TAOGLAS

Datasheet

Part No:
SXP.25.4.A.02

Description

SDARS 2320~2345MHz Dual-Band XM & Sirius Patch Antenna

Features:

SDARS (Satellite Digital Audio Radio Services)
Coverage:

- SXM High Band* (Satellite) - 2332-2345 MHz
- SXM High Band* (Terrestrial) - 2336-2341 MHz
- SXM Wideband - 2320-2345 MHz

High Efficiency >85% across all bands
Optimized LHCP Radiation Pattern
Pin & Adhesive Mounting
Dims: 25 x 25 x 4mm
RoHS & Reach Compliant

1. Introduction

The Taoglas SXP.25.4.A.02 is part of a series of high-efficiency patch antennas designed for use with Satellite Digital Audio Radio Services (SDARS). It features left-hand circular polarization and excellent gain characteristics in the 2320 to 2345 MHz band, making it compatible with the most popular satellite radio services available in many new vehicles.

The SXP.25 comes in a convenient, compact form factor, with dimensions of just 25mm x 25mm x 4mm, and is manufactured with high-quality ceramic. It is mounted via pin and 3M adhesive tape.

For further optimization to customer-specific device environments, custom tuned patch antennas can be supplied. Your regional Taoglas sales office can help you identify the best patch antenna for your specific SDARS application.

2. Specification

SDARS Electrical								
Band	**Frequency (MHz)**	**Measurement**	**Efficiency (%)**	**Average Gain (dB)**	**Peak Gain (dBi)**	**Impedance**	**Polarization**	**Max. input power**
SXM High Band* (Satellite)	2332-2345	100x100cm Ground Plane	87.7	-0.57	5.11	50 Ω	LHCP	10W
		50x50cm Ground Plane	93.8	-0.28	5.92			
		30x30cm Ground Plane	87.4	-0.59	5.56			
		15x15cm Ground Plane	92.0	-0.36	6.16			
		7x7cm Ground Plane	88.8	-0.52	5.69			
SXM High Band* (Terrestrial)	2336-2341	100x100cm Ground Plane	87.4	-0.59	5.11			
		50x50cm Ground Plane	91.0	-0.41	5.92			
		30x30cm Ground Plane	85.4	-0.69	5.48			
		15x15cm Ground Plane	87.9	-0.56	5.93			
		7x7cm Ground Plane	87.8	-0.57	5.53			
SXM Wideband	2320-2345	100x100cm Ground Plane	87.7	-0.57	5.11			
		50x50cm Ground Plane	93.8	-0.28	5.92			
		30x30cm Ground Plane	87.4	-0.59	5.56			
		15x15cm Ground Plane	92.0	-0.36	6.16			
		7x7cm Ground Plane	88.8	-0.52	5.69			

XM Gain Requirements (Satellite) - Ground Plane (2326.25MHz)

Elevation Angle(degrees)	XM Sirius Limits (dBic)	Measured Average Gain (dBic)									
		7x7cm Ground		15x15cm Ground		30x30cm Ground		50x50cm Ground		100x100cm Ground	
		Phi 0	Phi 90	Phi 0	Phi 90	Phi 0	Phi 90	Phi 0	Phi 90	Phi 0	Phi 90
20 ≤ Φ ≤ 25	0.5	0.0	0.7	0.0	0.9	0.1	1.0	0.8	2.0	1.9	1.3
25 ≤ Φ ≤ 30	1	0.9	1.4	1.0	1.8	1.3	2.0	2.5	3.4	2.2	1.5
30 ≤ Φ ≤ 50	2	3.1	3.3	3.6	4.1	3.1	3.6	4.1	4.3	3.3	3.0
50 ≤ Φ ≤ 70	4	4.8	5.0	5.5	5.6	3.7	3.7	4.3	4.5	4.3	4.3
70 ≤ Φ ≤ 90	2	5.5	5.5	6.1	6.1	4.6	4.6	4.4	4.6	4.6	4.7

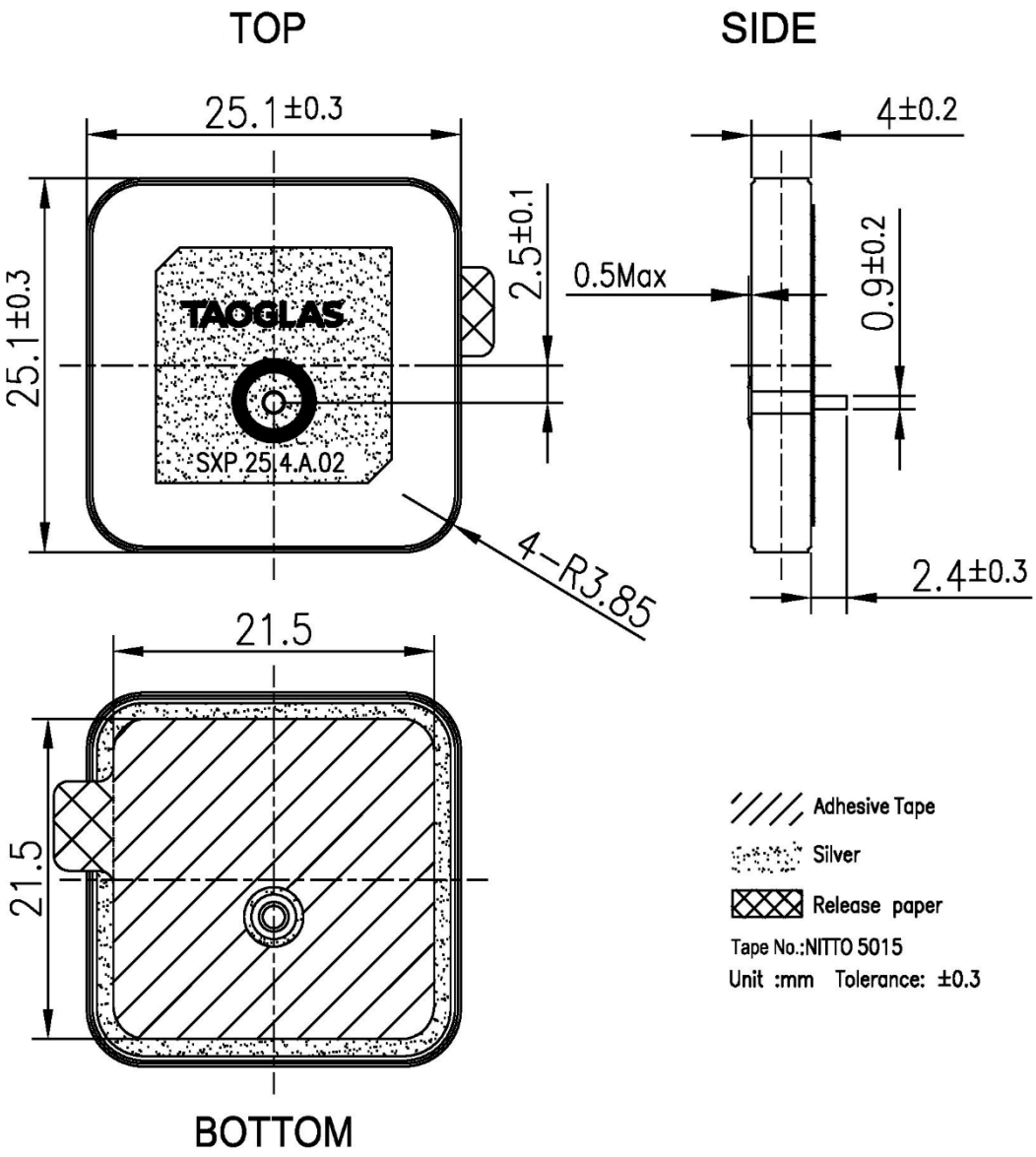
XM Gain Requirements (Satellite) - Ground Plane (2338.75MHz)

Elevation Angle(degrees)	XM Sirius Limits (dBic)	Measured Average Gain (dBic)									
		7x7cm Ground		15x15cm Ground		30x30cm Ground		50x50cm Ground		100x100cm Ground	
		Phi 0	Phi 90	Phi 0	Phi 90	Phi 0	Phi 90	Phi 0	Phi 90	Phi 0	Phi 90
20 ≤ Φ ≤ 25	0.5	0.1	0.2	0.2	-0.3	0.2	0.4	0.7	1.5	1.7	1.7
25 ≤ Φ ≤ 30	1	0.8	0.9	1.2	0.6	1.3	1.5	2.3	3.0	2.1	1.7
30 ≤ Φ ≤ 50	2	3.0	3.0	3.9	3.0	2.7	3.5	3.4	4.0	3.2	3.0
50 ≤ Φ ≤ 70	4	4.7	4.8	5.3	5.0	2.9	3.8	3.7	3.8	4.2	4.1
70 ≤ Φ ≤ 90	2	5.3	5.3	5.8	5.8	4.6	4.6	3.7	4.2	4.9	4.9

Mechanical	
Dimensions	25 x 25 x 4mm
Weight	10g
Material	Ceramic
Pin Diameter	0.9±0.2mm
Pin Length	2.4±0.3mm

Environmental	
Operation Temperature	-40°C to 105°C
Storage Temperature	-40°C to 105°C
Humidity	Non-condensing 65°C 95% RH

3. Mechanical Drawing



4. Antenna Integration Guide

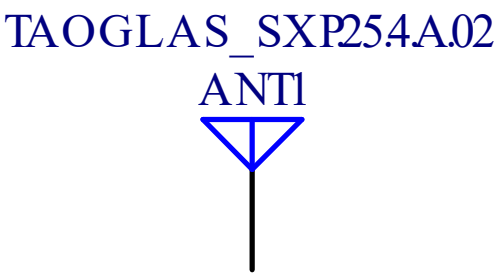
The following is an example on how to integrate the SXP.25.4.A.02 into a design. The SXP.25.4.A.02 has one pin which is used for the RF Feed. Taoglas recommends using a minimum of 70x70mm ground plane to ensure optimal performance.

Top view of an example 70x70mm PCB Reference Design.

4.1 Schematic Symbol and Pin Definitions

Top view of an example 70x70mm PCB Reference Design.

The circuit symbol for a SXP.25.4.A.02 is shown below. The antenna has 1 pin as indicated below.

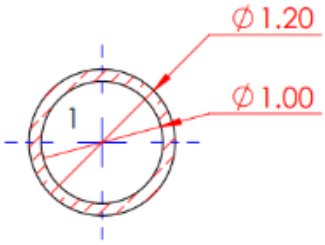


Pin	Description
1	RF Feed

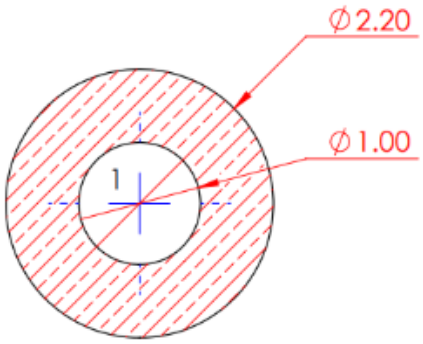
Above is a schematic symbol of the SXP.25.4.A.02 and a table of the pin definitions.

4.2 Antenna Footprint

TOP



BOTTOM

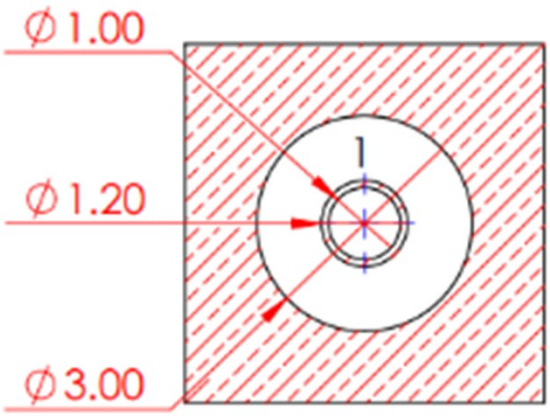


Pin	Description
1	RF Feed

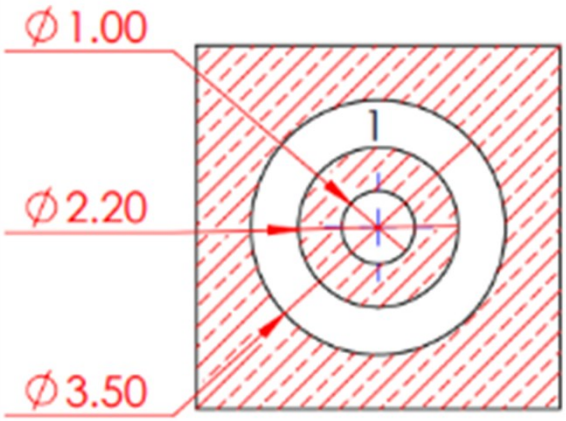
4.3 Copper Clearance

The footprint and clearance on the PCB must comply with the antenna's specification. The PCB layout shown in the diagrams below demonstrates the SXP.25.4.A.02 clearance area for Pin 1 (RF Feed Pad). The bottom copper keep out area only applies to the bottom layer and the top copper keep out area applies to all other layers.

There should be a Ø3mm copper clearance around the antenna pins on the top side of the PCB with a Ø3.5mm copper clearance around the antenna pins on the bottom side.



TOP SIDE

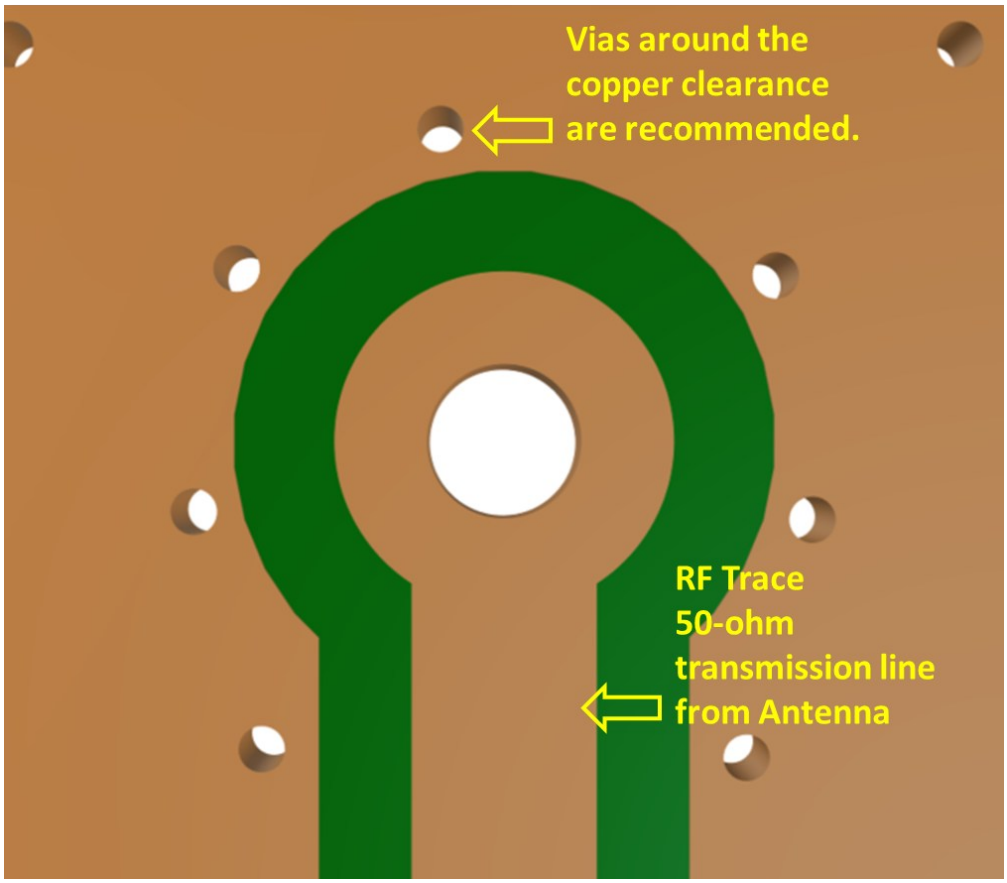


BOTTOM SIDE

2D Images of Copper Clearances for the SXP.25.4.A.02

4.4 Antenna Integration

The SXP.25.4.A.02 should be placed in the centre of the PCB to take advantage of the ground plane. The RF traces must maintain a 50 Ohm transmission line. Ground vias should be placed around the copper clearance area and the transmission line. Note that depending on the design application, tuning may be required for optimal performance. This may be achieved using a 'pi' matching network or custom tuning of the patch antenna.

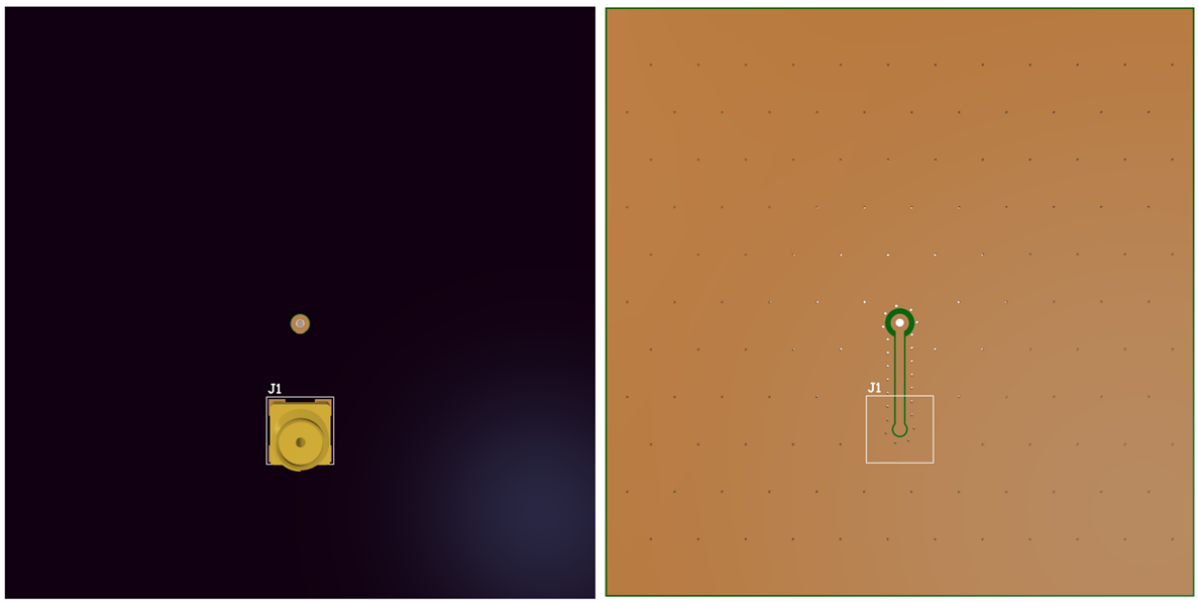


Bottom view of the PCB Reference Design, showing transmission lines and integration notes.

4.5 Final Integration

The bottom side image shown below highlights the antenna transmission line. Taoglas recommends using a minimum of 70x70mm ground plane to ensure optimal performance.

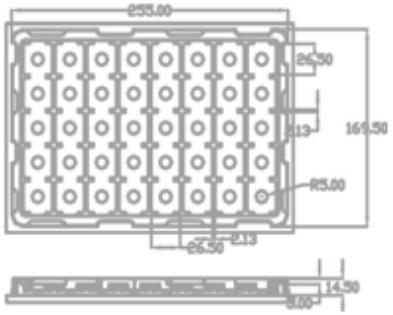
Top Side (70x70mm example PCB Reference Design)



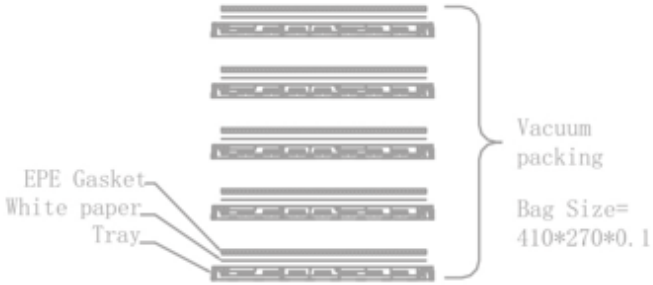
Bottom Side

5. Packaging

SXP.25.4.A.02
40 PCS / Tray



SXP.25.4.A.02
200 PCS / Vacuum package

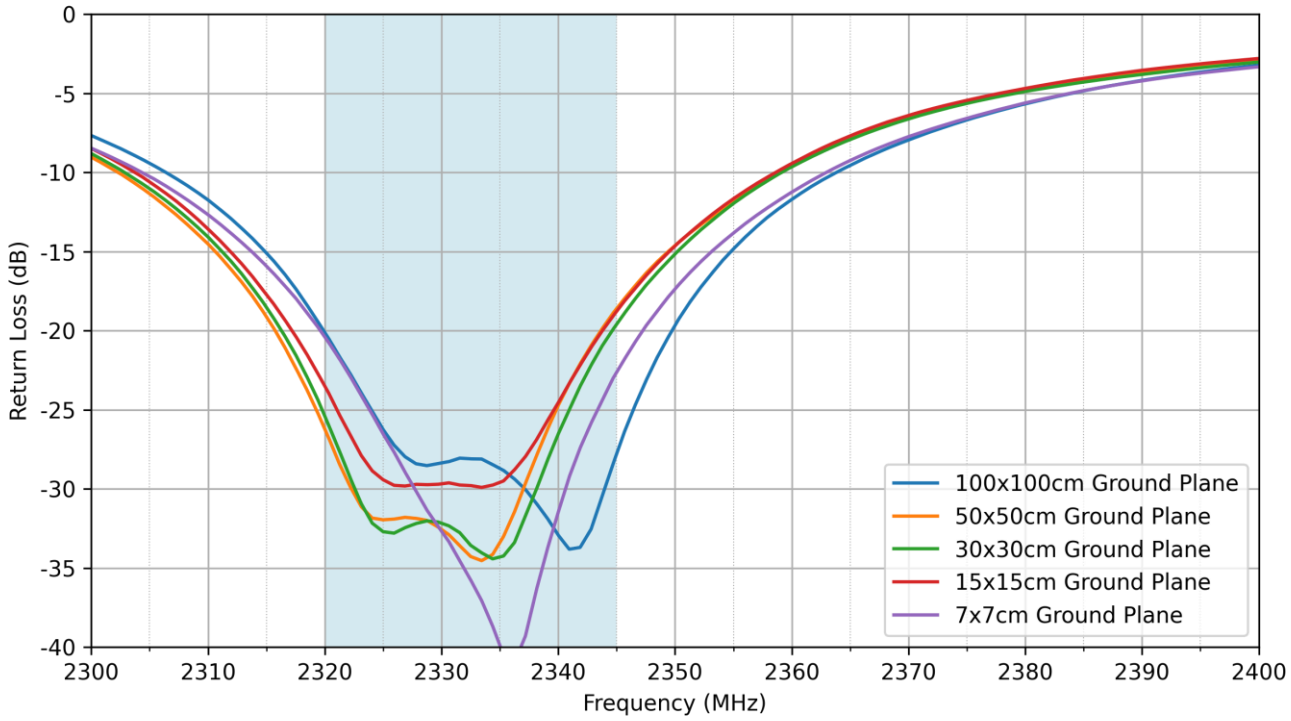


200 PCS / Box
Small box (mm): 280 x 187 x 70
Weight (Kg): 2.2 ±3%

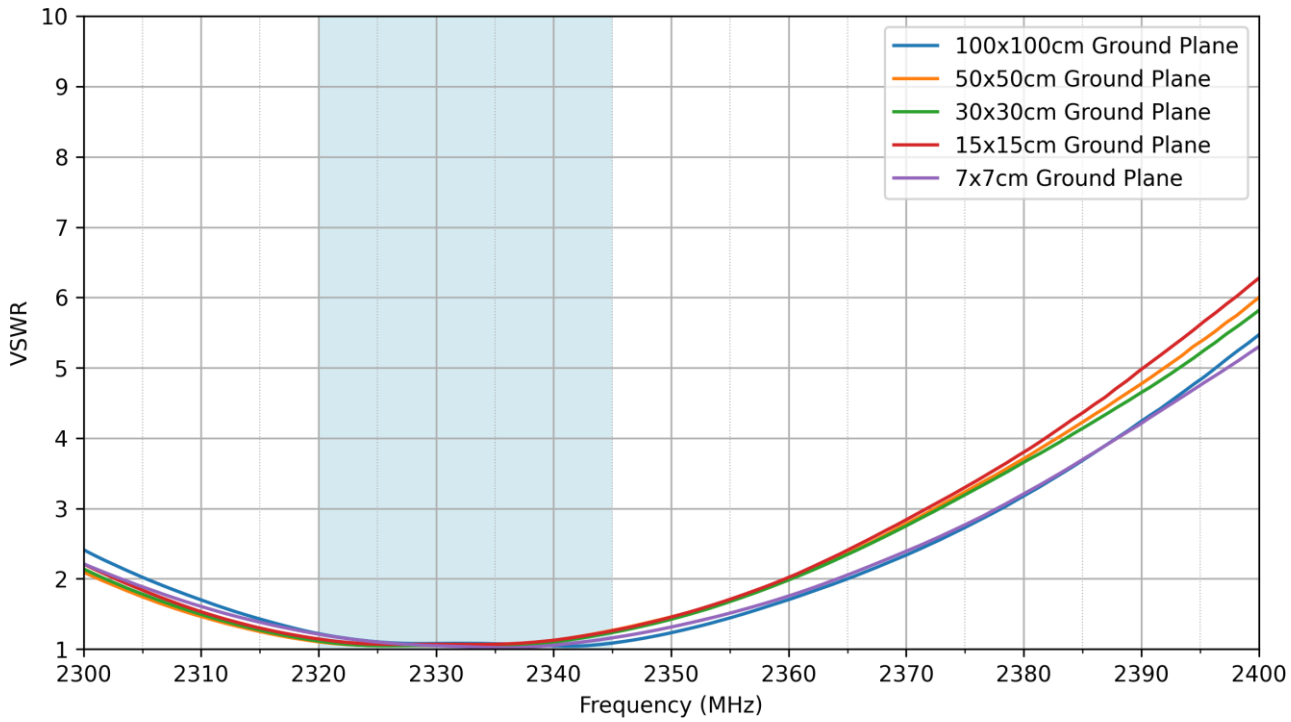
800 PCS / Carton
Carton(mm): 405 x 293 x 185
Weight (Kg): 8.6 ±3%

6. Antenna Characteristics

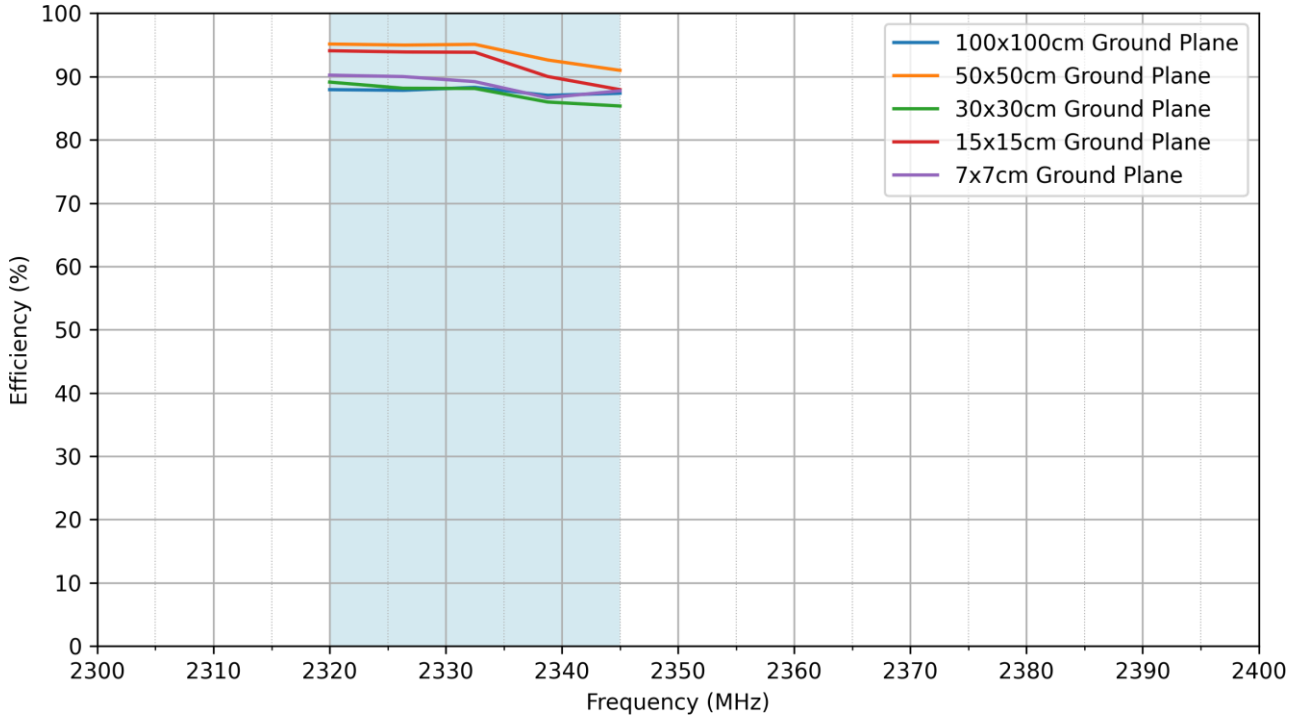
6.1 Return Loss



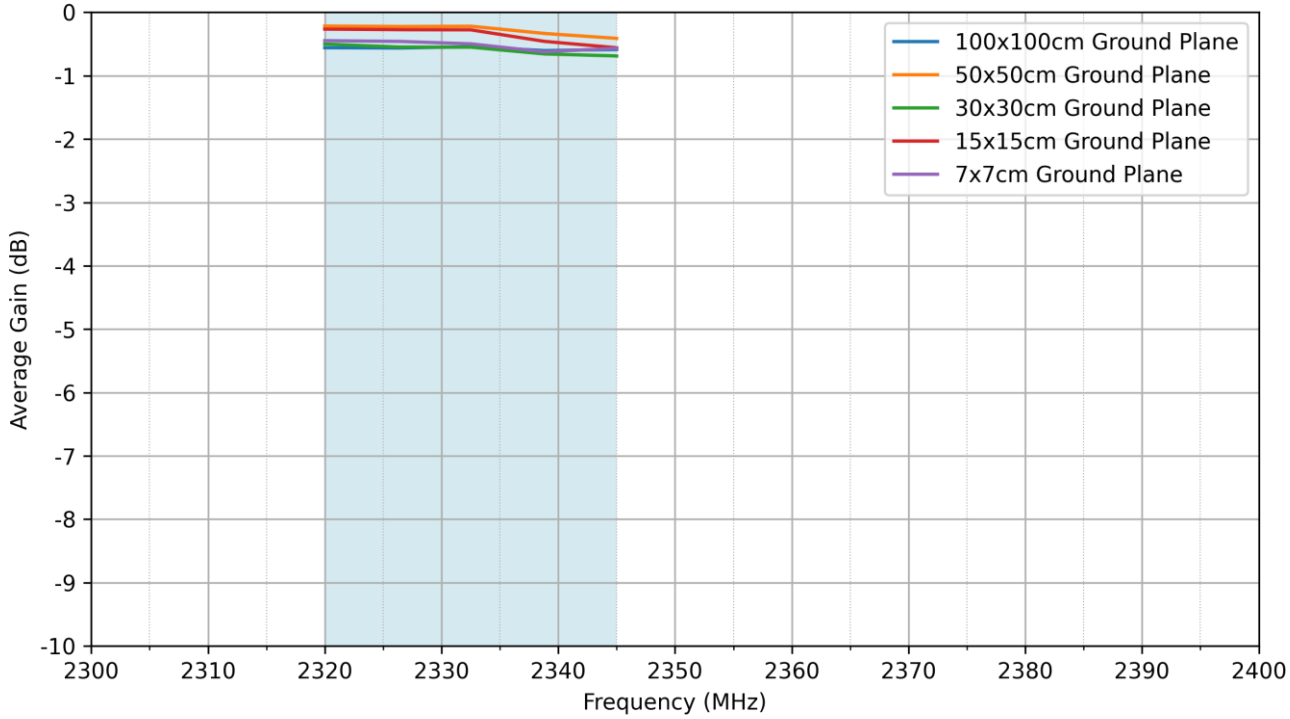
6.2 VSWR



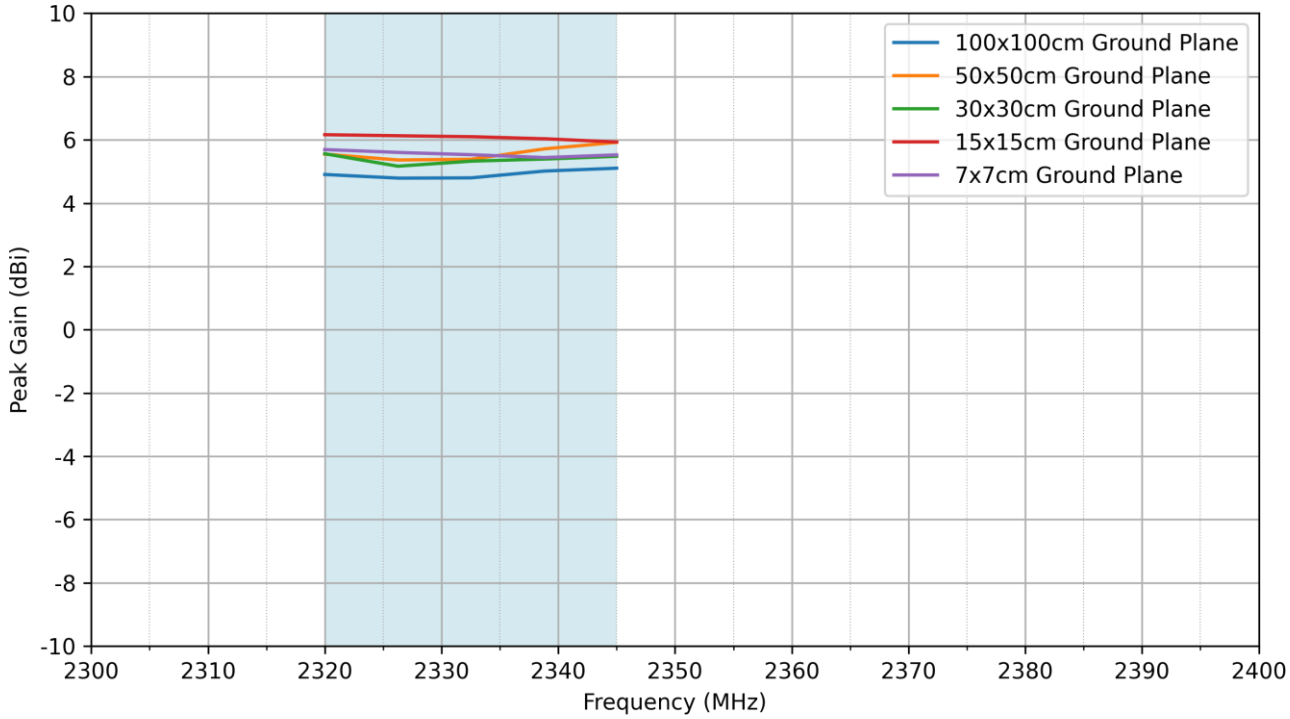
6.3 Efficiency



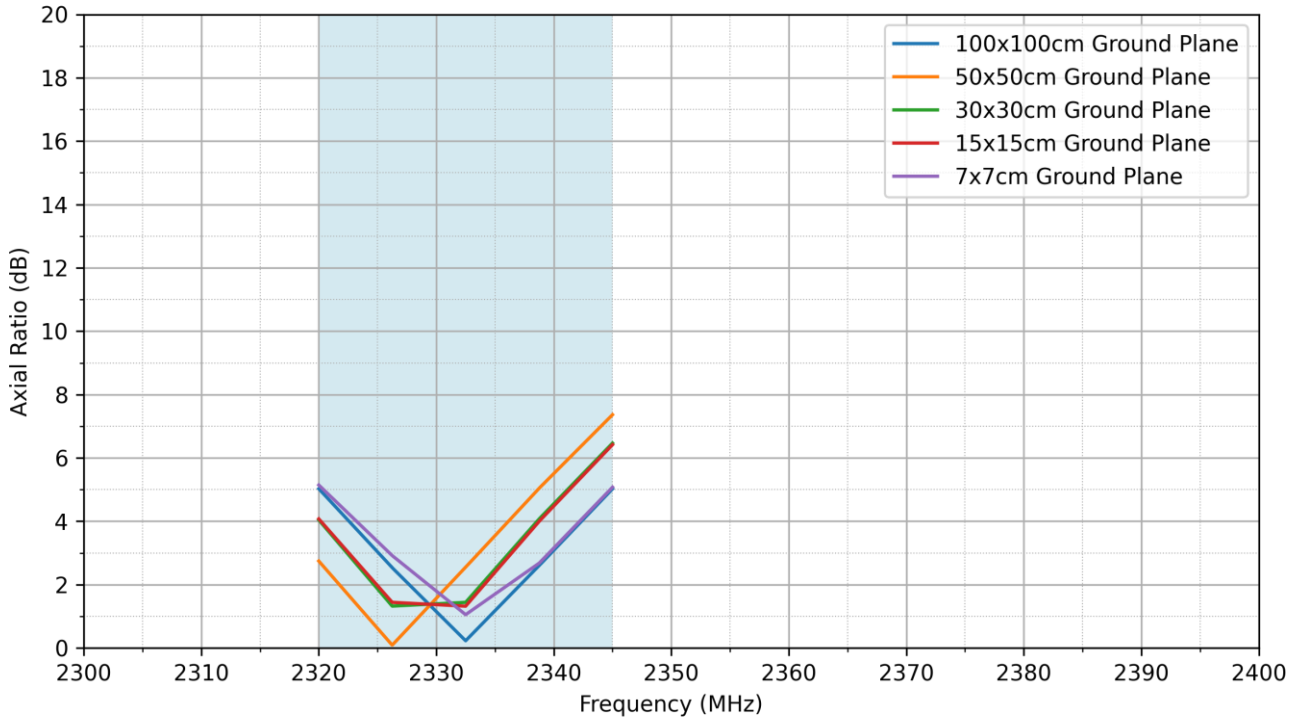
6.4 Average Gain



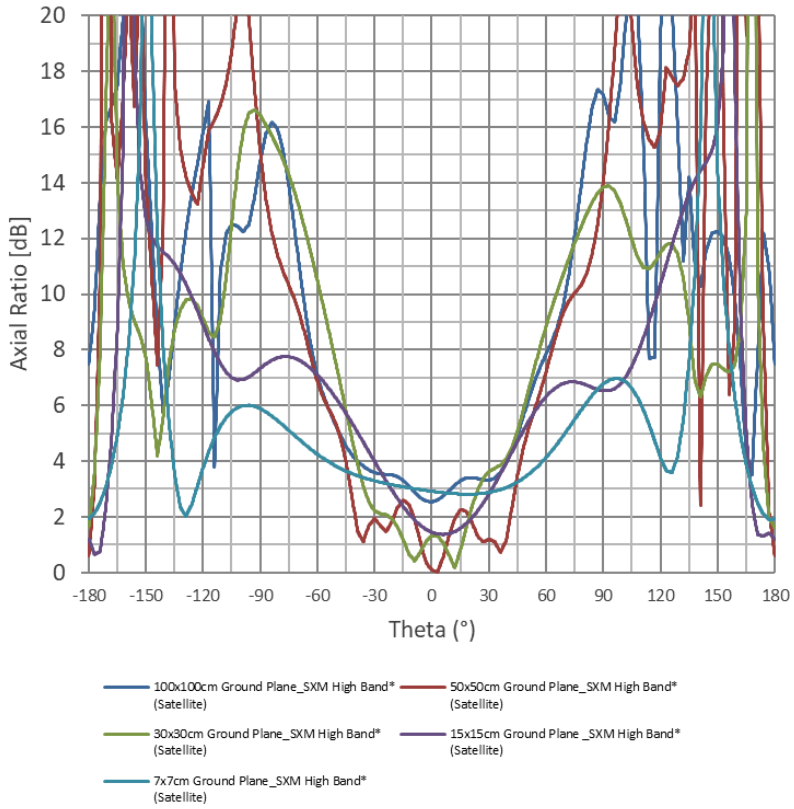
6.5 Peak Gain



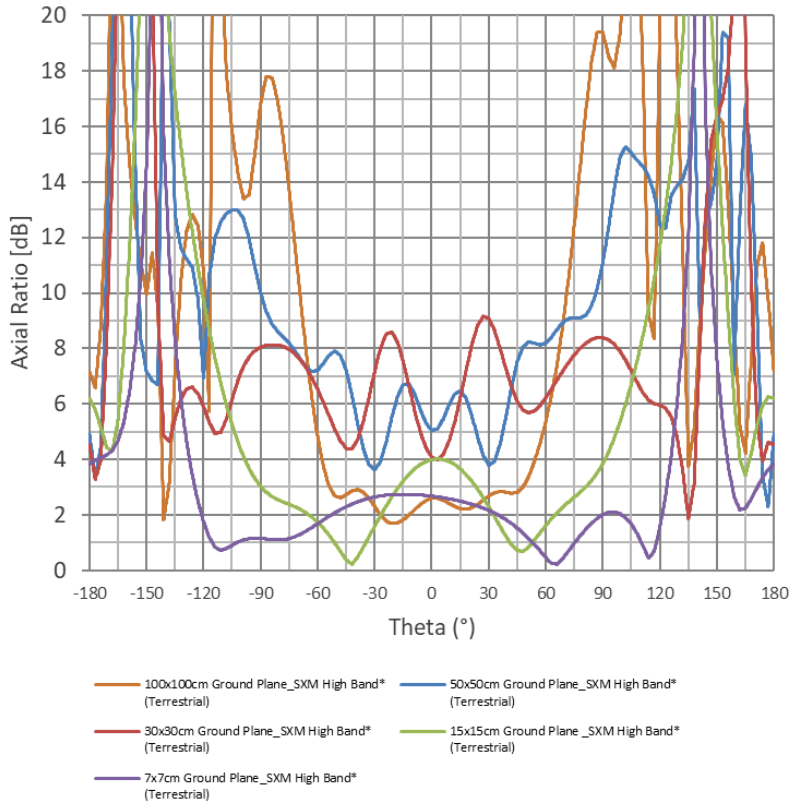
6.6 Axial Ratio



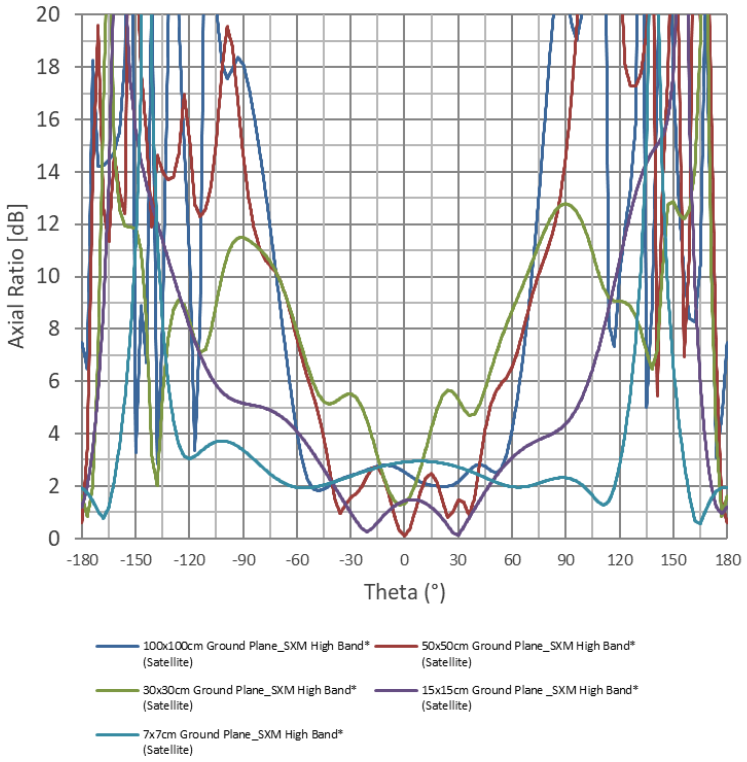
6.7 AR vs Angle for Phi=0 (Satellite)



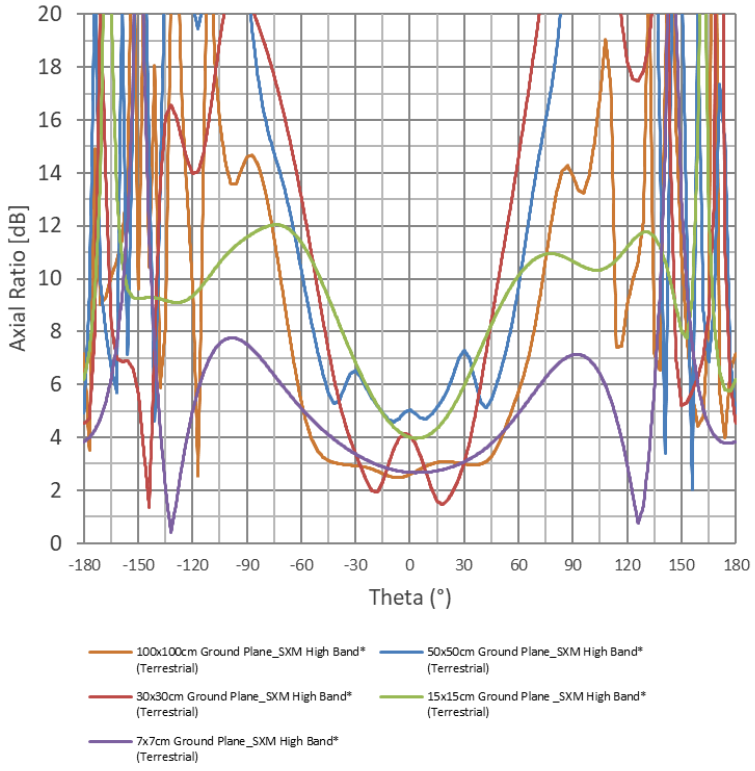
6.8 AR vs Angle for Phi=0 (Terrestrial)



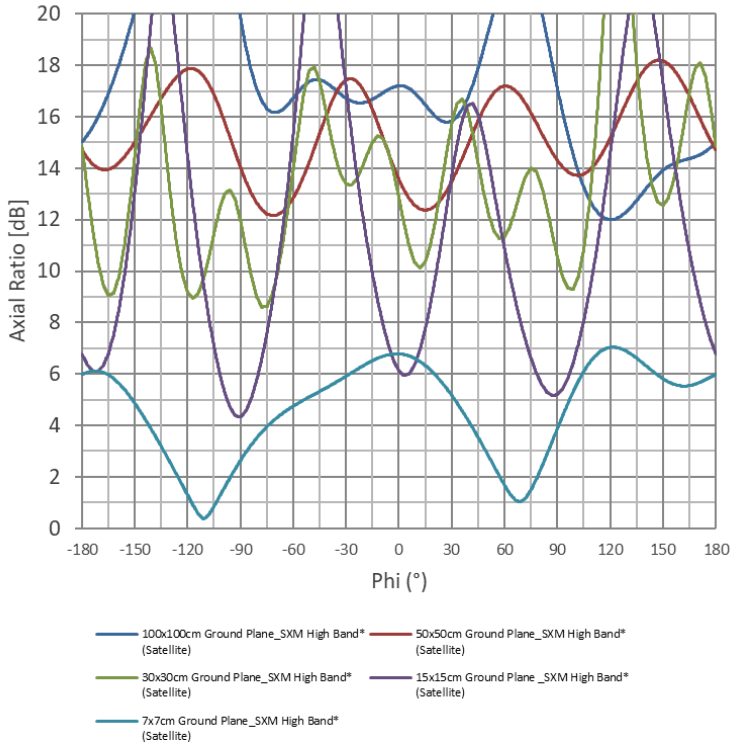
6.9 AR vs Angle for Phi=90 (Satellite)



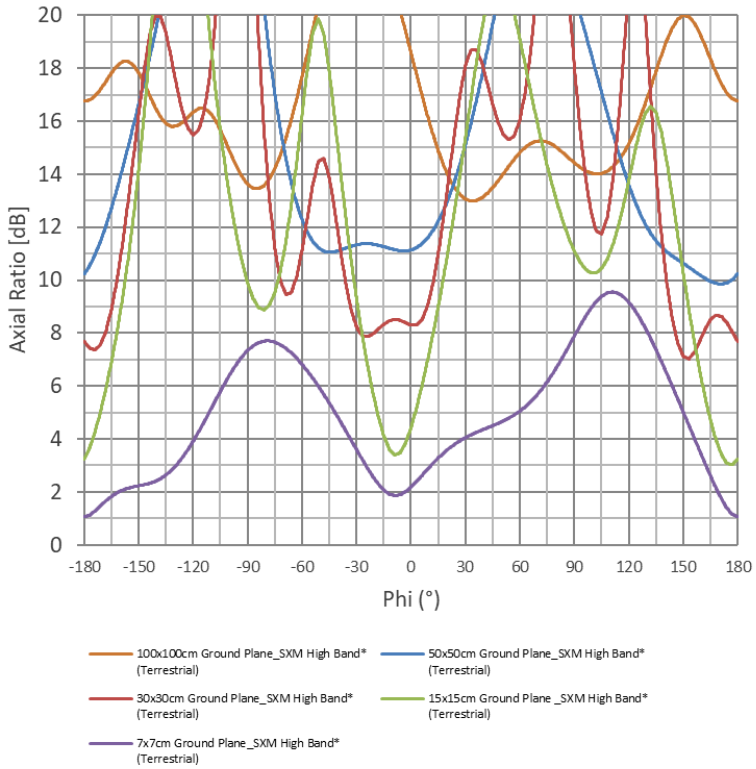
6.10 AR vs Angle for Phi=90 (Terrestrial)



6.11 AR vs Angle for Teata=0 (Satellite)

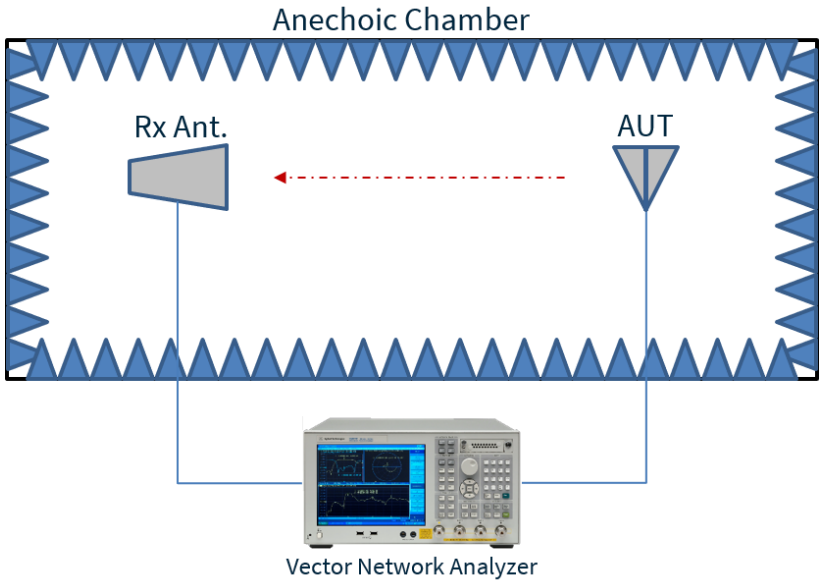


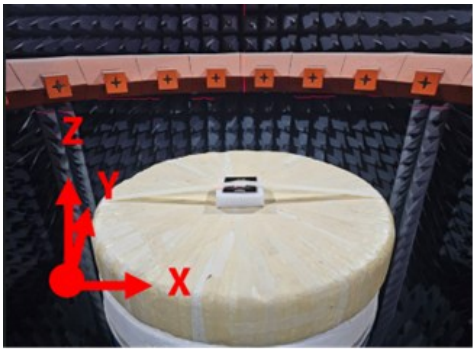
6.12 AR vs Angle for Theta=90 (Terrestrial)



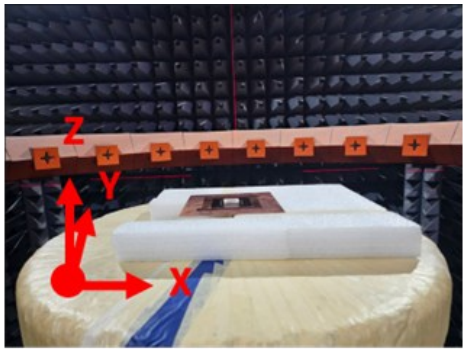
7. Radiation Patterns

7.1 Test Setup

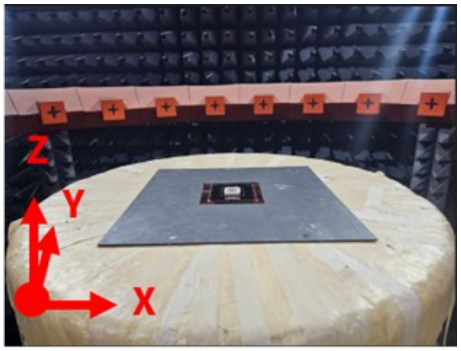




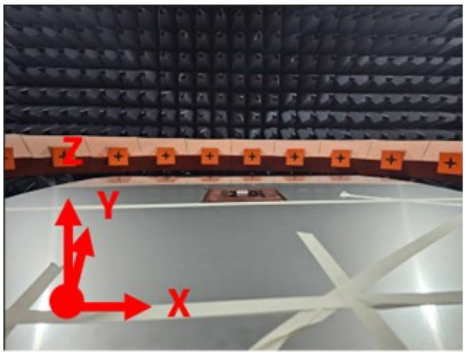
7x7cm Ground Plane



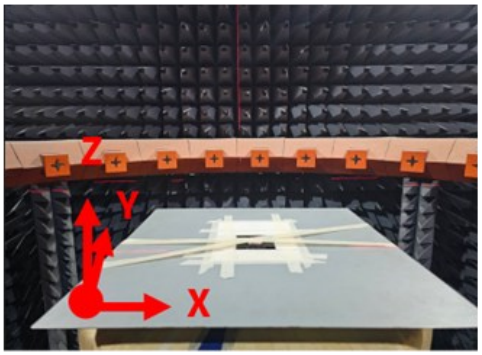
15x15cm Ground Plane



30x30cm Ground Plane

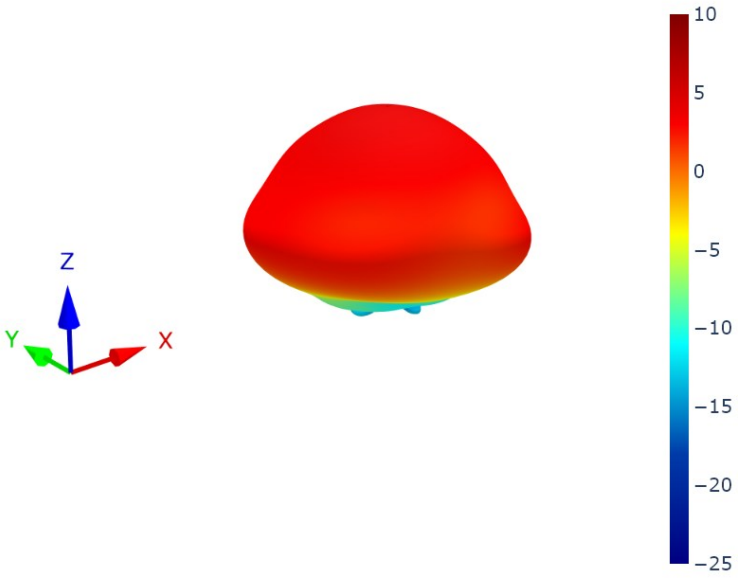


100x100cm Ground Plane

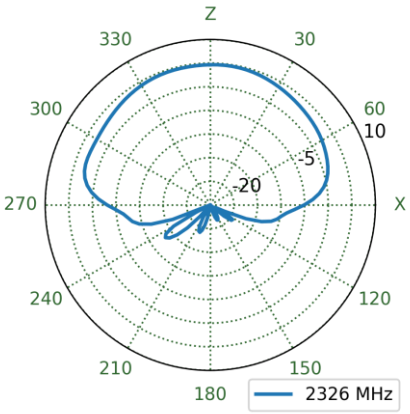


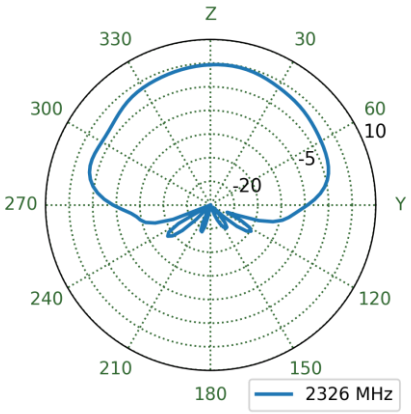
50x50cm Ground Plane

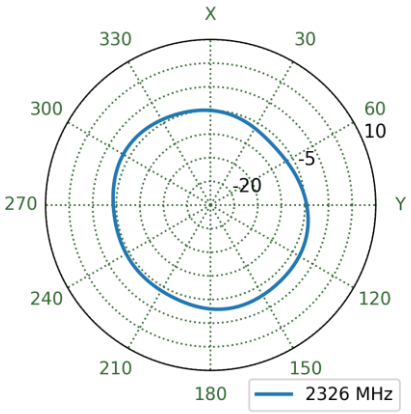
7.2 100x100cm Ground Plane Patterns at 2326 MHz



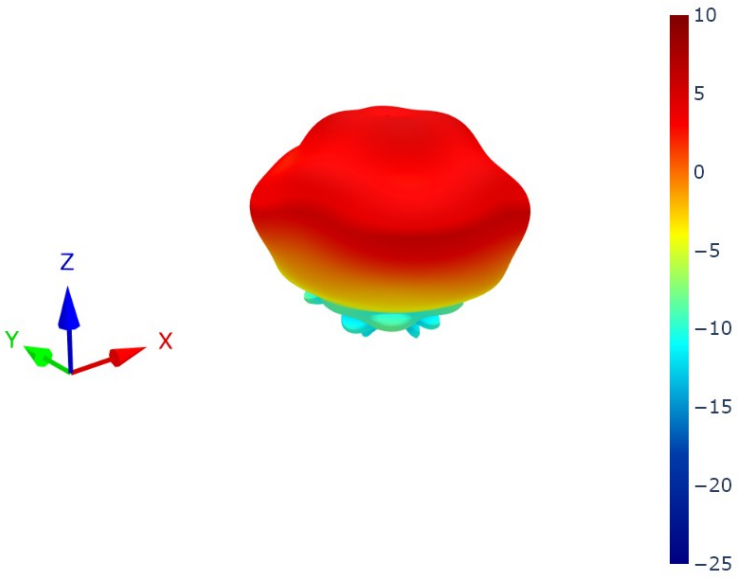
XZ Plane	YZ Plane	XY Plane

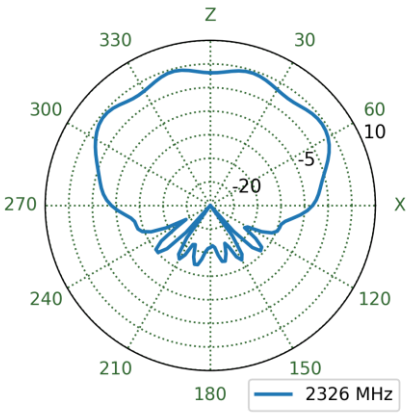
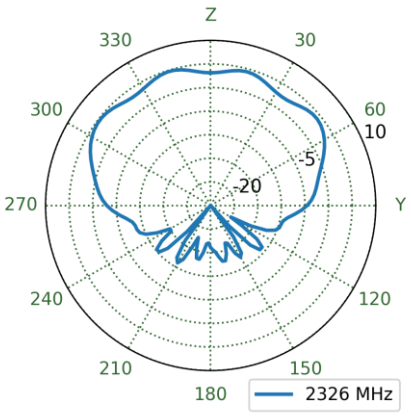
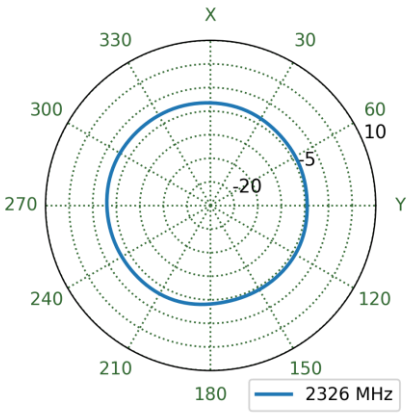




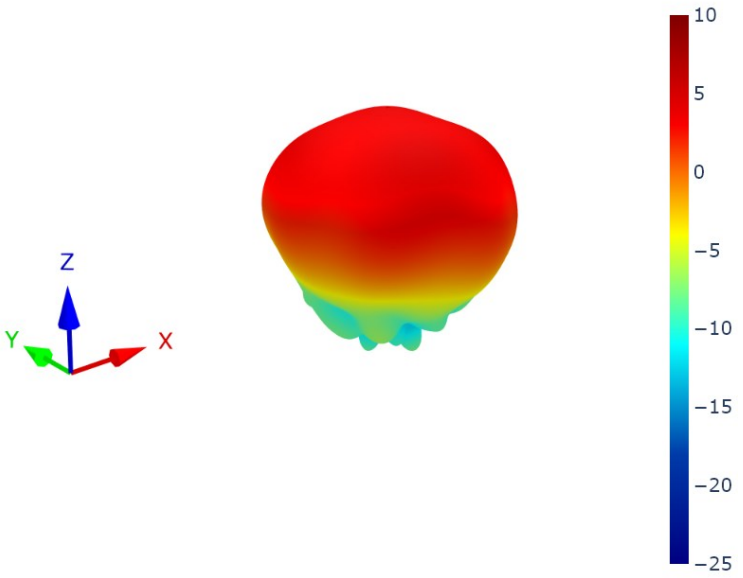


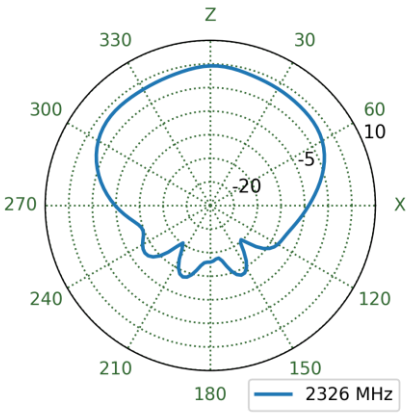
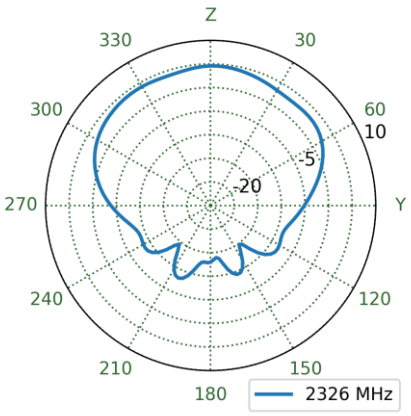
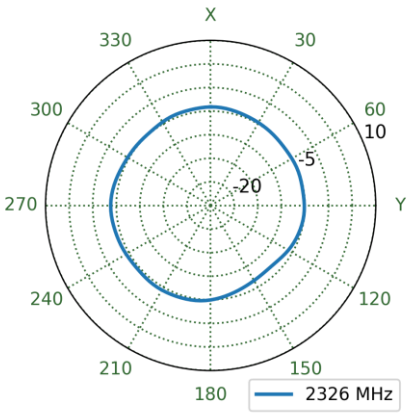
7.3 50x50cm Ground Plane Patterns at 2326 MHz



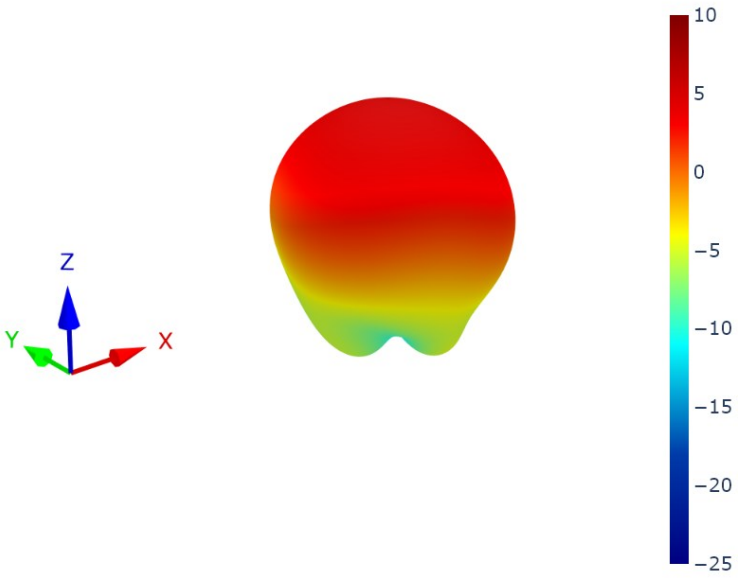
XZ Plane	YZ Plane	XY Plane
		

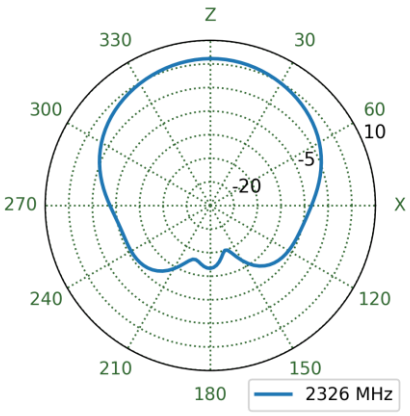
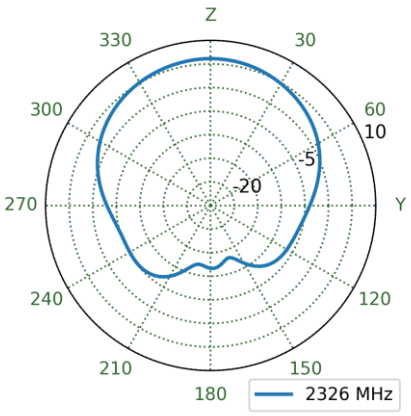
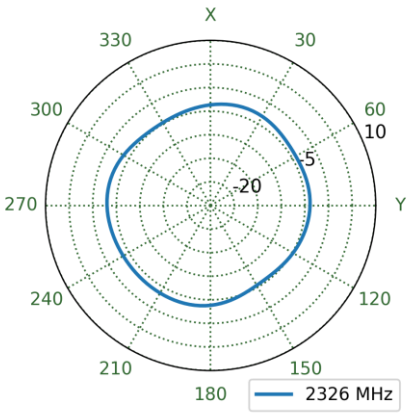
7.4 30x30cm Ground Plane Patterns at 2326 MHz



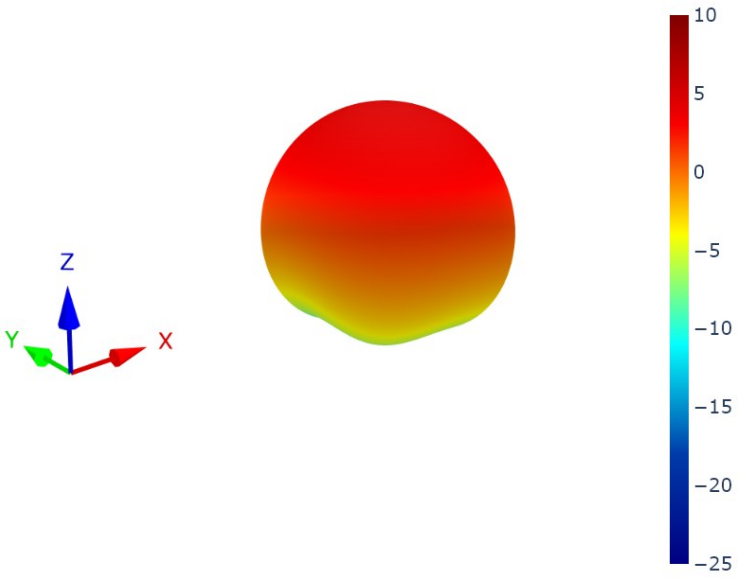
XZ Plane	YZ Plane	XY Plane
		

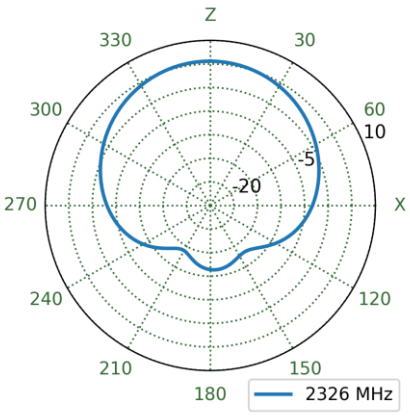
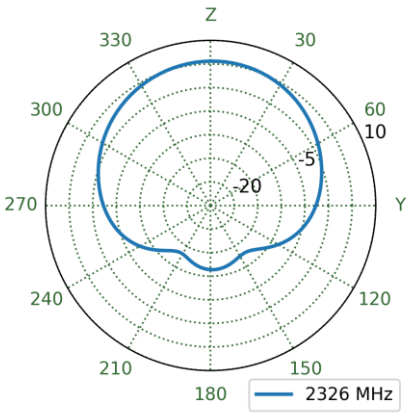
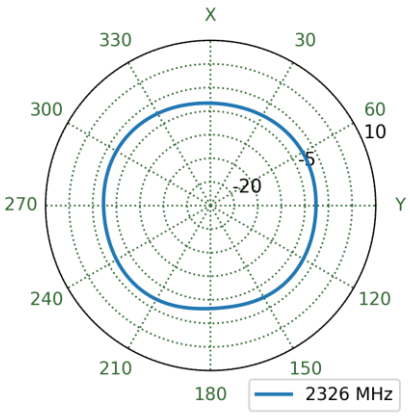
7.5 15x15cm Ground Plane Patterns at 2326 MHz



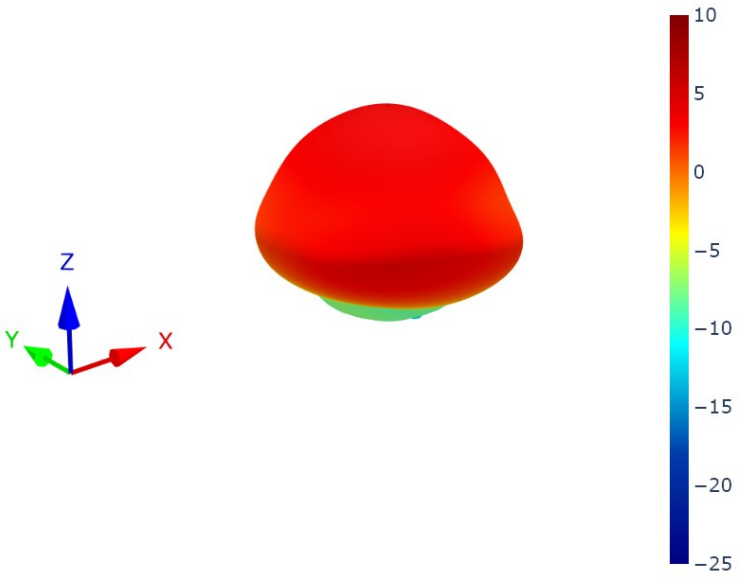
XZ Plane	YZ Plane	XY Plane
		

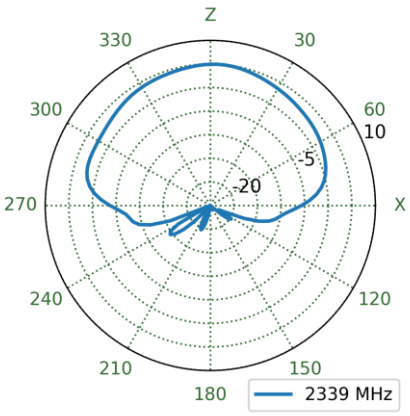
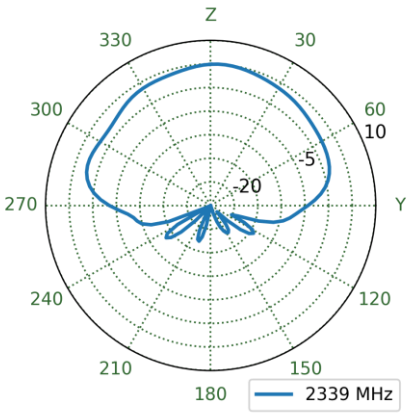
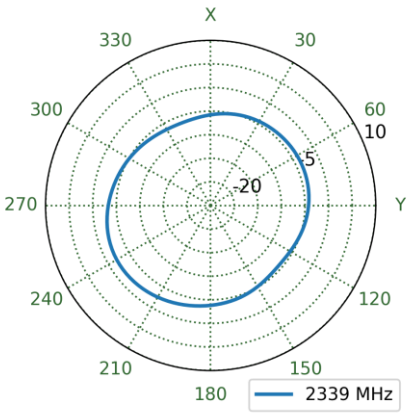
7.6 7x7cm Ground Plane Patterns at 2326 MHz



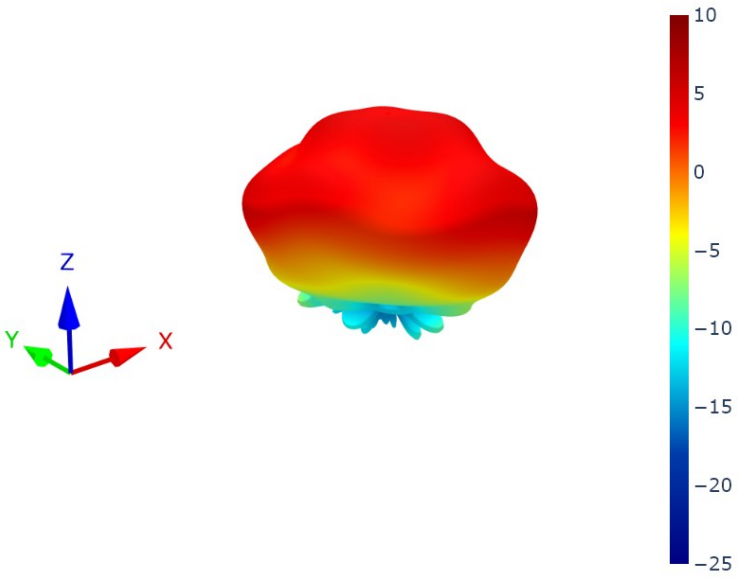
XZ Plane	YZ Plane	XY Plane
		

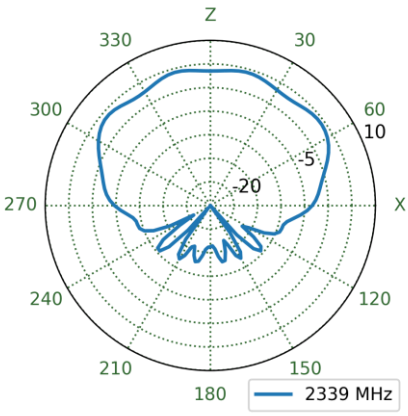
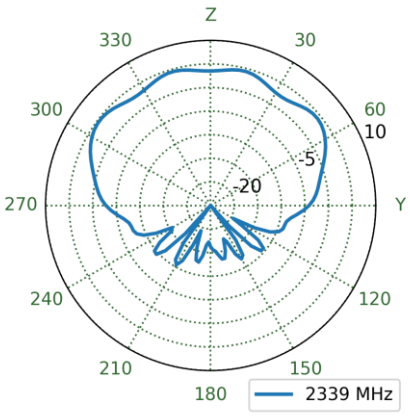
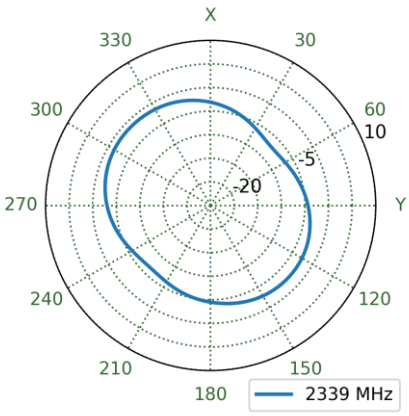
7.7 100x100cm Ground Plane Patterns at 2339 MHz



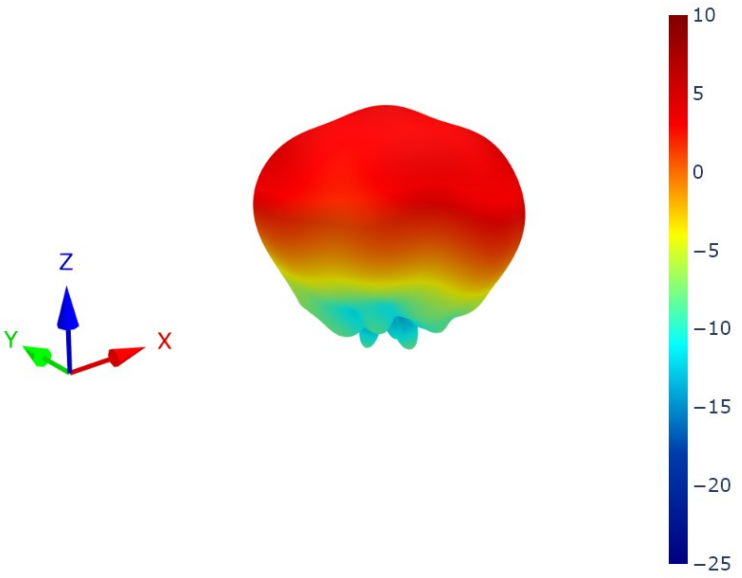
XZ Plane	YZ Plane	XY Plane
		

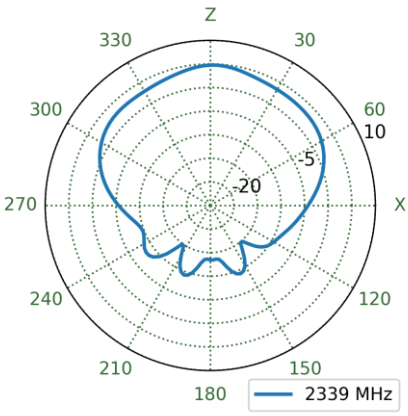
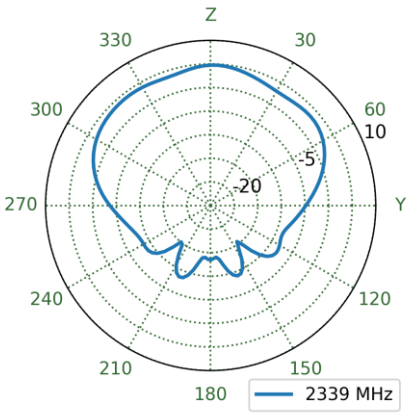
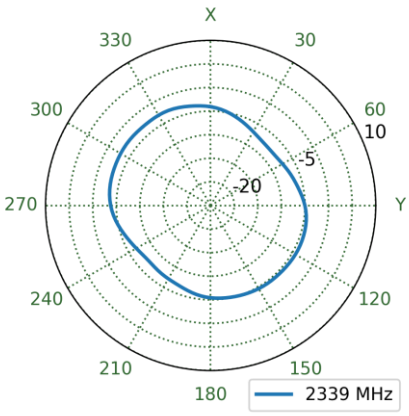
7.8 50x50cm Ground Plane Patterns at 2339 MHz



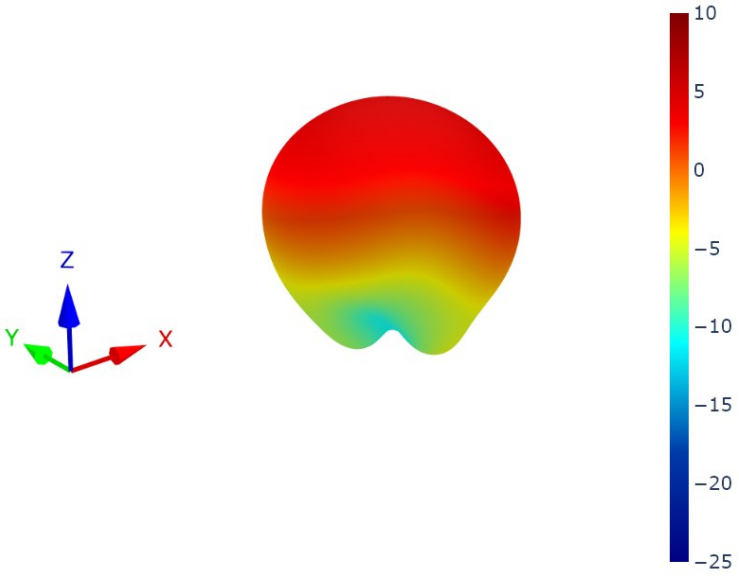
XZ Plane	YZ Plane	XY Plane
		

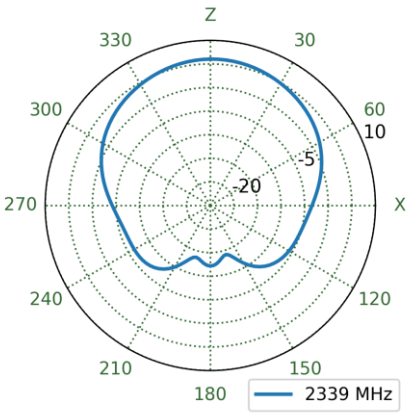
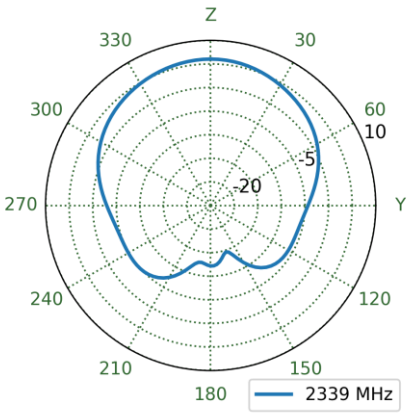
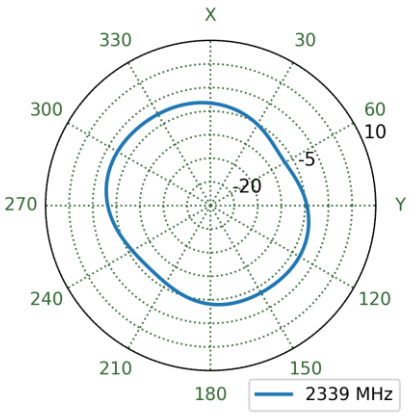
7.9 30x30cm Ground Plane Patterns at 2339 MHz



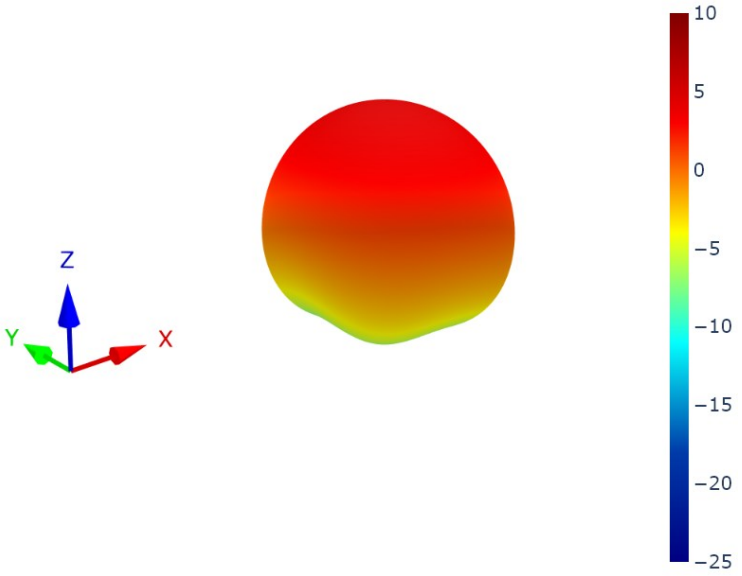
XZ Plane	YZ Plane	XY Plane
		

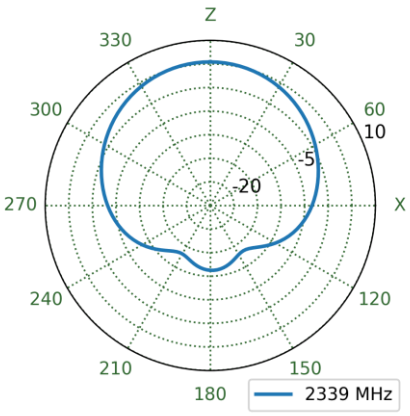
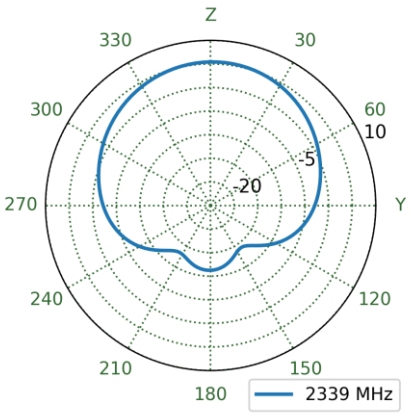
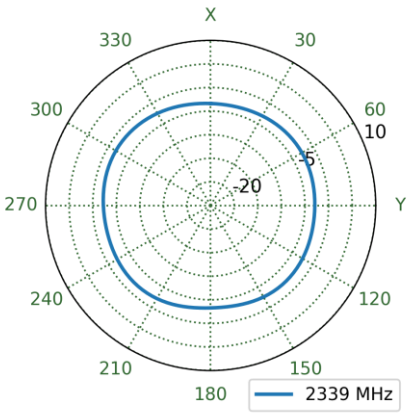
7.10 15x15cm Ground Plane Patterns at 2339 MHz



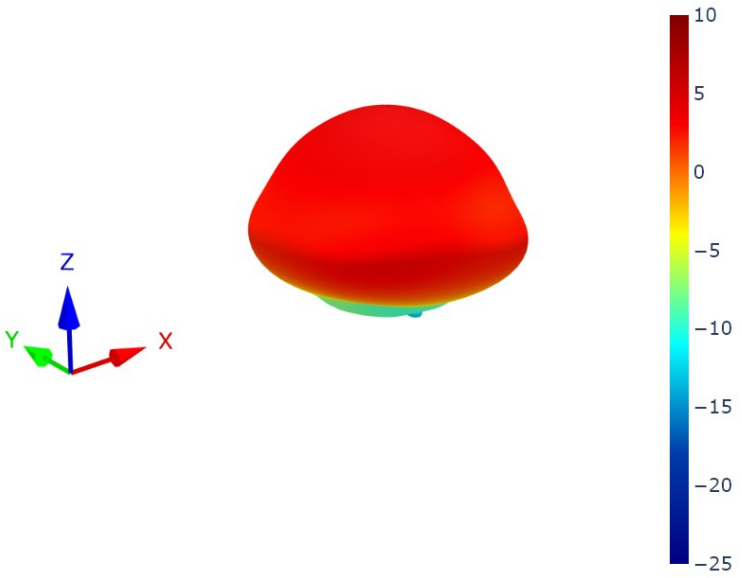
XZ Plane	YZ Plane	XY Plane
		

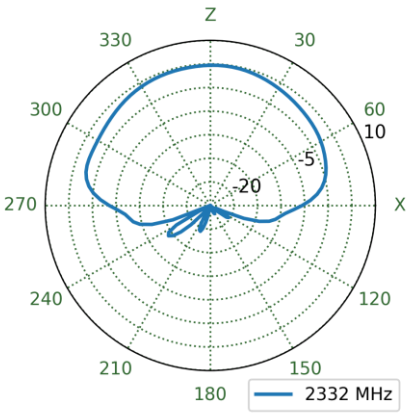
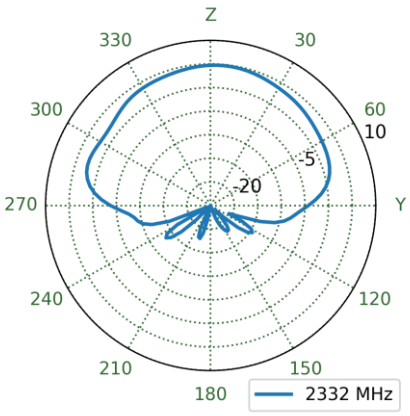
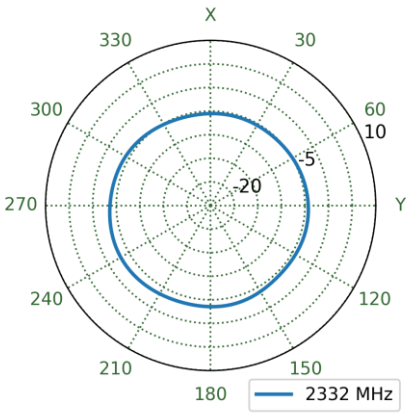
7.11 7x7cm Ground Plane Patterns at 2339 MHz



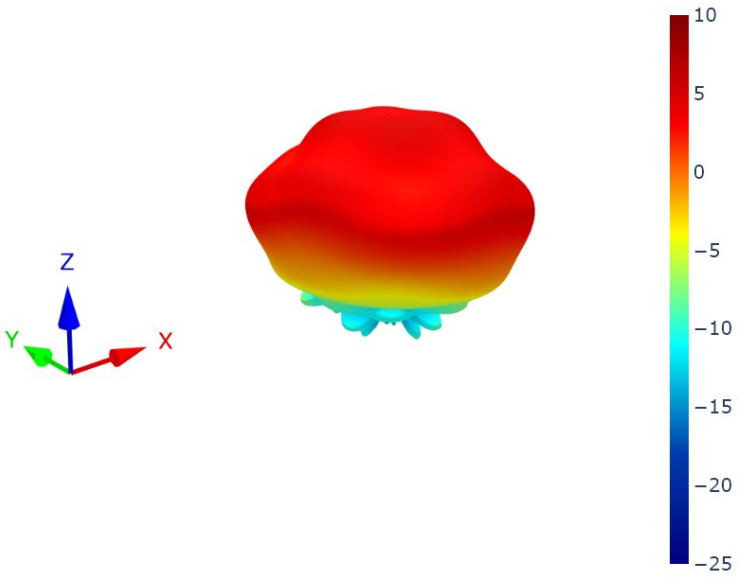
XZ Plane	YZ Plane	XY Plane
		

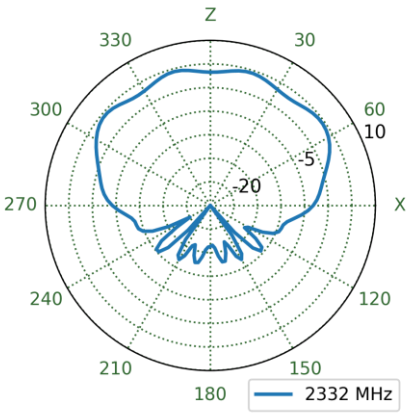
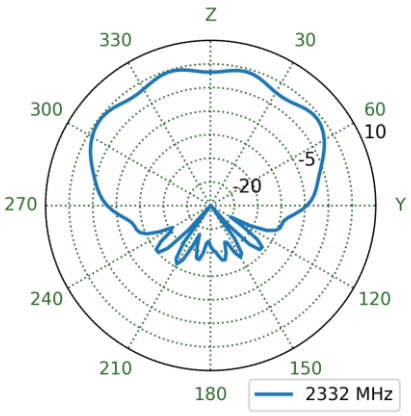
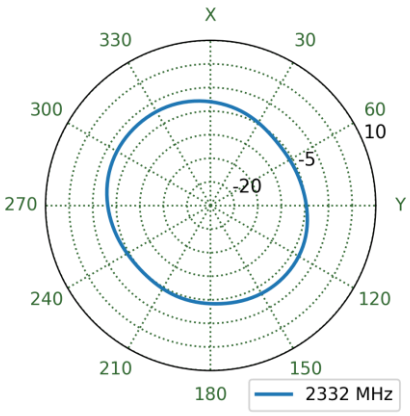
7.12 100x100cm Ground Plane Patterns at 2332 MHz



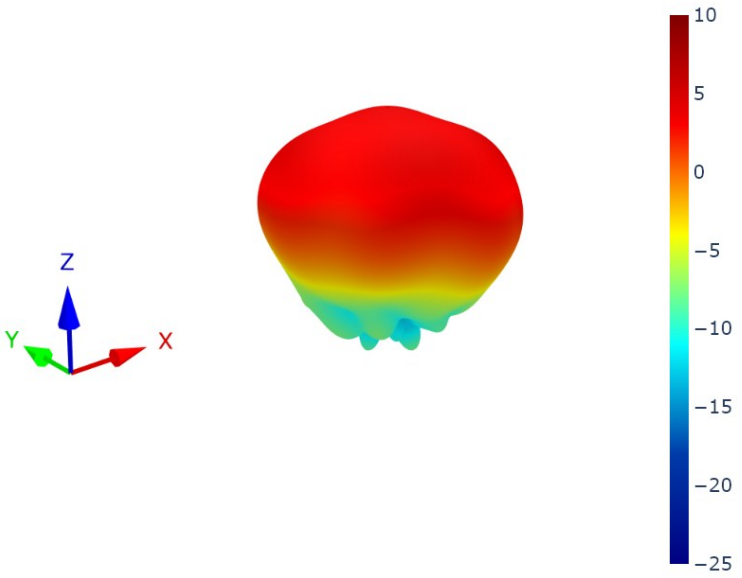
XZ Plane	YZ Plane	XY Plane
		

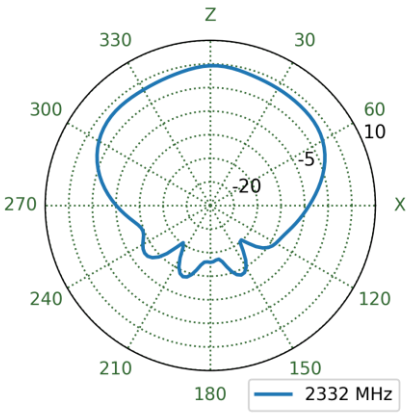
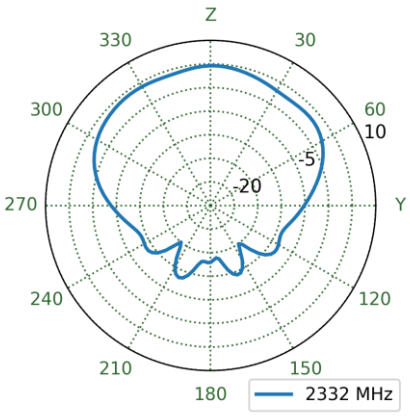
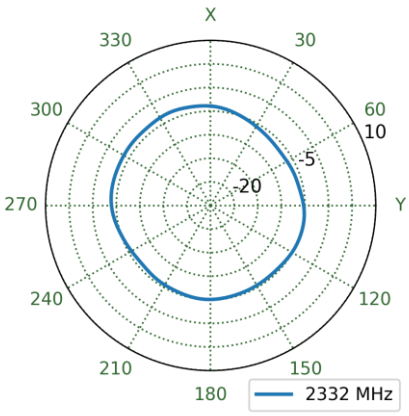
7.13 50x50cm Ground Plane Patterns at 2332 MHz



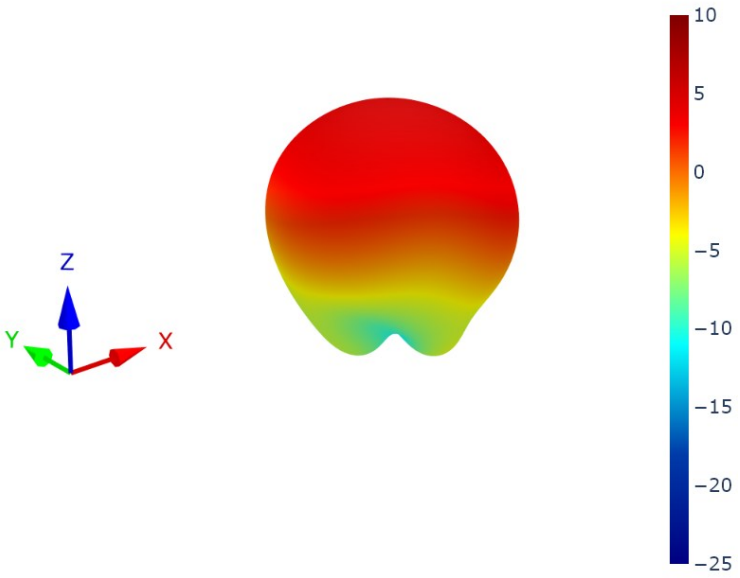
XZ Plane	YZ Plane	XY Plane
		

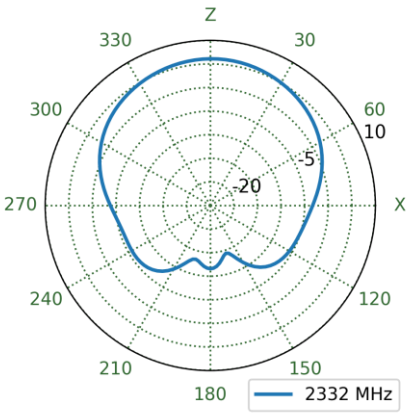
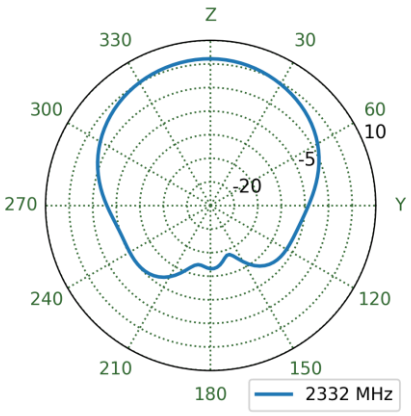
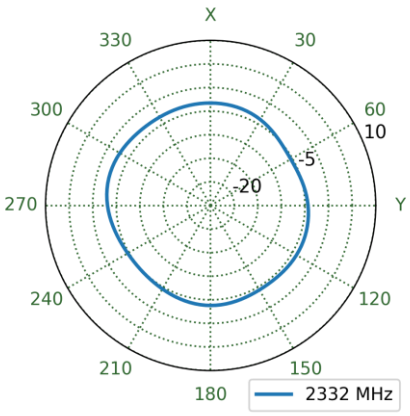
7.14 30x30cm Ground Plane Patterns at 2332 MHz



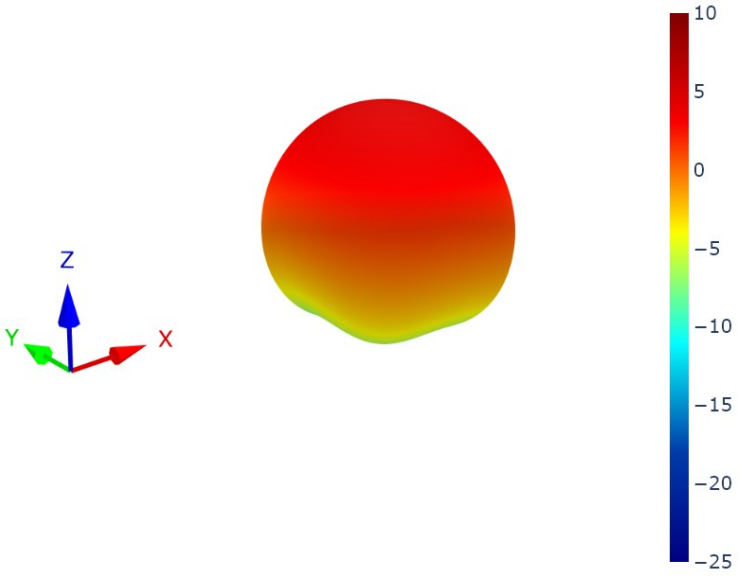
XZ Plane	YZ Plane	XY Plane
		

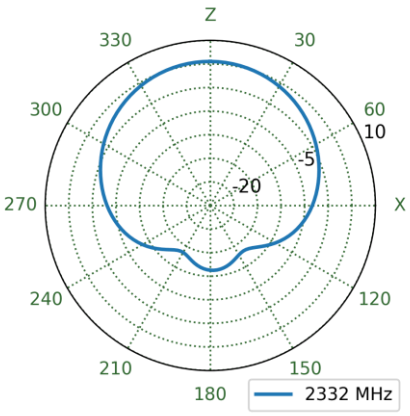
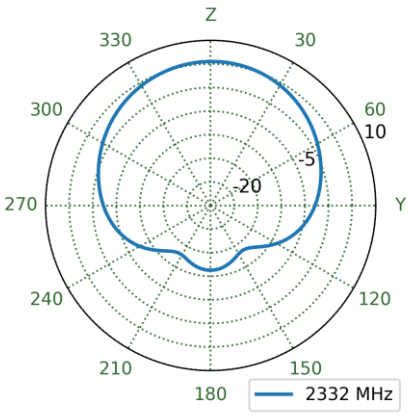
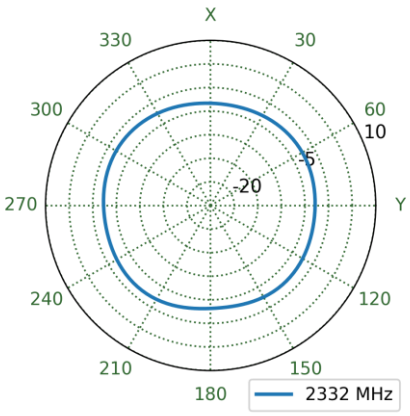
7.15 15x15cm Ground Plane Patterns at 2332 MHz



XZ Plane	YZ Plane	XY Plane
		

7.16 7x7cm Ground Plane Patterns at 2332 MHz



XZ Plane	YZ Plane	XY Plane
		

Changelog for the datasheet

SPE-25-8-109 – SXP.25.4.A.02

Revision: A (Original First Release)	
Date:	2025-04-02
Notes:	Initial Release
Author:	Gary West

Previous Revisions

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