



Antenna Datasheet

Product OC: Y2GMS00A0BA

Version: 1.0

Date: 2024-1-30

Status: Released

Product Name: LTE & WiFi & GNSS 3IN1 Box Antenna

Key Features:

LTE + WiFi + GPS L1 & L5

Screw Mount

Φ 127.7 * 71.7mm

SMA Connector

IP Rating: IP67 & IP69K

PC Housing

Overview

This ultra-wide-band 5G/4G antenna box provides broad coverage from 600–6000 MHz whilst backward-compatible to support 3G/2G networks as well as Cat-M and NB-IoT. The antenna is designed to work with various GND plane sizes or in free space for ease of integration with connection via 5 various cable lengths from 300–5000 mm, terminated with SMA connectors. This screw mount omnidirectional antenna is easy to install with maximum durability with its IP69 KIBILAC® ASA enclosure. Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

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1 Specification

1.1. Electrical

| Electrical Specifications | | |
|---------------------------|------------|------------------------------|
| Frequency Range | LTE | 600–960 MHz, 1400–6000 MHz |
| | WiFi | 2400–2500 MHz, 5150–5850 MHz |
| | GNSS | 1164–1189 MHz, 1565–1606 MHz |
| Radiation Pattern | LTE & WiFi | Omni-directional |
| | GNSS | Directional |
| Polarization | LTE & WiFi | Linear |
| | GNSS | RHCP |
| Impedance | 50 Ω | |
| Isolation | ≤ -11.9 dB | |

1.1.1. LTE

| SPEC | Band | B71 | B12 /B13 /B28 | B5 /B8 /B26 | N74 /N75 /N76 | B1 /B2 /B3 | B40 | Wi-Fi 2G | B38 /B41 | B42 /B48 /N77 | N79 | Wi-Fi 5G |
|-------------------------|----------------|-------------|---------------------|-------------------|---------------------|------------------|---------------|---------------|---------------|---------------------|---------------|---------------|
| | Freq. (MHz) | 600– 700 | 700– 810 | 820– 960 | 1420– 1520 | 1700– 2170 | 2300– 2400 | 2400– 2500 | 2500– 2690 | 3300– 4200 | 4400– 5000 | 5150– 5850 |
| Max VSWR | | 2.7 | 1.7 | 2.3 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.6 | 1.7 | 1.6 |
| Max Return Loss (dB) | | -6.7 | -11.4 | -8.1 | -16.2 | -18.8 | -18.1 | -21.5 | -21.2 | -13.1 | -11.6 | -12.6 |
| AVG Eff. (%) | | 13.6 | 25.3 | 14.2 | 25.5 | 28.8 | 30.0 | 27.8 | 26.1 | 15.0 | 12.7 | 11.7 |
| AVG AVG Gain (dB) | | -8.7 | -6.0 | -8.5 | -5.9 | -5.4 | -5.2 | -5.6 | -5.8 | -8.2 | -9.0 | -9.3 |

| | | | | | | | | | | | |
|---------------------|------------|------|------|------|------|------|------|------|------|------|------|
| Max Peak Gain (dBi) | -2.8 | -0.3 | -0.6 | -0.1 | -0.1 | -0.5 | -0.6 | -1.1 | -0.8 | -2.4 | -4.1 |
| VSWR | ≤ 2.7 | | | | | | | | | | |
| Return Loss | ≤ -6.7 dB | | | | | | | | | | |
| Peak Gain | ≤ -0.1 dBi | | | | | | | | | | |

1.1.2. WiFi

| SPEC | Band | B71 | B12 /B13 /B28 | B5 /B8 /B26 | GPS L5 | N74 /N75 /N76 | B1 /B2 /B3 | B40 | Wi-Fi 2G | B38 /B41 | B42 /B48 /N77 | N79 | Wi-Fi 5G |
|----------------------|-------------|---------|---------------|-------------|-----------|---------------|------------|-----------|-----------|-----------|---------------|-----------|-----------|
| | Freq. (MHz) | 600–700 | 700–810 | 820–960 | 1164–1189 | 1420–1520 | 1700–2170 | 2300–2400 | 2400–2500 | 2500–2690 | 3300–4200 | 4400–5000 | 5150–5850 |
| Max VSWR | - | - | - | - | - | - | - | - | 1.7 | - | - | - | 1.6 |
| Max Return Loss (dB) | - | - | - | - | - | - | - | - | -11.6 | - | - | - | -12.7 |
| AVG Eff. (%) | - | - | - | - | - | - | - | - | 14.4 | - | - | - | 13.1 |
| AVG AVG Gain (dB) | - | - | - | - | - | - | - | - | -8.4 | - | - | - | -8.8 |
| Max Peak Gain (dBi) | - | - | - | - | - | - | - | - | -2.5 | - | - | - | -2.7 |
| VSWR | ≤1.7 | | | | | | | | | | | | |
| Return Loss | ≤ -11.6 dB | | | | | | | | | | | | |
| Peak Gain | ≤ -2.5 dBi | | | | | | | | | | | | |

1.1.3. GNSS

| Band | GPS L5 | GALILEO E5a | GALILEO E5b | GPS L2 QZSS L2C | GLONASS G2 | BEIDOU B3 | BEIDOU B1I | GPS L1 GALILEO E1 | GLONASS G1 |
|-----------------|----------------|-------------|-------------|-----------------|------------|-----------|------------|-------------------|------------|
| Frequency (MHz) | BEIDOU B2a-B2I | BEIDOU B2b | BEIDOU B2b | | | | | BEIDOU B1C | |
| | QZSS L5 | | | | | | | QZSS L1 | |
| | IRNSS L5 | | | | | | | | |

| | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-------------------------|-------|------|------|------|------|------|-------|-------|
| VSWR | 1.61 | | | | | | 1.52 | 1.49 |
| Return Loss (dB) | -12.8 | | | | | | -13.6 | -14 |
| Efficiency (%) | 47 | | | | | | 42 | 40 |
| Peak Gain (dBi) | -0.04 | | | | | | -1.49 | -1.17 |

| LNA Electrical | |
|---------------------------------------|--|
| LNA Gain | 28 ±3 dB |
| Noise Figure | ≤ 2.5 dB |
| Output VSWR | < 2.0 |
| Filter Out-of-Band Attenuation | 65 dB f0 ±100 MHz f0 (1176 MHz, 1588 MHz) |
| Working Voltage | DC 2–5V |
| Working Current | 12.3 ±3 mA |
| Impedance | 50 Ω |

1.2. Mechanical & Environmental

| Mechanical | |
|--------------------------------|---|
| Antenna Size | Φ 127.7 * 71.7mm |
| Casing Material & Color | PC & Black |
| Cable Type & Length | LMHs & MHs & GNSS RG174LL Black & 3000 mm |
| Connector Type | SMA (The current state of the SMA connector is not waterproof. If a waterproof connector is needed, it can be customized.) |
| Mounting Type | Magnetic Mounting |
| Environmental | |
| Operation Temperature | -40 °C to +85 °C |
| Storage Temperature | -40 °C to +85 °C |
| Ingress Protection (IP) Rating | IP67 (After Installation) IP69K (After Installation) |
| RoHS & REACH Compliant | Yes |

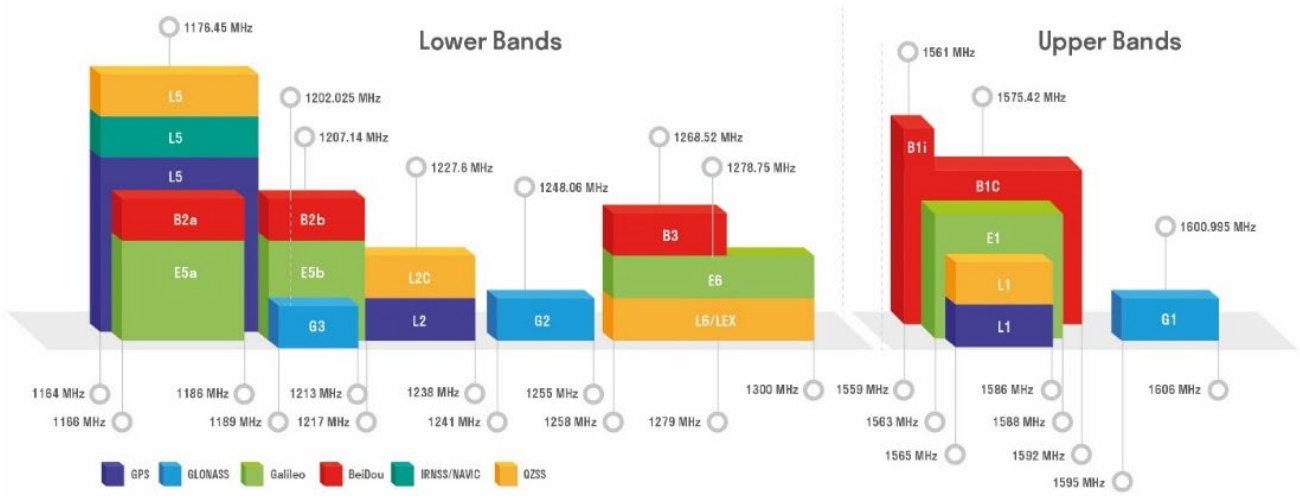
1.3. Supported Bands

| 5G NR/ LTE/ LTE-Advanced/ WCDMA/ HSPA/ HSPA+/ GPRS/ GSM/ NB-IoT | | | | | |
|---|-----------------|---------------|----------------|-----|--|
| Band | Frequency (MHz) | Uplink (MHz) | Downlink (MHz) | LTE | |
| 1 | 2100 | 1920–1980 | 2110–2170 | √ | |
| 2 | 1900 | 1850–1910 | 1930–1990 | √ | |
| 3 | 1800 | 1710–1785 | 1805–1880 | √ | |
| 4 | 1700 | 1710–1755 | 2110–2155 | √ | |
| 5 | 850 | 824–849 | 869–894 | √ | |
| 7 | 2600 | 2500–2570 | 2620–2690 | √ | |
| 8 | 900 | 880–915 | 925–960 | √ | |
| 9 | 1800 | 1749.9–1784.9 | 1844.9–1879.9 | √ | |
| 11 | 1500 | 1427.9–1447.9 | 1475.9–1495.9 | √ | |
| 12 | 700 | 699–716 | 729–746 | √ | |
| 13 | 700 | 777–787 | 746–756 | √ | |
| 14 | 700 | 788–798 | 758–768 | √ | |
| 17 | 700 | 704–716 | 734–746 | √ | |
| 18 | 850 | 815–830 | 860–875 | √ | |
| 19 | 850 | 830–845 | 875–890 | √ | |
| 20 | 800 | 832–862 | 791–821 | √ | |
| 21 | 1500 | 1447.9–1462.9 | 1495.9–1510.9 | √ | |
| 22 | 3500 | 3410–3490 | 3510–3590 | √ | |
| 23 | 2100 | 2000–2020 | 2180–2200 | √ | |
| 24 | 1600 | 1626.5–1660.5 | 1525–1559 | √ | |
| 25 | 1900 | 1850–1915 | 1930–1995 | √ | |
| 26 | 850 | 814–849 | 859–894 | √ | |

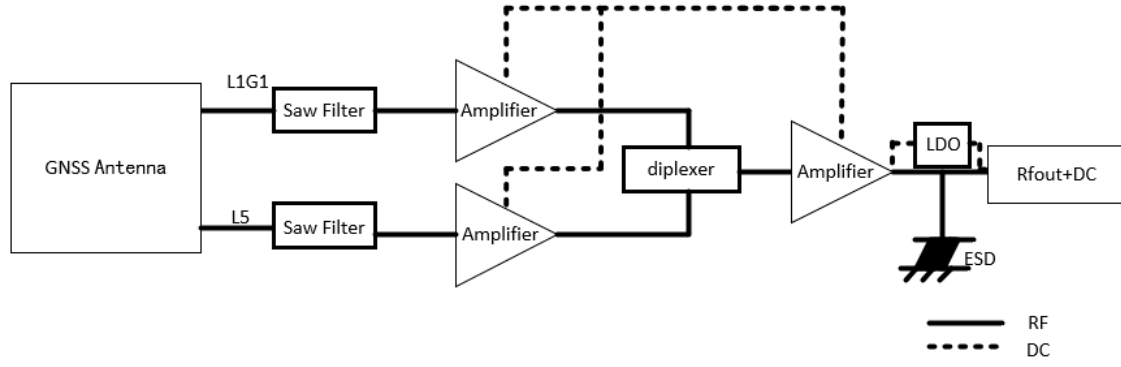
| | | | | | |
|--|------|-------------|-------------|---|--|
| 28 | 700 | 703–748 | 758–803 | √ | |
| 31 | 450 | 452.5–457.5 | 462.5–467.5 | - | |
| 34 | 2100 | 2010–2025 | | √ | |
| 38 | 2600 | 2570–2620 | | √ | |
| 39 | 1900 | 1880–1920 | | √ | |
| 40 | 2300 | 2300–2400 | | √ | |
| 41 | 2500 | 2496–2690 | | √ | |
| 42 | 3500 | 3400–3600 | | √ | |
| 48 | 3500 | 3550–3700 | | √ | |
| 66 | 1700 | 1710–1780 | 2110–2200 | √ | |
| 71 | 600 | 663–698 | 617–652 | √ | |
| 74 | 1500 | 1427–1470 | 1475–1518 | √ | |
| 77 | 3500 | 3300–4200 | | √ | |
| 78 | 3500 | 3300–3800 | | √ | |
| 79 | 4500 | 4400–5000 | | √ | |
| Note: Covered √ means efficiency > 10% | | | | | |

| 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) | |
| | √ | √ | - | - | |
| BEIDOU | B1I Centre 1561.098 (1559–1564) | B1C (BeiDou-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) | | | | |
| | √ | | | | |

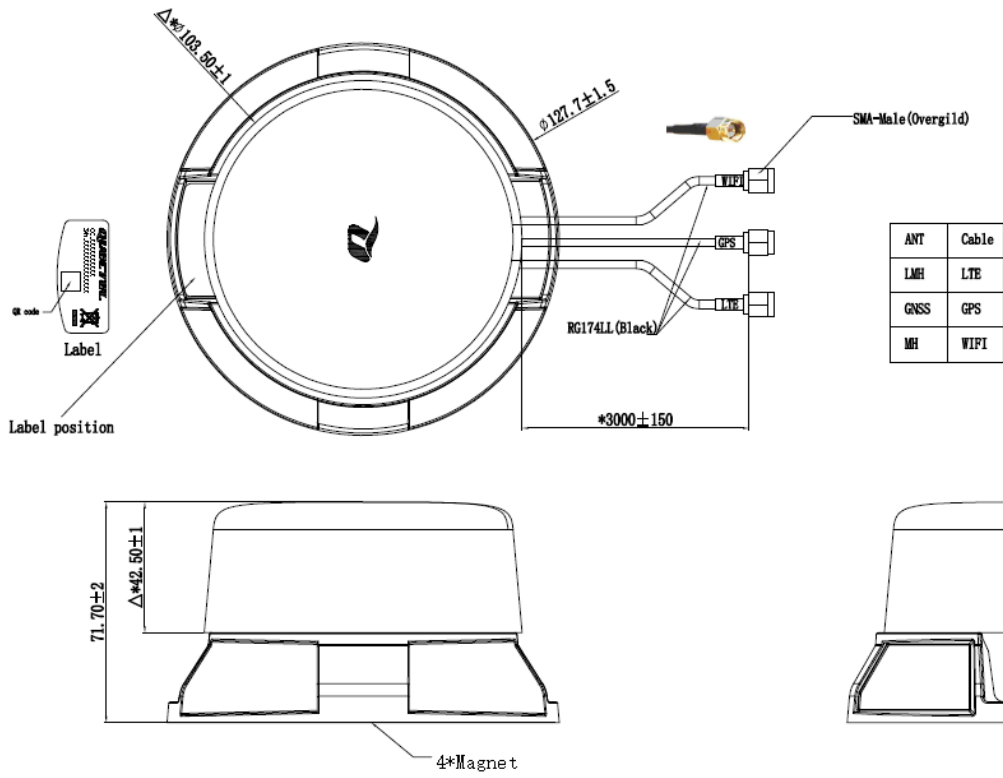
GNSS Bands and Constellations



1.4. Block Diagram (Active Antenna)



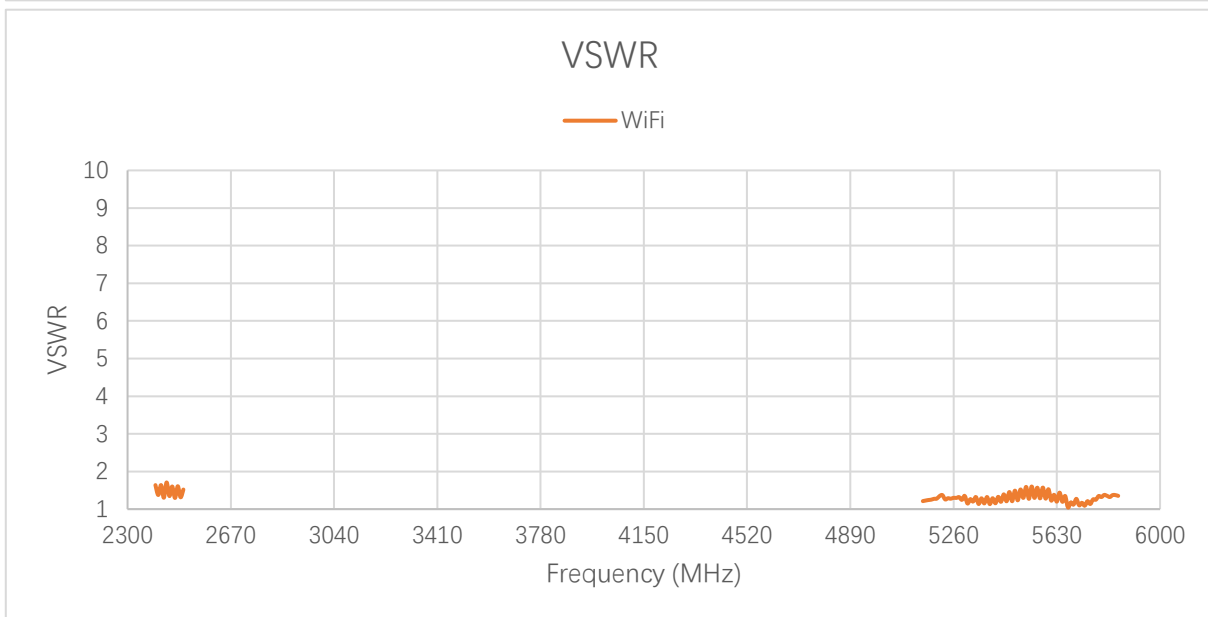
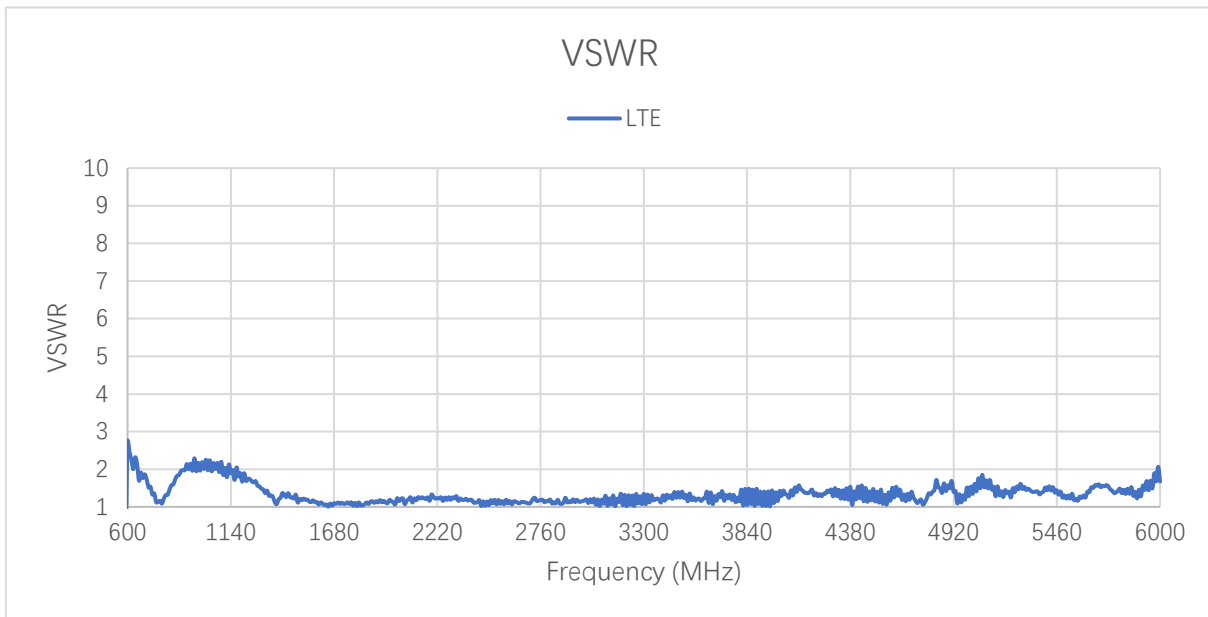
2 Drawing



3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR

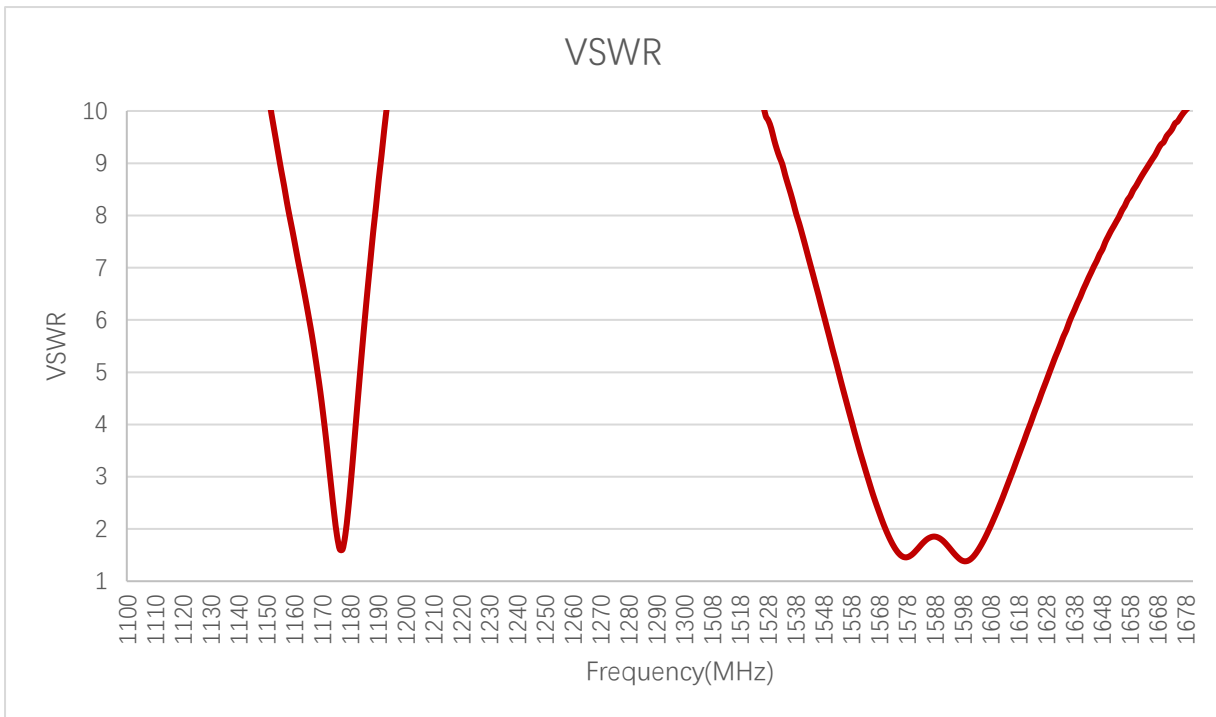


VSWR - LTE

| Frequency (MHz) | 600 | 630 | 710 | 830 | 900 | 960 | 1440 | 1710 | 1740 | 1880 |
|-----------------|------|------|------|------|------|------|------|------|------|------|
| LTE | 2.7 | 2.0 | 1.5 | 1.6 | 2.0 | 1.9 | 1.4 | 1.1 | 1.1 | 1.1 |
| Frequency (MHz) | 1950 | 2140 | 2350 | 2450 | 2600 | 3600 | 4700 | 5000 | 5500 | 6000 |
| LTE | 1.1 | 1.3 | 1.2 | 1.0 | 1.2 | 1.2 | 1.4 | 1.3 | 1.3 | 1.7 |

VSWR - WiFi

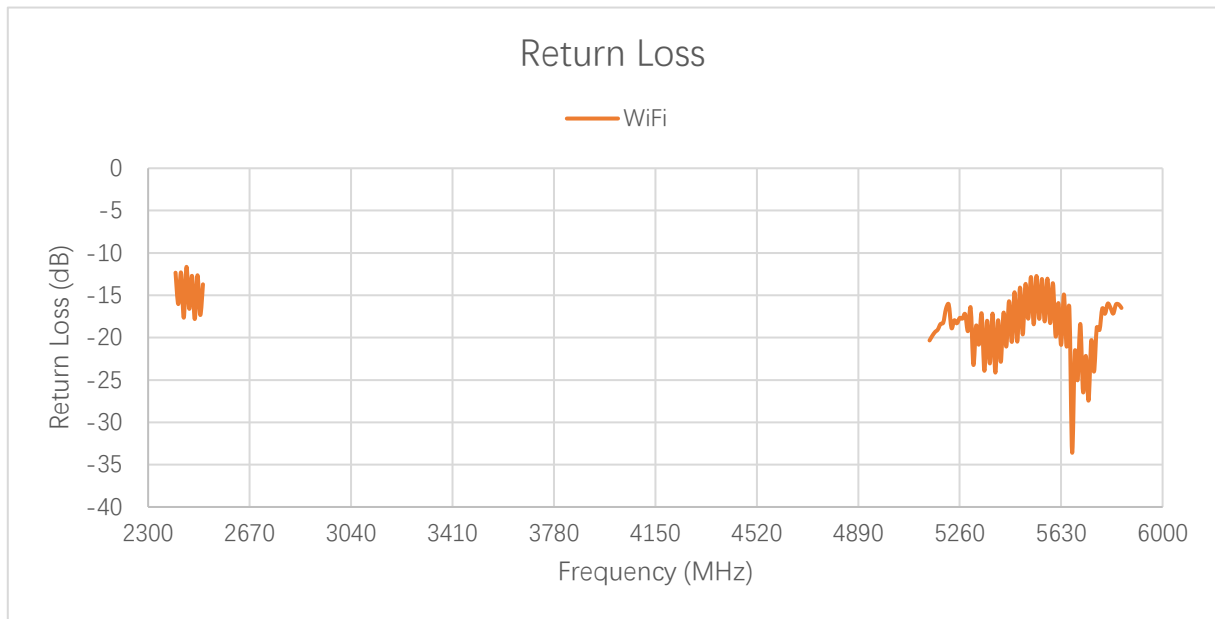
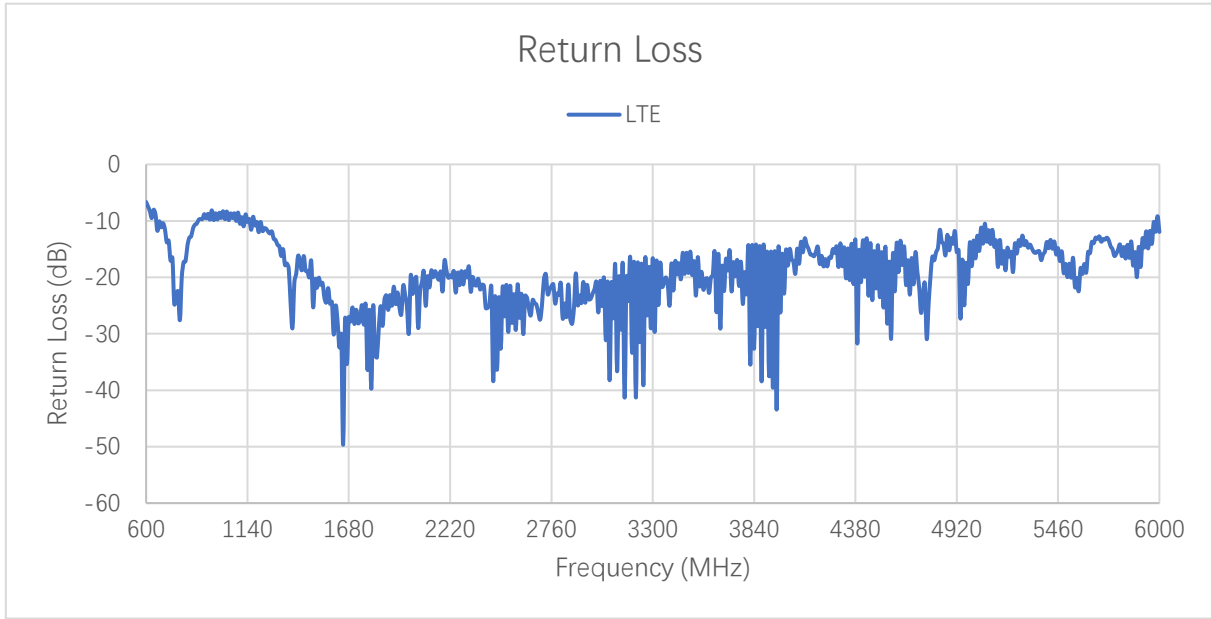
| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5920 | 6520 | 7120 |
|-----------------|------|------|------|------|------|------|------|------|------|
| WiFi | 1.6 | 1.3 | 1.5 | 1.2 | 1.5 | 1.4 | - | - | - |



VSWR-GNSS

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| VSWR | 1.61 | - | - | - | - | - | 1.52 | 1.49 |

3.1.2. Return Loss

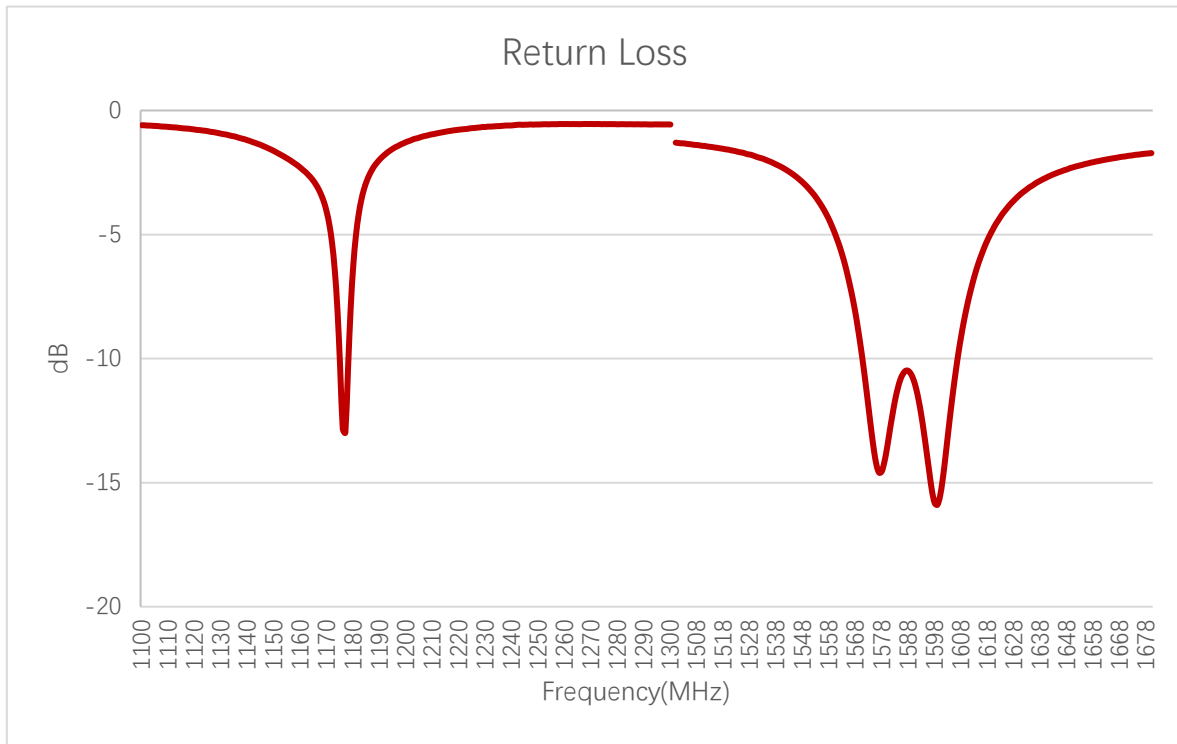


Return Loss (dB) - LTE

| | | | | | | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Frequency (MHz) | 600 | 630 | 710 | 830 | 900 | 960 | 1440 | 1710 | 1740 | 1880 |
| LTE | -6.7 | -9.5 | -13.8 | -13.0 | -9.7 | -9.9 | -16.2 | -28.3 | -27.5 | -23.2 |
| Frequency (MHz) | 1950 | 2140 | 2350 | 2450 | 2600 | 3600 | 4700 | 5000 | 5500 | 6000 |
| LTE | -25.4 | -18.9 | -21.2 | -38.4 | -22.9 | -22.8 | -15.5 | -18.0 | -17.6 | -12.0 |

Return Loss (dB) - WiFi

| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5920 | 6520 | 7120 |
|-----------------|-------|-------|-------|-------|-------|-------|------|------|------|
| WiFi | -12.3 | -16.6 | -13.7 | -20.3 | -13.7 | -16.5 | - | - | - |



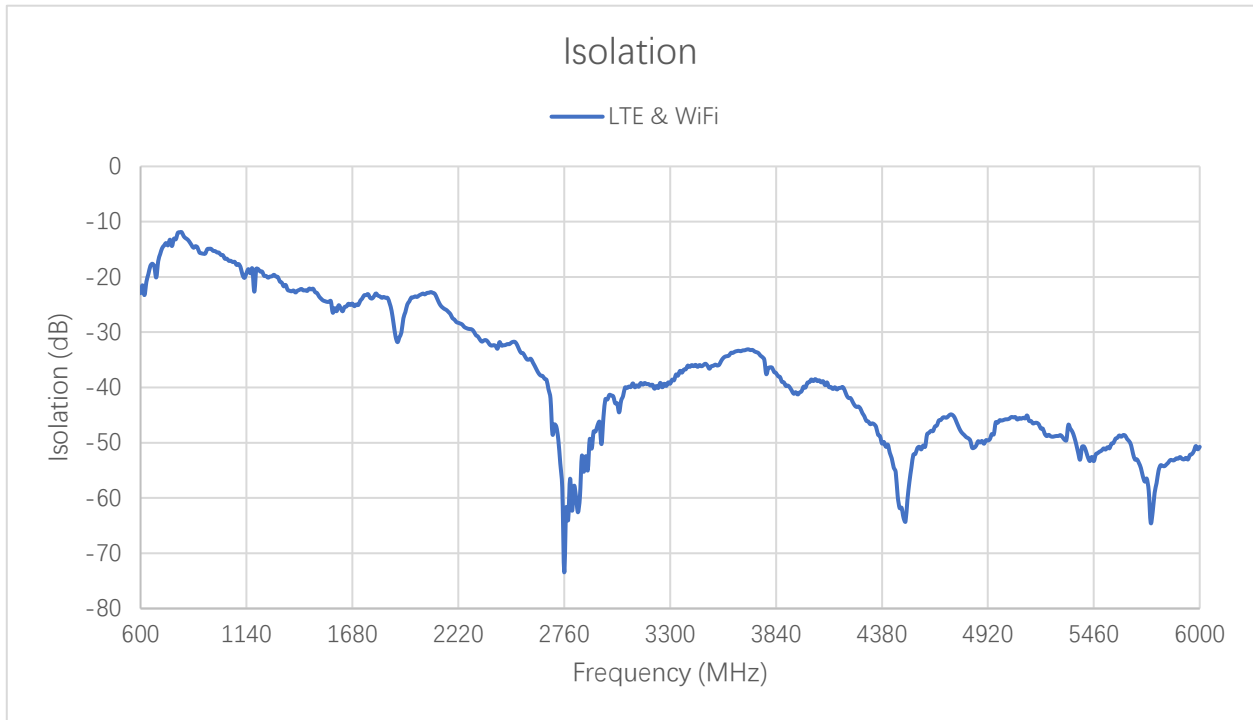
Return Loss (dB) - GNSS

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|------------------|-------|------|------|------|------|------|-------|------|
| Return Loss (dB) | -12.8 | - | - | - | - | - | -13.6 | -14 |

3.1.3. Isolation

3.1.3.1. Test Status: In Free Space

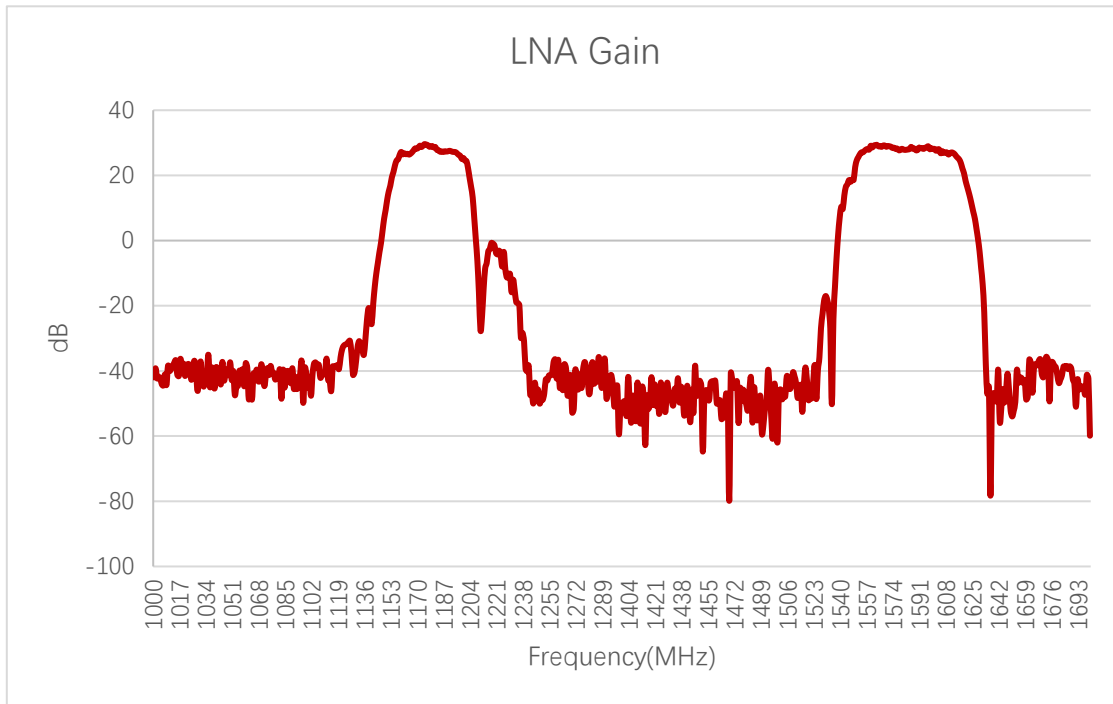
3.1.3.1.1. LTE



Max Isolation (dB)

| Band | B71 | B12/ B13/ B28 | B5/ B8/ B26 | N74/ N75/ N76 | B1/ B2/ B3 | B40 | Wi-Fi 2G | B38/ B41 | B42/ B48/ N77 | N79 | Wi-Fi 5G |
|----------------|-------------|---------------------|-------------------|---------------------|------------------|---------------|---------------|---------------|---------------------|---------------|---------------|
| Freq. (MHz) | 600- 700 | 700- 810 | 820- 960 | 1420-1 520 | 1700-2 170 | 2300-2 400 | 2400-2 500 | 2500-2 690 | 3300-4 200 | 4400-5 000 | 5150-5 850 |
| LTE & WiFi | -15.9 | -11.9 | -12.6 | -22.1 | -22.7 | -29.9 | -31.7 | -31.7 | -33.1 | -44.9 | -46.4 |

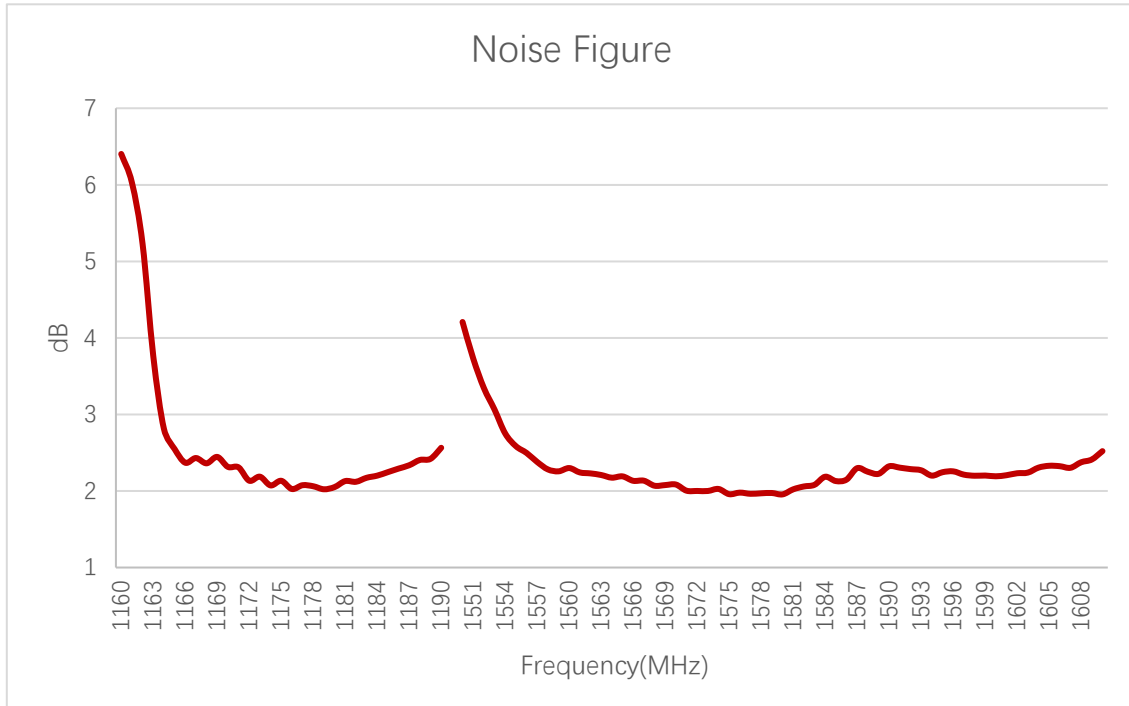
3.1.4. GNSS LNA Gain



LNA Gain(dB)

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| LNA Gain (dB) | 29.3 | - | - | - | - | - | 28.1 | 27.9 |

3.1.5. GNSS Noise Figure

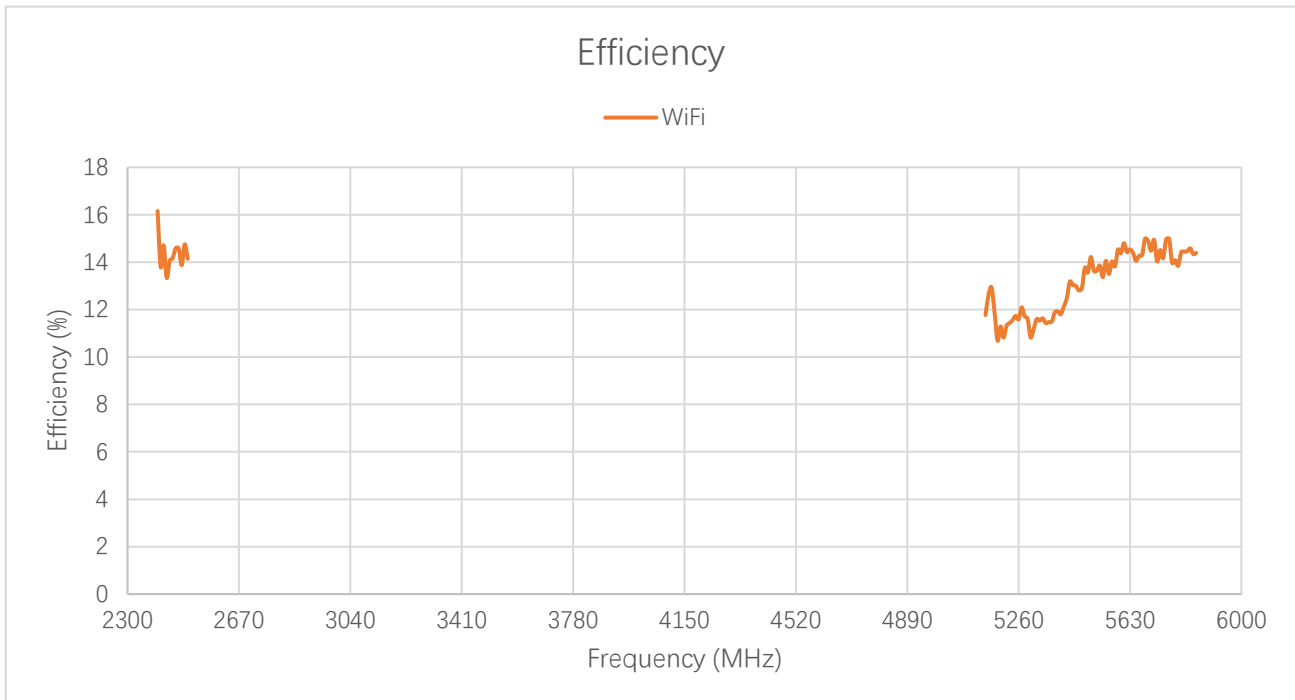
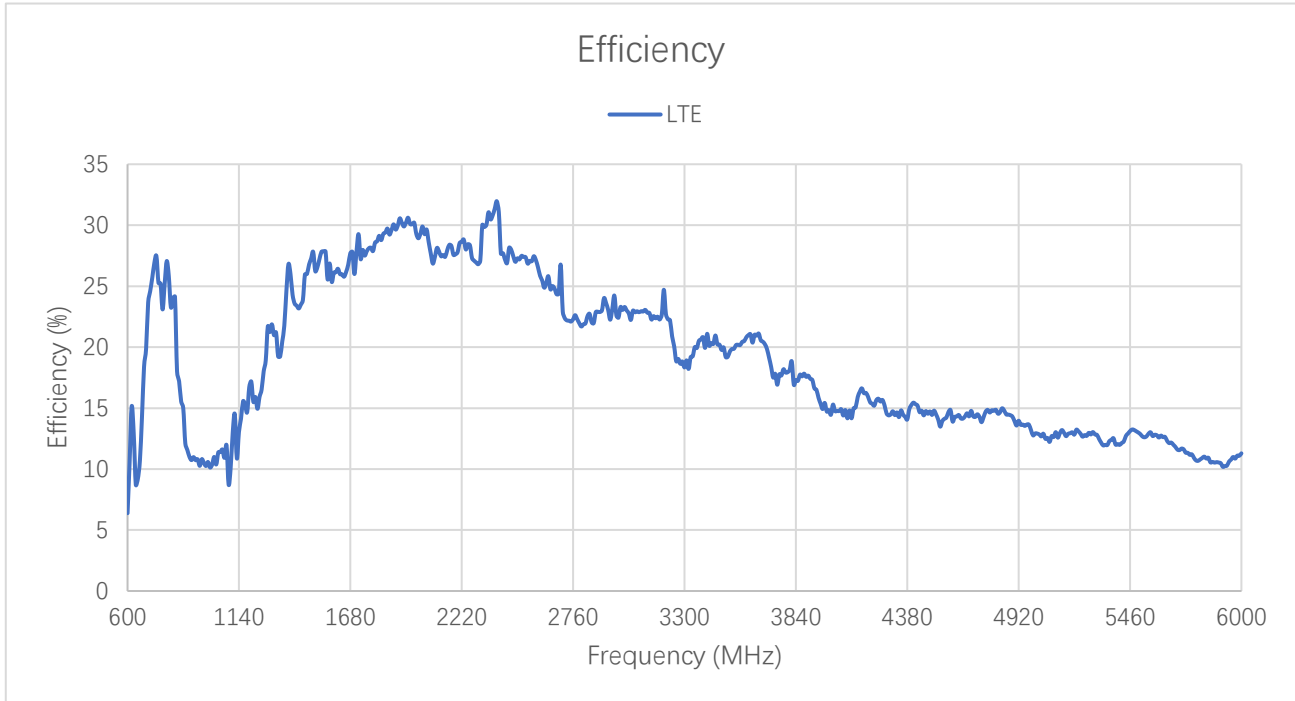


Noise Figure(dB)

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-------------------|------|------|------|------|------|------|------|------|
| Noise Figure (dB) | 2.02 | - | | | | | 1.95 | 2.23 |

3.2. Radiation Performance Test

3.2.1. Efficiency

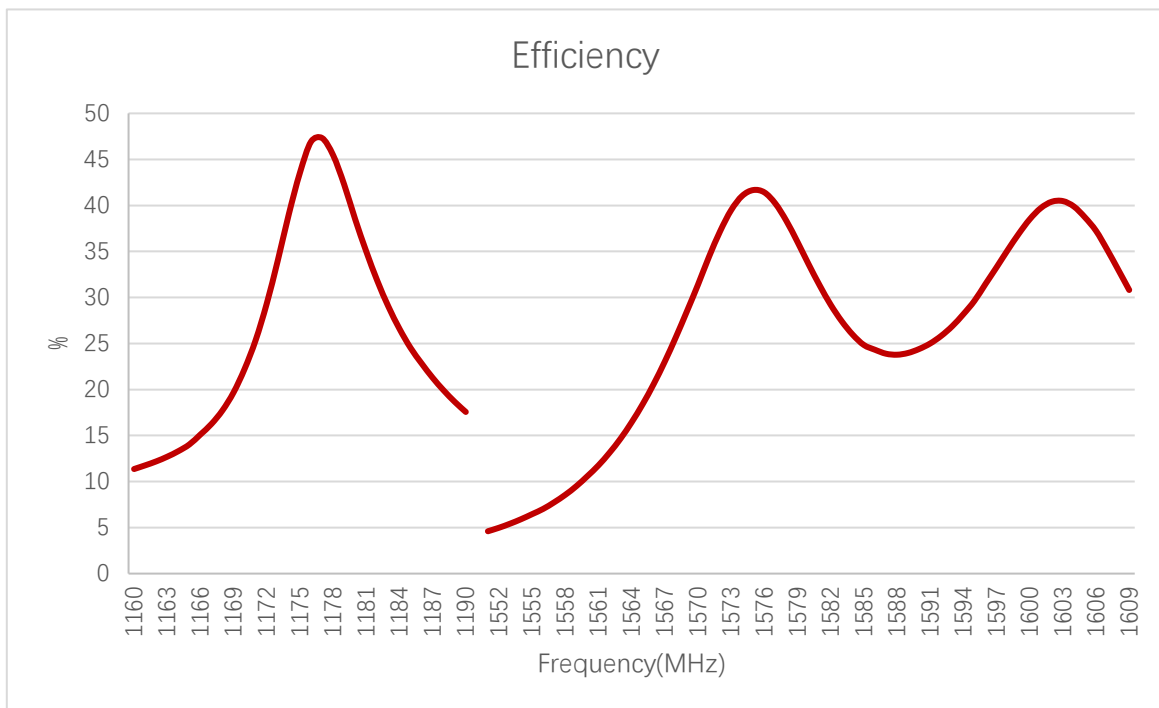


Efficiency (%) - LTE

| | | | | | | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Frequency (MHz) | 600 | 630 | 710 | 830 | 900 | 960 | 1440 | 1710 | 1740 | 1880 |
| LTE | 6.4 | 12.9 | 24.6 | 24.1 | 11.0 | 10.8 | 23.8 | 27.8 | 28.0 | 29.6 |
| Frequency (MHz) | 1950 | 2140 | 2350 | 2450 | 2600 | 3600 | 4700 | 5000 | 5500 | 6000 |
| LTE | 30.2 | 27.4 | 31.1 | 28.1 | 25.9 | 20.8 | 14.3 | 12.9 | 13.0 | 11.3 |

Efficiency (%) - WiFi

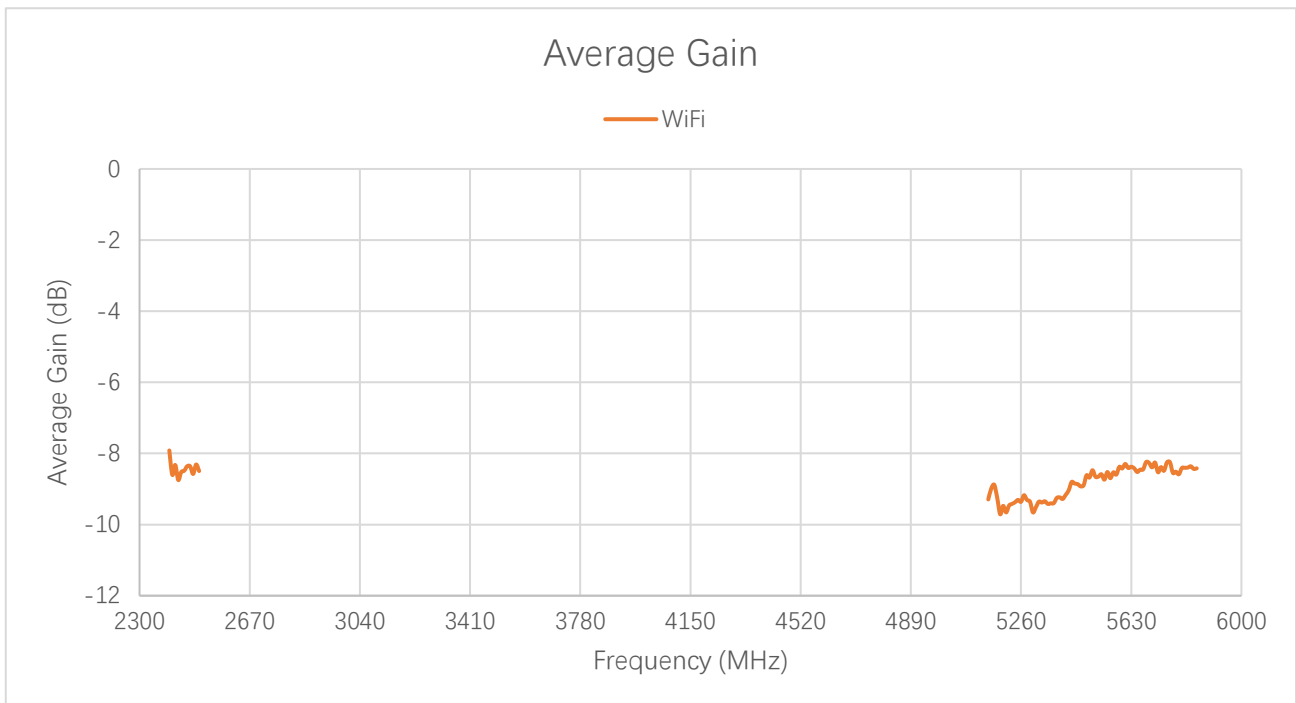
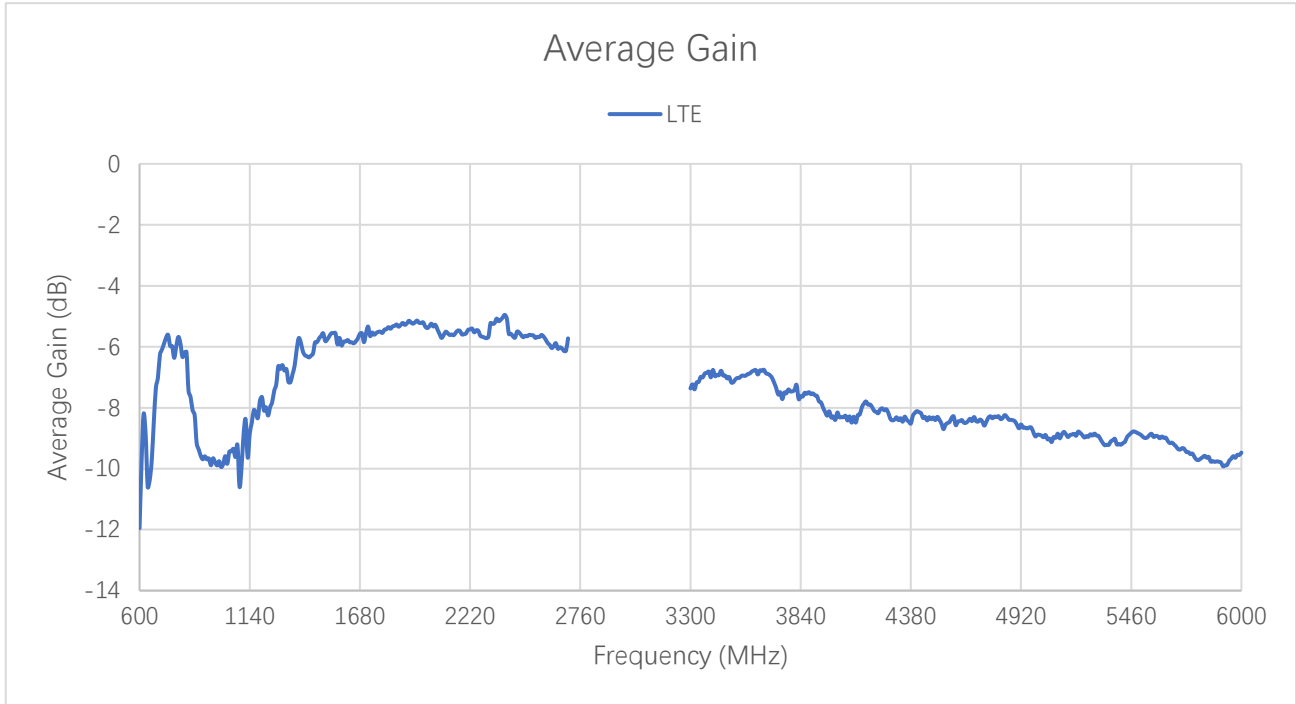
| | | | | | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5920 | 6520 | 7120 |
| WiFi | 16.2 | 14.2 | 14.1 | 11.8 | 14.2 | 14.4 | - | - | - |



Efficiency (%) - GNSS

| | | | | | | | | |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
| Efficiency (%) | 47 | - | - | - | - | - | 42 | 40 |

3.2.2. Average Gain



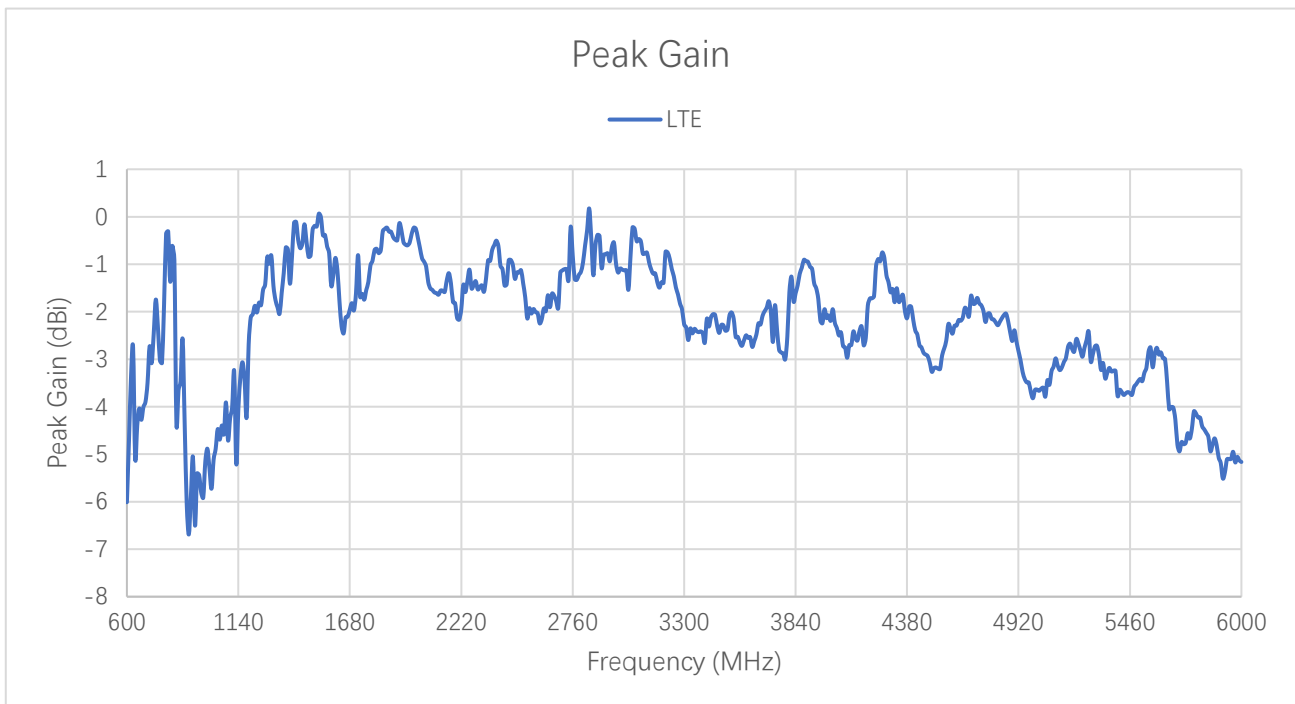
Average Gain (dB) - LTE

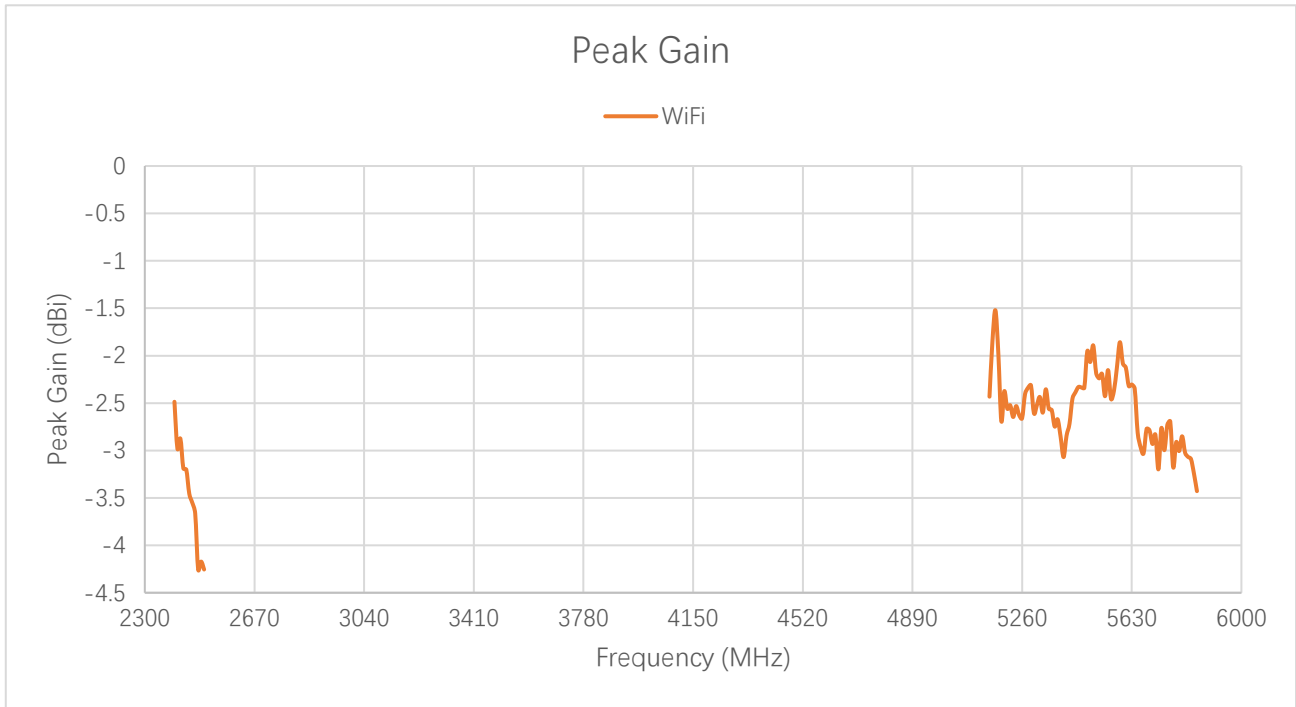
| | | | | | | | | | | |
|-----------------|-------|------|------|------|------|------|------|------|------|------|
| Frequency (MHz) | 600 | 630 | 710 | 830 | 900 | 960 | 1440 | 1710 | 1740 | 1880 |
| LTE | -12.0 | -8.9 | -6.1 | -6.2 | -9.6 | -9.7 | -6.2 | -5.6 | -5.5 | -5.3 |
| Frequency (MHz) | 1950 | 2140 | 2350 | 2450 | 2600 | 3600 | 4700 | 5000 | 5500 | 6000 |
| LTE | -5.2 | -5.6 | -5.1 | -5.5 | -5.9 | -6.8 | -8.4 | -8.9 | -8.9 | -9.5 |

Average Gain (dB) - WiFi

| | | | | | | | | | |
|-----------------|------|------|------|------|------|------|------|------|------|
| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5920 | 6520 | 7120 |
| WiFi | -7.9 | -8.5 | -8.5 | -9.3 | -8.5 | -8.4 | - | - | - |

3.2.3. Peak Gain



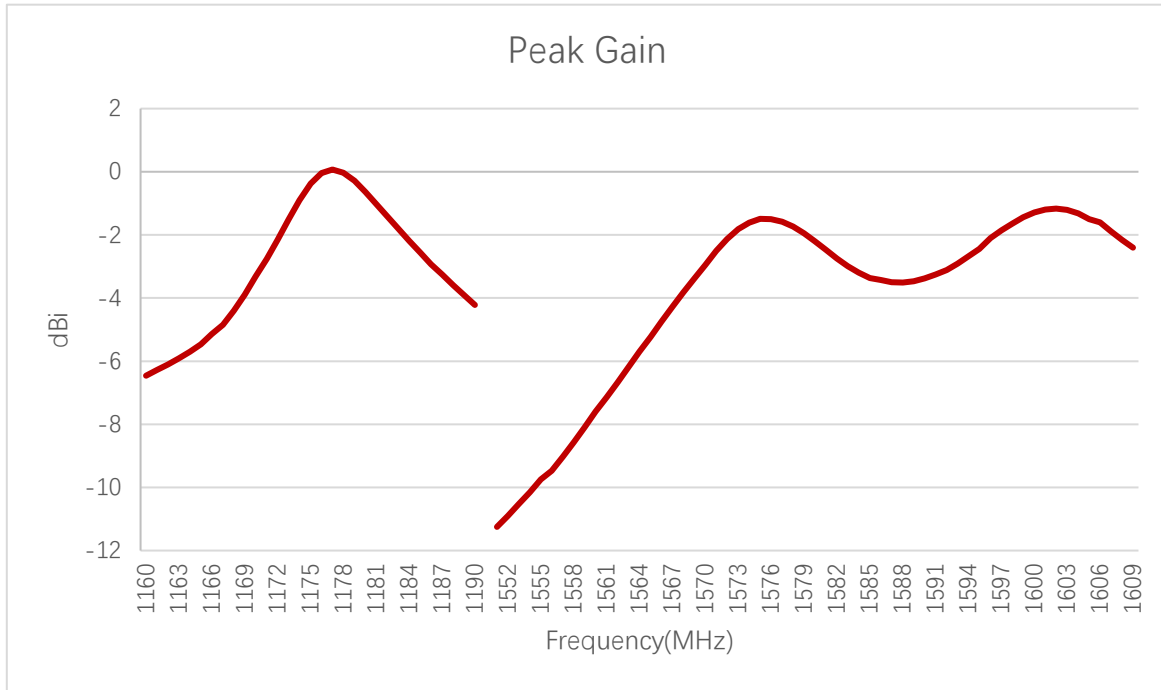


Peak Gain (dBi) - LTE

| Frequency (MHz) | 600 | 630 | 710 | 830 | 900 | 960 | 1440 | 1710 | 1740 | 1880 |
|-----------------|------|------|------|------|------|------|------|------|------|------|
| LTE | -6.0 | -2.8 | -2.7 | -0.9 | -6.7 | -5.8 | -0.6 | -1.6 | -1.6 | -0.3 |
| Frequency (MHz) | 1950 | 2140 | 2350 | 2450 | 2600 | 3600 | 4700 | 5000 | 5500 | 6000 |
| LTE | -0.6 | -1.6 | -0.9 | -0.9 | -2.2 | -2.5 | -1.8 | -3.6 | -3.5 | -5.2 |

Peak Gain (dBi) - WiFi

| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5920 | 6520 | 7120 |
|-----------------|------|------|------|------|------|------|------|------|------|
| WiFi | -2.5 | -3.5 | -4.3 | -2.4 | -1.9 | -3.4 | - | - | - |



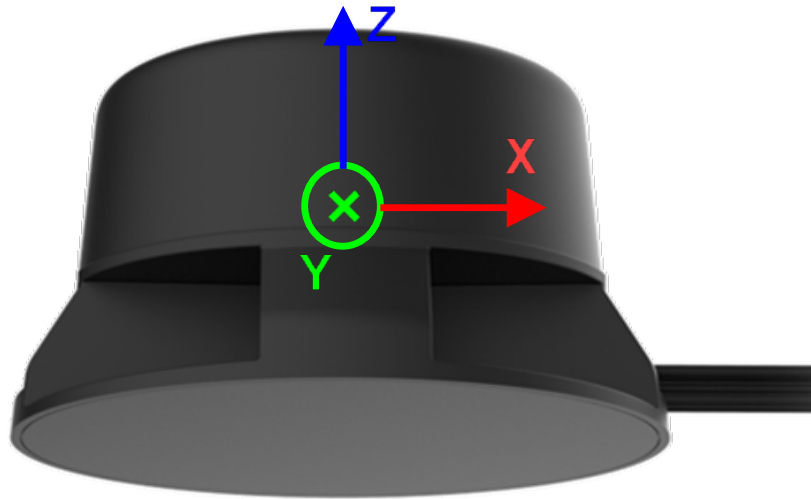
Peak Gain(dBi)

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|-------|------|------|------|------|------|-------|-------|
| Peak Gain(dBi) | -0.04 | - | - | - | - | - | -1.49 | -1.17 |

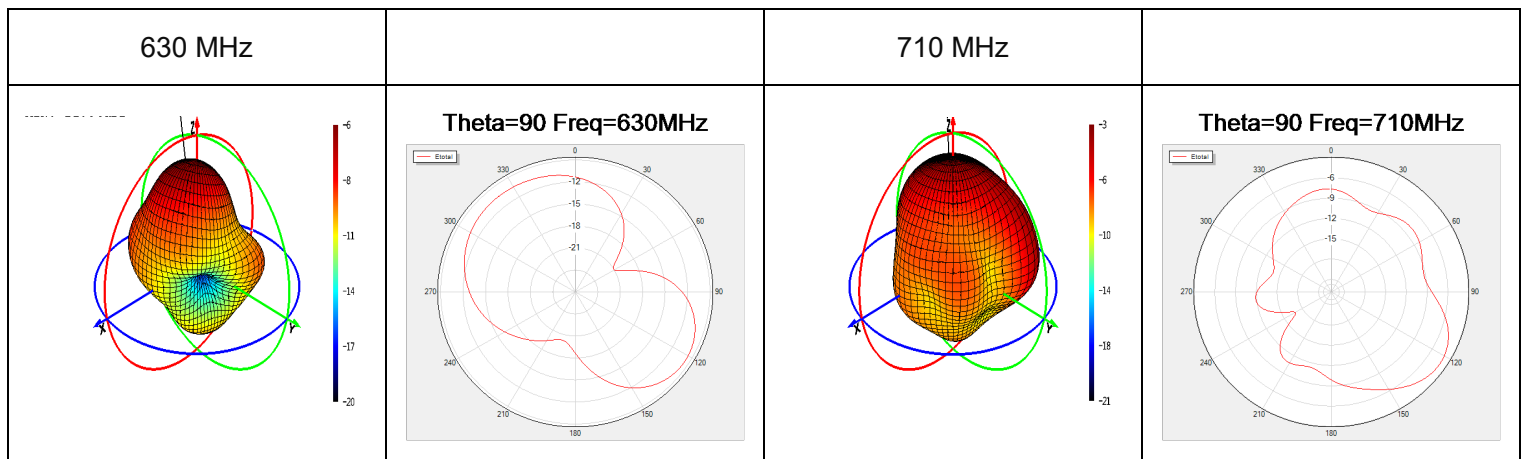
3.2.4. 3D & 2D Radiation Pattern

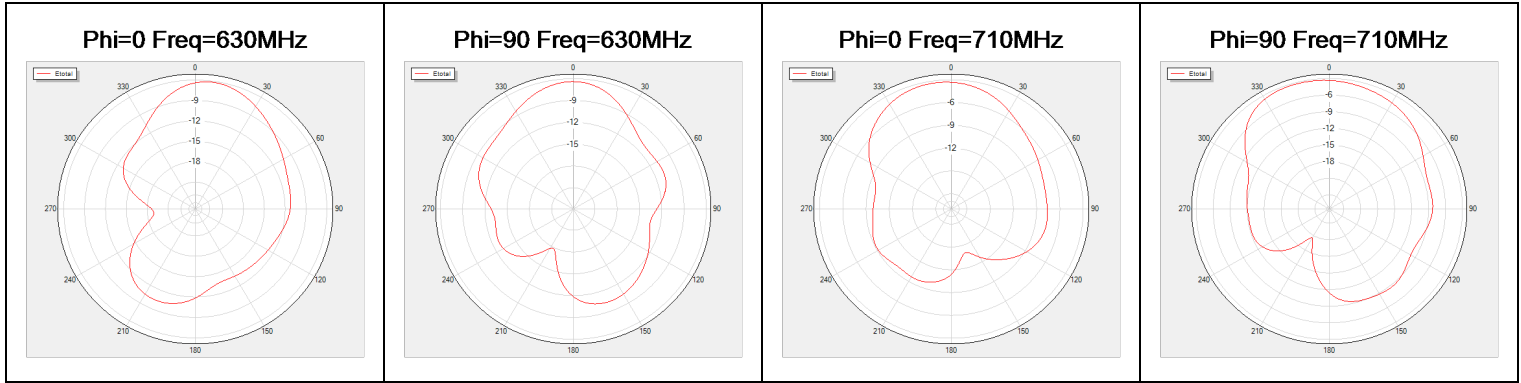
3.2.4.1. Test Status: In Free Space

- Test Chamber: FS-S-1 (LTE & WiFi); FS-G-1 (GNSS)

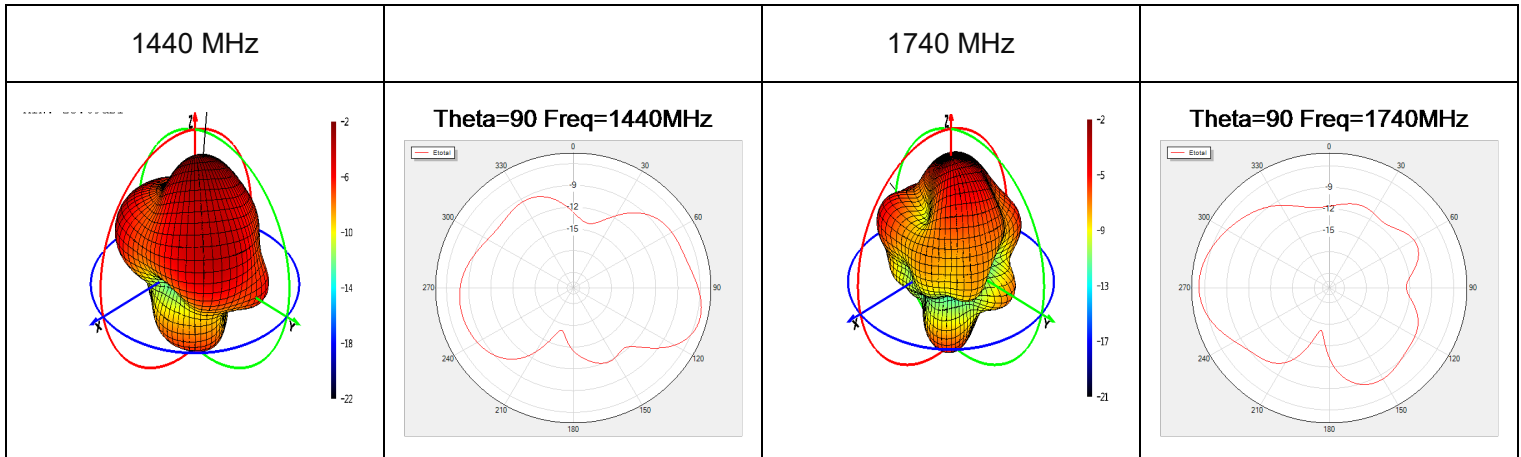
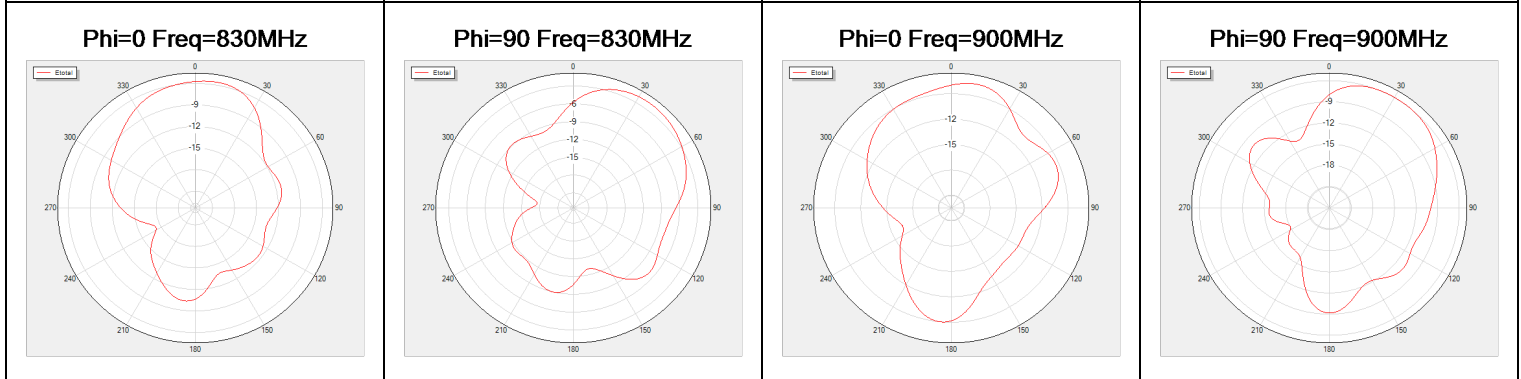
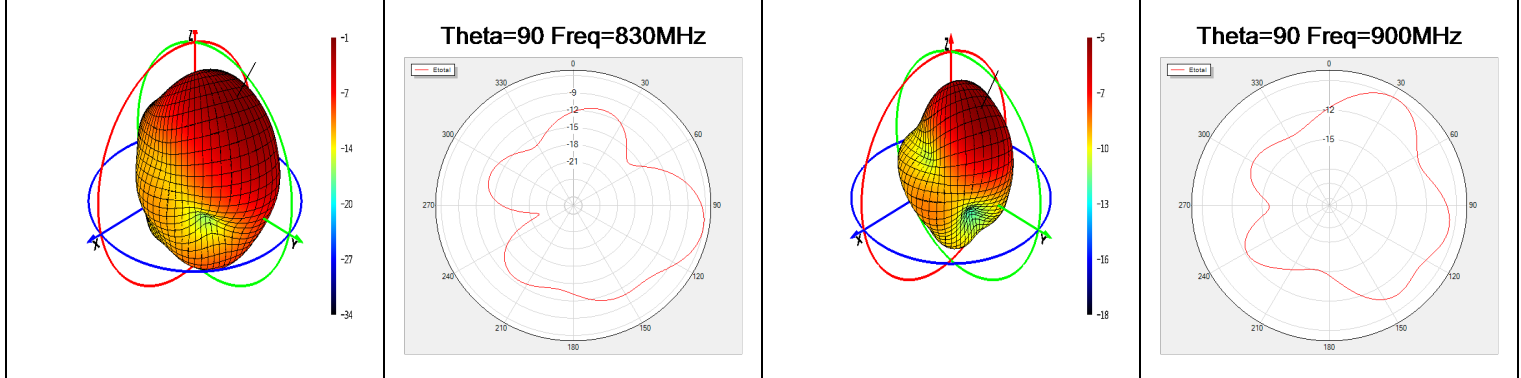


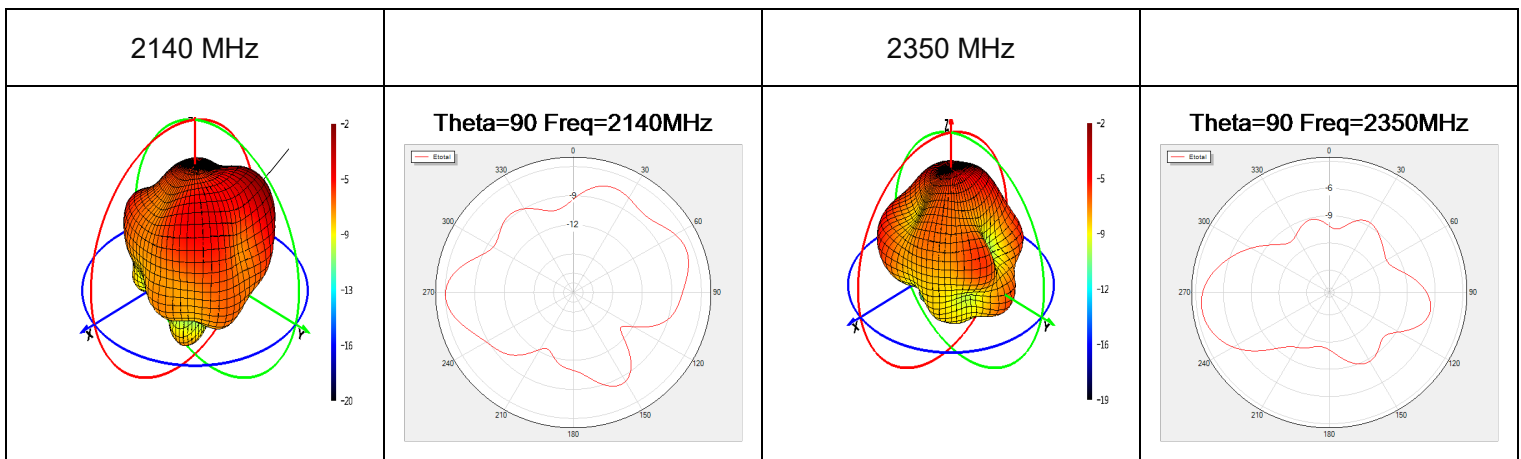
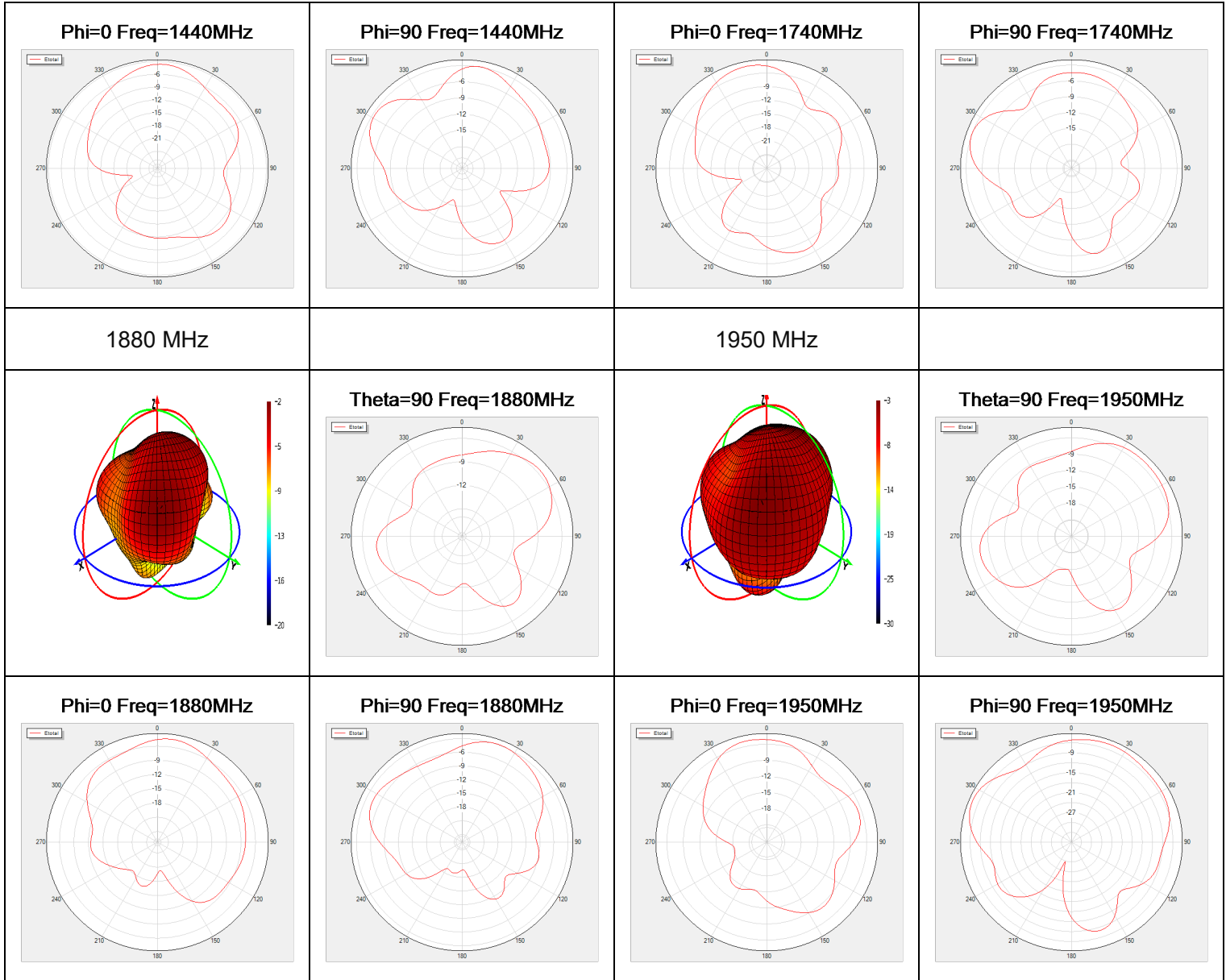
- **LTE**

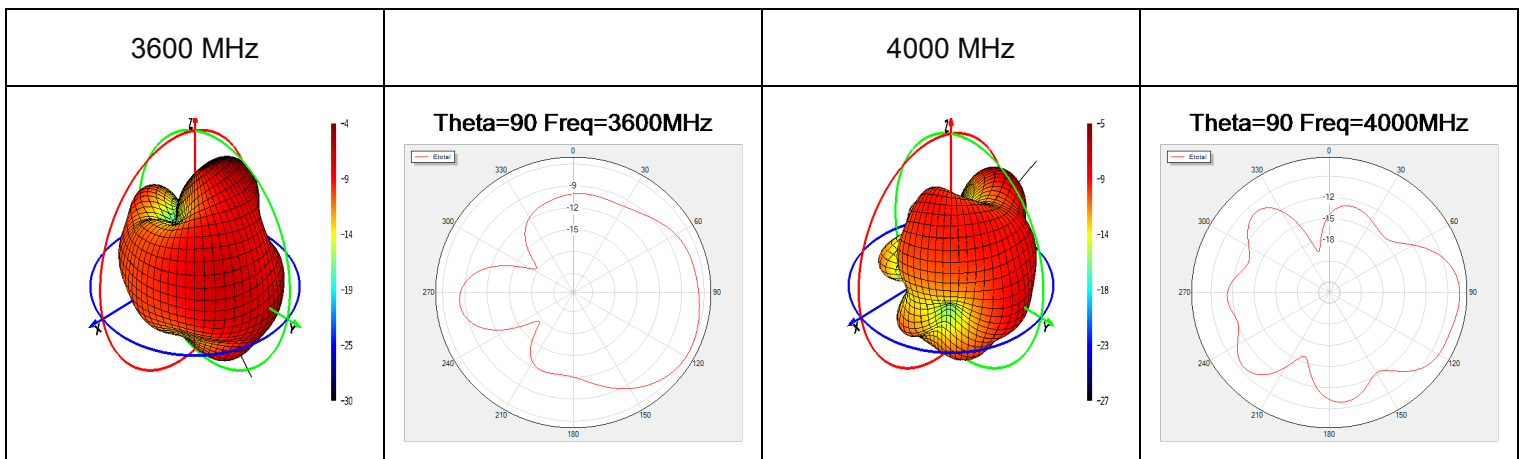
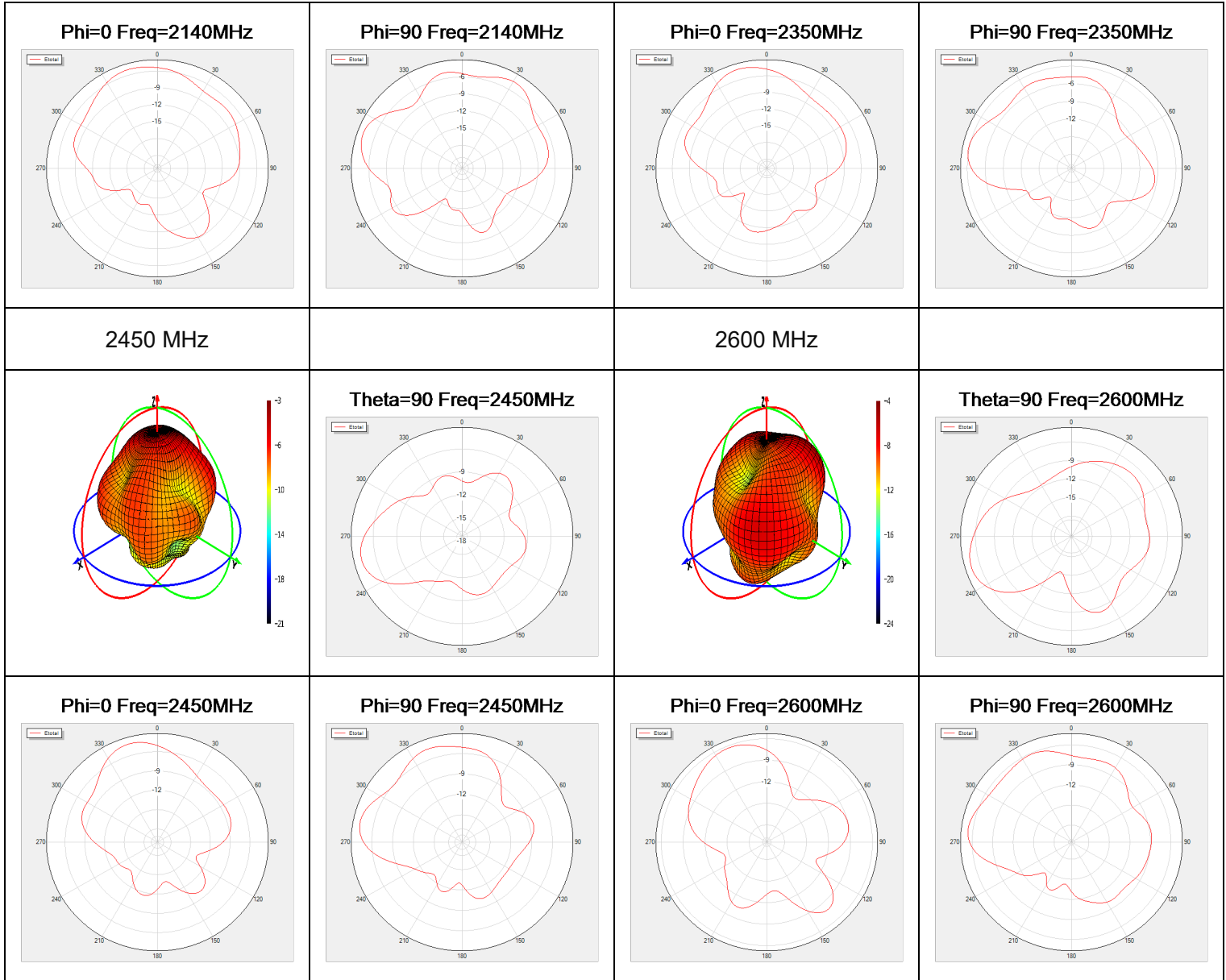


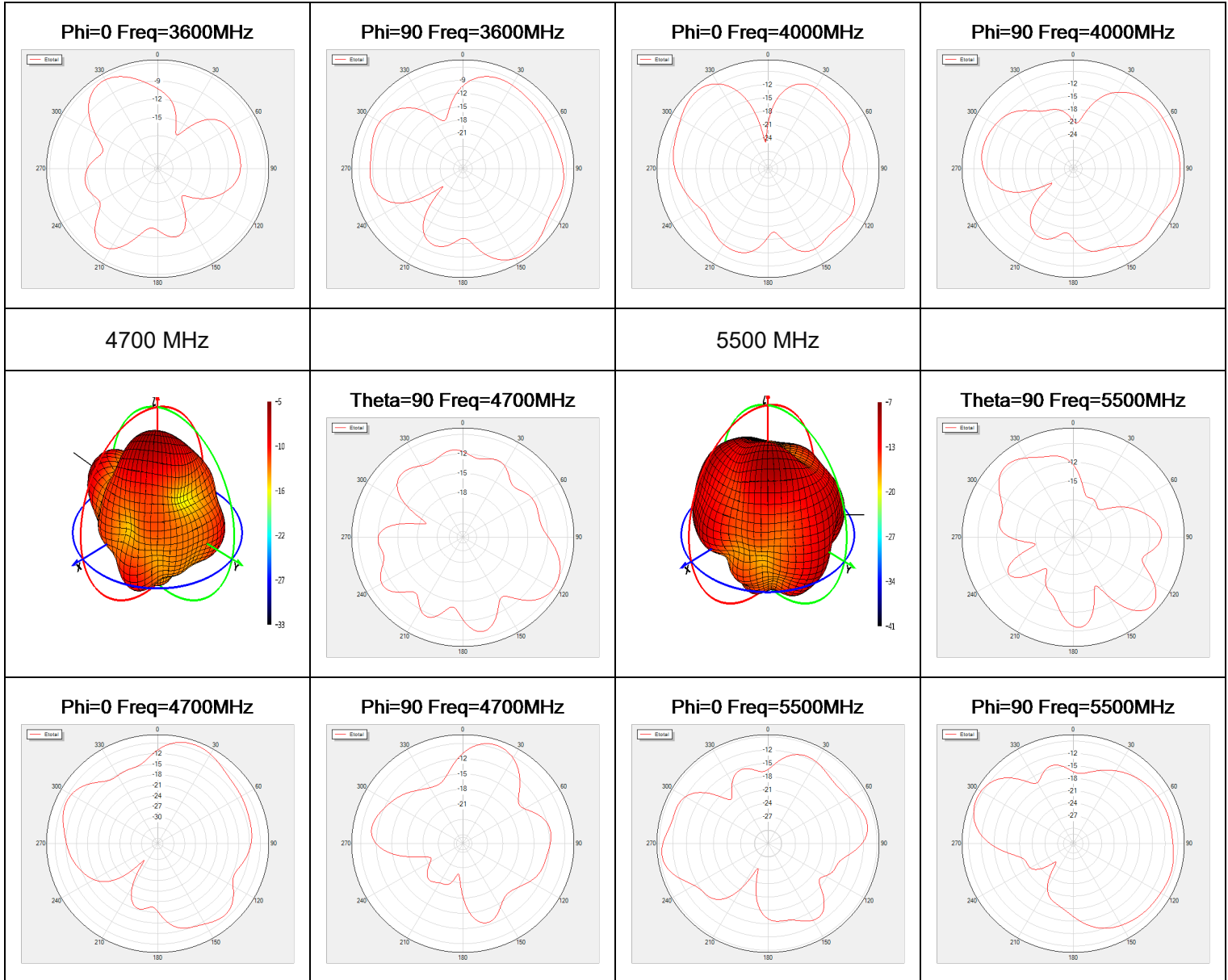


| | | | |
|-----------------------|--|-----------------------|--|
| <p>830 MHz</p> | | <p>900 MHz</p> | |
|-----------------------|--|-----------------------|--|

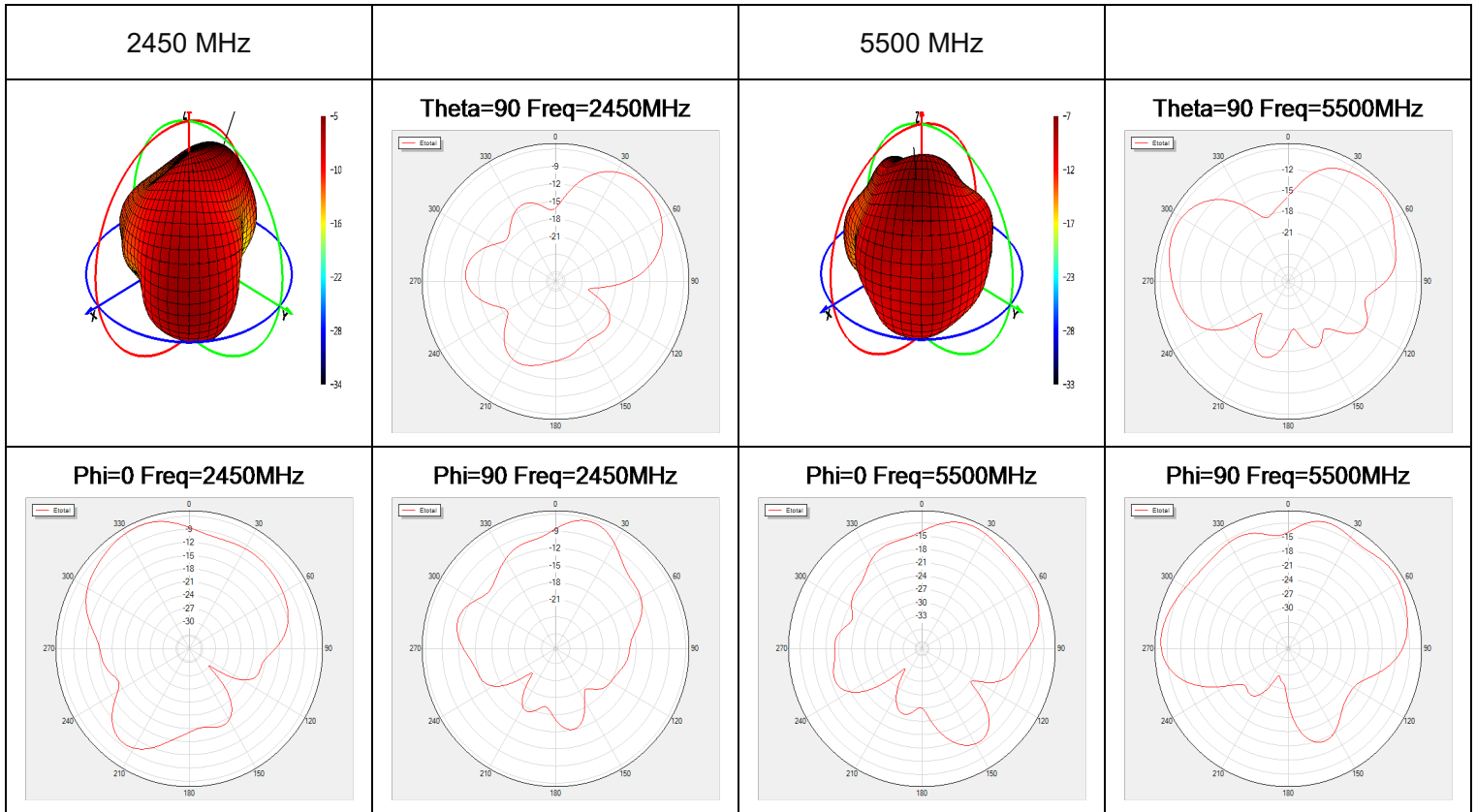




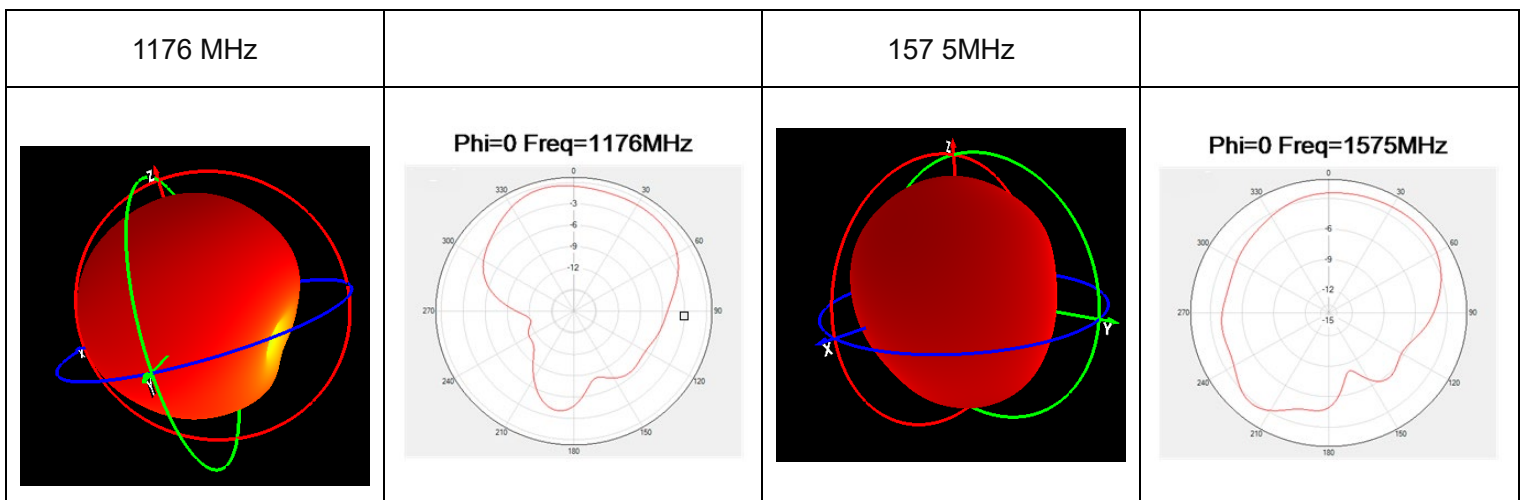


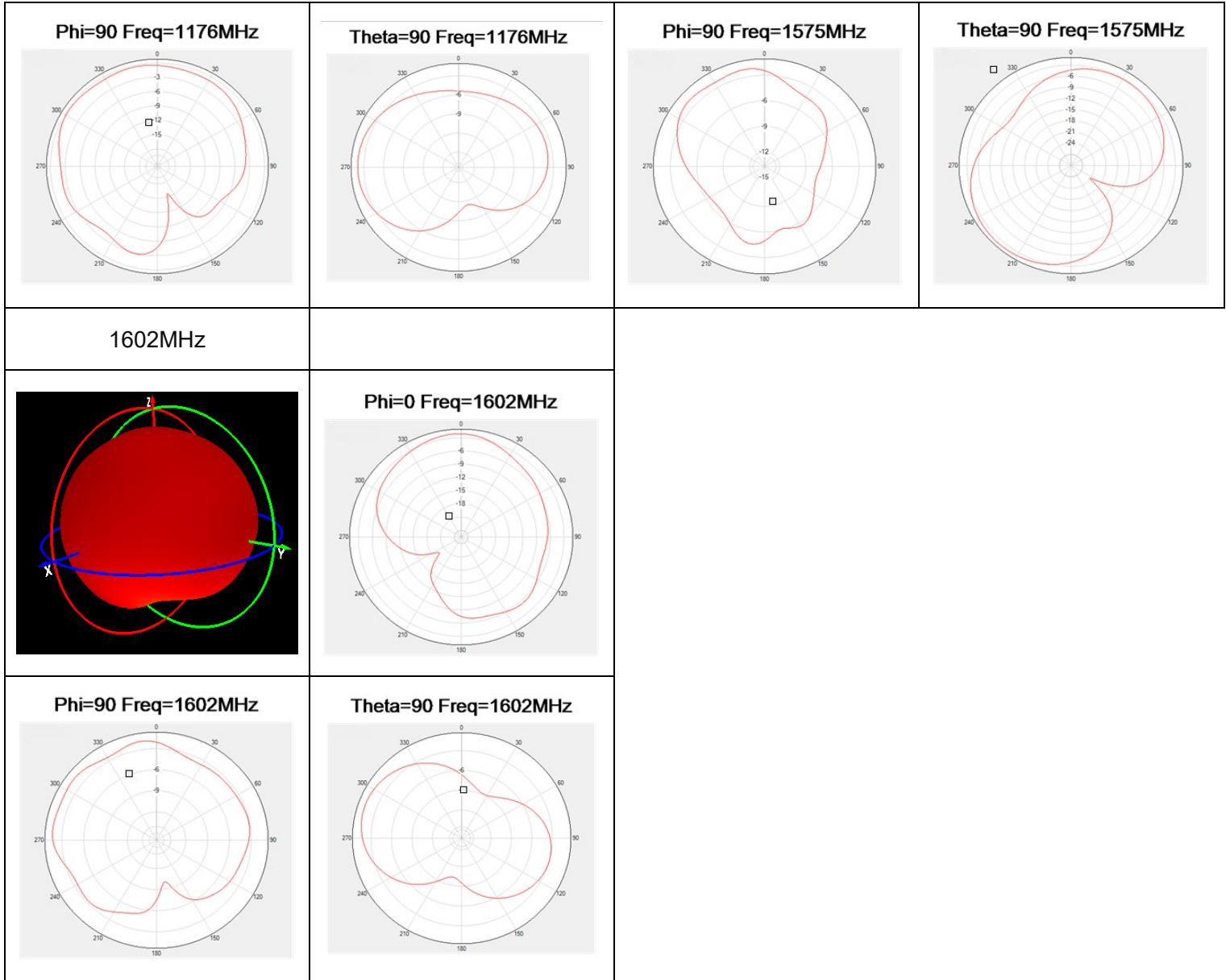


● **WiFi**

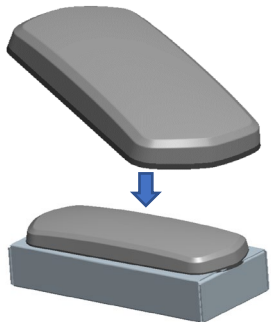
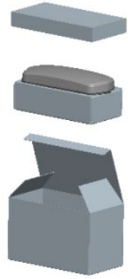
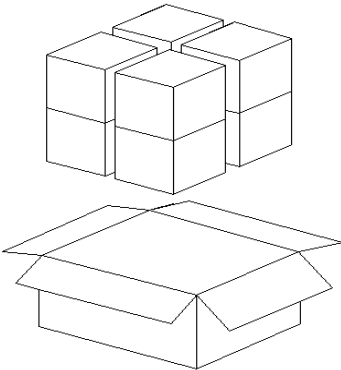


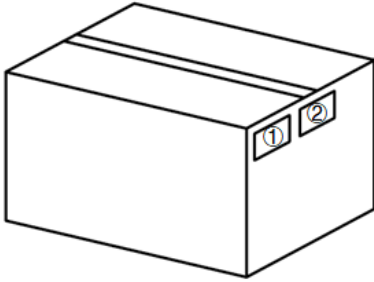
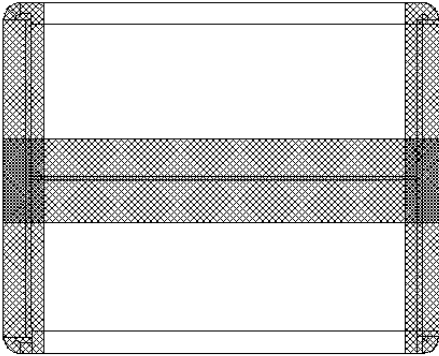
● **GNSS**





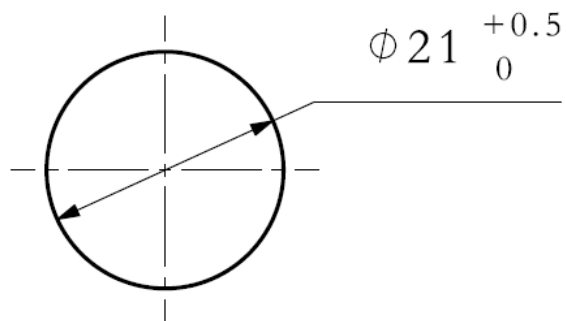
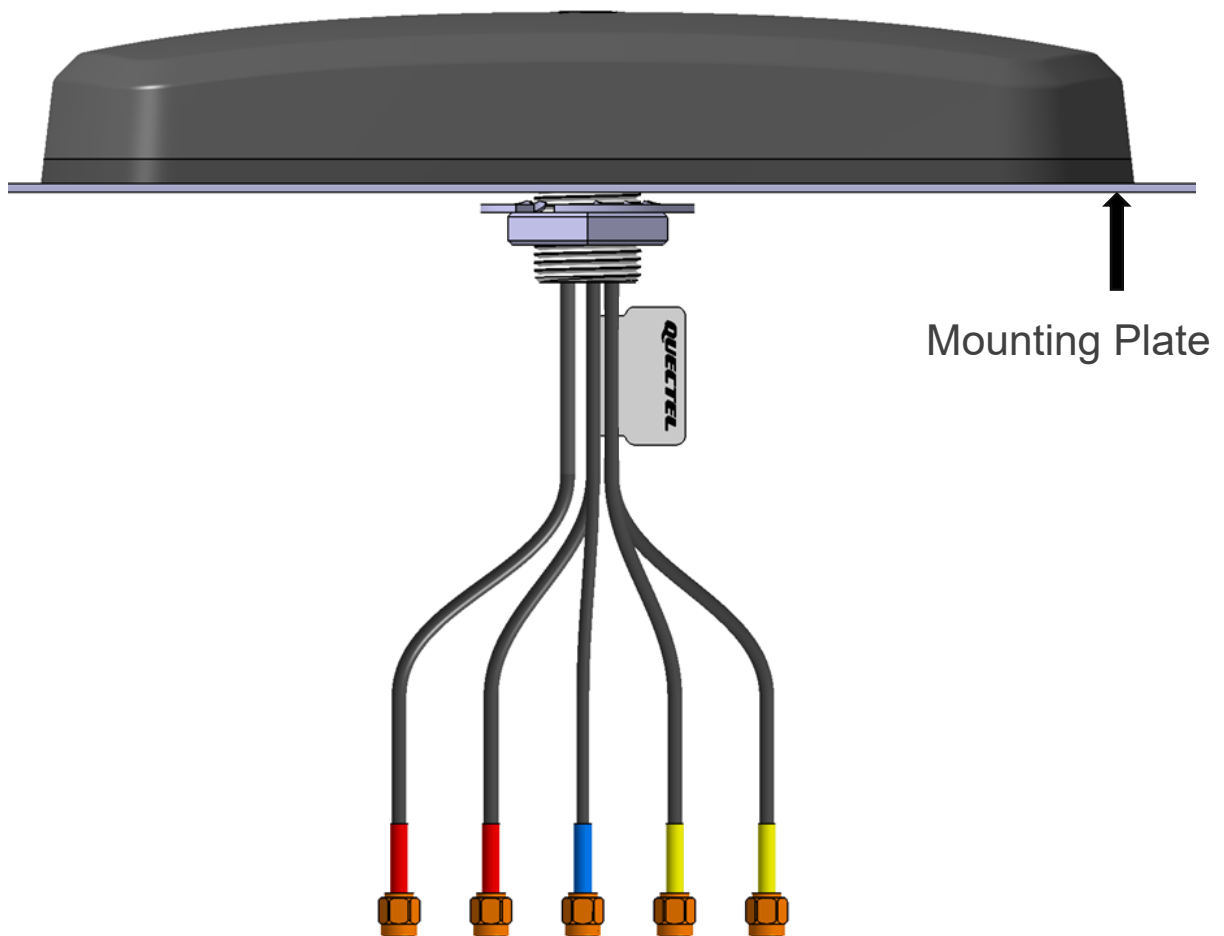
4 Packaging

| Step | Packaging Picture / 2D Picture | Description |
|------|---|--|
| 1 |  | <p>Put the product harness inside the paper card, and the product on the paper card.</p> |
| 2 |  | <p>Place the product in the box; Pearl cotton protection is placed on the product.</p> |
| 3 |  | <p>Put inner boxes into the outer box, 4 boxes per layer, stacked 2 layers, a total of 8 inner boxes. (8 pcs antennas per carton box)</p> <p><u>Carton Size:</u> <u>L × W × H = 500 × 415 × 220 mm</u></p> |

| | | |
|---|---|--|
| 4 |  | <p>Position for Attaching Labels</p> <ul style="list-style-type: none">① Carton Label② Quality Label |
| 5 |  | <p>Sealing Cartons</p> <p>“工” type sealing cartons</p> |

5 Installation

- Recommended hole dimensions as below view.
- Recommended mounting plate thickness: 1–4 mm.



Recommended Hole

Contact Us

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Tel: +86 21 5108 6236

Email: info@quectel.com

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Revision History

| Version | Date | Author | Note |
|---------|------------|---|--------------------------|
| - | 2023-12-21 | Mordecai LIU Blake XIANG David LIU/ Aria CHU | Creation of the document |
| 1.0 | 2023-12-21 | Mordecai LIU Blake XIANG David LIU/ Aria CHU | First official release |

