



# Antenna Datasheet

**Product OC:** YEMD302L1B

**Version:** 1.1

**Date:** 2024-11-07

**Status:** Released

**Product Name:** 4G & Wi-Fi & GNSS 3in1 Magnet & Adhesive & Screw Mount Combo Antenna

**Key Features:**

Frequency Band: 4G: 700–960 MHz, 1710–2690 MHz & Wi-Fi: 2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz & GNSS: 1559–1606 MHz

Dimensions: 109.28 mm × 89 mm × 25.8 mm

Efficiency: Up to 75.6 %

GNSS LNA Gain: 28 ±3 dB

RoHS & REACH & POPS Compliant

IP67

# Overview

YEMD302L1B is a 4G & Wi-Fi & GNSS 3in1 measuring 109.28 × 89 × 25.8 mm. This ultra-wide-band 4G & Wi-Fi & GNSS antenna provides broad coverage from 700–960 MHz, 1710–2690 MHz, 2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz, 1559–1606 MHz whilst offering backward-compatibility to support 3G and 2G networks as well as LTE Cat-M and narrowband IoT (NB-IoT). The antenna is available magnet & adhesive & screw mount omni-directional antenna, ideal for applications where the antenna is required to be discrete, is easy to install with maximum durability assured and suitable for use in harsh outdoor environments thanks to its IP67 rated, UV-resistant and UL 94 V-0 Flame Rating enclosure. It is compatible with Quectel's RM520x Series modules.

YEMD302L1B has 1 × 4G antenna, 1 × Wi-Fi antenna and 1 × GNSS L1 antenna. It allows high efficiency, stable signal transmission and reception for active GNSS from 1559–1606 MHz, and 4G bands from 700–960 MHz, 1710–2690 MHz, Wi-Fi bands from 2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz. In the meantime, this product also offers high isolation between antennas to avoid self-interference. All in all, this unique product is designed to provide stable and high-speed data connection to 4G & Wi-Fi & GNSS applications. YEMD302L1B can be used in harsh environments thanks to its robust UV resistant (UL 746c f1) and flame resistant (UL 94 V-0) enclosure.

Typical applications include:

- Public safety
- HD Video Streaming
- Utilities and Smart Cities
- Fleet Management
- Automotive vehicle tracking

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: Free Space & On 300 mm × 300 mm metal plane

## 1.1. Electrical

| Electrical Specifications |              |                                             |            |
|---------------------------|--------------|---------------------------------------------|------------|
| Frequency Range           | LTE          | 700–960 MHz, 1710–2690 MHz                  |            |
|                           | Wi-Fi        | 2400-2500 MHz, 5150–5850 MHz, 5925–7125 MHz |            |
|                           | GNSS         | 1559-1606 MHz                               |            |
| Radiation Pattern         | LTE          | Omni-directional                            |            |
|                           | Wi-Fi        | Omni-directional                            |            |
|                           | GNSS         | Directional                                 |            |
| Polarization              | LTE          | Linear                                      |            |
|                           | Wi-Fi        | Linear                                      |            |
|                           | GNSS         | RHCP                                        |            |
| Impedance                 |              | 50 Ω                                        |            |
| Isolation                 | LTE - Wi-Fi  | FS                                          | ≤ -12.0 dB |
|                           |              | MP                                          | ≤ -12.4 dB |
|                           | LTE - GNSS   | FS                                          | ≤ -42.5 dB |
|                           |              | MP                                          | ≤ -42.9 dB |
|                           | Wi-Fi - GNSS | FS                                          | ≤ -46.8 dB |
|                           |              | MP                                          | ≤ -52.4 dB |

### 1.1.1.1. LTE

| Electrical – Detail         |                |             |             |                     |                   |                     |                  |               |               |               |                     |               |             |
|-----------------------------|----------------|-------------|-------------|---------------------|-------------------|---------------------|------------------|---------------|---------------|---------------|---------------------|---------------|-------------|
| SPEC                        | Band           | Band        | B71         | B12<br>/B13<br>/B28 | B5<br>/B8<br>/B26 | n74<br>/n75<br>/n76 | B1<br>/B2<br>/B3 | B40           | Wi-Fi<br>2G   | B38<br>/B41   | B42<br>/B48<br>/n77 | n79           | Wi-Fi<br>5G |
|                             | Freq.<br>(MHz) | 600–<br>700 | 700–<br>810 | 820–<br>960         | 1420–<br>1520     | 1700–<br>2170       | 2300–<br>2400    | 2400–<br>2500 | 2500–<br>2690 | 3300–<br>4200 | 4400–<br>5000       | 5150–<br>5850 |             |
| Max.<br>VSWR                | FS             | -           | 2.6         | 3.0                 | -                 | 1.7                 | 1.9              | 2.9           | 3.6           | -             | -                   | -             |             |
|                             | MP             | -           | 1.7         | 3.7                 | -                 | 2.5                 | 1.8              | 2.2           | 2.4           | -             | -                   | -             |             |
| Max.<br>Return<br>Loss (dB) | FS             | -           | -7.1        | -6.0                | -                 | -11.5               | -10.5            | -6.3          | -5.0          | -             | -                   | -             |             |
|                             | MP             | -           | -12.0       | -4.9                | -                 | -7.4                | -10.7            | -8.6          | -7.8          | -             | -                   | -             |             |
| AVG Eff.<br>(%)             | FS             | -           | 51.0        | 40.8                | -                 | 62.9                | 51.6             | 42.8          | 32.6          | -             | -                   | -             |             |
|                             | MP             | -           | 51.4        | 32.0                | -                 | 57.7                | 53.9             | 48.1          | 42.0          | -             | -                   | -             |             |
| AVG AVG<br>Gain (dB)        | FS             | -           | -2.9        | -3.9                | -                 | -2.0                | -2.9             | -3.7          | -4.9          | -             | -                   | -             |             |
|                             | MP             | -           | -2.9        | -4.9                | -                 | -2.4                | -2.7             | -3.2          | -3.8          | -             | -                   | -             |             |
| Max. Peak<br>Gain (dBi)     | FS             | -           | 3.9         | 1.6                 | -                 | 5.1                 | 4.0              | 3.7           | 1.5           | -             | -                   | -             |             |
|                             | MP             | -           | 4.9         | 4.4                 | -                 | 5.9                 | 4.7              | 4.9           | 4.9           | -             | -                   | -             |             |
| VSWR                        |                |             | FS          |                     |                   |                     | ≤3.6             |               |               |               |                     |               |             |
|                             |                |             | MP          |                     |                   |                     | ≤3.7             |               |               |               |                     |               |             |
| Return Loss                 |                |             | FS          |                     |                   |                     | ≤ -5.0 dB        |               |               |               |                     |               |             |
|                             |                |             | MP          |                     |                   |                     | ≤ -4.9 dB        |               |               |               |                     |               |             |
| Gain                        |                |             | FS          |                     |                   |                     | ≤ 5.1 dBi        |               |               |               |                     |               |             |
|                             |                |             | MP          |                     |                   |                     | ≤ 5.9 dBi        |               |               |               |                     |               |             |

- FS: In Free Space
- MP: On 300 mm × 300 mm Metal Plane

### 1.1.2. Wi-Fi

| Electrical – Detail   |      |             |             |             |             |
|-----------------------|------|-------------|-------------|-------------|-------------|
| Specification         | Band | Band        | Wi-Fi 2G    | Wi-Fi 5G    | Wi-Fi 7G    |
|                       |      | Freq. (MHz) | 2400 - 2500 | 5150 - 5850 | 5925 - 7125 |
| Max. VSWR             | FS   |             | 1.3         | 1.3         | 1.4         |
|                       | MP   |             | 1.8         | 1.4         | 1.5         |
| Max. Return Loss (dB) | FS   |             | -17.6       | -17.3       | -14.8       |
|                       | MP   |             | -11.1       | -15.7       | -13.5       |
| AVG Eff. (%)          | FS   |             | 59.5        | 53.0        | 39.8        |
|                       | MP   |             | 58.1        | 51.1        | 38.2        |
| AVG Gain (dB)         | FS   |             | -2.3        | -2.8        | -4.0        |
|                       | MP   |             | -2.4        | -2.9        | -4.2        |
| Max. Peak Gain (dBi)  | FS   |             | 2.6         | 5.8         | 4.0         |
|                       | MP   |             | 6.5         | 4.9         | 3.0         |
| VSWR                  | FS   |             | ≤ 1.4       |             |             |
|                       | MP   |             | ≤ 1.8       |             |             |
| Return Loss           | FS   |             | ≤ -14.8 dB  |             |             |
|                       | MP   |             | ≤ -11.1 dB  |             |             |
| Peak Gain             | FS   |             | ≤ 5.8 dBi   |             |             |
|                       | MP   |             | ≤ 6.5 dBi   |             |             |

- FS: In Free Space
- MP: On 300 mm × 300 mm Metal Plane

### 1.1.3. GNSS

| Band<br>Frequency<br>(MHz) | GPS L5<br>GALILEO<br>E5a<br>BDS B2a-<br>B2I<br>QZSS L5<br>IRNSS L5 | GALILEO<br>E5b<br>BDS B2b | GPS L2<br>QZSS L2C | GLONASS<br>G2 | BDS B3 | BDS B1I | GPS L1<br>GALILEO<br>E1<br>BDS B1C<br>QZSS L1 | GLONASS<br>G1 |
|----------------------------|--------------------------------------------------------------------|---------------------------|--------------------|---------------|--------|---------|-----------------------------------------------|---------------|
|                            | 1176                                                               | 1207                      | 1227               | 1248          | 1268   | 1561    | 1575                                          | 1602          |
| VSWR                       | -                                                                  | -                         | -                  | -             | -      | 4.73    | 1.63                                          | 1.54          |
| Return Loss (dB)           | -                                                                  | -                         | -                  | -             | -      | -3.7    | -12.3                                         | -13.2         |
| Efficiency (%)             | -                                                                  | -                         | -                  | -             | -      | 42      | 79                                            | 76            |
| Peak Gain (dBi)            | -                                                                  | -                         | -                  | -             | -      | -0.91   | 1.95                                          | 2.18          |

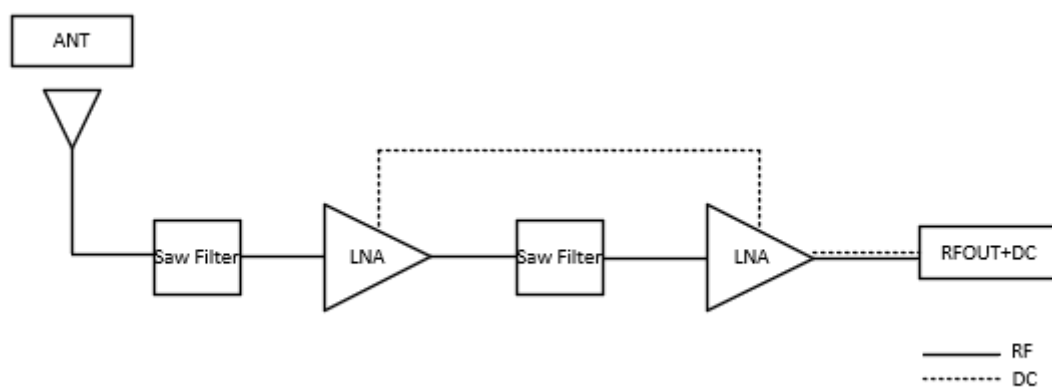
| LNA Electrical                 |                                    |
|--------------------------------|------------------------------------|
| LNA Gain                       | 28 ±3 dB                           |
| Noise Figure                   | ≤ 2.5 dB                           |
| Output VSWR                    | < 2.0                              |
| Input VSWR                     | < 2.0                              |
| Filter Out-of-Band Attenuation | 60 dB f0 ±100 MHz<br>f0 (1580 MHz) |
| Working Voltage                | 2.7–3.3 V                          |
| Working Current                | 8.3 ±1.5 mA @ 3 V                  |
| Impedance                      | 50 Ω                               |

## 1.2. Mechanical & Environmental

| Mechanical                     |       |                                                                                                                                   |
|--------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------|
| Antenna Dimensions             |       | 109.28 × 89 × 25.8 mm                                                                                                             |
| Antenna Material & Color       |       | PC & Black                                                                                                                        |
| Cable Type & Color & Length    | LTE   | ALS302 & Black & 1025 ±25 mm                                                                                                      |
|                                | Wi-Fi | ALS302 & Black & 1025 ±25 mm                                                                                                      |
|                                | GNSS  | RG174 & Black & 1025 ±25 mm                                                                                                       |
| Connector Type                 | LTE   | SMA Male (The current state of the SMA connector is not waterproof. If a waterproof connector is required, it can be customized.) |
|                                | Wi-Fi | SMA Male (The current state of the SMA connector is not waterproof. If a waterproof connector is required, it can be customized.) |
|                                | GNSS  | SMA Male (The current state of the SMA connector is not waterproof. If a waterproof connector is required, it can be customized.) |
| Weight                         |       | Typ. 154 g                                                                                                                        |
| Mounting Type                  |       | Magnet & Adhesive & Screw                                                                                                         |
| Environmental                  |       |                                                                                                                                   |
| Operation Temperature          |       | -40 °C to +85 °C                                                                                                                  |
| Storage Temperature            |       | -40 °C to +85 °C                                                                                                                  |
| Ingress Protection (IP) Rating |       | IP67                                                                                                                              |
| RoHS & REACH & POPS Compliant  |       | Yes                                                                                                                               |
| Housing Flame Rating           |       | UL 94 V-0                                                                                                                         |
| Housing UV Resistant           |       | UL 746c f1                                                                                                                        |



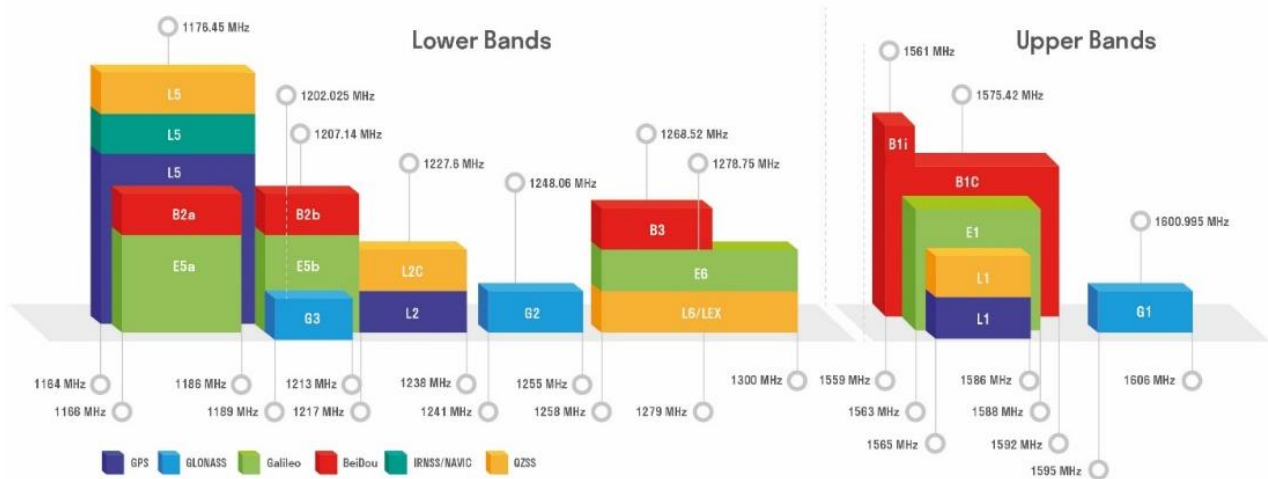
### 1.3. Block Diagram (Active Antenna)



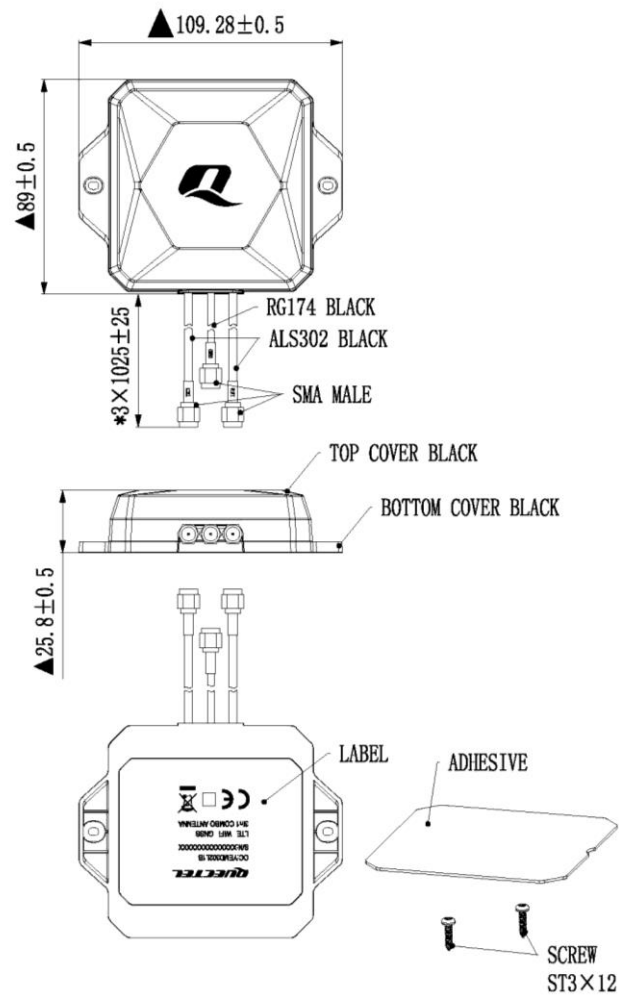
## 1.4. Supported GNSS Frequency Bands

| 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>BDS</b>                 | <b>B1I</b><br>Centre 1561.098<br>(1559–1564)      | <b>B1C (BDS-3)</b><br>Centre 1575.42<br>(1559–1592)  | <b>B2a-B2I</b><br>Centre 1176.45<br>(1166–1187)  | <b>B2b</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



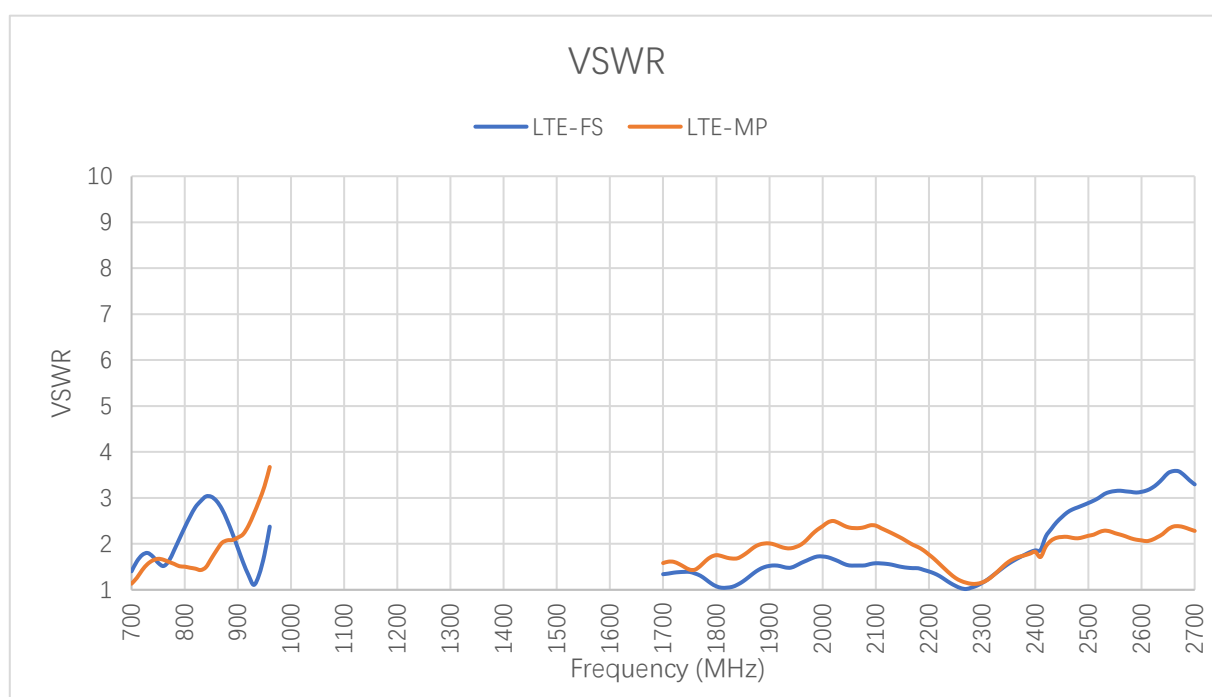
## 2 Drawing



# 3 Detailed Performance

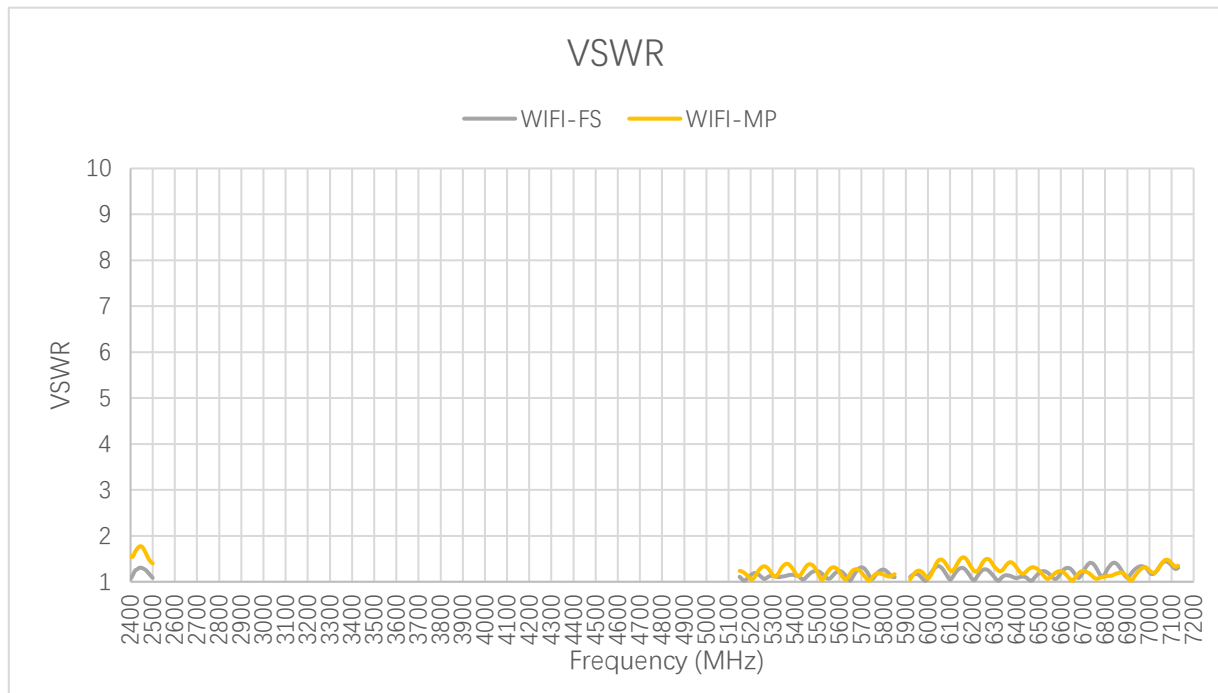
## 3.1. S-Parameter Test

### 3.1.1. VSWR



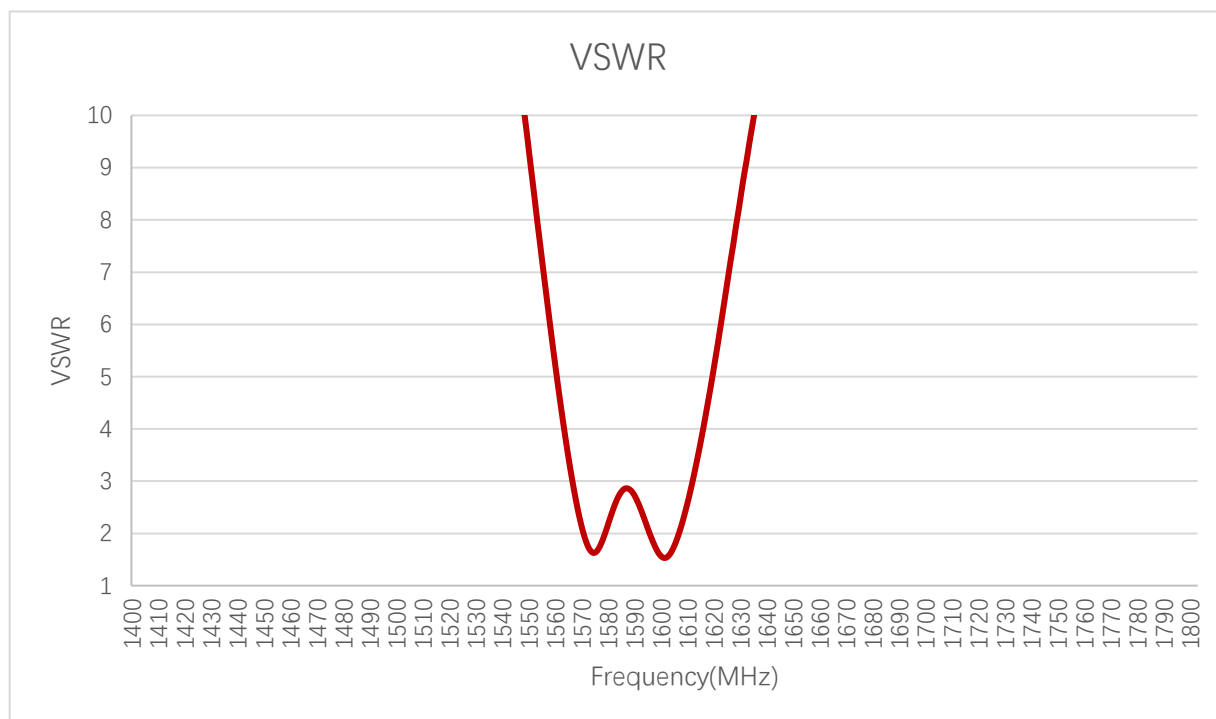
**VSWR – LTE**

| Frequency (MHz) |    | 600  | 630  | 710  | 830  | 900  | 960  | 1440 | 1710 | 1740 | 1880 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| LTE             | FS | -    | -    | 1.6  | 2.9  | 1.9  | 2.4  | -    | 1.4  | 1.4  | 1.4  |
|                 | MP | -    | -    | 1.3  | 1.4  | 2.1  | 3.7  | -    | 1.6  | 1.5  | 2.0  |
| Frequency (MHz) |    | 1950 | 2140 | 2350 | 2450 | 2600 | 2690 | 4700 | 5000 | 5500 | 6000 |
| LTE             | FS | 1.5  | 1.5  | 1.6  | 2.6  | 3.1  | 3.4  | -    | -    | -    | -    |
|                 | MP | 1.9  | 2.2  | 1.6  | 2.1  | 2.1  | 2.3  | -    | -    | -    | -    |



**VSWR – Wi-Fi**

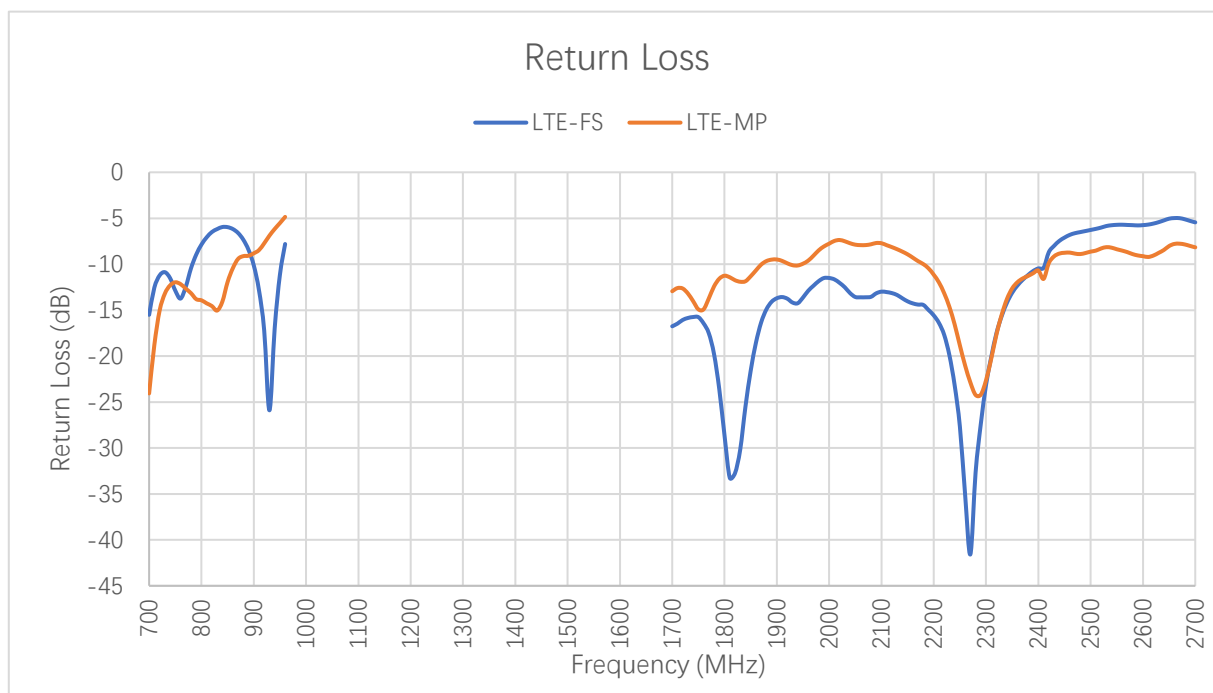
| Frequency (MHz) |    | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6325 | 6725 | 7125 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| Wi-Fi           | FS | 1.1  | 1.3  | 1.1  | 1.1  | 1.2  | 1.1  | 1.1  | 1.0  | 1.4  | 1.3  |
|                 | MP | 1.6  | 1.8  | 1.4  | 1.2  | 1.2  | 1.2  | 1.1  | 1.2  | 1.2  | 1.3  |



**VSWR – GNSS**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| VSWR            | -    | -    | -    | -    | -    | 4.73 | 1.63 | 1.54 |

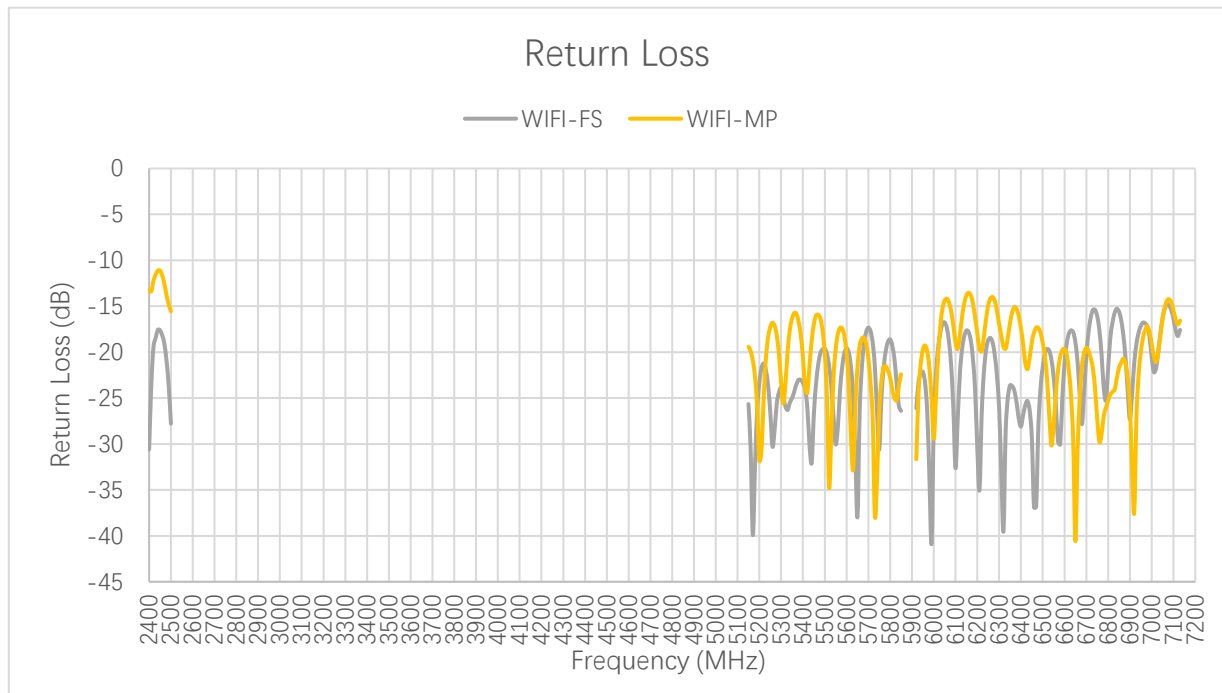
### 3.1.2. Return Loss



**Return Loss (dB) – LTE**

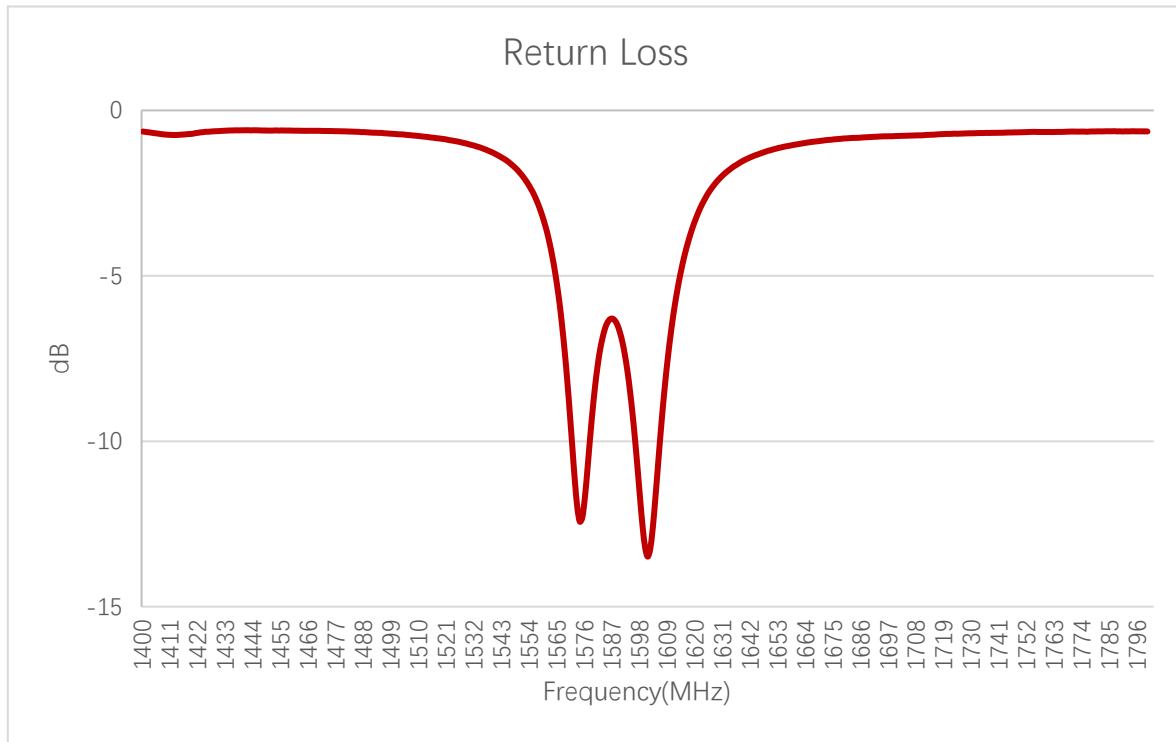
| Frequency (MHz) |    | 600   | 630   | 710   | 830   | 900   | 960  | 1440 | 1710  | 1740  | 1880  |
|-----------------|----|-------|-------|-------|-------|-------|------|------|-------|-------|-------|
| LTE             | FS | -     | -     | -12.5 | -6.2  | -10.1 | -7.8 | -    | -16.5 | -15.7 | -14.9 |
|                 | MP | -     | -     | -18.8 | -15.0 | -8.8  | -4.9 | -    | -12.6 | -14.0 | -9.7  |
| Frequency (MHz) |    | 1950  | 2140  | 2350  | 2450  | 2600  | 2690 | 4700 | 5000  | 5500  | 6000  |
| LTE             | FS | -13.6 | -13.7 | -13.1 | -7.1  | -5.7  | -5.3 | -    | -     | -     | -     |
|                 | MP | -9.9  | -8.6  | -12.6 | -8.8  | -9.1  | -8.0 | -    | -     | -     | -     |





**Return Loss (dB) – Wi-Fi**

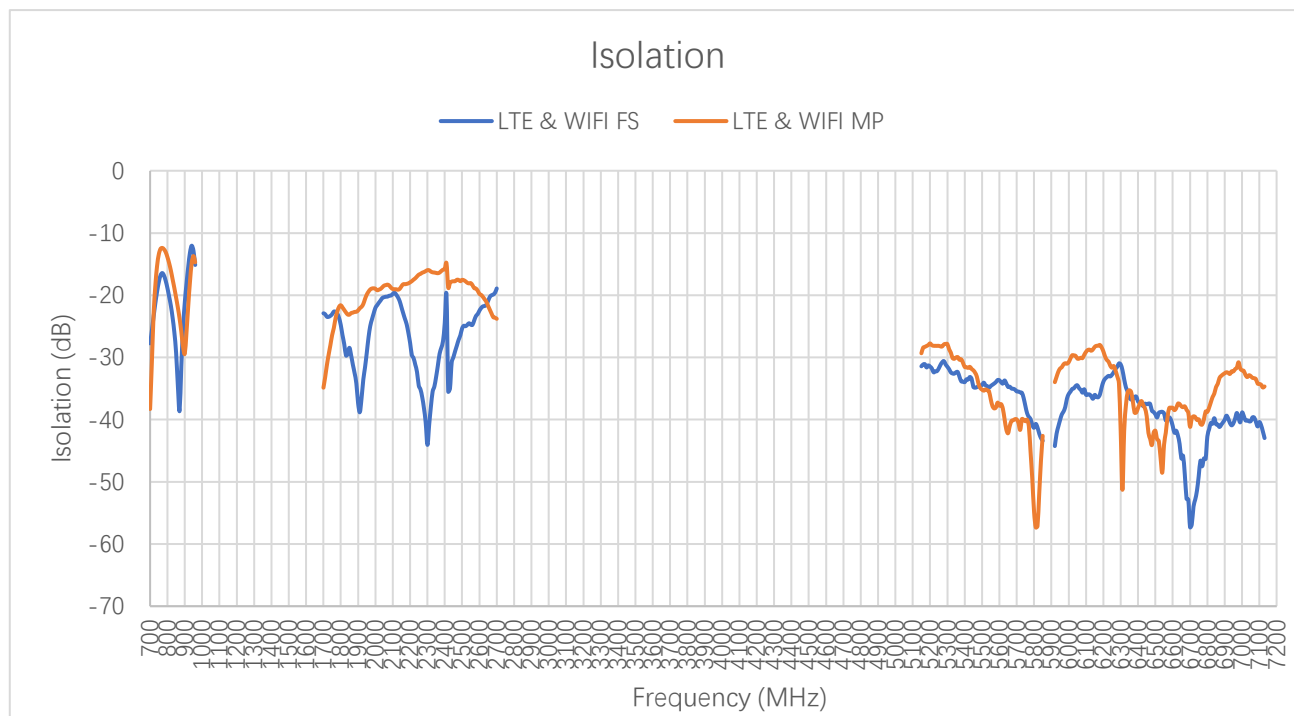
| Frequency (MHz) |    | 2400  | 2450  | 2500  | 5150  | 5500  | 5850  | 5925  | 6325  | 6725  | 7125  |
|-----------------|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Wi-Fi           | FS | -30.6 | -17.6 | -27.8 | -25.7 | -19.6 | -26.4 | -26.1 | -39.5 | -16.3 | -18.3 |
|                 | MP | -13.2 | -11.1 | -15.6 | -19.4 | -20.1 | -22.4 | -31.7 | -19.5 | -20.6 | -17.0 |



**Return Loss (dB) – GNSS**

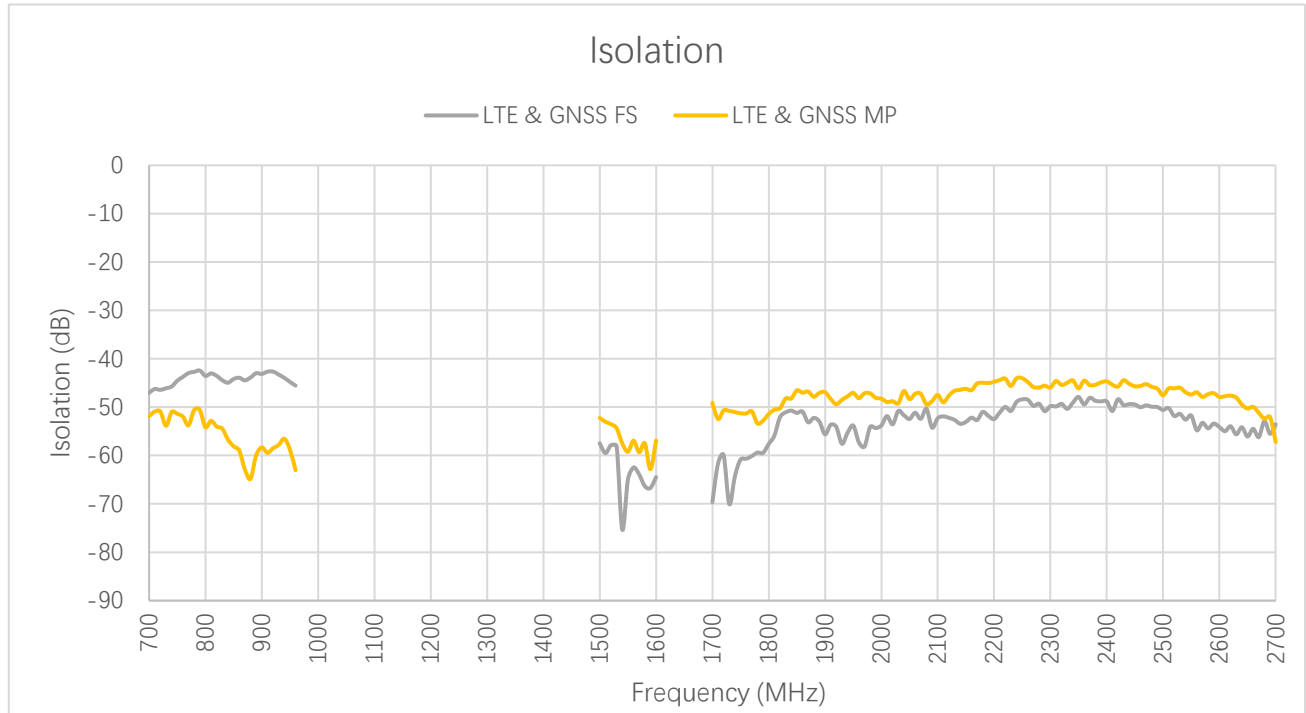
| Frequency (MHz)  | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575  | 1602  |
|------------------|------|------|------|------|------|------|-------|-------|
| Return Loss (dB) | -    | -    | -    | -    | -    | -3.7 | -12.3 | -13.2 |

### 3.1.3. Isolation



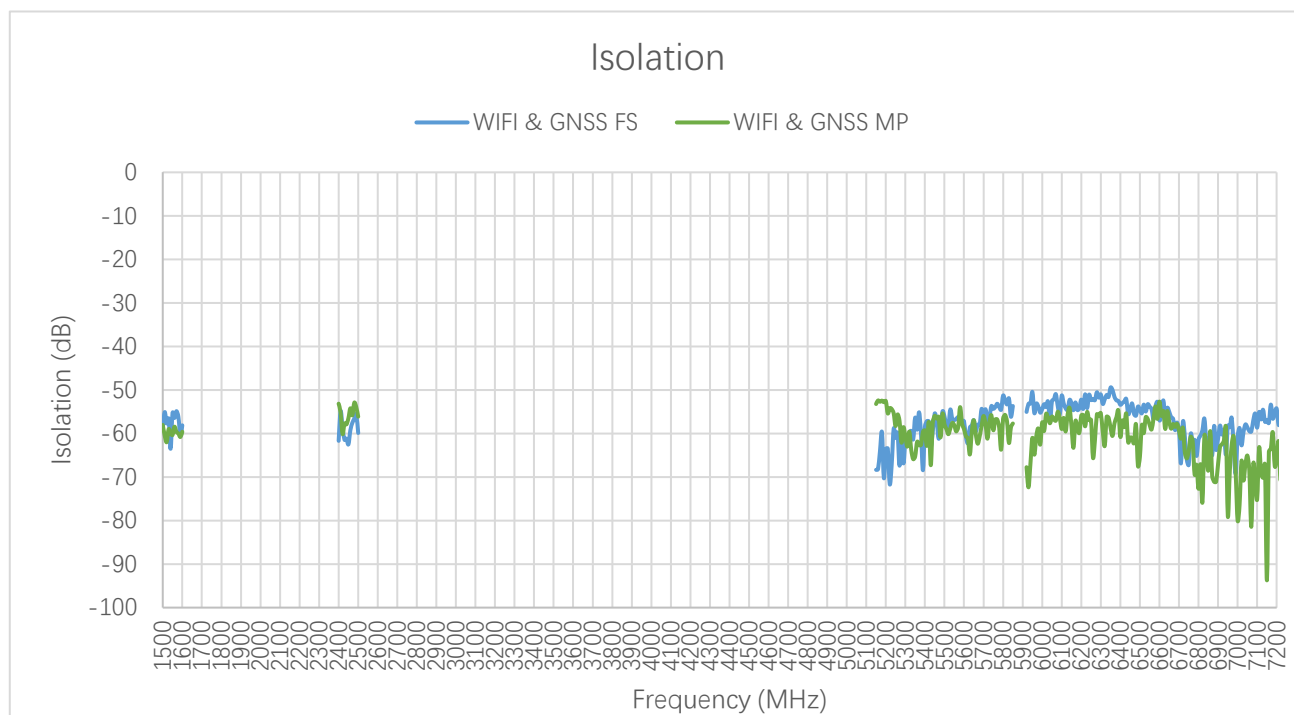
**Max Isolation (dB)**

| Band           |    | B71         | B12/<br>B13/<br>B28 | B5/<br>B8/<br>B26 | n74/<br>n75/<br>n76 | B1/<br>B2/<br>B3 | B40           | Wi-Fi<br>2G   | B38/<br>B41   | Wi-Fi<br>5G   | Wi-Fi<br>7G   |
|----------------|----|-------------|---------------------|-------------------|---------------------|------------------|---------------|---------------|---------------|---------------|---------------|
| Freq.<br>(MHz) |    | 600–<br>700 | 700–<br>810         | 820–<br>960       | 1420–<br>1520       | 1700–<br>2170    | 2300–<br>2400 | 2400–<br>2500 | 2500–<br>2690 | 5150–<br>5850 | 5925–<br>7125 |
| LTE &<br>Wi-Fi | FS | -           | -16.4               | -12.0             | -                   | -19.6            | -24.5         | -20.0         | -19.6         | -30.6         | -31.0         |
|                | MP | -           | -12.4               | -23.7             | -                   | -18.2            | -15.8         | -14.9         | -17.5         | -27.7         | -28.0         |



**Max Isolation (dB)**

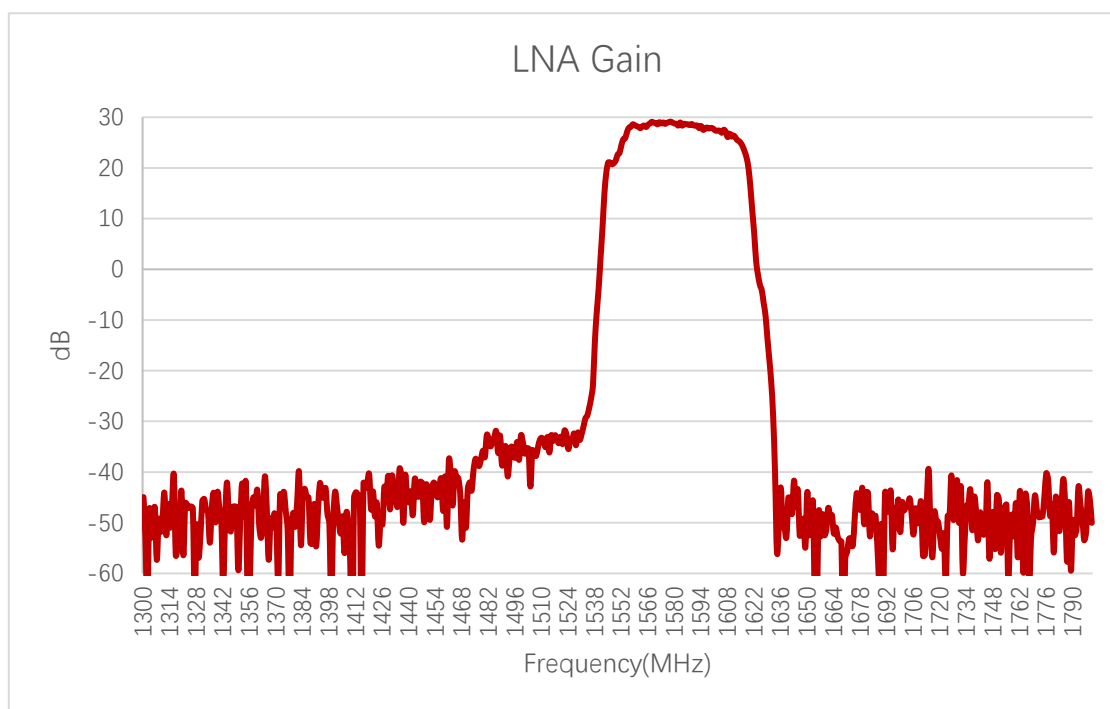
| Band                  |           | B71         | B12/<br>B13/<br>B28 | B5/<br>B8/<br>B26 | n74/<br>n75/<br>n76 | B1/<br>B2/<br>B3 | B40           | Wi-Fi<br>2G   | B38/<br>B41   | B42/<br>B48/<br>n77 | BDS<br>B1I    | GPS<br>L1     |
|-----------------------|-----------|-------------|---------------------|-------------------|---------------------|------------------|---------------|---------------|---------------|---------------------|---------------|---------------|
| Freq.<br>(MHz)        |           | 600–<br>700 | 700–<br>810         | 820–<br>960       | 1420–<br>1520       | 1700–<br>2170    | 2300–<br>2400 | 2400–<br>2500 | 2500–<br>2690 | 3300–<br>4200       | 1559–<br>1564 | 1565–<br>1586 |
| <b>LTE &amp; GNSS</b> | <b>FS</b> | -           | -42.4               | -42.7             | -                   | -50.4            | -47.9         | -48.4         | -50.2         | -                   | -57.5         | -62.5         |
|                       | <b>MP</b> | -           | -50.6               | -54.0             | -                   | -45.1            | -44.5         | -44.4         | -46.0         | -                   | -52.2         | -56.9         |



**Max Isolation (dB)**

| Band         |    | Wi-Fi 2G | Wi-Fi 5G  | Wi-Fi 7G  | BDS B1I   | GPS L1    |
|--------------|----|----------|-----------|-----------|-----------|-----------|
| Freq. (MHz)  |    | 2400–500 | 5150–5850 | 5925–7125 | 1559–1564 | 1565–1586 |
| Wi-Fi & GNSS | FS | -54.8    | -51.3     | -49.5     | -54.9     | -54.9     |
|              | MP | -52.9    | -52.4     | -52.7     | -58.5     | -58.4     |

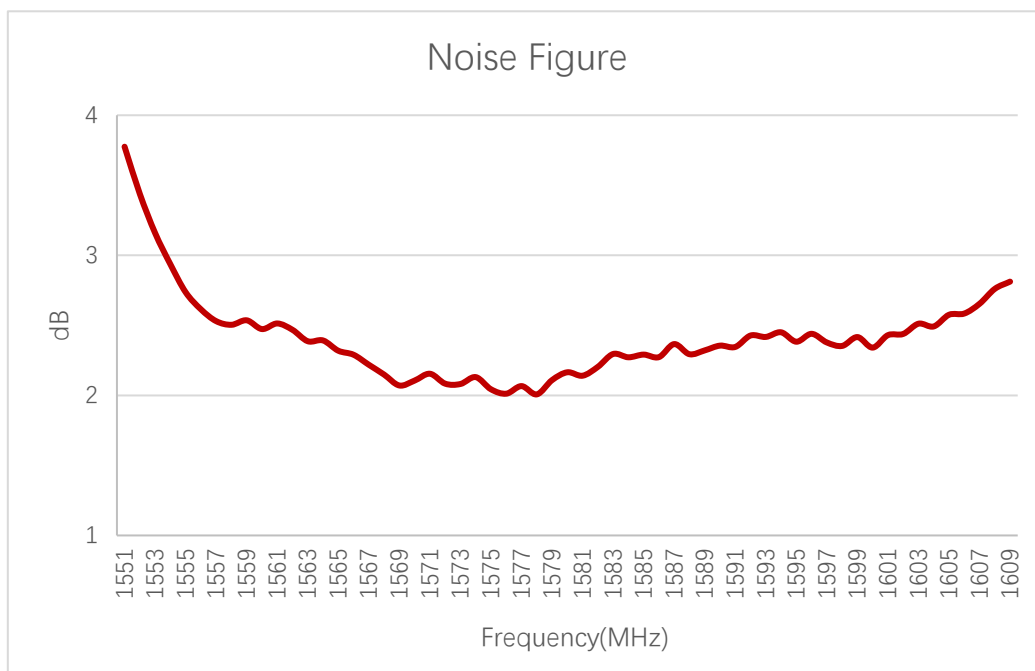
### 3.1.4. GNSS LNA Gain



**LNA Gain (dB)**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| LNA Gain (dB)   | -    | -    | -    | -    | -    | 28.1 | 28.6 | 27.3 |

### 3.1.5. GNSS Noise Figure

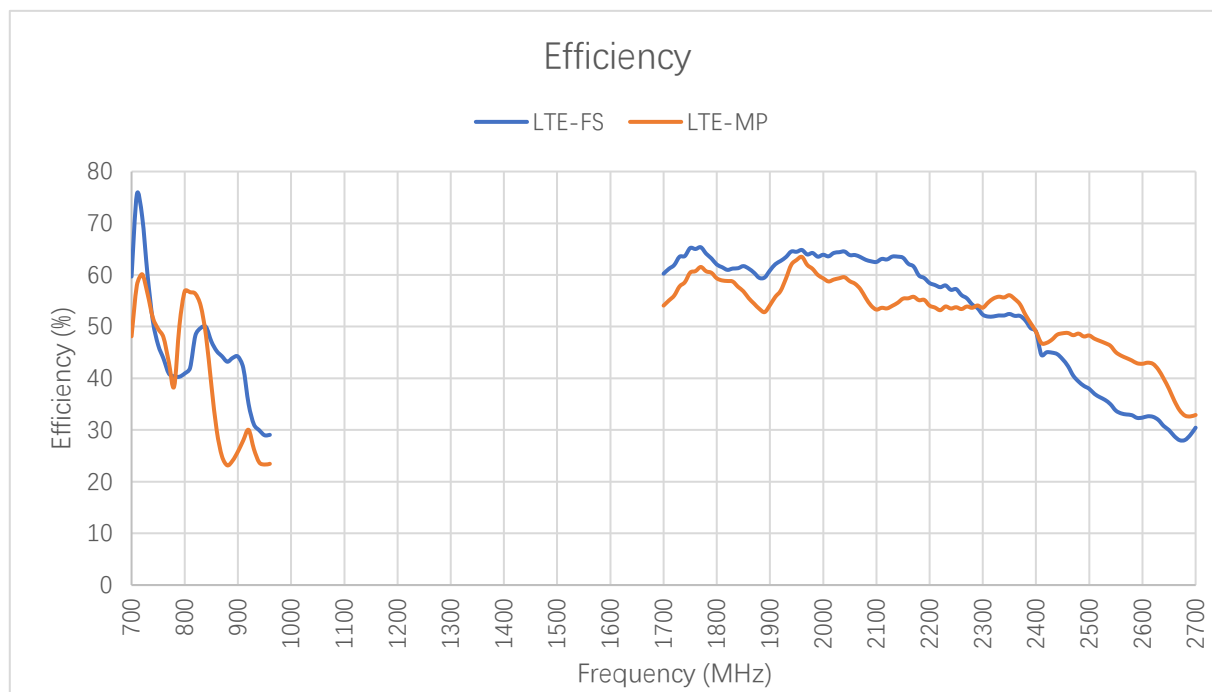


**Noise Figure (dB)**

| Frequency (MHz)   | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-------------------|------|------|------|------|------|------|------|------|
| Noise Figure (dB) | -    | -    | -    | -    | -    | 2.5  | 2.04 | 2.43 |

## 3.2. Radiation Performance Test

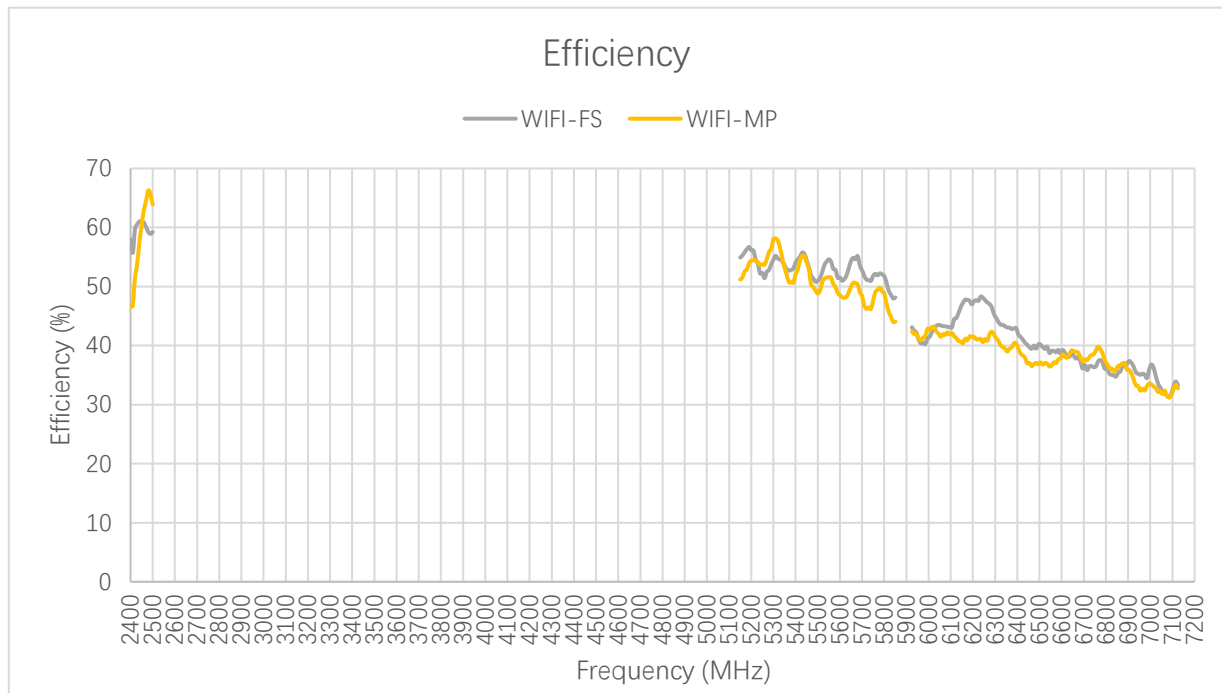
### 3.2.1. Efficiency



**Efficiency (%) – LTE**

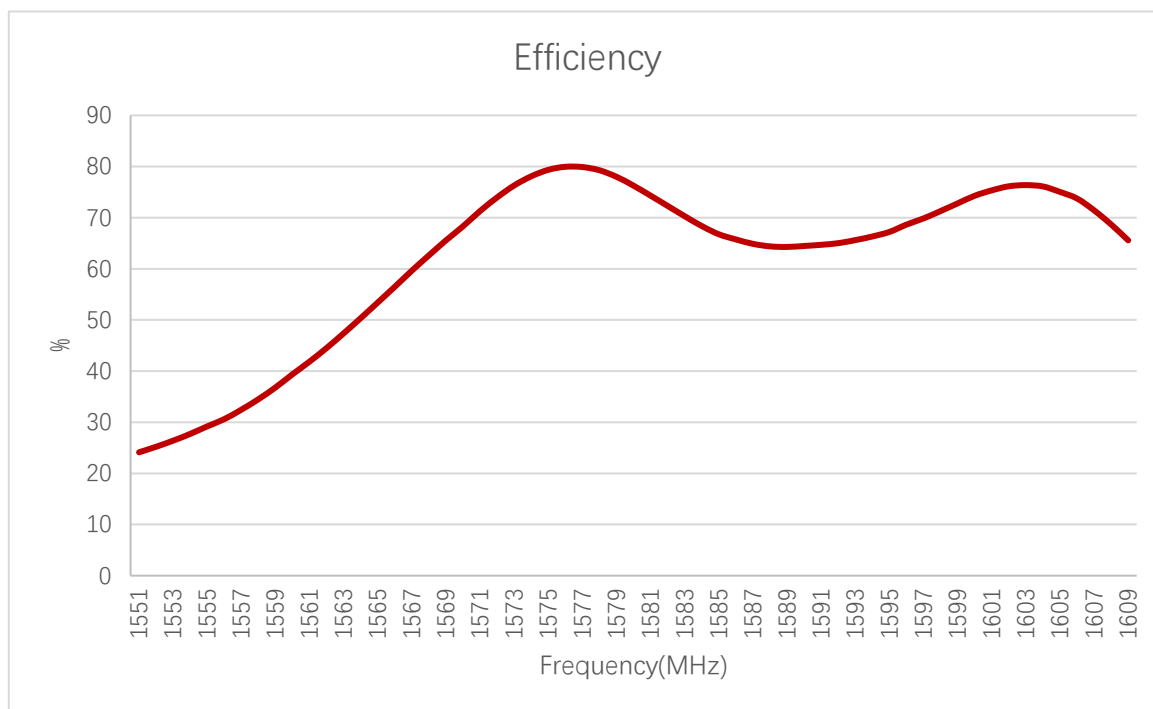
| Frequency (MHz) |    | 600  | 630  | 710  | 830  | 900  | 960  | 1440 | 1710 | 1740 | 1880 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| LTE             | FS | -    | -    | 75.6 | 49.7 | 44.2 | 29.1 | -    | 61.2 | 63.7 | 59.4 |
|                 | MP | -    | -    | 58.0 | 54.0 | 25.8 | 23.5 | -    | 55.1 | 58.6 | 53.4 |
| Frequency (MHz) |    | 1950 | 2140 | 2350 | 2450 | 2600 | 2690 | 4700 | 5000 | 5500 | 6000 |
| LTE             | FS | 64.5 | 63.5 | 52.5 | 43.7 | 32.4 | 29.0 | -    | -    | -    | -    |
|                 | MP | 62.9 | 54.6 | 56.1 | 48.7 | 42.8 | 32.6 | -    | -    | -    | -    |





**Efficiency (%) – Wi-Fi**

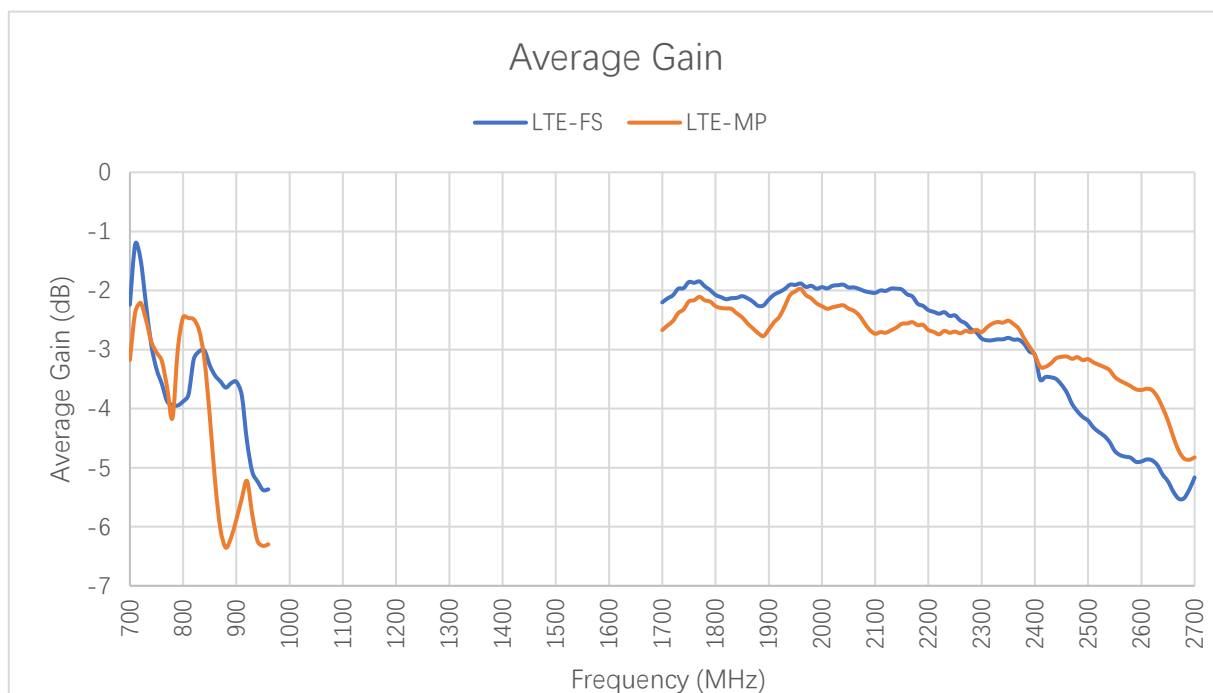
| Frequency (MHz) |    | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6325 | 6725 | 7125 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| Wi-Fi           | FS | 58.0 | 60.9 | 59.2 | 54.9 | 51.0 | 48.2 | 43.1 | 43.6 | 36.5 | 33.2 |
|                 | MP | 46.6 | 60.4 | 63.9 | 51.2 | 48.8 | 44.1 | 42.4 | 40.0 | 38.1 | 32.8 |



**Efficiency (%) – GNSS**

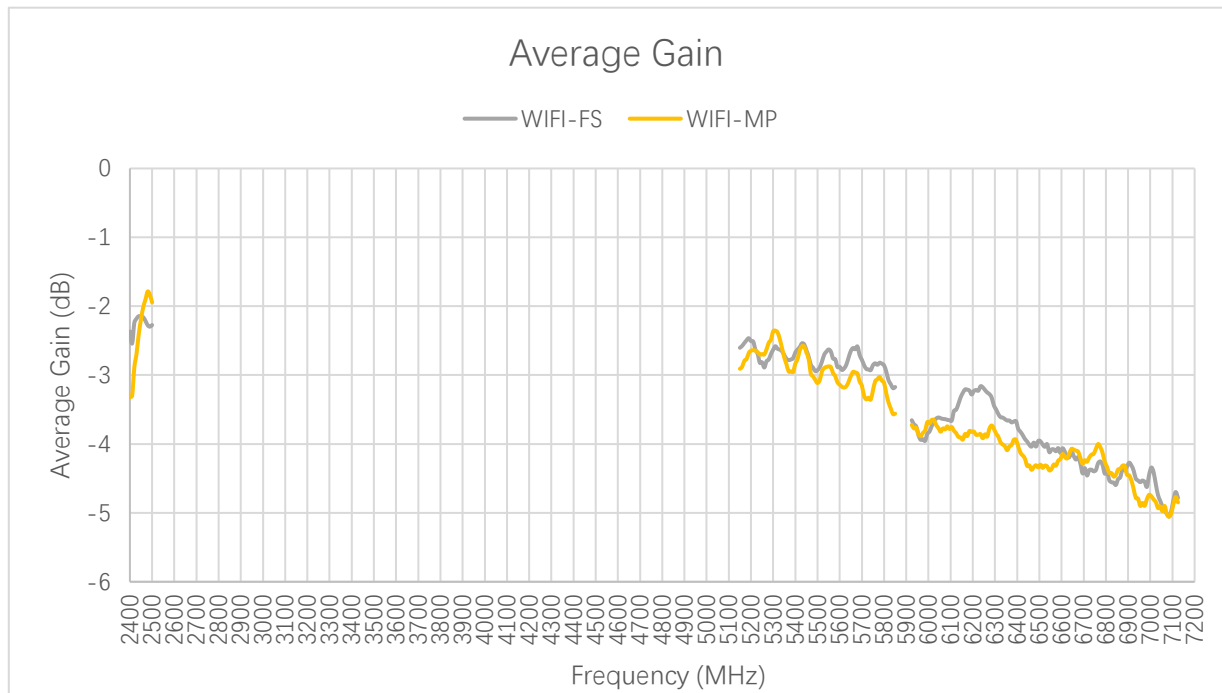
| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561 | 1575 | 1602 |
|-----------------|------|------|------|------|------|------|------|------|
| Efficiency (%)  | -    | -    | -    | -    | -    | 42   | 79   | 76   |

### 3.2.2. Average Gain



**Average Gain (dB) – LTE**

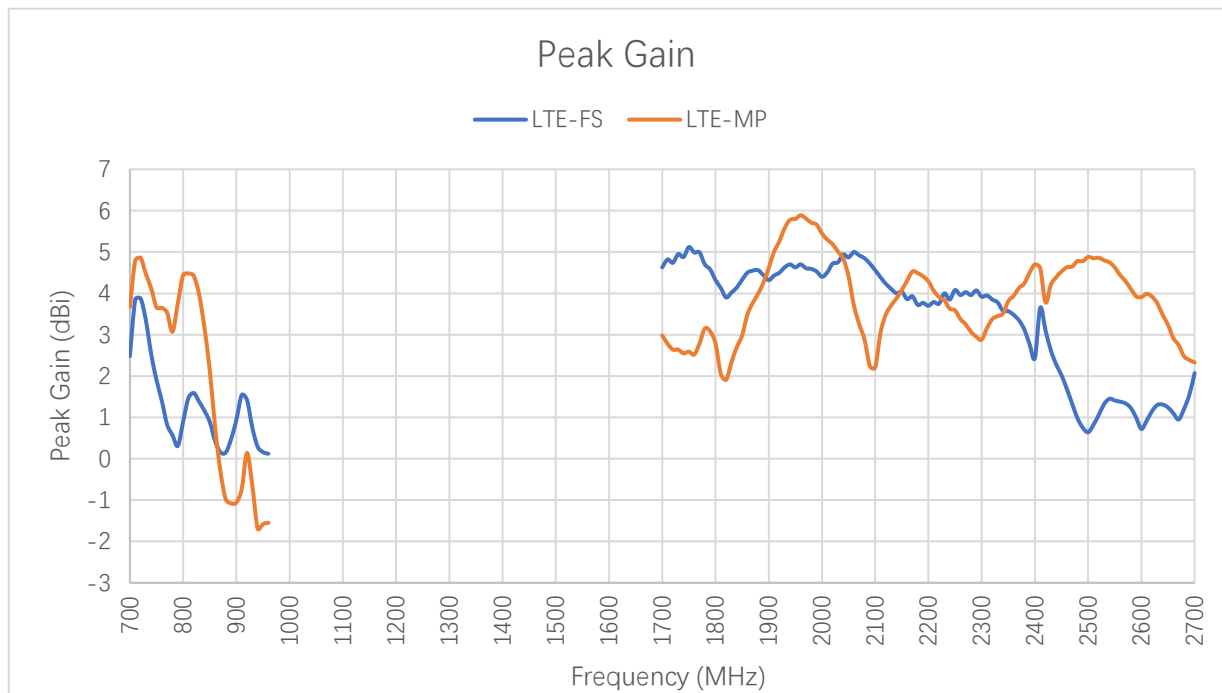
| Frequency (MHz) |    | 600  | 630  | 710  | 830  | 900  | 960  | 1440 | 1710 | 1740 | 1880 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| LTE             | FS | -    | -    | -1.2 | -3.0 | -3.5 | -5.4 | -    | -2.1 | -2.0 | -2.3 |
|                 | MP | -    | -    | -2.4 | -2.7 | -5.9 | -6.3 | -    | -2.6 | -2.3 | -2.7 |
| Frequency (MHz) |    | 1950 | 2140 | 2350 | 2450 | 2600 | 2690 | 4700 | 5000 | 5500 | 6000 |
| LTE             | FS | -1.9 | -2.0 | -2.8 | -3.6 | -4.9 | -5.4 | -    | -    | -    | -    |
|                 | MP | -2.0 | -2.6 | -2.5 | -3.1 | -3.7 | -4.9 | -    | -    | -    | -    |



**Average Gain (dB) – Wi-Fi**

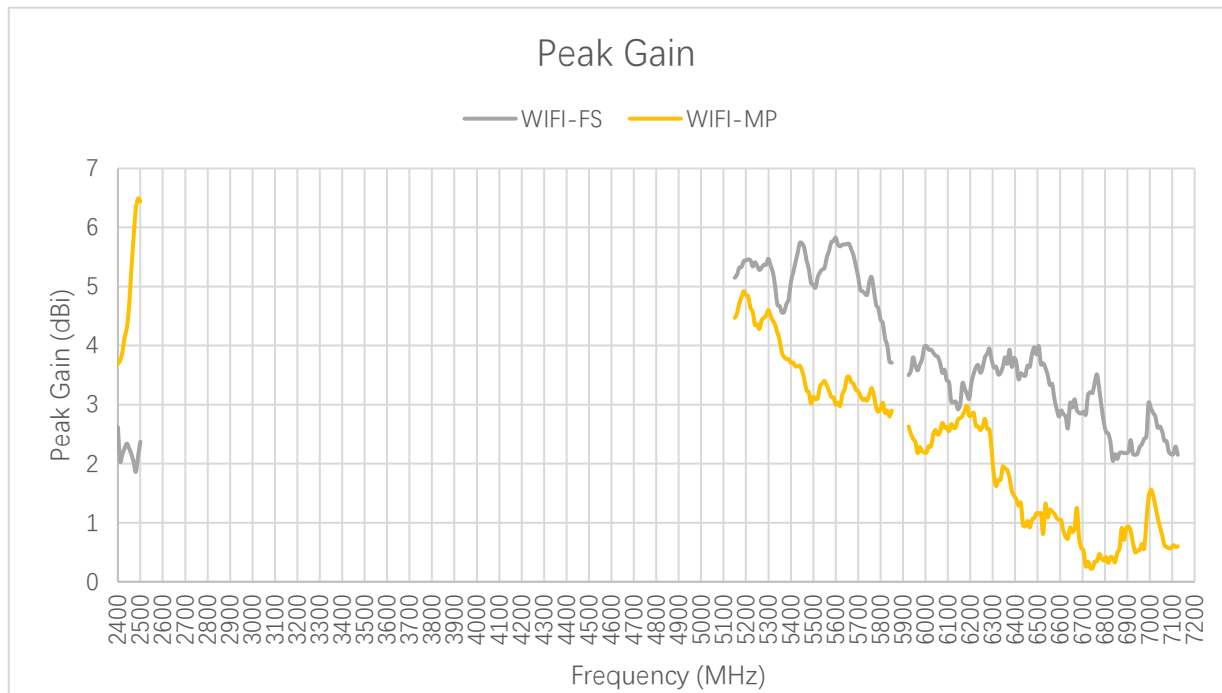
| Frequency (MHz) |    | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6325 | 6725 | 7125 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| Wi-Fi           | FS | -2.4 | -2.2 | -2.3 | -2.6 | -2.9 | -3.2 | -3.7 | -3.6 | -4.4 | -4.8 |
|                 | MP | -3.3 | -2.2 | -1.9 | -2.9 | -3.1 | -3.6 | -3.7 | -4.0 | -4.2 | -4.8 |

### 3.2.3. Peak Gain



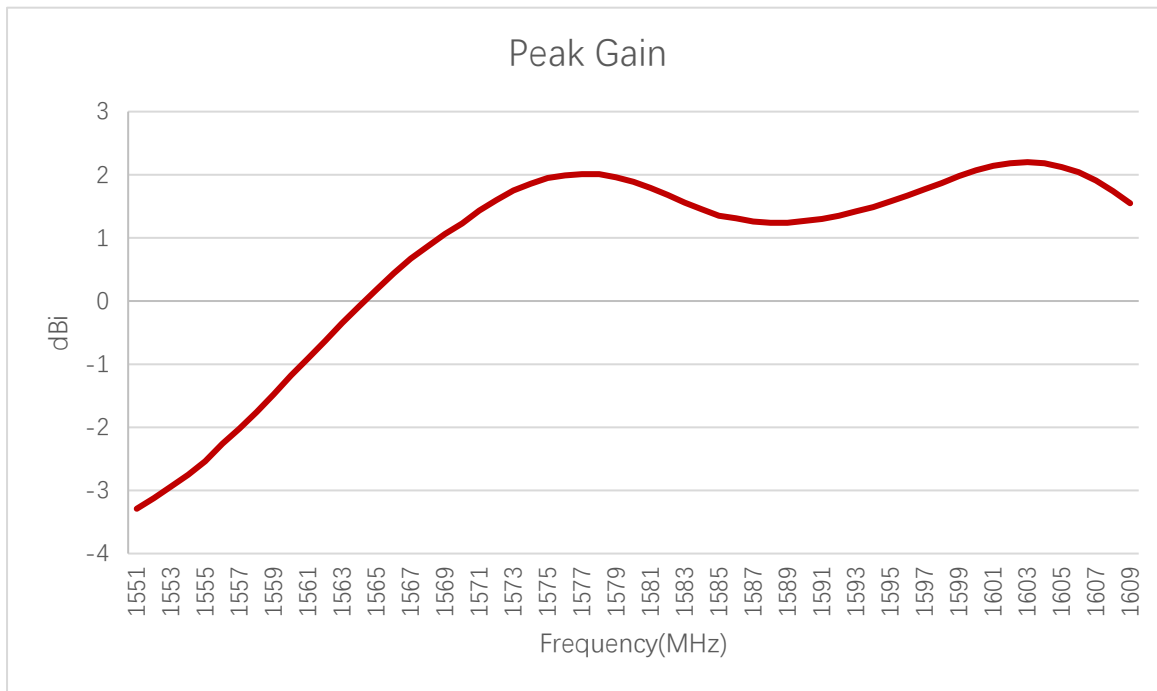
**Peak Gain (dBi) – LTE**

| Frequency (MHz) |    | 600  | 630  | 710  | 830  | 900  | 960  | 1440 | 1710 | 1740 | 1880 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| LTE             | FS | -    | -    | 3.9  | 1.4  | 0.9  | 0.1  | -    | 4.8  | 4.9  | 4.6  |
|                 | MP | -    | -    | 4.8  | 4.0  | -1.1 | -1.6 | -    | 2.8  | 2.6  | 4.0  |
| Frequency (MHz) |    | 1950 | 2140 | 2350 | 2450 | 2600 | 2690 | 4700 | 5000 | 5500 | 6000 |
| LTE             | FS | 4.6  | 4.0  | 3.6  | 2.0  | 0.7  | 1.5  | -    | -    | -    | -    |
|                 | MP | 5.8  | 3.9  | 3.8  | 4.5  | 3.9  | 2.4  | -    | -    | -    | -    |



**Peak Gain (dBi) – Wi-Fi**

| Frequency (MHz) |    | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6325 | 6725 | 7125 |
|-----------------|----|------|------|------|------|------|------|------|------|------|------|
| Wi-Fi           | FS | 2.6  | 2.3  | 2.4  | 5.2  | 5.0  | 3.7  | 3.5  | 3.5  | 3.2  | 2.2  |
|                 | MP | 3.7  | 4.7  | 6.4  | 4.5  | 3.1  | 2.9  | 2.6  | 1.7  | 0.3  | 0.6  |

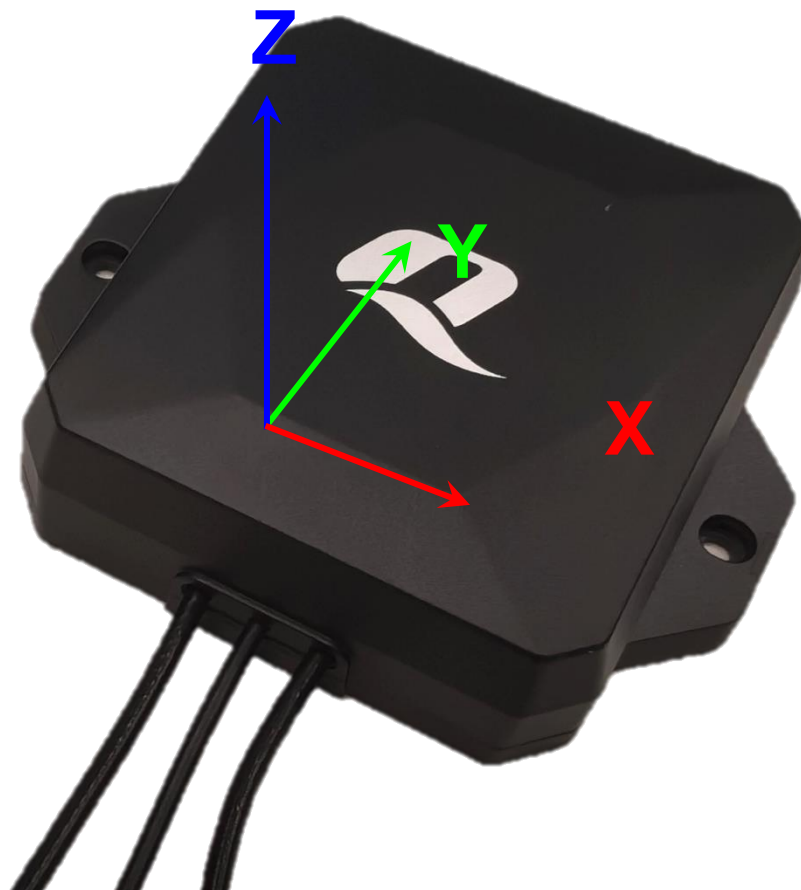


**Peak Gain (dBi) – GNSS**

| Frequency (MHz) | 1176 | 1207 | 1227 | 1248 | 1268 | 1561  | 1575 | 1602 |
|-----------------|------|------|------|------|------|-------|------|------|
| Peak Gain (dBi) | -    | -    | -    | -    | -    | -0.91 | 1.95 | 2.18 |

### 3.2.4. 3D & 2D Radiation Pattern

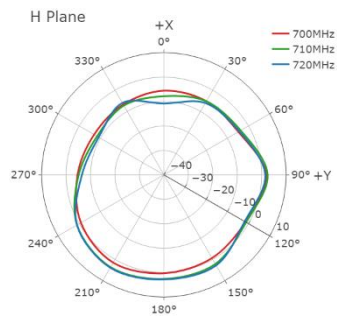
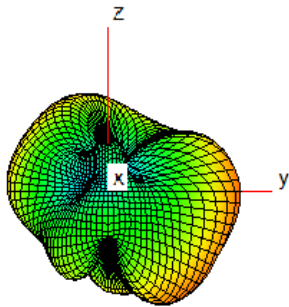
- Test Condition: Free space
- Test Chamber: FS-G-1 (LTE); SH-SY-16 (GNSS)



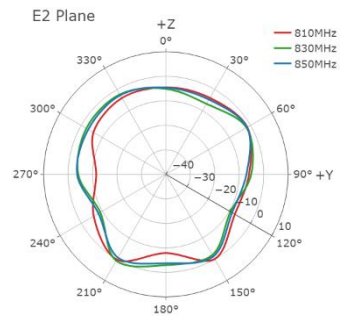
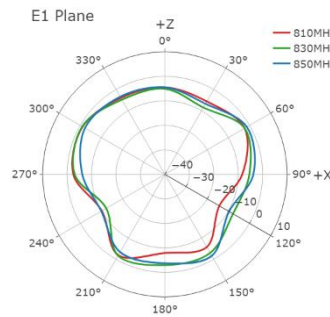
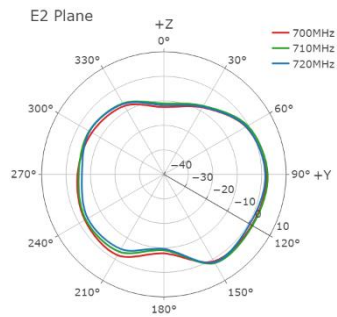
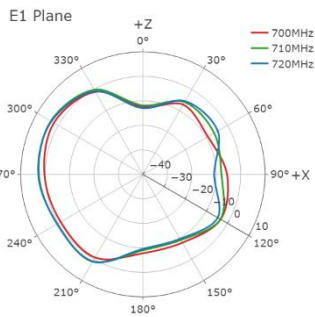
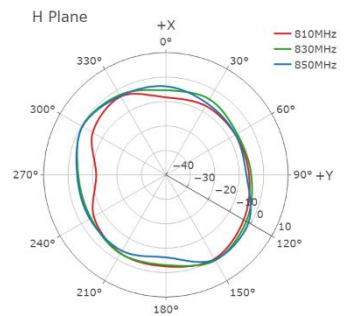
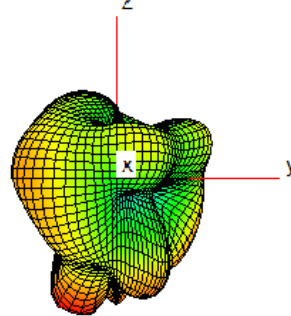


● **LTE**

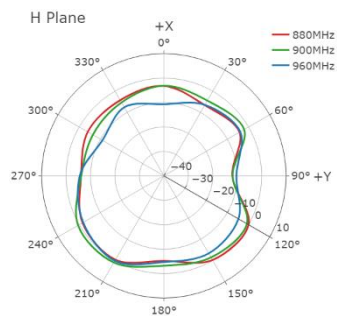
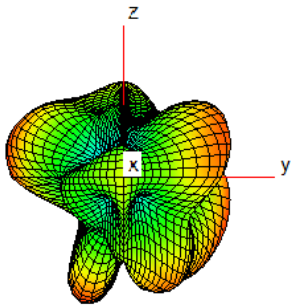
**710 MHz**



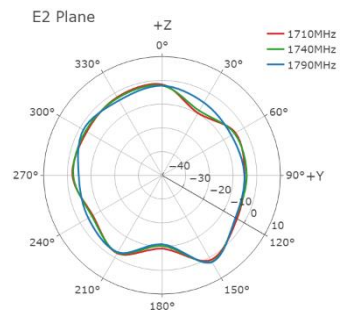
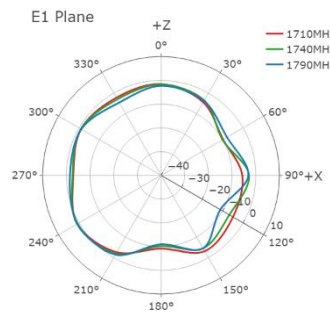
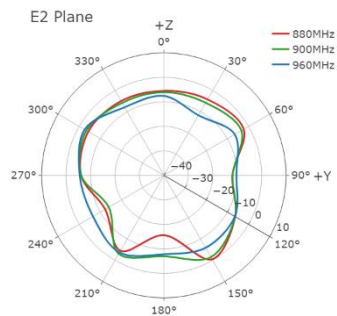
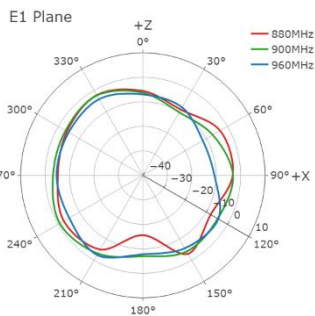
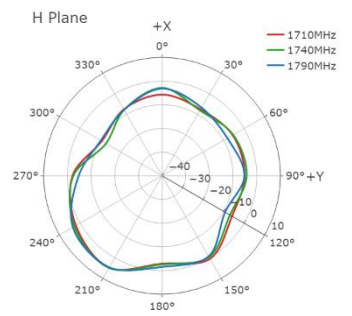
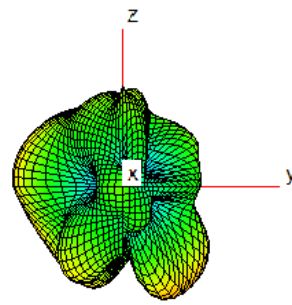
**830 MHz**

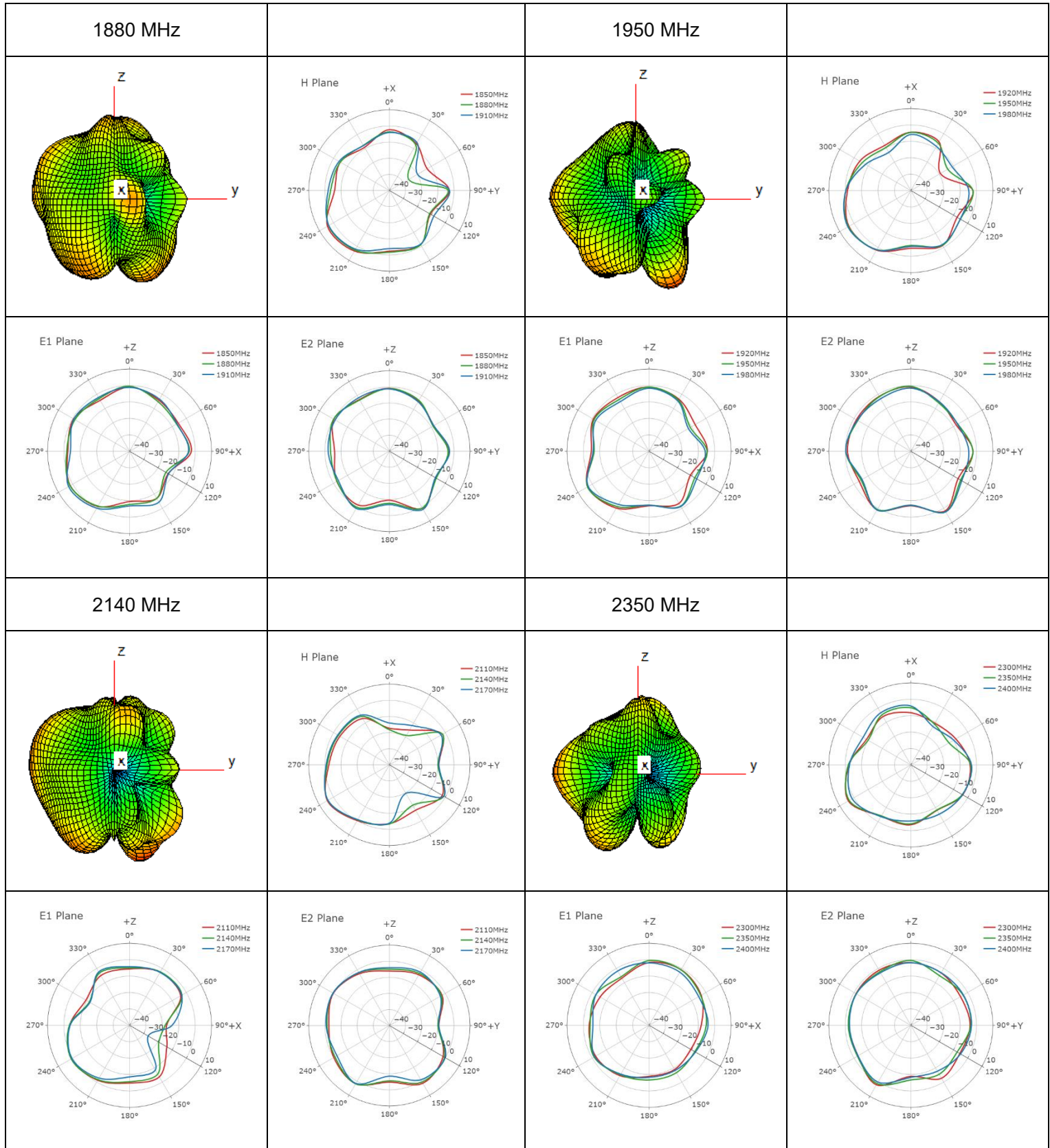


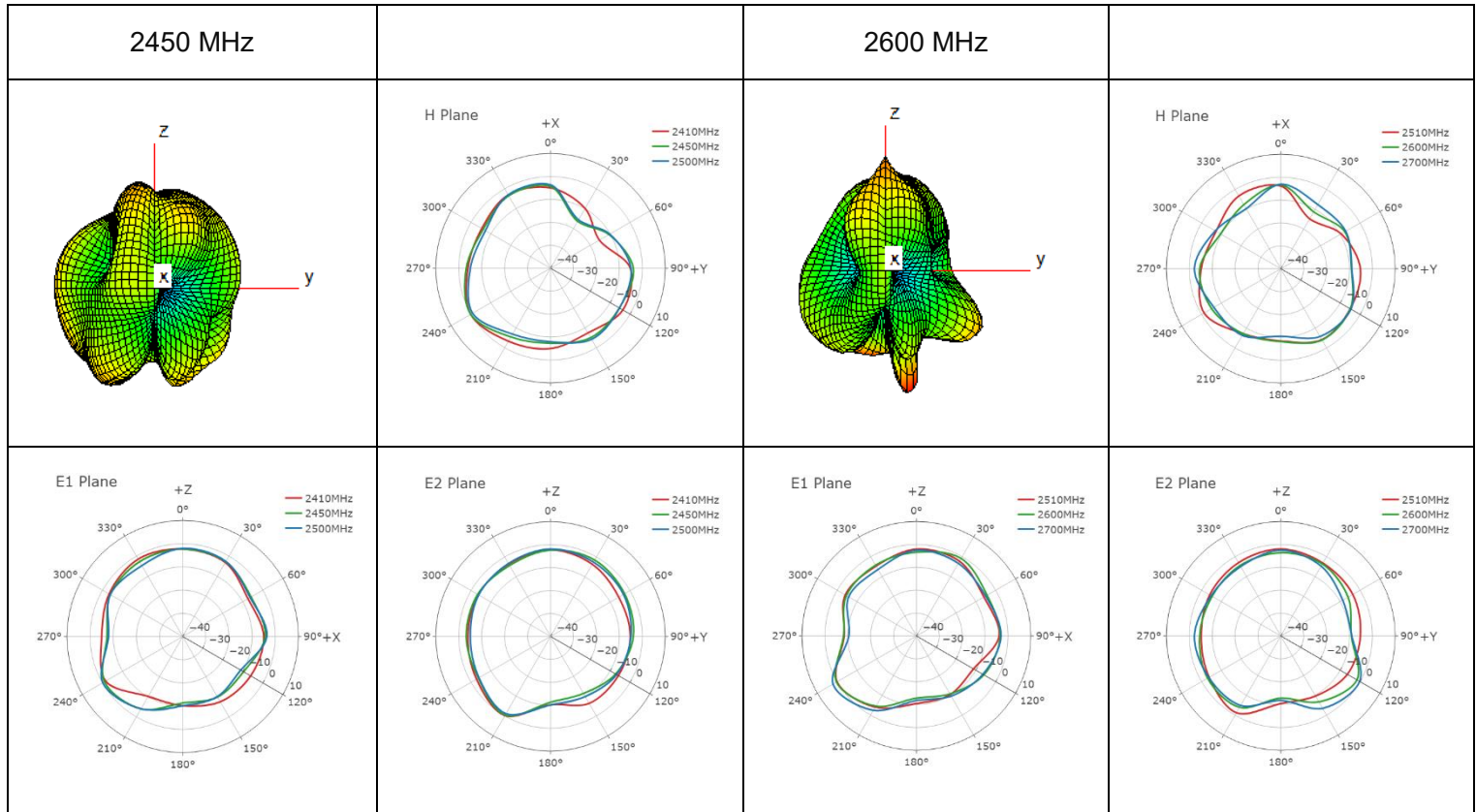
**900 MHz**



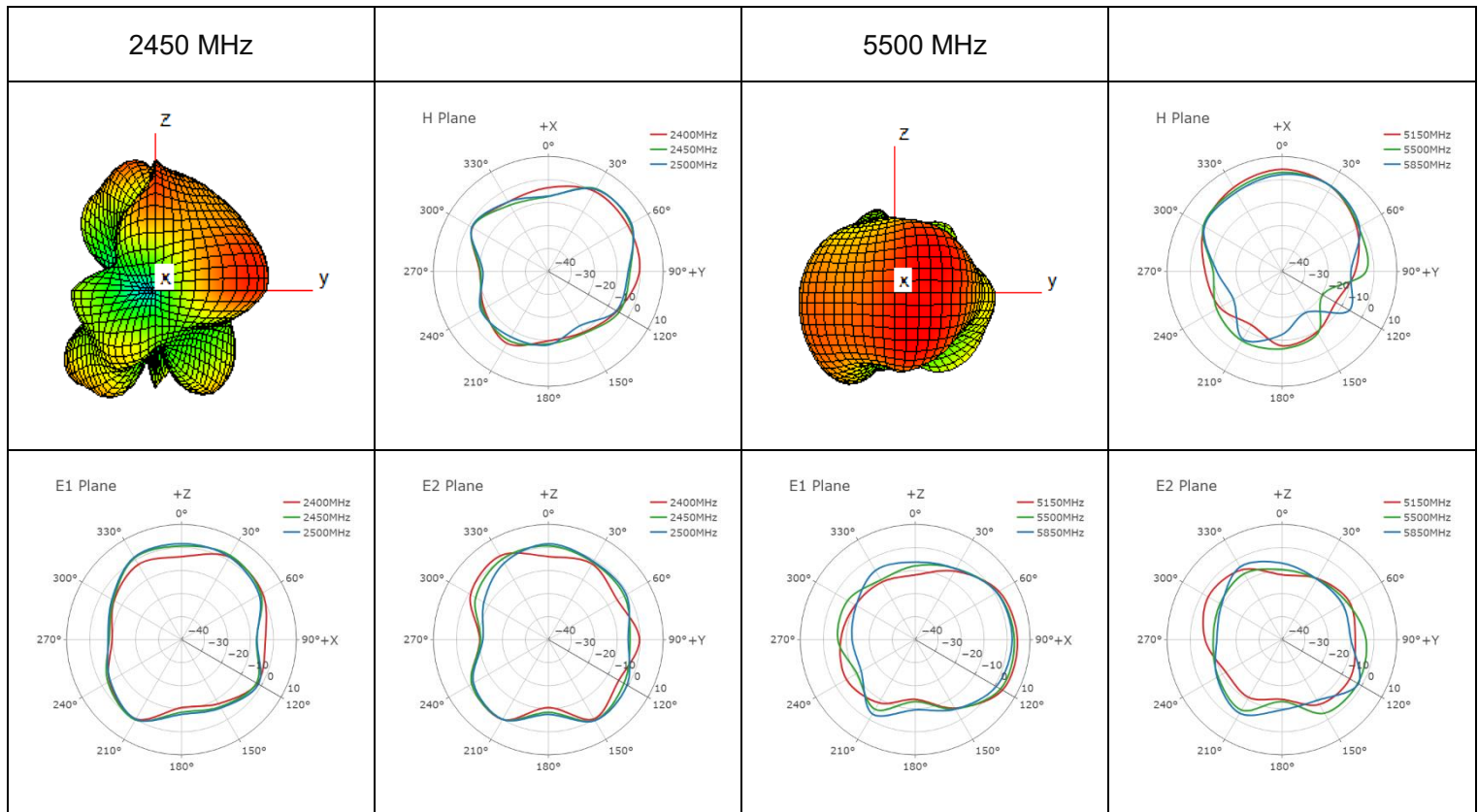
**1740 MHz**

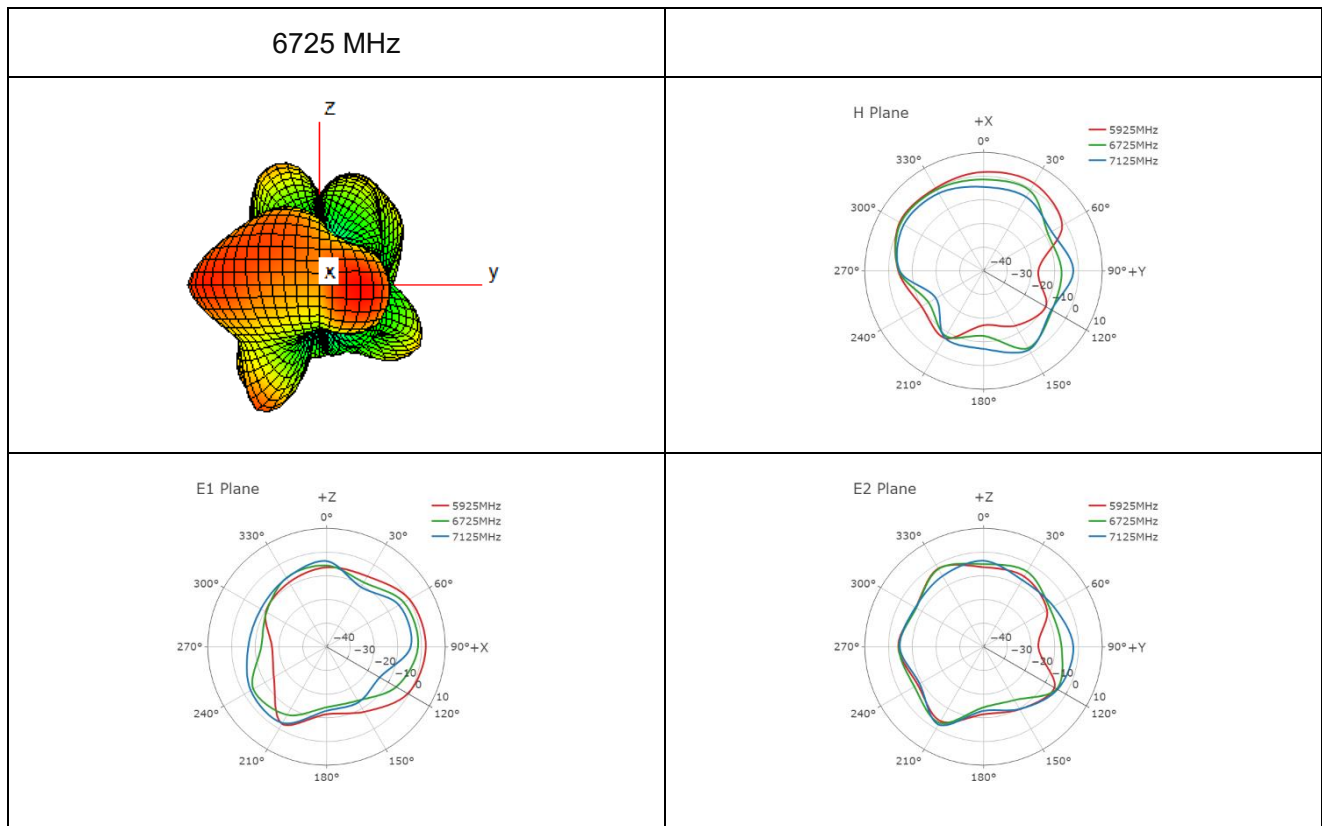






● **Wi-Fi**

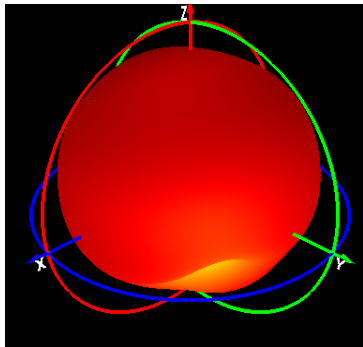




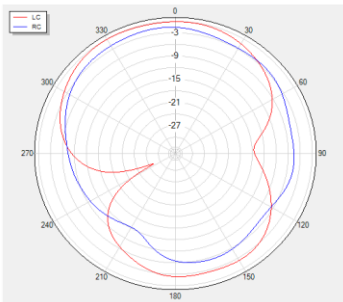


● **GNSS**

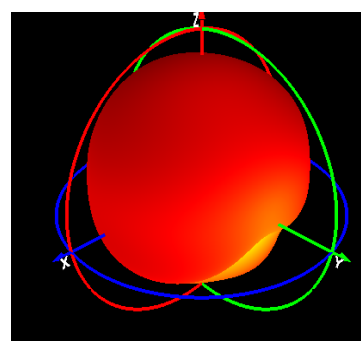
**1561 MHz**



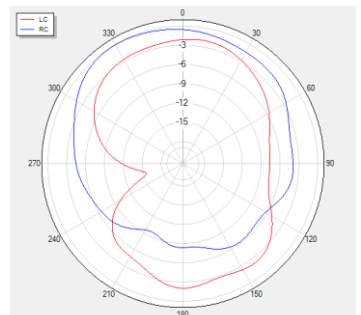
**Phi=0 freq=1561MHz**



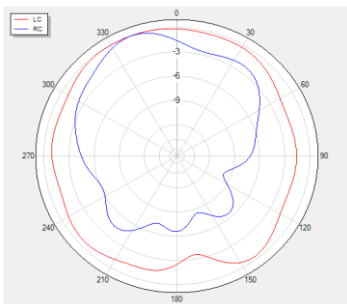
**1575 MHz**



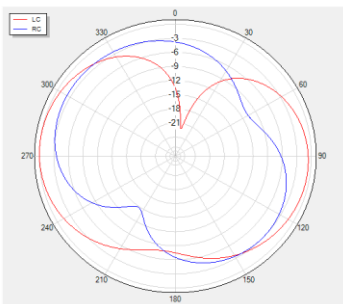
**Phi=0 freq=1575MHz**



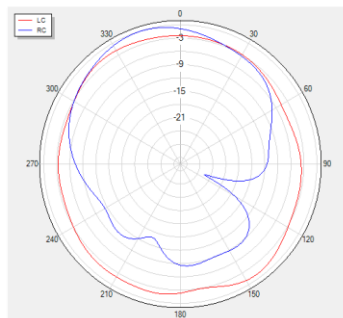
**Phi=90 freq=1561MHz**



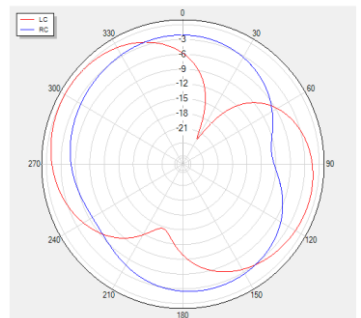
**Theta=90 freq=1561MHz**



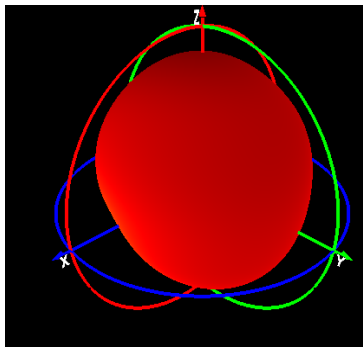
**Phi=90 freq=1575MHz**



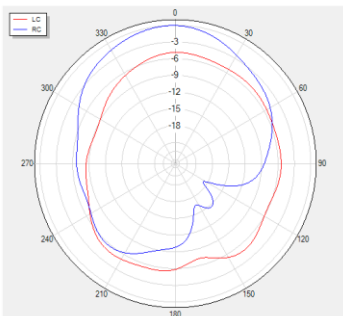
**Theta=90 freq=1575MHz**



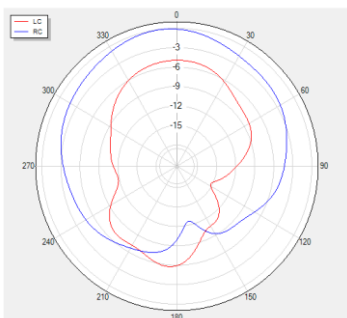
**1602 MHz**



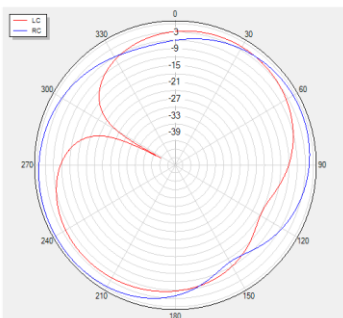
**Phi=0 freq=1602MHz**



**Phi=90 freq=1602MHz**

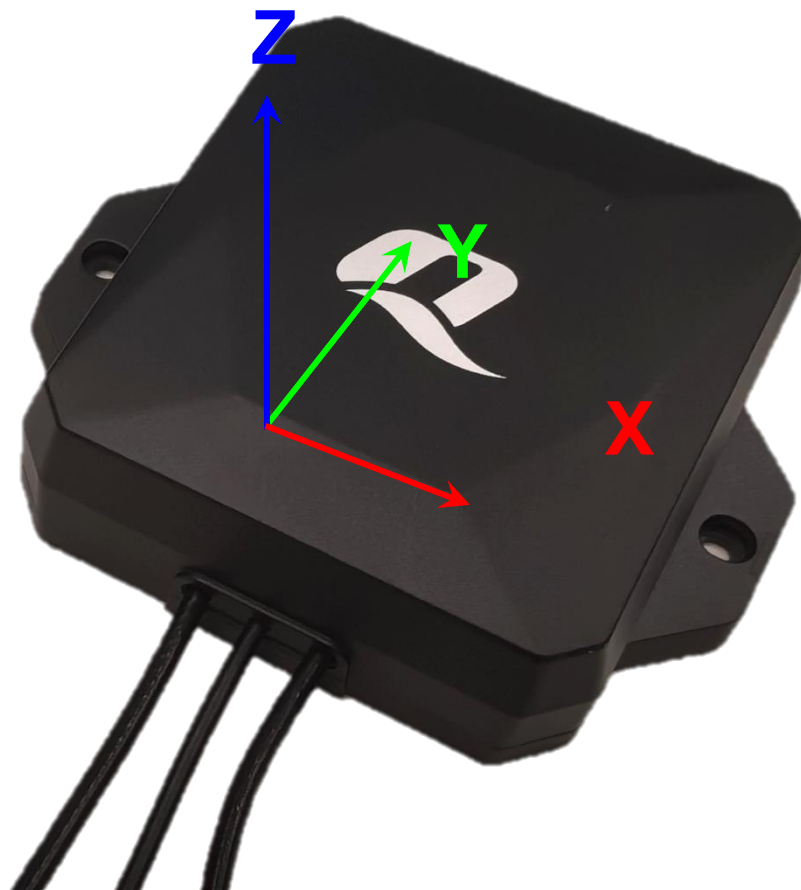


**Theta=90 freq=1602MHz**



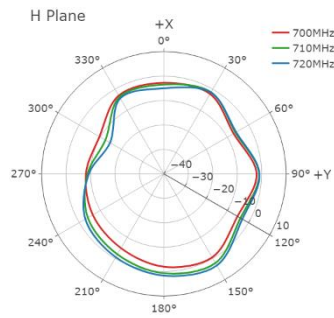
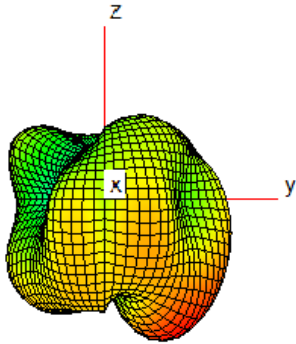
### 3.2.5. 3D & 2D Radiation Pattern

- Test Condition: On 300 mm × 300 mm Metal Plane
- Test Chamber: FS-G-1(LTE)

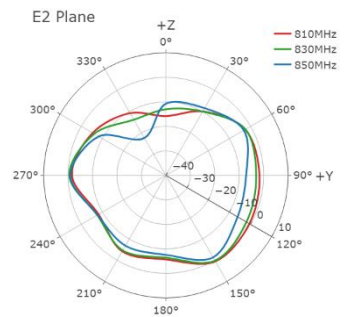
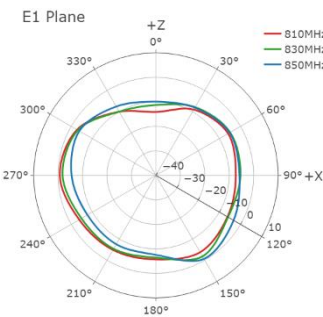
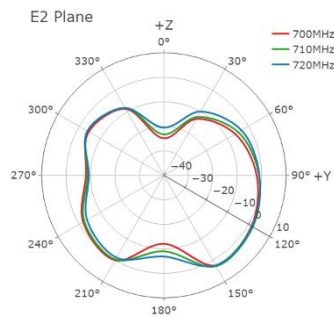
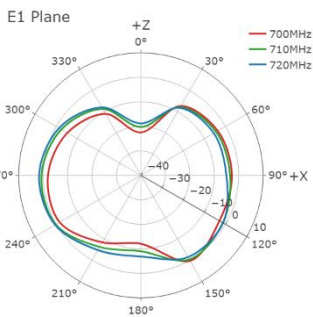
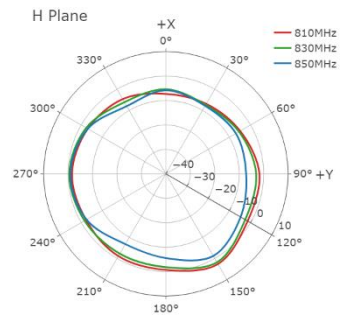
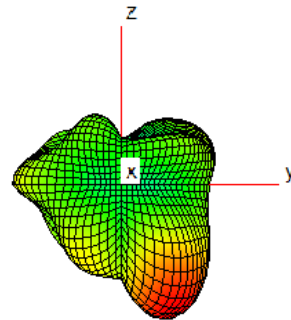


● **LTE**

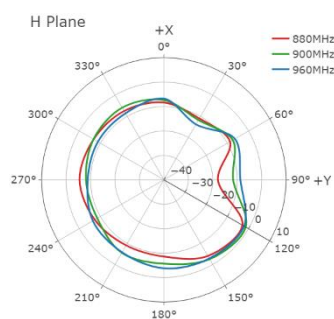
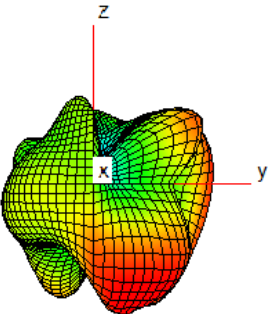
**710 MHz**



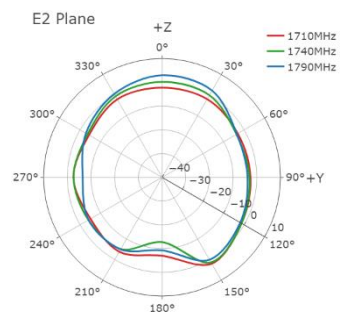
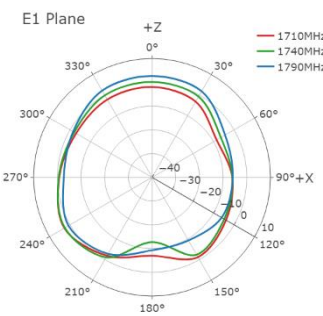
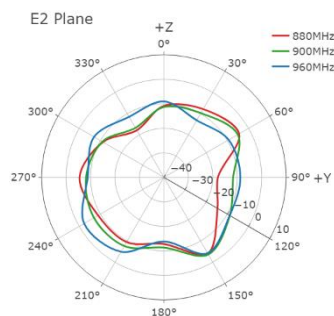
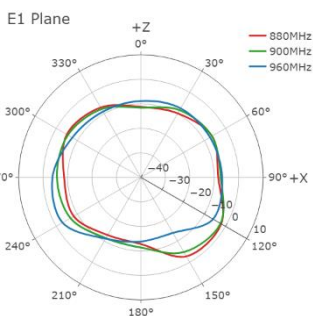
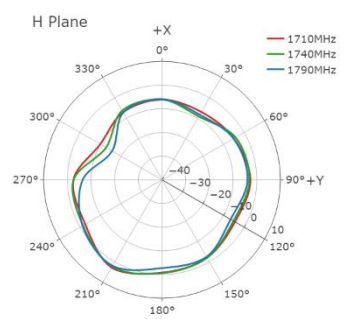
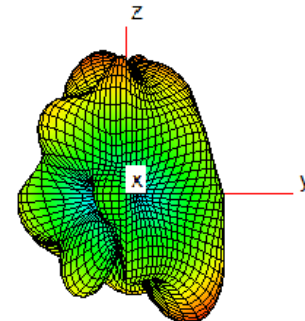
**830 MHz**

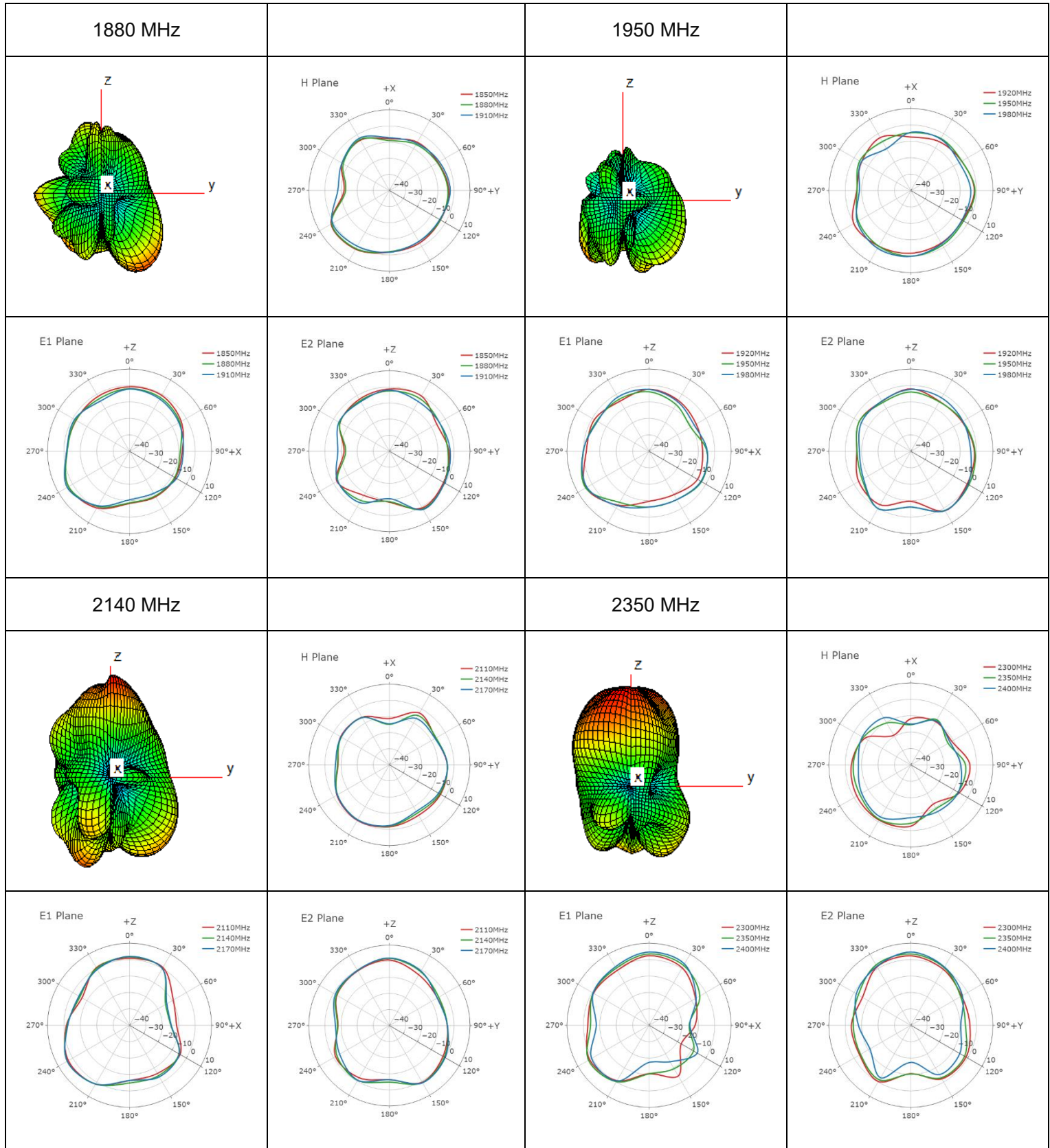


**900 MHz**

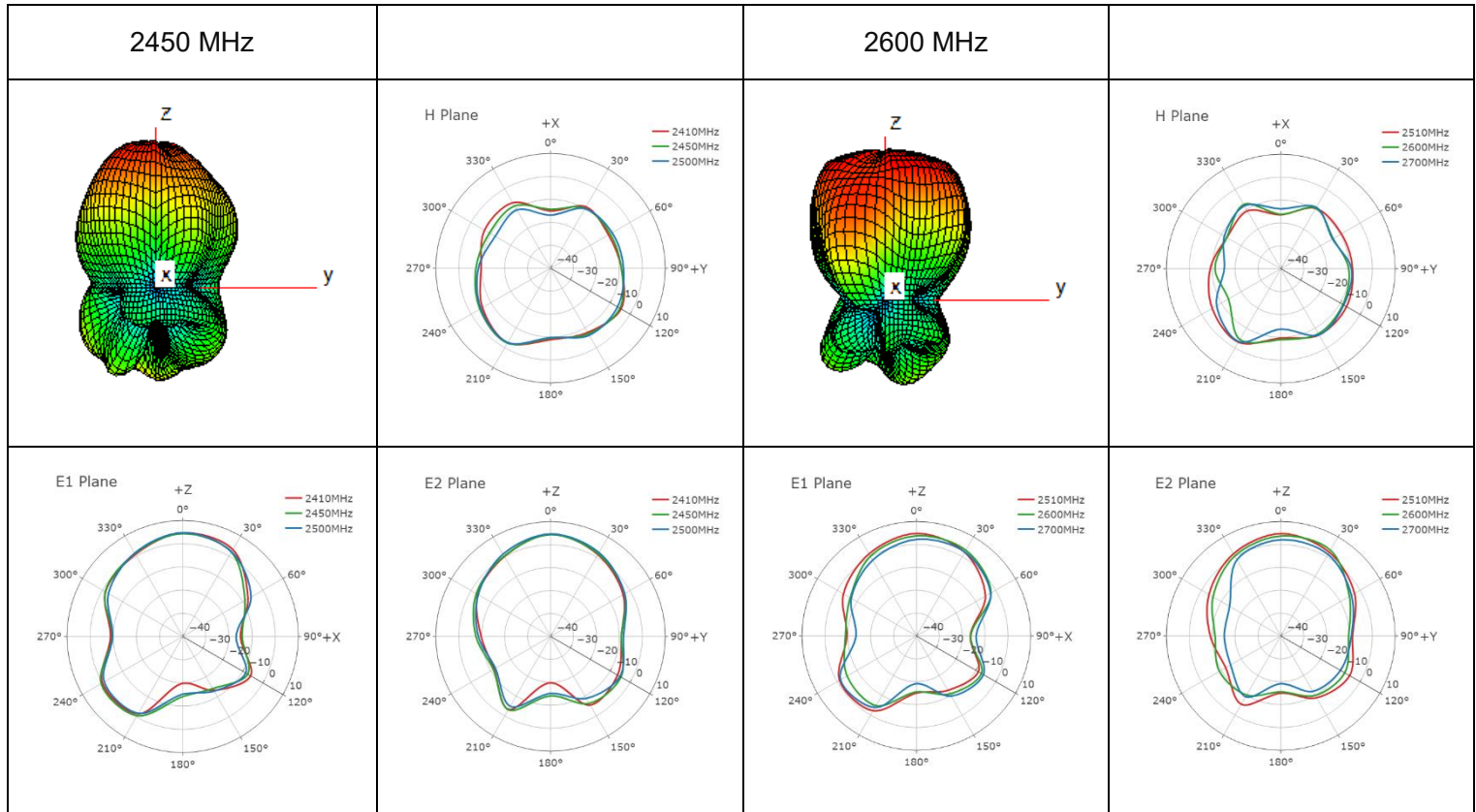


**1740 MHz**

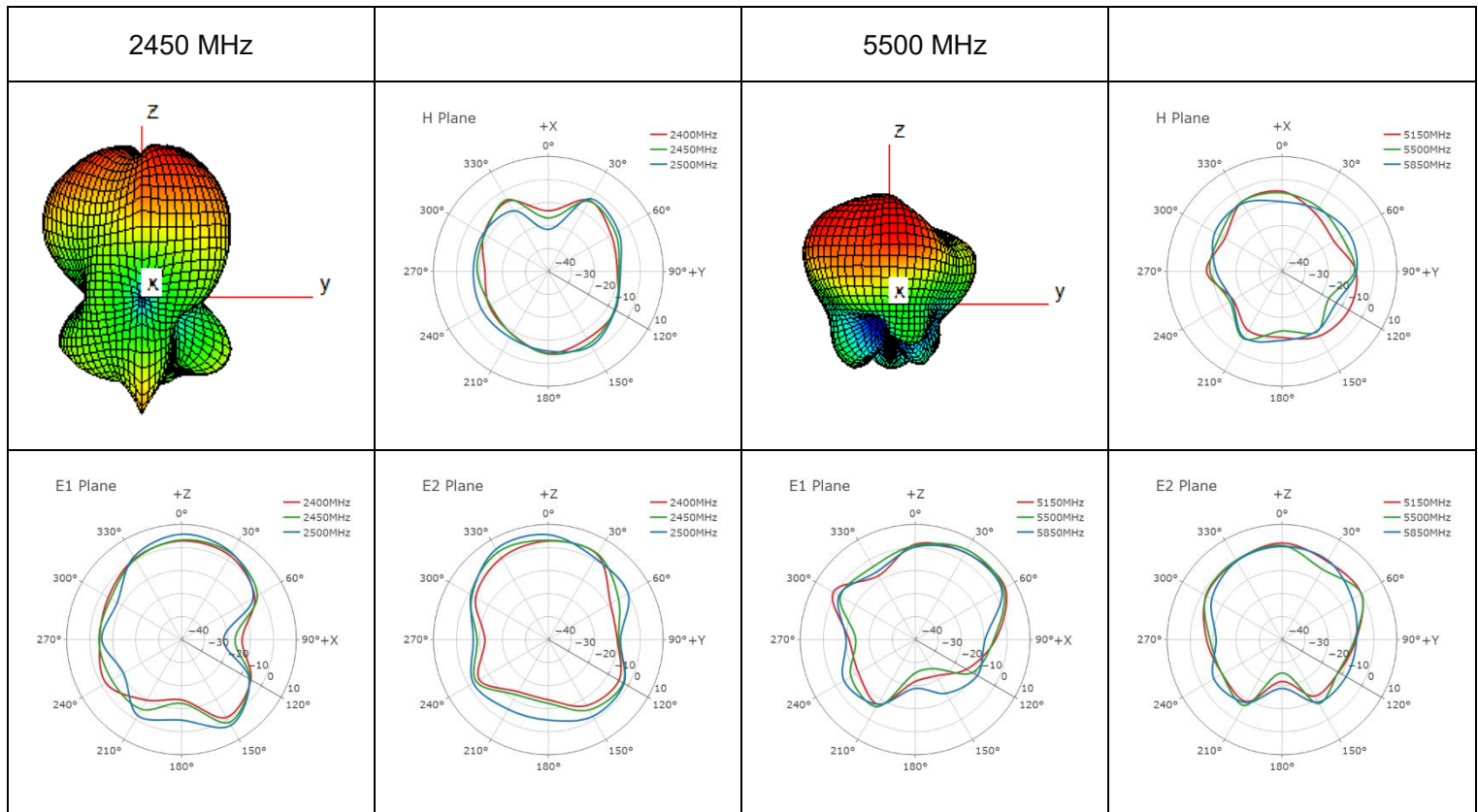


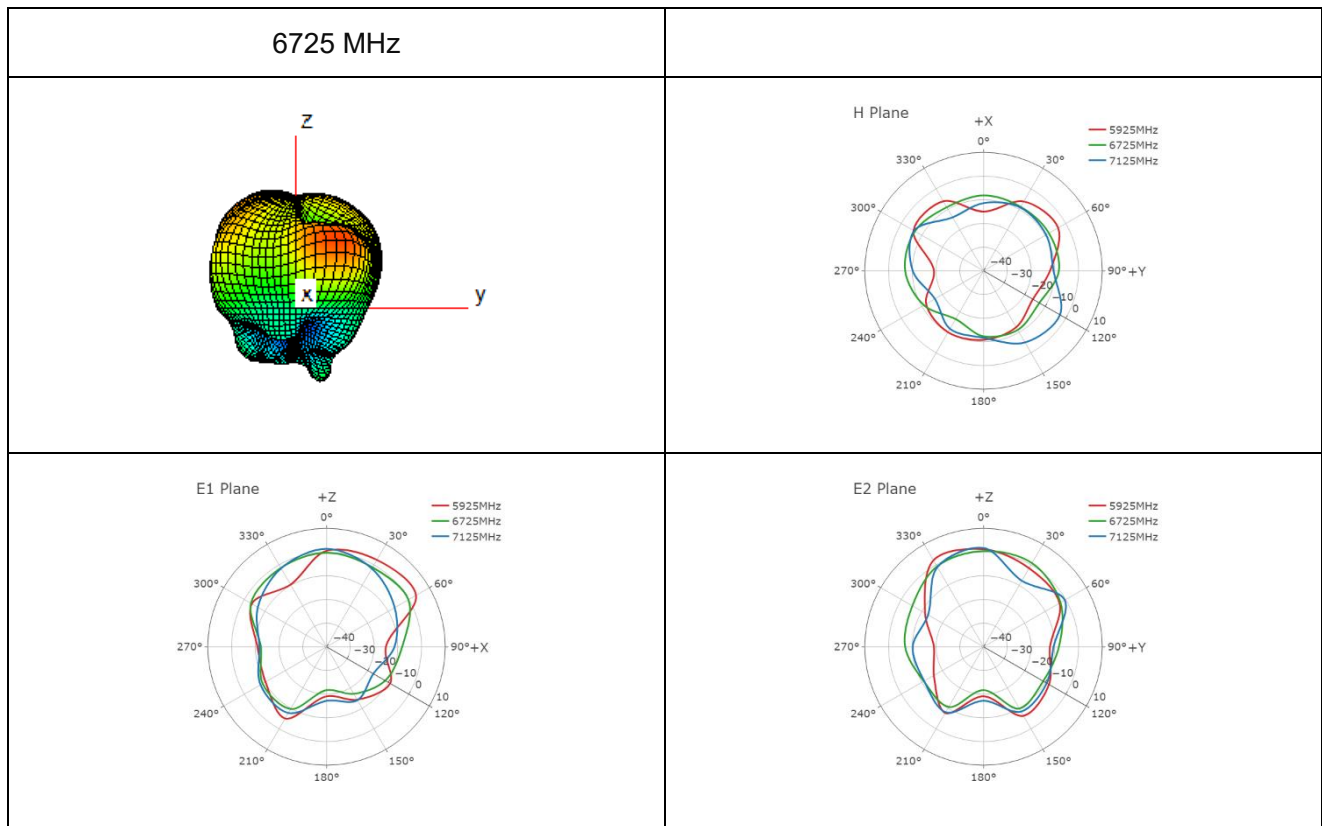






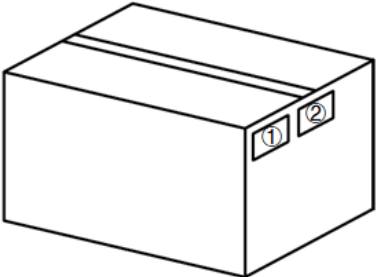
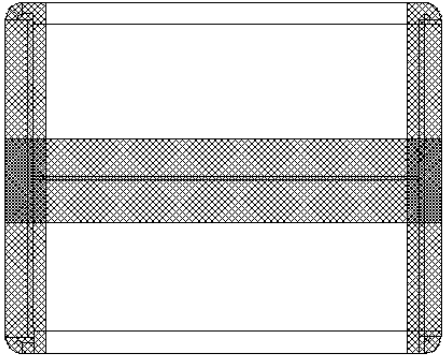
● **Wi-Fi**





## 4 Packaging

| Step | Packaging Picture/2D Picture                                                        | Description                                                                                                                        |
|------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1    |    | 1 pcs antenna product in a PE bag.<br>(1 PC / PE Bag)                                                                              |
| 2    |  | 5 pcs antenna products in an inner box.<br>(5 PCS / Inner Box)                                                                     |
| 3    |  | (6 Inner Boxes / Carton Box)<br>(30 PCS Antennas / Carton Box)<br><br><u>Carton Size:</u><br><u>L × W × H = 600 × 404 × 164 mm</u> |

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

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# Revision History

| Version | Date       | Author                                                                 | Note                                                                                                                      |
|---------|------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| -       | 2024-07-03 | Mordecai LIU/<br>Junsen LI/<br>Rojin LUO/<br>David LIU/<br>Rainey LIAO | Creation of the document                                                                                                  |
| 1.0     | 2024-07-03 | Mordecai LIU/<br>Junsen LI/<br>Rojin LUO/<br>David LIU/<br>Rainey LIAO | First official release                                                                                                    |
| 1.1     | 2024-11-07 | Junsen LI                                                              | <ol style="list-style-type: none"> <li>Updated block diagram (Chapter 1.3).</li> <li>Added 1561 MHz test data.</li> </ol> |





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