

Spartan  
MA602.A.ABJ.002

Specification

Part No.	MA602.A.ABJ.002
Product Name	Spartan Screwmount 3in1 Combination Antenna GPS/ GLONASS-SMA(M)1M RG174 Cellular-SMA(M)1M CFD-200 IRIDIUM-SMA(M) 1M CFD-200
Features	IP67 Waterproof High performance outdoor antenna Custom cables and connectors available RoHS Compliant



## 1. Introduction

The Spartan MA602 antenna is a heavy-duty, fully IP67 waterproof external M2M antenna for use in telematics, transportation, and remote monitoring applications.

The Spartan is unique in the market because it combines a 3in1 GPS/GLONASS, Cellular (2G and 3G), and IRIDIUM heavy-duty antenna with high efficiency in a compact format. The antenna screws down permanently onto a roof or metal panel and can be pole or wall-mounted with a metal bracket.

For industries such as commercial vehicle telematics, remote monitoring, smart meter systems, and construction equipment, the Spartan provides a robust, rugged antenna that is durable, even in extreme environments.

Customized cable and connector versions available.

## 2. Specifications

CELLULAR ANTENNA			
Frequency	824~960 MHz	1710~1990 MHz	1990~2170 MHz
Average Gain	≥-5 dBi	≥-4 dBi	≥-4 dBi
Average Efficiency	60.18 %	53.97 %	79.27 %
VSWR	≤4.5	≤5.2	≤3.0
Polarization	Linear		
Impedance	50 Ω Nominal		
Cable	1M CFD200 Coaxial Cable, fully customizable		
Connector	SMA(M) standard, fully customizable		

GPS/GLONASS ANTENNA		
Center Frequency $f_c$	1575.42 MHz	1602 MHz
Gain @ Zenith	3 dBic Min.	2.5 dBic Min.
Efficiency	76 %	70 %
VSWR	1.92 Max	1.92 Max
Polarization	Linear	Linear
Impedance	50 Ω Nominal	50 Ω Nominal
Cable	1M RG-174 Coaxial Cable, fully customizable	
Connector	SMA(M) standard, fully customizable	

IRIDIUM ANTENNA	
Frequency Range	1616~1626.5 MHz
Gain @ Zenith	3.5 dBic Min.
Efficiency	90 %
VSWR	1.92 Max.
Axial Ratio	4 dB Max.
Polarization	PHCP
Impedance	50 Ω Nominal
Cable	1M CFD200 Coaxial Cable, fully customizable
Connector	SMA(M) standard, fully customizable

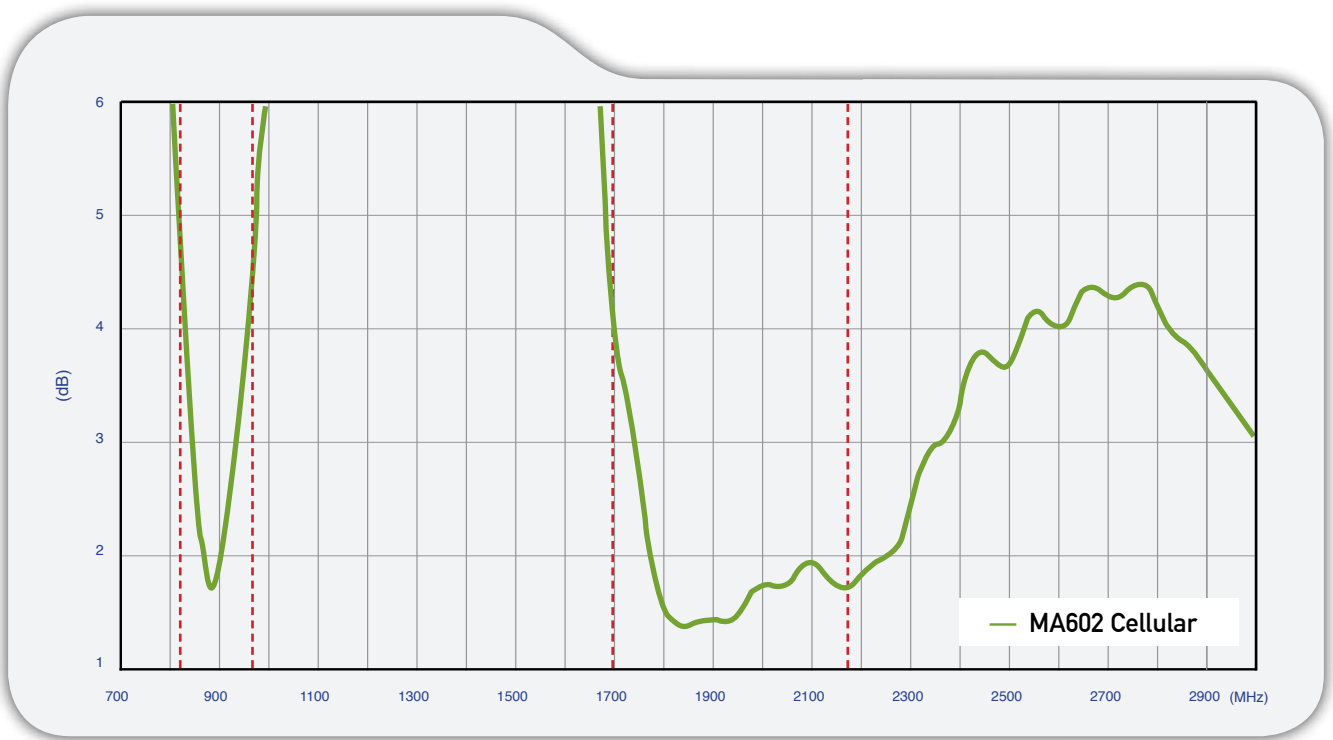
GPS/GLONASS LNA ELECTRICAL PROPERTIES	
Frequency	GPS:1575.42±3 MHz   GLONASS:1598~1610 MHz
Impedance	50 Ω Nominal
VSWR	1.92:1 Max.
Return Loss	10 dB Min.
Gain@3.3V	29 ~ 30 dB
DC Power Input	3~5V
Noise Figure @3.3V	3 dB Typ.
Power Consumption	7~9 mA Typ.

MECHANICAL	
Dimensions	Profile 39.5mm x Diameter 145.6mm
Casing	UV resistant PVC
Base and thread	Nickel Plated Zinc
Thread diameter	30mm
Waterproof	IP67
Weight	1.03 Kg
Recommended Torque for Mounting	49N·m
Maximum Torque for Mounting	58.8N·m

ENVIRONMENTAL	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

### 3. Cellular Antenna Characteristics

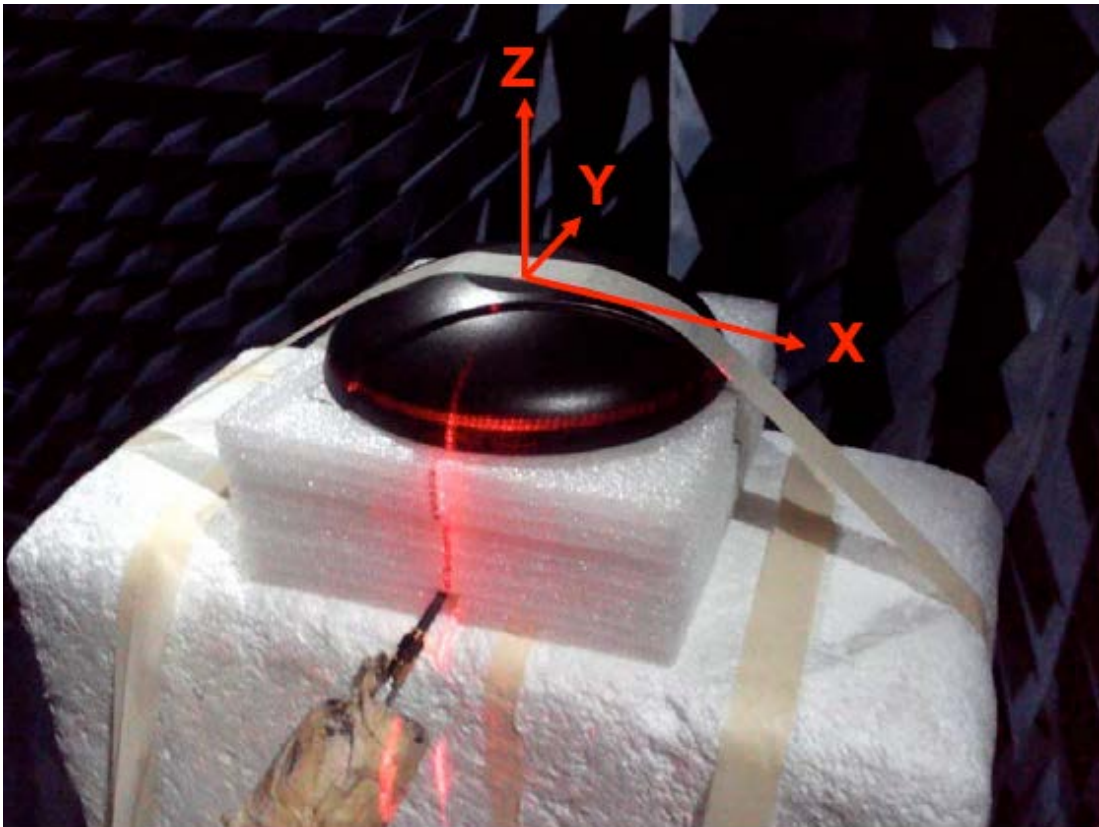
#### 3.1 VSWR



#### 3.2 3D Efficiency

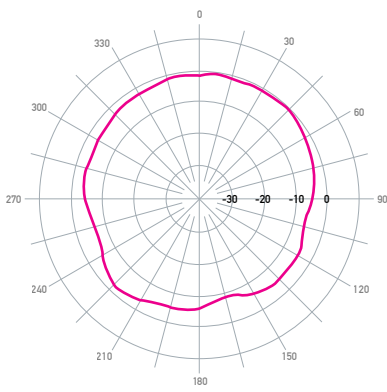
Frequency (MHz)	Average Gain(dBi)	Efficiency (%)
824	-3.68	42.78
894	-1.19	76.00
960	-2.09	61.75
1710	-5.11	30.79
1990	-1.12	77.15
2110	-0.68	85.44
2170	-1.23	75.21

### 3.3 2D Radiation Pattern

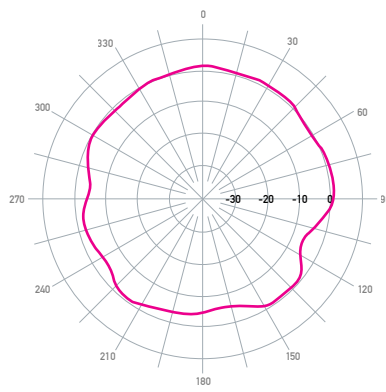


## XZ plane

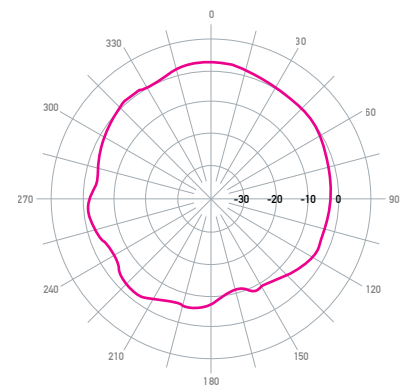
8240 MHz



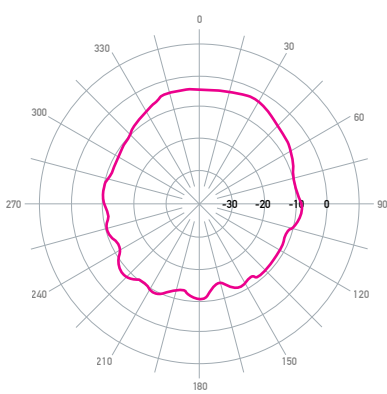
894 MHz



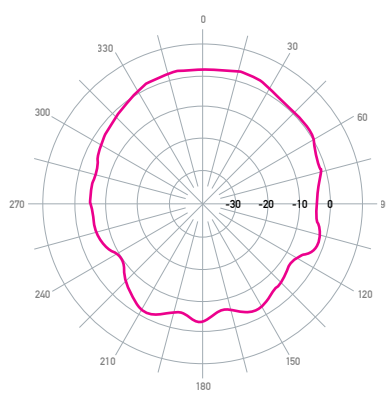
960 MHz



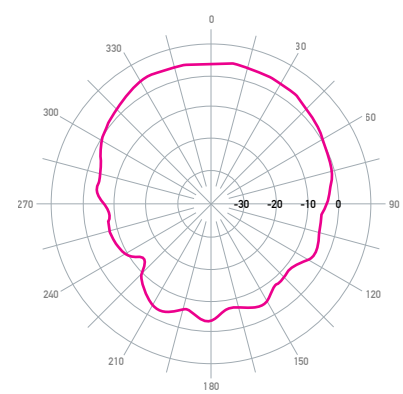
1710 MHz



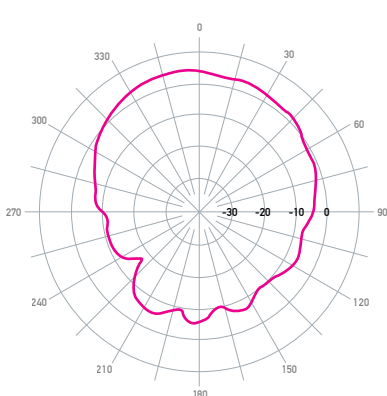
1900 MHz



2110 MHz

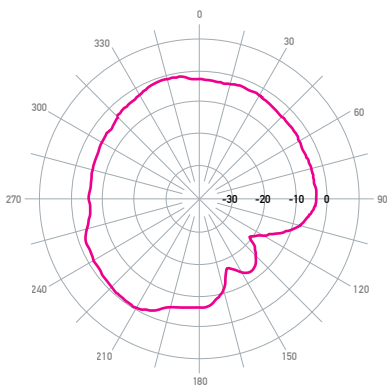


2170 MHz

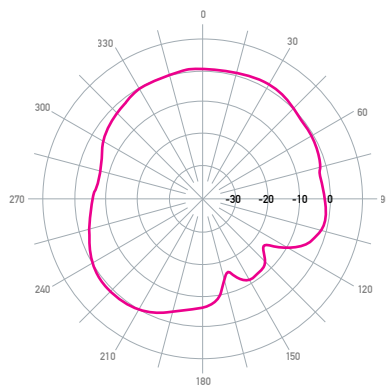


## YZ plane

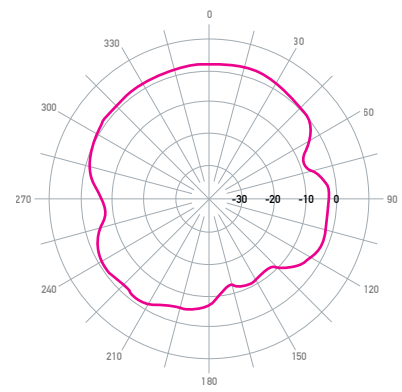
8240 MHz



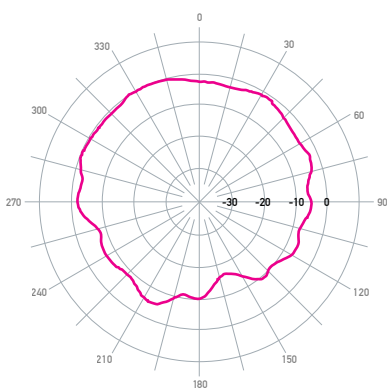
894 MHz



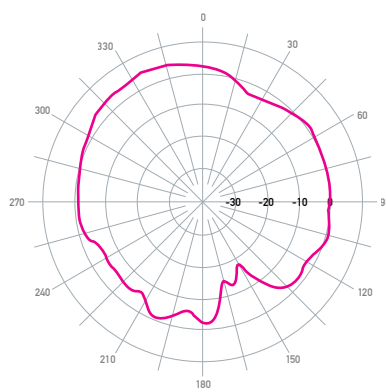
960 MHz



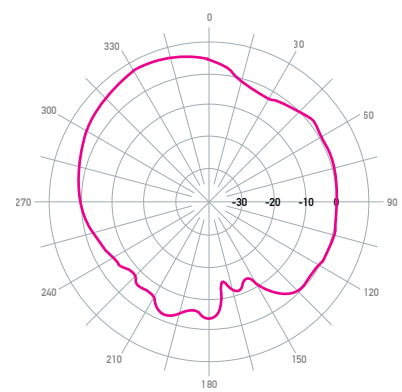
1710 MHz



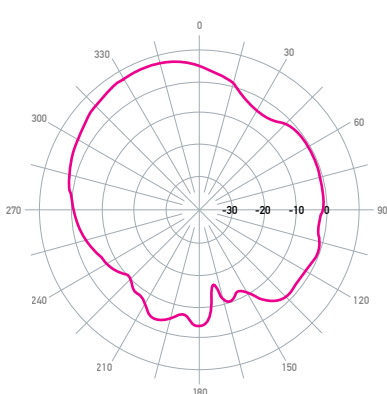
1900 MHz



2110 MHz



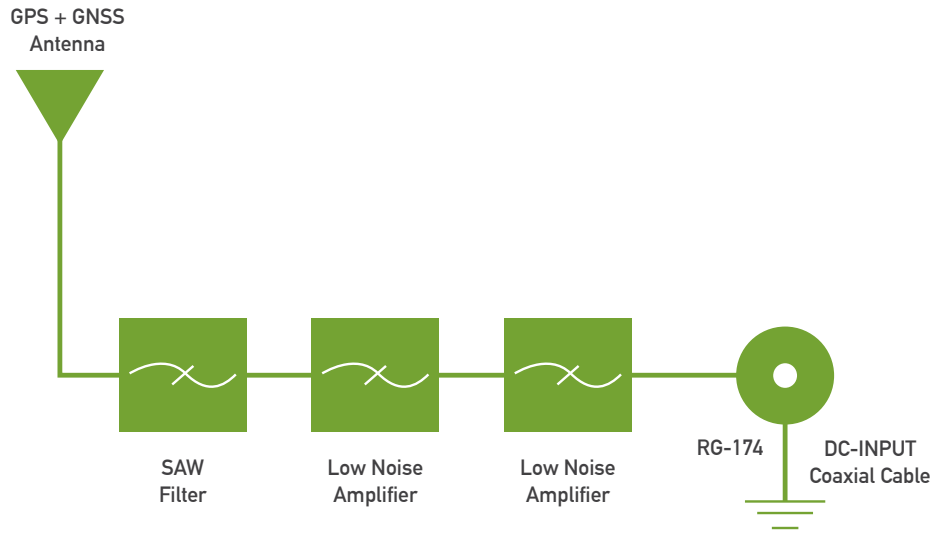
2170 MHz





## 4. GPS/GLONASS Antenna Characteristics

### 4.1 Block Diagram



### 4.2 S-Parameter Measurement

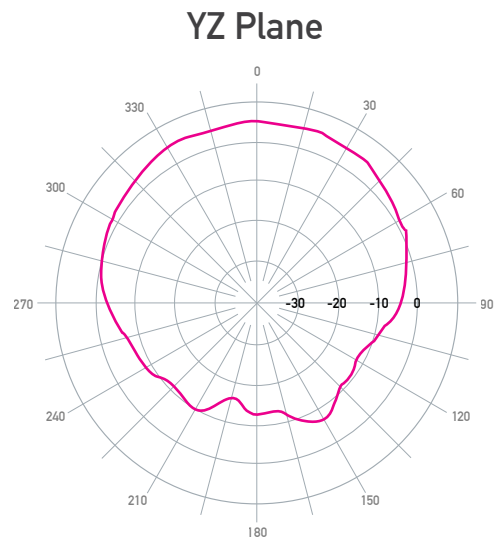
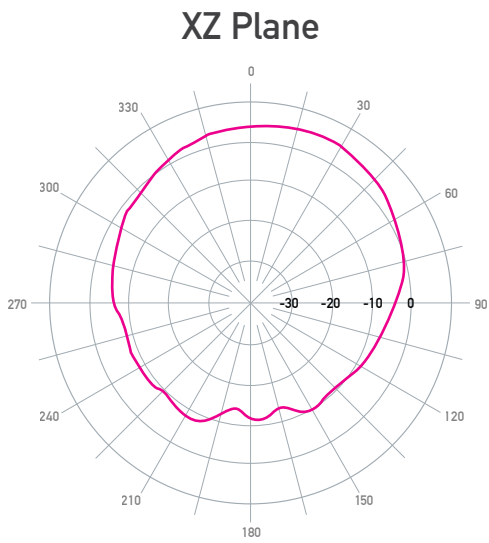


### 4.3 3D Efficiency

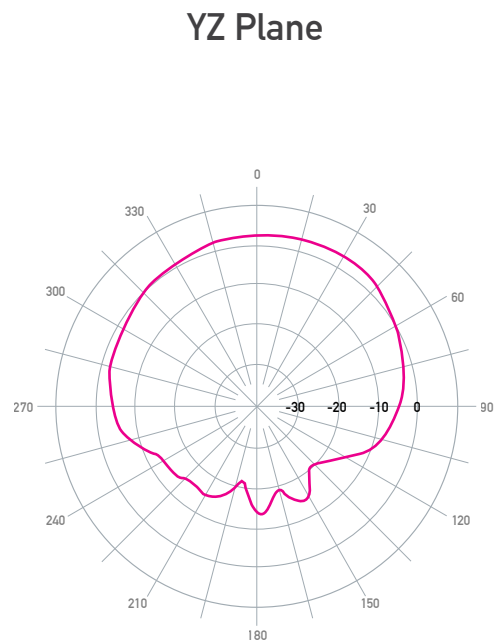
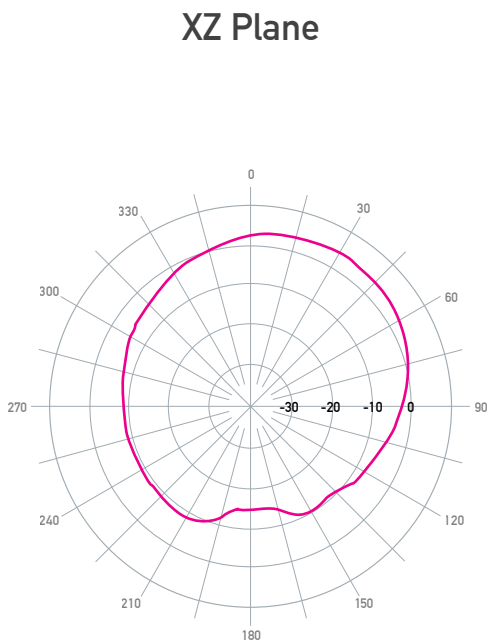
Frequency (MHz)	Gain @Zenith ( dBic)	Efficiency (%)
1575.42	3.6	76
1602	3.0	70

## 4.4 Radiation Pattern

### 4.4.1 GPS Antenna (@1575.42MHz)



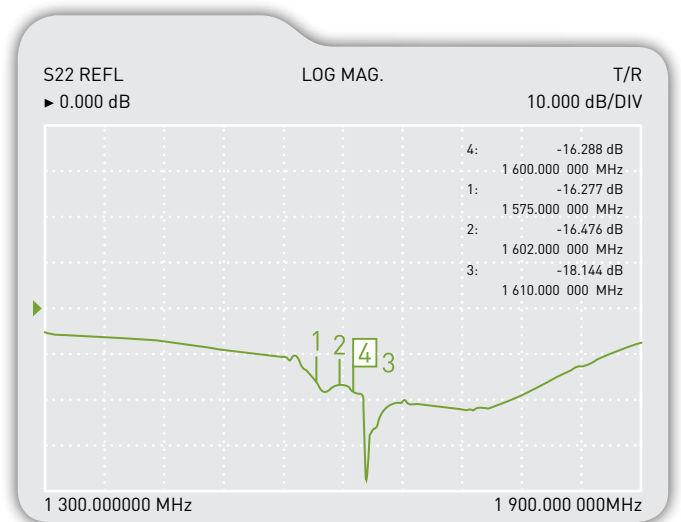
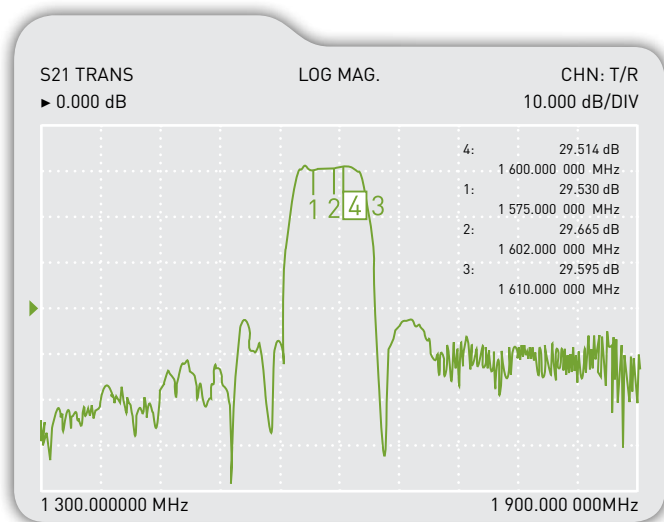
### 4.4.2 GLONASS Antenna (@1602MHz)



## 4.5 GPS/GLONASS LNA

S21

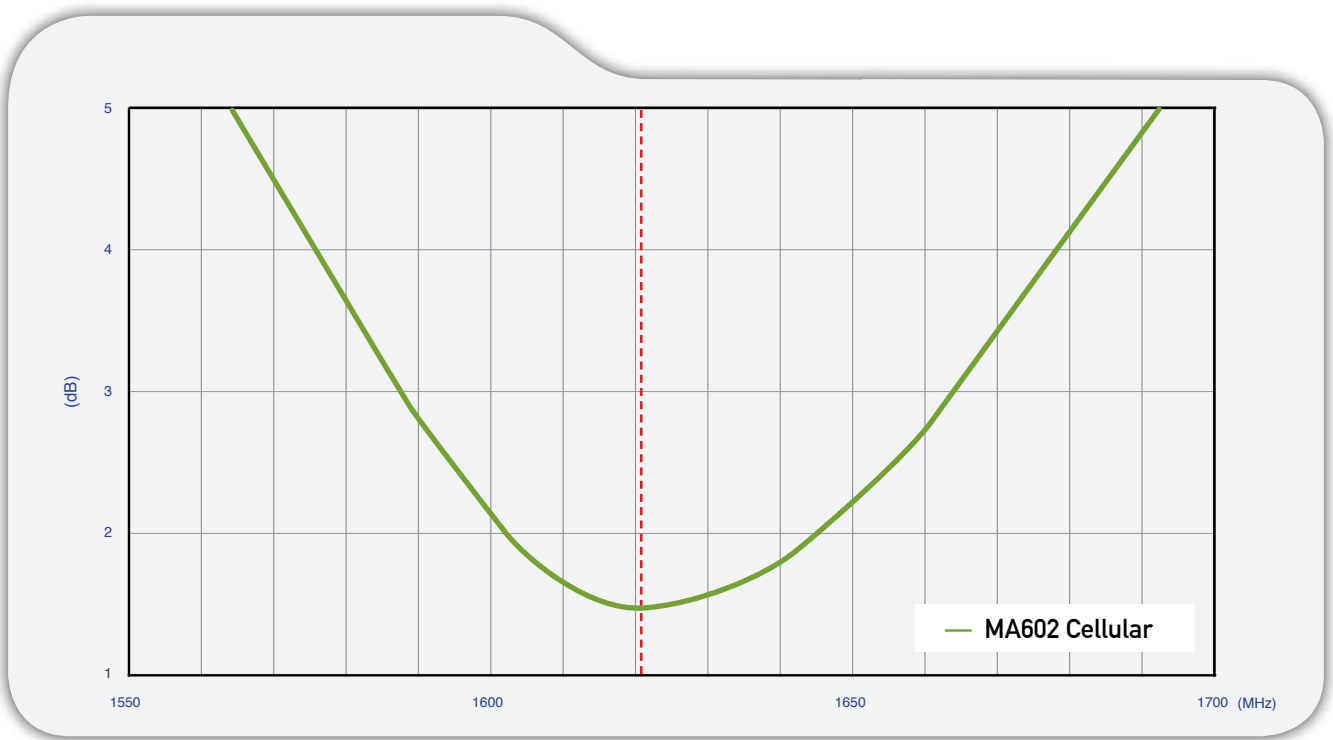
S22



Test Item	1575.42 MHz (GPS Band)	1602 MHz (GLONASS Band)
Gain @ 3.3V	29.5 dB	29.6 dB
Return Loss @ 3.3V	-16 dB	-16 dB
Noise Figure @ 3.3V	3 dB	3 dB
Current consumption @ 3.3V	7-9 mA	

## 5. IRIDIUM Antenna Characteristics

### 5.1 S-Parameter Measurement



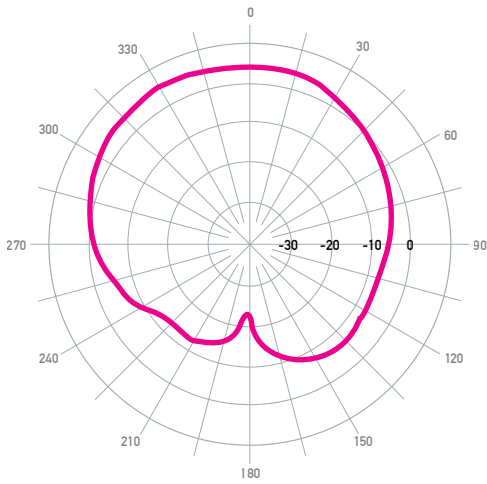
### 5.2 3D Efficiency

Frequency (MHz)	Gain @Zenith (dBic)	Efficiency (%)
1616	4.9	88
1621.25	5.7	93
1626.5	5.0	89

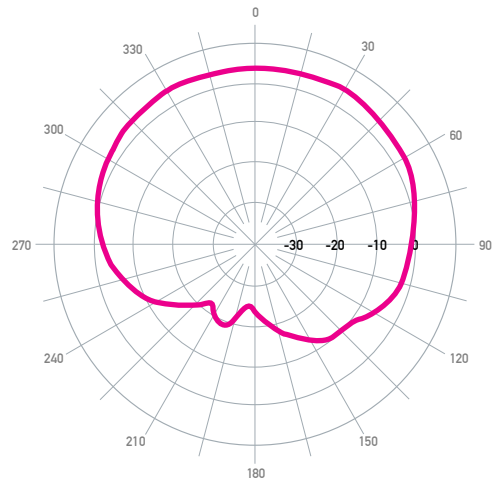
### 5.3 Radiation Pattern

1616  
MHz

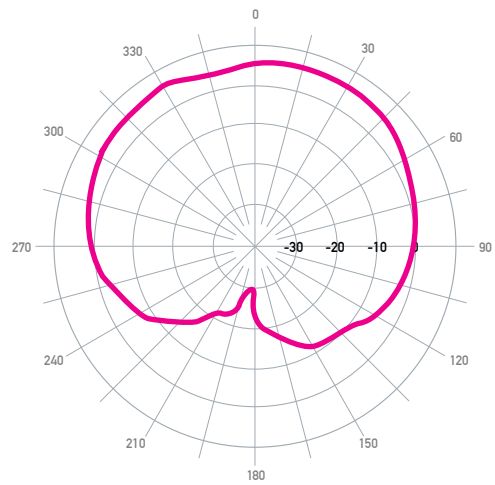
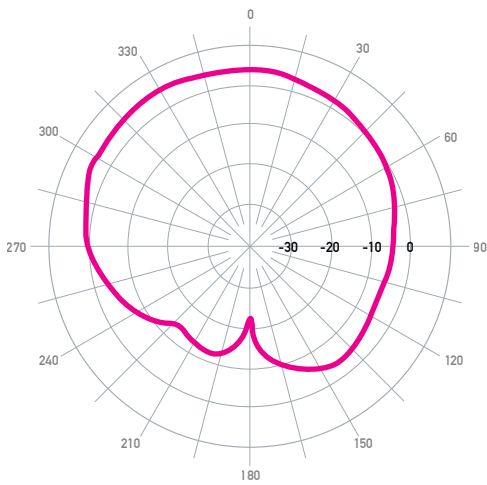
XZ Plane



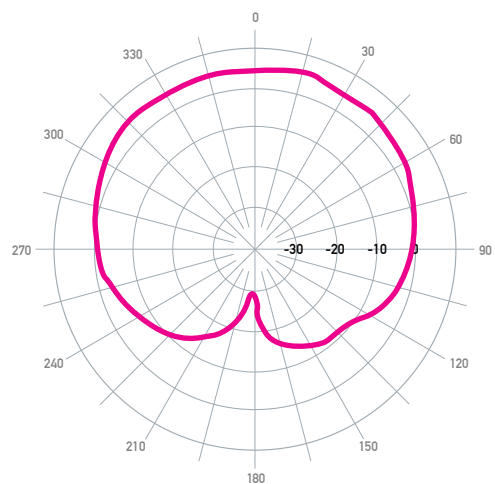
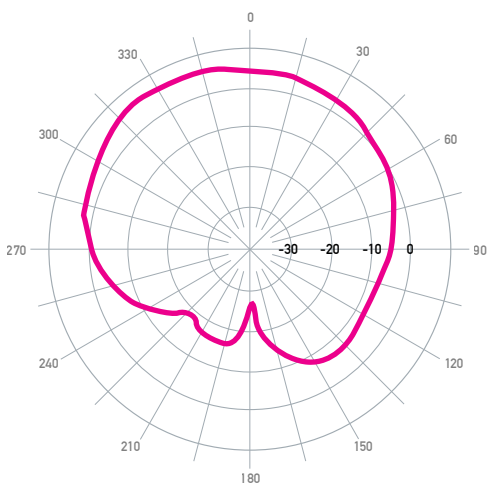
YZ Plane



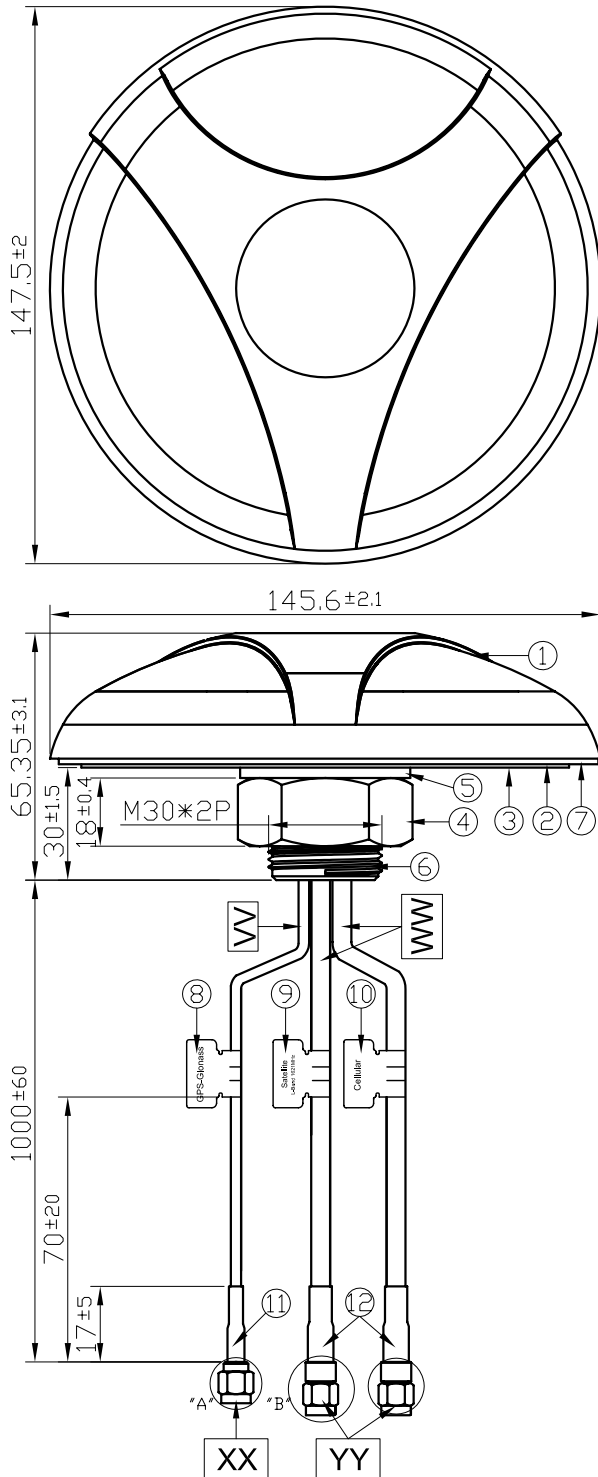
1621.25  
MHz



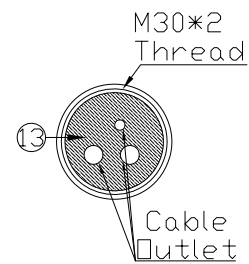
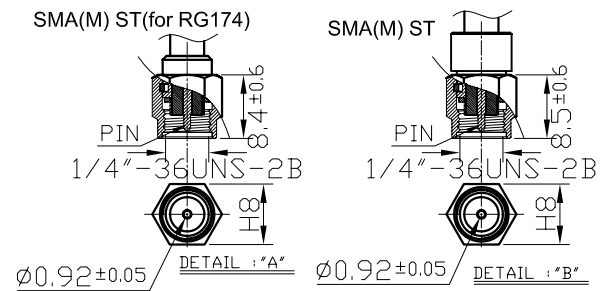
1626.5  
MHz

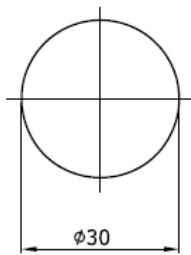
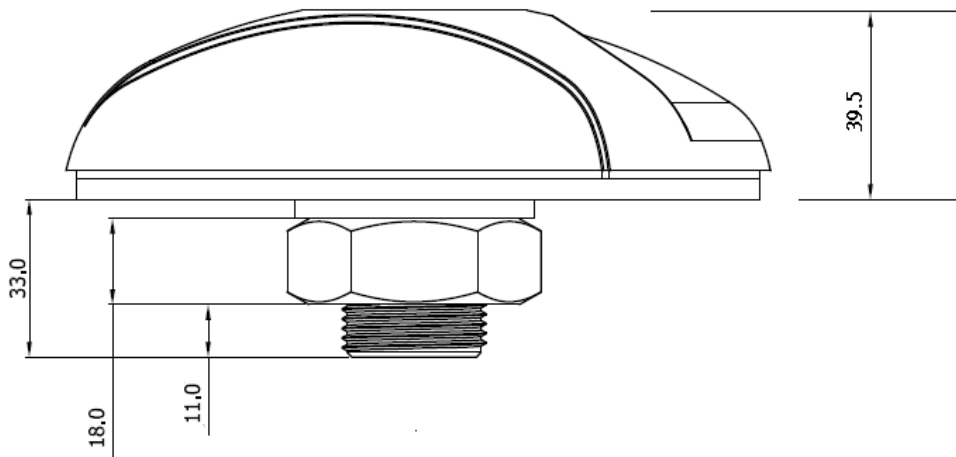
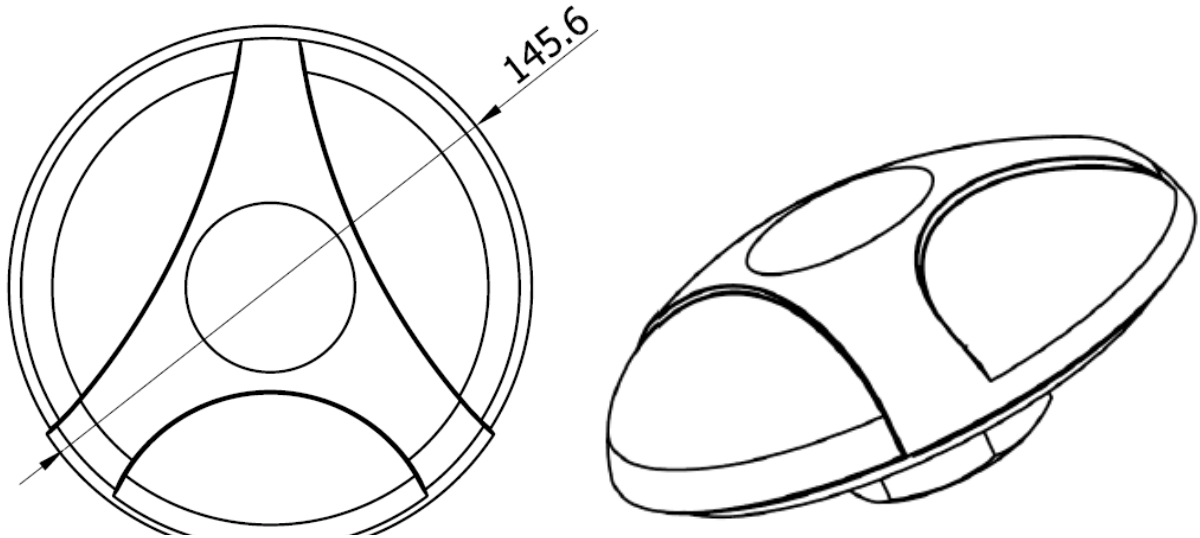


## 6. Mechanical Drawing

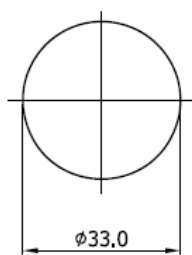


Name	Material	Finish	Qty
1 Housing	PC450	Black	1
2 Closed Cell Foam	CR 4305	Black	1
3 3M Double Adhesive	3M 9448 HK	White Liner	1
4 M30 Nut	Steel AISI 1215	Ni Plated	1
5 Washer	Steel AISI 1215	Ni Plated	1
6 M30 x 2 Thread 32L	Zinc Alloy	Ni Plated	1
7 Waterproof Rubber	Silicon	Black	1
8 GPS-Glonass Label	Coated paper	Orange	1
9 L-Band Label	Coated paper	Moccasin	1
10 Cellular label	Coated paper	Blue	1
11 Heat Shrink Tube	PE	Black	1
12 Heat Shrink Tube	PE	Black	1
13 Rubber Stopper	Silicone Rubber	Black	1
Name	Spec	Finish	Qty
VV Cable Type	RG174	Black	1
WW Cable Type	CFD 200	Black	2
XX Connector Type	SMA(M) ST(RG174)	Gold	1
YY Connector Type	SMA(M) ST(CFD200)	Gold	1



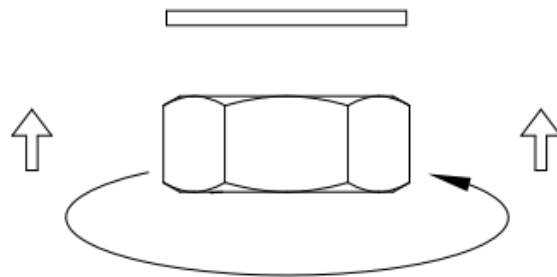
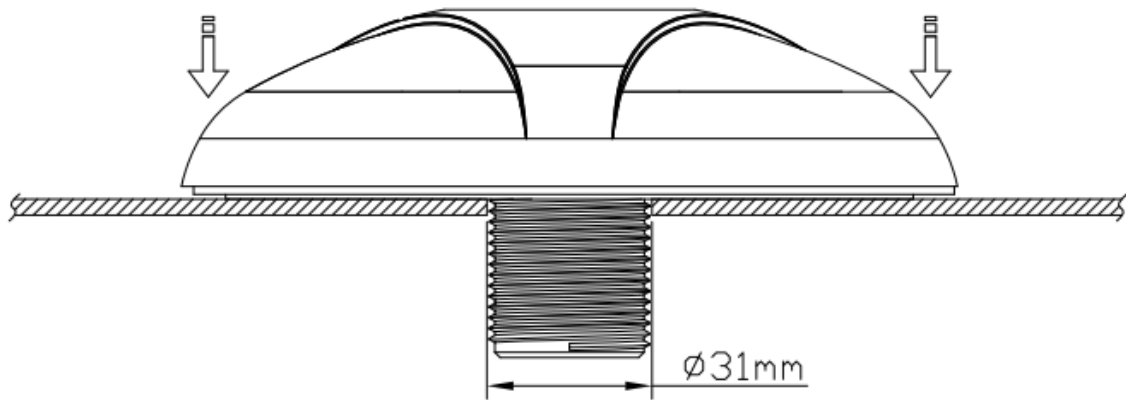


Thread  
Diameter



Recommended  
Mounting Hole

## 7. Installation

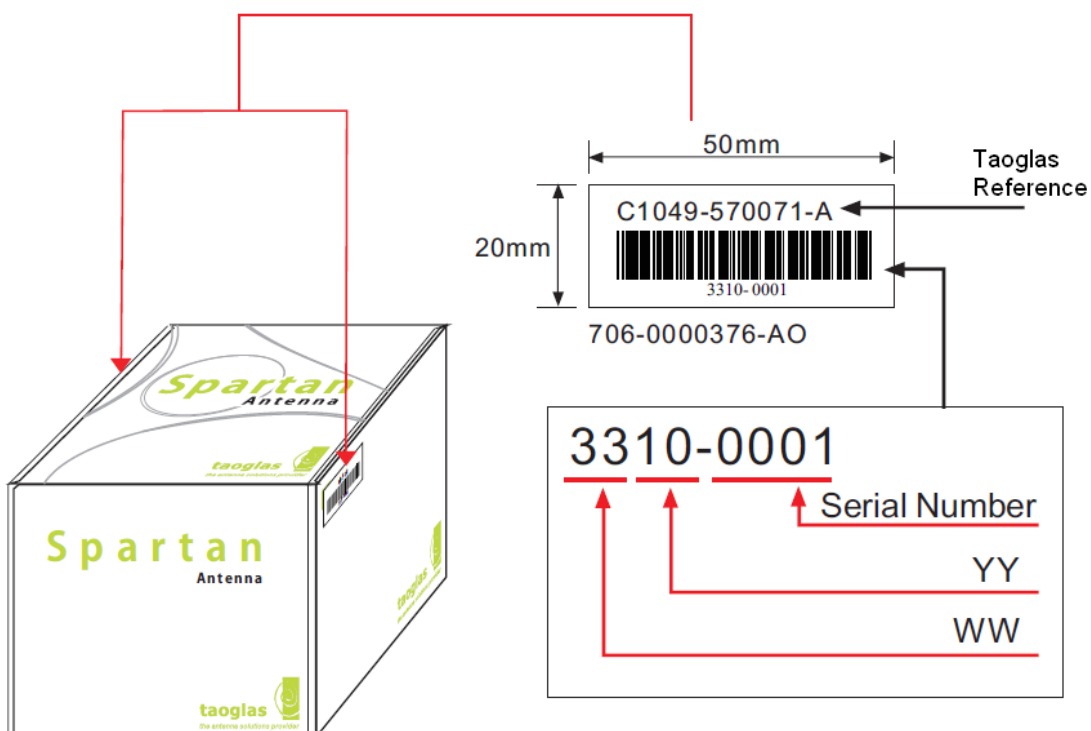
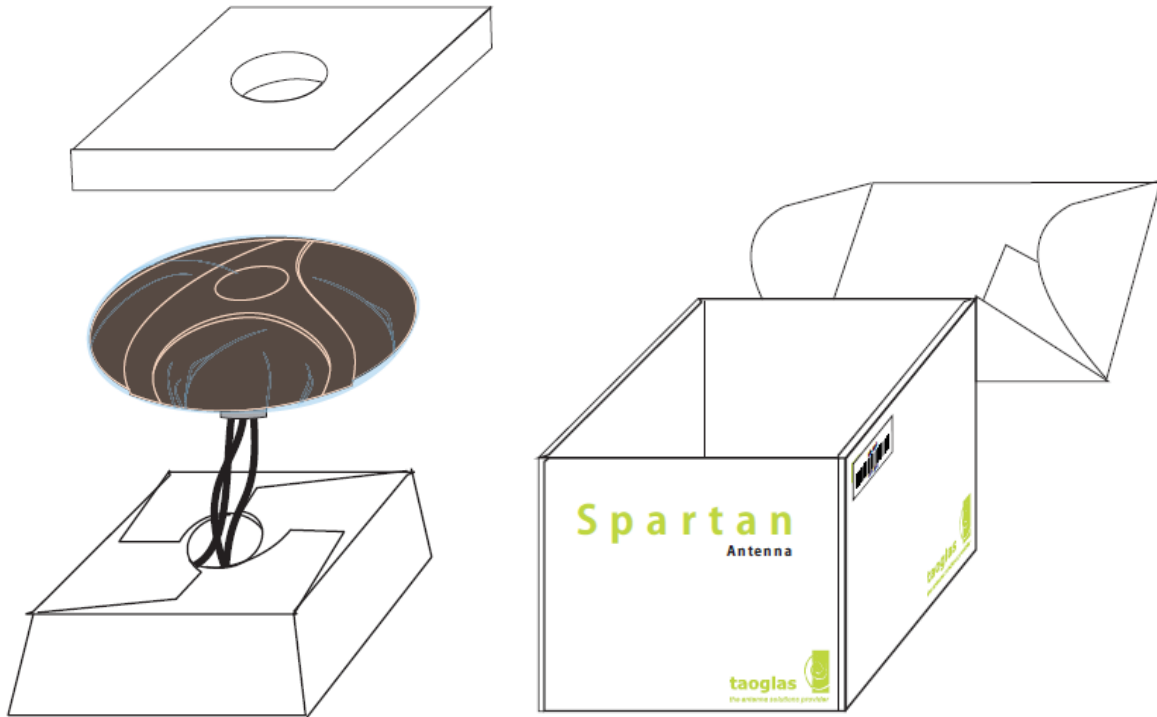


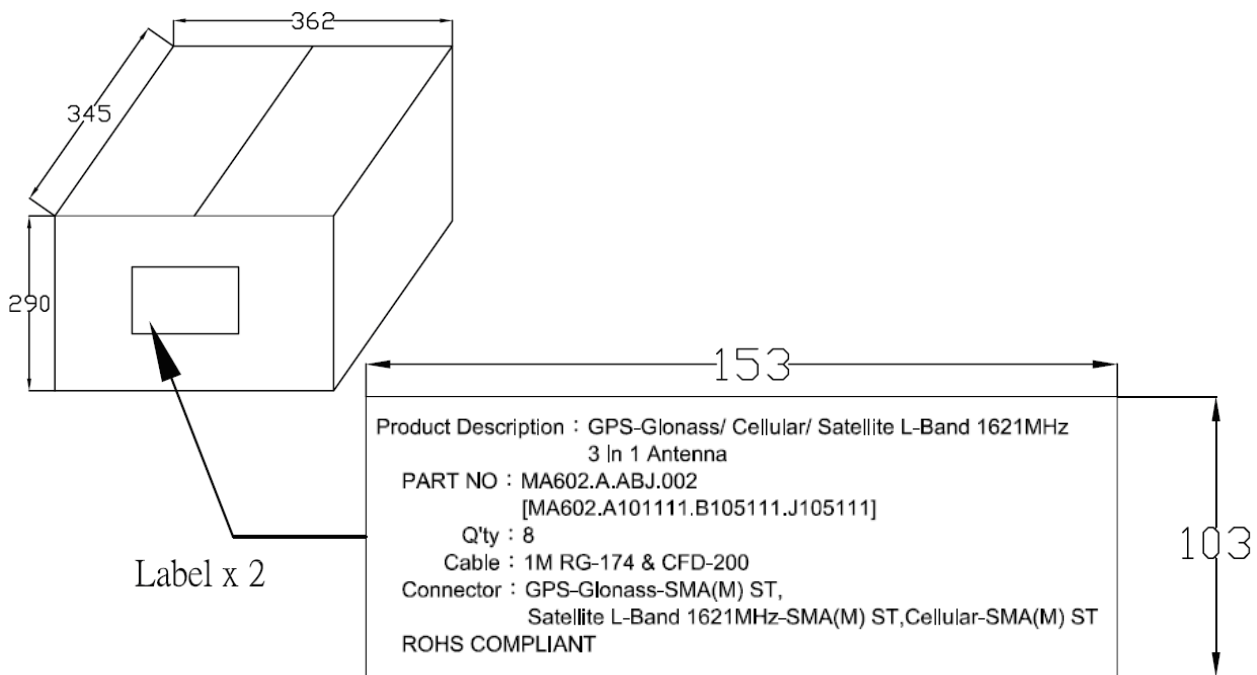
Maximum torque for mounting is 58.8 N·m





## 8. Packaging





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