SPECIFICATION

Part No. : **MA231.LBC.003**

Product Name : MA231 3 in1Stream 3M: GPS-GLONASS-GALILEO RG174 RP-SMA(M), 2G/3G/4G CFD-200 RP-SMA(M), Wi-Fi CFD-200 RP-SMA(M)

Feature : IP67 Antenna
GPS-GLONASS-GALILEO: 3M RG-174 SMA(M) ST
1.8~5.5V/30dB
Cellular 4G/3G/2G: 3M Low Loss CFD-200 SMA(M) ST
Wi-Fi: 3M Low Loss CFD-200 RP-SMA(M) ST
Dimensions: 200.5*66.5*9mm
RoHS Compliant

1. Introduction

The Stream 3in1 MA231 GPS-GLONASS-GALILEO, LTE Cellular 4G/3G/2G and Wi-Fi 2.4/5.8GHz antenna is a low profile, heavy-duty, fully IP67 waterproof external M2M antenna for use by RF professionals in telematics, transportation and remote monitoring applications. The Stream 3in1 is unique in the market as it combines the highest possible efficiency and peak gain for GPS-GLONASS-GALILEO, Wi-Fi dual-band 2.4/5.8GHz and all cellular bands in 4G/3G/2G in a low profile compact format for mounting via high quality first tier automotive approved 3M adhesive foam.

The patent pending design incorporates a custom Taoglas 35mm GPS-GLONASS-GALILEO patch antenna on an extended integral ground-plane. A front-end SAW filter dramatically reduces radiated spurious emissions.

The extended ground-plane used with an innovative internal 4G/3G/2G Cellular PIFA also enables the unique wide-band 4G/3G/2G response to deliver the highest performance possible, at 3 meters cable length. High antenna efficiencies are absolutely critical in today's 4G and 2G systems to achieving targeted data-speeds and coverage.

A powerful Wi-Fi dual-band 2.4/5.8GHz antenna gives maximum gain and coverage for common applications.

The Stream works best when attached to plastic or glass, but can also be used on metal if a minimum of 40mm foam spacing is added.

2. Specification Table

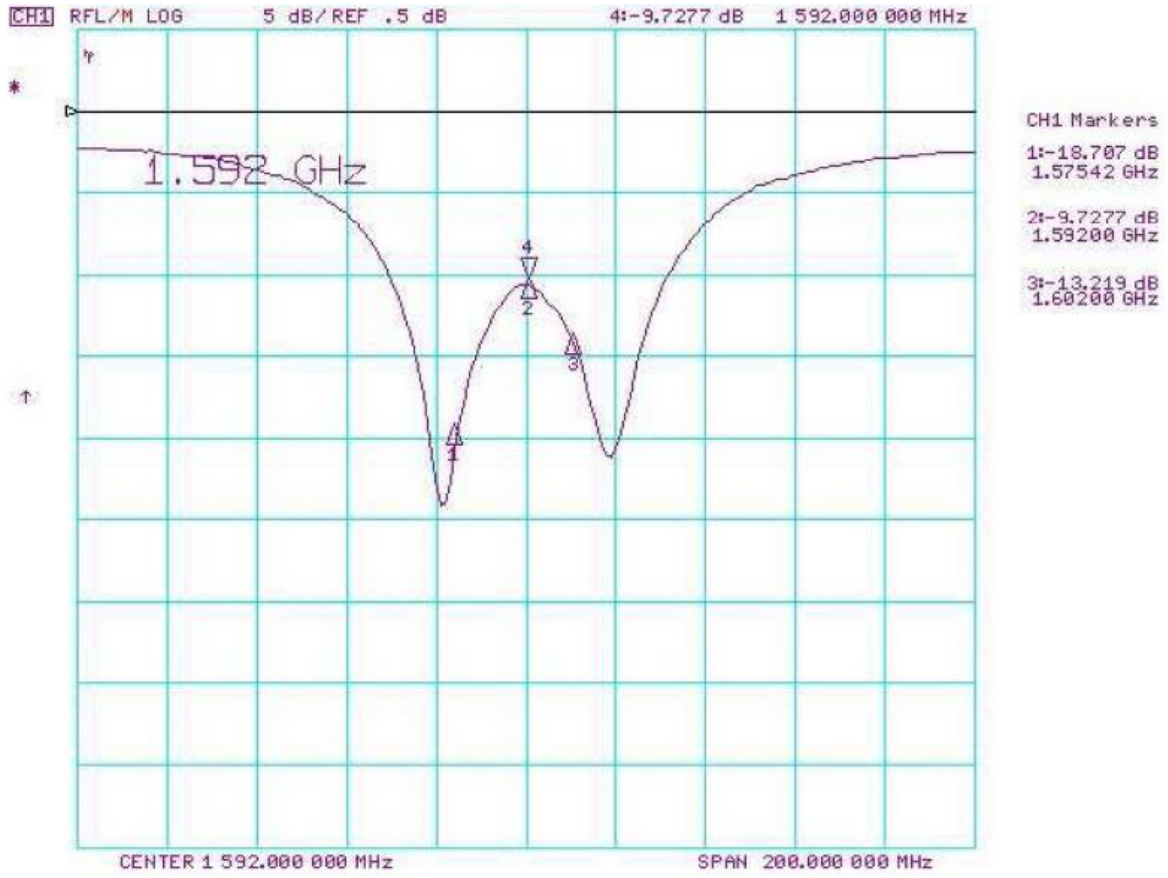
Performance Specifications			
Parameter	GPS-GLONASS-GALILEO Antenna	Cellular Antenna	Wi-Fi Antenna
Frequency Range	1,575.42±10MHz 1,602±8MHz	700-960MHz 1710-2170MHz 2500-2690MHz	2400-2484MHz 5150-5850MHz
Gain	1575.42MHz:1.3dBi typ. @ Zenith 1602MHz:2.9dBi typ. @ Zenith	Listed below	Listed below
VSWR	2.0 Max	3.0 Max	2.0 Max
Impedance	50Ω	50Ω	50Ω
Efficiency	-	≧ 70% @ 700MHz ≧ 60% @ 750MHz ≧ 50% @ 824MHz ≧ 50% @ 880MHz ≧ 40% @ 890MHz ≧ 25% @ 960MHz ≧ 50% @ 1710MHz ≧ 50% @ 1880MHz ≧ 50% @ 1990MHz ≧ 45% @ 2110MHz ≧ 45% @ 2170MHz ≧ 30% @ 2500MHz ≧ 15% @ 2690MHz	≧ 35% @ 2450MHz ≧ 35% @ 5250MHz ≧ 35% @ 5650MHz

MECHANICAL			
Cable / Connector	3M RG-174 with SMA(M) Fully customizable	3M CFD-200 with SMA(M) Fully customizable	3M CFD-200 with RP-SMA(M) Fully customizable
Housing	ABS		
Adhesive Mount	3M 1600TB(196.57*62.57*1.25mm)		
Protection Class	IP-67		
Weight	180g		

ENVIRONMENTAL	
Operation Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Relative Humidity	20% to 95%

3. GPS-GLONASS-GALILEO Antenna

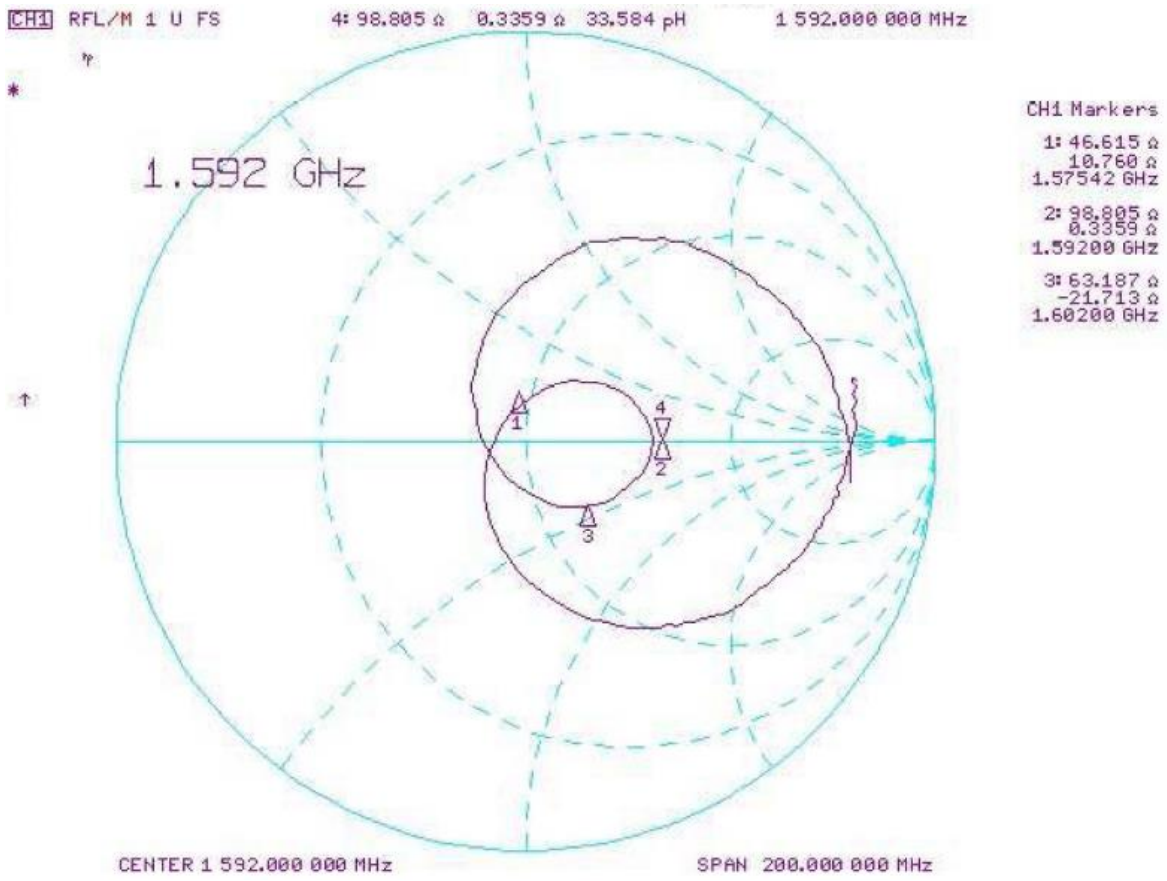
3.1. Return Loss



Return Loss: -18.70 dB@1575.42MHz

Return Loss: -13.21 dB@1602MHz

3.2. Smith Chart

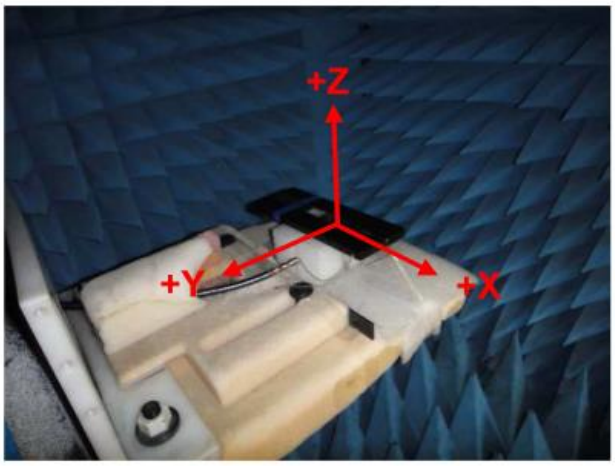


Impedance: 46.61+j10.76 Ohm@1575.42MHz

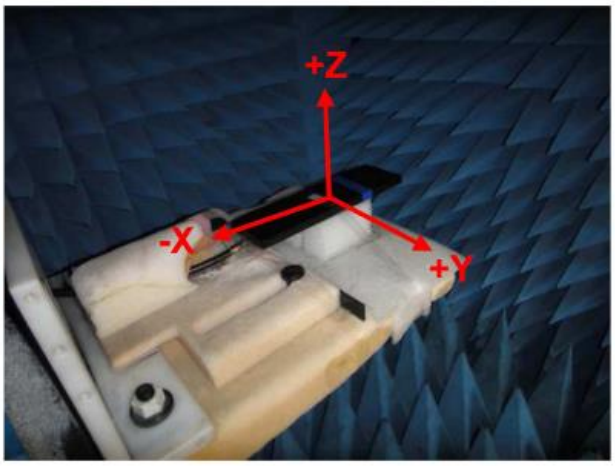
Impedance: 63.18-j21.73 Ohm@1602MHz

3.3. Radiation Patterns

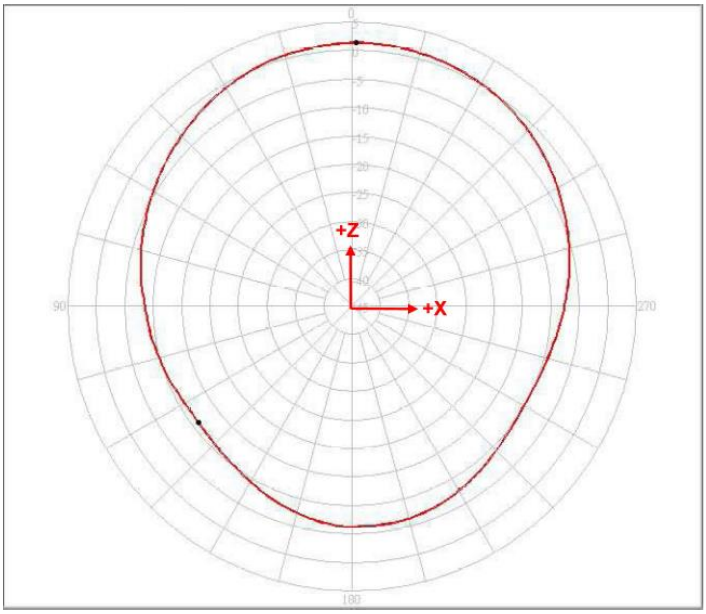
XZ-Plane



YZ-Plane

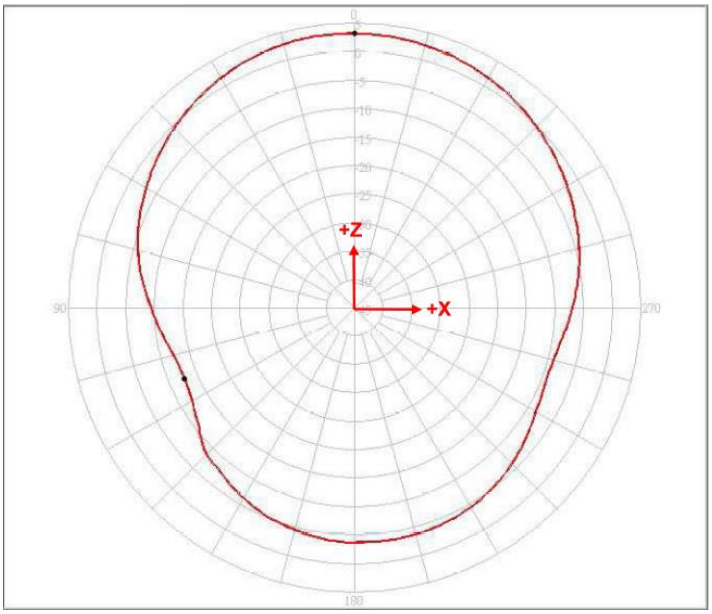


3.3.1. XZ Plane 1575.42MHz



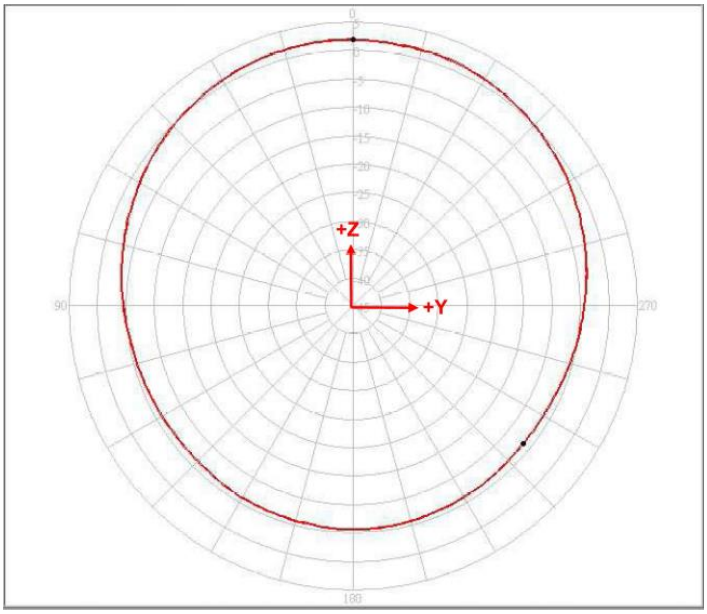
1575.42MHZ	Peak Gain	Zenith Gain
V+H	1.39 dBi	1.35 dBi

3.3.2. XZ Plane 1602MHz



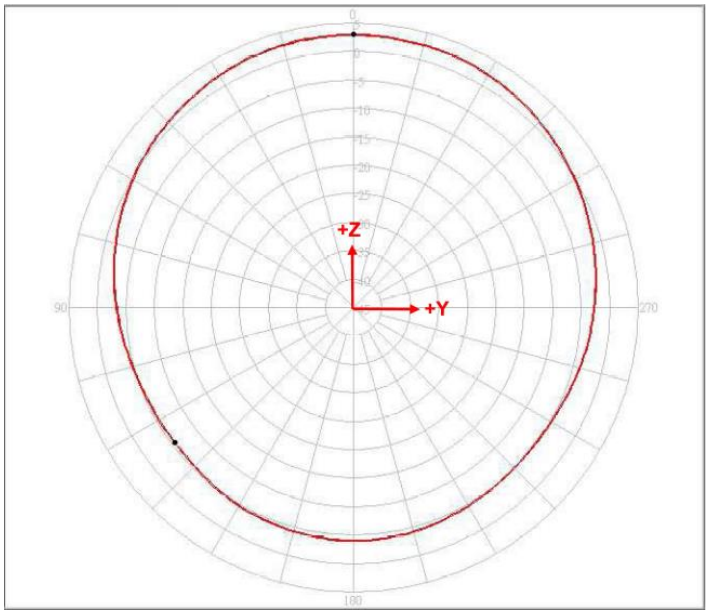
1602MHZ	Peak Gain	Zenith Gain
V+H	3.19 dBi	3.19 dBi

3.3.3. YZ Plane 1575.42MHz



1575.42MHZ	Peak Gain	Zenith Gain
V+H	1.92 dBi	1.92 dBi

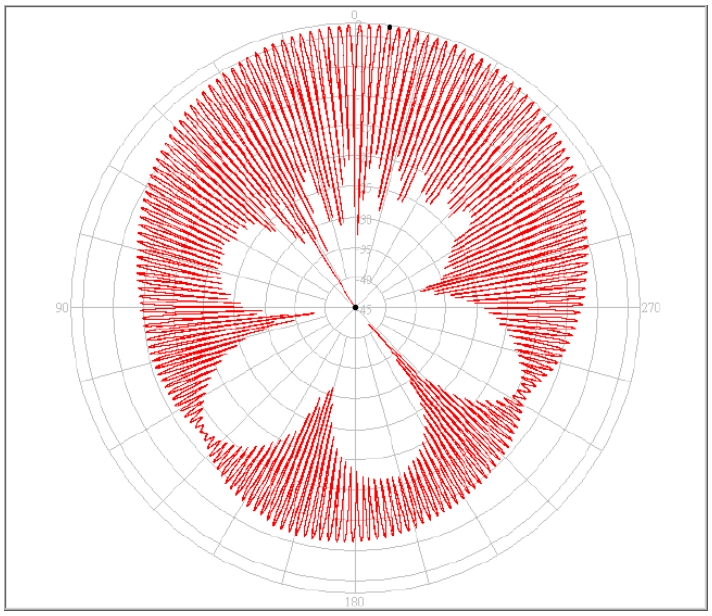
3.3.4. YZ Plane 1602MHz



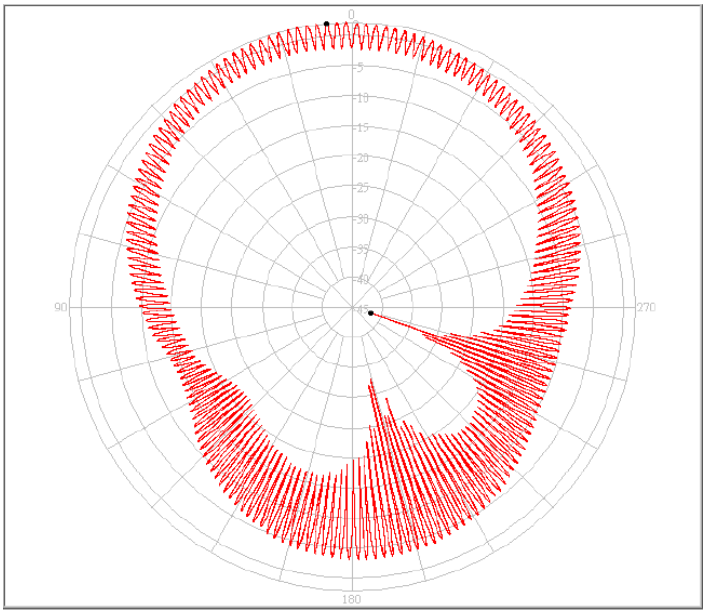
1602MHZ	Peak Gain	Zenith Gain
V+H	2.92 dBi	2.92 dBi

3.4. Axial Ratio Pattern

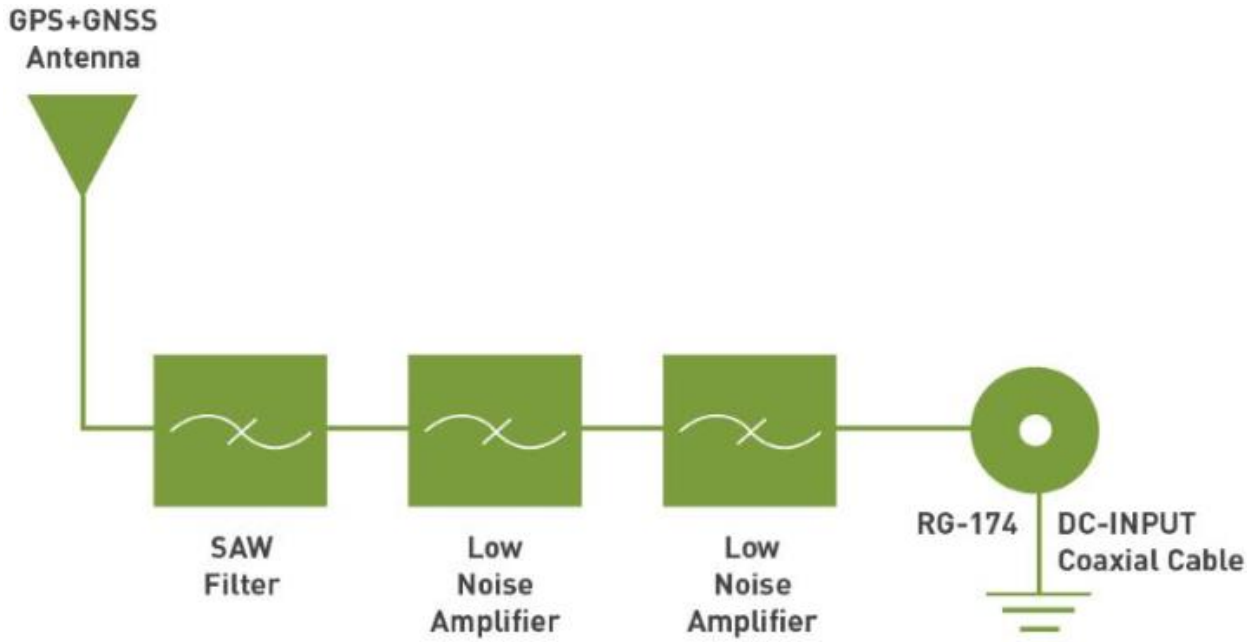
3.4.1. 1575.42MHz



3.4.2. 1602MHz

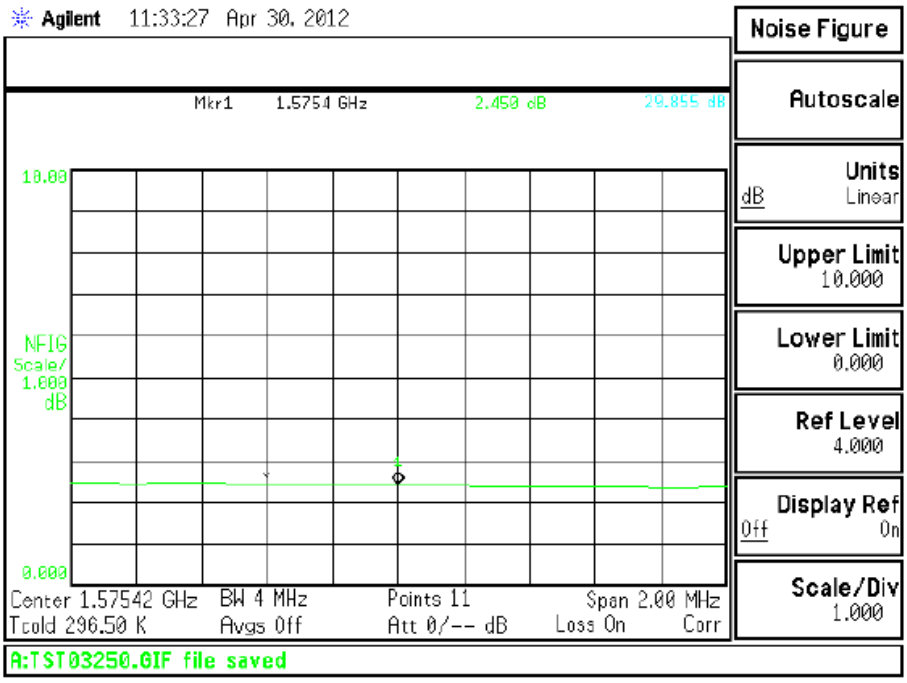


3.5. LNA characteristics

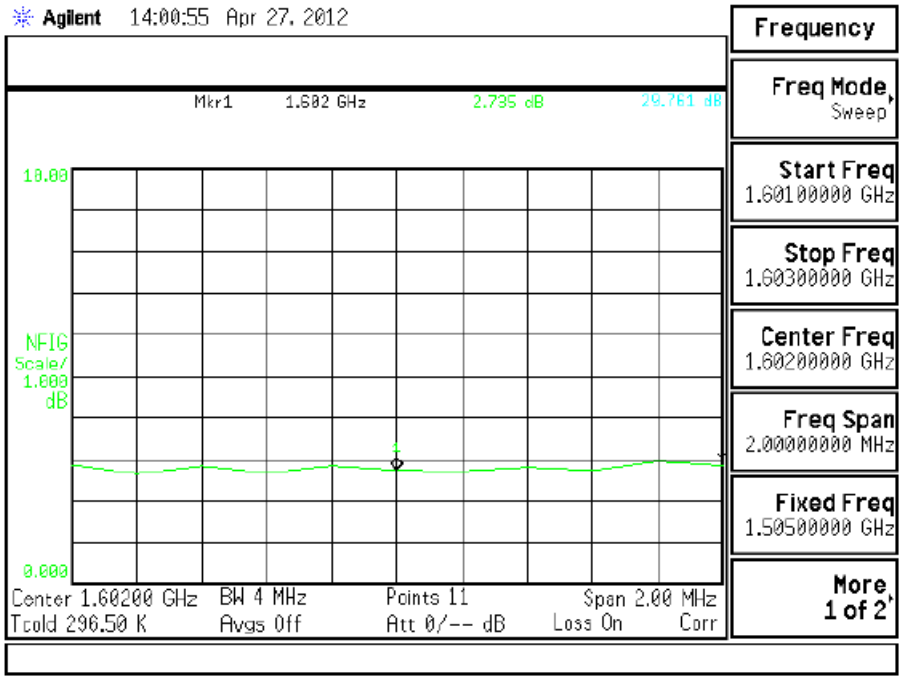


Parameter	
Frequency Range	1,575.42±10MHz For GPS/GALILEO 1,602±8MHz For GLONASS
Output Impedance	50 Ohm
Output VSWR	2.0 max

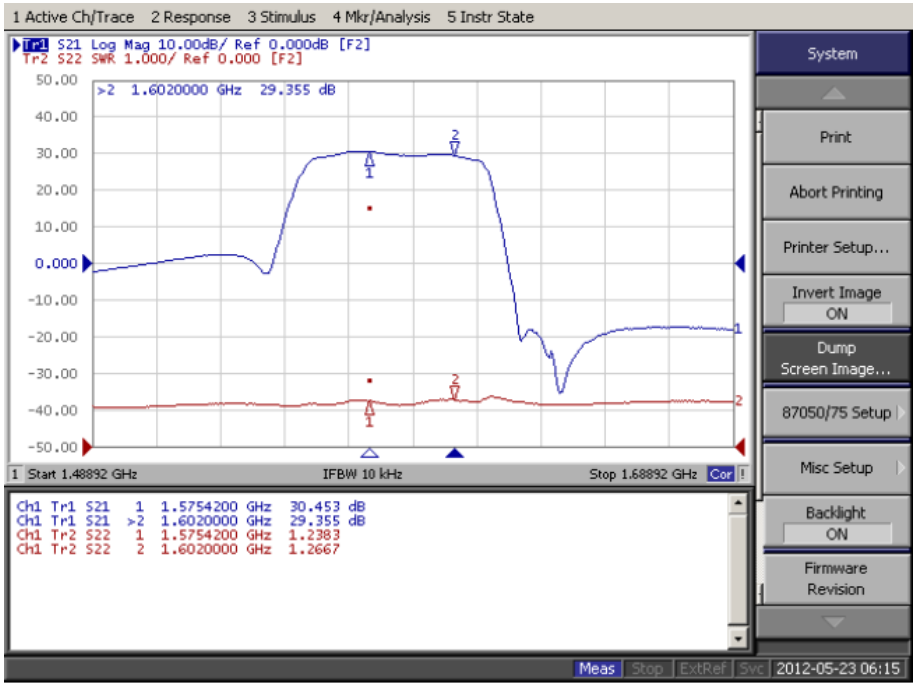
Supply Voltage	Gain(Typ)	Noise Figure(Typ)	Power Consumption(Typ)
1.8V	24dB	-	5.5mA
3.0V	30dB	2.4dB For GPS/GALILEO 2.7dB For GLONASS	13.2mA
5.5V	32dB	-	16.2mA



LNA Noise Figure@3.0V for 1575.42MHz



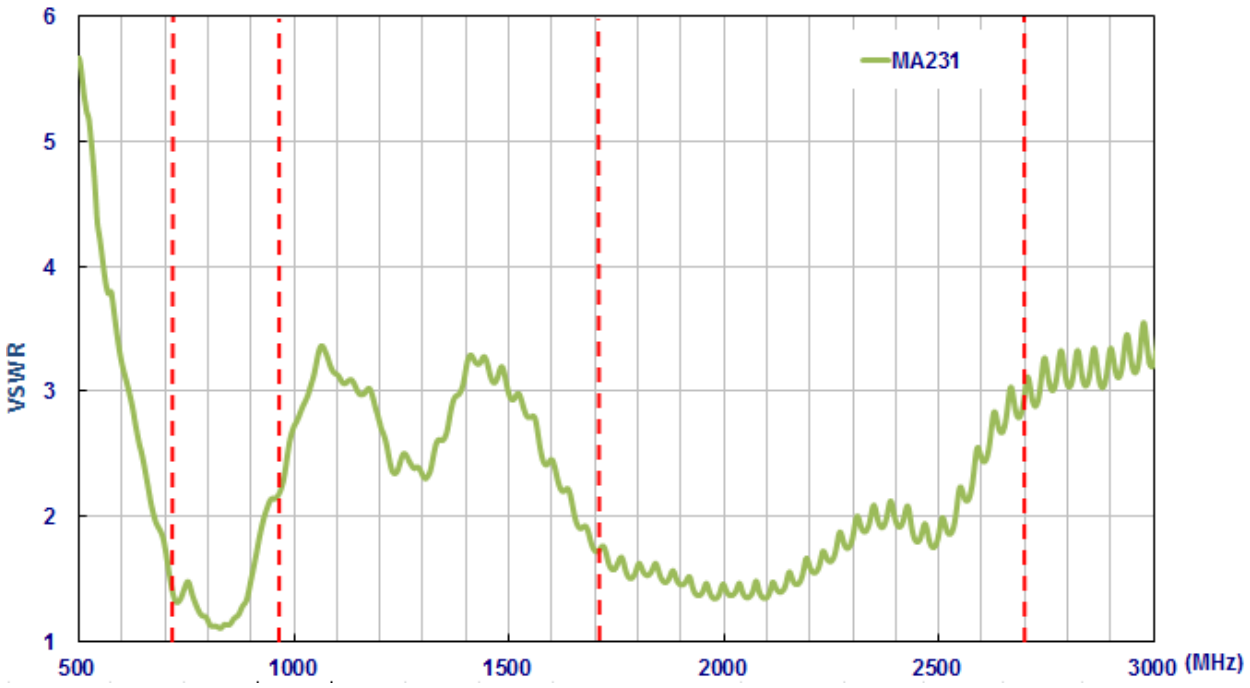
LNA Noise Figure@3.0V for 1602MHz



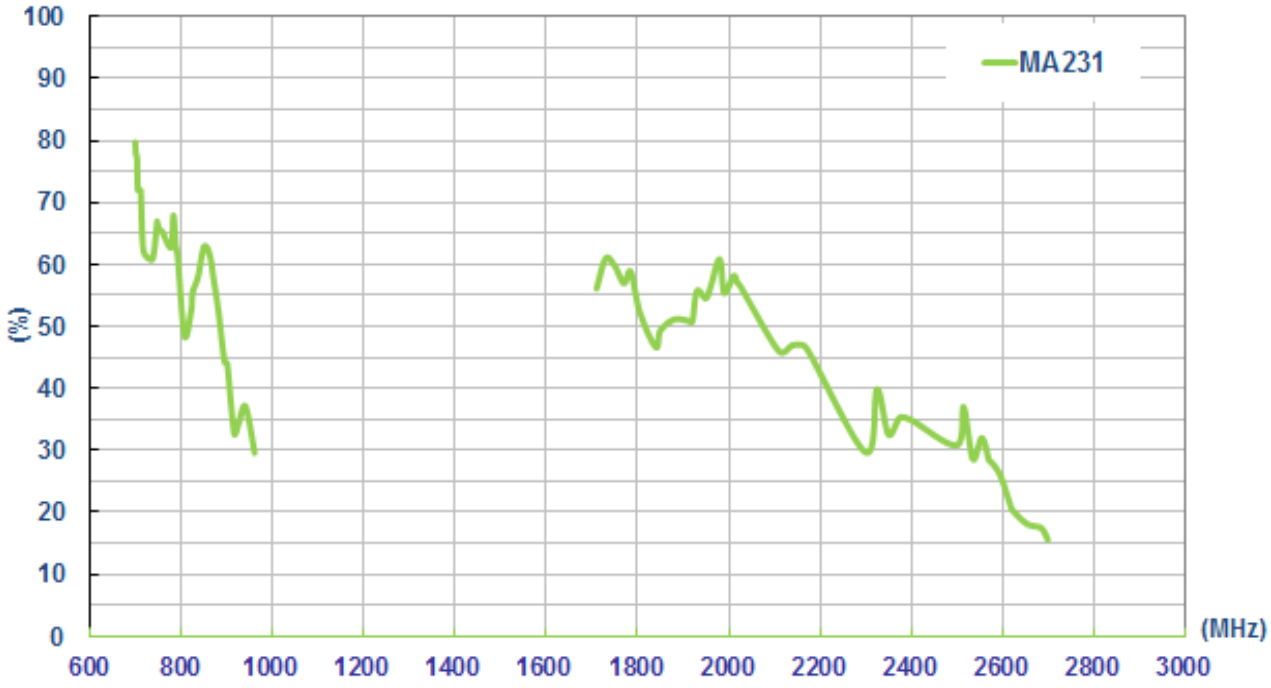
LNA Gain and Output of VSWR at 3.0V

4. Cellular 4G/3G/2G antenna

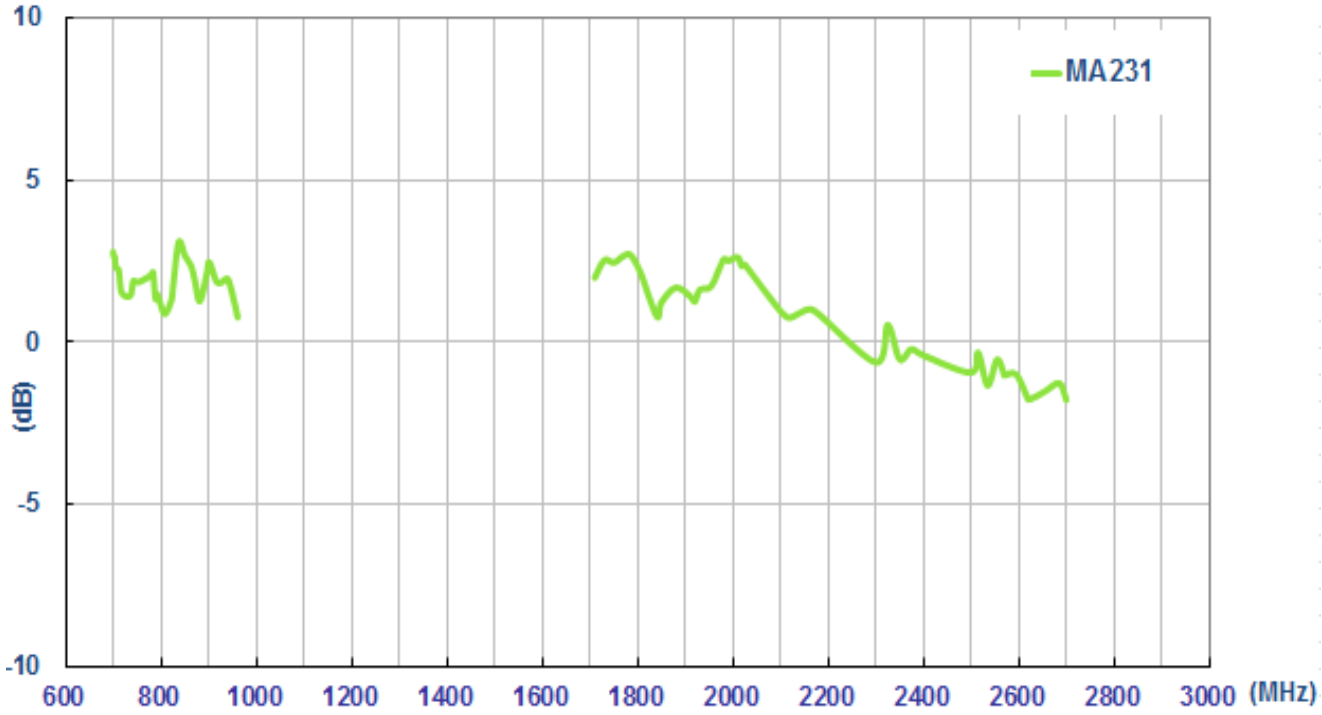
4.1. VSWR



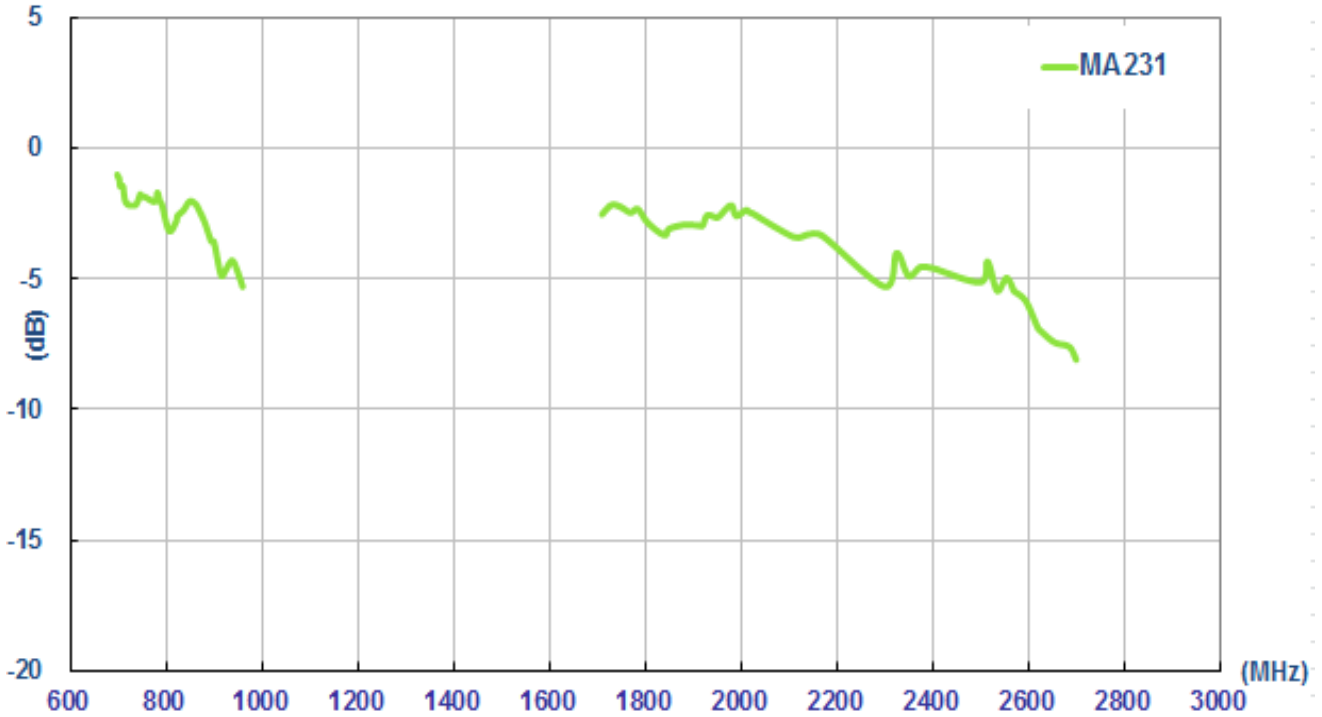
4.2. Efficiency



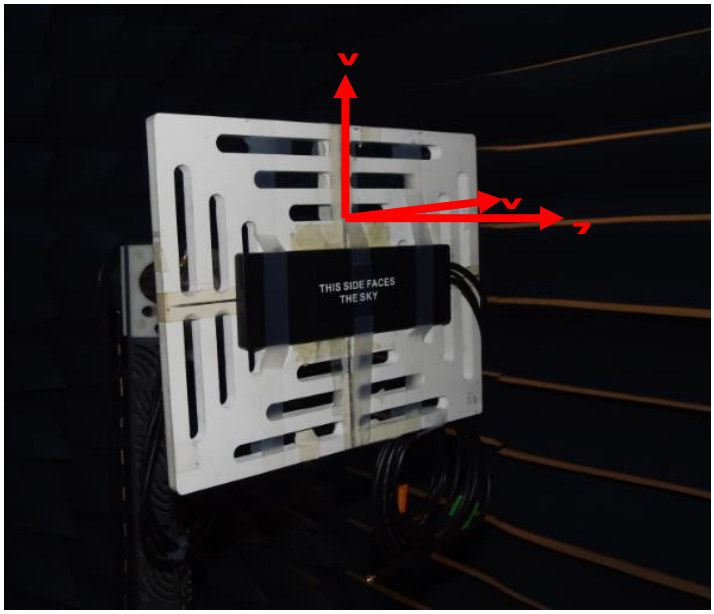
4.3. Peak Gain



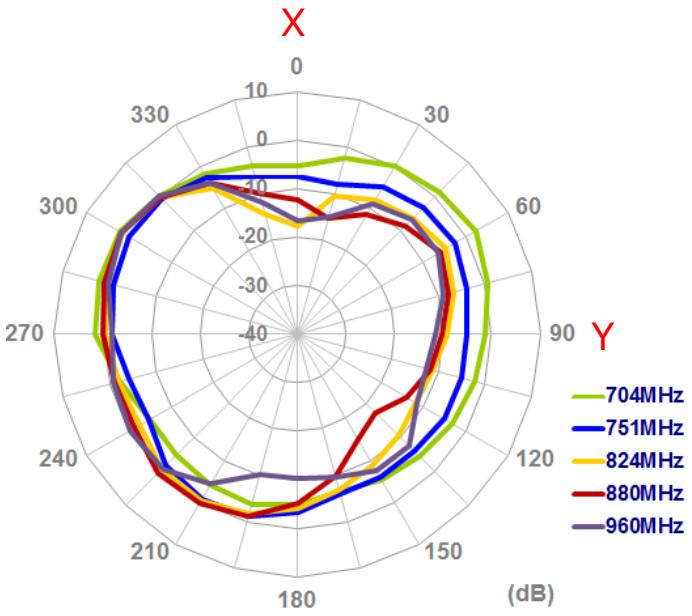
4.4. Average Gain



4.5. Antenna Radiation Pattern



XY Plane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(dB)
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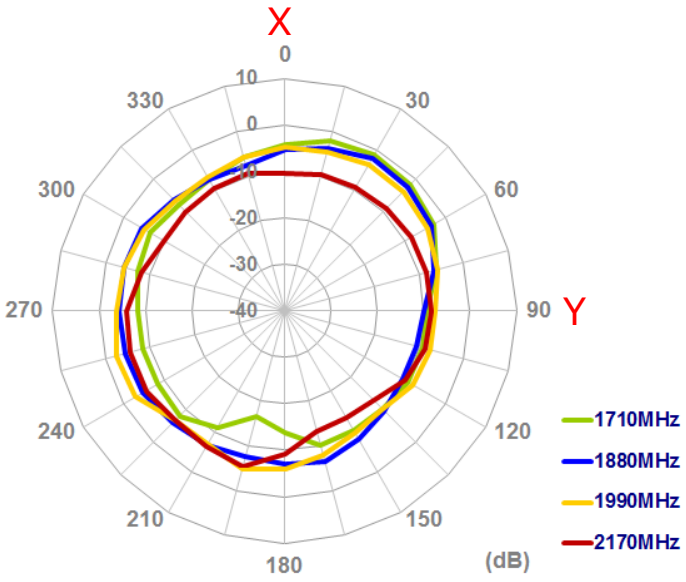
751MHz
824MHz
880MHz
960MHz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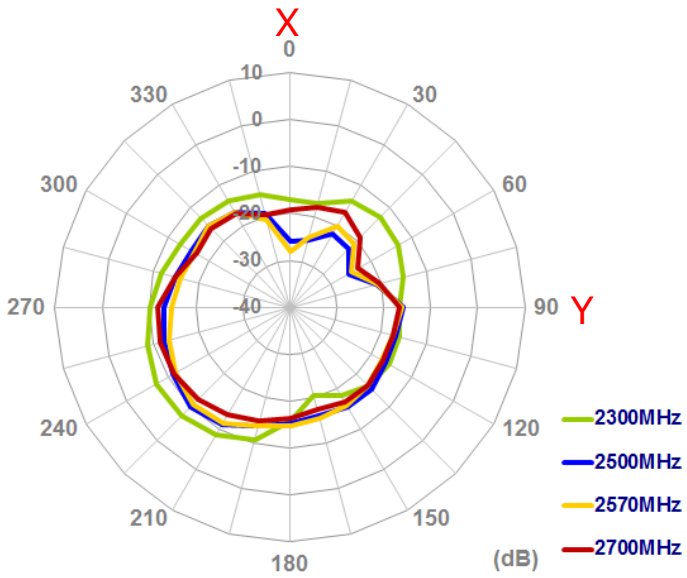
(dB)
1710MHz
1880MHz
1990MHz
2170MHz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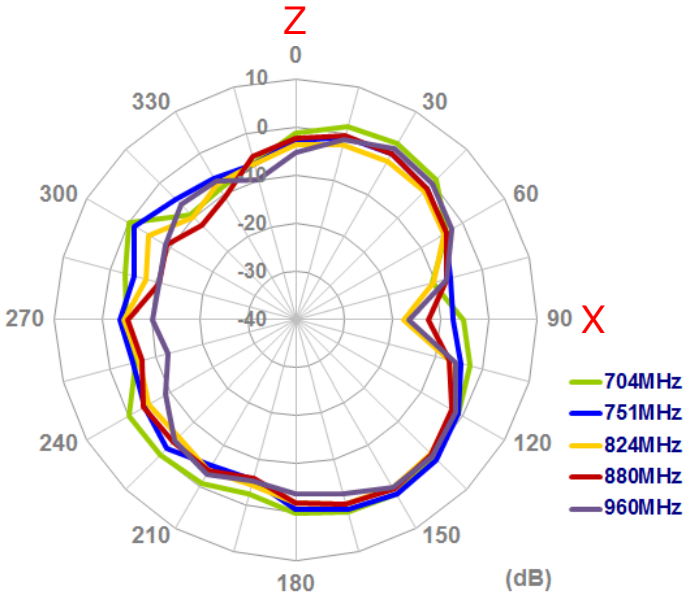
ZX Plane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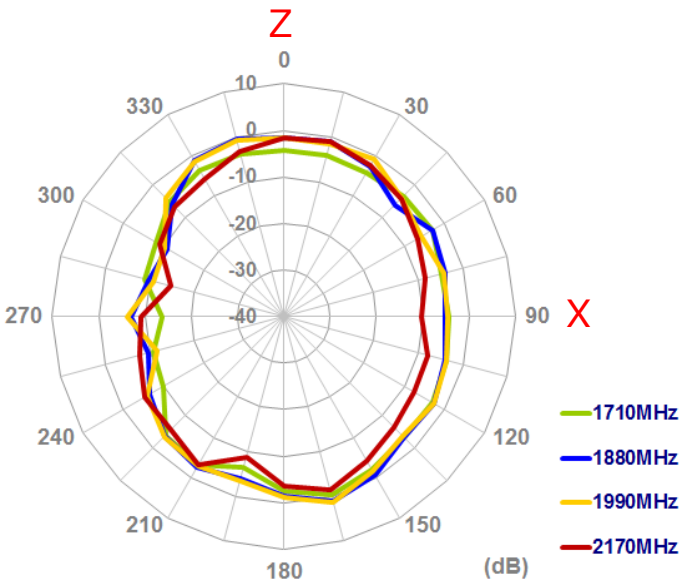
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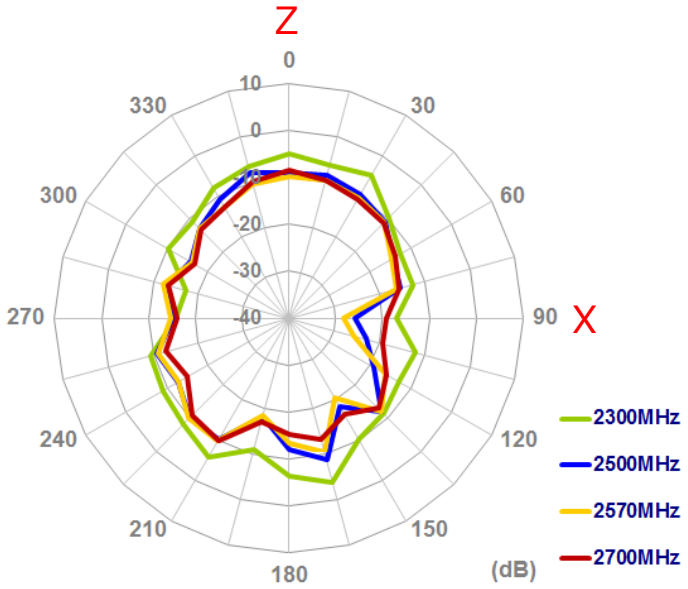
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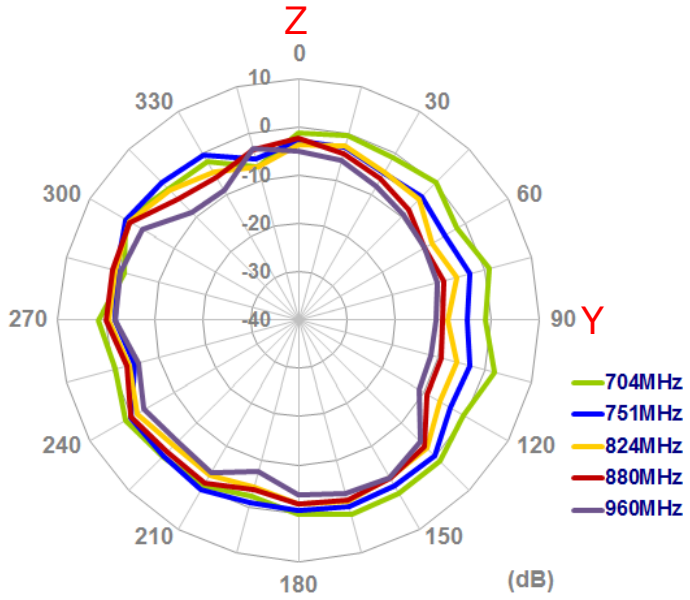
ZY Plane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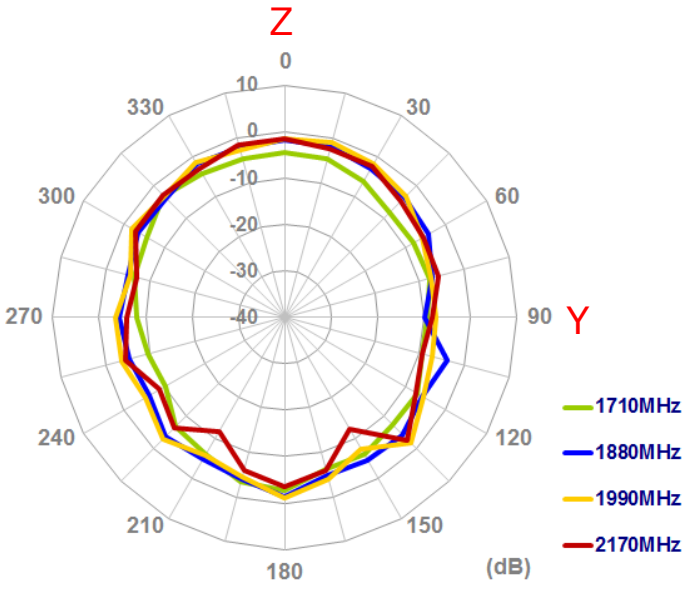
960MHz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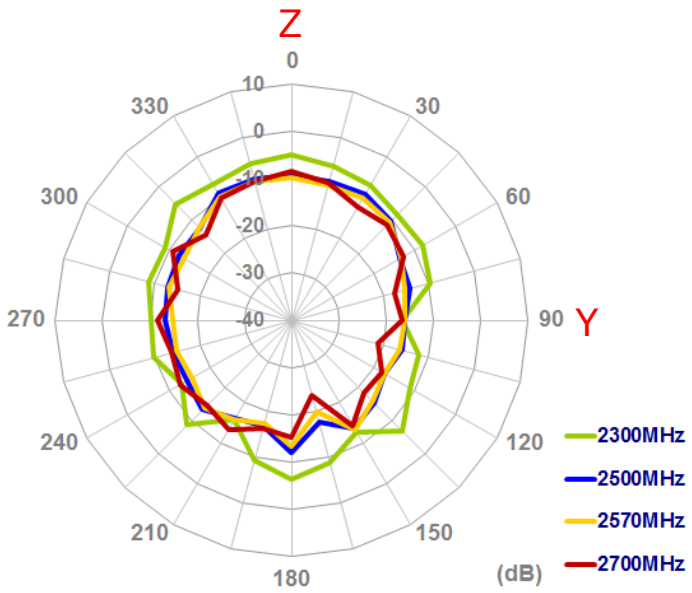
1880MHz
1990MHz
2170MHz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-10
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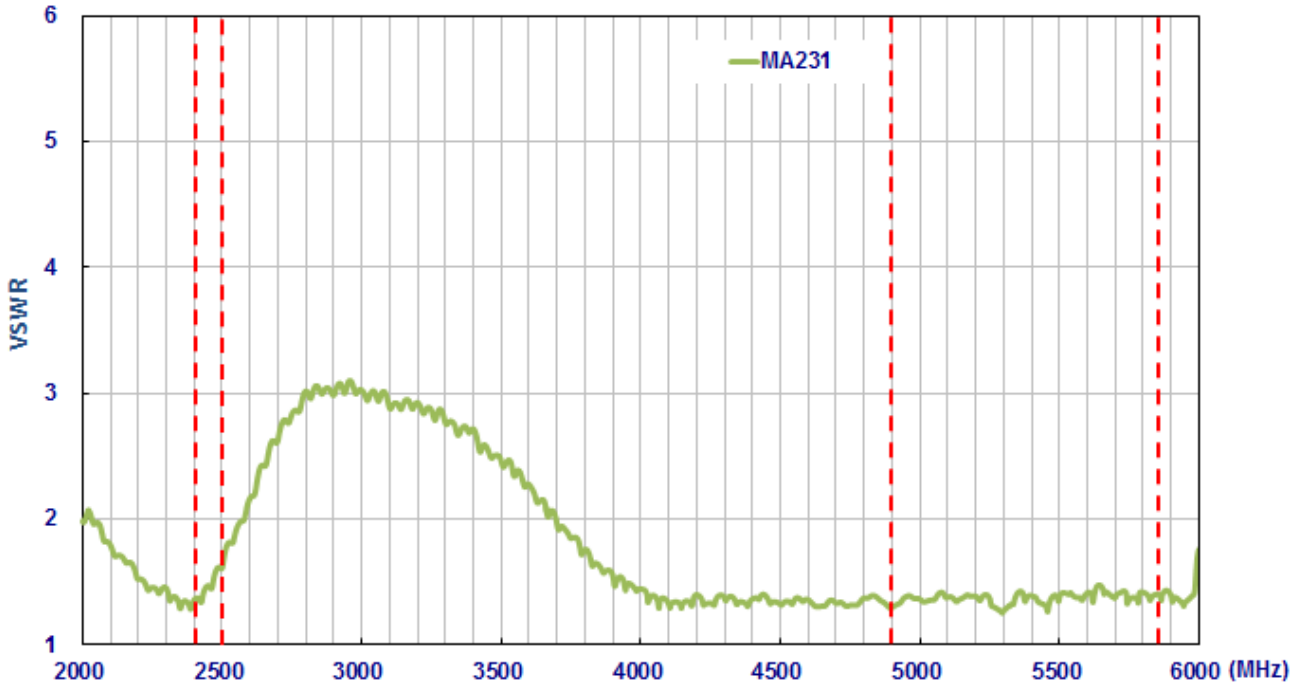
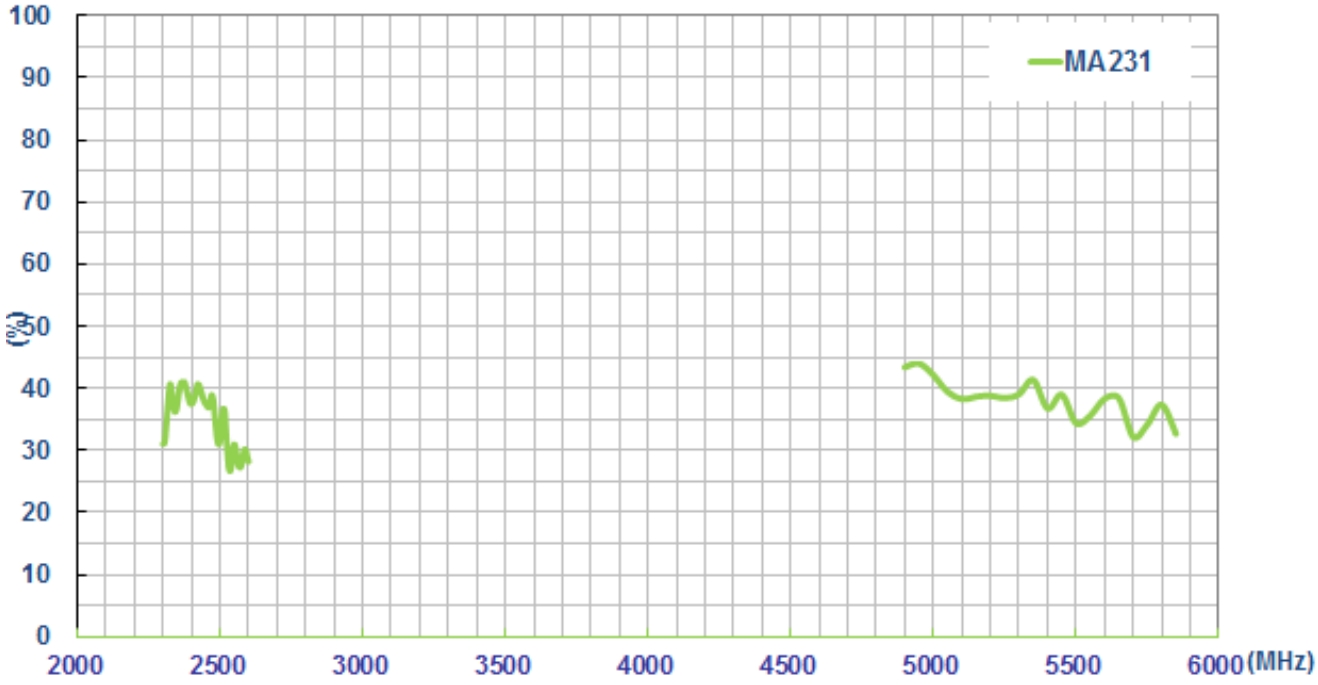
-30
-40
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

5. Wi-Fi 2.4/5.0 GHz antenna

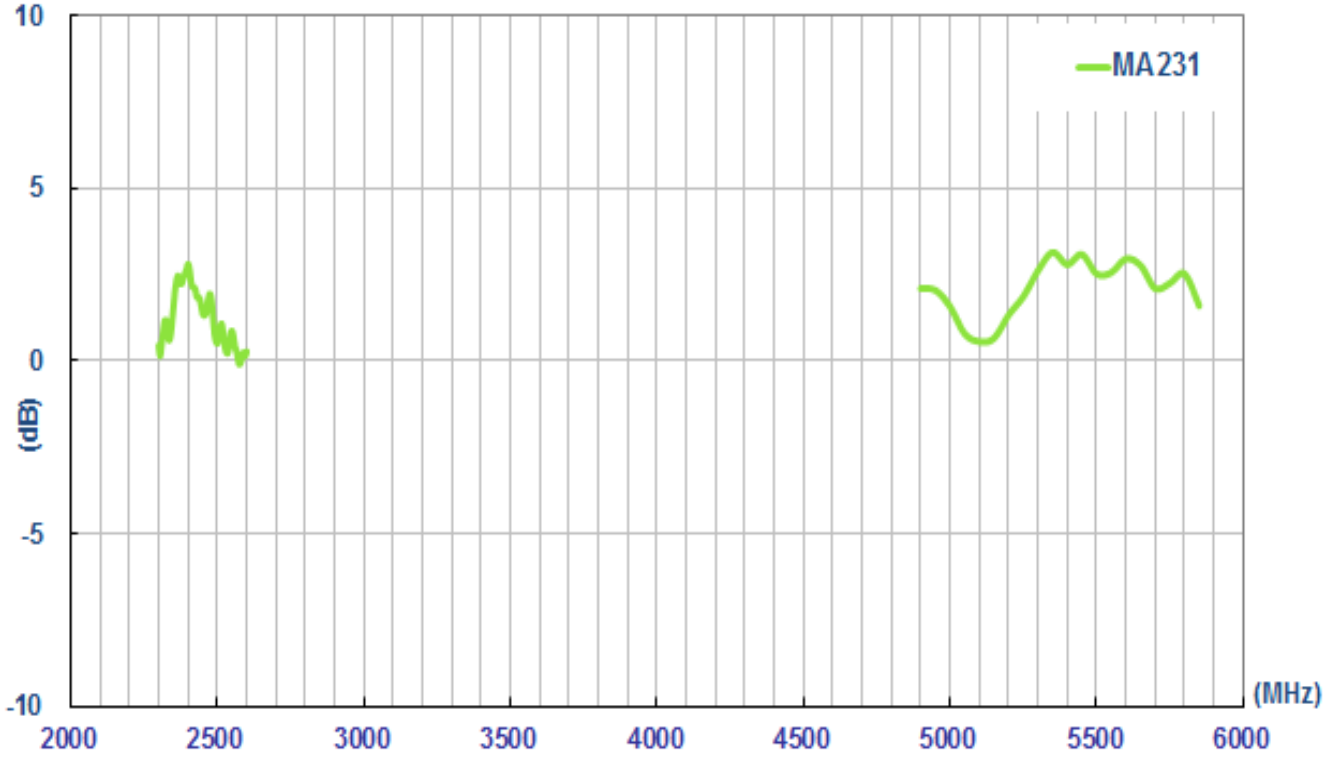
5.1. VSWR



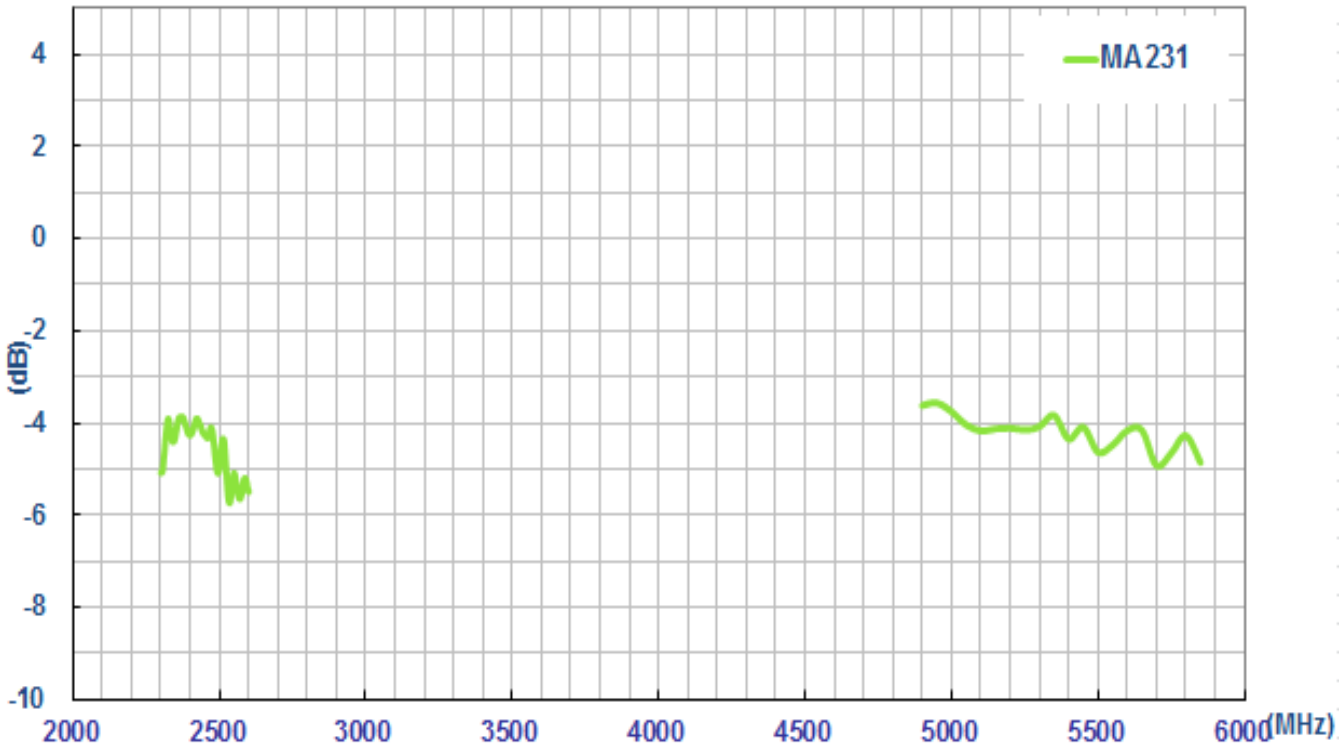
5.2. Efficiency



5.3. Peak Gain

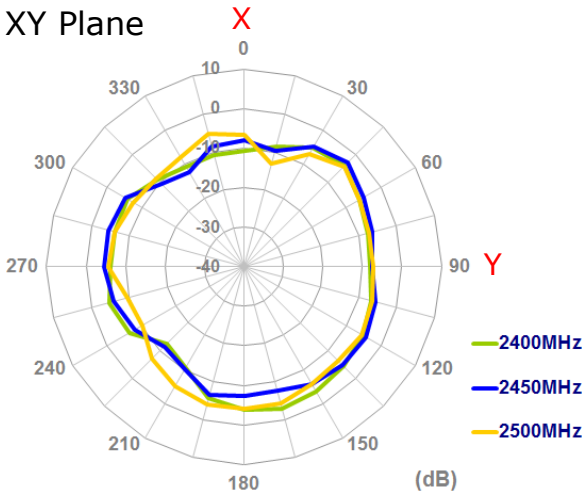


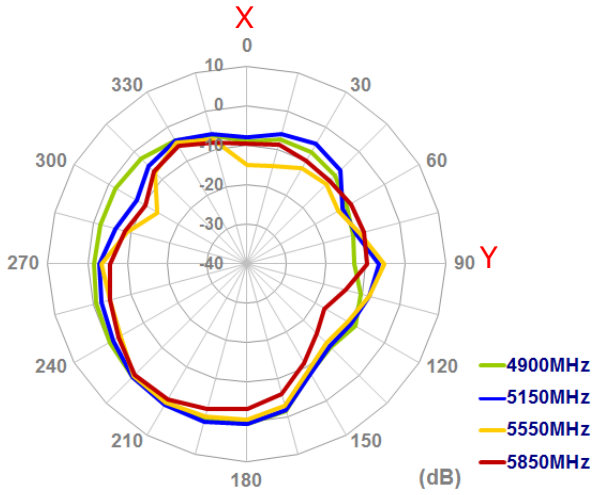
5.4. Average Gain



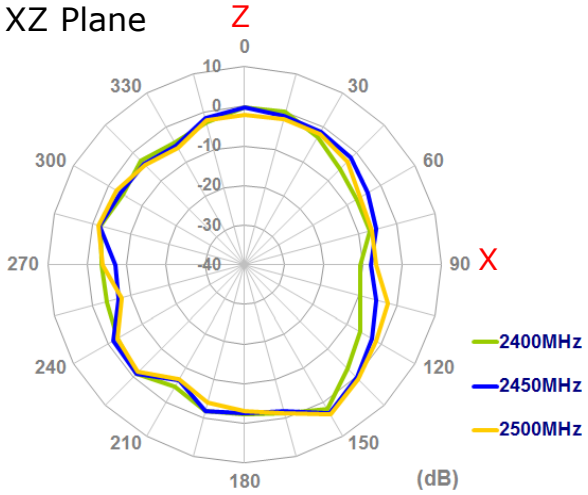
5.5. 2D Radiation Pattern

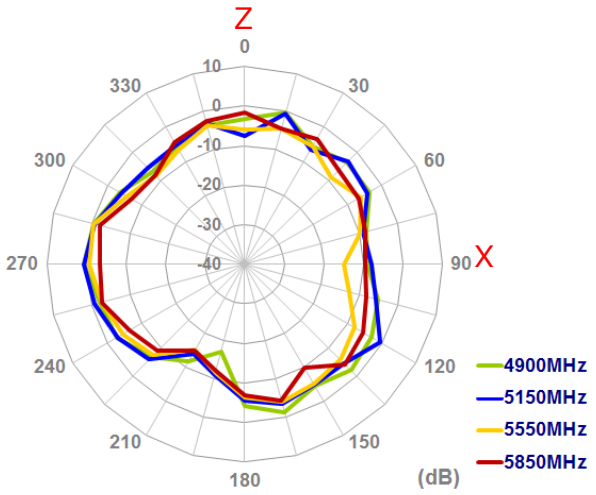
XY Plane



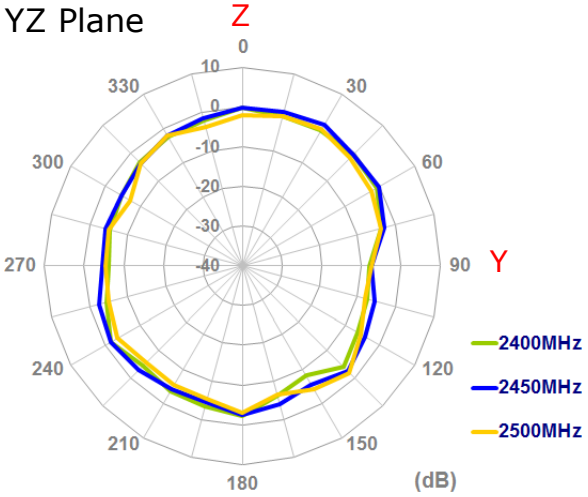


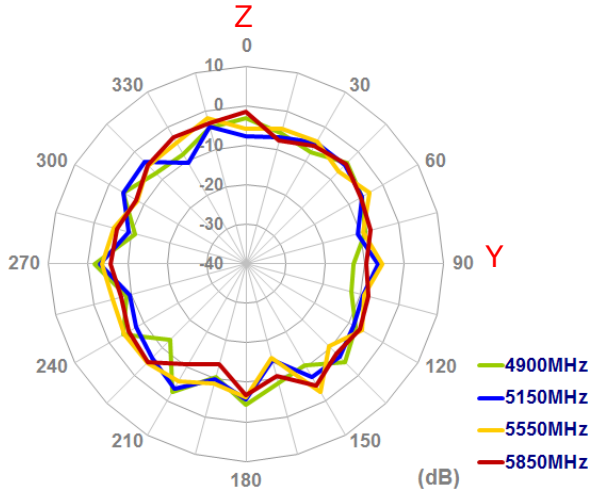
XZ Plane



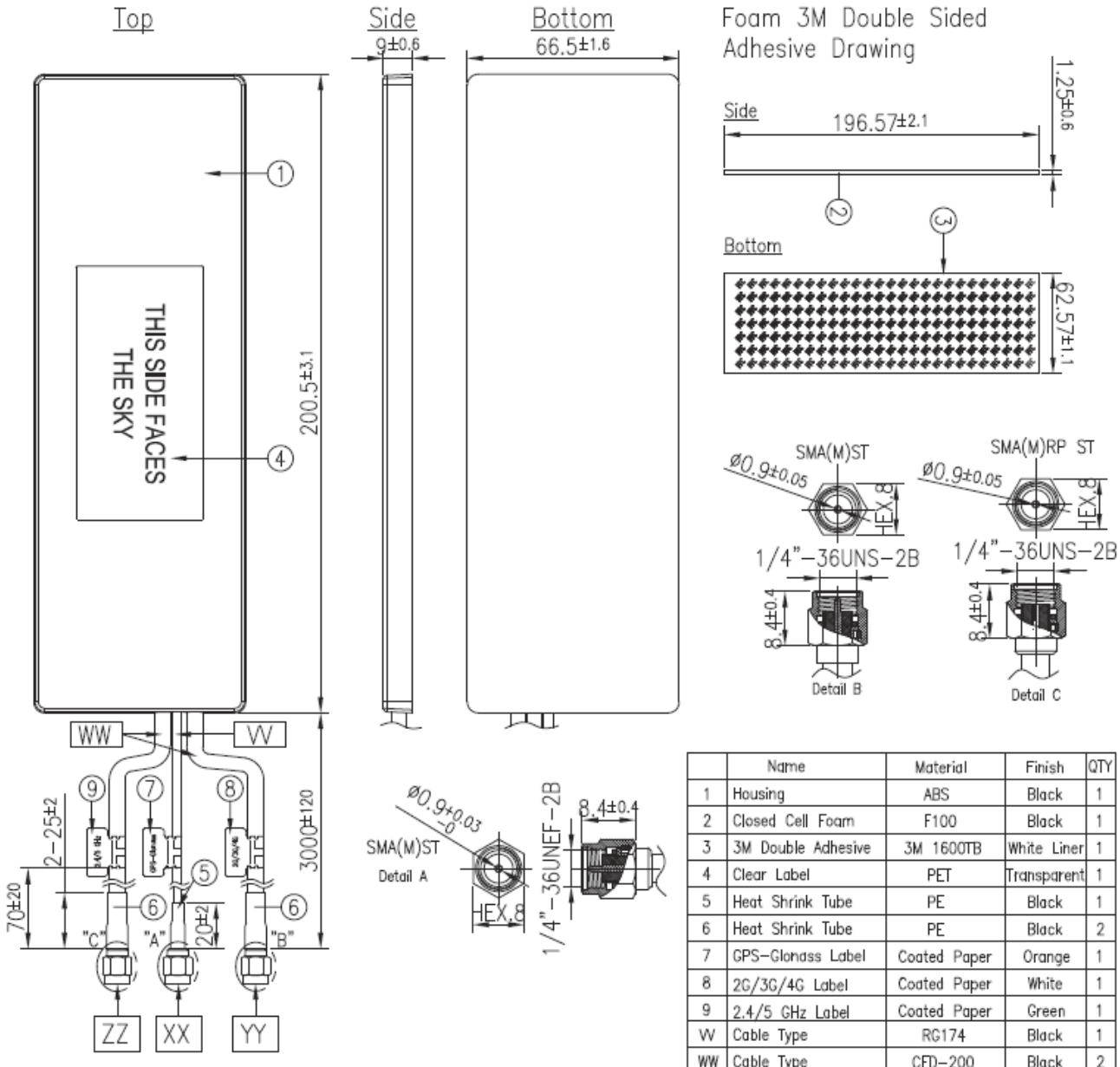


YZ Plane





6. Mechanical Drawing



	Name	Material	Finish	QTY
1	Housing	ABS	Black	1
2	Closed Cell Foam	F100	Black	1
3	3M Double Adhesive	3M 1600TB	White Liner	1
4	Clear Label	PET	Transparent	1
5	Heat Shrink Tube	PE	Black	1
6	Heat Shrink Tube	PE	Black	2
7	GPS-Glonass Label	Coated Paper	Orange	1
8	2G/3G/4G Label	Coated Paper	White	1
9	2.4/5 GHz Label	Coated Paper	Green	1
VV	Cable Type	RG174	Black	1
WW	Cable Type	CFD-200	Black	2
XX	Connector Type	SMA(M)ST	Gold Plated	1
YY	Connector Type	SMA(M)ST	Gold Plated	1
ZZ	Connector Type	SMA(M)RP ST	Gold Plated	1