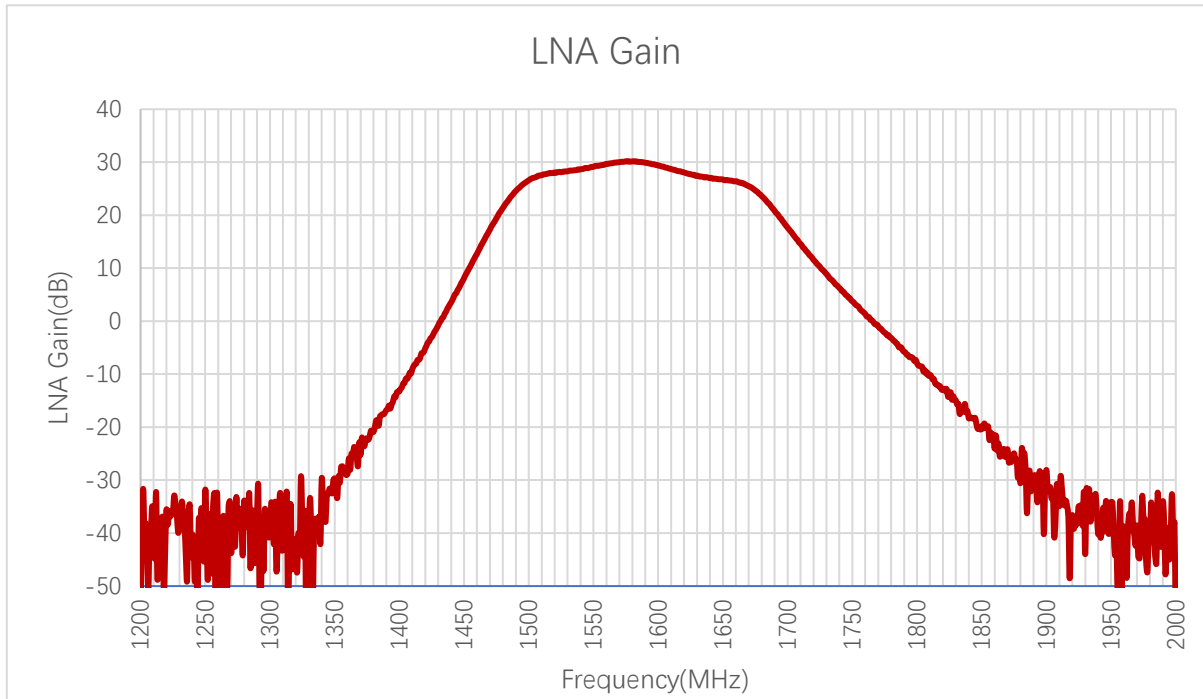
**3.1.2. Return Loss**



**Return Loss (dB)**

| Frequency (MHz)  | 1176  | 1207  | 1227  | 1248 | 1268 | 1561  | 1575  | 1602  |
|------------------|-------|-------|-------|------|------|-------|-------|-------|
| Return Loss (dB) | -23.0 | -26.1 | -25.0 | -    | -    | -22.4 | -22.1 | -21.7 |

**3.1.3. GNSS LNA Gain**

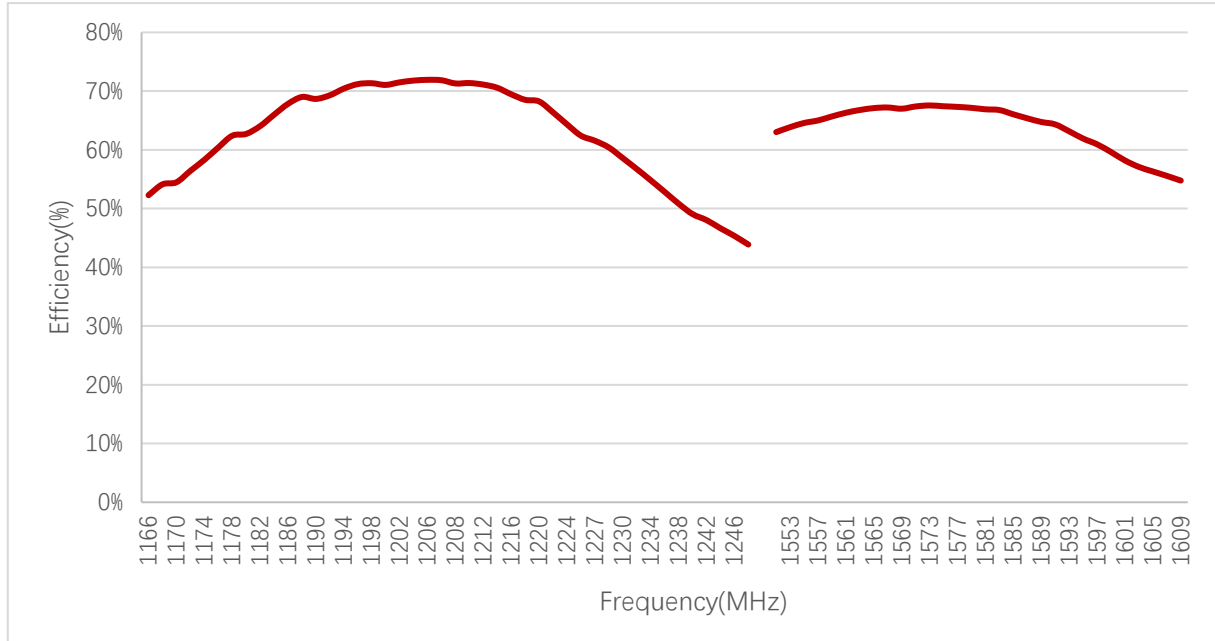


**LNA Gain (dB)**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| LNA Gain (dB)   | 30.0 | 30.3 | 29.5 | -    | -    | 29.6 | 30.1 | 29.2 |

### 3.2. Radiation Performance Test

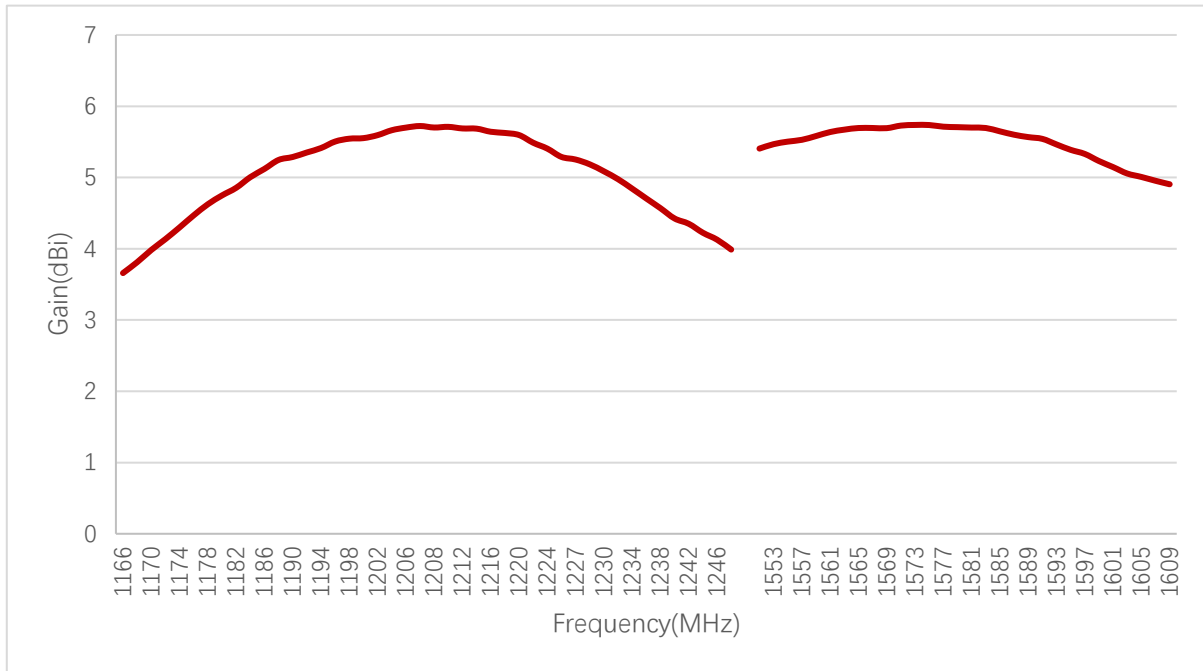
#### 3.2.1. Efficiency



**Efficiency (%)**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| Efficiency (%)  | 60   | 72   | 62   | -    | -    | 66   | 67   | 58   |

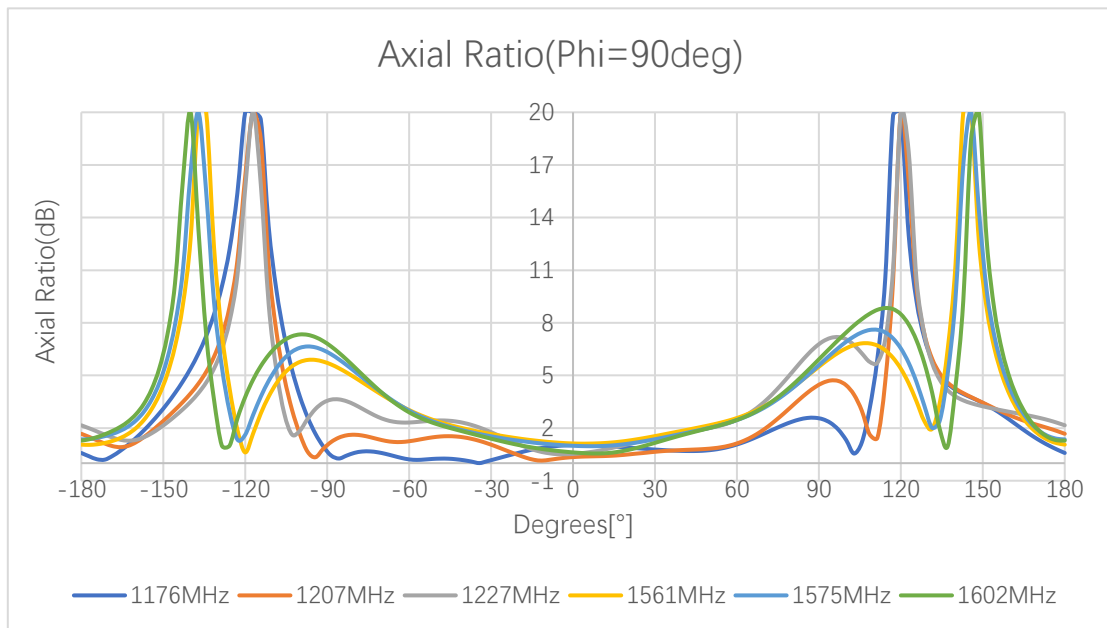
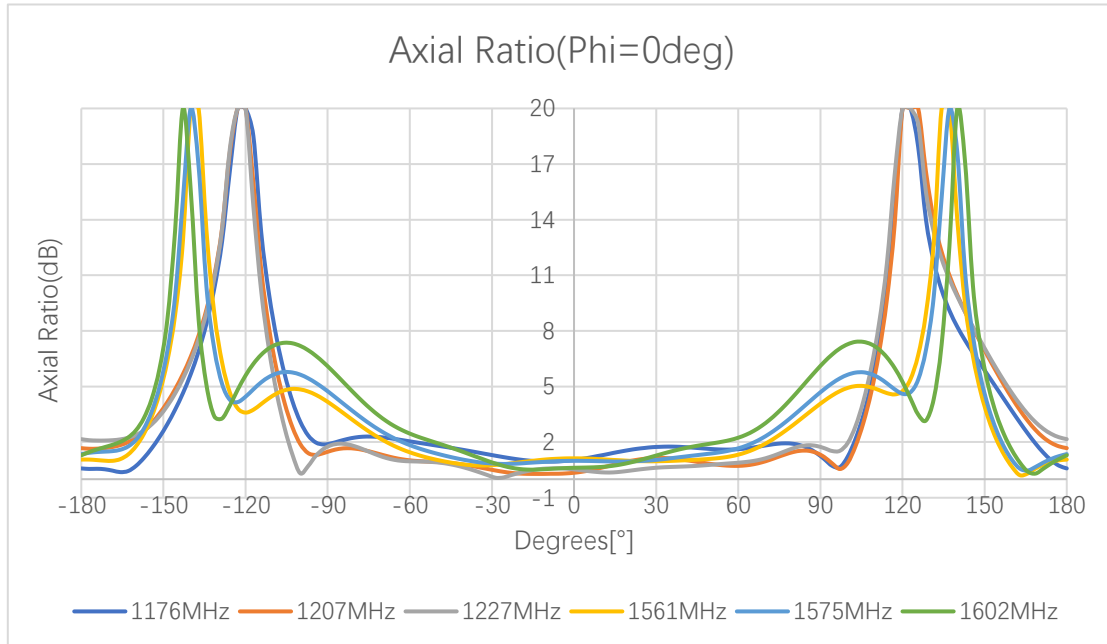
**3.2.2. Peak Gain**



**Peak Gain (dBi)**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| Peak Gain (dBi) | 4.47 | 5.7  | 5.25 | -    | -    | 5.64 | 5.74 | 5.14 |

**3.2.3. Axial Ratio**

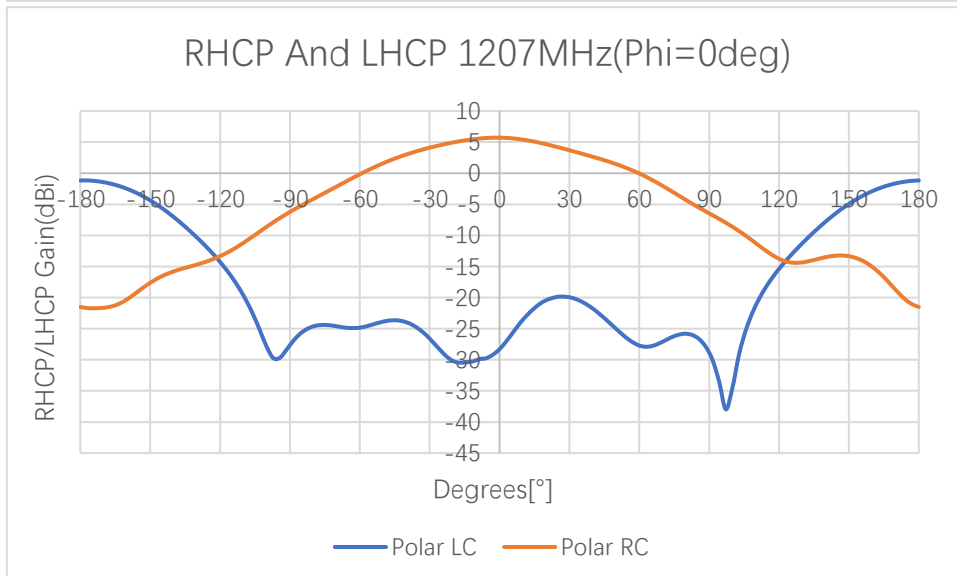
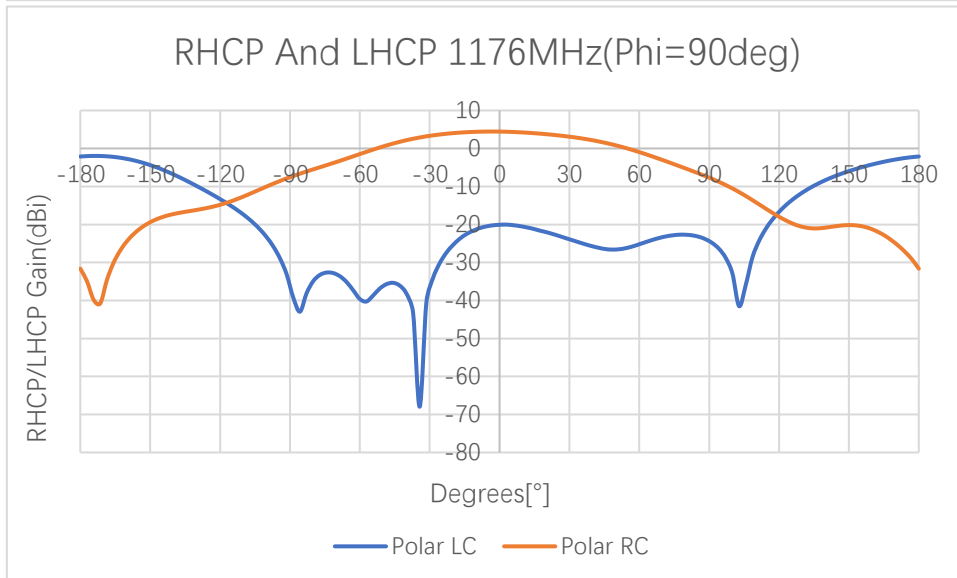
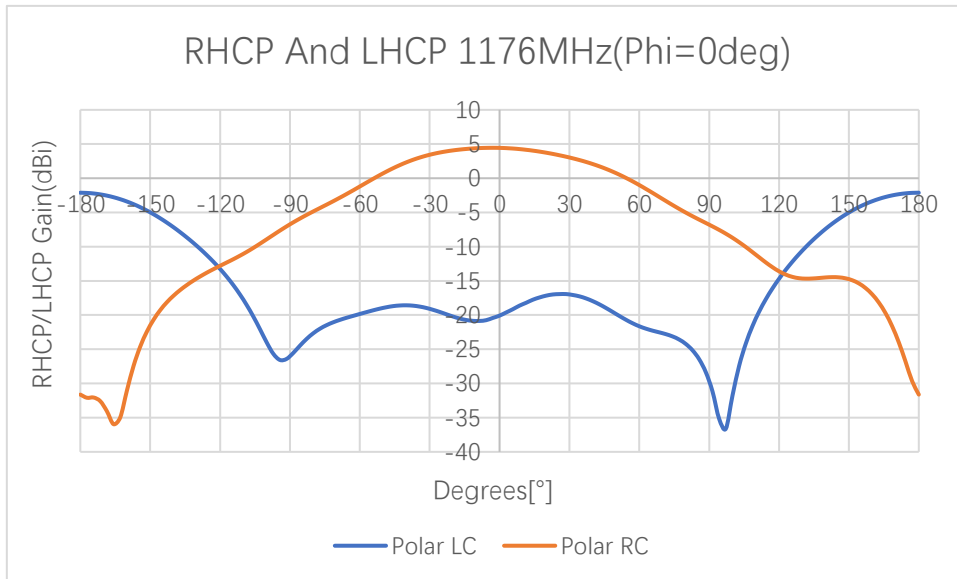


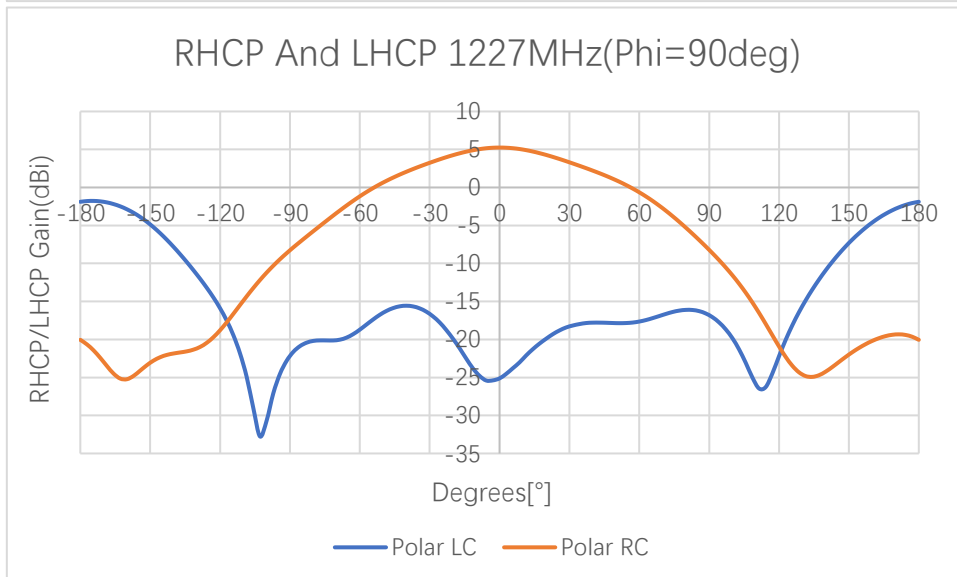
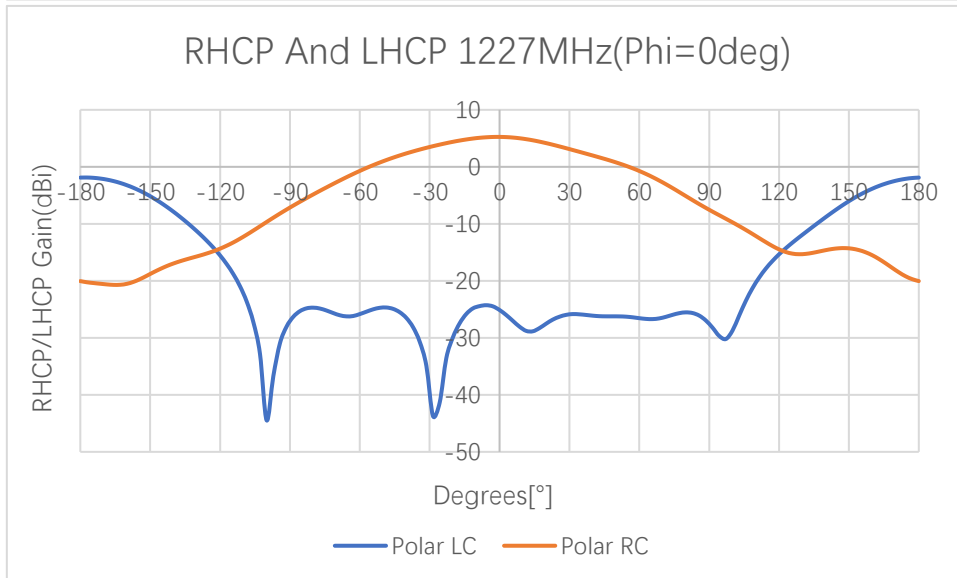
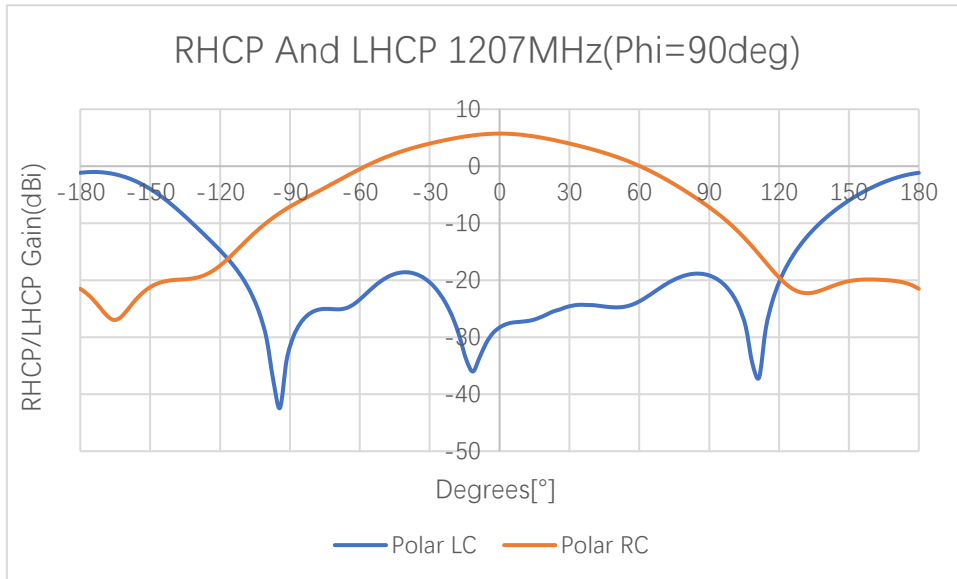
**Axial Ratio (dB)**

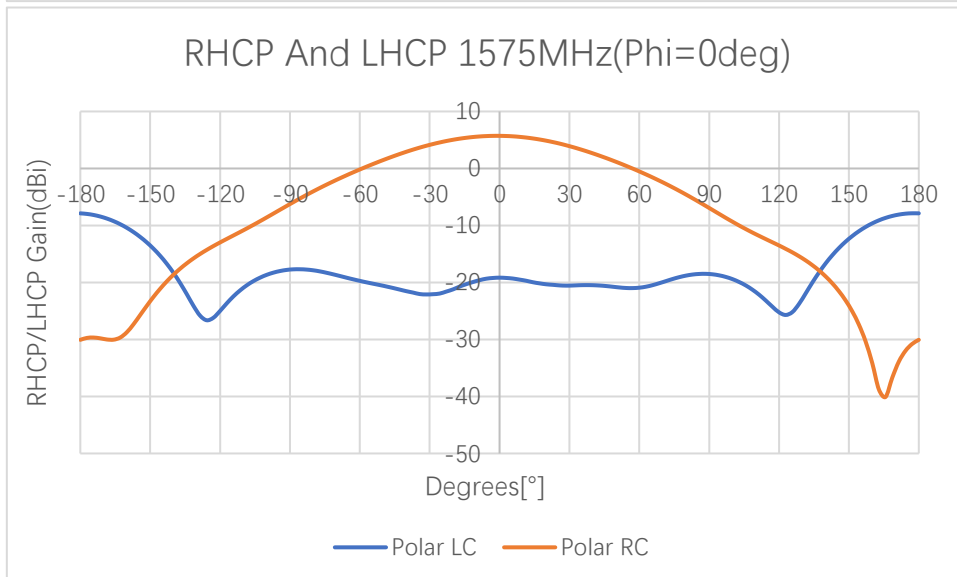
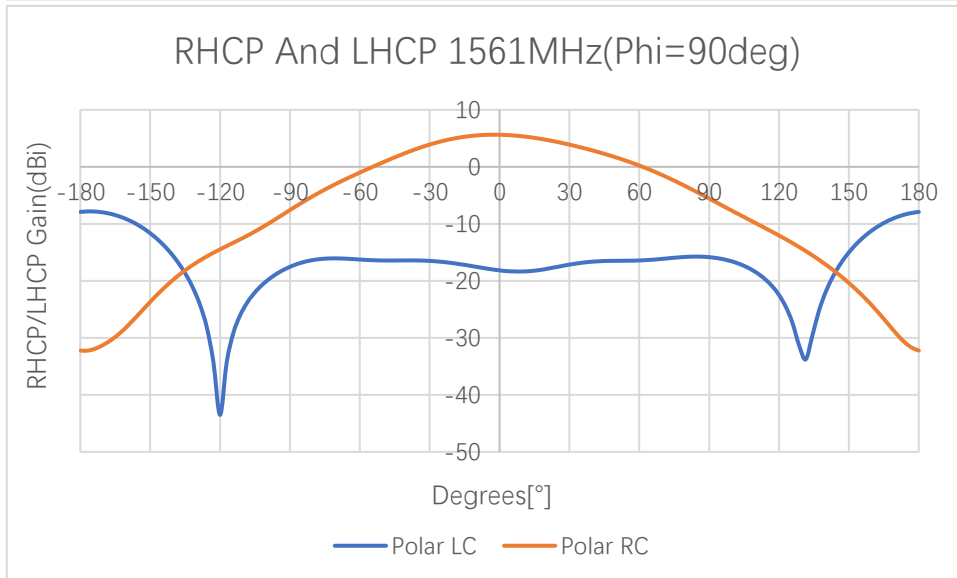
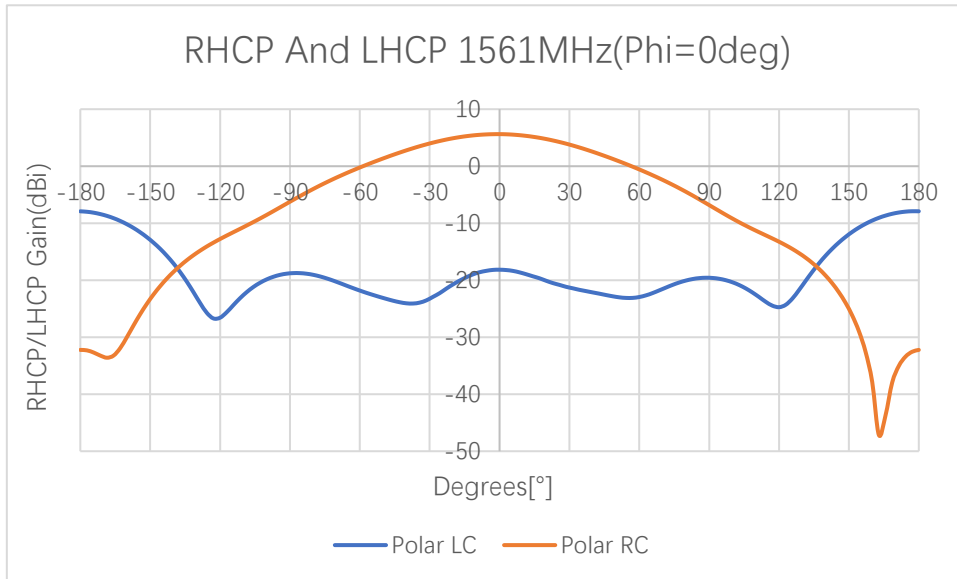
| Frequency (MHz)  |                                   | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|------------------|-----------------------------------|------|------|------|------|------|------|------|------|
| Axial Ratio (dB) | Phi = 0 (deg)<br>Theta = 0 (deg)  | 1.03 | 0.35 | 0.53 | -    | -    | 1.12 | 0.99 | 0.61 |
|                  | Phi = 90 (deg)<br>Theta = 0 (deg) | 1.03 | 0.35 | 0.53 | -    | -    | 1.12 | 0.99 | 0.61 |

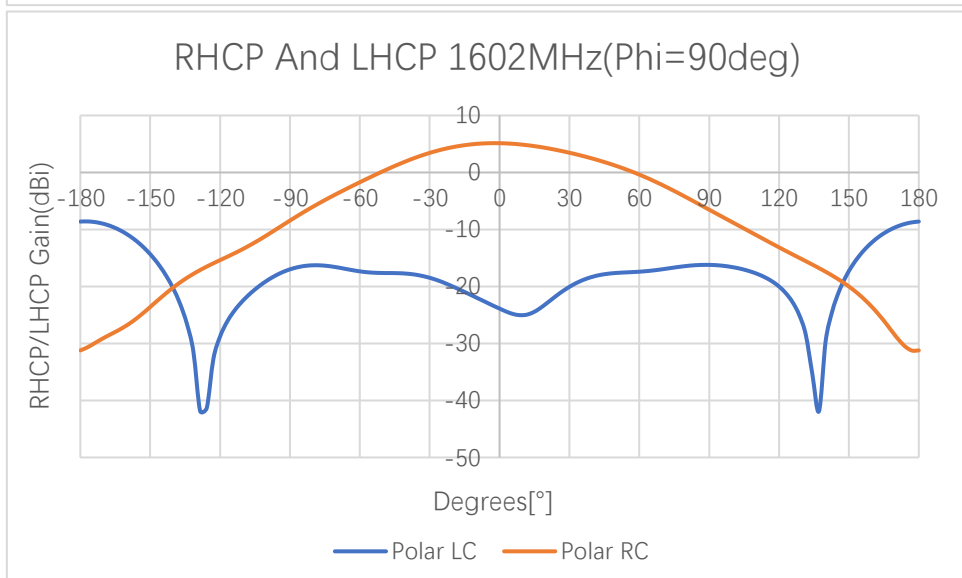
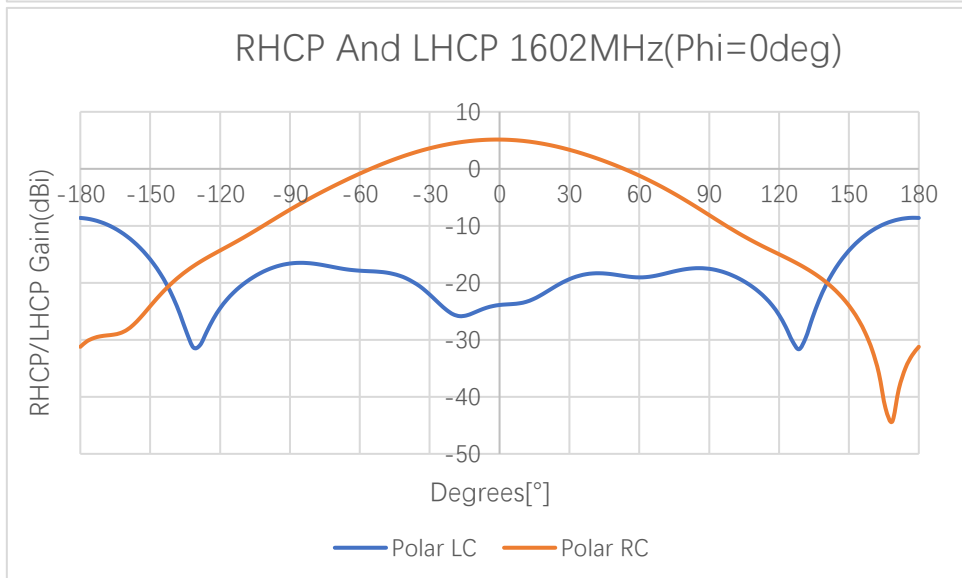
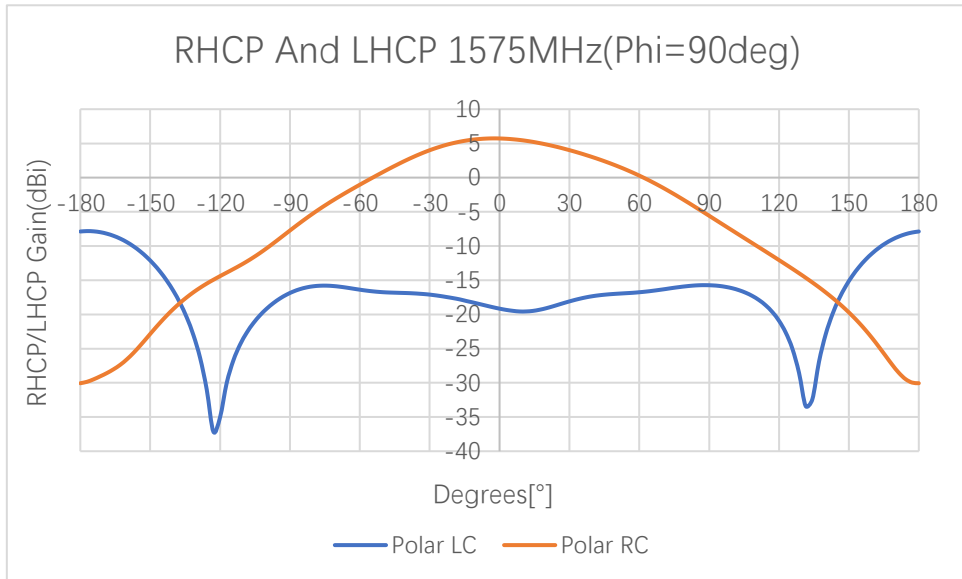


**3.2.4. 2D RHCP and LHCP Gain**







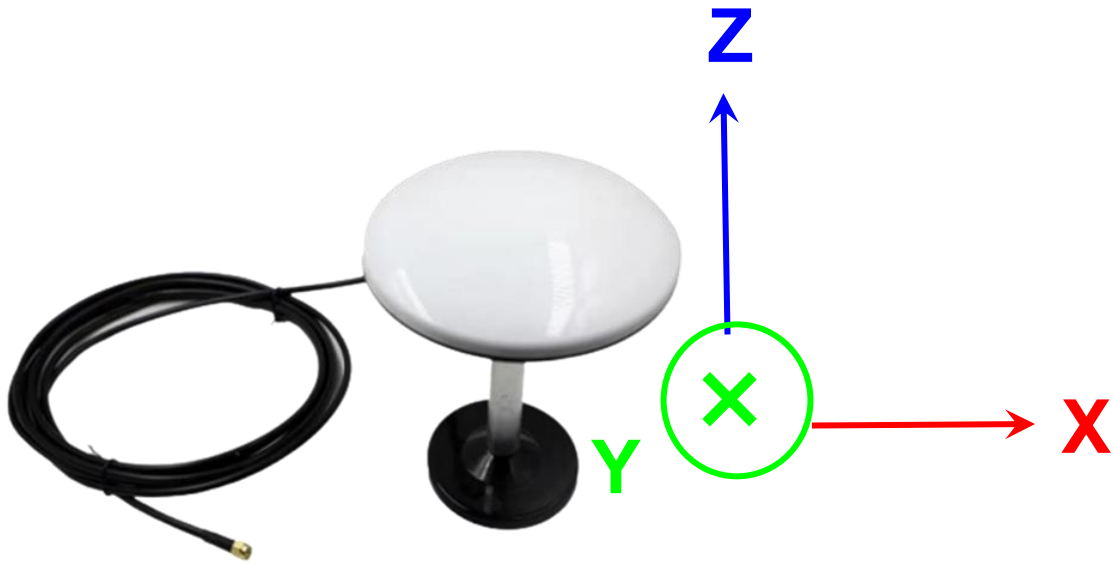


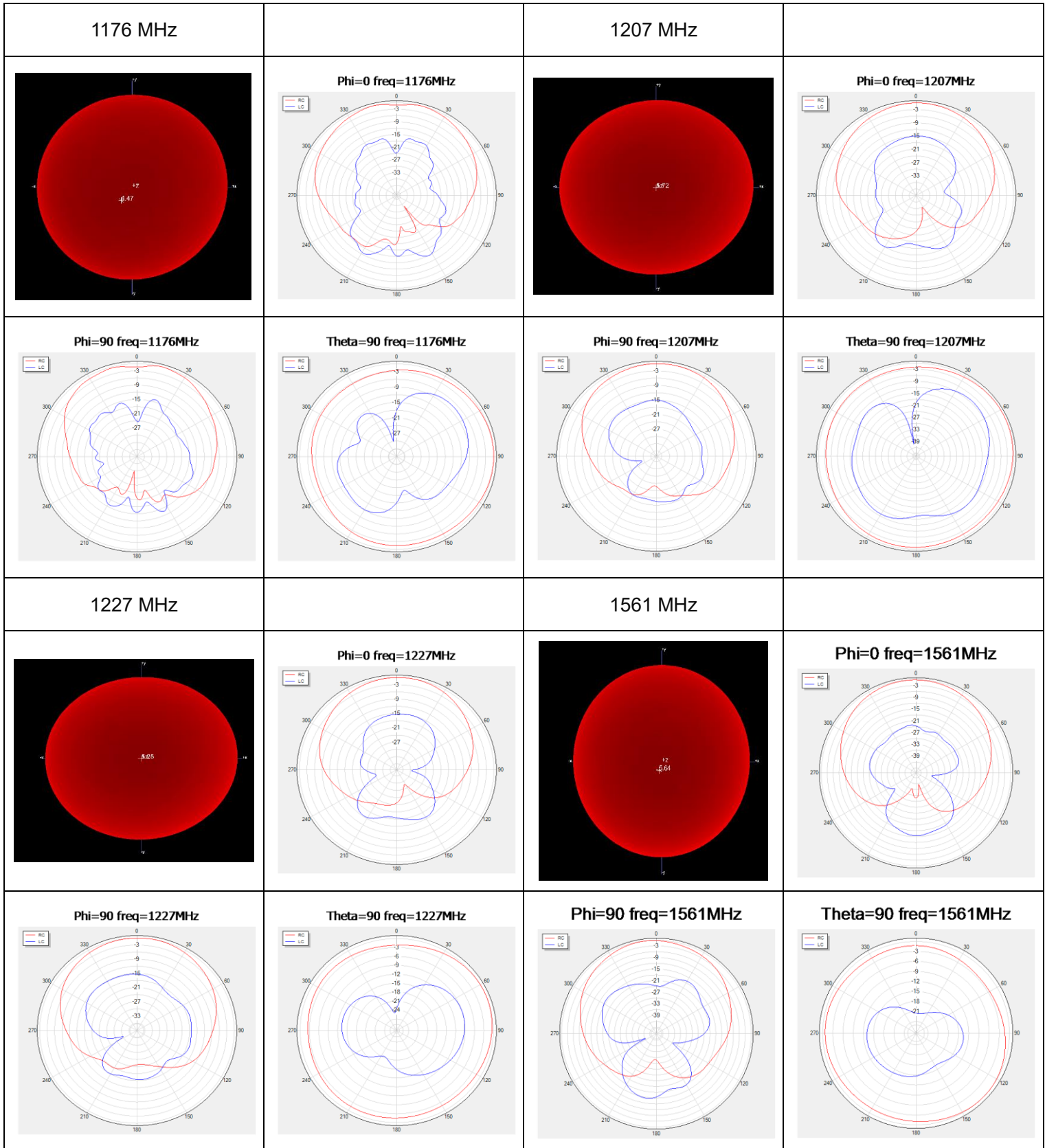
2D RHCP and LHCP Gain (dBi)

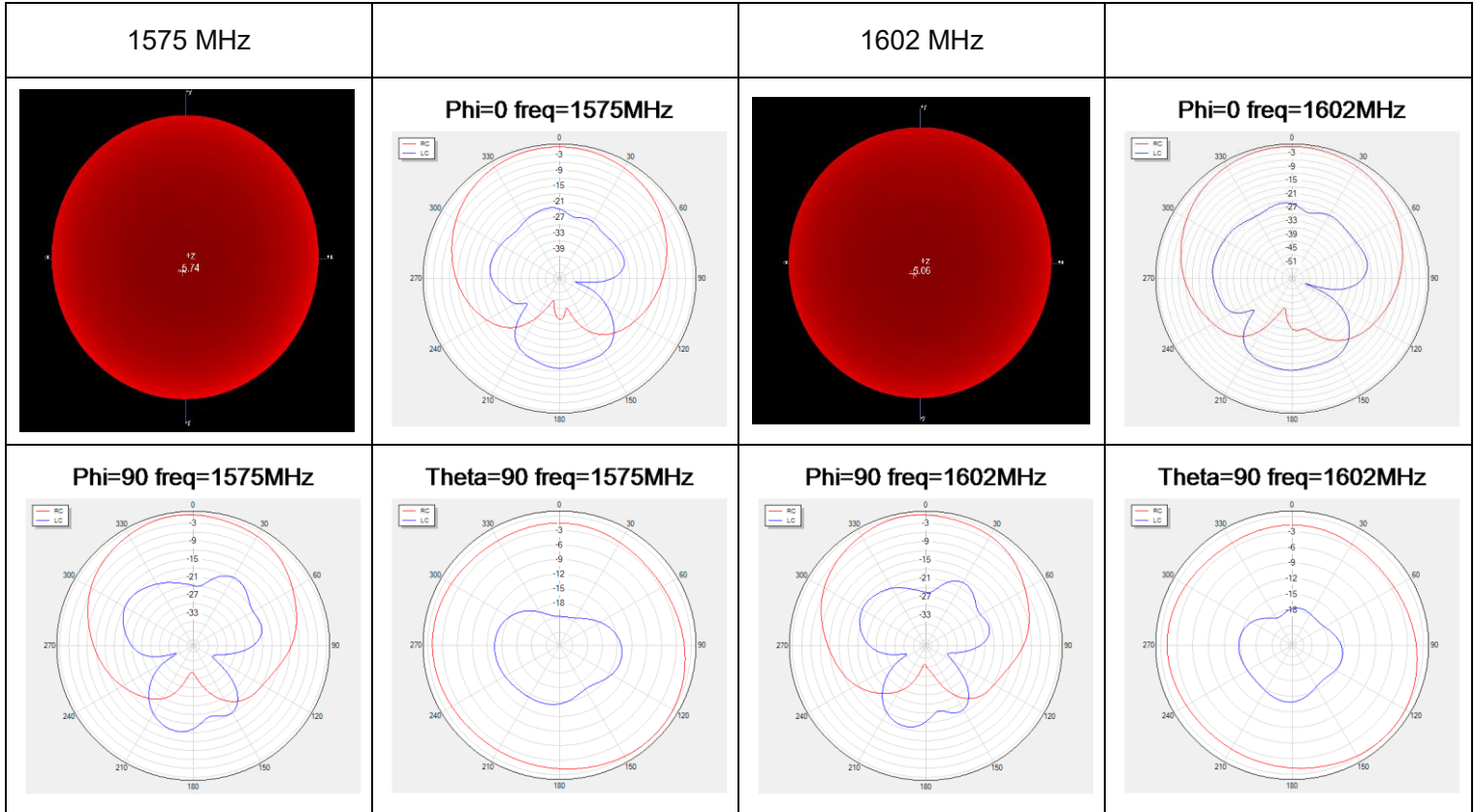
| Frequency (MHz)  |                                   | 1176   | 1207   | 1227   | 1248 | 1268 | 1561   | 1575   | 1602   |
|------------------|-----------------------------------|--------|--------|--------|------|------|--------|--------|--------|
| RC Gain<br>(dBi) | Phi = 0 (deg)<br>Theta = 0 (deg)  | 4.43   | 5.72   | 5.24   | -    | -    | 5.62   | 5.72   | 5.13   |
|                  | Phi = 90 (deg)<br>Theta = 0 (deg) | 4.43   | 5.72   | 5.24   | -    | -    | 5.62   | 5.72   | 5.13   |
| LC Gain<br>(dBi) | Phi = 0 (deg)<br>Theta = 0 (deg)  | -20.08 | -28.29 | -25.12 | -    | -    | -18.16 | -19.15 | -23.88 |
|                  | Phi = 90 (deg)<br>Theta = 0 (deg) | -20.08 | -28.29 | -25.12 | -    | -    | -18.16 | -19.15 | -23.88 |

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

- Test Condition: Free Space
- Test Chamber: FS-G-1


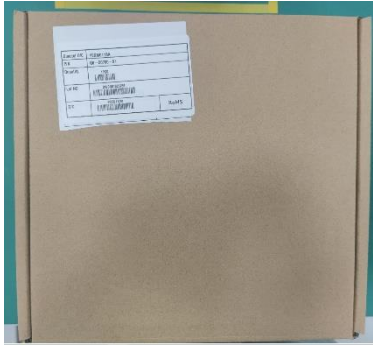



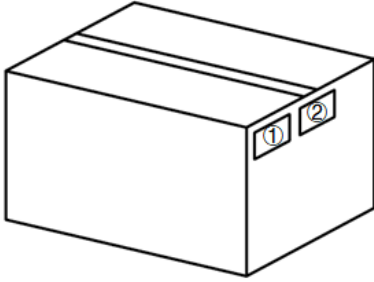
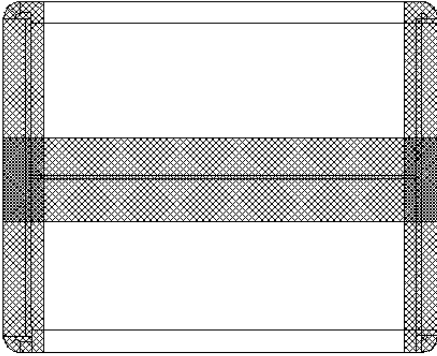






# 4 Packaging

| Step | Packaging Picture / 2D Picture                                                      | Description                                                                                                                             |
|------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 1    |   | <p>1 pc antenna product in an inner box.<br/>(1 PC Antenna / Inner Box)</p>                                                             |
| 2    |  | <p>Inner box diagram</p>                                                                                                                |
| 3    |  | <p>(5 Inner Boxes / Carton Box)<br/>(5 PCS Antennas / Carton Box)<br/><u>Carton Size:</u><br/><u>L × W × H = 450 × 240 × 290 mm</u></p> |

|   |                                                                                   |                                                                           |
|---|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 4 |  | <b>Position for Attaching Labels</b><br>① Carton Label<br>② Quality Label |
| 5 |  | <b>Sealing Cartons</b><br>“I” type sealing cartons                        |

# 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                                                                            |
|---------|------------|-------------------------------------------------------|---------------------------------------------------------------------------------|
| -       | 2022-03-17 | Kenny YIN/<br>Junsen LI                               | Creation of the document                                                        |
| 1.0     | 2022-03-17 | Kenny YIN/<br>Junsen LI                               | First official release                                                          |
| 1.1     | 2022-06-17 | Kenny YIN                                             | Updated the coaxial cable drawing (Chapter 4 and 6).                            |
| 1.2     | 2023-03-10 | Kenny YIN                                             | Updated the base drawing (Chapter 6).                                           |
| 2.0     | 2023-09-05 | Damon ZHANG/<br>Lucky FENG/<br>David LIU/<br>Aria CHU | Numerous changes were made to this document. It should be read in its entirety. |

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