



Spartan

MA650.A.AB.002

## Specification

<b>Part No.</b>	<b>MA650.A.AB.002</b>
<b>Product Name</b>	<b>Spartan</b> 2in1 MA.650 with 10M cable length Low Profile Screw Mount (Permanent Mount) GPS/GLONASS Cellular combination antenna
<b>Feature</b>	Cellular <ul style="list-style-type: none"> <li>• 850/900/1700/1800/2100MHz</li> <li>• GSM/CDMA/UMTS/HSPA</li> </ul> GPS/GLONASS - 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 MA.650 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 MA.650 antenna is unique in the market because it combines 2in1 GPS, Cellular (2G and 3G) 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

## Electrical – GPS/GLONASS Passive Antenna

<b>Frequency</b>	1575.42 ± 3MHz 1602 ± 3MHz
<b>Radiation Efficiency</b>	50%
<b>Peak Gain</b>	4 ±1 dBic typ.
<b>VSWR</b>	2:1 Max
<b>Polarization</b>	Linear
<b>Impedance</b>	50Ω

## Electrical - LNA

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

## 2. Specification

### Electrical – Cellular Antenna

<b>Frequency (GHz)</b>	824~896	880~960	1710~1880	1850~1990	1920~2170
<b>Peak Gain (dBi) *</b>	-0.5	-0.5	-1.0	-0.5	-0.8
<b>Avg. Gain (dBi) *</b>	-5.8	-5.6	-5.4	-5.3	-5.5
<b>Efficiency (%) *</b>	29	28	30	27.9	28
<b>VSWR</b>	3 Max				
<b>Polarization</b>	Linear				
<b>Radiation pattern</b>	Omni				

\*Including 10 meters cable loss

### Mechanical

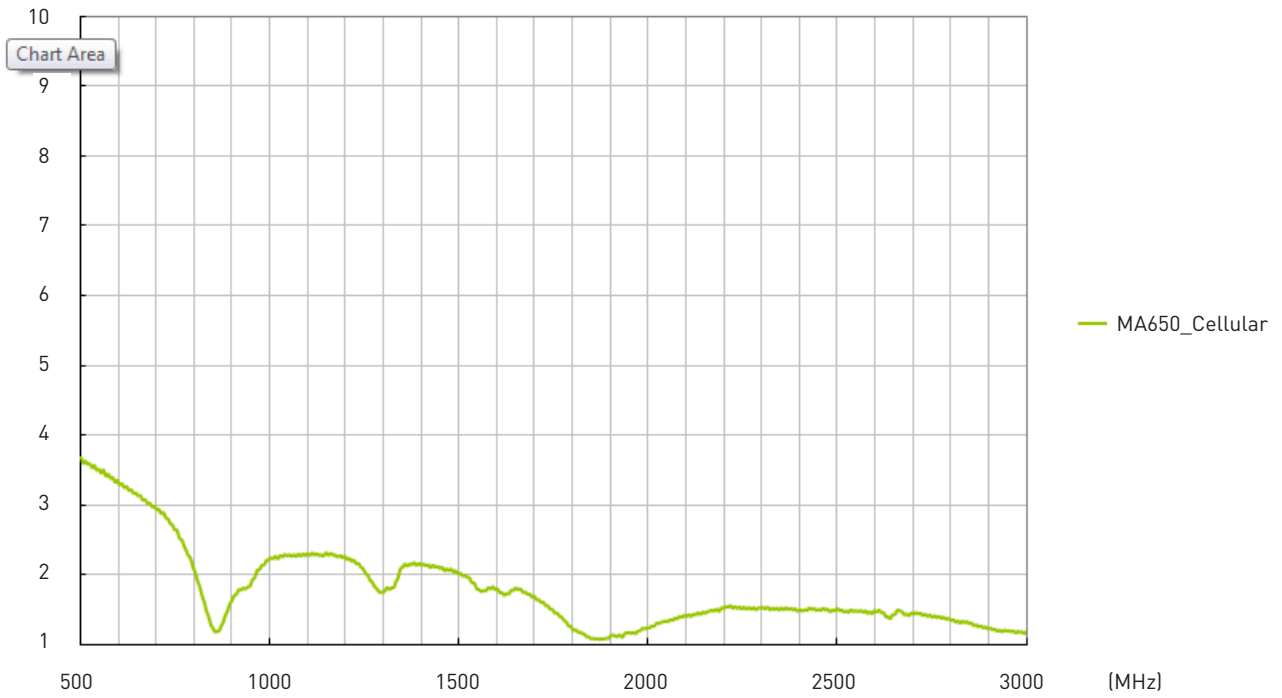
<b>Antenna Dimensions</b>	Height 50mm x Diameter 150mm
<b>Housing</b>	PC
<b>Base and thread</b>	Nickel plated Zinc
<b>Waterproof</b>	IP67

### Environmental

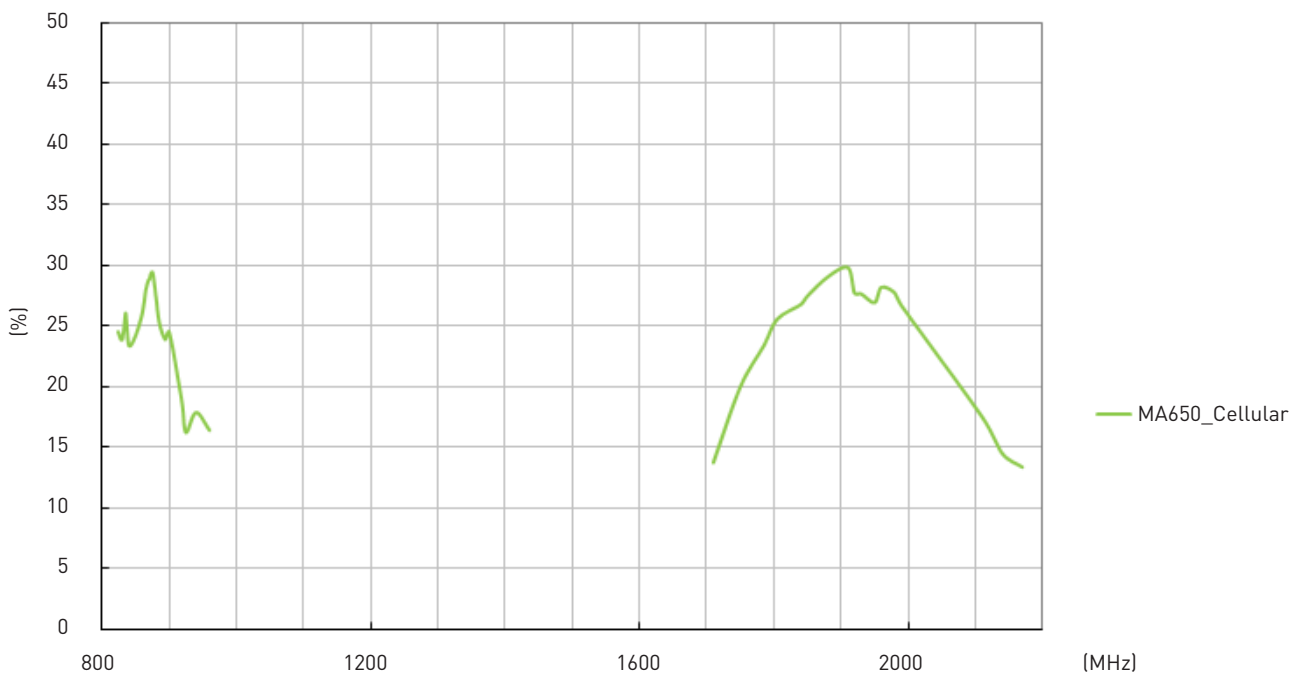
<b>Operating Temperature</b>	-40°C to 85°C
<b>Storage Temperature</b>	-40°C to 80°C
<b>Humidity</b>	Non-condensing 65°C 95% RH

### 3. Cellular Antenna Characteristics

#### 3.1 VSWR

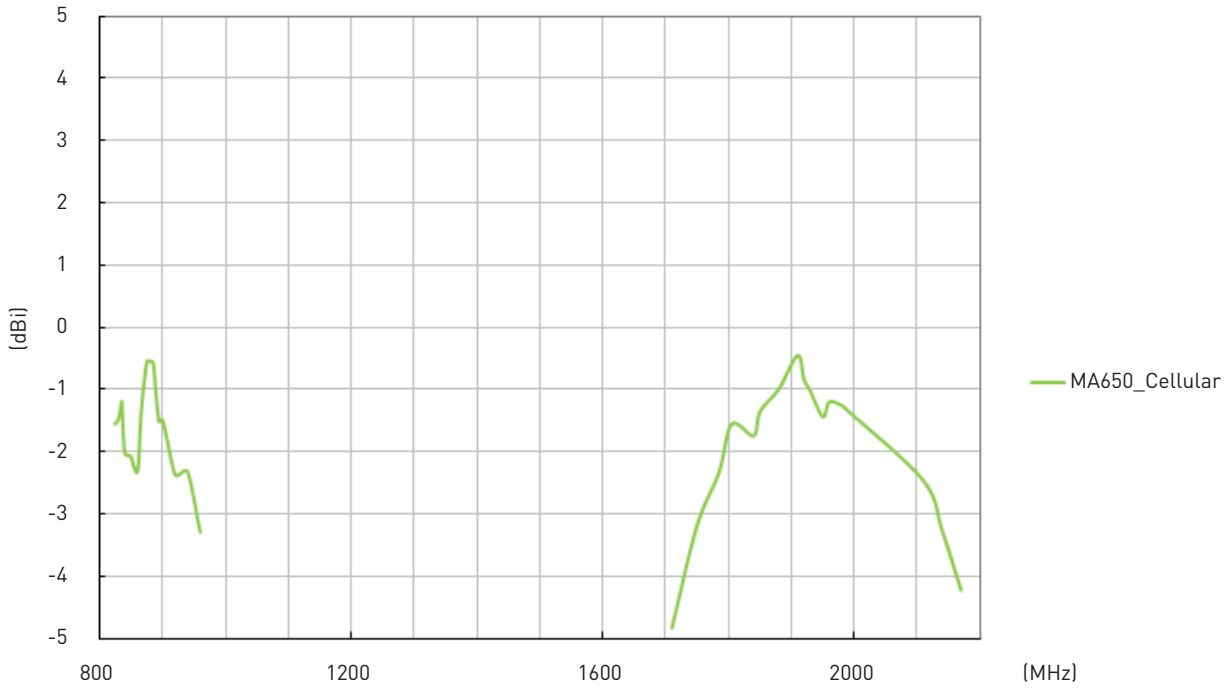


#### 3.2 Efficiency

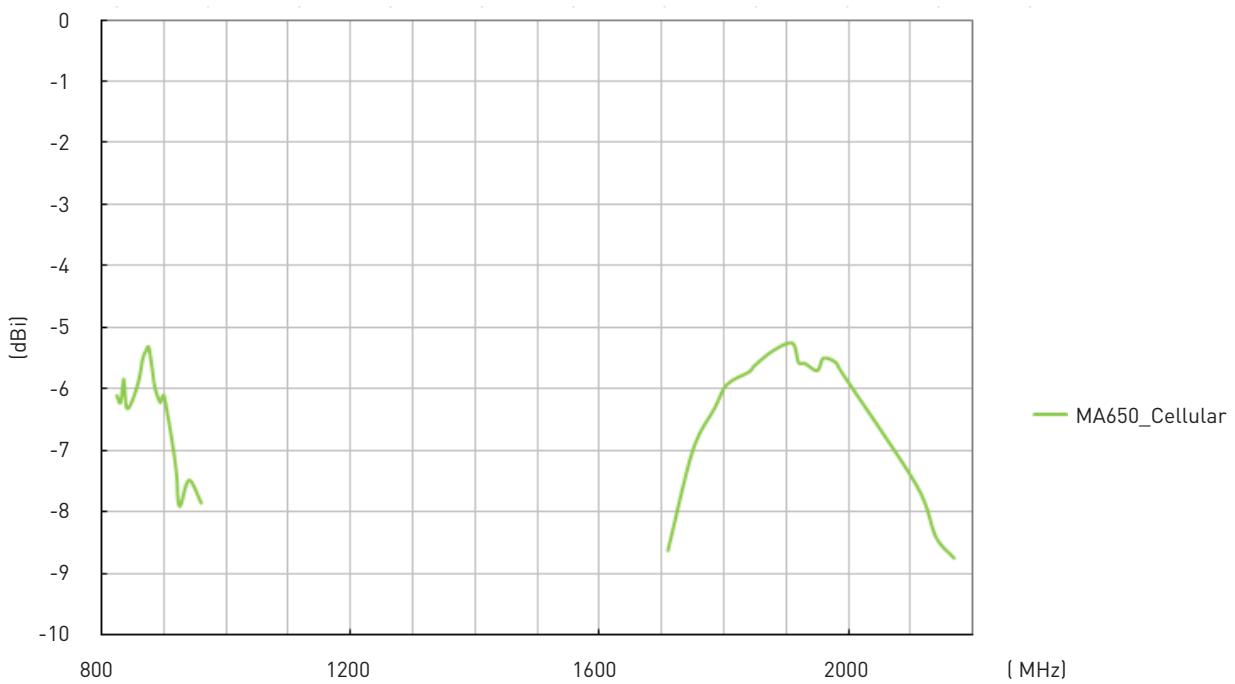


### 3. Cellular Antenna Characteristics

#### 3.3 Peak Gain

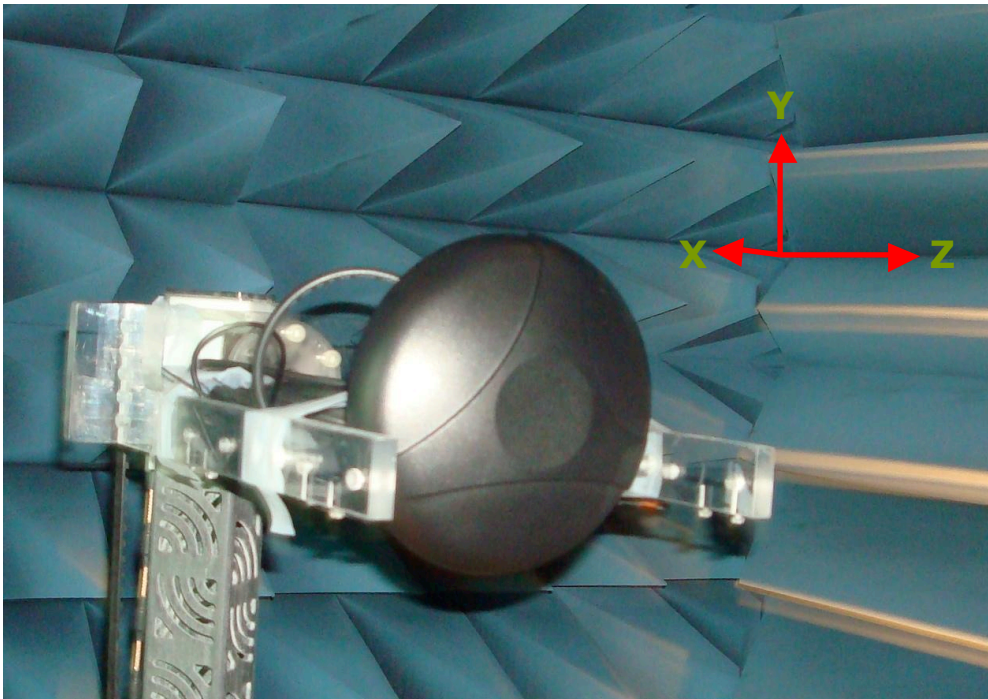


#### 3.4 Average Gain



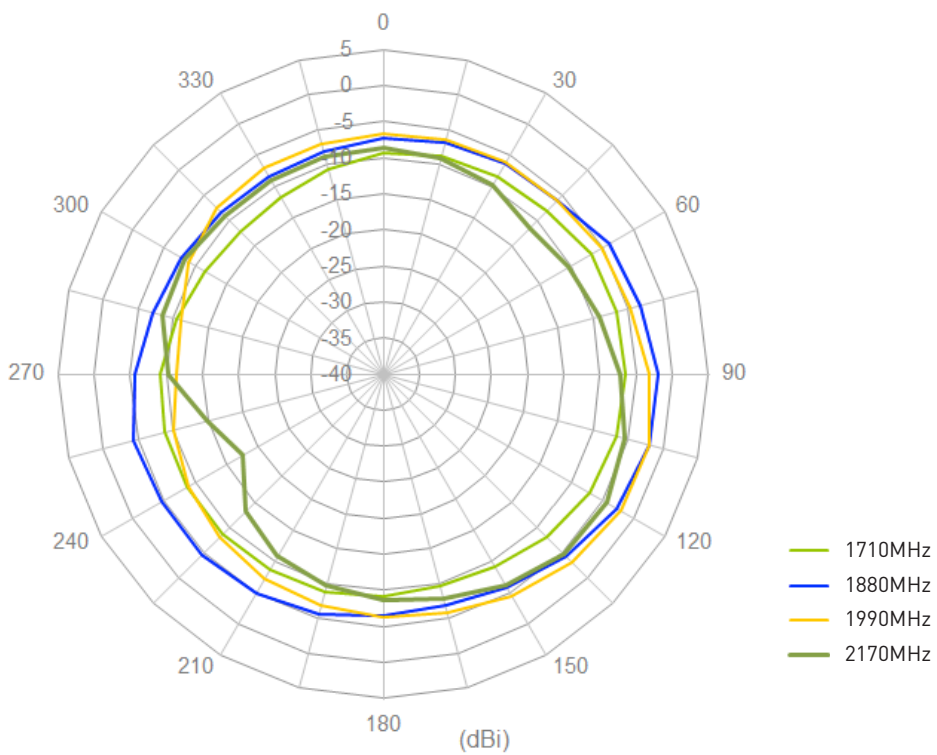
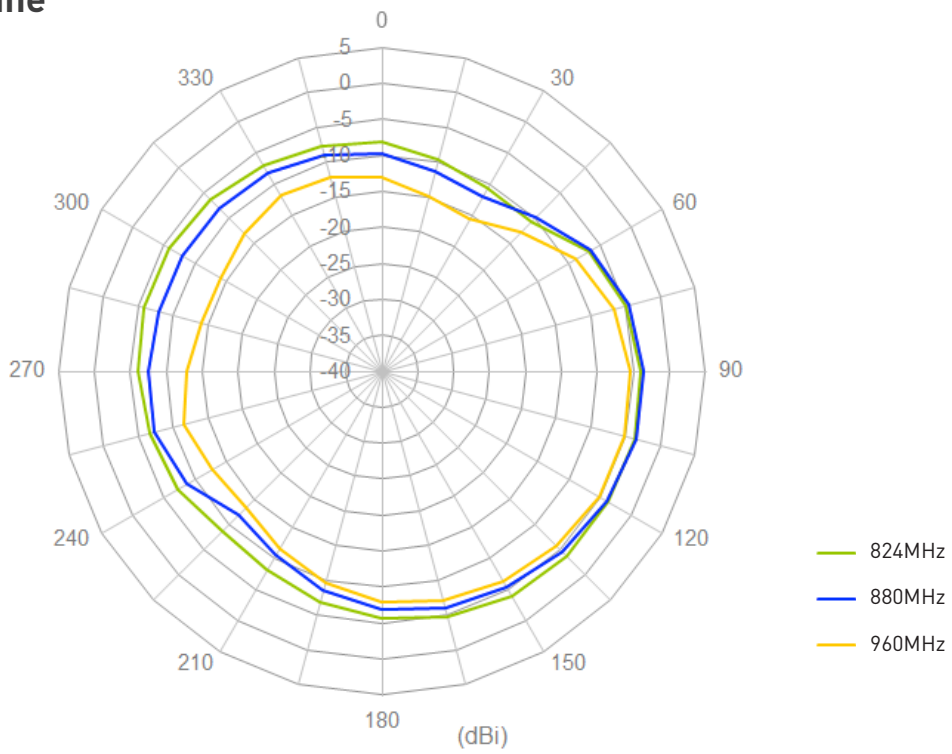
## 4. Radiation Patterns - Cellular

### 4.1 Antenna Setup



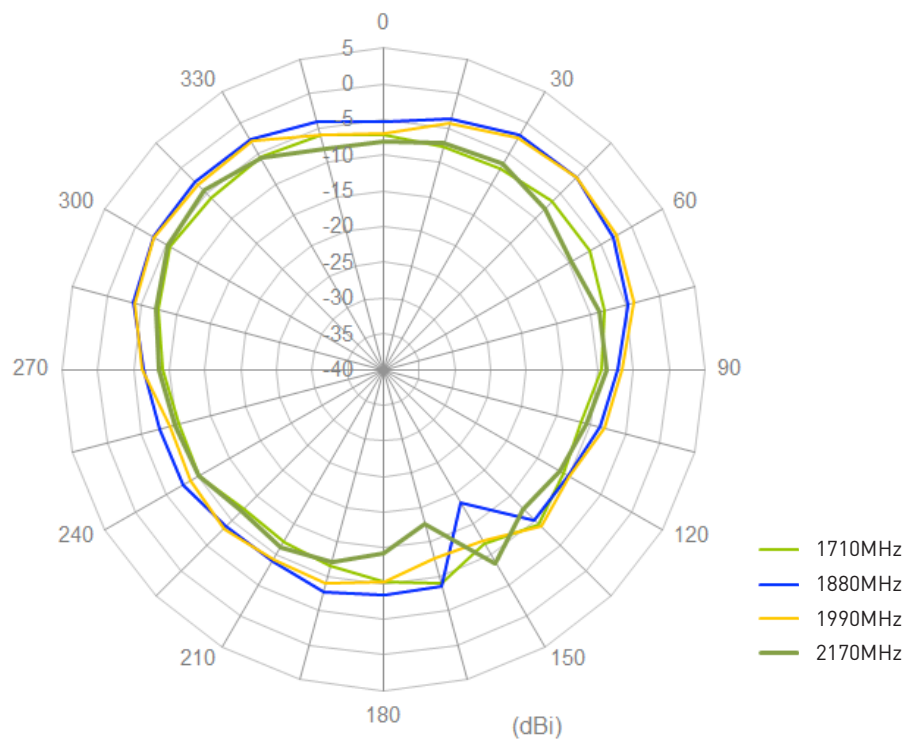
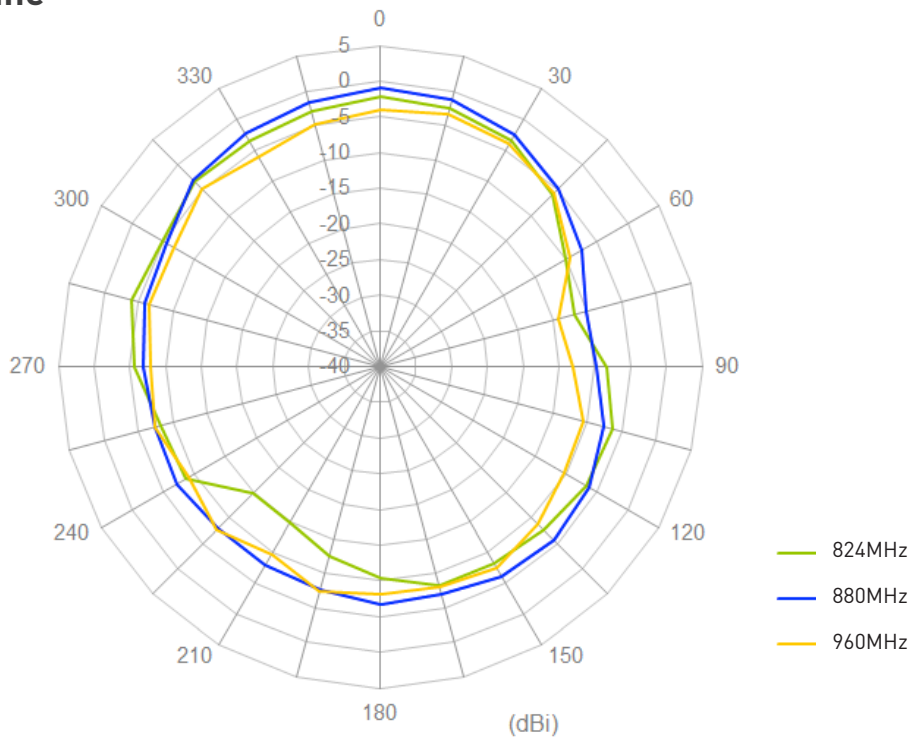
## 4. Radiation Patterns - Cellular

### 4.2 XY Plane



## 4. Radiation Patterns - Cellular

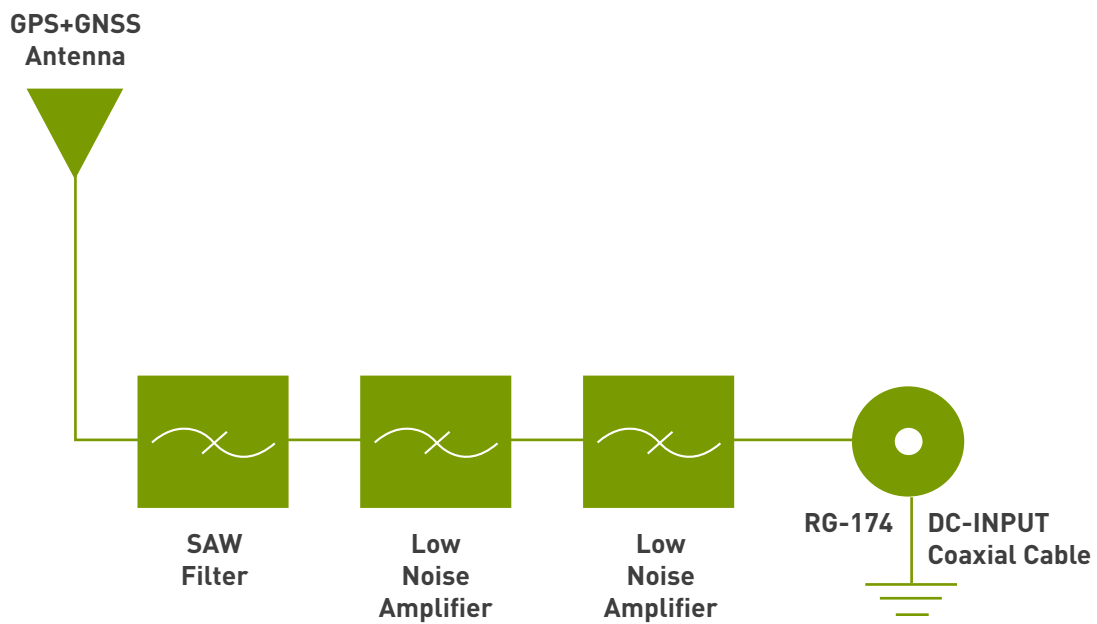
### 4.3 XZ Plane





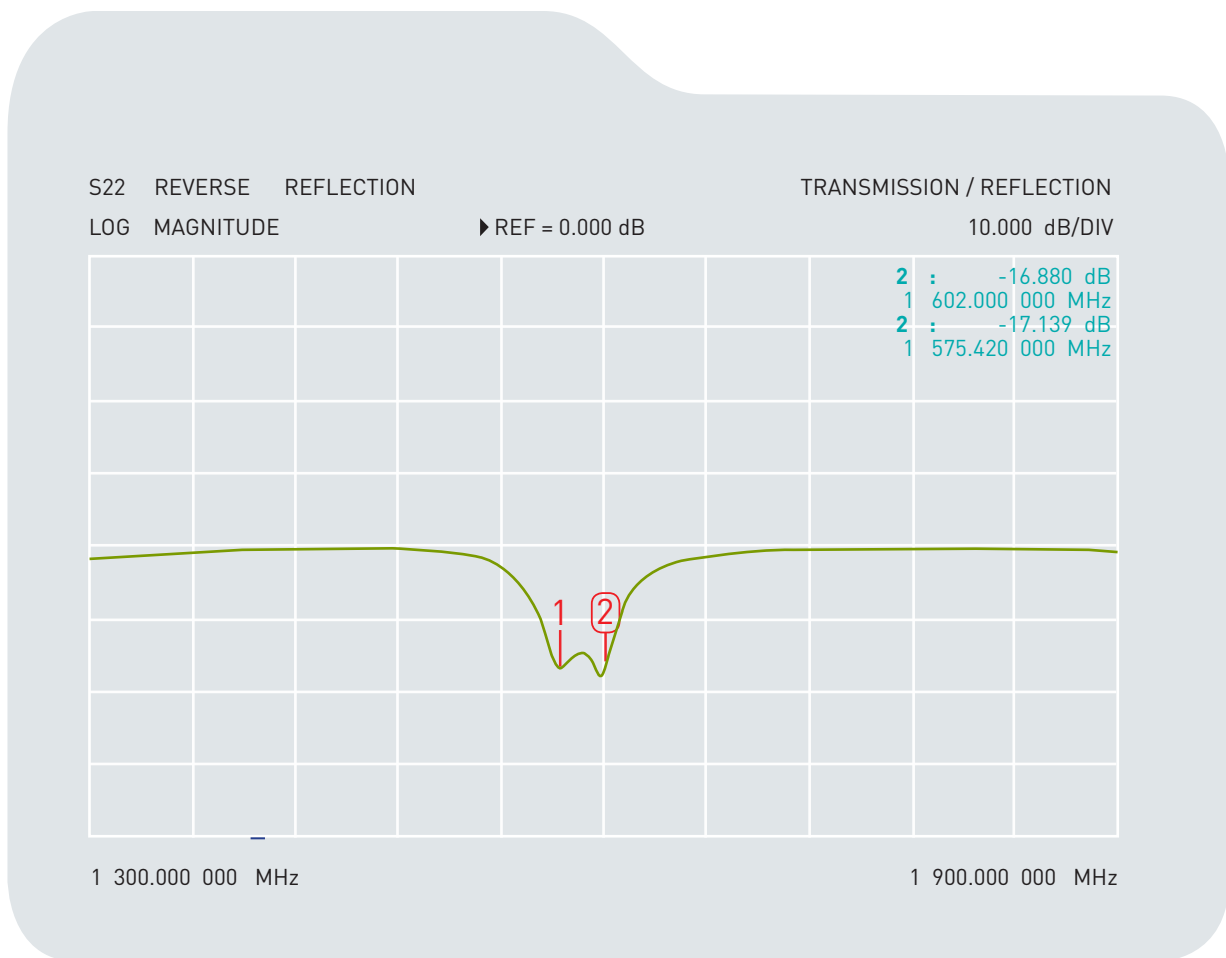
## 5. GPS/Glonass Antenna Characteristics

### 5.1 Block Diagram



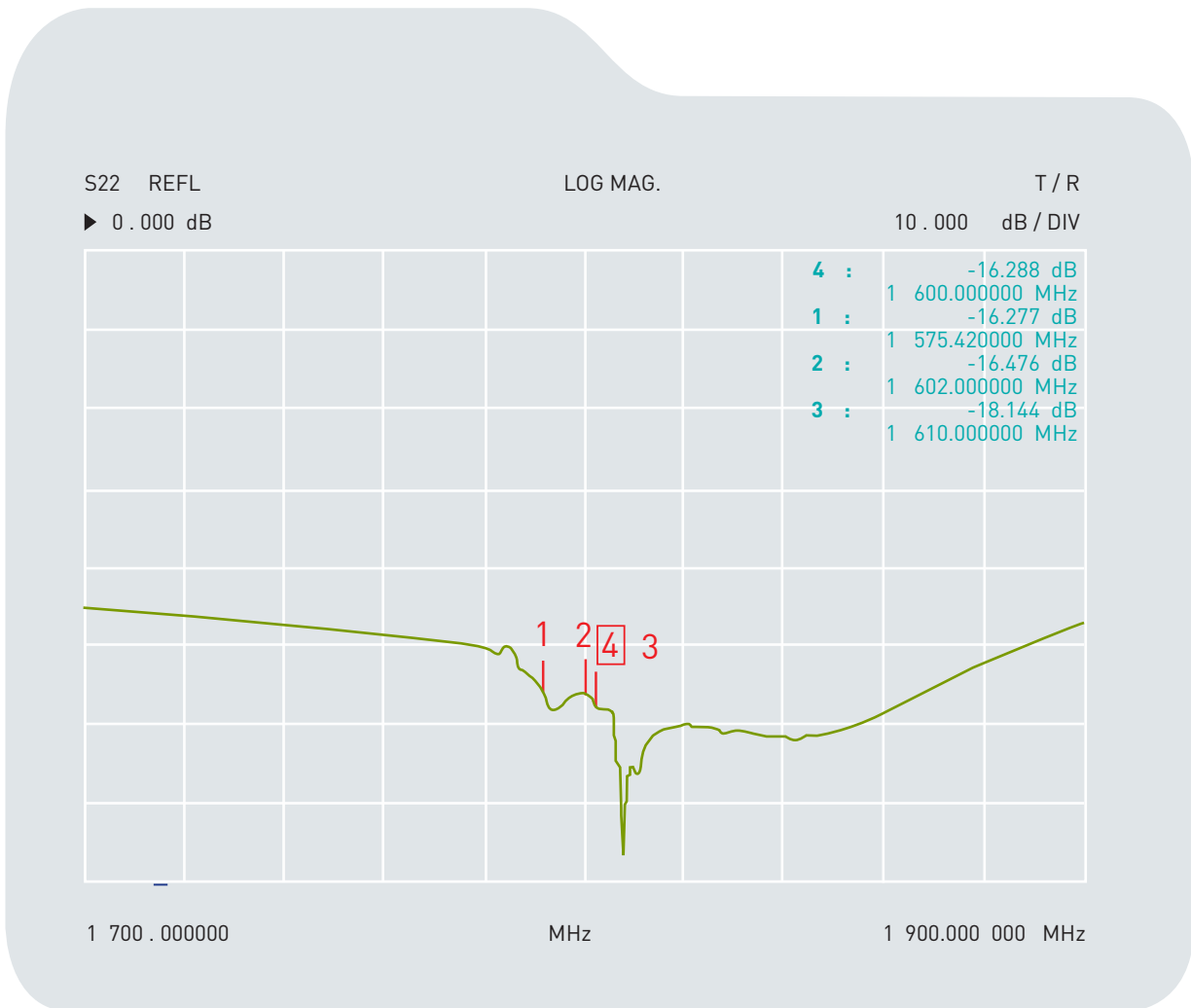
## 5. GPS/Glonass Antenna Characteristics

### 5.2 Return Loss



## 5. GPS/Glonass Antenna Characteristics

### 5.3 LNA S22



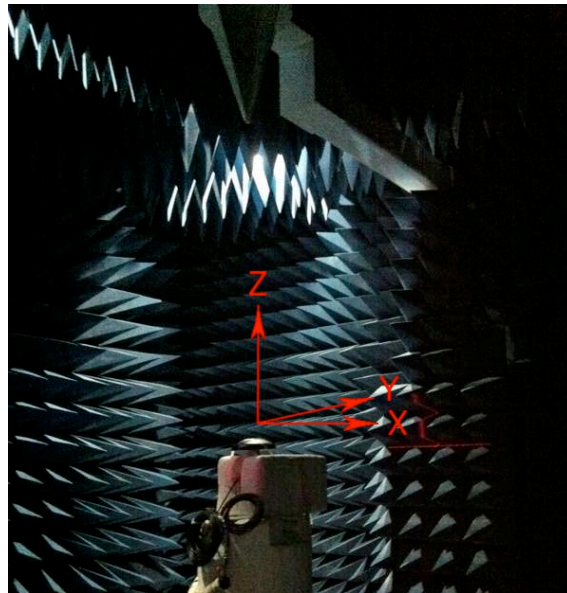
## 5. GPS/Glonass Antenna Characteristics

### 5.4 LNA S21



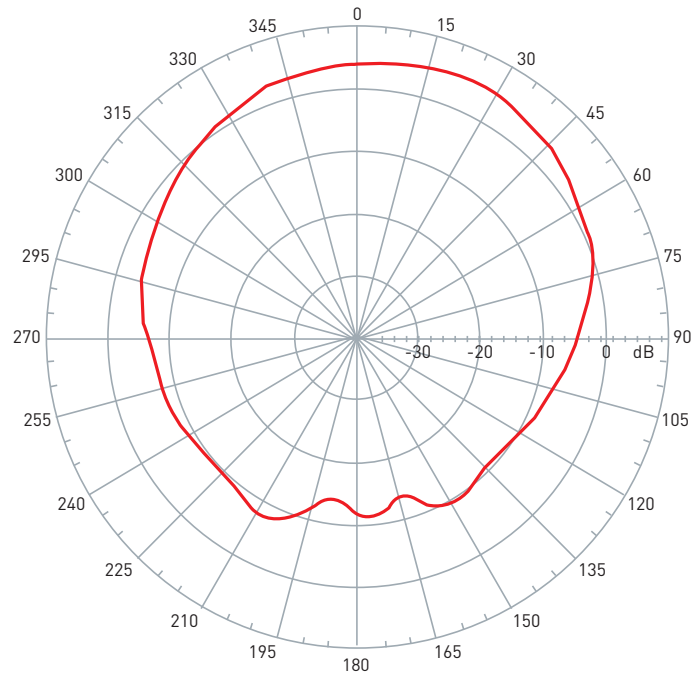
## 6. Radiation Patterns - GPS/GLONASS

### 6.1 Antenna Setup

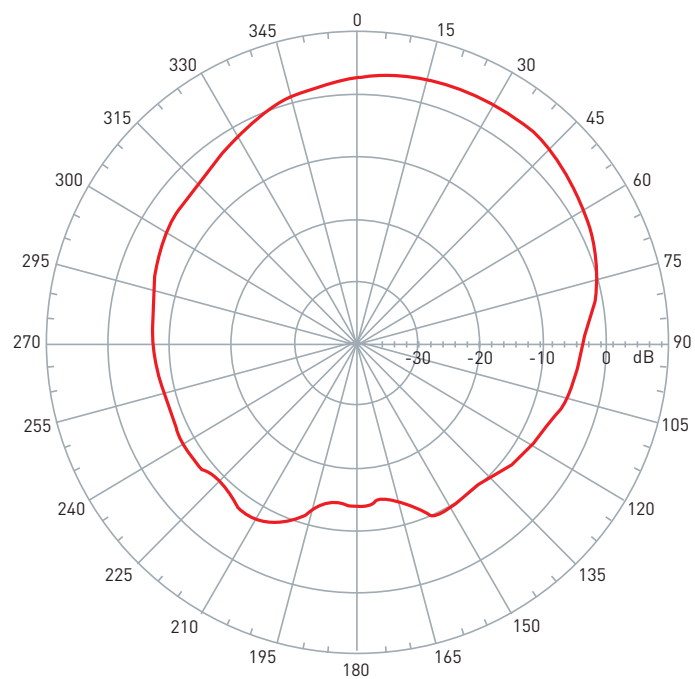


## 6.2 XZ Plane

### 6.2.1 1575MHz

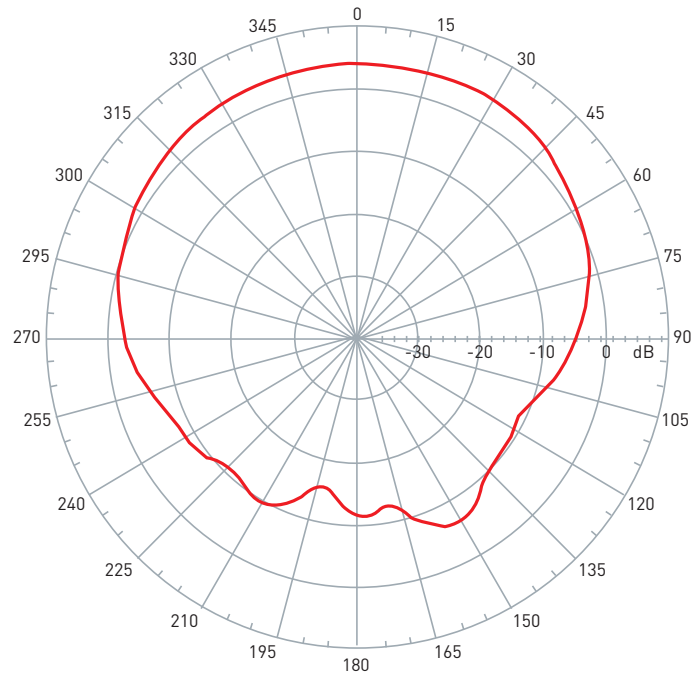


### 6.2.2 1602MHz

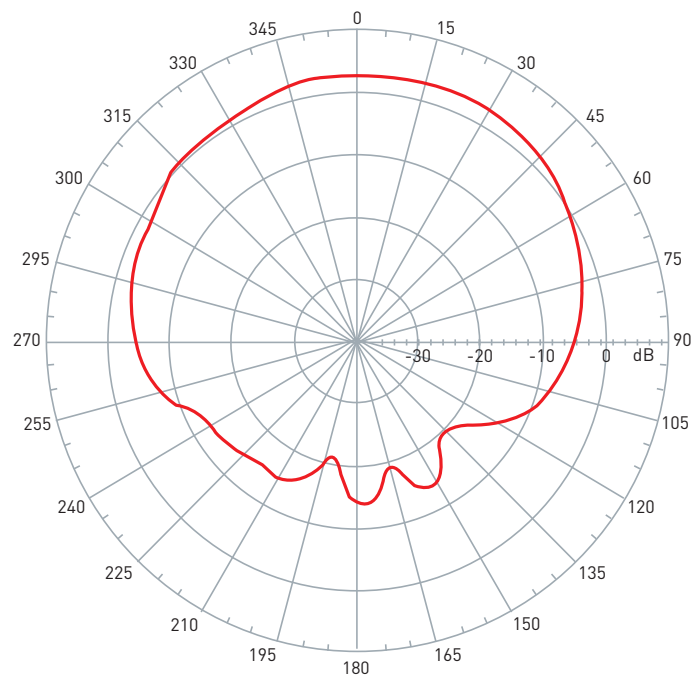


## 6.3 YZ Plane

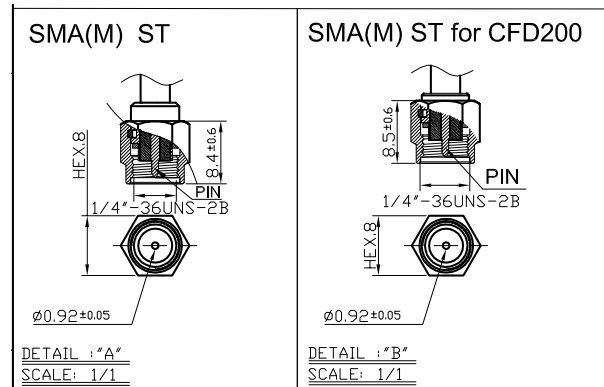
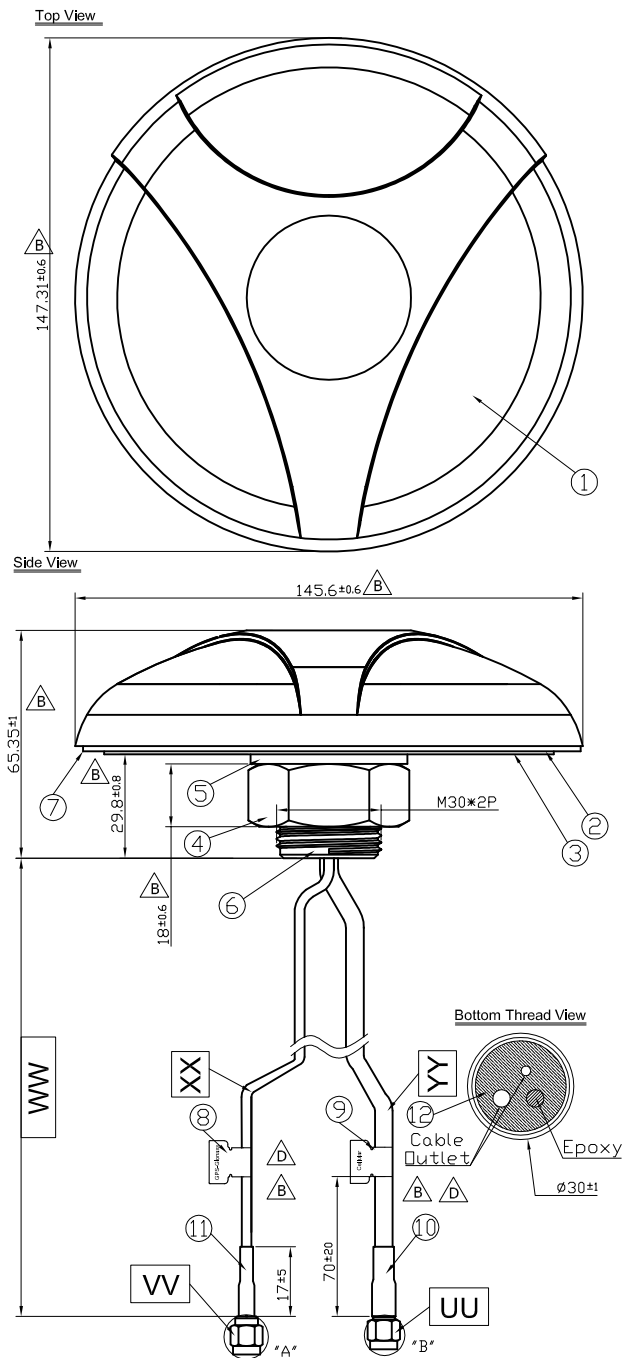
### 6.3.1 1575MHz



### 6.3.2 1602MHz



## 7. Drawings

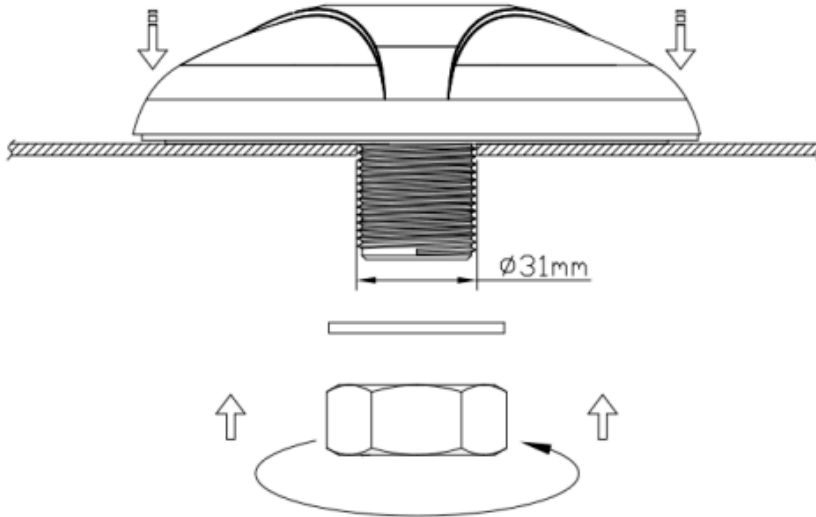


	Name	Material	Finish	QTY
1	Housing	PC 540	Black	1
2	Closed Cell Foam	CR 4305	Black	1
3	3M Double Adhesive	3M 9448 HK	White Liner	1
4	M30 Nut	Steel AISI 1215	Ni Plated	1
5	Washer	Steel AISI 1215	Ni Plated	1
6	M30 x 2 Thread 32L	Zinc Alloy	Ni Plated	1
7	Waterproof Rubber	Silicon	Black	1
8	GPS/Glonass Label	Coated Paper	Orange	1
9	Cellular Label	Coated Paper	Blue	1
10	Heat Shrink Tube	PE	Black	1
11	Heat Shrink Tube	PE	Black	1
12	Cable Rubber	Silicone Rubber	Black	1

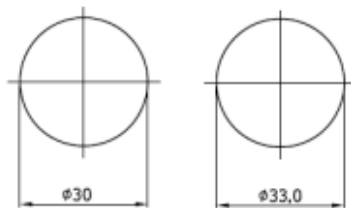
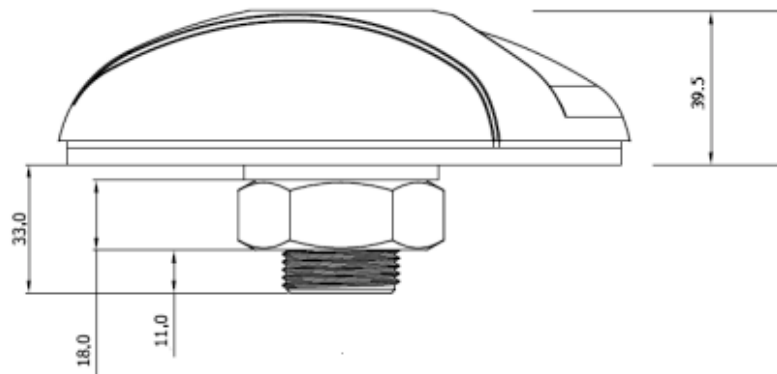
	Name	Spec	Finish	QTY
UU	Connector Type	SMA(M) ST for CFD200	Gold	1
VV	Connector Type	SMA(M) ST	Gold	1
WW	Cable Length	10000 $\pm$ 250mm		1
XX	Cable Type	RG174	Black	1
YY	Cable Type	CFD 200	Black	1



## 8. Installation



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



**Thread  
Diameter**

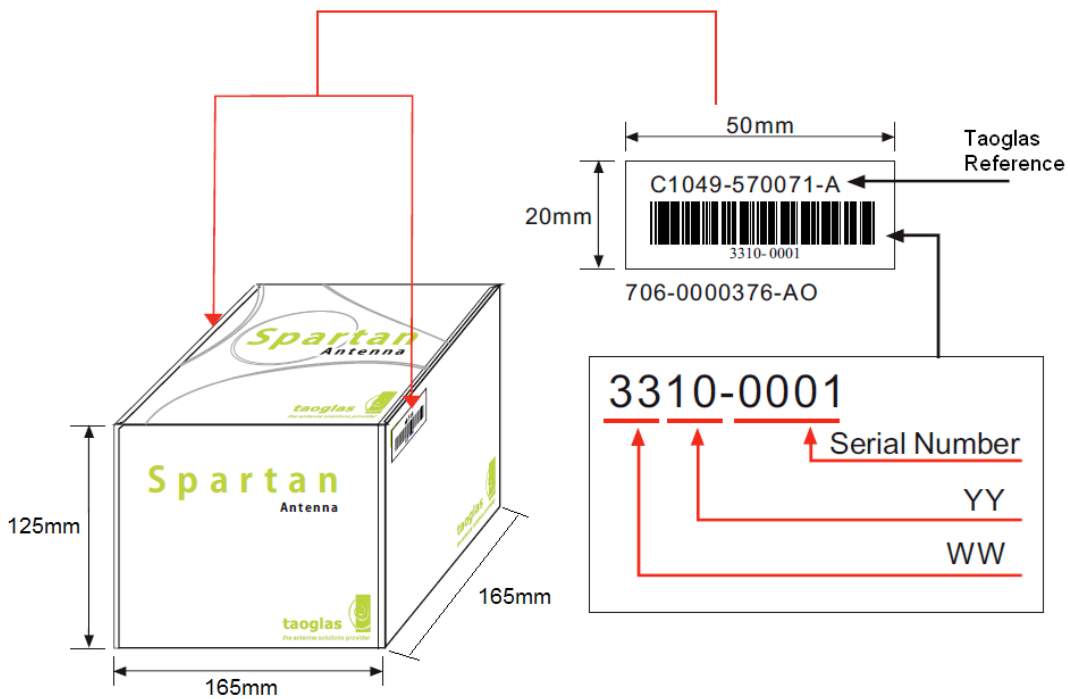
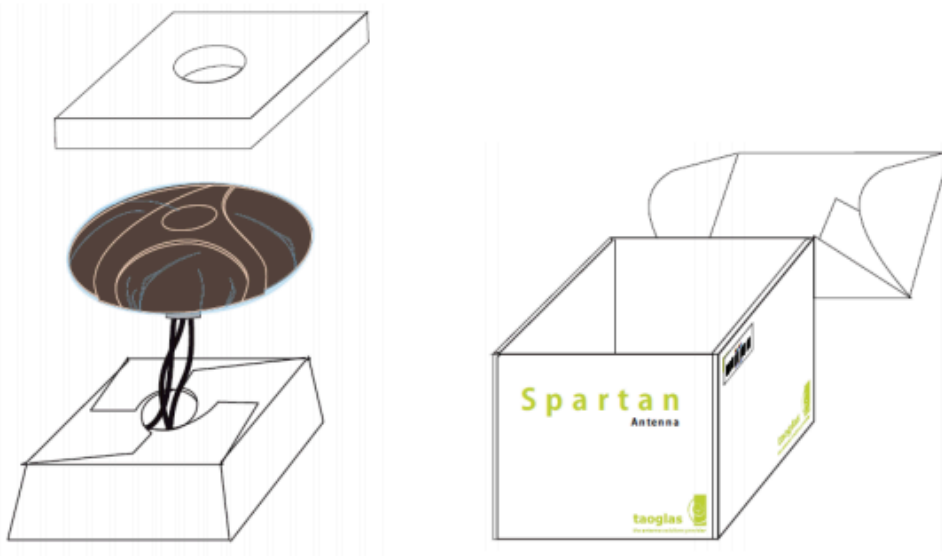
**Recommended  
Mounting Hole**

**Unit: mm**

## 9. Packaging

1 Antenna per individual box (L: 165mm : B: 165mm : H: 125mm)

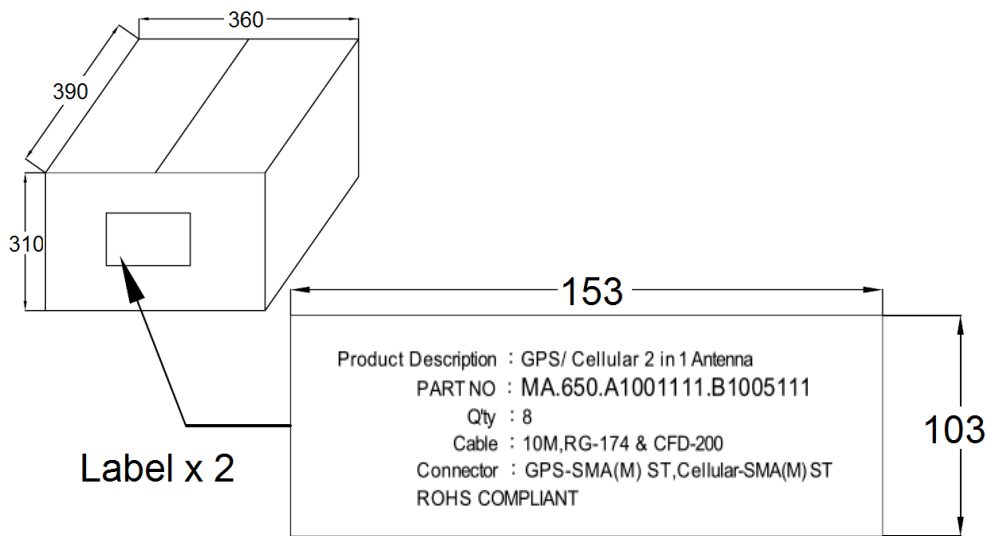
Weight 1.5kg



## 9. Packaging

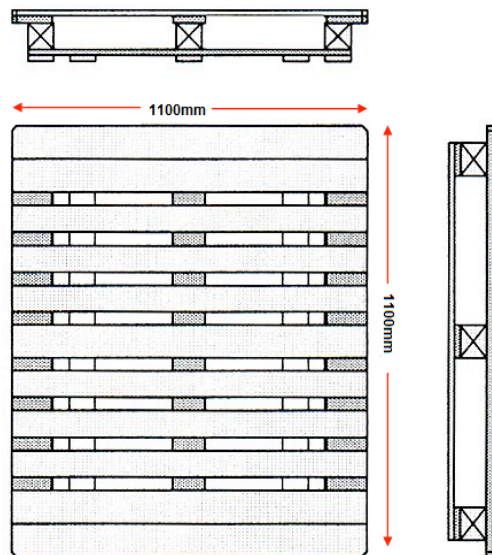
8 Individual boxes per carton (L: 390mm : B: 360mm : H: 310mm)

Weight 12.5kg



32 cartons per pallet (110\*110cm)

256 pieces per pallet



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