

## Regulatory WWAN Antenna Information

<b>Platform</b>	
Platform Owner	DELL
Brand Name	DELL
Model Name	P175G
ODM	Compal
	TB mode
<b>Antenna</b>	
Manufacturer	WNC
Part Number	<ul style="list-style-type: none"> <li>■ Tx1/Rx1 <u>Antenna</u> WWAN Main/AUX: 81ELA715.G31(DC33002RN0L)</li> <li>■ MIMO2/3 <u>Antenna</u> WWAN: 81ELA715.G35 (DC33002RO0L)</li> </ul>
<b>Module</b>	
With WWAN Module	FM350-GL
(Check Box)	L860-GL-16

## Antenna Sample / Antenna Data Requirements for worldwide regulatory approval

Section	Description of Required OEM / ODM Antenna Information	US / IC	EU	Japan	Taiwan	S.Korea
1A	Part Number for Antenna only	Required	Required	Required	Required	Required
1B	Antenna Manufacturer Name	Required	Required	Required	Required	Required
1C	Description of Antenna Type	Required	N/A	N/A	N/A	N/A
1D	Part number of Antenna Assembly / cable impedance, length & diameter.	Required	Desired	Desired	Desired	Desired
1E	Tx1, Tx2 & Tx3 antenna (Peak Gain W/ cable loss) *	Required	Required	Required	Required	Required
	1E OR 1F, 1G, 1H					
1F	Tx1, Tx2 & Tx3 antenna (Peak Gain only) *	Required	Required	Required	Required	Required
1G	VSWR of cable including connector	Required	Required	Required	Required	Required
1H	Tx1, Tx2 & Tx3 antenna (Cable loss W/ connector) *	Required	Required	Required	Required	Required
2	Dimensioned Photographs and Drawings of Tx1, Tx2, and Tx3 (or Rx3) antennas	Required	Required	Required	Required	Required
3	Radiation patterns of antennas loaded in the host platform.	Required	Desired	Required	N/A	Required
4	Platform model name / number - correlated to antenna manufacturer and antenna part number	Required	Required	Desired	Required	Desired
5	Photograph(s) or Drawings showing location of antennas in platform. (S. Korea requires <u>photographs of antennas for approval submission</u> ). <u>Taiwan requires pictures of each antenna type shown in the system.</u>	Required	Required	Desired	<u>Required (Photos)</u>	<u>Required (Photos)</u>
6	Mech. drawings / photos with dimensions of antenna locations and distance from end-user (For evaluation of SAR testing requirement).	Required	N/A	N/A	N/A	N/A
7	Photograph(s) or Drawings showing the location of all antennas (WLAN, other) and distance between those transmitting antennas. Information will be used to evaluate whether co-location testing is required.	Required	N/A	N/A	N/A	N/A
8	Local representative contact information for LMA/ PARS process.	Required	N/A	N/A	N/A	N/A

# Antenna Information

## Section 1. Antenna Assembly Specifications

1A	1B	1C	1D	1E	1F	1G	1H
Antenna Part Number	Manufacture	Antenna Type	Cable Assembly Part Number and Information	*Peak Gain W/ Cable loss (dBi)	Peak Gain w/o Cable Loss (dBi)	VSWR	Cable Loss (dBi)
Tx/Rx1 Antenna <b>WNC P/N:</b> 81ELA715.G31 <b>Customer P/N:</b> DC33002RN0L	WNC	PIFA	Cable length: 319mm diameter: 1.13mm 50 ohm SLL Coaxial MAIN  Connector: I-PEX PN:20565-001R-13	617-698MHz <b>-8.61</b> dBi (peak)	617-698MHz <b>-8.06</b> dBi (peak)	617-698MHz <b>3.50</b> max	617-698MHz <b>0.55</b> dBi (peak)
				698-821MHz <b>-5.52</b> dBi (peak)	698-821MHz <b>-4.97</b> dBi (peak)	698-821MHz <b>3.50</b> max	698-821MHz <b>0.55</b> dBi (peak)
				824-960MHz <b>-4.69</b> dBi (peak)	824-960MHz <b>-4.11</b> dBi (peak)	824-960MHz <b>3.50</b> max	824-960MHz <b>0.58</b> dBi (peak)
				1425-1515MHz <b>-8.79</b> dBi (peak)	1425-1515MHz <b>-8.09</b> dBi (peak)	1425-1515MHz <b>3.50</b> max	1425-1515MHz <b>0.70</b> dBi (peak)
				1710-2200MHz <b>-2.04</b> dBi (peak)	1710-2200MHz <b>-1.24</b> dBi (peak)	1710-2200MHz <b>3.50</b> max	1710-2200MHz <b>0.80</b> dBi (peak)
				2300-2690MHz <b>-0.57</b> dBi (peak)	2300-2690MHz <b>0.32</b> dBi (peak)	2300-2690MHz <b>3.50</b> max	2300-2690MHz <b>0.89</b> dBi (peak)
				3400-3800MHz <b>-4.08</b> dBi (peak)	3400-3800MHz <b>-3.02</b> dBi (peak)	3400-3800MHz <b>3.50</b> max	3400-3800MHz <b>1.06</b> dBi (peak)
				4200-4700MHz <b>-2.73</b> dBi (peak)	4200-4700MHz <b>-1.51</b> dBi (peak)	4200-4700MHz <b>3.50</b> dBi (peak)	4200-4700MHz <b>1.22</b> dBi (peak)
	5150-5925MHz <b>-1.36</b> dBi (peak)	5150-5925MHz <b>-0.01</b> dBi (peak)	5150-5925MHz <b>3.50</b> max	5150-5925MHz <b>1.35</b> dBi (peak)			
	WNC	PIFA	Cable length: 511mm diameter: 1.13mm 50 ohm SLL Coaxial AUX  Connector: I-PEX PN:20565-001R-13	617-698MHz <b>-8.82</b> dBi (peak)	617-698MHz <b>-8.01</b> dBi (peak)	617-698MHz <b>3.50</b> max	617-698MHz <b>0.81</b> dBi (peak)
				698-821MHz <b>-5.07</b> dBi (peak)	698-821MHz <b>-4.19</b> dBi (peak)	698-821MHz <b>3.50</b> max	698-821MHz <b>0.88</b> dBi (peak)
				824-960MHz <b>-4.19</b> dBi (peak)	824-960MHz <b>-3.27</b> dBi (peak)	824-960MHz <b>3.50</b> max	824-960MHz <b>0.92</b> dBi (peak)
				1425-1515MHz <b>0.44</b> dBi (peak)	1425-1515MHz <b>1.56</b> dBi (peak)	1425-1515MHz <b>3.50</b> max	1425-1515MHz <b>1.12</b> dBi (peak)
				1557-1610 MHz <b>-6.23</b> dBi (peak)	1557-1610 MHz <b>-5.09</b> dBi (peak)	1557-1610 MHz <b>3.50</b> max	1557-1610 MHz <b>1.14</b> dBi (peak)
				1805-2200MHz <b>-3.71</b> dBi (peak)	1805-2200MHz <b>-2.41</b> dBi (peak)	1805-2200MHz <b>3.50</b> max	1805-2200MHz <b>1.3</b> dBi (peak)
				2300-2690MHz <b>0.47</b> dBi (peak)	2300-2690MHz <b>1.9</b> dBi (peak)	2300-2690MHz <b>3.50</b> max	2300-2690MHz <b>1.43</b> dBi (peak)

				3400-3800MHz <b>-2.09</b> dBi (peak)	3400-3800MHz <b>-0.4</b> dBi (peak)	3400-3800MHz <b>3.50</b> max	3400-3800MHz <b>1.69</b> dBi (peak)
				4200-4700MHz <b>-2.3</b> dBi (peak)	4200-4700MHz <b>-0.33</b> dBi (peak)	4200-4700MHz <b>3.50</b> dBi (peak)	4200-4700MHz <b>1.97</b> dBi (peak)
				5150-5925MHz <b>-0.27</b> dBi (peak)	5150-5925MHz <b>1.9</b> dBi (peak)	5150-5925MHz <b>3.50</b> max	5150-5925MHz <b>2.17</b> dBi (peak)

1A Antenna Part Number	1B Manufacture	1C Antenna Type	1D Cable Assembly Part Number and Information	1E *Peak Gain W/ Cable loss (dBi)	1F Peak Gain w/o Cable Loss (dBi)	1G VSWR	1H Cable Loss (dBi)
Antenna <b>WNC P/N:</b> 81ELA715.G35 <b>Customer P/N:</b> DC33002ROOL	<b>WNC</b>	<b>Coupled</b>	<b>Cable length: 147.5mm diameter: 1.13mm 50 ohm LL Coaxial  Connector: I-PEX PN:20565-001R-13</b>	1425-1515MHz <b>-0.87</b> dBi (peak)	1425-1515MHz <b>-0.55</b> dBi (peak)	1425-1515MHz <b>3.5</b> max	1425-1515MHz <b>0.32</b> dBi (peak)
				1710-2200MHz <b>-1.94</b> dBi (peak)	1710-2200MHz <b>-1.56</b> dBi (peak)	1710-2200MHz <b>3.5</b> max	1710-2200MHz <b>0.38</b> dBi (peak)
				2300-2690MHz <b>-0.34</b> dBi (peak)	2300-2690MHz <b>0.07</b> dBi (peak)	2300-2690MHz <b>3.5</b> max	2300-2690MHz <b>0.41</b> dBi (peak)
				3400-3800MHz <b>0.59</b> dBi (peak)	3400-3800MHz <b>1.08</b> dBi (peak)	3400-3800MHz <b>3.5</b> max	3400-3800MHz <b>0.49</b> dBi (peak)
				4200-5000MHz <b>0.92</b> dBi (peak)	4200-5000MHz <b>1.49</b> dBi (peak)	4200-5000MHz <b>3.5</b> max	4200-5000MHz <b>0.57</b> dBi (peak)
	<b>WNC</b>	<b>Coupled</b>	<b>Cable length: 218mm diameter: 1.13mm 50 ohm LL Coaxial  Connector: I-PEX PN:20565-001R-13</b>	1805-2200MHz <b>-1.59</b> dBi (peak)	1805-2200MHz <b>-1.04</b> dBi (peak)	1805-2200MHz <b>3.5</b> max	1805-2200MHz <b>0.55</b> dBi (peak)
				2300-2690MHz <b>-0.02</b> dBi (peak)	2300-2690MHz <b>0.59</b> dBi (peak)	2300-2690MHz <b>3.5</b> max	2300-2690MHz <b>0.61</b> dBi (peak)
				3400-3800MHz <b>0.52</b> dBi (peak)	3400-3800MHz <b>1.24</b> dBi (peak)	3400-3800MHz <b>3.5</b> max	3400-3800MHz <b>0.72</b> dBi (peak)
				4200-5000MHz <b>1.57</b> dBi (peak)	4200-5000MHz <b>2.41</b> dBi (peak)	4200-5000MHz <b>3.5</b> max	4200-5000MHz <b>0.84</b> dBi (peak)

- Antenna Peak Gain required being test in system basis.
- 1E frame contend absolutely peak antenna gain include H/V

## Antenna Peak Gain Table: Low and middle band

Frequency (MHz)	TPx antenna		DRx antenna	
	Horizontal (dBi)	Vertical (dBi)	Horizontal (dBi)	Vertical (dBi)
617	-16.08	-16.72	-10.52	-10.83
634.5	-14.43	-15.77	-9.36	-9.56
652	-13.05	-13.30	-8.85	-8.82
663	-13.09	-12.08		
680.5	-9.91	-9.17		
698	-8.61	-8.83		
703	-11.39	-10.96		
707.5	-11.04	-10.52		
717	-9.94	-9.49	-7.39	-8.10
725.5	-8.73	-9.22	-7.12	-7.78
748	-6.46	-7.50	-7.53	-7.36
756	-5.92	-6.80	-7.23	-7.65
768	-5.53	-6.17	-6.92	-7.59
777	-5.52	-6.11	-7.15	-6.35
782	-5.59	-6.37	-7.02	-6.17
787	-5.66	-6.70	-7.13	-6.29
791			-9.90	-7.45
806			-6.70	-5.69
814	-6.53	-7.29	-5.07	-6.49
821			-5.75	-6.72
824	-7.20	-8.33	-6.24	-6.73
832	-7.44	-8.75	-7.45	-6.82
836.5	-7.69	-8.93	-8.07	-6.84
849	-8.32	-9.25	-7.61	-6.74
862	-9.28	-9.24	-7.96	-7.52
880	-5.53	-7.30	-5.92	-7.55
897.5	-4.69	-8.56	-6.27	-8.23
915	-5.82	-8.94	-7.25	-7.69
925	-6.82	-9.14	-7.64	-6.91
960	-7.34	-9.22	-4.19	-4.90
1427.9	-10.94	-9.67	0.44	-4.18
1447.9	-10.26	-9.78	-0.51	-3.90
1455.4	-10.22	-10.02	-0.98	-4.00
1462.9	-10.30	-10.25	-1.26	-4.32
1496	-11.22	-9.49	-3.95	-6.39
1510.9	-12.33	-8.79	-5.39	-6.30
1557			-6.23	-6.41

1575			-6.60	-6.74
1610			-6.45	-7.21

**High band**

Frequency (MHz)	TPx antenna		DRx antenna	
	Horizontal (dBi)	Vertical (dBi)	Horizontal (dBi)	Vertical (dBi)
1710	-6.50	-6.85		
1732.5	-7.31	-5.93		
1747.5	-7.25	-5.83		
1755	-7.23	-5.98		
1785	-7.38	-6.52		
1805	-6.70	-6.74	-6.33	-5.62
1850	-4.83	-6.53	-7.93	-7.82
1880	-3.53	-4.73	-7.18	-8.46
1910	-3.21	-2.76	-6.91	-7.40
1920	-2.40	-2.44	-7.04	-6.89
1950	-2.20	-2.86	-6.66	-6.37
1980	-2.04	-3.68	-6.69	-6.02
2110	-4.27	-4.75	-4.46	-5.31
2200	-3.86	-5.10	-3.71	-4.49
2300	-0.73	-2.37	0.47	-1.30
2305	-0.64	-2.43	0.31	-1.36
2315	-0.57	-2.62	-0.05	-1.60
2350	-1.45	-4.88	-1.33	-3.26
2400	-2.98	-5.21	-1.47	-3.70
2500	-5.60	-7.89	-1.42	-4.03
2570	-6.58	-8.70	-1.34	-4.30
2595	-5.73	-8.05	-1.61	-4.49
2620	-4.89	-7.89	-1.74	-4.92
2690	-5.01	-7.11	-0.78	-4.04
3400	-4.23	-7.74	-2.09	-5.04
3500	-8.05	-11.36	-2.49	-4.79
3600	-7.55	-7.62	-3.14	-5.78
3700	-6.94	-6.23	-4.12	-7.81
3800	-4.94	-4.08	-6.37	-6.62
4200	-5.64	-6.99	-7.02	-7.11
4400	-6.06	-7.47	-2.30	-3.82
4700	-2.73	-4.24	-3.86	-4.49
5150	-1.92	-1.36	-2.51	-0.27
5537.5	-2.45	-1.77	-5.78	-3.70
5925	-4.27	-2.44	-2.96	-5.82

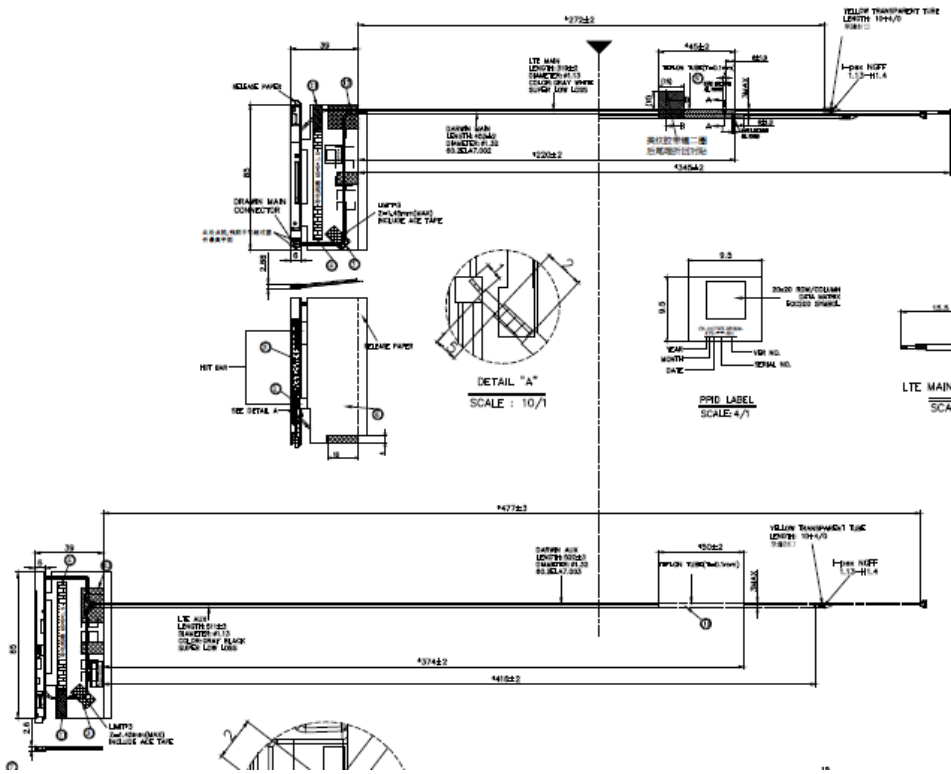
Frequency (MHz)	DRx2 antenna		DRx1 antenna	
	Horizontal (dBi)	Vertical (dBi)	Horizontal (dBi)	Vertical (dBi)
1452	-0.87	-2.68		
1474	-1.75	-3.30		
1496	-1.93	-3.70		
1710	-2.44	-3.78		
1732.5	-1.85	-5.68		
1747.5	-1.88	-5.77		
1755	-1.97	-5.96		
1785	-2.44	-6.91		
1805	-2.70	-7.13	-2.78	-4.29
1850	-4.03	-5.55	-2.76	-4.98
1880	-2.62	-4.85	-2.28	-4.33
1910	-2.46	-4.97	-1.59	-3.78
1920	-2.80	-4.82	-1.73	-3.84
1950	-3.45	-4.36	-2.13	-3.61
1980	-2.44	-4.27	-1.59	-4.52
2110	-1.94	-4.01	-3.50	-4.54
2200	-2.04	-2.64	-2.96	-4.69
2300	-0.39	-0.80	-0.02	-2.79
2305	-0.44	-0.79	-0.28	-2.74
2315	-0.45	-0.63	-0.52	-2.90
2350	-1.21	-0.40	-1.10	-4.12
2400	-1.53	-1.24	-1.40	-3.87
2500	-0.59	-1.52	-0.08	-2.51
2570	-0.74	-1.86	-1.84	-4.44
2595	-0.34	-1.91	-1.95	-3.90
2620	-0.37	-1.83	-2.03	-3.60
2690	-1.60	-1.35	-1.04	-3.30
3400	0.59	-1.02	0.09	-2.28
3500	0.25	-1.93	0.52	-2.28
3600	-0.06	-1.55	-1.15	-1.92
3700	-0.23	-2.08	-0.47	-2.47
3800	-0.76	-1.66	-1.23	-2.94
4200	-0.41	0.01	-1.59	-1.34
4400	-0.08	-0.66	-0.06	1.57
4700	-3.46	-3.45	-0.82	-0.50
5000	-0.94	0.92	-3.88	-3.69



## Section 2. Dimensioned Photos or Drawings of Antennas

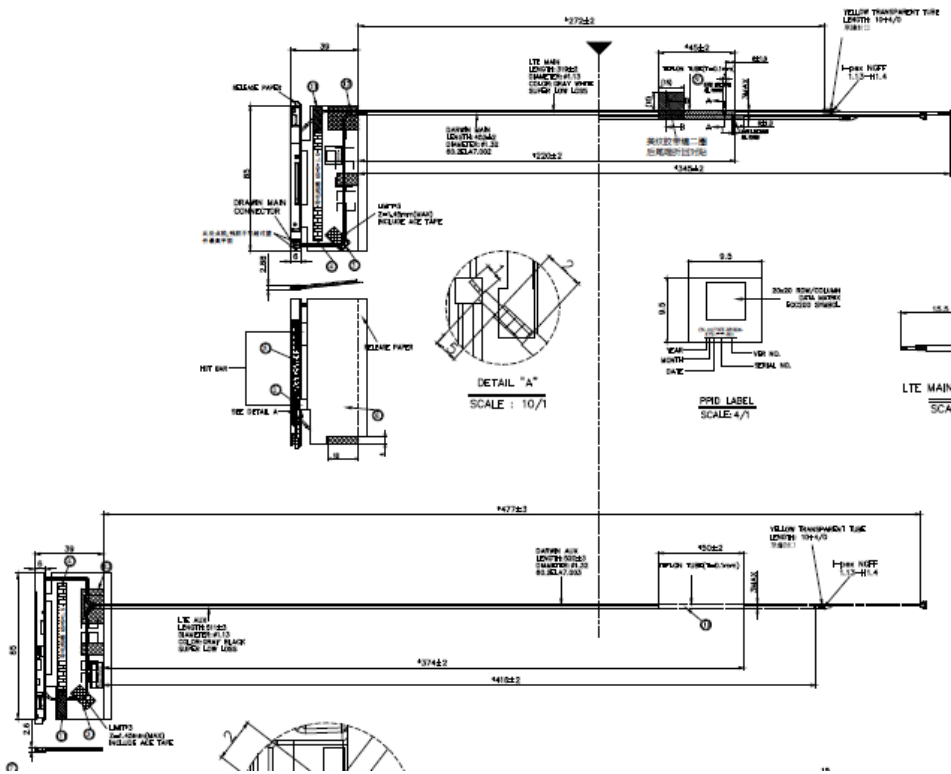
Include a dimensioned photo and dimensioned drawing of Main antenna here.

### TPx Antenna Dimensioned Drawing:



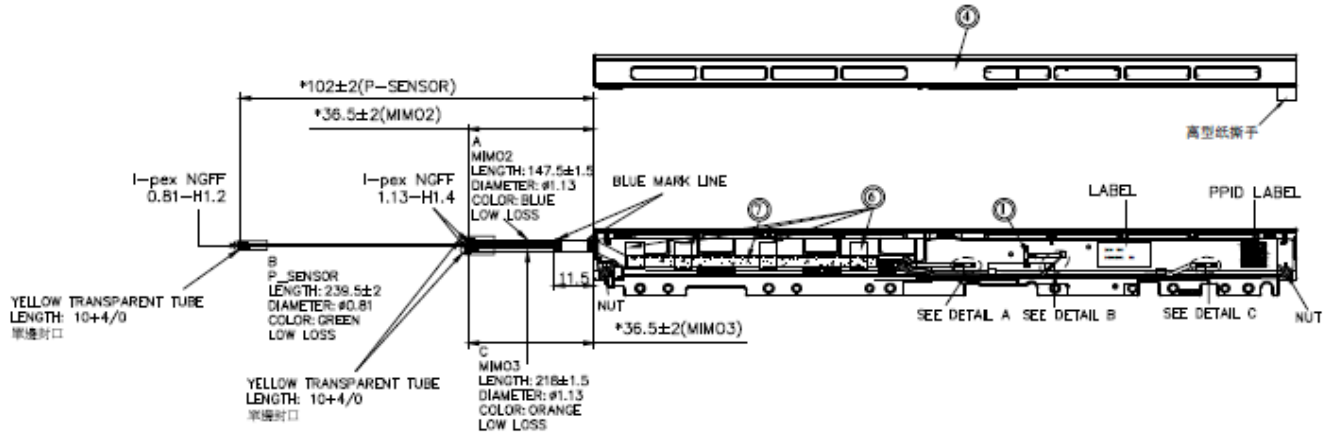
Include a dimensioned photo and dimensioned drawing of Aux antenna here.

### DRx Antenna Dimensioned Drawing:



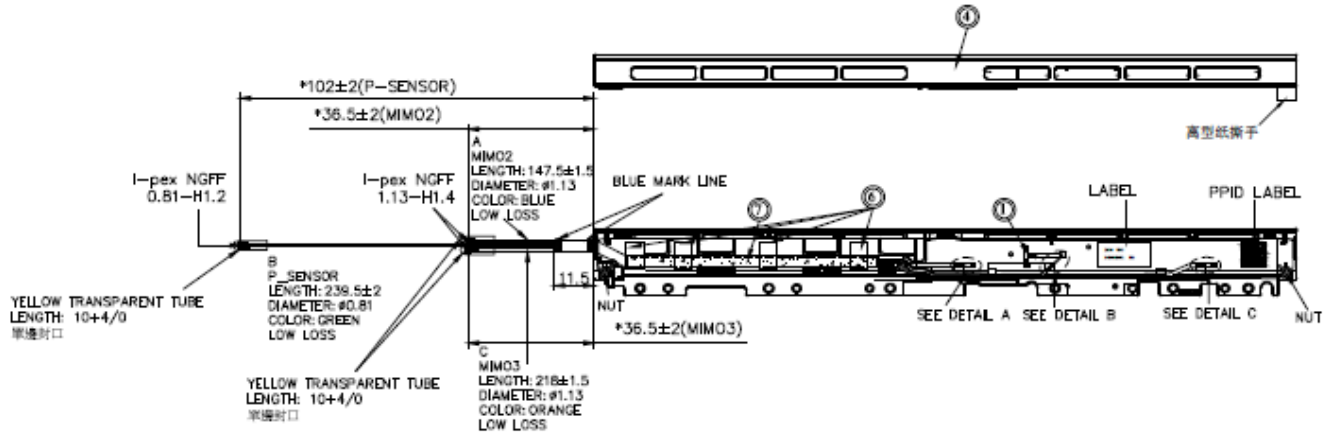
Include a dimensioned photo and dimensioned drawing of Aux antenna here.

**DRx2 Antenna Dimensioned Drawing:**



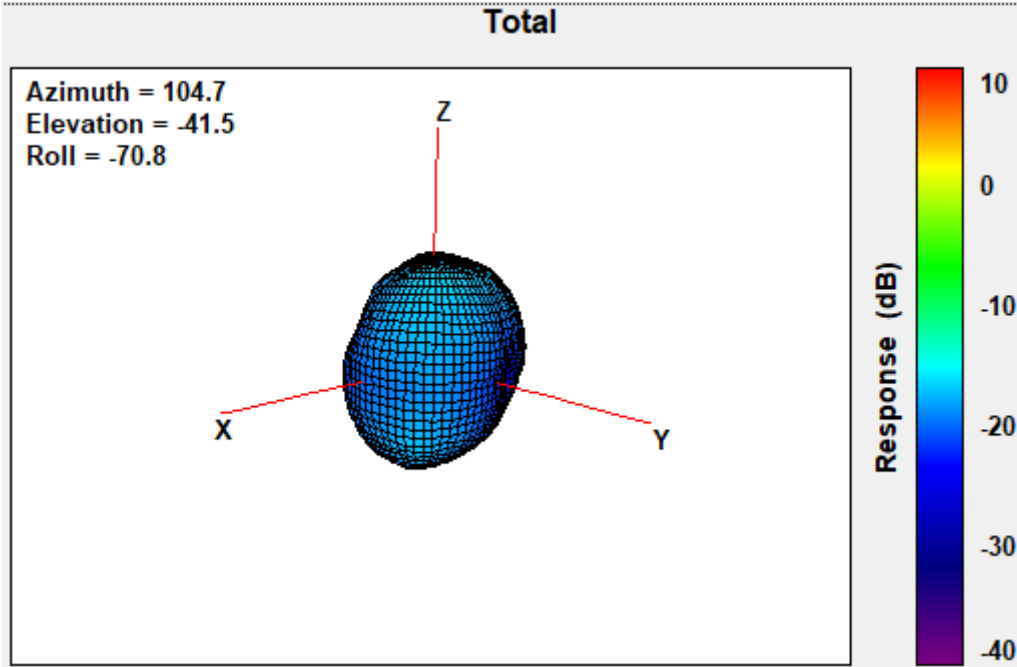
Include a dimensioned photo and dimensioned drawing of Aux antenna here.

**DRx1 Antenna Dimensioned Drawing:**



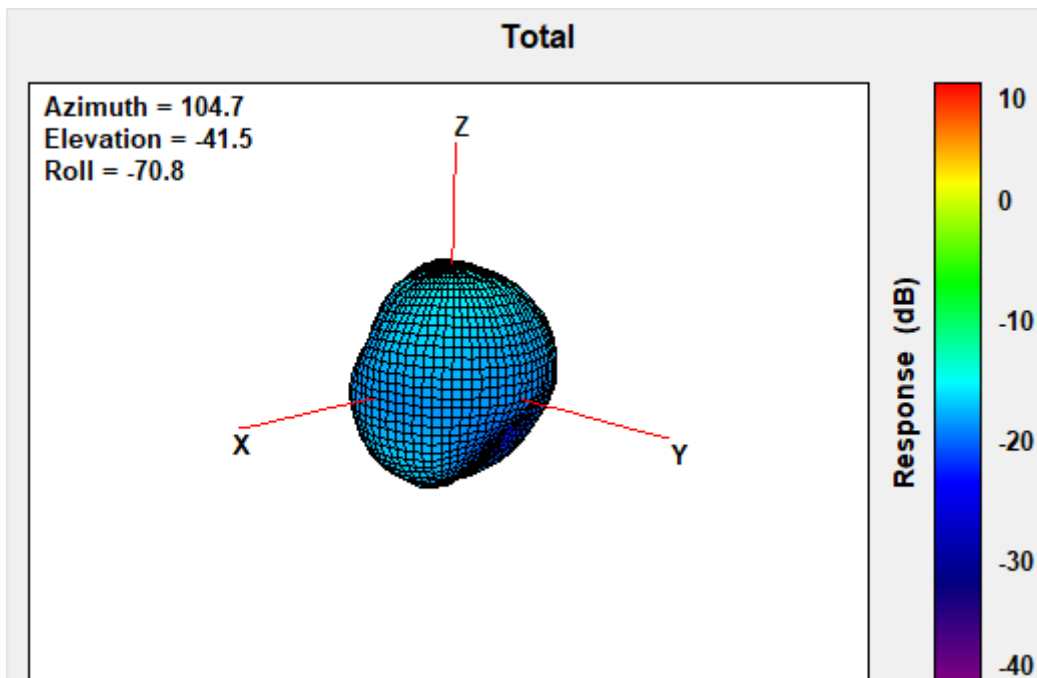
## Section 3. Radiation characteristics of antennae Loaded in Host Platform WWAN Main Antenna (TPx)

617MHz



Center Frequency	<b>617 MHz</b>
Horizontal (dBi) peak	-16.08
Vertical (dBi) peak	-16.72

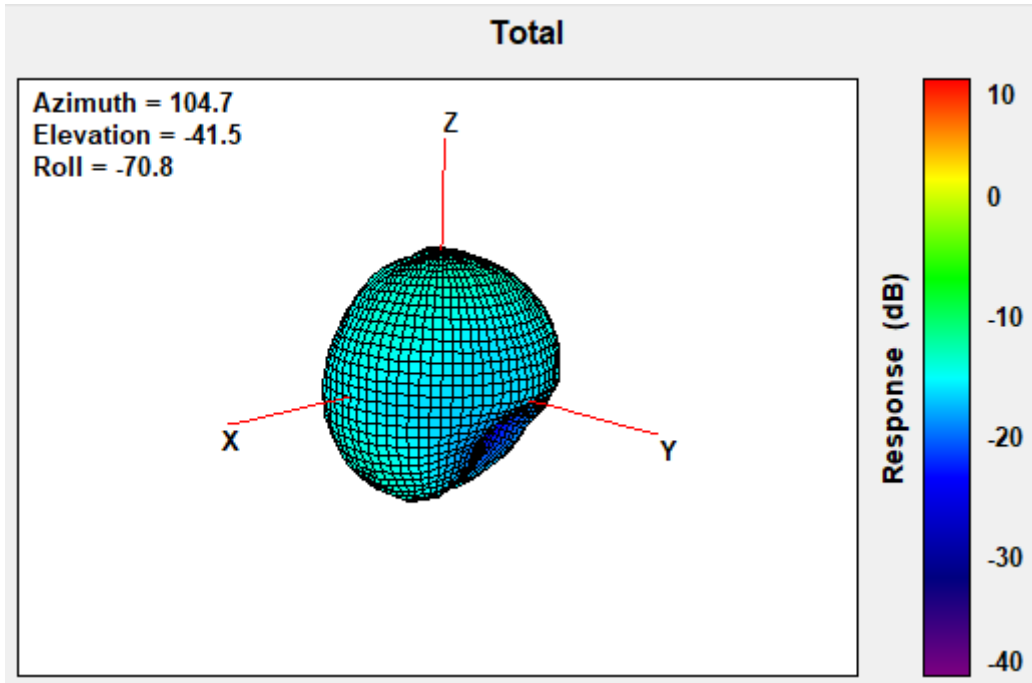
634.5MHz



Center Frequency	<b>634.5MHz</b>
Horizontal (dBi) peak	-14.43

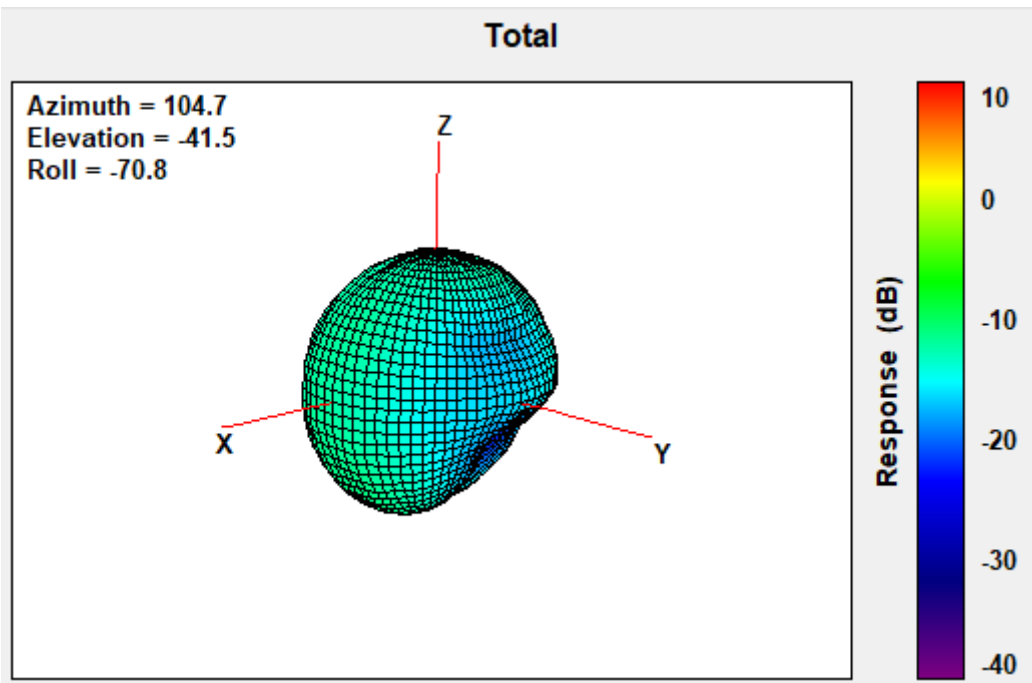
Vertical (dBi) peak	-15.77
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**652MHz**



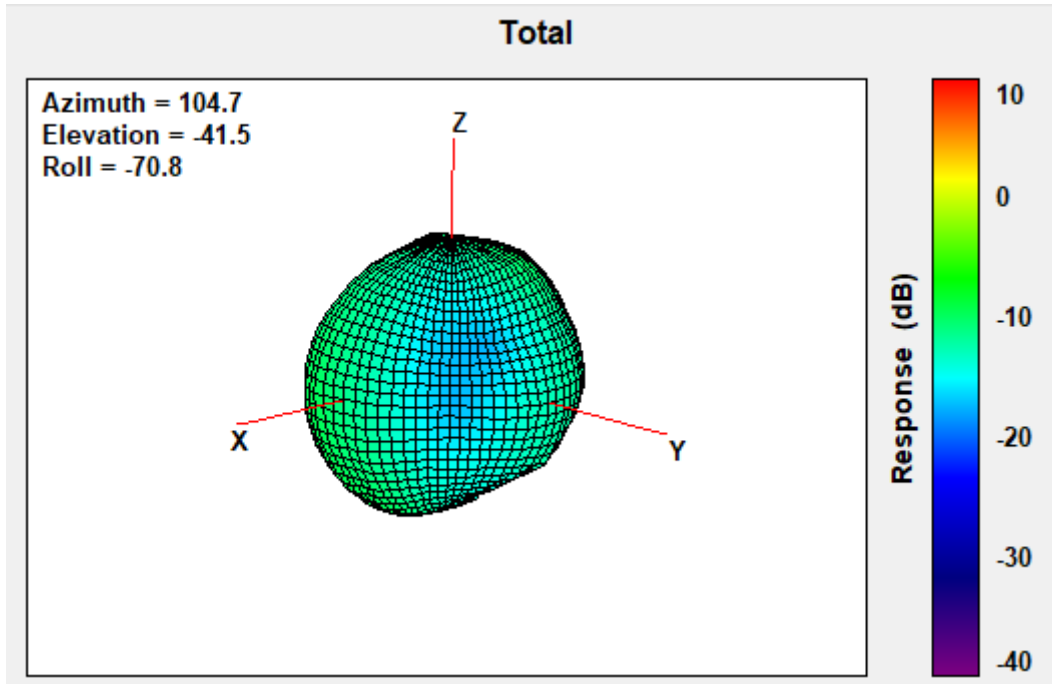
Center Frequency	<b>652MHz</b>
Horizontal (dBi) peak	-13.05
Vertical (dBi) peak	-13.30

**663MHz**



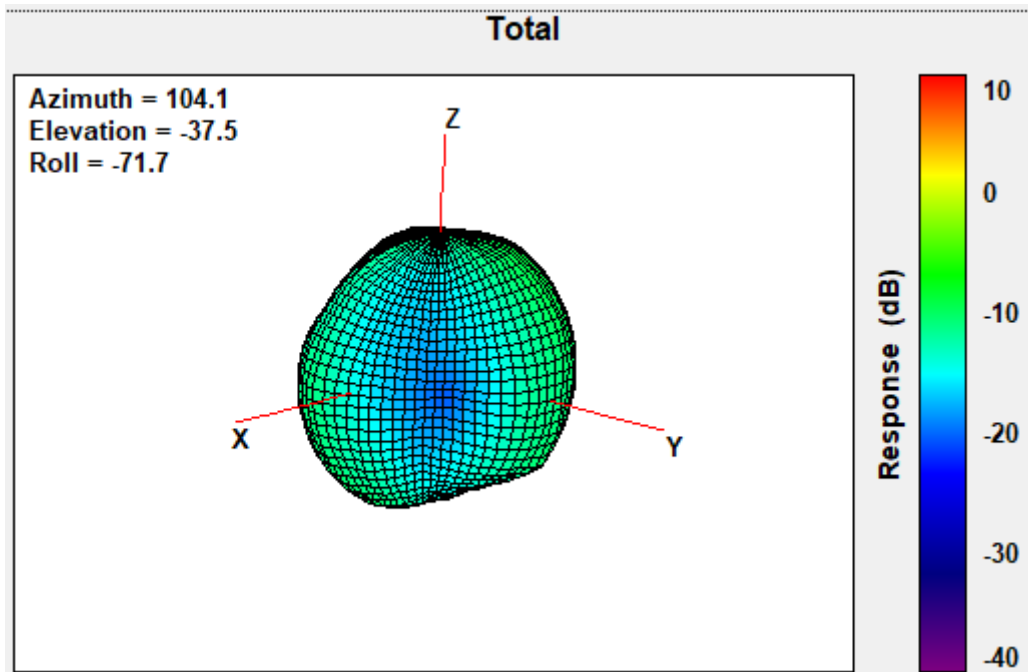
Center Frequency	<b>663MHz</b>
Horizontal (dBi) peak	-13.09
Vertical (dBi) peak	-12.08

**680.5MHz**



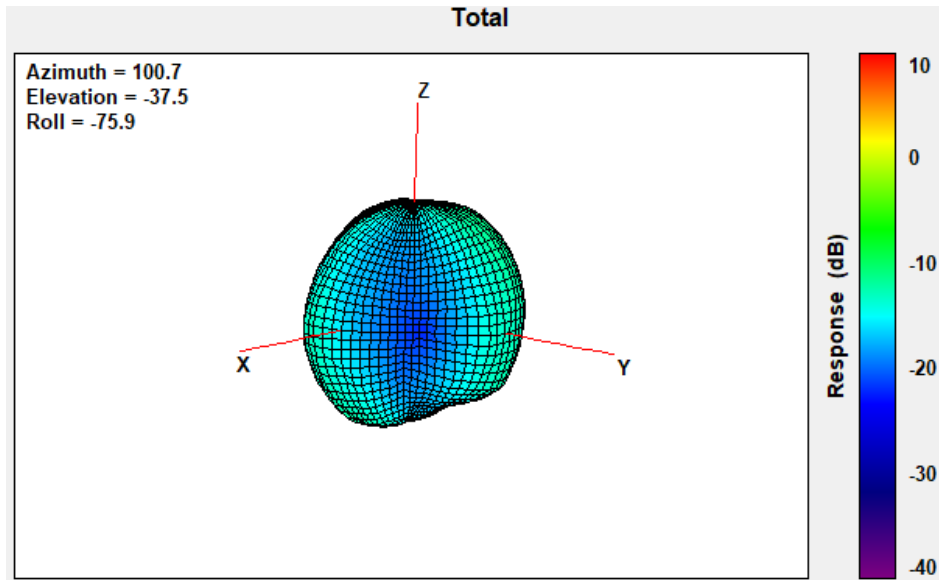
Center Frequency	<b>680.5 MHz</b>
Horizontal (dBi) peak	-9.91
Vertical (dBi) peak	-9.17

**698MHz**



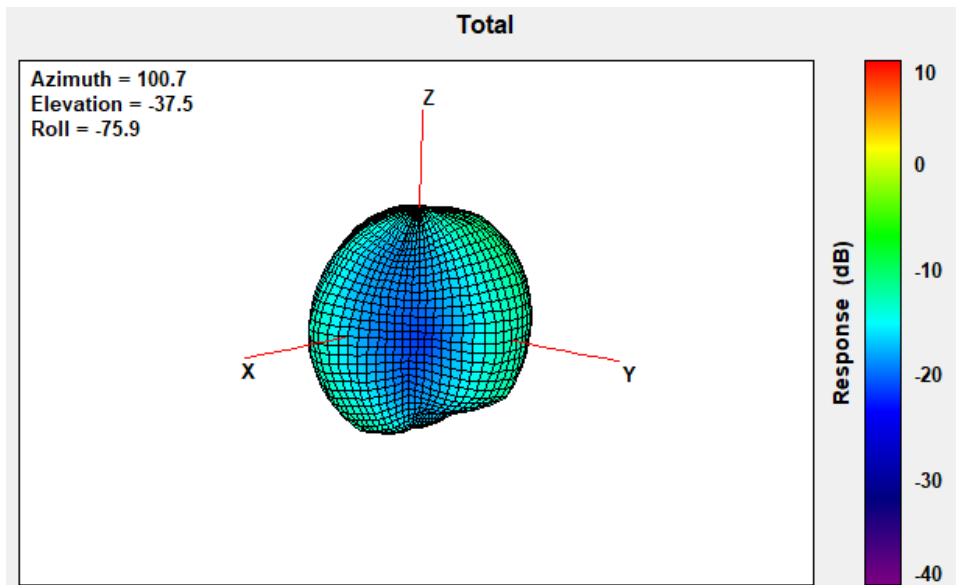
Center Frequency	<b>698MHz</b>
Horizontal (dBi) peak	-8.61
Vertical (dBi) peak	-8.83

### 703MHz



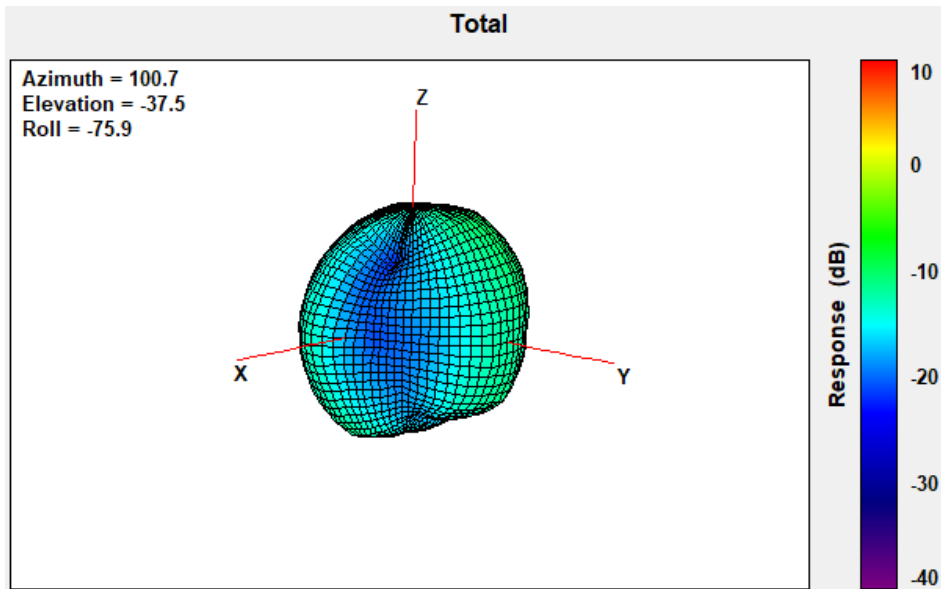
Center Frequency	<b>703 MHz</b>
Horizontal (dBi) peak	-11.39
Vertical (dBi) peak	-10.96

### 707.5MHz



Center Frequency	<b>707.5MHz</b>
Horizontal (dBi) peak	-11.04
Vertical (dBi) peak	-10.52

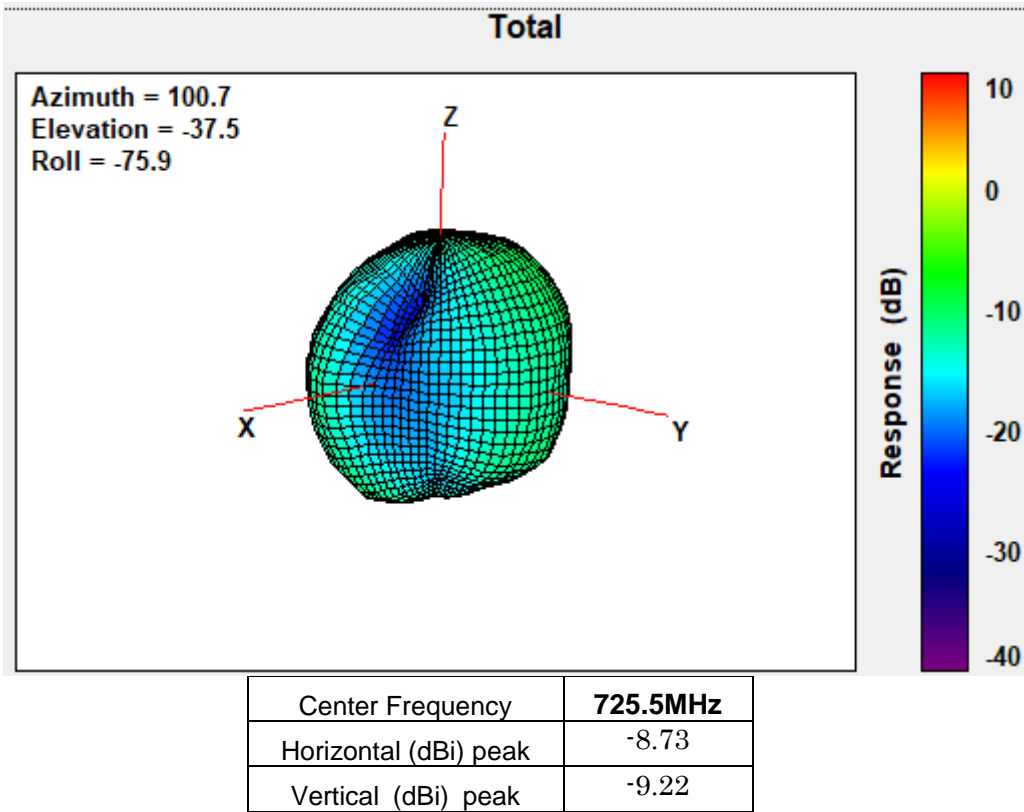
### 717MHz



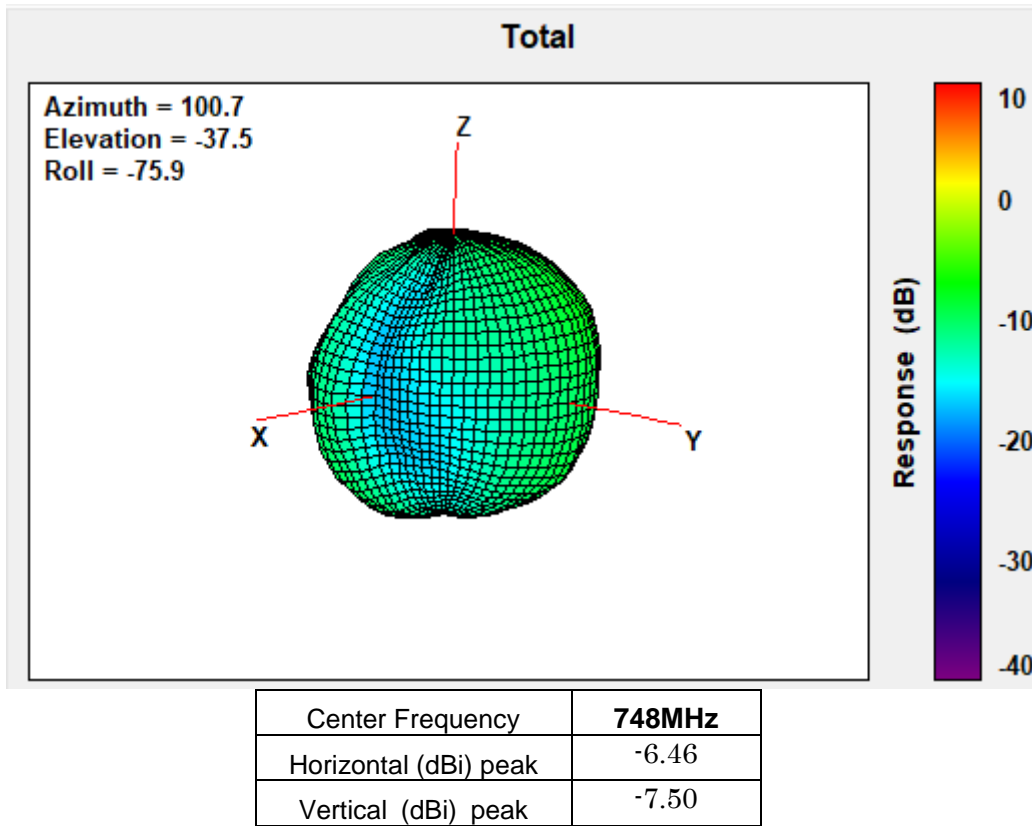
Center Frequency	<b>717MHz</b>
Horizontal (dBi) peak	-9.94
Vertical (dBi) peak	-9.49



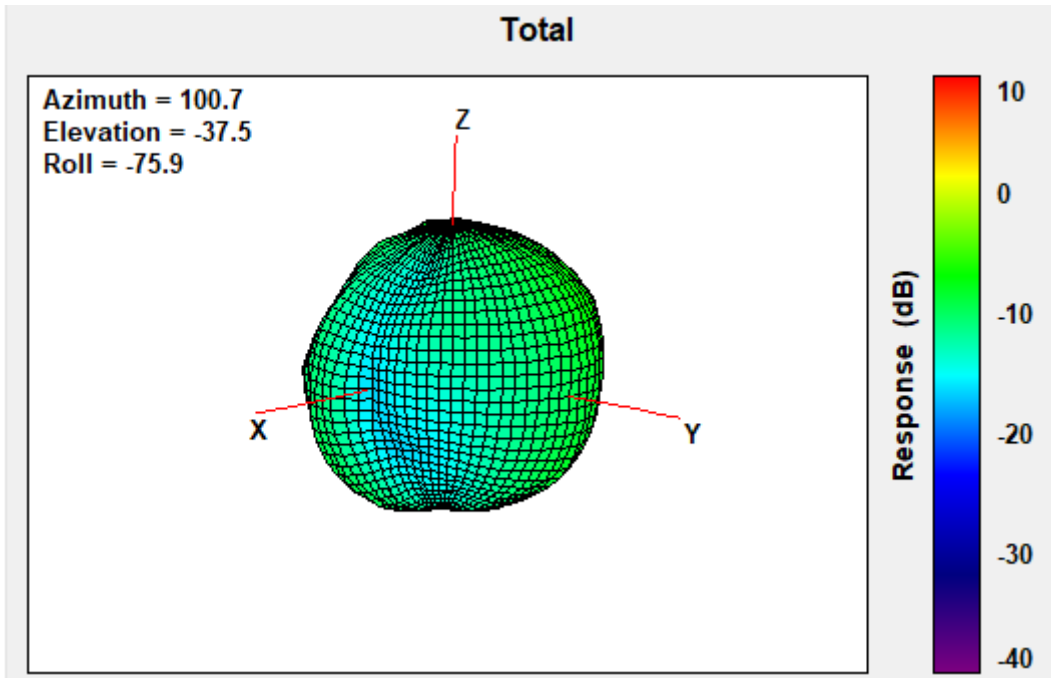
**725.5MHz**



**748MHz**

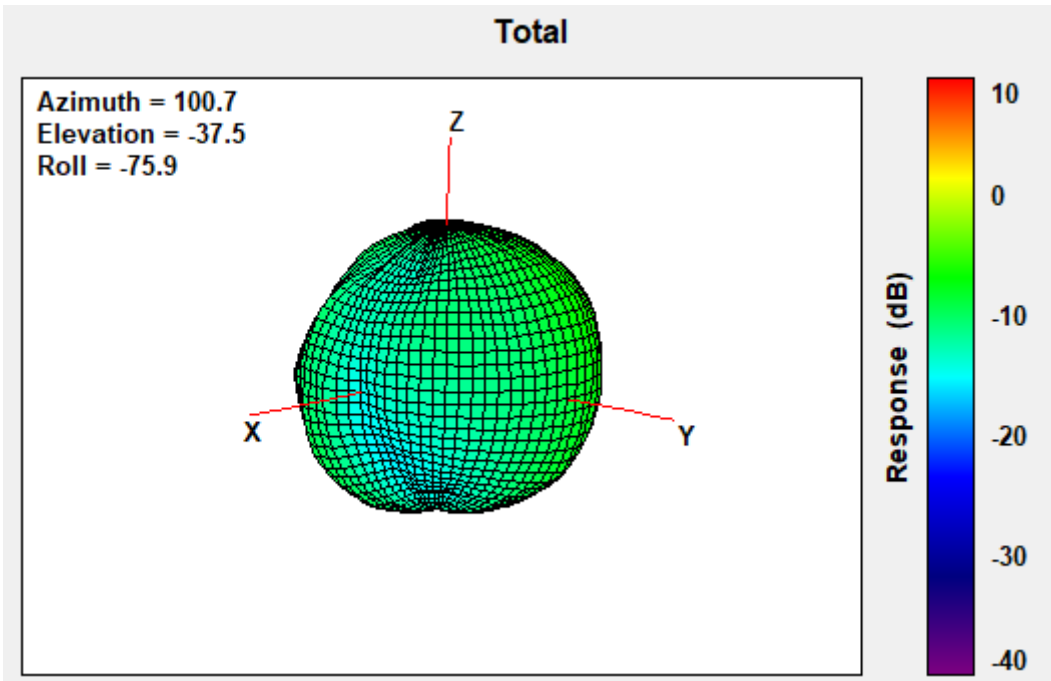


756MHz



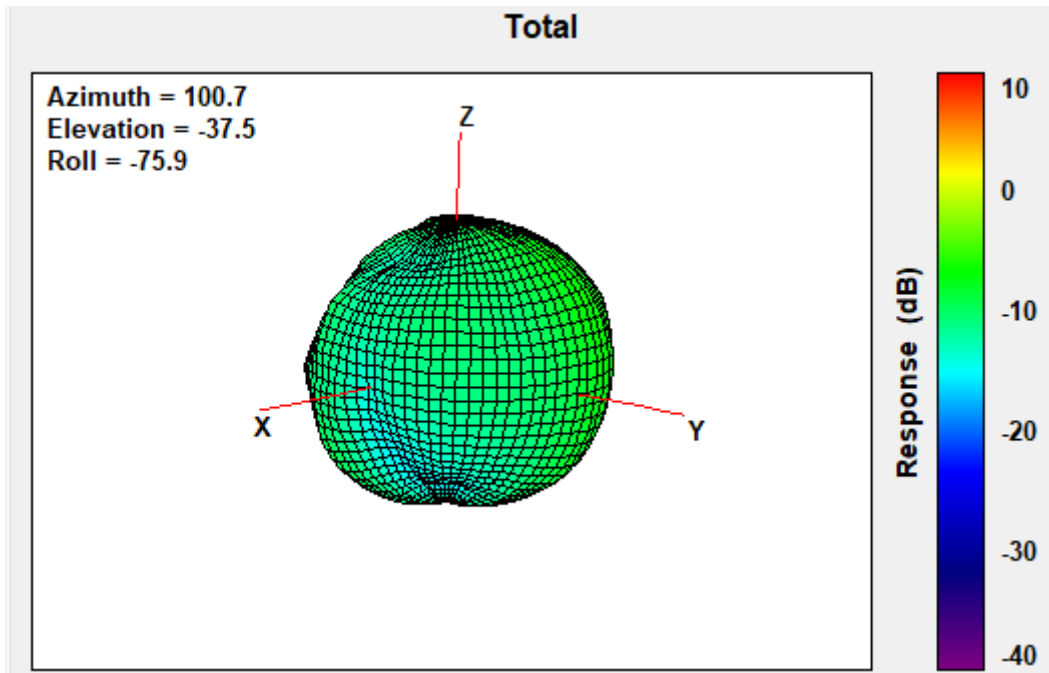
Center Frequency	<b>756MHz</b>
Horizontal (dBi) peak	-5.92
Vertical (dBi) peak	-6.80

768MHz



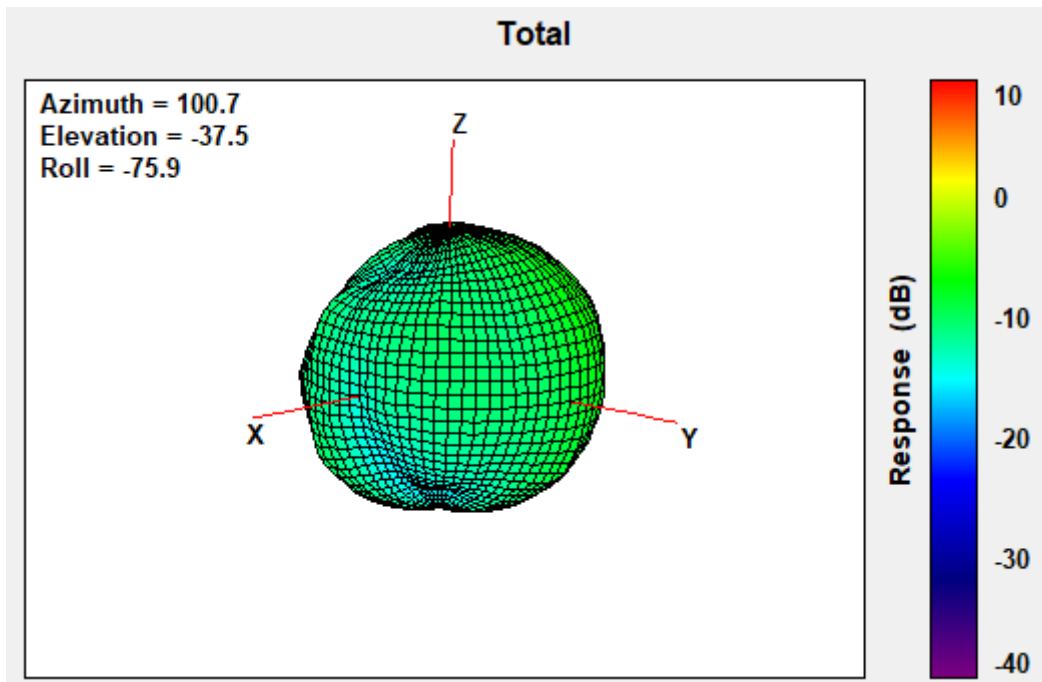
Center Frequency	<b>768MHz</b>
Horizontal (dBi) peak	-5.53
Vertical (dBi) peak	-6.17

**777MHz**



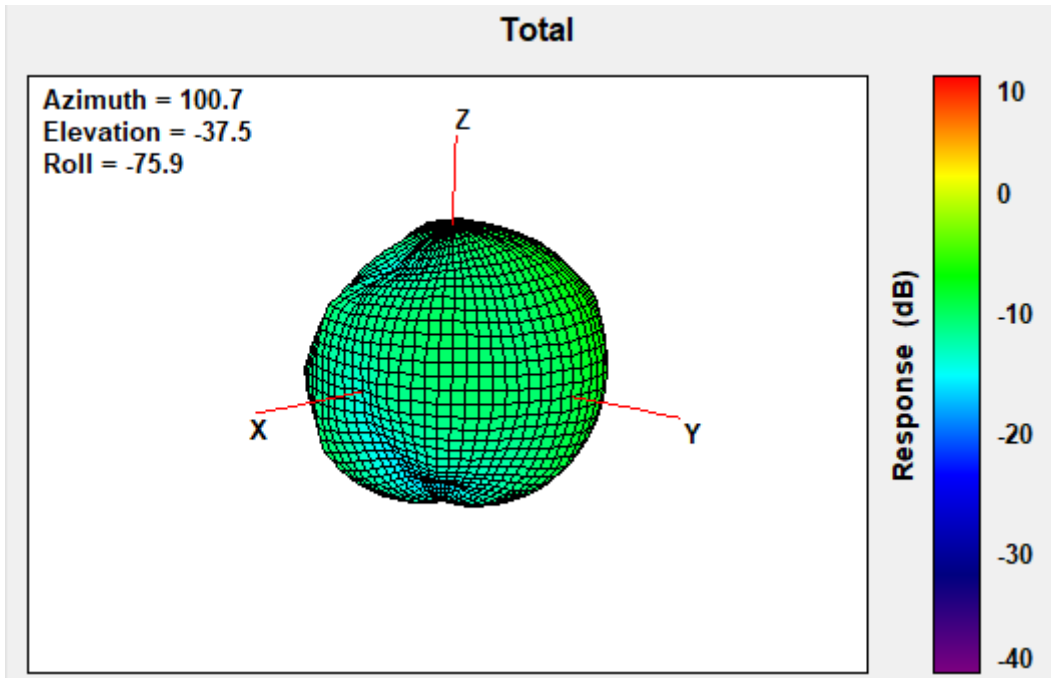
Center Frequency	<b>777MHz</b>
Horizontal (dBi) peak	-5.52
Vertical (dBi) peak	-6.11

**782MHz**



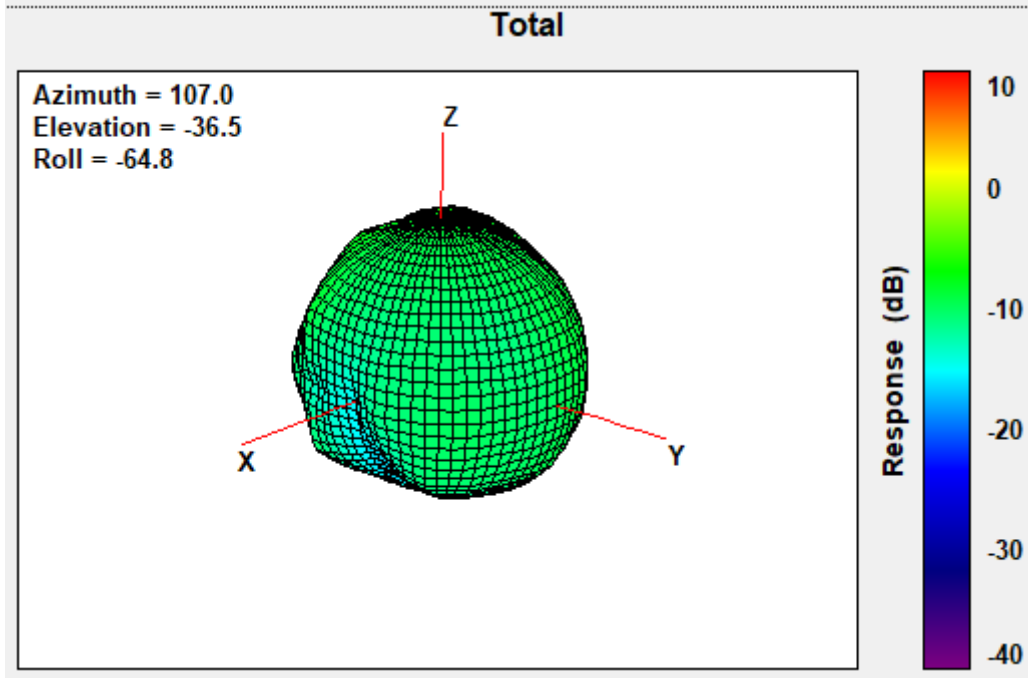
Center Frequency	<b>782MHz</b>
Horizontal (dBi) peak	-5.59
Vertical (dBi) peak	-6.37

**787MHz**



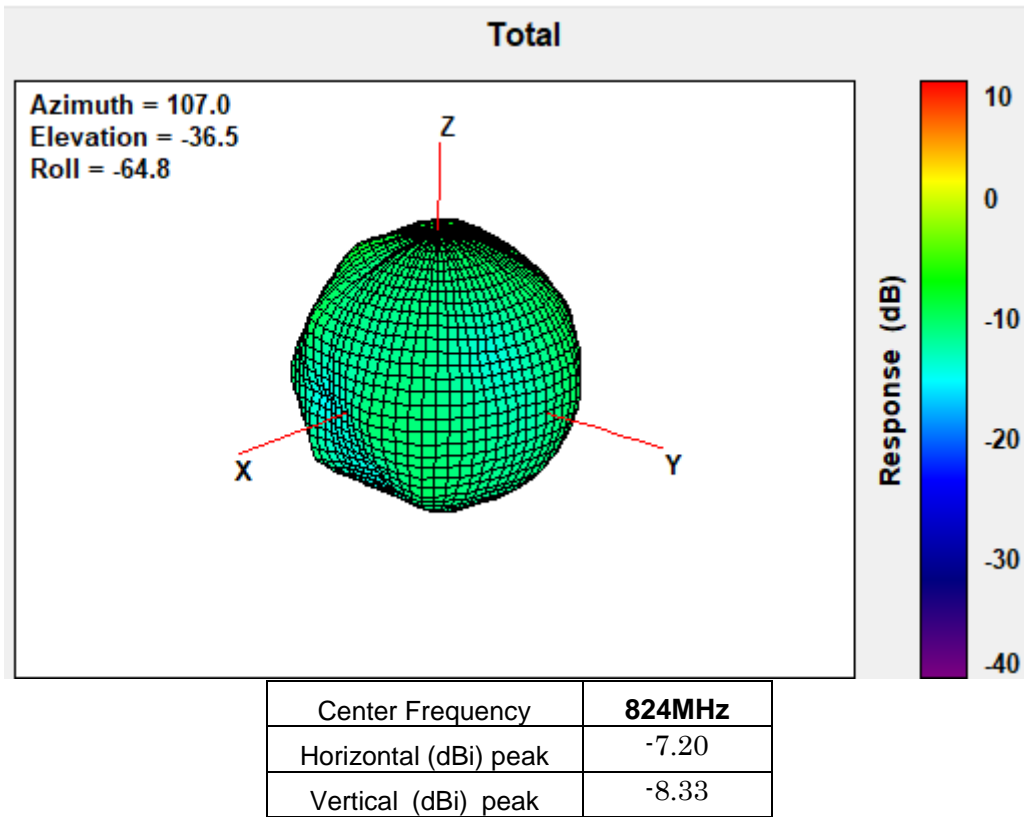
Center Frequency	<b>787MHz</b>
Horizontal (dBi) peak	-5.66
Vertical (dBi) peak	-6.70

**814MHz**

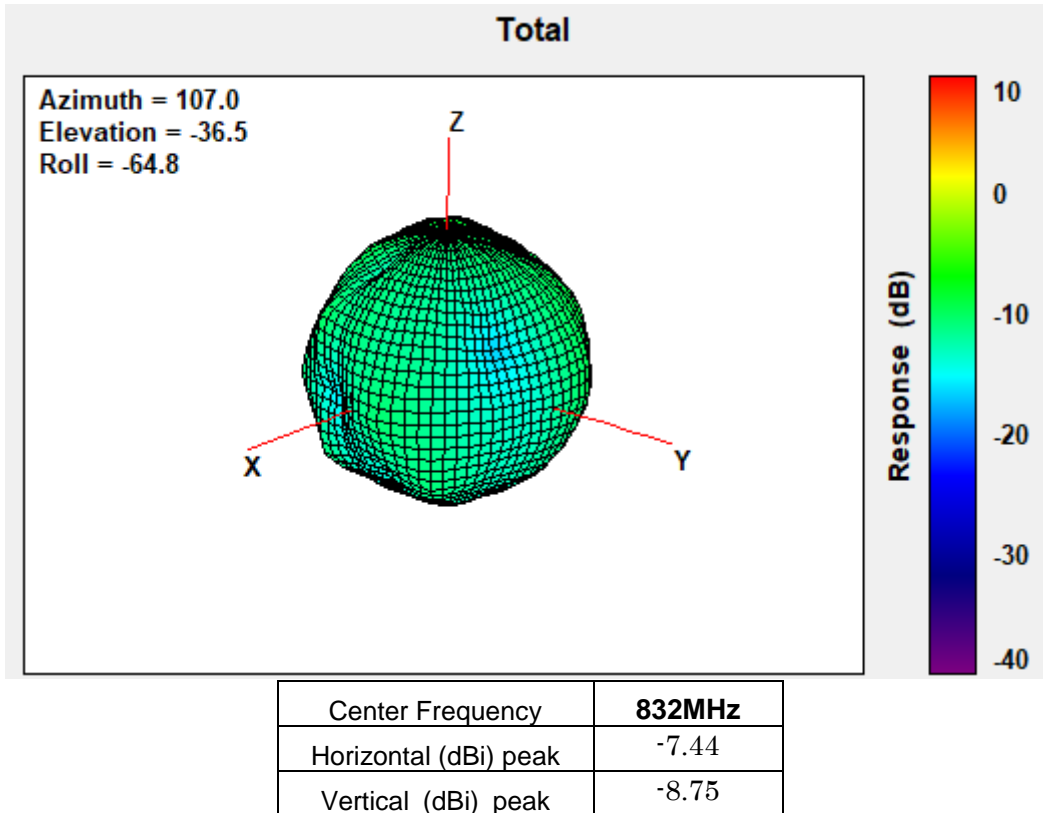


Center Frequency	<b>814MHz</b>
Horizontal (dBi) peak	-6.53
Vertical (dBi) peak	-7.29

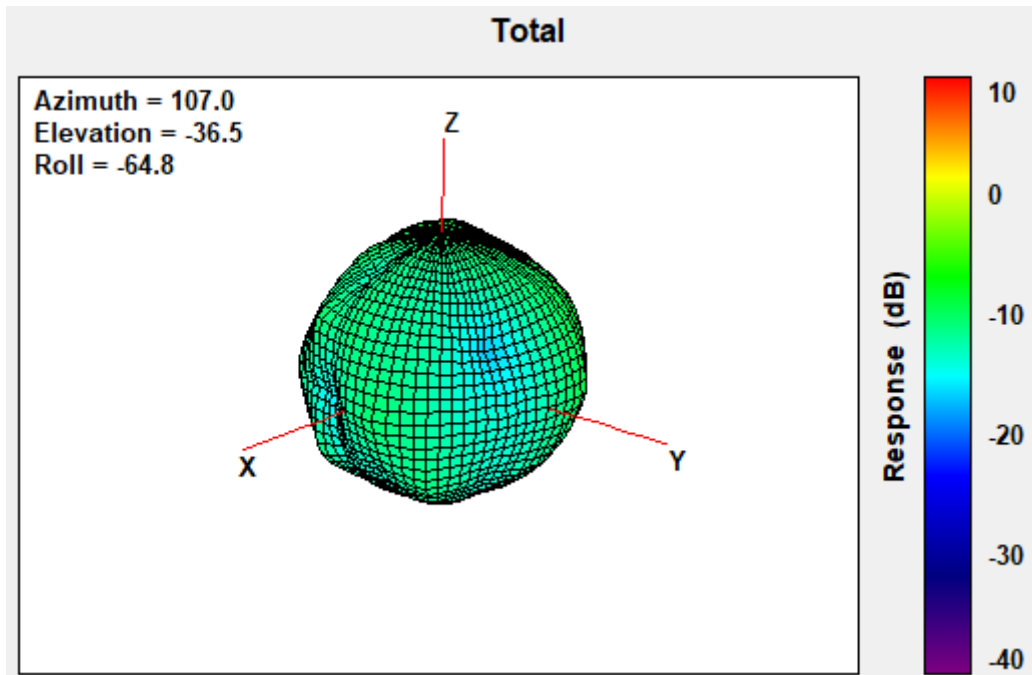
### 824MHz



### 832MHz

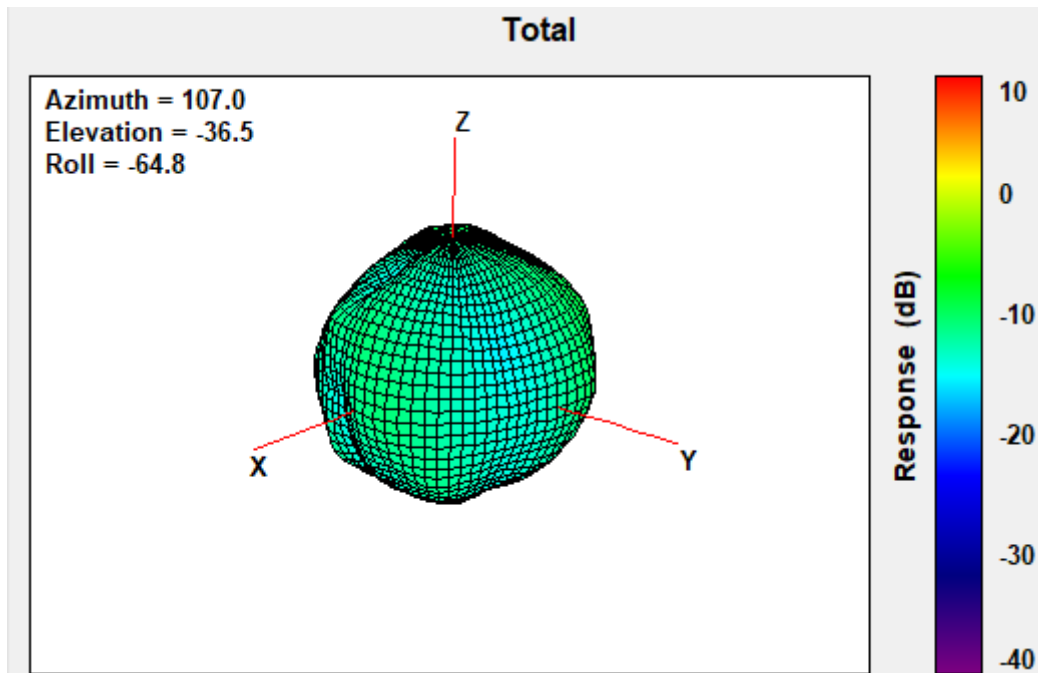


**836.5MHz**



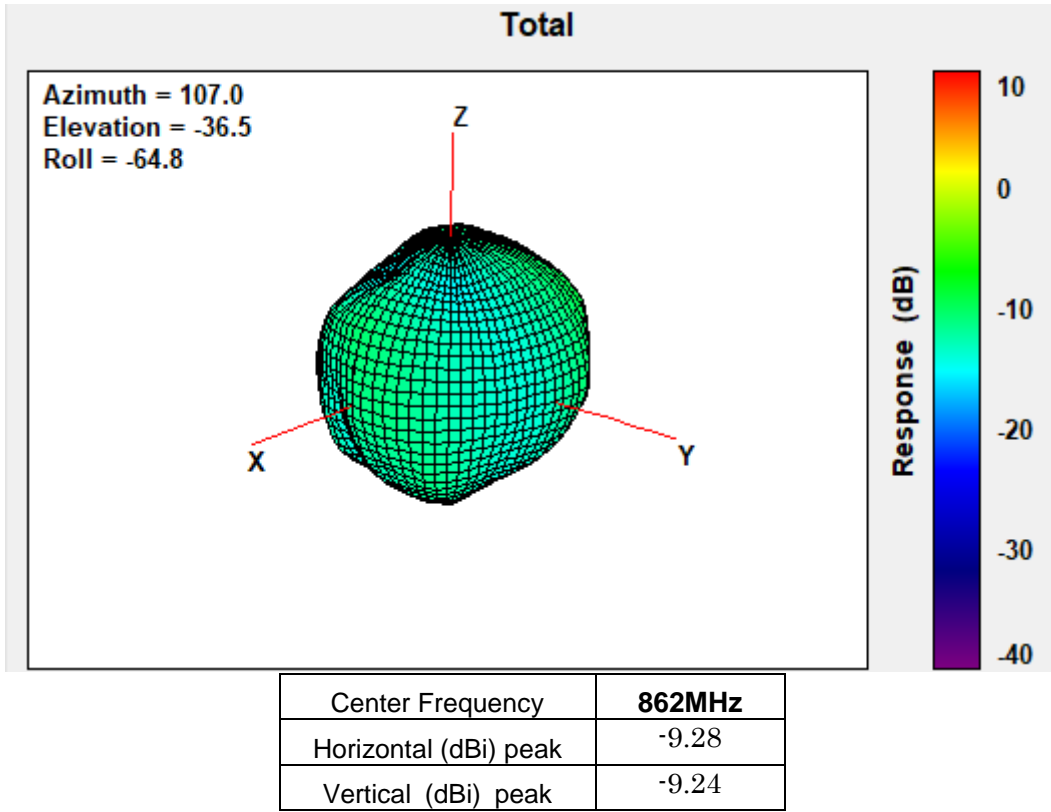
Center Frequency	<b>836.5MHz</b>
Horizontal (dBi) peak	-7.69
Vertical (dBi) peak	-8.93

**849MHz**

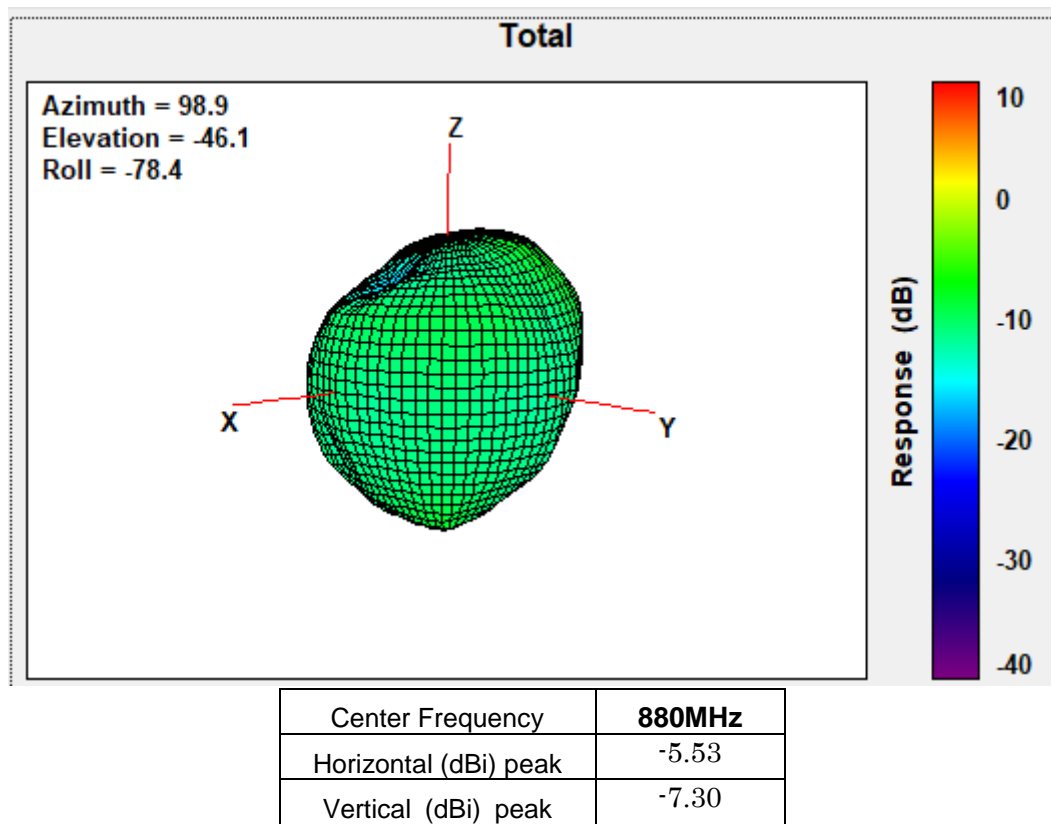


Center Frequency	<b>849MHz</b>
Horizontal (dBi) peak	-8.32
Vertical (dBi) peak	-9.25

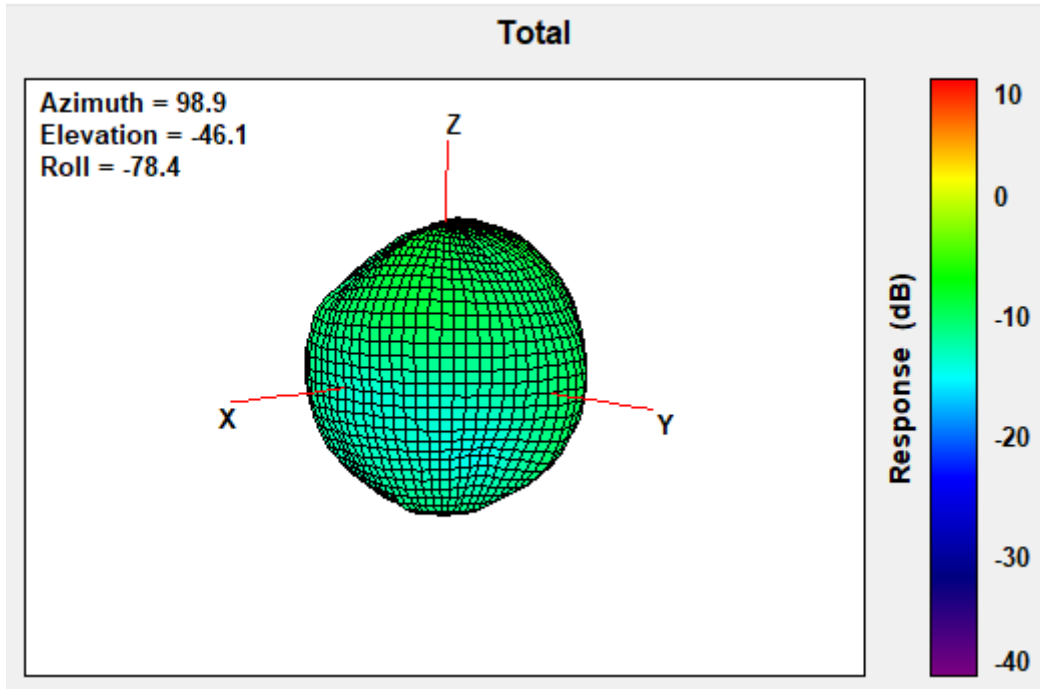
**862MHz**



**880MHz**

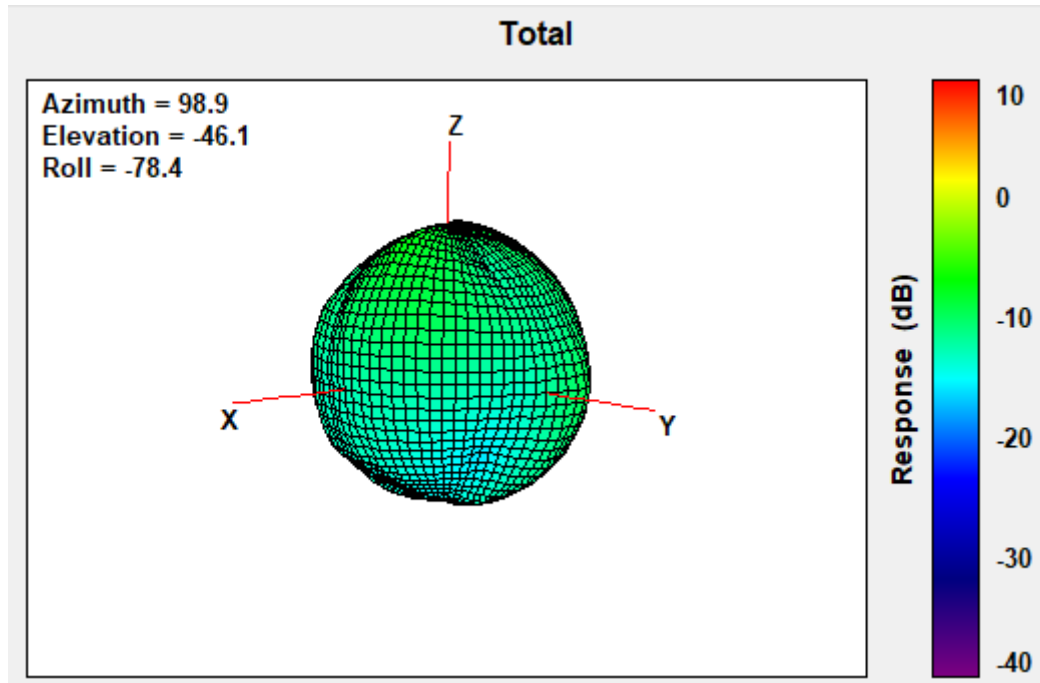


**897.5MHz**



Center Frequency	<b>897.5MHz</b>
Horizontal (dBi) peak	-4.69
Vertical (dBi) peak	-8.56

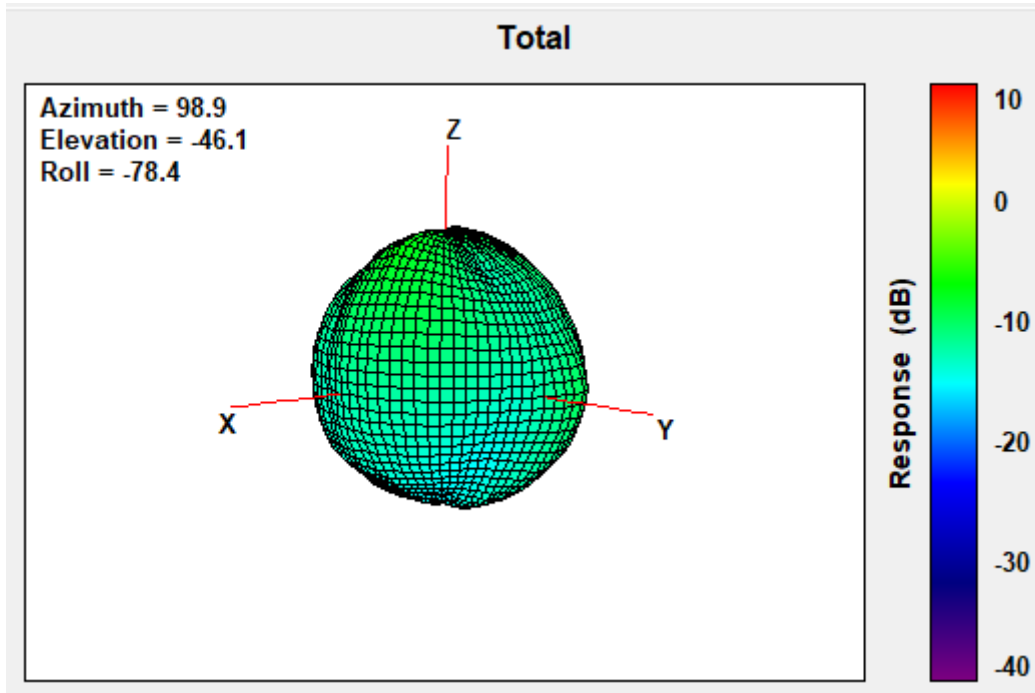
**915MHz**



Center Frequency	<b>915MHz</b>
Horizontal (dBi) peak	-5.82
Vertical (dBi) peak	-8.94

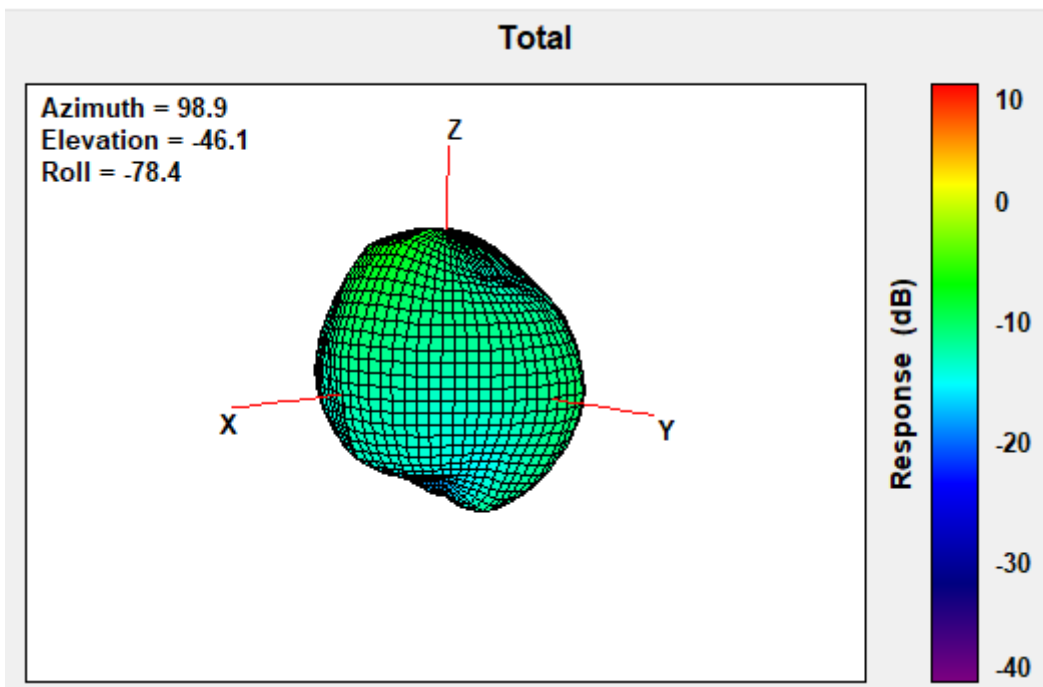


**925MHz**



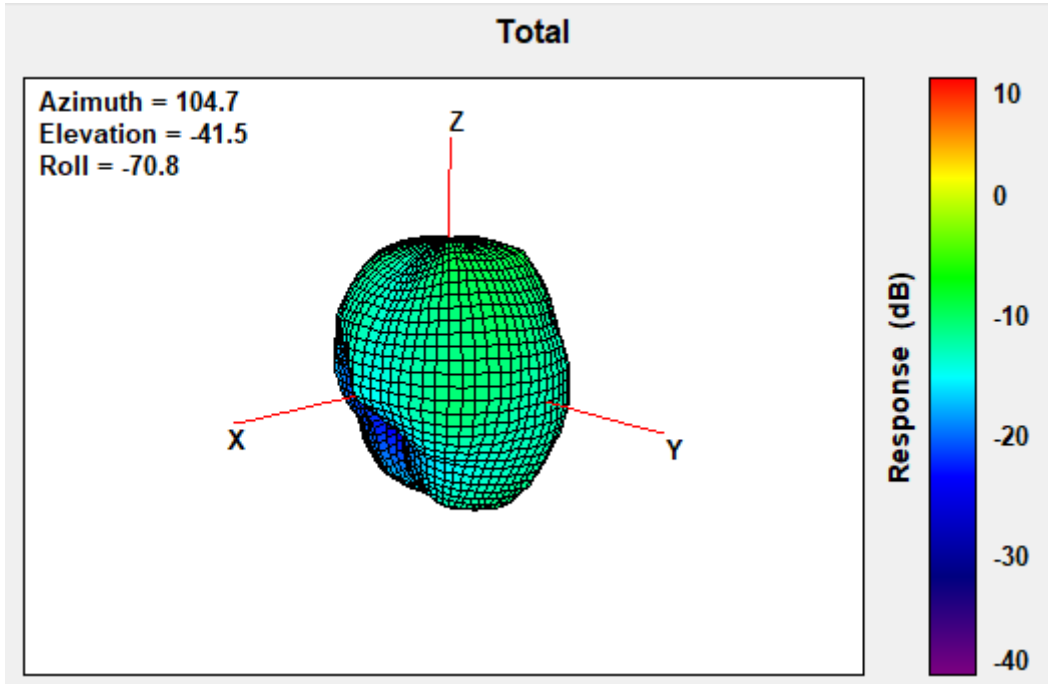
Center Frequency	<b>925MHz</b>
Horizontal (dBi) peak	-6.82
Vertical (dBi) peak	-9.14

**960MHz**



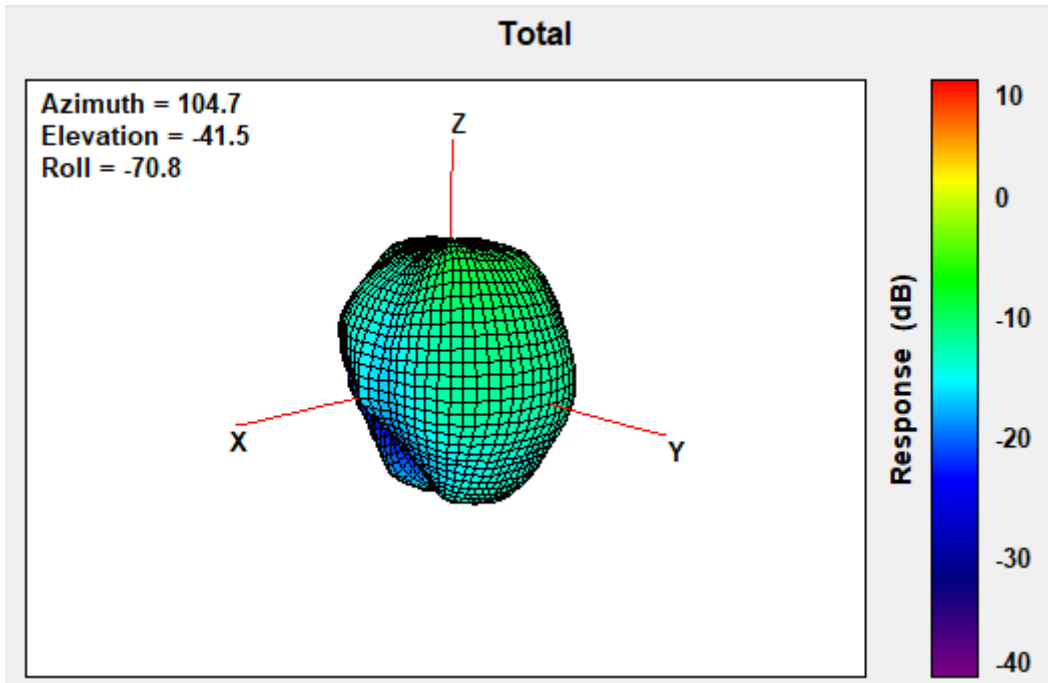
Center Frequency	<b>960MHz</b>
Horizontal (dBi) peak	-7.34
Vertical (dBi) peak	-9.22

1427.9MHz



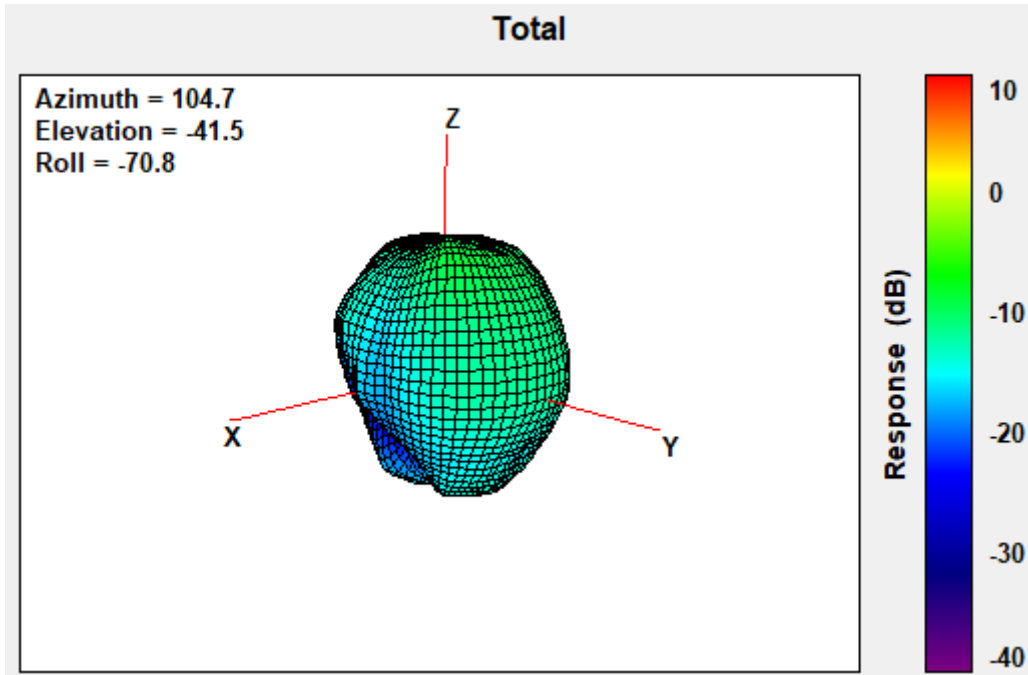
Center Frequency	<b>1427.9MHz</b>
Horizontal (dBi) peak	-10.94
Vertical (dBi) peak	-9.67

1447.9MHz



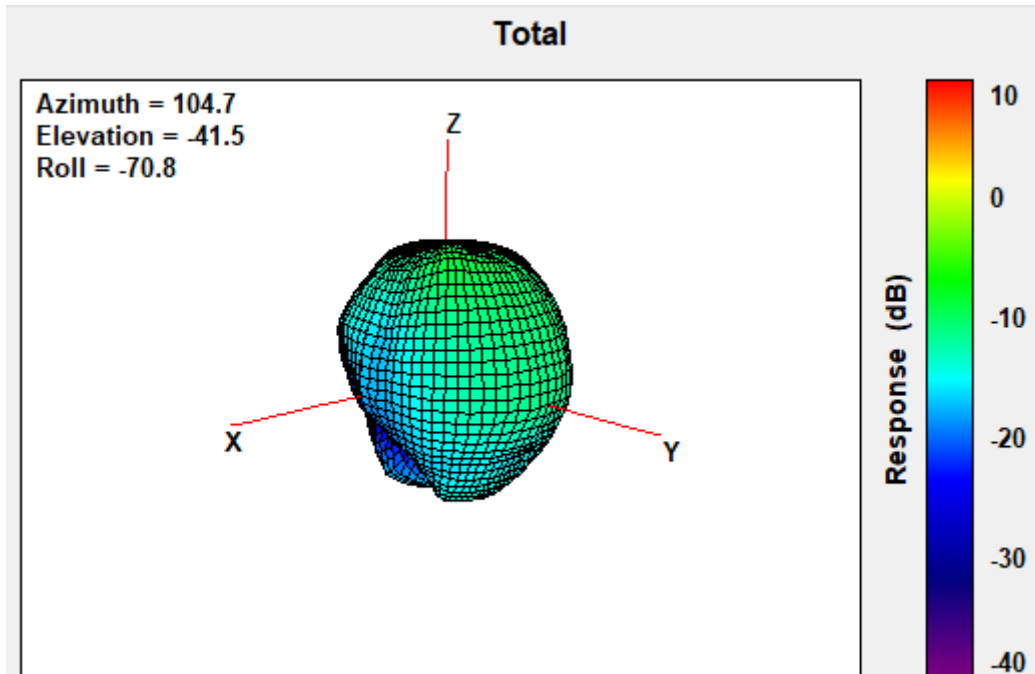
Center Frequency	<b>1447.9MHz</b>
Horizontal (dBi) peak	-10.26
Vertical (dBi) peak	-9.78

**1455.4MHz**



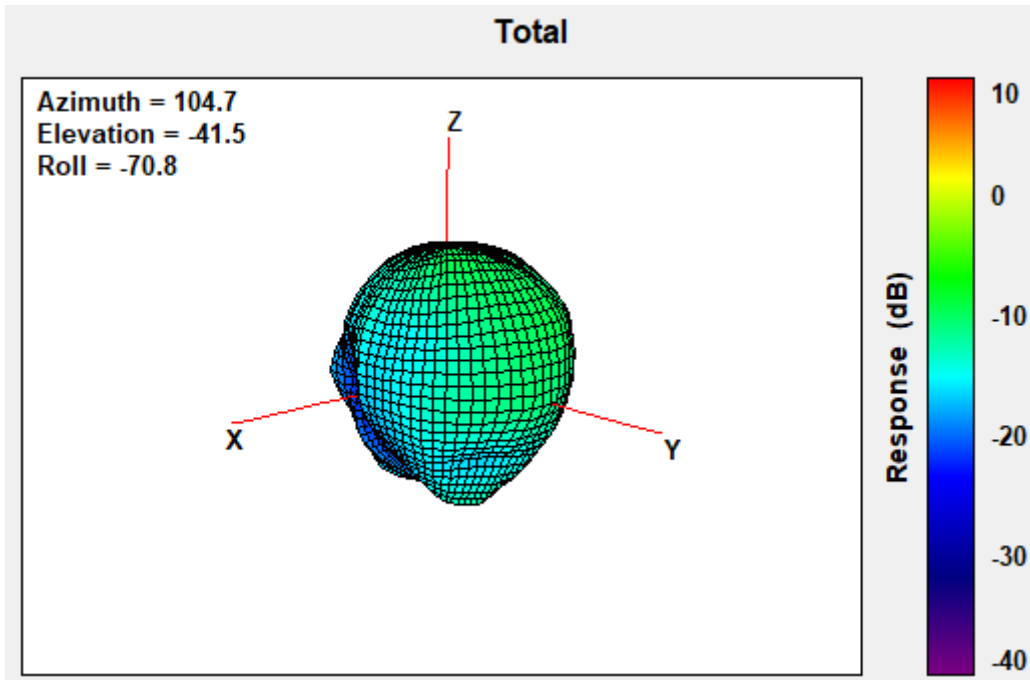
Center Frequency	<b>1455.4MHz</b>
Horizontal (dBi) peak	-10.22
Vertical (dBi) peak	-10.02

**1462.9MHz**



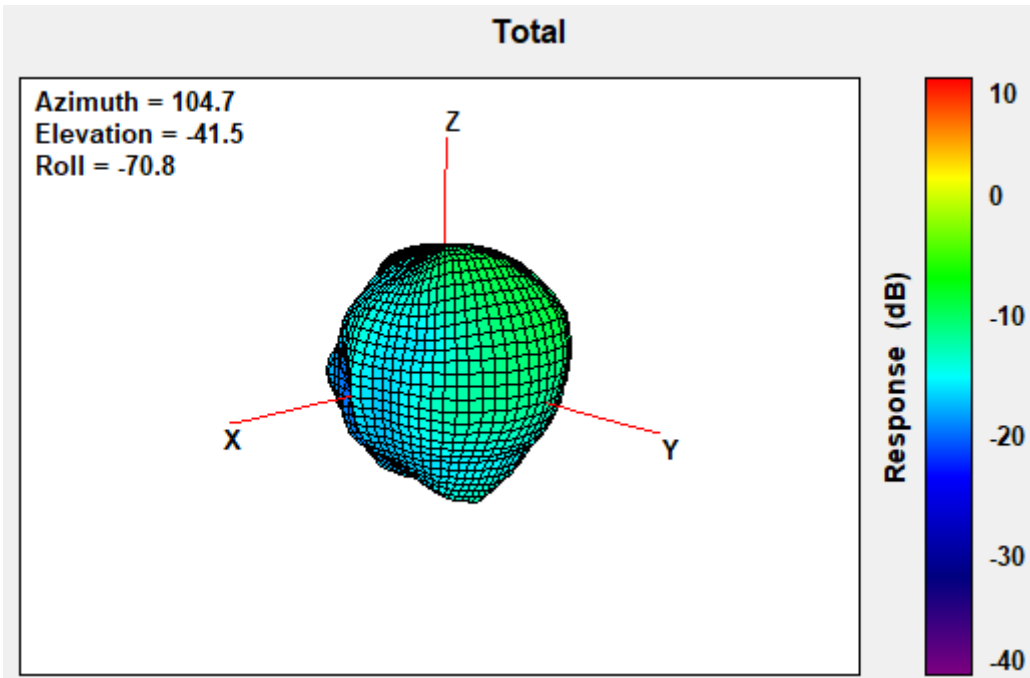
Center Frequency	<b>1462.9MHz</b>
Horizontal (dBi) peak	-10.30
Vertical (dBi) peak	-10.25

1496MHz



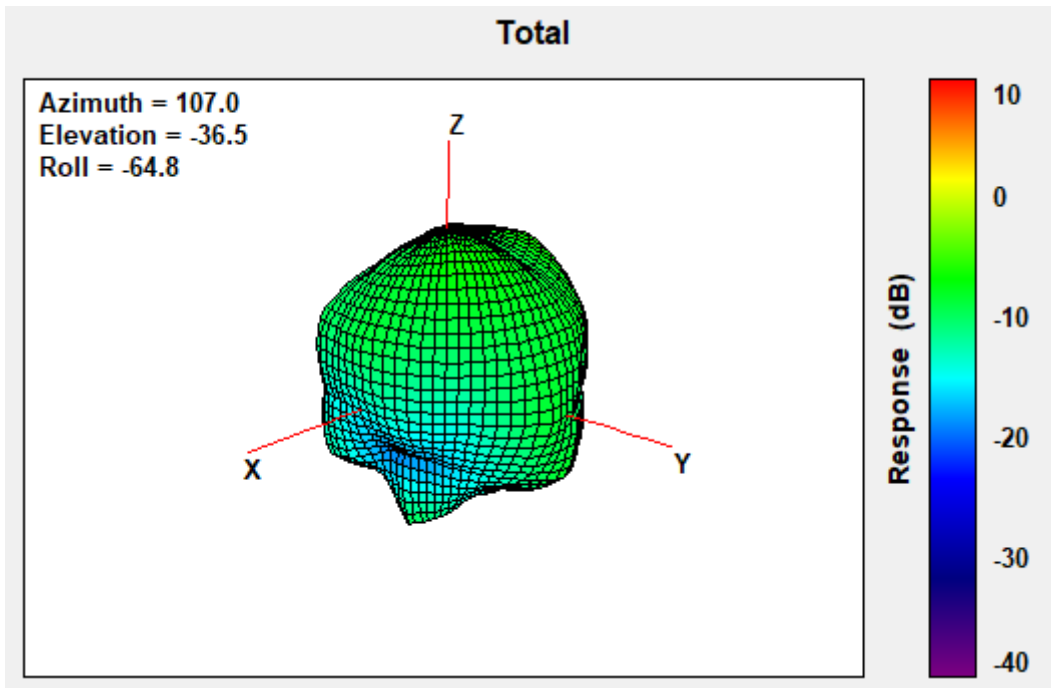
Center Frequency	<b>1496MHz</b>
Horizontal (dBi) peak	-11.22
Vertical (dBi) peak	-9.49

1510.9 MHz



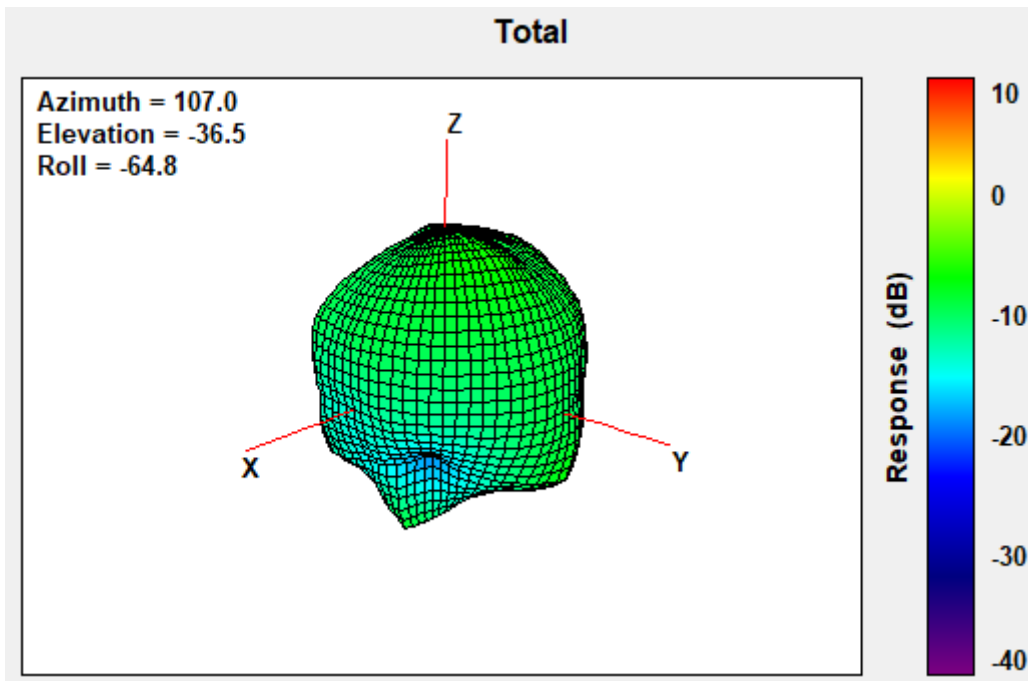
Center Frequency	<b>1510.9 MHz</b>
Horizontal (dBi) peak	-12.33
Vertical (dBi) peak	-8.79

**1710 MHz**



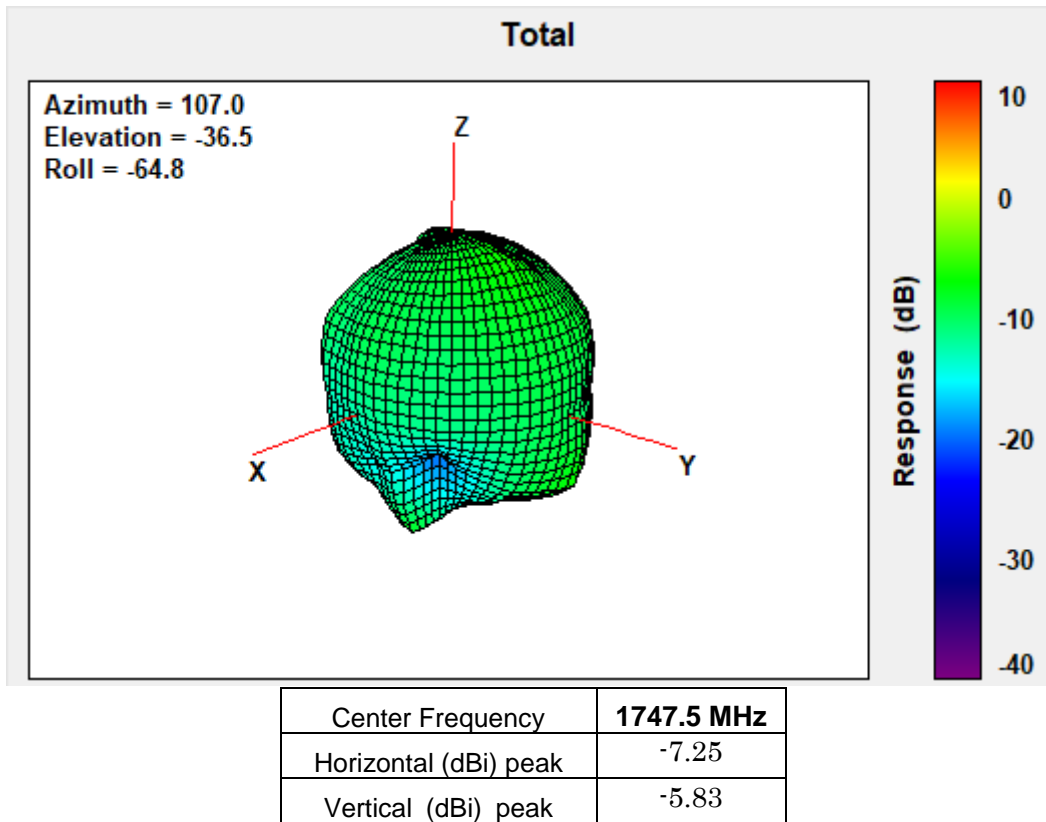
Center Frequency	<b>1710 MHz</b>
Horizontal (dBi) peak	-6.50
Vertical (dBi) peak	-6.85

**1732.5 MHz**

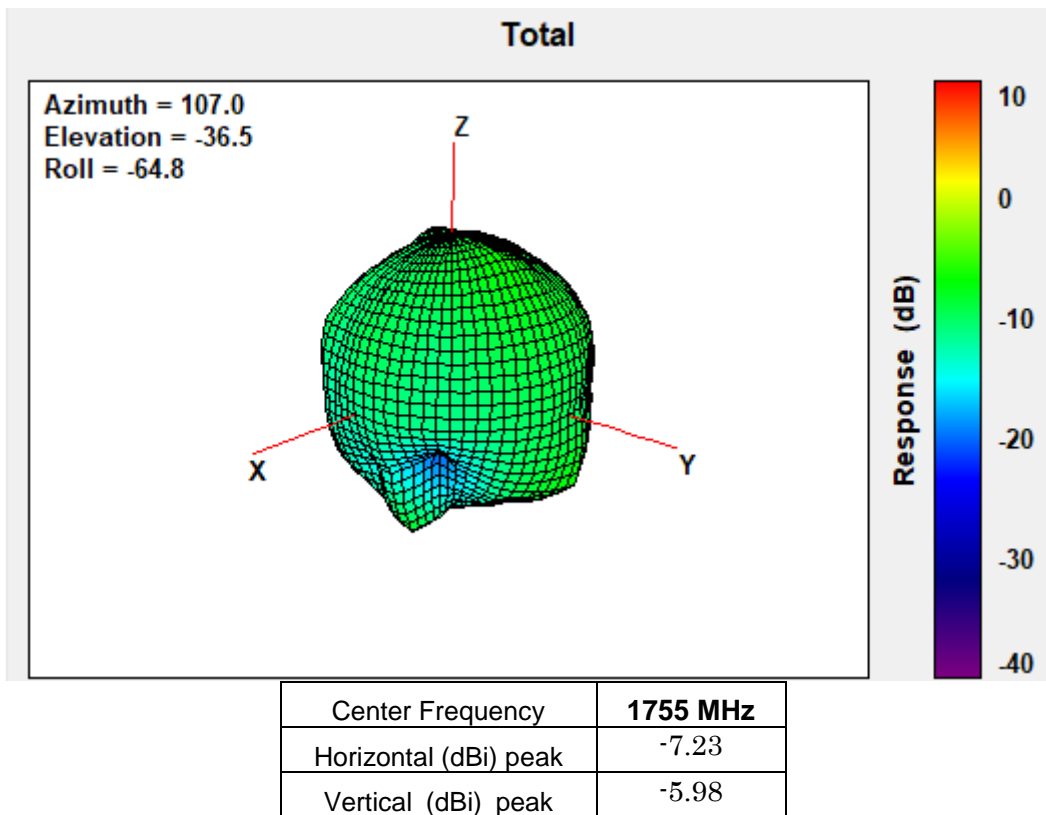


Center Frequency	<b>1732.5 MHz</b>
Horizontal (dBi) peak	-7.31
Vertical (dBi) peak	-5.93

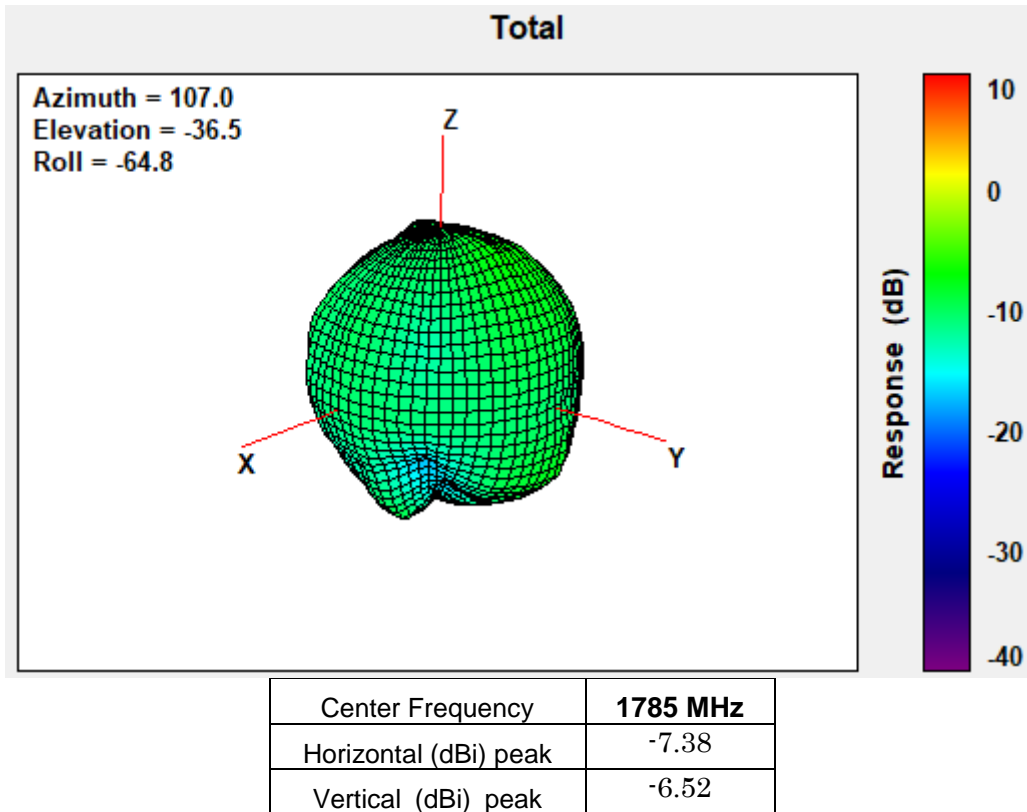
1747.5 MHz



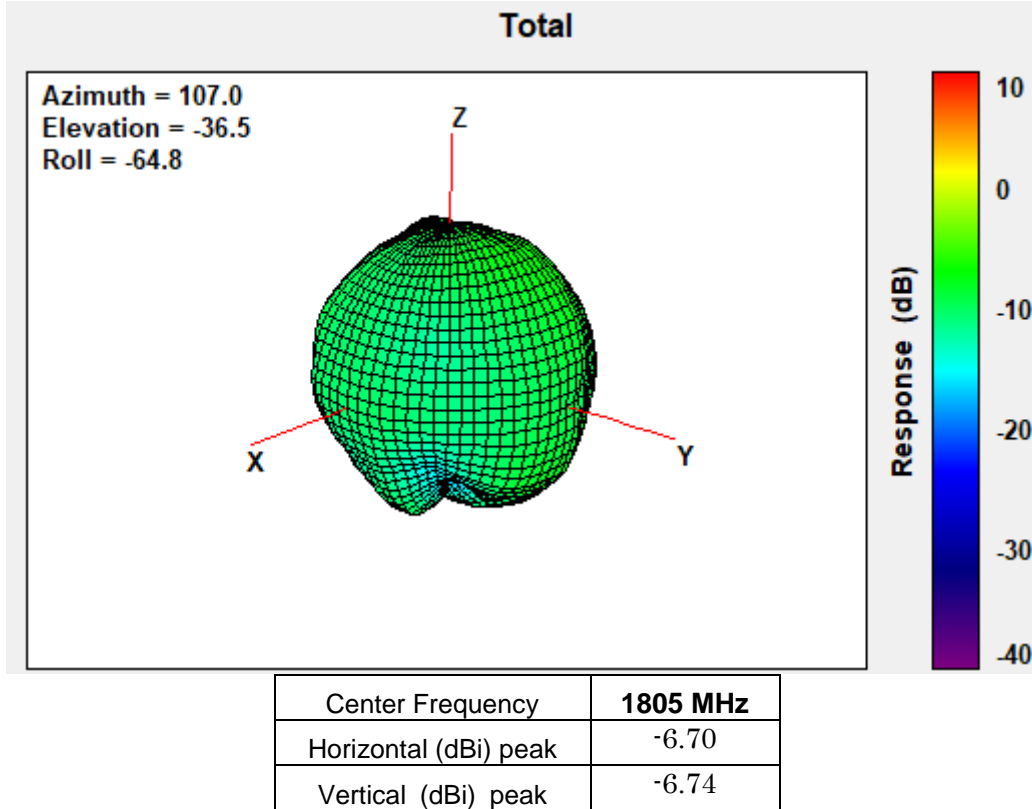
1755 MHz



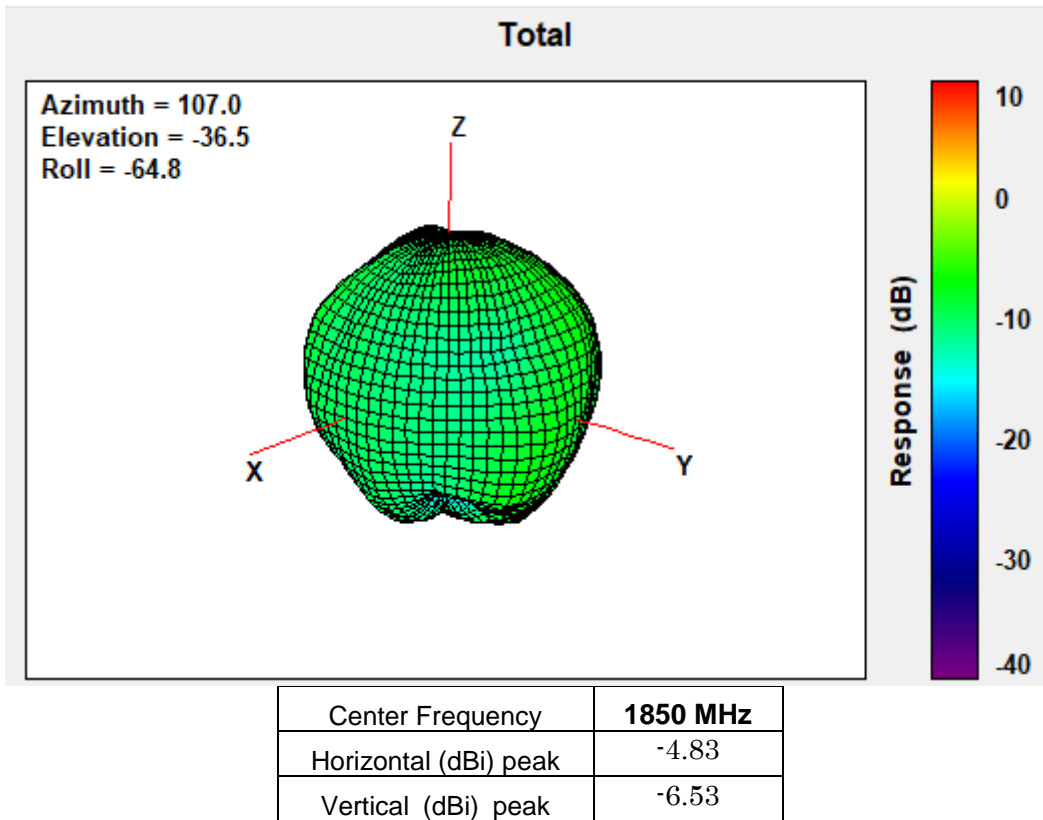
**1785 MHz**



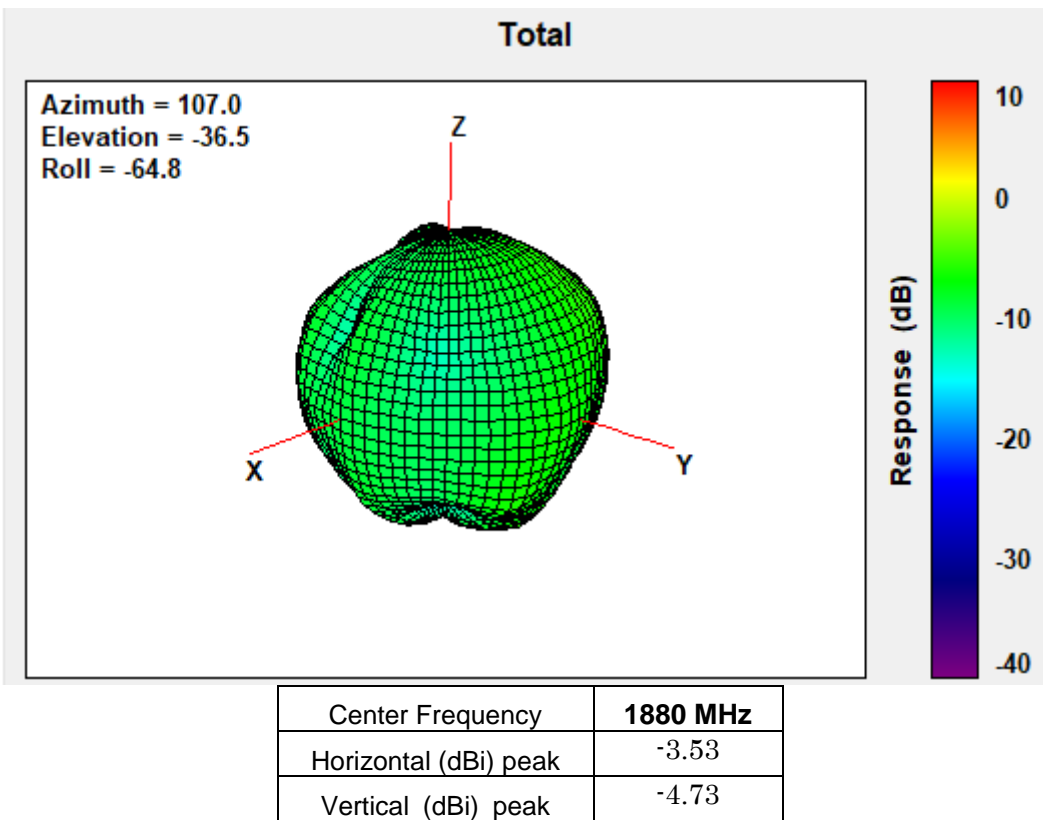
**1805 MHz**



**1850 MHz**

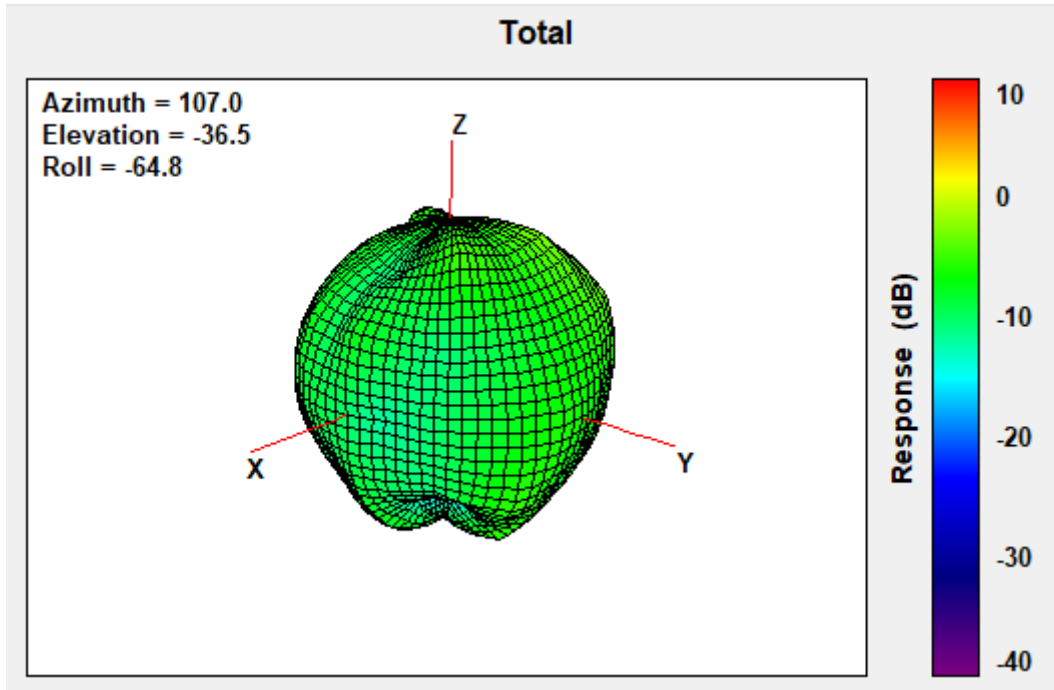


**1880 MHz**



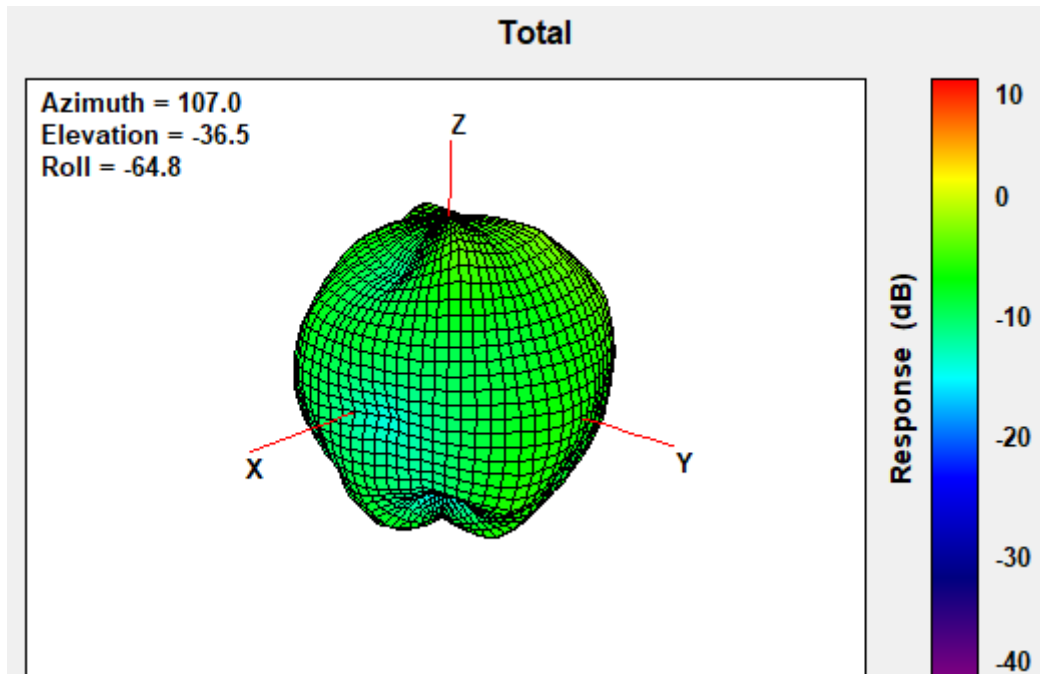


**1910MHz**



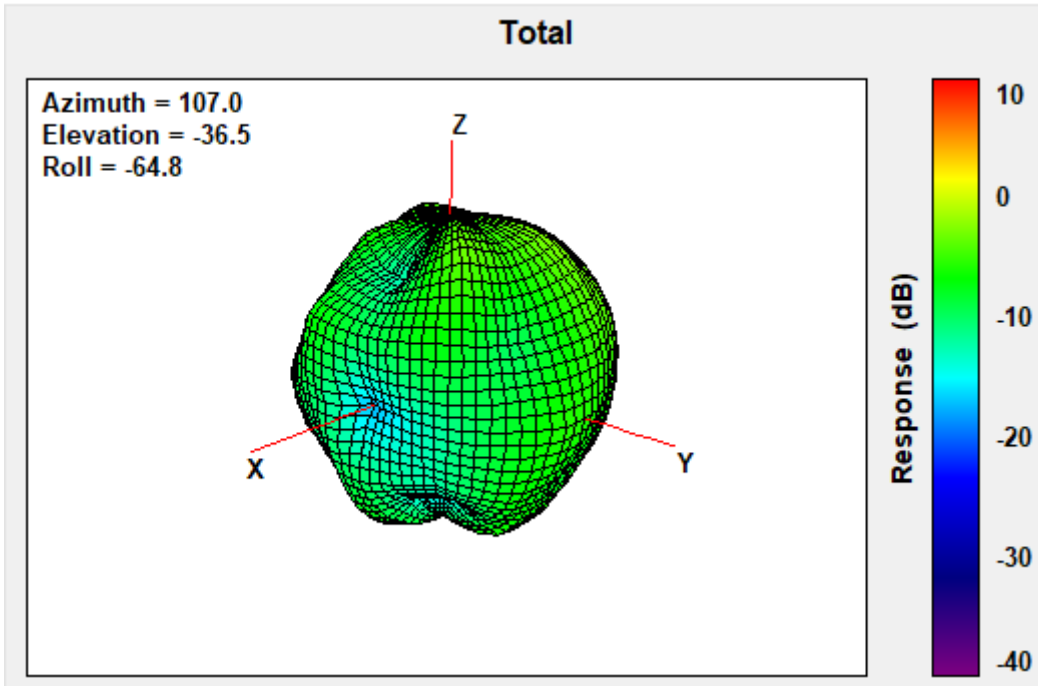
Center Frequency	<b>1910MHz</b>
Horizontal (dBi) peak	-3.21
Vertical (dBi) peak	-2.76

**1920MHz**



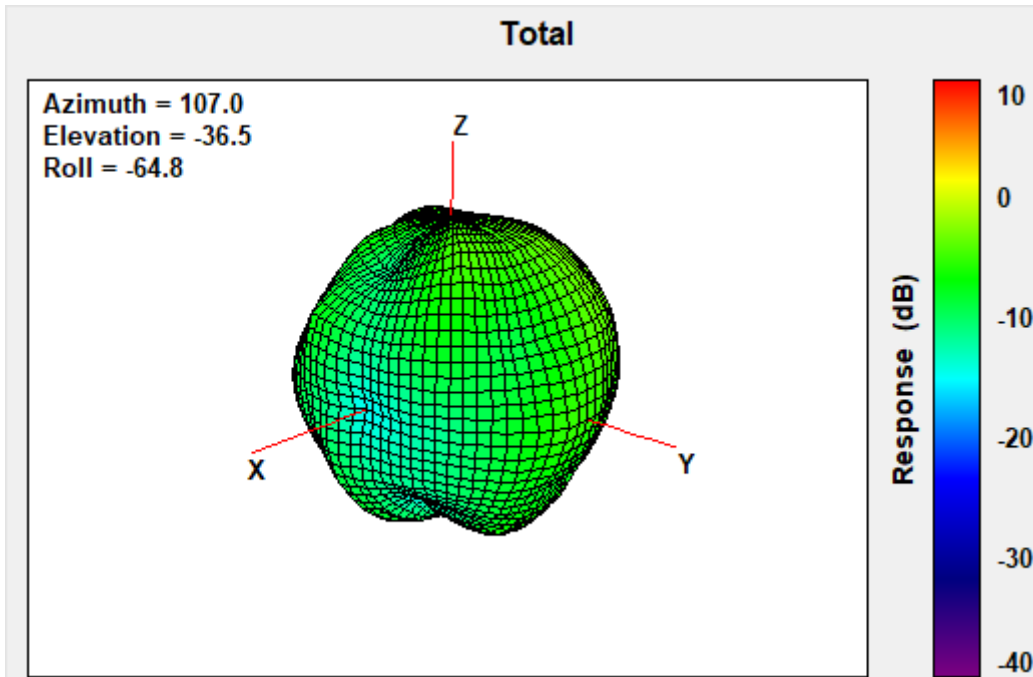
Center Frequency	<b>1920MHz</b>
Horizontal (dBi) peak	-2.40
Vertical (dBi) peak	-2.44

**1950MHz**



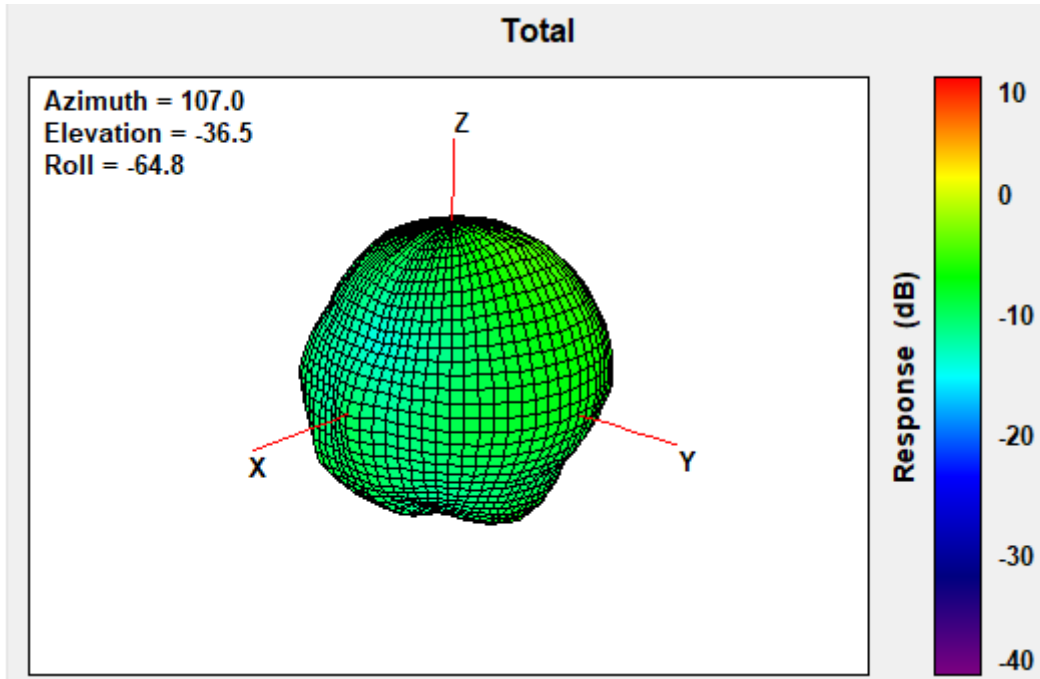
Center Frequency	<b>1950MHz</b>
Horizontal (dBi) peak	-2.20
Vertical (dBi) peak	-2.86

**1980MHz**



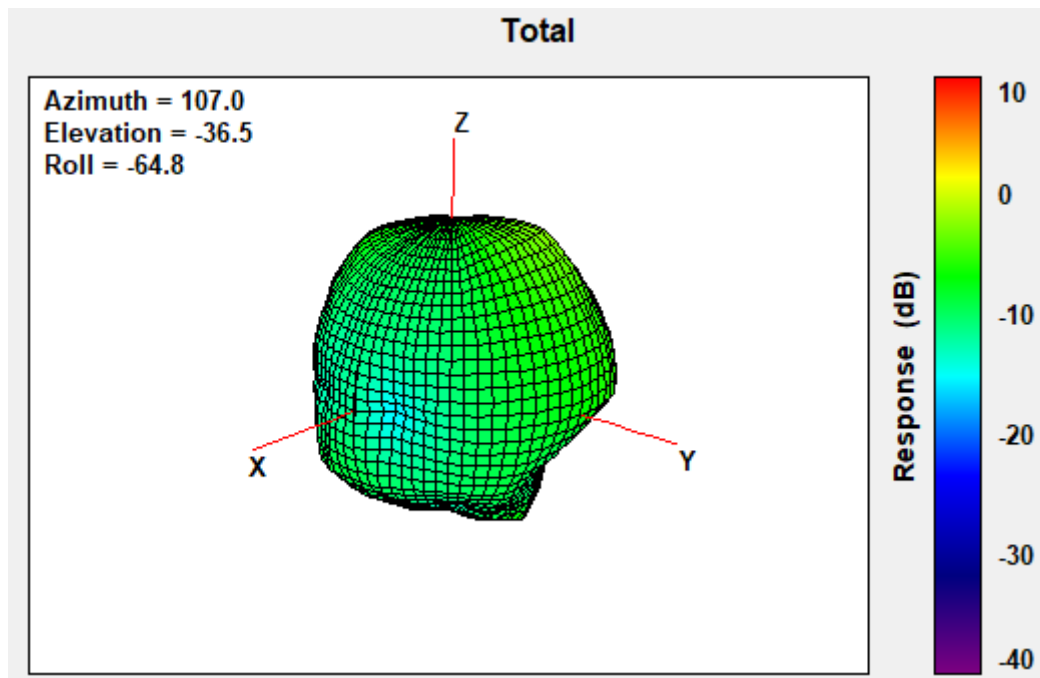
Center Frequency	<b>1980MHz</b>
Horizontal (dBi) peak	-2.04
Vertical (dBi) peak	-3.68

**2110MHz**



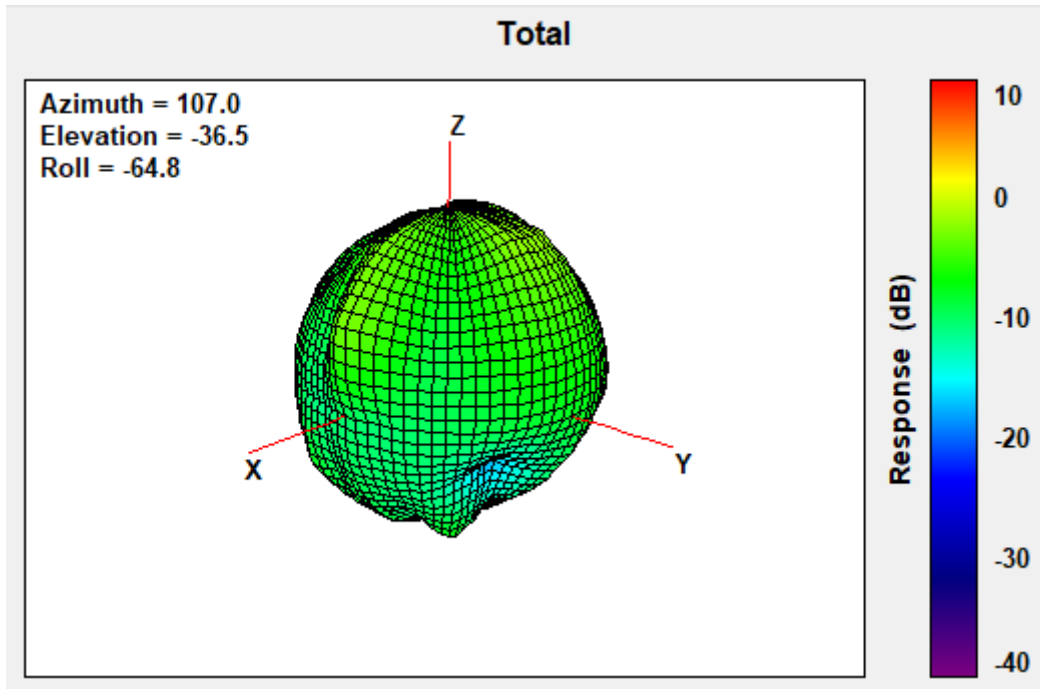
Center Frequency	<b>2110MHz</b>
Horizontal (dBi) peak	-4.27
Vertical (dBi) peak	-4.75

**2200MHz**



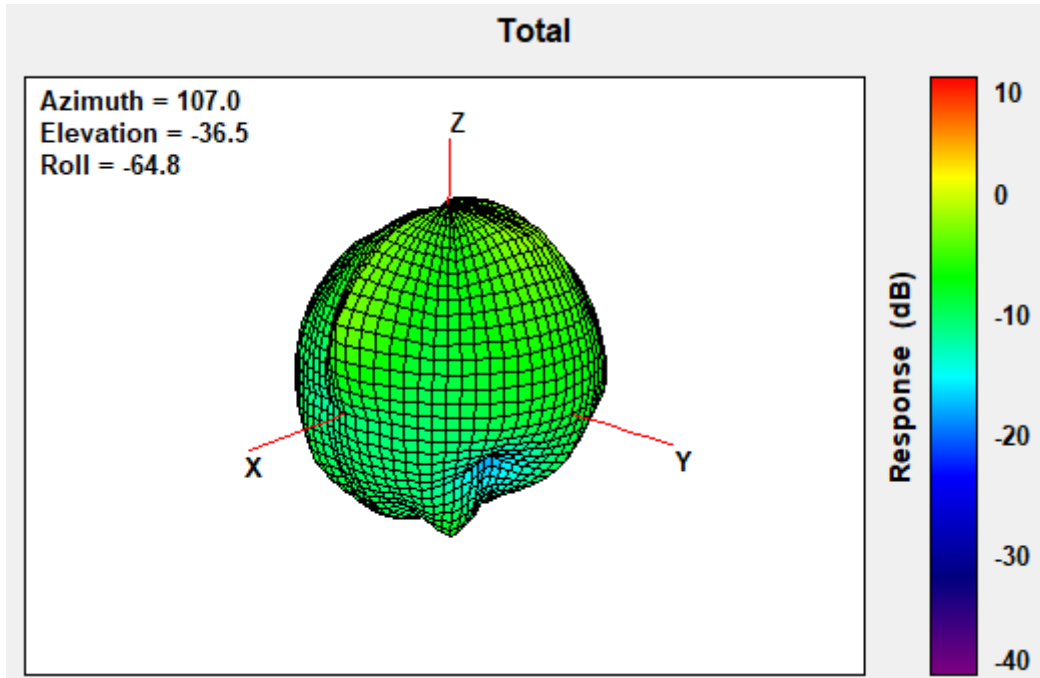
Center Frequency	<b>2200MHz</b>
Horizontal (dBi) peak	-3.86
Vertical (dBi) peak	-5.10

**2300MHz**



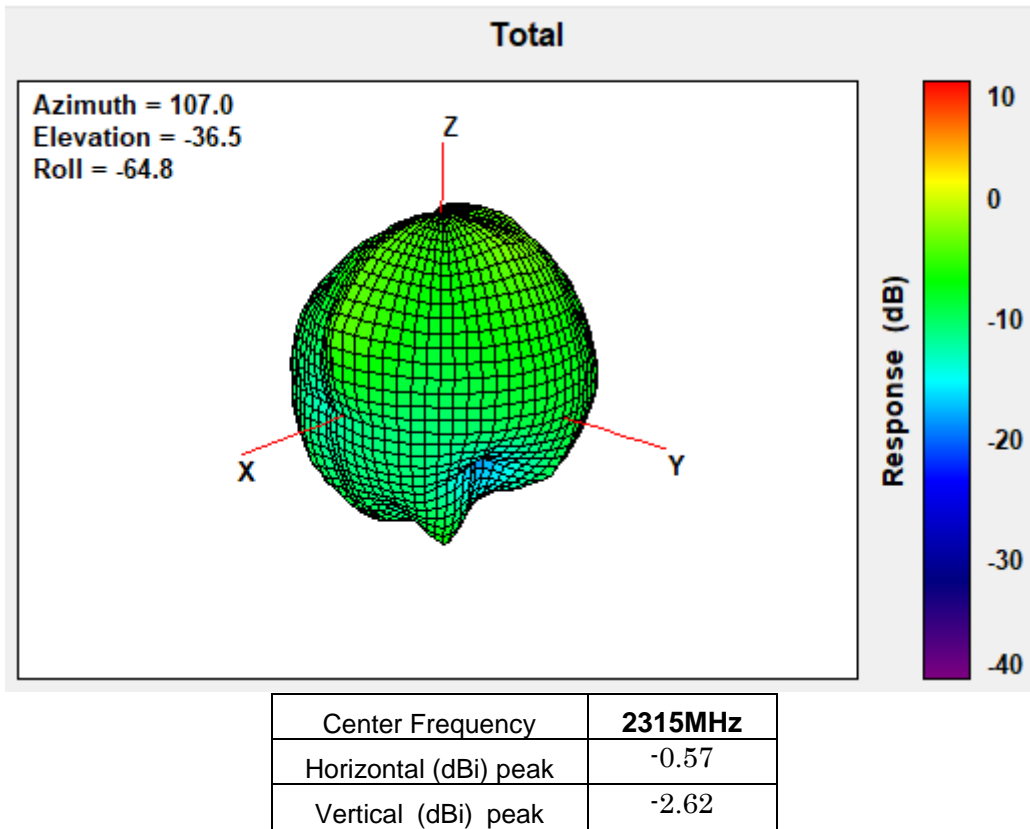
Center Frequency	<b>2300MHz</b>
Horizontal (dBi) peak	-0.73
Vertical (dBi) peak	-2.37

**2305MHz**

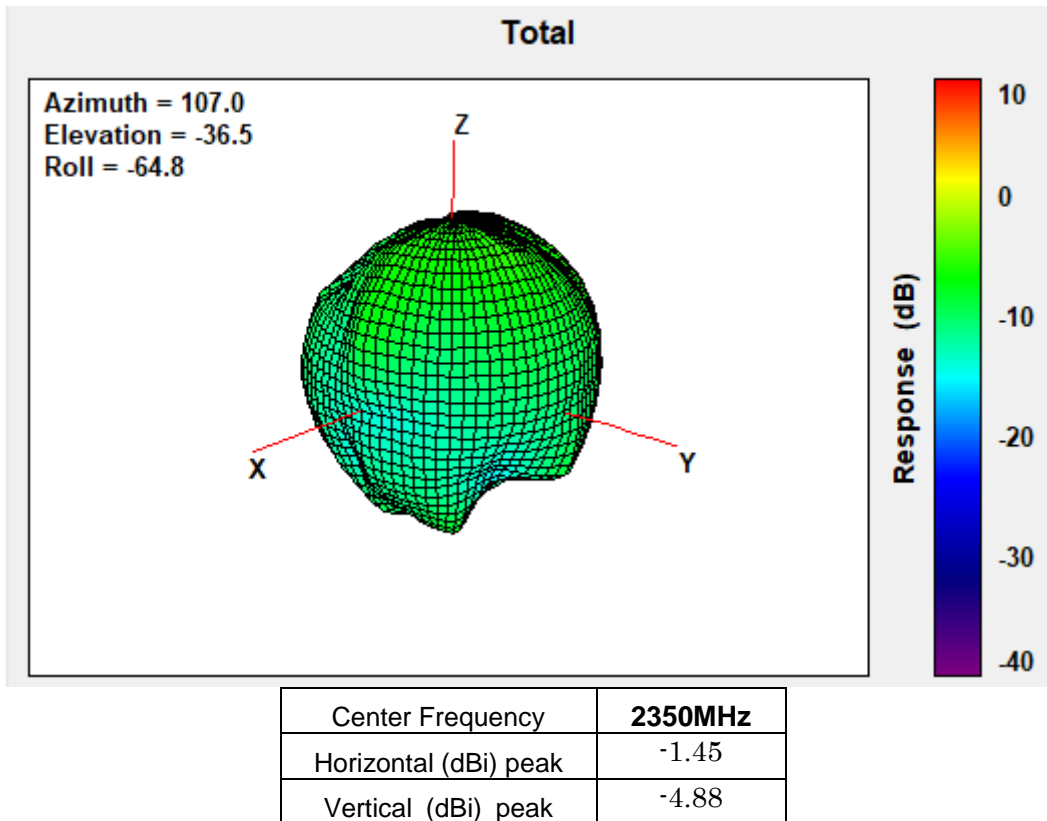


Center Frequency	<b>2305MHz</b>
Horizontal (dBi) peak	-0.64
Vertical (dBi) peak	-2.43

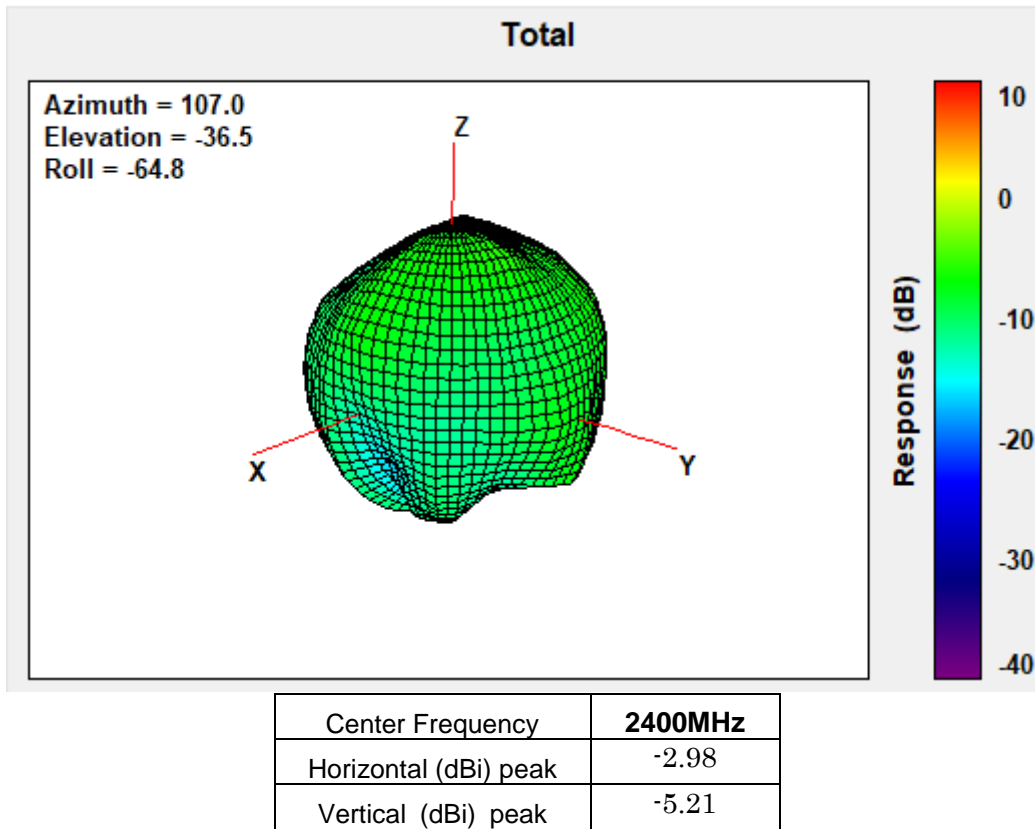
**2315MHz**



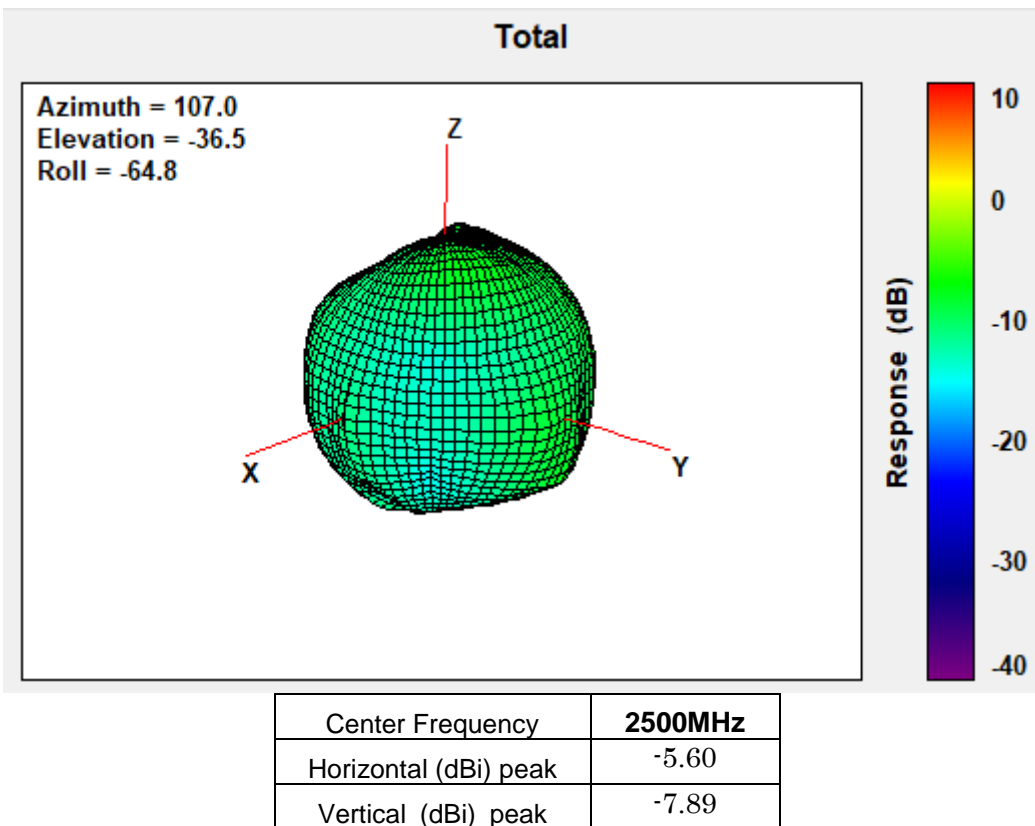
**2350MHz**



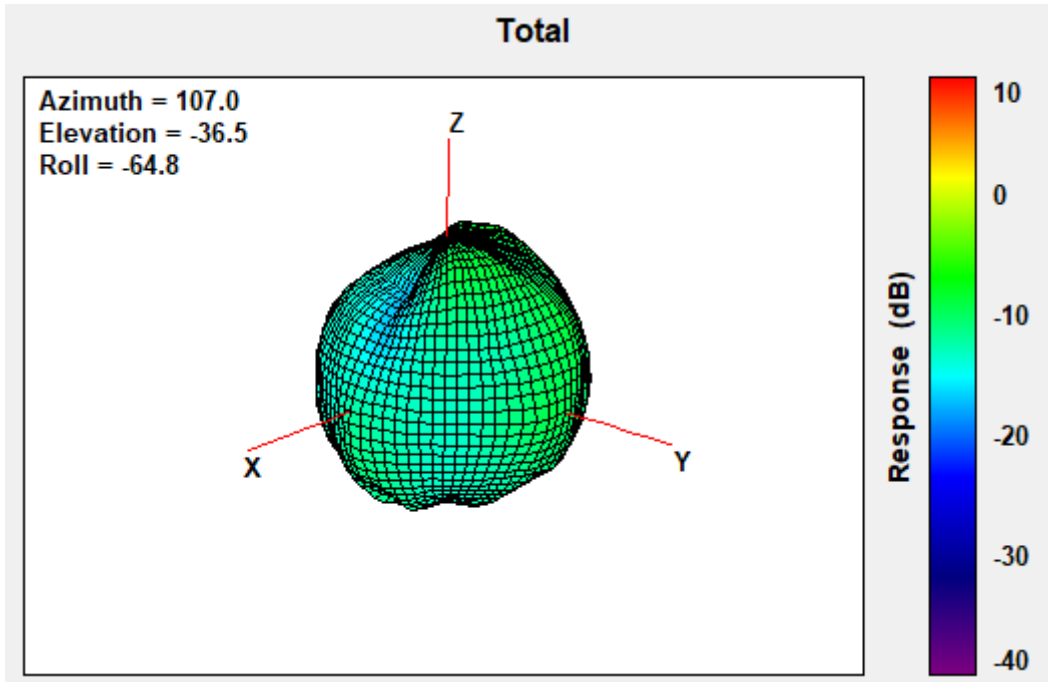
**2400MHz**



**2500MHz**

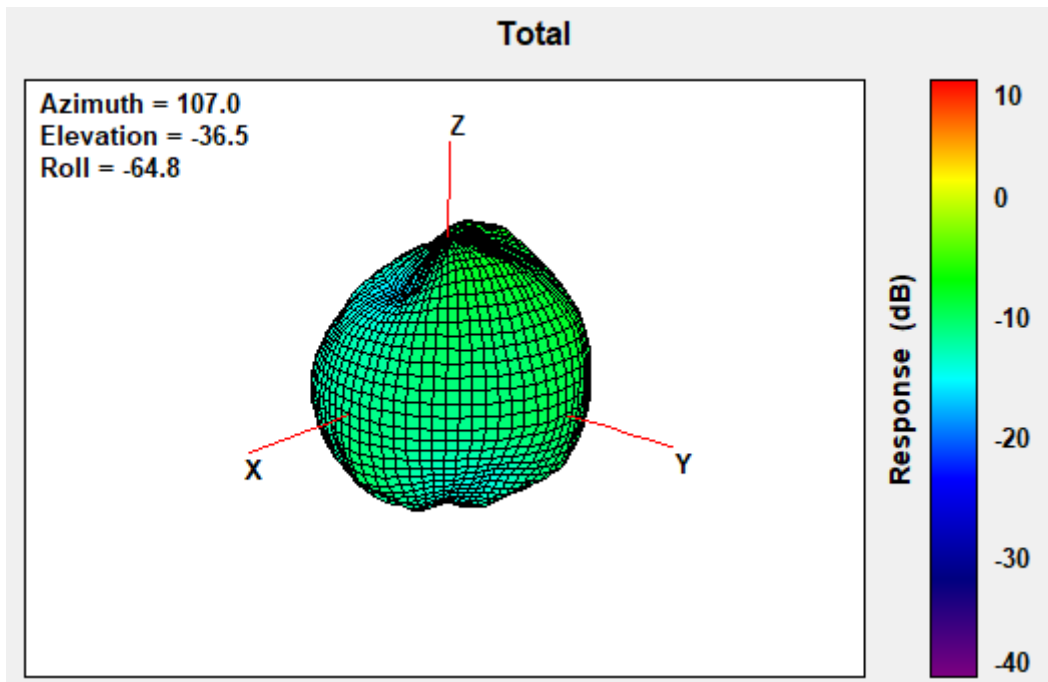


**2570MHz**



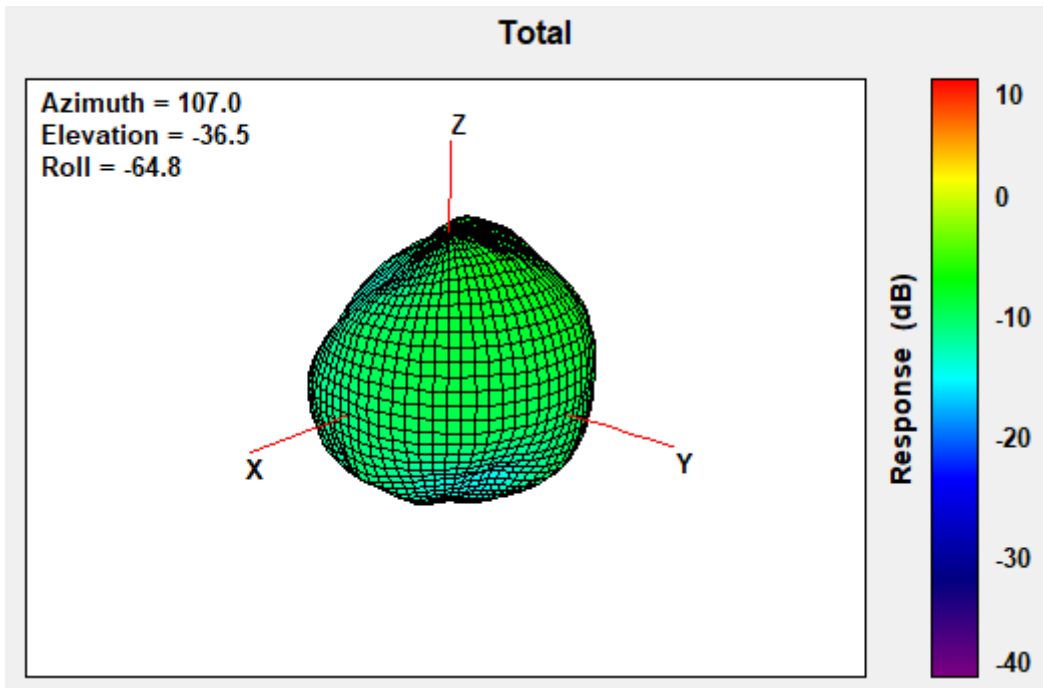
Center Frequency	<b>2570MHz</b>
Horizontal (dBi) peak	-6.58
Vertical (dBi) peak	-8.70

**2595MHz**



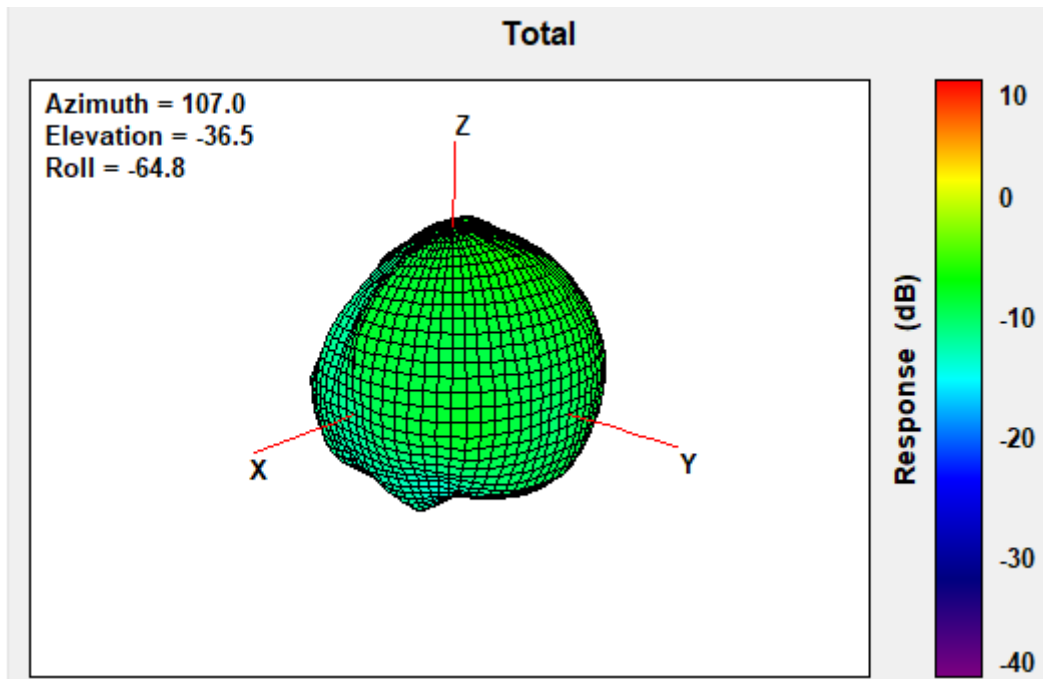
Center Frequency	<b>2595MHz</b>
Horizontal (dBi) peak	-5.73
Vertical (dBi) peak	-8.05

**2620MHz**



Center Frequency	<b>2620MHz</b>
Horizontal (dBi) peak	-4.89
Vertical (dBi) peak	-7.89

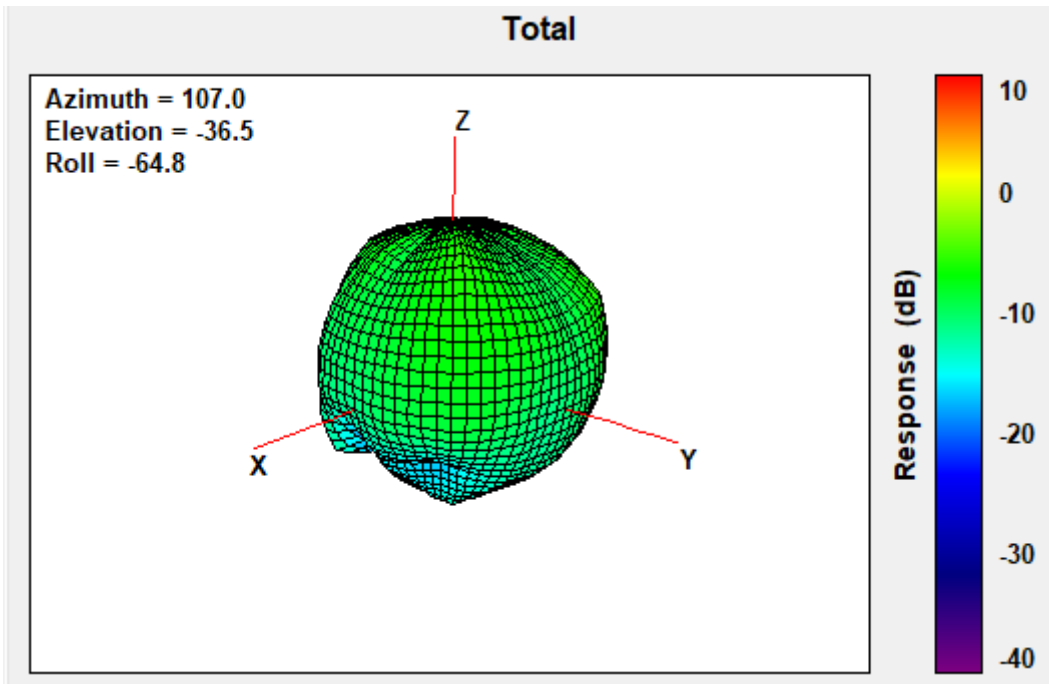
**2690MHz**



Center Frequency	<b>2690MHz</b>
Horizontal (dBi) peak	-5.01
Vertical (dBi) peak	-7.11

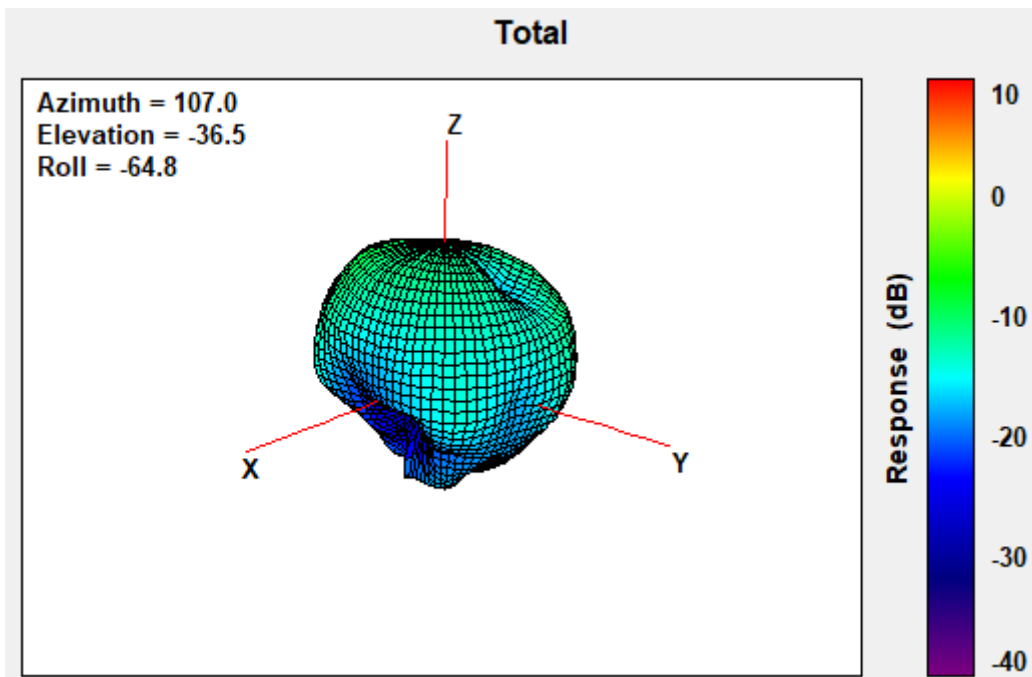


### 3400MHz



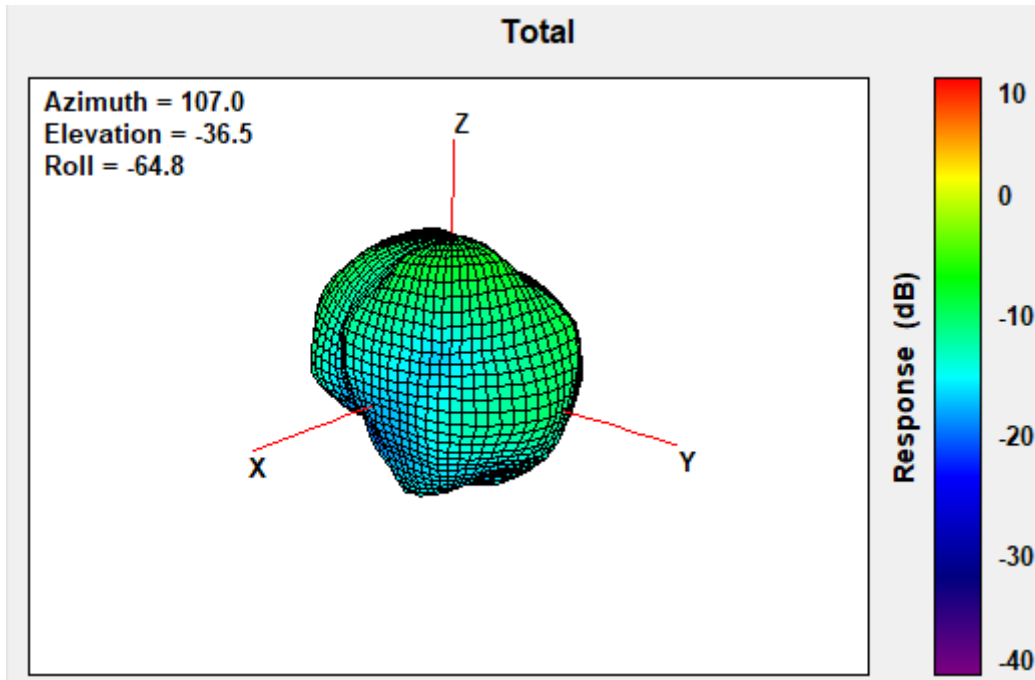
Center Frequency	<b>3400MHz</b>
Horizontal (dBi) peak	-4.23
Vertical (dBi) peak	-7.74

### 3500MHz



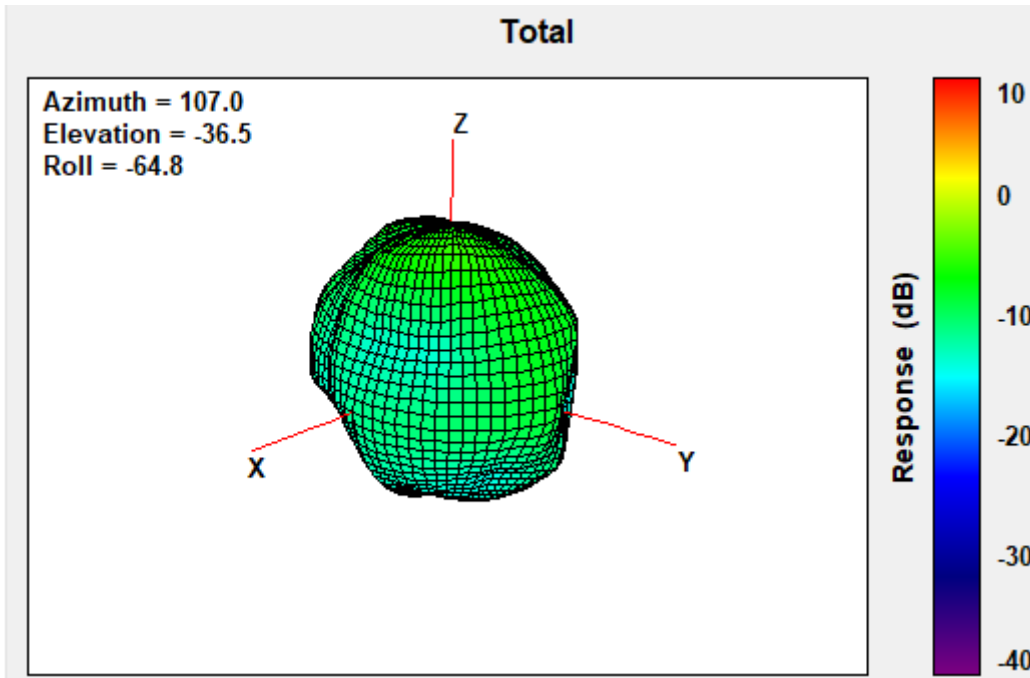
Center Frequency	<b>3500MHz</b>
Horizontal (dBi) peak	-8.05
Vertical (dBi) peak	-11.36

**3600MHz**



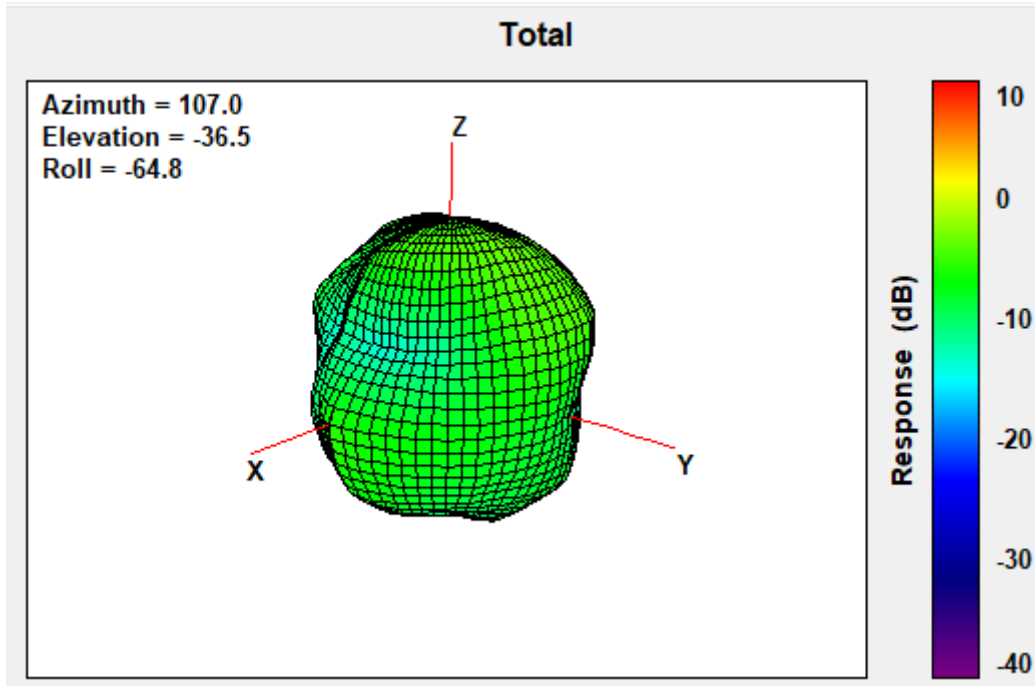
Center Frequency	<b>3600MHz</b>
Horizontal (dBi) peak	-7.55
Vertical (dBi) peak	-7.62

**3700MHz**



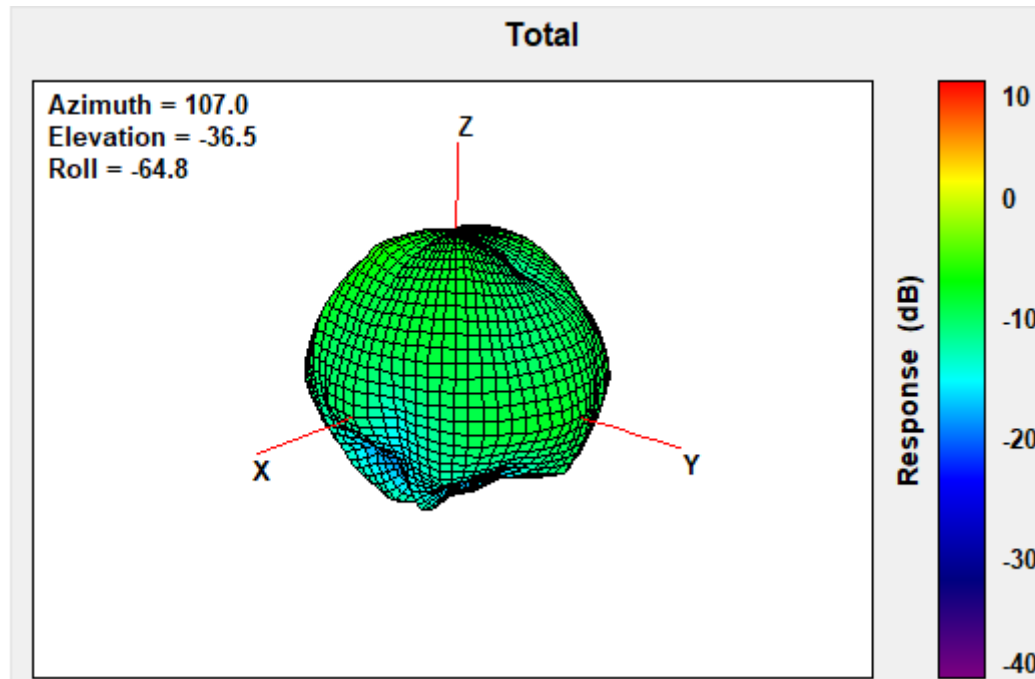
Center Frequency	<b>3700MHz</b>
Horizontal (dBi) peak	-6.94
Vertical (dBi) peak	-6.23

**3800MHz**



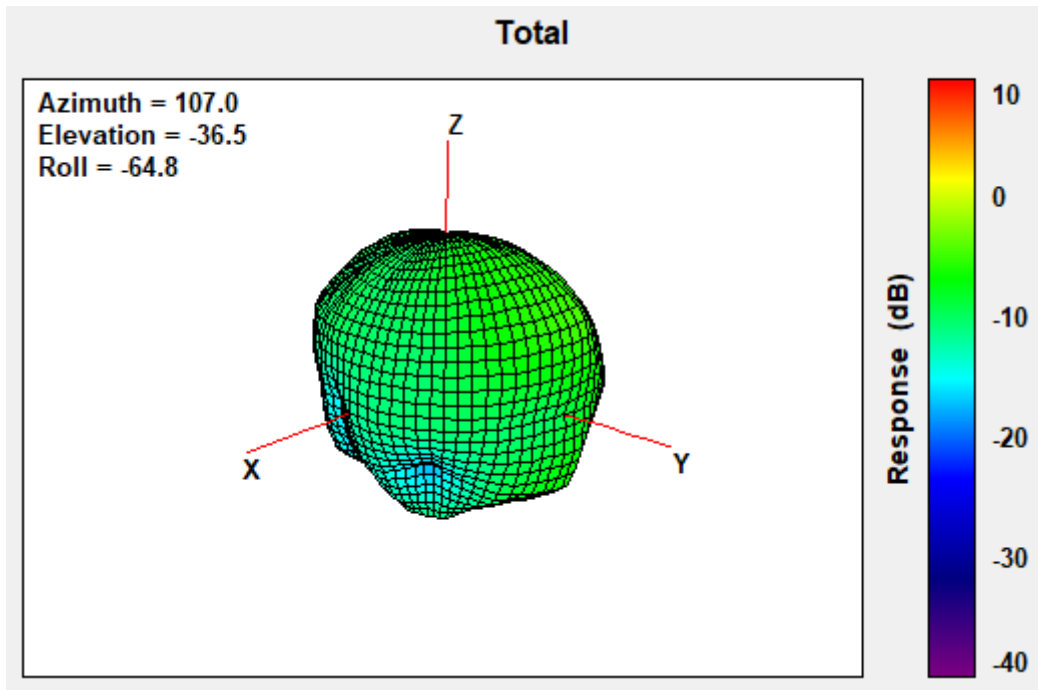
Center Frequency	<b>3800MHz</b>
Horizontal (dBi) peak	-4.94
Vertical (dBi) peak	-4.08

**4200MHz**



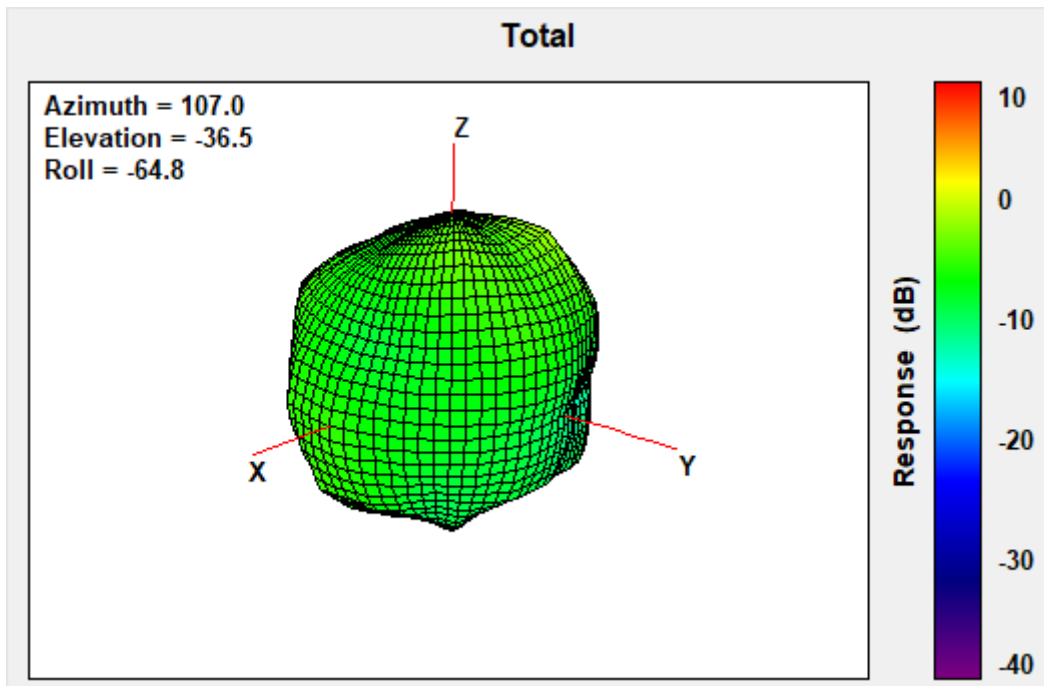
Center Frequency	<b>4200MHz</b>
Horizontal (dBi) peak	-5.64
Vertical (dBi) peak	-6.99

### 4400MHz



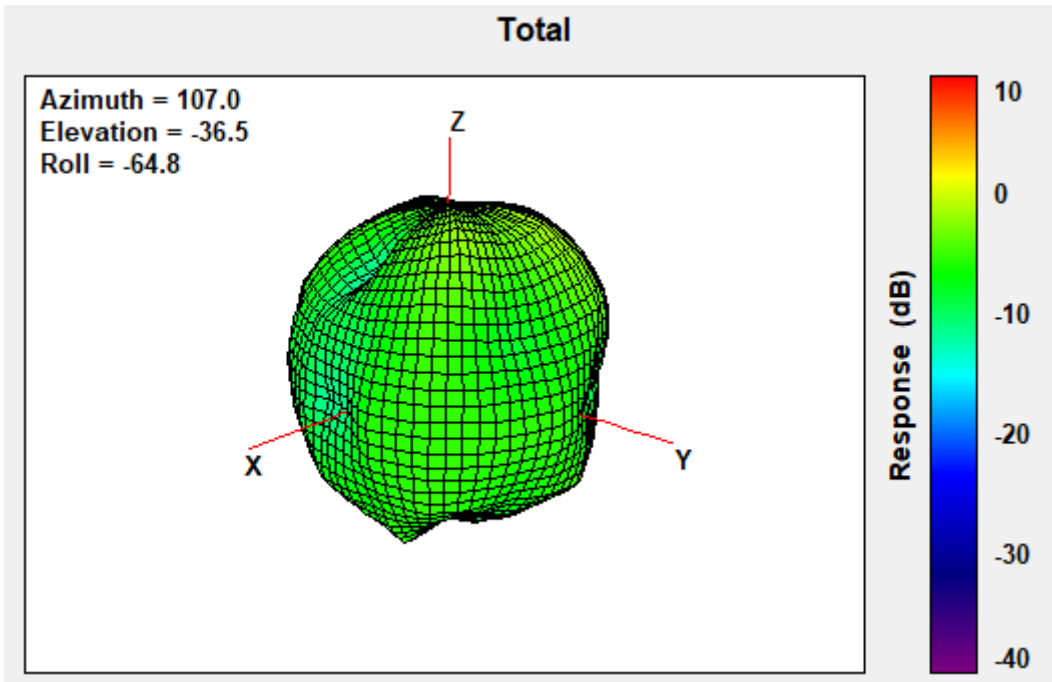
Center Frequency	<b>4400MHz</b>
Horizontal (dBi) peak	-6.06
Vertical (dBi) peak	-7.47

### 4700MHz



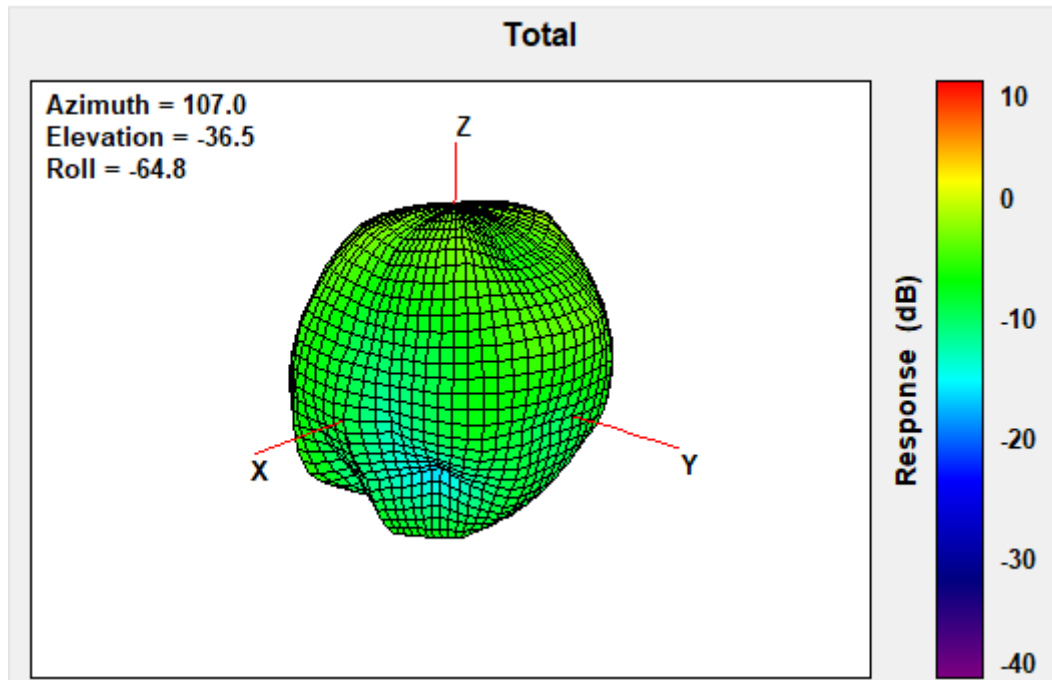
Center Frequency	<b>4700MHz</b>
Horizontal (dBi) peak	-2.73
Vertical (dBi) peak	-4.24

5150MHz



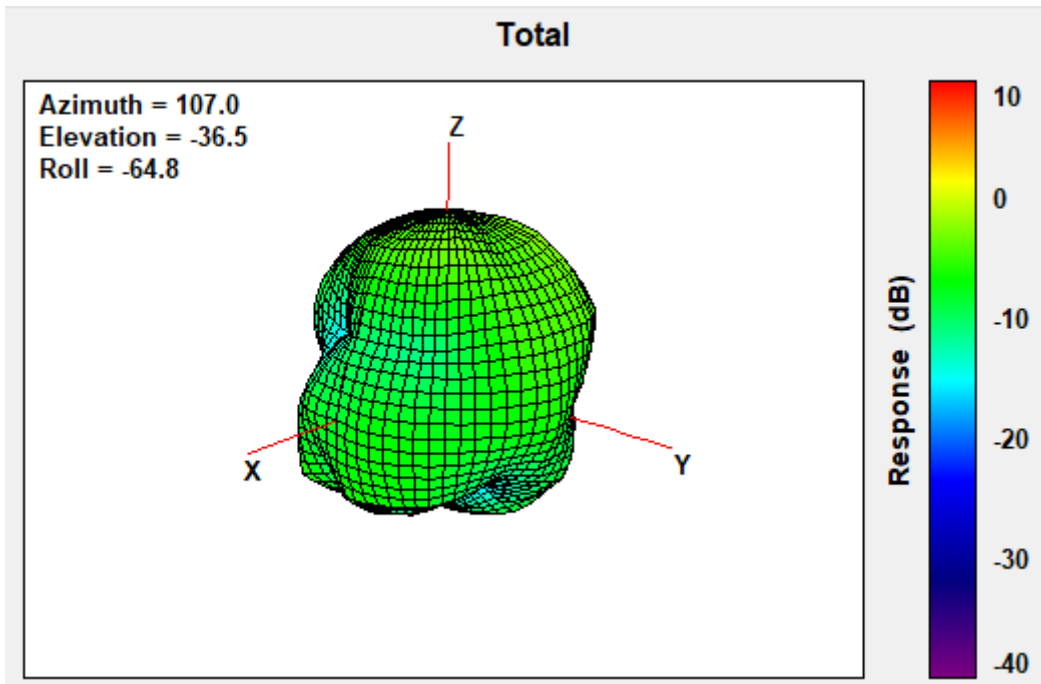
Center Frequency	<b>5150MHz</b>
Horizontal (dBi) peak	-1.92
Vertical (dBi) peak	-1.36

5537.5MHz



Center Frequency	<b>5537.5MHz</b>
Horizontal (dBi) peak	-2.45
Vertical (dBi) peak	-1.77

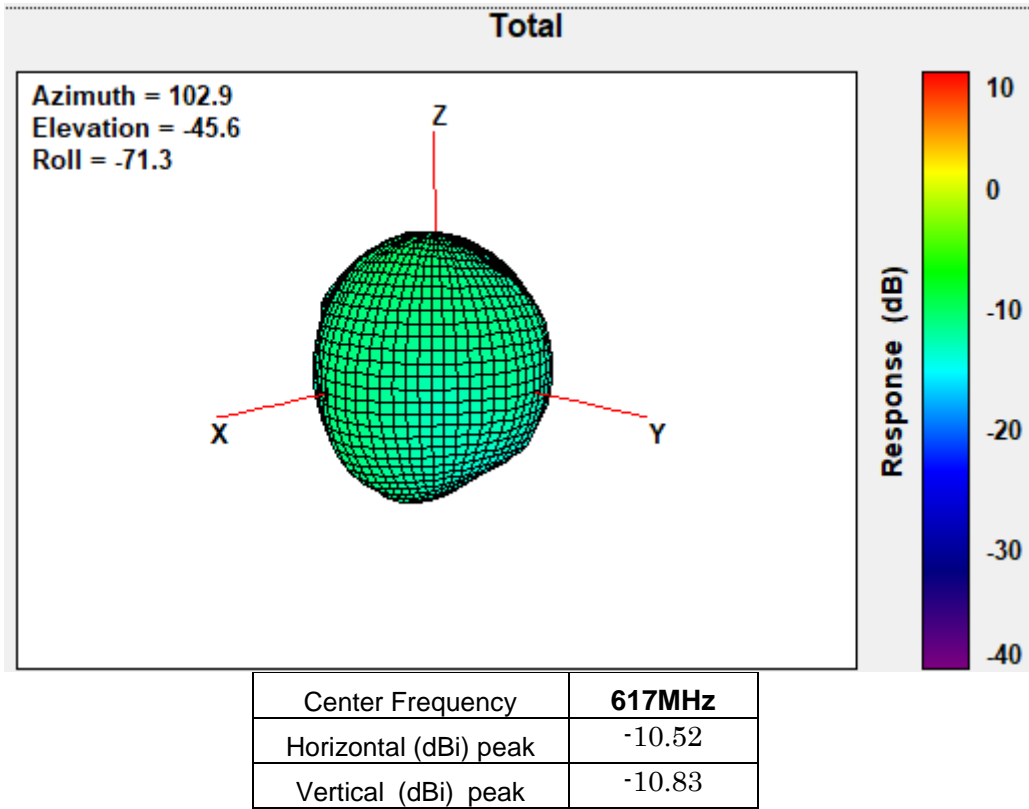
### 5925MHz



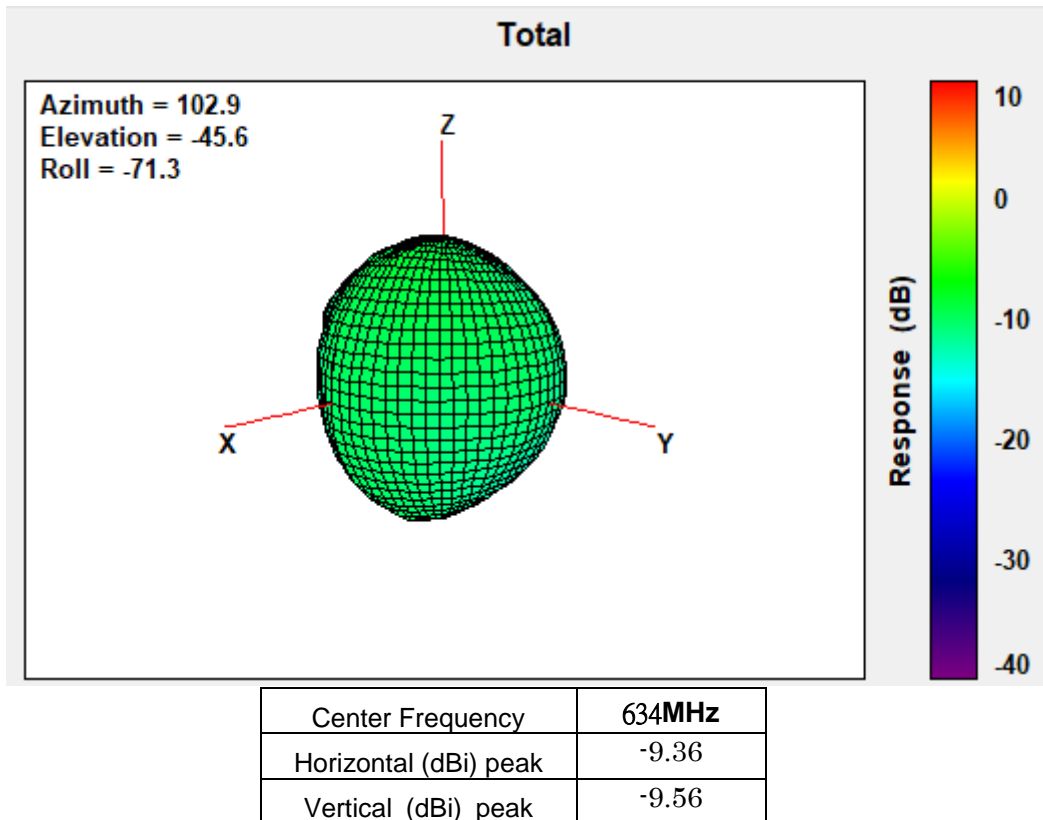
Center Frequency	<b>5925MHz</b>
Horizontal (dBi) peak	-4.27
Vertical (dBi) peak	-2.44

# WWAN Aux Antenna (DRx)

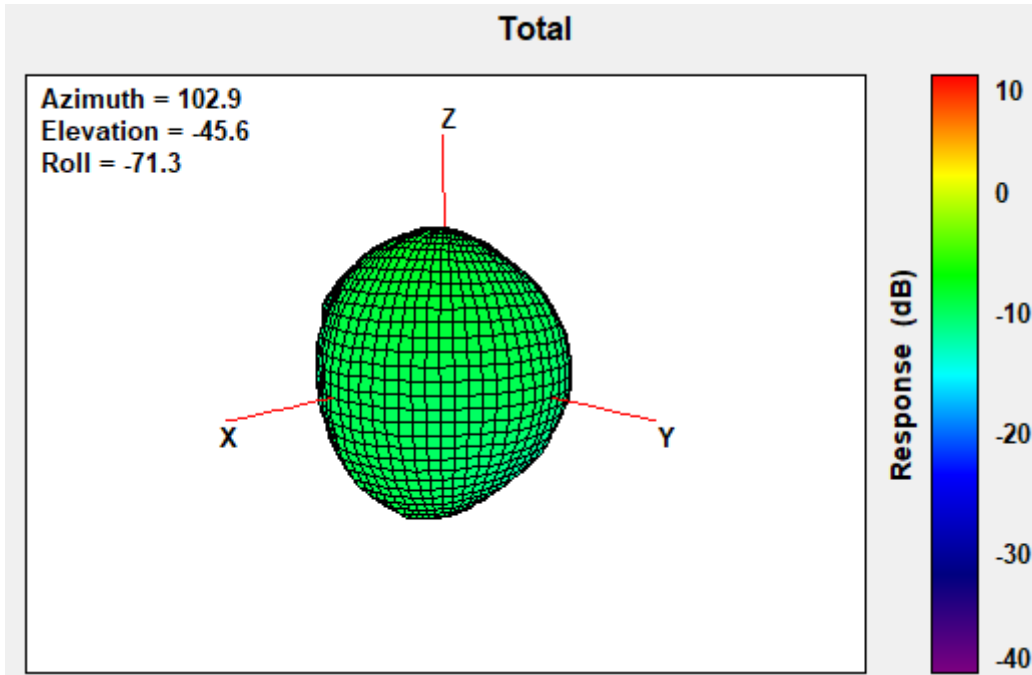
617MHz



634MHz

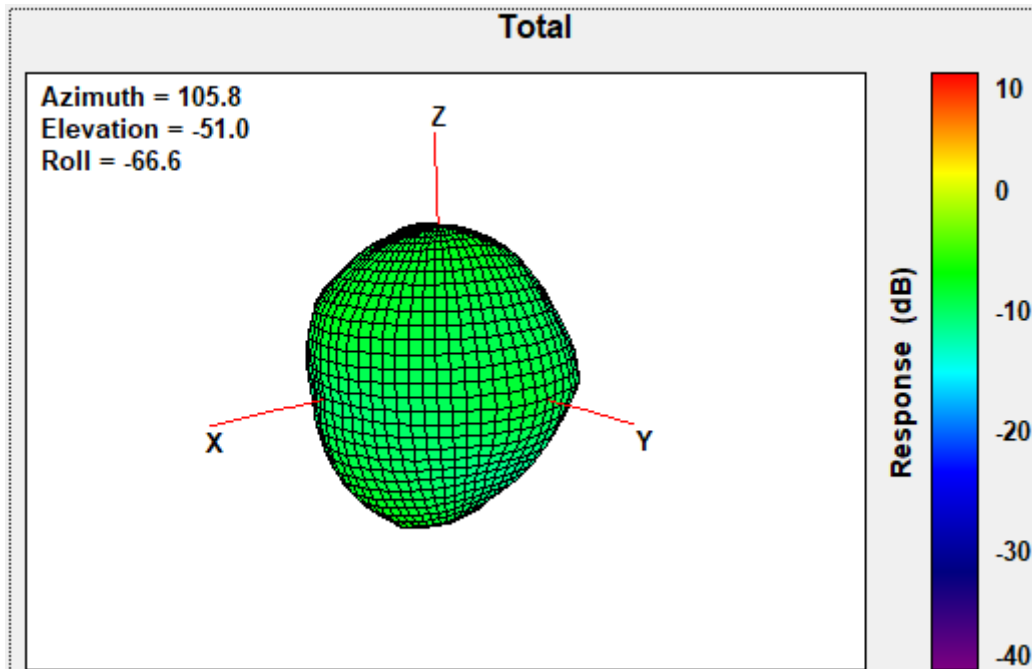


**652MHz**



Center Frequency	<b>652MHz</b>
Horizontal (dBi) peak	-8.85
Vertical (dBi) peak	-8.82

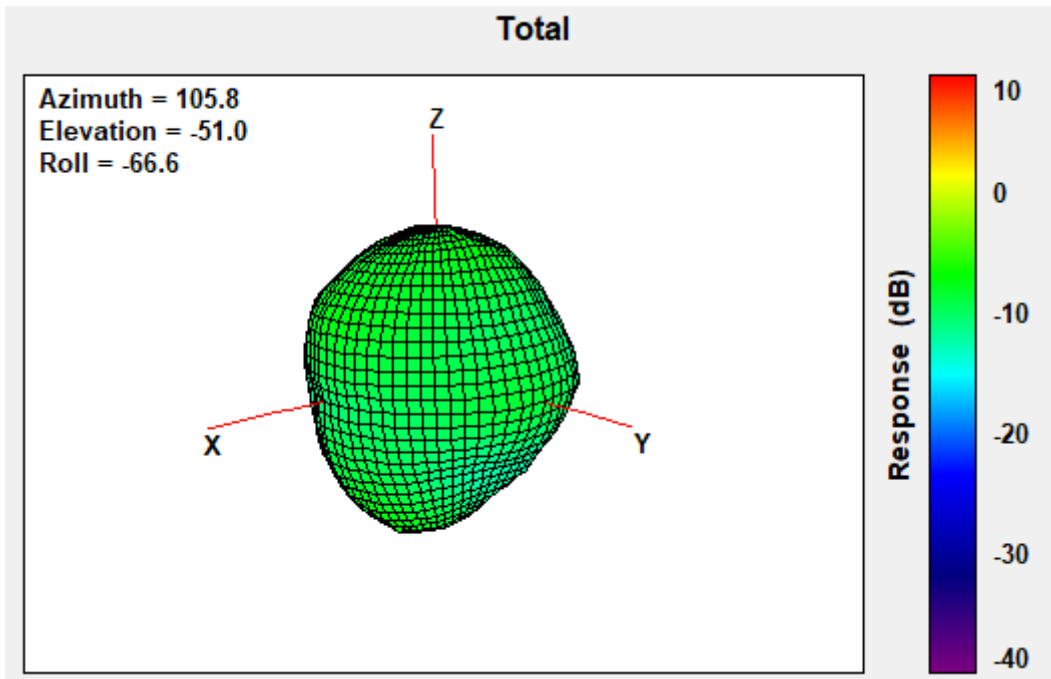
**717MHz**



Center Frequency	<b>717MHz</b>
Horizontal (dBi) peak	-7.39
Vertical (dBi) peak	-8.10

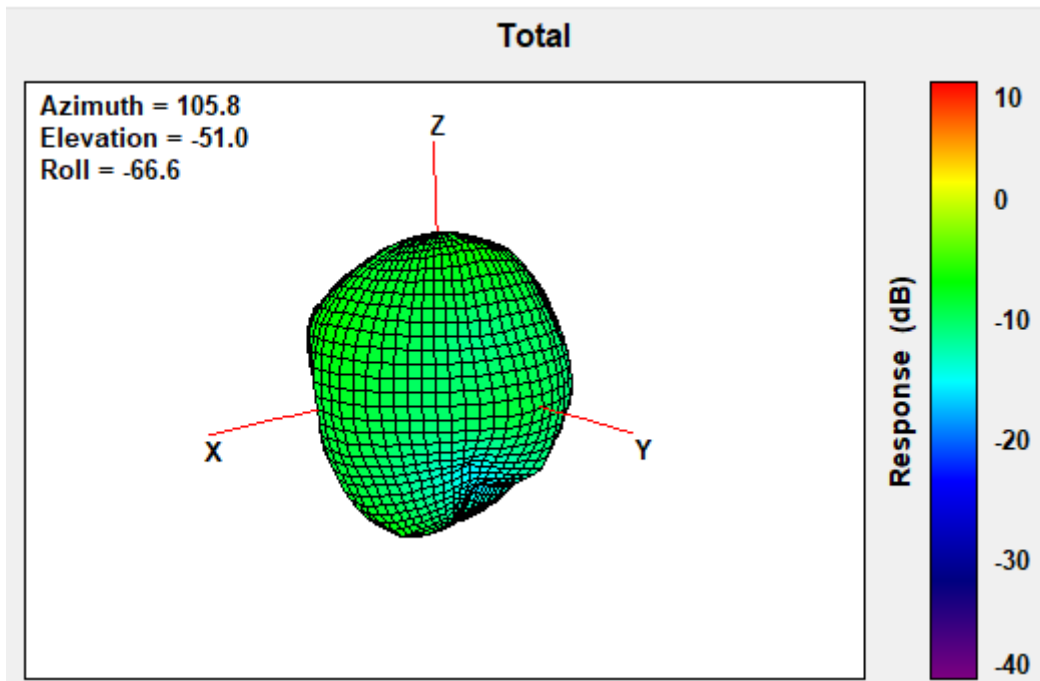


### 725.5MHz



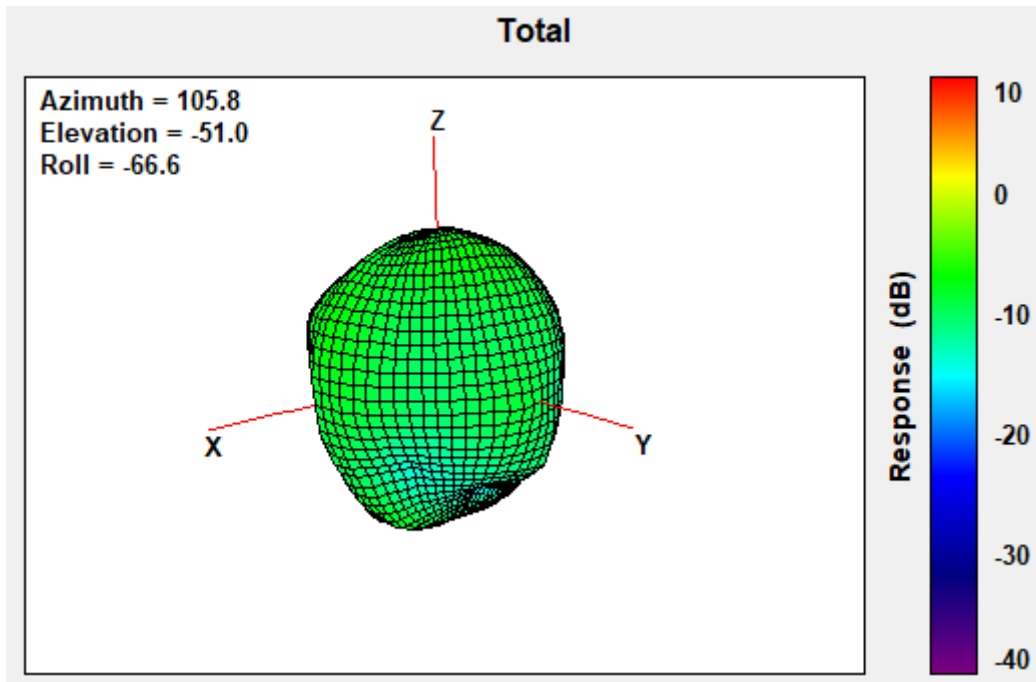
Center Frequency	<b>725.5MHz</b>
Horizontal (dBi) peak	-7.12
Vertical (dBi) peak	-7.78

### 748MHz



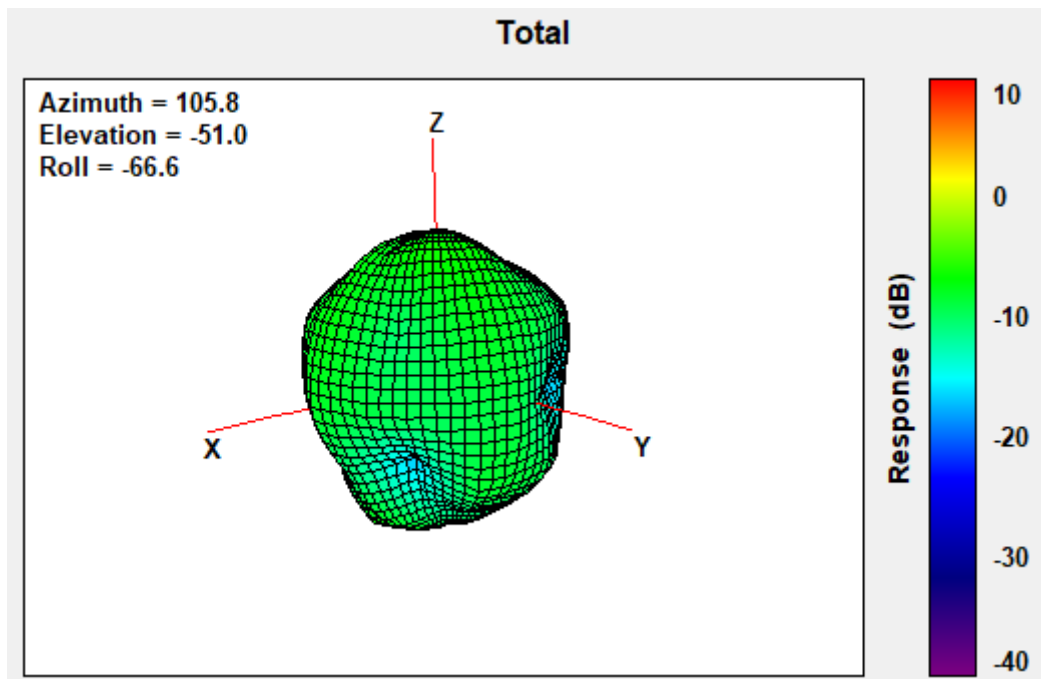
Center Frequency	<b>748MHz</b>
Horizontal (dBi) peak	-7.53
Vertical (dBi) peak	-7.36

### 756MHz



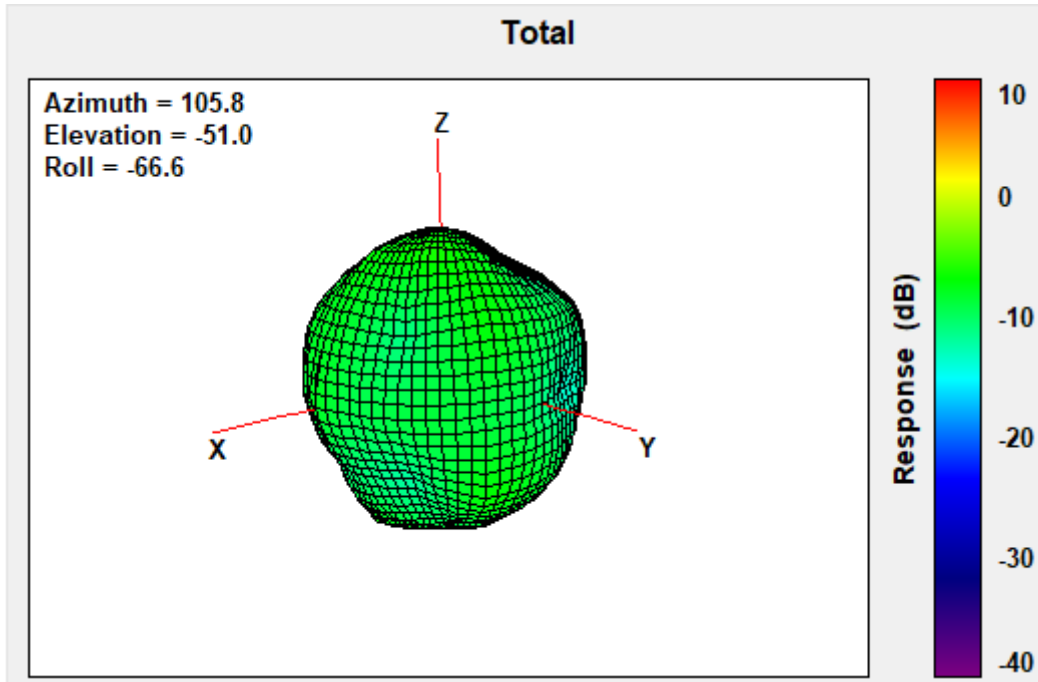
Center Frequency	<b>756MHz</b>
Horizontal (dBi) peak	-7.23
Vertical (dBi) peak	-7.65

### 768MHz



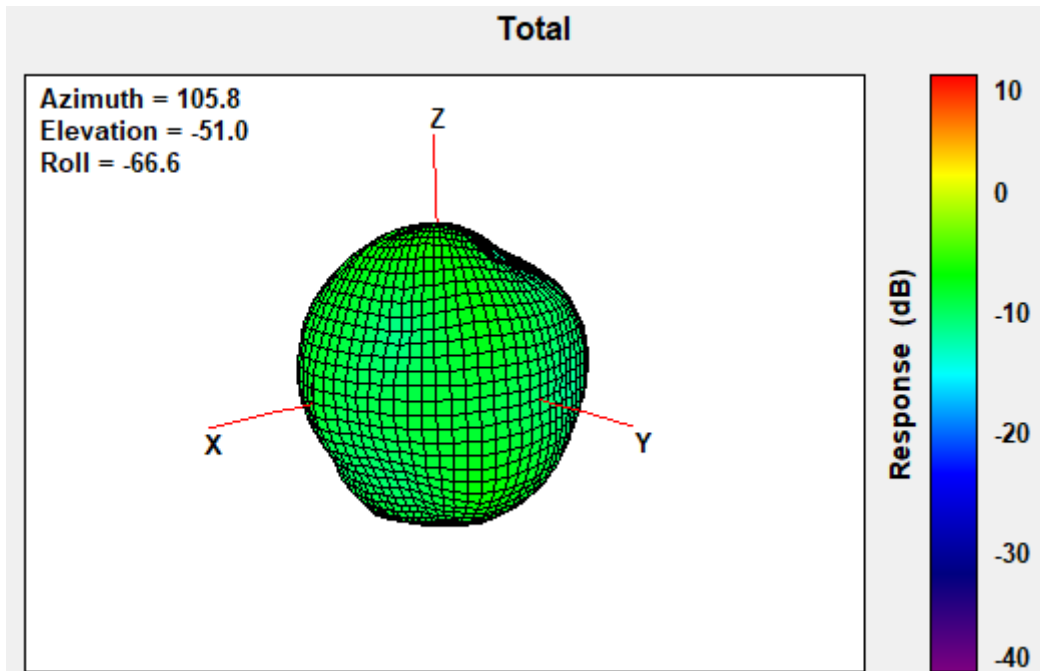
Center Frequency	<b>768MHz</b>
Horizontal (dBi) peak	-6.92
Vertical (dBi) peak	-7.59

### 777MHz



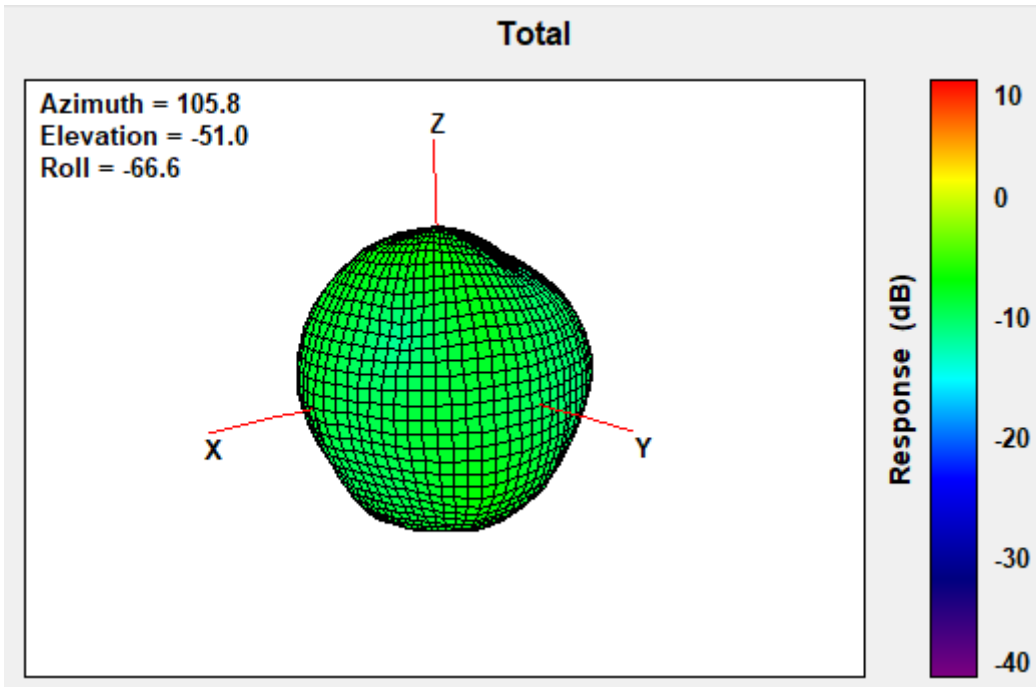
Center Frequency	<b>777MHz</b>
Horizontal (dBi) peak	-7.15
Vertical (dBi) peak	-6.35

### 782MHz



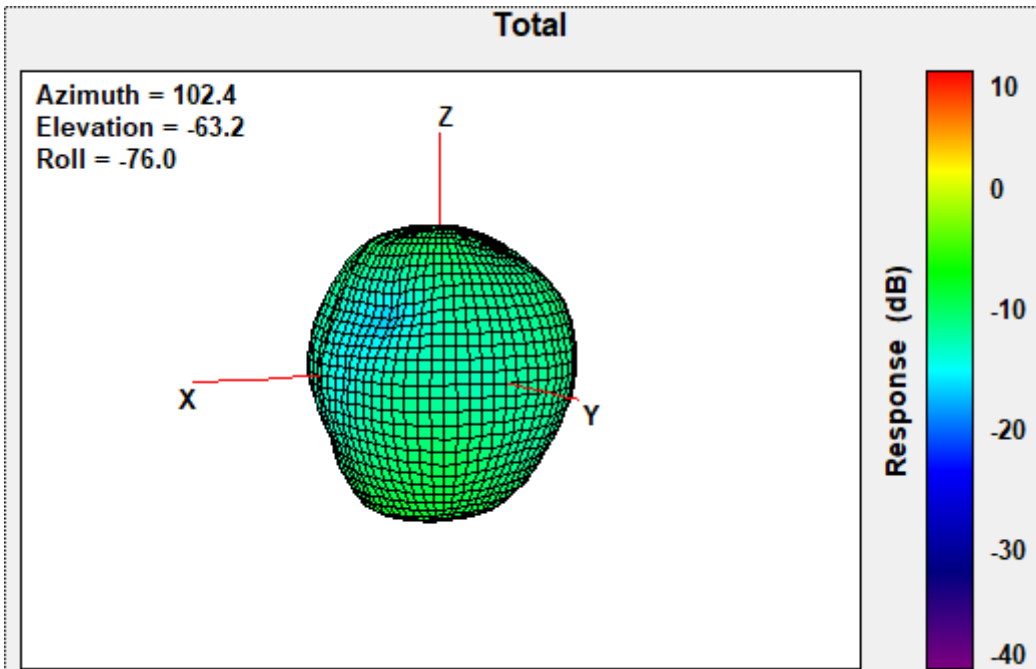
Center Frequency	<b>782MHz</b>
Horizontal (dBi) peak	-7.02
Vertical (dBi) peak	-6.17

### 787MHz



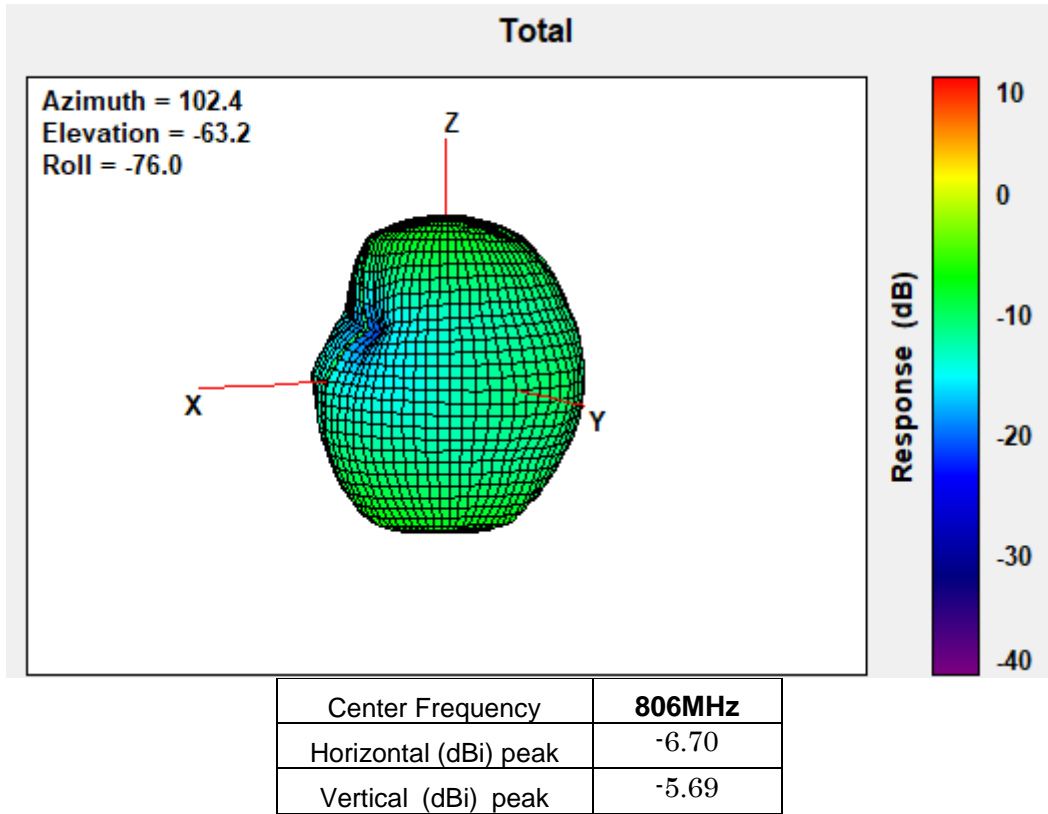
Center Frequency	<b>787MHz</b>
Horizontal (dBi) peak	-7.13
Vertical (dBi) peak	-6.29

### 791MHz

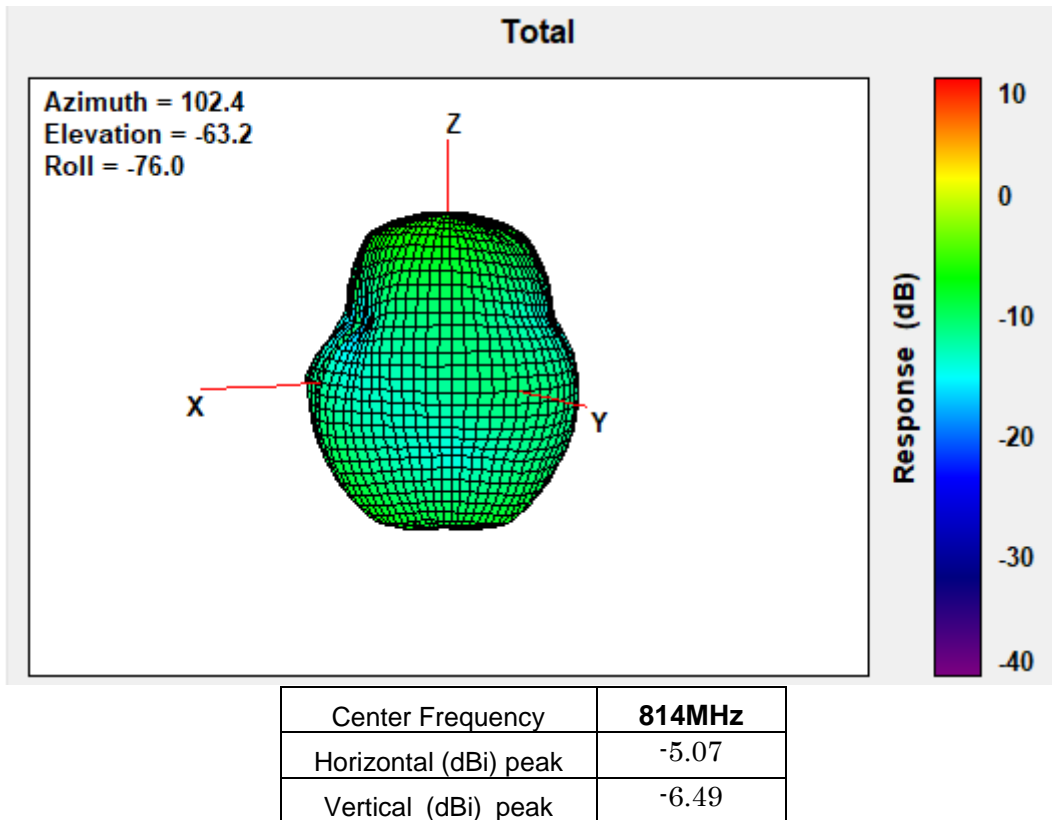


Center Frequency	<b>791MHz</b>
Horizontal (dBi) peak	-9.90
Vertical (dBi) peak	-7.45

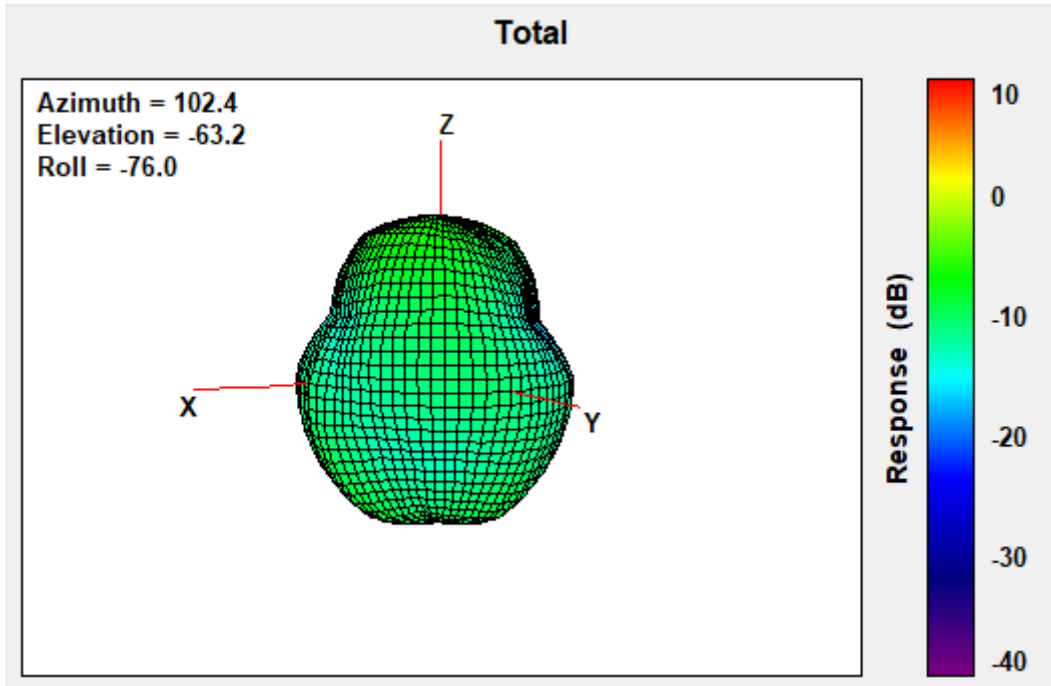
### 806MHz



### 814MHz

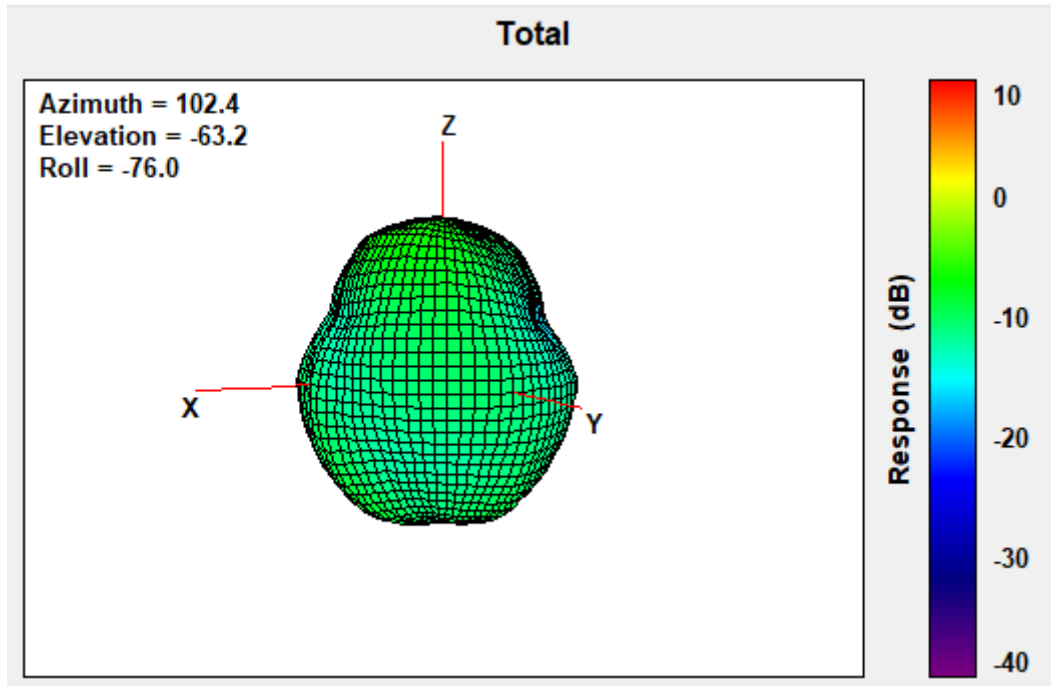


### 821MHz



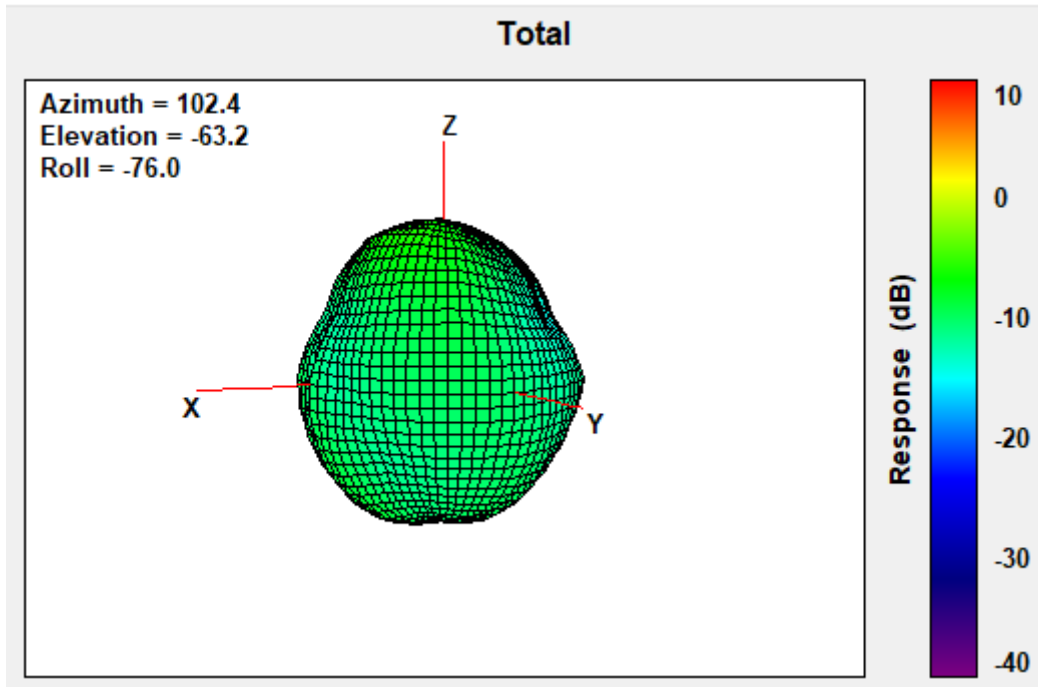
Center Frequency	<b>821MHz</b>
Horizontal (dBi) peak	-5.75
Vertical (dBi) peak	-6.72

### 824MHz

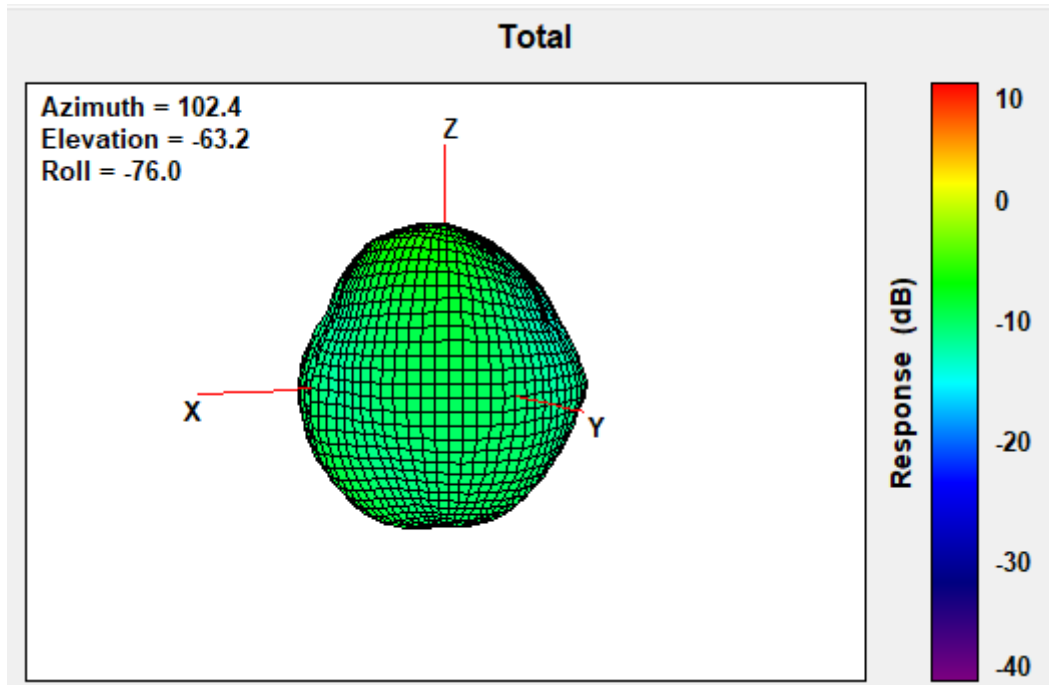


Center Frequency	<b>824MHz</b>
Horizontal (dBi) peak	-6.24
Vertical (dBi) peak	-6.73

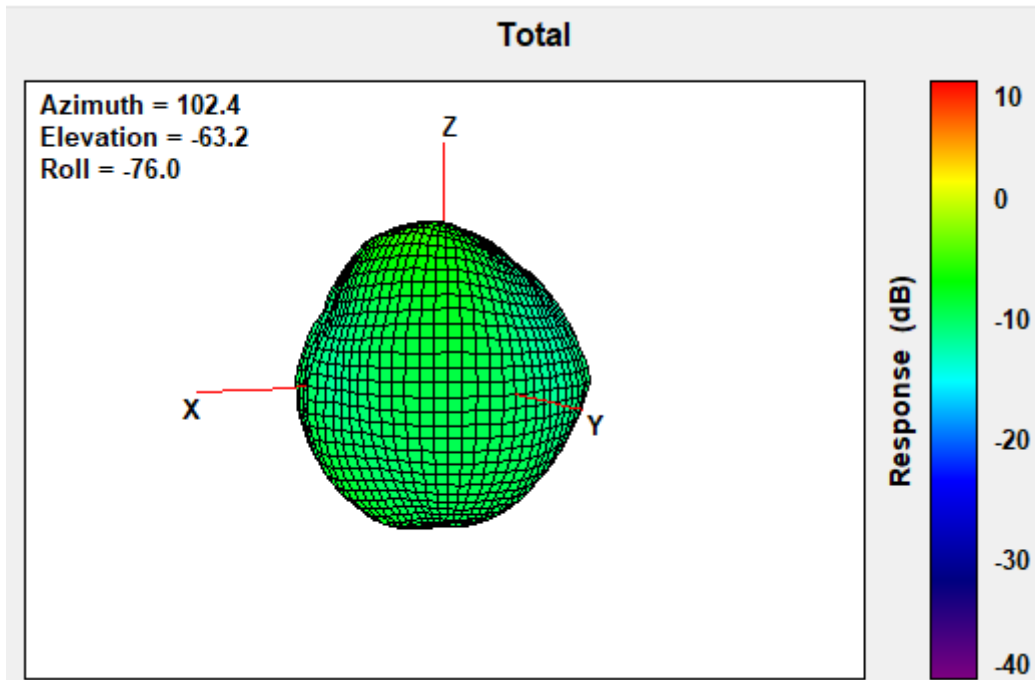
**832MHz**



**836.5MHz**

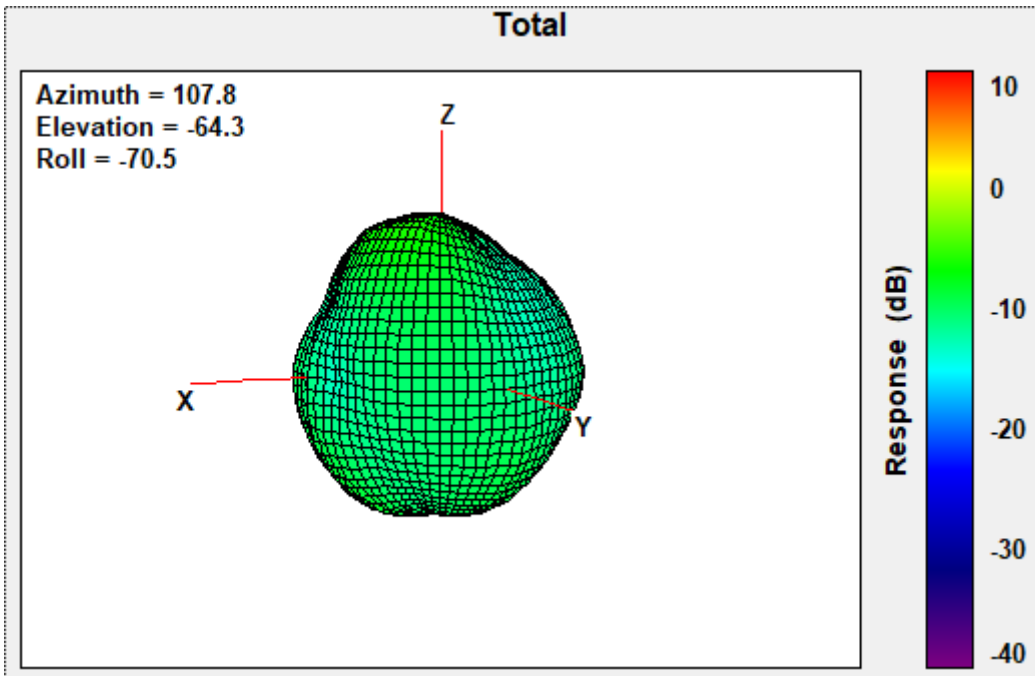


**849MHz**



Center Frequency	<b>849MHz</b>
Horizontal (dBi) peak	-7.61
Vertical (dBi) peak	-6.74

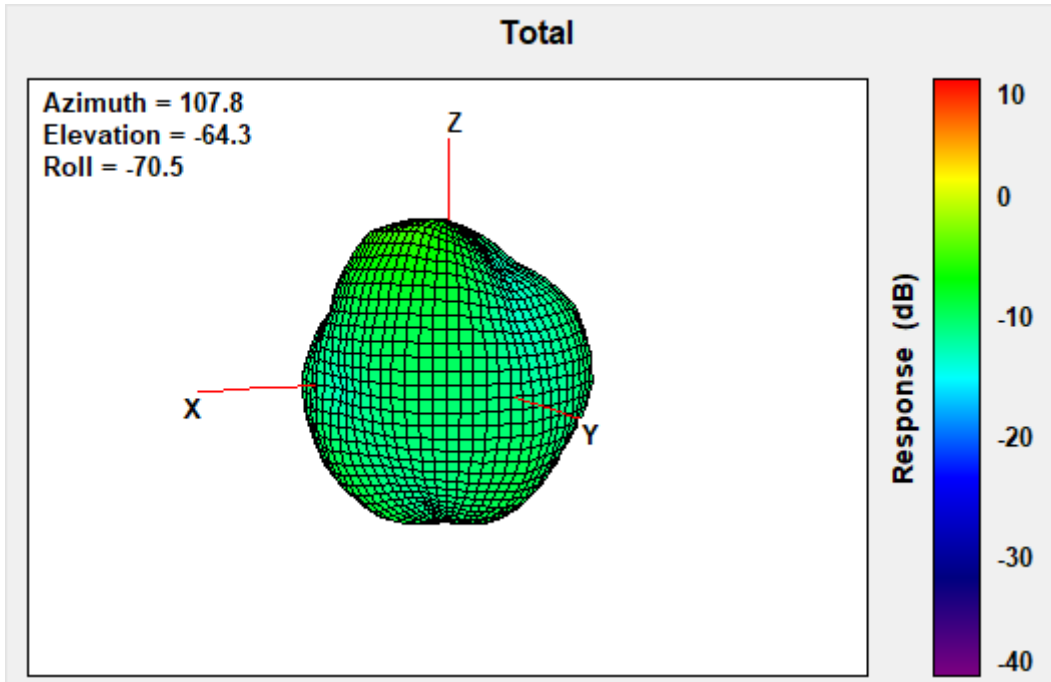
**862MHz**



Center Frequency	<b>862MHz</b>
Horizontal (dBi) peak	-7.96
Vertical (dBi) peak	-7.52

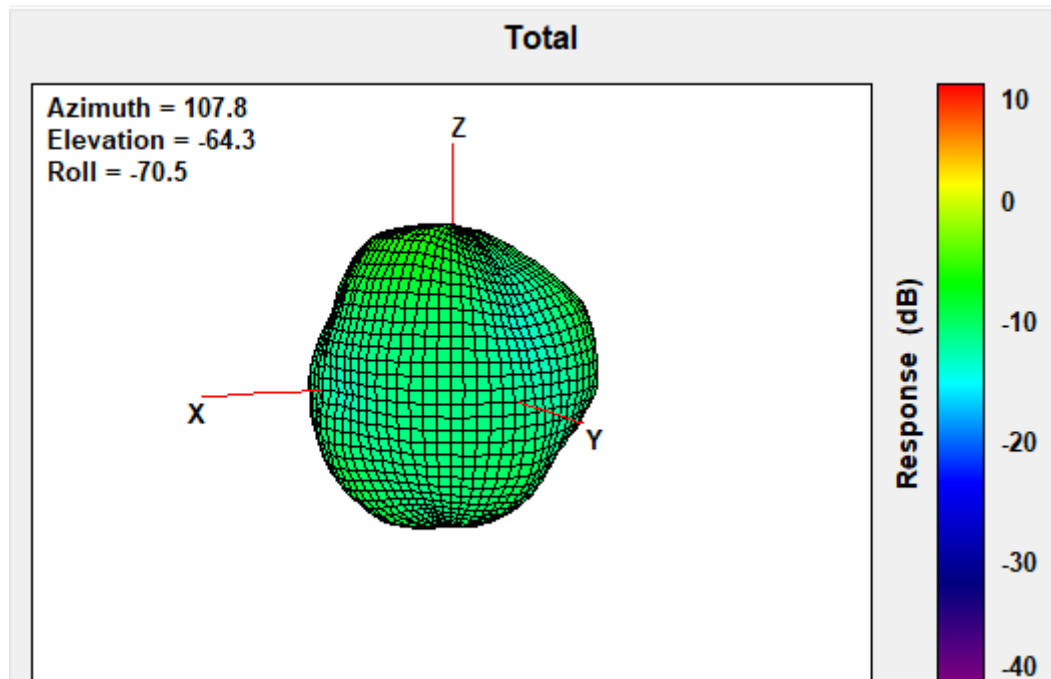


**880MHz**



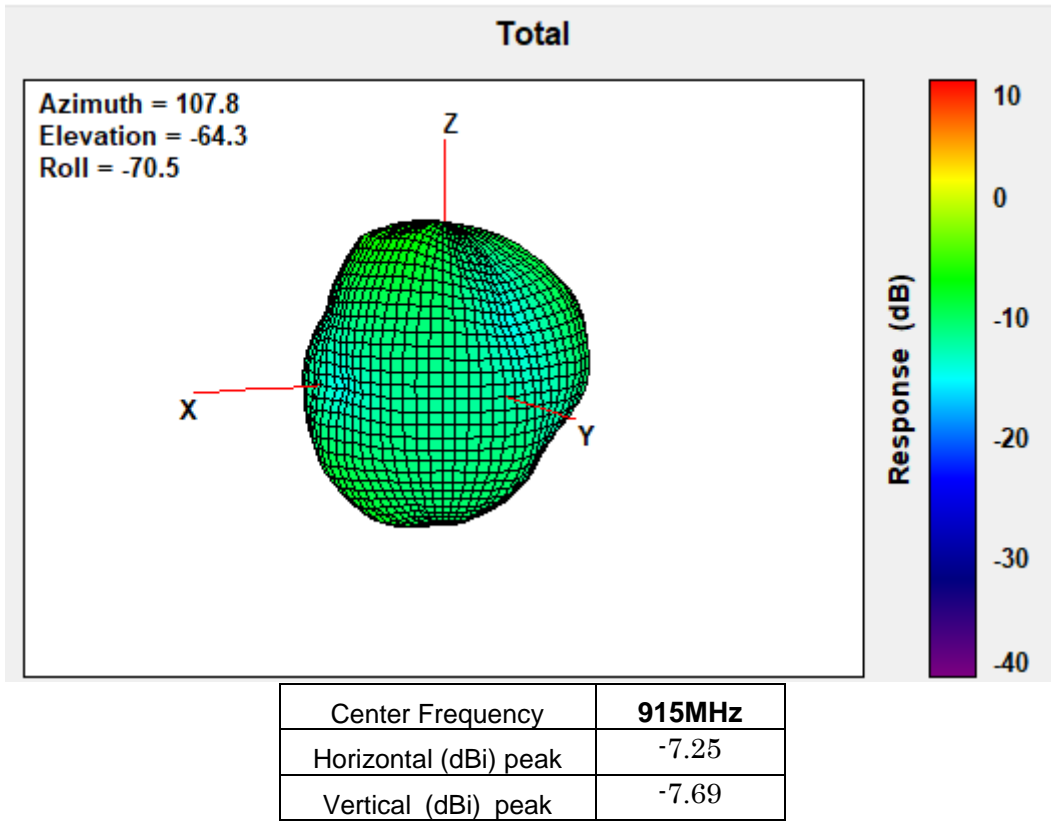
Center Frequency	<b>880MHz</b>
Horizontal (dBi) peak	-5.92
Vertical (dBi) peak	-7.55

**897.5MHz**

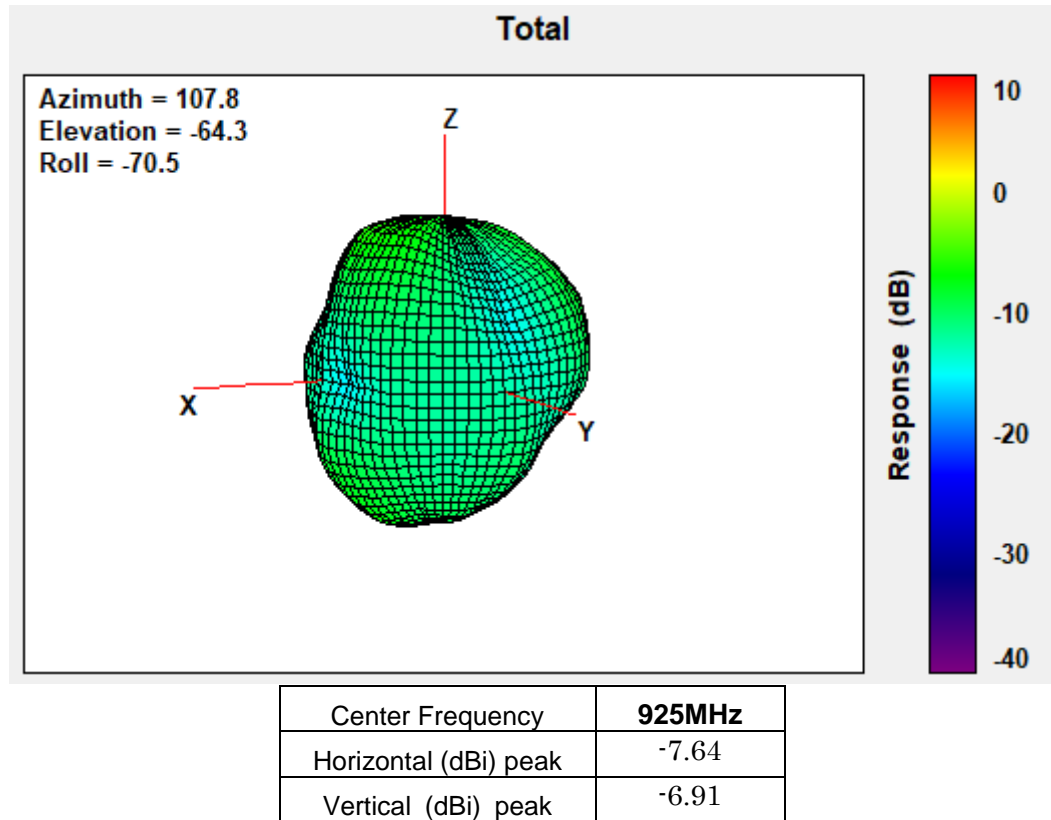


Center Frequency	<b>897.5MHz</b>
Horizontal (dBi) peak	-6.27
Vertical (dBi) peak	-8.23

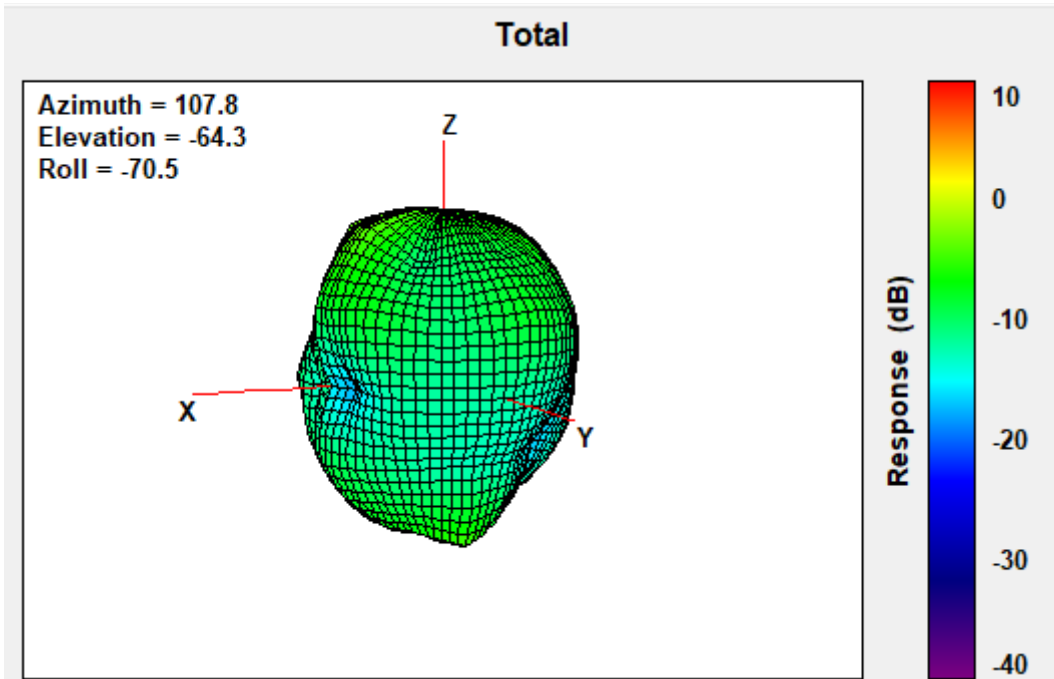
### 915MHz



### 925MHz

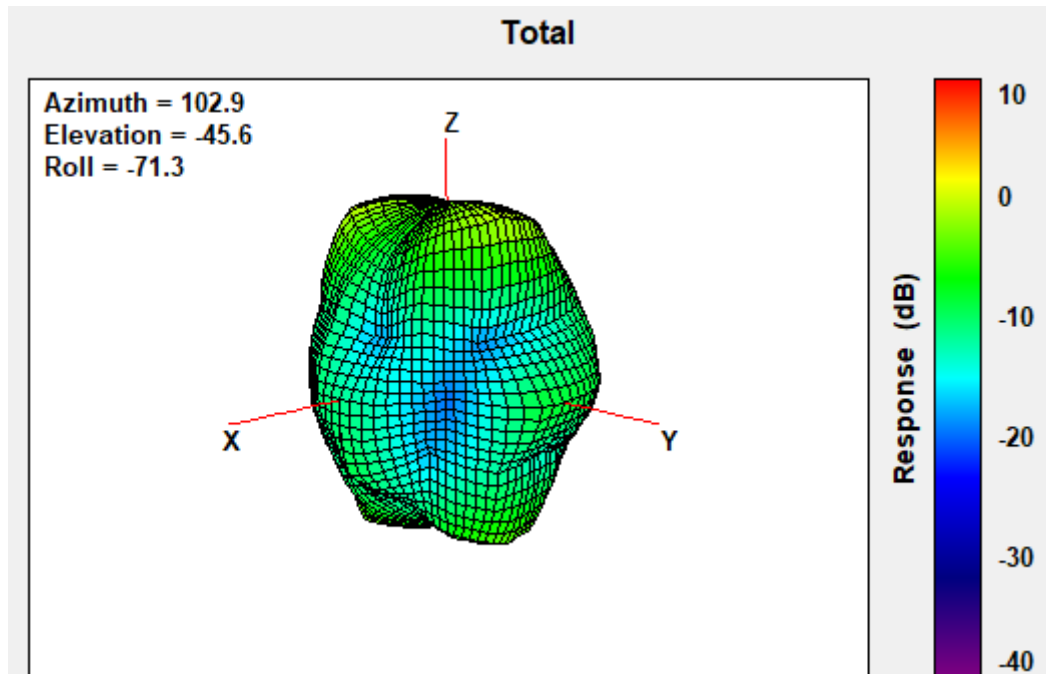


**960MHz**



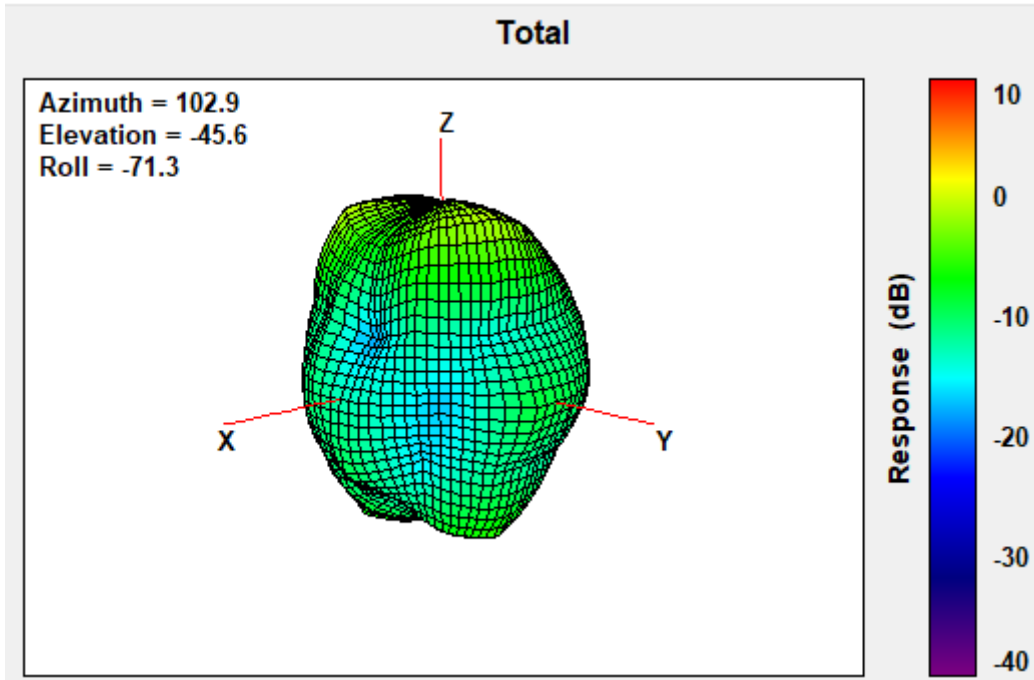
Center Frequency	<b>960MHz</b>
Horizontal (dBi) peak	-4.19
Vertical (dBi) peak	-4.90

**1427.9MHz**



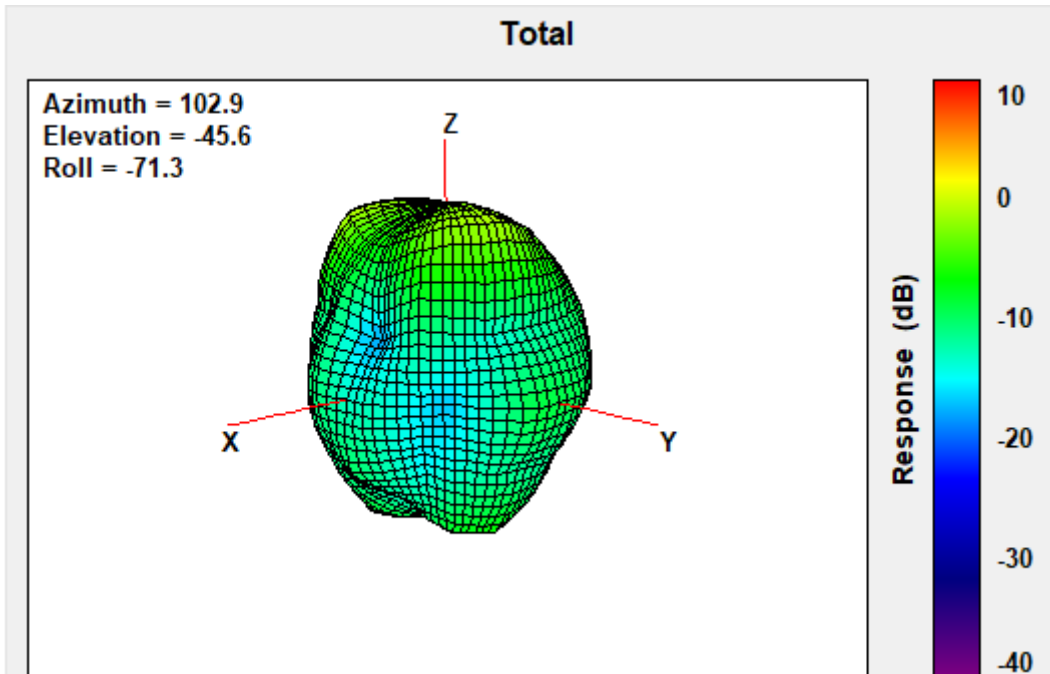
Center Frequency	<b>1427.9MHz</b>
Horizontal (dBi) peak	0.44
Vertical (dBi) peak	-4.18

**1447.9MHz**



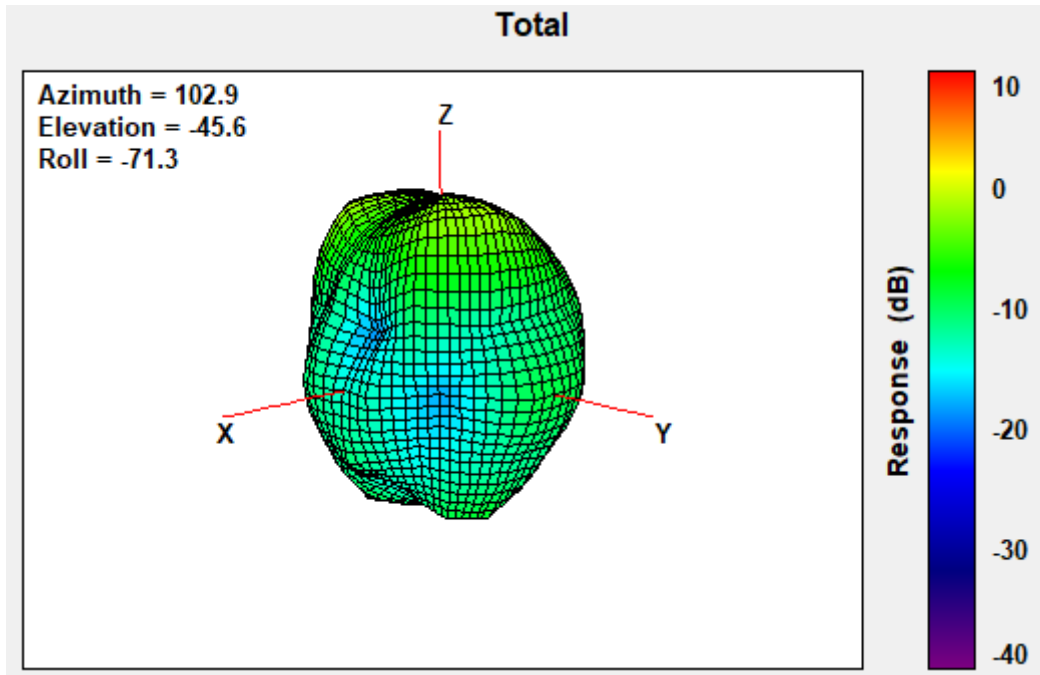
Center Frequency	<b>1447.9MHz</b>
Horizontal (dBi) peak	-0.51
Vertical (dBi) peak	-3.90

**1455.4MHz**



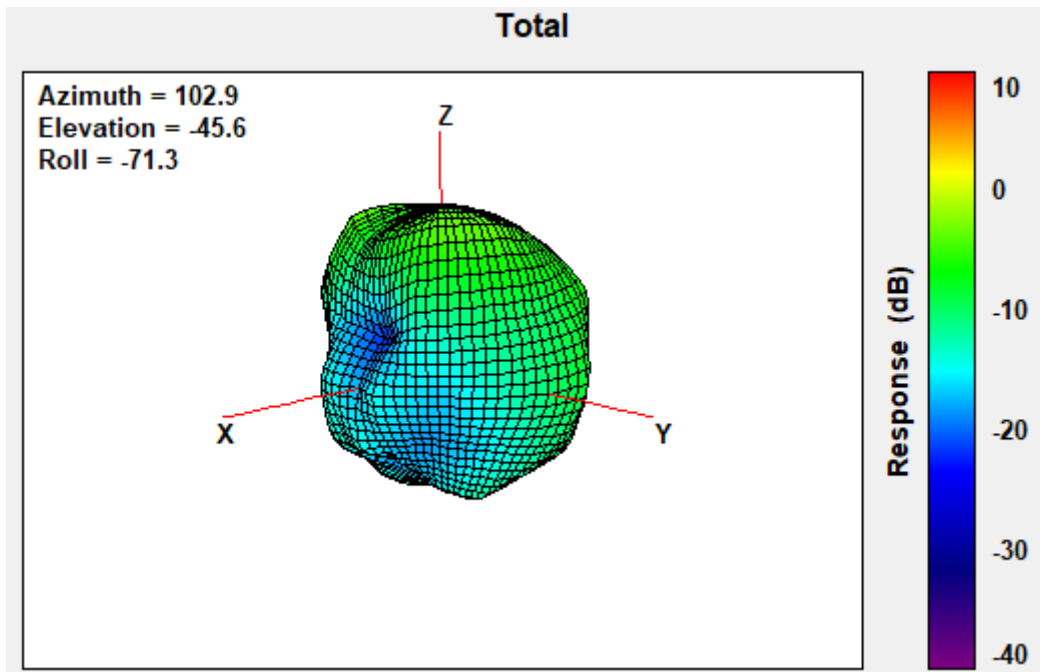
Center Frequency	<b>1455.4MHz</b>
Horizontal (dBi) peak	-0.98
Vertical (dBi) peak	-4.00

1462.9MHz



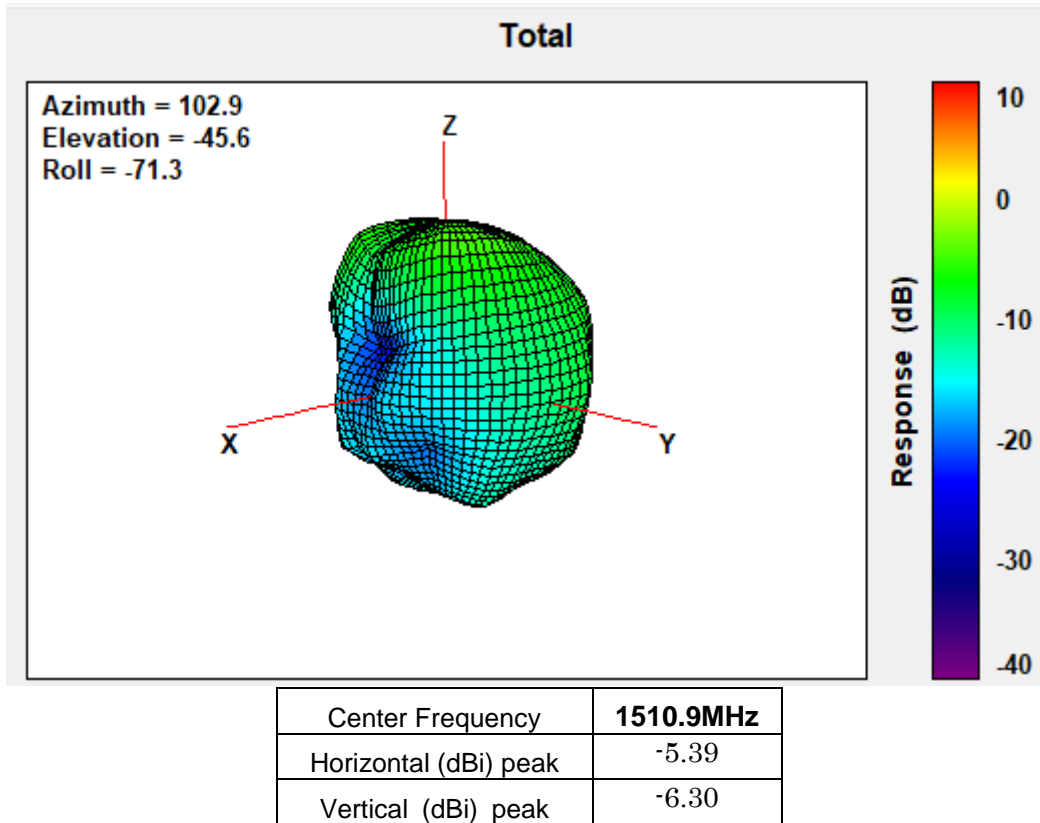
Center Frequency	<b>1462.9MHz</b>
Horizontal (dBi) peak	-1.26
Vertical (dBi) peak	-4.32

1496MHz

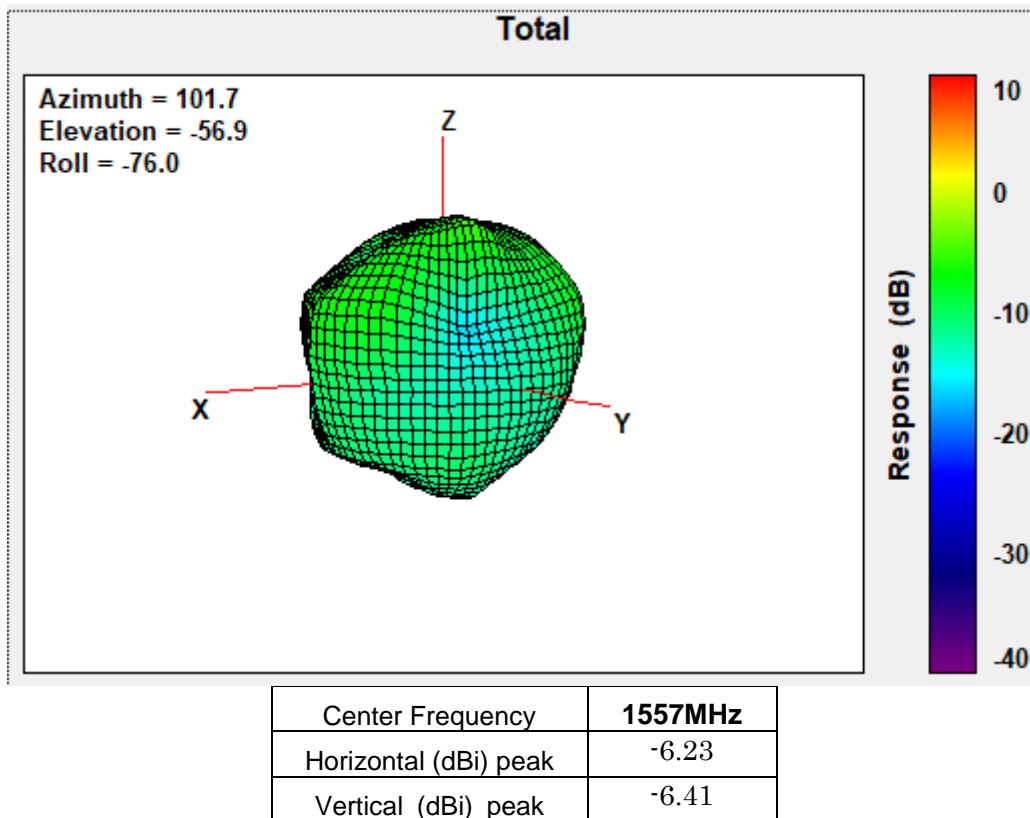


Center Frequency	<b>1496MHz</b>
Horizontal (dBi) peak	-3.95
Vertical (dBi) peak	-6.39

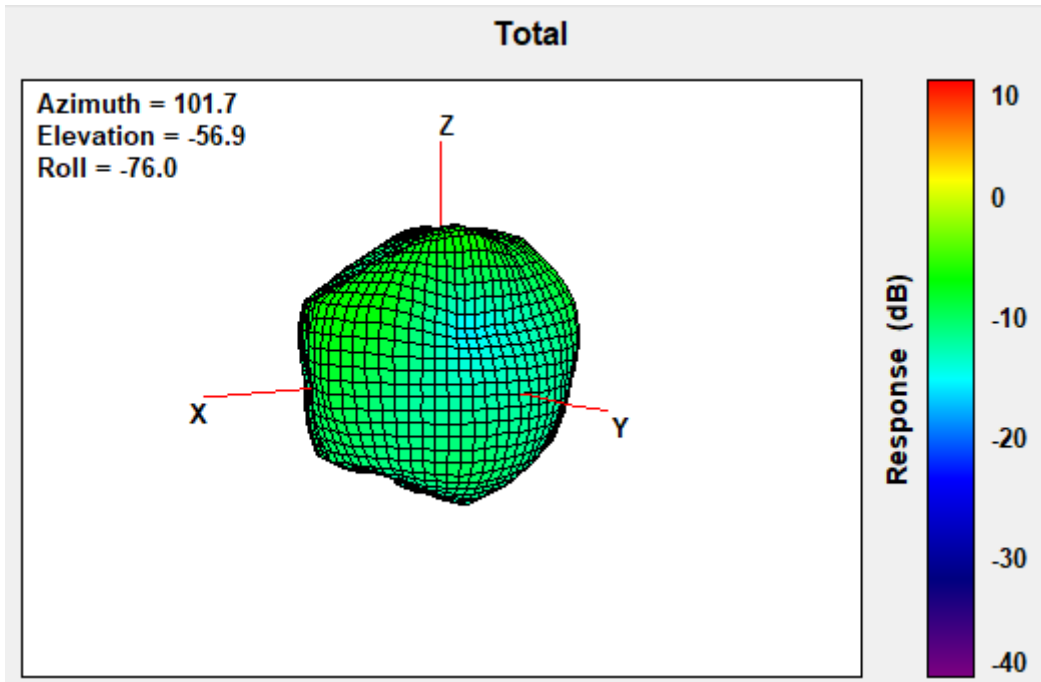
**1510.9MHz**



**1557MHz**

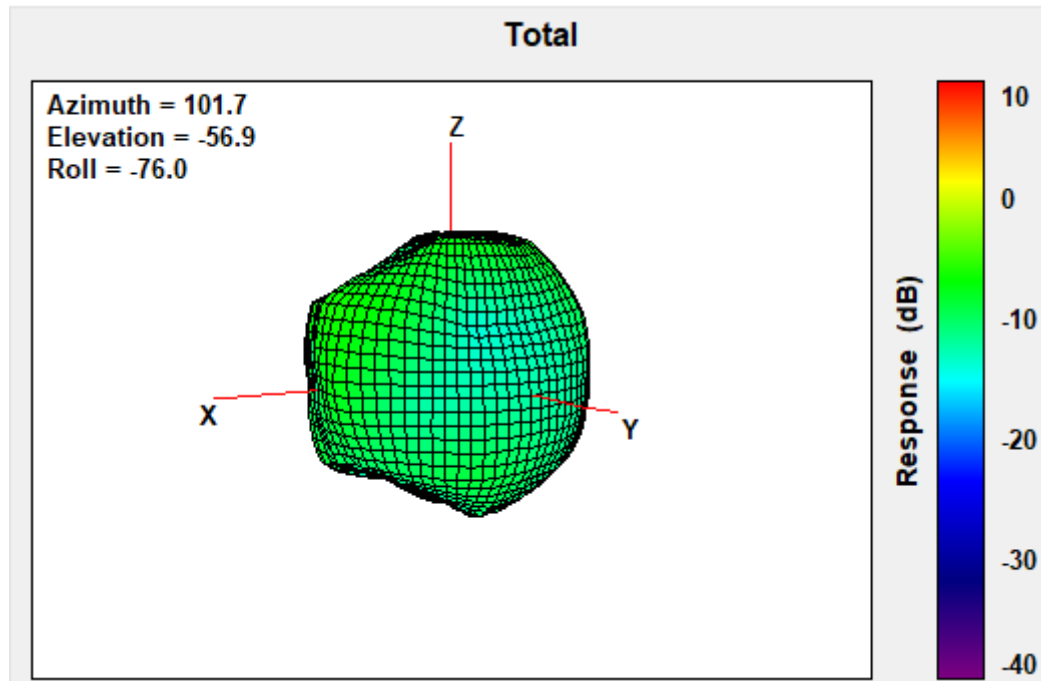


**1575MHz**



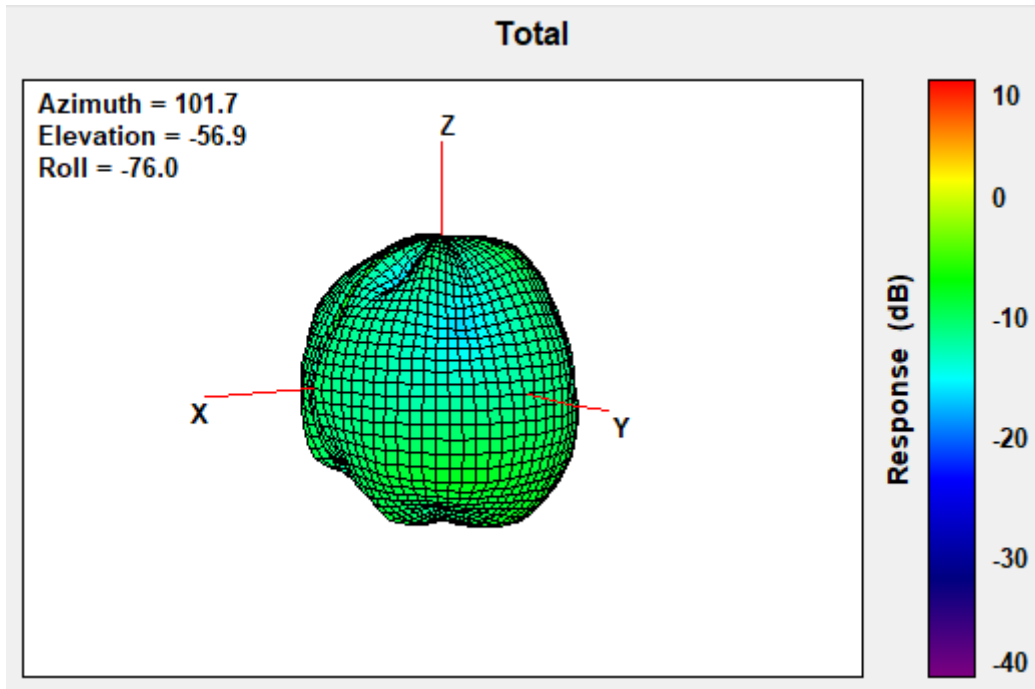
Center Frequency	<b>1575MHz</b>
Horizontal (dBi) peak	-6.60
Vertical (dBi) peak	-6.74

**1610MHz**



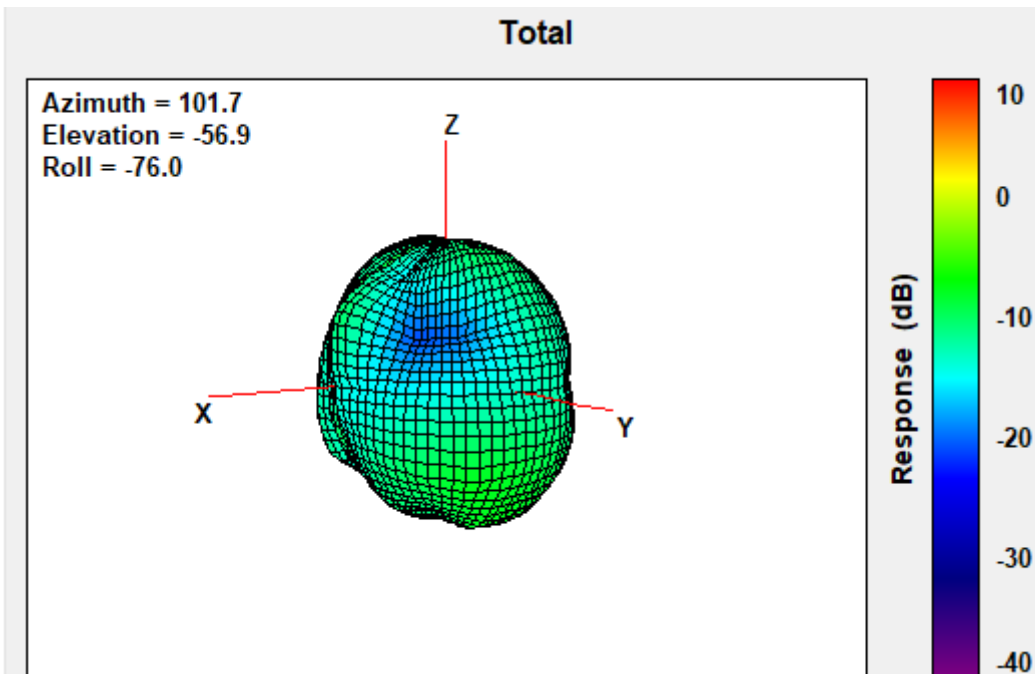
Center Frequency	<b>1610MHz</b>
Horizontal (dBi) peak	-6.45
Vertical (dBi) peak	-7.21

**1805 MHz**



Center Frequency	<b>1805 MHz</b>
Horizontal (dBi) peak	-6.33
Vertical (dBi) peak	-5.62

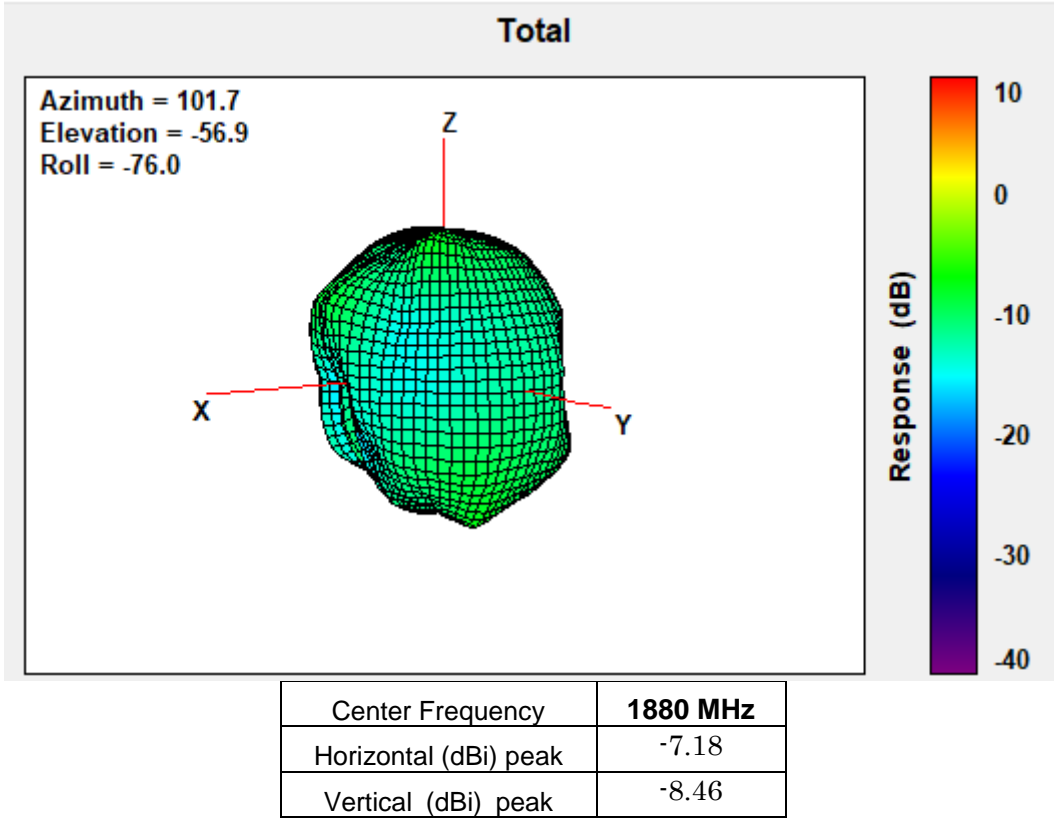
**1850 MHz**



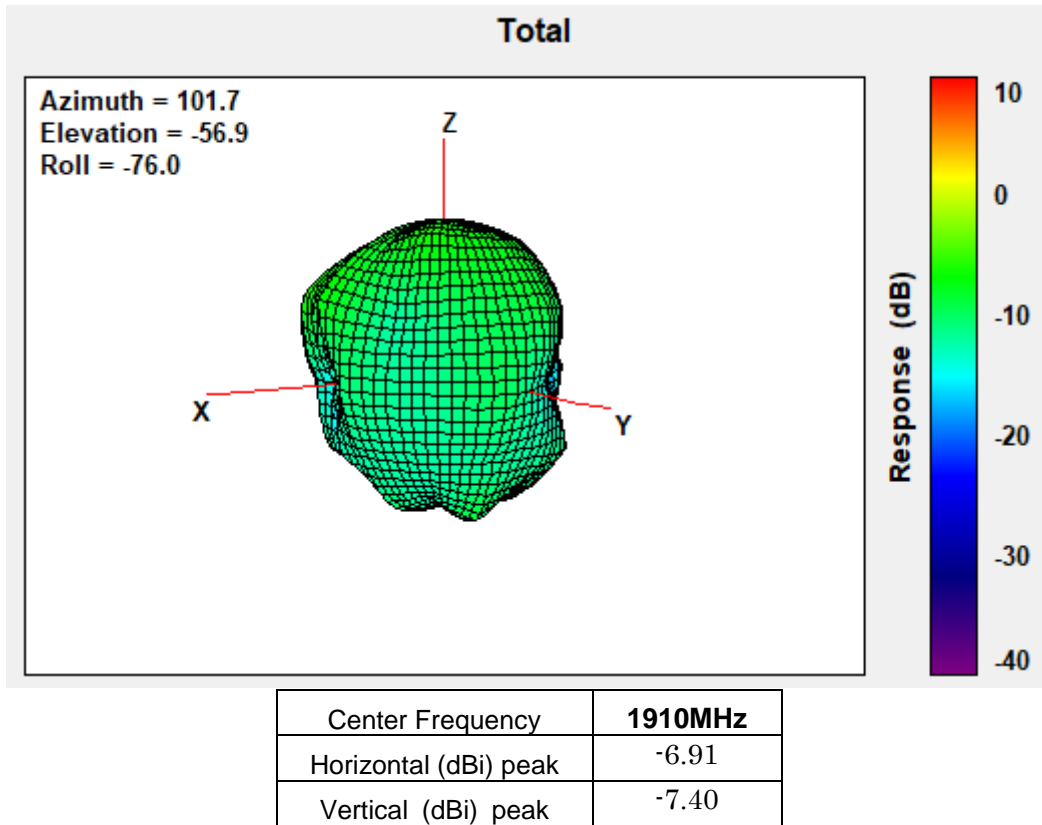
Center Frequency	<b>1850 MHz</b>
Horizontal (dBi) peak	-7.93
Vertical (dBi) peak	-7.82



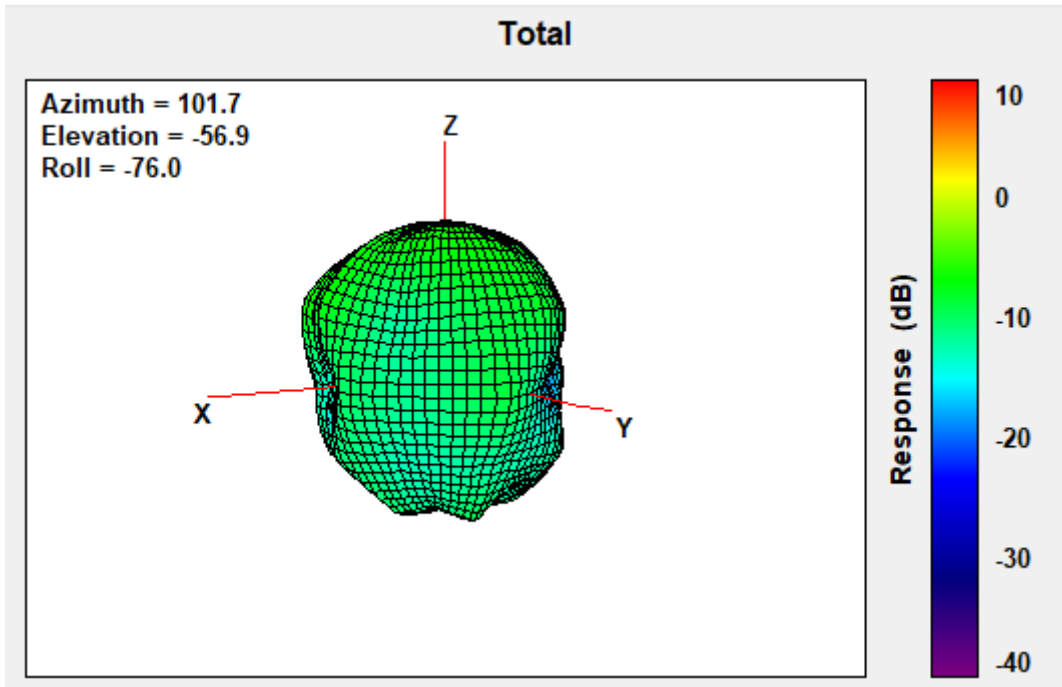
**1880 MHz**



**1910MHz**

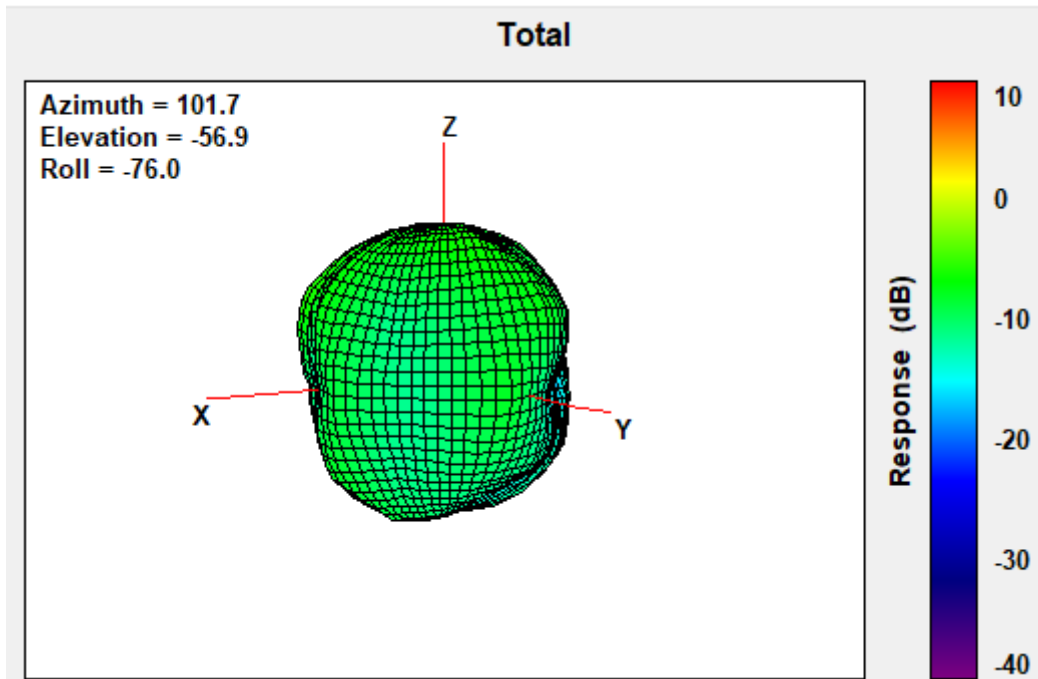


**1920MHz**



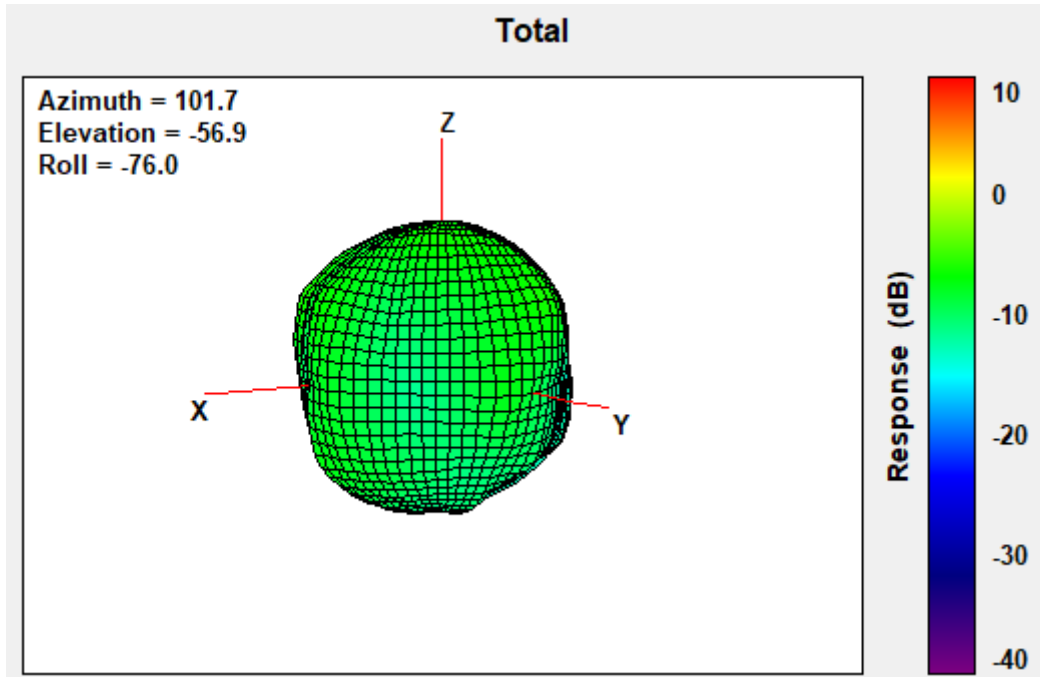
Center Frequency	<b>1920MHz</b>
Horizontal (dBi) peak	-7.04
Vertical (dBi) peak	-6.89

**1950MHz**



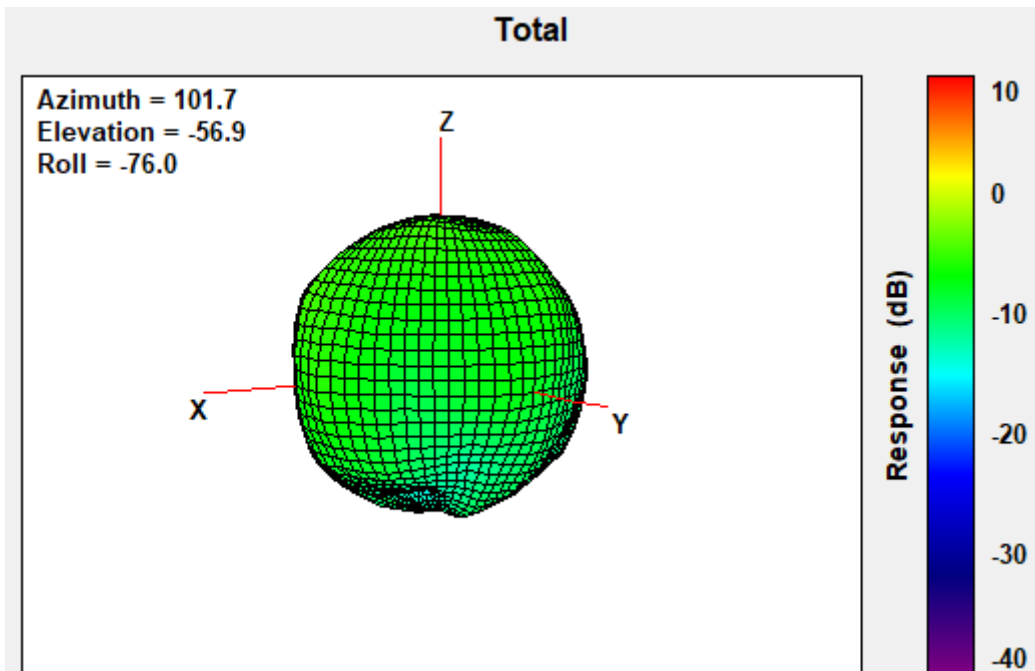
Center Frequency	<b>1950MHz</b>
Horizontal (dBi) peak	-6.66
Vertical (dBi) peak	-6.37

**1980MHz**



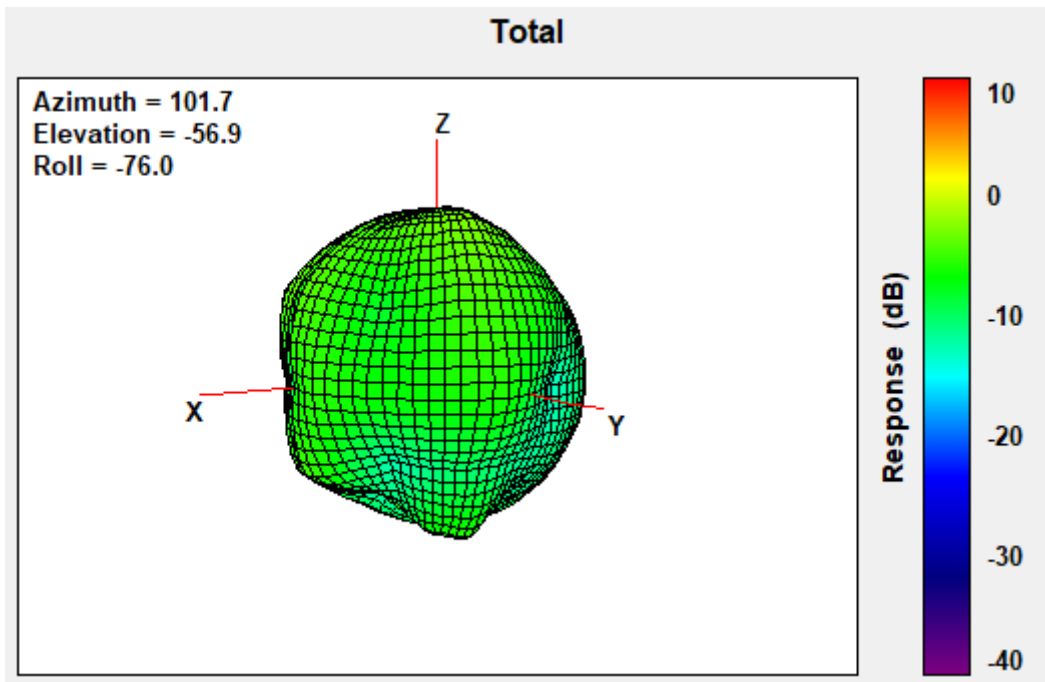
Center Frequency	<b>1980MHz</b>
Horizontal (dBi) peak	-6.69
Vertical (dBi) peak	-6.02

**2110MHz**



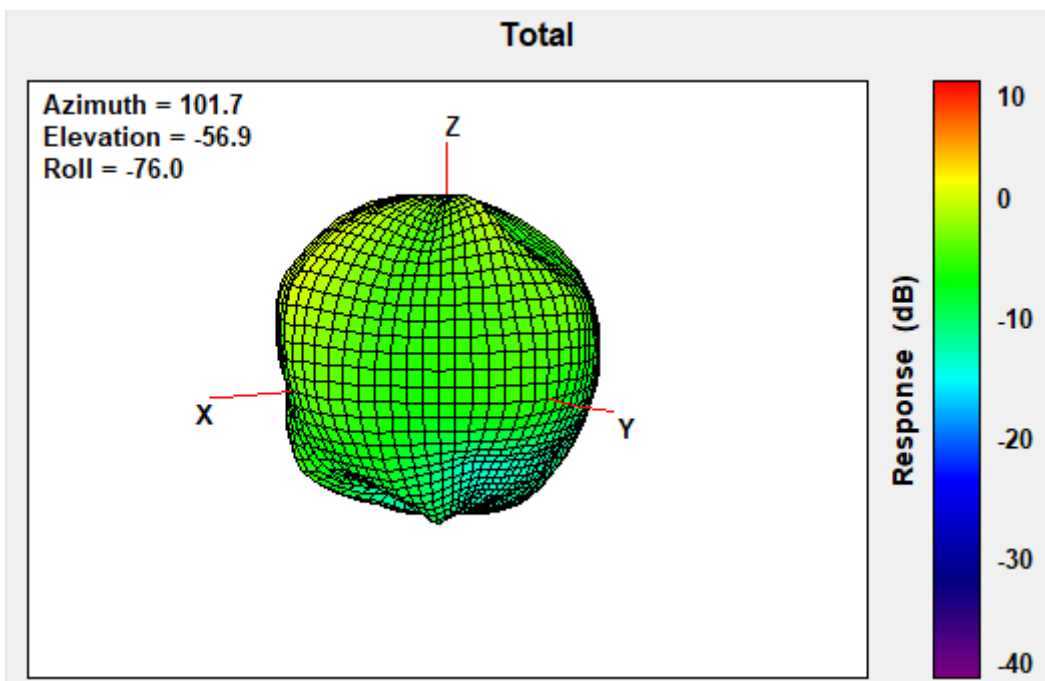
Center Frequency	<b>2110MHz</b>
Horizontal (dBi) peak	-4.46
Vertical (dBi) peak	-5.31

**2200MHz**



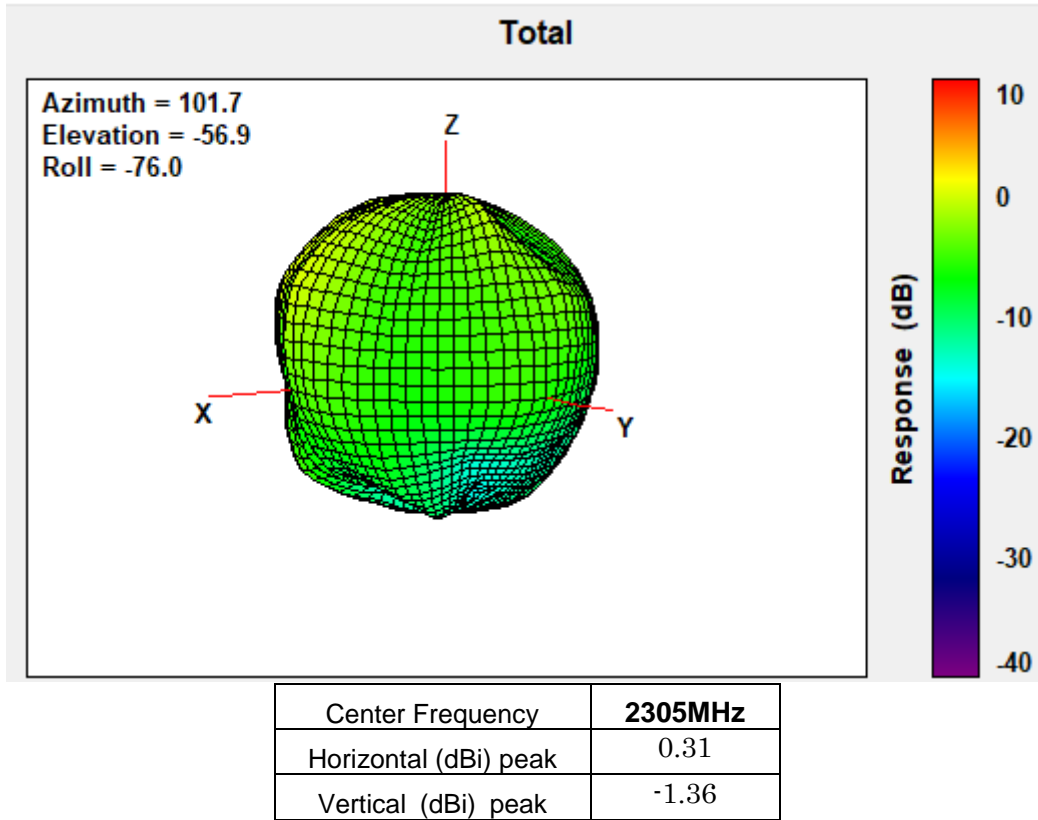
Center Frequency	<b>2200MHz</b>
Horizontal (dBi) peak	-3.71
Vertical (dBi) peak	-4.49

**2300MHz**

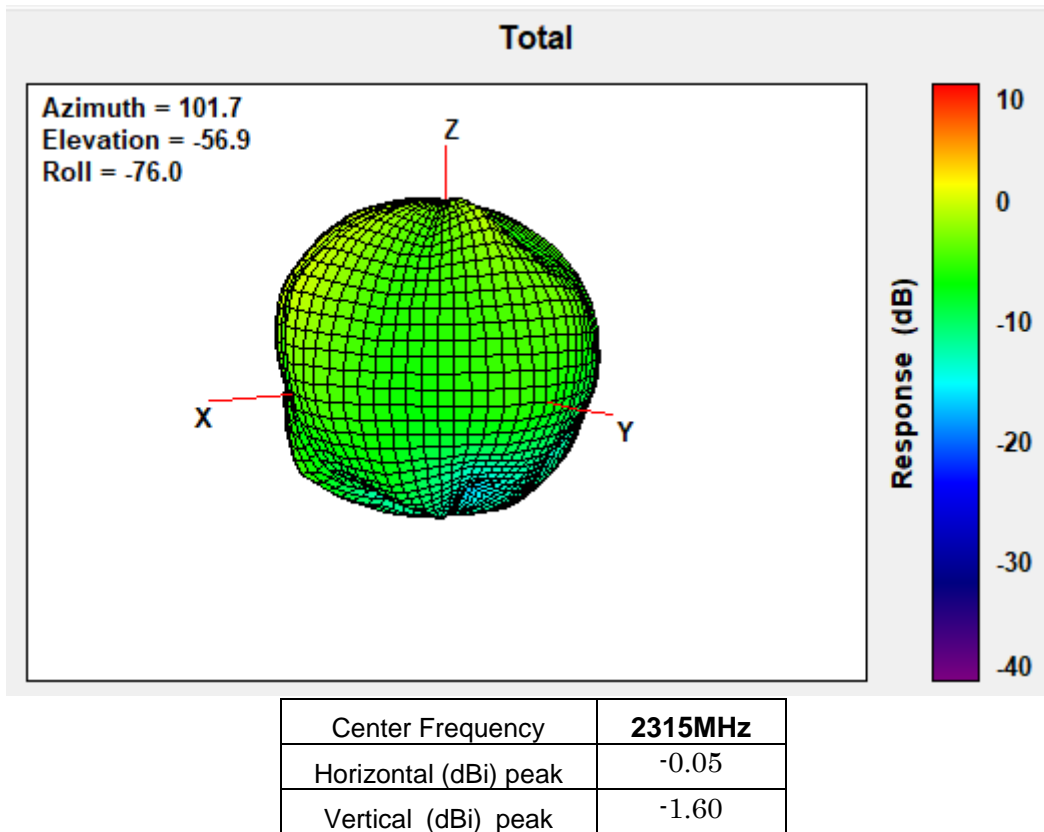


Center Frequency	<b>2300MHz</b>
Horizontal (dBi) peak	0.47
Vertical (dBi) peak	-1.30

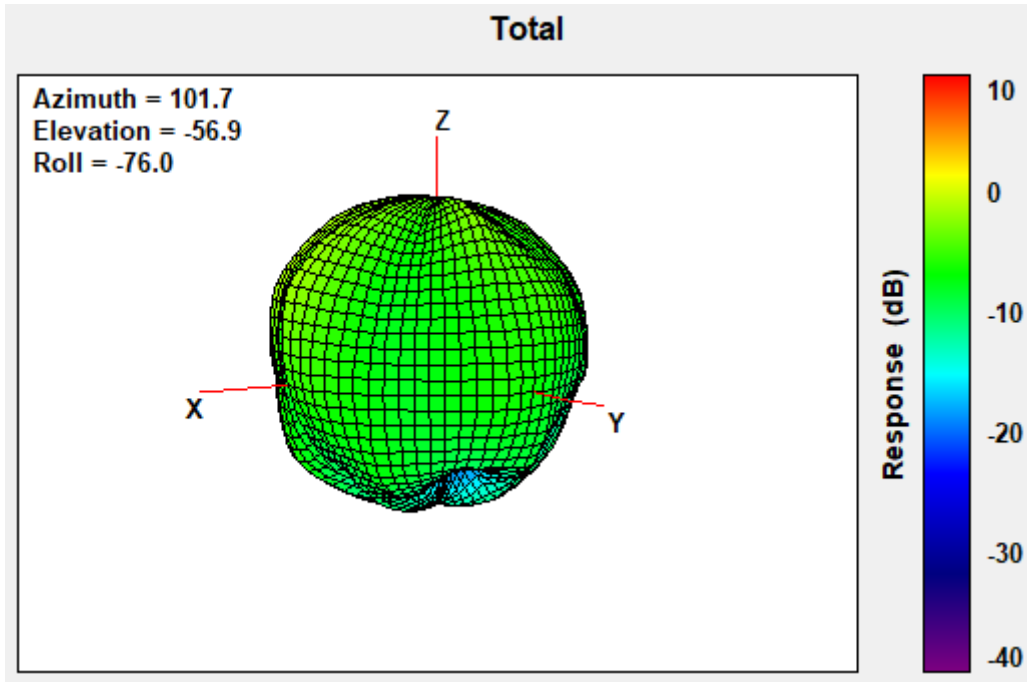
**2305MHz**



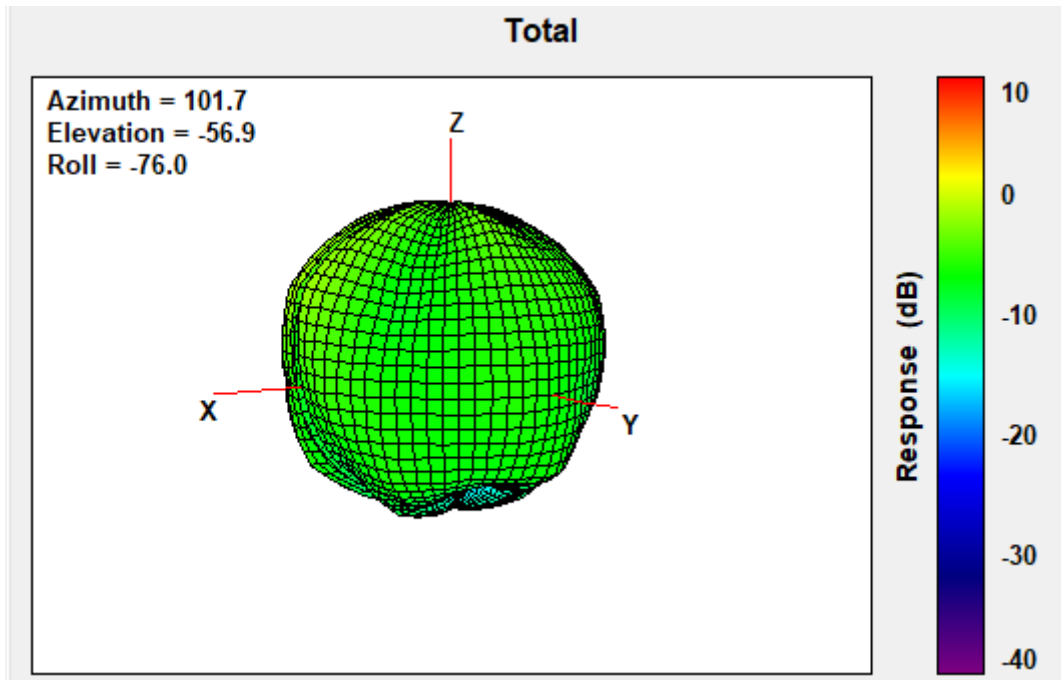
**2315MHz**



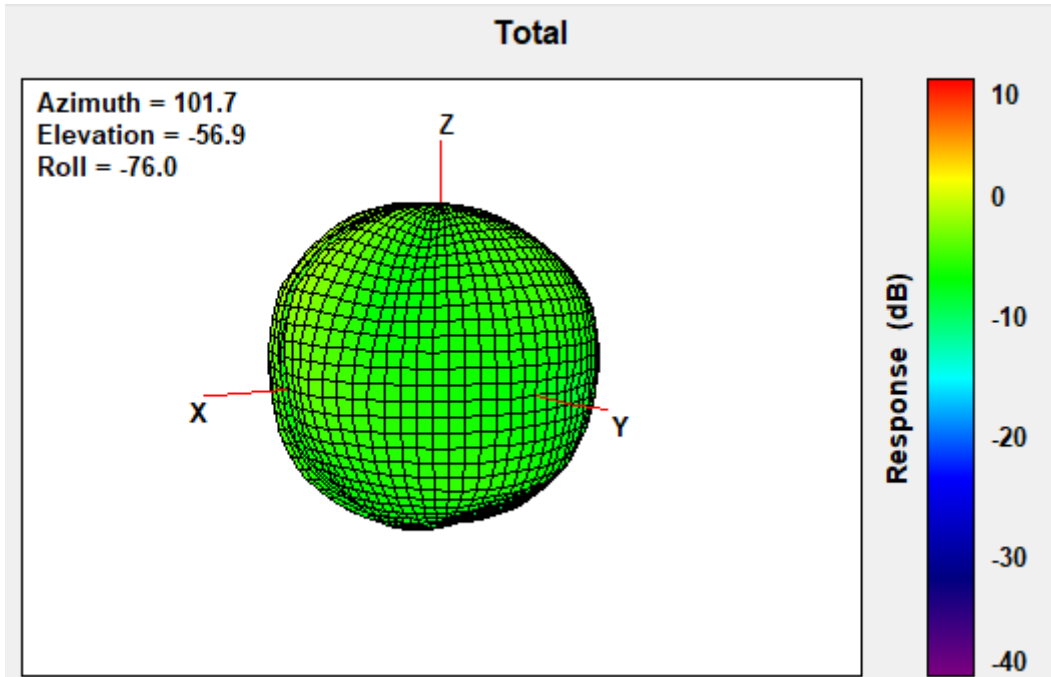
### 2350MHz



### 2400MHz

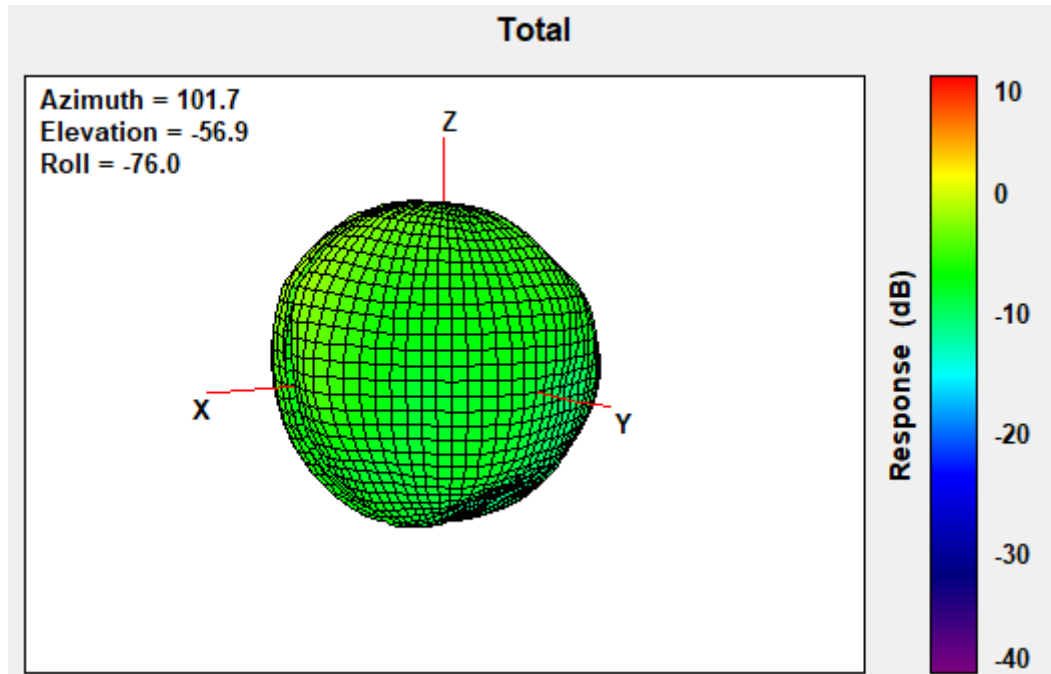


**2500MHz**



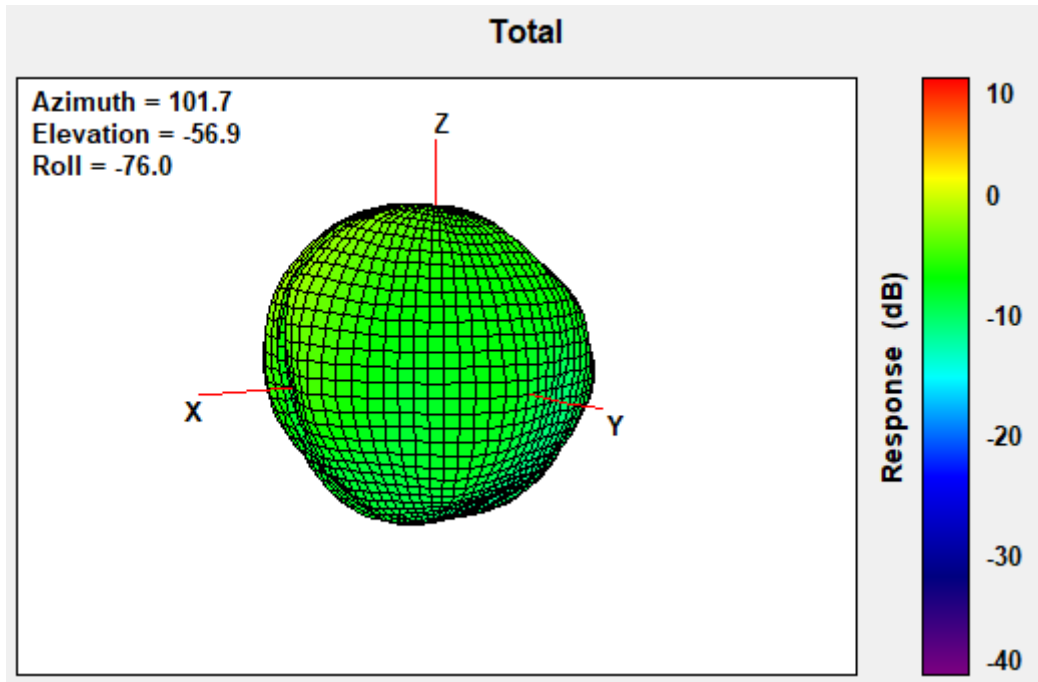
Center Frequency	<b>2500MHz</b>
Horizontal (dBi) peak	-1.42
Vertical (dBi) peak	-4.03

**2570MHz**



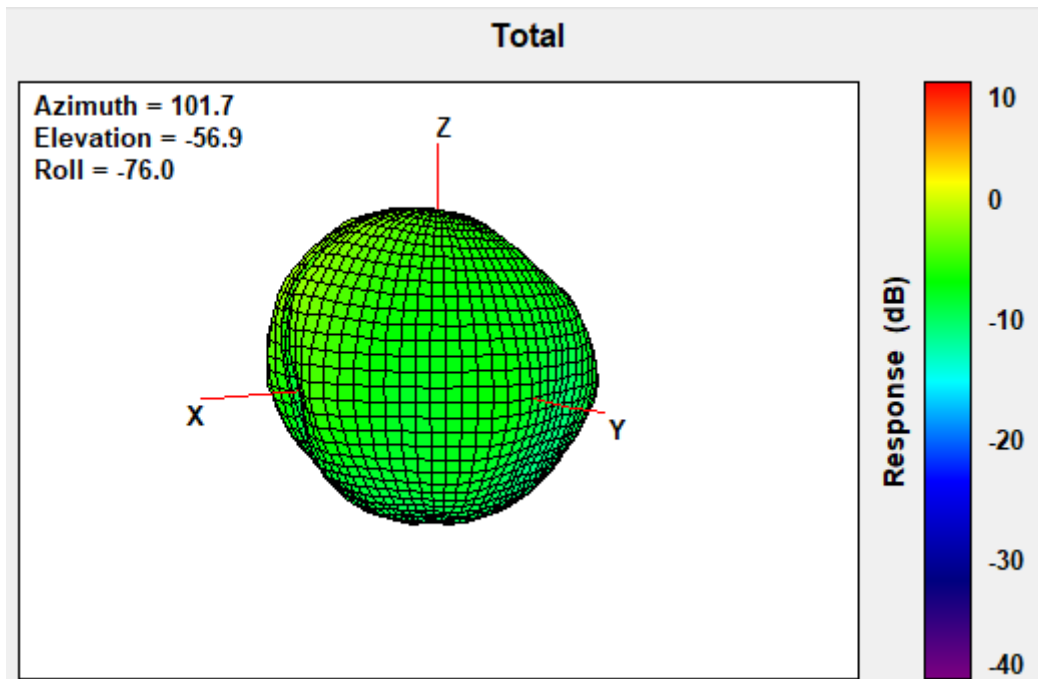
Center Frequency	<b>2570MHz</b>
Horizontal (dBi) peak	-1.34
Vertical (dBi) peak	-4.30

**2595MHz**



Center Frequency	<b>2595MHz</b>
Horizontal (dBi) peak	-1.61
Vertical (dBi) peak	-4.49

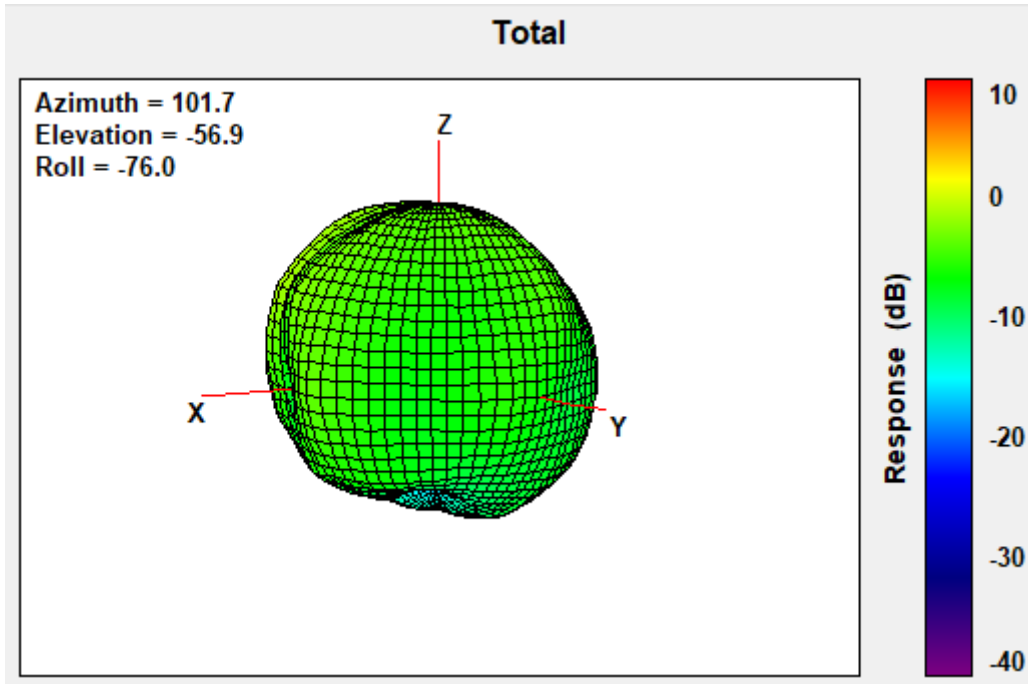
**2620MHz**



Center Frequency	<b>2620MHz</b>
Horizontal (dBi) peak	-1.74
Vertical (dBi) peak	-4.92

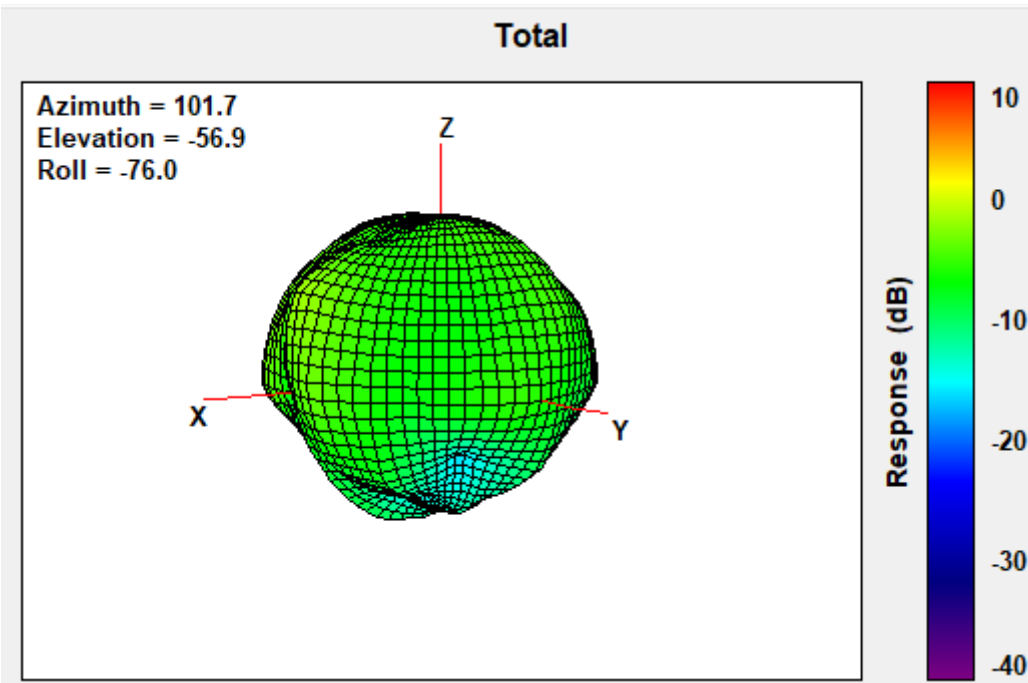


**2690MHz**



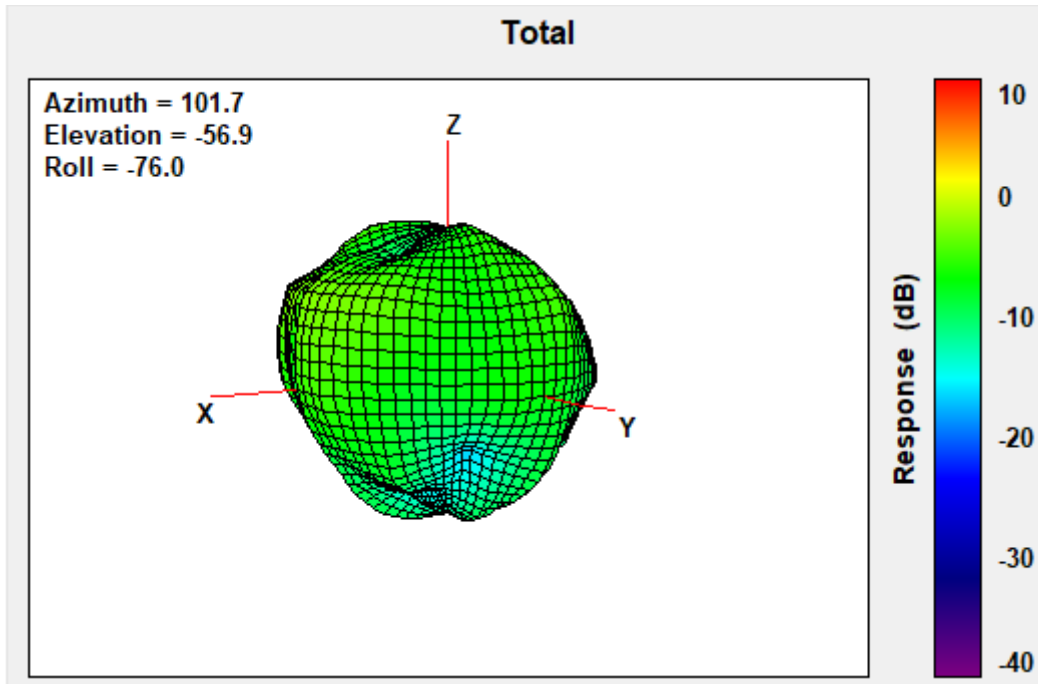
Center Frequency	<b>2690MHz</b>
Horizontal (dBi) peak	-0.78
Vertical (dBi) peak	-4.04

**3400MHz**



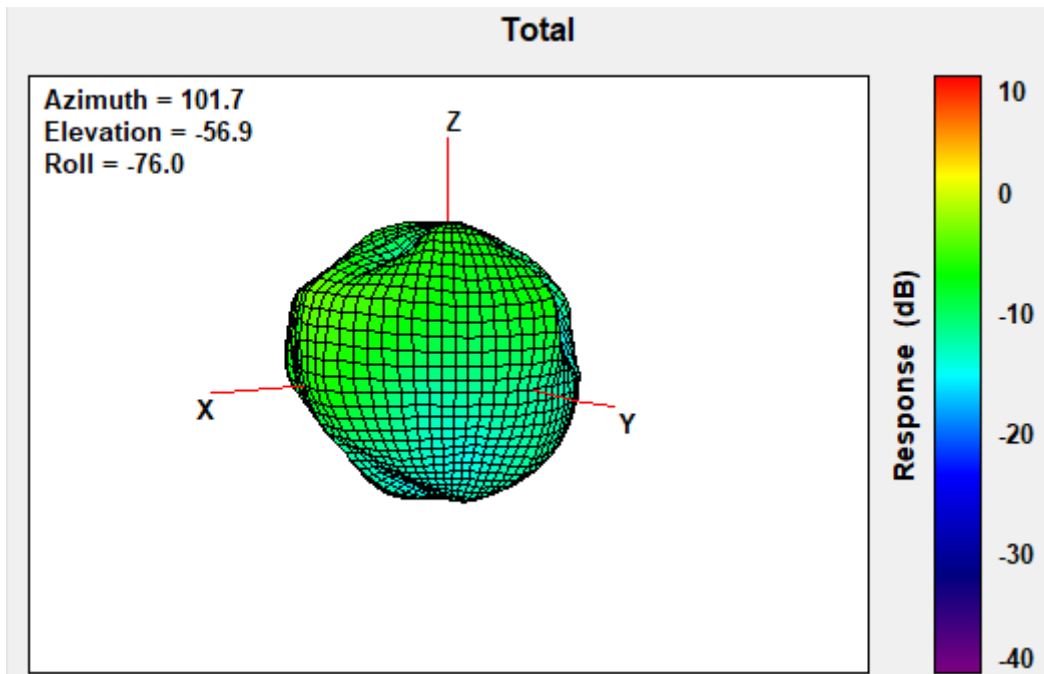
Center Frequency	<b>3400MHz</b>
Horizontal (dBi) peak	-2.09
Vertical (dBi) peak	-5.04

### 3500MHz



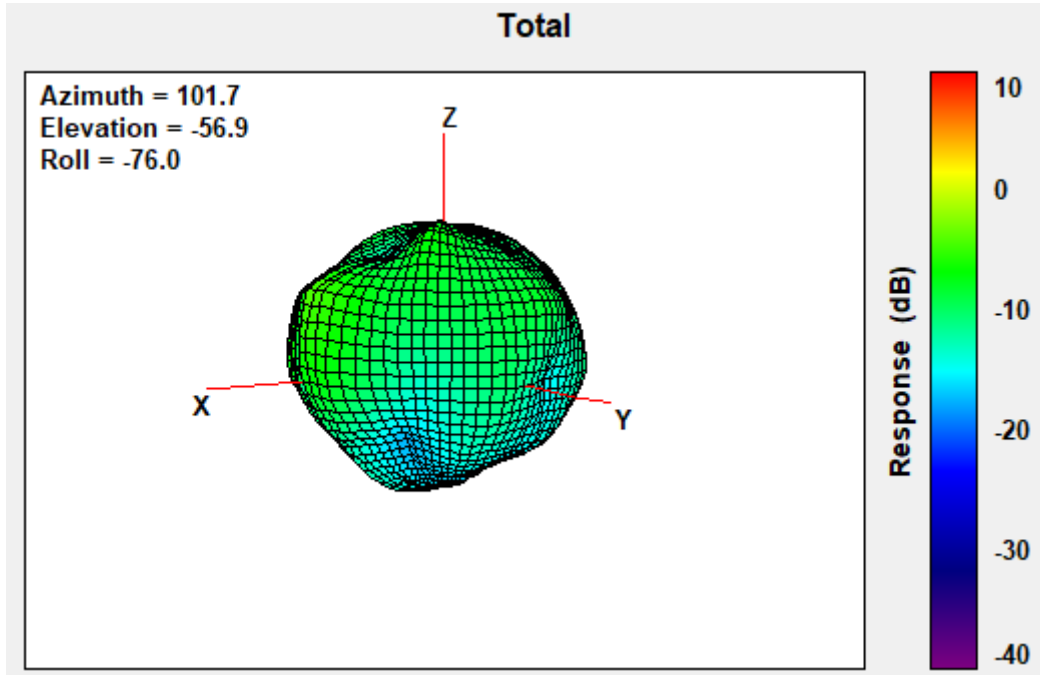
Center Frequency	<b>3500MHz</b>
Horizontal (dBi) peak	-2.49
Vertical (dBi) peak	-4.79

### 3600MHz



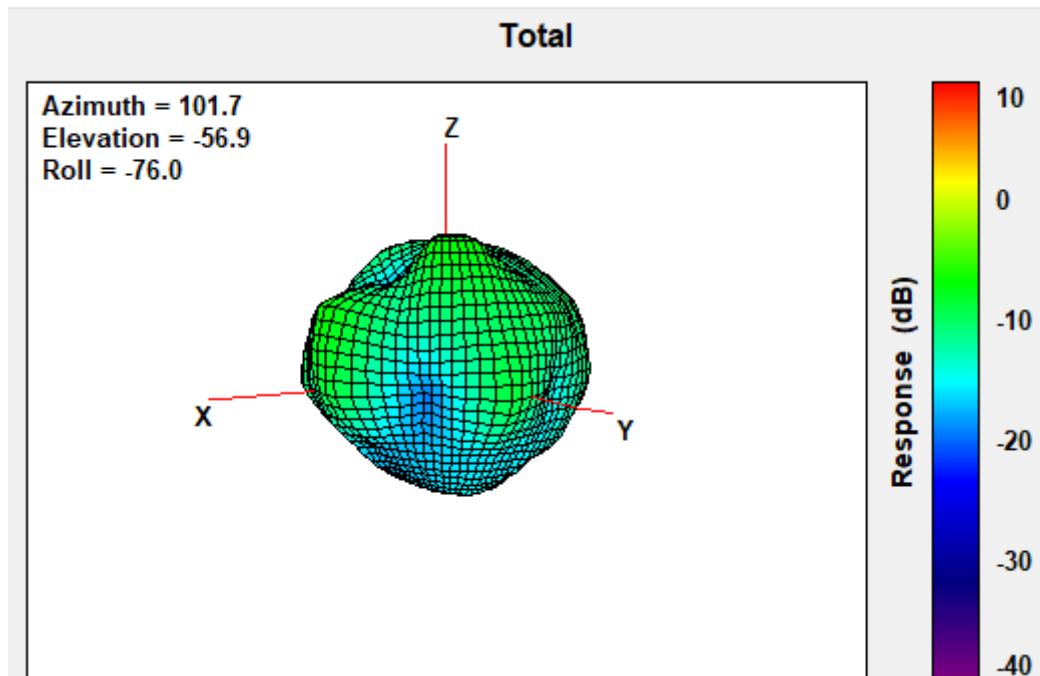
Center Frequency	<b>3600MHz</b>
Horizontal (dBi) peak	-3.14
Vertical (dBi) peak	-5.78

### 3700MHz



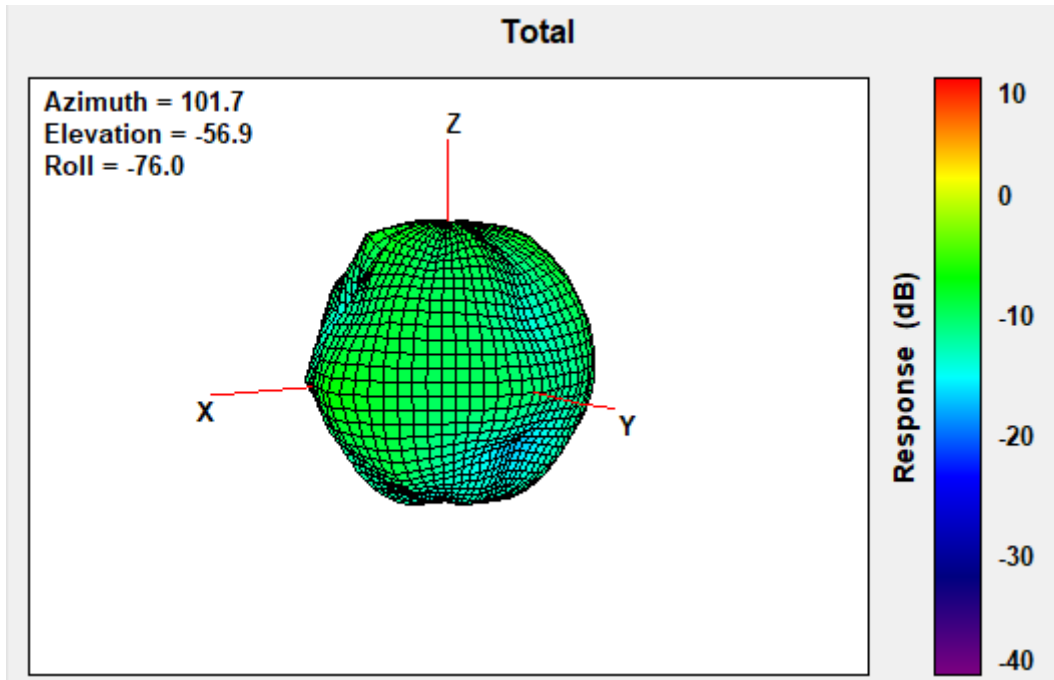
Center Frequency	<b>3700MHz</b>
Horizontal (dBi) peak	-4.12
Vertical (dBi) peak	-7.81

### 3800MHz



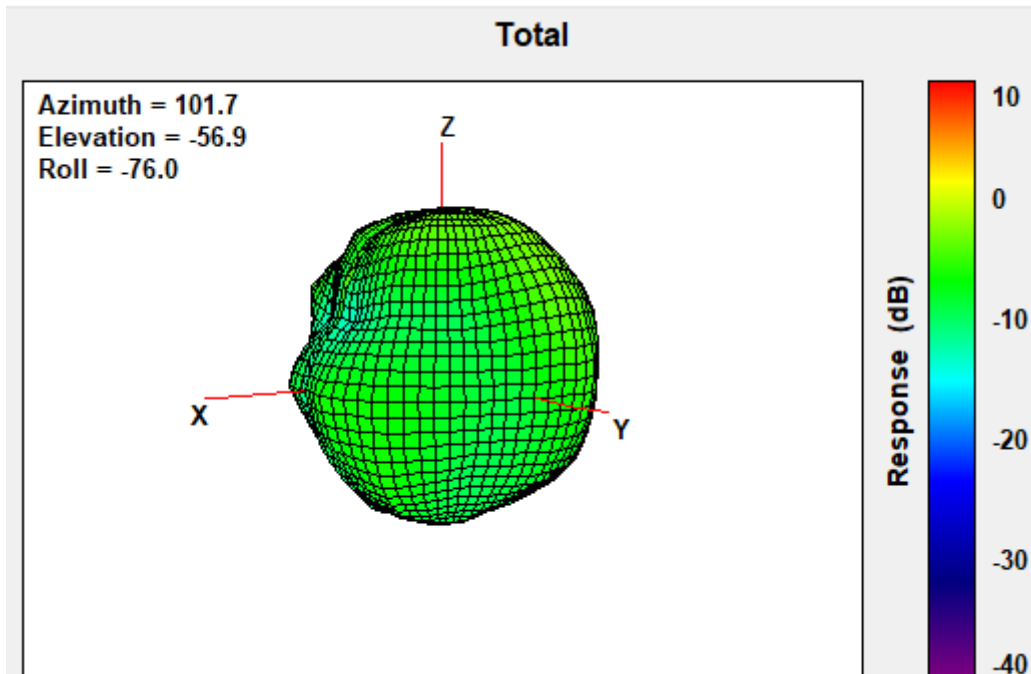
Center Frequency	<b>3800MHz</b>
Horizontal (dBi) peak	-6.37
Vertical (dBi) peak	-6.62

**4200MHz**



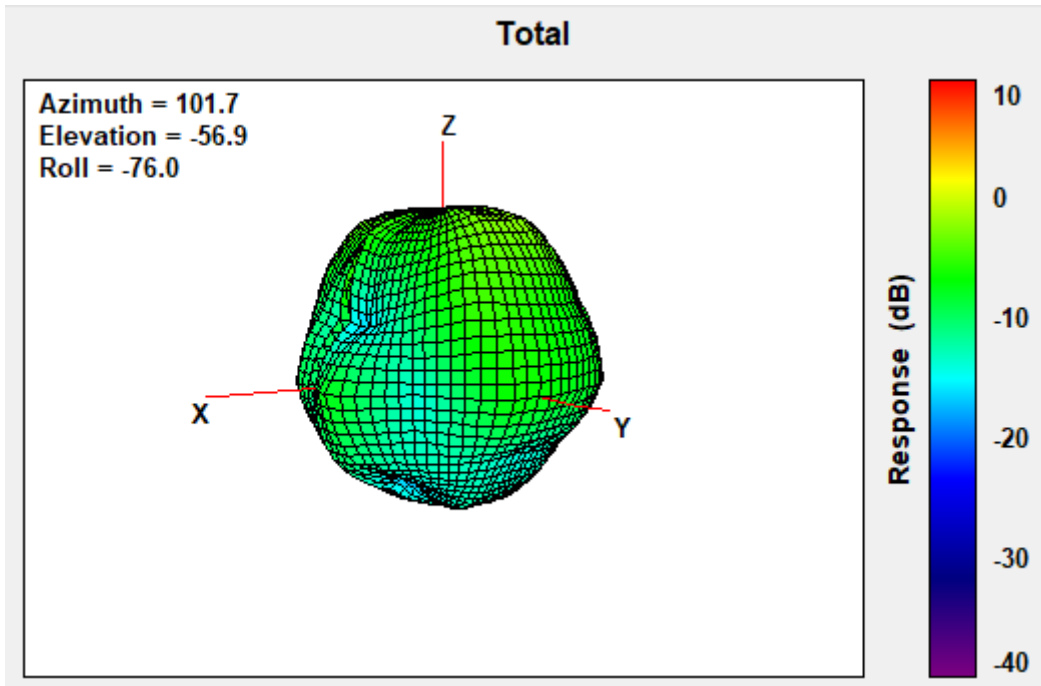
Center Frequency	<b>4200MHz</b>
Horizontal (dBi) peak	-7.02
Vertical (dBi) peak	-7.11

**4400MHz**



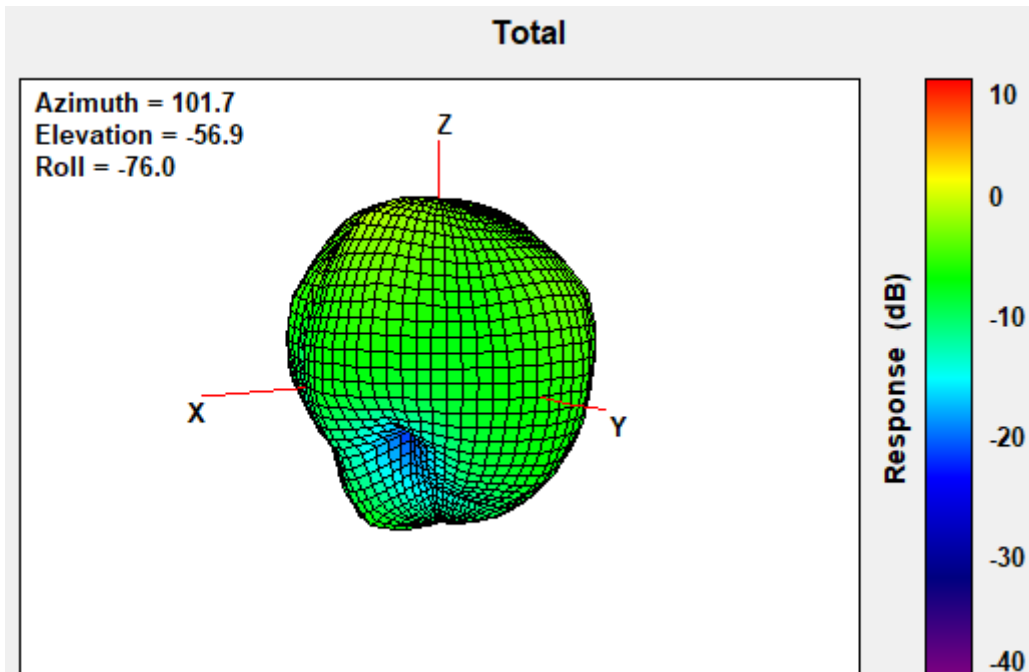
Center Frequency	<b>4400MHz</b>
Horizontal (dBi) peak	-2.30
Vertical (dBi) peak	-3.82

### 4700MHz



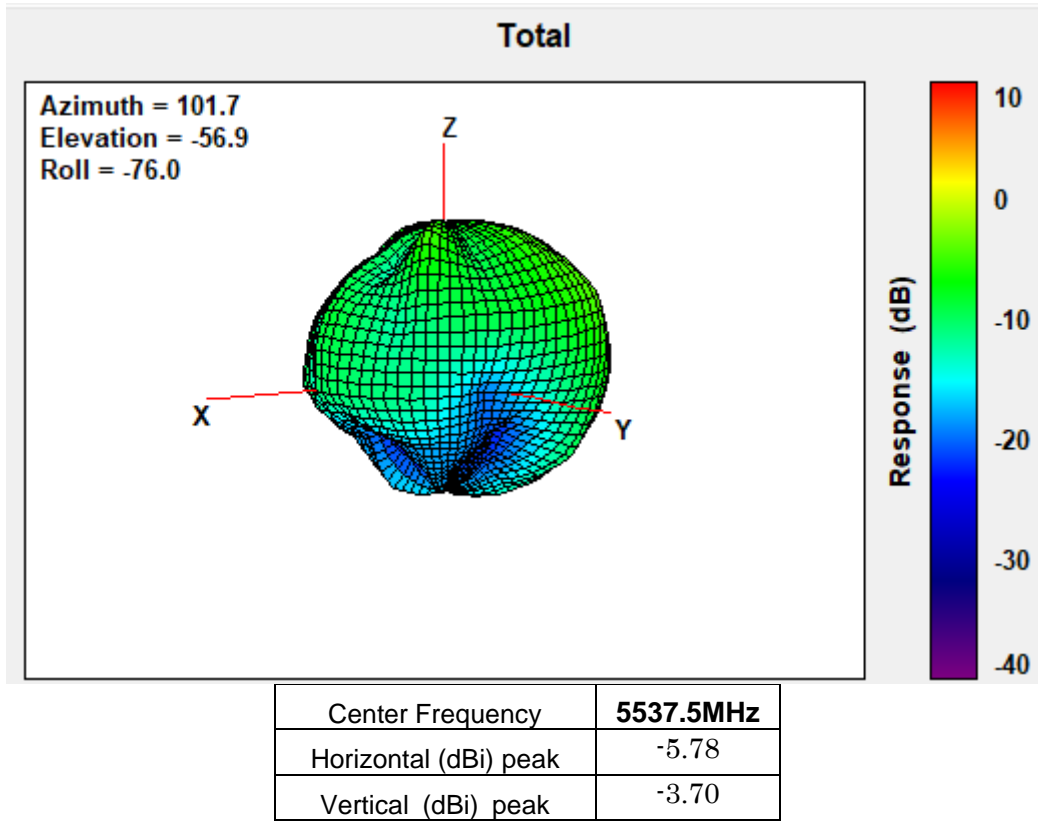
Center Frequency	<b>4700MHz</b>
Horizontal (dBi) peak	-3.86
Vertical (dBi) peak	-4.49

### 5150MHz

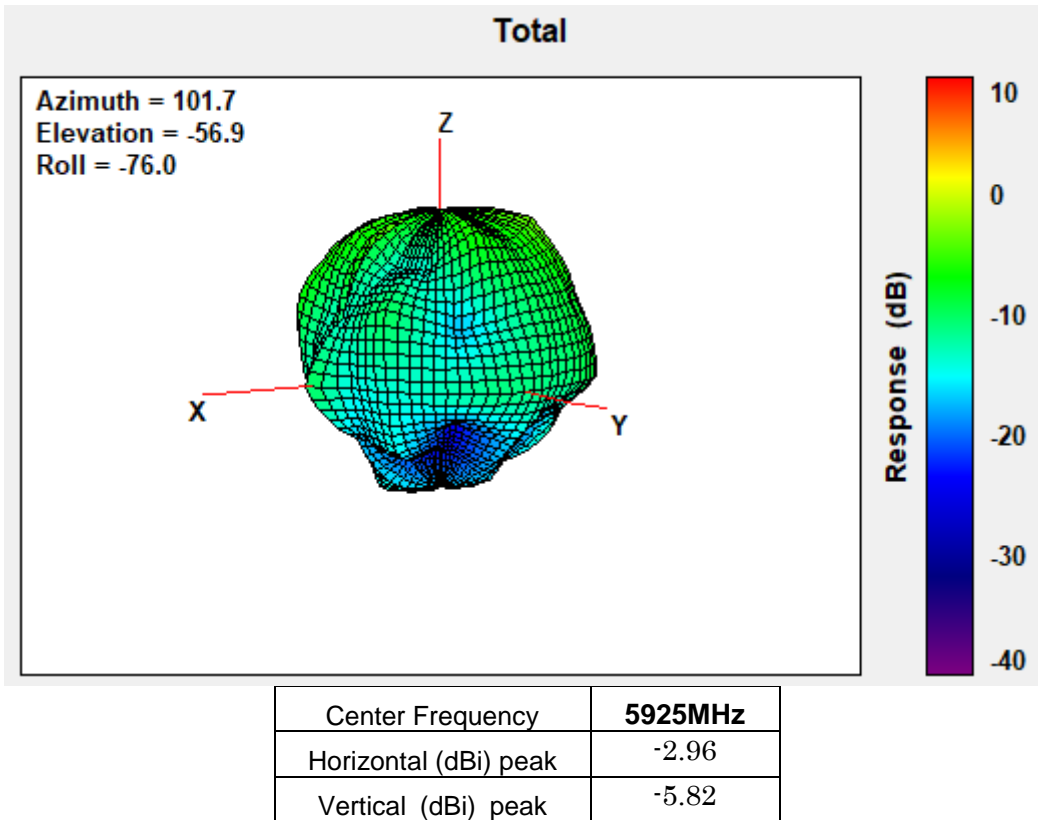


Center Frequency	<b>5150MHz</b>
Horizontal (dBi) peak	-2.51
Vertical (dBi) peak	-0.27

5537.5MHz

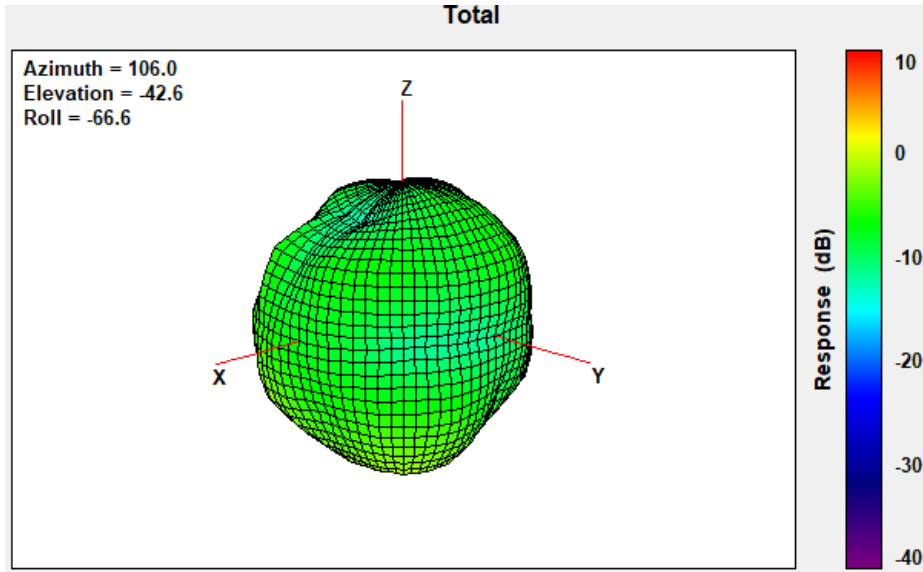


5925MHz



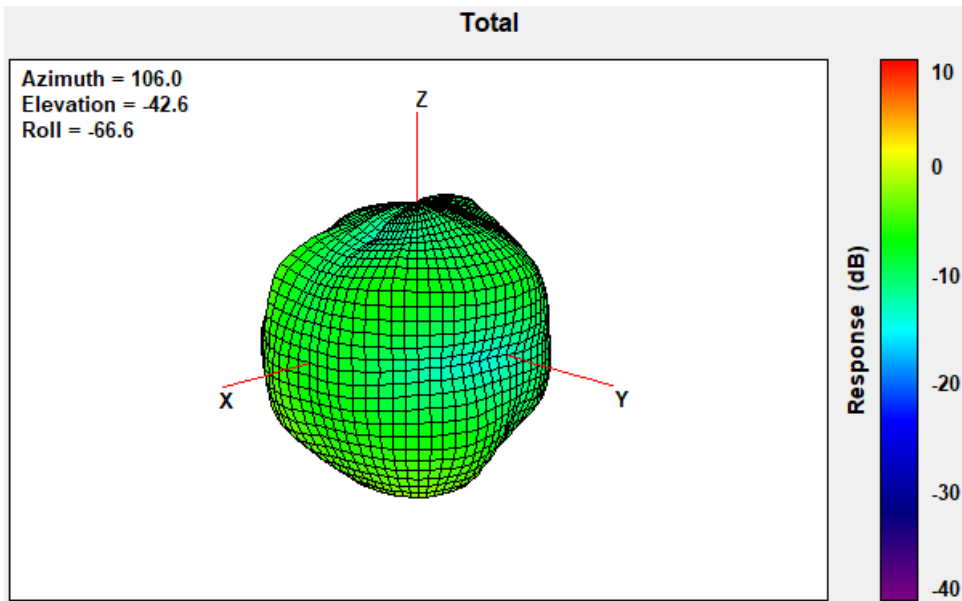
# MIMO2 Antenna (DRx2)

1452 MHz



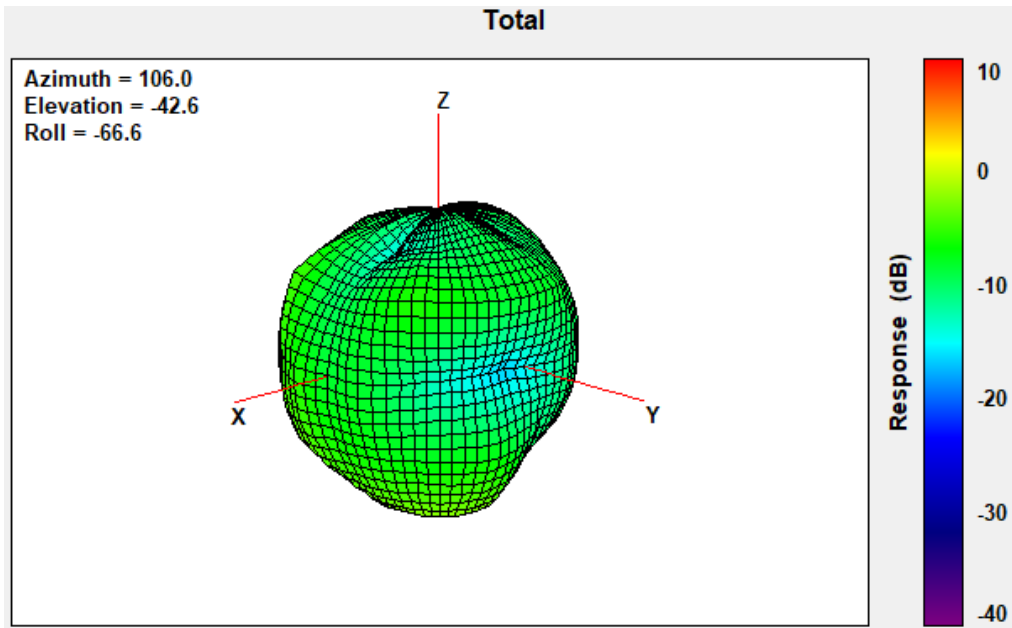
Center Frequency	<b>1452 MHz</b>
Horizontal (dBi) peak	-0.87
Vertical (dBi) peak	-2.68

1474 MHz



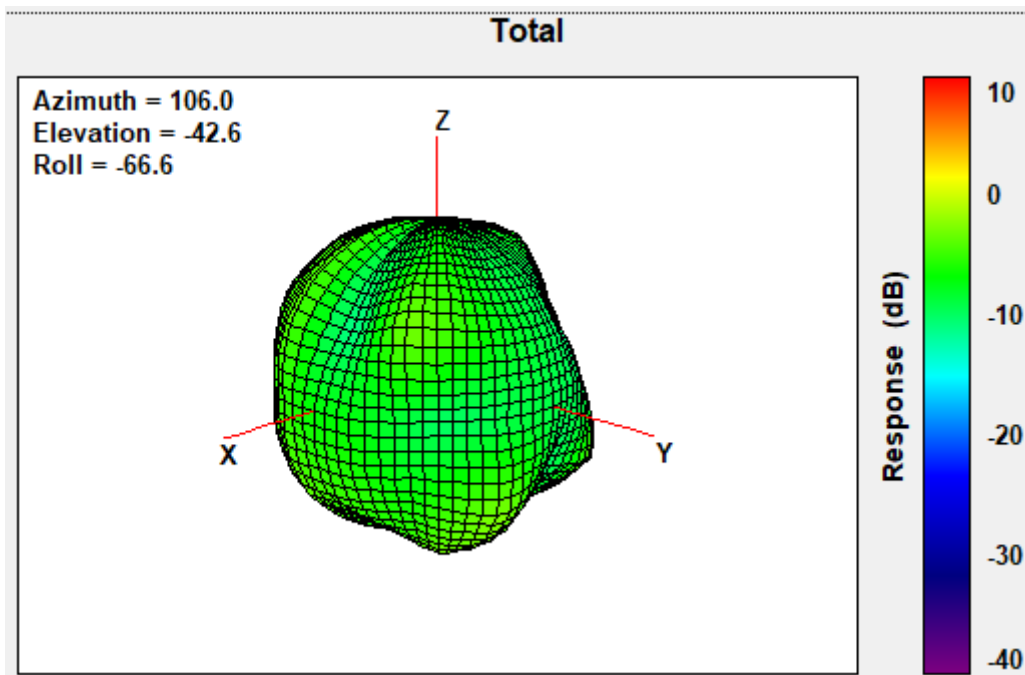
Center Frequency	<b>1474 MHz</b>
Horizontal (dBi) peak	-1.75
Vertical (dBi) peak	-3.30

**1496 MHz**



Center Frequency	<b>1496 MHz</b>
Horizontal (dBi) peak	-1.93
Vertical (dBi) peak	-3.70

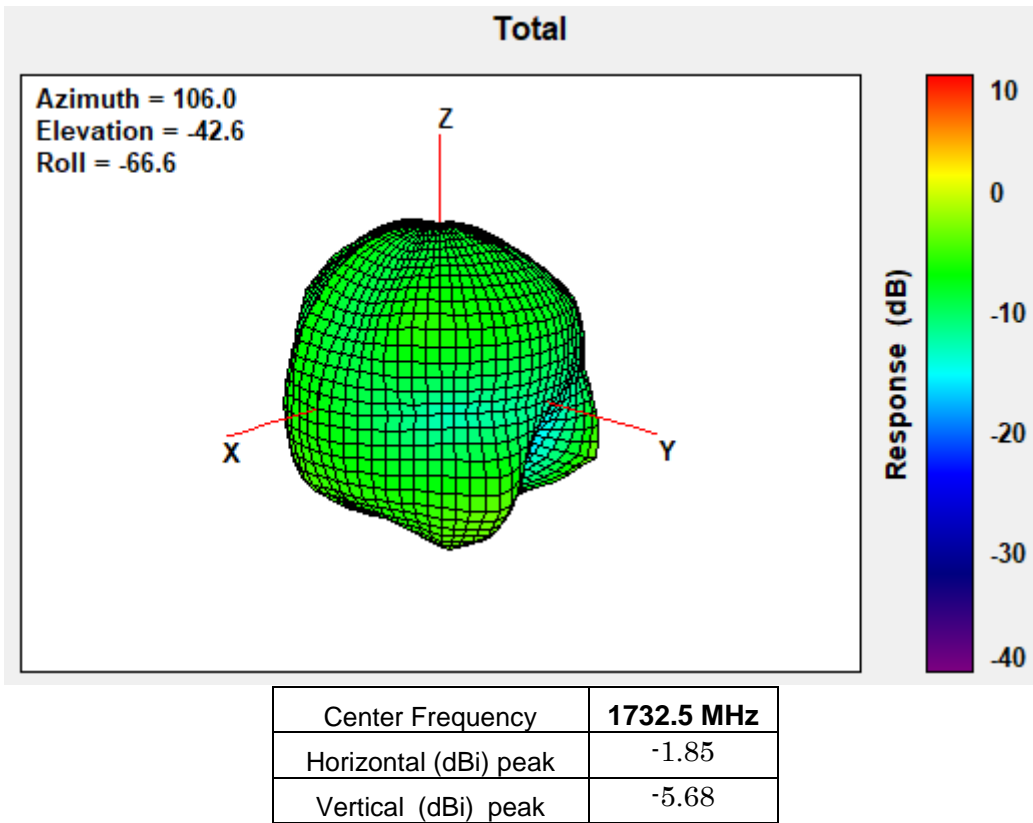
**1710 MHz**



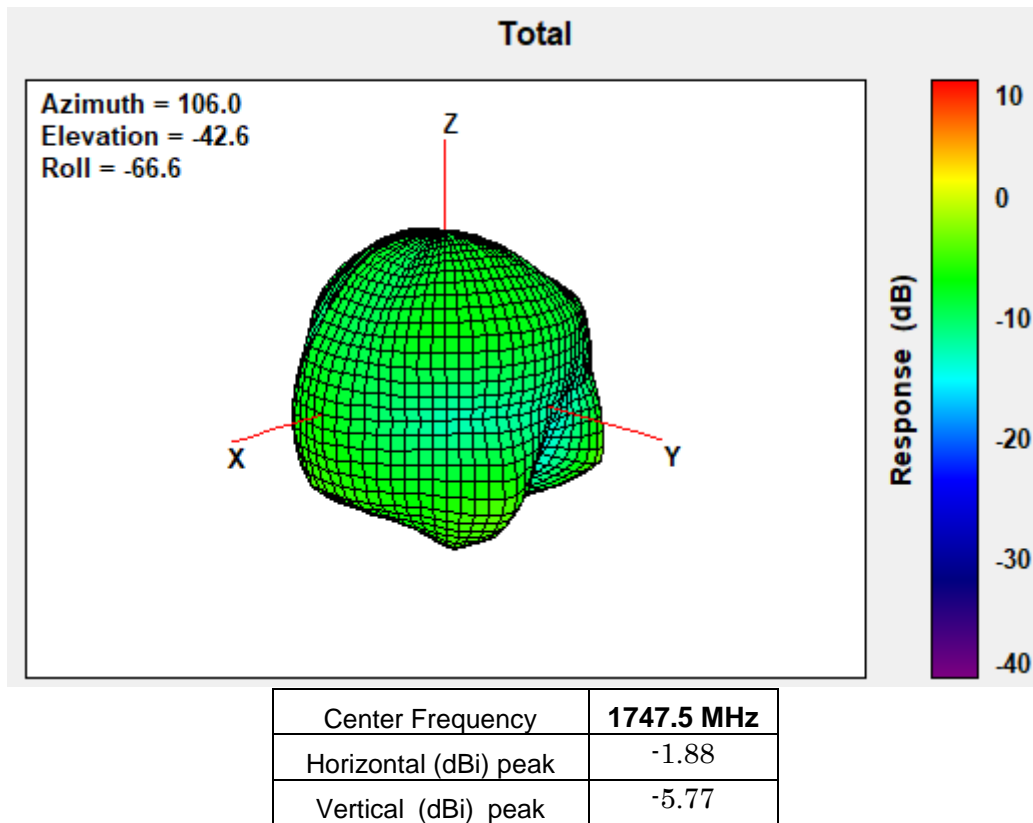
Center Frequency	<b>1710 MHz</b>
Horizontal (dBi) peak	-2.44
Vertical (dBi) peak	-3.78

**1732.5 MHz**

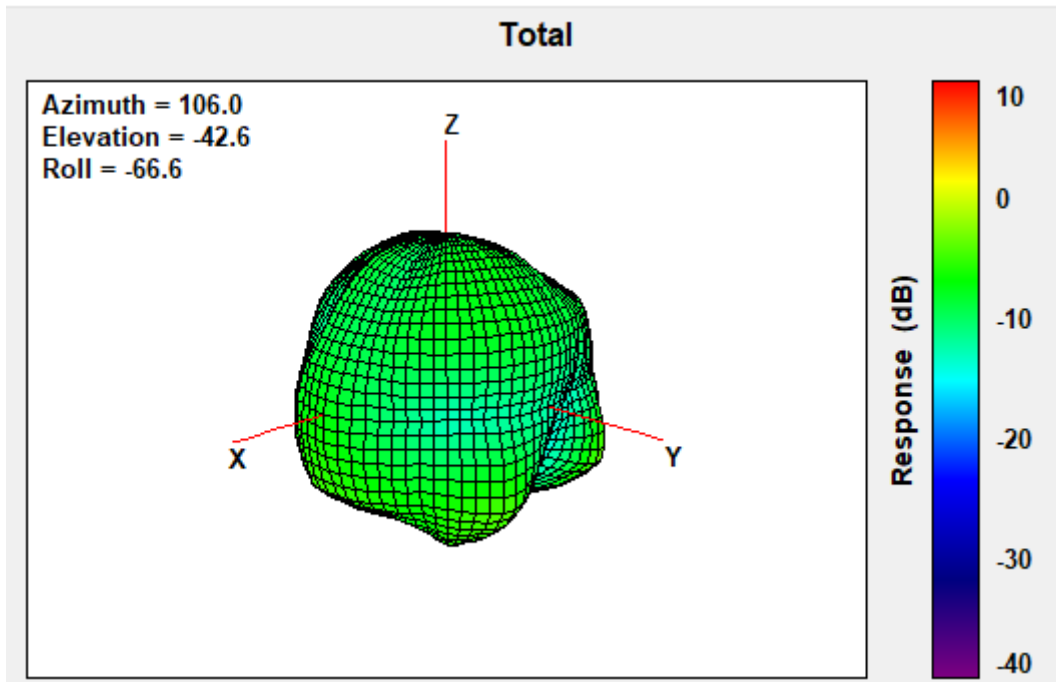




**1747.5 MHz**

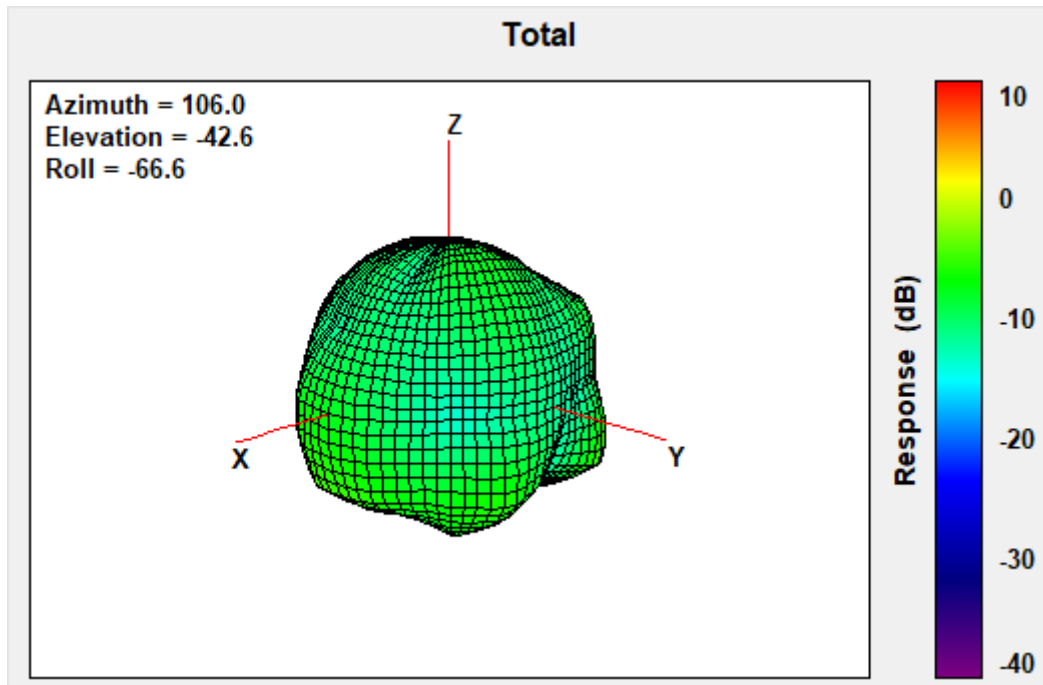


**1755 MHz**



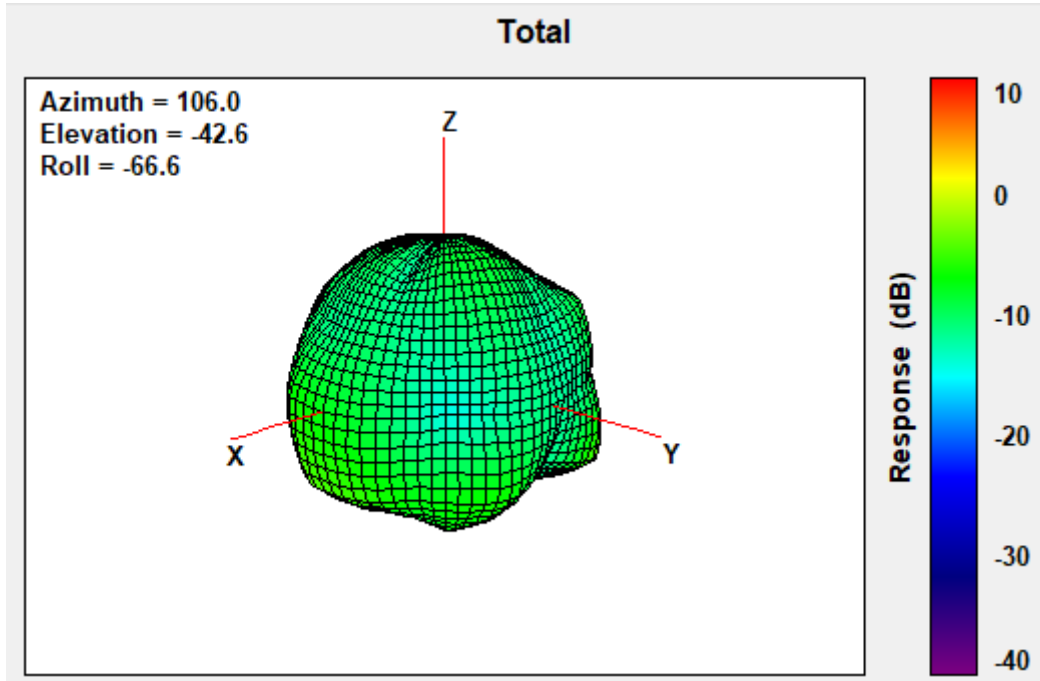
Center Frequency	<b>1755 MHz</b>
Horizontal (dBi) peak	-1.97
Vertical (dBi) peak	-5.96

**1785 MHz**



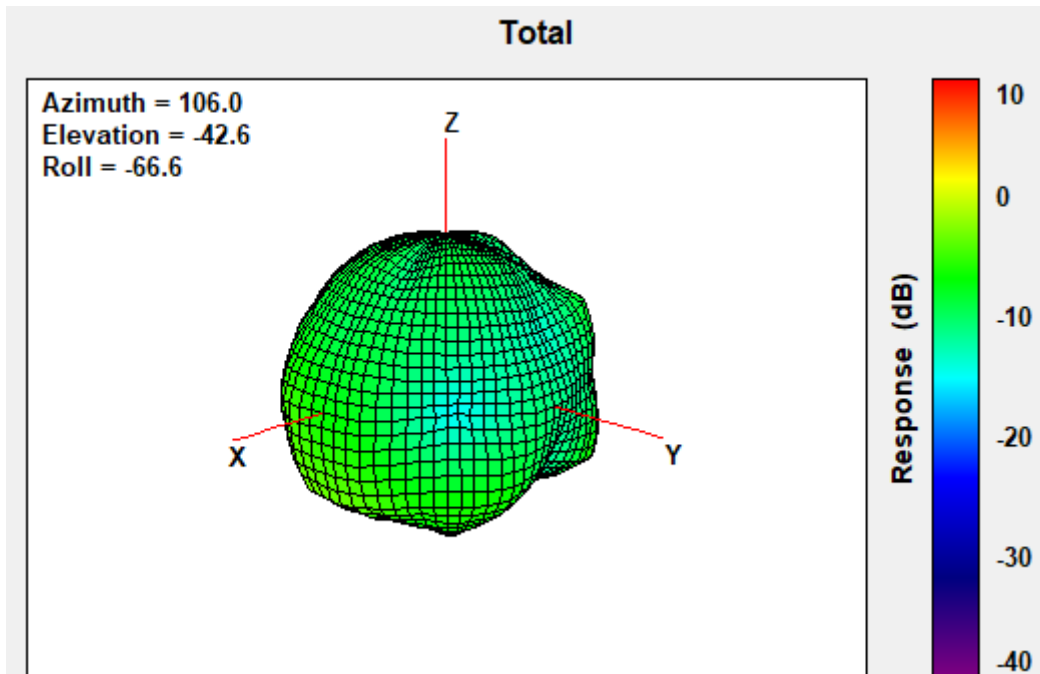
Center Frequency	<b>1785 MHz</b>
Horizontal (dBi) peak	-2.44
Vertical (dBi) peak	-6.91

**1805 MHz**



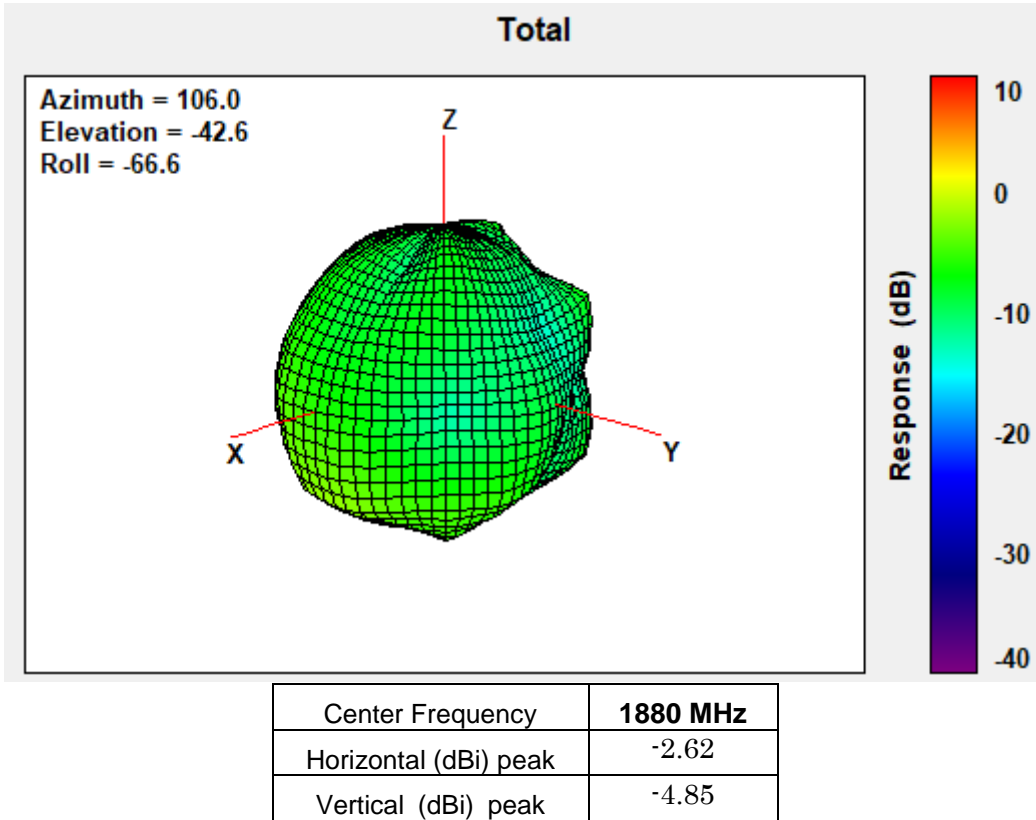
Center Frequency	<b>1805 MHz</b>
Horizontal (dBi) peak	-2.70
Vertical (dBi) peak	-7.13

**1850 MHz**

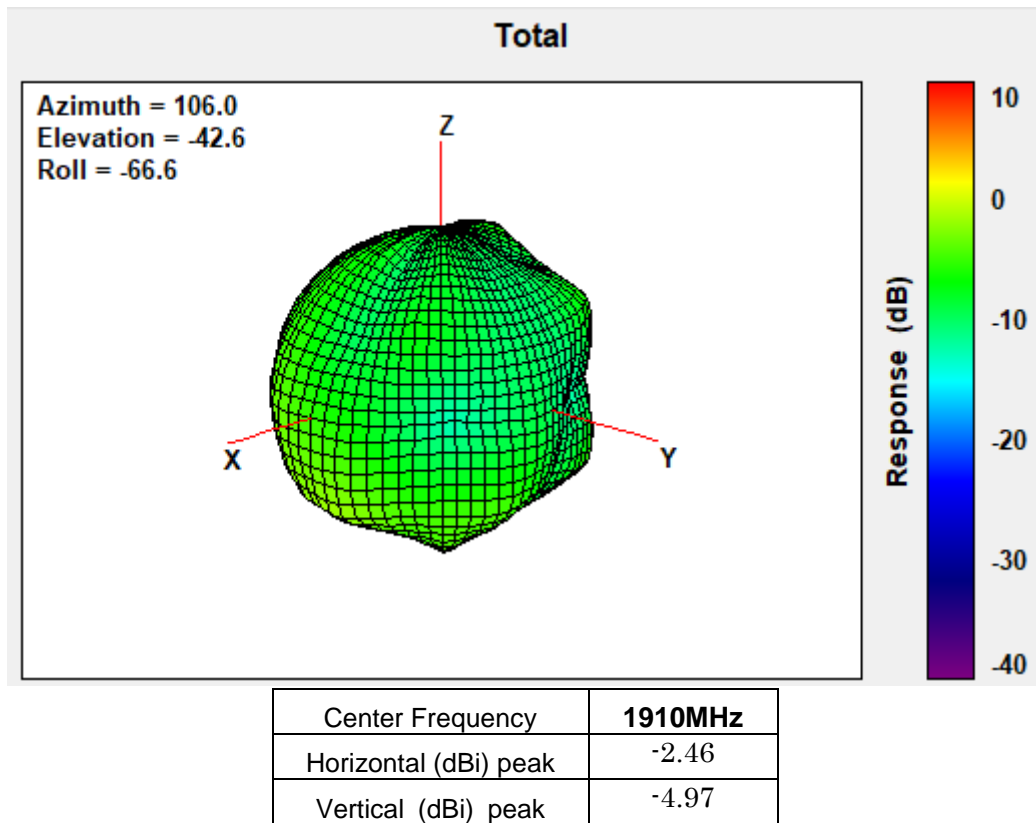


Center Frequency	<b>1850 MHz</b>
Horizontal (dBi) peak	-4.03
Vertical (dBi) peak	-5.55

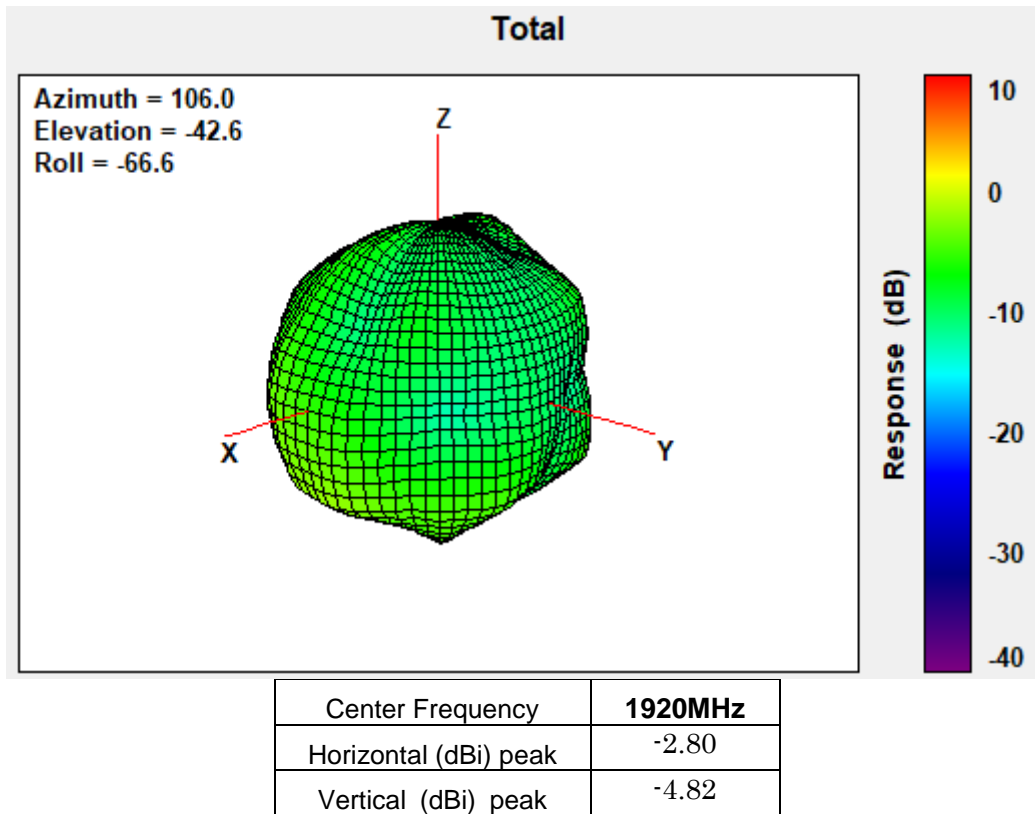
**1880 MHz**



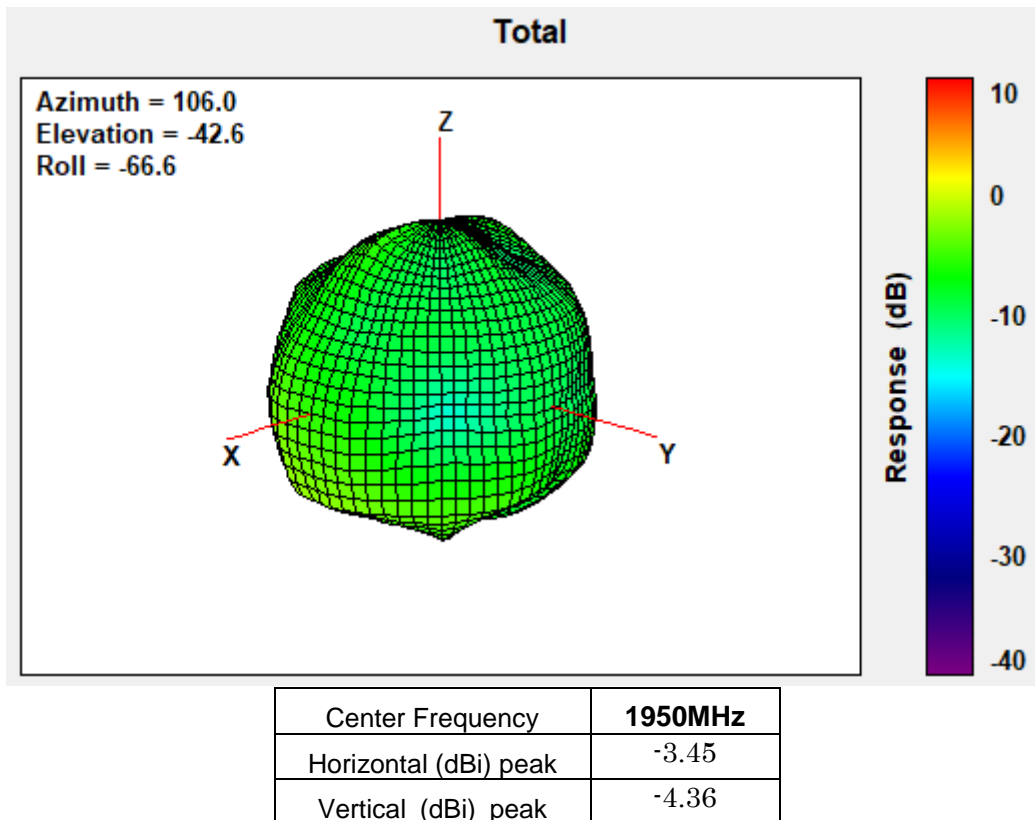
**1910MHz**



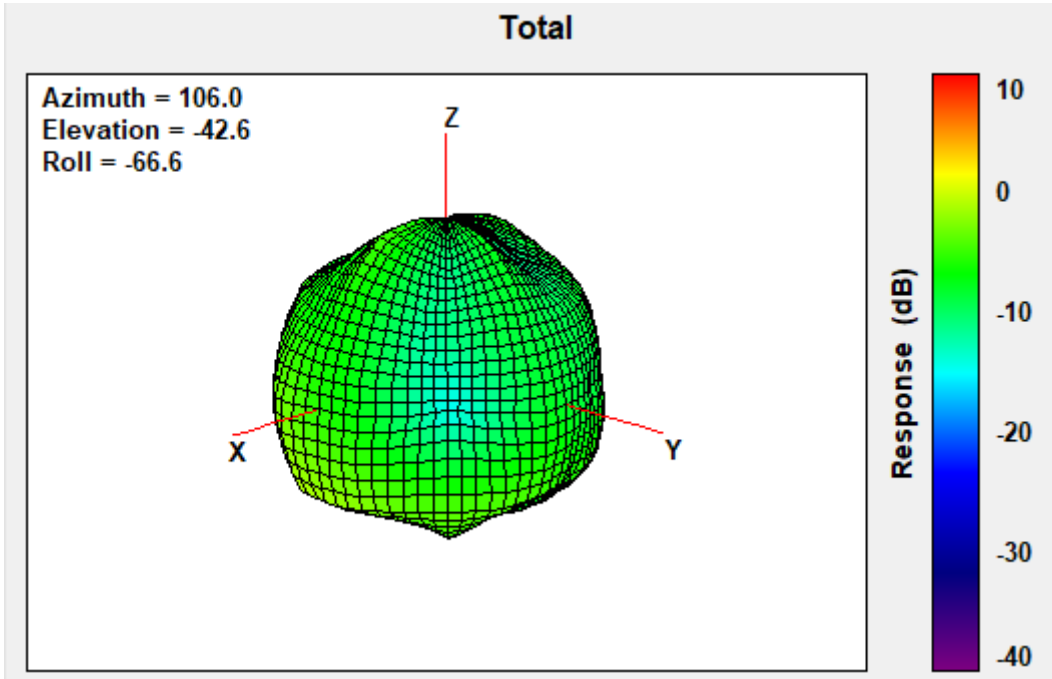
**1920MHz**



**1950MHz**

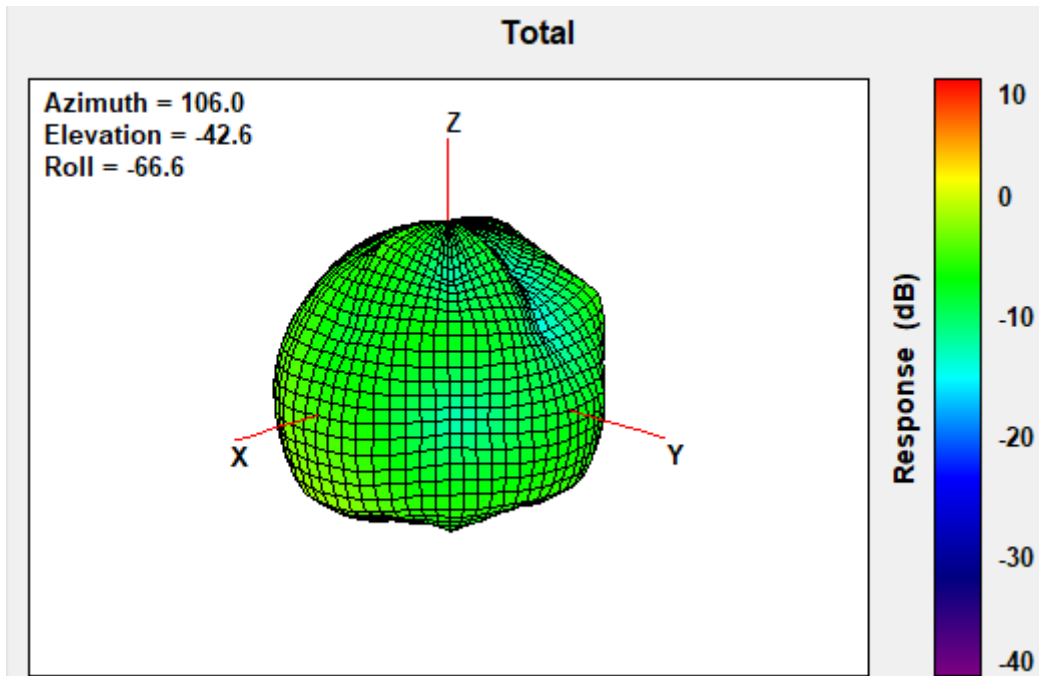


**1980MHz**



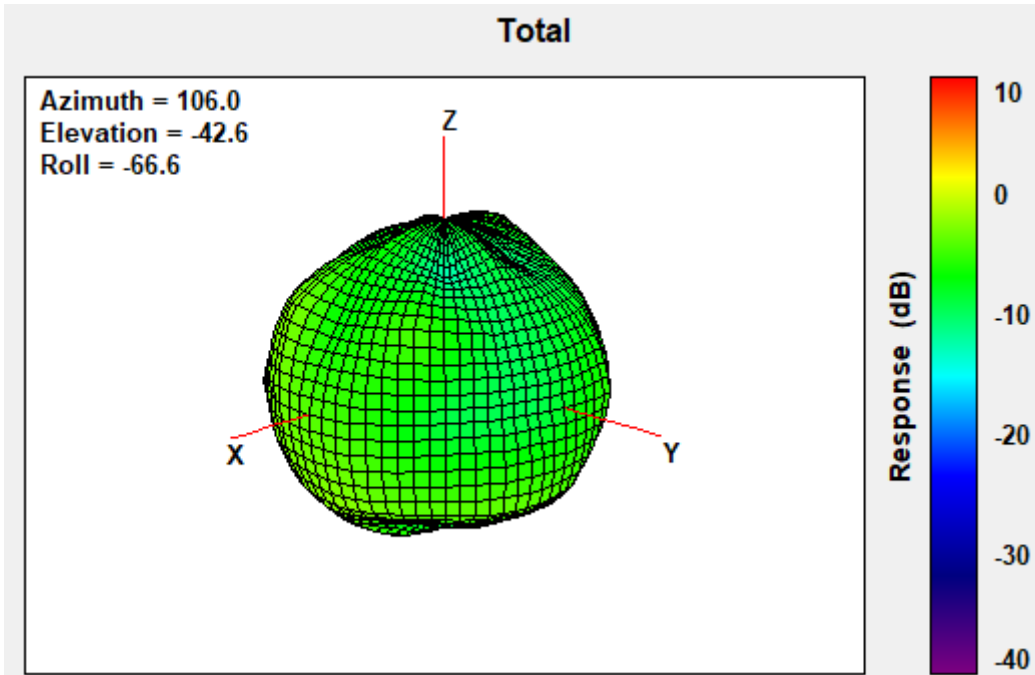
Center Frequency	<b>1980MHz</b>
Horizontal (dBi) peak	-2.44
Vertical (dBi) peak	-4.27

**2110MHz**



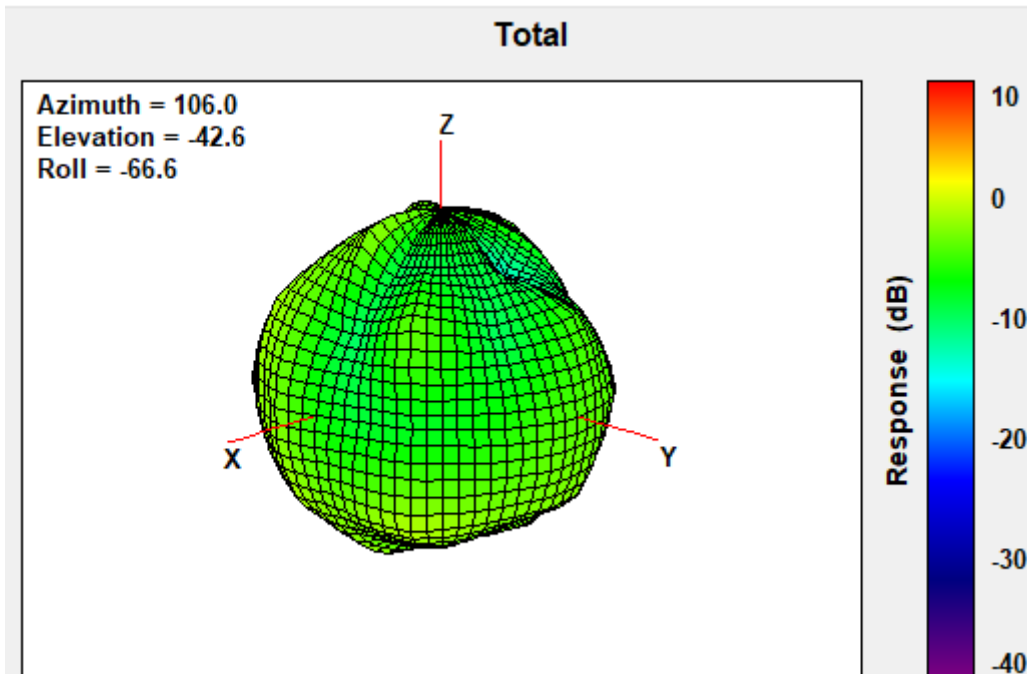
Center Frequency	<b>2110MHz</b>
Horizontal (dBi) peak	-1.94
Vertical (dBi) peak	-4.01

**2200MHz**



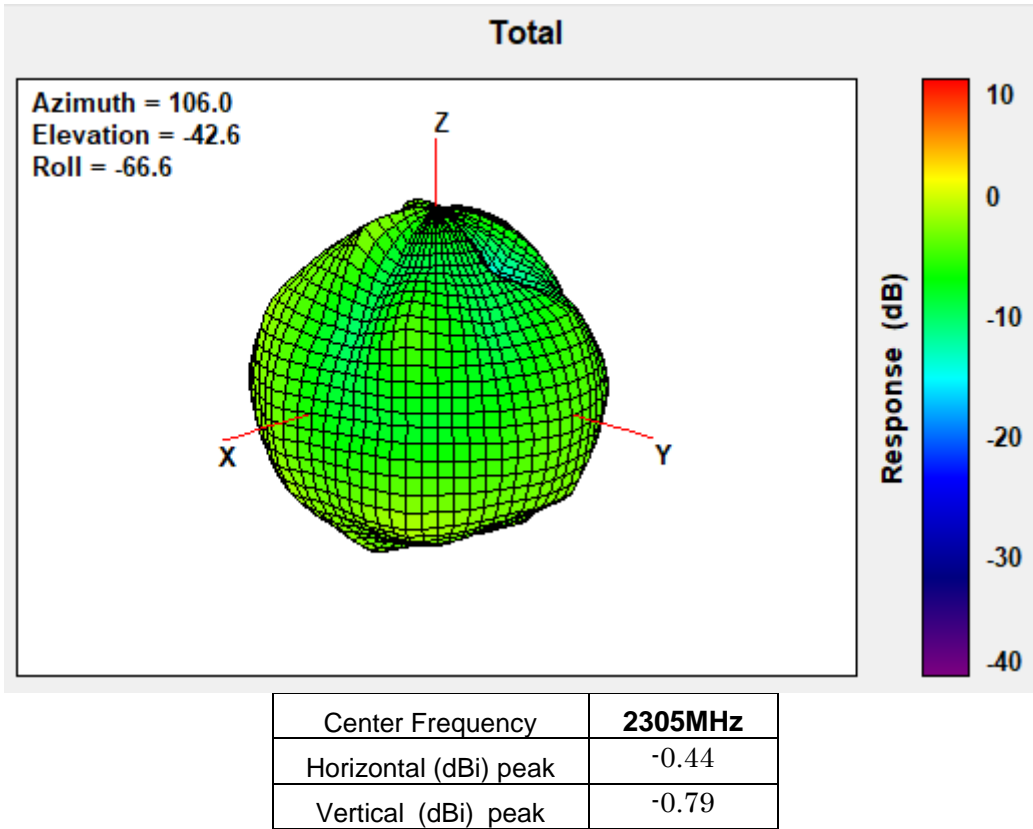
Center Frequency	<b>2200MHz</b>
Horizontal (dBi) peak	-2.04
Vertical (dBi) peak	-2.64

**2300MHz**

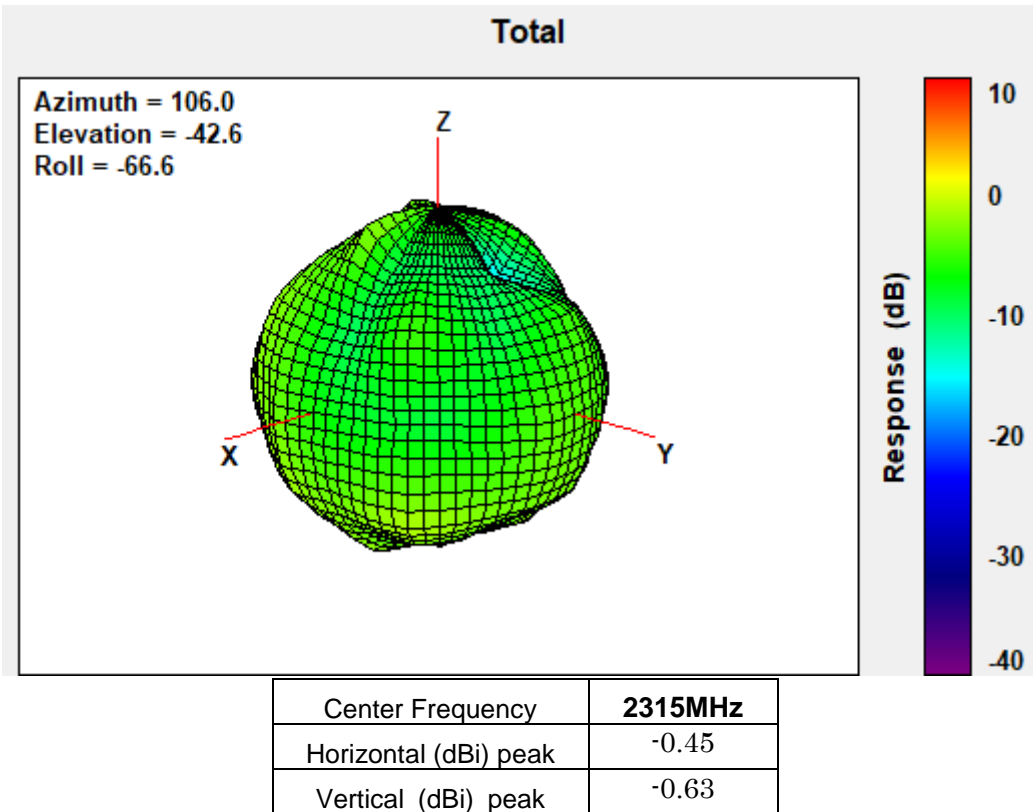


Center Frequency	<b>2300MHz</b>
Horizontal (dBi) peak	-0.39
Vertical (dBi) peak	-0.80

**2305MHz**

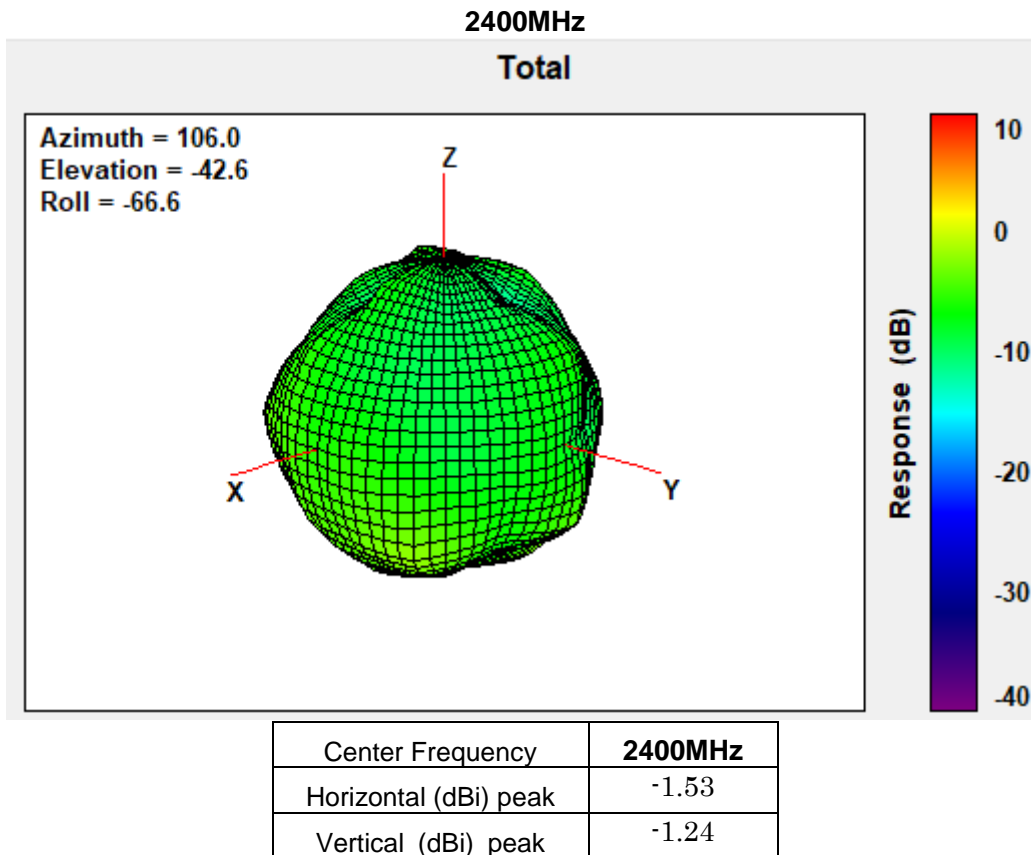
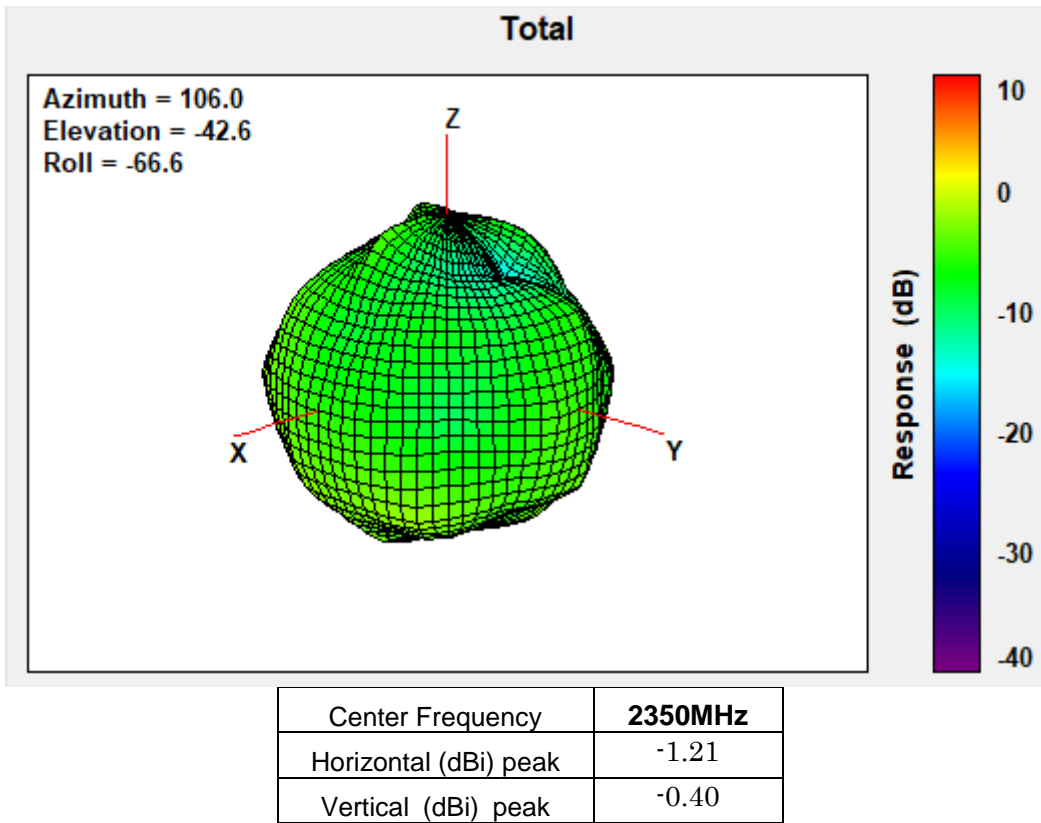


**2315MHz**

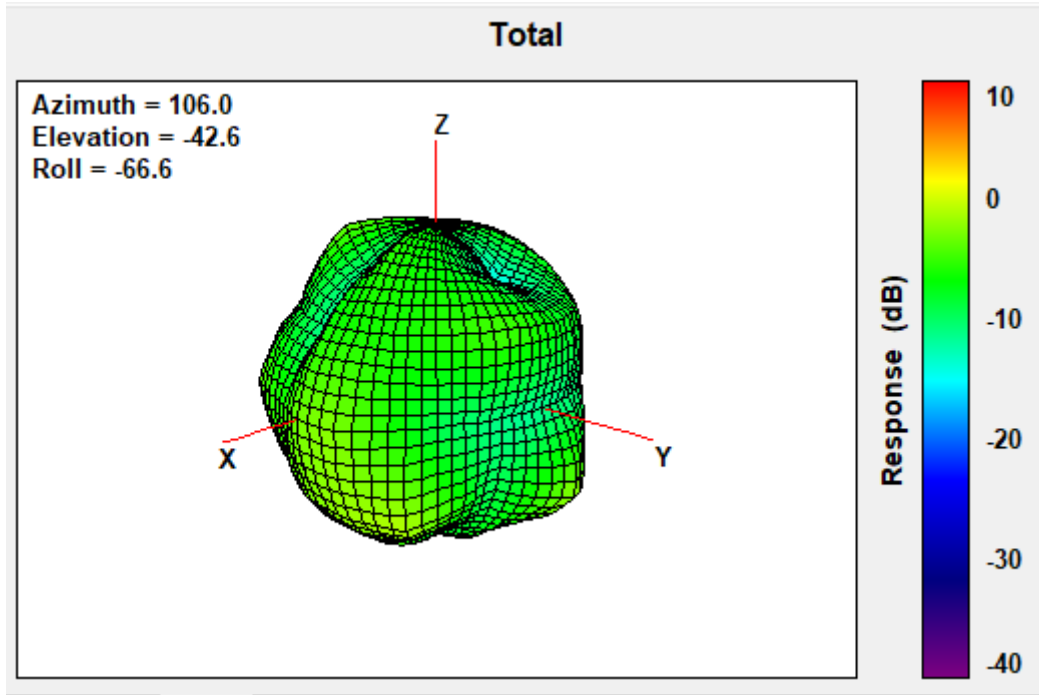


**2350MHz**



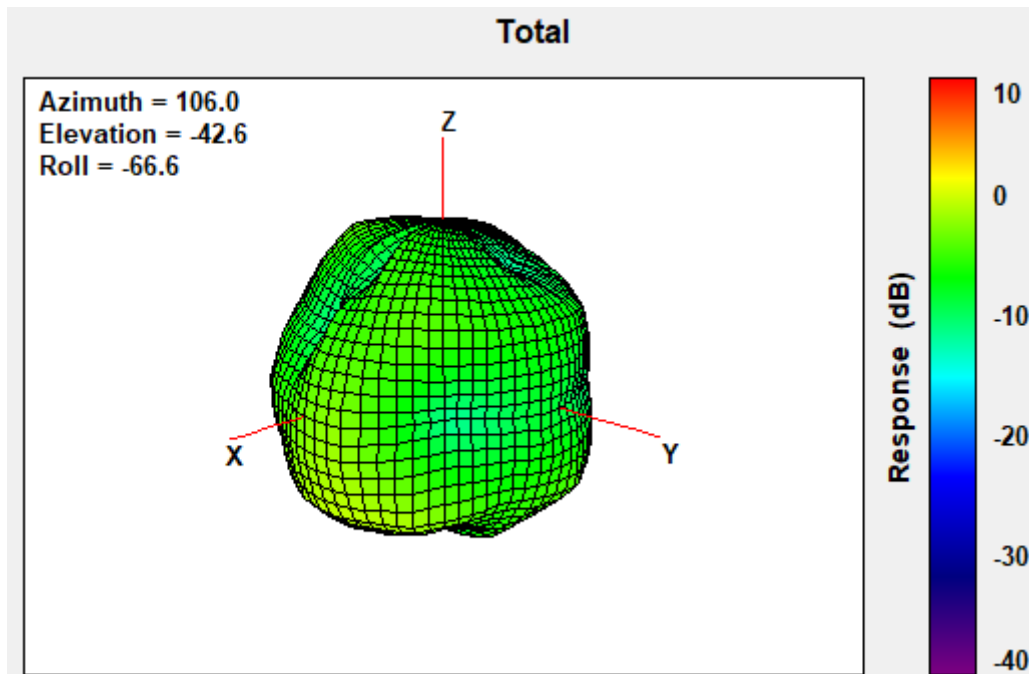


**2500MHz**



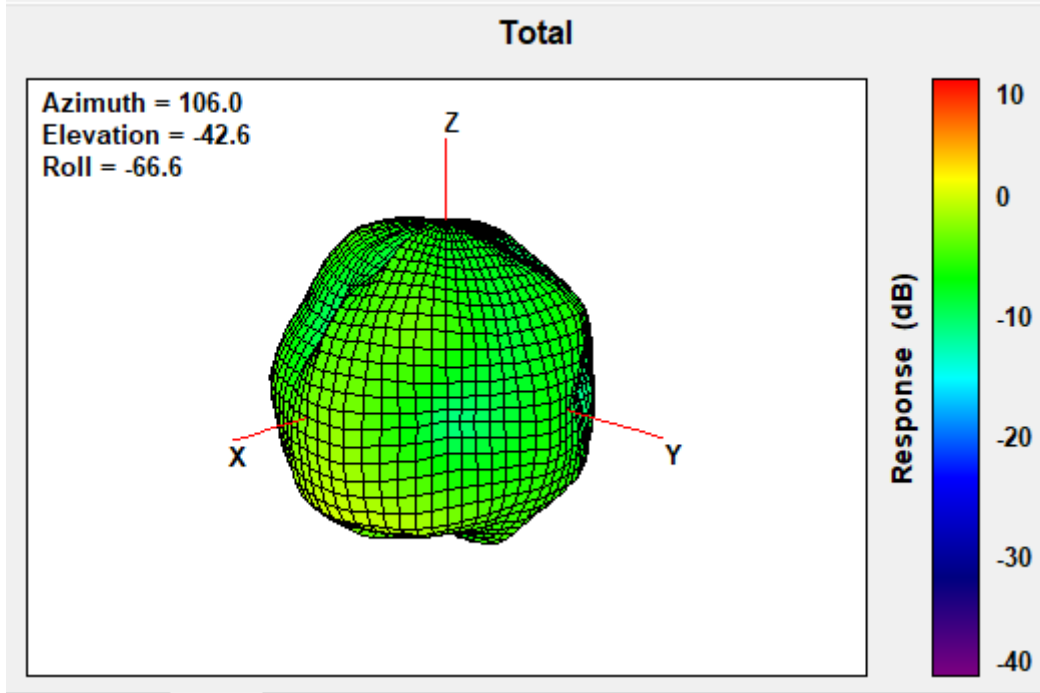
Center Frequency	<b>2500MHz</b>
Horizontal (dBi) peak	-0.59
Vertical (dBi) peak	-1.52

### 2570MHz



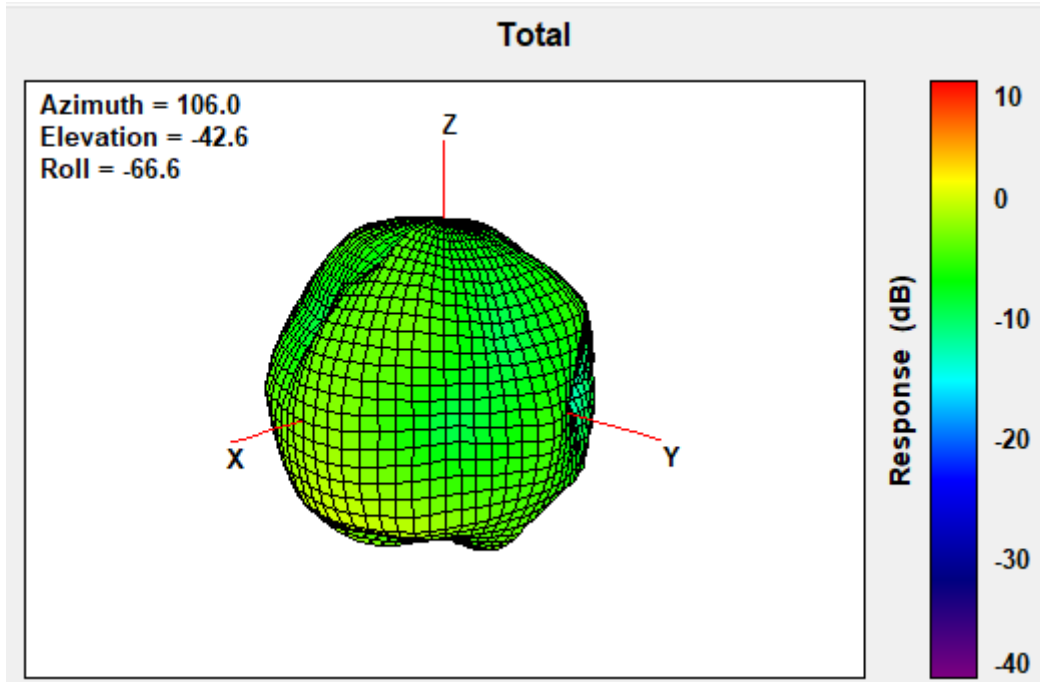
Center Frequency	<b>2570MHz</b>
Horizontal (dBi) peak	-0.74
Vertical (dBi) peak	-1.86

**2595MHz**



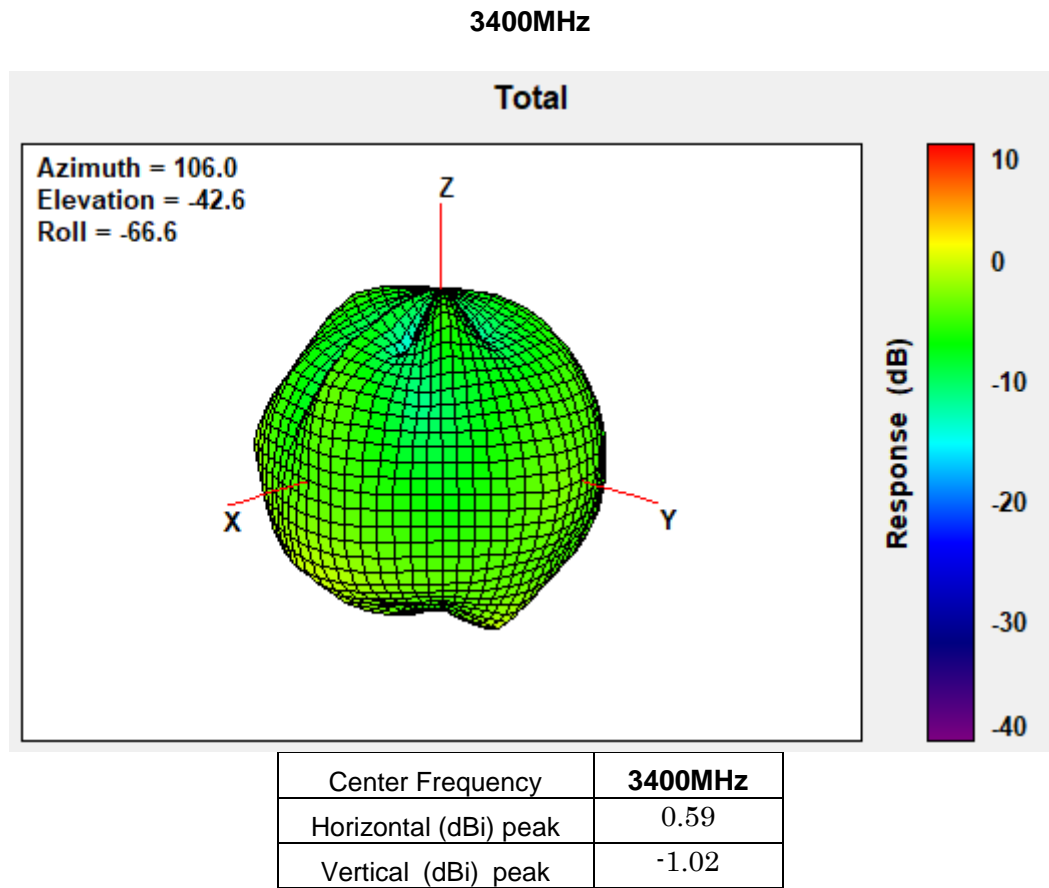
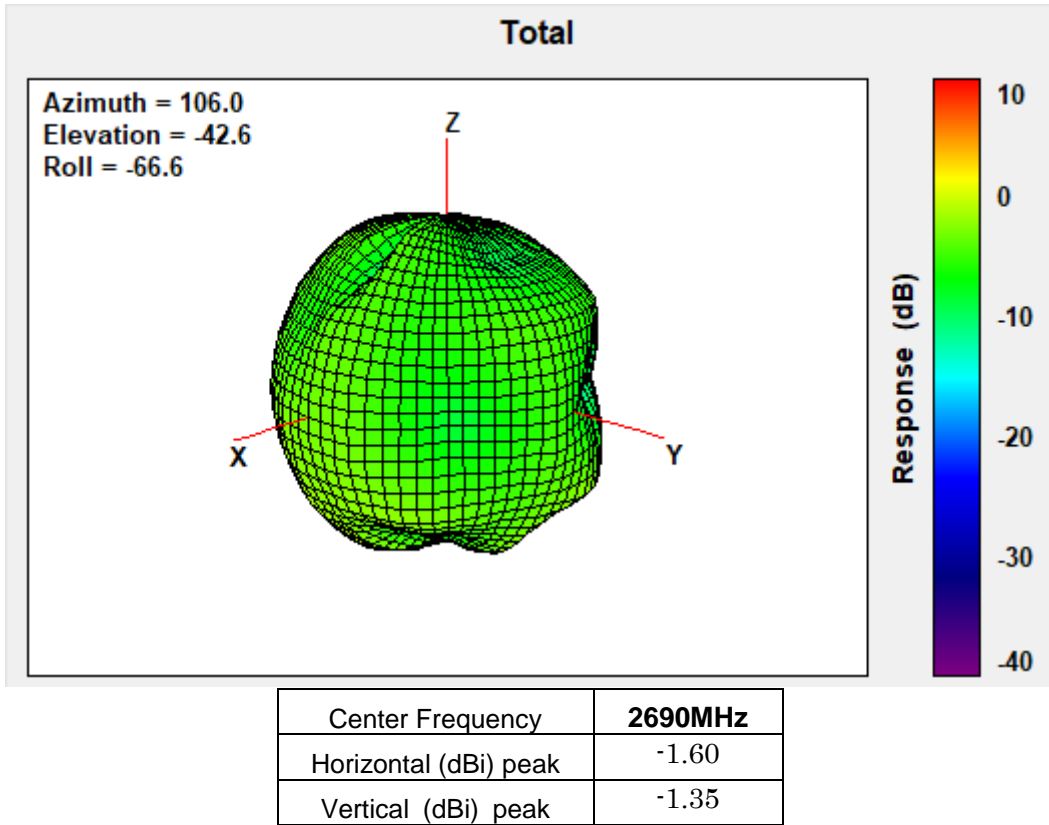
Center Frequency	<b>2595MHz</b>
Horizontal (dBi) peak	-0.34
Vertical (dBi) peak	-1.91

**2620MHz**

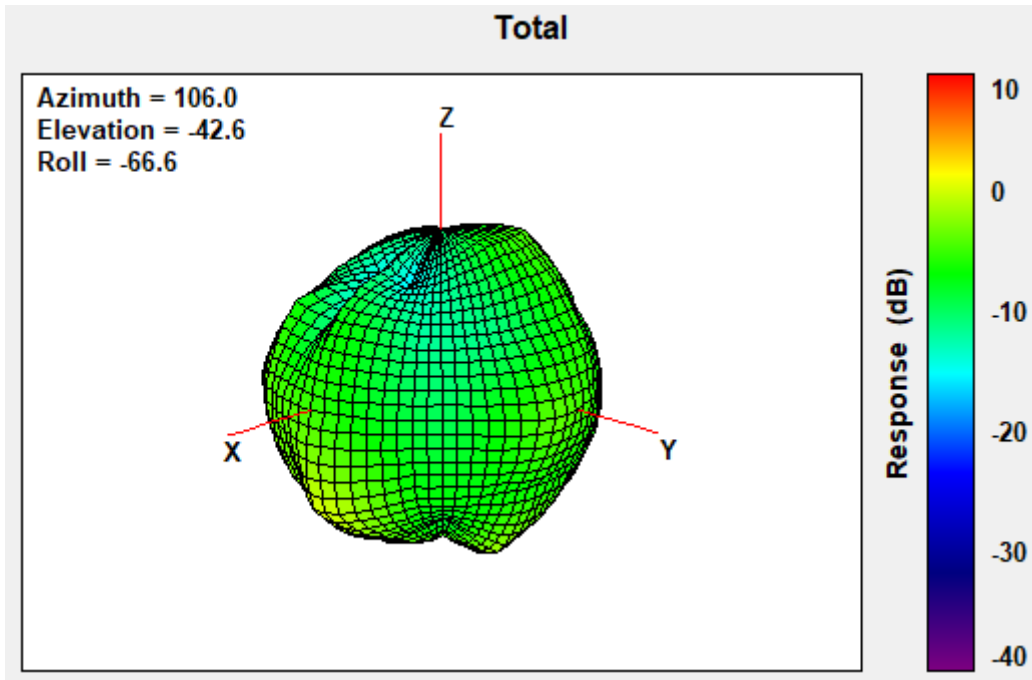


Center Frequency	<b>2620MHz</b>
Horizontal (dBi) peak	-0.37
Vertical (dBi) peak	-1.83

**2690MHz**

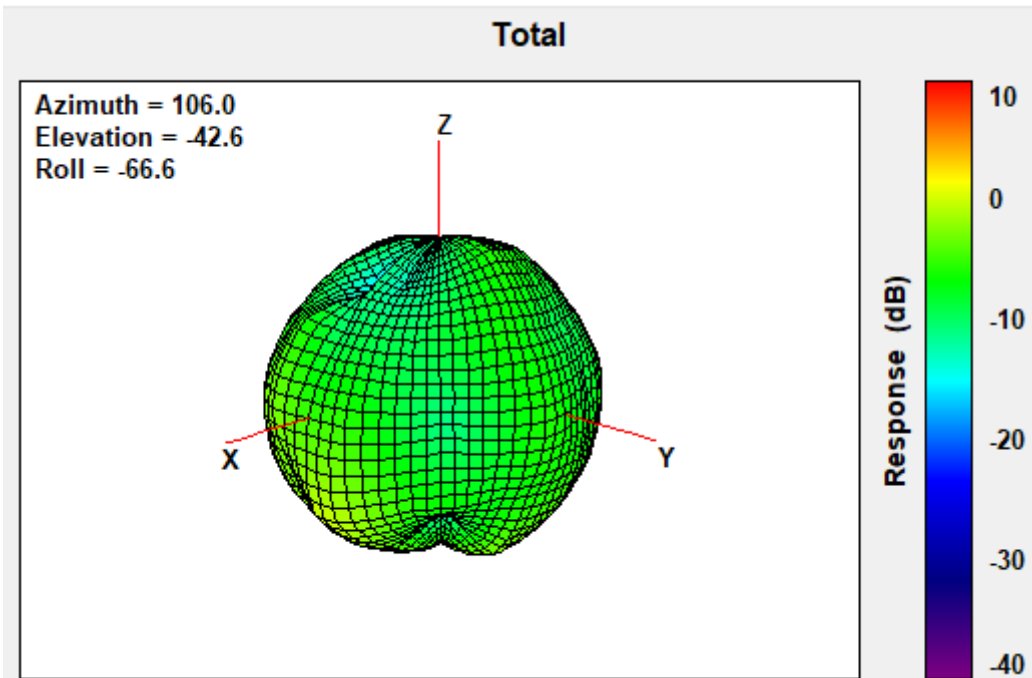


### 3500MHz



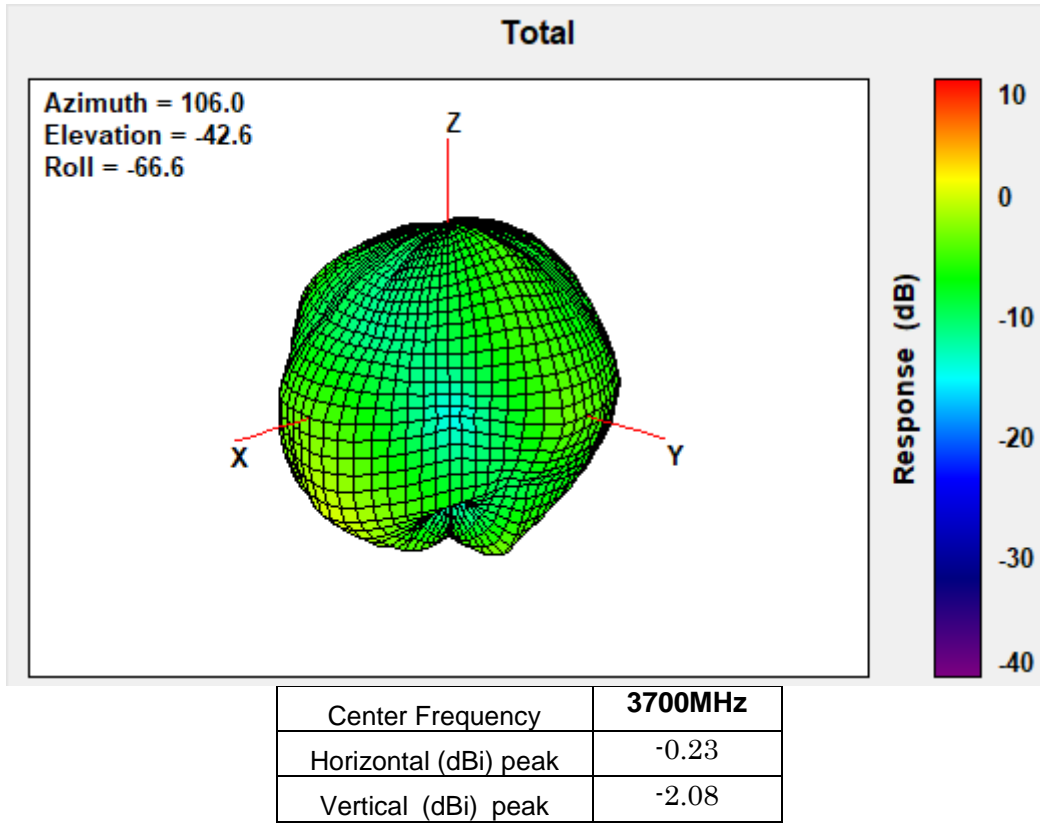
Center Frequency	<b>3500MHz</b>
Horizontal (dBi) peak	0.25
Vertical (dBi) peak	-1.93

### 3600MHz

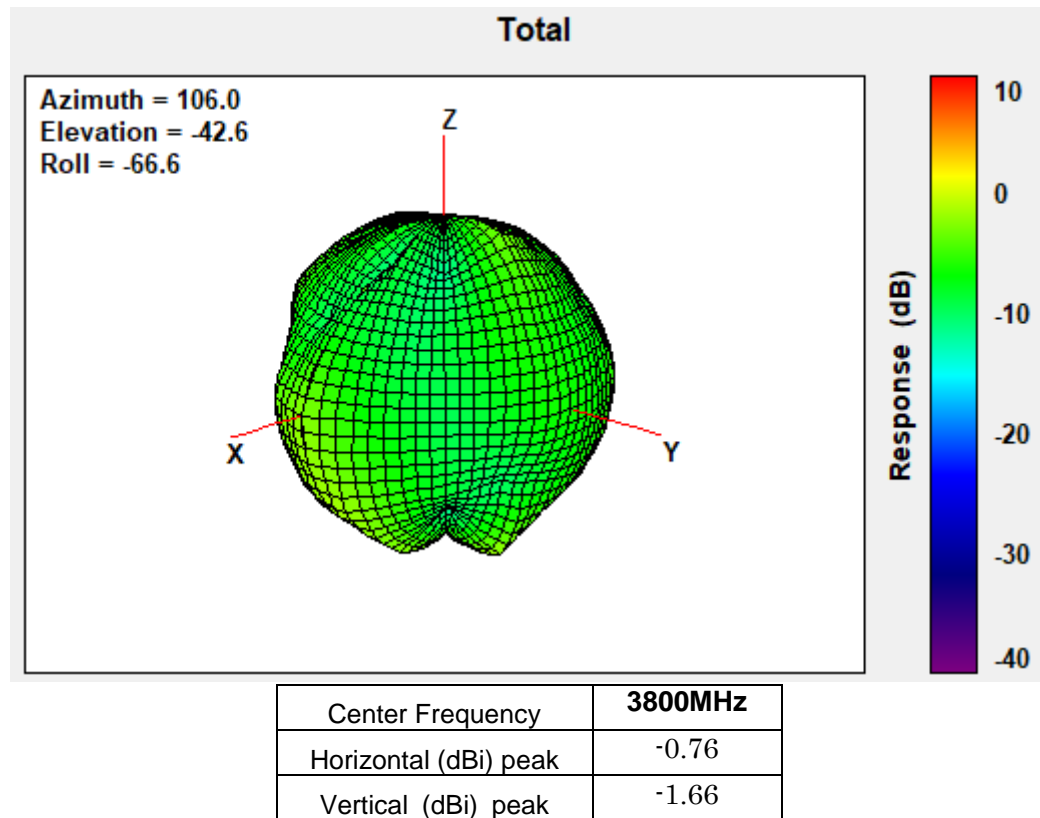


Center Frequency	<b>3600MHz</b>
Horizontal (dBi) peak	-0.06
Vertical (dBi) peak	-1.55

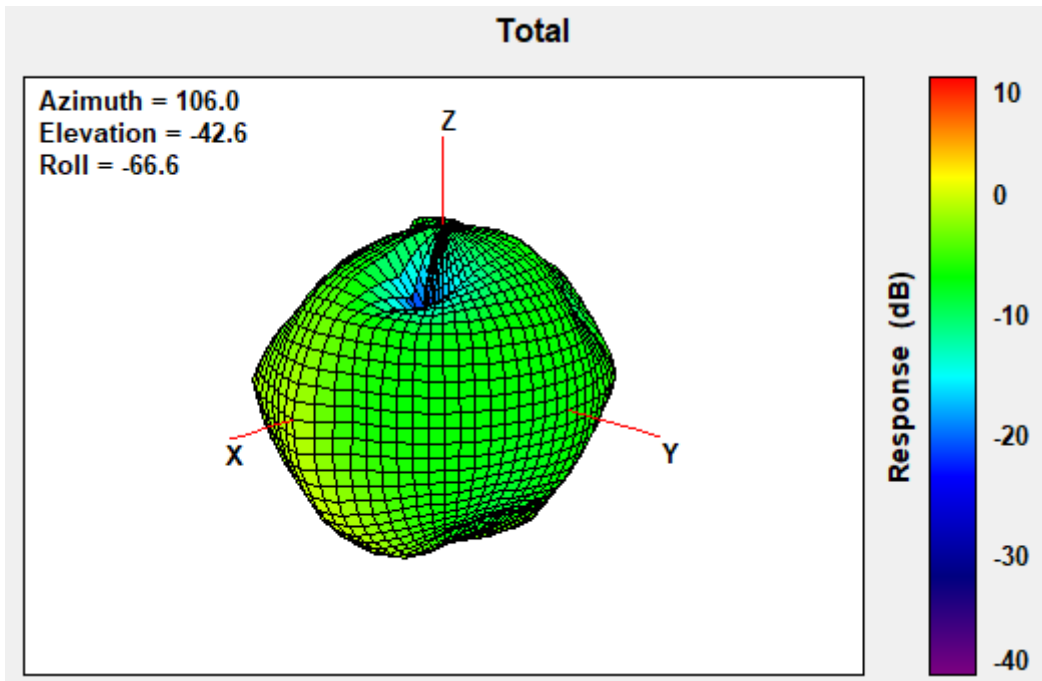
### 3700MHz



### 3800MHz

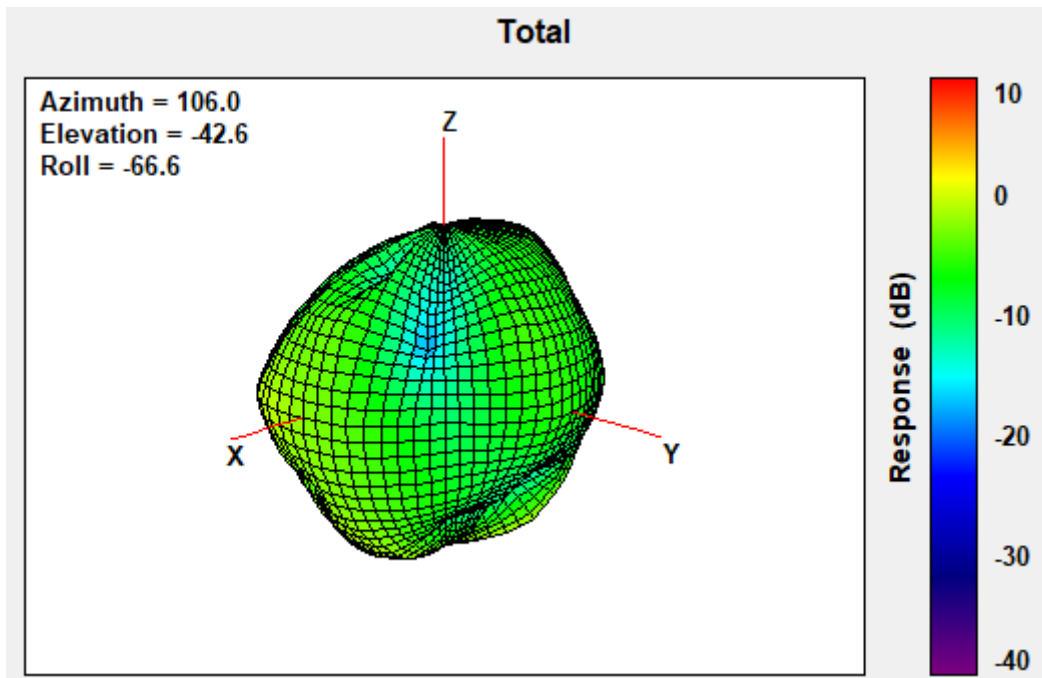


### 4200MHz



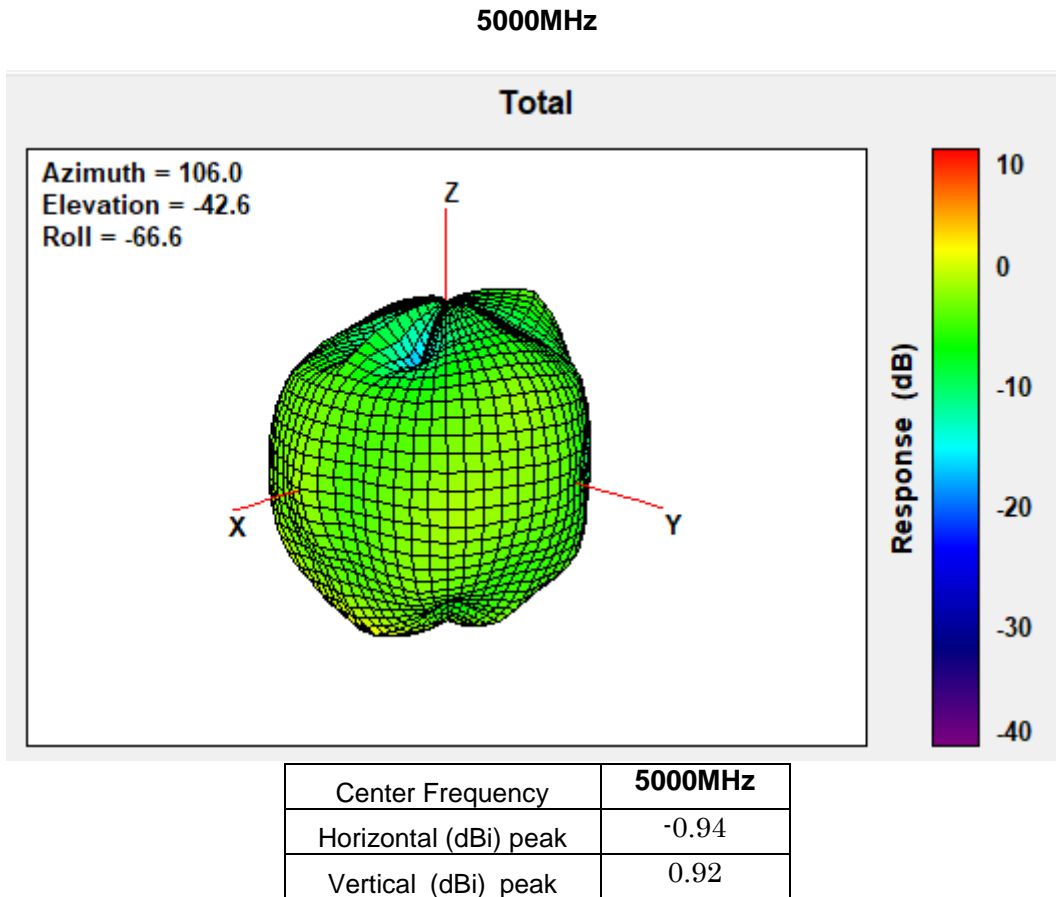
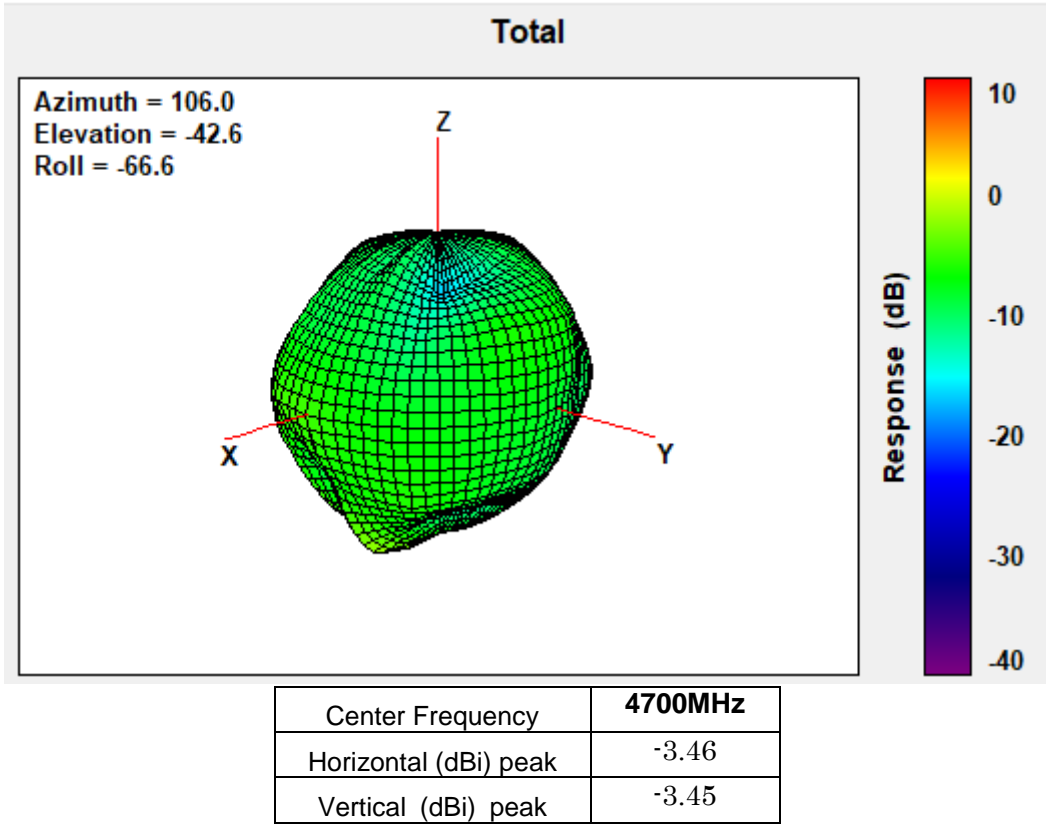
Center Frequency	<b>4200MHz</b>
Horizontal (dBi) peak	-0.41
Vertical (dBi) peak	0.01

### 4400MHz



Center Frequency	<b>4400MHz</b>
Horizontal (dBi) peak	-0.08
Vertical (dBi) peak	-0.66

### 4700MHz

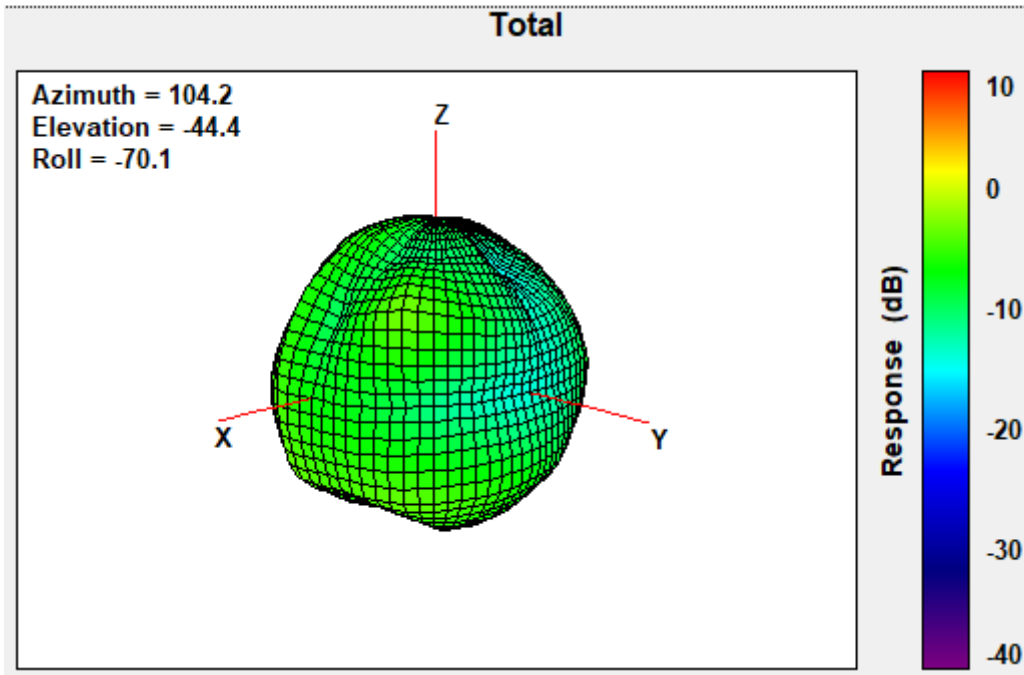




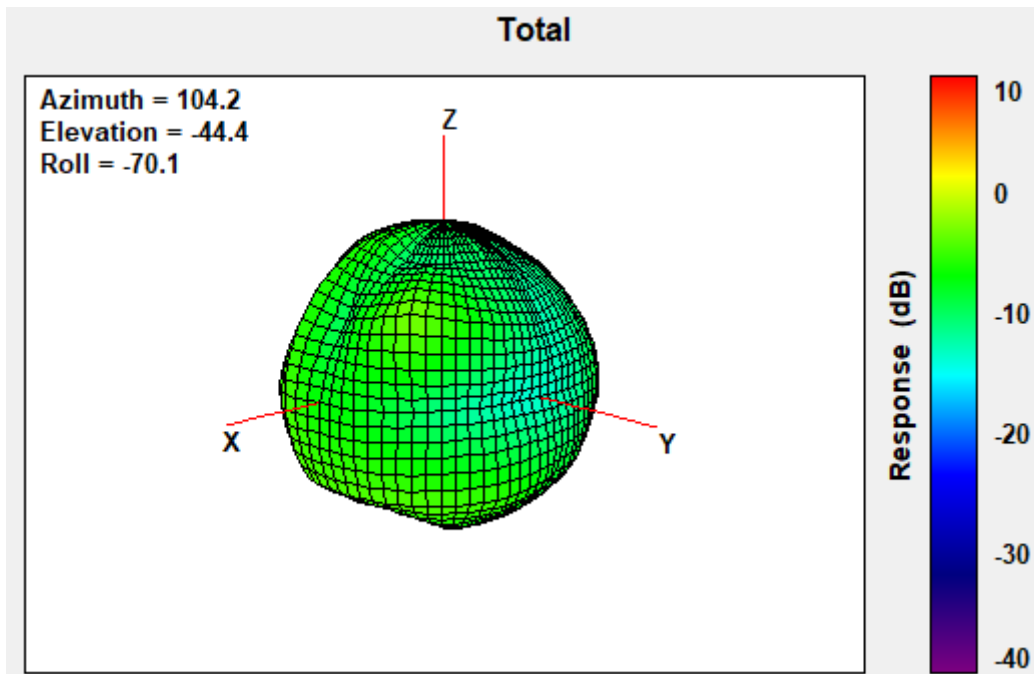


# MIMO3 Antenna (DRx1)

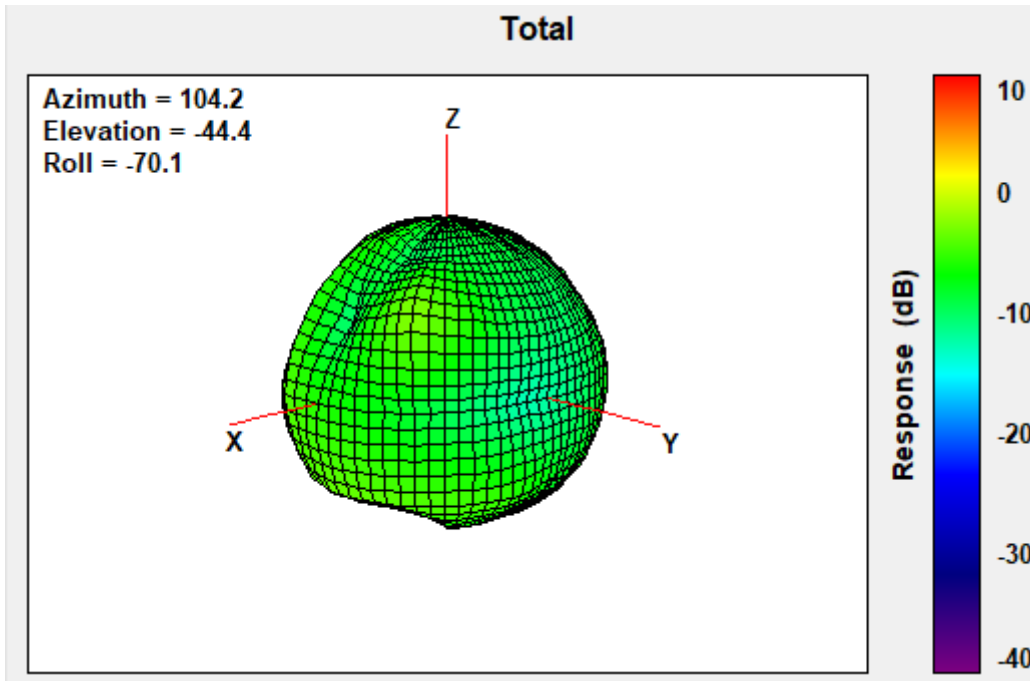
1805 MHz



1850 MHz

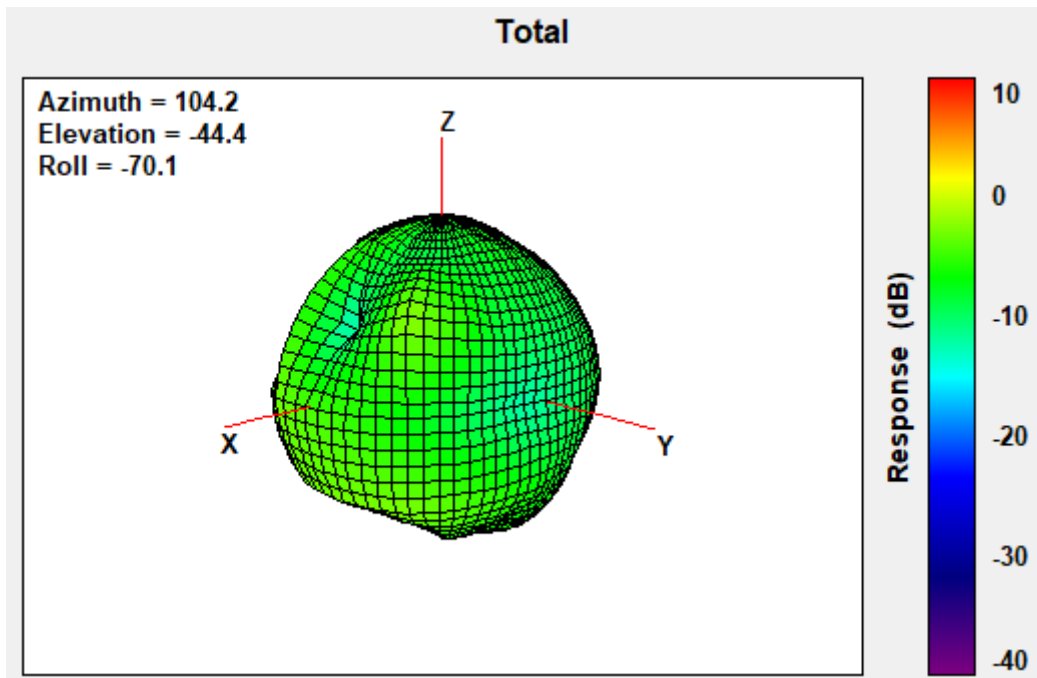


**1880 MHz**



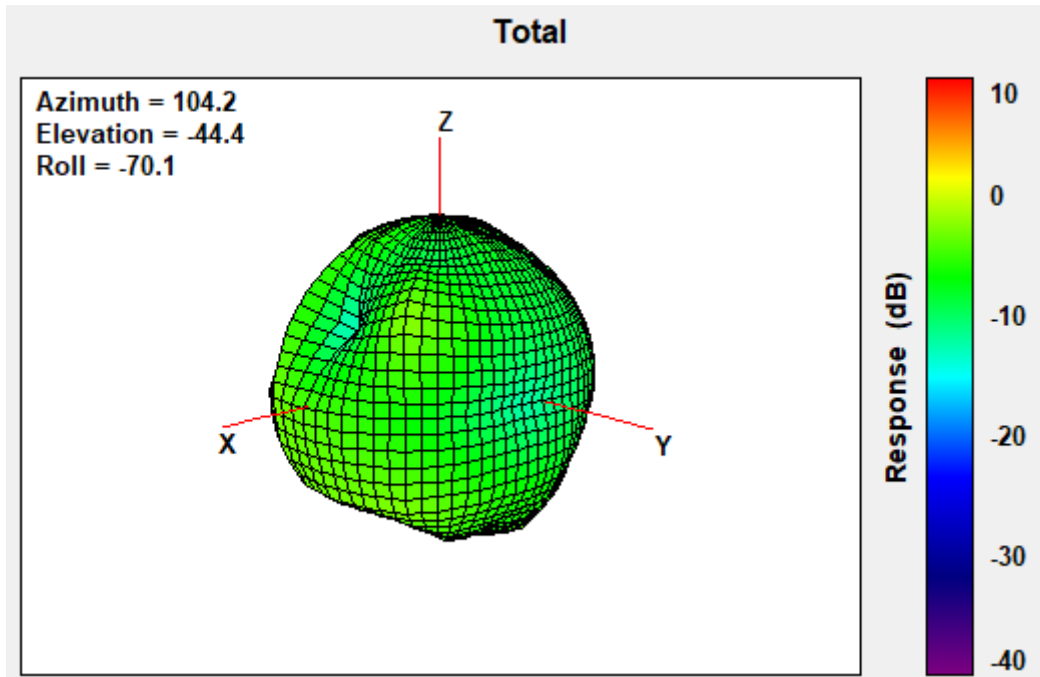
Center Frequency	<b>1880 MHz</b>
Horizontal (dBi) peak	-2.28
Vertical (dBi) peak	-4.33

**1910MHz**



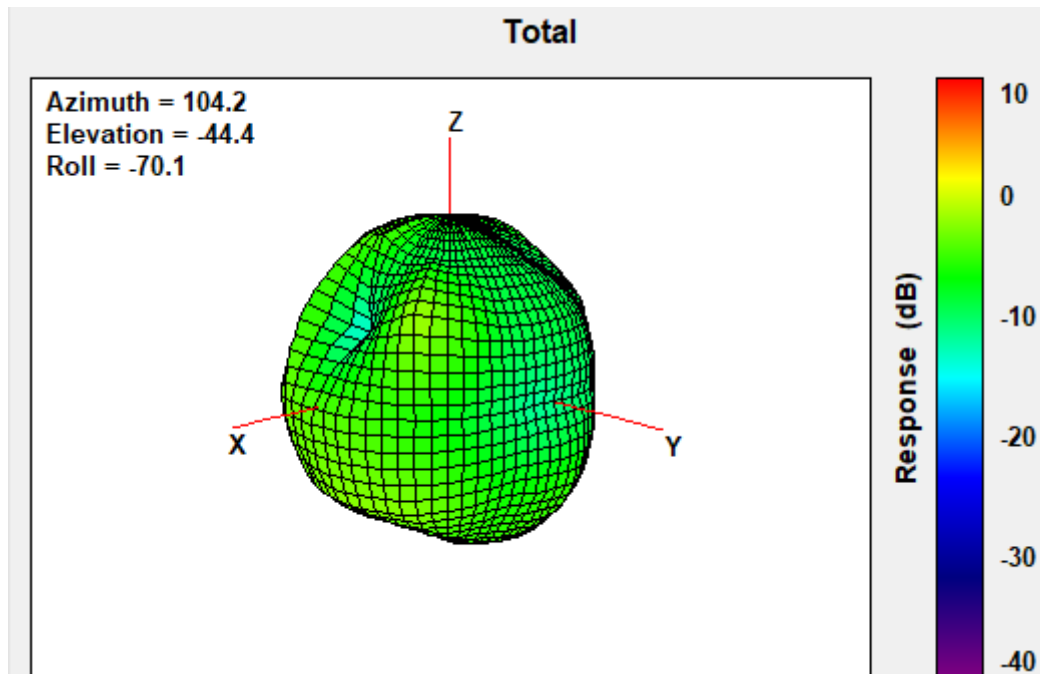
Center Frequency	<b>1910MHz</b>
Horizontal (dBi) peak	-1.59
Vertical (dBi) peak	-3.78

**1920MHz**



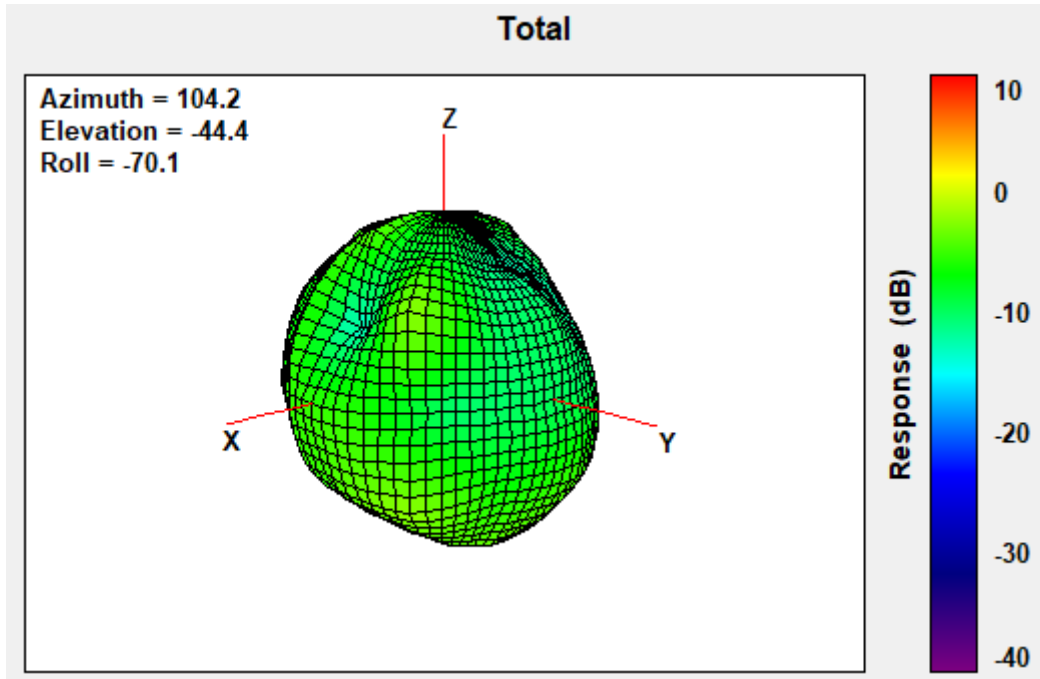
Center Frequency	<b>1920MHz</b>
Horizontal (dBi) peak	-1.73
Vertical (dBi) peak	-3.84

**1950MHz**



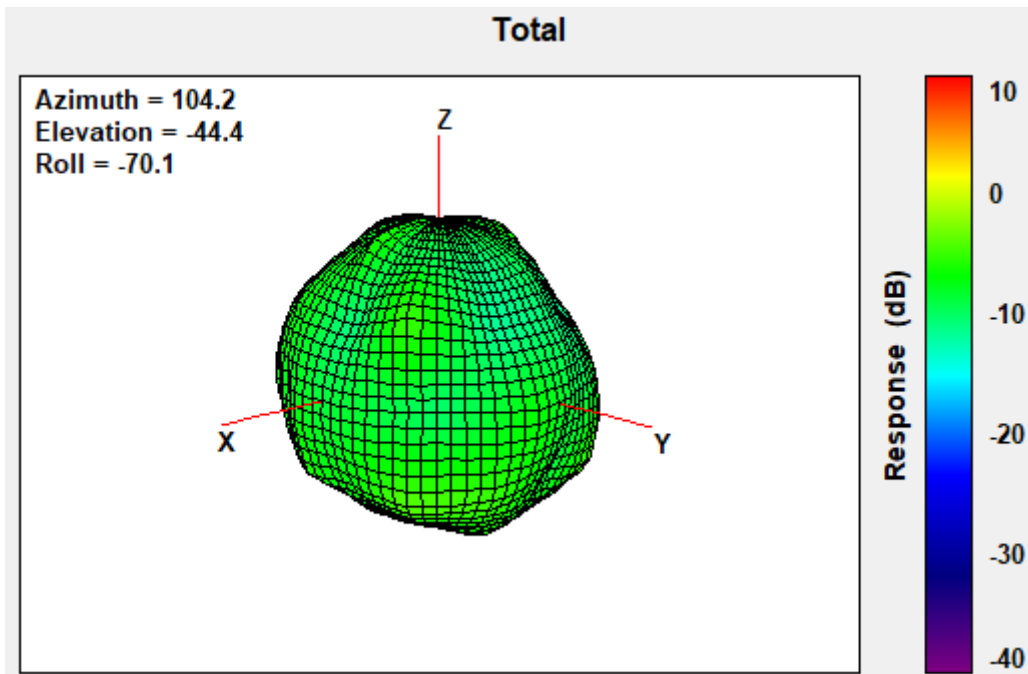
Center Frequency	<b>1950MHz</b>
Horizontal (dBi) peak	-2.13
Vertical (dBi) peak	-3.61

**1980MHz**



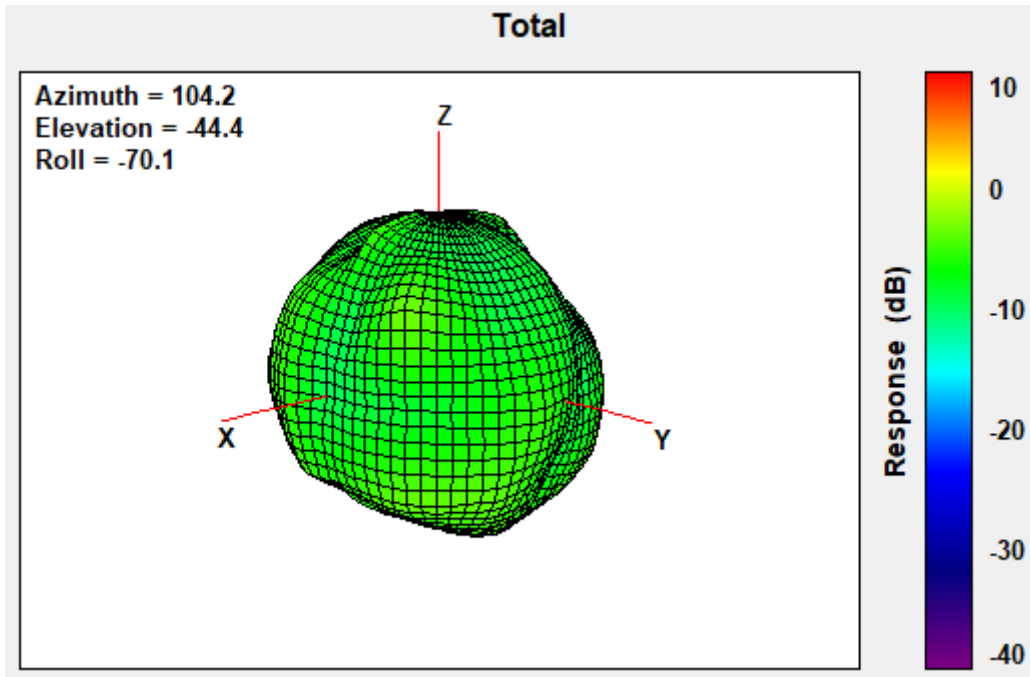
Center Frequency	<b>1980MHz</b>
Horizontal (dBi) peak	-1.59
Vertical (dBi) peak	-4.52

**2110MHz**



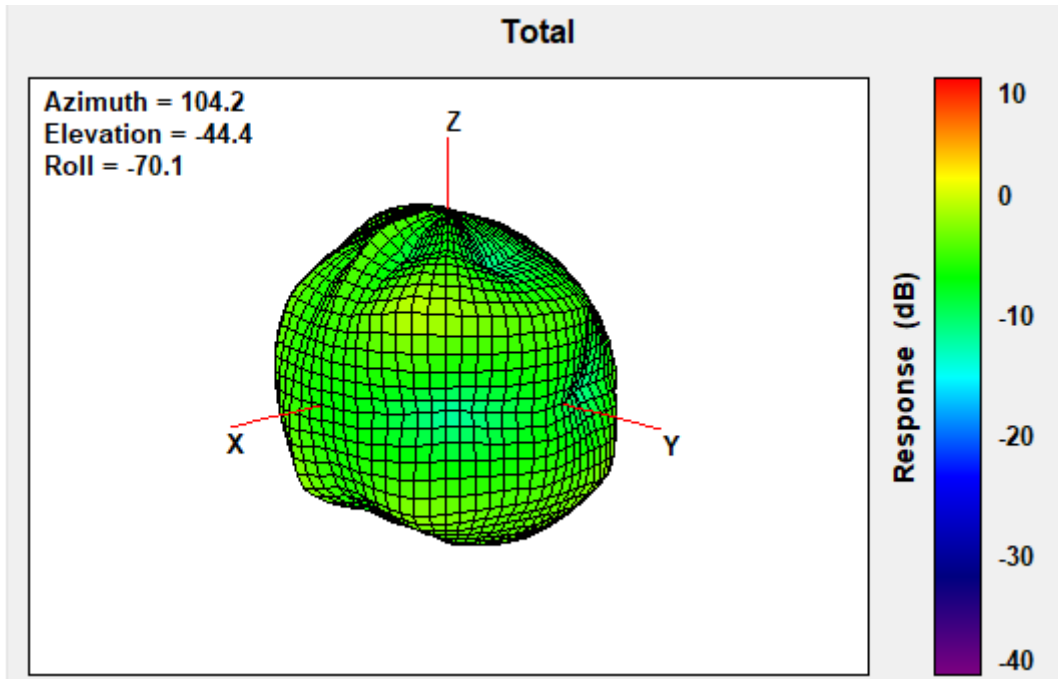
Center Frequency	<b>2110MHz</b>
Horizontal (dBi) peak	-3.50
Vertical (dBi) peak	-4.54

**2200MHz**



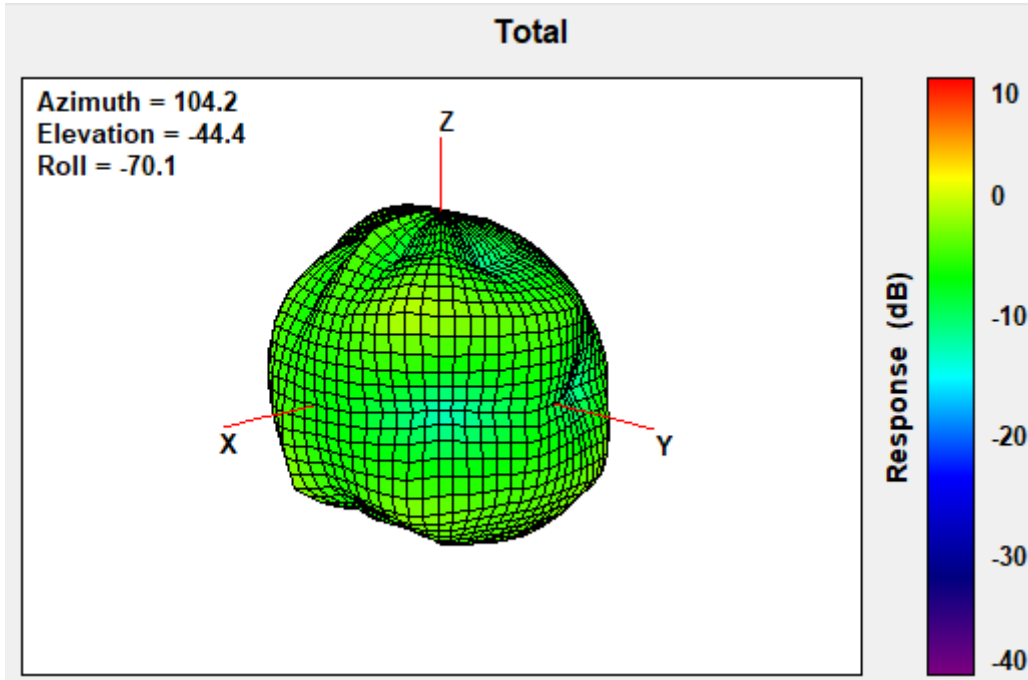
Center Frequency	<b>2200MHz</b>
Horizontal (dBi) peak	-2.96
Vertical (dBi) peak	-4.69

**2300MHz**



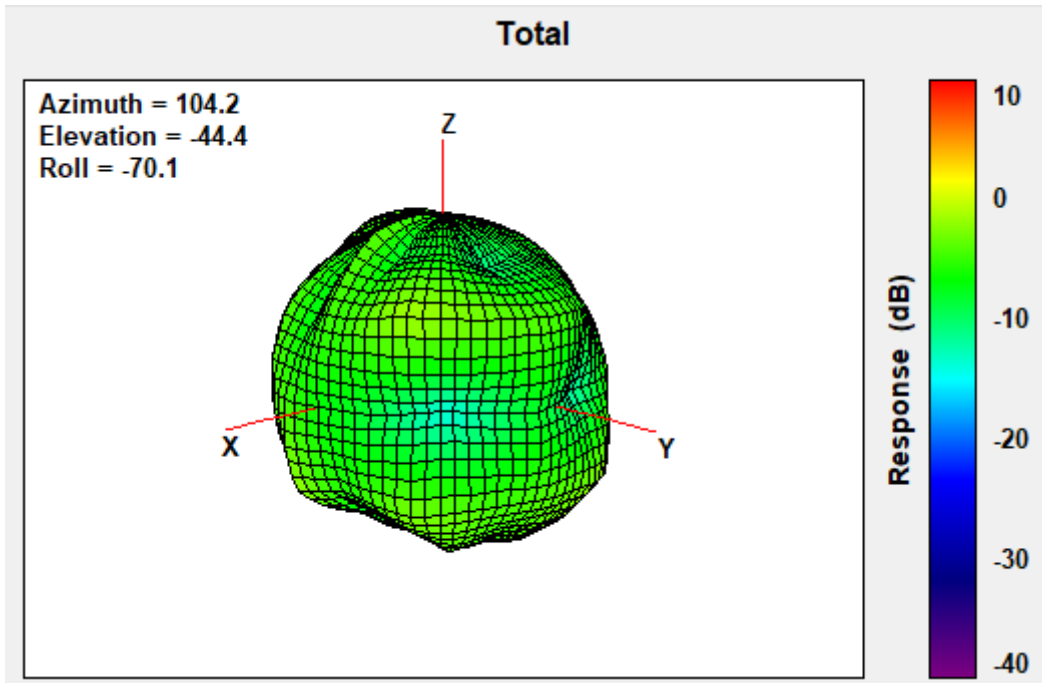
Center Frequency	<b>2300MHz</b>
Horizontal (dBi) peak	-0.02
Vertical (dBi) peak	-2.79

**2305MHz**



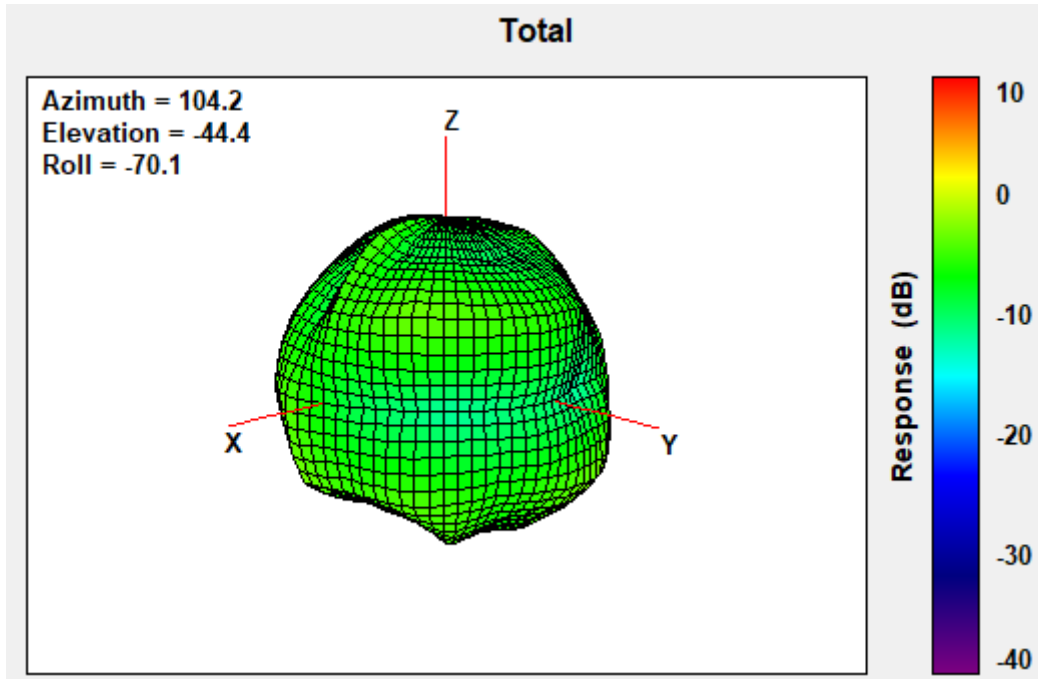
Center Frequency	<b>2305MHz</b>
Horizontal (dBi) peak	-0.28
Vertical (dBi) peak	-2.74

**2315MHz**



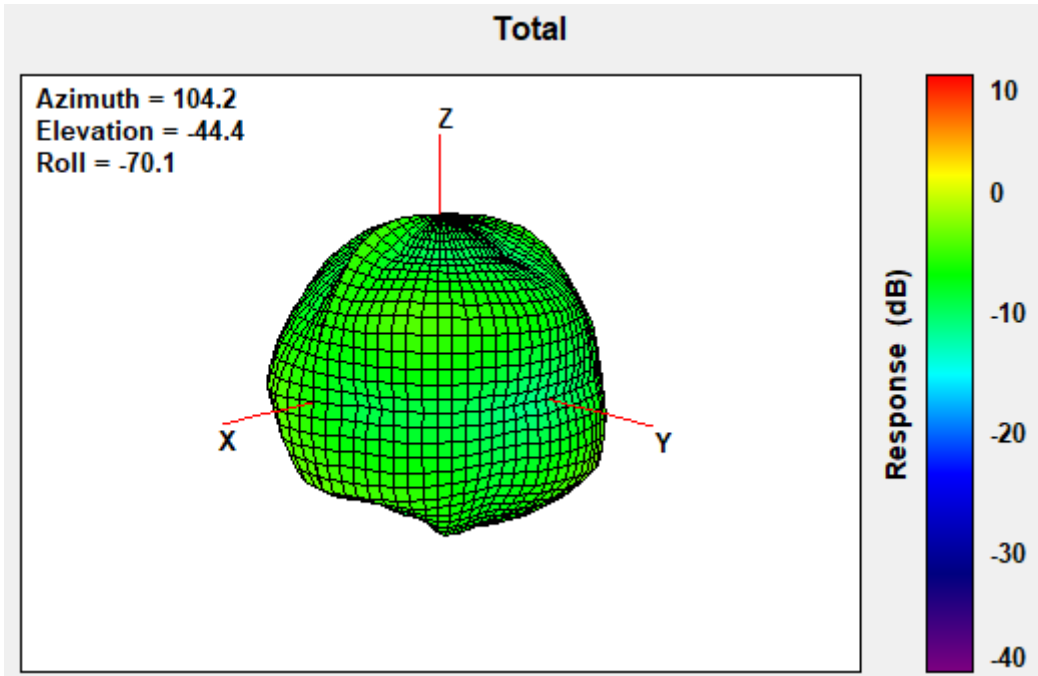
Center Frequency	<b>2315MHz</b>
Horizontal (dBi) peak	-0.52
Vertical (dBi) peak	-2.90

### 2350MHz



Center Frequency	<b>2350MHz</b>
Horizontal (dBi) peak	-1.10
Vertical (dBi) peak	-4.12

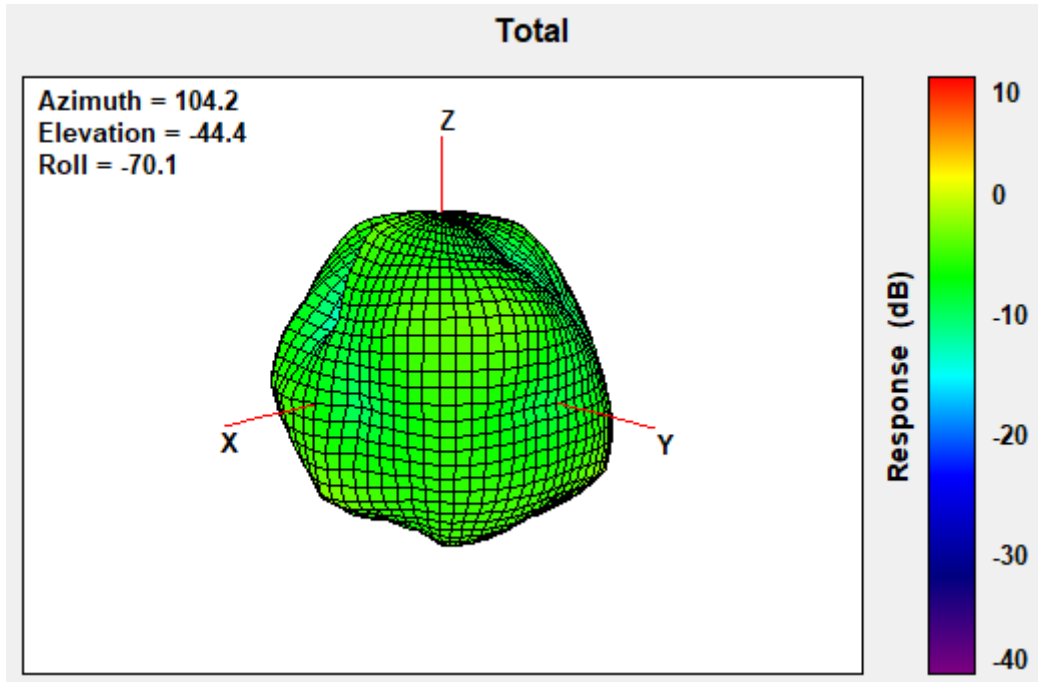
### 2400MHz



Center Frequency	<b>2400MHz</b>
Horizontal (dBi) peak	-1.40
Vertical (dBi) peak	-3.87

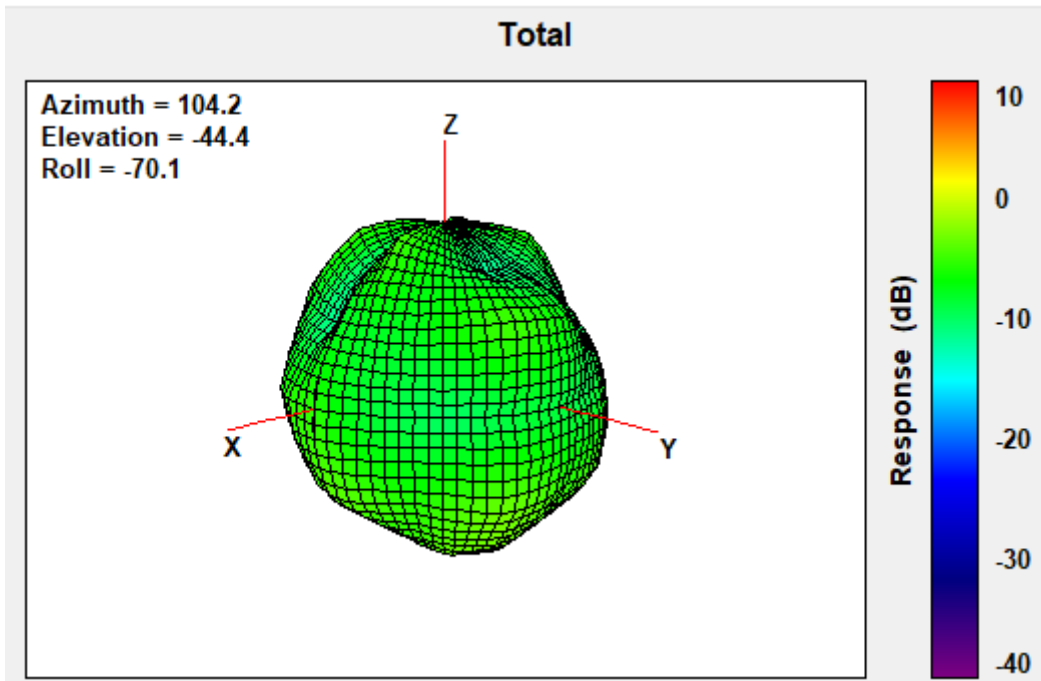


**2500MHz**



Center Frequency	<b>2500MHz</b>
Horizontal (dBi) peak	-0.08
Vertical (dBi) peak	-2.51

**2570MHz**

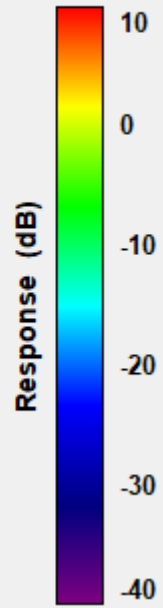
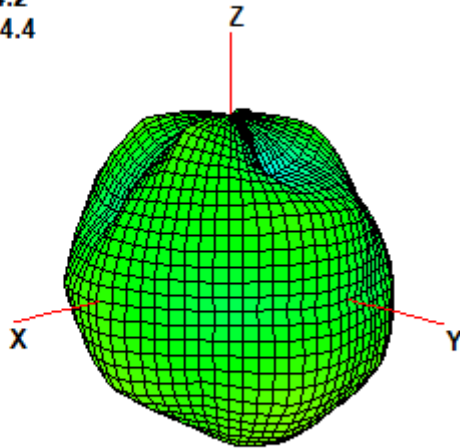


Center Frequency	<b>2570MHz</b>
Horizontal (dBi) peak	-1.84
Vertical (dBi) peak	-4.44

**2595MHz**

**Total**

Azimuth = 104.2  
 Elevation = -44.4  
 Roll = -70.1

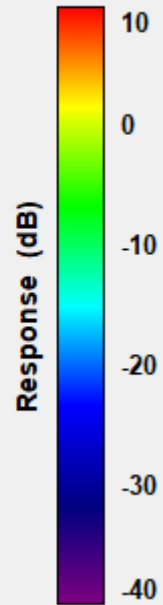
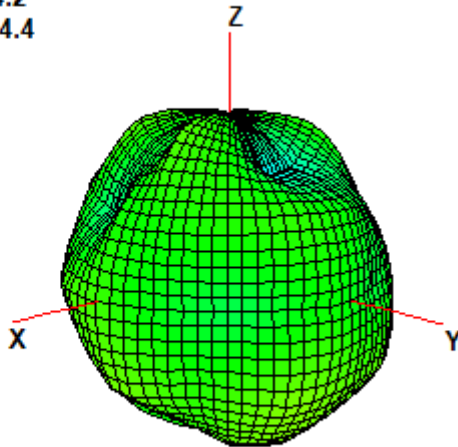


Center Frequency	<b>2595MHz</b>
Horizontal (dBi) peak	-1.95
Vertical (dBi) peak	-3.90

**2620MHz**

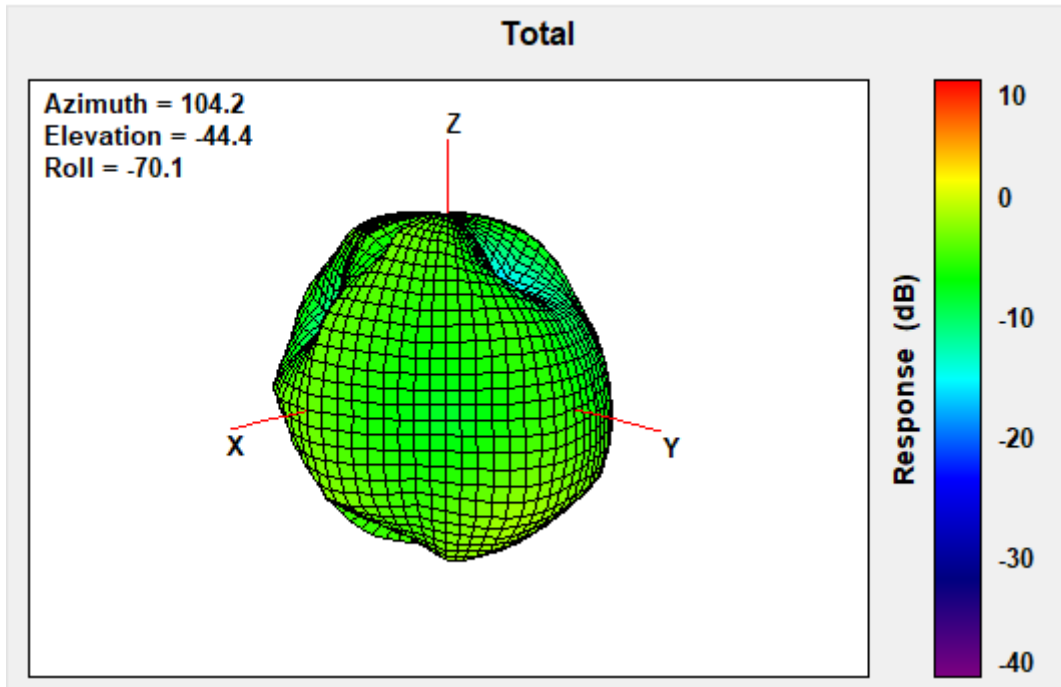
**Total**

Azimuth = 104.2  
 Elevation = -44.4  
 Roll = -70.1



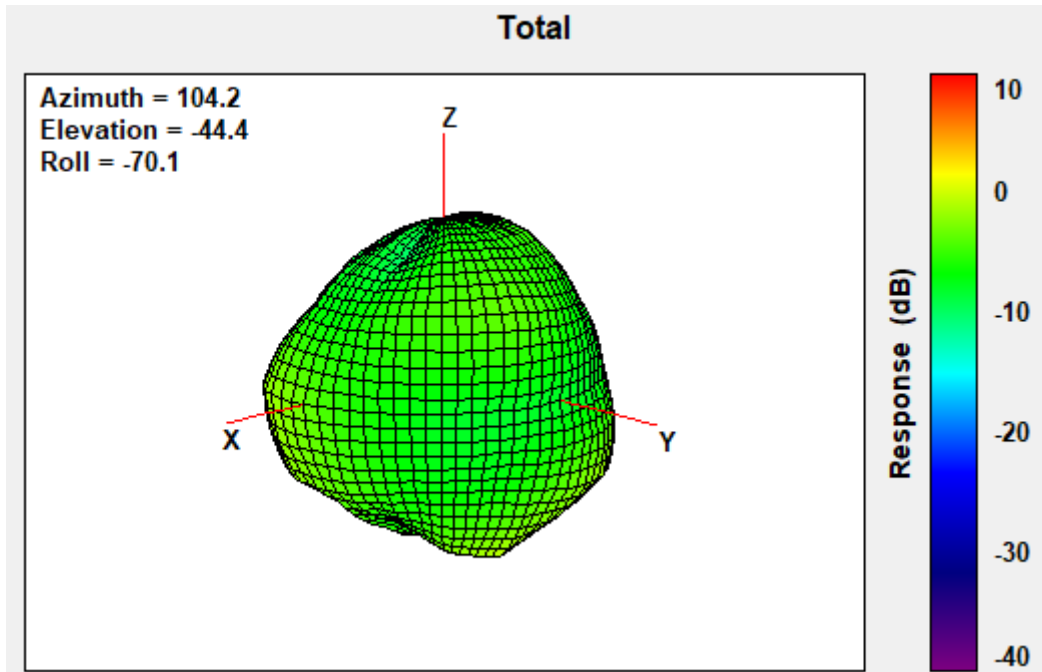
Center Frequency	<b>2620MHz</b>
Horizontal (dBi) peak	-2.03
Vertical (dBi) peak	-3.60

**2690MHz**



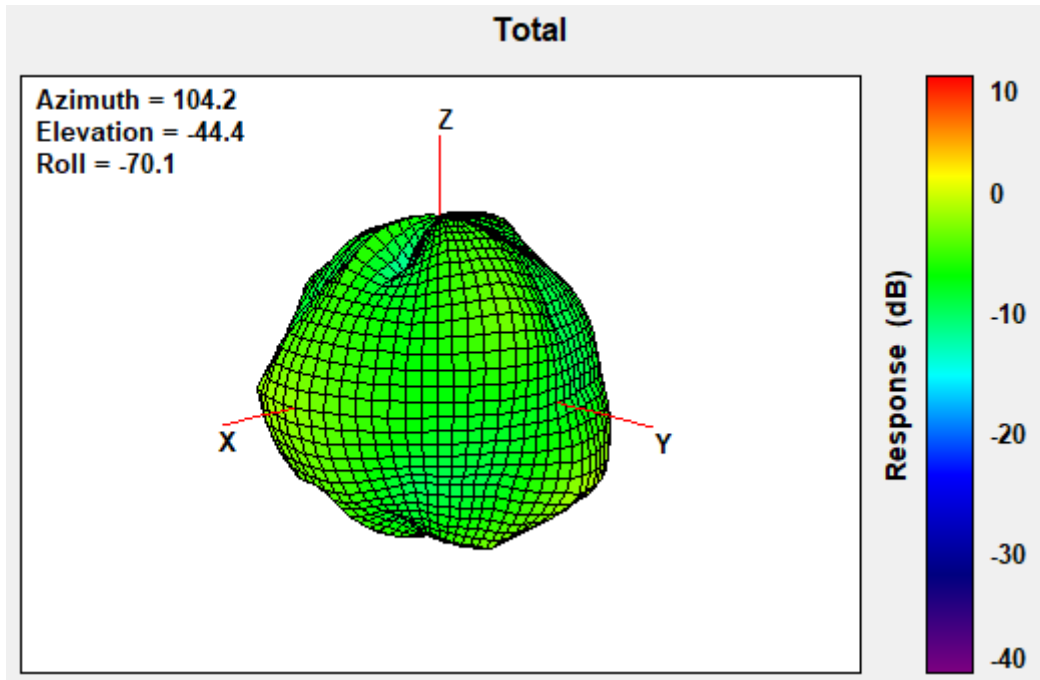
Center Frequency	<b>2690MHz</b>
Horizontal (dBi) peak	-1.04
Vertical (dBi) peak	-3.30

**3400MHz**



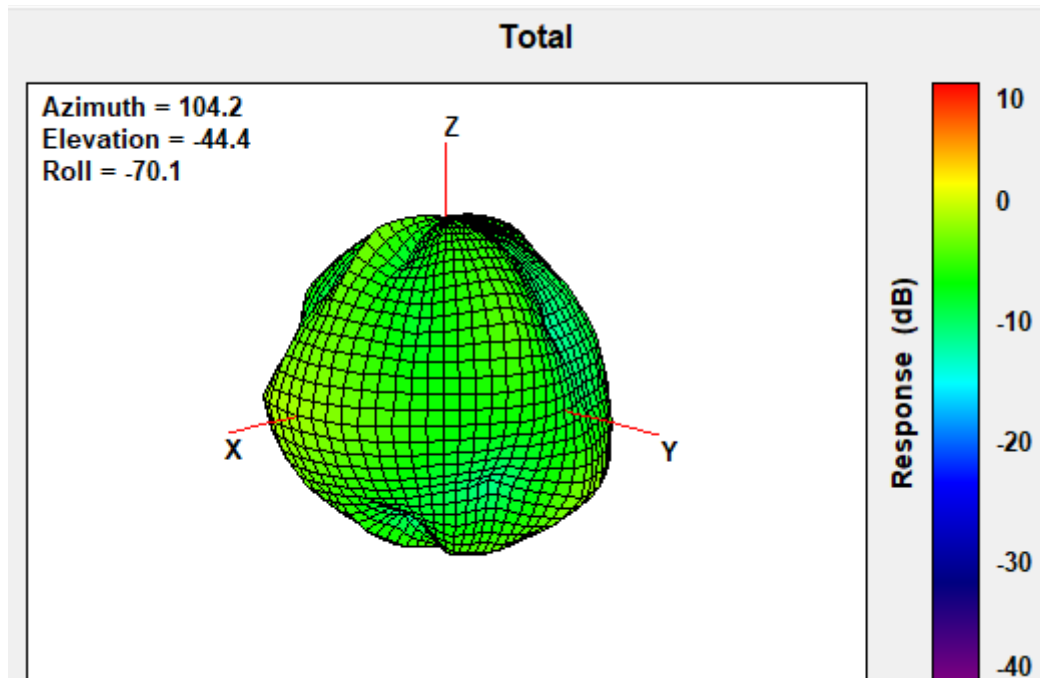
Center Frequency	<b>3400MHz</b>
Horizontal (dBi) peak	0.09
Vertical (dBi) peak	-2.28

### 3500MHz



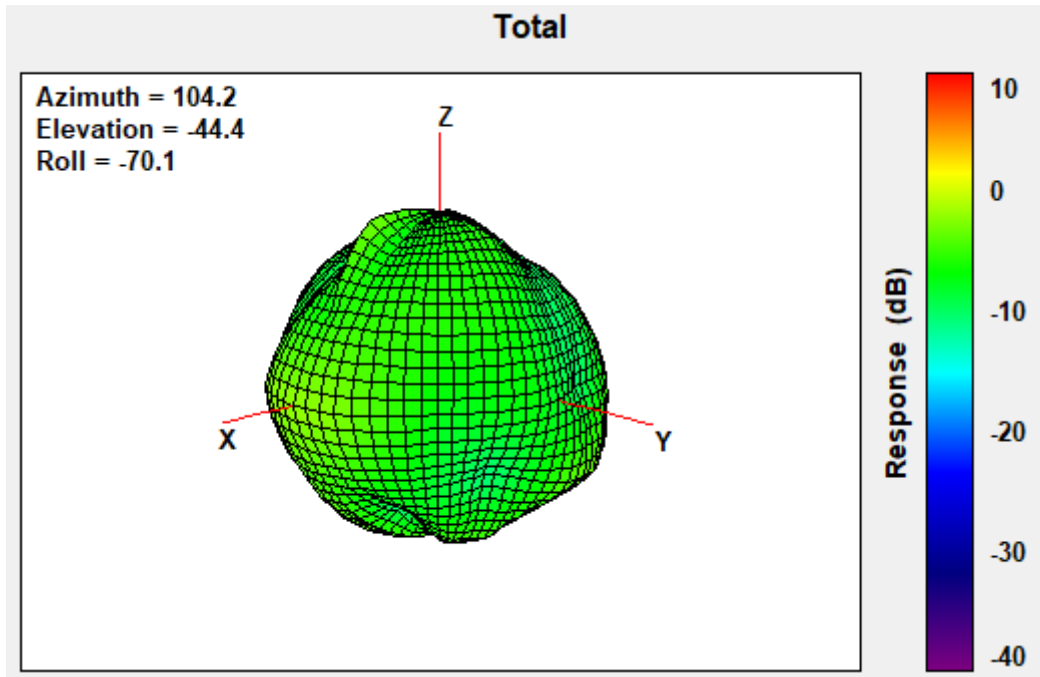
Center Frequency	<b>3500MHz</b>
Horizontal (dBi) peak	0.52
Vertical (dBi) peak	-2.28

### 3600MHz



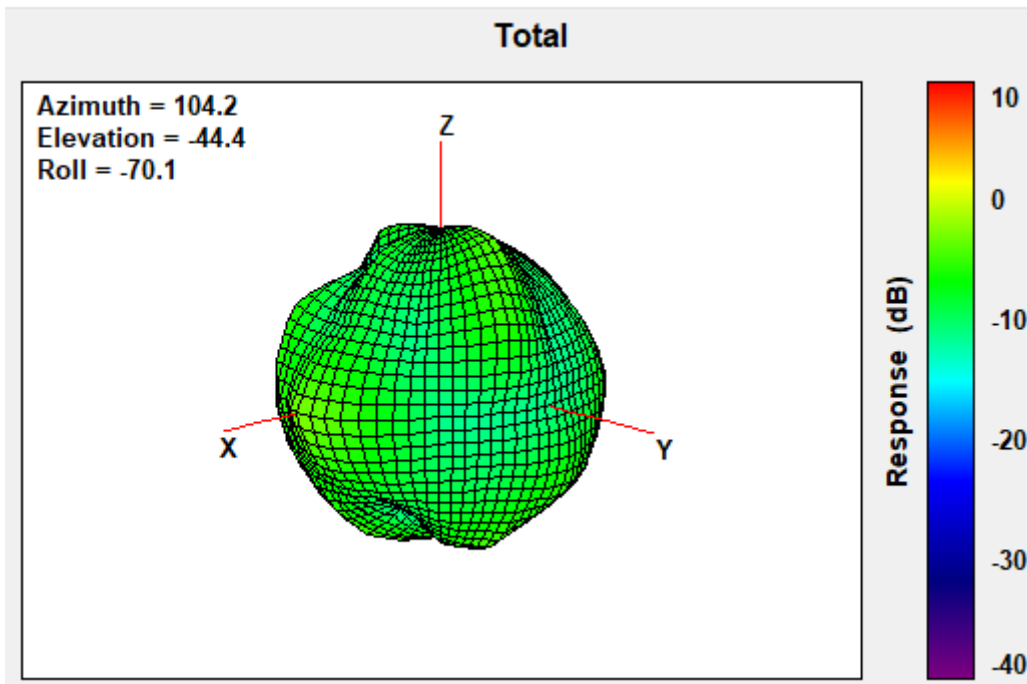
Center Frequency	<b>3600MHz</b>
Horizontal (dBi) peak	-1.15
Vertical (dBi) peak	-1.92

### 3700MHz



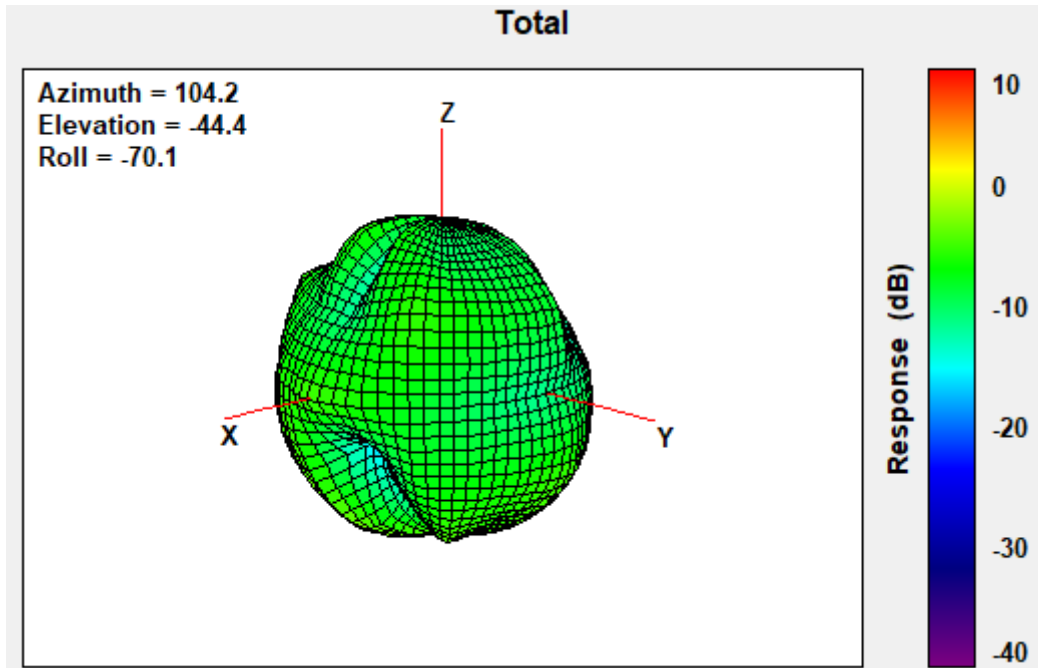
Center Frequency	<b>3700MHz</b>
Horizontal (dBi) peak	-0.47
Vertical (dBi) peak	-2.47

### 3800MHz



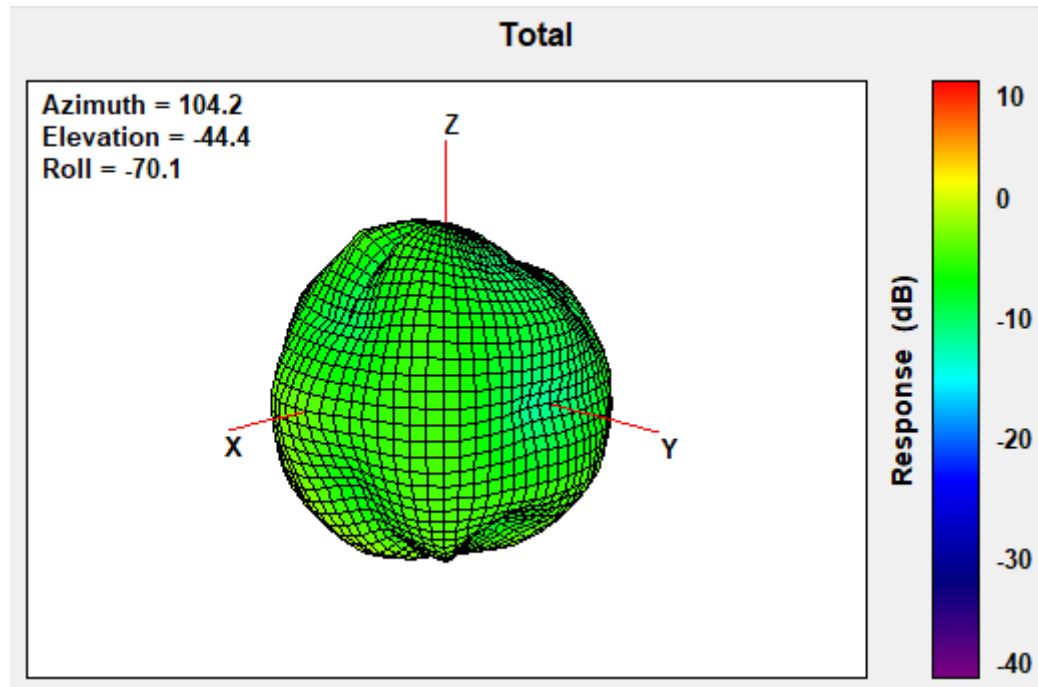
Center Frequency	<b>3800MHz</b>
Horizontal (dBi) peak	-1.23
Vertical (dBi) peak	-2.94

4200MHz



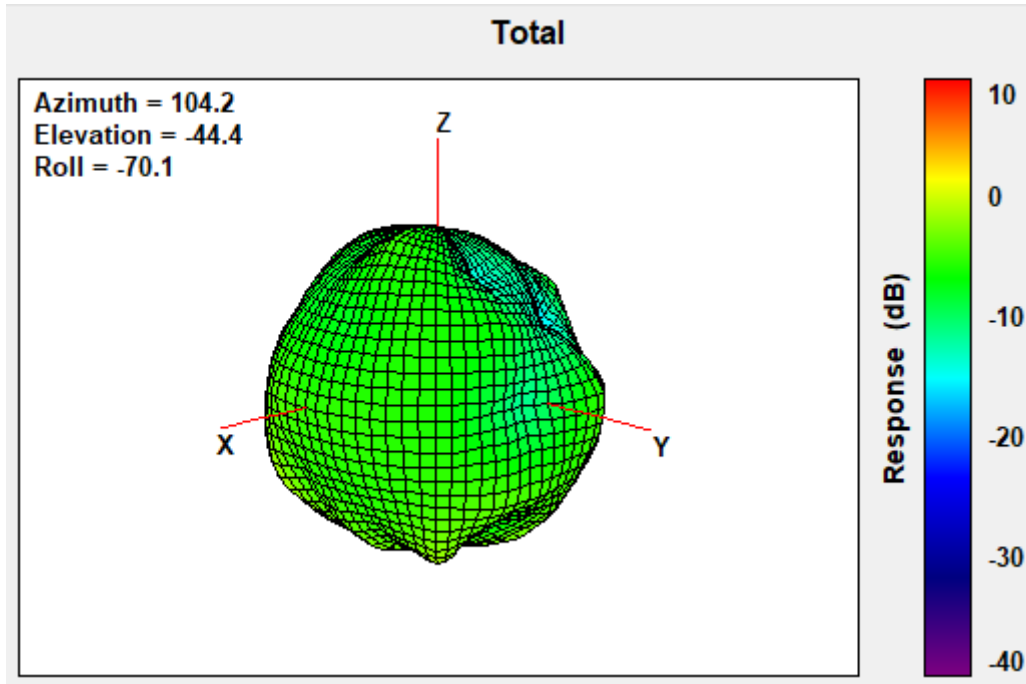
Center Frequency	<b>4200MHz</b>
Horizontal (dBi) peak	-1.59
Vertical (dBi) peak	-1.34

4400MHz



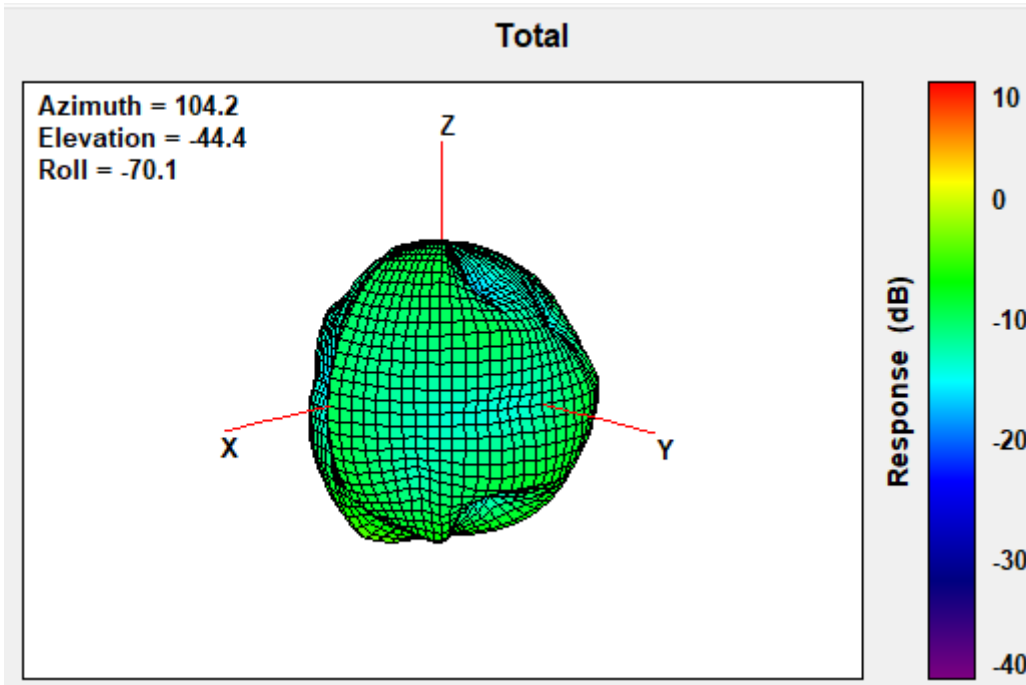
Center Frequency	<b>4400MHz</b>
Horizontal (dBi) peak	-0.06
Vertical (dBi) peak	1.57

**4700MHz**



Center Frequency	<b>4700MHz</b>
Horizontal (dBi) peak	-0.82
Vertical (dBi) peak	-0.50

**5000MHz**

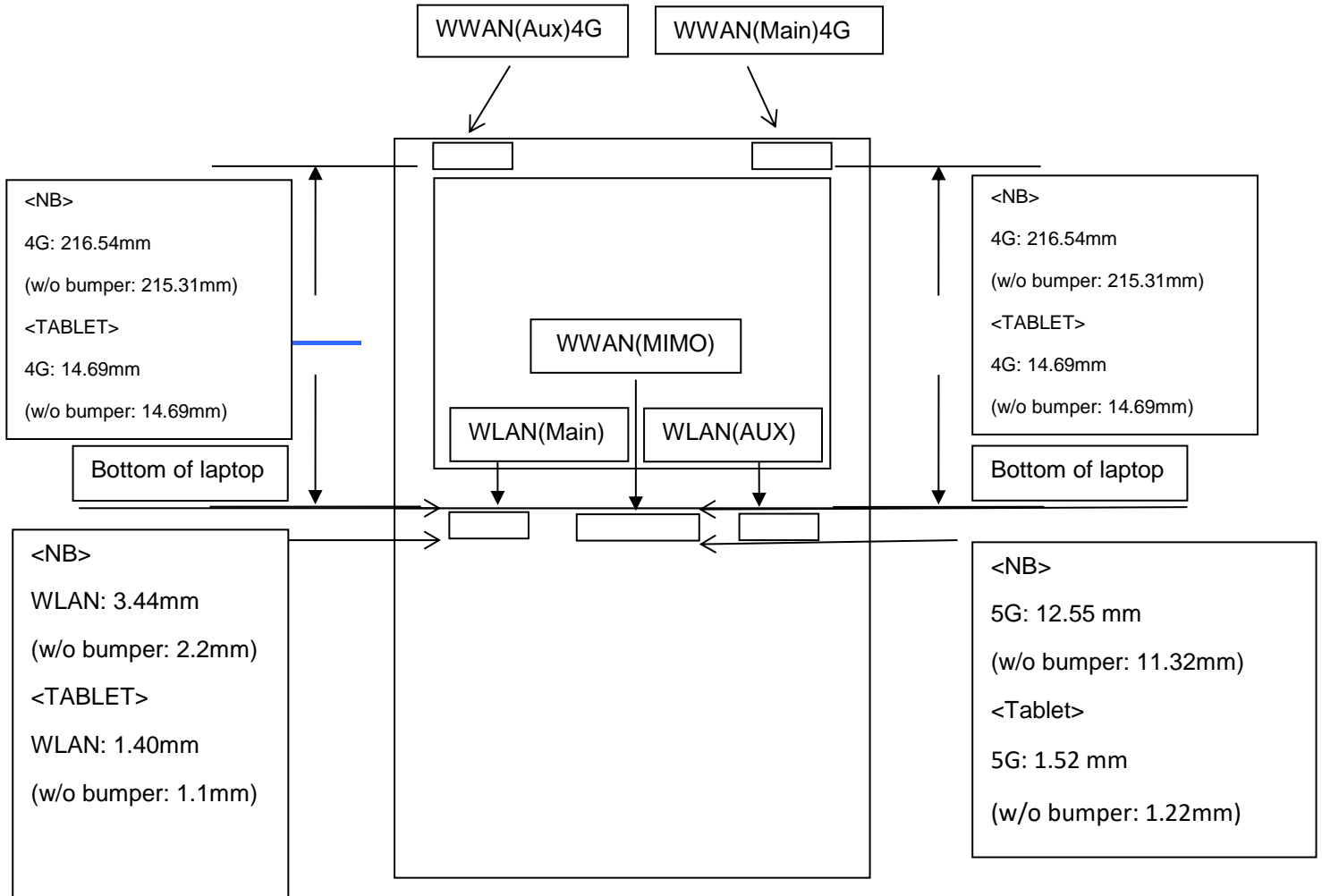


Center Frequency	<b>5000MHz</b>
Horizontal (dBi) peak	-3.88
Vertical (dBi) peak	-3.69

**Section 4. Antenna Host Platform Location Information**

Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

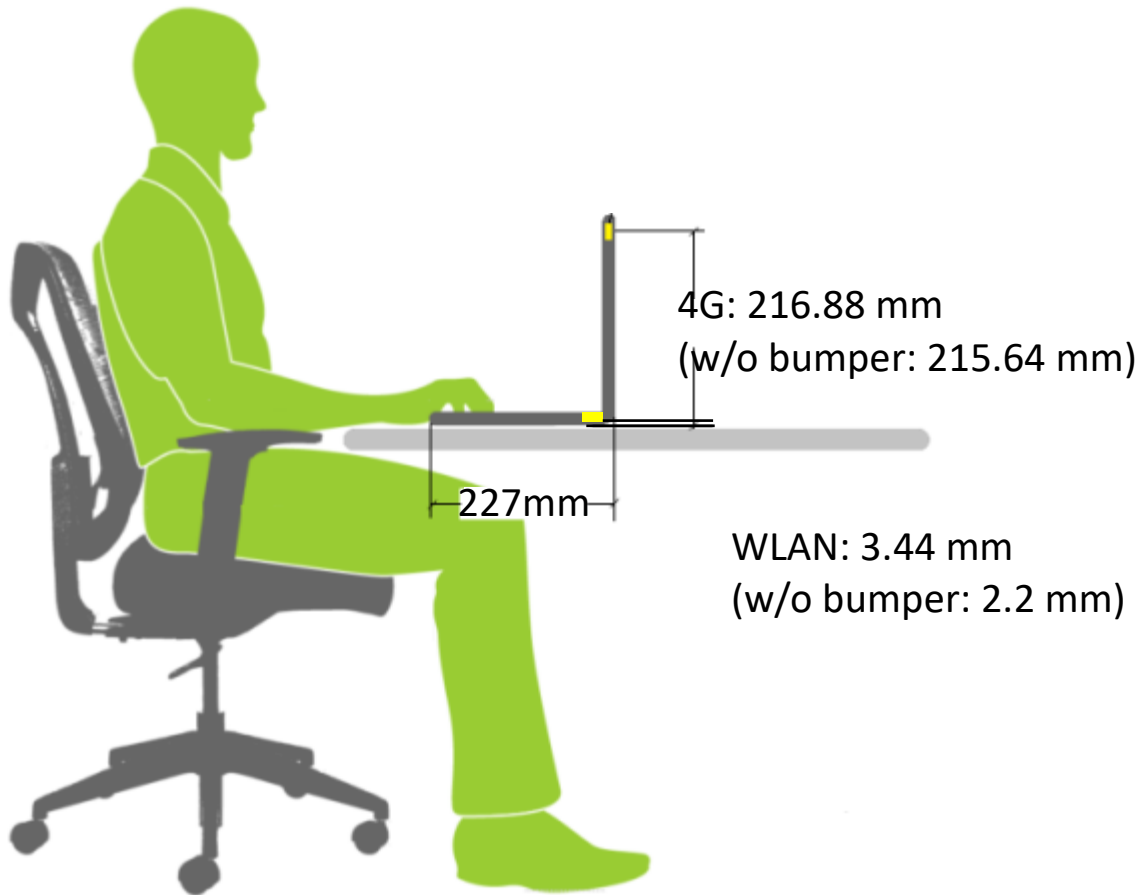
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.





**Section 5. Antenna dimensional information for SAR evaluation**

Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary landscape positions. Include a description of any proximity sensors or power throttling implementations that limit or exclude use of any host orientation.



**Section 6. Diagram Example of Co-Location Antenna Separation**

Include a **dimensioned photo or dimensioned drawing** showing the distance (mm) between **all WLAN transmit antennas** and other co-located radiator transmit antenna such as Bluetooth, WWAN,..

**(Note: Due to the evolving rules regarding co-location, each platform will need to be reviewed on a case by case basis)**

