TAOGLAS

Datasheet

Storm 4-in-1 Permanent Mount

Part No:
MA491.A.BICG.005.gb

Description:

Storm 4-in-1 Permanent mount with 2*Cellular MIMO and 2*Wi-Fi MIMO

Features:

Super low-profile, vandal resistant enclosure

2* 4G MIMO Antenna

2* Dual-Band Wi-Fi 2.4/5.8GHz

IP67 Rated Enclosure

Dimensions: 216 * 93 * 31mm

Cables: 500mm RG-316

Connectors: Cellular - FAKRA Code B and Code L - Wi-Fi – FAKRA Code I and Code E

RoHS & Reach Compliant

1. Introduction

The Taoglas Storm MA491 antenna is a 4-in-1 low profile, heavy-duty, fully IP67 rated external antenna for use in worldwide telematics and IoT applications which require best in class LTE and Wi-Fi performance. Until the arrival of the Storm, achieving high efficiency in LTE and Wi-Fi required the use of large dome antennas typically 80mm+ in height.

However, this unique product, at only 31mm high, delivers powerful worldwide 4G LTE MIMO antenna technology. The antenna also covers legacy 3G/2G bands for devices that fallback where 4G is unavailable. Dual-band MIMO Wi-Fi antennas enable high throughput Wi-Fi speeds.

Typical applications include:

- Internet of Things (IoT) Gateways and Routers
- Remote Asset and Pipeline Monitoring
- HD Video over LTE
- First Responder and Emergency Services
- Automotive Vehicle Tracking and Telematics

LTE 4G applications demand high speed data uplink and downlink. High efficiency and high gain MIMO antennas are 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. The MA491 does not require a ground plane. Low loss cables are used to keep efficiency high over long cable lengths. In contrast, smaller MIMO antennas with thinner, poorer quality cables will have much reduced efficiency and isolation, which would lead to a large drop in system throughput or drops, and may not make a system connection at all.

Conformity is declared under the following standard: EN55022 Class B.
This is to declare that the product listed above conform to the EMC directive 2014/30/EU.

Contact your regional Taoglas customer support team for further information.

2. Specifications

Cellular Electrical (30cm)									
Band	**Frequency (MHz)**		**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**VSWR**	**Envelope Correlation Coefficient**	**Polarization**	**Impedance**
4G/3G Band 12,13,14,17,20,28,29	698~803	MIMO 1	41.2	-4	2.1	<3:1	<0.3	Linear	50 Ω
		MIMO 2	53.4	-2.9	2.6				
4G/3G Band 5,8,18,19,20,26,27	824~894	MIMO 1	34.4	-4.6	1				
		MIMO 2	35.1	-4.5	0.6				
4G/3G Band 5,8,19,20,26,27	880~960	MIMO 1	41.4	-3.9	2.2				
		MIMO 2	39.2	-4.1	0.9				
5GNR/4G Band 3,4,9,25,35	1710~1880	MIMO 1	65.9	-1.9	6.9				
		MIMO 2	69.1	-1.6	6.7				
4G/3G Band 1,2,3,9,25,35,39,66	1850~1990	MIMO 1	42.5	-3.8	5.6				
		MIMO 2	51	-3	5.9				
4G/3G Band 1,2,4,23,25,66	1920~2170	MIMO 1	41.4	-3.9	4.8				
		MIMO 2	44.9	-3.5	5.4				
4G/3G Band 7,30,38,40,41	2300~2690	MIMO 1	44.7	-3.5	5.4				
		MIMO 2	47.3	-3.3	6.1				
5GNR/4G Band 22,42,43,48,77,78	3300~3600	MIMO 1	51.9	-2.9	4.4				
		MIMO 2	45.9	-3.5	5.3				

Cellular Electrical (5m)									
Band	**Frequency (MHz)**		**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**VSWR**	**Envelope Correlation Coefficient**	**Polarization**	**Impedance**
4G/3G Band 12,13,14,17,20,28,29	698~803	MIMO 1	17.8	-7.5	-1.4	<3:1	<0.3	Linear	50 Ω
		MIMO 2	22.9	-6.4	-0.9				
4G/3G Band 5,8,18,19,20,26,27	824~894	MIMO 1	13.8	-8.6	-3				
		MIMO 2	14.1	-8.5	-3.4				
4G/3G Band 5,8,19,20,26,27	880~960	MIMO 1	14.5	-8.4	-2.3				
		MIMO 2	13.8	-8.6	-3.6				
5GNR/4G Band 3,4,9,25,35	1710~1880	MIMO 1	18.2	-7.4	1.4				
		MIMO 2	19.5	-7.1	1.2				
4G/3G Band 1,2,3,9,25,35,39,66	1850~1990	MIMO 1	10.5	-9.8	-0.4				
		MIMO 2	12.6	-9	-0.1				
4G/3G Band 1,2,4,23,25,66	1920~2170	MIMO 1	9.1	-10.4	-1.7				
		MIMO 2	10.0	-10	-1.1				

4G/3G Band 7,30,38,40,41	2300~2690	MIMO 1	7.1	-11.5	-2.6				
		MIMO 2	7.4	-11.3	-1.9				
5GNR/4G Band 22,42,43,48,77,78	3300~3600	MIMO 1	8.1	-10.9	-3.6				
		MIMO 2	7.1	-11.5	-2.7				

Wi-Fi Electrical (30cm)									
Band	**Frequency (MHz)**		**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**VSWR**	**Envelope Correlation Coefficient**	**Polarization**	**Impedance**
2.4GHz	2400~2500	MIMO 1	68.4	-1.7	5.4	<2:1	<0.3	Linear	50 Ω
		MIMO 2	56.7	-2.5	4.2				
5.8GHz	4900~5850	MIMO 1	69.2	-1.6	6.7				
		MIMO 2	50.9	-3	8				

Wi-Fi Electrical (5m)									
Band	**Frequency (MHz)**		**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**VSWR**	**Envelope Correlation Coefficient**	**Polarization**	**Impedance**
2.4GHz	2400~2500	MIMO 1	12.7	-8.95	-1.85	<2:1	<0.3	Linear	50 Ω
		MIMO 2	10.6	-9.75	-3.05				
5.8GHz	4900~5850	MIMO 1	4.9	-13.1	-4.8				
		MIMO 2	3.5	-14.5	-3.5				

Mechanical	
Antenna Dimensions	216.24*93.25*30.95mm
Casing	ABS+PC
Base and thread	Nickel Plated Aluminium
Ingress Protection Rating	IP67

Cable	500mm RG-316
Connectors	Cellular 1: FAKRA Code D Jack Cellular 2: FAKRA Code L Jack Wi-Fi 1: FAKRA Code I Jack Wi-Fi 2: FAKRA Code E Jack
Housing Colour	Black
Maximum Assembly Torque	39.2 N-m
Environmental	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 90°C
Humidity	Non-condensing 65°C 95% RH

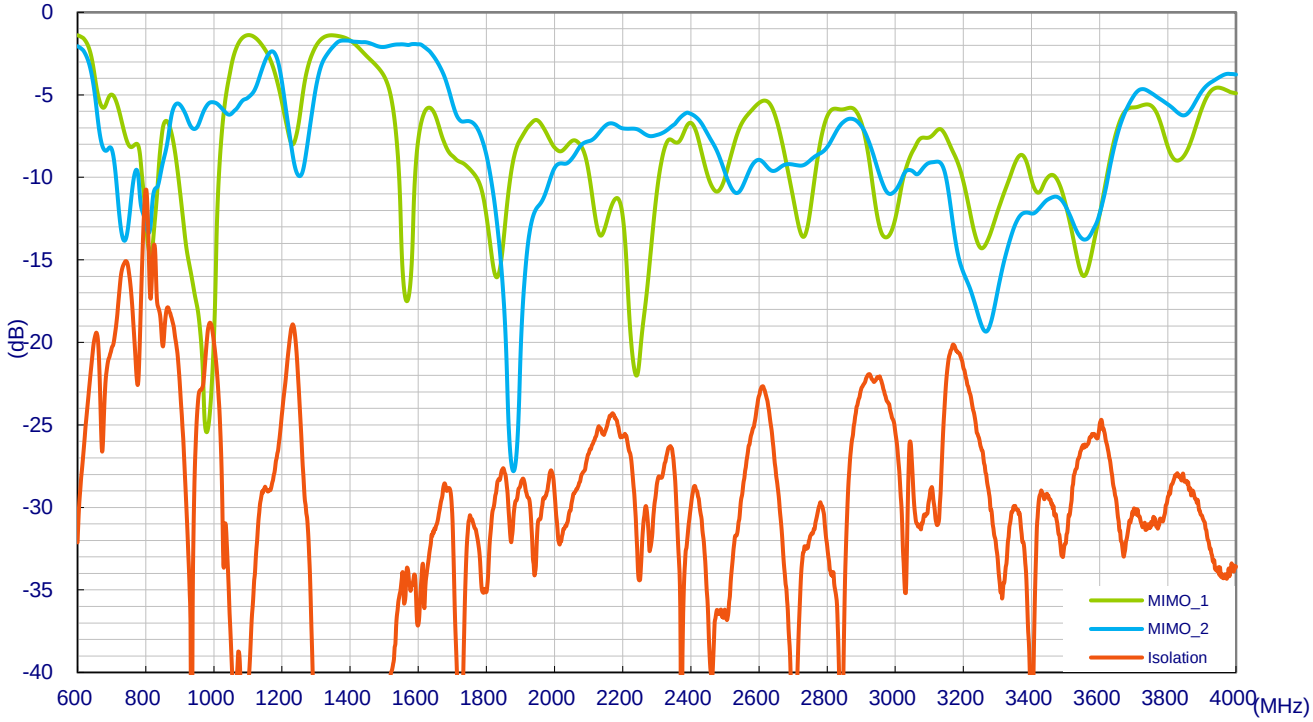
5G/4G Bands				
Band Number	5GNR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA			
	Uplink	**Downlink**	**Covered**	
			MIMO 1	**MIMO 2**
1	UL: 1920 to 1980	DL: 2110 to 2170	✓	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓	✓
5	UL: 824 to 849	DL: 869 to 894	✓	✓
7	UL: 2500 to 2570	DL:2620 to 2690	✓	✓
8	UL: 880 to 915	DL: 925 to 960	✓	✓
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗	✗

12	UL: 699 to 716	DL: 729 to 746	✓	✓
13	UL: 777 to 787	DL: 746 to 756	✓	✓
14	UL: 788 to 798	DL: 758 to 768	✓	✓
17	UL: 704 to 716	DL: 734 to 746	✓	✓
18	UL: 815 to 830	DL: 860 to 875	✓	✓
19	UL: 830 to 845	DL: 875 to 890	✓	✓
20	UL: 832 to 862	DL: 791 to 821	✓	✓
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✓	✓
23	UL:2000 to 2020	DL: 2180 to 2200	✓	✓
24	UL:1625.5 to 1660.5	DL: 1525 to 1559	✗	✗
25	UL: 1850 to 1915	DL: 1930 to 1995	✓	✓
26	UL: 814 to 849	DL: 859 to 894	✓	✓
27	UL: 807 to 824	DL: 852 to 869	✓	✓
28	UL: 703 to 748	DL: 758 to 803	✓	✓
29	UL: -	DL: 717 to 728	✓	✓
30	UL: 2305 to 2315	DL: 2350 to 2360	✓	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5	✗	✗
32	UL: -	DL: 1452 – 1496	✗	✗
35	1850 to 1910		✓	✓
38	2570 to 2620		✓	✓
39	1880 to 1920		✓	✓
40	2300 to 2400		✓	✓
41	2496 to 2690		✓	✓
42	3400 to 3600		✓	✓
43	3600 to 3800		✓	✓
48	3550 to 3700		✓	✓
66	UL: 1710-1780	DL: 2110-2200	✓	✓
71	617 to 698		✗	✗
74/75/76	1427 to 1518		✗	✗
77	3300 to 4200		✓	✓
78	3300 to 3800		✓	✓
79	4400 to 5000		✗	✗

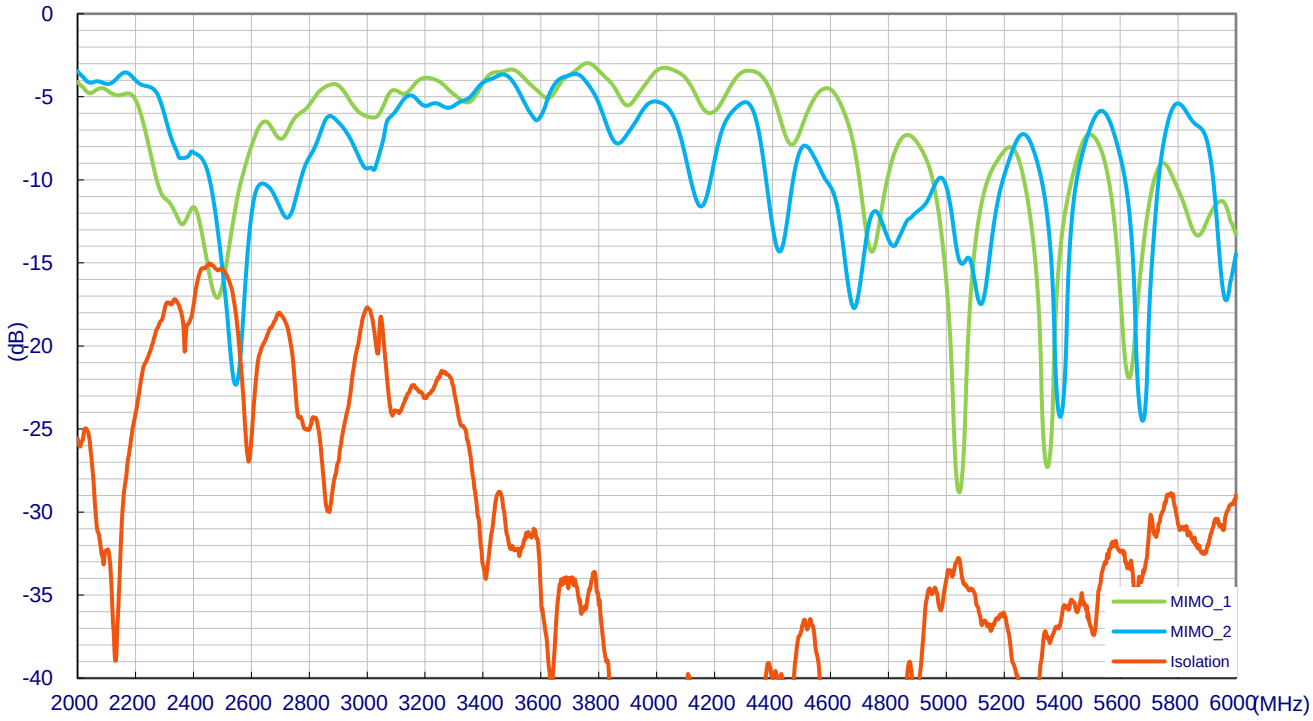
*Measured in Free space, with 300mm cable – covered bands represent greater than 20% efficiency
**Bands reference from 3GPP

3. Antenna Characteristics

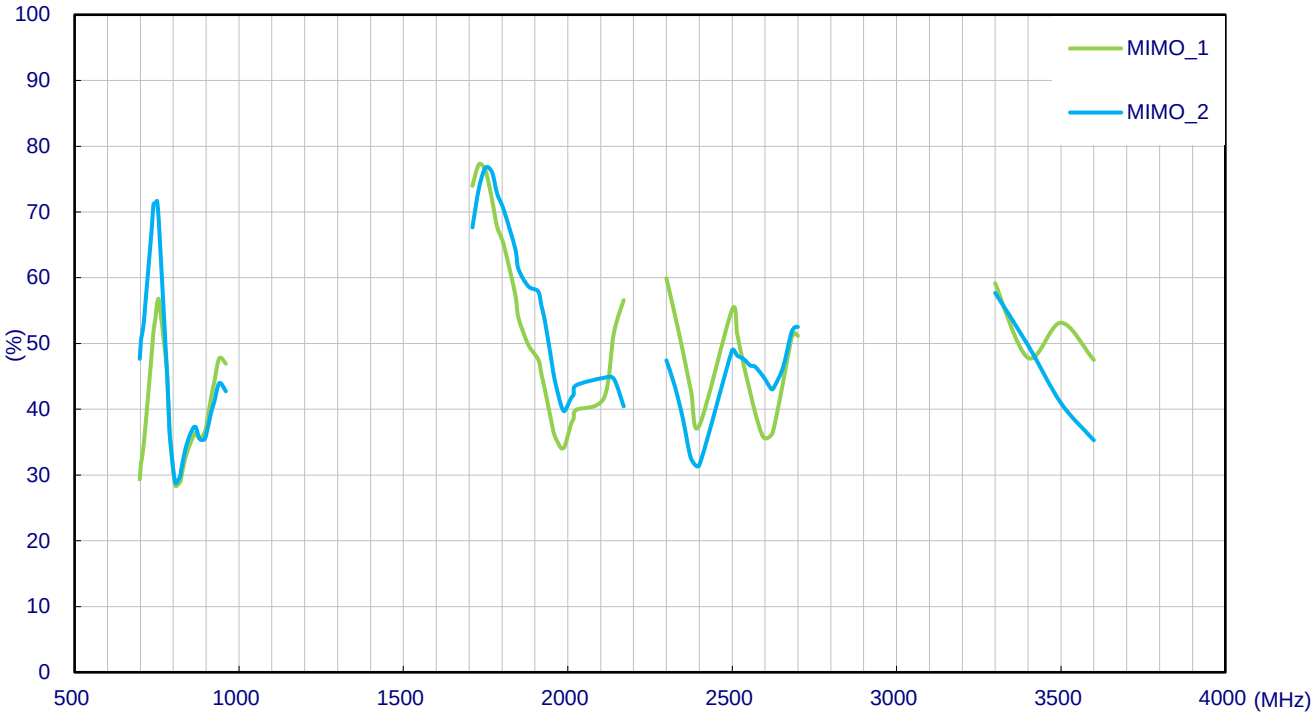
3.1 Return Loss – Cellular



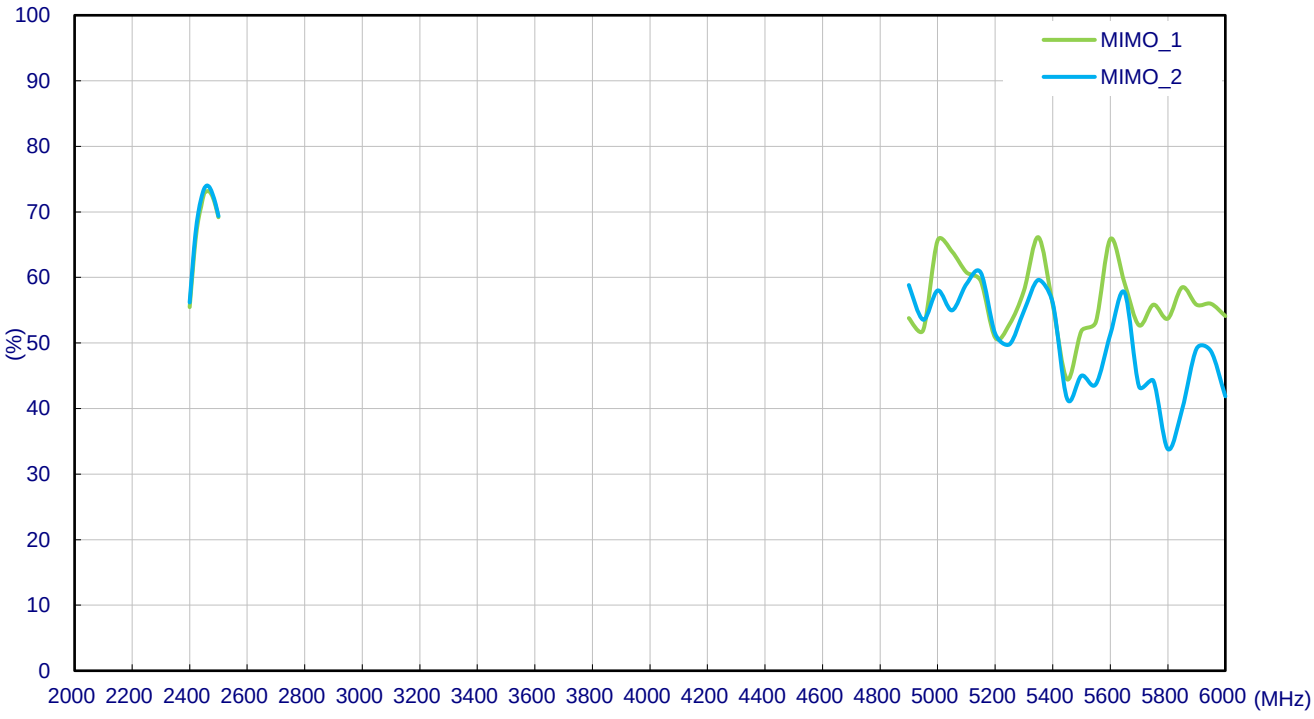
3.2 Return Loss – Wi-Fi



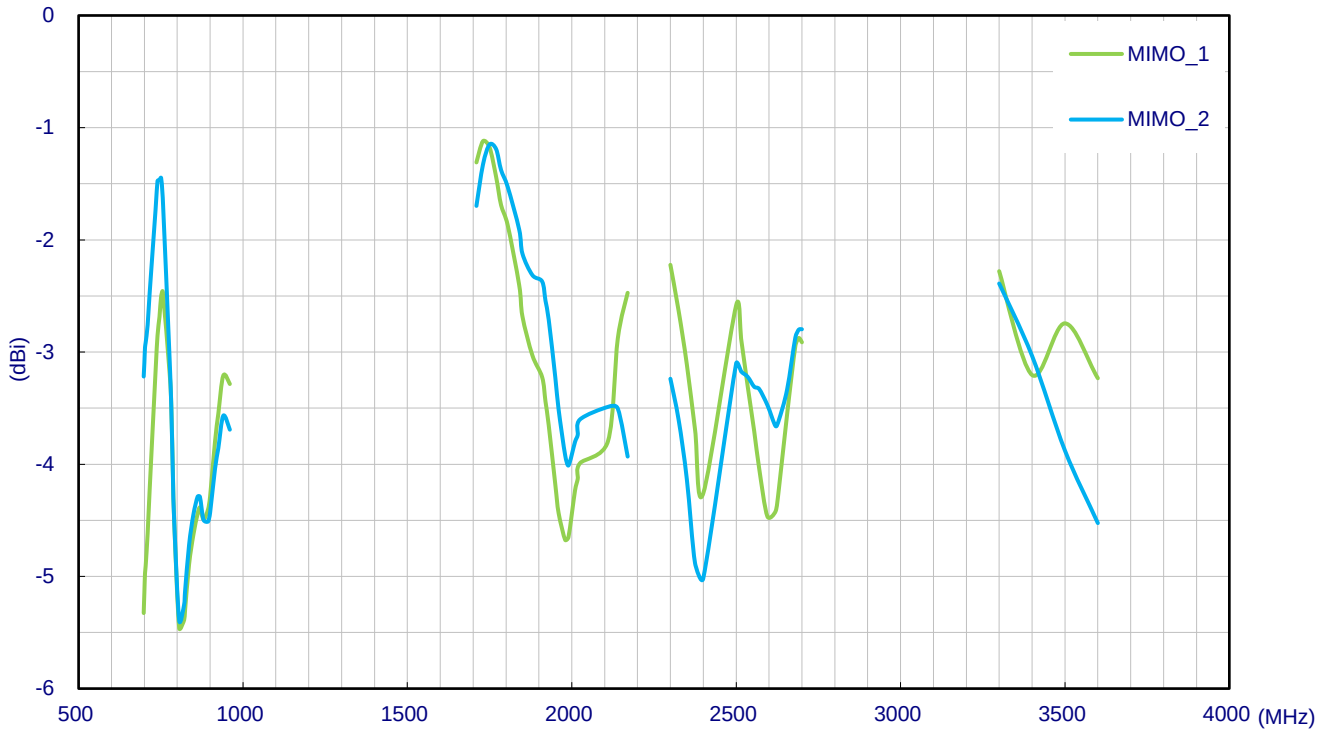
3.3 Efficiency – Cellular



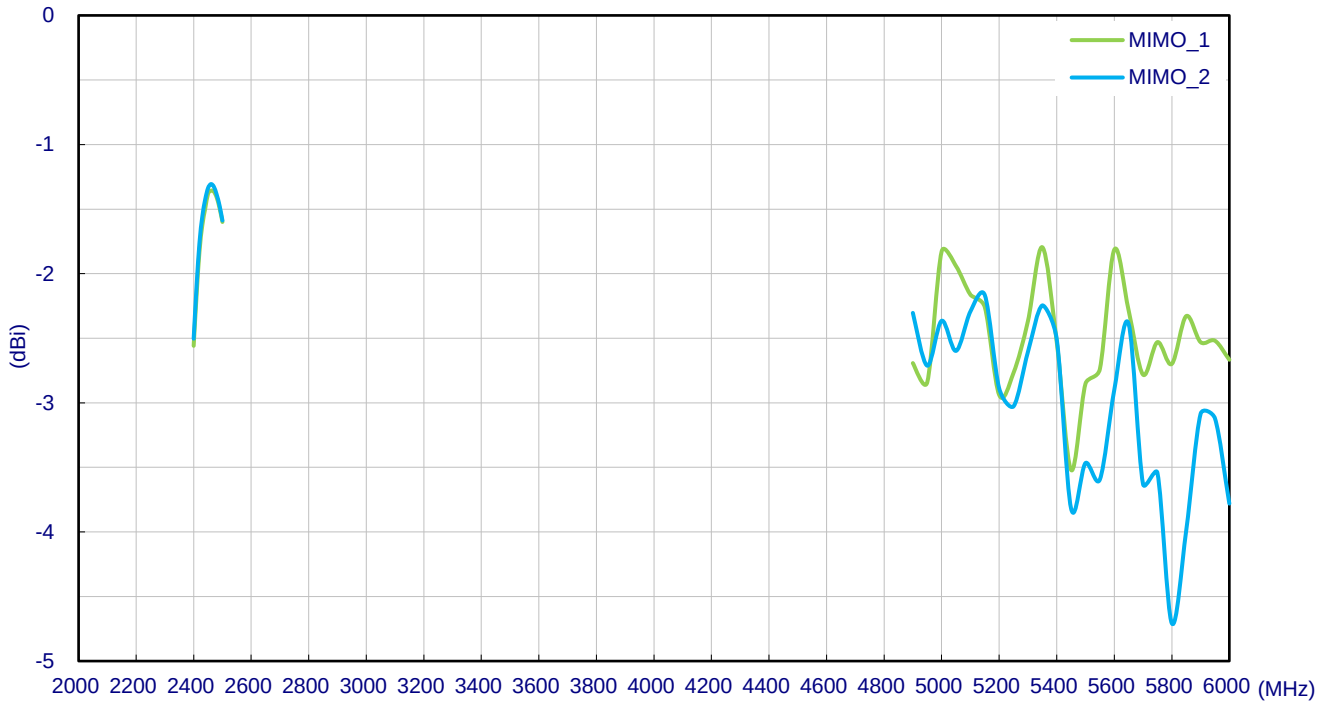
3.4 Efficiency – Wi-Fi



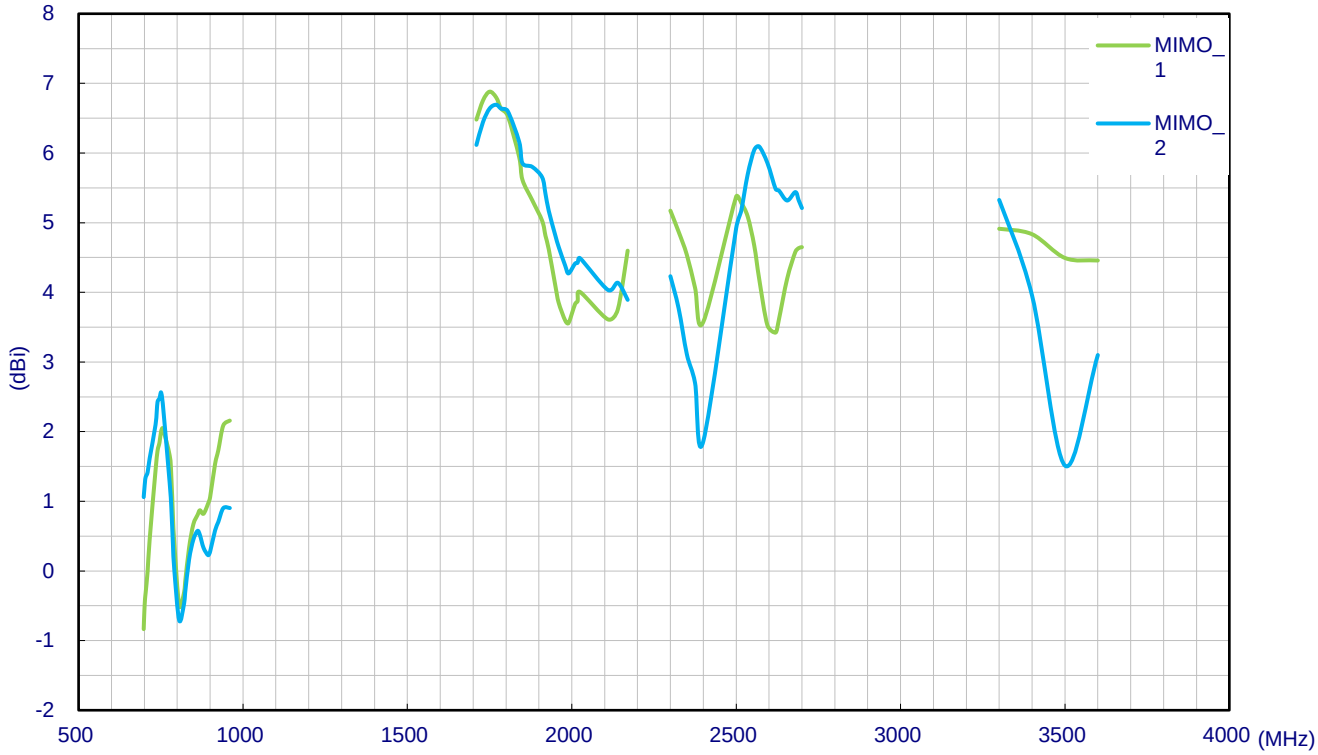
3.5 Average Gain – Cellular



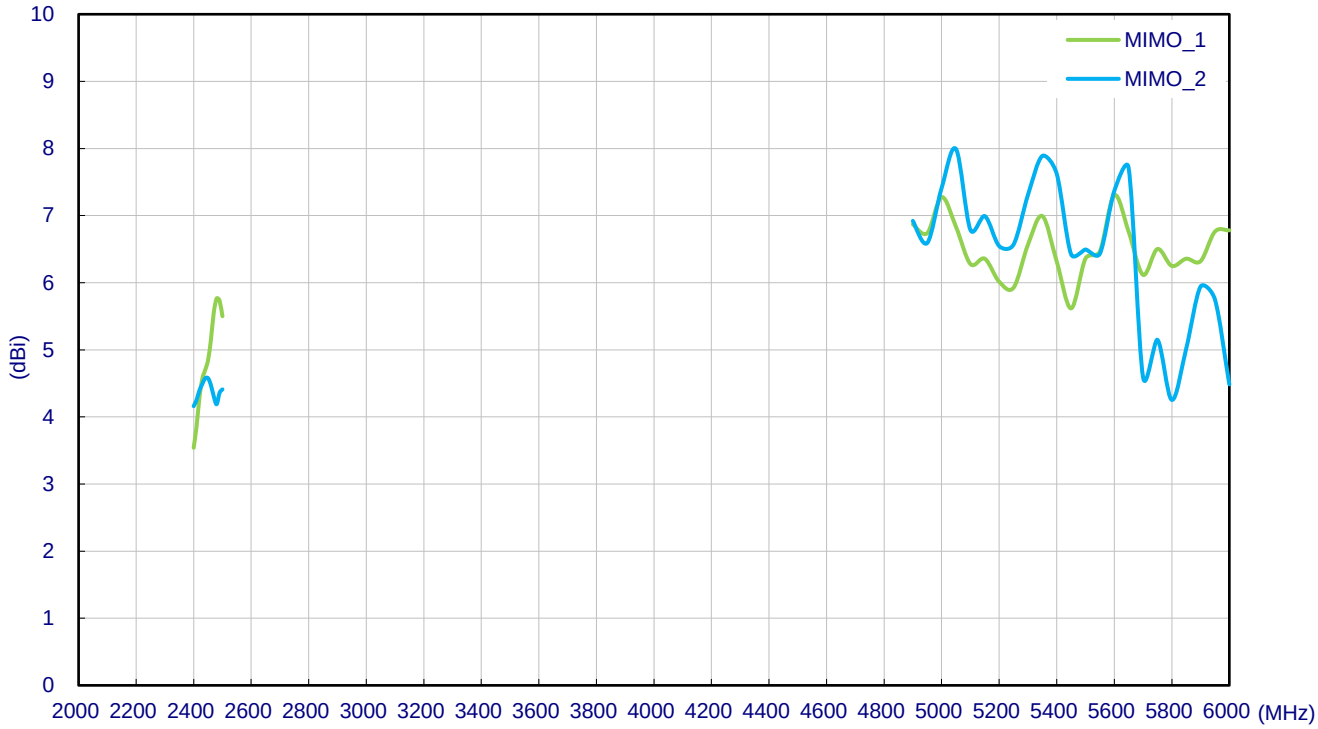
3.6 Average Gain – Wi-Fi



3.7 Peak Gain – Cellular

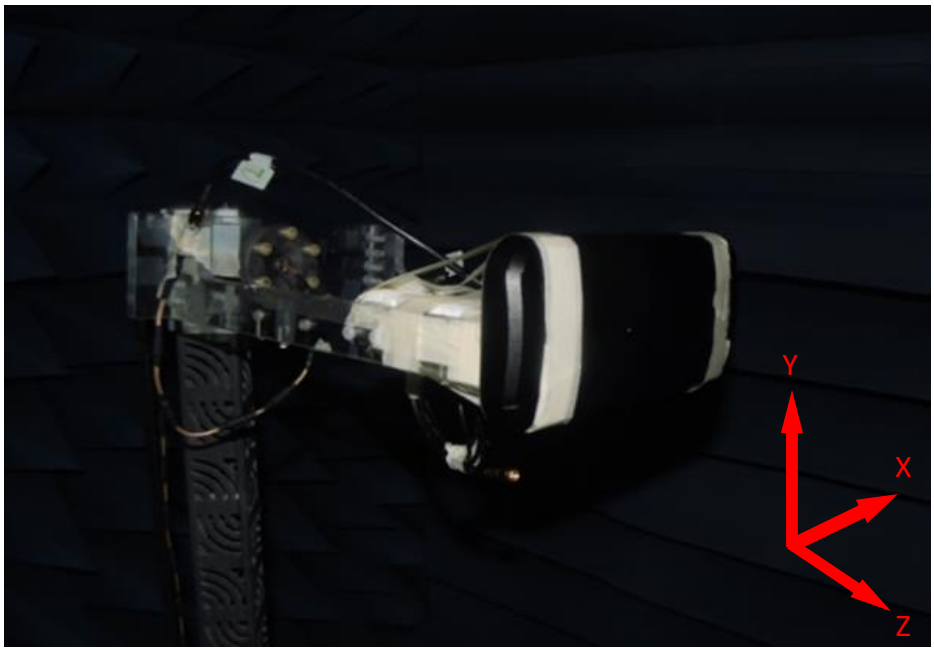


3.8 Peak Gain – Wi-Fi



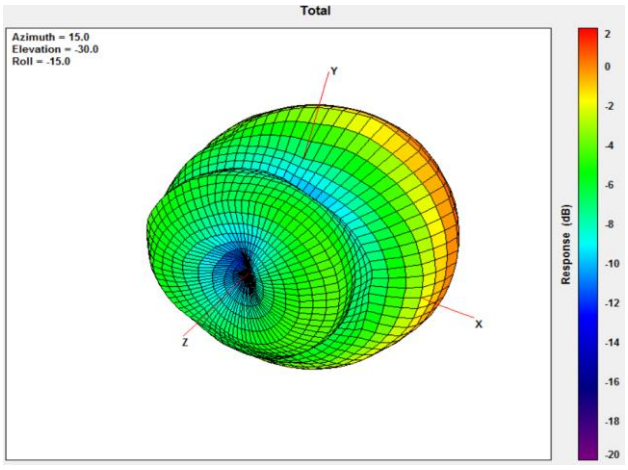
4. Radiation Patterns

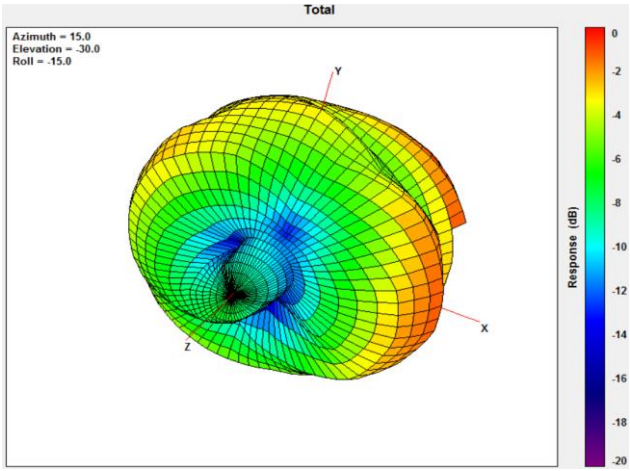
4.1 Test Setup – Free Space



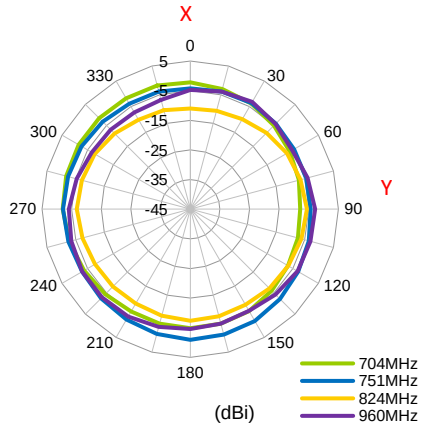
4.2 3D and 2D Radiation Patterns – Cellular MIMO 2

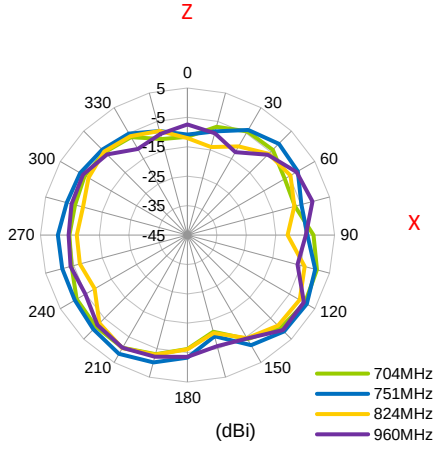
704-960MHz	
704MHz	960MHz

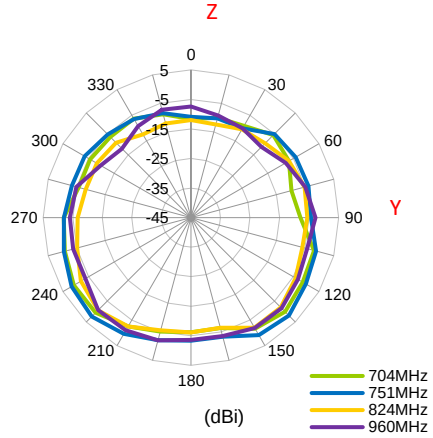




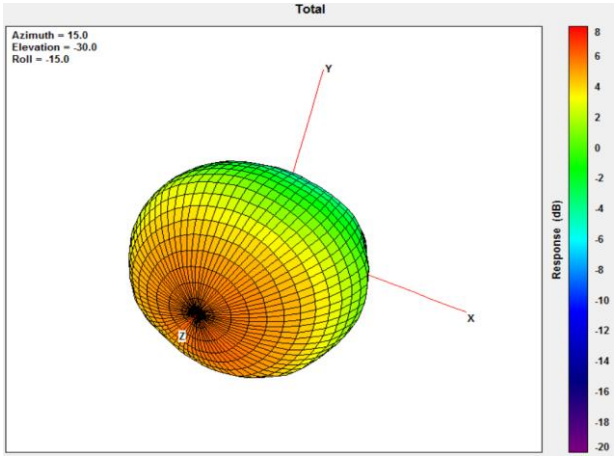
XY Plane	XZ Plane	YZ Plane

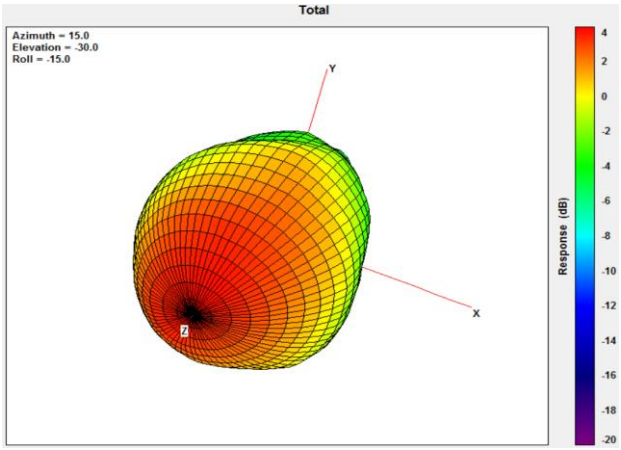




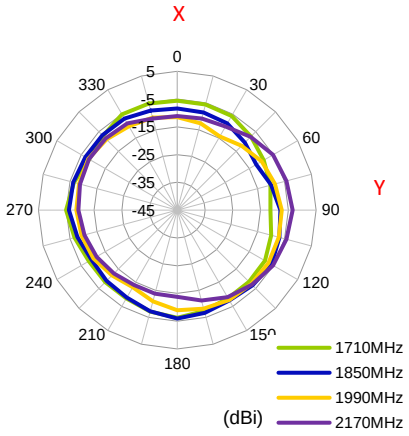


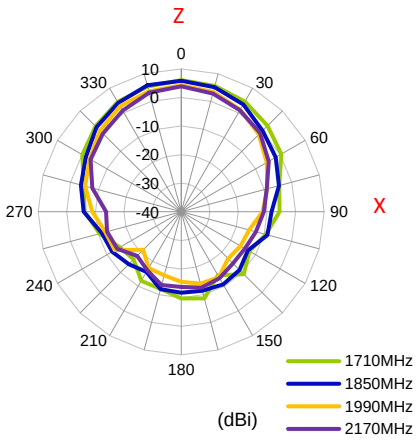
1710-2170MHz	
1710MHz	2170MHz

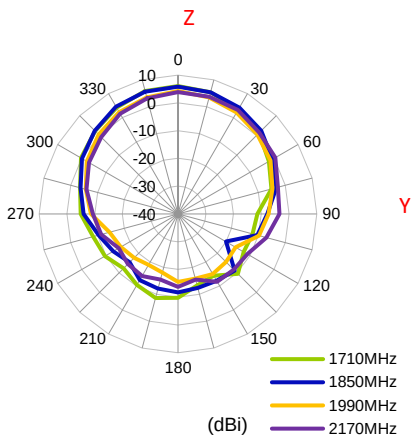




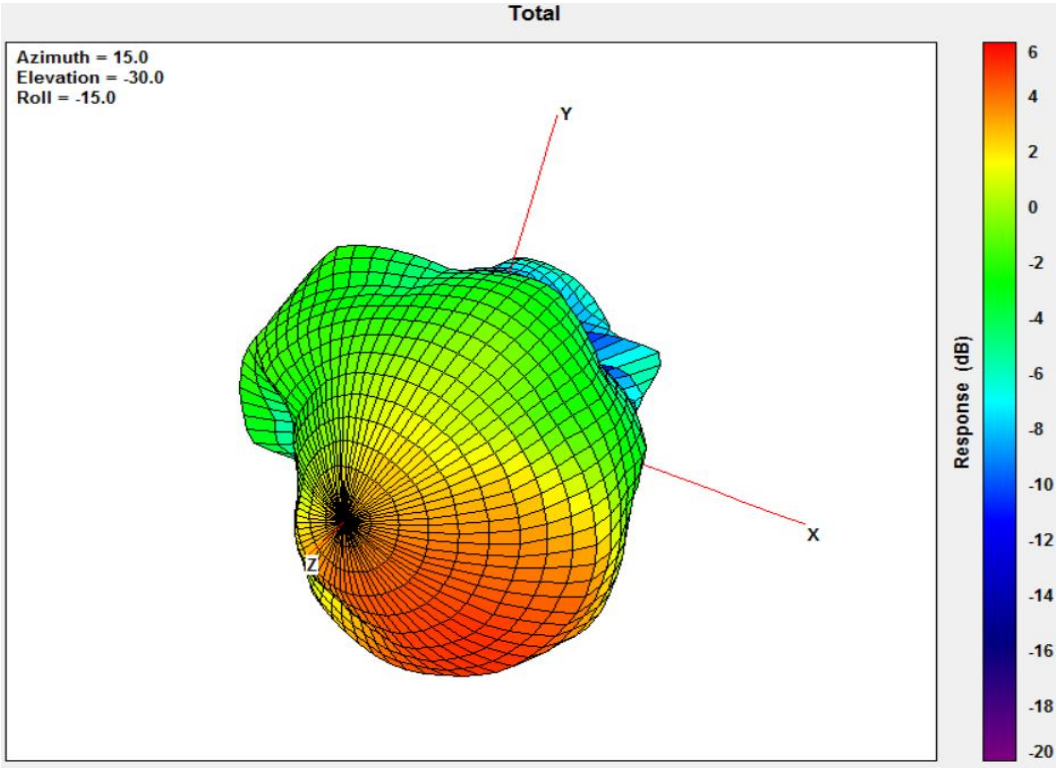
XY Plane	XZ Plane	YZ Plane



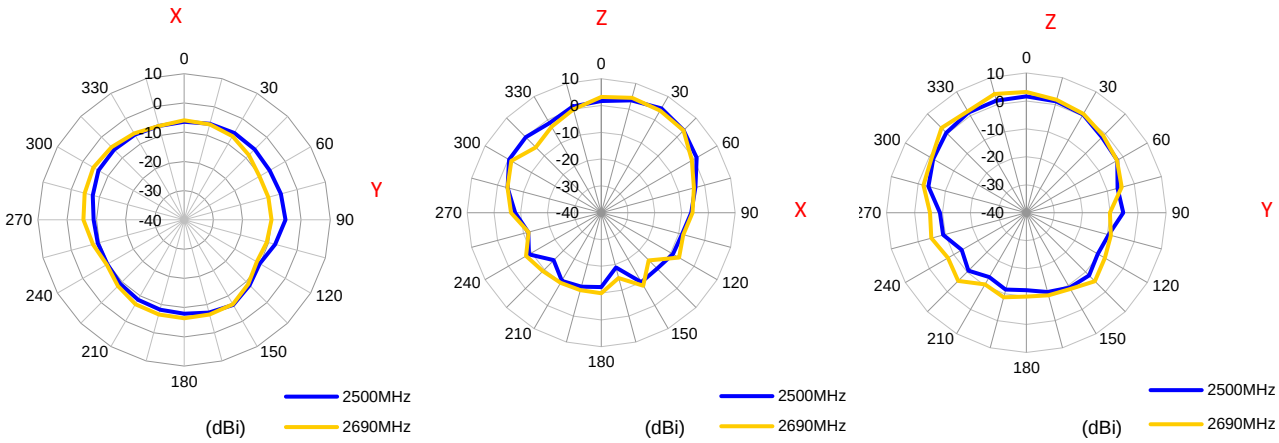




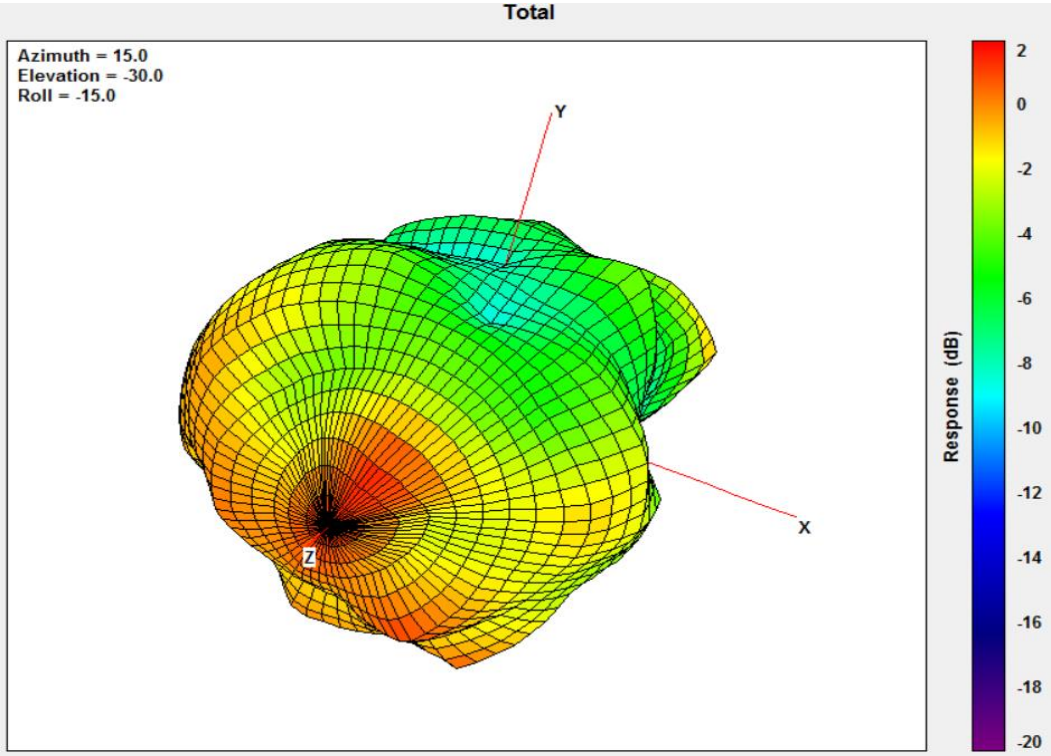
2690MHz

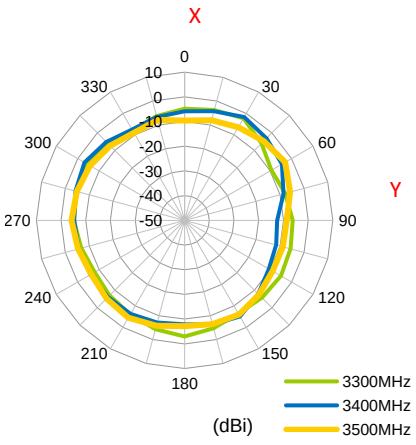
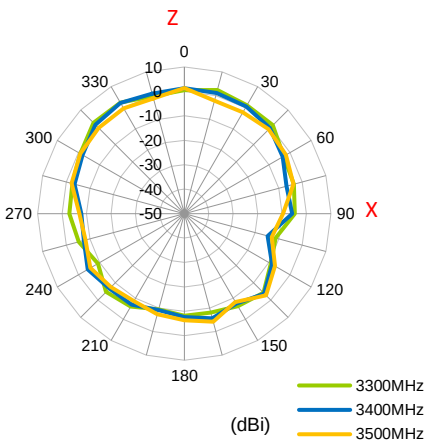
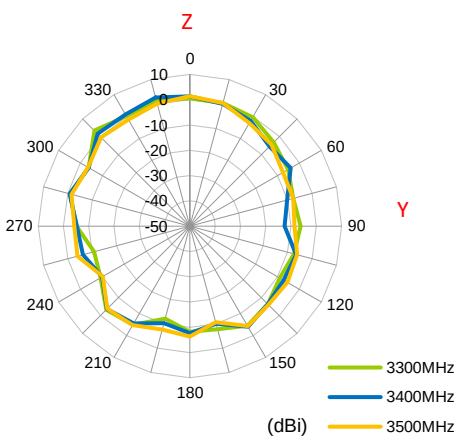


XY Plane	XZ Plane	YZ Plane



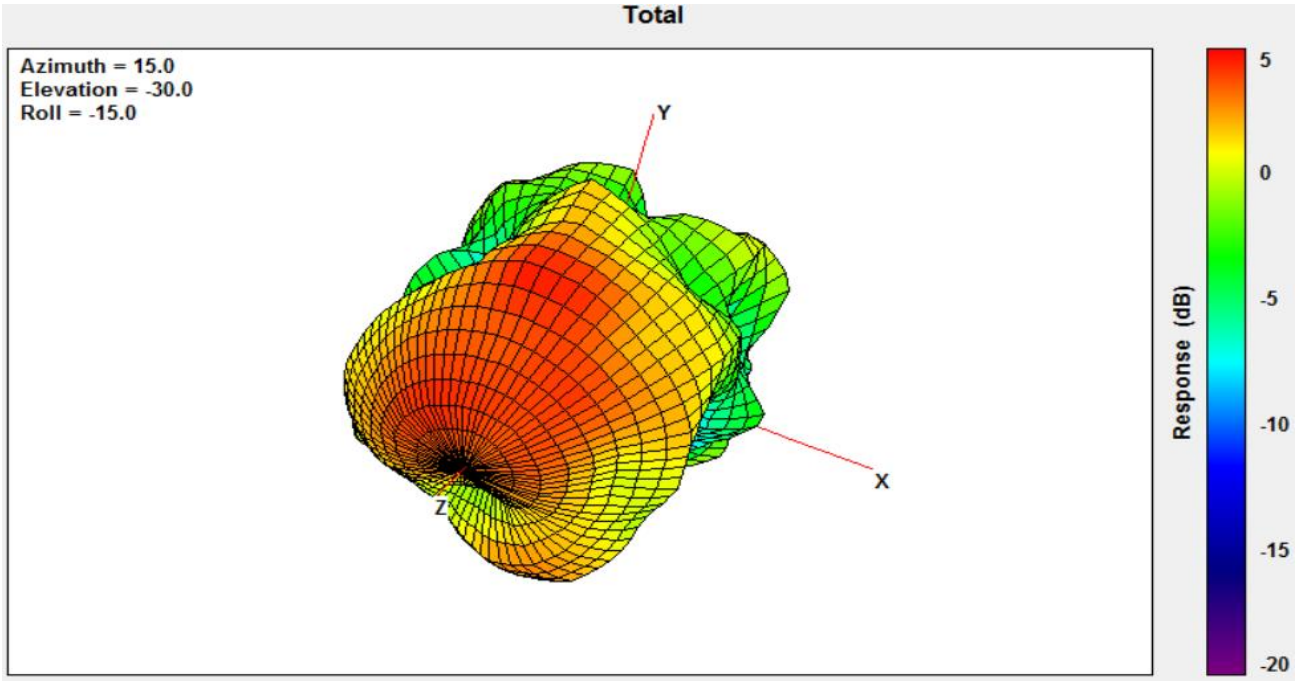
3500MHz



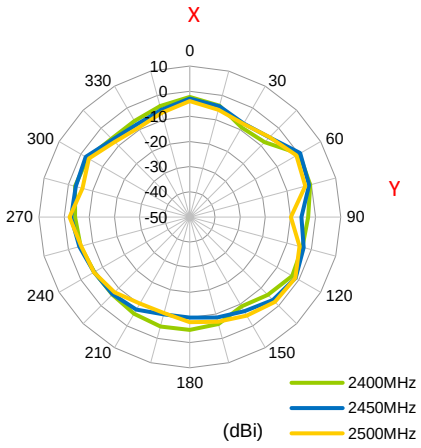
XY Plane	XZ Plane	YZ Plane
		

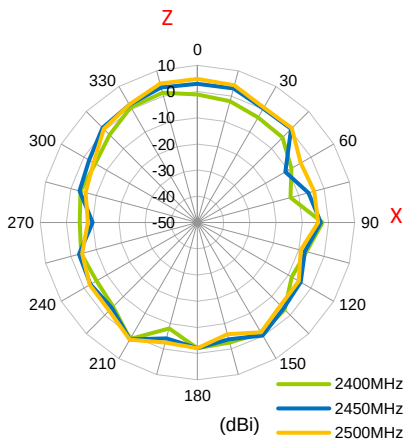
4.3 3D and 2D Radiation Patterns – Wi-Fi MIMO 1

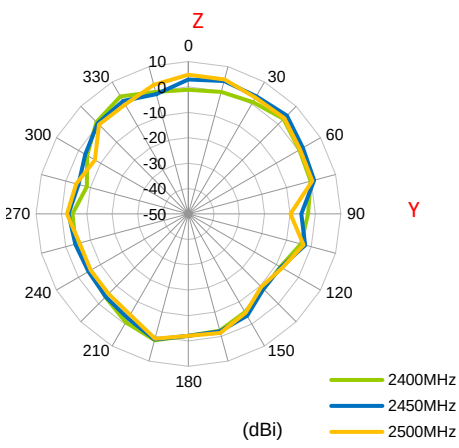
2450MHz



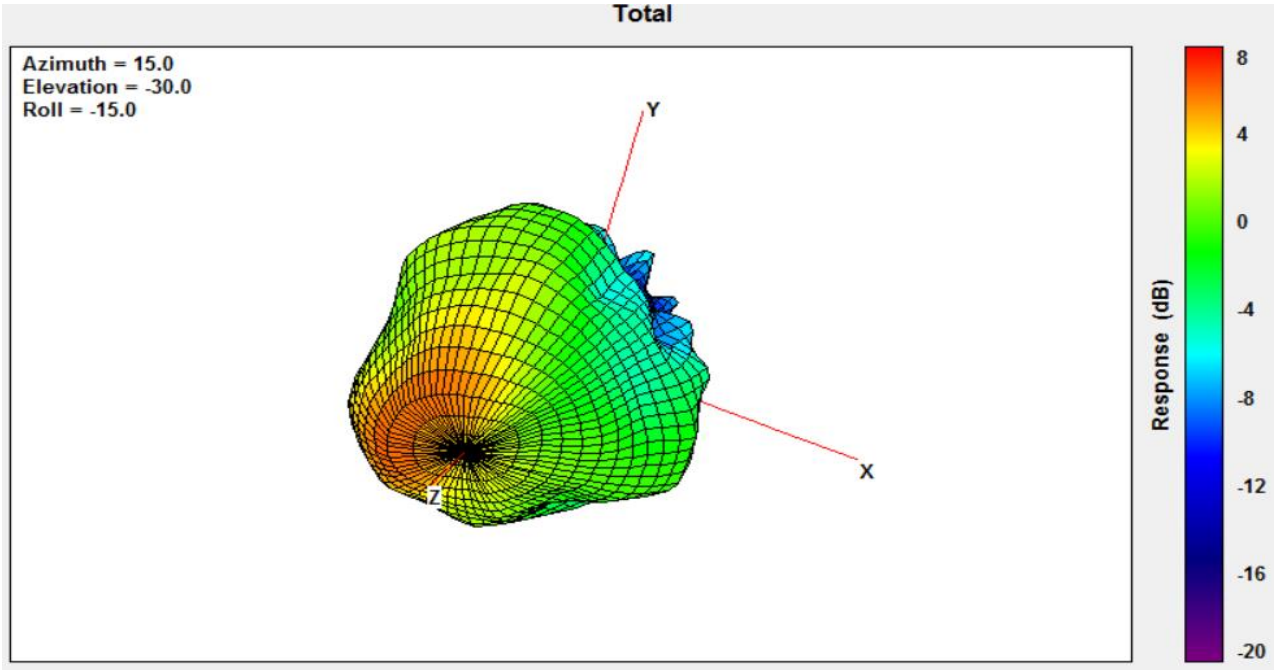
XY Plane	XZ Plane	YZ Plane



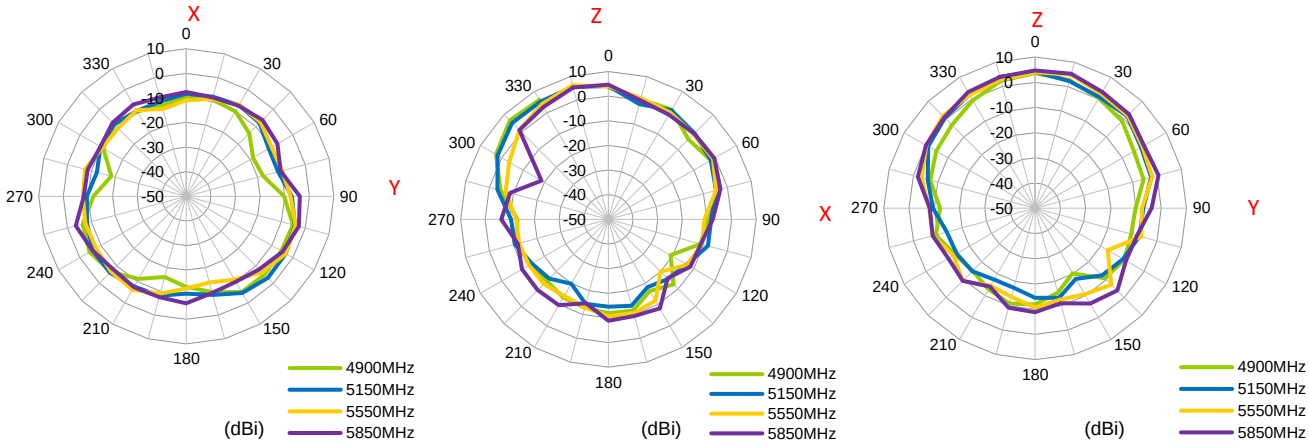




5550MHz

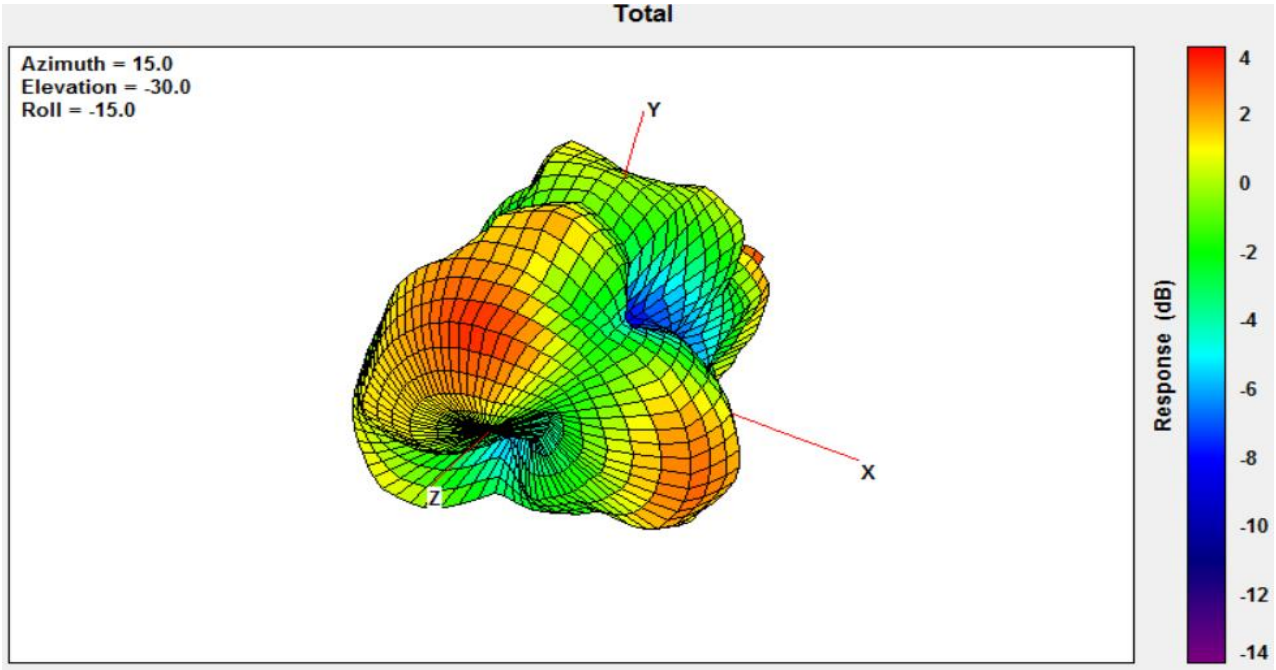


XY Plane	XZ Plane	YZ Plane

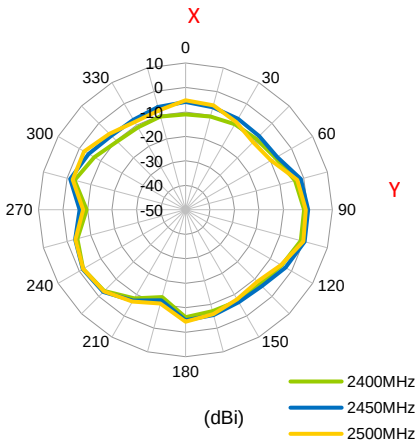


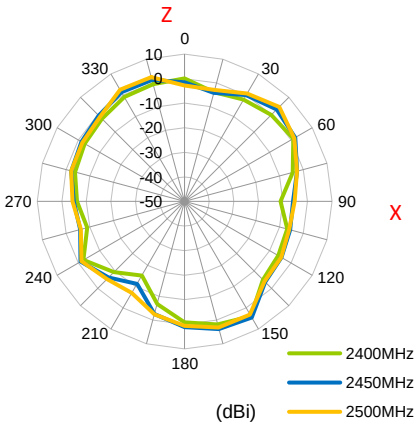
4.4 3D and 2D Radiation Patterns – Wi-Fi MIMO 2

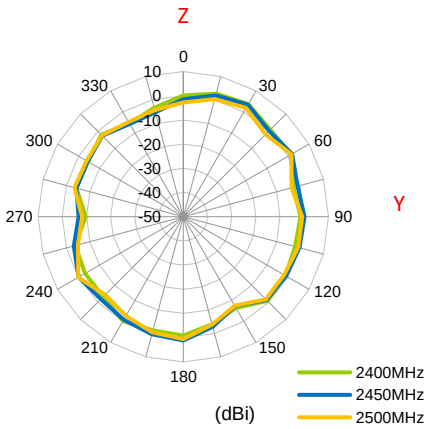
2450MHz



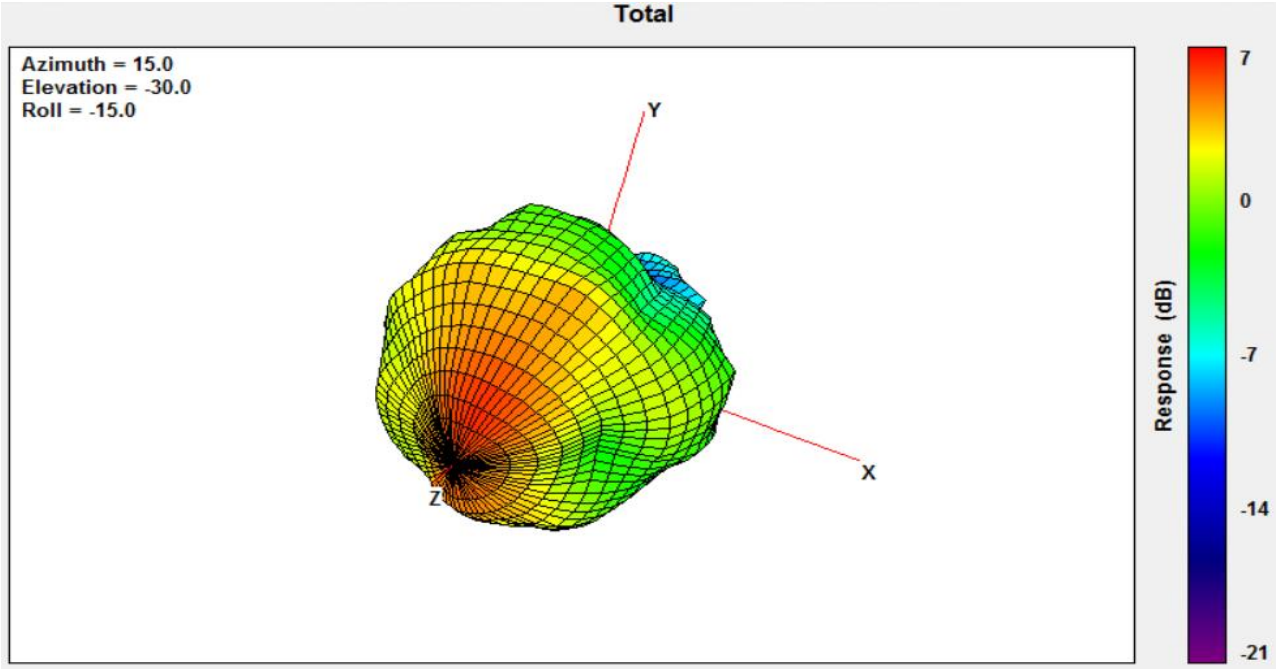
XY Plane	XZ Plane	YZ Plane



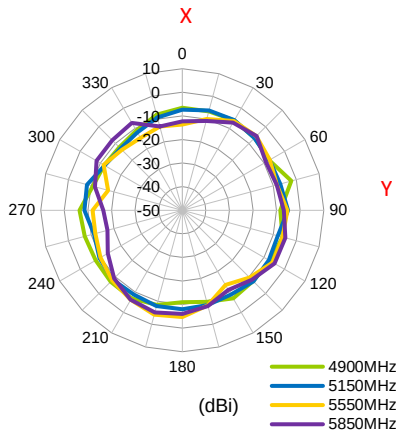




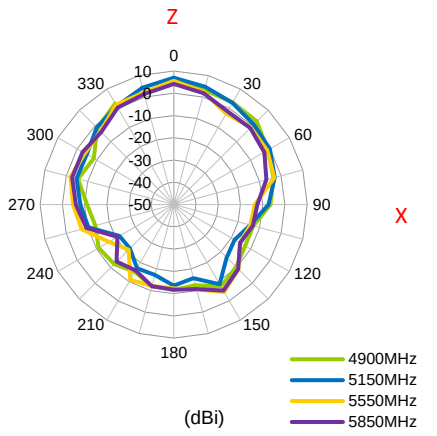
5550MHz



XY Plane



XZ Plane



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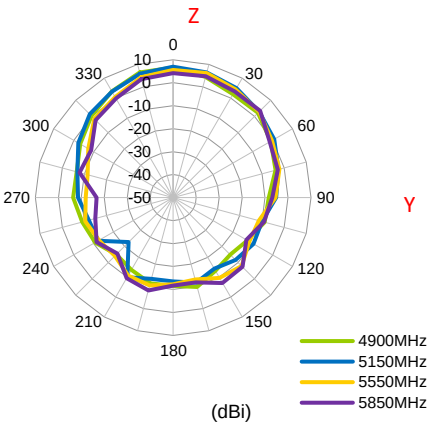
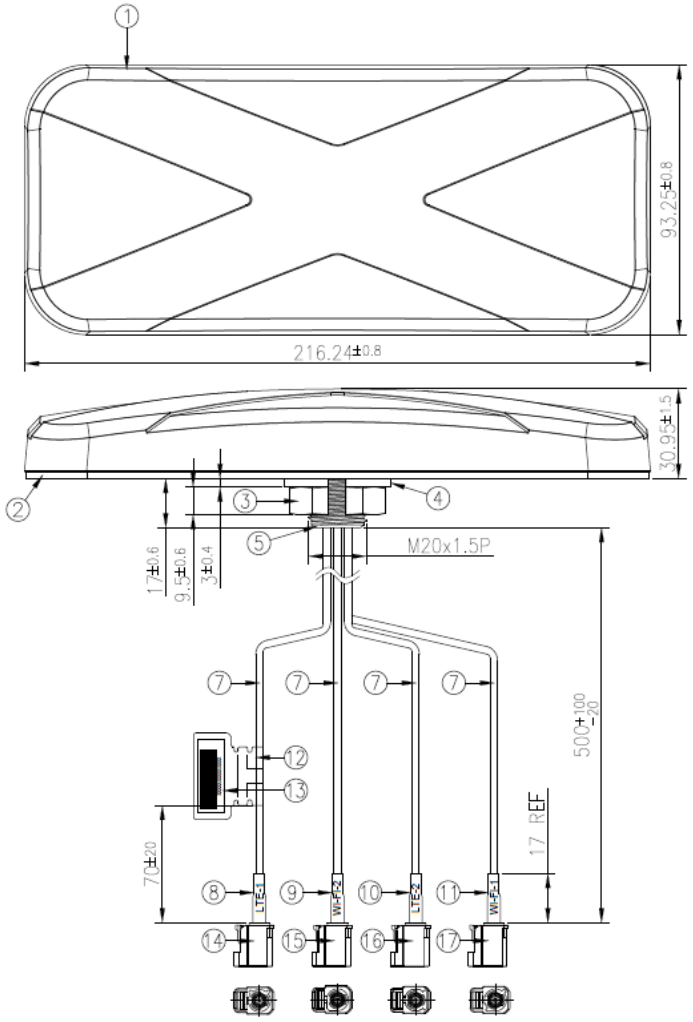
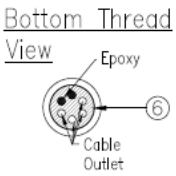


5. Mechanical Drawing (Units: mm)

ISO NO.: EDW-20-8-0784
STATE: Release
NOTES: 1. All material must be RoHS compliant.
2. Housing Color Codes: Pantone 432C

REV.	DESCRIPTION	ENG.	APPROVED	DATE
00	Initial Design	Ruby	Clark	2020/09/07





	Name	Material	Finish	QTY
1	Housing	ASA	Bluish Grey(432C)	1
2	Double Sided Adhesive(Black Foam)	3M 9448HCR-4305	White Liner	1
3	Nut_M20x1.5Px8.5H Cut	Steel Carbon	Ni-Zn Plated	1
4	Washer_Cut	Steel Carbon	Ni-Zn Plated	1
5	Metal Pipe	AL	Ni Plated	1
6	Cable Rubber	Silicone Rubber	Black	1
7	RG316 Coaxial Cable	FEP	Brown	4
8	Heat Shrink Tube (LTE-1)	PE	Red Tube/White Text	1
9	Heat Shrink Tube (Wi-Fi-2)	PE	Yellow Tube/Black Text	1
10	Heat Shrink Tube (LTE-2)	PE	Red Tube/White Text	1
11	Heat Shrink Tube (Wi-Fi-1)	PE	Yellow Tube/Black Text	1
12	Empty Label	PEVA	White	1
13	Barcode Label	PET	White	1
14	FAKRA CODE D	PA66	Violet	1
15	FAKRA CODE E	PA66	Green	1
16	FAKRA CODE L	PA66	Carmine Red	1
17	FAKRA CODE I	PA66	Beige	1

APPROVED BY:	Clark
CHECK BY:	Aaron
DRAWN BY:	Ruby
DATE:	2020/09/07
UNLESS OTHERWISE SPECIFIED TOLERANCES ON:	XX±0.5 X.X±0.2 X.XX±0.1 X.XXX±0.05
THIRD ANGLE PROJECTION	

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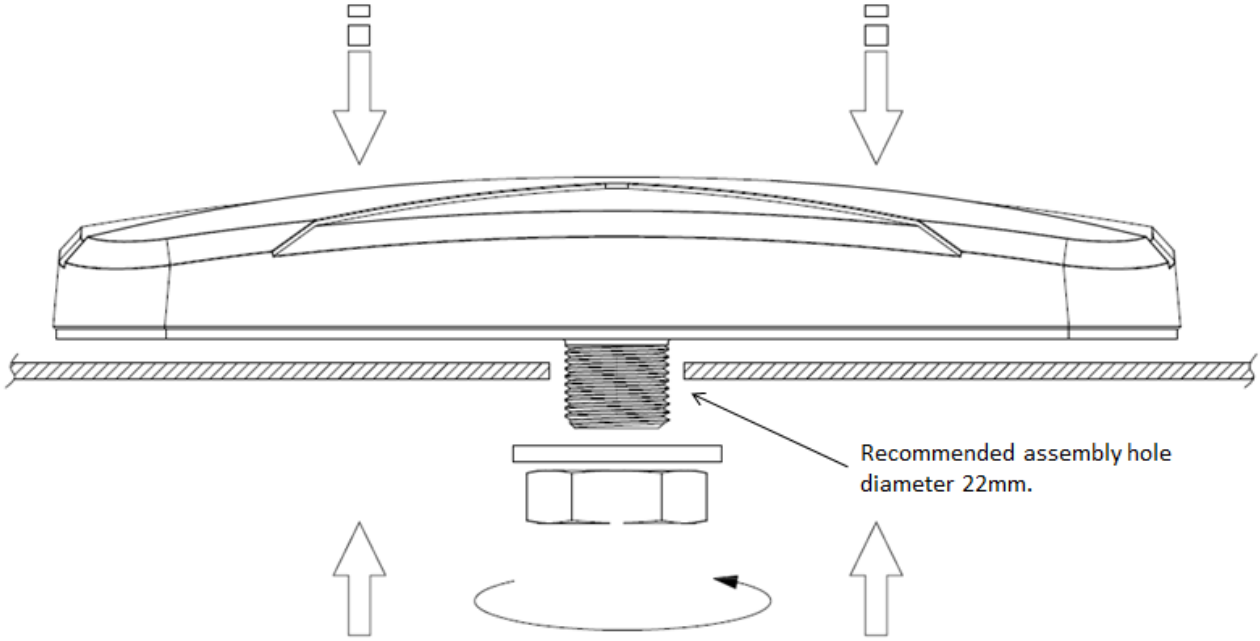
TITLE : Storm 4in1 500mm RG316 LTE1 FAKRA D LTE2 FAKRA L Jack WiFi1 FAKRA I Jack WIFI2 FAKRA E Jack

PART NO. : MA491.A.BICG.005.gb

UNIT:	SCALE:	PAGES:	REV.
mm	1:2	1/1	D01

6. Installation



Recommended toque for mountlng ls 29.4 N.m or 300 kgf.cm
Maximun toque for mounting is 39.2 N.m or 400 kgf.cm

7. Packaging

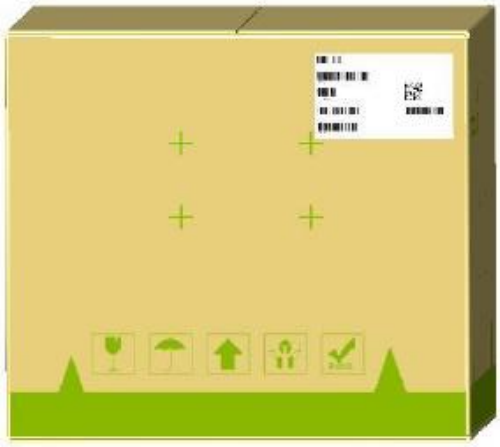
☑ 1 PCS / BOX

☑ “8” Shape Cable Winding

☑ EPE Foam

☑ SPQ Label

☑ Carton(mm): 325x125x106



☑ 9 PCS / Carton

☑ Carton(mm): 360x360x400

☑ Carton Label

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