

Antenna Test Report

Report No.: TEOT2412001164EP

Applicant Name: Raytac Corp.
Manufacturer Name: Raytac Corp.

Product Name: WiFi Module
Model No.: AN7002Q-P

Measurements performed at
SGS Taiwan Ltd.
NeiHu District, Taiwan

Issued Date: January 09, 2025

	Name	Date & Signature	Distribution
Prepared by:	Walter Lin Sr. Engineer	 January 09, 2025	
Approved by:	Shawn Yen Supervisor	 January 09, 2025	

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Revision Version

Report Number	Revision	Date	Memo
TEOT2412001164EP	00	2025/01/09	Initial creation of test report.

This test report contains a reference to the previous version test report that it replaces.

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Measurement System Information

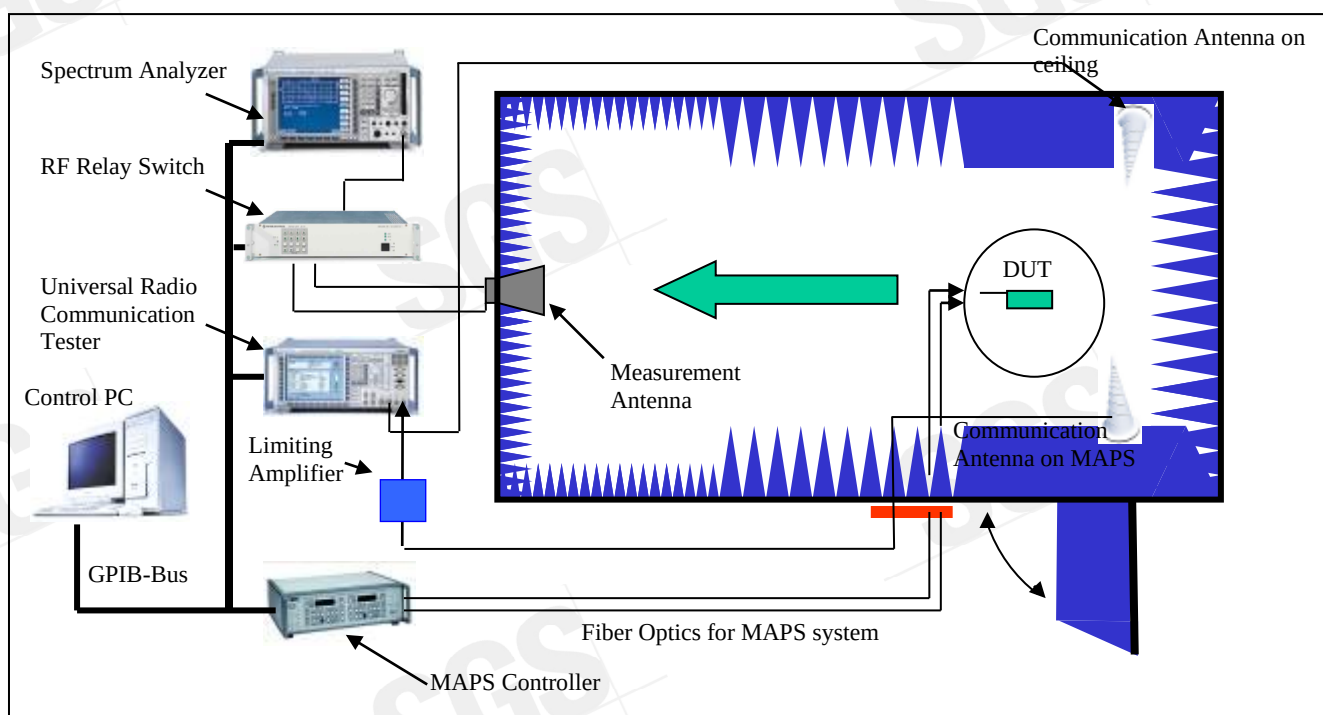
General Information

Testing Condition:

- Temperature: $25 \pm 3^{\circ}\text{C}$
- Humidity: $< 80\%$

Measurement Facility:

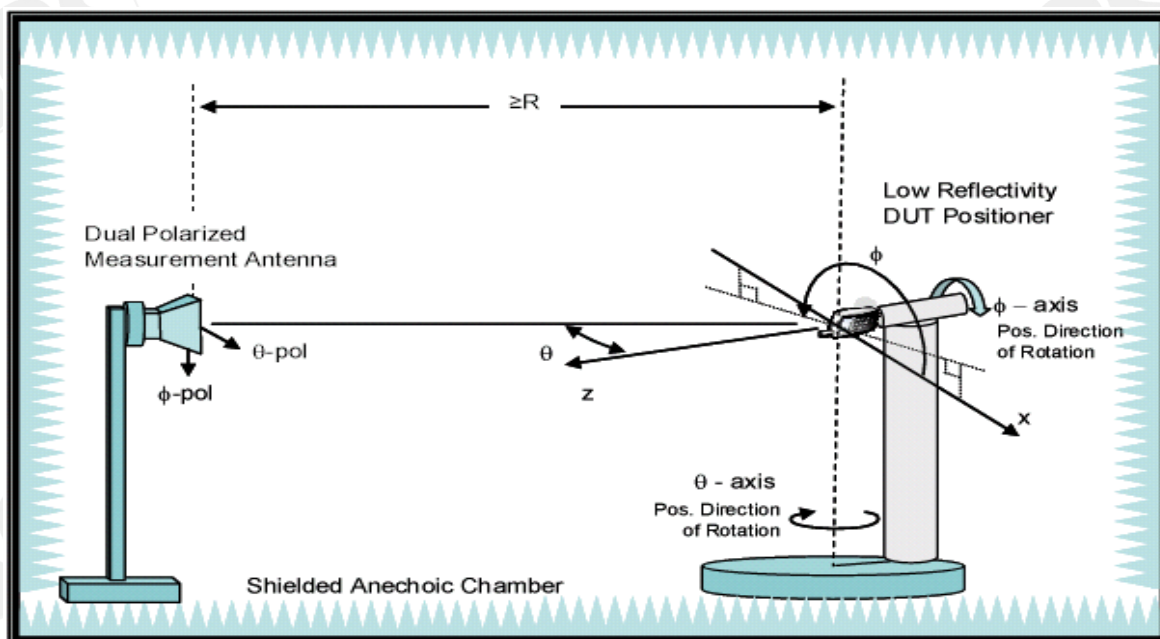
- Measurement Chamber: ETS-Lindgren 3D fully anechoic chamber and its measuring system (AMS-8500)
- Base Station Simulator: Agilent E5515C
- ETS-Lindgren EMCO-2090 Auxiliary Ports RF Relay Switches
- Spectrum Analyzer: Agilent N9010A
- Network Analyzer: Agilent E5071C



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Measurements are performed in an ETS-Lindgren **AMS-8500** 3D fully anechoic test system. The test system includes a high-performance RF-shielded, rectangular anechoic chamber, a Multi-Axis Positioning System (MAPS), and *EMQuest™* EMQ-100 data acquisition and analysis software. The geometry of the setup is specified below for reference.

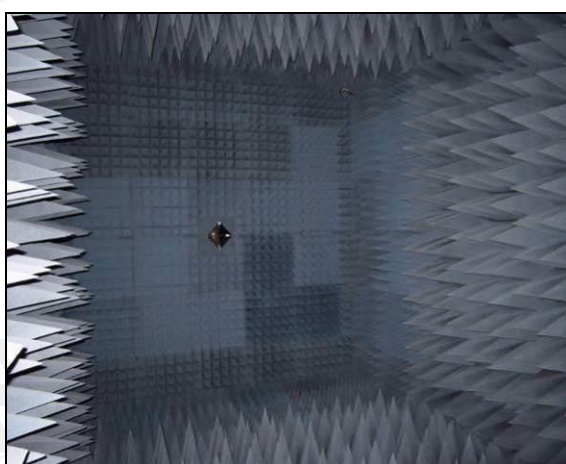
Typical Setup for ETS-Lindgren AMS-8500:



Instruments View



Inside View



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Testing Laboratory: Identification of the Responsible Test Laboratory.

- **OTA Laboratory:**
SGS Taiwan Ltd. Wireless Laboratory
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803.
Telephone: +886 2 2299 3279
Fax: +886 2 2298 0488
Internet: <http://www.tw.sgs.com>
- **Testing Location:**
1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road, NeiHu District, Taipei City 114, Taiwan 11446.

Details of Applicant:

Applicant's name:	Raytac Corp.
Applicant's address:	5F.-1, No. 145, Sec. 1, Heping E. Rd., Da'an Dist., Taipei City 106010 , Taiwan (R.O.C.)
Contact person:	Fei Wang
Telephone:	+886-2-3234-0208
Fax:	+886-2-3234-0547
E-mail:	fei@raytac.com

Details of Manufacturer:

Manufacturer's name:	Raytac Corp.
Manufacturer's address:	5F.-1, No. 145, Sec. 1, Heping E. Rd., Da'an Dist., Taipei City 106010 , Taiwan (R.O.C.)
Contact person:	Fei Wang
Telephone:	+886-2-3234-0208
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E-mail:	fei@raytac.com

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Details of EUT:

Device Description:	WiFi Module
Device Manufacturer:	Raytac Corp.
Device Model:	AN7002Q-P
Hardware Version:	v0.9
Software Version:	v2.5.2
Frequency Range:	2400MHz ~ 2500MHz, Step size: 10MHz 5150MHz ~ 5350MHz, Step size: 20MHz 5480MHz ~ 5880MHz, Step size: 20MHz 5890MHz
Antenna Type:	PIFA Antenna

Duration of Tests:

Sample Receive Date:	2024-12-26
Test Starting Date:	2024-12-28
Test Ending Date:	2024-12-28
Report Issued Date:	2025-01-09

Photographs of EUT:

Please refer to the attached file (EUT Photo)

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List of Equipment

Equipment Summary Sheet

Equipment Description	Manufacturer	Identification no.	Current calibration date	Next calibration date
Network analyzer	Agilent	E5071C	2024/08/19	2025/08/18
Measurement software	ETS-Lindgren	EMQuest 1.14	N/A	N/A
Multi axis positioning system(MAPSTM)	ETS-Lindgren	EMCO 2115	N/A	N/A
Multi axis positioning system(MAPSTM)	ETS-Lindgren	EMCO 2110	N/A	N/A
MAPSTM controller	ETS-Lindgren	EMCO 2090	N/A	N/A
Fully anechoic test system	ETS-Lindgren	AMS-8500	N/A	N/A
Horn antenna	ETS-Lindgren	3164-10	N/A	N/A

Reference Measurement Procedure

The reference measurement procedure is described in SGS Working Instruction WI-TESP-EO-101 to 108 for OTA service.

Antenna Gain and Efficiency

Test Result															
Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500	5150	5170	5190	5210
Point Values															
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. Rad. Pwr. (dBm)	-2.20	-2.13	-2.09	-2.13	-1.52	-1.74	-2.16	-2.48	-2.84	-3.09	-3.11	-3.17	-2.79	-2.83	-2.82
Peak EIRP (dBm)	1.21	1.36	1.43	1.50	2.20	2.04	1.69	1.42	1.18	1.01	1.11	2.61	2.64	2.67	2.94
Directivity (dBi)	3.41	3.49	3.52	3.64	3.72	3.78	3.85	3.89	4.02	4.10	4.23	5.78	5.43	5.49	5.76
Efficiency (dB)	-2.20	-2.13	-2.09	-2.13	-1.52	-1.74	-2.16	-2.48	-2.84	-3.09	-3.11	-3.17	-2.79	-2.83	-2.82
Efficiency (%)	60.29	61.28	61.78	61.21	70.45	67.05	60.78	56.55	51.95	49.13	48.86	48.15	52.58	52.17	52.22
Gain (dBi)	1.21	1.36	1.43	1.50	2.20	2.04	1.69	1.42	1.18	1.01	1.11	2.61	2.64	2.67	2.94
NHPRP $\pm$ Pi/4 (dBm)	-3.38	-3.32	-3.27	-3.31	-2.70	-2.91	-3.34	-3.65	-4.02	-4.27	-4.29	-4.66	-4.26	-4.29	-4.32
NHPRP $\pm$ Pi/6 (dBm)	-4.91	-4.84	-4.78	-4.80	-4.17	-4.35	-4.77	-5.08	-5.44	-5.68	-5.70	-6.85	-6.44	-6.47	-6.52
NHPRP $\pm$ Pi/8 (dBm)	-6.10	-6.02	-5.96	-5.97	-5.32	-5.50	-5.92	-6.22	-6.57	-6.80	-6.81	-8.58	-8.19	-8.21	-8.24
Upper Hem. PRP (dBm)	-5.86	-5.79	-5.74	-5.76	-5.12	-5.30	-5.69	-5.98	-6.31	-6.52	-6.52	-8.47	-8.02	-7.99	-8.04
Lower Hem. PRP (dBm)	-4.64	-4.57	-4.54	-4.60	-4.01	-4.26	-4.71	-5.04	-5.44	-5.71	-5.76	-4.70	-4.34	-4.40	-4.37

Test Result															
Frequency (MHz)	5230	5250	5270	5290	5310	5330	5350	5480	5500	5520	5540	5560	5580	5600	5620
Point Values															
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. Rad. Pwr. (dBm)	-2.65	-2.45	-2.20	-1.81	-1.72	-1.66	-1.77	-2.84	-2.60	-2.47	-2.64	-2.89	-3.22	-3.57	-4.00
Peak EIRP (dBm)	3.33	3.78	4.18	4.62	4.84	4.83	4.59	3.28	3.55	3.61	3.61	3.51	3.29	2.80	2.66
Directivity (dBi)	5.98	6.23	6.38	6.42	6.56	6.49	6.36	6.12	6.16	6.08	6.25	6.41	6.51	6.36	6.65
Efficiency (dB)	-2.65	-2.45	-2.20	-1.81	-1.72	-1.66	-1.77	-2.84	-2.60	-2.47	-2.64	-2.89	-3.22	-3.57	-4.00
Efficiency (%)	54.32	56.86	60.28	65.93	67.33	68.22	66.46	52.06	54.92	56.66	54.41	51.35	47.64	44.00	39.86
Gain (dBi)	3.33	3.78	4.18	4.62	4.84	4.83	4.59	3.28	3.55	3.61	3.61	3.51	3.29	2.80	2.66
NHPRP $\pm$ Pi/4 (dBm)	-4.18	-4.00	-3.76	-3.40	-3.30	-3.23	-3.34	-4.44	-4.22	-4.10	-4.28	-4.57	-4.92	-5.28	-5.71
NHPRP $\pm$ Pi/6 (dBm)	-6.37	-6.21	-5.99	-5.63	-5.52	-5.45	-5.55	-6.66	-6.45	-6.33	-6.52	-6.81	-7.16	-7.48	-7.91
NHPRP $\pm$ Pi/8 (dBm)	-8.06	-7.91	-7.70	-7.33	-7.21	-7.14	-7.24	-8.39	-8.18	-8.07	-8.24	-8.53	-8.87	-9.16	-9.59
Upper Hem. PRP (dBm)	-7.98	-7.80	-7.66	-7.40	-7.36	-7.27	-7.37	-8.55	-8.44	-8.44	-8.73	-9.08	-9.53	-9.91	-10.34
Lower Hem. PRP (dBm)	-4.16	-3.95	-3.65	-3.21	-3.10	-3.06	-3.18	-4.19	-3.91	-3.73	-3.87	-4.09	-4.38	-4.71	-5.14

Test Result															
Frequency (MHz)	5640	5660	5680	5700	5720	5740	5760	5780	5800	5820	5840	5860	5880	5890	
Point Values															
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. Rad. Pwr. (dBm)	-4.07	-4.04	-4.11	-4.13	-3.72	-3.25	-3.23	-3.01	-2.71	-3.02	-3.52	-3.90	-3.97	-3.87	
Peak EIRP (dBm)	2.56	3.12	2.82	2.84	3.44	4.12	3.80	4.24	4.61	4.38	4.01	3.74	3.59	3.77	
Directivity (dBi)	6.62	7.16	6.94	6.96	7.16	7.36	7.04	7.25	7.32	7.39	7.53	7.64	7.57	7.64	
Efficiency (dB)	-4.07	-4.04	-4.11	-4.13	-3.72	-3.25	-3.23	-3.01	-2.71	-3.02	-3.52	-3.90	-3.97	-3.87	
Efficiency (%)	39.20	39.47	38.78	38.66	42.49	47.37	47.52	50.05	53.54	49.92	44.51	40.75	40.05	41.01	
Gain (dBi)	2.56	3.12	2.82	2.84	3.44	4.12	3.80	4.24	4.61	4.38	4.01	3.74	3.59	3.77	
NHPRP $\pm$ Pi/4 (dBm)	-5.78	-5.80	-5.89	-5.92	-5.53	-5.07	-5.05	-4.84	-4.58	-4.91	-5.42	-5.83	-5.94	-5.84	
NHPRP $\pm$ Pi/6 (dBm)	-7.95	-7.95	-8.04	-8.04	-7.59	-7.14	-7.10	-6.89	-6.60	-6.95	-7.48	-7.88	-8.00	-7.90	
NHPRP $\pm$ Pi/8 (dBm)	-9.62	-9.56	-9.64	-9.64	-9.12	-8.67	-8.61	-8.40	-8.10	-8.45	-8.99	-9.38	-9.48	-9.39	
Upper Hem. PRP (dBm)	-10.46	-10.53	-10.66	-10.73	-10.38	-10.02	-9.94	-9.69	-9.46	-9.78	-10.31	-10.81	-10.86	-10.73	
Lower Hem. PRP (dBm)	-5.20	-5.14	-5.20	-5.20	-4.77	-4.27	-4.27	-4.06	-3.74	-4.04	-4.54	-4.89	-4.97	-4.87	

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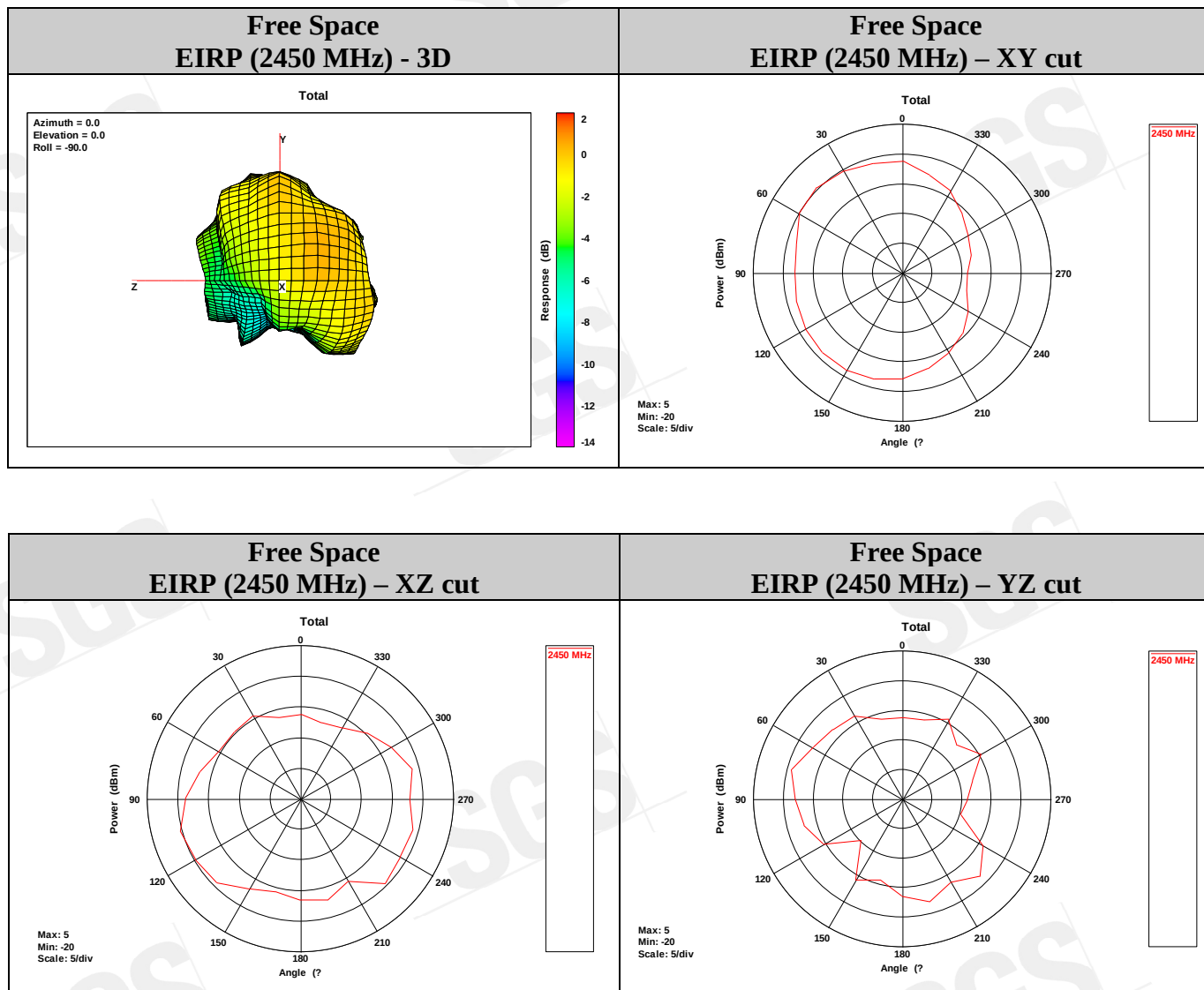
Test Setup

Please refer to the attached file (EUT Photo)

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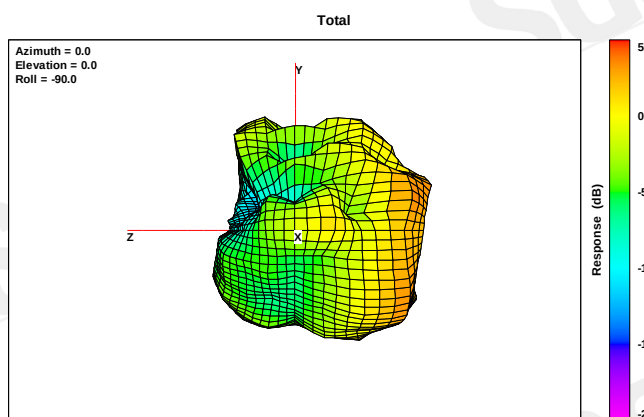
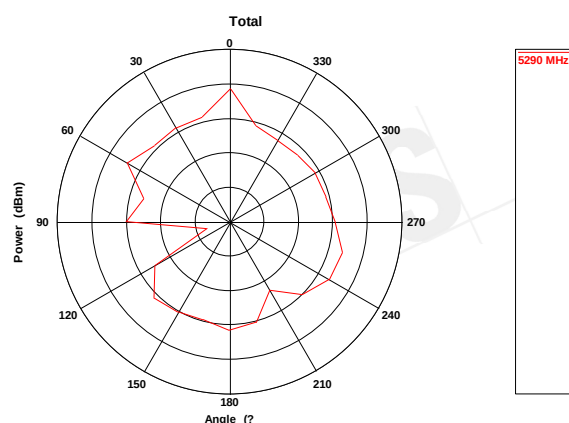
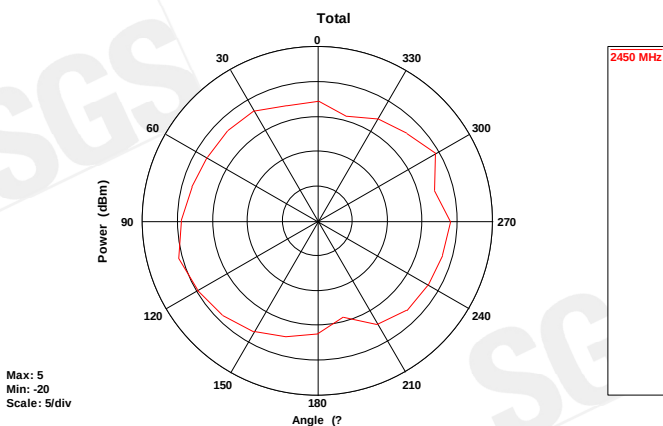
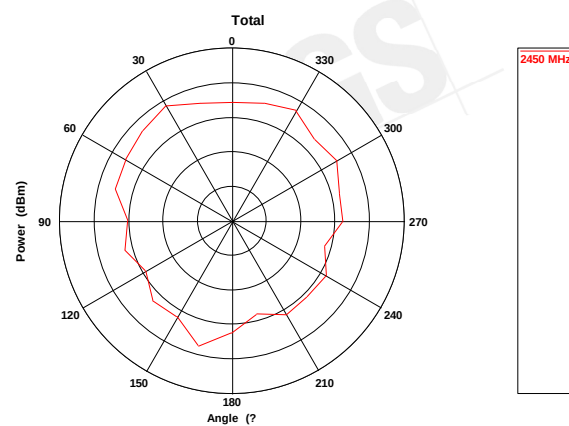
Antenna 3D Plot Matrix

All plots in this section show the total EIRP ($EIRP_{\theta} + EIRP_{\phi}$) with the +x-axis pointing out of the page, +y-axis pointing top of the page, and +z-axis pointing left of the page.



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**Free Space
EIRP (5290 MHz) - 3D****Free Space
EIRP (5290 MHz) - XY cut****Free Space
EIRP (5290 MHz) - XZ cut****Free Space
EIRP (5290 MHz) - YZ cut****End of Report**

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