

## SPECIFICATION

|              |   |                                                                                                                                                                                                                                                                                                                         |
|--------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Part No.     | : | <b>GW.05.0153</b>                                                                                                                                                                                                                                                                                                       |
| Product Name | : | Dual-Band WiFi 2.4~2.5GHz/5.15~5.85GHz<br>Terminal Mount Monopole Antenna                                                                                                                                                                                                                                               |
| Features     | : | High Efficiency – with and without groundplane<br>WiFi/Bluetooth/Zigbee<br>Extremely Compact - 62.3mm $\pm$ 1.5mm<br>Aesthetic look and feel<br>Unique can rotate 360 degrees and articulate<br>through 180 degrees<br>Max Peak Gain compliant with most WiFi modules<br>Standard RP-SMA(M) connector<br>ROHS Compliant |

Photo:



## 1. Introduction

The GW.05 dual band WiFi Hinged Rotatable Antenna is a high efficiency monopole antenna. Compared to other much larger antennas on the market, it has superior wide-band high efficiency characteristics. The bright green colour of the antenna adds a unique quality look and feel to any modern WiFi application point, device or router. It also provides differentiation if using Taoglas other similar looking antennas (such as the black color Taoglas TG.09 cellular antenna) on same device. The connector used is Rev SMA(M), the standard mating part for an antenna to most WiFi application points and routers in the market.

The GW.05, as all monopole antennas, works best connected directly to the ground-plane of the device main PCB or to the outside of a metal housing. However it still has very good performance (>50%) even without connecting to a ground-plane, making it the best all round small WiFi terminal antenna on the market.

In the un-grounded installation condition it also comes below the max peak gain requirements for most WiFi modules which are usually 2dBi, so it can comply with FCC regulations.

The GW.05 is for Wi-Fi, WLAN, Zigbee, Bluetooth, and 802.11a/b/g/n/ac applications.

Many module manufacturers specify peak gain limits for any antennas that are to be connected to that module. Those peak gain limits are based on free-space conditions. In practice, the peak gain of an antenna tested in free-space can degrade by at least 1 or 2dBi when put inside a device. So ideally you should go for a slightly higher peak gain antenna than mentioned on the module specification to compensate for this effect, giving you better performance.

Upon testing of any of our antennas with your device and a selection of appropriate layout, integration technique, or cable, Taoglas can make sure any of our antennas' peak gain will be below the peak gain limits. Taoglas can then issue a specification and/or report for the selected antenna in your device that will clearly show it complying with the peak gain limits, so you can be assured you are meeting regulatory requirements for that module.

For example, a module manufacturer may state that the antenna must have less than 2dBi peak gain, but you don't need to select an embedded antenna that has a peak gain of less than 2dBi in free-space. This will give you a less optimized solution. It is better to go for a slightly higher free-space peak gain of 3dBi or more if available. Once that antenna gets integrated into your device, performance will degrade below this 2dBi peak gain due to the effects of GND plane, surrounding components, and device housing. If you want to be absolutely sure, contact Taoglas and we will test. Choosing a Taoglas antenna with a higher peak gain than what is specified by the module manufacturer and enlisting our help will ensure you are getting the best performance possible without exceeding the peak gain limits.

It is better not to select an embedded antenna with very low free-space peak gain (<2dBi) directly, as this antenna would have worse performance in your device, and lead to compromised performance compared to using a Taoglas antenna.

Also comes as a standard SMA(M) version.

## 2. Specification

| Parameter          |                             | Wireless Bands |       |       |       |       |       |       |
|--------------------|-----------------------------|----------------|-------|-------|-------|-------|-------|-------|
| Straight Position  |                             |                |       |       |       |       |       |       |
| Frequency (MHz)    |                             | 2400           | 2450  | 2500  | 5150  | 5350  | 5750  | 5850  |
| Average Gain (dBi) | In Free Space               | -2.62          | -2.61 | -1.74 | -2.00 | -2.17 | -3.15 | -2.62 |
| Efficiency (%)     |                             | 54.71          | 54.78 | 67.05 | 63.12 | 60.71 | 48.43 | 54.71 |
| Peak Gain (dBi)    |                             | 1.04           | 1.25  | 0.82  | 0.85  | 1.38  | 0.28  | 1.04  |
| Return Loss (dB)   |                             | < -6           |       |       | < -10 |       |       |       |
| Average Gain (dBi) | With 15x9cm Ground Plane    | -1.90          | -1.58 | -2.28 | -2.98 | -3.08 | -4.06 | -1.90 |
| Efficiency (%)     |                             | 64.54          | 69.56 | 59.14 | 50.33 | 49.21 | 39.26 | 64.54 |
| Peak Gain (dBi)    |                             | 3.22           | 3.57  | 1.42  | 1.07  | 1.30  | 0.40  | 3.22  |
| Return Loss (dB)   |                             | < -8           |       |       | < -5  |       |       |       |
| Average Gain (dBi) | On 30x30cm Metal Plane Edge | -0.88          | -0.62 | -1.37 | -1.62 | -1.97 | -2.74 | -0.88 |
| Efficiency (%)     |                             | 81.67          | 86.74 | 72.99 | 68.85 | 63.56 | 53.23 | 81.67 |
| Peak Gain (dBi)    |                             | 4.73           | 5.13  | 3.83  | 3.63  | 3.93  | 3.21  | 4.73  |
| Return Loss (dB)   |                             | < -10          |       |       | < -10 |       |       |       |
| Average Gain (dBi) | On 30x30cm                  | -1.67          | -1.12 | -2.36 | -2.57 | -2.32 | -3.18 | -1.67 |

|                                 |                               |                  |       |       |       |       |       |       |
|---------------------------------|-------------------------------|------------------|-------|-------|-------|-------|-------|-------|
| Efficiency (%)                  | Metal Plane Center            | 68.05            | 77.21 | 58.10 | 55.32 | 58.60 | 48.11 | 68.05 |
| Peak Gain (dBi)                 |                               | 3.85             | 4.62  | 4.50  | 4.21  | 5.80  | 4.67  | 3.85  |
| Return Loss (dB)                |                               | < -6             |       |       | < -10 |       |       |       |
| Bent Position 90°               |                               |                  |       |       |       |       |       |       |
| Average Gain (dBi)              | In Free Space                 | -2.80            | -2.71 | -1.67 | -1.71 | -1.68 | -1.85 | -2.80 |
| Efficiency (%)                  |                               | 52.53            | 53.54 | 68.07 | 67.43 | 67.87 | 65.29 | 52.53 |
| Peak Gain (dBi)                 |                               | 1.19             | 1.57  | 2.57  | 0.66  | 1.03  | 0.59  | 1.19  |
| Return Loss (dB)                |                               | < -6             |       |       | < -10 |       |       |       |
| Average Gain (dBi)              | With 15x9cm Ground Plane      | -1.80            | -1.50 | -1.98 | -2.18 | -2.18 | -2.42 | -1.80 |
| Efficiency (%)                  |                               | 66.14            | 70.72 | 63.44 | 60.53 | 60.57 | 57.34 | 66.14 |
| Peak Gain (dBi)                 |                               | 3.47             | 3.68  | 3.88  | 3.59  | 2.40  | 1.92  | 3.47  |
| Return Loss (dB)                |                               | < -8             |       |       | < -7  |       |       |       |
| Average Gain (dBi)              | On 30x30cm Metal Plane Edge   | -0.89            | -0.63 | -1.52 | -1.63 | -1.30 | -1.36 | -0.89 |
| Efficiency (%)                  |                               | 81.40            | 86.57 | 70.51 | 68.75 | 74.21 | 73.15 | 81.40 |
| Peak Gain (dBi)                 |                               | 5.36             | 5.46  | 4.98  | 4.33  | 4.07  | 4.53  | 5.36  |
| Return Loss (dB)                |                               | < -10            |       |       | < -10 |       |       |       |
| Average Gain (dBi)              | On 30x30cm Metal Plane Center | -1.53            | -0.97 | -2.10 | -2.28 | -1.95 | -2.38 | -1.53 |
| Efficiency (%)                  |                               | 70.29            | 80.04 | 61.72 | 59.21 | 63.83 | 57.80 | 70.29 |
| Peak Gain (dBi)                 |                               | 3.63             | 4.36  | 3.81  | 3.31  | 4.90  | 4.04  | 3.63  |
| Return Loss (dB)                |                               | < -7             |       |       | < -10 |       |       |       |
| Radiation                       |                               | Omni-directional |       |       |       |       |       |       |
| Polarization                    |                               | Linear           |       |       |       |       |       |       |
| Impedance                       |                               | 50 Ω             |       |       |       |       |       |       |
| Input Power                     |                               | 10W              |       |       |       |       |       |       |
| MECHANICAL                      |                               |                  |       |       |       |       |       |       |
| Antenna length                  |                               | 62.3mm           |       |       |       |       |       |       |
| Antenna Diameter                |                               | 10mm             |       |       |       |       |       |       |
| Casing                          |                               | POM              |       |       |       |       |       |       |
| Connector                       |                               | RP-SMA(M)        |       |       |       |       |       |       |
| Weight                          |                               | 6g               |       |       |       |       |       |       |
| Recommended Torque for Mounting |                               | 0.9N·m           |       |       |       |       |       |       |
| Max Torque for Mounting         |                               | 1.176N·m         |       |       |       |       |       |       |
| ENVIRONMENTAL                   |                               |                  |       |       |       |       |       |       |
| Operation Temperature           |                               | -40℃ ~ + 85℃     |       |       |       |       |       |       |
| Storage Temperature             |                               | -40℃ ~ + 85℃     |       |       |       |       |       |       |

Humidity

Non-condensing 65°C 95% RH

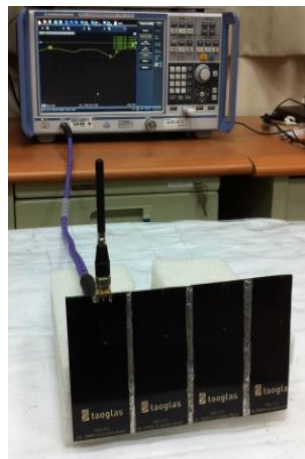
## 3. Antenna Characteristics

### 3.1 Testing Setup

#### Antenna Straight Position



a) In free space



b) with 15\*9cm  
Ground Plane



c) with 30\*30cm  
Ground Plane Edge

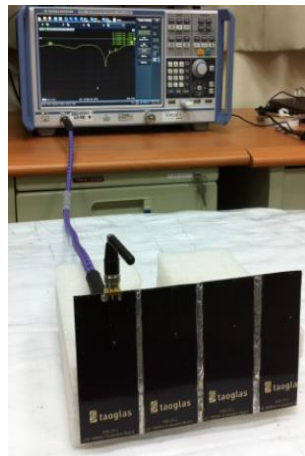


d) with 30\*30cm  
Ground Plane Center

#### Antenna Bent 90° Position



a) In free space



b) with 15\*9cm  
Ground Plane



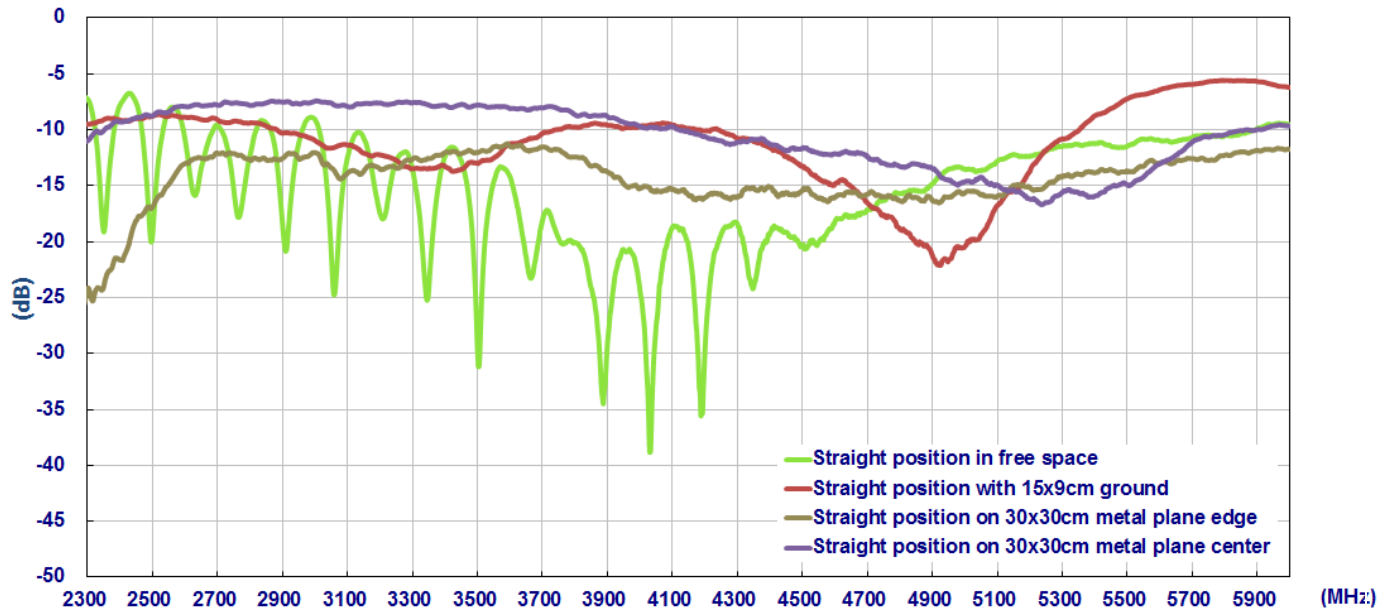
c) with 30\*30cm  
Ground Plane Edge



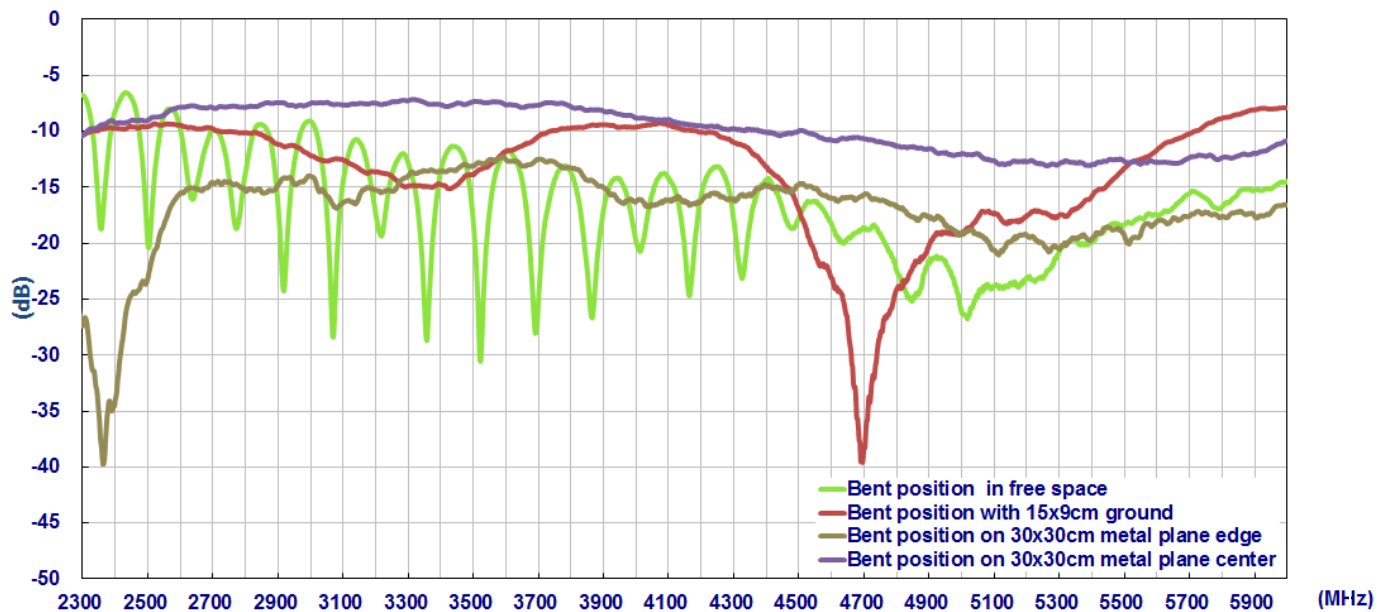
d) with 30\*30cm  
Ground Plane Center

**Figure.1** Measurement environments

### 3.2 Return Loss

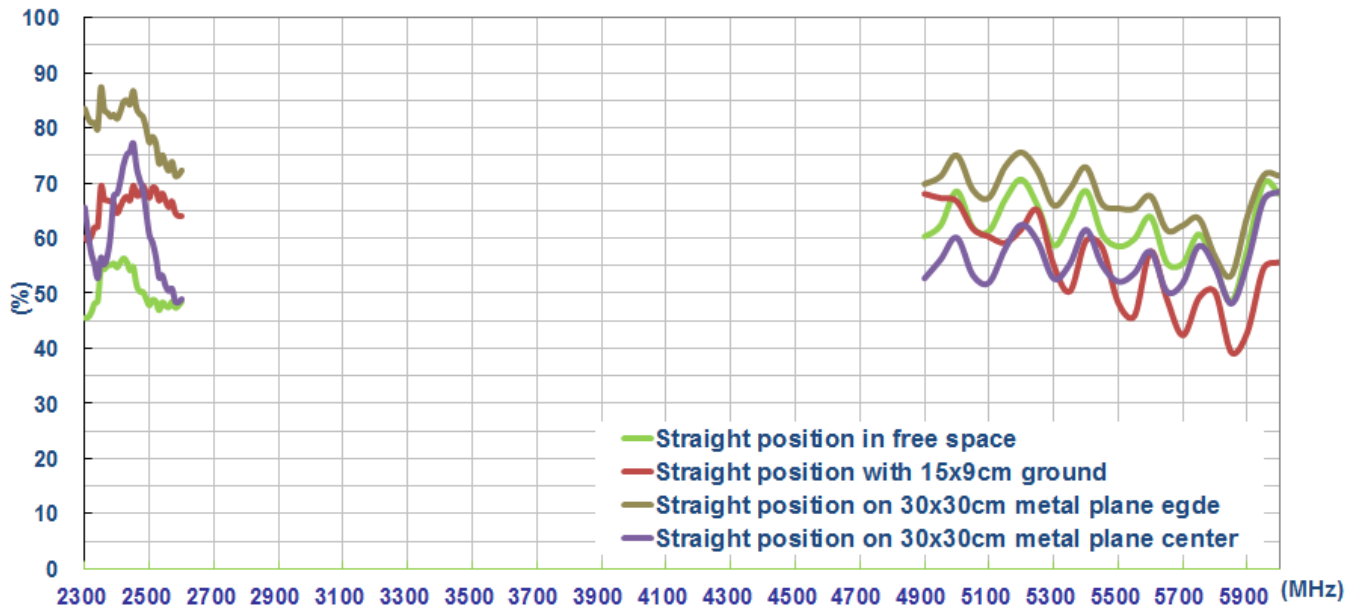


**Figure2.** Return loss of GW.05 antenna with straight position

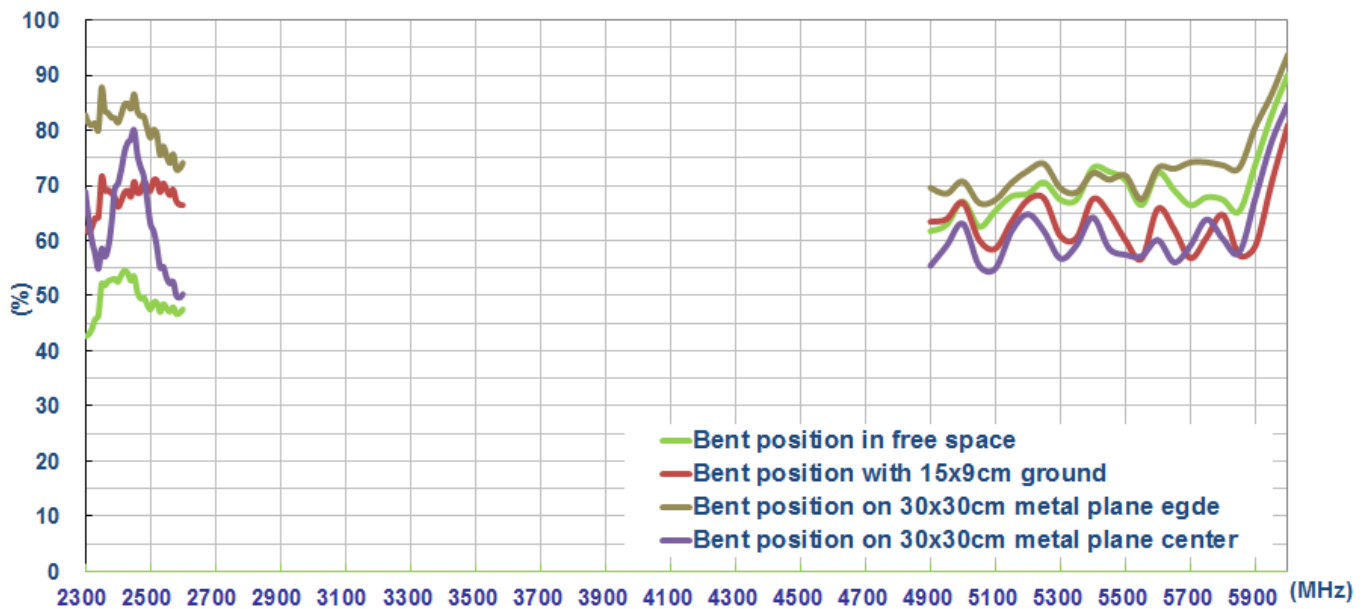


**Figure3.** Return loss of GW.05 antenna with bent position

### 3.3 Efficiency



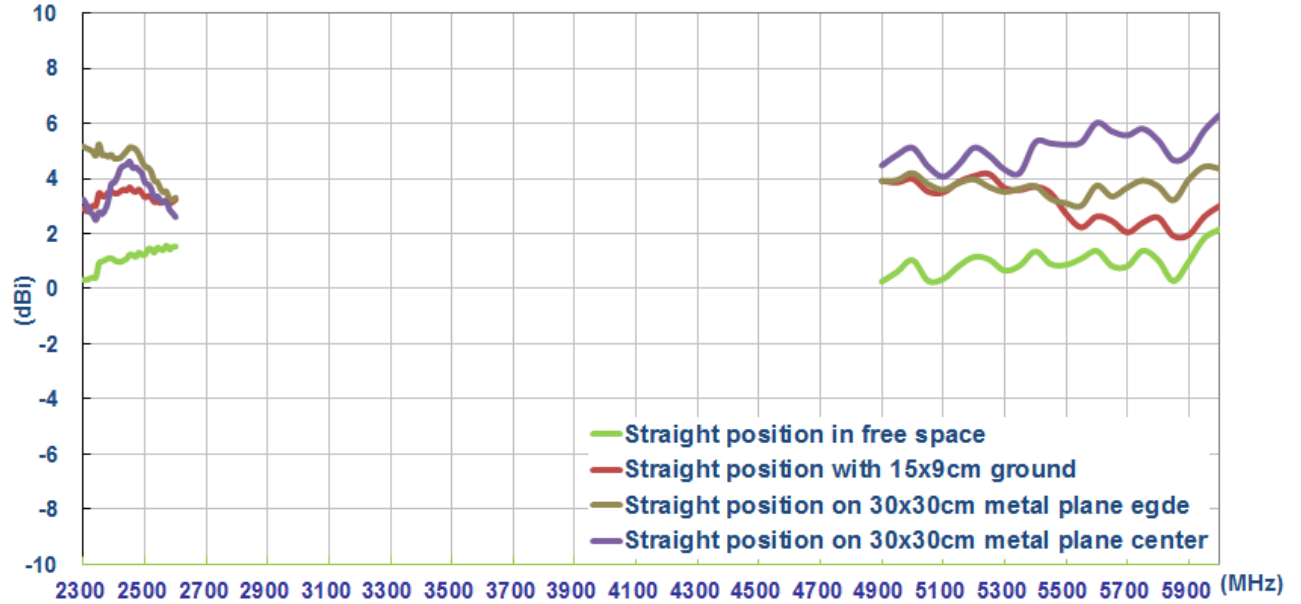
**Figure4.** Efficiency of GW.05 antenna with straight position



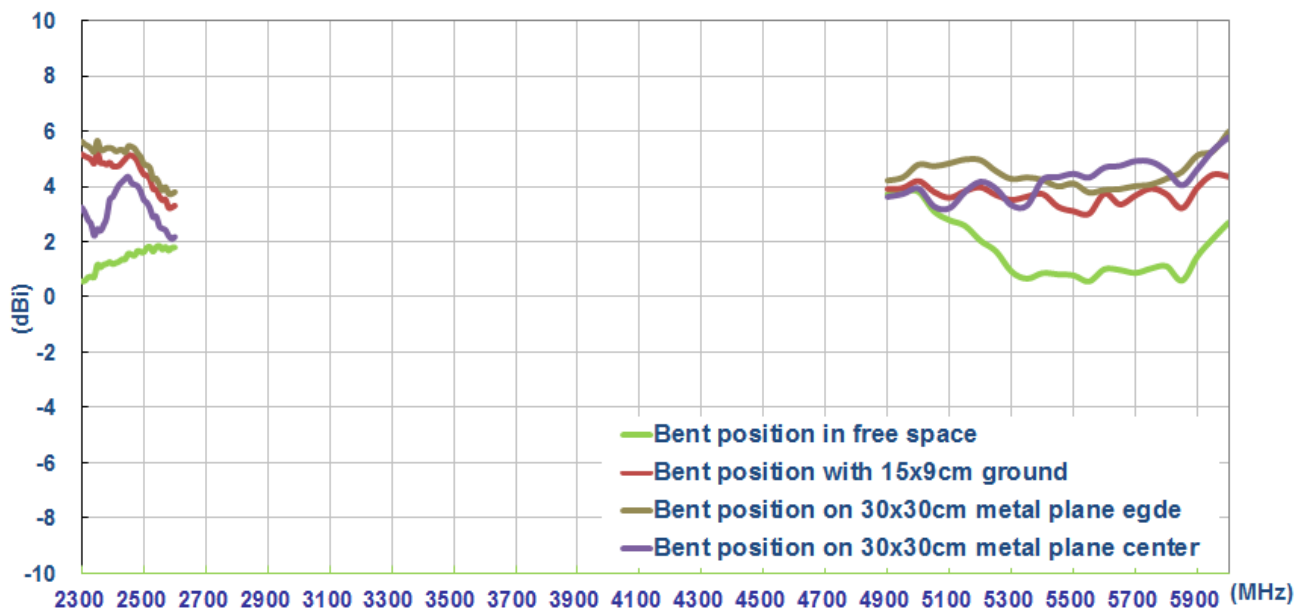
**Figure5.** Efficiency of GW.05 antenna with bent position



### 3.4 Peak Gain

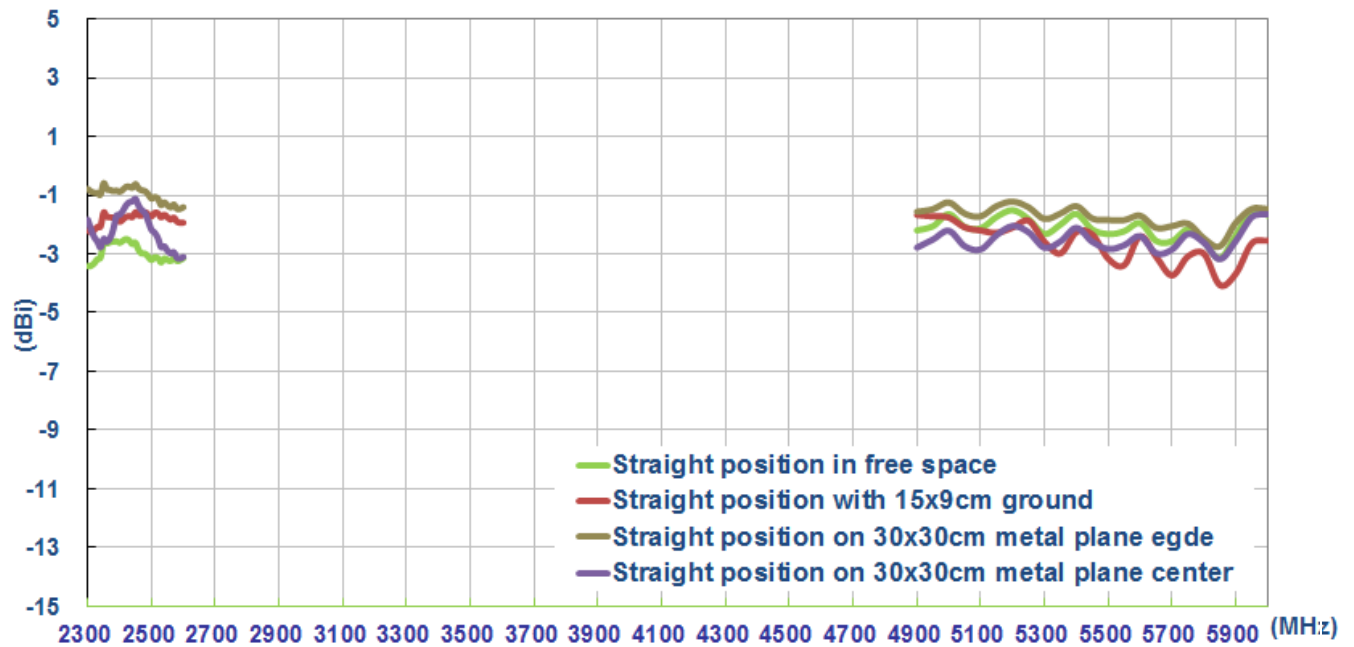


**Figure6.** Peak gain of GW.05 antenna with straight position

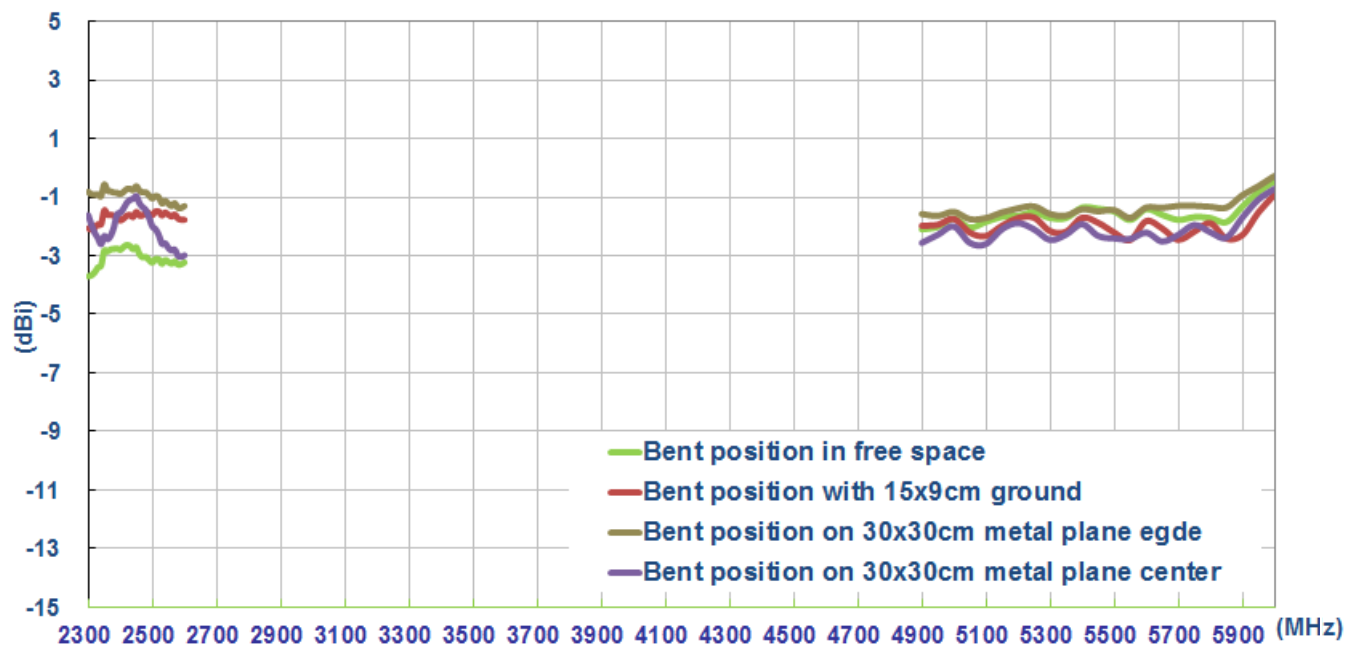


**Figure7.** Peak gain of GW.05 antenna with bent position

### 3.5 Average Gain



**Figure8.** Average gain of GW.05 with antenna straight position

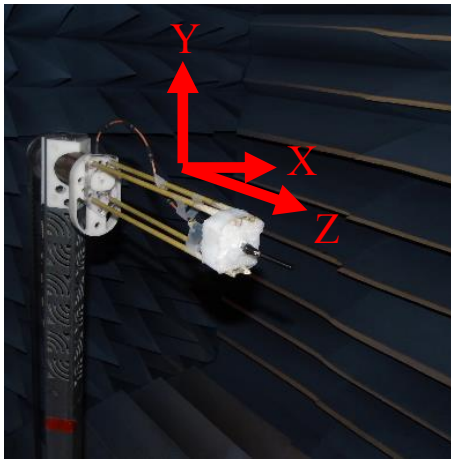


**Figure9.** Average gain of GW.05 antenna with bent position

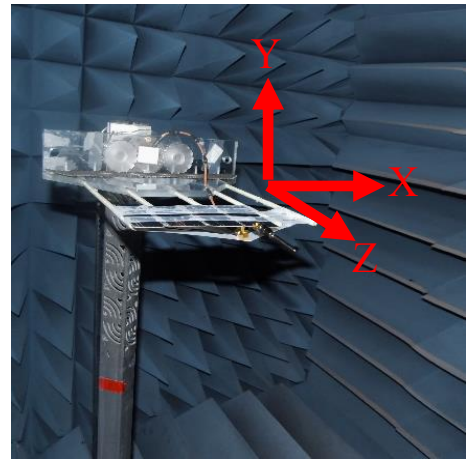
## 4. Antenna Radiation Patterns

The antenna radiation patterns were measured in a CTIA certified ETS Anechoic Chamber. The measurement setup is shown below.

### Antenna with Straight Position



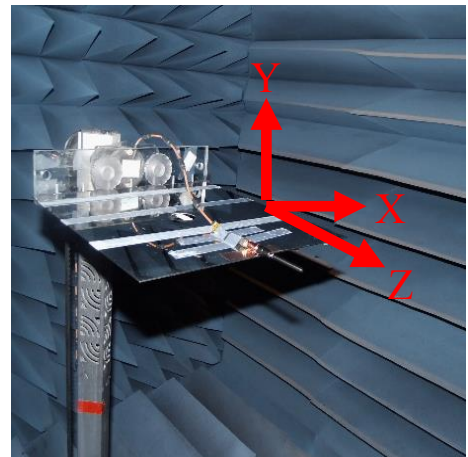
In free space



15x9cm ground plane



30x30cm metal ground center

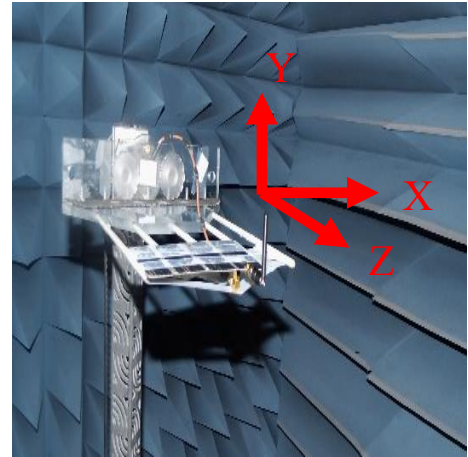


30x30cm metal ground edge

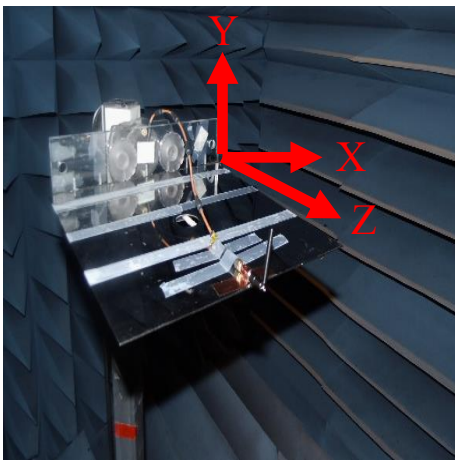
### Antenna Bent Position



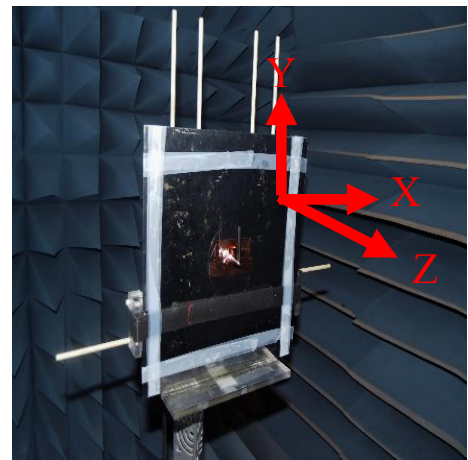
In free space



15x9cm ground plane



30x30cm metal ground center

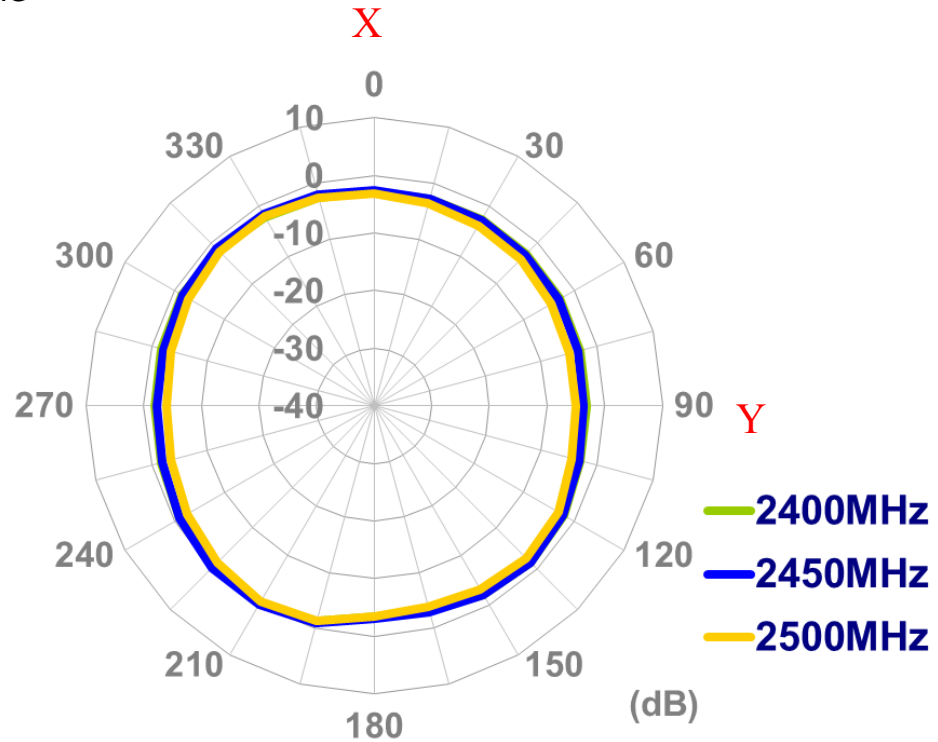


30x30cm metal ground edge

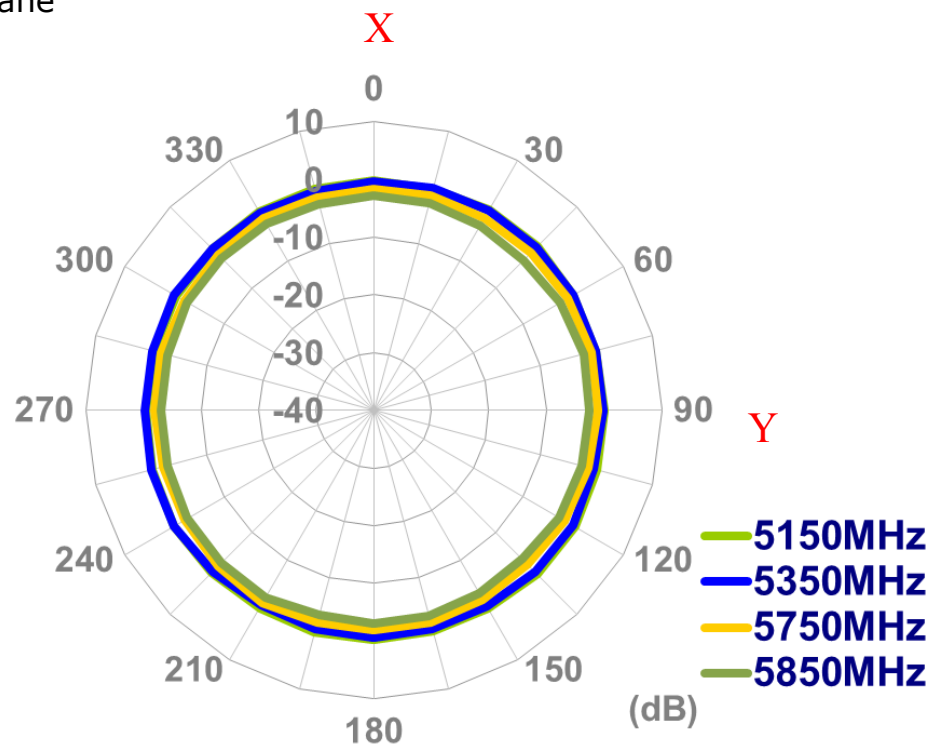
**Figure.10.** Testing Setup in ETS Anechoic Chamber

## 4.1 2D Radiation Pattern (Straight position in free space)

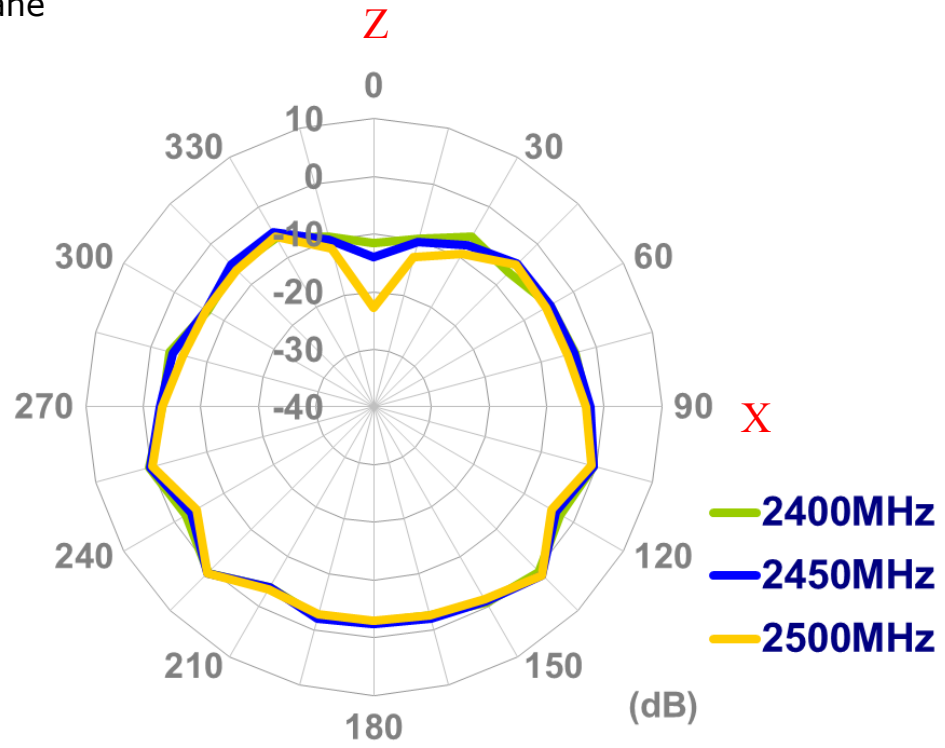
XY Plane



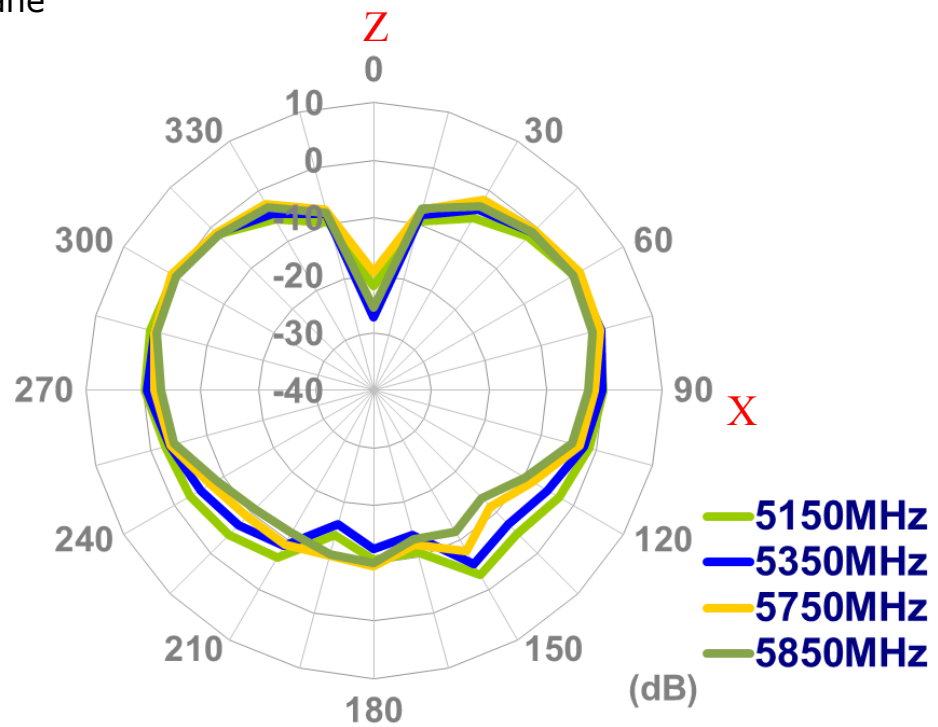
XY Plane



XZ Plane

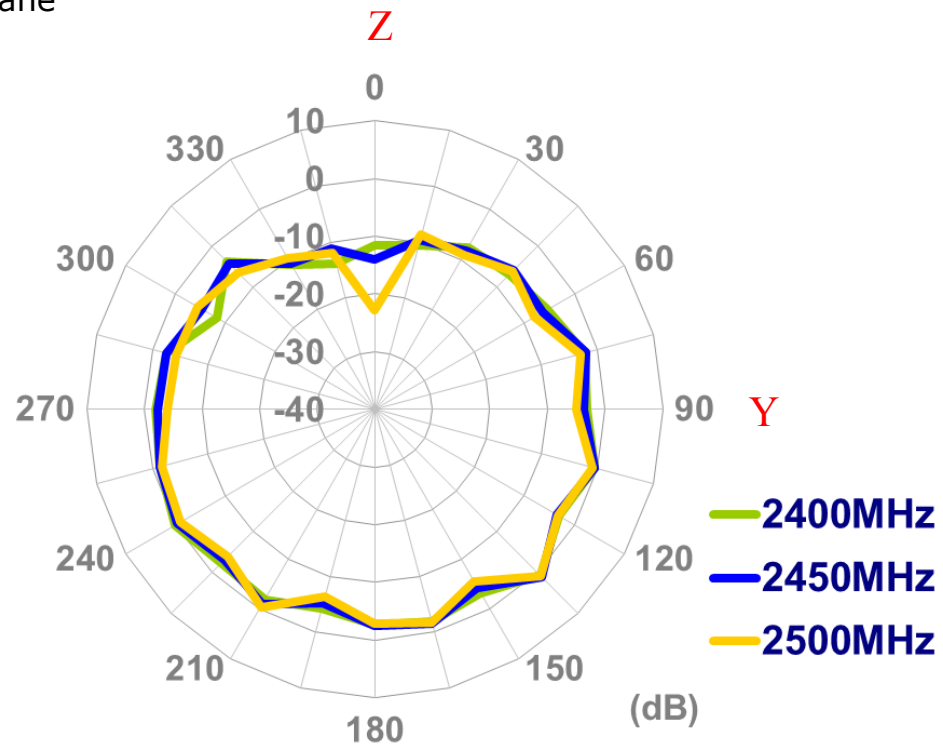


XZ Plane

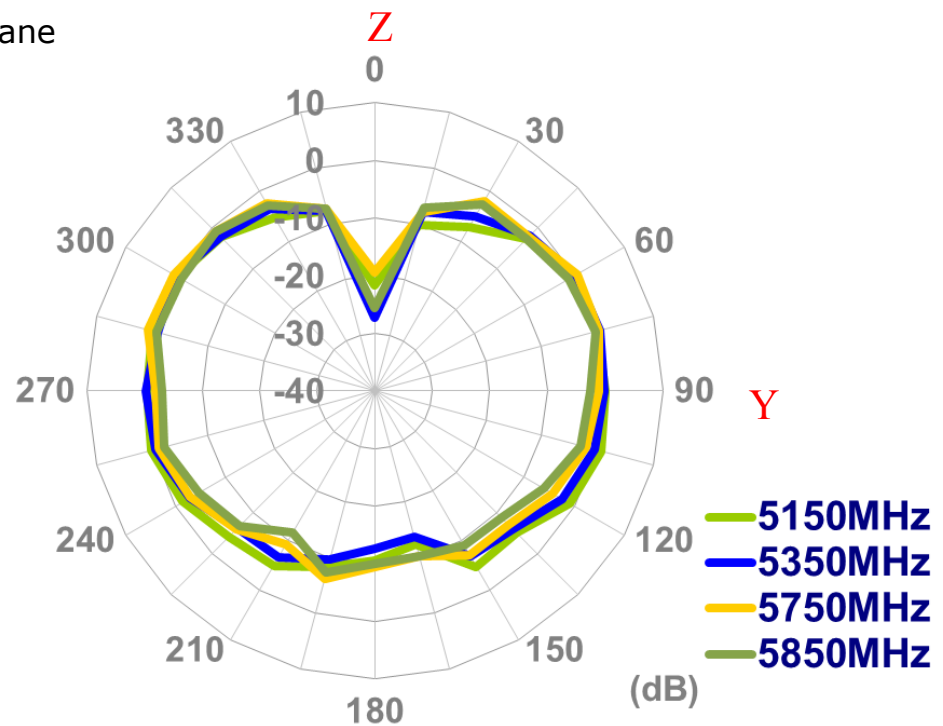




YZ Plane

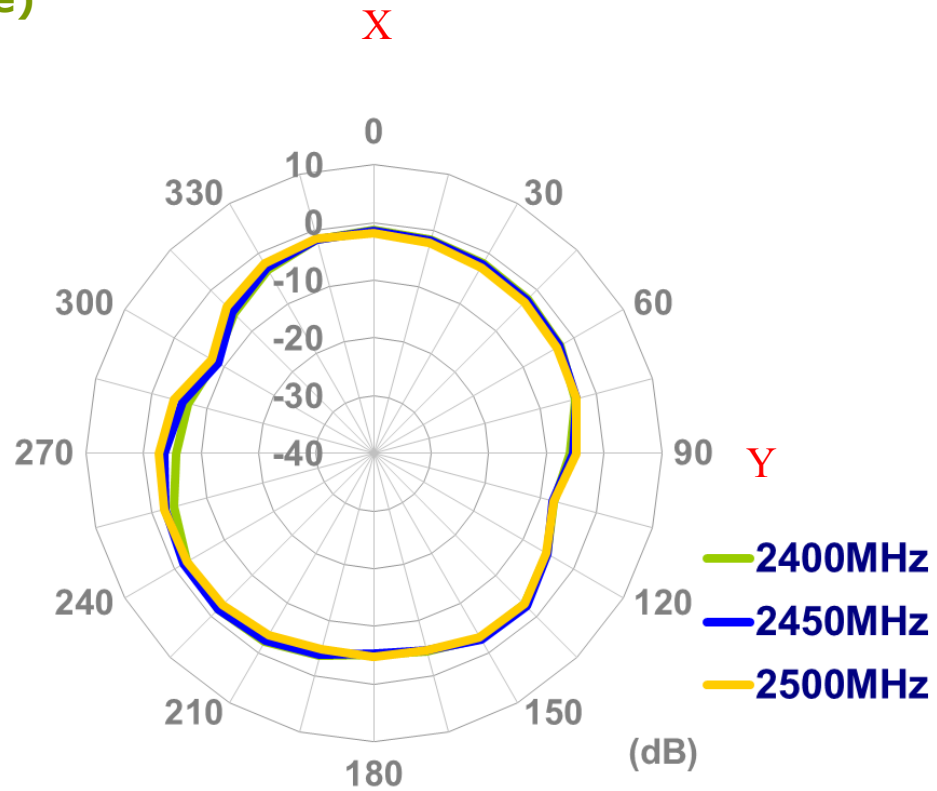


YZ Plane

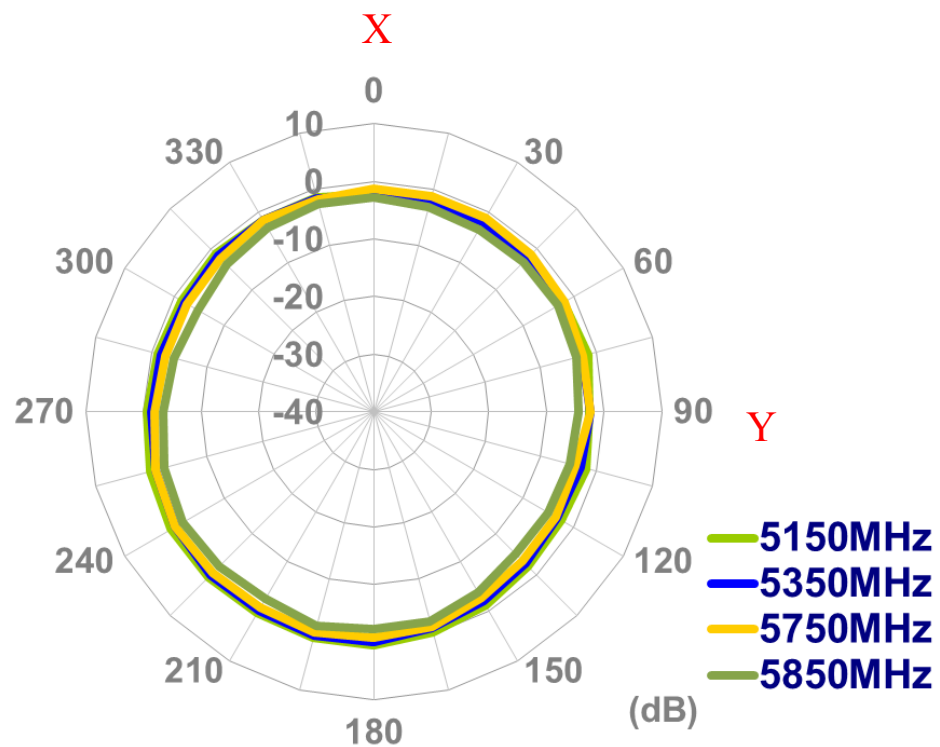


## 4.2 2D Radiation Pattern (Straight position with 15x9cm ground plane)

XY Plane

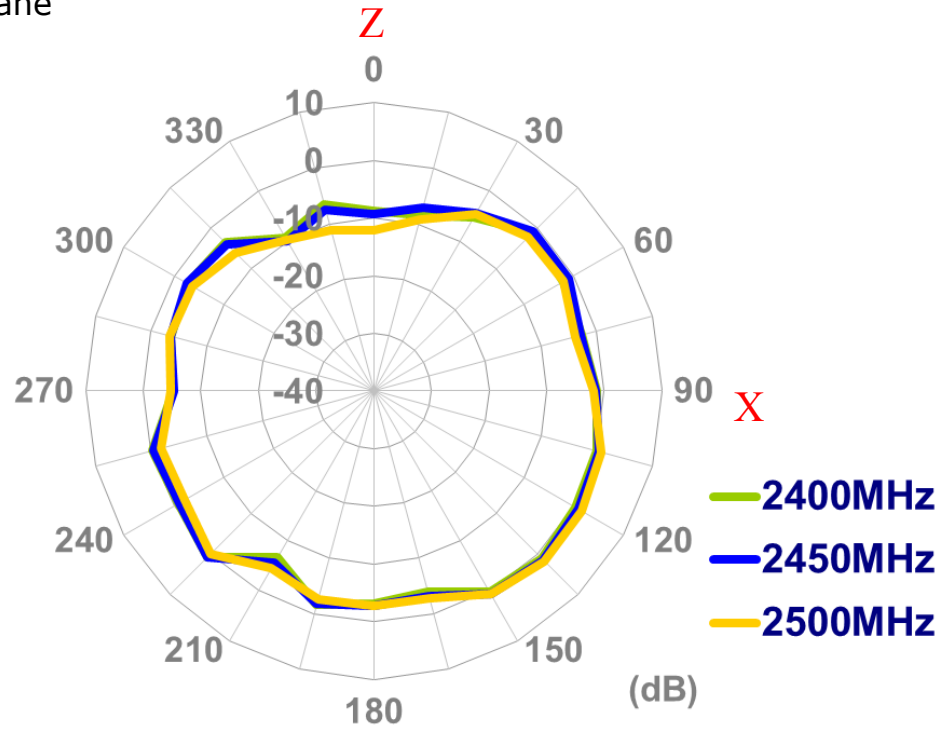


XY Plane

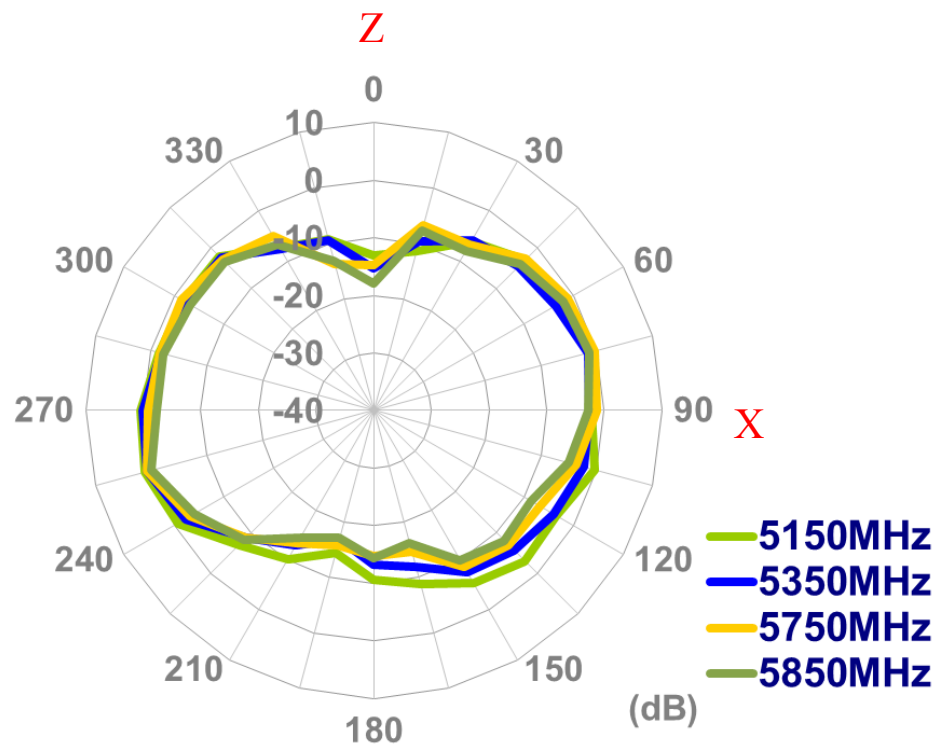




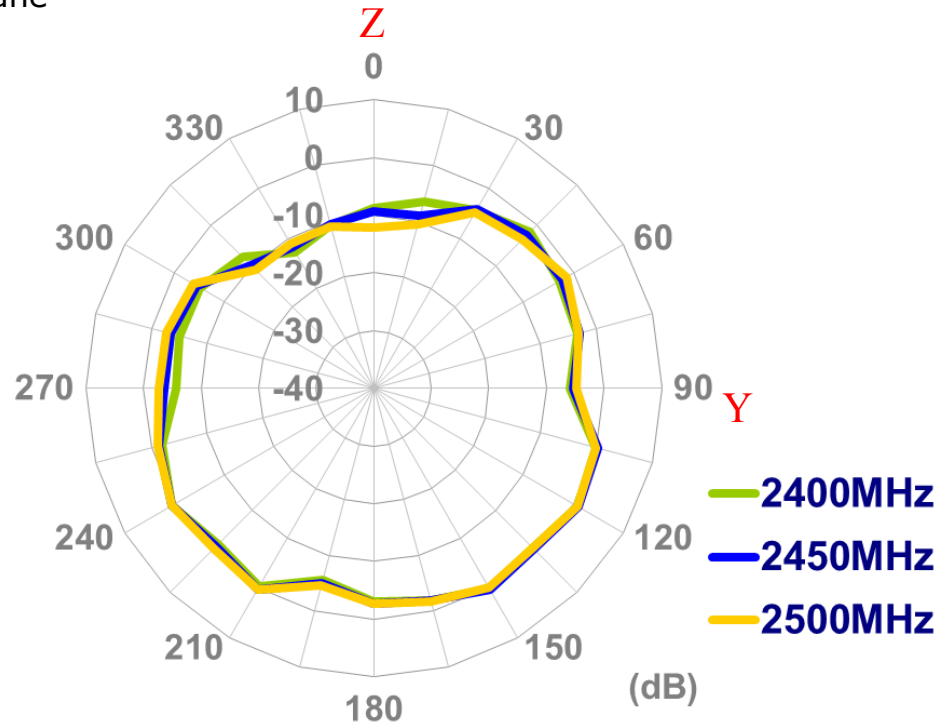
XZ Plane



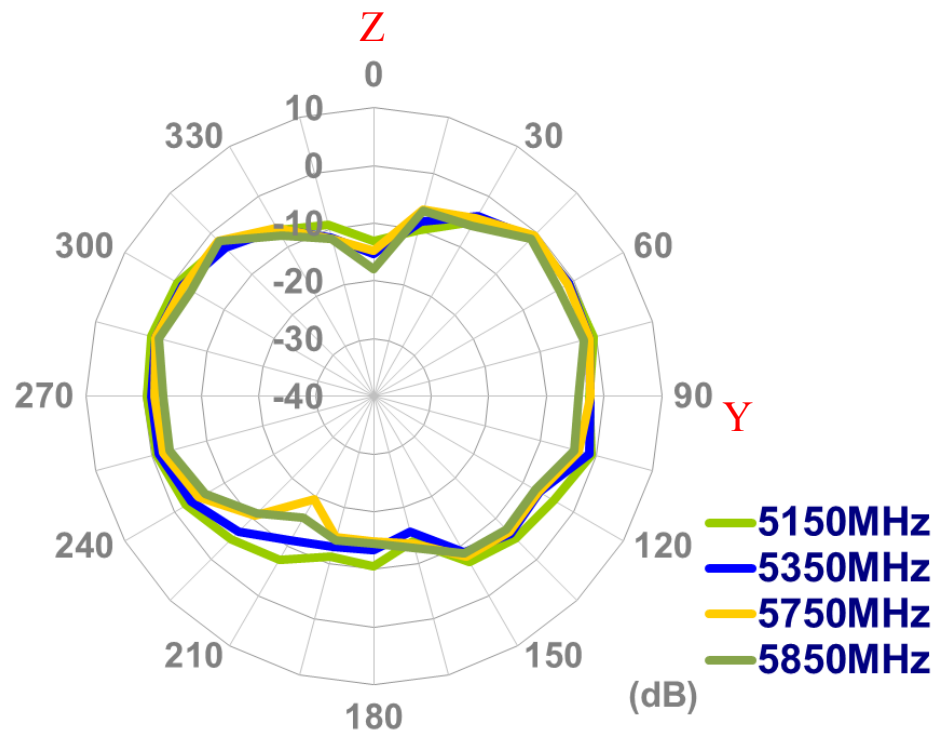
XZ Plane



YZ Plane

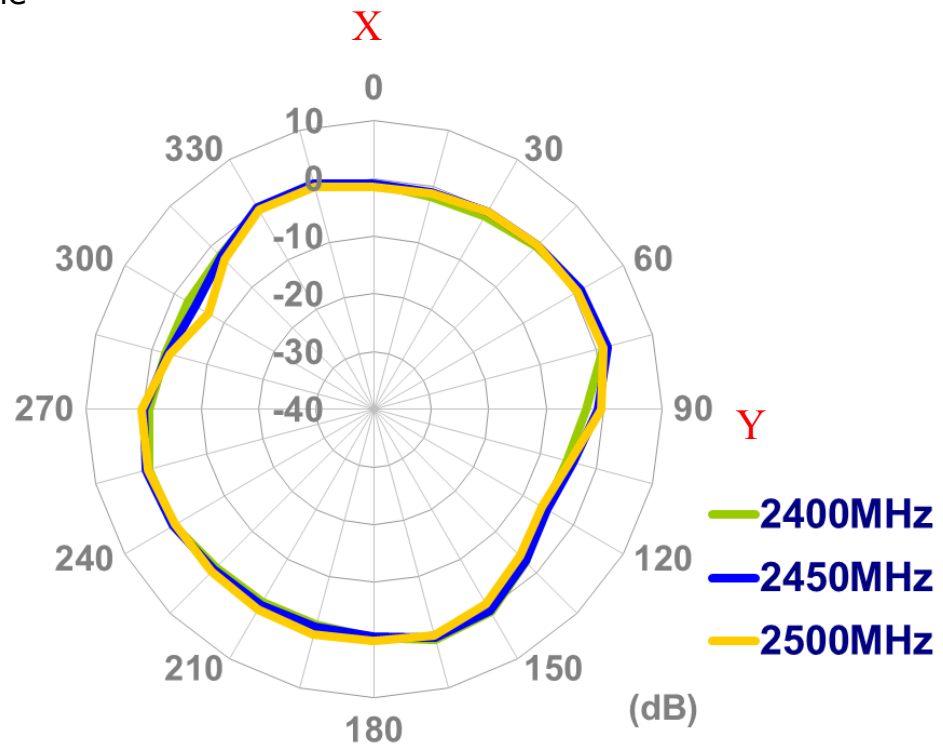


YZ Plane

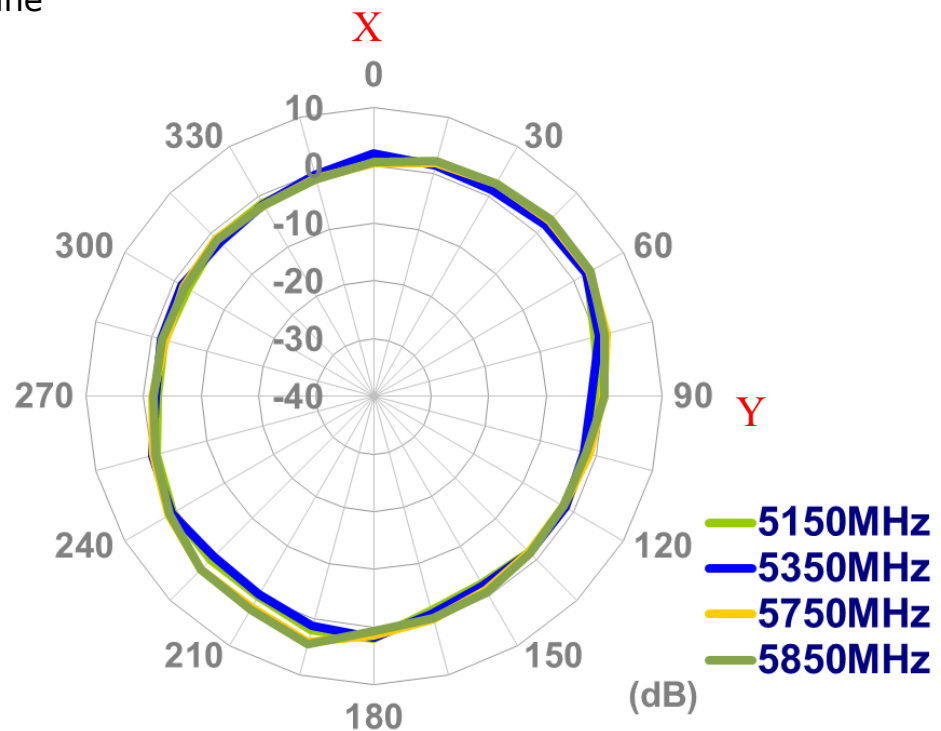


### 4.3 2D Radiation Pattern (Straight position with 30x30cm ground plane edge)

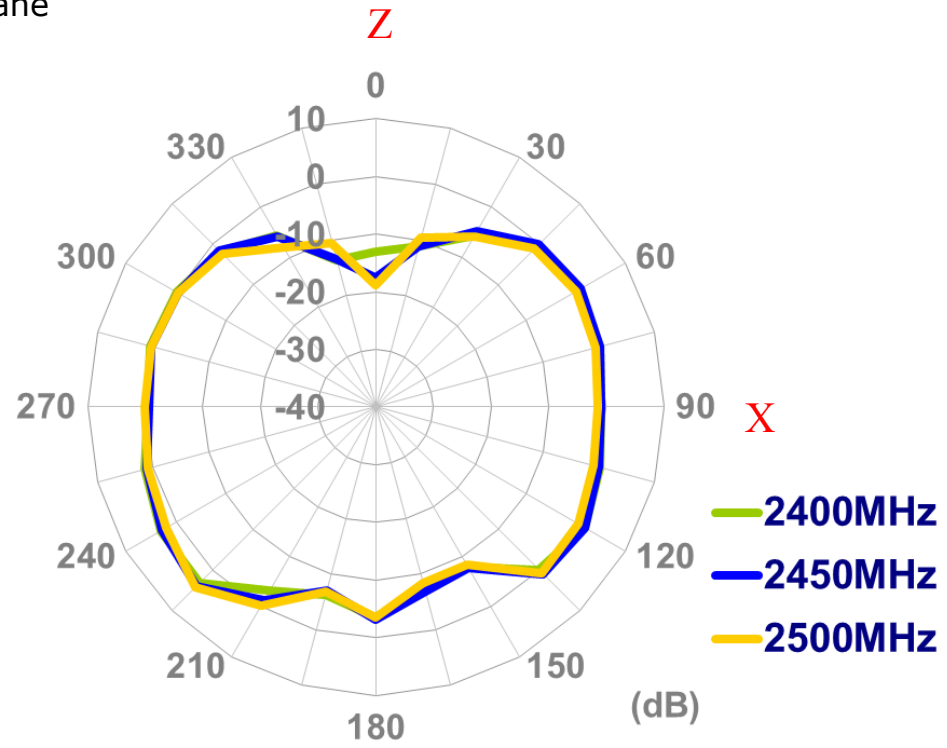
XY Plane



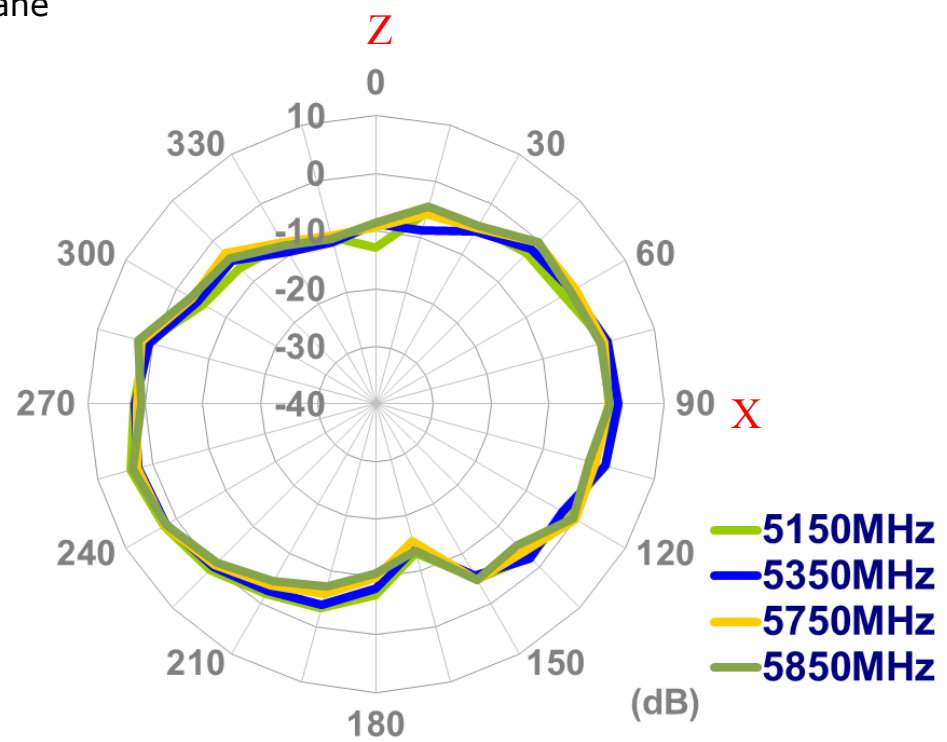
XY Plane



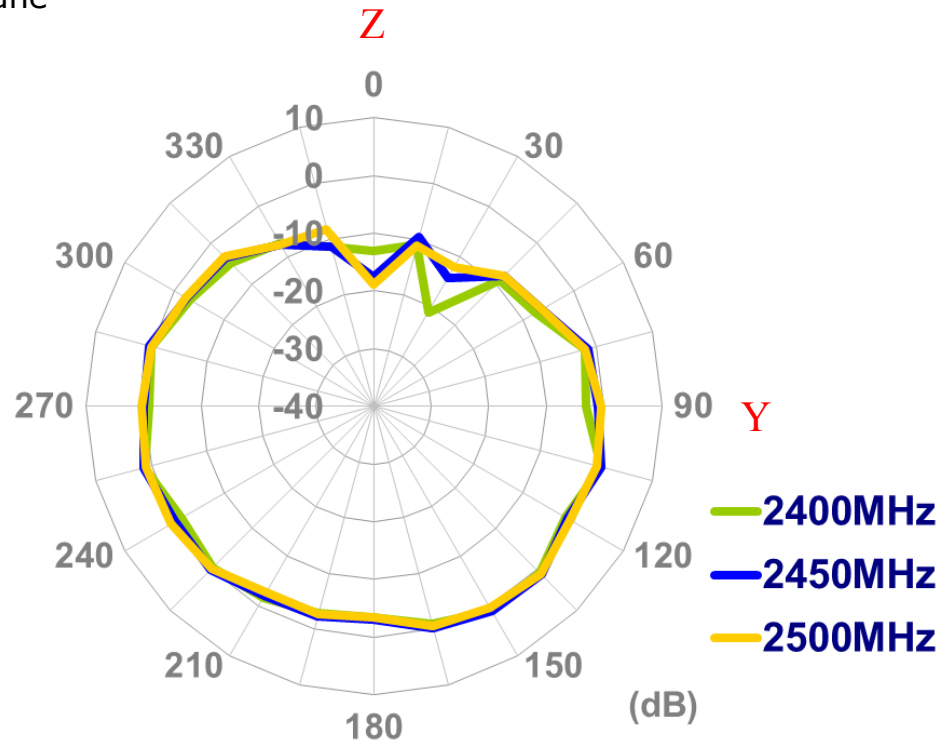
XZ Plane



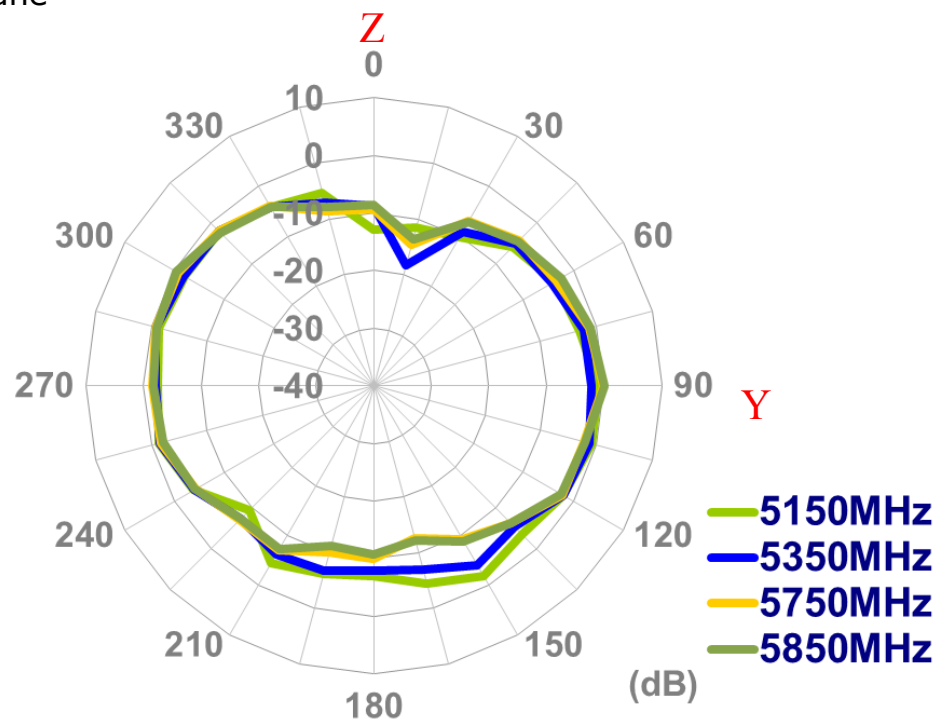
XZ Plane



YZ Plane

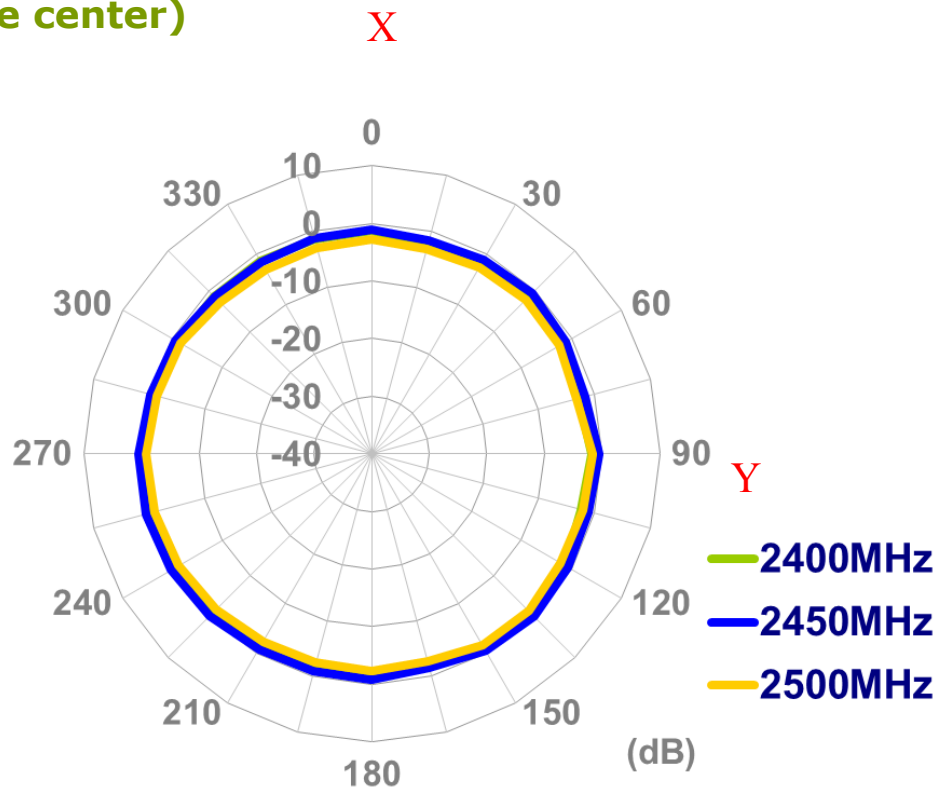


YZ Plane

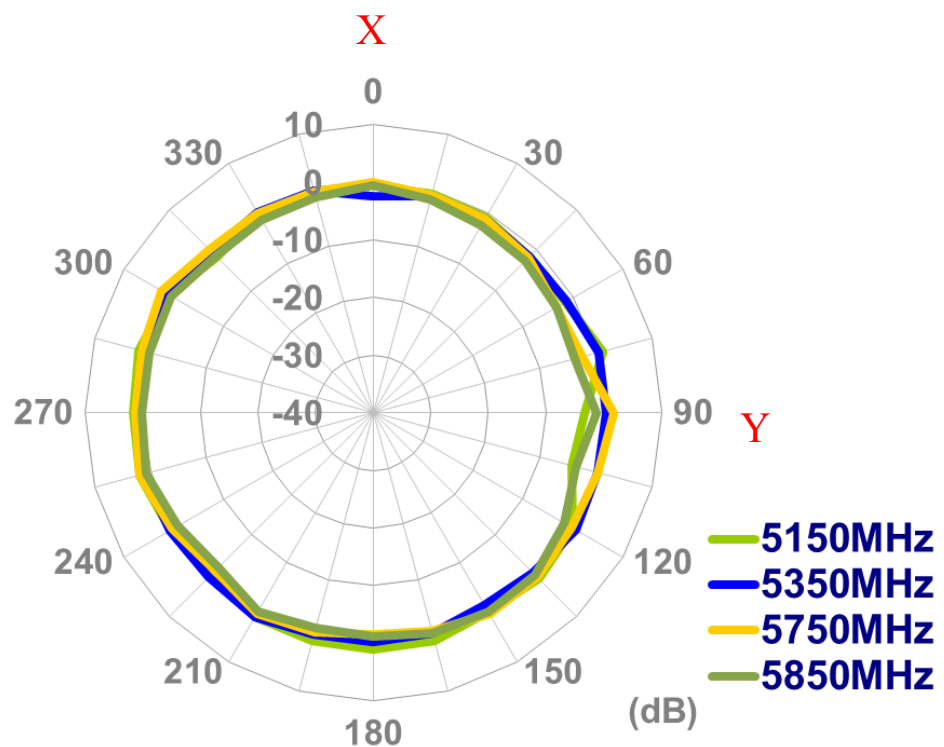


#### 4.4 2D Radiation Pattern (Straight position with 30x30cm ground plane center)

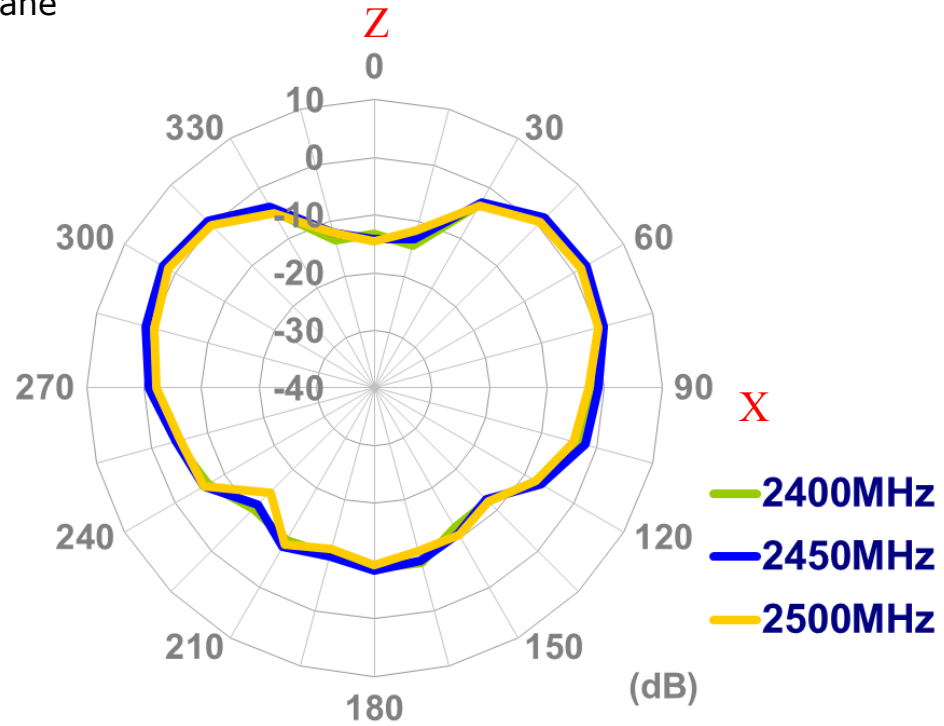
XY Plane



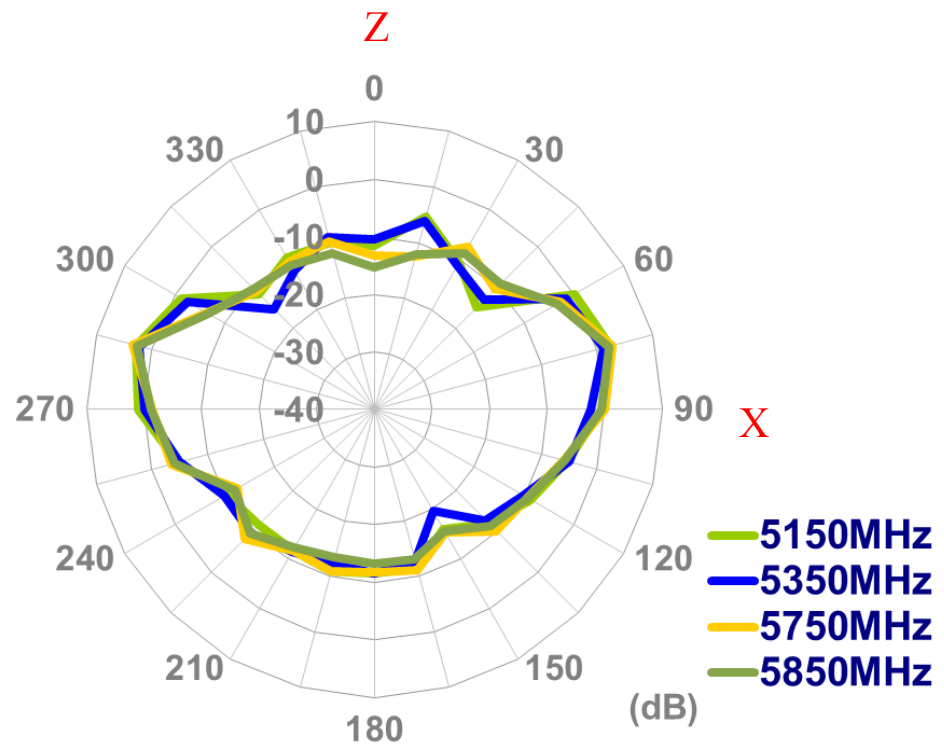
XY Plane



XZ Plane

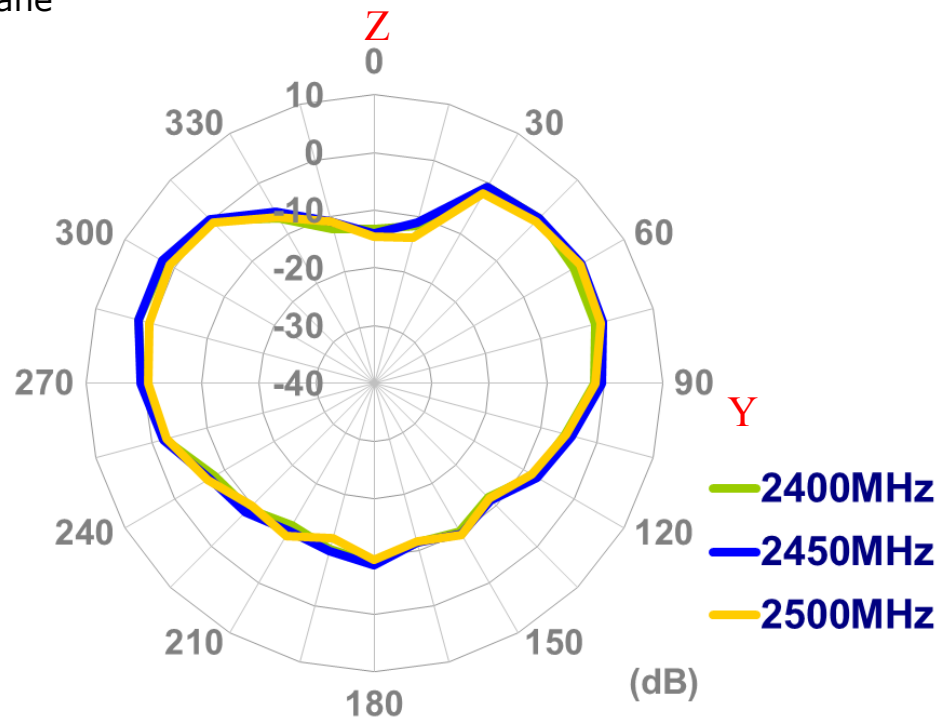


XZ Plane

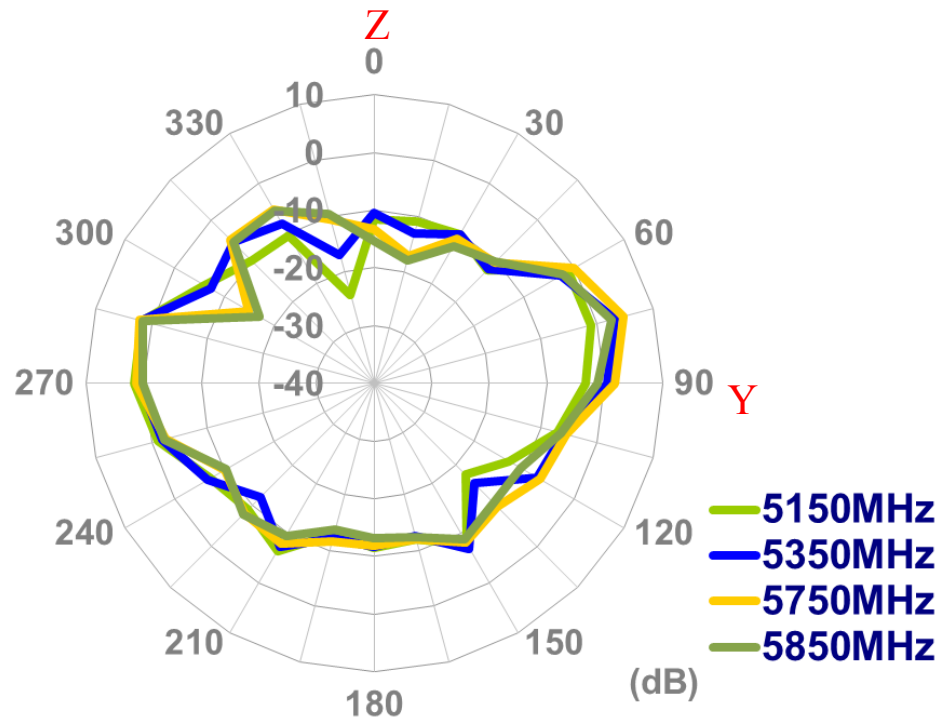




YZ Plane

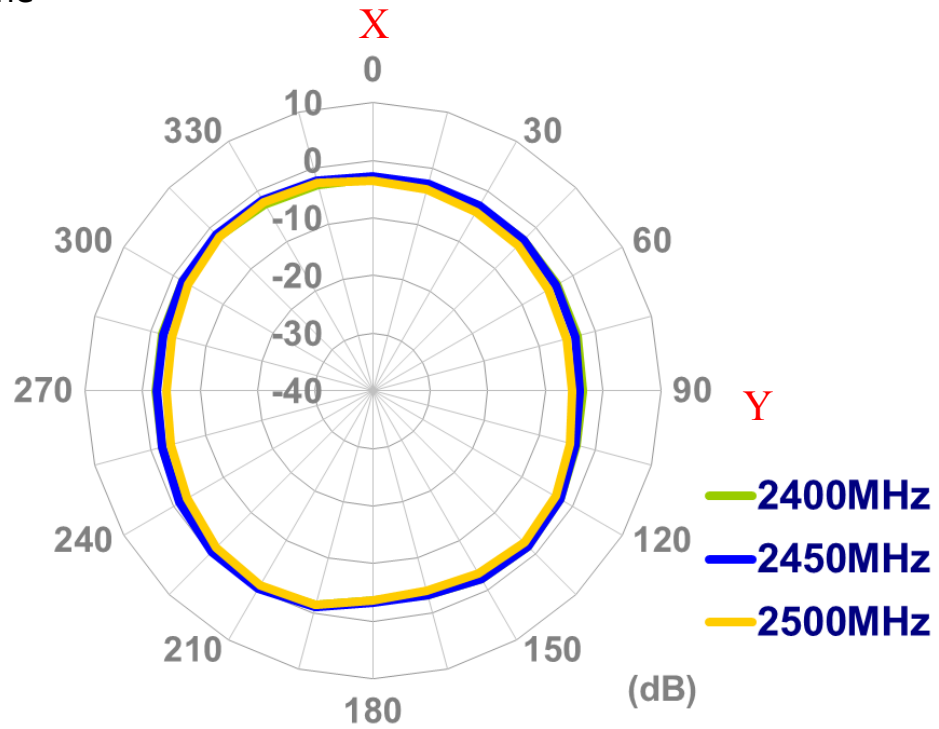


YZ Plane

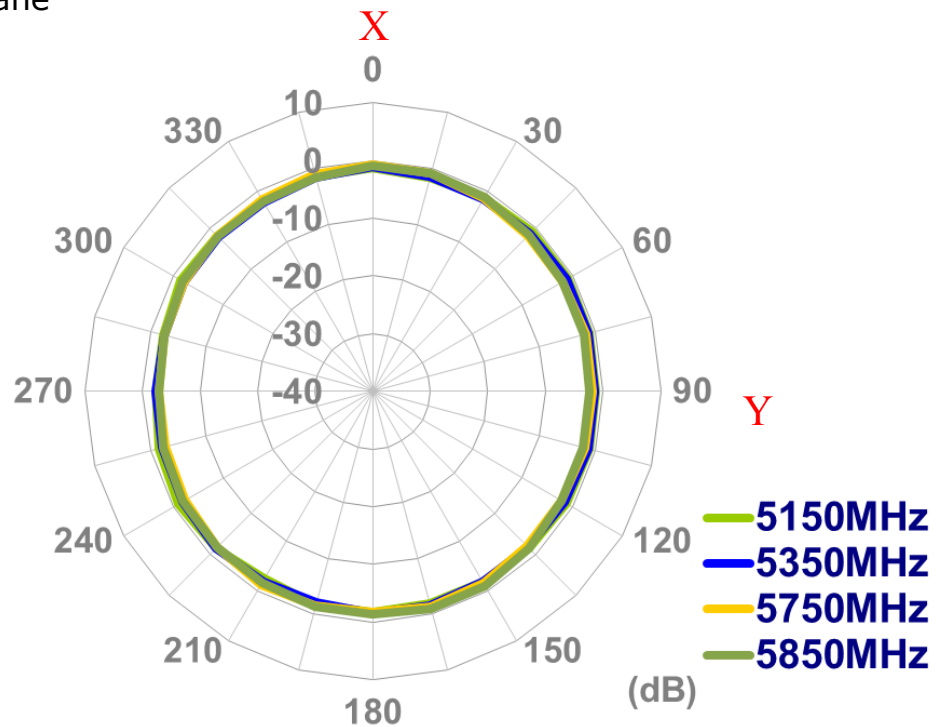


#### 4.5 2D Radiation Pattern (Bent position in free space)

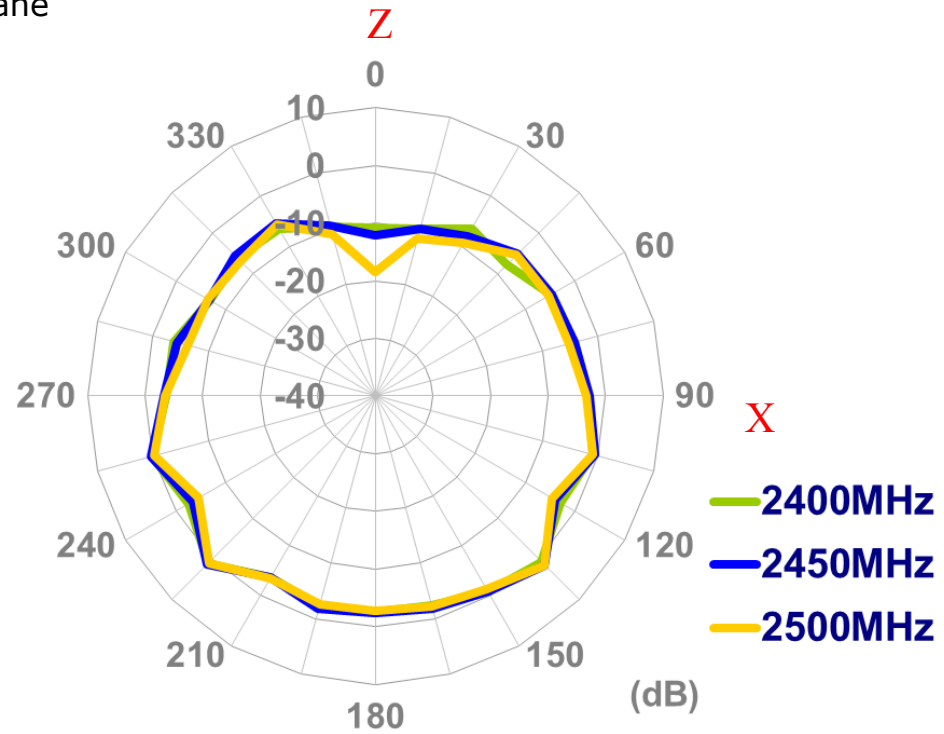
XY Plane



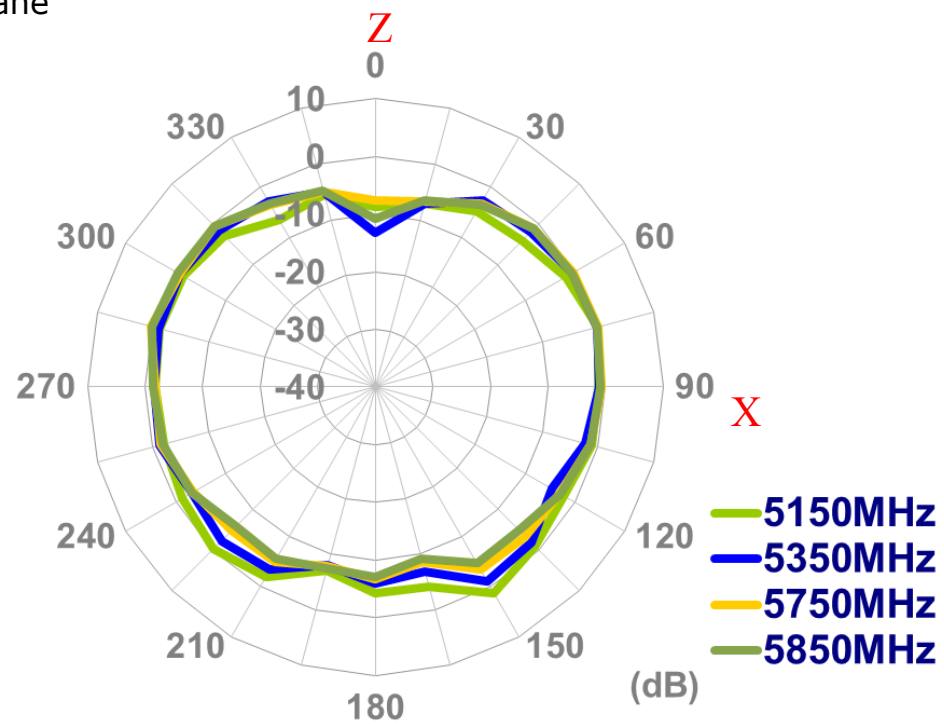
XY Plane



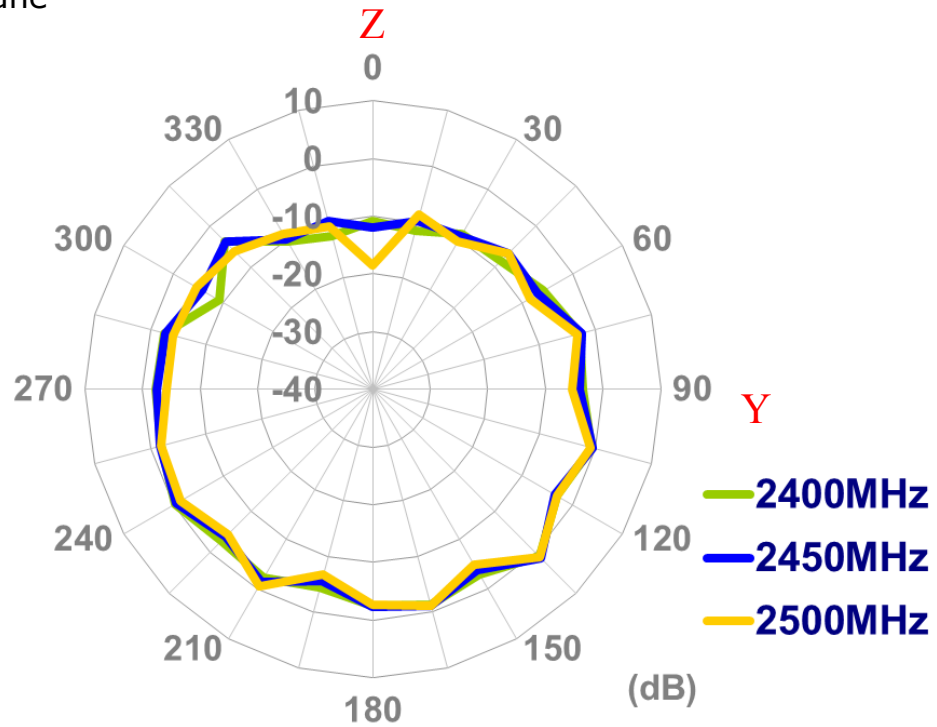
XZ Plane



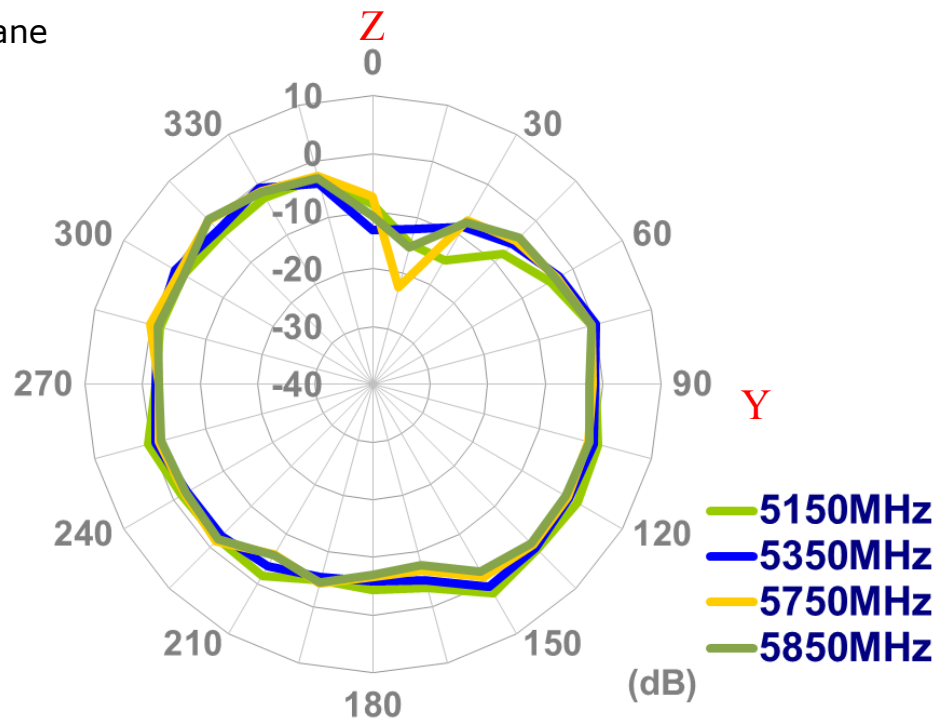
XZ Plane



YZ Plane

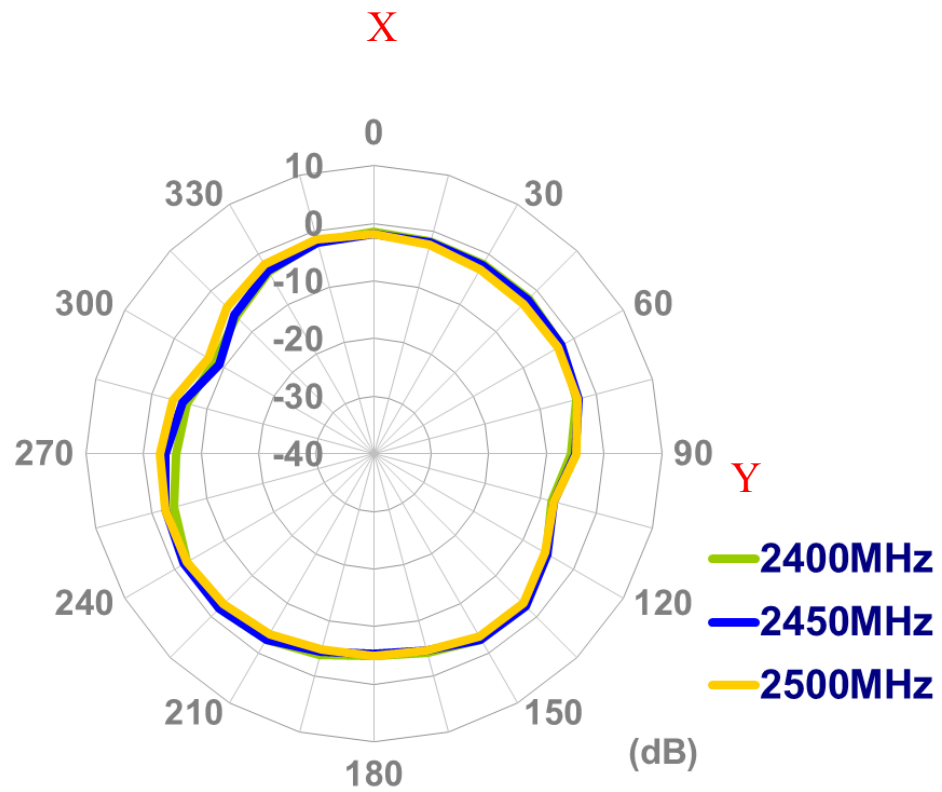


YZ Plane

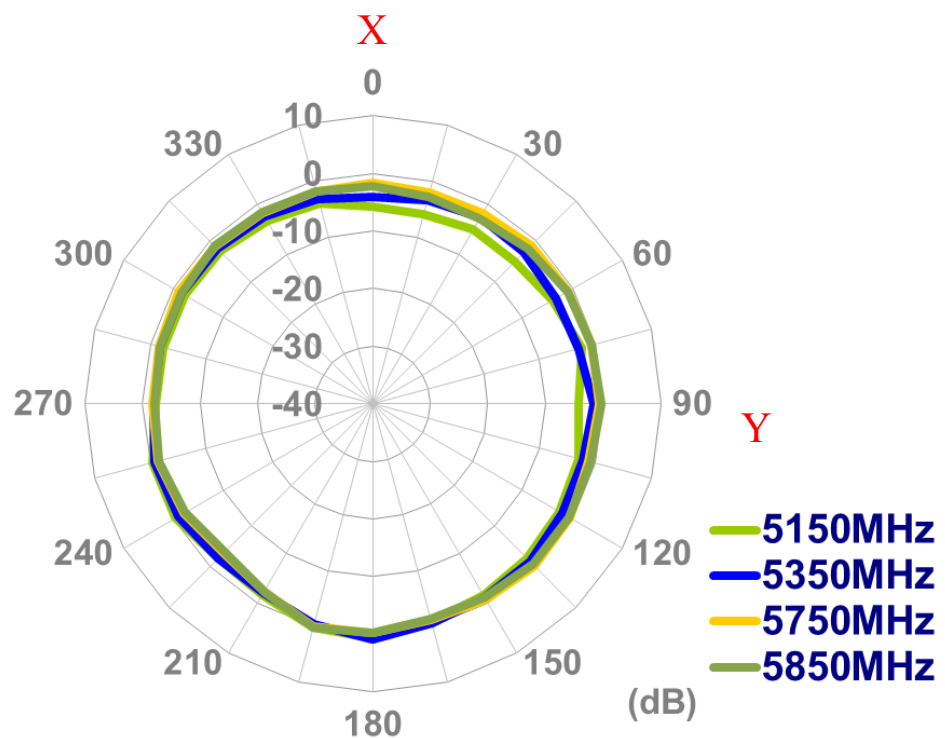


## 4.6 2D Radiation Pattern (Bent position with 15x9cm ground plane)

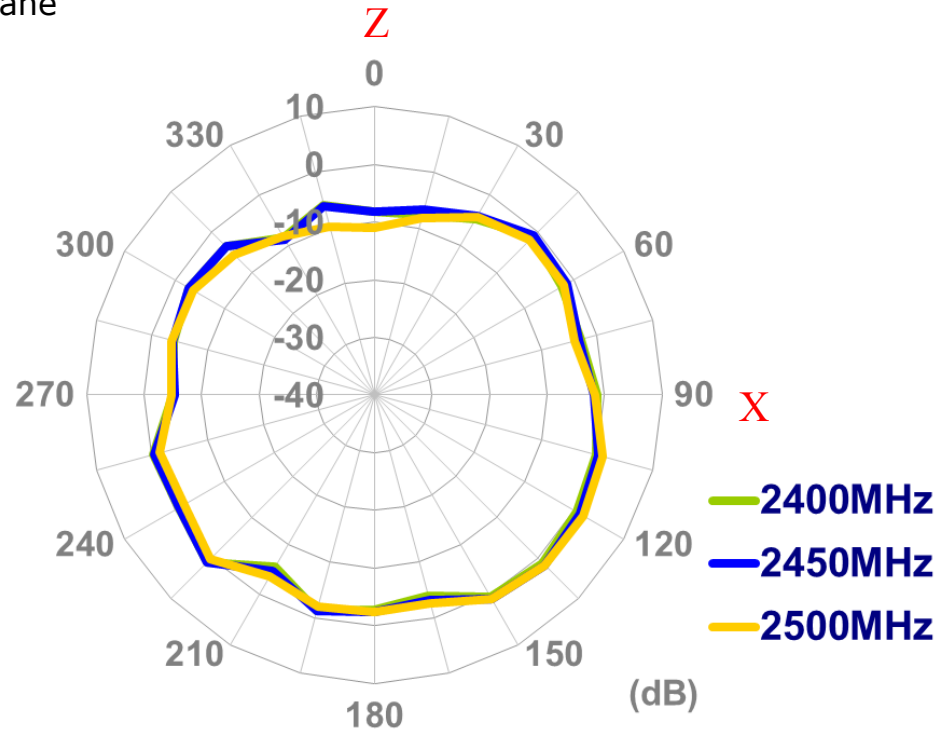
XY Plane



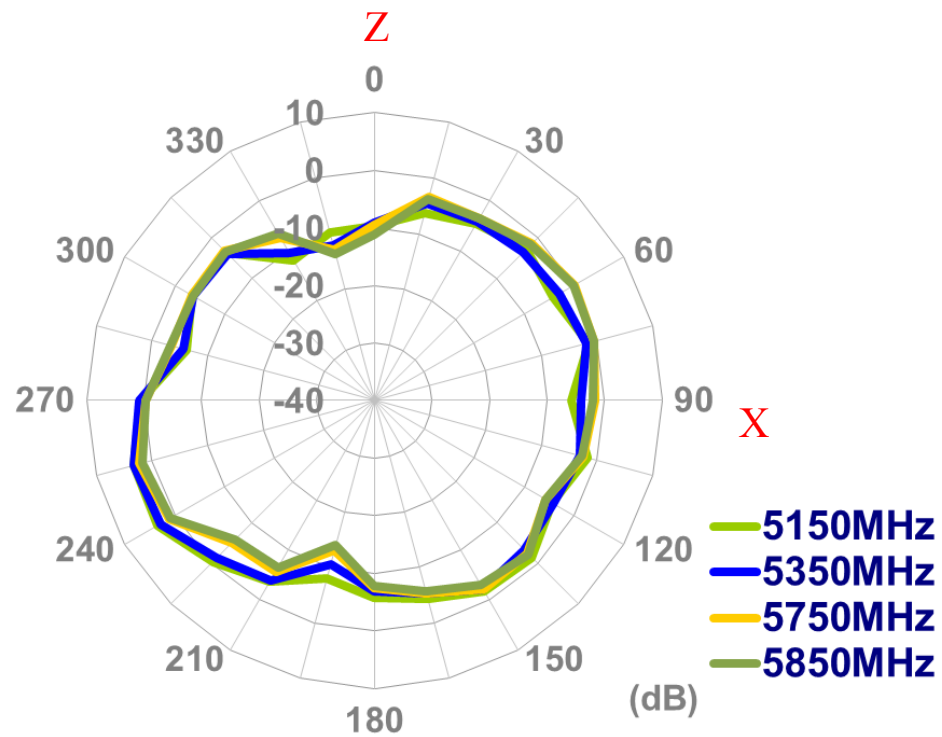
XY Plane



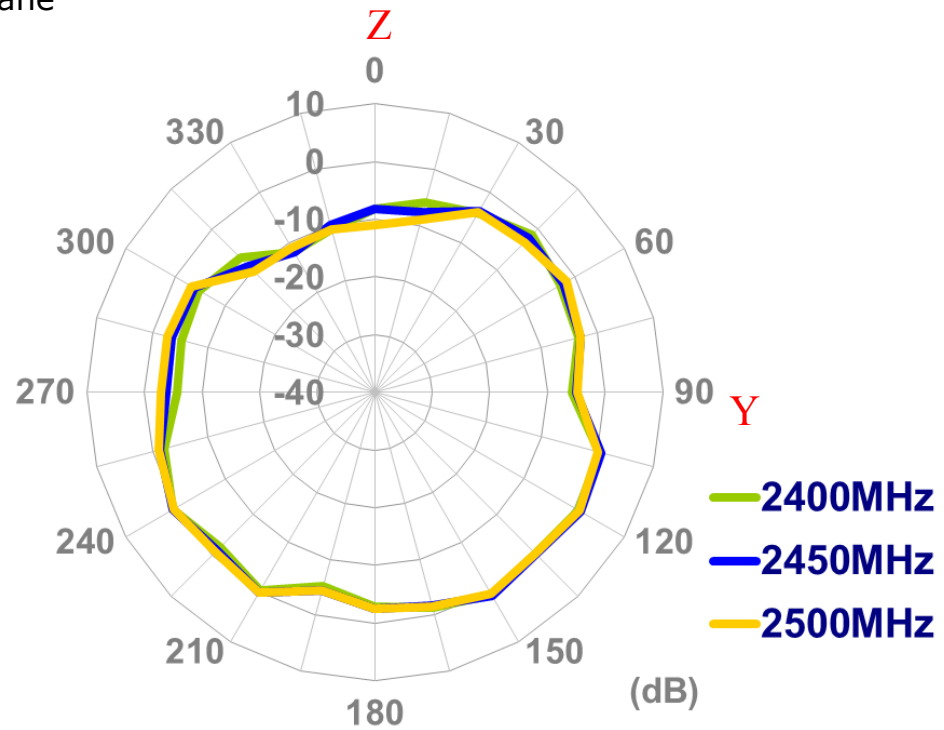
XZ Plane



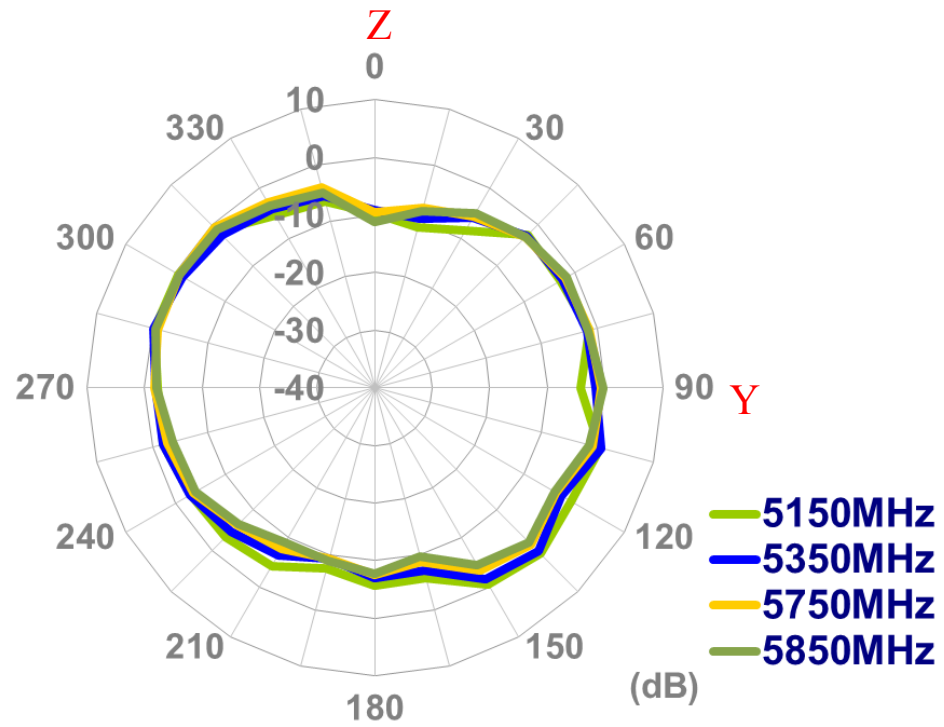
XZ Plane



YZ Plane



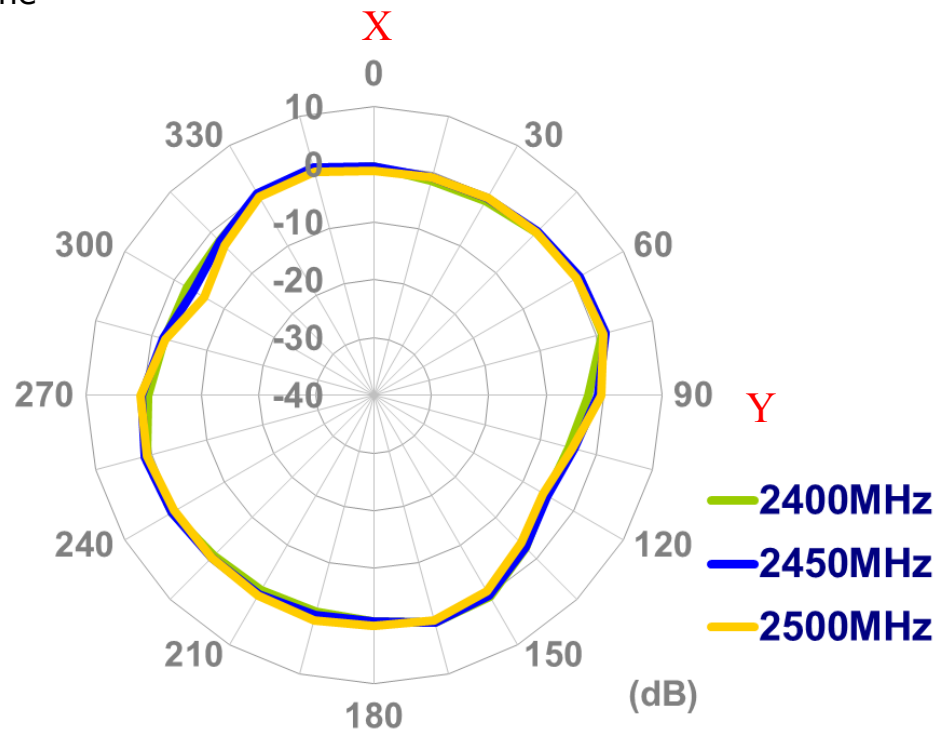
YZ Plane



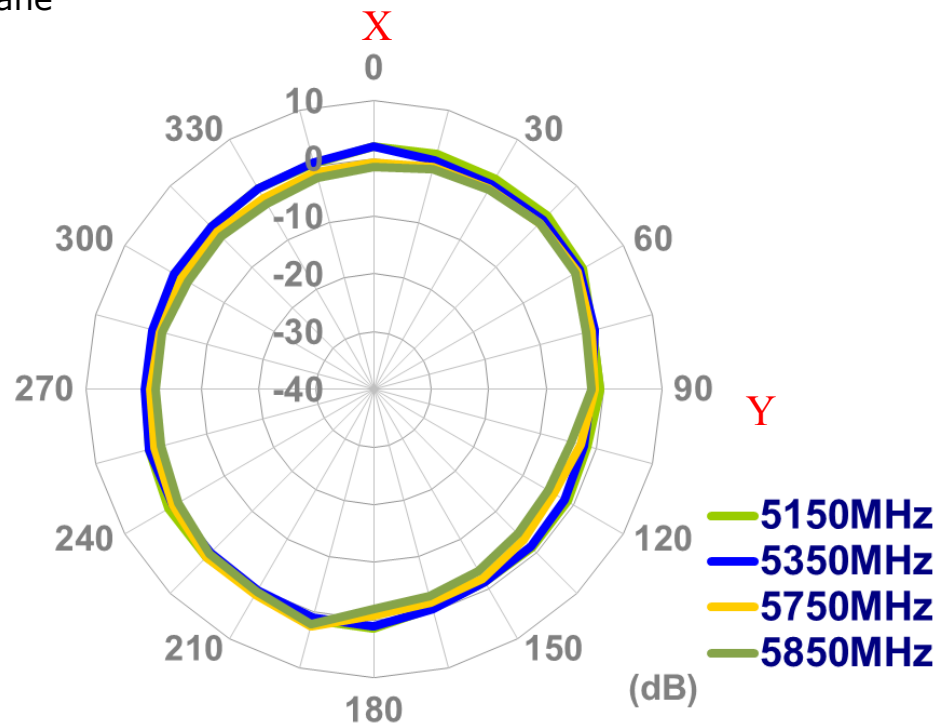


#### 4.7 2D Radiation Pattern (Bent position with 30x30cm ground plane edge)

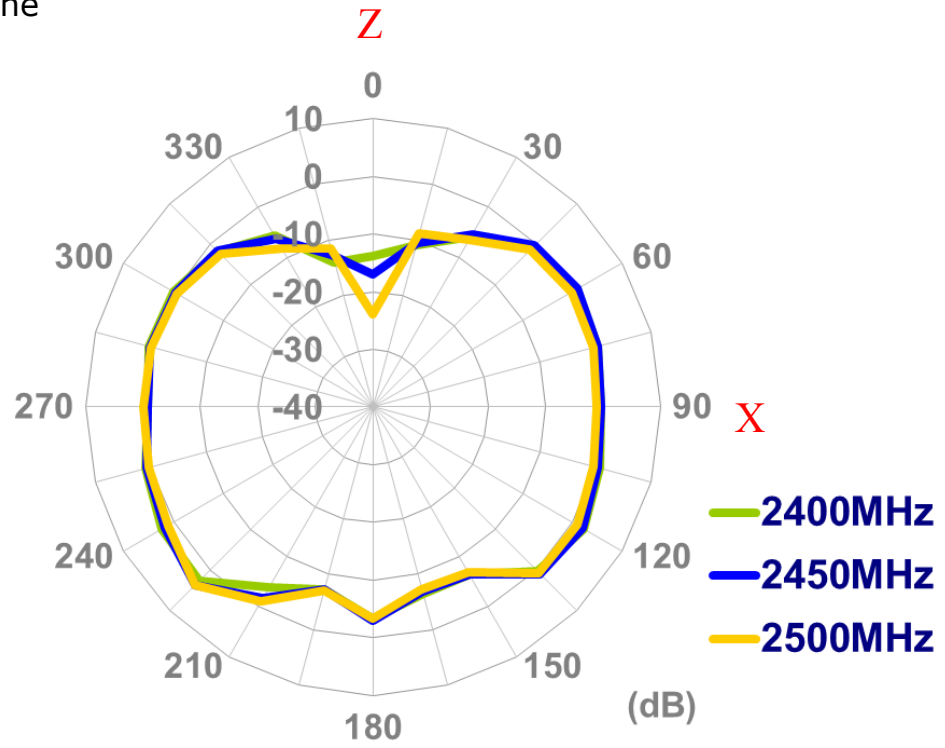
XY Plane



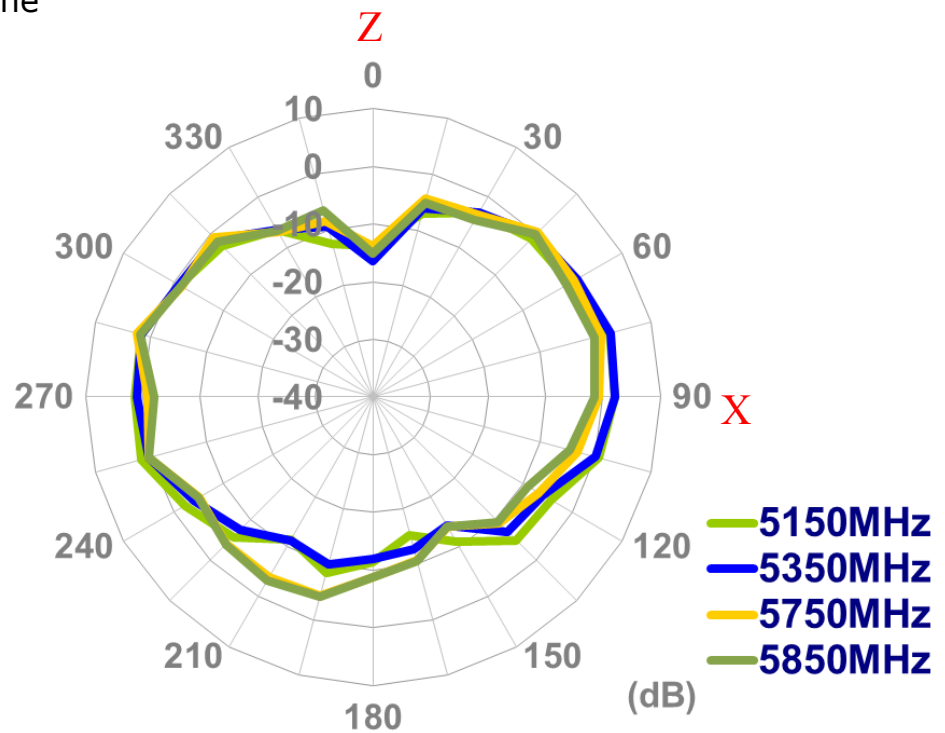
XY Plane



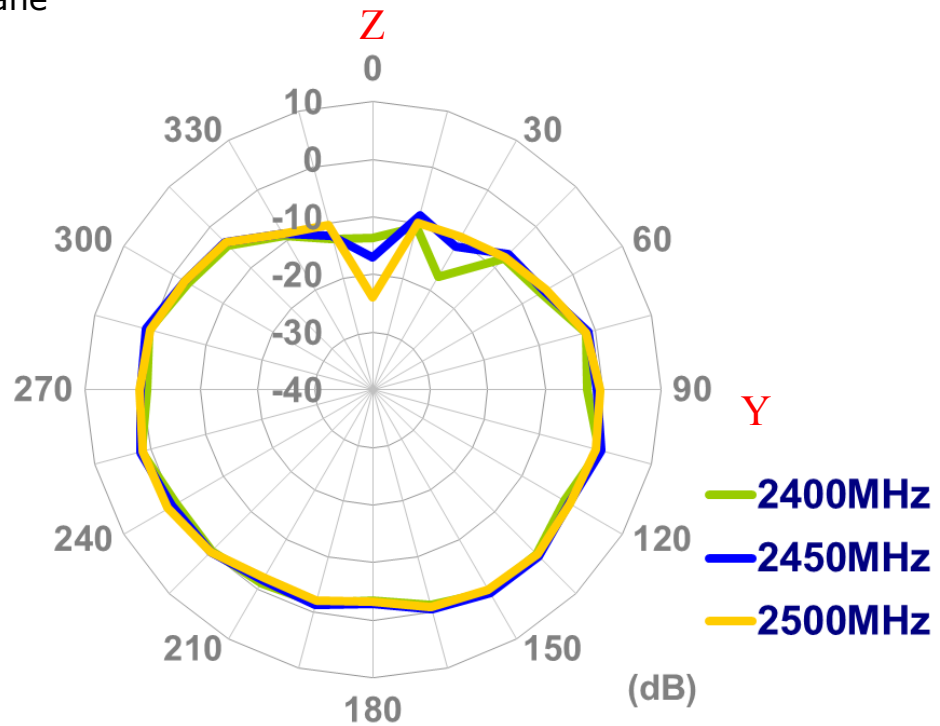
XZ Plane



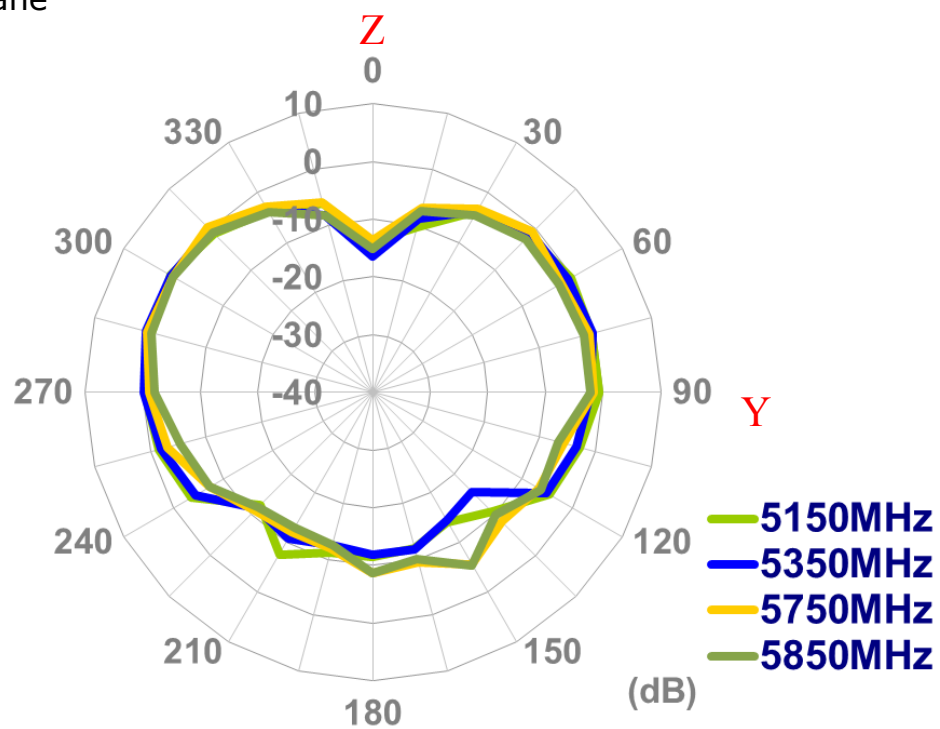
XZ Plane



YZ Plane

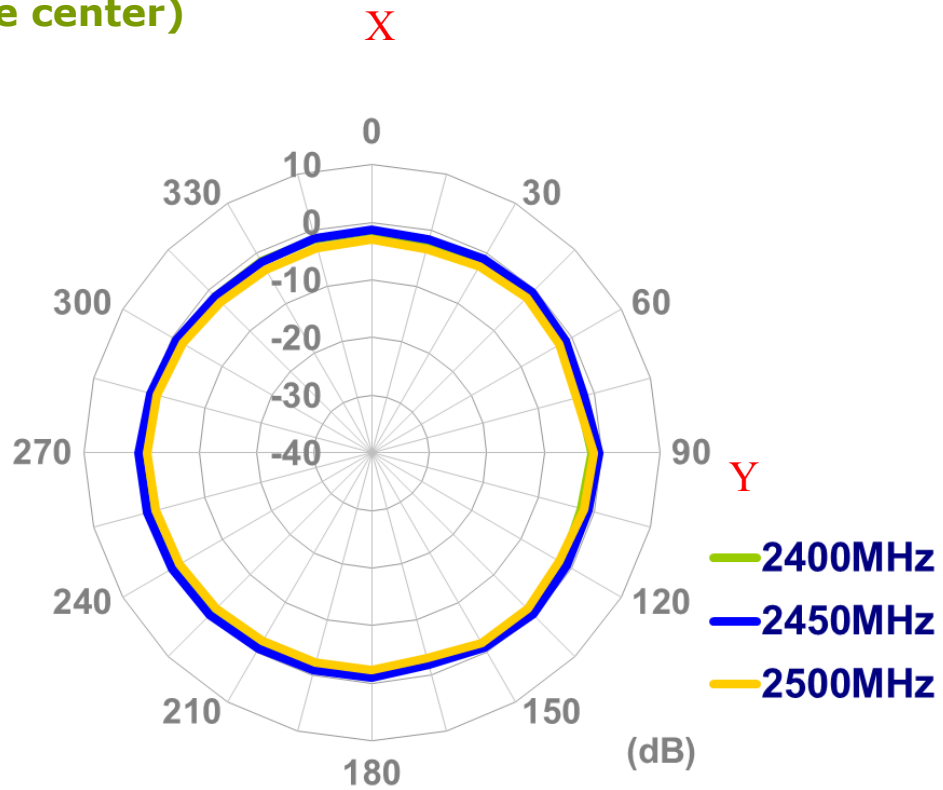


YZ Plane

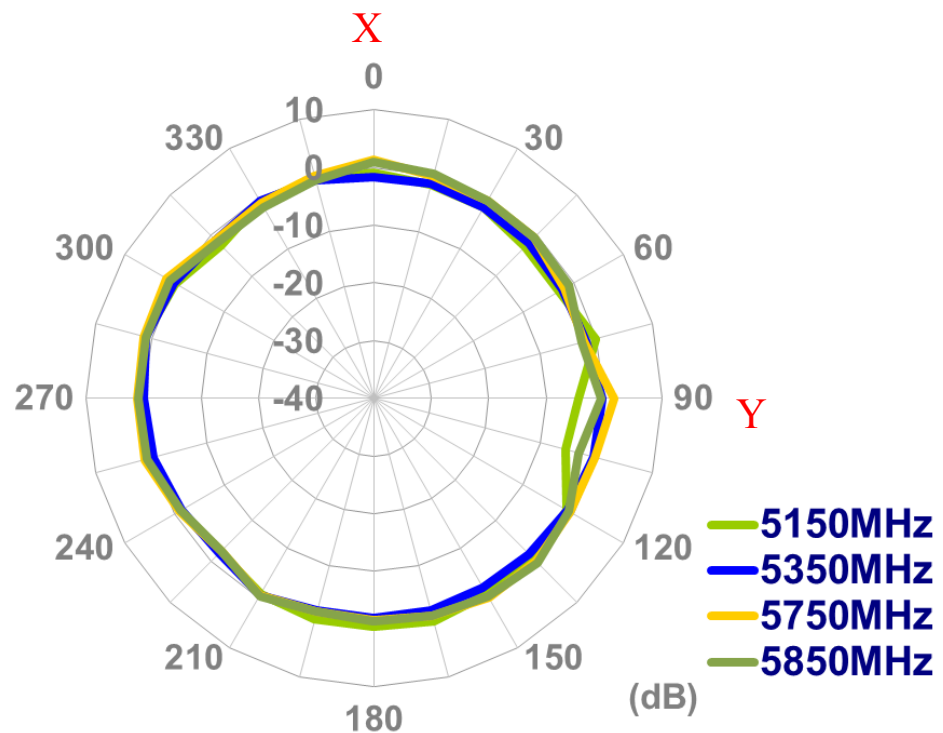


## 4.8 2D Radiation Pattern (Bent position with 30\*30cm ground plane center)

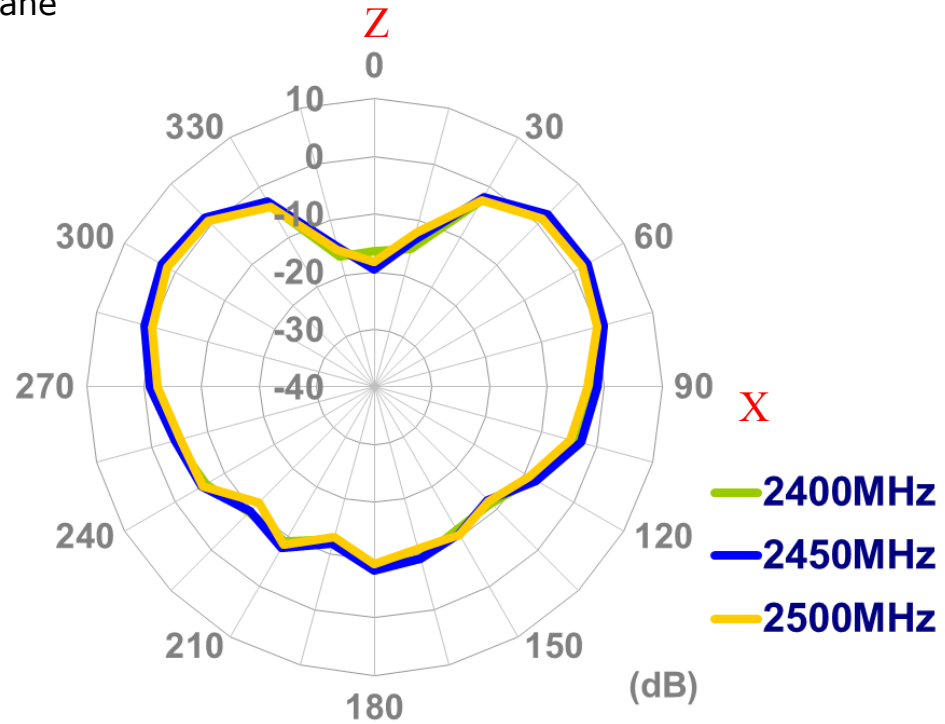
XY Plane



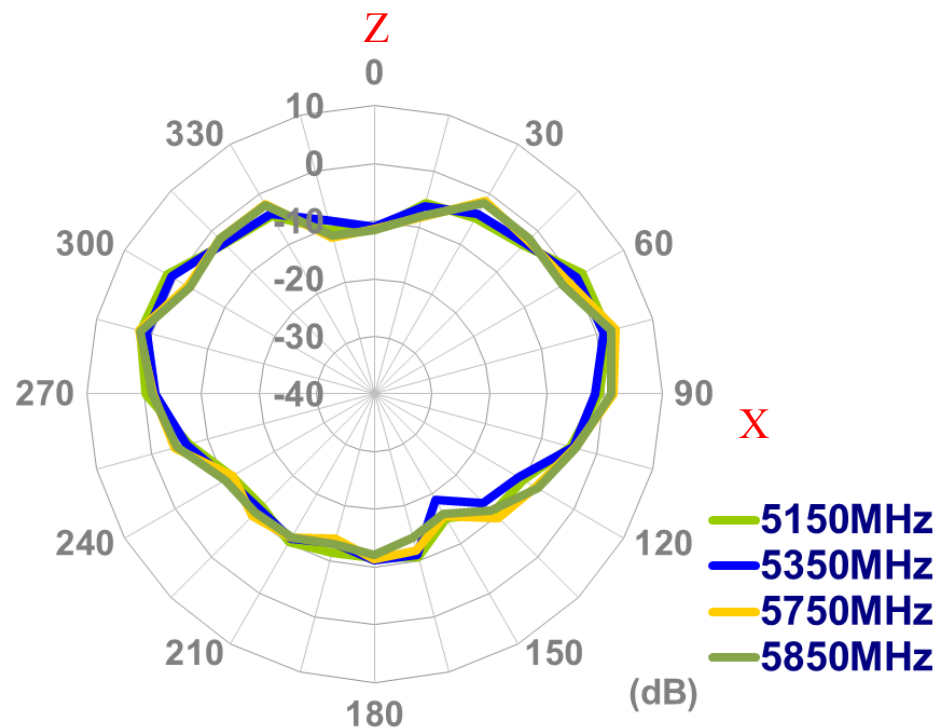
XY Plane



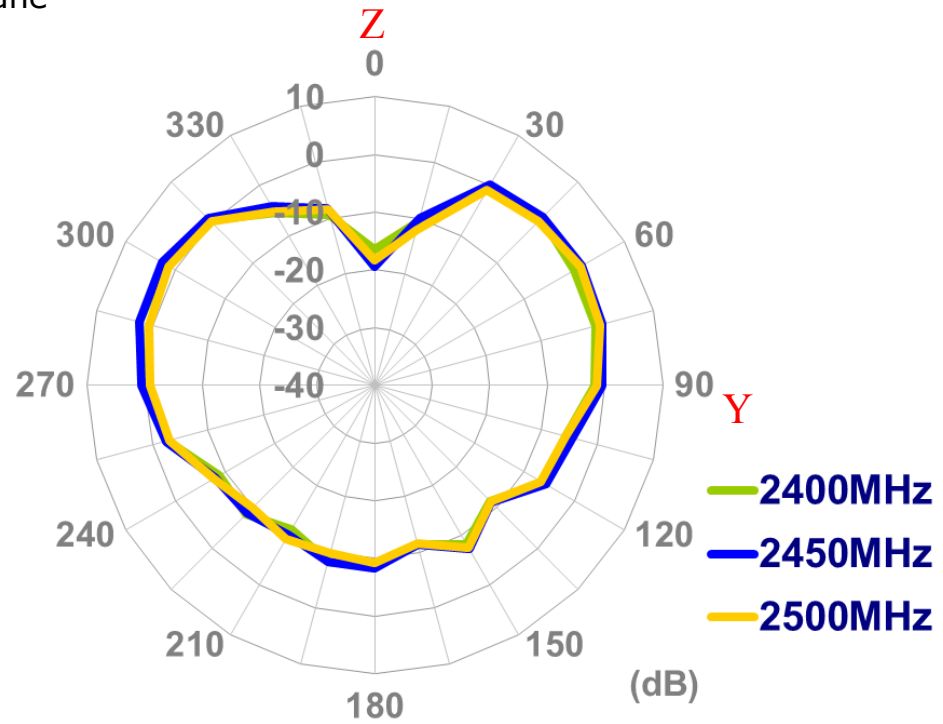
XZ Plane



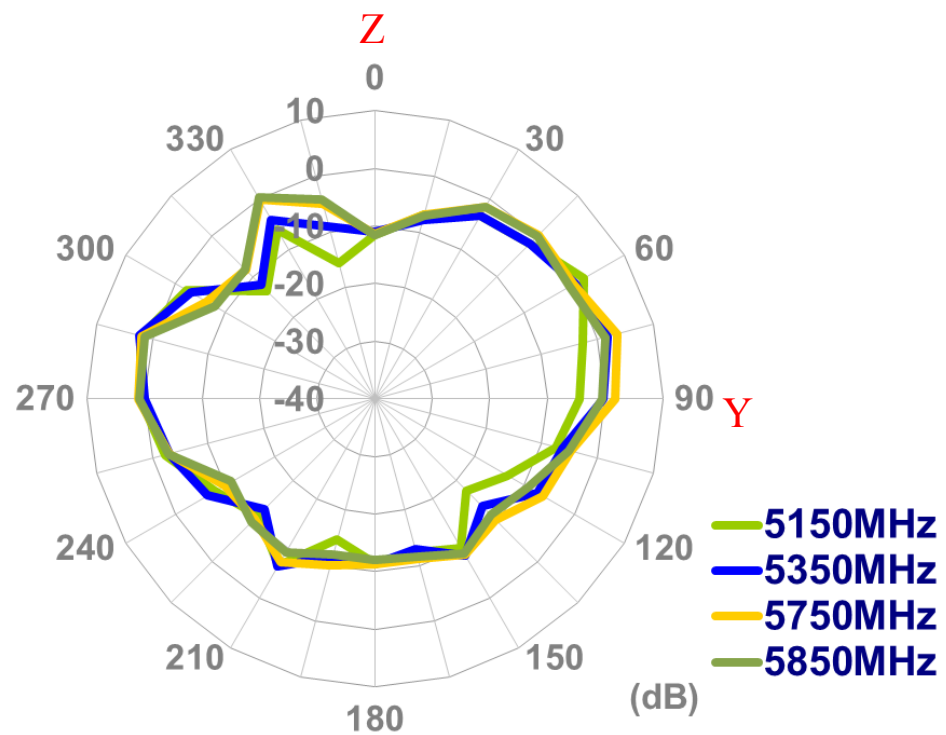
XZ Plane



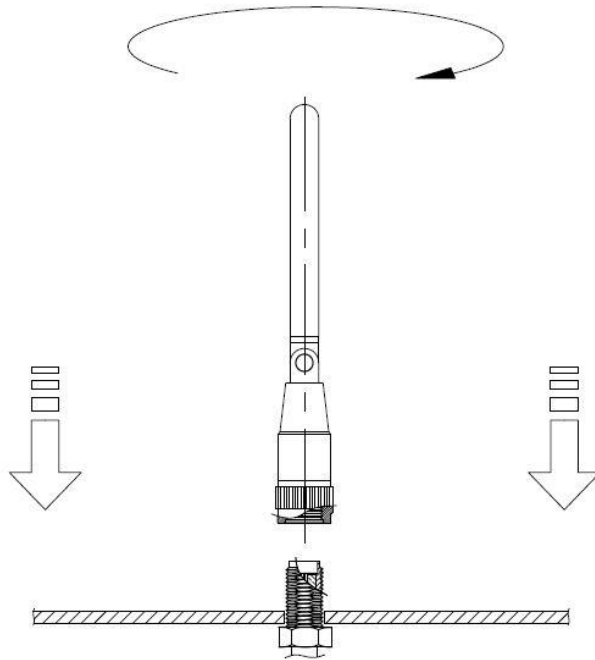
YZ Plane



YZ Plane

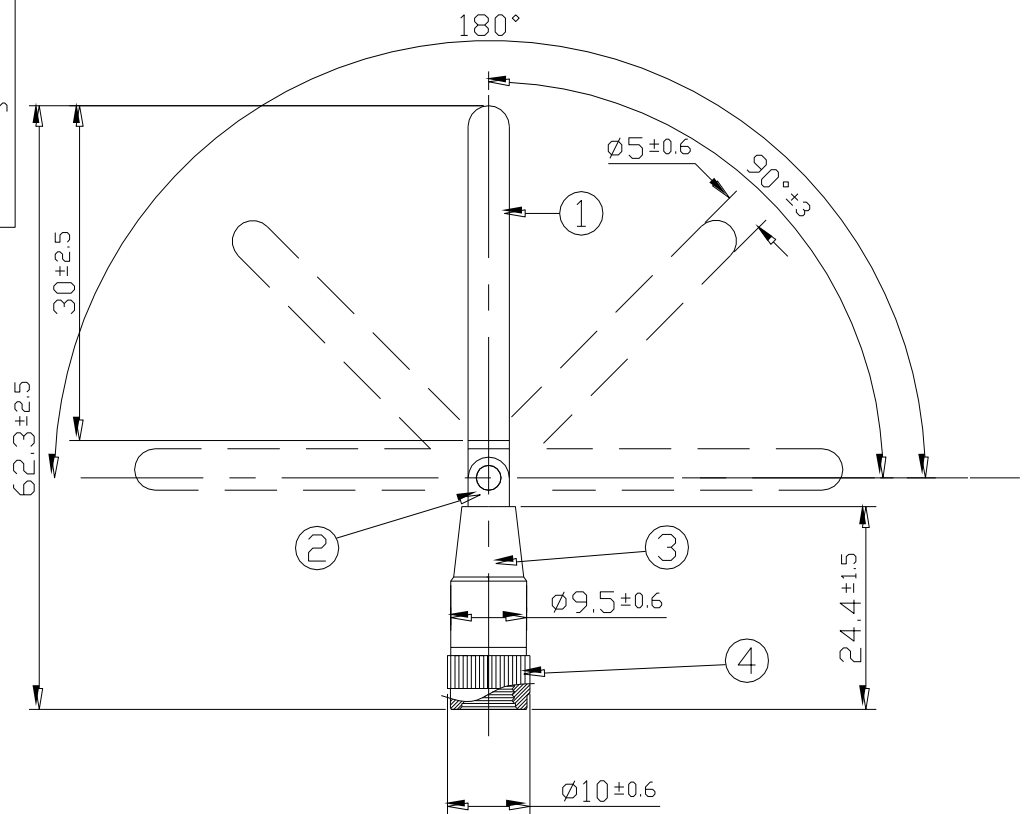
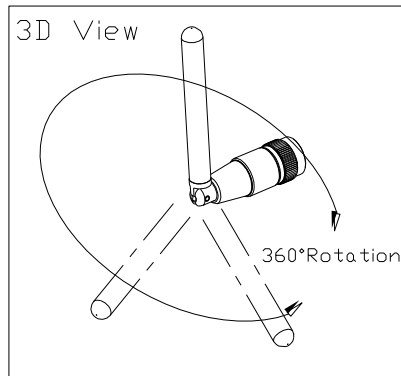


## 5. Installation



Recommended torque for mounting is 0.9 N.m  
Maximum torque for mounting is 1.176 N.m

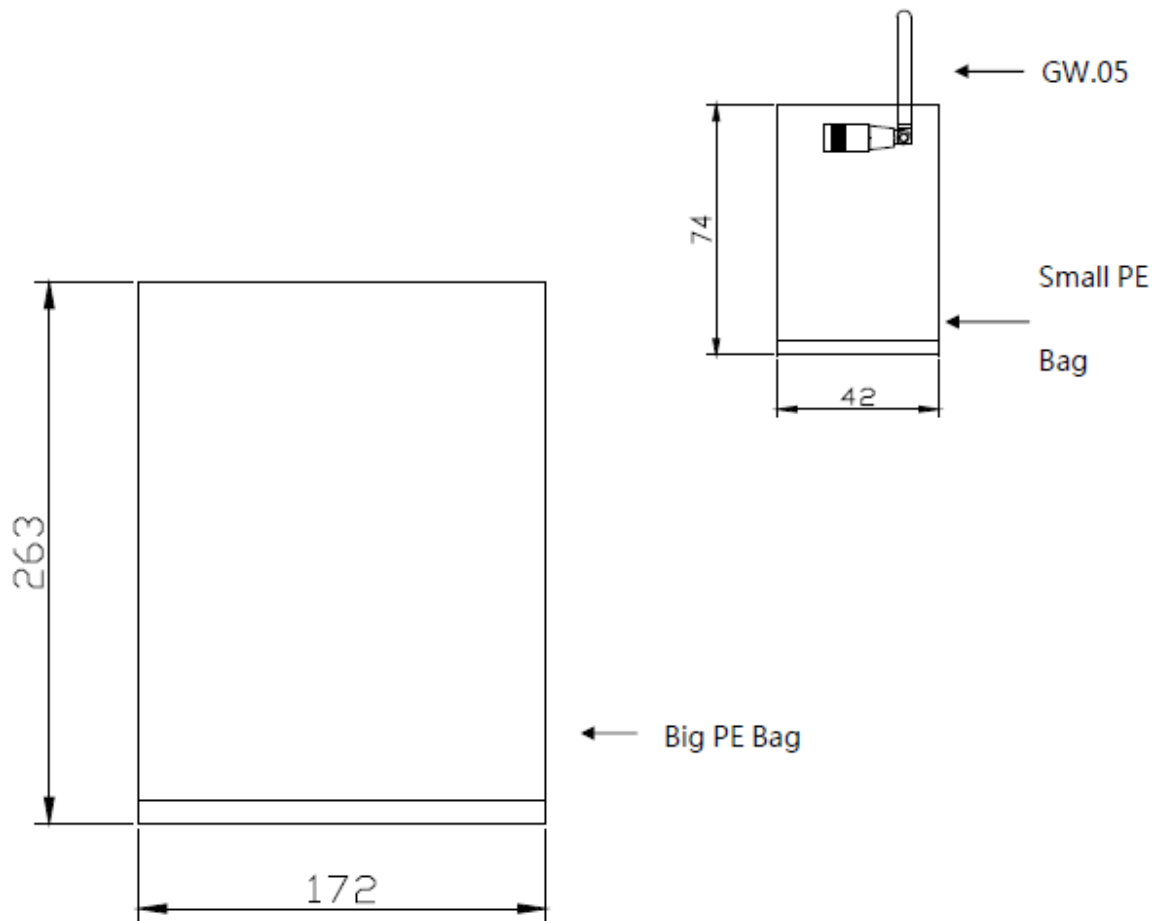
## 6. Mechanical Drawing



|   | Name      | Material | Finish    | QTY |
|---|-----------|----------|-----------|-----|
| 1 | Housing   | POM      | Green     | 1   |
| 2 | Hinge     | Brass    | Ni Plated | 1   |
| 3 | Cap       | POM      | Green     | 1   |
| 4 | SMA(M) RP | Brass    | Ni Plated | 1   |



## 7. Packaging



1 piece per small PE Bag, 100 small bags per big PE bag.