MA.600
on ground-plane

MA.600

Specification

Part No.	**MA600.A301111.B305111.C305111**
Product Name	MA600 Spartan Screw-mount 3in1 Combination Antenna GPS Cellular – GSM/CDMA/HSPA/UMTS 2.4GHz / 5GHz
Feature	High performance outdoor antenna Custom cables and connectors available RoHS Compliant

1. Introduction

The Spartan MA.600 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, Cellular (2G and 3G) and Wi-Fi, 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.

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, with an average 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 GPS reception without need to attach to an external ground-plane due to coupling to its unique own metal base.

***Note:** For ground-isolation antennas use the MA.605 version with Isolation Gaskets.

2. 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		

2. Specification

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	-7.5	-2.7	-3.1	-3.1
Efficiency	35%	20%	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			
Polarization	Linear			
Radiation Pattern	Omni			
Cable	3m CFD200 standard, fully customizable			
Connector	SMA(M) standard, standard, fully customizable			

Mechanical

Dimensions	Profile 39.5mm x Diameter 145.6mm
Housing	Wonderloy PC-540 PC+ABS Alloy, all UV resistant
Base and thread	Nickel Plated Zinc
Thread	M30
Thread diameter	30mm
Waterproof	IP67

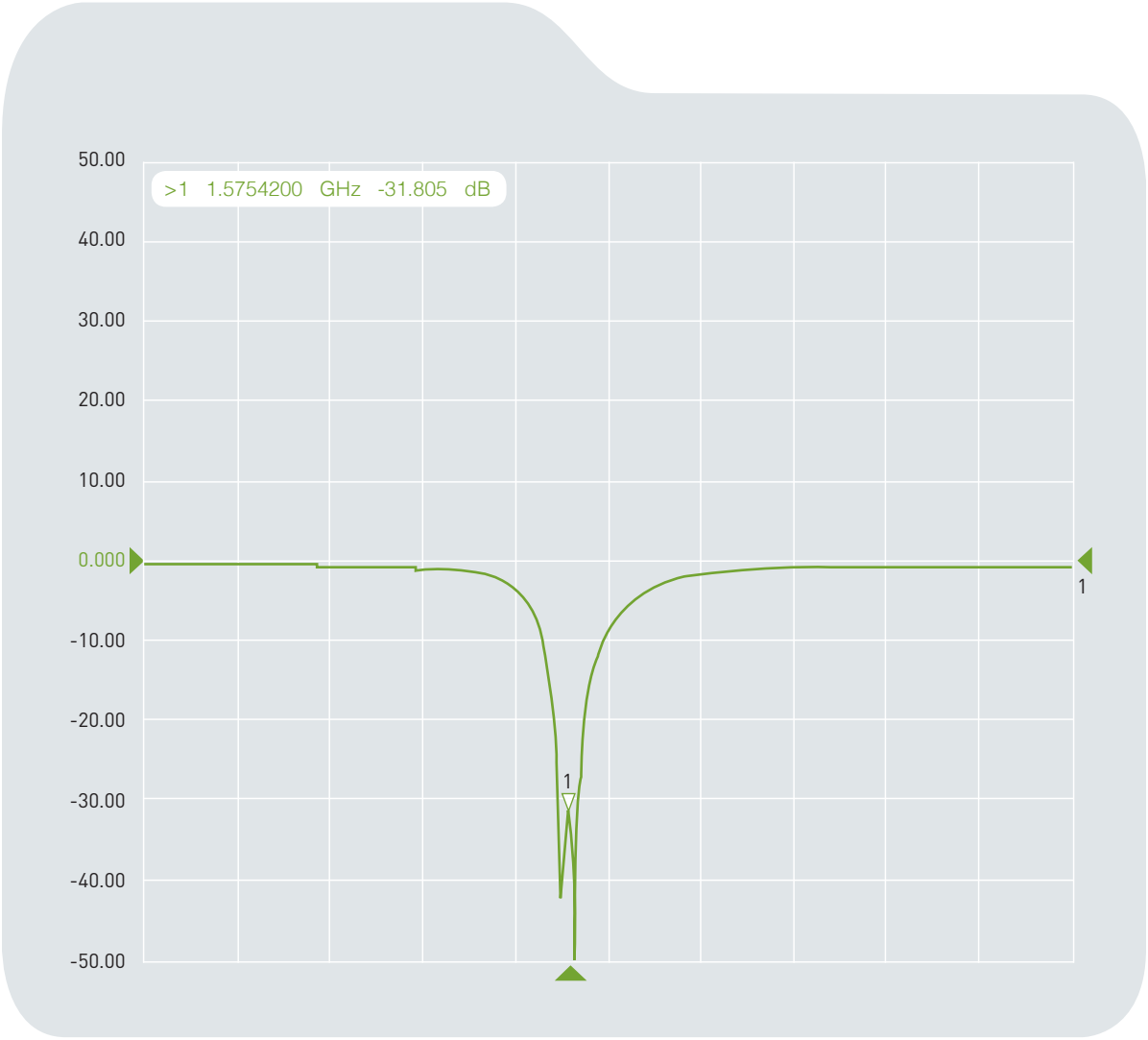
Environmental

Temperature Range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

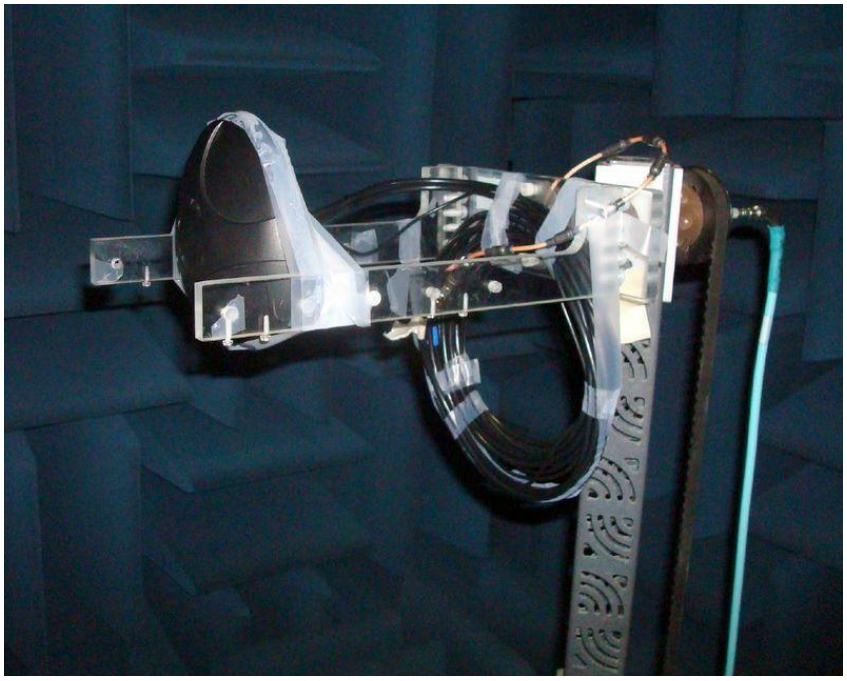
*All measurements are done in free space with standard cables

3. GPS Antenna Characteristics

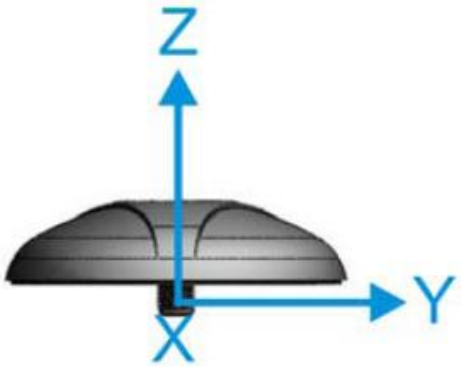
3.1 Return Loss



3.2 GPS Antenna Radiation Pattern

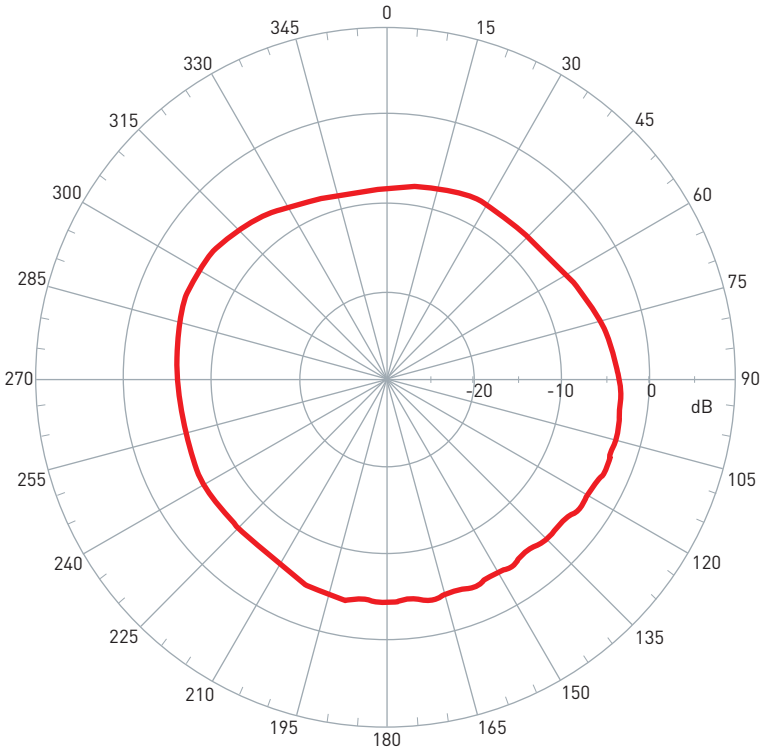


MA.600 tested in CTIA approved 3D chamber

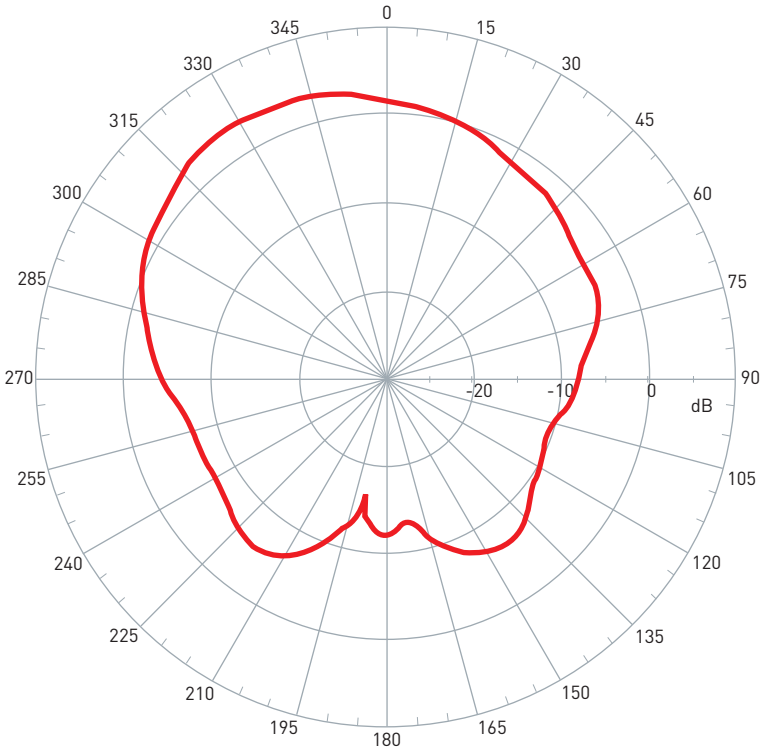


XYZ co-ordinate for reference.

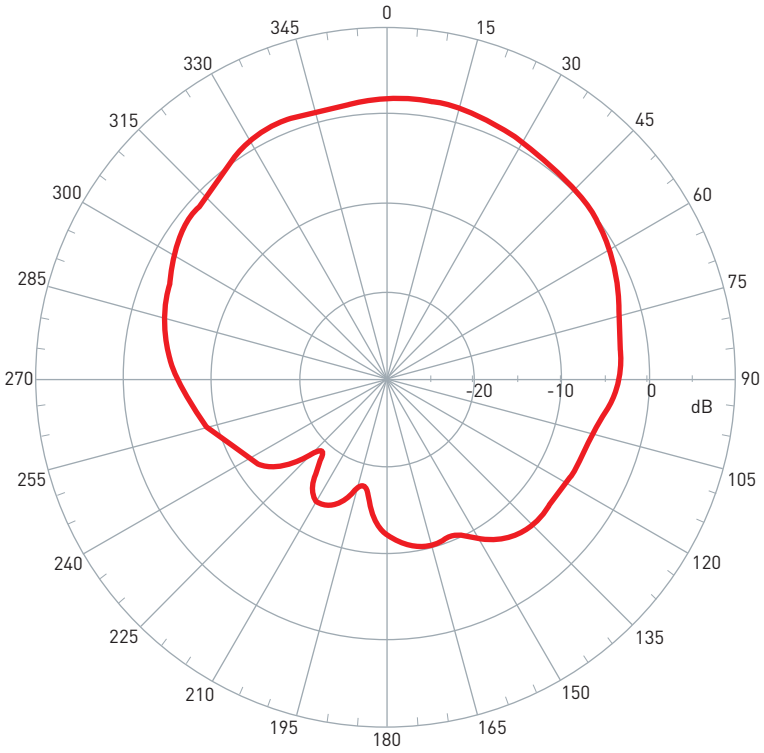
3.3 XY Plane



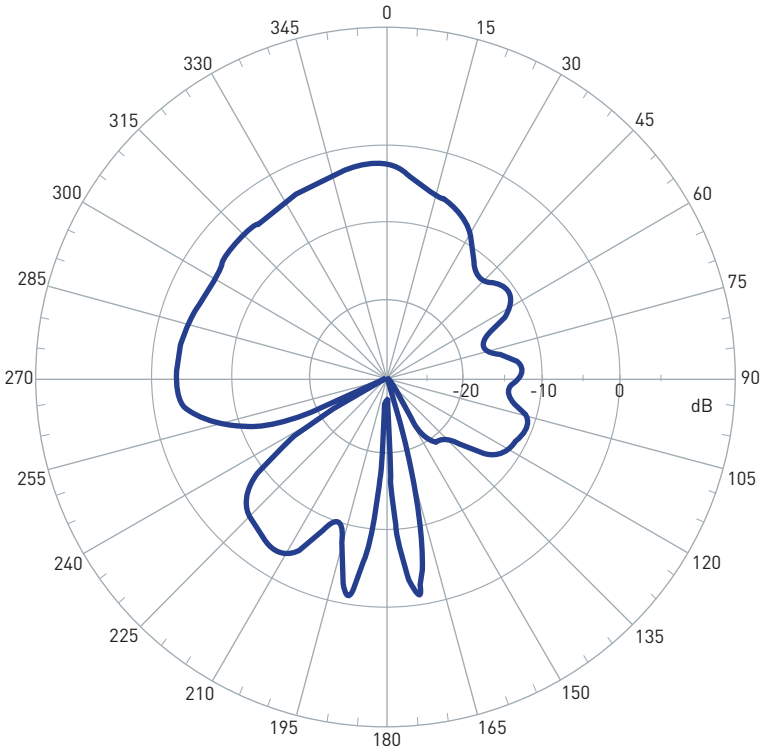
3.4 XZ Plane



3.5 YZ Plane

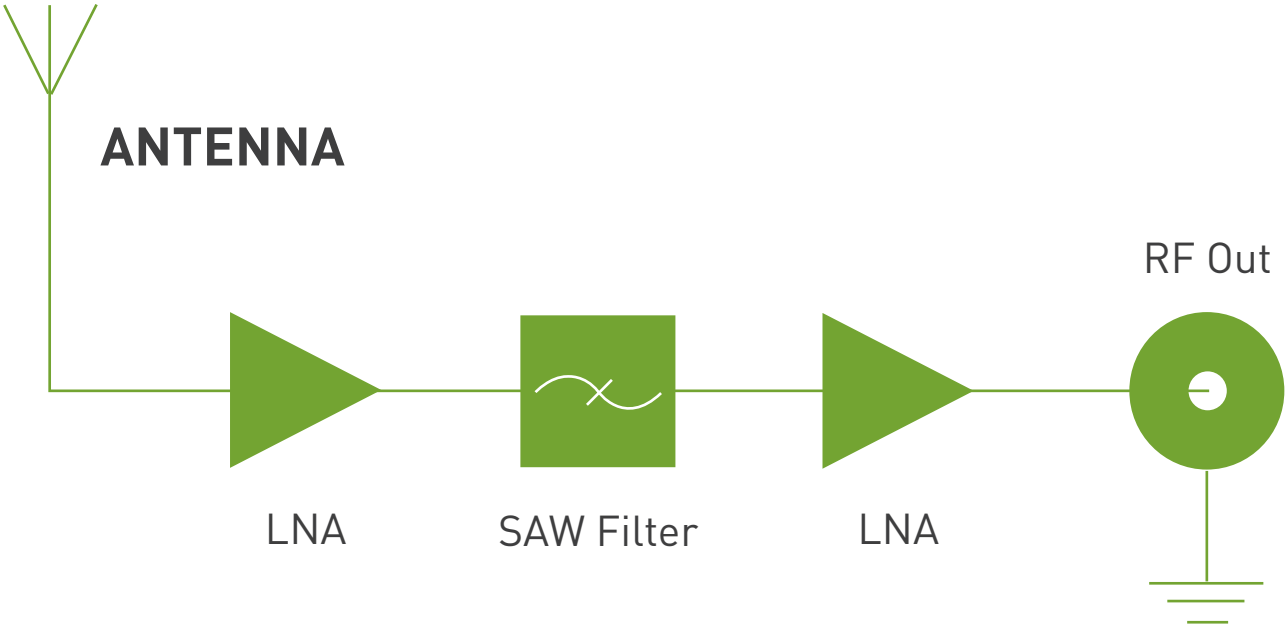


4. Axial Ratio

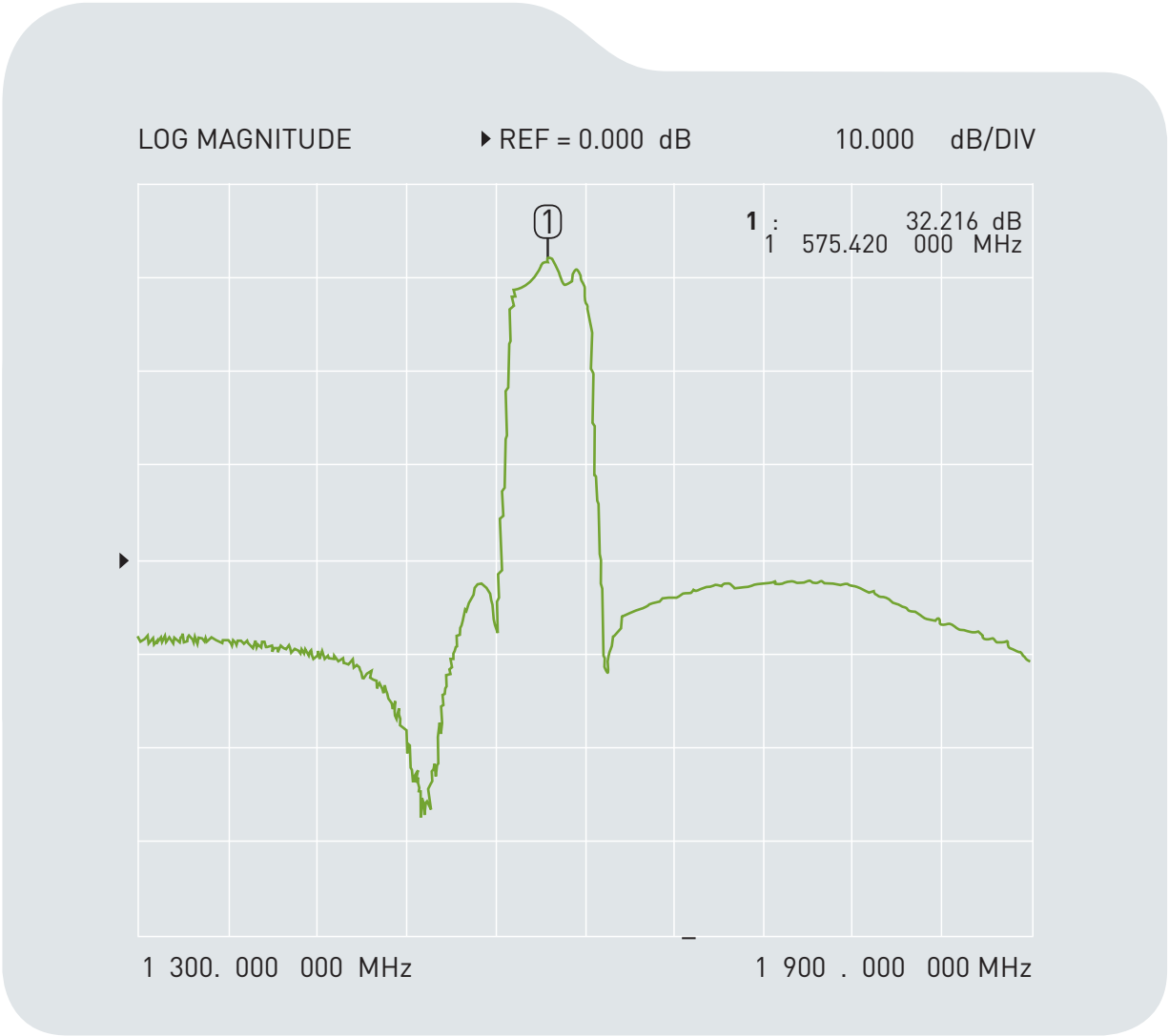


5. GPS LNA

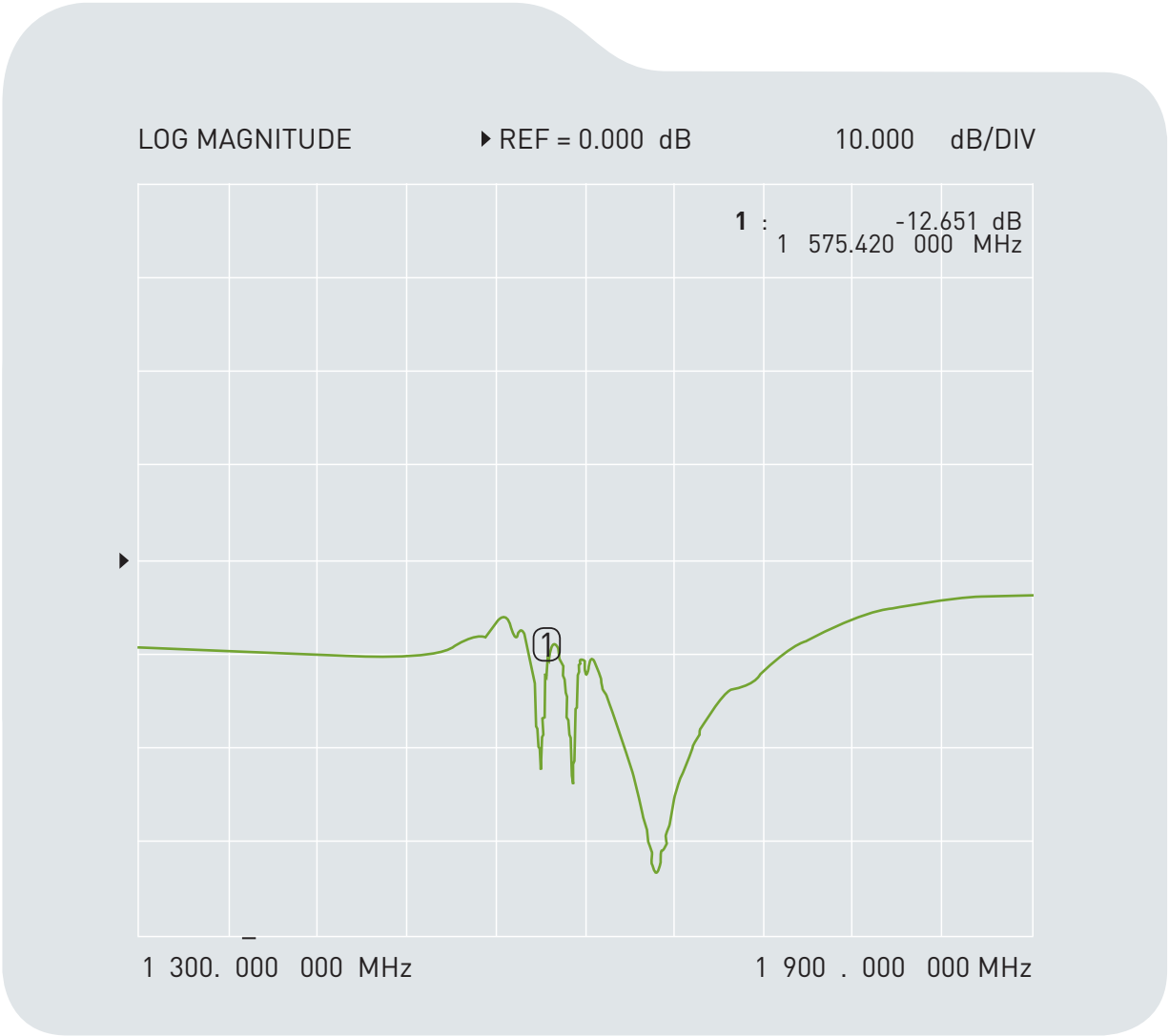
5.1 Block Diagram



5.2 Forward Transmission

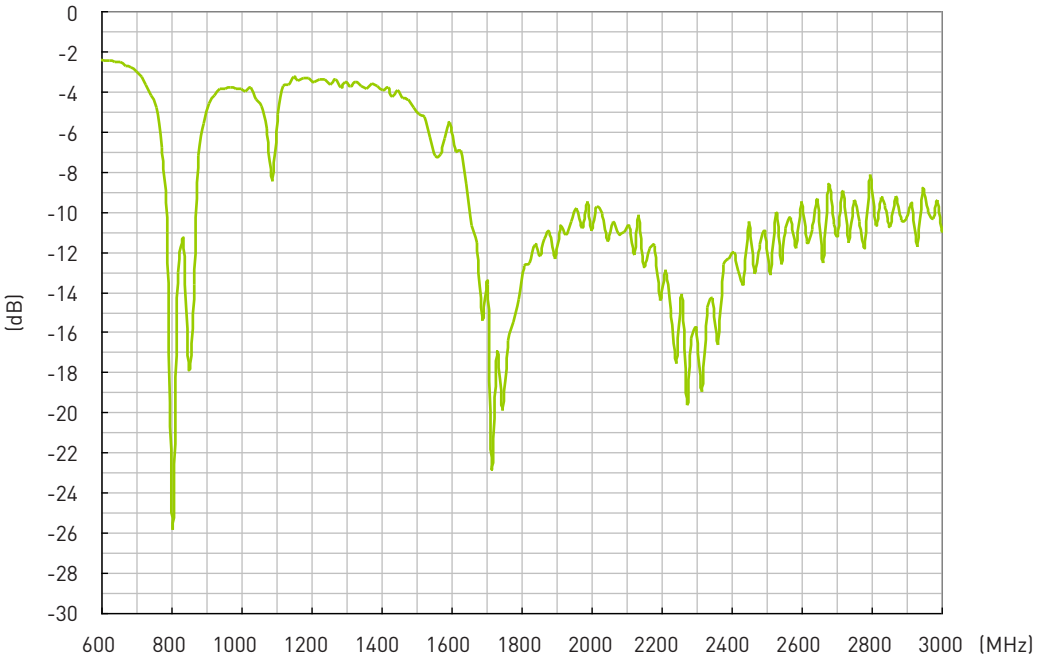


5.3 S22 Reverse Reflection

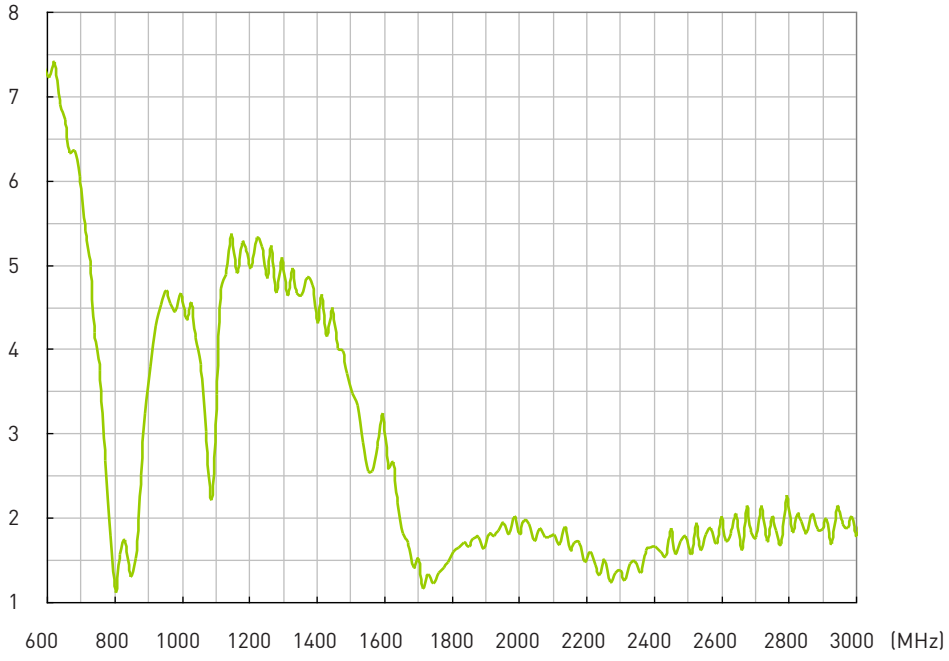


6. Cellular Antenna Characteristics

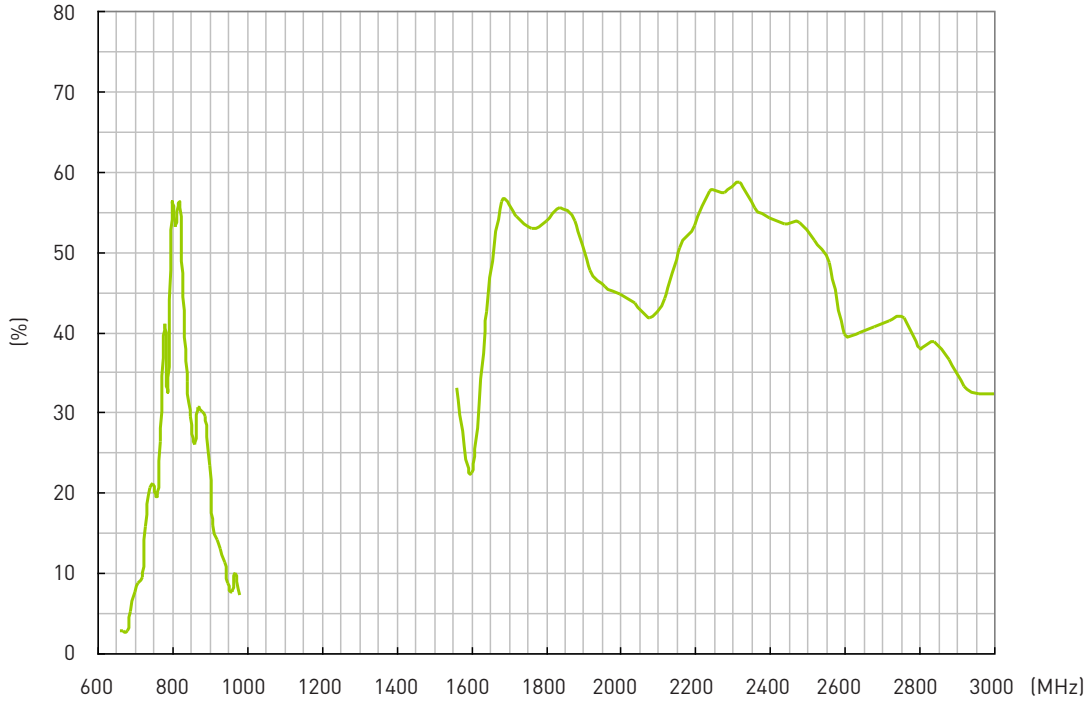
6.1 Return Loss



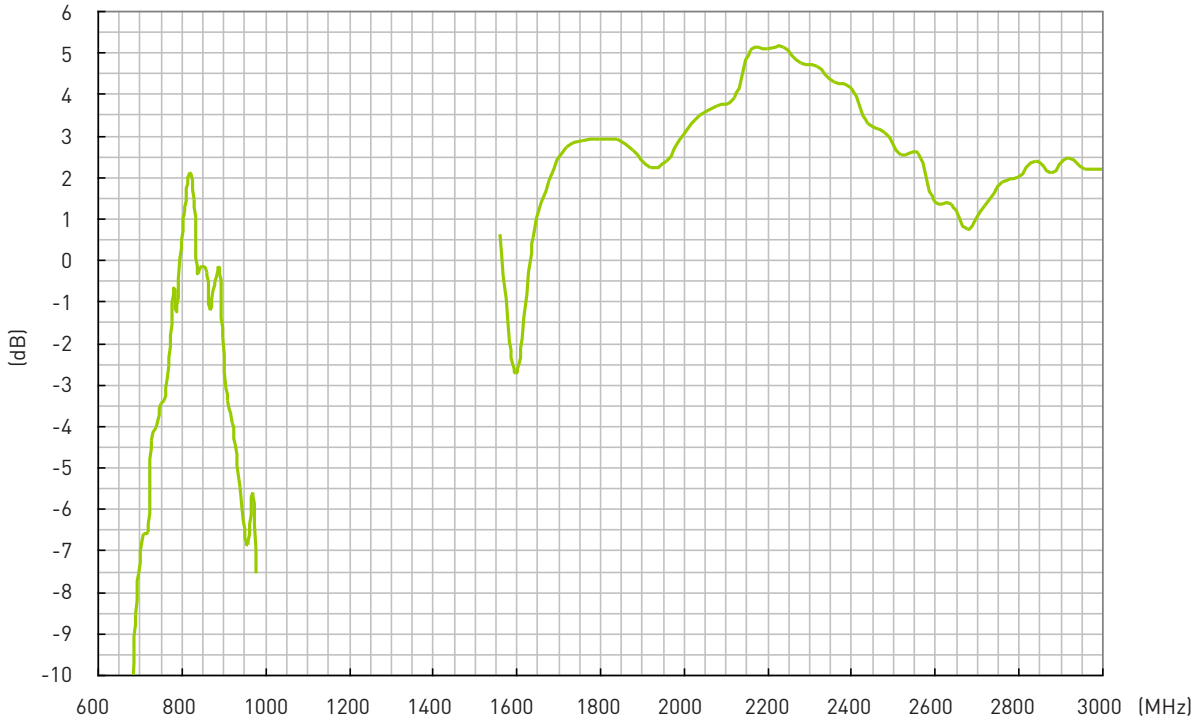
6.2 VSWR



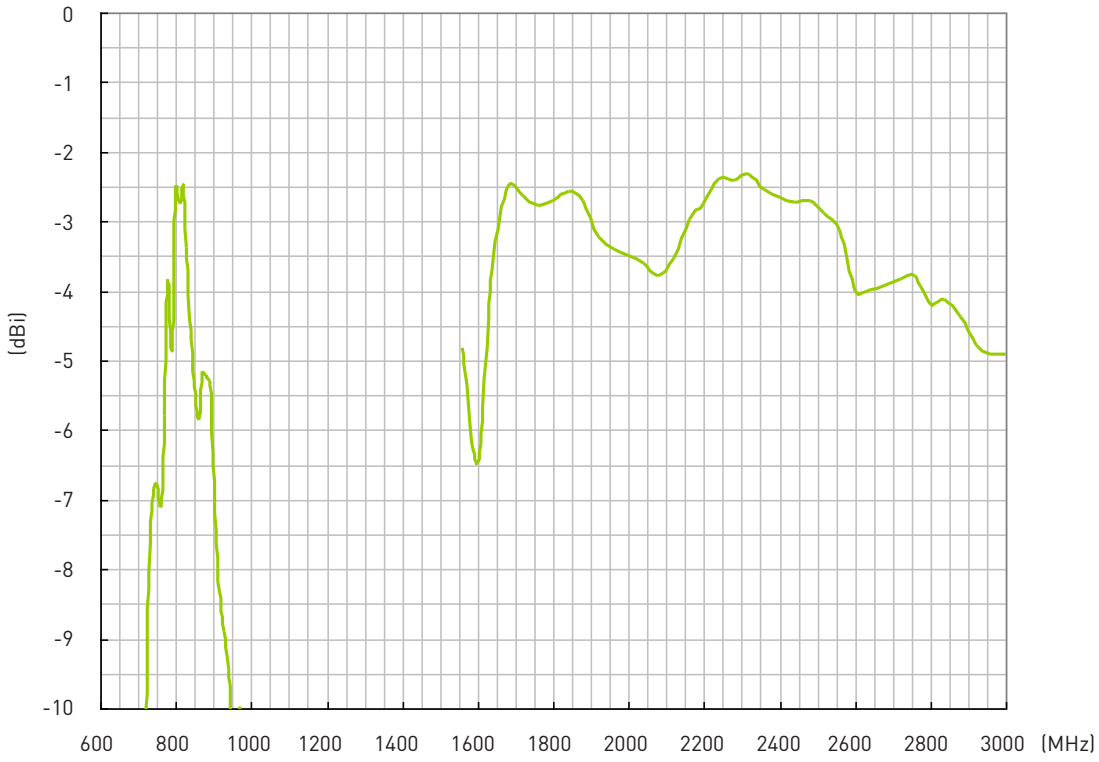
6.3 Cellular Antenna Efficiency



6.4 Cellular Antenna Peak Gain

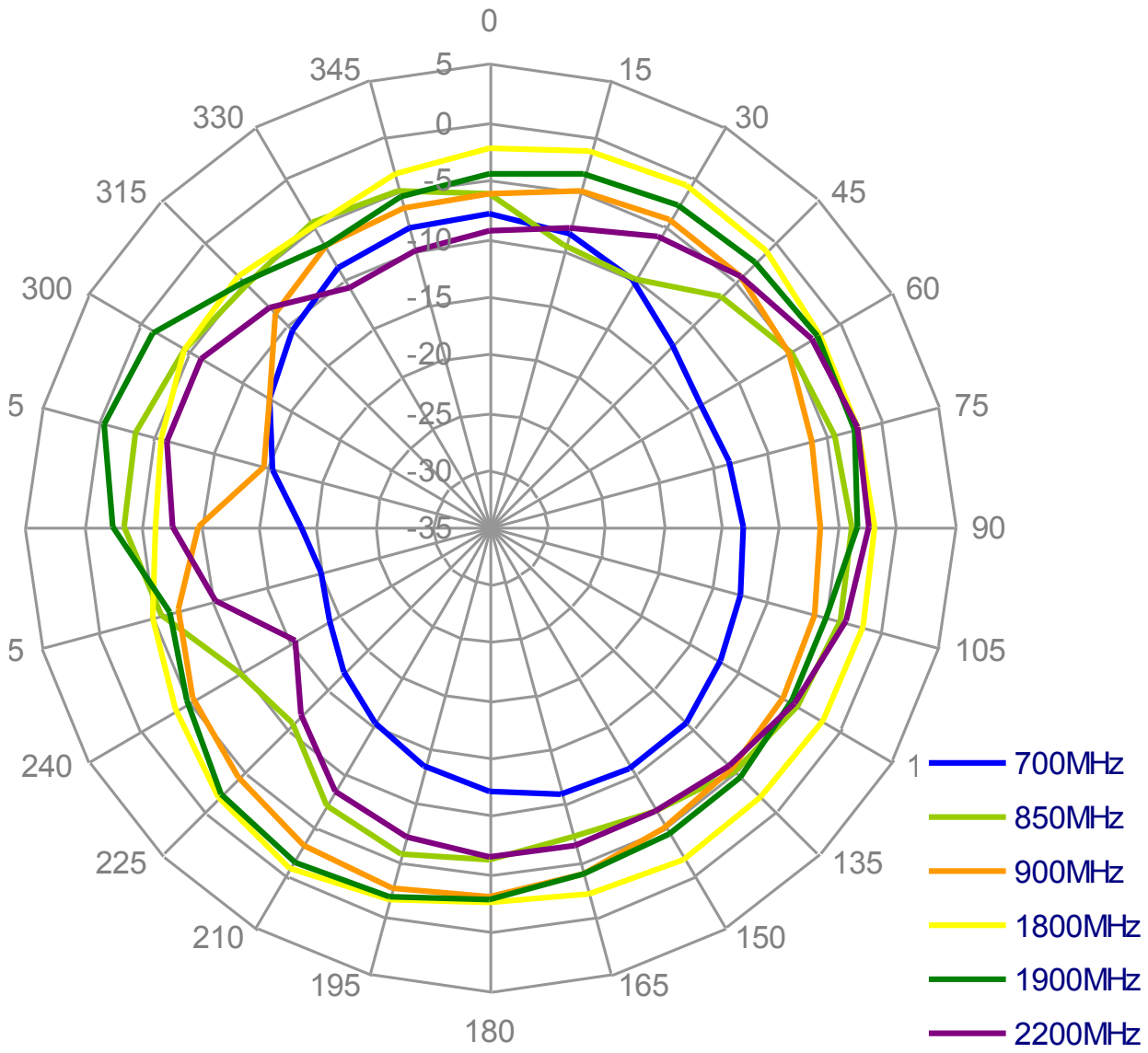


6.5 Cellular Antenna 3D Average Gain

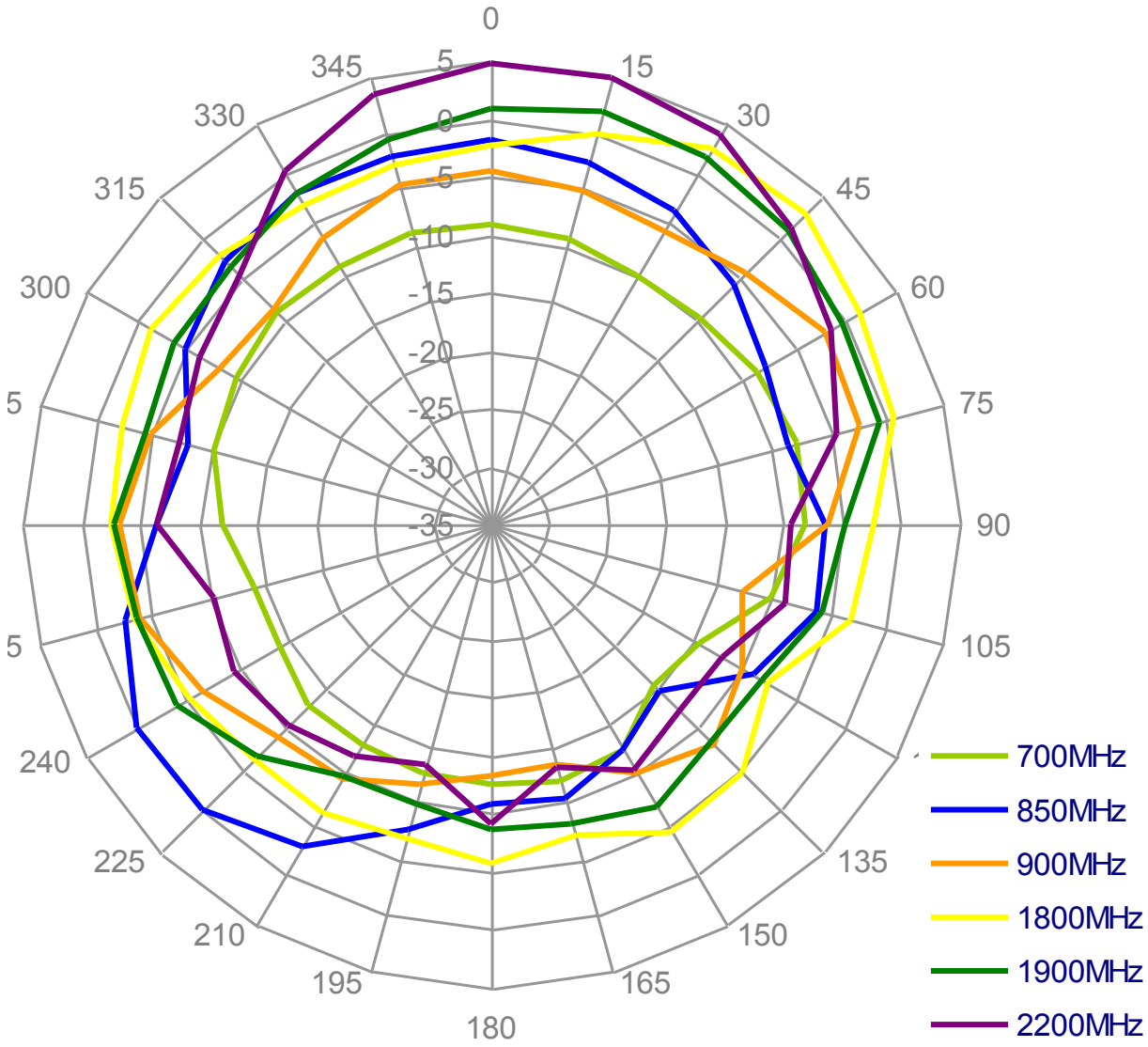


7. Cellular Antenna Radiation Pattern

7.1 XY Plane

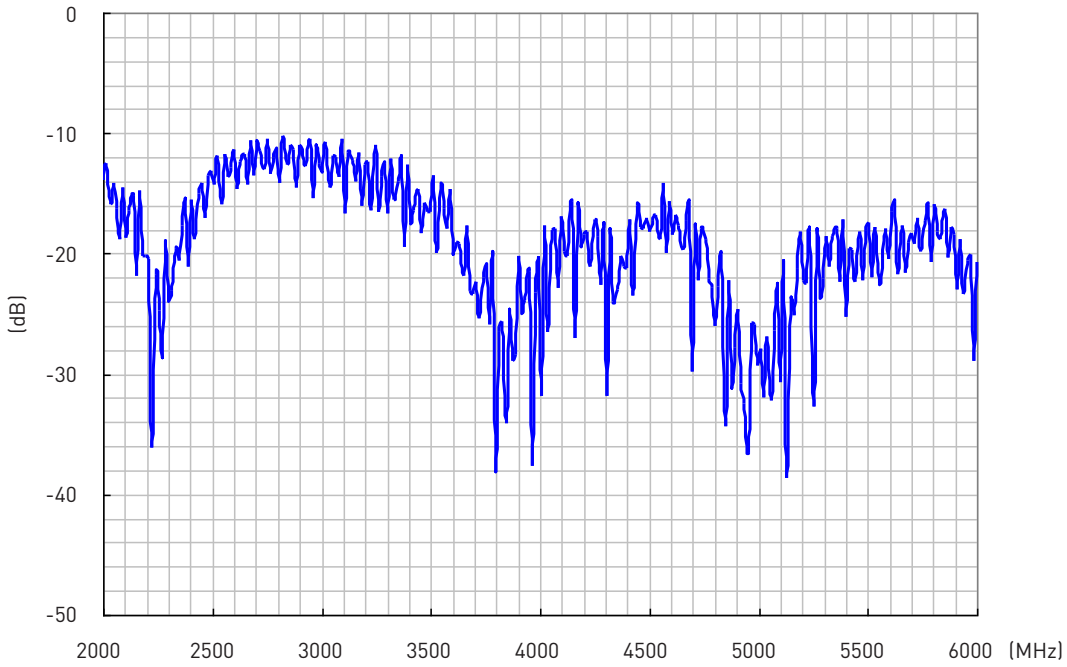


7.2 XZ Plane

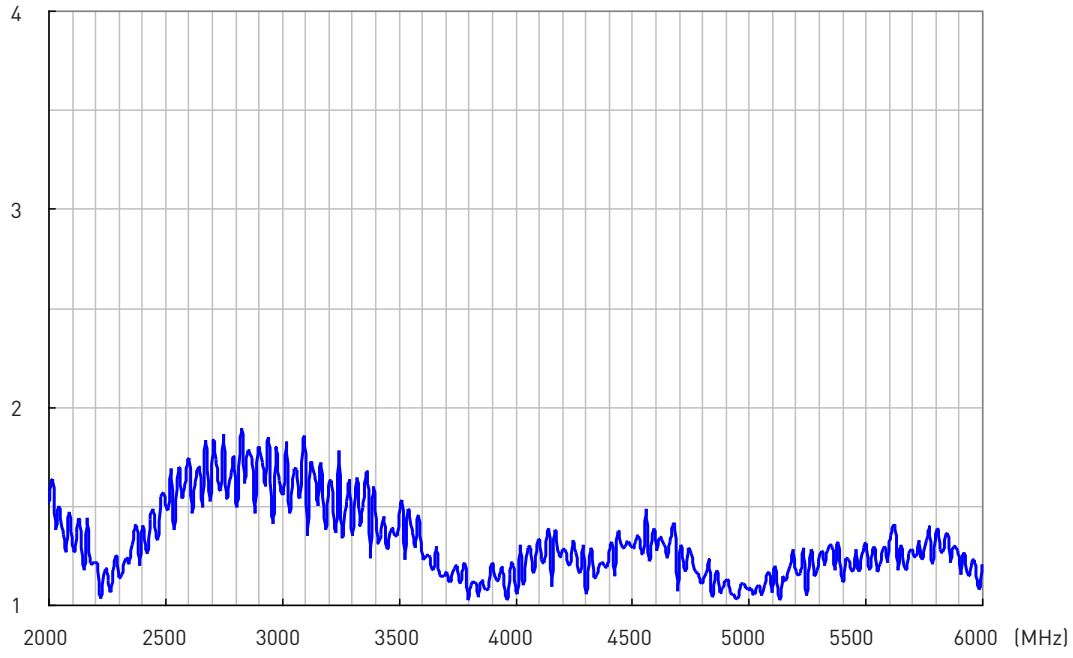

0
15
30
45
60
75
90
105
135
150
165
180
195
210
225
240
5
300
315
330
345
5
0
-5
-10
-15
-20
-25
-30
-35
700MHz
850MHz
900MHz
1800MHz
1900MHz
2200MHz

8. 2.4/5GHz Antenna Characteristics

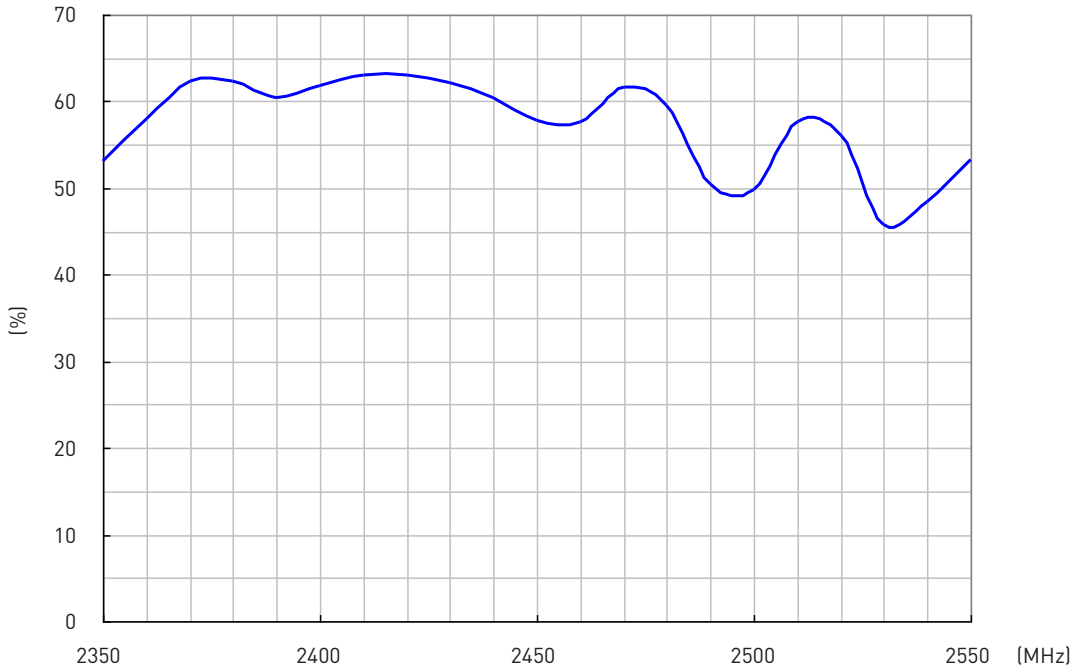
8.1 S11 Return Loss

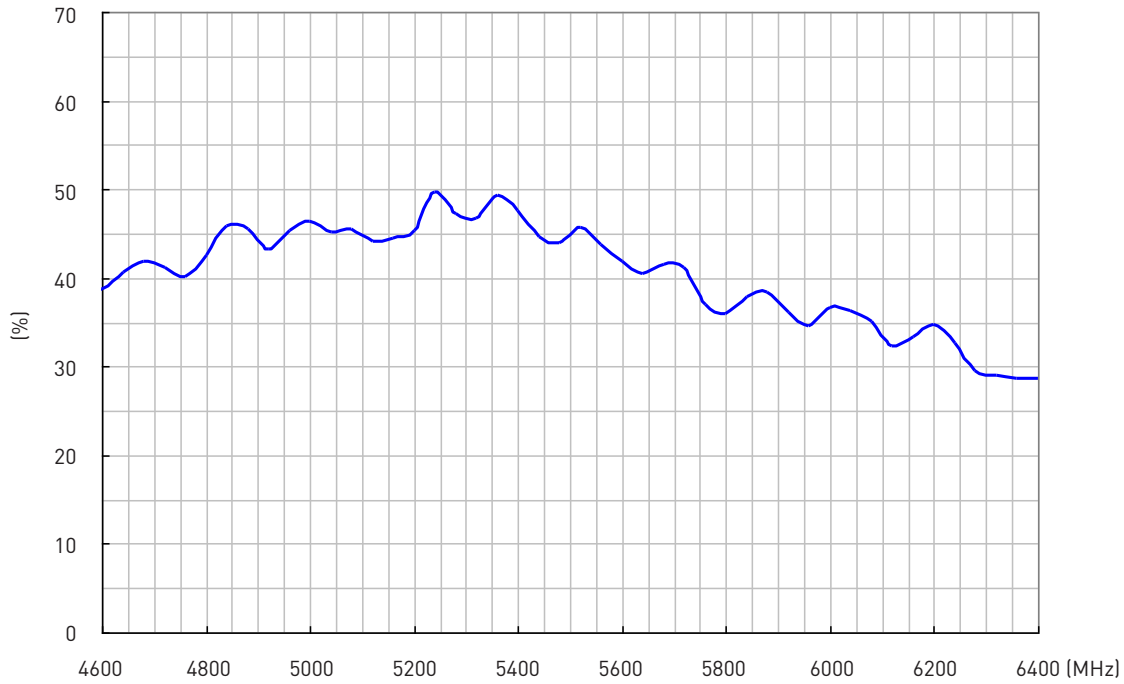


8.2 VSWR

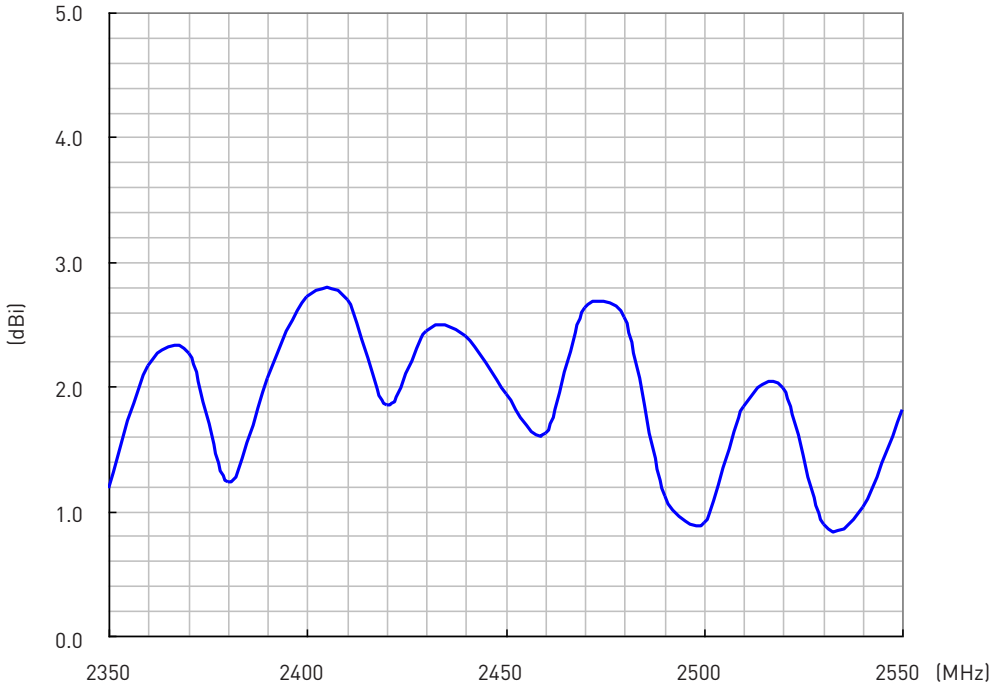


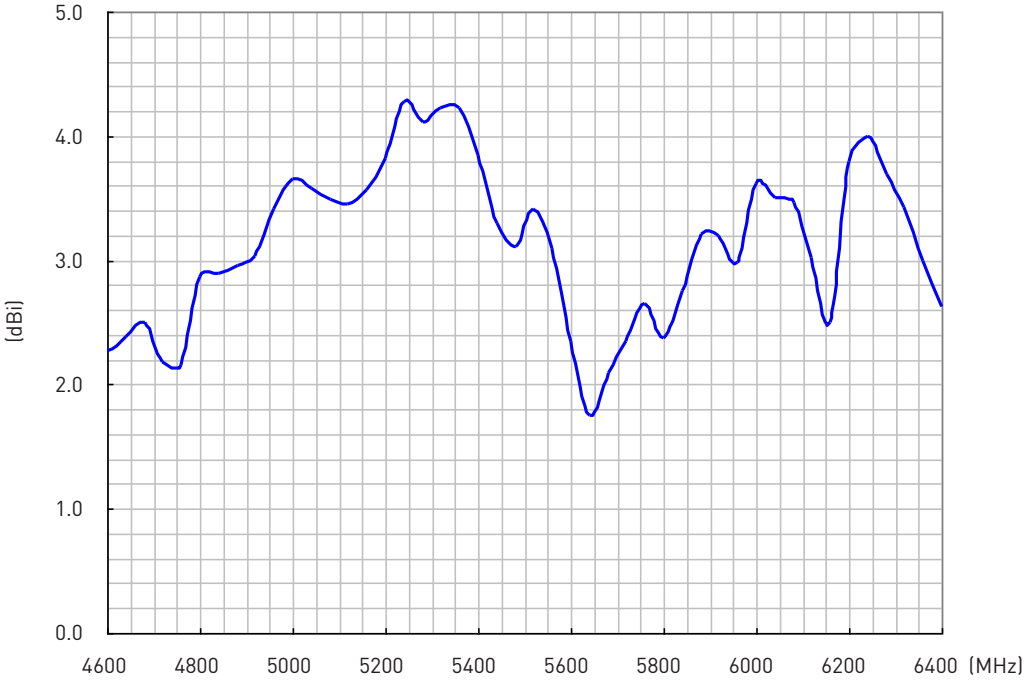
8.3 2.4/5GHz Antenna Efficiency



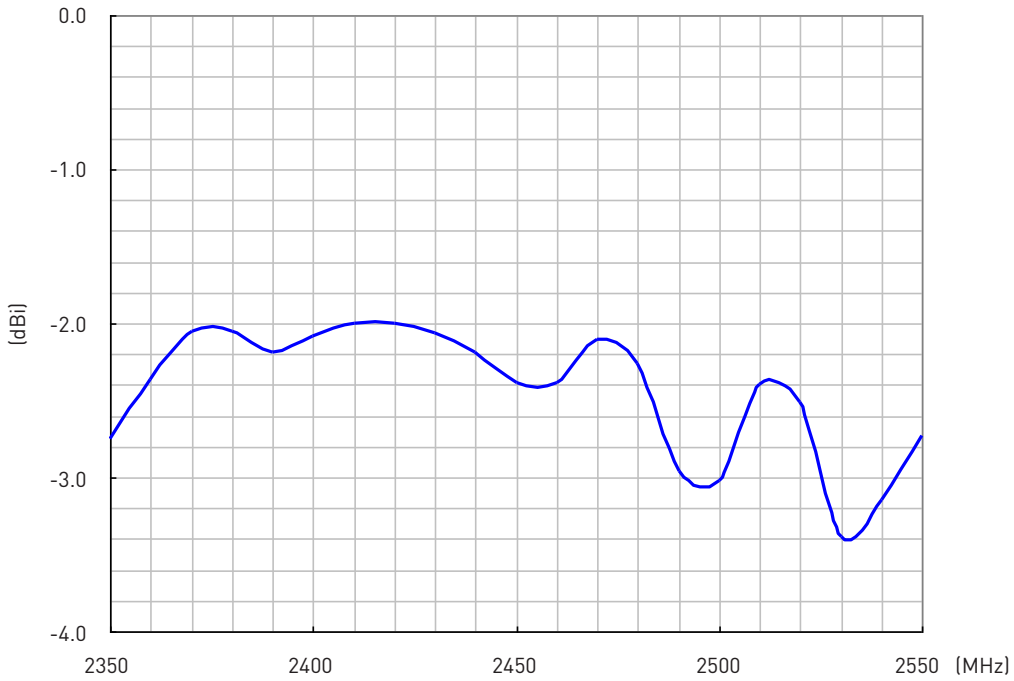


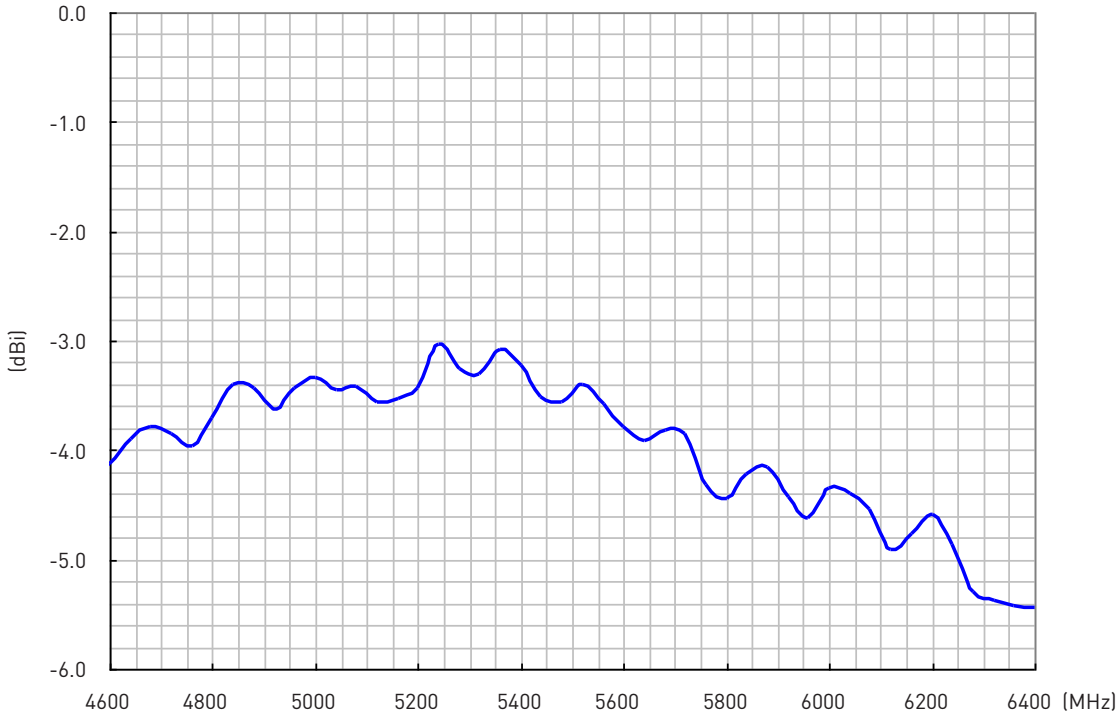
8.4 2.4/5GHz Antenna Peak Gain



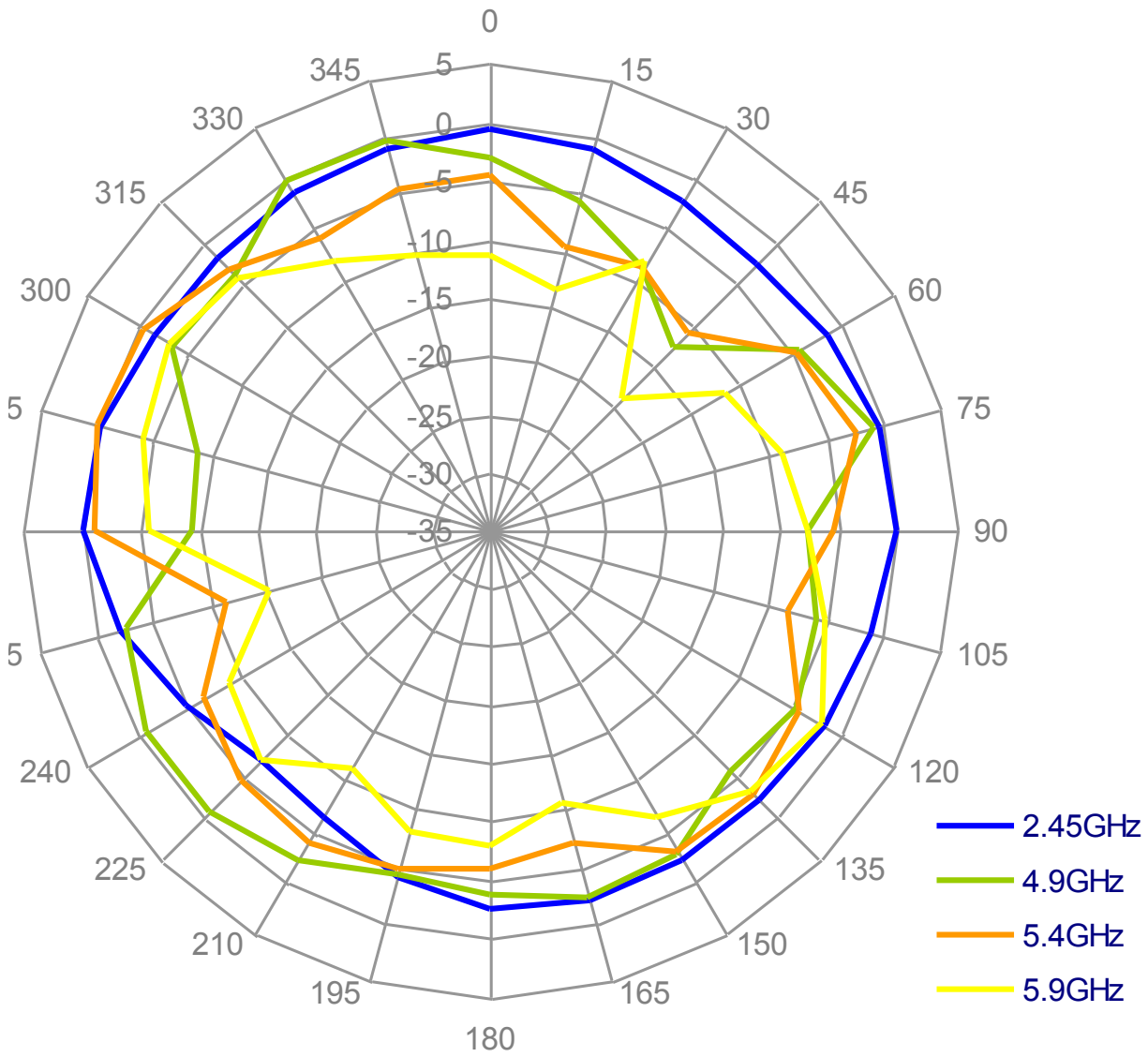


8.5 2.4/5GHz Antenna Peak Gain

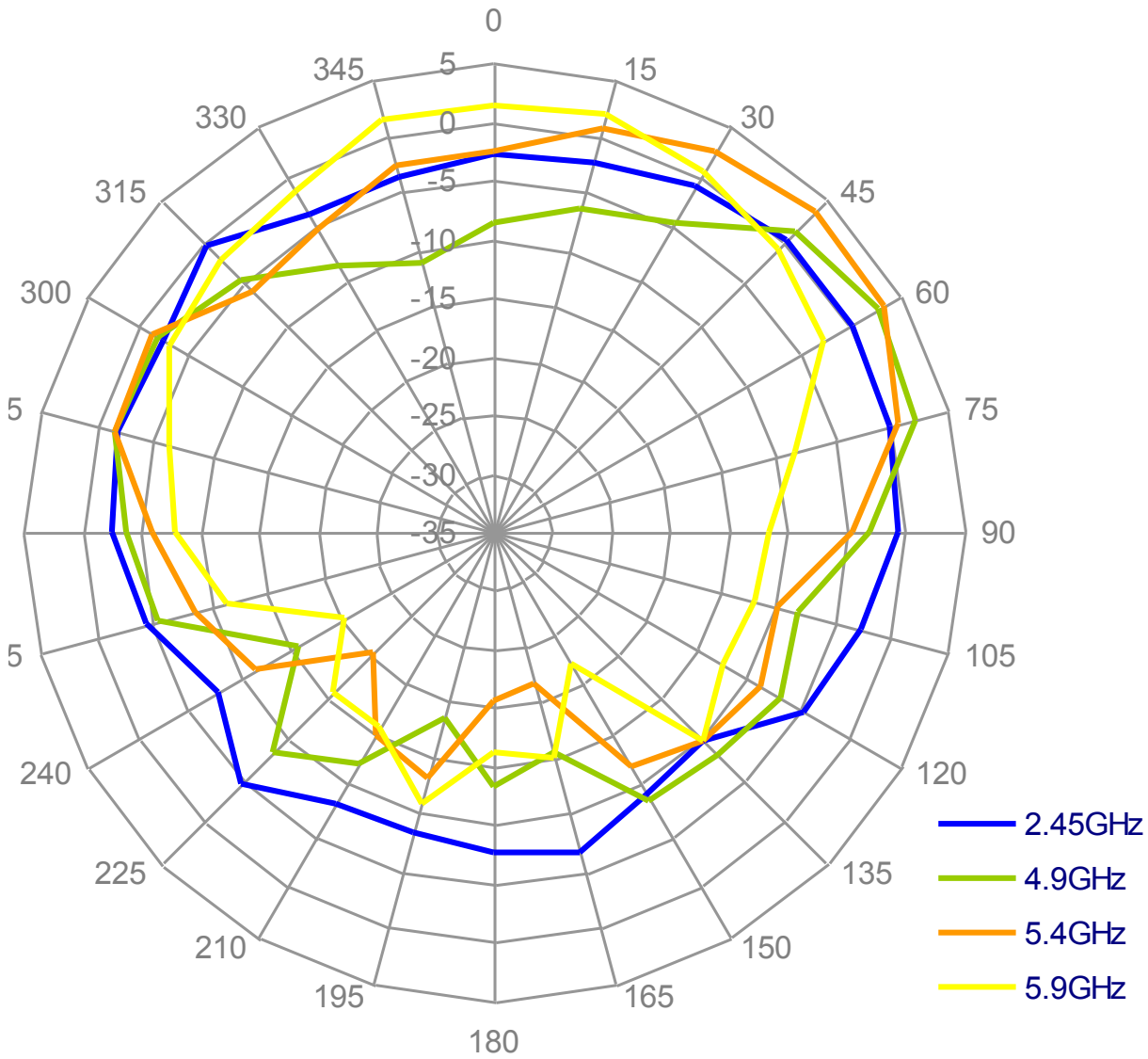




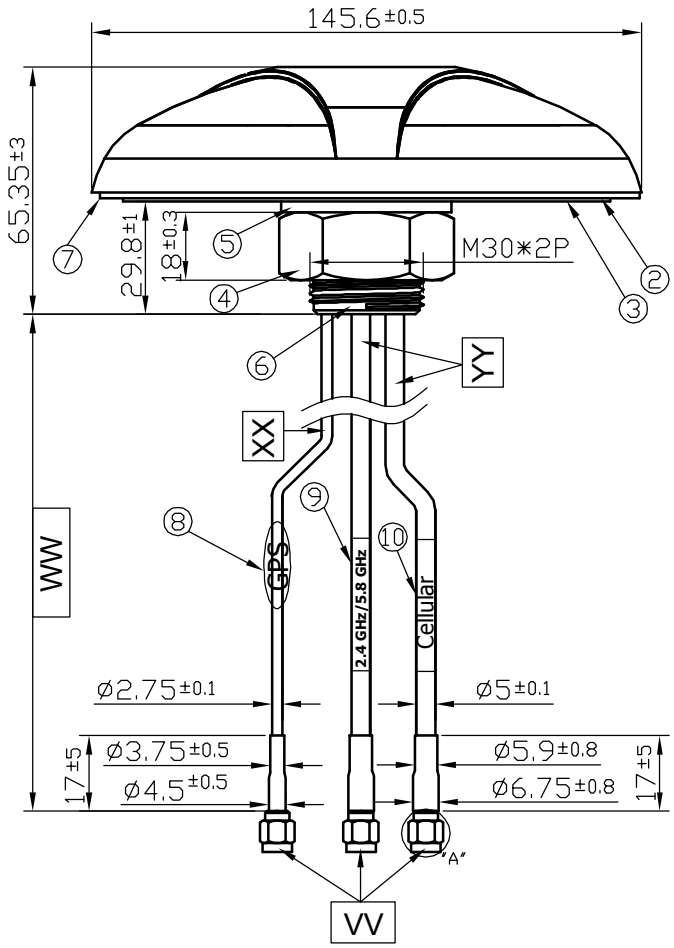
9. 2.4/5GHz Antenna Radiation Pattern

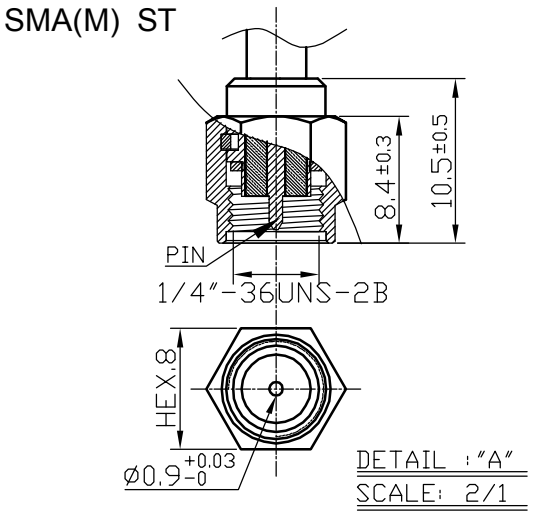


9. 2.4/5GHz Antenna Radiation Pattern



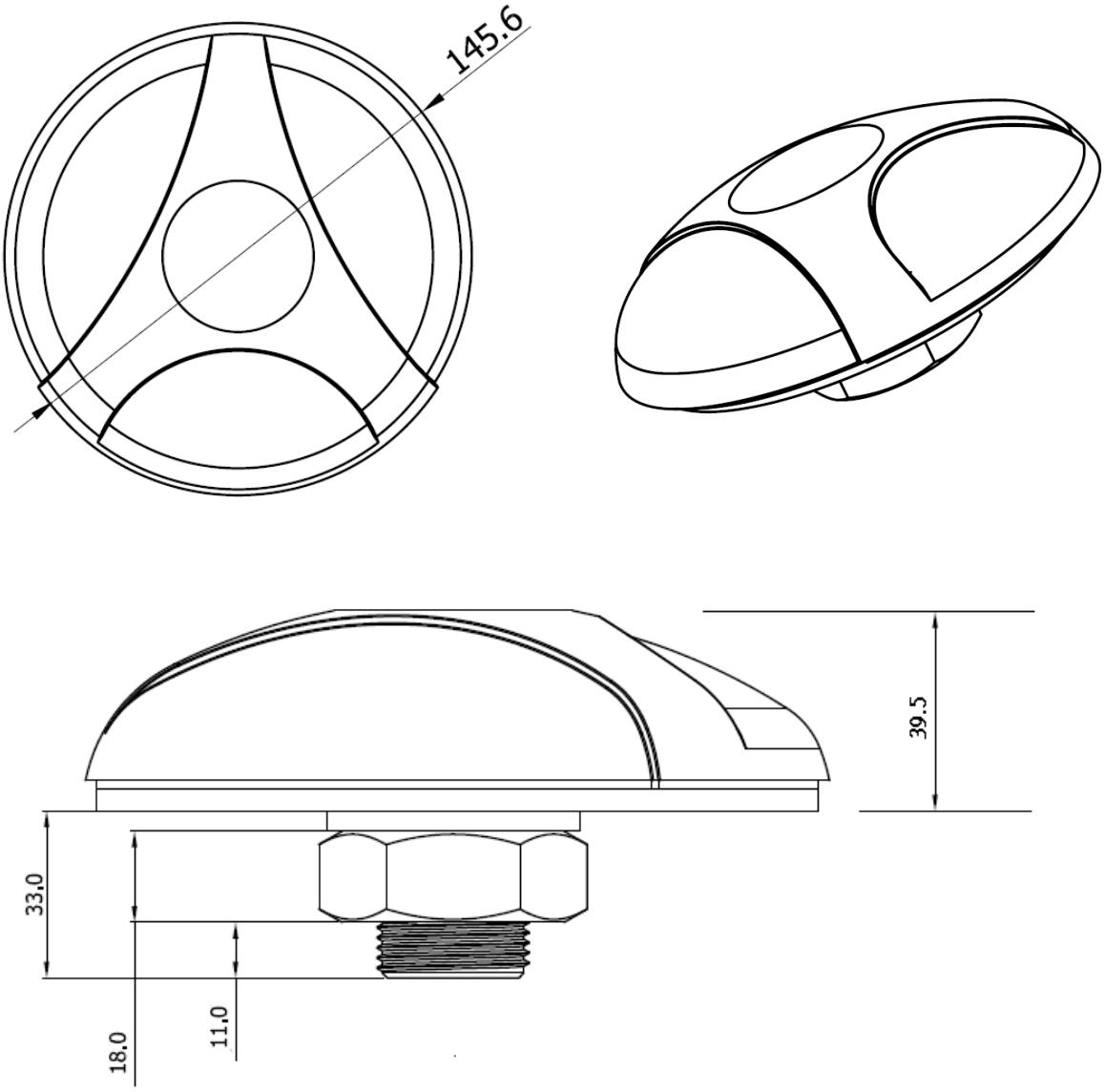
10. Mechanical Drawing





	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	M30x 2 Thread 32L	Zinc Alloy	Ni Plated	1
7	Waterproof Rubber	Silicon	Black	1
8	GPS Label	Coated Paper	Orange	1
9	2.4GHz/5.8GHz Label	Coated Paper	Green	1
10	Cellular Label	Coated Paper	Blue	1

	Name	Spec	Finish	QTY
VV	Connector Type	SMA(M) ST	Gold	3
WW	Cable Length	3000±30mm	Black	1
XX	Cable Type	RG174	Black	1
YY	Cable Type	CFD 200	Black	2

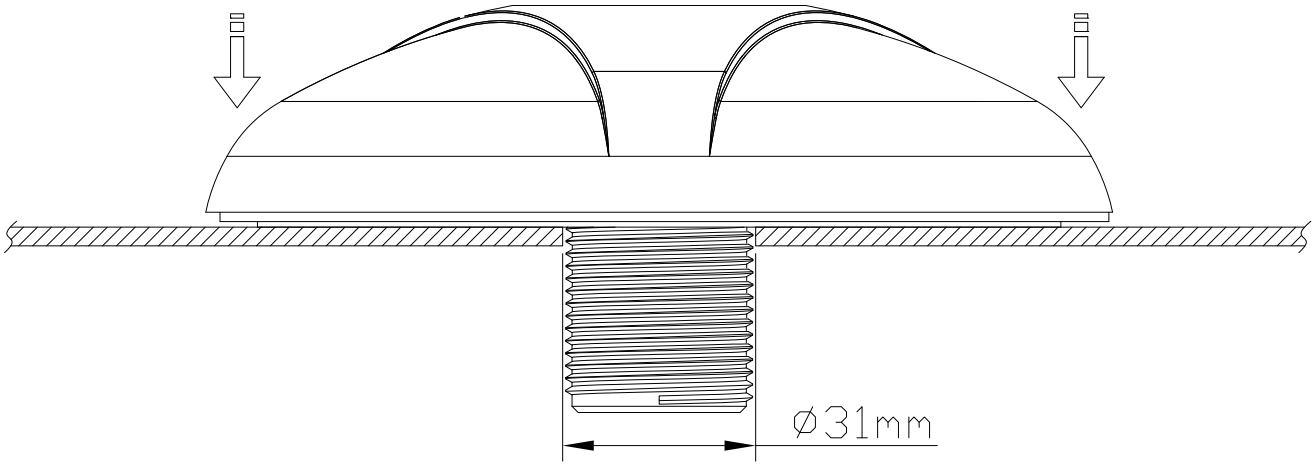


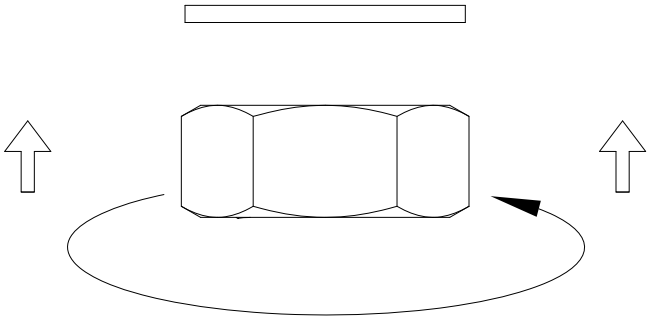
Unit: mm

Thread Diameter

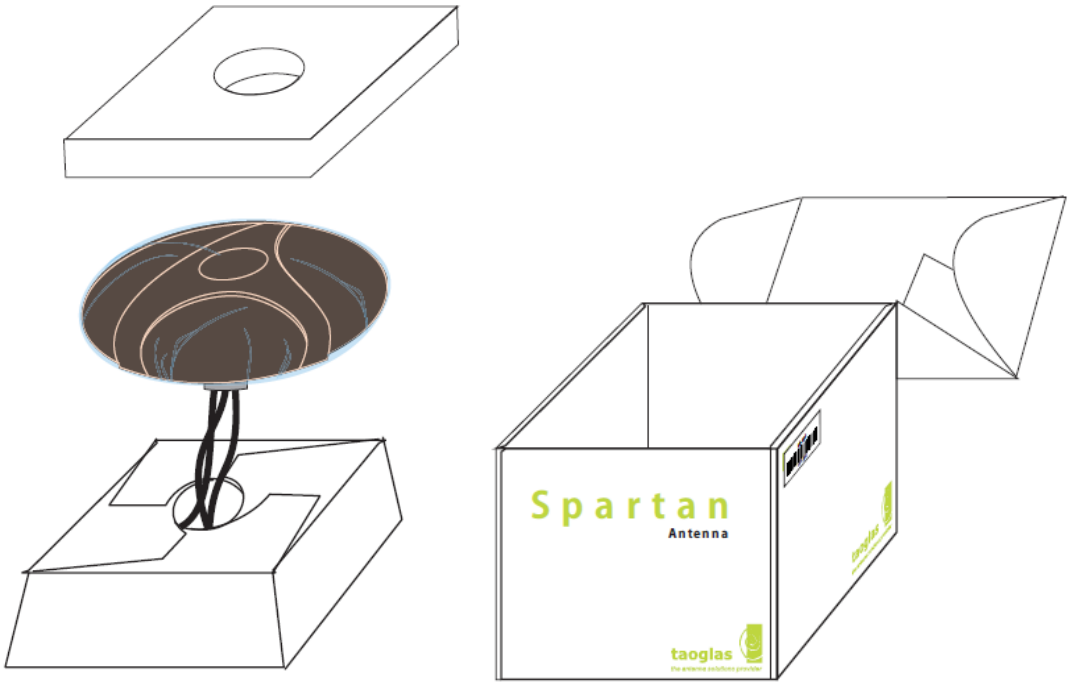
Recommended Mounting Hole

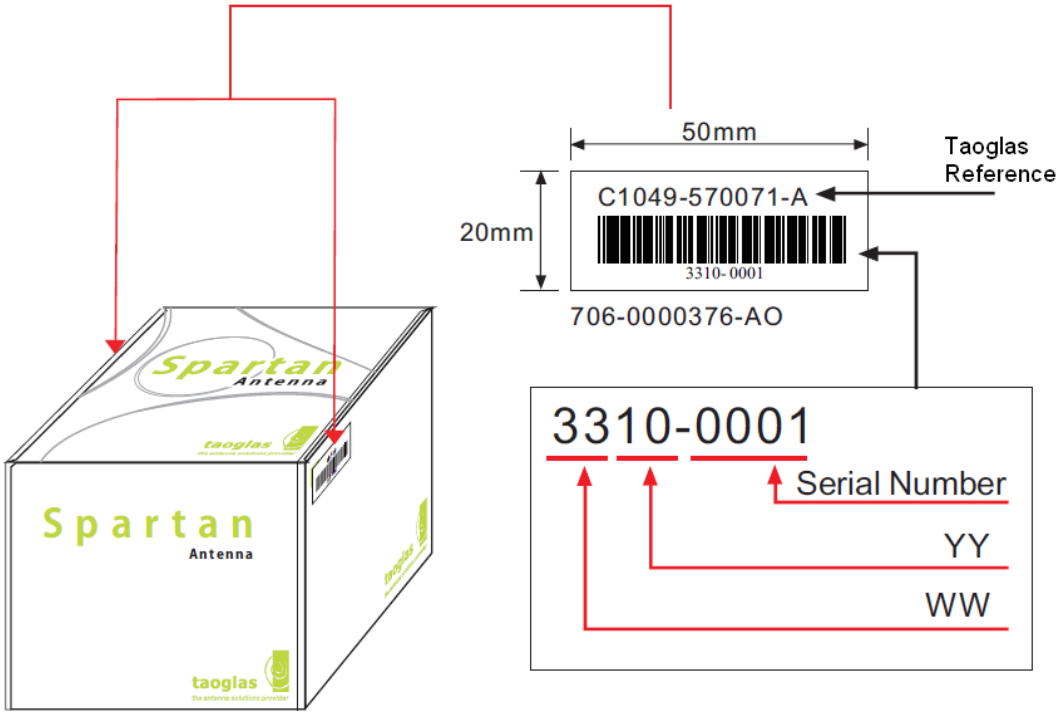
11. Installation





12. Packaging





8 boxes per carton