

## SPECIFICATION

|              |                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Part No.     | : MA250.A.LBI.001                                                                                                                                                                                                                                                                                                                                                                                             |
| Product Name | : Sentinel 3in1 Adhesive Mount<br>2*LTE MIMO & GNSS Antenna                                                                                                                                                                                                                                                                                                                                                   |
| Feature      | : Ideal for IoT and Automotive Applications<br>Smallest High Performance MIMO <ul style="list-style-type: none"><li>• 2 x LTE 4G/3G/2G MIMO 1&amp;2 Antennas</li><li>• 1 x GPS-GLONASS-GALILEO-BeiDou L1 Active Antenna</li></ul> IP67 Waterproof<br>High Efficiency<br>Low Profile Housing – Only 14mm in Height<br>2M CFD-200 and RG-174 Cables<br>SMA(M) Connectors<br>Dims: 139*76*14mm<br>RoHS Compliant |



## 1. Introduction

The MA250 Sentinel 3in1 Adhesive Mount 4G LTE MIMO and GPS/GLONASS/GALILEO/BeiDou L1 antenna is an omnidirectional, fully IP67 waterproof external M2M antenna for use in telematics, transportation and remote monitoring applications worldwide. It is designed to be mounted directly on glass or plastic in the interior of vehicles.

It is the smallest high performance solution in the market, 50% smaller than the previous generation, with higher efficiency and wider bandwidth to cover emerging LTE bands. Its performance is comparable with much larger permanent roof mount antennas and now offers a convenient and economical alternative in-cabin mounting solution.

Typical applications include;

- HD video over LTE
- First Responder and Emergency Services
- Automotive vehicle tracking
- Telematics

It is mounted via high quality, first tier automotive approved, 3M adhesive.

In-house world leading dielectric ceramic antenna technology inside allows for smaller size antennas without loss in efficiency. It delivers powerful 2\*2 MIMO antenna technology for worldwide 4G LTE bands at 700MHz/ 800MHz/ 1700MHz/ 1800MHz /2300MHz /2600MHz, while allowing fallback to all common worldwide 3G and 2G frequency bands. The antenna has an output for GPS-GLONASS-GALILEO-BeiDou for next generation location accuracy.

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 between the two MIMO antennas to prevent self-interference. Low

loss cables are used to keep efficiency high over long cable lengths.

The IP67 waterproof housing measures just 139\*76\*14mm with 3M foam adhesive. The antenna can be mounted internally or externally on a vehicle. Both MIMO 1 and MIMO 2 coaxial cables are 2m low loss CFD-200 with SMA(M) connectors. The GPS-GLONASS-GALILEO-BeiDou cable is RG-174 with SMA(M) connector.

Customized cable and connector versions are also available. The antenna also comes in a 2in1 LTE/GNSS or a single LTE only variant. Contact your regional Taoglas sales office for support.

## 2. Specification Table

| 4G/3G/2G MIMO 1 Antenna |      |         |         |         |           |           |           |           |
|-------------------------|------|---------|---------|---------|-----------|-----------|-----------|-----------|
| Frequency (MHz)         |      | LTE700  | GSM850  | GSM900  | DCS       | PCS       | UMTS1     | LTE2600   |
|                         |      | 698~803 | 824~894 | 880~960 | 1710~1880 | 1850~1990 | 1920~2170 | 2490~2690 |
| Efficiency (%)          |      |         |         |         |           |           |           |           |
| In free space           | 30cm | 41.77   | 58.99   | 60.75   | 66.44     | 76.05     | 66.91     | 56.87     |
|                         | 1M   | 39.89   | 56.33   | 58.01   | 60.59     | 69.53     | 61.59     | 51.86     |
|                         | 2M   | 37.22   | 52.23   | 52.91   | 54.49     | 61.97     | 54.72     | 44.70     |
|                         | 3M   | 34.74   | 48.42   | 49.06   | 48.24     | 54.54     | 47.85     | 37.97     |
|                         | 5M   | 29.75   | 40.81   | 41.20   | 37.70     | 42.12     | 37.06     | 29.04     |
| On 2mm ABS base         | 30cm | 41.14   | 54.04   | 57.58   | 66.82     | 76.00     | 66.82     | 55.38     |
|                         | 1M   | 39.29   | 51.61   | 54.99   | 60.94     | 69.48     | 61.51     | 50.51     |
|                         | 2M   | 36.67   | 47.83   | 50.15   | 54.81     | 61.93     | 54.64     | 43.54     |
|                         | 3M   | 34.22   | 44.34   | 46.52   | 48.52     | 54.49     | 47.79     | 36.98     |
|                         | 5M   | 29.32   | 37.37   | 39.06   | 37.92     | 42.08     | 37.01     | 28.29     |
| On glass base           | 30cm | 43.33   | 55.50   | 58.33   | 63.40     | 63.83     | 55.87     | 56.49     |
|                         | 1M   | 41.38   | 53.00   | 55.71   | 57.82     | 58.35     | 51.42     | 51.52     |
|                         | 2M   | 38.62   | 49.13   | 50.81   | 52.03     | 52.01     | 45.69     | 44.42     |
|                         | 3M   | 36.04   | 45.54   | 47.12   | 46.04     | 45.77     | 39.95     | 37.74     |
|                         | 5M   | 30.91   | 38.38   | 39.57   | 36.00     | 35.35     | 30.95     | 28.86     |
| Average Gain(dBi)       |      |         |         |         |           |           |           |           |
| In free space           | 30cm | -3.87   | -2.29   | -2.17   | -1.81     | -1.19     | -1.81     | -2.48     |
|                         | 1M   | -4.07   | -2.49   | -2.37   | -2.21     | -1.58     | -2.17     | -2.88     |
|                         | 2M   | -4.37   | -2.82   | -2.77   | -2.66     | -2.08     | -2.68     | -3.53     |
|                         | 3M   | -4.67   | -3.15   | -3.10   | -3.20     | -2.63     | -3.27     | -4.23     |
|                         | 5M   | -5.34   | -3.89   | -3.85   | -4.26     | -3.76     | -4.37     | -5.40     |
| On 2mm ABS base         | 30cm | -3.89   | -2.68   | -2.41   | -1.78     | -1.19     | -1.83     | -2.60     |
|                         | 1M   | -4.09   | -2.88   | -2.61   | -2.18     | -1.58     | -2.18     | -3.00     |
|                         | 2M   | -4.39   | -3.21   | -3.01   | -2.64     | -2.08     | -2.70     | -3.64     |
|                         | 3M   | -4.69   | -3.54   | -3.33   | -3.17     | -2.64     | -3.28     | -4.35     |
|                         | 5M   | -5.36   | -4.28   | -4.09   | -4.24     | -3.76     | -4.39     | -5.51     |
| On glass base           | 30cm | -3.65   | -2.56   | -2.34   | -1.99     | -1.95     | -2.60     | -2.50     |
|                         | 1M   | -3.85   | -2.76   | -2.54   | -2.39     | -2.34     | -2.95     | -2.90     |
|                         | 2M   | -4.15   | -3.09   | -2.94   | -2.84     | -2.84     | -3.47     | -3.54     |
|                         | 3M   | -4.45   | -3.42   | -3.27   | -3.38     | -3.40     | -4.05     | -4.25     |
|                         | 5M   | -5.12   | -4.16   | -4.03   | -4.44     | -4.52     | -5.16     | -5.41     |
| Peak Gain(dBi)          |      |         |         |         |           |           |           |           |
| In free space           | 30cm | 1.22    | 1.89    | 2.73    | 4.69      | 4.69      | 4.27      | 4.15      |
|                         | 1M   | 1.02    | 1.69    | 2.53    | 4.29      | 4.29      | 3.87      | 3.75      |
|                         | 2M   | 0.72    | 1.29    | 2.13    | 3.79      | 3.79      | 3.37      | 3.05      |
|                         | 3M   | 0.42    | 0.99    | 1.73    | 3.29      | 3.29      | 2.87      | 2.35      |
|                         | 5M   | -0.28   | 0.19    | 1.03    | 2.19      | 2.19      | 1.67      | 1.15      |
| On 2mm ABS base         | 30cm | 0.76    | 1.57    | 1.79    | 3.68      | 3.68      | 3.22      | 3.24      |
|                         | 1M   | 0.56    | 1.37    | 1.59    | 3.28      | 3.28      | 2.86      | 2.84      |
|                         | 2M   | 0.26    | 0.97    | 1.19    | 2.78      | 2.78      | 2.36      | 2.14      |
|                         | 3M   | -0.04   | 0.67    | 0.89    | 2.28      | 2.28      | 1.82      | 1.44      |
|                         | 5M   | -0.74   | -0.13   | 0.09    | 1.18      | 1.18      | 0.66      | 0.24      |
| On glass base           | 30cm | 1.86    | 1.94    | 2.06    | 3.10      | 2.90      | 2.90      | 3.66      |
|                         | 1M   | 1.66    | 1.74    | 1.86    | 2.70      | 2.50      | 2.50      | 3.26      |
|                         | 2M   | 1.36    | 1.44    | 1.46    | 2.30      | 2.00      | 2.00      | 2.56      |
|                         | 3M   | 1.06    | 1.14    | 1.06    | 1.70      | 1.40      | 1.40      | 1.86      |
|                         | 5M   | 0.46    | 0.34    | 0.36    | 0.70      | 0.30      | 0.30      | 0.75      |

### 4G/3G/2G MIMO 2 Antenna

| Frequency (MHz)   |      | LTE700<br>698~803 | GSM850<br>824~894 | GSM900<br>880~960 | DCS<br>1710~1880 | PCS<br>1850~1990 | UMTS1<br>1920~2170 | LTE2600<br>2490~2690 |
|-------------------|------|-------------------|-------------------|-------------------|------------------|------------------|--------------------|----------------------|
| Efficiency (%)    |      |                   |                   |                   |                  |                  |                    |                      |
| In free space     | 30cm | 46.24             | 33.45             | 35.37             | 54.05            | 57.08            | 51.87              | 67.48                |
|                   | 1M   | 44.16             | 31.95             | 33.78             | 49.29            | 52.17            | 47.71              | 61.55                |
|                   | 2M   | 41.21             | 29.61             | 30.81             | 44.42            | 46.50            | 42.38              | 53.09                |
|                   | 3M   | 38.46             | 27.44             | 28.56             | 39.27            | 40.93            | 37.07              | 45.10                |
|                   | 5M   | 33.09             | 23.13             | 24.00             | 30.73            | 31.59            | 28.70              | 34.48                |
| On 2mm ABS base   | 30cm | 50.50             | 40.14             | 42.93             | 53.67            | 56.84            | 53.32              | 66.89                |
|                   | 1M   | 48.23             | 38.33             | 41.00             | 48.95            | 51.96            | 49.05              | 61.01                |
|                   | 2M   | 45.01             | 35.53             | 37.39             | 44.10            | 46.31            | 43.57              | 52.61                |
|                   | 3M   | 42.01             | 32.93             | 34.66             | 39.00            | 40.76            | 38.10              | 44.68                |
|                   | 5M   | 36.10             | 27.75             | 29.12             | 30.51            | 31.46            | 29.51              | 34.17                |
| On glass base     | 30cm | 48.41             | 37.93             | 39.94             | 54.71            | 61.77            | 61.21              | 66.66                |
|                   | 1M   | 46.24             | 36.22             | 38.14             | 49.90            | 56.48            | 56.36              | 60.79                |
|                   | 2M   | 43.15             | 33.57             | 34.78             | 44.97            | 50.34            | 50.04              | 52.42                |
|                   | 3M   | 40.27             | 31.11             | 32.25             | 39.76            | 44.28            | 43.76              | 44.51                |
|                   | 5M   | 34.63             | 26.22             | 27.09             | 31.11            | 34.18            | 33.90              | 34.04                |
| Average Gain(dBi) |      |                   |                   |                   |                  |                  |                    |                      |
| In free space     | 30cm | -3.54             | -4.77             | -4.51             | -2.69            | -2.46            | -2.89              | -1.71                |
|                   | 1M   | -3.74             | -4.97             | -4.71             | -3.09            | -2.84            | -3.24              | -2.11                |
|                   | 2M   | -4.04             | -5.30             | -5.11             | -3.55            | -3.34            | -3.76              | -2.75                |
|                   | 3M   | -4.34             | -5.63             | -5.44             | -4.08            | -3.90            | -4.34              | -3.46                |
|                   | 5M   | -5.01             | -6.37             | -6.20             | -5.15            | -5.02            | -5.45              | -4.63                |
| On 2mm ABS base   | 30cm | -3.08             | -3.98             | -3.67             | -2.72            | -2.47            | -2.76              | -1.75                |
|                   | 1M   | -3.28             | -4.18             | -3.87             | -3.12            | -2.86            | -3.11              | -2.15                |
|                   | 2M   | -3.58             | -4.51             | -4.27             | -3.57            | -3.36            | -3.63              | -2.79                |
|                   | 3M   | -3.88             | -4.83             | -4.60             | -4.11            | -3.91            | -4.21              | -3.50                |
|                   | 5M   | -4.55             | -5.58             | -5.36             | -5.17            | -5.04            | -5.32              | -4.67                |
| On glass base     | 30cm | -3.31             | -4.22             | -3.99             | -2.64            | -2.11            | -2.14              | -1.77                |
|                   | 1M   | -3.51             | -4.42             | -4.19             | -3.04            | -2.50            | -2.50              | -2.17                |
|                   | 2M   | -3.81             | -4.75             | -4.59             | -3.49            | -3.00            | -3.02              | -2.82                |
|                   | 3M   | -4.11             | -5.08             | -4.92             | -4.03            | -3.55            | -3.60              | -3.52                |
|                   | 5M   | -4.77             | -5.82             | -5.67             | -5.09            | -4.67            | -4.71              | -4.69                |
| Peak Gain(dBi)    |      |                   |                   |                   |                  |                  |                    |                      |
| In free space     | 30cm | 3.75              | 1.34              | 1.45              | 4.53             | 3.17             | 3.32               | 4.17                 |
|                   | 1M   | 3.55              | 1.14              | 1.25              | 4.13             | 2.77             | 2.92               | 3.77                 |
|                   | 2M   | 3.25              | 0.74              | 0.85              | 3.73             | 2.27             | 2.42               | 3.07                 |
|                   | 3M   | 2.95              | 0.44              | 0.54              | 3.23             | 1.77             | 1.82               | 2.37                 |
|                   | 5M   | 2.35              | -0.31             | -0.25             | 2.13             | 1.77             | 0.72               | 1.17                 |
| On 2mm ABS base   | 30cm | 3.78              | 2.32              | 2.39              | 3.45             | 4.37             | 4.37               | 5.63                 |
|                   | 1M   | 3.58              | 2.12              | 2.19              | 3.05             | 3.97             | 3.97               | 5.23                 |
|                   | 2M   | 3.28              | 1.74              | 1.79              | 2.55             | 3.47             | 3.47               | 4.53                 |
|                   | 3M   | 2.98              | 1.42              | 1.49              | 2.05             | 2.87             | 2.87               | 3.73                 |
|                   | 5M   | 2.38              | 0.72              | 0.72              | 0.95             | 1.77             | 1.77               | 2.63                 |
| On glass base     | 30cm | 3.35              | 1.54              | 2.10              | 3.15             | 3.86             | 3.86               | 3.75                 |
|                   | 1M   | 3.15              | 1.34              | 1.90              | 2.75             | 3.46             | 3.46               | 3.35                 |
|                   | 2M   | 2.85              | 1.03              | 1.50              | 2.35             | 2.96             | 2.96               | 2.71                 |
|                   | 3M   | 2.55              | 0.64              | 1.10              | 1.85             | 2.36             | 2.36               | 2.01                 |
|                   | 5M   | 1.95              | 0.64              | 0.40              | 0.75             | 1.26             | 1.26               | 0.91                 |

| 4G/3G/2G                         |                 |
|----------------------------------|-----------------|
| Envelope Correlation Coefficient | All Bands < 0.3 |
| Impedance                        | 50Ω             |
| Polarization                     | Linear          |
| Return Loss                      | < -6dB          |
| Input Power                      | 5Watts          |

| GPS-GLONASS-GALILEO-BeiDou                          |                                                                                  |
|-----------------------------------------------------|----------------------------------------------------------------------------------|
| Center Frequency                                    | GPS/GALILEO: 1575.42±1.023MHz<br>GLONASS: 1602±5MHz<br>BeiDou: 1561.098±2.046MHz |
| Passive Antenna Efficiency<br>(without cable loss)  | GPS/GALILEO:65.86<br>GLONASS:75.07<br>BeiDou:62.2                                |
| Passive Antenna Average<br>gain(without cable loss) | GPS/GALILEO: -1.81<br>GLONASS: -1.25<br>BeiDou: -2.03                            |
| Passive Antenna Peak<br>gain(without cable loss)    | GPS/GALILEO:3.03<br>GLONASS:4.22<br>BeiDou:1.7                                   |
| VSWR                                                | < 3:1                                                                            |
| Impedance                                           | 50Ω                                                                              |
| Axial Ratio                                         | GPS/GALILEO: 12.48<br>GLONASS: 20.6<br>BeiDou: 8.97                              |
| Polarization                                        | RHCP                                                                             |

| LNA and Filter Electrical Properties                         |                                                                                  |               |                      |                      |
|--------------------------------------------------------------|----------------------------------------------------------------------------------|---------------|----------------------|----------------------|
| Center Frequency                                             | GPS/GALILEO: 1575.42±1.023MHz<br>GLONASS: 1602±5MHz<br>BeiDou: 1561.098±2.046MHz |               |                      |                      |
| Output Impedance                                             | 50Ω                                                                              |               |                      |                      |
| VSWR                                                         | < 2:1                                                                            |               |                      |                      |
| Return Loss                                                  | < -10dB                                                                          |               |                      |                      |
| LNA Gain, Current Draw,<br>and Noise Figure @<br>GPS/GALILEO | Voltage                                                                          | LNA Gain(Typ) | Current<br>Draw(Typ) | Noise<br>Figure(Typ) |
|                                                              | Min 1.8V                                                                         | 25.34         | 5mA                  | 2.30                 |
|                                                              | Typ 3.0V                                                                         | 28.63         | 10mA                 | 2.69                 |
|                                                              | Max 5.5V                                                                         | 32.79         | 23mA                 | 2.98                 |

| Total specification (Through antenna, SAW Filter and LNA) |                    |                   |            |
|-----------------------------------------------------------|--------------------|-------------------|------------|
| Frequency                                                 | 1561.098±2.046 MHz | 1575.42±1.023 MHz | 1602±5 MHz |
| Gain@3V(dB)                                               | 28.06              | 28.63             | 27.84      |
| Output Impedance                                          | 50Ω                |                   |            |

| MECHANICAL            |                                                    |
|-----------------------|----------------------------------------------------|
| Antenna Dimensions    | 139.27*76.27*14mm                                  |
| Housing               | ABS                                                |
| Waterproof            | IP67                                               |
| Connector             | SMA(M) ST                                          |
| Cable type            | LTE: CFD-200<br>GPS/GLONASS/GALILEO/BeiDou: RG-174 |
| Cable length          | 2000mm                                             |
| Weight                | 280g                                               |
| ENVIRONMENTAL         |                                                    |
| Operation Temperature | -40°C to 85°C                                      |
| Storage Temperature   | -40°C to 85°C                                      |
| Humidity              | Non-condensing 65°C 95% RH                         |

## 3. Antenna Characteristics

### 3.1. LTE Characteristics

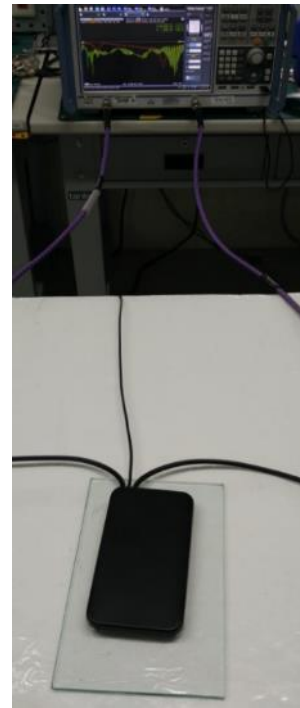
#### 3.1.1. Test Setup



In free space

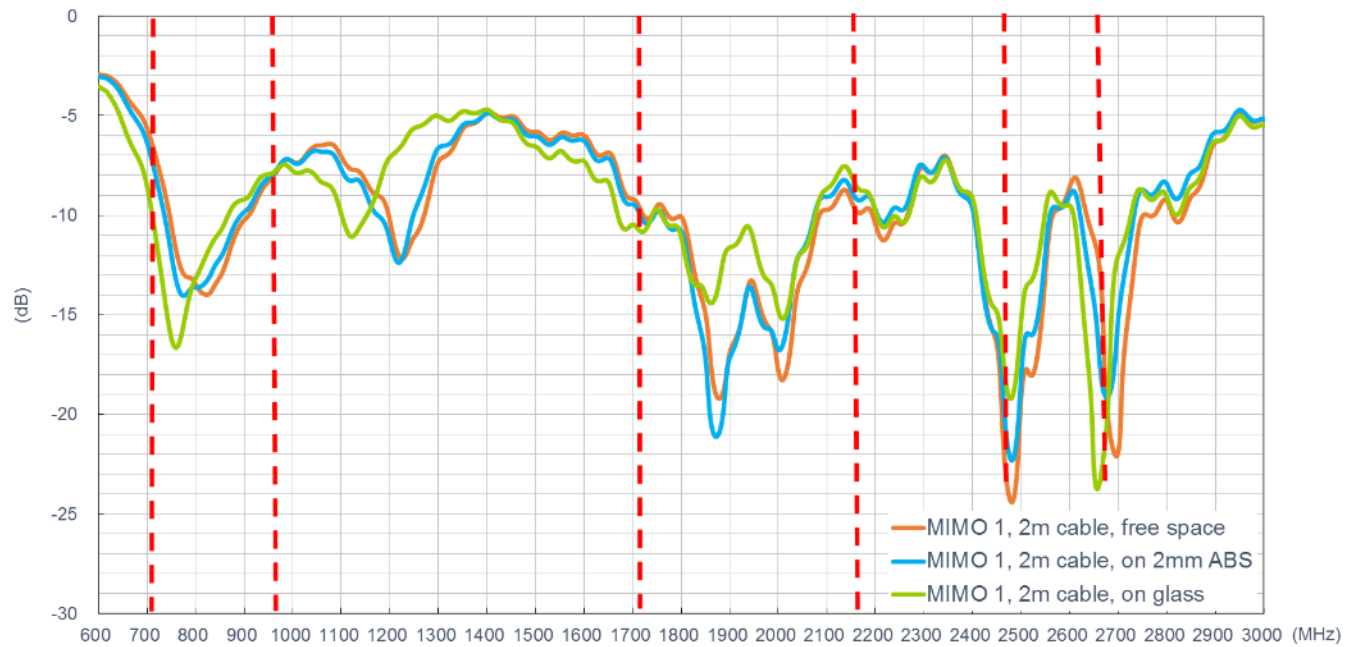


On 2mm ABS

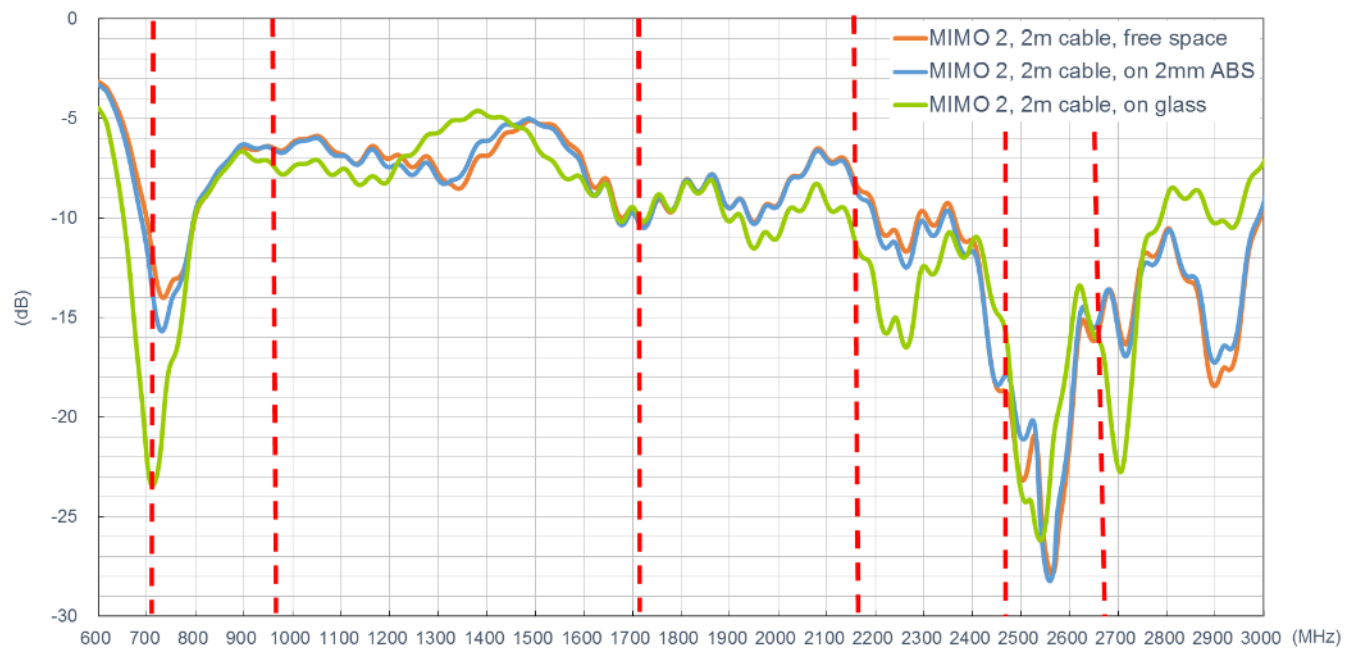


On glass

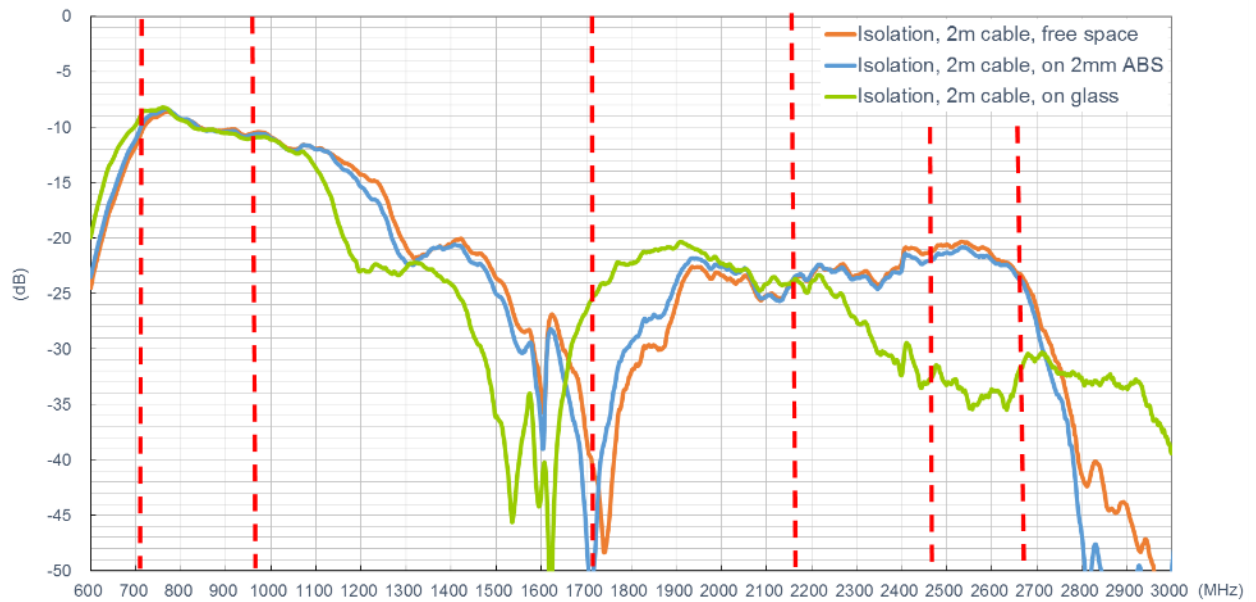
### 3.1.2. Return Loss (MIMO 1)



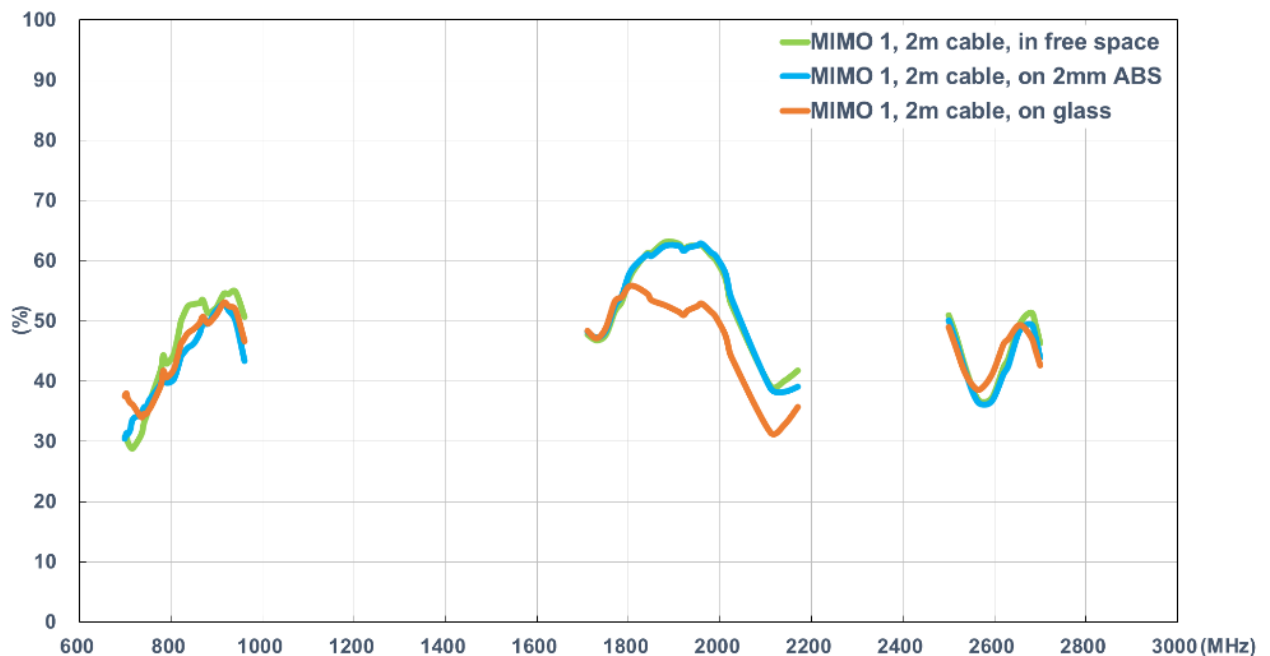
### 3.1.3. Return Loss (MIMO 2)



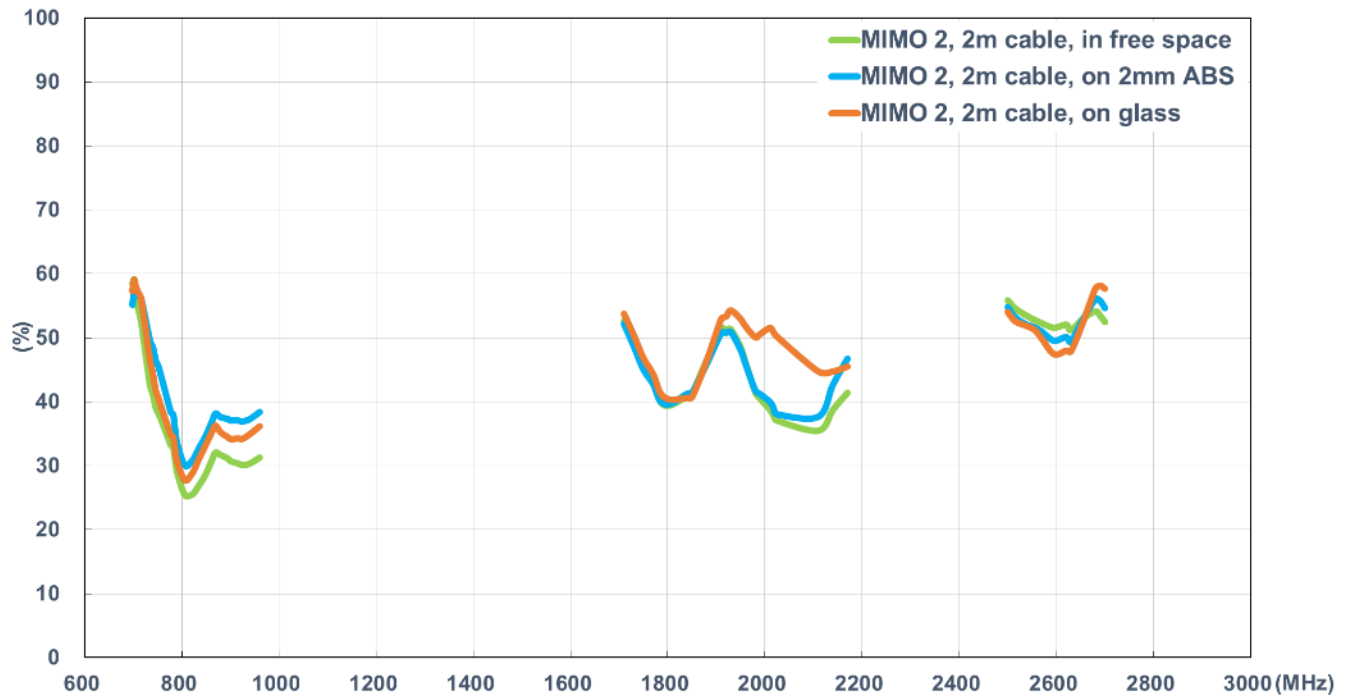
### 3.1.4. Isolation



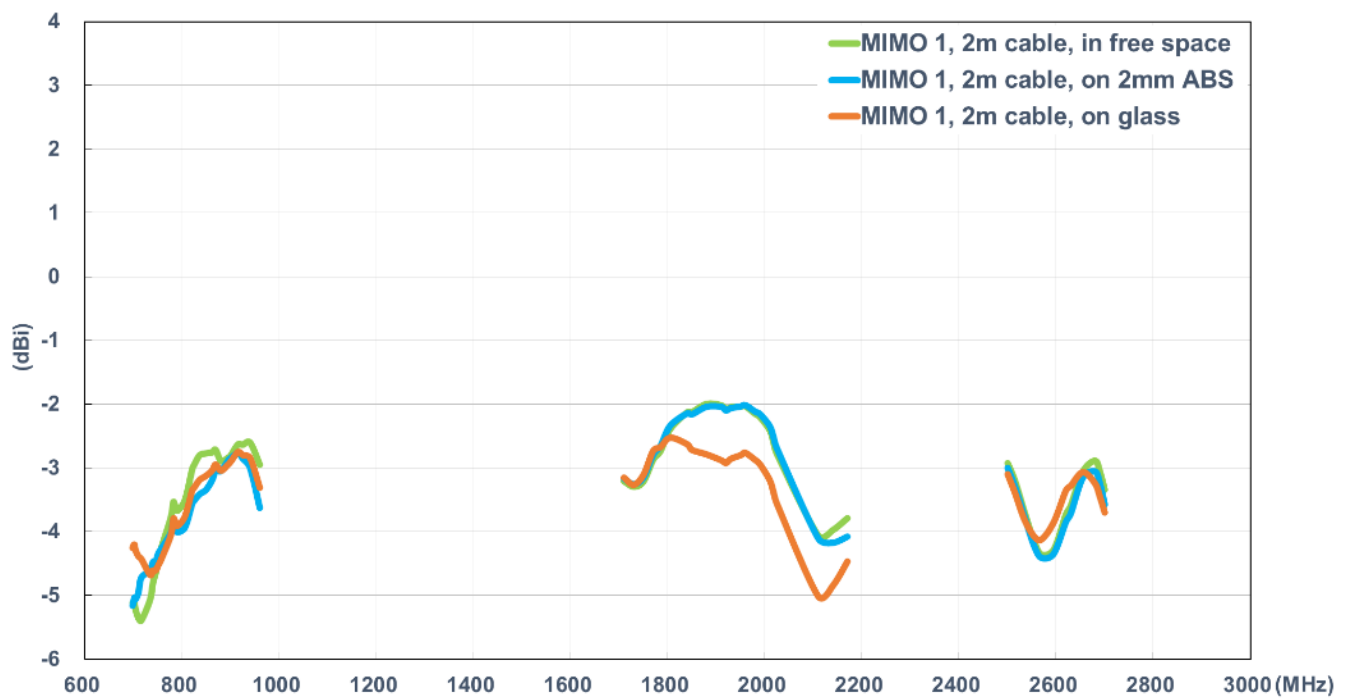
### 3.1.5. Efficiency (MIMO 1)



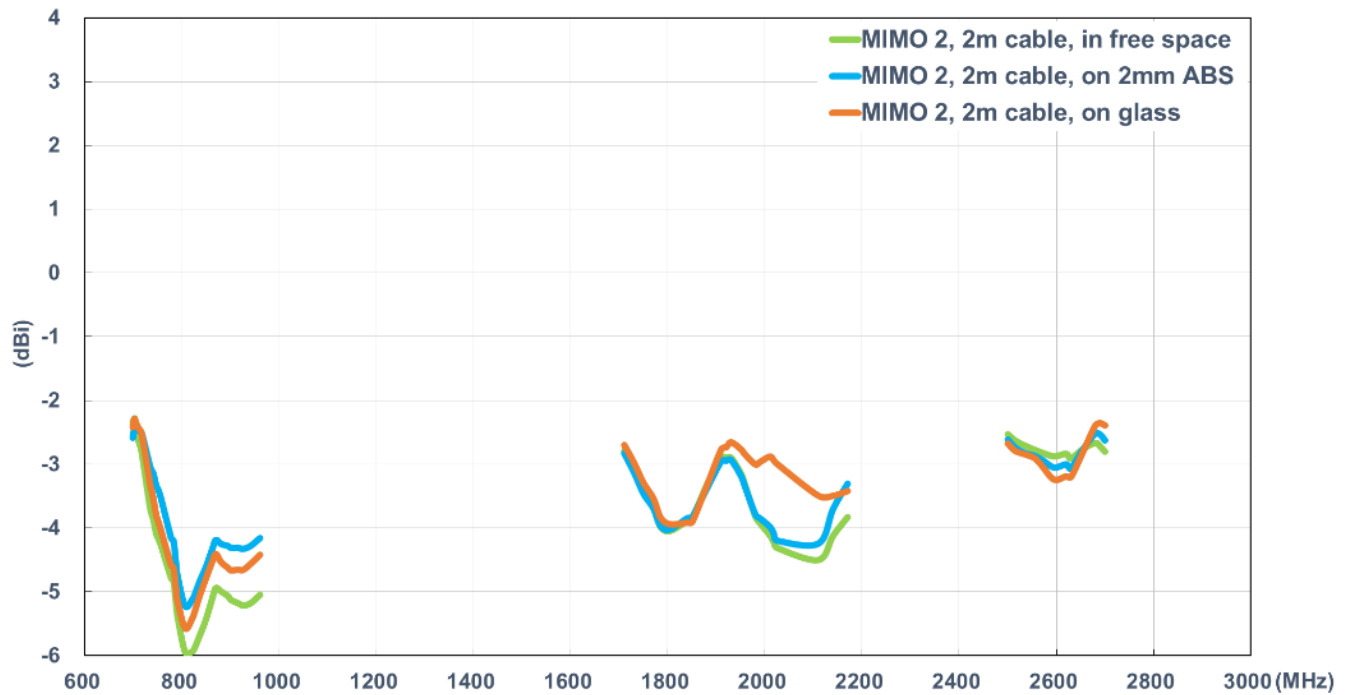
### 3.1.6. Efficiency (MIMO 2)



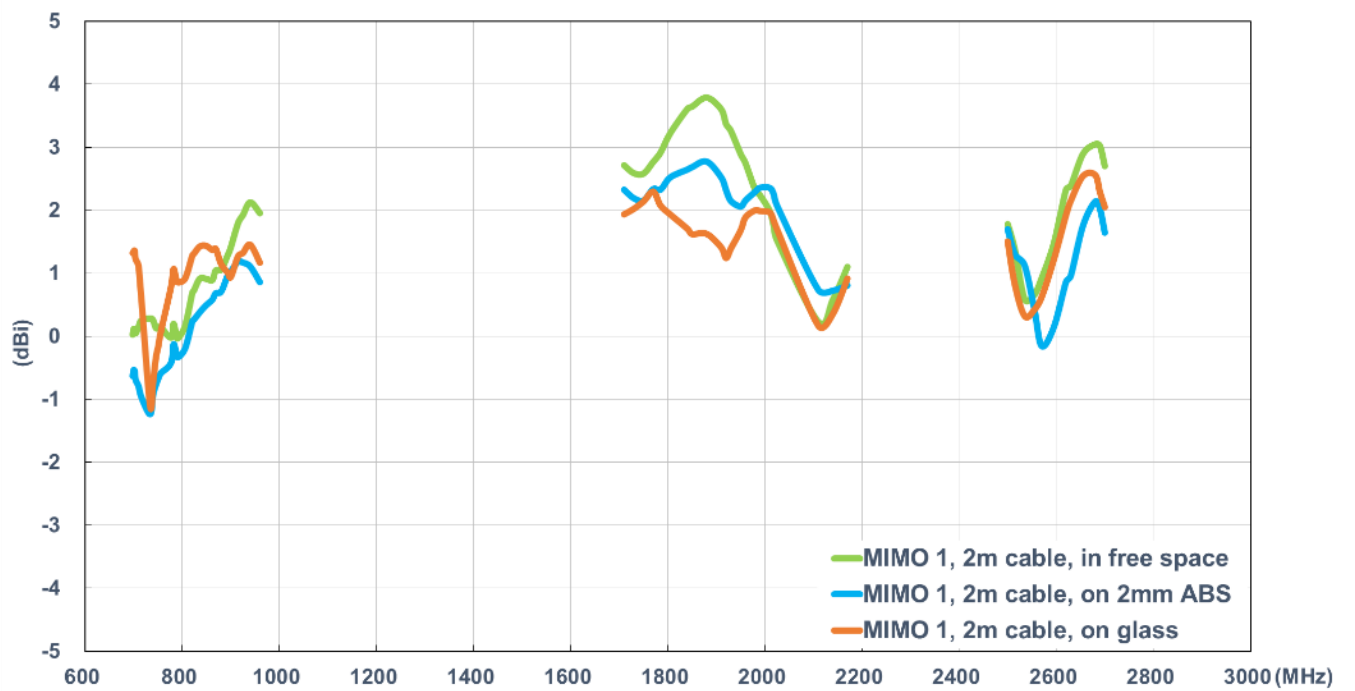
### 3.1.7. Average Gain (MIMO 1)



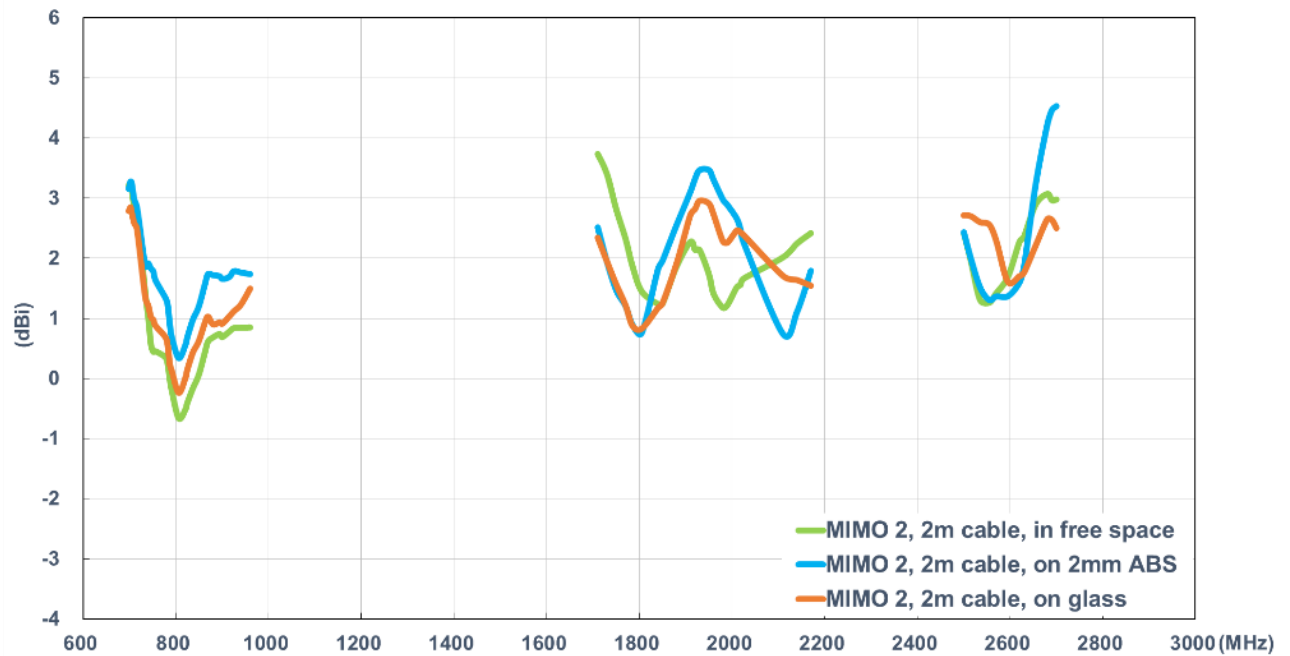
### 3.1.8. Average Gain (MIMO 2)



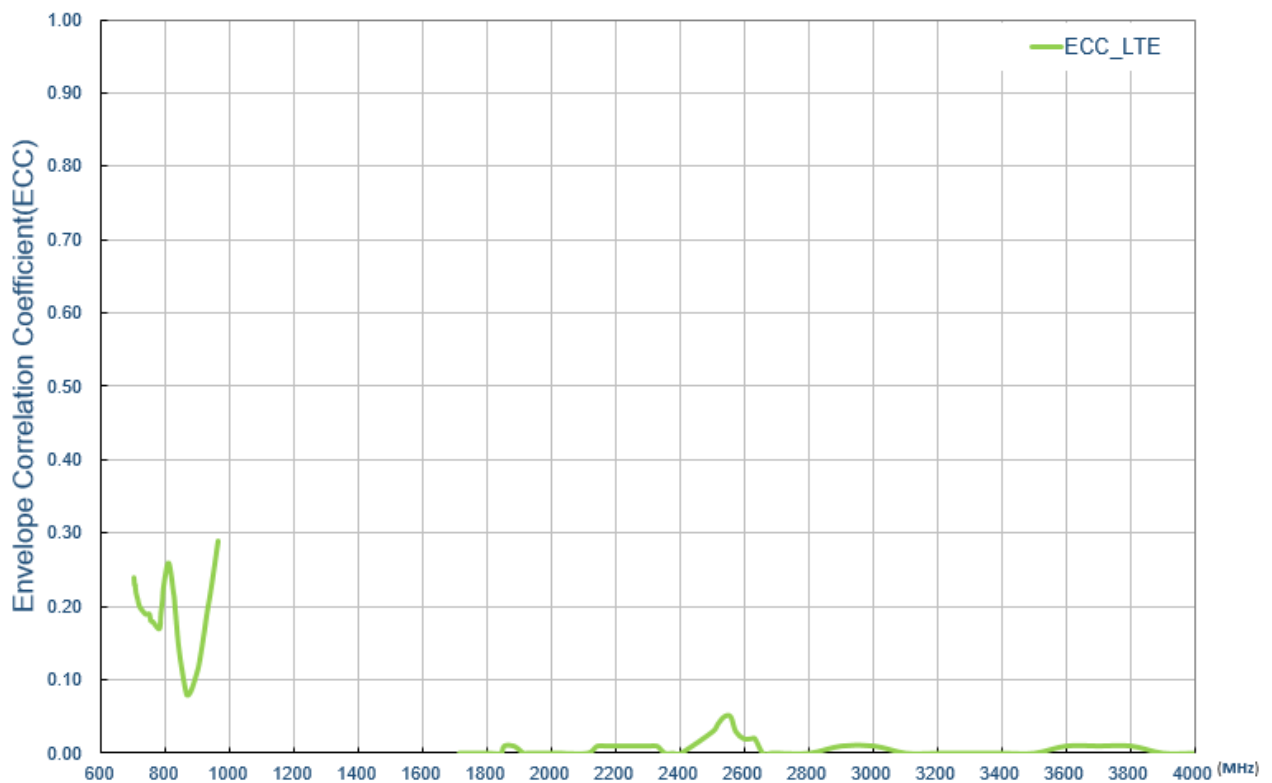
### 3.1.9. Peak Gain (MIMO 1)



### 3.1.10. Peak Gain (MIMO 2)

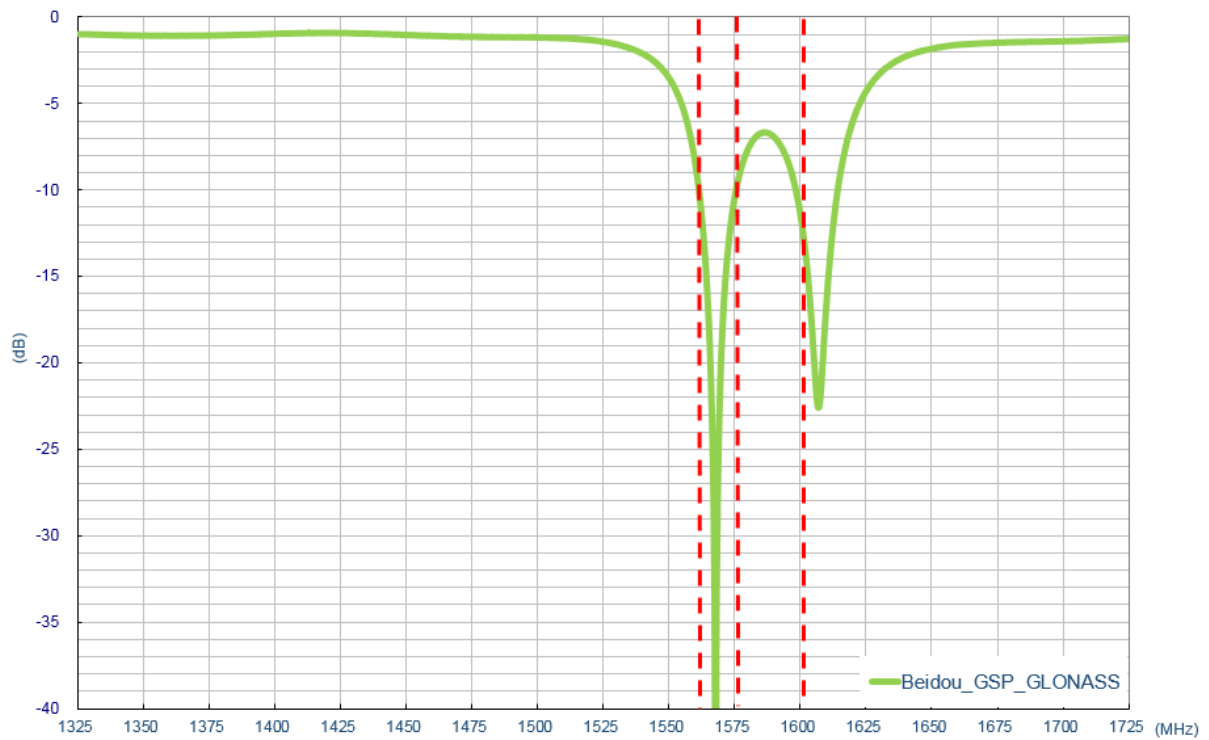


### 3.1.11. Envelope Correlation Coefficient (ECC)

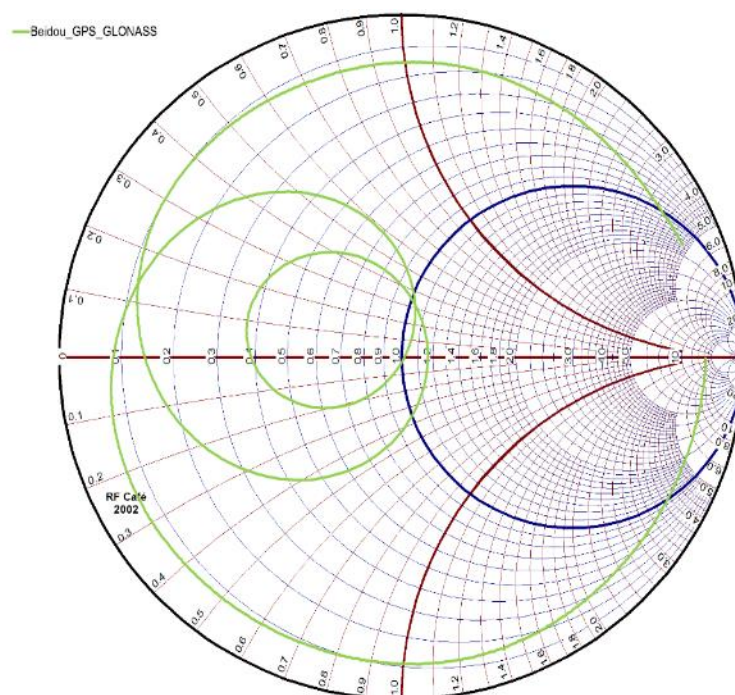


## 3.2. GPS/GLONASS/GALILEO/BeiDou Characteristics

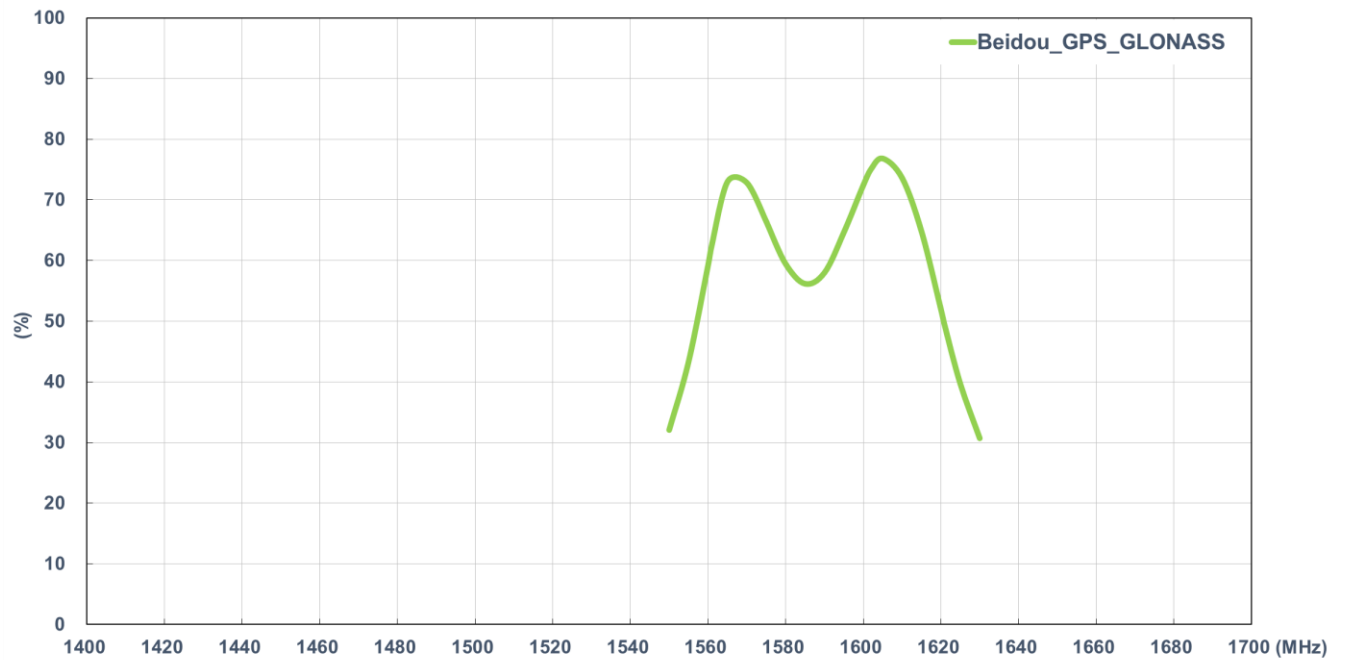
### 3.2.1. Return Loss



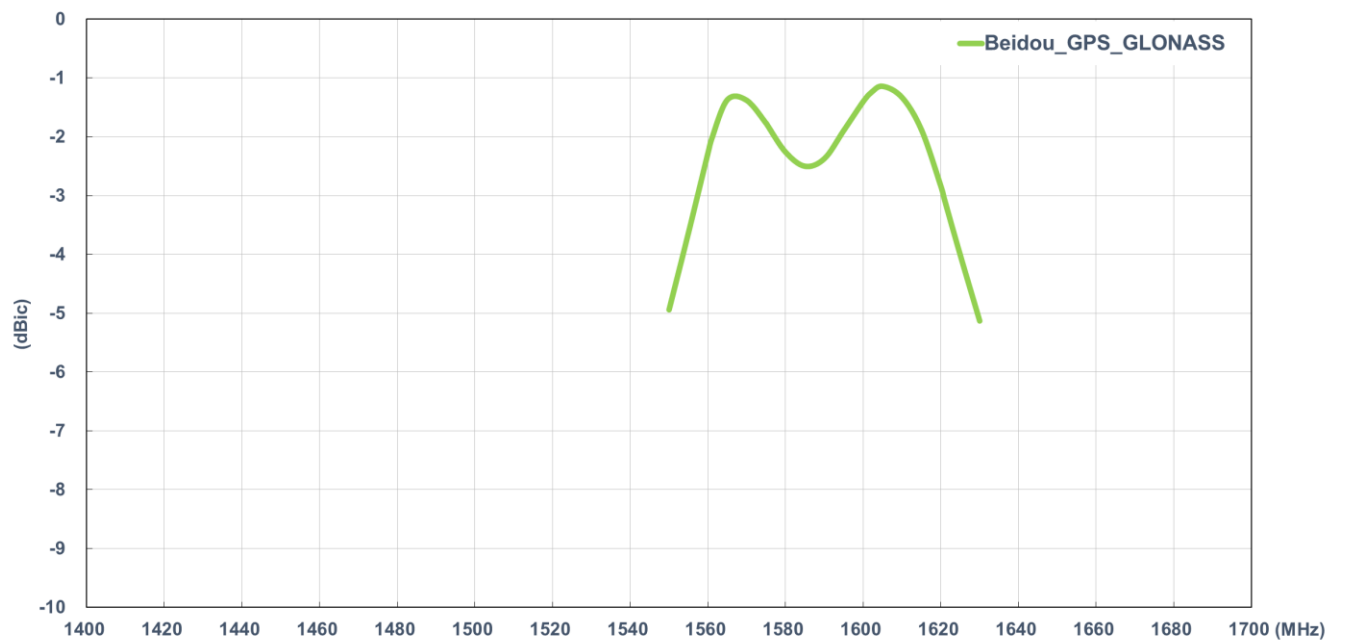
### 3.2.2. Smith Chart



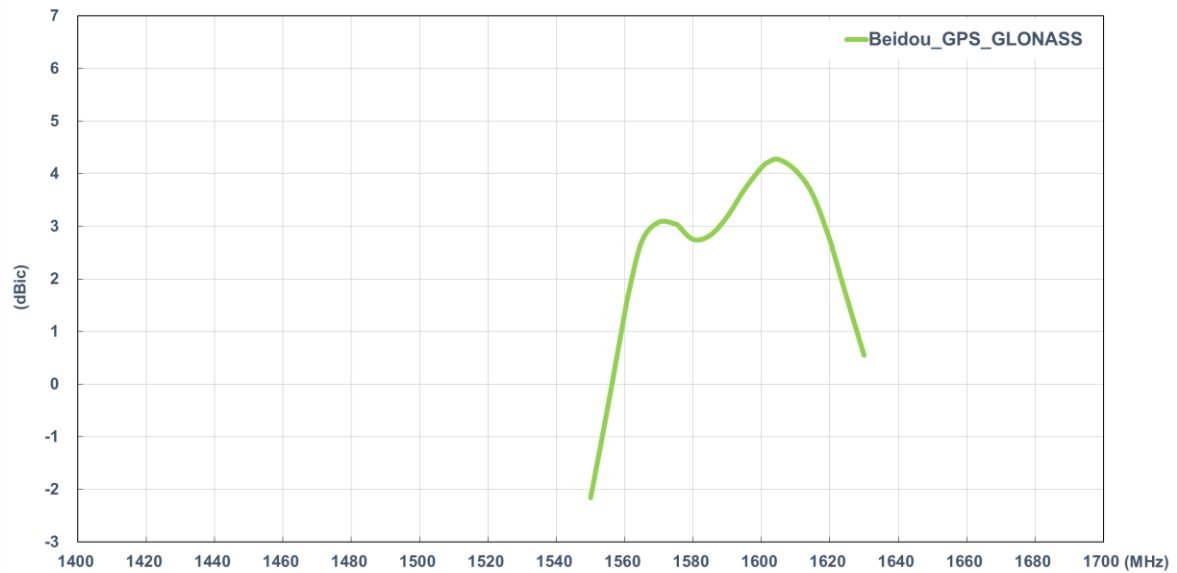
### 3.2.3. Efficiency



### 3.2.4. Average Gain

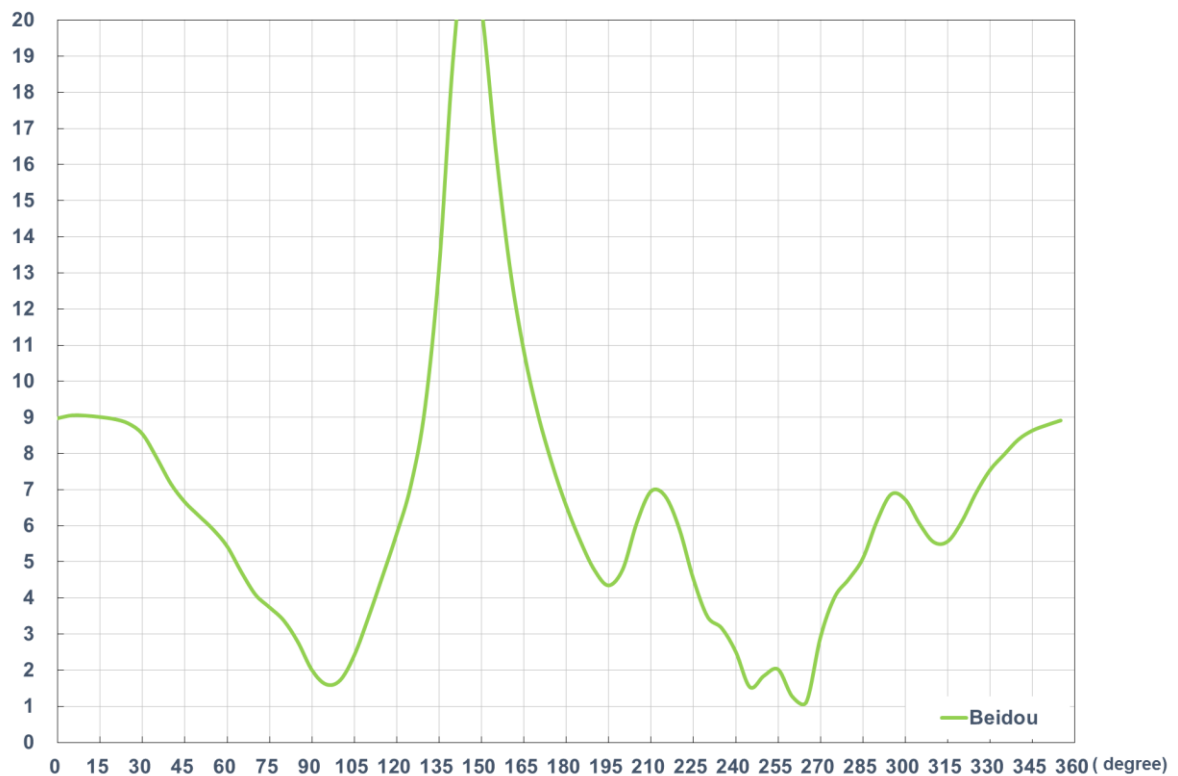


### 3.2.5. Peak Gain

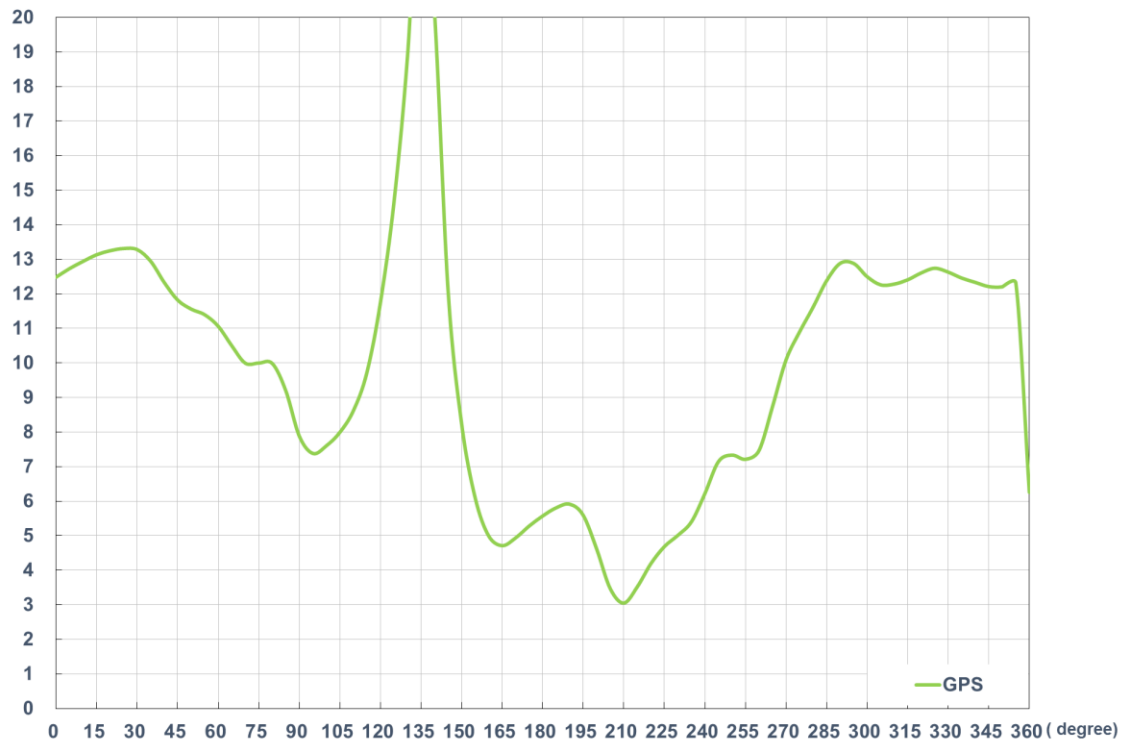


### 3.2.6. Axial Ratio

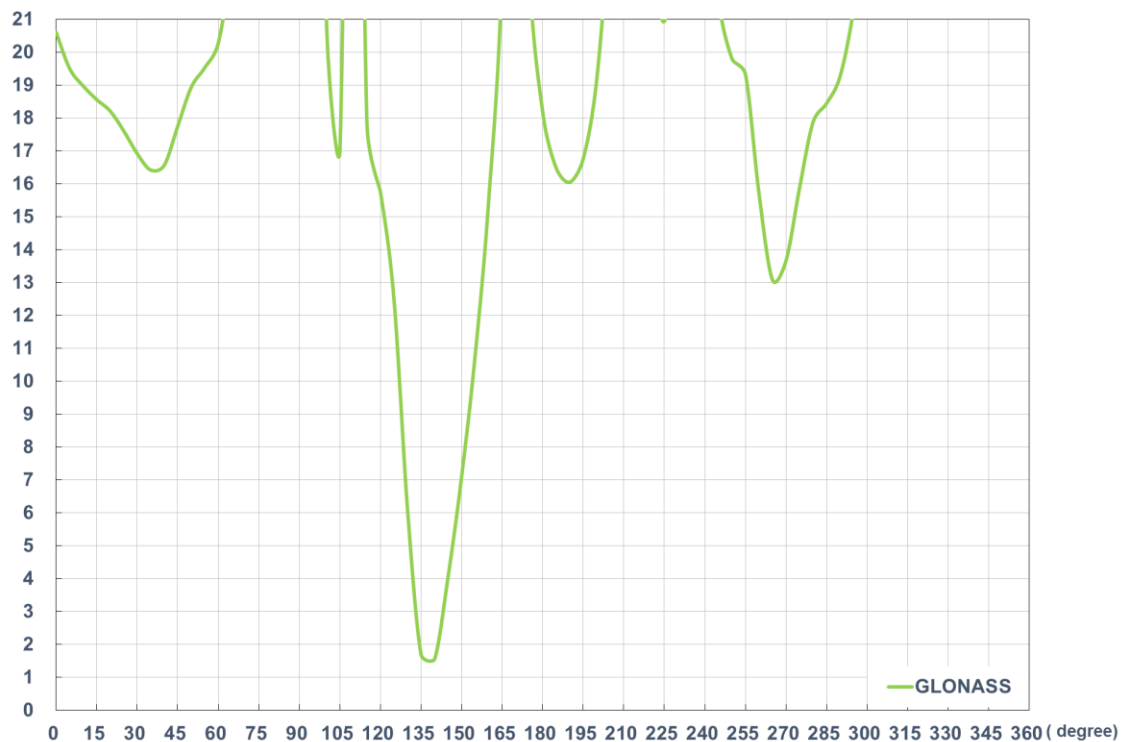
#### 3.2.6.1. BeiDou



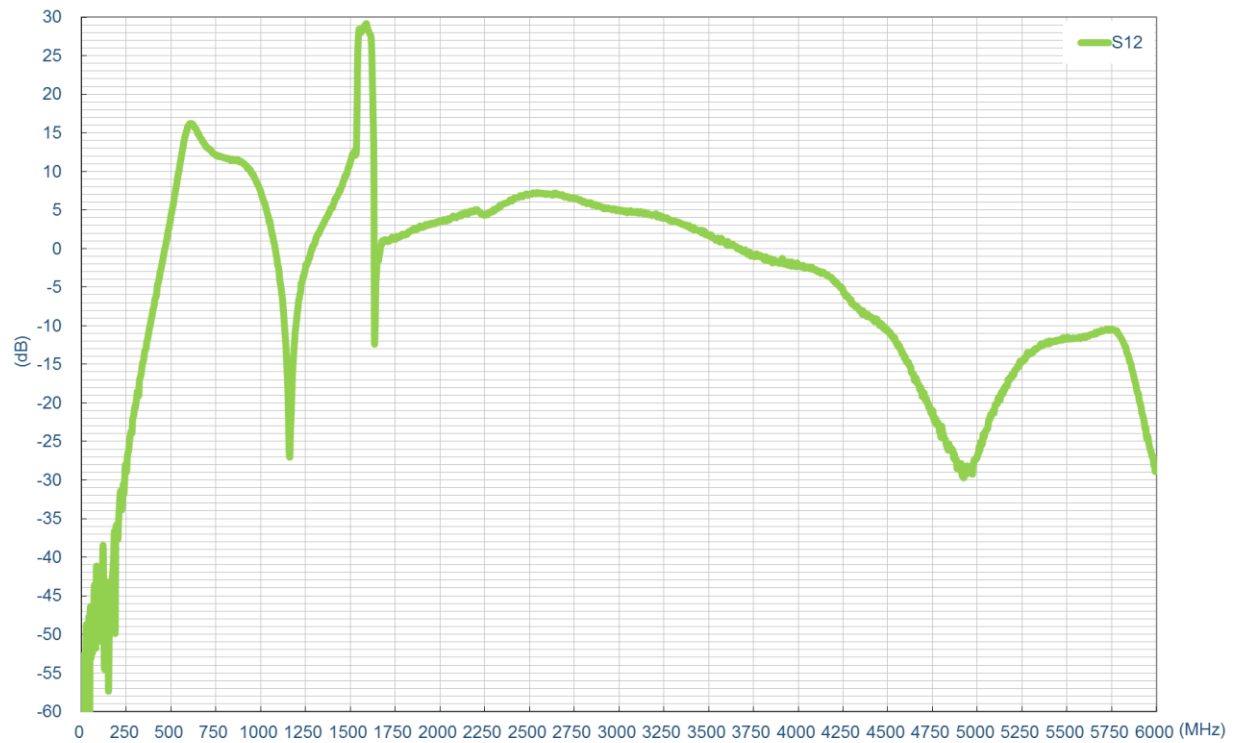
### 3.2.6.2. GPS/GALILEO



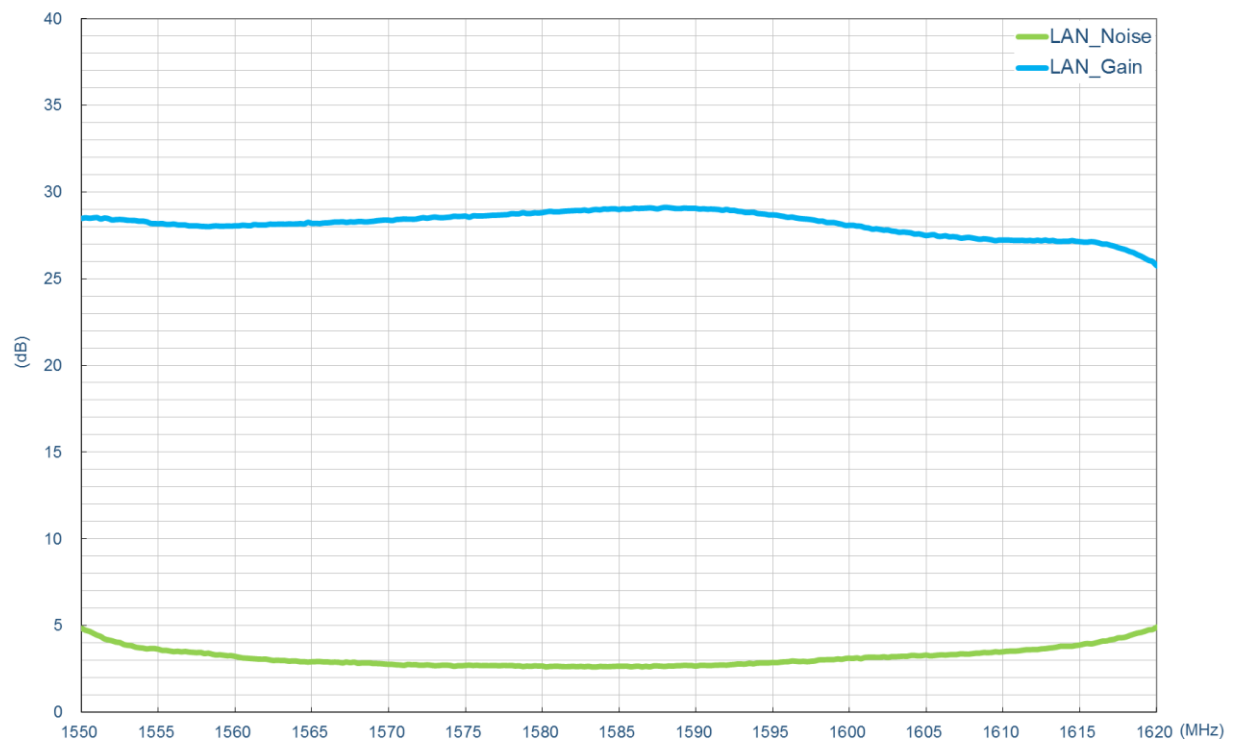
### 3.2.6.3. GLONASS



### 3.2.7. LNA Gain and Noise Figure



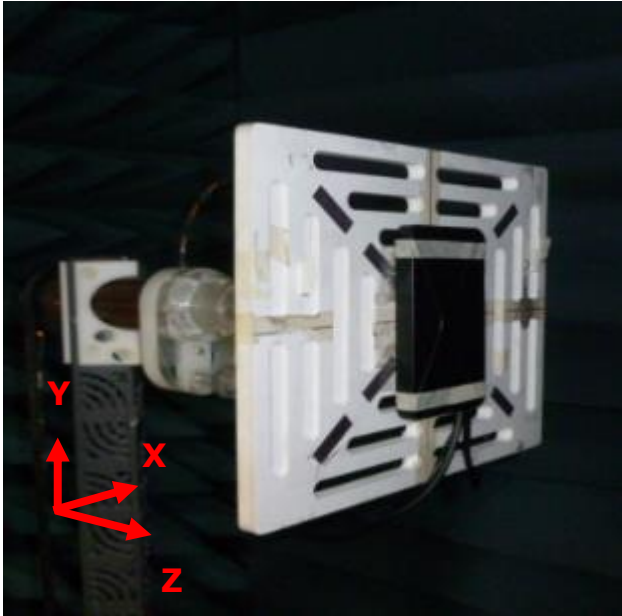
LNA Gain@3.0V



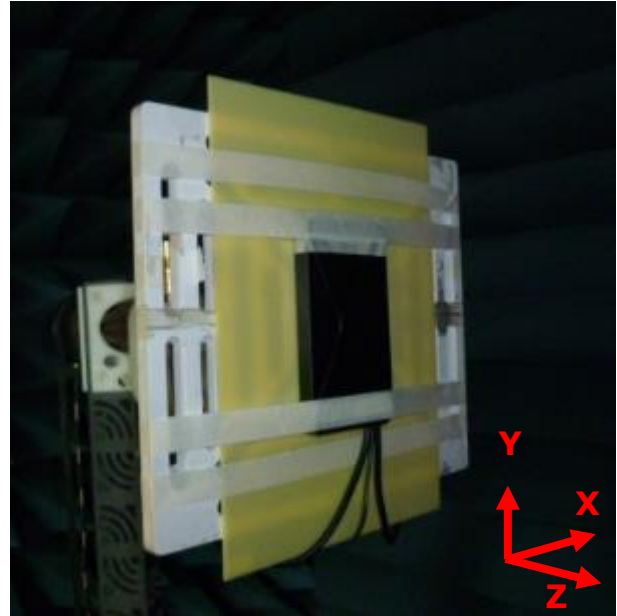
LNA Noise @3.0V

### 3.3. 2D Radiation Pattern

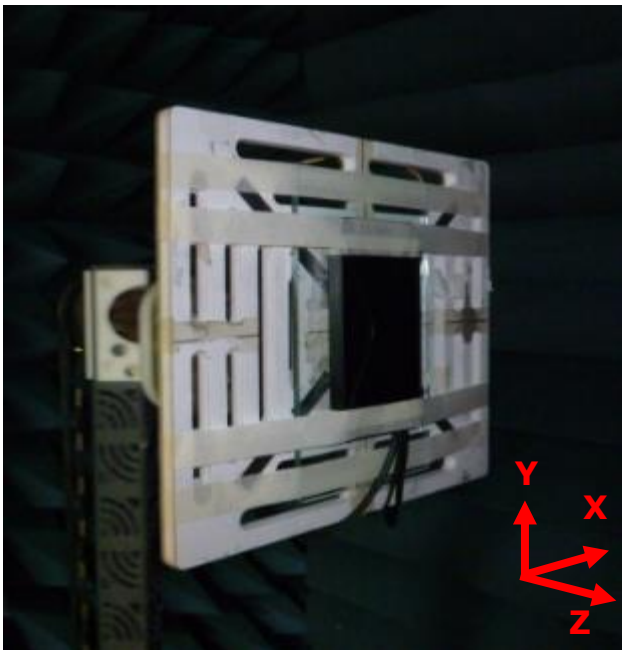
#### 3.3.1. Test Setup



In free space



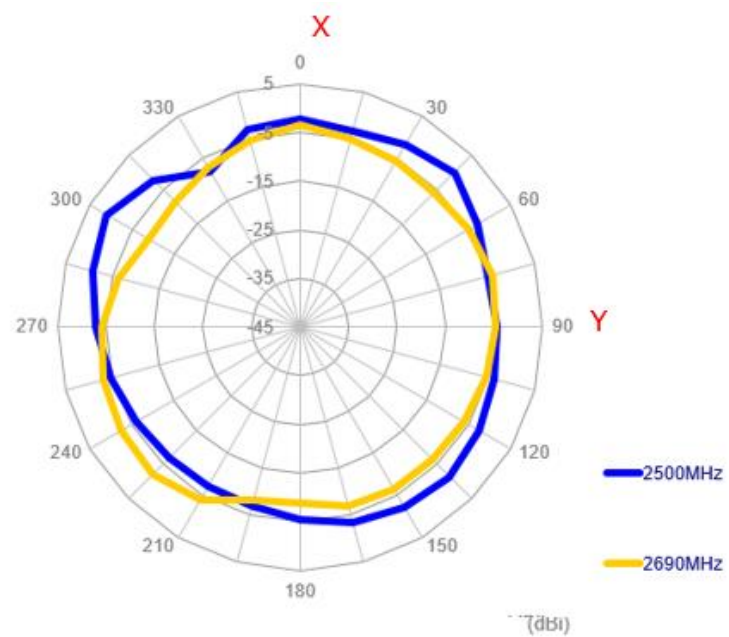
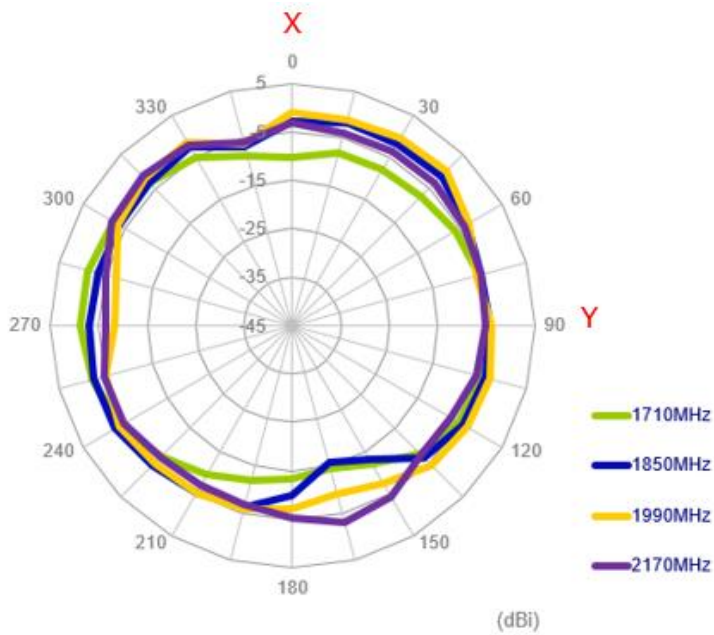
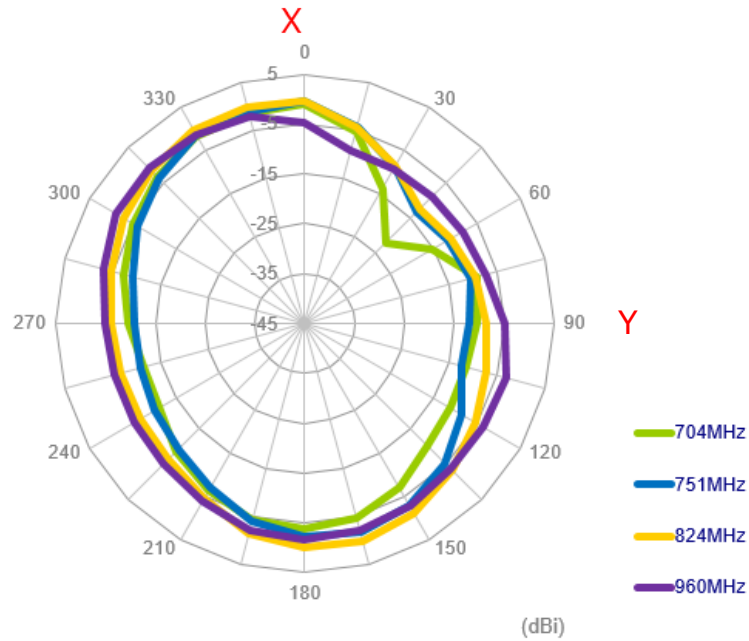
On 2mm ABS



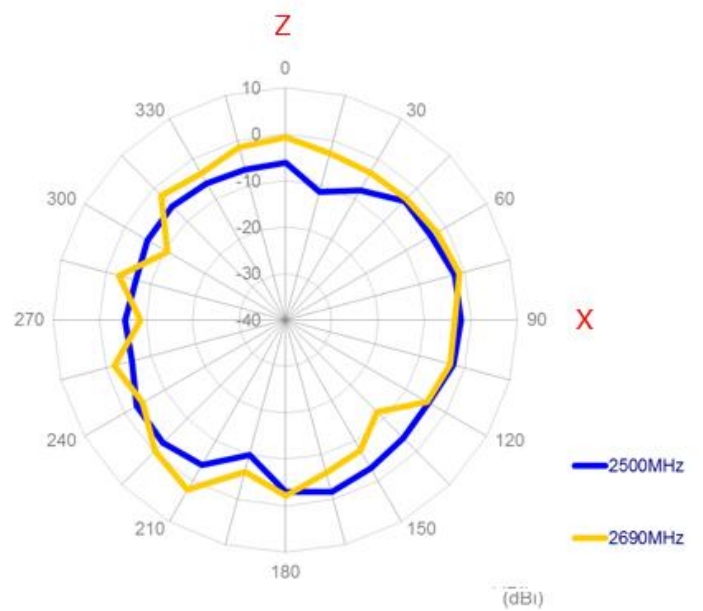
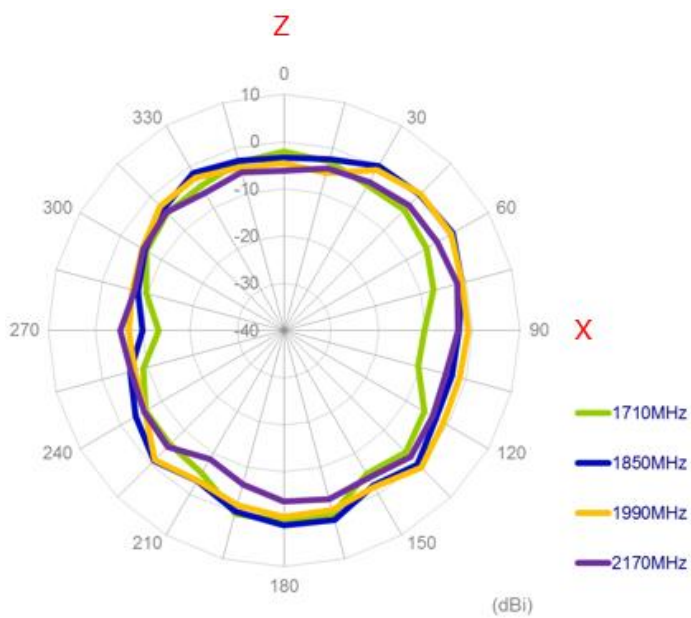
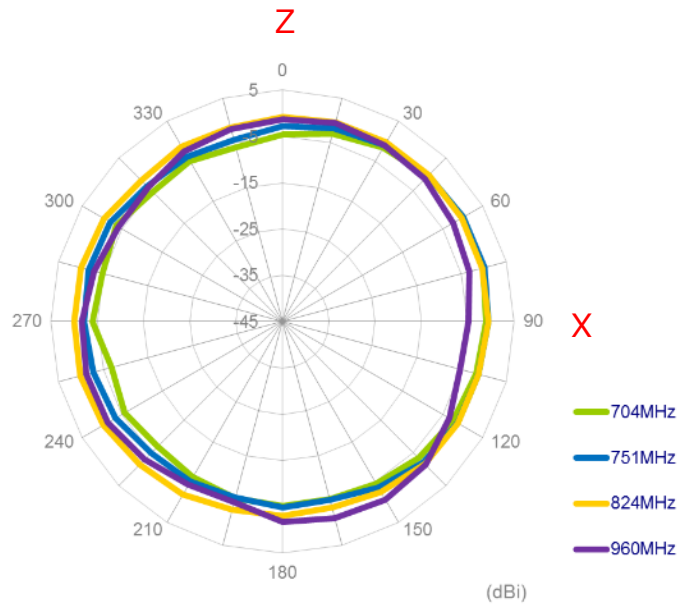
On glass base

### 3.3.2. LTE with 2M cable length in free space (MIMO 1)

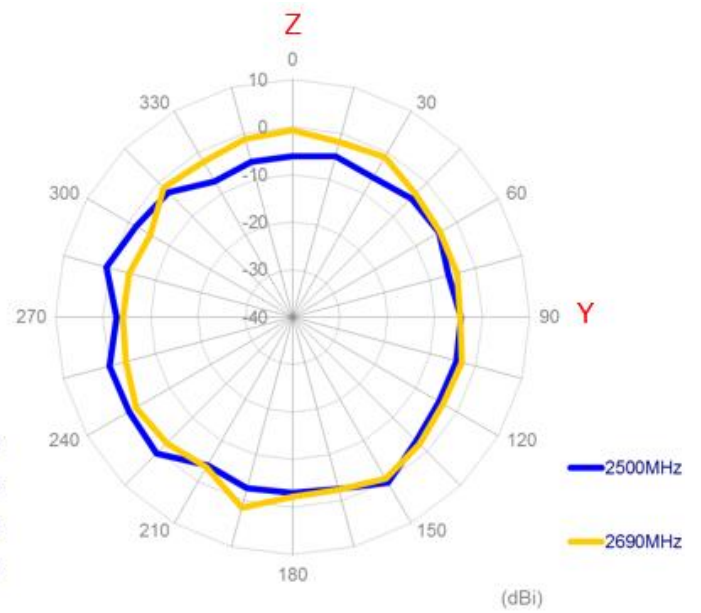
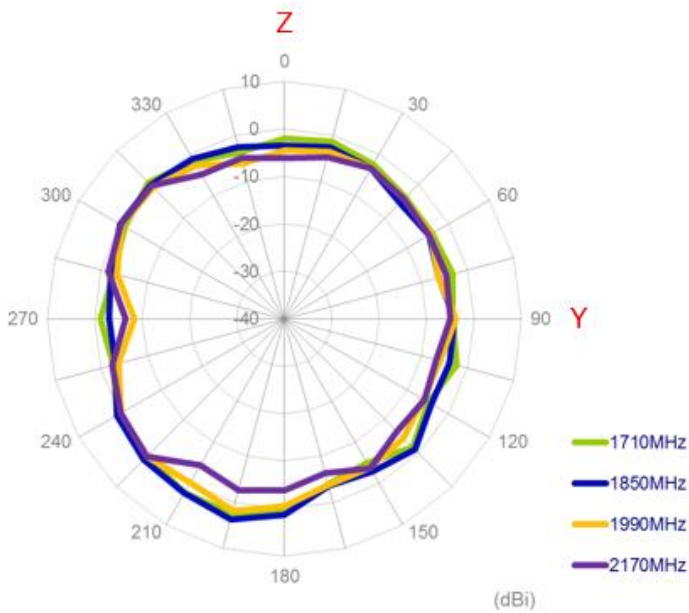
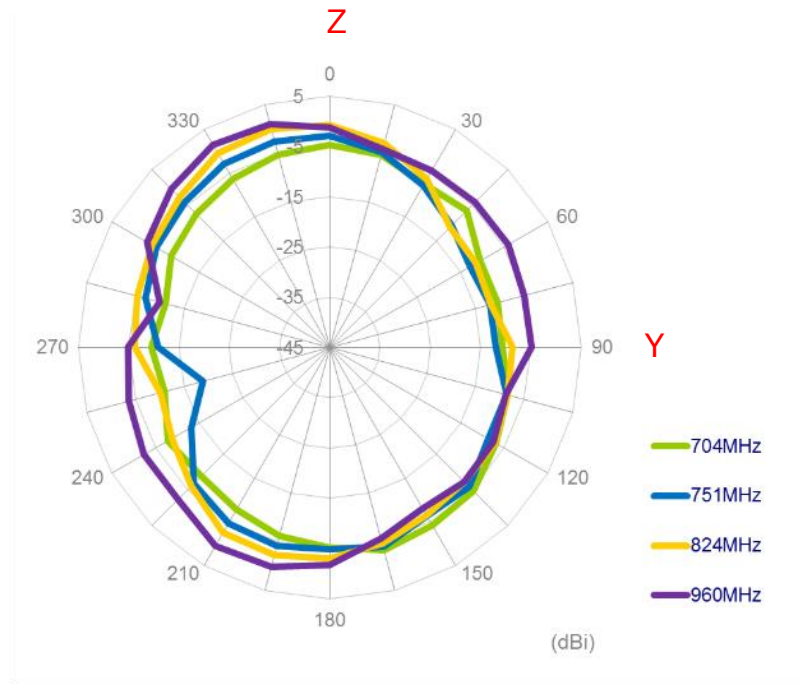
#### XY Plane



## XZ Plane

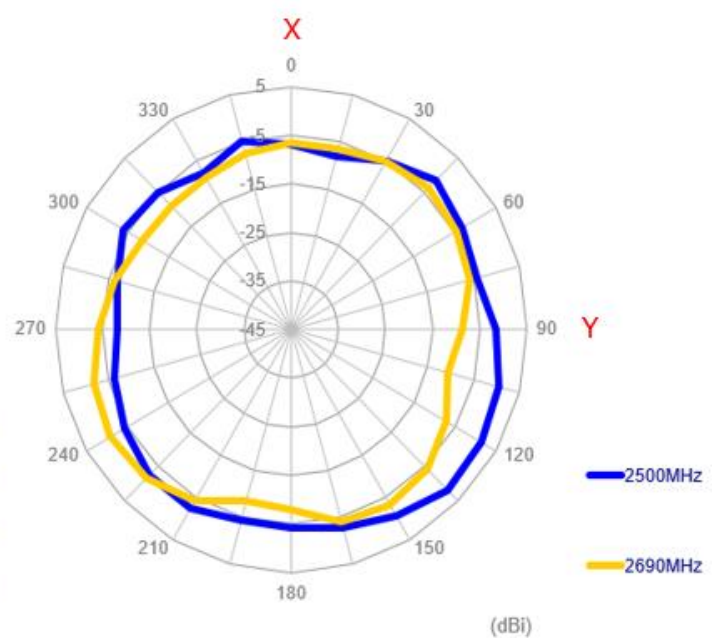
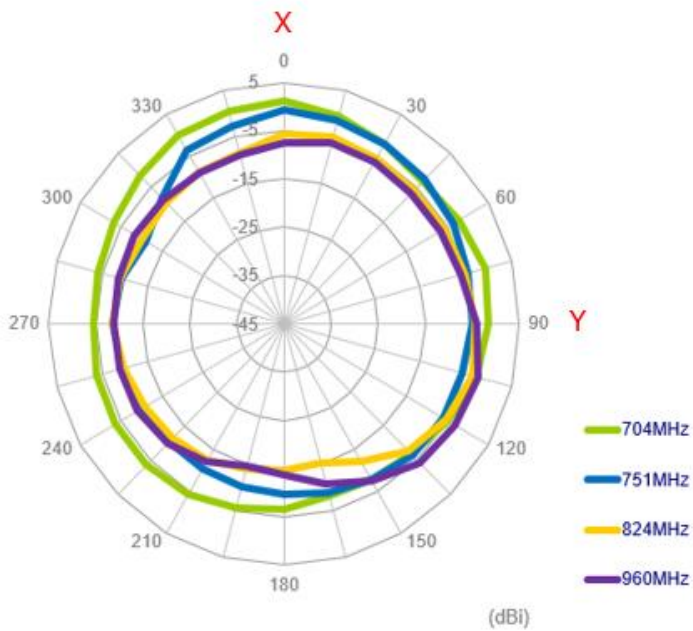
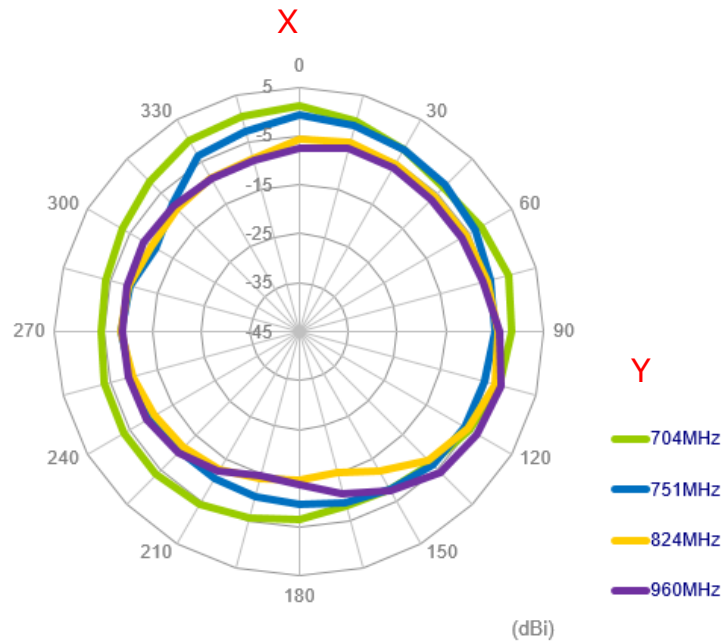


## YZ Plane

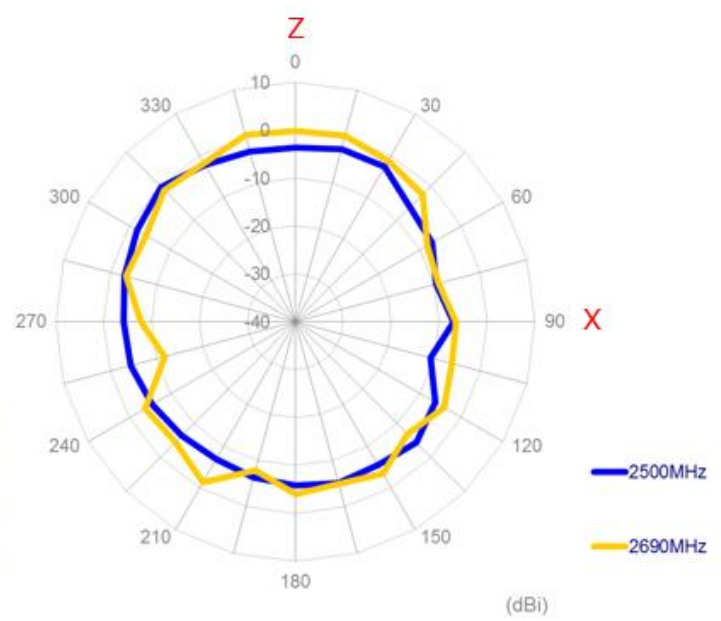
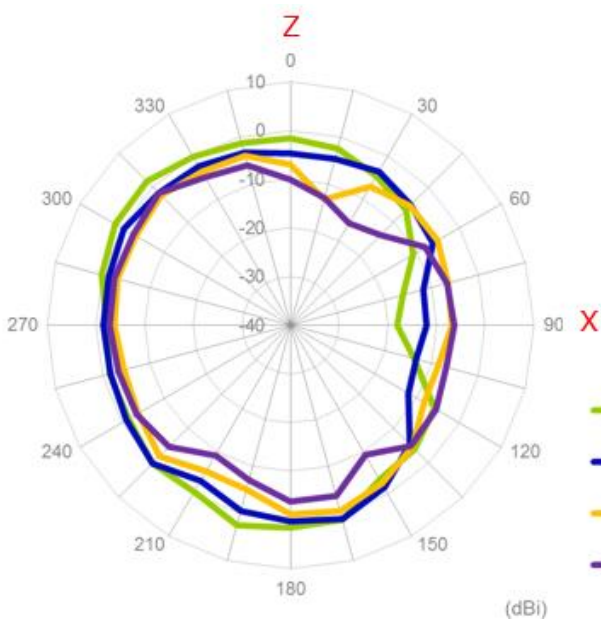
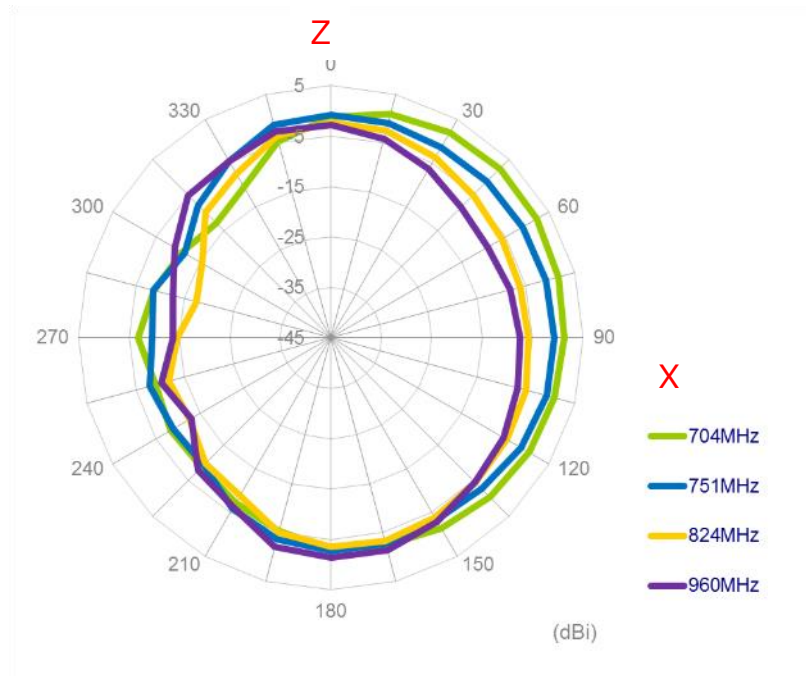


### 3.3.3. LTE with 2M cable length in free space (MIMO 2)

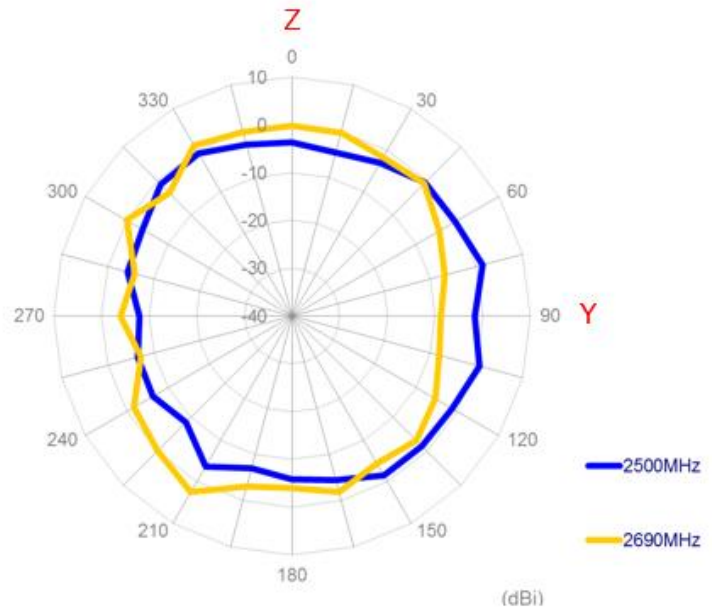
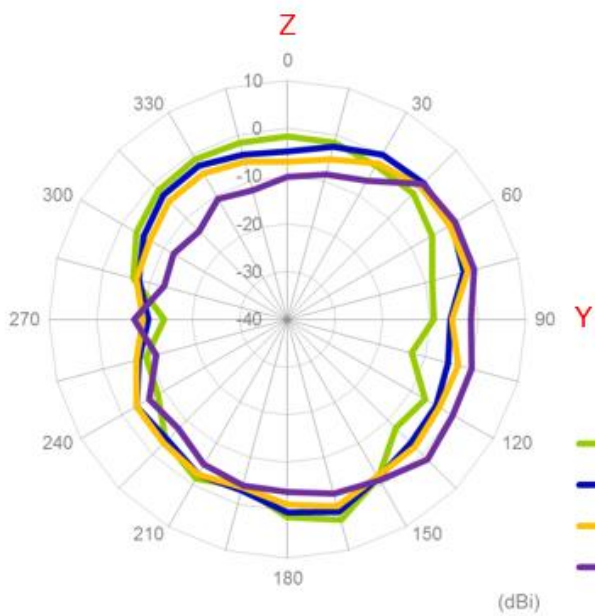
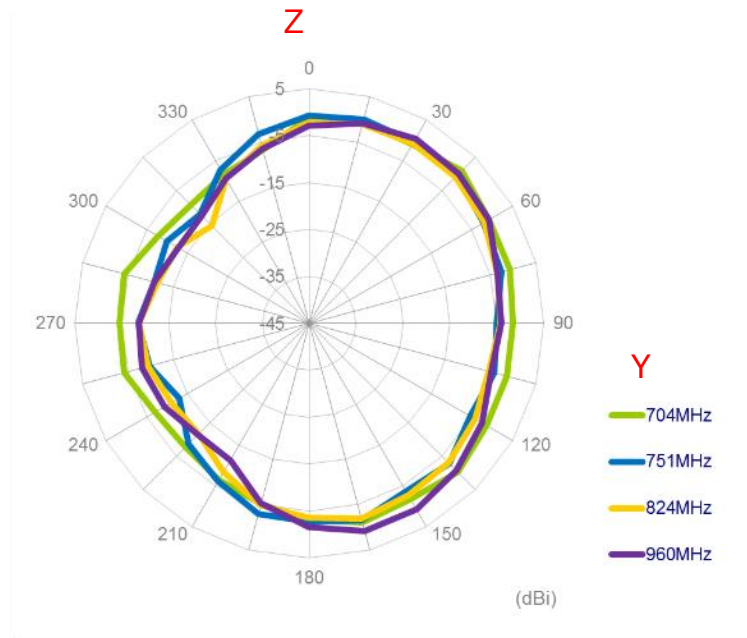
XY Plane



## XZ Plane

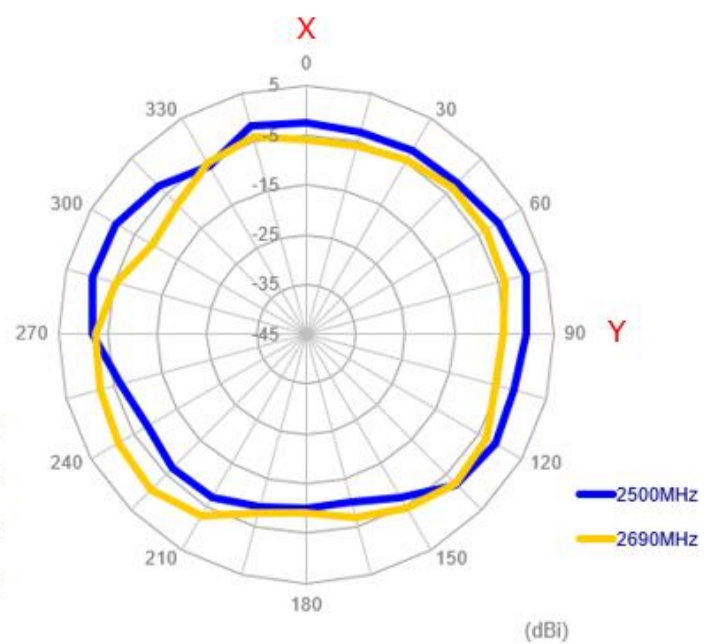
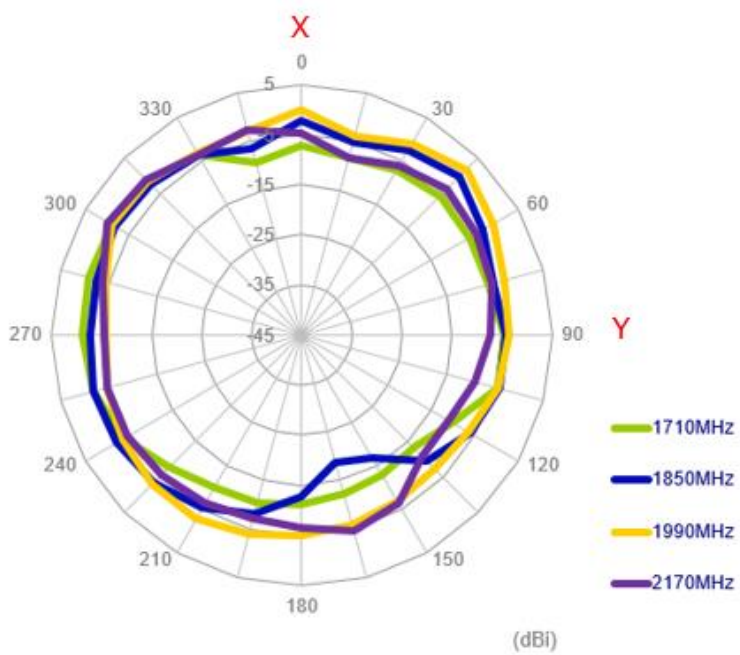
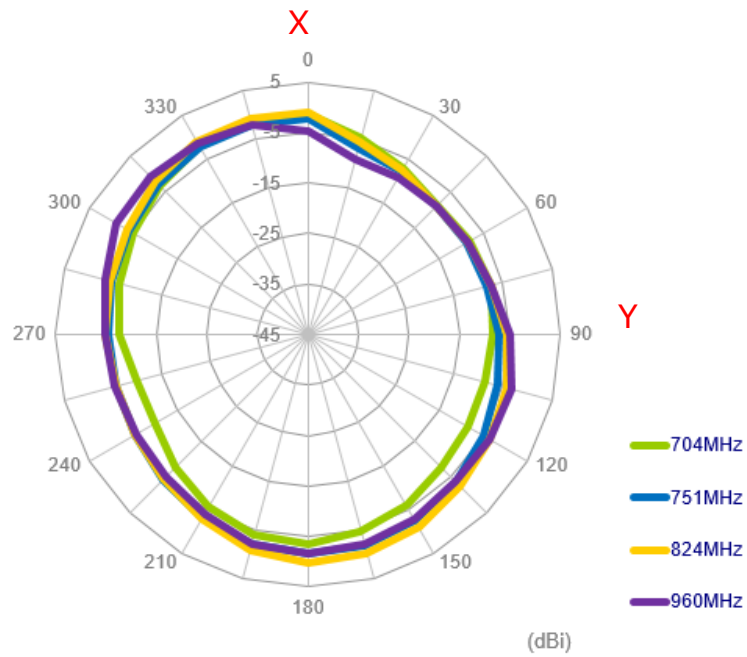


## YZ Plane

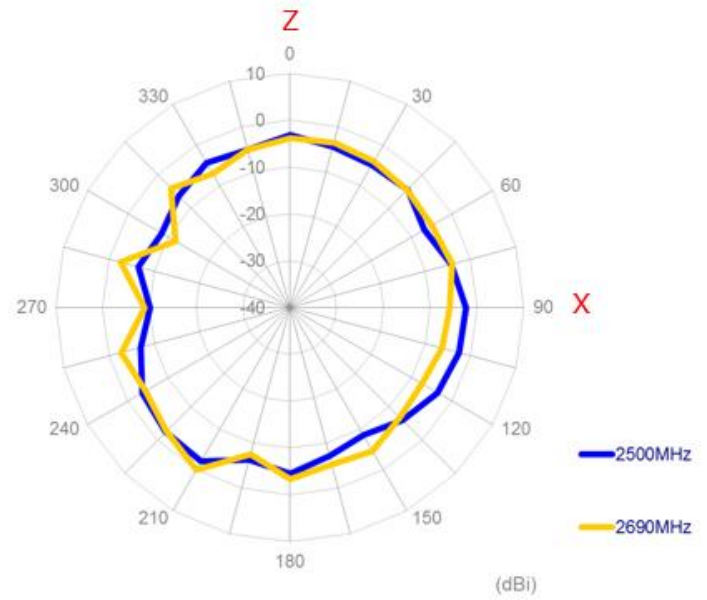
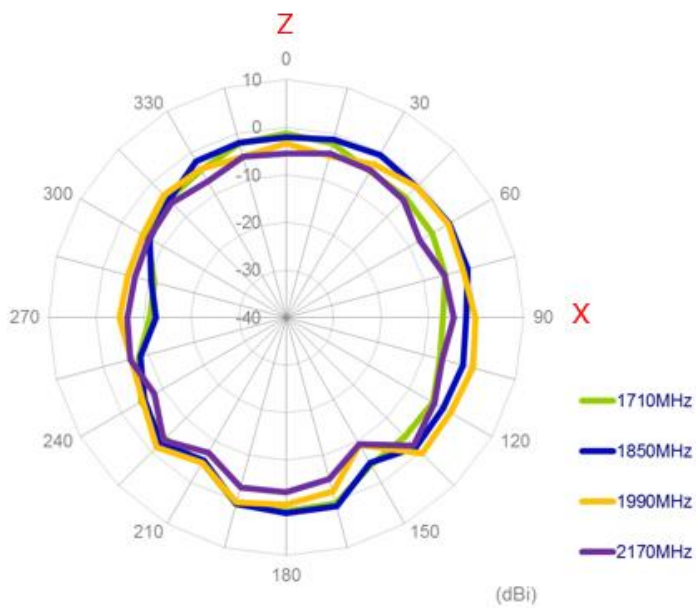
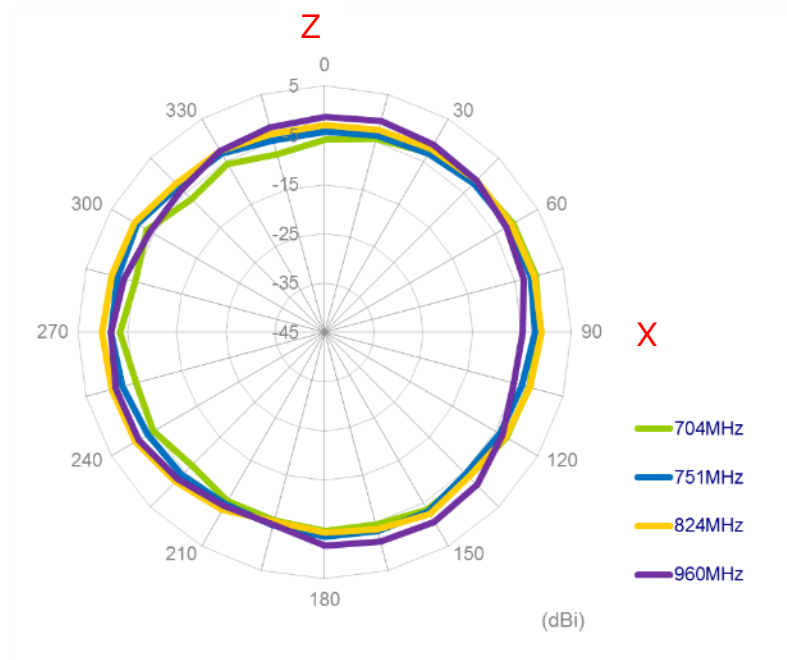


### 3.3.4. LTE with 2M cable length on the 2mm ABS (MIMO 1)

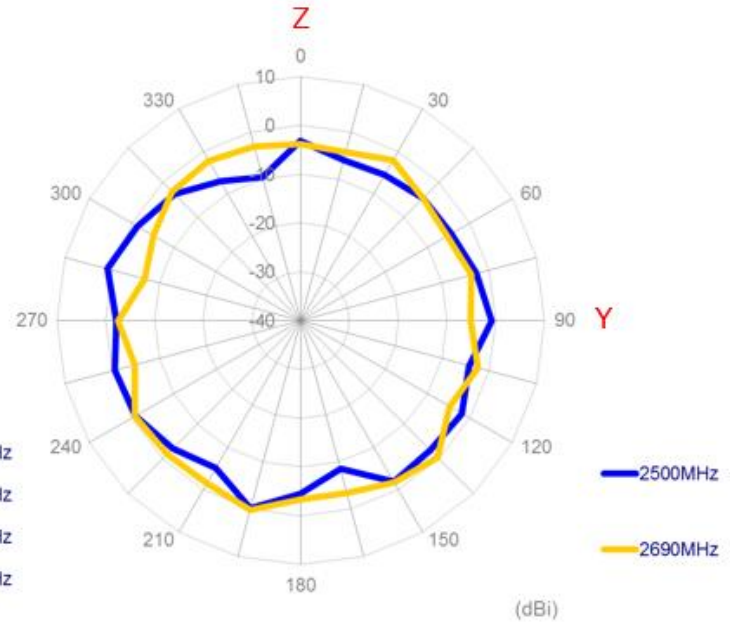
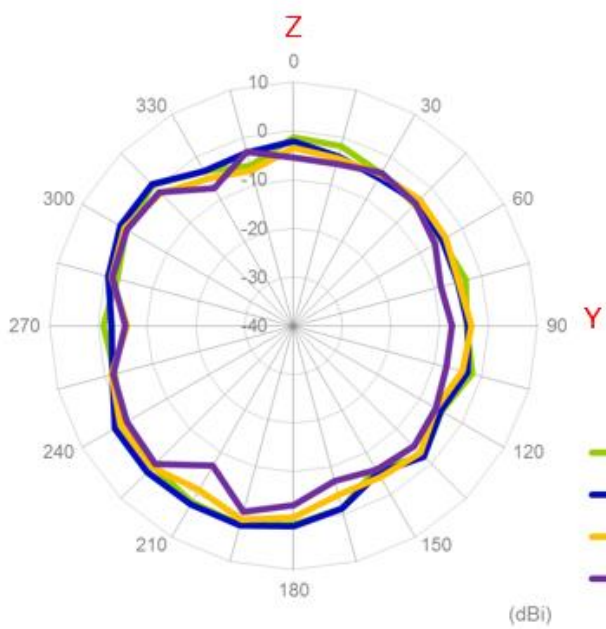
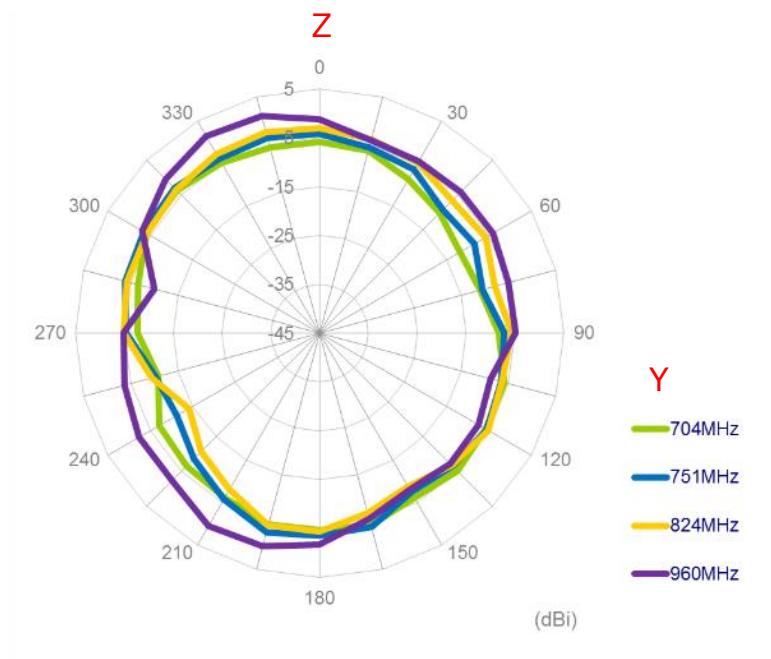
XY Plane



## XZ Plane

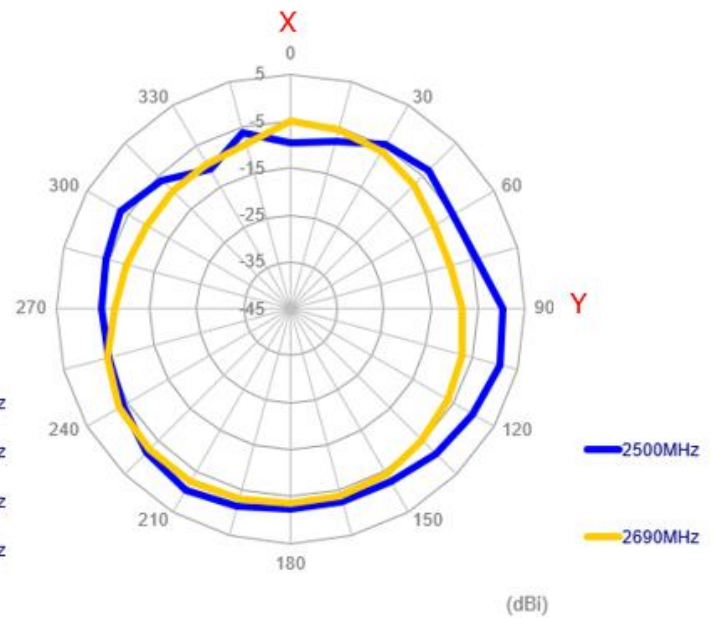
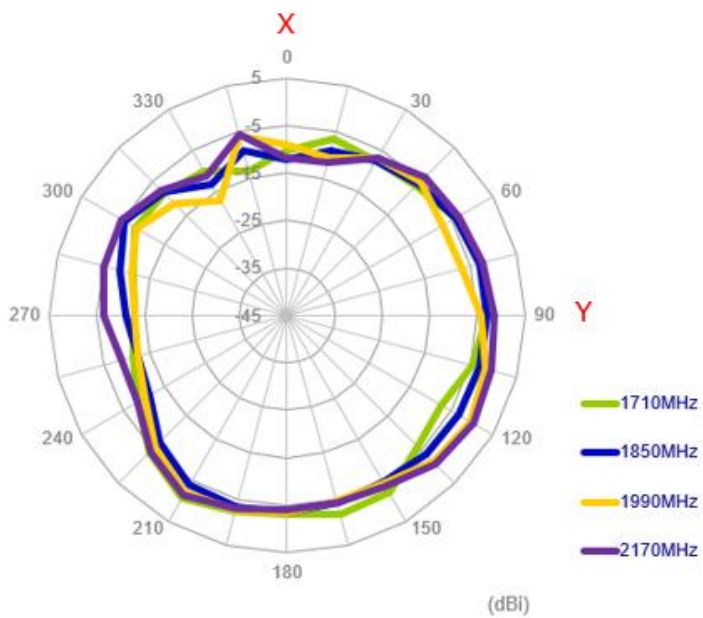
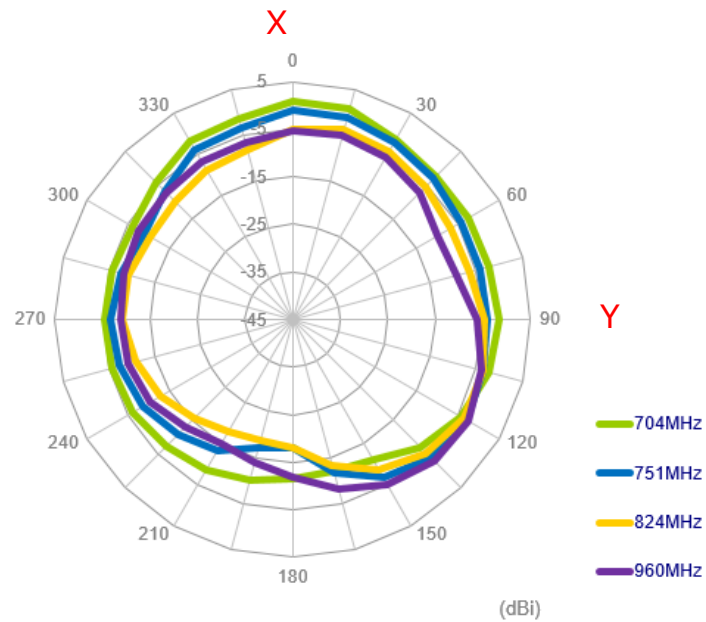


## YZ Plane

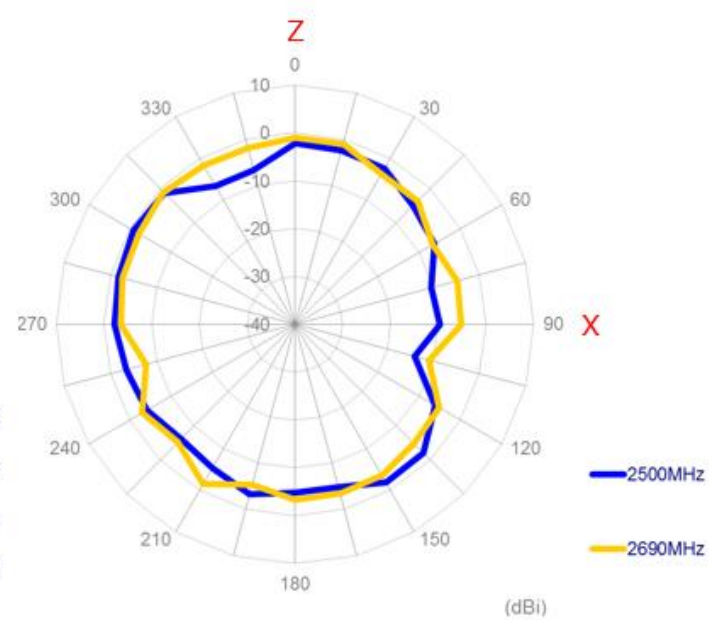
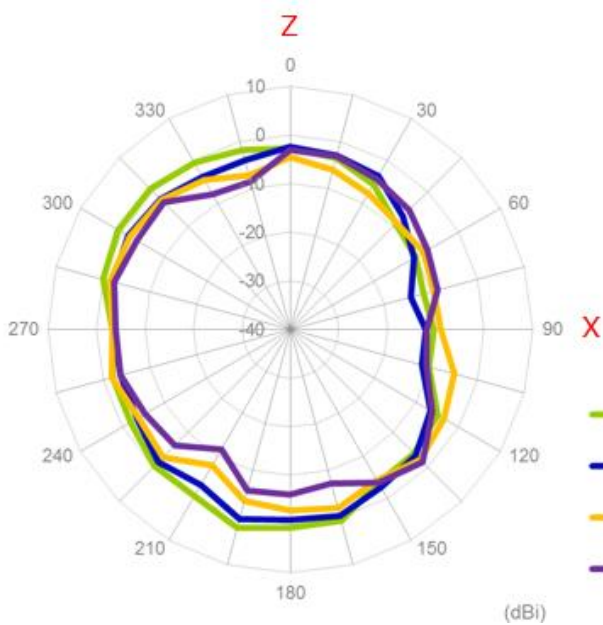
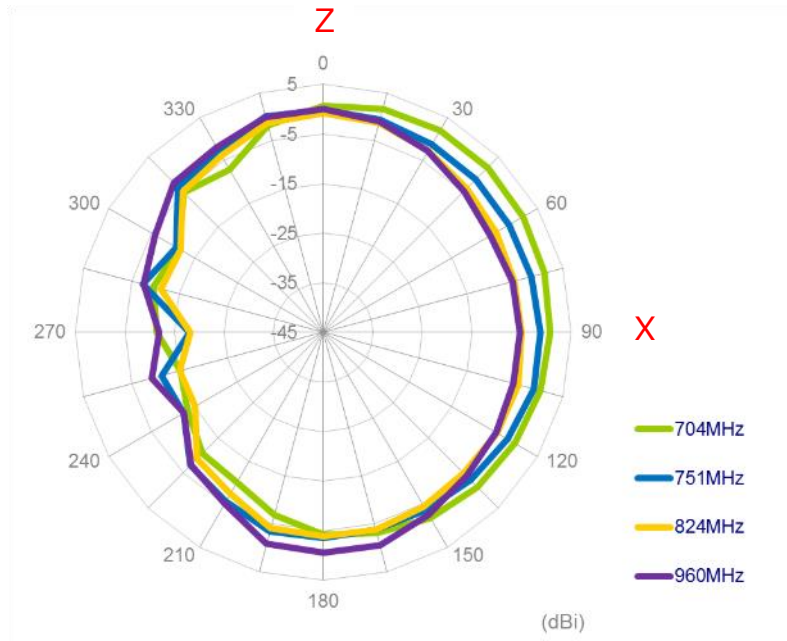


### 3.3.5. LTE with 2M cable length on the 2mm ABS (MIMO 2)

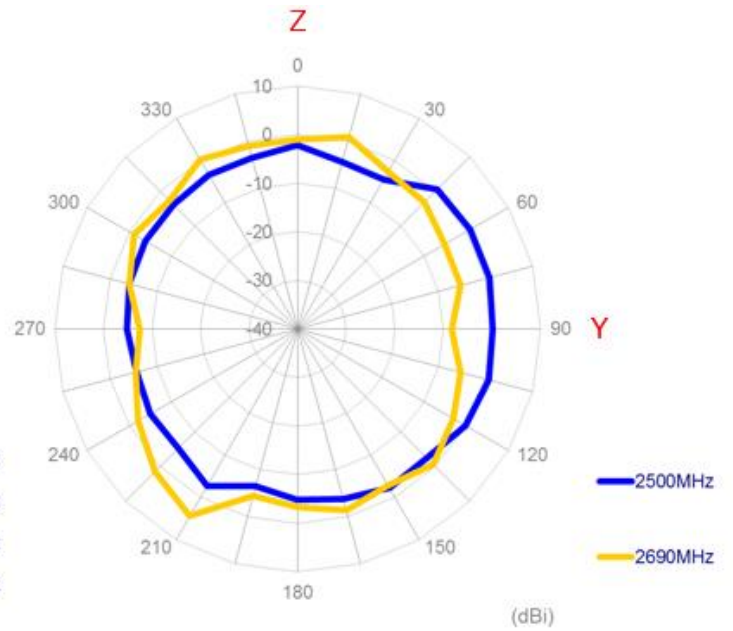
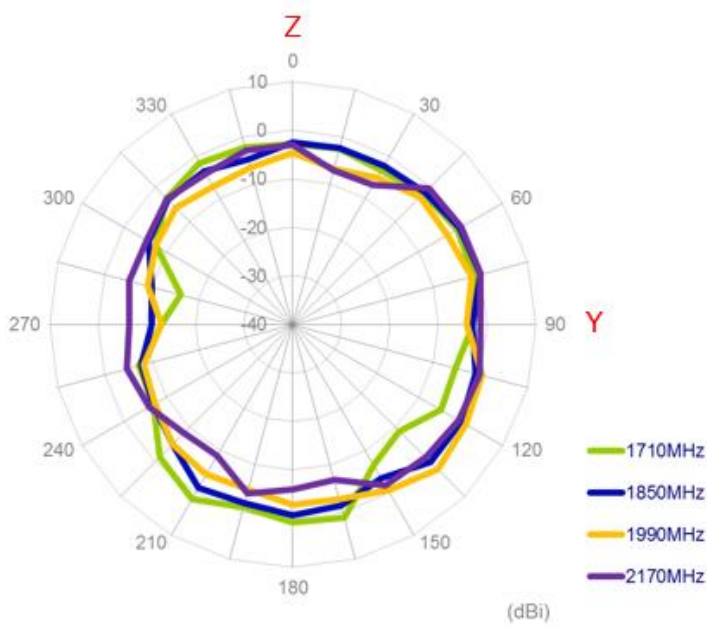
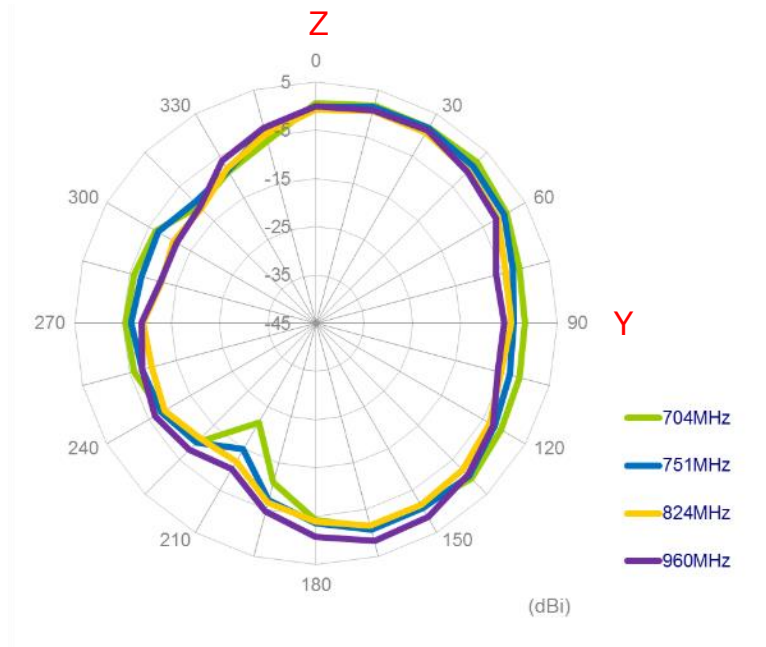
XY Plane



## XZ Plane

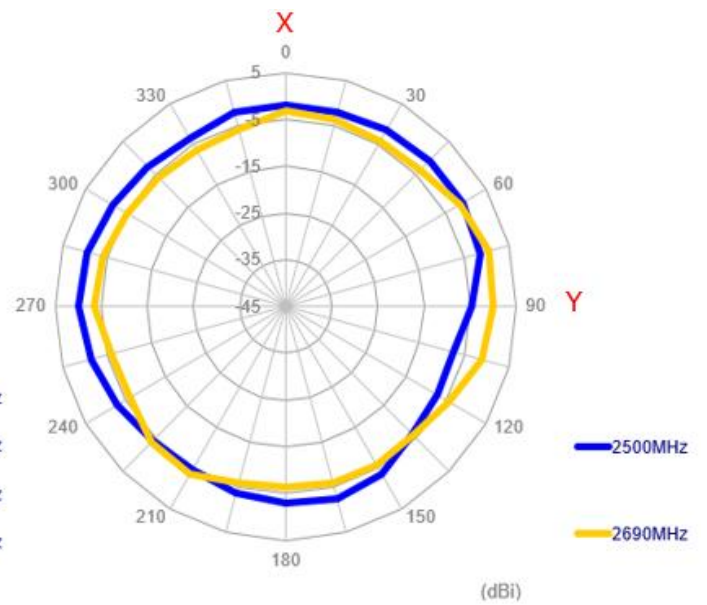
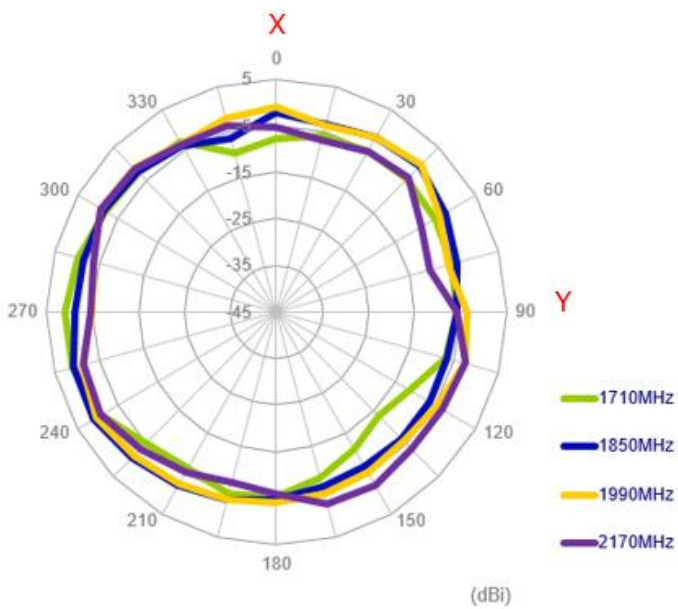
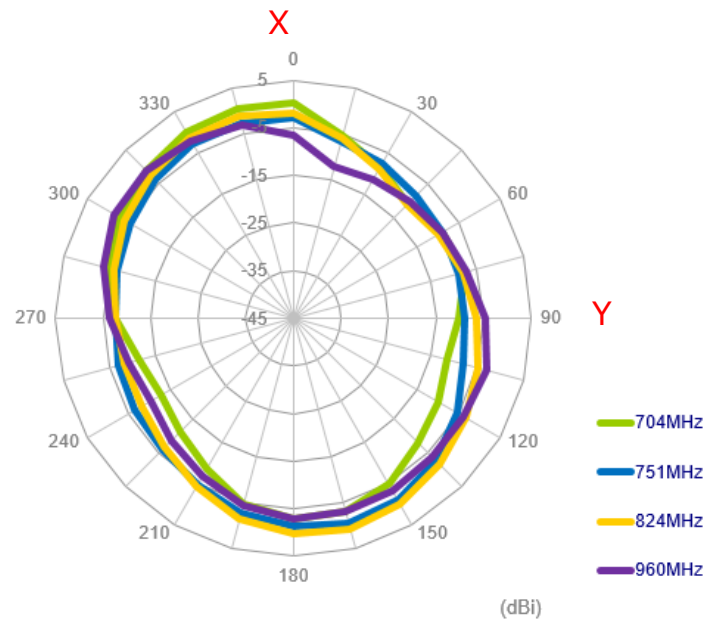


## YZ Plane

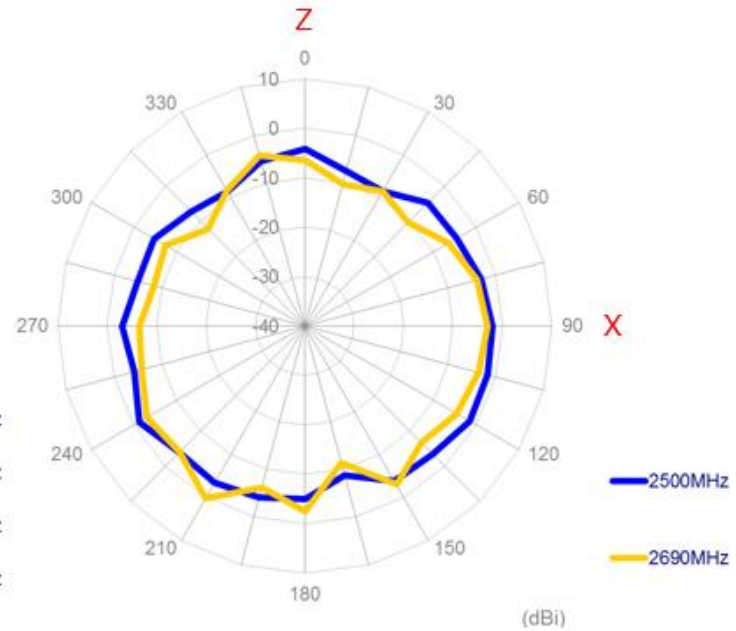
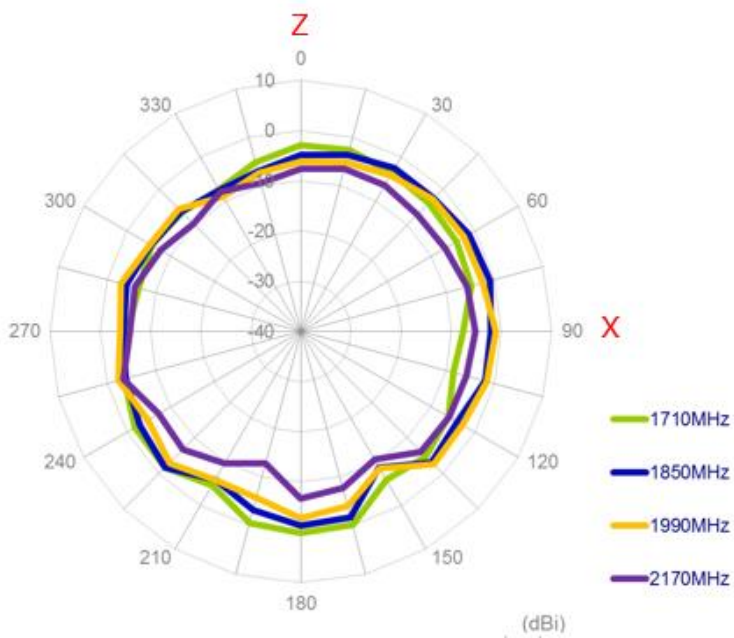
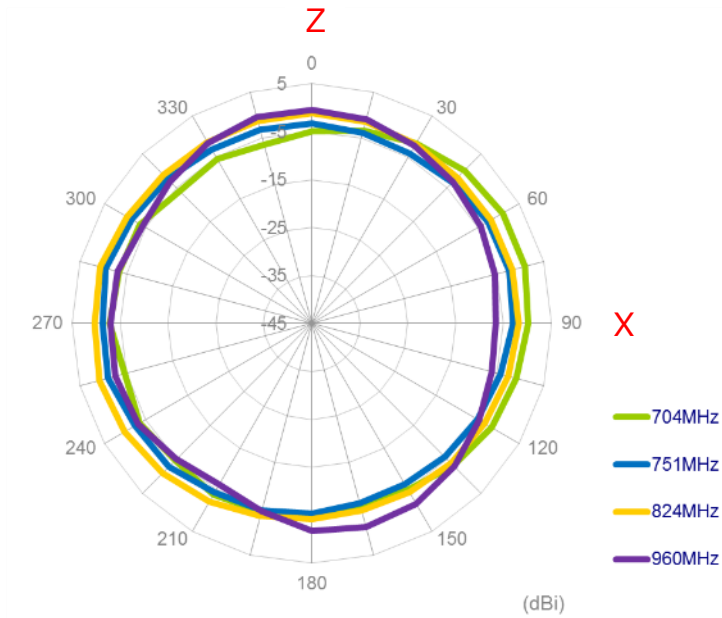


### 3.3.6. LTE with 2M cable length on the glass (MIMO 1)

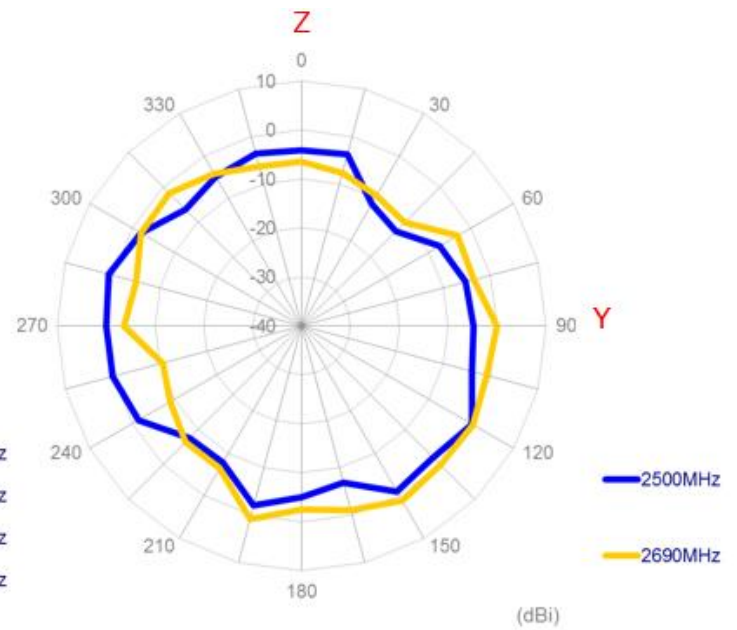
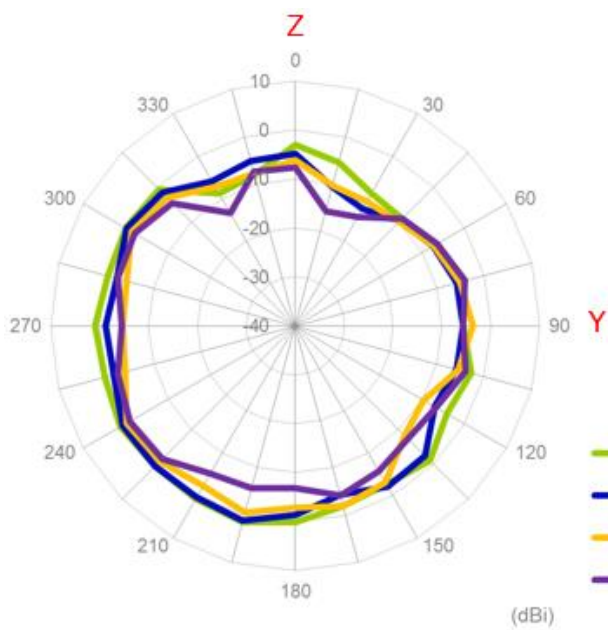
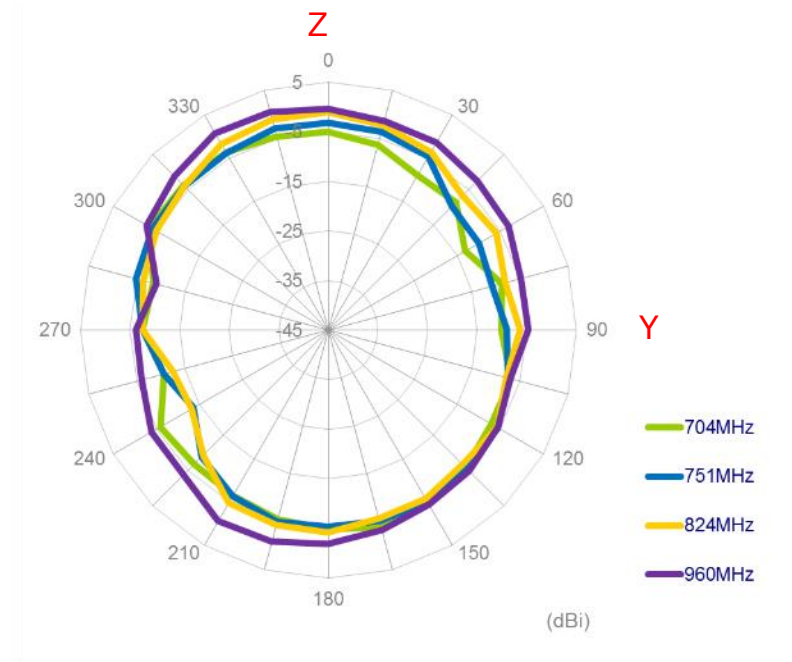
XY Plane



## XZ Plane

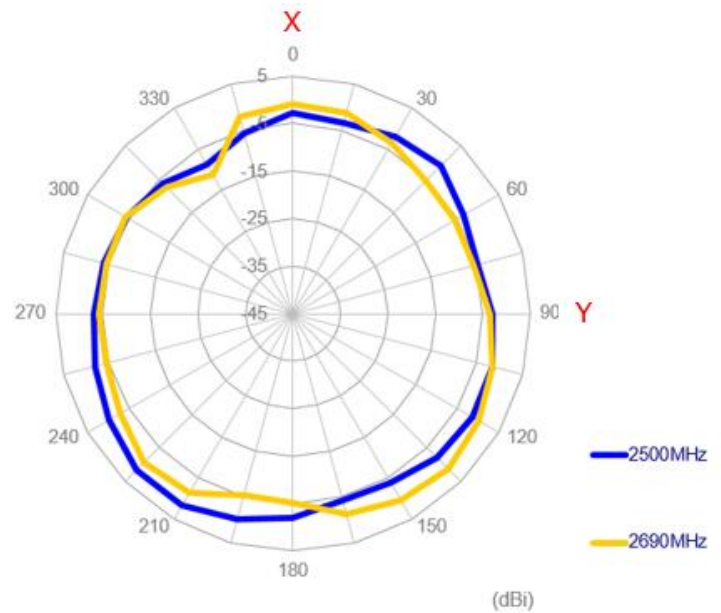
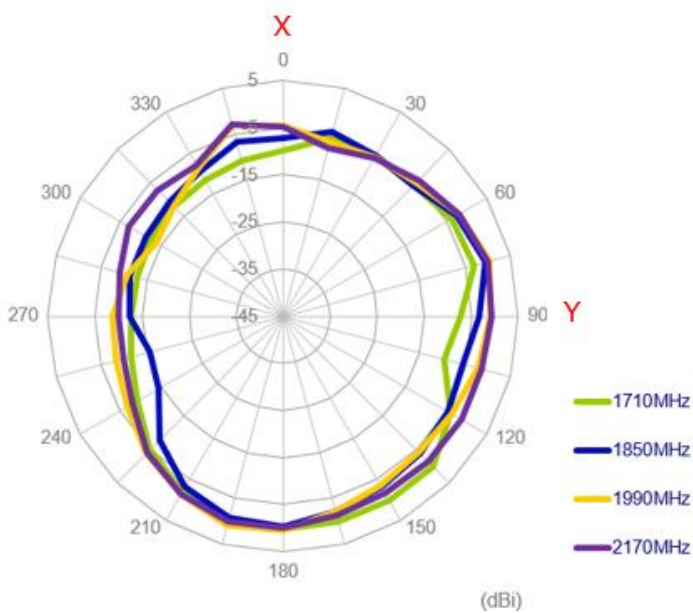
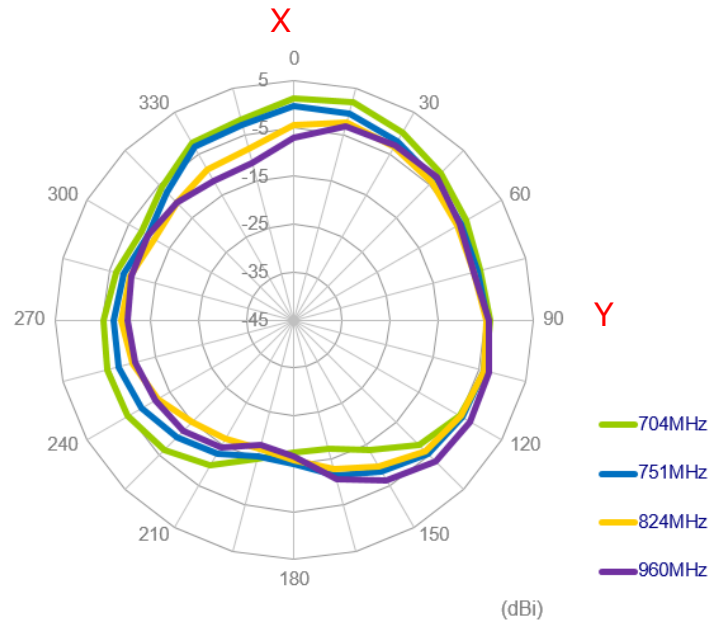


## YZ Plane

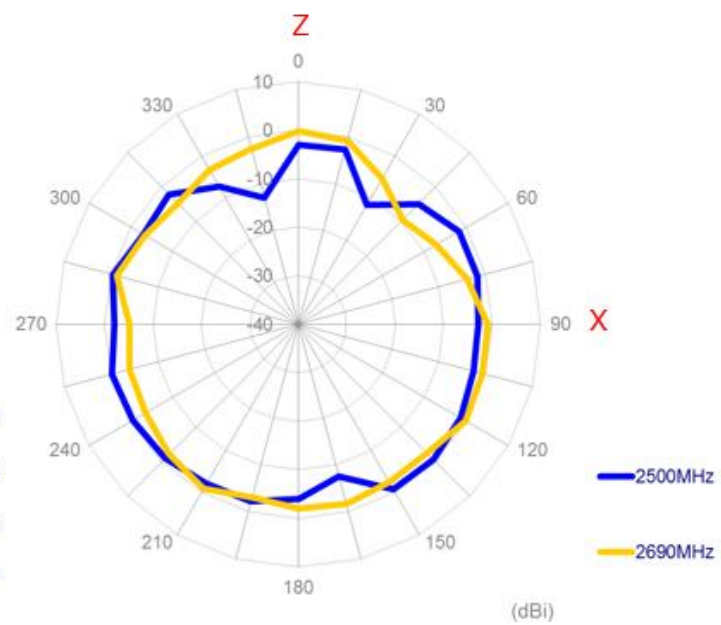
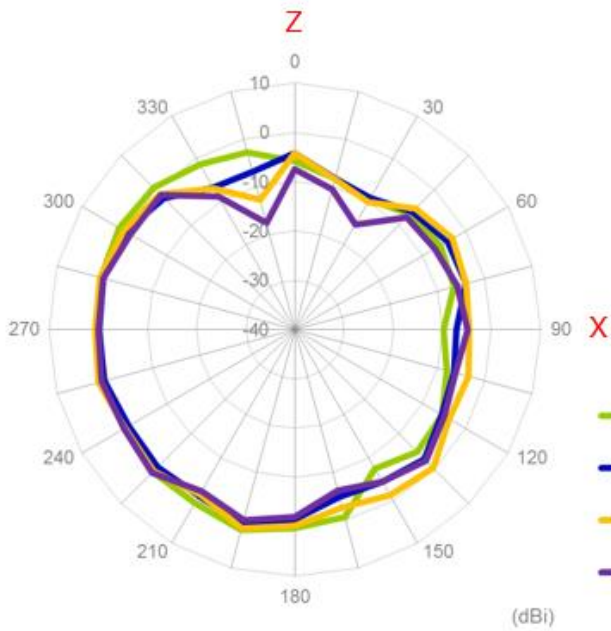
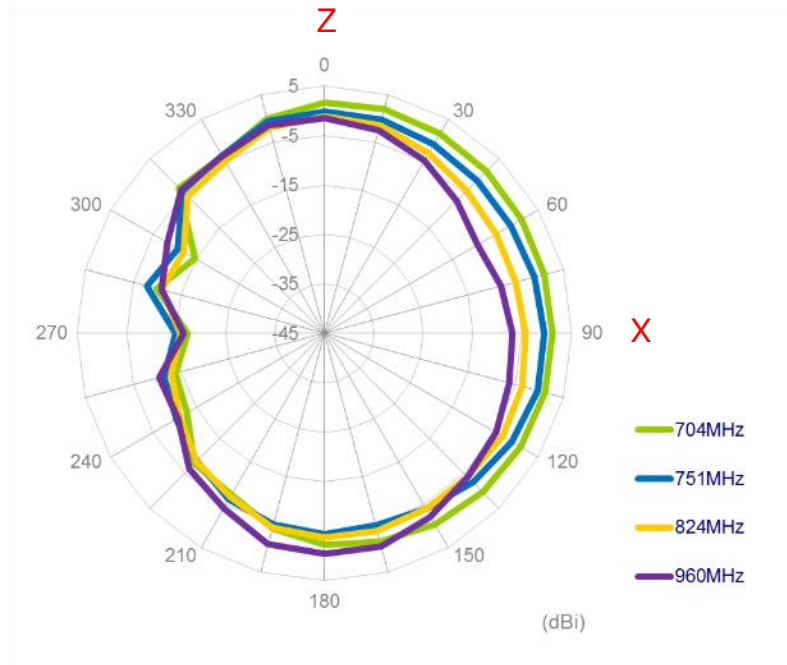


### 3.3.7. LTE with 2M cable length on the glass (MIMO 2)

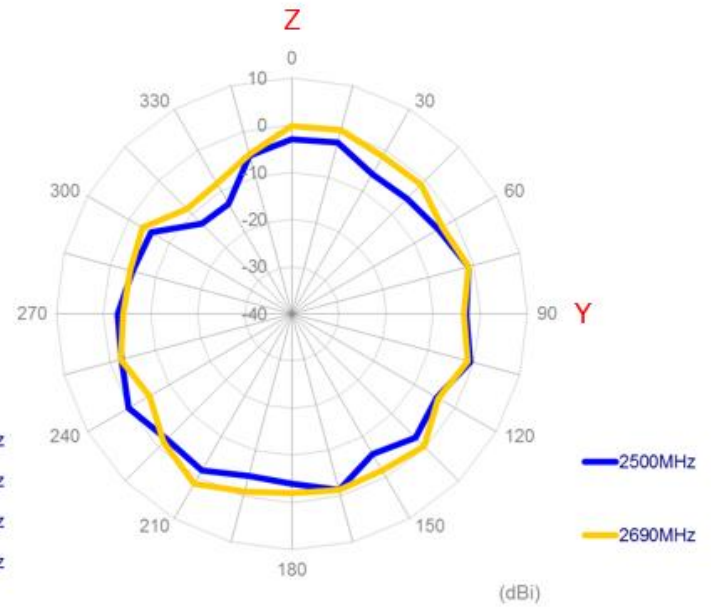
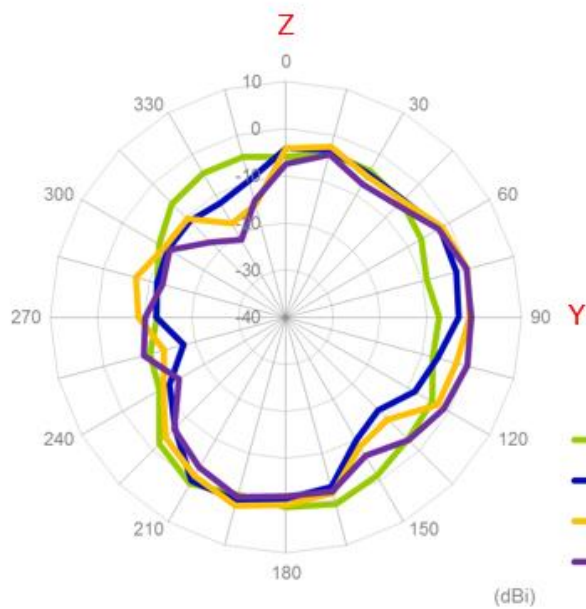
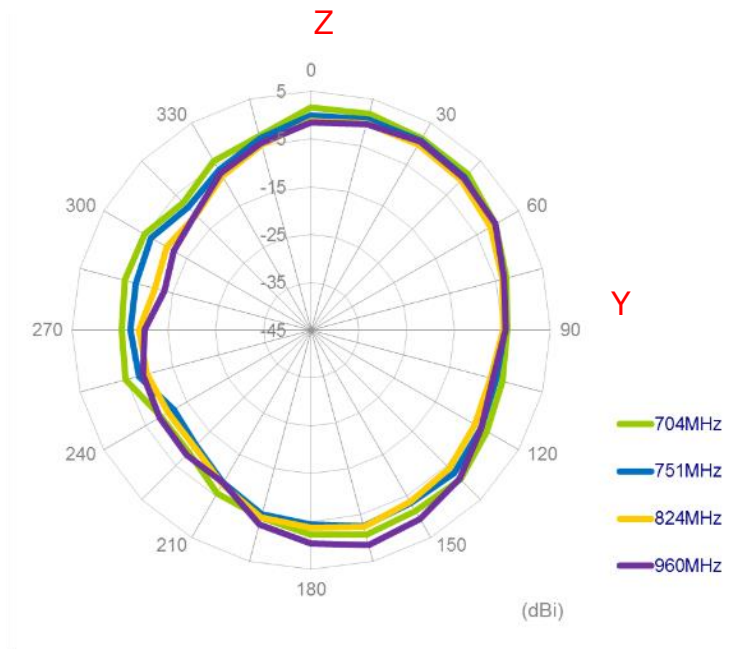
XY Plane



## XZ Plane

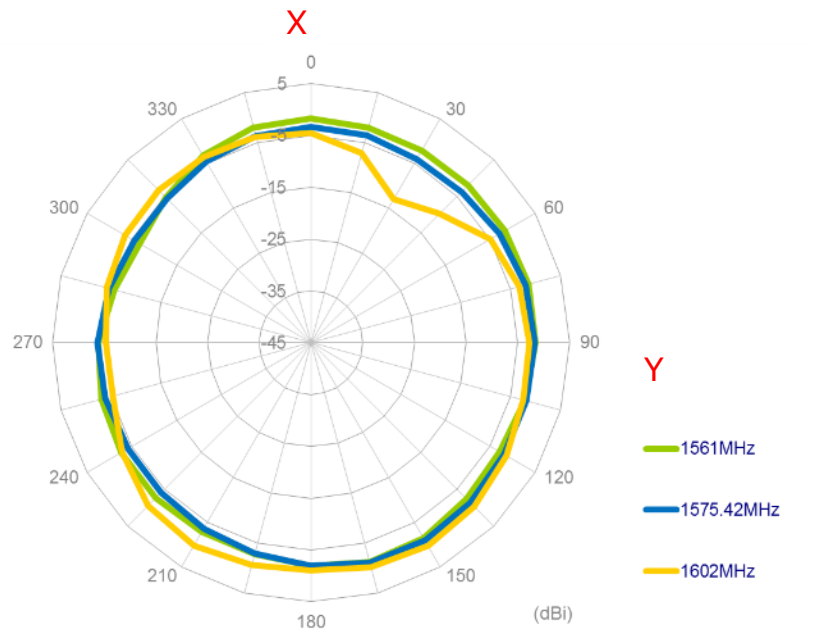


## YZ Plane

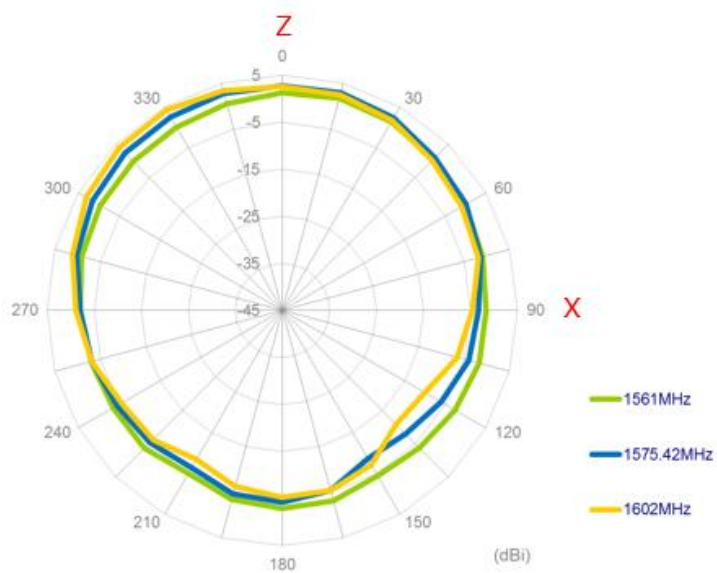


### 3.3.8. GPS/GLONASS/GALILEO/BeiDou

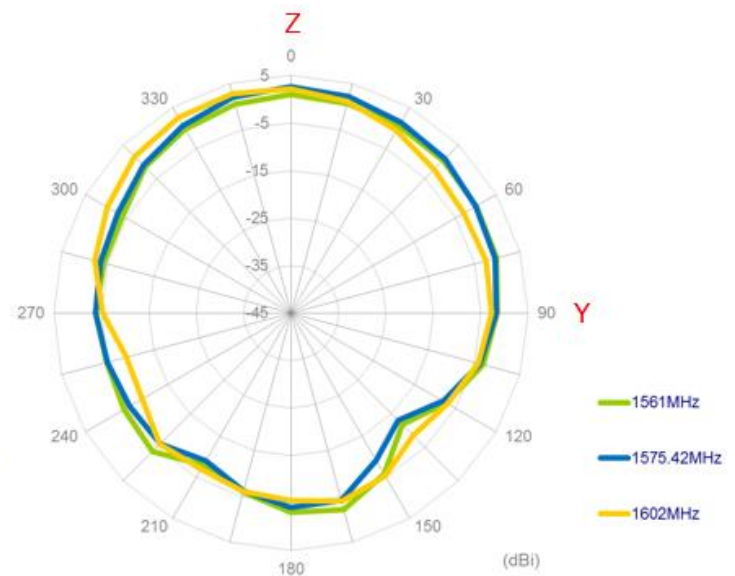
#### XY Plane



#### XZ Plane

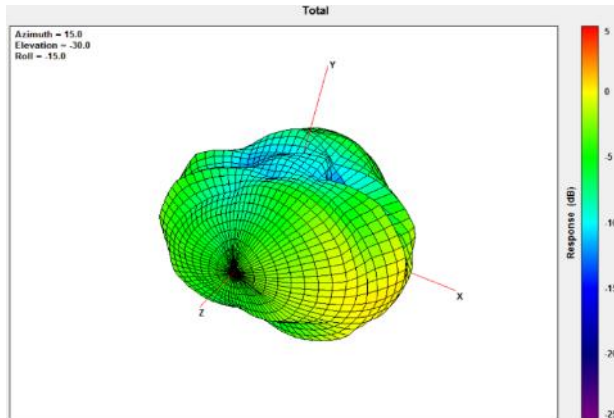


#### YZ Plane

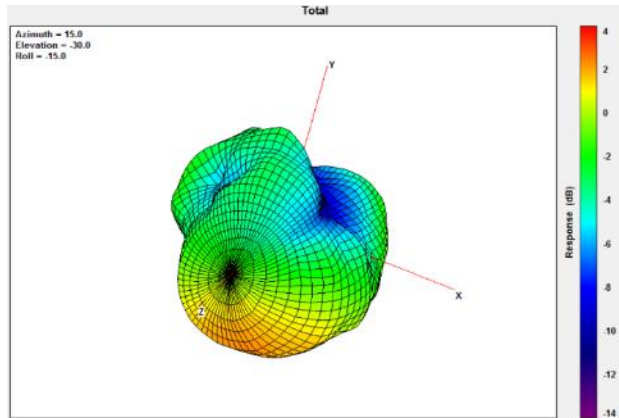


### 3.4. 3D Radiation Pattern

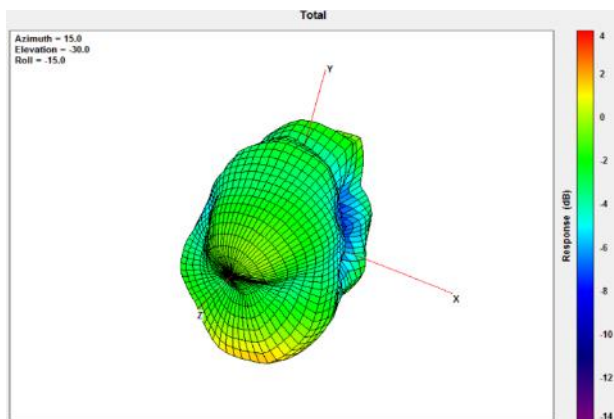
#### 3.4.1. LTE with 2M cable length in free space (MIMO 1)



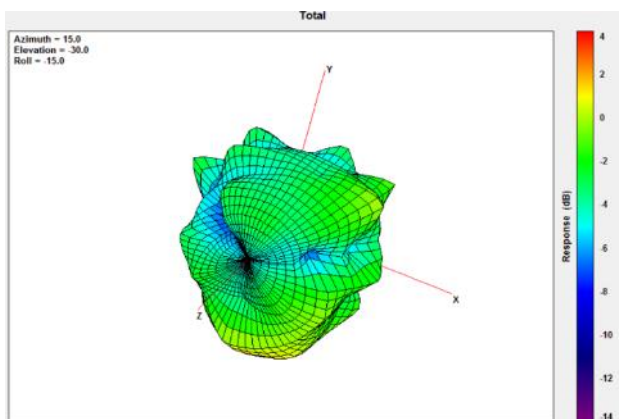
704MHz



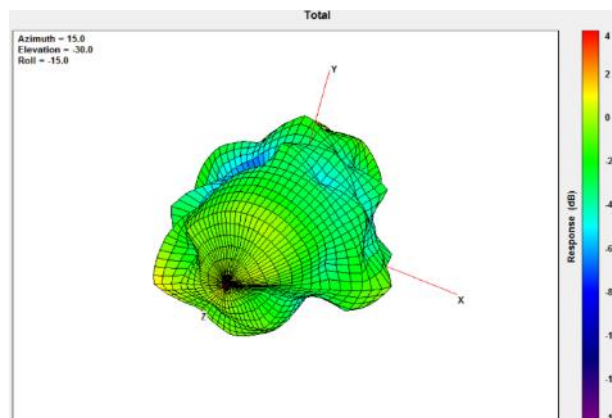
960MHz



1710MHz

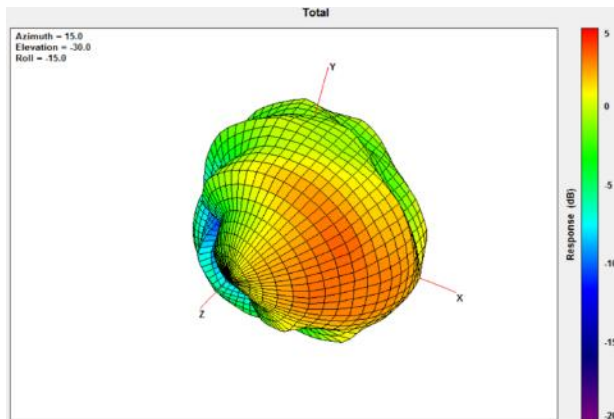


2170MHz

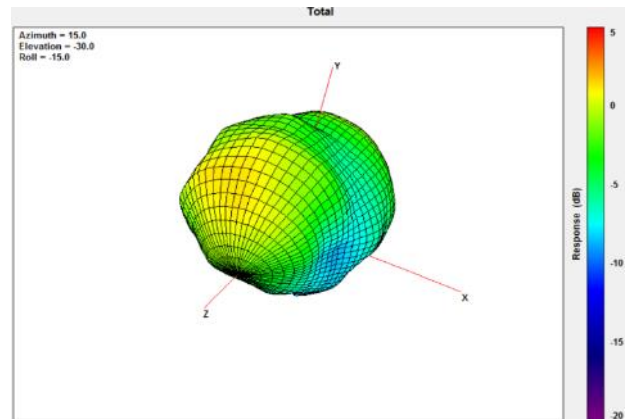


2690MHz

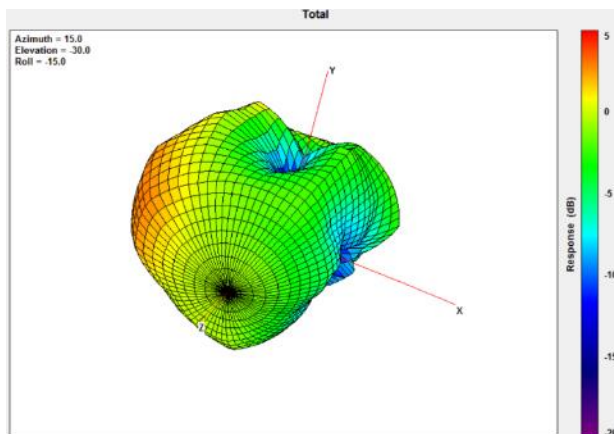
### 3.4.2. LTE with 2M cable length in free space (MIMO 2)



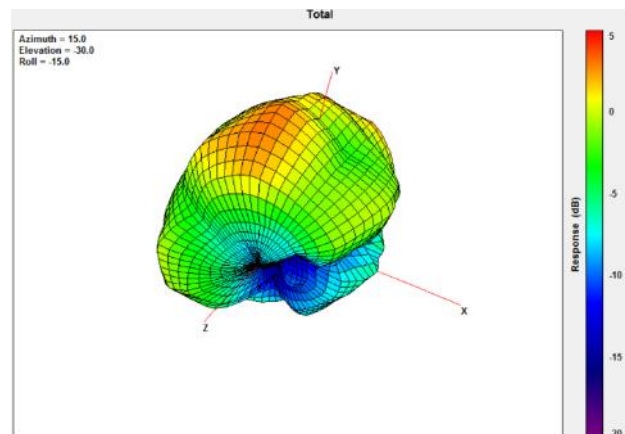
704MHz



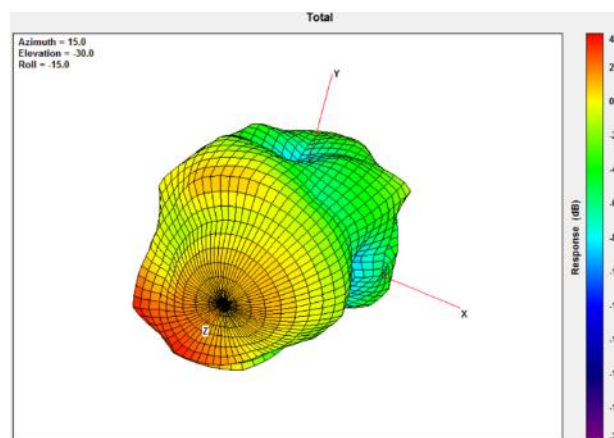
960MHz



1710MHz

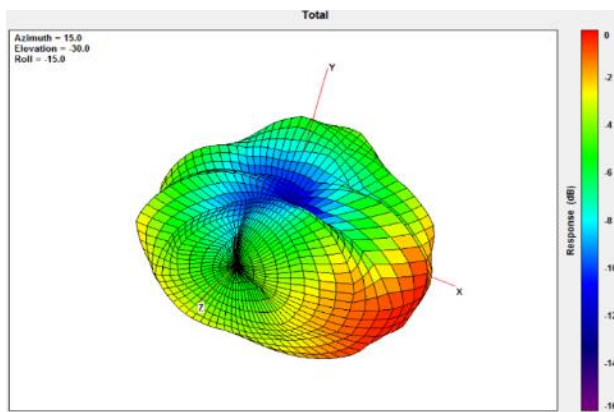


2170MHz

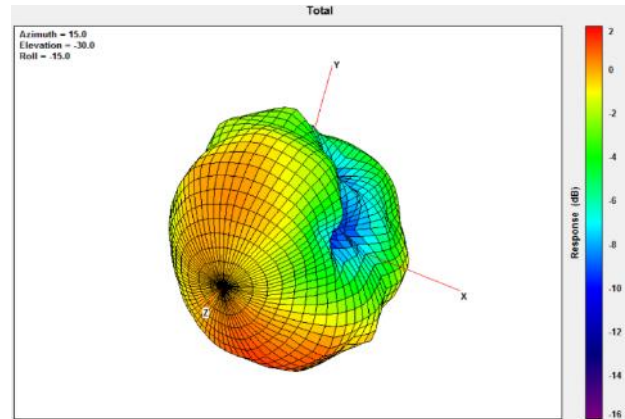


2690MHz

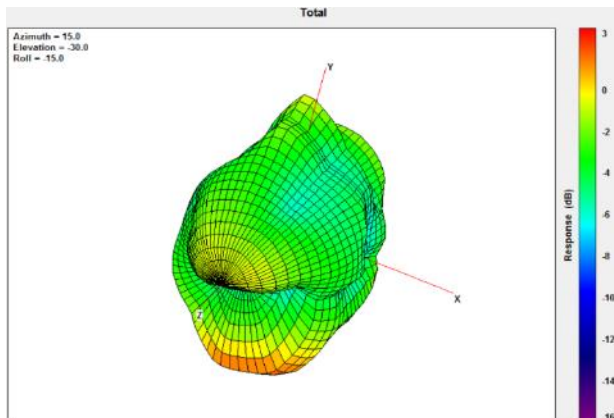
### 3.4.3. LTE with 2M cable length on the 2mm ABS (MIMO 1)



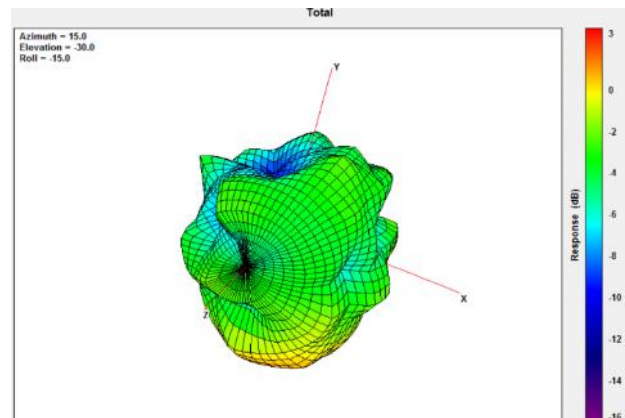
704MHz



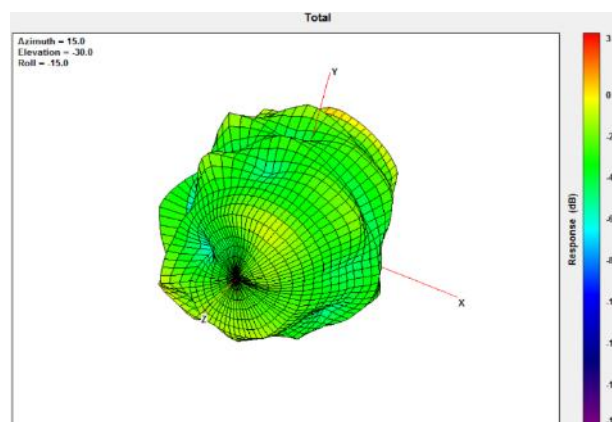
960MHz



1710MHz

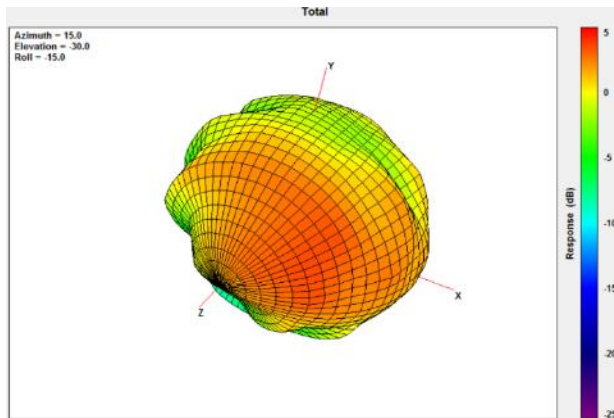


2170MHz

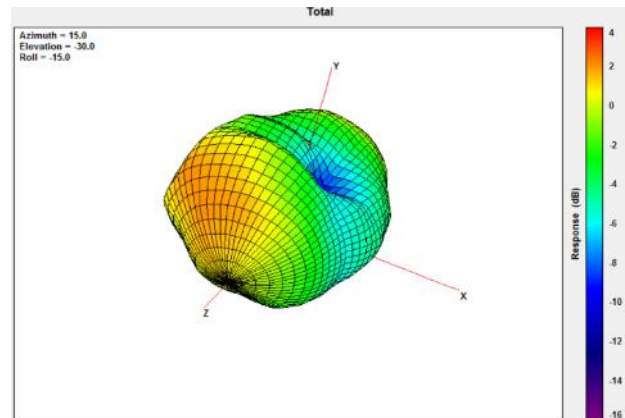


2690MHz

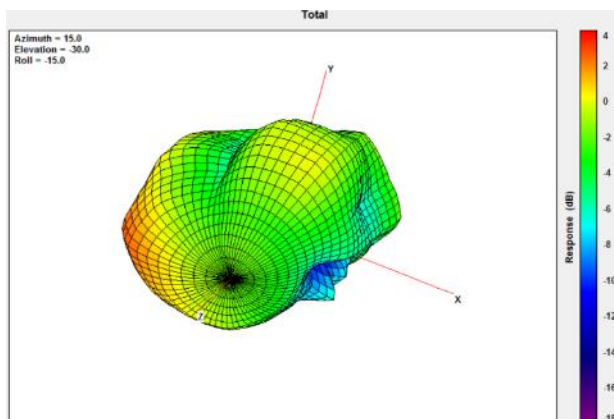
#### 3.4.4. LTE with 2M cable length on the 2mm ABS (MIMO 2)



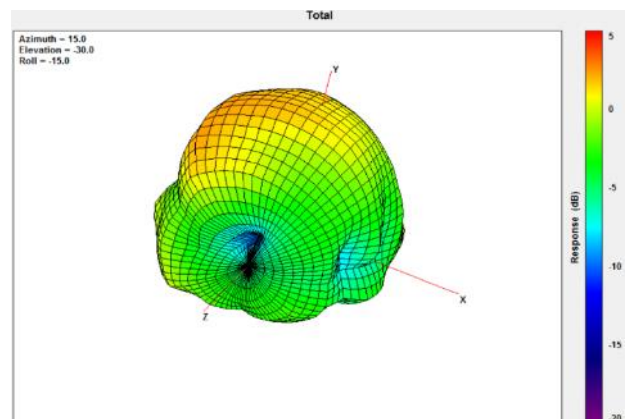
704MHz



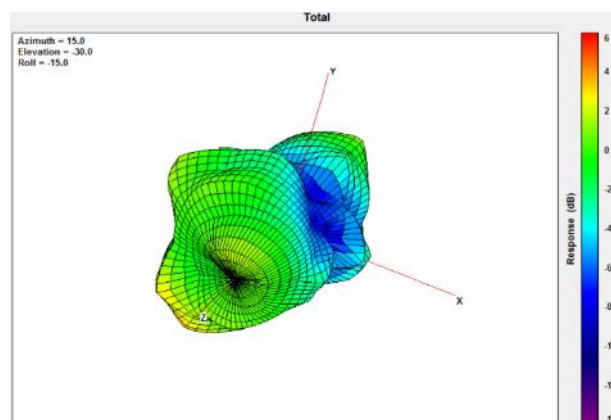
960MHz



1710MHz

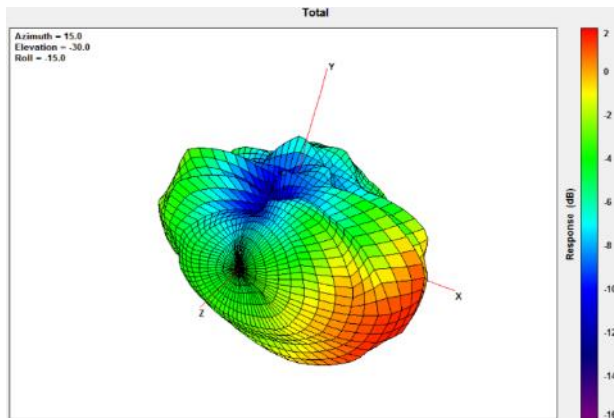


2170MHz

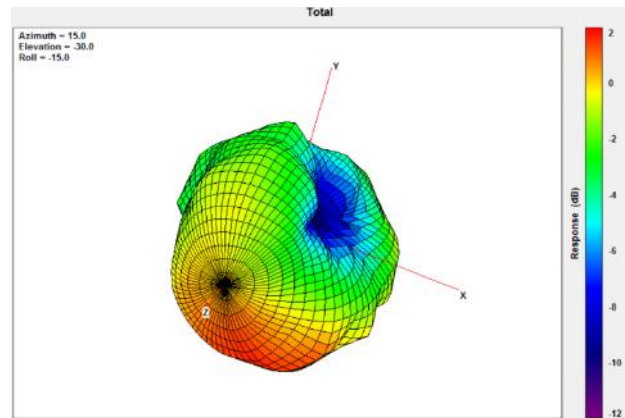


2690MHz

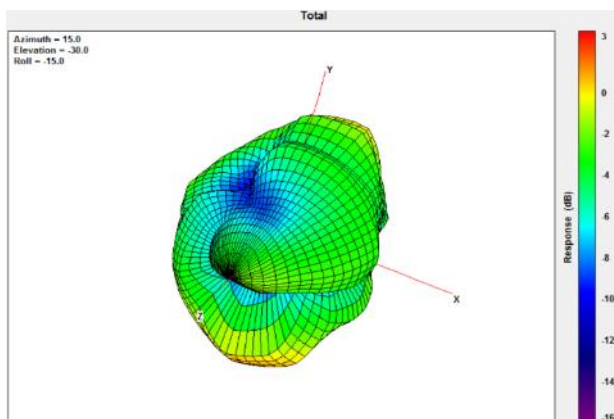
### 3.4.5. LTE with 2M cable length on the glass (MIMO 1)



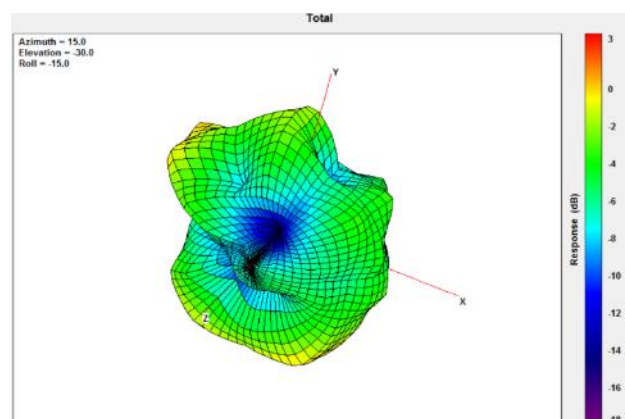
704MHz



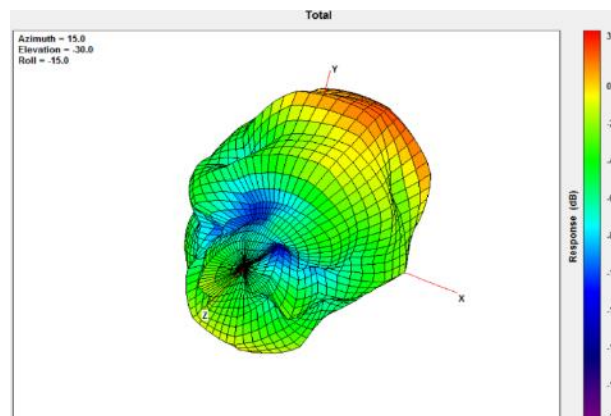
960MHz



1710MHz

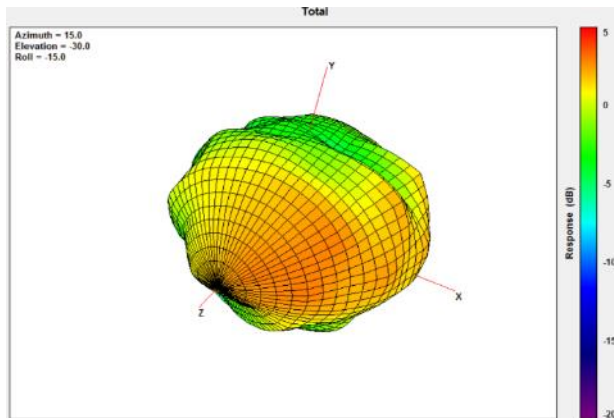


2170MHz

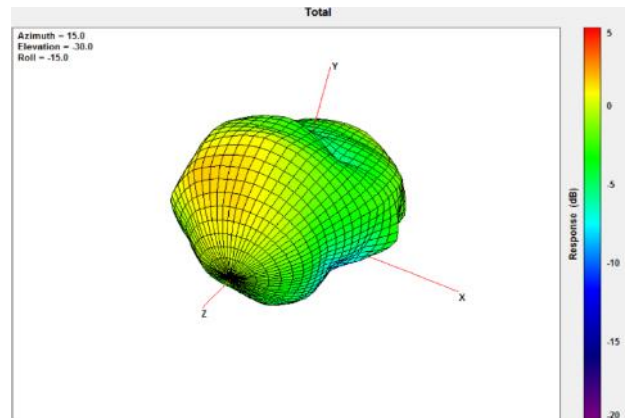


2690MHz

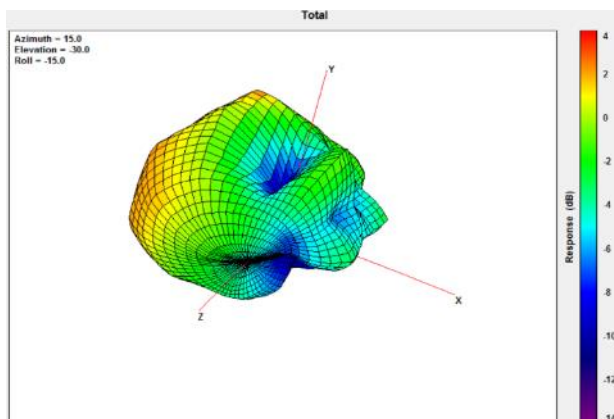
### 3.4.6. LTE with 2M cable length on the glass (MIMO 2)



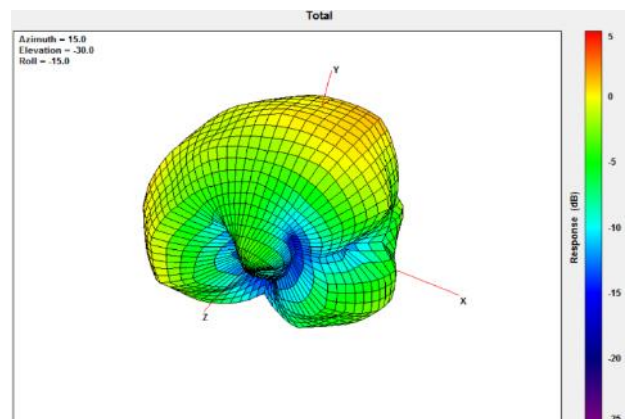
704MHz



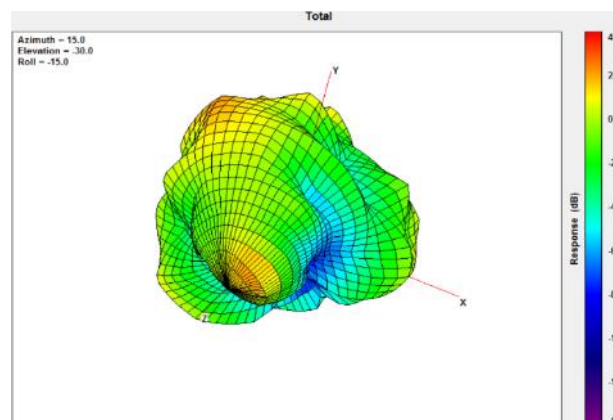
960MHz



1710MHz

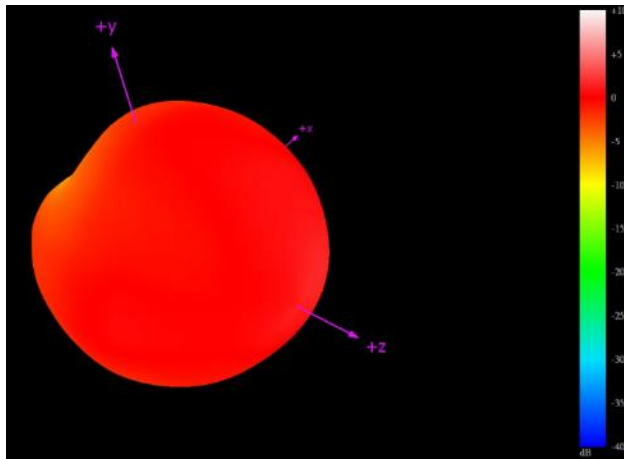


2170MHz

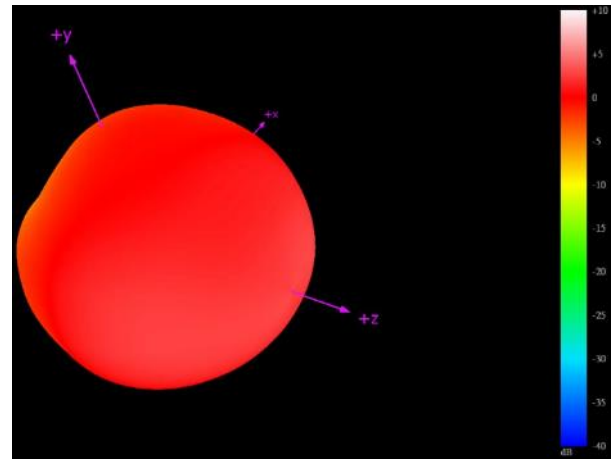


2690MHz

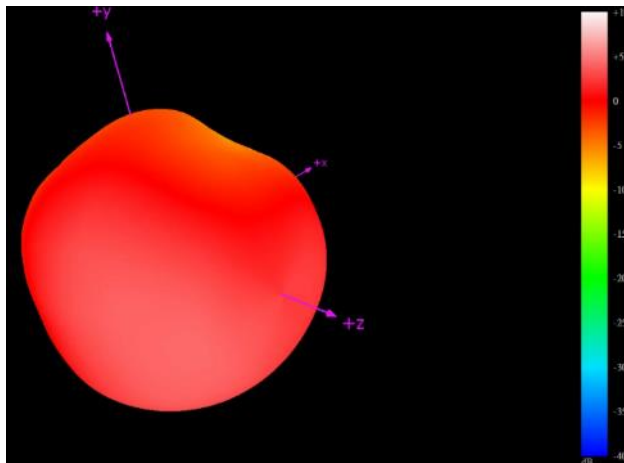
### 3.4.7. GPS/GLONASS/GALILEO/BeiDou



1561MHz

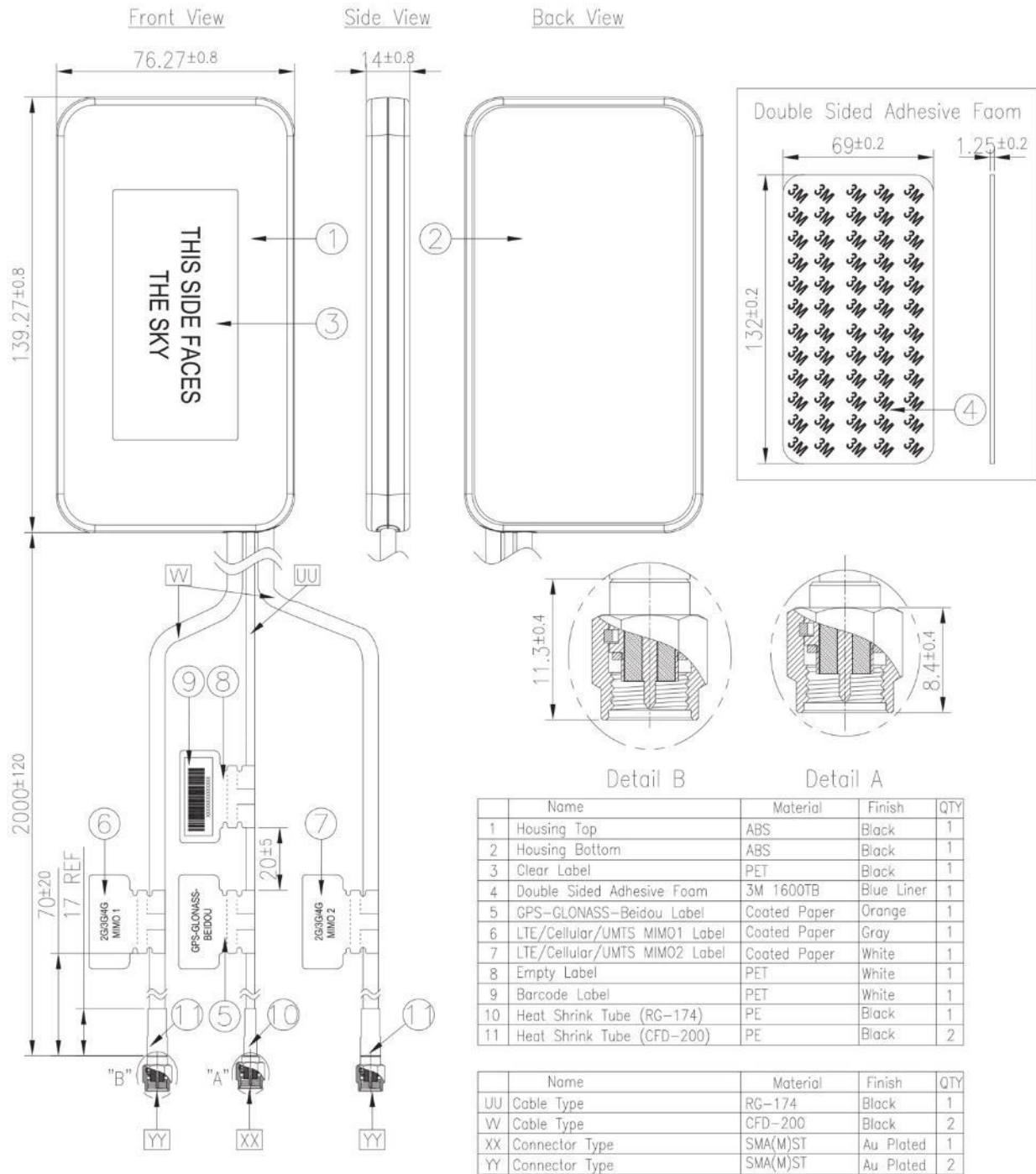


1575.42MHz



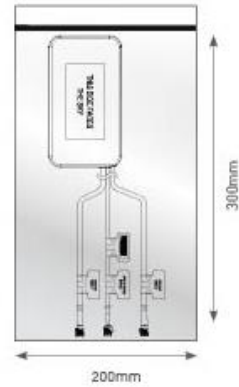
1602MHz

## 4. Drawing

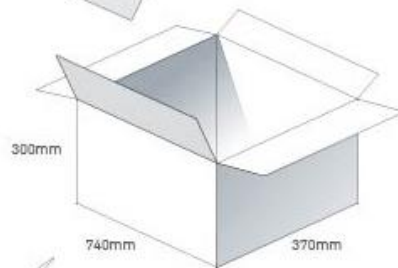


## 5. Packaging

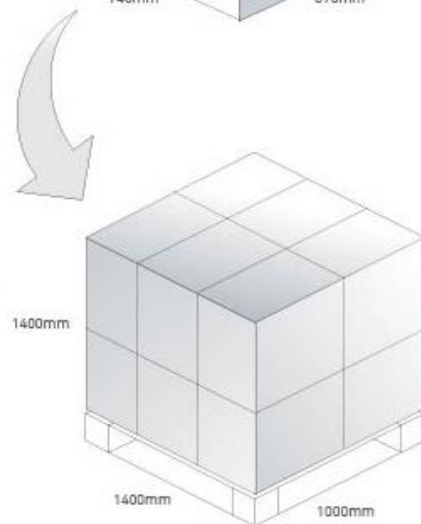
1 pc MA250.A.LBI.003 per PE bag  
Dimensions - 300\*200mm  
Total Weight - 410g



20 pcs MA250.A.LBI.003 per carton  
Carton Dimensions - 740\*370\*300mm  
Weight - 8.7kg



Pallet Dimensions 1200\*1000\*1400mm  
12 Cartons per pallet  
6 Cartons per layer  
2 Layers



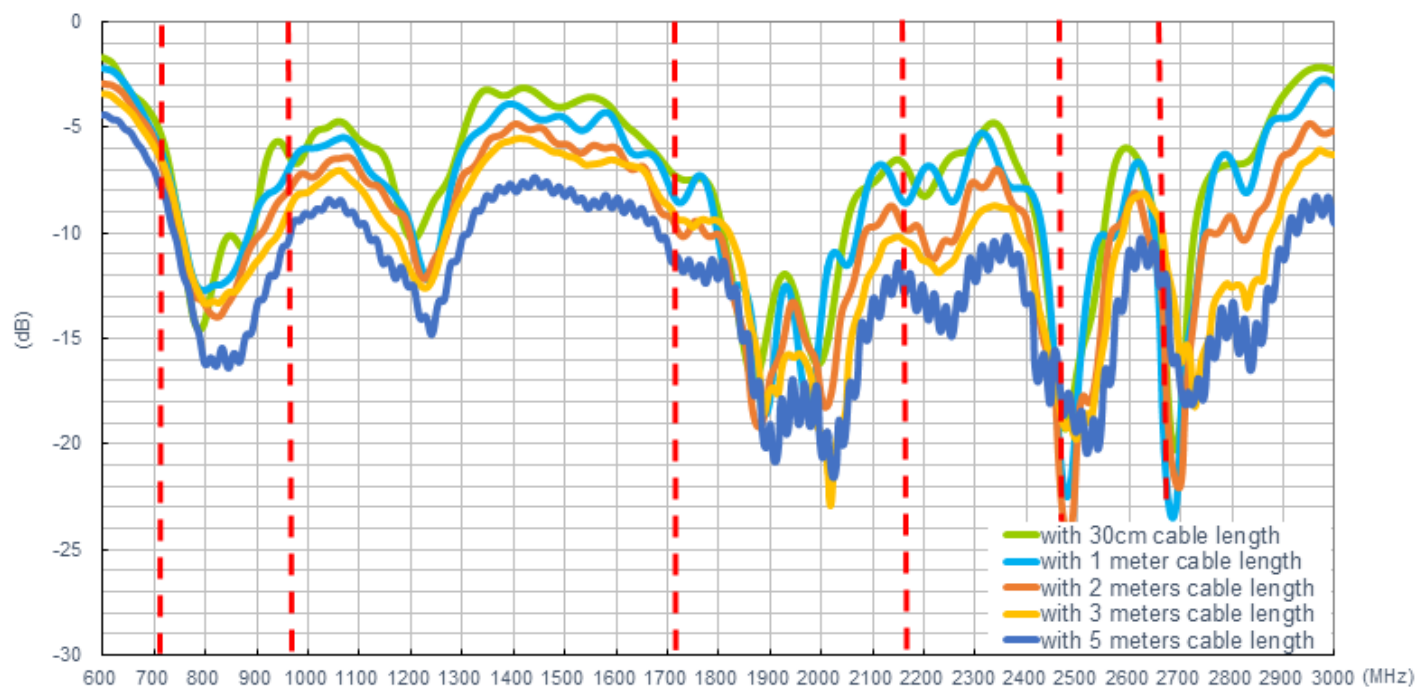
## 6. Application Note

The antenna was tested with different cable lengths and various base mounting options to indicate its performance to act as a reference for the customer's design

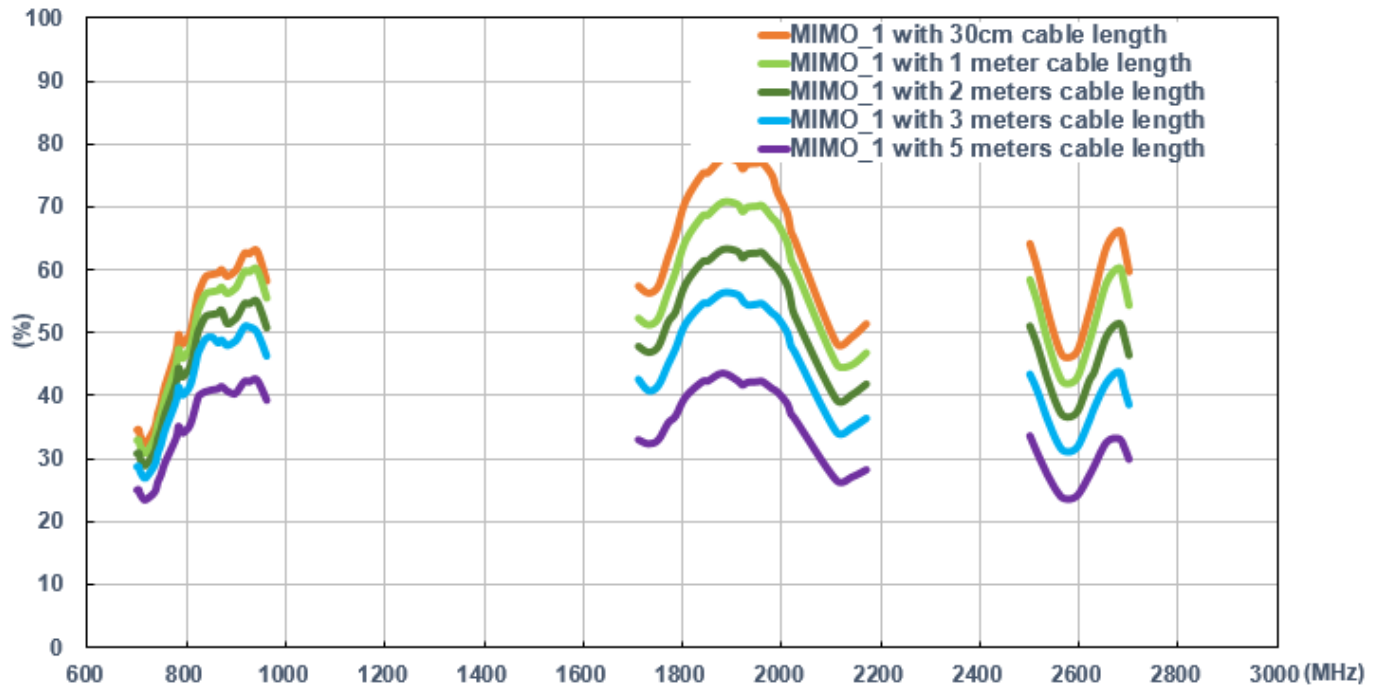
### In Free Space

#### LTE MIMO 1

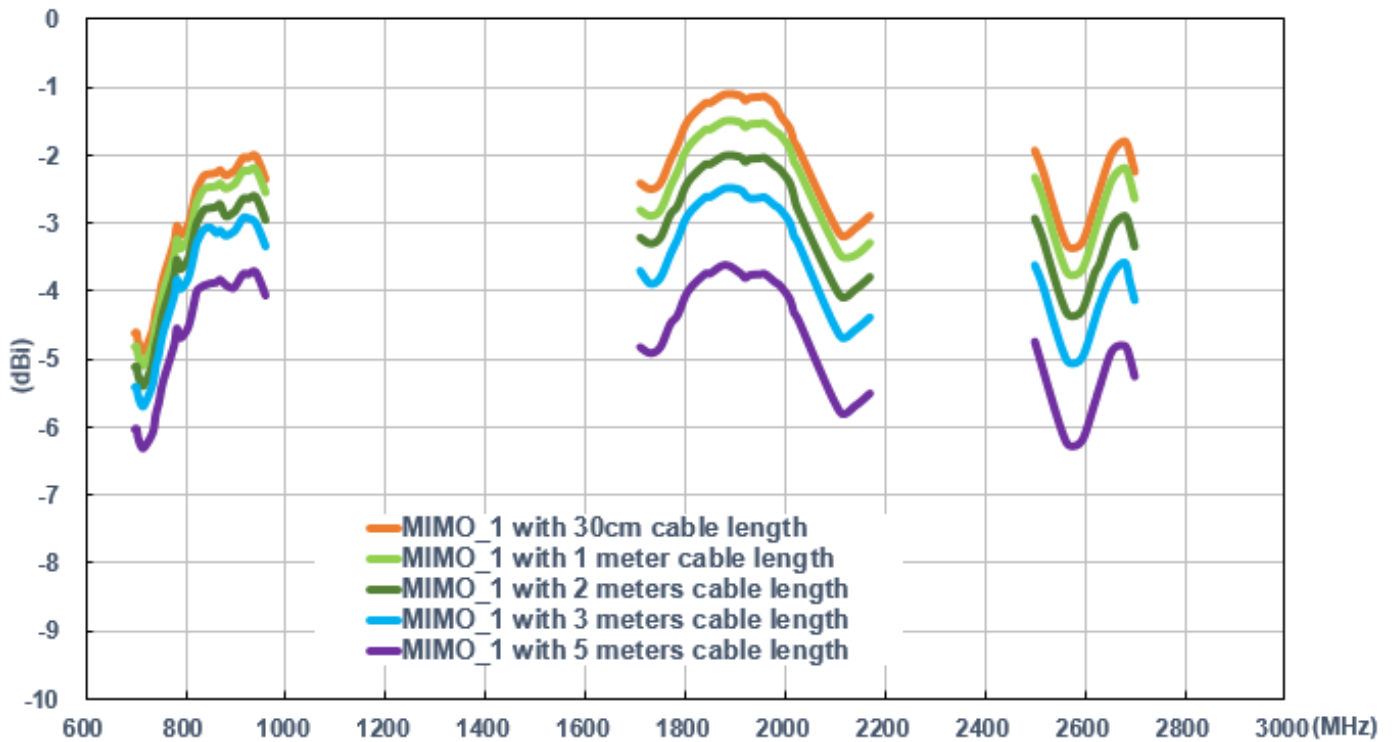
##### Return Loss



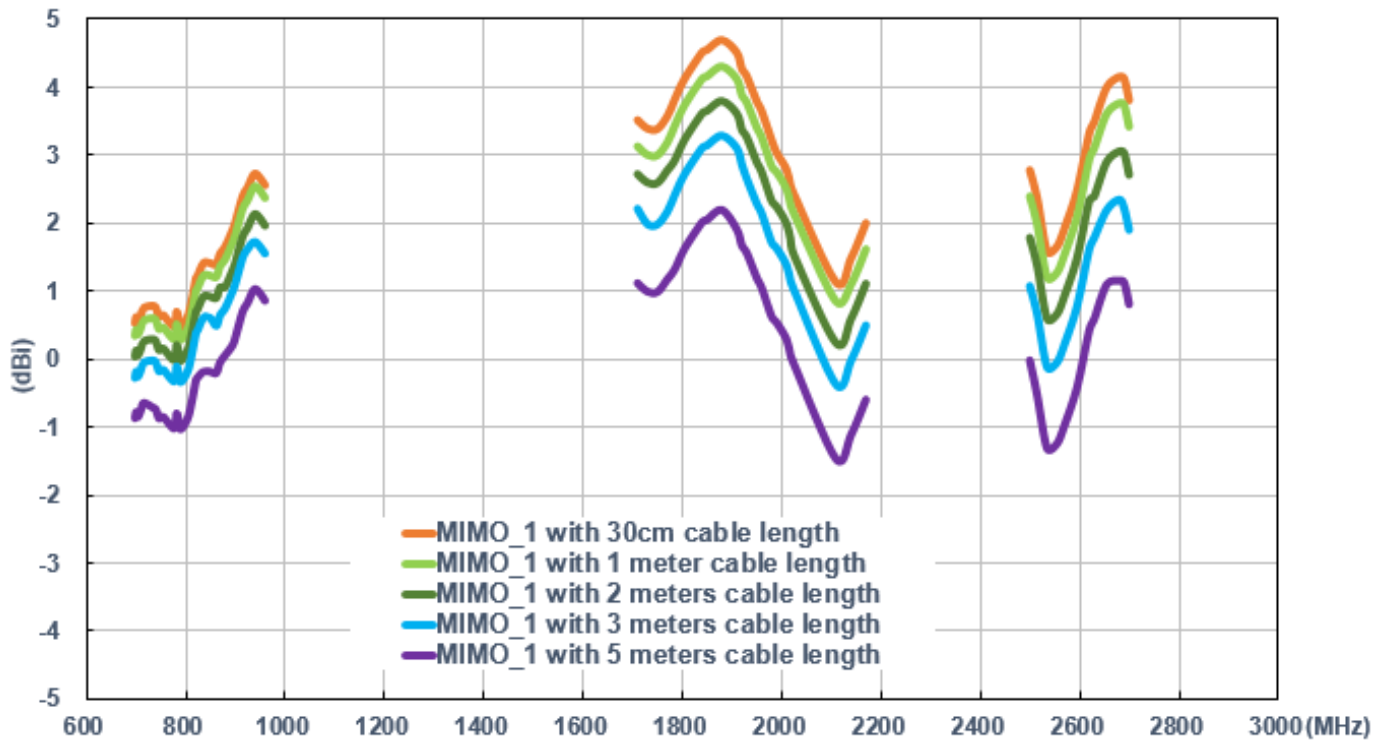
## Efficiency



## Average Gain

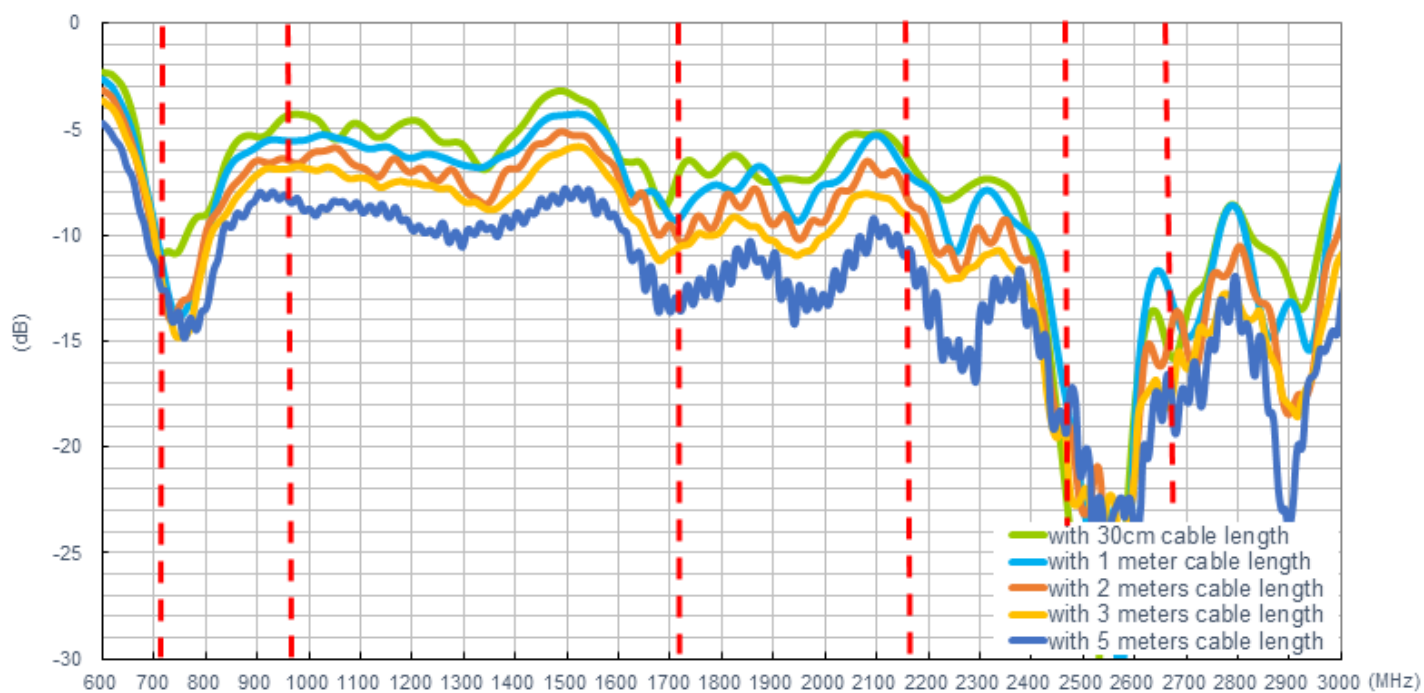


## Peak Gain

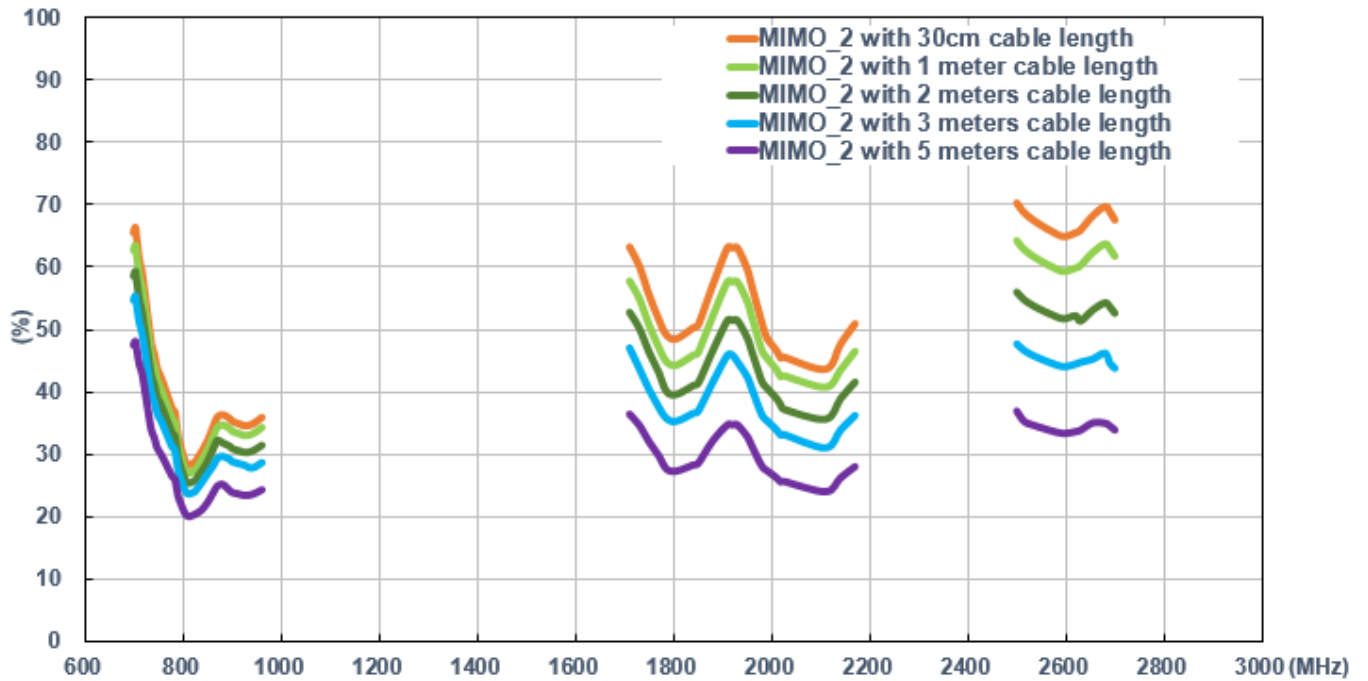


## LTE MIMO 2

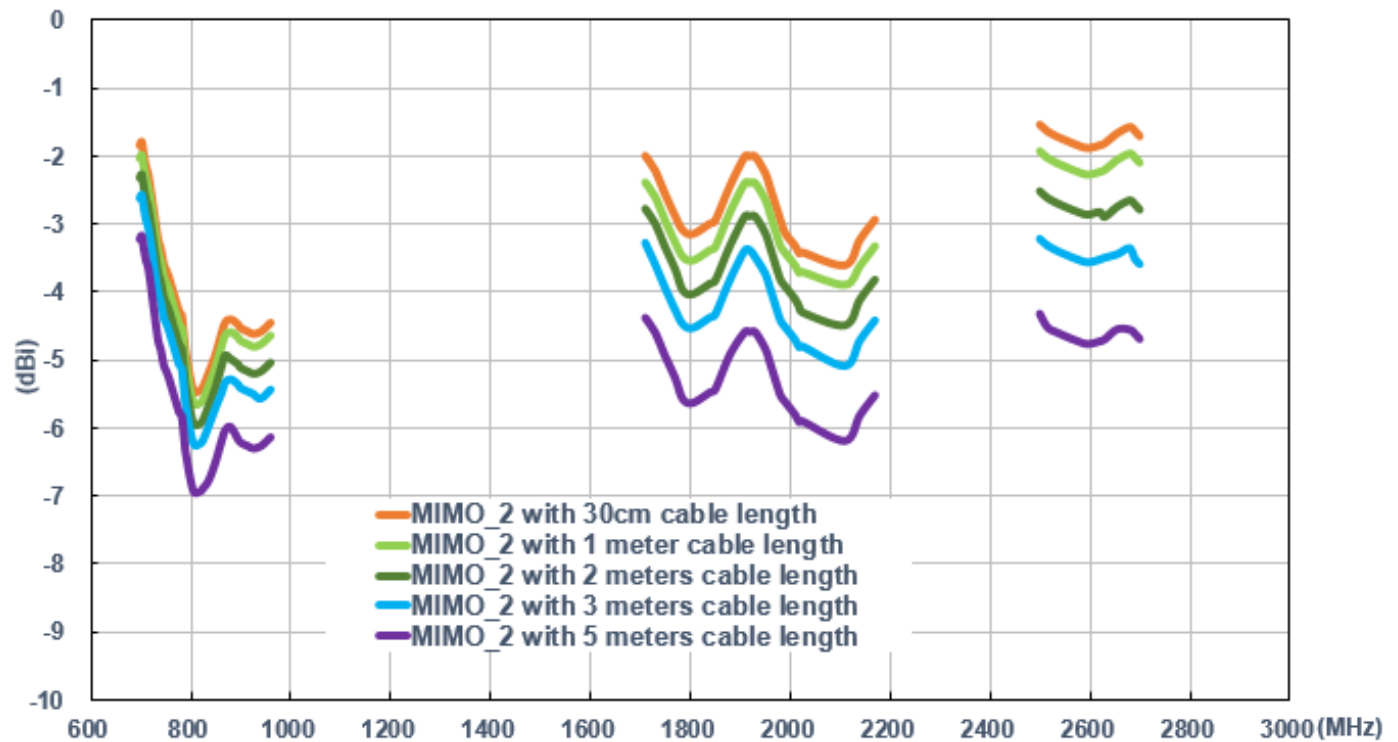
### Return Loss



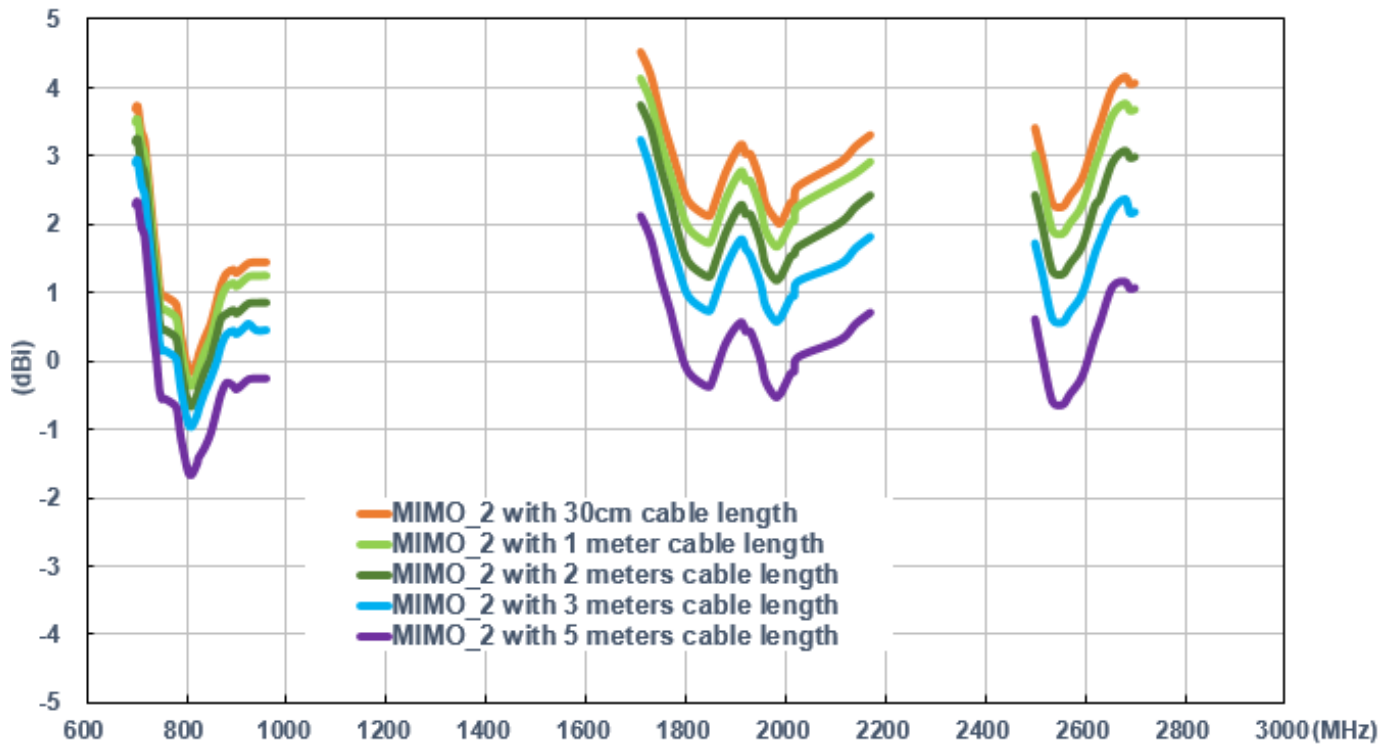
## Efficiency



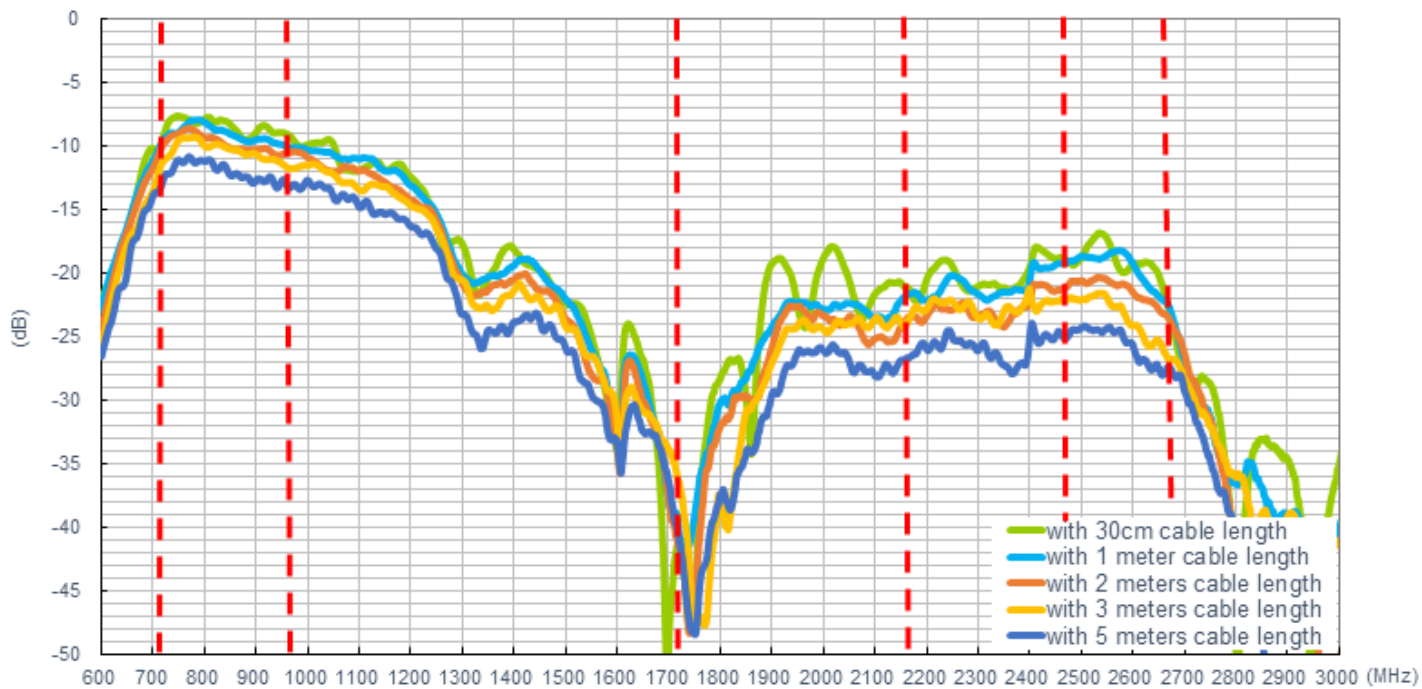
## Average Gain



## Peak Gain



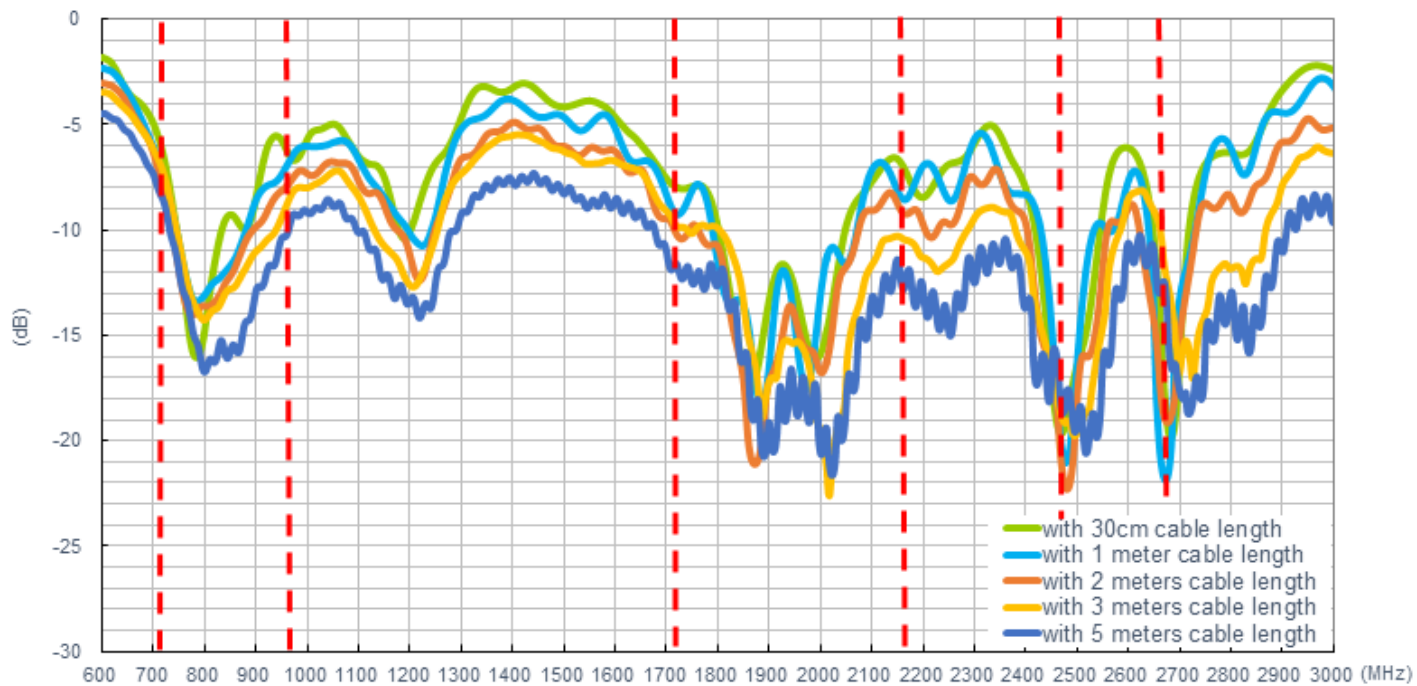
## Isolation of MIMO 1 and MIMO 2



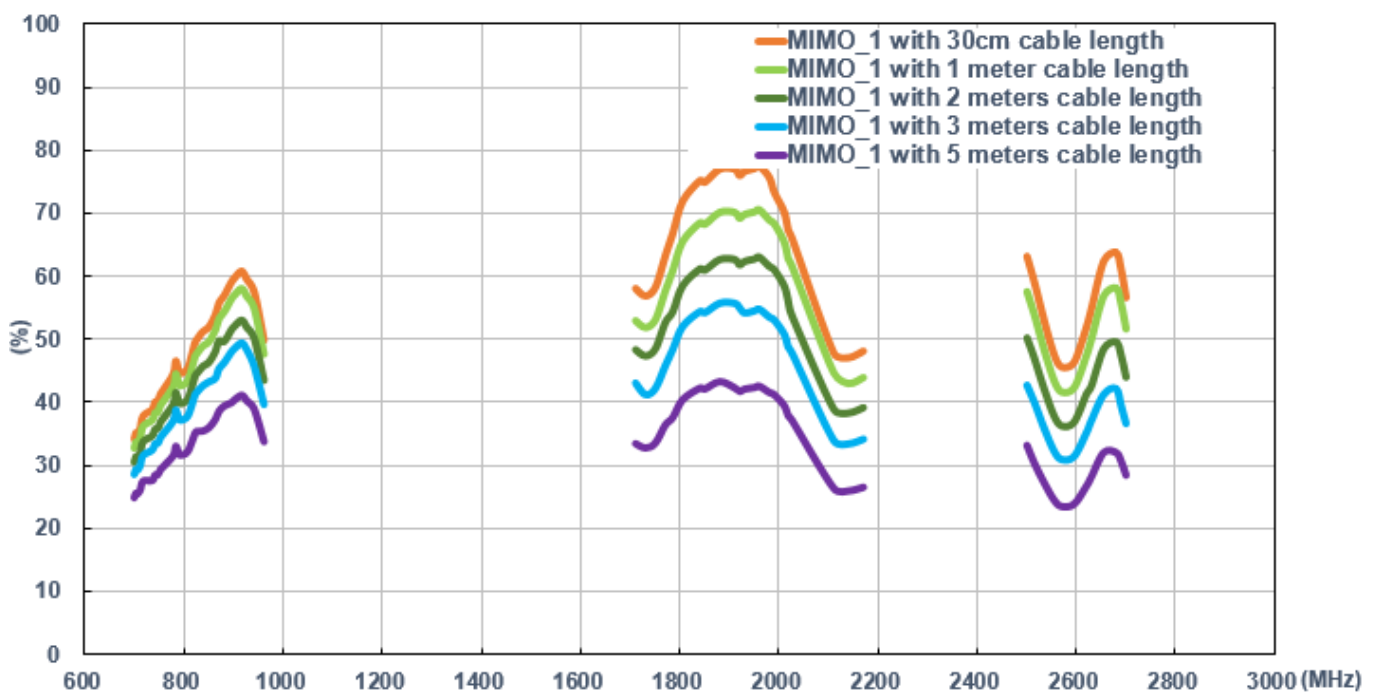
**On 2mm ABS**

**LTE MIMO 1**

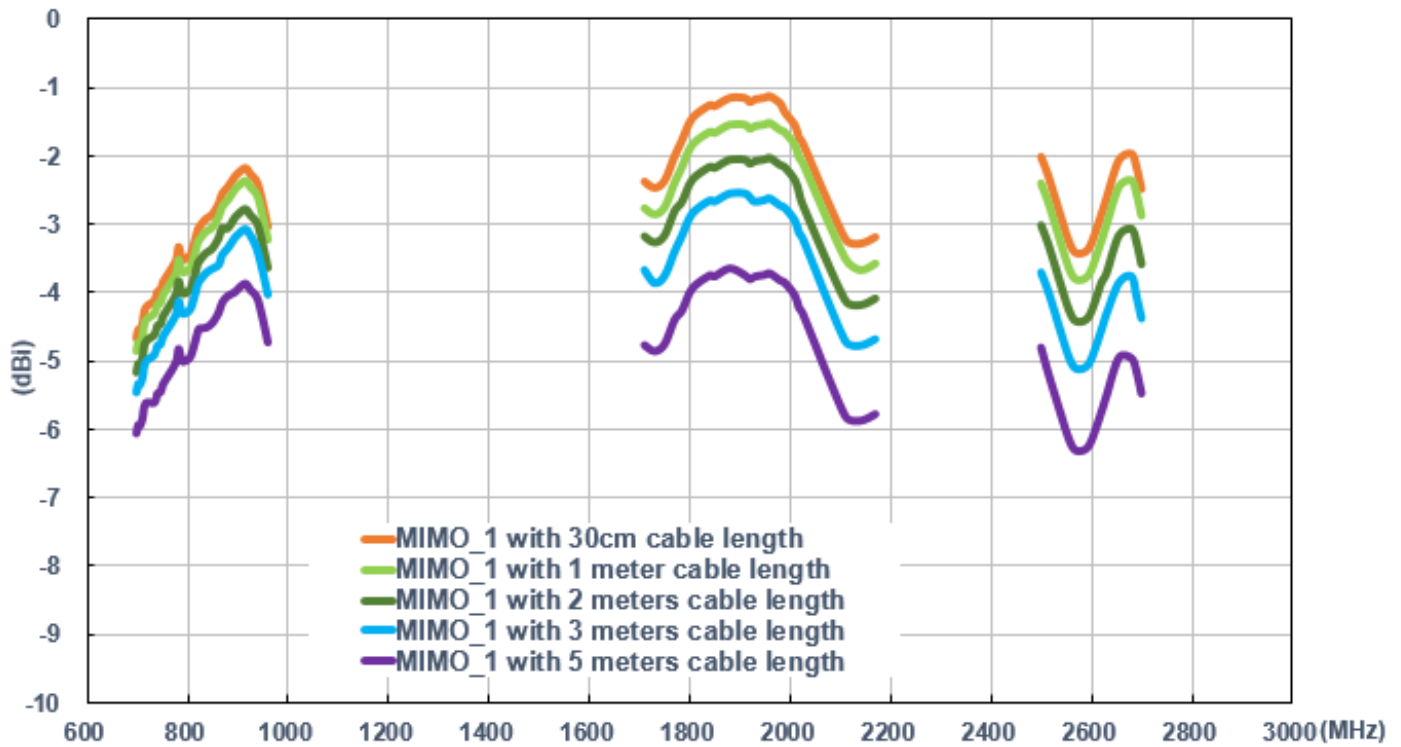
Return Loss



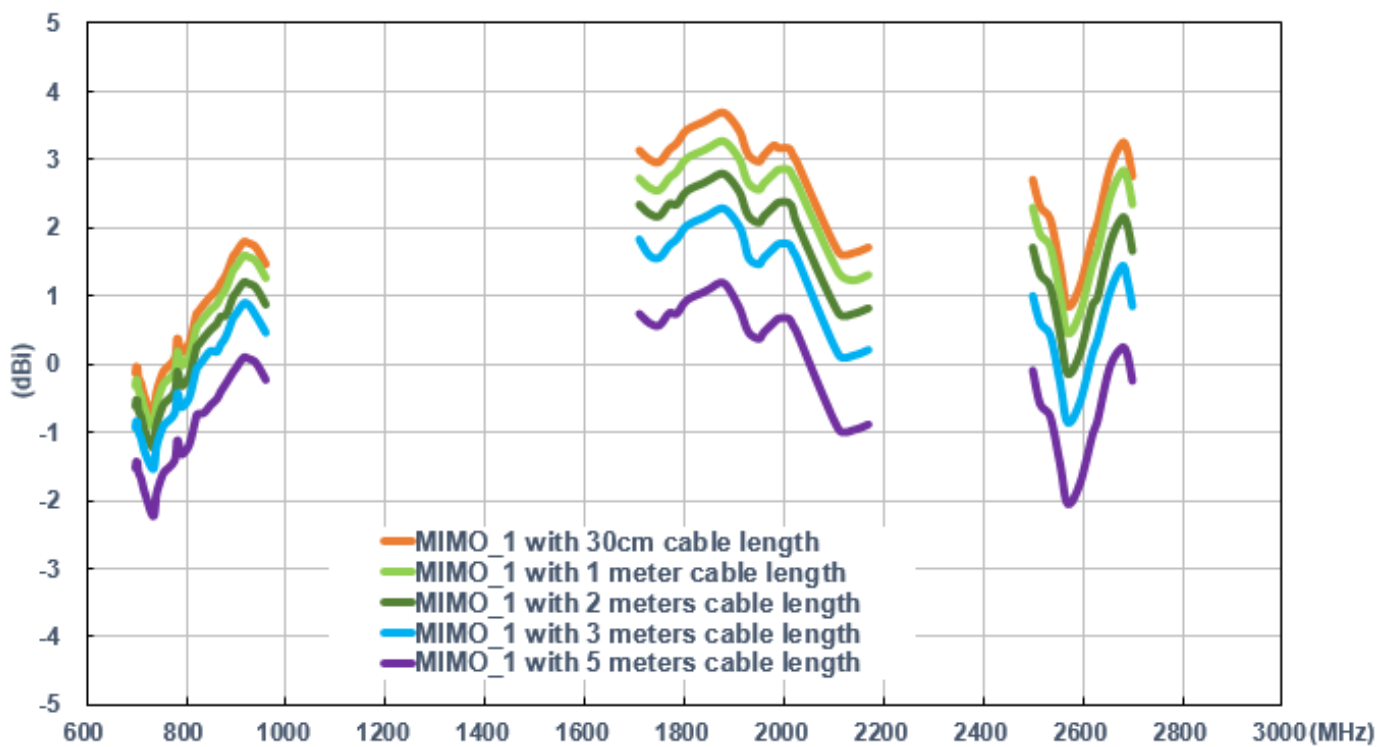
Efficiency



### Average Gain

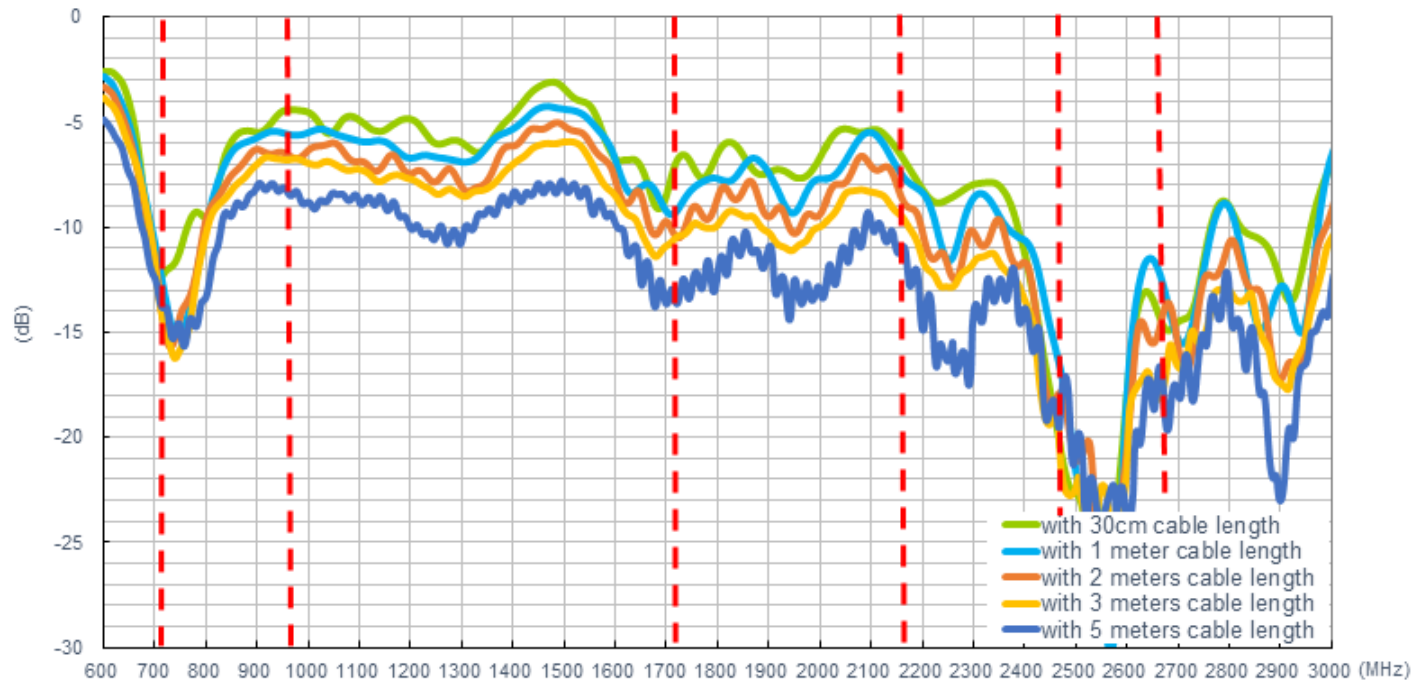


### Peak Gain

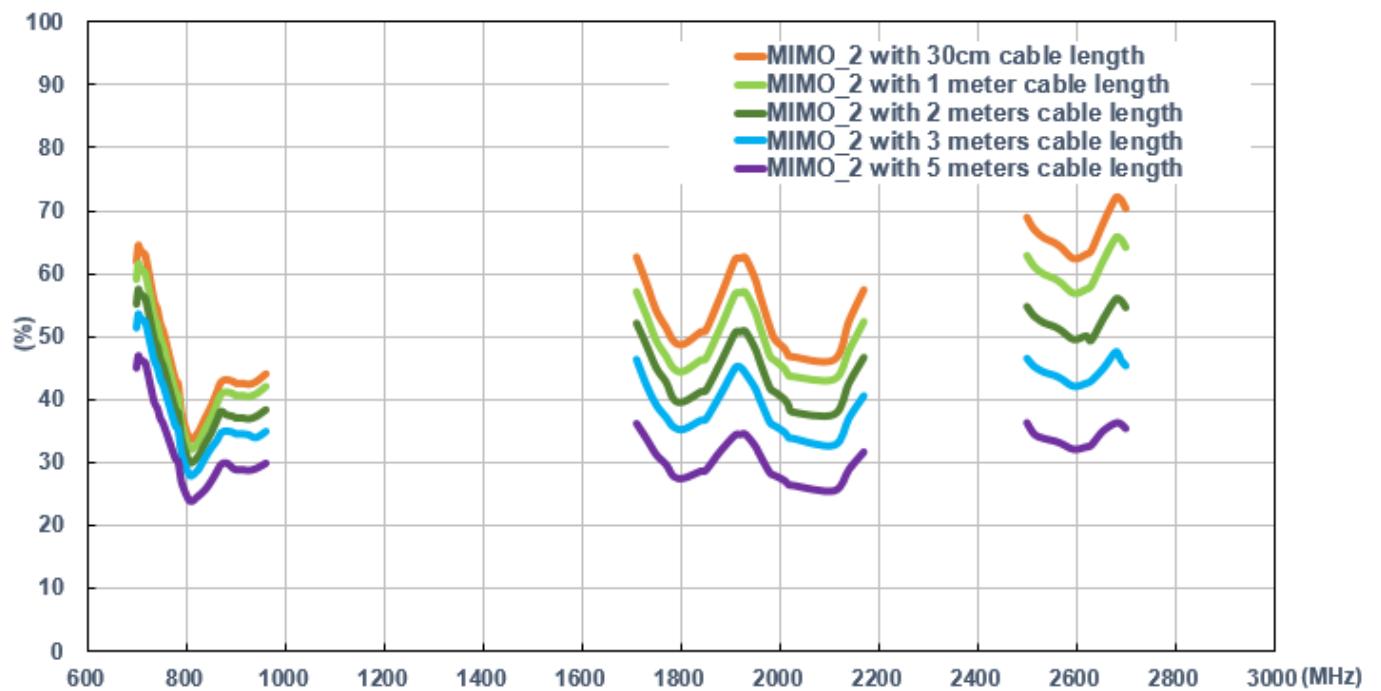


## LTE MIMO 2

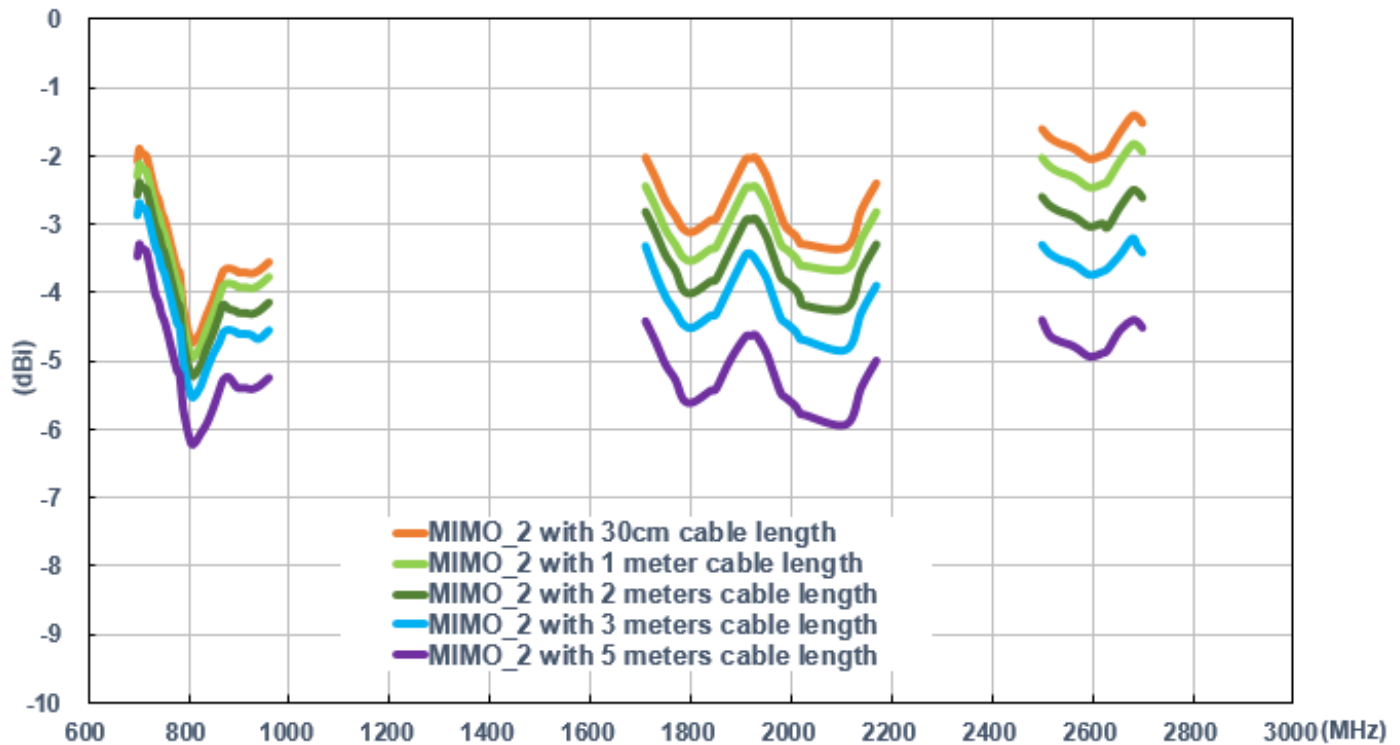
### Return Loss



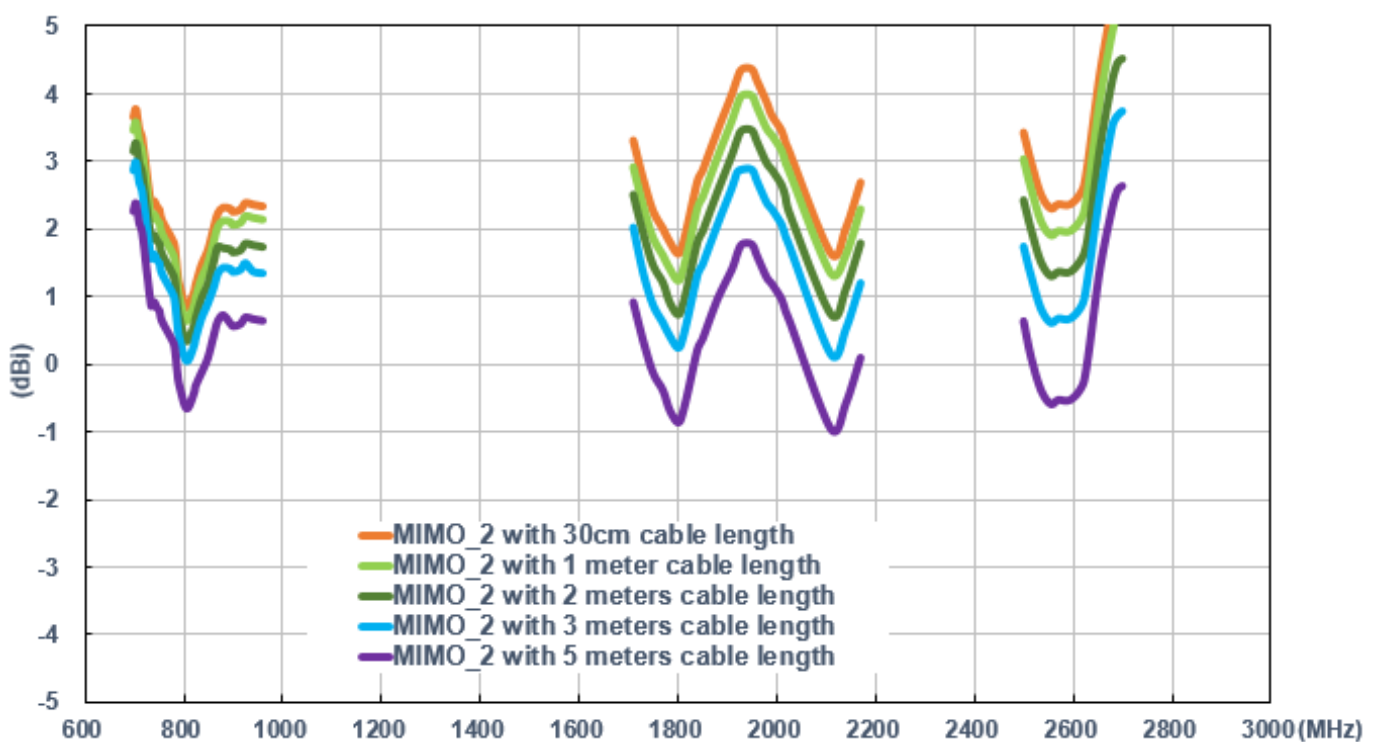
### Efficiency



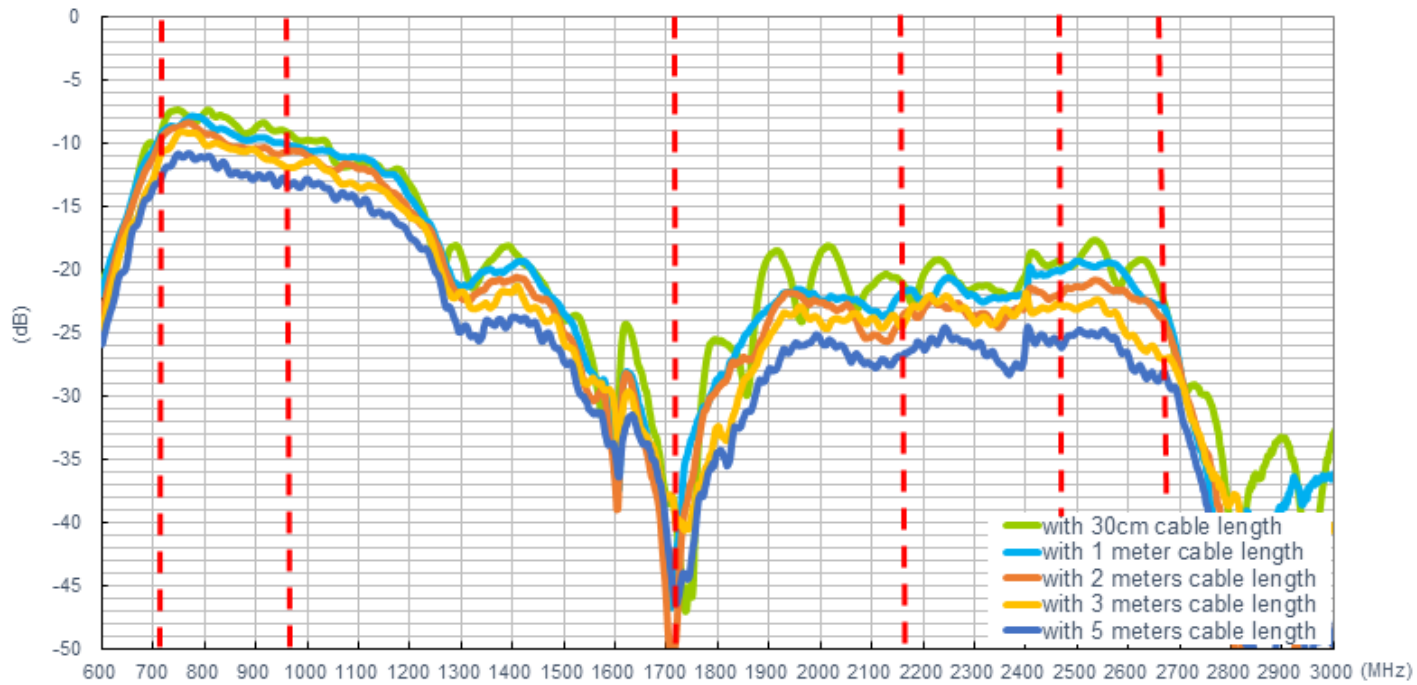
### Average Gain



### Peak Gain



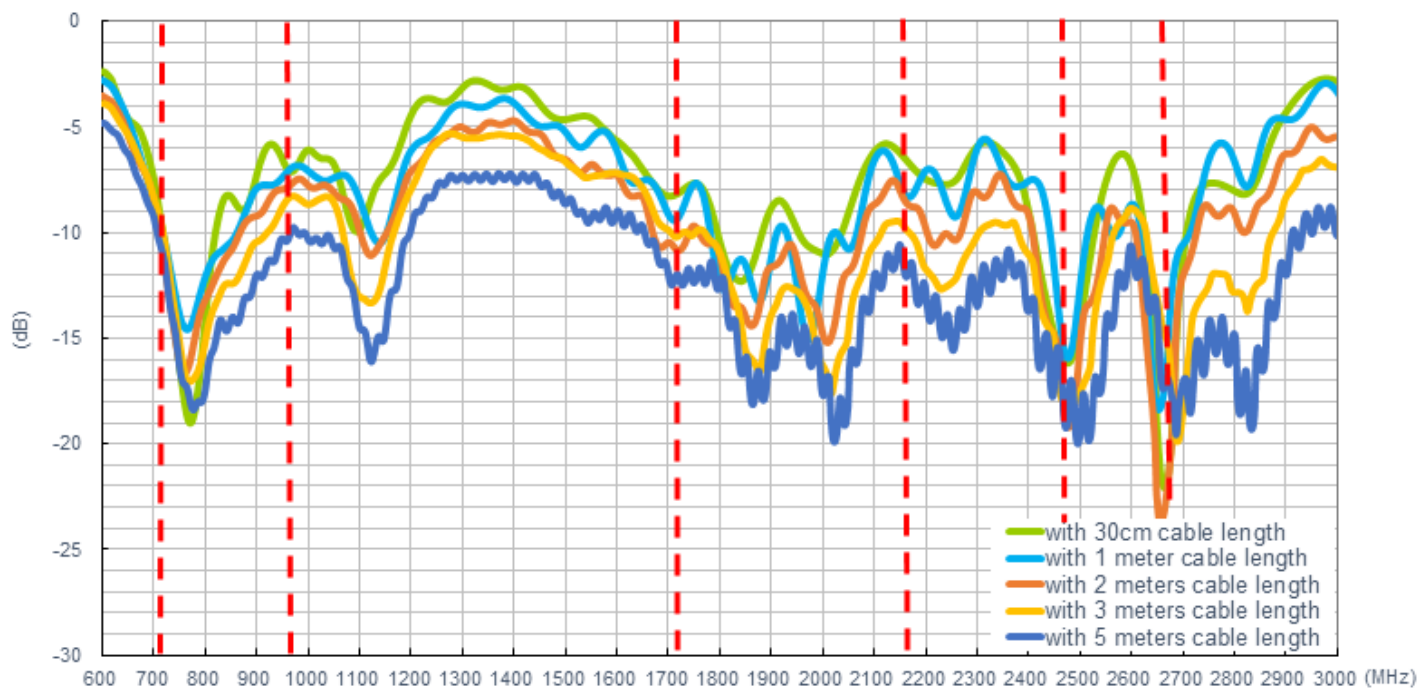
## Isolation of MIMO 1 and MIMO 2



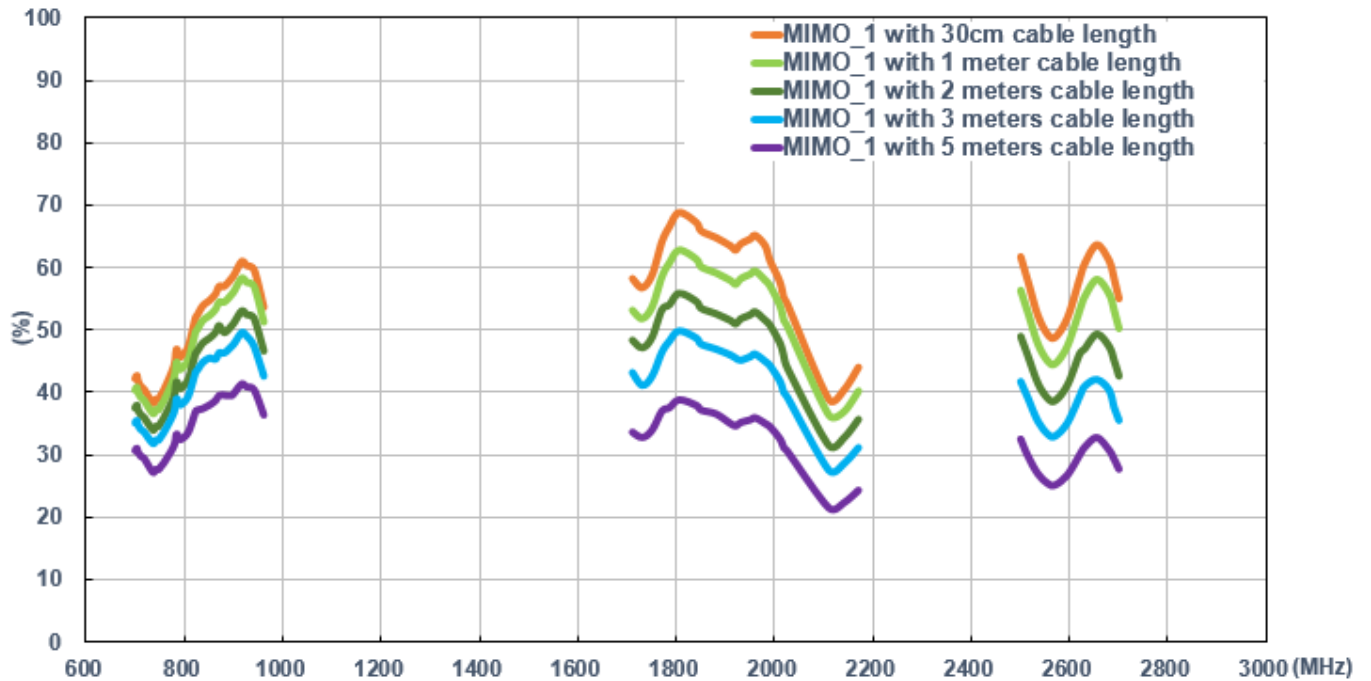
## On a glass base

### LTE MIMO 1

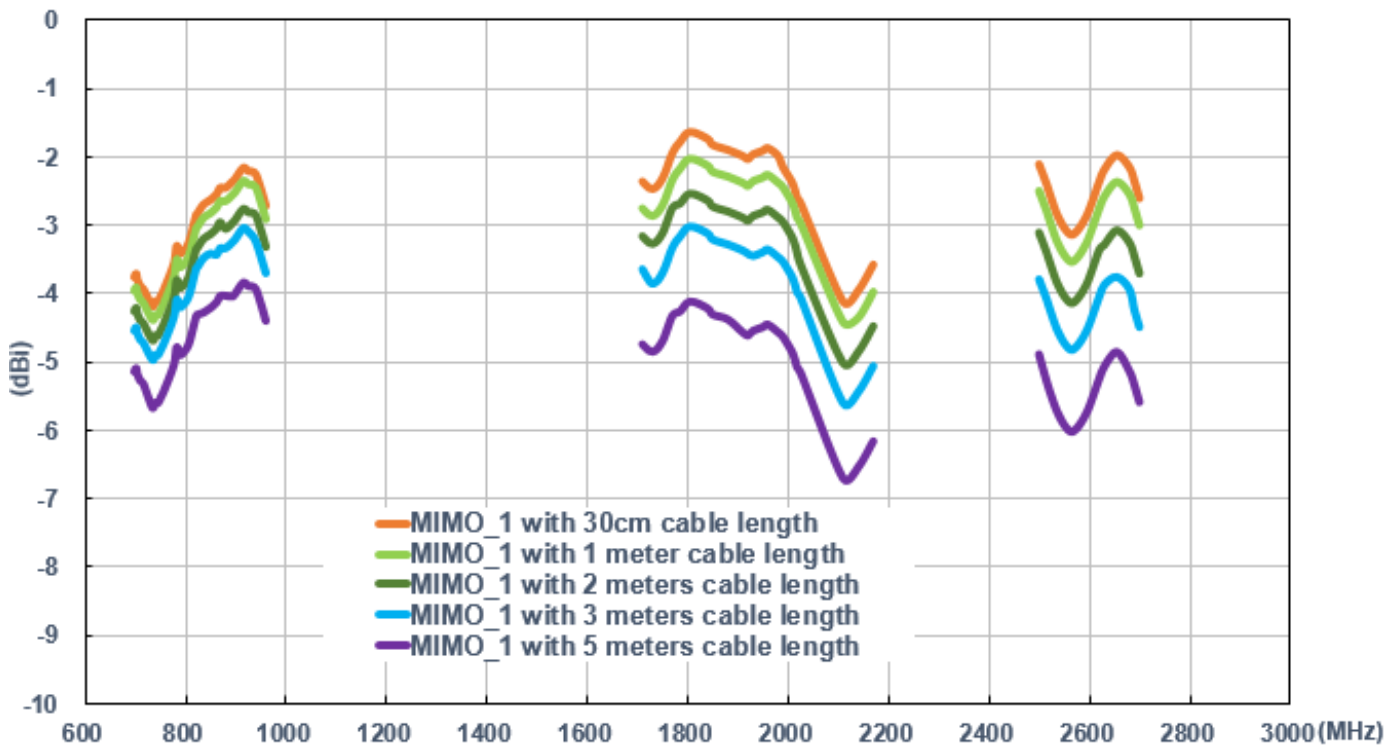
#### Return Loss



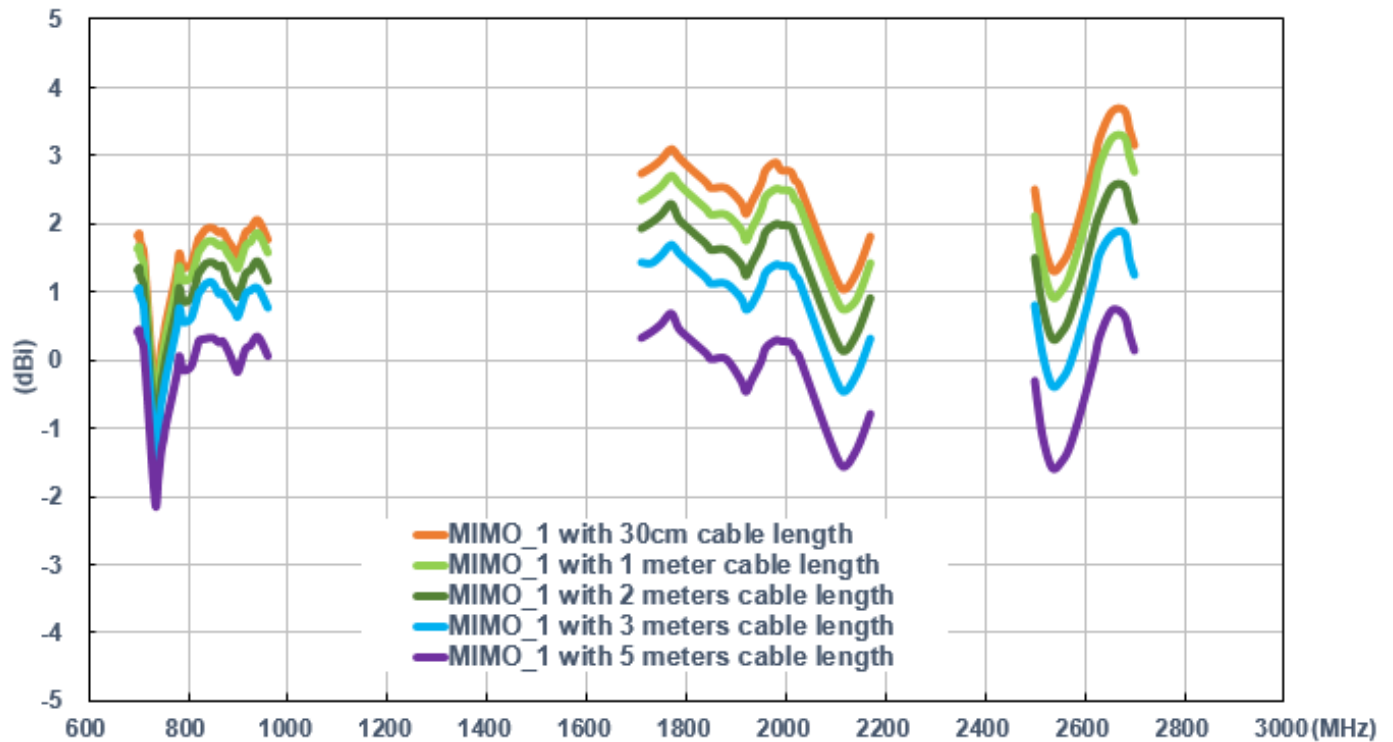
## Efficiency



## Average Gain

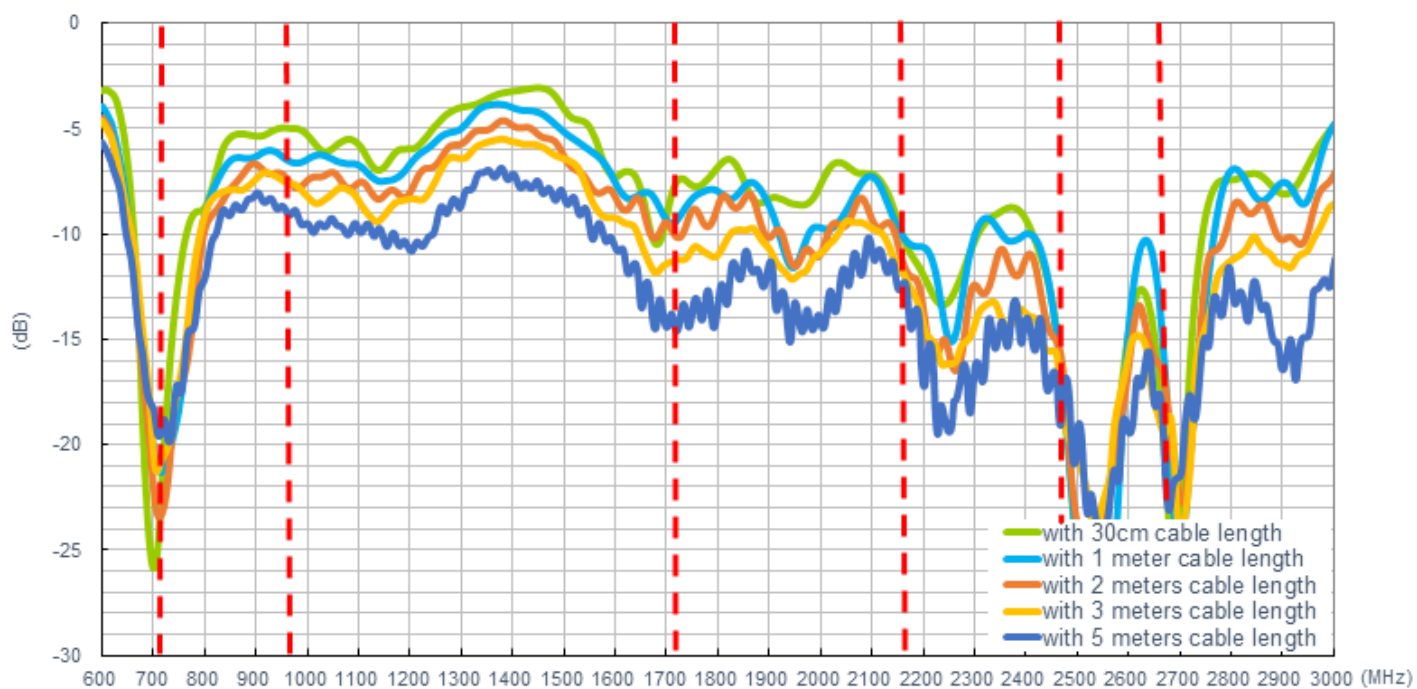


## Peak Gain

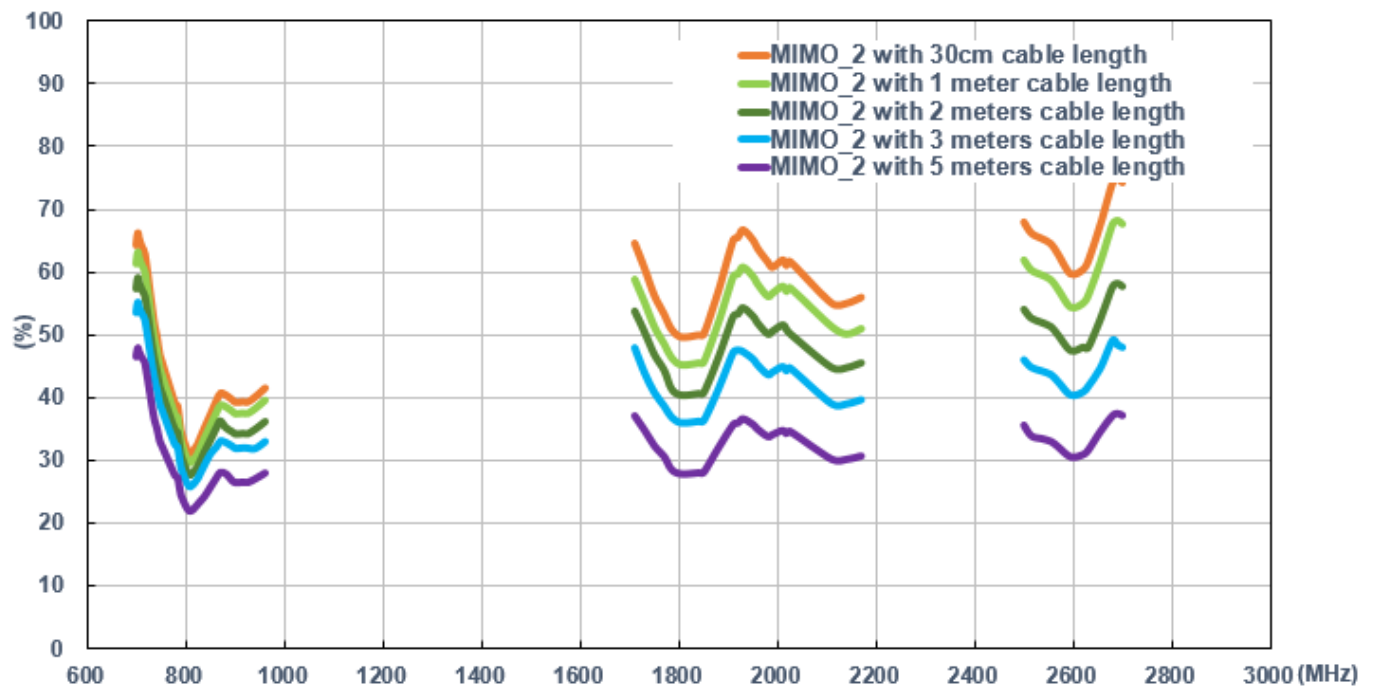


## LTE MIMO 2

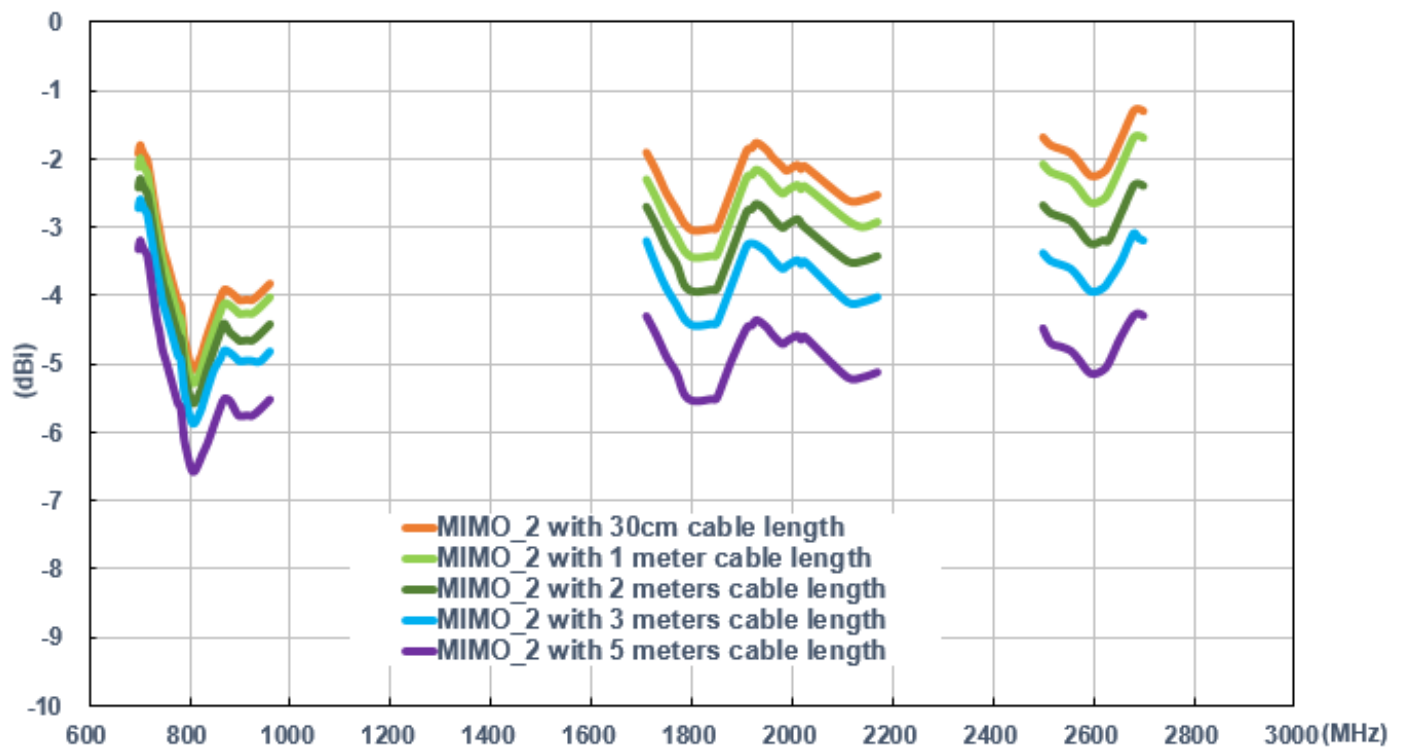
### Return Loss



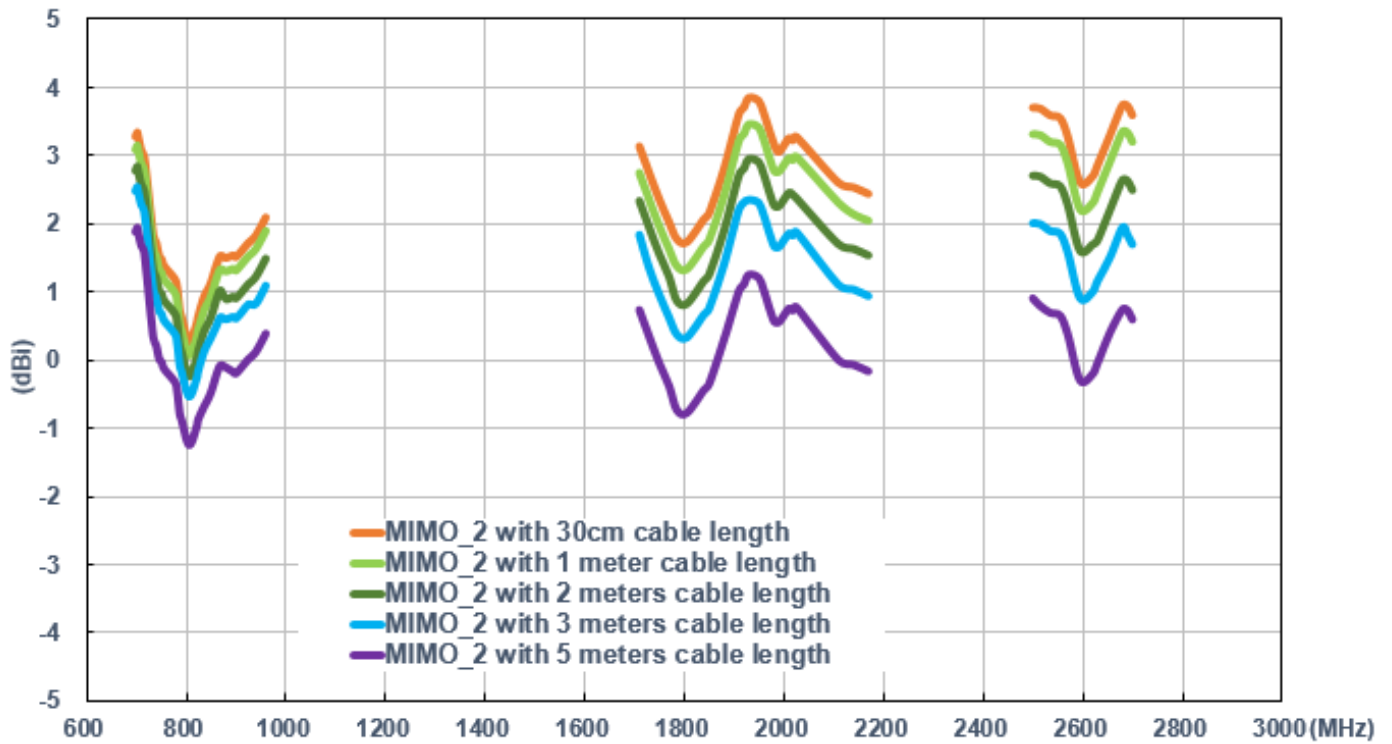
## Efficiency



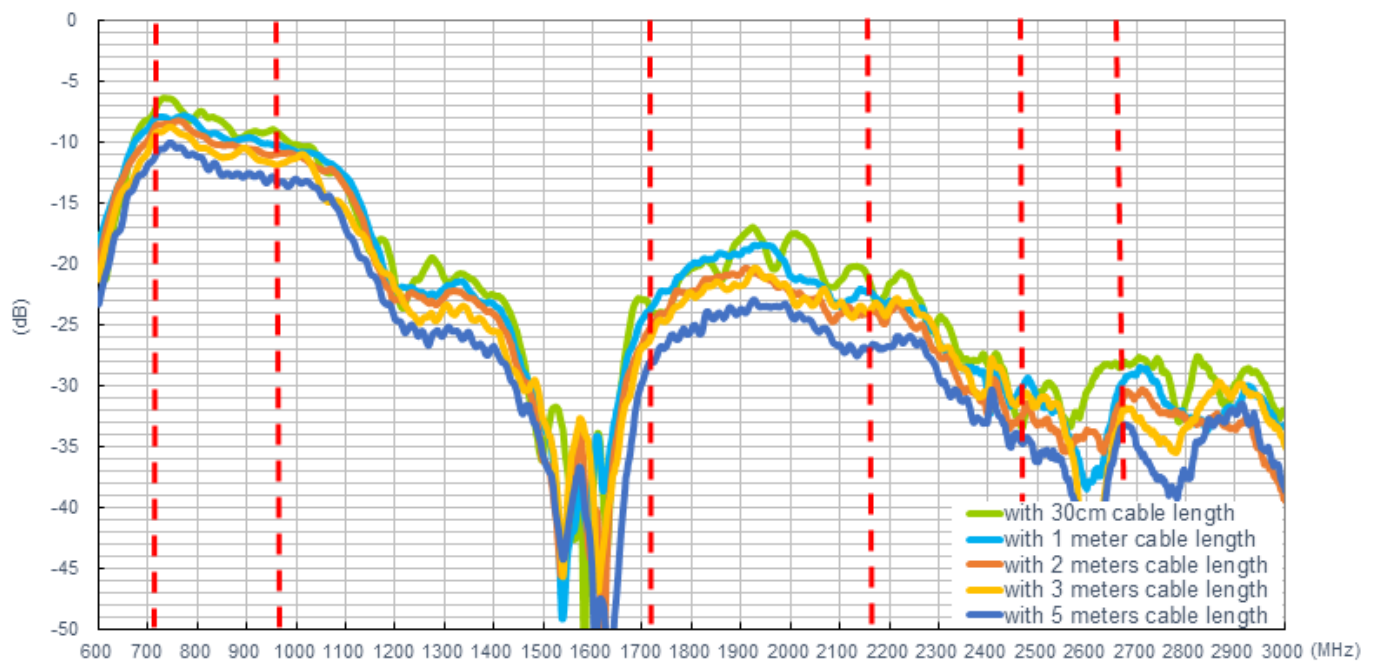
## Average Gain



## Peak Gain



## Isolation of MIMO 1 and MIMO 2



Taoglas makes no warranties based on the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice.

Taoglas reserves the rights to this document and the information contained herein. Reproduction, use or disclosure to third parties without express permission is strictly prohibited.

Copyright © Taoglas Ltd.