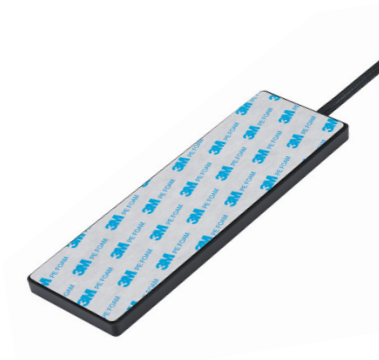


Topside View



Underside View

Stream

MA230.LBC.002

Specification

Part No.	MA230.LBC.002
Product Name	Stream MA.230 Stream 3 in 1 High Performance Adhesive Mount Combination Antenna GNSS - GPS/Glonass Cellular - LTE/HSPA/GSM/CDMA/UMTS Wi-Fi - 2.4/5 GHz
Feature	IP67 Antenna GPS/Glonass: 3M RG-174 SMA(M) 1.8-5.5V/30dB Cellular 2G/3G/4G: 3M Low Loss CFD-200 SMA(M) Wi-Fi: 3M Low Loss CFD-200 RP-SMA(M) Dimensions: 200.5*66.5*9mm RoHS Compliant

1. Introduction

The Stream 3in1 MA.230 GPS/Glonass, LTE Cellular 2G/3G/4G and Wi-Fi 2.4/5GHz 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, Wi-Fi dual-band 2.4/5GHz and all cellular bands in 2G/3G/4G in a low profile compact format for mounting via high quality first tier automotive approved 3M adhesive foam.

GPS/Glonass

The patent pending design incorporates internally a custom Taoglas 35mm patch antenna on an extended integral ground-plane to deliver more than 3.5dBiC gain. A front-end SAW filter dramatically reduces radiated spurious emissions.

Cellular 2G/3G/4G

The extended ground-plane used with an innovative internal cellular PIFA also enables the unique wide-band 2G/3G/4G response to deliver the highest performance possible, at 3 metres cable length. Nothing else out there comes close in terms of consistency of efficiency and peak gain at all cellular bands, with 70%+ at the LTE 700MHz band, again including 3 metres of cable loss. High antenna efficiencies are absolutely critical in today's 3G and 4G systems to achieving targeted data-speeds and coverage.

Wi-Fi dual-band 2.4/5GHz

A powerful antenna gives maximum gain and coverage for common applications. 3dBi+ stable gain on both bands including cable loss means the antenna is ideal for high bandwidth applications.

All this is done while still maintaining 20dB isolation between antennas. The Stream uses 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 Stream maximizes chances of passing PTCRB and network approvals first time. 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

Parameter	GPS/Glonass Antenna	Cellular Antenna	Wi-Fi Antenna
Features	High performance GPS/Glonass 35*35*4mm ceramic patch antenna	LTE: 700MHz CDMA: 824~896MHz GSM: 880~960MHz DCS: 1710-1880 MHz PCS: 1850~1990MHz 3G: 1920~2170MHz	High performance dual-band Wi-Fi 2.4/5 GHz
Gain	1575.42MHz 1.92dBi typ @ Zenith 1602MHz 3.19dBi typ @ Zenith	Average:-3.03dBi at 700~960MHz -4.34dBi at 1710~2170MHz Peak:2.16dBi at 700~960MHz 0.42dBi at 1710~2170MHz	1.5dBi typ. @ 2450MHz 2.0dBi typ. @ 5000MHz
VSWR	1.21 Max at 1575MHz 1.55 Max at 1602MHz	3.3 Max. at 700~960MHz 3.6 Max. at 1710~1850MHz 2.2 Max. at 1880~2170MHz	2.30 Max at 2400MHz 1.08 Max at 5000MHz
Impedance	50Ω	50Ω	50Ω
Efficiency		≥ 68% @ 700MHz ≥ 72% @ 750MHz ≥ 66% @ 824MHz ≥ 56% @ 890MHz ≥ 61% @ 880MHz ≥ 53% @ 960MHz ≥ 37% @1710MHz ≥ 51% @1880MHz ≥ 55% @1990MHz ≥ 54% @2110MHz ≥ 45% @2170MHz	≥ 40% @ 2450MHz ≥ 30% @ 5000MHz

2. Specification

Mechanical

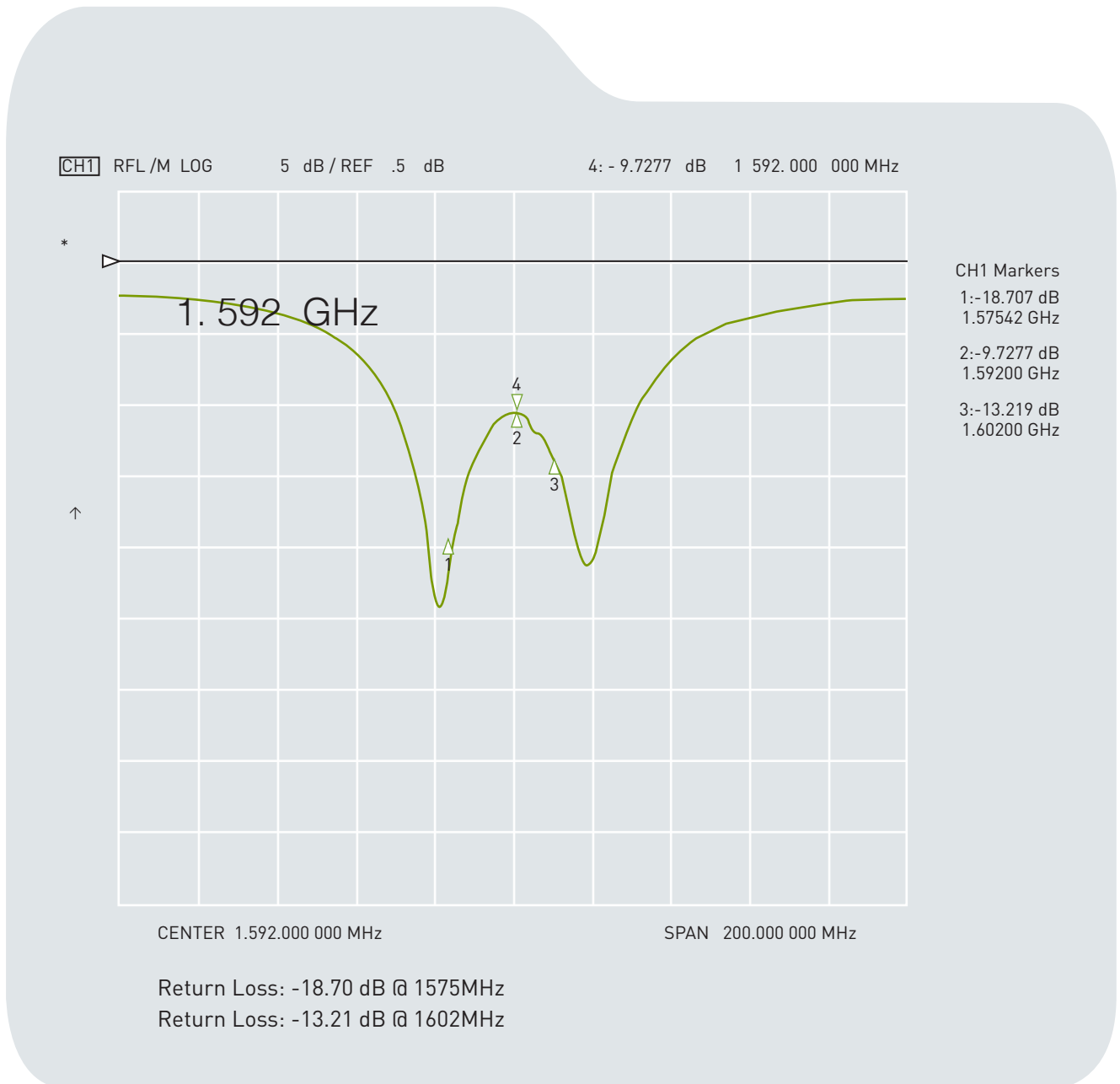
Cable / Connector	3M RG-174 with SMA(M) Fully Customisable	3M CFD-200 with SMA(M) Fully customisable	3M CFD-200 with RP-SMA(M) Fully customisable
Housing	UV resistant ABS		
Adhesive Mount	3M 1600TB (196.57*62.57*1.25mm)		
Protection Class	IP-67		
Weight per unit	0.18kg		

Environmental

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

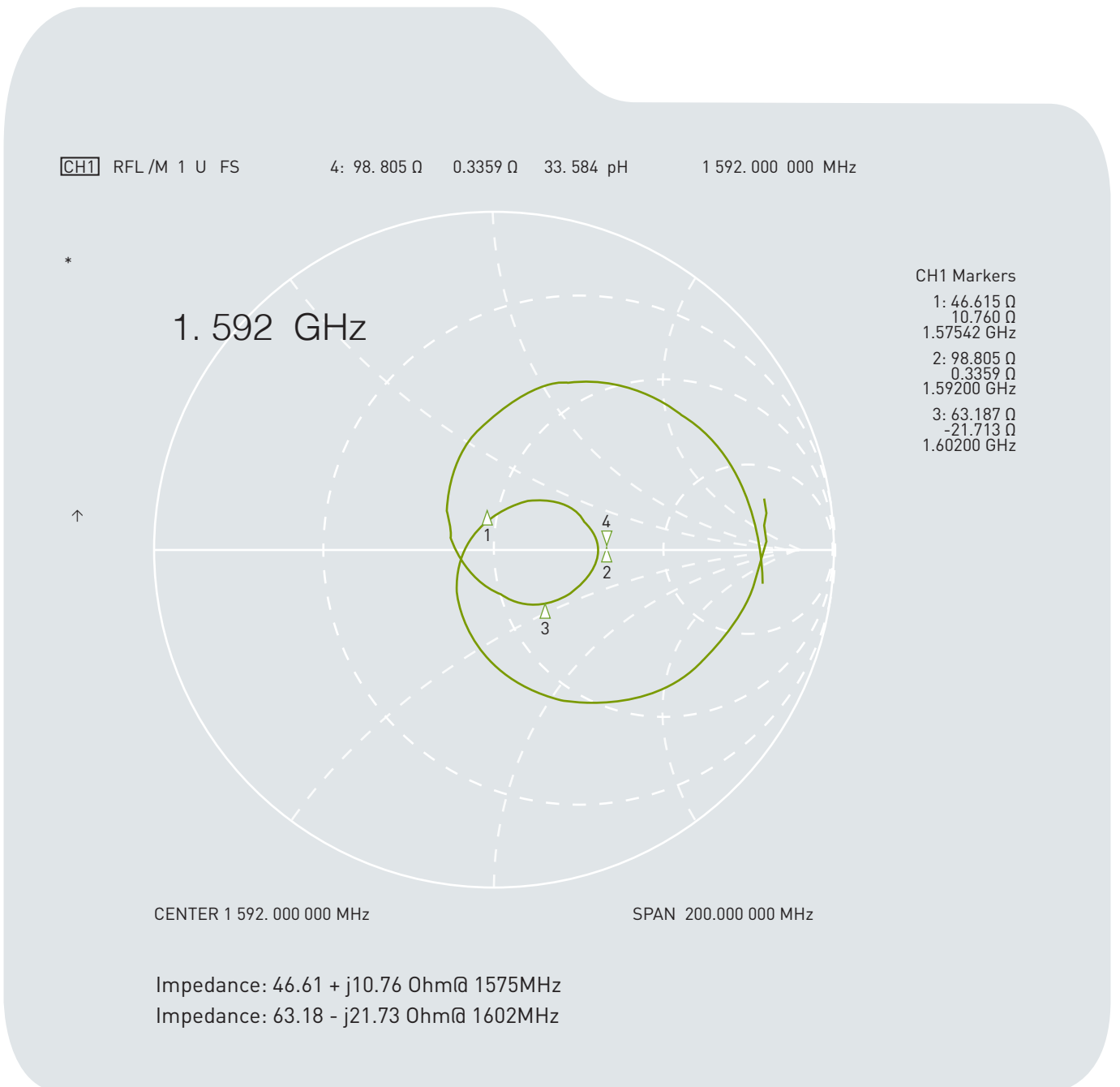
3. GPS-GLONASS antenna

3.1 Return Loss



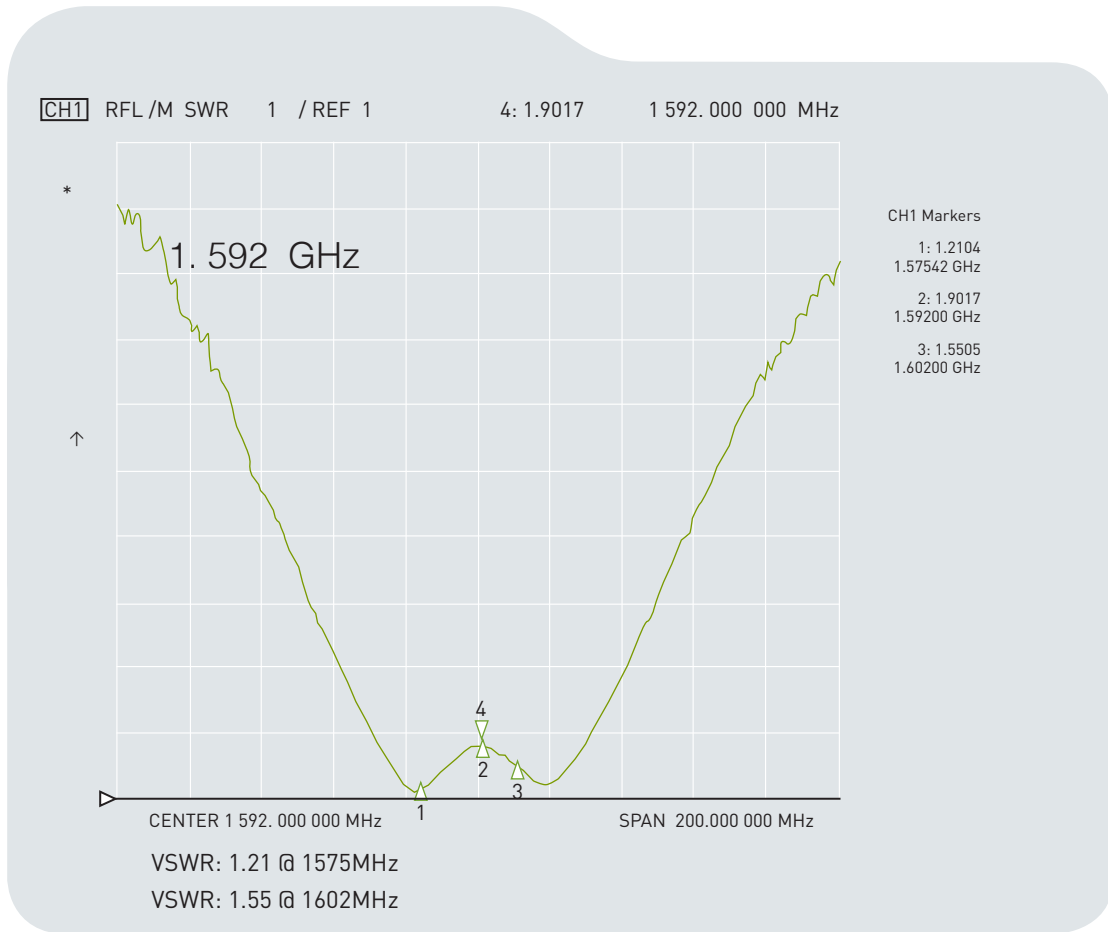
3. GPS-GLONASS antenna

3.2 Smith Chart



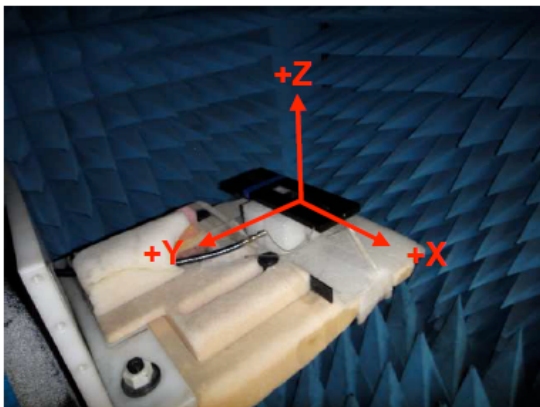
3. GPS-GLONASS antenna

3.3 VSWR

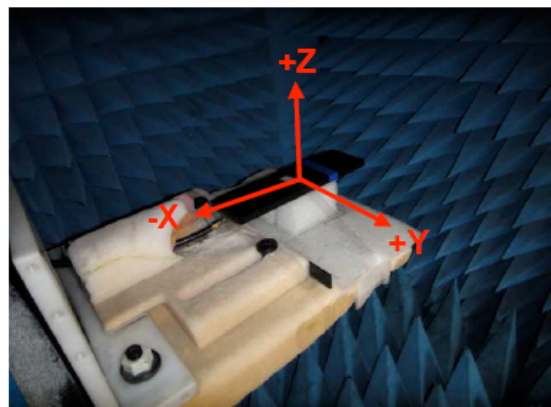


3.4 Radiation Patterns

XZ - Plane

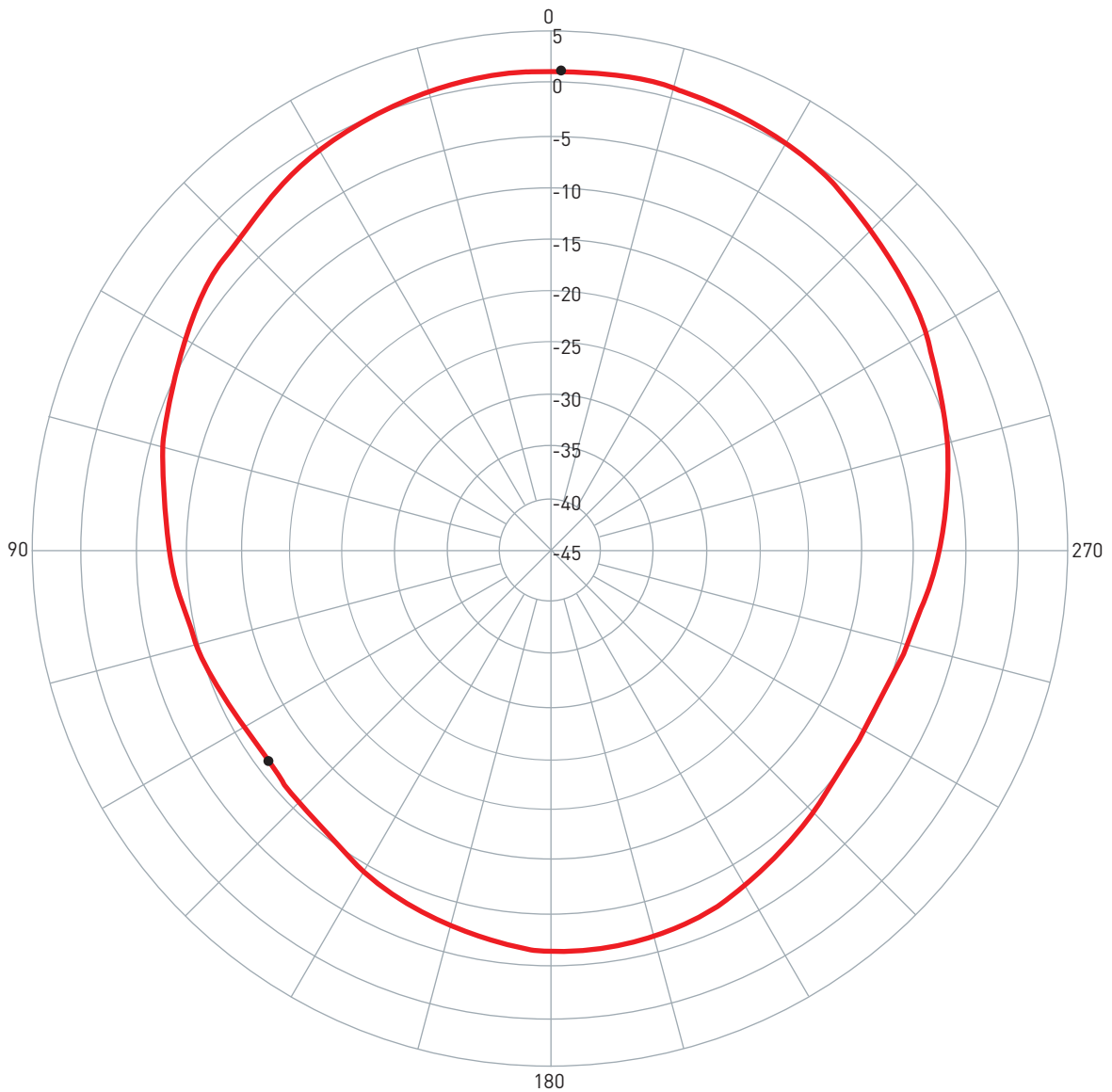


YZ - Plane



3.4 Radiation Patterns

3.4.1 XZ Plane 1575.42MHz Horizontal & Vertical



Pattern	Model No.	Test Mode	Freq (MHz)	Max Gain(dBi)	Min Gain(dBi)	Avg. Gain(dBi)	Source Polar.
1	MA230.LBC.002	XZ	1575.42	1.39 / 359.00	-11.14 / 127.00	-3.71	V+H
		1575 MHz		Peak Gain	Zenith Gain		
		V+H		1.39	1.35 dBi		

3.4 Radiation Patterns

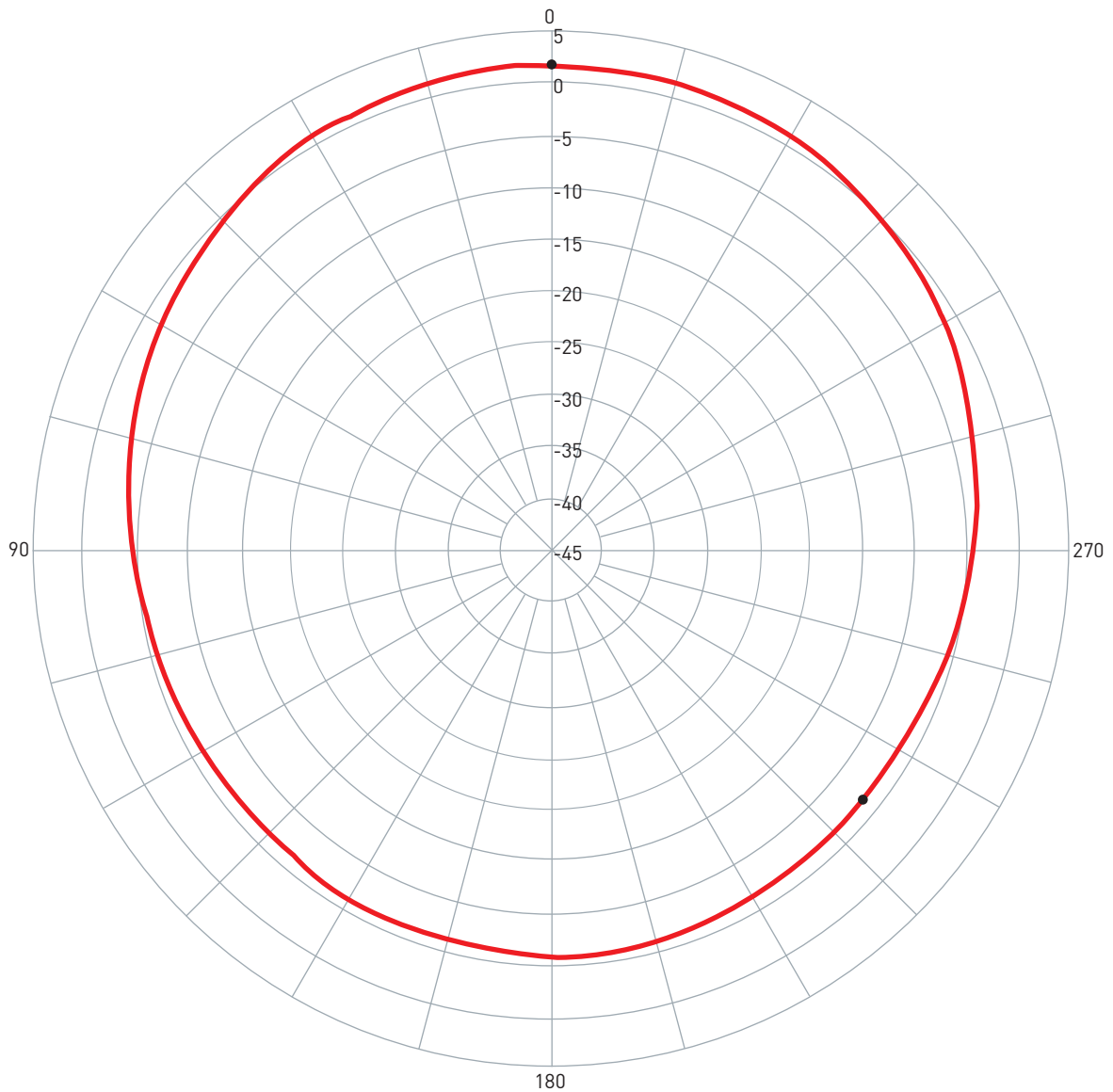
3.4.2 XZ Plane 1602MHz Horizontal & Vertical



Pattern	Model No.	Test Mode	Freq (MHz)	Max Gain(dBi)	Min Gain(dBi)	Avg. Gain(dBi)	Source Polar.
1	MA230.LBC.002	XZ	1602.00	3.19 / 0.00	-12.76 / 113.00	-1.96	V+H
		1602 MHz		Peak Gain	Zenith Gain		
		V+H		3.19	3.19 dBi		

3.4 Radiation Patterns

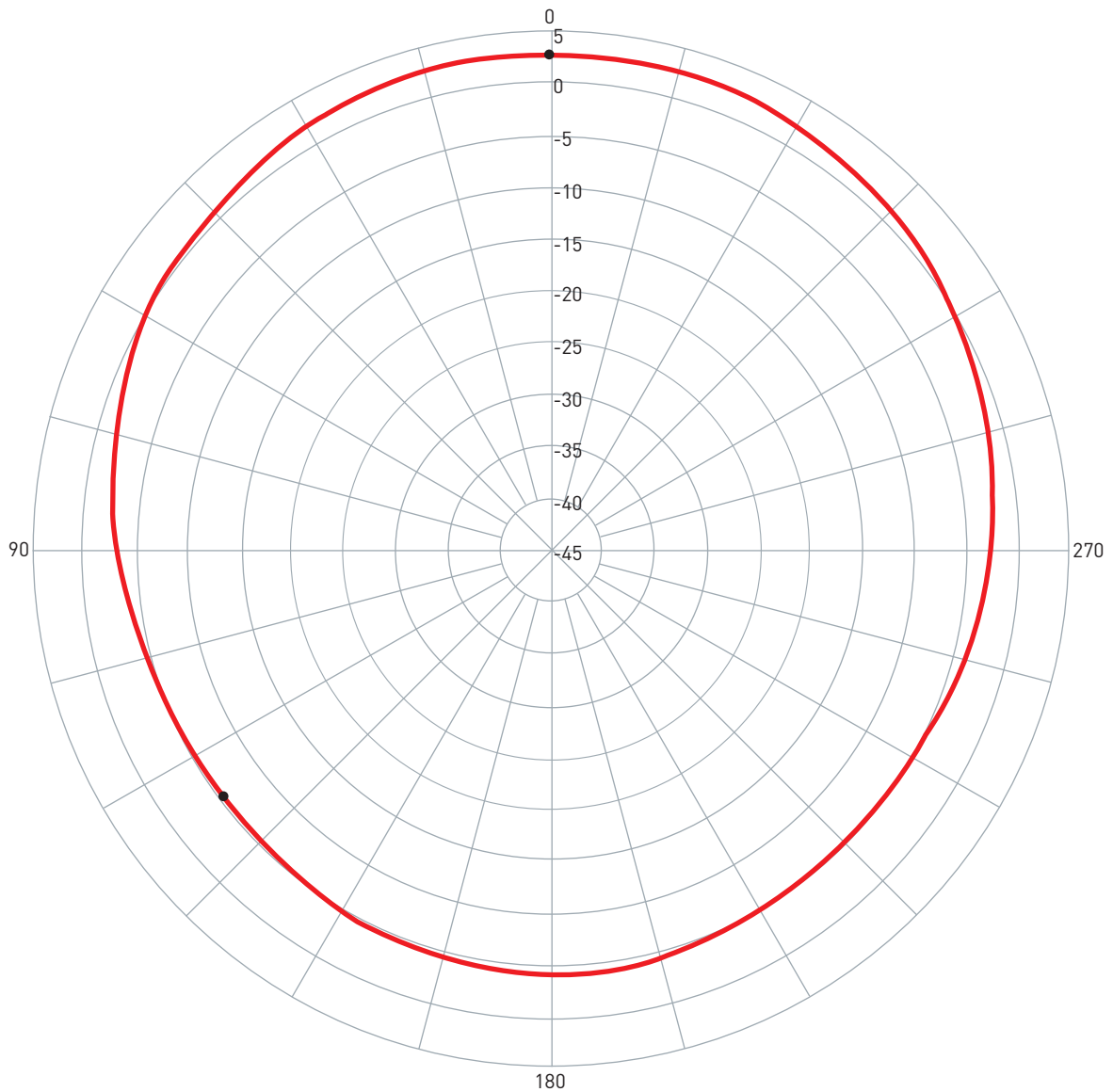
3.4.3 YZ Plane 1575.42MHz Horizontal & Vertical



Pattern	Model No.	Test Mode	Freq (MHz)	Max Gain(dBi)	Min Gain(dBi)	Avg. Gain(dBi)	Source Polar.
1	MA230.LBC.002	YZ	1575.42	1.92 / 0.00	-6.48 / 231.00	-2.07	V+H
		1575 MHz		Peak Gain		Zenith Gain	
		V+H		1.92		1.92 dBi	

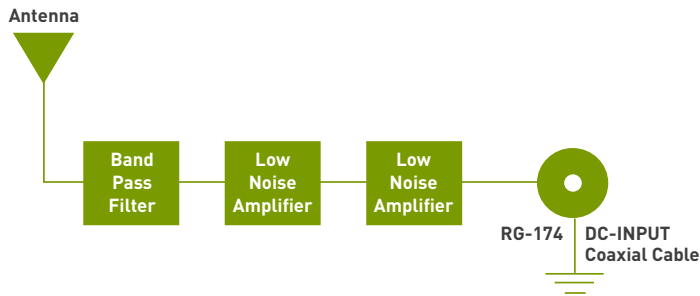
3.4 Radiation Patterns

3.4.4 YZ Plane 1602MHz Horizontal & Vertical



Pattern	Model No.	Test Mode	Freq (MHz)	Max Gain(dBi)	Min Gain(dBi)	Avg. Gain(dBi)	Source Polar.
1	MA230.LBC.002	YZ	1602.00	2.92 / 0.00	-5.62 / 127.00	-0.87	V+H
		1602 MHz		Peak Gain		Zenith Gain	
		V+H		2.92		2.92 dBi	

3.5 LNA characteristics

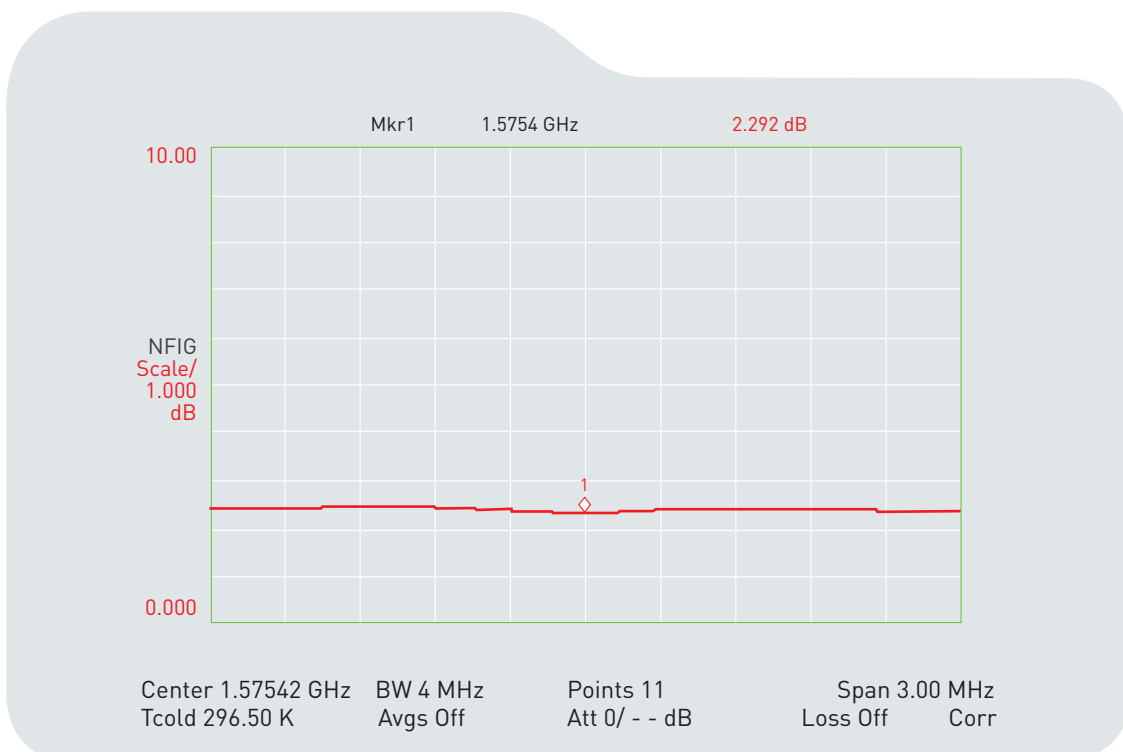


Parameter

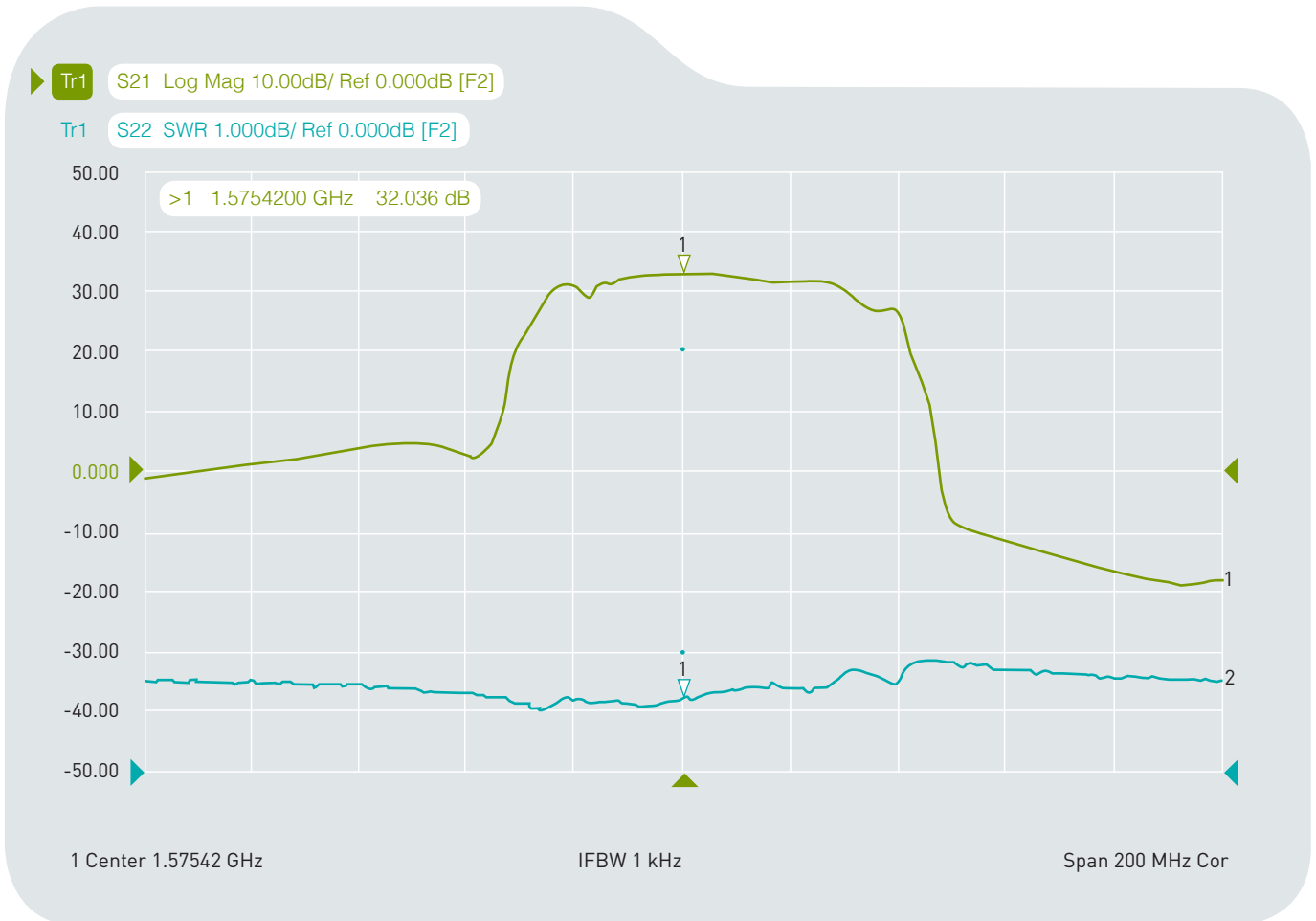
Output Impedance	50 Ω
Output Power at 1dB Compression Point	-35dBm typ.
Output VSWR	2.0 Max.

Supply Voltage	Gain(Typ)	Noise Figure(Typ)	Power Consumption (Typ.)
1.8V	27.0dB	2.2dB	5.5mA
3.0V	32.9dB	2.3dB	12.5mA
5.5V	33.8dB	2.5dB	15.0mA

3.6 LNA Noise Figure @ 3.0V



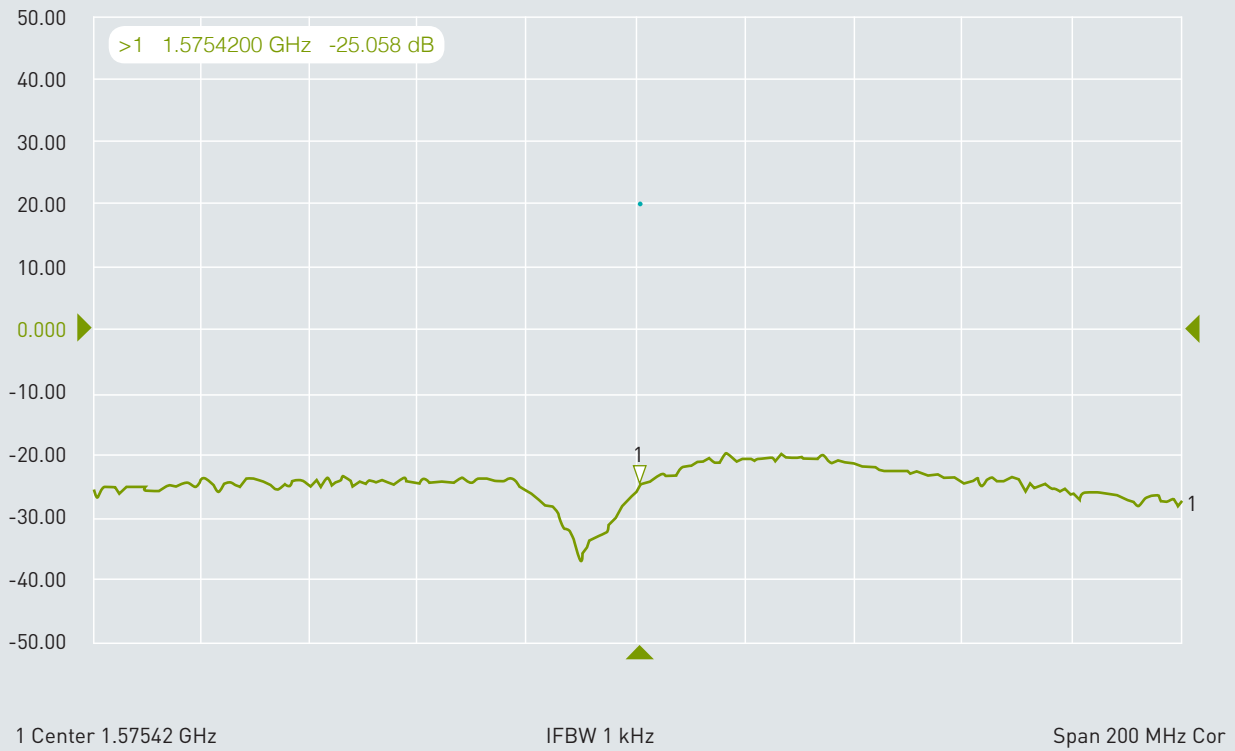
3.7 LNA Gain and Output of VSWR at 3.0V



Ch1	Tr1	S21	>1	1.5754200 GHz	32.936	dB
Ch1	Tr2	S22	1	1.5754200 GHz	1.2368	

3.8 20dBmin isolation to LNA input and LTE/ GSM/ CDMA/UMTS /HSPA antenna

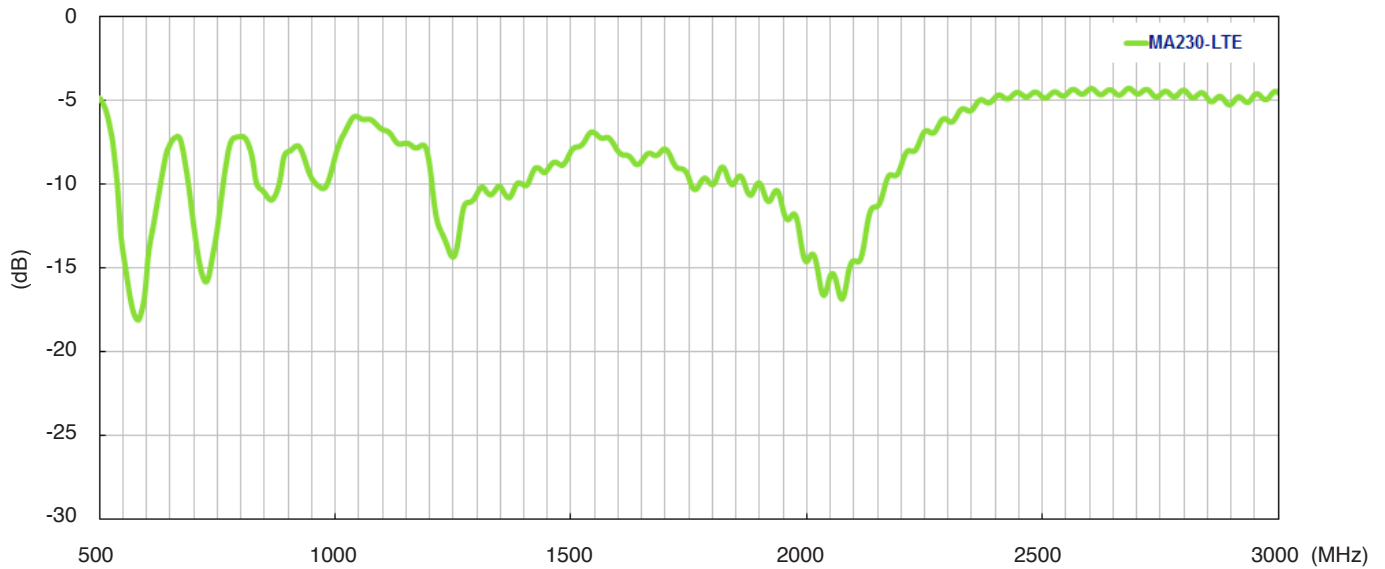
Tr1 S12 Log Mag 10.00dB/ Ref 0.000dB [F2]



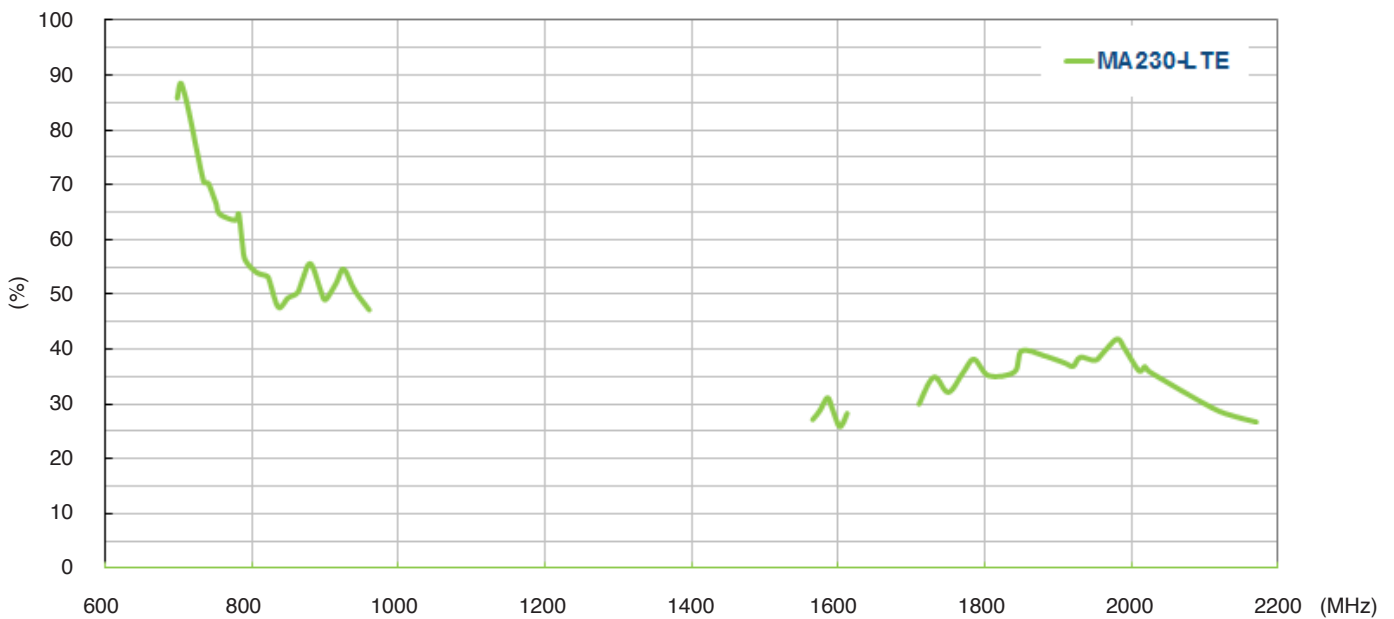
Ch1 Tr1 S12 >1 1.5754200 GHz -25.058 dB

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

4.1 Return Loss



4.2 Efficiency

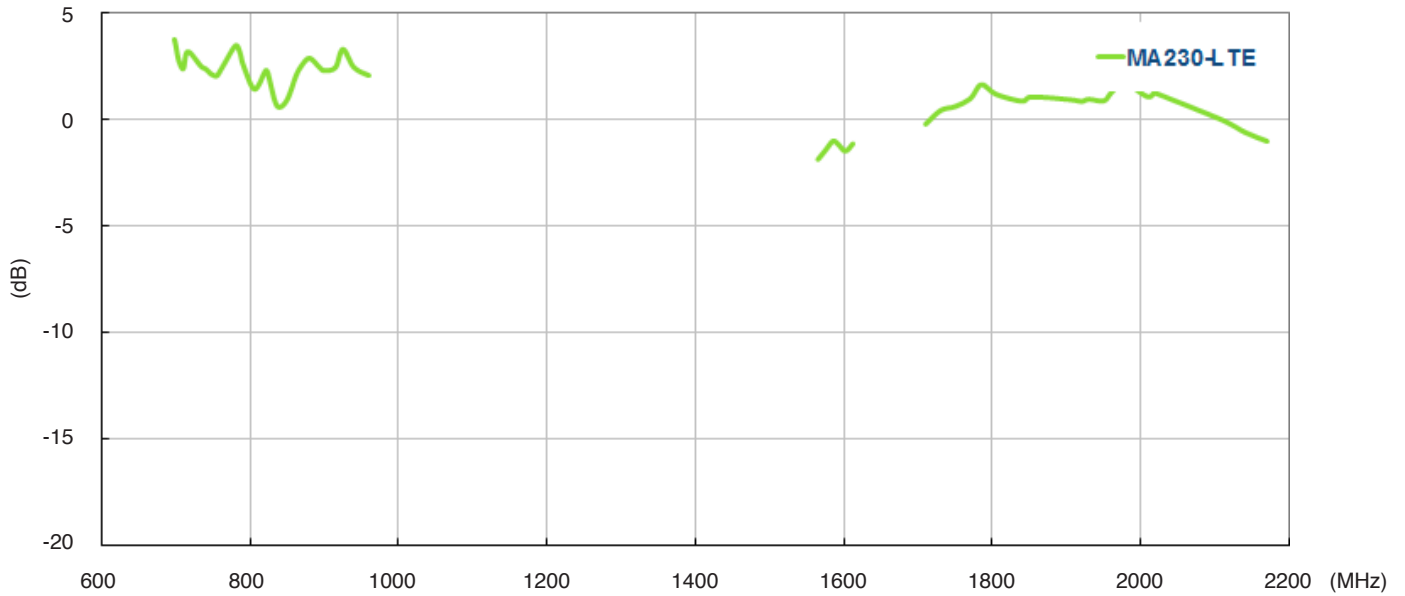


4. Cellular 2G/3G/4G antenna

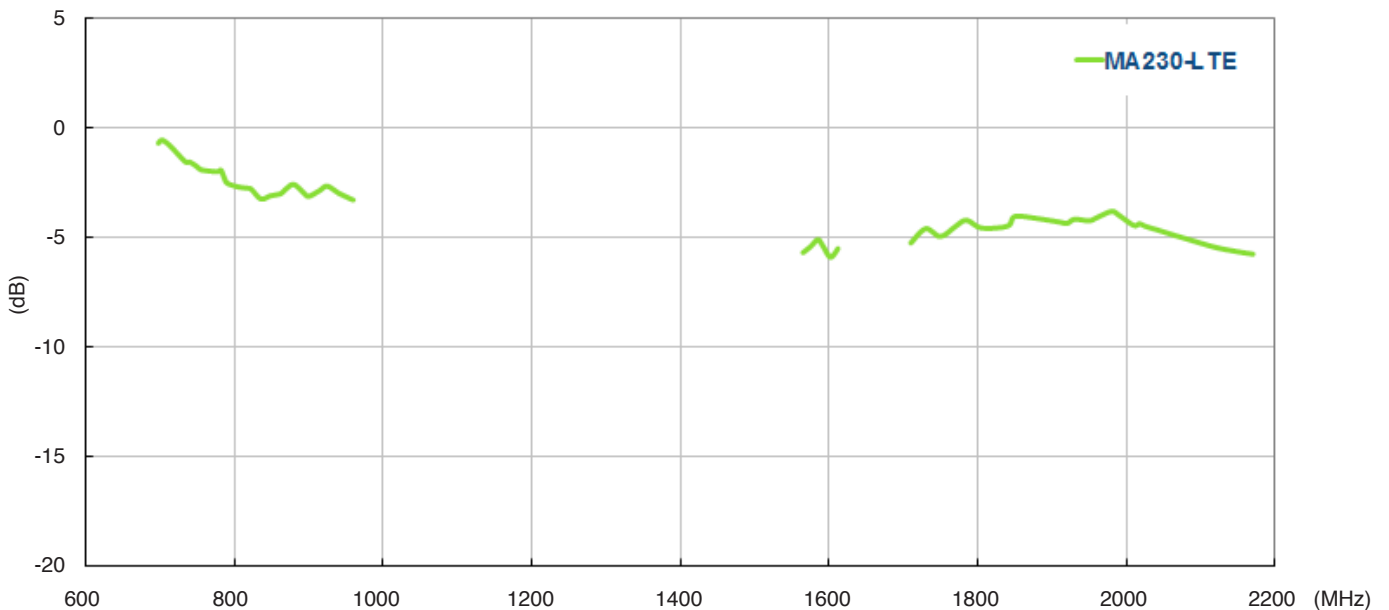
4.3 Peak Gain

1.5dBi typ.@ 2450 MHz

2.0dBi typ.@ 5000 MHz

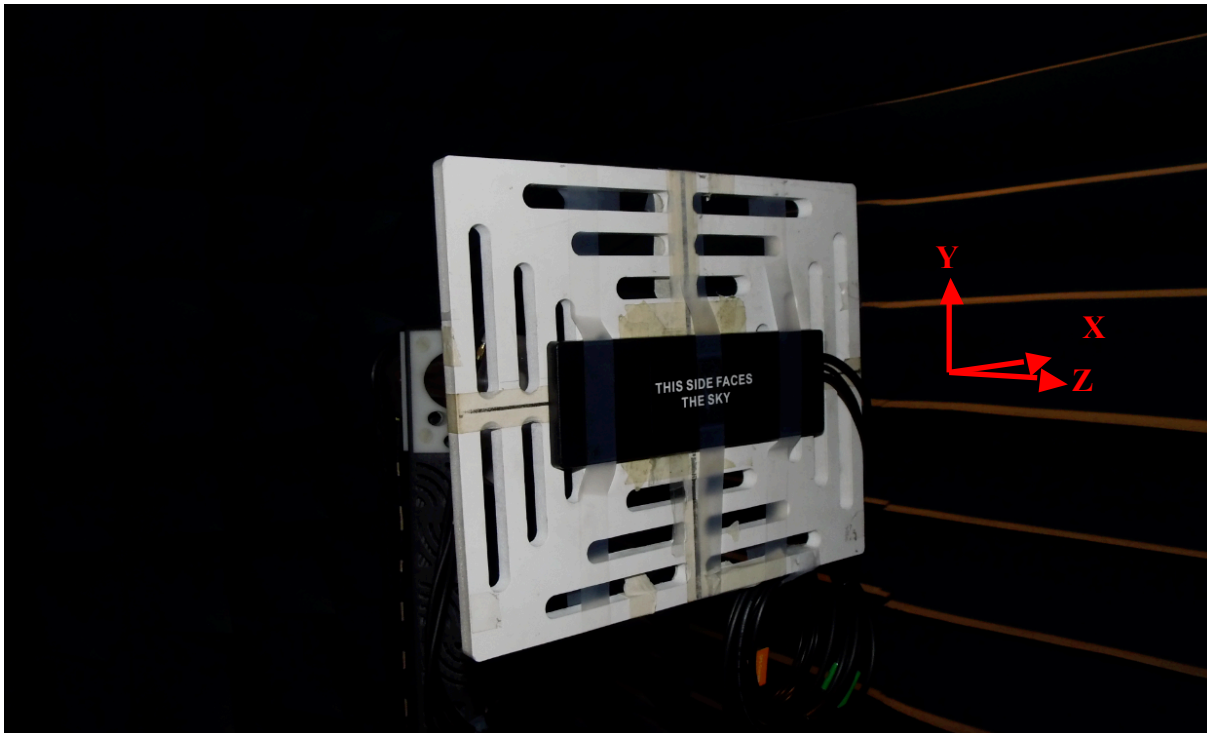


4.4 Average Gain

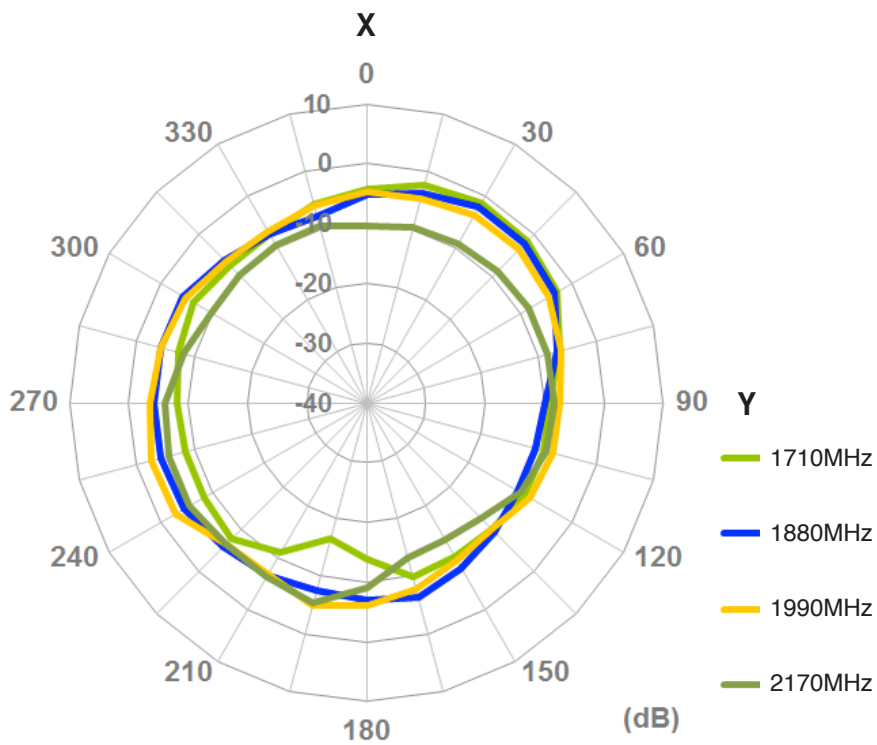
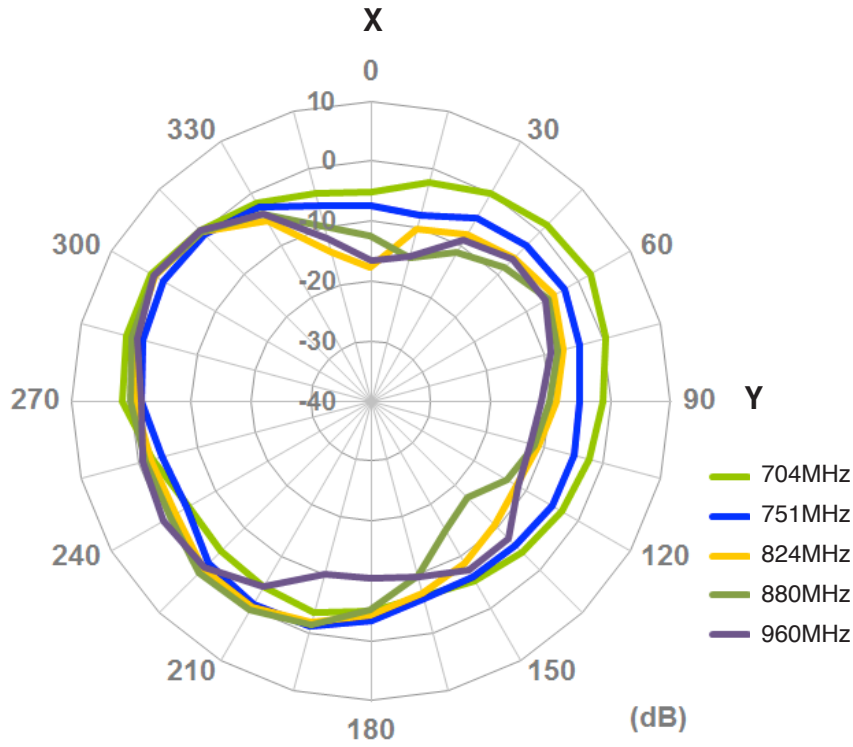


4.5 Radiation Patterns

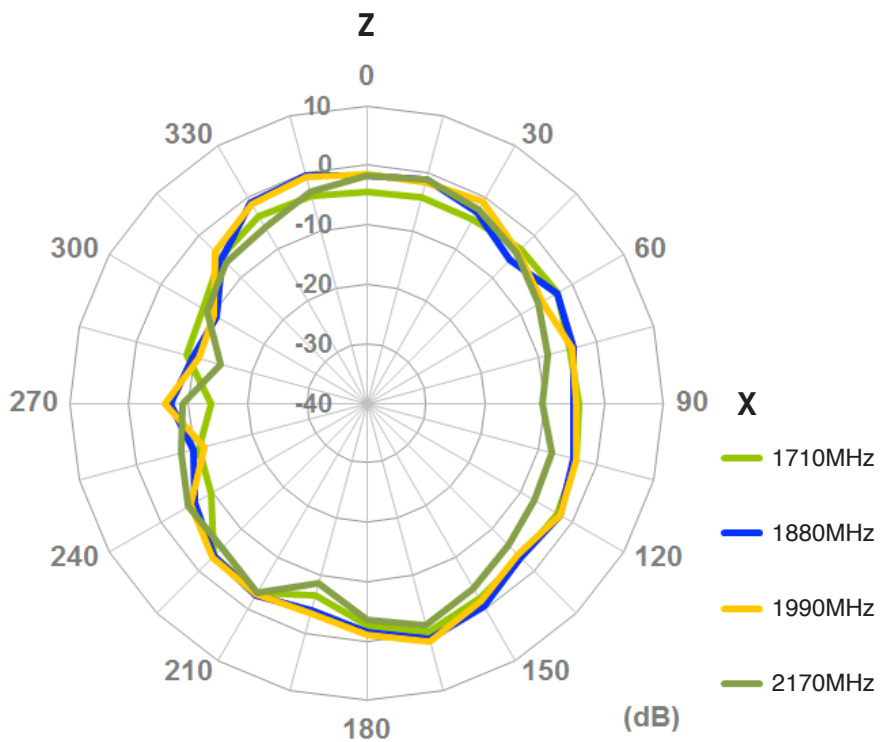
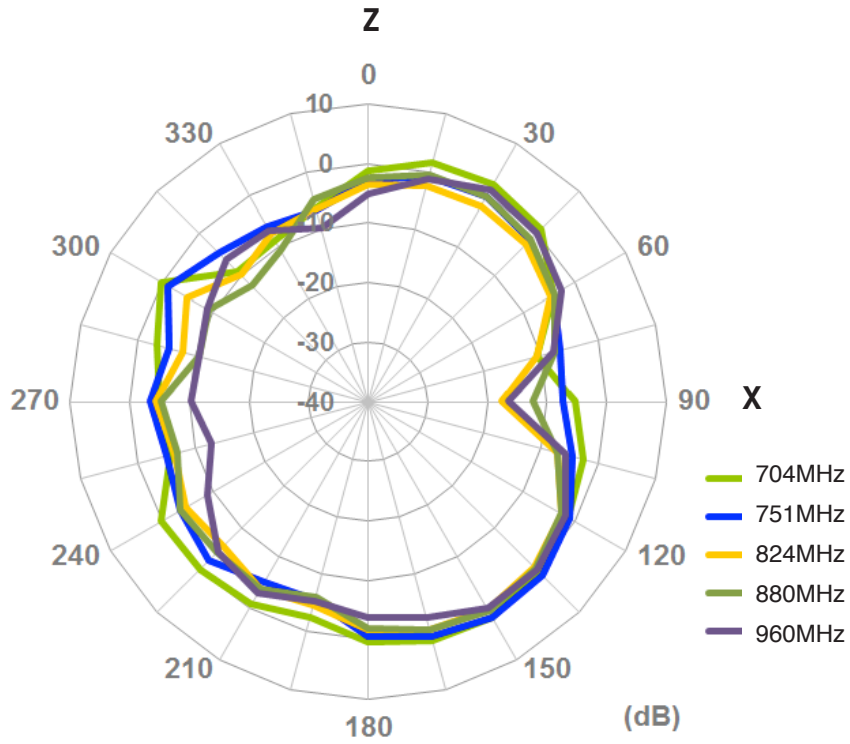
Measurement setup



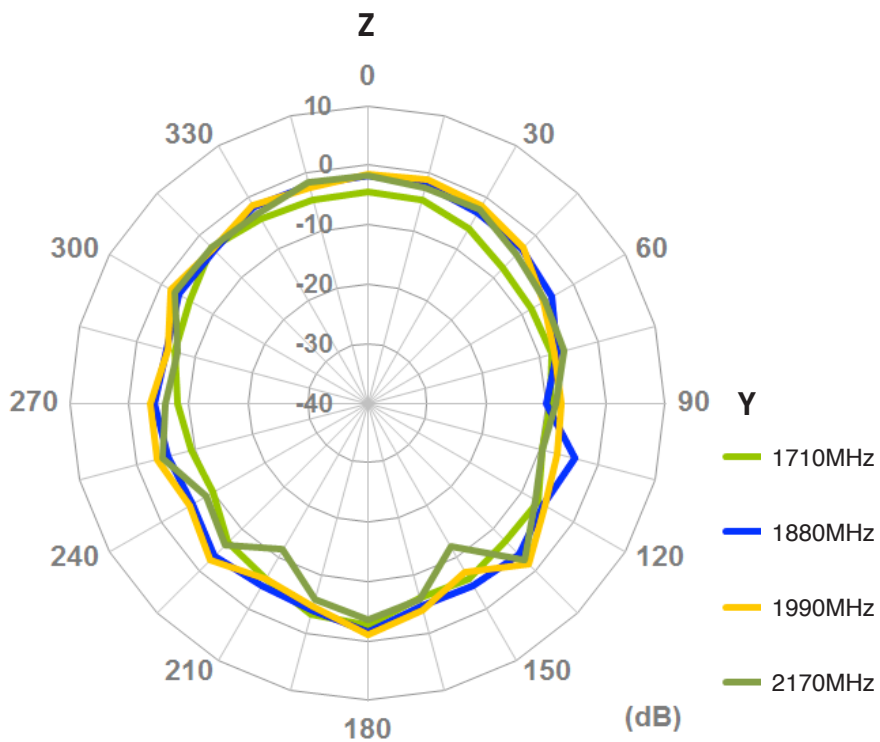
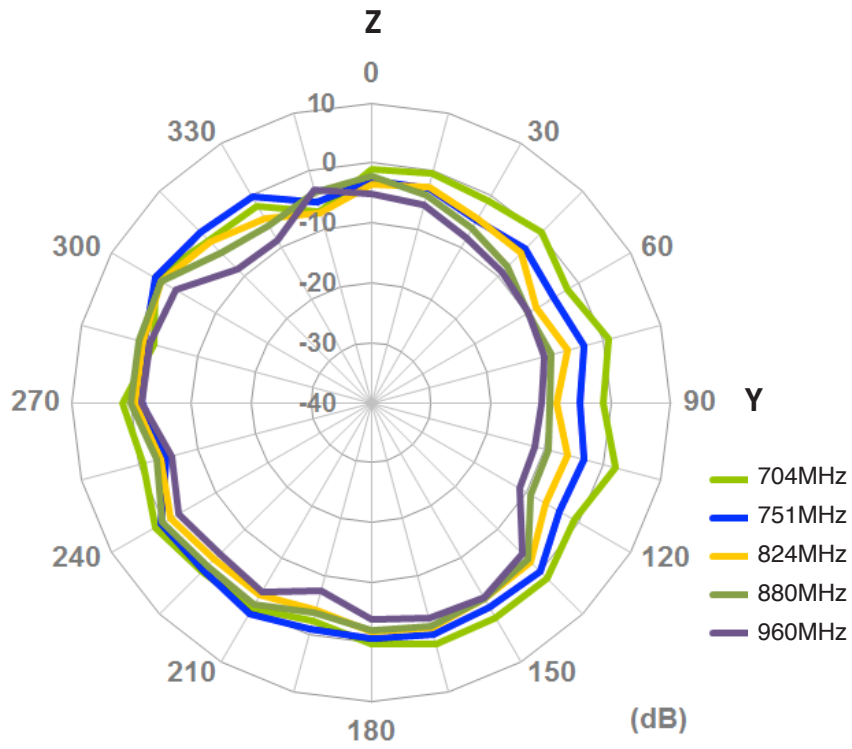
XY-Plane



XZ-Plane

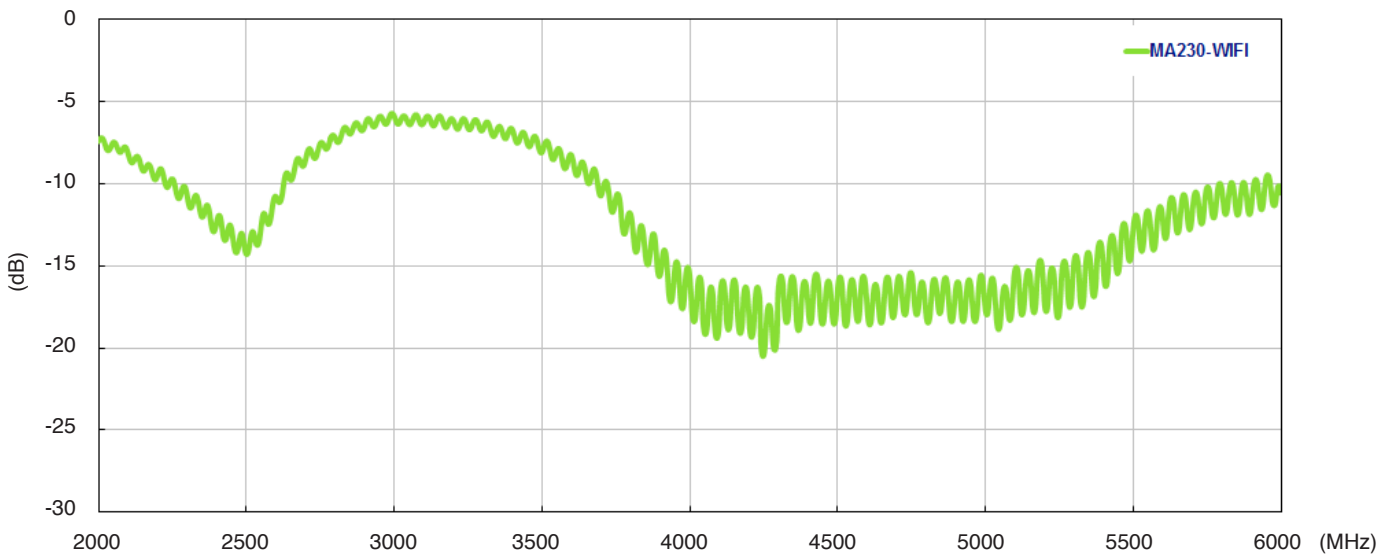


YZ-Plane

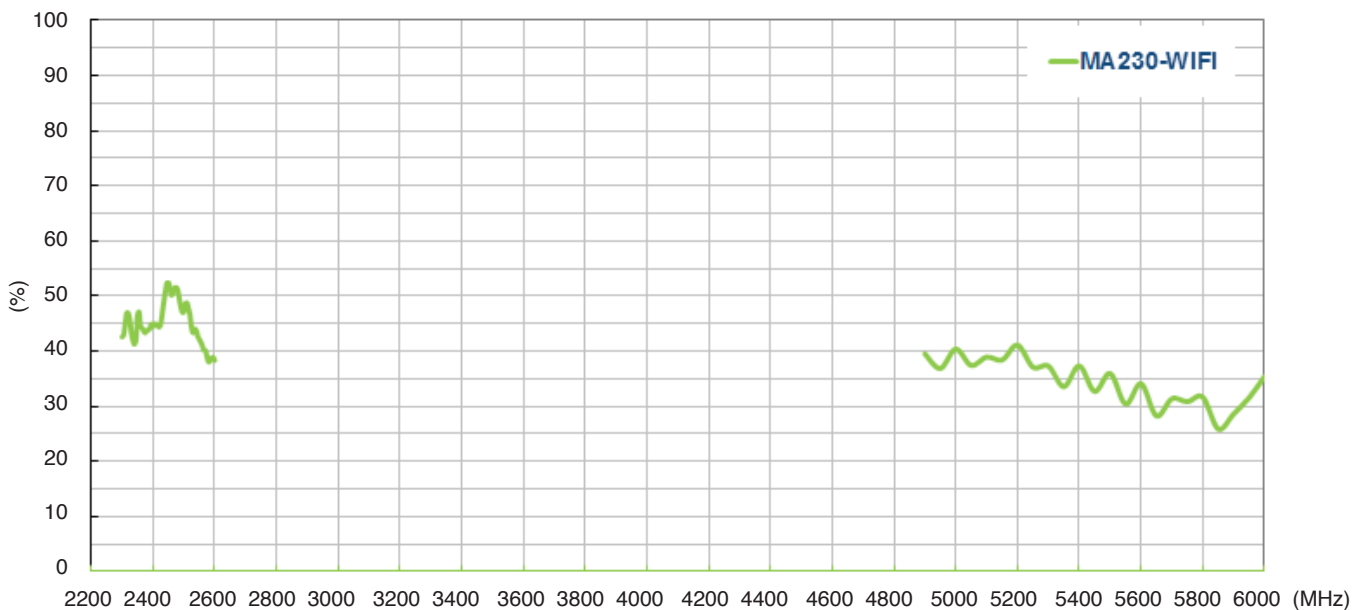


5. Wi-Fi 2.4 / 5.0 GHz antenna

5.1 Return Loss

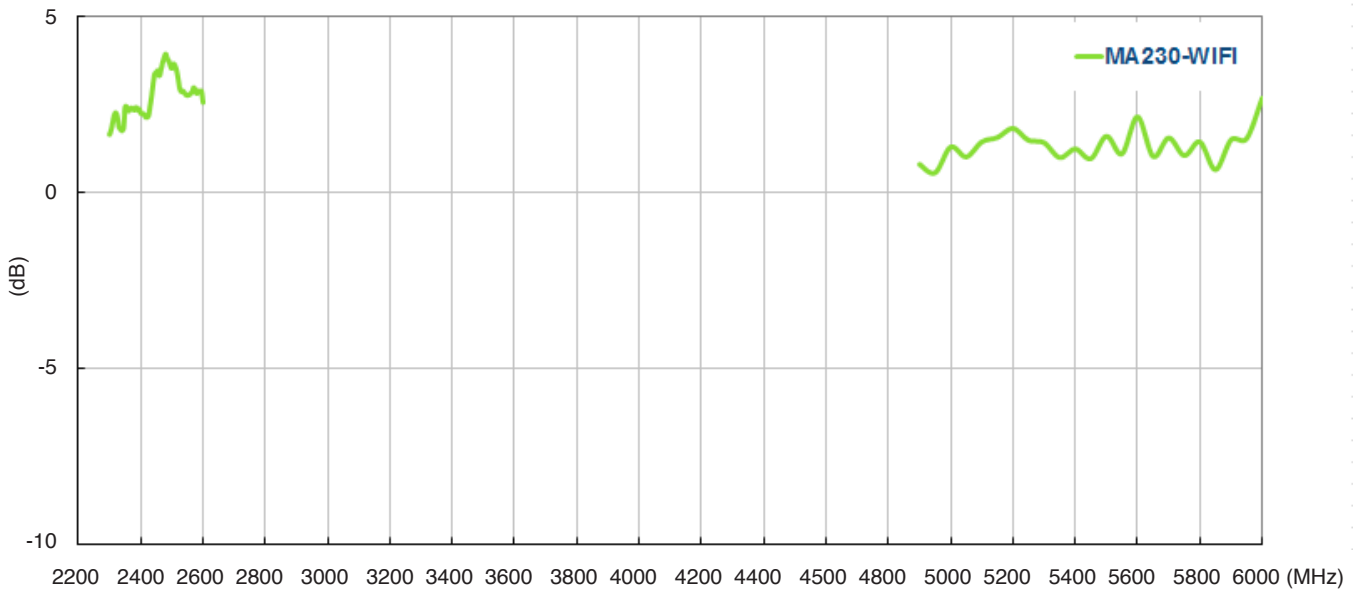


5.2 Efficiency

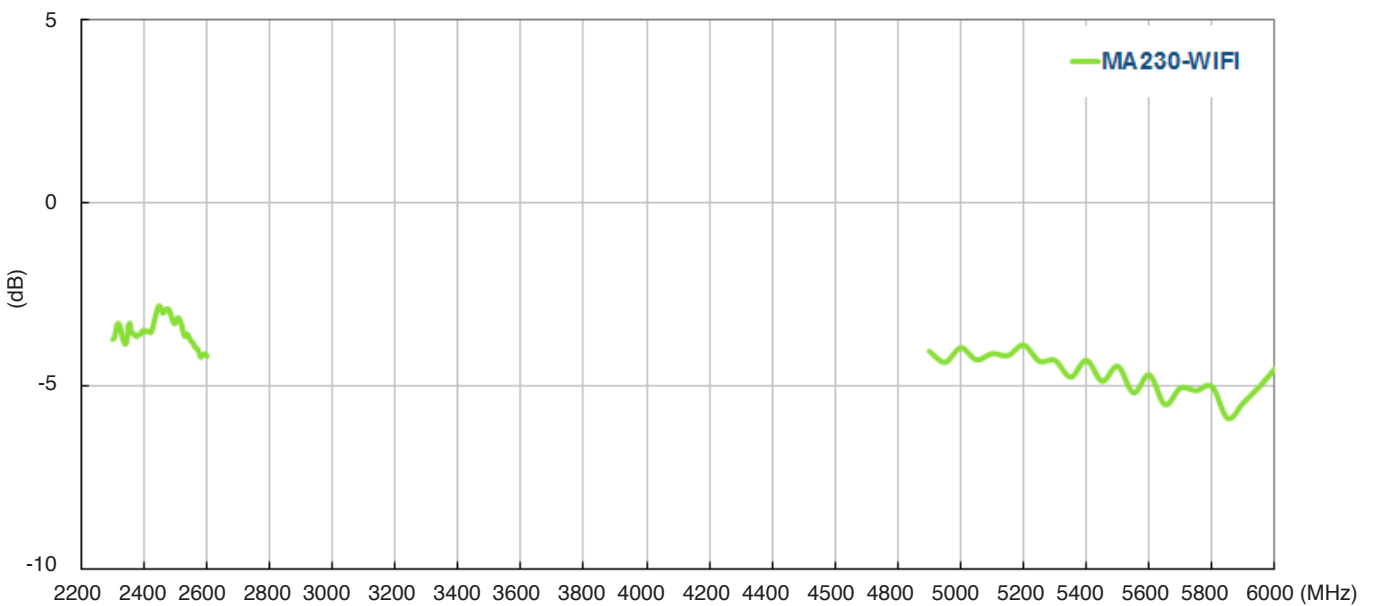


5. Wi-Fi 2.4 / 5.0 GHz antenna

5.3 Peak Gain 1.5dBi tpe.@ 2450MHz
 2. 0dBi tpe.@2 450MHz

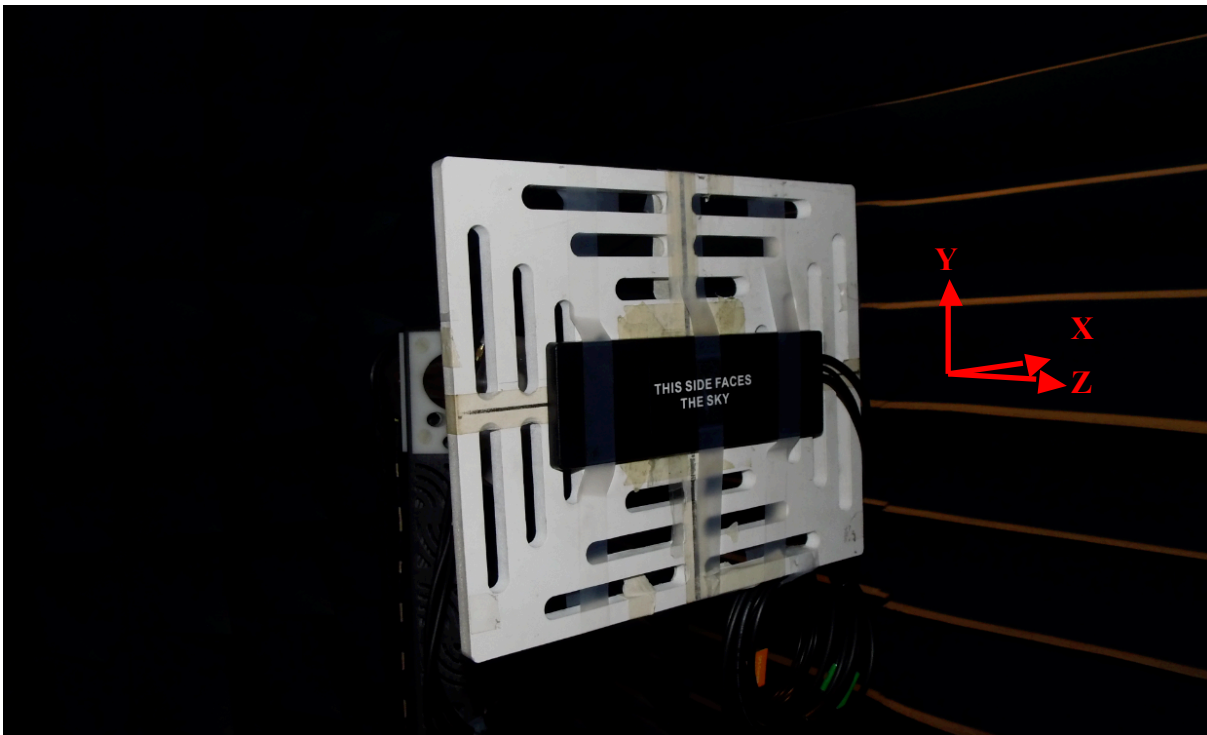


5.4 Average Gain

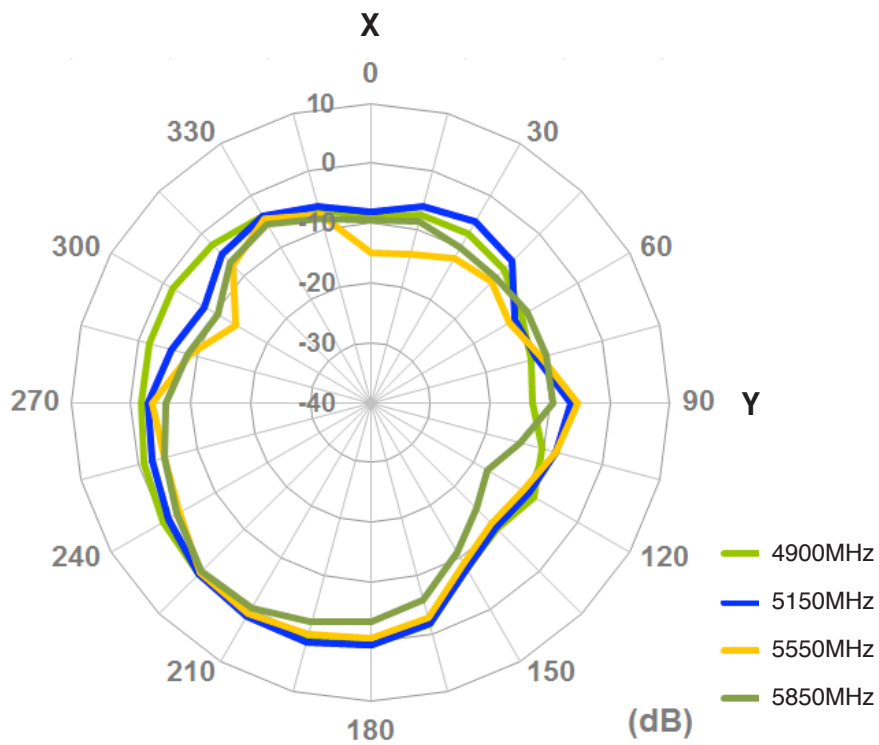
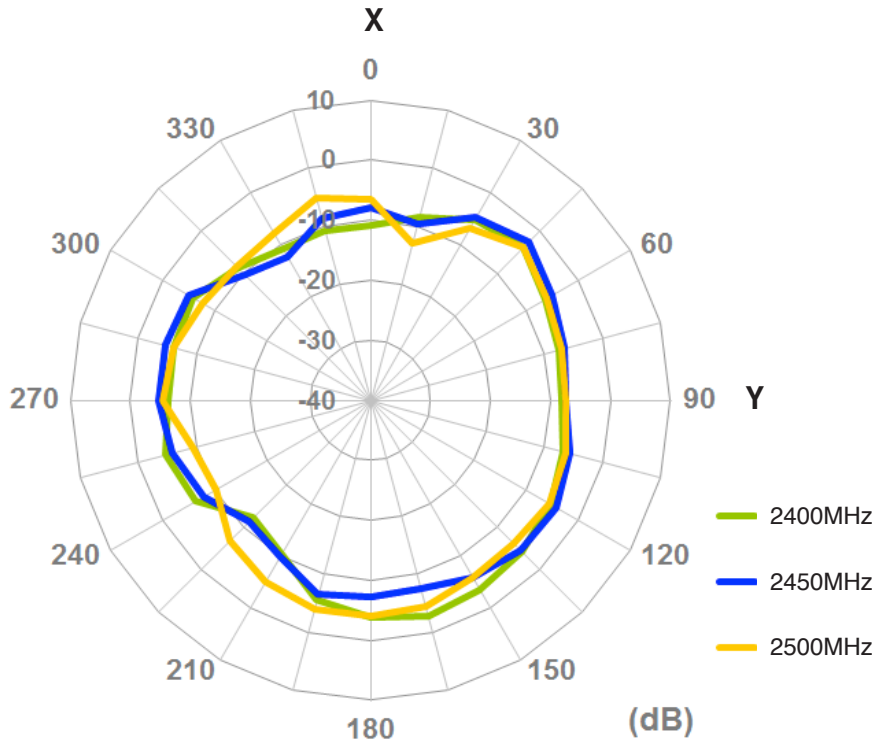


5.5 Radiation Patterns

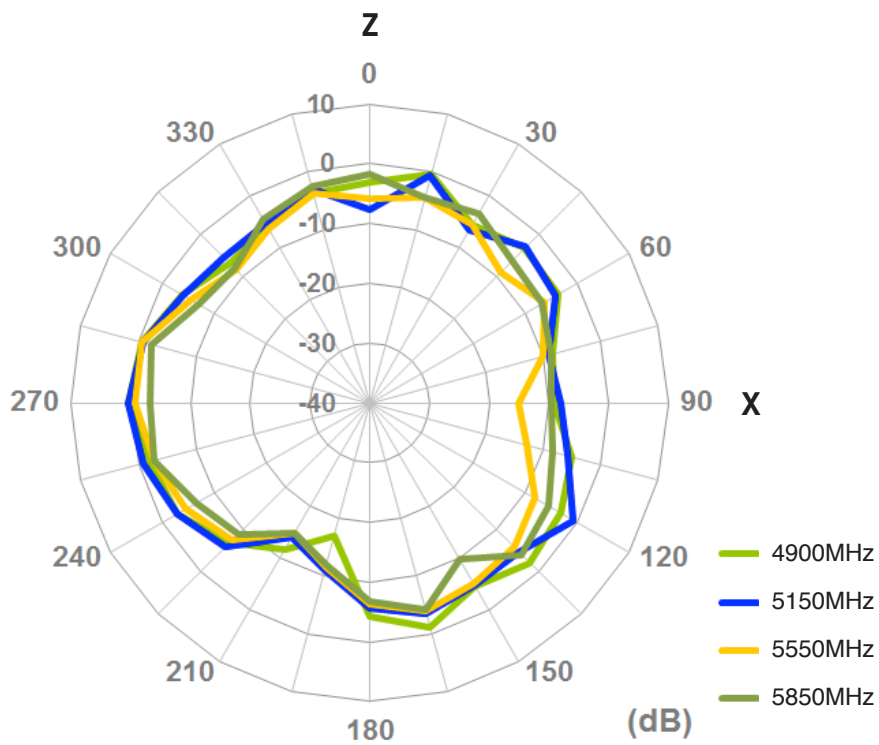
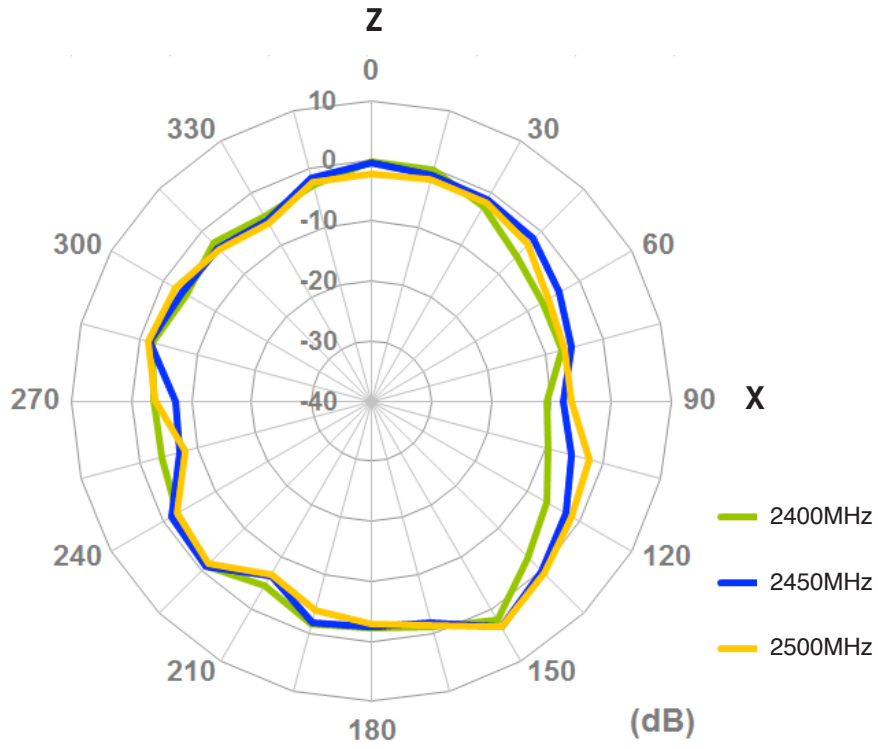
Measurement setup



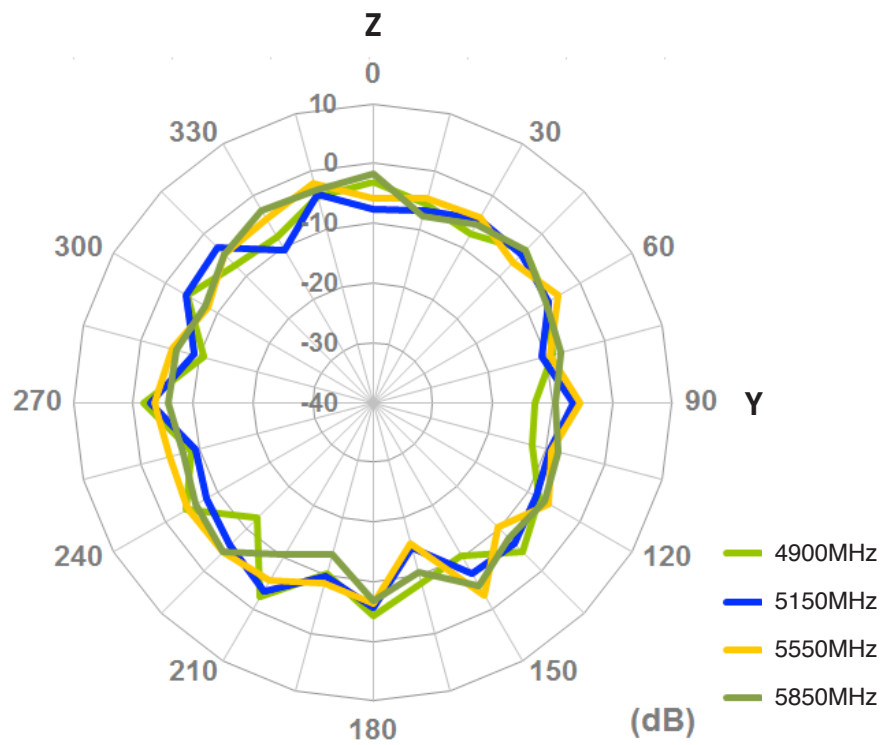
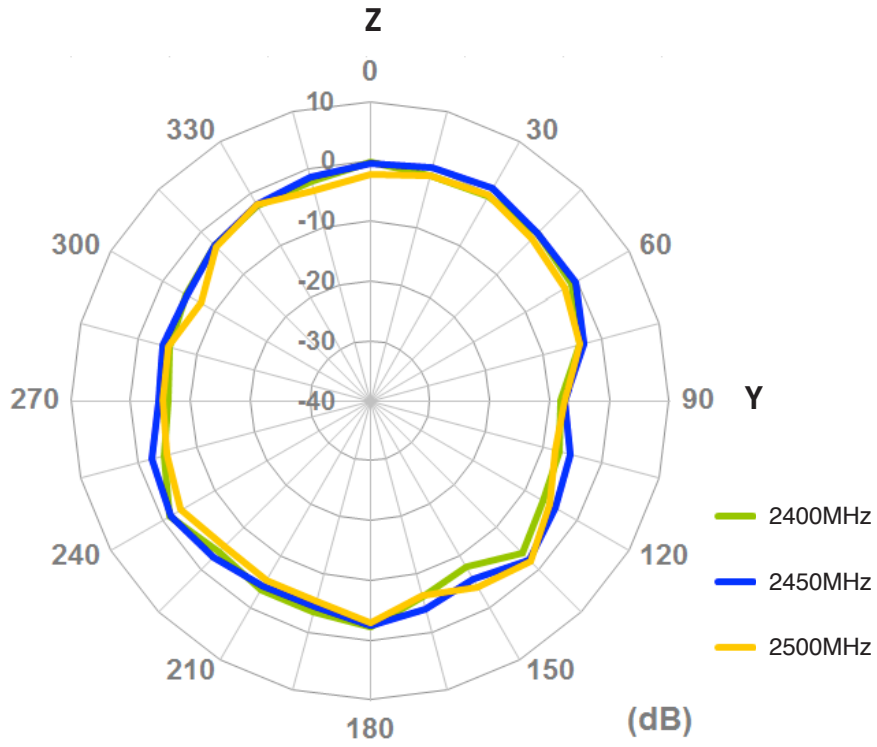
XY-Plane



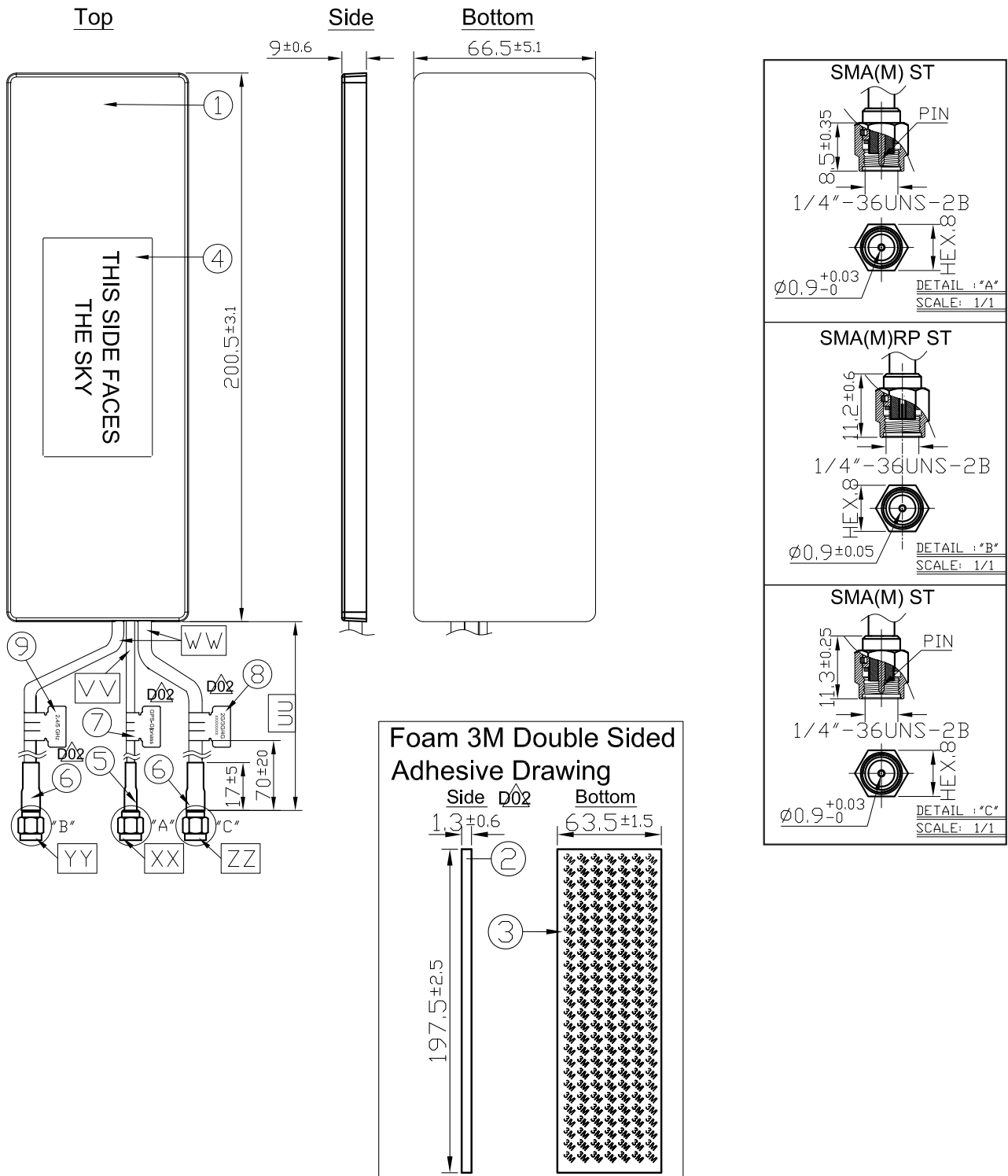
XZ-Plane



YZ-Plane



8. Drawing



8. Drawing

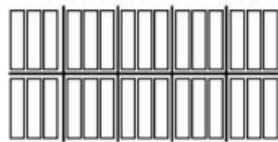
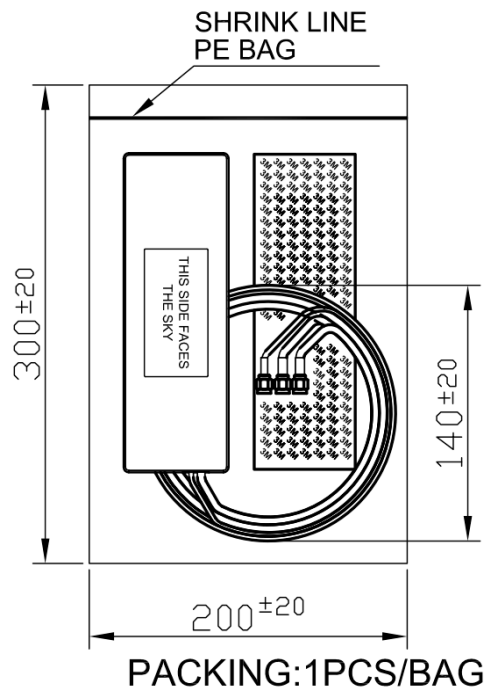
	Name	Material	Finish	QTY
1	Housing	ABS	Black	1
2	Closed Cell Foam	F100	Black	1
3	3M Double Adhesive	3M 9448 B	White Linear	1
4	Clear Label	PET	Transparent	1
5	Heat Shrink Tube (RG-174)	PE	Black	1
6	Heat Shrink Tube (CFD-200)	PE	Black	2
7	GPS-Glonass Label (48*30)	Coated Paper	Orange	1
8	2G/3G/4G Label (48*30)	Coated Paper	White	1
9	2.4GHz / 5GHz Label (48*30)	Coated Paper	Green	1

	Name	Spec	Finish	QTY
UU	Cable Length	3000±120mm		3
VV	Cable Type	RG-174	Black	1
WW	Cable Type	CFD-200	Black	2
XX	Connector Type	SMA(M) ST	Gold	1
YY	Connector Type	SMA(M)RP ST	Gold	1
ZZ	Connector Type	SMA(M) ST	Gold	1

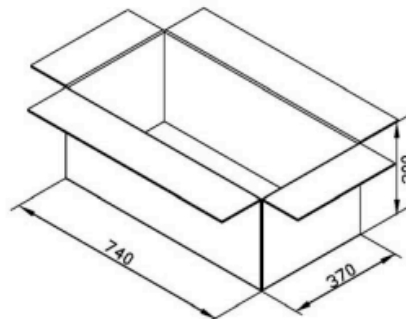
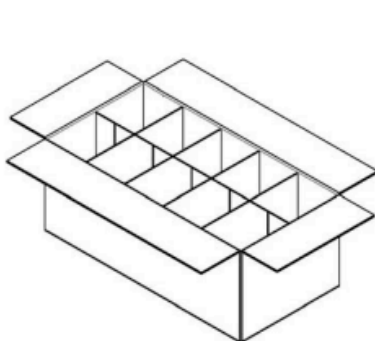
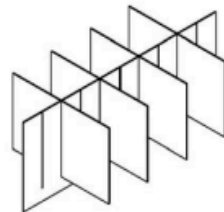
9. Packaging

1 pcs antenna and 1 3M double side adhesive per small PE bag

30 pcs antennas in one box



30 pcs antennas
in one box



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