

# Antenna Test Report



**Report No.: TEOT2311000686EP**

**Applicant Name: Askey Computer Corporation**  
**Manufacturer Name: Askey Computer Corporation**

**Product Name: 5G NR Sub 6 WiFi 7 Router**  
**Model No.: ASK-NCM1100**

**Measurements performed at**  
**SGS Taiwan Ltd.**  
**NeiHu District, Taiwan**

**Issued Date: December 19, 2023**

	Name	Date & Signature	Distribution
Prepared by:	Walter Lin  Engineer	 December 19, 2023	
Approved by:	Eason Chou  Supervisor	 December 19, 2023	

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**Revision Version**

Report Number	Revision	Date	Memo
TEOT2311000686EP	00	2023/12/19	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

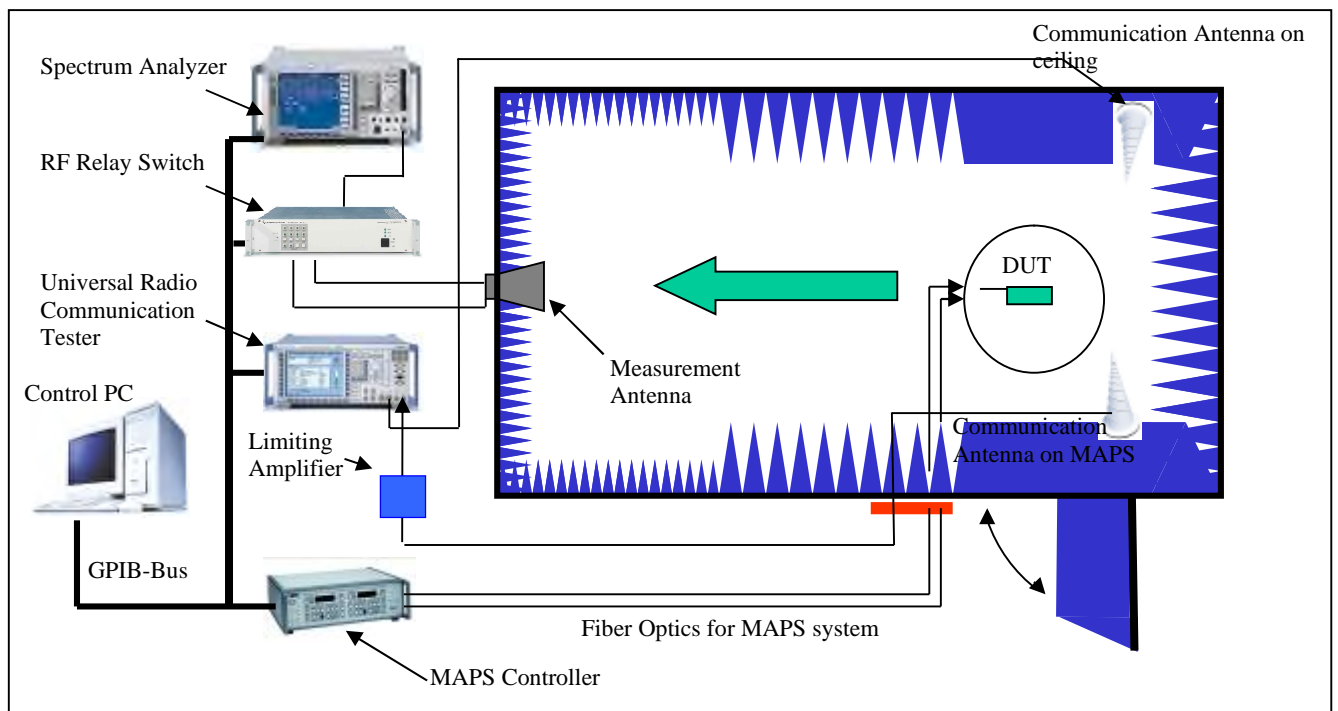
### General Information

#### Testing Condition:

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

#### Measurement Facility:

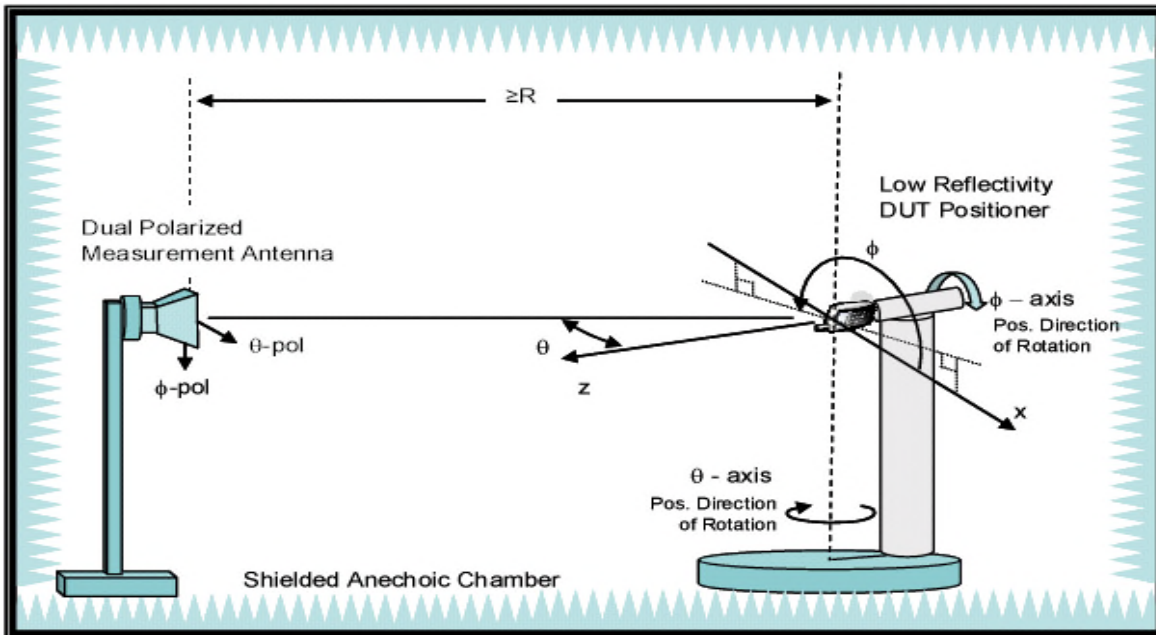
- Measurement Chamber: ETS-Lindgren 3D fully anechoic chamber and its measuring system (AMS-8500)
- Base Station Simulator: Agilent E5515C
- ETS-Lindgren EMCO-2090 Auxiliary Ports RF Relay Switches
- Spectrum Analyzer: Agilent N9010A
- Network Analyzer: Agilent E5071C



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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.

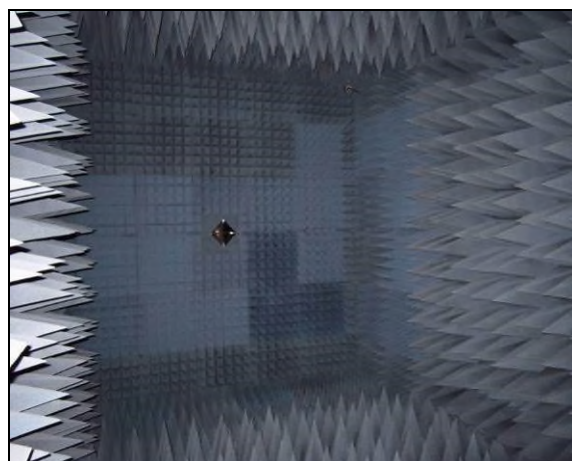
### Typical Setup for ETS-Lindgren AMS-8500:



### **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:**

<b>Applicant's name:</b>	<b>Askey Computer Corporation</b>
<b>Applicant's address:</b>	<b>10F, No. 119, Jiankang Rd., Zhonghe Dist., New Taipei City, Taiwan</b>
<b>Contact person:</b>	<b>Jack Po</b>
<b>Telephone:</b>	<b>+886 2 2228 7588 ext. 18734</b>
<b>Fax:</b>	<b>N/A</b>
<b>E-mail:</b>	<b><a href="mailto:jackpo@askey.com">jackpo@askey.com</a></b>

**Details of Manufacturer:**

<b>Manufacturer's name:</b>	<b>Askey Computer Corporation</b>
<b>Manufacturer's address:</b>	<b>10F, No. 119, Jiankang Rd., Zhonghe Dist., New Taipei City, Taiwan</b>
<b>Contact person:</b>	<b>Jack Po</b>
<b>Telephone:</b>	<b>+886 2 2228 7588 ext. 18734</b>
<b>Fax:</b>	<b>N/A</b>
<b>E-mail:</b>	<b><a href="mailto:jackpo@askey.com">jackpo@askey.com</a></b>

**Details of EUT:**

<b>Device Description:</b>	<b>Location information notification device</b>
<b>Device Manufacturer:</b>	<b>Askey Computer Corporation</b>
<b>Device Model:</b>	<b>ASK-NCM1100</b>
<b>Hardware Version:</b>	<b>Rev4</b>
<b>Software Version:</b>	<b>SDK 2.0.6</b>
<b>Frequency Range:</b>	<b>2402MHz ~ 7115 MHz</b>
<b>Antenna Type:</b>	<b>Embedded Antenna</b>

**Duration of Tests:**

<b>Sample Receive Date:</b>	<b>2023-11-07</b>
<b>Test Starting Date:</b>	<b>2023-11-08</b>
<b>Test Ending Date:</b>	<b>2023-11-08</b>
<b>Report Issued Date:</b>	<b>2023-12-19</b>

**Photographs of EUT:**
**Front View**
**Back View**

## List of Equipment

### Equipment Summary Sheet

Equipment Description	Manufacturer	Identification no.	Current calibration date	Next calibration date
Network analyzer	Agilent	E5071C	2023/05/10	2024/05/09
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	2023/03/03	2024/03/02
Horn antenna	ETS-Lindgren	3164-10	2023/03/03	2024/03/02

## Reference Measurement Procedure

The reference measurement procedure is described in SGS Working Instruction WI-TESP-EO-101 to 108 for OTA service. Measurements are made by placing the probe in contact with the sample and measuring the admittance or reflection coefficient with respect to the open-circuit end, using a network analyzer or equivalent instrumentation.

## Antenna Gain and Efficiency

Ant 21				
Frequency (MHz)	5955	6475	6895	7115
Point Values				
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.42</b>	<b>-2.51</b>	<b>-2.10</b>	<b>-2.75</b>
Peak EIRP (dBm)	4.53	3.57	4.28	2.53
Directivity (dBi)	6.96	6.09	6.38	5.28
Efficiency (dB)	-2.42	-2.51	-2.10	-2.75
<b>Efficiency (%)</b>	<b>57.25</b>	<b>56.08</b>	<b>61.73</b>	<b>53.06</b>
Gain (dBi)	4.53	3.57	4.28	2.53
NHPRP $\pm$ Pi/4 (dBm)	-3.29	-3.49	-3.07	-3.81
NHPRP $\pm$ Pi/6 (dBm)	-4.32	-4.56	-4.16	-4.99
NHPRP $\pm$ Pi/8 (dBm)	-5.26	-5.46	-5.09	-5.89
Upper Hem. PRP (dBm)	-4.57	-4.62	-4.46	-5.29
Lower Hem. PRP (dBm)	-8.52	-8.66	-5.87	-6.30

Ant 22				
Frequency (MHz)	5955	6475	6895	7115
Point Values				
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.13</b>	<b>-2.54</b>	<b>-2.04</b>	<b>-2.63</b>
Peak EIRP (dBm)	5.74	4.54	4.65	3.36
Directivity (dBi)	7.87	7.08	6.69	5.98
Efficiency (dB)	-2.13	-2.54	-2.04	-2.63
<b>Efficiency (%)</b>	<b>61.23</b>	<b>55.71</b>	<b>62.52</b>	<b>54.63</b>
Gain (dBi)	5.74	4.54	4.65	3.36
NHPRP $\pm$ Pi/4 (dBm)	-2.98	-3.33	-2.98	-3.52
NHPRP $\pm$ Pi/6 (dBm)	-4.27	-4.59	-4.28	-4.67
NHPRP $\pm$ Pi/8 (dBm)	-5.40	-5.73	-5.39	-5.75
Upper Hem. PRP (dBm)	-4.42	-4.86	-4.48	-5.11
Lower Hem. PRP (dBm)	-6.01	-6.38	-5.71	-6.23

Ant 23				
Frequency (MHz)	5955	6475	6895	7115
Point Values				
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.21</b>	<b>-2.90</b>	<b>-2.58</b>	<b>-3.06</b>
Peak EIRP (dBm)	5.01	3.40	3.39	3.91
Directivity (dBi)	7.22	6.30	5.97	6.97
Efficiency (dB)	-2.21	-2.90	-2.58	-3.06
<b>Efficiency (%)</b>	<b>60.09</b>	<b>51.27</b>	<b>55.15</b>	<b>49.41</b>
Gain (dBi)	5.01	3.40	3.39	3.91
NHPRP $\pm$ Pi/4 (dBm)	-3.41	-4.00	-3.76	-4.03
NHPRP $\pm$ Pi/6 (dBm)	-4.59	-5.22	-5.12	-5.24
NHPRP $\pm$ Pi/8 (dBm)	-5.52	-6.20	-6.12	-6.33
Upper Hem. PRP (dBm)	-4.48	-5.14	-4.92	-5.82
Lower Hem. PRP (dBm)	-6.11	-6.85	-6.39	-6.34

Ant 24				
Frequency (MHz)	5955	6475	6895	7115
Point Values				
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.98</b>	<b>-3.16</b>	<b>-2.24</b>	<b>-3.25</b>
Peak EIRP (dBm)	4.13	4.08	4.26	5.52
Directivity (dBi)	7.10	7.24	6.50	8.77
Efficiency (dB)	-2.98	-3.16	-2.24	-3.25
<b>Efficiency (%)</b>	<b>50.40</b>	<b>48.30</b>	<b>59.72</b>	<b>47.34</b>
Gain (dBi)	4.13	4.08	4.26	5.52
NHPRP $\pm$ Pi/4 (dBm)	-3.66	-3.98	-3.09	-4.06
NHPRP $\pm$ Pi/6 (dBm)	-5.03	-5.05	-4.20	-4.95
NHPRP $\pm$ Pi/8 (dBm)	-6.03	-6.03	-5.23	-5.79
Upper Hem. PRP (dBm)	-5.52	-5.98	-5.21	-6.53
Lower Hem. PRP (dBm)	-6.51	-6.37	-5.28	-6.00

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Ant 25(RX only)				
Frequency (MHz)	5955	6475	6895	7115
Point Values				
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.63</b>	<b>-3.28</b>	<b>-2.63</b>	<b>-3.36</b>
Peak EIRP (dBm)	2.88	3.50	4.86	3.15
Directivity (dBi)	5.50	6.78	7.49	6.51
Efficiency (dB)	-2.63	-3.28	-2.63	-3.36
<b>Efficiency (%)</b>	<b>54.64</b>	<b>47.01</b>	<b>54.58</b>	<b>46.15</b>
Gain (dBi)	2.88	3.50	4.86	3.15
NHPRP $\pm$ Pi/4 (dBm)	-3.82	-4.26	-3.48	-4.37
NHPRP $\pm$ Pi/6 (dBm)	-5.30	-5.68	-4.71	-5.61
NHPRP $\pm$ Pi/8 (dBm)	-6.48	-6.84	-5.78	-6.69
Upper Hem. PRP (dBm)	-5.11	-5.73	-5.22	-5.80
Lower Hem. PRP (dBm)	-6.23	-6.93	-6.11	-7.02

Ant 11							
Frequency (MHz)	2412	2437	2462	5180	5320	5500	5825
Point Values							
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.43</b>	<b>-1.79</b>	<b>-1.36</b>	<b>-2.86</b>	<b>-3.04</b>	<b>-2.90</b>	<b>-4.21</b>
Peak EIRP (dBm)	1.94	2.33	2.66	3.12	4.73	2.94	1.09
Directivity (dBi)	4.37	4.12	4.02	5.97	7.77	5.84	5.30
Efficiency (dB)	-2.43	-1.79	-1.36	-2.86	-3.04	-2.90	-4.21
<b>Efficiency (%)</b>	<b>57.16</b>	<b>66.29</b>	<b>73.10</b>	<b>51.80</b>	<b>49.66</b>	<b>51.26</b>	<b>37.92</b>
Gain (dBi)	1.94	2.33	2.66	3.12	4.73	2.94	1.09
NHPRP $\pm$ Pi/4 (dBm)	-3.11	-2.43	-2.02	-3.72	-3.96	-4.12	-5.42
NHPRP $\pm$ Pi/6 (dBm)	-4.14	-3.46	-3.02	-4.79	-4.96	-5.21	-6.70
NHPRP $\pm$ Pi/8 (dBm)	-5.08	-4.40	-3.96	-5.77	-5.94	-6.12	-7.77
Upper Hem. PRP (dBm)	-5.62	-5.04	-4.52	-5.72	-6.09	-5.80	-7.06
Lower Hem. PRP (dBm)	-5.27	-4.56	-4.22	-6.02	-6.01	-6.03	-7.38

Ant 12							
Frequency (MHz)	2412	2437	2462	5180	5320	5500	5825
Point Values							
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.56</b>	<b>-1.92</b>	<b>-1.37</b>	<b>-2.73</b>	<b>-2.97</b>	<b>-2.91</b>	<b>-3.21</b>
Peak EIRP (dBm)	3.65	4.14	4.49	3.89	3.33	3.35	3.51
Directivity (dBi)	6.21	6.06	5.88	6.42	6.30	6.26	6.72
Efficiency (dB)	-2.56	-1.92	-1.37	-2.73	-2.97	-2.91	-3.21
<b>Efficiency (%)</b>	<b>55.41</b>	<b>64.27</b>	<b>73.02</b>	<b>53.33</b>	<b>50.47</b>	<b>51.11</b>	<b>47.78</b>
Gain (dBi)	3.65	4.14	4.49	3.89	3.33	3.35	3.51
NHPRP $\pm$ Pi/4 (dBm)	-3.38	-2.72	-2.16	-3.75	-3.97	-3.84	-4.04
NHPRP $\pm$ Pi/6 (dBm)	-4.33	-3.70	-3.20	-4.96	-5.07	-4.83	-5.19
NHPRP $\pm$ Pi/8 (dBm)	-5.21	-4.59	-4.12	-5.96	-5.99	-5.70	-6.25
Upper Hem. PRP (dBm)	-5.99	-5.25	-4.46	-5.63	-5.90	-5.83	-6.33
Lower Hem. PRP (dBm)	-5.19	-4.63	-4.30	-5.86	-6.06	-6.03	-6.11

Ant 13							
Frequency (MHz)	2412	2437	2462	5180	5320	5500	5825
Point Values							
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.16</b>	<b>-1.50</b>	<b>-1.09</b>	<b>-2.69</b>	<b>-2.94</b>	<b>-2.91</b>	<b>-3.30</b>
Peak EIRP (dBm)	2.39	2.25	3.49	2.82	3.32	2.19	2.36
Directivity (dBi)	4.54	3.75	4.58	5.51	6.28	5.10	5.67
Efficiency (dB)	-2.16	-1.50	-1.09	-2.69	-2.94	-2.91	-3.30
<b>Efficiency (%)</b>	<b>60.84</b>	<b>70.80</b>	<b>77.85</b>	<b>53.78</b>	<b>50.78</b>	<b>51.17</b>	<b>46.75</b>
Gain (dBi)	2.39	2.25	3.49	2.82	3.32	2.19	2.36
NHPRP $\pm$ Pi/4 (dBm)	-2.92	-2.24	-1.83	-3.85	-4.23	-4.01	-4.38
NHPRP $\pm$ Pi/6 (dBm)	-4.01	-3.32	-2.92	-5.06	-5.37	-5.22	-5.62
NHPRP $\pm$ Pi/8 (dBm)	-4.98	-4.28	-3.89	-6.07	-6.25	-6.17	-6.62
Upper Hem. PRP (dBm)	-5.83	-5.22	-4.76	-6.03	-6.09	-6.41	-6.38
Lower Hem. PRP (dBm)	-4.59	-3.90	-3.52	-5.40	-5.82	-5.48	-6.25

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<b>Ant 14</b>							
Frequency (MHz)	2412	2437	2462	5180	5320	5500	5825
Point Values							
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.50</b>	<b>-1.92</b>	<b>-1.32</b>	<b>-2.63</b>	<b>-2.94</b>	<b>-2.63</b>	<b>-3.64</b>
Peak EIRP (dBm)	2.04	2.52	3.24	4.06	3.43	2.98	2.89
Directivity (dBi)	4.54	4.43	4.56	6.69	6.37	5.60	6.54
Efficiency (dB)	-2.50	-1.92	-1.32	-2.63	-2.94	-2.63	-3.64
<b>Efficiency (%)</b>	<b>56.22</b>	<b>64.34</b>	<b>73.85</b>	<b>54.55</b>	<b>50.85</b>	<b>54.63</b>	<b>43.21</b>
Gain (dBi)	2.04	2.52	3.24	4.06	3.43	2.98	2.89
NHPRP ±Piv/4 (dBm)	-3.29	-2.67	-2.06	-3.82	-3.97	-3.67	-4.60
NHPRP ±Piv/6 (dBm)	-4.44	-3.82	-3.26	-5.23	-5.35	-5.01	-5.90
NHPRP ±Piv/8 (dBm)	-5.43	-4.82	-4.32	-6.31	-6.48	-6.11	-7.06
Upper Hem. PRP (dBm)	-5.42	-4.97	-4.40	-6.42	-6.79	-6.39	-7.11
Lower Hem. PRP (dBm)	-5.61	-4.88	-4.26	-4.99	-5.24	-5.00	-6.24

<b>Ant 15(DFS)(RX only)</b>							
Frequency (MHz)	2412	2437	2462	5180	5320	5500	5825
Point Values							
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-2.10</b>	<b>-1.60</b>	<b>-1.09</b>	<b>-2.05</b>	<b>-2.32</b>	<b>-2.03</b>	<b>-2.13</b>
Peak EIRP (dBm)	3.92	4.40	5.06	6.90	7.66	7.44	6.47
Directivity (dBi)	6.02	6.00	6.15	8.95	9.97	9.47	8.60
Efficiency (dB)	-2.10	-1.60	-1.09	-2.05	-2.32	-2.03	-2.13
<b>Efficiency (%)</b>	<b>61.65</b>	<b>69.21</b>	<b>77.82</b>	<b>62.37</b>	<b>58.68</b>	<b>62.70</b>	<b>61.30</b>
Gain (dBi)	3.92	4.40	5.06	6.90	7.66	7.44	6.47
NHPRP ±Piv/4 (dBm)	-2.99	-2.60	-2.01	-2.97	-3.28	-2.98	-3.06
NHPRP ±Piv/6 (dBm)	-4.21	-3.76	-3.32	-4.00	-4.36	-4.10	-4.32
NHPRP ±Piv/8 (dBm)	-5.27	-4.83	-4.41	-4.92	-5.27	-5.10	-5.40
Upper Hem. PRP (dBm)	-5.71	-5.15	-4.61	-4.44	-4.81	-4.75	-4.73
Lower Hem. PRP (dBm)	-4.58	-4.12	-3.64	-5.78	-5.91	-5.35	-5.58

<b>Ant BT</b>			
Frequency (MHz)	2402	2441	2480
Point Values			
Ant. Port Input Pwr. (dBm)	0.00	0.00	0.00
<b>Tot. Rad. Pwr. (dBm)</b>	<b>-3.82</b>	<b>-3.24</b>	<b>-2.06</b>
Peak EIRP (dBm)	3.71	4.40	5.55
Directivity (dBi)	7.53	7.64	7.61
Efficiency (dB)	-3.82	-3.24	-2.06
<b>Efficiency (%)</b>	<b>41.53</b>	<b>47.44</b>	<b>62.17</b>
Gain (dBi)	3.71	4.40	5.55
NHPRP ±Piv/4 (dBm)	-4.42	-3.88	-2.74
NHPRP ±Piv/6 (dBm)	-5.60	-5.07	-3.92
NHPRP ±Piv/8 (dBm)	-6.68	-6.14	-4.98
Upper Hem. PRP (dBm)	-7.01	-6.52	-5.42
Lower Hem. PRP (dBm)	-6.65	-5.99	-4.76

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Test Setup

Free Space

Report No.: TEOT2311000686EP

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t (886-2) 2299-3279

f (886-2) 2298-0488

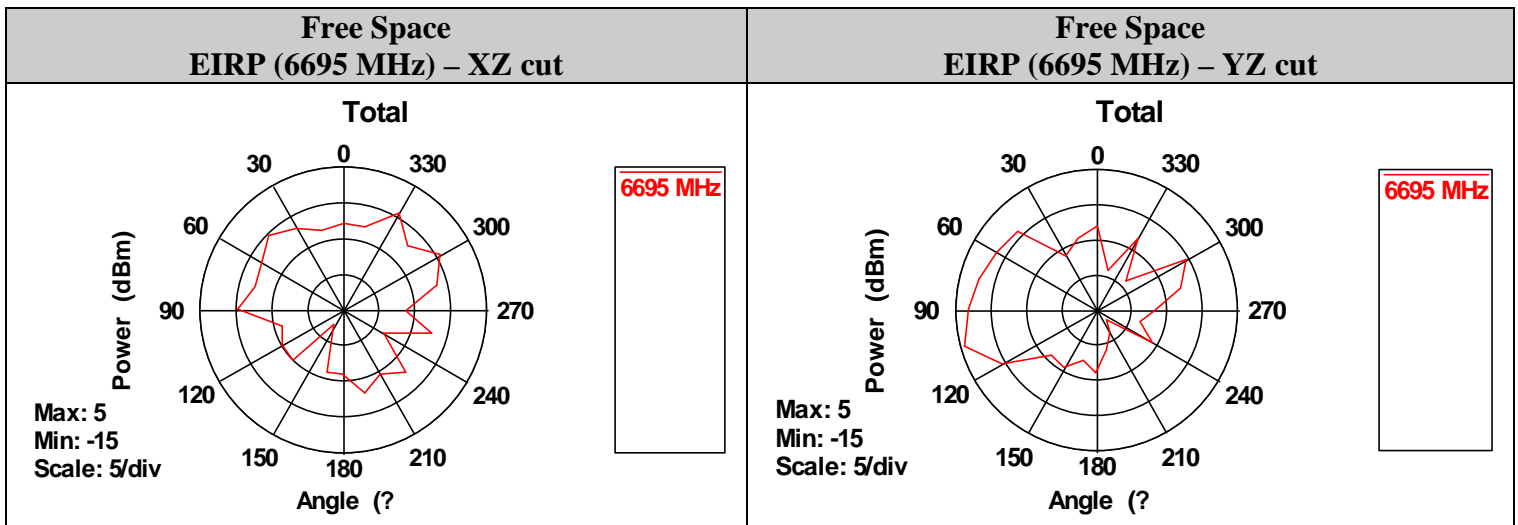
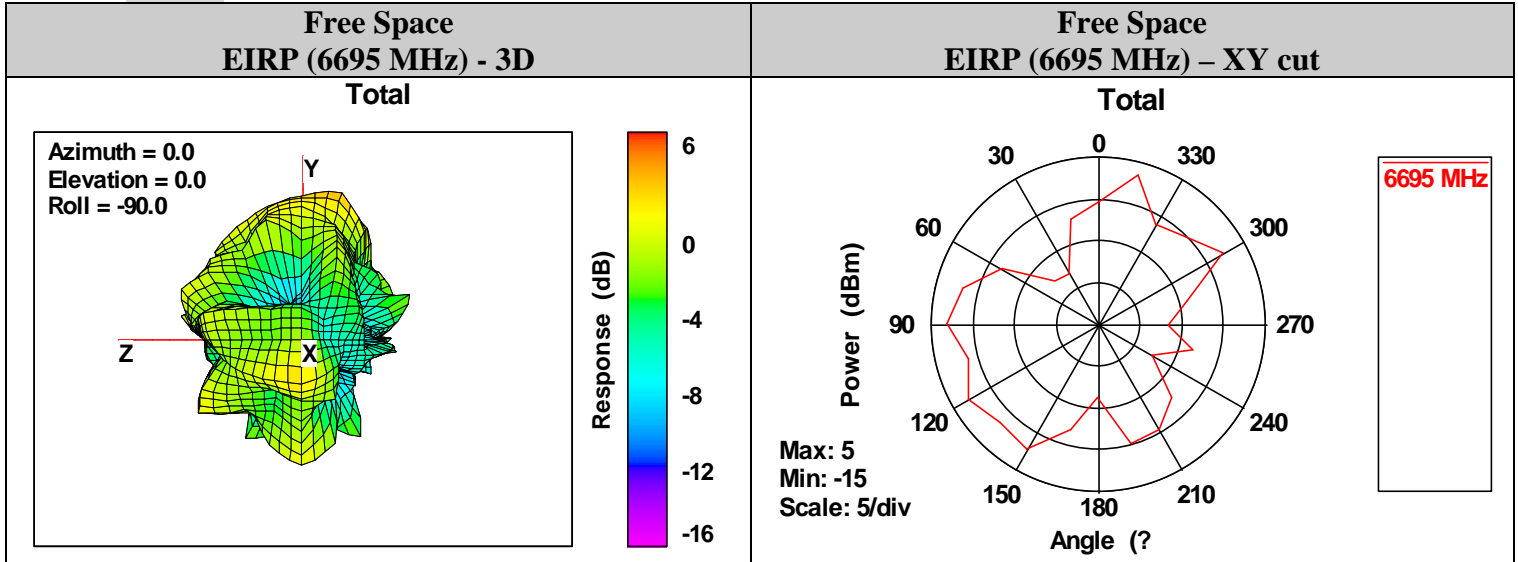
[www.tw.sgs.com](http://www.tw.sgs.com)

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## Antenna 3D Plot Matrix

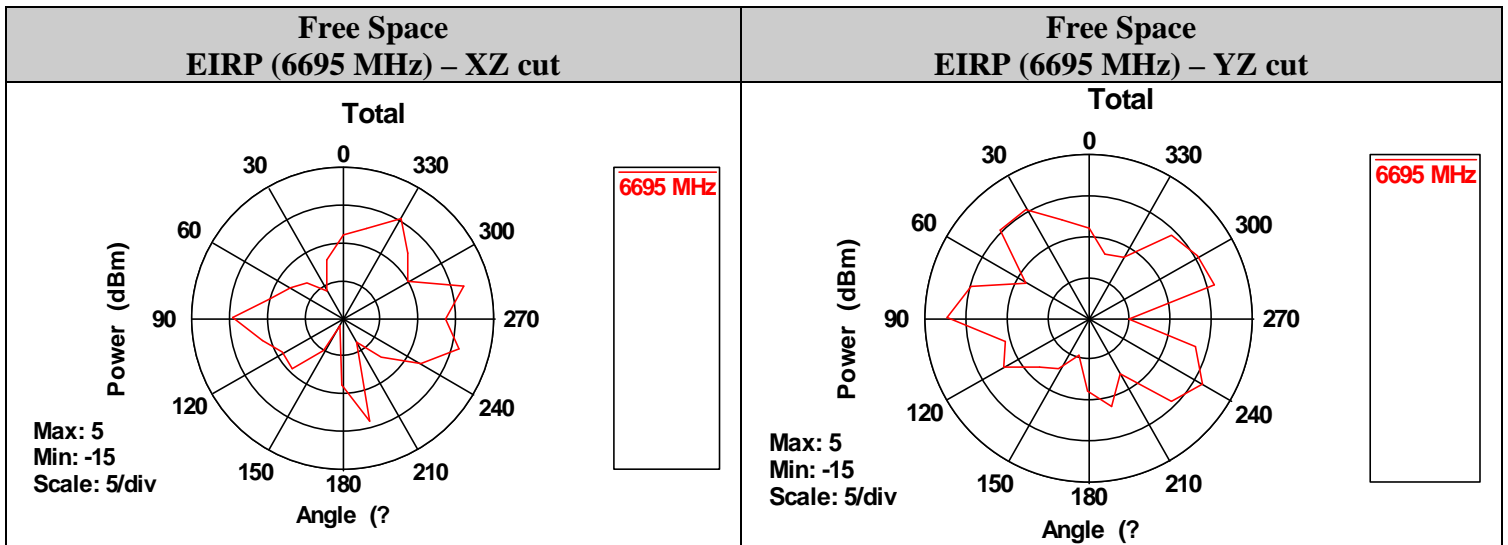
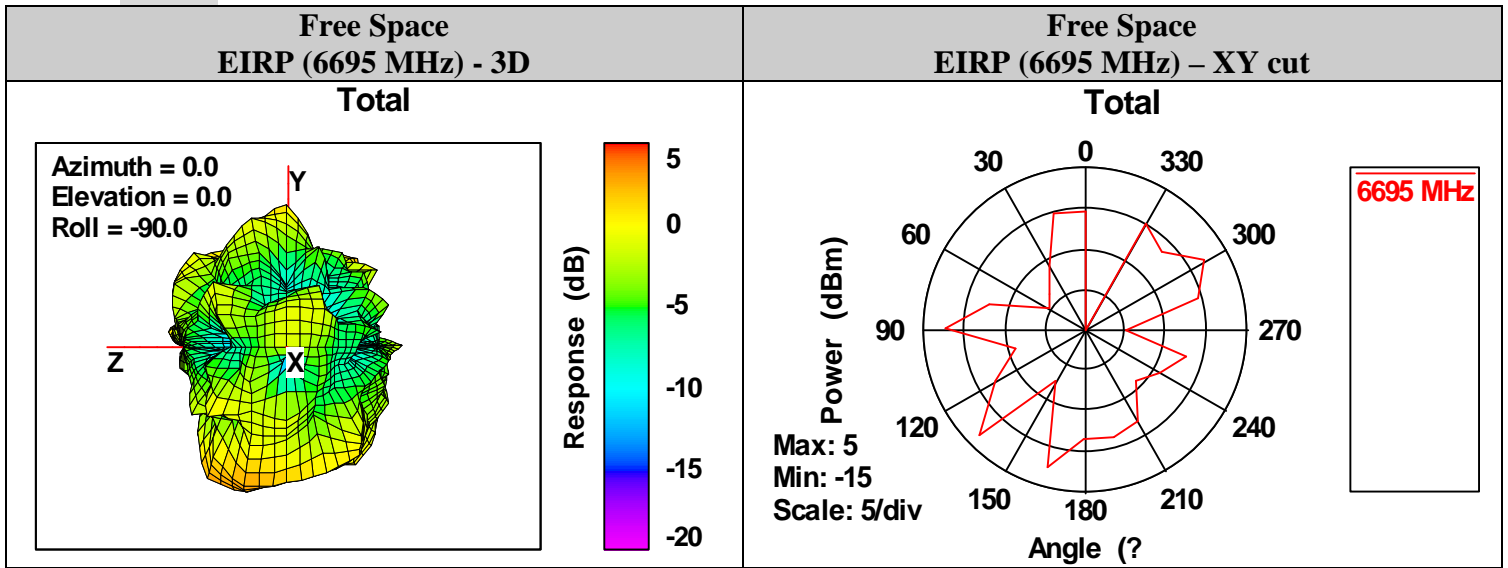
All plots in this section show the total EIRP ( $EIRP_{\theta} + EIRP_{\phi}$ ) with the +x-axis pointing out of the page, +y-axis pointing top of the page, and +z-axis pointing left of the page.

### Ant 21



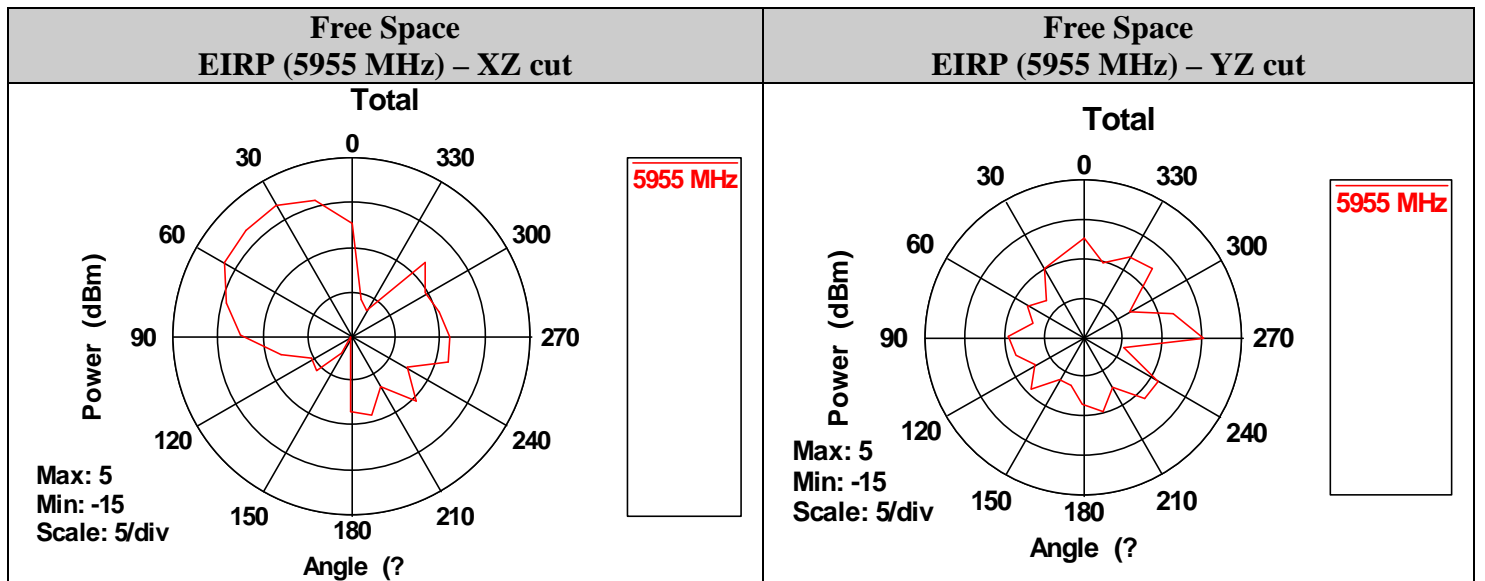
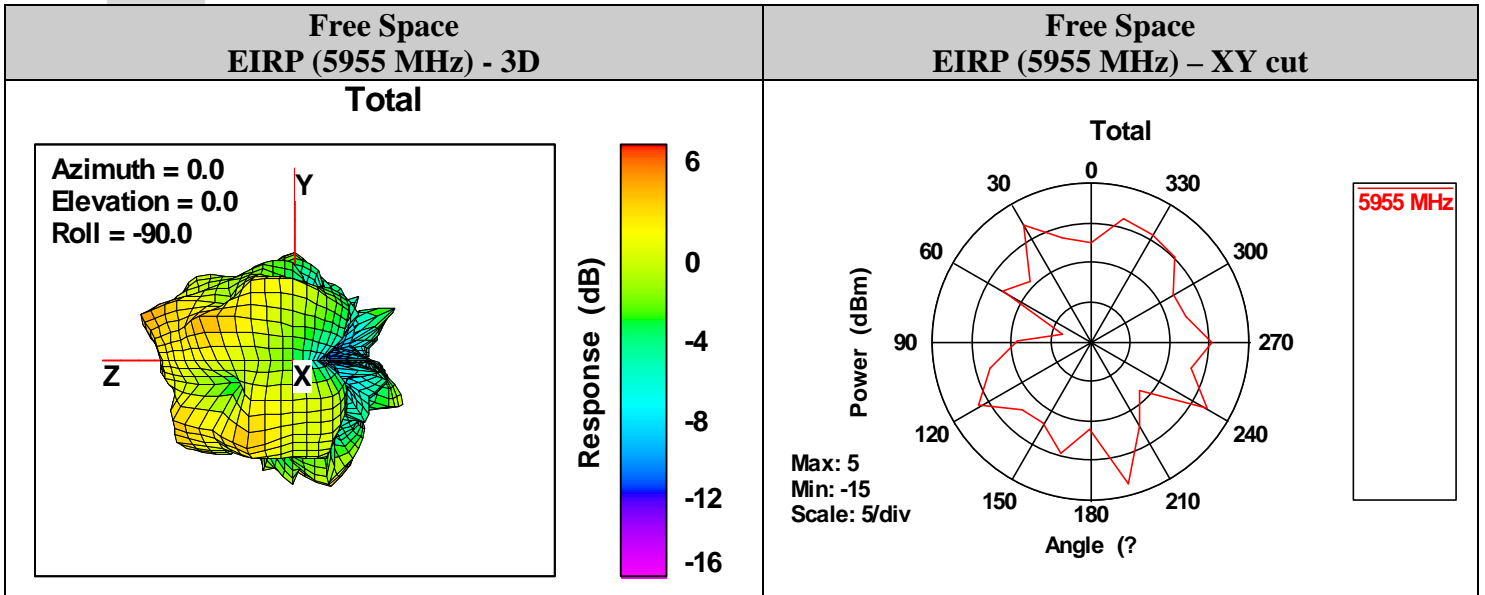
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**Ant 22**



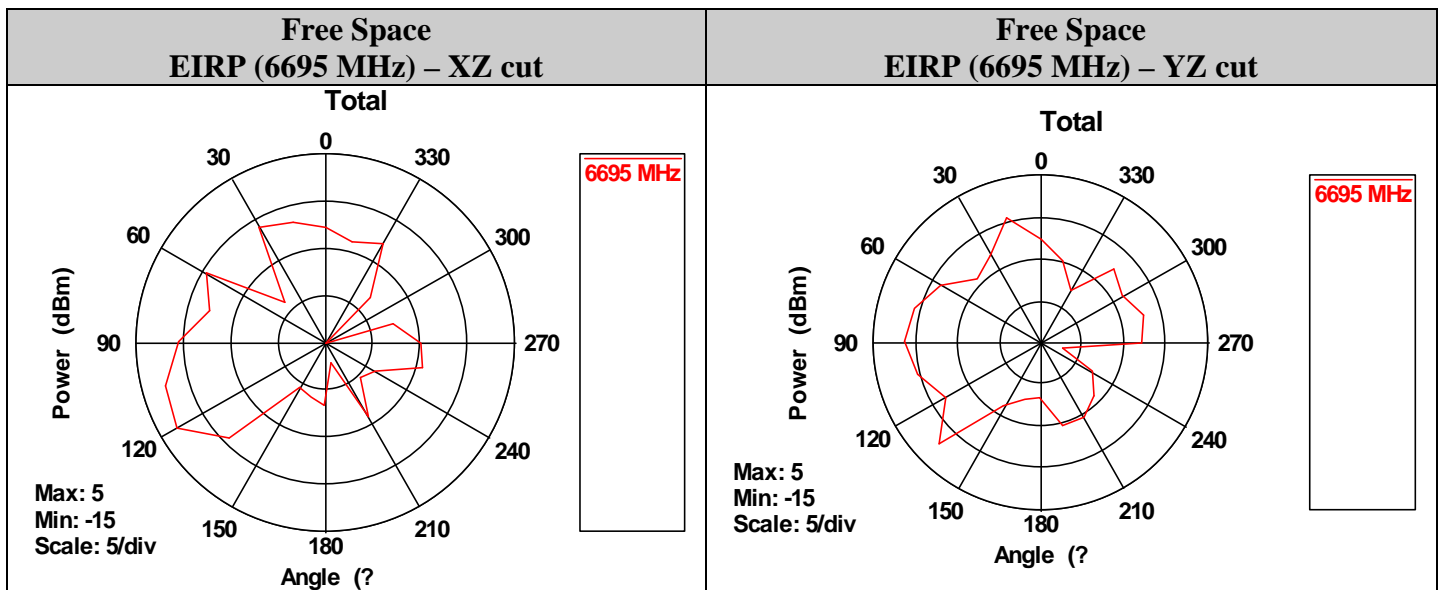
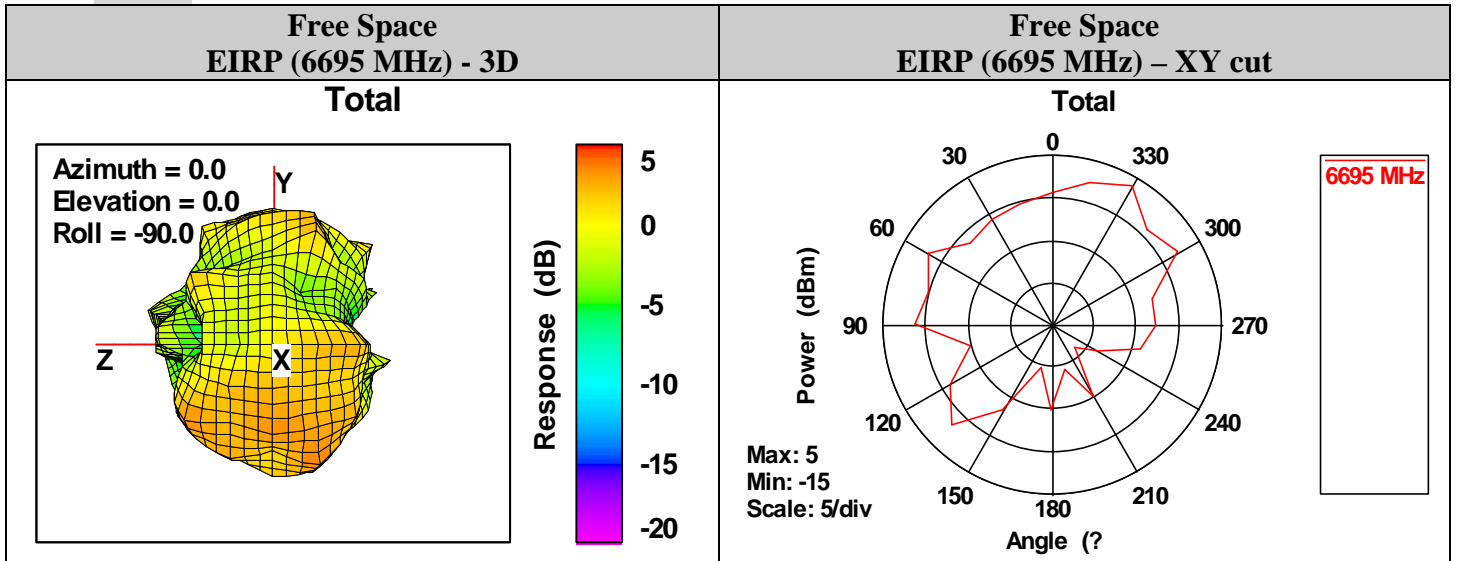
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**Ant 23**



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**Ant 24**

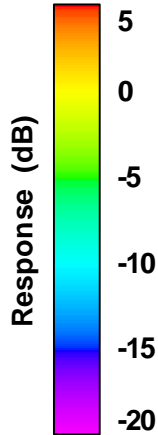
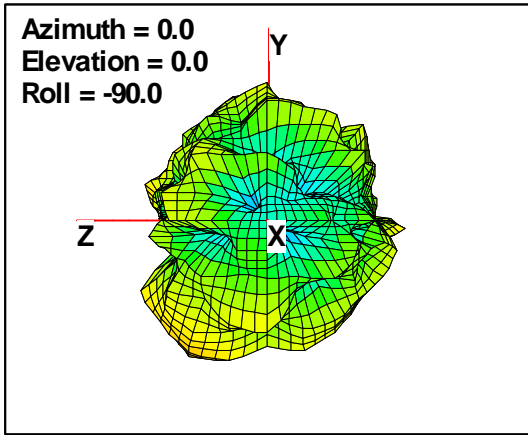


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**Ant 25(RX Only)**

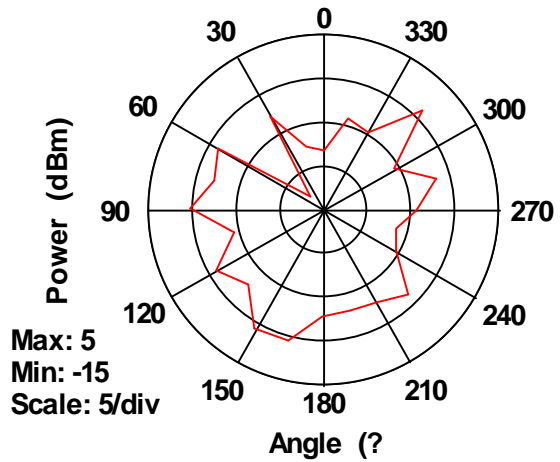
**Free Space  
EIRP (5955 MHz) - 3D**

**Total**



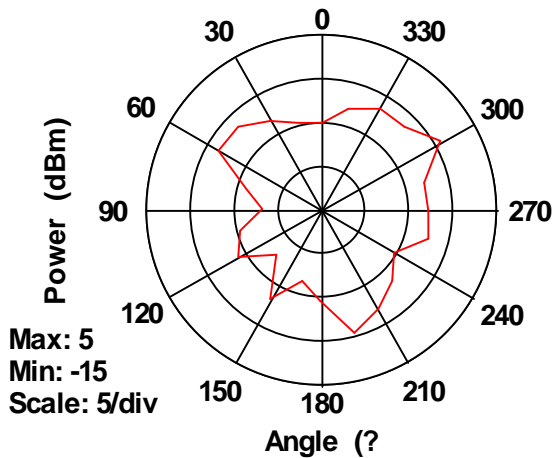
**Free Space  
EIRP (5955 MHz) - XY cut**

**Total**



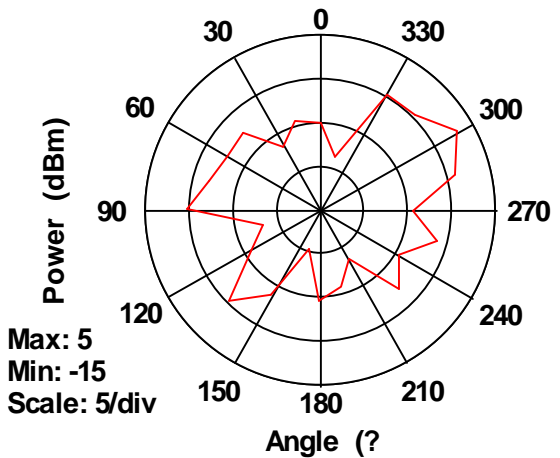
**Free Space  
EIRP (5955 MHz) - XZ cut**

**Total**



**Free Space  
EIRP (5955 MHz) - YZ cut**

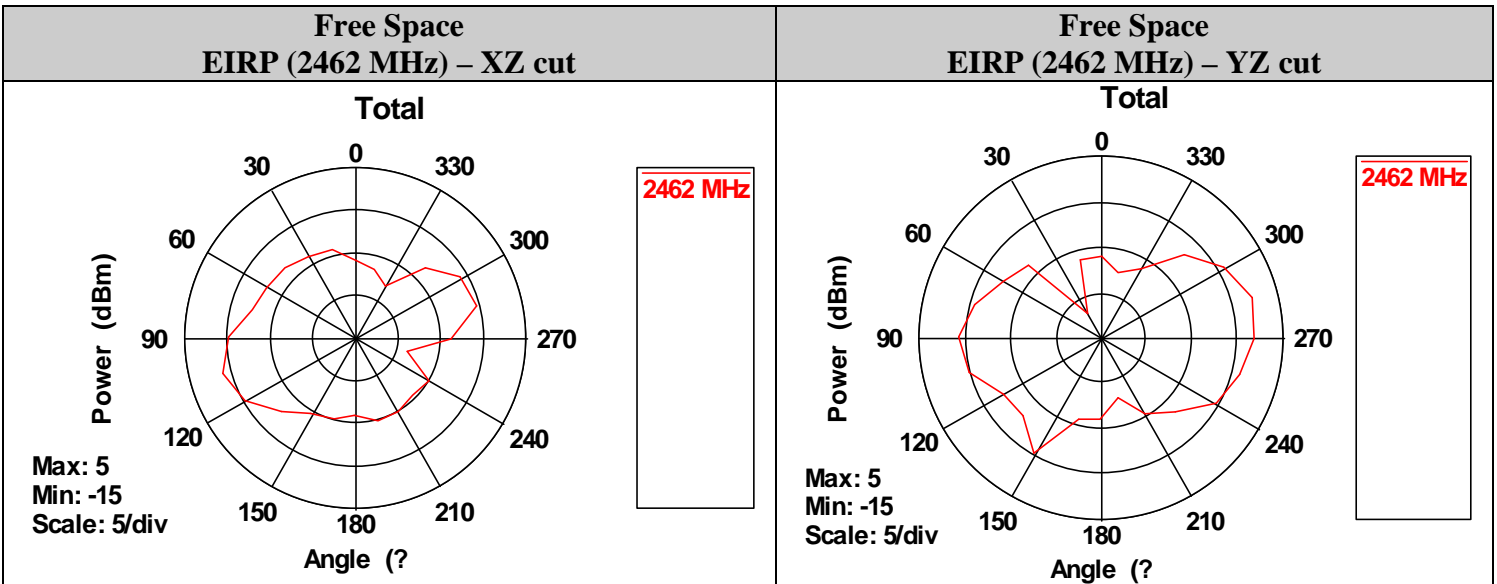
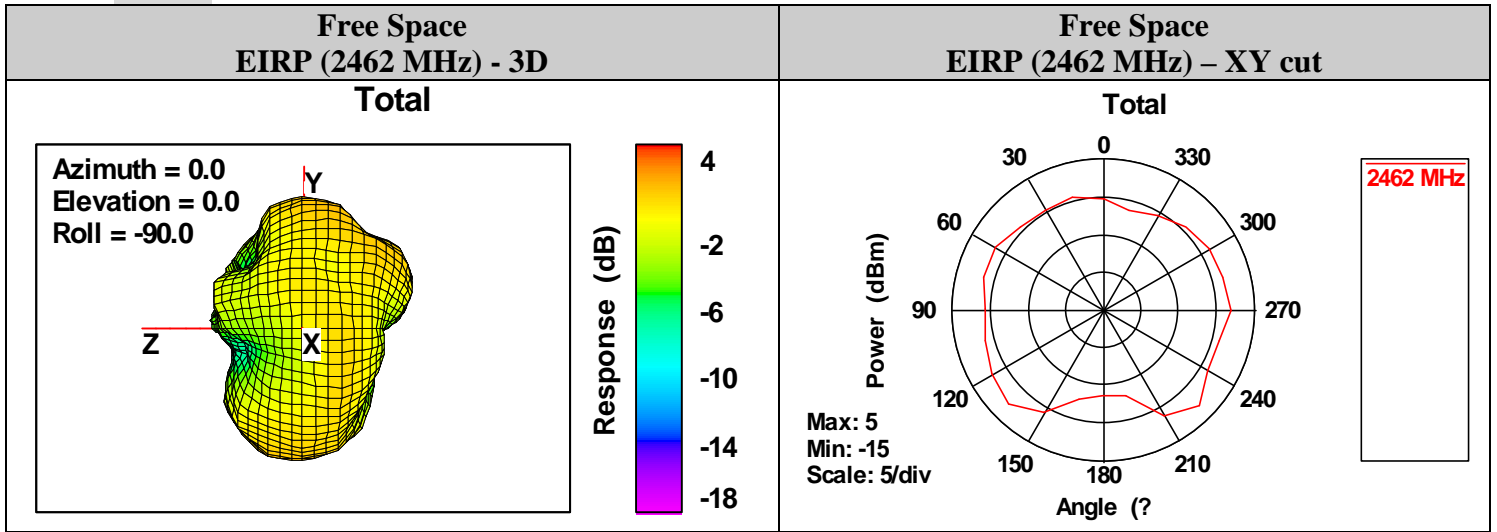
**Total**



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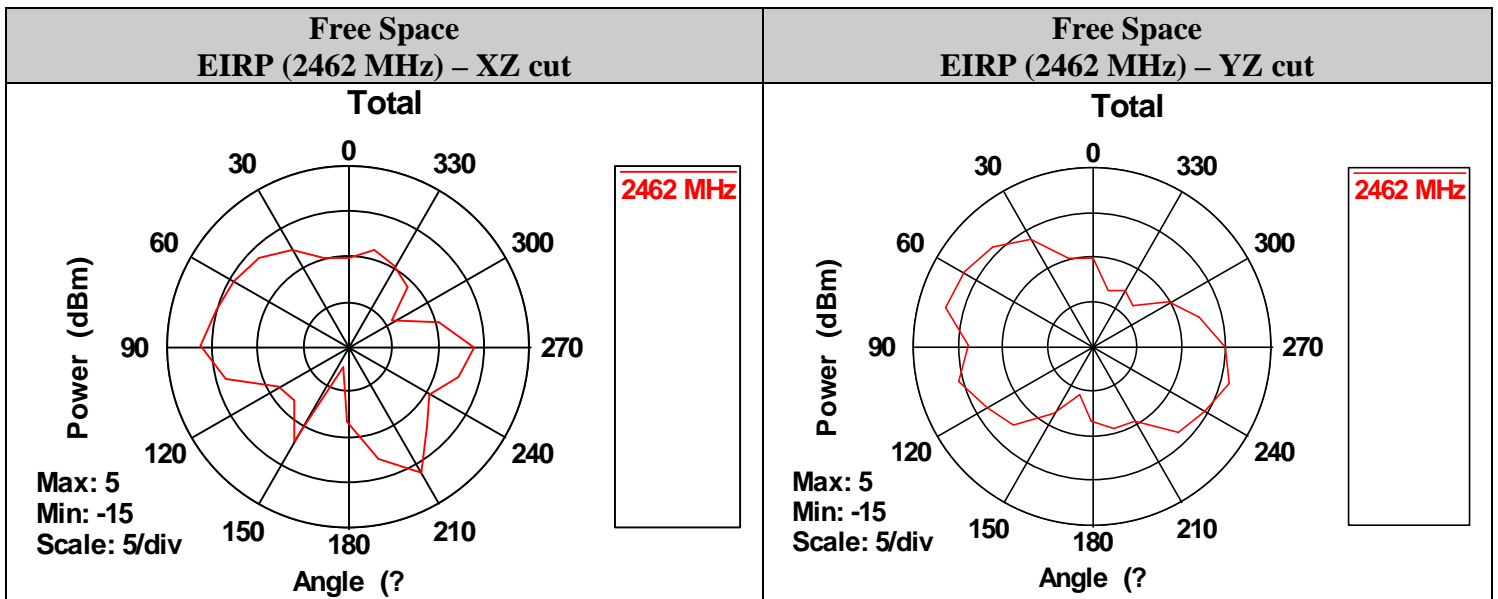
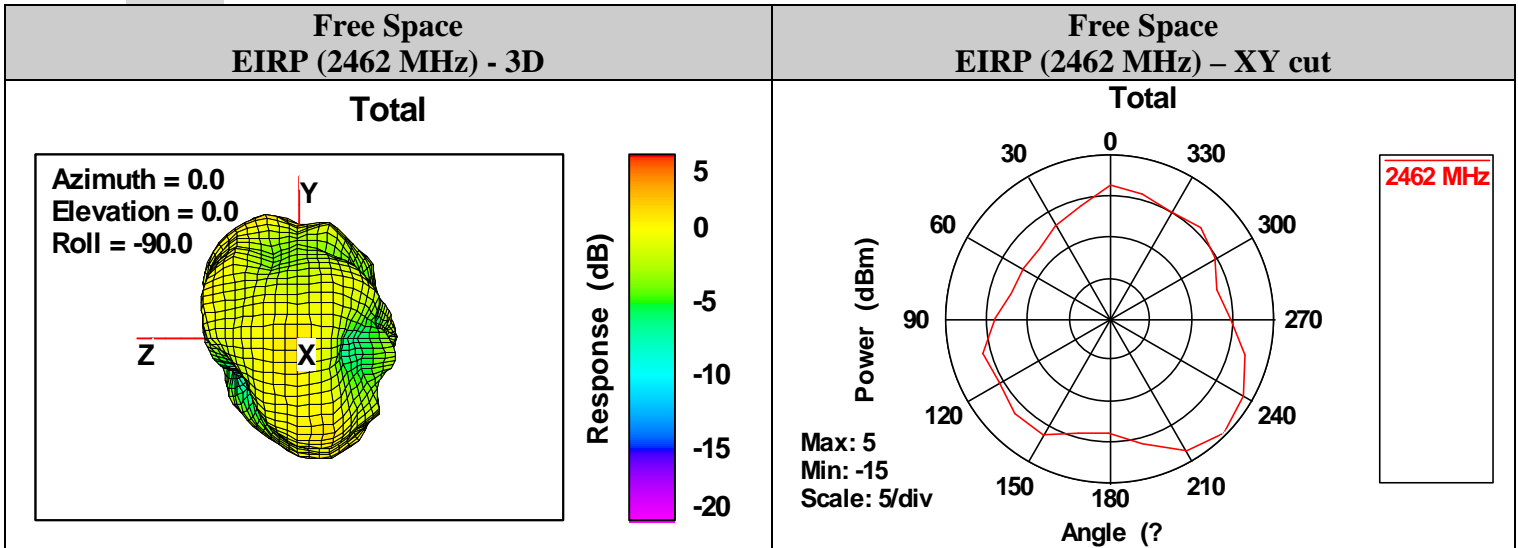


**Ant 11**



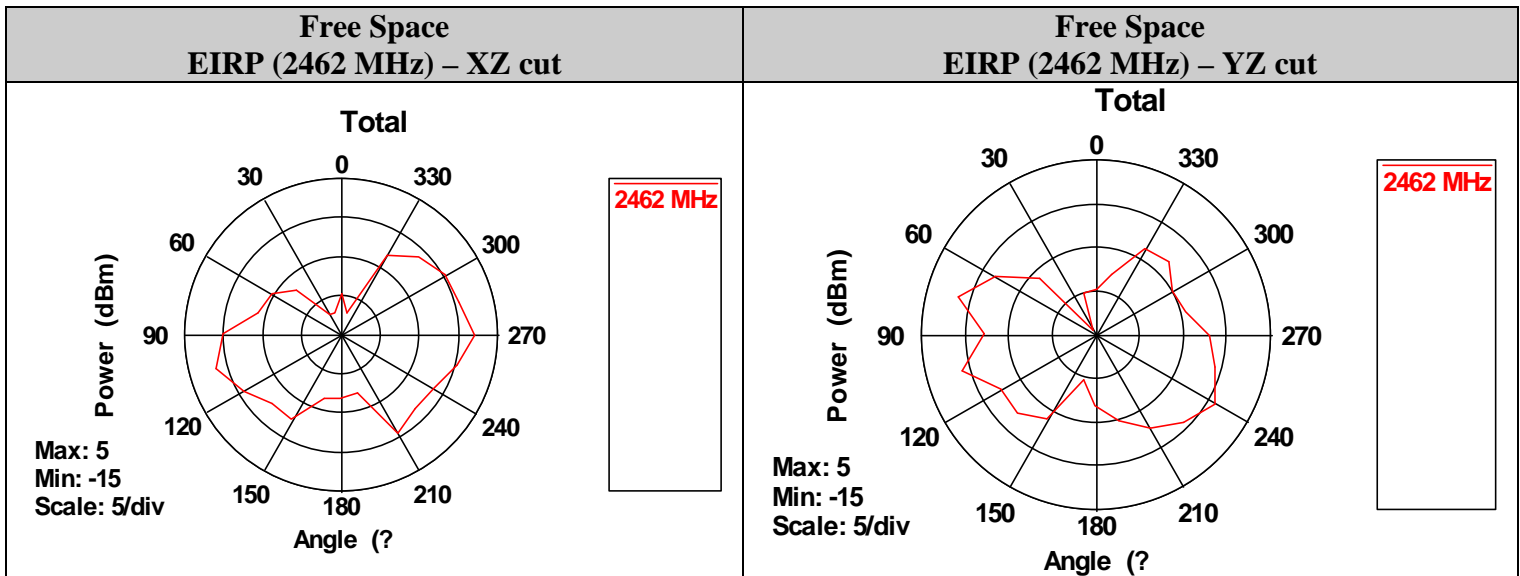
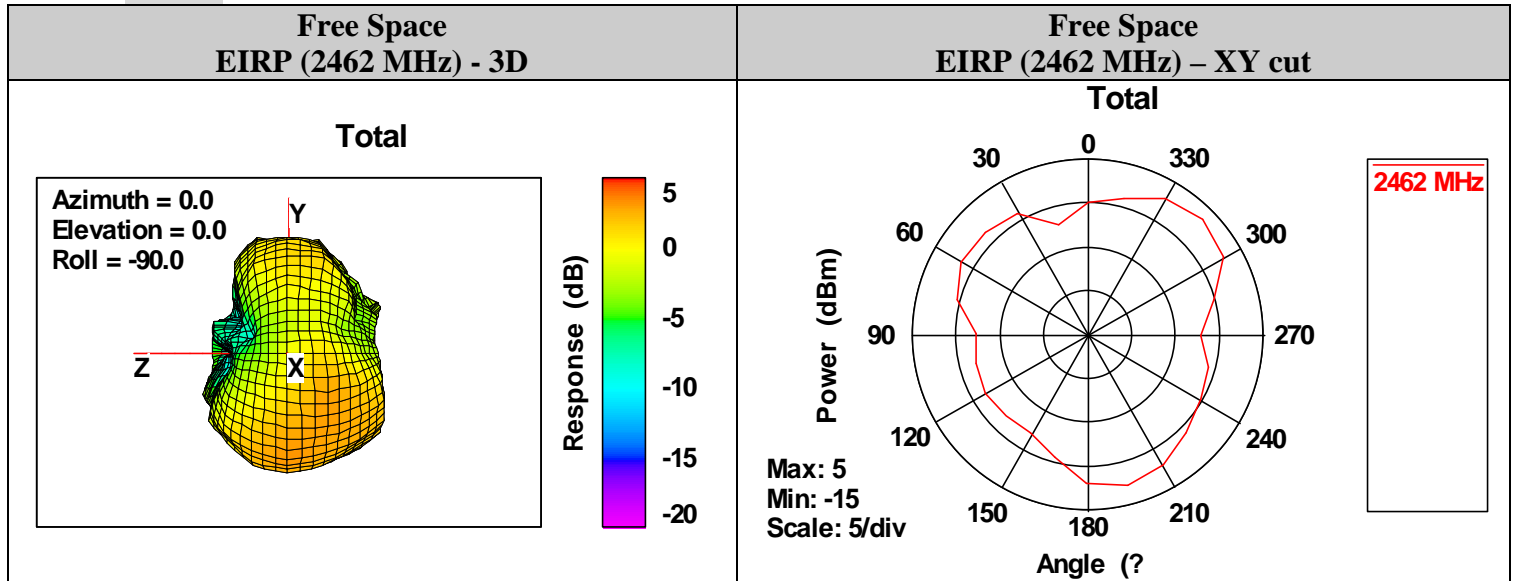
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**Ant 12**



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**Ant 13**



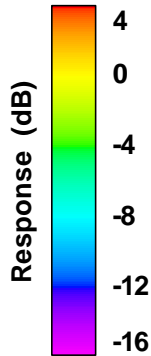
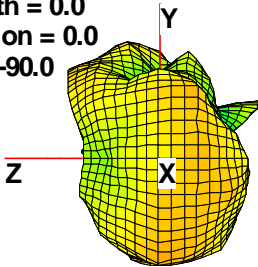
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**Ant 14**

**Free Space  
EIRP (2462 MHz) - 3D**

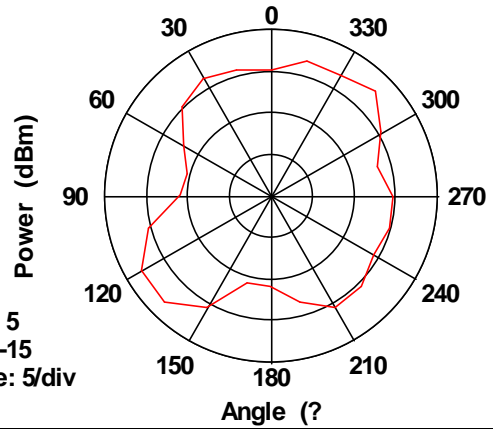
**Total**

Azimuth = 0.0  
Elevation = 0.0  
Roll = -90.0



**Free Space  
EIRP (2462 MHz) - XY cut**

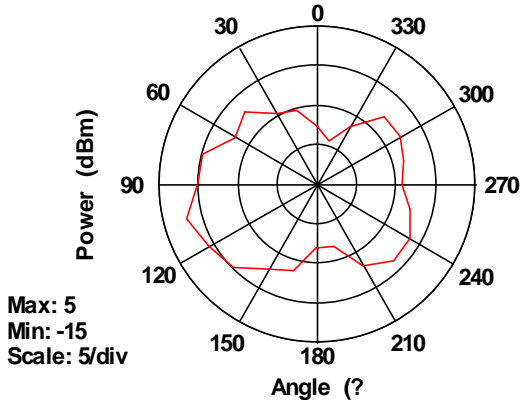
**Total**



2462 MHz

**Free Space  
EIRP (2462 MHz) - XZ cut**

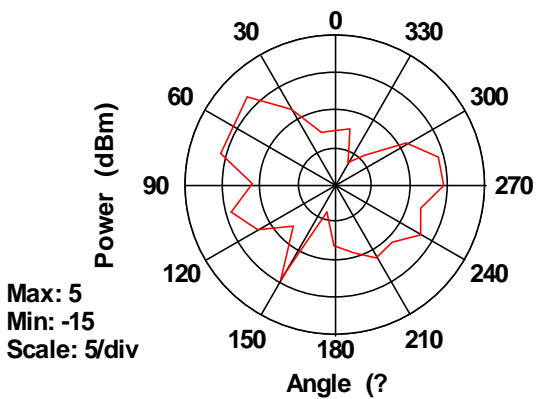
**Total**



2462 MHz

**Free Space  
EIRP (2462 MHz) - YZ cut**

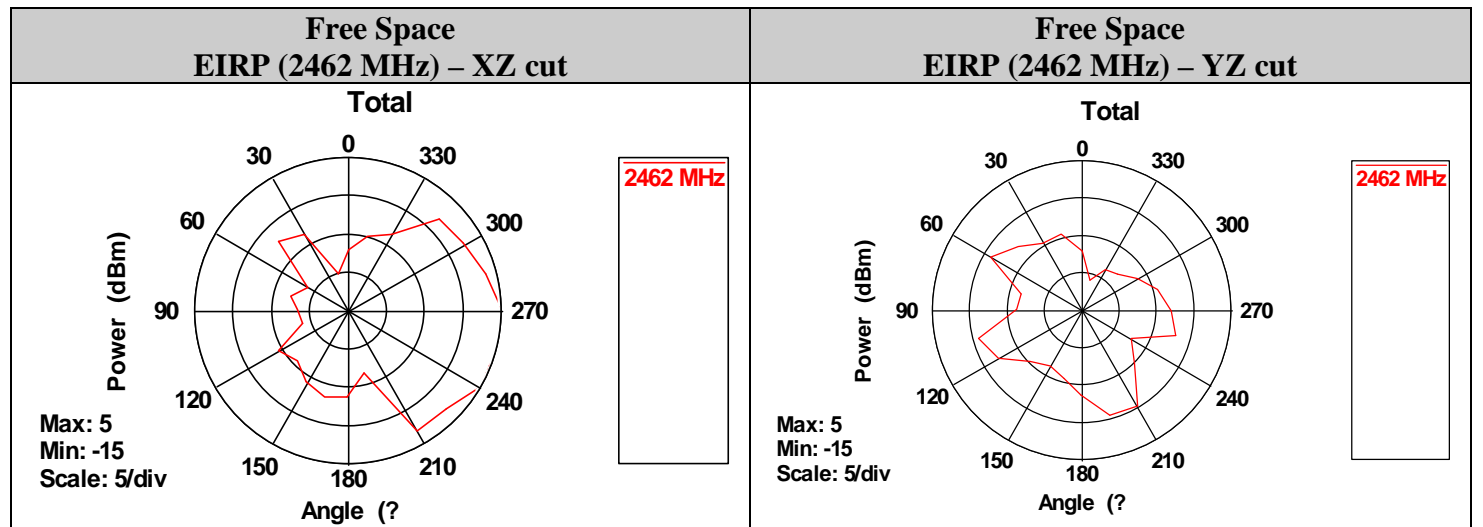
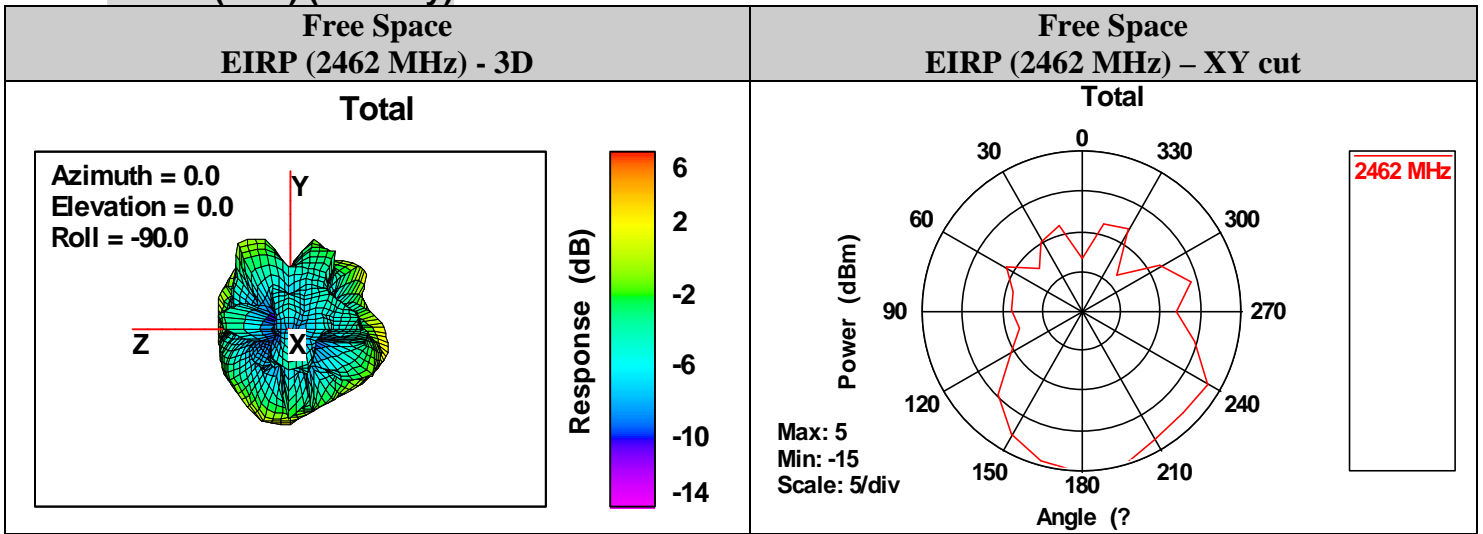
**Total**



2462 MHz

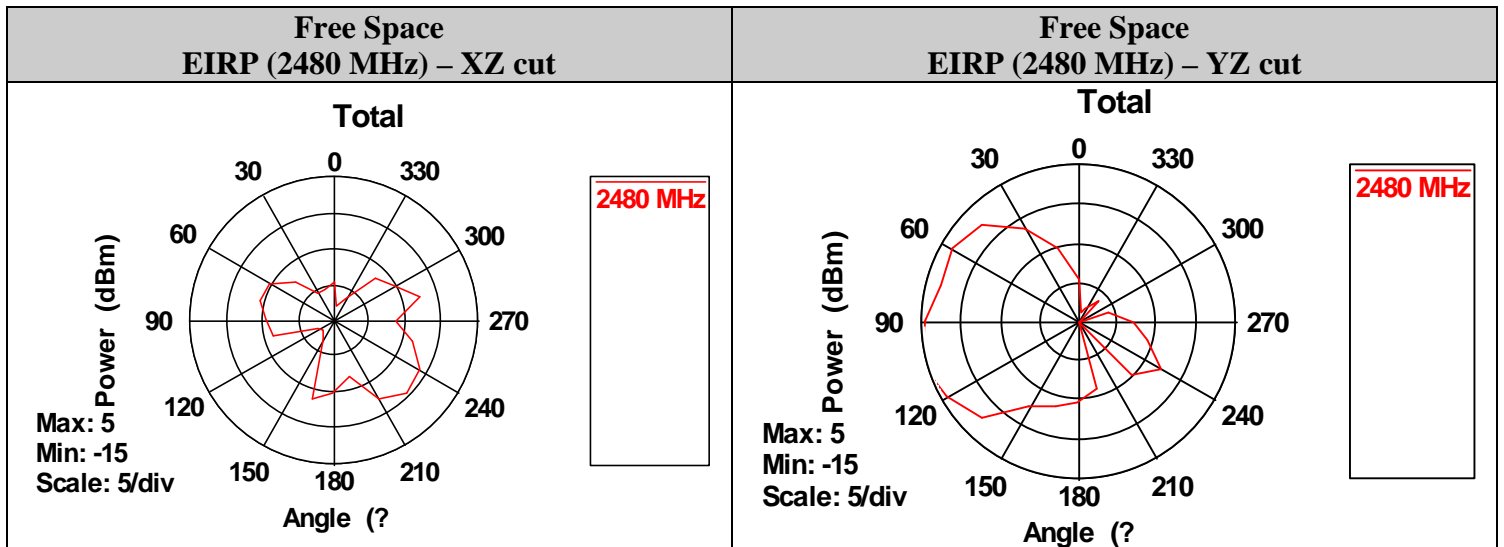
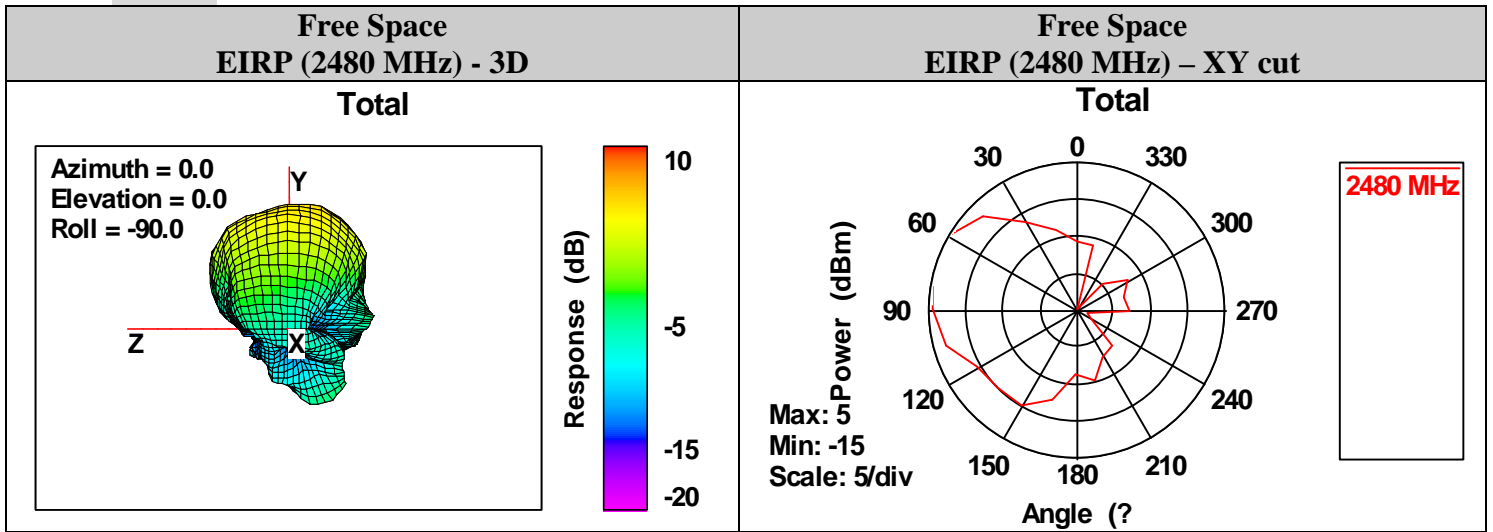
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## Ant 15 (DFS) (RX Only)



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## Ant BT



## End of Report