

Test report No:

NIE: 57461RAN.001

Test Report

Antenna gain and Radiation Pattern Tests

Identification of item tested.....:	Wellness device for Isometric exercises and games
Model and/or type reference	Activ5
Other identification of the product	S/N (radiated sample): 5P1011031649AA3456 S/N (conducted sample): 5P1011011708AB1510
Final HW version	Version 6
Final SW version	Version 1.0
Features	Force sensing, Bluetooth communication
Manufacturer	Company name: ActivBody Inc. Postal Address: 65 Enterprise, Aliso Viejo, CA, USA, 92656
Test methodology according to	[1] CTIA Test plan for mobile station over the air performance. Method of measurement for radiated RF power and receiver performance. May 2017. Revision 3.7.1
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager
Date of issue	2018-05-16
Report template No.....:	FDT08_20

Instrumentation used.....:

1. Anechoic chamber ETS LINDGREN AMS-8700
2. RF switch unit and positioning control system ETS-Lindgren EMCenter 7-Slot RF 7000-001
3. Medium-Duty Rotation Mast Shaft ETS-Lindgren 2115CR-7200
4. Agilent E4445 PSA Spectrum Analyzer
5. OTA measurement software ETS LINDGREN EMQuest v1.10
6. Absorber Nested Dual-Polarized Dual-Vivaldi Array Antenna ETS-Lindgren 3165-02
7. Temperature and Humidity probe, model HWg-STE

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1. TEST CONDITIONS

1.1 Power supply (V)

Power supply (V) under test:

V_n = supplied by a fully charged 1.5 V AAA battery

1.2 Test frequencies and output power

3D radiation pattern and conducted power measurements were performed at frequencies indicated by the client.

The output power of the device under test was set to maximum for all tests.

1.3 Antenna orientation and setup requirements

The EUT is rotated along two different spherical axes: theta (θ) and phi (Φ). The relationship between the 3D Cartesian coordinate system (X, Y, Z) and the theta and phi axes is illustrated in the following figure. This coordinate system should be used as reference in all 3D radiation pattern graphs in section 4 as well as test setup photographs in Appendix A.

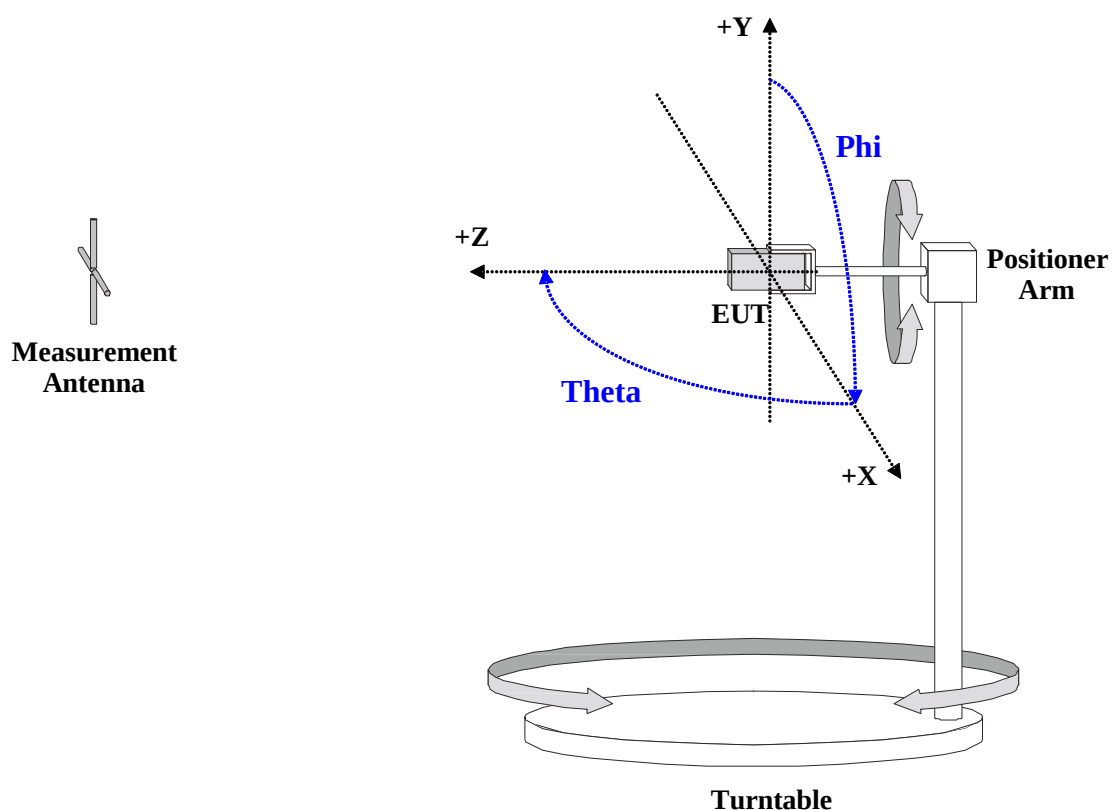


Fig. 1. Coordinate system.

Theta is the spherical axis that rotates along the Cartesian Y axis while Phi is the spherical axis that rotates along the Cartesian Z axis. The initial measurement position (Theta = 0° and Phi = 0°) is illustrated in each of the test setup photographs in Appendix A. The EUT has only one mechanical configuration each and they were tested in the “Free-space” configuration, whereby EUT has been placed directly on a support.

2. TEST RESULTS

2.1 Equipment Under Test (EUT) information

Manufacturer	ActivBody Inc.
Model	Activ5
Serial Number(s)/ESN(s)/IMEI(s)	S/N (radiated sample): 5P1011031649AA3456 S/N (conducted sample): 5P1011011708AB1510
Hardware Version	Version 6
Software Version	Version 1.0
Configuration of Primary Mechanical Mode	Integrated device (only one)

2.2 EUTs used for each test

Control N°	CATL/ Chamber used	Radio Technology	Band(s)	Test Type(s)	Test Condition(s)
57461/001 S/N: 5P1011031649AA3456	Code 20080208-00 / ETS Lindgren AMS- 8700	BLE	2.4 GHz	3D Radiation Pattern	Free Space
54052/003 S/N: 5P1011011708AB1510	Code 20080208-00 / ETS Lindgren AMS- 8700	BLE	2.4 GHz	Conducted Power	Conducted Measurements

2.3 Summation Test Results

Channel Frequency (MHz)	Maximum EIRP (dBm)	Conducted Power (dBm)	Antenna Peak Gain (dBi)
2402	0.99	-0.10	1.09
2440	-0.20	-0.44	0.24
2480	-1.54	-0.81	-0.73

2.4 EIRP Test Results – 2402 MHz

2.4.1 Horizontal Polarization

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-14.82	-7.33	-3.55	-1.94	-1.84	-3.51	-7.56	-15.14	-13.33	-12.02	-16.86	-12.65	-
15	-	-7.40	-3.66	-1.58	-1.04	-2.47	-5.81	-14.54	-19.07	-13.73	-17.36	-11.35	-
30	-	-6.85	-3.74	-1.14	-0.46	-1.57	-4.71	-12.85	-22.55	-12.06	-10.87	-9.97	-
45	-	-6.07	-3.89	-0.90	-0.12	-1.03	-4.05	-11.18	-15.83	-9.19	-6.84	-9.01	-
60	-	-5.43	-4.15	-0.83	0.02	-0.82	-3.86	-10.30	-12.23	-6.99	-4.52	-8.10	-
75	-	-5.19	-4.44	-0.81	0.15	-0.73	-3.78	-9.97	-10.74	-5.64	-3.10	-7.36	-
90	-	-5.38	-4.79	-0.82	0.30	-0.56	-3.66	-10.14	-10.50	-4.92	-2.38	-6.82	-
105	-	-6.16	-5.18	-0.78	0.50	-0.27	-3.40	-10.70	-11.55	-4.74	-2.10	-6.56	-
120	-	-7.57	-5.59	-0.76	0.72	0.03	-3.05	-11.20	-13.76	-4.95	-2.32	-6.53	-
135	-	-10.09	-6.07	-0.86	0.71	0.22	-2.76	-11.36	-16.91	-5.56	-2.90	-6.81	-
150	-	-14.25	-6.34	-1.11	0.46	0.17	-2.84	-11.08	-17.48	-6.24	-3.73	-7.46	-
165	-	-17.69	-6.03	-1.43	0.05	-0.23	-3.41	-11.12	-14.48	-6.76	-4.68	-8.43	-
180	-	-12.48	-5.05	-1.60	-0.45	-0.93	-4.43	-11.78	-12.20	-6.80	-5.30	-9.72	-
195	-	-8.10	-3.55	-1.34	-0.66	-1.63	-5.56	-13.19	-10.90	-6.45	-5.42	-11.35	-
210	-	-5.07	-2.08	-0.65	-0.52	-1.97	-6.22	-15.56	-10.21	-5.88	-4.93	-13.10	-
225	-	-3.07	-0.89	0.08	-0.16	-1.92	-6.33	-18.07	-9.97	-5.39	-4.17	-15.09	-
240	-	-1.81	-0.14	0.58	0.09	-1.78	-6.25	-19.78	-9.92	-5.03	-3.48	-17.00	-
255	-	-1.10	0.22	0.86	0.03	-1.86	-6.48	-20.88	-9.71	-4.81	-3.03	-18.97	-
270	-	-0.89	0.22	0.76	-0.29	-2.29	-7.31	-23.92	-9.33	-4.74	-2.89	-20.66	-
285	-	-1.13	-0.12	0.38	-0.96	-3.08	-8.86	-27.13	-8.83	-4.82	-3.15	-21.97	-
300	-	-1.82	-0.72	-0.28	-1.84	-4.24	-11.13	-21.08	-8.33	-5.11	-3.89	-21.52	-
315	-	-2.90	-1.59	-1.07	-2.71	-5.42	-13.17	-16.84	-8.22	-5.72	-5.27	-19.70	-
330	-	-4.33	-2.49	-1.79	-3.08	-5.88	-12.63	-15.07	-8.76	-6.83	-7.42	-17.32	-
345	-	-5.98	-3.07	-2.17	-2.80	-5.14	-10.47	-14.91	-9.89	-8.73	-10.12	-14.81	-3.82
360	-	-7.33	-3.55	-1.94	-1.84	-3.51	-7.56	-15.14	-13.33	-12.02	-16.86	-12.65	-

2.4.2 Vertical Polarization

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-3.92	-4.62	-6.82	-8.66	-14.82	-16.33	-13.20	-9.53	-8.46	-6.23	-4.40	-13.02	-
15	-	-5.19	-8.18	-10.44	-21.62	-15.73	-11.43	-8.63	-7.85	-5.87	-4.21	-12.52	-
30	-	-6.45	-10.11	-13.67	-32.59	-13.13	-9.93	-7.71	-7.50	-5.78	-4.45	-12.52	-
45	-	-8.43	-12.69	-17.64	-20.00	-11.44	-9.14	-7.26	-7.39	-6.05	-5.18	-13.30	-
60	-	-11.48	-15.87	-21.46	-16.26	-10.78	-9.11	-7.53	-7.83	-6.85	-6.48	-14.52	-
75	-	-15.60	-17.74	-20.09	-14.82	-11.18	-9.94	-8.44	-8.84	-8.19	-8.33	-16.36	-
90	-	-16.50	-15.68	-17.31	-14.56	-12.57	-11.86	-10.12	-10.53	-9.92	-10.36	-19.36	-
105	-	-12.49	-12.80	-15.06	-14.88	-15.05	-15.30	-13.08	-13.10	-11.98	-11.28	-23.82	-
120	-	-9.09	-10.32	-13.03	-15.30	-18.96	-21.24	-17.40	-15.53	-12.64	-9.84	-22.93	-
135	-	-6.82	-8.62	-11.43	-15.36	-22.48	-21.80	-17.70	-14.35	-10.84	-7.66	-18.39	-
150	-	-5.37	-7.35	-9.92	-14.85	-20.41	-17.00	-13.50	-11.39	-8.55	-5.84	-15.47	-
165	-	-4.51	-6.64	-8.74	-14.26	-18.45	-14.79	-10.93	-9.26	-6.85	-4.60	-13.66	-
180	-	-4.28	-6.39	-8.03	-13.79	-18.51	-14.61	-9.90	-8.10	-5.99	-3.91	-12.76	-
195	-	-4.55	-6.72	-7.83	-13.78	-21.09	-15.88	-10.10	-7.92	-5.80	-3.78	-13.06	-
210	-	-5.54	-7.84	-8.38	-14.76	-25.80	-18.70	-11.35	-8.65	-6.30	-4.19	-13.65	-
225	-	-7.17	-9.64	-9.89	-15.72	-23.80	-21.04	-13.26	-10.06	-7.46	-5.23	-14.82	-
240	-	-9.76	-11.97	-12.17	-15.64	-18.25	-19.48	-15.28	-12.11	-9.19	-6.91	-16.65	-
255	-	-12.91	-13.19	-14.25	-14.00	-14.89	-16.58	-16.50	-14.38	-11.64	-9.30	-19.00	-
270	-	-13.43	-11.67	-13.42	-11.74	-12.66	-14.46	-16.01	-15.79	-14.26	-11.87	-21.58	-
285	-	-10.58	-9.32	-10.90	-9.98	-11.35	-13.10	-14.82	-15.35	-15.07	-12.44	-22.12	-
300	-	-7.84	-7.46	-8.78	-9.06	-10.71	-12.63	-13.61	-13.78	-13.11	-10.34	-19.92	-
315	-	-6.02	-6.35	-7.50	-8.91	-10.82	-12.86	-12.79	-12.00	-10.77	-7.99	-17.20	-
330	-	-4.94	-5.93	-6.98	-9.65	-11.81	-13.65	-12.01	-10.55	-8.86	-6.21	-15.16	-
345	-	-4.43	-6.00	-7.23	-11.00	-13.75	-14.17	-10.97	-9.53	-7.34	-5.20	-14.04	-4.45
360	-	-4.62	-6.82	-8.66	-14.82	-16.33	-13.20	-9.53	-8.46	-6.23	-4.40	-13.02	-

2.4.3 Total

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-3.58	-2.76	-1.87	-1.10	-1.63	-3.29	-6.51	-8.48	-7.23	-5.21	-4.16	-9.82	-
15	-	-3.15	-2.35	-1.05	-1.00	-2.27	-4.76	-7.64	-7.54	-5.21	-4.00	-8.89	-
30	-	-3.63	-2.84	-0.90	-0.46	-1.27	-3.57	-6.55	-7.36	-4.86	-3.56	-8.05	-
45	-	-4.08	-3.35	-0.81	-0.08	-0.65	-2.88	-5.78	-6.81	-4.33	-2.92	-7.64	-
60	-	-4.47	-3.87	-0.79	0.12	-0.40	-2.72	-5.69	-6.48	-3.91	-2.38	-7.21	-
75	-	-4.81	-4.24	-0.76	0.28	-0.36	-2.84	-6.13	-6.67	-3.72	-1.96	-6.84	-
90	-	-5.05	-4.45	-0.72	0.44	-0.30	-3.05	-7.12	-7.50	-3.73	-1.73	-6.58	-
105	-	-5.25	-4.49	-0.62	0.63	-0.13	-3.13	-8.72	-9.24	-3.99	-1.60	-6.48	-
120	-	-5.25	-4.33	-0.51	0.82	0.08	-2.99	-10.27	-11.54	-4.27	-1.61	-6.43	-
135	-	-5.15	-4.15	-0.50	0.81	0.24	-2.71	-10.45	-12.43	-4.44	-1.64	-6.52	-
150	-	-4.84	-3.80	-0.57	0.59	0.20	-2.68	-9.12	-10.44	-4.23	-1.64	-6.83	-
165	-	-4.31	-3.31	-0.69	0.20	-0.16	-3.11	-8.01	-8.12	-3.79	-1.63	-7.29	-
180	-	-3.67	-2.66	-0.71	-0.25	-0.85	-4.03	-7.73	-6.67	-3.37	-1.54	-7.97	-
195	-	-2.96	-1.84	-0.46	-0.45	-1.58	-5.17	-8.36	-6.15	-3.10	-1.51	-9.11	-
210	-	-2.29	-1.06	0.02	-0.36	-1.95	-5.98	-9.95	-6.35	-3.07	-1.54	-10.35	-
225	-	-1.64	-0.35	0.49	-0.04	-1.89	-6.18	-12.02	-7.00	-3.29	-1.65	-11.94	-
240	-	-1.16	0.14	0.80	0.21	-1.69	-6.04	-13.96	-7.87	-3.62	-1.86	-13.81	-
255	-	-0.82	0.41	0.99	0.20	-1.65	-6.07	-15.15	-8.44	-3.99	-2.11	-15.97	-
270	-	-0.65	0.49	0.92	0.01	-1.90	-6.55	-15.36	-8.44	-4.28	-2.37	-18.09	-
285	-	-0.67	0.37	0.69	-0.44	-2.48	-7.47	-14.57	-7.96	-4.43	-2.66	-19.03	-
300	-	-0.85	0.11	0.29	-1.09	-3.35	-8.81	-12.89	-7.24	-4.47	-3.01	-17.64	-
315	-	-1.18	-0.34	-0.18	-1.78	-4.32	-10.01	-11.35	-6.70	-4.54	-3.41	-15.26	-
330	-	-1.61	-0.87	-0.64	-2.21	-4.89	-10.10	-10.27	-6.55	-4.72	-3.76	-13.10	-
345	-	-2.13	-1.28	-0.99	-2.19	-4.58	-8.93	-9.50	-6.70	-4.97	-3.99	-11.40	-1.12
360	-	-2.76	-1.87	-1.10	-1.63	-3.29	-6.51	-8.48	-7.23	-5.21	-4.16	-9.82	-

2.5 EIRP Test Results – 2440 MHz

2.5.1 Horizontal Polarization

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-14.29	-8.10	-4.37	-2.57	-2.29	-3.94	-8.19	-17.25	-15.79	-13.61	-20.52	-12.71	-
15	-	-7.99	-4.44	-2.32	-1.65	-3.06	-6.56	-15.83	-21.97	-14.29	-16.35	-11.72	-
30	-	-7.40	-4.48	-1.98	-1.20	-2.33	-5.52	-13.61	-20.44	-11.81	-10.41	-10.67	-
45	-	-6.74	-4.59	-1.85	-0.95	-1.94	-4.96	-12.07	-15.32	-9.12	-6.96	-9.94	-
60	-	-6.26	-4.80	-1.87	-0.90	-1.85	-4.96	-11.62	-12.62	-7.22	-4.88	-9.28	-
75	-	-6.15	-5.13	-1.98	-0.91	-1.91	-5.13	-11.86	-11.43	-5.96	-3.63	-8.74	-
90	-	-6.46	-5.59	-2.10	-0.88	-1.94	-5.26	-12.60	-11.34	-5.42	-2.97	-8.31	-
105	-	-7.44	-6.14	-2.15	-0.77	-1.83	-5.17	-13.70	-12.05	-5.24	-2.81	-8.07	-
120	-	-9.07	-6.72	-2.25	-0.74	-1.70	-4.97	-14.53	-13.50	-5.41	-3.05	-8.07	-
135	-	-11.94	-7.41	-2.40	-0.83	-1.59	-4.76	-14.59	-14.93	-5.78	-3.58	-8.41	-
150	-	-16.81	-7.75	-2.67	-1.16	-1.70	-4.91	-13.96	-14.52	-6.23	-4.37	-9.02	-
165	-	-20.10	-7.40	-2.96	-1.63	-2.20	-5.58	-13.77	-12.67	-6.48	-5.13	-9.90	-
180	-	-13.72	-6.28	-3.03	-2.08	-2.87	-6.60	-14.49	-11.04	-6.54	-5.60	-11.15	-
195	-	-9.26	-4.71	-2.71	-2.23	-3.42	-7.84	-15.94	-9.96	-6.22	-5.65	-12.42	-
210	-	-6.37	-3.23	-2.00	-1.98	-3.58	-8.48	-18.31	-9.39	-5.79	-5.30	-13.77	-
225	-	-4.52	-2.11	-1.23	-1.63	-3.37	-8.36	-20.97	-9.14	-5.52	-4.73	-15.03	-
240	-	-3.32	-1.35	-0.63	-1.41	-3.07	-8.08	-22.76	-9.11	-5.36	-4.18	-16.18	-
255	-	-2.74	-0.96	-0.38	-1.39	-2.99	-8.04	-23.12	-9.10	-5.25	-3.79	-17.10	-
270	-	-2.61	-0.97	-0.40	-1.61	-3.24	-8.54	-22.99	-9.03	-5.34	-3.81	-17.76	-
285	-	-2.89	-1.32	-0.73	-2.09	-3.79	-9.63	-22.13	-8.91	-5.61	-4.24	-18.23	-
300	-	-3.56	-1.88	-1.32	-2.74	-4.66	-11.22	-19.97	-8.84	-6.09	-5.16	-18.18	-
315	-	-4.64	-2.65	-1.97	-3.23	-5.51	-12.49	-17.74	-9.18	-6.84	-6.65	-17.32	-
330	-	-5.93	-3.43	-2.53	-3.34	-5.81	-12.20	-16.84	-10.09	-8.26	-9.07	-16.00	-
345	-	-7.30	-3.92	-2.76	-2.97	-5.24	-10.60	-17.31	-11.63	-10.33	-12.40	-14.30	-5.12
360	-	-8.10	-4.37	-2.57	-2.29	-3.94	-8.19	-17.25	-15.79	-13.61	-20.52	-12.71	-

2.5.2 Vertical Polarization

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-5.51	-5.95	-8.02	-9.80	-18.43	-19.90	-14.90	-10.60	-9.51	-6.97	-5.17	-15.47	-
15	-	-6.57	-9.24	-11.68	-27.31	-17.39	-12.75	-9.68	-8.97	-6.60	-5.04	-15.18	-
30	-	-7.81	-10.82	-14.72	-24.03	-13.93	-11.08	-8.73	-8.63	-6.52	-5.32	-15.34	-
45	-	-9.78	-12.97	-17.93	-18.46	-12.21	-10.18	-8.24	-8.55	-6.81	-6.15	-16.24	-
60	-	-12.68	-15.51	-19.86	-16.09	-11.73	-10.22	-8.45	-8.99	-7.62	-7.47	-17.56	-
75	-	-15.98	-17.24	-19.34	-15.48	-12.42	-11.12	-9.33	-9.97	-8.93	-9.30	-19.57	-
90	-	-16.05	-16.45	-17.76	-15.97	-14.15	-13.26	-11.00	-11.78	-10.66	-11.12	-22.66	-
105	-	-12.88	-14.09	-16.22	-17.15	-17.48	-17.22	-14.03	-14.51	-12.65	-11.70	-25.68	-
120	-	-9.97	-11.86	-14.79	-18.62	-23.62	-26.08	-18.72	-17.09	-13.29	-10.26	-22.99	-
135	-	-7.97	-10.03	-13.30	-19.64	-30.53	-25.01	-19.33	-15.85	-11.75	-8.35	-19.36	-
150	-	-6.70	-8.79	-11.91	-19.99	-23.61	-18.16	-14.84	-12.71	-9.62	-6.72	-17.02	-
165	-	-5.96	-8.01	-10.68	-19.60	-21.42	-15.86	-12.08	-10.37	-7.99	-5.64	-15.40	-
180	-	-5.75	-7.73	-9.86	-18.67	-22.97	-15.59	-11.06	-9.27	-7.16	-5.03	-14.74	-
195	-	-6.07	-8.00	-9.63	-17.50	-30.65	-16.56	-11.36	-9.11	-6.95	-4.93	-15.20	-
210	-	-7.03	-8.93	-10.10	-16.45	-25.80	-17.89	-12.58	-9.77	-7.43	-5.36	-15.85	-
225	-	-8.73	-10.41	-11.48	-15.36	-19.50	-18.25	-14.20	-11.18	-8.51	-6.37	-17.28	-
240	-	-11.22	-12.28	-13.38	-14.03	-16.17	-17.06	-15.50	-13.04	-10.11	-7.90	-19.44	-
255	-	-13.99	-13.21	-14.67	-12.66	-14.17	-15.50	-15.82	-14.94	-12.31	-10.11	-22.12	-
270	-	-14.04	-12.13	-13.57	-11.38	-12.86	-14.27	-15.27	-15.79	-14.48	-12.24	-24.64	-
285	-	-11.26	-10.19	-11.30	-10.39	-12.16	-13.51	-14.42	-15.10	-15.04	-12.40	-24.31	-
300	-	-8.78	-8.55	-9.52	-9.98	-11.99	-13.53	-13.65	-13.70	-13.30	-10.44	-21.61	-
315	-	-7.07	-7.54	-8.40	-10.30	-12.48	-14.23	-13.22	-12.30	-11.19	-8.36	-19.15	-
330	-	-6.13	-7.13	-7.99	-11.54	-13.99	-15.38	-12.78	-11.17	-9.40	-6.78	-17.28	-
345	-	-5.71	-7.23	-8.34	-13.40	-16.82	-16.16	-11.97	-10.36	-8.01	-5.88	-16.36	-5.37
360	-	-5.95	-8.02	-9.80	-18.43	-19.90	-14.90	-10.60	-9.51	-6.97	-5.17	-15.47	-

2.5.3 Total

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-4.97	-3.89	-2.82	-1.82	-2.19	-3.83	-7.35	-9.75	-8.59	-6.12	-5.05	-10.87	-
15	-	-4.21	-3.20	-1.85	-1.64	-2.90	-5.62	-8.73	-8.76	-5.91	-4.73	-10.11	-
30	-	-4.59	-3.57	-1.75	-1.18	-2.04	-4.45	-7.51	-8.36	-5.39	-4.15	-9.40	-
45	-	-4.99	-4.00	-1.74	-0.87	-1.55	-3.82	-6.74	-7.72	-4.81	-3.53	-9.02	-
60	-	-5.36	-4.44	-1.81	-0.77	-1.42	-3.83	-6.74	-7.42	-4.40	-2.97	-8.68	-
75	-	-5.72	-4.87	-1.90	-0.76	-1.54	-4.16	-7.40	-7.63	-4.19	-2.59	-8.40	-
90	-	-6.00	-5.25	-1.98	-0.75	-1.69	-4.62	-8.72	-8.54	-4.28	-2.35	-8.16	-
105	-	-6.35	-5.50	-1.99	-0.67	-1.71	-4.91	-10.85	-10.10	-4.52	-2.28	-8.00	-
120	-	-6.48	-5.56	-2.01	-0.67	-1.67	-4.94	-13.13	-11.92	-4.75	-2.29	-7.94	-
135	-	-6.50	-5.52	-2.06	-0.77	-1.58	-4.72	-13.33	-12.36	-4.80	-2.33	-8.07	-
150	-	-6.30	-5.23	-2.18	-1.11	-1.67	-4.71	-11.37	-10.51	-4.59	-2.38	-8.38	-
165	-	-5.80	-4.68	-2.28	-1.56	-2.15	-5.20	-9.83	-8.36	-4.16	-2.37	-8.82	-
180	-	-5.10	-3.94	-2.21	-1.99	-2.83	-6.09	-9.44	-7.05	-3.83	-2.29	-9.57	-
195	-	-4.37	-3.04	-1.91	-2.11	-3.41	-7.29	-10.06	-6.50	-3.56	-2.26	-10.58	-
210	-	-3.67	-2.19	-1.38	-1.83	-3.56	-8.01	-11.55	-6.56	-3.52	-2.32	-11.68	-
225	-	-3.13	-1.51	-0.83	-1.45	-3.26	-7.94	-13.37	-7.03	-3.76	-2.46	-13.00	-
240	-	-2.67	-1.01	-0.40	-1.18	-2.86	-7.57	-14.75	-7.64	-4.11	-2.64	-14.50	-
255	-	-2.43	-0.71	-0.22	-1.08	-2.67	-7.32	-15.08	-8.09	-4.47	-2.88	-15.91	-
270	-	-2.31	-0.65	-0.20	-1.17	-2.79	-7.51	-14.59	-8.20	-4.84	-3.23	-16.95	-
285	-	-2.30	-0.79	-0.36	-1.49	-3.20	-8.14	-13.74	-7.98	-5.15	-3.62	-17.27	-
300	-	-2.42	-1.04	-0.70	-1.99	-3.93	-9.22	-12.74	-7.61	-5.33	-4.03	-16.55	-
315	-	-2.68	-1.43	-1.08	-2.45	-4.71	-10.27	-11.91	-7.46	-5.48	-4.41	-15.13	-
330	-	-3.02	-1.89	-1.44	-2.73	-5.19	-10.50	-11.34	-7.59	-5.78	-4.77	-13.58	-
345	-	-3.43	-2.26	-1.70	-2.59	-4.94	-9.54	-10.86	-7.94	-6.01	-5.01	-12.20	-2.23
360	-	-3.89	-2.82	-1.82	-2.19	-3.83	-7.35	-9.75	-8.59	-6.12	-5.05	-10.87	-

2.6 EIRP Test Results – 2480 MHz

2.6.1 Horizontal Polarization

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-16.04	-9.42	-5.66	-4.04	-3.64	-5.89	-10.51	-21.25	-17.63	-15.30	-23.07	-14.83	-
15	-	-9.62	-5.88	-3.86	-3.18	-5.03	-8.81	-19.09	-21.68	-15.38	-16.87	-13.96	-
30	-	-9.36	-6.05	-3.59	-2.85	-4.27	-7.65	-16.24	-18.69	-12.58	-11.22	-12.92	-
45	-	-8.93	-6.28	-3.49	-2.63	-3.85	-7.04	-14.54	-14.91	-9.91	-7.89	-12.22	-
60	-	-8.53	-6.47	-3.51	-2.62	-3.74	-7.01	-14.19	-12.76	-8.15	-5.95	-11.47	-
75	-	-8.44	-6.81	-3.56	-2.63	-3.77	-7.16	-14.75	-11.77	-7.06	-4.80	-10.93	-
90	-	-8.84	-7.18	-3.60	-2.64	-3.74	-7.20	-15.97	-11.67	-6.50	-4.26	-10.47	-
105	-	-9.63	-7.68	-3.61	-2.58	-3.62	-7.07	-17.82	-12.29	-6.40	-4.21	-10.21	-
120	-	-11.27	-8.26	-3.64	-2.59	-3.43	-6.76	-19.16	-13.35	-6.59	-4.55	-10.15	-
135	-	-13.98	-8.83	-3.76	-2.70	-3.28	-6.43	-18.37	-13.97	-6.97	-5.16	-10.33	-
150	-	-18.32	-9.14	-4.01	-3.00	-3.35	-6.55	-16.41	-13.21	-7.36	-6.00	-10.85	-
165	-	-19.96	-8.72	-4.22	-3.39	-3.78	-7.20	-15.22	-11.71	-7.53	-6.63	-11.47	-
180	-	-14.55	-7.56	-4.28	-3.72	-4.45	-8.30	-14.98	-10.44	-7.34	-6.89	-12.32	-
195	-	-10.46	-6.03	-3.96	-3.73	-5.00	-9.55	-15.40	-9.69	-6.96	-6.72	-13.21	-
210	-	-7.71	-4.54	-3.26	-3.40	-5.14	-10.29	-16.48	-9.29	-6.50	-6.21	-14.15	-
225	-	-5.94	-3.42	-2.55	-3.00	-4.85	-10.24	-17.78	-9.23	-6.19	-5.57	-14.93	-
240	-	-4.74	-2.69	-2.01	-2.66	-4.47	-9.93	-18.58	-9.32	-6.04	-5.03	-15.51	-
255	-	-4.12	-2.34	-1.72	-2.54	-4.32	-9.85	-18.94	-9.46	-6.04	-4.73	-15.99	-
270	-	-3.98	-2.28	-1.75	-2.70	-4.43	-10.24	-19.20	-9.49	-6.16	-4.78	-16.37	-
285	-	-4.23	-2.61	-2.07	-3.06	-4.97	-11.24	-19.61	-9.67	-6.50	-5.22	-16.94	-
300	-	-4.90	-3.14	-2.59	-3.54	-5.76	-12.70	-19.40	-9.92	-7.08	-6.21	-17.40	-
315	-	-5.87	-3.83	-3.23	-4.02	-6.58	-14.08	-18.99	-10.49	-8.06	-7.87	-17.60	-
330	-	-7.07	-4.56	-3.79	-4.24	-7.12	-14.14	-19.07	-11.70	-9.59	-10.51	-17.17	-
345	-	-8.40	-5.13	-4.10	-4.09	-6.89	-12.84	-20.67	-13.47	-12.04	-14.28	-16.01	-6.49
360	-	-9.42	-5.66	-4.04	-3.64	-5.89	-10.51	-21.25	-17.63	-15.30	-23.07	-14.83	-

2.6.2 Vertical Polarization

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-7.14	-7.42	-9.31	-11.08	-20.61	-22.74	-16.40	-11.42	-10.35	-8.07	-6.61	-17.64	-
15	-	-7.97	-10.29	-13.03	-26.03	-19.02	-13.91	-10.35	-9.73	-7.67	-6.54	-16.92	-
30	-	-9.18	-11.86	-16.13	-21.93	-15.17	-11.99	-9.38	-9.26	-7.58	-6.87	-16.83	-
45	-	-11.05	-13.93	-19.59	-18.16	-13.33	-10.92	-8.85	-9.07	-7.82	-7.57	-17.63	-
60	-	-13.86	-16.61	-21.68	-16.47	-12.75	-10.73	-8.99	-9.37	-8.48	-8.79	-18.60	-
75	-	-17.23	-18.91	-20.64	-16.06	-13.22	-11.51	-9.82	-10.22	-9.57	-10.31	-20.03	-
90	-	-17.86	-18.21	-18.72	-16.71	-14.66	-13.25	-11.36	-11.67	-10.94	-11.59	-22.33	-
105	-	-14.71	-15.50	-16.97	-17.93	-17.28	-16.39	-13.91	-13.88	-12.27	-11.70	-25.58	-
120	-	-11.69	-12.98	-15.43	-19.30	-21.52	-21.71	-17.76	-16.04	-12.71	-10.46	-26.84	-
135	-	-9.57	-10.99	-13.89	-20.20	-28.97	-28.14	-19.33	-16.07	-11.60	-8.86	-24.24	-
150	-	-8.16	-9.66	-12.46	-19.96	-35.67	-22.82	-16.01	-13.92	-10.00	-7.53	-21.51	-
165	-	-7.37	-8.79	-11.30	-18.78	-30.44	-20.03	-13.48	-11.98	-8.66	-6.70	-19.93	-
180	-	-7.15	-8.41	-10.56	-17.17	-32.96	-19.57	-12.56	-10.88	-8.04	-6.27	-19.26	-
195	-	-7.47	-8.62	-10.35	-16.00	-30.73	-20.70	-12.98	-10.75	-8.06	-6.33	-20.10	-
210	-	-8.41	-9.53	-10.97	-15.26	-24.06	-21.97	-14.39	-11.50	-8.79	-6.94	-21.33	-
225	-	-10.17	-11.07	-12.41	-14.92	-20.07	-21.23	-16.36	-13.08	-10.05	-8.08	-23.52	-
240	-	-12.70	-13.32	-14.55	-14.50	-17.68	-19.00	-17.66	-15.04	-11.87	-9.95	-26.82	-
255	-	-15.68	-15.07	-16.08	-14.04	-15.99	-16.78	-17.48	-16.67	-14.17	-12.25	-30.49	-
270	-	-16.03	-14.54	-14.88	-13.19	-14.77	-15.30	-16.23	-16.82	-15.92	-14.17	-29.45	-
285	-	-13.24	-12.48	-12.54	-12.53	-13.84	-14.41	-15.15	-15.75	-15.61	-13.63	-25.90	-
300	-	-10.61	-10.53	-10.58	-12.22	-13.61	-14.43	-14.36	-14.26	-13.70	-11.45	-23.28	-
315	-	-8.82	-9.32	-9.47	-12.61	-14.05	-15.26	-13.91	-12.98	-11.75	-9.45	-21.28	-
330	-	-7.76	-8.78	-9.10	-13.91	-15.54	-16.70	-13.51	-11.92	-10.26	-7.97	-19.49	-
345	-	-7.28	-8.71	-9.48	-15.92	-18.79	-17.83	-12.81	-11.19	-9.02	-7.21	-18.65	-6.17
360	-	-7.42	-9.31	-11.08	-20.61	-22.74	-16.40	-11.42	-10.35	-8.07	-6.61	-17.64	-

2.6.3 Total

Theta (°)	0	15	30	45	60	75	90	105	120	135	150	165	180
Phi (°)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)
0	-6.61	-5.30	-4.10	-3.26	-3.55	-5.80	-9.51	-10.99	-9.60	-7.32	-6.52	-13.00	-
15	-	-5.70	-4.54	-3.36	-3.16	-4.86	-7.64	-9.81	-9.46	-6.99	-6.15	-12.18	-
30	-	-6.26	-5.04	-3.36	-2.79	-3.93	-6.29	-8.56	-8.79	-6.38	-5.51	-11.44	-
45	-	-6.85	-5.59	-3.38	-2.51	-3.39	-5.55	-7.82	-8.07	-5.73	-4.72	-11.12	-
60	-	-7.42	-6.07	-3.45	-2.44	-3.23	-5.47	-7.85	-7.73	-5.30	-4.13	-10.70	-
75	-	-7.90	-6.55	-3.48	-2.44	-3.30	-5.80	-8.60	-7.91	-5.13	-3.73	-10.42	-
90	-	-8.32	-6.85	-3.46	-2.47	-3.40	-6.24	-10.07	-8.66	-5.17	-3.52	-10.19	-
105	-	-8.46	-7.01	-3.41	-2.46	-3.44	-6.59	-12.43	-10.00	-5.40	-3.50	-10.08	-
120	-	-8.46	-7.00	-3.36	-2.50	-3.36	-6.62	-15.40	-11.48	-5.64	-3.56	-10.06	-
135	-	-8.23	-6.77	-3.36	-2.63	-3.26	-6.40	-15.81	-11.88	-5.68	-3.62	-10.16	-
150	-	-7.76	-6.38	-3.43	-2.91	-3.34	-6.45	-13.20	-10.54	-5.47	-3.69	-10.49	-
165	-	-7.14	-5.75	-3.44	-3.26	-3.77	-6.98	-11.25	-8.83	-5.05	-3.65	-10.89	-
180	-	-6.42	-4.95	-3.36	-3.53	-4.44	-7.99	-10.59	-7.65	-4.66	-3.55	-11.52	-
195	-	-5.70	-4.12	-3.06	-3.48	-4.99	-9.23	-11.01	-7.18	-4.46	-3.51	-12.40	-
210	-	-5.03	-3.35	-2.58	-3.12	-5.08	-10.00	-12.30	-7.25	-4.48	-3.55	-13.39	-
225	-	-4.55	-2.73	-2.12	-2.73	-4.73	-9.91	-14.00	-7.73	-4.69	-3.63	-14.36	-
240	-	-4.10	-2.33	-1.77	-2.38	-4.27	-9.42	-15.08	-8.29	-5.03	-3.82	-15.20	-
255	-	-3.83	-2.11	-1.56	-2.24	-4.03	-9.04	-15.14	-8.71	-5.42	-4.02	-15.84	-
270	-	-3.72	-2.03	-1.54	-2.33	-4.05	-9.06	-14.45	-8.75	-5.73	-4.31	-16.16	-
285	-	-3.71	-2.19	-1.70	-2.59	-4.44	-9.53	-13.82	-8.71	-5.99	-4.64	-16.42	-
300	-	-3.87	-2.42	-1.95	-2.99	-5.10	-10.47	-13.18	-8.56	-6.22	-5.07	-16.40	-
315	-	-4.09	-2.75	-2.30	-3.46	-5.87	-11.62	-12.74	-8.55	-6.52	-5.58	-16.05	-
330	-	-4.39	-3.16	-2.67	-3.80	-6.54	-12.22	-12.44	-8.80	-6.90	-6.05	-15.17	-
345	-	-4.79	-3.55	-2.99	-3.82	-6.62	-11.64	-12.15	-9.17	-7.26	-6.43	-14.13	-3.32
360	-	-5.30	-4.10	-3.26	-3.55	-5.80	-9.51	-10.99	-9.60	-7.32	-6.52	-13.00	-

3. RF TEST RESULT ON 3D

3.1 3D Radiation Pattern – 2402 MHz – Free Space

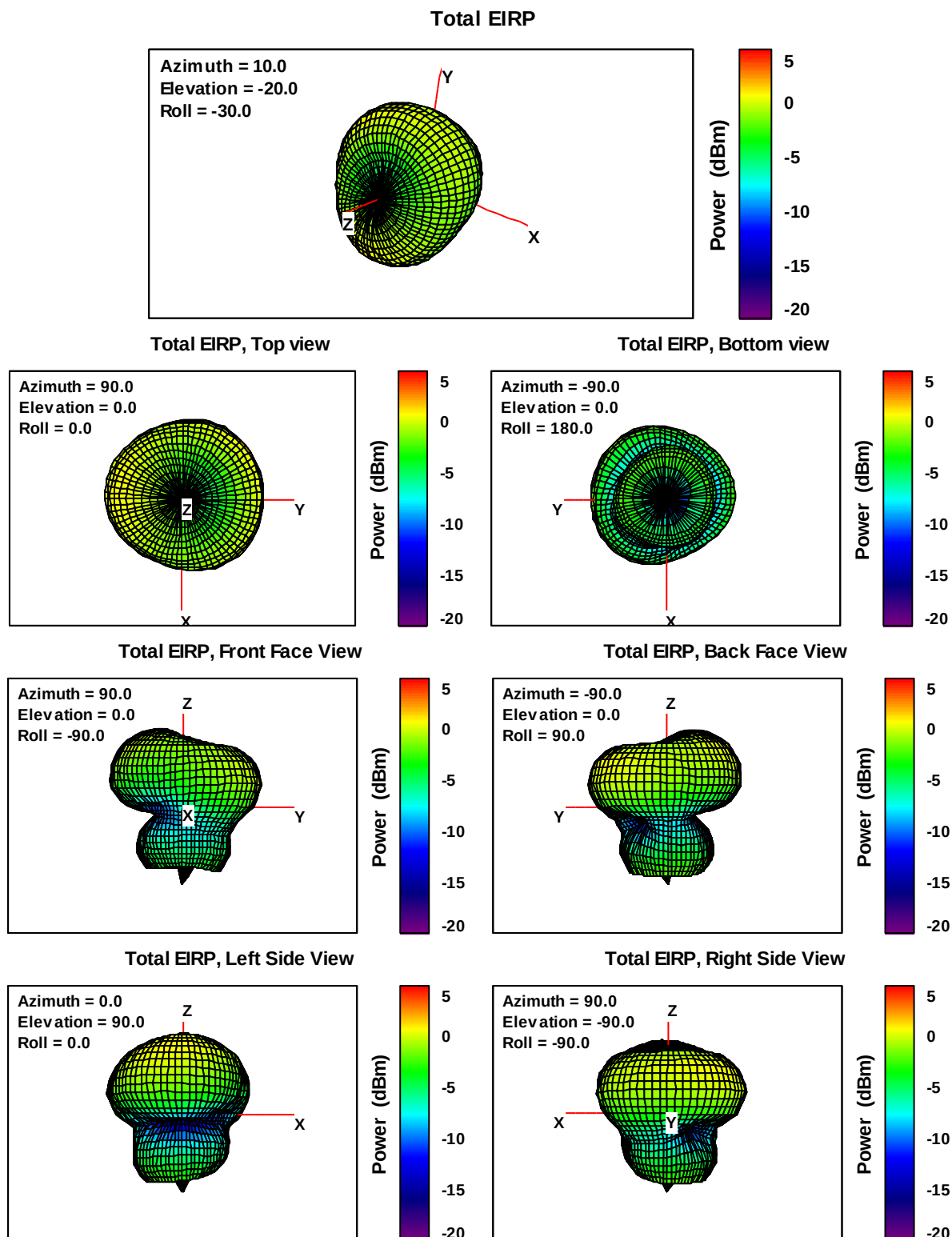


Fig. 2. Total EIRP, Free Space, 2402 MHz

3.2 3D Radiation Pattern – 2440 MHz – Free Space

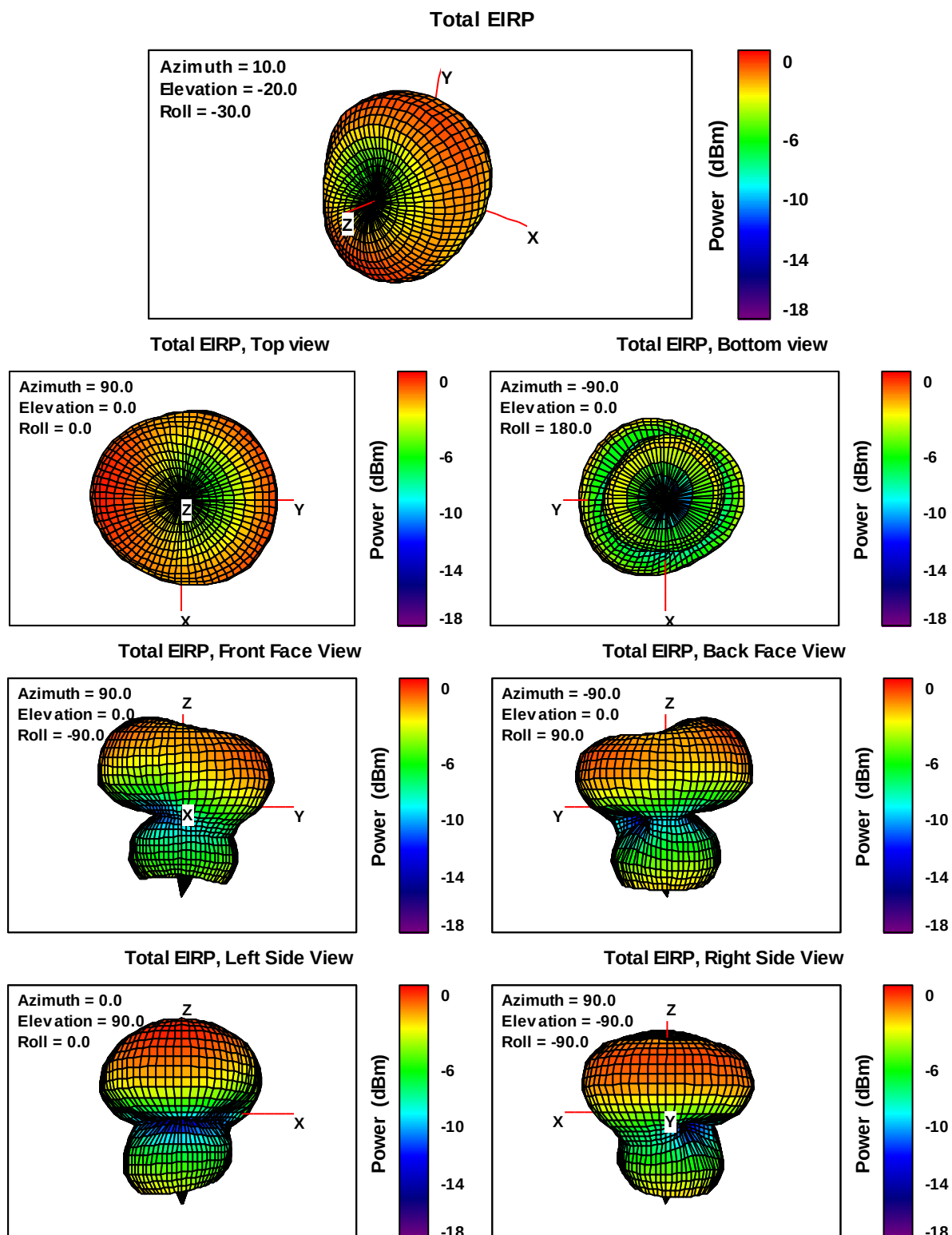


Fig. 3. Total EIRP, Free Space, 2440 MHz

3.3 3D Radiation Pattern – 2480 MHz – Free Space

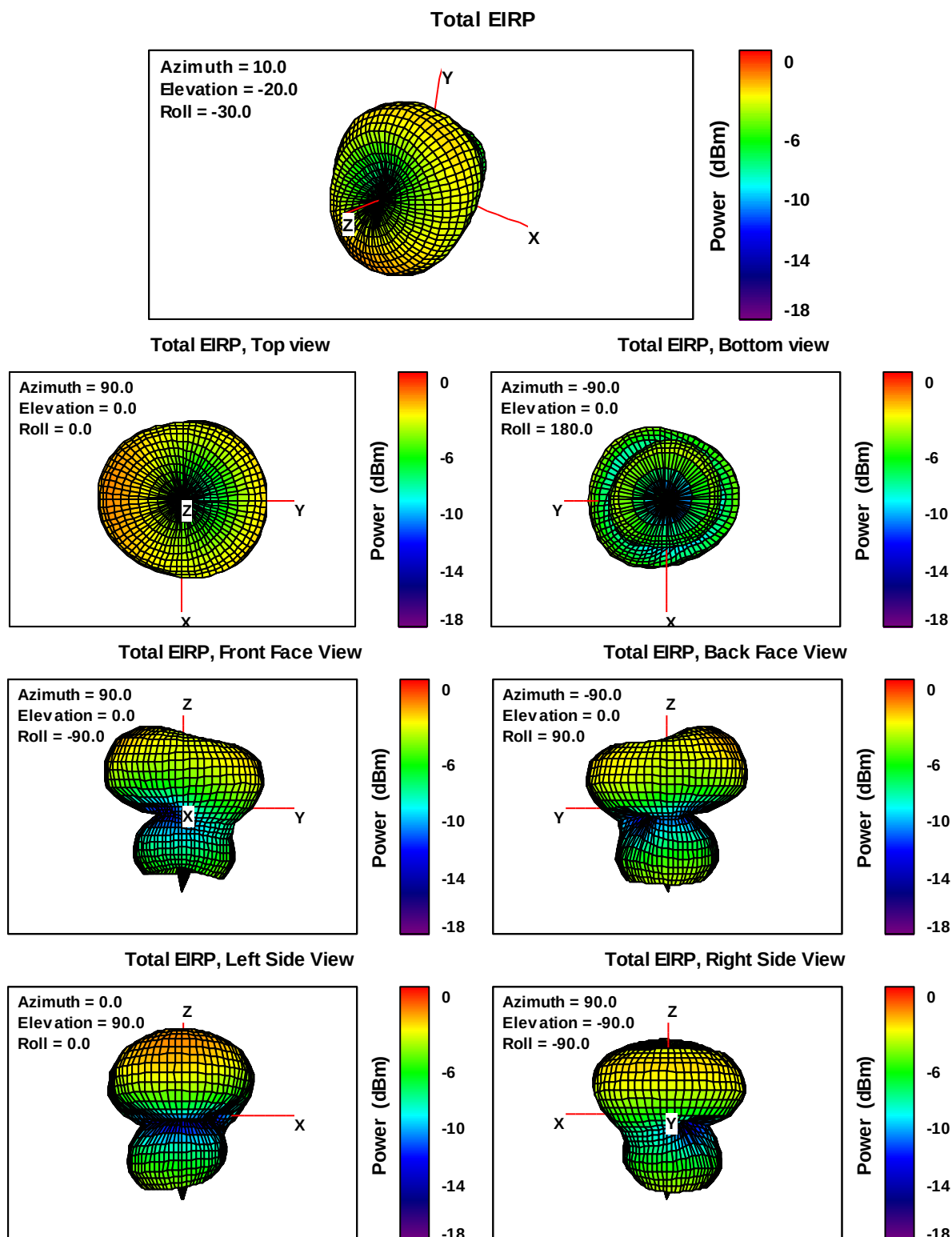


Fig. 4. Total EIRP, Free Space, 2480 MHz

4. RF TEST RESULT ON 2D

4.1 Radiation Pattern 2D Cuts – 2402 MHz – Free Space

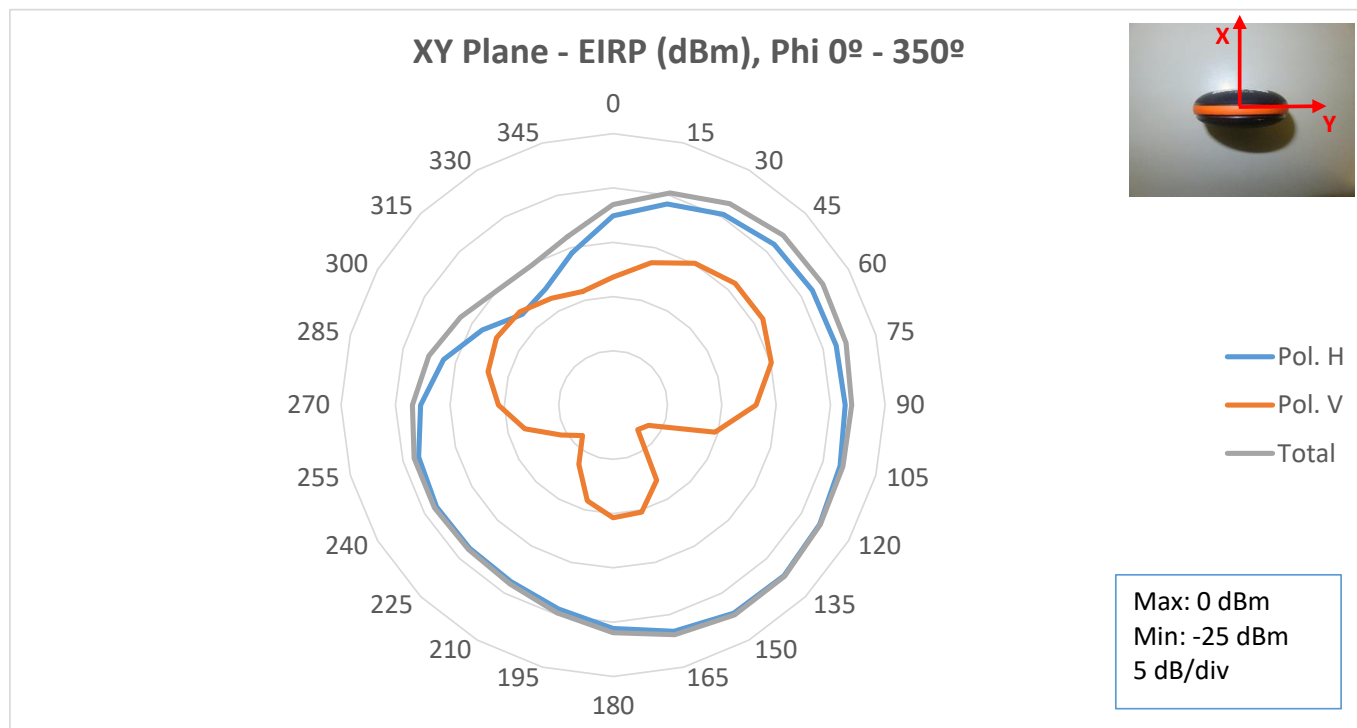


Fig. 5. XY Cut, Free Space, 2402 MHz

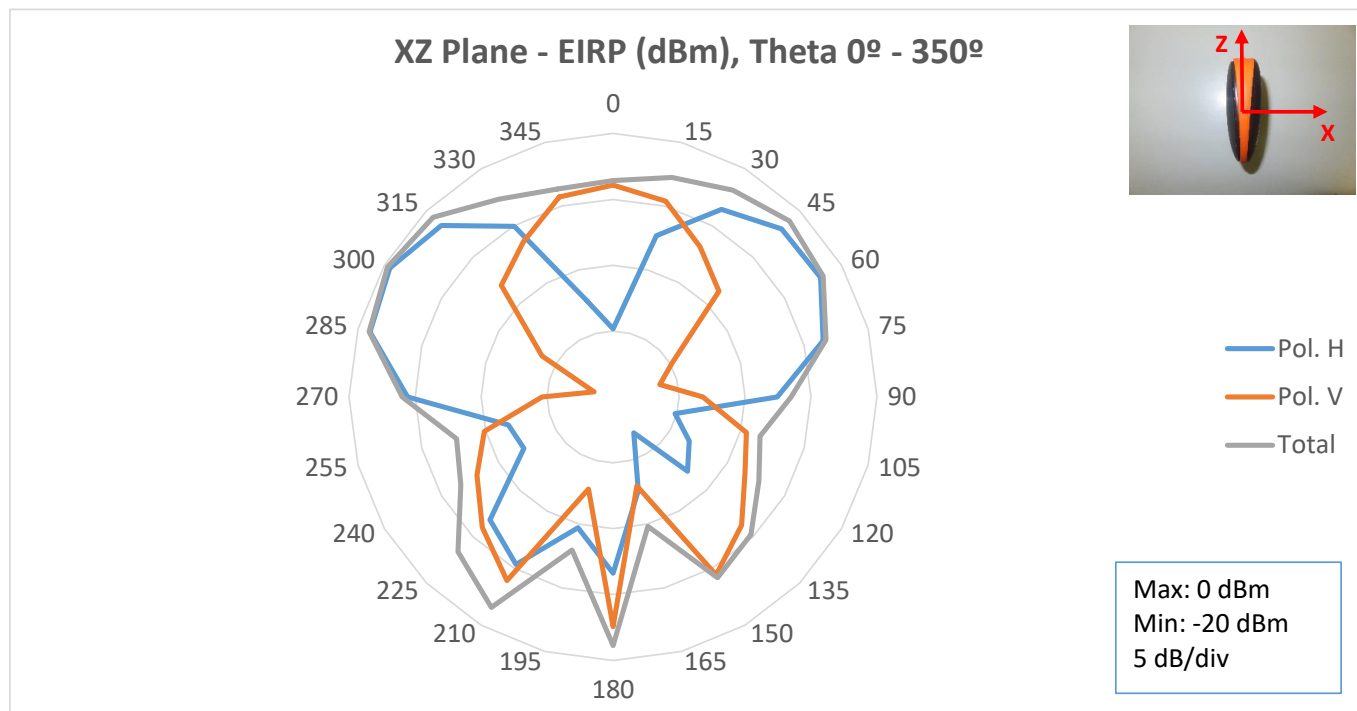


Fig. 6. XZ Cut, Free Space, 2402 MHz

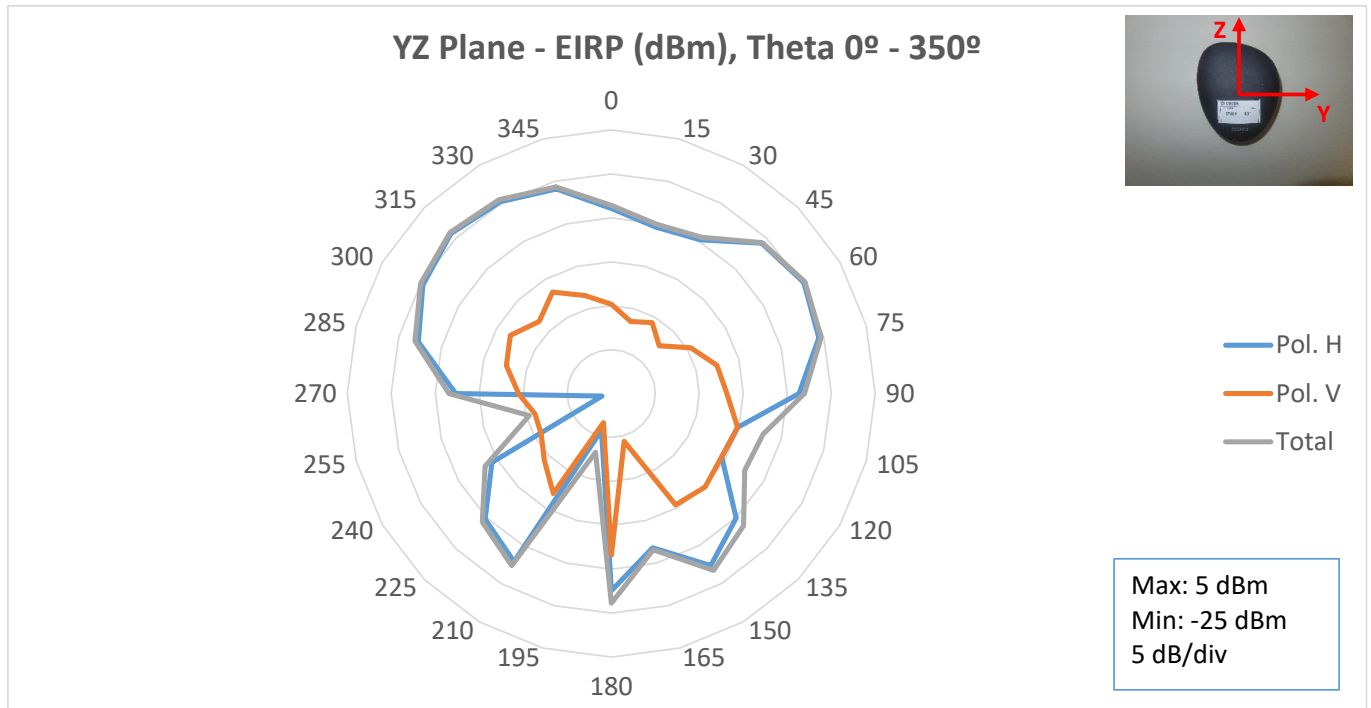


Fig. 7. YZ Cut, Free Space, 2402 MHz

4.2 Radiation Pattern 2D Cuts – 2440 MHz – Free Space

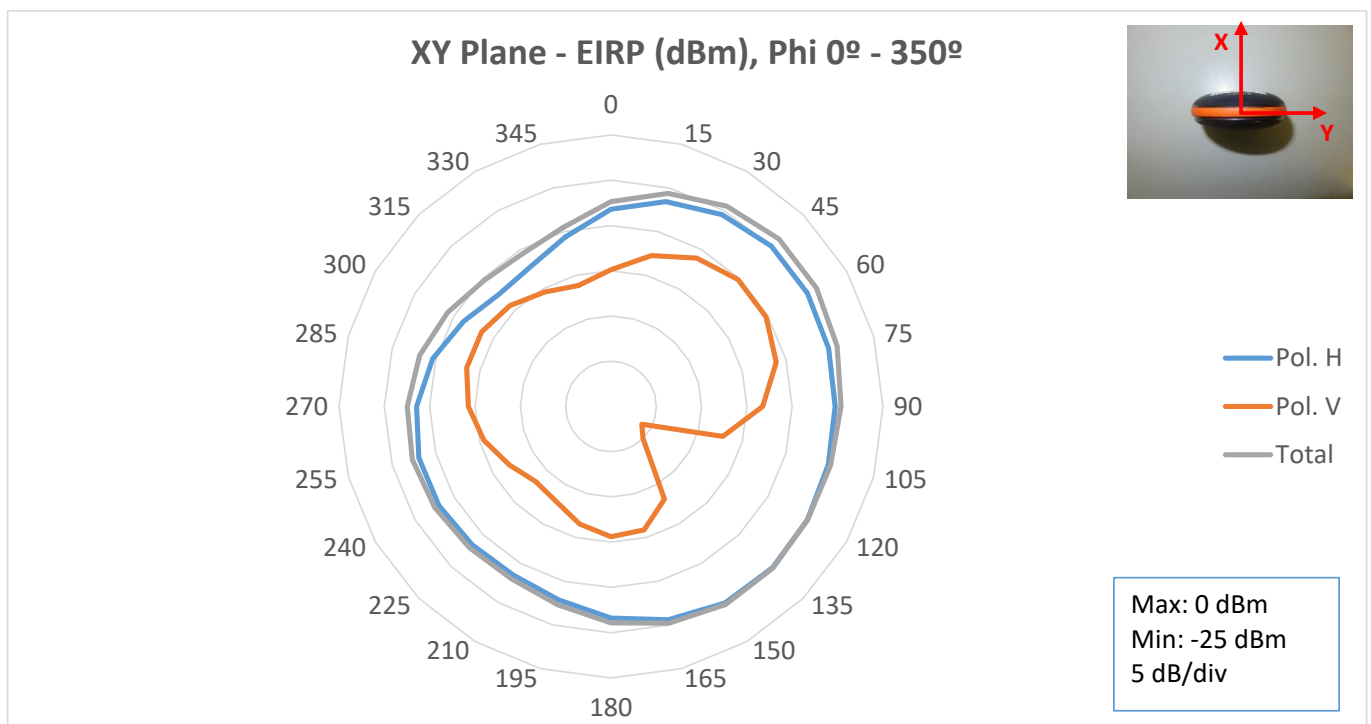


Fig. 8. XY Cut, Free Space, 2440 MHz

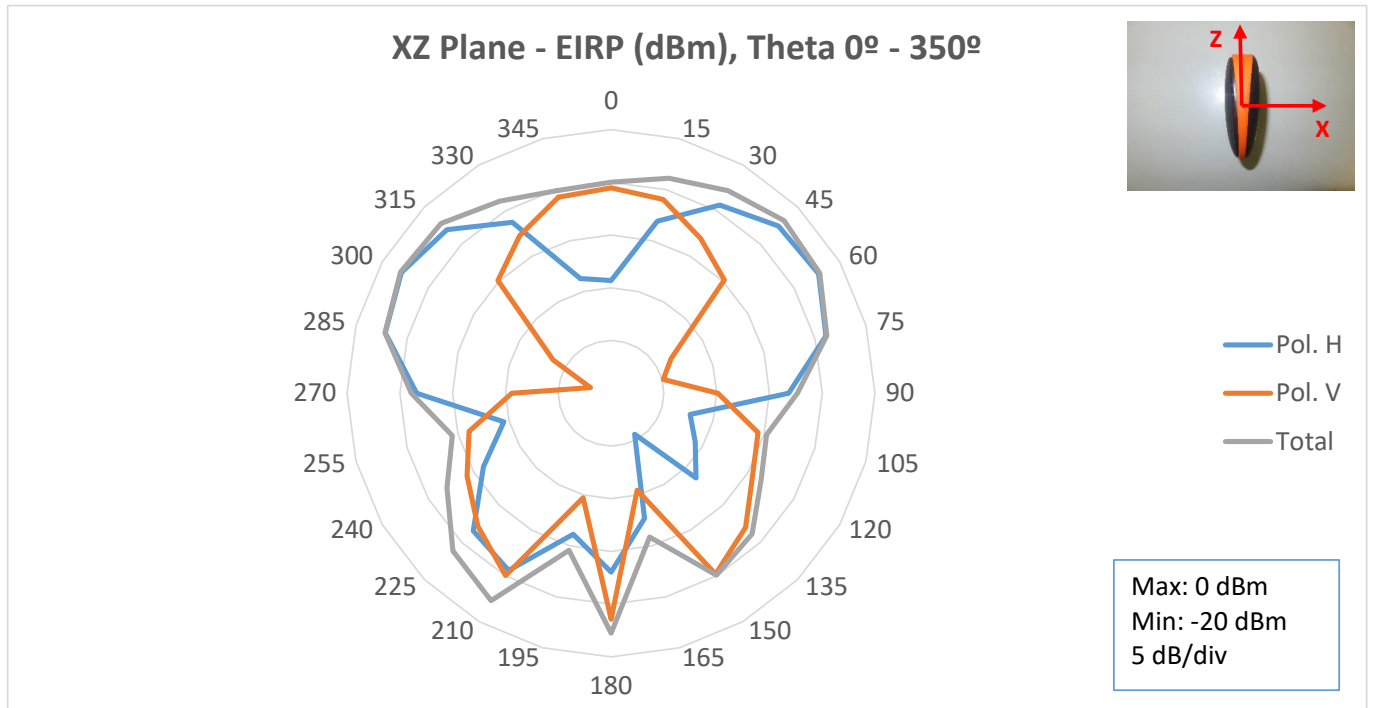


Fig. 9. XZ Cut, Free Space, 2440 MHz

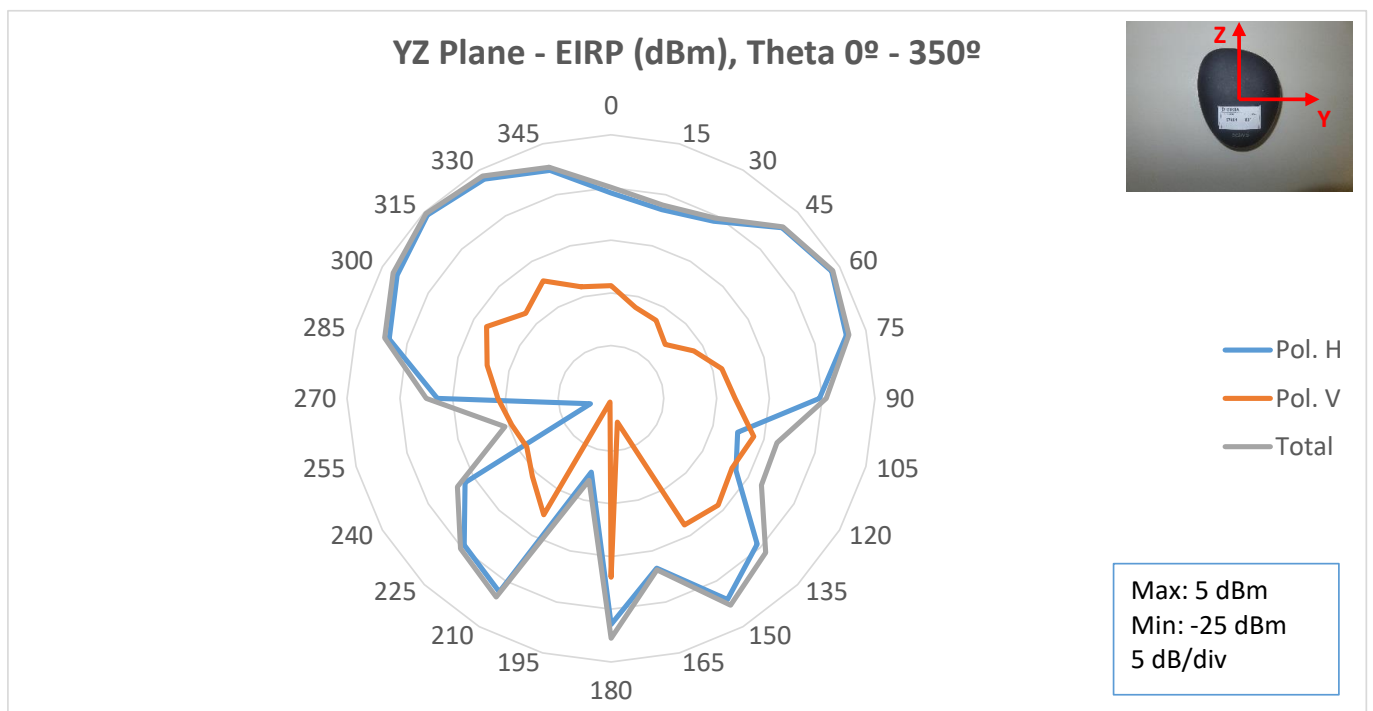


Fig. 10. YZ Cut, Free Space, 2440 MHz

4.3 Radiation Pattern 2D Cuts – 2480 MHz – Free Space

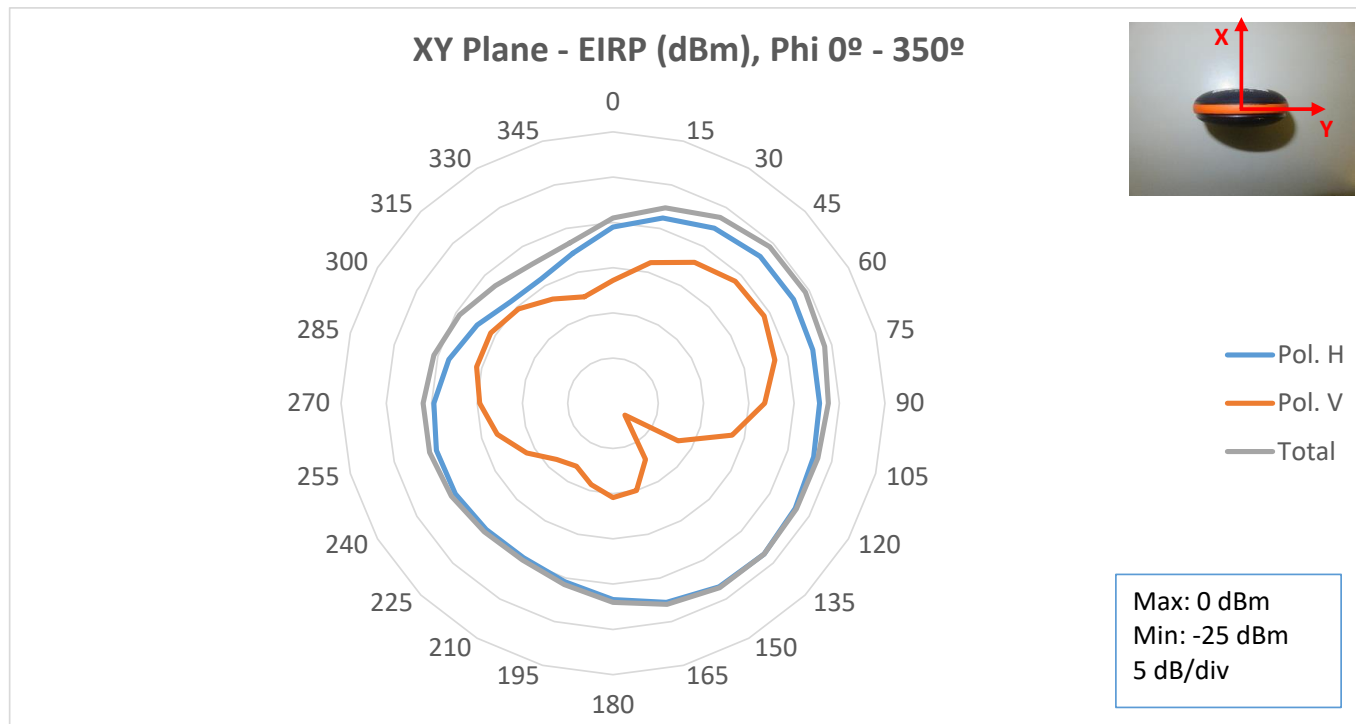


Fig. 11. XY Cut, Free Space, 2480 MHz

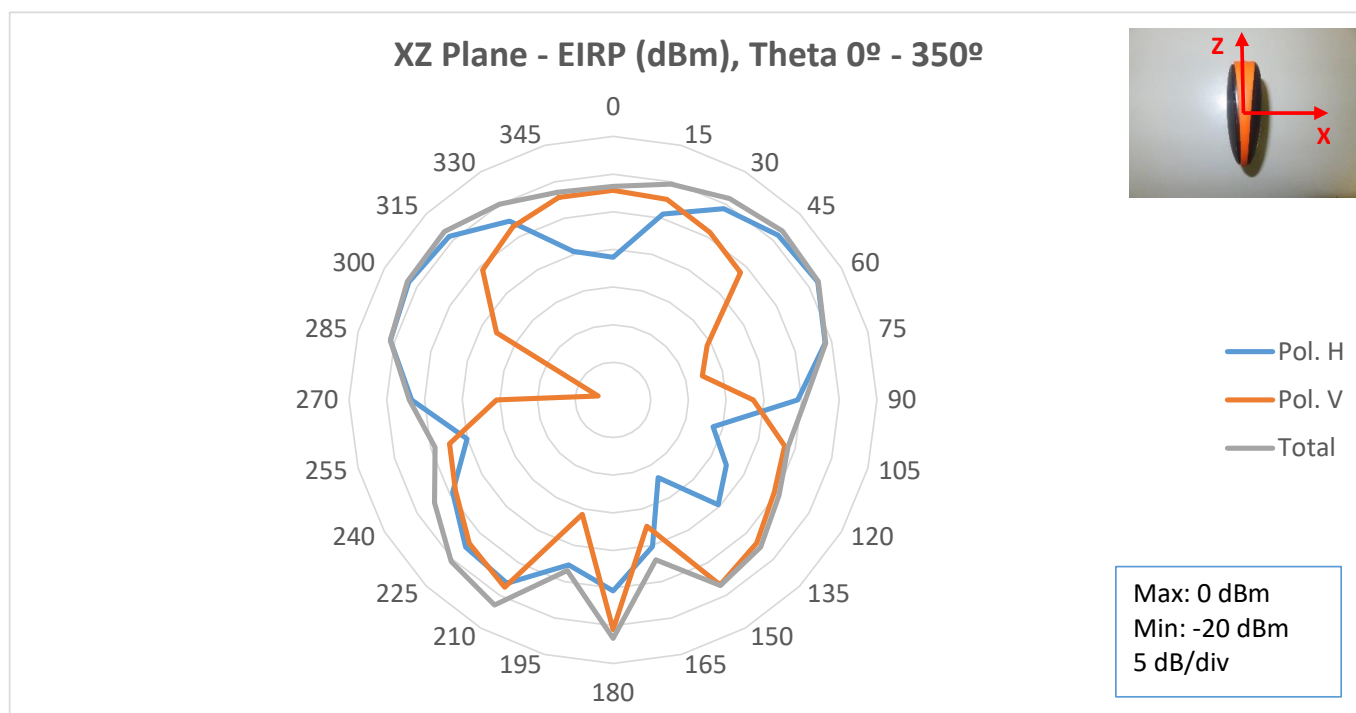


Fig. 12. XZ Cut, Free Space, 2480 MHz

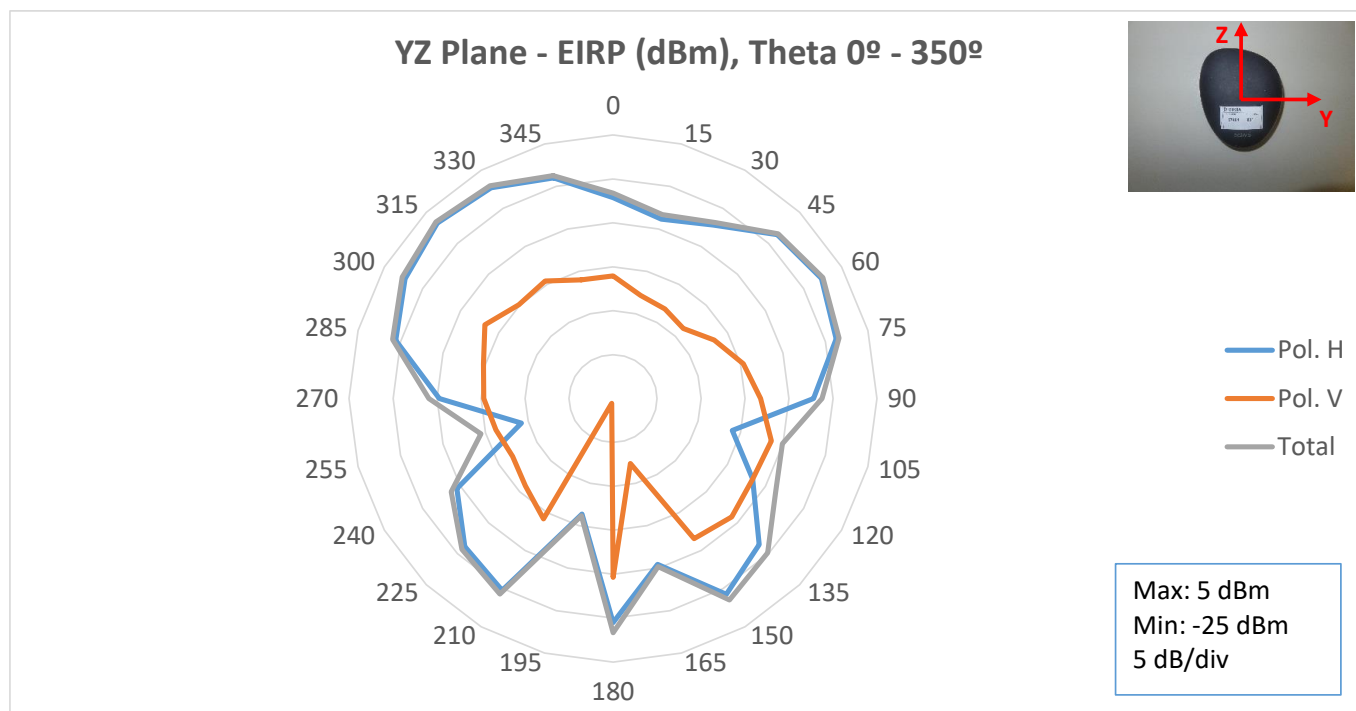


Fig. 13. YZ Cut, Free Space, 2480 MHz

5. EXPANDED MEASUREMENT UNCERTAINTIES

The expanded measurement uncertainties are listed below for the different frequency bands. These uncertainties refer to a coverage factor of 2, corresponding to 95% confidence level.

The expanded measurement uncertainties listed below were derived following the methodology described in the CTIA Test plan for mobile station over the air performance. Method of measurement for radiated RF power and receiver performance. February 2018. Revision 3.7.1. These uncertainty figures refer to the Total Radiated Power (TRP) which is the spatially averaged EIRP over all measurement points in the 3D radiation pattern. The measurement uncertainty for each individual EIRP measurement will never be greater than the figures listed below.

Table 1. *Total Normal and Alternate TRP Measurement Uncertainty results*

Test Method	TRP Test Configuration	Uncertainty Expanded Uncertainty (k=2, 95 % confidence level) [dB]				
		LTE 700 699-798 MHz	Cellular 824-894 MHz	AWS-1 Tx 1710-1755 MHz	PCS 1850-1990 MHz	LTE 41 2300-2800 MHz
Normal	FREE SPACE	1.43	1.27	1.40	1.46	1.57

Appendix A – Photographs

Equipment under test:

- **EUT orientation:**

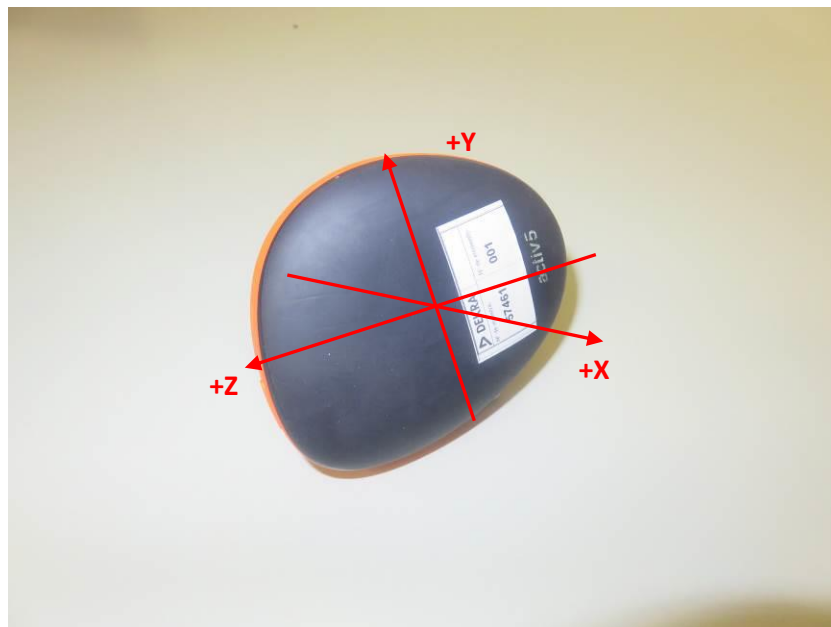


Fig 14. EUT orientation

- **EUT front view:**



Fig 15. EUT front view.

- **EUT back view:**

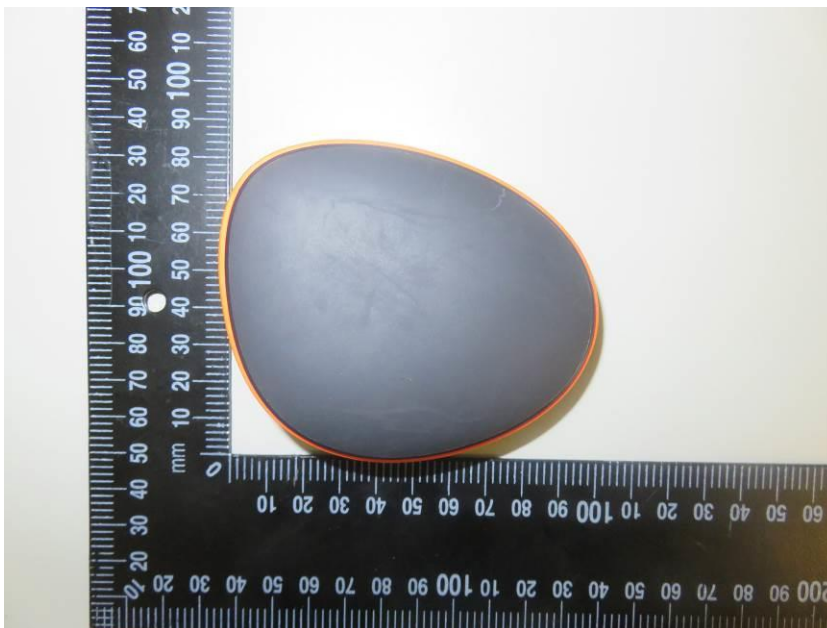


Fig 16. EUT back view.

Test set:

- **Free Space set-up: Initial position: $\Theta = 0^\circ$, $\Phi = 0^\circ$**

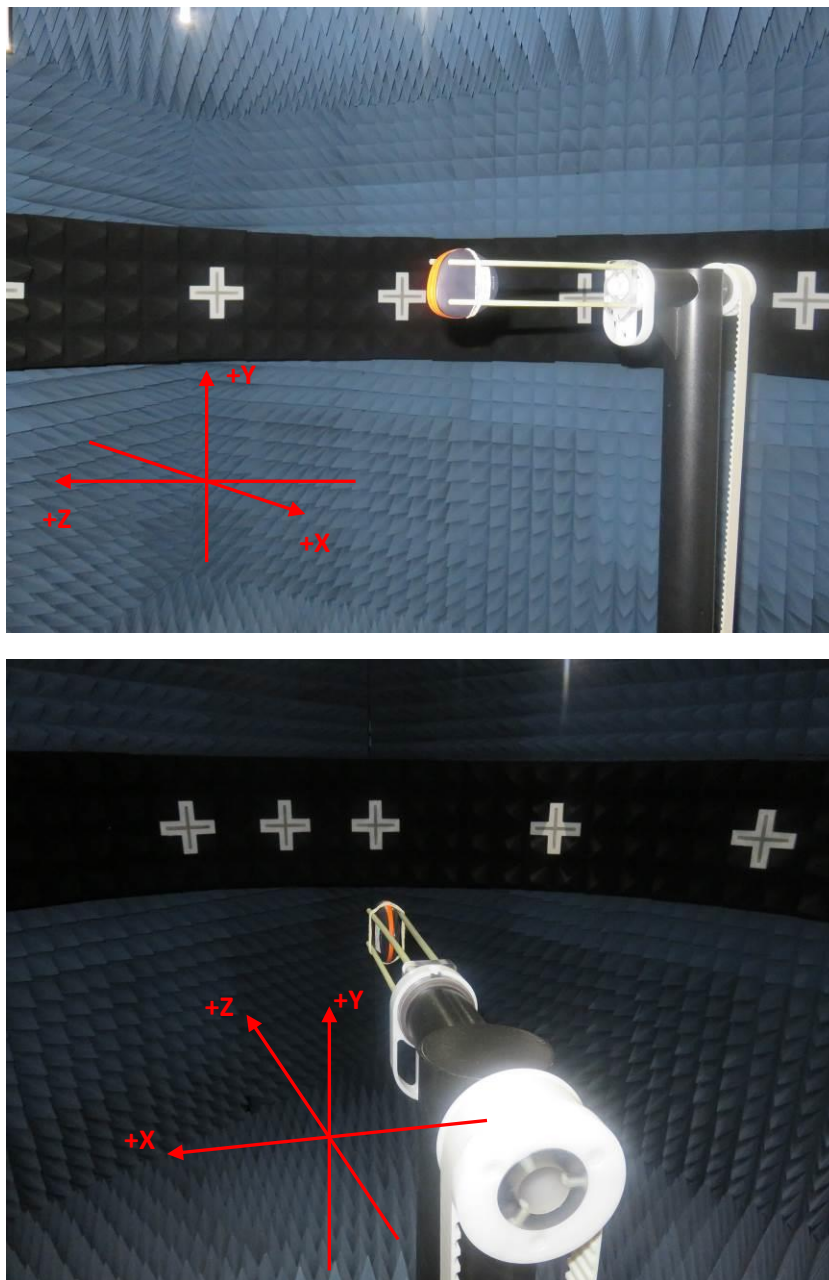


Fig 17. Free Space configuration set-up view.