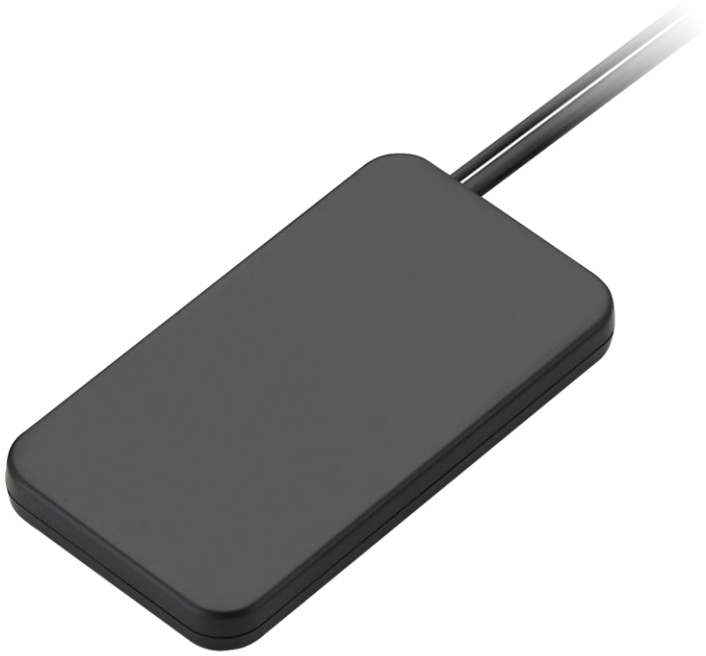
Specification

Part No.	:	**FMA253.A.LF.001**
Product Name	:	Sentinel Adhesive Mount 2in1 GNSS & FirstNet Antenna
Feature	:	Ideal for IoT and Automotive Applications 1*FirstNet(Band 14) Antenna 1*GPS-GLONASS-GALILEO-BeiDou Active Antenna IP67 Waterproof High Efficiency Low Profile Housing – Only 14mm in Height 2M CFD-200 and RG-174 Cables SMA(M) Connectors Dims: 139*76*14mm **RoHS Compliant**



1. Introduction

The Sentinel Scout FMA253 2in1 FirstNet and GPS/GLONASS/GALILEO/BeiDou L1 Antenna is an omnidirectional, fully IP67 waterproof external M2M antenna for use in telematics, transportation and remote monitoring applications worldwide. It is designed to be mounted directly on glass or plastic in the interior of vehicles.

It is the smallest high performance solution in the market, 50% smaller than the previous generation, with higher efficiency and wider bandwidth to cover emerging LTE bands. Its performance is comparable with much larger permanent roof mount antennas and now offers a convenient and economical alternative in-cabin mounting solution.

Typical applications include;

HD video over LTE
First Responder and Emergency Services
Automotive vehicle tracking
Telematics

FirstNet also known as Band 14 or PS-LTE (Public Service LTE) is a dedicated communications tool for First Responders in the US. It is an isolated network for providing faster critical information and data-sharing between blue light service providers and their agencies. New FirstNet devices are being deployed to allow for the multitude of services and applications which will be using the network for the following mission critical applications:

- Computer-aided dispatch (vehicle location)
- EMS Electronic Patient Care Reporting
- Vehicle Mounted RMS/ Citations/ Scanners
- Video Streaming

It is mounted via high quality, first tier automotive approved, 3M adhesive.

In-house world leading dielectric ceramic antenna technology inside allows for smaller size antennas without loss in efficiency. It delivers powerful performance for the FirstNet band 14 plus GPS-GLONASS-GALILEO-BeiDou for next generation location accuracy.

4G wireless applications demand high speed data uplink and downlink. High efficiency is necessary to achieve the required signal to noise ratio and throughput required to solve these challenges. Taoglas also takes care to have high isolation between the two MIMO antennas to prevent self-interference. Low loss cables are used to keep efficiency high over long cable lengths.

The IP67 waterproof housing measures just 139*76*14mm with 3M foam adhesive. The antenna can be mounted internally or externally on a vehicle. The FirstNet coaxial cable is 2m low loss TGC-200 with SMA(M) connectors. The GPS-GLONASS-GALILEO-BeiDou cable is RG-174 with SMA(M) connector.

Customized cable and connector versions are also available. Contact your regional Taoglas sales office for support.

2. Specification Table

4G/3G/2G Antenna											
Frequency (MHz)		LTE700	LTE800	GSM850	GSM900	DCS	PCS	UMTS1	LTE2300	LTE2600	LTE3500
		698~803	703~803	824~894	880~960	1710~1880	1850~1990	1920~2170	2305~2360	2490~2690	3400~3600
Efficiency (%)											
In free space	30cm	41.77		58.99	60.75	66.44	76.05	66.91		56.87	
	1M	39.89		56.33	58.01	60.59	69.53	61.59		51.86	
	2M	37.22		52.23	52.91	54.49	61.97	54.72		44.70	
	3M	34.74		48.42	49.06	48.24	54.54	47.85		37.97	
	5M	29.75		40.81	41.20	37.70	42.12	37.06		29.04	
On 2mm ABS base	30cm	41.14		54.04	57.58	66.82	76.00	66.82		55.38	
	1M	39.29		51.61	54.99	60.94	69.48	61.51		50.51	
	2M	36.67		47.83	50.15	54.81	61.93	54.64		43.54	
	3M	34.22		44.34	46.52	48.52	54.49	47.79		36.98	
	5M	29.32		37.37	39.06	37.92	42.08	37.01		28.29	
On glass base	30cm	43.33		55.50	58.33	63.40	63.83	55.87		56.49	
	1M	41.38		53.00	55.71	57.82	58.35	51.42		51.52	
	2M	38.62		49.13	50.81	52.03	52.01	45.69		44.42	
	3M	36.04		45.54	47.12	46.04	45.77	39.95		37.74	
	5M	30.91		38.38	39.57	36.00	35.35	30.95		28.86	
Average Gain (dBi)											
In free space	30cm	-3.87		-2.29	-2.17	-1.81	-1.19	-1.81		-2.48	
	1M	-4.07		-2.49	-2.37	-2.21	-1.58	-2.17		-2.88	
	2M	-4.37		-2.82	-2.77	-2.66	-2.08	-2.68		-3.53	
	3M	-4.67		-3.15	-3.10	-3.20	-2.63	-3.27		-4.23	
	5M	-5.34		-3.89	-3.85	-4.26	-3.76	-4.37		-5.40	
On 2mm ABS base	30cm	-3.89		-2.68	-2.41	-1.78	-1.19	-1.83		-2.60	
	1M	-4.09		-2.88	-2.61	-2.18	-1.58	-2.18		-3.00	
	2M	-4.39		-3.21	-3.01	-2.64	-2.08	-2.70		-3.64	
	3M	-4.69		-3.54	-3.33	-3.17	-2.64	-3.28		-4.35	
	5M	-5.36		-4.28	-4.09	-4.24	-3.76	-4.39		-5.51	
On glass base	30cm	-3.65		-2.56	-2.34	-1.99	-1.95	-2.60		-2.50	
	1M	-3.85		-2.76	-2.54	-2.39	-2.34	-2.95		-2.90	

	2M	-4.15		-3.09	-2.94	-2.84	-2.84	-3.47		-3.54	
	3M	-4.45		-3.42	-3.27	-3.38	-3.40	-4.05		-4.25	
	5M	-5.12		-4.16	-4.03	-4.44	-4.52	-5.16		-5.41	

4G/3G/2G Antenna											
Frequency (MHz)		LTE700	LTE800	GSM850	GSM900	DCS	PCS	UMTS1	LTE2300	LTE2600	LTE3500
		698 ~803	703 ~803	824 ~894	880 ~960	1710 ~1880	1850 ~1990	1920 ~2170	2305 ~2360	2490 ~2690	3400 ~3600
Peak Gain (dBi)											
In free space	30cm	1.22		1.89	2.73	4.69	4.69	4.27		4.15	
	1M	1.02		1.69	2.53	4.29	4.29	3.87		3.75	
	2M	0.72		1.29	2.13	3.79	3.79	3.37		3.05	
	3M	0.42		0.99	1.73	3.29	3.29	2.87		2.35	
	5M	-0.28		0.19	1.03	2.19	2.19	1.67		1.15	
On 2mm ABS base	30cm	0.76		1.57	1.79	3.68	3.68	3.22		3.24	
	1M	0.56		1.37	1.59	3.28	3.28	2.86		2.84	
	2M	0.26		0.97	1.19	2.78	2.78	2.36		2.14	
	3M	-0.04		0.67	0.89	2.28	2.28	1.82		1.44	
	5M	-0.74		-0.13	0.09	1.18	1.18	0.66		0.24	
On glass base	30cm	1.86		1.94	2.06	3.10	2.90	2.90		3.66	
	1M	1.66		1.74	1.86	2.70	2.50	2.50		3.26	
	2M	1.36		1.44	1.46	2.30	2.00	2.00		2.56	
	3M	1.06		1.14	1.06	1.70	1.40	1.40		1.86	
	5M	0.46		0.34	0.36	0.70	0.30	0.30		0.75	
Impedance		50Ω									
Polarization		Linear									
Return Loss		< -6dB									
Input Power		5W									

GPS-GLONASS-GALILEO-BeiDou	
Center Frequency	BeiDou: 1561.098±2.046MHz GPS/GALILEO: 1575.42±1.023MHz GLONASS: 1602±5MHz
Passive Antenna Efficiency (without cable loss)	BeiDou: 62.2% GPS/GALILEO: 65.86% GLONASS: 75.07%
Passive Antenna Average gain(without cable loss)	BeiDou: -2.03 GPS/GALILEO: -1.81 GLONASS: -1.25
Passive Antenna Peak gain(without cable loss)	BeiDou:1.7 GPS/GALILEO:3.03 GLONASS:4.22
VSWR	< 3:1
Impedance	50Ω
Axial Ratio	BeiDou: 8.97 GPS/GALILEO: 12.48 GLONASS: 20.6
Polarization	RHCP

LNA and Filter Electrical Properties				
Center Frequency	BeiDou: 1561.098±2.046MHz GPS/GALILEO: 1575.42±1.023MHz GLONASS: 1602±5MHz			
Output Impedance	50Ω			
VSWR	< 2:1			
Return Loss	< -10dB			
LNA Gain, Current Draw, and Noise Figure @GPS/GALILEO	Voltage	LNA Gain(Typ)	Current Draw (Typ)	Noise Figure(Typ)
	Min 1.8V	25.34	5mA	2.30
	Typ 3.0V	28.63	10mA	2.69
	Max 5.5V	32.79	23mA	2.98

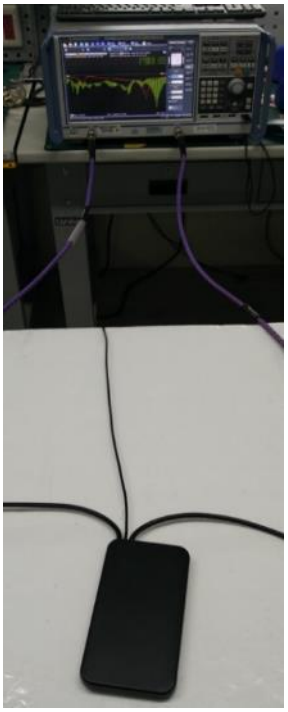
Total specification(Through Antenna, SAW Filter, and LNA)			
Frequency	1561.098±2.046 MHz	1575.42±1.023 MHz	1602±5 MHz
Gain@3V(dB)	28.06	28.63	27.84
Output Impedance	50Ω		

MECHANICAL	
Antenna Dimensions	139.27*76.27*14mm
Housing	ABS
Waterproof	IP67
Connector	SMA(M) ST
Cable type	LTE : CFD-200 GPS/GLONASS/GALILEO/BeiDou : RG-174
Cable length	2000mm
Weight	280g
ENVIRONMENTAL	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

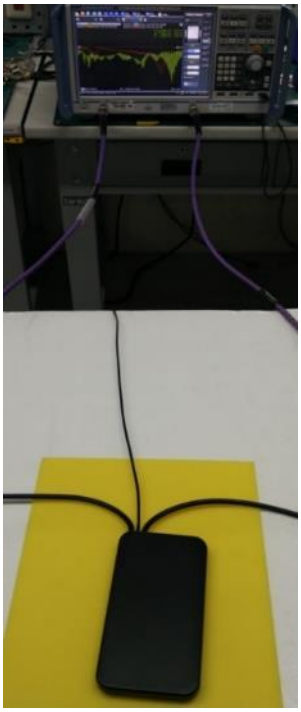
3. Antenna Characteristics

3.1. LTE Characteristics

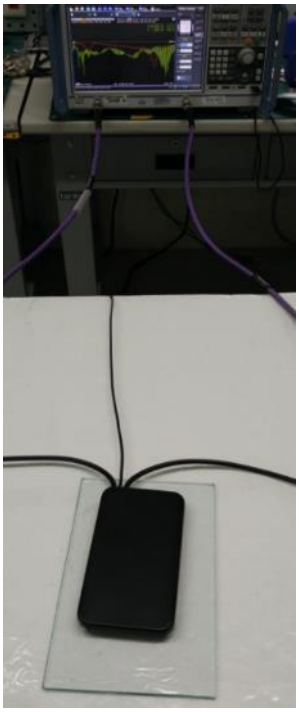
3.1.1. Test Setup



In free space

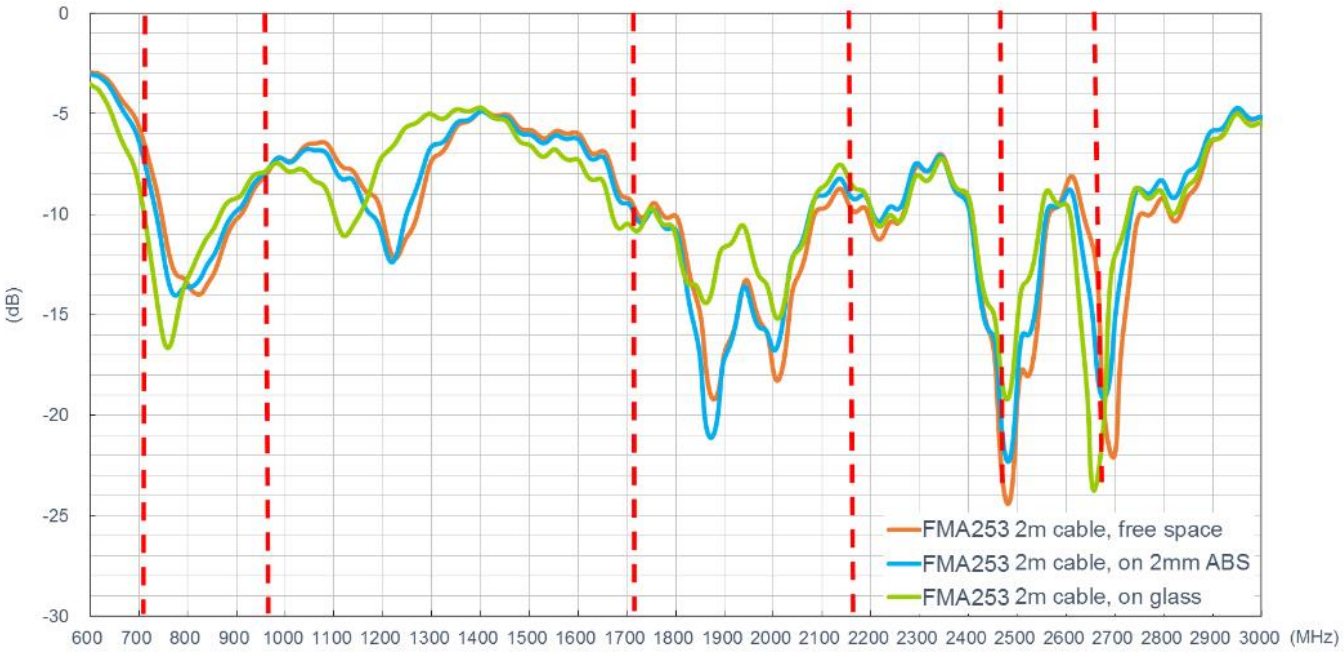


On 2mm ABS

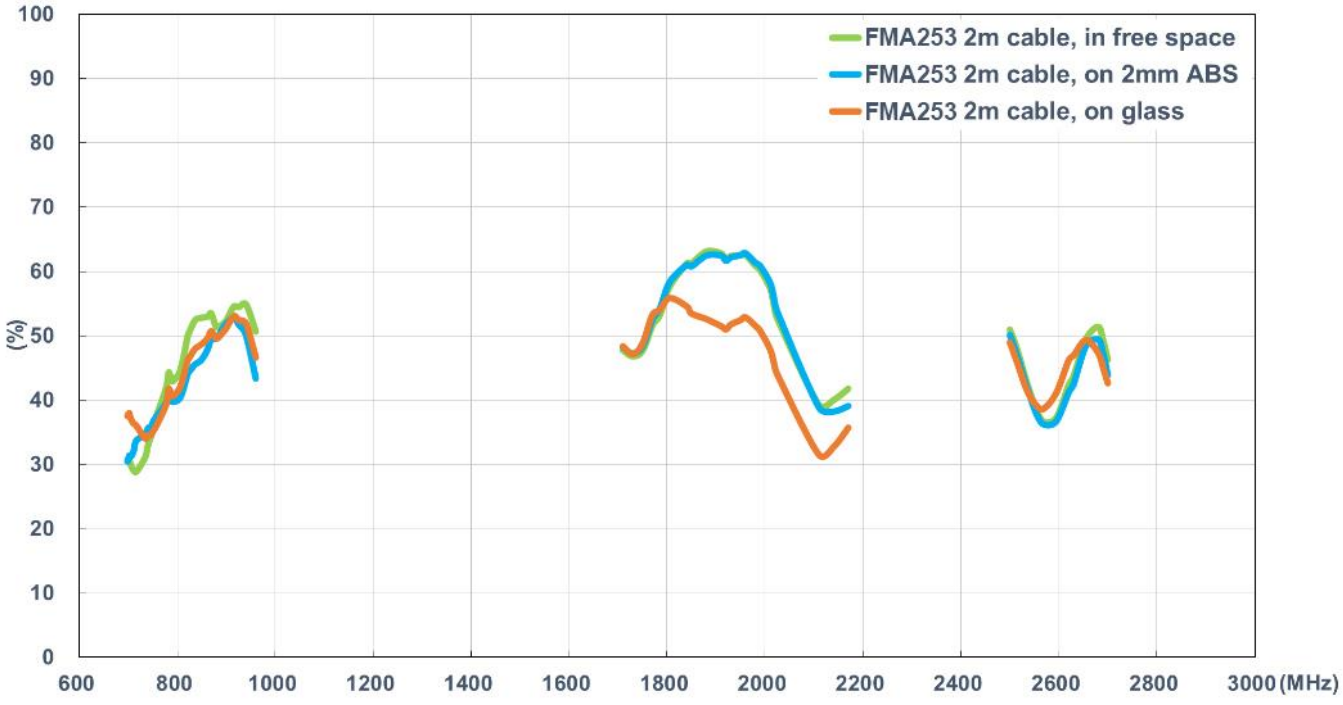


On glass

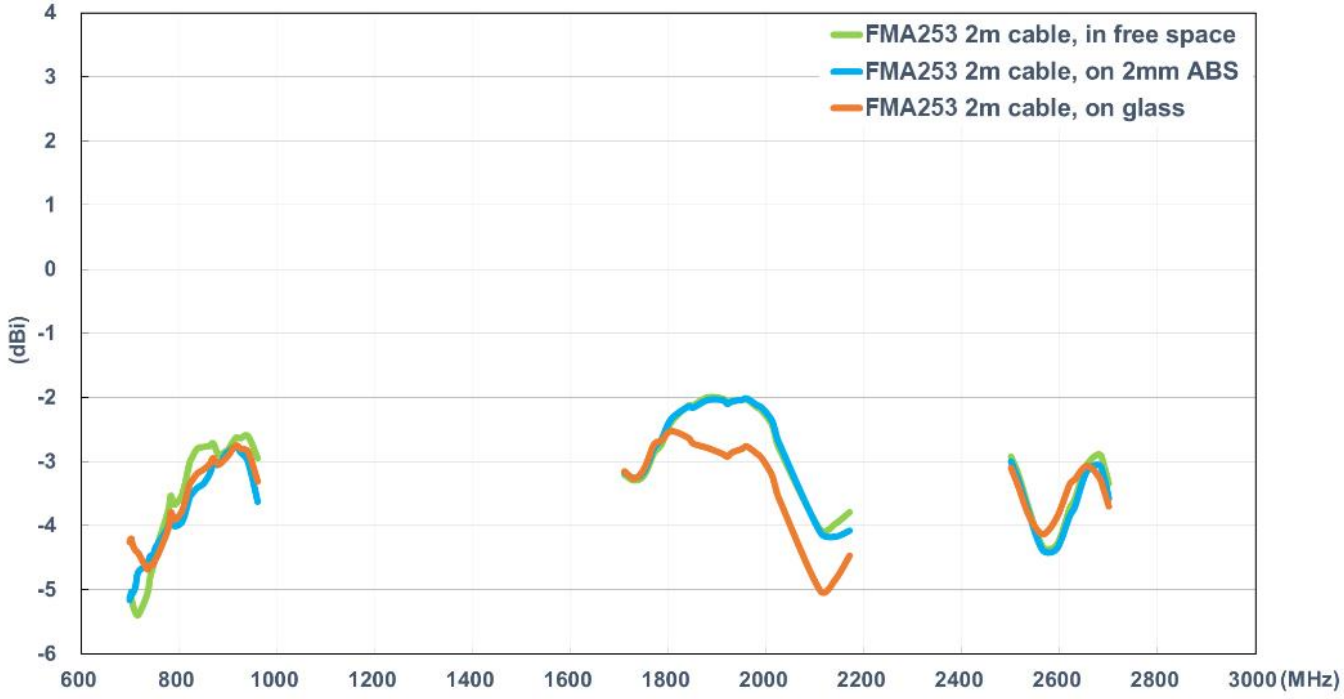
3.1.2. Return Loss



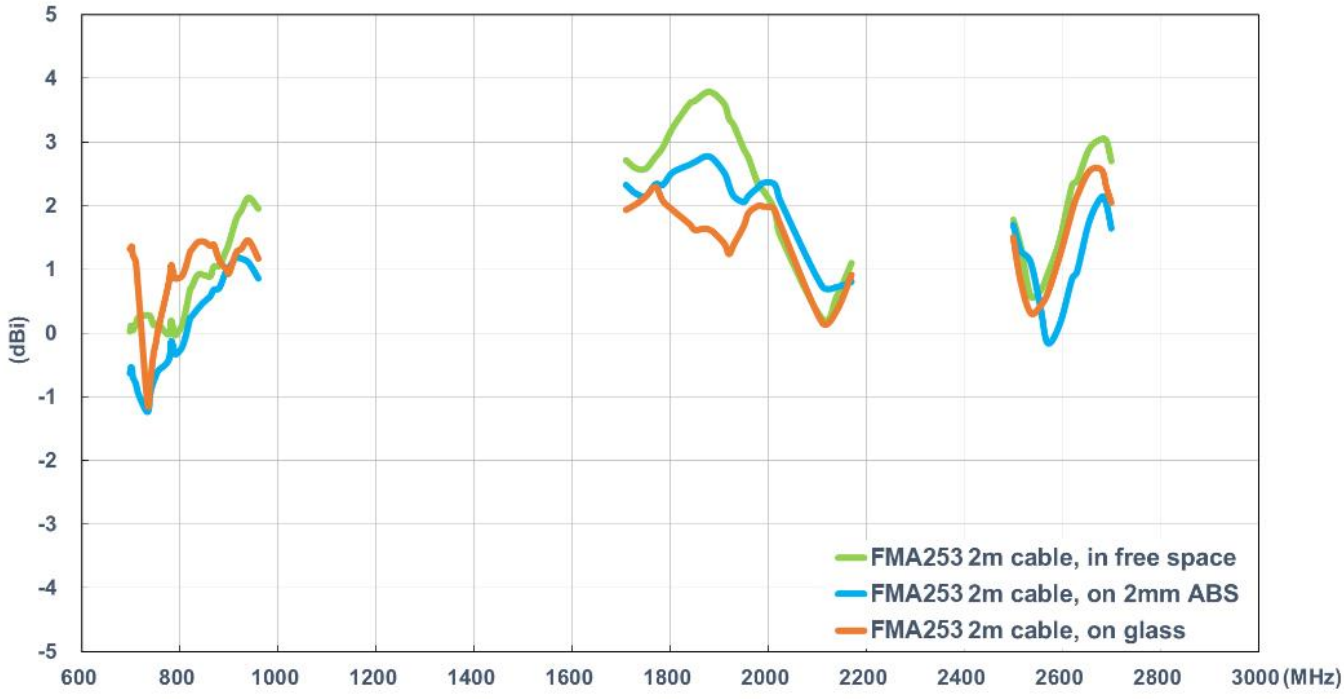
3.1.3. Efficiency



3.1.4. Average Gain

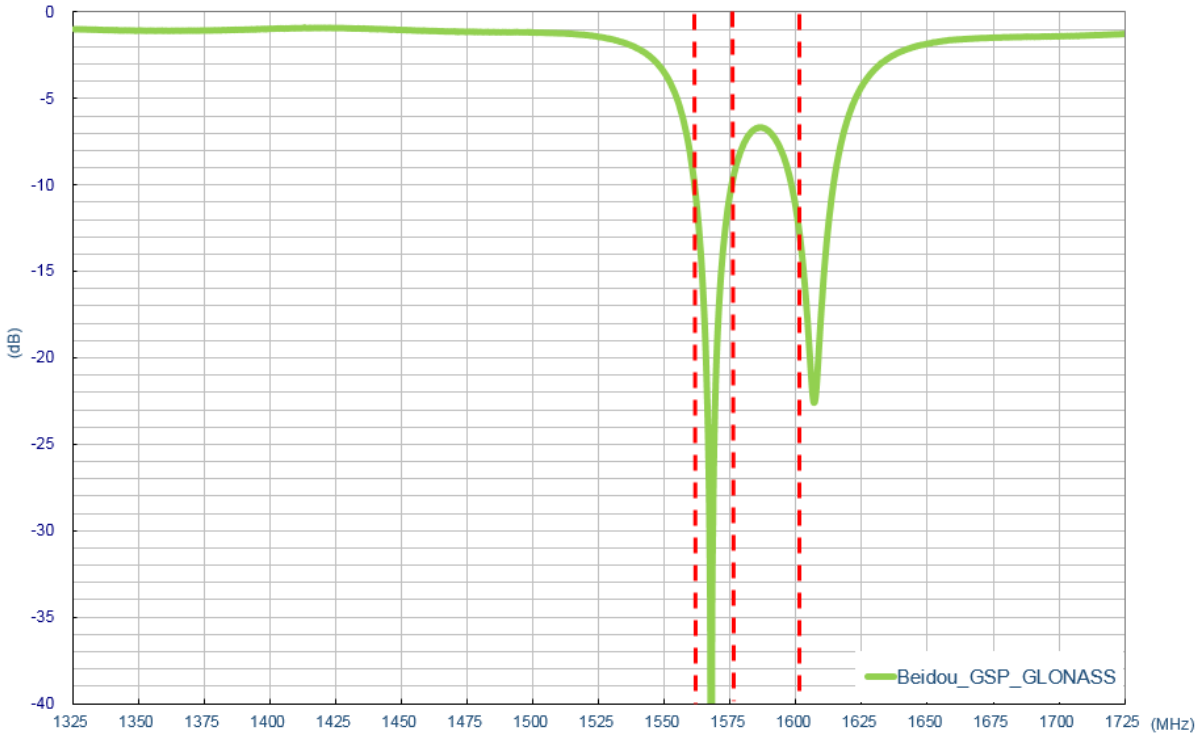


3.1.5. Peak Gain

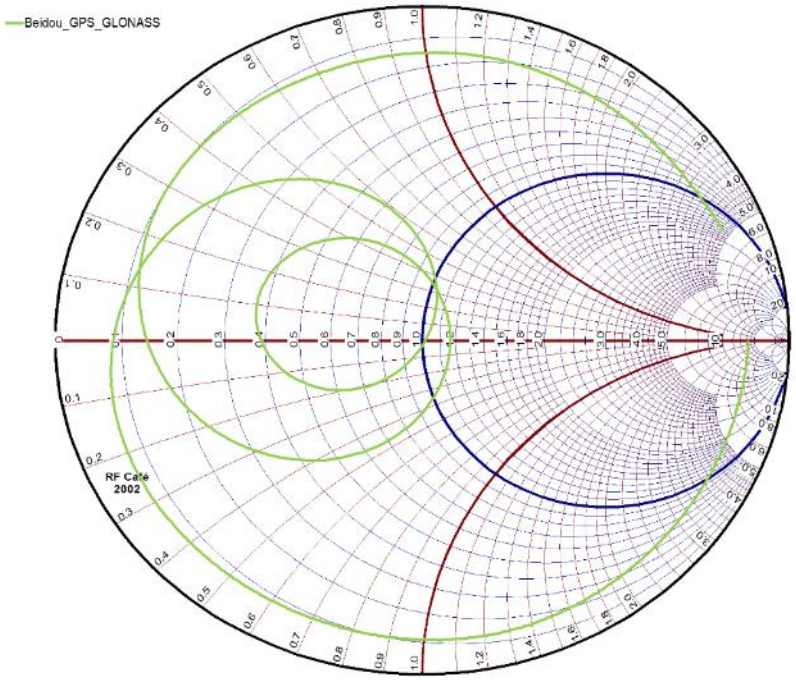


3.2. GPS/GLONASS/BeiDou Characteristics

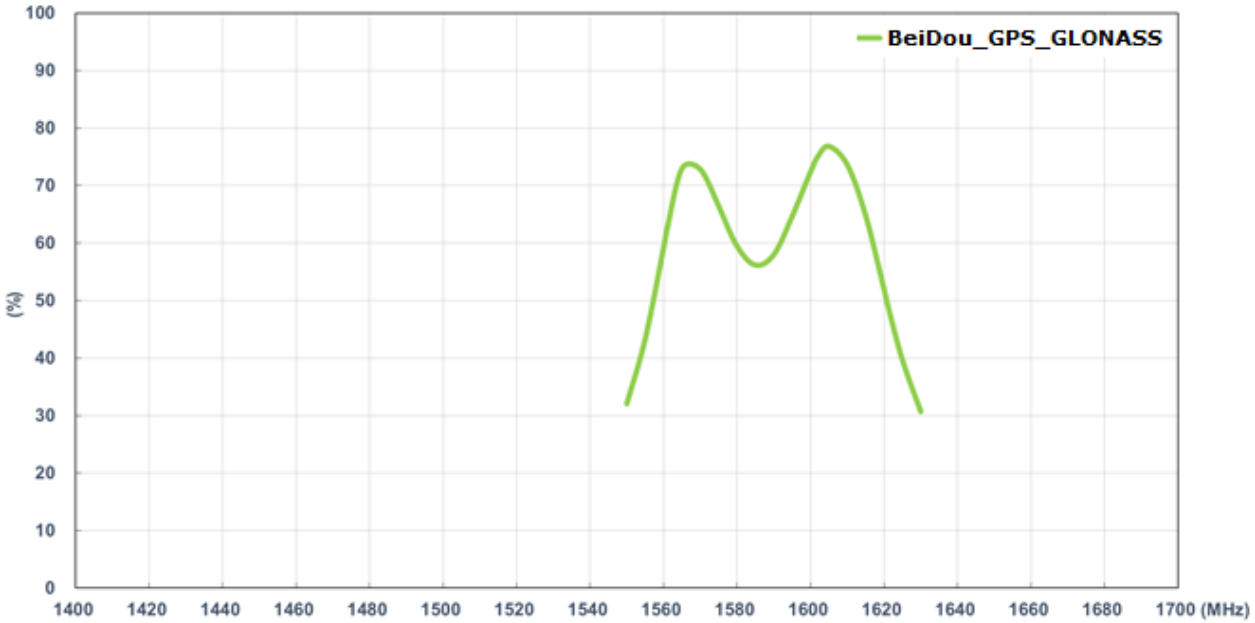
3.2.1. Return Loss



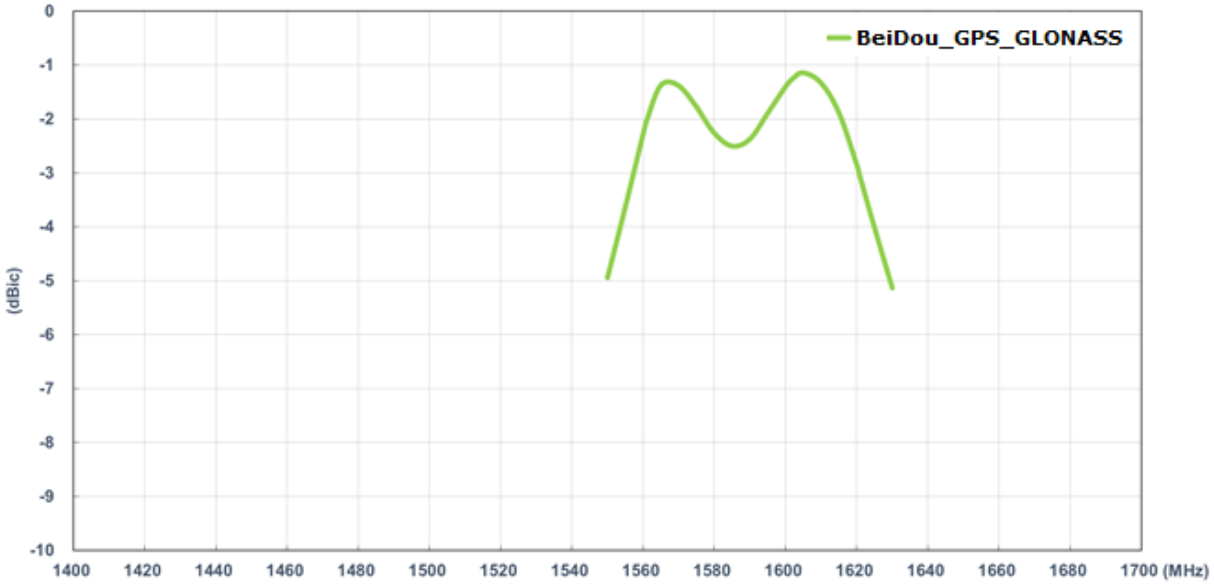
3.2.2. Smith Chart



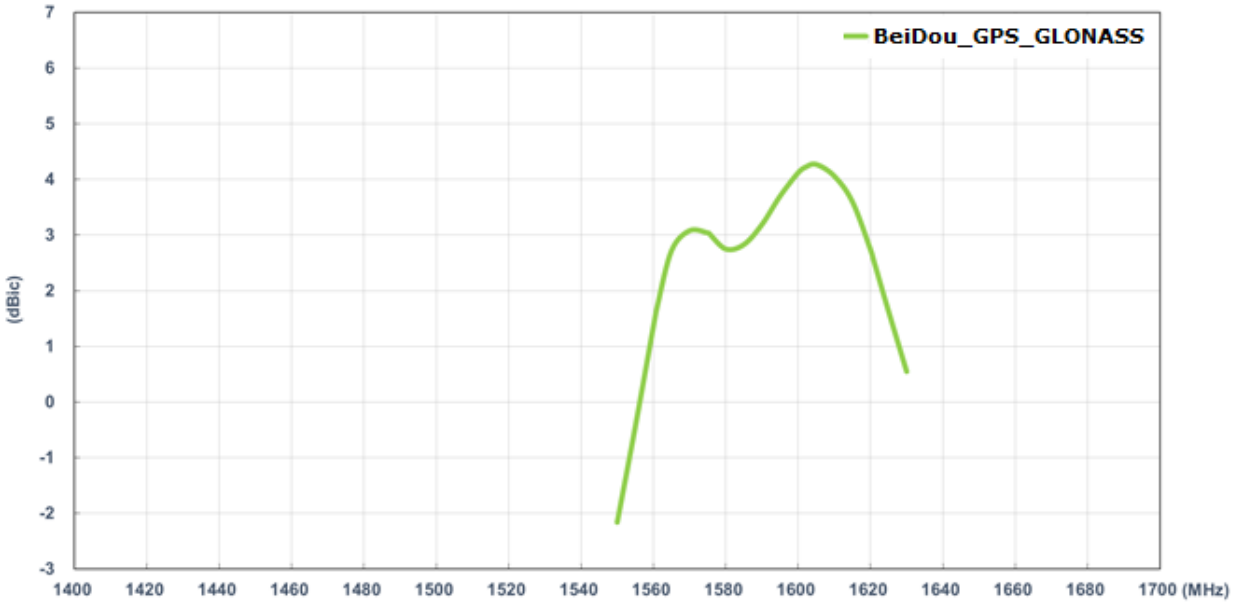
3.2.3. Efficiency



3.2.4. Average Gain

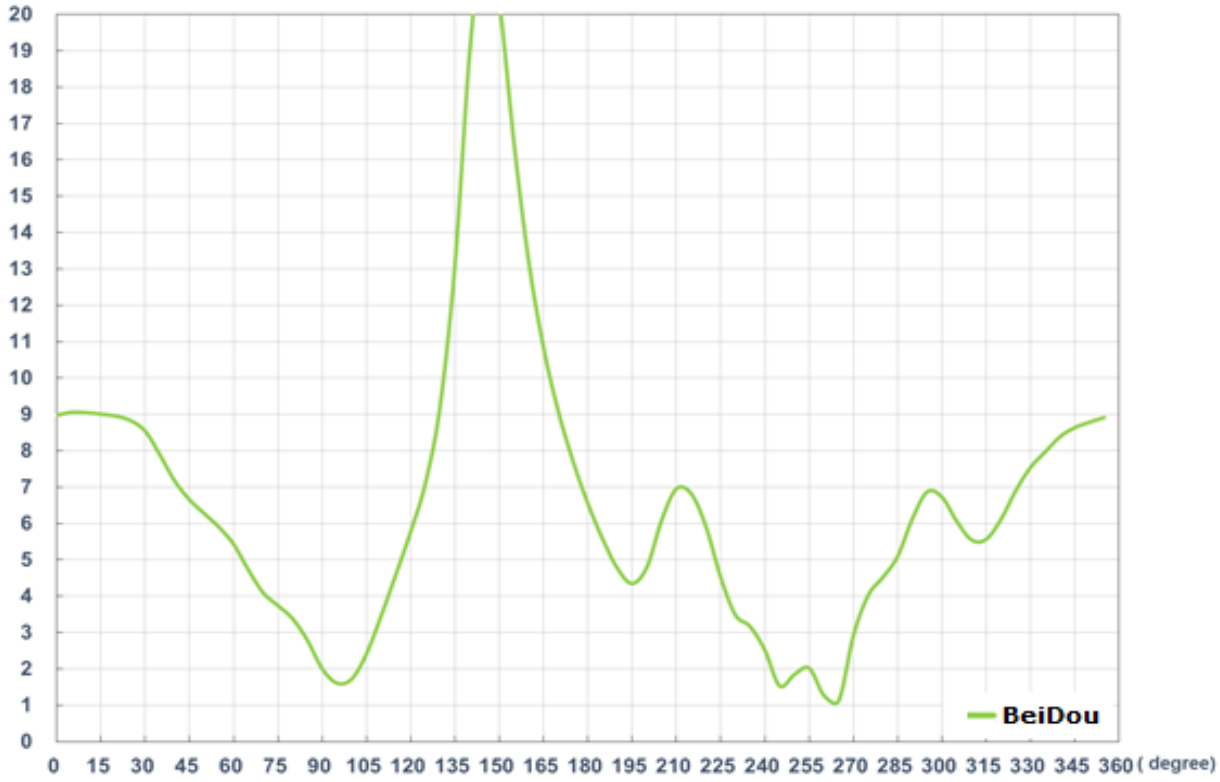


3.2.5. Peak Gain

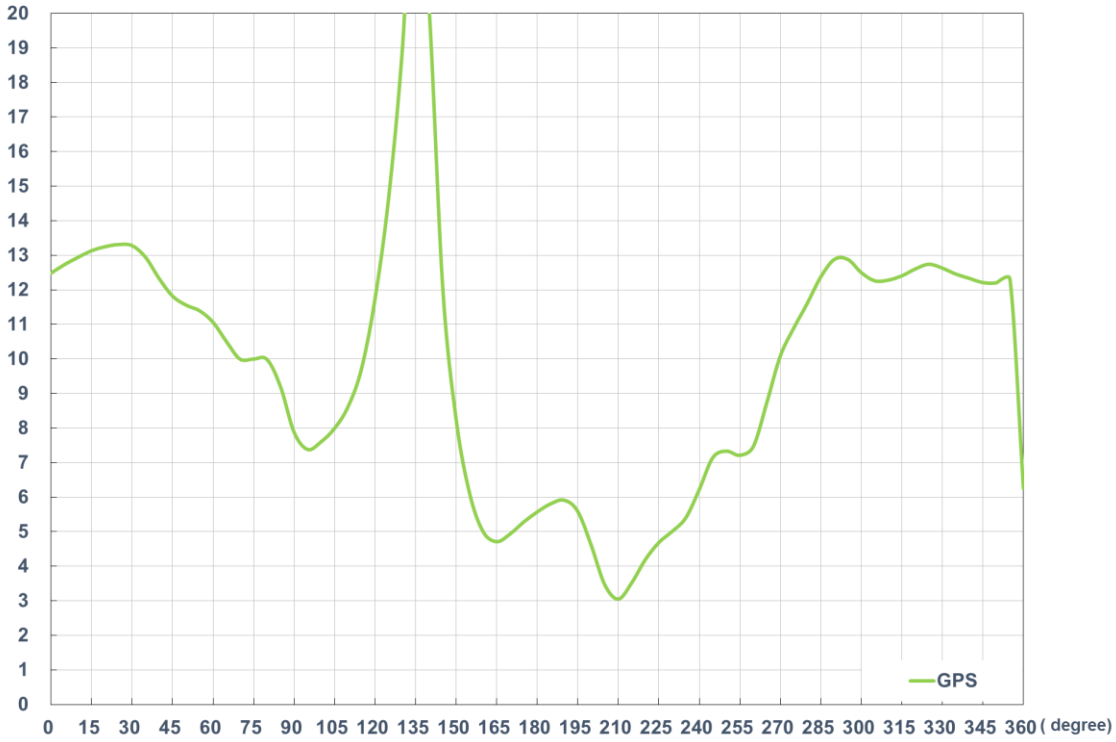


3.2.6. Axial Ratio

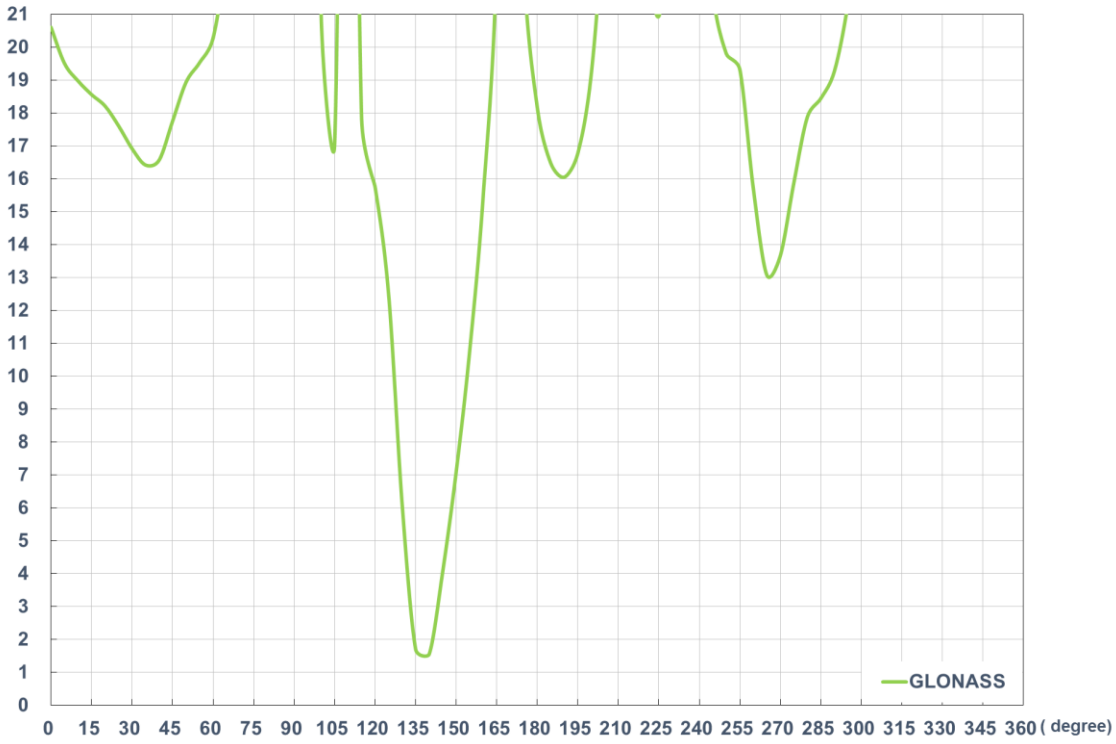
3.2.6.1. BeiDou



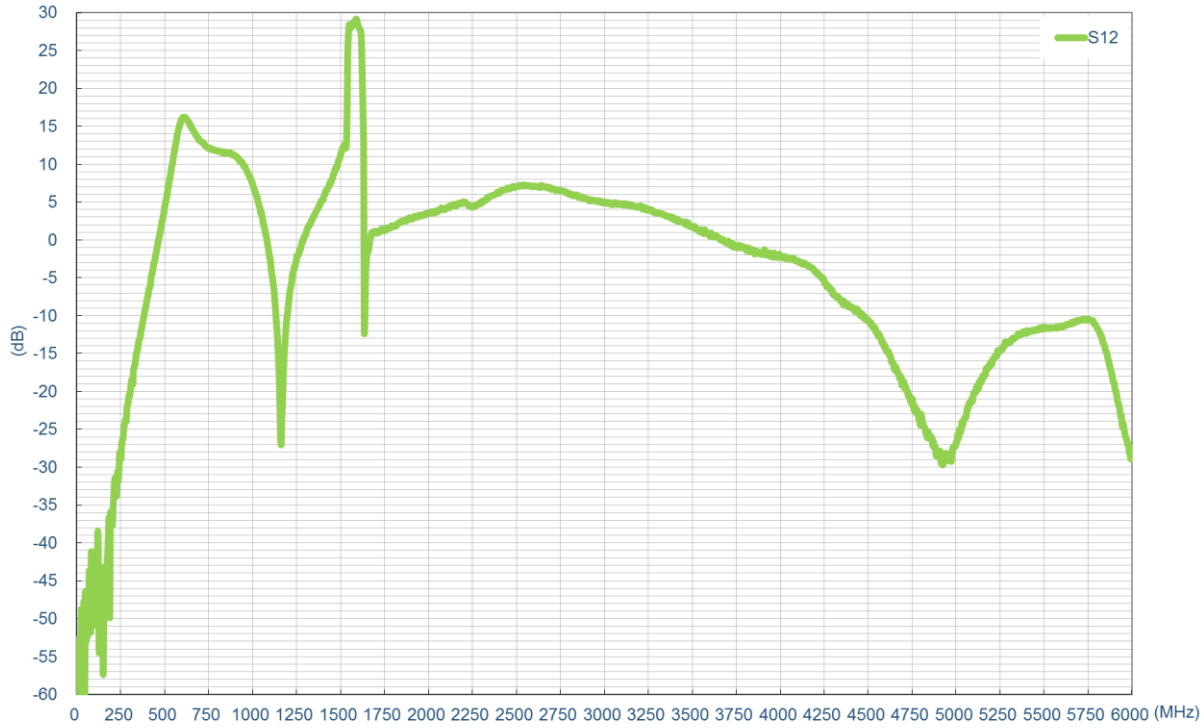
3.2.6.2. GPS/GALILEO



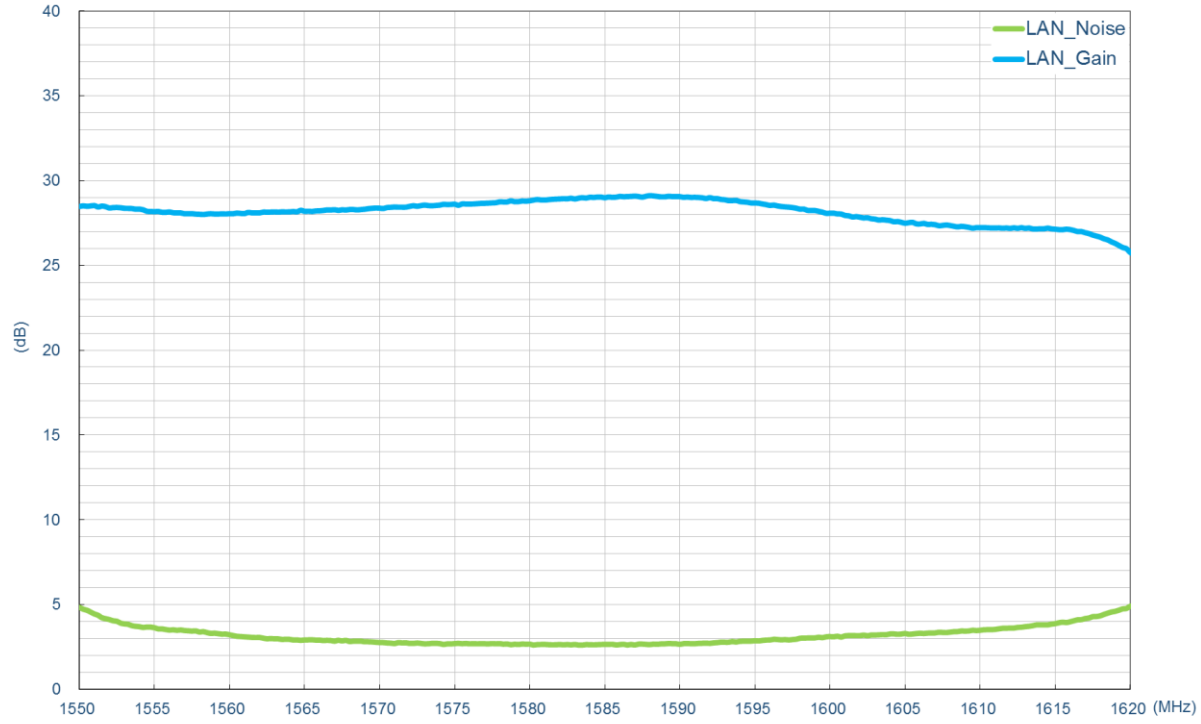
3.2.6.3. GLONASS



3.2.7. LNA Gain and Noise Figure



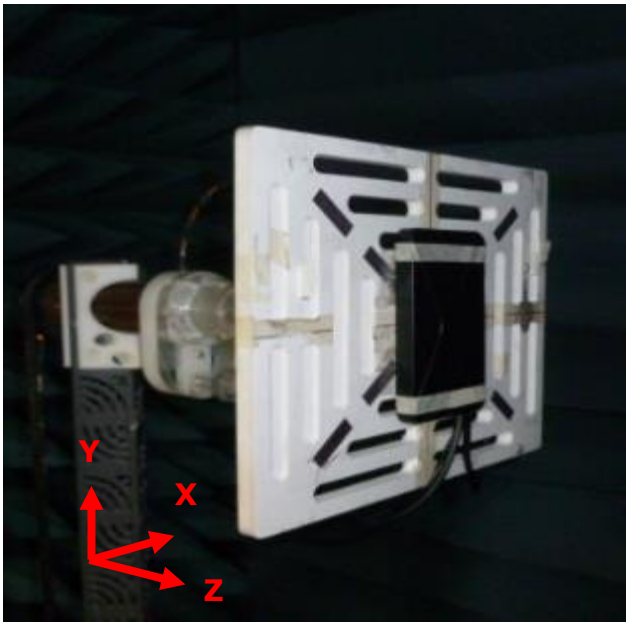
LNA Gain @3.0V



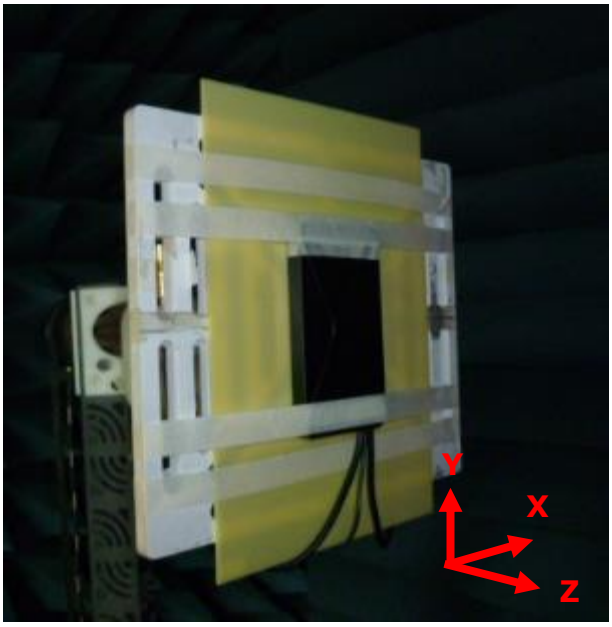
LNA Noise Figure @3.0V

3.3. 2D Radiation Pattern

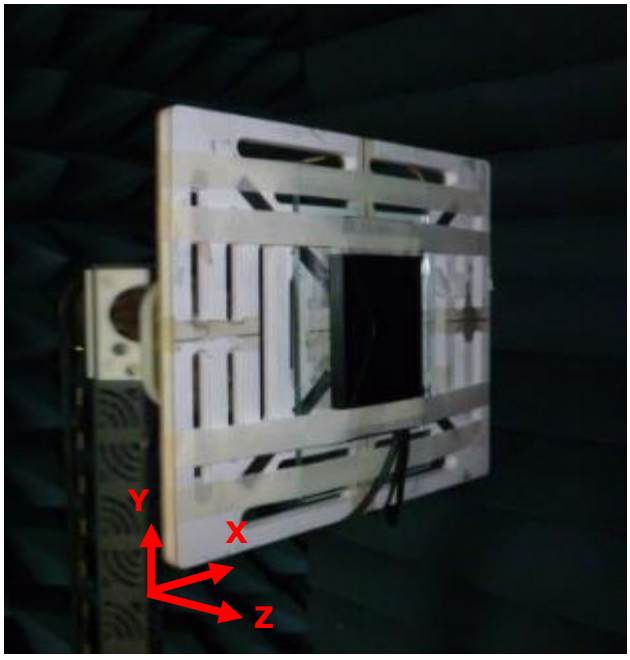
3.3.1. Test Setup



In free space



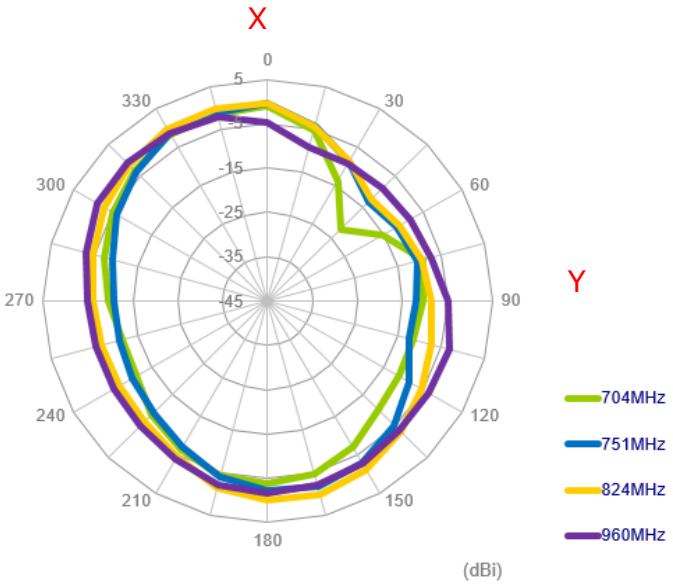
On 2mm ABS

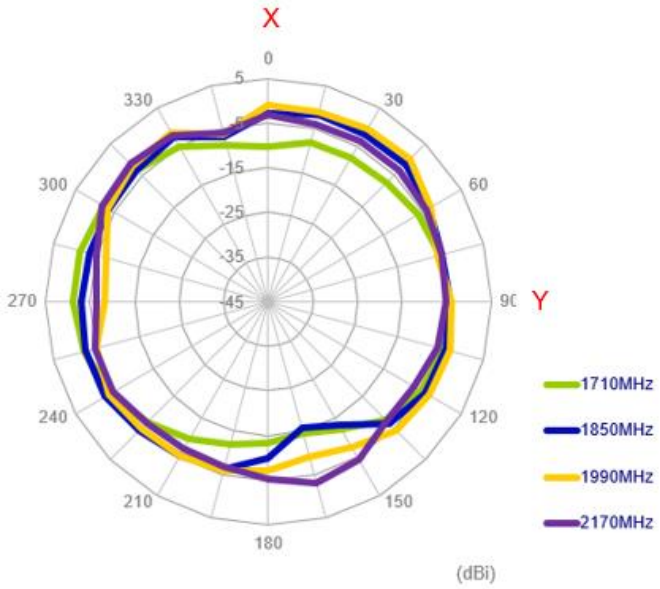


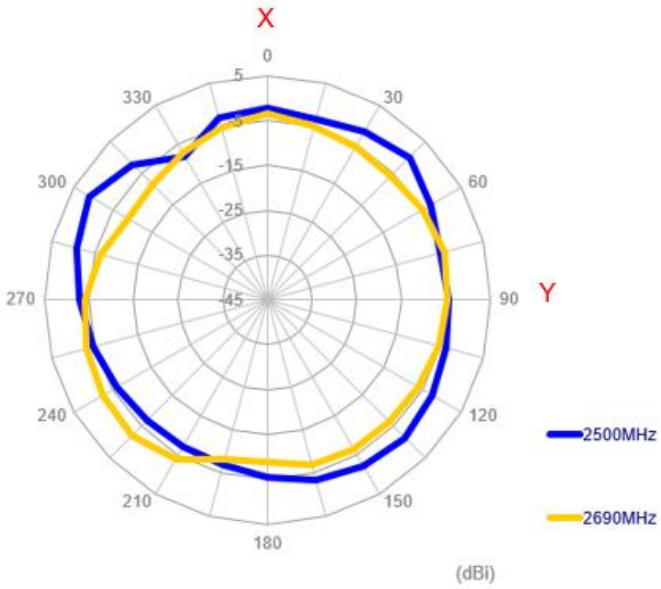
On the glass base

3.3.2. LTE with 2M cable length in free space

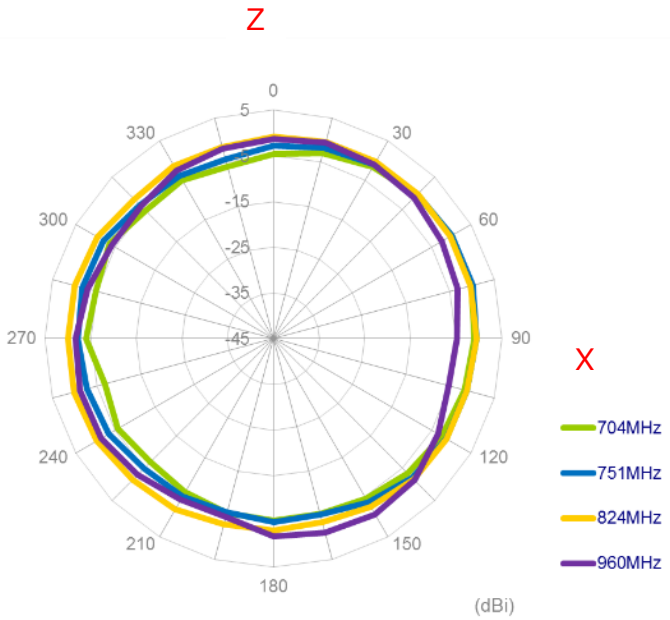
XY Plane

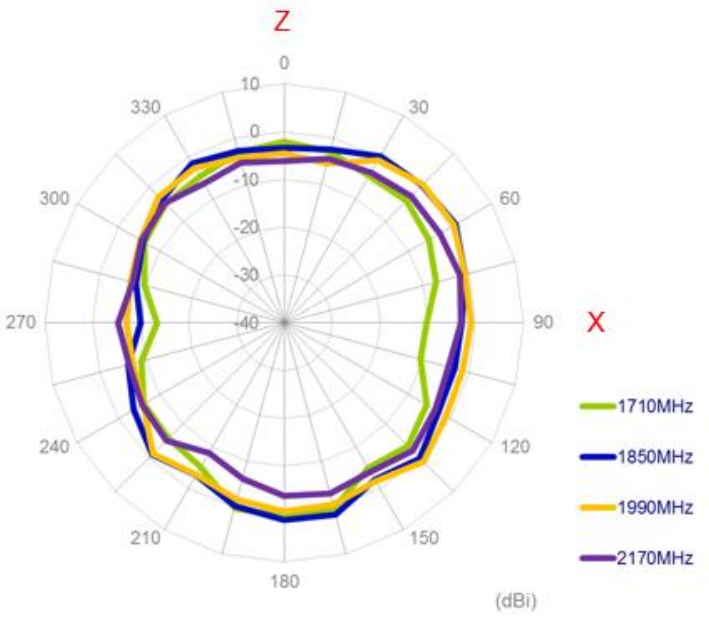


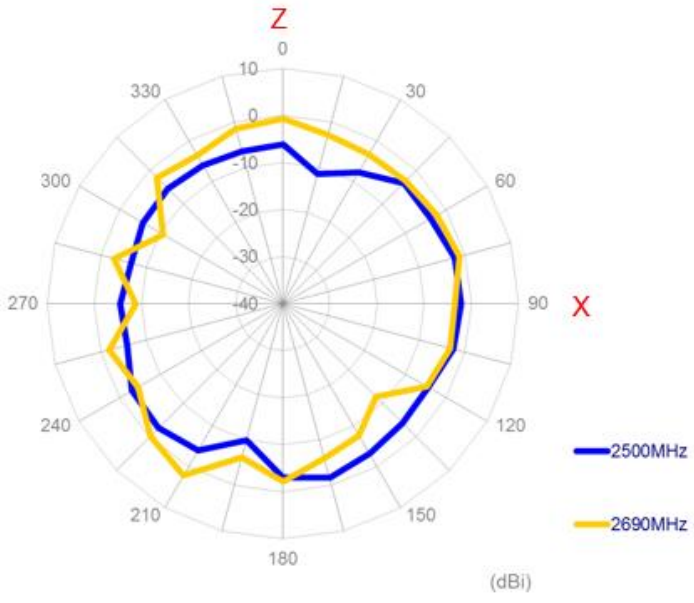




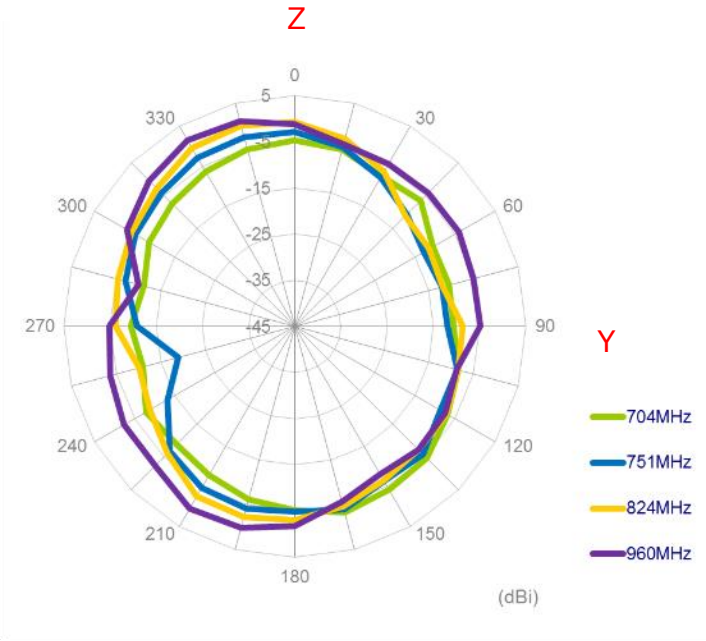
XZ Plane

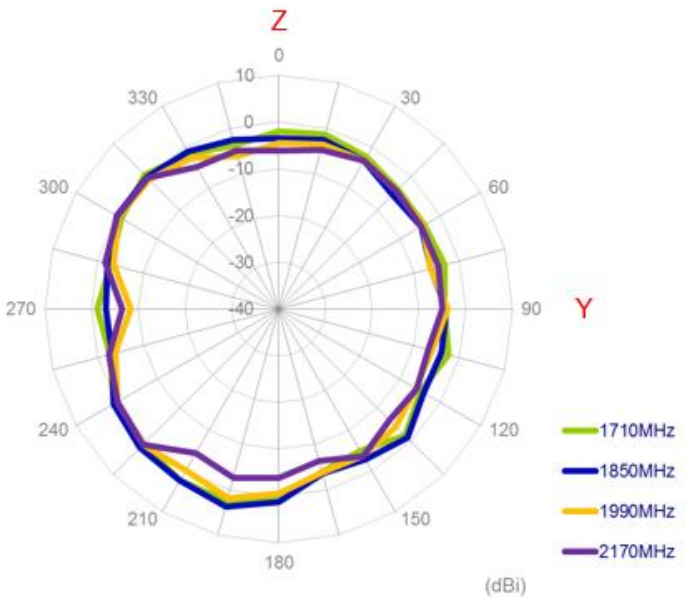


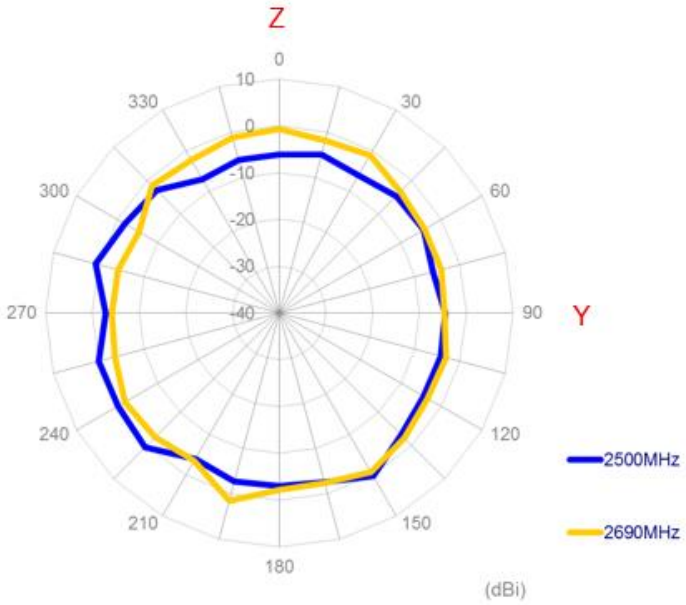




YZ Plane

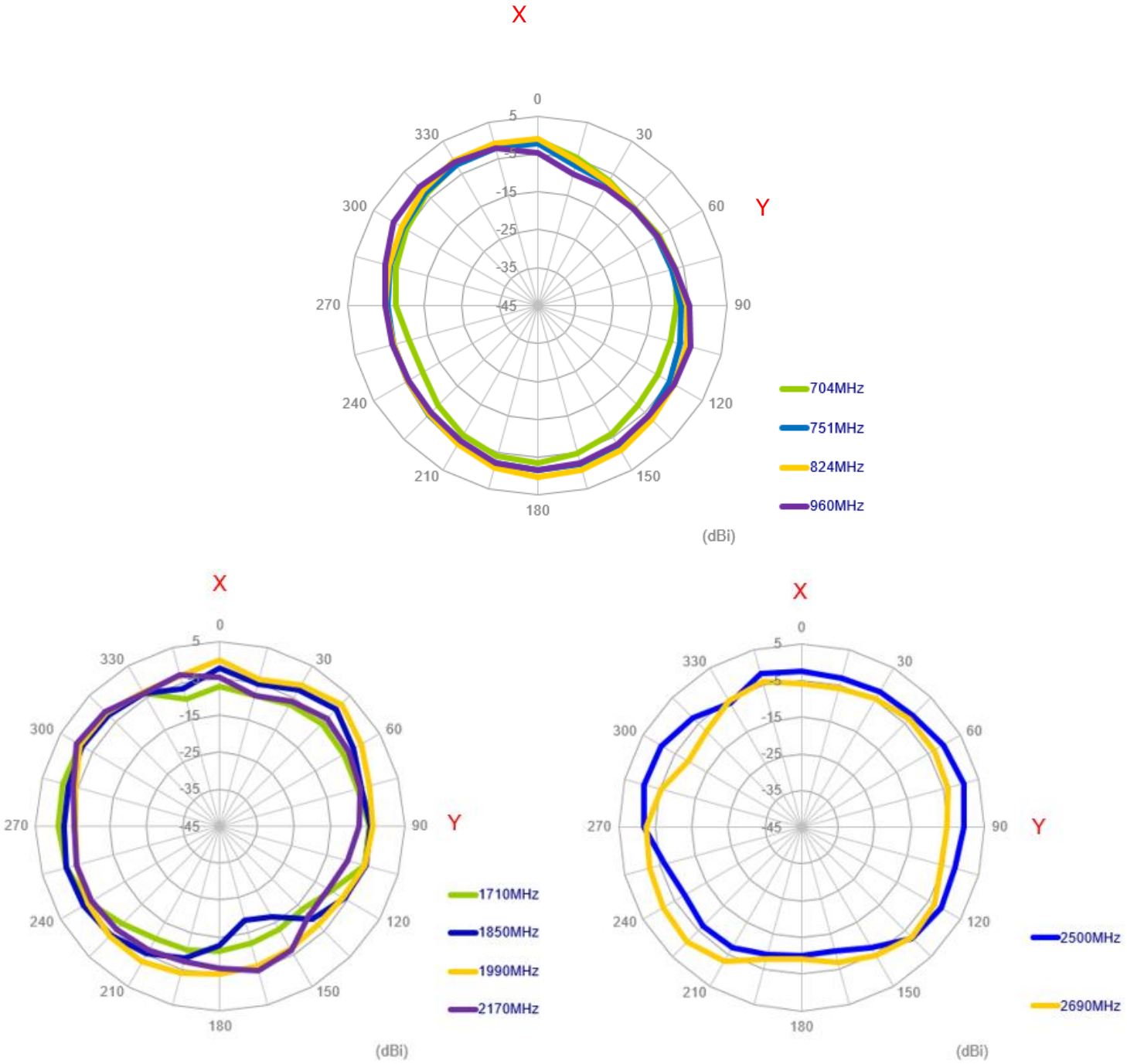




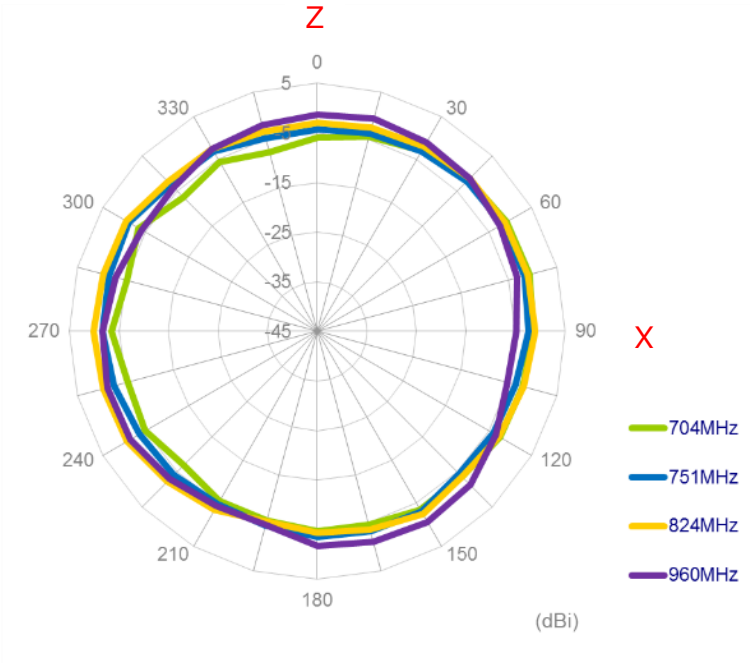


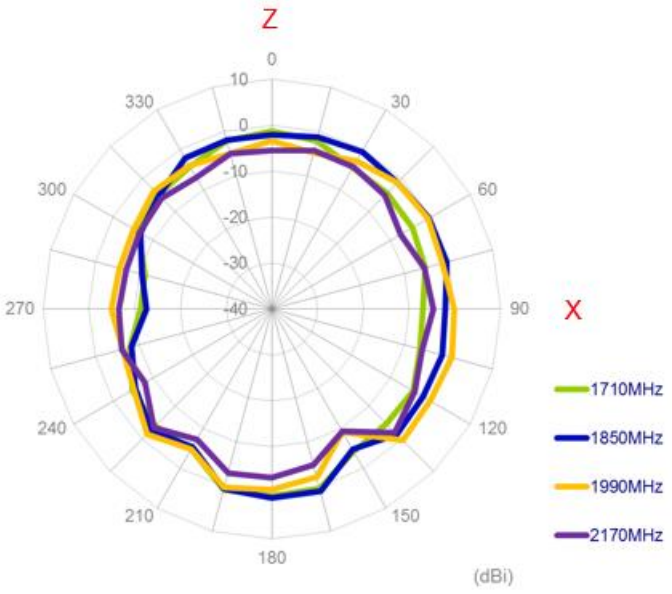
3.3.3. LTE with 2M cable length on the 2mm ABS

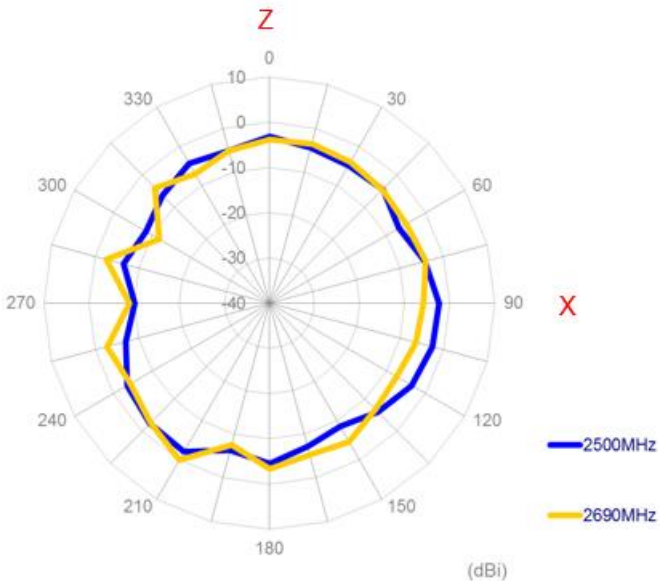
XY Plane



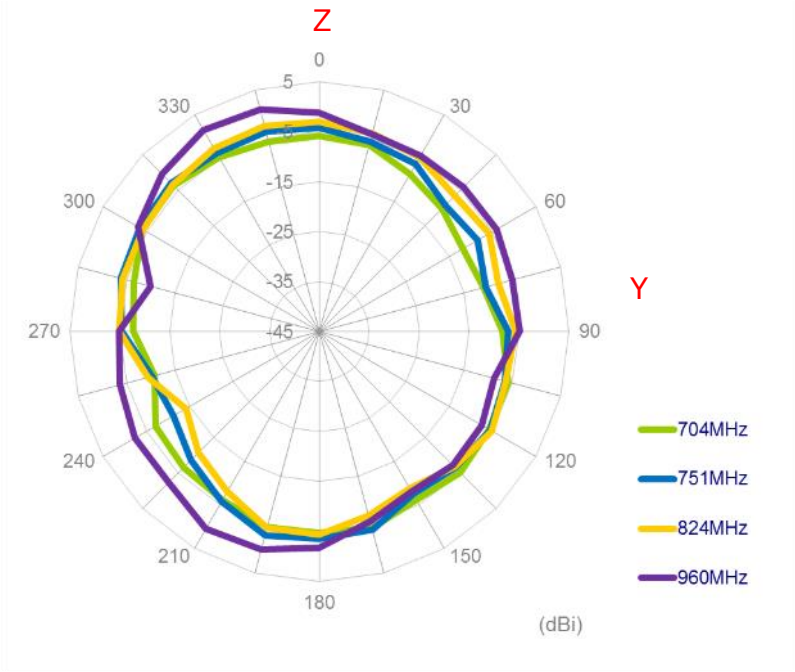
XZ Plane

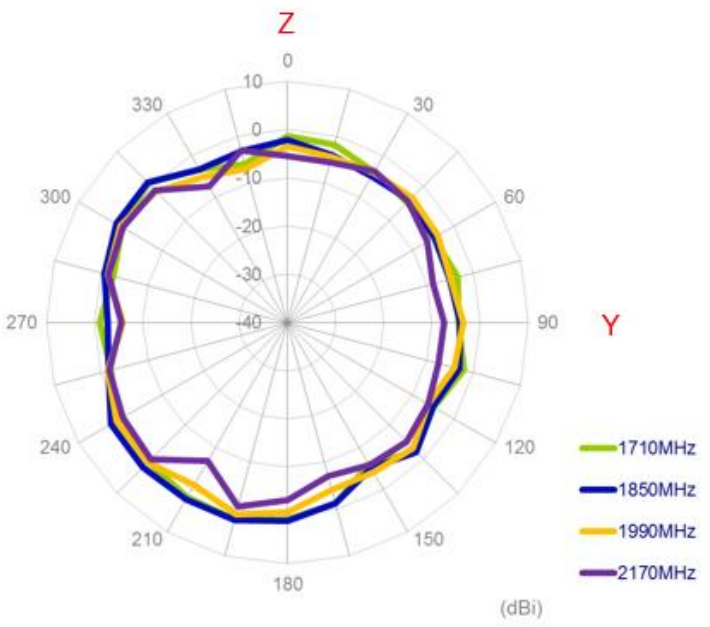


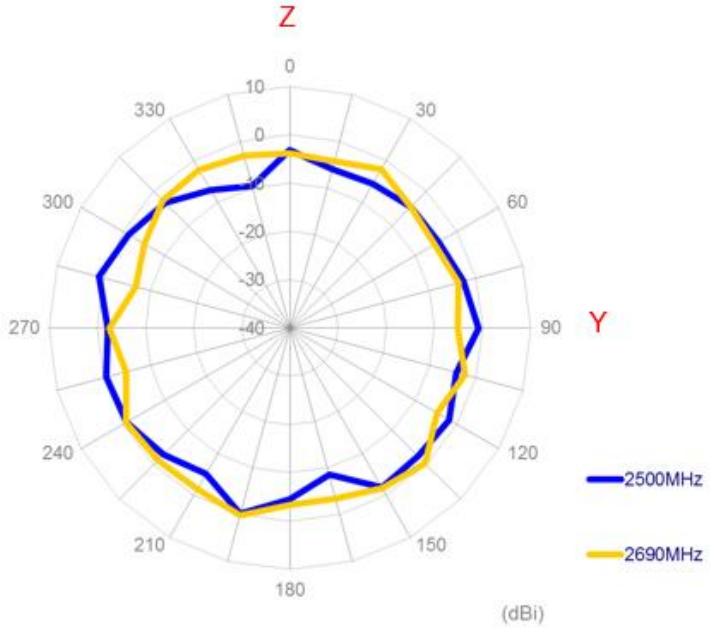




YZ Plane

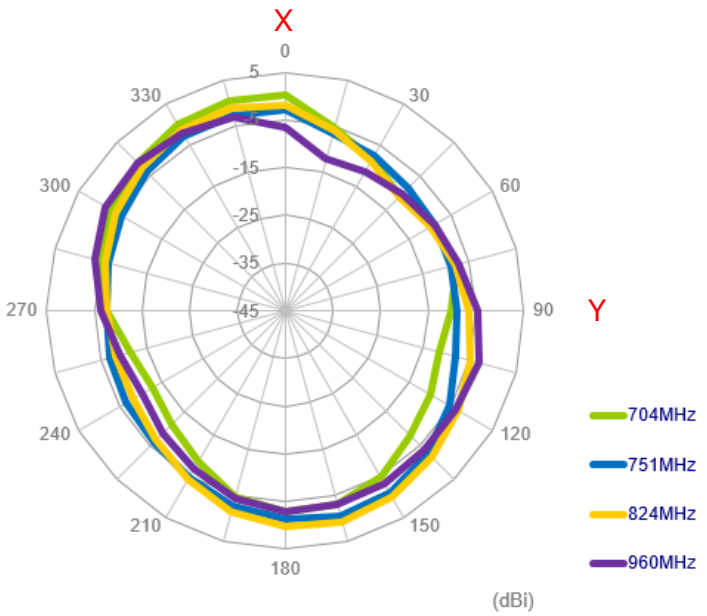


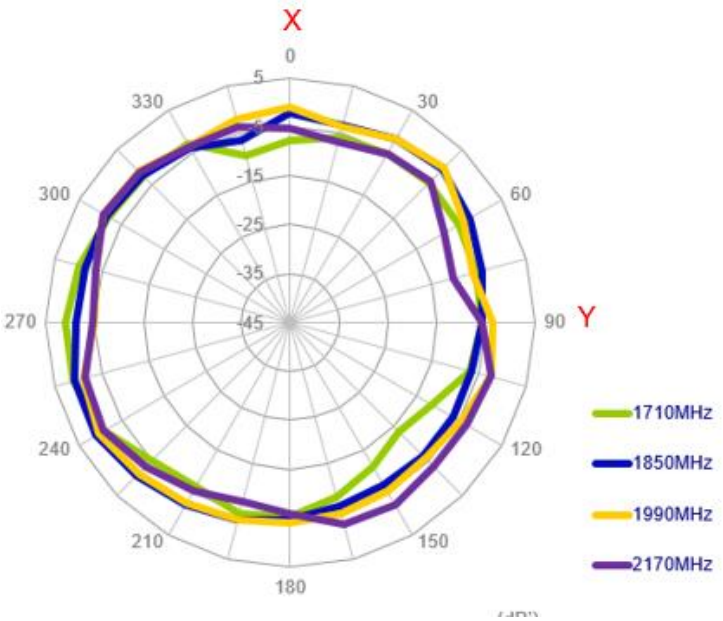


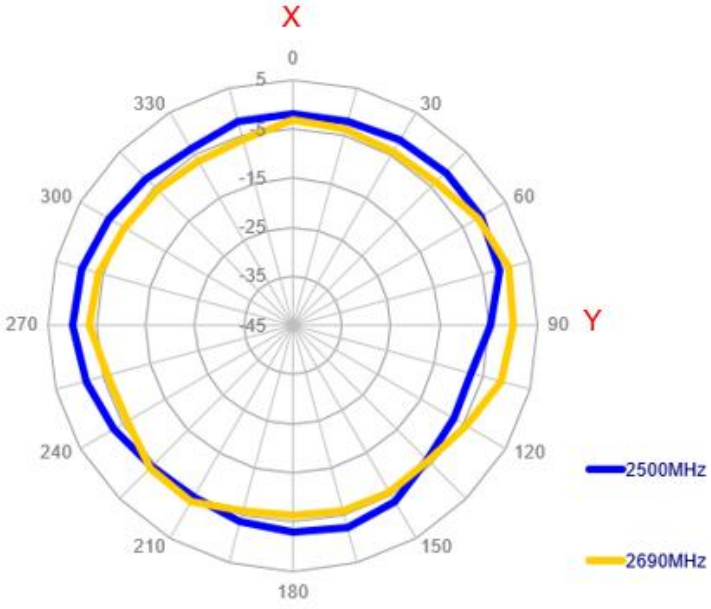


3.3.4. LTE with 2M cable length on the glass

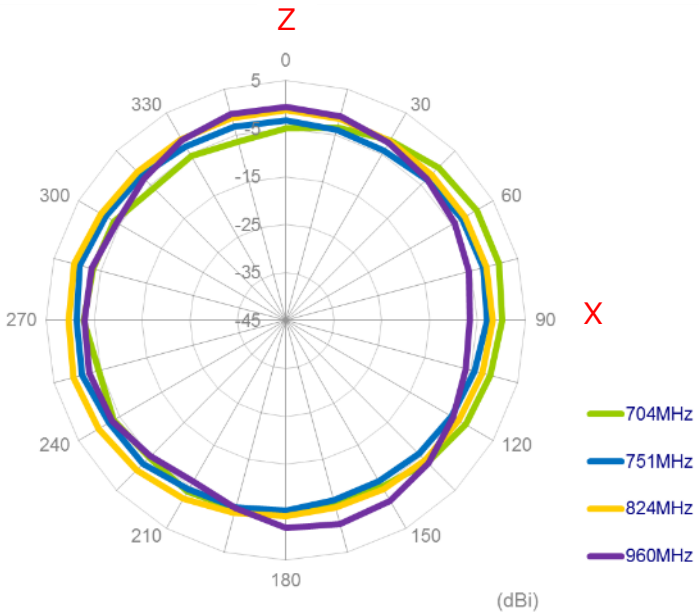
XY Plane

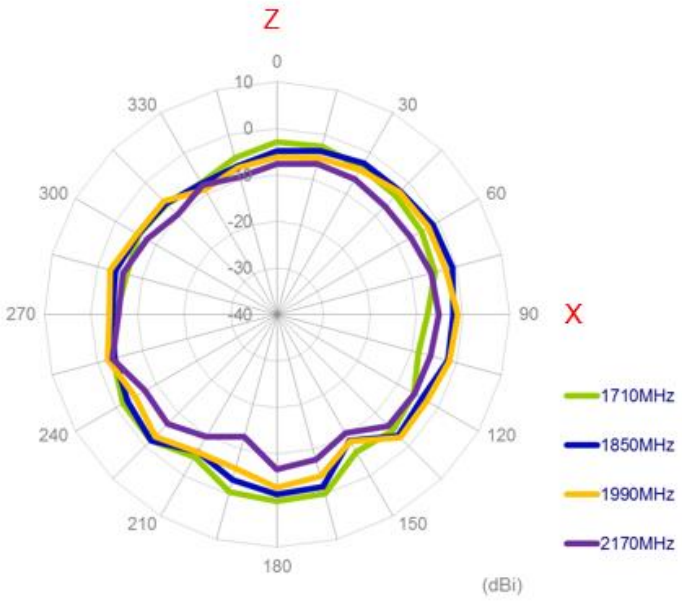


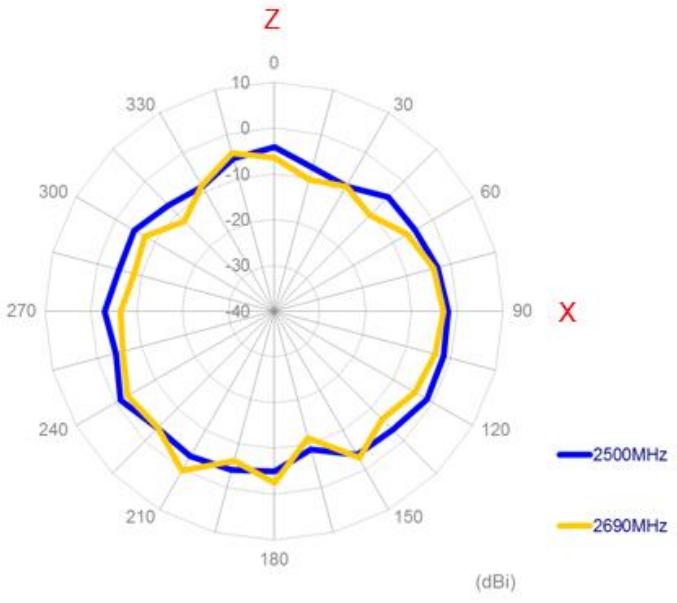




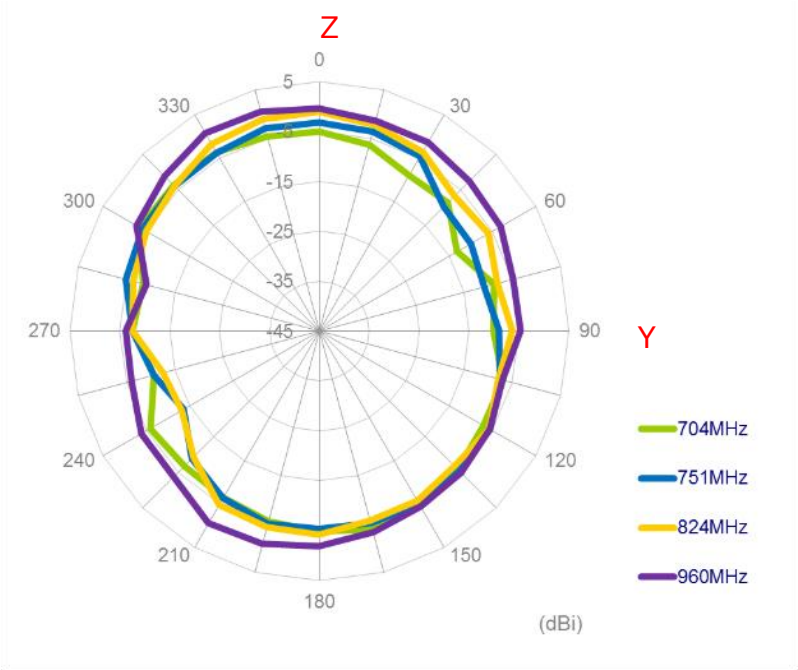
XZ Plane

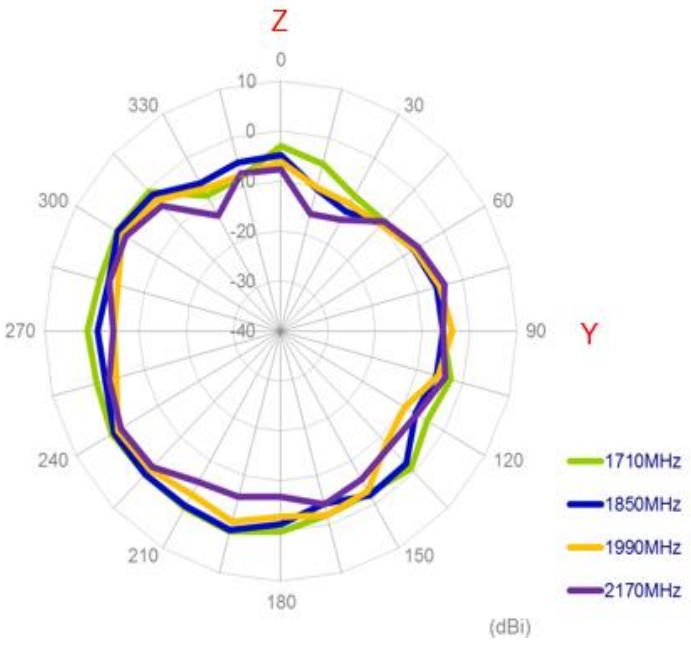


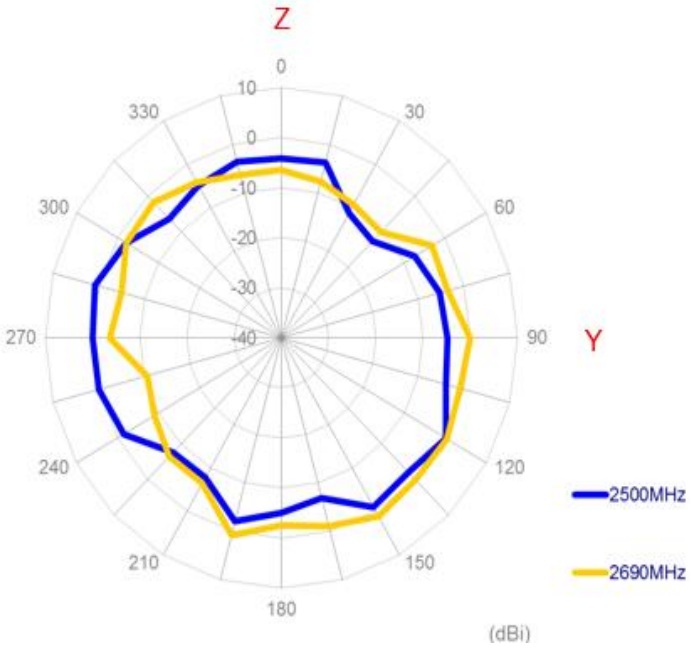




YZ Plane

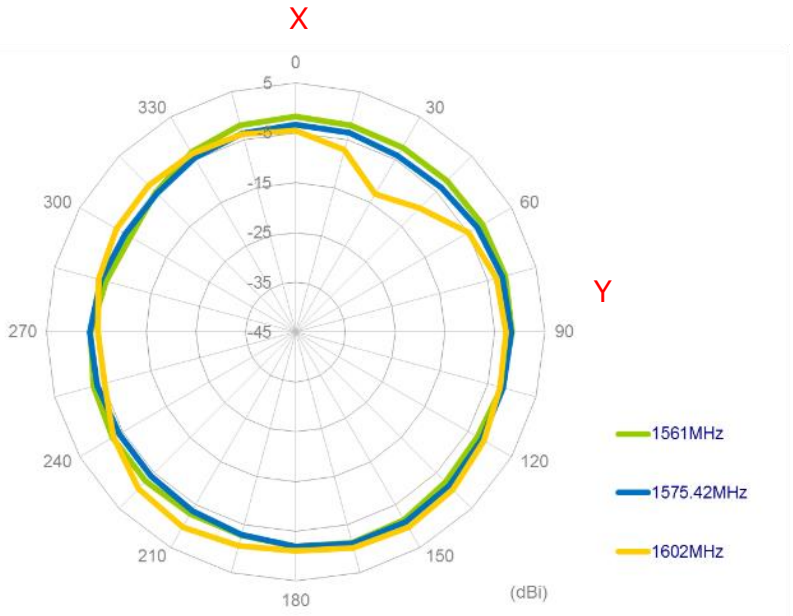




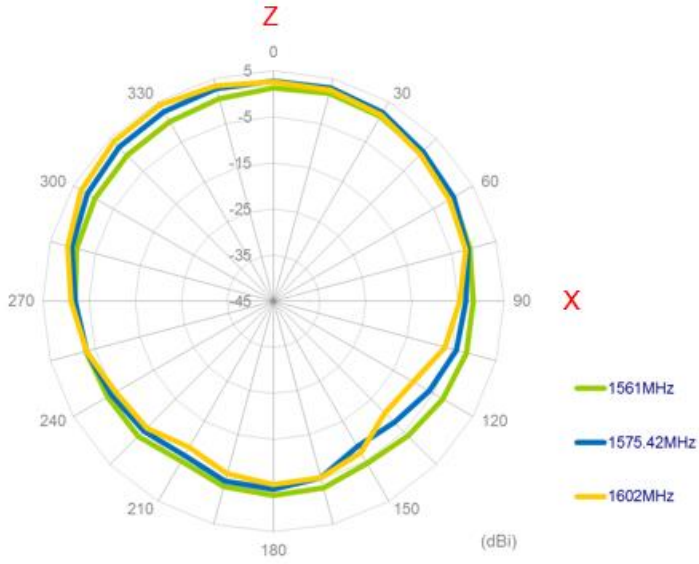


3.3.5. GPS/GLONASS/GALILEO/BeiDou

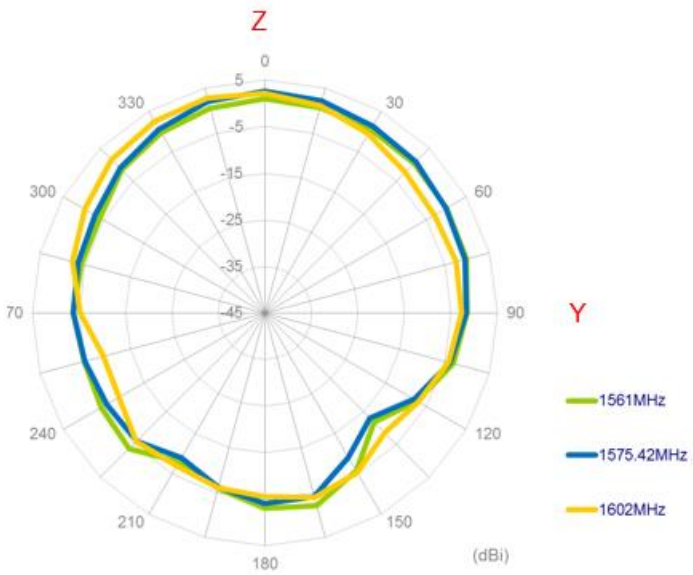
XY Plane



XZ Plane

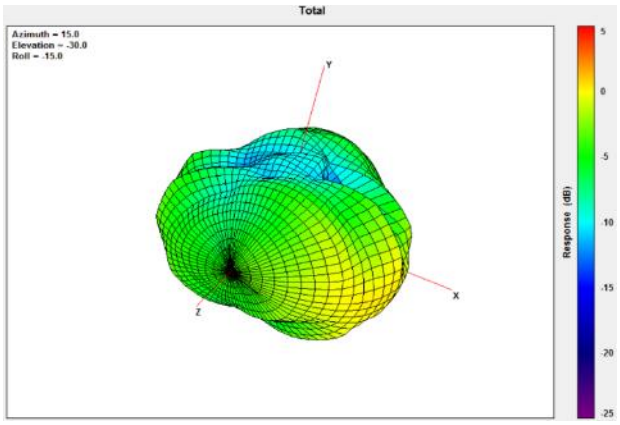


YZ Plane

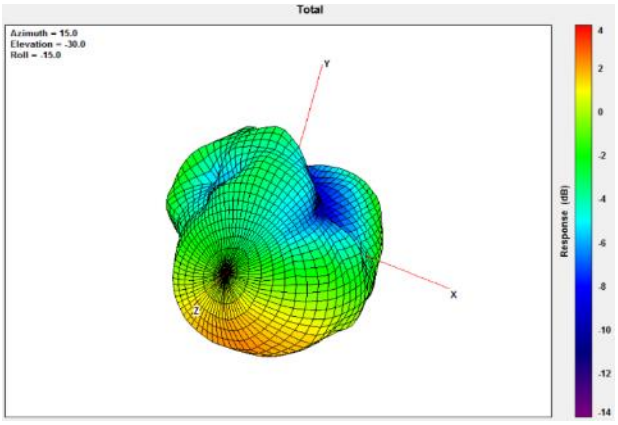


3.4. 3D Radiation Pattern

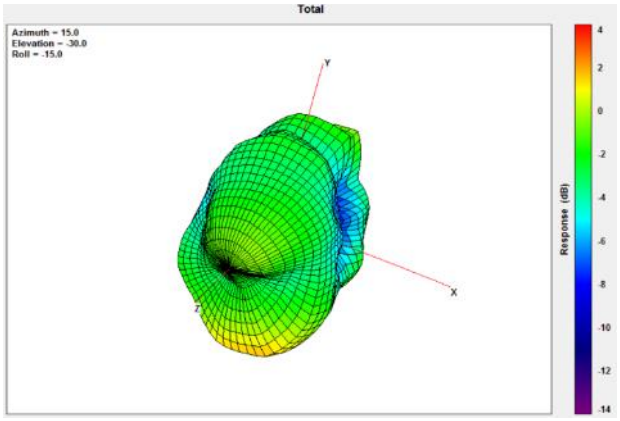
3.4.1. LTE with 2M cable length in free space



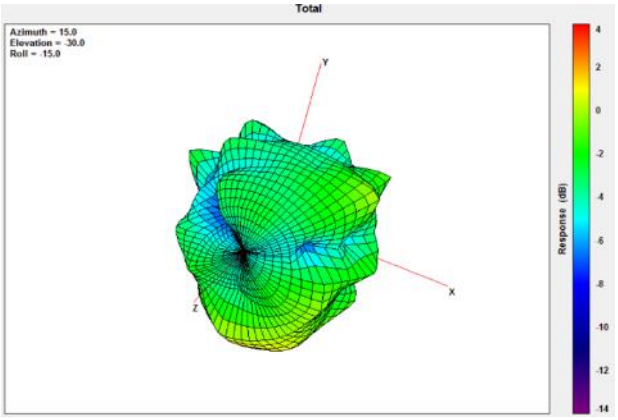
704MHz



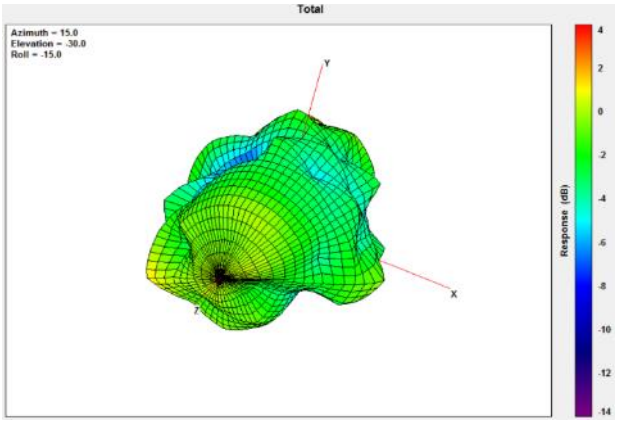
960MHz



1710MHz

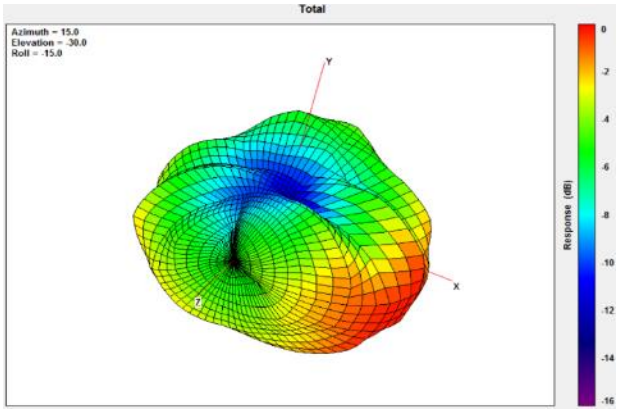


2170MHz

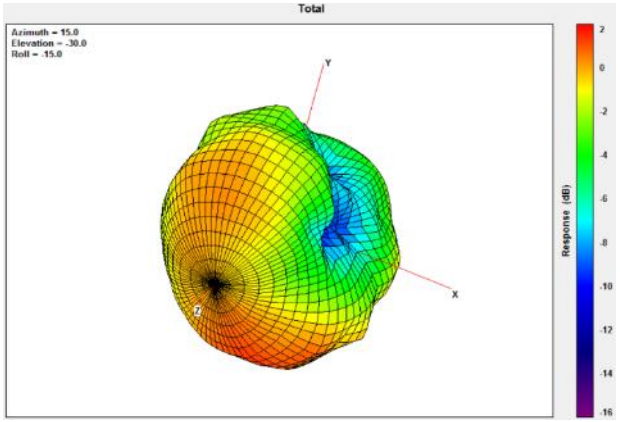


2690MHz

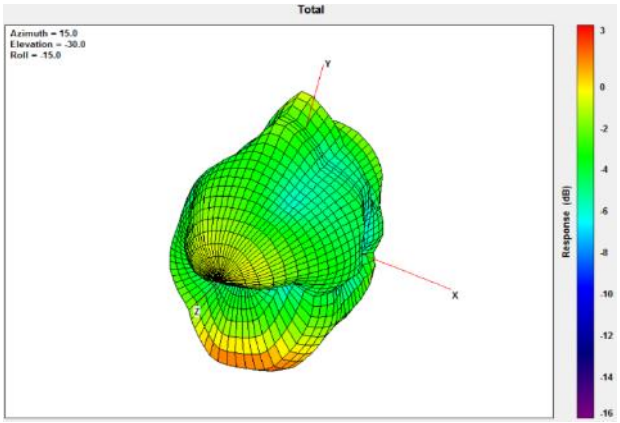
3.4.2. LTE with 2M cable length on the 2mm ABS



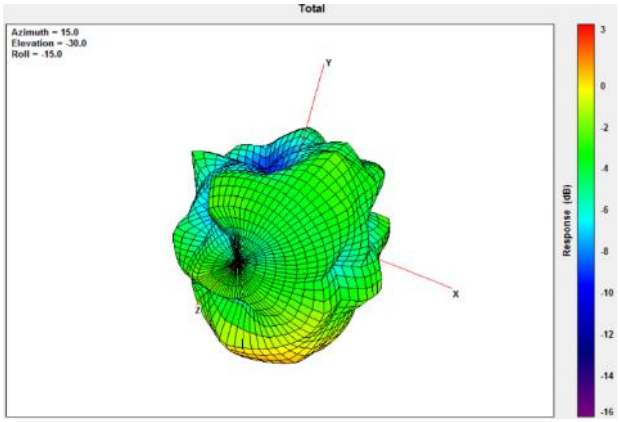
704MHz



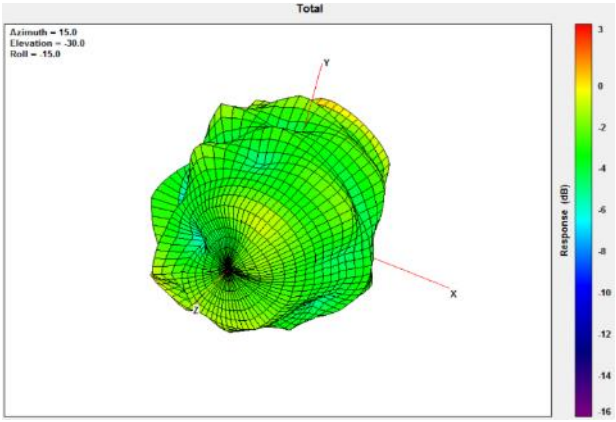
960MHz



1710MHz

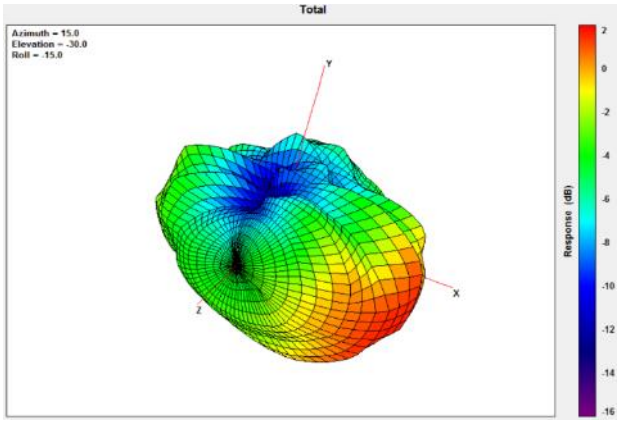


2170MHz

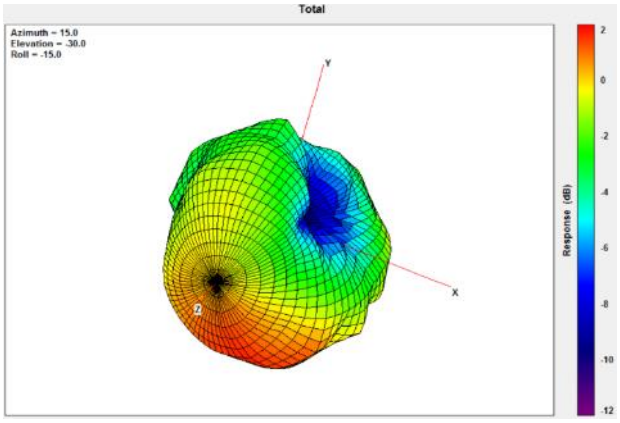


2690MHz

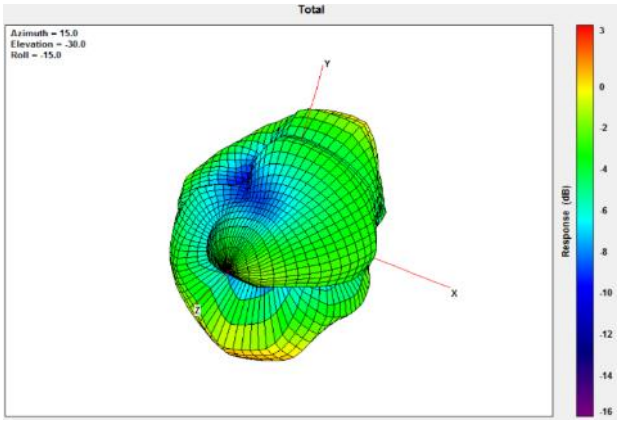
3.4.3. LTE with 2M cable length on the glass



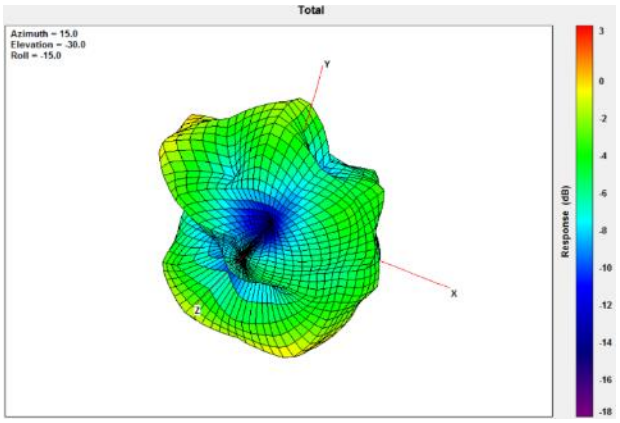
704MHz



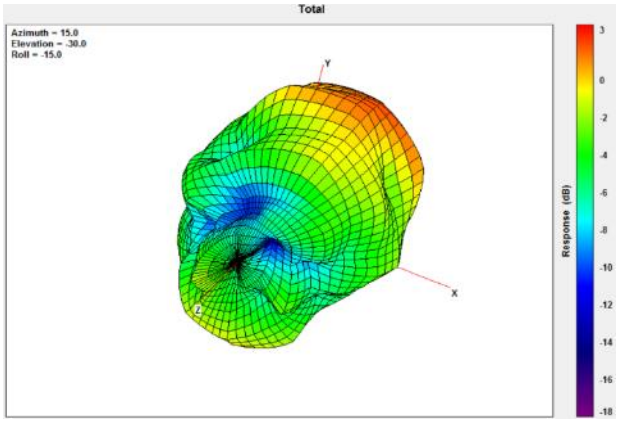
960MHz



1710MHz

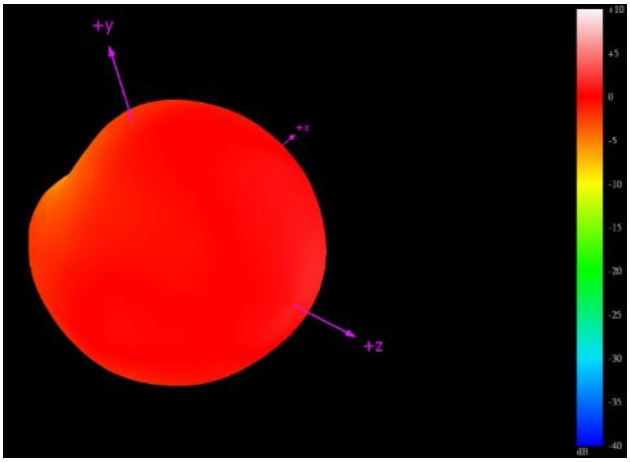


2170MHz

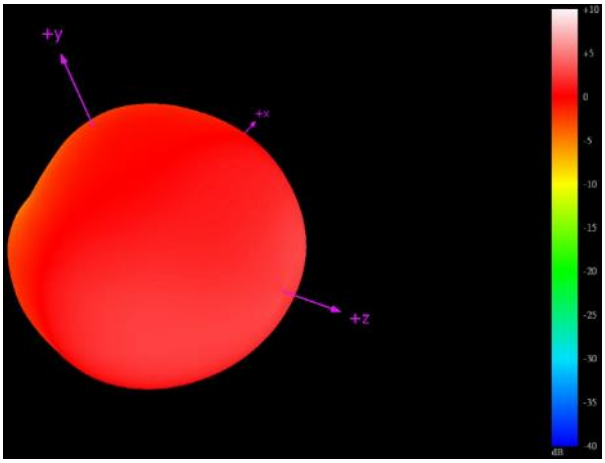


2690MHz

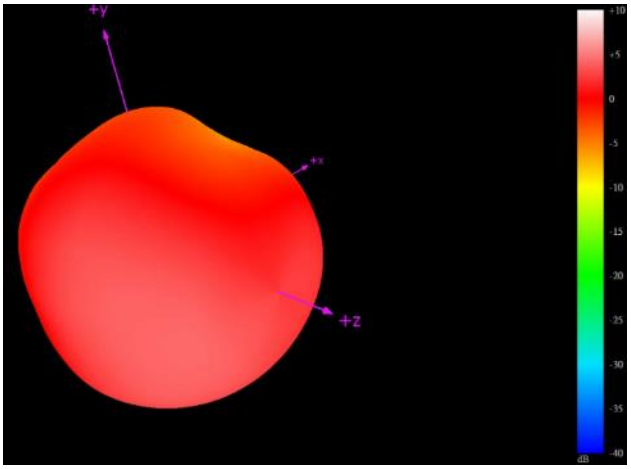
3.4.4. GPS/GLONASS/GALILEO/BeiDou



1561MHz

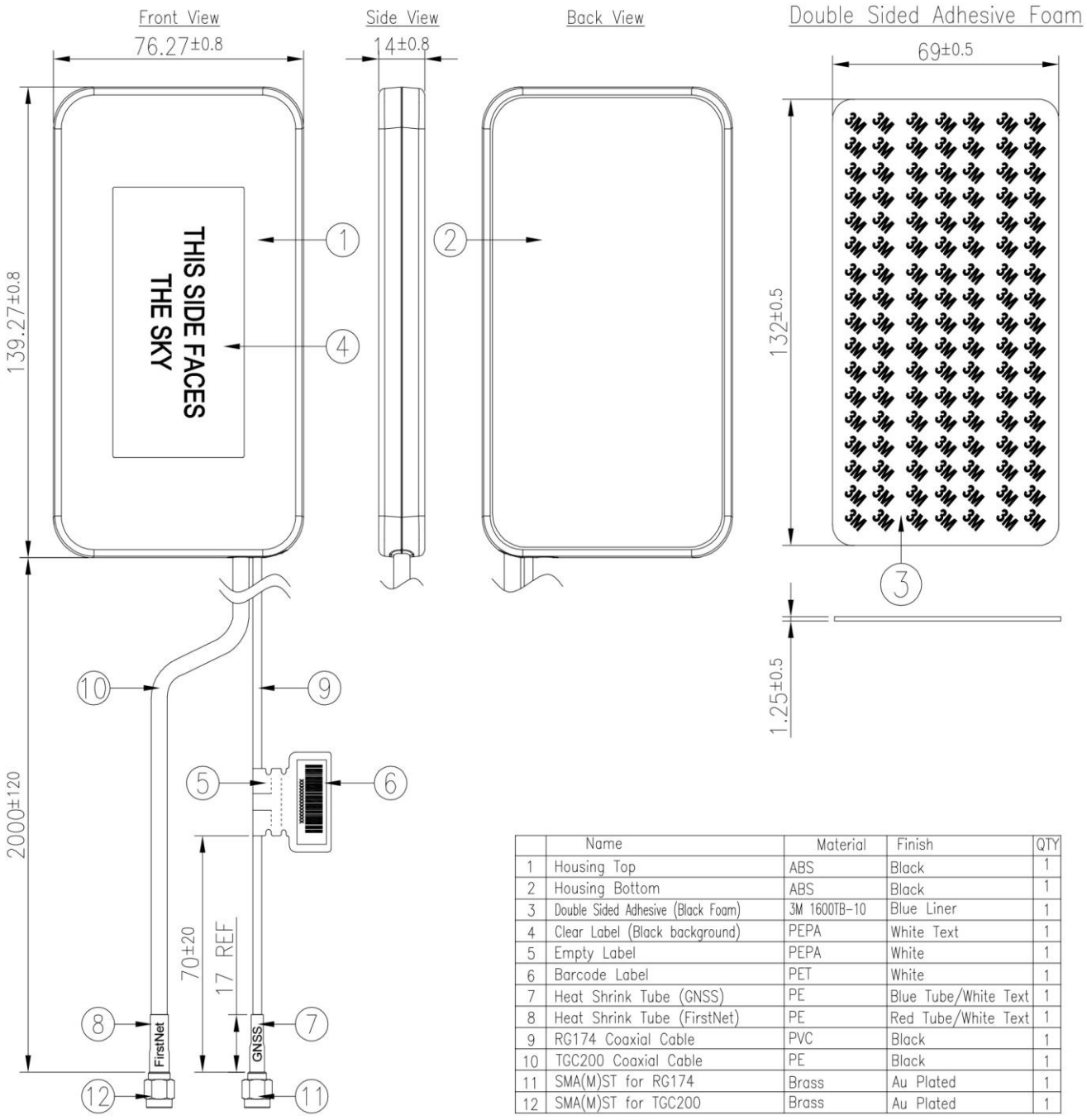


1575.42MHz



1602MHz

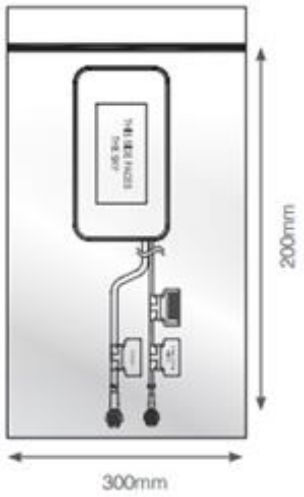
4. Drawing



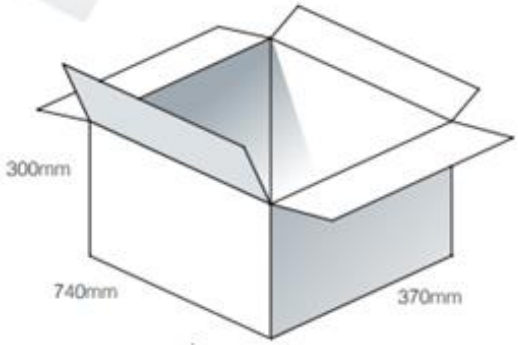
	Name	Material	Finish	QTY
1	Housing Top	ABS	Black	1
2	Housing Bottom	ABS	Black	1
3	Double Sided Adhesive (Black Foam)	3M 1600TB-10	Blue Liner	1
4	Clear Label (Black background)	PEPA	White Text	1
5	Empty Label	PEPA	White	1
6	Barcode Label	PET	White	1
7	Heat Shrink Tube (GNSS)	PE	Blue Tube/White Text	1
8	Heat Shrink Tube (FirstNet)	PE	Red Tube/White Text	1
9	RG174 Coaxial Cable	PVC	Black	1
10	TGC200 Coaxial Cable	PE	Black	1
11	SMA(M)ST for RG174	Brass	Au Plated	1
12	SMA(M)ST for TGC200	Brass	Au Plated	1

5. Packaging

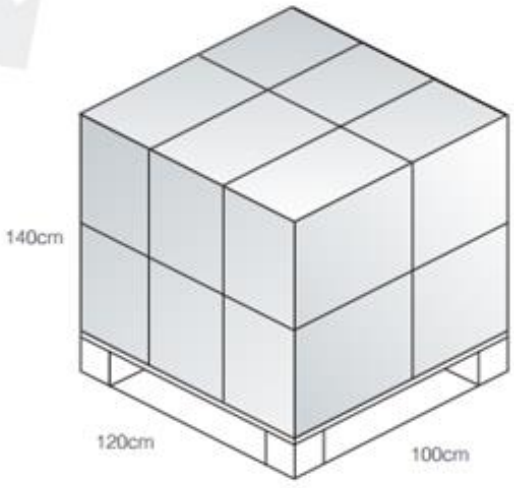
1pcs FMA253.A.LF.001 per PE Bag
Bag Dimensions - 300 x 200mm
Weight - 227g



40 pcs FMA253.A.LF.001 per carton
Carton - 740x 370 x 300mm
Weight - 11.1Kg



Pallet Dimensions 120 x 100x 140cm
12 Cartons per Pallet
6 Cartons per layer
2 Layers

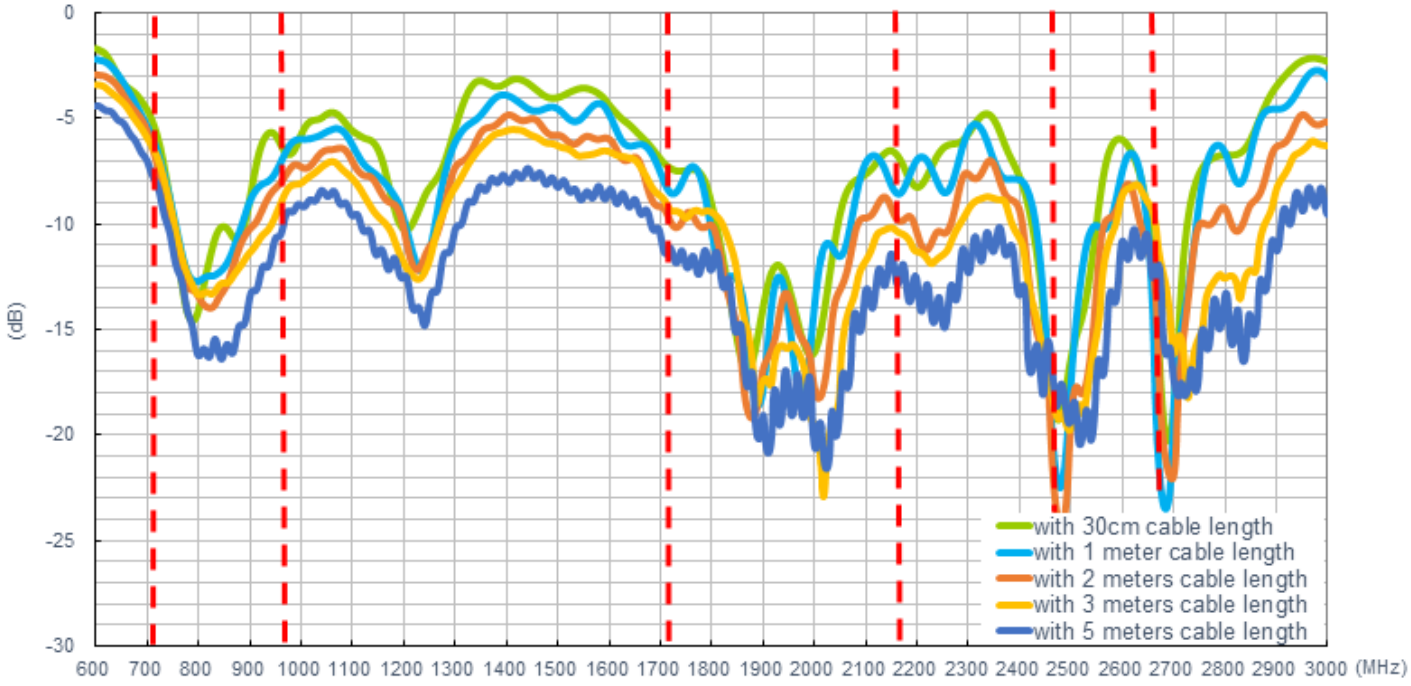


6. Application Note

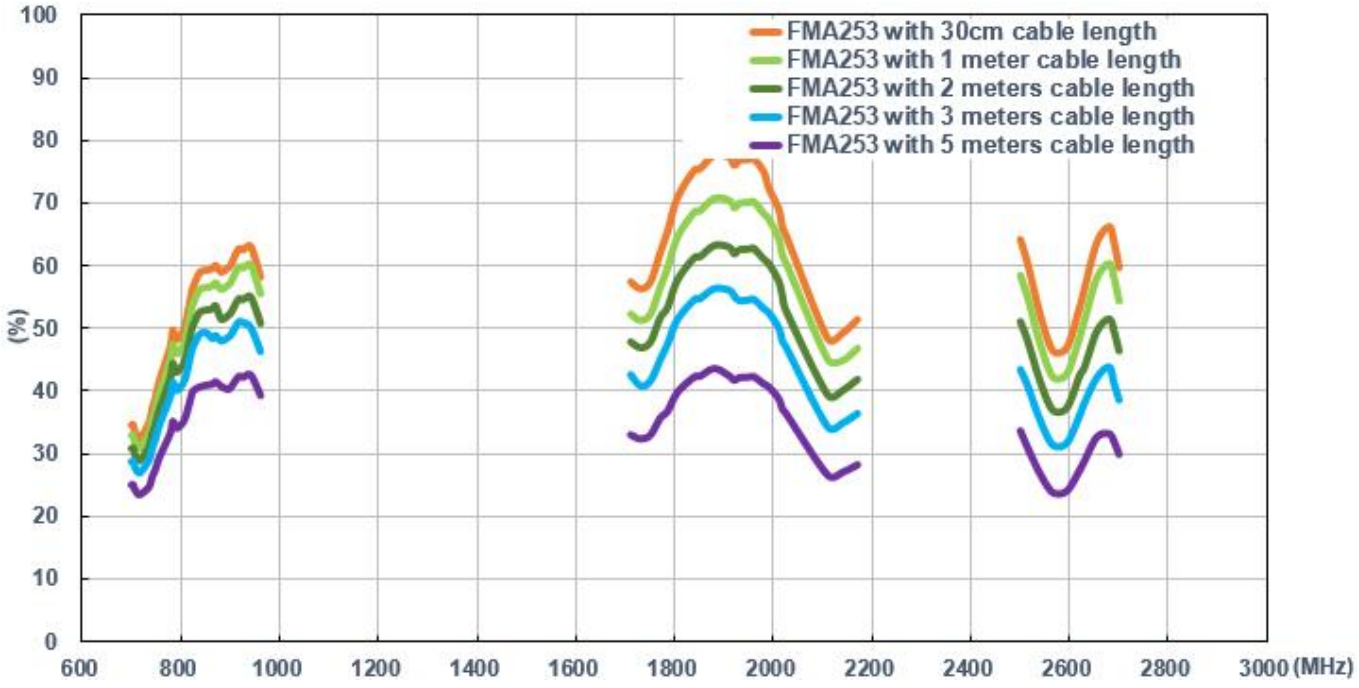
Taoglas provides antennas with different cable lengths and various base mounting options to indicate its performance to act as a reference for a customer's design.

In Free Space

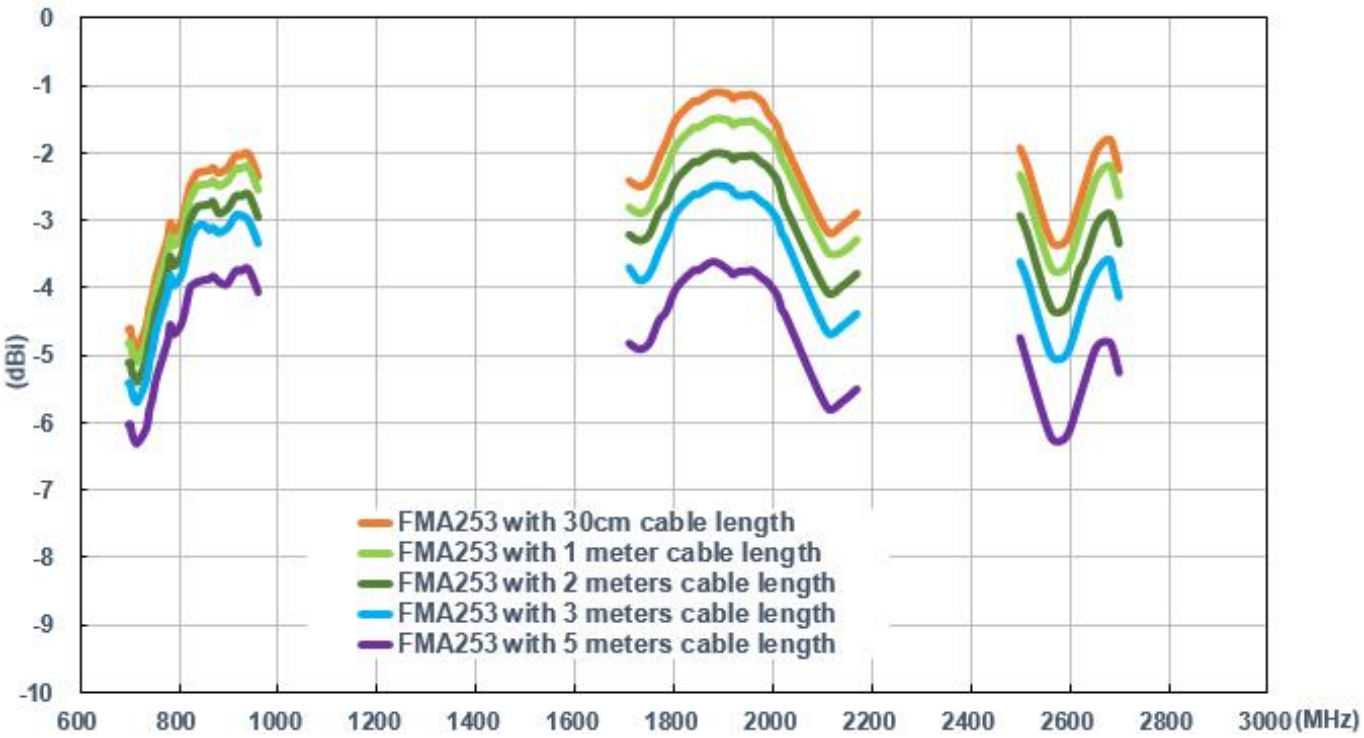
Return Loss



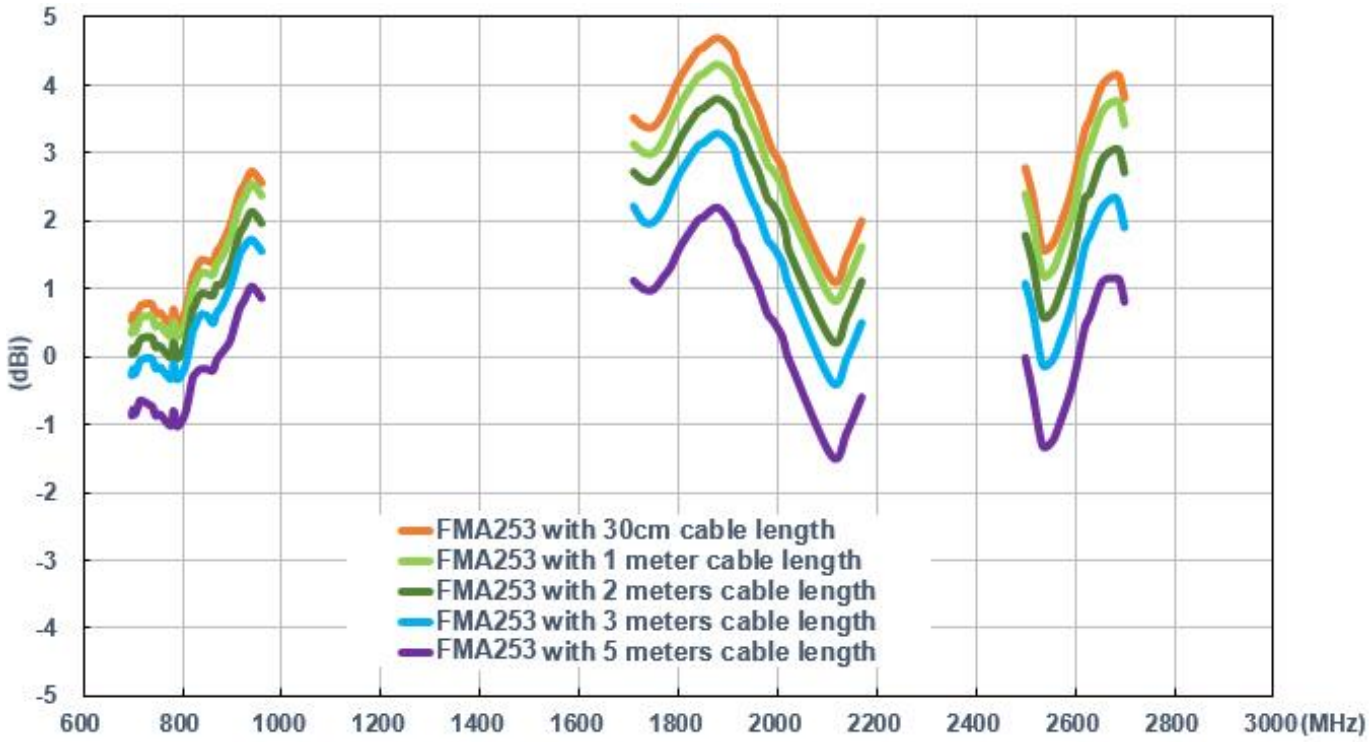
Efficiency



Average Gain



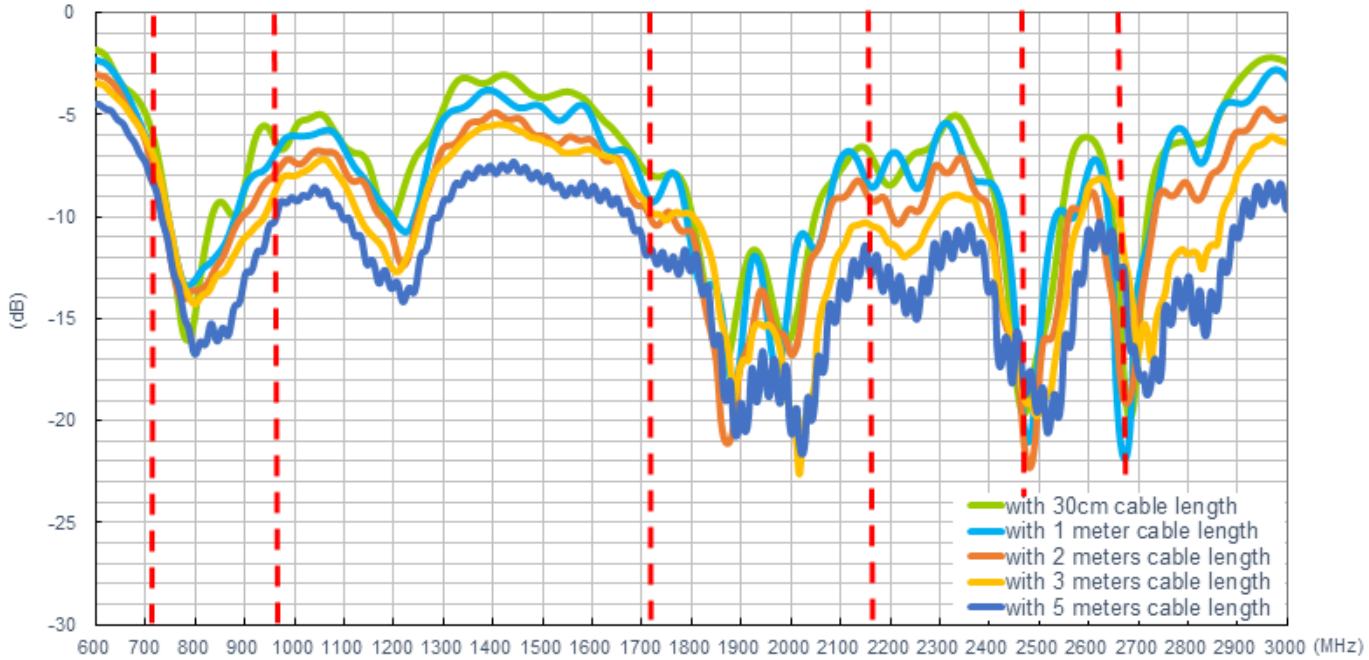
Peak Gain



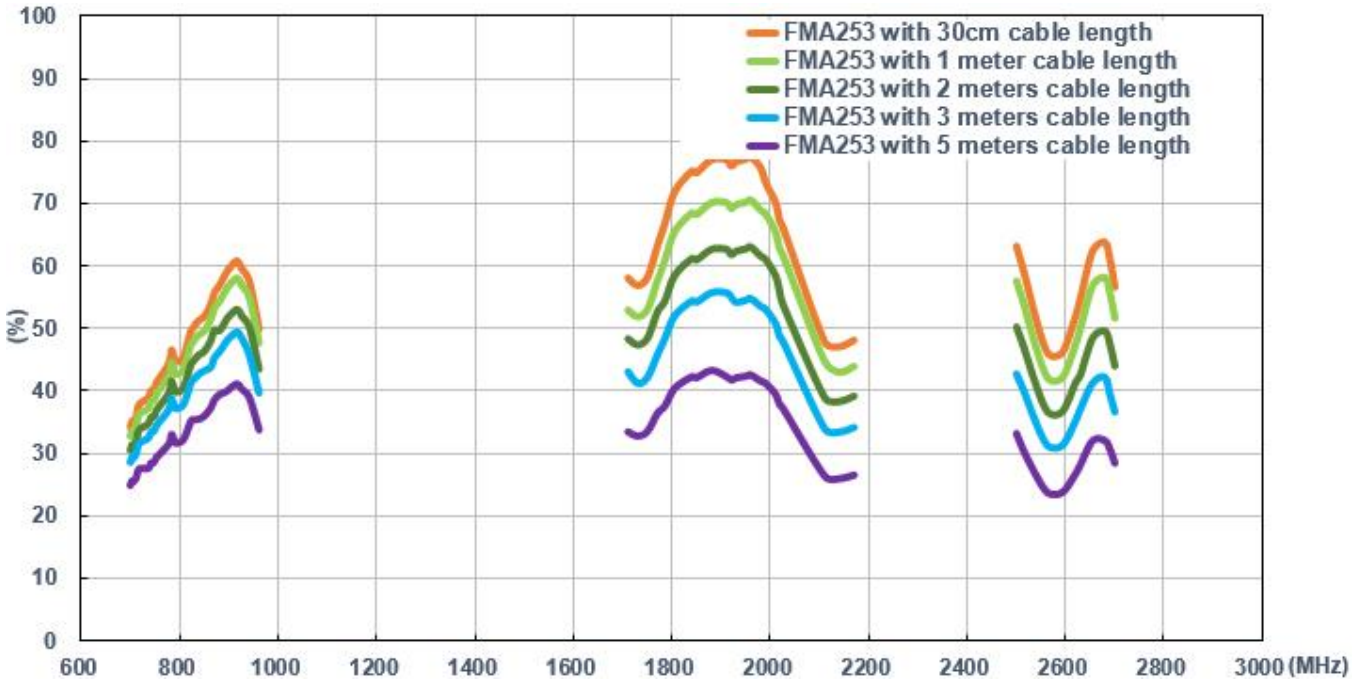
On 2mm ABS

LTE

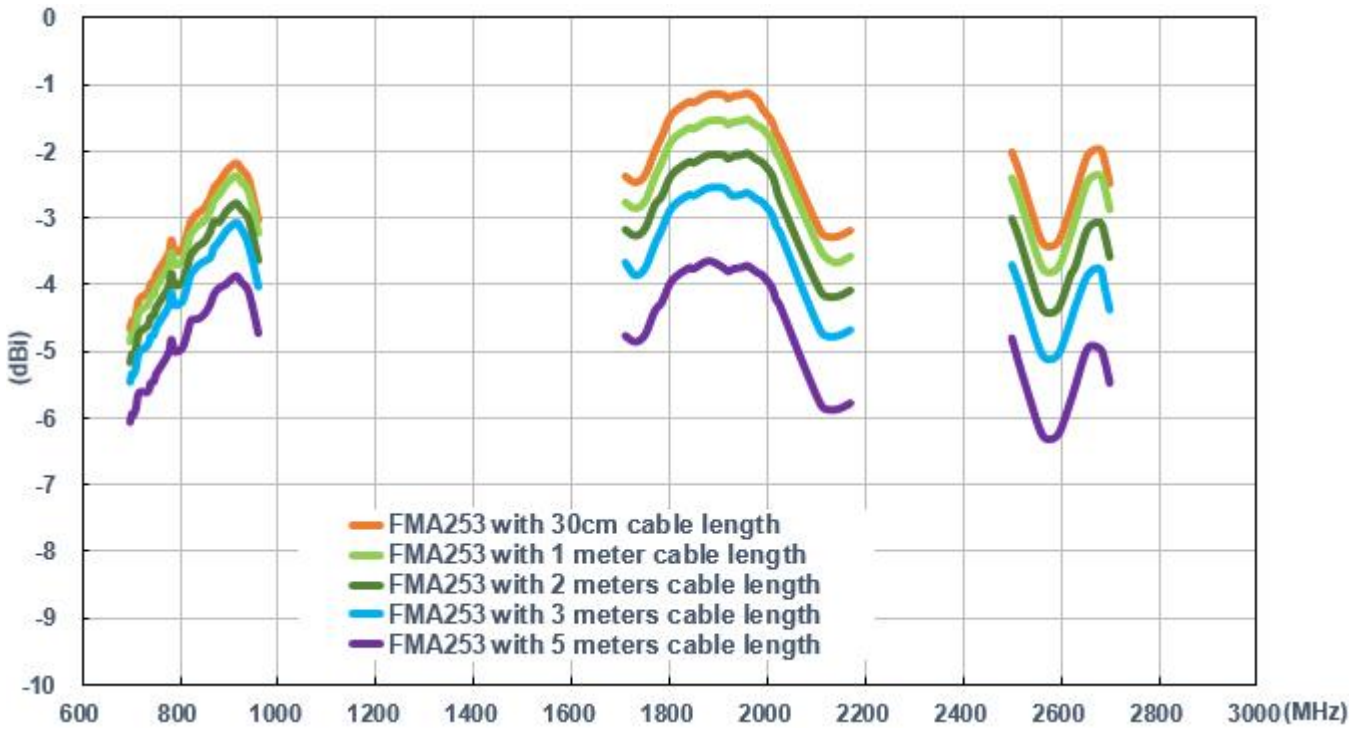
Return Loss



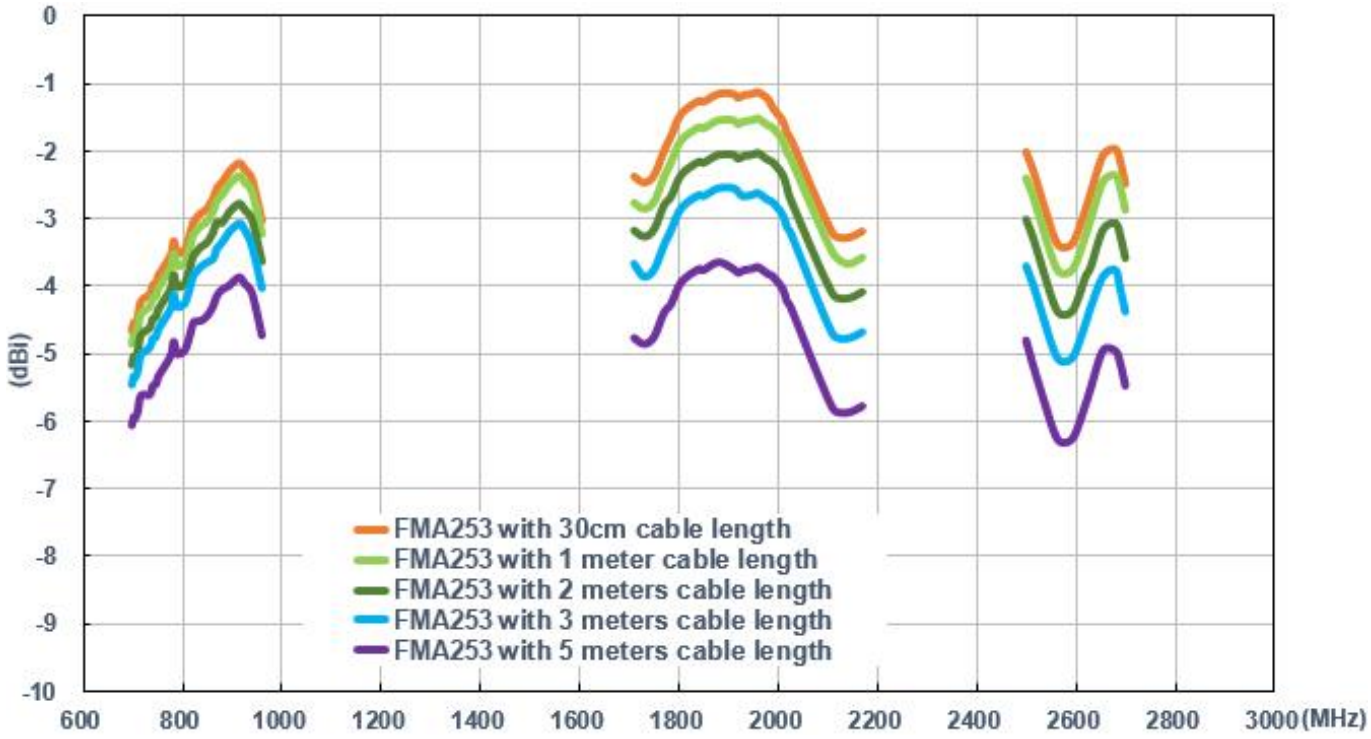
Efficiency



Average Gain



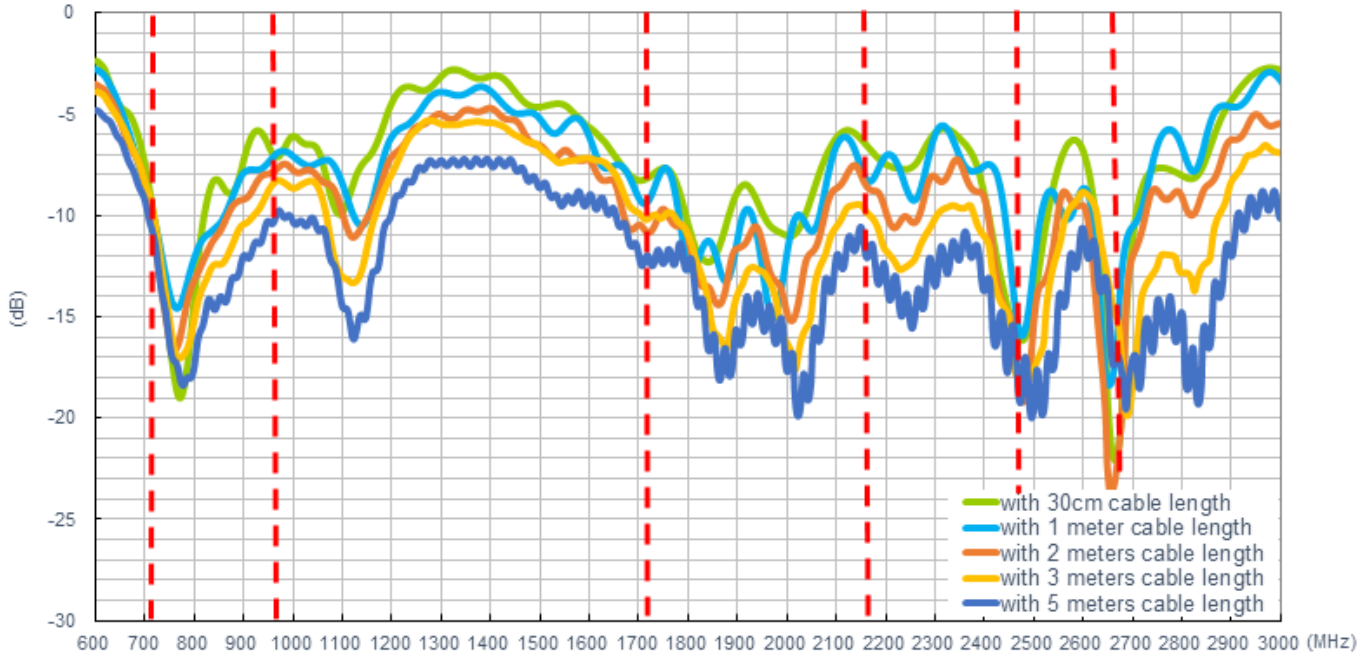
Peak Gain



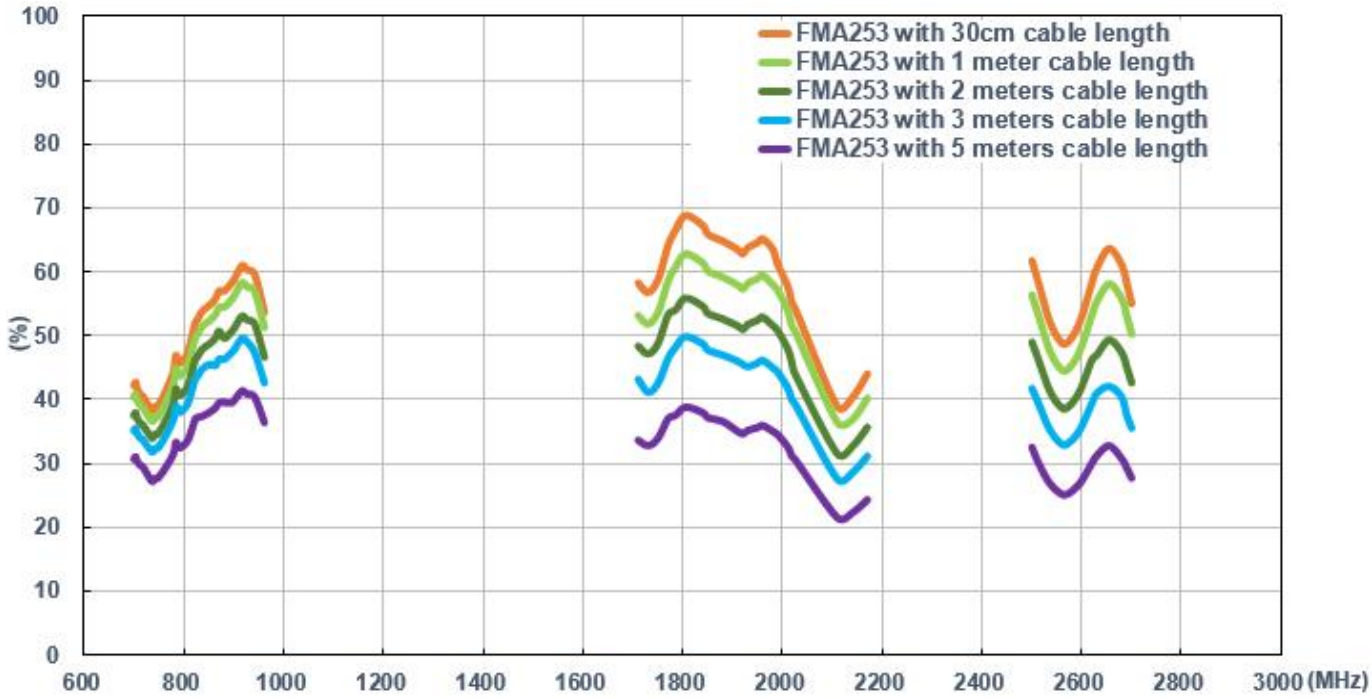
On glass base

LTE

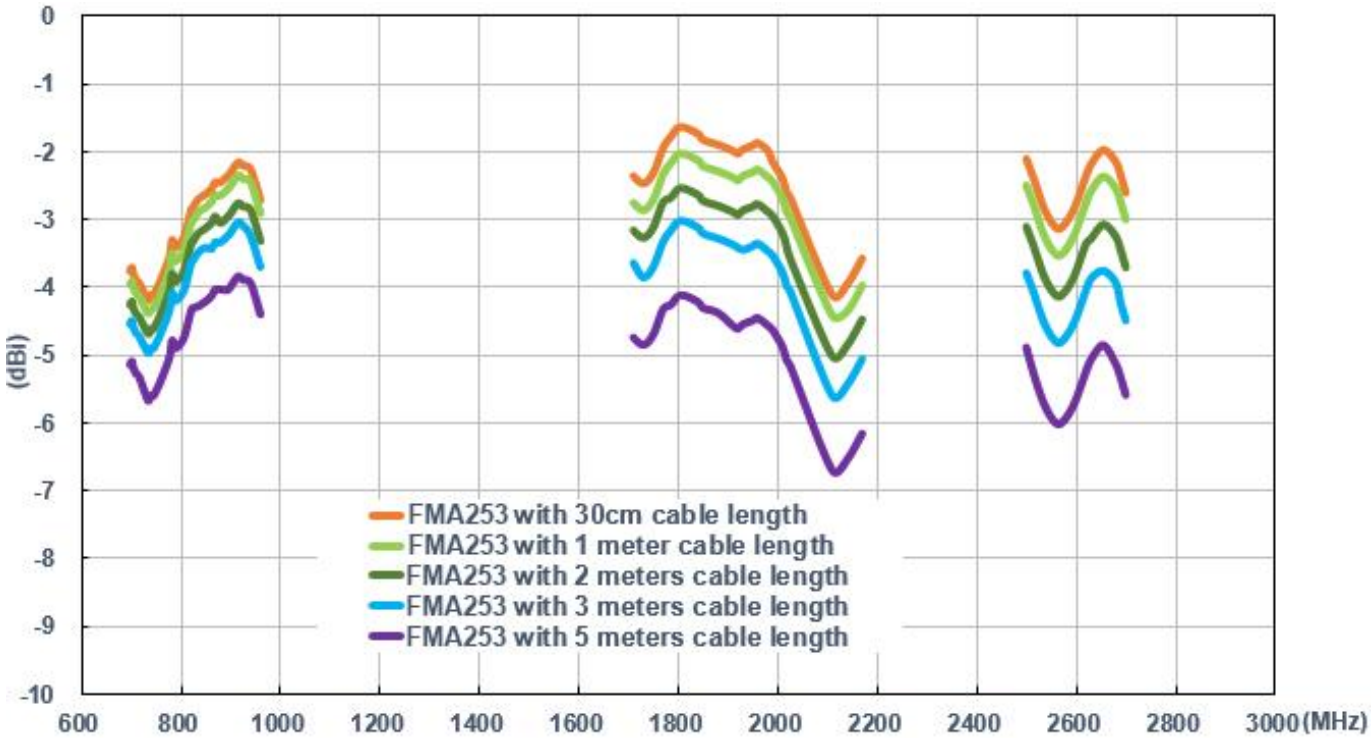
Return Loss



Efficiency



Average Gain



Peak Gain