



SPECIFICATION

- Part No. : MA600.A301111.B305111.C305111
- Product Name : Spartan Antenna 3in1 MA.600
Low Profile Screw-Mount (Permanent Mount)
GPS / Cellular / 2.4GHz ~ 5GHz combination antenna
- Feature : IP67 Waterproof
High Efficiency/Peak Gain Outdoor Antenna
Advanced RF Design and Materials
Heavy Duty – Integrated Metal Base/Ground-plane
Custom cables and connectors available
RoHS ✓



Version	Date	Revision Description	Prepared	Approved
A	Aug 25 th 2010	New Product	TW Product Centre	Zita Lin
B	Oct 1 st 2010	Mechanical Drawing	TW Product Centre	Zita Lin



I. Introduction

The Spartan MA.600 antenna is a low profile, 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, Cellular (2G and 3G) and Wi-Fi, heavy-duty antenna 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.

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

All while still maintaining 20dB isolation between antennas. It uses high-shielded PTFE dielectric ultra low-loss cables that maintain low attenuation at all frequency bands, and high noise rejection, with an average loss of only 0.3dB per meter (0.1dB per foot), compared to 0.7dB for RG58 and 1.2dB for RG174. Because of this, the Spartan maximizes chances of passing PTCRB and network approvals first time. The Spartan also has excellent performance without need to attach to an external ground-plane due to its internal antennas coupling to its unique super strong integrated metal base. The antenna comes with a 3M adhesive waterproof layer to prevent water leaking under the antenna into the mounting hole. The Spartan can also be supplied in single GPS, Cellular, Wi-Fi only versions, or at other frequencies.

Custom designed integrated wall mounted and pole mounted brackets are available for the Spartan antennas. These patent pending mounts allow for 180 degrees freedom of movement of the antennas for ease of positioning while also preventing access to the cables so they cannot be cut by vandals or thieves and also protecting the cables from long term weather exposure. The removal of unsightly cables also leads to a cleaner more professional installation and look, and makes the antenna less identifiable and more unobtrusive. Customized cable sleeves can be supplied for extra protection where required.



Specification

II. Specification

GPS					
Centre Frequency	1575.42MHz				
Bandwidth	10MHz				
Average Gain	32dBic typ.				
Radiation Efficiency	50%				
Gain @ Zenith	4.0dBic typ.				
Axial Ratio	3.0dB typ.				
Polarization	Right Hand Circular				
VSWR	<=1.9:1				
Impedance	50Ω				
DC Power Input Range	3 ~ 5V				
DC input	3.3V	4.0V	5.0V		
LNA Gain	35dB	31dB	32dB		
Noise Figure	1.5dB	1.55dB	1.62dB		
Power Consumption	8mA	10mA	13mA		
Band Attenuation	± 50MHz	± 70MHz	± 100MHz		
	40dB	40dB	50dB		
Cable	3m RG174 standard, fully customizable				
Connector	SMA(M) standard, standard, fully customizable				
CELLULAR					
Frequency (GHz)	824 ~ 896	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1710 ~ 2170
Peak Gain (dBi)	2.1	-0.2	2.9	3.0	5.1
Average (dBi)	-4.7	-5.0	-2.7	-3.1	-3.1
Efficiency	35%	30%	51%	49%	49%
Impedance	50Ω				
Polarization	Linear				
Radiation Pattern	Omni				
Cable	3m CFD200 standard, fully customizable				
Connector	SMA(M) standard, fully customizable				
WIFI					
Frequency (GHz)	2.4 ~ 2.5	4.7 ~ 5.0	5.0 ~ 5.4	5.4 ~ 5.9	
Peak Gain (dBi)	2.1	2.9	3.8	2.8	
Average Gain (dBi)	-2.3	-3.6	-3.3	-3.8	
Efficiency	60%	44%	46%	42%	
VSWR	<=1.6:1				
Impedance	50Ω				



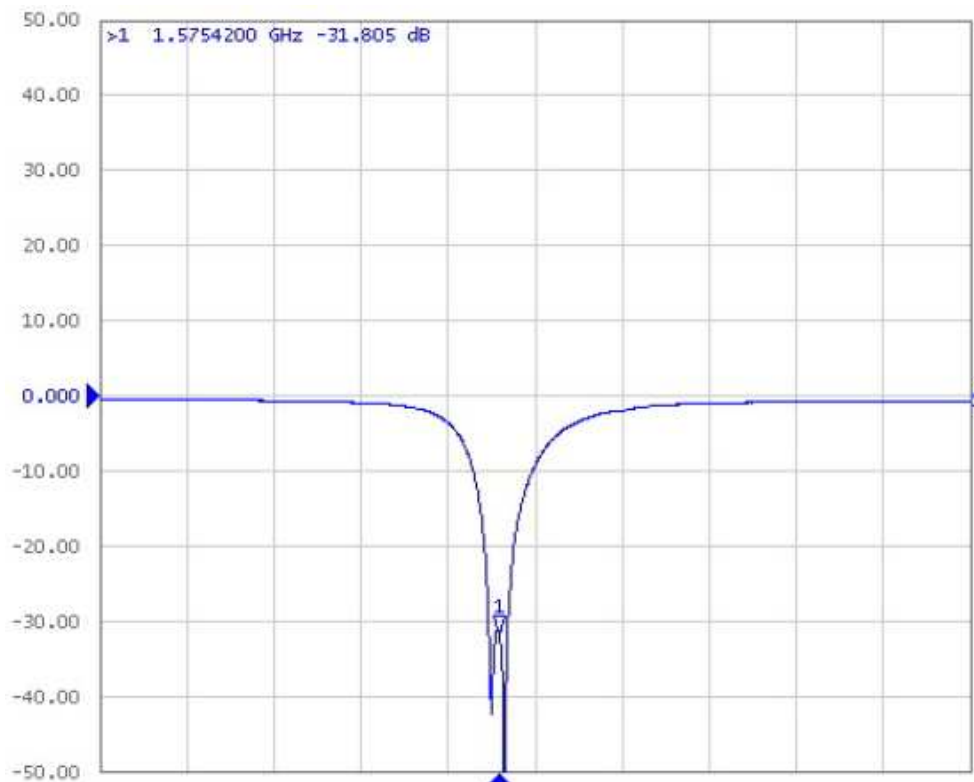
Specification

Polarization	Linear
Radiation Pattern	Omni
Cable	3m CFD200 standard, fully customizable
Connector	SMA(M) standard, standard, fully customizable
MECHANICAL	
Dimensions	Height 50mm x Diameter 150mm
Casing	UV resistant PVC
Base and thread	Zinc
Thread diameter	30mm
Waterproof	IP67
ENVIRONMENTAL	
Temperature Range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

* all measurements are done in free space with standard cables

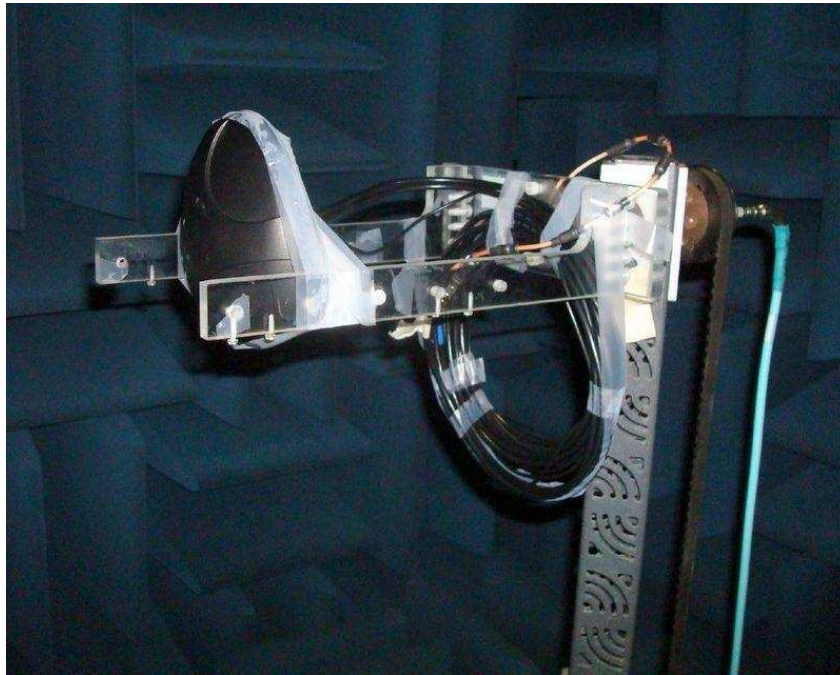
III. GPS Antenna Characteristics

III.1. Return Loss

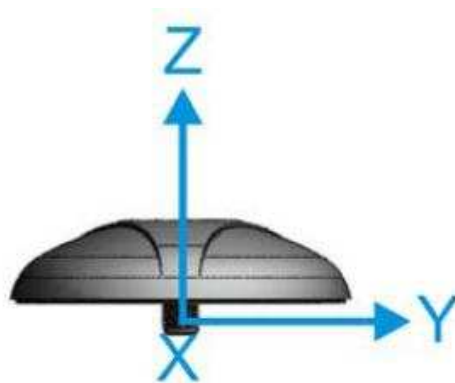




III.2. GPS Antenna Radiation Pattern



MA.600 tested in CTIA approved 3D chamber

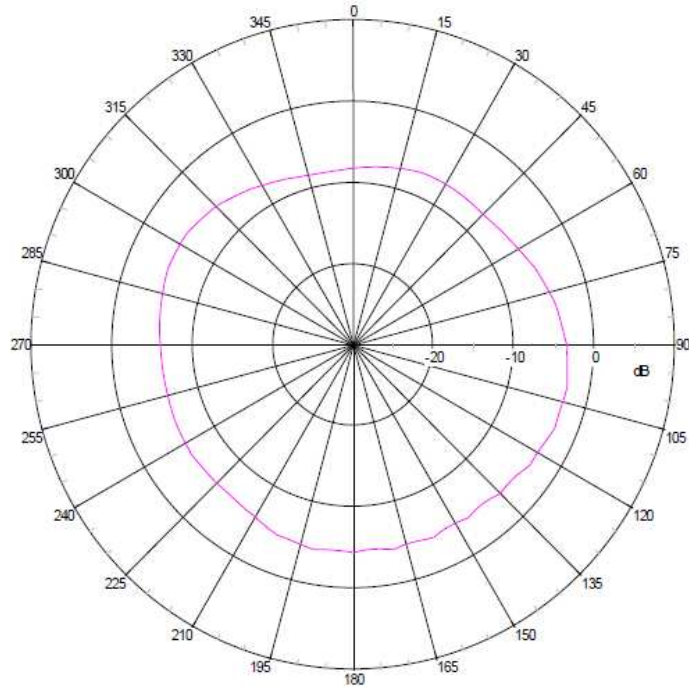


XYZ co-ordinate for reference.

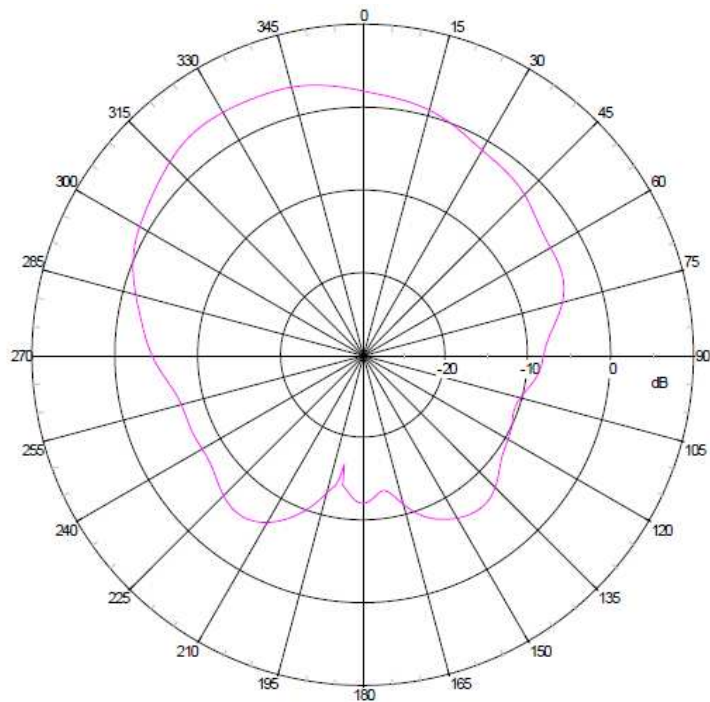


Specification

XY-plane



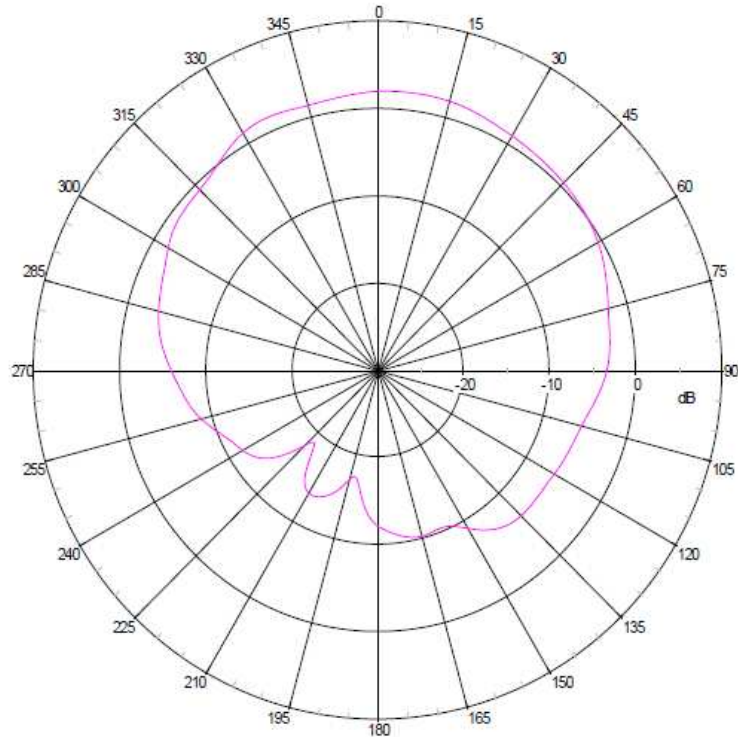
XZ Plane



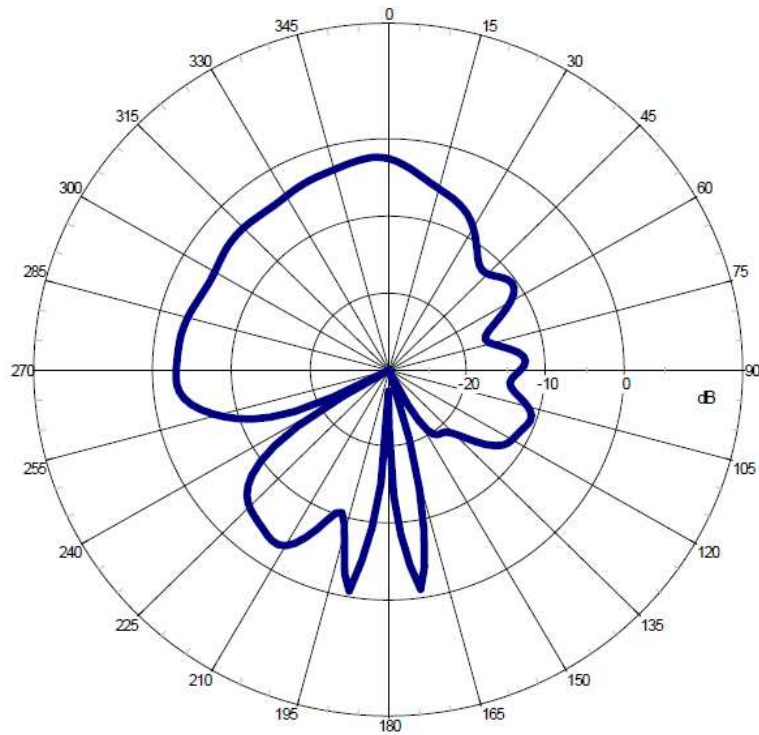


Specification

YZ Plane



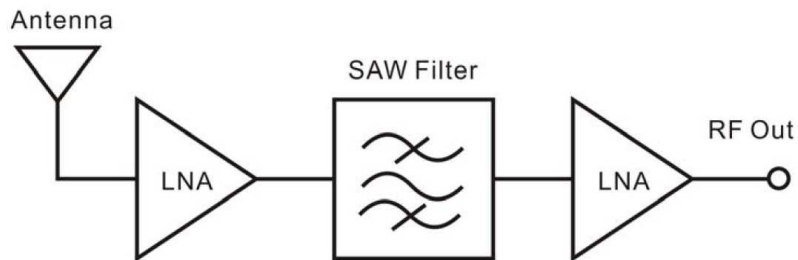
III.3. Axial Ratio



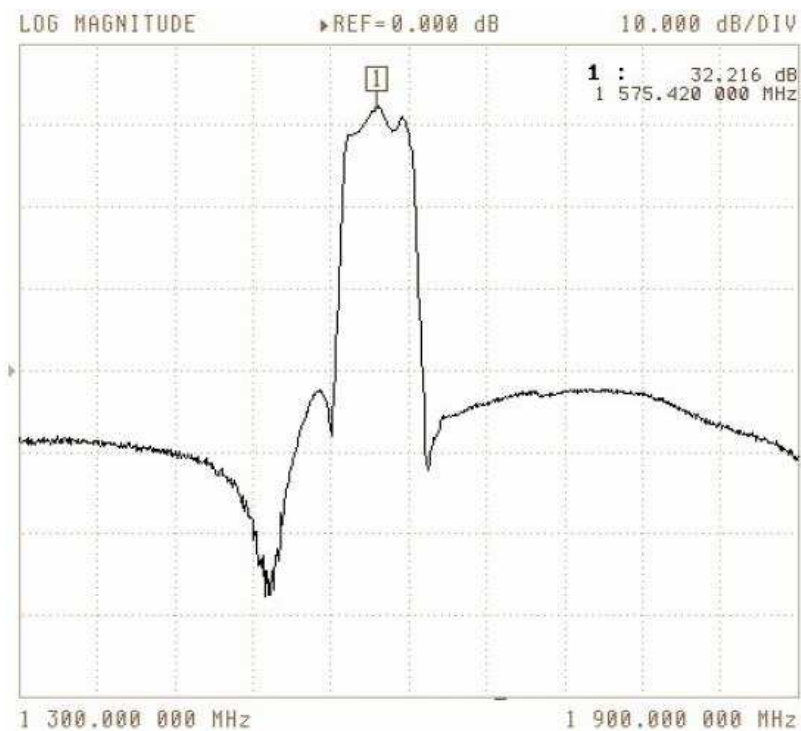


III.4. GPS LNA

Block Diagram



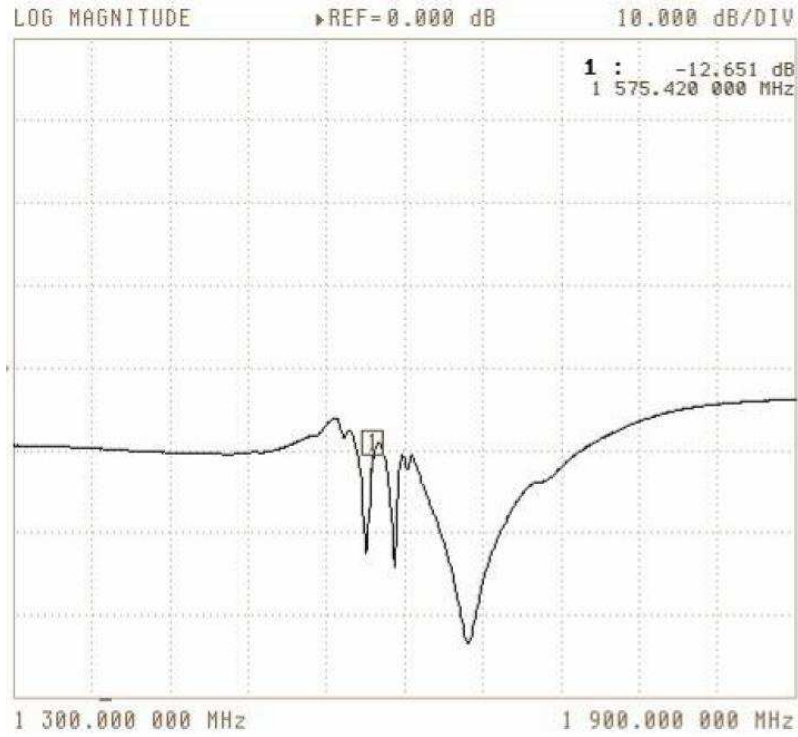
Forward Transmission





Specification

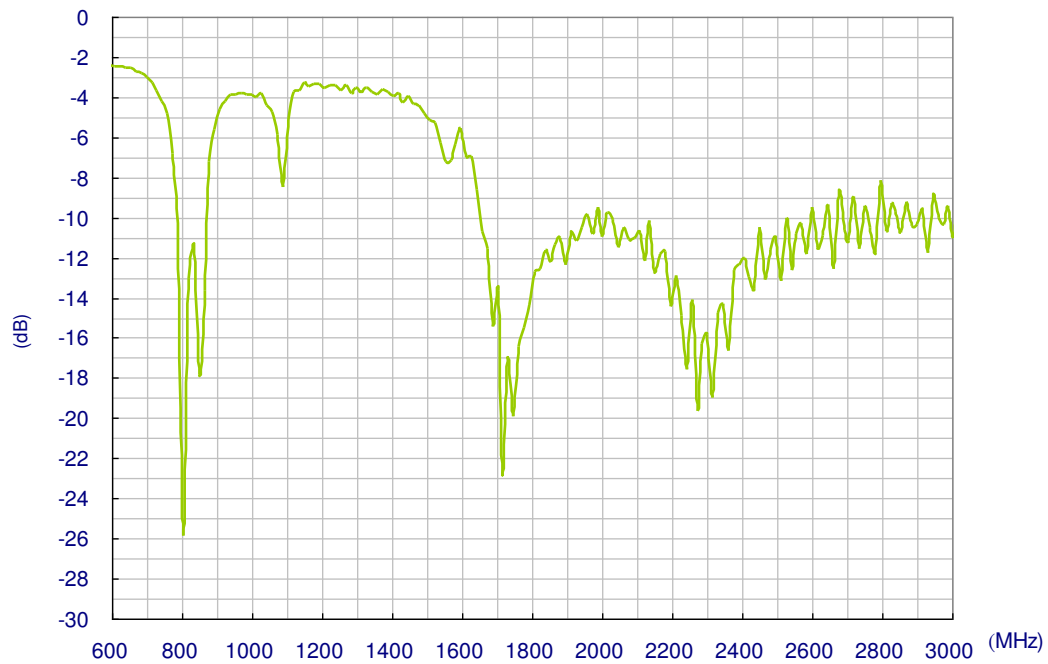
S22 Reverse Reflection



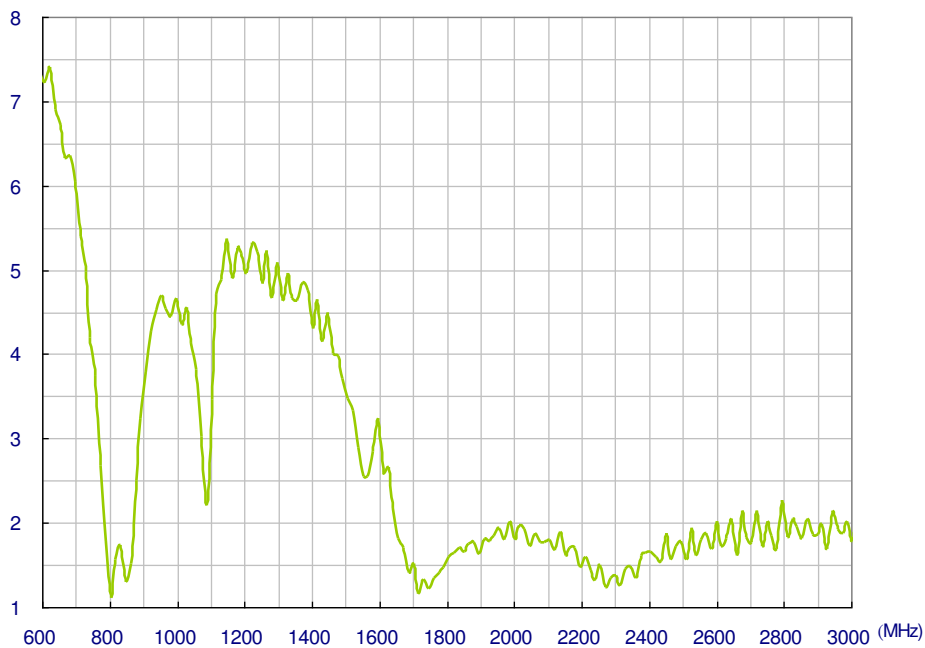


IV. Cellular Antenna Characteristics

IV.1. Return Loss

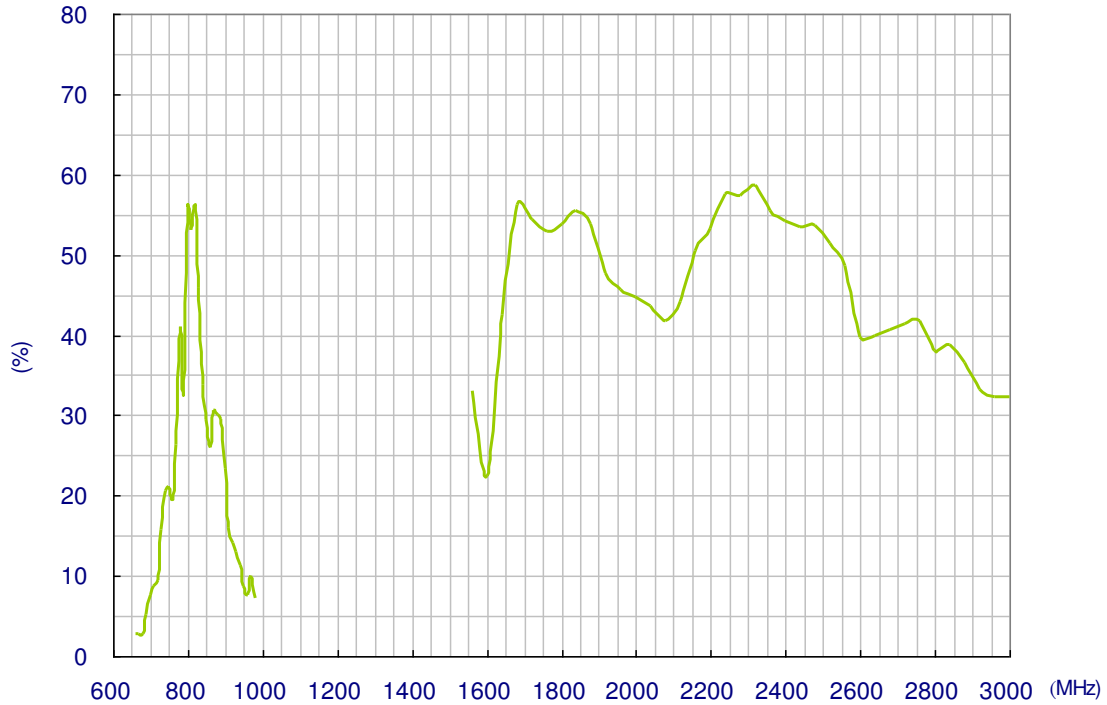


IV.2. VSWR

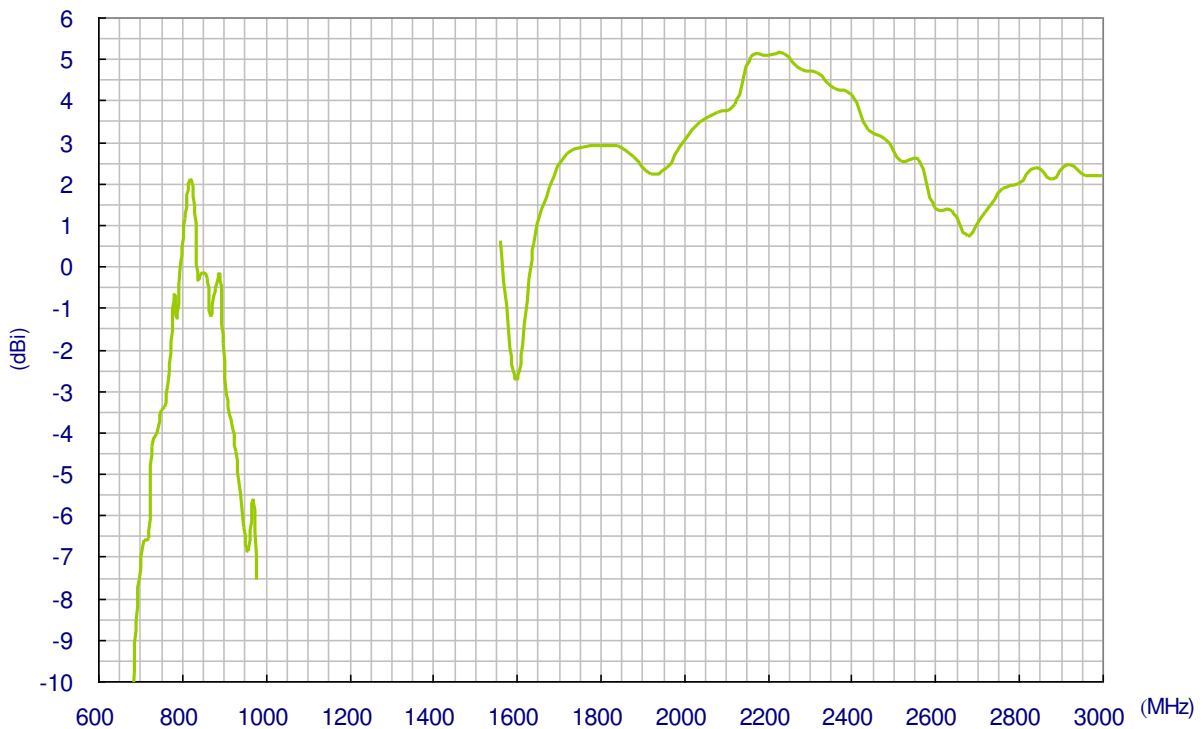




IV.3. Cellular Antenna Efficiency

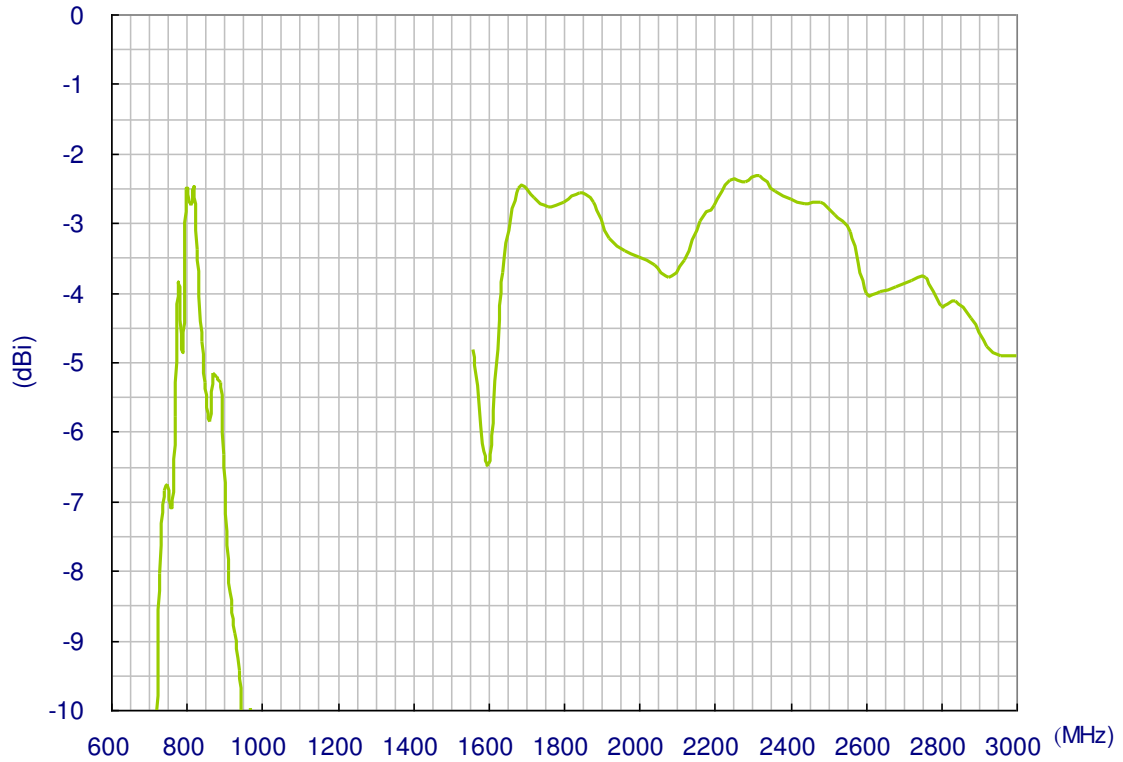


IV.4. Cellular Antenna Peak Gain





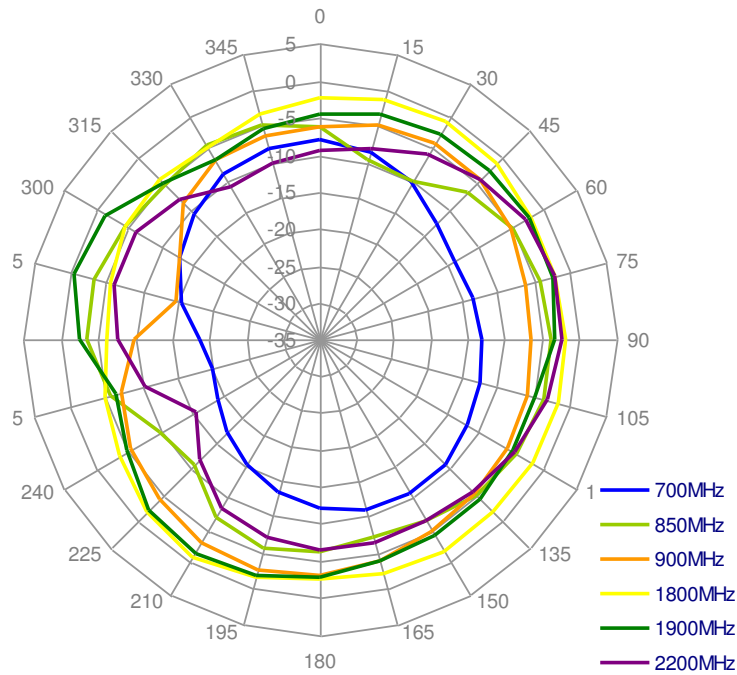
IV.5. Cellular Antenna 3D Average Gain



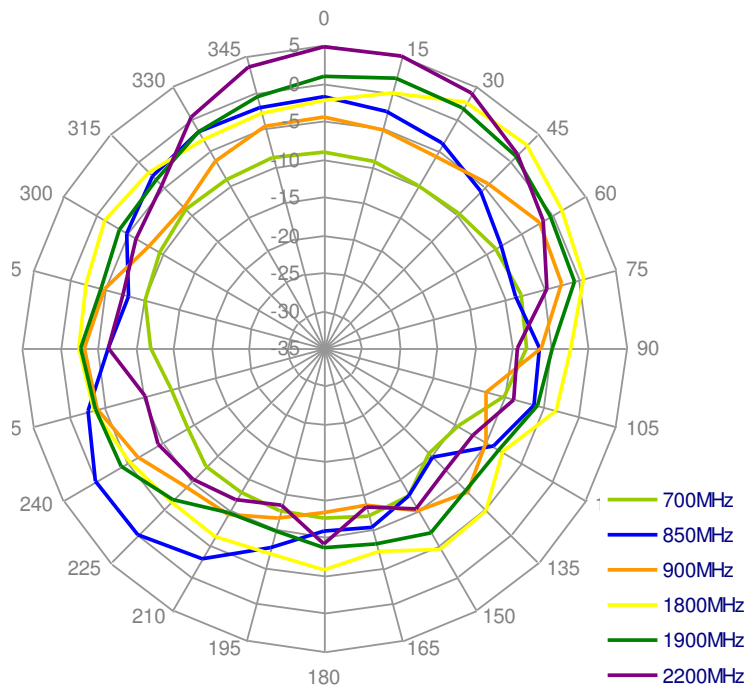


IV.6. Cellular Antenna Radiation Pattern

XY-plane



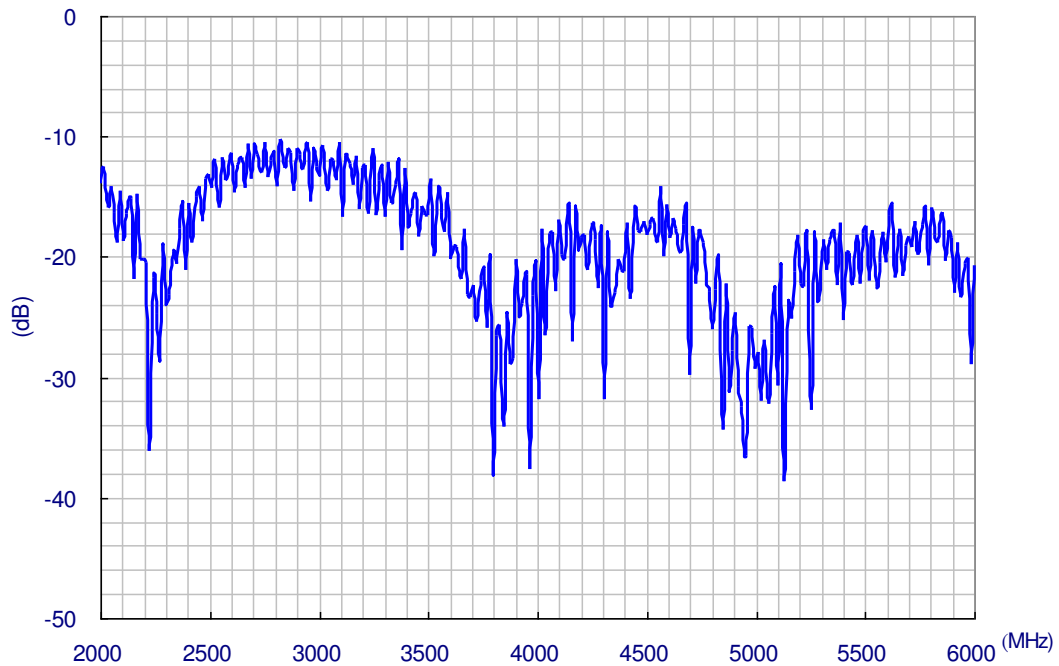
XZ-plane



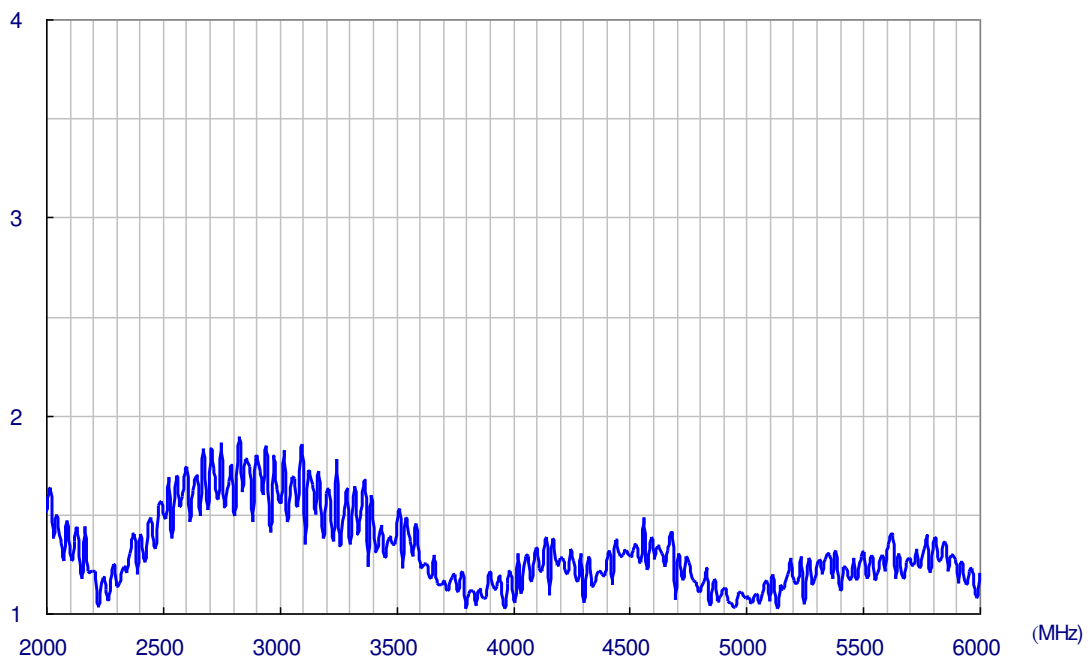


V. 2.4/5GHz Antenna Characteristics

V.1. S11 Return Loss

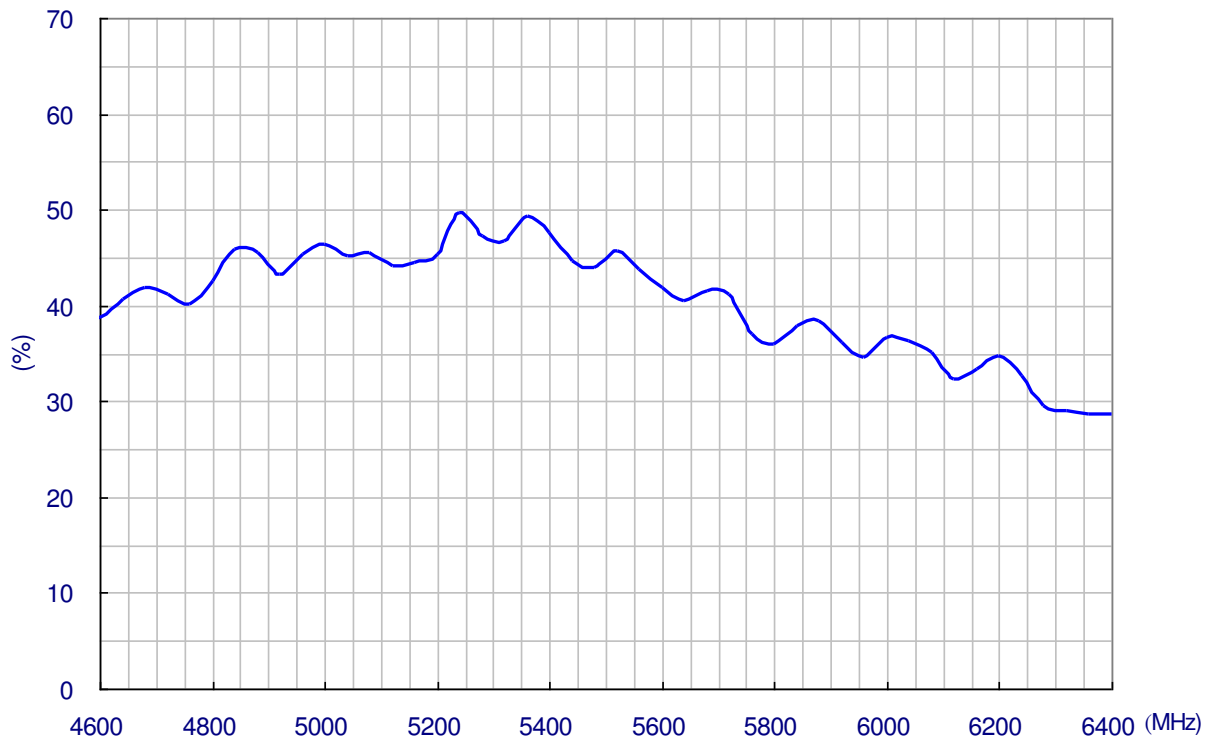
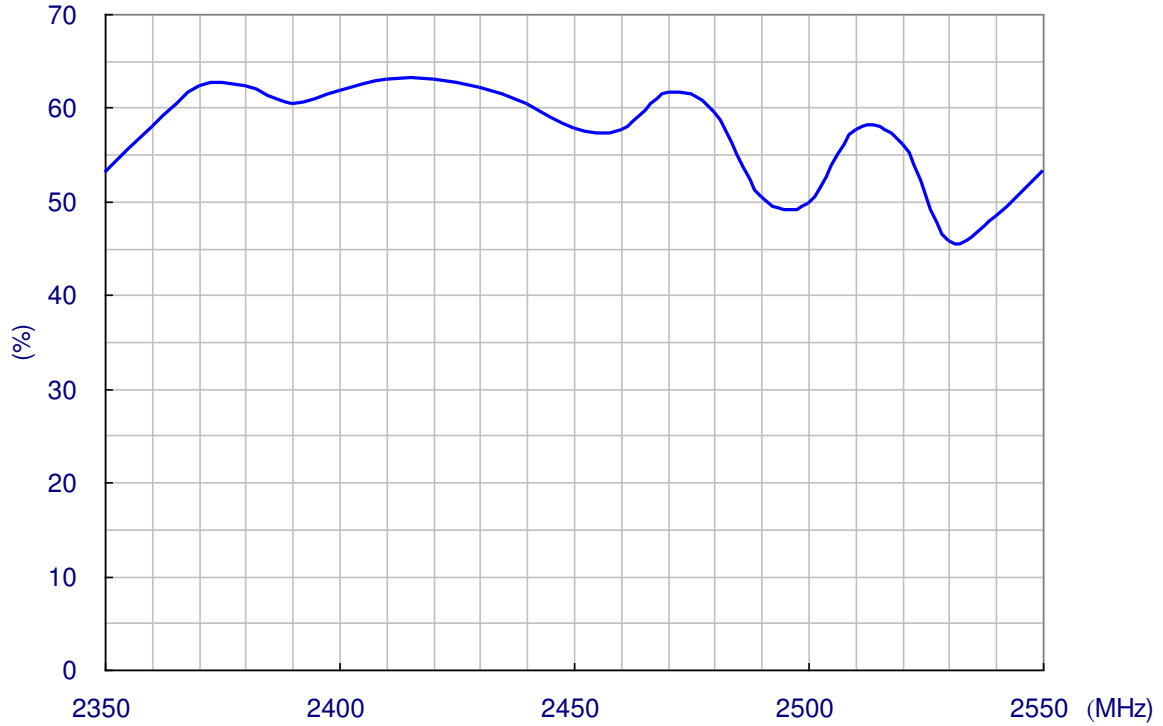


V.2. VSWR





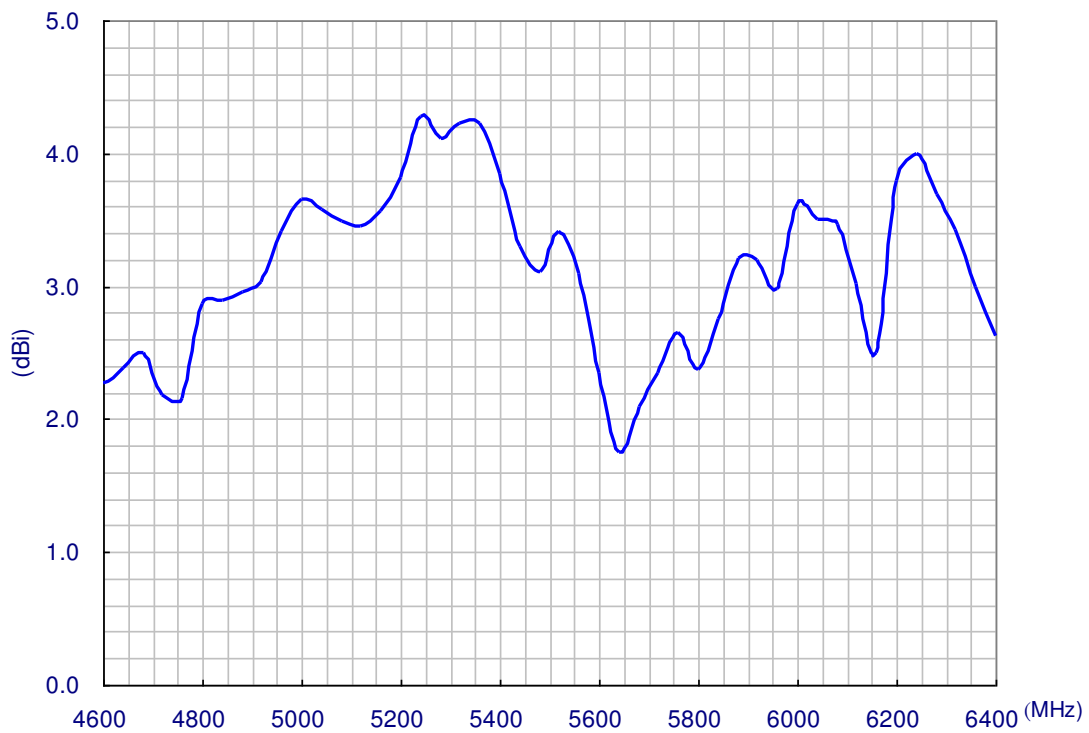
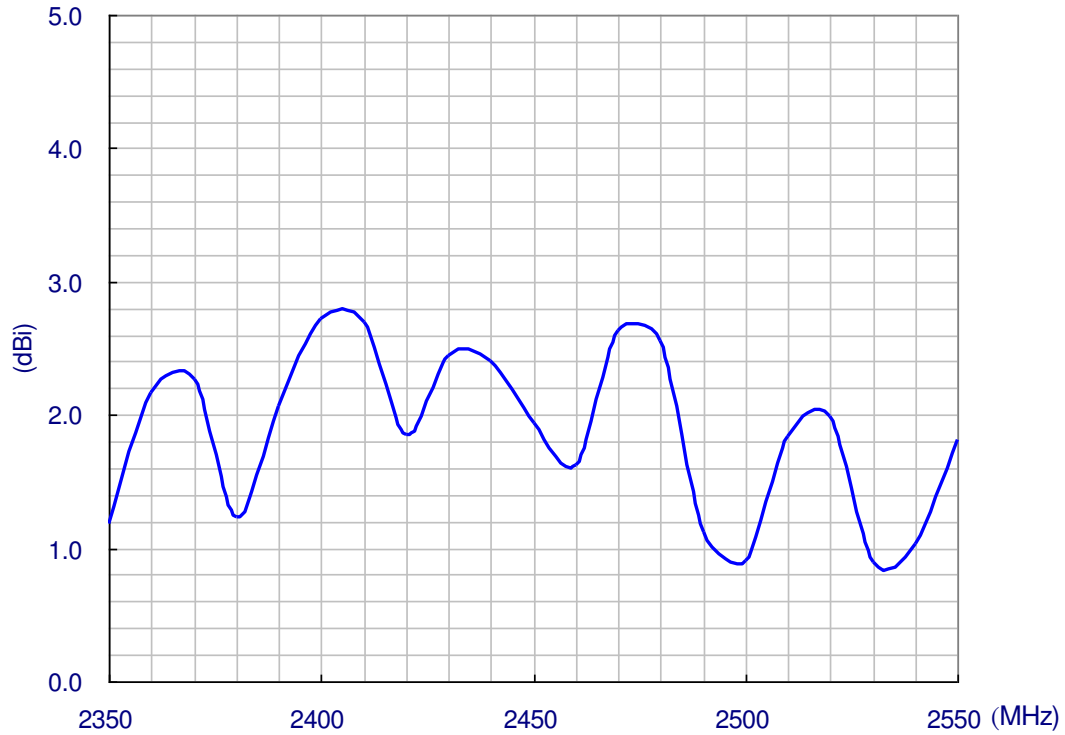
V.3. 2.4/5GHz Antenna Efficiency





Specification

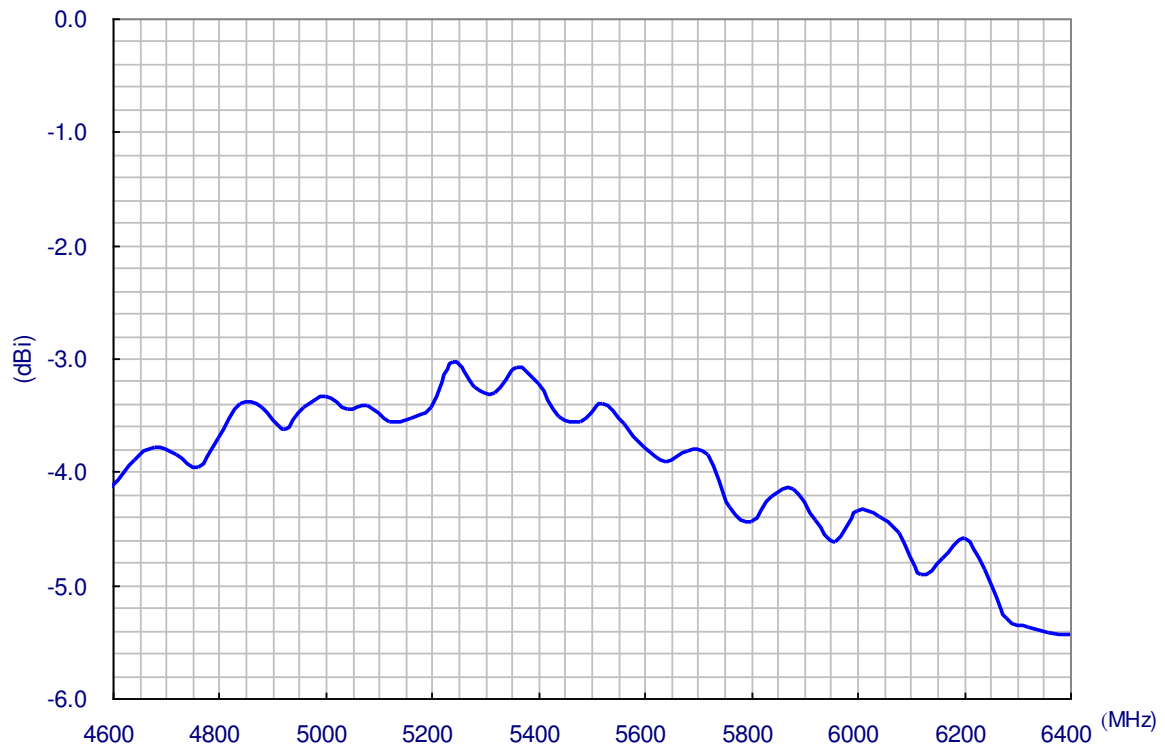
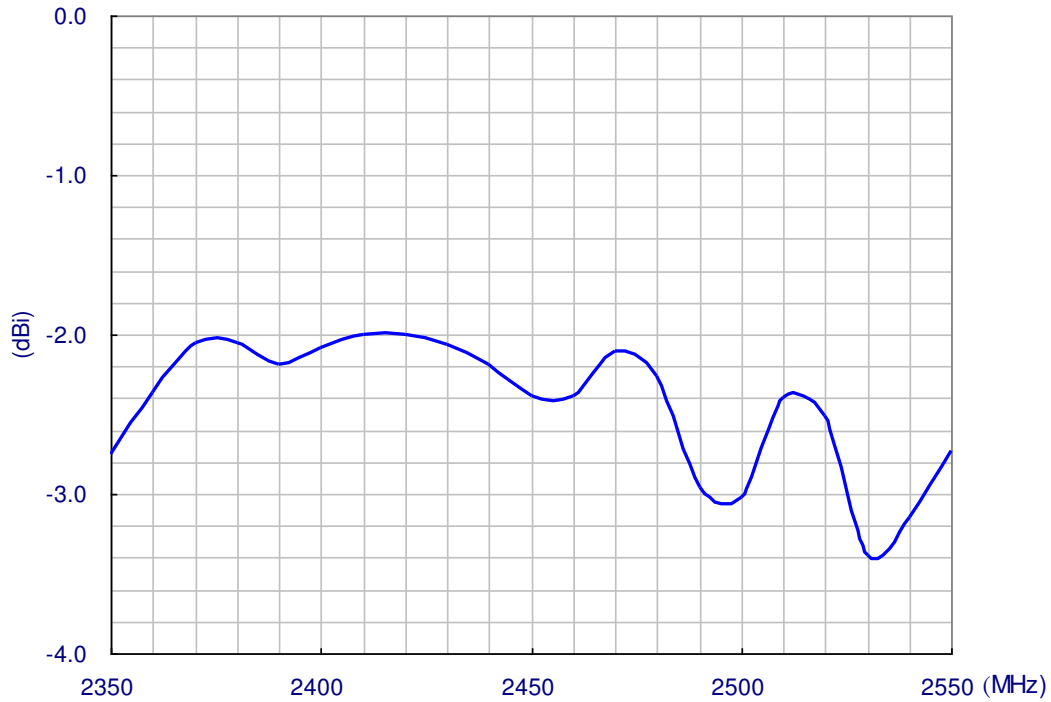
V.4. 2.4/5GHz Antenna Peak Gain





Specification

V.5. 2.4/5GHz Antenna 3D Average Gain

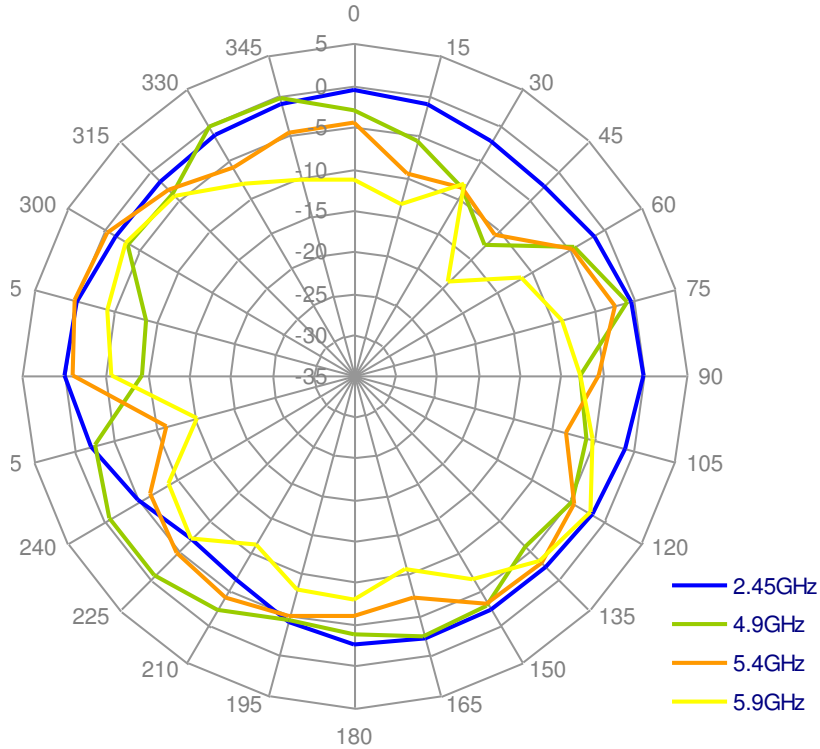




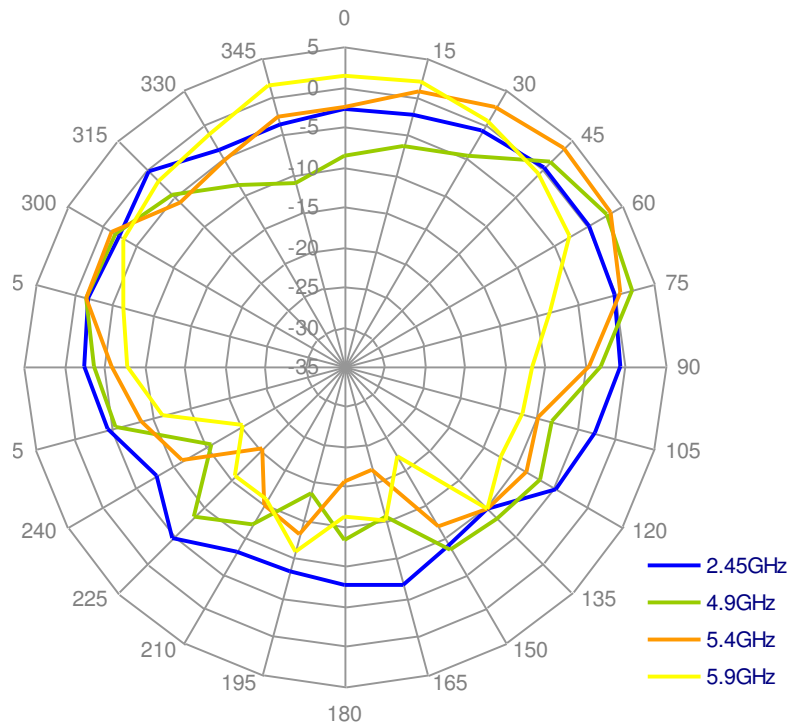
Specification

V.6. 2.4/5GHz Antenna Radiation Pattern

XY-plane

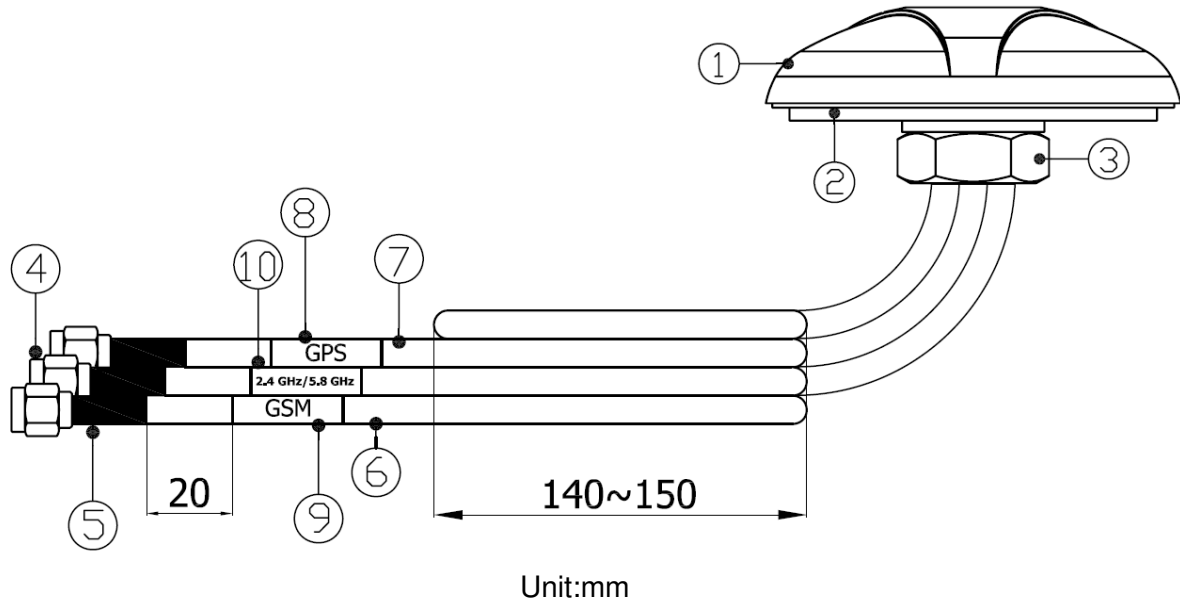


XZ-plane





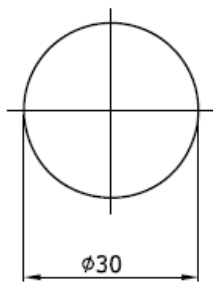
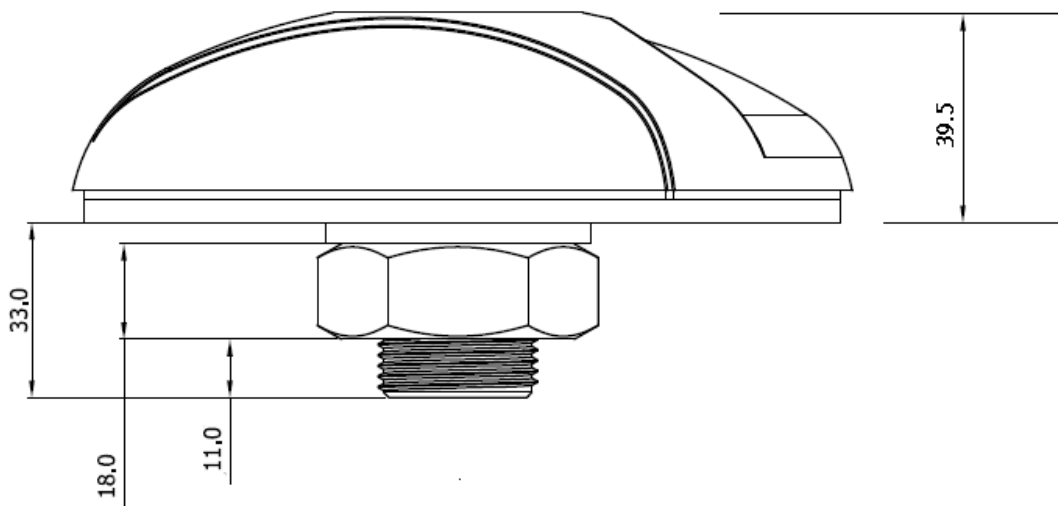
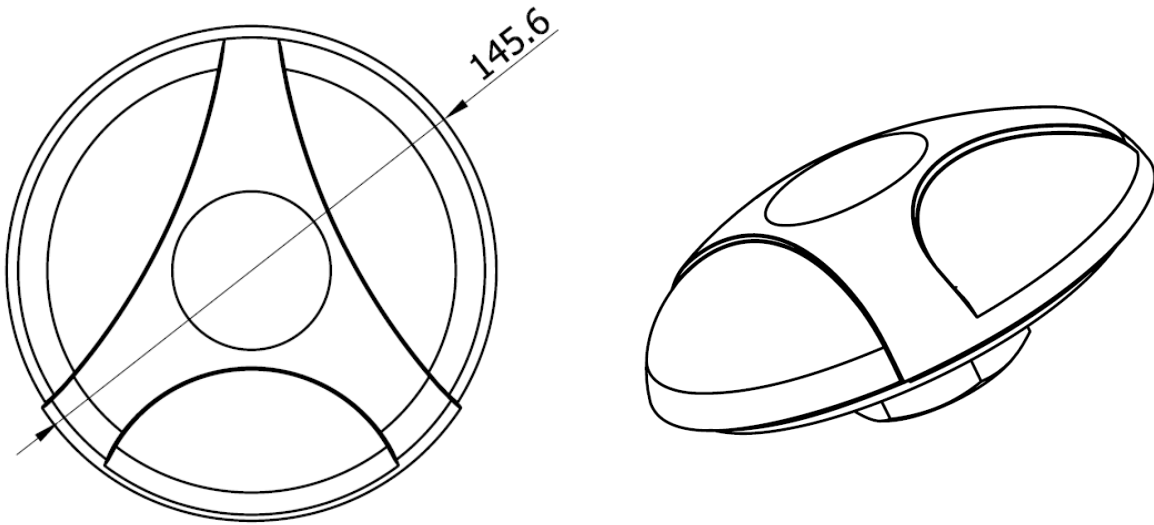
VI. Mechanical Drawing



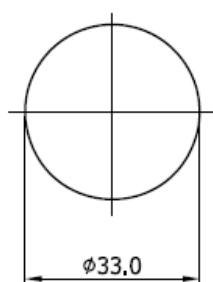
No.	Item	Description
1	Antenna Cover	Black ABS
2	Bottom Cover	Zinc Alloy
3	Hexagon Nut	Ø30mm, H18mm
4	Connector	SMA
5	Heat Shrink Tube	Black H.S tube
6	CFD 200 Cable	3m standard
7	RG.174 cable	3m standard
8	Label	GPS label, orange
9	Label	GSM label, blue
10	Label	WiFi label, green



Specification



Thread Diameter

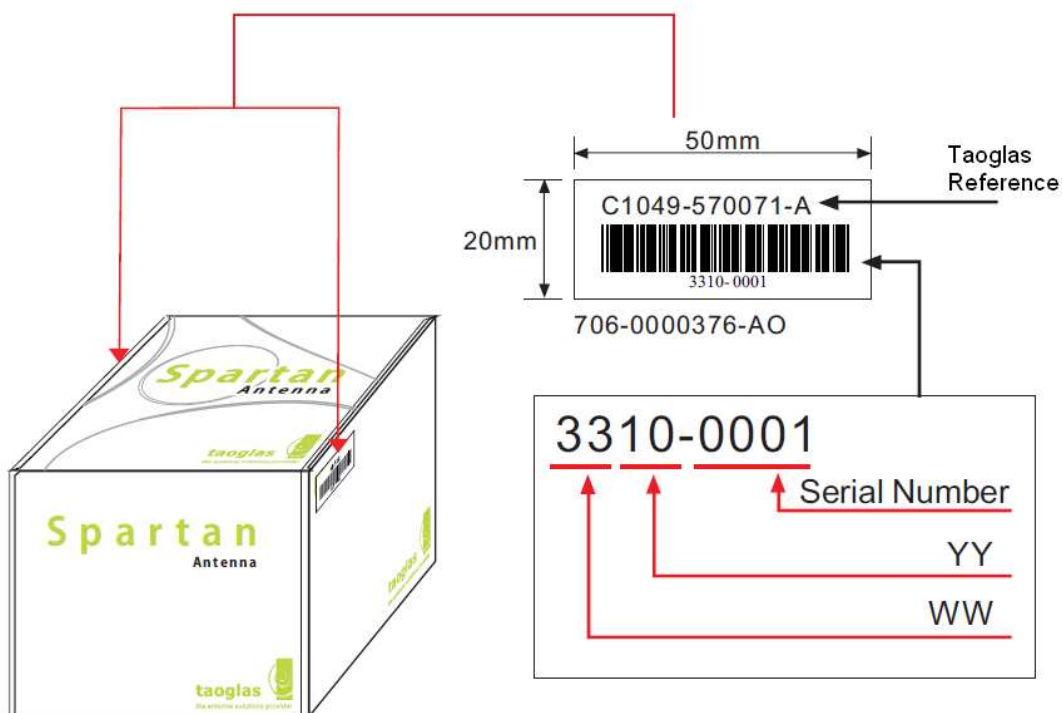
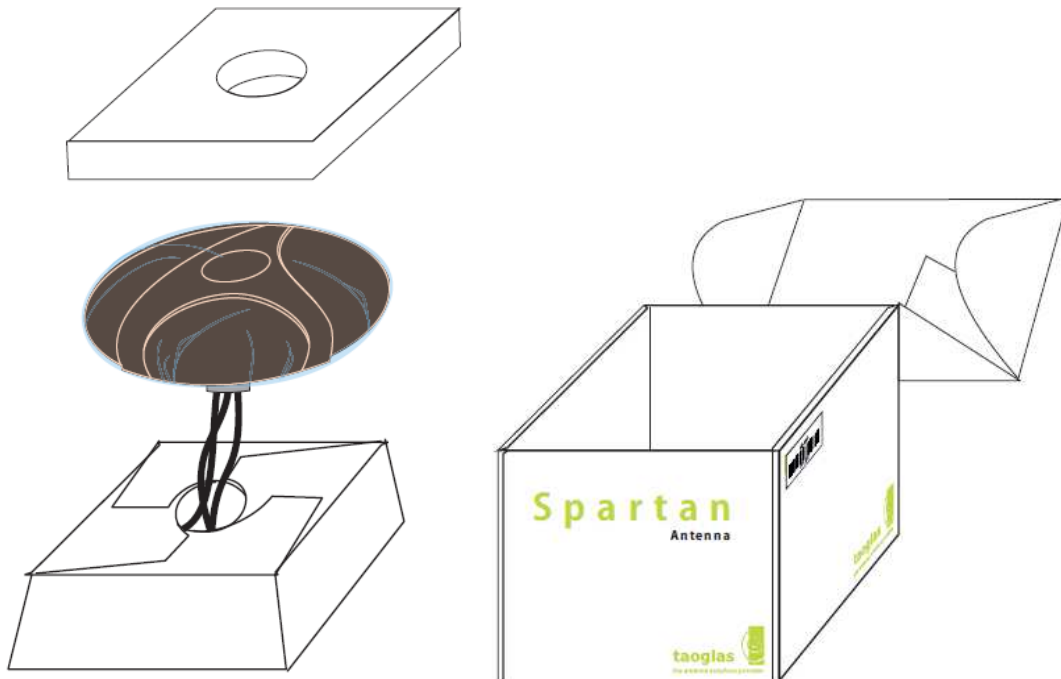


Recommended
Mounting Hole

Unit: mm



VII. Packing





Specification

8 boxes per carton

