

# **SPECIFICATION**

Part No.	:	MA303.A.LB.002
Product Name	:	MA303 SAUCER Magnetic Mount GPS/GLONASS and Cellular 2G/3G 2in1 Combination Antenna
Features	:	IP65 - Water Resistant - GPS/GLONASS - High gain LNA up to 31dB - Cellular 2G/3G - 850/900/1800/1900/2100 MHz Low Profile, Robust and Stylish Design Magnetic Mounted IP65 Rated 58.15mm x 56.2mm x 16.8mm Cable: 1 meter RG174 Connector: SMA(M) RoHS & REACH 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 -1 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 Sp	ace		
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				



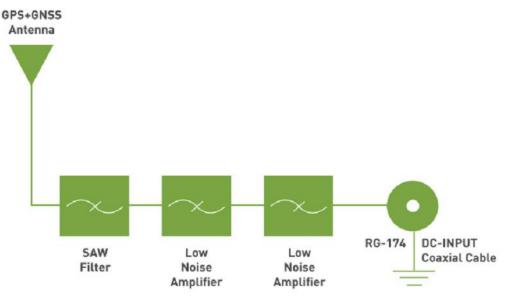
GPS-GLONASS			
Center Frequency	GPS:1575.42±3 MHz GLONASS:1602±3 MHz		
Gain	-1 dBic typ.		
VSWR	1.92:1 Max		
Impedance	50Ω		
Antenna Patch Size	25x25x4mm		
Cable	1m RG174 standard, fully customizable		
Connector	SMA(M), standard, fully customizable		
LNA Electrical Properties			
Center Frequency fc	GPS:1575.42±3 MHz 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	1~18mA		

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		



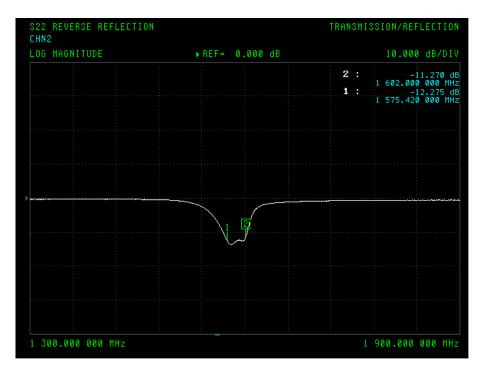
# 3. GPS/GLONASS Antenna

## 3.1 GPS/GLONASS Antenna Block Diagram



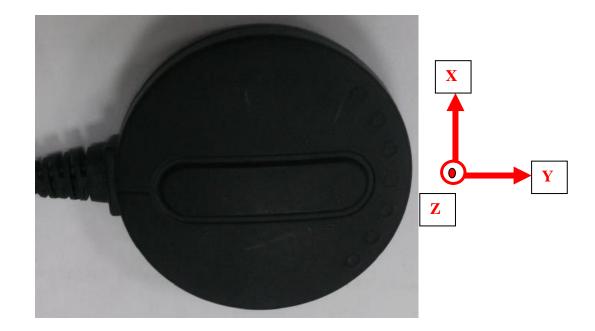


### **3.2 GPS/GLONASS Antenna** Return Loss

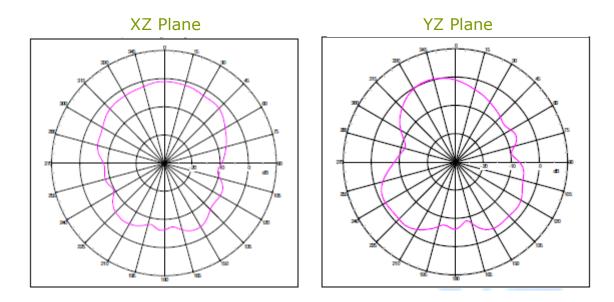




## **3.3 GPS/GLONASS Antenna Radiation Patterns**

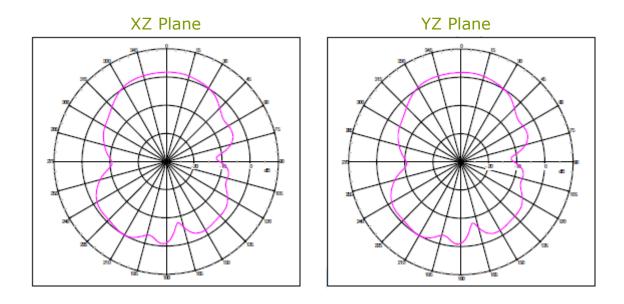


## 1575.42MHz





### 1602MHz



## **3.4 GPS/GLONASS Antenna Gain Chart**

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

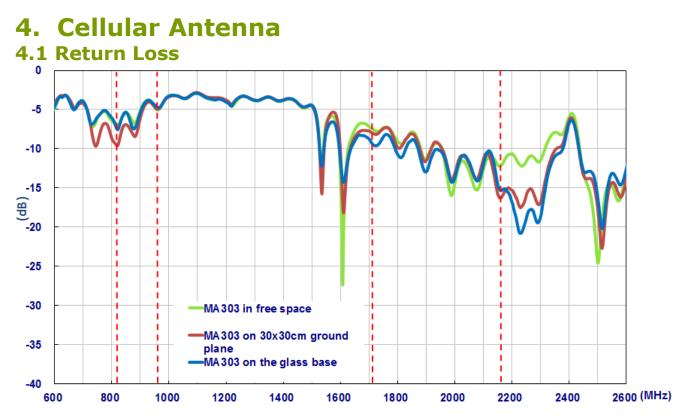


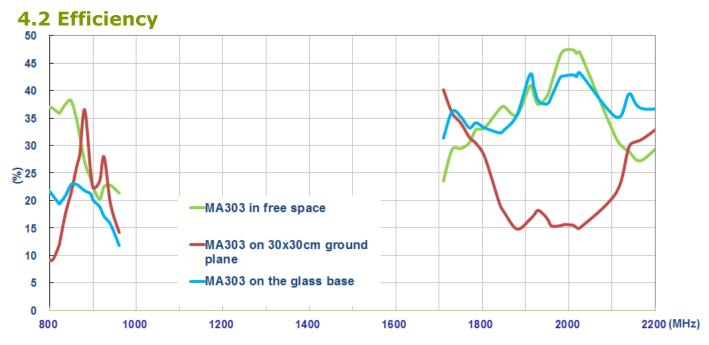
## **3.5 GPS/GLONASS LNA S21 & S22 Parameter Results**

S21 TRANS ▶ 0.000 dB	LOG MAG.	T/R 10.000 dB/DIV	S11 REFL ▶ 0.000 dB	LOG MAG.	T/R 10.000 dB/DIV
	2:	29.928 dB 02.000000 MHz		2 :	-16.746 dB 1 602.000000 MHz
		31.320 dB 75.420000 MHz		1:	-18.039 dB 1 575.420000 MHz
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	······¥·····			WW	
1 300.000000	MHz	1 900.000000	1 300.000000	MHz	1 900.000000

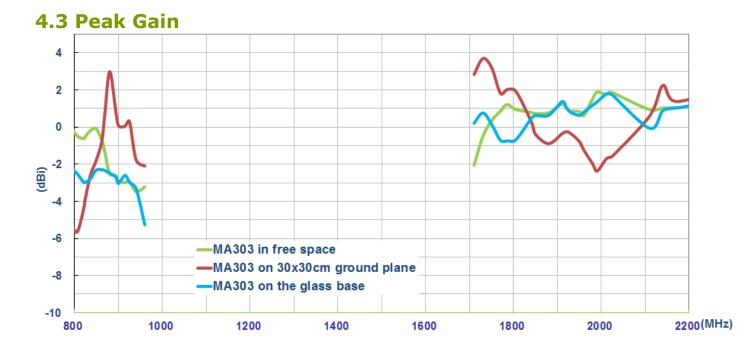
Test Item	Test Result		
Gain @3.3V	31 dB@ 1575.42 MHz 29dB@1602MHz		
Return Loss @3.3V	<-10dB		
Noise Figure @3.3V	2.8 dB@ 1575.42 MHz 3.2dB@1602MHz		
Current consumption @3.3V	7~10 mA		

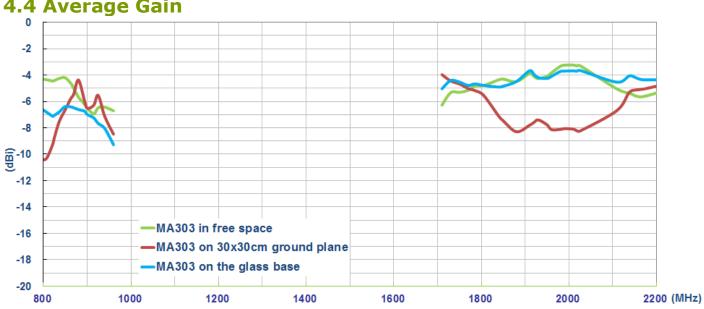








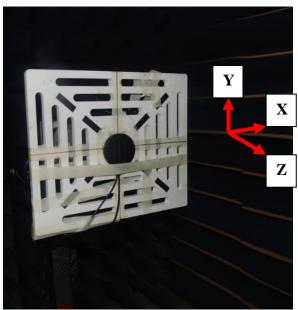




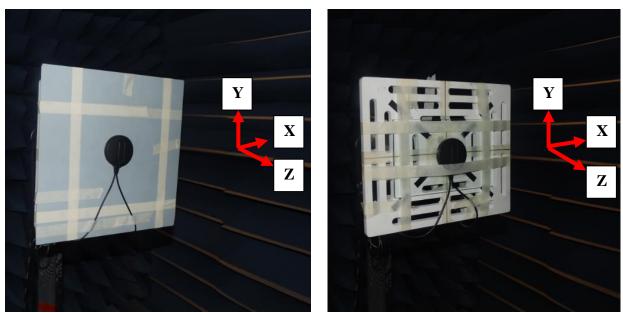
#### 4.4 Average Gain



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



In Free Space

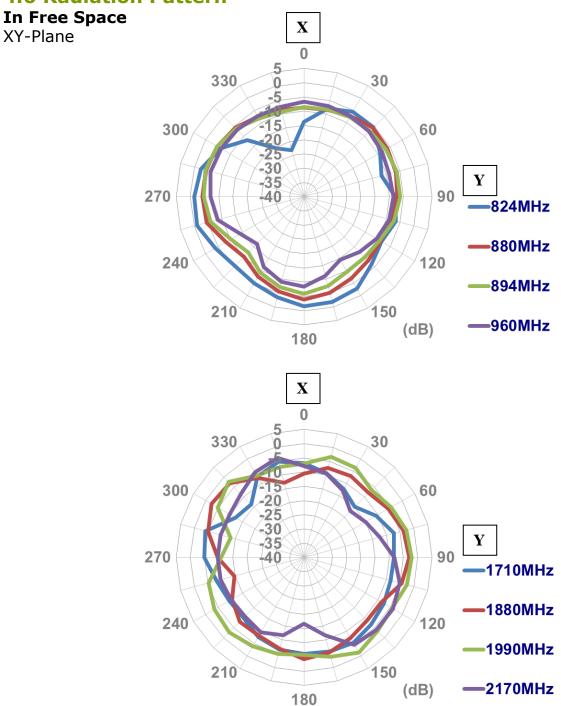


On 30cmX30cm Ground Plane

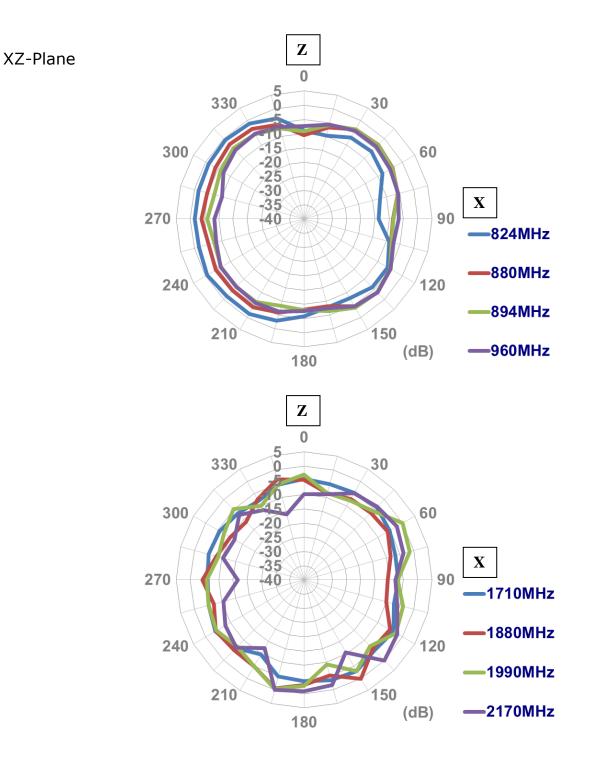
On the Glass Base



#### **4.6 Radiation Pattern**

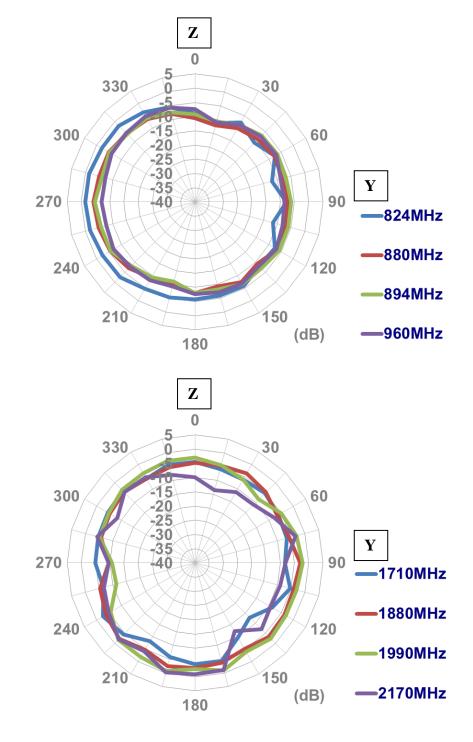




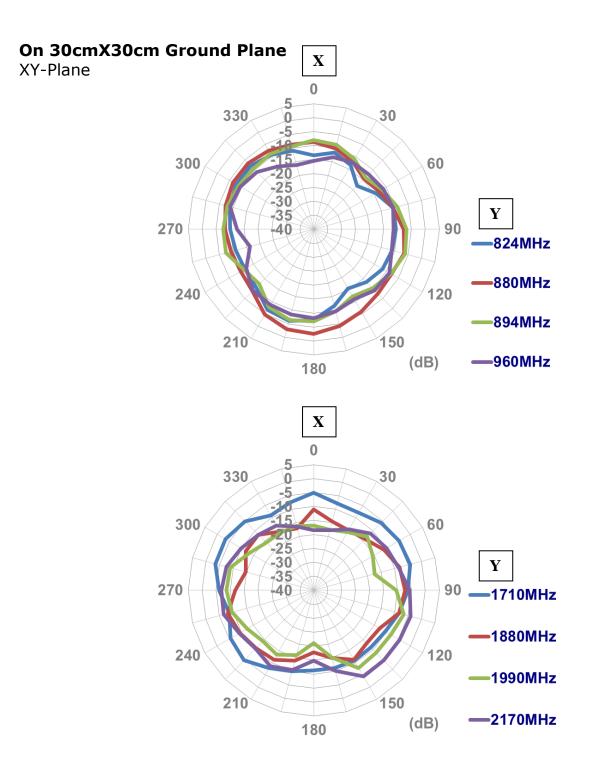




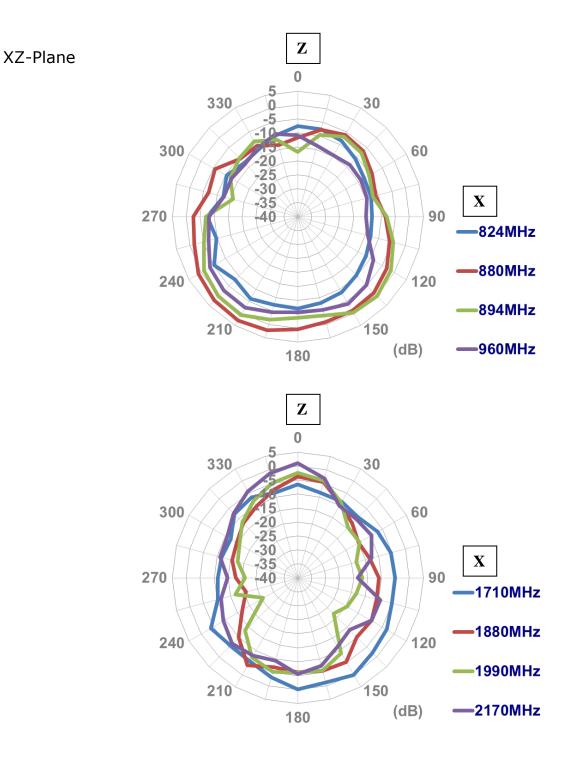
YZ-Plane



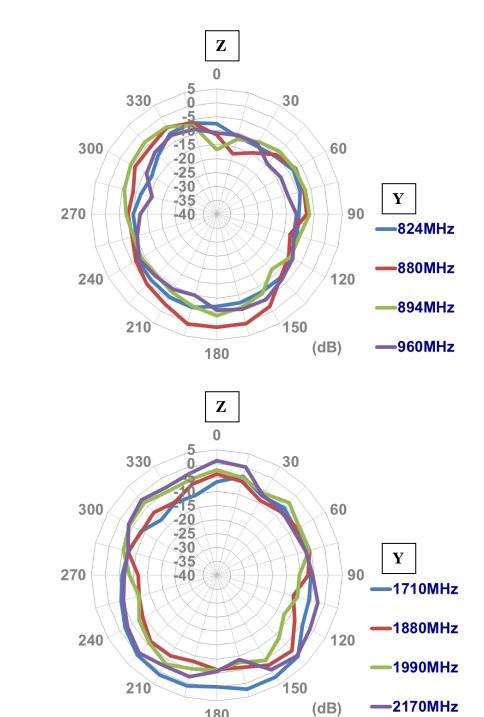










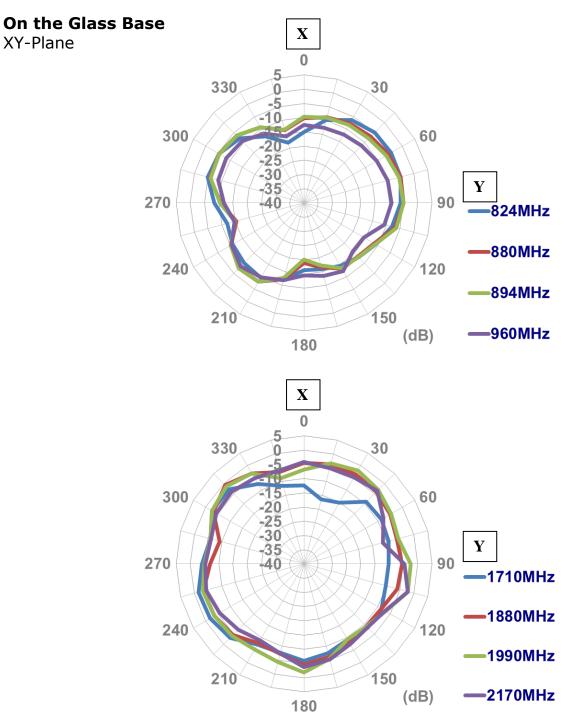


180



SPE-14-8-079-B





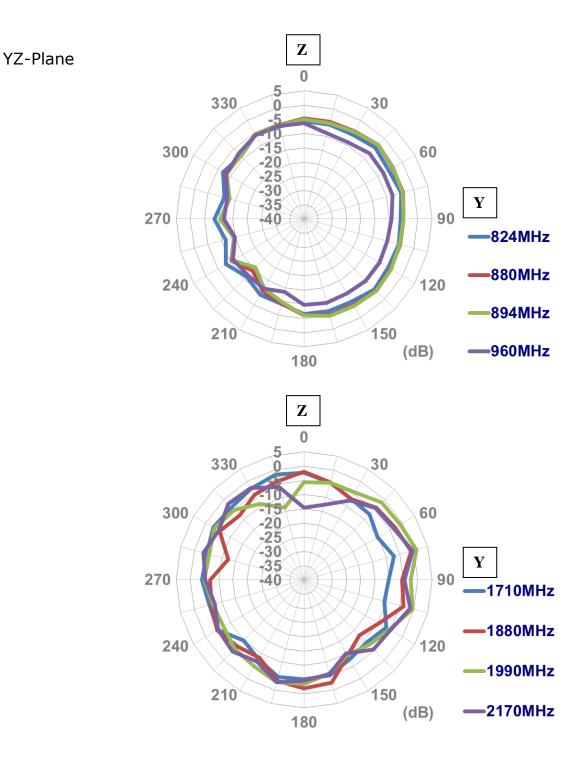




#### -20 -25 -30 -35 -40 Х 824MHz 880MHz 894MHz -960MHz (dB) $\mathbf{Z}$ -15 -20 -25 -30 -35 -40 Х -1710MHz -1880MHz -1990MHz -2170MHz (dB)

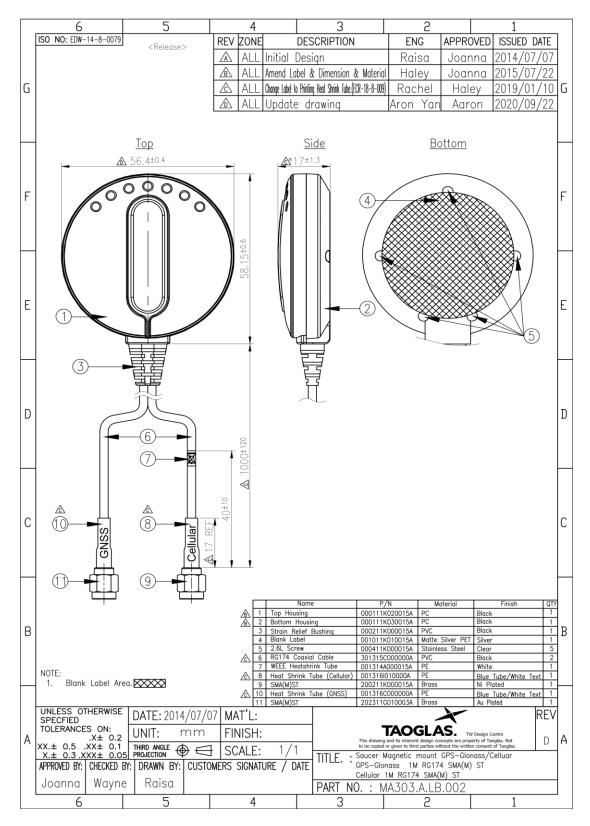
XZ-Plane







# 5. Drawing





## 6. Packaging

# MA303.A.LB.002 **Packaging Specifications** 210mm 1 pc MA303.A.LB.002 per PE bag Dimensions - 100\*210mm 100mm Total Weight - 78.5g 380mm 10 pcs MA303.A.LB.002 per Large PE bag Dimensions - 460\*380mm Total Weight - 850kg 460mm <sup>80pcs</sup> MA303.A.LB.002 per carton Carton Dimensions - 400\*330\*220mm 220mm Weight - 9.3kg 400mm 330mm Pallet Dimensions 1200\*1000\*1520mm 54 Cartons per pallet 9 Cartons per layer 1520mm 6 Layers 1000mm

1200mm



# 7. Magnetic Pulling Force

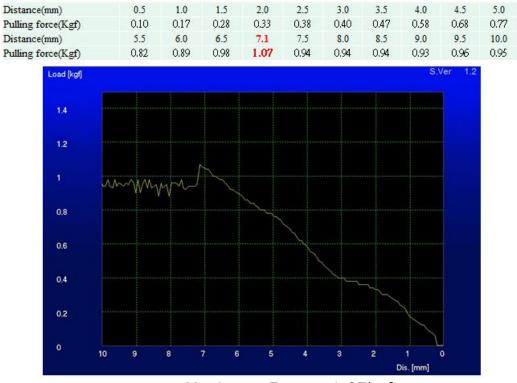
## 7.1 Testing Setup







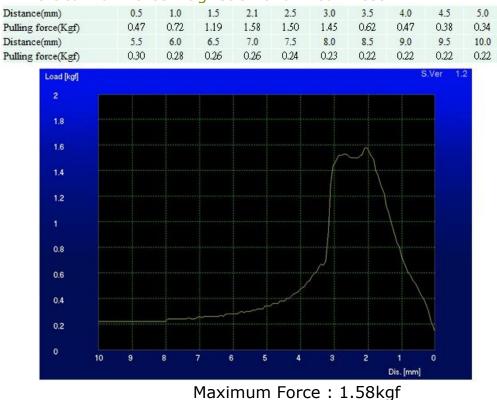
## 7.2 Testing Results



#### 7.2.1 Horizontal Pull Force Magnetic Bond Break Test

Maximum Force : 1.07kgf





#### 7.2.2 Vertical Pull Force Magnetic Bond Break Test

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