TAOGLAS

Datasheet

Apex IV

Part No:
TG.46.8113

Description:

Apex IV Wideband 5G/4G Dipole Terminal Antenna

450MHz – 6000MHz with 90° Hinged SMA(M) Connector

Features:

Highest efficiency for 450-6000MHz wideband applications

Worldwide 5G/4G Coverage

Dipole Antenna Design – No Ground Plane Required

Hinged 90° Termination with SMA(M) Connector

Robust Metal Hinge Design for Improved Connection Reliability.

Dimensions: 218 * 58mm

RoHS & Reach Compliant

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1. Introduction

The Taoglas Apex IV TG.46.8113 is a wideband 5G/4G dipole antenna that has been designed to cover all sub 6GHz 5G/4G Cellular, ISM and Wi-Fi bands with frequencies in the 450 to 6000MHz spectrum. Evolved from the highly successful Apex range of products, the TG.46 has the highest wideband efficiency of any terminal antenna on the market today. Designed specifically for optimum performance on 5G NR bands between 3.3-4.2GHz, the TG.46 exhibits a uniform omnidirectional radiation pattern that allows for truly uninterrupted 360° 5G connection reliability. Additionally, the extended lower frequency coverage at 450MHZ (Band 31), makes the TG.46 ideal for a range of IoT applications, such as remote monitoring of smart utilities.

This attractive slim-line antenna is ground plane independent, meaning it does not need to be connected to the ground-plane of a device to radiate efficiently and neither is it in any way detuned by connecting to a ground-plane, thus avoiding a problem that is synonymous with smaller terminal mount antennas. The TG.46 includes an SMA(M) connector as standard, and the swivel mechanism that allows the antenna to be rotated to fit in tight environments and positioned for optimum performance. The 90° metal hinge structure has been designed so that when the antenna is mounted in a 90° position, it retains its position if used in environments prone to vibration.

The Apex IV has been primarily designed for use with wideband 5G/4G modules and devices that require the highest possible efficiency and peak gain to deliver best in class throughput on all major worldwide cellular bands for access points, terminals and routers. High efficiency is vital for applications

such as high speed video and real-time streaming or high capacity MIMO networks on public transportation. The Apex IV is backward compatible with 3G and 2G cellular applications such as HSPA, GSM, GPRS, UMTS, Wi-Fi and even has GPS included for Assisted GPS and/or E911 applications.

In summary, the Apex IV is the ideal solution for any device requiring high, reliable performance. It will meet most types of approval or carrier certification requirements from an efficiency standpoint. The antenna also makes an excellent reference antenna for test purposes. It has been designed as an omni-directional antenna and the radiation patterns prove this, being stable across all bands. The connector type is customizable and the housing is also available in white. Contact your regional Taoglas customer support team for more information.

2. Specifications

Electrical									
Band	**Frequency (MHz)**		**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**Impedance**	**Max Input Power**	**Polarization**	**Radiation Pattern**
LTE 450	450~470	Straight FS	46.4	-3.34	1.84	50 Ω	10W	Linear	Omni-Directional
		Bent FS	45.7	-3.40	0.96				
		Straight GP	43.6	-3.61	1.52				
		Bent GP	43.6	-3.61	1.27				
5GNR/4G Band 71	617~698	Straight FS	63.7	-1.96	1.70				
		Bent FS	76.2	-1.18	2.19				
		Straight GP	64.9	-1.87	2.21				
		Bent GP	71.0	-1.49	1.90				
4G/3G Band 12,13,14,17,28,29	698~806	Straight FS	50.0	-3.01	1.70				
		Bent FS	55.9	-2.53	2.12				
		Straight GP	48.4	-3.15	1.97				
		Bent GP	50.5	-2.96	1.26				
4G/3G/NB-IoT/Cat M Band 5,8,18,19,20,26,27	824~960	Straight FS	36.7	-4.35	1.76				
		Bent FS	49.8	-3.03	2.57				
		Straight GP	50.1	-3.01	3.12				
		Bent GP	57.0	-2.44	3.87				
5GNR/4G Band 21,32,74,75,76	1427~1518	Straight FS	69.1	-1.60	2.11				
		Bent FS	77.9	-1.09	3.15				
		Straight GP	66.6	-1.77	2.31				
		Bent GP	66.7	-1.76	2.84				
4G/3G Band 1,2,3,4,9,23,25,35,39,66	1710~2200	Straight FS	79.6	-0.99	3.98				
		Bent FS	87.3	-0.59	4.90				
		Straight GP	75.1	-1.24	3.67				
		Bent GP	76.0	-1.19	4.43				
4G/3G Band 7,30,38,40,41	2300~2690	Straight FS	69.9	-1.55	3.77				
		Bent FS	77.9	-1.09	5.05				
		Straight GP	64.7	-1.89	4.24				
		Bent GP	66.1	-1.80	4.34				
5GNR/4G Band 22,42,48,77,78,79	3300~4200	Straight FS	52.0	-2.84	4.36				
		Bent FS	58.2	-2.35	4.52				
		Straight GP	48.2	-3.17	3.70				
		Bent GP	47.1	-3.27	4.20				
LTE5200/ Wi-Fi 5800	5150~5925	Straight FS	56.7	-2.46	3.92				
		Bent FS	61.1	-2.14	4.45				
		Straight GP	41.1	-3.86	4.29				
		Bent GP	40.8	-3.90	4.64				

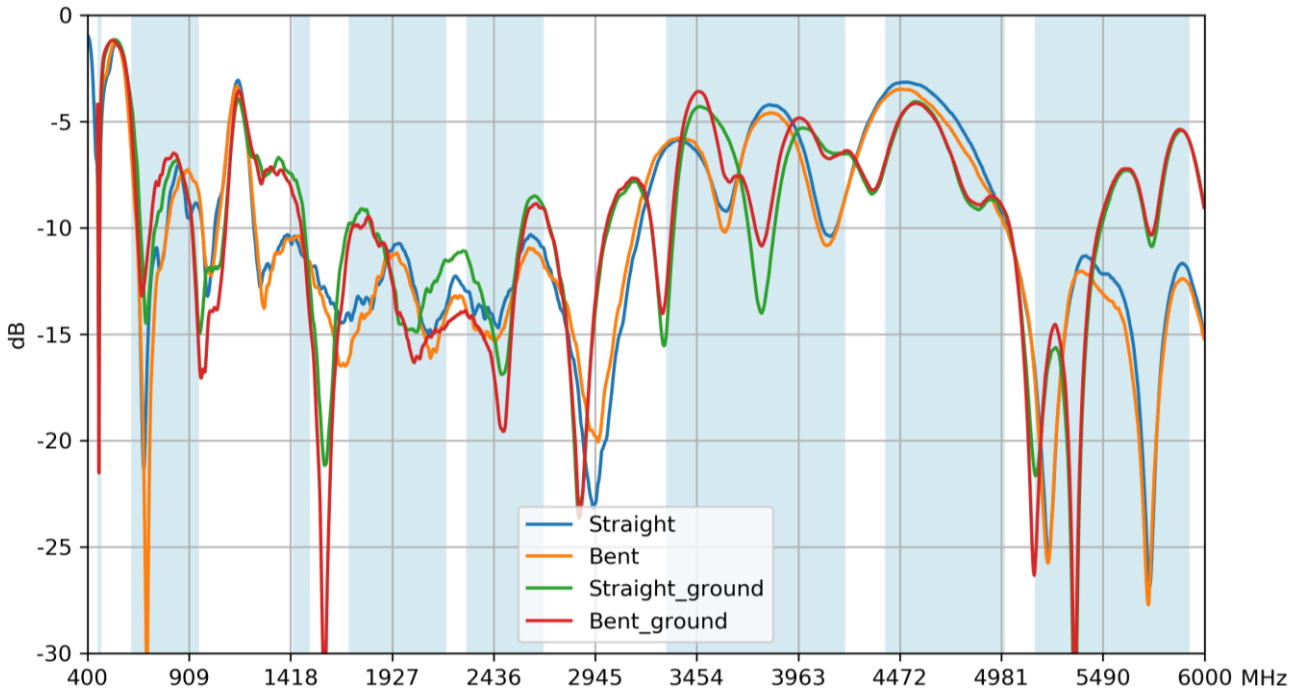
*Test ground plane size: 150*90mm

Mechanical	
Enclosure	UV Resistant PC/ABS
Connector	SMA Male Hinged 90°
Weight	75g
Dimensions	218 * 58mm
Recommended Torque for Mounting	0.9N·m
Max torque for Mounting	1.176N·m
Environmental	
Storage & Usage Temperature Range	-40°C to 85°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
B1	1920 to 1980	2110 to 2170	✓
B2	1850 to 1910	1930 to 1990	✓
B3	1710 to 1785	1805 to 1880	✓
B4	1710 to 1755	2110 to 2155	✓
B5	824 to 849	869 to 894	✓
B7	2500 to 2570	2620 to 2690	✓
B8	880 to 915	925 to 960	✓
B9*	1749.9 to 1784.9	1844.9 to 1879.9	✓
B11	1427.9 to 1447.9	1475.9 to 1495.9	✓
B12	699 to 716	729 to 746	✓
B13	777 to 787	746 to 756	✓
B14	788 to 798	758 to 768	✓
B17	704 to 716	734 to 746	✓
B18	815 to 830	860 to 875	✓
B19	830 to 845	875 to 890	✓
B20	832 to 862	791 to 821	✓
B21	1447.9 to 1462.9	1495.9 to 1510.9	✓
B22*	3410 to 3490	3510 to 3590	✓
B23*	2000 to 2020	2180 to 2200	✓
B24	1626.5 to 1660.5	1525 to 1559	✓
B25	1850 to 1915	1930 to 1995	✓
B26	814 to 849	859 to 894	✓
B27*	807 to 824	852 to 869	✓
B28	703 to 748	758 to 803	✓
B29	717 to 728		✓
B30	2305 to 2315	2350 to 2360	✓
B31	452.5 to 457.5	462.5 to 467.5	✓
B32	1452 to 1496		✓
B34	2010 to 2025		✓
B35	1850 to 1910		✓
B36	1930 to 1990		✓
B37	1910 to 1930		✓
B38	2570 to 2620		✓
B39	1880 to 1920		✓
B40	2300 to 2400		✓
B41	2496 to 2690		✓
B42	3400 to 3600		✓
B43	3600 to 3800		✓
B45	1447 to 1467		✓
B46	5150 to 5925		✓
B47	5855 to 5925		✓
B48	3550 to 3700		✓
B49	3550 to 3700		✓
B50	1432 to 1517		✓
B51	1427 to 1432		✓
B52	3300 to 3400		✓
B53	2483.5 to 2495		✓
B65	1920 to 2010	2110 to 2200	✓
B66	1710 to 1780	2110 to 2200	✓
B68	698 to 728	753 to 783	✓
B69	2570 to 2620		✓
B70	1695 to 1710	1995 to 2020	✓
B71	663 to 698	617 to 652	✓
B72	451 to 456	461 to 466	✓
B73	450 to 455	460 to 465	✓
B74	1427 to 1470	1475 to 1518	✓
B75	1432 to 1517		✓
B76	1427 to 1432		✓
B77	3300 to 4200		✓
B78	3300 to 3800		✓
B79	4400 to 5000		✓
B85	698 to 716	728 to 746	✓
B87	410 to 415	420 to 425	*
B88	412 to 417	422 to 427	*

3. Antenna Characteristics

3.1 Return Loss



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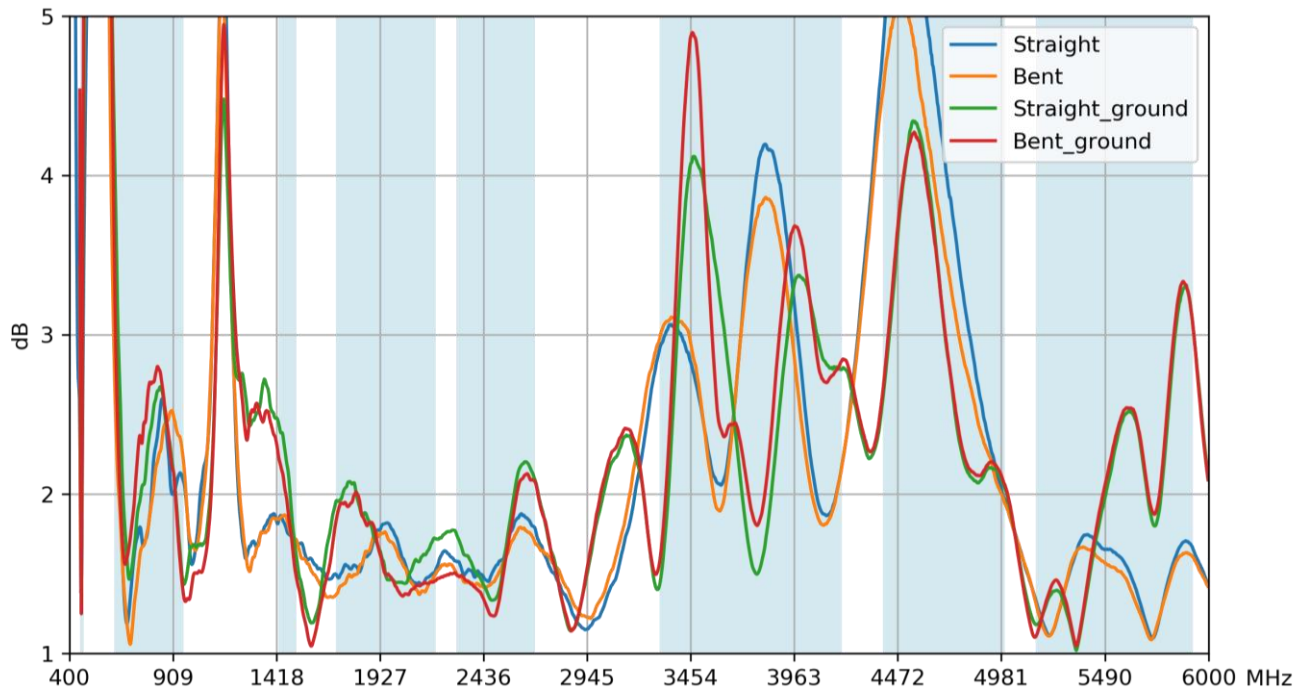
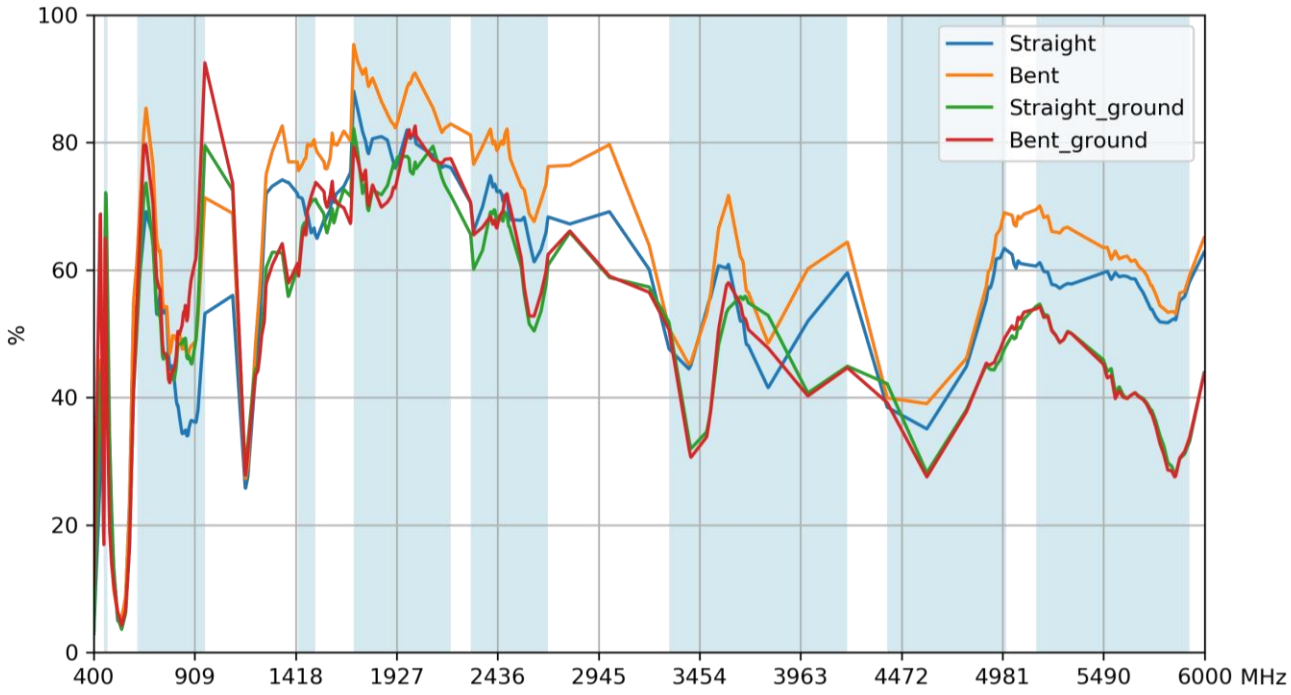
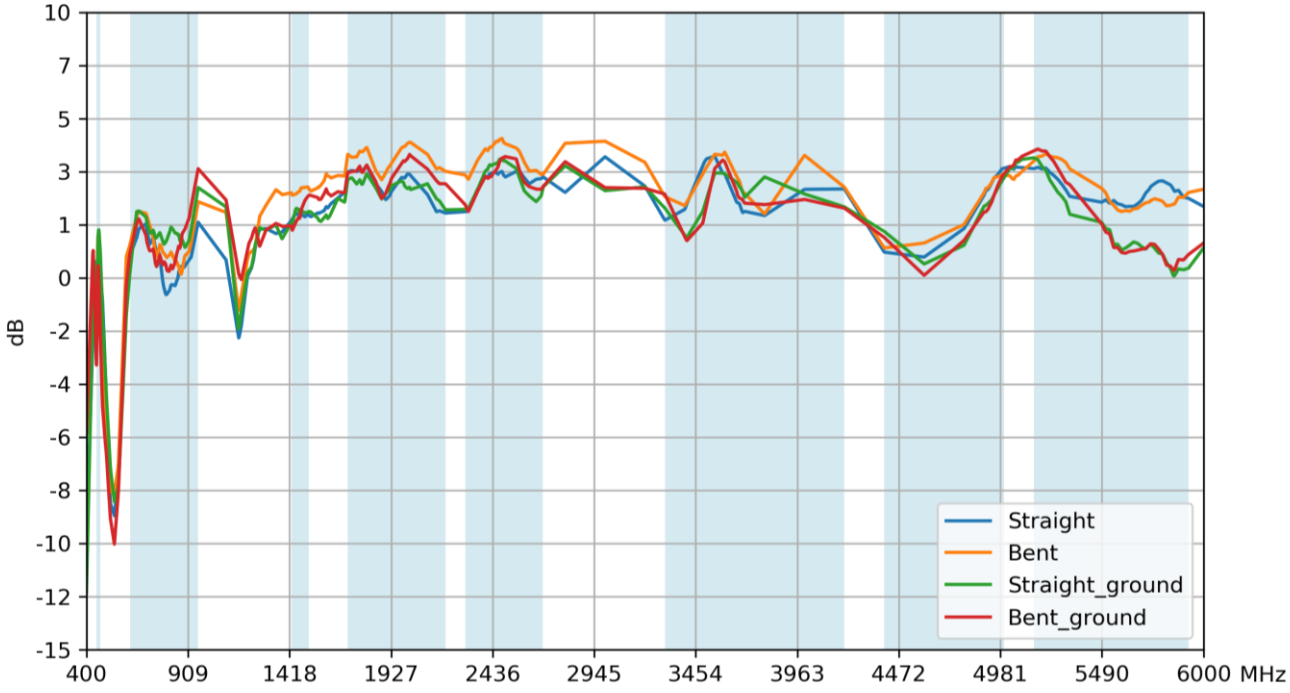


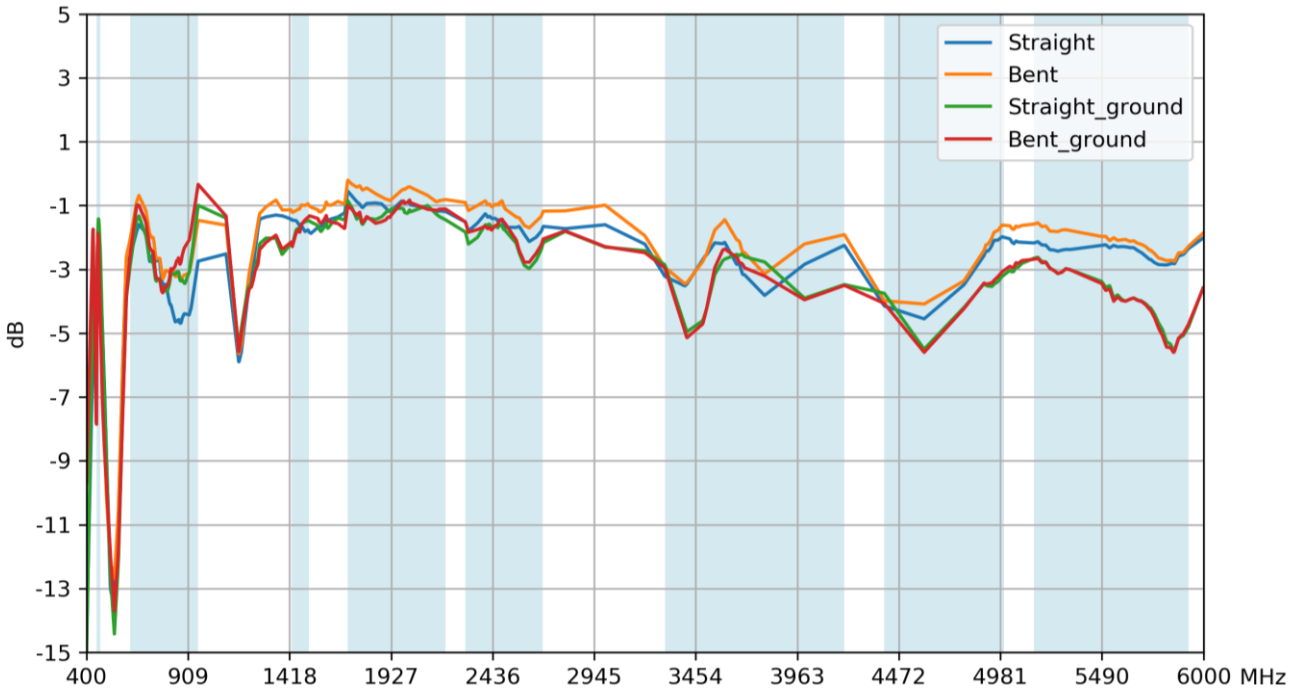
3.3 Efficiency



3.4 Peak Gain

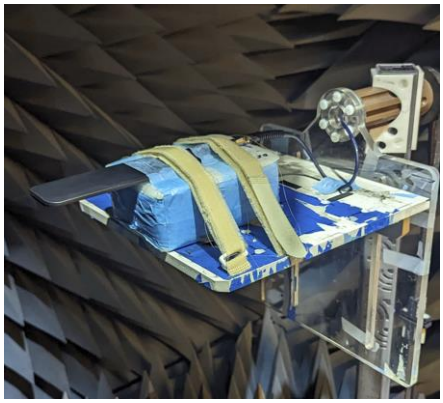


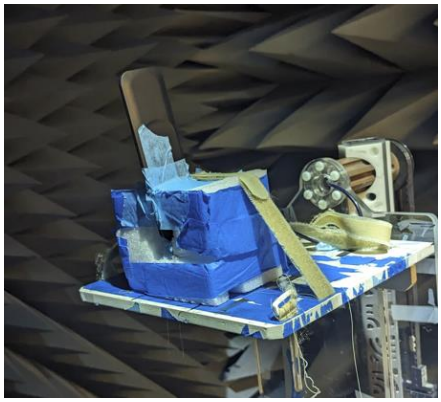
3.5 Average Gain

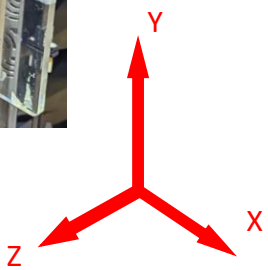


4. Radiation Patterns

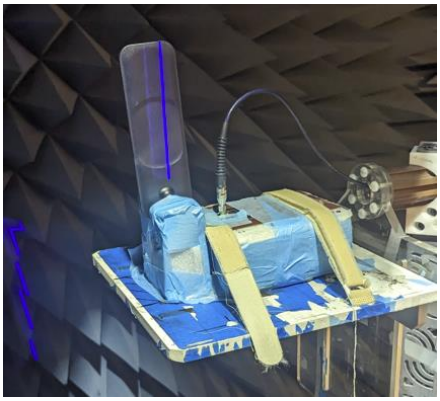
4.1 Test Setup







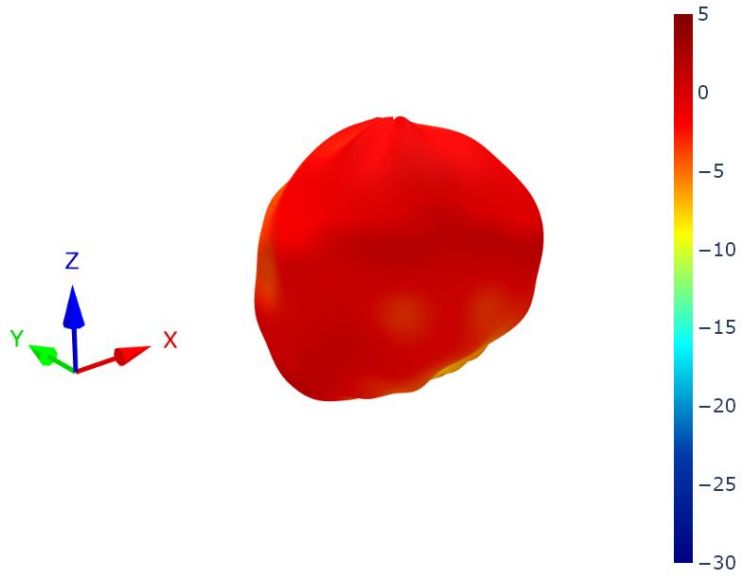
Tested In FreeSpace

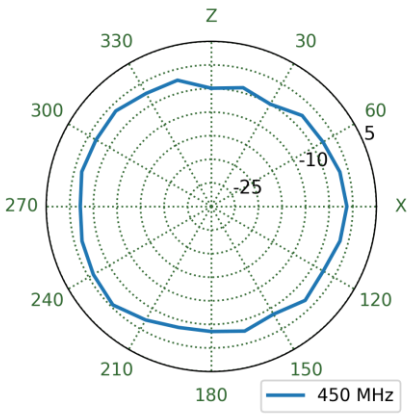
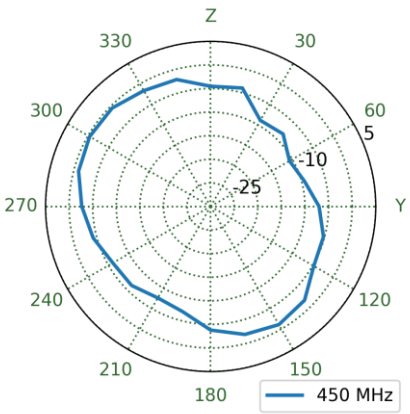
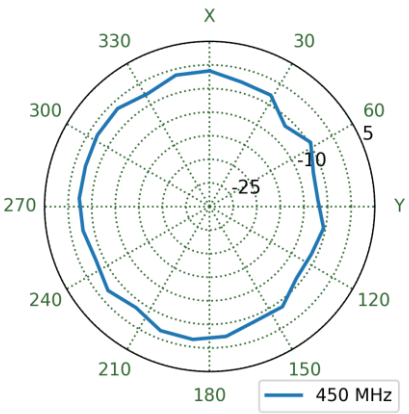


Tested on a 90x150mm GroundPlane

4.2 3D and 2D Radiation Patterns – Bent on Ground Plane

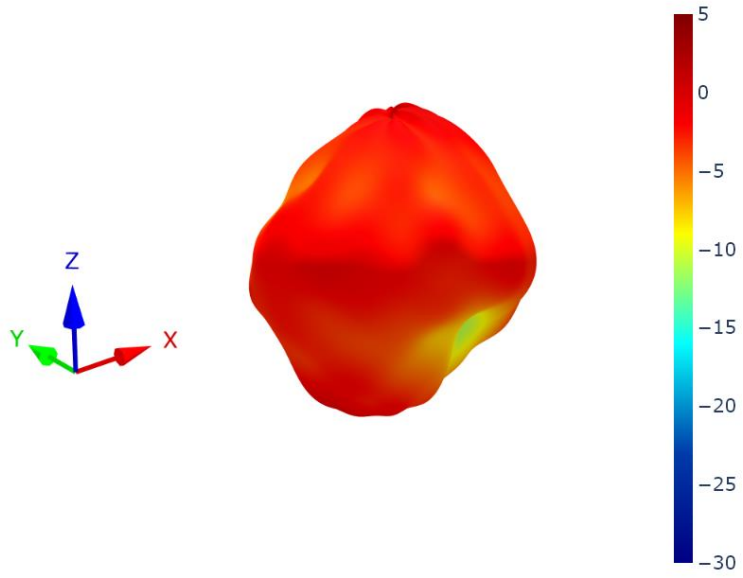
450MHz



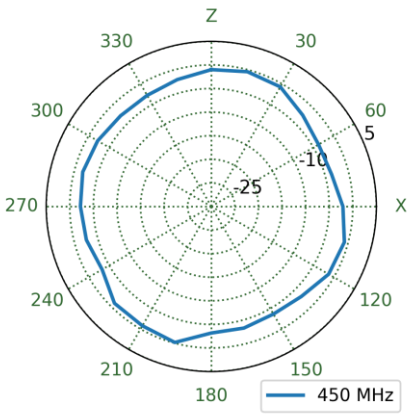
XZ Plane	YZ Plane	XY Plane
		

4.3 3D and 2D Radiation Patterns – Bent in Free Space

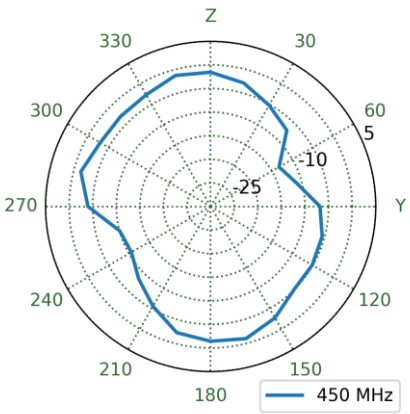
450MHz



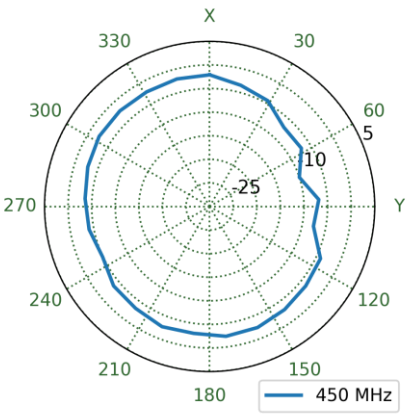
XZ Plane



YZ Plane

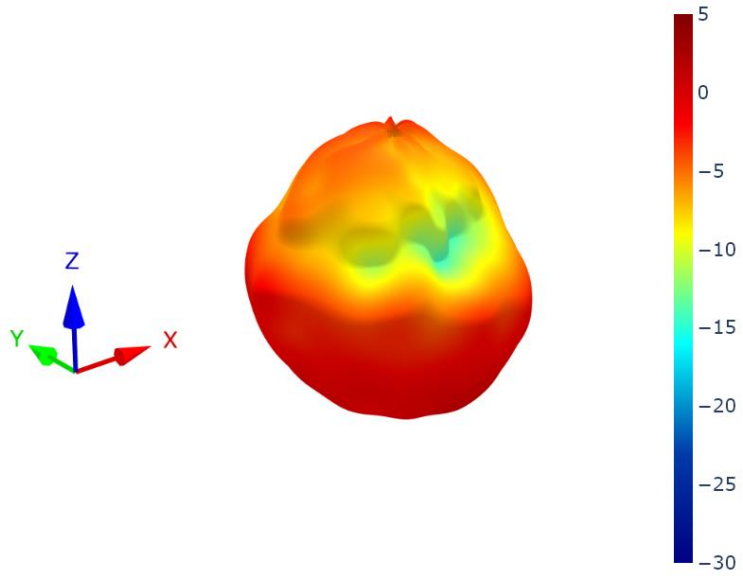


XY Plane

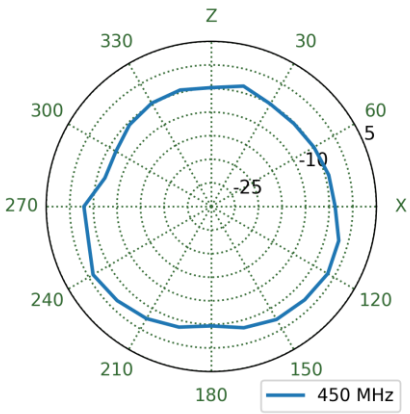


4.4 3D and 2D Radiation Patterns – Straight on Ground Plane

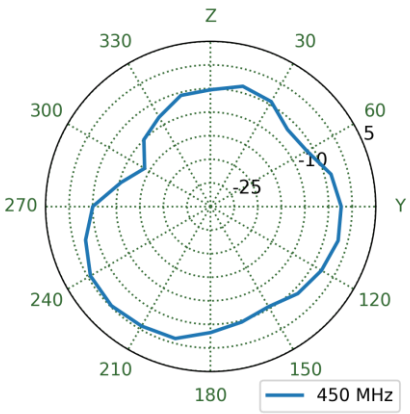
450MHz



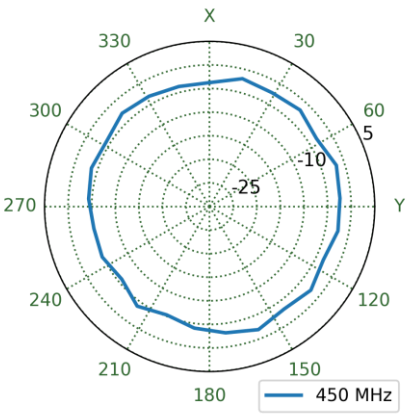
XZ Plane



YZ Plane

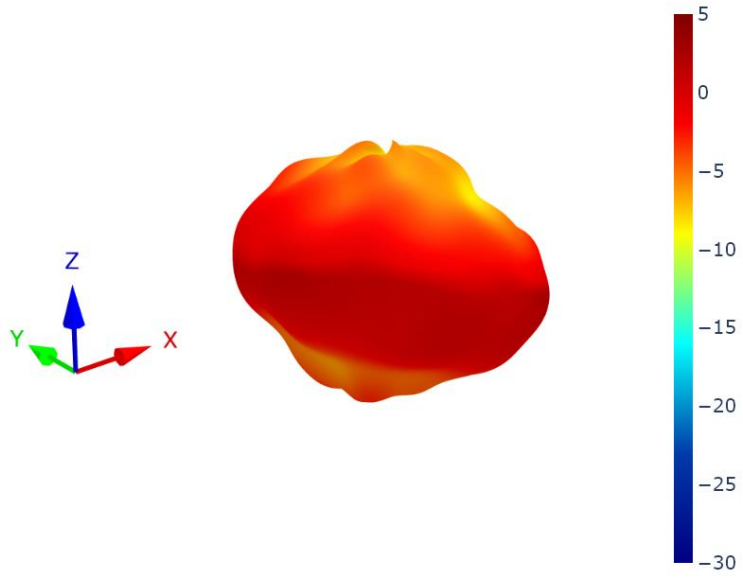


XY Plane

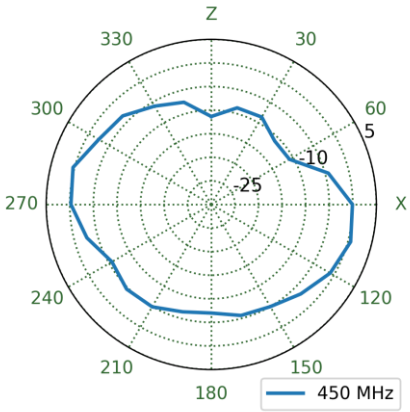


4.5 3D and 2D Radiation Patterns – Straight in Free Space

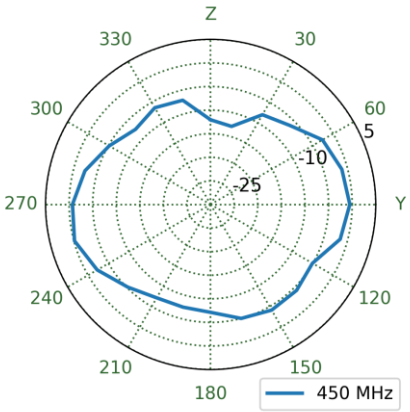
450MHz



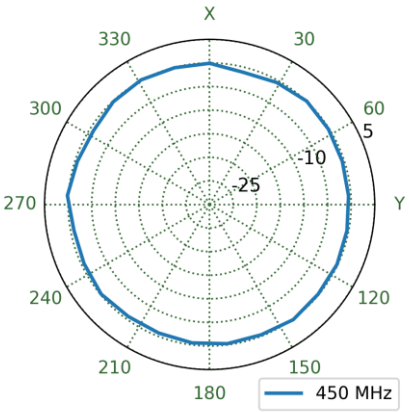
XZ Plane



YZ Plane

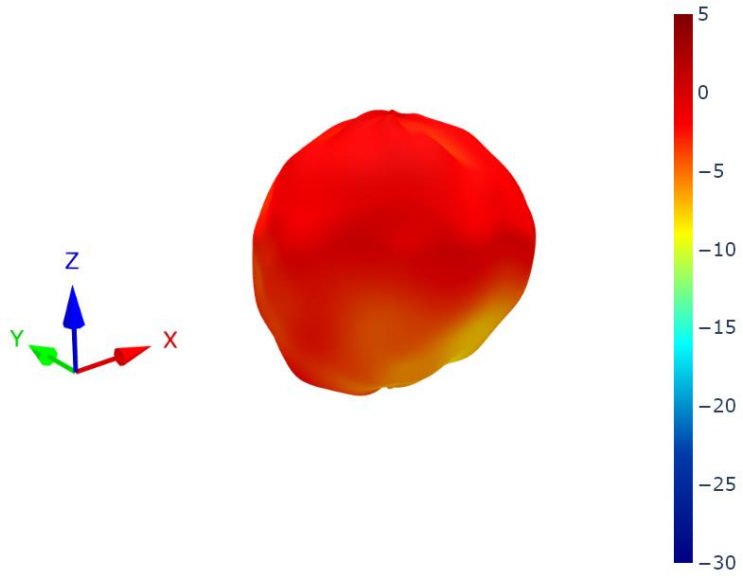


XY Plane

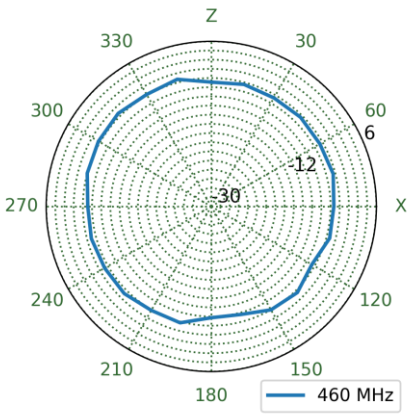


4.6 3D and 2D Radiation Patterns – Bent on Ground Plane

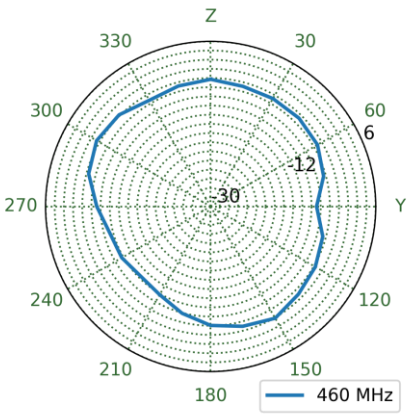
460MHz



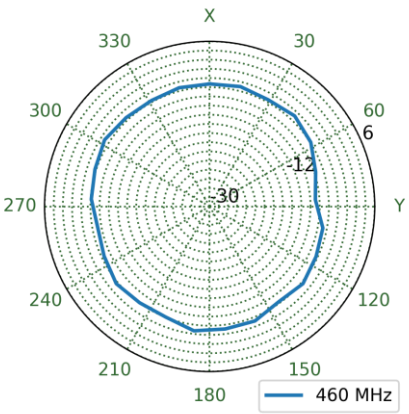
XZ Plane



YZ Plane

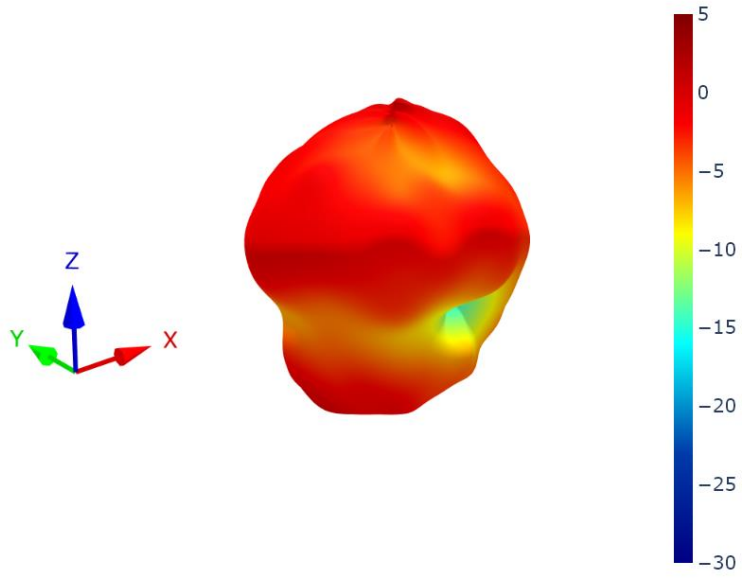


XY Plane

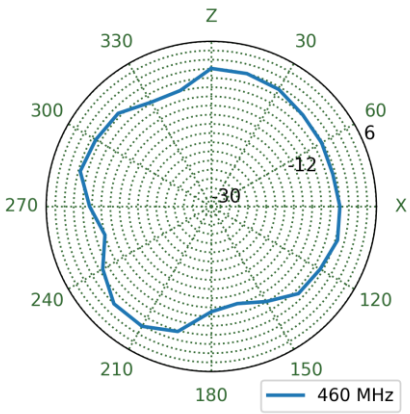


4.7 3D and 2D Radiation Patterns – Bent in Free Space

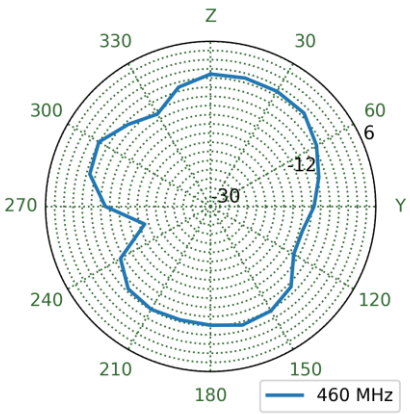
460MHz



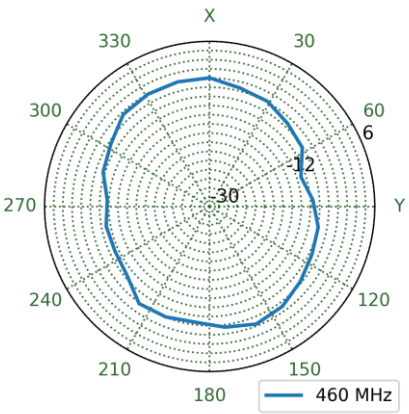
XZ Plane



YZ Plane

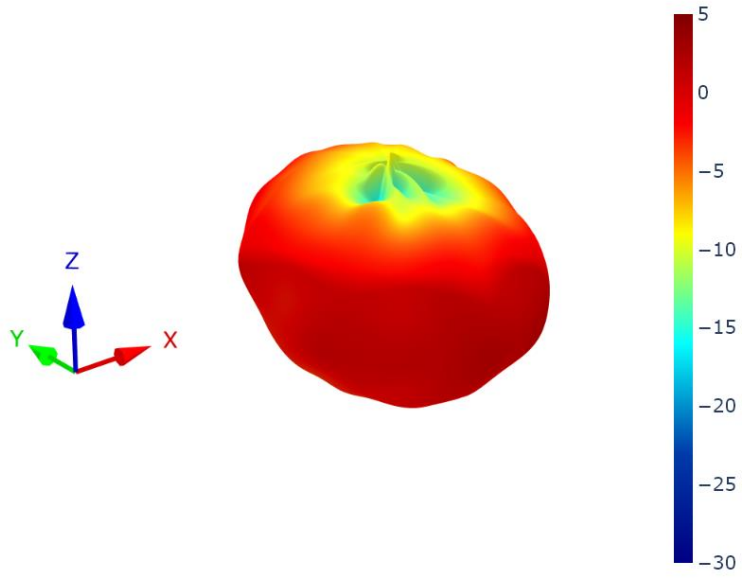


XY Plane

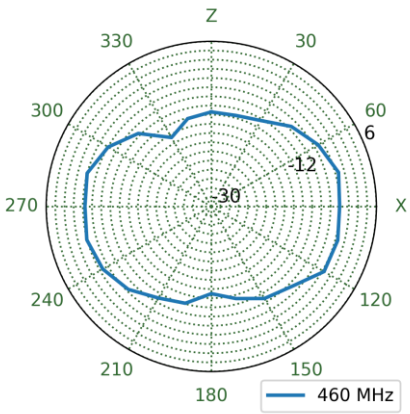


4.8 3D and 2D Radiation Patterns –Straight on Ground Plane

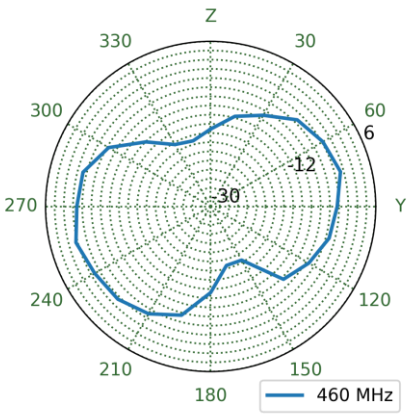
460MHz



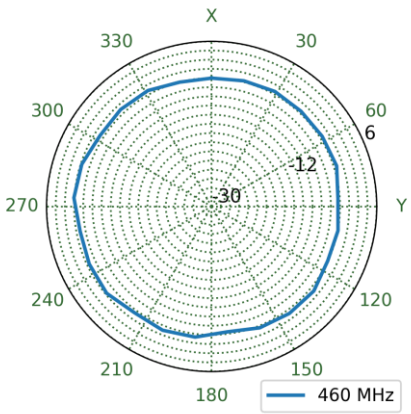
XZ Plane



YZ Plane

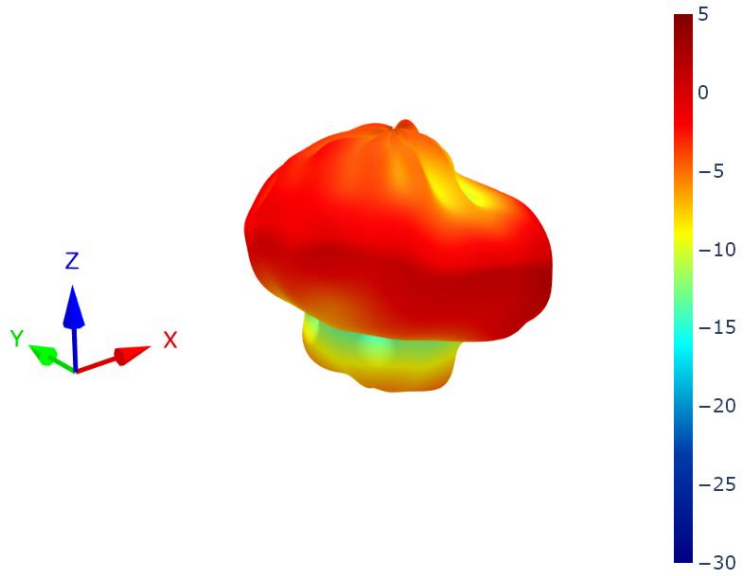


XY Plane

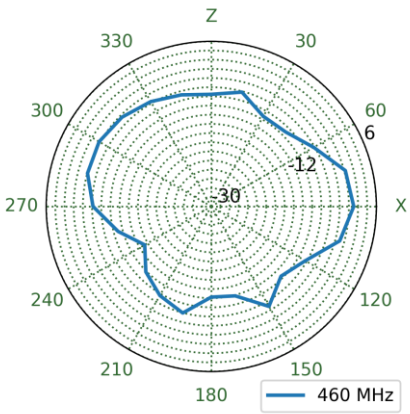


4.9 3D and 2D Radiation Patterns – Straight in Free Space

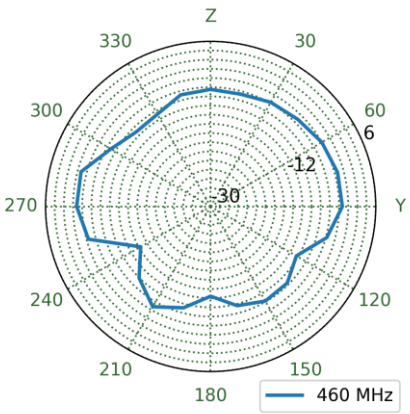
460MHz



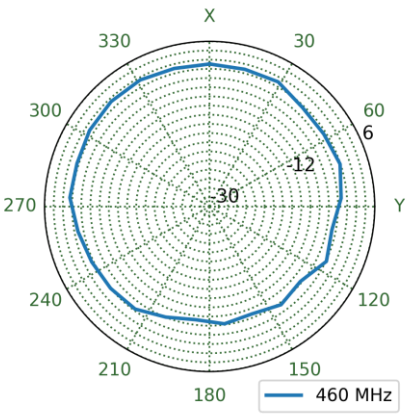
XZ Plane



YZ Plane

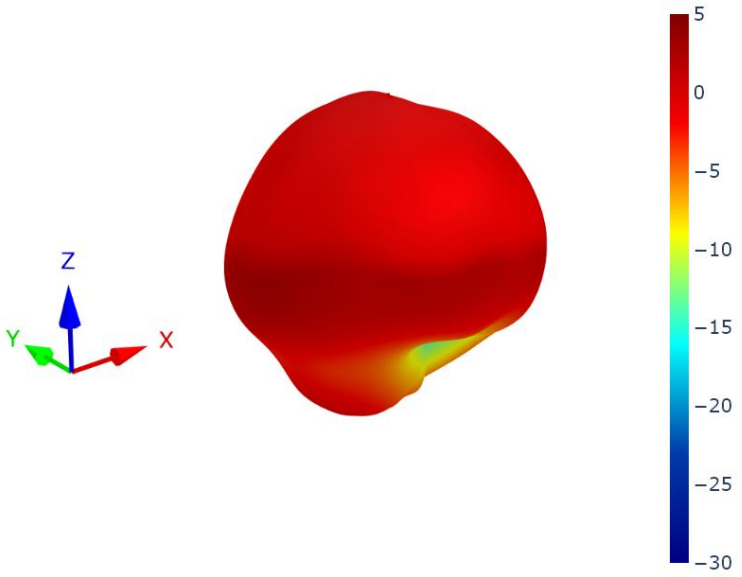


XY Plane

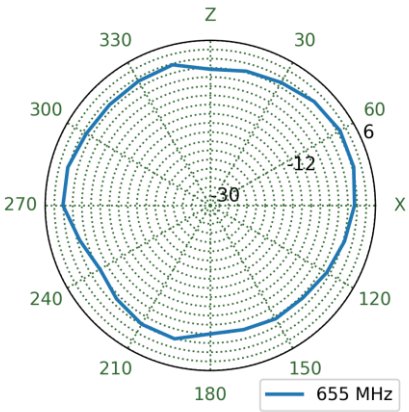


4.10 3D and 2D Radiation Patterns – Bent on Ground Plane

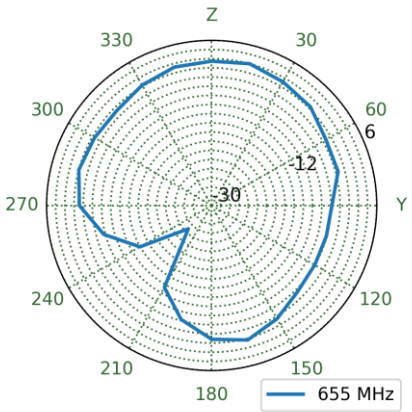
658MHz



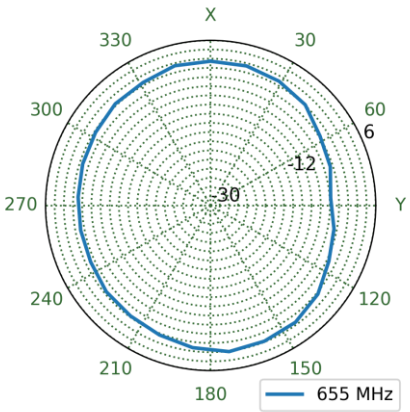
XZ Plane



YZ Plane

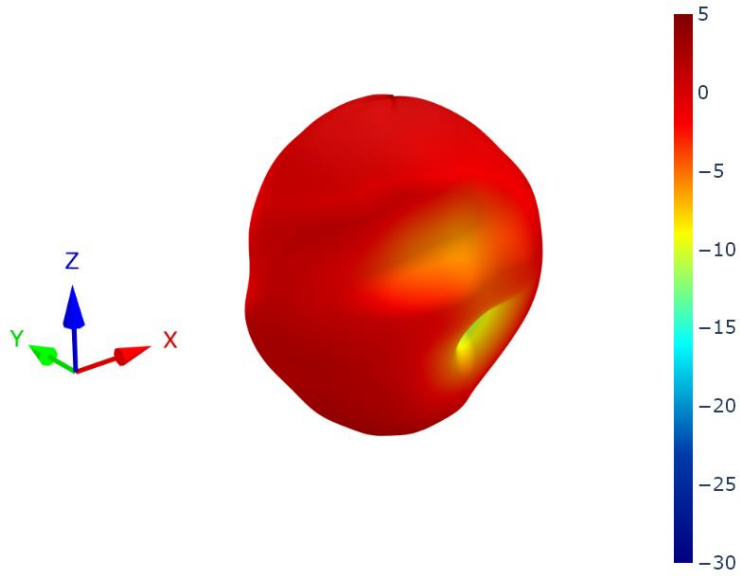


XY Plane

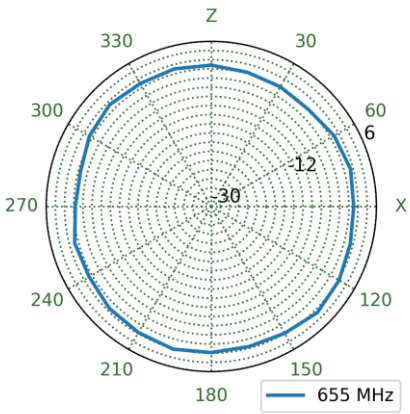


4.11 3D and 2D Radiation Patterns – Bent in Free Space

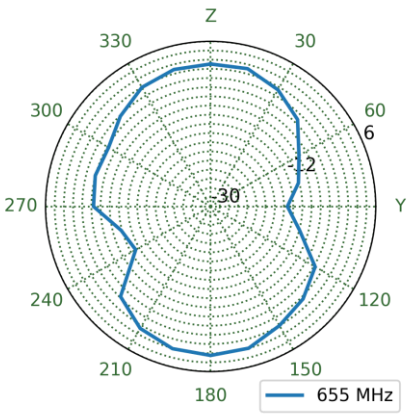
658MHz



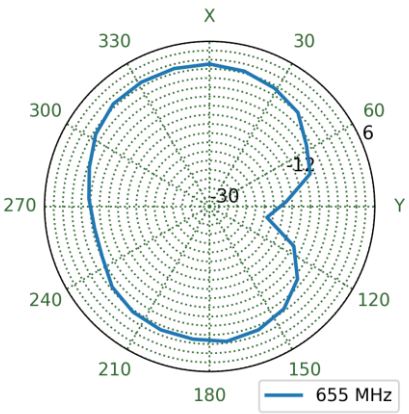
XZ Plane



YZ Plane

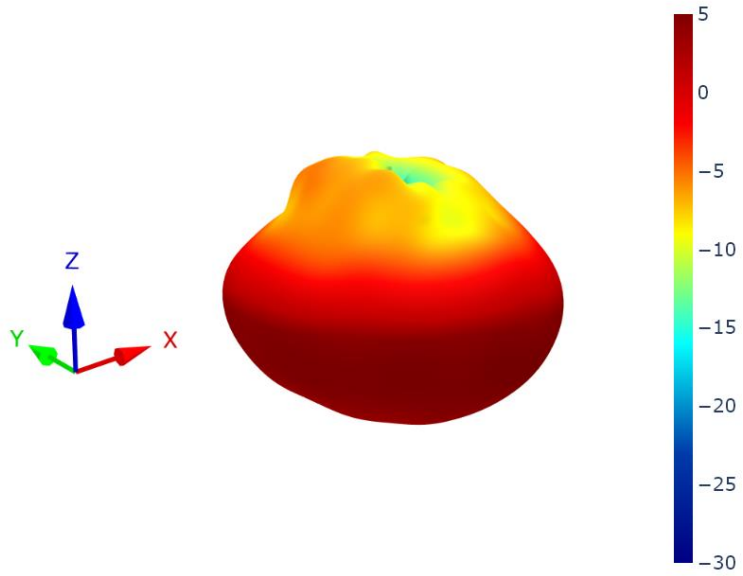


XY Plane

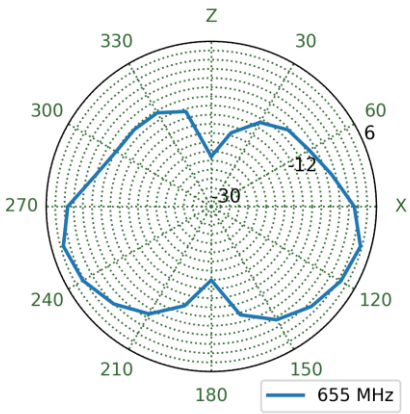


4.12 3D and 2D Radiation Patterns – Straight on Ground Plane

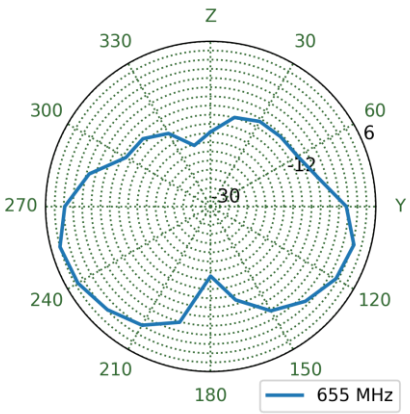
658MHz



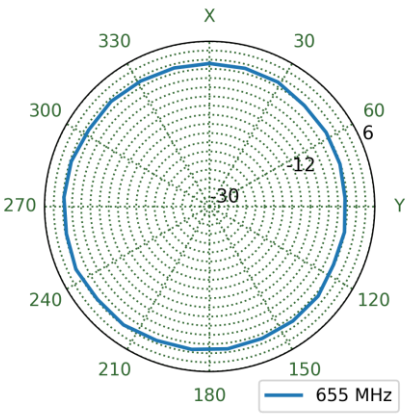
XZ Plane



YZ Plane

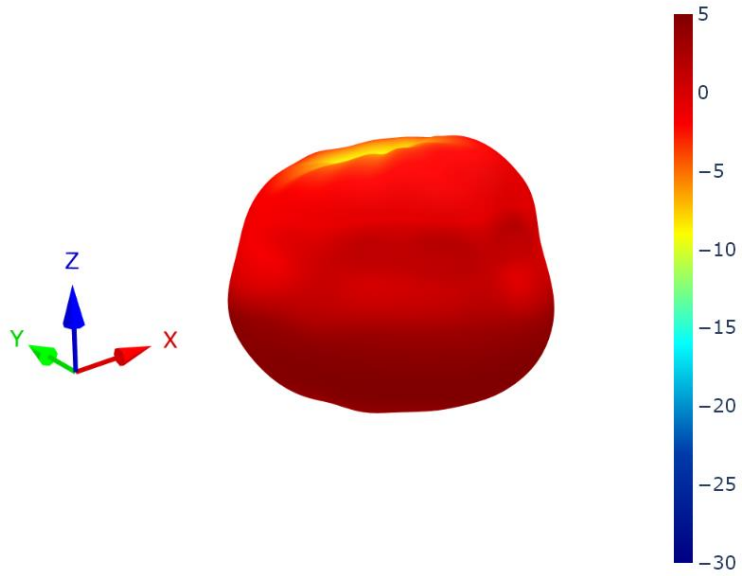


XY Plane

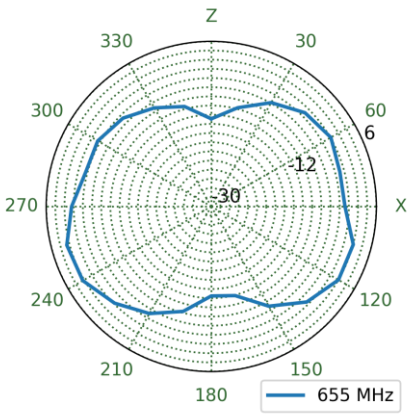


4.13 3D and 2D Radiation Patterns – Straight in Free Space

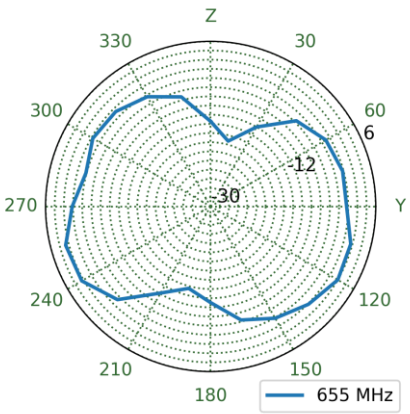
658MHz



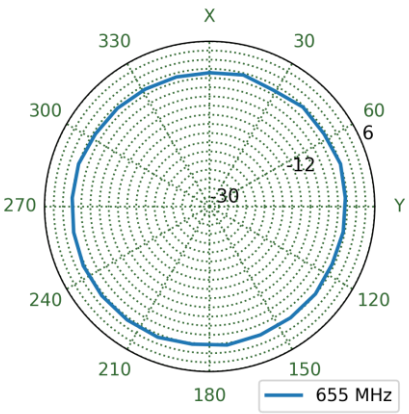
XZ Plane



YZ Plane

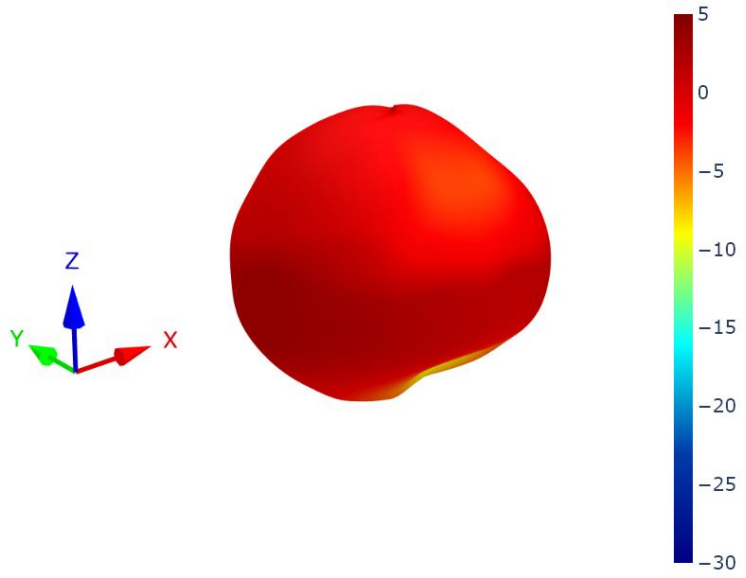


XY Plane

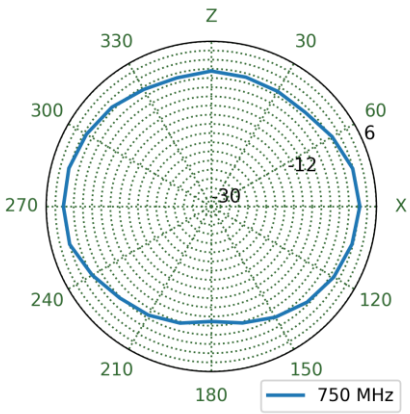


4.14 3D and 2D Radiation Patterns – Bent on Ground Plane

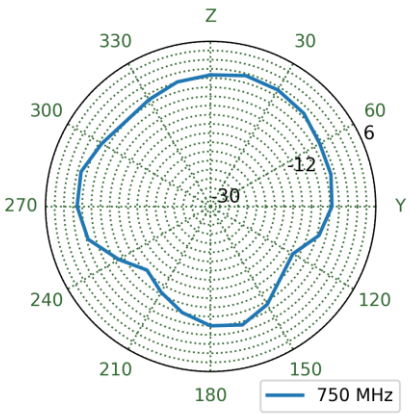
752MHz



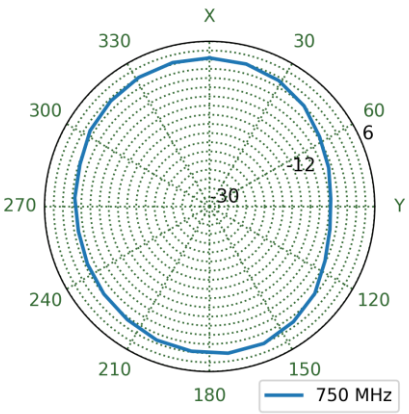
XZ Plane



YZ Plane

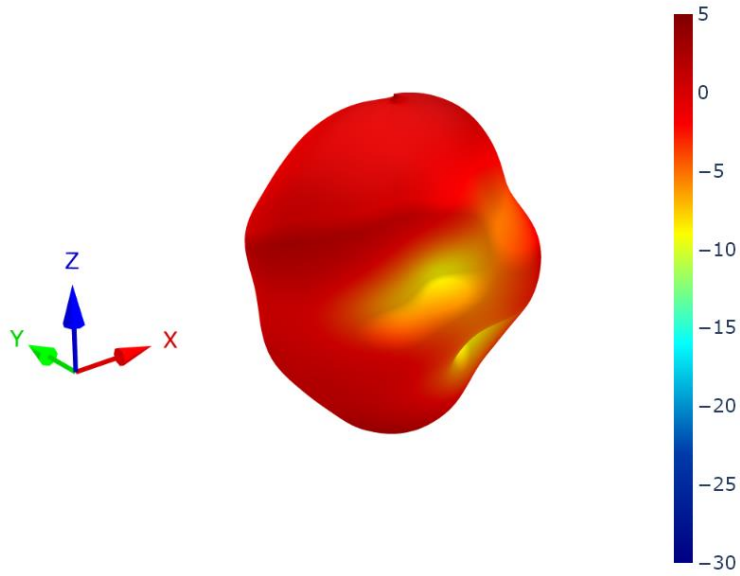


XY Plane

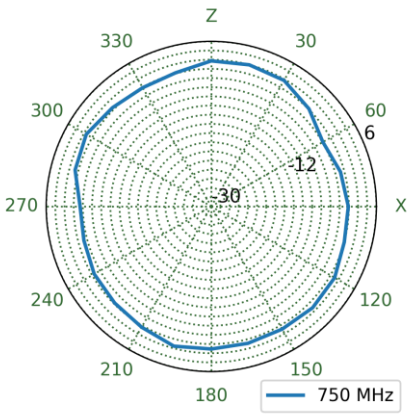


4.15 3D and 2D Radiation Patterns – Bent in Free Space

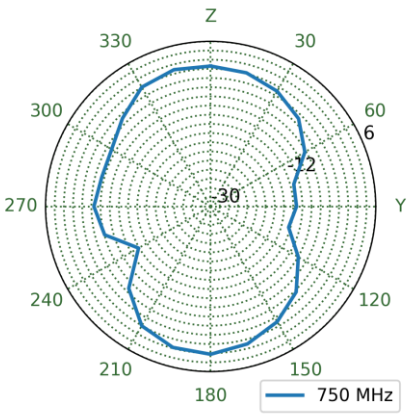
752MHz



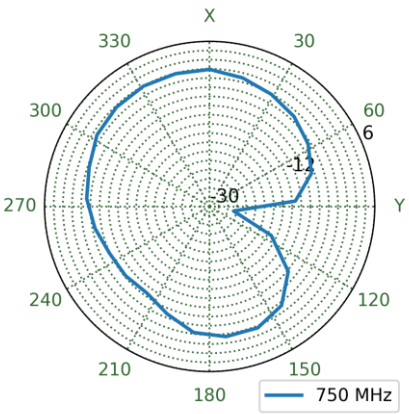
XZ Plane



YZ Plane

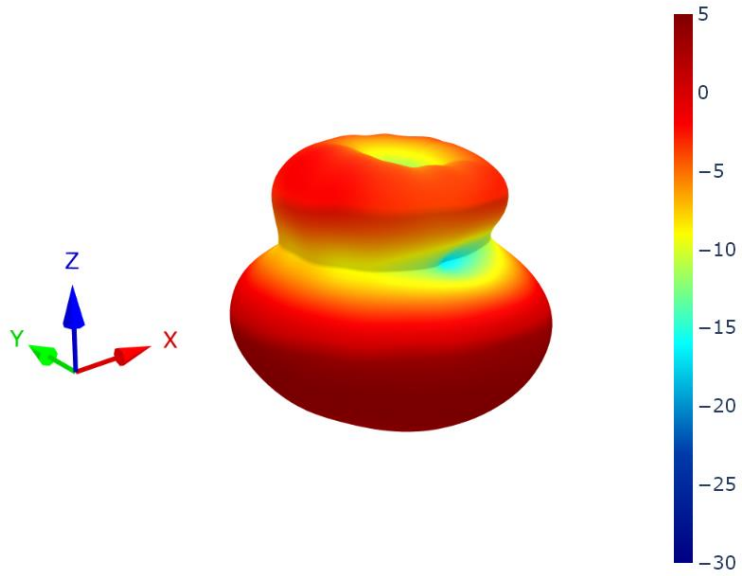


XY Plane

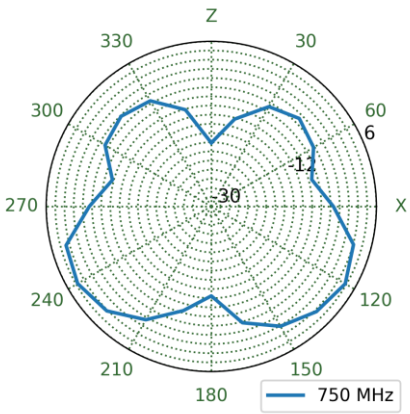


4.16 3D and 2D Radiation Patterns –Straight on Ground Plane

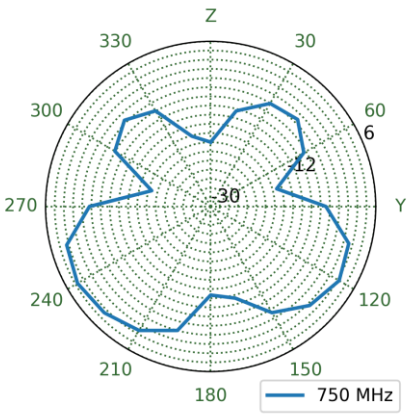
752MHz



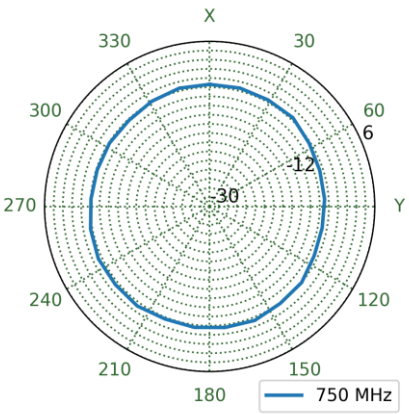
XZ Plane



YZ Plane

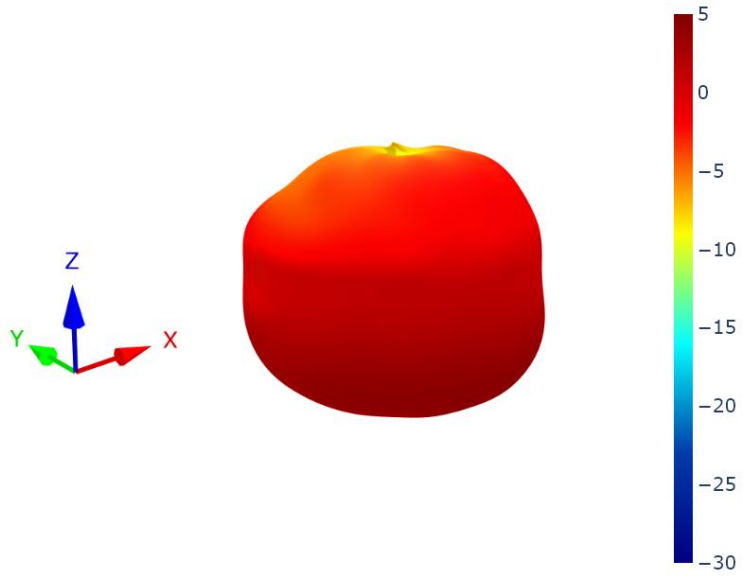


XY Plane

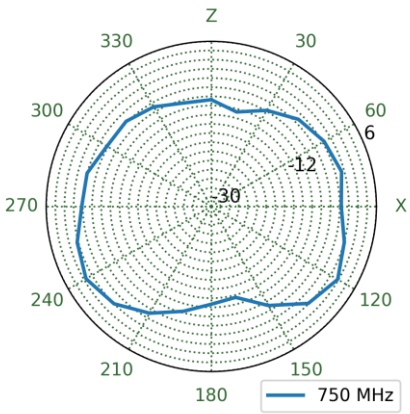


4.17 3D and 2D Radiation Patterns – Straight in Free Space

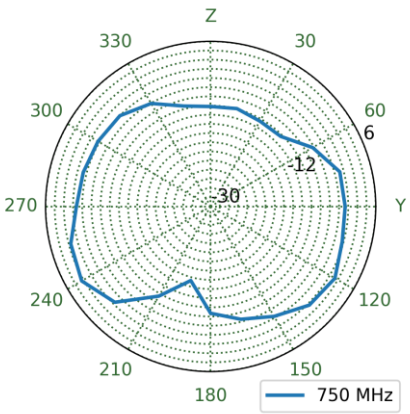
752MHz



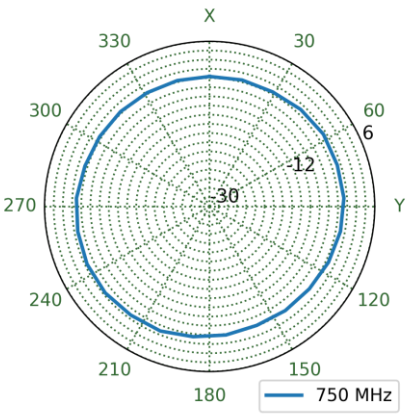
XZ Plane



YZ Plane

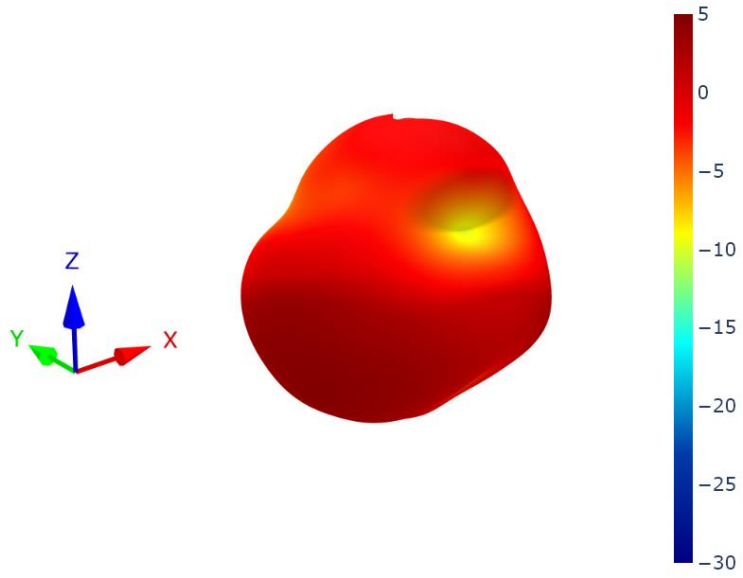


XY Plane

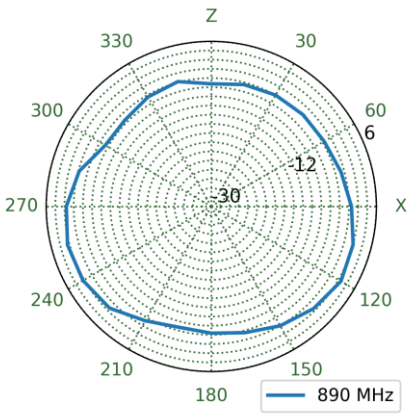


4.18 3D and 2D Radiation Patterns – Bent on Ground Plane

892MHz



XZ Plane



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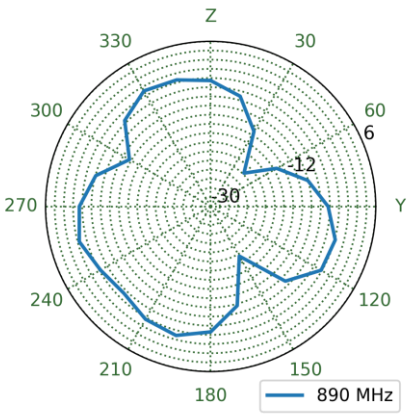
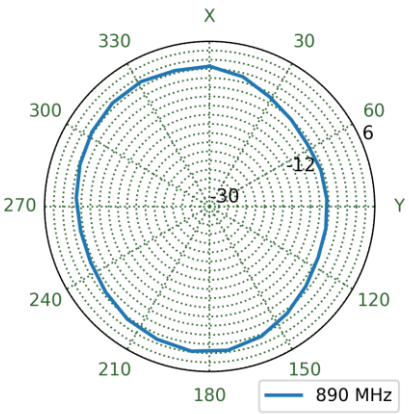
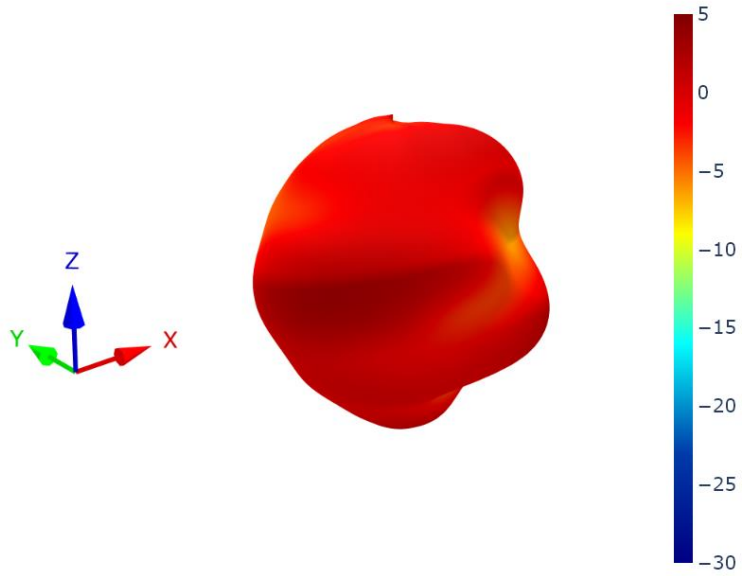


XY Plane

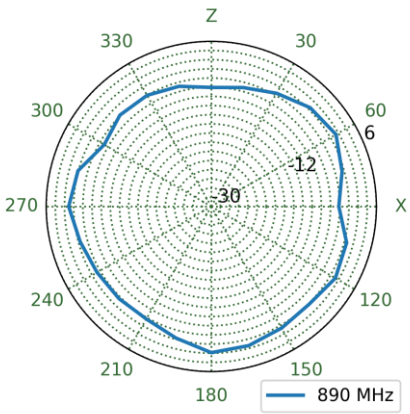


4.19 3D and 2D Radiation Patterns – Bent in Free Space

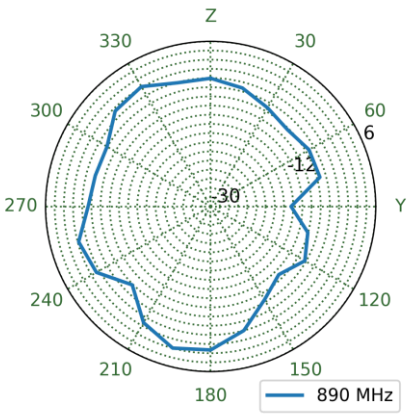
892MHz



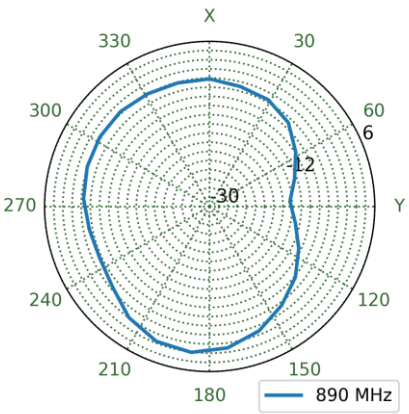
XZ Plane



YZ Plane

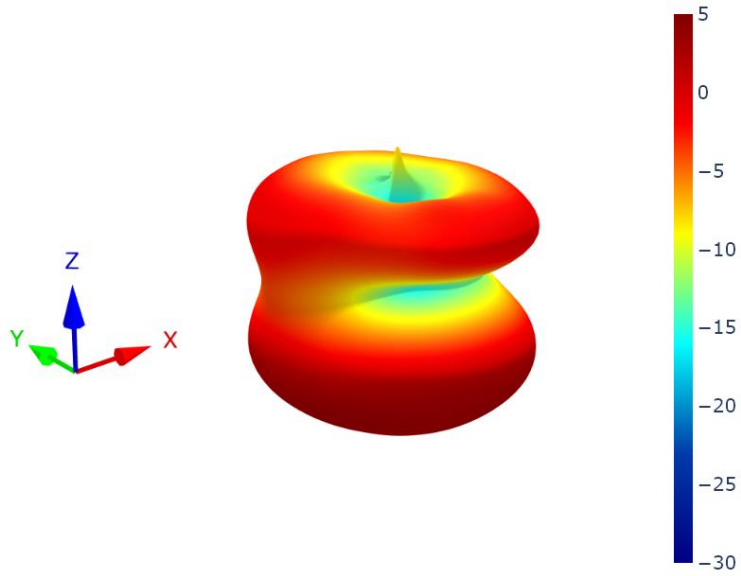


XY Plane

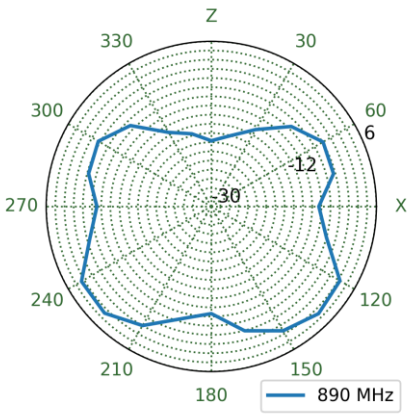


4.20 3D and 2D Radiation Patterns – Straight on Ground Plane

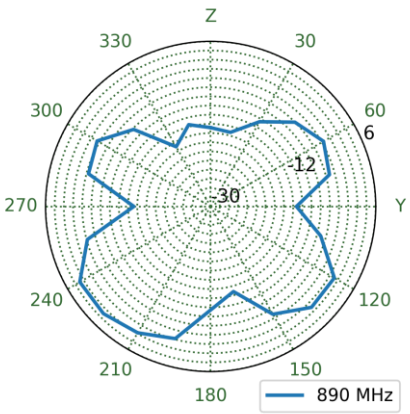
892MHz



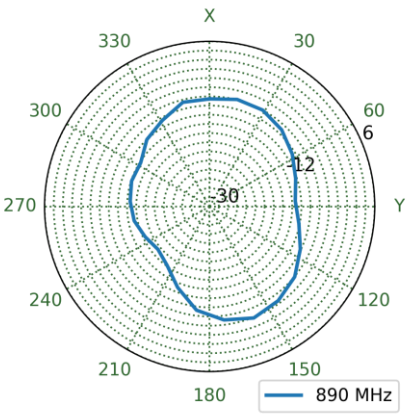
XZ Plane



YZ Plane

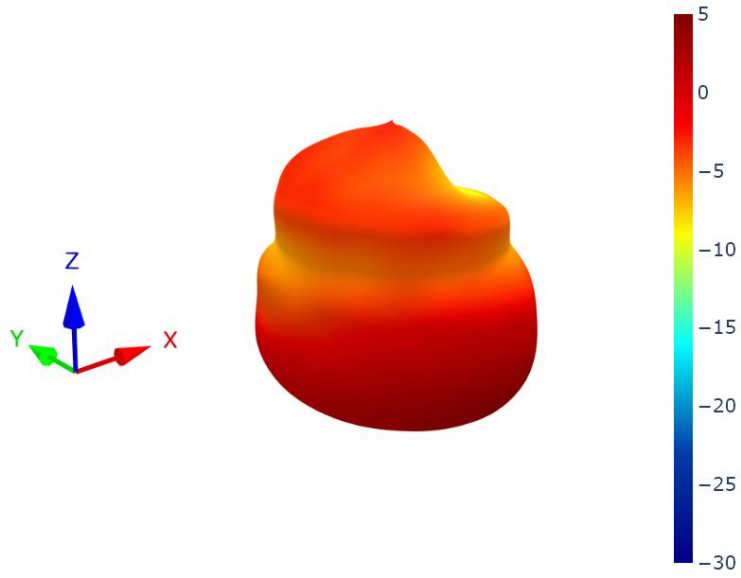


XY Plane

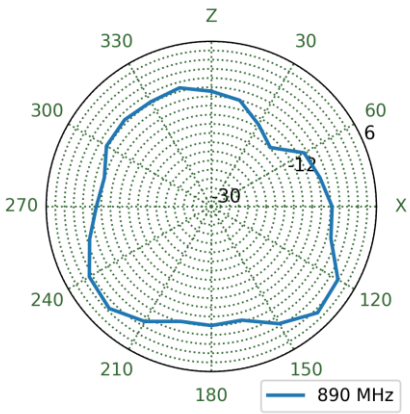


4.21 3D and 2D Radiation Patterns – Straight in Free Space

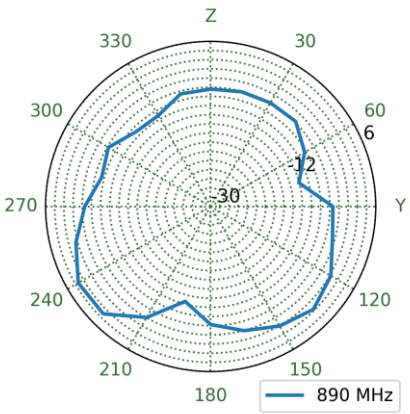
892MHz



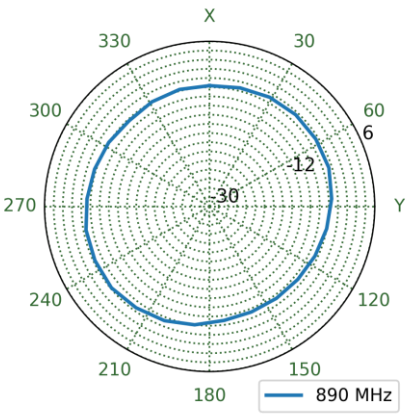
XZ Plane



YZ Plane

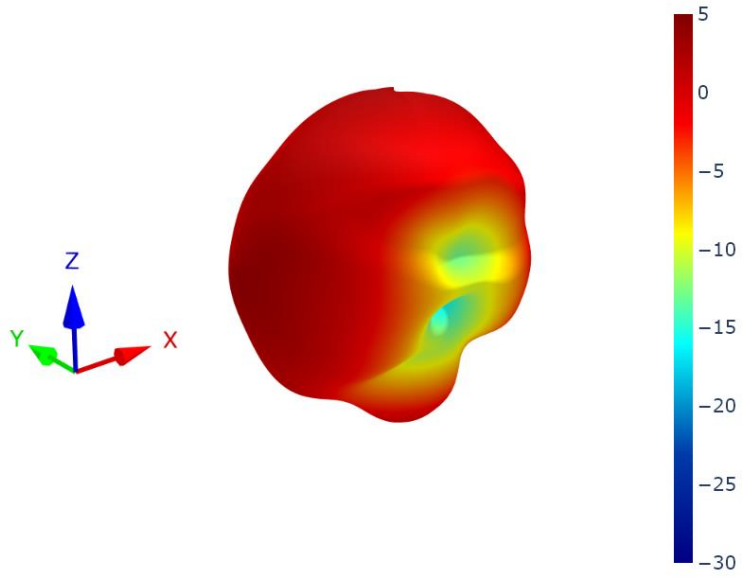


XY Plane

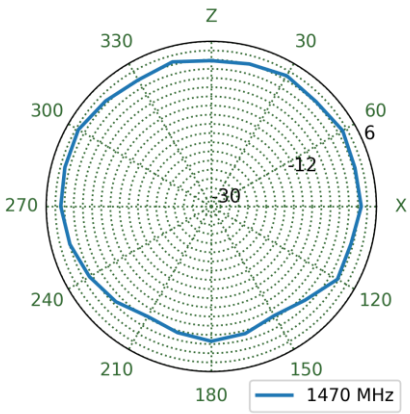


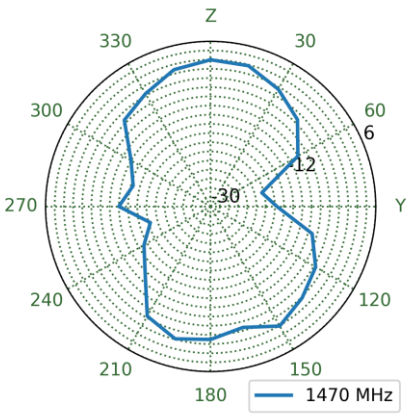
4.22 3D and 2D Radiation Patterns – Bent on Ground Plane

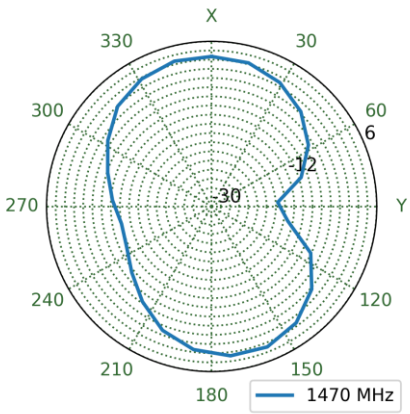
1473MHz



XZ Plane	YZ Plane	XY Plane

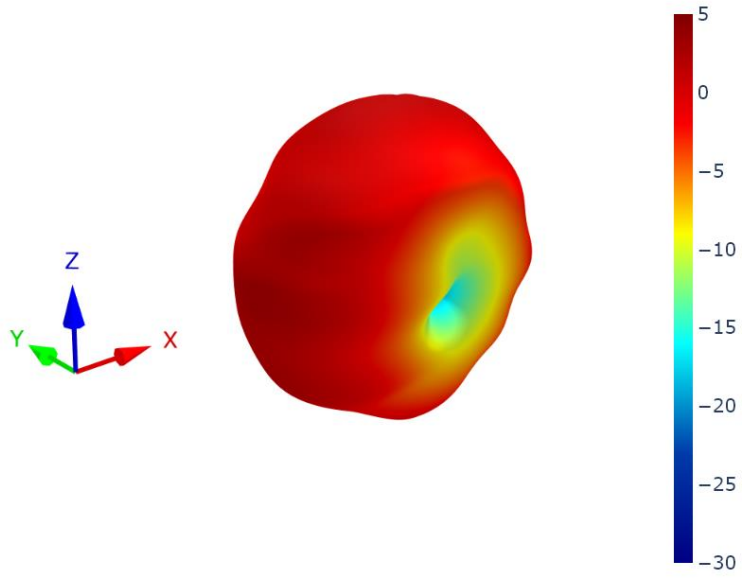




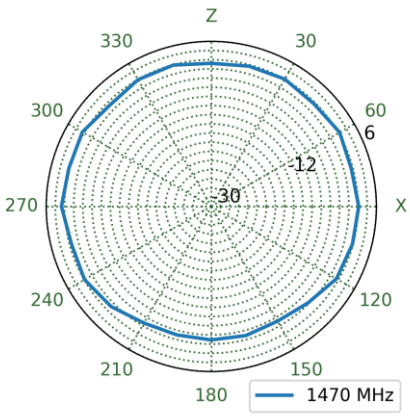


4.23 3D and 2D Radiation Patterns – Bent in Free Space

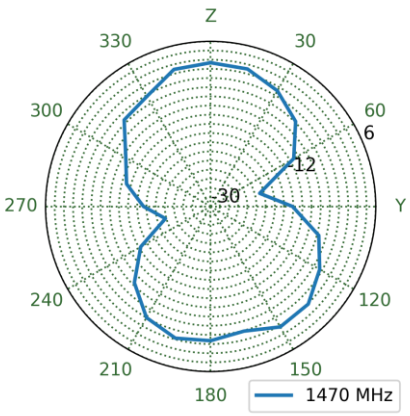
1473MHz



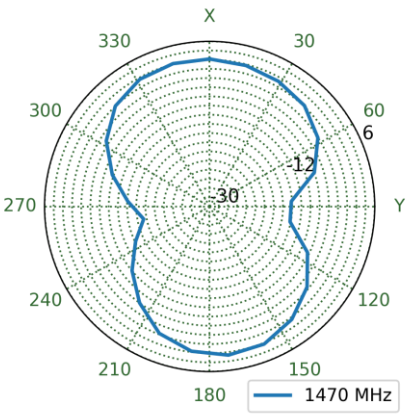
XZ Plane



YZ Plane

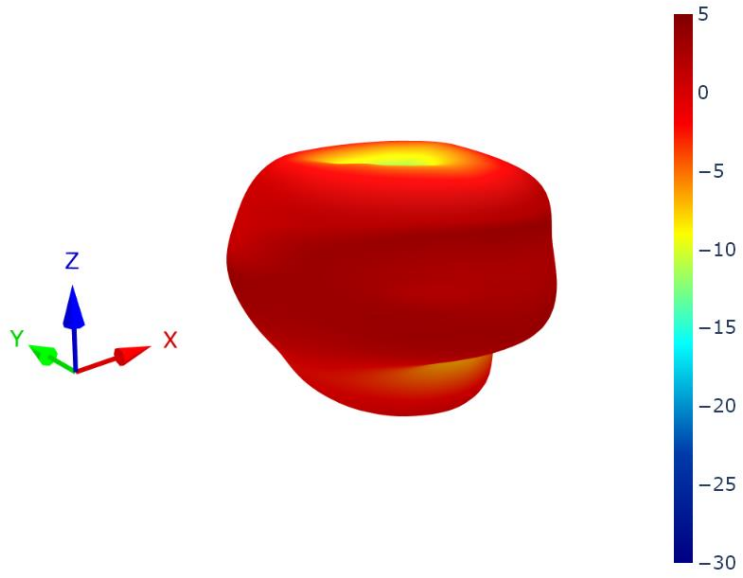


XY Plane

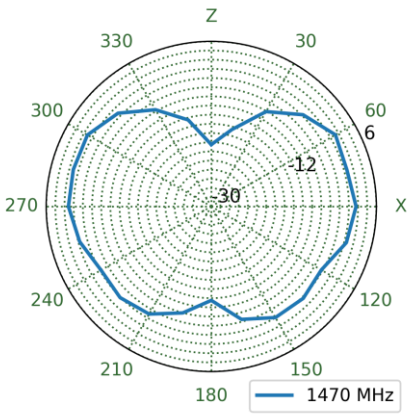


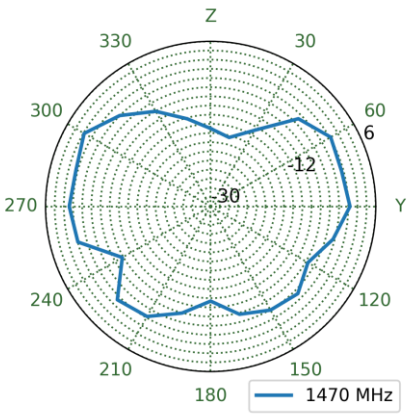
4.24 3D and 2D Radiation Patterns –Straight on Ground Plane

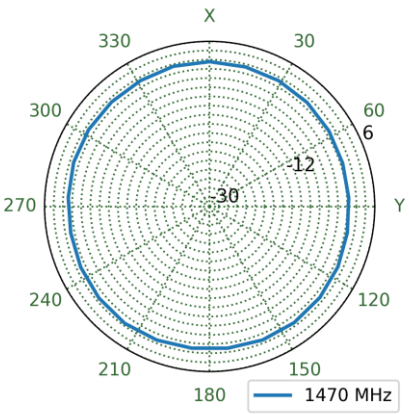
1473MHz



XZ Plane	YZ Plane	XY Plane

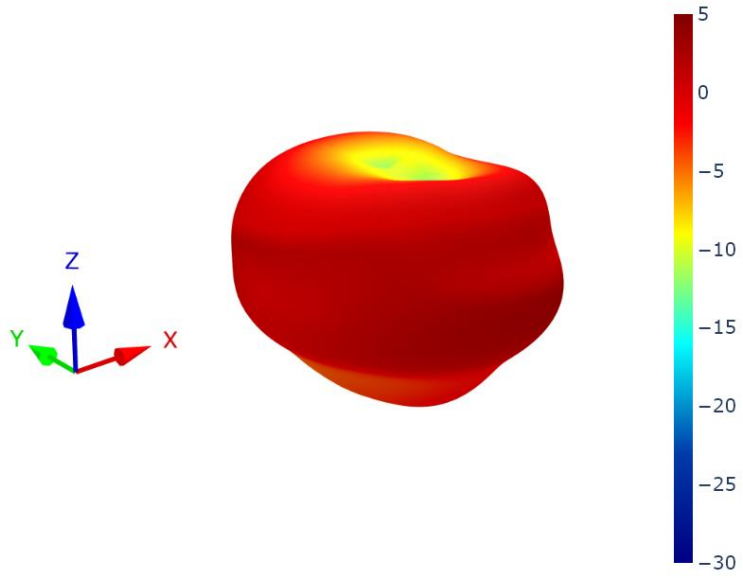




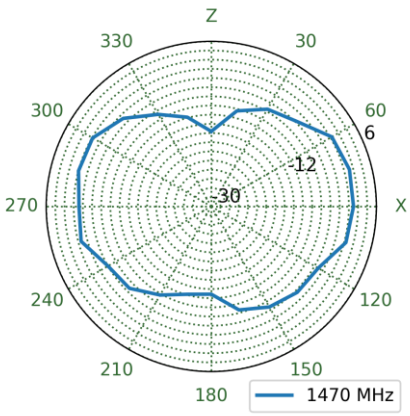


4.25 3D and 2D Radiation Patterns – Straight in Free Space

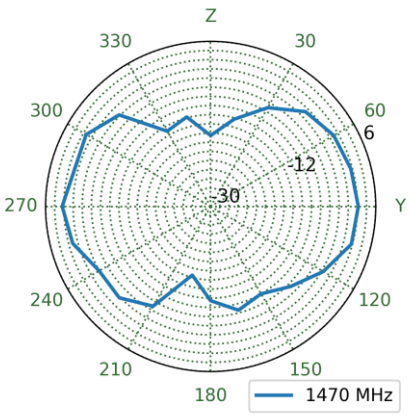
1473MHz



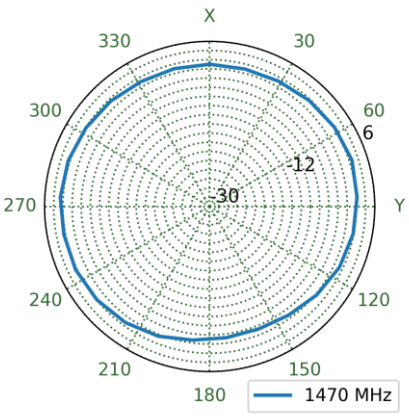
XZ Plane



YZ Plane

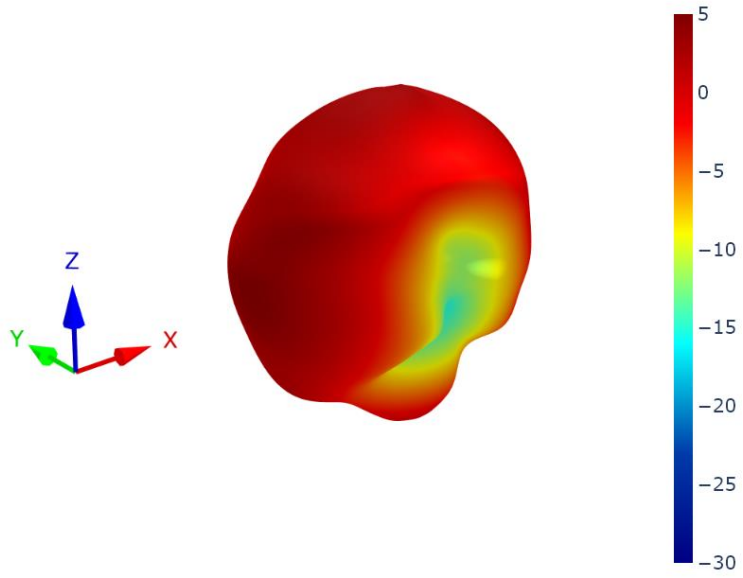


XY Plane

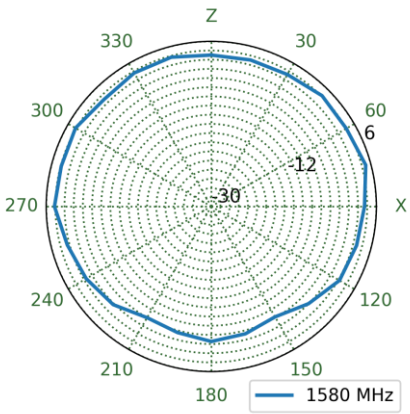


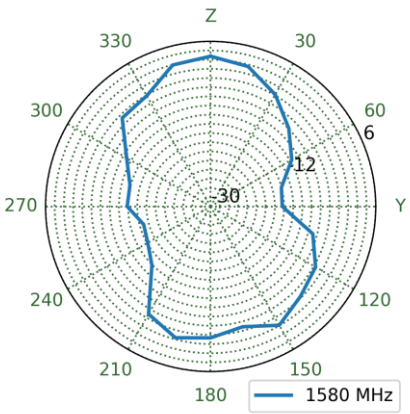
4.26 3D and 2D Radiation Patterns – Bent on Ground Plane

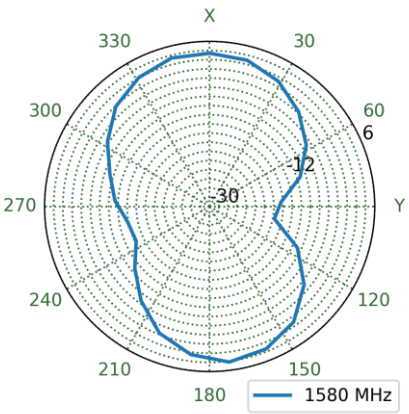
1582MHz



XZ Plane	YZ Plane	XY Plane

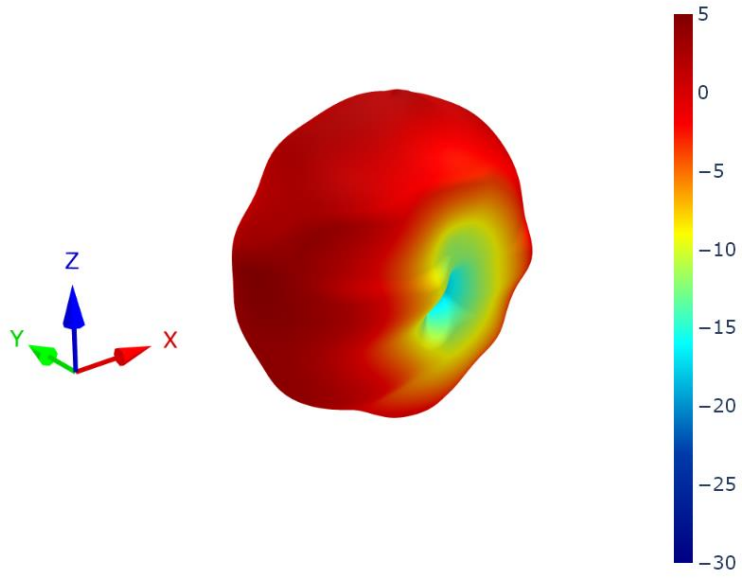




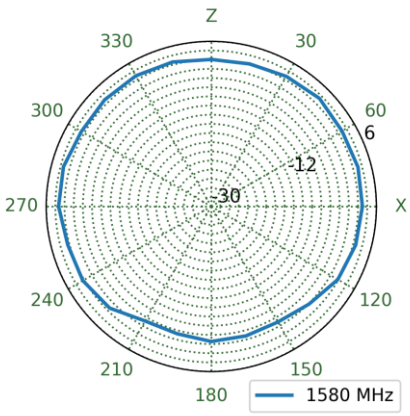


4.27 3D and 2D Radiation Patterns – Bent in Free Space

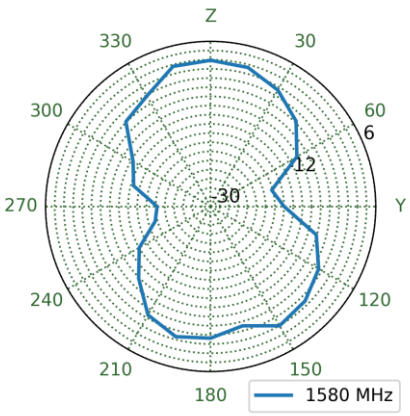
1582MHz



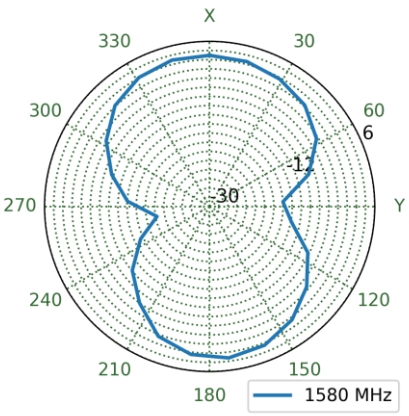
XZ Plane



YZ Plane

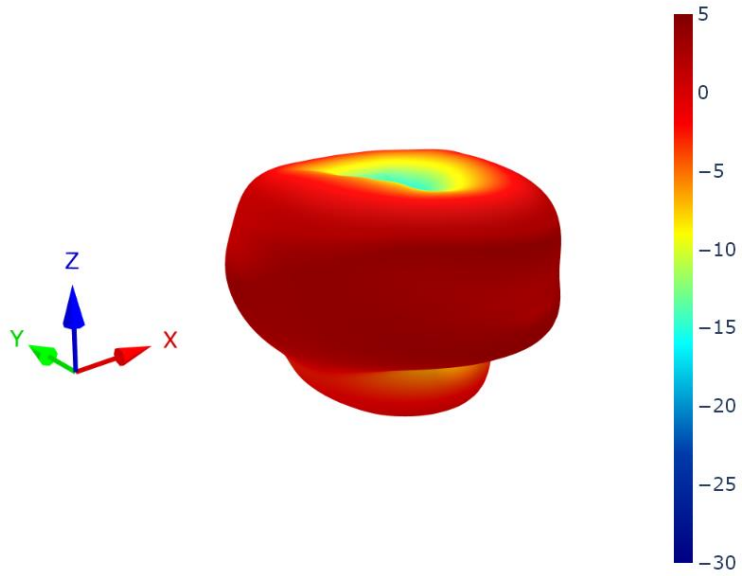


XY Plane

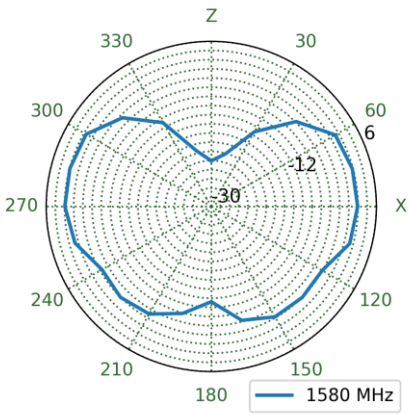


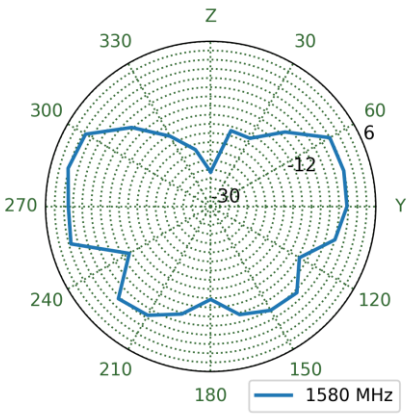
4.28 3D and 2D Radiation Patterns – Straight on Ground Plane

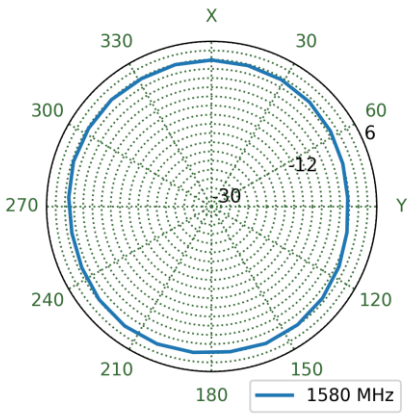
1582MHz



XZ Plane	YZ Plane	XY Plane

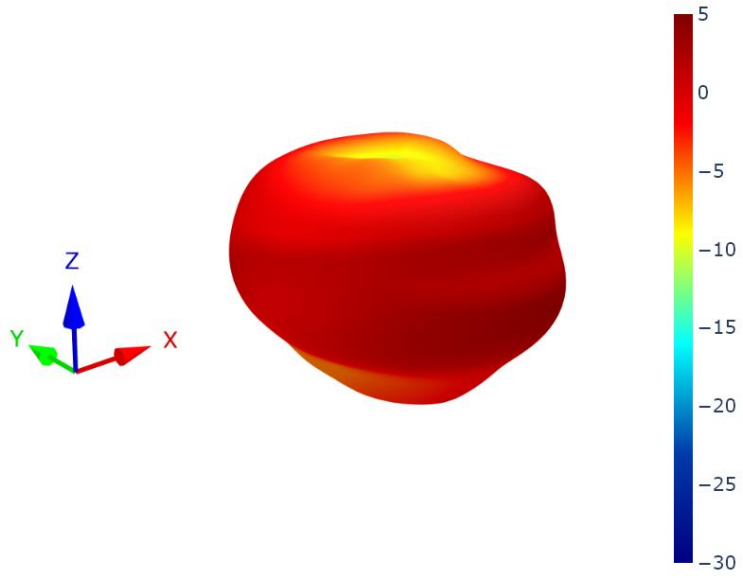




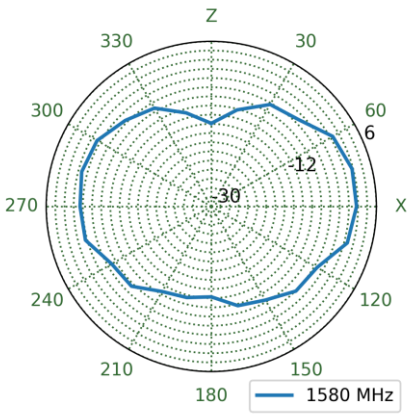


4.29 3D and 2D Radiation Patterns – Straight in Free Space

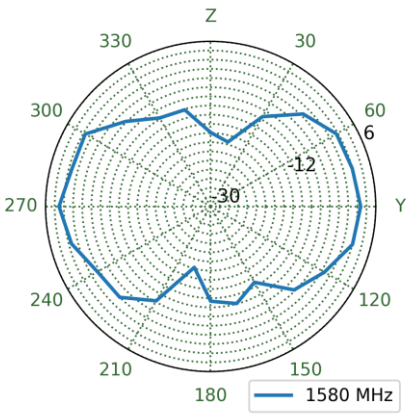
1582MHz



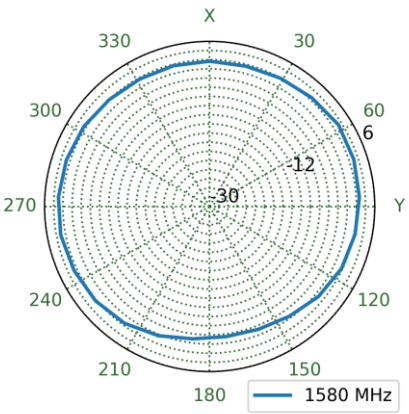
XZ Plane



YZ Plane

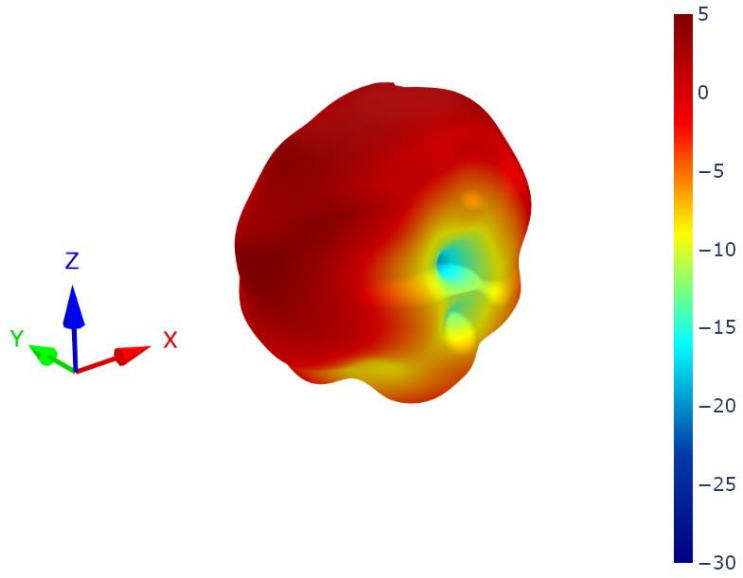


XY Plane

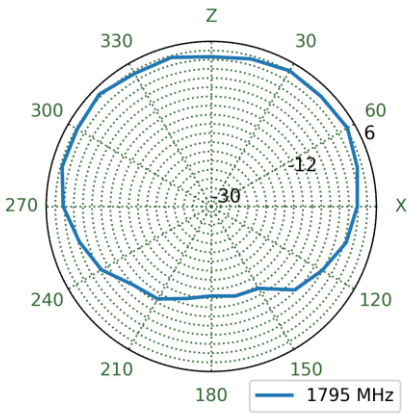


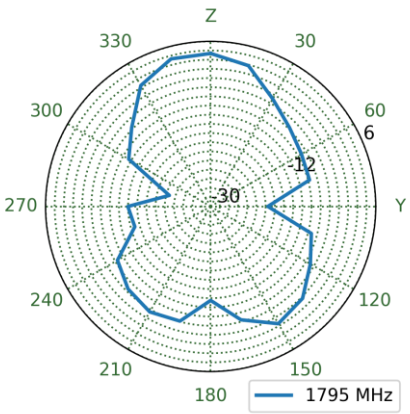
4.30 3D and 2D Radiation Patterns – Bent on Ground Plane

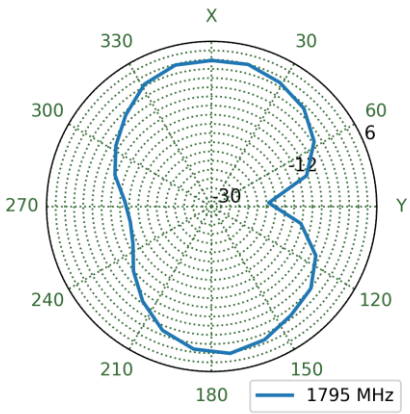
1795MHz



XZ Plane	YZ Plane	XY Plane

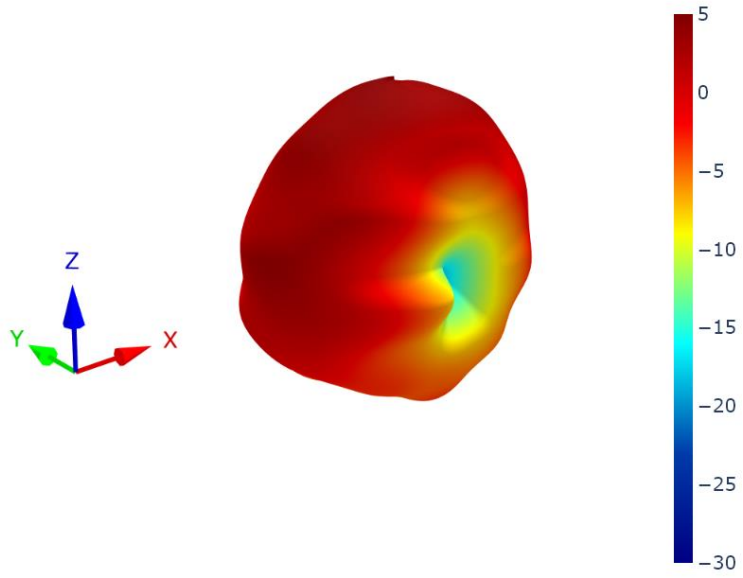




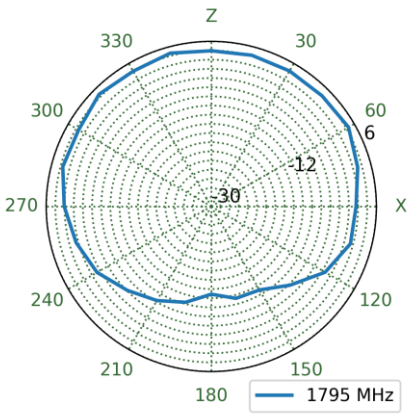


4.31 3D and 2D Radiation Patterns – Bent in Free Space

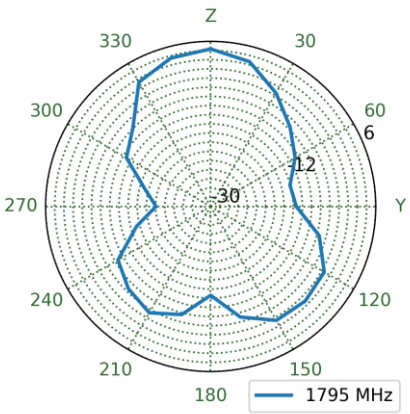
1795MHz



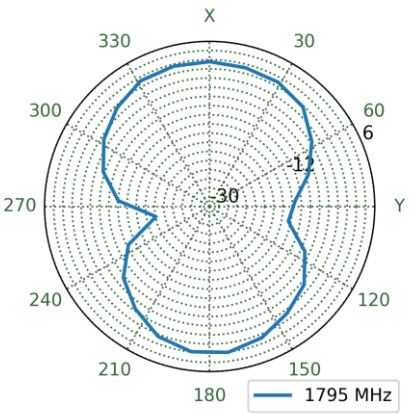
XZ Plane



YZ Plane

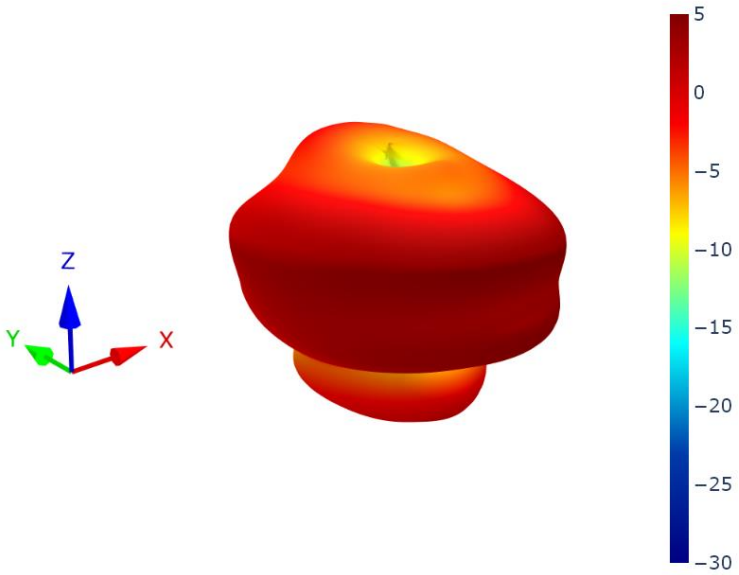


XY Plane

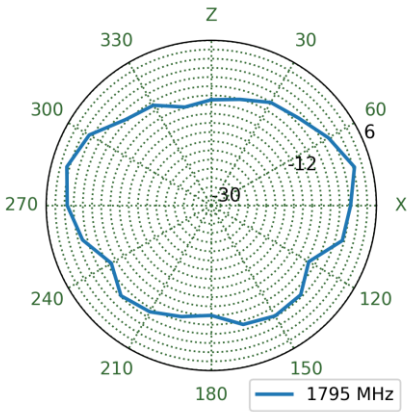


4.32 3D and 2D Radiation Patterns –Straight on Ground Plane

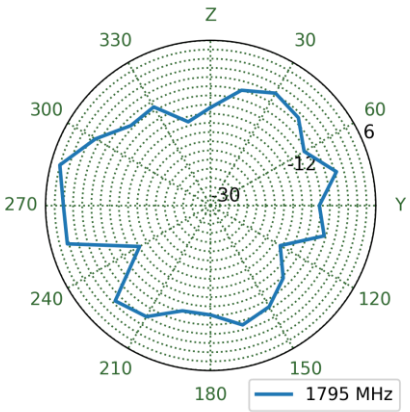
1795MHz



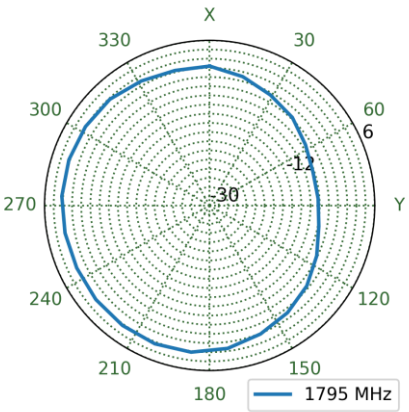
XZ Plane



YZ Plane

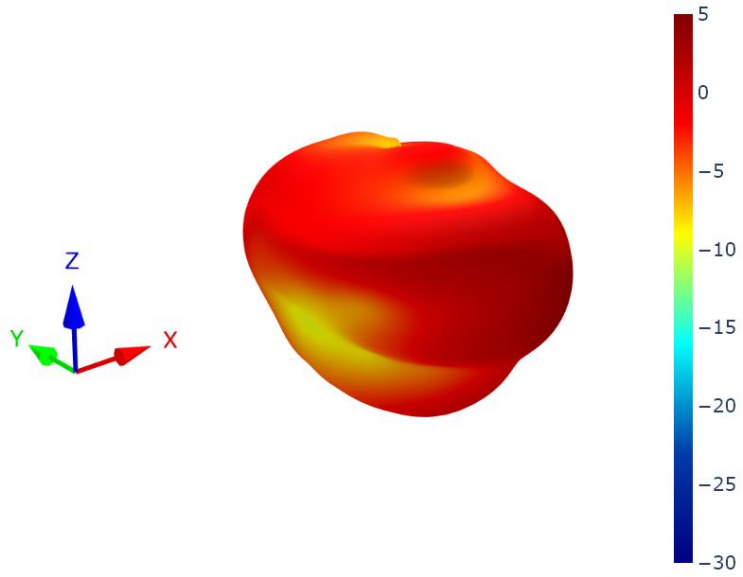


XY Plane

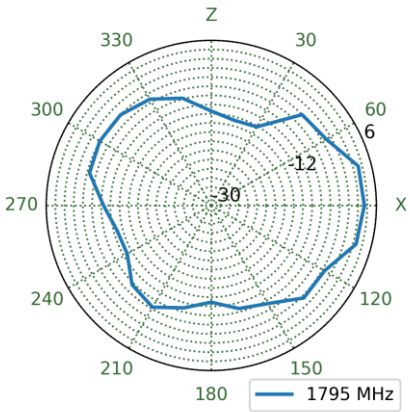


4.33 3D and 2D Radiation Patterns – Straight in Free Space

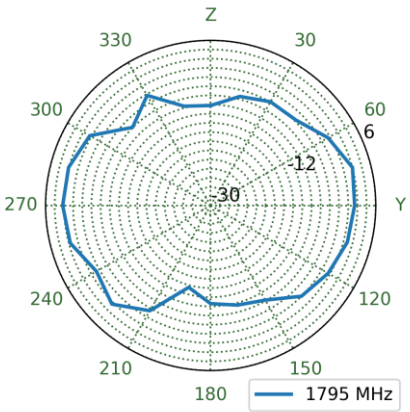
1795MHz



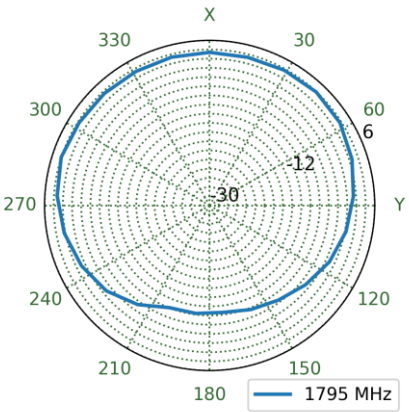
XZ Plane



YZ Plane

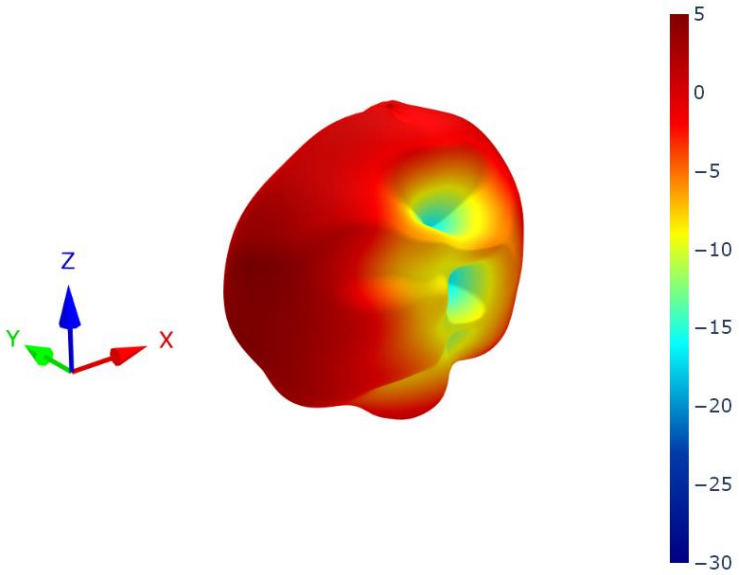


XY Plane

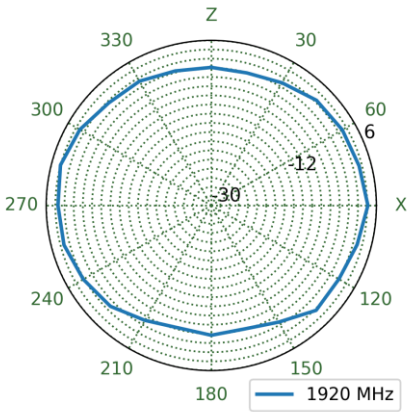


4.34 3D and 2D Radiation Patterns – Bent on Ground Plane

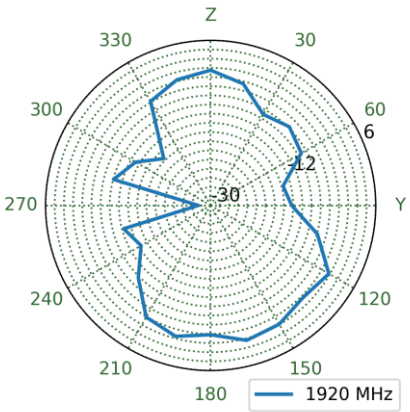
1920MHz



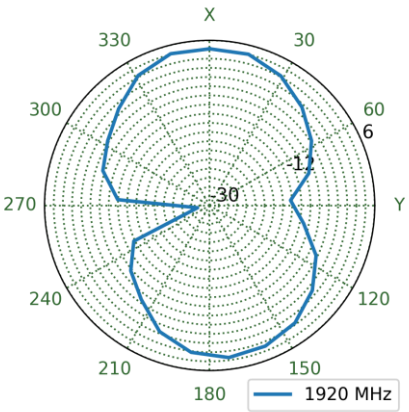
XZ Plane



YZ Plane

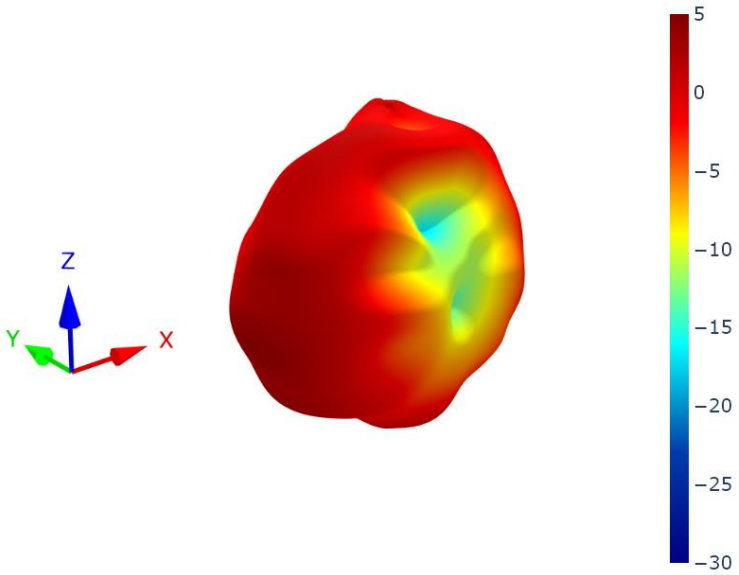


XY Plane

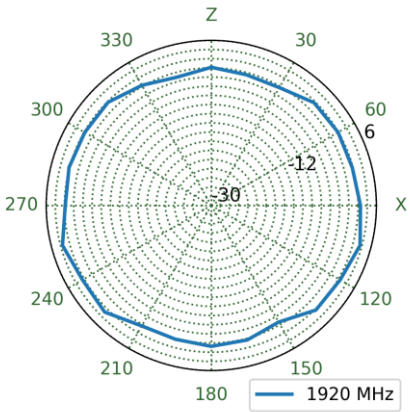


4.35 3D and 2D Radiation Patterns – Bent in Free Space

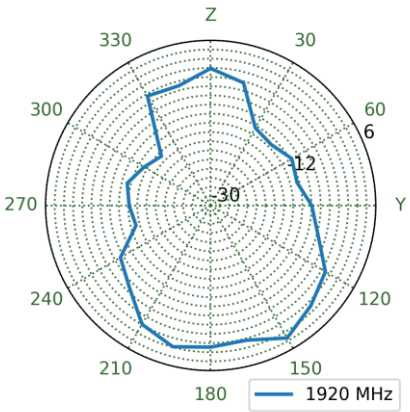
1920MHz



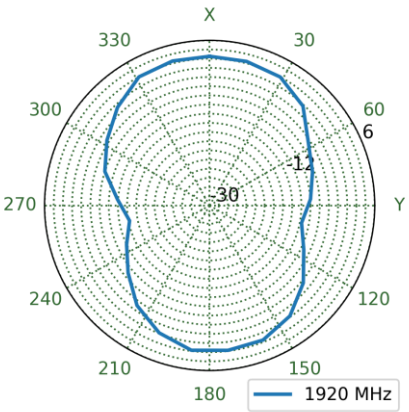
XZ Plane



YZ Plane

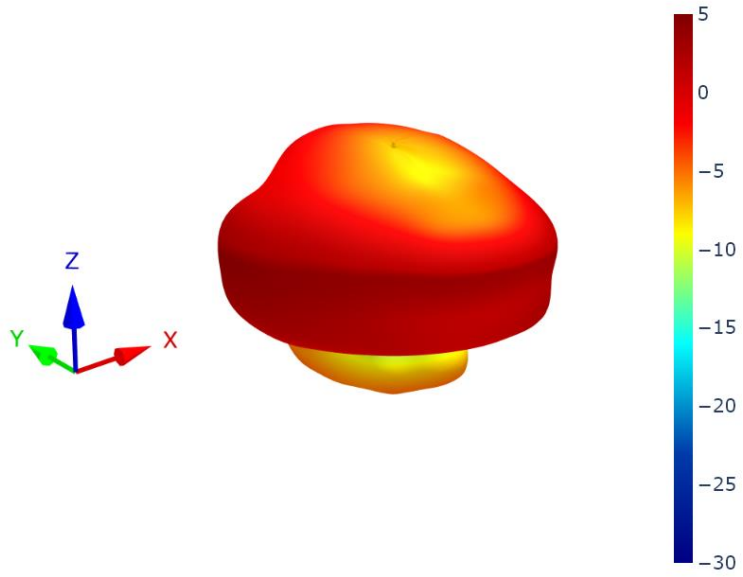


XY Plane

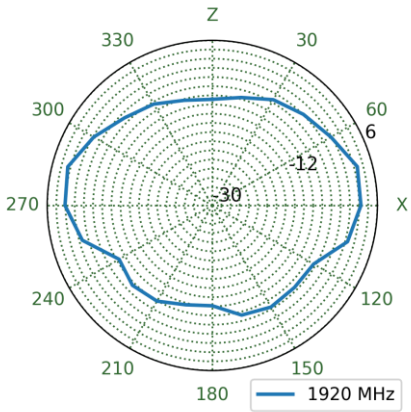


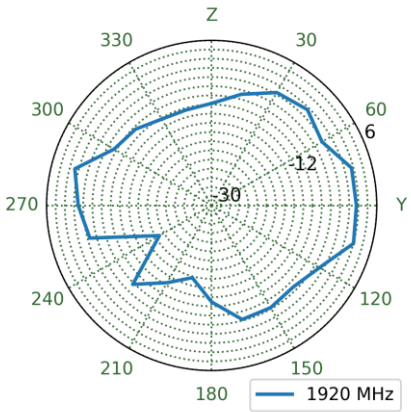
4.36 3D and 2D Radiation Patterns – Straight on Ground Plane

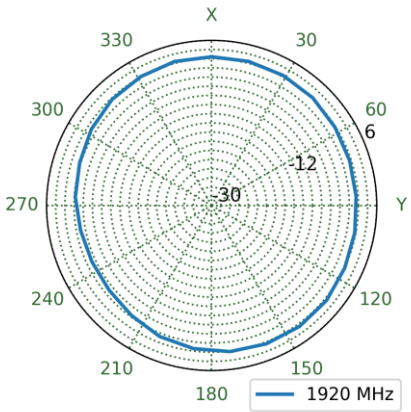
1920MHz



XZ Plane	YZ Plane	XY Plane

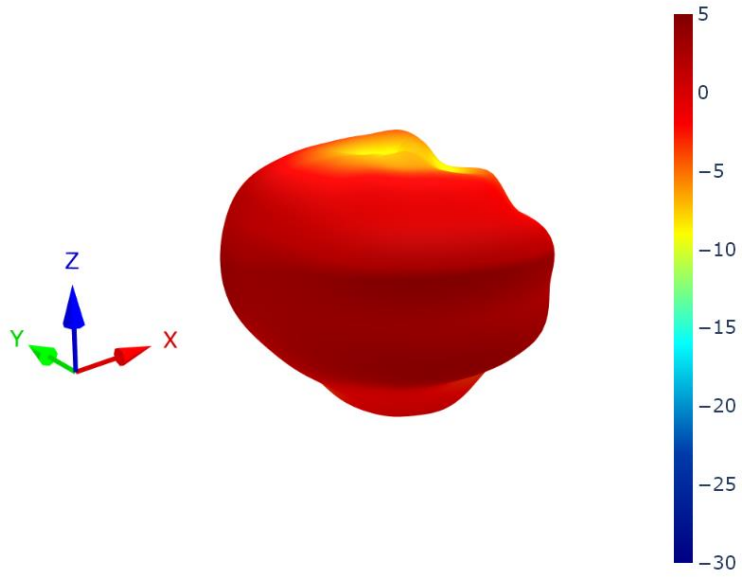




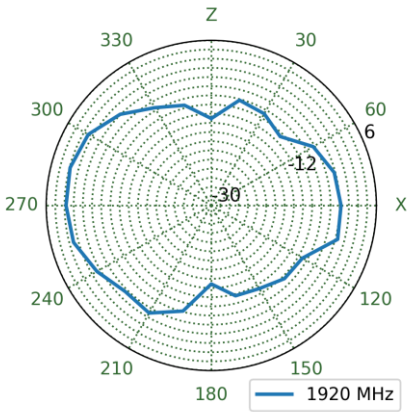


4.37 3D and 2D Radiation Patterns – Straight in Free Space

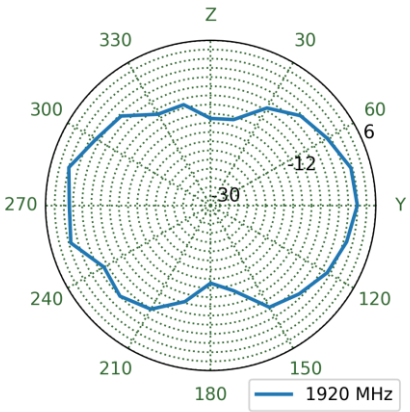
1920MHz



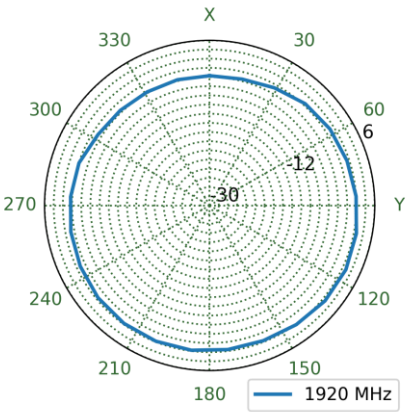
XZ Plane



YZ Plane

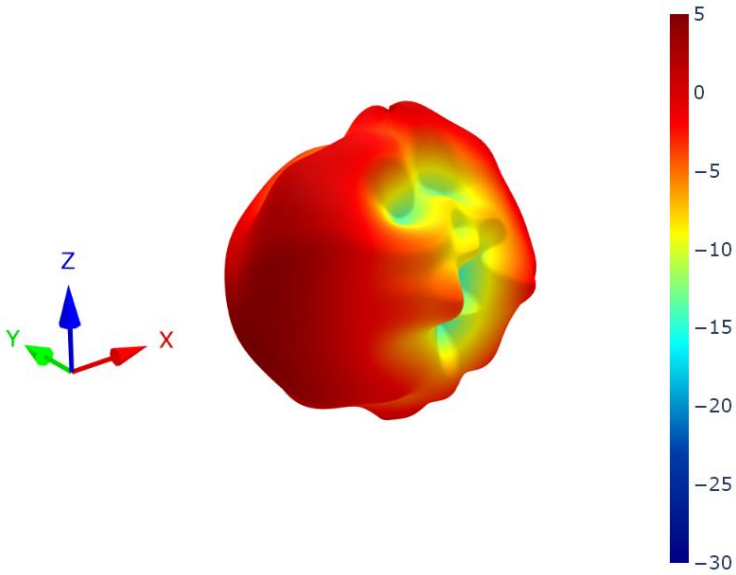


XY Plane

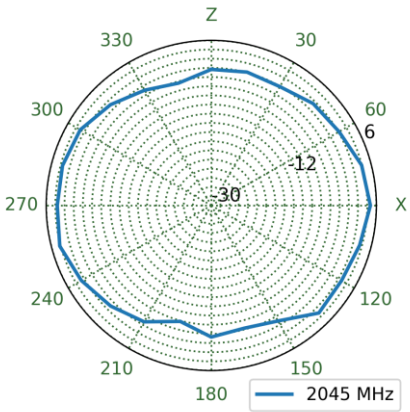


4.38 3D and 2D Radiation Patterns – Bent on Ground Plane

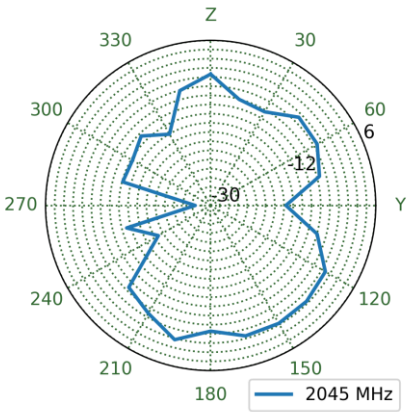
2045MHz



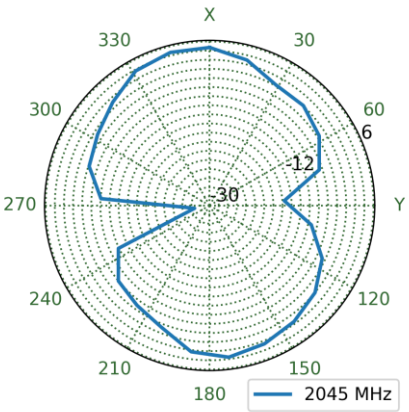
XZ Plane



YZ Plane

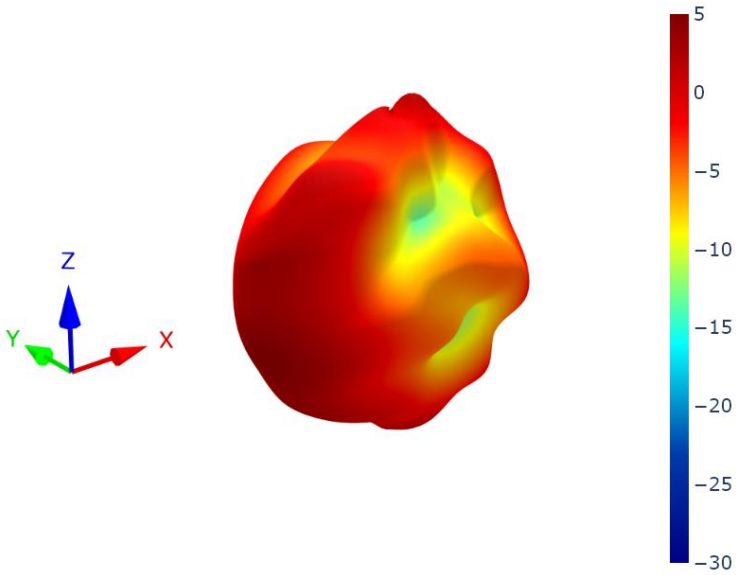


XY Plane

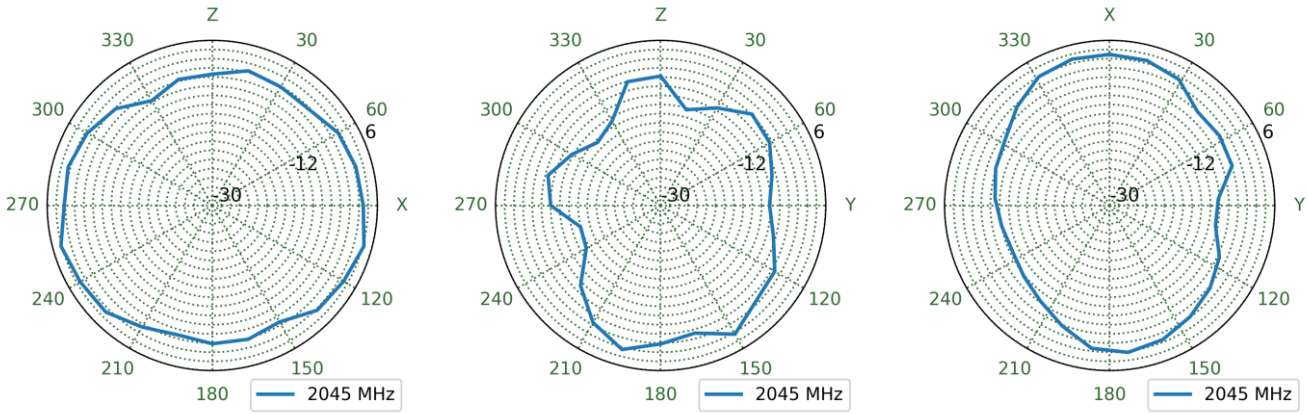


4.39 3D and 2D Radiation Patterns – Bent in Free Space

2045MHz

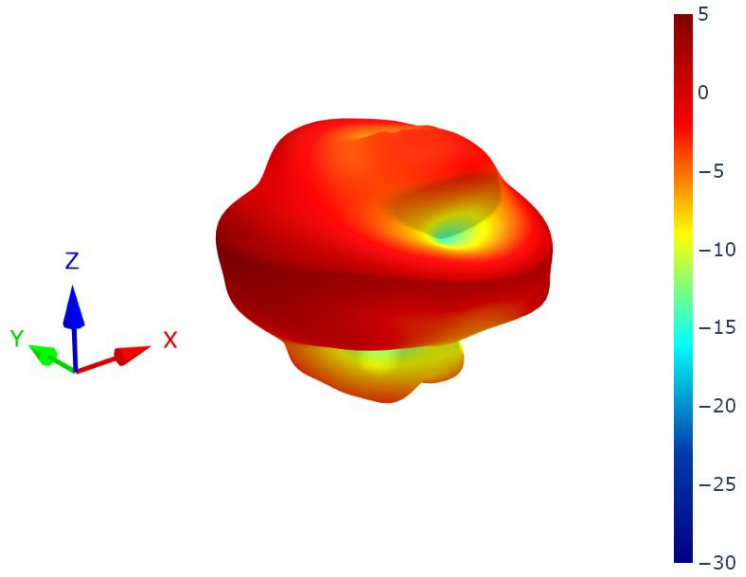


XZ Plane	YZ Plane	XY Plane

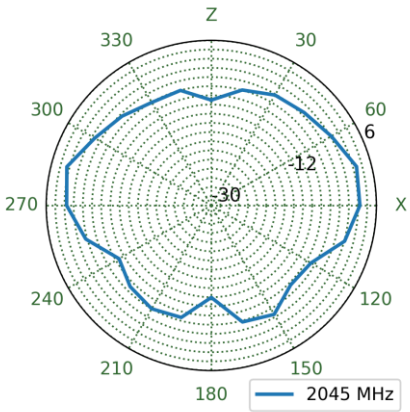


4.40 3D and 2D Radiation Patterns –Straight on Ground Plane

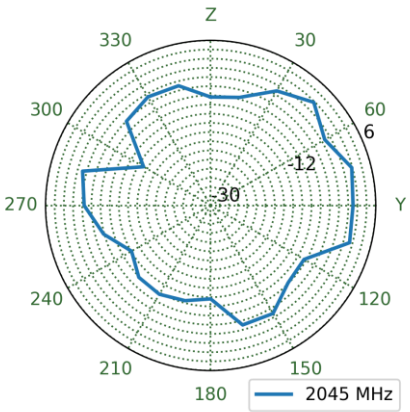
2045MHz



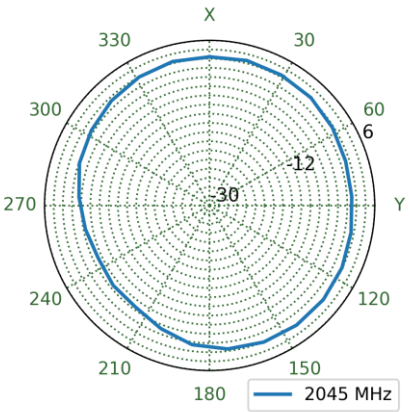
XZ Plane



YZ Plane

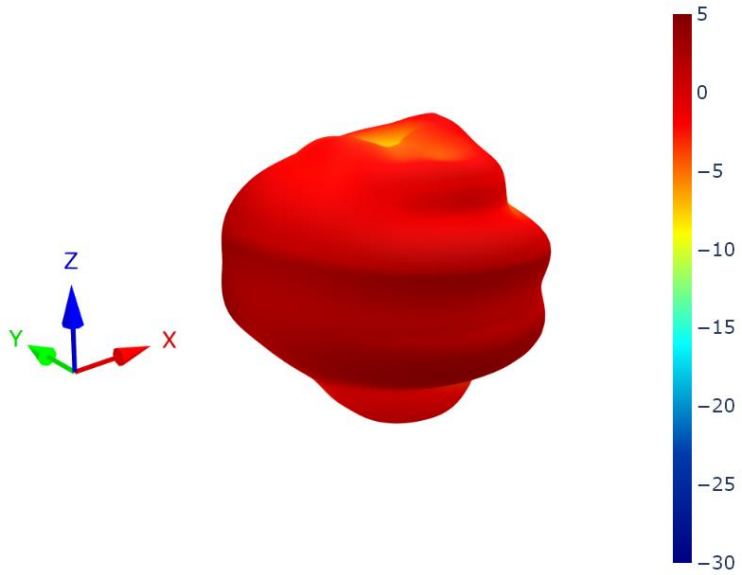


XY Plane

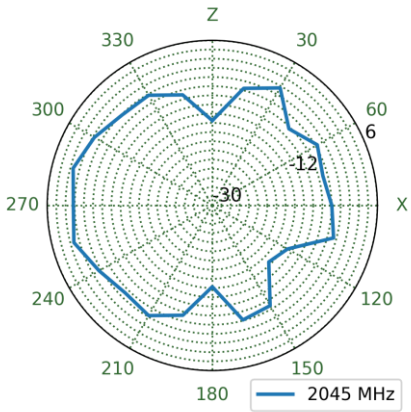


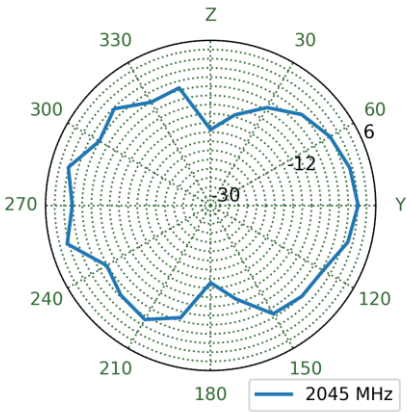
4.41 3D and 2D Radiation Patterns – Straight in Free Space

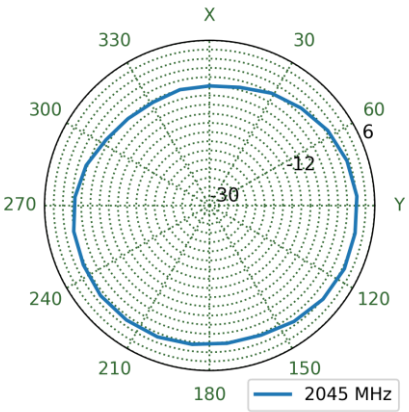
2045MHz



XZ Plane	YZ Plane	XY Plane

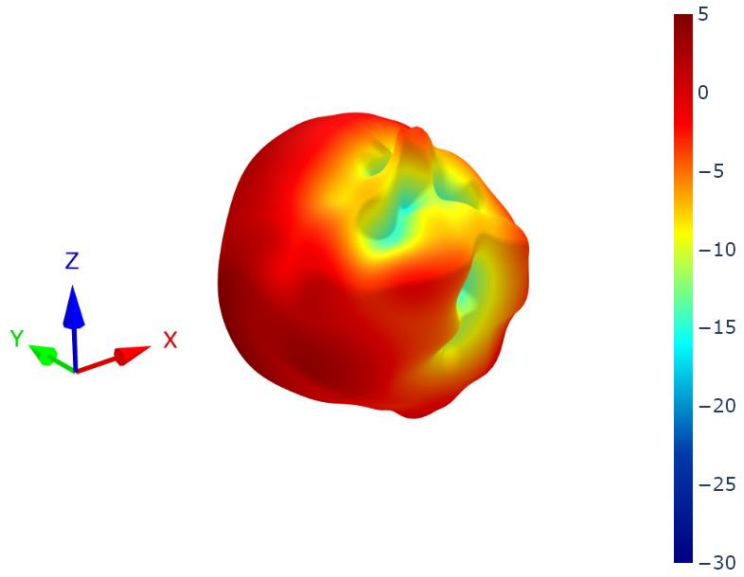




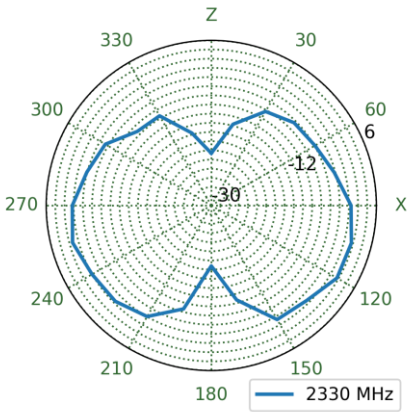


4.42 3D and 2D Radiation Patterns – Bent on Ground Plane

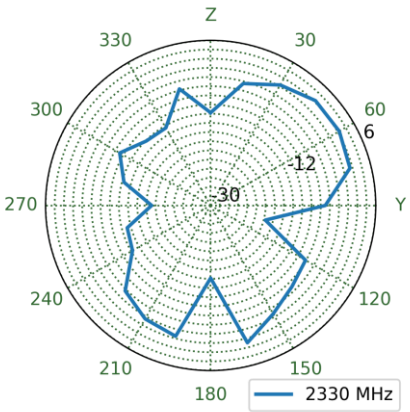
2333MHz



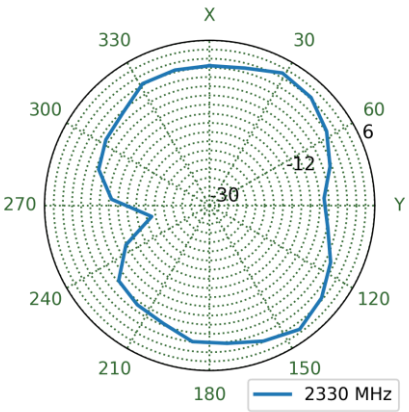
XZ Plane



YZ Plane

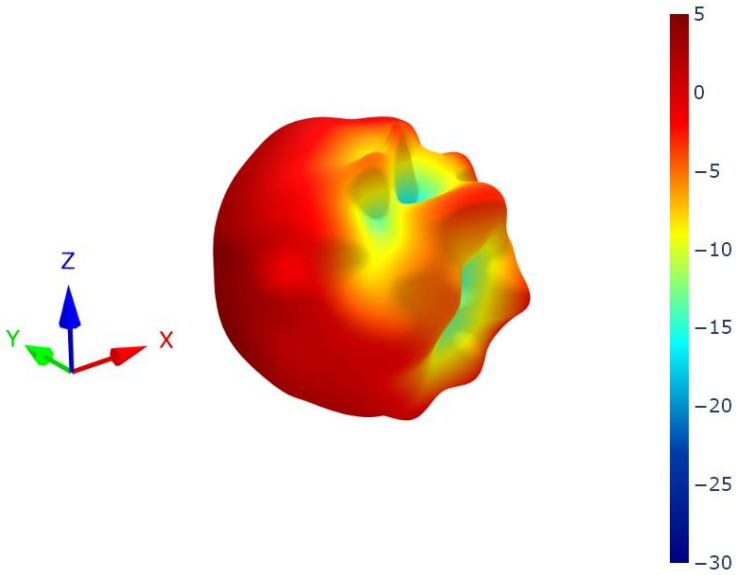


XY Plane

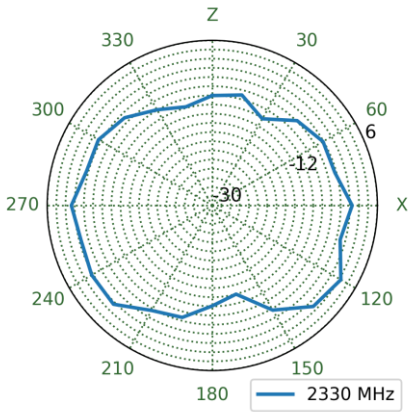


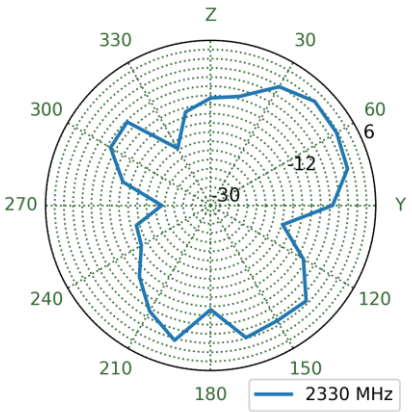
4.43 3D and 2D Radiation Patterns – Bent in Free Space

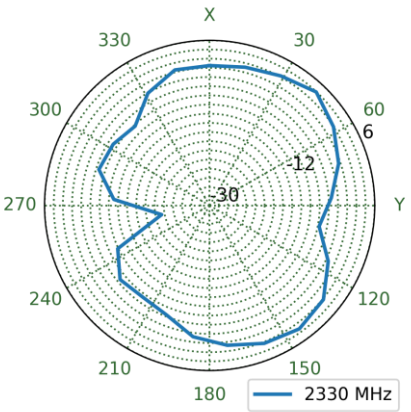
2333MHz



XZ Plane	YZ Plane	XY Plane

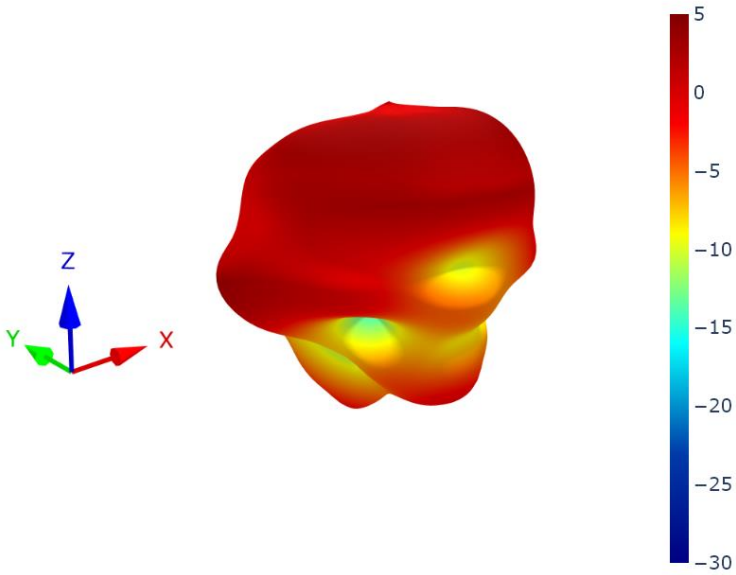




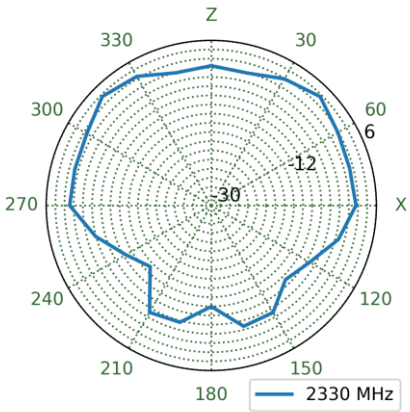


4.44 3D and 2D Radiation Patterns – Straight on Ground Plane

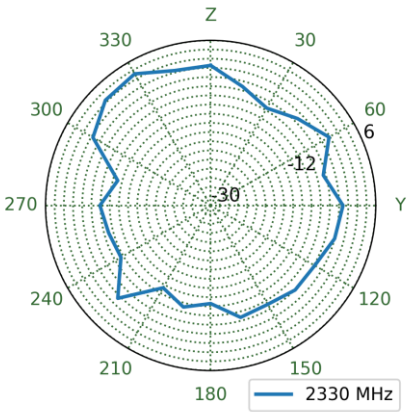
2333MHz



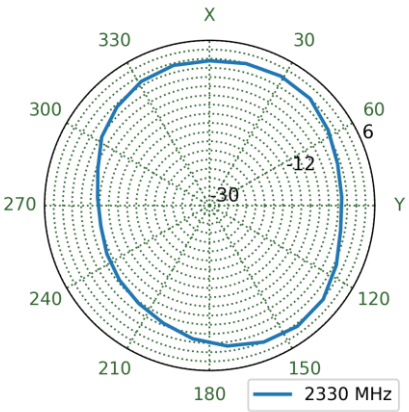
XZ Plane



YZ Plane

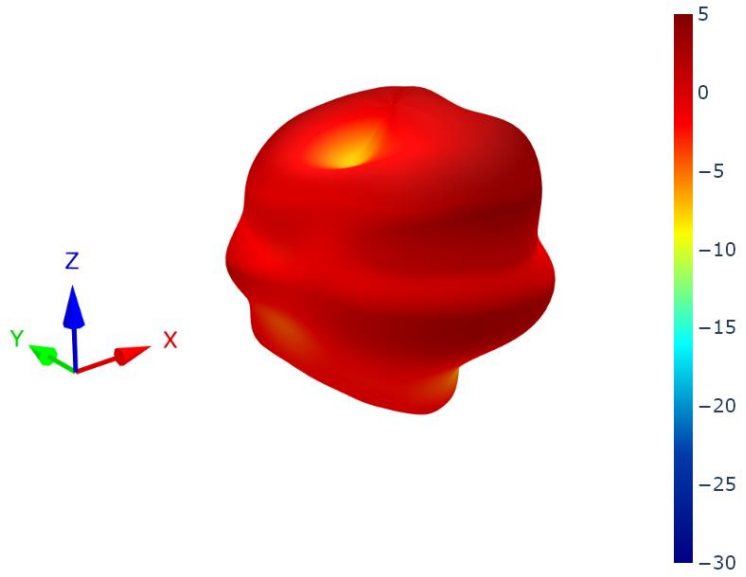


XY Plane

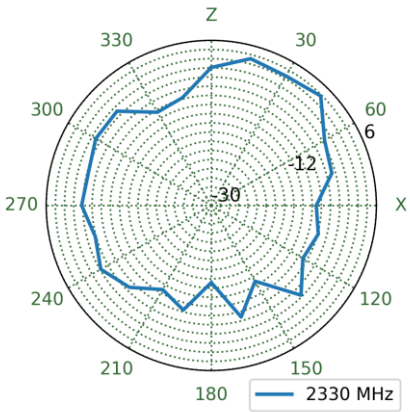


4.45 3D and 2D Radiation Patterns – Straight in Free Space

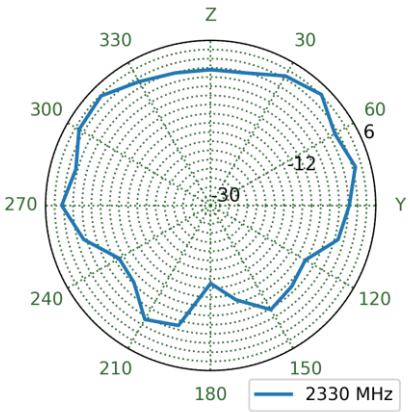
2333MHz



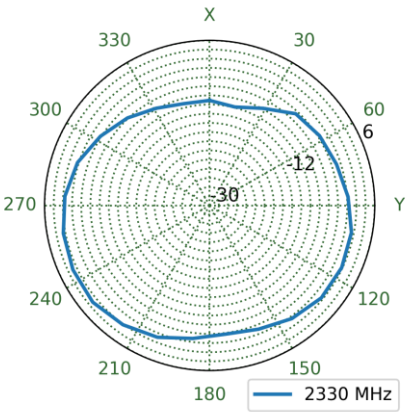
XZ Plane



YZ Plane

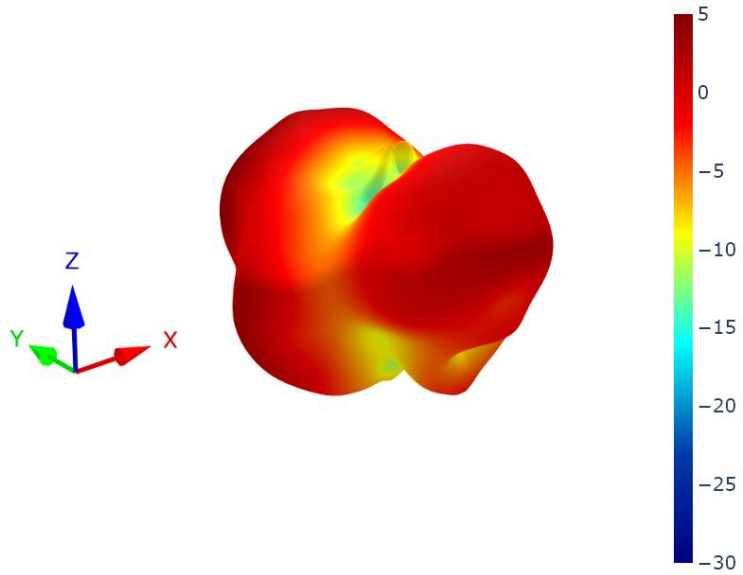


XY Plane

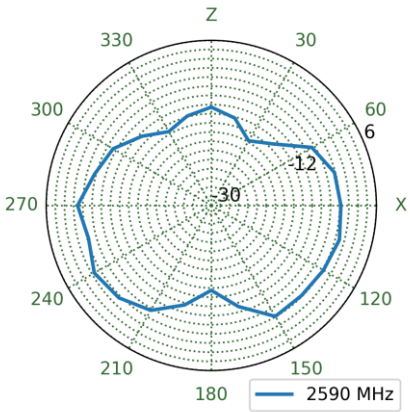


4.46 3D and 2D Radiation Patterns – Bent on Ground Plane

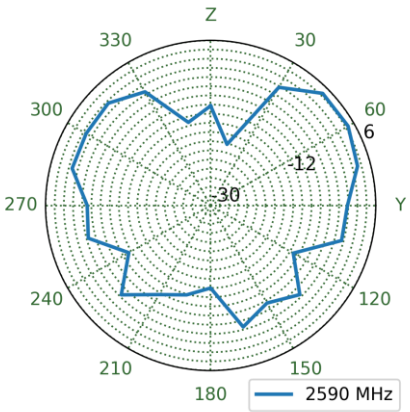
2590MHz



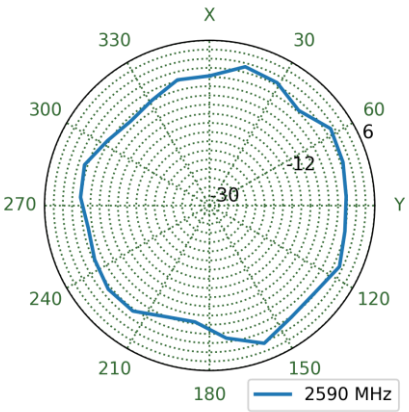
XZ Plane



YZ Plane

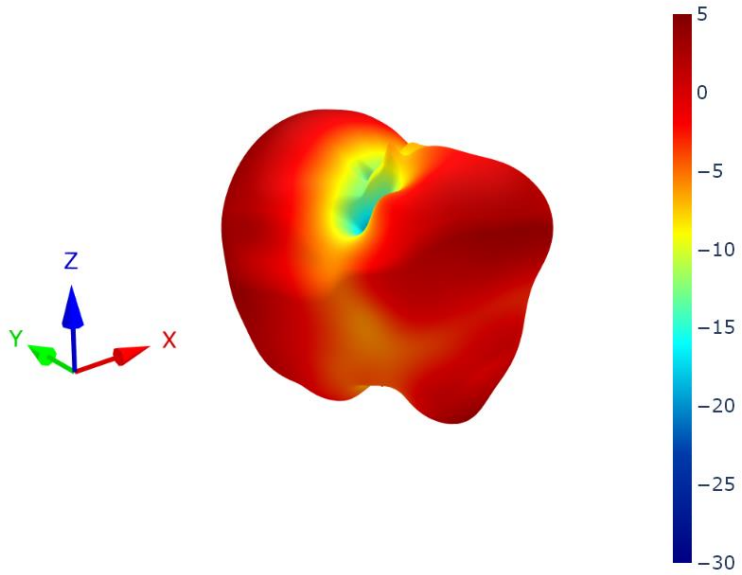


XY Plane

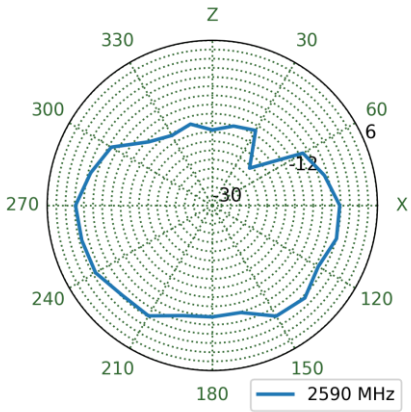


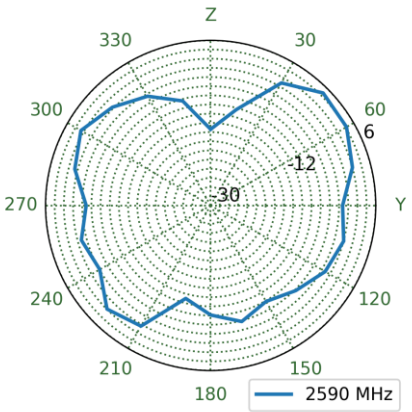
4.47 3D and 2D Radiation Patterns – Bent in Free Space

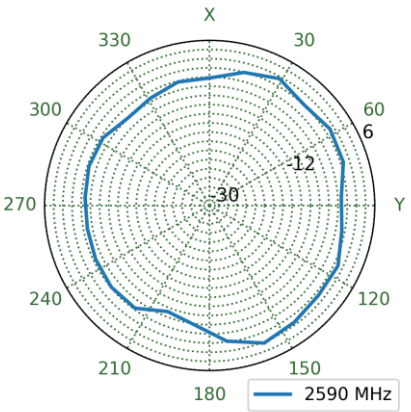
2590MHz



XZ Plane	YZ Plane	XY Plane

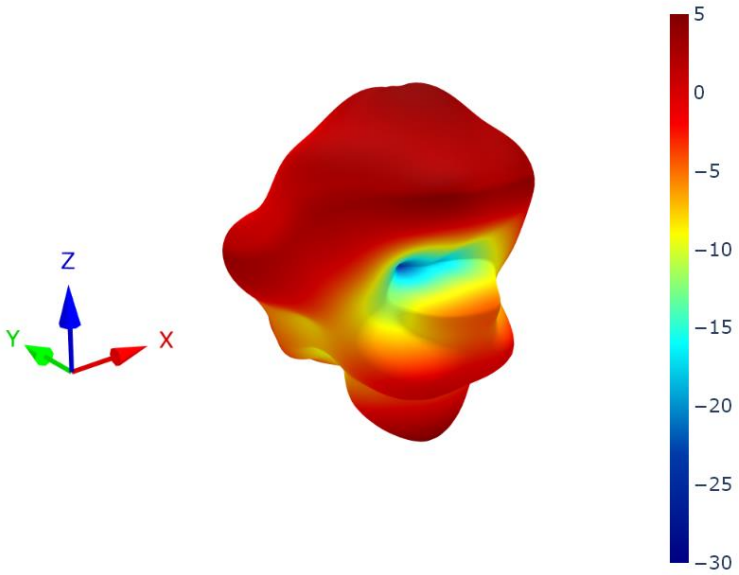




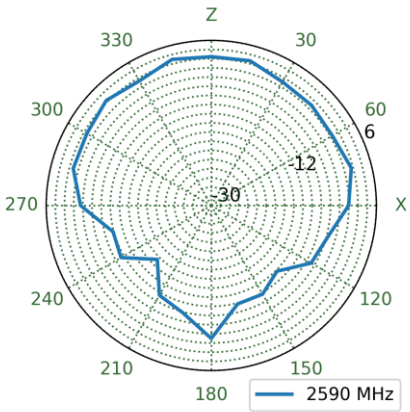


4.47 3D and 2D Radiation Patterns –Straight on Ground Plane

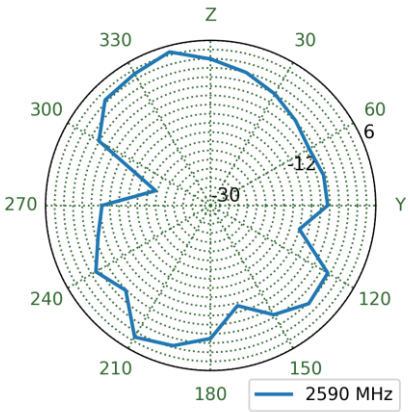
2333MHz



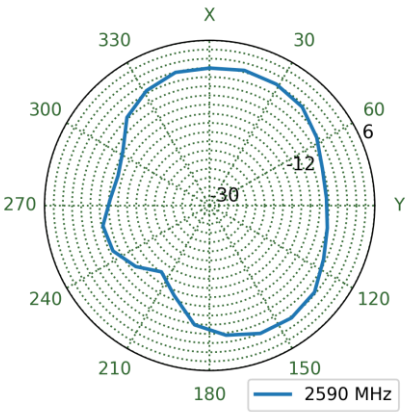
XZ Plane



YZ Plane

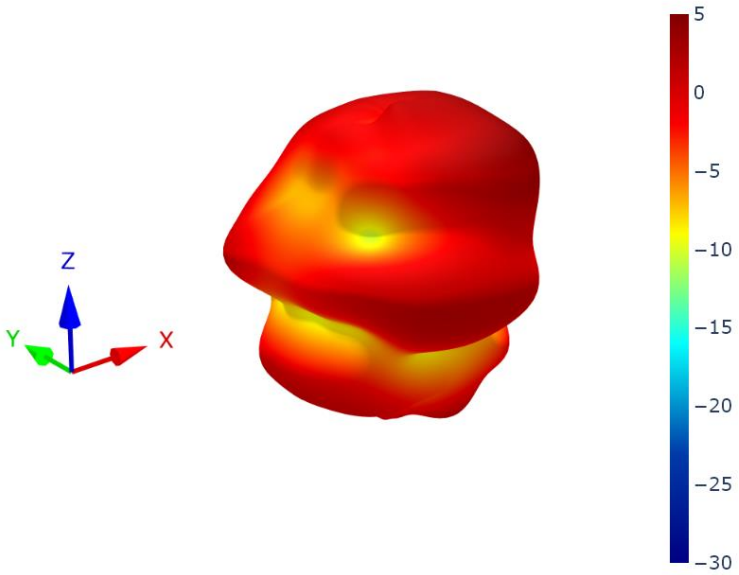


XY Plane

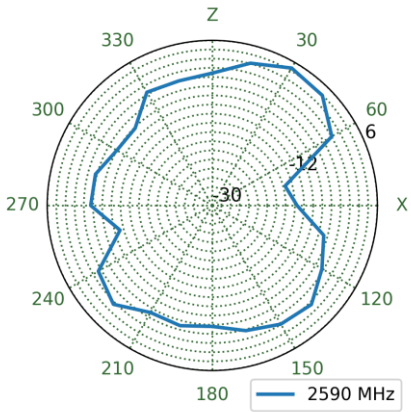


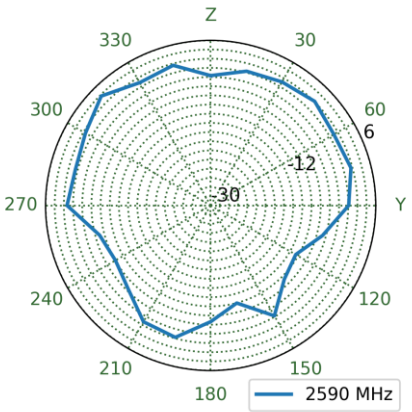
4.48 3D and 2D Radiation Patterns – Straight in Free Space

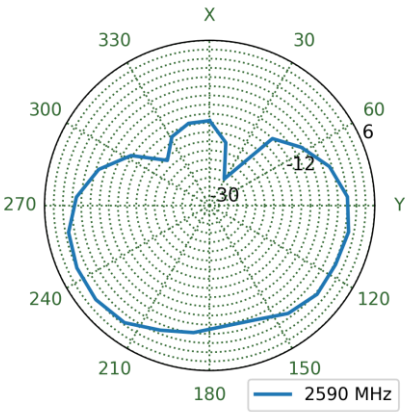
2590MHz



XZ Plane	YZ Plane	XY Plane

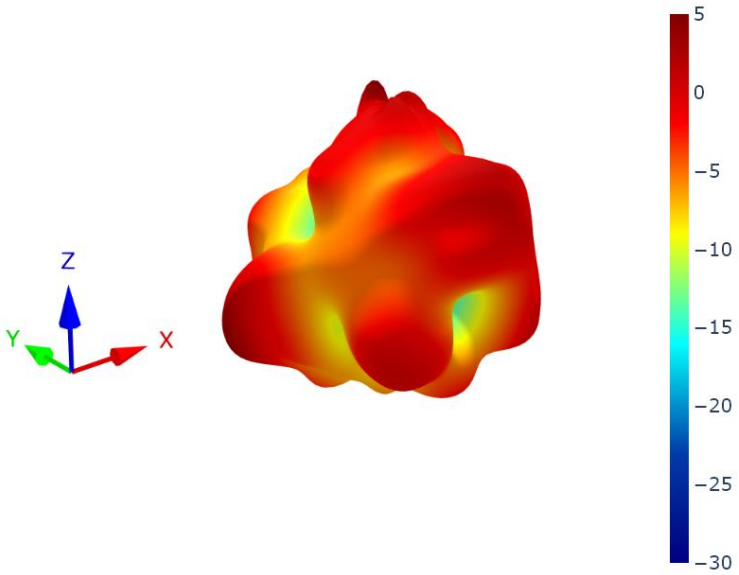




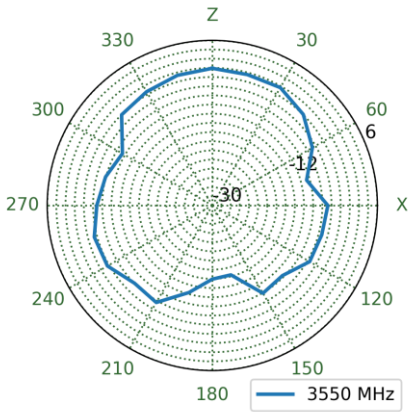


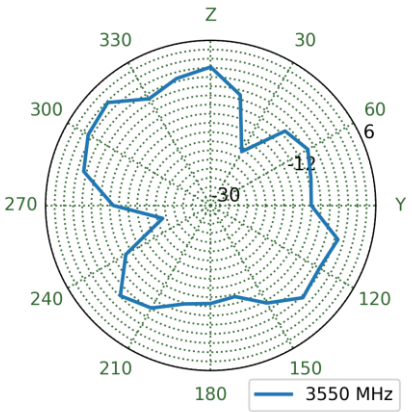
4.49 3D and 2D Radiation Patterns – Bent on Ground Plane

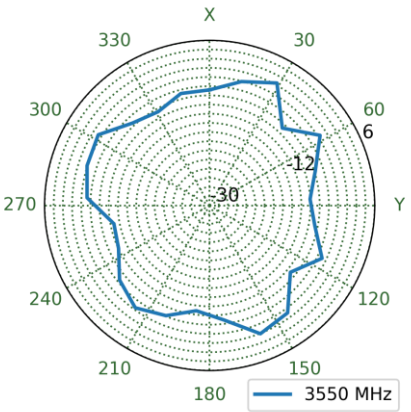
3550MHz



XZ Plane	YZ Plane	XY Plane

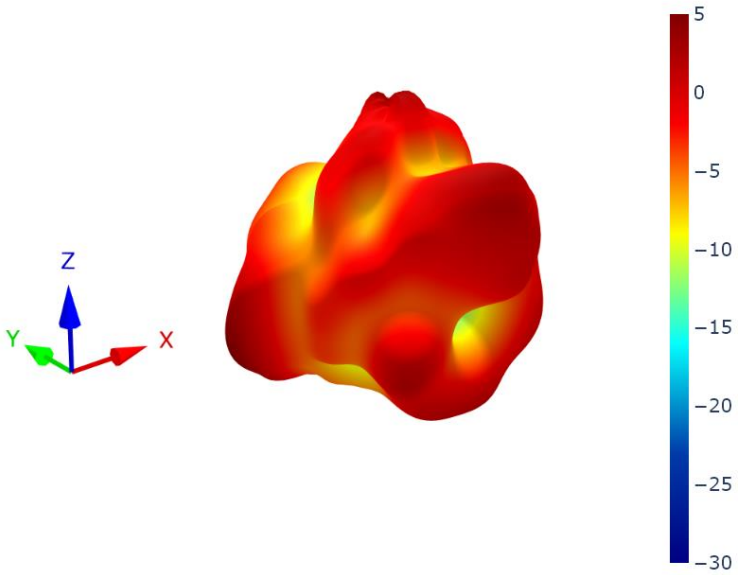




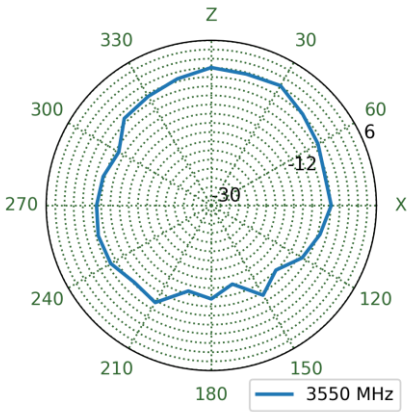


4.50 3D and 2D Radiation Patterns – Bent in Free Space

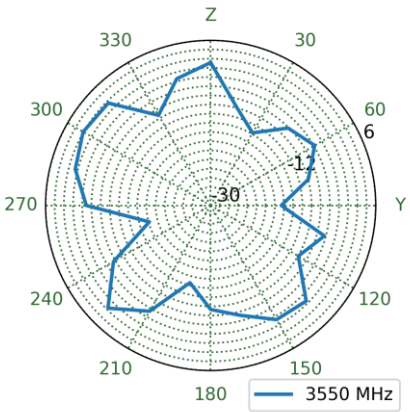
3550MHz



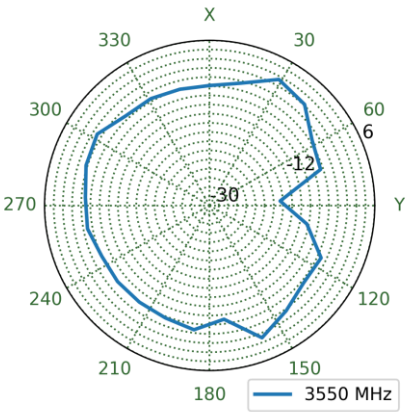
XZ Plane



YZ Plane

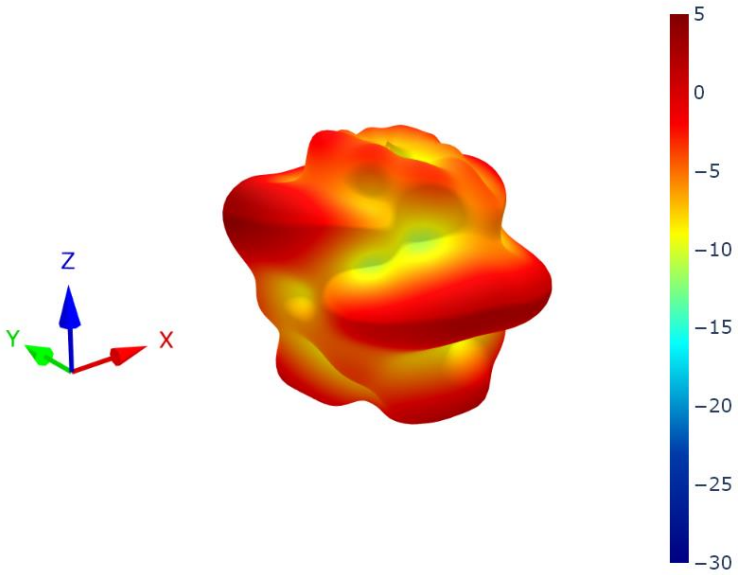


XY Plane

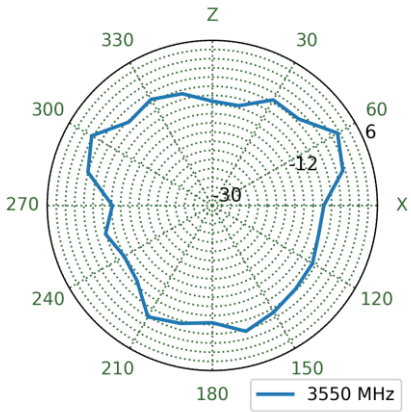


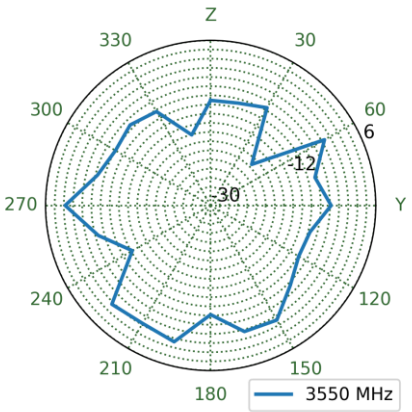
4.51 3D and 2D Radiation Patterns – Straight on Ground Plane

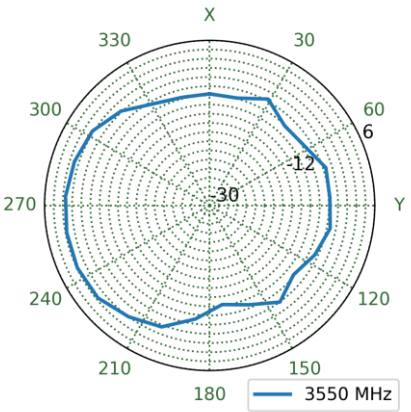
3550MHz



XZ Plane	YZ Plane	XY Plane

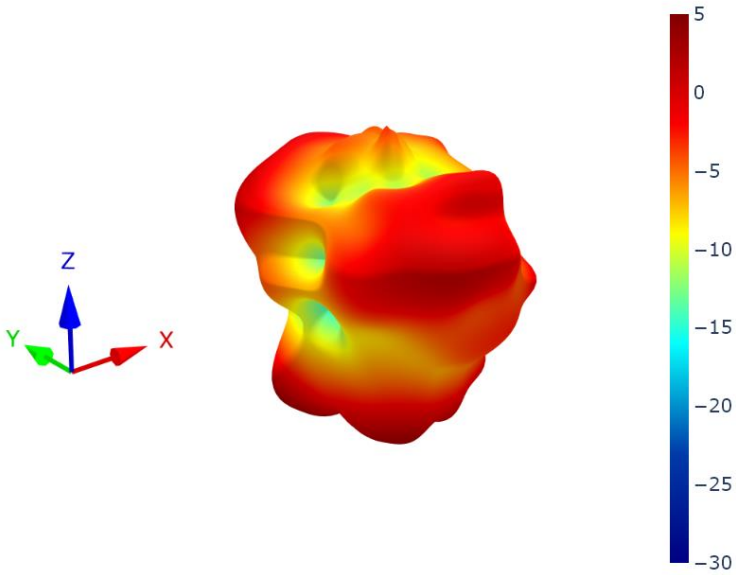




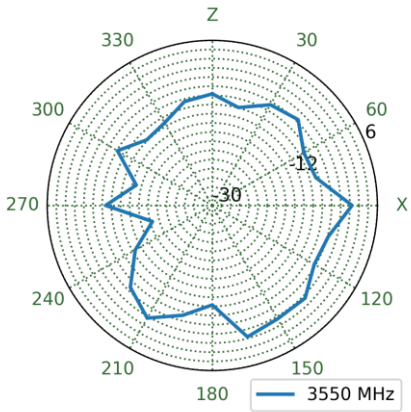


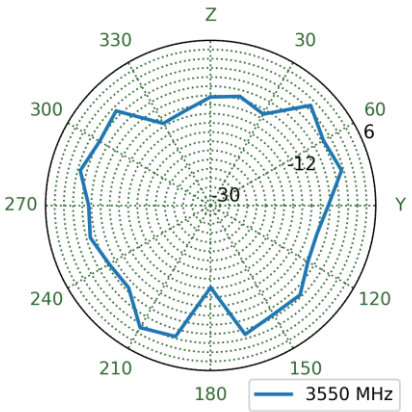
4.52 3D and 2D Radiation Patterns – Straight in Free Space

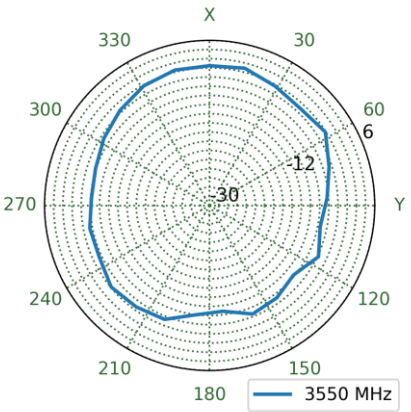
3550MHz



XZ Plane	YZ Plane	XY Plane

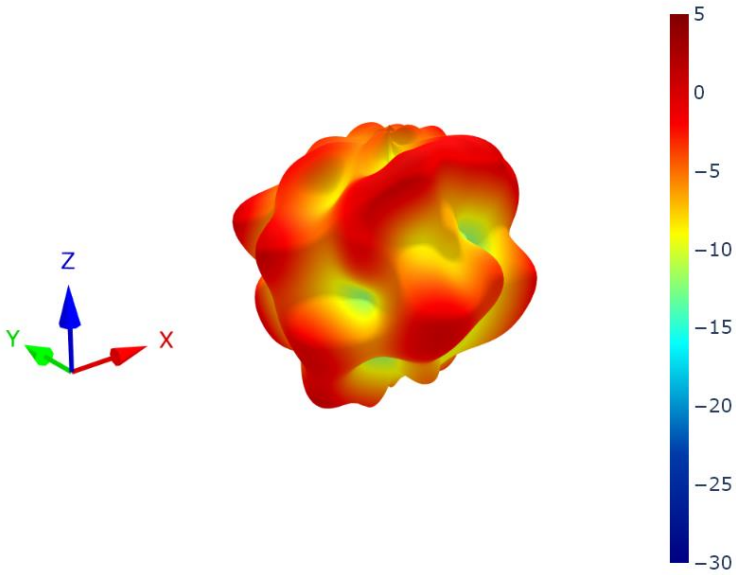




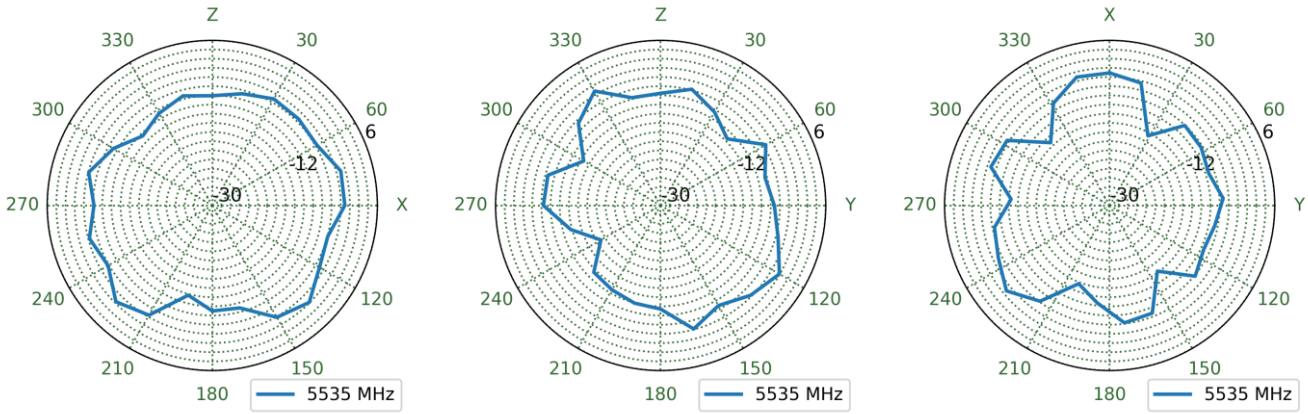


4.53 3D and 2D Radiation Patterns – Bent on Ground Plane

5538MHz

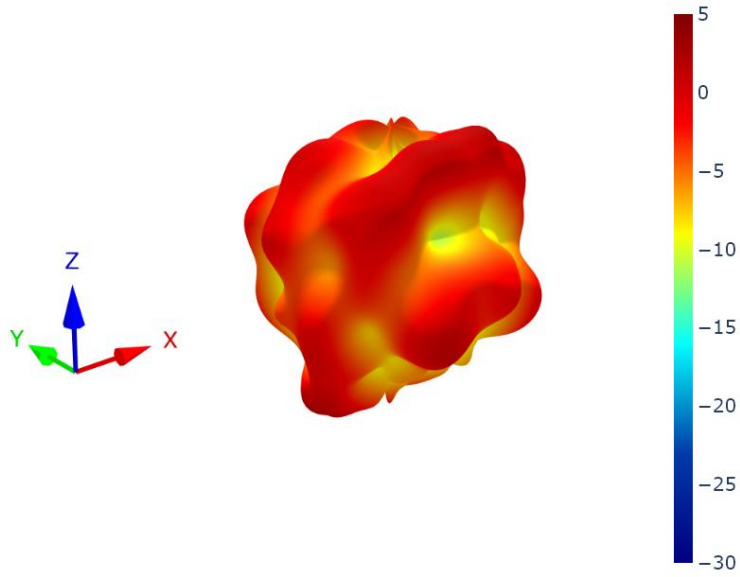


XZ Plane	YZ Plane	XY Plane

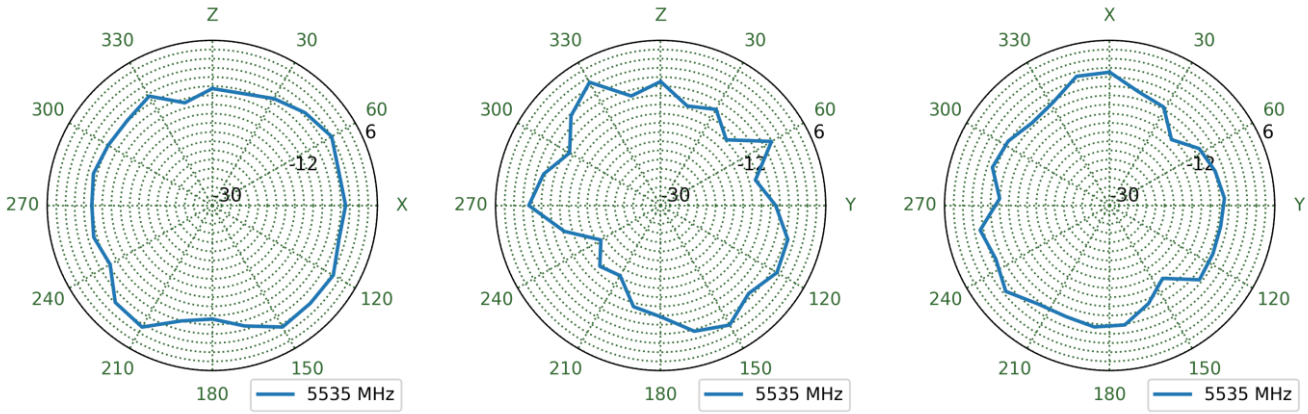


4.54 3D and 2D Radiation Patterns – Bent in Free Space

5538MHz

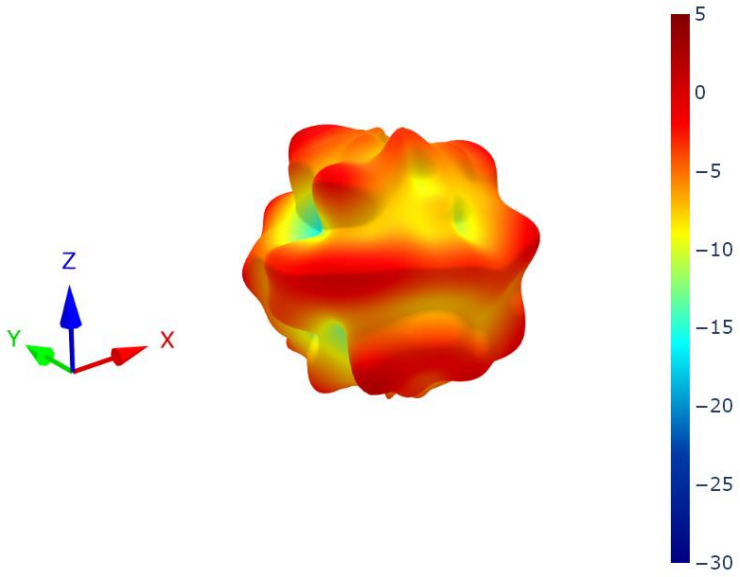


XZ Plane	YZ Plane	XY Plane

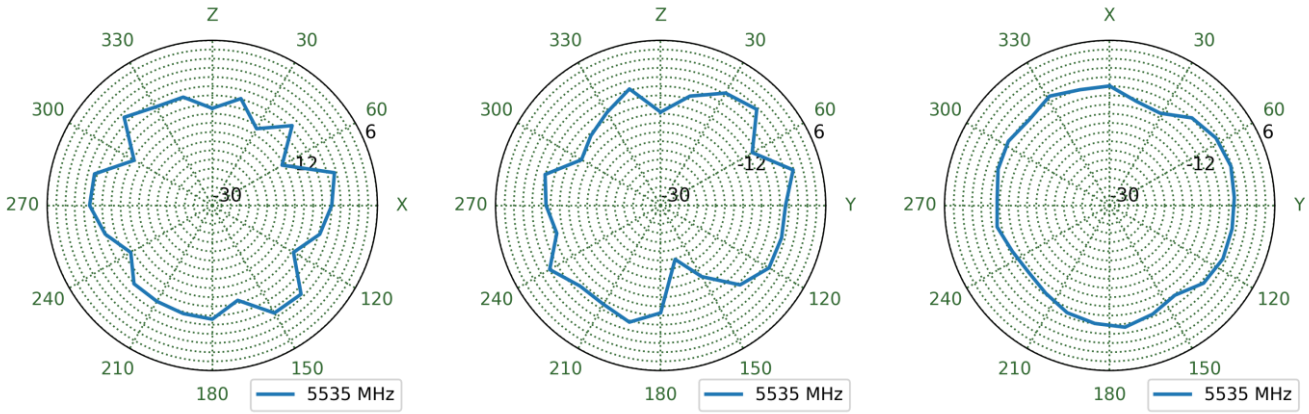


4.55 3D and 2D Radiation Patterns –Straight on Ground Plane

5538MHz

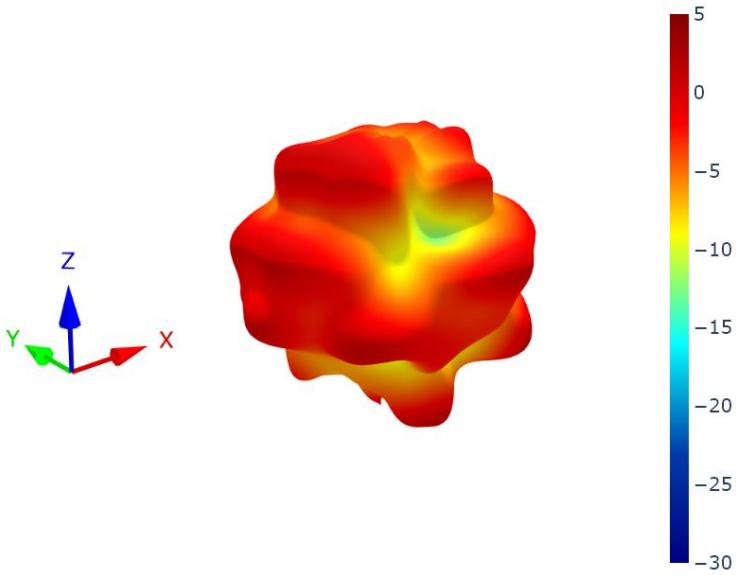


XZ Plane	YZ Plane	XY Plane

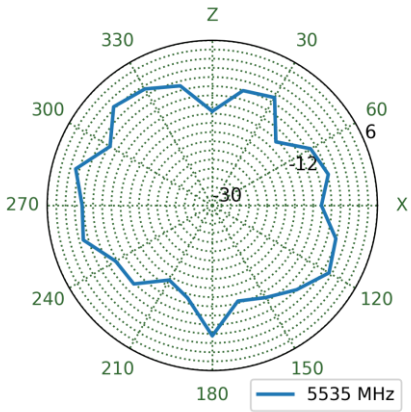


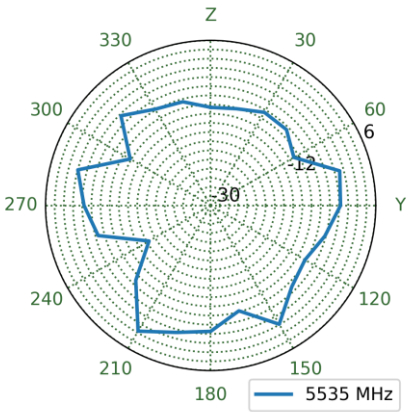
4.56 3D and 2D Radiation Patterns – Straight in Free Space

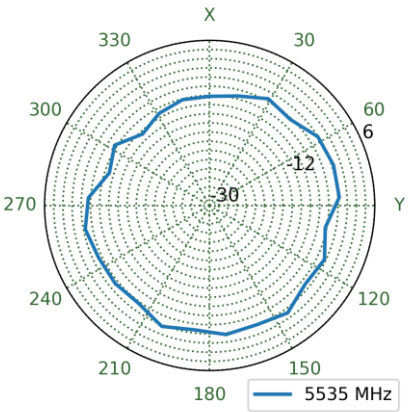
5538MHz



XZ Plane	YZ Plane	XY Plane



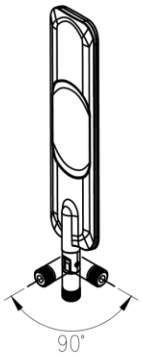


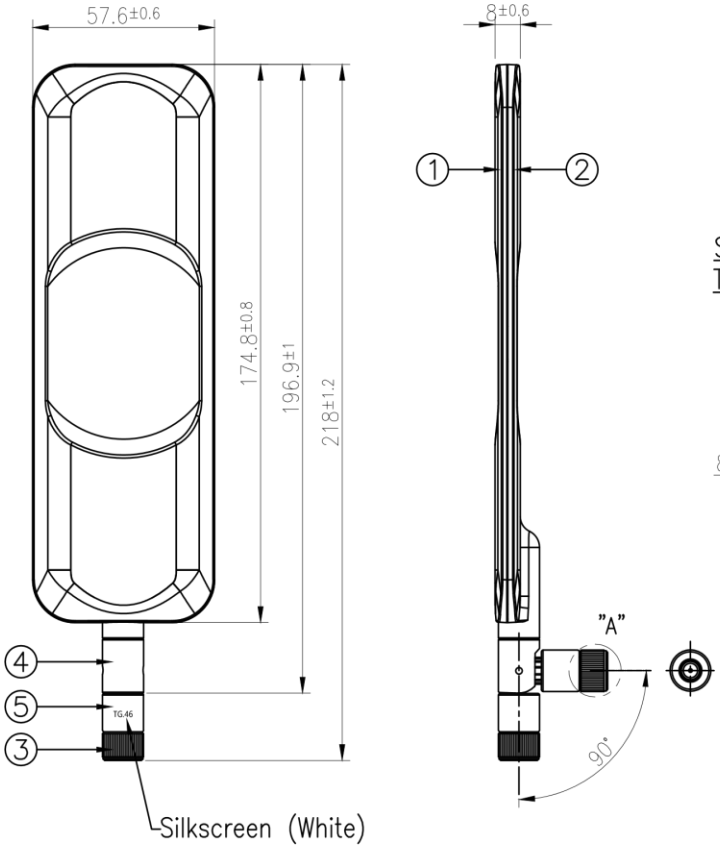


5. Mechanical Drawing (Units: mm)

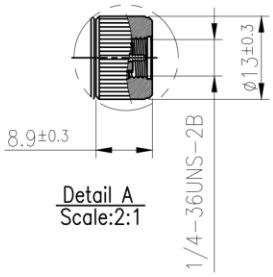
ISO NO.: EDW-20-8-0090
STATE: Release
NOTES:
1. All material must be RoHS compliant.
2. Once product have any crack/break/thread damage or any structural tooling issue, molding supplier need to correct the issue unconditionally.
3. Use this drawing together with the corresponding 3D CAD database file to fully describe the part.

REV.	DESCRIPTION	ENG.	APPROVED	DATE
D01	Initial Design	Rachel Di	Aaron	2020/02/11
D02	Change text description	Aron Yan	Aaron	2020/06/11





SMA(M)ST TG35/TG45 Thread



Detail A
Scale:2:1

	Name	Material	Finish	QTY
1	Housing Top TG35/TG45	ABS	Black	1
2	Housing Bottom TG35/TG45	ABS	Black	1
3	SMA(M)ST TG35/TG45 Thread	Brass	Black	1
4	Hinge Top TG35/TG45 Type2	PP 8681	Black	1
D02 5	Bottom hinge with TG46 silkscreen	No.5 Zinc Alloy	Black	1

APPROVED BY:	Clark
CHECK BY:	Aaron
DRAWN BY:	Rachel Di
DATE:	2020/02/11
UNLESS OTHERWISE SPECIFIED TOLERANCES ON:	XX.±0.5 X.±0.3 .X±0.2 .XX±0.1 .XXX±0.05
THIRD ANGLE PROJECTION	

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TITLE : Apex IV WideBand 5G/4G Dipole Terminal Antenna 90° Hinged R/A SMA(M) – with 450MHz

PART NO. : TG.46.8113

UNIT:	SCALE:	PAGES:	REV.
mm	1:2	1/1	D02

6. TG.46 Installation Instructions

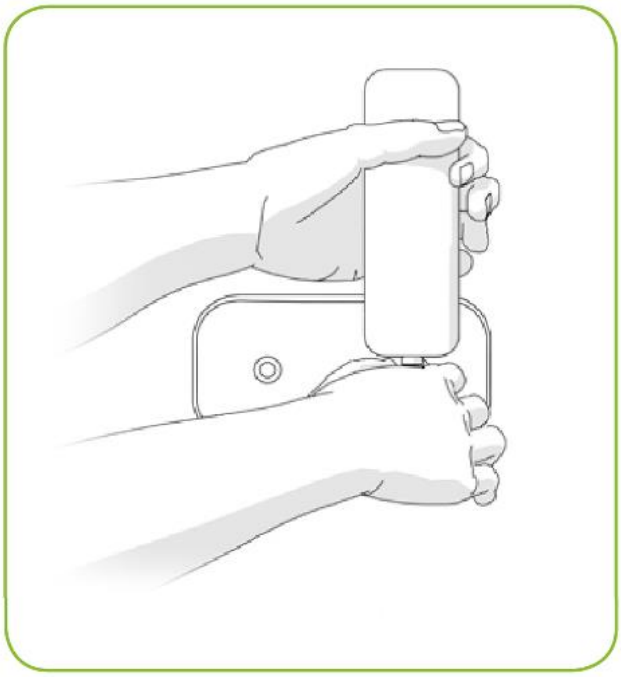
The TG.46 antenna has an independent rotating SMA connector which enables the user to install the antenna in their preferred orientation. Once tightened, the SMA connector will hold the antenna in place. The following illustrations show the TG.46 used on a wall mounted device as an example.

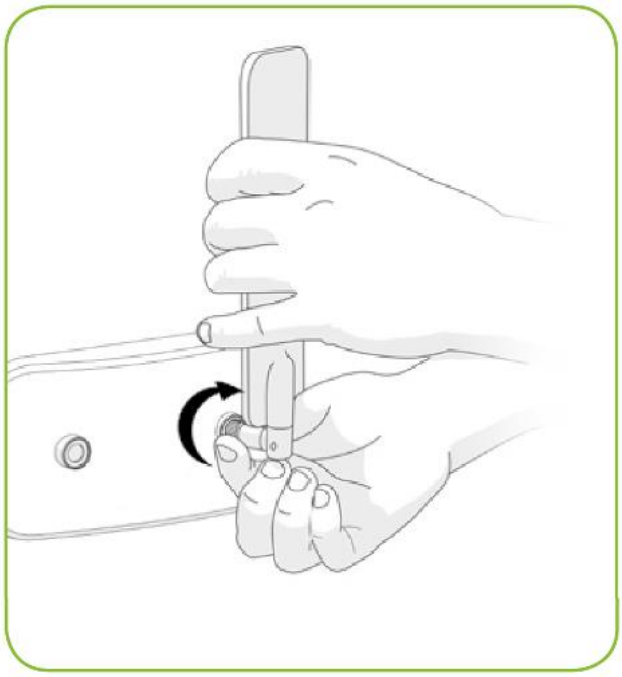
Step 1:

Adjust the antenna to the preferred orientation having placed it on the SMA(F) connector of the device.

Step 2:

While holding the antenna with on hand, rotate the SMA(M) connector with the other until it is fully tightened. When tightened with the required force, the antenna will hold it's position without shifting, even when exposed to high vibration environments.





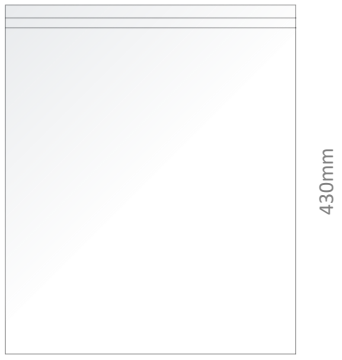
Note:

If using a torque wrench, the recommended force for mounting the antenna is 0.9Nm, maximum torque to prevent damage to the antenna is 1.17Nm.

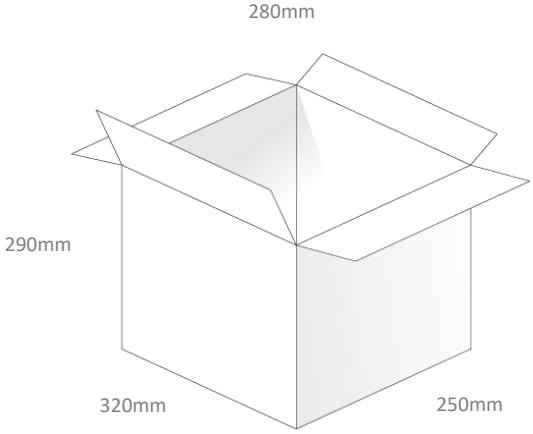
7. Packaging

1pc TG.46.8113 per Small PE Bag with Video Link label
Dimensions: 100*280mm
Weight: 73.5g

25pcs per Large PE Bag
Dimensions: 280*430mm
Weight: 1.85Kg



75pcs TG.46.8113 per Carton
Carton Dimensions: 320*250*290mm
Weight: 6.1Kg



Changelog for the datasheet

SPE-20-8-094 – TG.46.8113

Revision: C (Current Version)	
Date:	2024-02-02
Notes:	Updated Spec Table to remove Band 87.
Author:	Gary West

Previous Revisions

Revision: B	
Date:	2023-10-04
Notes:	Updated Spec Table to include Band 87.
Author:	Aswin Biju

Revision: A (Original First Release)	
Date:	2020-09-15
Notes:	
Author:	Jack Conroy

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