SPECIFICATION

Part No. : **MA602.A.ABJ.002**

Product Name : Spartan Screwmount 3in1 Combination Antenna
GPS/GLONASS/GALILEO-SMA(M)1M RG174
Cellular-SMA(M)1M CFD-200
IRIDIUM-SMA(M) 1M CFD-200

Feature : 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/GALILEO, Cellular (3G and 2G) 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 cables and connectors version available.

2. Specification Table

Cellular Antenna			
Frequency	824~960MHz	1710~1990MHz	1990~2170MHz
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	50Ω Nominal		
Cable	1M CFD200 Coaxial Cable, fully customizable		
Connector	SMA(M) standard, fully customizable		

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

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

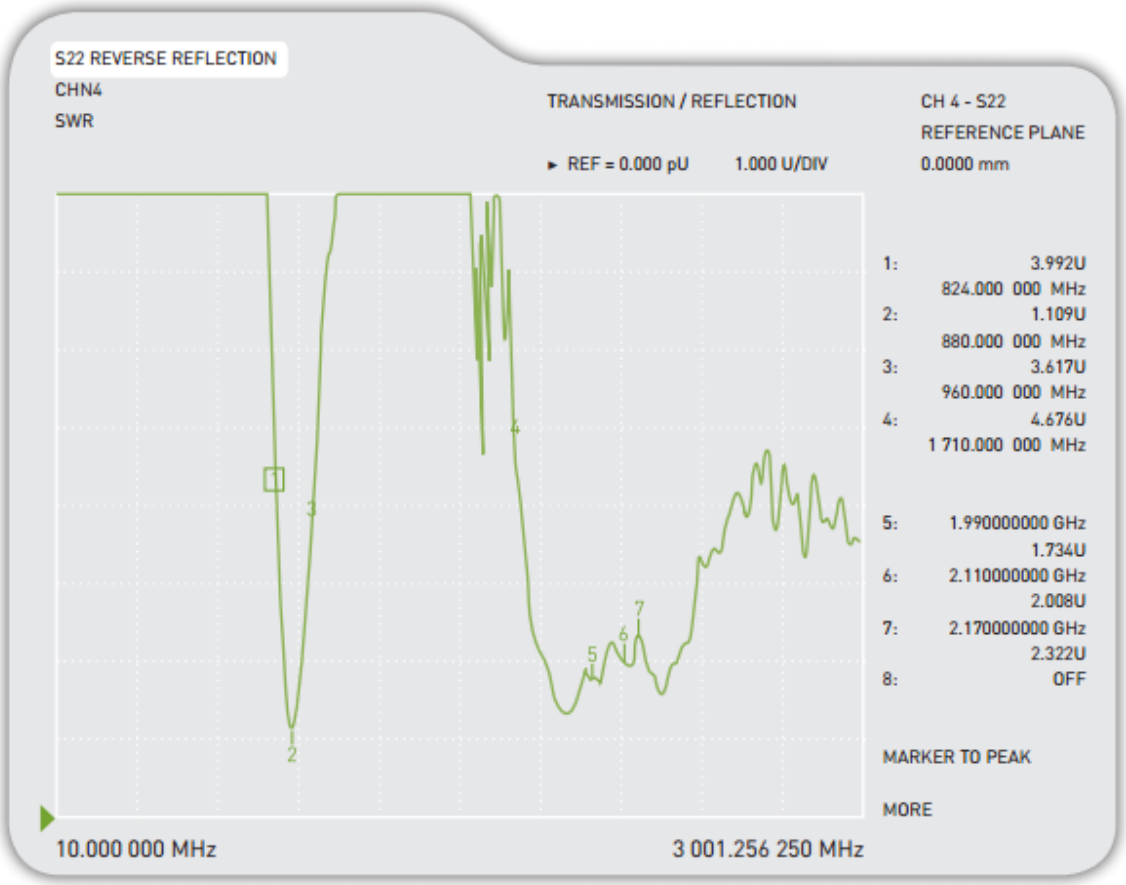
GPS/GLONASS/GALILEO LNA Electrical Properties	
Frequency	GPS/GALILEO:1575.42±3MHz GLONASS:1598~1610MHz
Impedance	50Ω Nominal
VSWR	1.92:1 Max.
Return Loss	10 dB Min.
Gain@3.3V	29~30dB
DC Power Input	3~5V
Noise Figure @3.3V	3 dB Typ.
Power Consumption	7~9 mA Typ.

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	1.03Kg
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

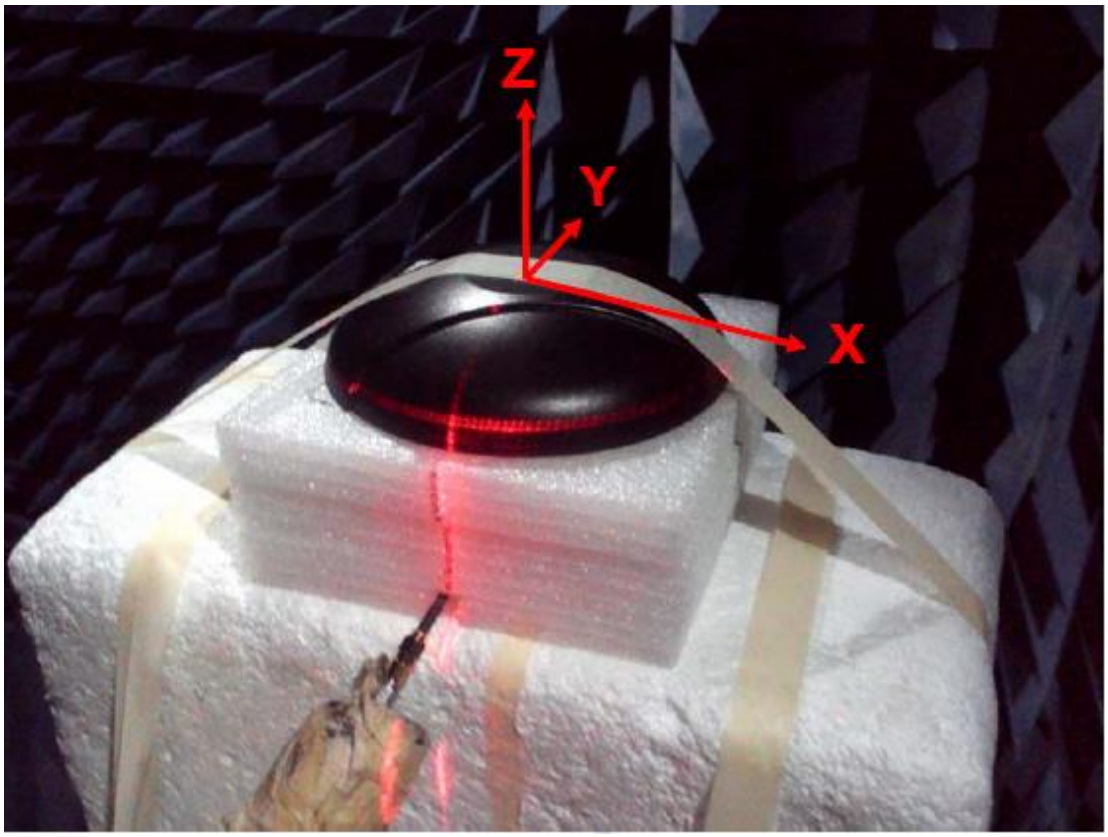
3.1. VSWR



3.2. 3D Efficiency

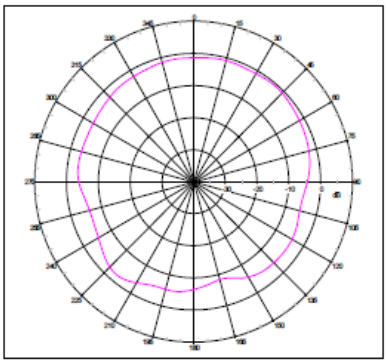
Frequency (MHz)	Average Gain(dBi)	Efficiency (%)
824	-3.68	42.78
894	-1.19	76.00
960	-2.09	61.75
1710	-5.11	30.79
1990	-1.12	77.15
2110	-0.68	85.44
2170	-1.23	75.21

3.3. 2D Radiation Pattern

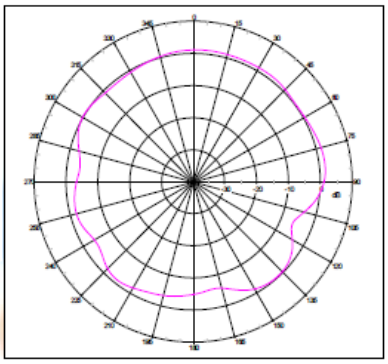


3.3.1. XZ Plane

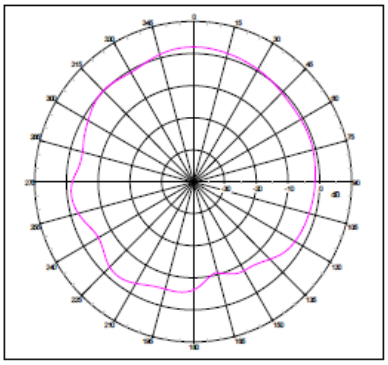
824 MHz



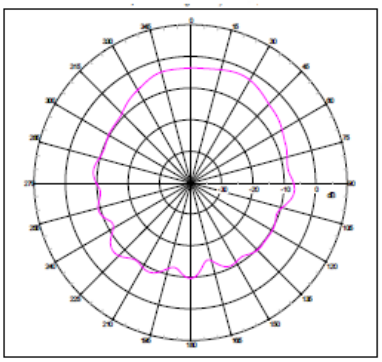
894 MHz



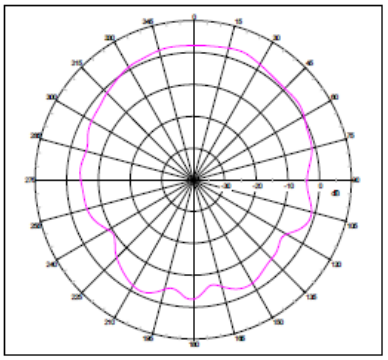
960 MHz



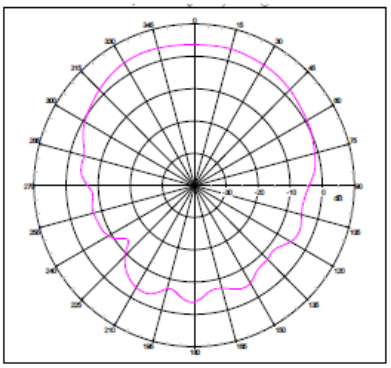
1710 MHz



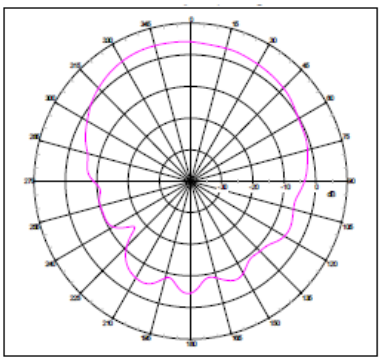
1990 MHz



2110 MHz

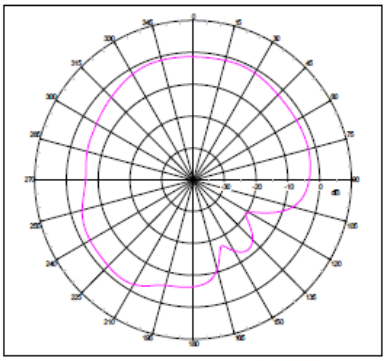


2170 MHz

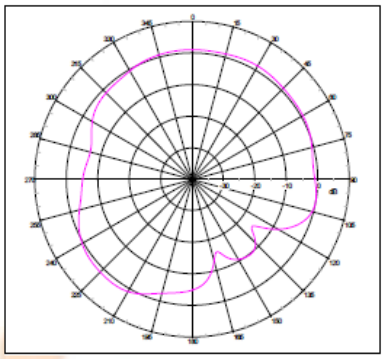


3.3.2. YZ Plane

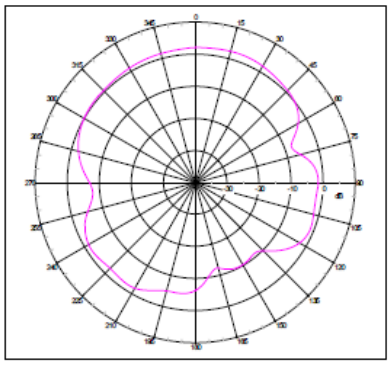
824 MHz



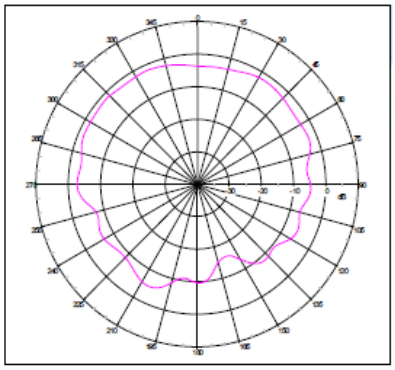
894 MHz



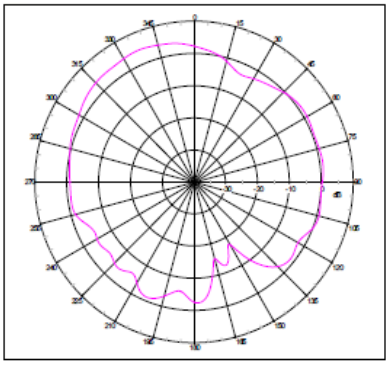
960 MHz



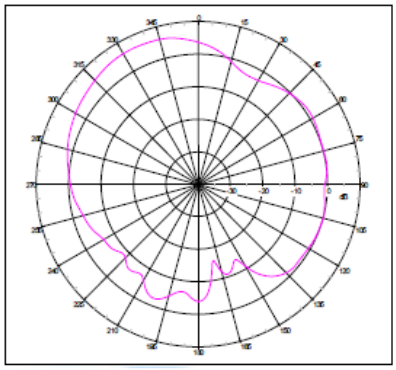
1710 MHz



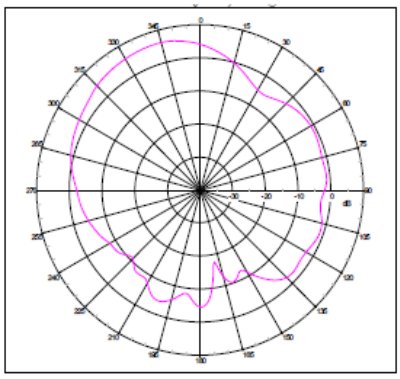
1990 MHz



2110 MHz

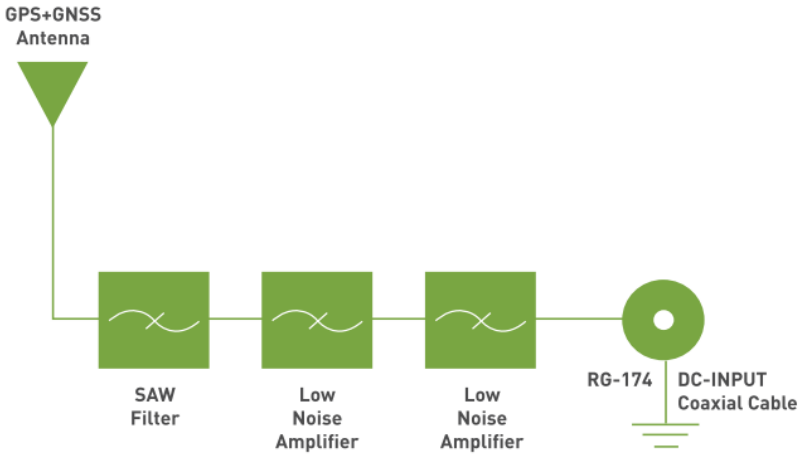


2170 MHz



4. GPS/GLONASS/GALILEO Antenna Characteristics

4.1. Block Diagram



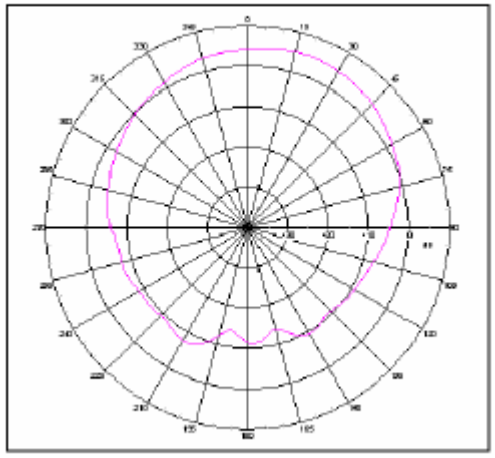
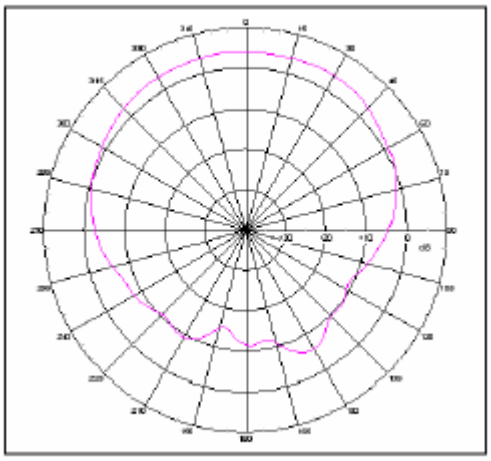
4.2. S-Parameter Measurement

4.3. 3D Efficiency

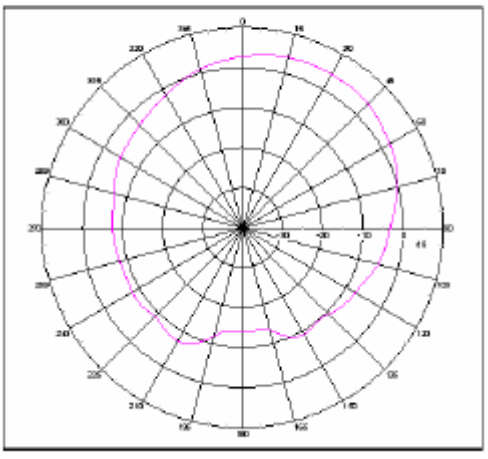
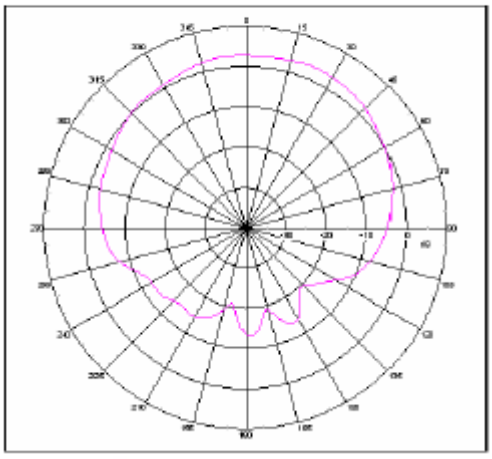
Frequency (MHz)	Gain @Zenith (dBic)	Efficiency (%)
1575.42	3.6	76
1602	3.0	70

4.4. Radiation Pattern

4.4.1. GPS/GALILEO/GALILEO Antenna(@1575.42MHz)

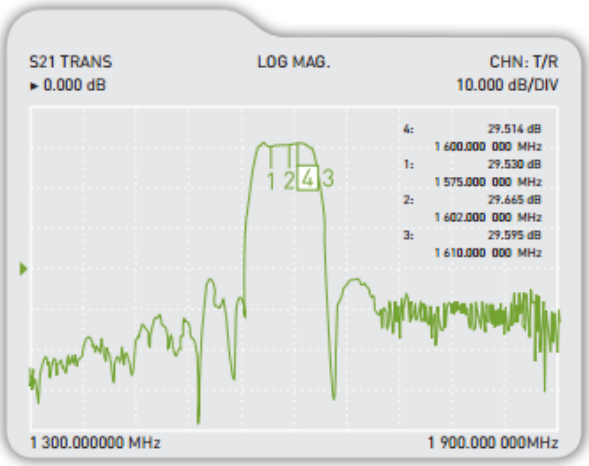
XZ Plane	YZ Plane
	

4.4.2. GLONASS Antenna(@1602MHz)

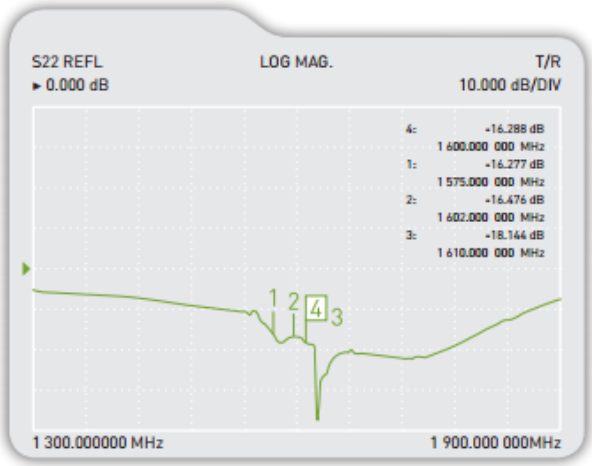
XZ Plane	YZ Plane
	

4.5. GPS/GLONASS/GALILEO LNA

S21



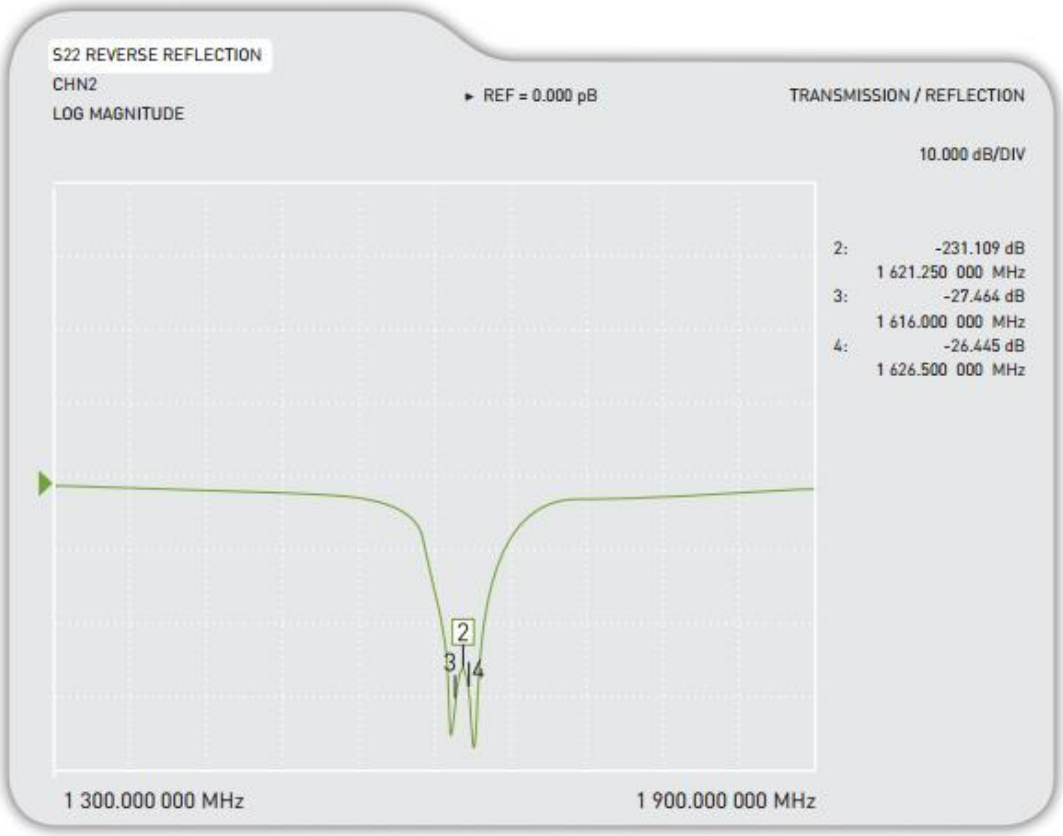
S22



Test Item	1575.42 MHz (GPS/GALILEO 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

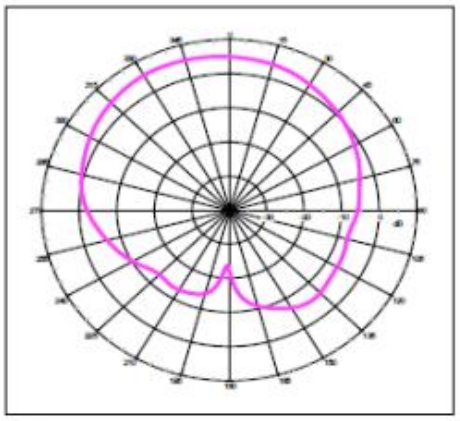
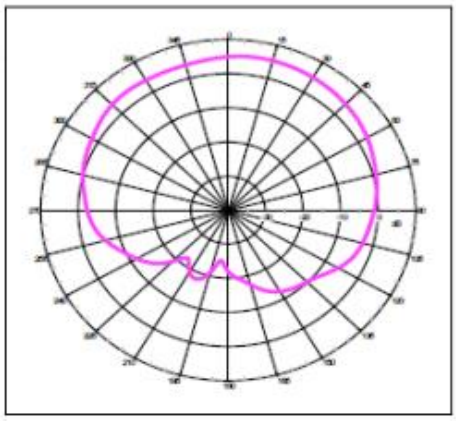
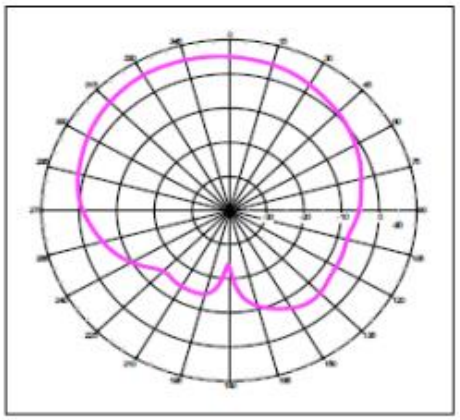
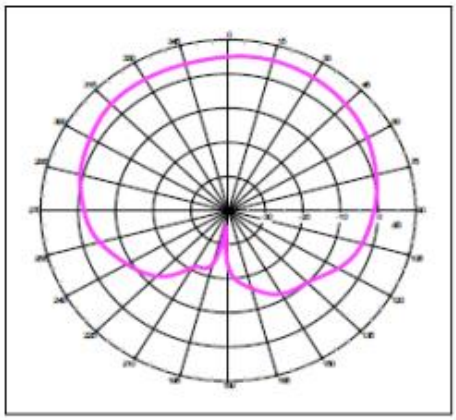
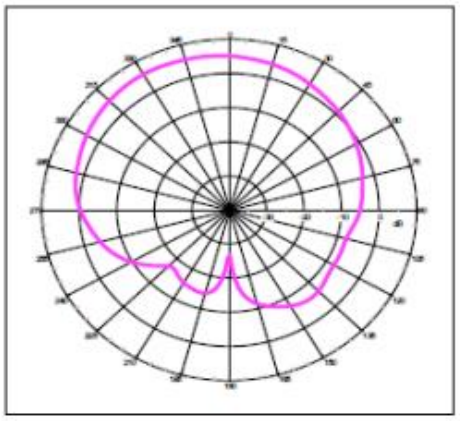
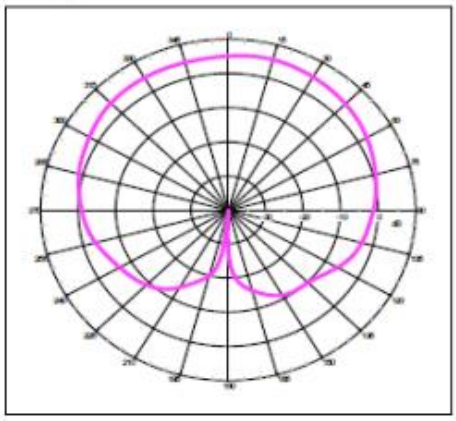
5.1. S-Parameter Measurement



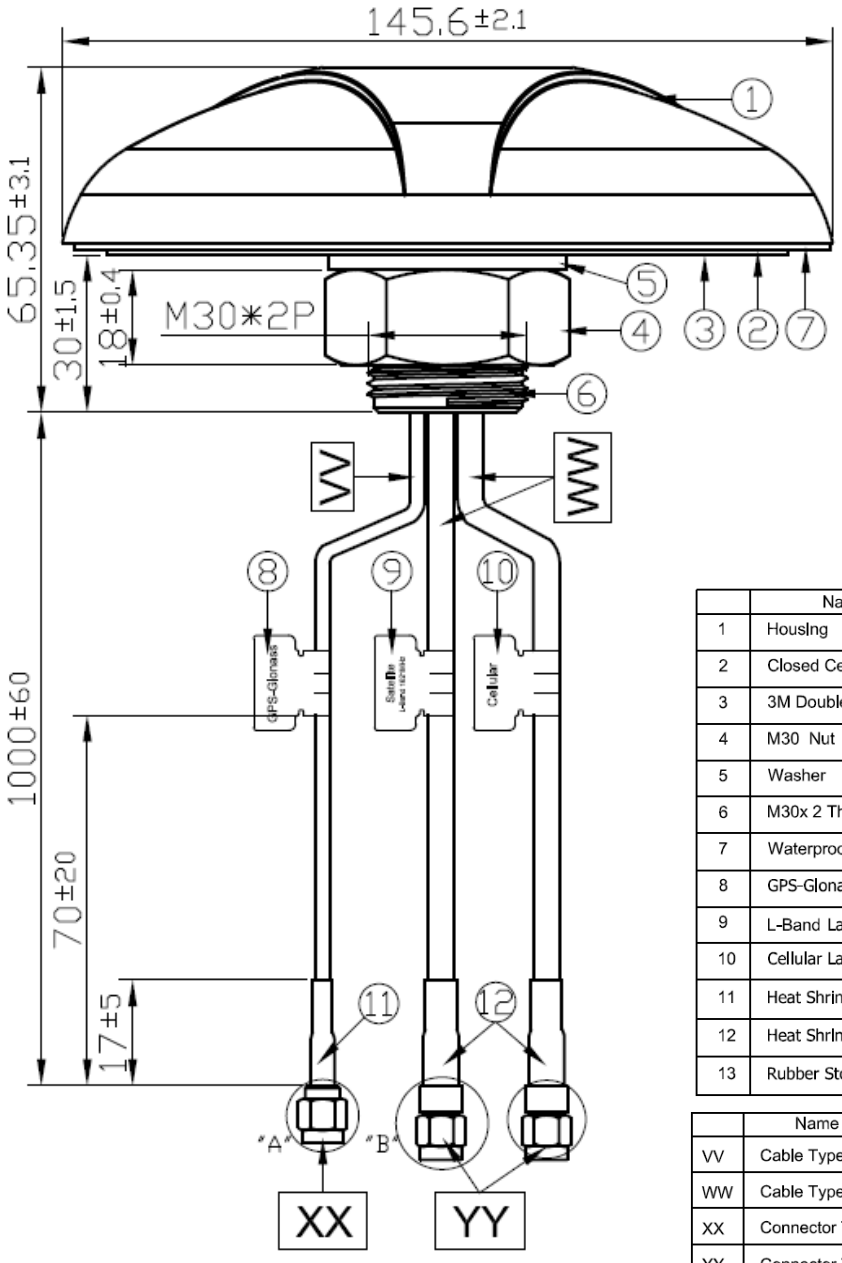
5.2. 3D Efficiency

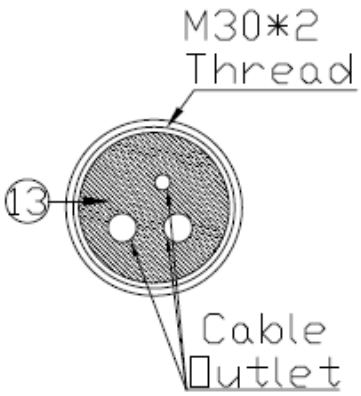
Frequency (MHz)	Gain @Zenith (dBic)	Efficiency (%)
1616	4.9	88
1621.25	5.7	93
1626.5	5.0	89

5.3. Radiation Pattern

	XZ Plane	YZ Plane
1616 MHz		
1621.25 MHz		
1626.5 MHz		

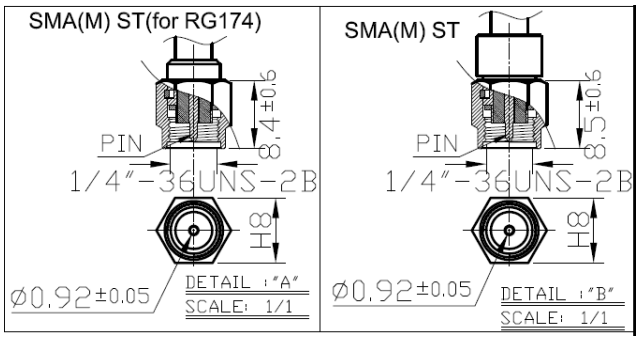
6. Mechanical Drawing



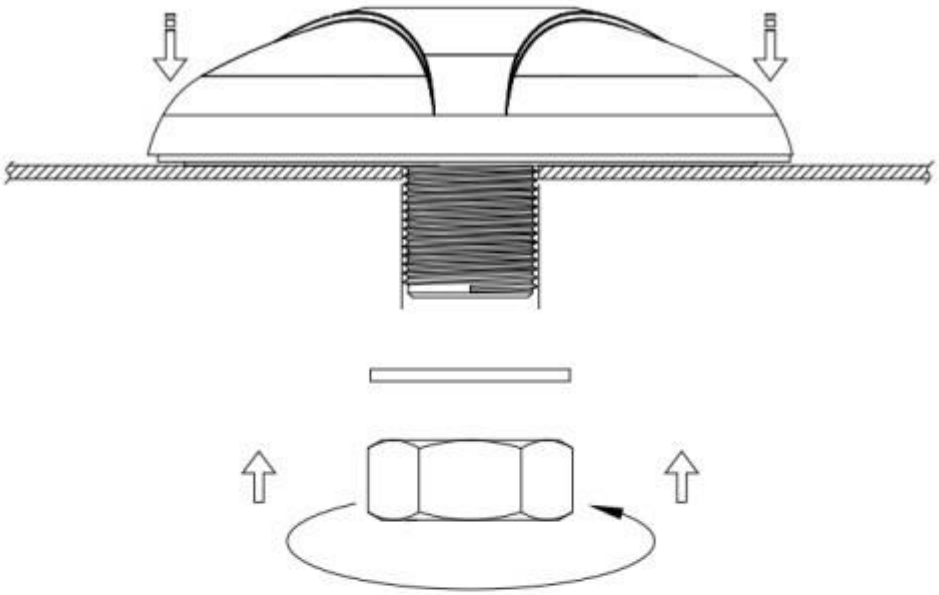


	Name	Material	Material	Finish	QTY
1	Housing	000111F000015A	PC 540	Black	1
2	Closed Cell Foam	001011F030015A	CR 4305	Black	1
3	3M Double Adhesive	001011F030015A	3M 9448 HK	White Liner	1
4	M30 Nut	000411F000015A	Steel AISI 1215	Ni Plated	1
5	Washer	000411F010015A	Steel AISI 1215	Ni Plated	1
6	M30x 2 Thread 32L	000311F000015A	Zinc Alloy	Ni Plated	1
7	Waterproof Rubber	000711F000015A	Silicon	Black	1
8	GPS-Glonass Label	001012K010015A	Coated Paper	Orange	1
9	L-Band Label	001014C000015A	Coated Paper	Moccasin	1
10	Cellular Label	001011F020015A	Coated Paper	Blue	1
11	Heat Shrink Tube	001311F000015A	PE (RG-174)	Black	1
12	Heat Shrink Tube	001311F010015A	PE (CFD-200)	Black	2
13	Rubber Stopper	000711F010015A	Silicone Rubber	Black	1

	Name	P/N	Spec	Finish	QTY
VV	Cable Type	301313A000015A	RG174	Black	1
WW	Cable Type	301413A000015A	CFD200	Black	2
XX	Connector Type	200212G000015A	SMA(M) ST(RG-174)	Gold	1
YY	Connector Type	200212G010015A	SMA(M) ST(CFD-200)	Gold	1

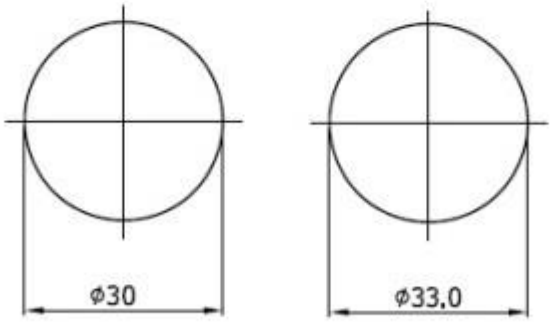


7. Installation



Recommended Torque for Mounting 49 N·m

Maximum Torque for Mounting 58.8N·m

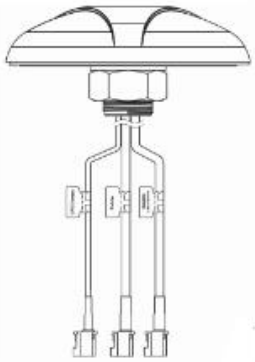


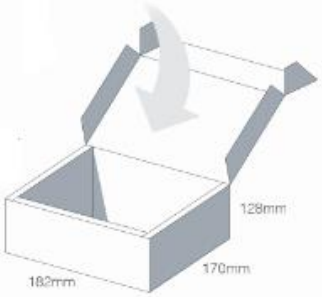
Thread Diameter **Recommended Mounting Hole**

Unit: mm

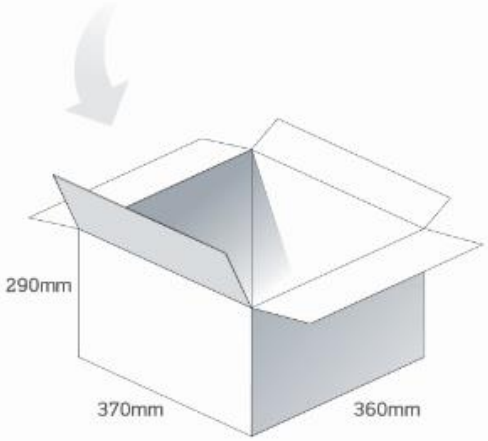
Maximum torque: 600kgf-cm

8. Packaging

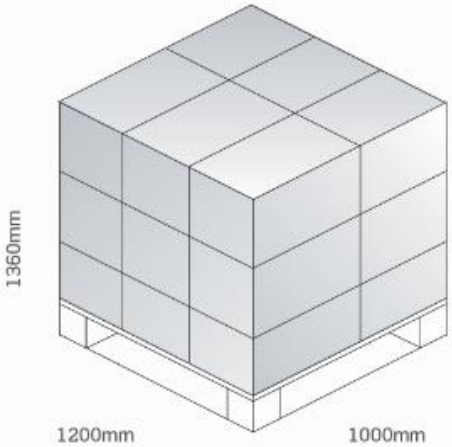




1 pcs MA602.A.ABJ.002 per box
Box Dimensions - 170 x 182 x 128mm
Weight - 0.95g



8 pcs MA602 per carton
Carton - 370 x 360 x 290mm
Weight - 8.4Kg



Pallet Dimensions 1200 x 1000 x 1360mm
18 Cartons per Pallet
6 Cartons per layer
3 Layers