

## SPECIFICATION

|              |   |                                                                                                                                                                                                                                                                                             |
|--------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Part No.     | : | <b>MA303.A.LB.002</b>                                                                                                                                                                                                                                                                       |
| Product Name | : | MA303 SAUCER Magnetic Mount<br>GPS/GLONASS and Cellular 2G/3G 2in1<br>Combination Antenna                                                                                                                                                                                                   |
| Features     | : | IP65 – Water Resistant<br>- GPS/GLONASS - High gain LNA up to 31dB<br>- Cellular 2G/3G - 850/900/1800/1900/2100 MHz<br>GSM/GPRS/CDMA/PCS/DCS/UMTS/HSPA<br>Low Profile, Robust and Stylish Design<br>Magnetic Mounted<br>58.15mm x 56.2mm x 16.8mm<br>1 meter RG174 SMA(M)<br>RoHS Compliant |



## 1. Introduction

The MA303 SAUCER antenna is a combination small form factor high performance GPS/GLONASS and 2G/3G Cellular GSM/GPRS/CDMA/ PCS/DCS/ WCDMA/UMTS antenna to simplify remote monitoring and fleet management worldwide.

It comes with magnetic mount as standard. An internal O-ring meets IP-65 waterproof standards. With the strongest GPS/GLONASS and Cellular antenna design team in the industry and rigorous testing Taoglas offers guaranteed performance with your system and your environment. A front end SAW helps prevent LNA compression and burn out from nearby high power wireless transmissions. It also reduces radiated spurious emission failures in certification. An integrated strain resist helps prevent cable damage from accidental tension on the cable.

The standard MA303 version comes with 1 metres RG174 cable and SMA(M) connectors for both GPS/GLONASS and Cellular feeds. Cables and connectors are customizable upon request. Due to typical RF losses, 1 metre cable length is optimal, it is not recommended to use longer than 3 metre cables. Contact your regional Taoglas sales office for more details.

### Features

#### GPS/GLONASS

- High LNA Gain up to 31 dB
- Antenna Gain  $28 \pm 2$  dB
- Miniaturized to 56.2 x 16.8 mm
- Low Noise Figure 2.8 dB typ. for GPS  
3.2 dB typ. for GLONASS
- Ultra-Low Power Consumption 7~10mA typ. ( at 3.3V DC)

#### Cellular

- Advanced 2G/3G cellular antenna GSM/GPRS/CDMA/PCS/DCS/WCDMA/UMTS/HSPA
- GSM850: 824~896MHz, GSM900: 880~960MHz,
- DCS: 1710~1880MHz, DCS: 1850~1990MHz
- UMTS/WCDMA/HSPA: 1920~2170MHz

#### Other

- IP65 Water Resistant due to Internal O-Ring Structure
- Quality textured covert design. Low profile.
- ABS housing
- Optional cables and connectors
- ROHS Compliant

## 2. Specification

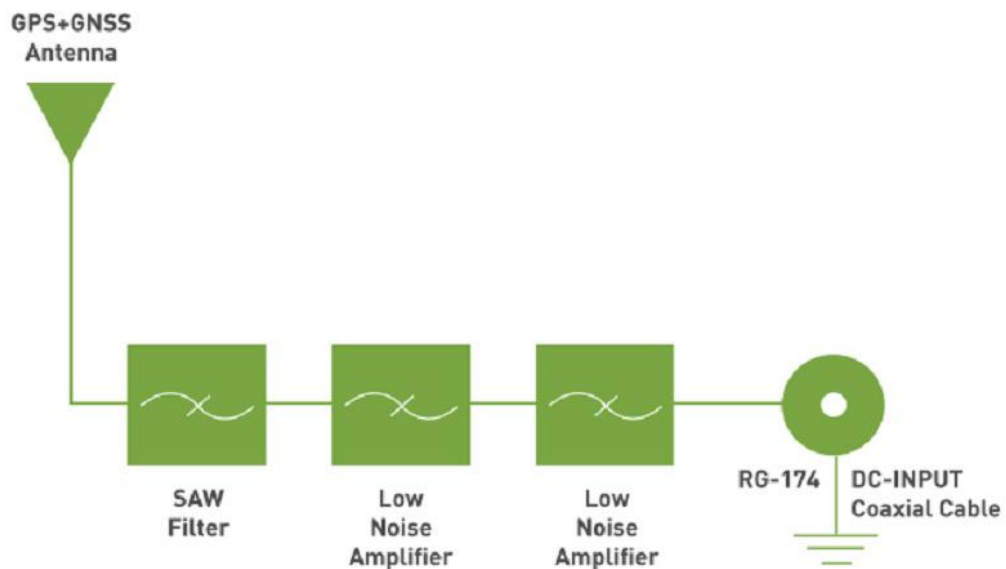
| 2G/3G Antenna             |                                       |         |           |           |                |
|---------------------------|---------------------------------------|---------|-----------|-----------|----------------|
|                           | GSM850                                | GSM900  | DCS       | PCS       | WCDMA I / UMTS |
| Frequency (MHz)           | 824~894                               | 880~960 | 1710~1880 | 1850~1990 | 1920~2170      |
| In Free Space             |                                       |         |           |           |                |
| Peak Gain (dBi) *         | -1.48                                 | -3.01   | 1.36      | 0.94      | 1.04           |
| Average Gain (dBi) *      | -5.21                                 | -6.54   | -3.63     | -4.46     | -4.37          |
| Efficiency (%)*           | 30.75                                 | 22.19   | 43.53     | 35.91     | 36.71          |
| On 30cmX30cm Ground Plane |                                       |         |           |           |                |
| Peak Gain (dBi) *         | -0.08                                 | -0.43   | -1.32     | 0.43      | -0.28          |
| Average Gain (dBi) *      | -6.05                                 | -6.65   | -7.96     | -6.82     | -6.81          |
| Efficiency (%)*           | 25.43                                 | 22.10   | 16.03     | 21.58     | 22.03          |
| On the Glass Base         |                                       |         |           |           |                |
| Peak Gain (dBi) *         | -2.56                                 | -3.31   | 1.24      | 0.32      | 0.86           |
| Average Gain (dBi) *      | -6.63                                 | -7.66   | -3.88     | -4.48     | -4.31          |
| Efficiency (%)*           | 21.76                                 | 17.45   | 40.96     | 35.85     | 37.66          |
| Return loss (dB) *        | < -5                                  |         |           |           |                |
| Polarization              | Linear                                |         |           |           |                |
| Impedance                 | 50Ω                                   |         |           |           |                |
| Cable                     | 1m RG174 standard, fully customizable |         |           |           |                |
| Connector                 | SMA(M), standard, fully customizable  |         |           |           |                |
| Maximum Input Power       | 5W                                    |         |           |           |                |

| GPS-GLONASS               |                                         |
|---------------------------|-----------------------------------------|
| Center Frequency          | GPS:1575.42±3 MHz<br>GLONASS:1602±3 MHz |
| Gain                      | -1 dBic typ.                            |
| VSWR                      | 1.92:1 Max                              |
| Impedance                 | 50Ω                                     |
| Antenna Patch Size        | 25x25x4mm                               |
| Cable                     | 1m RG174 standard, fully customizable   |
| Connector                 | SMA(M), standard, fully customizable    |
| LNA Electrical Properties |                                         |
| Center Frequency fc       | GPS:1575.42±3 MHz<br>GLONASS:1602±3 MHz |
| Impedance                 | 50 Ω Nominal                            |
| VSWR                      | < 1.92:1                                |
| Return Loss               | 10 dB Min.                              |
| Gain                      | 31 dB Min. @3.3V                        |
| DC Power Input            | 3.3V                                    |
| Noise Figure @3.3V        | 1.5dB                                   |
| Power Consumption         | 7~10mA                                  |

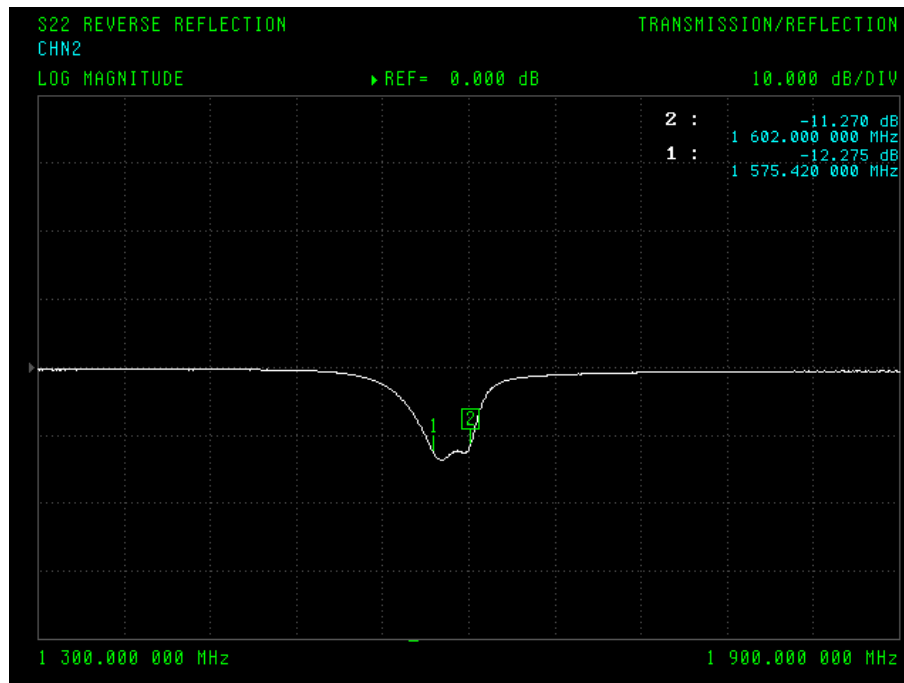
| MECHANICAL            |                            |                    |
|-----------------------|----------------------------|--------------------|
| Antenna Dimensions    | 58.15mm x 56.2mm x 16.8mm  |                    |
| Casing                | UV Resistant ABS           |                    |
| Waterproof            | IP65                       |                    |
| O-Ring                | Embedded for Waterproof    |                    |
| Weight                | 130g                       |                    |
| Mounting              | Magnetic                   |                    |
| Magnetic Puling Force | Horizontal :1.07kgf        | Vertical : 1.58kgf |
| ENVIRONMENTAL         |                            |                    |
| Operation Temperature | -40°C to 85°C              |                    |
| Storage Temperature   | -40°C to 90°C              |                    |
| Humidity              | Non-condensing 65°C 95% RH |                    |

## 3. GPS/GLONASS Antenna

### 3.1 GPS/GLONASS Antenna Block Diagram



## 3.2 GPS/GLONASS Antenna Return Loss

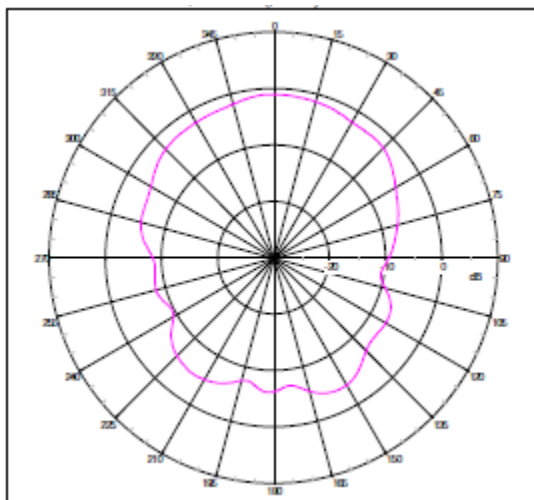


### 3.3 GPS/GLONASS Antenna Radiation Patterns

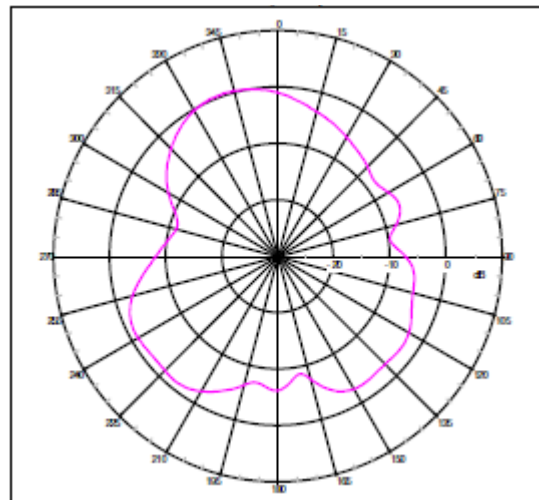


**1575.42MHz**

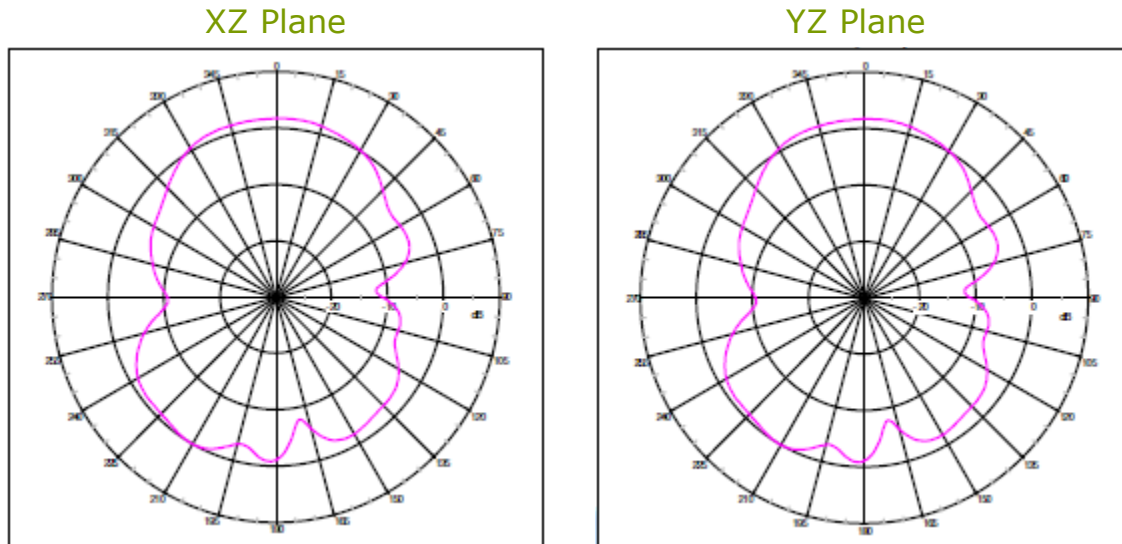
XZ Plane



YZ Plane



## 1602MHz

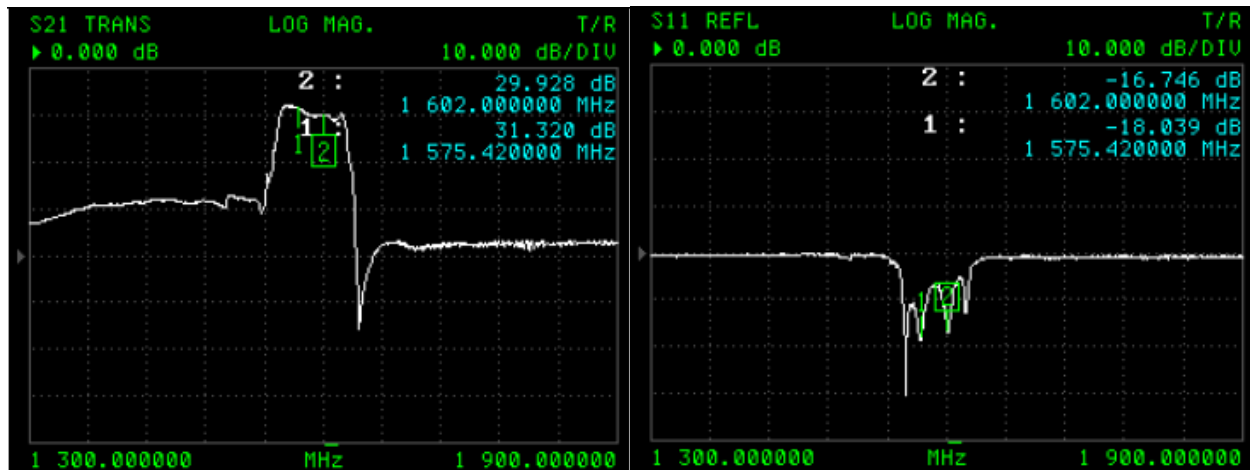


### 3.4 GPS/GLONASS Antenna Gain Chart

| Frequency(MHz) | Gain @Zenith(dBic) | Efficiency (%) |
|----------------|--------------------|----------------|
| 1575.42        | -0.2               | 40             |
| 1602           | 1.0                | 60             |



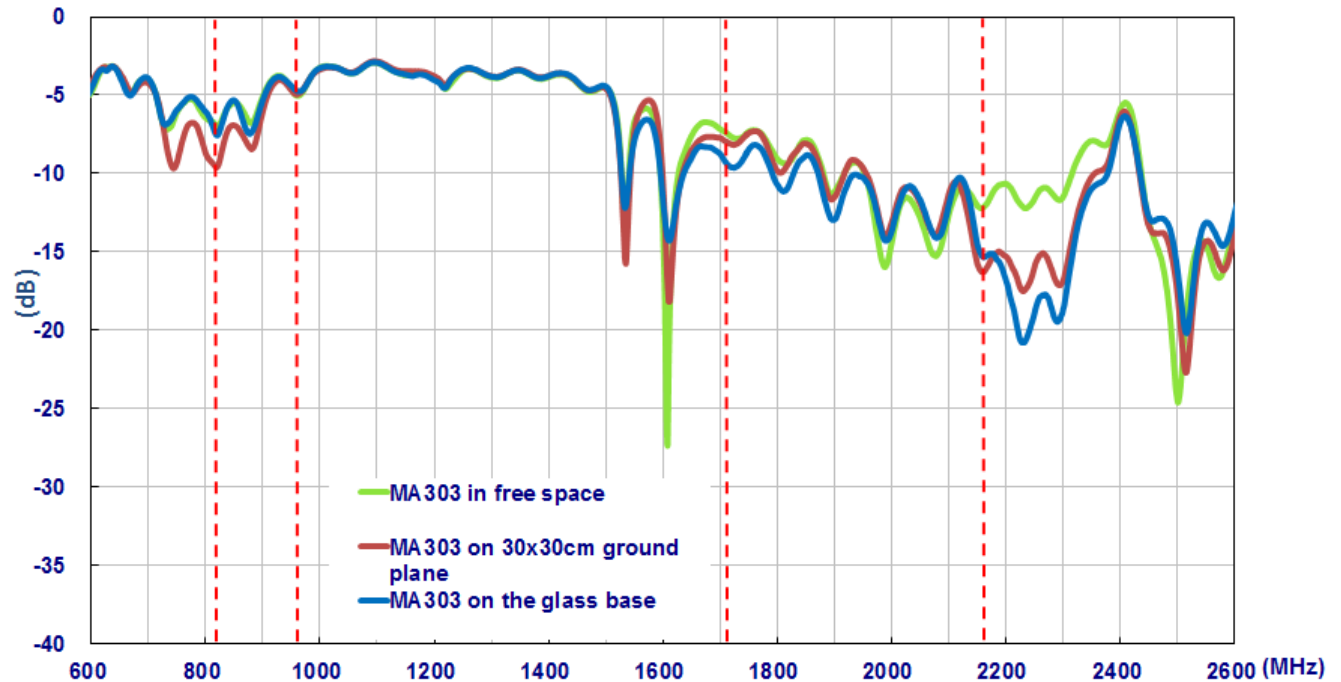
### 3.5 GPS/GLONASS LNA S21 & S22 Parameter Results



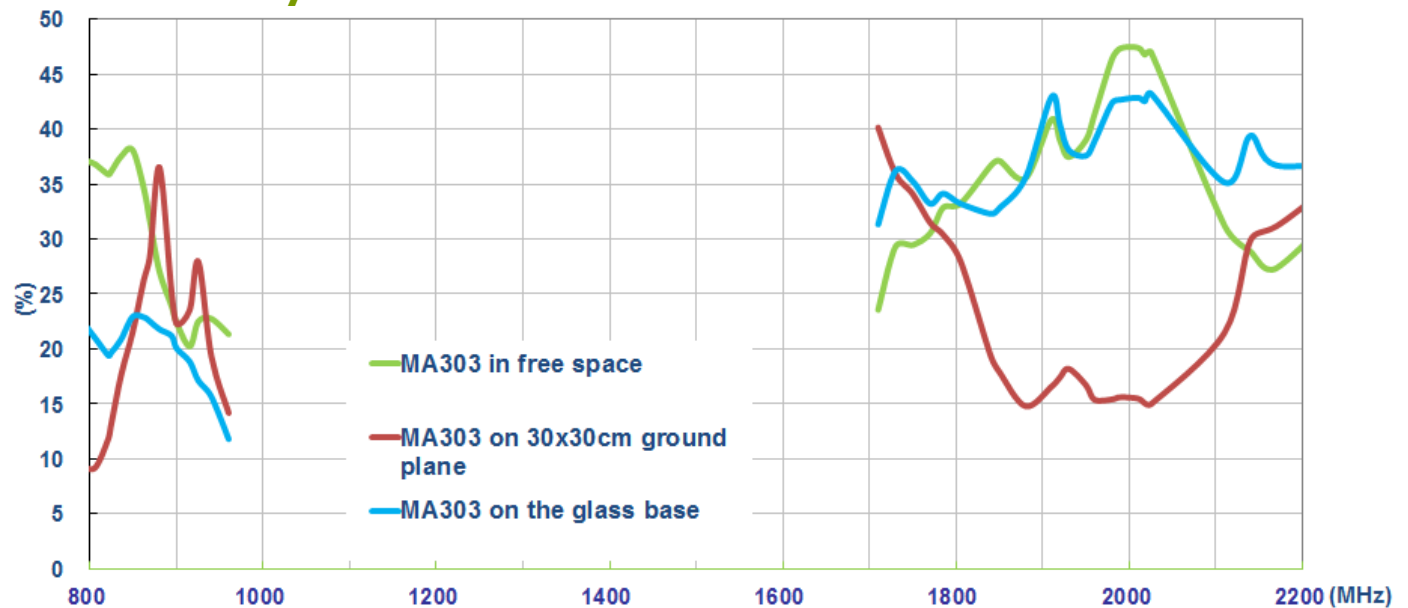
| Test Item                 | Test Result                          |
|---------------------------|--------------------------------------|
| Gain @3.3V                | 31 dB@ 1575.42 MHz<br>29dB@1602MHz   |
| Return Loss @3.3V         | <-10dB                               |
| Noise Figure @3.3V        | 2.8 dB@ 1575.42 MHz<br>3.2dB@1602MHz |
| Current consumption @3.3V | 7~10 mA                              |

## 4. Cellular Antenna

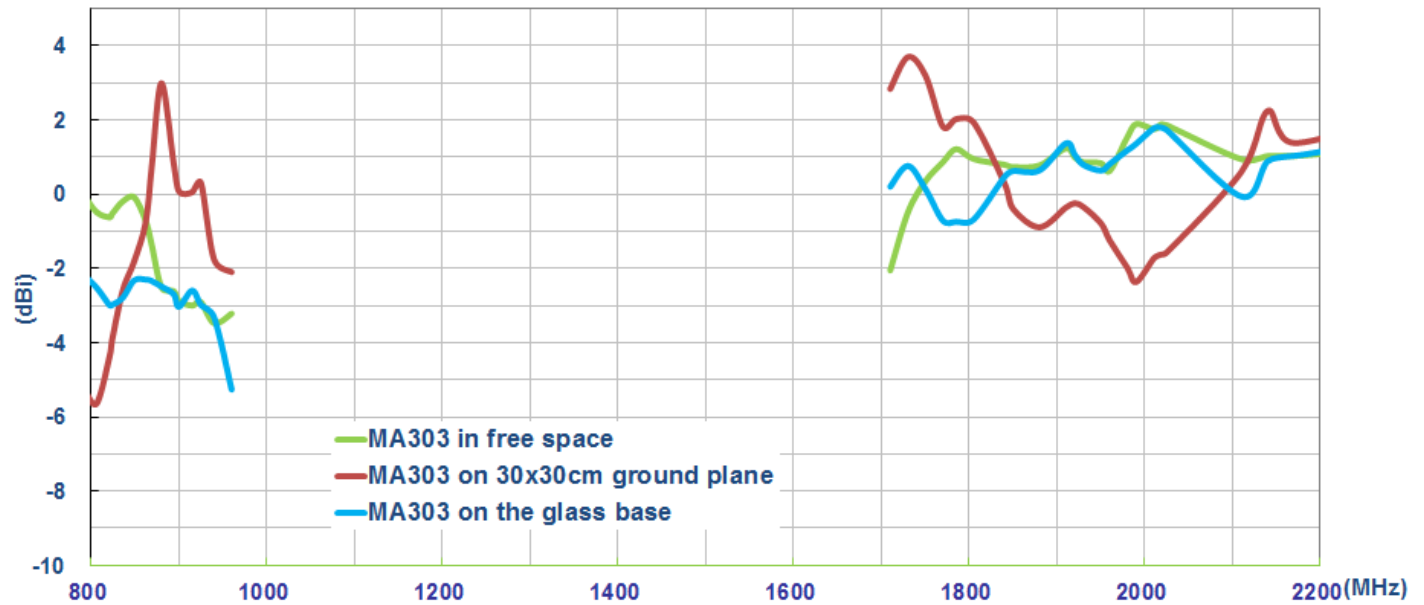
### 4.1 Return Loss



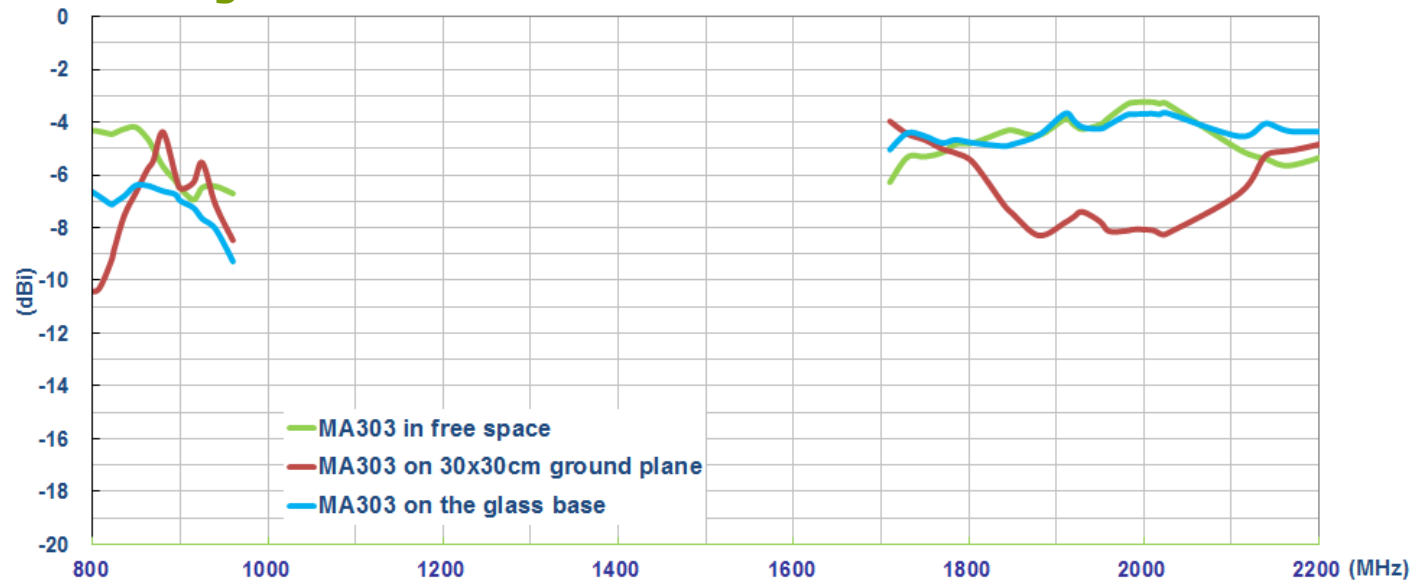
### 4.2 Efficiency



### 4.3 Peak Gain

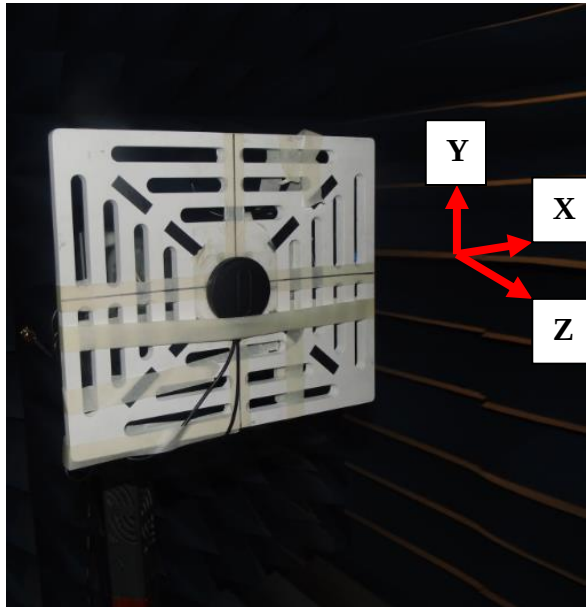


### 4.4 Average Gain

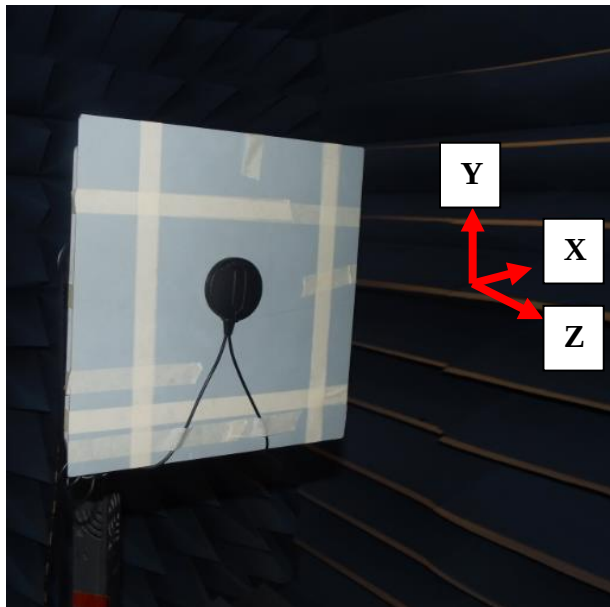


## 4.5 Measurement Setup

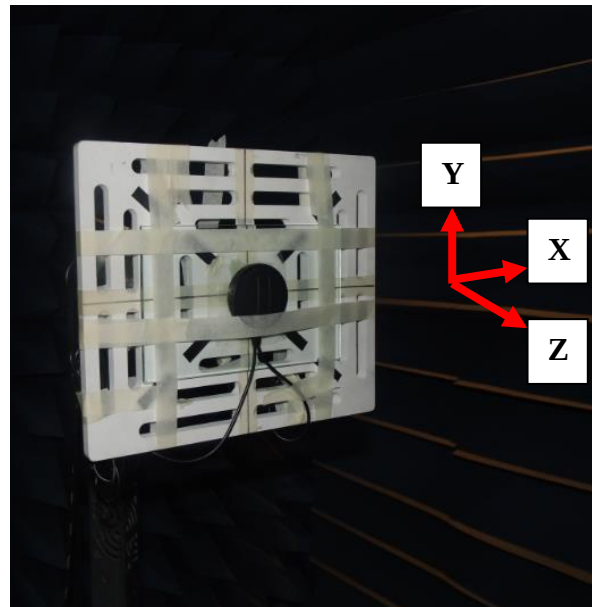
We measured the MA303 antenna in ETS Anechoic Chamber, there are three different measured methods as follows,



In Free Space



On 30cmX30cm Ground Plane

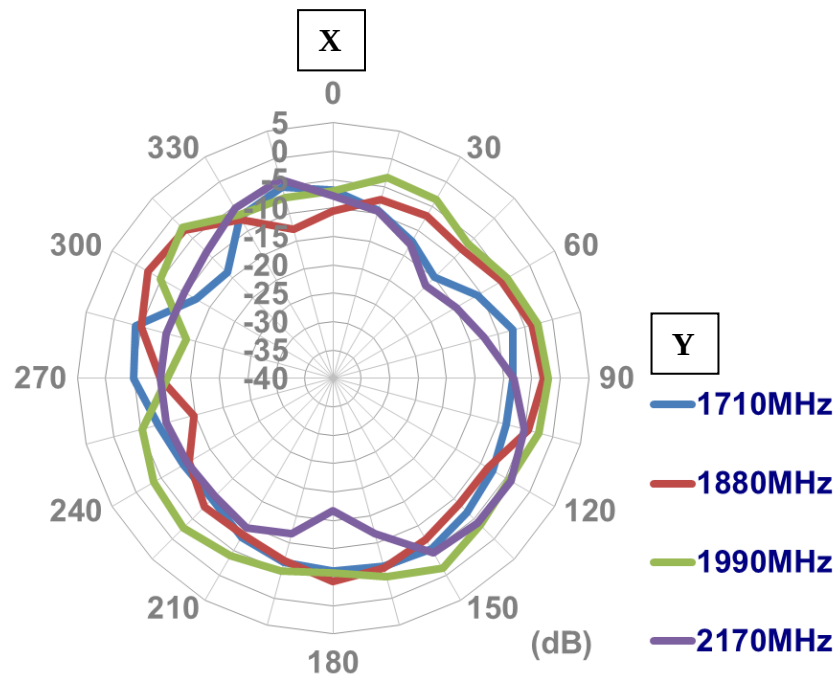
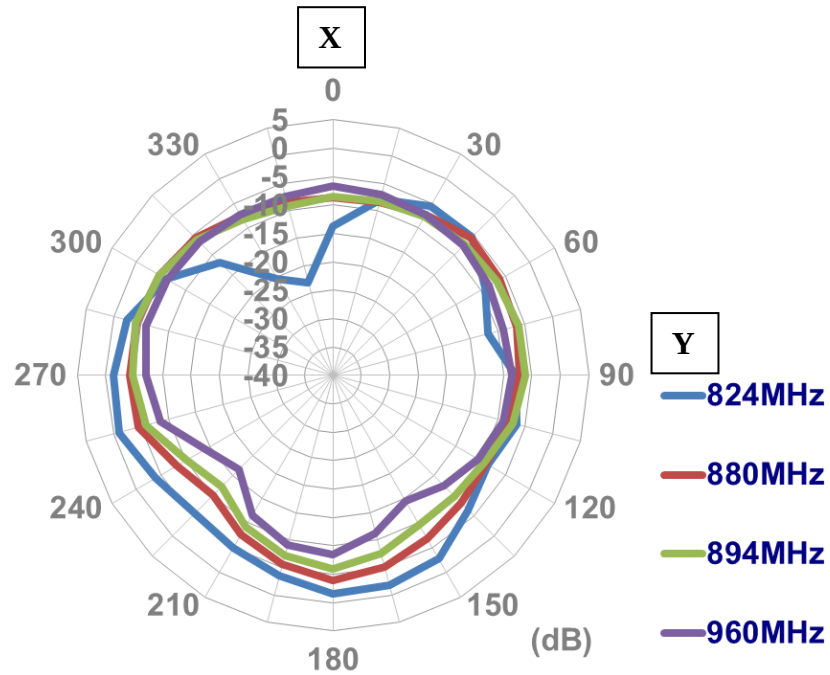


On the Glass Base

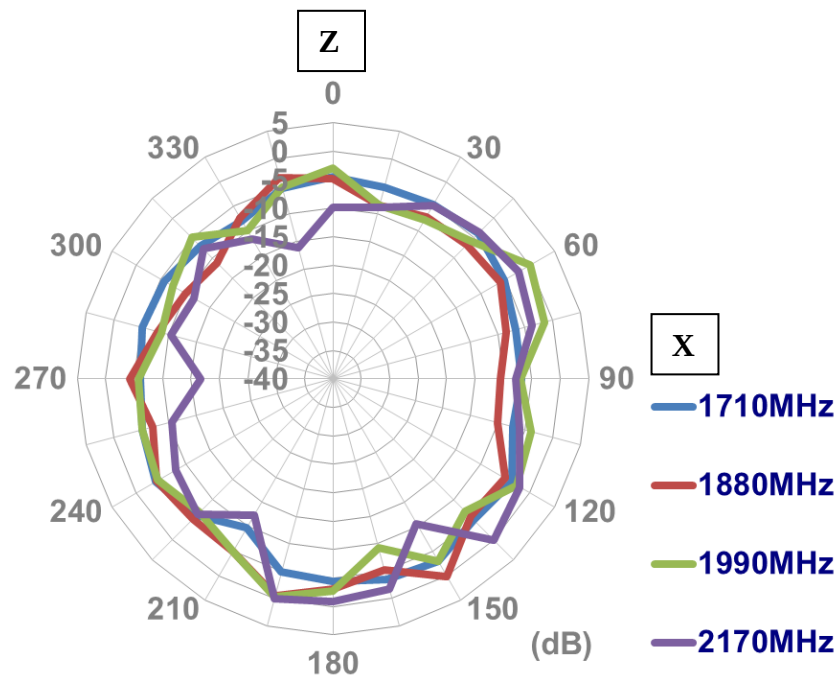
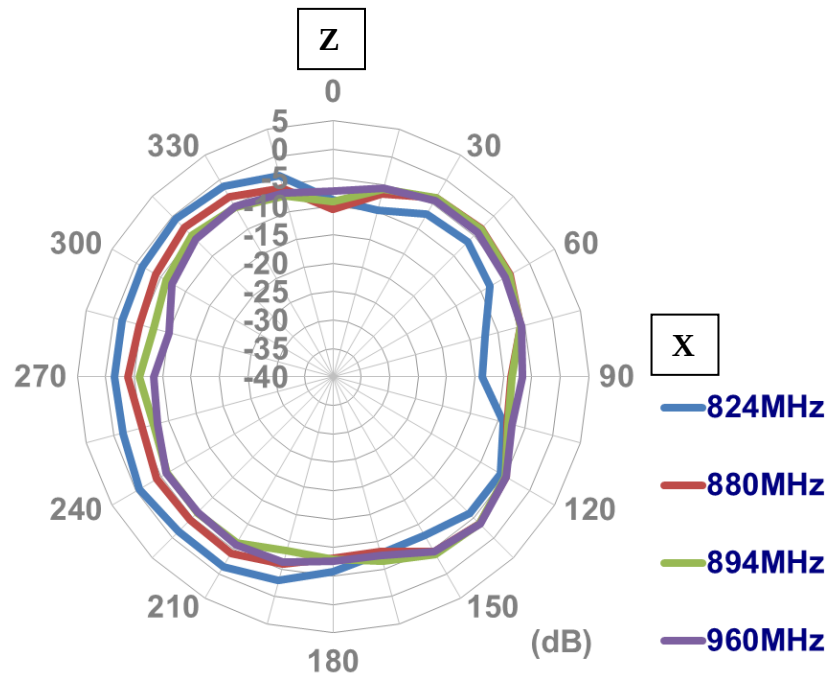
## 4.6 Radiation Pattern

### In Free Space

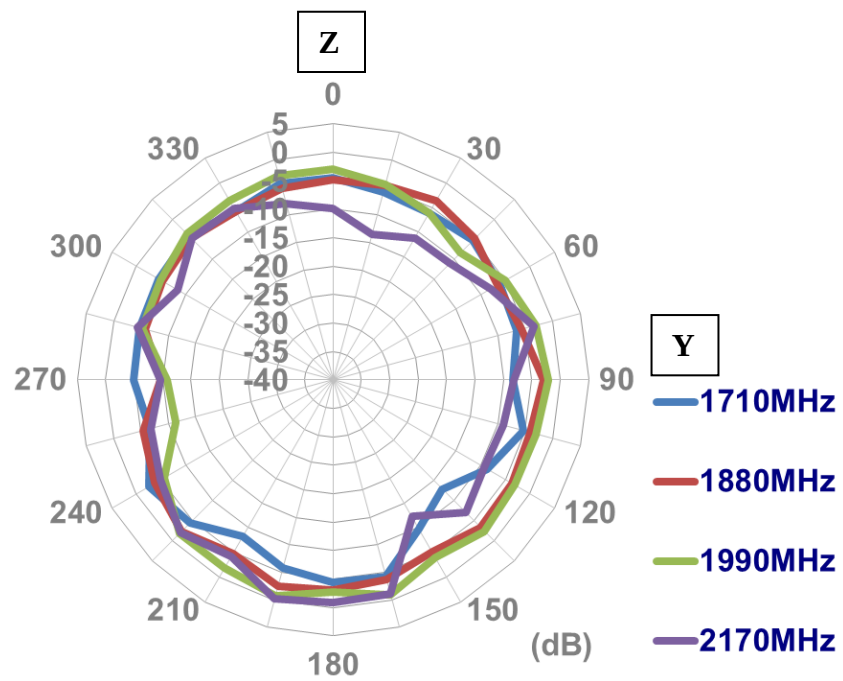
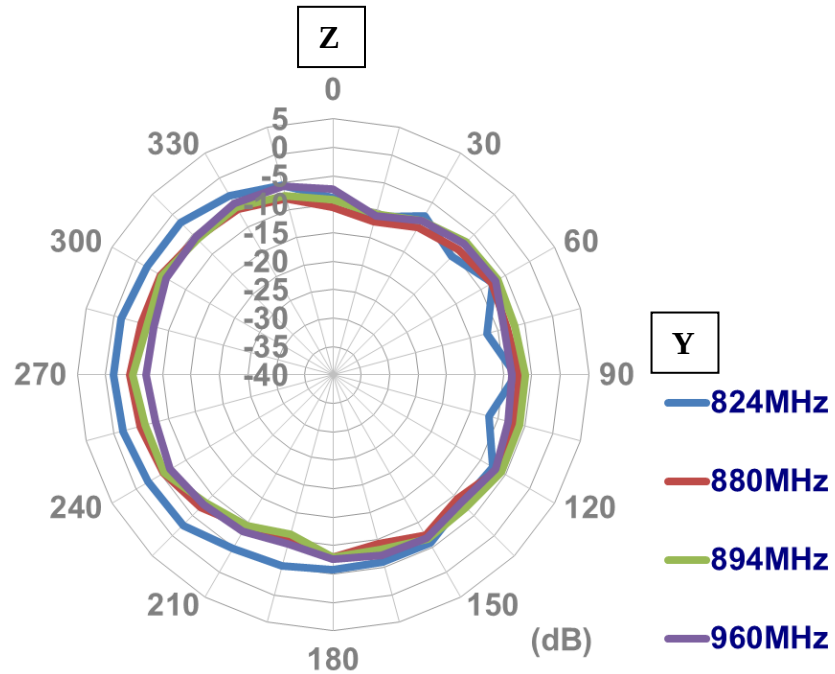
XY-Plane



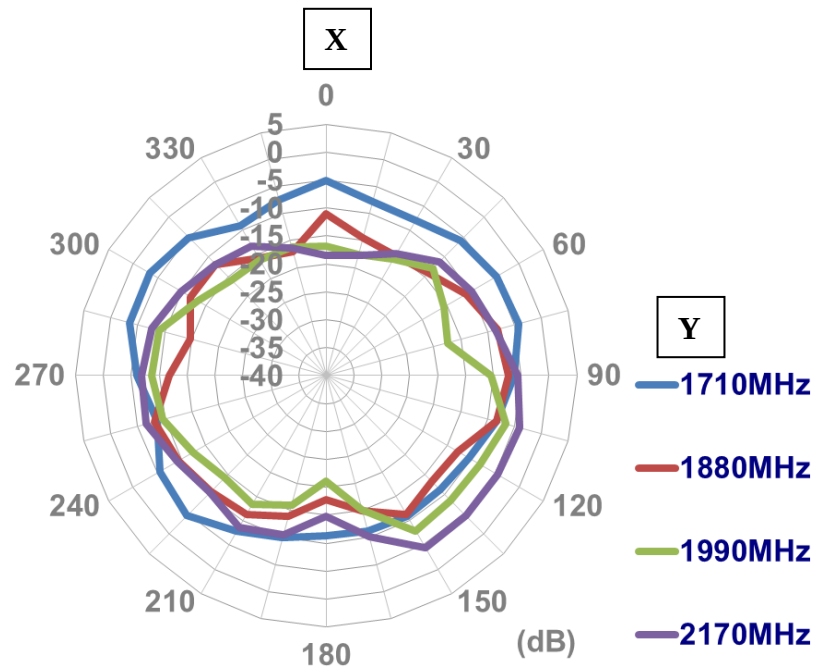
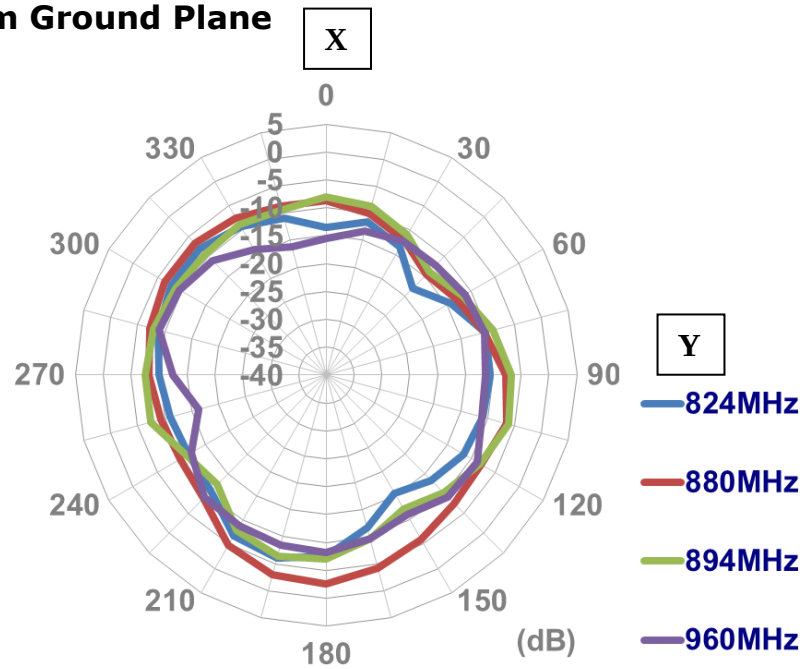
XZ-Plane



YZ-Plane

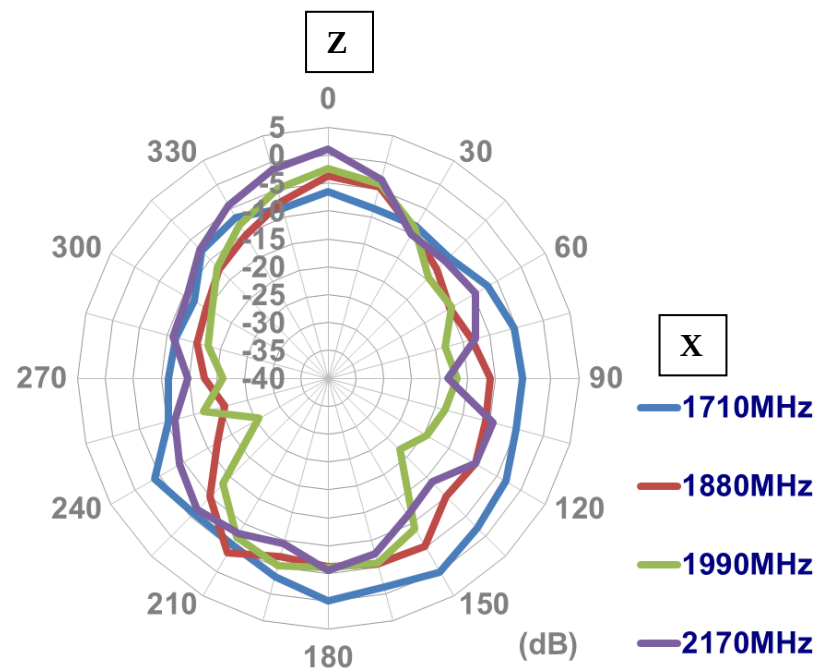
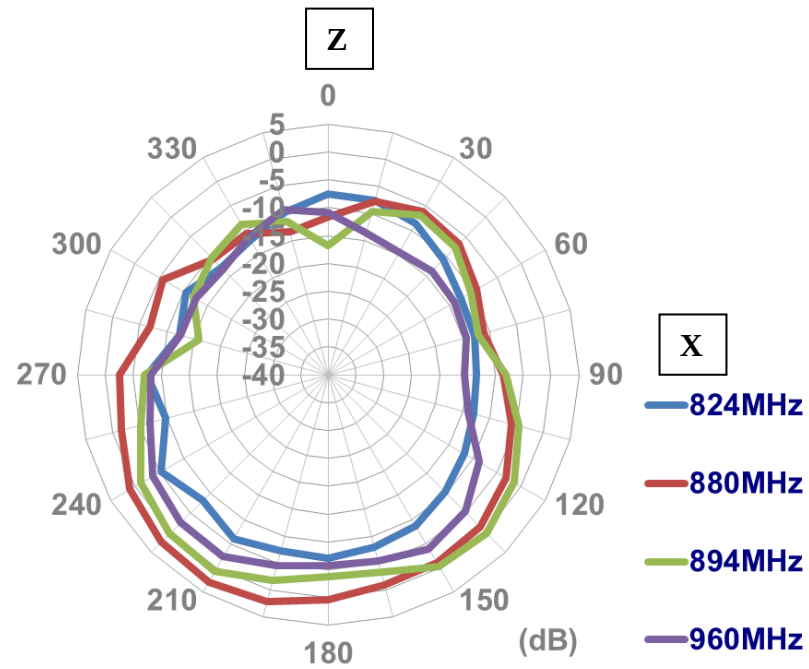


**On 30cmX30cm Ground Plane**  
XY-Plane

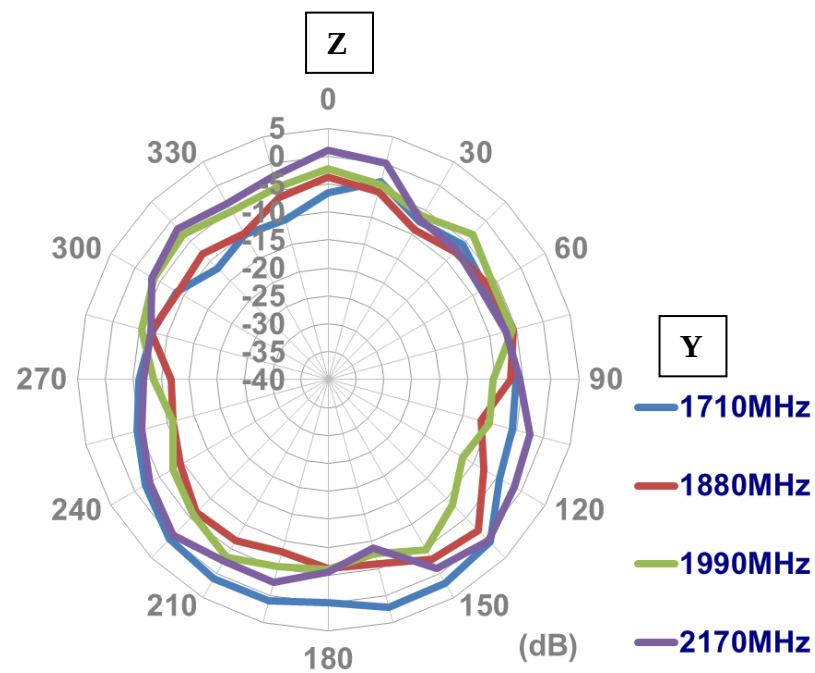
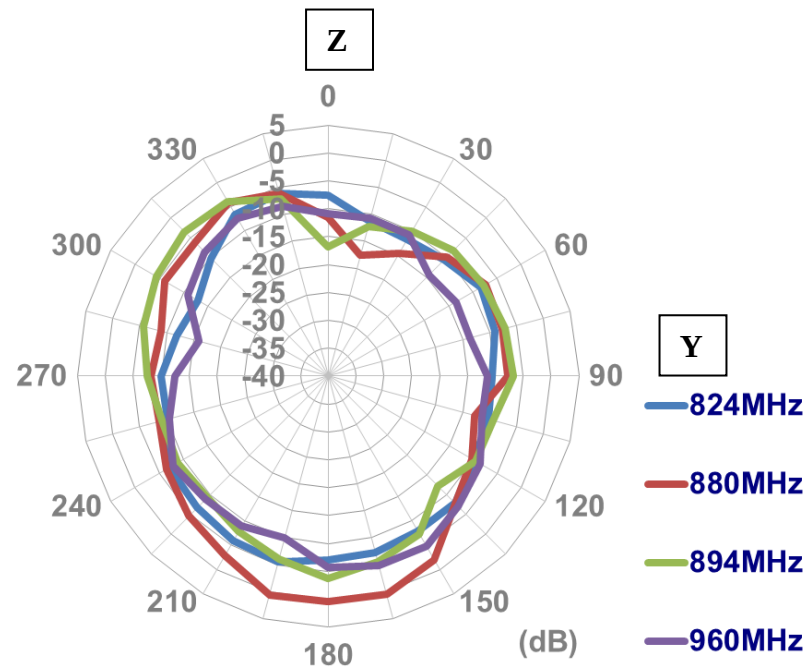




XZ-Plane

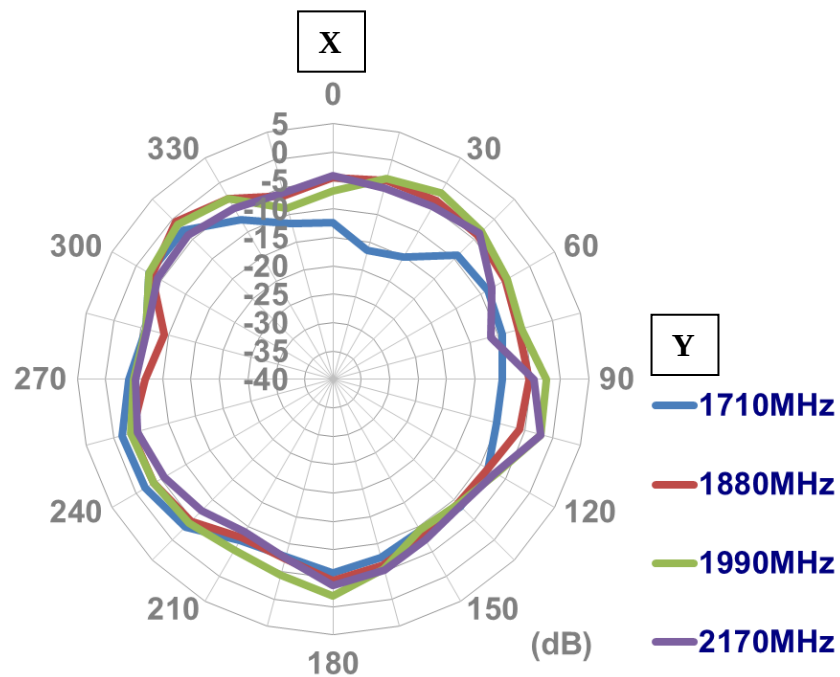
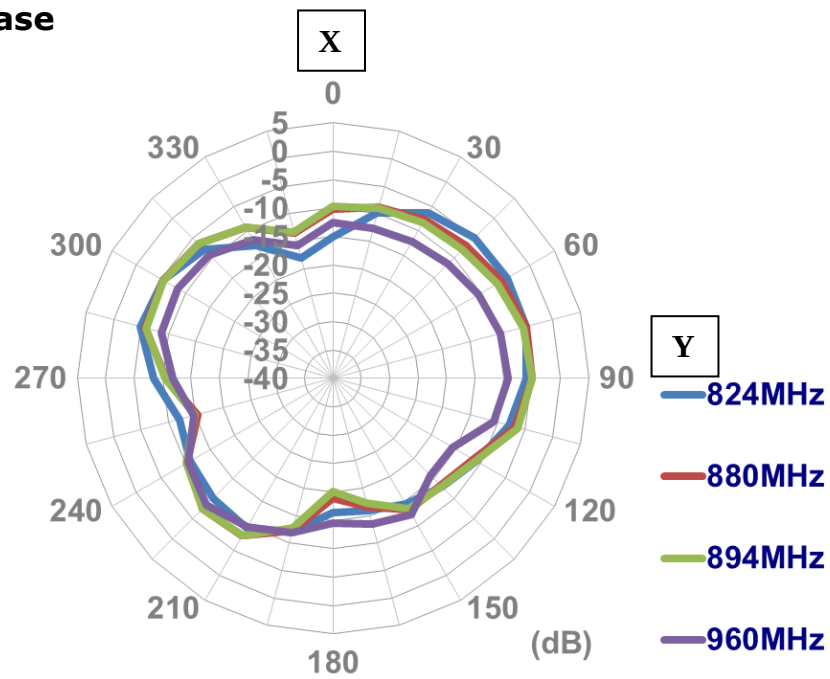


YZ-Plane

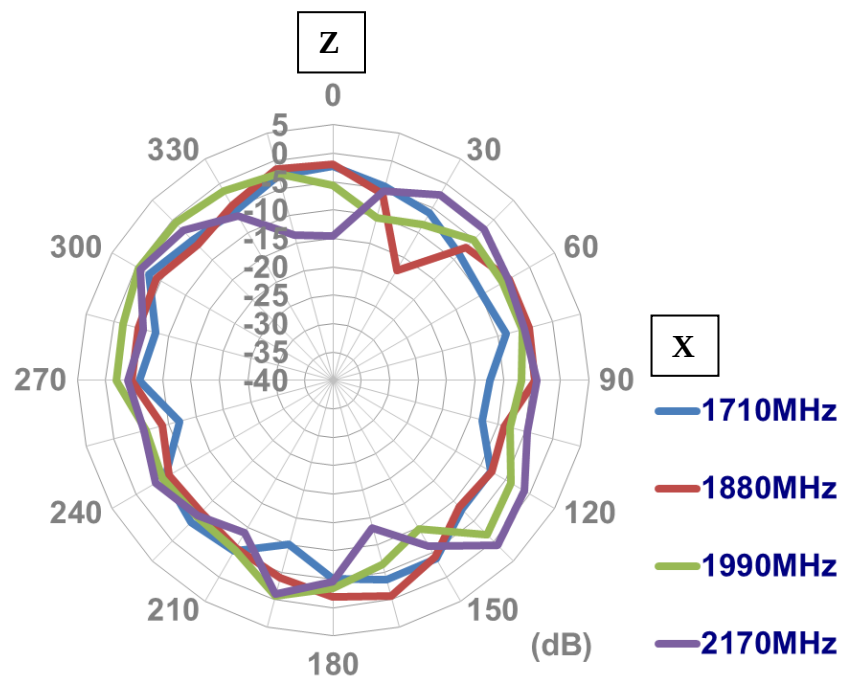
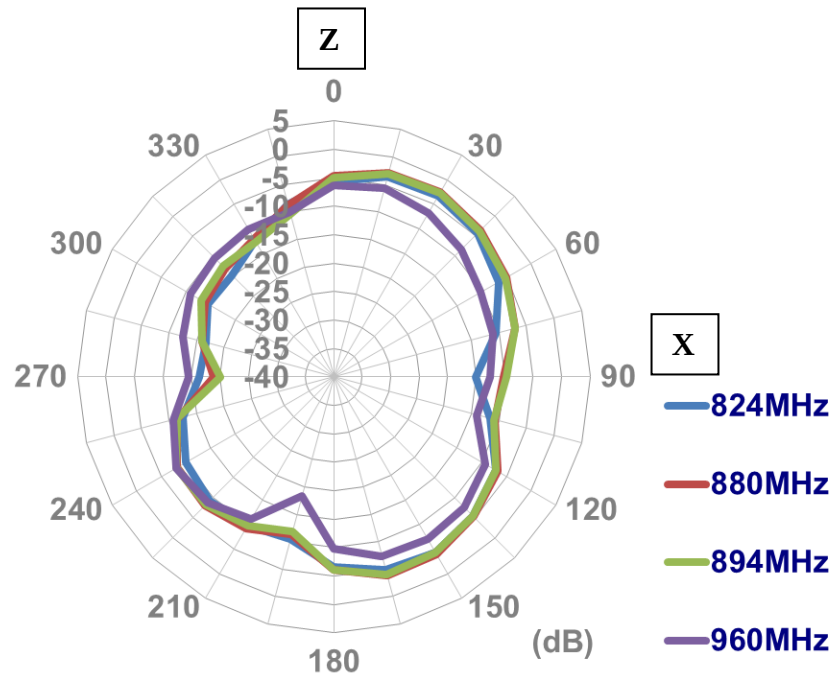


## On the Glass Base

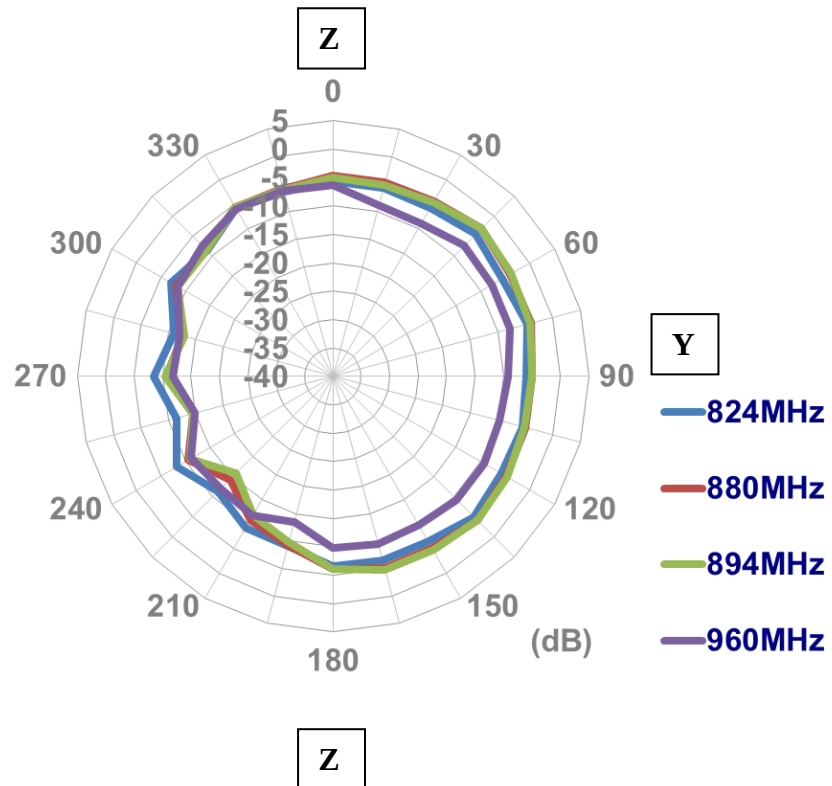
XY-Plane

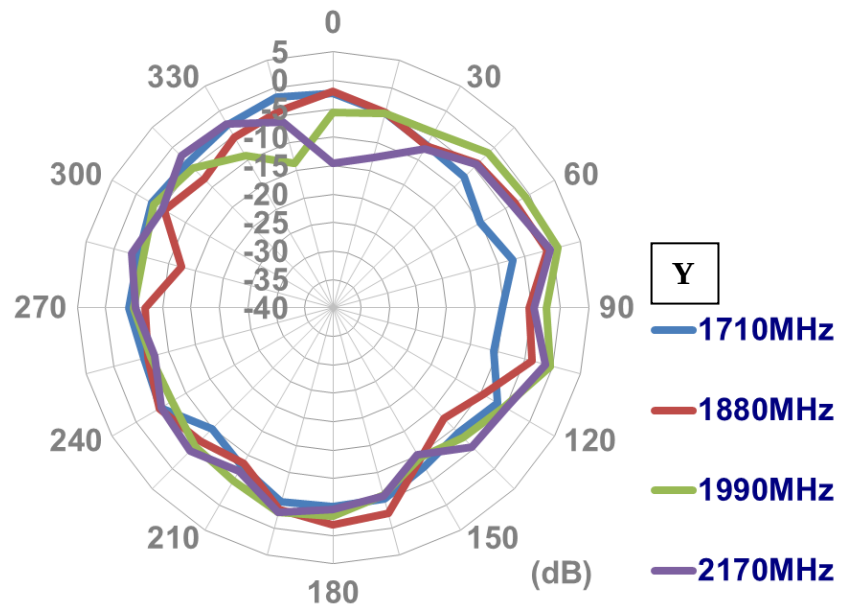


XZ-Plane

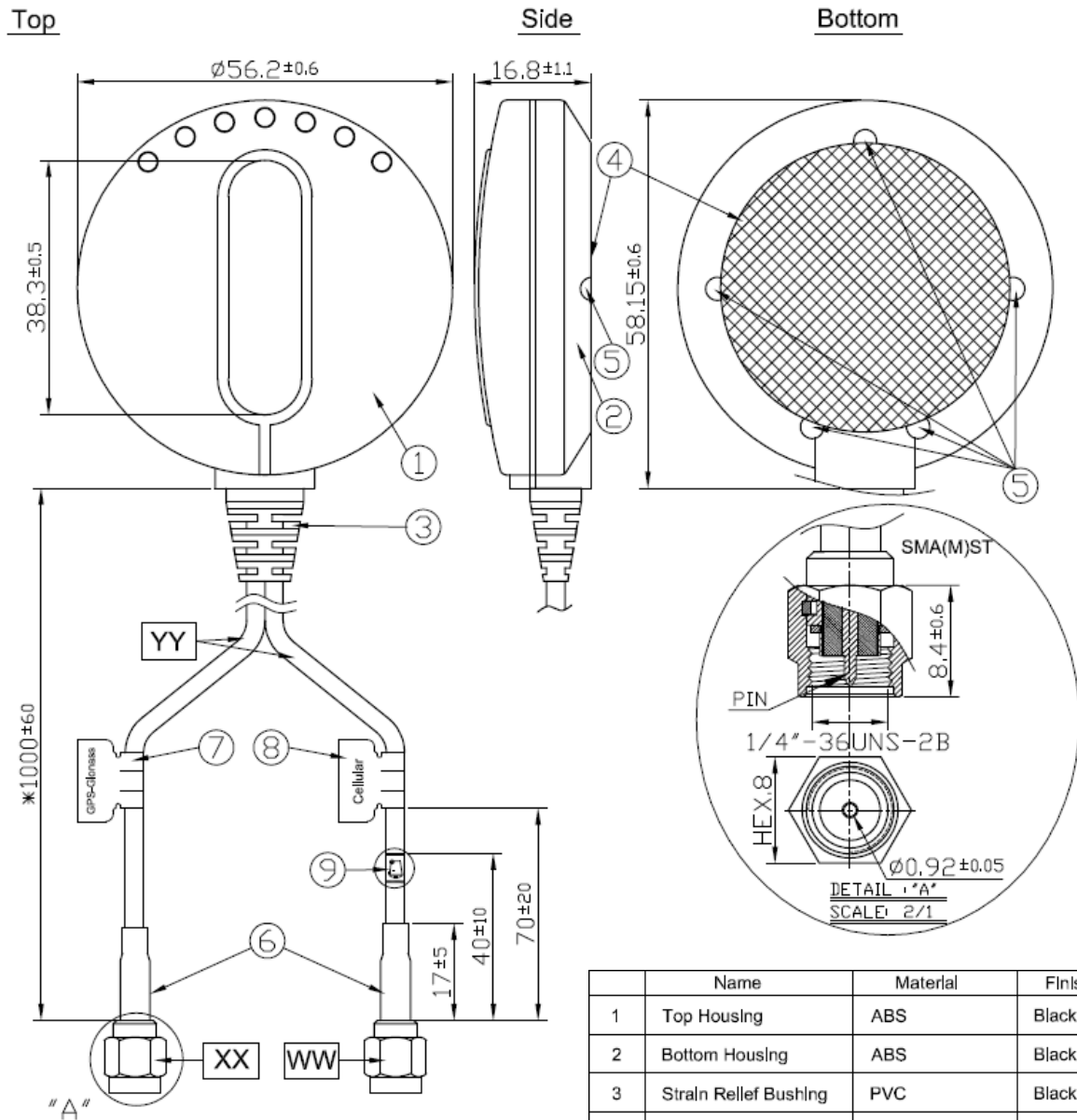


YZ-Plane





## 5. Drawing

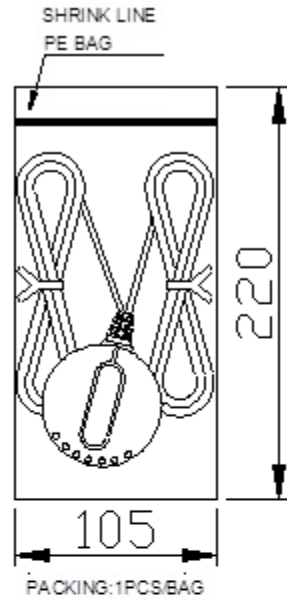
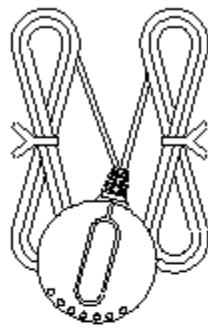


|    | Name           | Spec           | Finish    | QTY |
|----|----------------|----------------|-----------|-----|
| WW | Connector Type | SMA(M) ST      | NI Plated | 1   |
| XX | Connector Type | SMA(M) ST(GPS) | Gold      | 1   |
| YY | Cable Type     | RG174          | Black     | 2   |

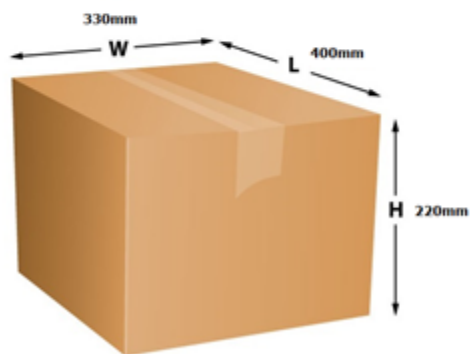
|   | Name                  | Material         | Finish | QTY |
|---|-----------------------|------------------|--------|-----|
| 1 | Top Housing           | ABS              | Black  | 1   |
| 2 | Bottom Housing        | ABS              | Black  | 1   |
| 3 | Strain Relief Bushing | PVC              | Black  | 1   |
| 4 | Blank Label           | Matte Silver PET | Silver | 1   |
| 5 | 2.6L Screw            | Stainless Steel  | Clear  | 5   |
| 6 | Heat Shrink Tube      | PE               | Black  | 2   |
| 7 | GPS-Glonass Label     | Coated Paper     | Orange | 1   |
| 8 | Cellular Label        | Coated Paper     | Blue   | 1   |
| 9 | WEEE Heatshrink Tube  | PE               | White  | 1   |

## 5. Packaging

1 piece MA303 per PE Bag



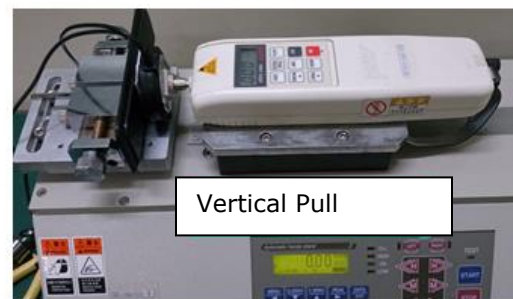
100 pieces per Carton





## 6. Magnetic Pulling Force

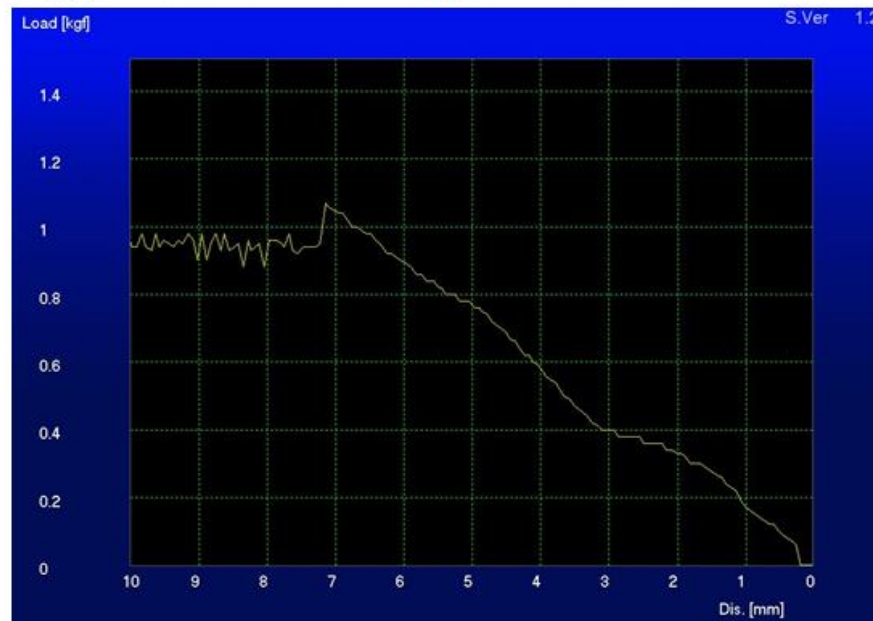
### 6.1 Testing Setup



## 6.2 Testing Results

### 6.2.1 Horizontal Pull Force Magnetic Bond Break Test

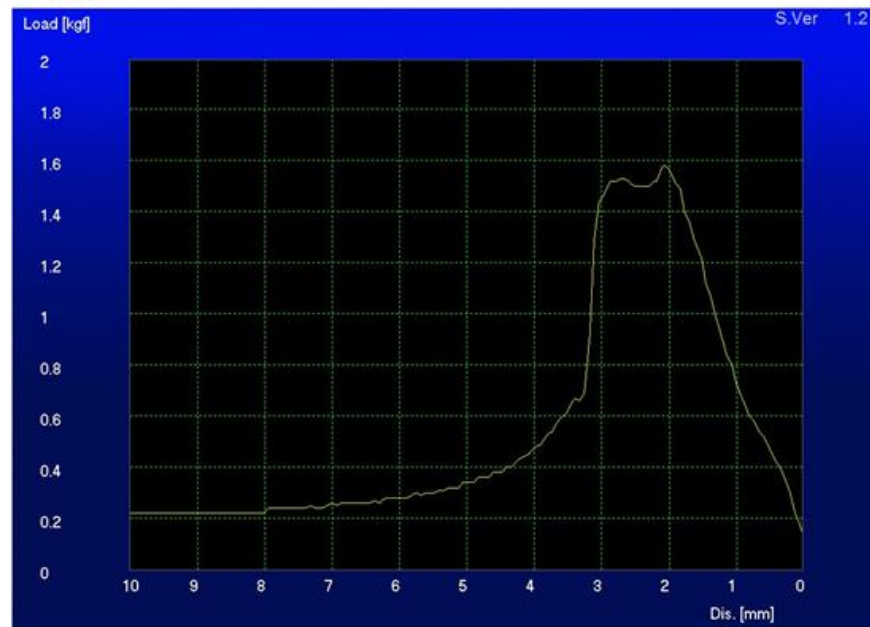
|                    |      |      |      |      |      |      |      |      |      |      |
|--------------------|------|------|------|------|------|------|------|------|------|------|
| Distance(mm)       | 0.5  | 1.0  | 1.5  | 2.0  | 2.5  | 3.0  | 3.5  | 4.0  | 4.5  | 5.0  |
| Pulling force(Kgf) | 0.10 | 0.17 | 0.28 | 0.33 | 0.38 | 0.40 | 0.47 | 0.58 | 0.68 | 0.77 |
| Distance(mm)       | 5.5  | 6.0  | 6.5  | 7.1  | 7.5  | 8.0  | 8.5  | 9.0  | 9.5  | 10.0 |
| Pulling force(Kgf) | 0.82 | 0.89 | 0.98 | 1.07 | 0.94 | 0.94 | 0.94 | 0.93 | 0.96 | 0.95 |



Maximum Force : 1.07kgf

## 6.2.2 Vertical Pull Force Magnetic Bond Break Test

|                    |      |      |      |      |      |      |      |      |      |      |
|--------------------|------|------|------|------|------|------|------|------|------|------|
| Distance(mm)       | 0.5  | 1.0  | 1.5  | 2.1  | 2.5  | 3.0  | 3.5  | 4.0  | 4.5  | 5.0  |
| Pulling force(Kgf) | 0.47 | 0.72 | 1.19 | 1.58 | 1.50 | 1.45 | 0.62 | 0.47 | 0.38 | 0.34 |
| Distance(mm)       | 5.5  | 6.0  | 6.5  | 7.0  | 7.5  | 8.0  | 8.5  | 9.0  | 9.5  | 10.0 |
| Pulling force(Kgf) | 0.30 | 0.28 | 0.26 | 0.26 | 0.24 | 0.23 | 0.22 | 0.22 | 0.22 | 0.22 |



Maximum Force : 1.58kgf

## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

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

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

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

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

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

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

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

### Офис по работе с юридическими лицами:

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