



# TAOGLAS®



# Datasheet

## GuardianX 9 in 1 Antenna

**Part No:**  
MA9909.A.002

### Description:

1\*Active GNSS with RG-174 & SMA(M)  
8\*Cellular MIMO with TGC-200 & SMA(M)

### Features:

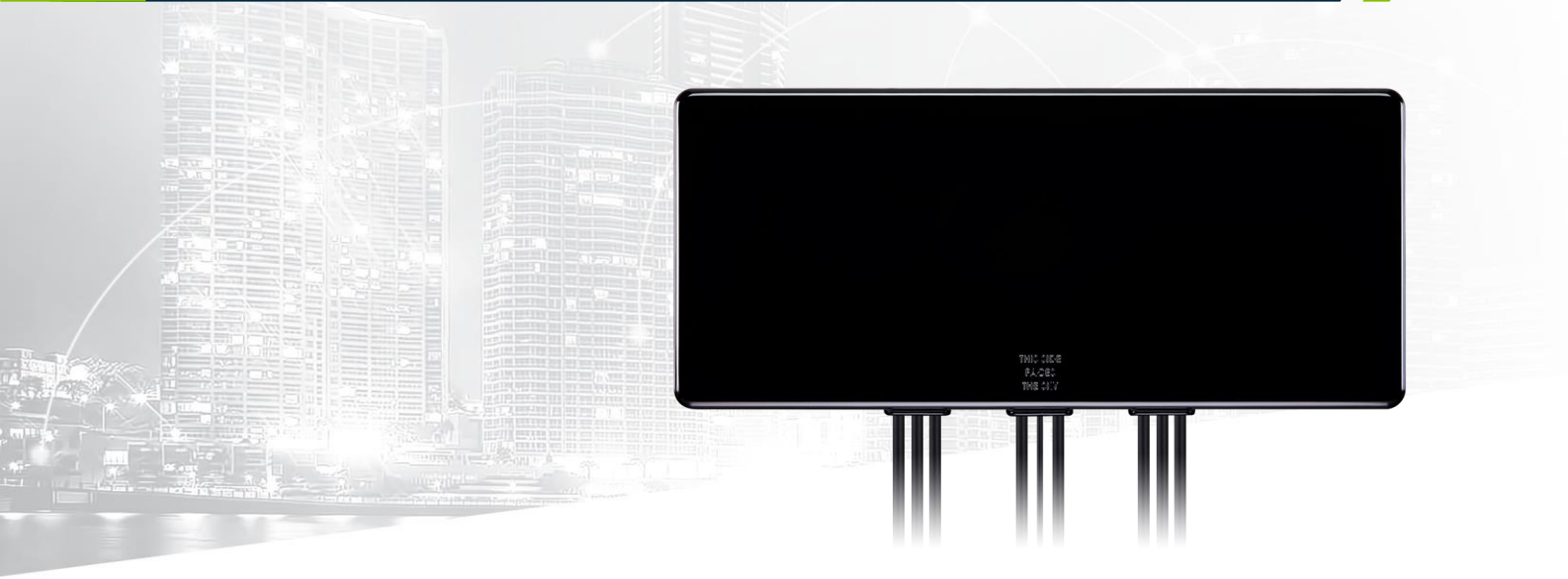
Low-profile Adhesive Mount Multi-antenna  
1\* GPS-GLONASS Antenna  
8\* Cellular MIMO  
Worldwide 4G Bands  
Covers 5G Band 71  
IP67 Rated Waterproof Enclosure  
Cables: 1M Low Loss TGC-200 and RG-174  
Connectors: SMA(M)  
Dimensions: 360 \* 160 \* 16.5mm  
RoHS & REACH Compliant

|                                   |    |
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## 1. Introduction



The Taoglas GuardianX MA9909 is a low profile heavy duty, fully IP67 rated waterproof, adhesive external combination antenna. It combines 9 antenna elements into one enclosure, 1 GPS/GLONASS/Galileo, 8\* Cellular MIMO (698 to 960MHz/1710 to 2170MHz/ 2490 to 2690MHz/ 3300 to 3600MHz). The Taoglas GuardianX has been designed as a low profile solution for several IoT and Automotive applications where space is at a premium.

This unique product delivers powerful worldwide 4G LTE MIMO antenna technology at 700MHz/800MHz/1700MHz/1800MHz/2600MHz and GNSS. This is an ideal external combination antenna solution that is used where drilling a hole through the roof of a vehicle or a metal panel for an external antenna is not feasible. The GuardianX can operate at band 71 a newly established 5G band at 600MHz.

Typical applications include:

- Passenger Bus / Rail / Air Applications.
- Automotive and Heavy Equipment Vehicle Tracking and Telematics
- Remote Asset and Pipeline Monitoring
- HD Video over LTE
- First Responder and Emergency Services
- M2M Applications/IoT

5G/4G 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 between the two MIMO antennas to prevent self-interference. Low loss cables are used to keep efficiency high over long cable lengths. In contrast, smaller MIMO antennas with poorer quality thinner cables will have much reduced efficiency and isolation, which would lead to a large drop in system throughput, increased number of drops, and may indeed not make a system connection at all.

Cable length and connector types are customizable. Contact your regional Taoglas customer support team for more information.

## 2. Specifications

| GNSS Frequency Bands Covered |                               |                           |                  |                    |                  |               |                  |
|------------------------------|-------------------------------|---------------------------|------------------|--------------------|------------------|---------------|------------------|
| 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 | L1<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)            | 1575.42 | 1602  |
| VSWR (max.)                | 2.0:1   | 2.0:1 |
| Peak Gain at Zenith (dBic) | 1.5     | 0     |
| Axial Ratio (dB)           | 6       | 14    |
| Polarization               | RHCP    |       |
| Impedance                  | 50Ω     |       |

| LNA and Filter Electrical Properties                      |         |        |
|-----------------------------------------------------------|---------|--------|
| Frequency (MHz)                                           | 1575.42 | 1602   |
| VSWR (max.)                                               | 2.0:1   | 2.0:1  |
| Gain@1.8V (dBic)                                          | 25      | 25     |
| Gain@3.0V (dBic)                                          | 31      | 31     |
| Gain@5.5V (dBic)                                          | 34      | 34     |
| Noise@1.8V (dB)                                           | 3       | 3      |
| Noise@3.0V (dB)                                           | 3       | 3      |
| Noise@5.5V (dB)                                           | 3.3     | 3.3    |
| Power consumption@1.8V (mA)                               | 5       |        |
| Power consumption@3.0V (mA)                               | 10      |        |
| Power consumption@5.5V (mA)                               | 23      |        |
| Total Specification (Through Antenna, SAW Filter and LNA) |         |        |
| Frequency (MHz)                                           | 1575.42 | 1602   |
| Gain@3V (dBic)                                            | 31 ± 3  | 30 ± 3 |
| Output Impedance                                          | 50 Ω    |        |

| 5G/4G Antenna     |    |               |          |             |                       |            |            |            |            |                       |                     |
|-------------------|----|---------------|----------|-------------|-----------------------|------------|------------|------------|------------|-----------------------|---------------------|
| Frequency (MHz)   |    | 5G NR Band 71 | LTE700   | GSM 850/900 | 5G NR Band 74, 75, 76 | DCS        | PCS        | UMTS1      | LTE2600    | 5G NR Band 77, 78, 79 | LTE5200/ Wi-Fi 5800 |
|                   |    | 617 ~698      | 698 ~824 | 824 ~960    | 1427 ~1518            | 1710 ~1880 | 1850 ~1990 | 1920 ~2170 | 2300 ~2690 | 3300 ~3500            | 5150 ~5925          |
| Efficiency (%)    |    |               |          |             |                       |            |            |            |            |                       |                     |
| MIMO 1            | 1m | 35.41         | 42.11    | 44.33       | 18.89                 | 52.83      | 48.11      | 47.82      | 43.25      | 10.60                 | 16.05               |
| MIMO 2            | 1m | 13.76         | 30.02    | 24.81       | 25.80                 | 54.18      | 59.28      | 59.20      | 34.24      | 20.71                 | 9.52                |
| MIMO 3            | 1m | 36.90         | 42.56    | 42.53       | 27.82                 | 57.08      | 54.93      | 53.95      | 32.99      | 17.13                 | 12.53               |
| MIMO 4            | 1m | 27.71         | 32.84    | 29.33       | 41.72                 | 43.61      | 36.50      | 34.63      | 40.21      | 13.29                 | 9.87                |
| MIMO 5            | 1m | 30.28         | 31.92    | 30.10       | 43.43                 | 48.18      | 40.97      | 38.80      | 42.42      | 14.18                 | 9.94                |
| MIMO 6            | 1m | 35.45         | 43.01    | 45.05       | 29.32                 | 60.41      | 59.52      | 58.29      | 38.87      | 16.88                 | 11.95               |
| MIMO 7            | 1m | 13.41         | 30.93    | 27.21       | 25.04                 | 57.83      | 61.70      | 62.69      | 36.90      | 21.87                 | 9.96                |
| MIMO 8            | 1m | 41.17         | 44.90    | 49.33       | 20.44                 | 53.31      | 52.45      | 51.09      | 44.85      | 10.88                 | 15.73               |
| Average Gain (dB) |    |               |          |             |                       |            |            |            |            |                       |                     |
| MIMO 1            | 1m | -4.54         | -3.76    | -3.55       | -7.25                 | -2.77      | -3.18      | -3.21      | -3.66      | -9.76                 | -8.12               |
| MIMO 2            | 1m | -9.02         | -5.30    | -6.06       | -5.91                 | -2.67      | -2.28      | -2.29      | -4.67      | -6.84                 | -10.24              |
| MIMO 3            | 1m | -4.35         | -3.72    | -3.72       | -5.66                 | -2.44      | -2.60      | -2.69      | -4.84      | -7.68                 | -9.09               |
| MIMO 4            | 1m | -5.61         | -4.84    | -5.37       | -3.80                 | -3.61      | -4.39      | -4.62      | -3.96      | -8.78                 | -10.15              |
| MIMO 5            | 1m | -5.23         | -4.96    | -5.26       | -3.63                 | -3.18      | -3.89      | -4.13      | -3.73      | -8.50                 | -10.07              |
| MIMO 6            | 1m | -4.53         | -3.67    | -3.47       | -5.43                 | -2.20      | -2.26      | -2.35      | -4.14      | -7.76                 | -9.30               |
| MIMO 7            | 1m | -9.07         | -5.14    | -5.66       | -6.05                 | -2.40      | -2.11      | -2.03      | -4.35      | -6.63                 | -10.07              |
| MIMO 8            | 1m | -3.88         | -3.49    | -3.07       | -6.90                 | -2.73      | -2.81      | -2.93      | -3.52      | -9.67                 | -8.19               |
| Peak Gain (dBi)   |    |               |          |             |                       |            |            |            |            |                       |                     |
| MIMO 1            | 1m | -0.30         | 0.42     | 1.35        | -3.07                 | 2.56       | 1.99       | 1.46       | 1.26       | -5.72                 | -1.93               |
| MIMO 2            | 1m | -4.26         | -1.30    | -2.64       | -0.30                 | 1.04       | 1.29       | 2.33       | 0.59       | -2.54                 | -4.93               |
| MIMO 3            | 1m | -0.41         | 0.59     | -0.15       | -0.77                 | 2.62       | 2.74       | 2.68       | -0.55      | -2.67                 | -3.38               |
| MIMO 4            | 1m | 0.04          | 0.52     | -0.34       | 0.73                  | 1.20       | 1.22       | 1.30       | 1.04       | -2.90                 | -5.29               |
| MIMO 5            | 1m | 0.22          | 0.84     | 0.05        | 0.34                  | 1.80       | 2.32       | 1.95       | 2.07       | -2.48                 | -4.94               |
| MIMO 6            | 1m | -0.83         | 0.62     | 0.13        | -1.13                 | 2.64       | 3.00       | 3.13       | 0.41       | -3.08                 | -4.01               |
| MIMO 7            | 1m | -4.11         | -0.57    | -2.04       | -0.53                 | 1.20       | 1.53       | 2.50       | 0.35       | -2.66                 | -4.73               |
| MIMO 8            | 1m | 0.70          | 1.42     | 1.99        | -2.78                 | 2.49       | 2.19       | 1.55       | 1.24       | -5.64                 | -1.87               |
| Impedance         |    | 50 Ω          |          |             |                       |            |            |            |            |                       |                     |
| Polarization      |    | Linear        |          |             |                       |            |            |            |            |                       |                     |
| Radiation Pattern |    | Omni          |          |             |                       |            |            |            |            |                       |                     |
| Max. input power  |    | 2W            |          |             |                       |            |            |            |            |                       |                     |

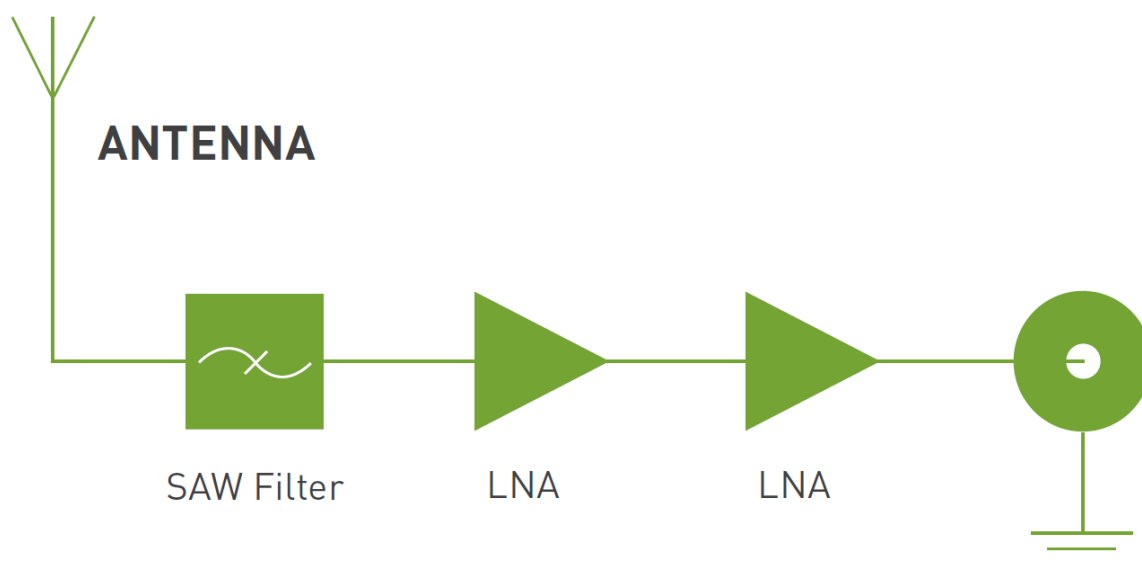
| Mechanical              |                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------|
| Dimension               | 360 * 160 * 16.5mm                                                                    |
| Casing                  | PC                                                                                    |
| Cable                   | 1M TGC200 for Cellular – Fully Customizable<br>1M RG174 for GNSS – Fully Customizable |
| Connector               | Cellular 5G/4G: SMA-Plug – Fully Customizable<br>GNSS: SMA-Plug – Fully Customizable  |
| Sealant                 | Rubber Stopper                                                                        |
| Weight Including Cables | 1060g                                                                                 |
| Environmental           |                                                                                       |
| Protection              | IP67                                                                                  |
| Temperature Range       | -40°C to 85°C                                                                         |
| Humidity                | Non-condensing 65°C 95% RH                                                            |
| Cable Pull              | RG174 4KgF/ TGC200 9KgF                                                               |

| 5G/4G Bands |                                                                    |                      |   |   |   |   |   |   |   |   |
|-------------|--------------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|---|
| Band Number | 5G NR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA |                      |   |   |   |   |   |   |   |   |
|             | Uplink                                                             | Downlink             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1           | UL: 1920 to 1980                                                   | DL: 2110 to 2170     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2           | UL: 1850 to 1910                                                   | DL: 1930 to 1990     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3           | UL: 1710 to 1785                                                   | DL: 1805 to 1880     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4           | UL: 1710 to 1755                                                   | DL: 2110 to 2155     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5           | UL: 824 to 849                                                     | DL: 869 to 894       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 7           | UL: 2500 to 2570                                                   | DL: 2620 to 2690     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 8           | UL: 880 to 915                                                     | DL: 925 to 960       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 9           | UL: 1749.9 to 1784.9                                               | DL: 1844.9 to 1879.9 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 11          | UL: 1427.9 to 1447.9                                               | DL: 1475.9 to 1495.9 | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ | ✓ |
| 12          | UL: 699 to 716                                                     | DL: 729 to 746       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 13          | UL: 777 to 787                                                     | DL: 746 to 756       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 14          | UL: 788 to 798                                                     | DL: 758 to 768       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 17          | UL: 704 to 716                                                     | DL: 734 to 746       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 18          | UL: 815 to 830                                                     | DL: 860 to 875       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 19          | UL: 830 to 845                                                     | DL: 875 to 890       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 20          | UL: 832 to 862                                                     | DL: 791 to 821       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 21          | UL: 1447.9 to 1462.9                                               | DL: 1495.9 to 1510.9 | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ | ✓ |
| 22          | UL: 3410 to 3490                                                   | DL: 3510 to 3590     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 23          | UL: 2000 to 2020                                                   | DL: 2180 to 2200     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24          | UL: 1625.5 to 1660.5                                               | DL: 1525 to 1559     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 25          | UL: 1850 to 1915                                                   | DL: 1930 to 1995     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 26          | UL: 814 to 849                                                     | DL: 859 to 894       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 27          | UL: 807 to 824                                                     | DL: 852 to 869       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 28          | UL: 703 to 748                                                     | DL: 758 to 803       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 29          | UL: -                                                              | DL: 717 to 728       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 30          | UL: 2305 to 2315                                                   | DL: 2350 to 2360     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 31          | UL: 452.5 to 457.5                                                 | DL: 462.5 to 467.5   | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |
| 32          | UL: -                                                              | DL: 1452 – 1496      | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ | ✓ |
| 35          | 1850 to 1910                                                       |                      | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 38          | 2570 to 2620                                                       |                      | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 39          | 1880 to 1920                                                       |                      | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 40          | 2300 to 2400                                                       |                      | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 41          | 2496 to 2690                                                       |                      | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 42          | 3400 to 3600                                                       |                      | ✗ | ✓ | ✗ | ✗ | ✗ | ✗ | ✓ | ✗ |
| 43          | 3600 to 3800                                                       |                      | ✗ | ✓ | ✗ | ✗ | ✗ | ✗ | ✓ | ✗ |
| 48          | 3550 to 3700                                                       |                      | ✗ | ✓ | ✗ | ✗ | ✗ | ✗ | ✓ | ✗ |
| 66          | UL: 1710-1780                                                      | DL: 2110-2200        | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 71          | 617 to 698                                                         |                      | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ |
| 74/75/76    | 1427 to 1518                                                       |                      | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ | ✓ |
| 77          | 3300 to 4200                                                       |                      | ✗ | ✓ | ✗ | ✗ | ✗ | ✗ | ✓ | ✗ |
| 78          | 3300 to 3800                                                       |                      | ✗ | ✓ | ✗ | ✗ | ✗ | ✗ | ✓ | ✗ |
| 79          | 4400 to 5000                                                       |                      | ✓ | ✗ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ |

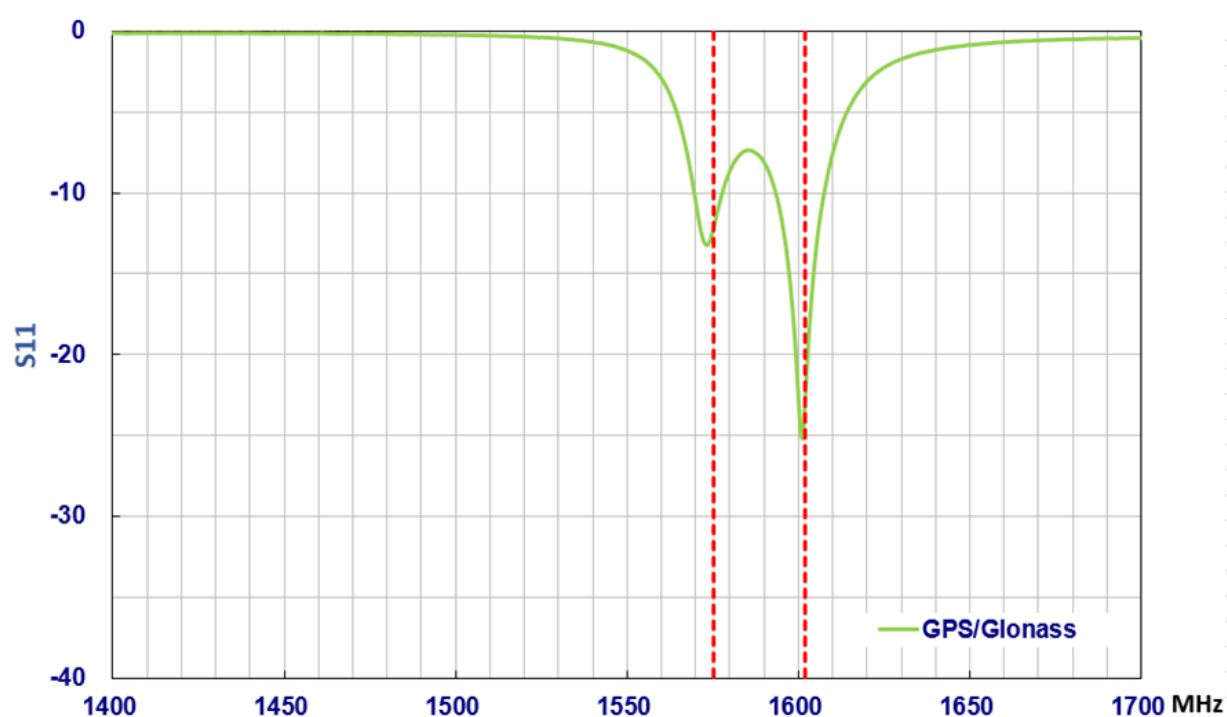
\*Covered bands represented as 20% efficiency, tested at 1m cable.

### 3. Active Antenna Characteristics

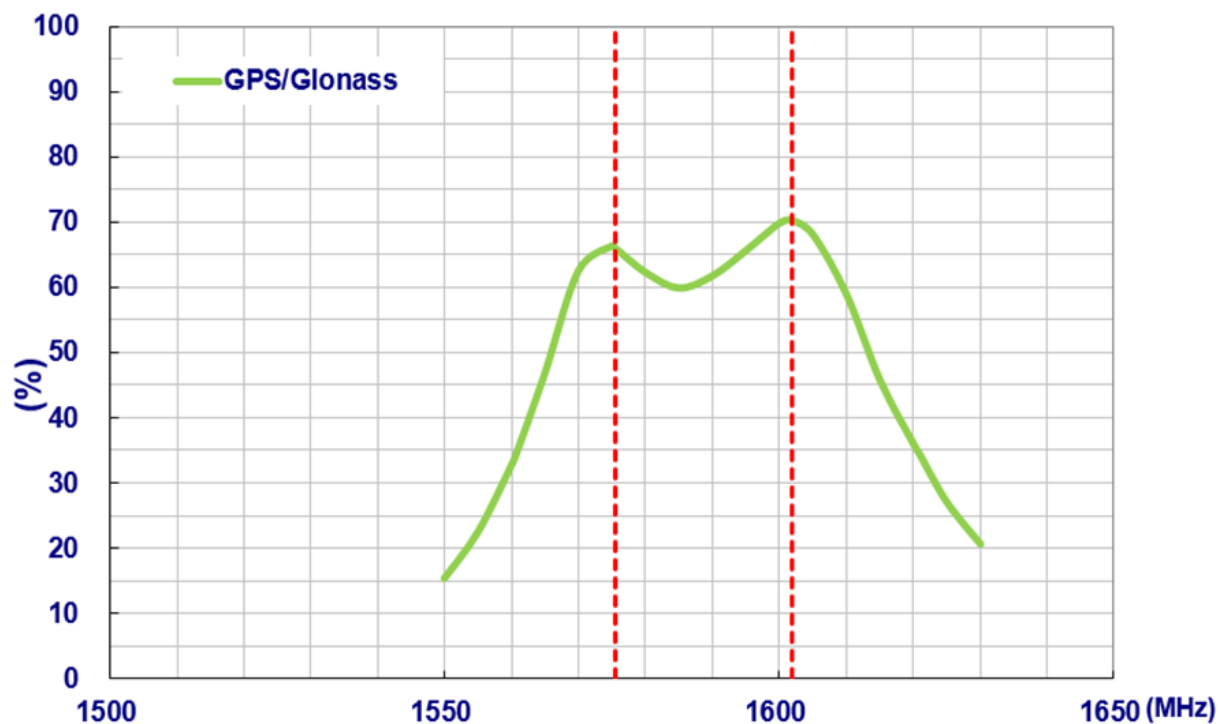
#### 3.1 Block Diagram (Active antenna)



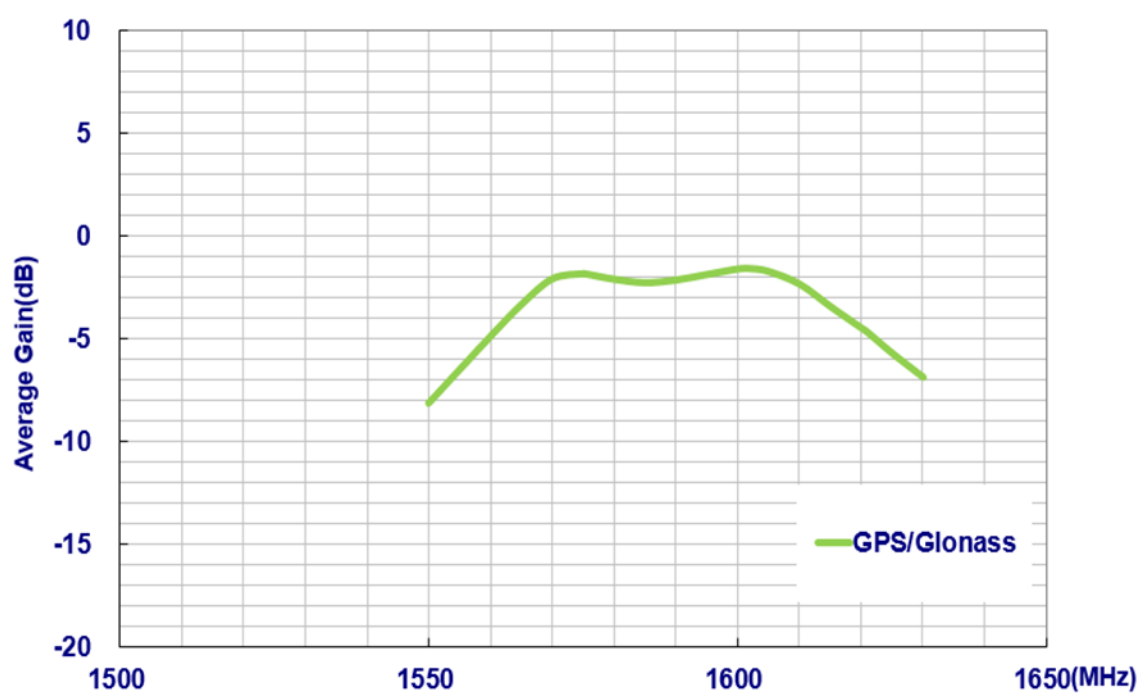
#### 3.2 Passive Antenna Return Loss



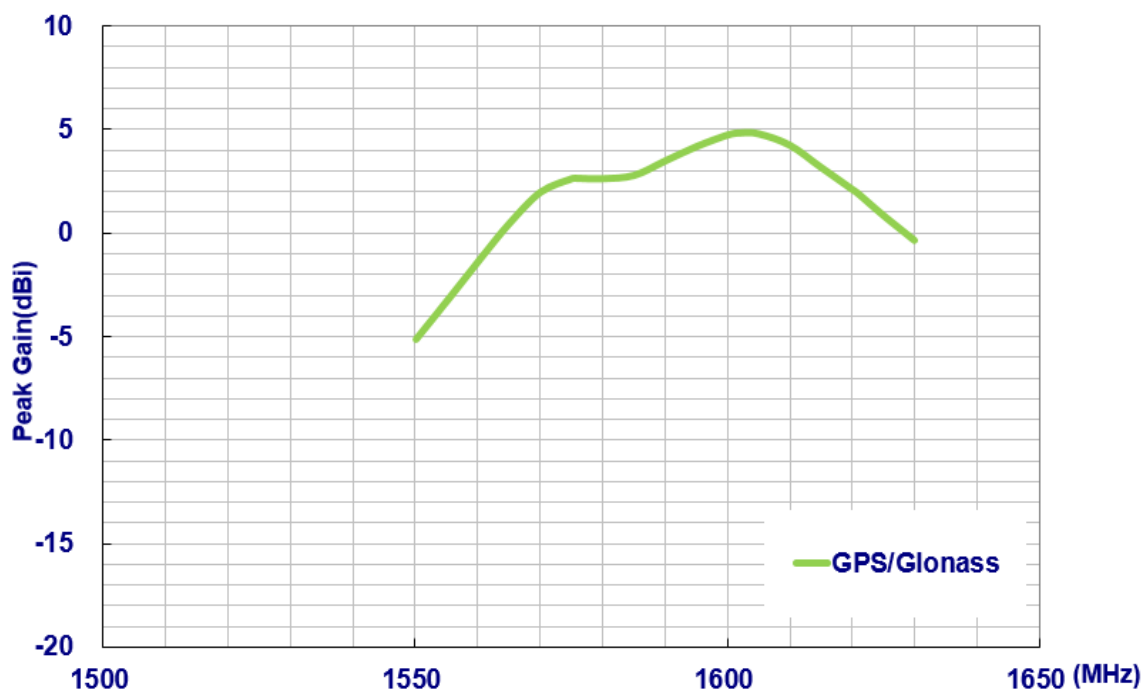
### 3.3 Passive Antenna Efficiency



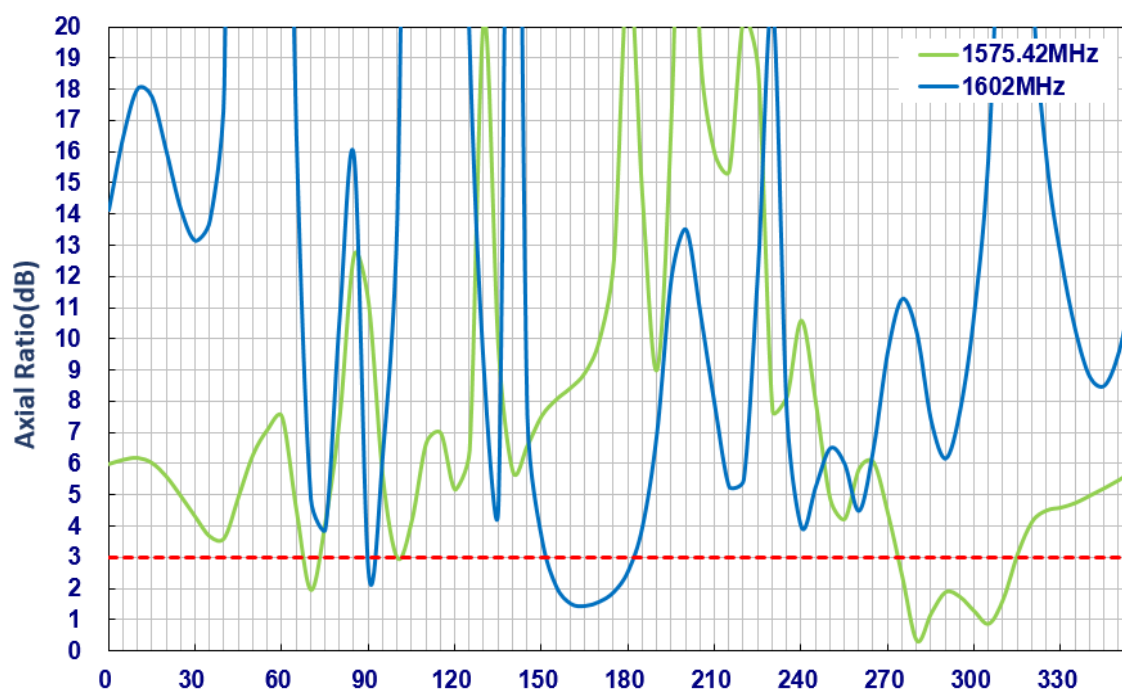
### 3.4 Passive Antenna Average Gain



### 3.5 Passive Antenna Peak Gain

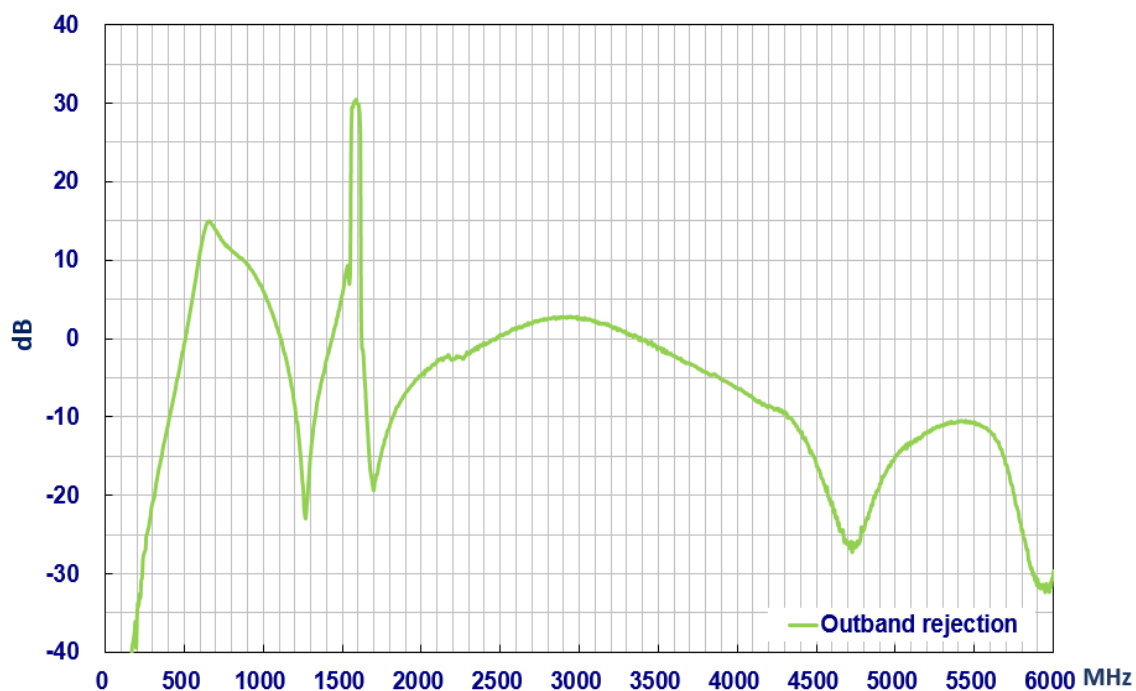


### 3.6 Passive Antenna Axial Ratio (Zenith is at 0°)

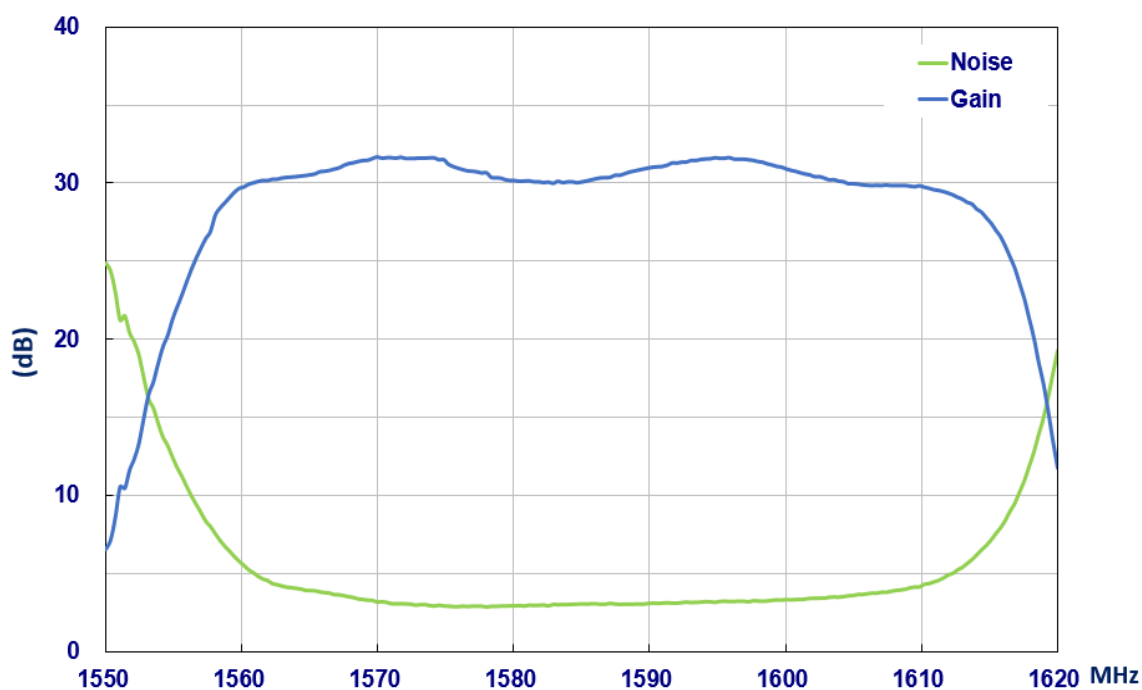


### 3.7 Active measurements

#### LNA Gain @ 3.0V

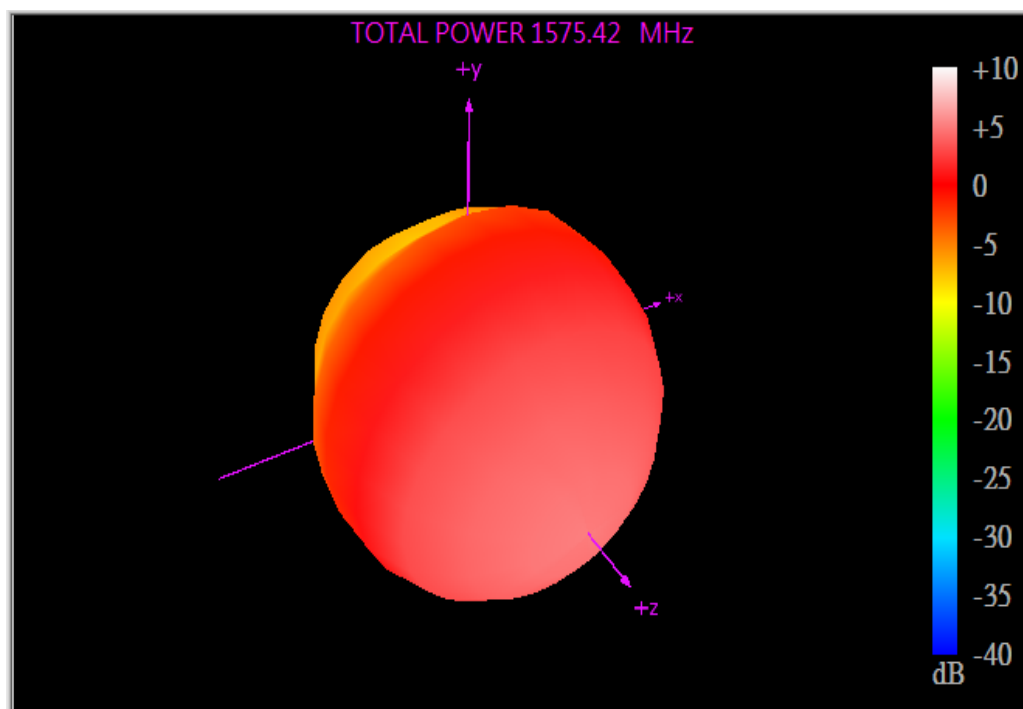


#### Noise Figure @ 3.0V

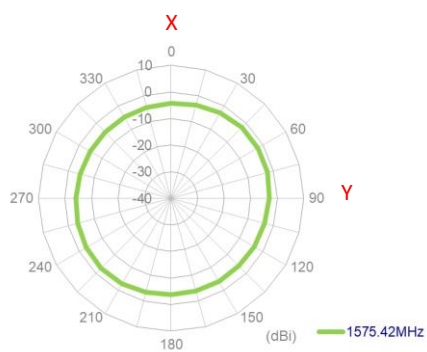


### 3.8 GNSS Radiation Pattern

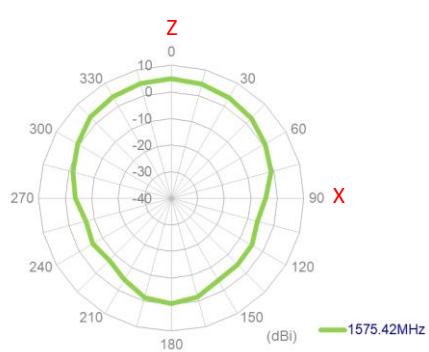
1575.42MHz



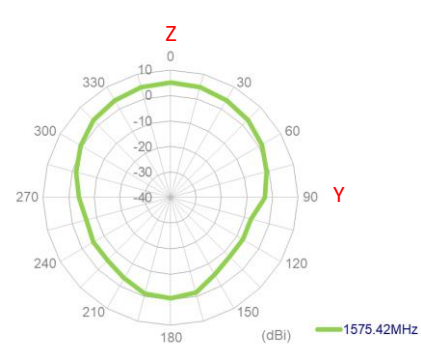
XY Plane



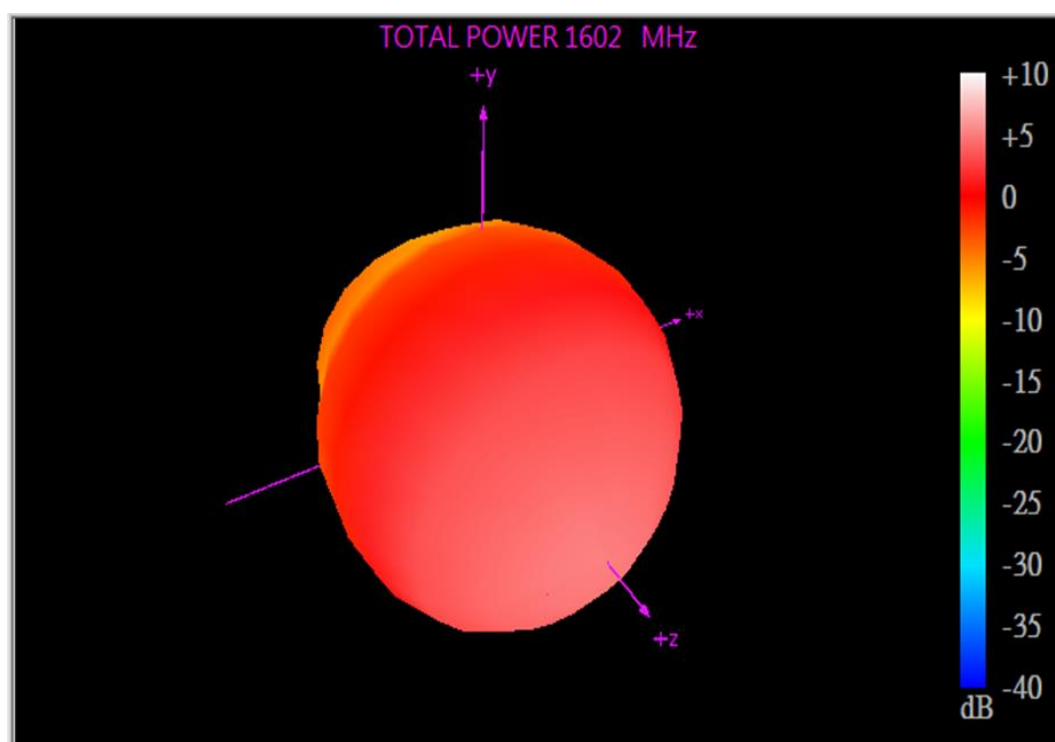
XZ Plane



YZ Plane



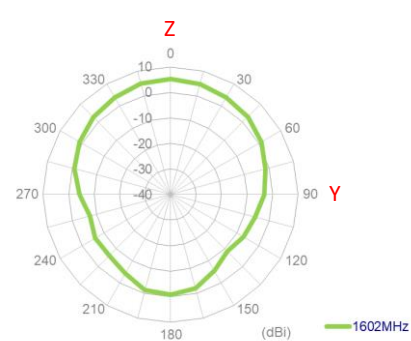
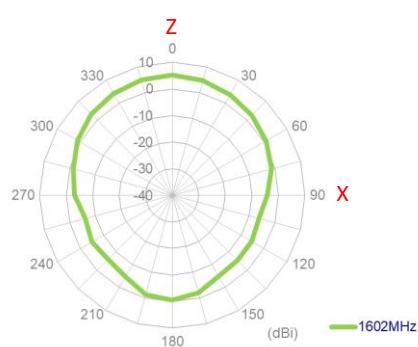
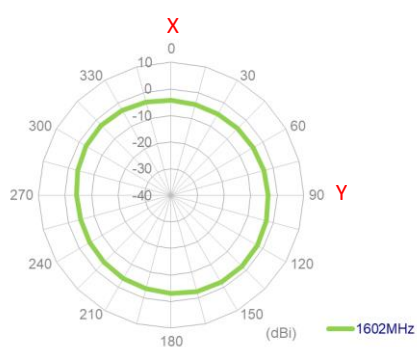
1602MHz



XY Plane

XZ Plane

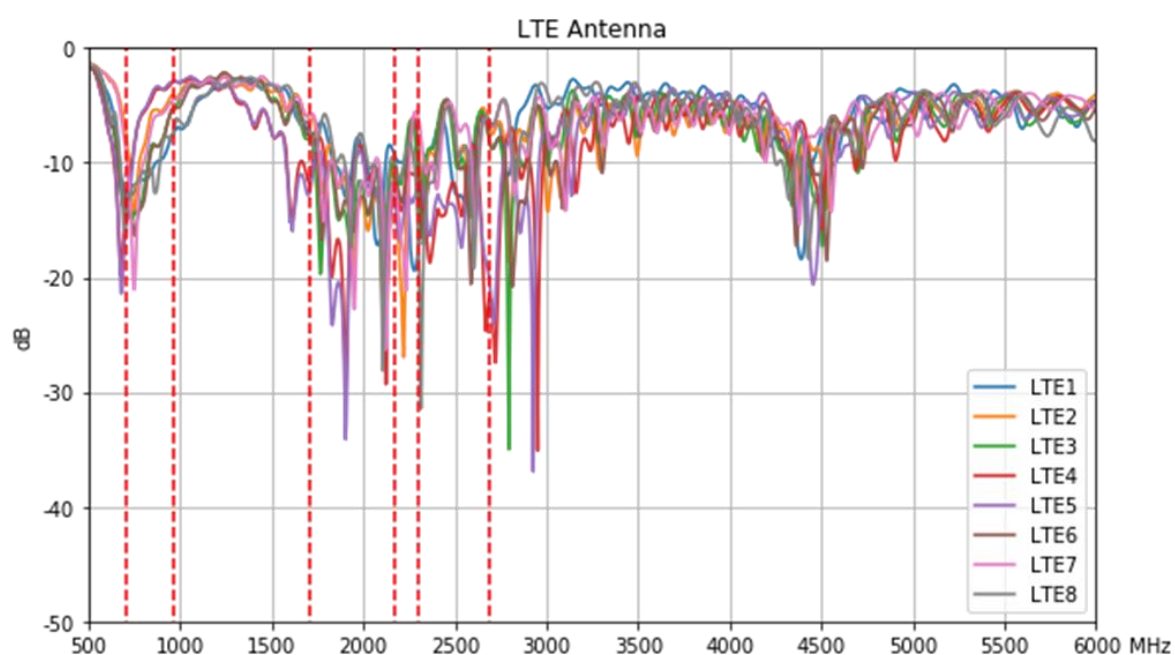
YZ Plane



## 4. Antenna Characteristics

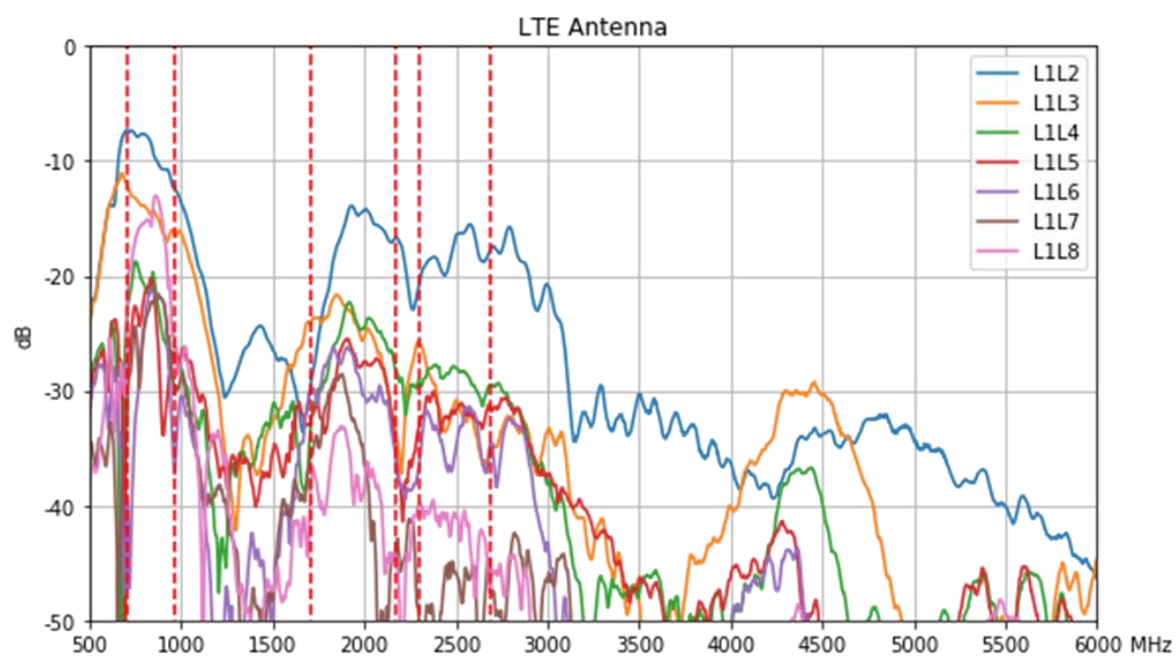
### 4.1 Return Loss

#### Cellular MIMO

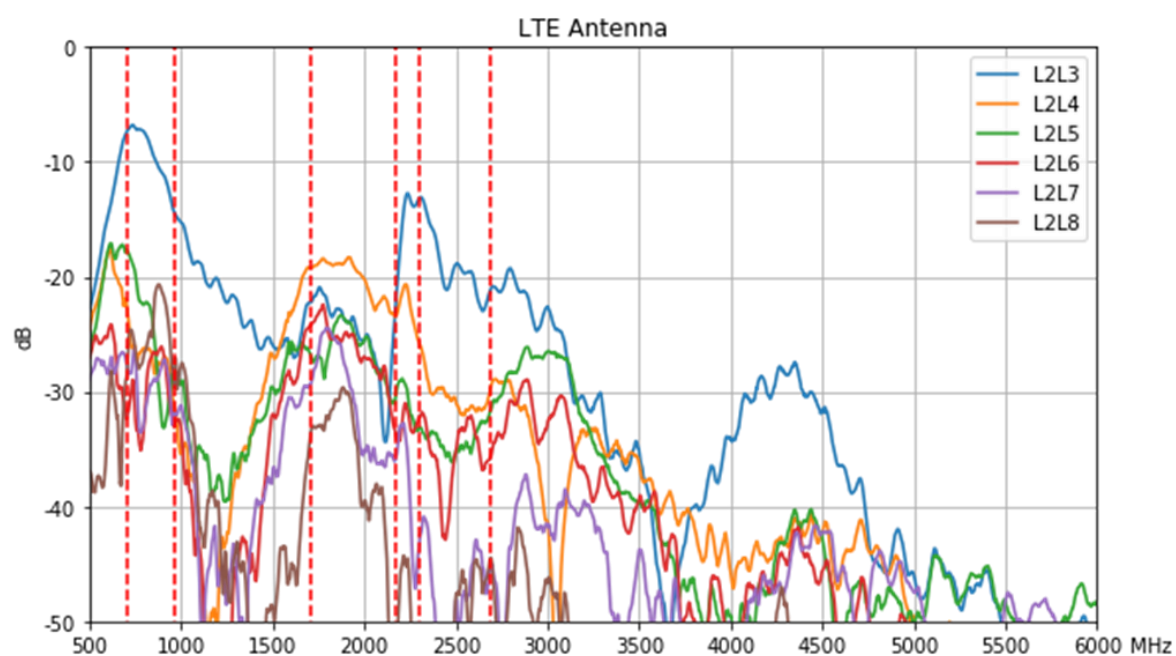


## 4.2 Isolation

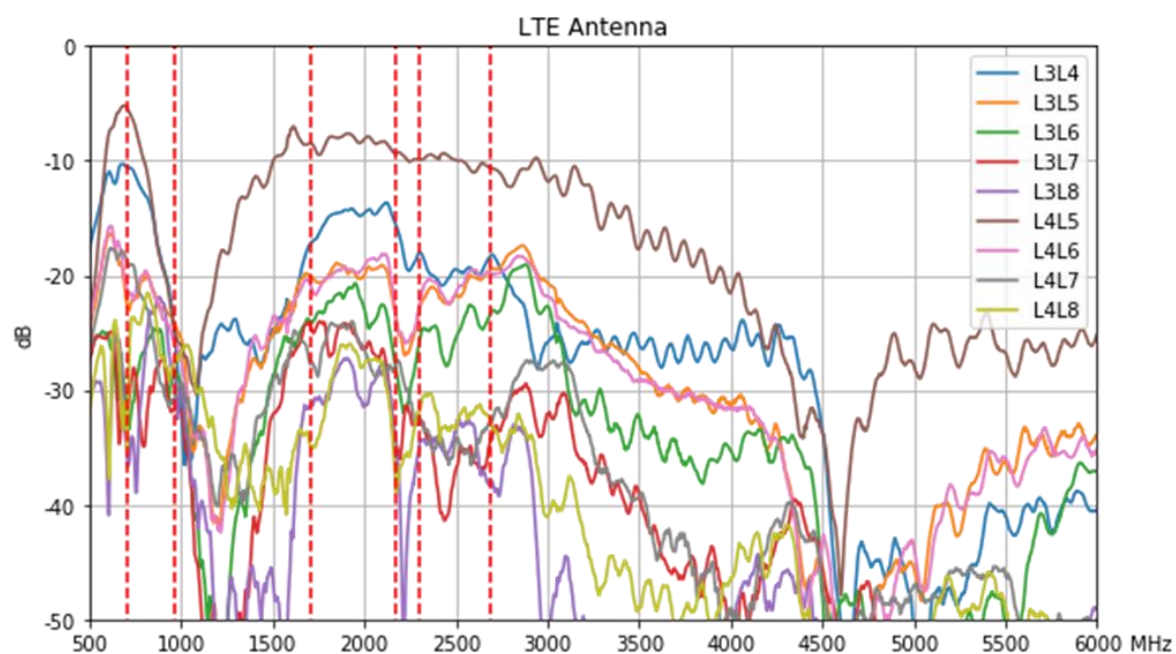
### Cellular 1



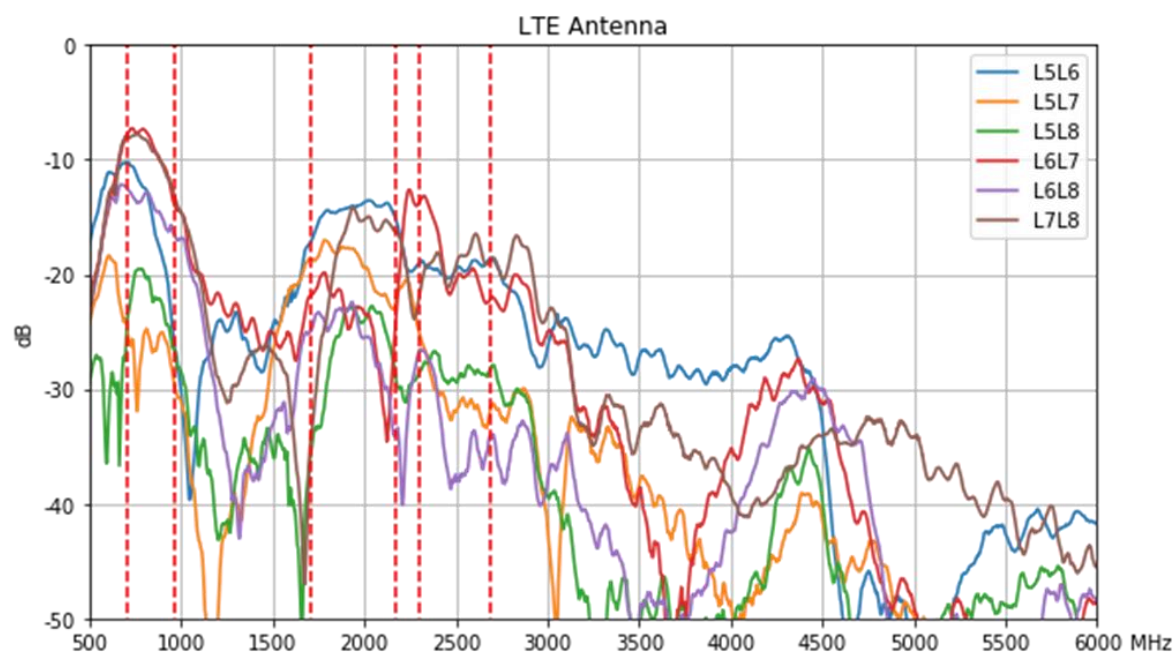
### Cellular 2



## Cellular 3 and Cellular 4

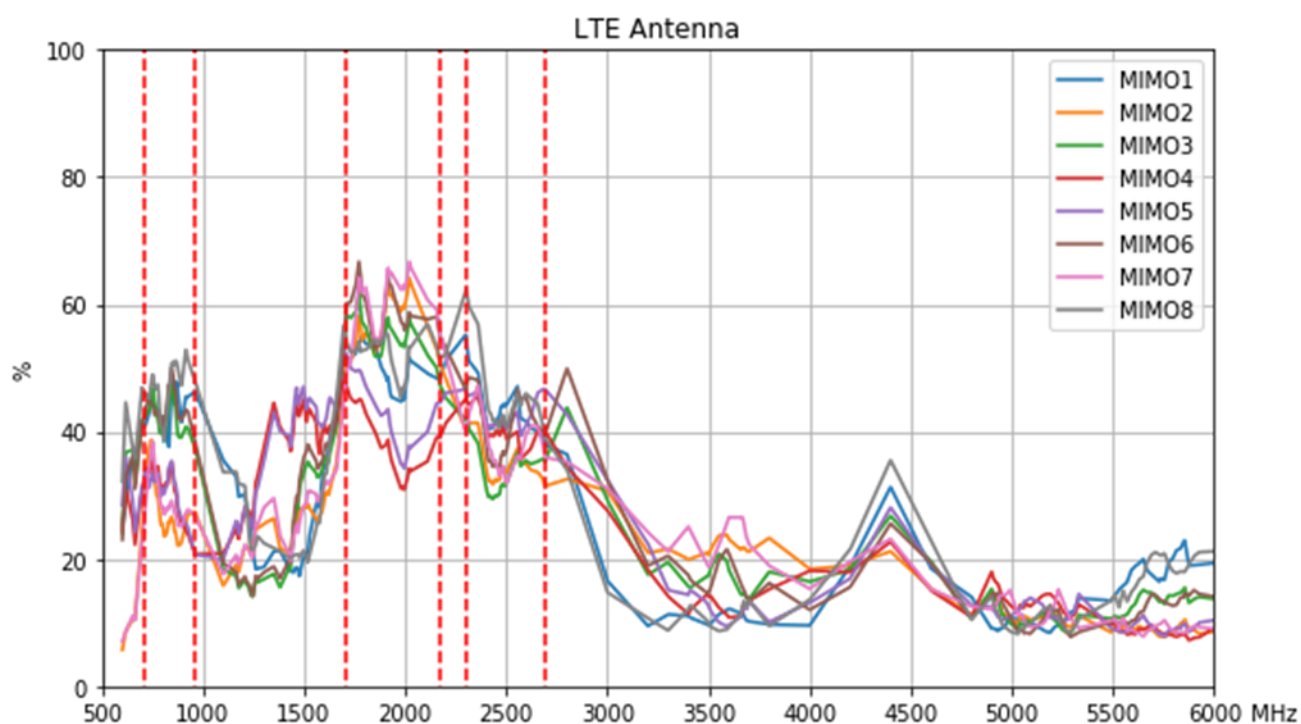


## Cellular 5 、 Cellular 6 and Cellular 7



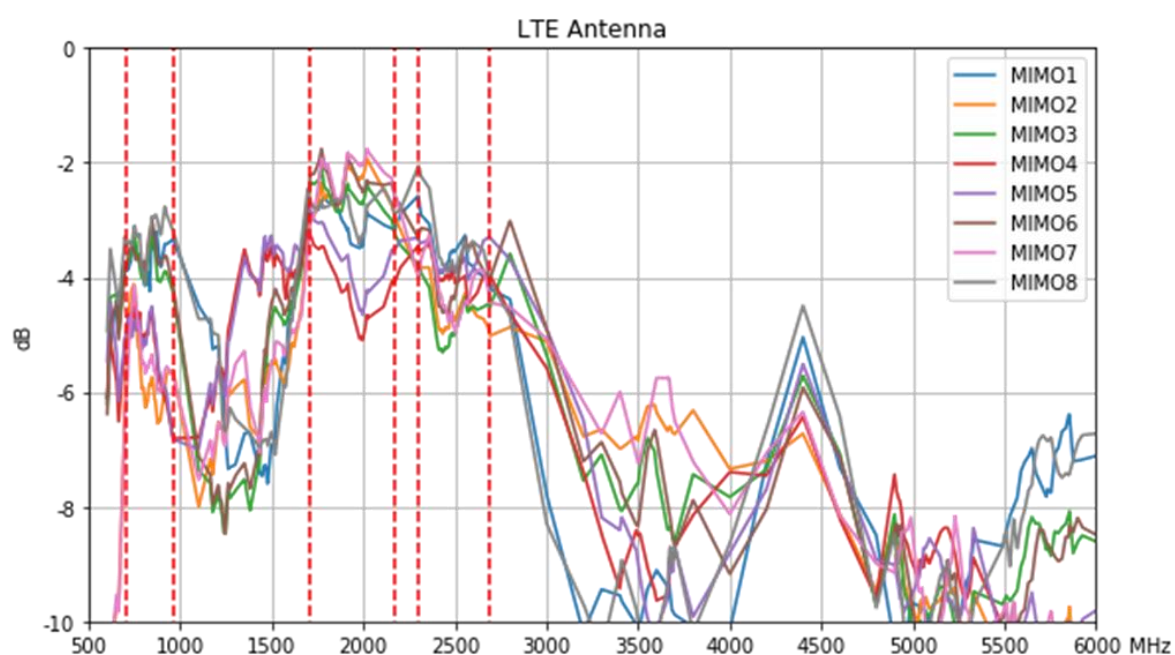
### 4.3 Efficiency

#### Cellular MIMO



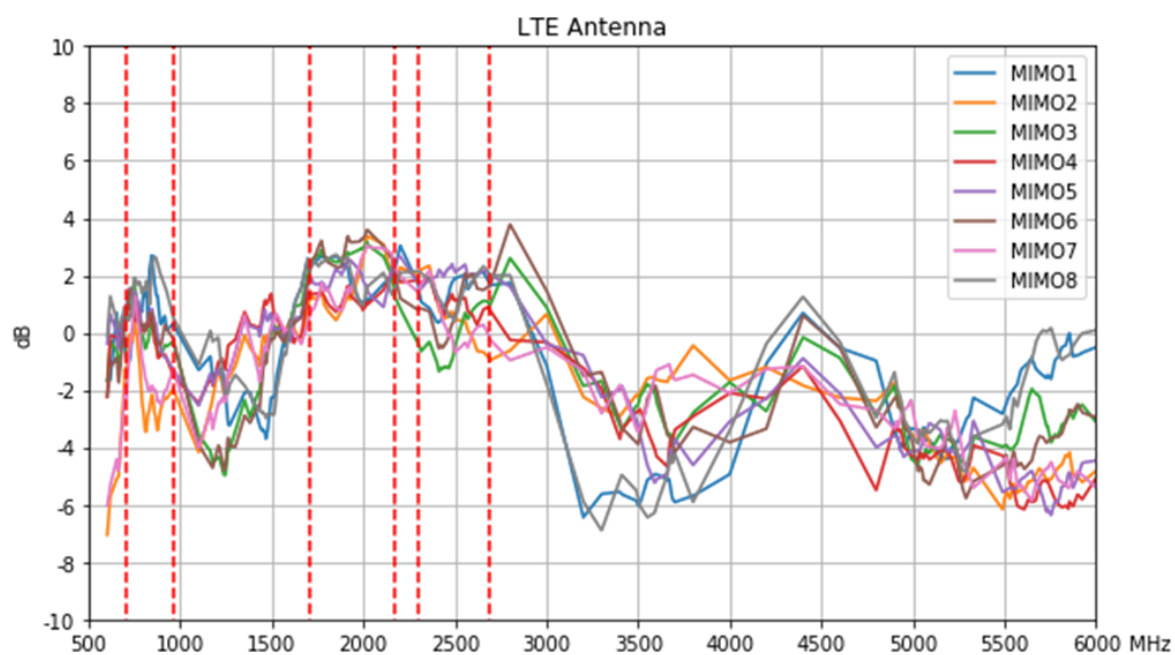
### 4.4 Average Gain

#### Cellular MIMO



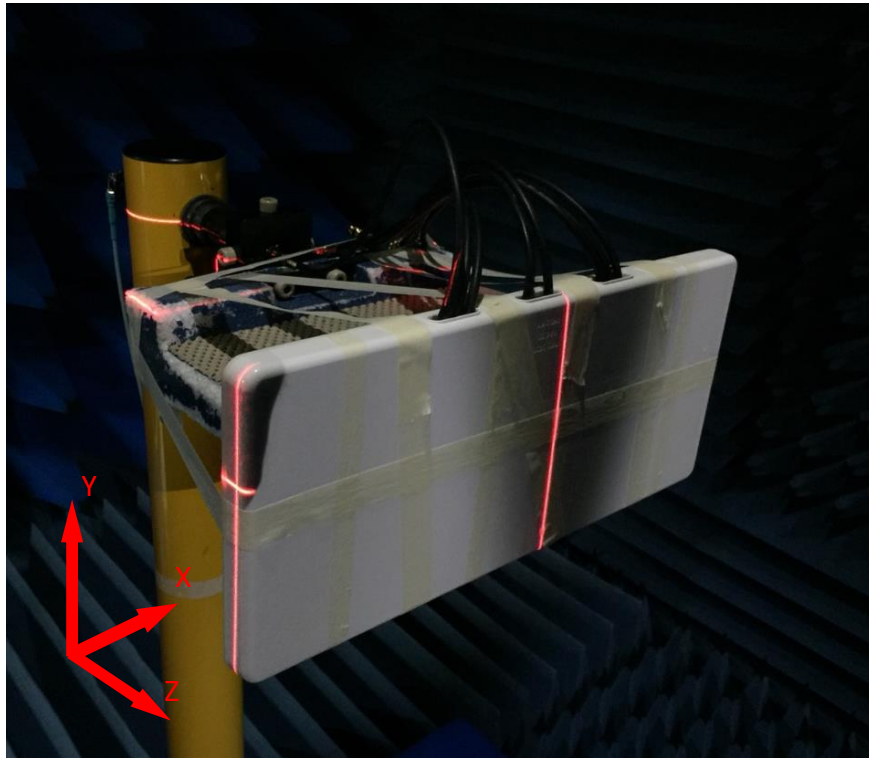
## 4.5 Peak Gain

### Cellular MIMO



## 5. Radiation Patterns

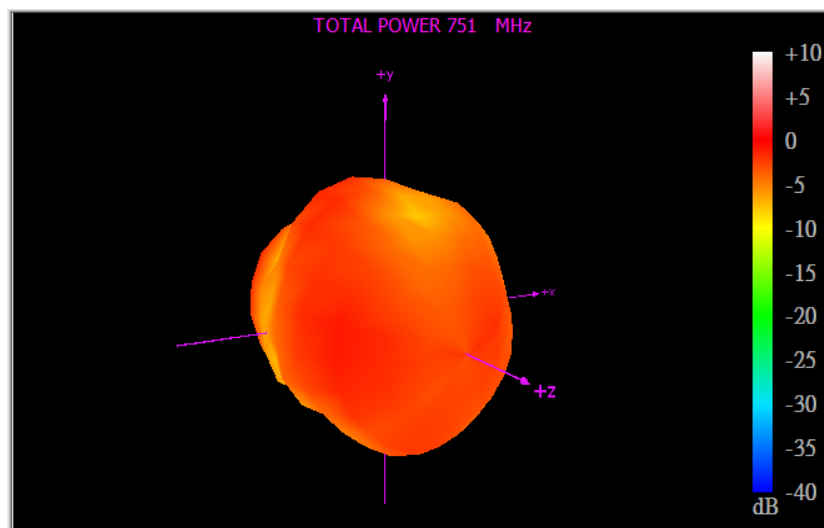
### 5.1 Test Setup



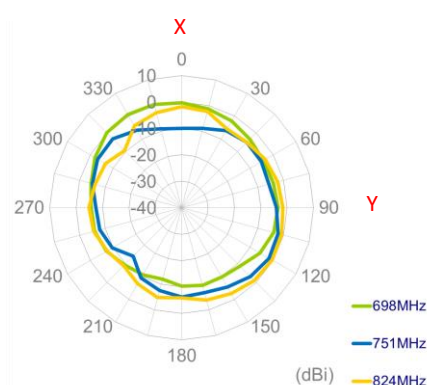
Free space

## 5.2 Cellular MIMO1 Radiation Pattern

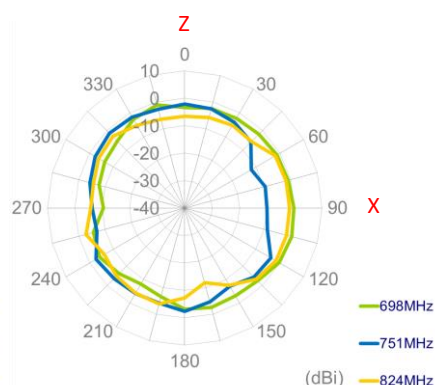
751MHz



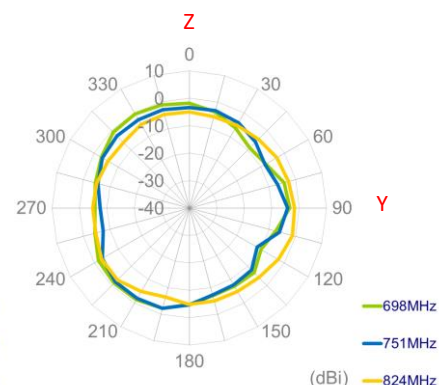
XY Plane



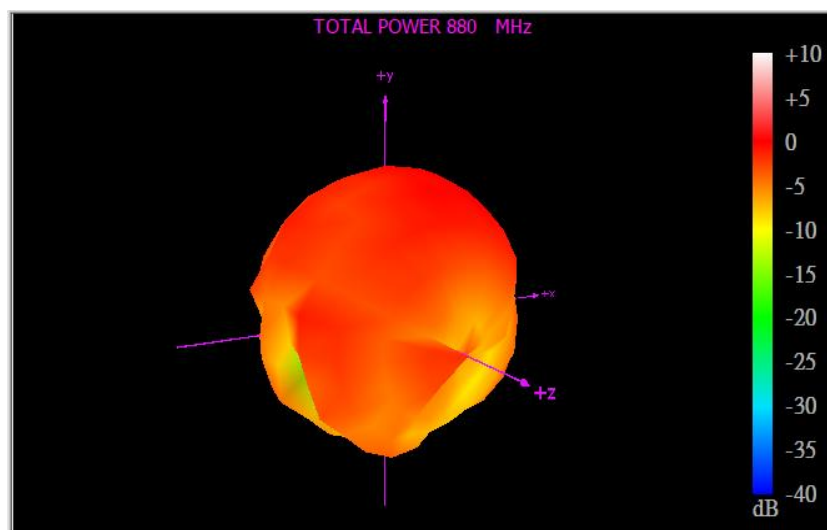
XZ Plane



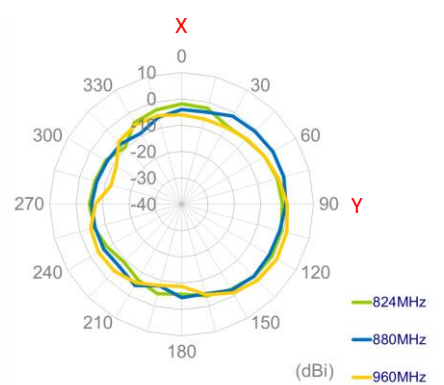
YZ Plane



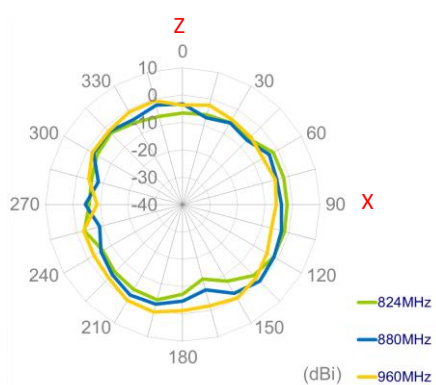
# 880MHz



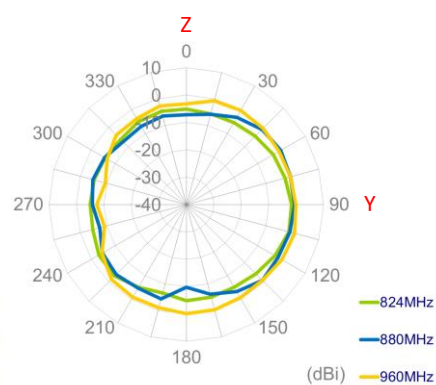
XY Plane



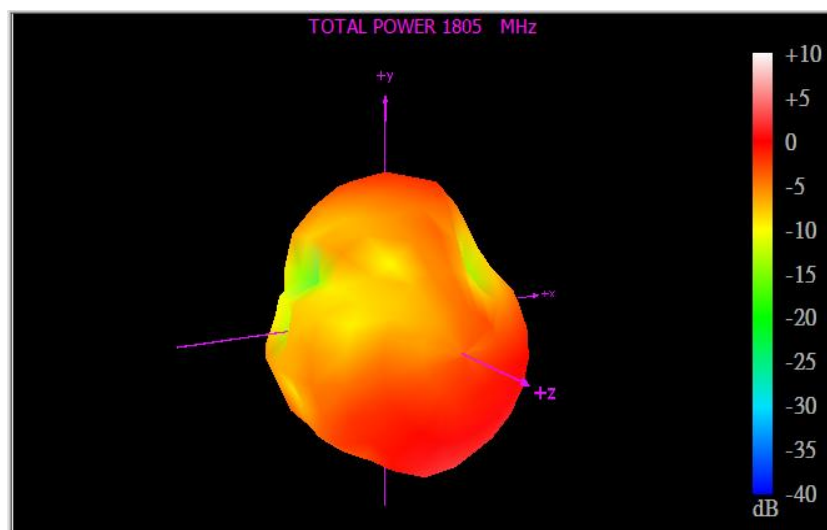
XZ Plane



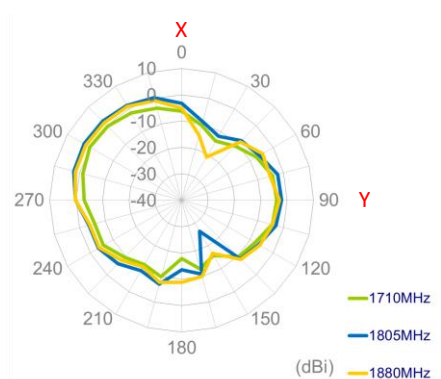
YZ Plane



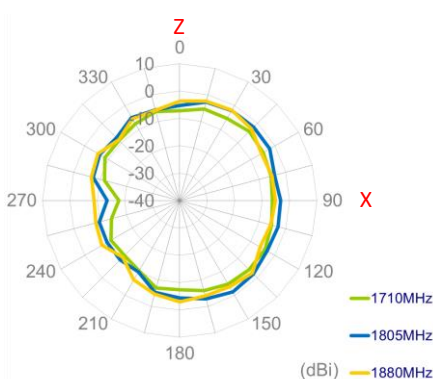
1805MHz



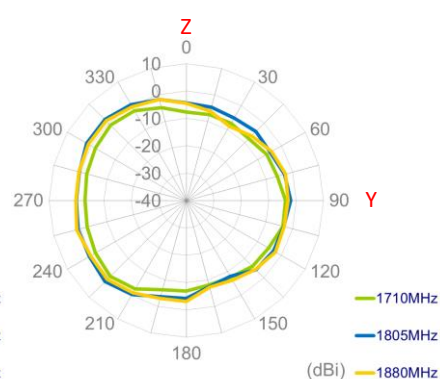
XY Plane



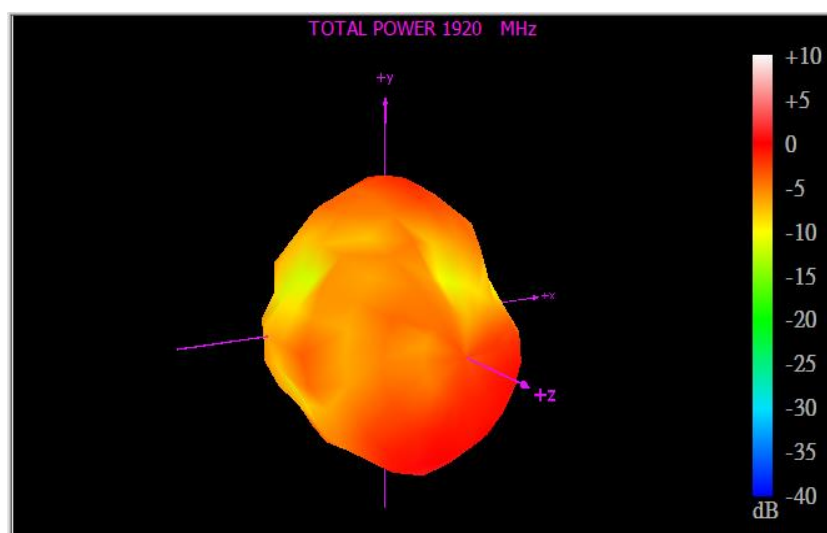
XZ Plane



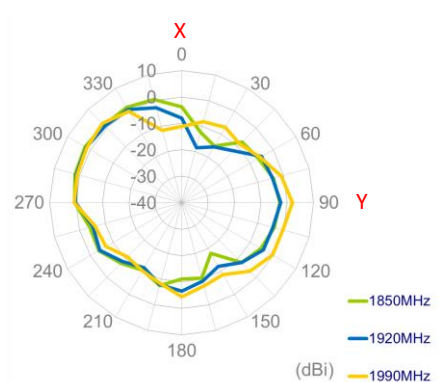
YZ Plane



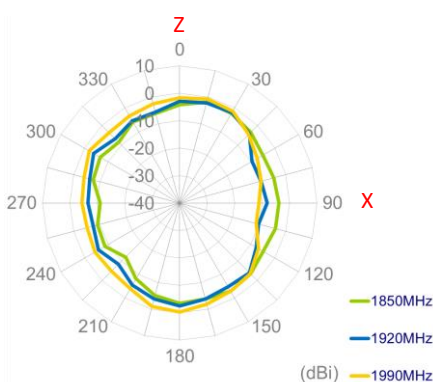
1920MHz



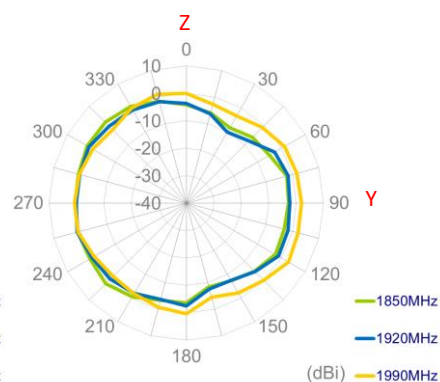
XY Plane



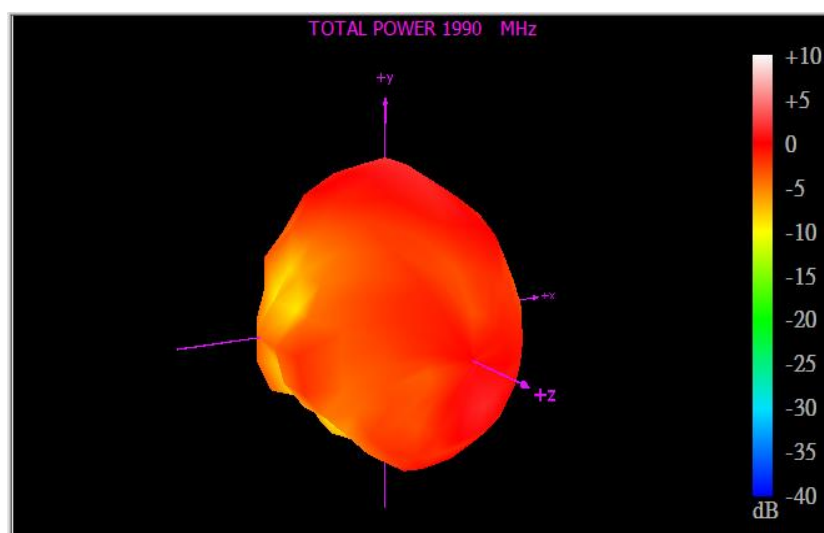
XZ Plane



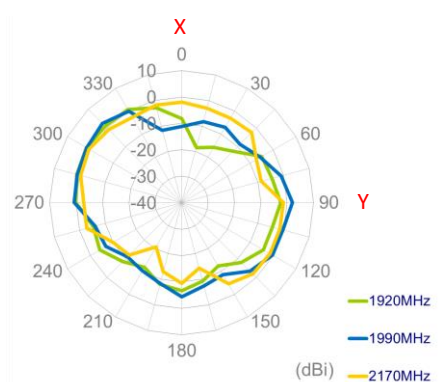
YZ Plane



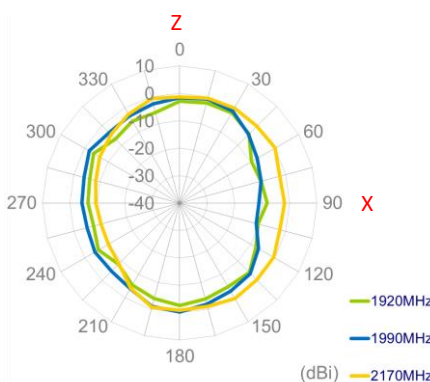
1990MHz



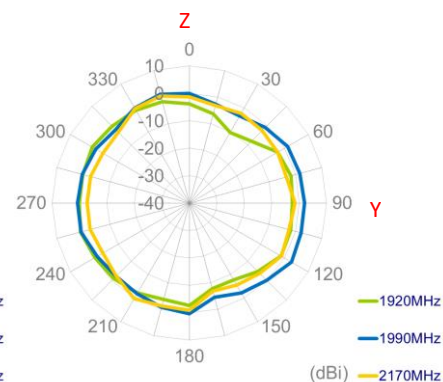
XY Plane



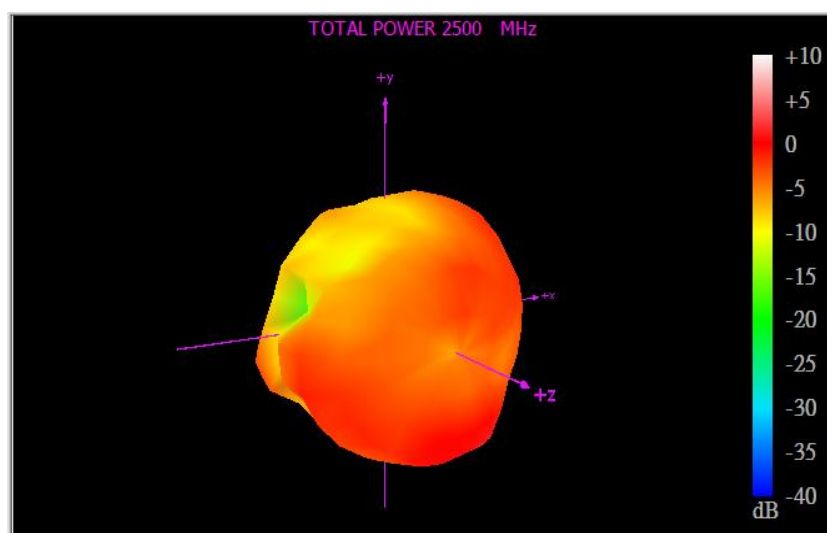
XZ Plane



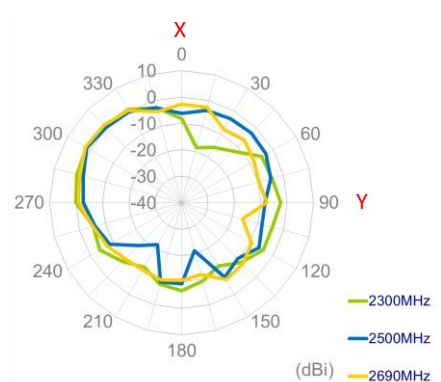
YZ Plane



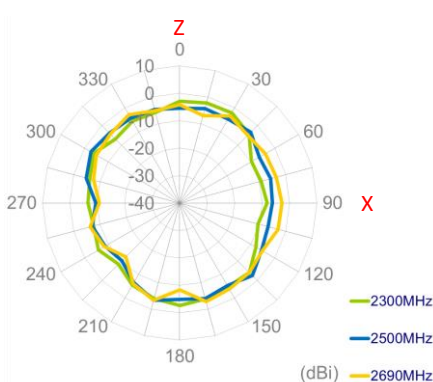
2500MHz



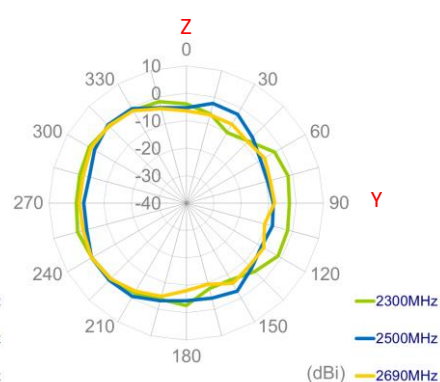
XY Plane



XZ Plane

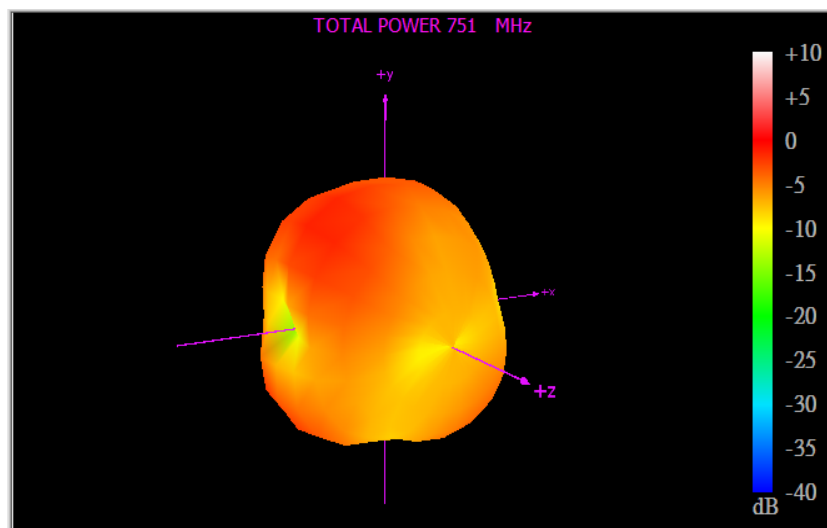


YZ Plane

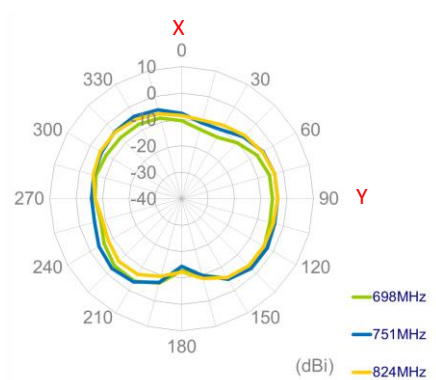


## 5.3 Cellular MIMO2 Radiation Pattern

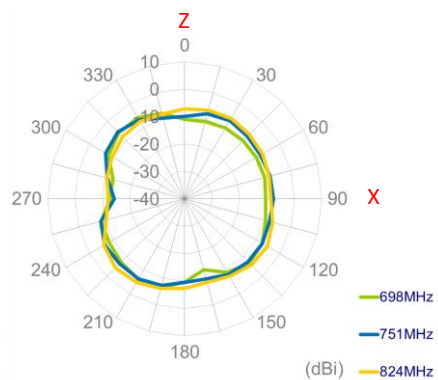
751MHz



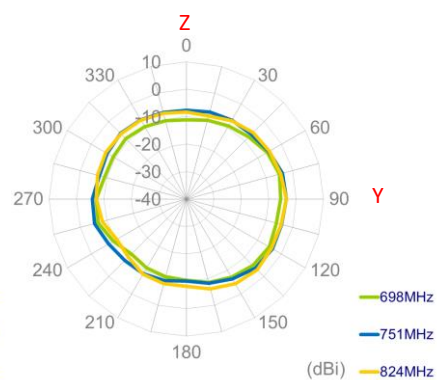
XY Plane



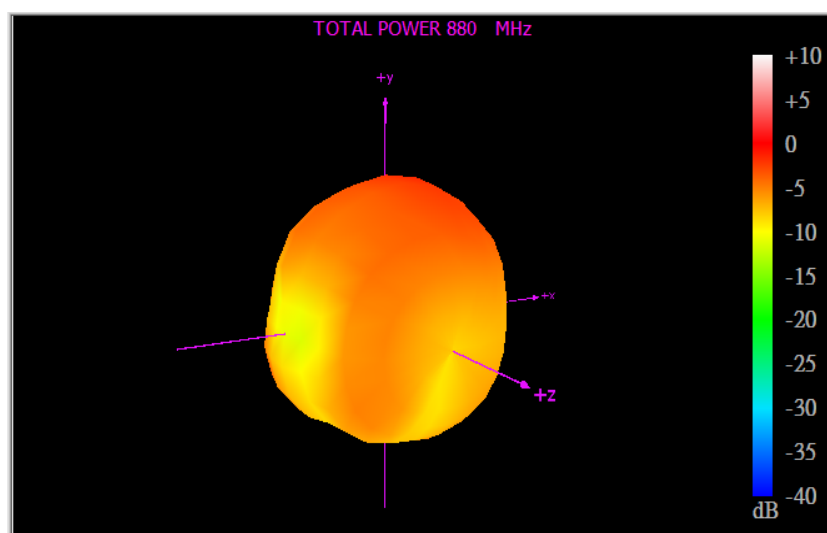
XZ Plane



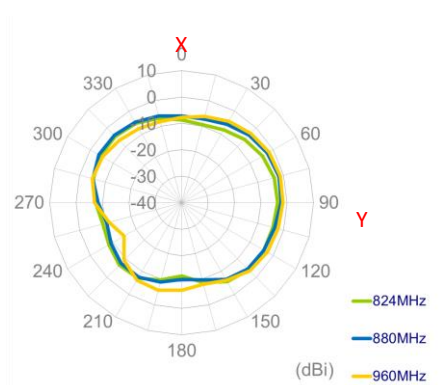
YZ Plane



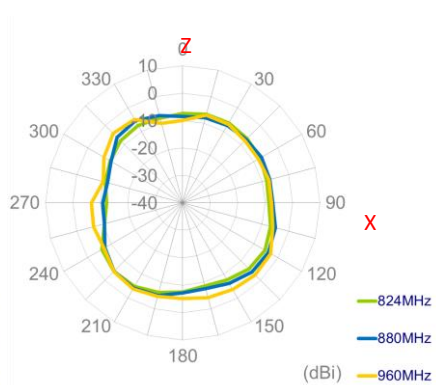
880MHz



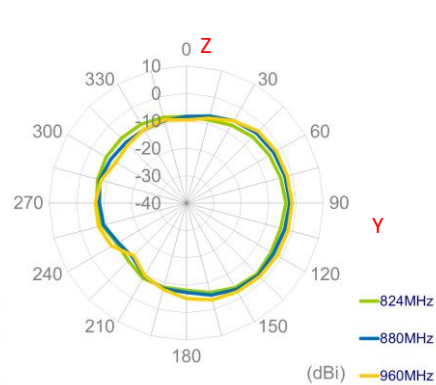
XY Plane



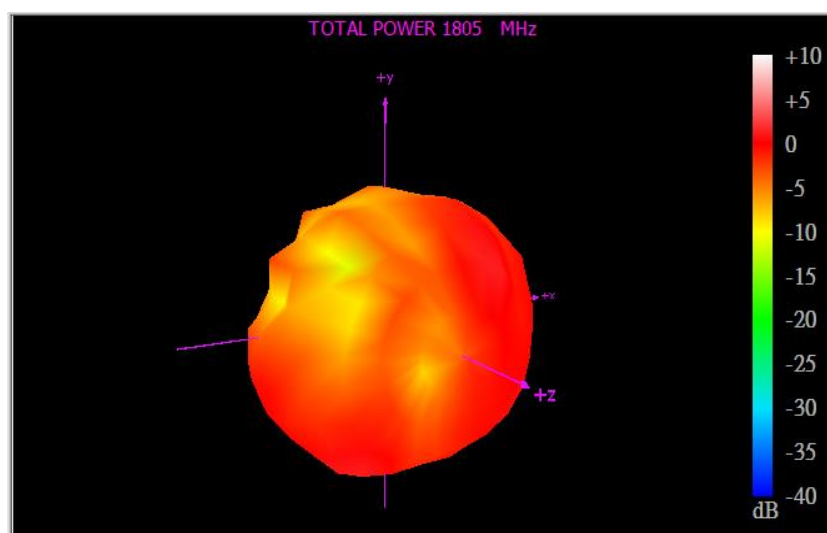
XZ Plane



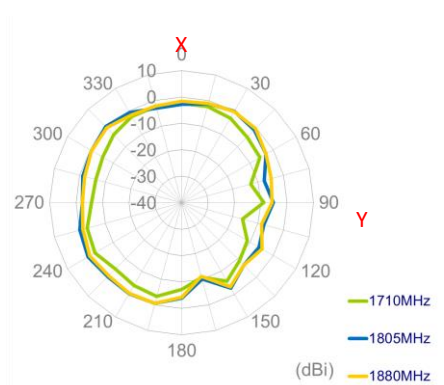
YZ Plane



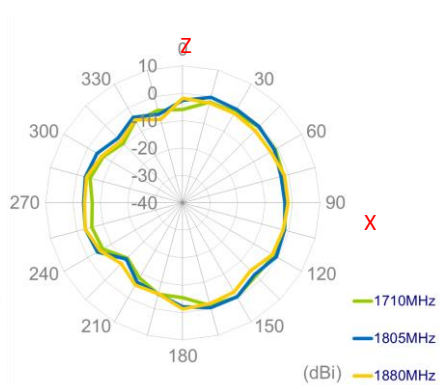
1805MHz



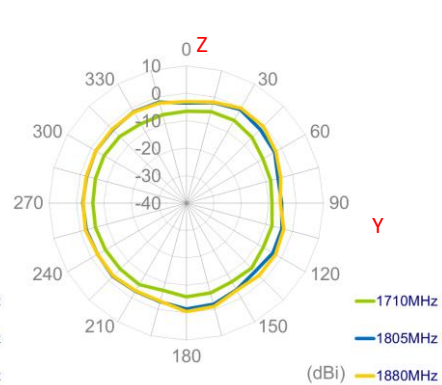
XY Plane



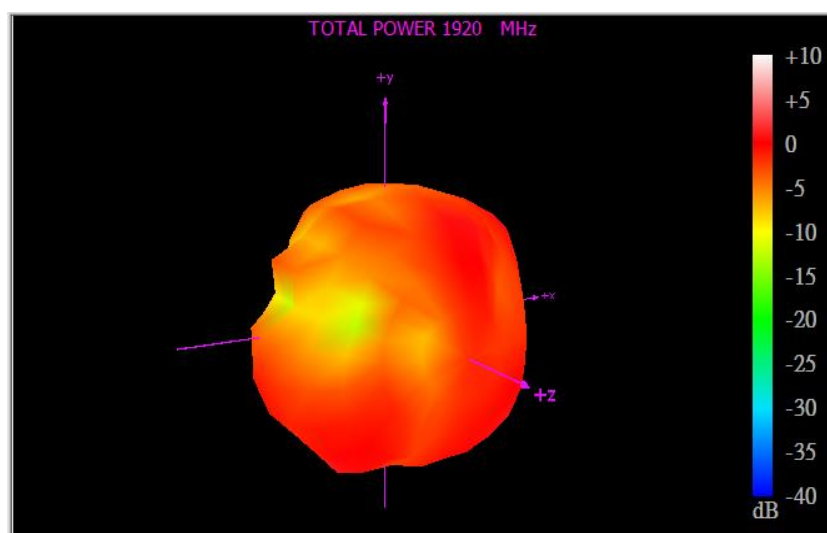
XZ Plane



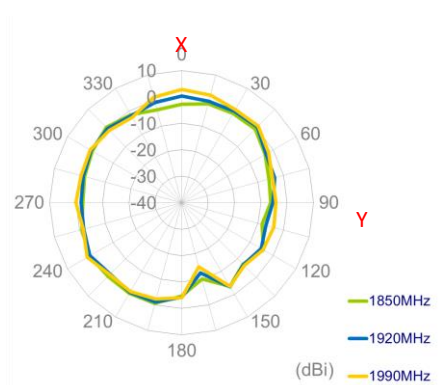
YZ Plane



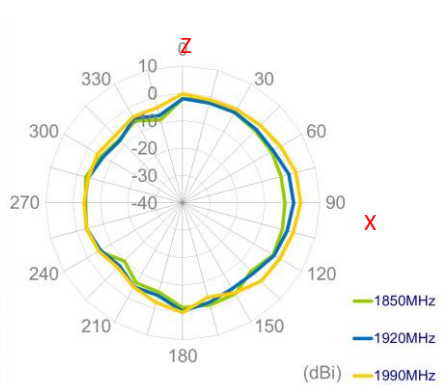
1920MHz



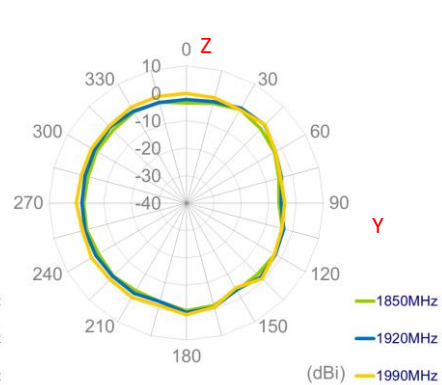
XY Plane



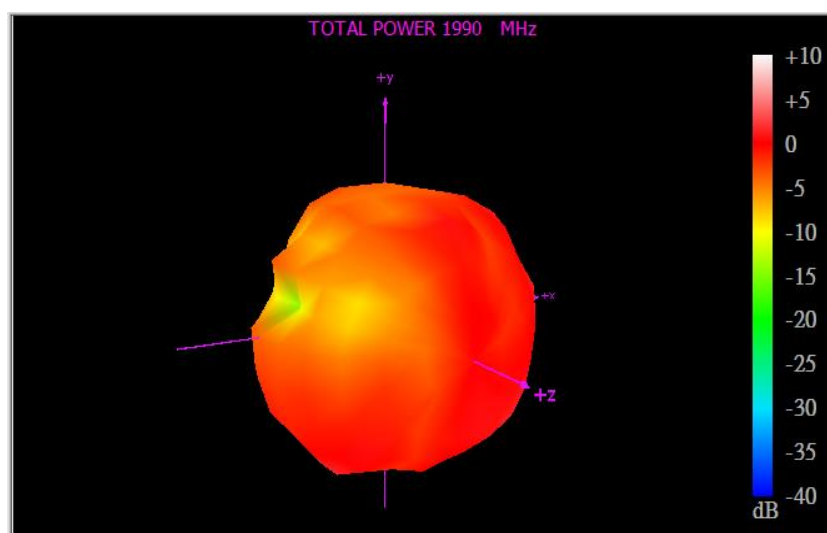
XZ Plane



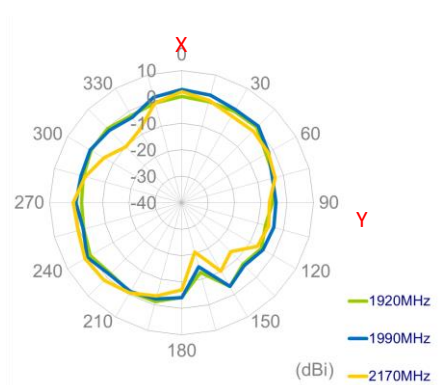
YZ Plane



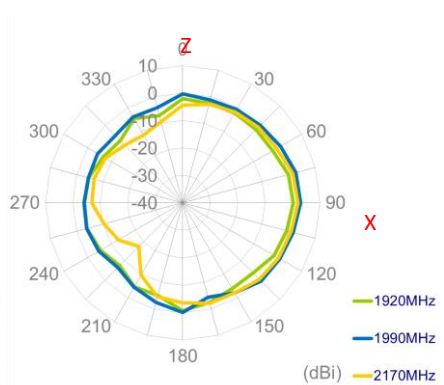
1990MHz



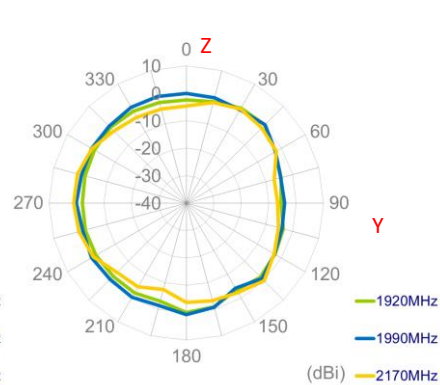
XY Plane



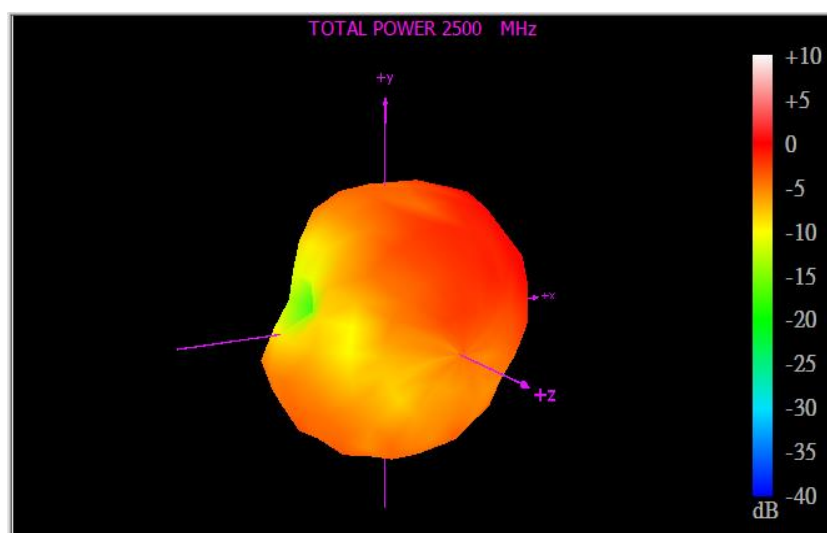
XZ Plane



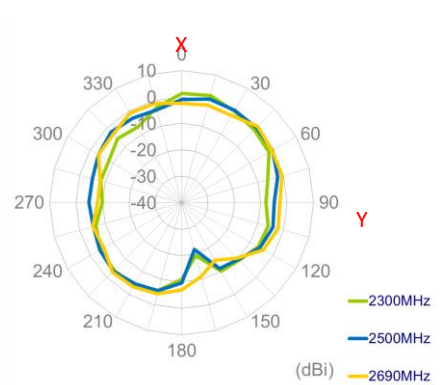
YZ Plane



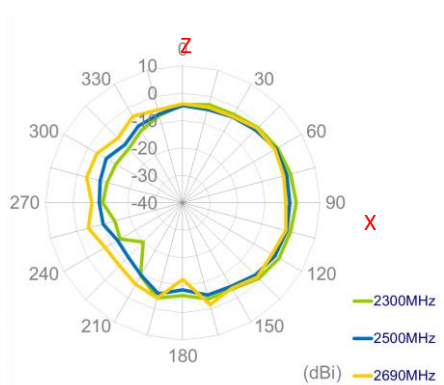
2500MHz



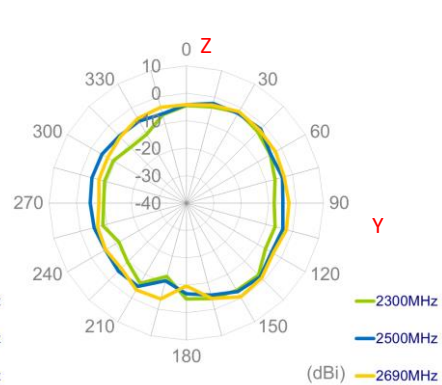
XY Plane



XZ Plane

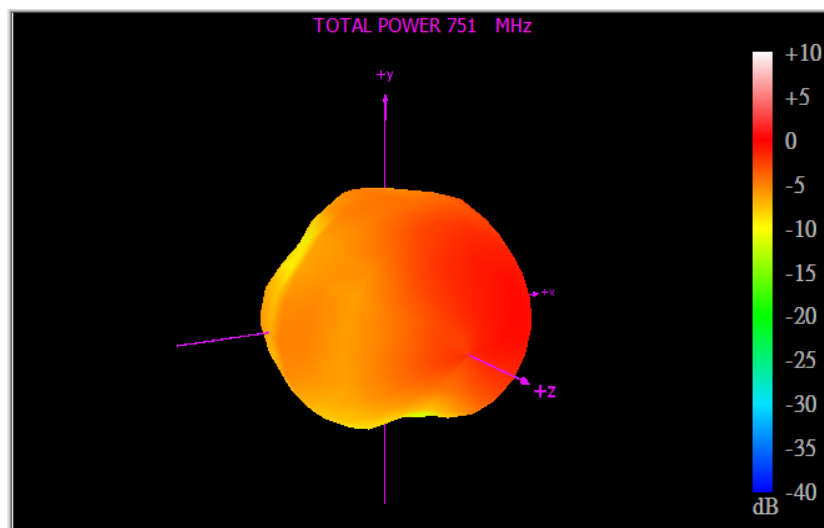


YZ Plane

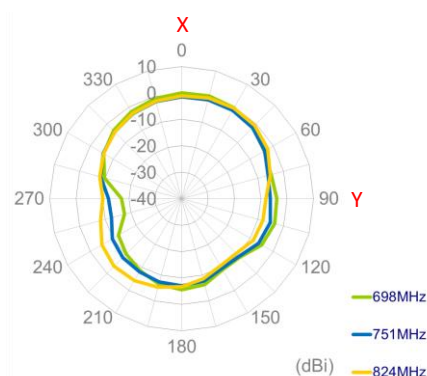


## 5.4 Cellular MIMO3 Radiation Pattern

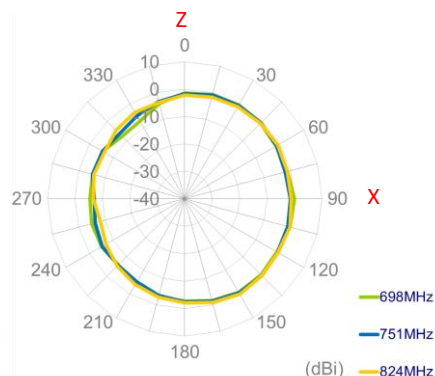
751MHz



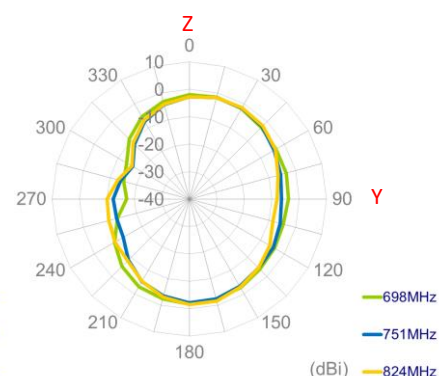
XY Plane



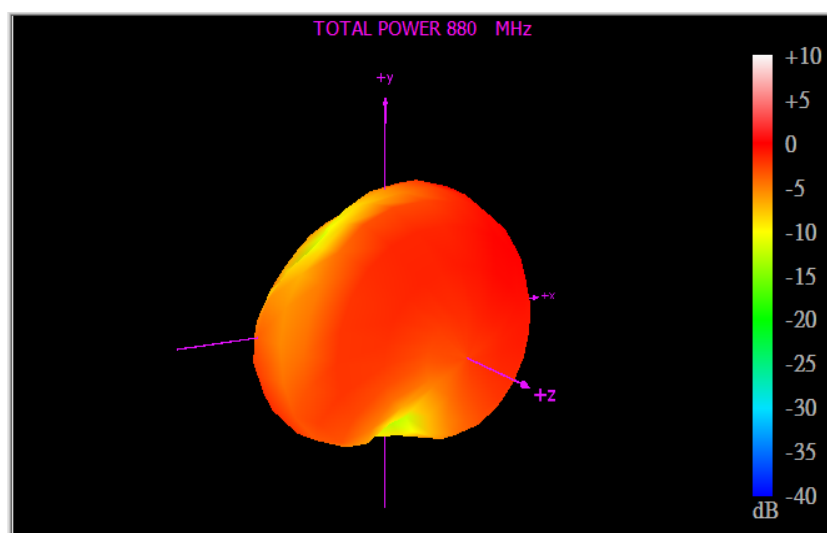
XZ Plane



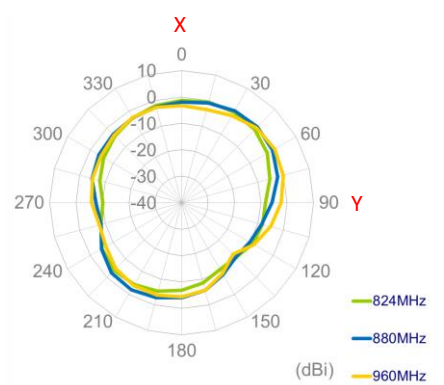
YZ Plane



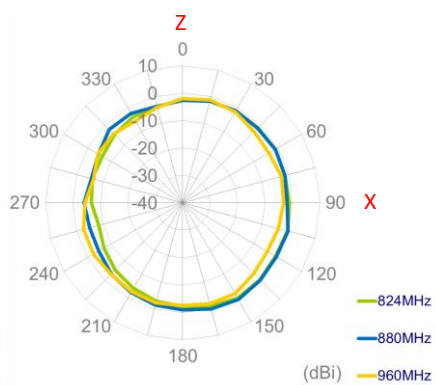
880MHz



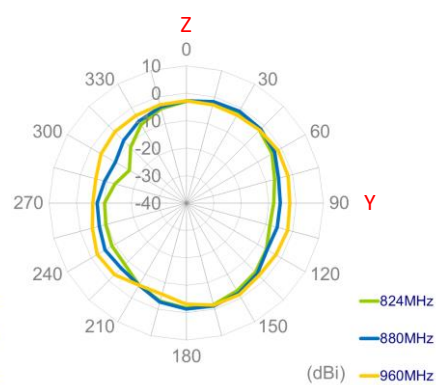
XY Plane



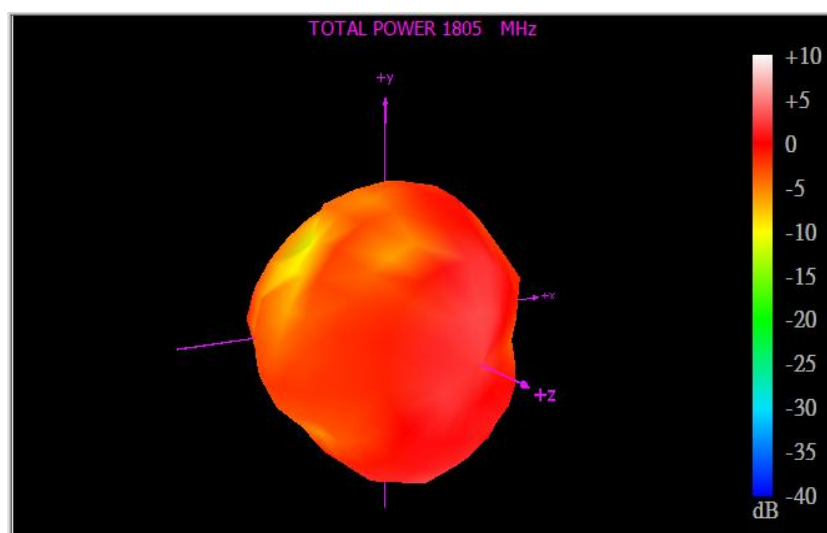
XZ Plane



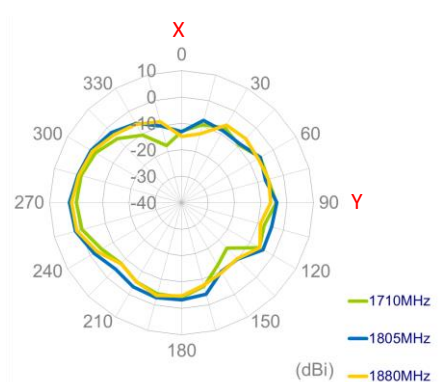
YZ Plane



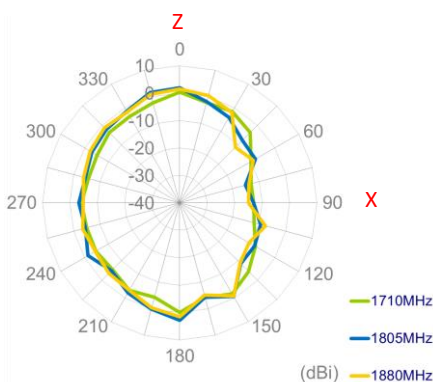
1805MHz



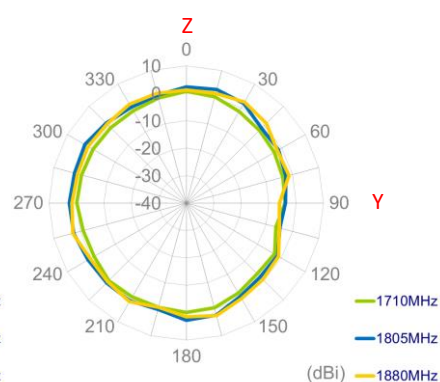
XY Plane



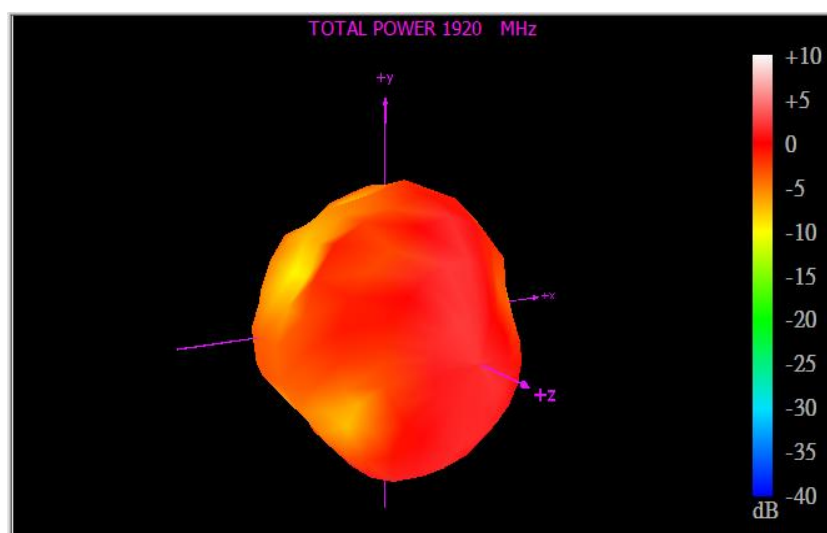
XZ Plane



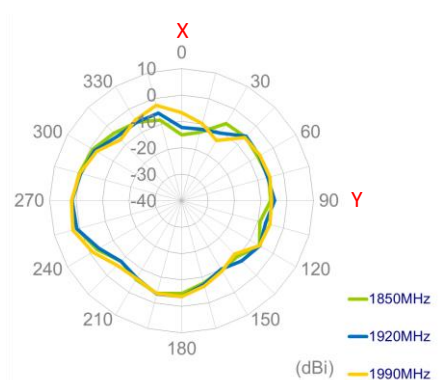
YZ Plane



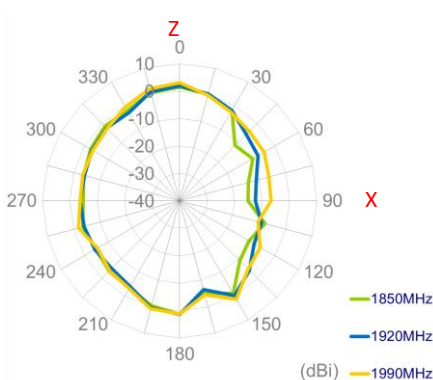
1920MHz



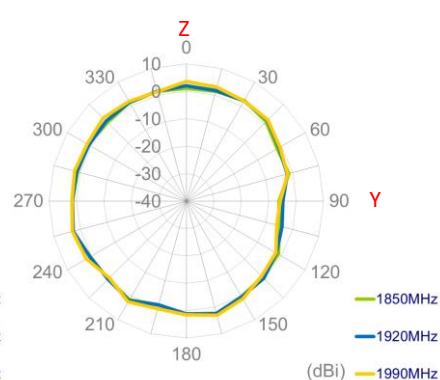
XY Plane



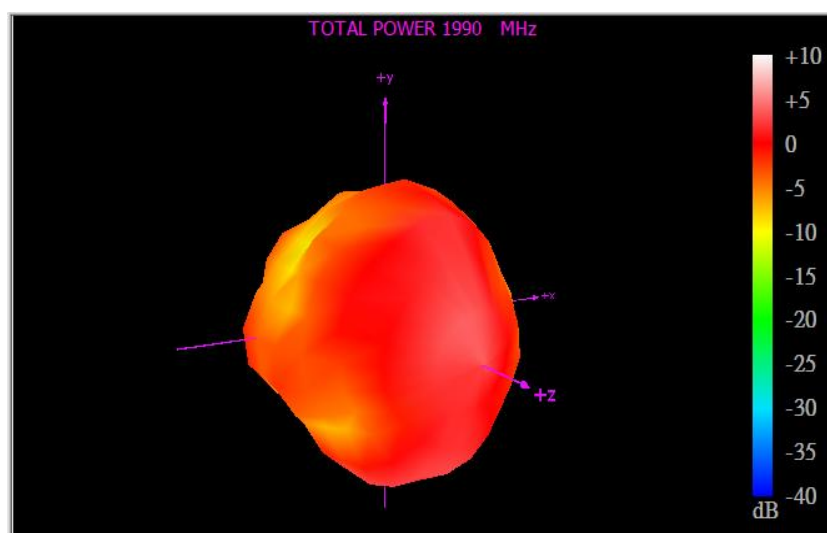
XZ Plane



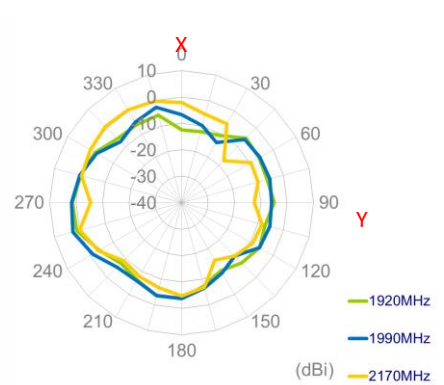
YZ Plane



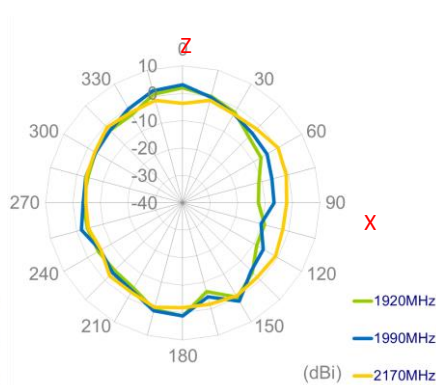
1990MHz



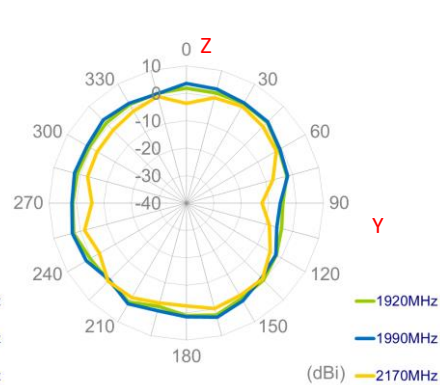
XY Plane



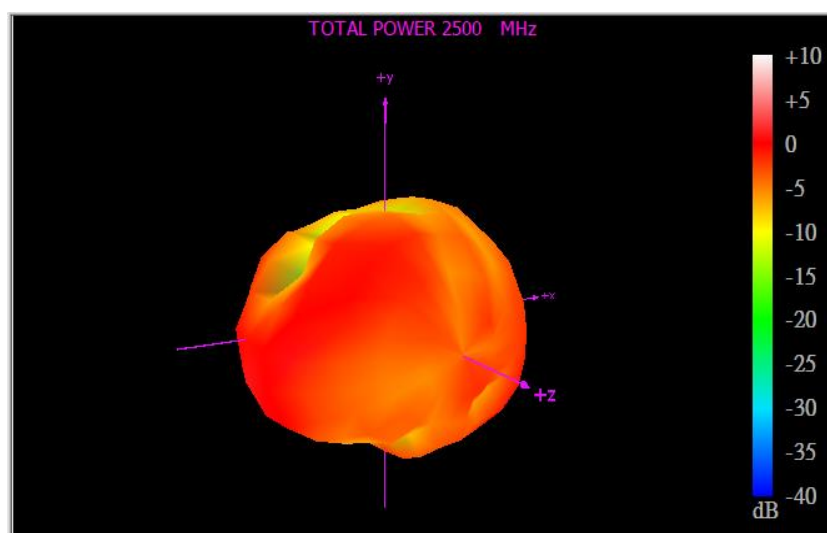
XZ Plane



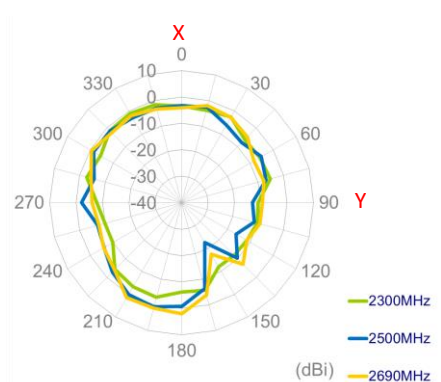
YZ Plane



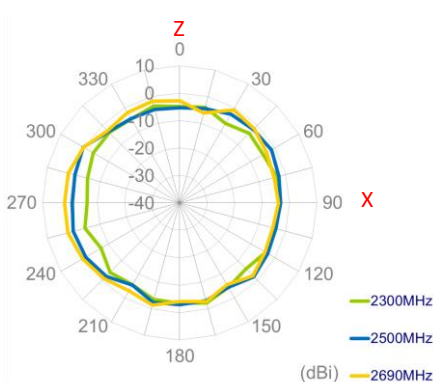
2500MHz



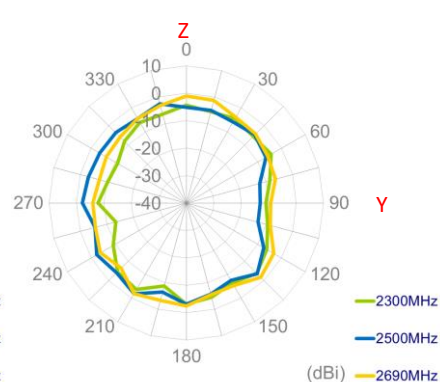
XY Plane



XZ Plane

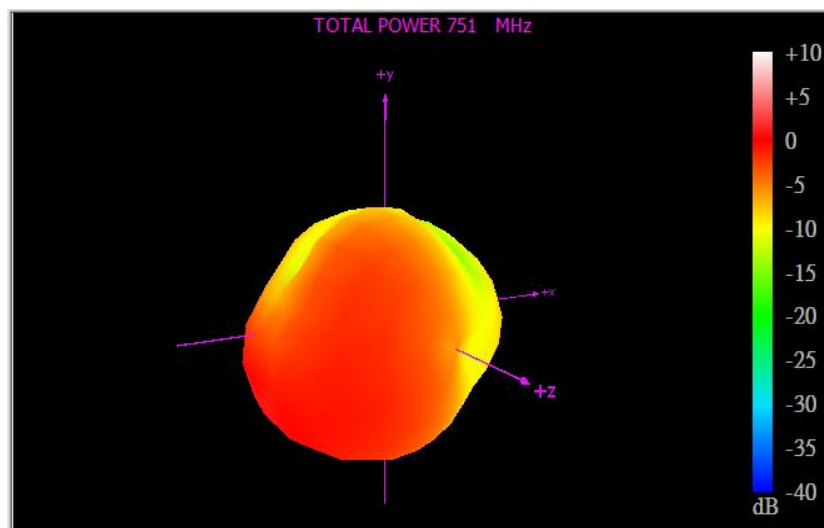


YZ Plane

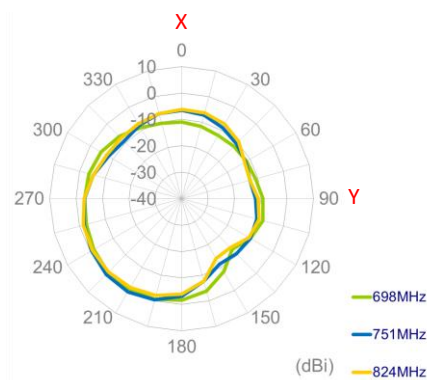


## 5.5 Cellular MIMO4 Radiation Pattern

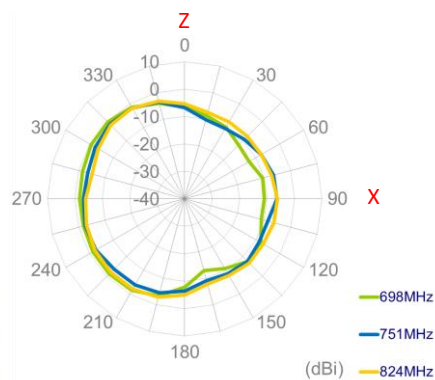
751MHz



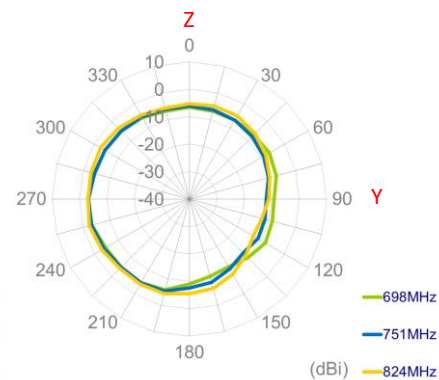
XY Plane



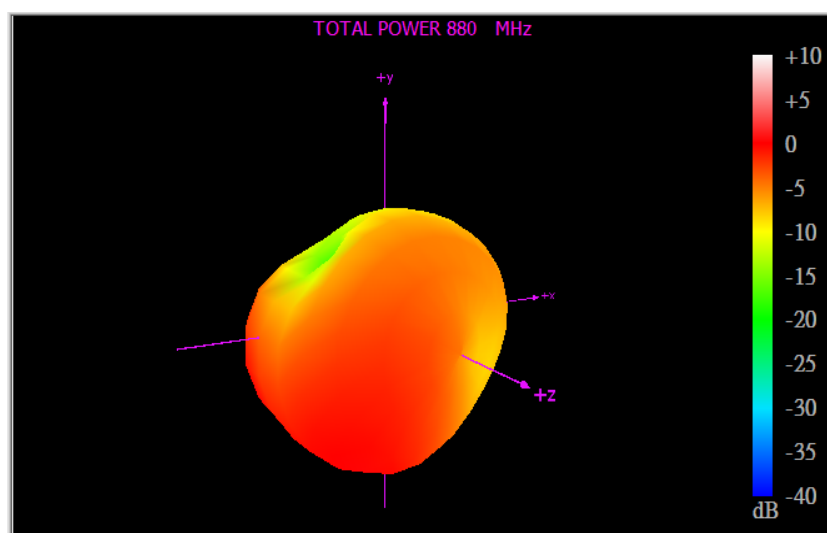
XZ Plane



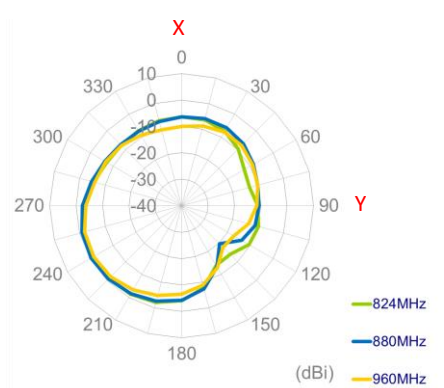
YZ Plane



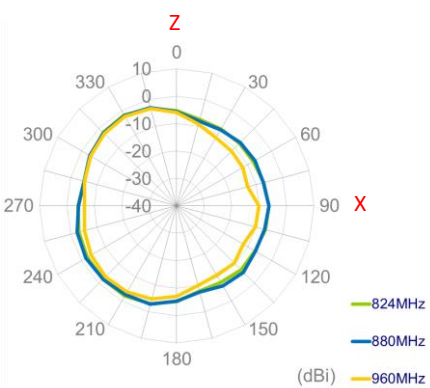
880MHz



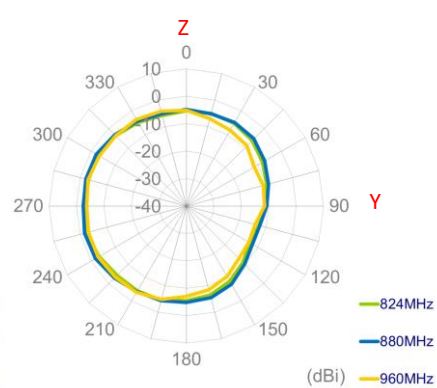
XY Plane



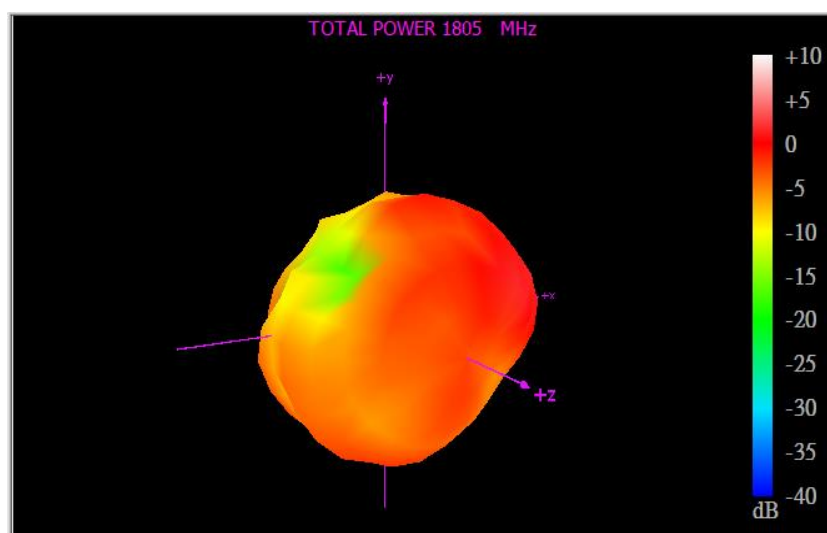
XZ Plane



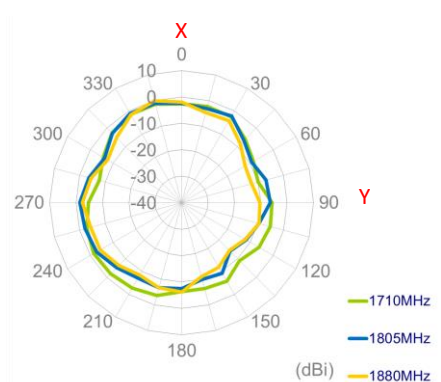
YZ Plane



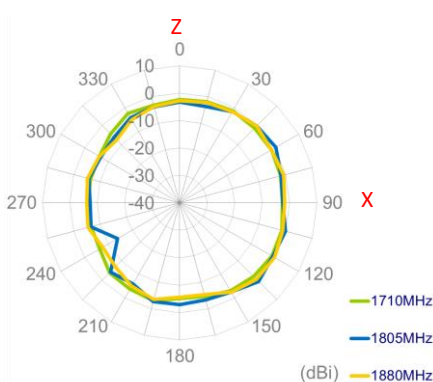
1805MHz



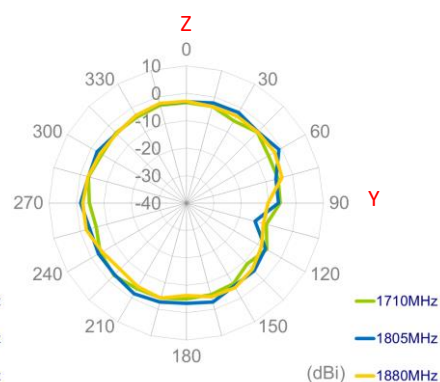
XY Plane



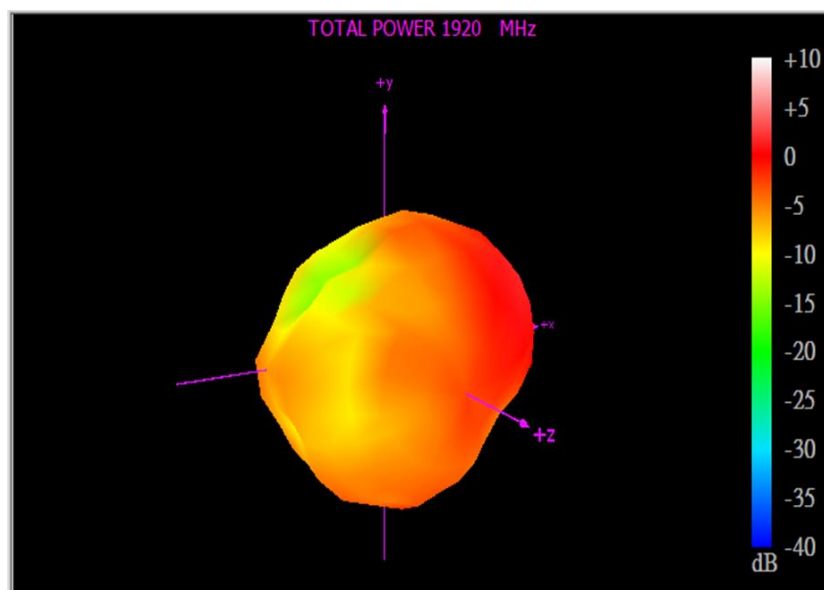
XZ Plane



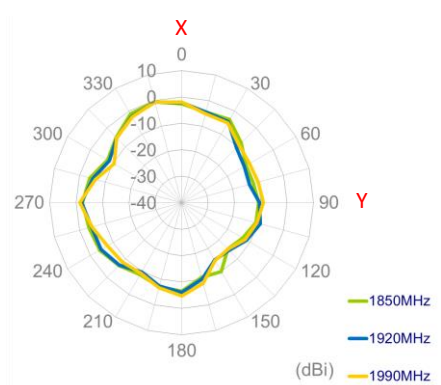
YZ Plane



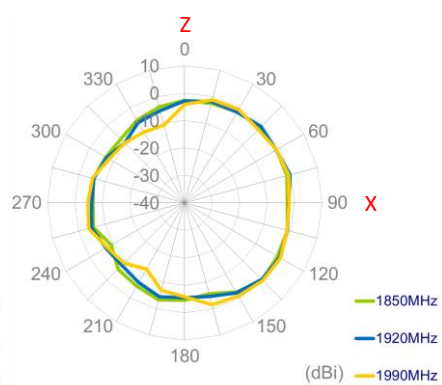
1920MHz



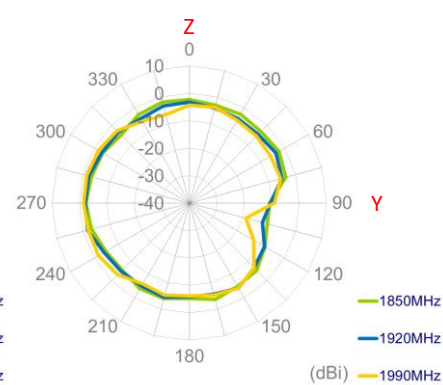
XY Plane



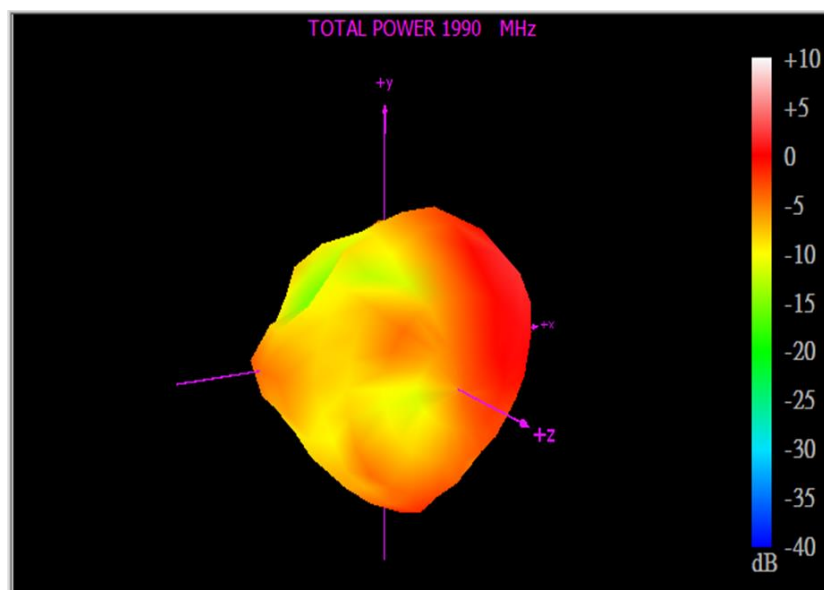
XZ Plane



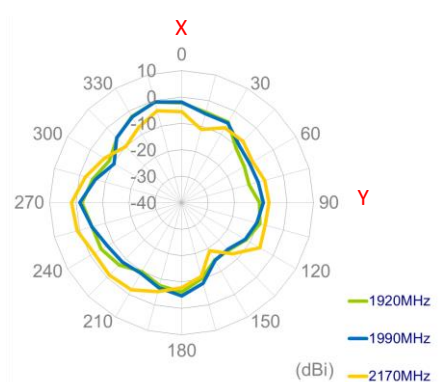
YZ Plane



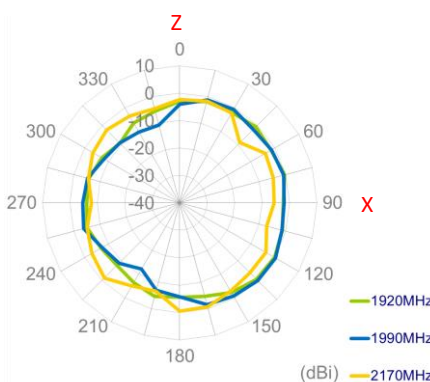
1990MHz



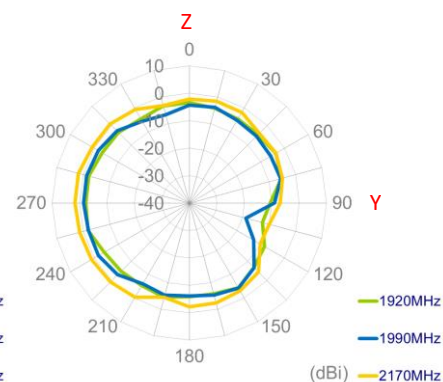
XY Plane



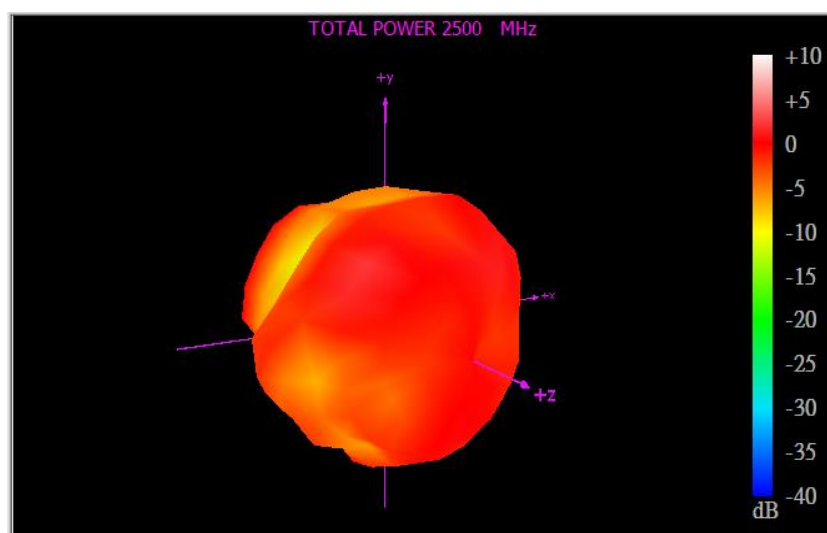
XZ Plane



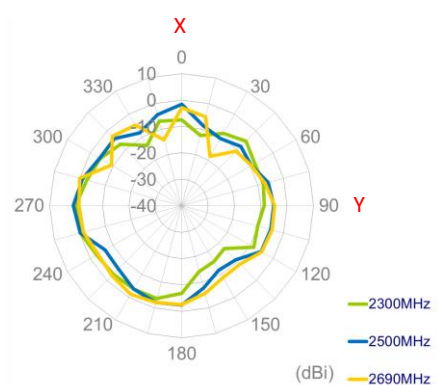
YZ Plane



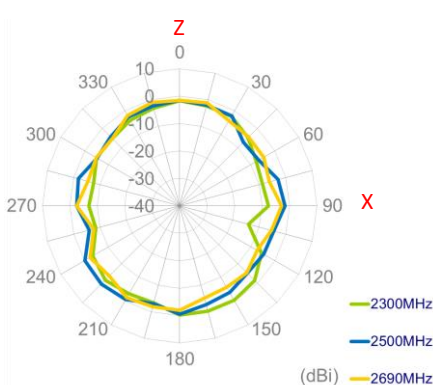
2500MHz



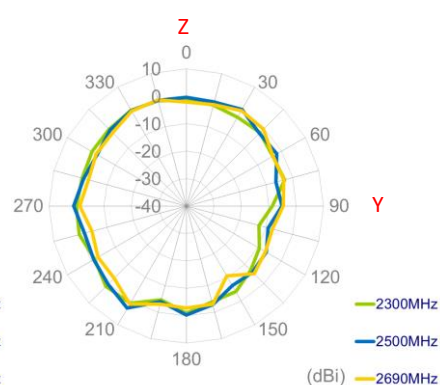
XY Plane



XZ Plane

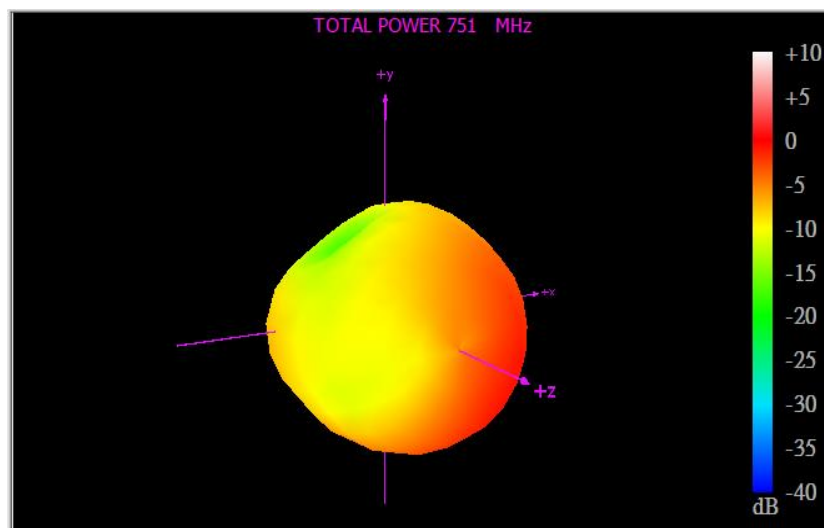


YZ Plane

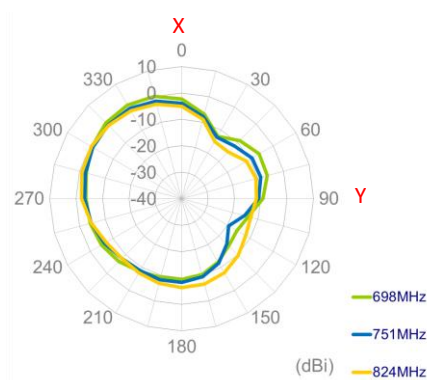


## 5.6 Cellular MIMO5 Radiation Pattern

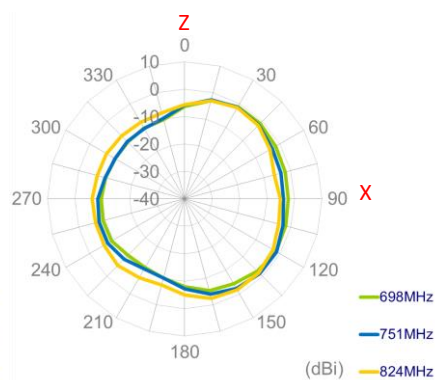
751MHz



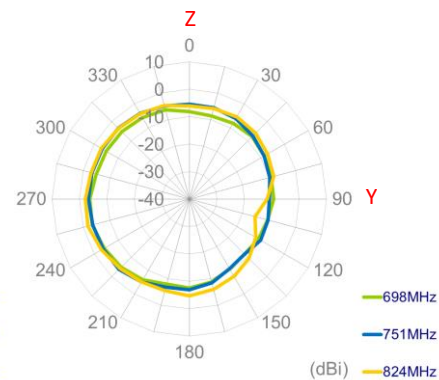
XY Plane



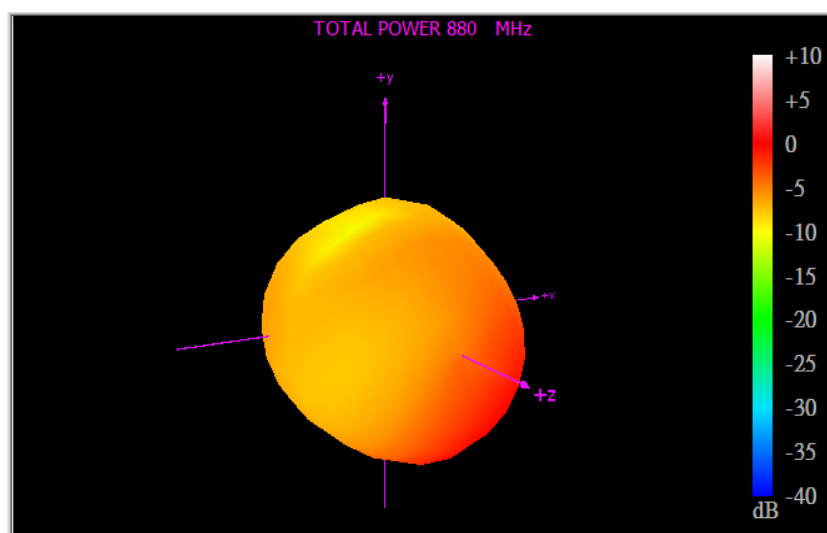
XZ Plane



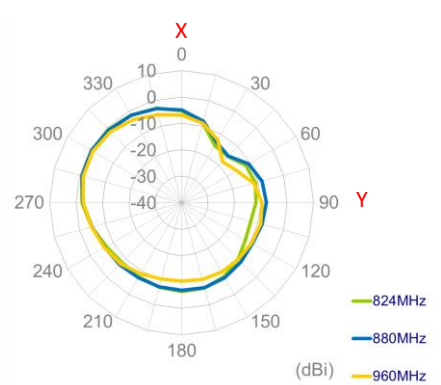
YZ Plane



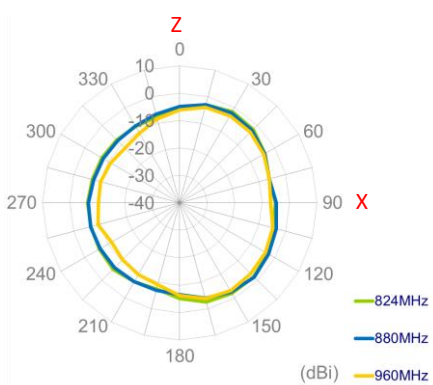
880MHz



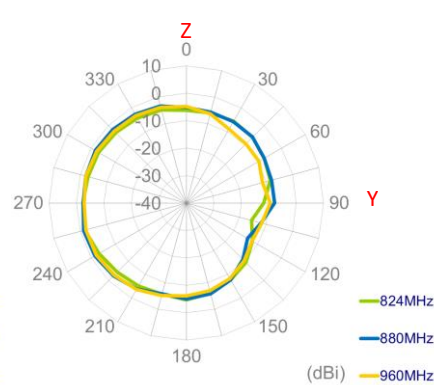
XY Plane



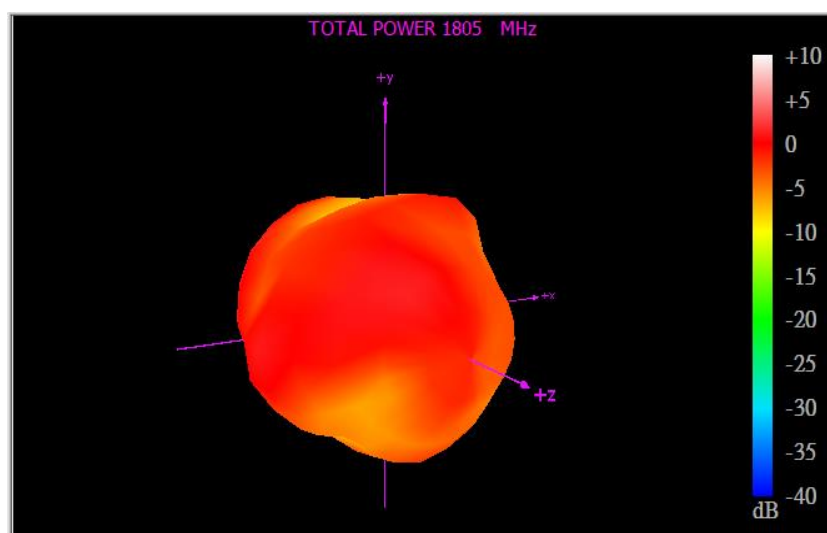
XZ Plane



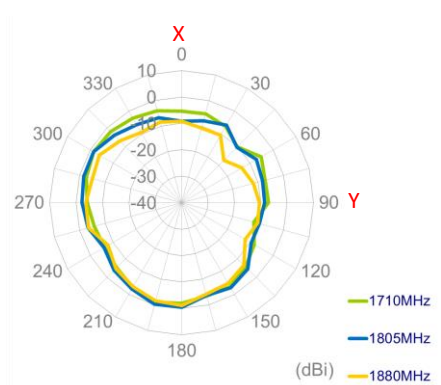
YZ Plane



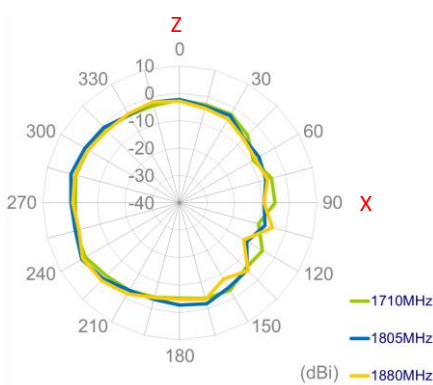
1805MHz



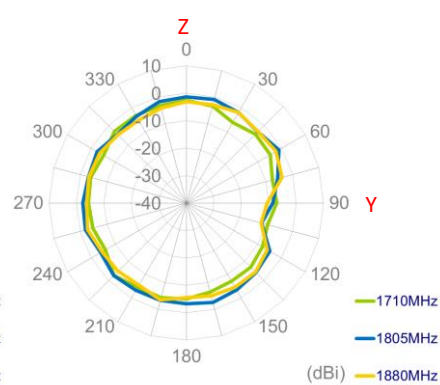
XY Plane



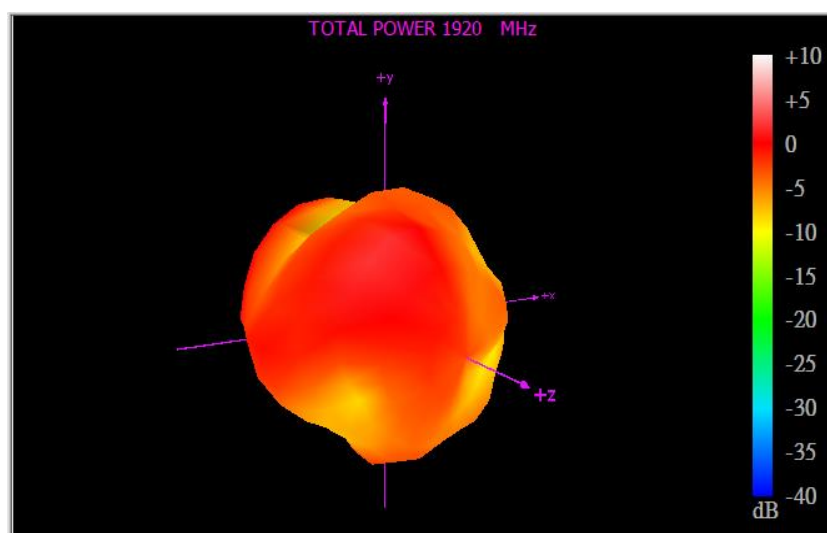
XZ Plane



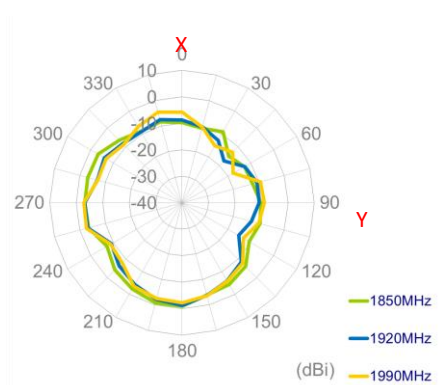
YZ Plane



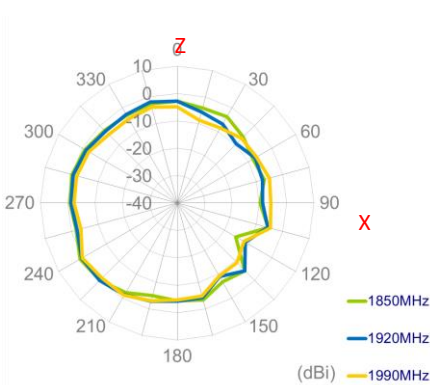
1920MHz



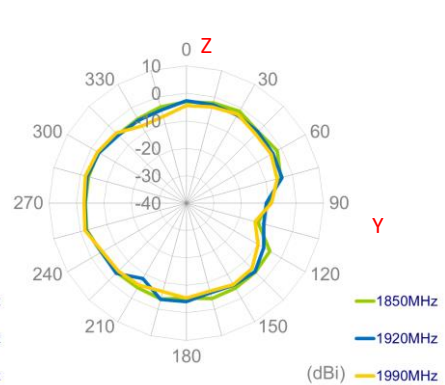
XY Plane



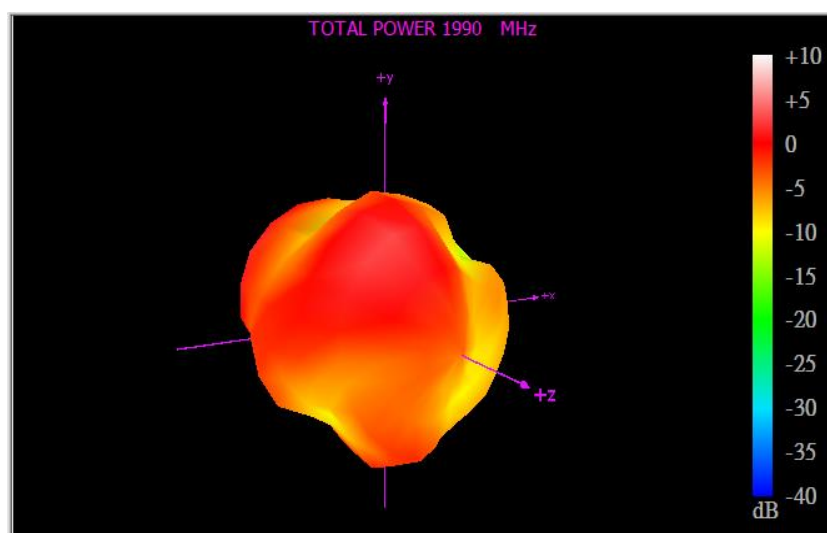
XZ Plane



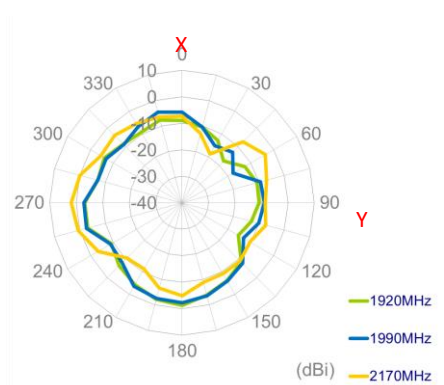
YZ Plane



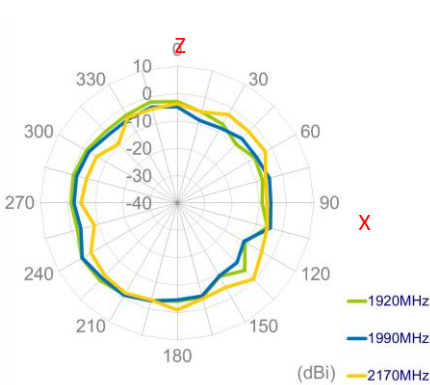
1990MHz



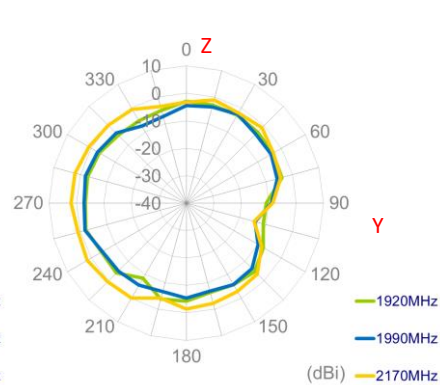
XY Plane



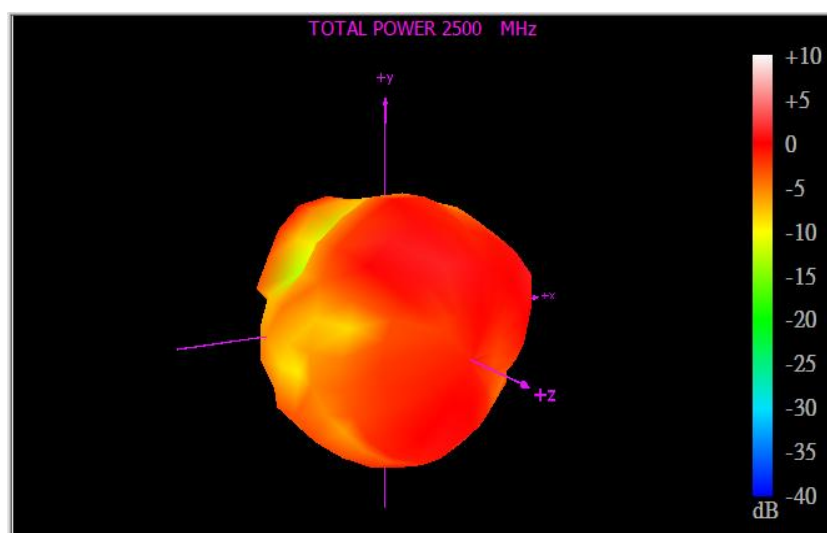
XZ Plane



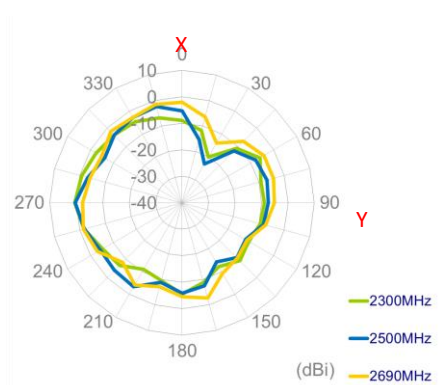
YZ Plane



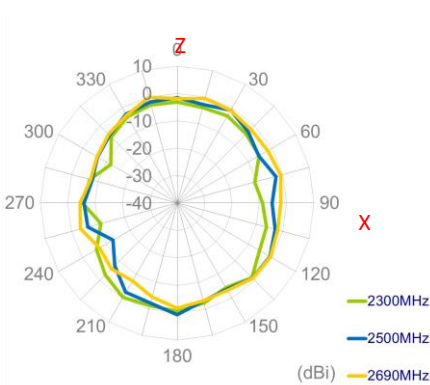
2500MHz



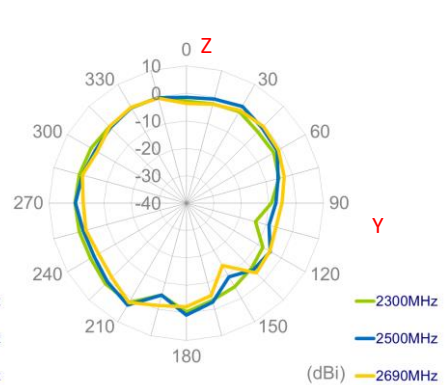
XY Plane



XZ Plane

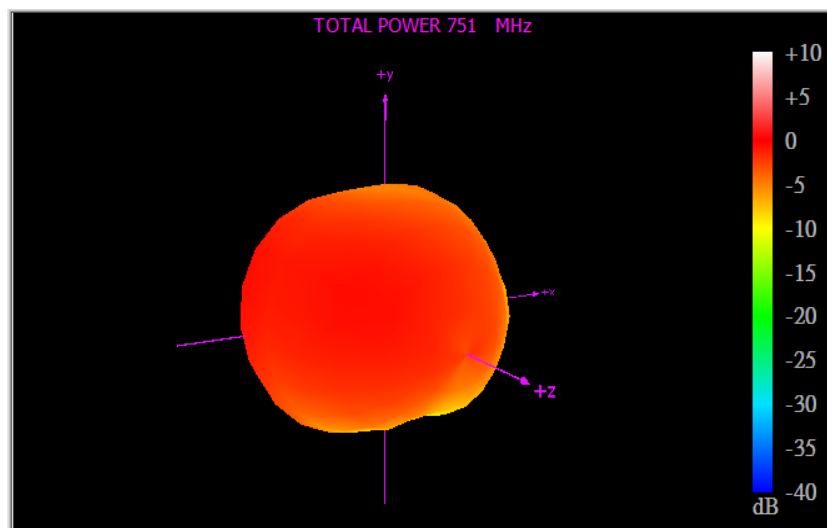


YZ Plane

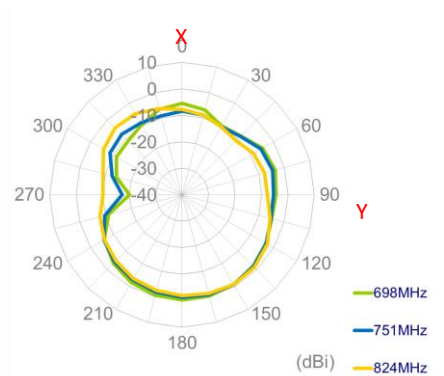


## 5.7 Cellular MIMO6 Radiation Pattern

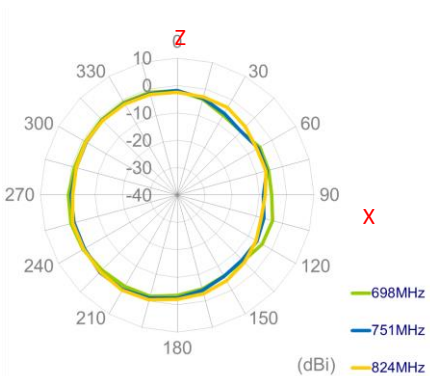
751MHz



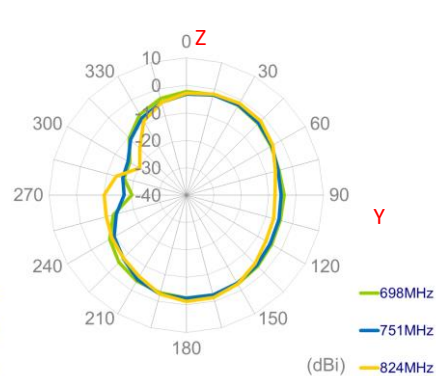
XY Plane



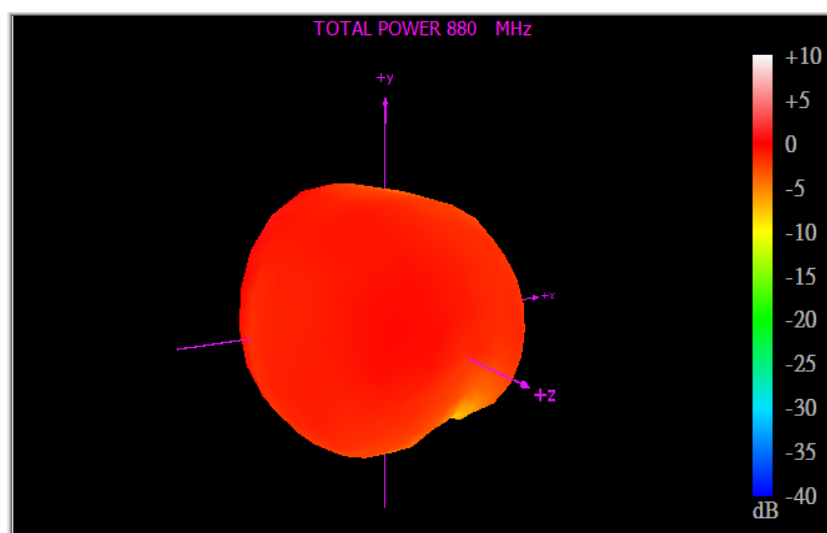
XZ Plane



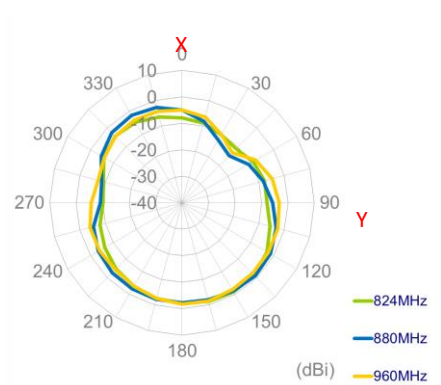
YZ Plane



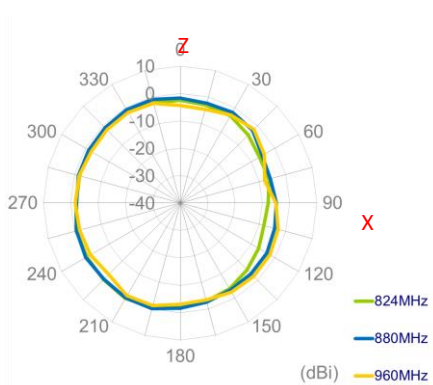
880MHz



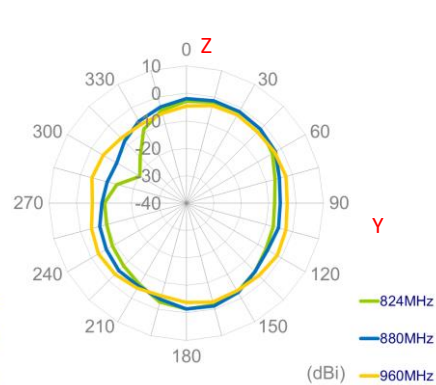
XY Plane



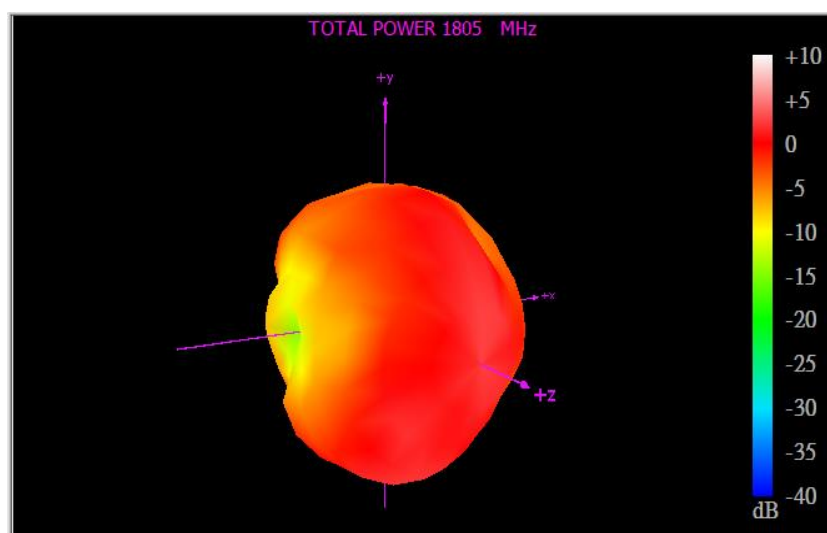
XZ Plane



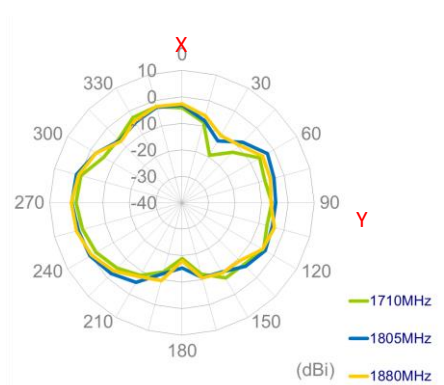
YZ Plane



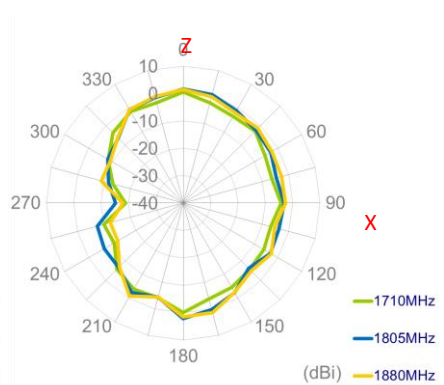
1805MHz



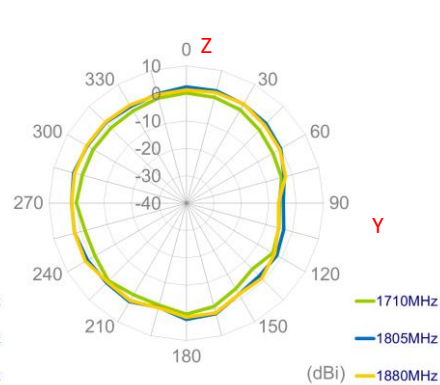
XY Plane



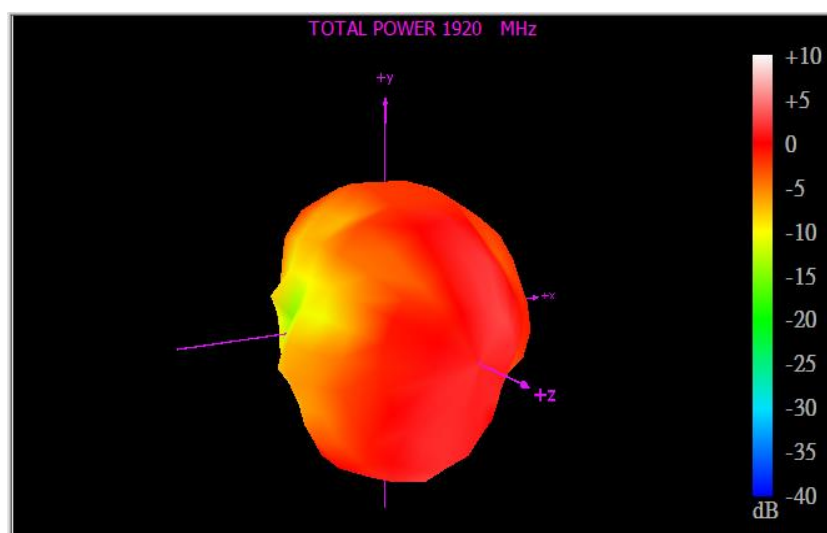
XZ Plane



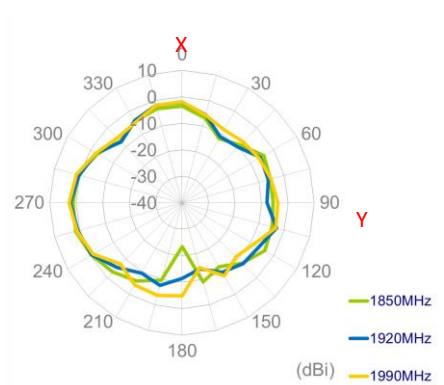
YZ Plane



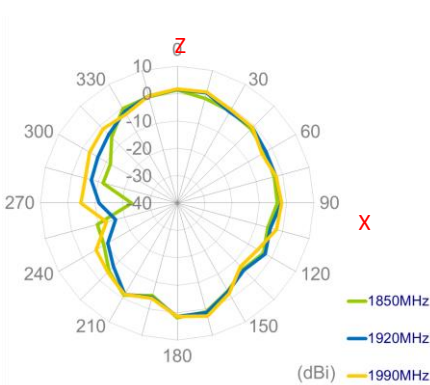
1920MHz



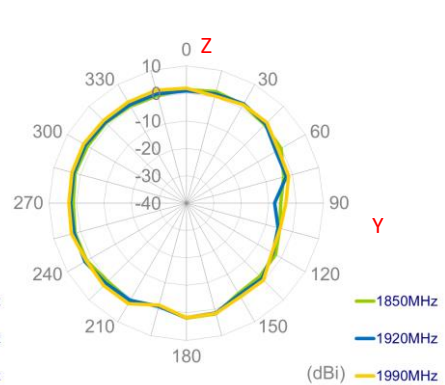
XY Plane



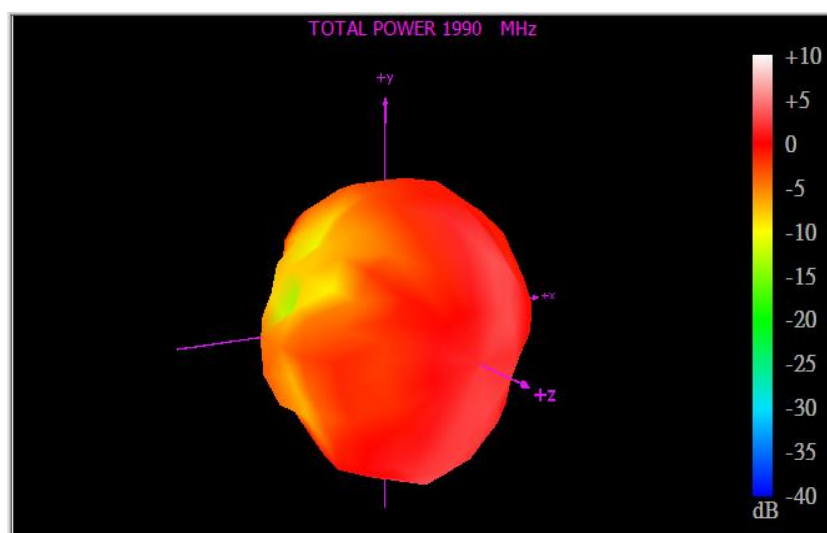
XZ Plane



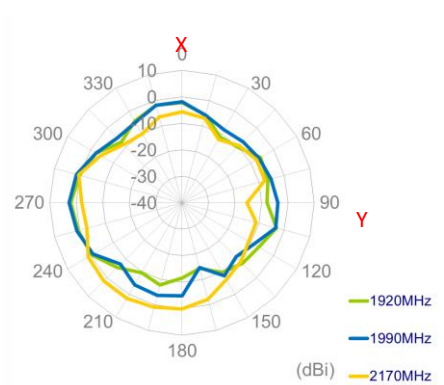
YZ Plane



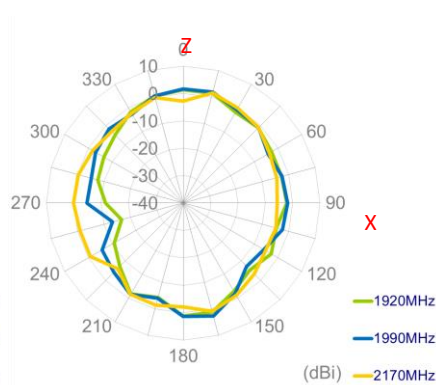
1990MHz



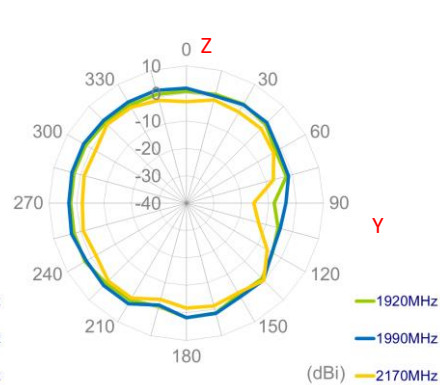
XY Plane



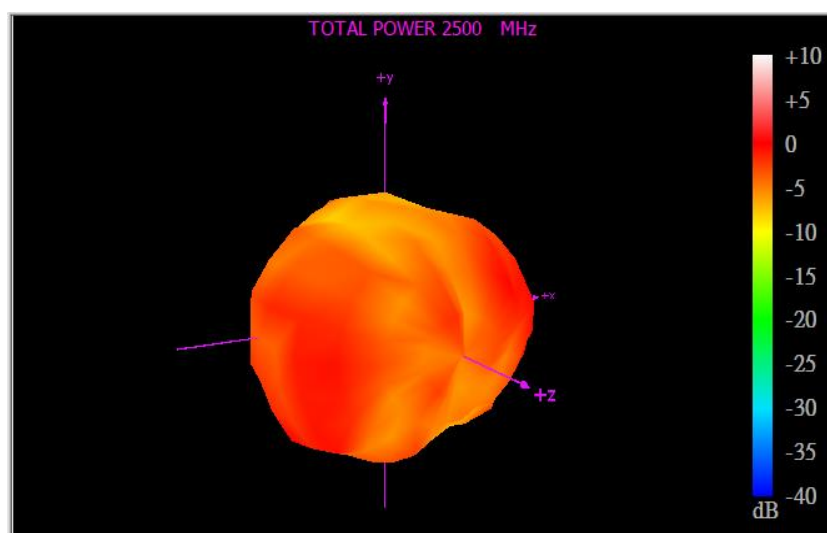
XZ Plane



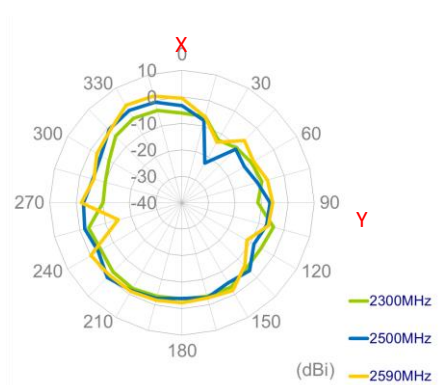
YZ Plane



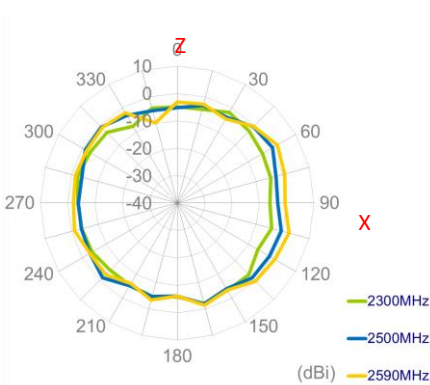
2500MHz



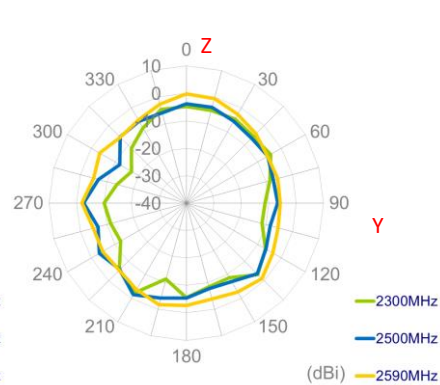
XY Plane



XZ Plane

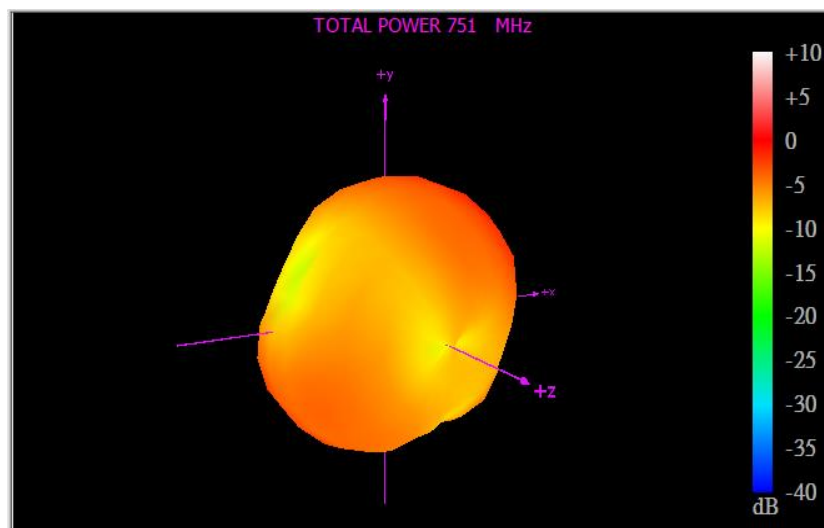


YZ Plane

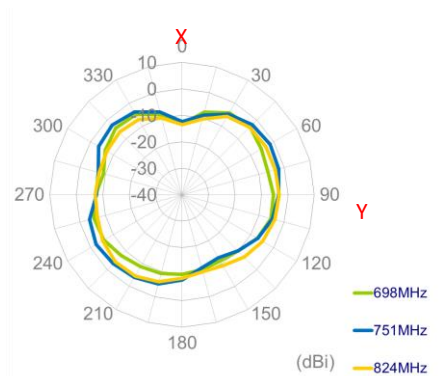


## 5.8 Cellular MIMO7 Radiation Pattern

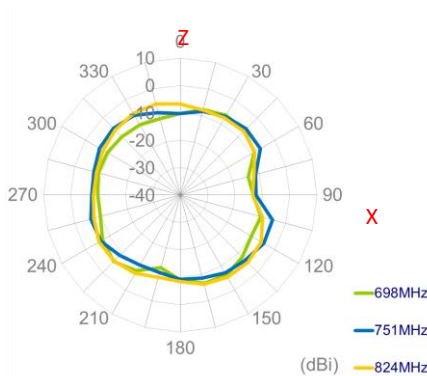
751MHz



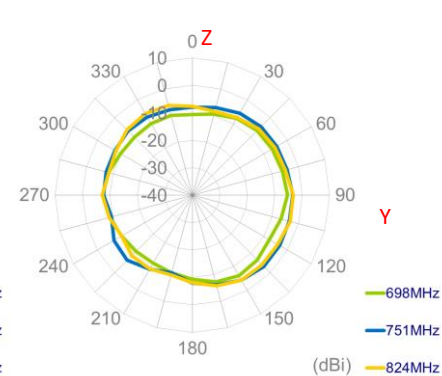
XY Plane



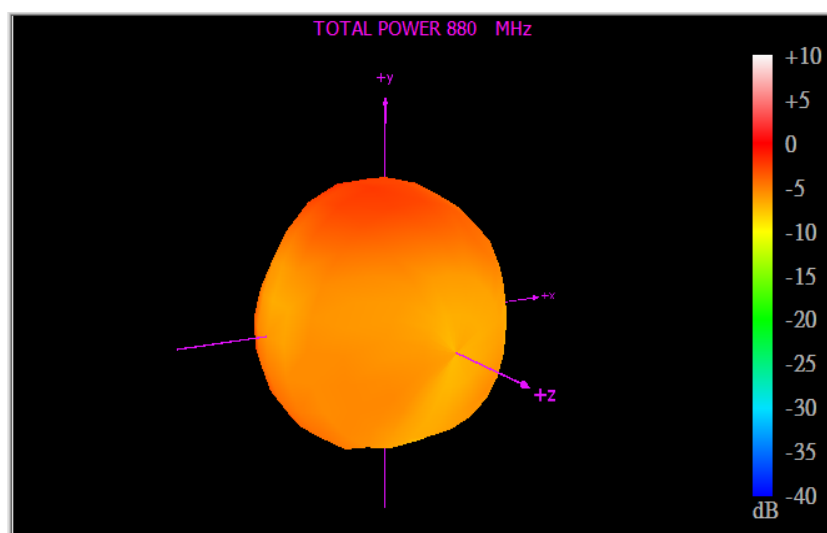
XZ Plane



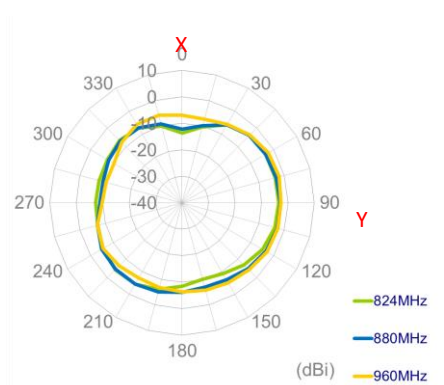
YZ Plane



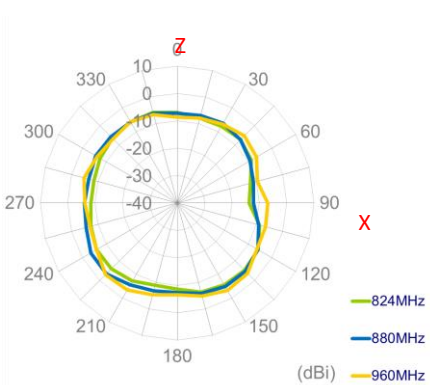
880MHz



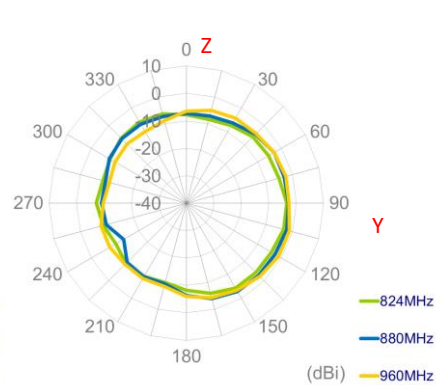
XY Plane



XZ Plane



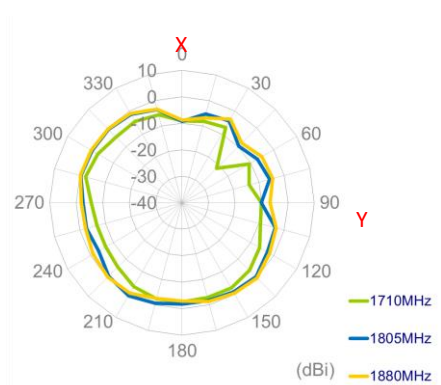
YZ Plane



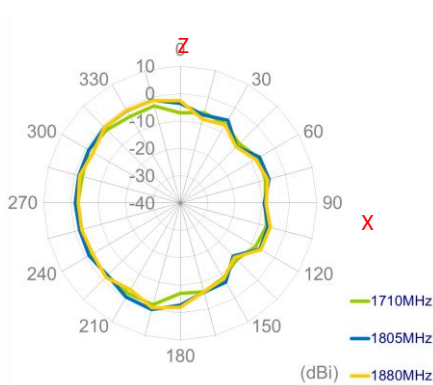
1805MHz



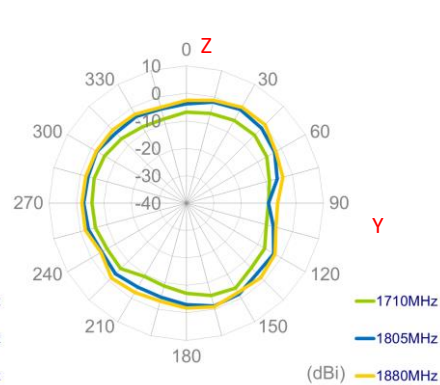
XY Plane



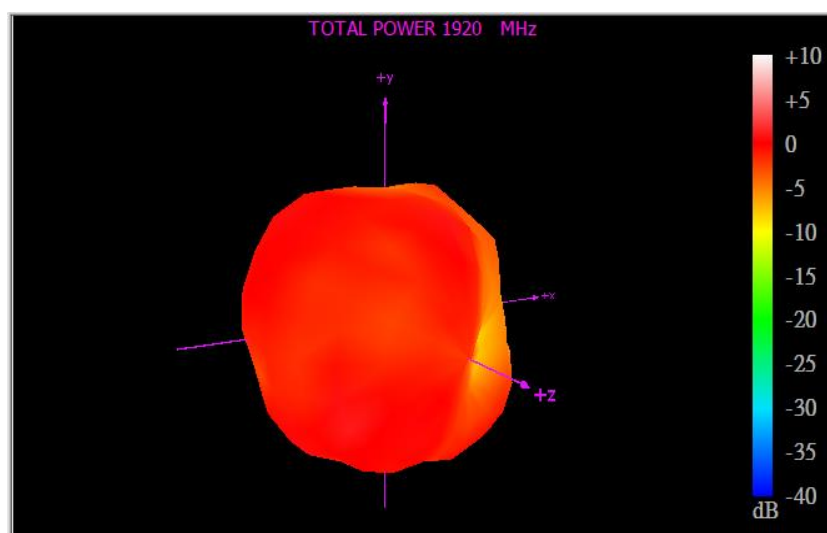
XZ Plane



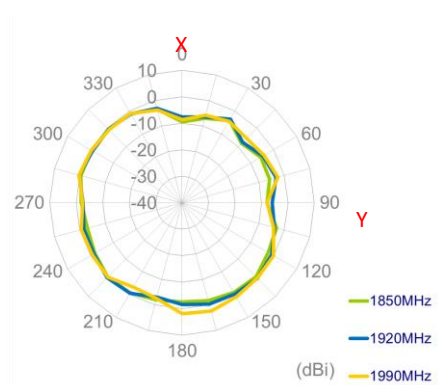
YZ Plane



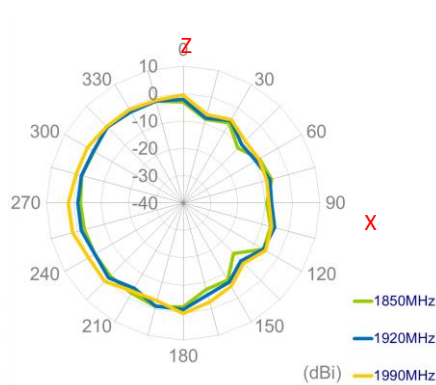
1920MHz



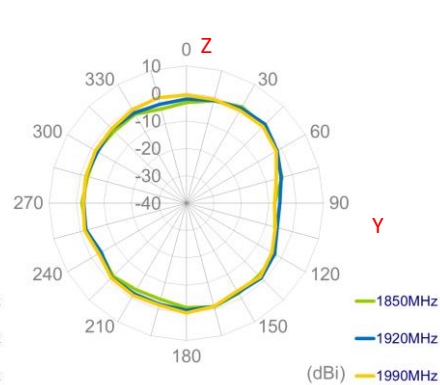
XY Plane



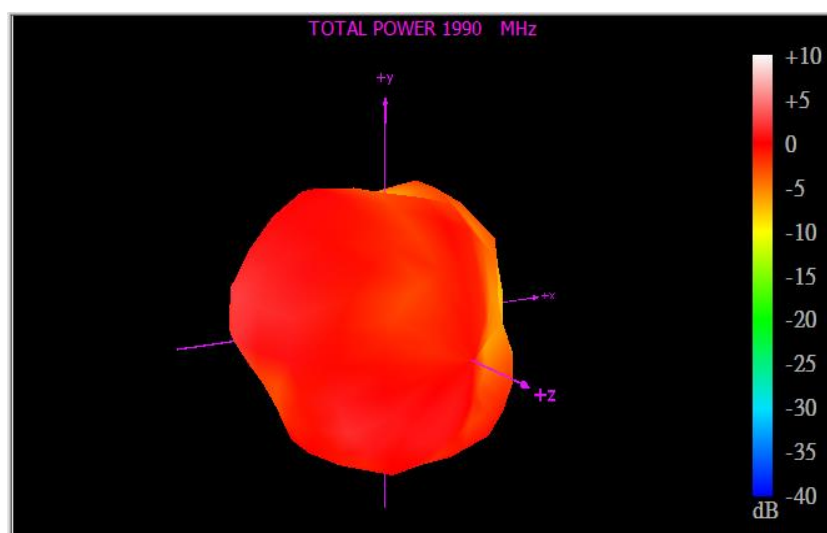
XZ Plane



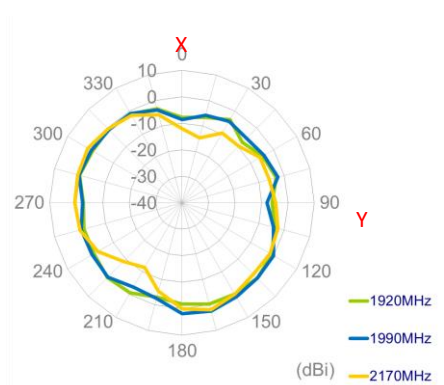
YZ Plane



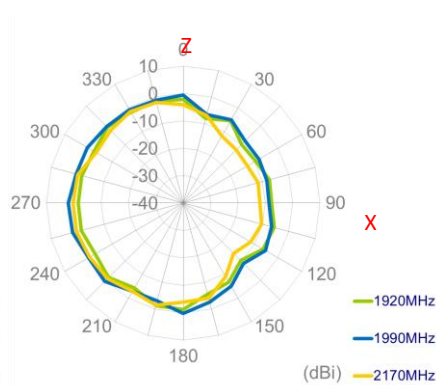
1990MHz



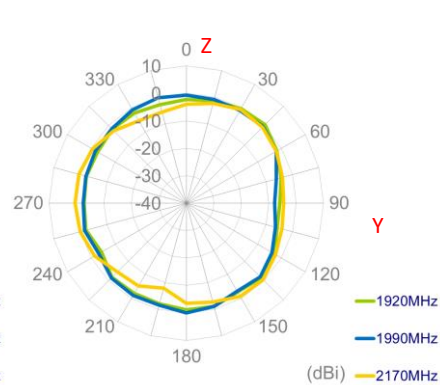
XY Plane



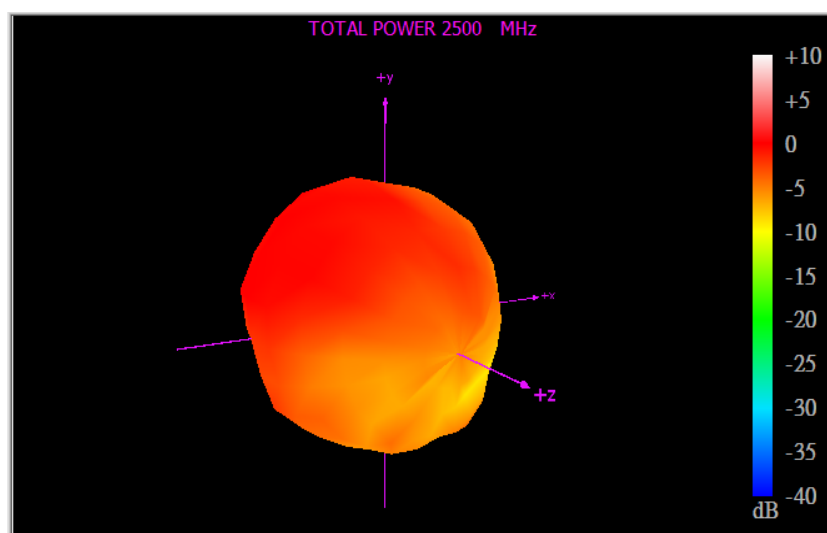
XZ Plane



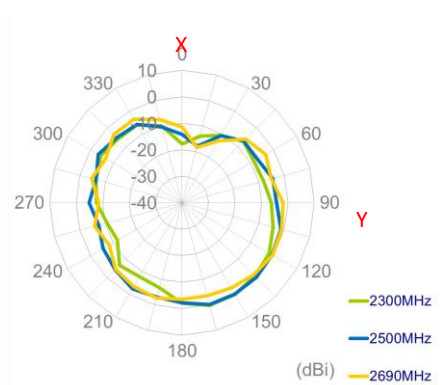
YZ Plane



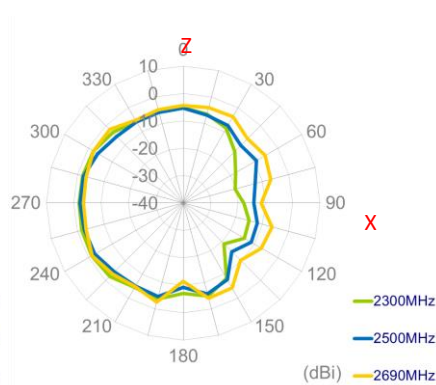
2500MHz



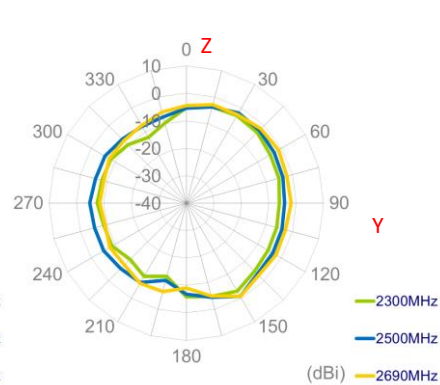
XY Plane



XZ Plane

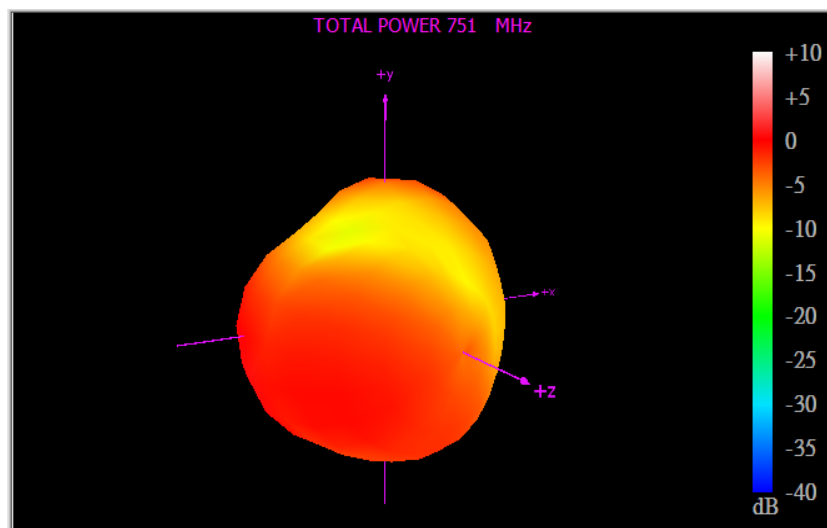


YZ Plane

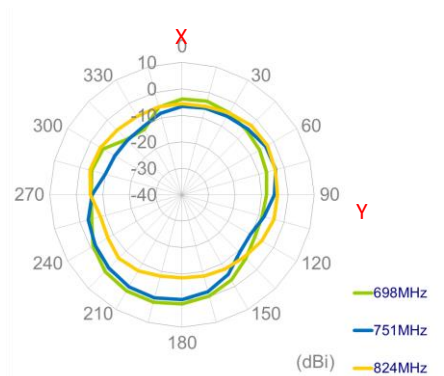


## 5.9 Cellular MIMO8 Radiation Pattern

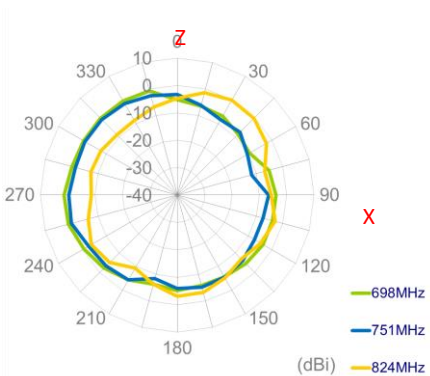
751MHz



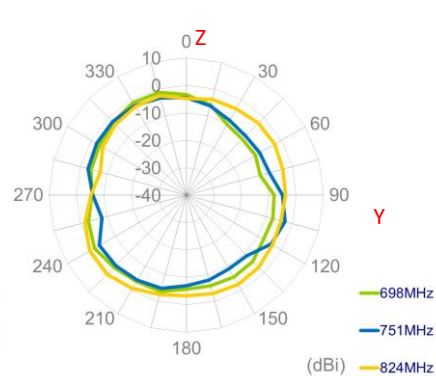
XY Plane



XZ Plane



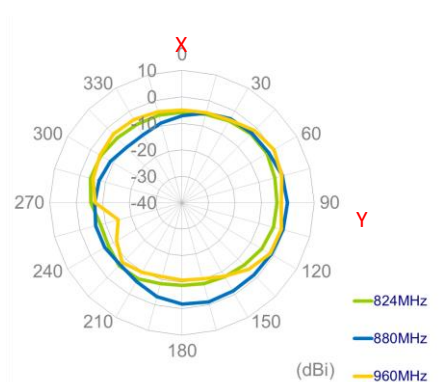
YZ Plane



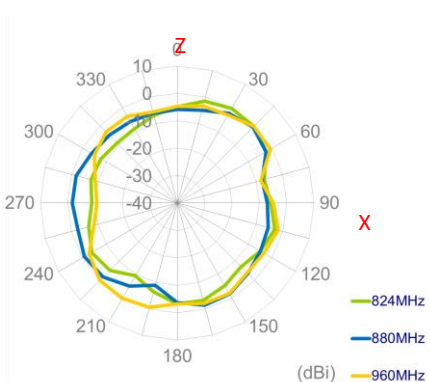
880MHz



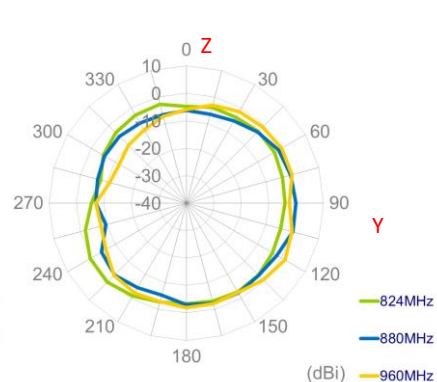
XY Plane



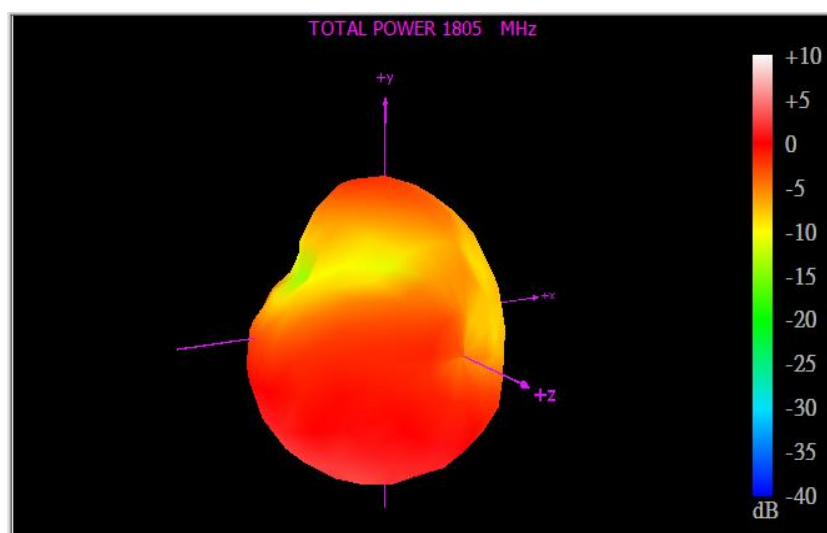
XZ Plane



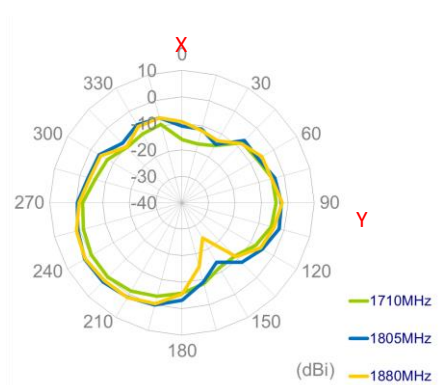
YZ Plane



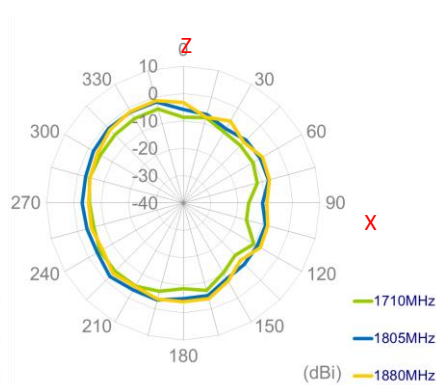
1805MHz



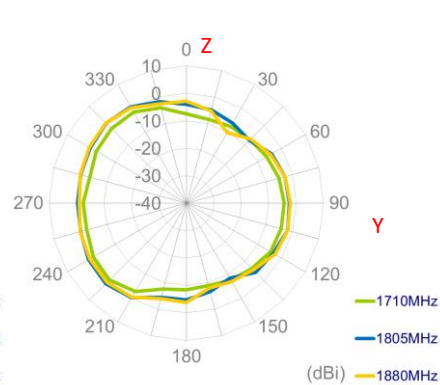
XY Plane



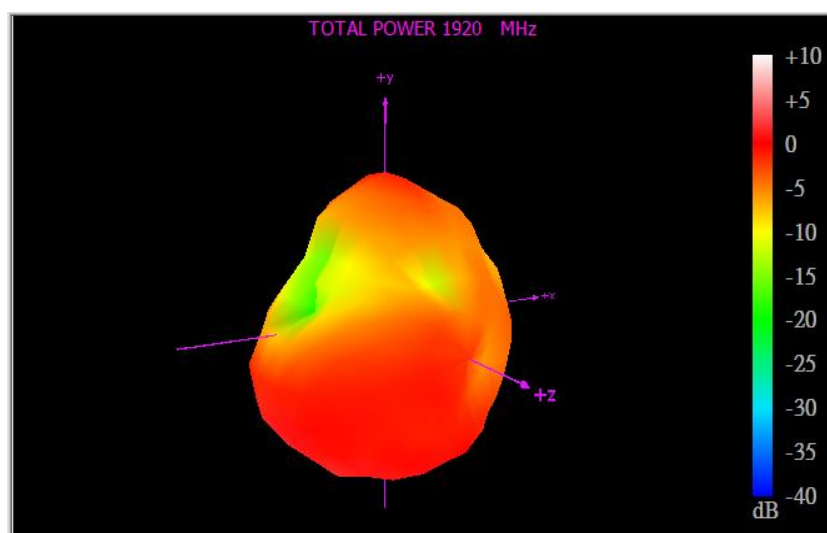
XZ Plane



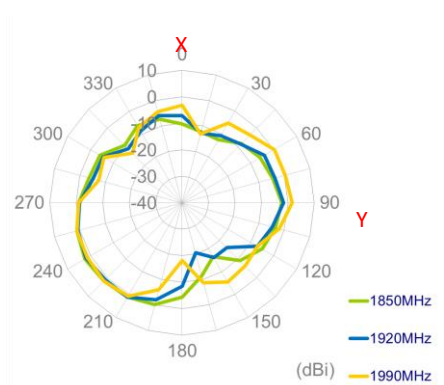
YZ Plane



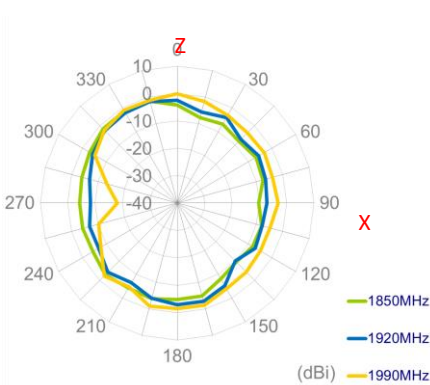
1920MHz



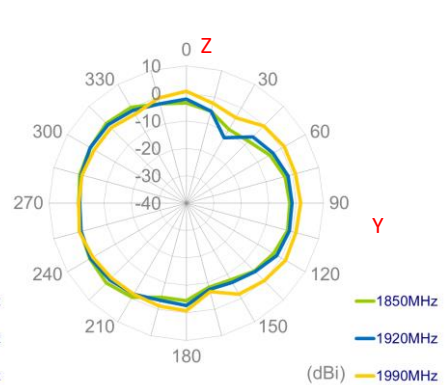
XY Plane



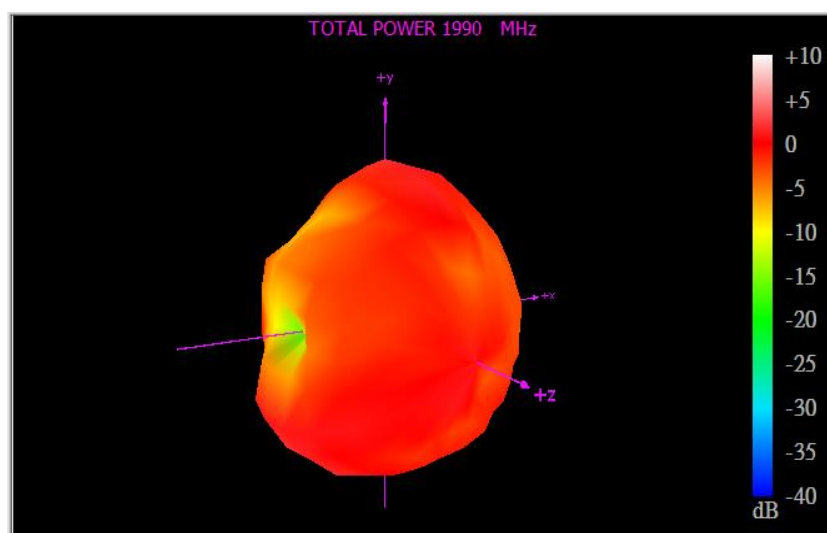
XZ Plane



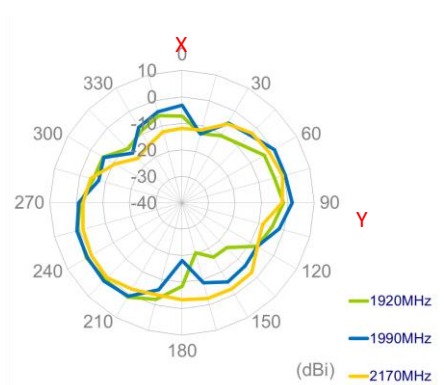
YZ Plane



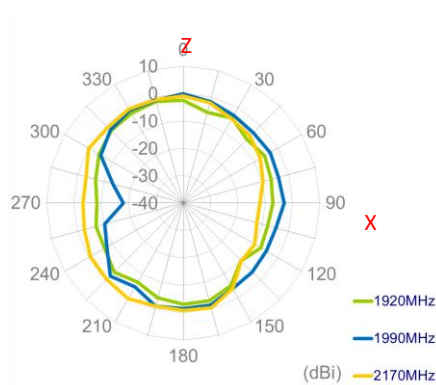
1990MHz



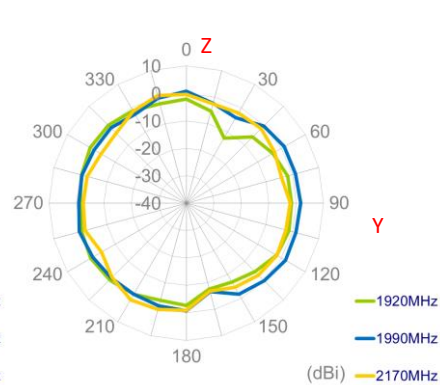
XY Plane



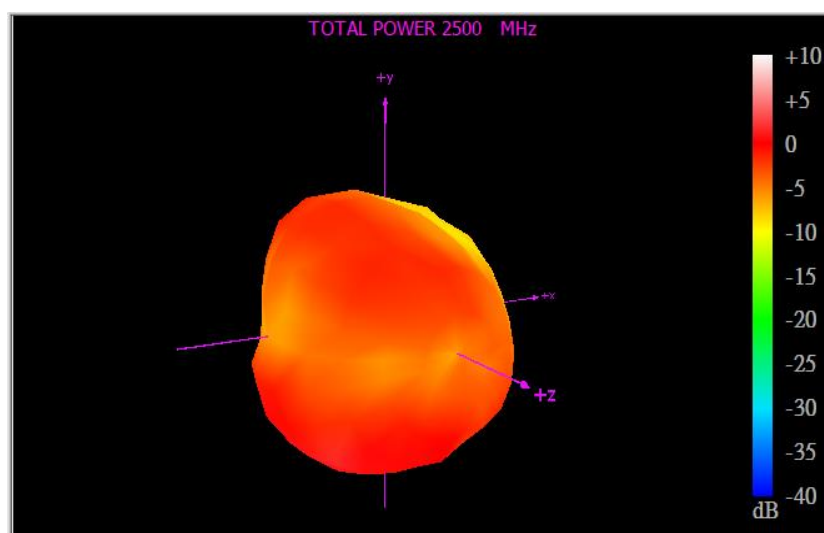
XZ Plane



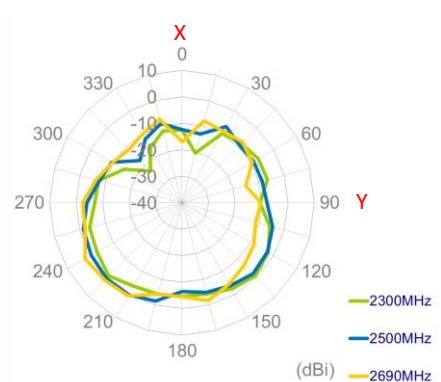
YZ Plane



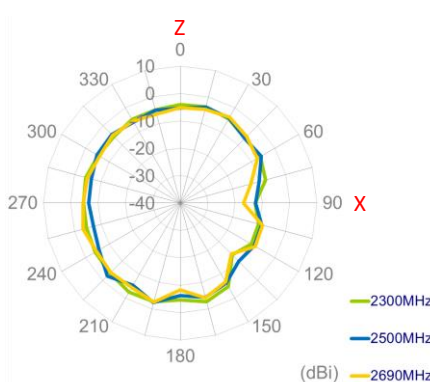
2500MHz



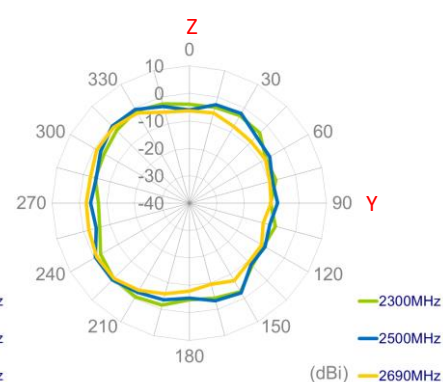
XY Plane



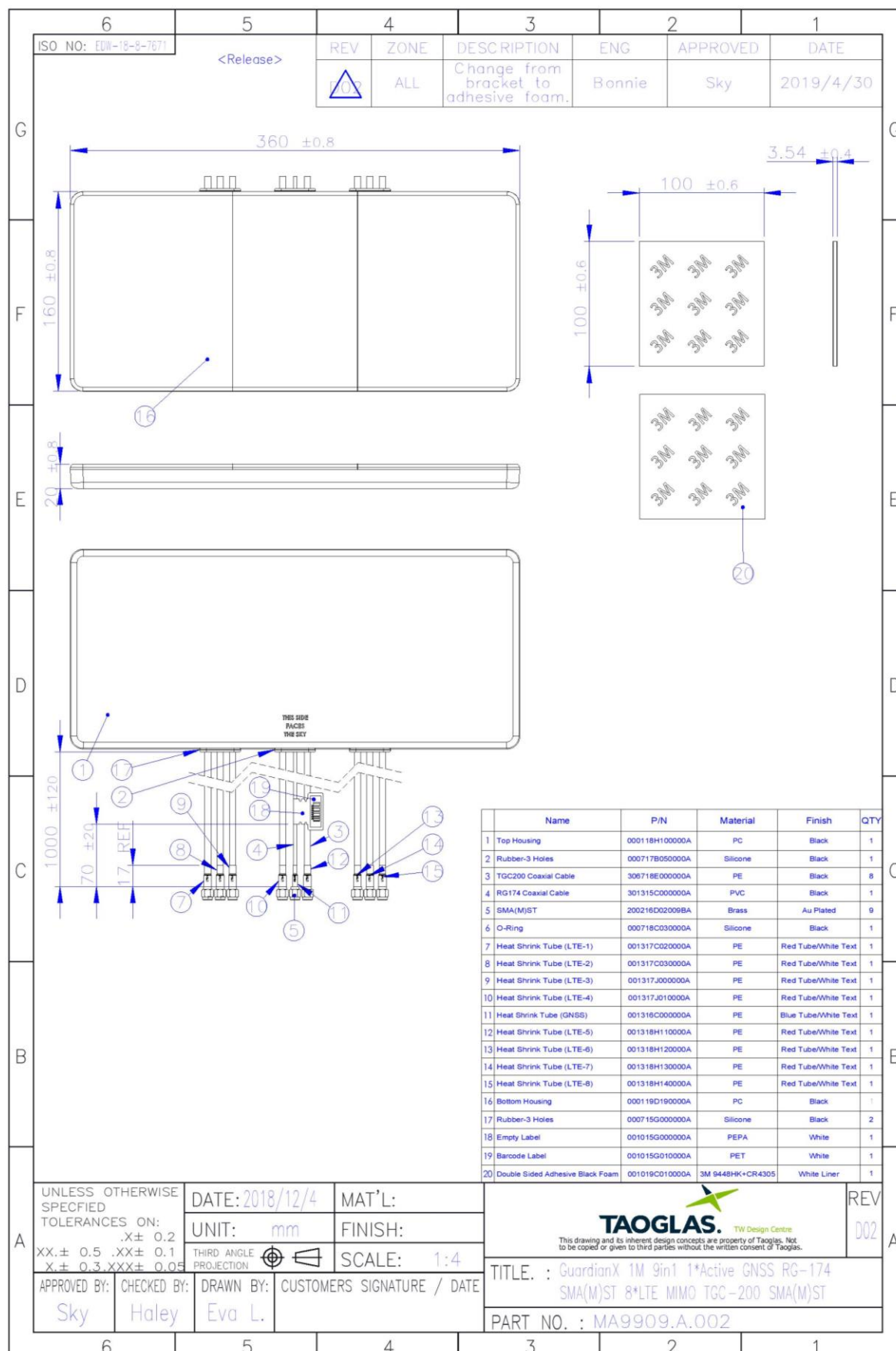
XZ Plane



YZ Plane

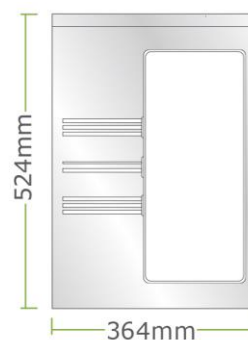


## 6. Mechanical Drawing (Units: mm)

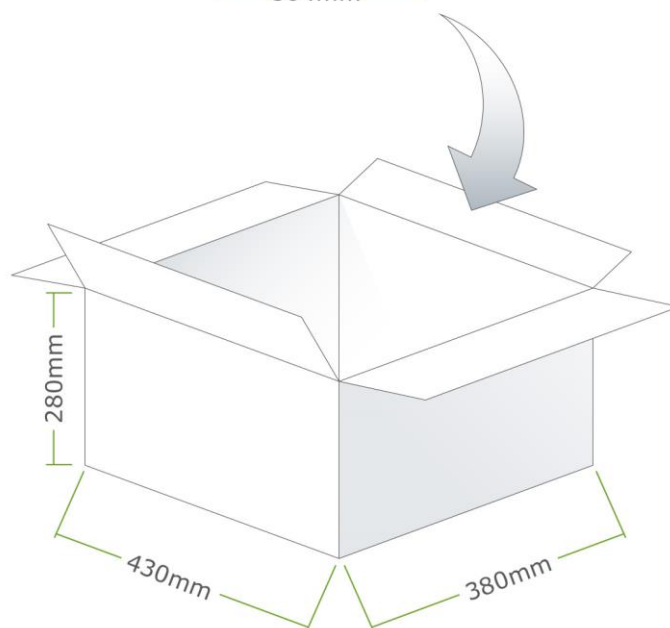


## 7. Packaging

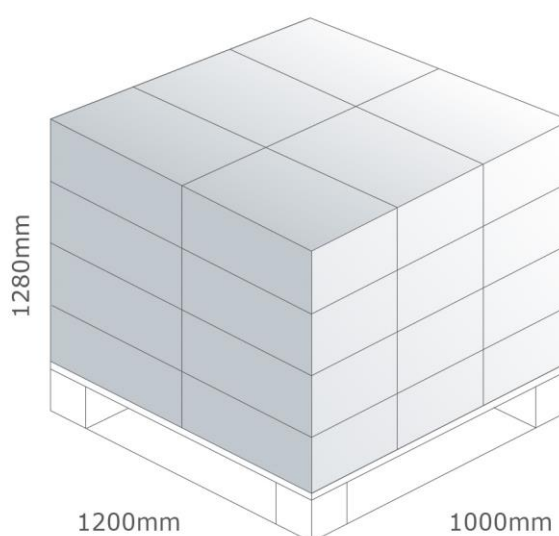
1pc MA9909.A.002 per PE Bag  
Bag Dimensions - 364\*524mm  
Weight - 1.068Kg



10pcs MA9909.A.002 per Carton  
Carton Dimensions - 430\*380\*280mm  
Weight - 11.6Kg



Pallet Dimensions:  
1200mm\*1000mm\*1280mm  
24 Cartons per Pallet  
6 Cartons per Layer, 4 Layers



Changelog for the datasheet

SPE-19-8-131 – MA9909.A.002

| Revision: A (Original First Release) |             |
|--------------------------------------|-------------|
| Date:                                | 2019-10-08  |
| Notes:                               |             |
| Author:                              | Jack Conroy |

Previous Revisions

|  |  |
|--|--|
|  |  |
|  |  |
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|  |  |
|  |  |



## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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