



# TAOGLAS®



## Datasheet

### Guardian 5in1 Adhesive and Wall Mount Antenna

**Part No:**  
MA952.A.LBIVW.001

**Description:**

Guardian 5in1 Adhesive and Wall Mount Antenna 4\*LTE GNSS Antenna

**Features:**

Low-Profile Adhesive Mount Panel Antenna

4\* LTE MIMO 600MHz-6GHz

1\* GPS-GLONASS-GALILEO-BeiDou Antenna

Covering Worldwide LTE Bands

Covering 5G NR Sub 6GHz Bands

Covering CAT-M1 & NB-IoT Bands

Includes 3G / 2G Fallback

IP67 Waterproof ASA Enclosure

Dimensions: 146\*134\*20mm

3m Low Loss KSR200-P and RG-174 Cables with SMA(M) connectors

Cables and Connectors Customizable

RoHS & REACH Compliant

|                                   |    |
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# 1. Introduction



The MA952 Guardian is a next generation 5in1 combination antenna. It is the world-first panel antenna designed for IoT Gateway and Router devices with multiple wireless technologies. This antenna delivers powerful MIMO antenna technology for LTE and Sub-6GHz 5G bands covering 600MHz - 6GHz. This antenna is designed for LTE bands worldwide (including 3G & 2G fallback) for access points, terminals, and routers. CAT-M1 and NB-IoT and the recently introduced 600MHz Extended LTE Band 71 are also covered. This wide bandwidth enables designers to cover a wide range of technologies by installing a single antenna installation. The MA952 Guardian also covers GPS/GLONASS/BeiDou/Galileo bands along with 4 LTE MIMO antennas for superb location accuracy. It is a heavy-duty, fully IP67 waterproof external M2M antenna available in both wall and adhesive mount versions.

Typical use cases include:

- IoT Gateways and Routers
- HD Video Streaming
- Transportation

4G wireless applications demand high-speed data uplink and downlink. High efficiency and high gain MIMO antennas are necessary to achieve the required signal to noise ratio and throughput required to solve these challenges. Taoglas also takes care to have high isolation among these antennas to prevent self-interference. Low loss cables used to keep efficiency high over long cable lengths.

The GPS-GLONASS-GALILEO-BEIDOU active antenna has been carefully designed for excellent performance across all L1 GNSS bands, leading to higher location accuracy and stability of tracking in urban environments.

The housing is IP67 waterproof and the adhesive mount version comes with 3M adhesive. The antenna can be mounted internally or externally on a vehicle. The MA952 comes with 3m, low loss KSR200-P coaxial cables for the LTE antennas as standard and 3m, RG-174 on the GNSS connection. Customized cables and connector versions are also available. Contact your regional Taoglas customer support for more information on how to integrate the MA952 or sales support.

## 2. Specifications

| GNSS Frequency Band |                               |                           |                  |                    |                  |               |                  |
|---------------------|-------------------------------|---------------------------|------------------|--------------------|------------------|---------------|------------------|
| GPS/QZSS            | L1<br>1575.42MHz              | L2<br>1227.6MHz           | L5<br>1176.45MHz | L6<br>1278.75MHz   |                  |               |                  |
|                     | ■                             | □                         | □                | □                  |                  |               |                  |
| GLONASS             | L5R<br>1176.45MHz             | L3PT<br>1201.5MHz         | L2PT<br>1246MHz  | L1CR<br>1575.42MHz | L1PT<br>1602MHz  |               |                  |
|                     | □                             | □                         | □                | ■                  | ■                |               |                  |
| Galileo             | E5a<br>1176.45MHz             | E5b<br>1201.5MHz          | E4<br>1215MHz    | E3<br>1256MHz      | E6<br>1278.75MHz | E2<br>1561MHz | E1<br>1575.42MHz |
|                     | □                             | □                         | □                | □                  | □                | ■             | ■                |
| Beidou              | B1<br>1561MHz                 | B2<br>1207.14MHz          | B3<br>1268.52MHz |                    |                  |               |                  |
|                     | ■                             | □                         | □                |                    |                  |               |                  |
| Compass             | E5B(B2)/ E6(B3)<br>1268.56MHz | E2(B1)<br>1561MHz         |                  |                    |                  |               |                  |
|                     | □                             | ■                         |                  |                    |                  |               |                  |
| SBAS                | Omnistar<br>1542.5MHz         | WAAS/EGN OS<br>1575.42MHz |                  |                    |                  |               |                  |
|                     | □                             | ■                         |                  |                    |                  |               |                  |

| GNSS ELECTRICAL                                              |                                             |         |       |
|--------------------------------------------------------------|---------------------------------------------|---------|-------|
| Frequency (MHz)                                              | 1561                                        | 1575.42 | 1602  |
| VSWR (max.)                                                  | 2.0:1                                       | 2.0:1   | 2.0:1 |
| Passive Antenna Efficiency (%)<br>(Without cable loss)       | 63                                          | 48      | 57    |
| Passive Antenna Gain at Zenith (dBi)<br>(Without cable loss) | 3                                           | 1.98    | 3.01  |
| Axial Ratio (dB)                                             | <9.7                                        | <14.2   | <5.9  |
| Polarization                                                 | RHCP                                        |         |       |
| Impedance                                                    | 50Ω                                         |         |       |
| Cable                                                        | RG174, 3 meter standard, fully customizable |         |       |
| Connector                                                    | SMA(M) standard, fully customizable         |         |       |

| LNA and Filter Electrical Properties                      |         |         |         |
|-----------------------------------------------------------|---------|---------|---------|
| Frequency (MHz)                                           | 1561    | 1575.42 | 1602    |
| VSWR (max.)                                               | 2.0:1   | 2.0:1   | 2.0:1   |
| Gain@1.8V (Typ.)                                          | 28 dB   | 28 dB   | 28 dB   |
| Gain@3.0V (Typ.)                                          | 30 dB   | 30 dB   | 30 dB   |
| Gain@5.5V (Typ.)                                          | 33 dB   | 33 dB   | 33 dB   |
| Noise@1.8V (Typ.)                                         | 1.13 dB | 1.13 dB | 1.13 dB |
| Noise@3.0V (Typ.)                                         | 1.13 dB | 1.13 dB | 1.13 dB |
| Noise@5.5V (Typ.)                                         | 1.14 dB | 1.14 dB | 1.14 dB |
| Power consumption@1.8V (Typ.)                             | 7.9 mA  |         |         |
| Power consumption@3.0V (Typ.)                             | 9.0 mA  |         |         |
| Power consumption@5.5V (Typ.)                             | 9.9 mA  |         |         |
| Total Specification (Through Antenna, SAW Filter and LNA) |         |         |         |
| Frequency (MHz)                                           | 1561    | 1575.42 | 1602    |
| Gain@3V (dBi)                                             | 28 ± 3  | 28 ± 3  | 28 ± 3  |
| Output Impedance                                          | 50 Ω    |         |         |

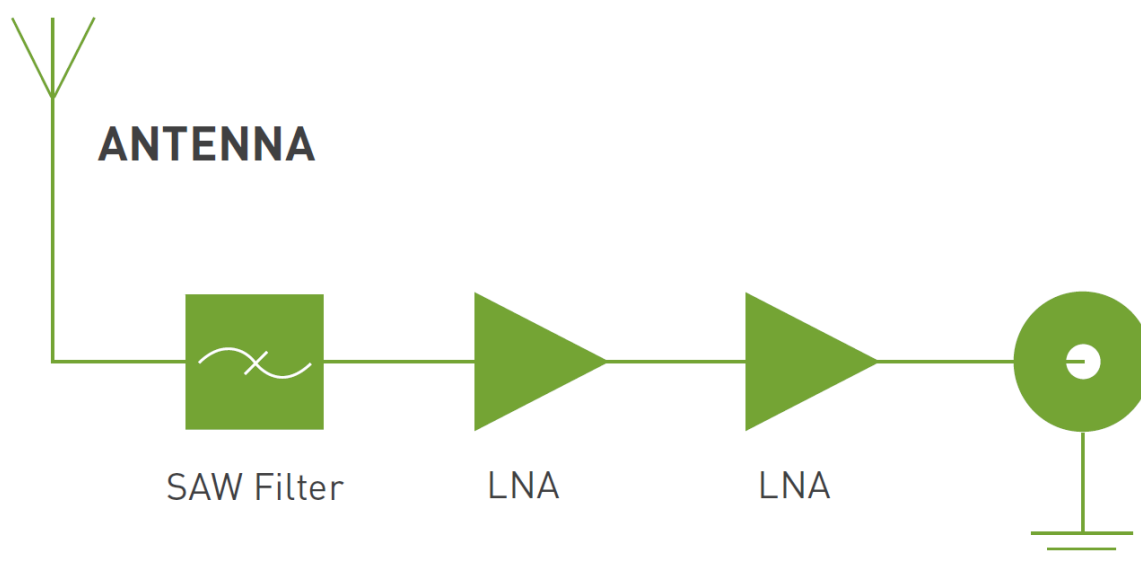
## LTE Antenna

| Frequency (MHz)   |    | 5G NR Band 71 | LTE700  | GSM850/900 | 5G NR Band 74, 75, 76 | DCS       | PCS       | UMTS1     | LTE2600   | 5G NR Band 77, 78, 79 | LTE5200/WiFi5800 |
|-------------------|----|---------------|---------|------------|-----------------------|-----------|-----------|-----------|-----------|-----------------------|------------------|
|                   |    | 617~698       | 698~806 | 824~960    | 1427~1518             | 1710~1880 | 1850~1990 | 1920~2170 | 2490~2690 | 3300~3500             | 5150~5925        |
| Efficiency (%)    |    |               |         |            |                       |           |           |           |           |                       |                  |
| MIMO 1            | 3m | 33.03         | 42.85   | 54.27      | 56.48                 | 62.58     | 57.98     | 55.61     | 57.04     | 43.44                 | 32.23            |
| MIMO 2            | 3m | 39.89         | 55.17   | 56.75      | 45.73                 | 48.59     | 43.62     | 41.21     | 40.46     | 37.88                 | 32.60            |
| MIMO 3            | 3m | 46.38         | 51.55   | 55.06      | 43.81                 | 46.39     | 45.05     | 44.82     | 51.22     | 42.86                 | 34.02            |
| MIMO 4            | 3m | 32.78         | 34.87   | 35.74      | 49.14                 | 61.44     | 58.48     | 54.84     | 53.27     | 42.94                 | 28.30            |
| Average Gain (dB) |    |               |         |            |                       |           |           |           |           |                       |                  |
| MIMO 1            | 3m | -4.81         | -3.68   | -2.65      | -2.48                 | -2.04     | -2.37     | -2.55     | -2.44     | -3.62                 | -4.92            |
| MIMO 2            | 3m | -3.99         | -2.58   | -2.46      | -3.40                 | -3.13     | -3.60     | -3.85     | -3.93     | -4.22                 | -4.87            |
| MIMO 3            | 3m | -3.34         | -2.88   | -2.59      | -3.58                 | -3.34     | -3.46     | -3.49     | -2.91     | -3.68                 | -4.68            |
| MIMO 4            | 3m | -4.84         | -4.58   | -4.47      | -3.09                 | -2.12     | -2.33     | -2.61     | -2.74     | -3.67                 | -5.48            |
| Peak Gain (dBi)   |    |               |         |            |                       |           |           |           |           |                       |                  |
| MIMO 1            | 3m | 1.42          | 1.28    | 3.56       | 3.24                  | 3.55      | 3.21      | 3.21      | 3.11      | 3.06                  | 3.84             |
| MIMO 2            | 3m | 1.59          | 2.76    | 3.38       | 3.42                  | 3.06      | 3.06      | 4.08      | 4.76      | 2.07                  | 1.92             |
| MIMO 3            | 3m | 1.93          | 2.26    | 2.86       | 3.12                  | 4.71      | 4.71      | 4.32      | 3.89      | 2.88                  | 2.39             |
| MIMO 4            | 3m | 1.08          | 0.76    | 3.02       | 3.62                  | 3.11      | 3.11      | 2.92      | 2.77      | 2.97                  | 2.46             |
| Impedance         |    | 50Ω           |         |            |                       |           |           |           |           |                       |                  |
| Polarization      |    | Linear        |         |            |                       |           |           |           |           |                       |                  |
| Radiation Pattern |    | Omni          |         |            |                       |           |           |           |           |                       |                  |
| Max. input power  |    | 2W            |         |            |                       |           |           |           |           |                       |                  |

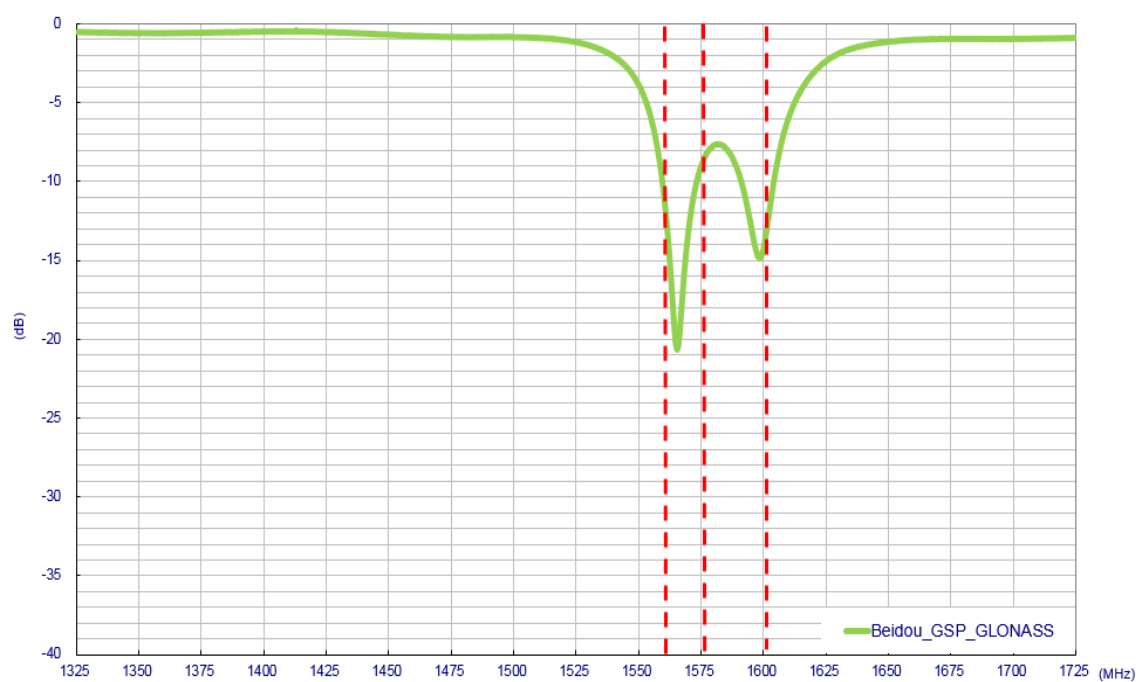
| Mechanical        |                                                      |
|-------------------|------------------------------------------------------|
| Height            | 20 ±2 mm                                             |
| Planner Dimension | 146*134 mm                                           |
| Casing            | ASA                                                  |
| Cable             | KSR200-P, 3000 mm for LTE<br>RG-174, 3000mm for GNSS |
| Connector         | SMA(M)                                               |
| Weight            | 450g                                                 |
| Environmental     |                                                      |
| Protection        | IP67                                                 |
| Temperature Range | -40°C to 85°C                                        |
| Humidity          | Non-condensing 65°C 95% RH                           |

## 3. Active Antenna Characteristics

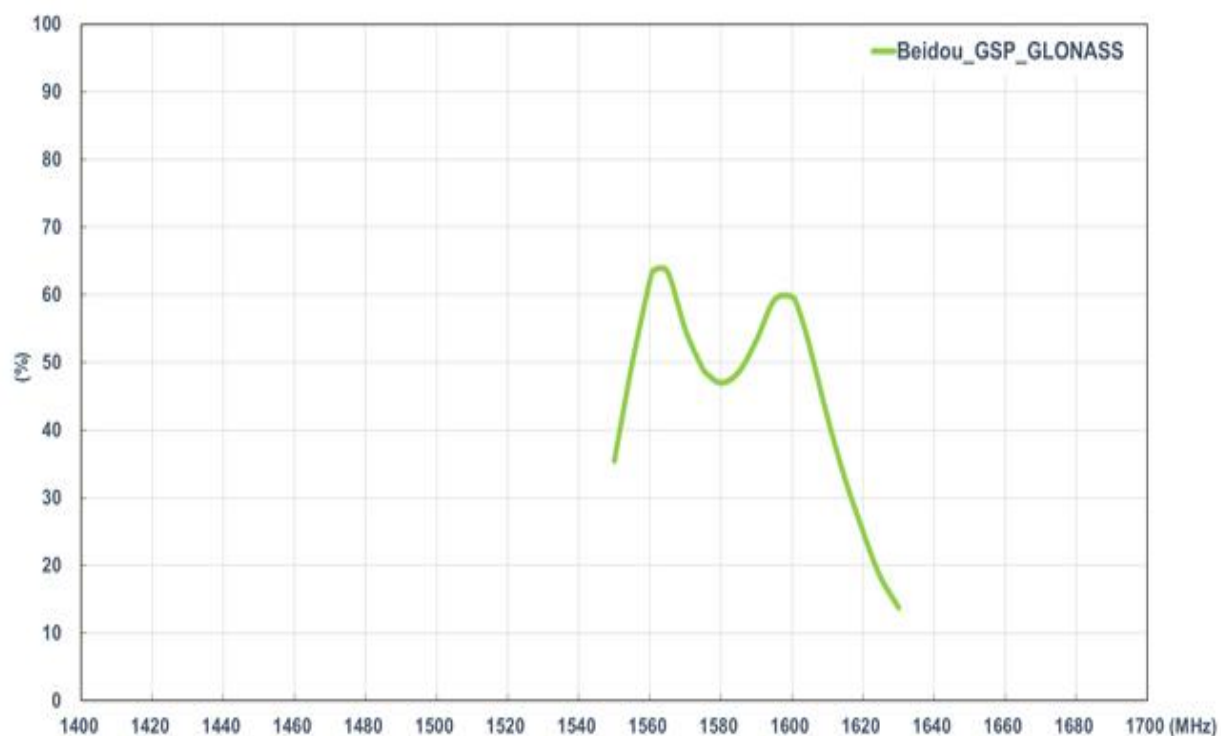
### 3.1 Block Diagram (Active antenna)



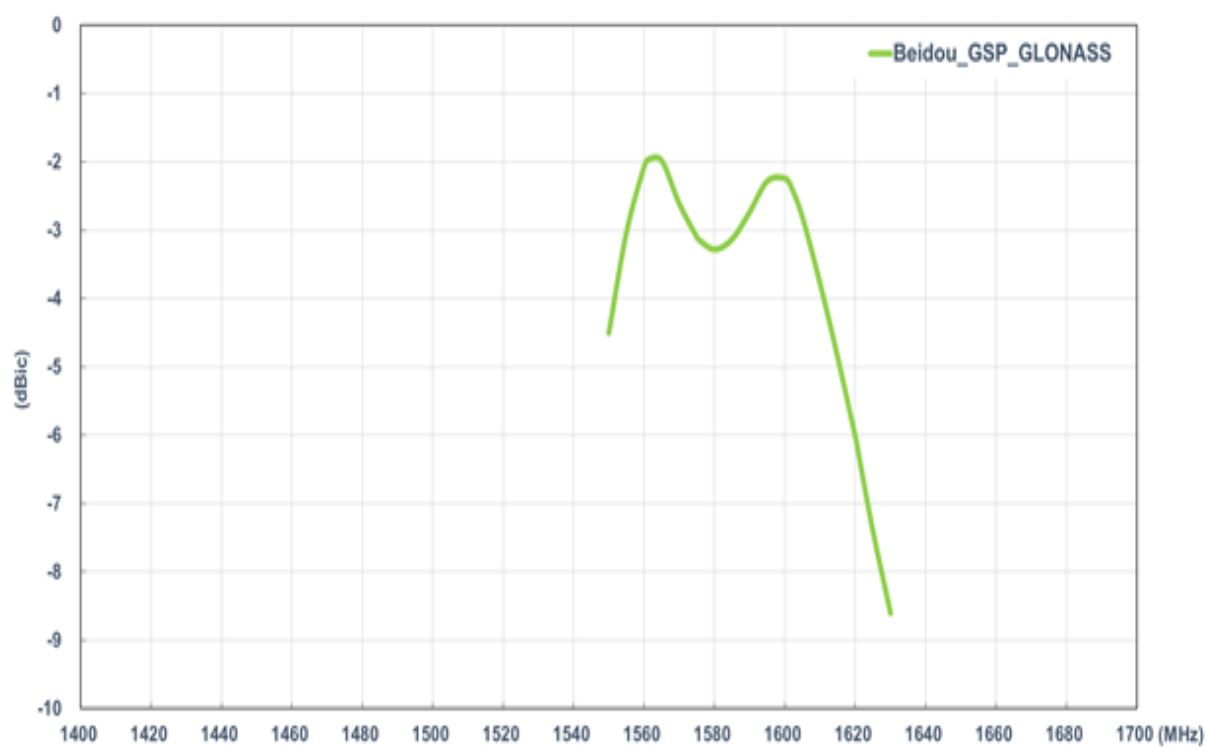
### 3.2 Passive Antenna Return Loss



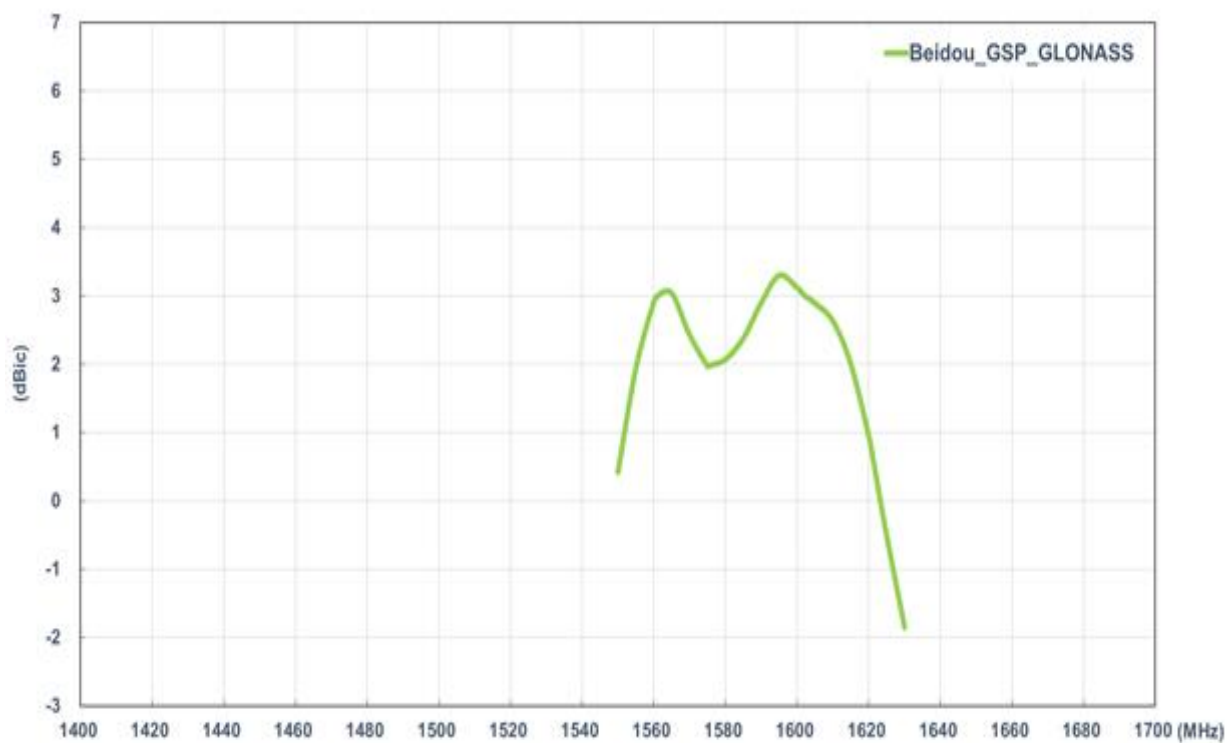
### 3.3 Passive Antenna Efficiency



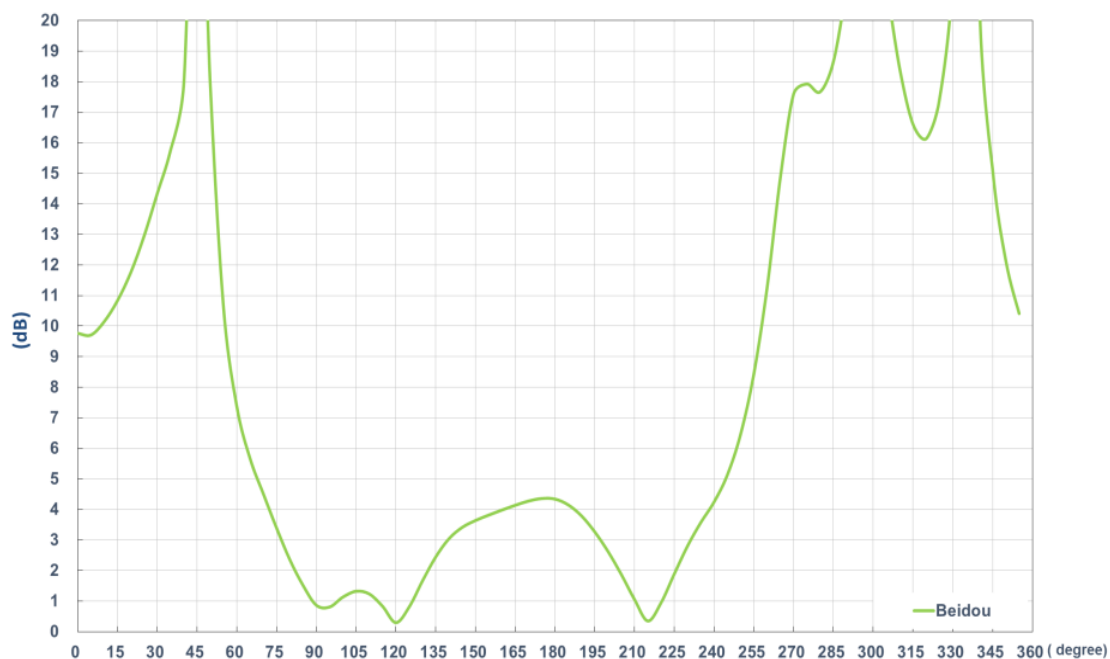
### 3.4 Passive Antenna Average Gain



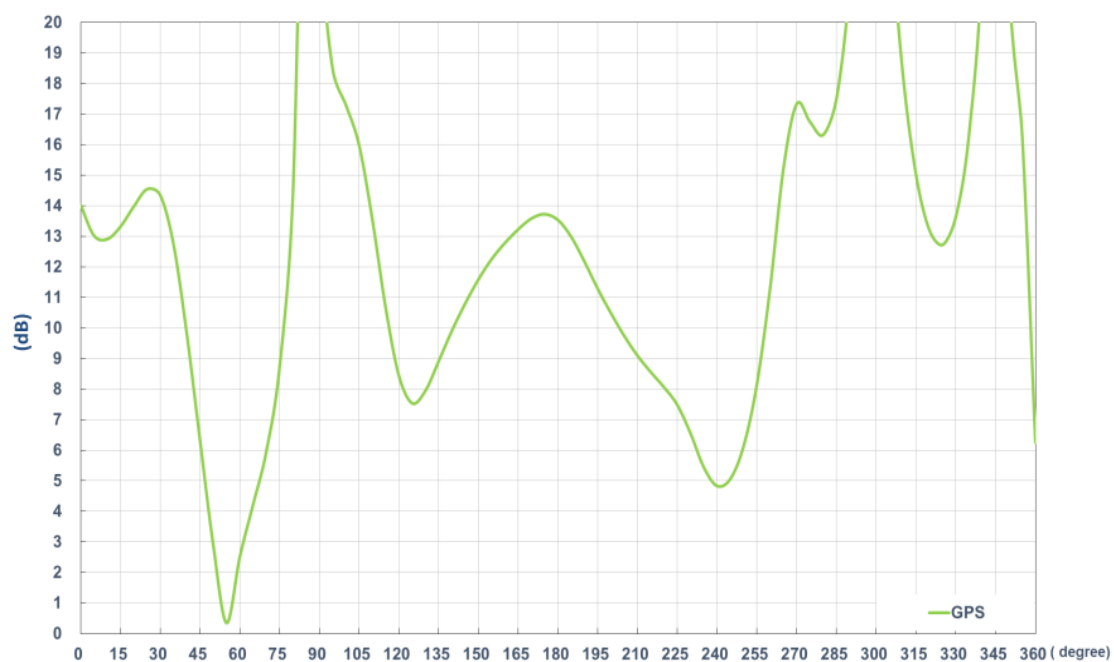
### 3.5 Passive Antenna Peak Gain



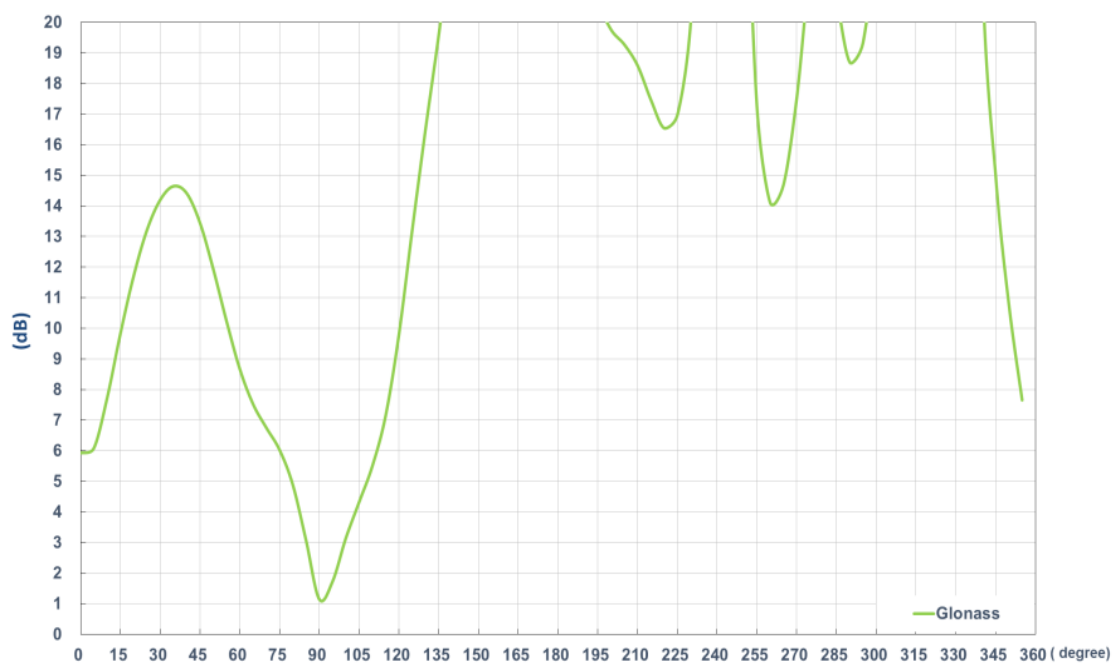
### 3.6 Passive Antenna Axial Ratio (Zenith is at 0°)



1561MHz



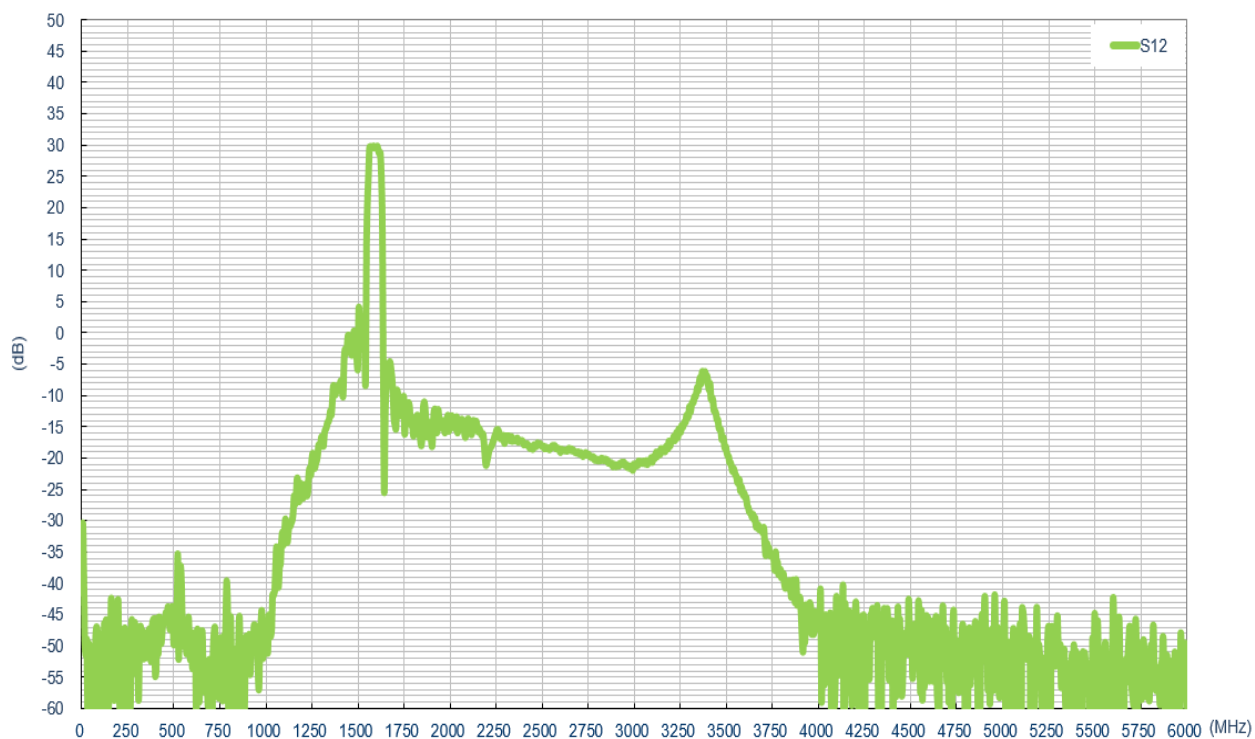
1575.42MHz



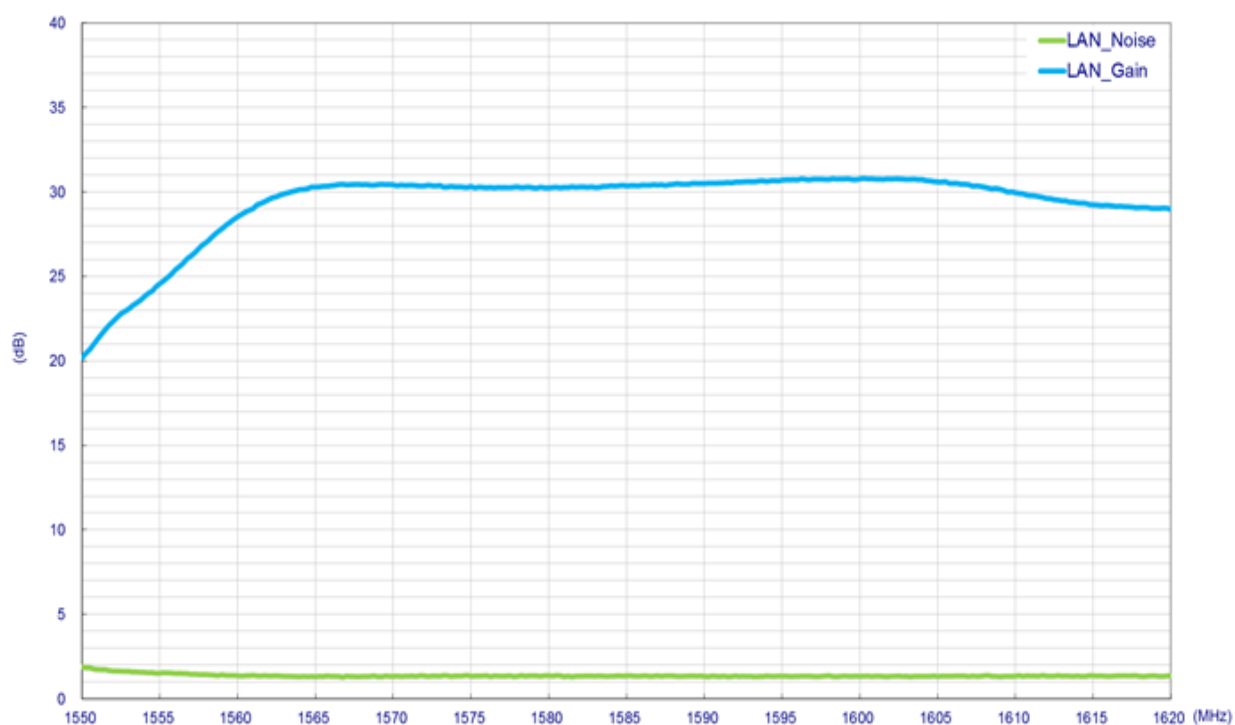
1602MHz

### 3.7 Active measurements

#### LNA Gain @ 3.0V

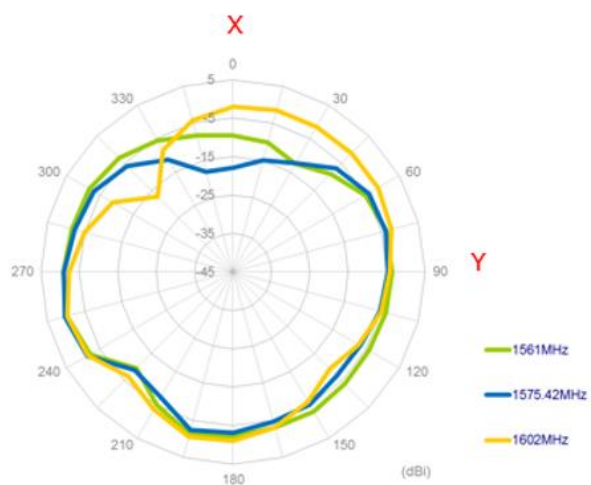


#### Noise Figure @ 3.0V

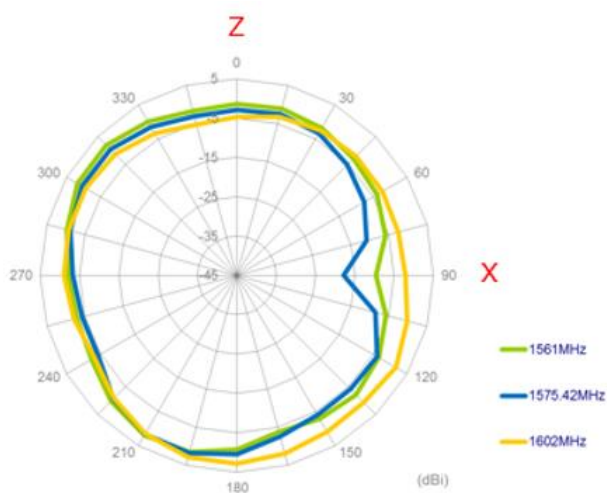


### 3.8 Passive Antenna 2D Radiation Patterns

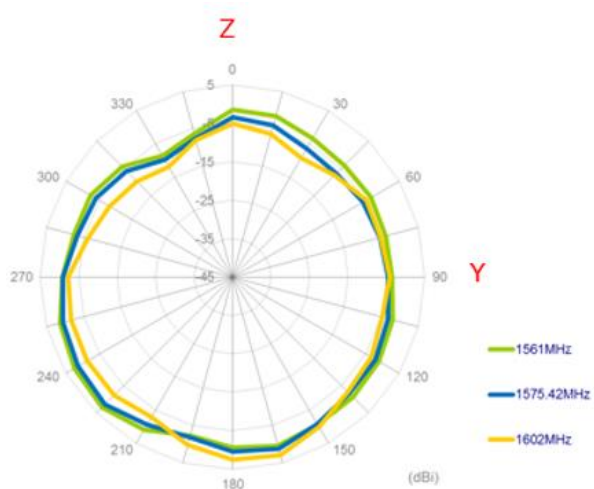
XY Plane



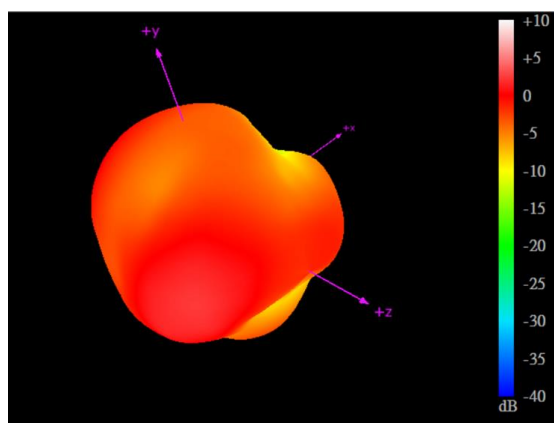
XY Plane



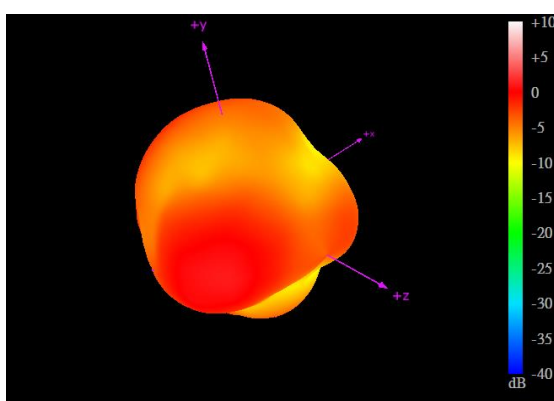
XY Plane



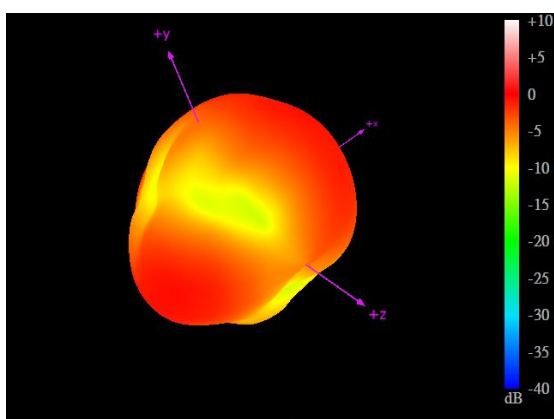
### 3.9 Passive Antenna 3D Radiation patterns



1561MHz



1575.42MHz



1602MHz

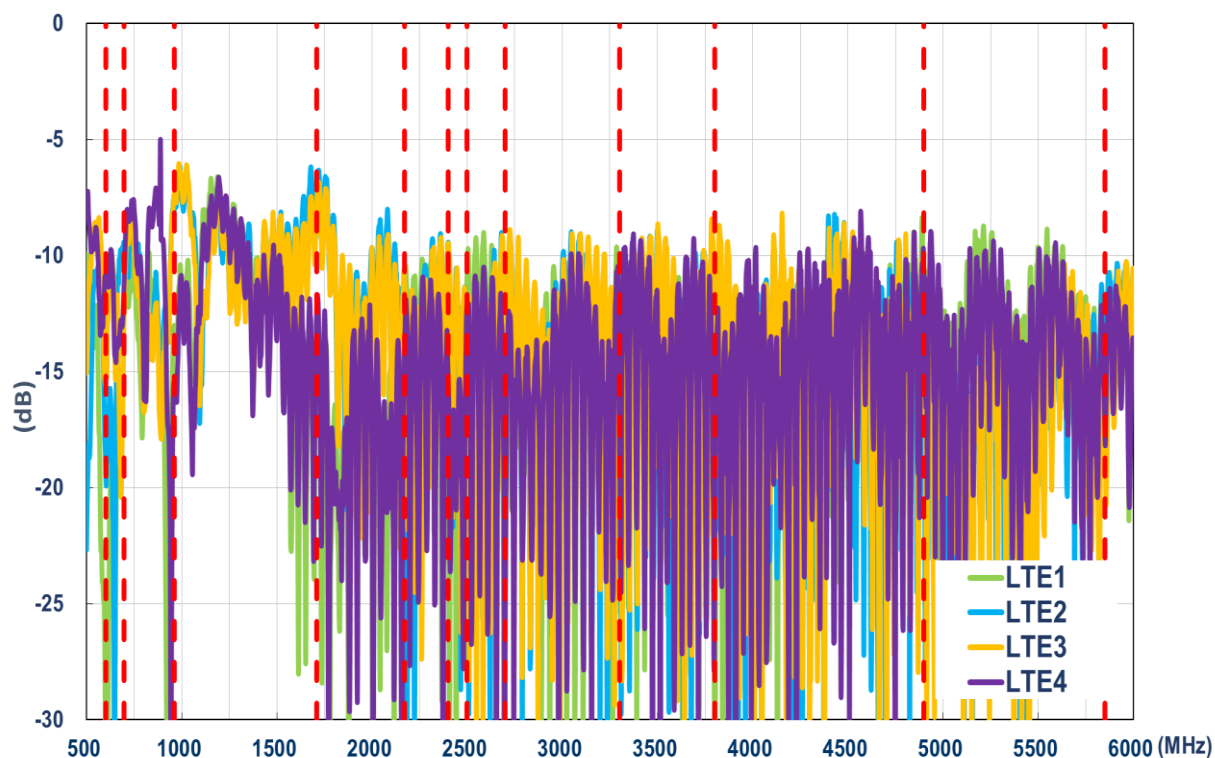
## 4. Antenna Characteristics

### 4.1 Test Setup

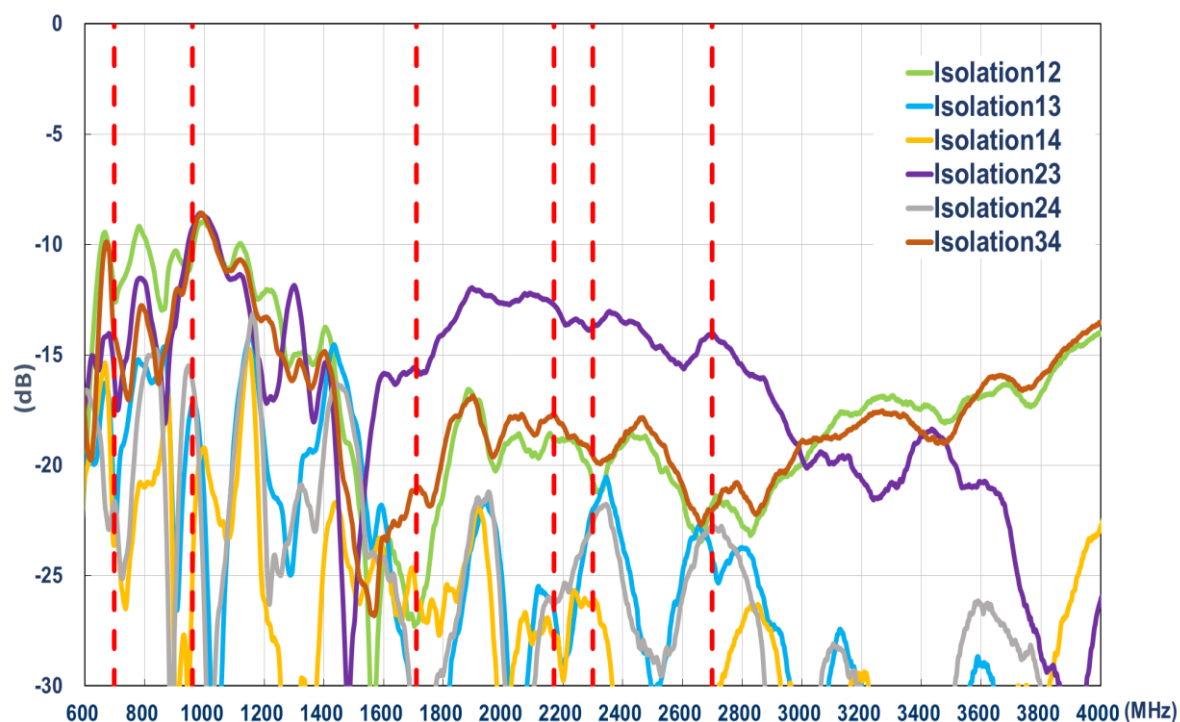


Free space

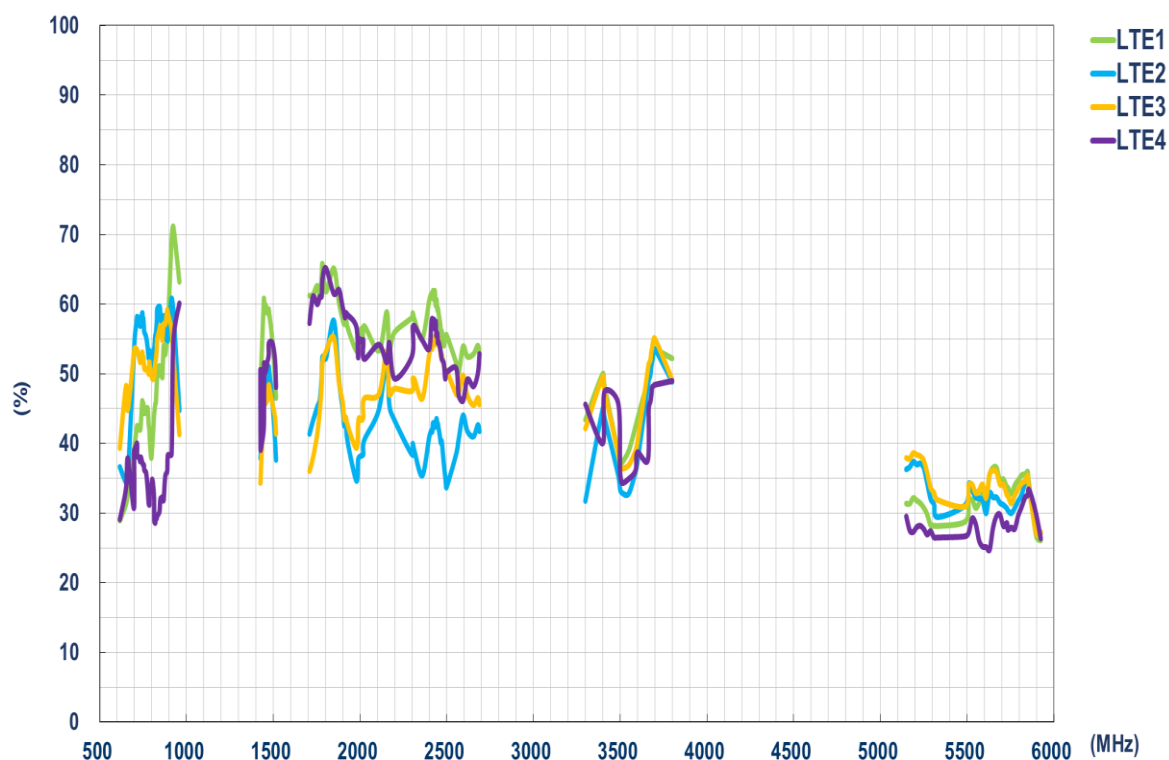
## 4.2 Return Loss



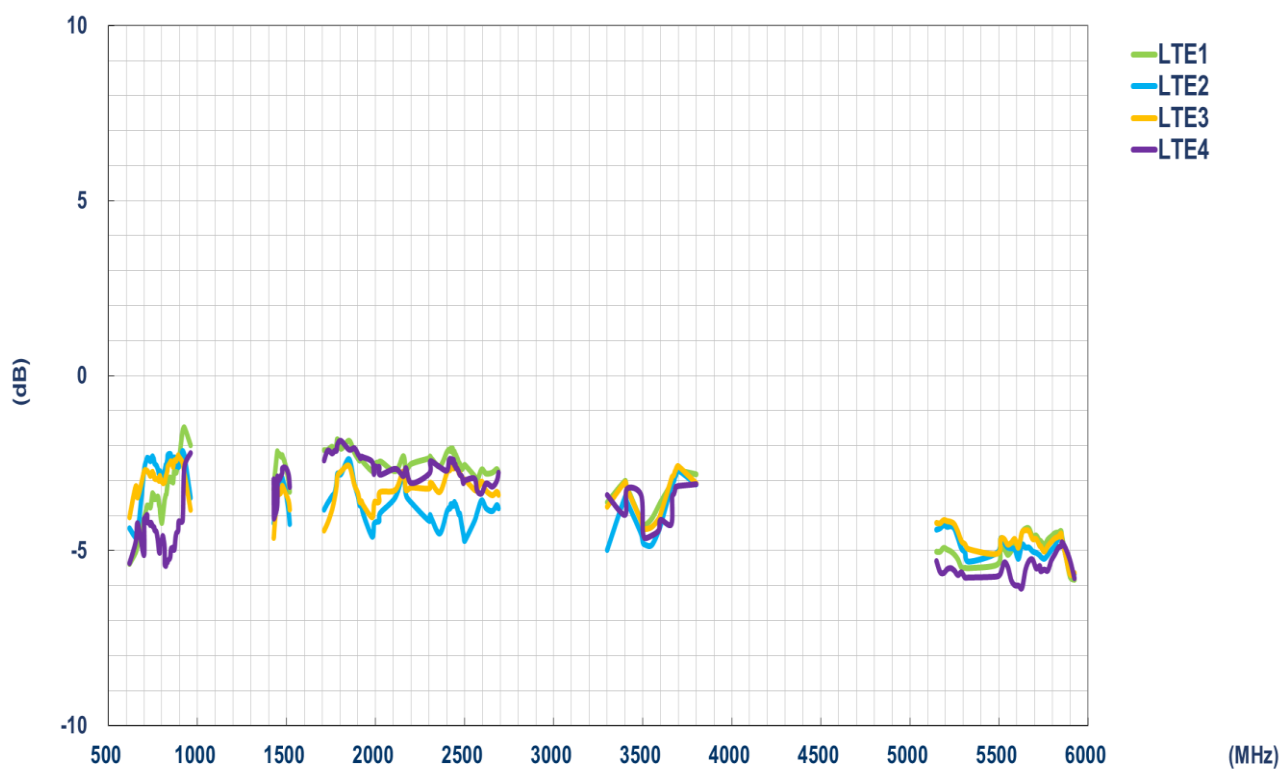
## 4.3 Isolation



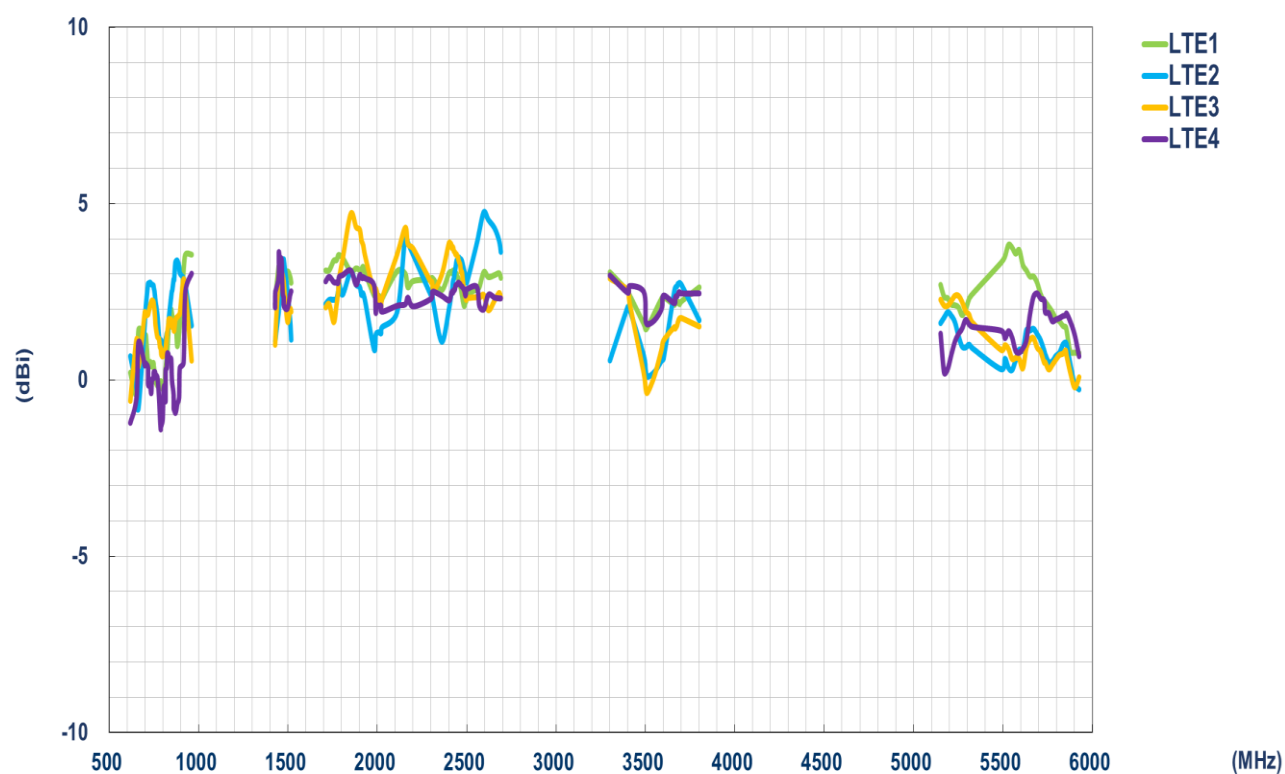
## 4.4 Efficiency



## 4.5 Average gain



## 4.6 Peak gain



## 5. Radiation Patterns

### 5.1 Test Setup

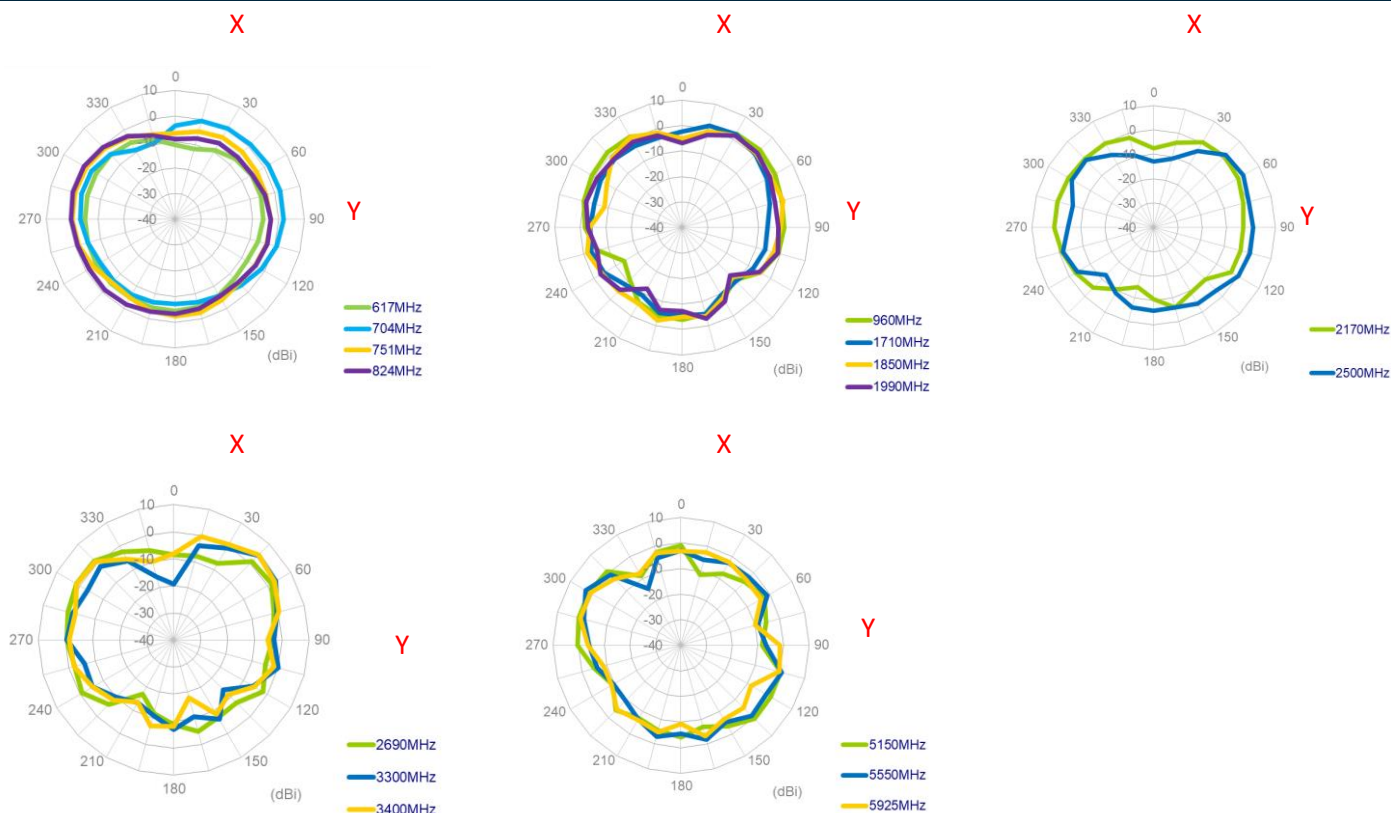


Free space

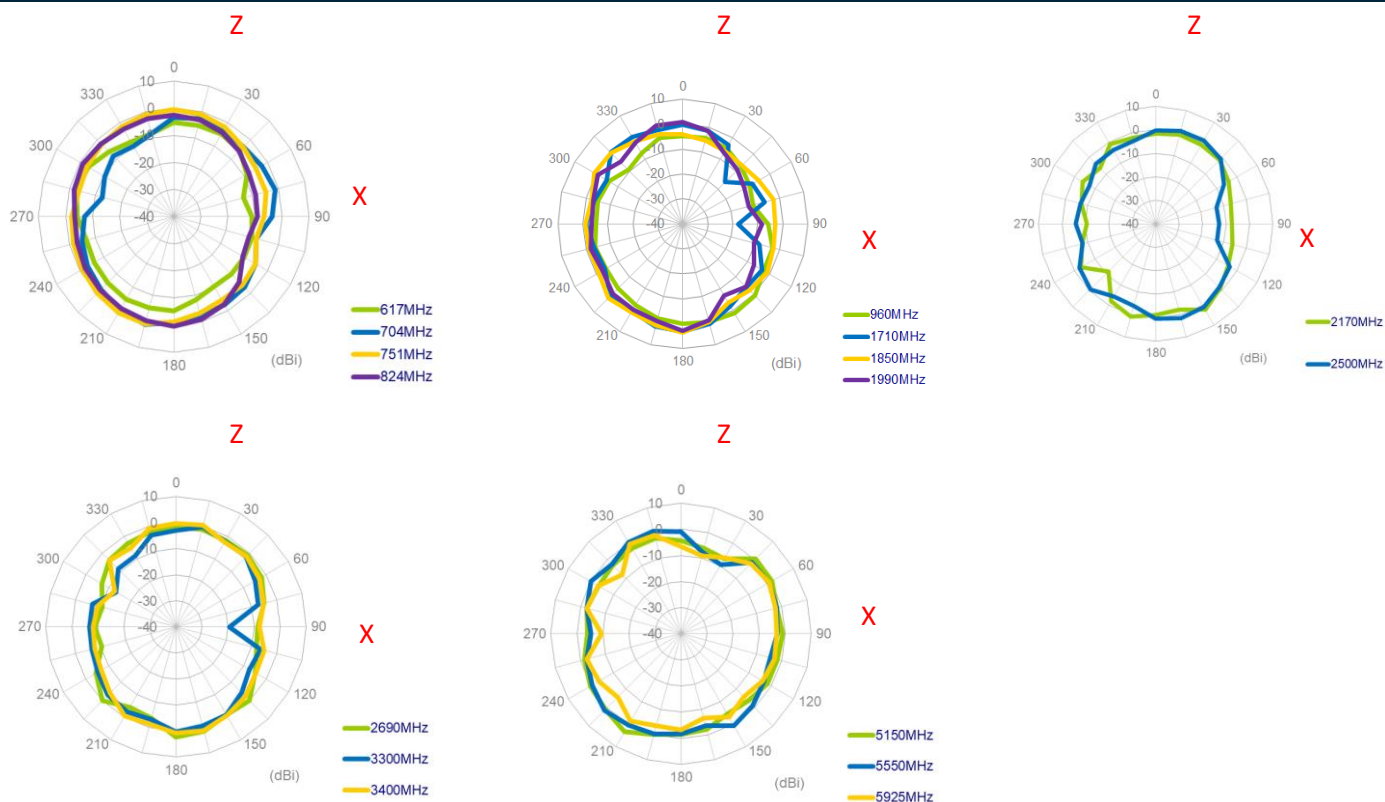
## 5.2 2D Radiation Patterns

### 5.2.1 LTE MIMO1

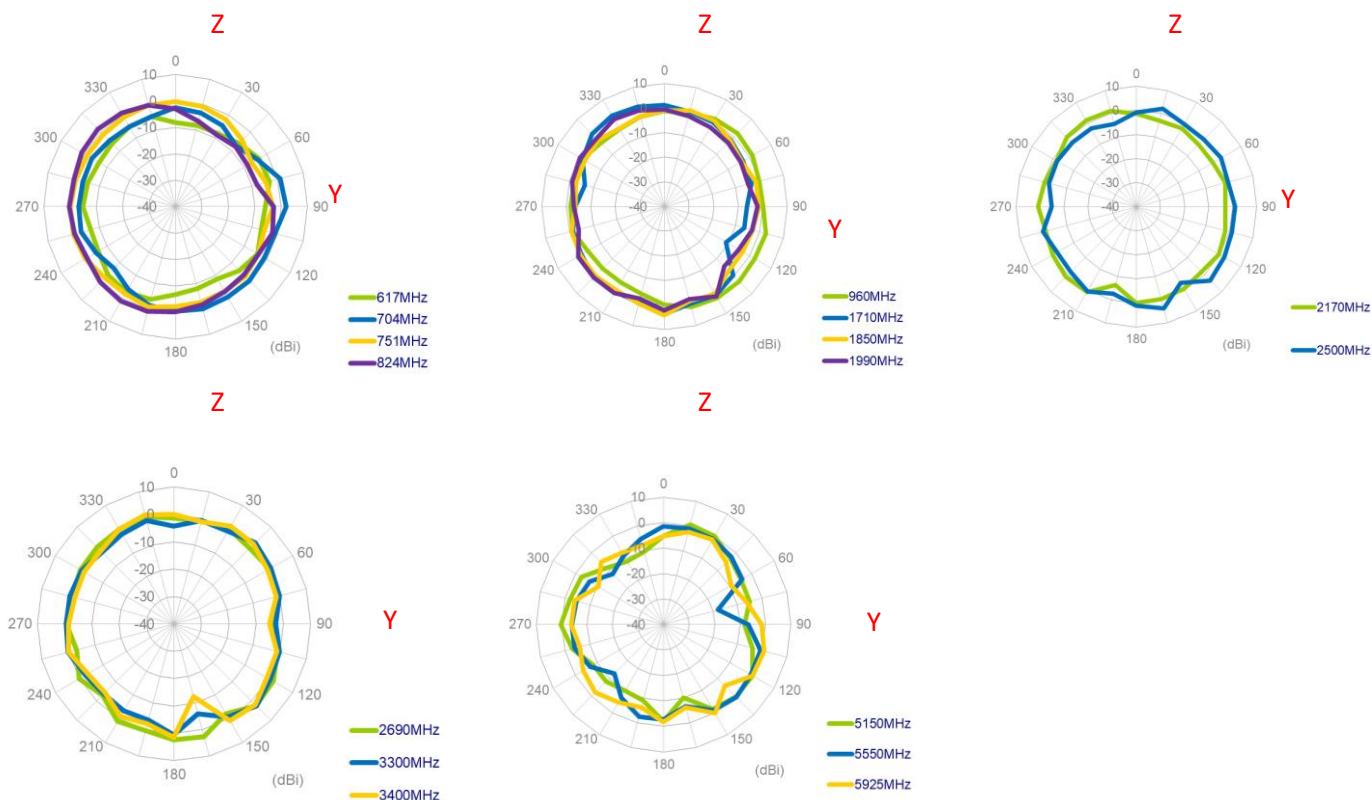
#### XY Plane



#### XZ Plane

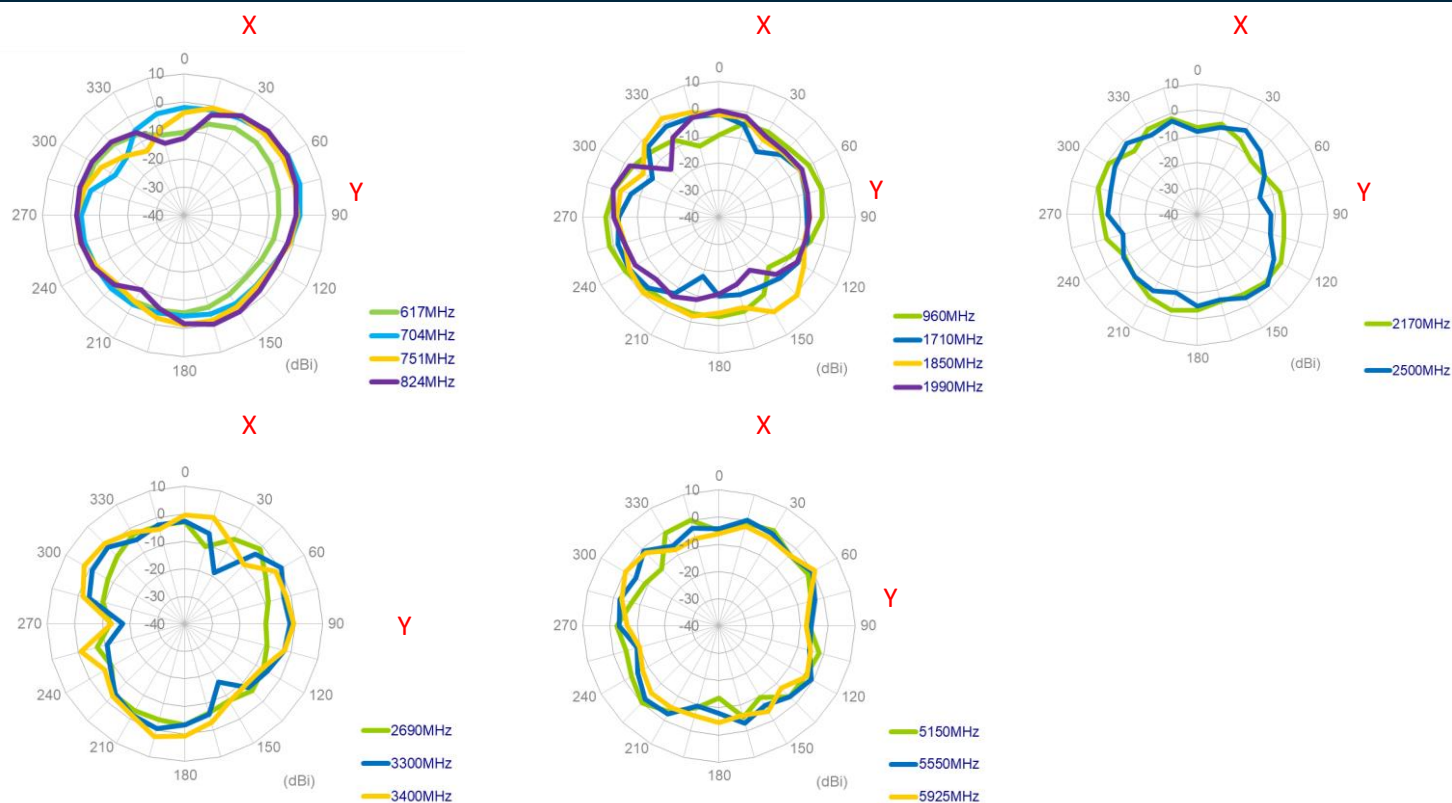


## YZ Plane

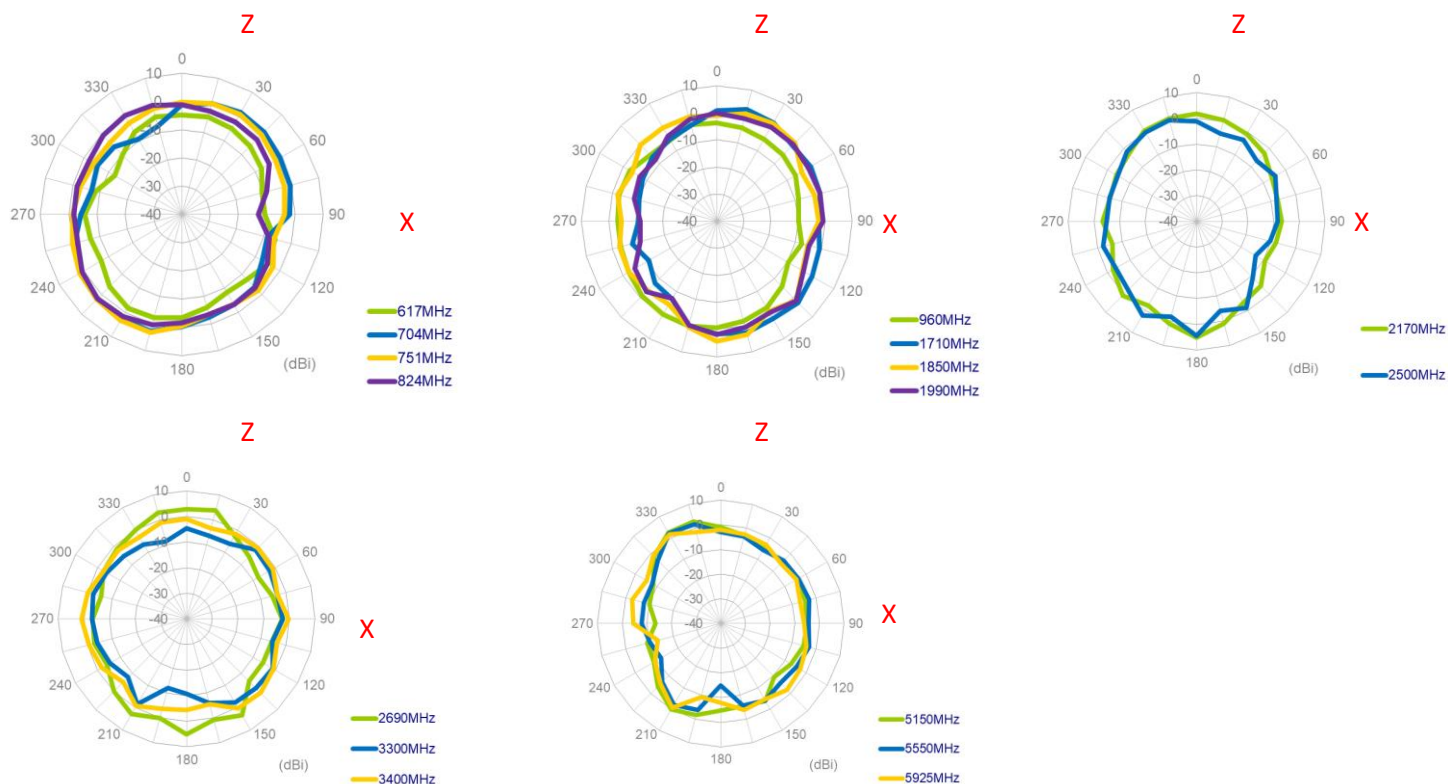


## 5.2.1 LTE MIMO2

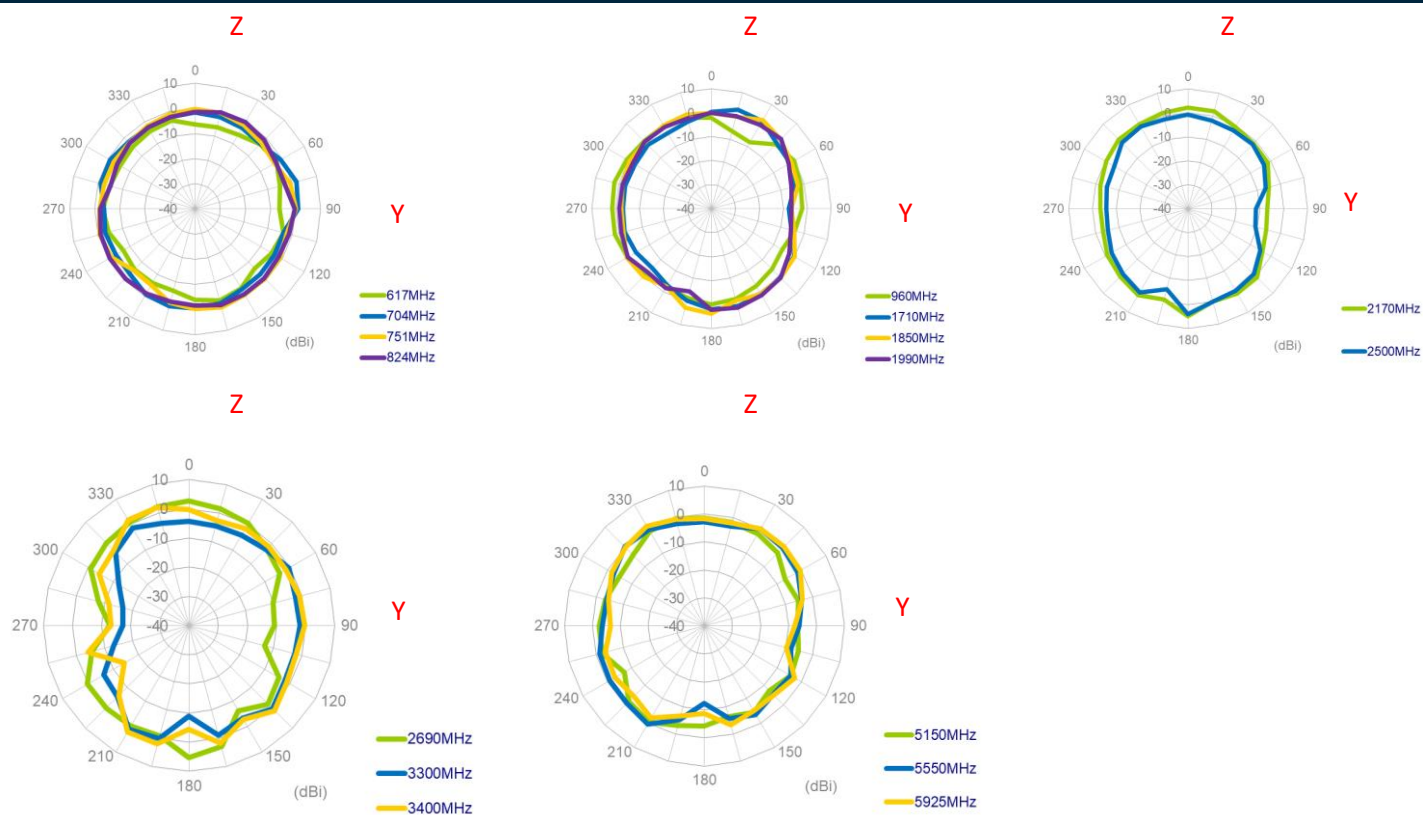
### XY Plane



## XZ Plane

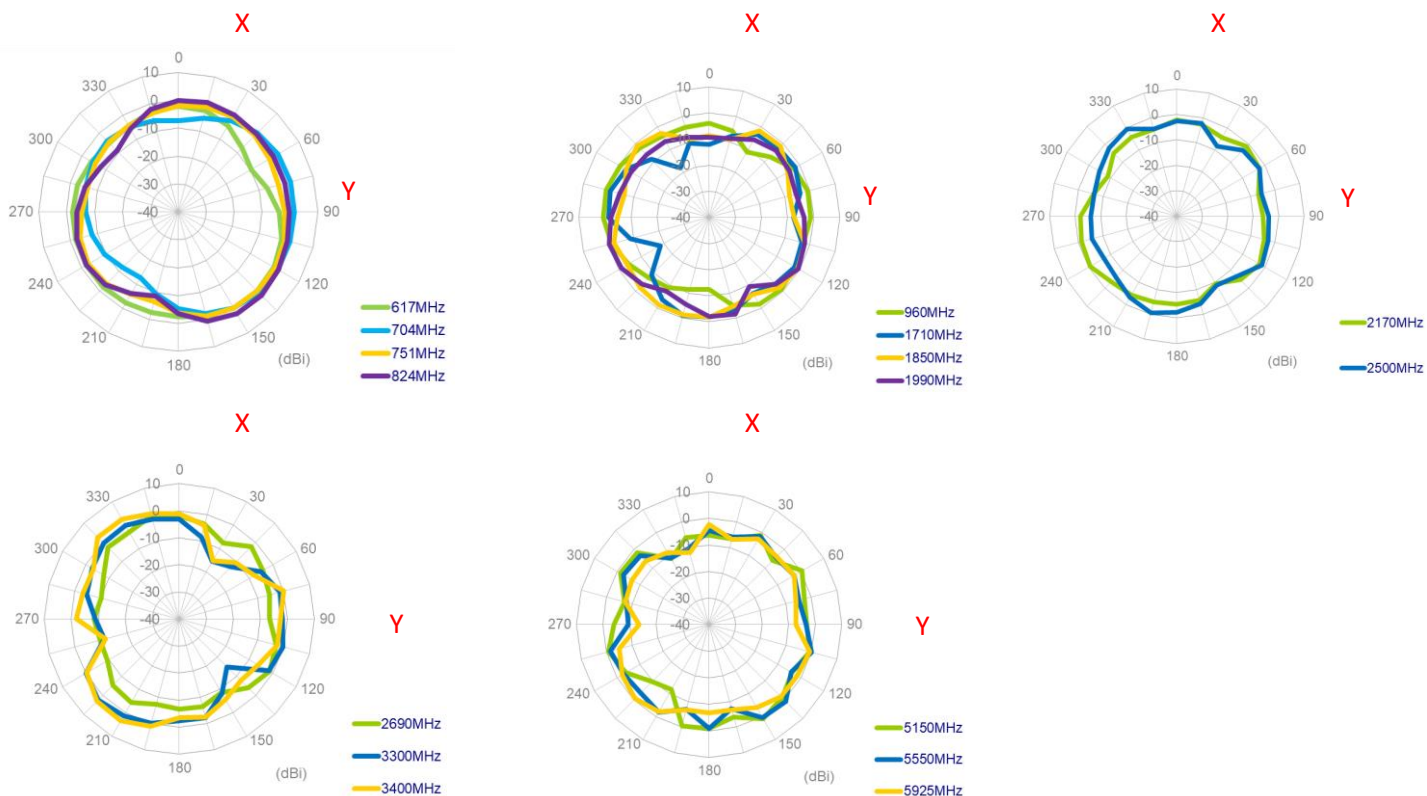


## YZ Plane

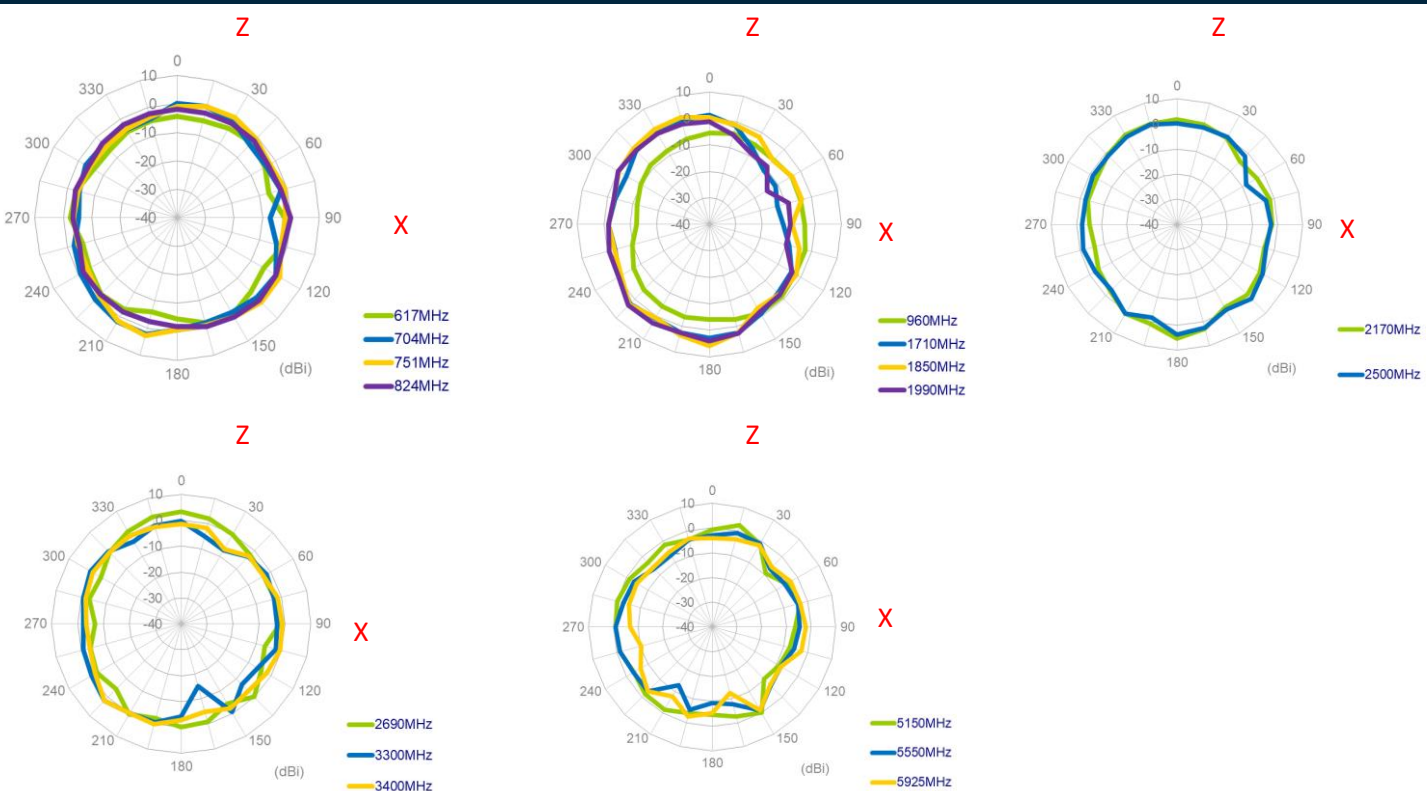


## 5.2.3 LTE MIMO3

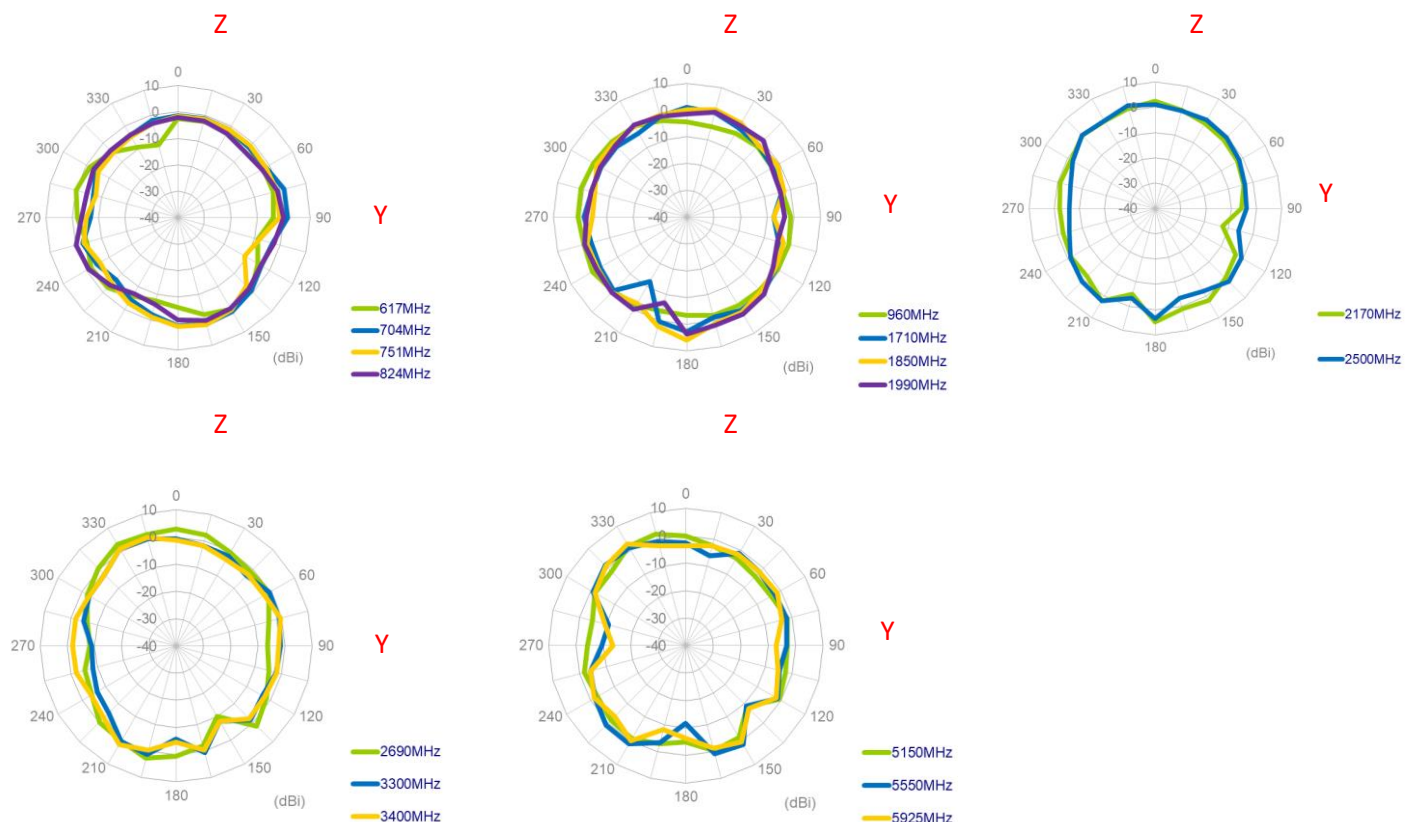
### XY Plane



### XZ Plane

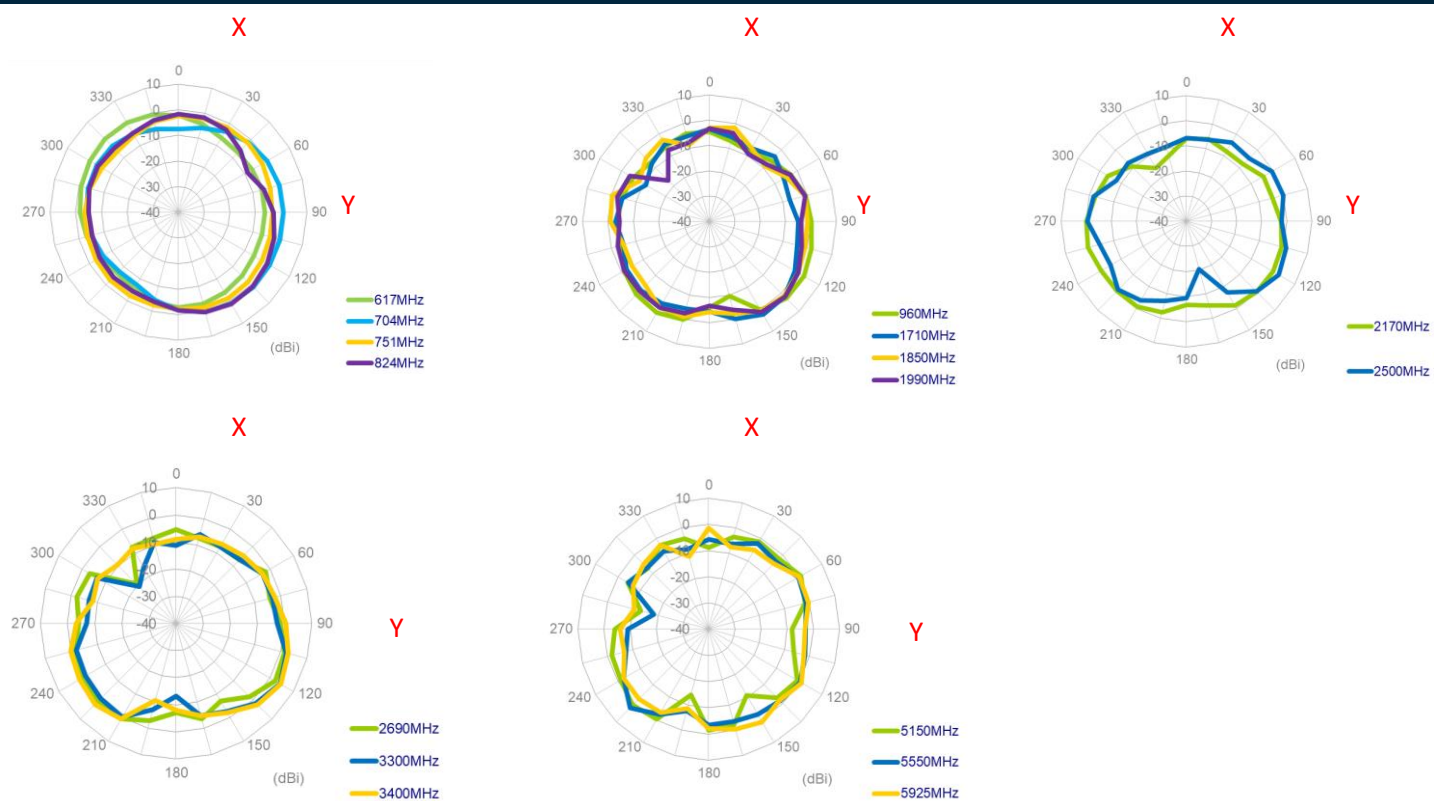


## YZ Plane

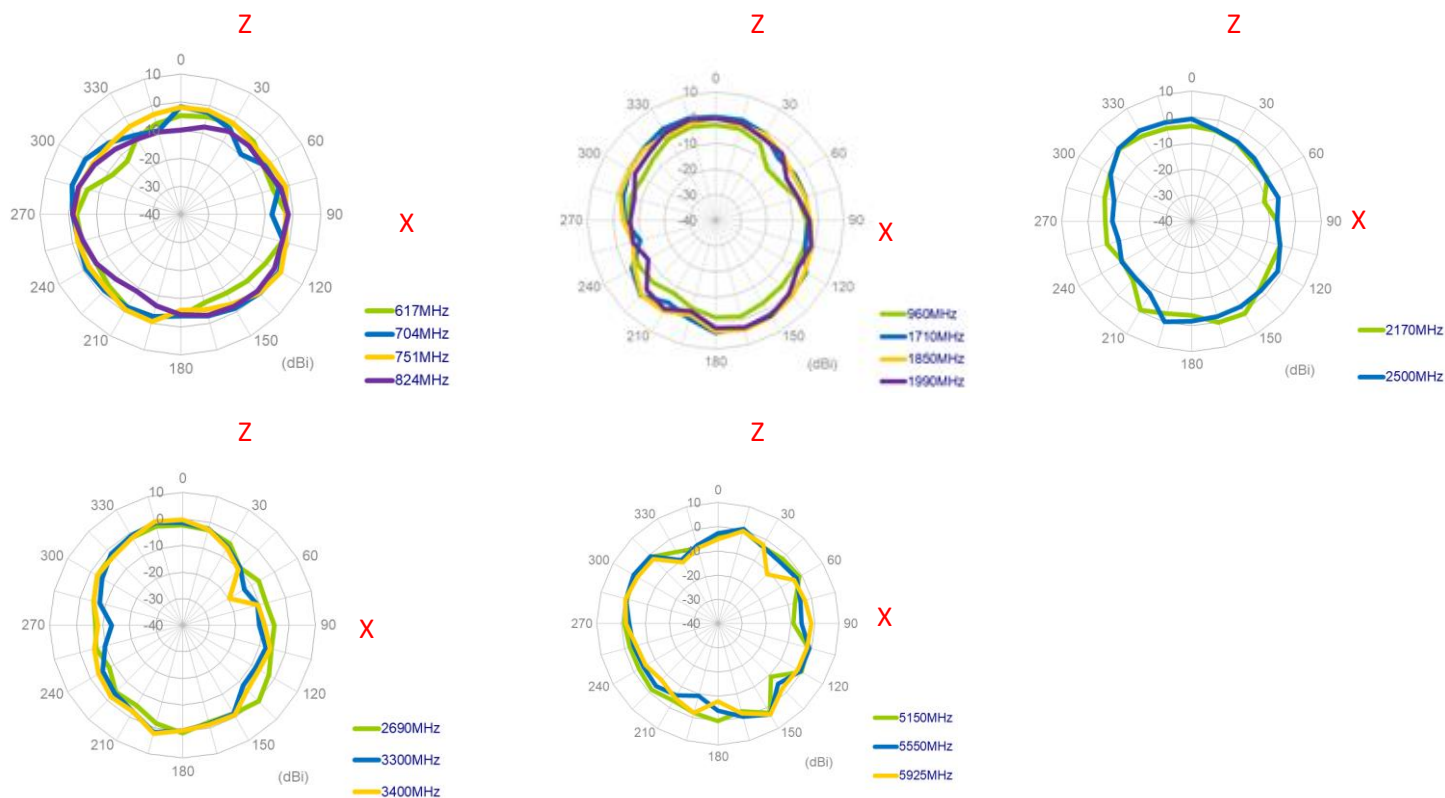


## 5.2.4 LTE MIMO4

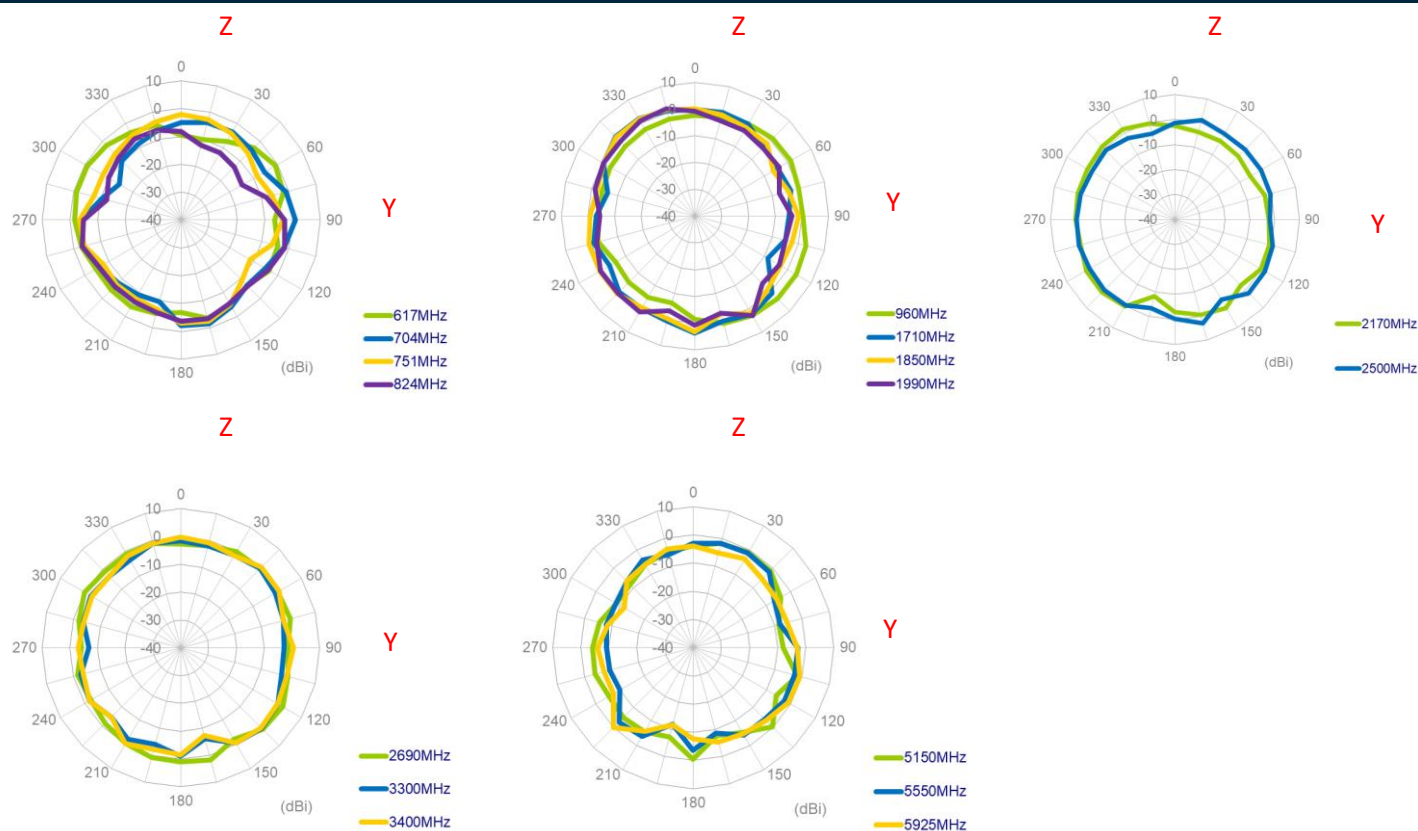
### XY Plane



## XZ Plane

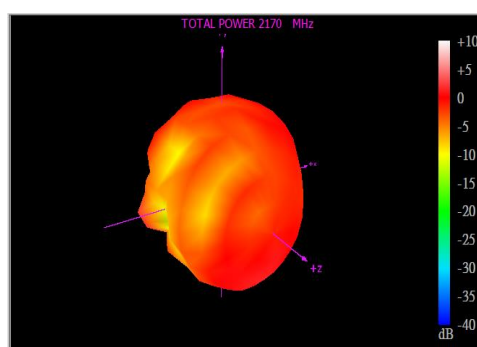
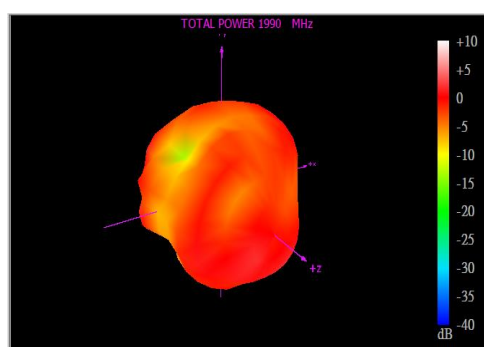
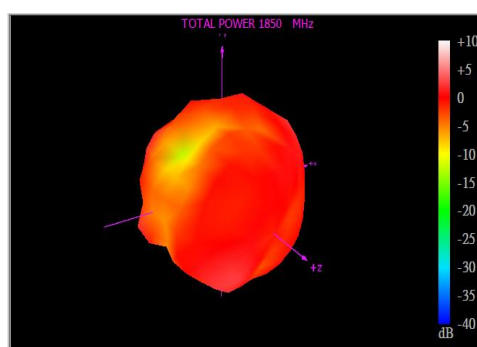
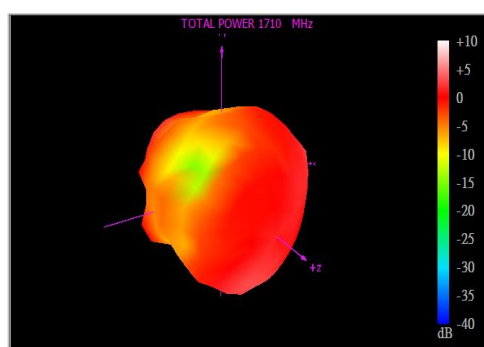
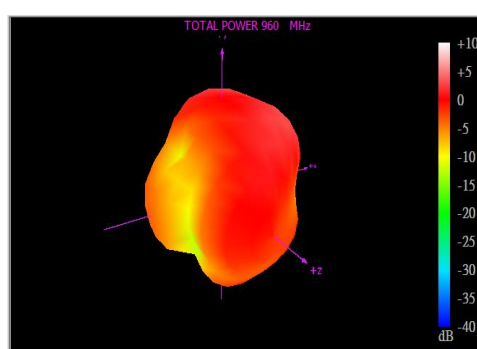
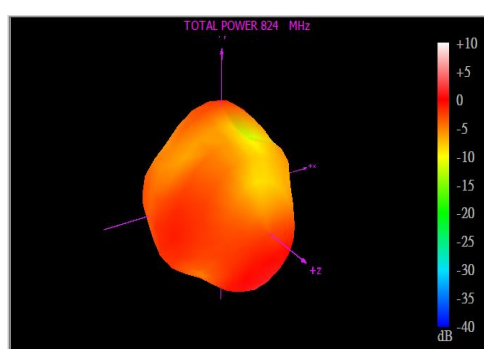
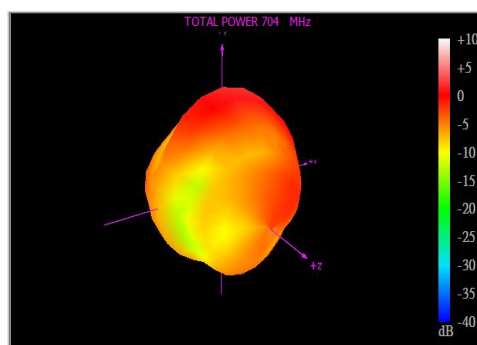
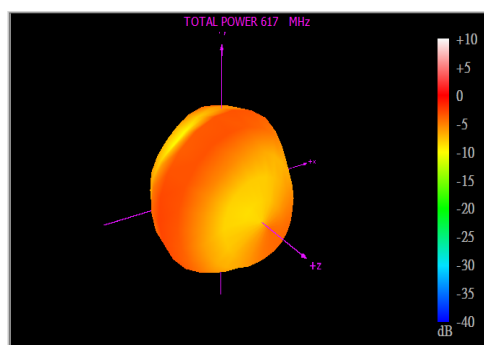


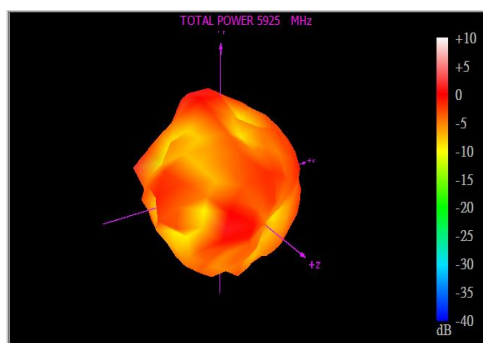
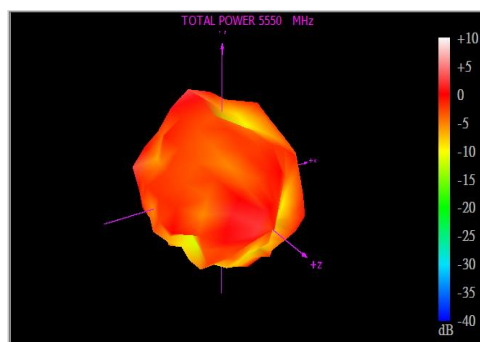
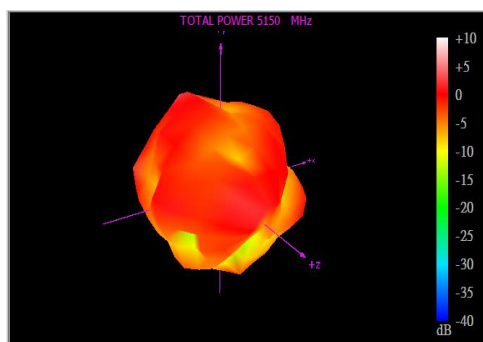
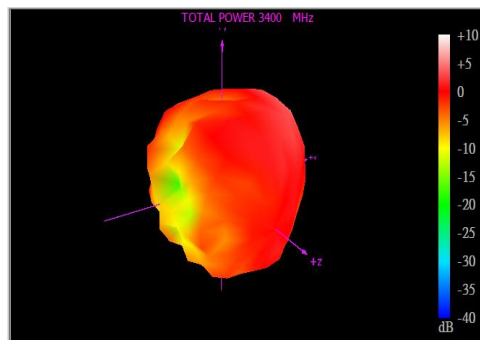
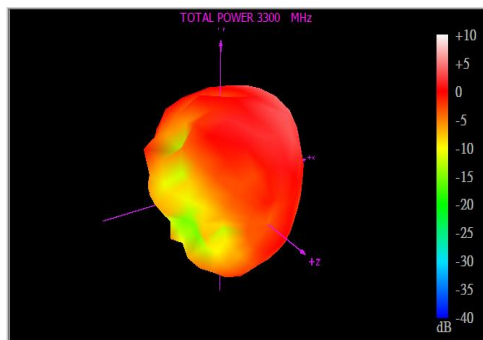
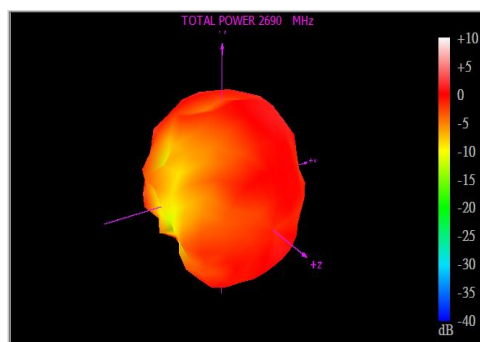
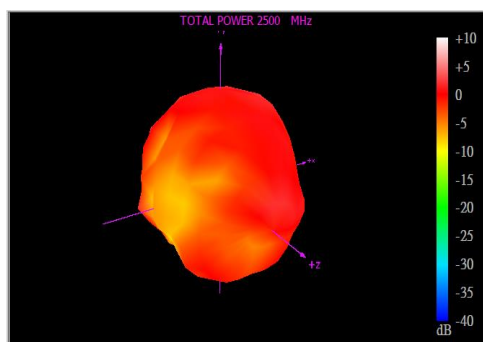
## YZ Plane



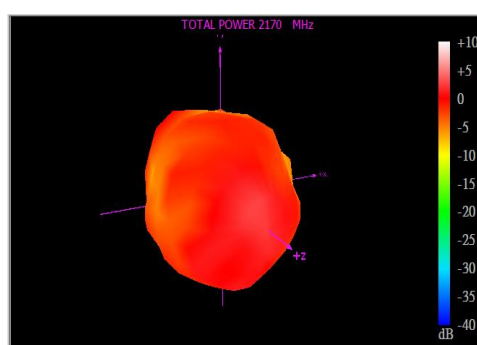
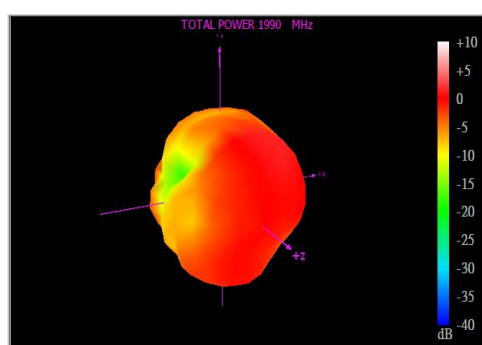
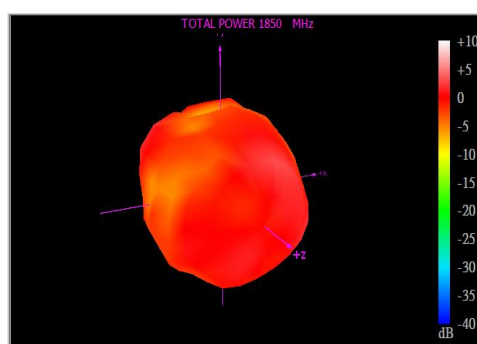
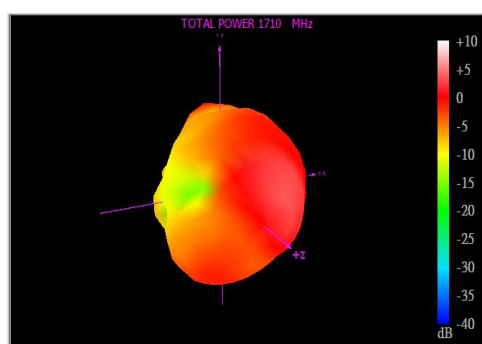
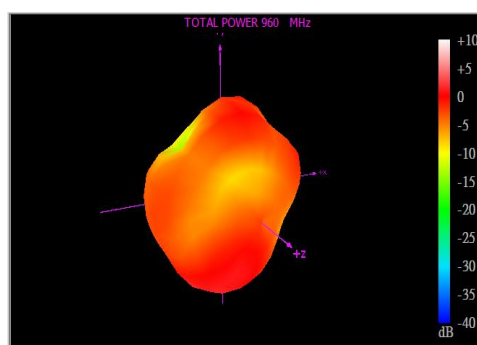
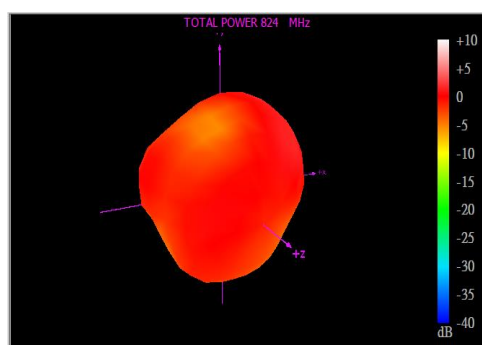
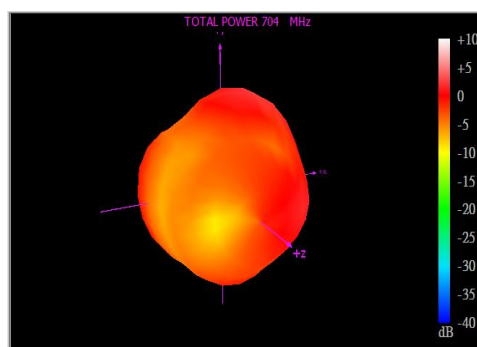
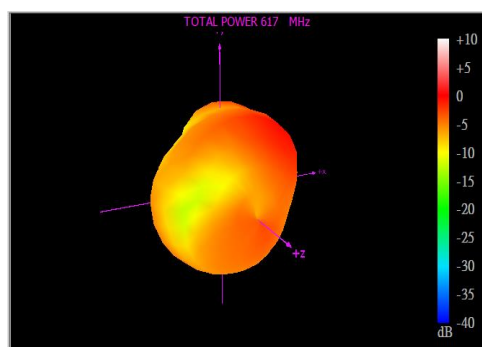
## 5.3 3D Radiation Pattern

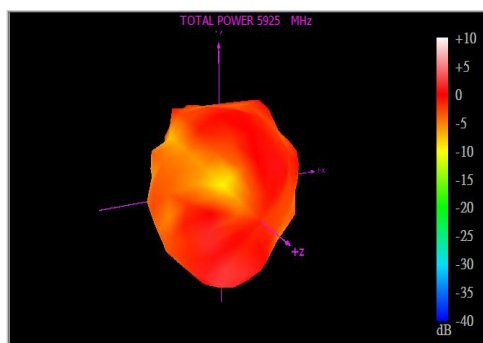
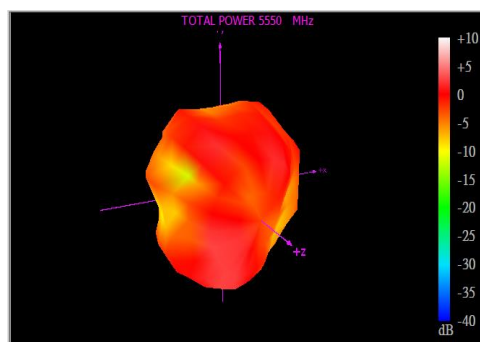
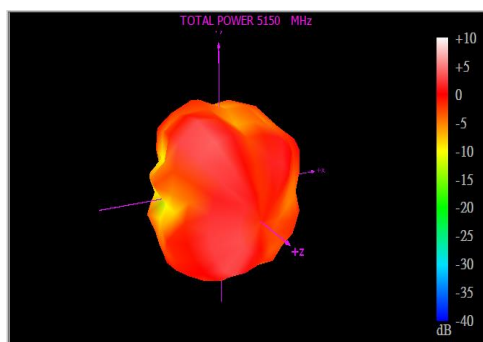
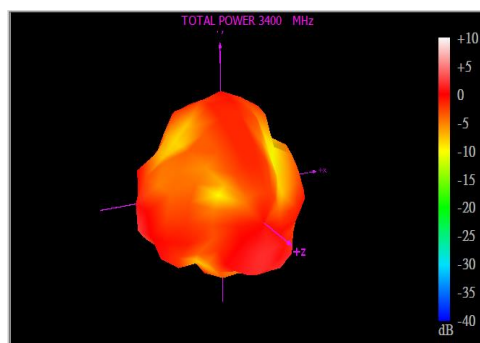
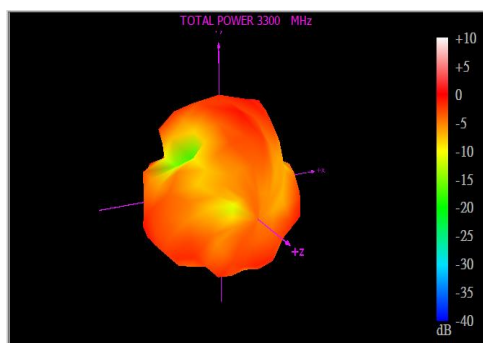
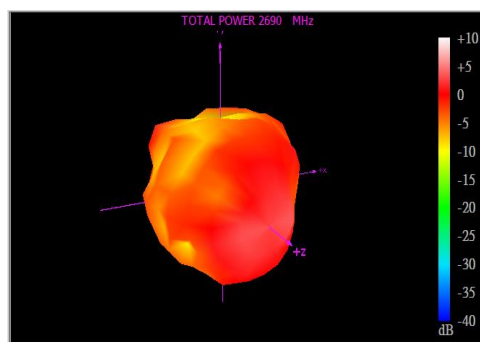
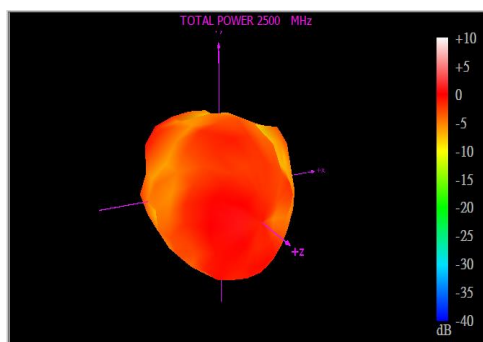
### 5.3.1 LTE MIMO1



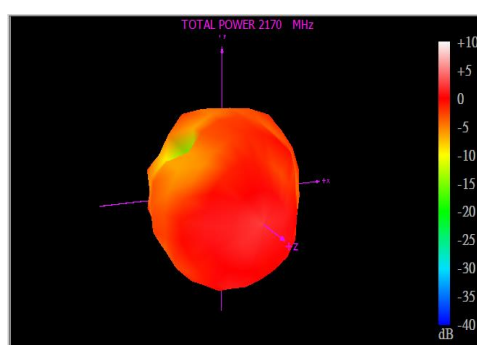
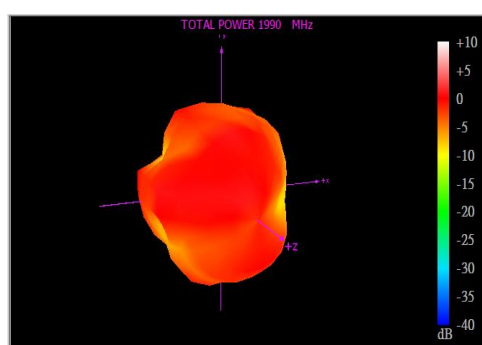
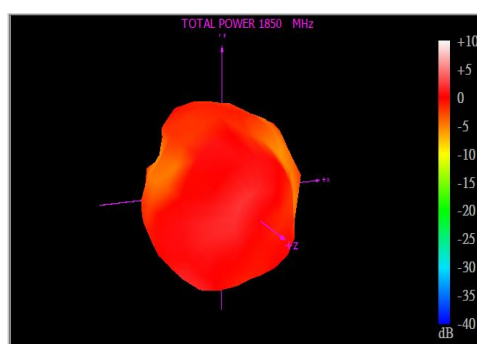
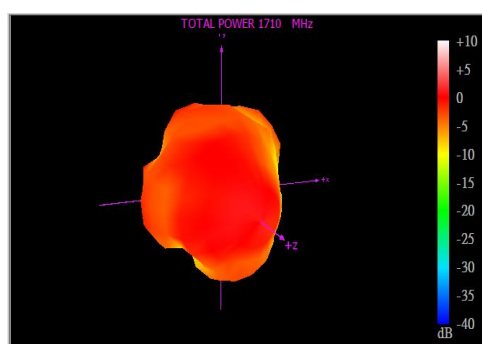
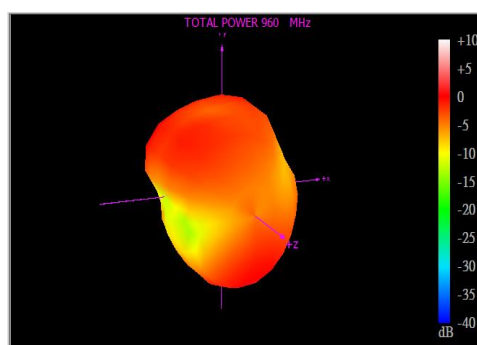
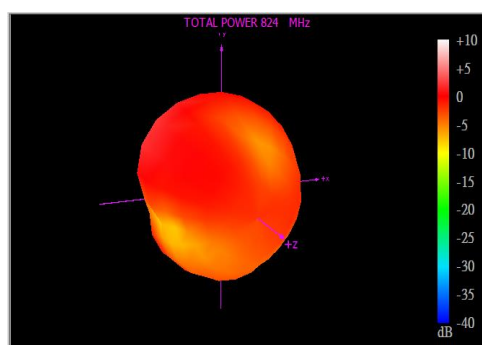
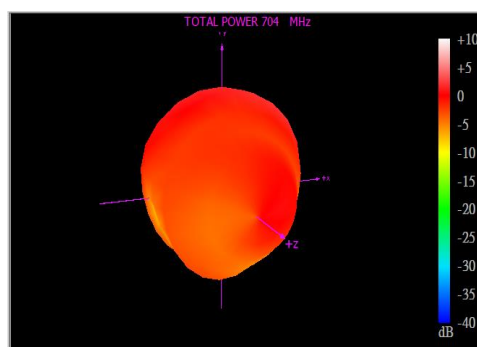
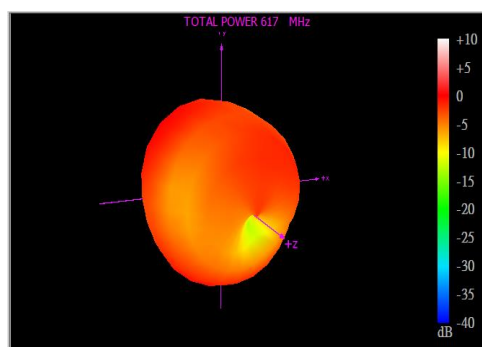


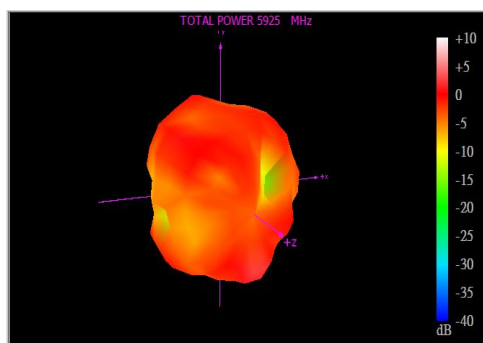
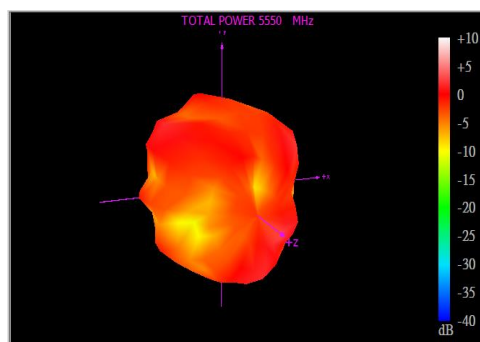
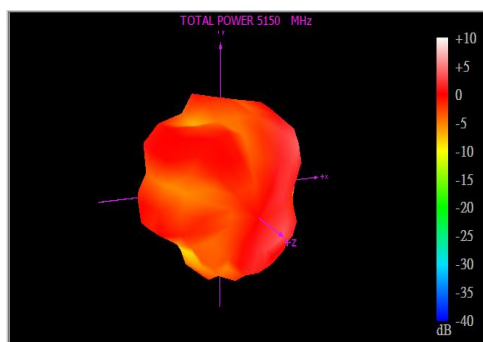
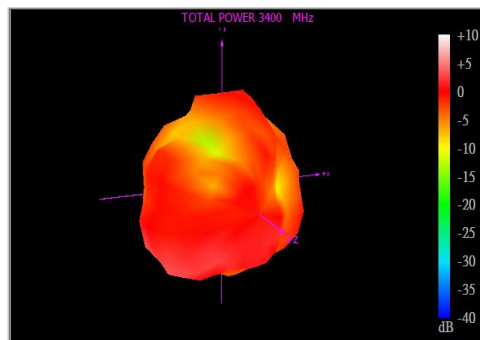
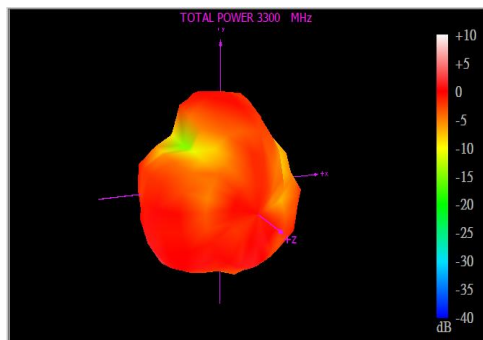
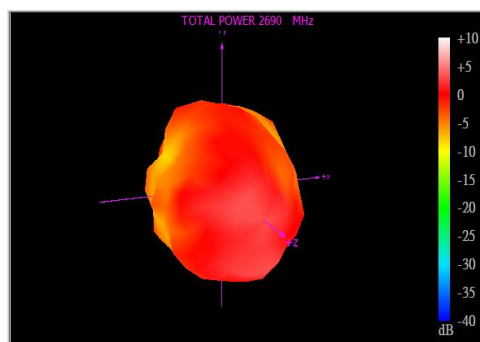
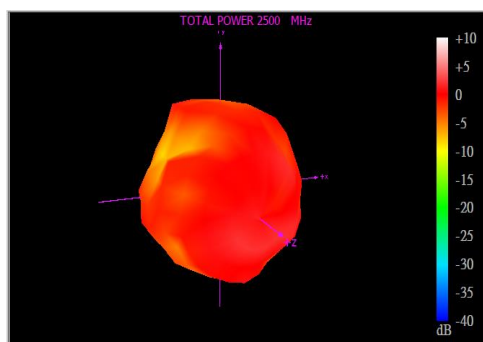
## 5.3.2 LTE MIMO2



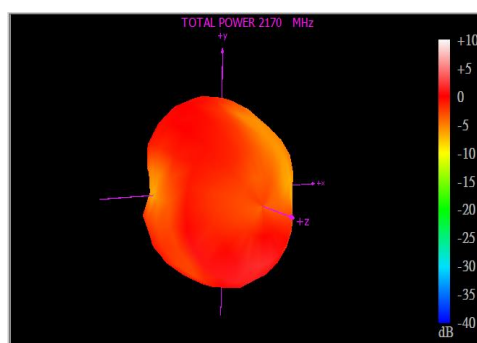
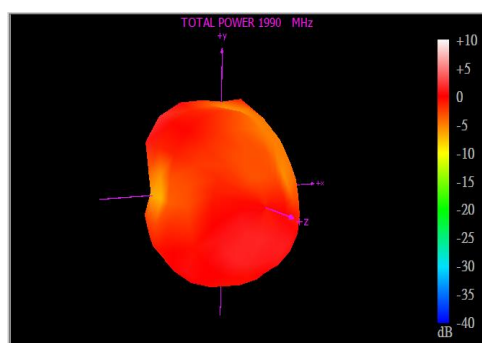
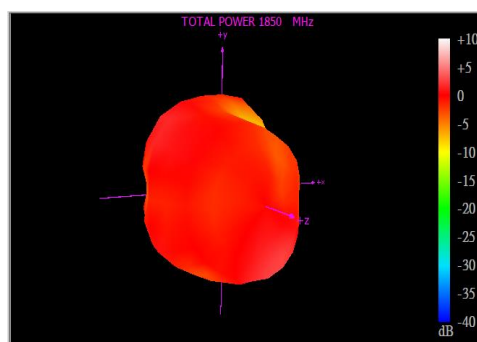
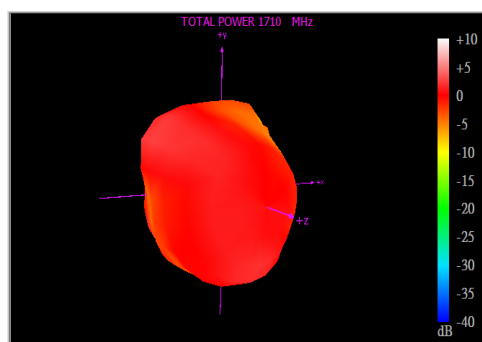
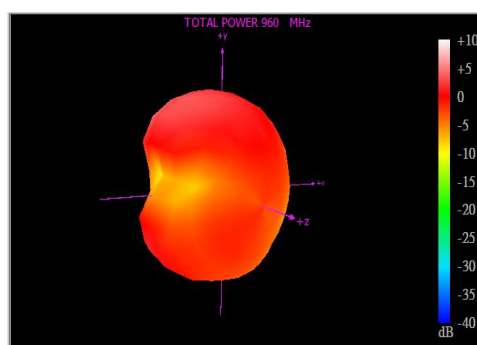
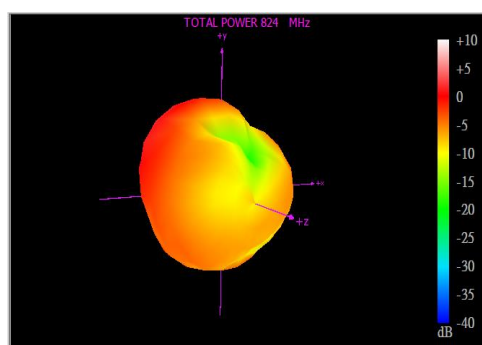
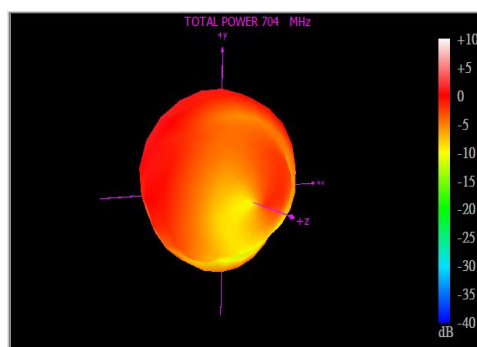
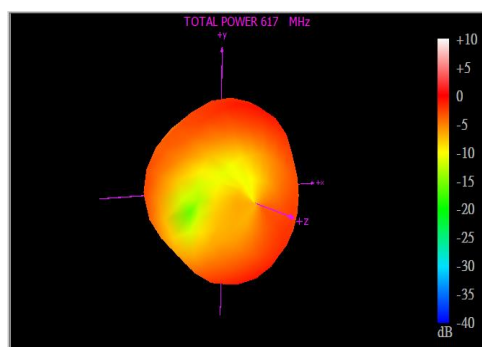


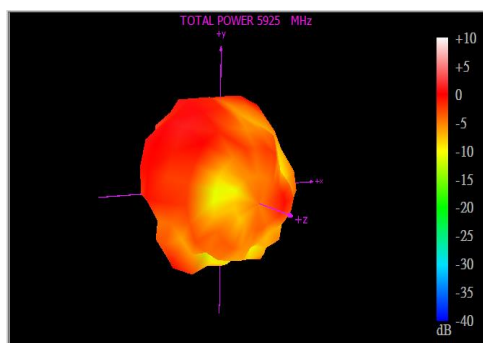
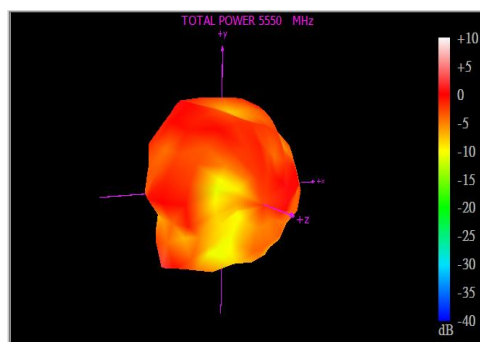
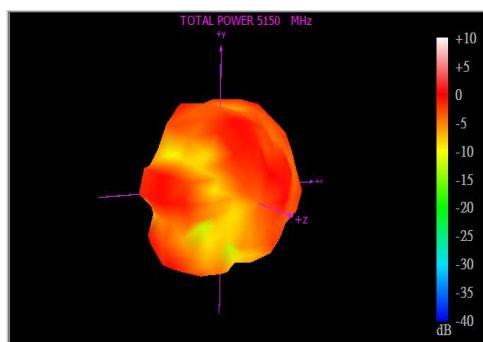
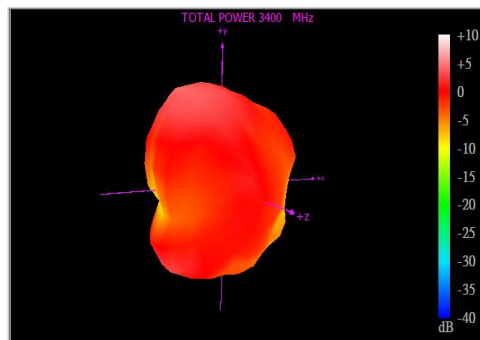
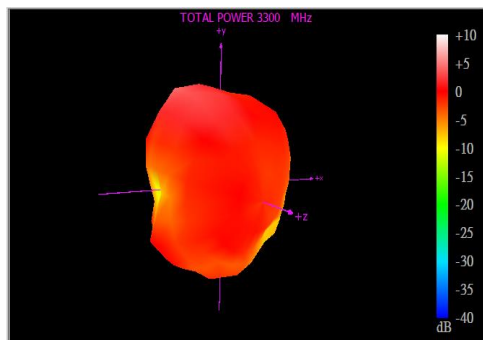
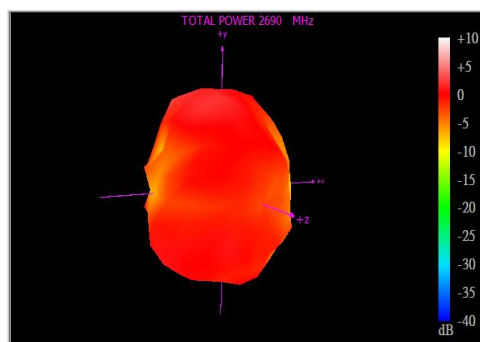
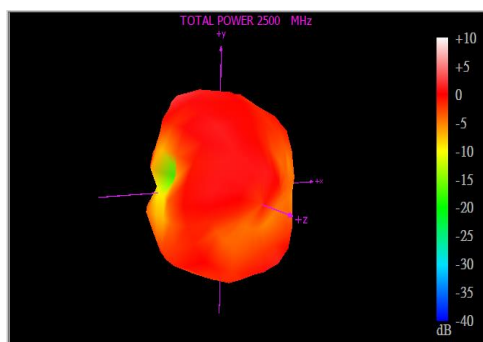
### 5.3.3 LTE MIMO3



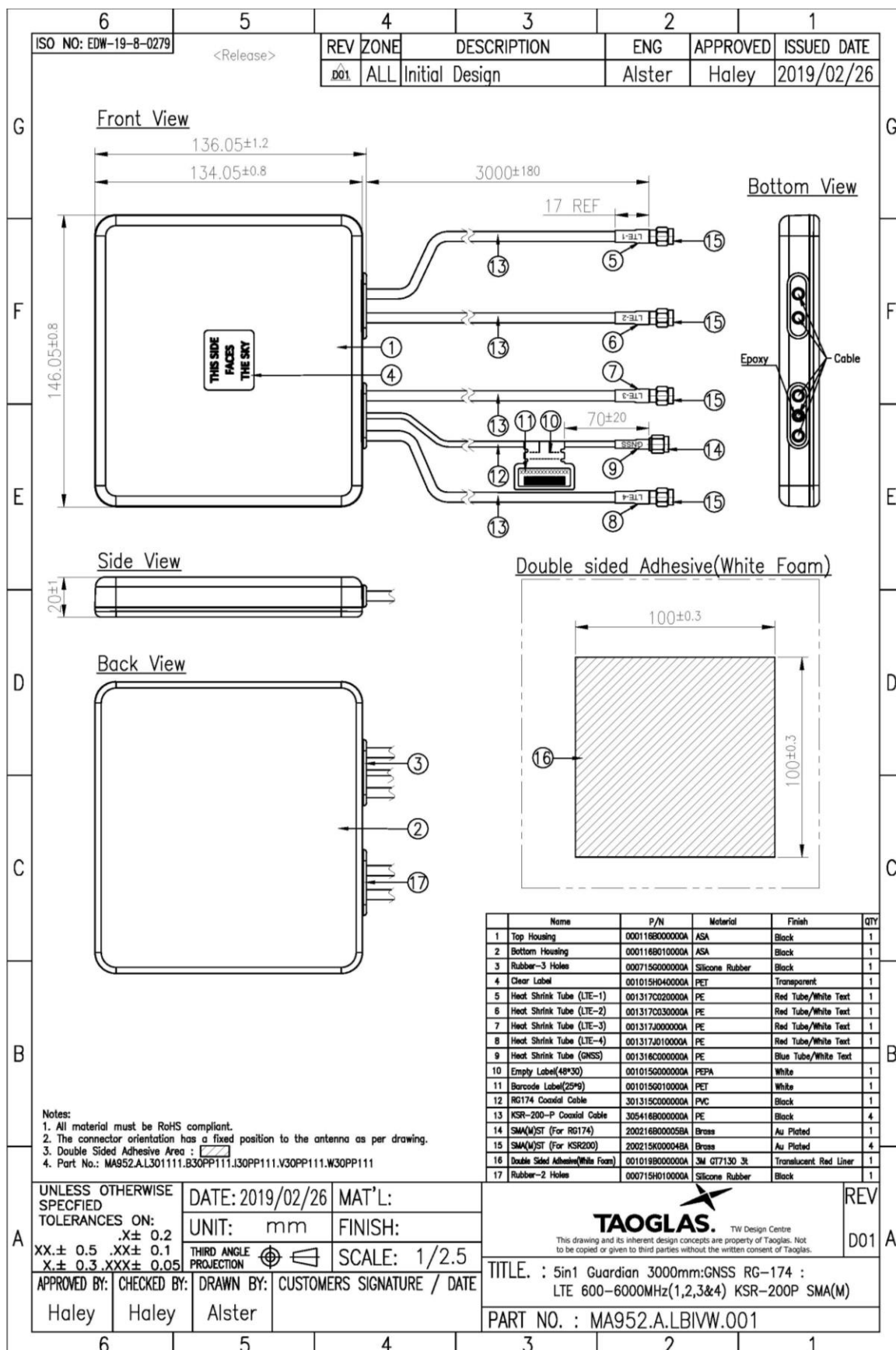


### 5.3.4 LTE MIMO4

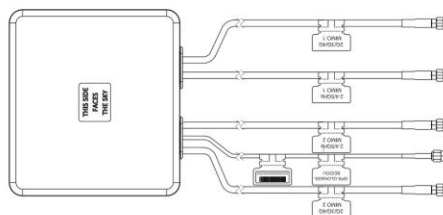




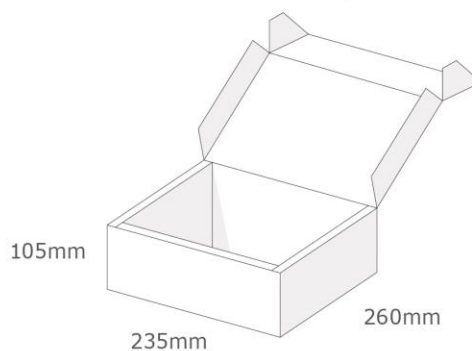
## 6. Mechanical Drawing (Units: mm)



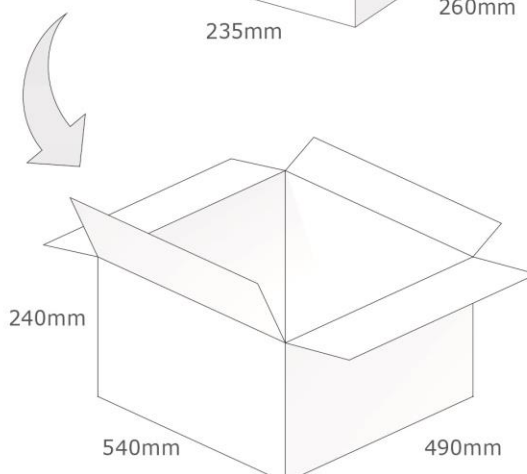
## 7. Packaging



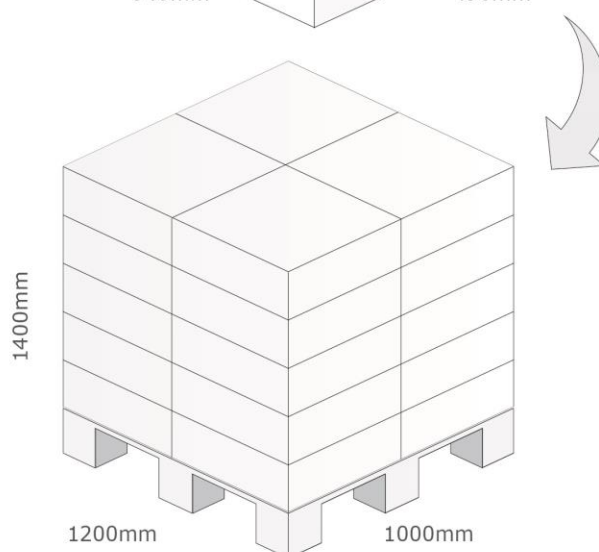
1 No. MA952.A.LBIVW.001 per small box  
Box Dimensions - 260\*235\*105mm  
Weight - 0.71Kg



1 Outer Carton  
Carton Dimensions - 540\*490\*240mm  
8 pcs MA952.A.LBIVW.001 per carton  
Weight - 6.3Kg



Pallet Dimensions 1200\*1000\*1400mm  
20 Cartons per Pallet  
4 Cartons per layer  
5 Layers



Changelog for the datasheet

SPE-19-8-054 – MA952.A.LBIVW.001

| Revision: A (Original First Release) |             |
|--------------------------------------|-------------|
| Date:                                | 2019-04-19  |
| Notes:                               |             |
| Author:                              | Jack Conroy |

Previous Revisions

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