TAOGLAS



Datasheet

Raptor X Series

Part No:
MA8005.A.001

Description

Raptor X - 5-in-1 Screwmount Antenna with GNSS - 2m RG-174, SMA(M) and 4* 5G – 2m TGC-302, SMA(M)

Features:

1* GNSS Covering L1/L5 Bands
4* 5G/4G Cellular Covering 600-6000MHz
Dimensions : 350mm x 70mm x 39mm
M22 Thread Mount
IP69K Rated Enclosure
Cables: GNSS with 2m RG-174 and 5G/4G with 2m TGC-302
Connector: GNSS with SMA(M) and 5G/4G with SMA(M)
Custom Cables and Connectors Available
RoHS & Reach Compliant

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1. Introduction



Introducing the Taoglas Raptor X MA8005, a low-profile, sleek, 5-in-1 combination antenna engineered for the next generation of routers and gateways. The advanced combination antenna offers dual-band GNSS L1/L5 for exceptional navigational positional accuracy and high-efficiency 5G/4G wideband cellular connectivity spanning 600-6000MHz for superior mobile connectivity.

The Raptor X boasts a compact form factor of just 350 x 70 x 39mm, setting a new market standard for products containing up to 10 antennas. With a height of only 39mm, it is ideal for vehicle roof installations where height constraints are common, typically below 80mm. Its sleek, 70mm design allows it to fit seamlessly on various NEMA cabinets and between the ribs on many vehicle roofs. The MA8005 has an extremely robust IP69K rated enclosure allowing for the most demanding of use cases and applications.

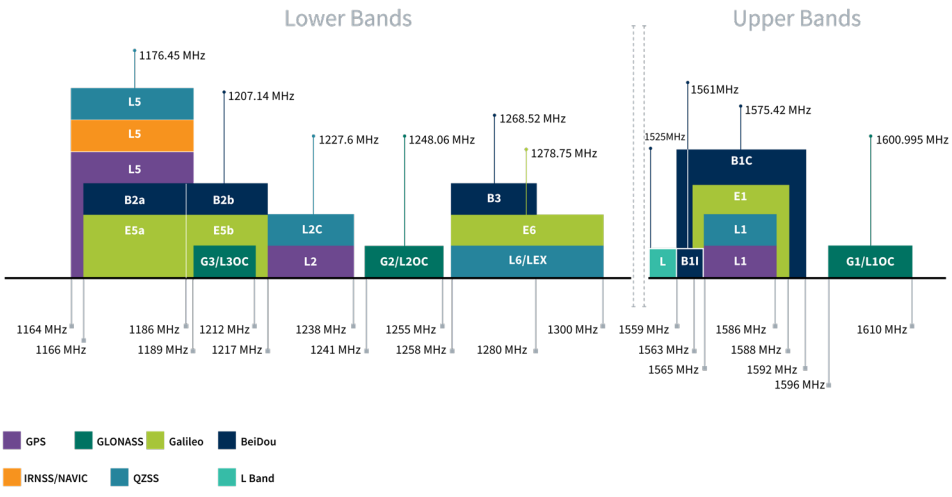
Typical applications include:
- Emergency and First Responder Vehicles
- EV Charger Stations
- Smart Industry and Warehouse Applications
- Private LTE Networks

The MA8005, part of the Raptor X series, offers customization with up to ten connections, one GNSS, four cellular, and five Wi-Fi antennas tailored for specific routers and customer configurations. All cables and connectors can be fully customized to meet your unique requirements.

For further information on how to integrate the Raptor X or for orders, please contact your regional Taoglas customer support team.

2. Specification

GNSS Frequency Bands					
GPS	L1 1575.42 MHz	L2 1227.6 MHz	L5 1176.45 MHz		
	■	□	■		
GLONASS	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz		
	■	□	□		
Galileo	E1 1575.24 MHz	E5a 1176.45 MHz	E5b 1201.5 MHz	E6 1278.75 MHz	
	■	■	□	□	
BeiDou	B1C 1575.42 MHz	B1I 1561 MHz	B2a 1176.45 MHz	B2b 1207.14 MHz	B3 1268.52 MHz
	■	■	■	□	□
L-Band	L-Band 1542 MHz				
	□				
QZSS (Regional)	L1 1575.42 MHz	L2C 1227.6 MHz	L5 1176.45 MHz	L6 1278.75e6	
	■	□	■	□	
IRNSS (Regional)	L5 1176.45 MHz				
	■				
SBAS	L1/E1/B1 1575.42 MHz	L5/B2a/E5a 1176.45 MHz	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz
	■	■	■	□	□



Bands and Constellations Table

GNSS Electrical				
Frequency (MHz)	GPS_L5	BeiDou_B1	GPS_L1	GLONASS_G1
	1164-1189	1559-1592	1565-1586	1596-1610
Average Gain (dB)	-2.95	-2.00	-1.77	-2.62
Efficiency (%)	50.7	63.0	66.5	54.7
Peak Gain (dBi)	2.49	3.93	3.93	3.38
Axial Ratio at Zenith	5	4.8	11.7	13.1
Impedance	50 Ω			
Polarization	RHCP			

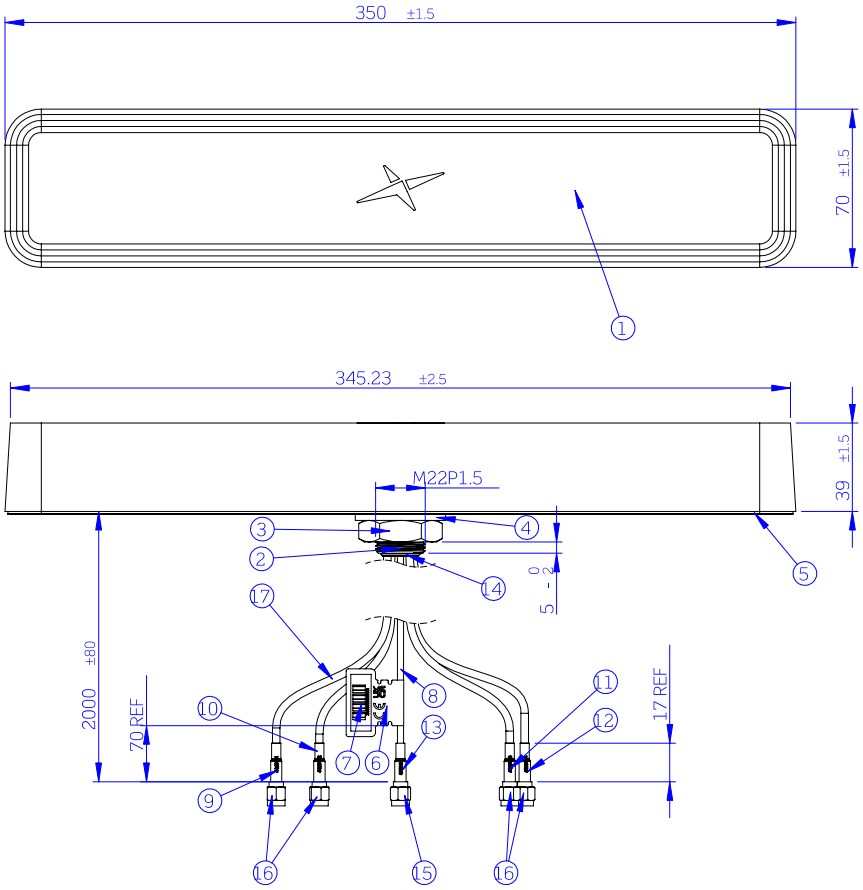
LNA and Fi5G/4Gr Electrical Properties (3.3V Typ.)			
Frequency (MHz)		High-Band	Low-Band
LNA Gain (dB)		32.3	26.3
Current Consumption (mA)		16.8	
Outer Band Attenuation (dB)	At 500 ~ 1000 MHz	60 dB	
	At 2000 ~ 2690MHz	60 dB	
	At 3300~ 6000MHz	60 dB	
Output Impedance		50 ohm	
Input Voltage(V)		+1.8 to 5.5	

5G/4G Electrical								
Band	**Frequency (MHz)**	**Set-up**	**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**Impedance**	**Polarization**	**Radiation Pattern**
5G NR Band 71	617-698	4G5G-1	49.8	-3.03	0.87	50 Ω	Linear	Omni
		4G5G-2	36.6	-4.37	0.91			
		4G5G-3	36.4	-4.38	1.03			
		4G5G-4	44.5	-3.52	2.25			
5G/4G700	698-824	4G5G-1	49.7	-3.04	2.94			
		4G5G-2	39.5	-4.03	2.11			
		4G5G-3	35.4	-4.51	1.97			
		4G5G-4	50.3	-2.99	2.25			
GSM800 900	824-960	4G5G-1	50.8	-2.94	2.64			
		4G5G-2	43.7	-3.60	2.18			
		4G5G-3	37.5	-4.26	2.17			
		4G5G-4	48.0	-3.19	2.25			
5G NR Band 1500	1427-1518	4G5G-1	27.9	-5.54	1.01			
		4G5G-2	27.8	-5.56	1.21			
		4G5G-3	24.5	-6.10	1.11			
		4G5G-4	26.7	-5.74	0.99			
5GNR N66	1710-2200	4G5G-1	47.7	-3.21	5.15			
		4G5G-2	53.7	-2.70	5.44			
		4G5G-3	51.2	-2.91	5.63			
		4G5G-4	42.5	-3.72	4.65			
5G/4G2600	2300-2690	4G5G-1	45.2	-3.45	6.16			
		4G5G-2	56.8	-2.45	6.97			
		4G5G-3	52.6	-2.79	6.72			
		4G5G-4	47.0	-3.28	6.15			
5GNR N77	3300-4200	4G5G-1	63.8	-1.95	6.23			
		4G5G-2	63.1	-2.00	6.78			
		4G5G-3	59.7	-2.24	7.74			
		4G5G-4	61.2	-2.13	5.97			
5GNR N78	3300-3800	4G5G-1	64.2	-1.92	6.23			
		4G5G-2	63.5	-1.97	6.78			
		4G5G-3	60.3	-2.20	7.74			
		4G5G-4	61.7	-2.10	5.97			
5GNR N79	4400-5000	4G5G-1	49.9	-3.02	5.49			
		4G5G-2	51.2	-2.91	6.77			
		4G5G-3	52.9	-2.76	5.80			
		4G5G-4	45.4	-3.43	5.96			
5G/4G5200	5150-5925	4G5G-1	48.9	-3.11	5.76			
		4G5G-2	41.2	-3.86	4.93			
		4G5G-3	43.5	-3.62	6.48			
		4G5G-4	40.1	-3.97	4.44			
***Tested with 0.3m of Cable on a 30x30cm Ground Plane**								

Mechanical	
Dimensions	350mm * 70mm * 39 mm
Weight	0.76Kg
Material	ASA
Connector	GNSS: SMA(M), 5G/4G: SMA(M)
Cable	GNSS: 2m of RG-174, 5G/4G: 2m of TGC-1.5DS

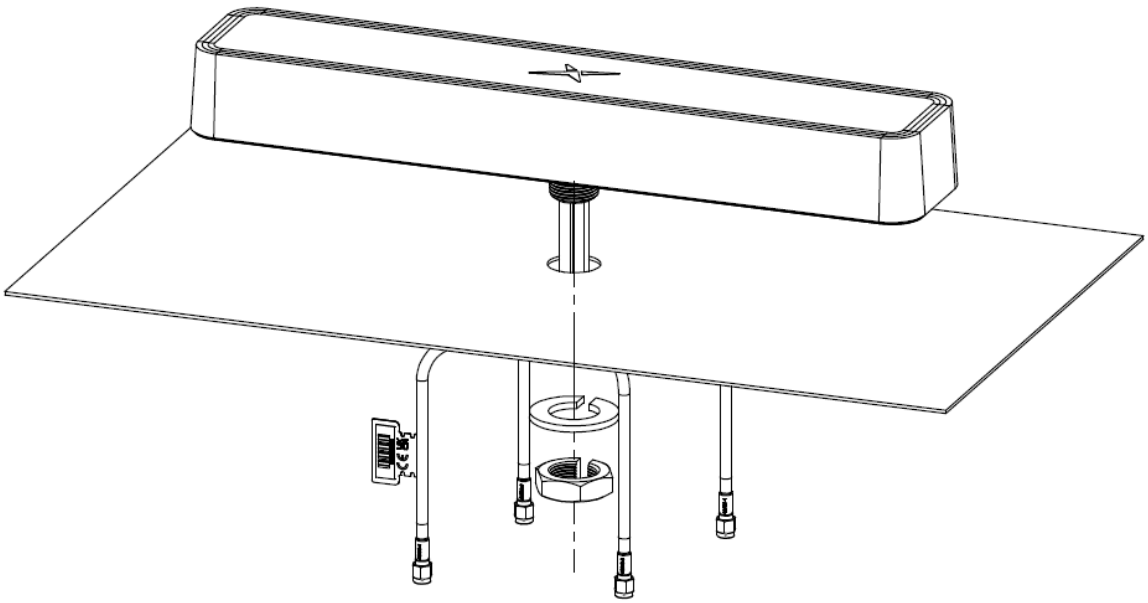
Environmental	
Waterproof Rating	IP69K
Temperature Range	-40°C to + 85°C
Humidity	Non-condensing 65°C 95% RH

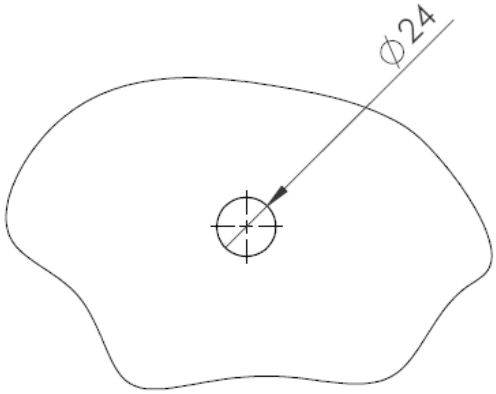
3. Mechanical Drawing



	Name	P/N	Material	Finish	Qty
1	Top Housing	000122K000000A	ASA	Black	1
2	Metal Stem	000323B000000A	Zinc Alloy	Ni Plated	1
3	Nut_M22x1.5P	000422K000000A	Steel	Ni-Zn Plated	1
4	Washer_M22	000422I010000A	Steel	Ni-Zn Plated	1
5	Double Side Adhesive	001022K010000A	3M 9448HK + CR4305 2t	Black	1
6	CE,WEEE and UKCA mark Label	001022C010000A	PEPA	White	1
7	Barcode Label	001015G010000A	PET	White	1
8	RG174 Coaxial Cable	301315C000000A	PVC	Black	1
9	Heat Shrink Tube(4G/5G-1)	001319G000000A	PE	Red Tube/White Text	1
10	Heat Shrink Tube(4G/5G-2)	001319G010000A	PE	Red Tube/White Text	1
11	Heat Shrink Tube(4G/5G-3)	001319G020000A	PE	Red Tube/White Text	1
12	Heat Shrink Tube(4G/5G-4)	001319G030000A	PE	Red Tube/White Text	1
13	Heat Shrink Tube(GNSS)	001316C000000A	PE	Blue Tube/White Text	1
14	Grommet_MA8957/MA8955_TGC302*8_RG174*1	PRT.000532	DJSilicon_NE-7150, HS=50A +/- 5A	Black	1
15	SMA(M) ST_RG174	200219K010000A	Brass	Au Plated	1
16	SMA(M) ST_TGC302	CON.000290	Brass	Au Plated	4
17	TGC-302 Cable	308522G000000A	PVC	Black	4

4. Installation Guide





RECCOMMENDED HOLE SIZE FOR MOUNTING

MAX PANEL THICKNESS = 6MM

5. Packaging

1pc MA8005.A.001 per PE Bag
Weight: 0.76Kg

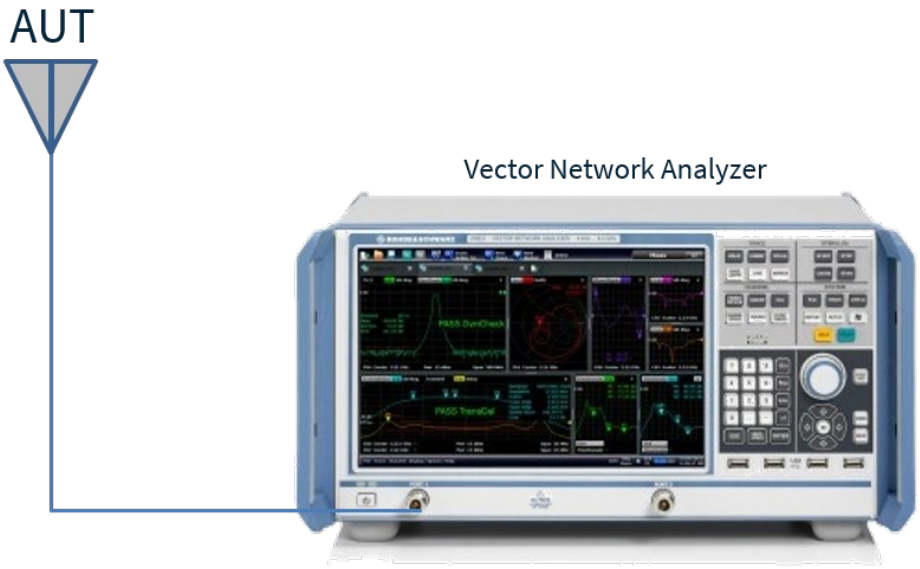


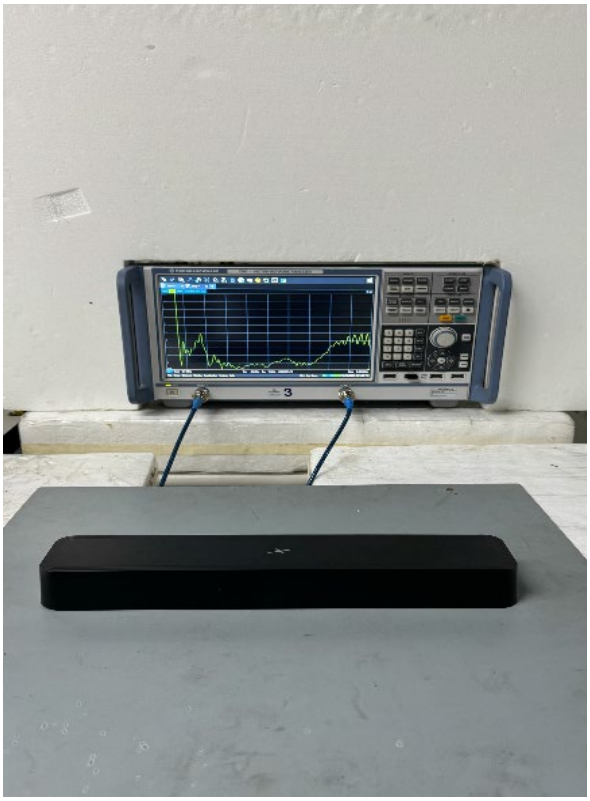
10pcs MA8005.A.001 per carton
Dimensions 370 x 370 x 300mm
Weight:8.7Kg



6. Antenna Characteristics

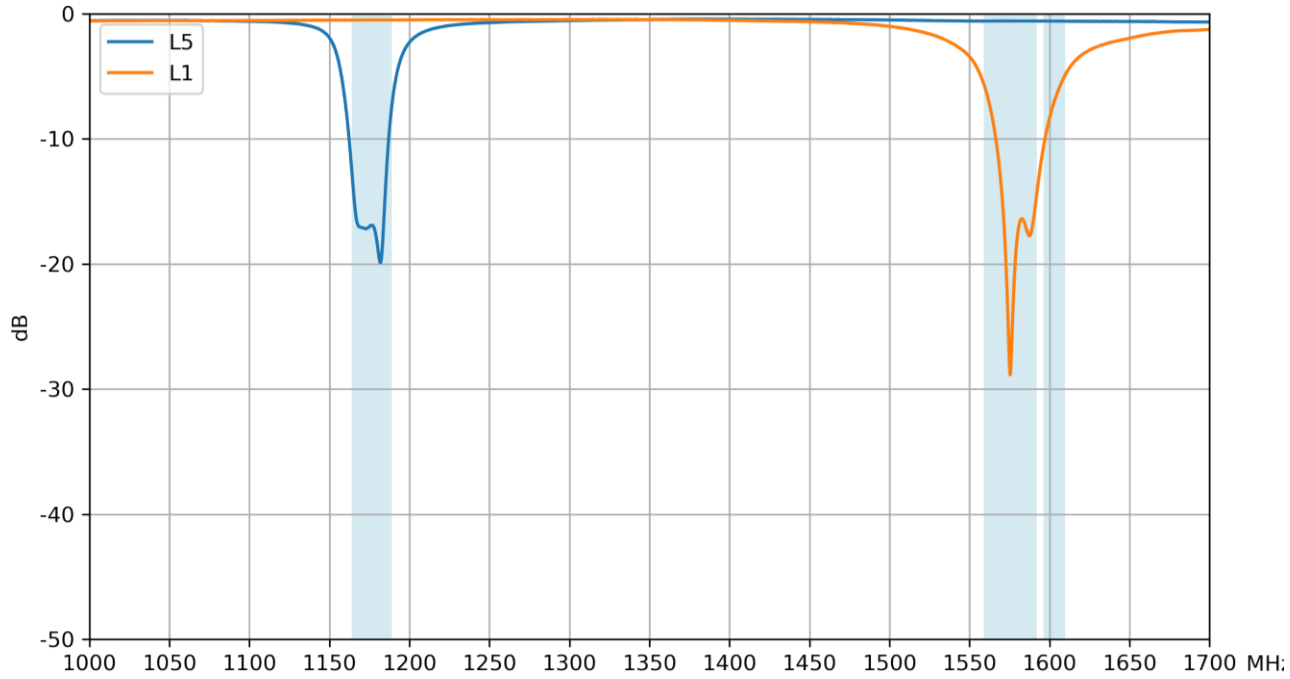
6.1 Test Setup



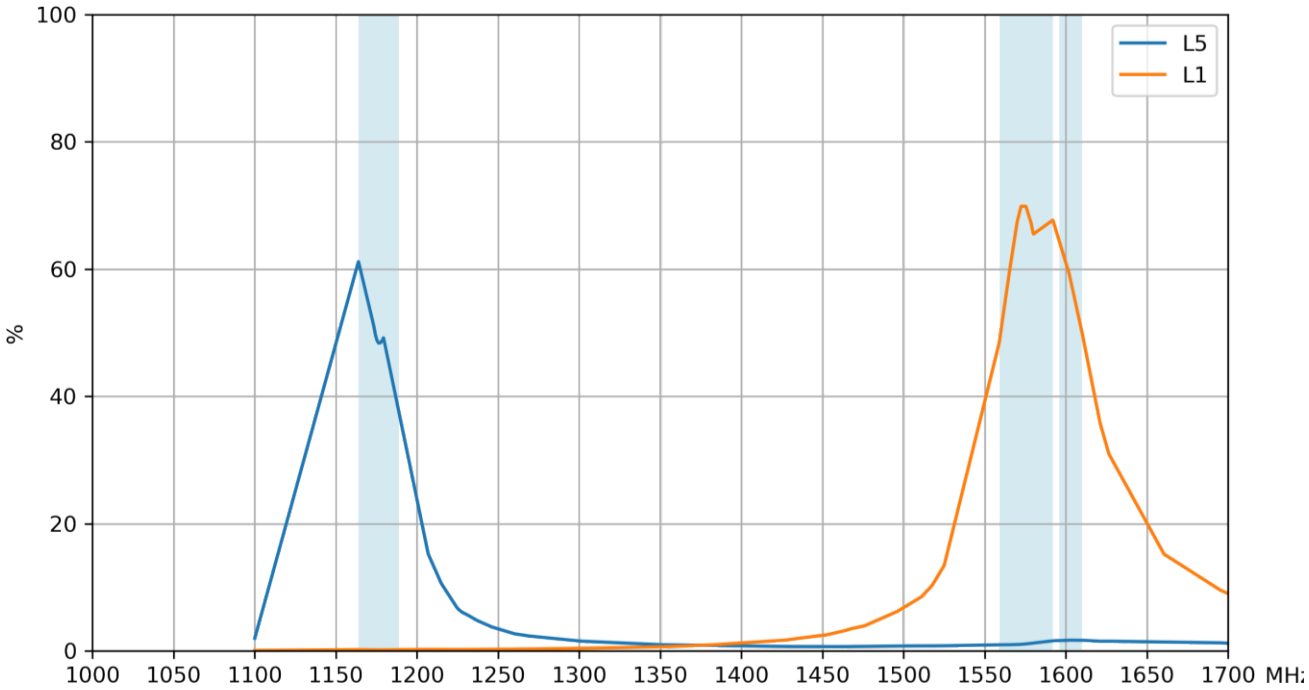


VNA Test Set up

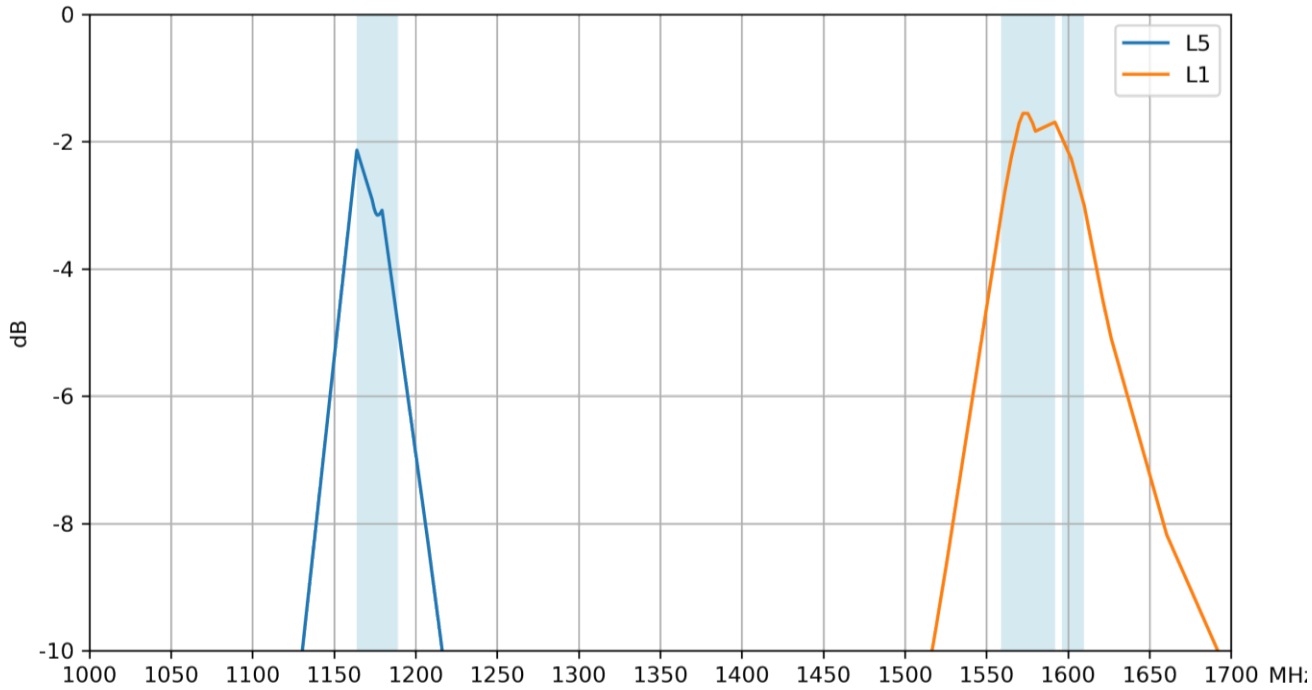
6.2 Return Loss (GNSS)



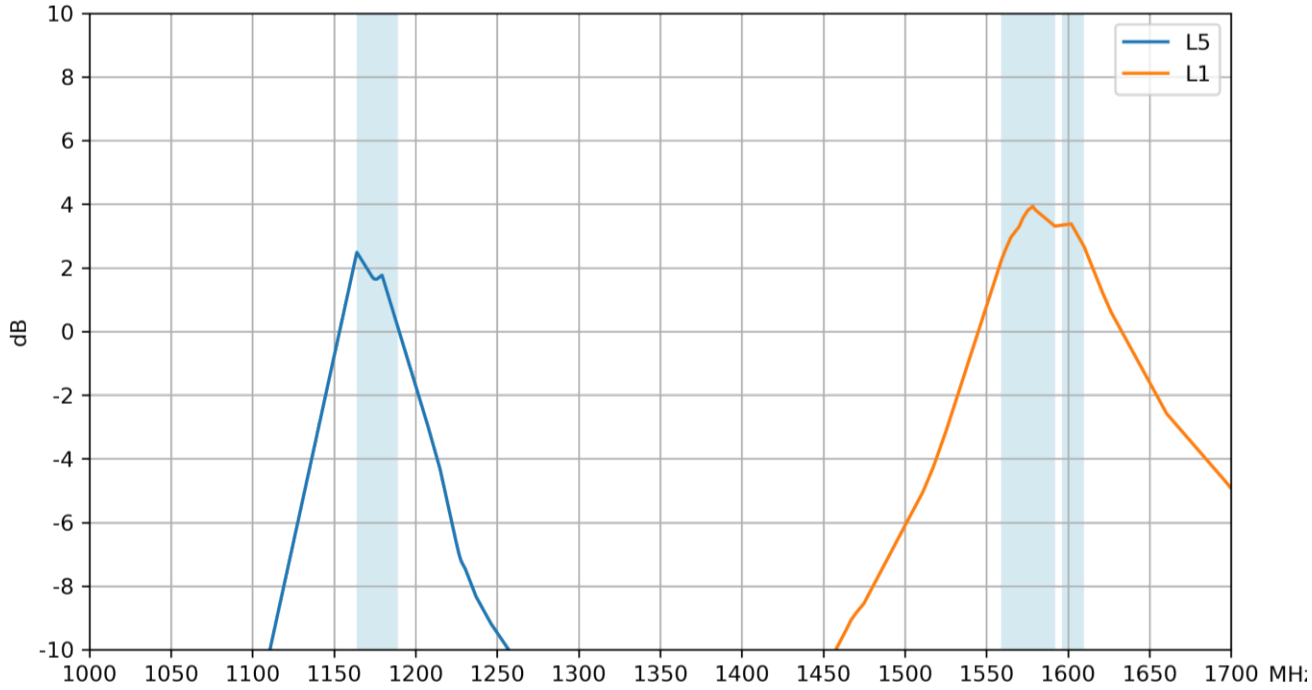
6.3 Efficiency (GNSS)



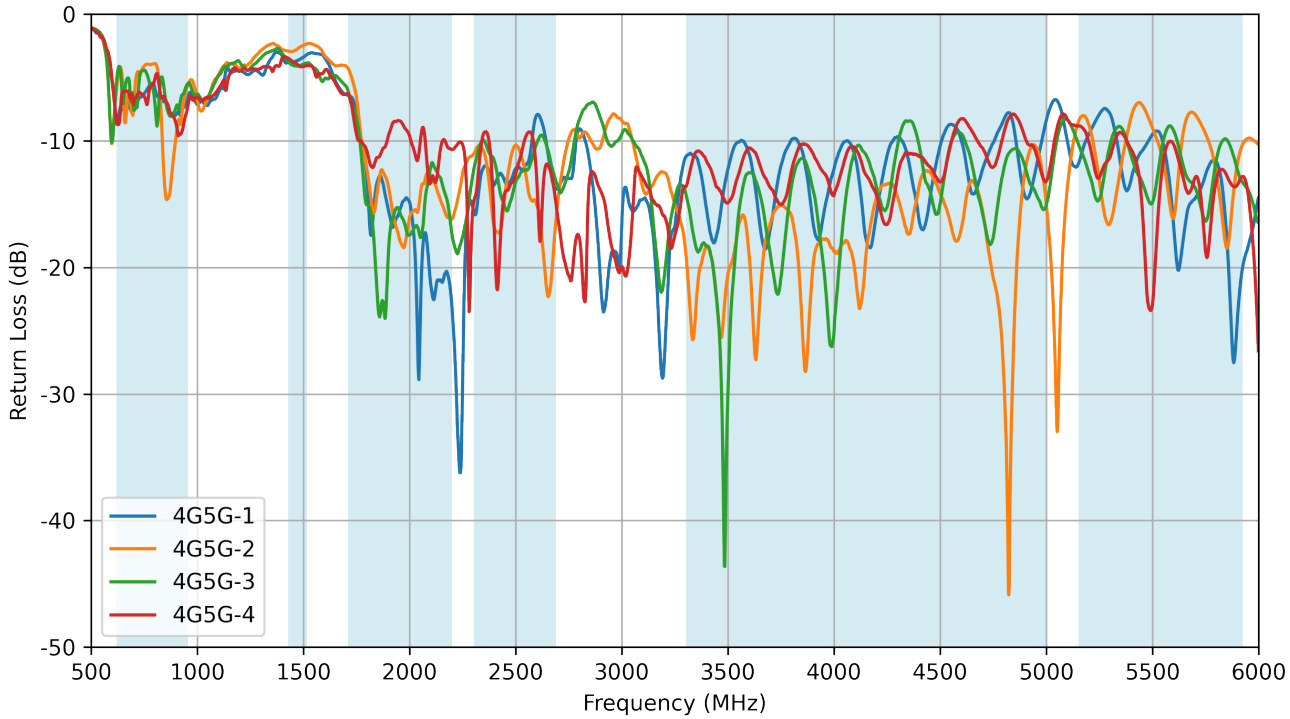
6.4 Average Gain (GNSS)



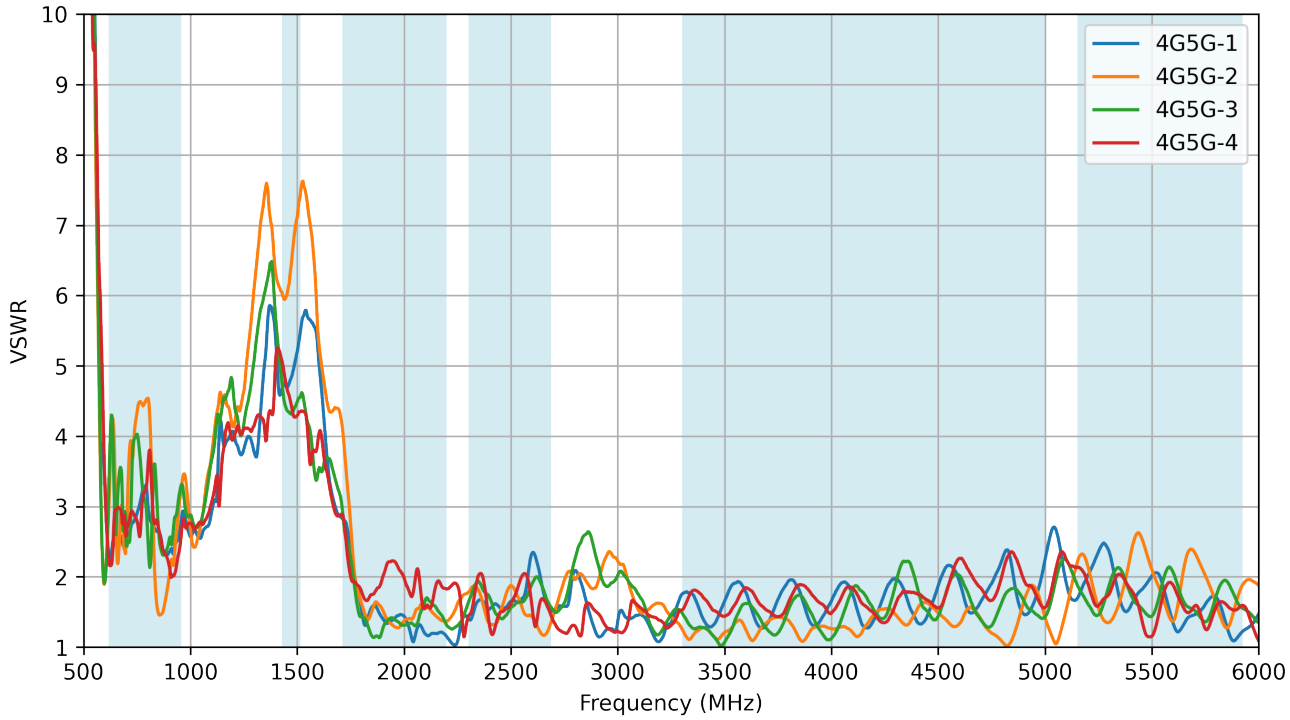
6.5 Peak Gain (GNSS)



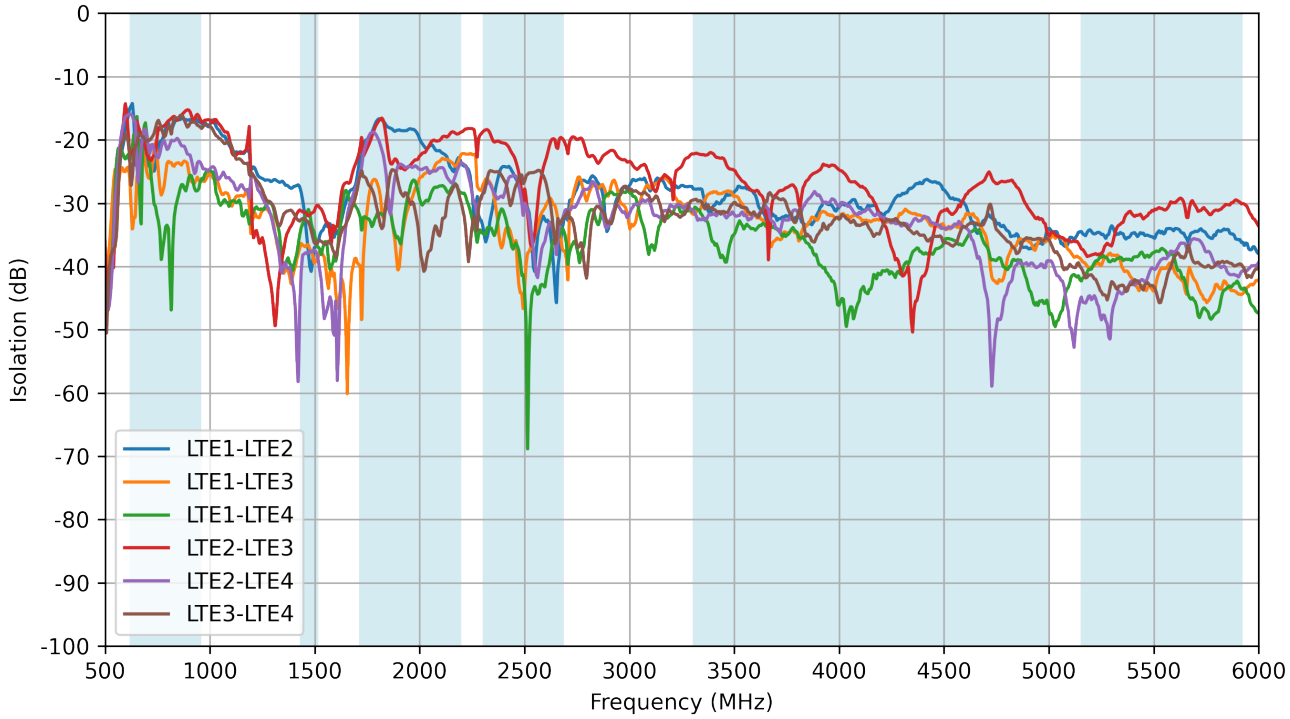
6.6 Return Loss (5G/4G)



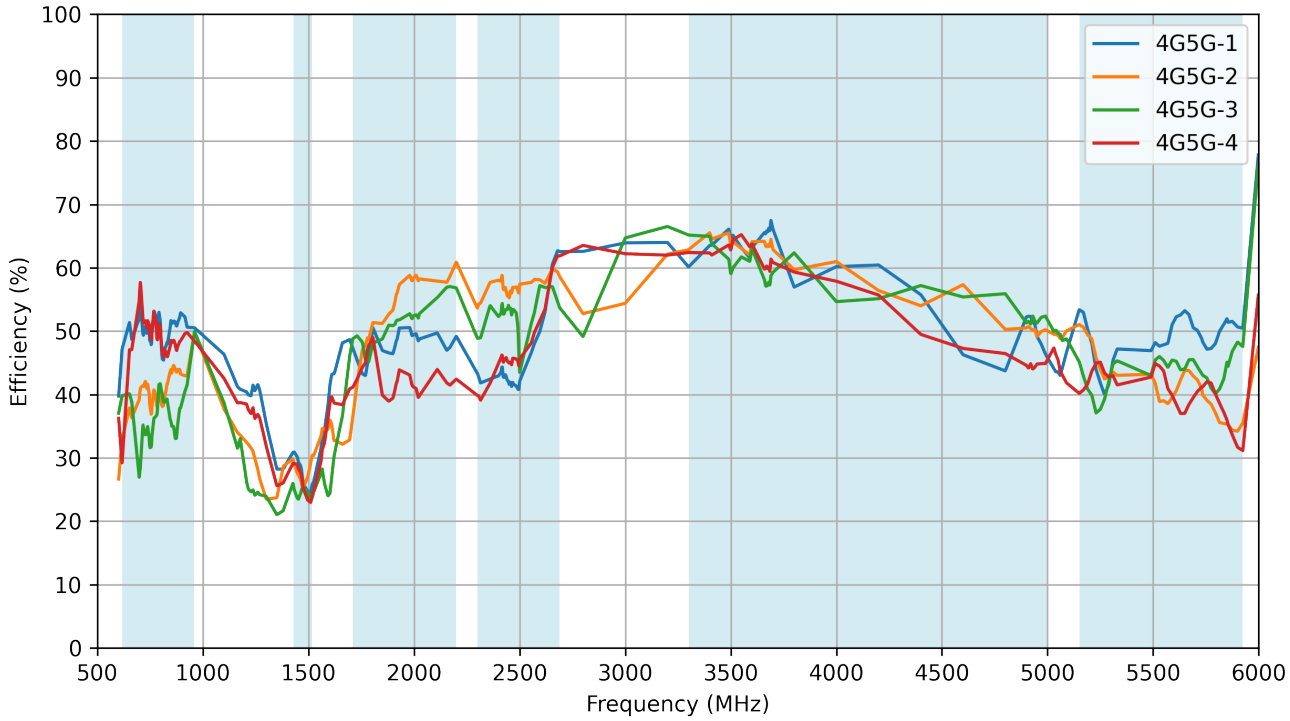
6.7 VSWR (5G/4G)



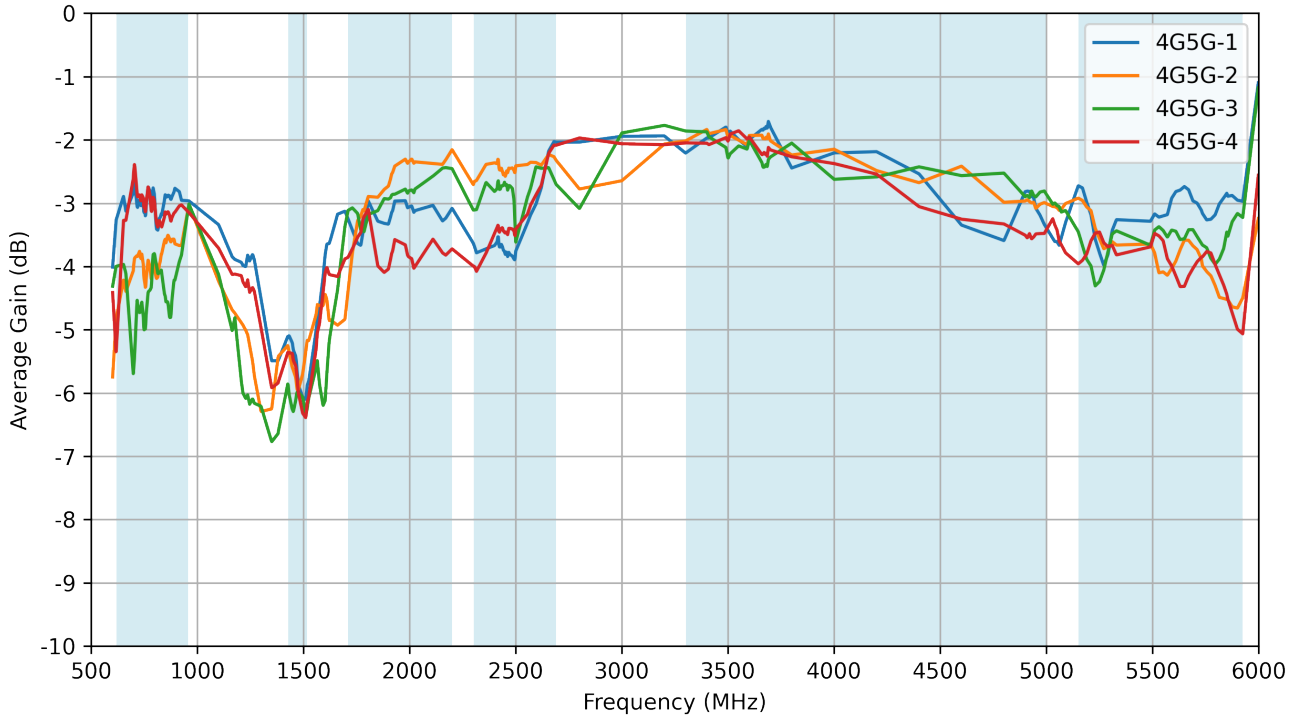
6.8 Isolation (5G/4G)



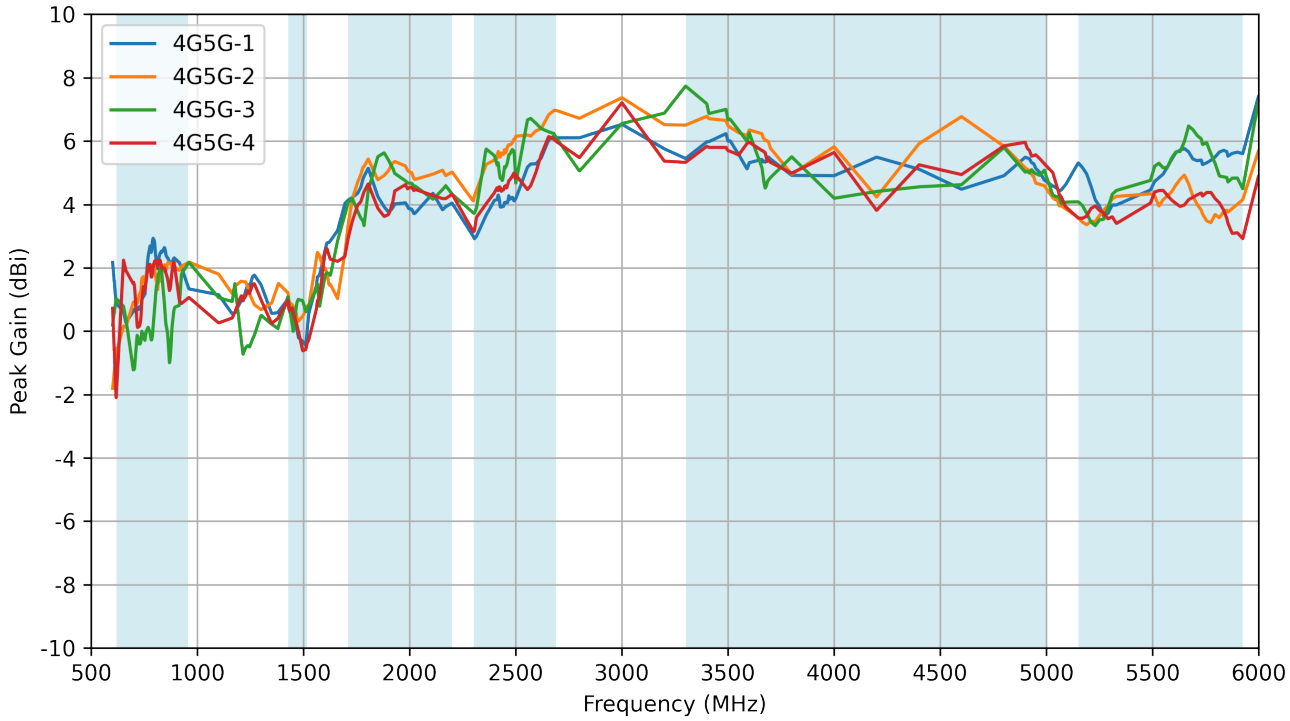
6.9 Efficiency (5G/4G)



6.10 Average Gain (5G/4G)

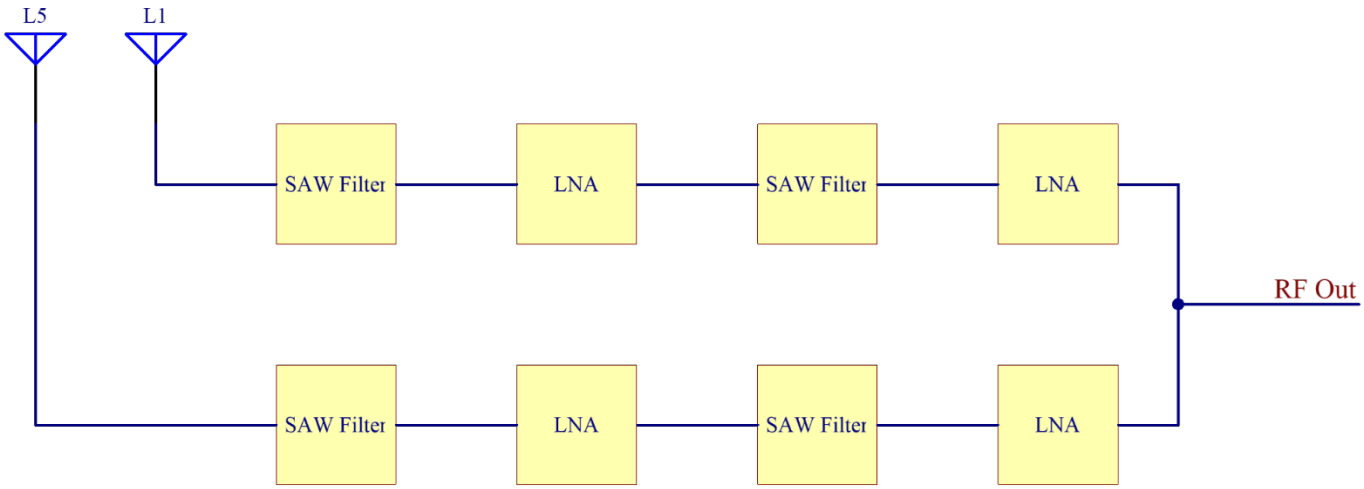


6.11 Peak Gain (5G/4G)

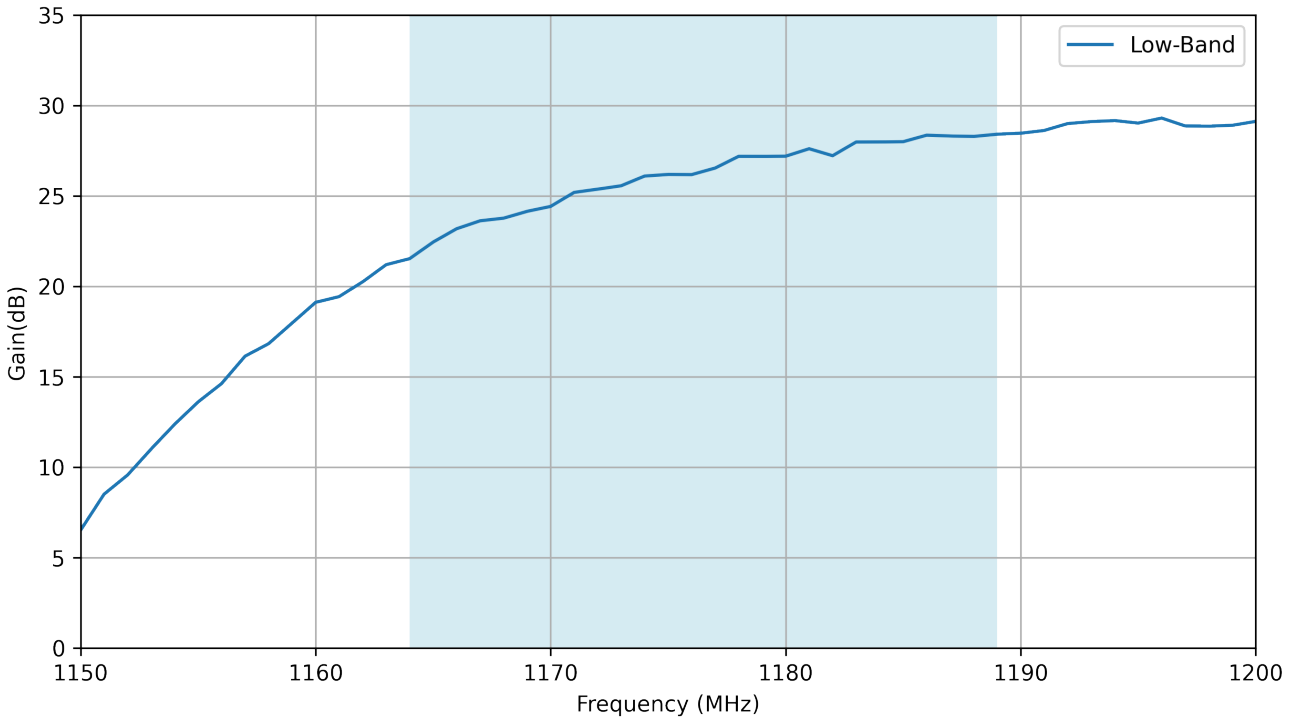


7. LNA Characteristics

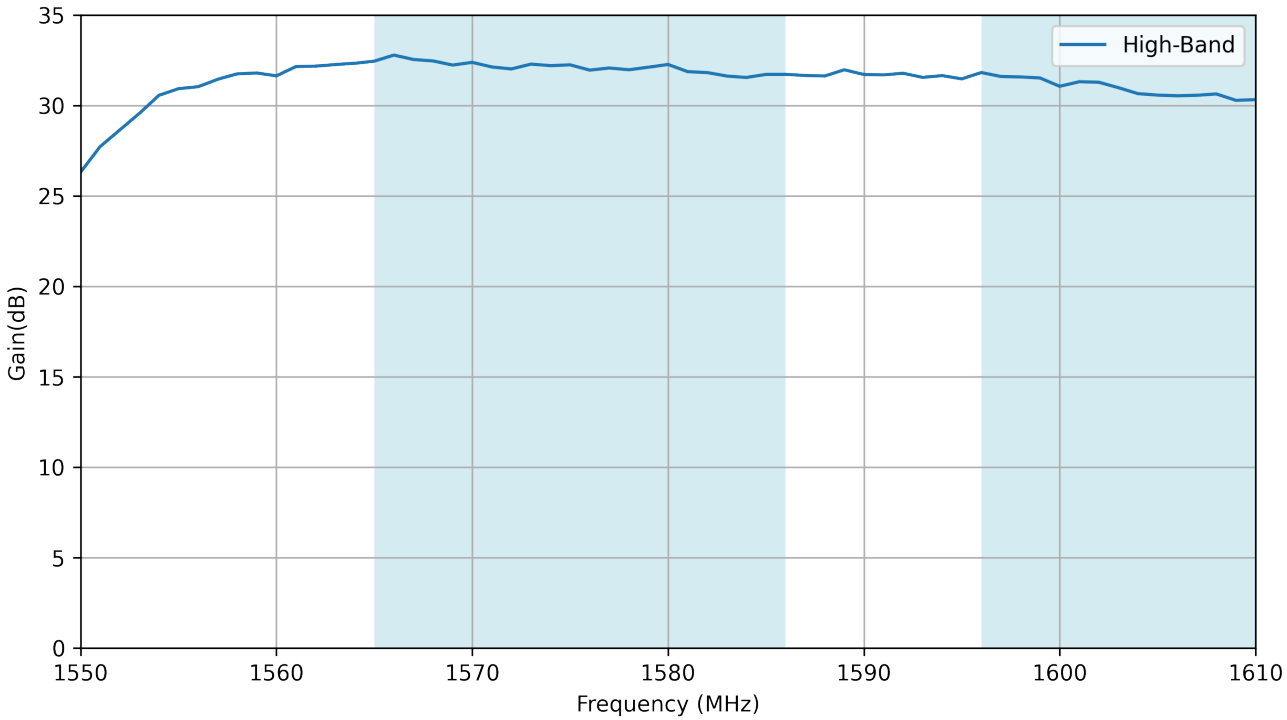
7.1 Block Diagram



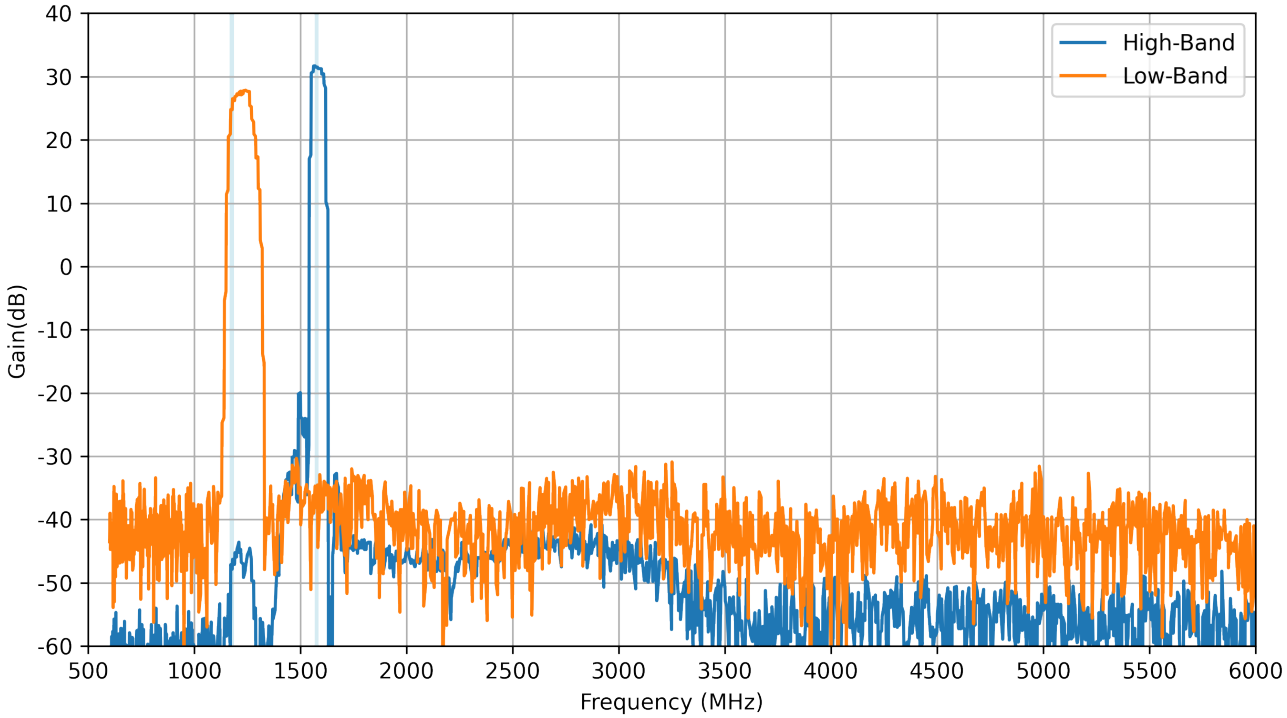
7.2 Gain – Low-Band



7.3 Gain – High-Band

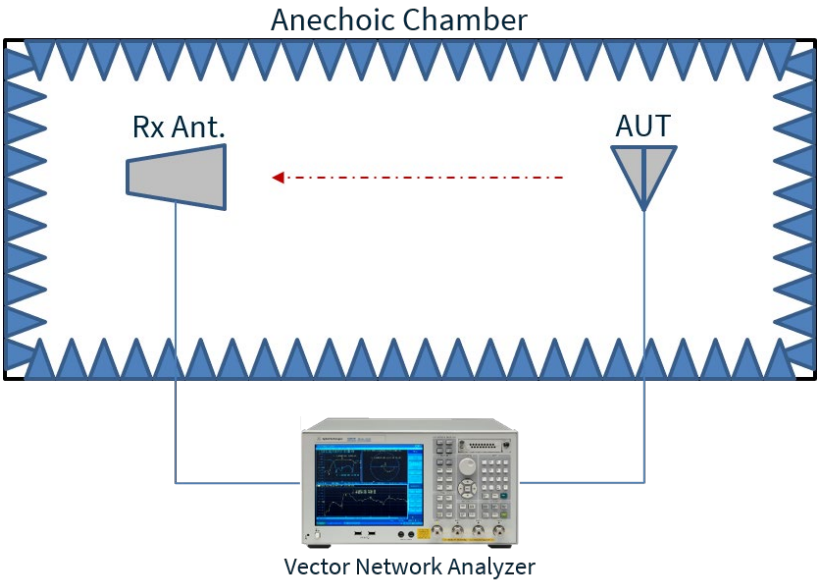


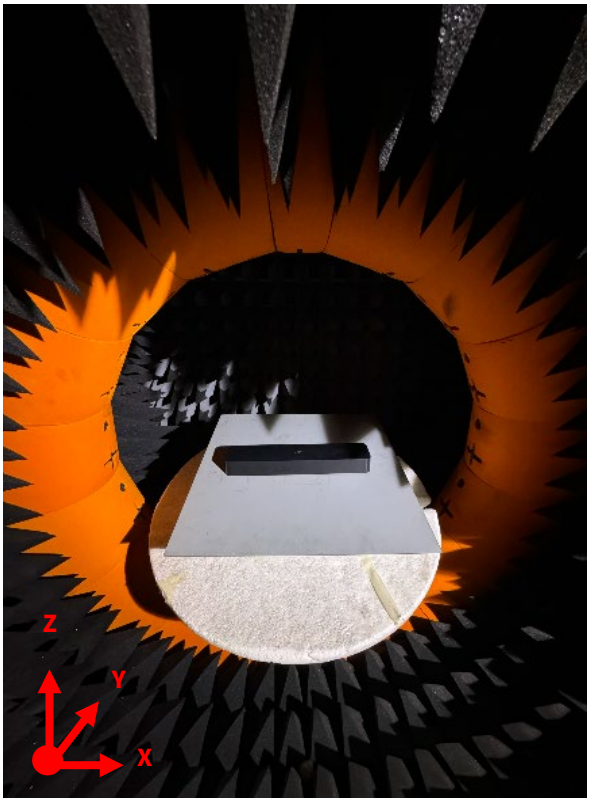
7.4 Out Of Band Attenuation



8. Radiation Patterns

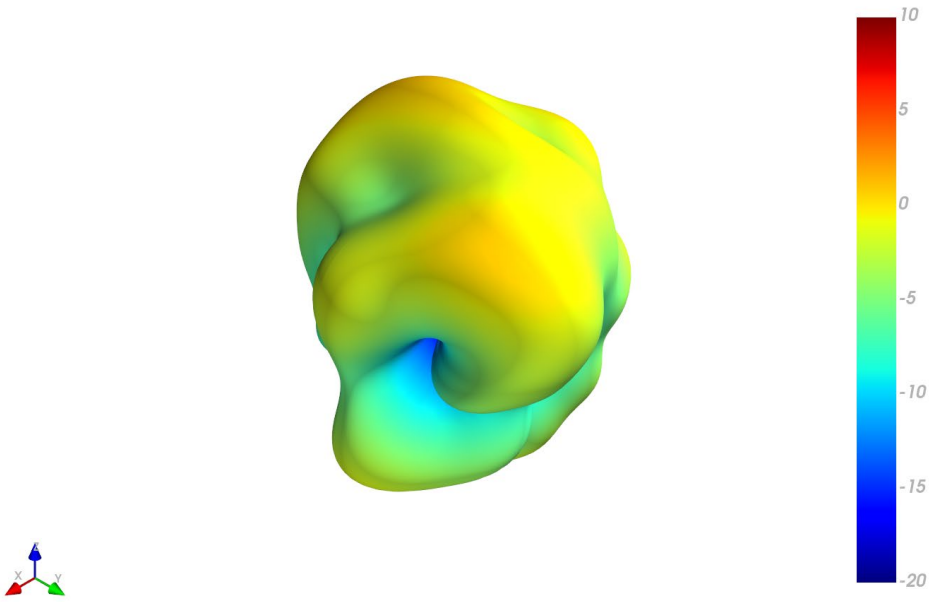
8.1 Test Setup



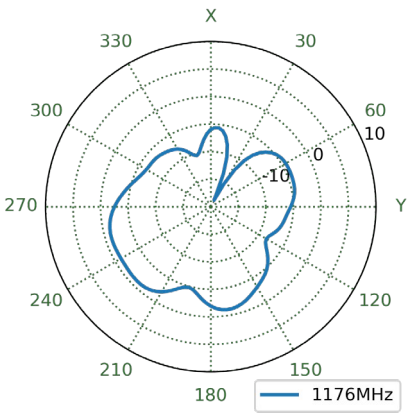


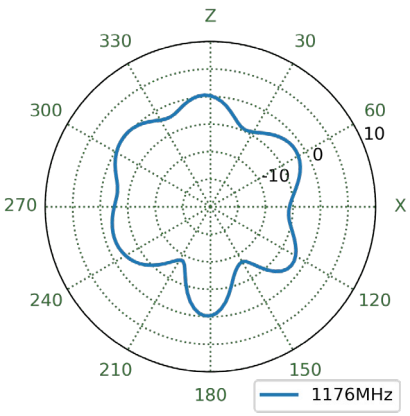
Chamber Test Set up

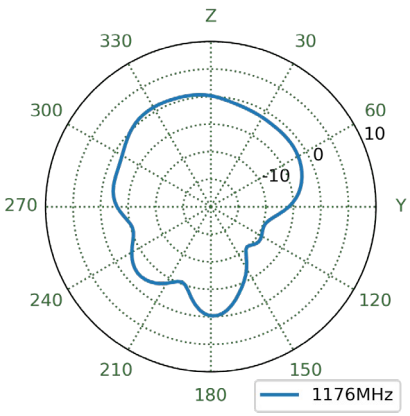
8.2 GNSS - Patterns at 1176 MHz



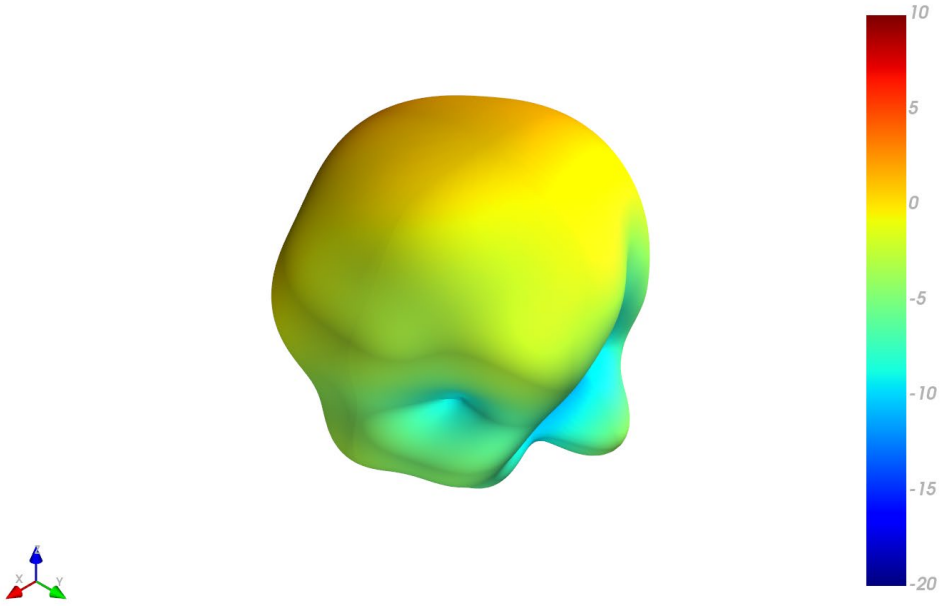
XY Plane	XZ Plane	YZ Plane



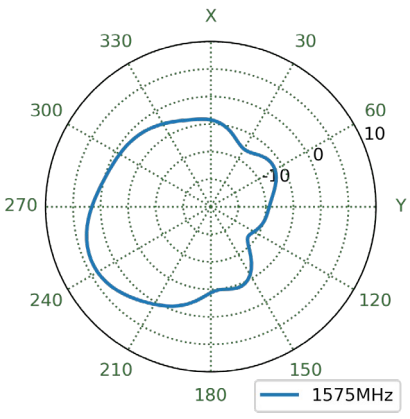


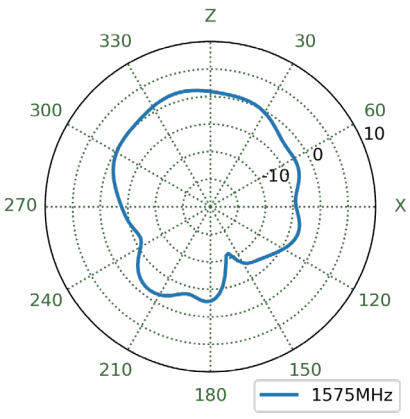


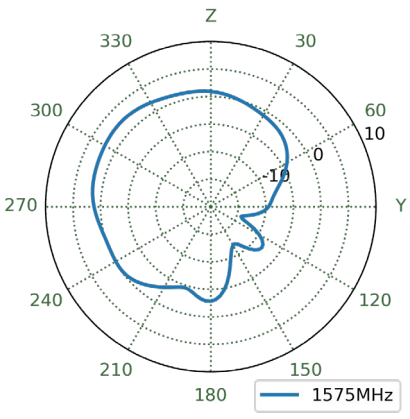
8.3 GNSS - Patterns at 1575 MHz



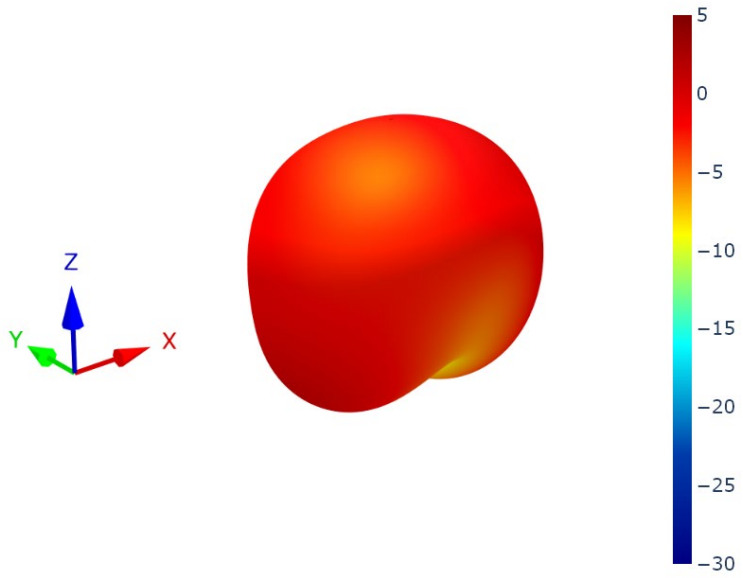
XY Plane	XZ Plane	YZ Plane

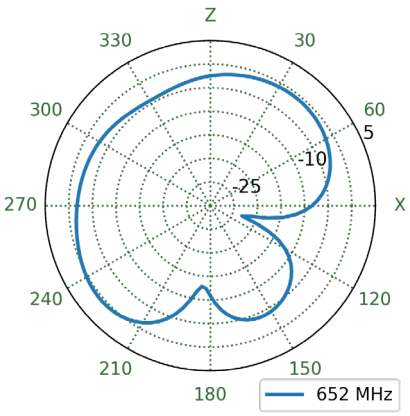
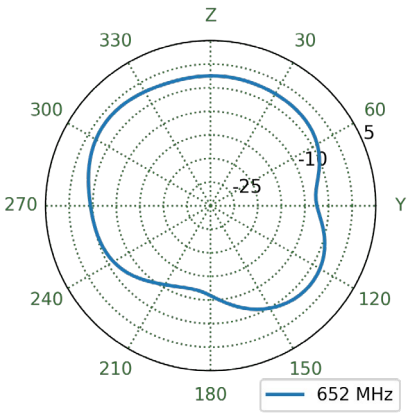
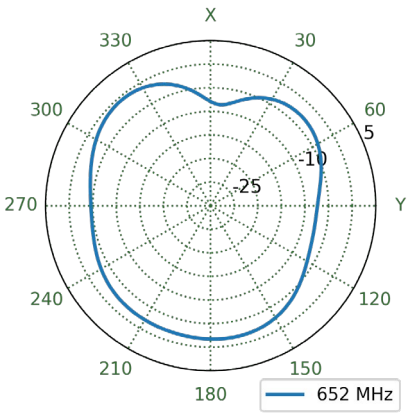




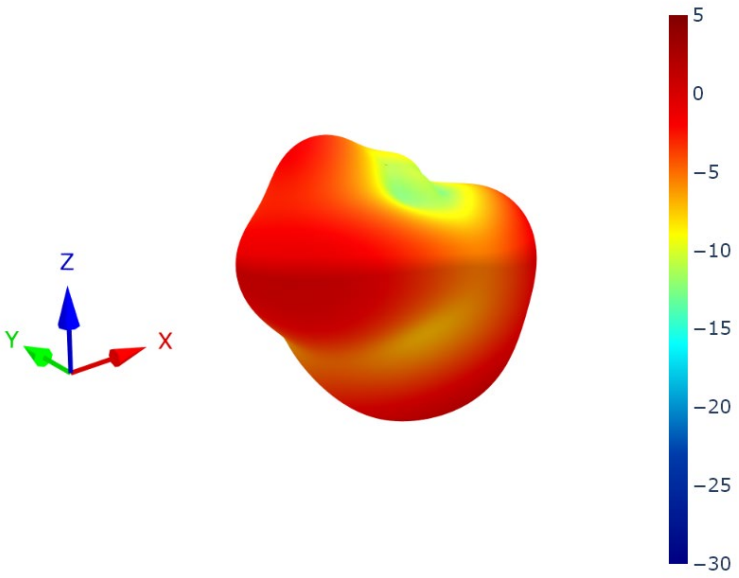


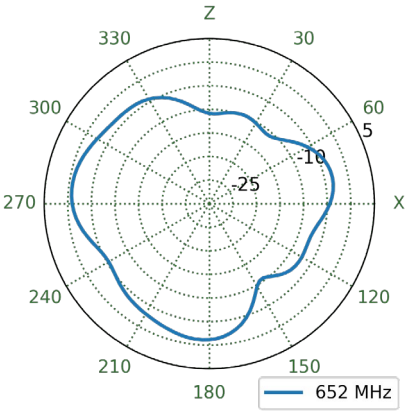
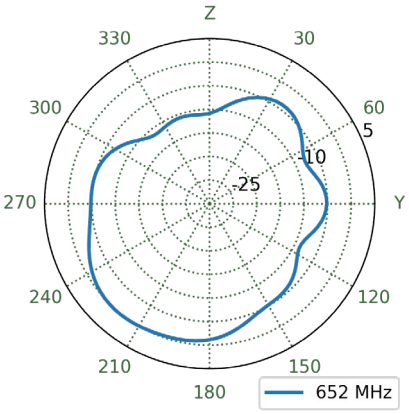
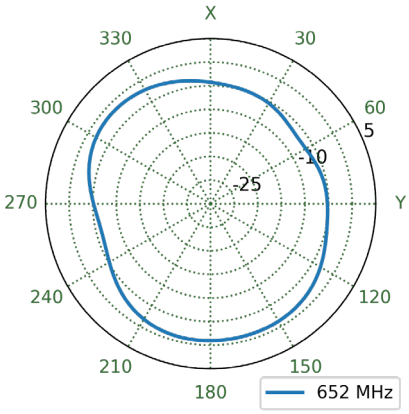
8.4 5G/4G-1 Patterns at 650 MHz



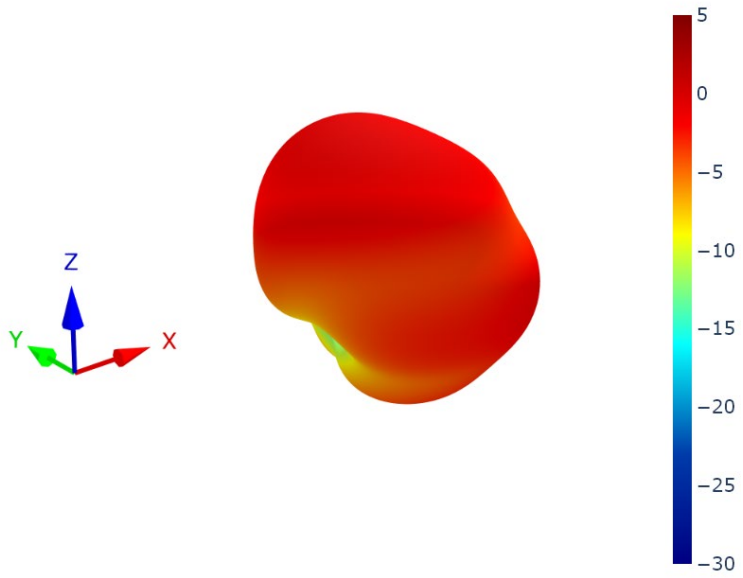
XZ Plane	YZ Plane	XY Plane
		

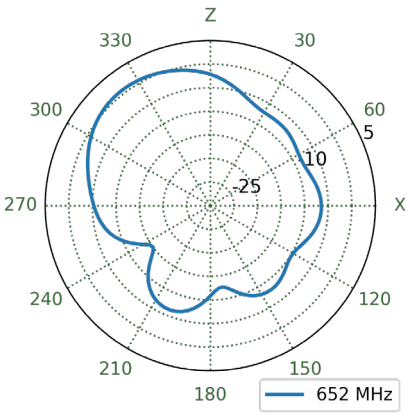
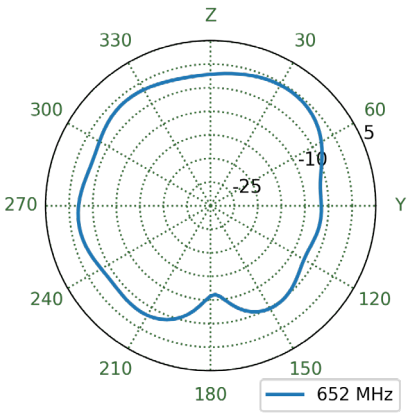
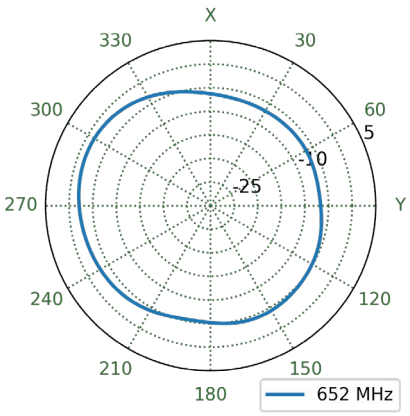
8.5 5G/4G-2 Patterns at 650 MHz



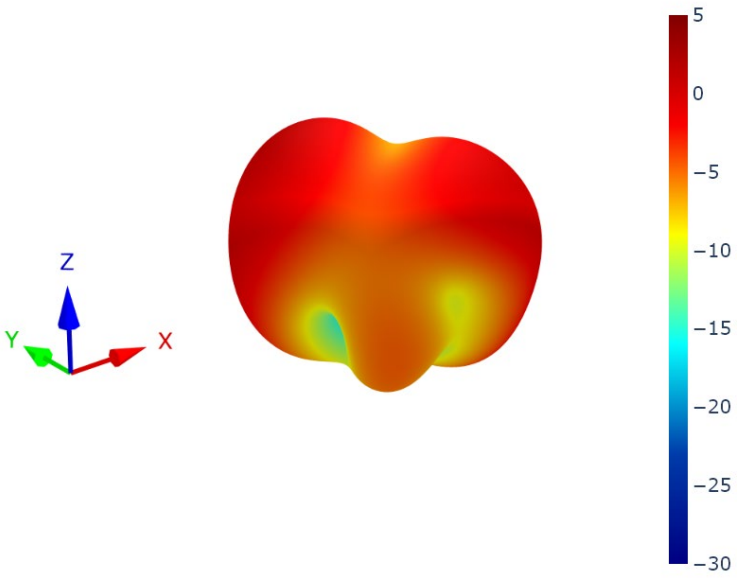
XZ Plane	YZ Plane	XY Plane
		

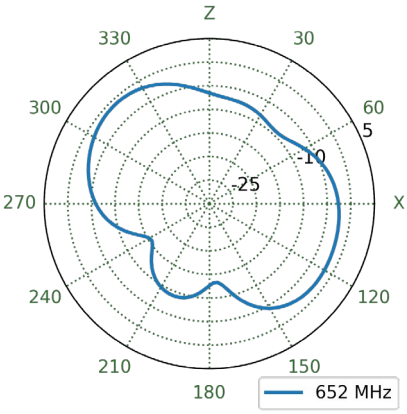
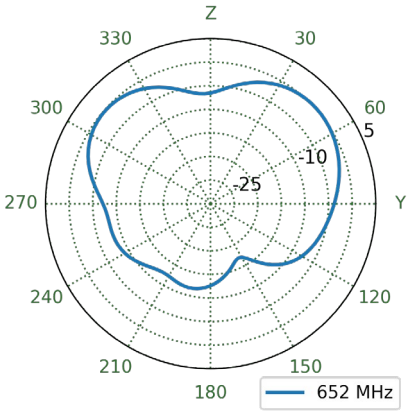
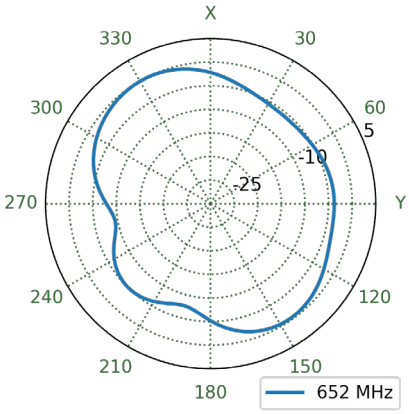
8.6 5G/4G-3 Patterns at 650 MHz



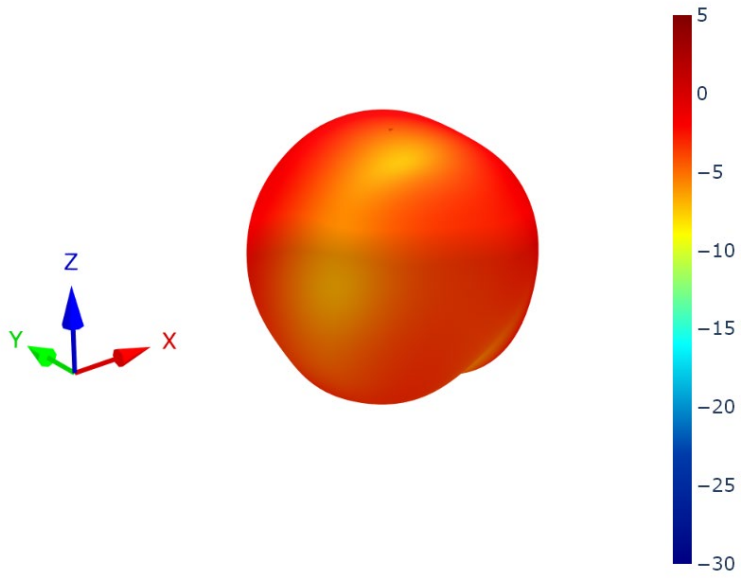
XZ Plane	YZ Plane	XY Plane
		

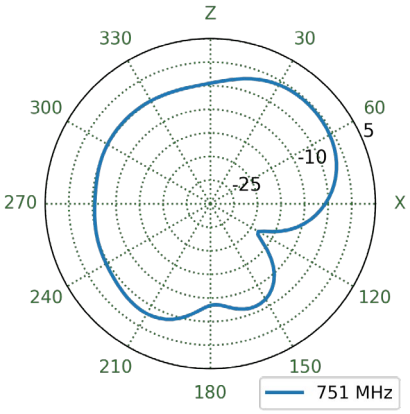
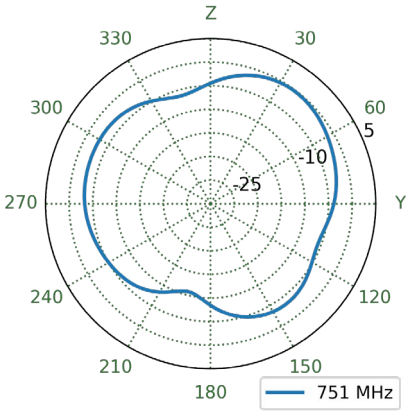
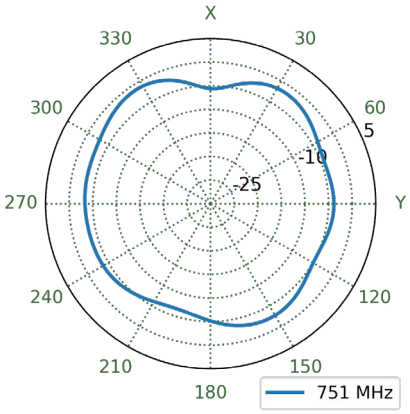
8.7 5G/4G-4 Patterns at 650 MHz



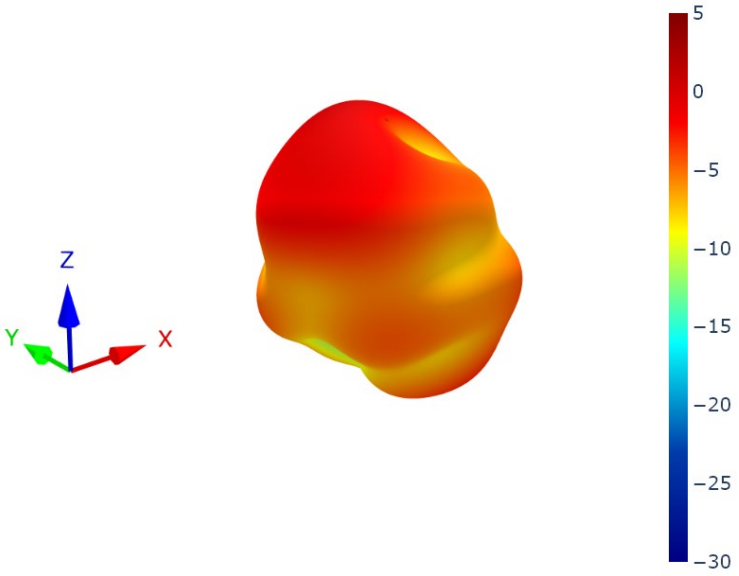
XZ Plane	YZ Plane	XY Plane
		

8.8 5G/4G-1 Patterns at 750 MHz

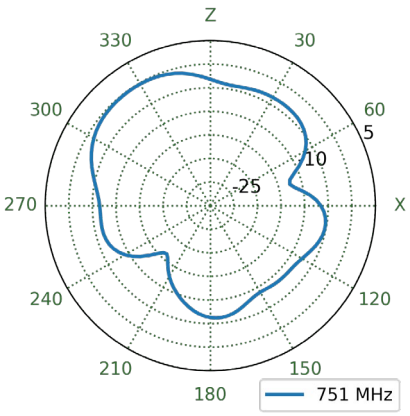


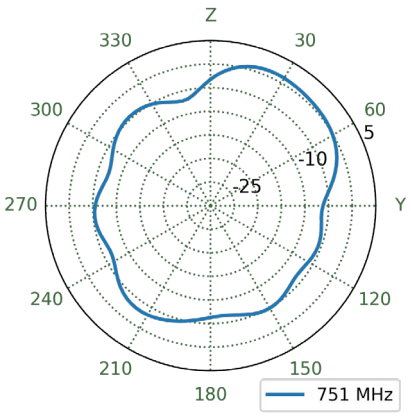
XZ Plane	YZ Plane	XY Plane
		

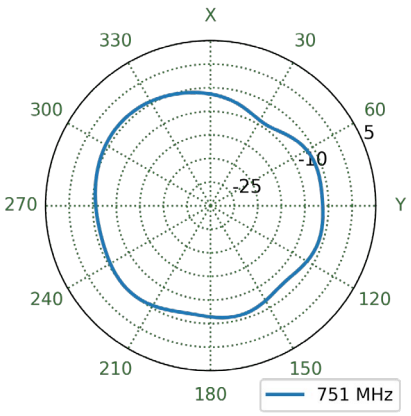
8.9 5G/4G-2 Patterns at 750 MHz



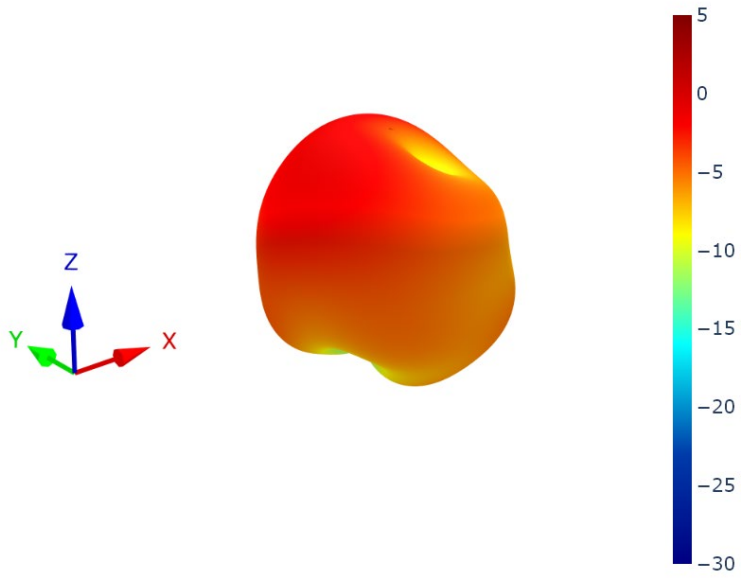
XZ Plane	YZ Plane	XY Plane

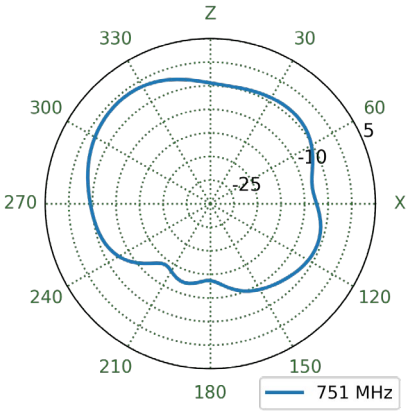
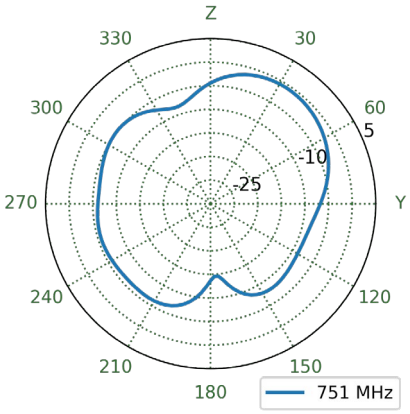
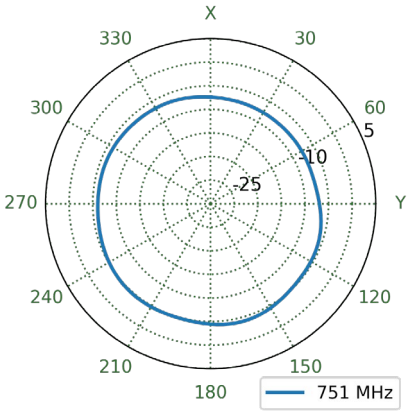




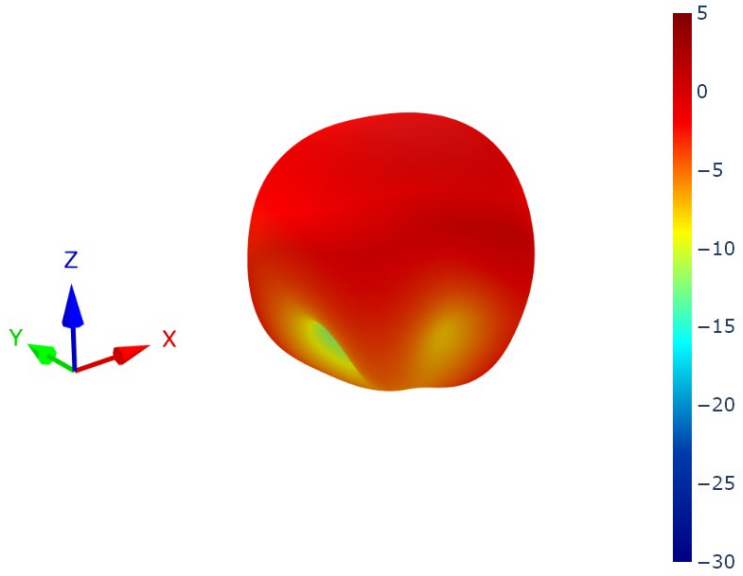


8.10 5G/4G-3 Patterns at 750 MHz

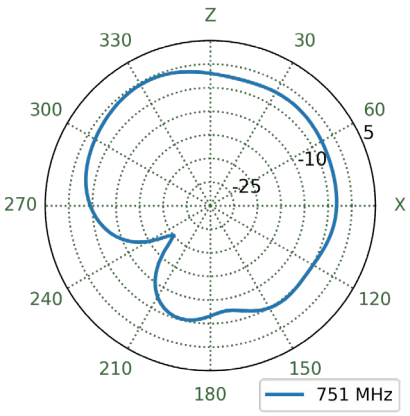


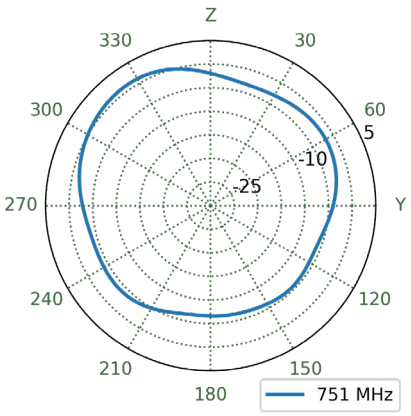
XZ Plane	YZ Plane	XY Plane
		

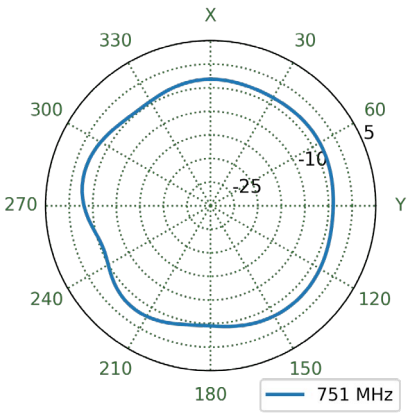
8.11 5G/4G-4 Patterns at 750 MHz



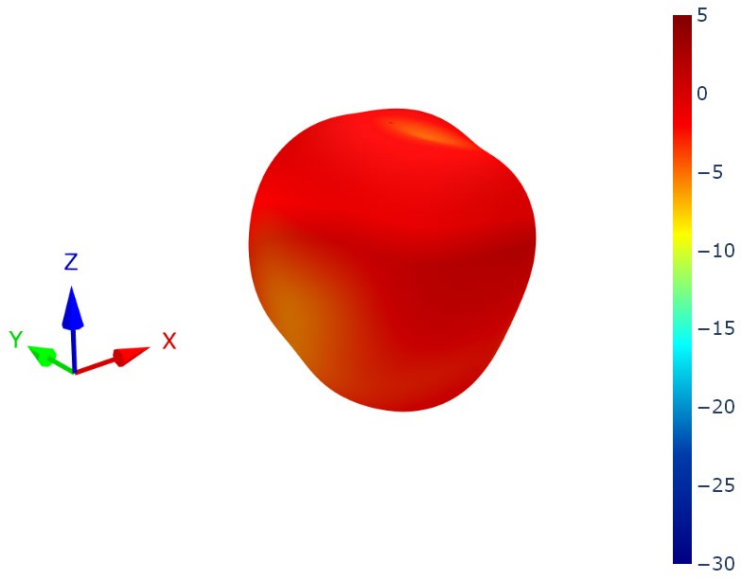
XZ Plane	YZ Plane	XY Plane

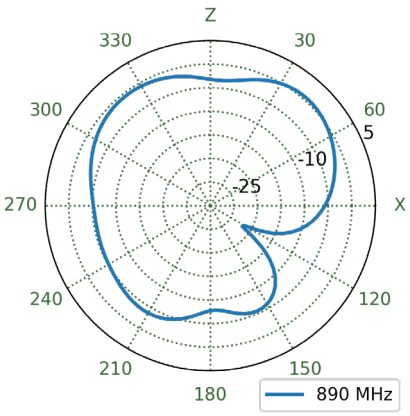
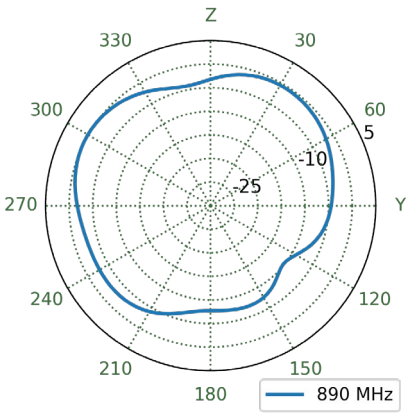
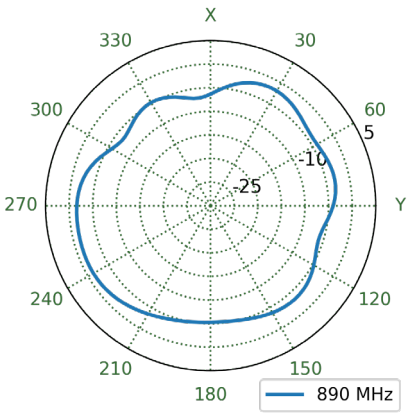




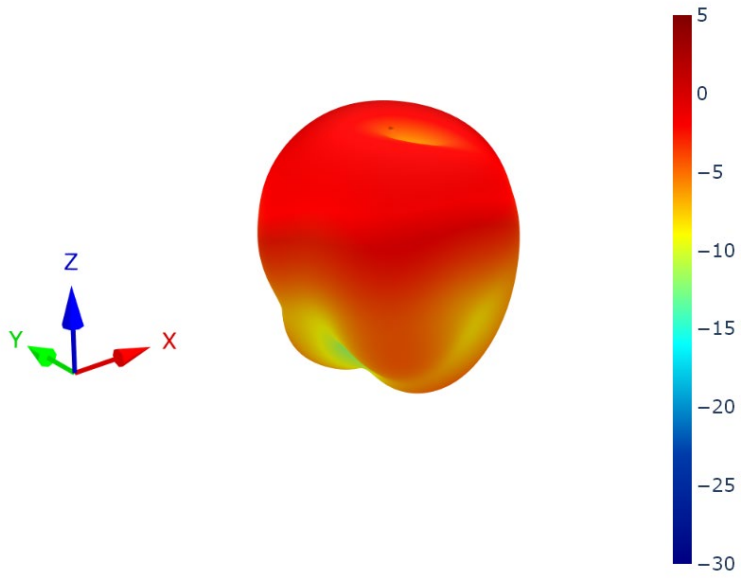


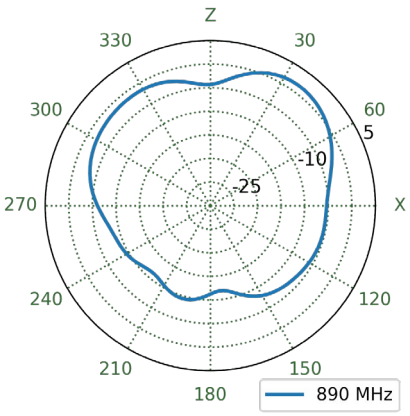
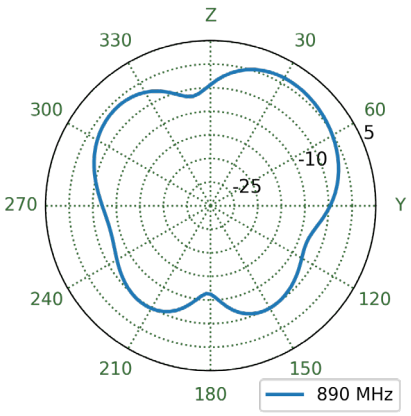
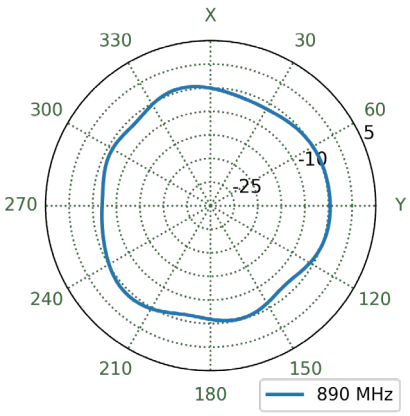
8.12 5G/4G-1 Patterns at 890 MHz



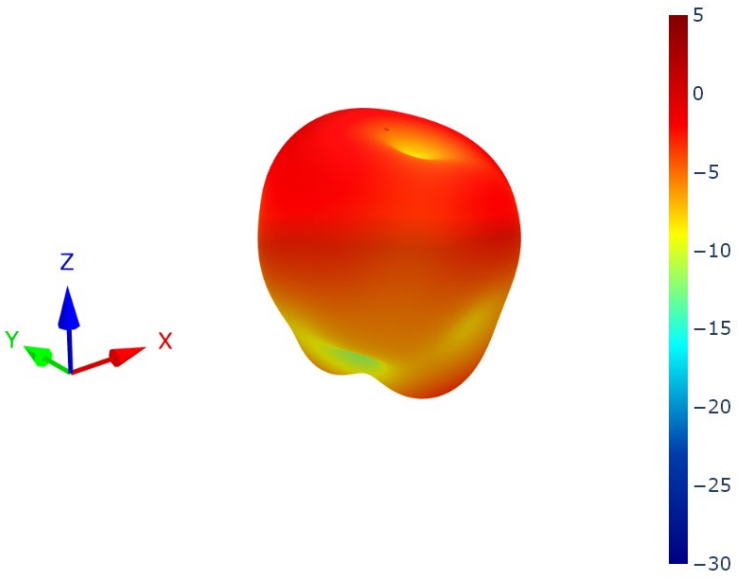
XZ Plane	YZ Plane	XY Plane
		

8.13 5G/4G-2 Patterns at 890 MHz

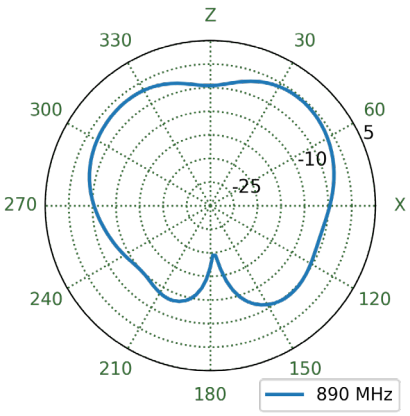


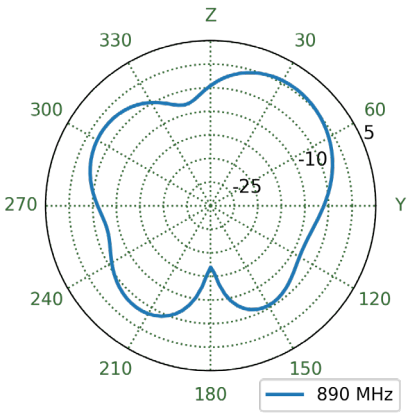
XZ Plane	YZ Plane	XY Plane
		

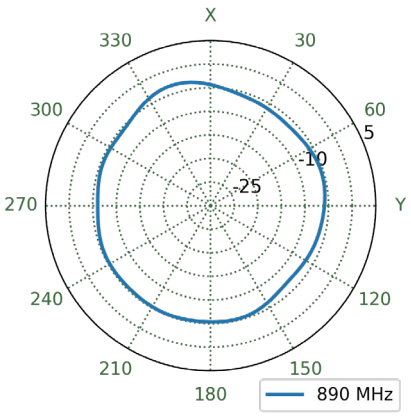
8.14 5G/4G-3 Patterns at 890 MHz



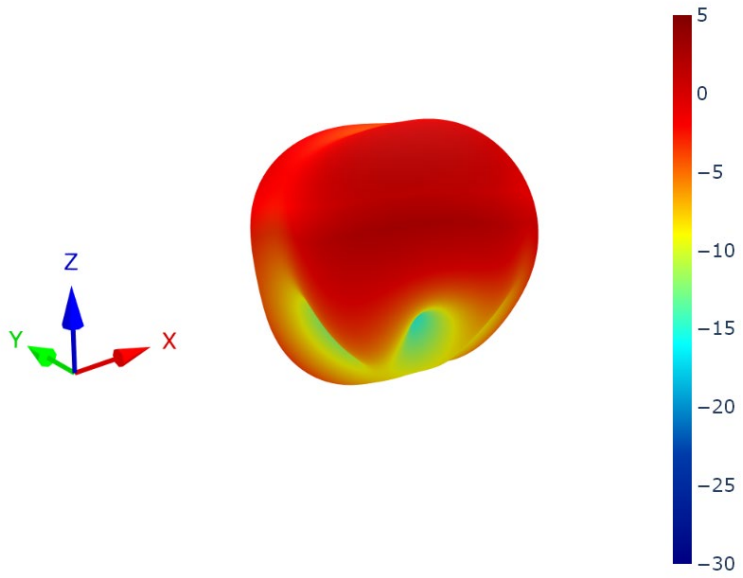
XZ Plane	YZ Plane	XY Plane

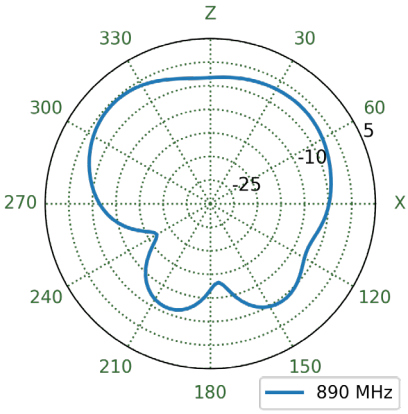
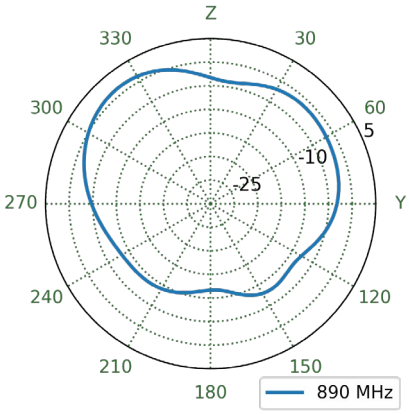
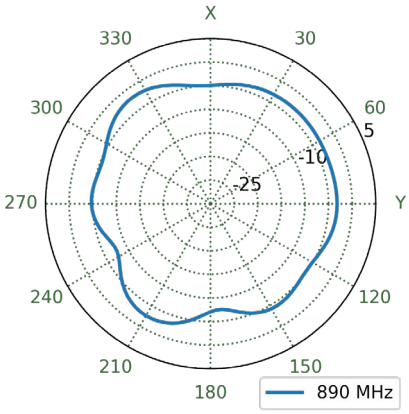




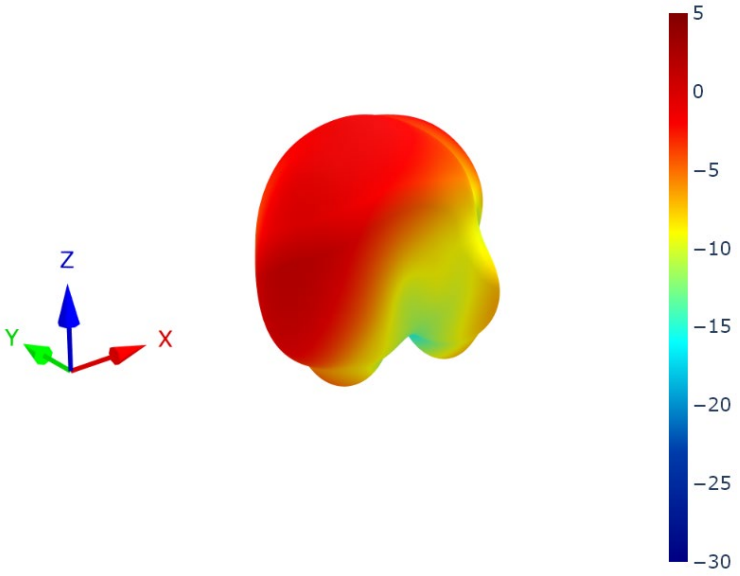


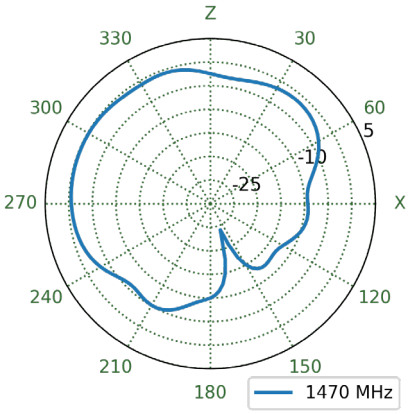
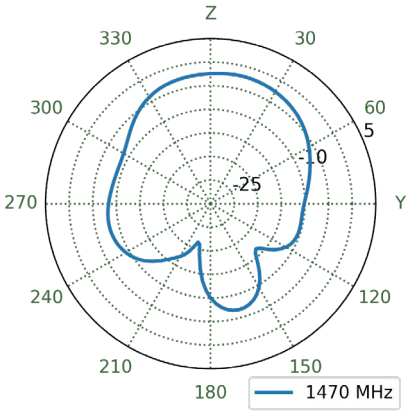
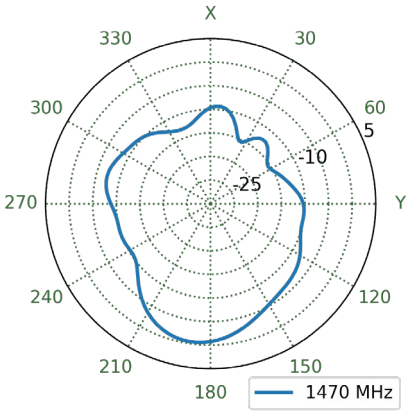
8.15 5G/4G-4 Patterns at 890 MHz



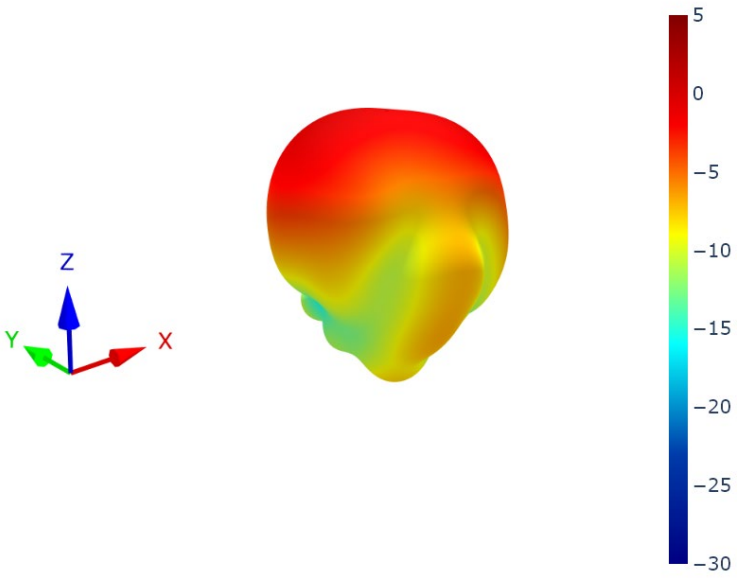
XZ Plane	YZ Plane	XY Plane
		

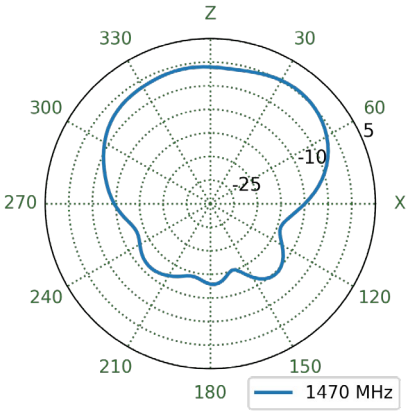
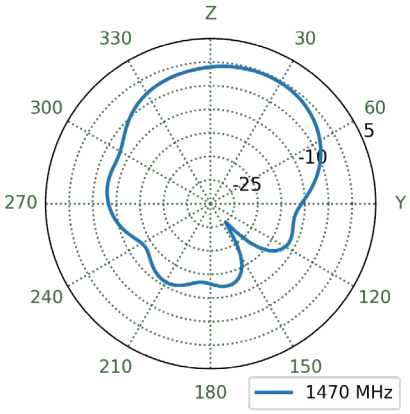
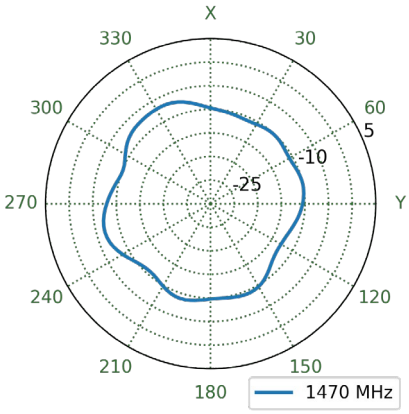
8.16 5G/4G-1 Patterns at 1470 MHz



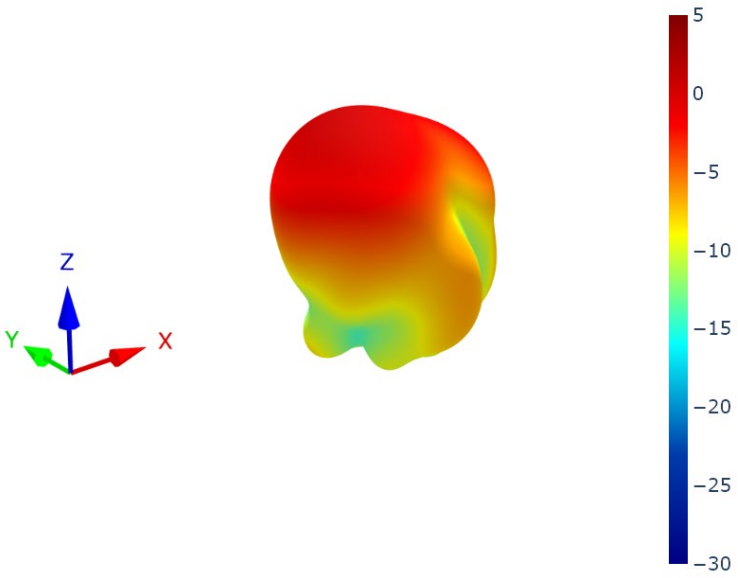
XZ Plane	YZ Plane	XY Plane
		

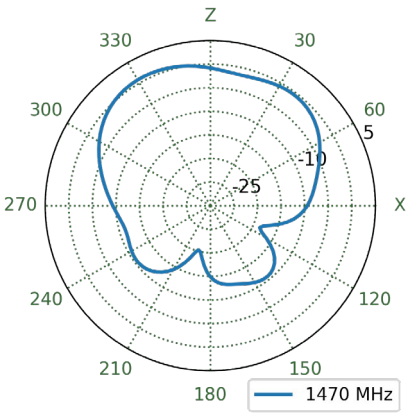
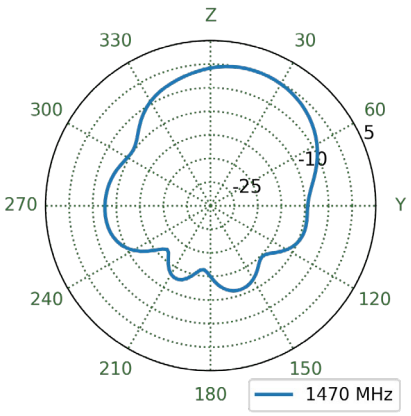
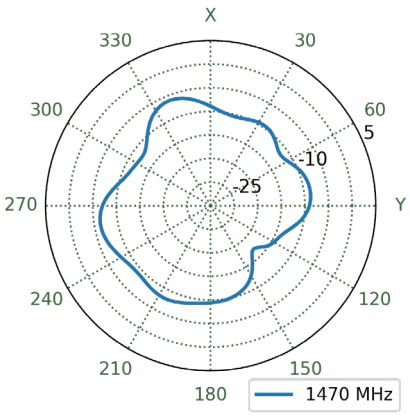
8.17 5G/4G-2 Patterns at 1470 MHz



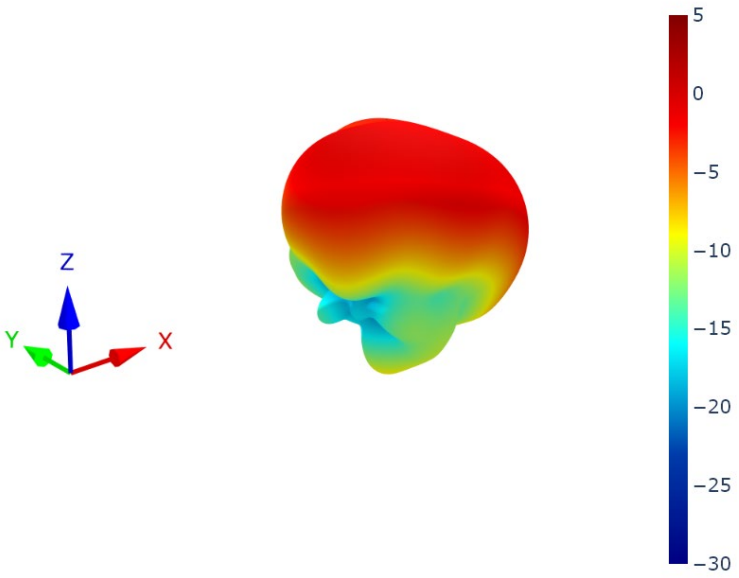
XZ Plane	YZ Plane	XY Plane
		

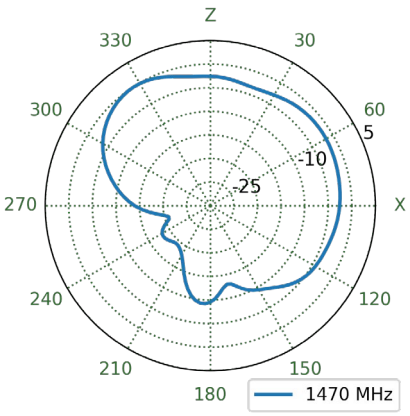
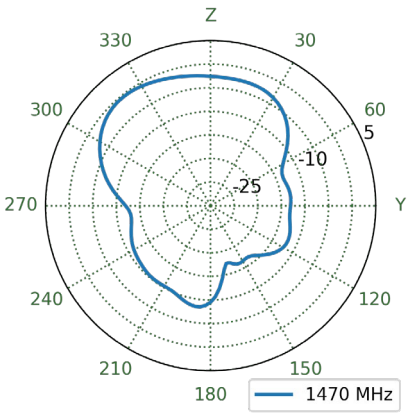
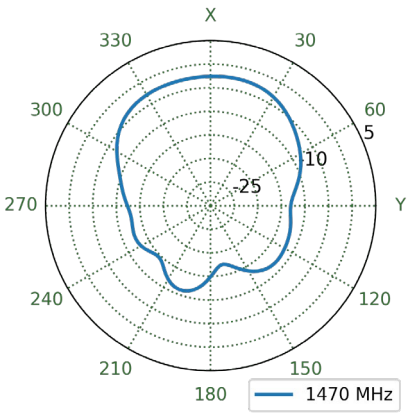
8.18 5G/4G-3 Patterns at 1470 MHz



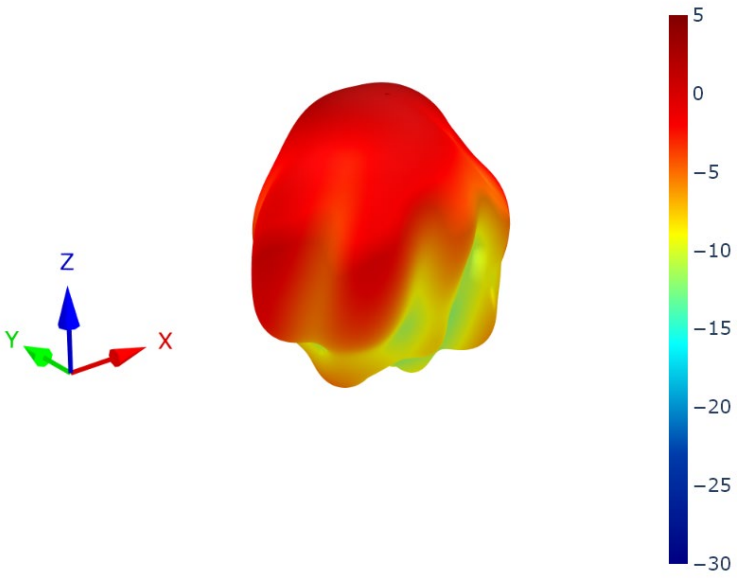
XZ Plane	YZ Plane	XY Plane
		

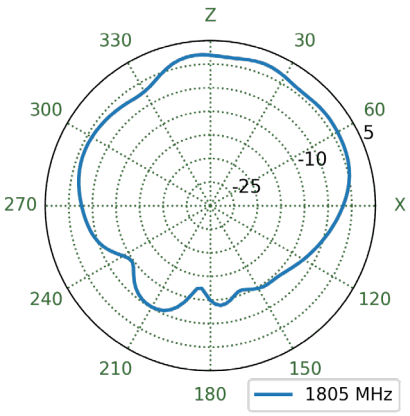
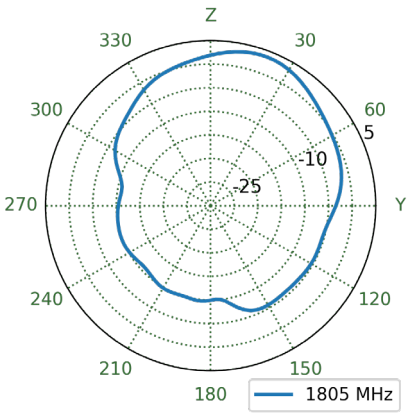
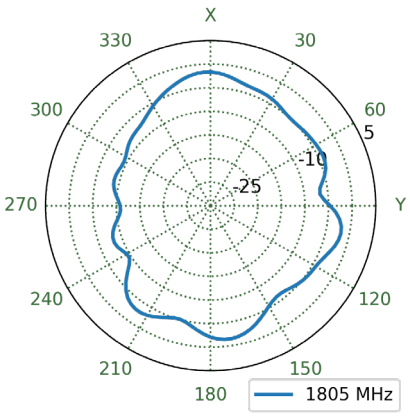
8.19 5G/4G-4 Patterns at 1470 MHz



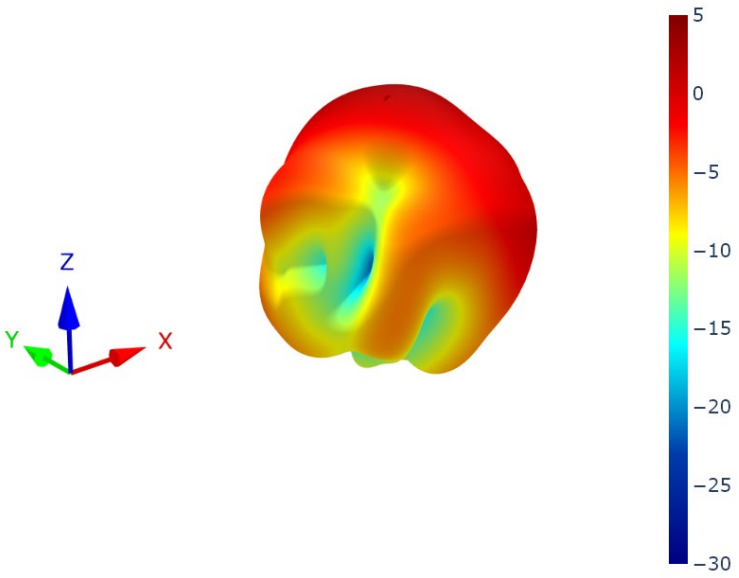
XZ Plane	YZ Plane	XY Plane
		

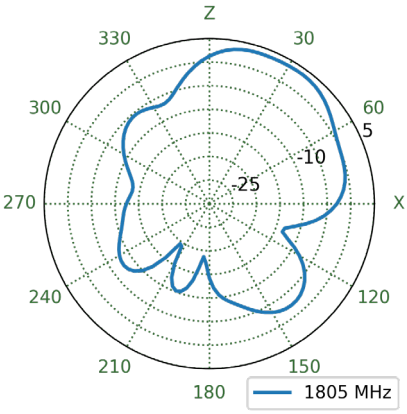
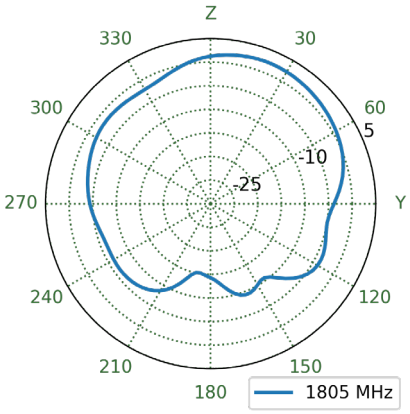
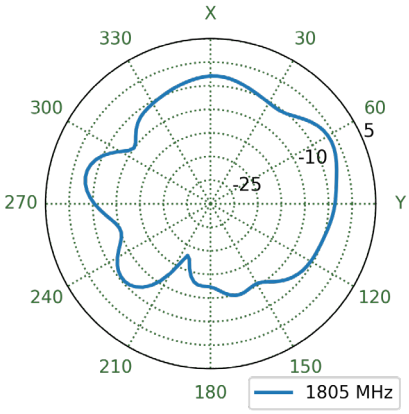
8.20 5G/4G-1 Patterns at 1805 MHz



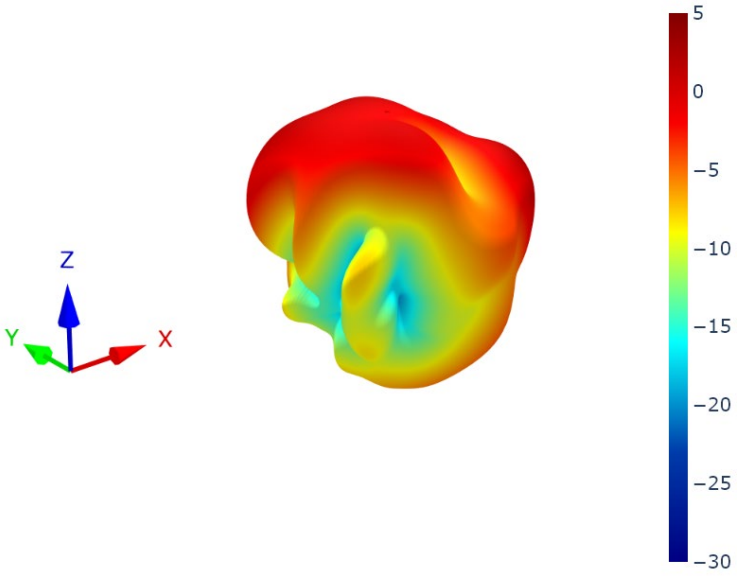
XZ Plane	YZ Plane	XY Plane
		

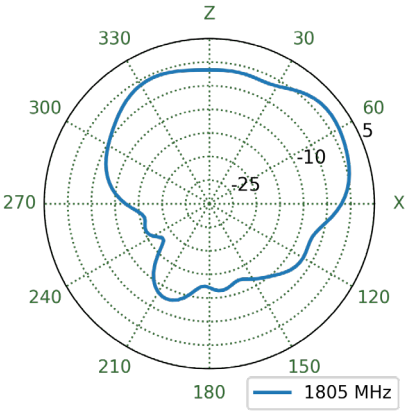
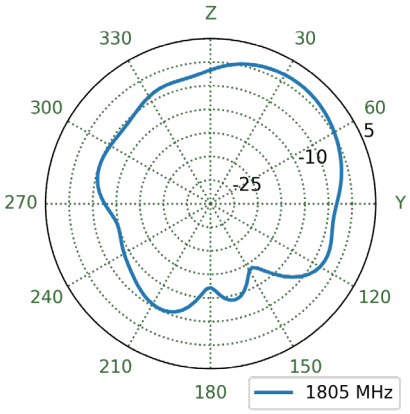
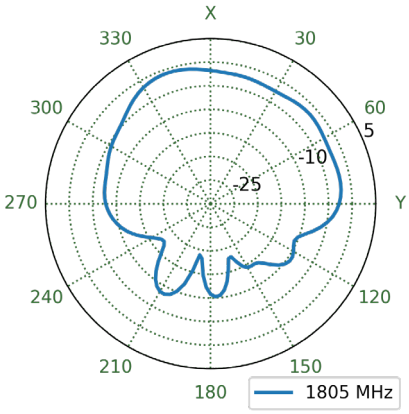
8.21 5G/4G-2 Patterns at 1805 MHz



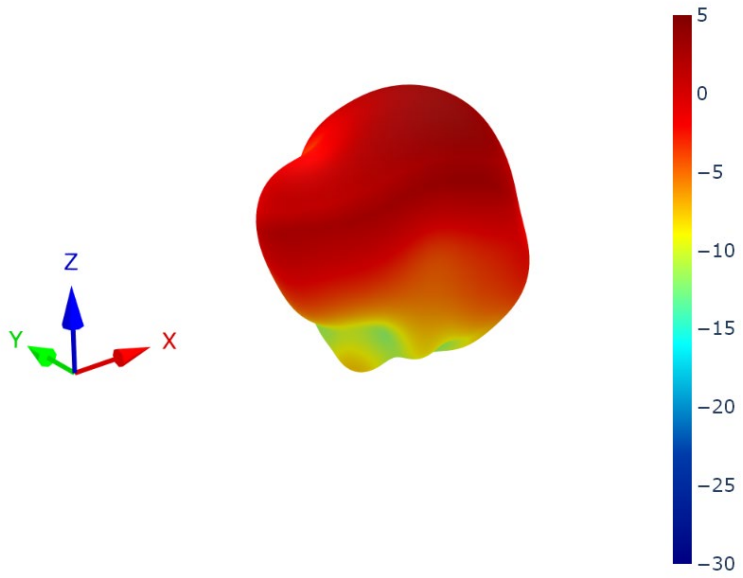
XZ Plane	YZ Plane	XY Plane
		

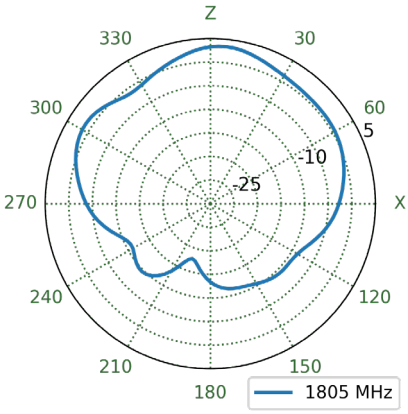
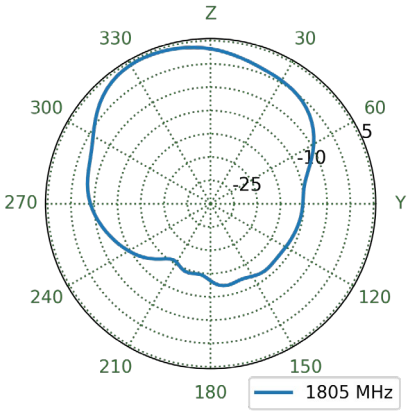
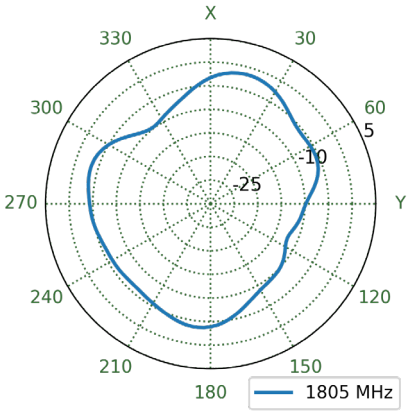
8.22 5G/4G-3 Patterns at 1805 MHz



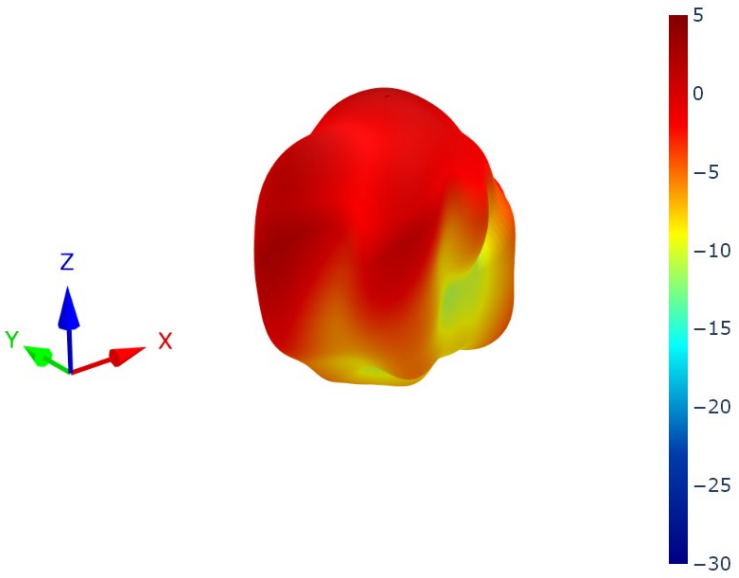
XZ Plane	YZ Plane	XY Plane
		

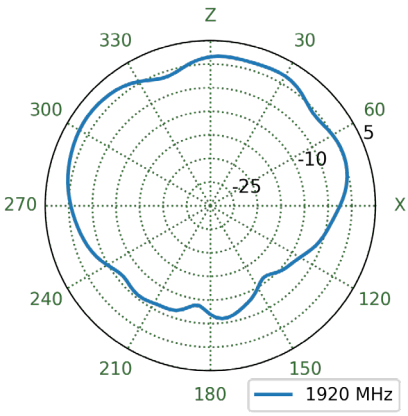
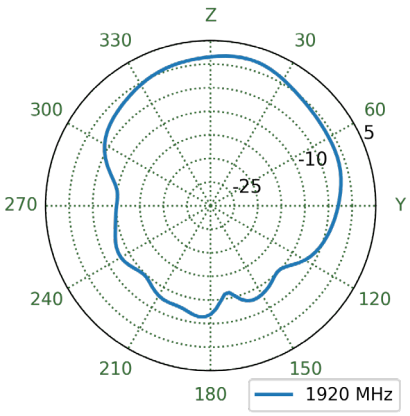
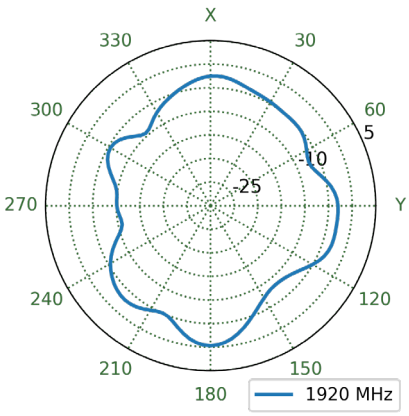
8.23 5G/4G-4 Patterns at 1805 MHz



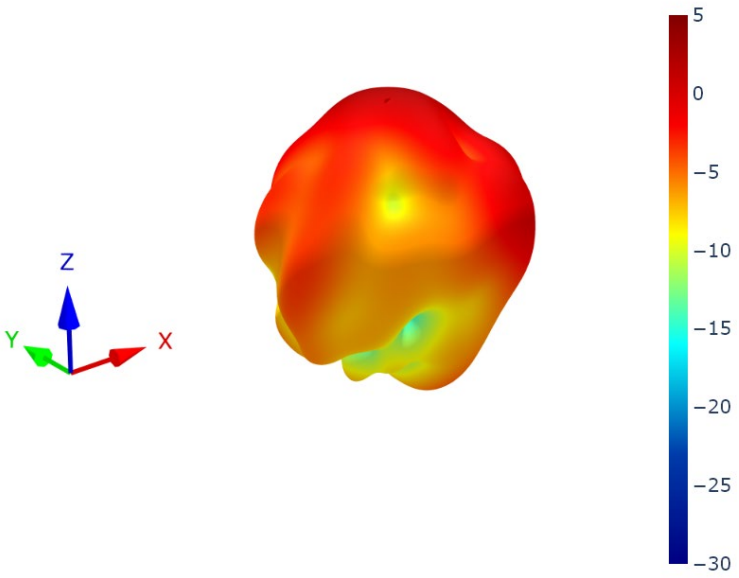
XZ Plane	YZ Plane	XY Plane
		

8.24 5G/4G-1 Patterns at 1920 MHz

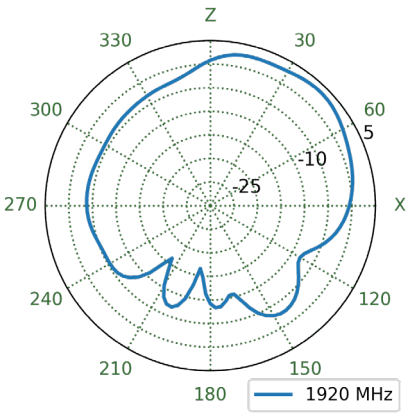


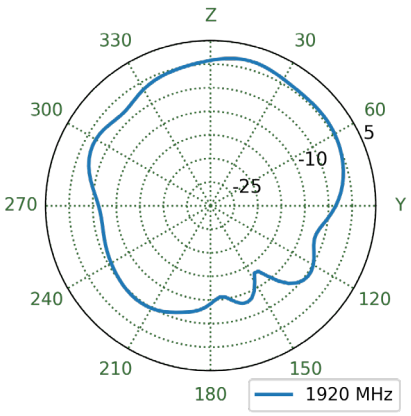
XZ Plane	YZ Plane	XY Plane
		

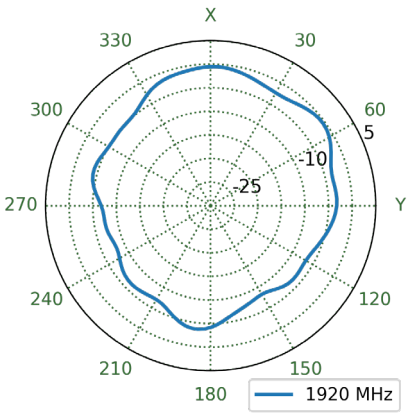
8.25 5G/4G-2 Patterns at 1920 MHz



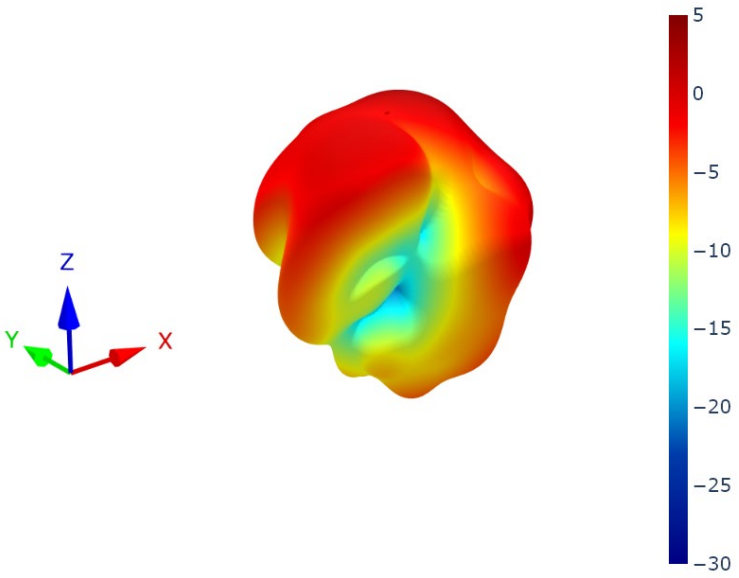
XZ Plane	YZ Plane	XY Plane

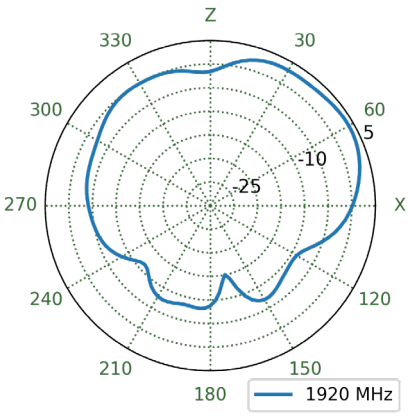
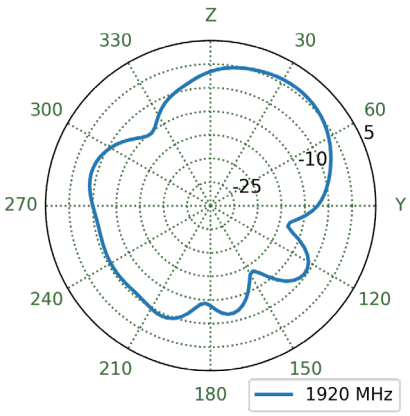
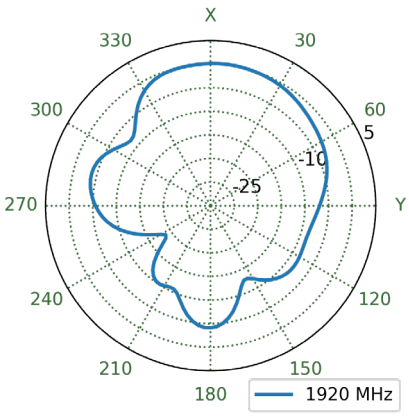




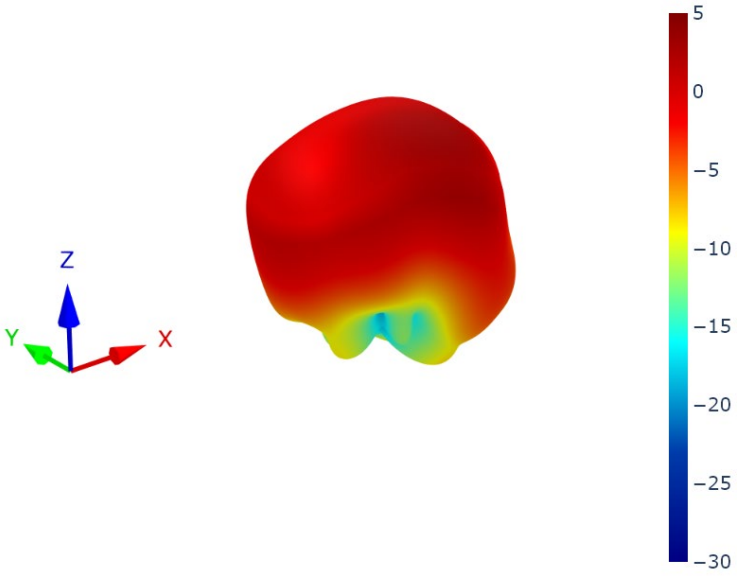


8.26 5G/4G-3 Patterns at 1920 MHz

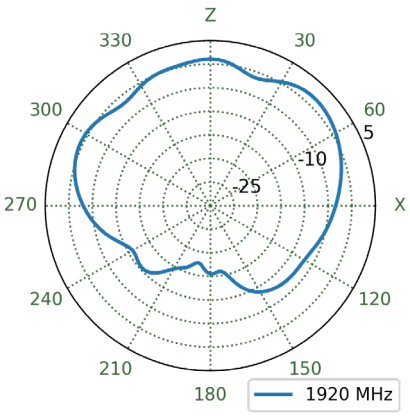


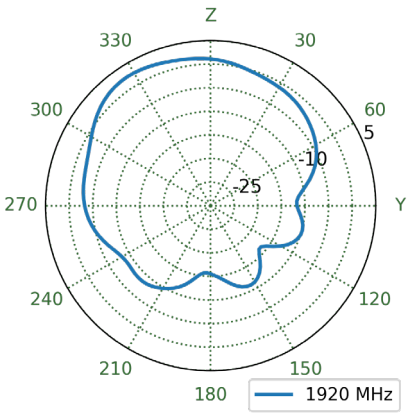
XZ Plane	YZ Plane	XY Plane
		

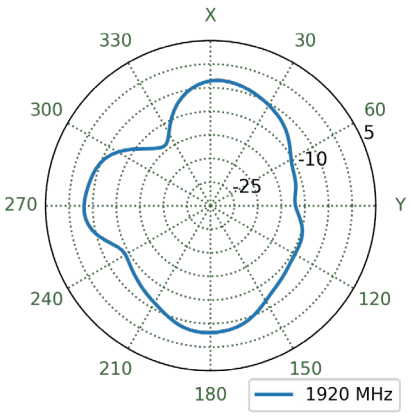
8.27 5G/4G-4 Patterns at 1920 MHz



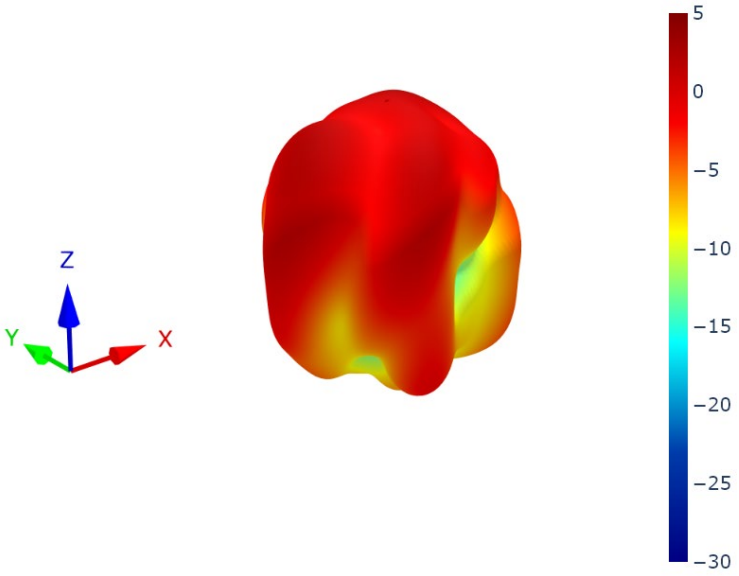
XZ Plane	YZ Plane	XY Plane

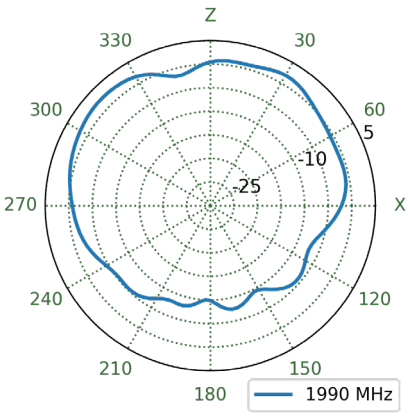
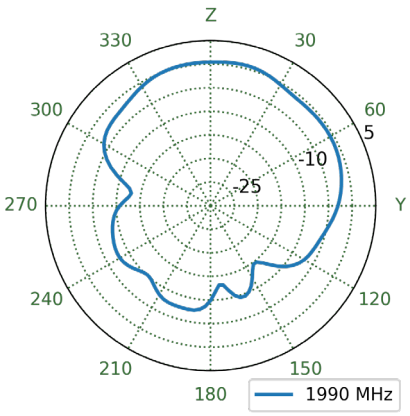
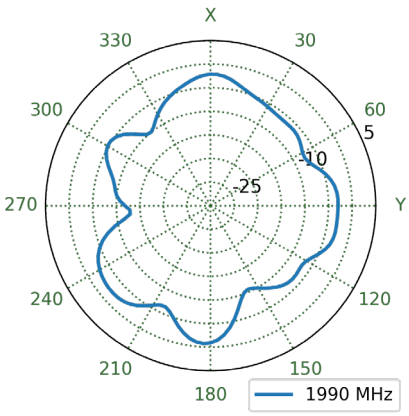




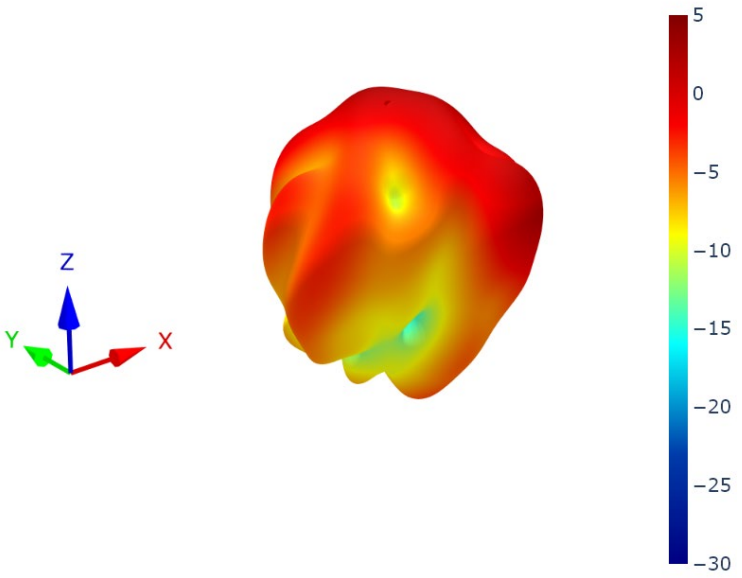


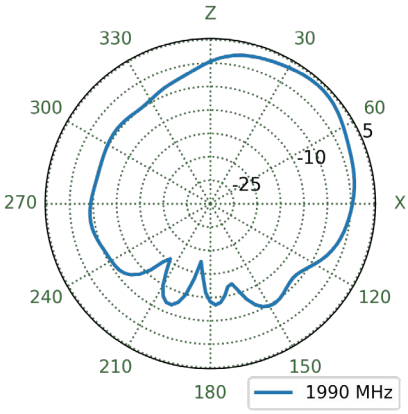
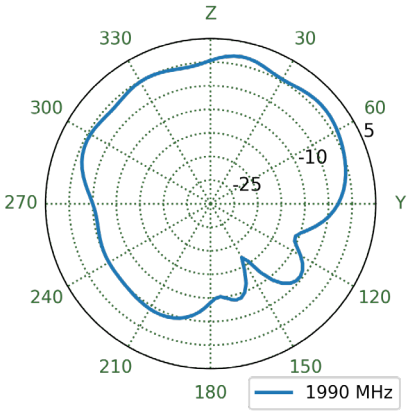
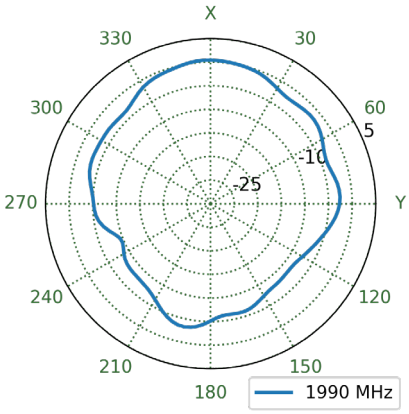
8.28 5G/4G-1 Patterns at 1990 MHz



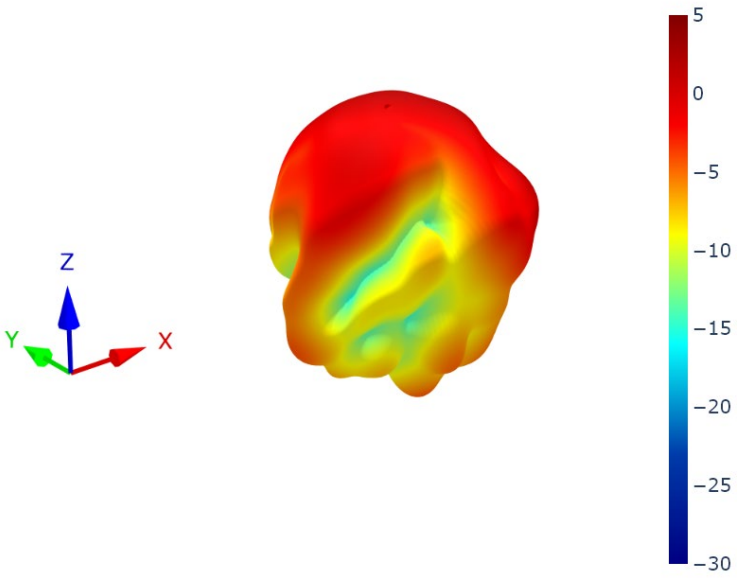
XZ Plane	YZ Plane	XY Plane
		

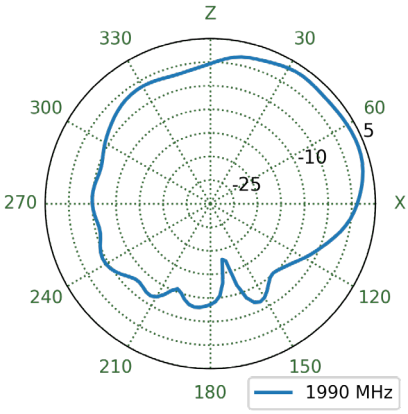
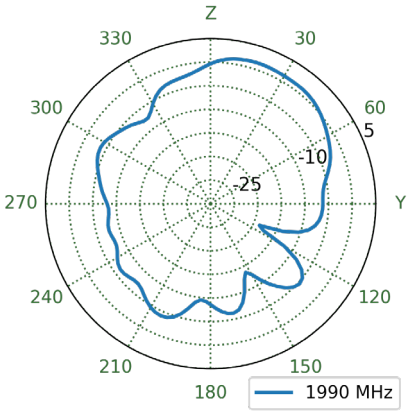
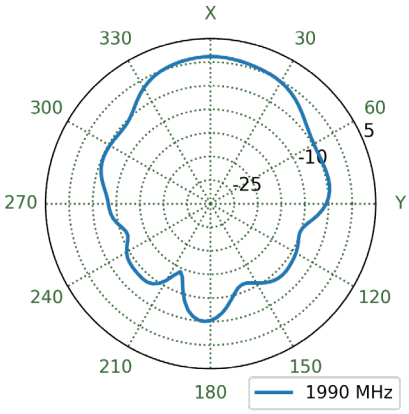
8.29 5G/4G-2 Patterns at 1990 MHz



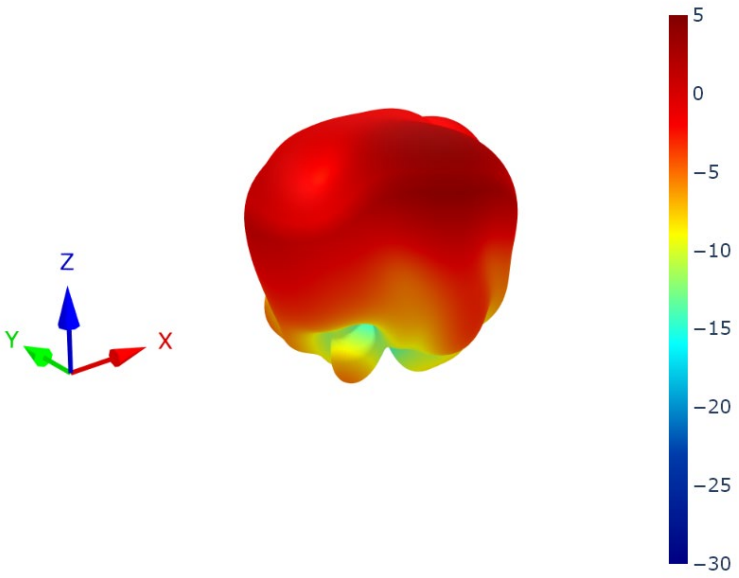
XZ Plane	YZ Plane	XY Plane
		

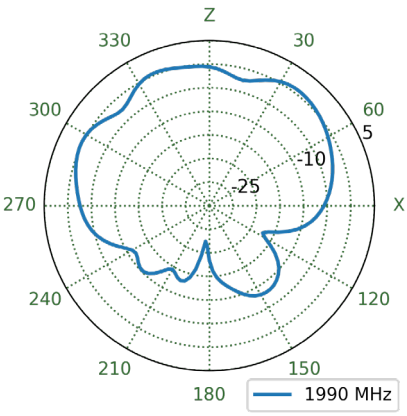
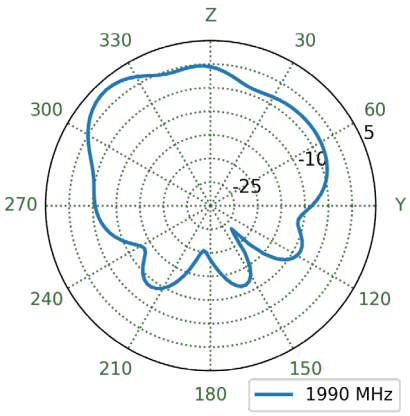
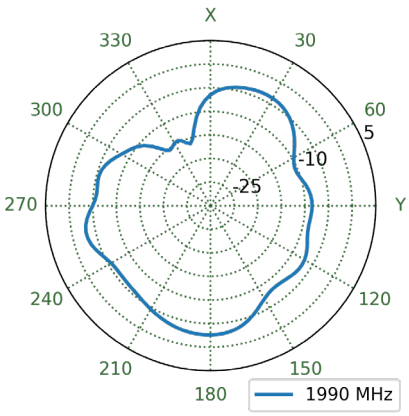
8.30 5G/4G-3 Patterns at 1990 MHz



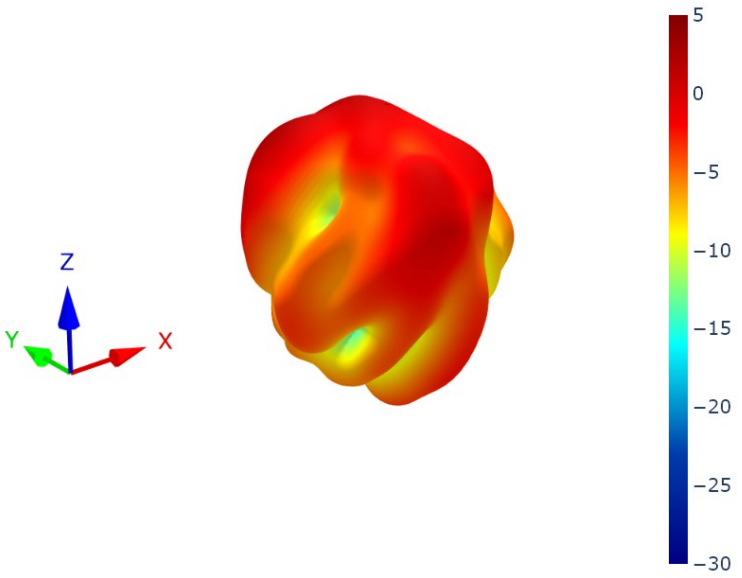
XZ Plane	YZ Plane	XY Plane
		

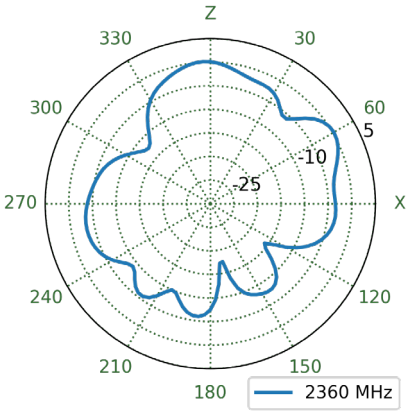
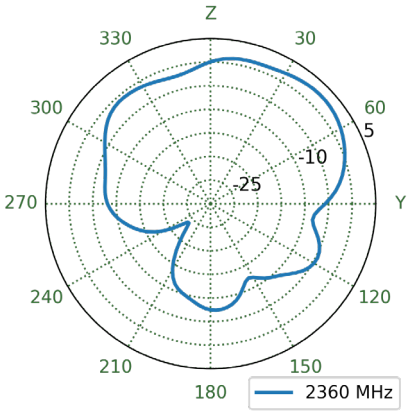
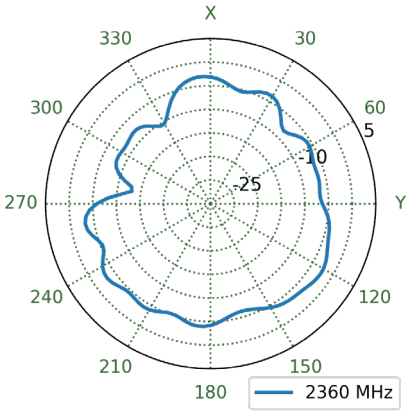
8.31 5G/4G-4 Patterns at 1990 MHz



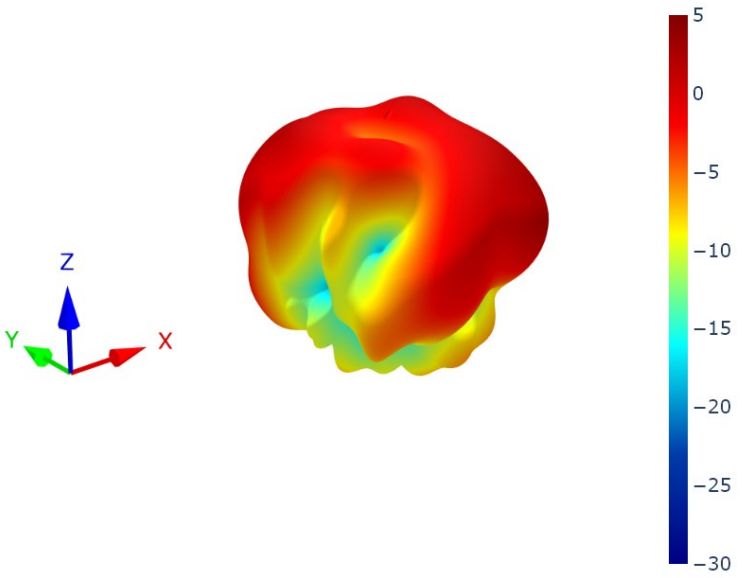
XZ Plane	YZ Plane	XY Plane
		

8.32 5G/4G-1 Patterns at 2360 MHz

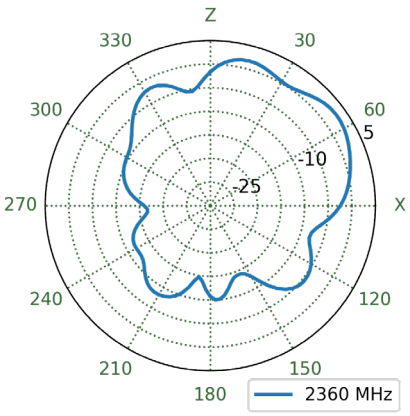


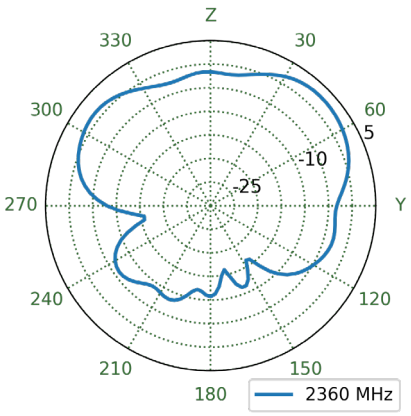
XZ Plane	YZ Plane	XY Plane
		

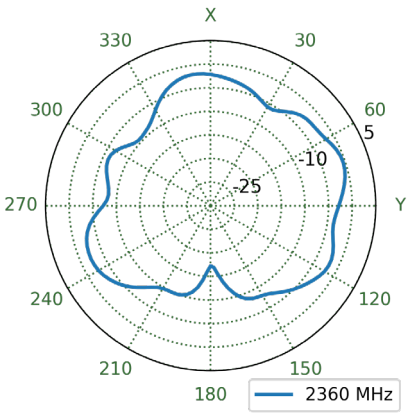
8.33 5G/4G-2 Patterns at 2360 MHz



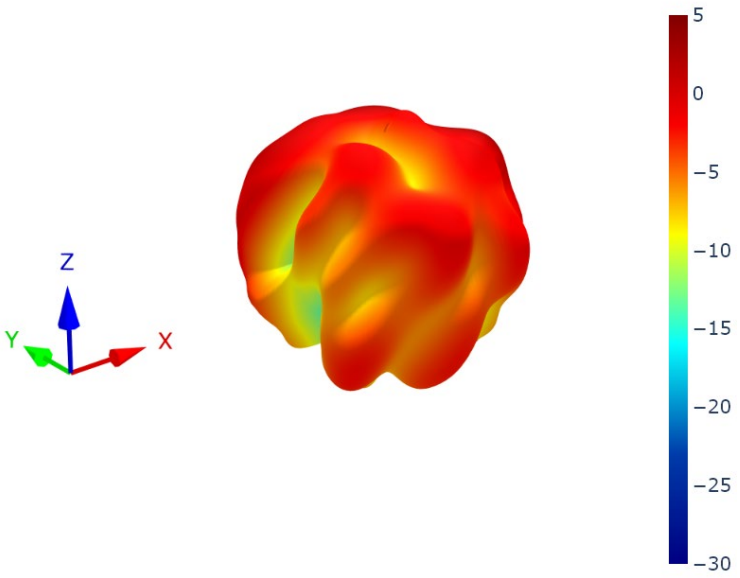
XZ Plane	YZ Plane	XY Plane

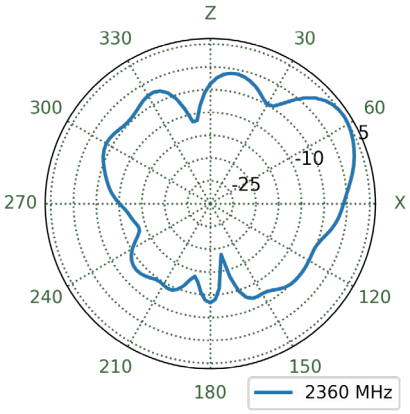
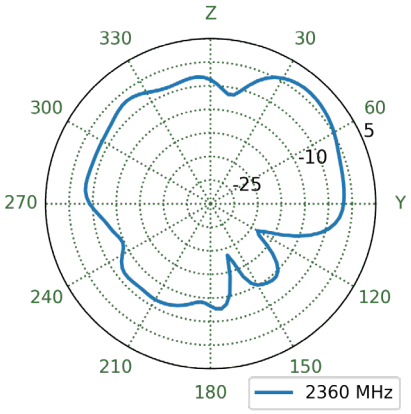
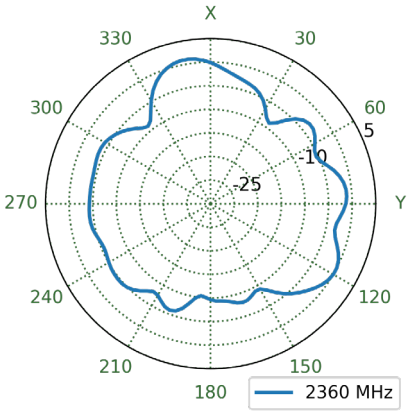




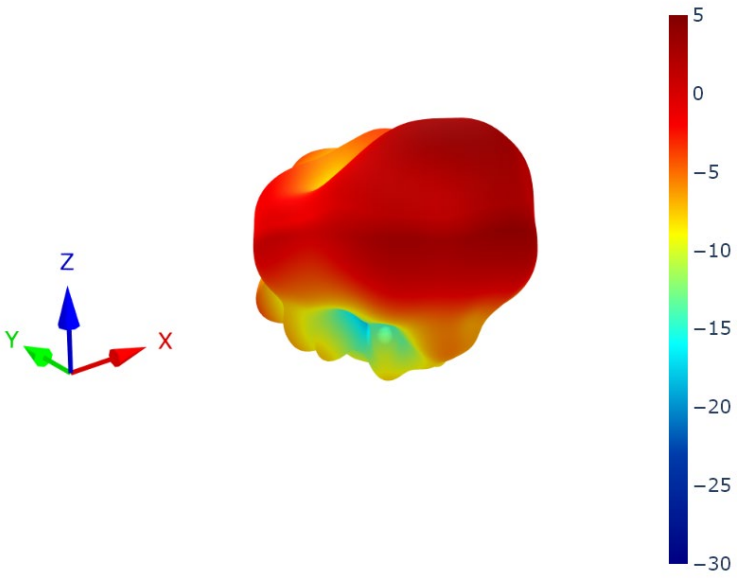


8.34 5G/4G-3 Patterns at 2360 MHz

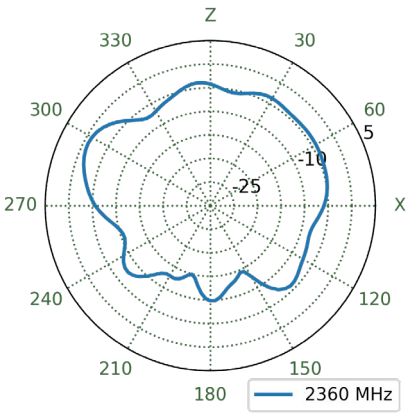


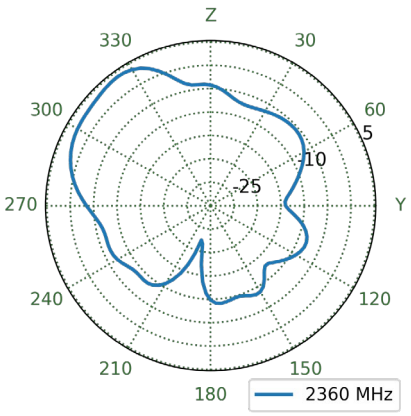
XZ Plane	YZ Plane	XY Plane
		

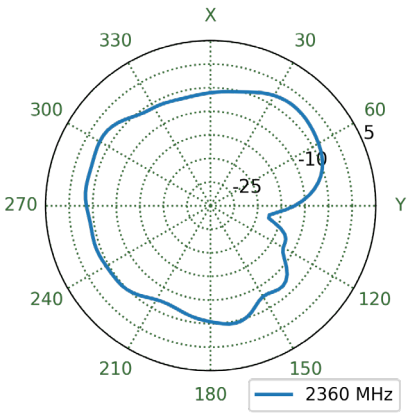
8.35 5G/4G-4 Patterns at 2360 MHz



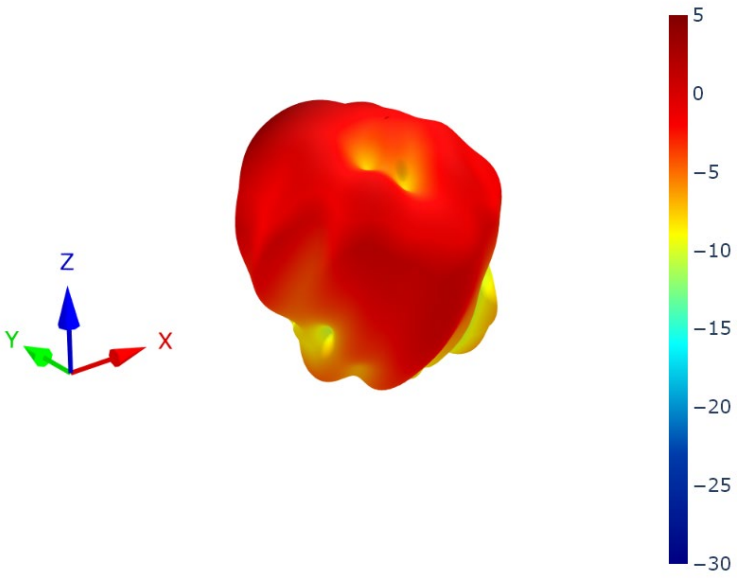
XZ Plane	YZ Plane	XY Plane

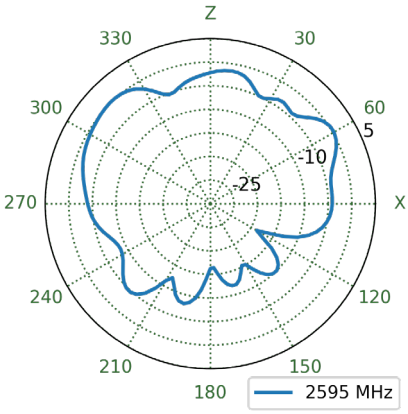
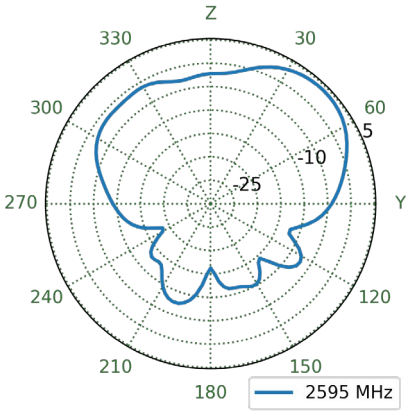
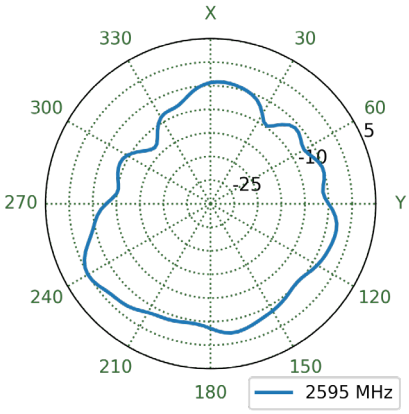




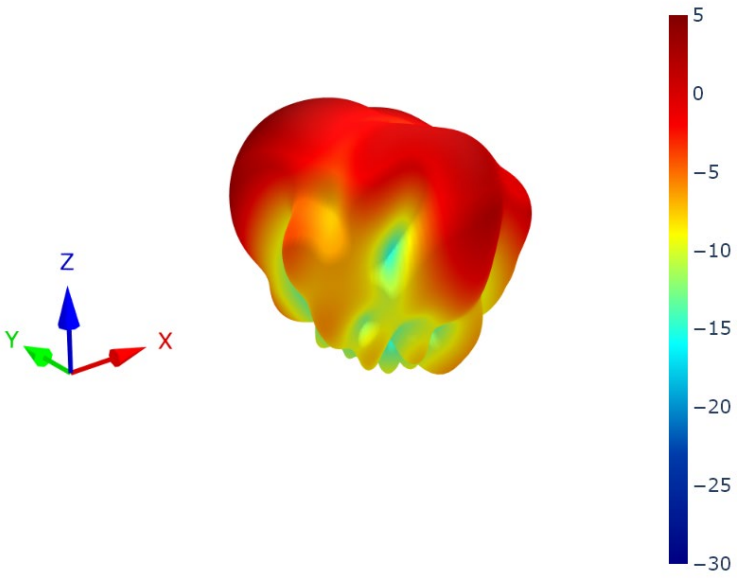


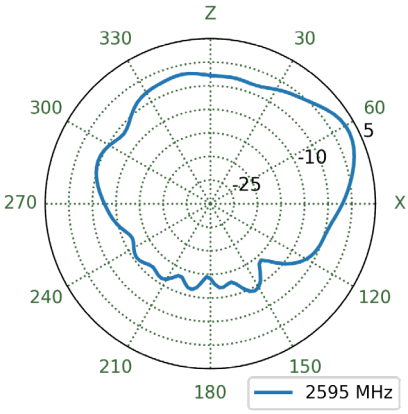
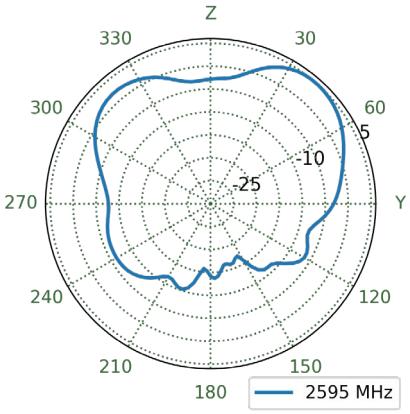
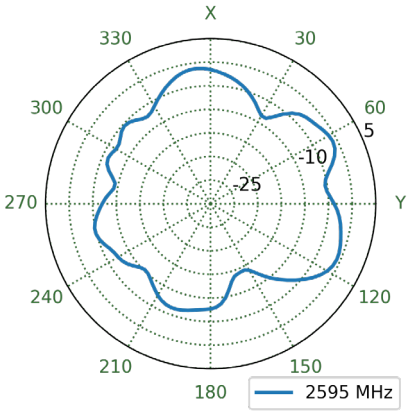
8.36 5G/4G-1 Patterns at 2595 MHz



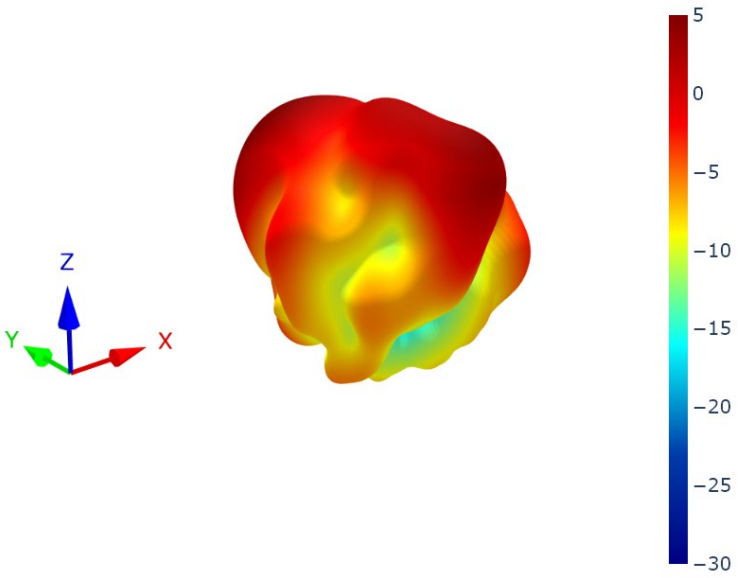
XZ Plane	YZ Plane	XY Plane
		

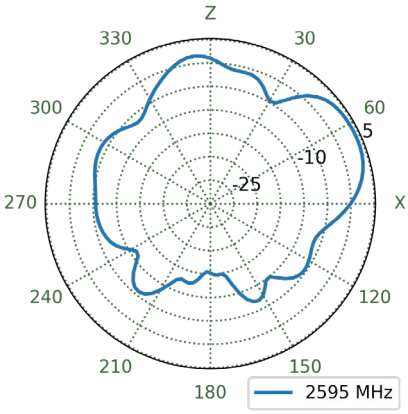
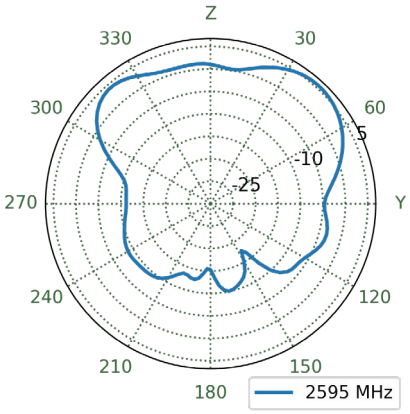
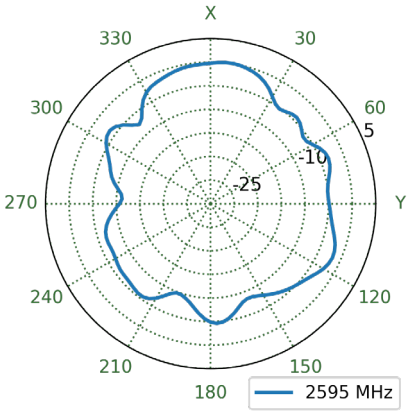
8.37 5G/4G-2 Patterns at 2595 MHz



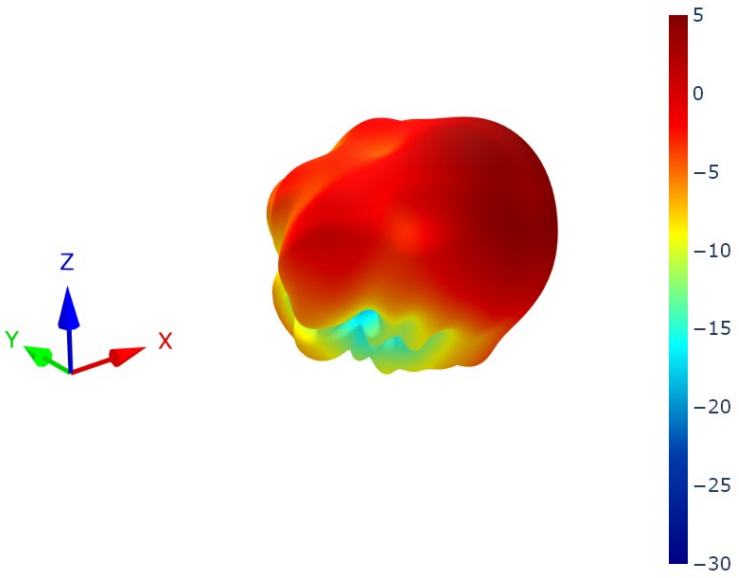
XZ Plane	YZ Plane	XY Plane
		

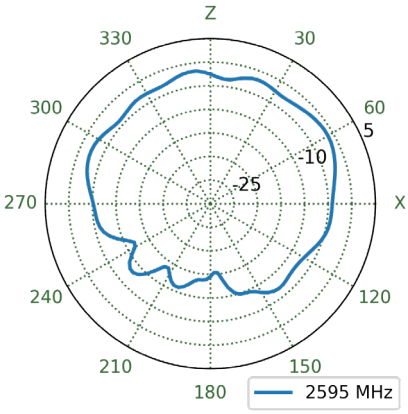
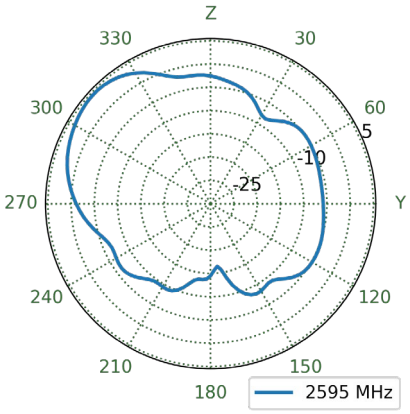
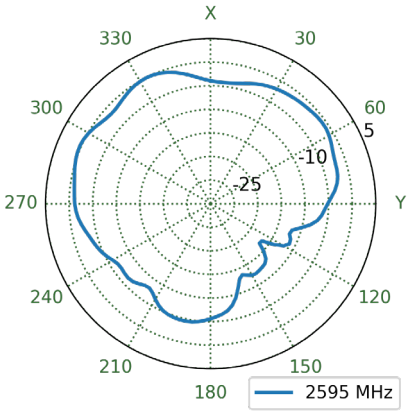
8.38 5G/4G-3 Patterns at 2595 MHz



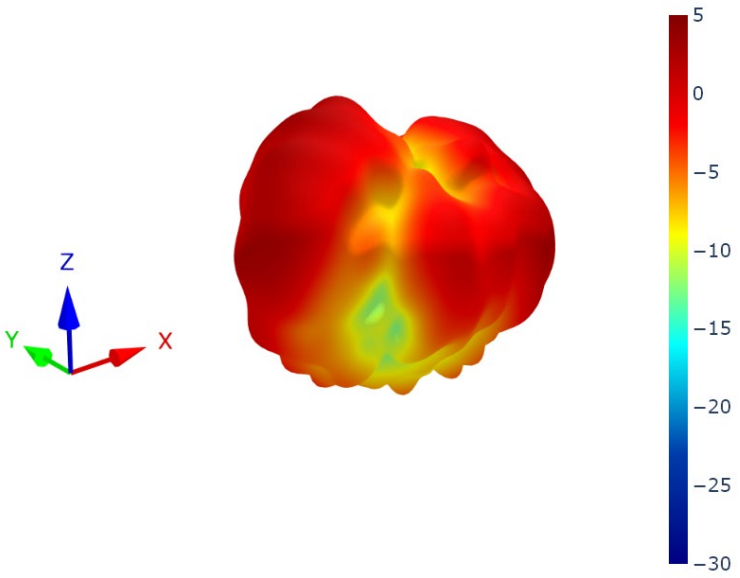
XZ Plane	YZ Plane	XY Plane
		

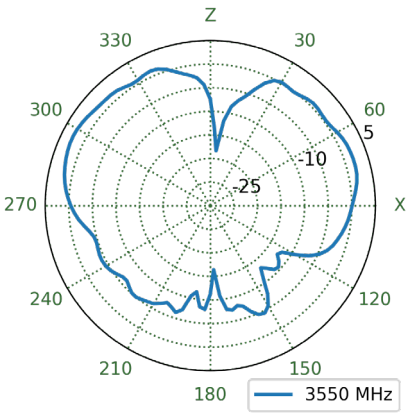
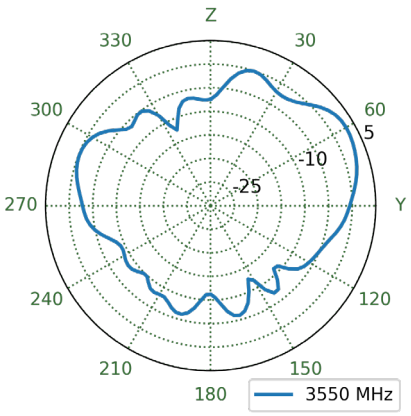
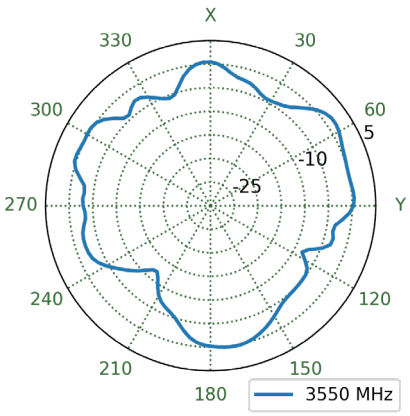
8.39 5G/4G-4 Patterns at 2595 MHz



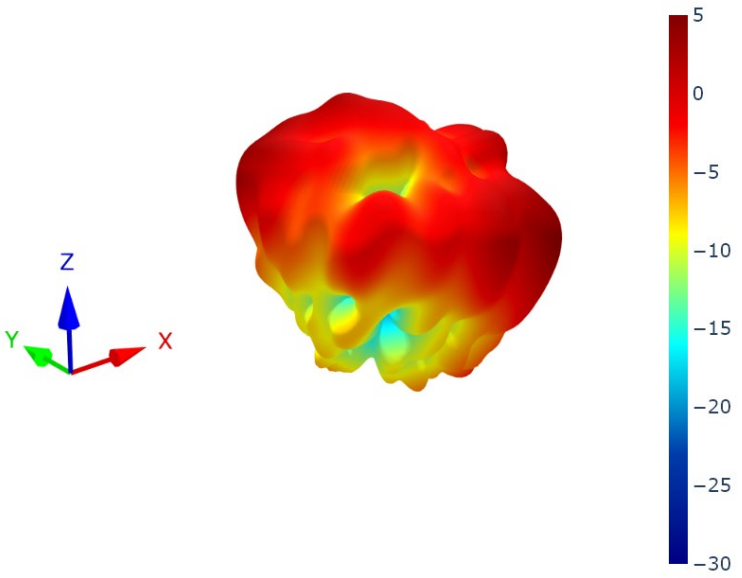
XZ Plane	YZ Plane	XY Plane
		

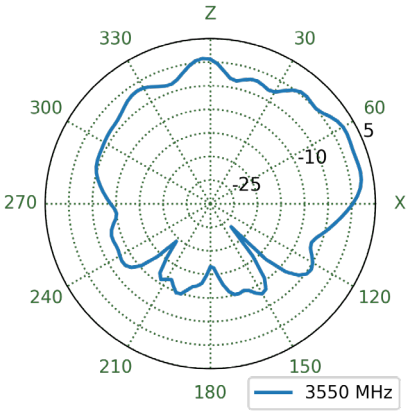
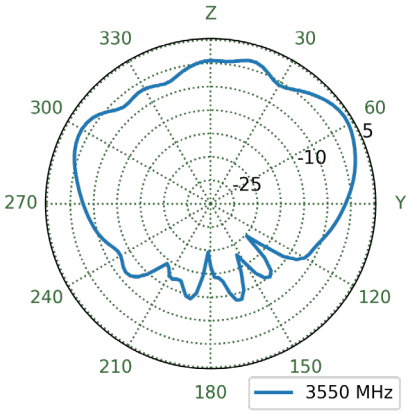
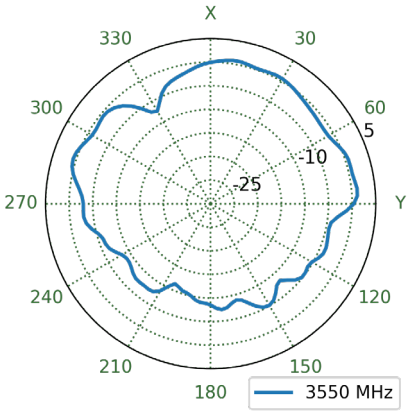
8.40 5G/4G-1 Patterns at 3550 MHz



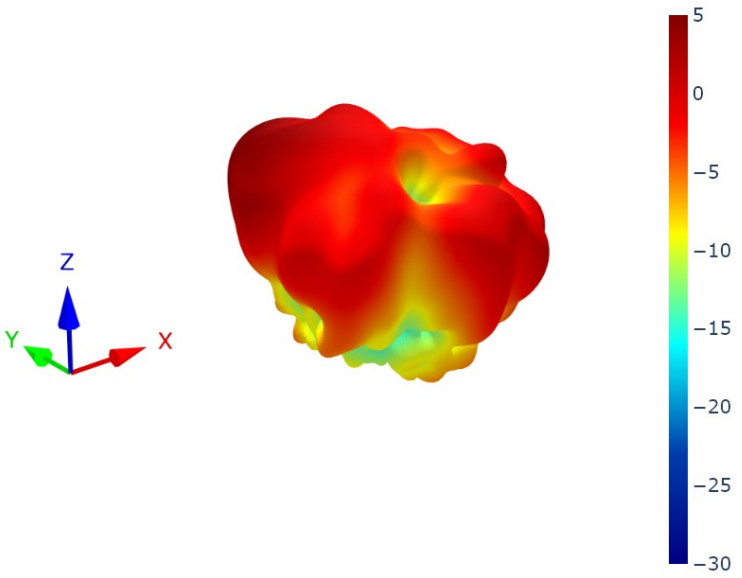
XZ Plane	YZ Plane	XY Plane
		

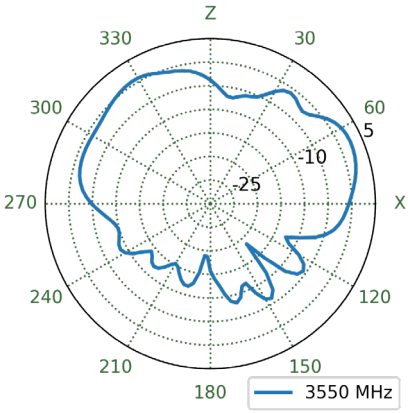
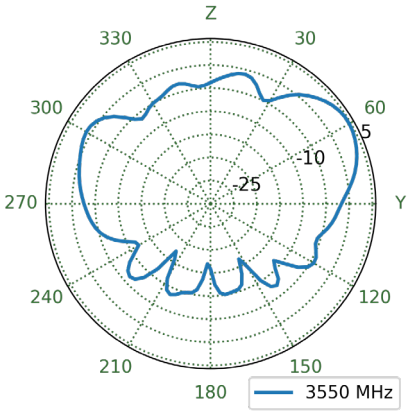
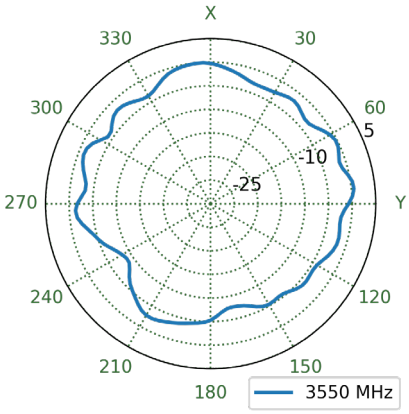
8.41 5G/4G-2 Patterns at 3550 MHz



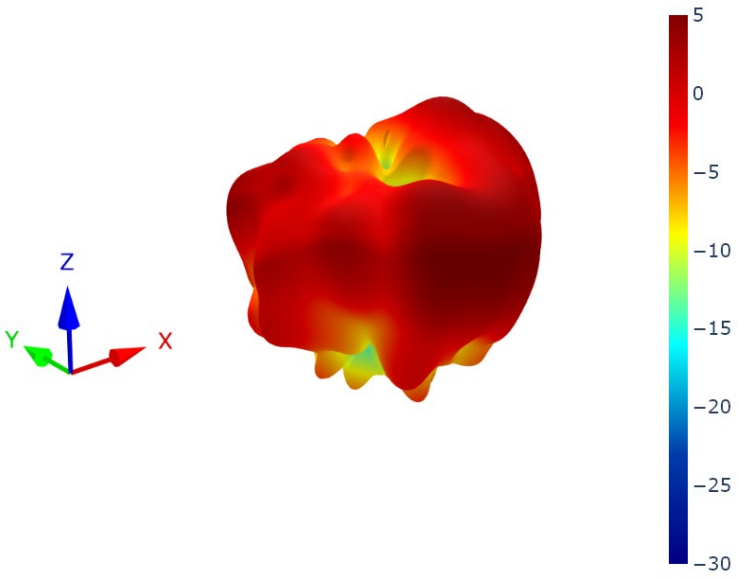
XZ Plane	YZ Plane	XY Plane
		

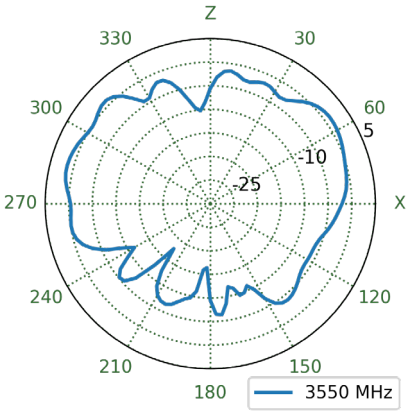
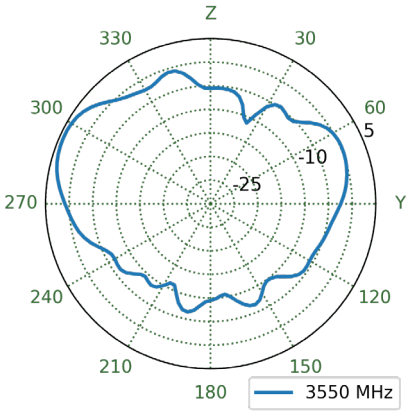
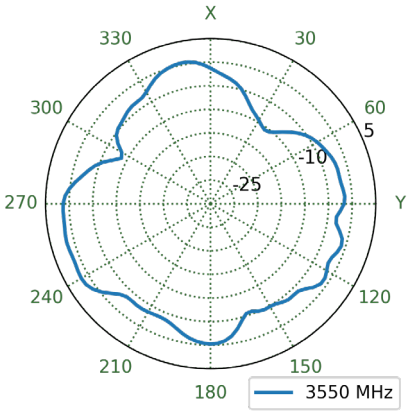
8.42 5G/4G-3 Patterns at 3550 MHz



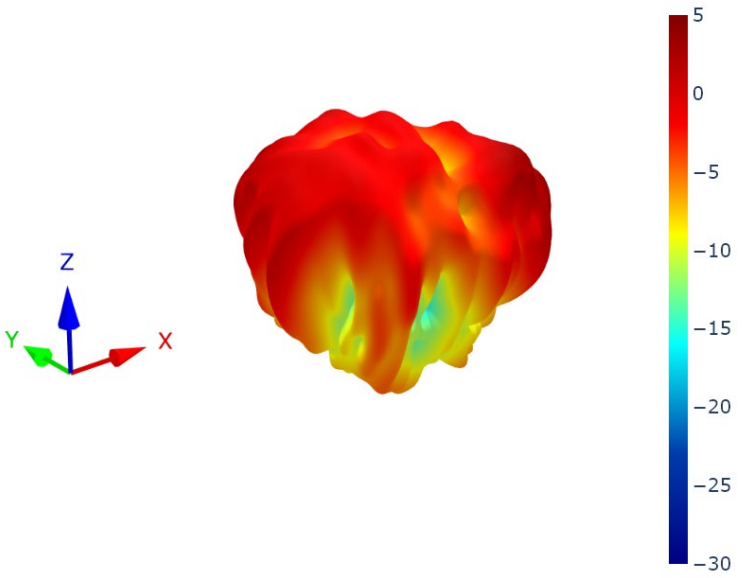
XZ Plane	YZ Plane	XY Plane
		

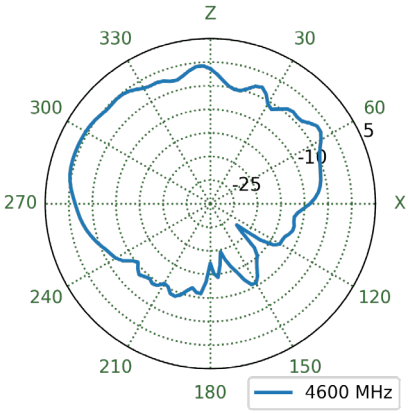
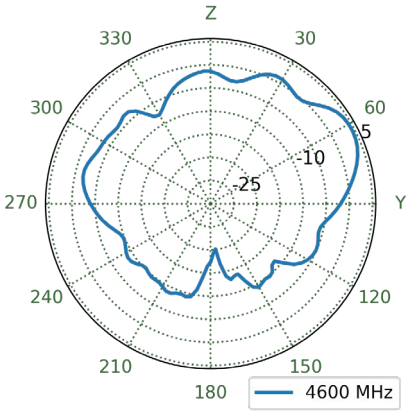
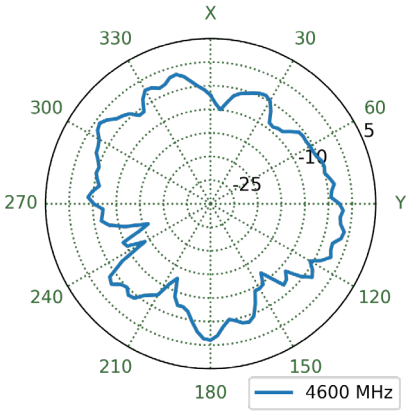
8.43 5G/4G-4 Patterns at 3550 MHz



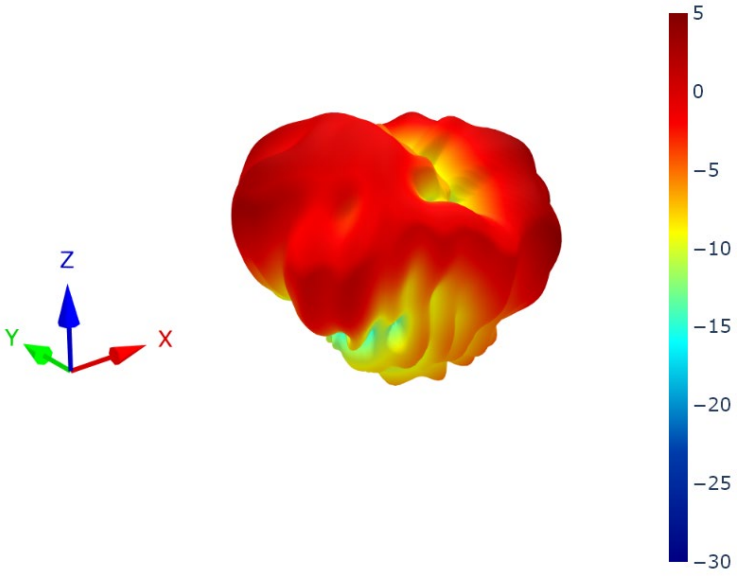
XZ Plane	YZ Plane	XY Plane
		

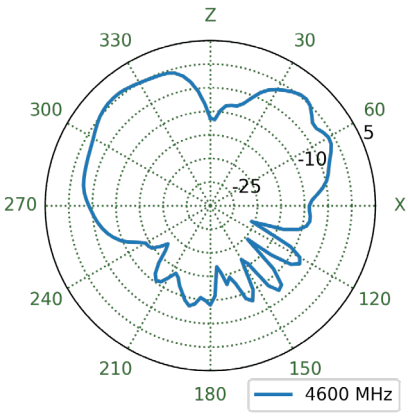
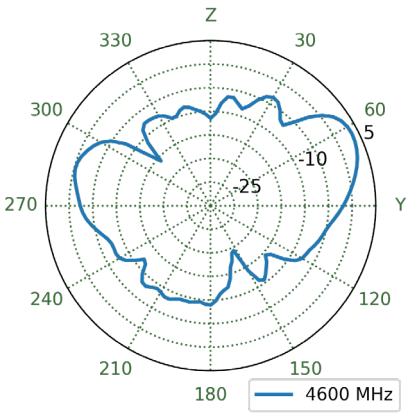
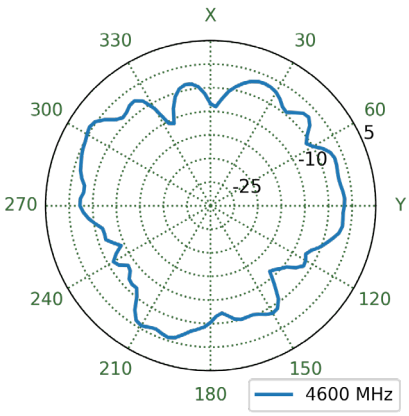
8.44 5G/4G-1 Patterns at 4600 MHz



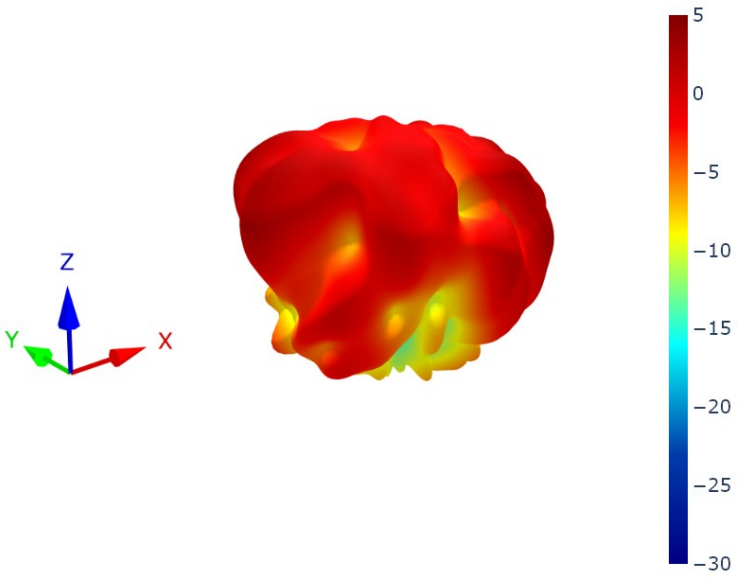
XZ Plane	YZ Plane	XY Plane
		

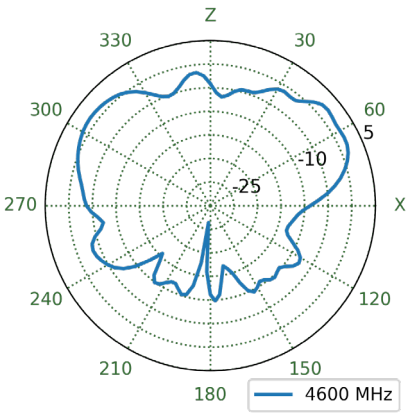
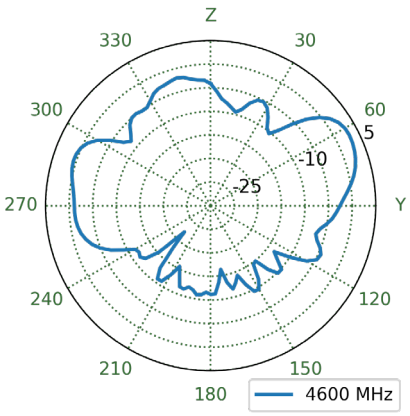
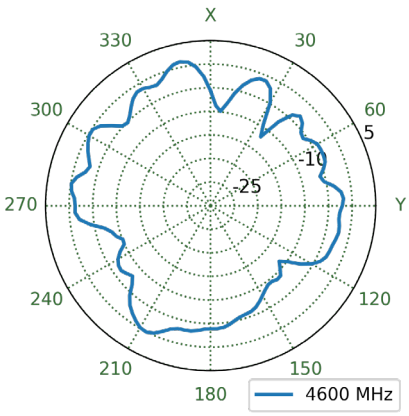
8.45 5G/4G-2 Patterns at 4600 MHz



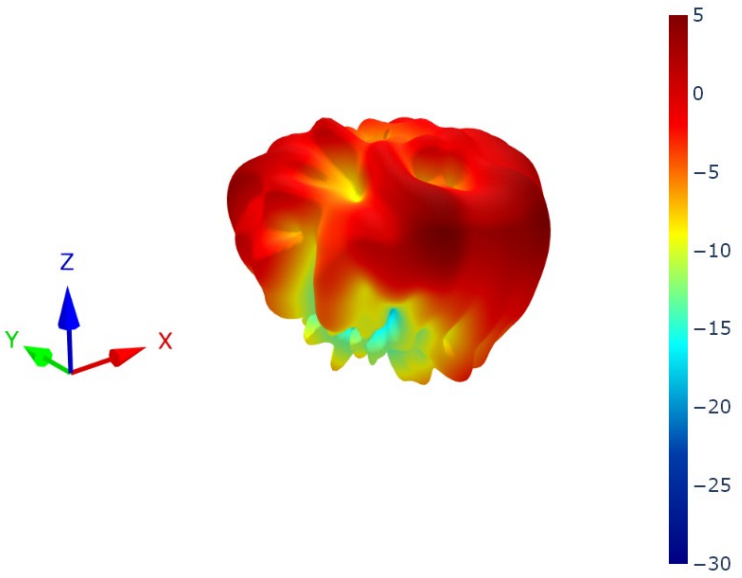
XZ Plane	YZ Plane	XY Plane
		

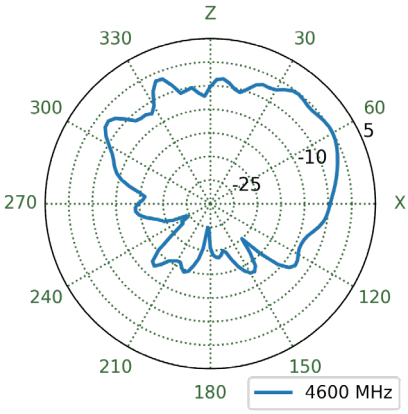
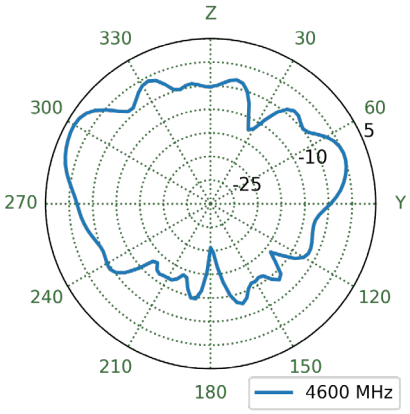
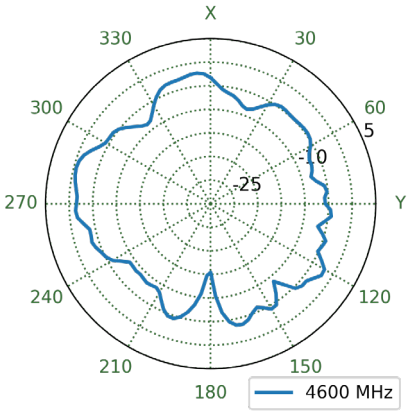
8.46 5G/4G-3 Patterns at 4600 MHz



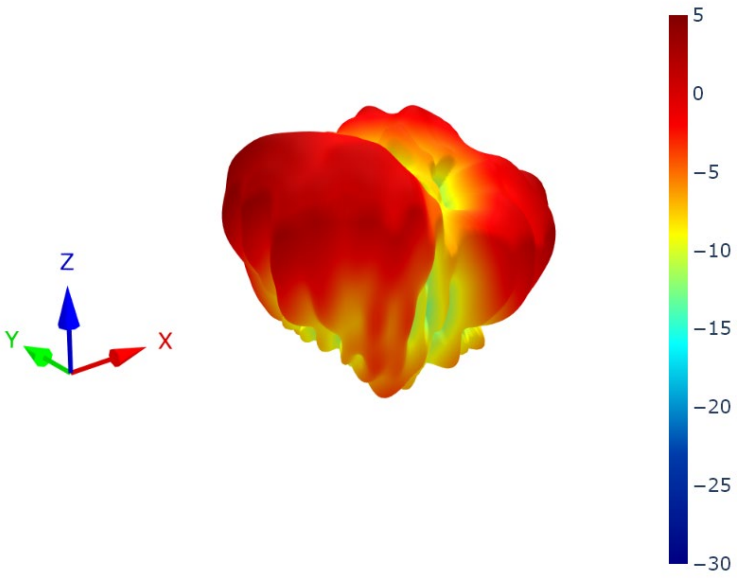
XZ Plane	YZ Plane	XY Plane
		

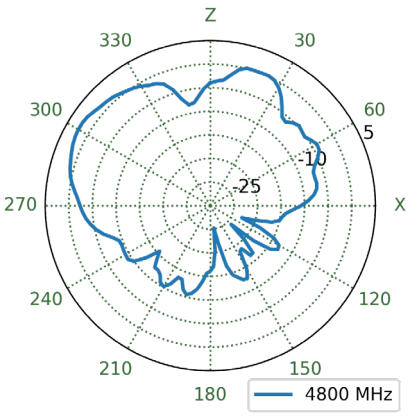
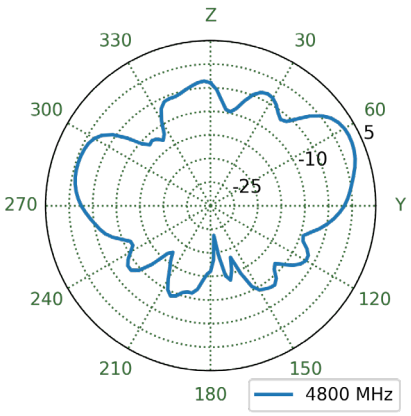
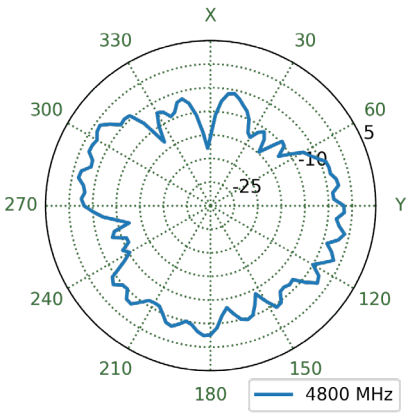
8.47 5G/4G-4 Patterns at 4600 MHz



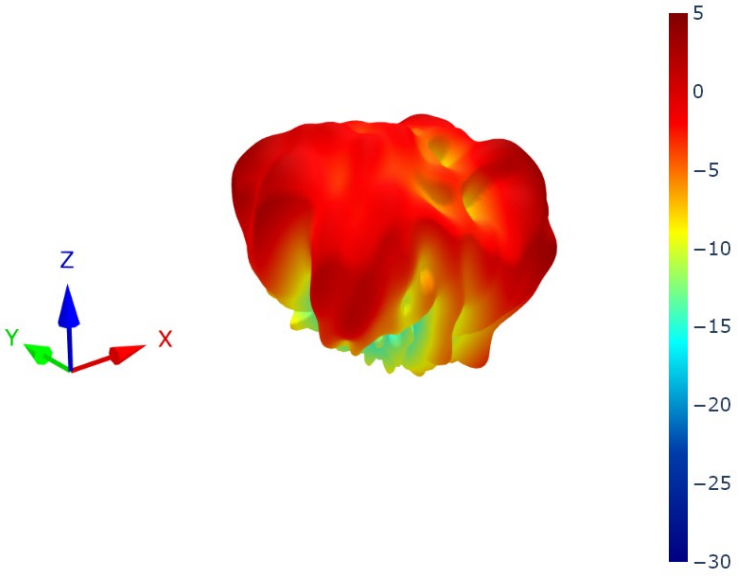
XZ Plane	YZ Plane	XY Plane
		

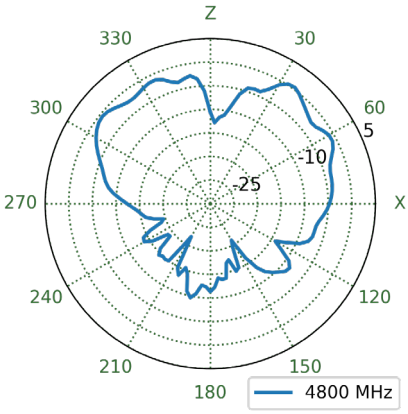
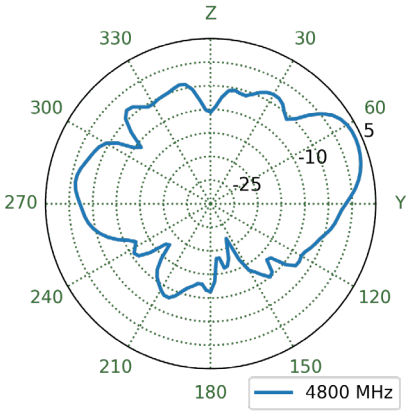
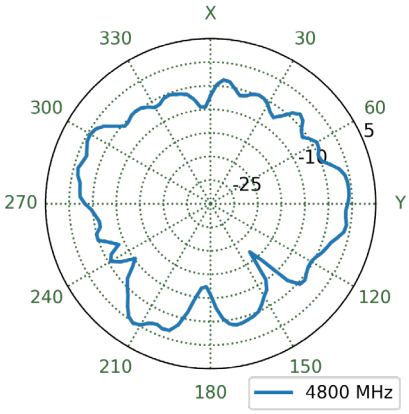
8.48 5G/4G-1 Patterns at 4800 MHz



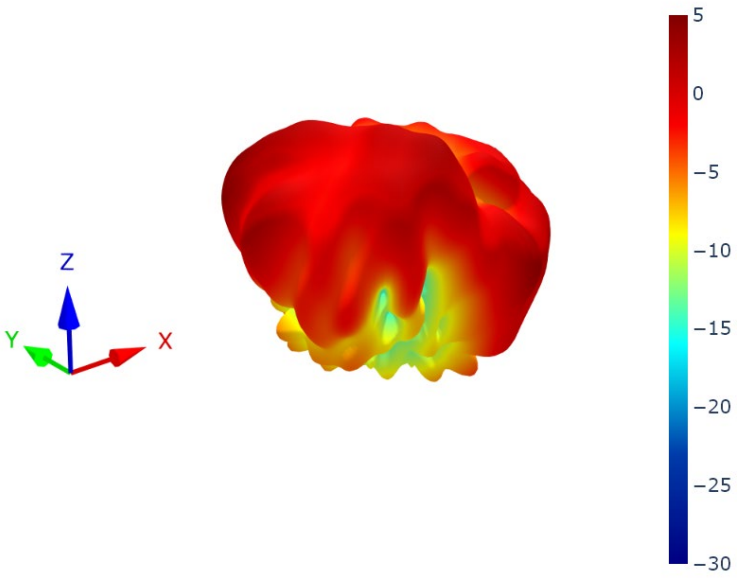
XZ Plane	YZ Plane	XY Plane
		

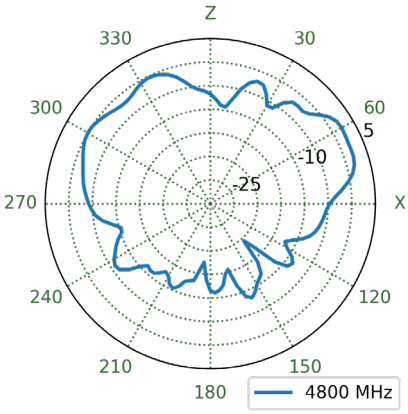
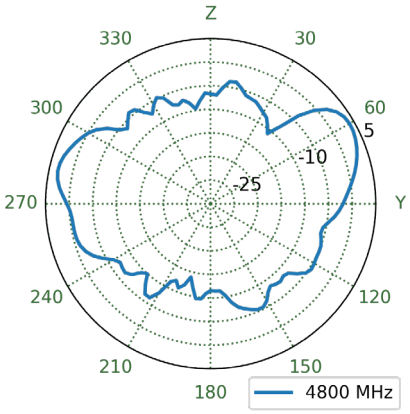
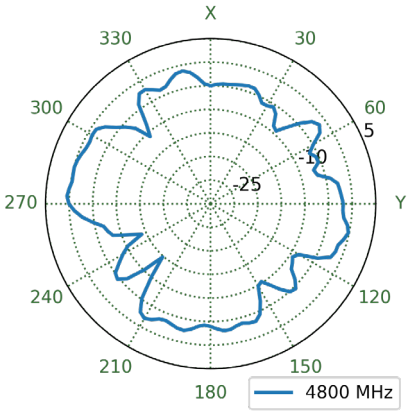
8.49 5G/4G-2 Patterns at 4800 MHz



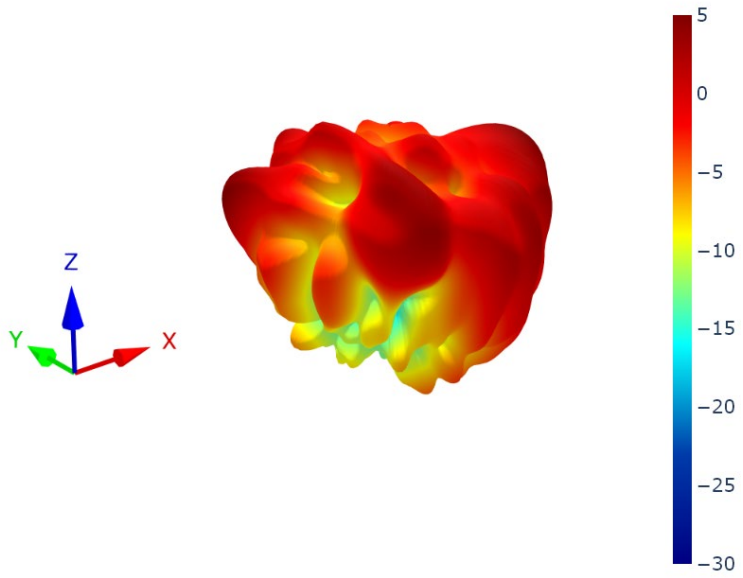
XZ Plane	YZ Plane	XY Plane
		

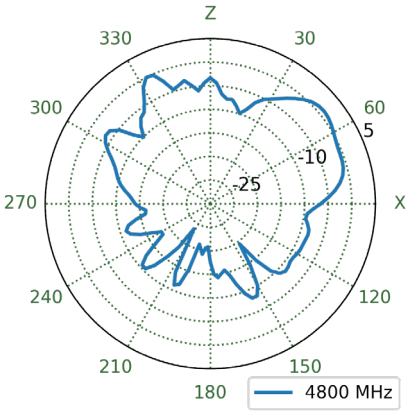
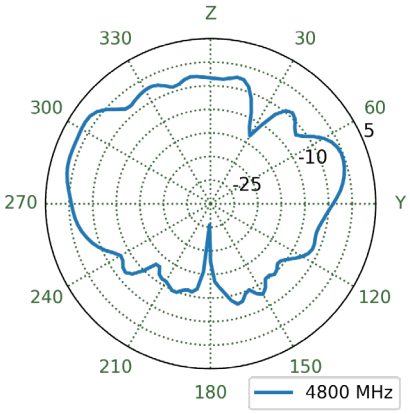
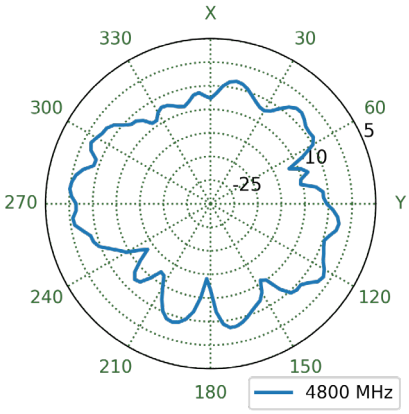
8.50 5G/4G-3 Patterns at 4800 MHz



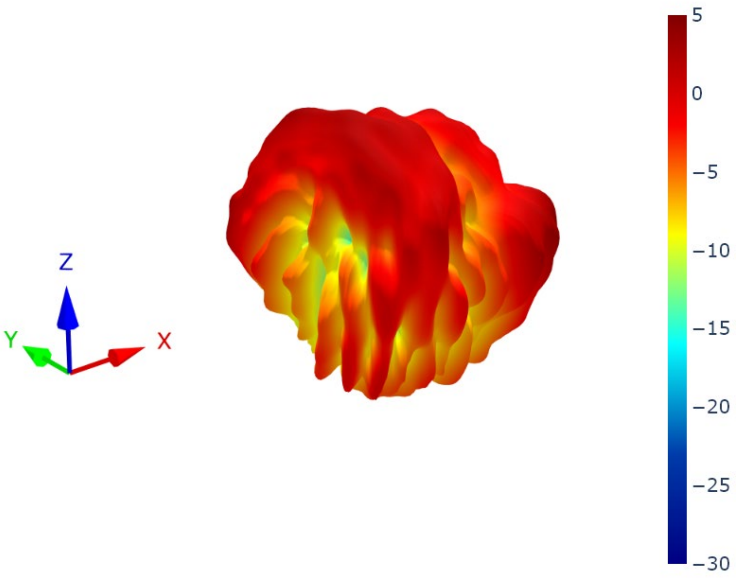
XZ Plane	YZ Plane	XY Plane
		

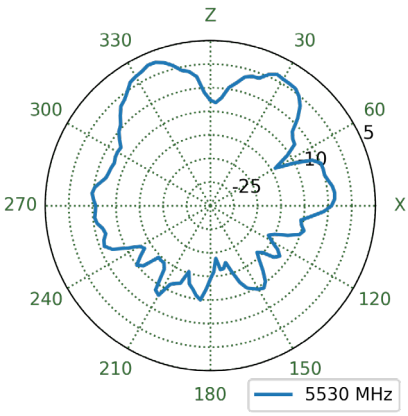
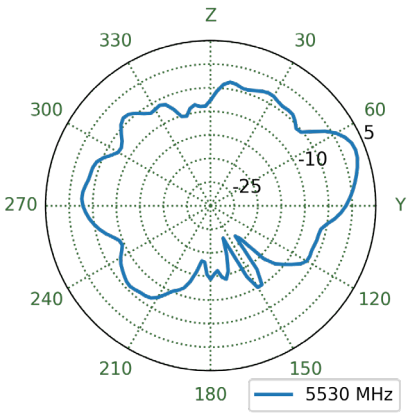
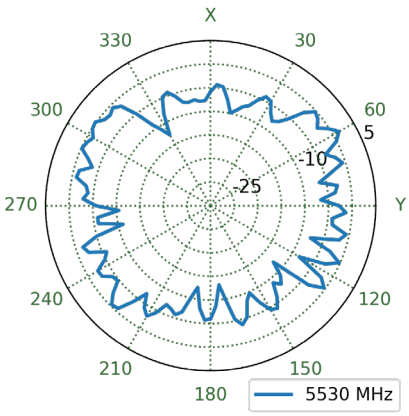
8.51 5G/4G-4 Patterns at 4800 MHz



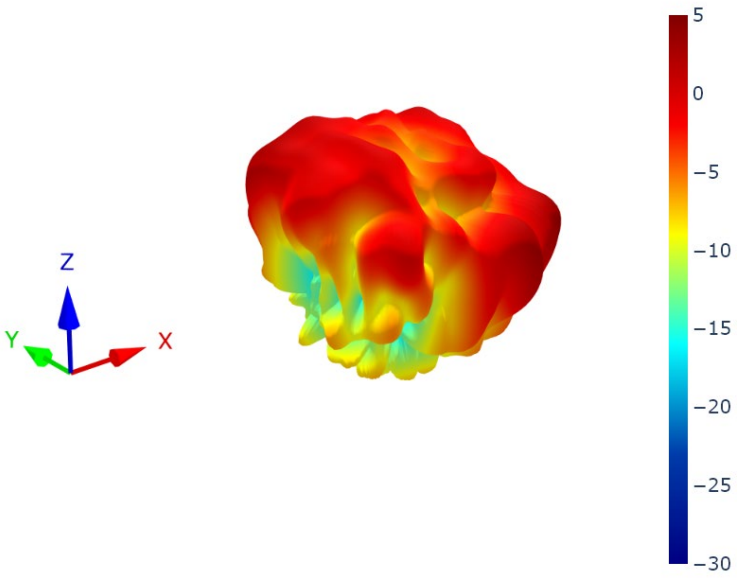
XZ Plane	YZ Plane	XY Plane
		

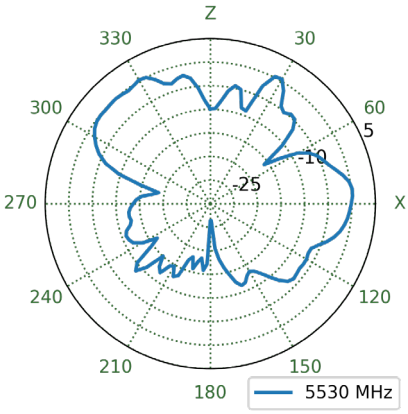
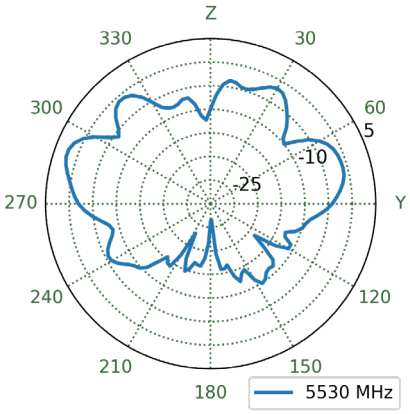
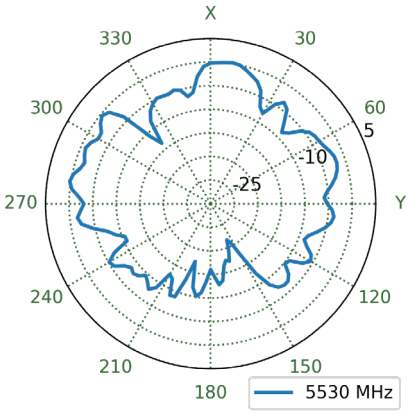
8.52 5G/4G-1 Patterns at 5530 MHz



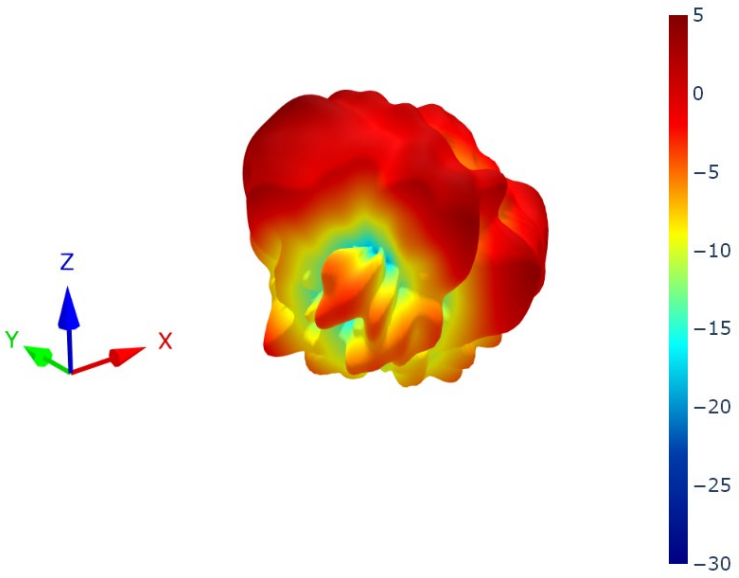
XZ Plane	YZ Plane	XY Plane
		

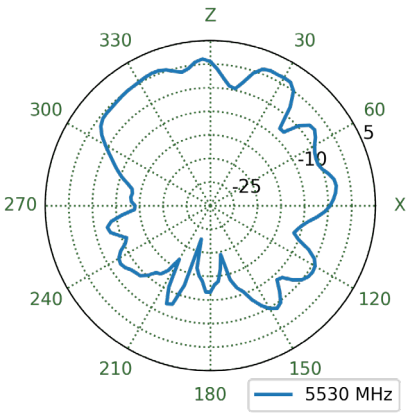
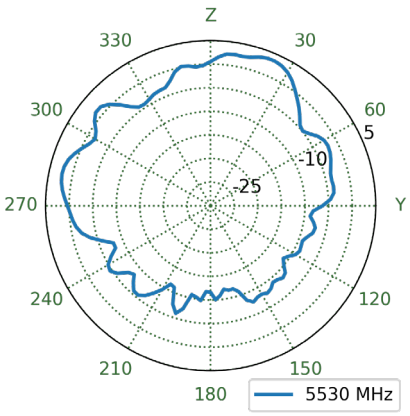
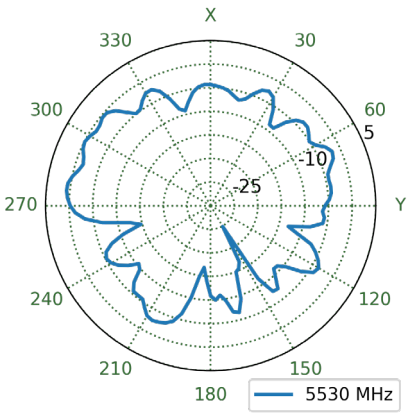
8.53 5G/4G-2 Patterns at 5530 MHz



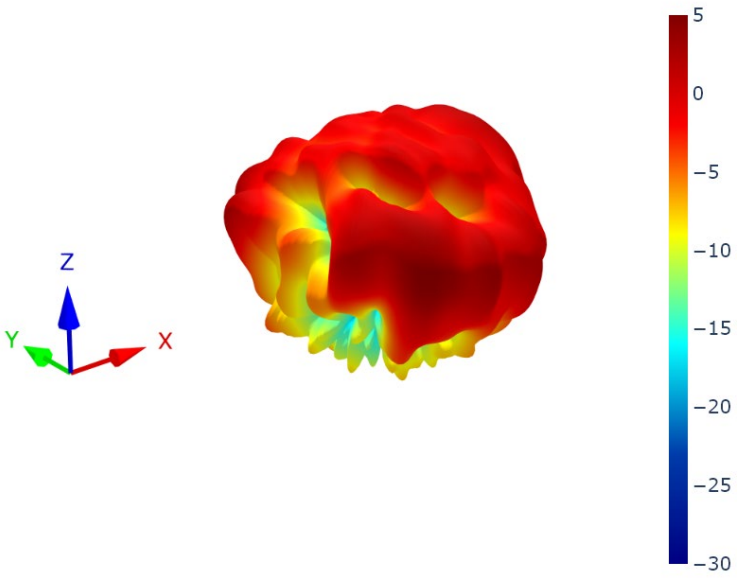
XZ Plane	YZ Plane	XY Plane
		

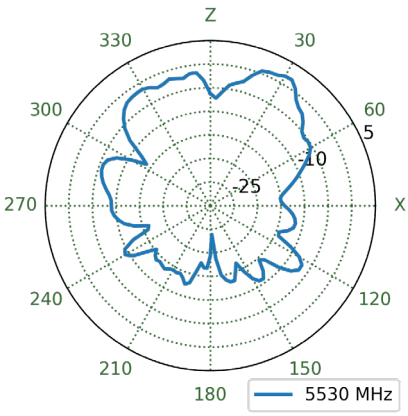
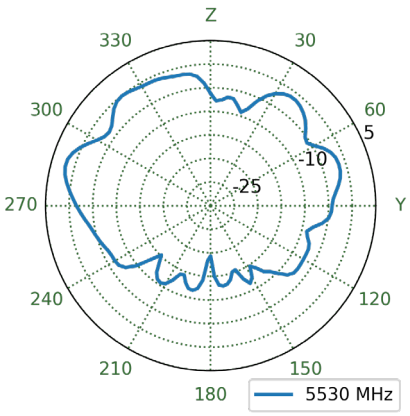
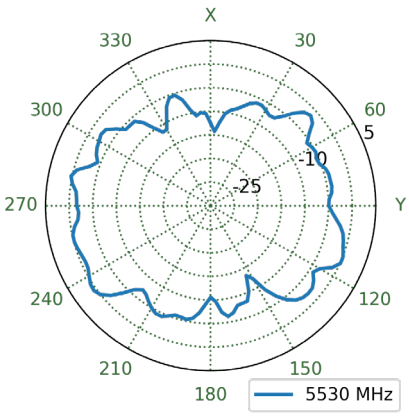
8.54 5G/4G-3 Patterns at 5530 MHz



XZ Plane	YZ Plane	XY Plane
		

8.55 5G/4G-4 Patterns at 5530 MHz



XZ Plane	YZ Plane	XY Plane
		

Changelog for the datasheet

SPE-24-8-089 - MA8005.A.001

Revision: A (Original First Release)	
Date:	2024-05-02
Notes:	Initial Release
Author:	Gary West

Previous Revisions

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