



Antenna Measurement Summary and Test Report – Floorsense Puck v4

The PCB trace antenna included on the Floorsight Puck v4 is designed to operate at both sub-1Ghz frequencies (868mhz and 915mhz) along with the 2.4Ghz frequency. The antenna follows precisely the reference design of Texas Instruments Development Kit 2 sample antenna model #9.

As per the FCC guidelines we are providing the test report from the reference design board 9 reference design along with details showing how the antenna on the Floorsense Puck v4 matches this reference design

Section 1

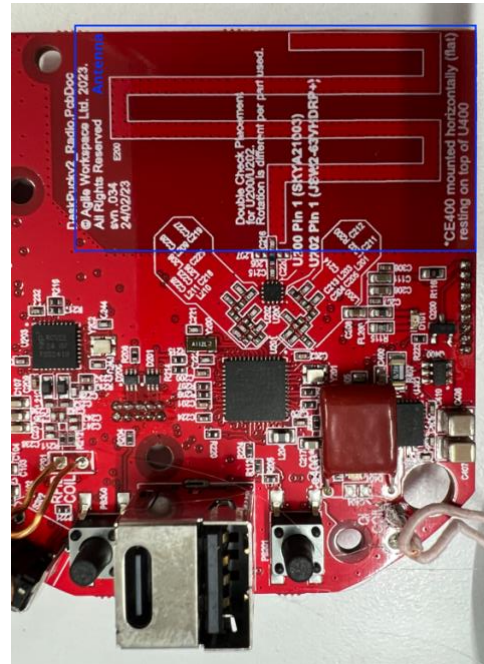
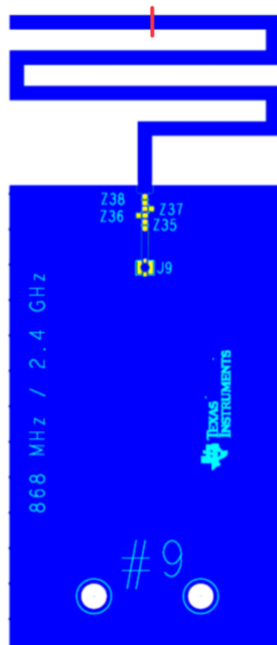
Antenna comparison – TI Reference board 9 vs Floorsense Puck v4

Acronyms and Descriptions

Table 1. Acronyms and Descriptions

Acronym	Description
AUT	Antenna Under Test
BOM	Bill Of Materials
BW	Bandwidth
CTIA	Cellular Telecommunications Industry Association
DK	Development Kit
DNM	Do Not Mount
EB	Evaluation Board
EIRP	Effective Isotropic Radiated Power
EM	Evaluation Module
ISM	Industrial, Scientific, Medical
NHPRP	Partial Radiated Power
NHPRP45	Partial Radiated Power within a 45° angle
OTA	Over The Air
PCB	Printed Circuit Board
RF	Radio Frequency
SWR	Standing Wave Ratio
TRP	Total Radiated Power

TI CC-Antenna-DK2 – Board 9 layout as implemented on floorsight Puck4



Size	Width (mm)	Height (mm)
PCB Board	42	95
GND	38	66
Reference Designator	Part Number	Value
Z35, Z38	RK73Z1ETTP	0 Ω
Z36, Z37	DNM	—

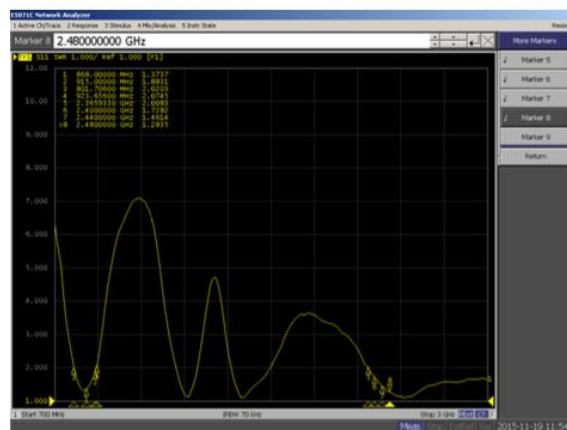
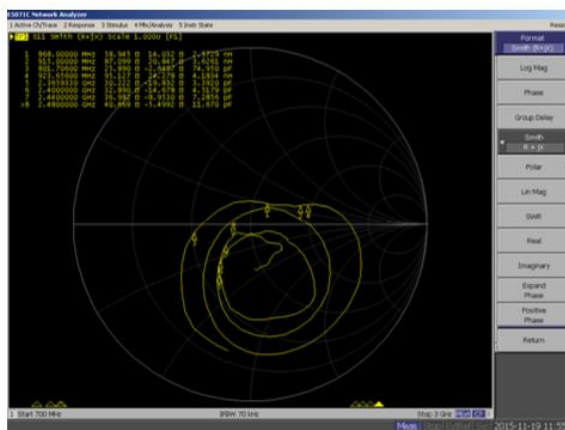
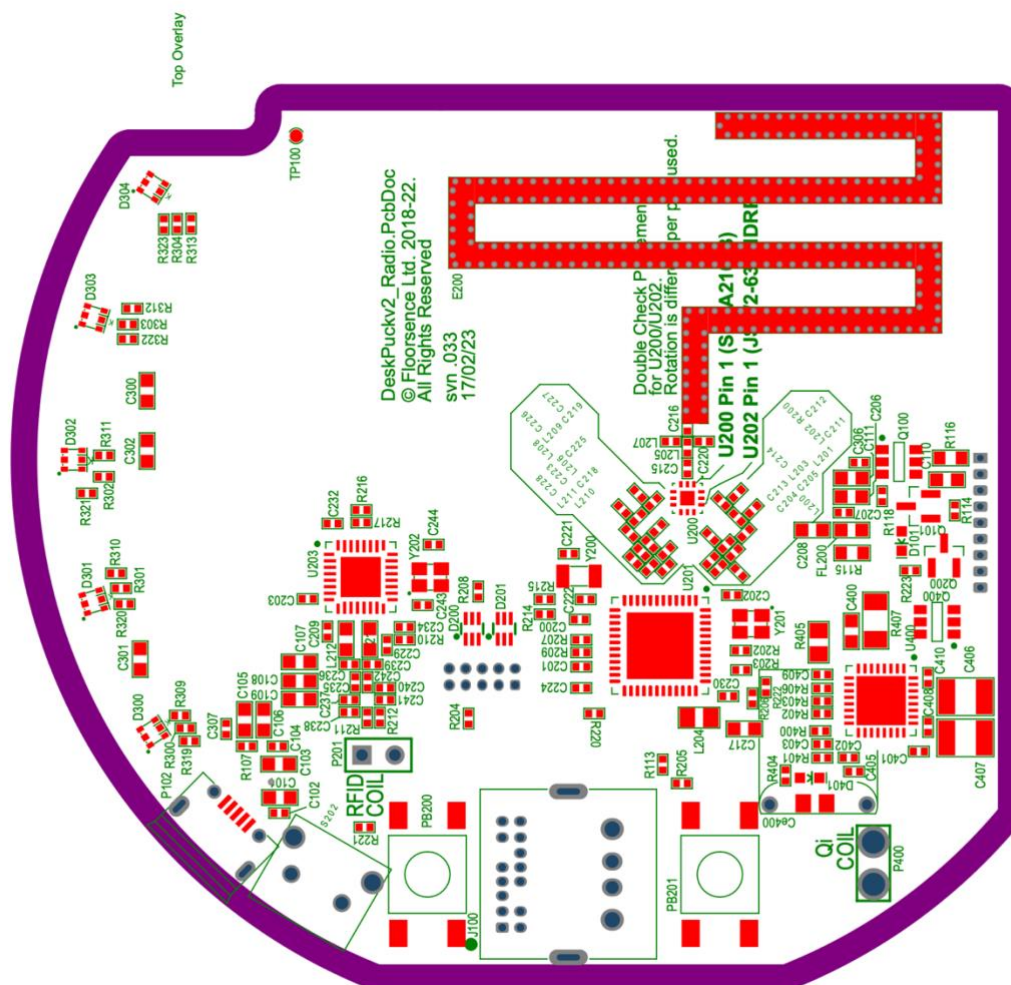


Figure 1 Impedance Measurement with no matching components

Figure 2 SWR Measurement of Puckv4 Antenna (Board 9) shows that the 868 MHz bandwidth (SWR: 2) is 122 MHz and the 2.4 GHz bandwidth (SWR: 2) is approximately 600 MHz.


The length of the Board #9 reference design antenna is variable as per the red line to optimise for 915mhz/868mhz/2.4Ghz operation as opposed to single frequency operation. The Puck4 antenna cuts the length as indicated in the reference design for operation with multiple frequencies. The test reports in Section 2 below are with antenna length as with the indicated cut as matched by the floorsense Puck 4 antenna.





Bantian
Longgang District
Shenzhen 518125
China

Antenna Manufacturer Attestation

Name	Designation	Signature/Company Stamp
Xi aoHui Tu	General Manager	

Section 2 – Antenna Specification and Test Report for Reference Design

Antenna OTA Evaluation Results

A.9.1 – 868 Mhz

Summary of evaluation results



Test Description	Test Result
Total Radiated Power	-0.95 dBm
Peak EIRP	3.52 dBm
Directivity	4.47 dBi
Efficiency	-0.95 dB
Efficiency	0.8038
Peak Gain	3.52 dBi
NHPRP 45°	-2.87 dBm
NHPRP 45° / TRP	-1.92 dB
NHPRP 45° / TRP	0.6421
NHPRP 30°	-4.35 dBm
NHPRP 30° / TRP	-3.40 dB
NHPRP 30° / TRP	0.4571
NHPRP 22.5°	-5.64 dBm
NHPRP 22.5° / TRP	-4.69 dB
NHPRP 22.5° / TRP	0.3394
UHRP	-4.13 dBm
UHRP / TRP	-3.18 dB
UHRP / TRP	0.4803
LHRP	-3.79 dBm
LHRP / TRP	-2.84 dB
LHRP / TRP	0.5197
PGRP (0-120°)	-2.37 dBm
PGRP / TRP	-1.42 dB
PGRP / TRP	0.7206
Front/Back Ratio	4.45
PhiBW	80.4°
PhiBW Up	47.9°
PhiBW Down	32.6°
ThetaBW	115.7°
ThetaBW Up	104.1°
ThetaBW Down	11.6°
Boresight Phi	165°
Boresight Theta	105°
Maximum Power	3.52 dBm
Minimum Power	-15.99 dBm
Average Power	-0.06 dBm
Max/Min Ratio	19.52 dB
Max/Avg Ratio	3.58 dB
Min/Avg Ratio	-15.94 dB
Worst Single Value	-30.83 dBm
Worst Position	Azi = 150°; Elev = 150°; Pol = Horizontal
Best Single Value	3.33 dBm
Best Position	Azi = 165°; Elev = 105°; Pol = Vertical

Total power



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	2.25	1.75	0.51	-1.48	-0.3	0.27	0.68	0.58	0.94	0.97	0.73	2.12	2.37
15	2.09	1.93	0.05	-1.57	0.04	0.48	-0.18	0.05	1.44	1.3	0.34	1.72	1.86
30	1.85	1.75	-0.5	-1.55	-0.13	-0.1	-2.01	-0.42	1.53	0.98	-0.76	1.08	1.31
45	1.5	1.28	-0.98	-1.45	-1.35	-2.4	-3.74	-0.77	0.54	-0.41	-2.74	0.12	0.74
60	1.18	0.78	-1.32	-1.67	-3.58	-6.06	-4.34	-2.01	-1.58	-2.53	-4.65	-0.71	0.47
75	0.82	0.16	-1.57	-2.56	-6.44	-9.09	-5.3	-5.4	-5.18	-5.11	-5.12	-1.29	0.6
90	0.53	-0.34	-1.59	-3.75	-6.99	-6.8	-6.48	-9.27	-7.69	-5.78	-3.93	-1.32	1.08
105	0.52	-0.52	-1.1	-4.73	-4.87	-3.58	-5.95	-6.21	-5.81	-4.41	-2.22	-0.9	1.71
120	0.82	-0.12	-0.34	-4.19	-2.6	-1.27	-3.78	-1.97	-2.86	-2.84	-0.87	-0.18	2.2
135	1.47	0.6	0.71	-2.58	-0.44	0.57	-1.57	1.04	-0.17	-1.26	0.41	0.69	2.48
150	2.05	1.43	1.43	-1.04	0.93	1.71	-0.52	2.72	1.42	0.08	1.24	1.33	2.45
165	2.53	2.23	1.9	0.11	1.81	2.53	-0.36	3.52	2.26	1.25	1.91	1.83	2.16
180	2.75	2.79	2.02	0.41	1.91	2.95	-0.64	3.25	2.01	1.81	2.25	2.09	1.72
195	2.72	3.13	1.96	-0.04	1.05	2.74	-0.9	1.98	0.47	1.61	2.28	2.17	1.13
210	2.48	3.09	1.83	-0.71	-0.69	1.62	-1.6	0.72	-1.84	0.51	1.95	2.02	0.58
225	2	2.73	1.36	-1.2	-3.21	-1.15	-3.77	-0.31	-4.36	-1.86	1.34	1.7	0.19
240	1.41	2.07	0.64	-1.6	-5.27	-5.33	-7.16	-1.78	-6.11	-4.62	0.63	1.49	0.3
255	0.65	1.01	-0.45	-2.41	-6.44	-12.98	-10.53	-4.77	-7.88	-7.68	-0.13	1.4	0.8
270	0.12	-0.14	-1.59	-3.54	-6.51	-15.99	-9.2	-9.04	-8.36	-8.93	-0.6	1.47	1.49
285	-0.09	-1.2	-2.18	-4.51	-5.29	-9.69	-6.44	-9.98	-5.96	-7.52	-0.78	1.65	2.17
300	0.3	-1.31	-1.75	-4.32	-3.75	-6.21	-4.37	-5.75	-3.47	-5.29	-0.5	1.87	2.61
315	1.06	-0.47	-0.8	-3.27	-2.23	-3.75	-2.36	-2.22	-1.47	-3.12	-0.09	2.04	2.83
330	1.69	0.46	-0.03	-2.26	-1.18	-2.12	-0.87	-0.24	-0.35	-1.59	0.19	2.11	2.83
345	1.91	1.35	0.18	-1.4	-0.62	-0.93	0.16	0.82	0.21	-0.37	0.42	2.24	2.57
360	2.25	1.75	0.51	-1.48	-0.3	0.27	0.68	0.58	0.94	0.97	0.73	2.12	2.37

Horizontal power

Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-14.8	-15.48	-19.15	-30.56	-15.65	-15.16	-14.97	-10.63	-5.44	-5.49	-10.15	-22.55	-18.56
15	-7.93	-7.29	-12.07	-20.33	-16.53	-17.4	-16.19	-9.13	-4	-4.77	-12.14	-12.76	-9.86
30	-3.81	-3.81	-7.82	-15.81	-22.04	-18.43	-17.19	-8.21	-3.43	-4.69	-10.81	-7.04	-4.99
45	-1.29	-1.7	-5.39	-11.44	-17.3	-14.96	-16.41	-8.14	-3.83	-4.92	-8.12	-3.87	-2.03
60	0.04	-0.66	-3.99	-8.16	-10.93	-13.15	-14.98	-9.1	-4.91	-5.24	-6.3	-2.29	-0.43
75	0.61	-0.26	-2.97	-5.83	-7.99	-12.24	-13.4	-11.16	-6.45	-5.68	-5.34	-1.52	0.53
90	0.45	-0.5	-2.5	-4.9	-7.2	-11.65	-12	-13	-7.77	-6.38	-5.46	-1.61	0.86
105	-0.36	-1.41	-2.72	-5.15	-7.82	-11.5	-11.1	-13.18	-9.39	-7.57	-6.83	-2.6	0.56
120	-1.54	-2.81	-3.8	-6.56	-9.46	-12.17	-11.2	-12.13	-11.23	-9.15	-9.19	-4.36	-0.43
135	-3.57	-5.52	-6.13	-9.93	-12.17	-13.78	-12.13	-10.95	-13.36	-11.65	-14.2	-7.72	-2.53
150	-6.66	-10.03	-10.01	-14.61	-14.55	-15.19	-13.27	-10.26	-13.96	-13.03	-30.83	-13.11	-5.78
165	-13.89	-24.43	-17.48	-13.78	-12.62	-15.34	-13.91	-10.16	-12.33	-10.68	-14.2	-15.65	-12.72
180	-20.55	-13.93	-14.31	-9.34	-9.08	-13.96	-14.45	-11.24	-10.89	-8.11	-7.91	-8.78	-20.27
195	-8.9	-6.9	-8.38	-6.43	-6.4	-12.14	-15.99	-14.68	-10.85	-6.35	-4.16	-4.19	-8.82
210	-4.53	-3.82	-5.45	-5.11	-5.25	-11.45	-17.3	-19.59	-12.74	-5.8	-2.08	-1.73	-4.34
225	-1.93	-1.83	-3.65	-4.48	-5.22	-12.38	-17.71	-17.89	-18.21	-6.35	-0.78	-0.1	-1.66
240	-0.53	-0.77	-2.56	-4.19	-5.78	-15.3	-16.95	-14.35	-20.36	-6.94	-0.32	0.85	-0.13
255	0.13	-0.31	-1.98	-4.15	-6.7	-20.15	-15.2	-12.15	-14.52	-8	-0.32	1.34	0.78
270	0.11	-0.46	-1.9	-4.33	-7.57	-24.08	-13.58	-11.19	-11.61	-9.44	-0.63	1.36	1.08
285	-0.62	-1.28	-2.28	-4.96	-8.51	-24.63	-12.47	-11.12	-10.49	-11.39	-1.26	0.86	0.81
300	-1.8	-2.57	-3.1	-6.05	-9.54	-23.99	-12.18	-11.56	-10.94	-12.6	-1.95	-0.15	-0.04
315	-3.8	-4.68	-4.67	-8	-11.31	-22.02	-12.31	-12.14	-12.56	-11.96	-3.14	-2.04	-1.95
330	-6.73	-8.03	-7.15	-11	-13.43	-19.22	-12.64	-12.48	-12.67	-10.08	-4.82	-4.74	-4.72
345	-13.5	-13.23	-12.67	-14.82	-15.25	-16.94	-13.1	-12.44	-9.62	-8.15	-7.13	-7.76	-10.19
360	-14.8	-15.48	-19.15	-30.56	-15.65	-15.16	-14.97	-10.63	-5.44	-5.49	-10.15	-22.55	-18.56

Vertical power



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	2.17	1.67	0.46	-1.48	-0.43	0.14	0.56	0.24	-0.2	-0.14	0.36	2.11	2.34
15	1.63	1.38	-0.22	-1.63	-0.06	0.41	-0.29	-0.51	-0.03	0.07	0.09	1.57	1.56
30	0.47	0.34	-1.4	-1.71	-0.16	-0.17	-2.14	-1.21	-0.14	-0.39	-1.21	0.35	0.15
45	-1.74	-1.76	-2.94	-1.9	-1.46	-2.65	-3.98	-1.65	-1.43	-2.3	-4.22	-2.09	-2.53
60	-5.19	-4.7	-4.7	-2.77	-4.46	-7	-4.74	-2.96	-4.3	-5.85	-9.67	-5.87	-6.8
75	-12.5	-10.23	-7.14	-5.32	-11.66	-11.96	-6.03	-6.74	-11.17	-14.22	-18.18	-14.03	-17.34
90	-16.79	-14.84	-8.84	-10.06	-20.17	-8.53	-7.92	-11.66	-24.89	-14.65	-9.21	-13.32	-11.9
105	-6.84	-7.88	-6.16	-15.1	-7.94	-4.35	-7.53	-7.19	-8.31	-7.29	-4.07	-5.82	-4.6
120	-2.96	-3.48	-2.94	-7.96	-3.6	-1.64	-4.65	-2.41	-3.55	-4	-1.56	-2.28	-1.23
135	-0.17	-0.62	-0.3	-3.47	-0.74	0.41	-1.97	0.76	-0.38	-1.68	0.25	0.01	0.84
150	1.42	1.11	1.11	-1.23	0.8	1.62	-0.75	2.5	1.29	-0.14	1.24	1.17	1.74
165	2.43	2.22	1.85	-0.07	1.65	2.46	-0.55	3.33	2.1	0.96	1.8	1.76	2.02
180	2.73	2.69	1.92	-0.08	1.55	2.86	-0.83	3.09	1.79	1.34	1.81	1.71	1.69
195	2.41	2.67	1.53	-1.17	0.19	2.6	-1.03	1.88	0.14	0.85	1.16	1.02	0.66
210	1.52	2.11	0.93	-2.67	-2.56	1.4	-1.72	0.68	-2.21	-0.65	-0.24	-0.35	-1.11
225	-0.25	0.86	-0.29	-3.96	-7.53	-1.49	-3.95	-0.39	-4.55	-3.77	-2.8	-2.99	-4.43
240	-3.02	-1.12	-2.18	-5.07	-14.82	-5.79	-7.64	-2.03	-6.28	-8.45	-6.42	-7.11	-10.04
255	-8.76	-4.81	-5.75	-7.23	-18.86	-13.91	-12.35	-5.65	-8.95	-19.11	-13.72	-16.9	-20.95
270	-26.88	-11.61	-13.29	-11.37	-13.17	-16.73	-11.17	-13.12	-11.15	-18.52	-22.22	-14.36	-9.05
285	-9.48	-18.46	-18.44	-14.58	-8.1	-9.83	-7.69	-16.34	-7.86	-9.82	-10.53	-6.11	-3.54
300	-3.86	-7.28	-7.49	-9.15	-5.08	-6.29	-5.16	-7.07	-4.32	-6.18	-5.99	-2.42	-0.78
315	-0.65	-2.53	-3.09	-5.05	-2.8	-3.81	-2.82	-2.69	-1.82	-3.73	-3.06	-0.12	1.07
330	1.02	-0.21	-0.96	-2.88	-1.45	-2.2	-1.17	-0.51	-0.62	-2.25	-1.46	1.1	1.99
345	1.78	1.2	-0.06	-1.6	-0.77	-1.04	-0.05	0.61	-0.26	-1.16	-0.42	1.78	2.34
360	2.17	1.67	0.46	-1.48	-0.43	0.14	0.56	0.24	-0.2	-0.14	0.36	2.11	2.34

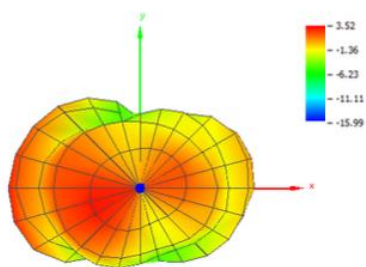


Figure 204. Board #9 (868 MHz): Theta = 0, Phi = 0

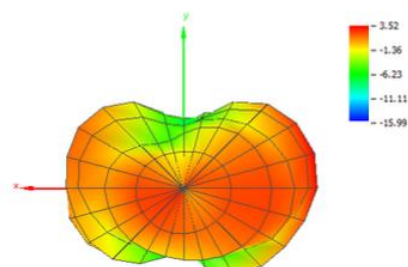


Figure 205. Board #9 (868 MHz): Theta = 180, Phi = 0

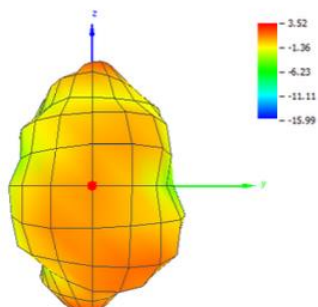


Figure 206. Board #9 (868 MHz): Theta = 90, Phi = 0

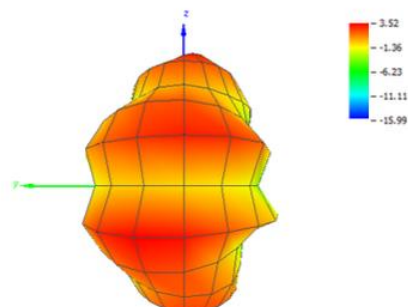


Figure 207. Board #9 (868 MHz): Theta = 90, Phi = 180

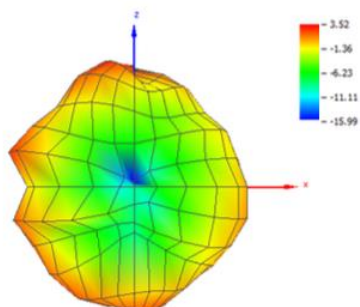


Figure 208. Board #9 (868 MHz): Theta = 90, Phi = 270

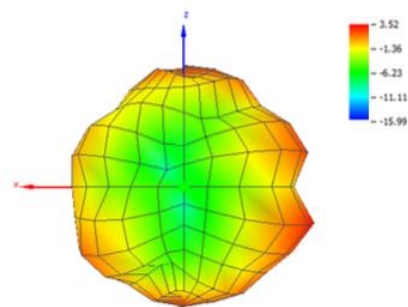


Figure 209. Board #9 (868 MHz): Theta = 90, Phi = 90

A.9.2 – 915 Mhz

Summary of evaluation results



Test Description	Test Result
Total Radiated Power	-3.64 dBm
Peak EIRP	0.97 dBm
Directivity	4.61 dBi
Efficiency	-3.64 dB
Efficiency	0.4327
Peak Gain	0.97 dBi
NHPRP 45°	-5.72 dBm
NHPRP 45° / TRP	-2.09 dB
NHPRP 45° / TRP	0.6184
NHPRP 30°	-7.36 dBm
NHPRP 30° / TRP	-3.72 dB
NHPRP 30° / TRP	0.4245
NHPRP 22.5°	-8.67 dBm
NHPRP 22.5° / TRP	-5.03 dB
NHPRP 22.5° / TRP	0.3141
UHRP	-7.45 dBm
UHRP / TRP	-3.81 dB
UHRP / TRP	0.4159
LHRP	-5.97 dBm
LHRP / TRP	-2.34 dB
LHRP / TRP	0.5841
PGRP (0-120°)	-5.47 dBm
PGRP / TRP	-1.83 dB
PGRP / TRP	0.6565
Front/Back Ratio	2.69
PhiBW	289.1°
PhiBW Up	74.5°
PhiBW Down	214.6°
ThetaBW	167.4°
ThetaBW Up	100.7°
ThetaBW Down	66.7°
Boresight Phi	345°
Boresight Theta	165°
Maximum Power	0.97 dBm
Minimum Power	-17.25 dBm
Average Power	-2.83 dBm
Max/Min Ratio	18.22 dB
Max/Avg Ratio	3.80 dB
Min/Avg Ratio	-14.42 dB
Worst Single Value	-31.53 dBm
Worst Position	Azi = 90°; Elev = 60°; Pol = Vertical
Best Single Value	0.82 dBm
Best Position	Azi = 0°; Elev = 180°; Pol = Vertical

Total



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-2.72	-2.44	-2.91	-4.94	-4.7	-3.73	-2.41	-0.89	-1.41	-0.36	0.24	0.79	0.83
15	-2.98	-2.52	-3.46	-5.05	-3.71	-3.01	-3.03	-1.42	-0.95	-0.23	-0.36	0.39	0.41
30	-3.49	-2.96	-4.25	-5.09	-3.16	-3.14	-4.89	-2.06	-0.88	-0.69	-1.64	-0.2	-0.15
45	-4.17	-3.76	-5.01	-4.94	-3.57	-5.02	-7.28	-2.74	-1.79	-2.15	-3.55	-1.1	-0.86
60	-4.86	-4.68	-5.28	-4.84	-5.33	-8.39	-9.09	-4.14	-3.98	-4.32	-5.65	-2.06	-1.43
75	-5.42	-5.33	-4.75	-5.07	-8.48	-11.81	-10.64	-7.54	-8.02	-7.27	-7.04	-3.07	-1.53
90	-5.58	-5.31	-3.73	-5.12	-10.71	-9.89	-11.31	-13.17	-11.6	-8.85	-6.6	-3.5	-1.15
105	-5.14	-4.68	-2.48	-4.48	-8.71	-6.43	-8.96	-11.95	-8.73	-7.63	-4.79	-3.27	-0.52
120	-4.44	-3.72	-1.58	-3.25	-5.92	-3.97	-6.01	-6.12	-5	-5.41	-3.12	-2.62	0.02
135	-3.53	-2.76	-0.83	-2.15	-3.6	-2.24	-3.78	-2.3	-1.88	-3.3	-1.53	-1.77	0.47
150	-2.96	-2.06	-0.64	-1.47	-2.24	-1.18	-3	-0.34	-0.1	-1.55	-0.47	-0.91	0.65
165	-2.67	-1.72	-0.82	-1.46	-1.76	-0.33	-2.94	0.26	0.7	-0.19	0.32	-0.14	0.72
180	-2.7	-1.7	-1.2	-2.07	-2.5	0.08	-2.9	-0.48	0.16	0.3	0.65	0.35	0.51
195	-2.95	-1.98	-1.75	-2.95	-4.67	-0.4	-2.87	-1.98	-1.75	-0.26	0.54	0.59	0.03
210	-3.41	-2.5	-2.44	-3.53	-7.13	-2.19	-3.73	-3.15	-4.33	-2	0.01	0.56	-0.58
225	-3.9	-3.3	-3.37	-3.93	-8.23	-5.98	-6.52	-4.11	-6.77	-5.3	-0.91	0.28	-1.17
240	-4.51	-4.13	-4.25	-4.62	-8.61	-10.42	-11.39	-5.86	-8.32	-10.11	-2.11	0	-1.44
255	-5.28	-5.03	-5.07	-5.38	-9.17	-14.5	-17.25	-9.72	-9.89	-17.16	-3.07	-0.29	-1.38
270	-5.75	-5.56	-5.43	-6.32	-9.81	-15.35	-14.62	-16.62	-10.41	-15.23	-3.4	-0.42	-1.01
285	-5.67	-5.57	-5.11	-6.92	-9.53	-13.58	-10.95	-13.45	-8.16	-9.93	-2.98	-0.31	-0.4
300	-5.05	-5.06	-4.29	-6.64	-8.17	-10.91	-8.65	-7.45	-5.49	-6.7	-2.13	0.05	0.16
315	-4.12	-4.1	-3.39	-5.86	-6.61	-8.94	-6.72	-3.9	-3.39	-4.47	-1.16	0.42	0.66
330	-3.38	-3.16	-2.87	-5.16	-5.89	-7.77	-4.94	-1.79	-2.4	-2.92	-0.33	0.72	0.9
345	-2.99	-2.52	-2.77	-4.77	-5.57	-6.24	-3.64	-0.73	-1.94	-1.62	0.12	0.97	0.84
360	-2.72	-2.44	-2.91	-4.94	-4.7	-3.73	-2.41	-0.89	-1.41	-0.36	0.24	0.79	0.83

Horizontal

Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-18.25	-20.07	-19.62	-18.25	-23.76	-27.49	-24.83	-19.98	-11.59	-9.95	-12.59	-19.5	-24.71
15	-13.27	-12.57	-13.76	-14.84	-29.94	-19.86	-29.95	-17.35	-10.52	-9.21	-15.59	-19.05	-13.17
30	-9.59	-9.02	-9.53	-12.38	-24.91	-15.08	-30.42	-15.03	-9.7	-9.12	-15.27	-10.47	-7.61
45	-7.36	-6.93	-7.12	-10.42	-15.99	-12.83	-28.43	-13.87	-9.78	-9.33	-11.47	-6.66	-4.55
60	-6.21	-5.89	-5.8	-8.64	-12.64	-11.98	-24.52	-14.09	-10.57	-9.29	-8.86	-4.74	-2.81
75	-5.69	-5.45	-4.99	-7.07	-11.08	-11.86	-20.1	-14.83	-11.76	-9	-7.39	-3.77	-1.71
90	-5.78	-5.72	-4.72	-6.13	-10.75	-12.28	-17.09	-15.23	-12.72	-8.91	-7.05	-3.61	-1.31
105	-6.67	-6.98	-5.13	-5.88	-10.99	-13.16	-15.27	-14.97	-14.13	-9.44	-7.65	-4.23	-1.5
120	-8.5	-9.21	-6.32	-6.43	-11.46	-14.22	-14.44	-13.73	-16.44	-10.78	-9.3	-5.64	-2.33
135	-11.78	-13.24	-8.58	-8.3	-12.55	-15.56	-14.12	-11.77	-17.43	-13.19	-13.04	-8.72	-4.07
150	-16.76	-19.78	-12.26	-11.73	-14.37	-16.62	-14.78	-10.41	-14	-13.31	-21.11	-14.4	-6.91
165	-30.61	-24.6	-18.51	-19.05	-18.5	-16.45	-17.23	-10.51	-11.22	-10.39	-15.8	-25.94	-12.18
180	-20.67	-15.88	-17.02	-17.7	-19.86	-15.08	-21.16	-12.35	-10.96	-8.47	-9.45	-12.15	-27.28
195	-13.42	-11.21	-11.96	-12.09	-13.93	-13.32	-25.21	-15.92	-13.32	-8.01	-6.02	-6.58	-13.82
210	-9.82	-8.62	-9.01	-9.57	-10.8	-12.31	-25.78	-20.56	-17.74	-8.8	-4.21	-3.73	-7.6
225	-7.61	-6.97	-7.15	-7.86	-9.63	-12.1	-23.17	-26.25	-19.04	-10.97	-3.28	-1.98	-4.33
240	-6.42	-6.09	-6.02	-7.04	-9.65	-12.84	-20.01	-25.31	-15.31	-13.56	-3.14	-0.98	-2.5
255	-5.94	-5.67	-5.53	-6.49	-10.14	-14.67	-17.94	-21.59	-13.06	-17.36	-3.19	-0.49	-1.49
270	-5.88	-5.67	-5.45	-6.63	-10.97	-17.32	-16.69	-19.32	-11.98	-21.92	-3.52	-0.45	-1.13
285	-6.28	-6.13	-5.79	-7.19	-12.13	-20.7	-15.34	-17.4	-11.41	-26.5	-4.06	-0.85	-1.34
300	-7.28	-7.33	-6.64	-8.07	-13.6	-22.87	-14.63	-16.44	-11.53	-27.3	-4.69	-1.57	-2.06
315	-9.49	-9.6	-8.35	-9.64	-15.07	-22.48	-14.67	-16.45	-12.07	-20.53	-5.51	-2.89	-3.57
330	-13.02	-13.06	-11.07	-11.88	-16.74	-22.34	-15.46	-17.43	-13	-15.42	-6.57	-5.1	-6.14
345	-19.06	-17.61	-16.12	-14.67	-19.48	-23.14	-17.45	-18.73	-13.53	-12.56	-8.26	-7.78	-11.3
360	-18.25	-20.07	-19.62	-18.25	-23.76	-27.49	-24.83	-19.98	-11.59	-9.95	-12.59	-19.5	-24.71

Vertical



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-2.85	-2.52	-3.01	-5.15	-4.75	-3.75	-2.43	-0.95	-1.85	-0.87	0.01	0.75	0.82
15	-3.41	-2.97	-3.89	-5.53	-3.72	-3.1	-3.03	-1.53	-1.46	-0.81	-0.49	0.34	0.22
30	-4.71	-4.19	-5.78	-5.99	-3.19	-3.43	-4.9	-2.28	-1.49	-1.37	-1.83	-0.62	-1.01
45	-7	-6.62	-9.17	-6.38	-3.83	-5.81	-7.31	-3.09	-2.54	-3.07	-4.31	-2.52	-3.28
60	-10.58	-10.82	-14.78	-7.18	-6.22	-10.89	-9.22	-4.61	-5.06	-5.99	-8.47	-5.42	-7.08
75	-17.59	-20.83	-17.49	-9.38	-11.94	-31.22	-11.16	-8.43	-10.41	-12.09	-18.2	-11.34	-15.43
90	-19.03	-15.7	-10.61	-11.95	-31.53	-13.63	-12.64	-17.41	-18.02	-27.43	-16.64	-19.57	-15.68
105	-10.41	-8.54	-5.88	-10.07	-12.61	-7.47	-10.11	-14.95	-10.2	-12.3	-7.96	-10.32	-7.44
120	-6.61	-5.17	-3.36	-6.1	-7.34	-4.4	-6.68	-6.94	-5.32	-6.9	-4.32	-5.62	-3.76
135	-4.23	-3.17	-1.63	-3.35	-4.19	-2.45	-4.2	-2.82	-2	-3.77	-1.85	-2.75	-1.41
150	-3.14	-2.13	-0.95	-1.9	-2.51	-1.3	-3.3	-0.79	-0.28	-1.85	-0.51	-1.11	-0.19
165	-2.68	-1.74	-0.89	-1.54	-1.85	-0.44	-3.11	-0.12	0.41	-0.62	0.22	-0.16	0.49
180	-2.77	-1.87	-1.31	-2.19	-2.58	-0.05	-2.97	-0.77	-0.19	-0.32	0.2	0.1	0.5
195	-3.36	-2.54	-2.19	-3.52	-5.22	-0.63	-2.89	-2.16	-2.07	-1.05	-0.54	-0.33	-0.15
210	-4.53	-3.72	-3.52	-4.77	-9.56	-2.63	-3.76	-3.23	-4.54	-3.02	-2.06	-1.46	-1.54
225	-6.31	-5.73	-5.73	-6.17	-13.81	-7.2	-6.62	-4.14	-7.04	-6.67	-4.66	-3.64	-4.04
240	-9.01	-8.52	-8.99	-8.3	-15.32	-14.13	-12.04	-5.91	-9.28	-12.72	-8.86	-6.91	-8.1
255	-13.83	-13.65	-15.11	-11.85	-16.14	-28.53	-25.62	-10.01	-12.74	-30.75	-18.74	-13.85	-17.56
270	-21.16	-21.76	-28.42	-17.88	-16.14	-19.73	-18.84	-19.97	-15.59	-16.28	-18.95	-21.91	-16.63
285	-14.54	-14.69	-13.48	-19.13	-12.98	-14.52	-12.91	-15.69	-10.94	-10.02	-9.56	-9.65	-7.49
300	-9.02	-8.96	-8.08	-12.17	-9.64	-11.19	-9.92	-8.04	-6.73	-6.74	-5.64	-5.02	-3.83
315	-5.61	-5.53	-5.06	-8.22	-7.28	-9.14	-7.47	-4.14	-4.03	-4.58	-3.16	-2.3	-1.4
330	-3.88	-3.63	-3.58	-6.2	-6.26	-7.92	-5.34	-1.91	-2.79	-3.17	-1.5	-0.6	-0.05
345	-3.1	-2.66	-2.98	-5.24	-5.75	-6.33	-3.82	-0.8	-2.26	-1.98	-0.56	0.35	0.56
360	-2.85	-2.52	-3.01	-5.15	-4.75	-3.75	-2.43	-0.95	-1.85	-0.87	0.01	0.75	0.82

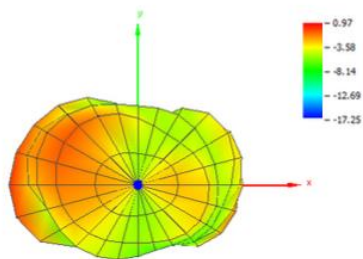


Figure 210. Board #9 (915 MHz): Theta = 0, Phi = 0

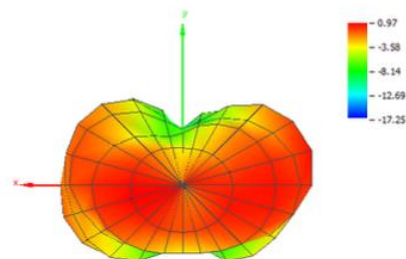


Figure 211. Board #9 (915 MHz): Theta = 180, Phi = 0

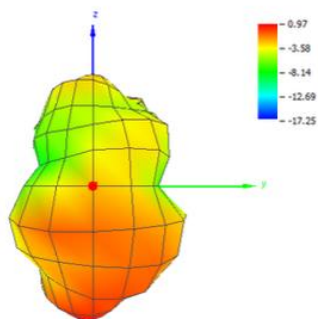


Figure 212. Board #9 (915 MHz): Theta = 90, Phi = 0

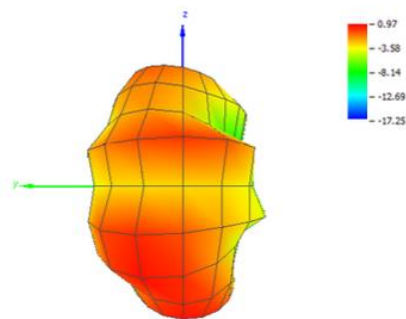


Figure 213. Board #9 (915 MHz): Theta = 90, Phi = 180

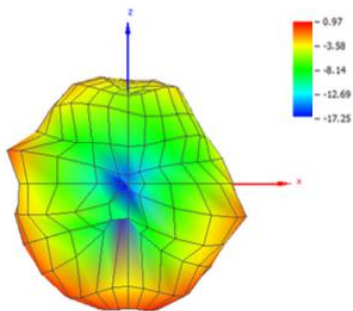


Figure 214. Board #9 (915 MHz): Theta = 90, Phi = 270

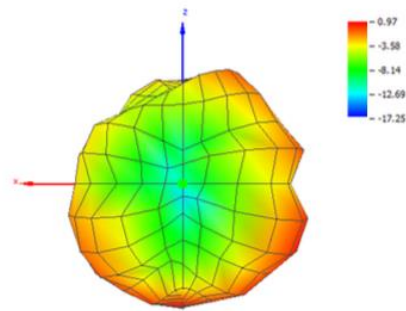


Figure 215. Board #9 (915 MHz): Theta = 90, Phi = 90

A.9.3 – 2.40 Ghz

Summary of evaluation results



Test Description	Test Result
Total Radiated Power	-1.93 dBm
Peak EIRP	2.94 dBm
Directivity	4.88 dBi
Efficiency	-1.93 dB
Efficiency	0.6407
Peak Gain	2.94 dBi
NHPRP 45°	-3.14 dBm
NHPRP 45° / TRP	-1.21 dB
NHPRP 45° / TRP	0.7574
NHPRP 30°	-4.67 dBm
NHPRP 30° / TRP	-2.73 dB
NHPRP 30° / TRP	0.5327
NHPRP 22.5°	-5.92 dBm
NHPRP 22.5° / TRP	-3.99 dB
NHPRP 22.5° / TRP	0.3995
UHRP	-5.13 dBm
UHRP / TRP	-3.20 dB
UHRP / TRP	0.4785
LHRP	-4.76 dBm
LHRP / TRP	-2.83 dB
LHRP / TRP	0.5215
PGRP (0-120°)	-3.08 dBm
PGRP / TRP	-1.14 dB
PGRP / TRP	0.7684
Front/Back Ratio	3.01
PhiBW	53.2°
PhiBW Up	24.8°
PhiBW Down	28.4°
ThetaBW	97.8°
ThetaBW Up	19.9°
ThetaBW Down	77.9°
Boresight Phi	90°
Boresight Theta	120°
Maximum Power	2.94 dBm
Minimum Power	-13.56 dBm
Average Power	-2.60 dBm
Max/Min Ratio	16.50 dB
Max/Avg Ratio	5.55 dB
Min/Avg Ratio	-10.95 dB
Worst Single Value	-22.73 dBm
Worst Position	Azi = 30°; Elev = 135°; Pol = Horizontal
Best Single Value	2.50 dBm
Best Position	Azi = 90°; Elev = 120°; Pol = Vertical

Total



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-7.53	-9.15	-5.53	-3.77	-4.66	-3.57	-2.67	-1.26	-0.99	-2.88	-3.07	-9.62	-4.38
15	-8.13	-9.1	-4.63	-2.57	-3.17	-2.05	-0.21	-0.51	-0.71	-2.54	-4.48	-10	-5.69
30	-7.8	-7.83	-2.68	-1.42	-0.39	-0.94	0.07	0.37	-0.94	-3.77	-5.63	-9.42	-5.79
45	-7.49	-6.41	-1.16	-0.64	0.38	0.63	-0.03	-0.94	-1.47	-4.54	-4.97	-7.98	-4.5
60	-7.73	-5.21	-0.63	0.31	0.5	0.6	0.34	0.34	-0.34	-0.8	-4.1	-7	-3.43
75	-8.16	-4.65	-0.79	0.64	1.17	0.85	0.93	2.29	2.28	1.35	-3.7	-6.83	-3.35
90	-8.22	-4.84	-1.71	0.34	1.12	1.62	1.55	2.55	2.94	1.82	-3.9	-6.82	-3.76
105	-8.36	-5.93	-3.42	-0.69	0.18	1.13	0.5	1.72	1.79	1.12	-4.76	-7.33	-3.91
120	-8.22	-7.72	-5.78	-2.77	-1.87	-1.07	-2.72	-0.54	-1.04	-1.08	-5.67	-8.09	-3.86
135	-8.28	-9.16	-7.61	-6.52	-5.68	-5.26	-8.37	-4.58	-4.63	-5.29	-6.84	-8.79	-3.82
150	-7.63	-7.79	-6.99	-10.94	-10.43	-10.81	-12.63	-9.4	-5.28	-9.12	-7.15	-8.85	-3.78
165	-6.51	-5.55	-5.27	-8.38	-12.11	-11.04	-10.17	-8.54	-6.4	-7.25	-6.21	-7.42	-3.48
180	-6.18	-4.22	-4.21	-5.81	-9.95	-9.92	-11.55	-8.1	-7.4	-6.86	-4.9	-6.35	-3.14
195	-6.26	-4.04	-3.83	-4.77	-8.45	-10.89	-13.56	-7.34	-4.16	-6.34	-3.6	-6.01	-2.86
210	-6.43	-4.24	-3	-3.69	-5.57	-8.35	-8.09	-4.1	-2.44	-3.79	-2.09	-5.8	-2.71
225	-6.24	-4.05	-1.58	-1.82	-2.72	-4.18	-3.16	-2.67	-2.1	-1.8	-1.2	-5.31	-2.7
240	-5.6	-3.35	-0.39	0.11	-0.86	-1.18	-1.21	-1.46	-1.11	-0.91	-0.73	-4.54	-2.76
255	-4.63	-2.66	0.21	0.88	0.01	-0.66	-0.32	0.09	-0.51	-0.92	-0.41	-3.98	-2.69
270	-4.22	-2.19	0.44	0.76	-0.06	-1.02	-0.5	0.35	-0.52	-0.86	-0.19	-3.71	-2.62
285	-3.95	-2.23	0.22	0.3	-0.62	-1.71	-1.57	-0.03	-0.7	-0.58	-0.23	-3.62	-2.38
300	-3.99	-2.76	-0.45	-0.49	-1.36	-2.62	-2.84	-0.73	-1.01	-0.5	-0.47	-3.95	-2.14
315	-4.81	-3.7	-1.35	-1.3	-2.34	-3.43	-3.98	-1.28	-1.48	-1.25	-0.85	-4.64	-2.1
330	-5.6	-5.22	-2.75	-2.3	-3.32	-4.49	-4.42	-1.81	-1.68	-2.35	-1.53	-6.01	-2.43
345	-6.55	-7.4	-3.99	-3.2	-4.15	-4.98	-4.28	-1.83	-1.81	-3.02	-2.06	-7.63	-2.84
360	-7.53	-9.15	-5.53	-3.77	-4.66	-3.57	-2.67	-1.26	-0.99	-2.88	-3.07	-9.62	-4.38

Horizontal

Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-12.94	-16.32	-11.02	-16.71	-15.56	-17.27	-13.49	-10.8	-11.89	-14.29	-8.75	-12.75	-8.39
15	-10.97	-16.73	-14.04	-19.04	-16.97	-18.07	-12.87	-15.26	-17.12	-18.29	-10.04	-13.34	-7.23
30	-9.24	-16.2	-19.3	-14.15	-12.54	-14.27	-14.18	-18.55	-21.41	-22.73	-11.25	-13.65	-6.19
45	-8.25	-14.91	-22.37	-12.2	-12.19	-12.92	-16.63	-18.67	-18.95	-17.97	-10.51	-13.33	-5.65
60	-8.18	-12.59	-20.1	-12.85	-15.62	-14.52	-16.18	-14.98	-13.78	-11.97	-8.37	-12.13	-5.93
75	-8.84	-10.08	-14	-13.03	-16.78	-18.05	-14.19	-11.5	-9.93	-7.92	-6.49	-10.22	-7.67
90	-10.23	-8.48	-10.19	-10.59	-13.21	-19.22	-14.15	-9.63	-7.17	-5.21	-5.17	-8.88	-11.27
105	-13.22	-8.06	-8.23	-8.26	-10.76	-15.85	-15.66	-8.85	-5.49	-3.88	-5.02	-8.68	-15.88
120	-18.6	-8.87	-7.81	-7.52	-9.33	-14.25	-16.82	-8.53	-5.03	-4.14	-6.14	-10.01	-14.59
135	-20.32	-11.59	-8.52	-8.81	-9.3	-15.11	-17.26	-9.16	-6.25	-6.72	-10.16	-13.68	-10.01
150	-14.61	-16	-10.74	-12.69	-11.89	-16.57	-15.44	-11.21	-8.93	-12.04	-13.99	-18.06	-7.32
165	-11.02	-12.59	-11.73	-17.21	-18.7	-15.59	-15.31	-14.9	-13.58	-21.74	-8.74	-12.1	-5.11
180	-9.04	-8	-8.69	-10.33	-17.79	-17.45	-18.35	-17.27	-16.98	-14.59	-5.35	-8.21	-3.8
195	-7.79	-5.48	-5.45	-6.53	-11.94	-18.77	-21.28	-12.25	-9.24	-9.4	-3.88	-6.54	-3.14
210	-7.11	-4.49	-3.74	-5.36	-9.06	-12.84	-17.26	-11.22	-7.54	-6.79	-3.45	-6.23	-3.02
225	-7.05	-4.62	-3.66	-6.24	-8.32	-12.68	-13.75	-13.9	-9.5	-7.49	-3.94	-6.66	-3.34
240	-7.4	-5.8	-5	-9.09	-10.57	-14.21	-12.23	-14.21	-14.27	-11.46	-5.79	-7.75	-4.04
255	-8.1	-8.06	-7.95	-13.6	-16.22	-14.85	-12.69	-11.71	-14.47	-15.4	-9.69	-9.62	-5.09
270	-9.13	-11.63	-12.79	-18.44	-18.15	-14.99	-14.31	-10.97	-11.08	-11.84	-17.89	-12.83	-6.84
285	-9.97	-16.55	-18.61	-14	-13.37	-14.02	-16.07	-10.3	-8.39	-8.27	-16.71	-16.99	-9.43
300	-11.03	-20.04	-15.18	-10.52	-10.8	-12.95	-17.03	-9.46	-7.11	-6.76	-10.87	-21.69	-12.88
315	-12.66	-17.44	-11.41	-8.7	-9.25	-12.16	-15.73	-8.47	-6.63	-6.68	-9.28	-17.06	-15.53
330	-14.35	-14.92	-8.95	-7.9	-9.02	-11.51	-14.38	-7.99	-6.23	-7.73	-8.5	-14.14	-14.35
345	-15.33	-15.02	-8.77	-8.78	-10.72	-11.79	-13.92	-7.67	-6.98	-9.74	-8.22	-12.95	-11.14
360	-12.94	-16.32	-11.02	-16.71	-15.56	-17.27	-13.49	-10.8	-11.89	-14.29	-8.75	-12.75	-8.39

Vertical



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-9.01	-10.07	-6.98	-3.99	-5.03	-3.76	-3.04	-1.77	-1.36	-3.21	-4.44	-12.5	-6.58
15	-11.31	-9.93	-5.16	-2.67	-3.36	-2.16	-0.45	-0.66	-0.81	-2.66	-5.89	-12.69	-10.93
30	-13.28	-8.51	-2.77	-1.65	-0.66	-1.15	-0.1	0.31	-0.98	-3.83	-7.02	-11.49	-16.4
45	-15.43	-7.07	-1.19	-0.95	0.13	0.44	-0.12	-1.01	-1.55	-4.74	-6.4	-9.48	-10.85
60	-17.85	-6.08	-0.68	0.1	0.4	0.46	0.24	0.21	-0.54	-1.14	-6.13	-8.59	-7
75	-16.55	-6.11	-1.01	0.44	1.1	0.79	0.79	2.11	2.01	0.81	-6.94	-9.48	-5.36
90	-12.54	-7.31	-2.38	-0.02	0.96	1.59	1.43	2.28	2.5	0.85	-9.86	-11.03	-4.61
105	-10.08	-10.05	-5.16	-1.52	-0.18	1.04	0.39	1.32	0.89	-0.53	-17.08	-13.04	-4.2
120	-8.64	-14.06	-10.07	-4.55	-2.73	-1.28	-2.89	-1.29	-3.25	-4.04	-15.57	-12.57	-4.24
135	-8.56	-12.84	-14.85	-10.41	-8.15	-5.74	-8.97	-6.44	-9.69	-10.82	-9.56	-10.5	-5.02
150	-8.6	-8.5	-9.36	-15.72	-15.88	-12.15	-15.85	-14.08	-7.73	-12.23	-8.15	-9.4	-6.32
165	-8.41	-6.51	-6.38	-8.98	-13.19	-12.92	-11.76	-9.69	-7.32	-7.41	-9.76	-9.23	-8.52
180	-9.36	-6.58	-6.13	-7.7	-10.73	-10.77	-12.57	-8.66	-7.9	-7.67	-15.01	-10.94	-11.65
195	-11.55	-9.54	-8.91	-9.53	-11.02	-11.66	-14.36	-9.03	-5.78	-9.3	-15.67	-15.38	-14.86
210	-14.82	-16.84	-11.06	-8.63	-8.16	-10.26	-8.65	-5.04	-4.04	-6.8	-7.78	-16.01	-14.22
225	-13.93	-13.14	-5.79	-3.77	-4.12	-4.84	-3.55	-3.01	-2.97	-3.17	-4.5	-11.06	-11.32
240	-10.29	-7	-2.23	-0.45	-1.36	-1.4	-1.57	-1.7	-1.32	-1.31	-2.36	-7.35	-8.68
255	-7.23	-4.14	-0.52	0.73	-0.09	-0.83	-0.58	-0.21	-0.69	-1.08	-0.95	-5.37	-6.41
270	-5.91	-2.72	0.23	0.7	-0.13	-1.2	-0.69	0.01	-0.92	-1.22	-0.26	-4.27	-4.69
285	-5.2	-2.39	0.16	0.13	-0.86	-1.97	-1.73	-0.46	-1.51	-1.39	-0.33	-3.83	-3.34
300	-4.94	-2.84	-0.59	-0.95	-1.89	-3.04	-3.01	-1.35	-2.23	-1.68	-0.88	-4.02	-2.53
315	-5.59	-3.89	-1.8	-2.17	-3.32	-4.05	-4.28	-2.2	-3.07	-2.72	-1.53	-4.89	-2.31
330	-6.22	-5.72	-3.95	-3.7	-4.68	-5.45	-4.88	-3.01	-3.55	-3.83	-2.5	-6.74	-2.72
345	-7.17	-8.23	-5.74	-4.61	-5.23	-5.99	-4.78	-3.14	-3.39	-4.06	-3.27	-9.14	-3.54
360	-9.01	-10.07	-6.98	-3.99	-5.03	-3.76	-3.04	-1.77	-1.36	-3.21	-4.44	-12.5	-6.58

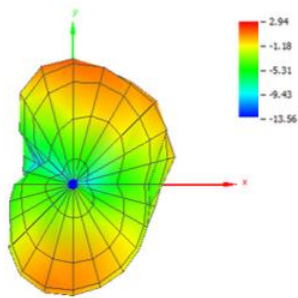


Figure 216. Board #9 (2.40 GHz): Theta = 0, Phi = 0

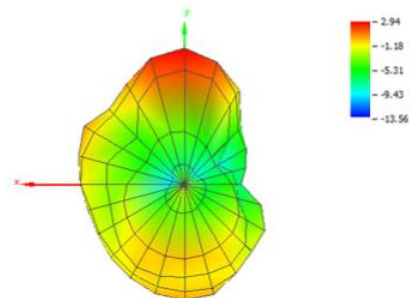


Figure 217. Board #9 (2.40 GHz): Theta = 180, Phi = 0

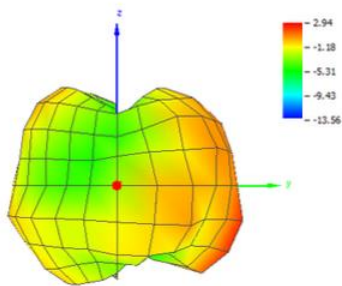


Figure 218. Board #9 (2.40 GHz): Theta = 90, Phi = 0

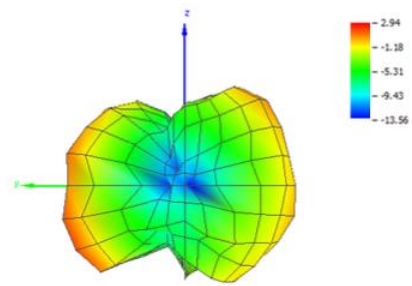


Figure 219. Board #9 (2.40 GHz): Theta = 90, Phi = 180

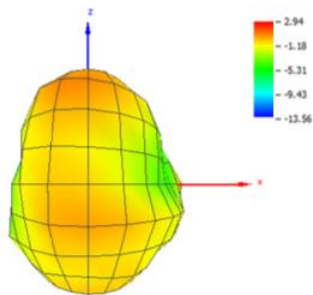


Figure 220. Board #9 (2.40 GHz): Theta = 90, Phi = 270

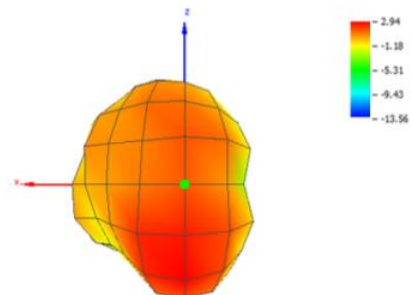


Figure 221. Board #9 (2.40 GHz): Theta = 90, Phi = 90

A.9.3 – 2.44 Ghz Summary of evaluation results



Test Description	Test Result
Total Radiated Power	-1.77 dBm
Peak EIRP	2.73 dBm
Directivity	4.50 dBi
Efficiency	-1.77 dB
Efficiency	0.6649
Peak Gain	2.73 dBi
NHPRP 45°	-2.96 dBm
NHPRP 45° / TRP	-1.19 dB
NHPRP 45° / TRP	0.7612
NHPRP 30°	-4.48 dBm
NHPRP 30° / TRP	-2.71 dB
NHPRP 30° / TRP	0.5357
NHPRP 22.5°	-5.71 dBm
NHPRP 22.5° / TRP	-3.94 dB
NHPRP 22.5° / TRP	0.4036
UHRP	-4.74 dBm
UHRP / TRP	-2.97 dB
UHRP / TRP	0.5044
LHRP	-4.82 dBm
LHRP / TRP	-3.05 dB
LHRP / TRP	0.4956
PGRP (0-120°)	-2.92 dBm
PGRP / TRP	-1.15 dB
PGRP / TRP	0.7675
Front/Back Ratio	2.48
PhiBW	52.9°
PhiBW Up	26.7°
PhiBW Down	26.2°
ThetaBW	103.7°
ThetaBW Up	22.2°
ThetaBW Down	81.5°
Boresight Phi	90°
Boresight Theta	120°
Maximum Power	2.73 dBm
Minimum Power	-12.25 dBm
Average Power	-2.28 dBm
Max/Min Ratio	14.98 dB
Max/Avg Ratio	5.01 dB
Min/Avg Ratio	-9.97 dB
Worst Single Value	-22.09 dBm
Worst Position	Azi = 165°; Elev = 135°; Pol = Horizontal
Best Single Value	2.32 dBm
Best Position	Azi = 75°; Elev = 60°; Pol = Vertical

Total



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-4.67	-2.83	-3.77	-5.45	-6.19	-4.87	-3.66	-4.6	-0.93	-2.76	-2.97	-6.26	-4.62
15	-4.47	-3.31	-3.57	-4.11	-3.63	-2.2	-0.73	-2.75	-0.18	-1.78	-3.56	-6.19	-4.04
30	-4.27	-3.98	-2.26	-1.73	0.21	-0.54	0.94	-0.14	-0.13	-2.1	-4.75	-5.74	-2.75
45	-4.5	-4.87	-0.73	-0.89	2.09	1	0.79	-0.43	-0.93	-3.77	-4.25	-5.19	-1.55
60	-4.96	-5.41	-0.35	0.63	2.12	1.71	1.34	0.45	-0.92	-0.61	-3.43	-4.84	-1.08
75	-5.15	-5.66	-0.81	1.44	2.43	1.49	1.52	2.33	1.64	1.85	-3.05	-4.65	-1.13
90	-5.32	-6.02	-1.82	0.91	2.32	2.18	1.93	2.41	2.73	2.44	-3.2	-4.09	-1.06
105	-5.21	-6.4	-3.37	-0.37	1.26	1.87	0.86	1.42	1.89	1.78	-3.53	-3.81	-1.11
120	-4.84	-6.58	-4.74	-2.49	-1.3	-0.12	-2.32	-1.19	-0.87	-0.53	-4.36	-3.68	-1.16
135	-4.4	-6.52	-5.69	-5.82	-5.94	-4.43	-8.27	-6.17	-4.52	-4.96	-4.95	-4.32	-1.38
150	-3.85	-5.98	-5.42	-10.02	-12.14	-11.31	-11.28	-12.25	-5.22	-10.58	-5.29	-4.45	-1.46
165	-3.98	-5.55	-4.95	-8.99	-10.83	-10.55	-7.47	-9.04	-6.56	-8.05	-4.82	-4.38	-1.15
180	-4.46	-5.39	-4.95	-7.2	-7.6	-8.11	-8.26	-10.02	-8.05	-6.75	-4.55	-5.16	-1.13
195	-4.98	-5.49	-4.89	-6.03	-6.79	-9.7	-11.25	-7.95	-4.34	-5.75	-3.46	-6.17	-1.37
210	-5.23	-5.48	-4.1	-4.54	-3.87	-7.12	-6.75	-6.22	-2.5	-3.28	-1.72	-6.64	-1.73
225	-5.17	-5.02	-2.7	-2.28	-1.72	-2.28	-2.84	-4.77	-2.98	-1.43	-0.98	-6.07	-2.01
240	-4.84	-4.01	-1.6	-0.2	-0.1	0.11	-0.69	-2.6	-1.94	-0.73	-0.83	-5.12	-2.2
255	-4.46	-3.1	-0.89	0.65	0.63	0.34	0.5	-0.35	-1.24	-1.16	-0.67	-4.34	-2.05
270	-3.93	-2.54	-0.77	0.69	0.25	0.32	0.28	0.21	-0.91	-1.11	-0.61	-3.97	-1.71
285	-3.84	-2.4	-1.13	0.46	-0.71	-0.25	-0.71	-0.26	-1.04	-0.79	-0.88	-4	-1.44
300	-4.12	-2.89	-1.95	-0.14	-2.03	-1.5	-2.34	-1.22	-1.36	-0.75	-1.5	-4.35	-1.53
315	-4.95	-3.48	-2.77	-1.11	-3.55	-2.83	-4.17	-2.2	-1.44	-1.16	-1.91	-4.95	-2.03
330	-5.54	-3.42	-3.3	-2.36	-5.56	-3.95	-5.48	-3.4	-1.48	-2.49	-2.38	-5.49	-2.96
345	-5.18	-3.07	-3.38	-3.76	-7.3	-5.24	-6.01	-4.21	-1.43	-3.65	-2.47	-6.29	-3.67
360	-4.67	-2.83	-3.77	-5.45	-6.19	-4.87	-3.66	-4.6	-0.93	-2.76	-2.97	-6.26	-4.62

Horizontal

Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-6.52	-6.1	-8.04	-12.59	-21.72	-17.15	-15.69	-16.39	-14.74	-14.66	-8.67	-7.96	-5.52
15	-5.21	-6.63	-10.39	-18.13	-16.24	-19.71	-15.74	-21.87	-21.64	-16.53	-9.18	-8.17	-4.51
30	-4.61	-7.45	-13.57	-13.24	-10.02	-15.12	-16.66	-19.44	-20.01	-21.76	-9.94	-9.02	-3.87
45	-4.98	-8.16	-12.23	-10.65	-9.07	-13.33	-18.22	-18.33	-19.4	-17.71	-9.21	-9.53	-3.85
60	-6.1	-8.33	-10.09	-10.34	-11.14	-15.04	-15.37	-16.41	-13.35	-10.81	-7.55	-9.64	-4.76
75	-7.64	-7.71	-8.66	-10.47	-13.5	-17.63	-14.56	-12.65	-9.41	-6.85	-5.67	-8.81	-6.78
90	-9.75	-7.02	-7.39	-9.44	-12.54	-15.01	-17.07	-10.79	-6.48	-4.45	-4.29	-7.31	-9.14
105	-11.31	-6.81	-6.18	-7.91	-9.8	-12.34	-20.25	-9.89	-4.93	-3.45	-3.79	-6.69	-11.48
120	-11.44	-7.34	-5.46	-6.9	-8.4	-10.93	-21.88	-10.45	-4.62	-4.12	-5.24	-7.12	-11.36
135	-10.24	-9.04	-6.2	-7.52	-9.04	-11.49	-21.3	-11.73	-5.89	-6.57	-9.64	-9.64	-9.2
150	-8.72	-11.1	-8.21	-12.04	-13.4	-14.05	-19.52	-13.45	-8.54	-12.47	-21.68	-13.79	-6.28
165	-7.59	-11.41	-10.34	-19.18	-21.97	-16.79	-16.19	-15.94	-12.98	-22.09	-9.6	-12.27	-4.1
180	-6.65	-8.89	-9.76	-10.22	-12.89	-18.23	-14.64	-11.91	-16.63	-11.92	-5.62	-9.58	-2.88
195	-6.18	-6.78	-7.29	-6.81	-9.92	-21.61	-16.35	-8.44	-7.55	-7.3	-3.62	-8.22	-2.24
210	-6.07	-5.96	-5.97	-6.47	-8.15	-15.22	-18.44	-9.89	-5.88	-5.16	-2.69	-7.4	-2.08
225	-6.22	-6.39	-6.22	-8.53	-8.21	-14.19	-19.01	-18.41	-8.5	-6.13	-3.31	-7.58	-2.31
240	-6.58	-7.85	-8.44	-13.71	-11.71	-16.13	-14.8	-17.05	-14.39	-10.45	-5.32	-8.45	-3.1
255	-7.23	-10.39	-11.98	-19.32	-16.62	-13.73	-12.52	-12.68	-17.42	-16.04	-8.79	-10.28	-4.14
270	-8.22	-14.09	-14.34	-13.45	-14.09	-10.2	-12.01	-10.64	-12.09	-12.68	-15.02	-13.57	-5.69
285	-10.1	-20.05	-11.59	-10.03	-11.13	-8.24	-11.68	-9.88	-9.14	-9.31	-21.23	-19.05	-8.2
300	-13.63	-15.37	-9.15	-8.24	-9.22	-7.6	-11.8	-9.55	-7.61	-7.5	-15.33	-20.32	-12.63
315	-20.18	-11.44	-7.73	-7.47	-8.61	-7.62	-11.96	-8.83	-6.59	-7.37	-11.03	-13.71	-16.32
330	-16.64	-8.34	-6.71	-7	-9.06	-8.54	-12.21	-9.11	-6.57	-8.87	-9.68	-9.97	-11.95
345	-10.71	-6.8	-6.15	-7.36	-11.19	-9.66	-13.77	-9.45	-7.45	-10.94	-8.52	-8.93	-8.41
360	-6.52	-6.1	-8.04	-12.59	-21.72	-17.15	-15.69	-16.39	-14.74	-14.66	-8.67	-7.96	-5.52

Vertical



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-9.27	-5.61	-5.81	-6.39	-6.31	-5.13	-3.94	-4.9	-1.11	-3.05	-4.33	-11.16	-11.89
15	-12.53	-6.04	-4.58	-4.29	-3.88	-2.28	-0.87	-2.8	-0.21	-1.93	-4.95	-10.55	-13.91
30	-15.5	-6.58	-2.59	-2.04	-0.22	-0.69	0.86	-0.2	-0.17	-2.15	-6.32	-8.49	-9.17
45	-14.36	-7.62	-1.05	-1.37	1.75	0.84	0.74	-0.5	-1	-3.95	-5.92	-7.18	-5.4
60	-11.33	-8.51	-0.84	0.27	1.91	1.62	1.24	0.36	-1.18	-1.05	-5.55	-6.59	-3.51
75	-8.76	-9.91	-1.59	1.15	2.32	1.44	1.41	2.19	1.28	1.22	-6.49	-6.75	-2.52
90	-7.26	-12.86	-3.23	0.49	2.17	2.09	1.87	2.2	2.17	1.45	-9.74	-6.9	-1.79
105	-6.44	-16.81	-6.6	-1.21	0.9	1.7	0.83	1.09	0.88	0.23	-15.8	-6.95	-1.52
120	-5.91	-14.51	-12.92	-4.45	-2.24	-0.49	-2.37	-1.74	-3.25	-3.03	-11.7	-6.3	-1.6
135	-5.71	-10.08	-15.23	-10.73	-8.85	-5.38	-8.49	-7.58	-10.18	-10.04	-6.75	-5.84	-2.17
150	-5.57	-7.58	-8.66	-14.32	-18.15	-14.61	-11.99	-18.41	-7.95	-15.11	-5.39	-4.99	-3.19
165	-6.47	-6.85	-6.44	-9.43	-11.18	-11.73	-8.1	-10.03	-7.69	-8.23	-6.57	-5.15	-4.23
180	-8.49	-7.97	-6.69	-10.2	-9.13	-8.55	-9.4	-14.53	-8.69	-8.32	-11.16	-7.1	-5.93
195	-11.14	-11.39	-8.62	-13.85	-9.69	-9.99	-12.85	-17.69	-7.15	-10.96	-18.07	-10.42	-8.81
210	-12.76	-15.31	-8.65	-8.97	-5.9	-7.85	-7.06	-8.66	-5.17	-7.82	-8.7	-14.62	-12.81
225	-11.82	-10.7	-5.25	-3.45	-2.82	-2.57	-2.95	-4.97	-4.41	-3.23	-4.81	-11.38	-13.81
240	-9.65	-6.32	-2.6	-0.39	-0.41	0.01	-0.86	-2.76	-2.2	-1.22	-2.74	-7.83	-9.45
255	-7.74	-4	-1.24	0.61	0.55	0.17	0.28	-0.62	-1.34	-1.3	-1.39	-5.62	-6.24
270	-5.95	-2.85	-0.96	0.52	0.09	-0.08	0.01	-0.16	-1.26	-1.43	-0.77	-4.47	-3.92
285	-5.01	-2.48	-1.54	0.05	-1.13	-1	-1.08	-0.76	-1.78	-1.45	-0.92	-4.14	-2.47
300	-4.64	-3.14	-2.87	-0.87	-2.96	-2.72	-2.86	-1.91	-2.54	-1.79	-1.69	-4.46	-1.88
315	-5.09	-4.24	-4.43	-2.25	-5.18	-4.58	-4.96	-3.27	-3.02	-2.35	-2.47	-5.57	-2.2
330	-5.9	-5.1	-5.95	-4.18	-8.13	-5.8	-6.52	-4.76	-3.09	-3.63	-3.28	-7.41	-3.55
345	-6.6	-5.46	-6.64	-6.25	-9.57	-7.19	-6.81	-5.75	-2.68	-4.55	-3.71	-9.71	-5.44
360	-9.27	-5.61	-5.81	-6.39	-6.31	-5.13	-3.94	-4.9	-1.11	-3.05	-4.33	-11.16	-11.89

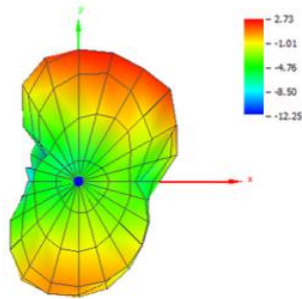


Figure 222. Board #9 (2.44 GHz): Theta = 0, Phi = 0

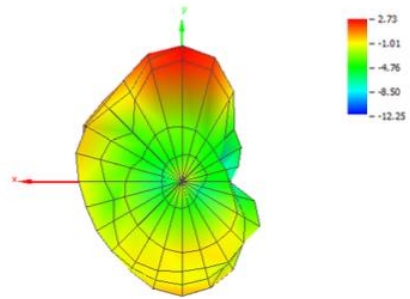


Figure 223. Board #9 (2.44 GHz): Theta = 180, Phi = 0

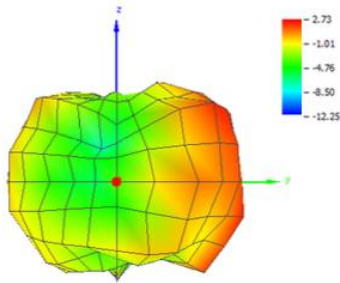


Figure 224. Board #9 (2.44 GHz): Theta = 90, Phi = 0

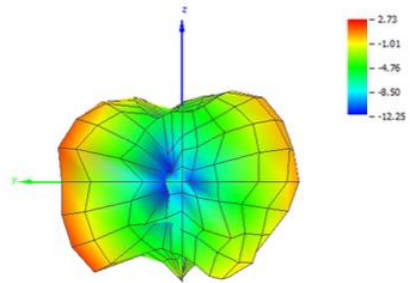


Figure 225. Board #9 (2.44 GHz): Theta = 90, Phi = 180

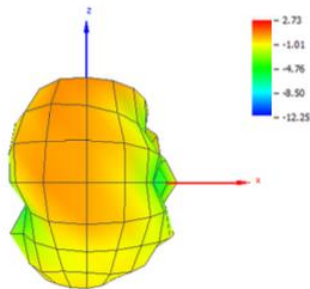


Figure 226. Board #9 (2.44 GHz): Theta = 90, Phi = 270

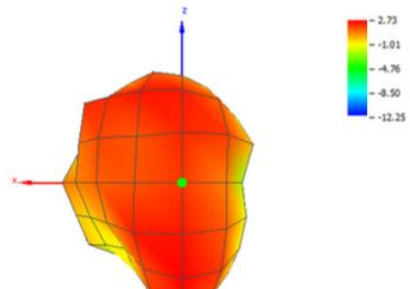


Figure 227. Board #9 (2.44 GHz): Theta = 90, Phi = 90

Summary of Evaluation Results – 2.48Ghz



Test Description	Test Result
Total Radiated Power	-1.47 dBm
Peak EIRP	4.00 dBm
Directivity	5.47 dBi
Efficiency	-1.47 dB
Efficiency	0.7134
Peak Gain	4.00 dBi
NHPRP 45°	-2.55 dBm
NHPRP 45° / TRP	-1.09 dB
NHPRP 45° / TRP	0.7785
NHPRP 30°	-3.93 dBm
NHPRP 30° / TRP	-2.46 dB
NHPRP 30° / TRP	0.5669
NHPRP 22.5°	-5.11 dBm
NHPRP 22.5° / TRP	-3.64 dB
NHPRP 22.5° / TRP	0.4325
UHRP	-4.96 dBm
UHRP / TRP	-3.49 dB
UHRP / TRP	0.4479
LHRP	-4.05 dBm
LHRP / TRP	-2.58 dB
LHRP / TRP	0.5521
PGRP (0-120°)	-2.68 dBm
PGRP / TRP	-1.21 dB
PGRP / TRP	0.7563
Front/Back Ratio	6.62
PhiBW	89.6°
PhiBW Up	22.7°
PhiBW Down	66.9°
ThetaBW	81.8°
ThetaBW Up	19.5°
ThetaBW Down	62.3°
Boresight Phi	90°
Boresight Theta	120°
Maximum Power	4.00 dBm
Minimum Power	-13.95 dBm
Average Power	-2.01 dBm
Max/Min Ratio	17.95 dB
Max/Avg Ratio	6.01 dB
Min/Avg Ratio	-11.94 dB
Worst Single Value	-21.77 dBm
Worst Position	Azi = 75°; Elev = 75°; Pol = Horizontal
Best Single Value	3.67 dBm
Best Position	Azi = 90°; Elev = 120°; Pol = Vertical

Total



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-2.07	-2.99	-2.63	-2.76	-2.08	-1.97	-0.94	-1.2	-1.56	-1.83	-2.26	-6.39	-3.97
15	-2.34	-3.7	-2.69	-2.23	-0.89	0.28	1.52	0.74	0.63	0.13	-2.29	-6.75	-3.6
30	-2.62	-4.54	-2.89	-0.91	0.63	1.39	2.62	2.75	1.31	0.2	-3.67	-6.87	-2.97
45	-2.66	-4.68	-2.55	-0.74	1.64	2.06	1.69	1.9	1.07	-1.85	-4.02	-6.34	-2.41
60	-2.1	-4.45	-2.07	-0.7	0.88	2.2	1.78	1.05	1.03	-0.18	-2.88	-4.65	-1.81
75	-1.73	-4.21	-2.19	-0.34	0.97	1.44	1.93	2.96	3.06	1.95	-2.33	-2.9	-1.13
90	-1.67	-3.92	-2.89	-0.75	1.31	1.86	2.43	3.55	4	2.43	-2.32	-1.97	-0.82
105	-1.93	-3.98	-3.71	-2.17	0.48	1.66	1.85	2.71	2.87	1.4	-2.91	-2.16	-1.12
120	-2.51	-4.6	-5.12	-4.94	-2.52	-0.72	-1.28	-0.25	-0.78	-1.57	-4.29	-3.18	-1.55
135	-2.82	-5.24	-5.48	-7.86	-8.25	-5.49	-6.54	-6.5	-5.94	-6.89	-5.38	-4.45	-2.13
150	-3.77	-5.62	-5.14	-5.93	-10.64	-13.95	-10.81	-11.47	-7.15	-9.05	-5.21	-4.92	-2.28
165	-4.71	-5.8	-4.83	-3.54	-6.6	-10.65	-7.53	-5.02	-7.67	-5	-4.75	-4.81	-2.14
180	-5.16	-5.91	-5.35	-3.08	-4.87	-7.99	-8	-5.34	-5.84	-4	-4.39	-5.25	-2.28
195	-5.22	-6.03	-5.65	-4.22	-6.13	-9.01	-8.7	-4.51	-2	-3.22	-2.96	-5.7	-2.38
210	-5.36	-6.1	-3.84	-6.18	-4.88	-6.98	-3.85	-2.83	-0.65	-1.32	-1.24	-6.25	-2.8
225	-5.54	-6.02	-2.21	-4.77	-2.6	-2.26	-0.86	-2.52	-0.45	0.09	-0.6	-6.98	-3.13
240	-5.62	-5.79	-1.35	-2.23	-1.28	0	0.54	-0.61	0.72	0.39	-0.27	-7.19	-3.17
255	-5.75	-5.17	-1.44	-1.7	-1.27	-0.3	1.11	0.83	0.87	-0.04	0.08	-6.99	-3.07
270	-5.82	-4	-1.44	-1.76	-2.62	-1.31	0.32	0.26	0.67	-0.37	-0.06	-6.72	-2.56
285	-5.18	-2.75	-1.62	-1.98	-4.28	-2.1	-1.33	-1.26	0.1	-1.12	-0.73	-6.39	-2.38
300	-4.1	-1.72	-1.6	-2.32	-5.55	-3.35	-3.31	-3.65	-1.34	-2.25	-1.57	-6.06	-2.63
315	-2.93	-1.43	-1.71	-2.45	-5.98	-4.76	-5.04	-6.35	-2.48	-3.8	-2.23	-6.12	-3.02
330	-2.36	-1.44	-2.08	-2.61	-5.71	-5.48	-5.69	-8.16	-3.76	-5.84	-2.73	-5.92	-3.73
345	-1.93	-1.74	-2	-2.89	-4.85	-4.53	-4.48	-6.64	-4.41	-6.12	-2.69	-6.19	-3.88
360	-2.07	-2.99	-2.63	-2.76	-2.08	-1.97	-0.94	-1.2	-1.56	-1.83	-2.26	-6.39	-3.97

Horizontal

Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-3.18	-4.89	-6.9	-8.2	-13.42	-20.8	-17.97	-16.13	-19.89	-20.52	-11.56	-7.1	-4.31
15	-2.98	-5.67	-8.34	-12.86	-13.71	-18.97	-15.97	-14.28	-18.56	-18.16	-12.16	-8.02	-3.81
30	-3.56	-6.84	-11.62	-18.23	-13.79	-16.14	-15.54	-12.91	-15.84	-15.94	-12.6	-9.46	-3.75
45	-4.62	-7.62	-13.31	-17.16	-12.56	-14.99	-18.53	-13.4	-15.13	-14.84	-10.73	-10.86	-4.33
60	-5.82	-7.33	-11.53	-13.96	-13.52	-18.16	-19.21	-15.05	-11.93	-11.29	-8.07	-10.27	-5.71
75	-6.81	-6.54	-8.94	-11.62	-14.6	-21.77	-18.28	-13.81	-9.89	-8.05	-5.87	-8.05	-7.51
90	-7.76	-5.8	-6.86	-9.2	-12.79	-17.22	-17.41	-12.1	-7.39	-5.68	-4.04	-6.02	-9.29
105	-8.77	-5.65	-5.72	-7.79	-10.74	-14.82	-16.8	-11.2	-5.86	-4.78	-3.46	-5.11	-11.41
120	-10.08	-6.62	-5.67	-7.17	-9.8	-13.84	-15.96	-11.43	-5.73	-5.24	-4.8	-5.75	-12.98
135	-10.31	-8.32	-6.42	-8.3	-10.75	-15.45	-15.61	-12.81	-7.17	-8.2	-9.49	-8.31	-12.14
150	-10.68	-11.9	-8.96	-12.29	-16.01	-17.83	-15.68	-18.48	-10.97	-16.12	-20.41	-14.21	-8.36
165	-10.37	-14.4	-12.22	-19.76	-17.49	-18.63	-19.95	-19.8	-17.58	-15.87	-9.93	-21.38	-6.09
180	-9.23	-10.46	-10.35	-10.63	-12.4	-17.19	-18.76	-10.54	-12.26	-8.13	-5.41	-13.55	-4.53
195	-8.14	-7.72	-6.7	-7.31	-10.75	-12.88	-15.29	-6.26	-5.22	-4.93	-3.21	-10.08	-3.65
210	-7.44	-6.45	-4.96	-6.96	-9.08	-11.87	-13.14	-6.48	-4.01	-3.37	-2.31	-8.8	-3.37
225	-7.24	-6.8	-5.12	-9.17	-9.25	-13.32	-13.1	-11.2	-6.22	-4.35	-2.83	-9.26	-3.56
240	-7.66	-8.68	-6.99	-13.87	-13.81	-16.68	-17.59	-21.31	-11.9	-9.3	-5.17	-11.3	-4.3
255	-8.95	-12.9	-10.98	-20.15	-21.65	-21.09	-20.41	-17.7	-21.51	-19.74	-8.96	-14.39	-5.78
270	-11.78	-20.38	-16.38	-16.07	-17.54	-14.59	-18.33	-13.97	-14.63	-14.53	-16.74	-19.39	-8.19
285	-16.17	-15.38	-15.35	-11.91	-15.05	-11.54	-17.18	-13.69	-10.86	-10.79	-18.28	-19.84	-11.97
300	-17.44	-9.92	-9.87	-9.09	-13.29	-10.55	-16.2	-14.16	-9.02	-9.19	-12.79	-13.97	-19.35
315	-12.27	-7.58	-7.35	-7.49	-11.99	-10.44	-16.62	-15.21	-8.35	-8.96	-10.85	-10.27	-14.46
330	-7.74	-5.91	-6.4	-6.24	-10.36	-11.69	-18.78	-16.14	-8.79	-11.47	-9.66	-7.53	-8.93
345	-5.03	-5.07	-5.78	-5.79	-10.28	-13.07	-21.1	-16.6	-10.62	-15.85	-9.51	-6.81	-6.37
360	-3.18	-4.89	-6.9	-8.2	-13.42	-20.8	-17.97	-16.13	-19.89	-20.52	-11.56	-7.1	-4.31

Vertical



Azimuth (°)	0° (dB)	15° (dB)	30° (dB)	45° (dB)	60° (dB)	75° (dB)	90° (dB)	105° (dB)	120° (dB)	135° (dB)	150° (dB)	165° (dB)	180° (dB)
0	-8.52	-7.5	-4.66	-4.23	-2.41	-2.02	-1.03	-1.34	-1.62	-1.89	-2.8	-14.64	-15.21
15	-10.95	-8.08	-4.07	-2.62	-1.13	0.22	1.44	0.6	0.58	0.07	-2.76	-12.74	-16.97
30	-9.71	-8.4	-3.52	-0.99	0.47	1.31	2.55	2.63	1.23	0.09	-4.26	-10.34	-10.82
45	-7.06	-7.77	-2.93	-0.84	1.48	1.97	1.65	1.77	0.97	-2.07	-5.06	-8.23	-6.9
60	-4.49	-7.61	-2.59	-0.91	0.72	2.16	1.74	0.95	0.81	-0.53	-4.44	-6.04	-4.08
75	-3.35	-8.03	-3.22	-0.68	0.84	1.42	1.89	2.87	2.83	1.5	-4.86	-4.49	-2.27
90	-2.89	-8.45	-5.12	-1.42	1.14	1.8	2.38	3.43	3.67	1.7	-7.18	-4.14	-1.49
105	-2.93	-8.95	-8.02	-3.56	0.13	1.56	1.79	2.53	2.24	0.2	-12.2	-5.22	-1.55
120	-3.35	-8.9	-14.39	-8.9	-3.42	-0.94	-1.43	-0.6	-2.46	-4.01	-13.83	-6.68	-1.87
135	-3.67	-8.19	-12.58	-18.03	-11.85	-5.95	-7.12	-7.66	-12.04	-12.73	-7.52	-6.74	-2.59
150	-4.76	-6.79	-7.47	-7.07	-12.14	-16.23	-12.53	-12.44	-9.48	-9.99	-5.34	-5.46	-3.51
165	-6.08	-6.45	-5.7	-3.65	-6.97	-11.4	-7.79	-5.16	-8.13	-5.37	-6.32	-4.91	-4.38
180	-7.32	-7.78	-7.01	-3.92	-5.72	-8.55	-8.38	-6.91	-6.97	-6.12	-11.18	-5.94	-6.2
195	-8.33	-10.94	-12.31	-7.16	-7.97	-11.3	-9.78	-9.31	-4.81	-8.1	-15.6	-7.67	-8.35
210	-9.55	-17.18	-10.27	-14.03	-6.95	-8.69	-4.39	-5.28	-3.34	-5.55	-7.87	-9.78	-11.92
225	-10.46	-13.89	-5.33	-6.73	-3.66	-2.61	-1.13	-3.16	-1.79	-1.85	-4.57	-10.87	-13.37
240	-9.89	-8.91	-2.73	-2.54	-1.53	-0.1	0.47	-0.65	0.48	-0.11	-1.97	-9.33	-9.59
255	-8.59	-5.97	-1.96	-1.76	-1.31	-0.34	1.08	0.76	0.84	-0.08	-0.5	-7.86	-6.41
270	-7.09	-4.1	-1.58	-1.92	-2.76	-1.52	0.26	0.1	0.54	-0.54	-0.15	-6.96	-3.95
285	-5.54	-3	-1.81	-2.45	-4.66	-2.62	-1.45	-1.51	-0.26	-1.62	-0.8	-6.59	-2.89
300	-4.3	-2.43	-2.3	-3.34	-6.35	-4.26	-3.54	-4.05	-2.16	-3.24	-1.91	-6.83	-2.72
315	-3.46	-2.64	-3.09	-4.09	-7.23	-6.13	-5.35	-6.96	-3.78	-5.38	-2.88	-8.23	-3.34
330	-3.84	-3.35	-4.08	-5.08	-7.53	-6.67	-5.91	-8.92	-5.4	-7.23	-3.71	-11.01	-5.3
345	-4.85	-4.45	-4.36	-6.02	-6.32	-5.18	-4.57	-7.11	-5.6	-6.6	-3.7	-14.97	-7.49
360	-8.52	-7.5	-4.66	-4.23	-2.41	-2.02	-1.03	-1.34	-1.62	-1.89	-2.8	-14.64	-15.21

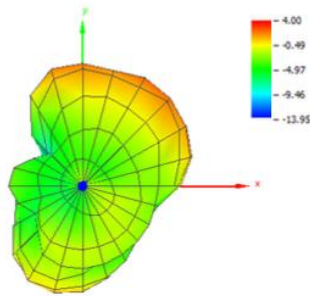


Figure 228. Board #9 (2.48 GHz): Theta = 0, Phi = 0

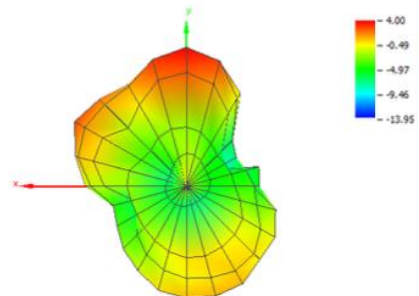


Figure 229. Board #9 (2.48 GHz): Theta = 180, Phi = 0

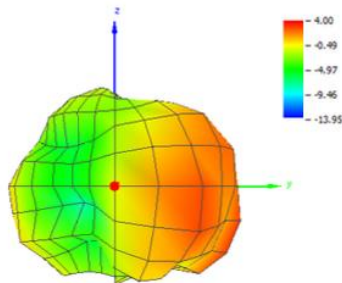


Figure 230. Board #9 (2.48 GHz): Theta = 90, Phi = 0

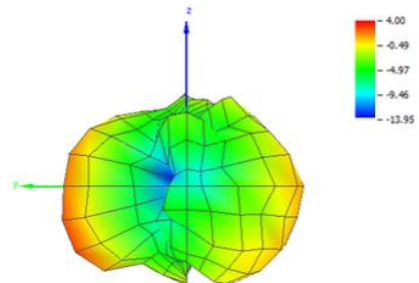


Figure 231. Board #9 (2.48 GHz): Theta = 90, Phi = 180

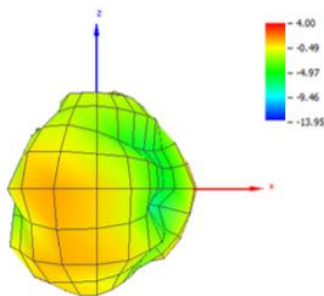


Figure 232. Board #9 (2.48 GHz): Theta = 90, Phi = 270

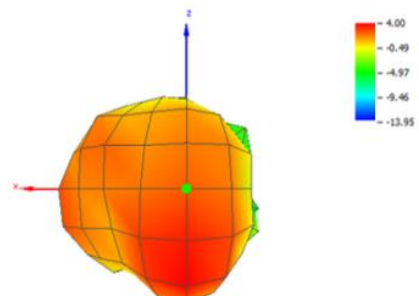


Figure 233. Board #9 (2.48 GHz): Theta = 90, Phi = 90

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