

## Specification

- Part No. : **MA650.A.AB.002**
- Product Name : Spartan Antenna 2in1 MA650 with 10M cable length
- Feature : Cellular 850/900/1700/1800/2100MHz  
GSM/CDMA/UMTS/HSPA  
GPS/GLONASS/GALILEO – 5dBiC  
IP67 Waterproof  
High Efficiency / Peak Gain Outdoor Antenna  
Advanced RF Design and Materials  
Heavy Duty – Integrated Metal Base/  
Ground-plane  
Standard 10 meters low loss cables  
Custom cables and connectors available  
**RoHS Compliant**



## **1. Introduction**

The Spartan MA650 antenna is a low profile, heavy-duty, fully IP67 waterproof external M2M antenna for use in telematics, transportation and remote monitoring applications. With a standard length of 10 meters of very low loss cable it is specially designed suitable for e-Bus or train telematics applications where long cable lengths are needed.

The Spartan MA650 antenna is unique in the market because it combines 2in1 GPS/GALILEO, Cellular (3G and 2G) antennas in a heavy-duty structure with high efficiency in a low profile compact format. The antenna screws down permanently onto a roof or metal panel and can be pole or wall-mounted. The antennas are designed to be isolated from each other to prevent cross-interference.

For industries such as commercial vehicle telematics, remote monitoring, smart meter systems, construction equipment, at only 40mm high, the Spartan provides an unobtrusive, robust, rugged antenna that is durable even in extreme environments.

## 2. Specification Table

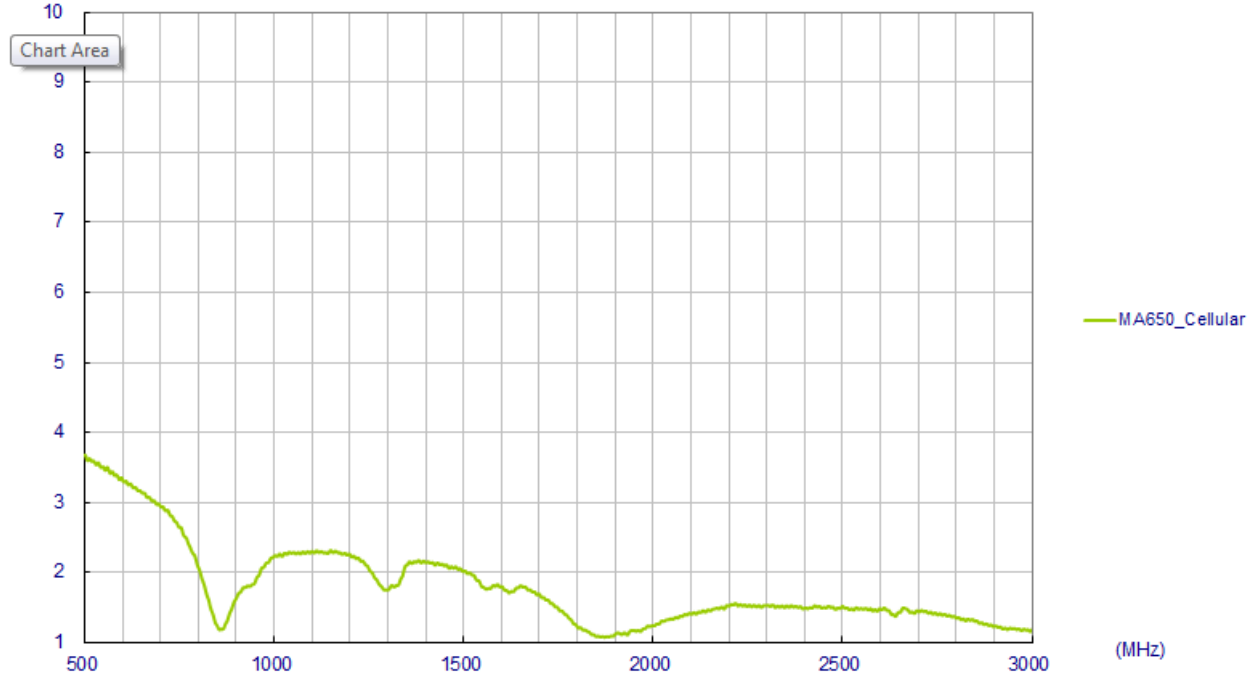
ELECTRICAL – GPS/GLONASS/GALILEO Passive Antenna	
Frequency	1575.42 ± 3MHz 1602 ± 3MHz
Radiation Efficiency	50%
Peak Gain	4 ±1 dBic typ.
VSWR	2:1 Max
Polarization	Linear
Impedance	50Ω

ELECTRICAL - LNA			
Frequency	1575.42 ± 3MHz 1602 ± 3MHz		
Impedance	50 Ω		
VSWR	2:1 Max		
DC Power Input	3.3V	4V	5V
Gain @3.3V	28dB	28dB	28dB
Noise Figure	1.50dB	1.55dB	1.62dB
Power Consumption	8mA	10mA	13mA
Band Attenuation	±50MHz	±70MHz	±100MHz
	30dB	30dB	30dB

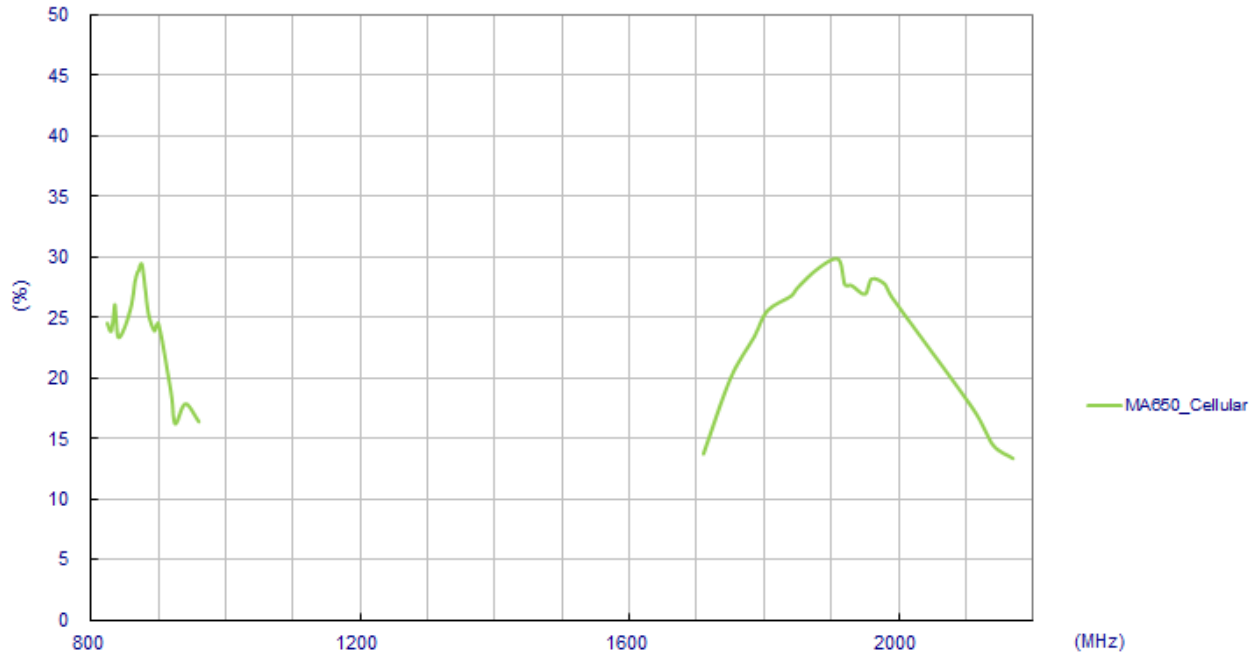
ELECTRICAL – Cellular Antenna					
Frequency (GHz)	824~896	880~960	1710~1880	1850~1990	1920~2170
Peak Gain (dBi) *	-0.5	-0.5	-1.0	-0.5	-0.8
Avg. Gain (dBi) *	-5.8	-5.6	-5.4	-5.3	-5.5
Efficiency (%) *	29	28	30	27.9	28
VSWR	3 Max				
Polarization	Linear				
Radiation pattern	Omni				
*Including 10 meters cable loss					
MECHANICAL					
Antenna Dimensions	Height 50mm x Diameter 150mm				
Housing	PC				
Base and thread	Nickel plated Zinc				
Waterproof	IP67				
ENVIRONMENTAL					
Operating Temperature	-40°C to 85°C				
Storage Temperature	-40°C to 80°C				
Humidity	Non-condensing 65°C 95% RH				

### 3. Cellular Antenna Characteristics

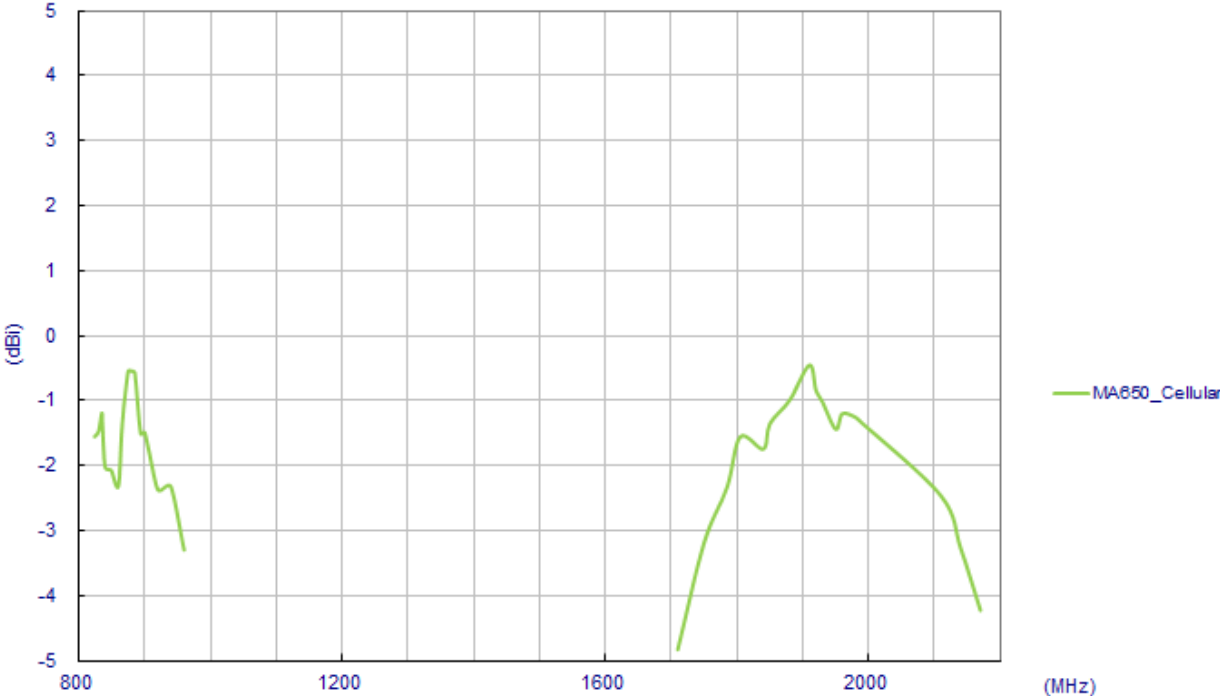
#### 3.1. VSWR



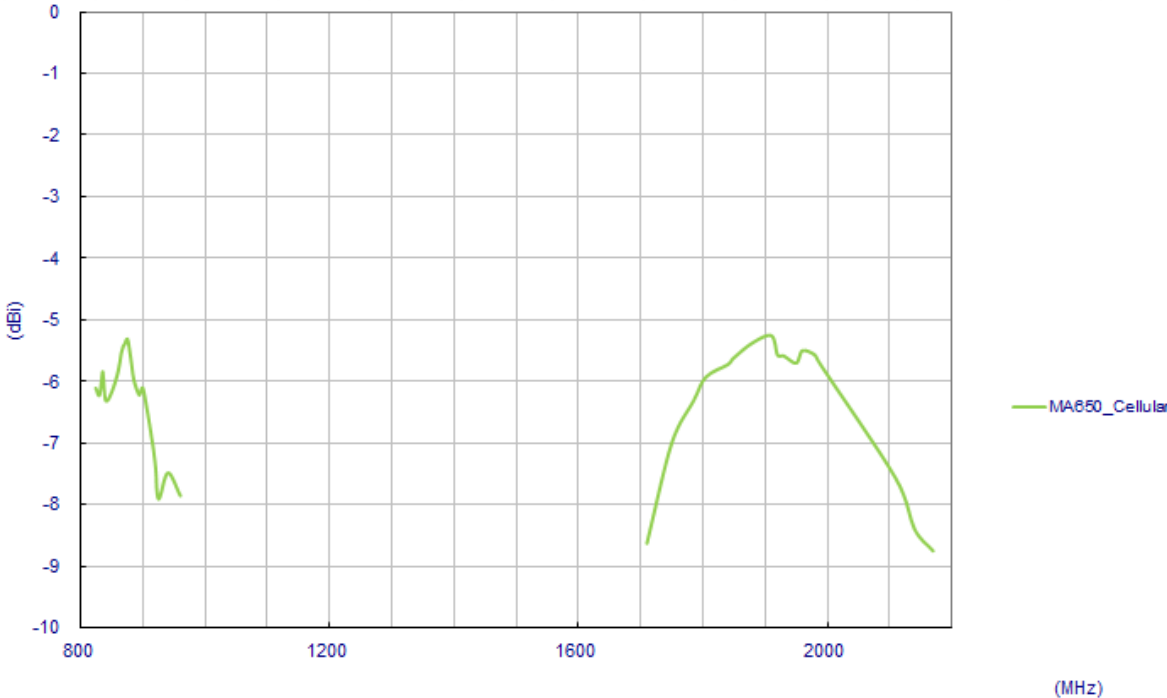
#### 3.2. Efficiency



**3.3. Peak Gain**

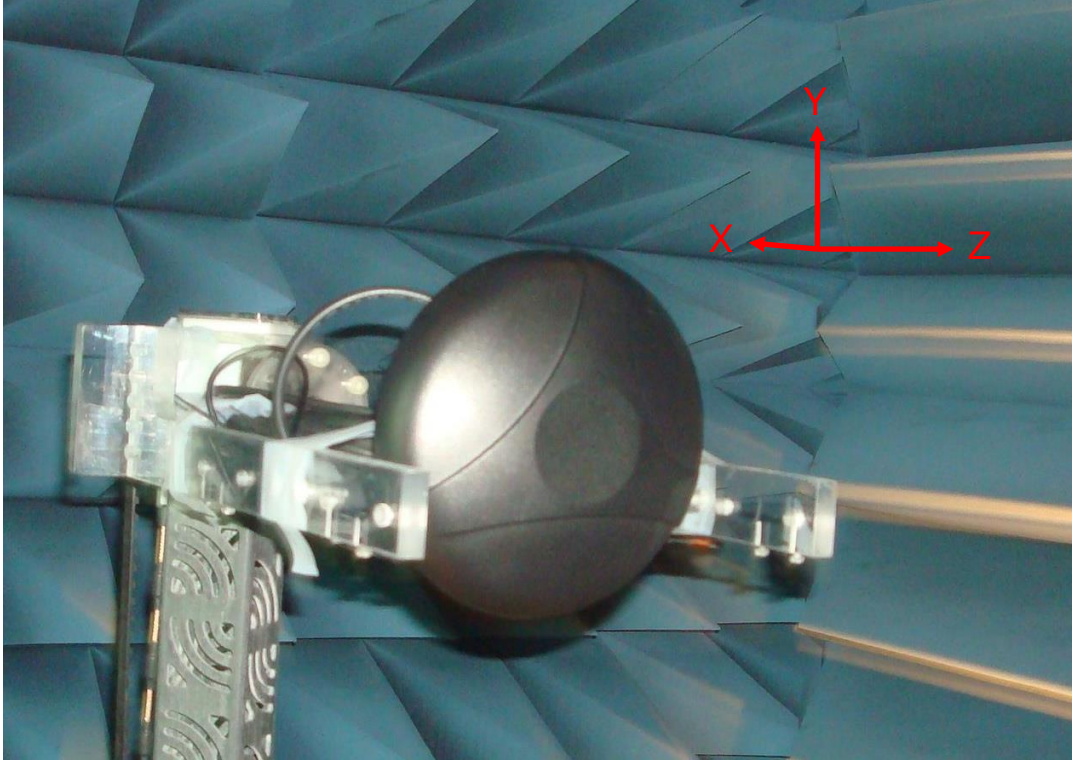


**3.4. Average Gain**

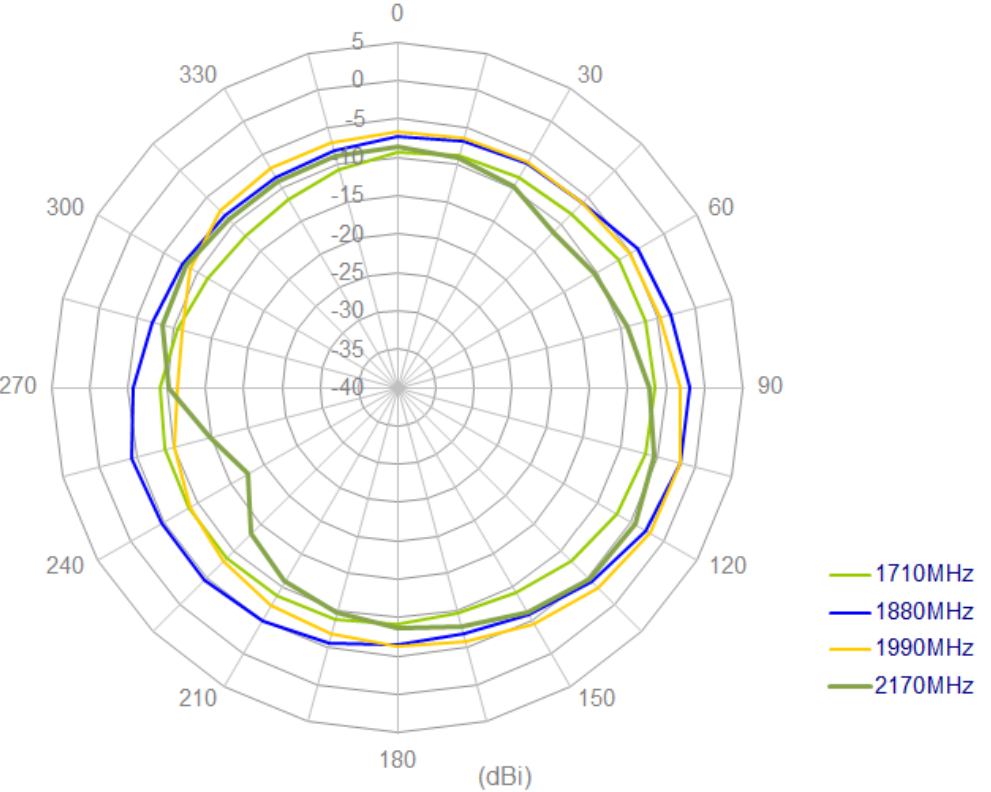
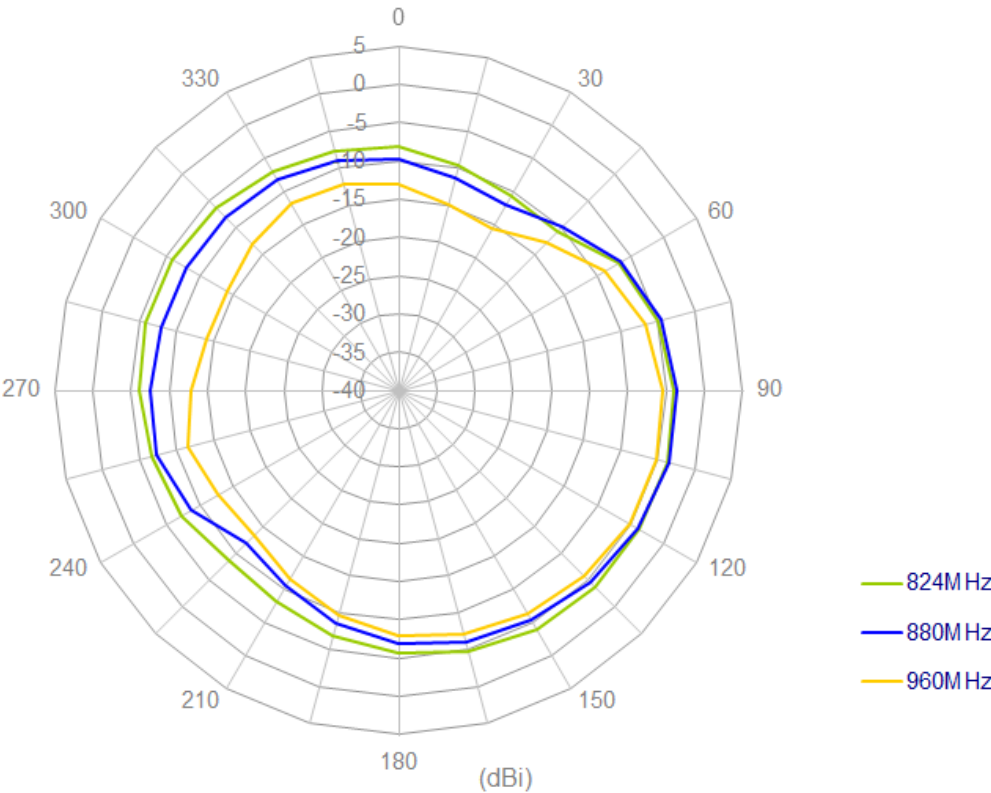


## 4. Radiation Patterns - Cellular

### 4.1. Antenna Setup

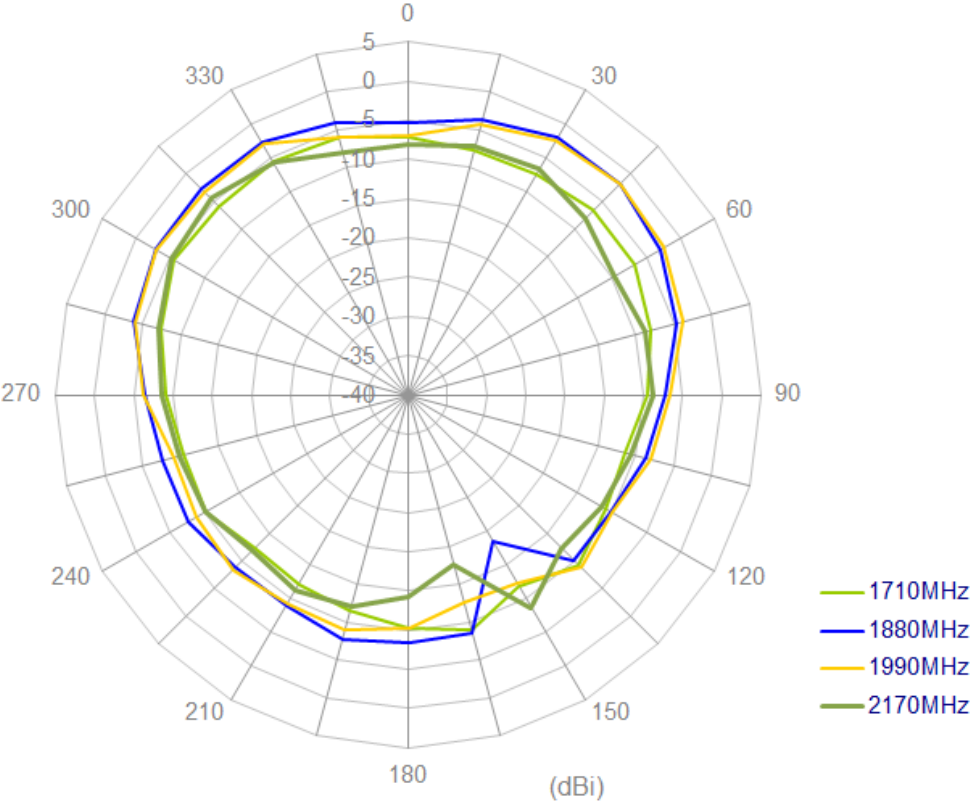
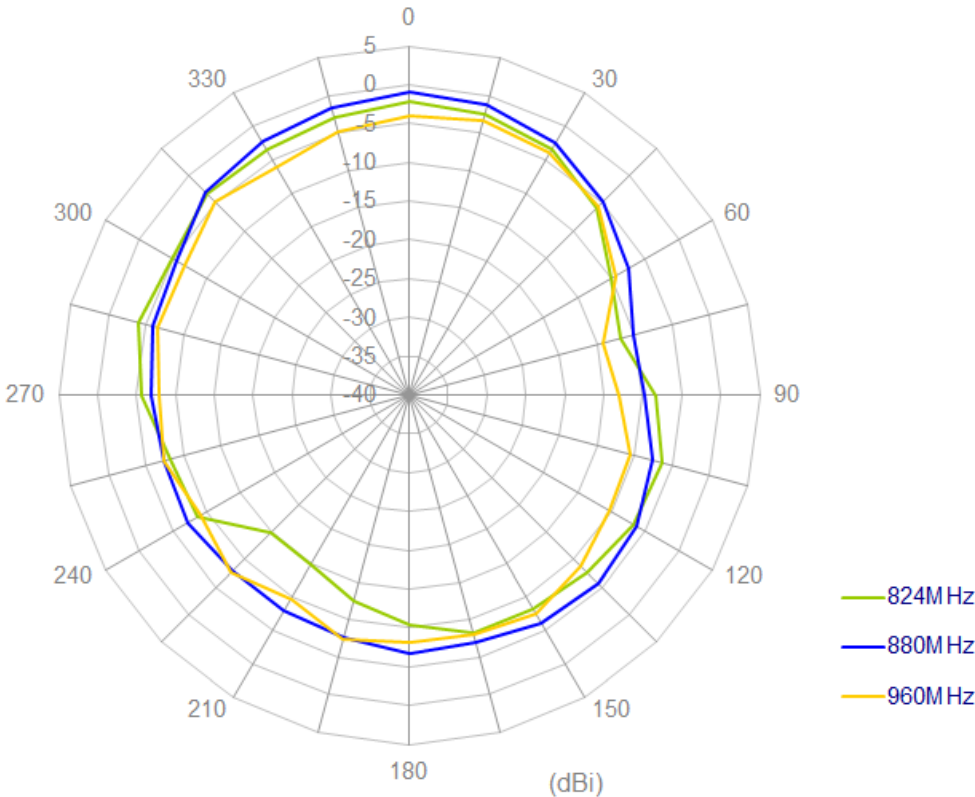


**4.2. XY Plane**





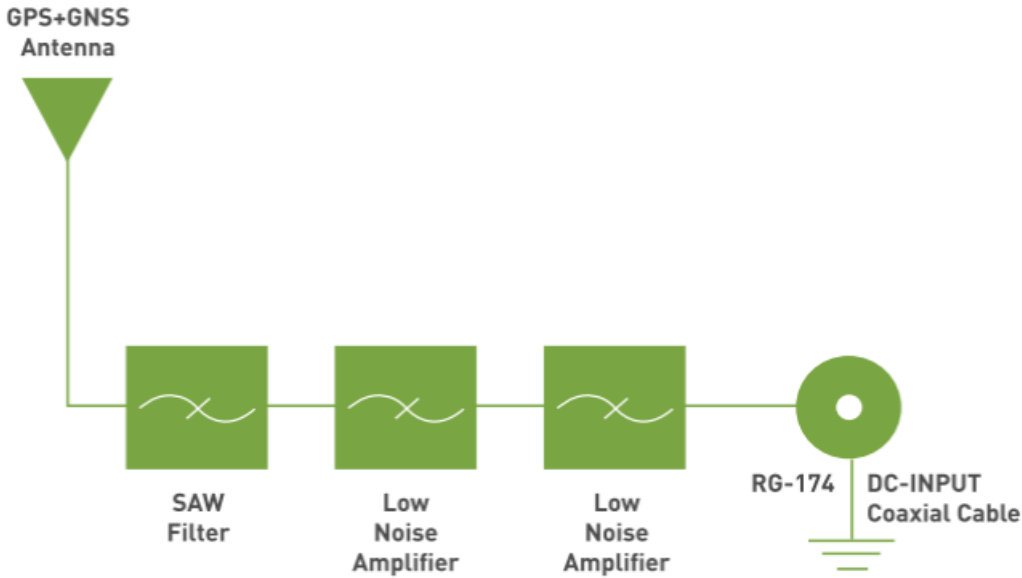
**4.3. XZ Plane**



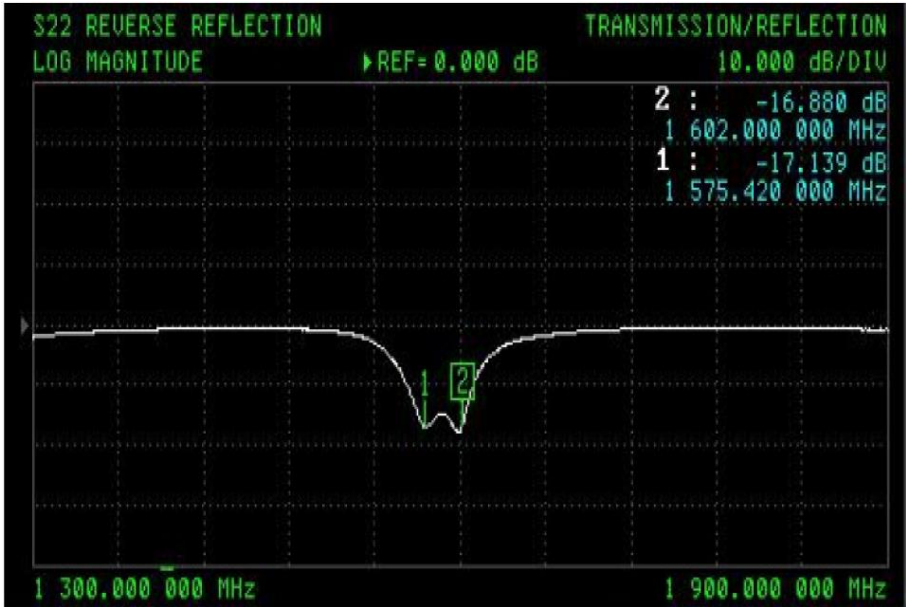
# 5. GPS/GLONASS/GALILEO Antenna

## Characteristics

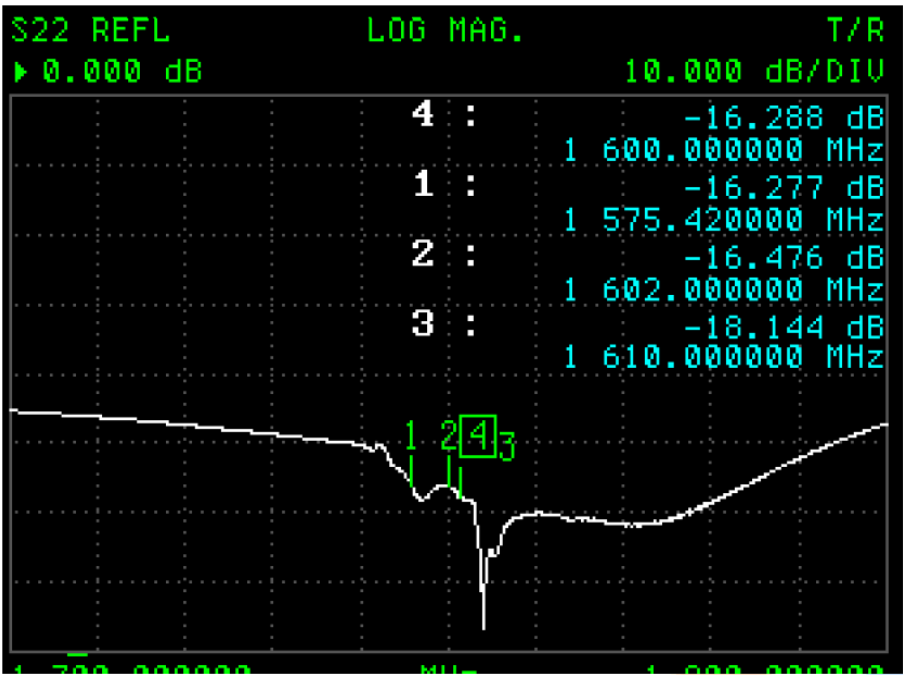
### 5.1. Block Diagram



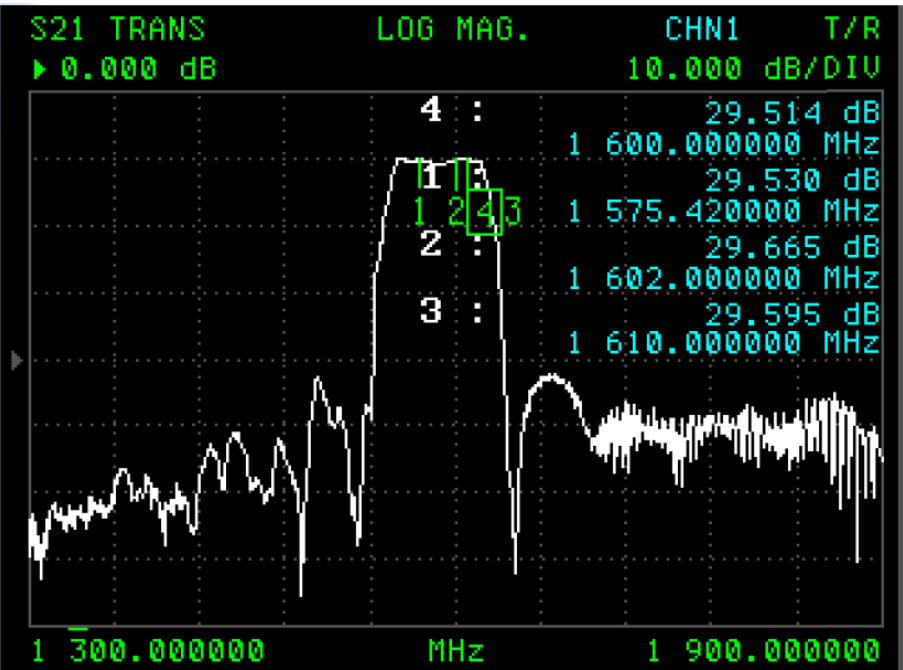
### 5.2. Return Loss



**5.3. LNA S 22**



**5.4. LNA S 21**



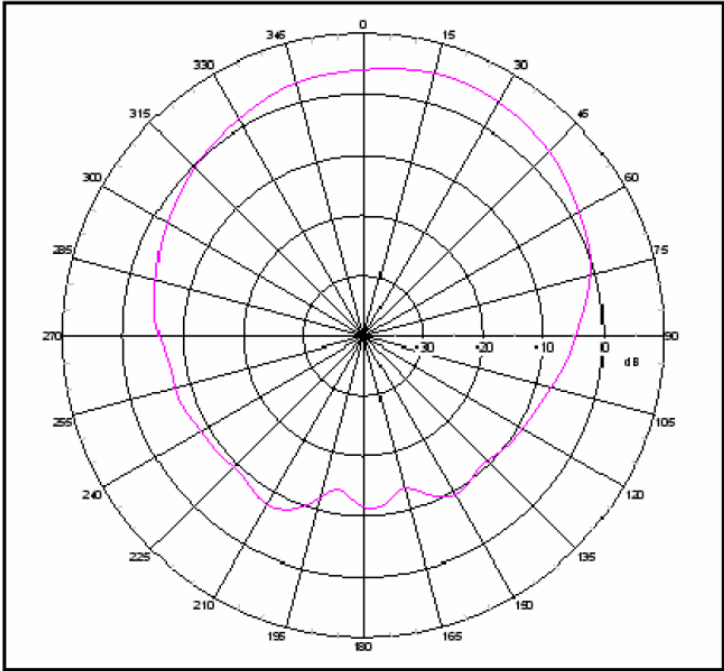
# 6. GPS/GLONASS/GALILEO Radiation patterns

## 6.1. Antenna Setup

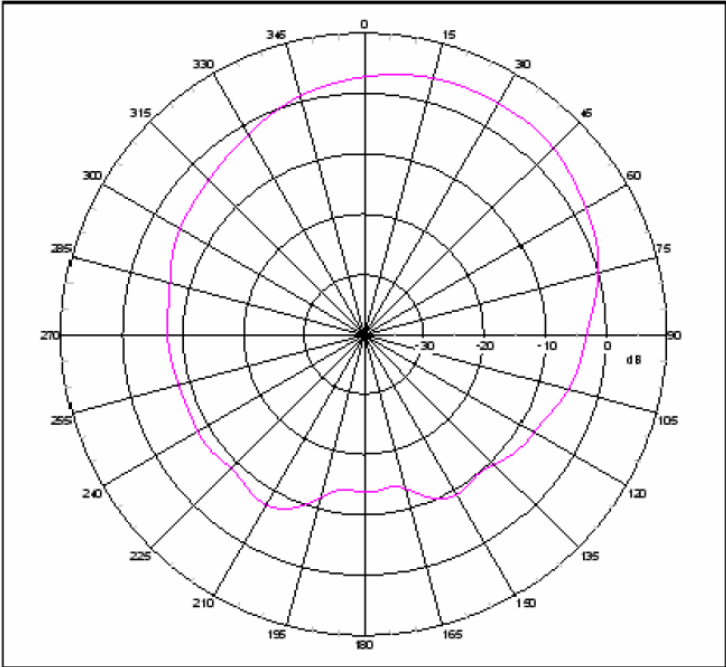


## 6.2. XZ Plane

### 6.2.1. 1575MHz

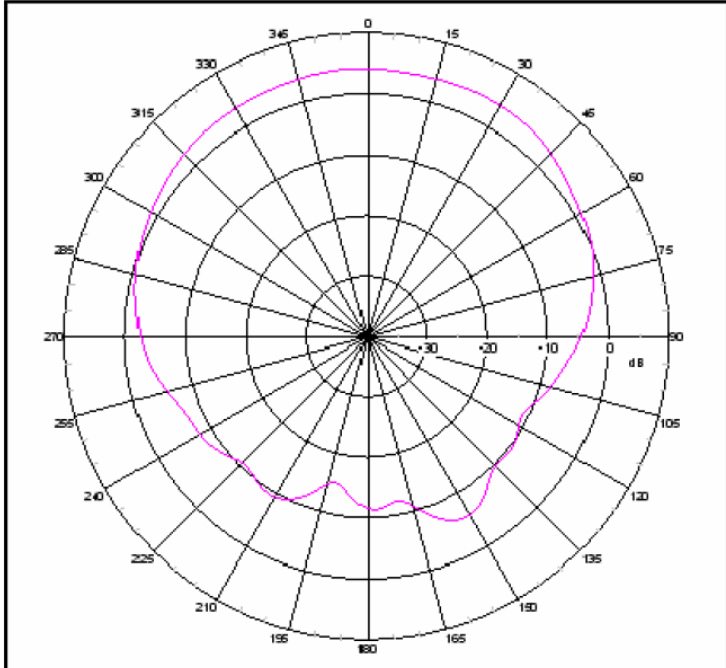


6.2.2. 1602MHz

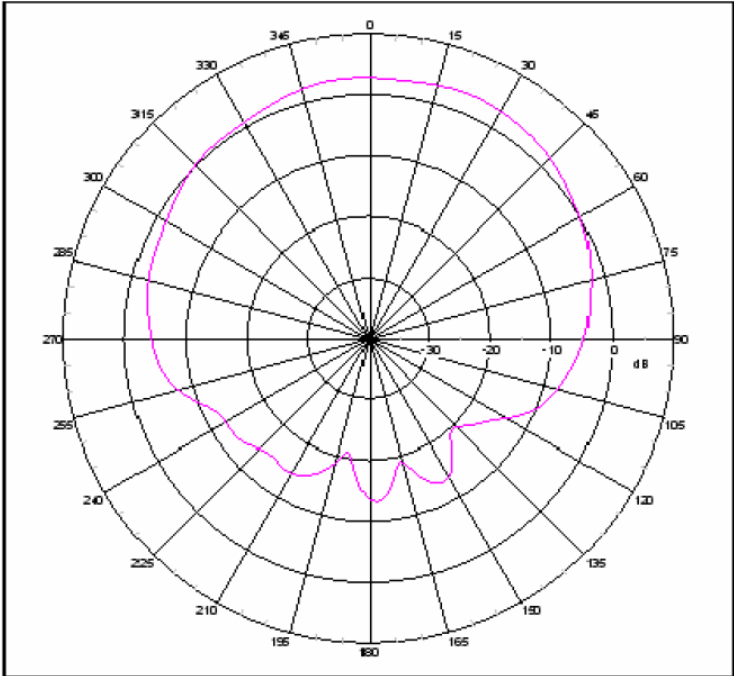


6.3. YZ Plane

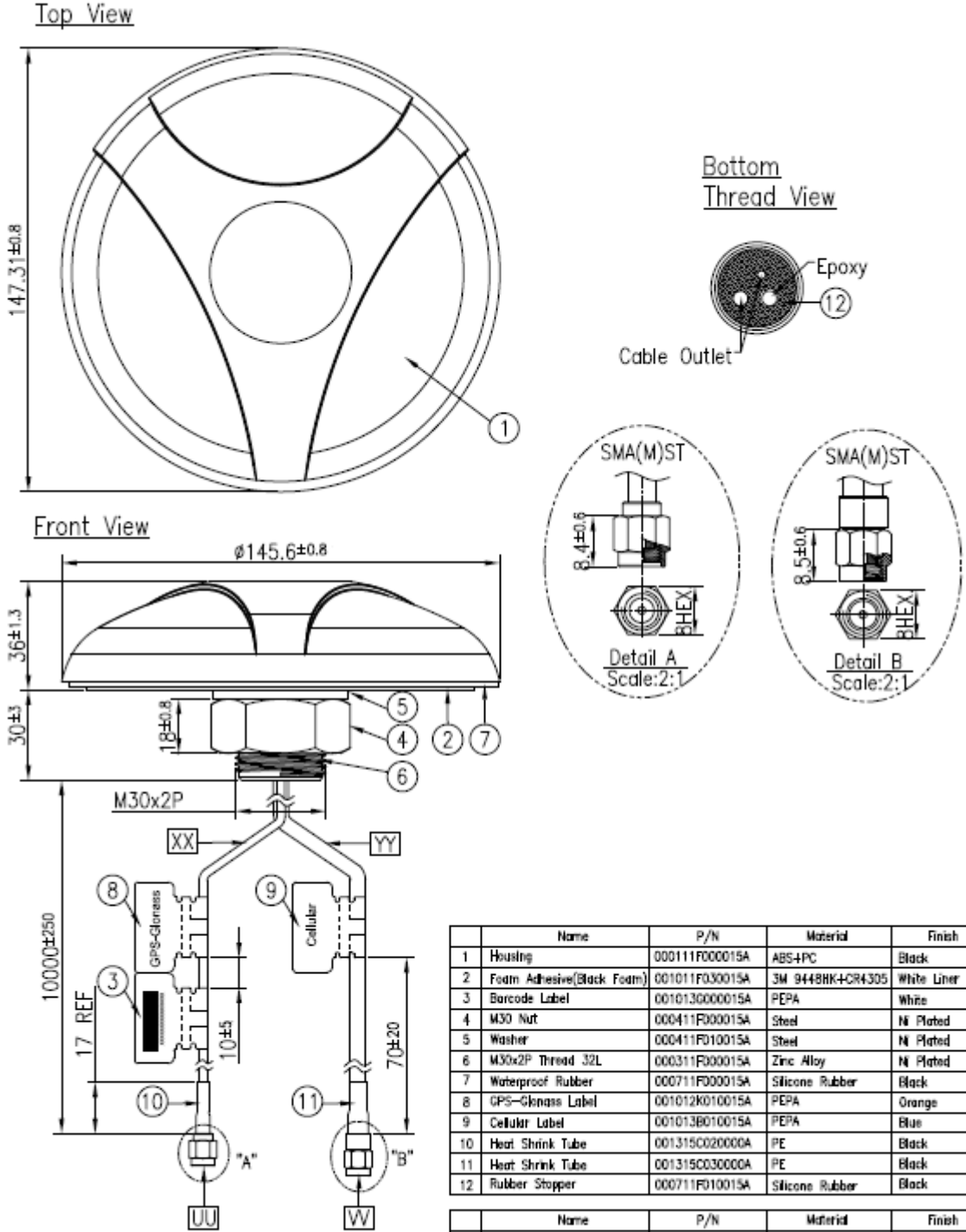
6.3.1. 1575MHz



6.3.2. 1602MHz



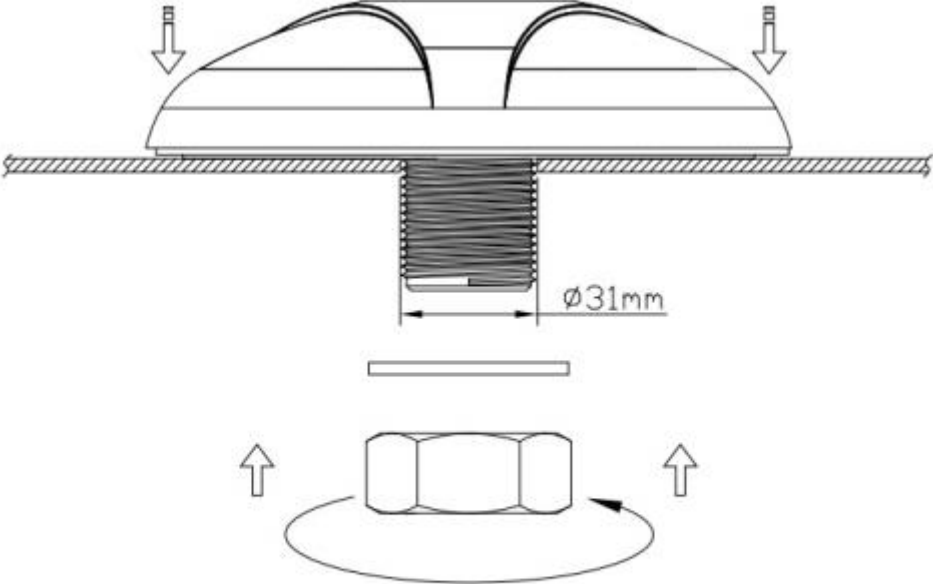
## 7. Drawing



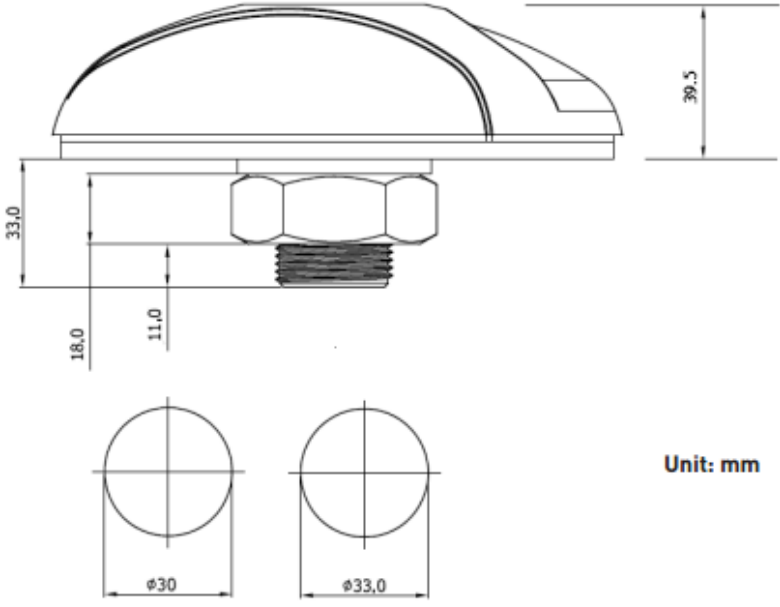
	Name	P/N	Material	Finish	QTY
1	Housing	000111F000015A	ABS+PC	Black	1
2	Foam Adhesive(Black Foam)	001011F030015A	3M 9448BK+CR4305	White Liner	1
3	Barcode Label	0010130000015A	PEPA	White	1
4	M30 Nut	000411F000015A	Steel	Ni Plated	1
5	Washer	000411F010015A	Steel	Ni Plated	1
6	M30x2P Thread 32L	000311F000015A	Zinc Alloy	Ni Plated	1
7	Waterproof Rubber	000711F000015A	Silicone Rubber	Black	1
8	GPS-Glass Label	001012K010015A	PEPA	Orange	1
9	Cellular Label	001013B010015A	PEPA	Blue	1
10	Heat Shrink Tube	001315C020000A	PE	Black	1
11	Heat Shrink Tube	001315C030000A	PE	Black	1
12	Rubber Stopper	000711F010015A	Silicone Rubber	Black	1

	Name	P/N	Material	Finish	QTY
UU	Connector Type	200212G000015A	SMA(M)ST	Au Plated	1
W	Connector Type	200212G010015A	SMA(M)ST	Au Plated	1
XX	Cable Type	301315C000000A	RG-174	Black	1
YY	Cable Type	301415C010000A	CFD-200	Black	1

**8. Installation**



Recommended Torque for Mounting 49 N·m  
 Maximum Torque for Mounting 58.8 N·m

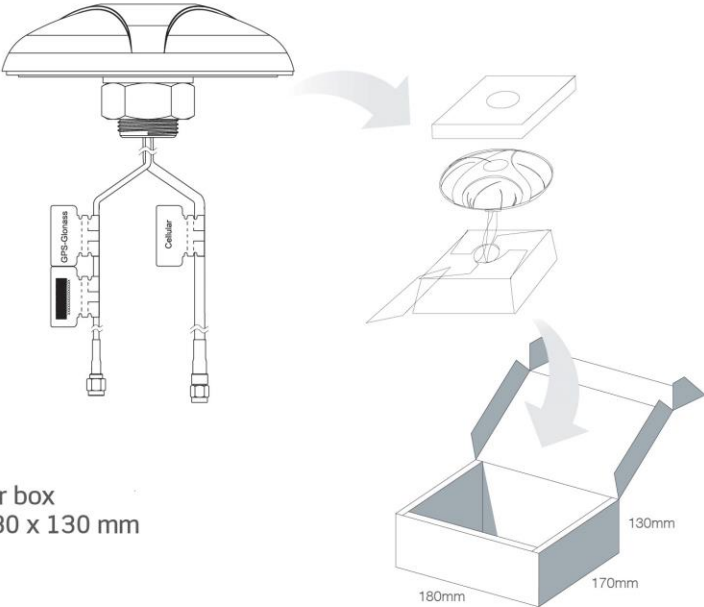


Unit: mm

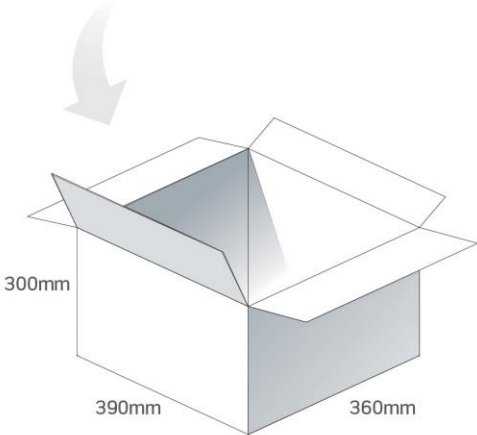
**Thread Diameter**      **Recommended Mounting Hole**



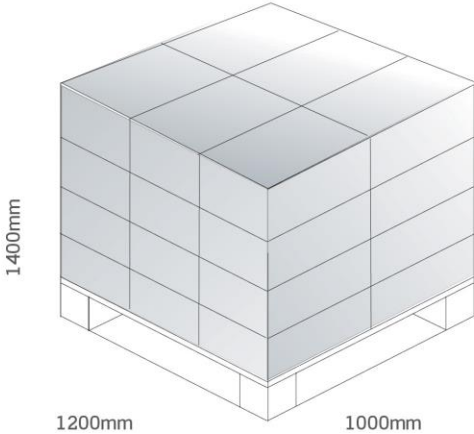
**9. Packaging**



1 pcs MA650.A.AB.008 per box  
 Box Dimensions - 170 x 180 x 130 mm  
 Weight - 1146g



8 pcs MA650.A.AB.008 per carton  
 Carton - 390 x 360 x 300mm  
 Weight - 10.2Kg



Pallet Dimensions 1200 x 1000 x 1400mm  
 24 Cartons per Pallet  
 6 Cartons per layer  
 4 Layers

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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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