



# TAOGLAS®



## Datasheet

### Apex III

**Part No:**  
**TG.45.8113**

#### **Description:**

Apex III Ultra-Wideband 5G/4G Dipole Terminal Antenna with 450MHz band  
90° Hinged R/A SMA(M) Connector

#### **Features:**

- Highest efficiency for 450-6000MHz
- Fully 5G/4G Operational
- Dipole Swivel Terminal Antenna
- Hinged 90° termination with SMA(M) Connector
- Enhanced hinge design for vibration environments
- Dimensions: 218 \* 58mm
- Connector Customizable
- RoHS & Reach Compliant

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## 1. Introduction



The Apex III TG.45 is a Wideband 5G/4G Dipole Antenna has been designed to cover all Cellular (including 5G), ISM and Wi-Fi working frequencies in the 450 to 6000MHz spectrum and includes 5G/4G Band 31 at 450MHz. Evolved from the already highly successful Apex II TG.35, the TG.45 has the highest wideband efficiency in its range of any terminal antenna on the market today. The extended lower frequency coverage at 450MHz makes the TG.45 ideal for IoT applications, such as remote monitoring of smart utilities.

The Apex III has been primarily designed for use with 5G/4G modules and devices that require the highest possible efficiency and peak gain to deliver best in class throughput on all major worldwide cellular bands (5G/4G/3G/2G) for access points, terminals and routers. High efficiency is vital for applications such as high speed video and real-time streaming or high capacity MIMO networks on public transportation.

This attractive slim-line antenna is ground plane independent, meaning it does not need to be connected to the ground-plane of a device to radiate efficiently. On the other hand, neither is it seriously detuned by connecting to a ground-plane, thus avoiding a problem notorious to smaller antennas.

It comes with a SMA(M) connector and swivel mechanism that allows the antenna to be rotated to fit in tight environments. The 90° hinge structure has been improved and strengthened so that the antenna in a 90° position would not drop down if used in environments prone to vibration.

The Apex III is backward compatible with 3G and 2G cellular applications such as HSPA, GSM, GPRS, UMTS, Wi-Fi and even has GPS included for Assisted GPS and/or E911 applications.

In summary, the Apex III is the ideal solution for any device requiring high, reliable performance. It will meet most type approval or carrier certification requirements from an efficiency standpoint. The antenna also makes an excellent reference antenna for test purposes. It has been designed as an omni-directional antenna and the radiation patterns prove this, being stable across all bands. Connector type is customizable and the housing is also available in white. Contact Taoglas regional customer support team for more information.

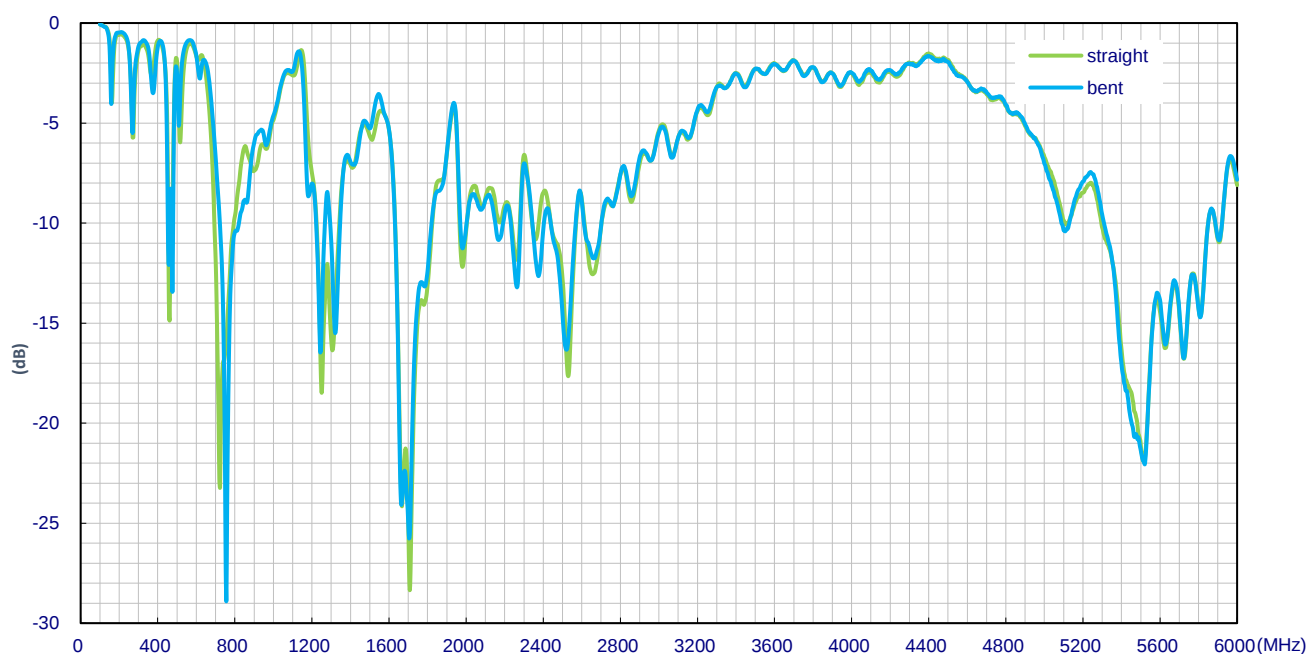
## 2. Specifications

| Electrical                      |                 |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
|---------------------------------|-----------------|------------|----------------------------|-------------|-----------------------|------------|------------|-----------------|--------------|------------|------------|-----------------------|----------------|
| Frequency (MHz)                 | LTE450          | 5G NR Band | LTE700                     | GSM 850/900 | 5G NR Band 74, 75, 76 | GNSS       | Band 3,9   | Band 2,25,35,39 | Band 1,23,66 | LTE 2300   | LTE 2600   | 5G NR Band 77, 78, 79 | LTE5200 /Wi-Fi |
|                                 | 450 ~470        | 617 ~698   | 698 ~806                   | 824 ~960    | 1427 ~1518            | 1561 ~1602 | 1710 ~1880 | 1850 ~1990      | 1920 ~2170   | 2305 ~2360 | 2490 ~2690 | 3300 ~3800            | 5150 ~5925     |
| Efficiency (%)                  |                 |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Straight                        | 64.47           | 40.05      | 74.08                      | 70.23       | 54.43                 | 29.65      | 71.46      | 57.68           | 64.54        | 58.02      | 65.96      | 27.86                 | 61.35          |
| Bent                            | 60.92           | 45.93      | 75.72                      | 59.04       | 55.49                 | 30.10      | 72.00      | 57.09           | 64.21        | 55.38      | 65.54      | 27.72                 | 61.37          |
| Peak Gain (dBi)                 |                 |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Straight                        | 1.46            | -0.92      | 2.87                       | 3.42        | 1.1                   | 0.75       | 3.95       | 4.17            | 4.85         | 2.82       | 4.16       | 0.46                  | 3.88           |
| Bent                            | 1.17            | -0.37      | 2.77                       | 2.8         | 0.57                  | 0.56       | 2.82       | 3.63            | 4.57         | 2.50       | 3.76       | -0.08                 | 4.24           |
| Average Gain (dB)               |                 |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Straight                        | -1.93           | -4.41      | -1.36                      | -1.19       | -2.66                 | -5.39      | -1.47      | -2.53           | -2.05        | -2.42      | -1.84      | -5.69                 | -2.17          |
| Bent                            | -2.16           | -3.86      | -1.23                      | -1.67       | -1.58                 | -5.31      | -1.43      | -2.58           | -2.07        | -2.61      | -1.88      | -5.71                 | -2.16          |
| Impedance                       | 50Ω             |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Polarization                    | Linear          |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Radiation Pattern               | Omnidirectional |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Max. input power                | 5 W             |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Mechanical                      |                 |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Casing                          |                 |            | UV Resistant PC/ABS        |             |                       |            |            |                 |              |            |            |                       |                |
| Connector                       |                 |            | SMA Male Hinged 90°        |             |                       |            |            |                 |              |            |            |                       |                |
| Weight                          |                 |            | 75g                        |             |                       |            |            |                 |              |            |            |                       |                |
| Recommended Torque for Mounting |                 |            | 0.9N·m                     |             |                       |            |            |                 |              |            |            |                       |                |
| Max torque for Mounting         |                 |            | 1.176N·m                   |             |                       |            |            |                 |              |            |            |                       |                |
| Environmental                   |                 |            |                            |             |                       |            |            |                 |              |            |            |                       |                |
| Temperature Range               |                 |            | -40°C to 85°C              |             |                       |            |            |                 |              |            |            |                       |                |
| Humidity                        |                 |            | Non-condensing 65°C 95% RH |             |                       |            |            |                 |              |            |            |                       |                |

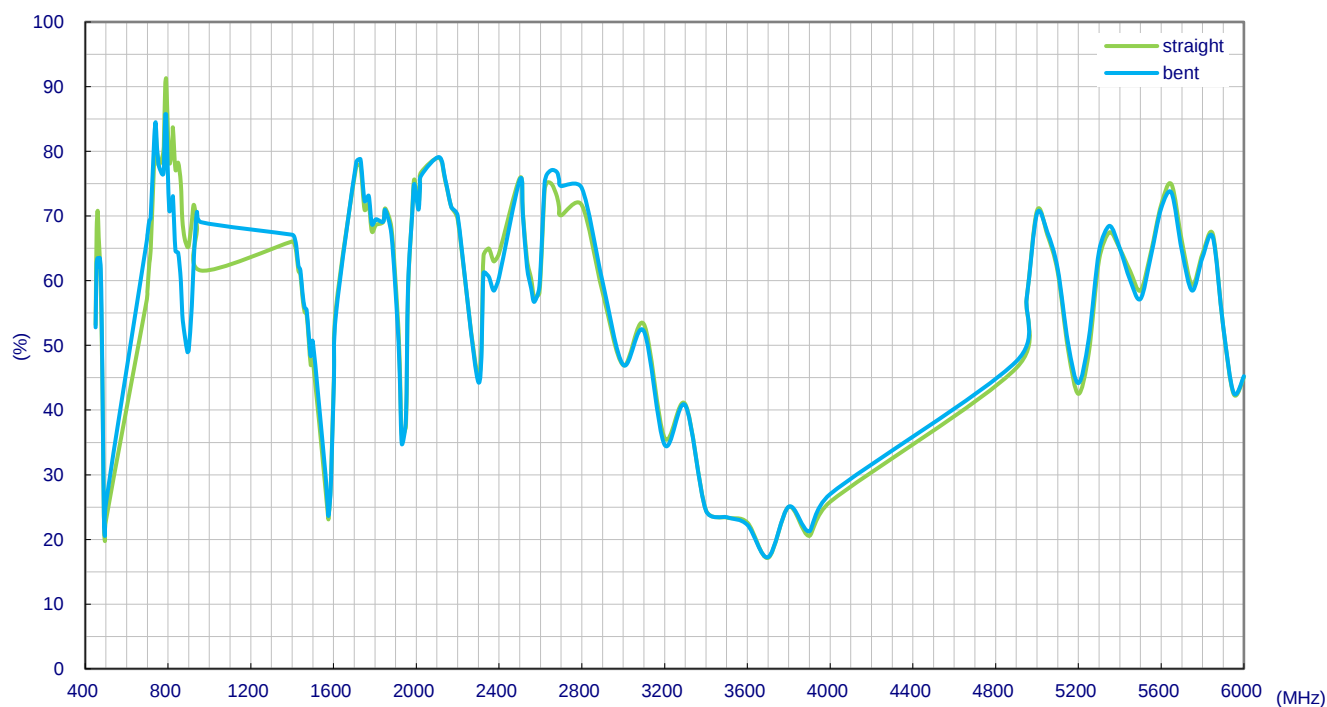
| 5G/4G Bands |                                                                    |                      |         |
|-------------|--------------------------------------------------------------------|----------------------|---------|
| Band Number | 5G NR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA |                      |         |
|             | Uplink                                                             | Downlink             | Covered |
| 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         | ✓       |

## 3. Antenna Characteristics

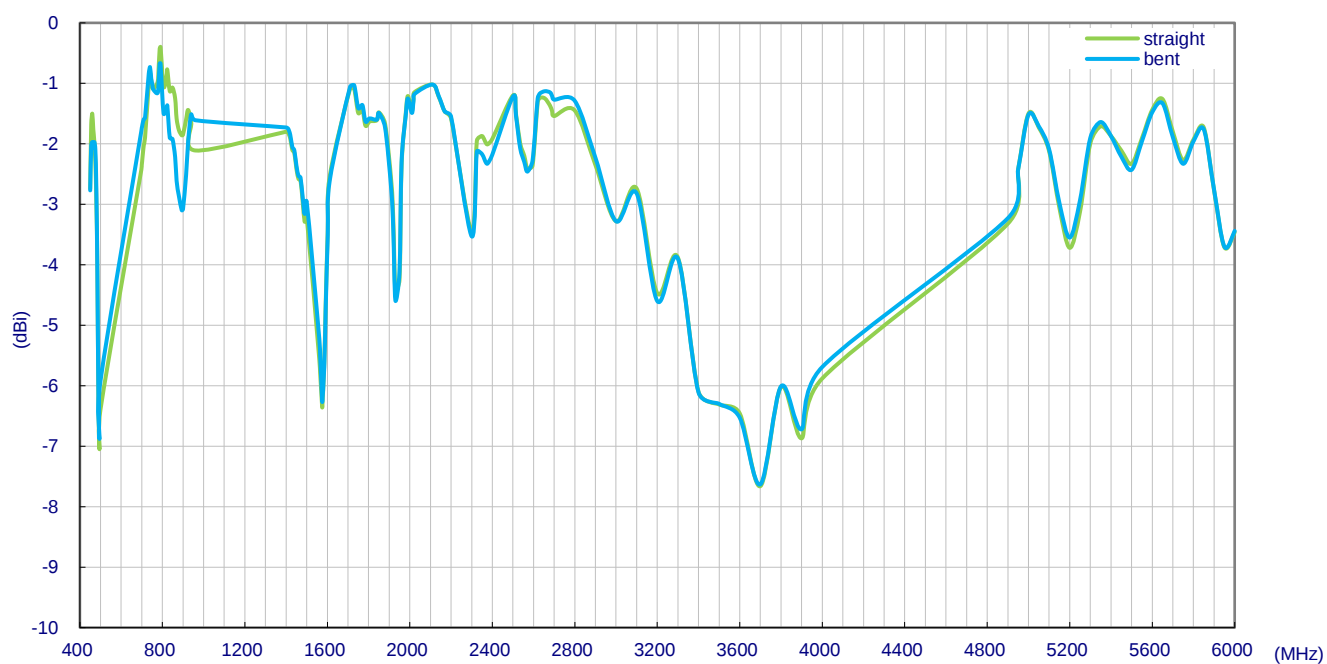
### 3.1 Return Loss



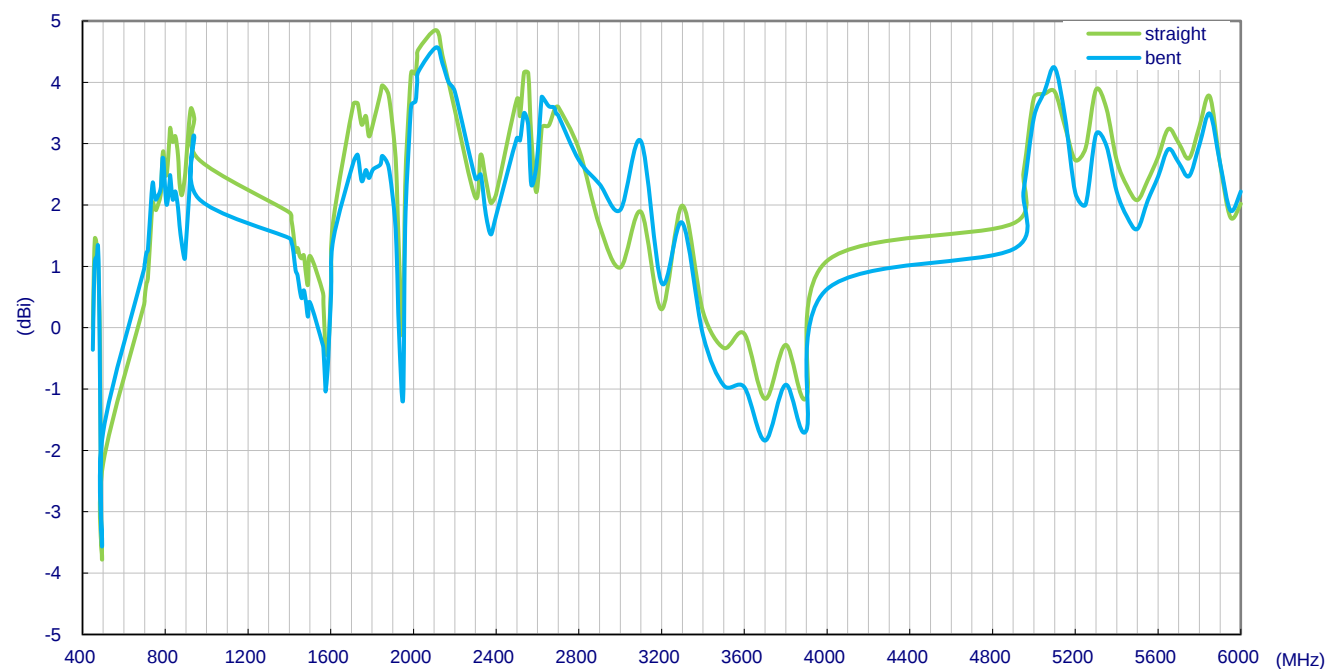
### 3.2 Efficiency



### 3.3 Average Gain

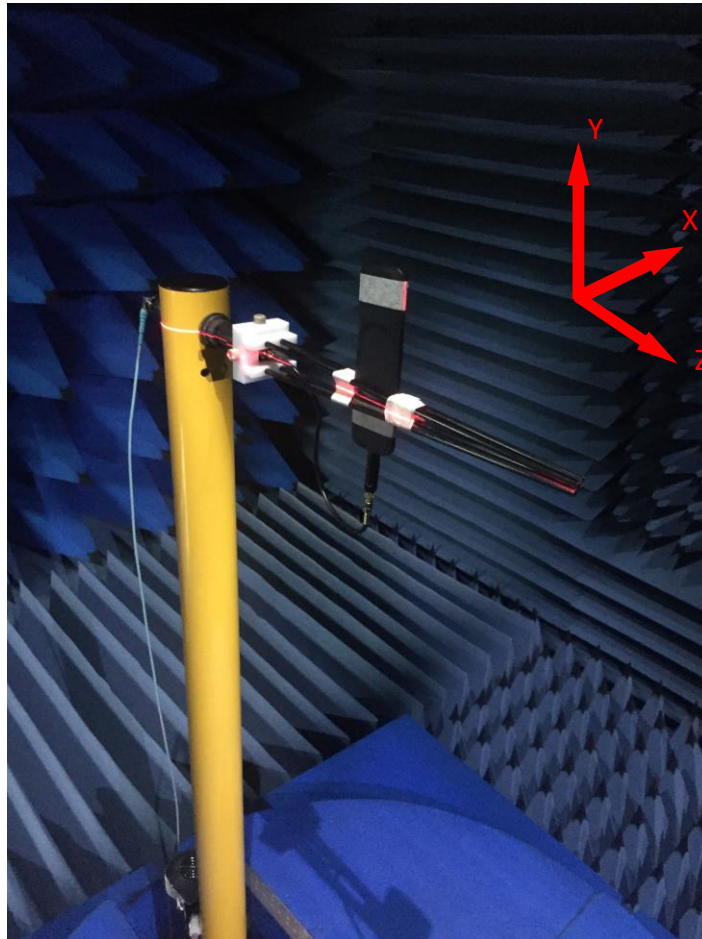


### 3.4 Peak Gain



## 4. Radiation Patterns

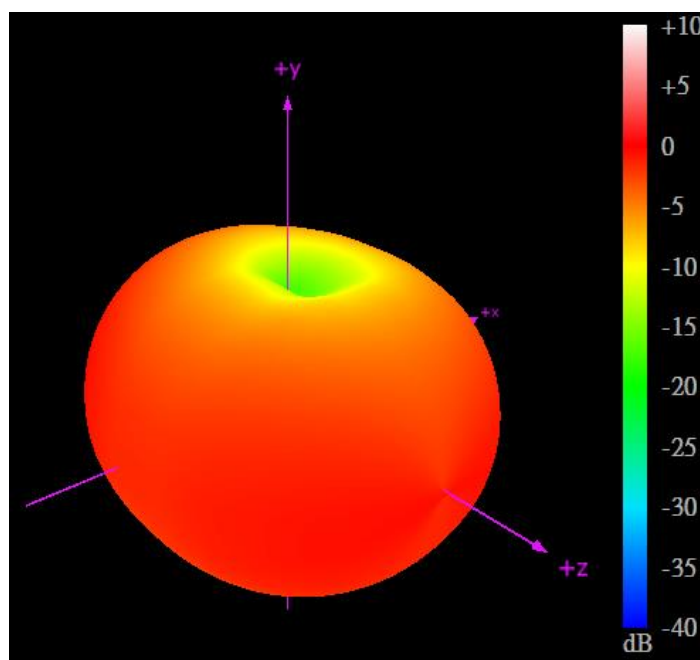
### 4.1 Test Setup



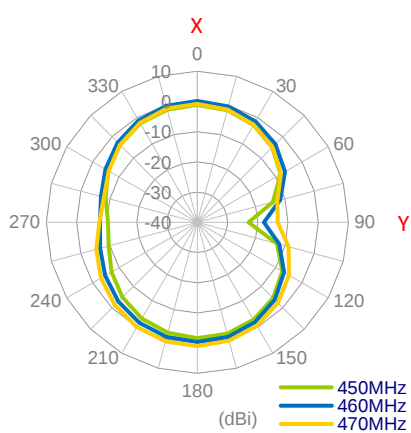
Free space

## 4.2 3D and 2D Radiation Patterns - Straight

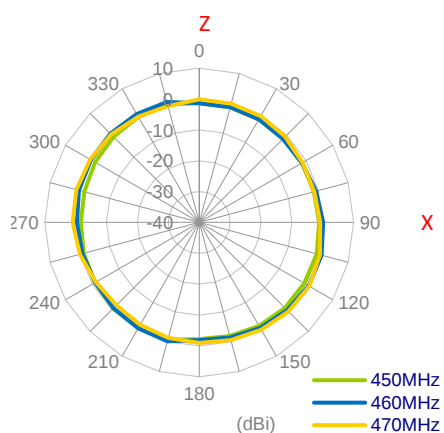
450MHz



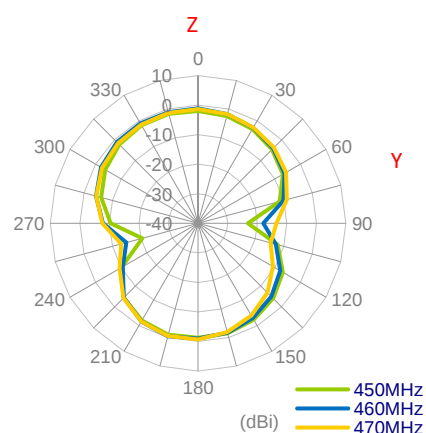
XY Plane



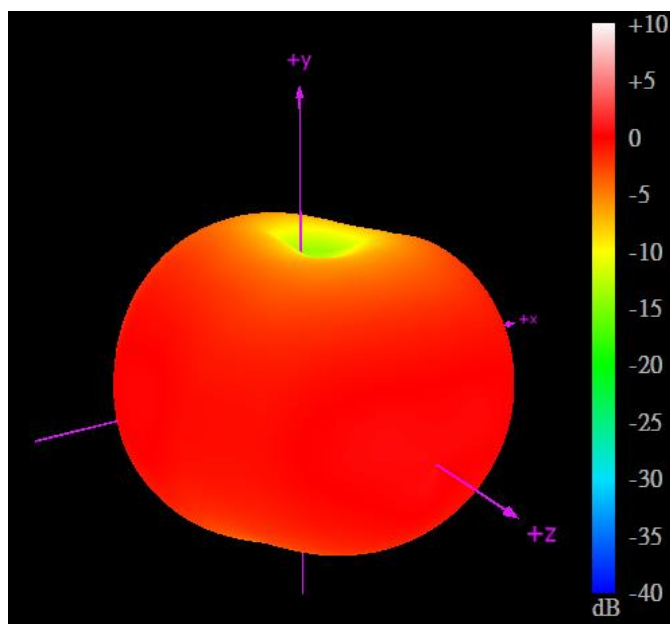
XZ Plane



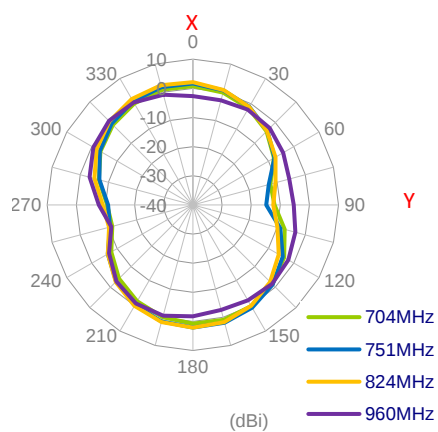
YZ Plane



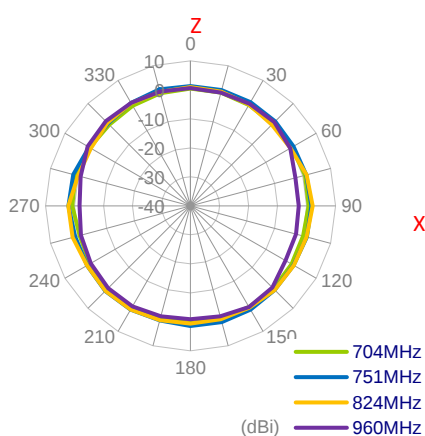
704MHz



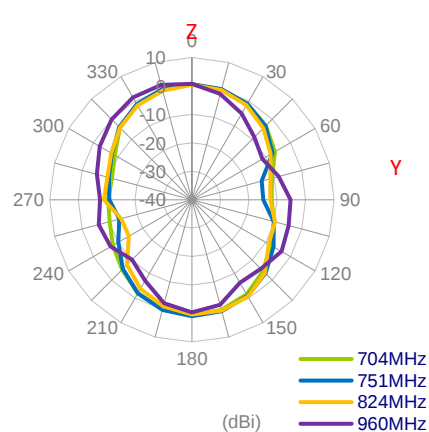
XY Plane



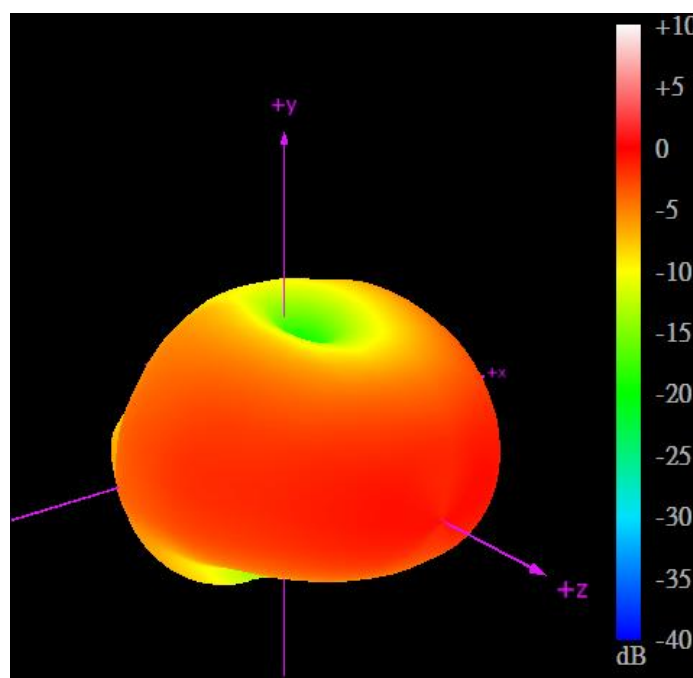
XZ Plane



YZ Plane



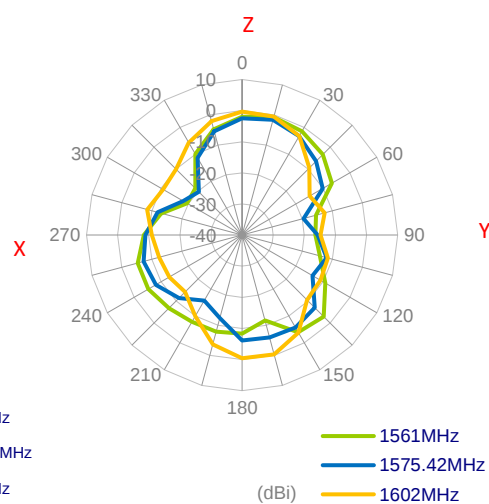
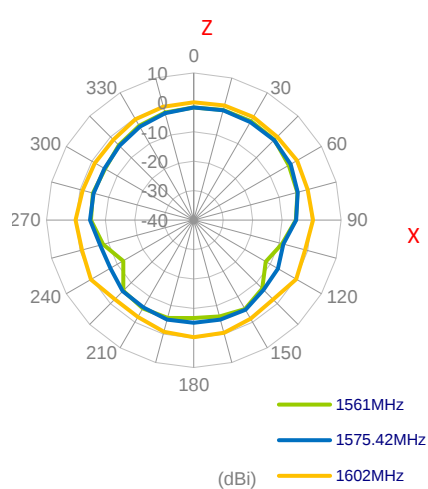
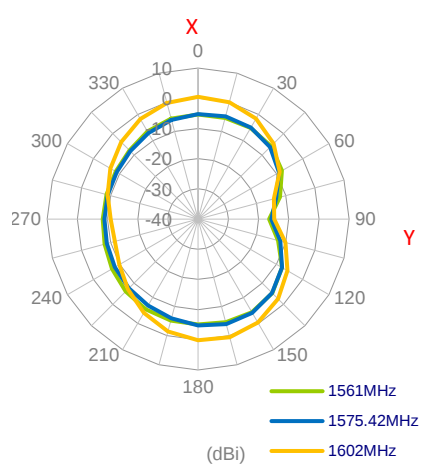
1575.42MHz



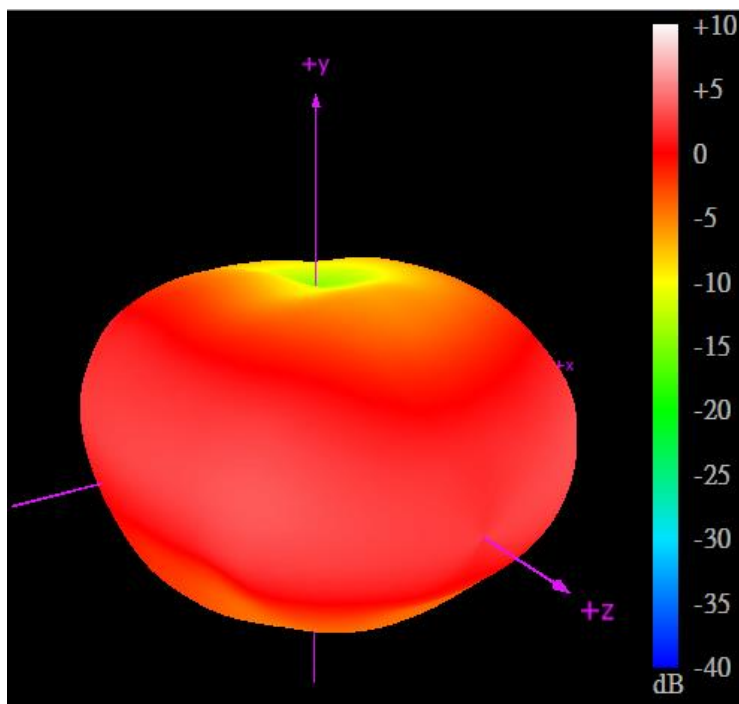
XY Plane

XZ Plane

YZ Plane



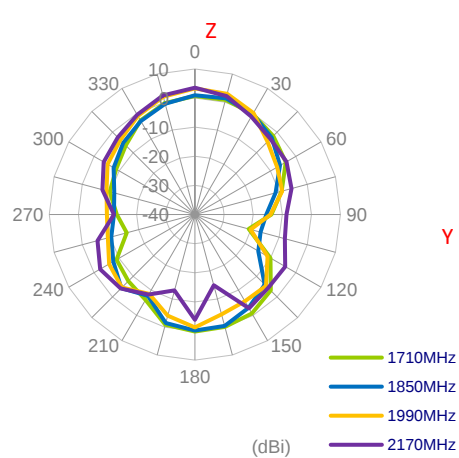
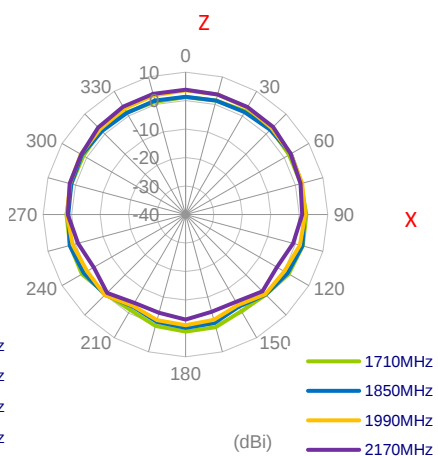
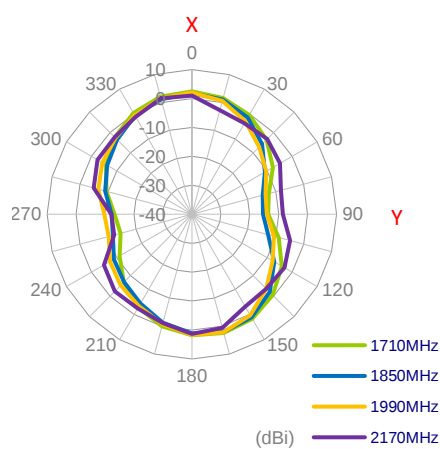
1710MHz



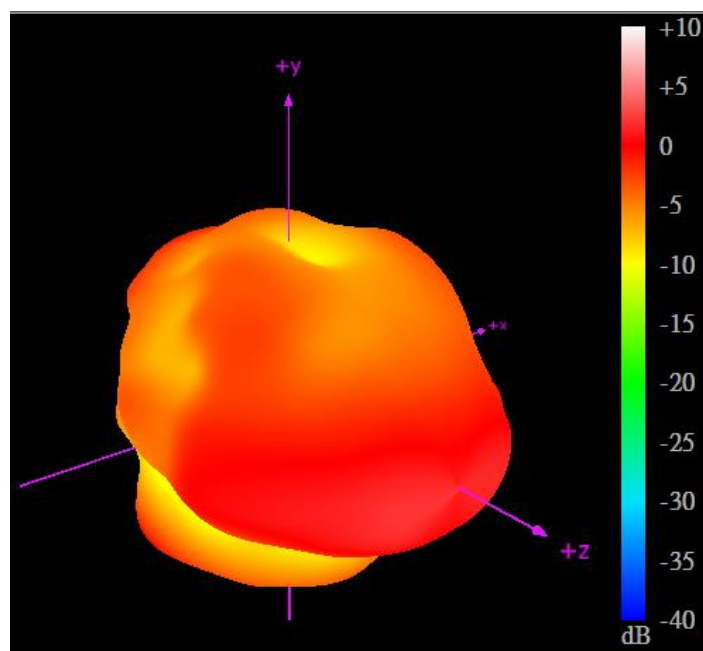
XY Plane

XZ Plane

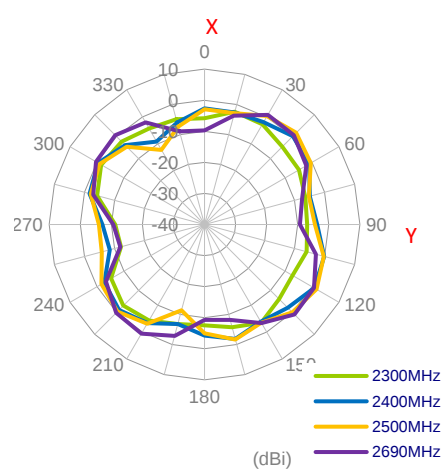
YZ Plane



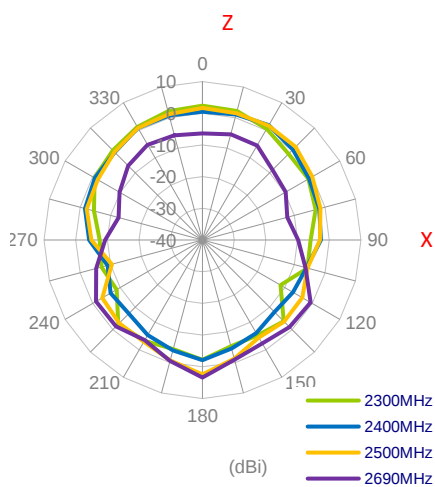
2300MHz



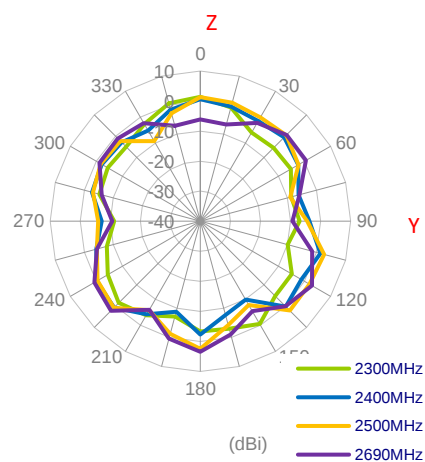
XY Plane



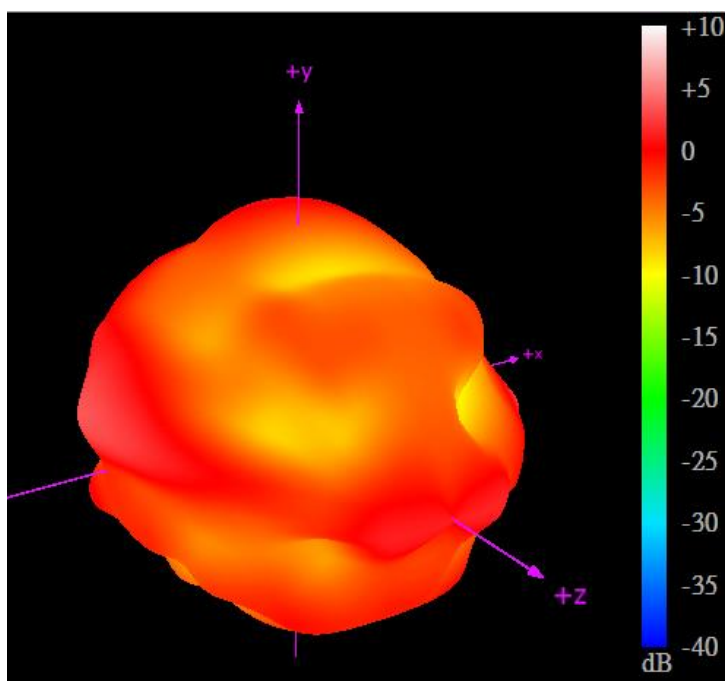
XZ Plane



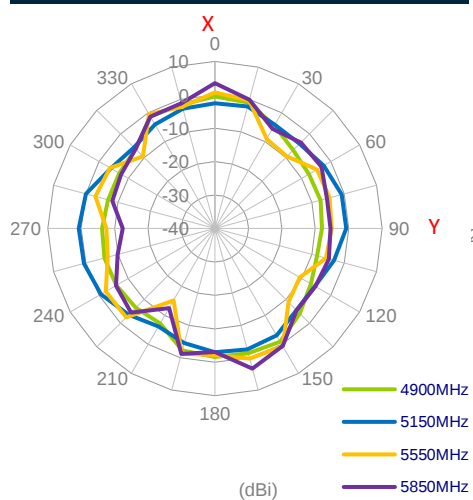
YZ Plane



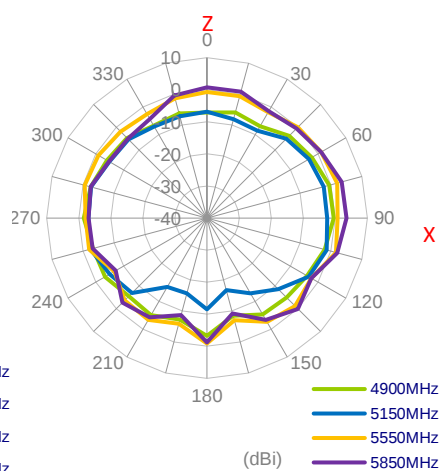
5850MHz



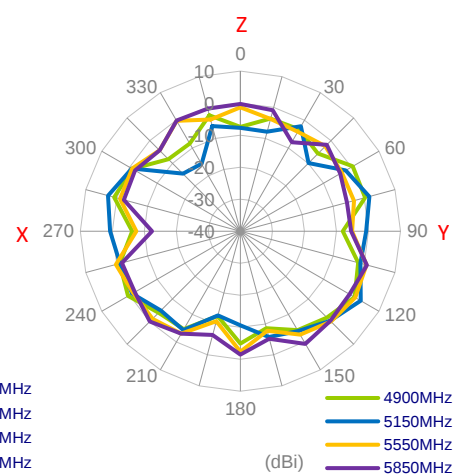
XY Plane



XZ Plane

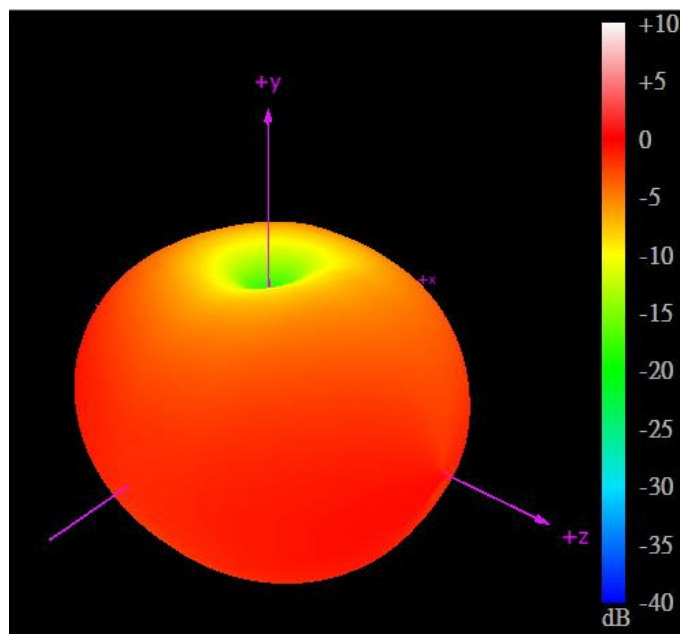


YZ Plane

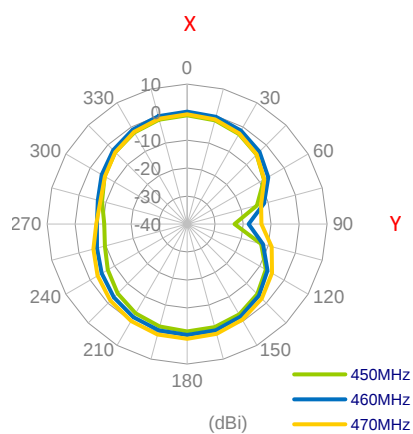


## 4.3 3D and 2D Radiation Patterns - Bent

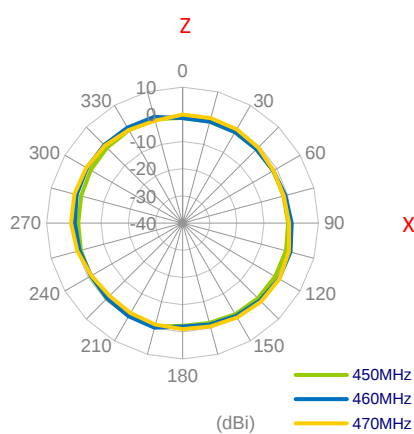
450MHz



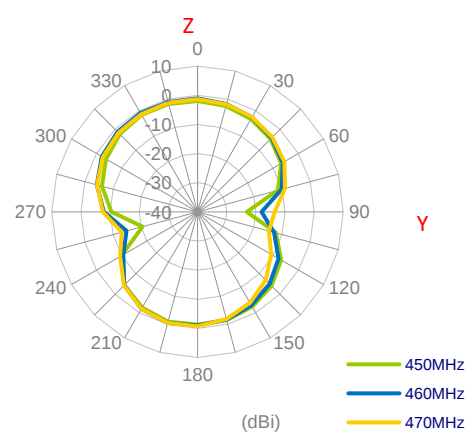
XY Plane



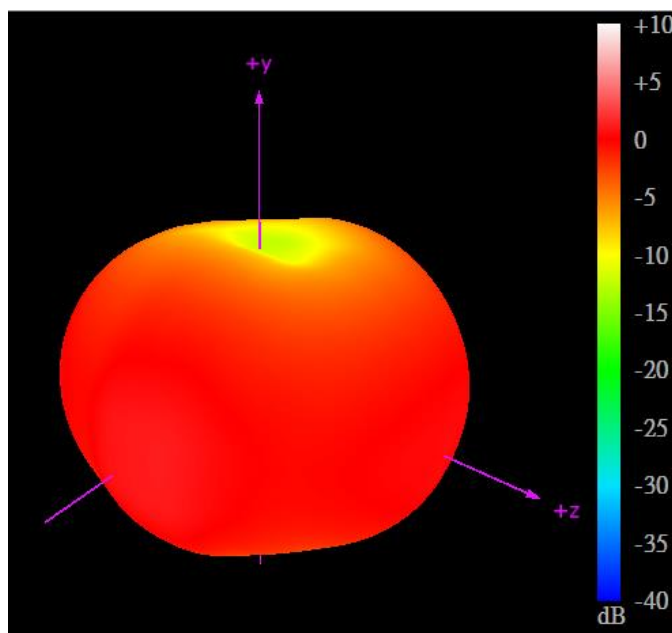
XZ Plane



YZ Plane



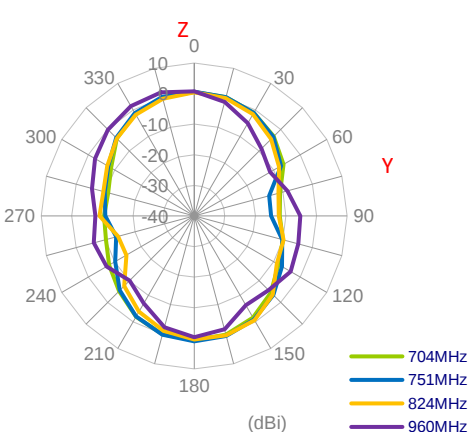
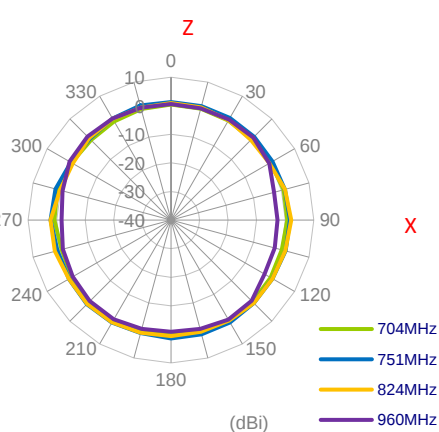
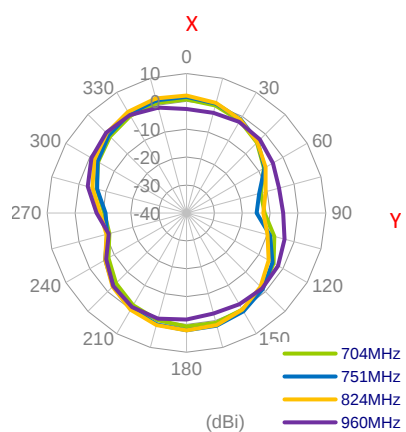
704MHz



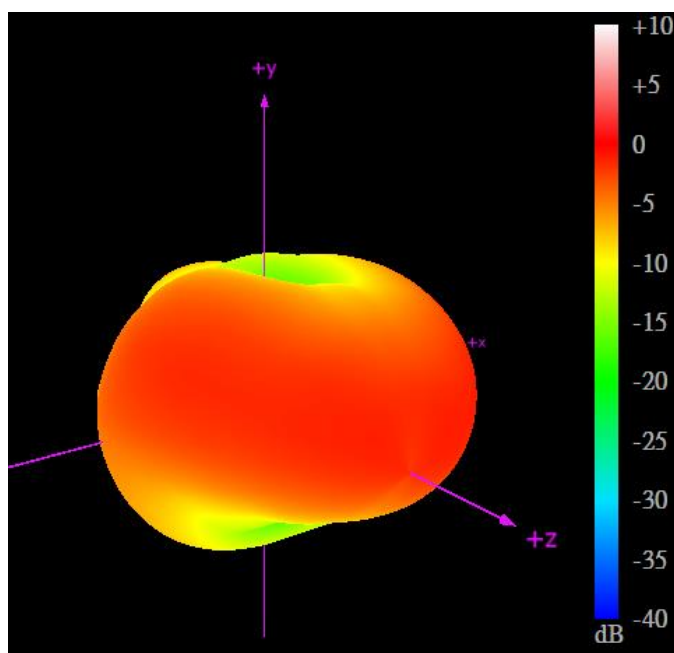
XY Plane

XZ Plane

YZ Plane



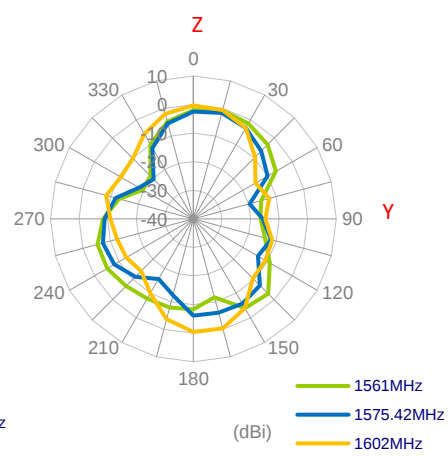
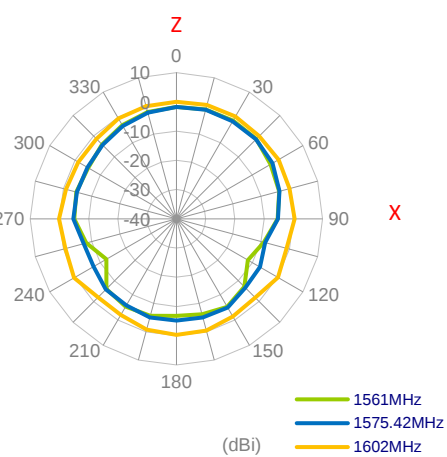
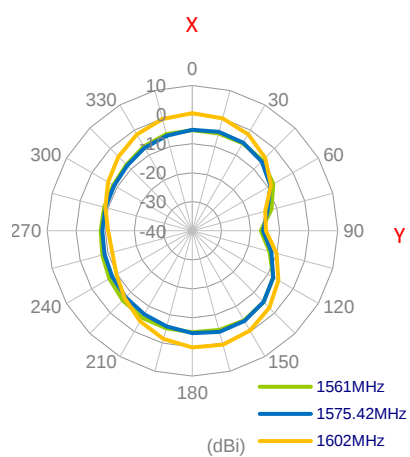
1575.42MHz



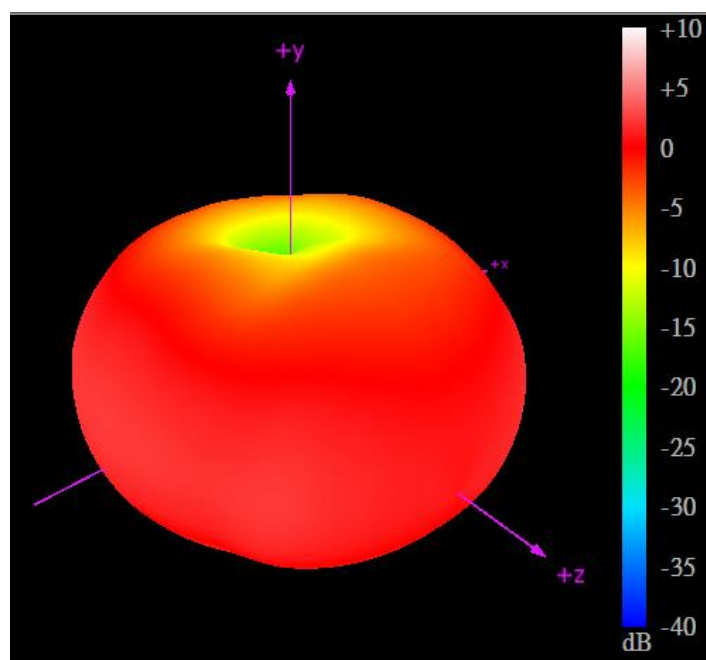
XY Plane

XZ Plane

YZ Plane



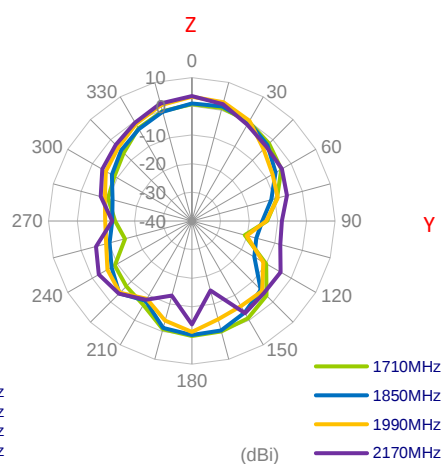
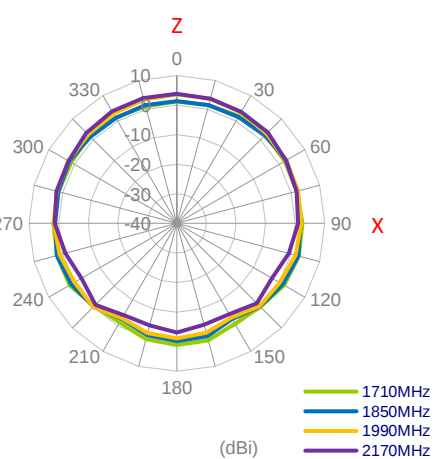
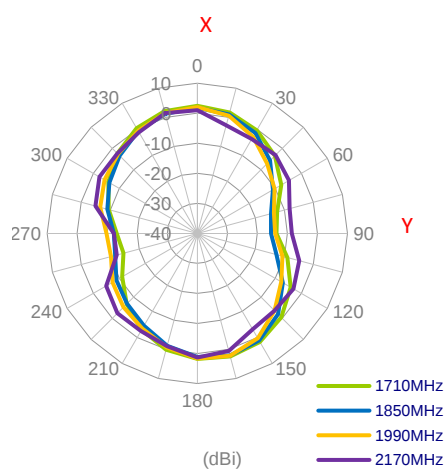
1710MHz



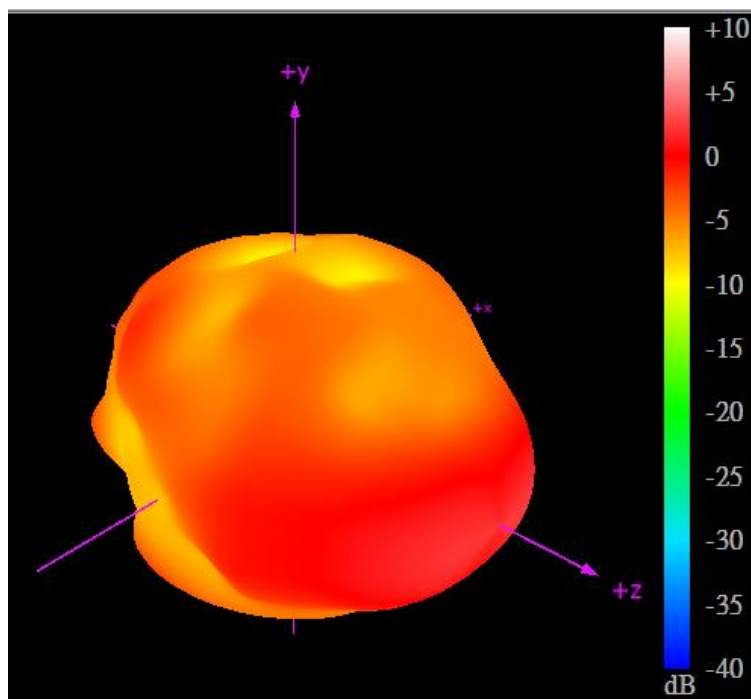
XY Plane

XZ Plane

YZ Plane



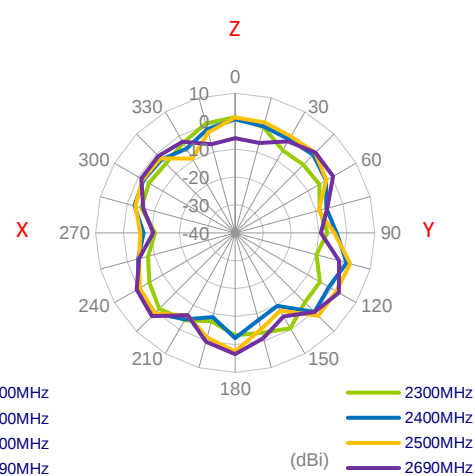
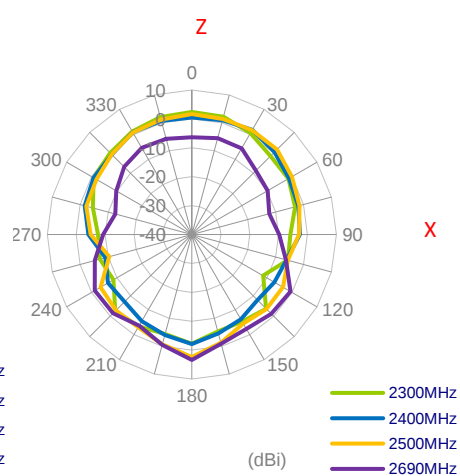
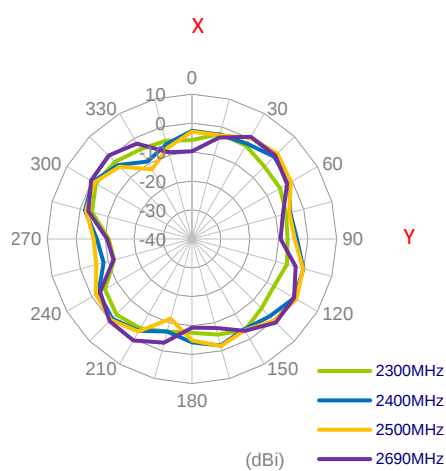
2300MHz



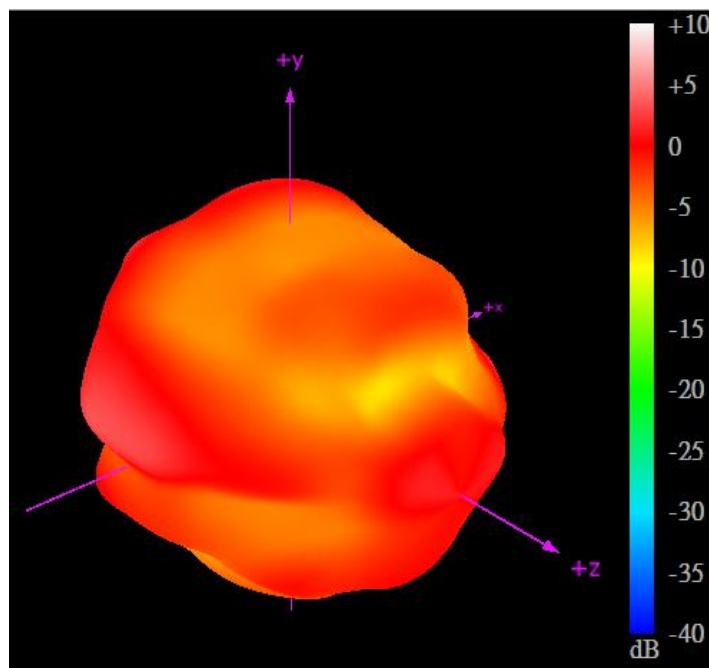
XY Plane

XZ Plane

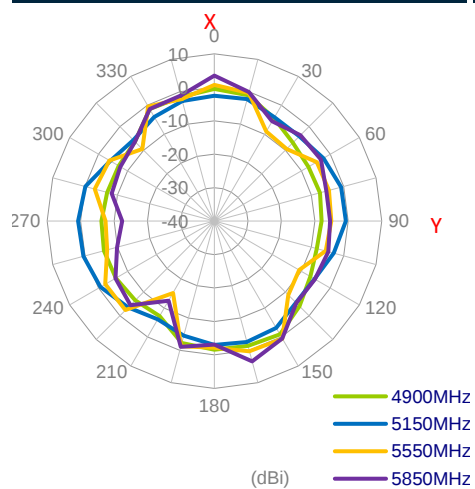
YZ Plane



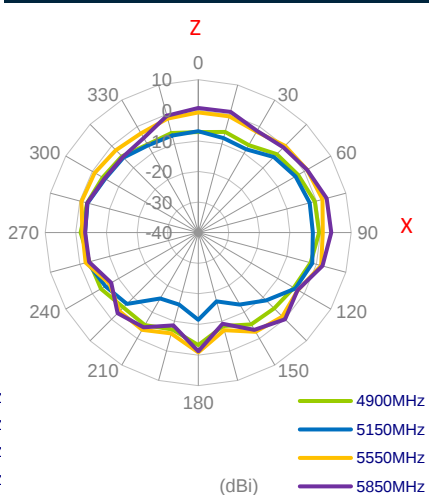
5850MHz



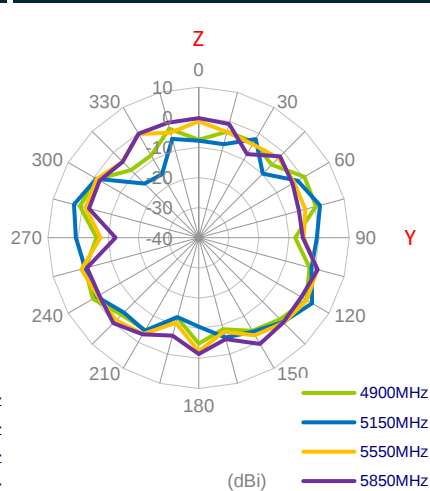
XY Plane



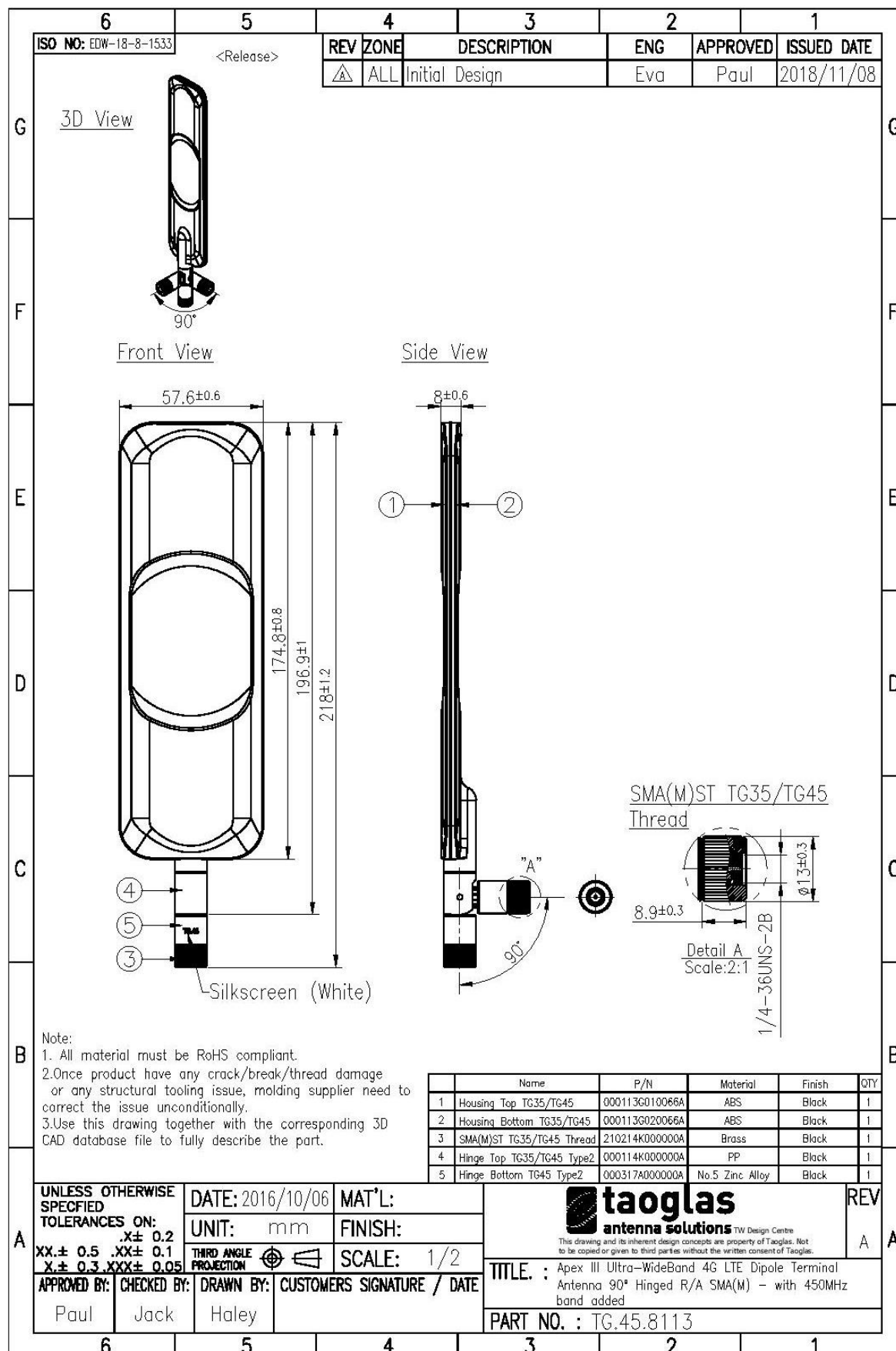
XZ Plane



YZ Plane



## 5. Mechanical Drawing (Units: mm)



## 6. Installation Guide

### TG.35/45 Installation Instructions

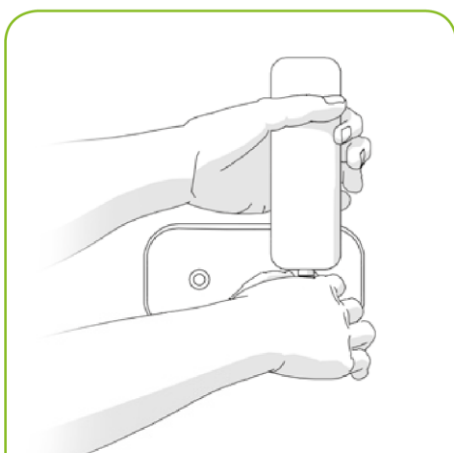
The TG.35/45 antenna has an independent rotating SMA connector, which enables users to install the antenna in a preferable direction. After tightening the SMA connector, the antenna will sit firmly on users' base/router either on a table or on a wall. This installation sheet illustrates using the TG.35/45 on a wall mounted device as an example.

#### Step 1.

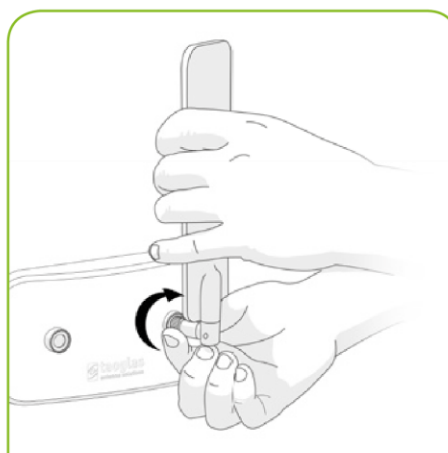
Adjust the antenna to preferable direction, then mount the SMA(M) connector on devices SMA(F) connector. (See figure 1)

#### Step 2.

Hold the antenna housing with one hand, while rotating the SMA(M) connector with the other hand until the connector is tight. If the connector was tightened properly, the antenna will keep its position without slipping down. (See figure 2)



**Figure 1.** Place the TG.35/45 antenna onto the connector of the device and hold the antenna in the preferred orientation.



**Figure 2.** Fix the connector to the device by twisting the rotating head of the SMA connector until it is tight enough to hold the antenna in the correct position.

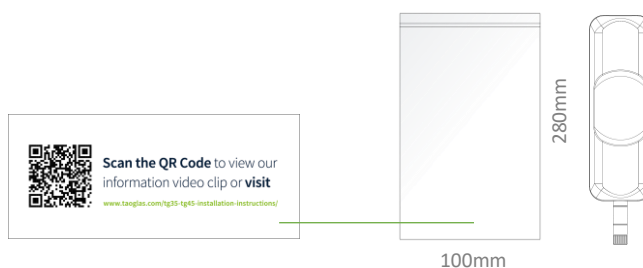
[www.taoglas.com/tg35-tg45-installation-instructions/](http://www.taoglas.com/tg35-tg45-installation-instructions/)

## 7. Packaging

1pc TG.45.8113 per Small PE Bag with Video Link label

Dimensions: 100\*280mm

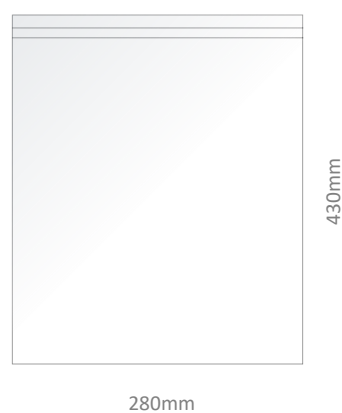
Weight: 73.5g



25pcs per Large PE Bag

Dimensions: 280\*430mm

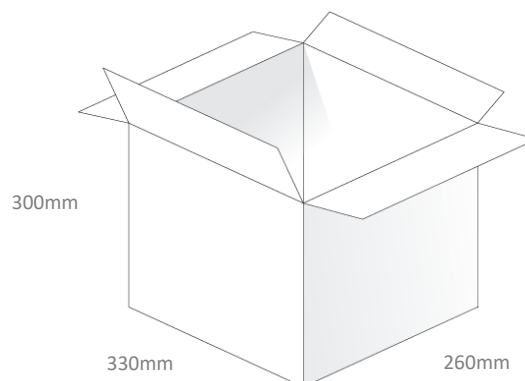
Weight: 1.85Kg



75pcs TG.45.8113 per Carton

Carton Dimensions: 330\*260\*300mm

Weight: 6.1Kg



## Changelog for the datasheet

### SPE-17-8-079 – TG.45.8113

#### Revision: D (Current Version)

|                  |                            |
|------------------|----------------------------|
| Date:            | 2023-10-09                 |
| Changes:         | Updated frequency coverage |
| Changes Made by: | Cesar Sousa                |

#### Previous Revisions

##### Revision: C

|                  |                       |
|------------------|-----------------------|
| Date:            | 2019-10-03            |
| Changes:         | Updated to include 5G |
| Changes Made by: | Jack Conroy           |

##### Revision: B

|                  |                      |
|------------------|----------------------|
| Date:            | 2018-12-18           |
| Changes:         | Introduction Updated |
| Changes Made by: | Jack Conroy          |

##### Revision: A (Original First Release)

|         |                |
|---------|----------------|
| Date:   | 2017-08-10     |
| Notes:  |                |
| Author: | Your Name Here |



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