December 15, 2016

TS-GARR-0005
WO: GARR0027
PO: PO00009950

Garrett Z-LYNK Wireless Model WT-1

Antenna Info:

Manufacturer: None

Type: PCB 2.4 GHz Inverted F

Model: Per Texas Instruments "Design Note DN0007"

Gain: 5.44 dBi

Form factor: 25.7 x 7.5 mm PCB trace

Complies with FCC 15.203 as a non-removable, built-in antenna with no connectors that would allow a change of antennas.

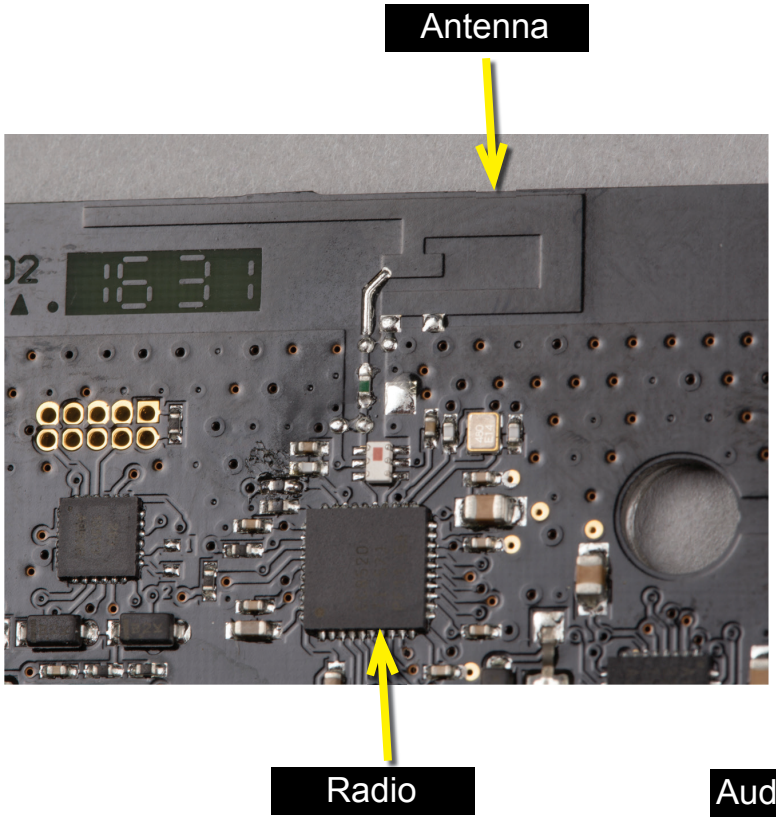
Weldon Sanders

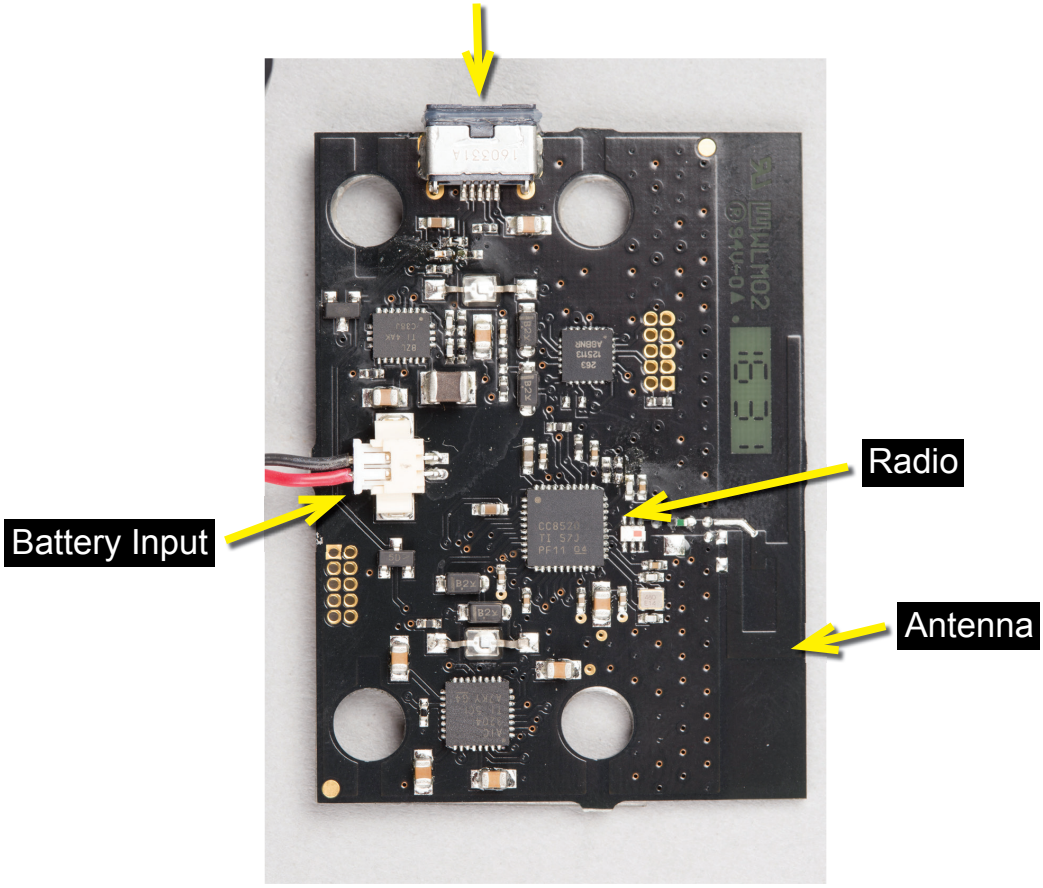
Weldon Sanders

Garrett Metal Detectors

Attachments: Photos

WT-1 Antenna/Radio





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3 Description of the Inverted F Antenna Design

Since the impedance of the Inverted F Antenna is matched directly to 50 ohm no external matching components are needed.

3.1 Implementation of the Inverted F Antenna

It is important to make an exact copy of the antenna dimensions to obtain optimum performance. The easiest approach to implement the antenna in a PCB CAD tool is to import the antenna layout from either a gerber or DXF file. Such files are included in CC2430DB reference design [1]. The gerber file is called “Inverted_F_Antenna.spl” and the DXF file is called “Inverted_F_Antenna.dxf”. If the antenna is implemented on a PCB that is wider than the antenna it is important to avoid placing components or having a ground plane close to the end points of the antenna. If the CAD tool being used doesn’t support import of gerber or DXF files, Figure 1 and Table 1 can be used.

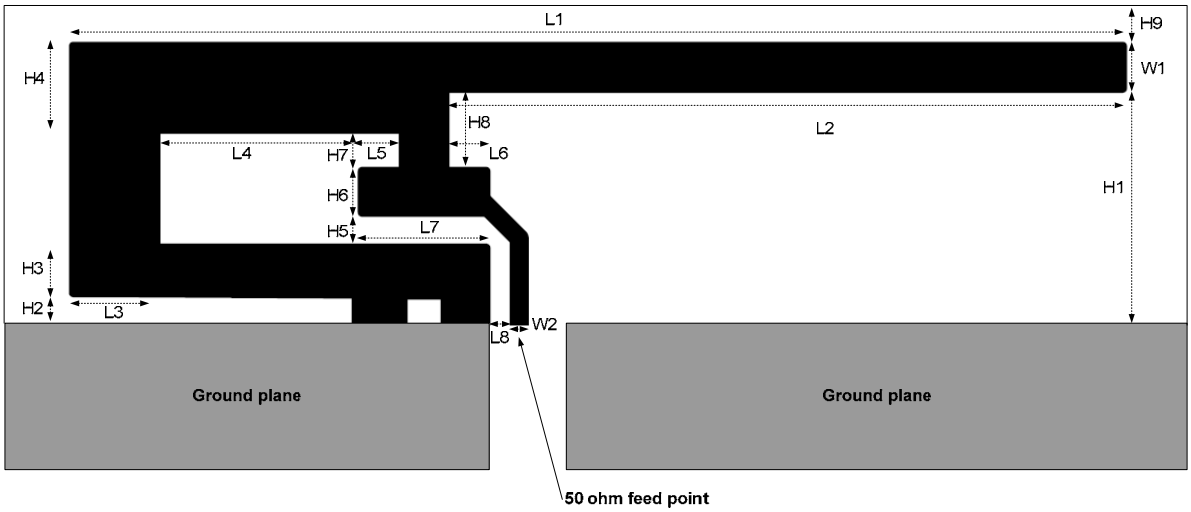

Figure 1. IFA Dimensions

H1	5.70 mm	W2	0.46 mm
H2	0.74 mm	L1	25.58 mm
H3	1.29 mm	L2	16.40 mm
H4	2.21 mm	L3	2.18 mm
H5	0.66 mm	L4	4.80 mm
H6	1.21 mm	L5	1.00 mm
H7	0.80 mm	L6	1.00 mm
H8	1.80 mm	L7	3.20 mm
H9	0.61 mm	L8	0.45 mm
W1	1.21 mm		

Table 1. IFA Dimensions

Since there is no ground plane beneath the antenna, PCB thickness will have little effect on the performance. The results presented in this design note are based on an antenna implemented on a PCB with 1 mm thickness.

3.1.7 Board #7: Inverted F-Antenna – 2440 MHz

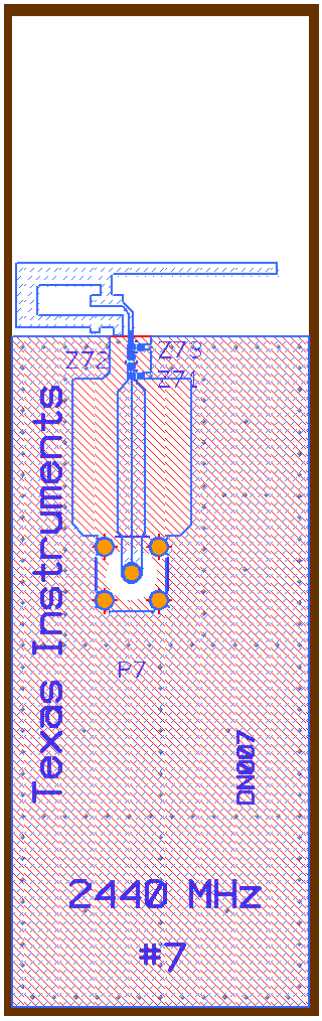

Figure 18: Board #7: Inverted F-Antenna – 2440 MHz

Size	Width (mm)	Height (mm)
PCB Board	30	95
GND	28	63

BOM	Ref. Designator	Koa Part Number	Value
	Z71	NC	-
	Z72	RK73Z1ETTP	0 ohm
	Z73	NC	-

Table 7: PCB Size and BOM for Board #7: Inverted F-Antenna – 2440 MHz

Pros: Excellent BW and excellent TRP efficiency.

4.11 2.4 GHz Band

This antenna can be used in the frequency band of 2400 MHz – 2480 MHz. 2440 MHz was chosen so the characteristics of the antenna can be compared.

4.11.1 PCB Antennas (2.4 GHz)

	Board 6 (3.1.6) (2440 MHz) Stand Alone	Board 7 (3.1.7) (2440 MHz) Stand Alone	Board 7 (3.1.7) (2400 MHz)	Board 7 (3.1.7) (2440 MHz)	Board 7 (3.1.7) (2480 MHz)
Full CTIA Report	DN616	DN615	DN604	DN604	DN604
Test Description	**Test Result**	**Test Result**	**Test Result**	**Test Result**	**Test Result**
Total Radiated Power	-0.63 dBm	-0.26 dBm	-0.99 dBm	-1.82 dBm	-1.90 dBm
Peak EIRP	3.83 dBm	5.89 dBm	5.44 dBm	4.51 dBm	4.12 dBm
Directivity	4.45 dBi	6.15 dBi	6.43 dBi	6.33 dBi	6.03 dBi
Efficiency	-0.63 dB	-0.26 dB	-0.99 dB	-1.82 dB	-1.90 dB
Efficiency	86.60 %	94.17 %	79.68 %	65.74 %	64.53 %
Gain	3.83 dBi	5.89 dBi	5.44 dBi	4.51 dBi	4.12 dBi
NHPRP 45°	-2.21 dBm	-2.07 dBm	-2.82 dBm	-3.68 dBm	-3.60 dBm
NHPRP 45° / TRP	-1.58 dB	-1.81 dB	-1.83 dB	-1.85 dB	-1.70 dB
NHPRP 45° / TRP	69.42 %	65.90 %	65.62 %	65.27 %	67.64 %
NHPRP 30°	-3.95 dBm	-3.93 dBm	-4.54 dBm	-5.37 dBm	-5.27 dBm
NHPRP 30° / TRP	-3.32 dB	-3.67 dB	-3.56 dB	-3.55 dB	-3.37 dB
NHPRP 30° / TRP	46.51 %	42.95 %	44.09 %	44.20 %	46.04 %
NHPRP 22.5°	-5.22 dBm	-5.07 dBm	-5.80 dBm	-6.59 dBm	-6.49 dBm
NHPRP 22.5° / TRP	-4.59 dB	-4.81 dB	-4.81 dB	-4.77 dB	-4.58 dB
NHPRP 22.5° / TRP	34.73 %	33.05 %	33.01 %	33.38 %	34.81 %
UHRP	-3.96 dBm	-3.65 dBm	-2.44 dBm	-3.27 dBm	-3.47 dBm
UHRP / TRP	-3.34 dB	-3.39 dB	-1.45 dB	-1.45 dB	-1.56 dB
UHRP / TRP	46.40 %	45.81 %	71.63 %	71.68 %	69.74 %
LHRP	-3.33 dBm	-2.92 dBm	-6.46 dBm	-7.30 dBm	-7.09 dBm
LHRP / TRP	-2.71 dB	-2.66 dB	-5.47 dB	-5.48 dB	-5.19 dB
LHRP / TRP	53.60 %	54.19 %	28.37 %	28.32 %	30.26 %
Front/Back Ratio	3.27	16.57	9.96	11.10	13.23
PhiBW	105.6 deg	118.1 deg	173.3 deg	171.5 deg	174.3 deg
PhiBW Up	62.6 deg	87.9 deg	137.2 deg	55.2 deg	51.9 deg
PhiBW Down	43.0 deg	30.2 deg	36.1 deg	116.3 deg	122.4 deg
ThetaBW	46.5 deg	32.0 deg	76.8 deg	41.0 deg	46.0 deg
ThetaBW Up	14.0 deg	11.1 deg	41.3 deg	24.0 deg	23.4 deg
ThetaBW Down	32.5 deg	20.8 deg	35.4 deg	17.0 deg	22.6 deg
Boresight Phi	245 deg	30 deg	45 deg	135 deg	135 deg
Boresight Theta	140 deg	150 deg	45 deg	30 deg	30 deg
Maximum Power	3.83 dBm	5.89 dBm	5.44 dBm	4.51 dBm	4.12 dBm
Minimum Power	-14.02 dBm	-12.15 dBm	-14.54 dBm	-13.88 dBm	-12.04 dBm
Average Power	-0.59 dBm	0.72 dBm	-0.84 dBm	-1.75 dBm	-1.92 dBm
Max/Min Ratio	17.85 dB	18.04 dB	19.98 dB	18.39 dB	16.16 dB
Max/Avg Ratio	4.42 dB	5.17 dB	6.28 dB	6.25 dB	6.04 dB
Min/Avg Ratio	-13.43 dB	-12.87 dB	-13.70 dB	-12.13 dB	-10.12 dB
Best Single Value	3.62 dBm	5.34 dBm	4.75 dBm	3.63 dBm	3.56 dBm
Best Position	Phi = 90 deg; Theta = 80 deg; Pol = Ver	Phi = 270 deg; Theta = 180 deg; Pol = Hor	Phi = 30 deg; Theta = 60 deg; Pol = Ver	Phi = 105 deg; Theta = 30 deg; Pol = Hor	Phi = 105 deg; Theta = 30 deg; Pol = Hor

Table 29: 2440 MHz PCB Antennas

Test Report

OTA Test Results for Frequency 2400.000 MHz

OTA Evaluation Results:

Total Radiated Power	-0.99 dBm
Peak EIRP	5.44 dBm
Directivity	6.43 dBi
Efficiency	-0.99 dB
Efficiency	79.68 %
Gain	5.44 dBi
NHPRP 45°	-2.82 dBm
NHPRP 45° / TRP	-1.83 dB
NHPRP 45° / TRP	65.62 %
NHPRP 30°	-4.54 dBm
NHPRP 30° / TRP	-3.56 dB
NHPRP 30° / TRP	44.09 %
NHPRP 22.5°	-5.80 dBm
NHPRP 22.5° / TRP	-4.81 dB
NHPRP 22.5° / TRP	33.01 %
UHRP	-2.44 dBm
UHRP / TRP	-1.45 dB
UHRP / TRP	71.63 %
LHRP	-6.46 dBm
LHRP / TRP	-5.47 dB
LHRP / TRP	28.37 %
Front/Back Ratio	9.96
PhiBW	173.3 deg
PhiBW Up	137.2 deg
PhiBW Down	36.1 deg
ThetaBW	76.8 deg
ThetaBW Up	41.3 deg
ThetaBW Down	35.4 deg
Boresight Phi	45 deg
Boresight Theta	45 deg
Maximum Power	5.44 dBm
Minimum Power	-14.54 dBm
Average Power	-0.84 dBm
Max/Min Ratio	19.98 dB
Max/Avg Ratio	6.28 dB
Min/Avg Ratio	-13.70 dB
Best Single Value	4.75 dBm
Best Position	Phi = 30 deg; Theta = 60 deg; Pol = Ver

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Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.00	0.44	0.39	1.73	1.34	1.99	1.86	1.90	1.27	0.46	-1.23	-4.80	-9.11	-7.19
15.00	0.78	1.49	3.05	3.20	4.14	3.61	3.57	2.24	0.50	-1.59	-4.82	-9.73	-6.43
30.00	0.85	2.49	3.91	4.85	4.90	4.38	3.42	1.67	-0.68	-2.64	-4.60	-10.15	-6.34
45.00	0.94	3.29	4.47	5.44	4.58	3.86	1.98	-0.03	-1.82	-2.67	-4.04	-10.29	-6.75
60.00	0.95	3.86	4.68	5.07	3.40	2.13	-0.42	-2.02	-2.43	-2.93	-3.74	-9.78	-6.86
75.00	1.23	4.12	4.58	4.06	1.43	-0.78	-3.53	-4.14	-3.95	-3.39	-3.54	-8.38	-6.73
90.00	1.24	4.03	4.53	3.08	-0.40	-3.48	-6.14	-7.21	-5.95	-3.76	-2.92	-6.83	-6.26
105.00	1.19	3.78	4.76	2.47	-0.93	-5.79	-8.04	-8.61	-6.07	-4.01	-2.27	-5.72	-5.31
120.00	1.18	3.39	5.11	2.54	-0.05	-6.23	-7.22	-5.87	-5.65	-5.19	-2.24	-5.04	-4.58
135.00	1.41	3.28	5.34	3.22	1.70	-4.31	-6.46	-5.17	-7.41	-8.06	-3.47	-4.86	-4.40
150.00	1.73	3.33	5.20	3.98	2.79	-2.06	-5.68	-5.52	-8.08	-9.73	-5.97	-4.98	-4.45
165.00	1.93	3.27	4.56	4.07	2.50	-0.85	-4.81	-5.34	-6.40	-10.01	-9.94	-5.66	-4.39
180.00	2.03	2.94	3.29	2.89	0.71	-1.98	-5.54	-5.94	-4.31	-10.09	-13.83	-6.45	-4.76
195.00	2.14	2.09	1.02	-0.14	-2.65	-5.61	-6.34	-6.53	-4.52	-7.14	-14.54	-7.03	-5.58
210.00	1.97	0.87	-1.63	-4.31	-5.78	-5.46	-3.12	-3.42	-3.99	-4.90	-10.54	-7.75	-6.23
225.00	1.51	-0.56	-4.36	-6.16	-4.80	-3.03	-1.36	-1.25	-2.11	-4.52	-6.53	-7.16	-6.23
240.00	1.22	-1.55	-5.50	-4.87	-3.23	-1.91	-1.47	-1.14	-2.85	-5.45	-5.16	-5.99	-5.95
255.00	1.07	-2.17	-5.52	-4.99	-3.08	-1.73	-2.30	-2.31	-5.67	-6.14	-4.72	-5.57	-5.92
270.00	0.97	-2.42	-5.36	-5.86	-4.01	-2.55	-3.53	-3.93	-8.52	-6.47	-4.30	-6.16	-6.95
285.00	0.74	-2.75	-4.98	-6.88	-5.05	-3.66	-4.24	-4.87	-7.97	-6.10	-4.05	-6.91	-7.78
300.00	0.46	-3.01	-4.53	-7.82	-5.68	-4.01	-4.12	-4.52	-6.34	-5.43	-3.65	-8.15	-8.40
315.00	0.11	-2.94	-3.66	-8.00	-6.57	-4.47	-4.65	-4.70	-5.00	-5.20	-3.45	-9.19	-8.69
330.00	-0.05	-2.41	-2.00	-6.24	-5.30	-4.90	-4.33	-5.13	-3.36	-4.28	-3.41	-9.91	-8.24
345.00	0.07	-1.34	-0.12	-2.72	-1.66	-2.22	-1.47	-2.80	-0.89	-2.42	-3.79	-9.85	-7.62
360.00	0.24	-0.02	1.27	0.21	1.00	0.97	1.04	0.50	0.20	-1.08	-4.41	-9.36	-7.04

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Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.0	-9.53	-13.51	-18.20	-13.49	-10.59	-9.10	-7.32	-5.49	-5.93	-9.29	-11.82	-15.98	-8.78
15.0	-8.41	-9.02	-15.97	-13.36	-11.33	-8.63	-6.27	-5.25	-7.47	-11.62	-12.12	-16.98	-8.50
30.0	-5.62	-4.38	-6.87	-6.60	-9.66	-8.41	-5.99	-6.69	-9.52	-13.36	-11.08	-17.93	-9.48
45.0	-3.12	-0.94	-1.80	-2.85	-6.53	-8.21	-6.71	-8.87	-10.09	-12.68	-9.79	-20.07	-11.62
60.0	-1.35	1.35	1.04	-0.69	-4.56	-8.23	-7.80	-9.59	-9.42	-11.36	-9.07	-19.91	-13.75
75.0	0.08	2.98	2.91	0.78	-3.17	-7.60	-8.45	-10.15	-10.05	-9.32	-7.76	-13.99	-13.22
90.0	0.67	3.62	3.93	1.70	-2.35	-7.34	-8.45	-11.70	-10.67	-7.03	-5.64	-10.36	-10.66
105.0	0.53	3.56	4.36	2.01	-2.11	-7.89	-9.17	-12.52	-11.01	-6.15	-3.71	-7.58	-7.71
120.0	-0.12	2.62	3.98	1.31	-2.90	-9.29	-10.43	-12.08	-14.48	-7.45	-3.07	-6.15	-6.16
135.0	-1.22	0.89	2.57	-0.97	-4.76	-11.06	-10.98	-10.41	-19.34	-11.96	-4.08	-5.40	-5.42
150.0	-2.64	-1.45	0.06	-4.88	-7.29	-10.18	-10.48	-8.13	-11.15	-13.75	-6.62	-5.25	-5.24
165.0	-4.80	-4.34	-3.69	-6.95	-7.19	-7.45	-9.28	-7.13	-7.66	-10.92	-10.75	-5.86	-5.06
180.0	-7.10	-5.87	-6.37	-5.00	-4.85	-6.11	-7.67	-8.26	-7.31	-12.18	-15.36	-6.77	-5.85
195.0	-7.29	-6.22	-7.32	-5.17	-4.38	-6.34	-7.26	-9.75	-9.11	-13.92	-16.55	-7.76	-7.53
210.0	-5.86	-6.56	-8.44	-8.01	-7.18	-8.02	-8.39	-8.88	-11.93	-12.50	-13.60	-8.85	-9.83
225.0	-3.80	-6.90	-10.67	-11.64	-10.03	-9.70	-9.17	-8.54	-13.77	-15.71	-11.23	-8.62	-12.20
240.0	-2.15	-6.49	-12.10	-10.95	-8.10	-8.45	-8.04	-10.45	-13.75	-18.01	-11.04	-7.84	-12.92
255.0	-0.87	-5.68	-11.90	-10.32	-6.97	-6.74	-7.44	-12.62	-13.55	-17.23	-10.51	-7.11	-13.52
270.0	-0.26	-4.86	-11.33	-10.31	-7.07	-5.92	-6.73	-9.73	-14.26	-19.87	-9.06	-7.57	-15.03
285.0	-0.20	-4.54	-10.15	-10.58	-7.64	-6.23	-6.39	-7.41	-13.77	-14.54	-7.48	-7.95	-13.59
300.0	-0.80	-4.87	-8.80	-11.13	-8.96	-7.20	-6.23	-6.55	-10.86	-9.85	-6.48	-9.12	-12.14
315.0	-2.30	-5.89	-8.50	-11.86	-11.10	-8.52	-6.57	-6.80	-8.08	-7.78	-6.13	-10.66	-10.83
330.0	-4.53	-7.45	-8.53	-12.08	-12.16	-9.45	-6.91	-7.04	-6.33	-7.30	-6.64	-12.33	-10.00
345.0	-7.57	-10.88	-10.73	-11.86	-11.64	-9.25	-7.28	-6.72	-5.50	-7.84	-8.25	-13.82	-9.08
360.0	-9.79	-13.42	-15.15	-12.80	-11.00	-9.13	-7.28	-5.85	-5.63	-8.85	-10.59	-15.00	-8.41

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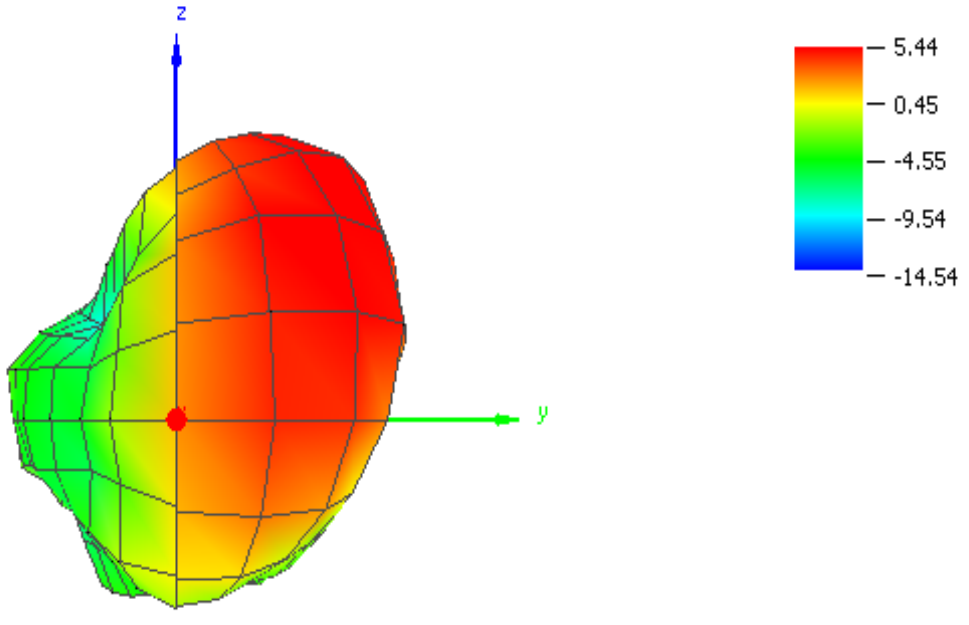
Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.0	-0.02	0.21	1.69	1.19	1.74	1.49	1.35	0.24	-0.67	-1.97	-5.76	-10.10	-12.30
15.0	0.23	1.08	2.99	3.10	4.01	3.34	3.09	1.38	-0.25	-2.05	-5.72	-10.64	-10.64
30.0	-0.27	1.49	3.53	4.52	4.75	4.15	2.89	0.99	-1.29	-3.02	-5.70	-10.94	-9.23
45.0	-1.22	1.24	3.30	4.75	4.23	3.58	1.36	-0.63	-2.52	-3.13	-5.38	-10.78	-8.46
60.0	-2.90	0.28	2.22	3.74	2.64	1.71	-1.29	-2.86	-3.40	-3.61	-5.24	-10.22	-7.86
75.0	-5.11	-2.24	-0.39	1.30	-0.42	-1.79	-5.22	-5.40	-5.17	-4.66	-5.61	-9.78	-7.83
90.0	-7.85	-6.50	-4.39	-2.54	-4.81	-5.78	-9.99	-9.11	-7.73	-6.52	-6.24	-9.37	-8.23
105.0	-7.36	-9.13	-5.76	-7.51	-7.18	-9.95	-14.43	-10.88	-7.75	-8.12	-7.76	-10.31	-9.03
120.0	-4.69	-4.48	-1.31	-3.52	-3.23	-9.20	-10.04	-7.05	-6.26	-9.11	-9.87	-11.49	-9.75
135.0	-2.00	-0.46	2.08	1.13	0.58	-5.35	-8.34	-6.71	-7.69	-10.34	-12.27	-14.22	-11.20
150.0	-0.25	1.57	3.62	3.37	2.34	-2.79	-7.43	-8.96	-11.04	-11.92	-14.52	-17.23	-12.23
165.0	0.89	2.44	3.86	3.71	2.01	-1.92	-6.73	-10.06	-12.39	-17.26	-17.67	-19.10	-12.84
180.0	1.47	2.33	2.79	2.12	-0.70	-4.11	-9.65	-9.77	-7.33	-14.26	-19.12	-17.96	-11.29
195.0	1.61	1.40	0.33	-1.78	-7.50	-13.72	-13.53	-9.35	-6.37	-8.16	-18.84	-15.17	-9.98
210.0	1.19	0.01	-2.65	-6.72	-11.37	-8.97	-4.65	-4.87	-4.75	-5.73	-13.50	-14.23	-8.73
225.0	0.00	-1.71	-5.51	-7.60	-6.34	-4.08	-2.15	-2.15	-2.42	-4.86	-8.33	-12.58	-7.50
240.0	-1.46	-3.23	-6.57	-6.09	-4.94	-3.00	-2.56	-1.68	-3.22	-5.70	-6.46	-10.58	-6.92
255.0	-3.38	-4.74	-6.66	-6.50	-5.36	-3.38	-3.88	-2.73	-6.45	-6.49	-6.05	-10.84	-6.75
270.0	-5.14	-6.10	-6.63	-7.79	-6.97	-5.22	-6.36	-5.26	-9.87	-6.68	-6.07	-11.75	-7.68
285.0	-6.37	-7.46	-6.56	-9.30	-8.52	-7.16	-8.33	-8.41	-9.30	-6.77	-6.68	-13.65	-9.10
300.0	-5.53	-7.60	-6.57	-10.55	-8.44	-6.85	-8.27	-8.79	-8.24	-7.38	-6.86	-15.16	-10.79
315.0	-3.59	-6.01	-5.38	-10.31	-8.45	-6.65	-9.11	-8.87	-7.93	-8.69	-6.81	-14.63	-12.79
330.0	-1.96	-4.04	-3.09	-7.55	-6.30	-6.77	-7.82	-9.62	-6.42	-7.29	-6.22	-13.60	-13.00
345.0	-0.75	-1.85	-0.51	-3.29	-2.12	-3.18	-2.79	-5.06	-2.73	-3.90	-5.71	-12.08	-13.07
360.0	-0.21	-0.22	1.17	-0.02	0.72	0.52	0.35	-0.64	-1.11	-1.87	-5.61	-10.75	-12.75

Theta = 90, Phi = 0



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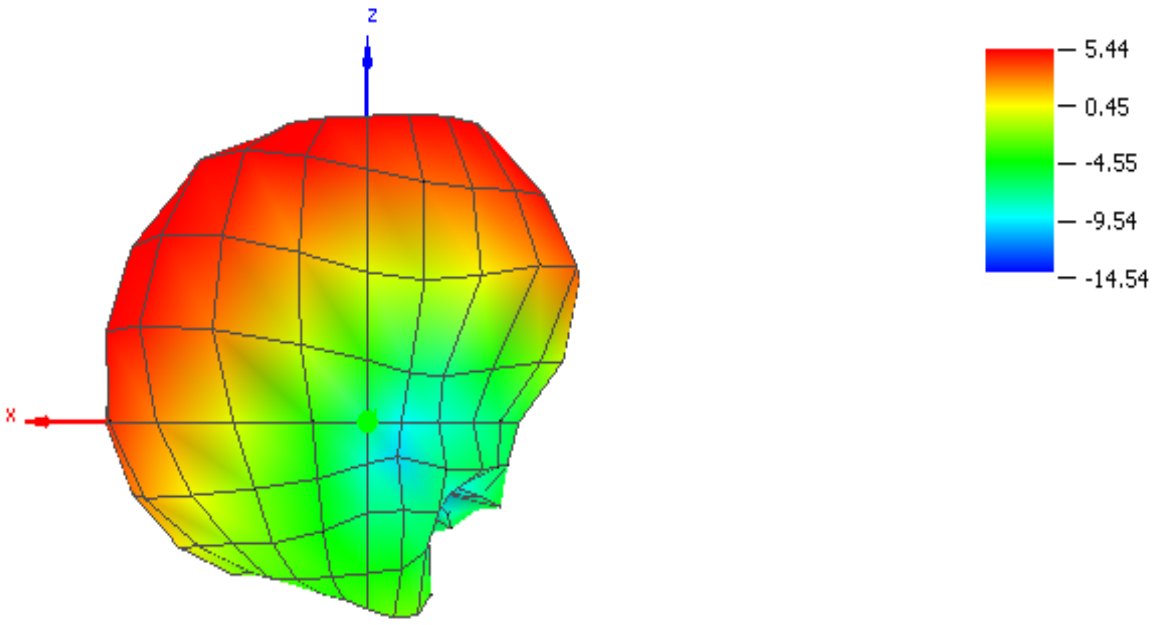

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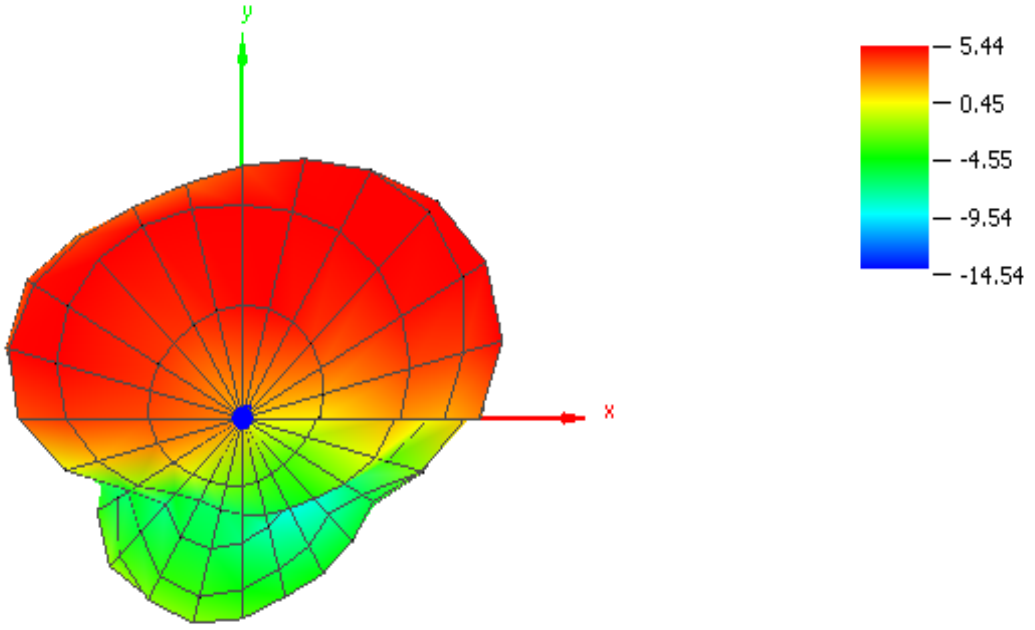

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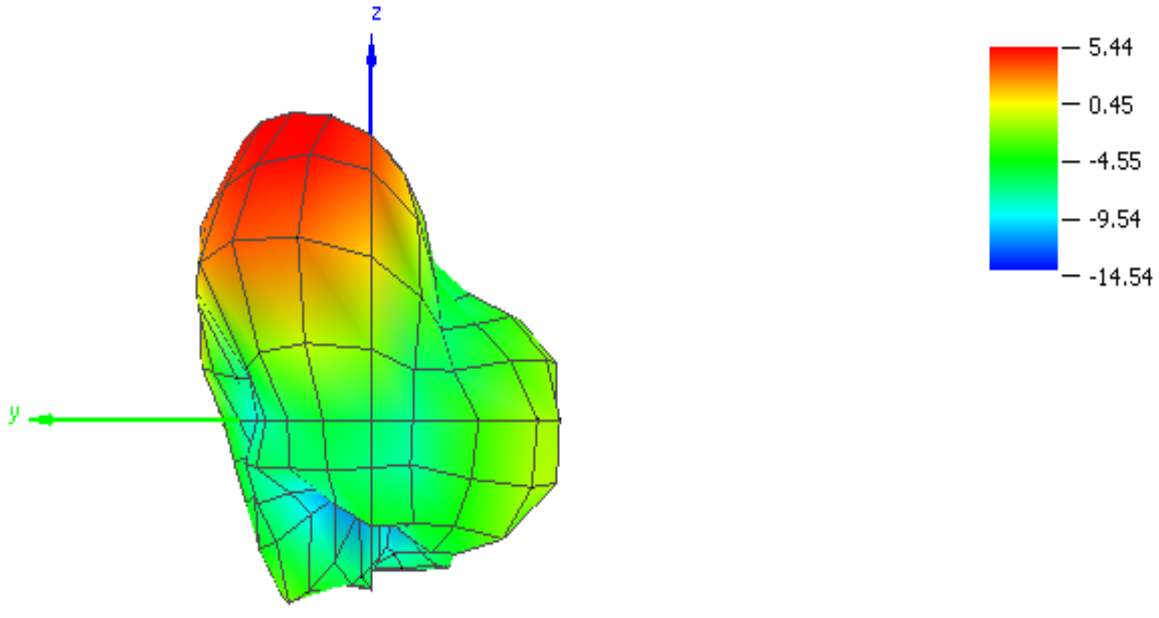

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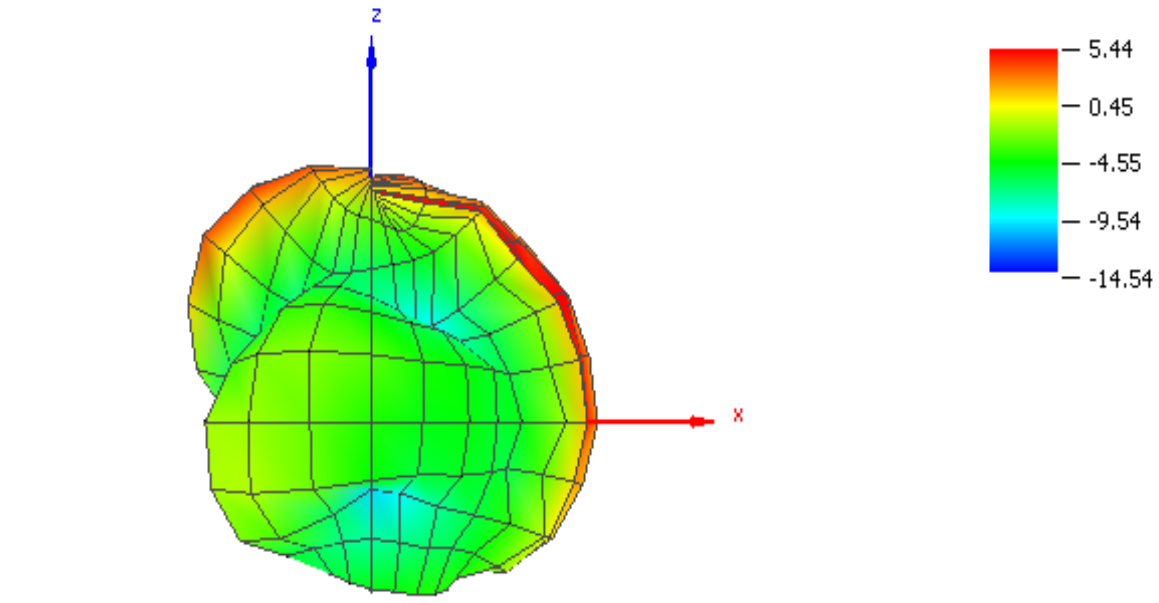

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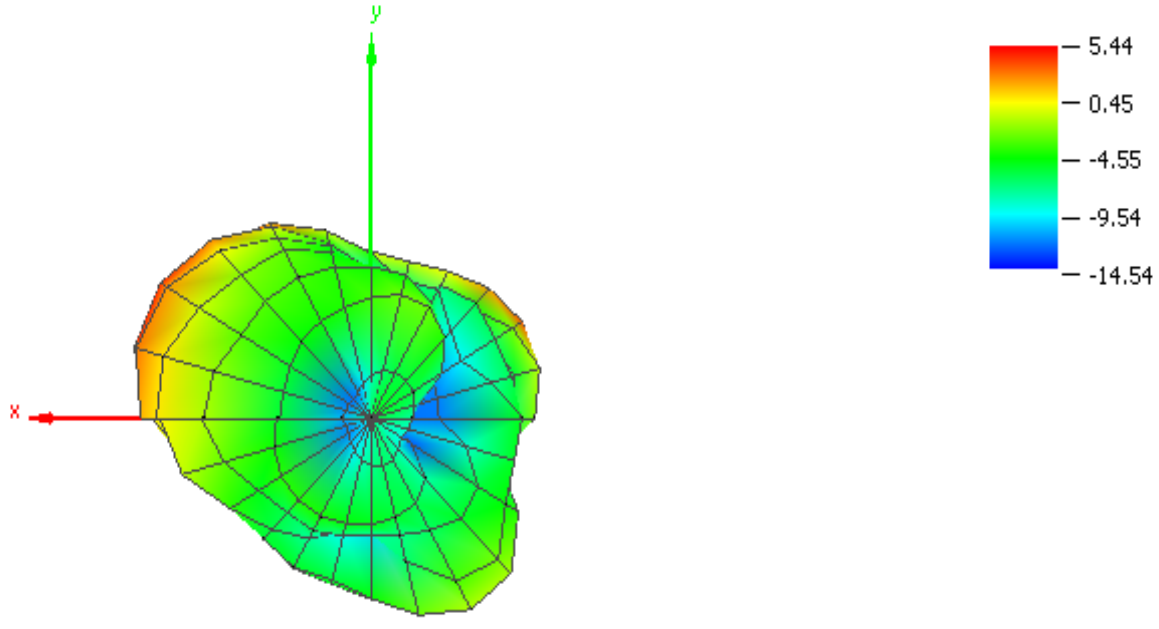


OTA Test Results for Frequency 2440.000 MHz

OTA Evaluation Results:

Total Radiated Power	-1.82 dBm
Peak EIRP	4.51 dBm
Directivity	6.33 dBi
Efficiency	-1.82 dB
Efficiency	65.74 %
Gain	4.51 dBi
NHPRP 45°	-3.68 dBm
NHPRP 45° / TRP	-1.85 dB
NHPRP 45° / TRP	65.27 %
NHPRP 30°	-5.37 dBm
NHPRP 30° / TRP	-3.55 dB
NHPRP 30° / TRP	44.20 %
NHPRP 22.5°	-6.59 dBm
NHPRP 22.5° / TRP	-4.77 dB
NHPRP 22.5° / TRP	33.38 %
UHRP	-3.27 dBm
UHRP / TRP	-1.45 dB
UHRP / TRP	71.68 %
LHRP	-7.30 dBm
LHRP / TRP	-5.48 dB
LHRP / TRP	28.32 %
Front/Back Ratio	11.10
PhiBW	171.5 deg
PhiBW Up	55.2 deg
PhiBW Down	116.3 deg
ThetaBW	41.0 deg
ThetaBW Up	24.0 deg
ThetaBW Down	17.0 deg
Boresight Phi	135 deg
Boresight Theta	30 deg
Maximum Power	4.51 dBm
Minimum Power	-13.88 dBm
Average Power	-1.75 dBm
Max/Min Ratio	18.39 dB
Max/Avg Ratio	6.25 dB
Min/Avg Ratio	-12.13 dB
Best Single Value	3.63 dBm
Best Position	Phi = 105 deg; Theta = 30 deg; Pol = Hor

RP_2440.000_tot

Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.00	-0.25	-0.44	-0.16	-0.33	-0.05	-0.04	0.44	-0.07	-1.57	-3.69	-6.79	-11.89	-7.78
15.00	-0.36	0.49	1.21	1.69	2.39	1.92	2.18	1.11	-1.23	-3.11	-6.35	-10.49	-8.02
30.00	-0.18	1.63	2.40	3.32	3.40	2.97	2.48	1.08	-1.57	-3.06	-5.60	-9.26	-8.49
45.00	0.10	2.43	3.23	3.84	3.16	2.66	1.35	-0.25	-2.45	-3.03	-5.06	-9.18	-8.64
60.00	0.46	3.03	3.72	3.78	2.17	1.04	-1.27	-2.19	-3.41	-3.18	-4.98	-9.88	-8.96
75.00	0.65	3.24	3.95	3.37	0.64	-1.70	-4.29	-4.71	-5.17	-3.94	-4.51	-10.98	-8.81
90.00	0.32	3.08	3.96	2.66	-1.20	-4.54	-6.22	-7.89	-6.81	-4.26	-3.90	-12.08	-9.31
105.00	-0.25	2.61	4.06	1.93	-1.87	-5.55	-7.05	-9.04	-6.22	-4.46	-3.74	-11.82	-9.52
120.00	-0.59	2.14	4.35	1.79	-0.84	-4.53	-6.47	-7.01	-5.73	-5.22	-4.04	-10.61	-9.23
135.00	-0.60	1.83	4.51	2.27	1.00	-2.60	-5.74	-5.81	-6.30	-6.56	-4.73	-8.90	-9.57
150.00	-0.20	1.69	4.26	2.83	2.26	-0.72	-4.59	-5.60	-7.13	-7.73	-5.96	-6.98	-9.49
165.00	0.40	1.86	3.51	3.18	2.39	0.40	-3.40	-4.99	-7.86	-8.41	-7.54	-6.11	-9.09
180.00	0.64	1.83	2.41	2.68	0.98	-0.32	-3.81	-5.28	-7.53	-10.64	-9.61	-5.84	-8.13
195.00	0.33	1.41	1.09	0.78	-2.19	-3.97	-6.48	-7.87	-8.61	-10.69	-9.72	-6.16	-6.86
210.00	-0.30	0.35	-0.33	-2.13	-5.20	-7.51	-5.38	-7.97	-11.51	-8.32	-7.34	-6.88	-6.19
225.00	-0.96	-0.74	-1.53	-3.83	-4.61	-4.55	-3.10	-5.70	-7.94	-7.70	-5.49	-7.42	-5.99
240.00	-1.19	-1.82	-2.09	-3.89	-3.49	-3.10	-2.20	-4.54	-6.20	-6.90	-4.19	-7.45	-6.25
255.00	-0.85	-2.27	-2.56	-3.84	-3.81	-2.93	-1.94	-3.49	-5.58	-5.04	-3.39	-7.13	-6.54
270.00	0.10	-2.24	-3.03	-4.41	-5.56	-3.69	-2.31	-3.13	-4.26	-3.97	-3.19	-8.24	-6.58
285.00	0.95	-2.19	-3.81	-6.04	-7.84	-4.72	-2.94	-3.29	-3.45	-4.38	-4.11	-10.45	-7.06
300.00	1.18	-2.50	-4.33	-7.81	-9.69	-5.93	-3.88	-3.39	-3.46	-5.87	-5.25	-12.42	-7.79
315.00	1.06	-2.75	-4.18	-8.78	-10.06	-7.08	-5.25	-4.03	-3.85	-8.01	-6.59	-13.49	-8.03
330.00	0.79	-2.53	-3.25	-7.49	-7.96	-7.24	-5.73	-5.21	-3.86	-8.51	-7.15	-13.88	-8.05
345.00	0.39	-1.82	-1.68	-4.45	-4.17	-5.16	-3.02	-3.85	-2.83	-6.11	-6.77	-13.62	-7.78
360.00	-0.14	-0.80	-0.60	-1.26	-1.19	-1.19	-0.30	-0.78	-1.86	-4.09	-6.84	-12.18	-7.58

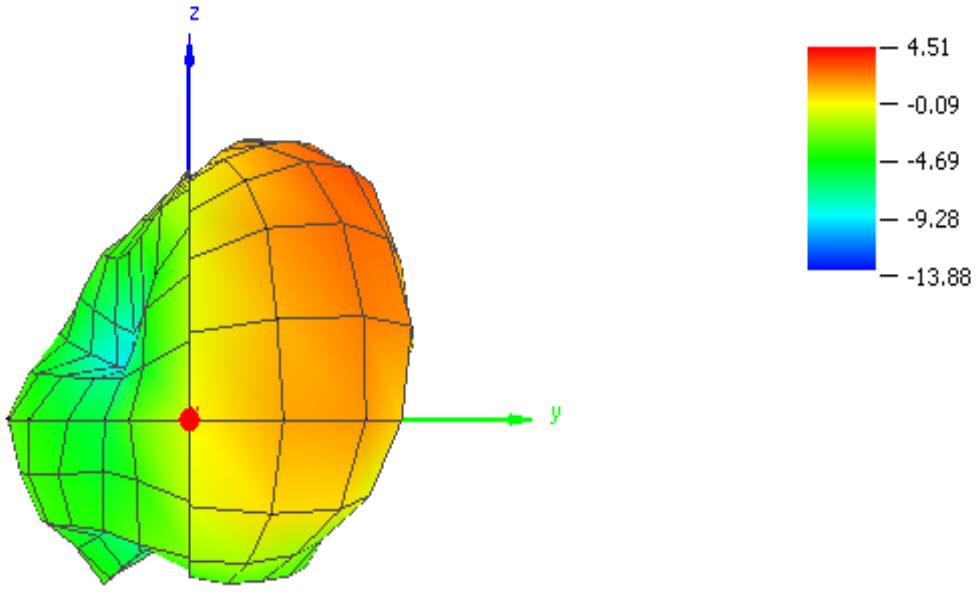
RP_2440.000_hor

Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.0	-10.35	-14.27	-18.82	-14.28	-10.05	-8.59	-7.95	-8.09	-8.98	-9.10	-11.87	-14.90	-8.69
15.0	-9.12	-9.24	-14.08	-10.90	-10.05	-8.03	-7.35	-6.45	-9.24	-8.98	-12.22	-14.38	-8.57
30.0	-5.40	-4.32	-5.58	-5.36	-7.76	-7.87	-6.45	-6.57	-9.88	-9.77	-12.28	-13.14	-9.10
45.0	-2.76	-1.05	-1.15	-2.18	-5.43	-7.75	-6.61	-7.83	-10.66	-9.57	-10.54	-13.02	-9.77
60.0	-0.98	1.17	1.27	-0.12	-4.03	-7.30	-7.85	-8.46	-9.18	-8.31	-8.95	-14.14	-11.21
75.0	-0.10	2.27	2.79	1.11	-3.01	-6.91	-8.08	-9.07	-8.74	-7.28	-7.44	-16.13	-12.44
90.0	-0.16	2.65	3.54	1.67	-2.84	-7.20	-8.53	-10.97	-9.83	-6.30	-6.02	-20.47	-15.99
105.0	-0.87	2.31	3.63	1.40	-3.51	-8.40	-9.37	-13.15	-10.27	-6.40	-5.27	-15.89	-19.71
120.0	-1.85	1.41	3.08	0.47	-4.90	-9.58	-9.94	-13.63	-12.79	-7.68	-4.84	-11.85	-16.18
135.0	-3.52	-0.36	1.51	-1.63	-6.70	-9.33	-10.14	-11.74	-18.76	-10.46	-5.30	-9.71	-13.12
150.0	-5.68	-3.15	-1.13	-5.71	-7.88	-7.67	-9.46	-9.44	-13.99	-13.04	-6.96	-8.16	-11.17
165.0	-8.37	-6.47	-4.74	-8.06	-6.20	-5.77	-7.93	-8.27	-10.37	-13.44	-9.52	-7.93	-9.71
180.0	-9.92	-7.69	-6.00	-5.23	-4.22	-4.94	-7.24	-9.28	-9.41	-15.49	-13.19	-8.51	-9.30
195.0	-8.54	-6.46	-5.26	-4.59	-4.27	-5.83	-7.33	-11.65	-10.72	-12.58	-15.13	-9.98	-8.77
210.0	-6.02	-5.65	-5.70	-6.71	-6.77	-8.56	-9.03	-11.13	-12.95	-9.67	-14.24	-13.08	-8.58
225.0	-4.22	-5.57	-7.24	-9.33	-8.88	-9.84	-9.53	-11.58	-14.51	-10.08	-15.52	-18.54	-8.94
240.0	-2.81	-6.05	-8.78	-11.79	-8.64	-9.38	-8.68	-14.23	-14.67	-11.54	-15.14	-19.01	-10.02
255.0	-1.70	-5.73	-9.71	-14.54	-10.13	-8.92	-8.94	-16.93	-14.07	-10.45	-10.61	-14.01	-11.06
270.0	-0.58	-4.83	-9.46	-15.20	-12.12	-9.01	-9.10	-13.26	-12.86	-9.60	-8.13	-14.37	-11.89
285.0	0.06	-4.32	-8.68	-13.24	-13.16	-9.00	-8.71	-10.39	-10.27	-9.12	-8.09	-16.15	-13.93
300.0	-0.14	-4.50	-8.14	-12.05	-13.13	-9.31	-8.32	-8.89	-8.18	-9.67	-9.22	-17.67	-16.75
315.0	-1.11	-5.49	-8.52	-11.37	-12.46	-9.51	-8.40	-8.87	-7.32	-10.72	-11.46	-17.58	-13.93
330.0	-2.84	-7.08	-9.25	-10.88	-11.08	-9.12	-8.68	-9.09	-7.42	-11.09	-12.74	-16.87	-11.24
345.0	-5.79	-10.11	-10.67	-11.18	-10.12	-9.07	-8.33	-8.95	-8.11	-10.18	-11.65	-16.16	-9.61
360.0	-9.57	-13.57	-15.34	-13.31	-9.75	-8.67	-7.83	-8.36	-8.99	-9.17	-11.62	-15.21	-8.52

RP_2440.000_ver

Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.0	-0.69	-0.62	-0.22	-0.51	-0.51	-0.70	-0.24	-0.82	-2.44	-5.16	-8.41	-14.89	-15.01
15.0	-0.98	0.01	1.08	1.44	2.14	1.46	1.67	0.27	-1.98	-4.41	-7.65	-12.77	-17.21
30.0	-1.73	0.36	1.65	2.69	3.06	2.60	1.89	0.26	-2.27	-4.11	-6.65	-11.54	-17.30
45.0	-3.06	-0.17	1.27	2.59	2.51	2.24	0.59	-1.08	-3.16	-4.11	-6.51	-11.50	-15.04
60.0	-5.04	-1.56	0.06	1.50	0.98	0.35	-2.35	-3.36	-4.74	-4.77	-7.21	-11.93	-12.89
75.0	-7.33	-3.74	-2.35	-0.56	-1.81	-3.26	-6.64	-6.69	-7.69	-6.64	-7.61	-12.57	-11.27
90.0	-9.50	-7.15	-6.35	-4.26	-6.20	-7.94	-10.07	-10.83	-9.82	-8.53	-8.03	-12.76	-10.36
105.0	-9.01	-9.21	-6.16	-7.40	-6.90	-8.73	-10.89	-11.18	-8.39	-8.89	-9.02	-13.97	-9.96
120.0	-6.60	-5.98	-1.58	-4.04	-3.00	-6.15	-9.07	-8.08	-6.69	-8.87	-11.78	-16.64	-10.21
135.0	-3.70	-2.19	1.48	-0.01	0.19	-3.64	-7.70	-7.09	-6.56	-8.83	-13.88	-16.58	-12.09
150.0	-1.64	-0.04	2.78	2.18	1.82	-1.70	-6.30	-7.92	-8.13	-9.24	-12.85	-13.22	-14.43
165.0	-0.22	1.18	2.81	2.84	1.74	-0.81	-5.29	-7.75	-11.44	-10.05	-11.89	-10.77	-17.82
180.0	0.24	1.32	1.73	1.92	-0.57	-2.15	-6.43	-7.48	-12.06	-12.36	-12.13	-9.22	-14.42
195.0	-0.27	0.64	-0.06	-0.72	-6.38	-8.57	-13.98	-10.23	-12.74	-15.21	-11.19	-8.48	-11.34
210.0	-1.66	-0.91	-1.82	-3.99	-10.39	-14.22	-7.83	-10.83	-17.02	-14.06	-8.33	-8.07	-9.92
225.0	-3.74	-2.47	-2.89	-5.27	-6.65	-6.08	-4.23	-7.00	-9.02	-11.44	-5.94	-7.77	-9.05
240.0	-6.26	-3.88	-3.14	-4.66	-5.08	-4.27	-3.31	-5.03	-6.87	-8.73	-4.56	-7.77	-8.61
255.0	-8.37	-4.87	-3.49	-4.22	-4.96	-4.19	-2.91	-3.69	-6.25	-6.51	-4.30	-8.13	-8.44
270.0	-8.34	-5.71	-4.15	-4.78	-6.64	-5.20	-3.33	-3.57	-4.90	-5.36	-4.86	-9.45	-8.10
285.0	-6.40	-6.31	-5.52	-6.96	-9.36	-6.75	-4.28	-4.23	-4.46	-6.15	-6.33	-11.81	-8.06
300.0	-4.63	-6.82	-6.67	-9.87	-12.30	-8.59	-5.82	-4.83	-5.24	-8.21	-7.48	-13.96	-8.38
315.0	-2.99	-6.04	-6.17	-12.24	-13.78	-10.75	-8.13	-5.76	-6.45	-11.34	-8.30	-15.64	-9.32
330.0	-1.68	-4.41	-4.51	-10.16	-10.87	-11.80	-8.81	-7.50	-6.38	-12.00	-8.56	-16.91	-10.89
345.0	-0.80	-2.52	-2.26	-5.48	-5.44	-7.42	-4.54	-5.45	-4.36	-8.26	-8.48	-17.15	-12.44
360.0	-0.67	-1.03	-0.75	-1.54	-1.84	-2.05	-1.14	-1.61	-2.80	-5.71	-8.60	-15.17	-14.72

Theta = 90, Phi = 0



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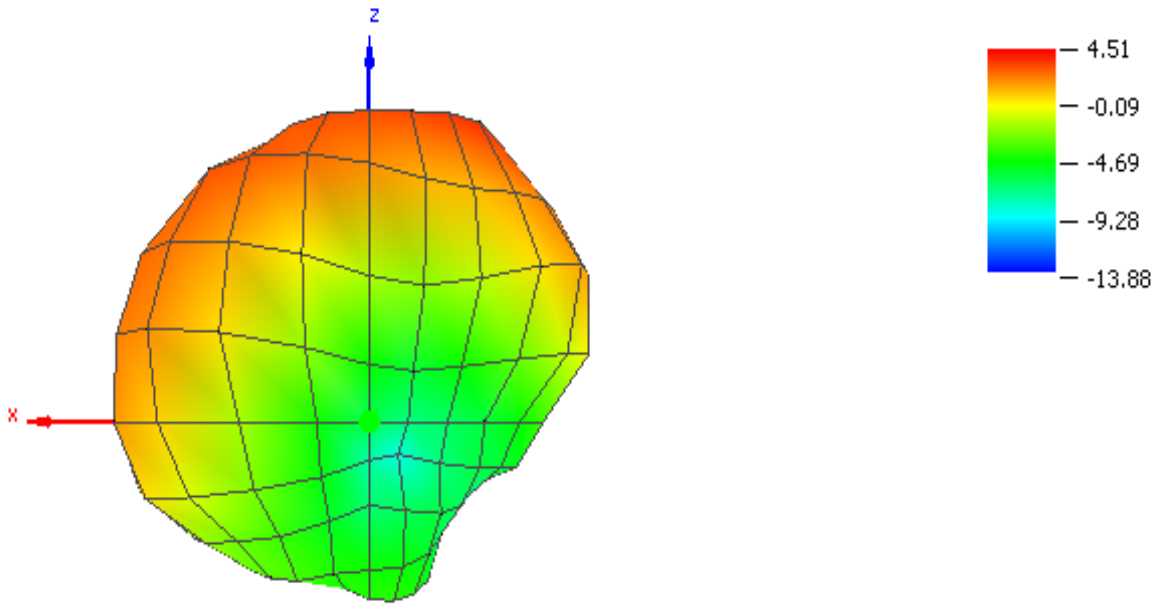
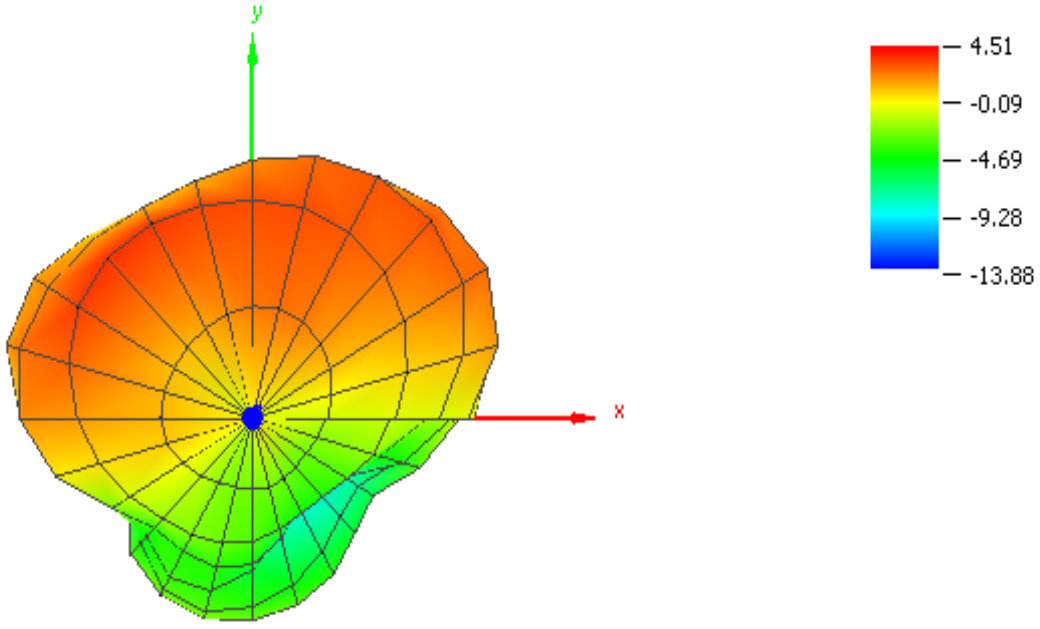
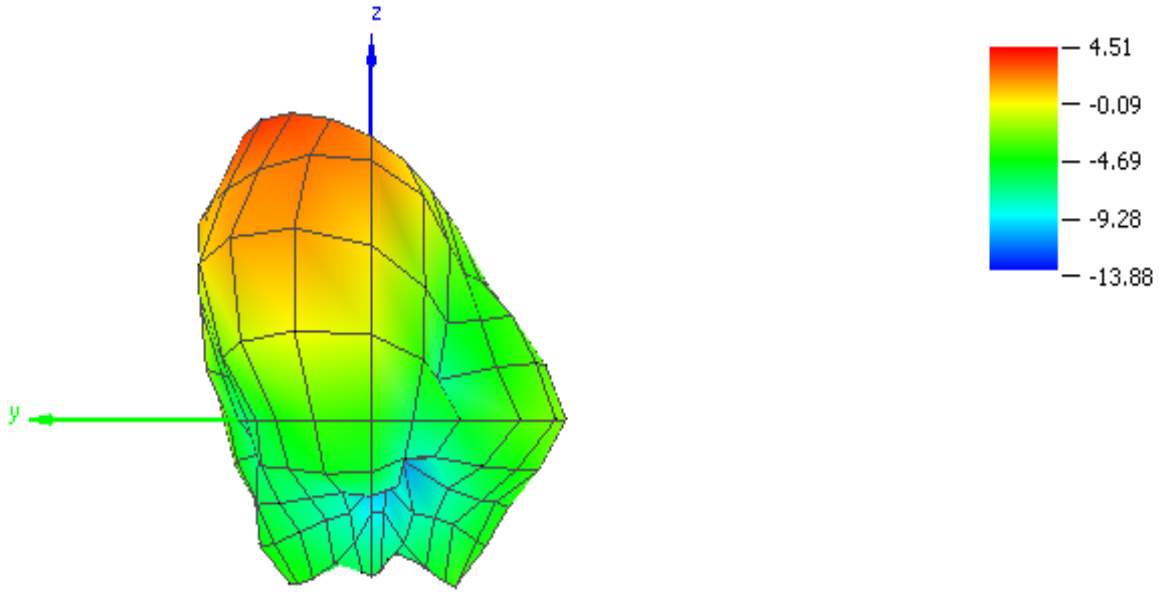


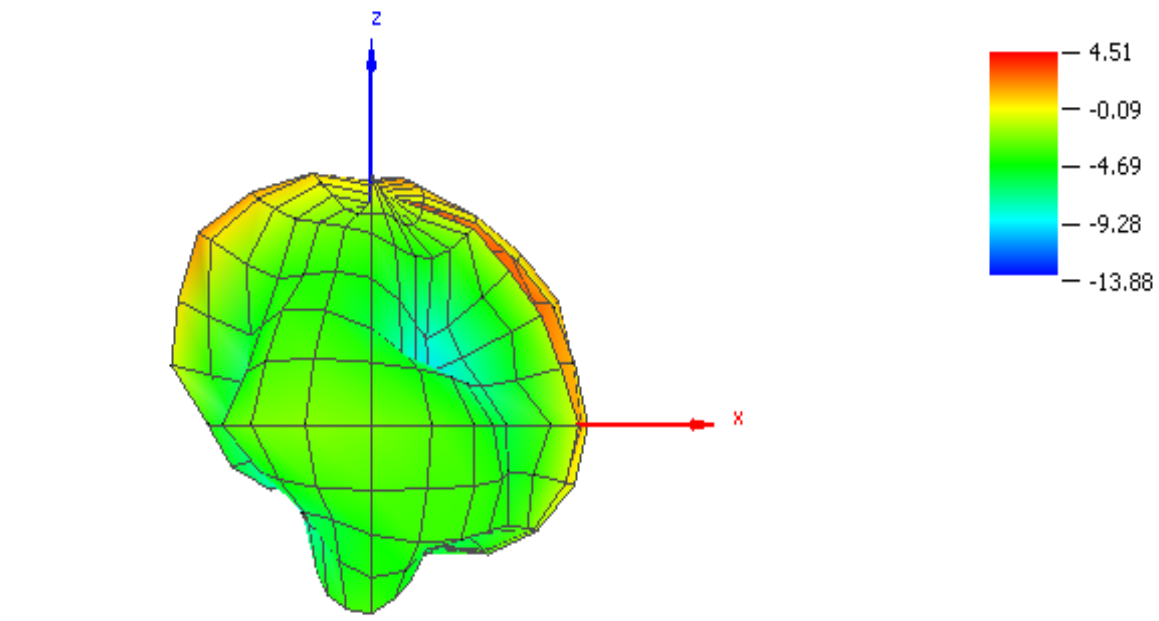
Theta = 0, Phi = 0



Theta = 90, Phi = 180



Theta = 90, Phi = 270



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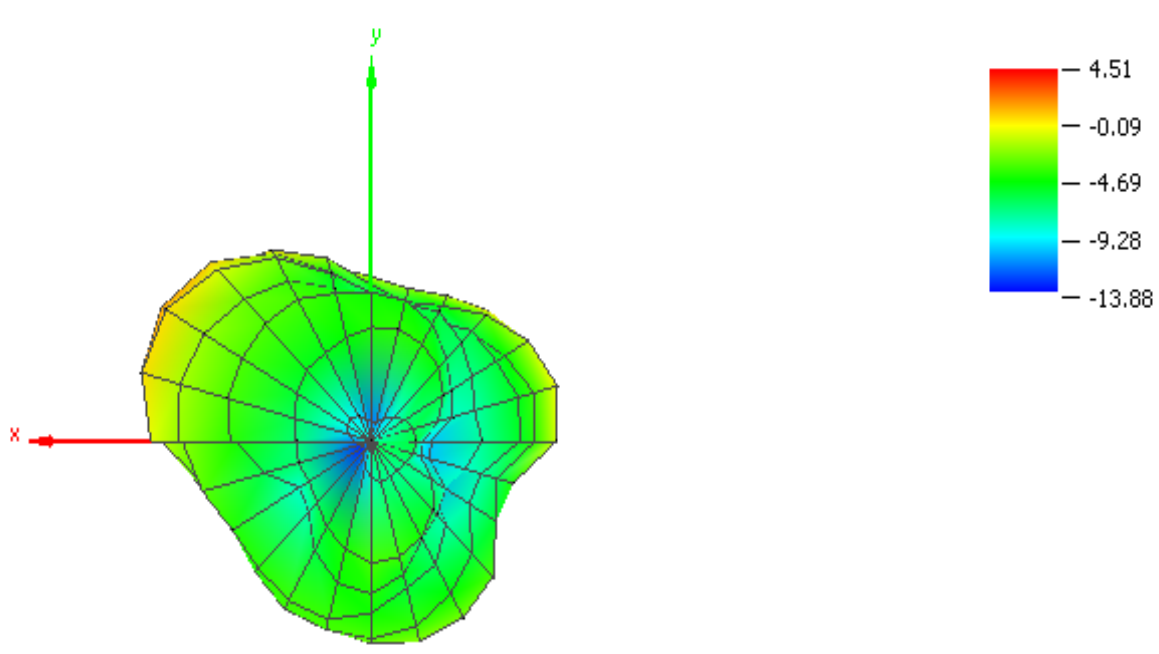

OTA Test Results for Frequency 2480.000 MHz

OTA Evaluation Results:

Total Radiated Power	-1.90 dBm
Peak EIRP	4.12 dBm
Directivity	6.03 dBi
Efficiency	-1.90 dB
Efficiency	64.53 %
Gain	4.12 dBi
NHPRP 45°	-3.60 dBm
NHPRP 45° / TRP	-1.70 dB
NHPRP 45° / TRP	67.64 %
NHPRP 30°	-5.27 dBm
NHPRP 30° / TRP	-3.37 dB
NHPRP 30° / TRP	46.04 %
NHPRP 22.5°	-6.49 dBm
NHPRP 22.5° / TRP	-4.58 dB
NHPRP 22.5° / TRP	34.81 %
UHRP	-3.47 dBm
UHRP / TRP	-1.56 dB
UHRP / TRP	69.74 %
LHRP	-7.09 dBm
LHRP / TRP	-5.19 dB
LHRP / TRP	30.26 %
Front/Back Ratio	13.23
PhiBW	174.3 deg
PhiBW Up	51.9 deg
PhiBW Down	122.4 deg
ThetaBW	46.0 deg
ThetaBW Up	23.4 deg
ThetaBW Down	22.6 deg
Boresight Phi	135 deg
Boresight Theta	30 deg
Maximum Power	4.12 dBm
Minimum Power	-12.04 dBm
Average Power	-1.92 dBm
Max/Min Ratio	16.16 dB
Max/Avg Ratio	6.04 dB
Min/Avg Ratio	-10.12 dB
Best Single Value	3.56 dBm
Best Position	Phi = 30 deg; Theta = 60 deg; Pol = Ver

RP_2480.000_tot

Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.00	-0.63	-0.42	-0.26	0.45	0.69	0.68	0.13	-0.96	-2.81	-3.16	-4.91	-7.96	-6.28
15.00	-1.15	0.18	1.39	2.15	3.01	2.66	2.47	0.69	-1.34	-2.57	-4.62	-7.62	-6.60
30.00	-1.64	0.90	2.33	3.23	3.80	3.68	3.10	1.30	-1.12	-2.44	-3.82	-7.20	-6.98
45.00	-2.05	1.34	2.72	3.48	3.27	3.32	2.17	0.50	-1.19	-2.22	-3.56	-7.27	-6.66
60.00	-2.31	1.80	2.75	3.19	1.80	1.85	-0.17	-0.89	-2.09	-2.58	-3.89	-7.45	-5.98
75.00	-2.27	1.93	2.68	2.52	-0.15	-0.78	-3.46	-3.44	-4.14	-3.48	-3.98	-7.27	-5.80
90.00	-1.85	2.00	2.80	1.74	-2.22	-5.06	-7.17	-7.95	-6.65	-3.87	-3.67	-7.41	-6.34
105.00	-1.15	2.08	3.22	1.43	-2.47	-7.88	-8.98	-12.04	-7.45	-4.26	-3.51	-7.91	-7.64
120.00	-0.35	2.06	3.79	2.05	-1.28	-6.41	-7.09	-8.37	-7.86	-6.40	-4.13	-8.42	-9.27
135.00	0.25	2.03	4.12	2.78	-0.17	-4.48	-5.89	-6.15	-9.02	-9.19	-5.68	-9.15	-10.16
150.00	0.59	1.95	4.08	3.18	0.72	-2.58	-5.69	-6.19	-8.85	-8.91	-7.56	-8.73	-9.86
165.00	0.97	1.84	3.50	3.00	1.26	-1.22	-5.40	-7.20	-7.75	-7.33	-7.39	-7.32	-8.19
180.00	0.82	1.50	2.04	1.84	0.53	-1.25	-5.59	-8.36	-7.48	-5.78	-6.79	-5.94	-6.97
195.00	0.72	0.67	0.04	-0.56	-2.13	-3.75	-7.88	-8.47	-6.85	-3.86	-6.34	-5.30	-6.00
210.00	0.53	-0.94	-2.14	-3.40	-4.40	-7.19	-6.43	-6.91	-4.70	-3.46	-5.38	-5.11	-5.57
225.00	0.20	-2.67	-3.33	-3.90	-3.21	-3.65	-3.18	-4.50	-2.82	-3.38	-4.73	-5.79	-5.71
240.00	-0.16	-4.31	-4.23	-3.01	-1.94	-1.55	-1.40	-2.52	-2.55	-3.08	-4.64	-7.38	-6.36
255.00	-0.40	-5.10	-5.14	-2.67	-2.03	-1.12	-0.85	-1.72	-2.47	-3.10	-5.76	-9.55	-6.36
270.00	-0.45	-4.89	-6.41	-3.22	-3.77	-2.17	-1.67	-2.16	-2.74	-4.38	-7.64	-11.56	-6.06
285.00	-0.07	-4.37	-6.97	-4.27	-6.35	-4.11	-3.46	-3.47	-4.20	-7.24	-10.34	-11.06	-5.78
300.00	0.35	-3.54	-7.08	-6.09	-8.54	-6.54	-5.48	-5.01	-6.06	-10.60	-11.70	-10.62	-6.20
315.00	0.48	-3.11	-6.18	-7.81	-10.22	-7.91	-6.78	-6.12	-7.46	-10.19	-9.11	-10.27	-6.32
330.00	0.26	-2.52	-4.45	-7.32	-9.41	-7.89	-6.32	-6.65	-7.30	-8.79	-6.60	-9.89	-6.19
345.00	-0.03	-1.63	-2.45	-4.18	-4.28	-4.87	-3.59	-4.98	-5.71	-6.47	-5.41	-9.95	-6.20
360.00	-0.50	-0.52	-1.00	-0.47	-0.65	-0.36	-0.82	-1.95	-3.92	-3.70	-5.15	-8.37	-6.00

RP_2480.000_hor

Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.0	-9.09	-13.92	-16.54	-15.02	-12.05	-9.67	-8.33	-7.17	-7.47	-7.85	-9.36	-11.94	-8.01
15.0	-9.81	-11.61	-16.98	-12.81	-10.57	-8.69	-7.81	-6.60	-7.74	-8.81	-9.86	-12.16	-7.81
30.0	-7.87	-6.21	-7.99	-8.15	-8.87	-8.52	-7.55	-7.35	-9.01	-10.58	-10.12	-11.90	-8.34
45.0	-5.73	-2.88	-3.64	-4.28	-7.58	-8.65	-8.43	-9.88	-10.80	-11.77	-9.97	-12.94	-8.89
60.0	-4.23	-0.45	-0.68	-1.53	-6.10	-8.62	-10.20	-10.82	-11.35	-11.33	-9.57	-14.46	-9.41
75.0	-3.48	0.82	1.20	-0.11	-4.76	-8.54	-10.89	-11.47	-11.96	-9.46	-8.50	-15.24	-9.78
90.0	-2.95	1.49	2.41	0.78	-4.01	-9.20	-11.00	-14.84	-11.30	-7.07	-6.53	-13.21	-10.82
105.0	-2.54	1.60	2.78	0.82	-4.22	-11.11	-12.34	-18.27	-10.30	-6.18	-5.07	-11.51	-12.47
120.0	-2.58	0.80	2.23	0.04	-5.05	-13.69	-13.46	-18.35	-11.71	-8.03	-4.87	-10.55	-14.46
135.0	-3.41	-0.83	0.69	-1.71	-6.91	-14.78	-13.41	-15.03	-17.91	-11.99	-6.02	-10.90	-15.80
150.0	-5.29	-3.97	-2.52	-5.43	-10.30	-11.32	-11.67	-12.38	-14.29	-12.01	-8.38	-12.24	-14.83
165.0	-8.20	-8.11	-6.80	-9.47	-9.96	-8.32	-10.32	-11.57	-11.14	-11.30	-11.03	-12.42	-12.01
180.0	-12.14	-10.65	-8.48	-8.24	-6.08	-6.72	-9.24	-12.88	-11.14	-12.74	-15.56	-12.64	-9.48
195.0	-11.31	-8.89	-7.19	-7.44	-5.85	-7.10	-9.98	-12.69	-12.78	-13.24	-17.73	-12.61	-7.53
210.0	-7.25	-7.55	-7.42	-9.48	-7.43	-9.02	-11.29	-11.00	-14.47	-13.58	-14.03	-12.07	-6.37
225.0	-4.47	-7.12	-9.26	-13.47	-9.15	-9.22	-10.47	-11.63	-13.65	-13.93	-13.10	-11.54	-6.21
240.0	-2.58	-7.52	-13.26	-16.02	-9.77	-8.29	-9.39	-15.35	-11.68	-11.13	-13.78	-12.25	-6.87
255.0	-1.52	-8.18	-17.80	-14.96	-10.77	-7.65	-9.56	-16.29	-10.53	-9.42	-13.48	-14.31	-7.63
270.0	-0.89	-7.85	-16.92	-13.14	-11.82	-7.46	-9.14	-12.80	-9.84	-9.99	-13.69	-15.23	-8.65
285.0	-0.57	-7.20	-13.65	-13.30	-13.23	-8.02	-8.80	-10.48	-9.42	-12.89	-16.68	-13.44	-9.30
300.0	-0.67	-6.39	-11.49	-14.29	-14.94	-9.28	-8.70	-9.39	-8.90	-14.72	-19.13	-12.79	-10.81
315.0	-1.34	-6.49	-10.02	-15.98	-16.50	-9.95	-8.67	-8.65	-8.68	-11.98	-13.84	-12.62	-10.58
330.0	-2.78	-7.40	-9.25	-16.39	-15.70	-10.32	-8.41	-8.18	-8.39	-9.53	-10.37	-12.04	-9.31
345.0	-4.93	-9.31	-10.04	-15.45	-13.65	-10.43	-8.54	-7.73	-8.05	-8.08	-9.12	-12.87	-8.75
360.0	-8.15	-11.79	-14.11	-15.83	-12.17	-10.03	-8.51	-7.48	-7.61	-7.79	-9.18	-11.89	-7.87

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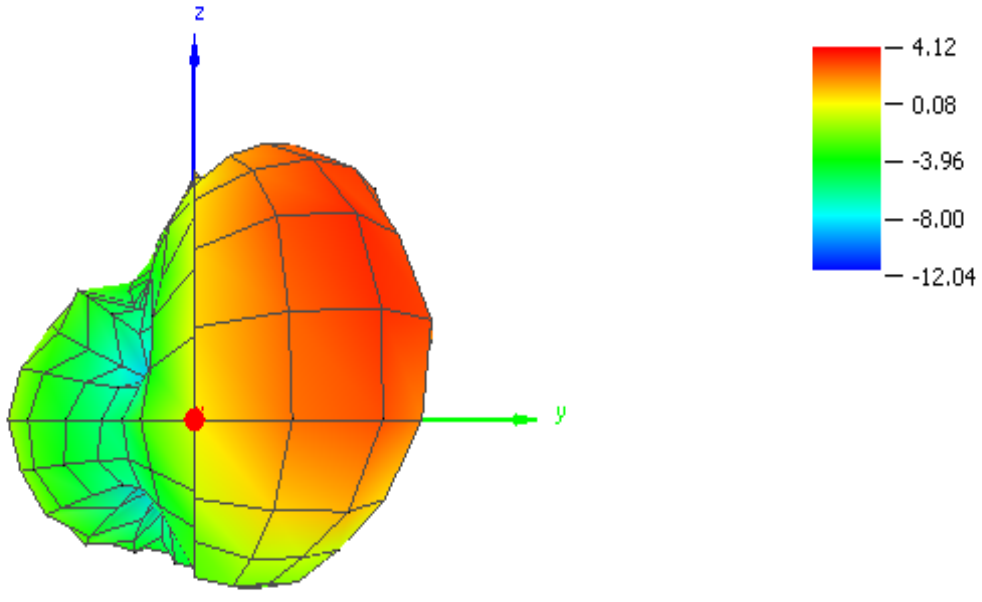
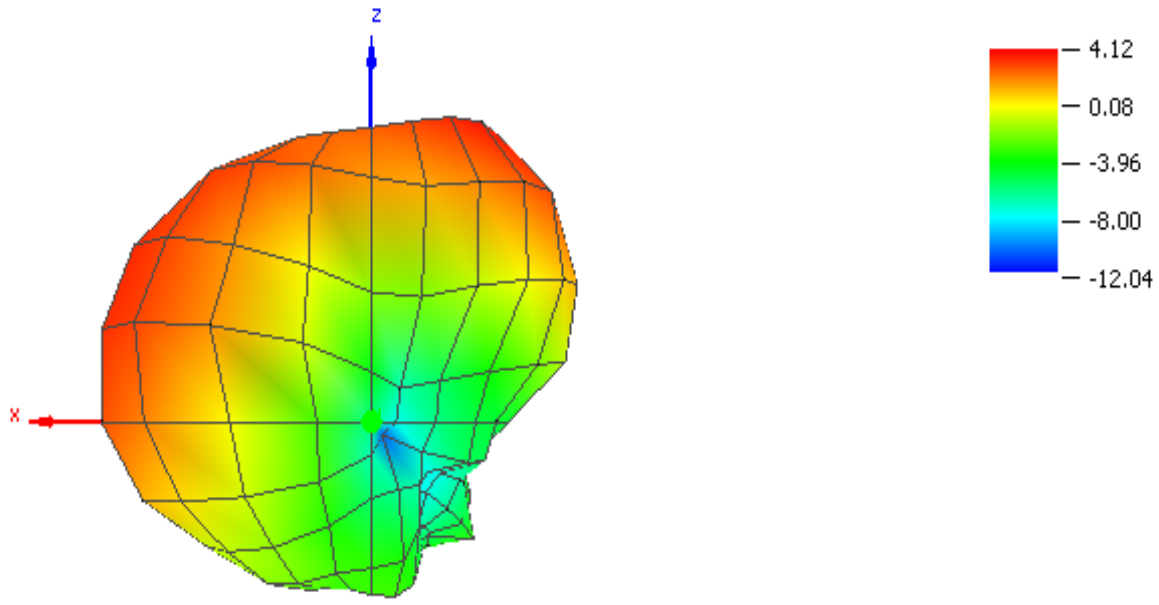
Azimuth (deg)	Elevation 0 deg (dB)	Elevation 15 deg (dB)	Elevation 30 deg (dB)	Elevation 45 deg (dB)	Elevation 60 deg (dB)	Elevation 75 deg (dB)	Elevation 90 deg (dB)	Elevation 105 deg (dB)	Elevation 120 deg (dB)	Elevation 135 deg (dB)	Elevation 150 deg (dB)	Elevation 165 deg (dB)	Elevation 180 deg (dB)
0.0	-1.30	-0.62	-0.36	0.32	0.45	0.26	-0.54	-2.15	-4.62	-4.96	-6.83	-10.17	-11.11
15.0	-1.78	-0.12	1.32	2.01	2.82	2.33	2.04	-0.21	-2.47	-3.74	-6.17	-9.51	-12.75
30.0	-2.83	-0.04	1.91	2.90	3.56	3.41	2.70	0.66	-1.89	-3.16	-4.98	-9.00	-12.68
45.0	-4.48	-0.72	1.57	2.69	2.89	3.04	1.77	0.08	-1.70	-2.73	-4.69	-8.65	-10.64
60.0	-6.79	-2.14	0.12	1.41	1.03	1.44	-0.62	-1.35	-2.64	-3.20	-5.26	-8.41	-8.60
75.0	-8.42	-4.54	-2.73	-0.91	-2.00	-1.58	-4.33	-4.18	-4.93	-4.75	-5.87	-8.02	-8.01
90.0	-8.34	-7.59	-7.82	-5.27	-6.91	-7.17	-9.49	-8.95	-8.47	-6.69	-6.84	-8.74	-8.25
105.0	-6.76	-7.77	-6.98	-7.39	-7.27	-10.69	-11.68	-13.22	-10.64	-8.73	-8.69	-10.41	-9.38
120.0	-4.31	-3.95	-1.41	-2.26	-3.65	-7.31	-8.23	-8.83	-10.16	-11.46	-12.14	-12.53	-10.84
135.0	-2.20	-1.13	1.50	0.88	-1.21	-4.90	-6.73	-6.75	-9.62	-12.42	-16.93	-13.93	-11.54
150.0	-0.70	0.66	3.00	2.53	0.36	-3.20	-6.96	-7.38	-10.32	-11.84	-15.25	-11.29	-11.53
165.0	0.40	1.38	3.07	2.75	0.92	-2.17	-7.09	-9.18	-10.42	-9.55	-9.85	-8.93	-10.51
180.0	0.59	1.23	1.64	1.40	-0.54	-2.70	-8.04	-10.25	-9.93	-6.75	-7.40	-6.98	-10.55
195.0	0.44	0.16	-0.87	-1.55	-4.54	-6.46	-12.03	-10.54	-8.13	-4.39	-6.67	-6.19	-11.27
210.0	-0.27	-2.00	-3.66	-4.63	-7.38	-11.85	-8.14	-9.05	-5.18	-3.91	-6.02	-6.09	-13.31
225.0	-1.61	-4.61	-4.61	-4.41	-4.49	-5.06	-4.08	-5.43	-3.20	-3.78	-5.42	-7.13	-15.31
240.0	-3.86	-7.12	-4.81	-3.24	-2.72	-2.58	-2.15	-2.75	-3.12	-3.82	-5.21	-9.09	-15.88
255.0	-6.85	-8.05	-5.38	-2.93	-2.65	-2.22	-1.48	-1.88	-3.21	-4.26	-6.56	-11.33	-12.34
270.0	-10.63	-7.95	-6.82	-3.69	-4.52	-3.69	-2.53	-2.55	-3.68	-5.77	-8.88	-13.99	-9.54
285.0	-9.67	-7.56	-8.02	-4.85	-7.34	-6.37	-4.97	-4.43	-5.75	-8.62	-11.49	-14.81	-8.33
300.0	-6.44	-6.71	-9.03	-6.80	-9.66	-9.84	-8.29	-6.98	-9.25	-12.72	-12.56	-14.66	-8.05
315.0	-4.19	-5.78	-8.49	-8.53	-11.38	-12.18	-11.32	-9.66	-13.59	-14.90	-10.89	-14.07	-8.36
330.0	-2.71	-4.23	-6.19	-7.90	-10.57	-11.56	-10.51	-11.93	-13.83	-16.84	-8.96	-13.98	-9.09
345.0	-1.72	-2.45	-3.28	-4.52	-4.81	-6.28	-5.27	-8.28	-9.51	-11.57	-7.82	-13.04	-9.72
360.0	-1.32	-0.86	-1.22	-0.60	-0.97	-0.85	-1.62	-3.37	-6.34	-5.85	-7.33	-10.92	-10.58

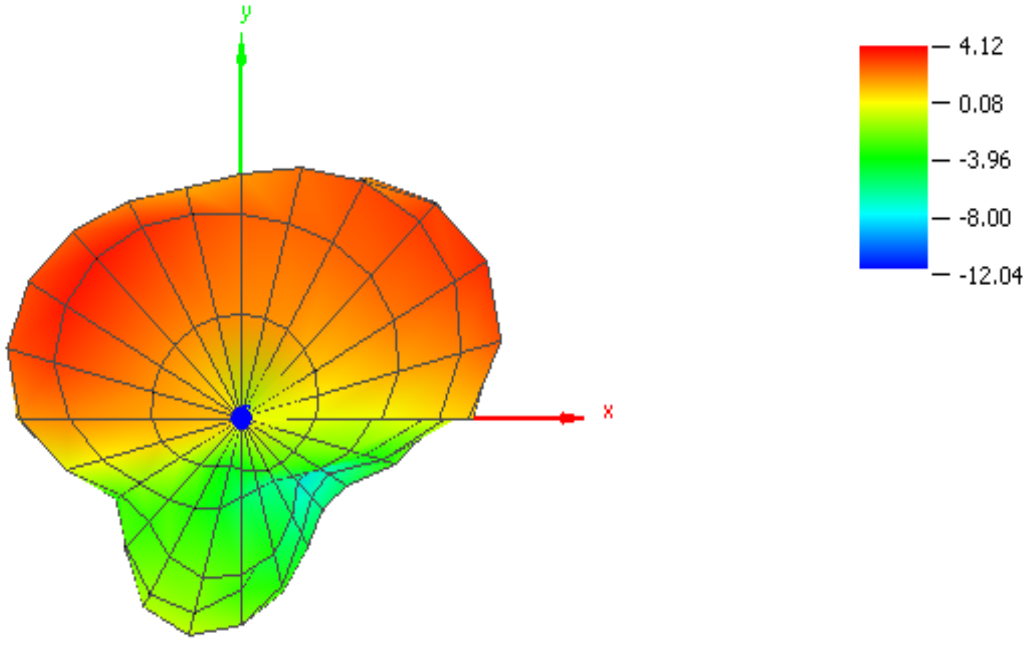
Theta = 90, Phi = 0



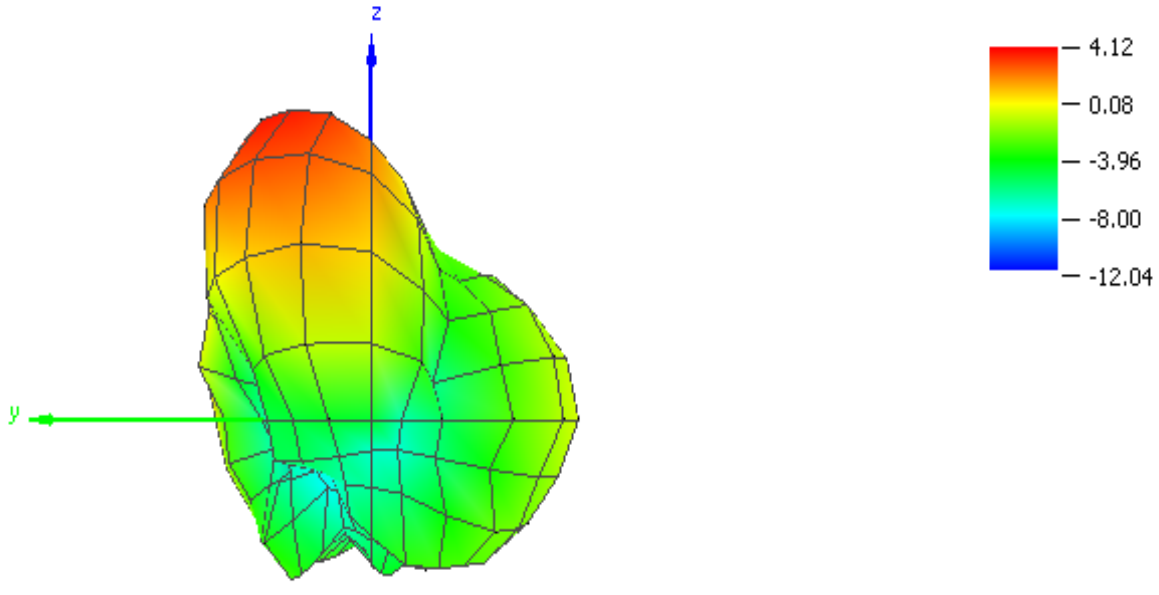
Theta = 90, Phi = 90



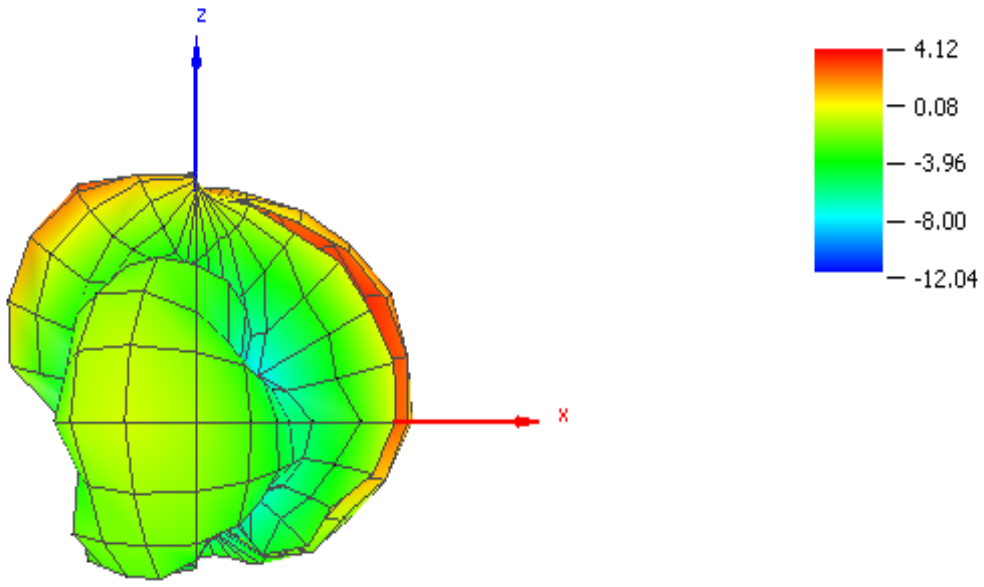
Theta = 0, Phi = 0



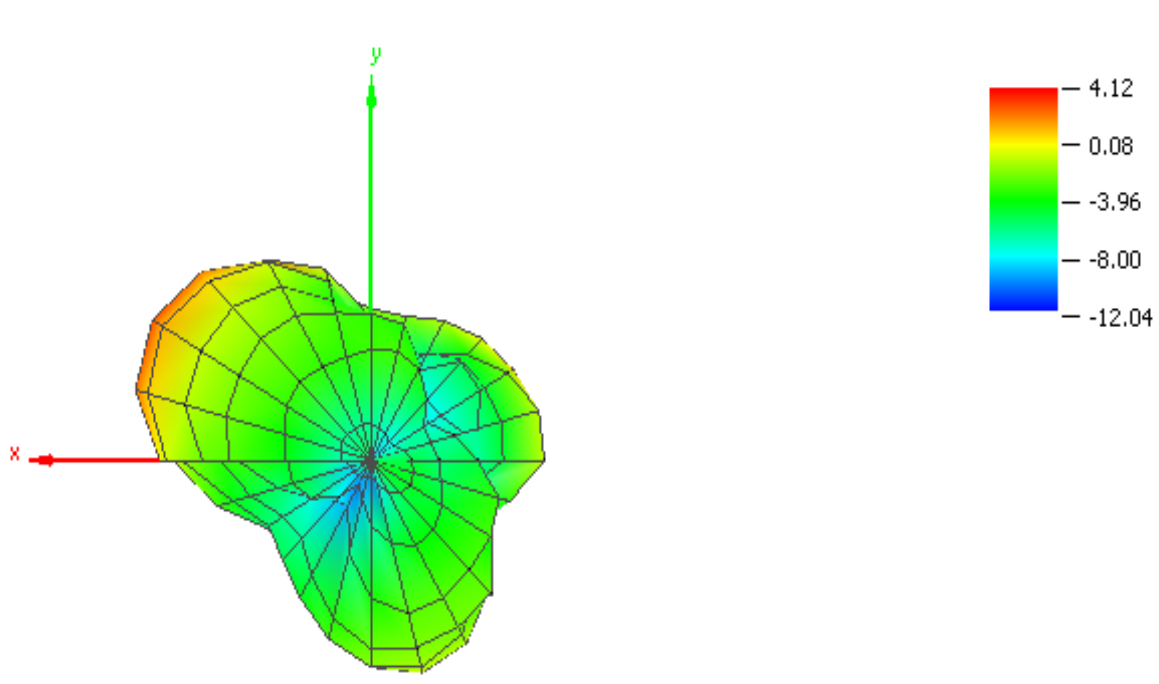
Theta = 90, Phi = 180



Theta = 90, Phi = 270



Theta = 180, Phi = 0



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