WIESON TECHNOLOGIES CO., LTD.

WIESON 3D CHAMBER TEST REPORT

Customer:	緯創
Project Name:	**LTE 4G+5G**
WIESON P/N:	**ARY118-0047-001-00**
Antenna Type:	**Dipole**
Version No. :	**02**

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Revision History

Revision	Date	Engineer	Description
01	2020/10/22	Wen	NEW RELEASE
01	2024/05/22	Aiden	Update

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I. ELECTRONIC CHARACTERISTICS

Item	Specification	Specification	Specification	Specification
Operating Frequency(GHz)	0.617~0.960	1.452~2.690	3.3-5.850	5.925-7.125
Bandwidth	343 MHz (Min.)	1238 MHz (Min.)	2625 MHz (Min.)	1200 MHz (Min.)
Return Loss	-6 dB (Max)	-6 dB (Max)	-6 dB (Max)	-6 dB (Max)
Polarization	Linear	Linear	Linear	Linear
Azimuth Bandwidth	Omni-directional	Omni-directional	Omni-directional	Omni-directional
Peak Gain	1.62dBi(Max)	3.72dBi(Max)	3.2dBi(Max)	3.09dBi(Max)
Impedance	50Ω	50Ω	50Ω	50Ω
Material	PCB	PCB	PCB	PCB
Maximum Power	1W	1W	1W	1W
V.S.W.R	3 : 1	3 : 1	3 : 1	3 : 1
Radiation	Omni directional	Omni directional	Omni directional	Omni directional
Efficiency	>45%	>43%	>45%	>35%
Connector	SMA	SMA	SMA	SMA
Cable type	OD:1.37	OD:1.37	OD:1.37	OD:1.37
Operating Temperature	-10~60℃	-10~60℃	-10~60℃	-10~60℃
Storage temp	-10~70℃	-10~70℃	-10~70℃	-10~70℃

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Ⅱ. Summary：

This report to account for the measurement setup and result of the Antenna.
The measurement setup includes s-parameter, pattern, and gain measurement.
The measured data for Antenna are presented and analysis.

Ⅲ. S-Parameter Measurement：

A. Reflection coefficient：

(a) Instrument：Network Analyzer.

(b) Setup：

(1) Calibrate the Network Analyzer by one port calibration using O.S.L. calibration kits.
(2) Connect the antenna under test to the Network Analyzer.
(3) Measure the S11(reflection coefficient) shown in Fig. 1.
(4) Generally, the S11 is less than –10dB to ensure the 90% power into antenna and only less than 10% power back to system.

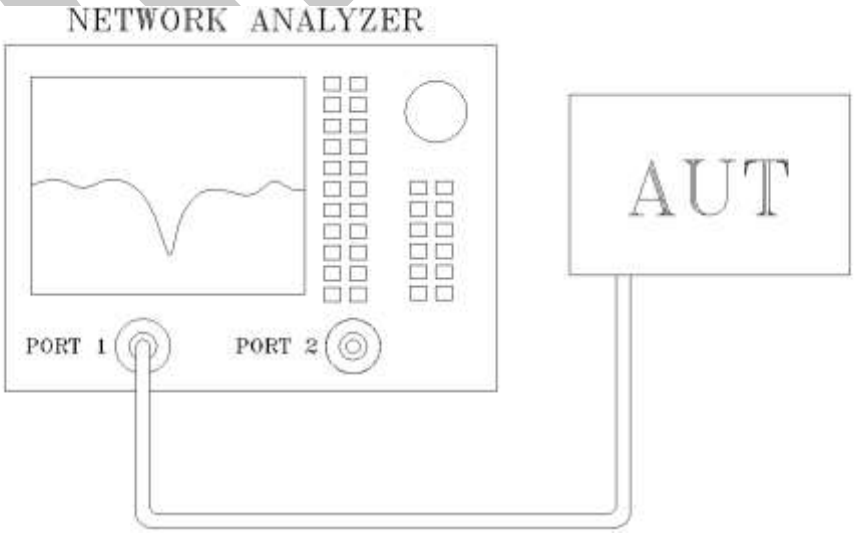

Fig.1 Antenna measured in Network Analyzer

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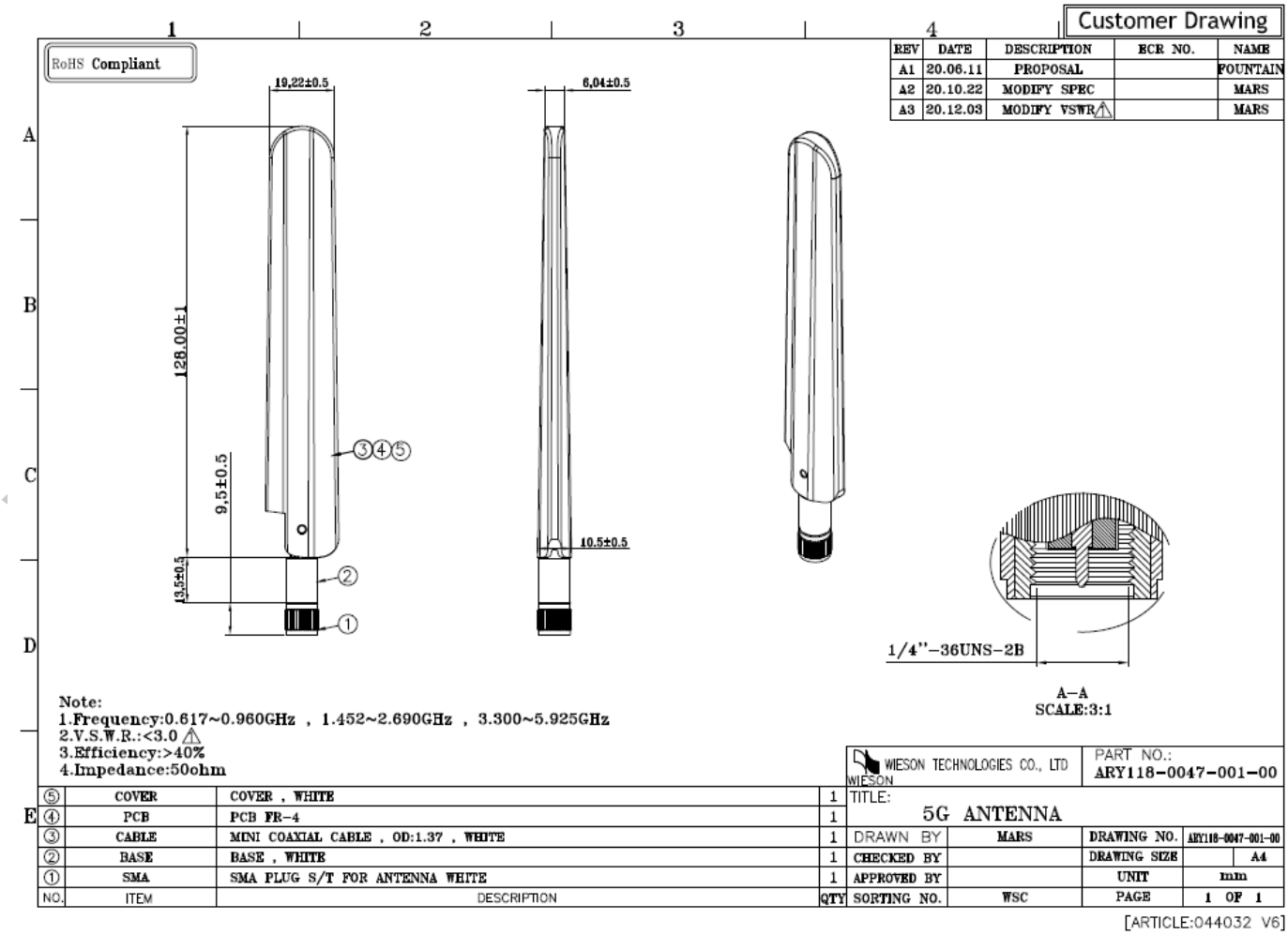
Ⅳ. Antenna Photos & Drawing：



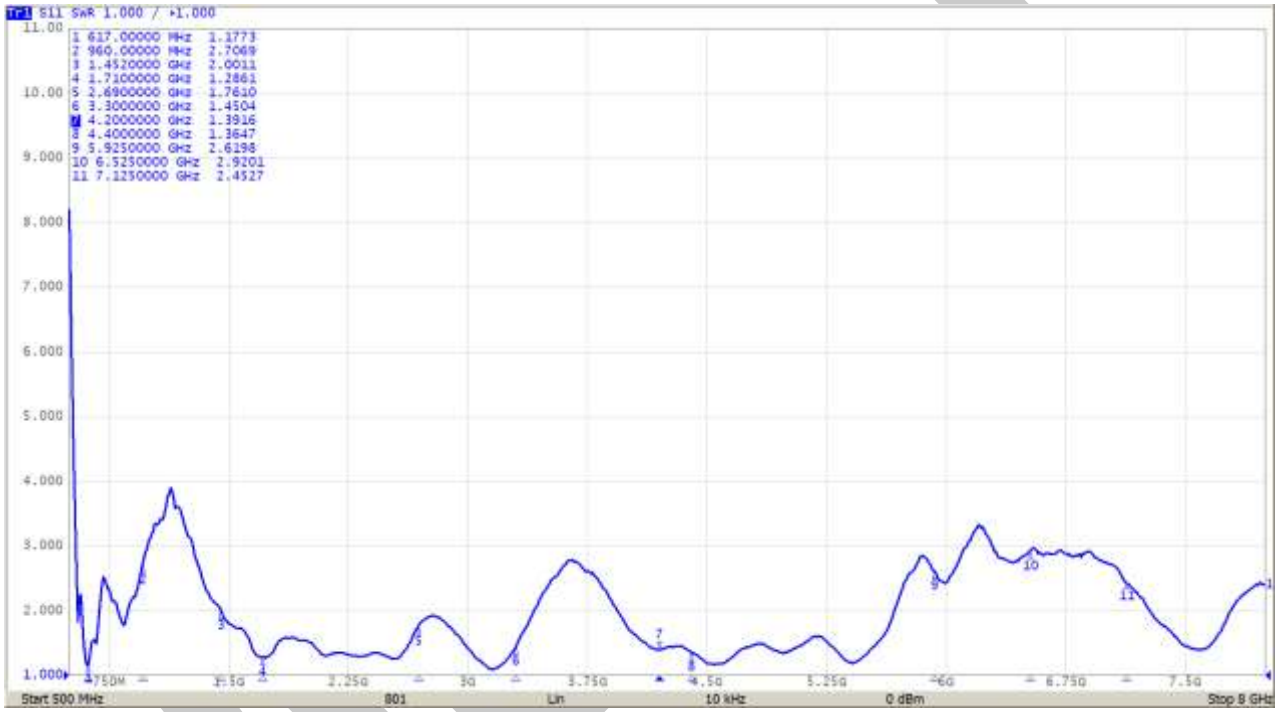
V. S-Parameter Measurement Result：

Return Loss

頻率 (MHz)	617	960	1452	1710	2690	3300	4200	4400	5925	6525	7125
S11(dB)	-21.9	-6.7	-9.5	-18	-11.1	-14.7	-15.7	-16.2	-6.9	-6.1	-7.1

VI. S-Parameter Measurement Result：

VSWR

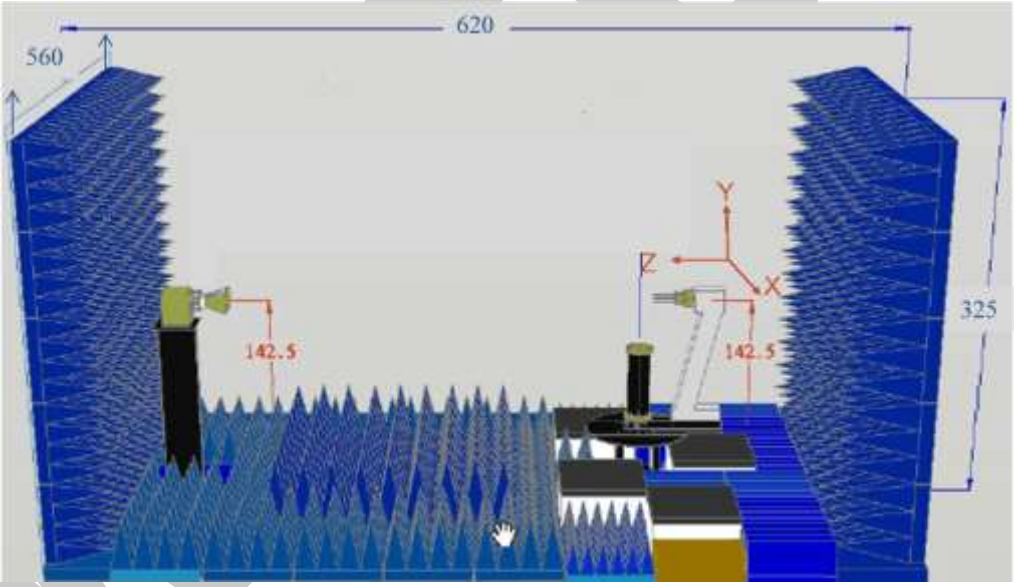


頻率 (MHz)	617	960	1452	1710	2690	3300	4200	4400	5925	6525	7125
VSWR	1.17	2.7	2	1.28	1.76	1.45	1.39	1.36	2.61	2.92	2.45

VII. The Test Information Anechoic Chamber

A. Scope

This statement of work defines the requirements of a far-field antenna measurement range, which includes
(1) One 560 cm (W) x 325 cm (H) x 620 cm (L) Antenna Measurement Anechoic Chamber, detailed requirements refer section B .
(2) One Far-field Antenna Measurement System with spinning linear CP measurement capabilities, detailed requirement refer section E & F .
(3) One broad-band transmitted antenna, detailed requirements refer section G .



B. Antenna Measurement Anechoic Chamber

Fully anechoic chamber with dimension 560 cm in width, 325 cm in height and 620 cm in length. The quiet zone of this Chamber shall be greater than

60 cm @ 400MHz~900MHz, 43 cm @2.4 GHz, 31 cm @5.8 GHz,. Contractor should be aware of this anechoic chamber is going to be used for performing far-filed antenna measurement.

C. Electrical specifications
Frequency Range: 400 MHz to 6 GHz,
Quiet zone size: >60 cm @ 400MHz~900MHz, >43 cm @2.4 GHz,
>31 cm @5.8 GHz.
Quiet zone ripple: < +/- 1.5 dB @500(400)MHz~800MHz, < +/-0.75 dB @800MHz~1.5GHz, < +/- 0.5 dB @1.5GHz~6.0GHz

Field Probing Frequency	Peak-to-Peak Amplitude Taper (Within specified Quiet Zone Area)	Quiet Zone Size (cm)	Compliant
0.9 GHz	< 0.75 dB	60	Yes
1.575 GHz	< 0.5 dB	43	Yes
1.8 GHz	< 0.5 dB	43	Yes
2.4 GHz	< 0.5 dB	43	Yes
5.8 GHz	< 0.5 dB	31	Yes

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D. Absorbers

We shall design and install proper absorbers on the inner walls of the chamber to guarantee the electrical specifications. However, the absorbers height shall be no less than 24" which enables the space in the chamber to be around 438 cm (W) x 203 cm (H) x 513 cm (L). All the absorber used shall meet NRL-8093 fire retardant regulations

E. Far-field Antenna Measurement System

We shall supply all the hardware and software which are capable of characterizing antenna radiation patterns from 30 KHz to 6 GHz using the existed Agilent 5230A PNA-L or Agilent 8753ES Vector Network Analyzer. The system shall be able to automatically measure and plot single axis amplitude and phase antenna patterns in either Cartesian or polar formats.

F. Far-field measurement software

The software consists of the control or data acquisition software and the data plotting software.

(1) The data acquisition software shall at least be capable of the following functions:
*measuring single frequency per cut - single axis (azimuth); system can automatically switch frequency at the end of a scan.
*measuring data in Uni-direction or bi-direction
*measuring data at least with azimuth 360 degrees. (+/- 180 degrees or 0-360 degrees)
*real time plot in Cartesian or polar format
*screen shows real time angle position

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*system automatically calculates S/N ratio level based on measured signal fluctuation
*function to set positioner zero position
*operator can set data taking velocity and data sampling interval
*entry to allow positioner offset to any angle

(2) The data plotting software shall at least be capable of the following functions:
*Editing plot data
*plotting data in Cartesian, Polar or delimited ASCII output with header information
*plotting data in linear or dB scales
*normalizing data to peak (dB), standard gain reference (dBi), or no normalization
*overlaying data, (drag and drop capability is preferable)
*outputting data to any Windows supported printers

G. Broadband Transmitted antenna

We shall provide a linear-polarized broadband antenna with the specifications better than those listed hereafter in this article,
Frequency: 0.5-6 GHz, Gain: >12 dBi @10 GHz, VSWR:<2,0:1, Front to Back Ration > 20 dB

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Ⅸ. Antenna Measurement Result

Frequency (MHz)	Peak Gain (dBi)	3D Gain (dBi)	3D Radiation Efficiency(%)
617	1.49	-2.76	53
634	1.04	-2.92	51
652	1.31	-2.60	55
663	1.49	-1.25	75
698	0.65	-3.10	49
704	0.26	-3.19	48
707	0.32	-3.10	49
716	0.25	-3.19	48
728	0.49	-3.47	45
737	0.82	-3.28	47
746	1.24	-3.19	48
757	0.97	-3.19	48
768	0.41	-2.92	51
777	0.11	-3.01	50
787	0.04	-3.28	47
798	0.64	-3.10	49
824	1.62	-3.19	48
836	1.34	-3.47	45
849	1.06	-3.19	48
869	0.23	-3.47	45
880	1.13	-3.47	45
894	1	-3.01	50
900	1.24	-3.19	48
915	1.16	-3.47	45
925	1.13	-3.10	49
940	1.13	-3.47	45
960	0.04	-3.47	45
1452	0.98	-3.01	50

1552	0.86	-3.47	45
1652	1.47	-3.37	46
1710	1.71	-2.51	56
1750	1.37	-2.88	51
1785	0.25	-3.19	48
1805	0.54	-3.19	48
1840	1.23	-3.28	47
1850	1.65	-3.38	46
1880	1.21	-3.47	45
1910	1.41	-3.4	46
1920	1.07	-3.64	43
1930	1.13	-3.48	45
1950	1.72	-2.79	53
1960	1.75	-2.77	53
1980	2.06	-2.51	56
1990	2.38	-2.19	60
2010	1.79	-2.83	52
2018	1.33	-3.34	46
2025	2.54	-2.2	60
2110	3.63	-2.42	57
2140	3.72	-2.25	60
2155	3.57	-2.24	60
2170	3.41	-2.25	60
2300	2.07	-3.47	45
2350	2.37	-3.28	47
2400	2	-3.16	48
2442	3.24	-1.72	67
2484	2.97	-1.87	65
2500	2.64	-2.17	61
2525	3.12	-1.63	69
2535	3	-1.74	67
2550	3.11	-1.61	69
2562	2.9	-1.73	67
2570	2.77	-1.73	67
2575	2.76	-1.64	69
2600	1.61	-2.28	59
2620	1.33	-2.22	60

2625	1.38	-2.1	62
2650	0.74	-2.71	54
2655	0.74	-2.74	53
2675	0.25	-3.22	48
2690	0.69	-3.47	45
3300	0.71	-3.18	48
3400	0.2	-3	50
3500	0.79	-2.74	53
3600	1.19	-3.05	49
3700	0.3	-3.47	45
3800	0.12	-3.37	46
4200	2.72	-1.8	66
4400	1.16	-2.37	58
4500	2.73	-1.39	73
4600	1.87	-1.98	63
4700	1.71	-2.03	63
4800	2.73	-1.89	65
4900	3.06	-1.79	66
5000	2.33	-2.25	60
5100	3.27	-1.79	66
5200	2.6	-2.01	63
5300	0.2	-3.47	45
5400	1.39	-3.18	48
5500	1.04	-3.19	48
5600	2.01	-2.45	57
5700	1.43	-3.28	47
5800	1.58	-3.49	45
5925	1.57	-3.74	42
6000	1.14	-4.31	37
6125	0.91	-4.6	35
6225	1.39	-4.46	36
6325	1.34	-4.2	38
6425	2.29	-3.66	43
6525	1.8	-3.82	41
6625	2.09	-3.64	43
6725	2.38	-3.7	43
6875	2	-3.38	46

6925	2.4	-2.89	51
7000	1.75	-3.96	40
7125	3.09	-2.69	54

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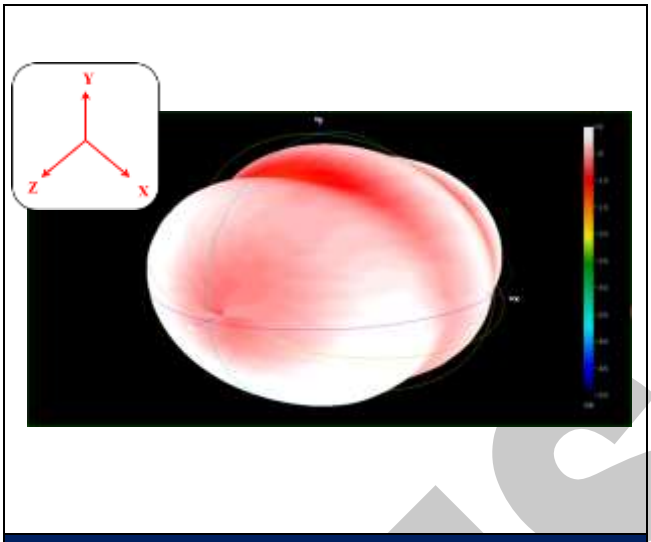
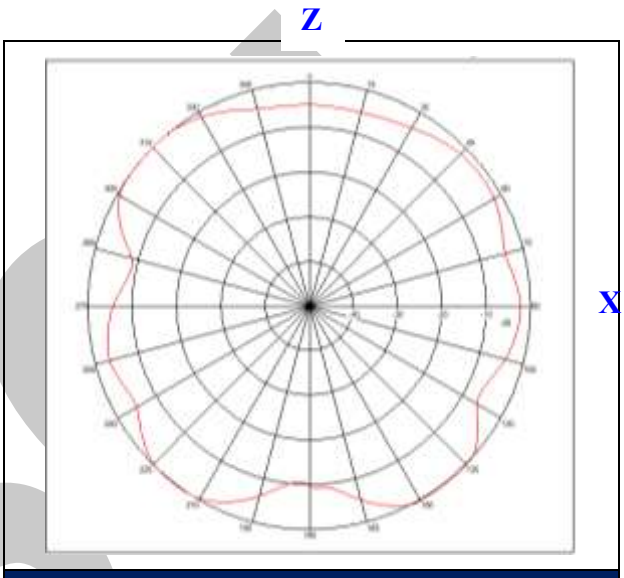
X. 3D Radiation Pattern of LTE Antenna

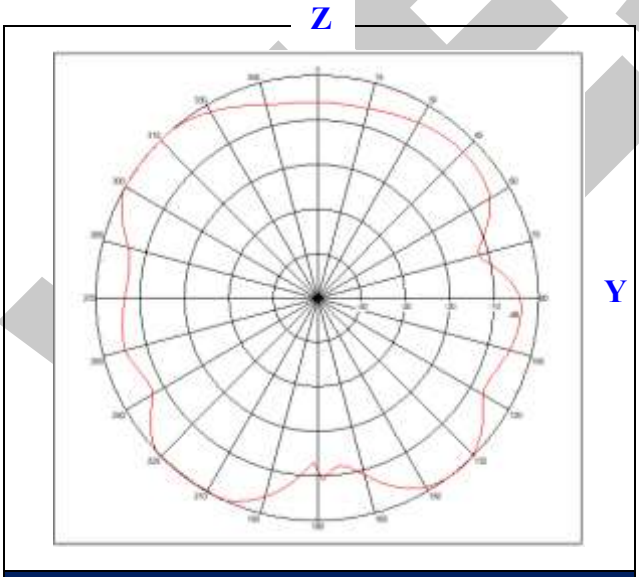
617MHz



3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)



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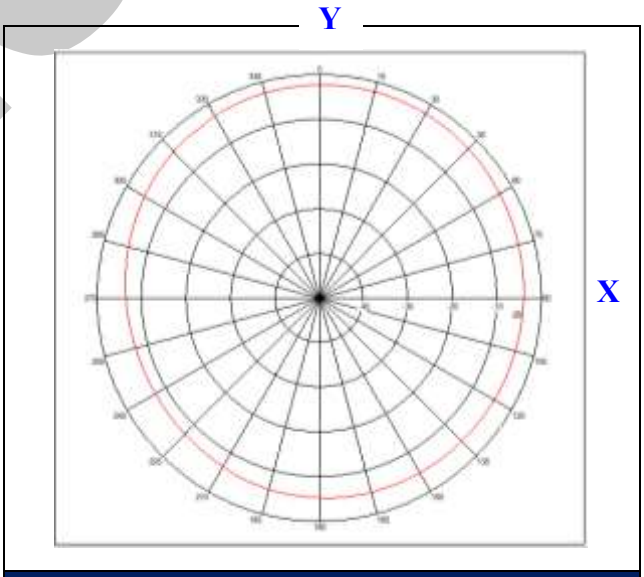
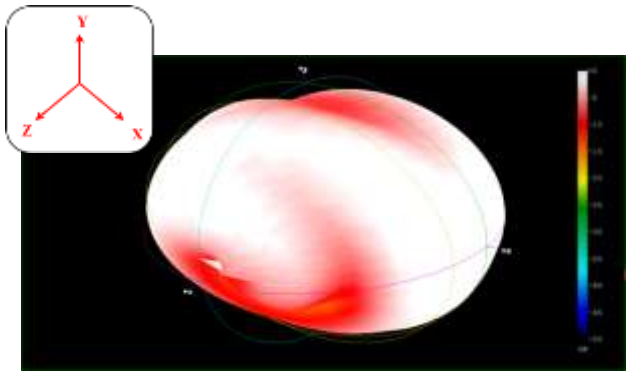
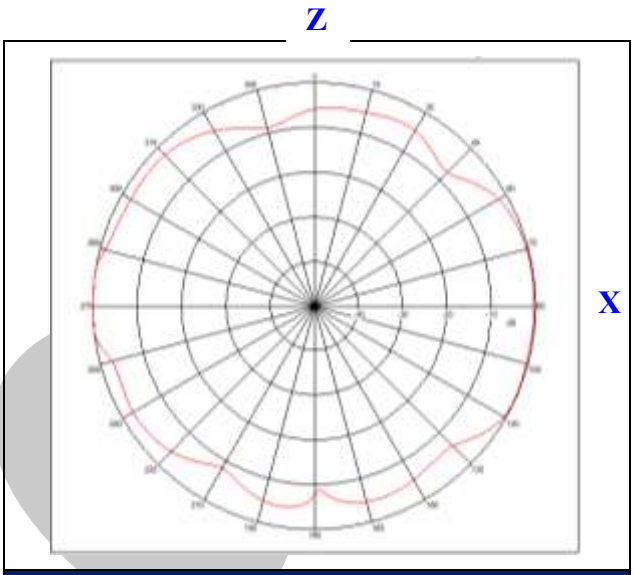


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

960MHz



3D Pattern



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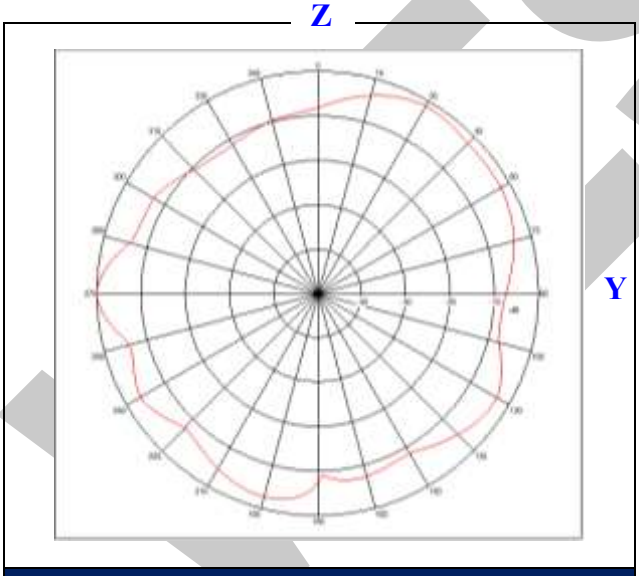

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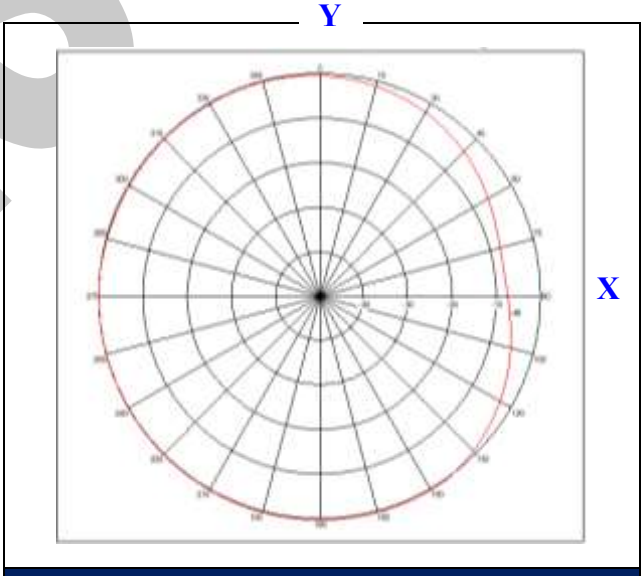
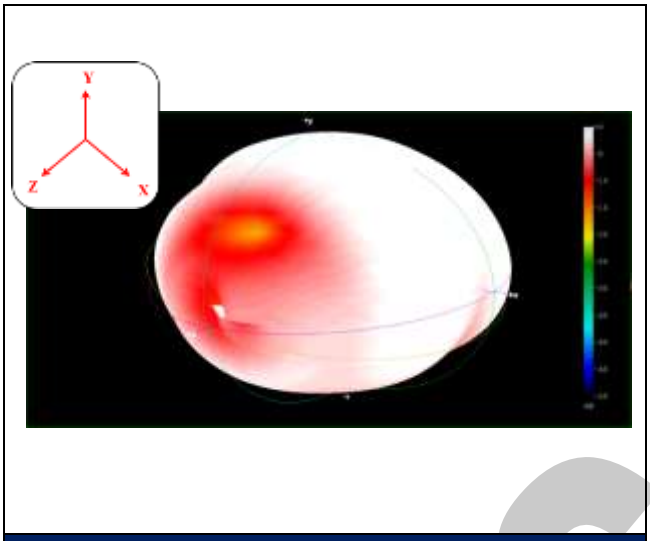
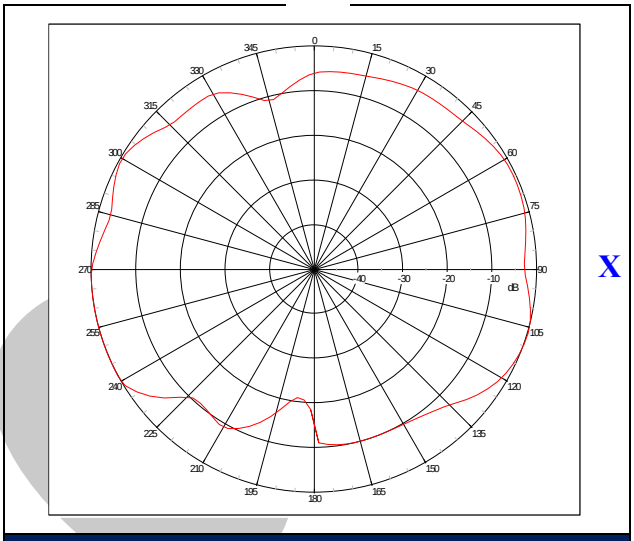


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

1452 MHz



3D Pattern



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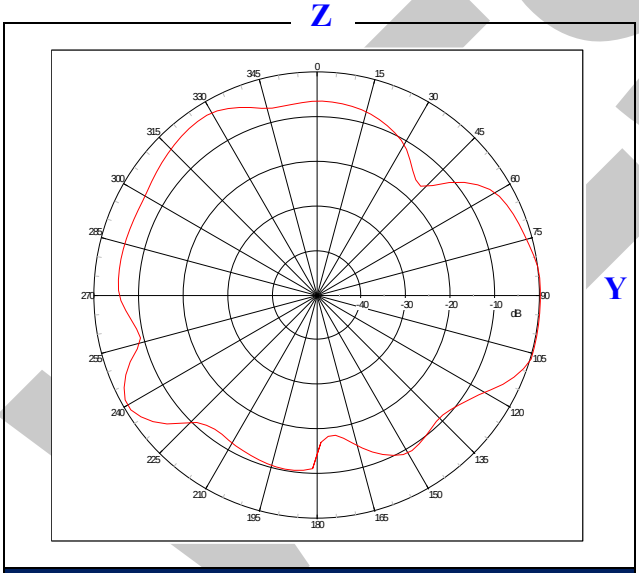
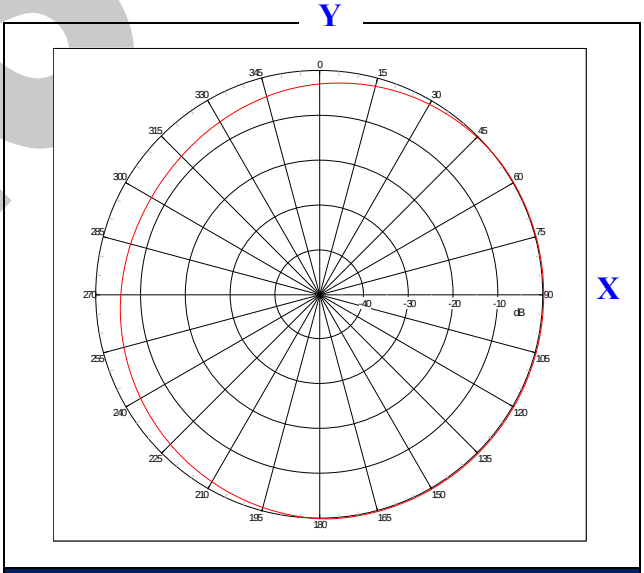
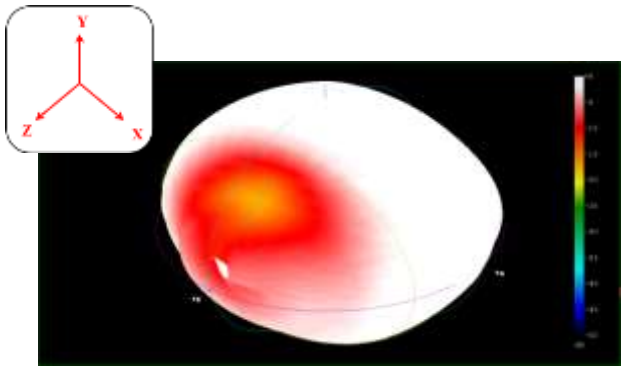


Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)

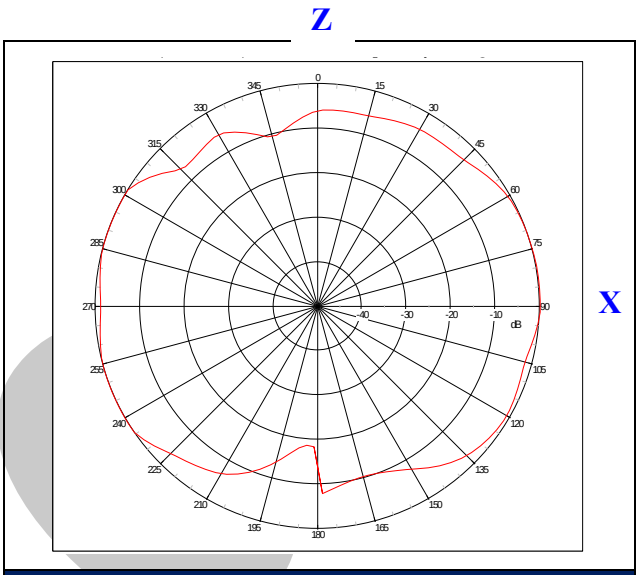


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

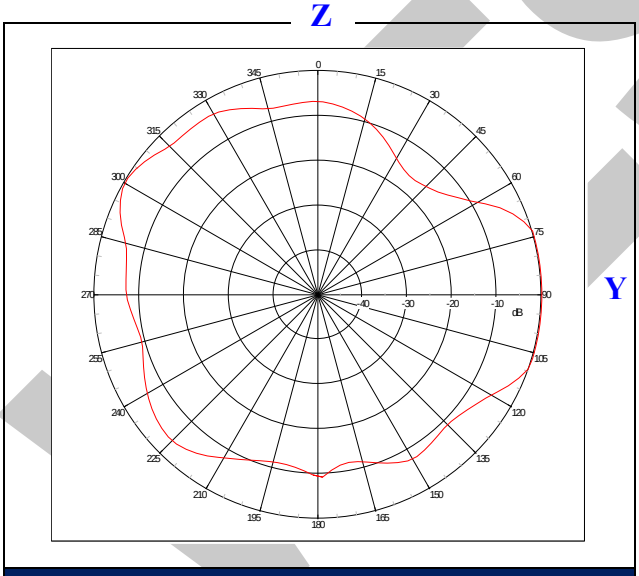
1710MHz



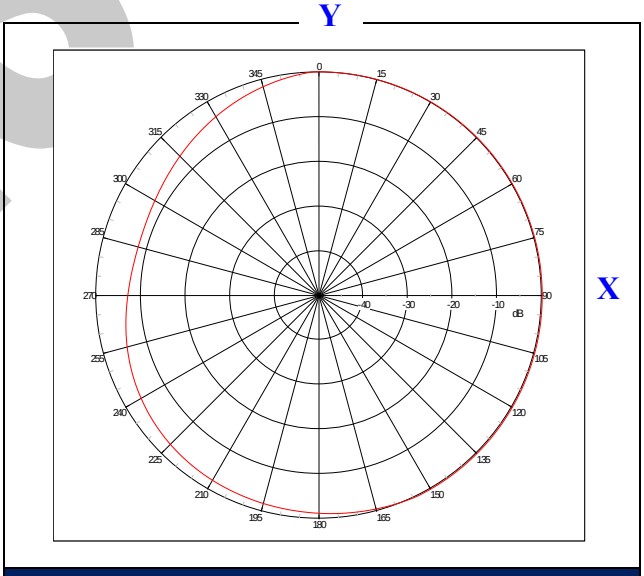
3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)

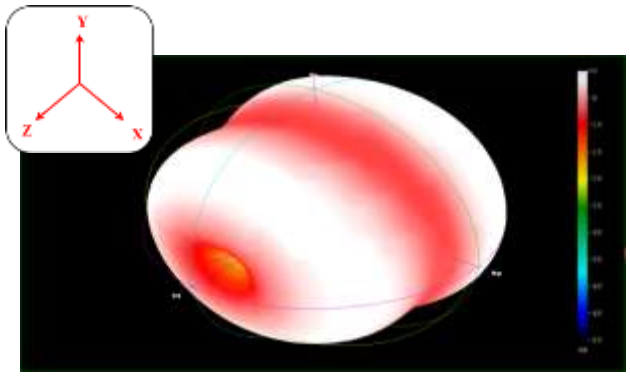


Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)

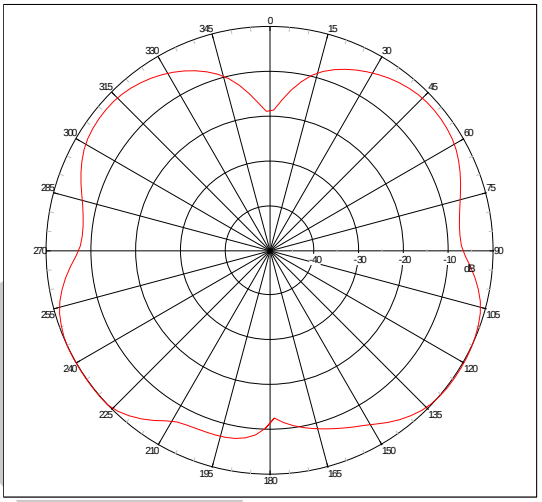


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

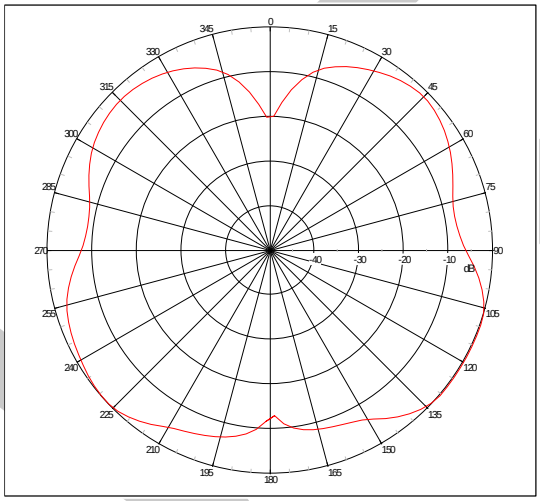
2690MHz



3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)



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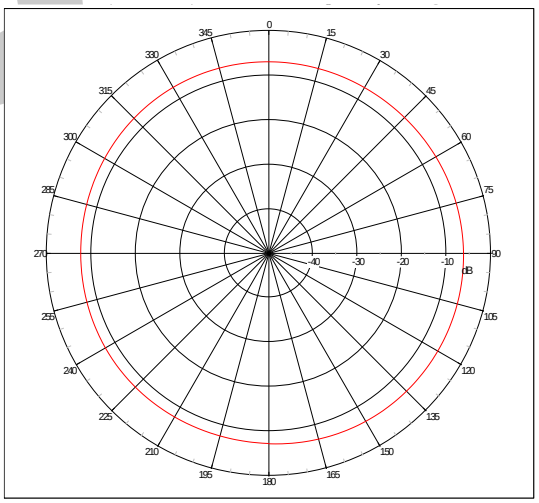
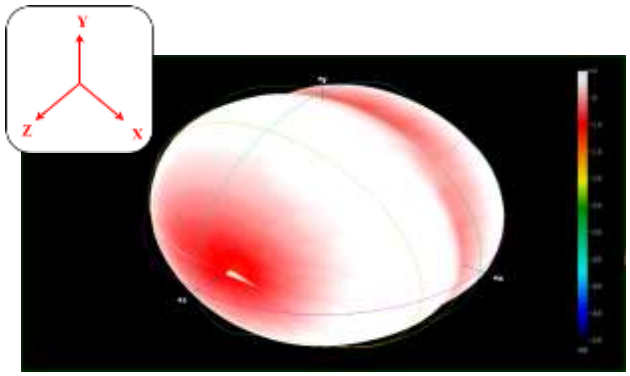
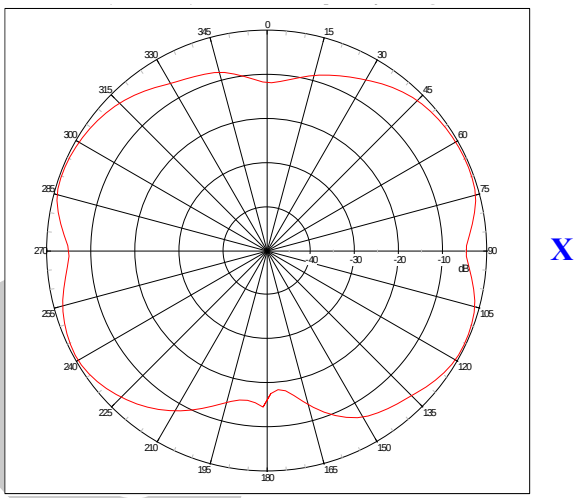


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

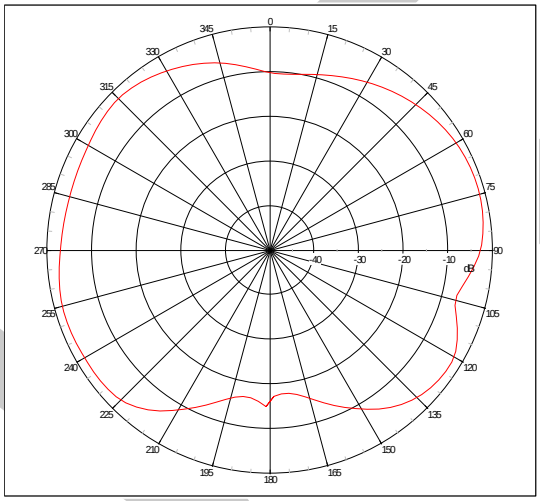
3300MHz



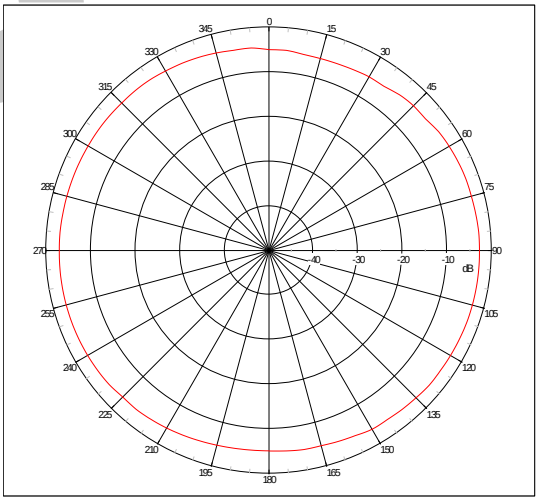
3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)

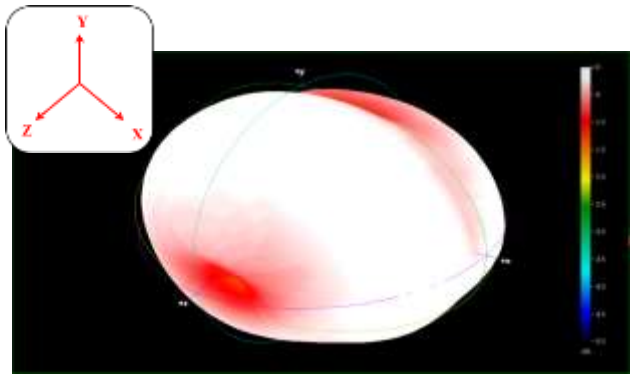


Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)

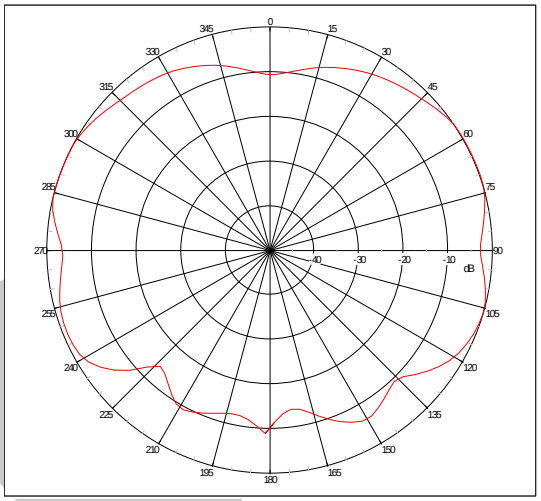


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

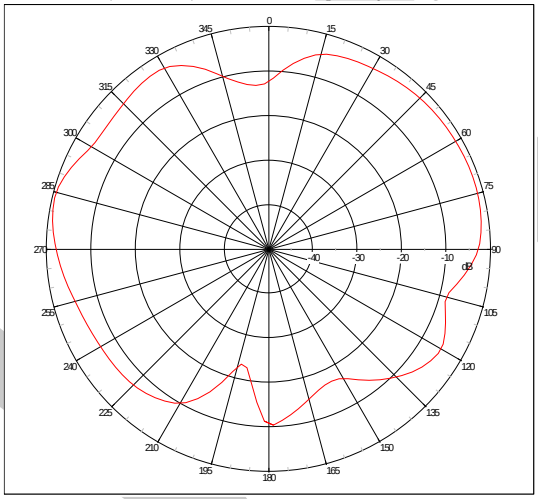
3800MHz



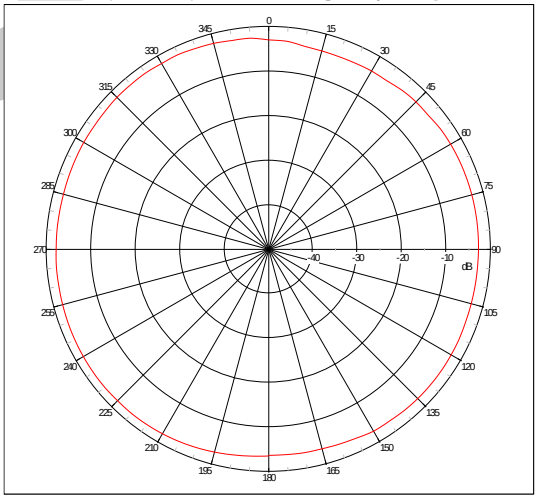
3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)

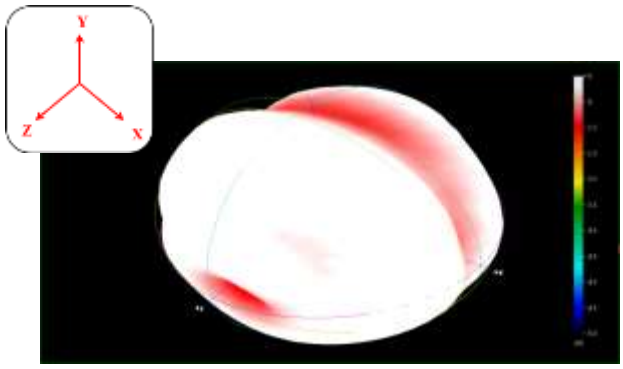


Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)

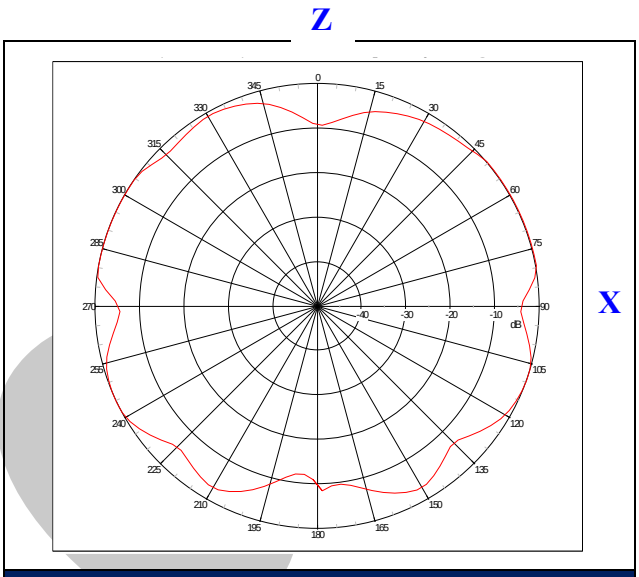


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

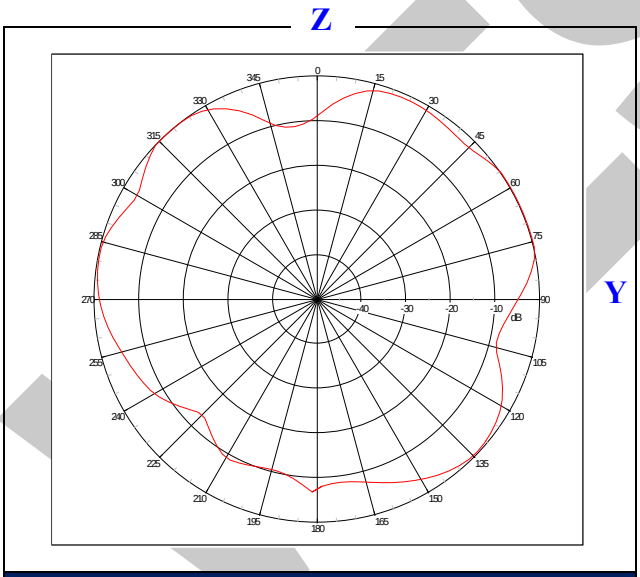
4200MHz



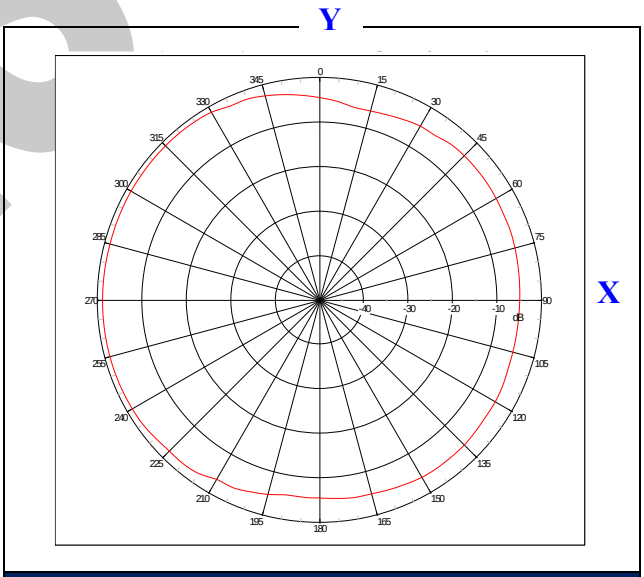
3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)

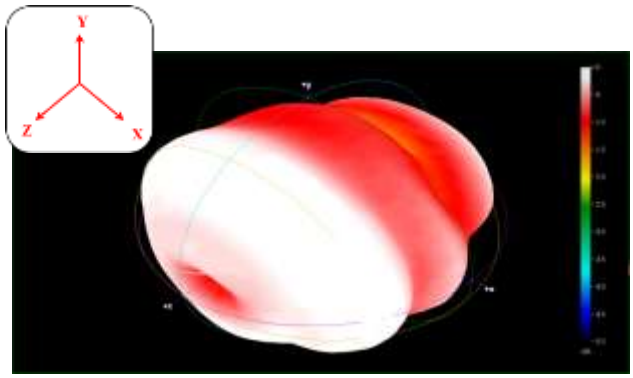


Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)



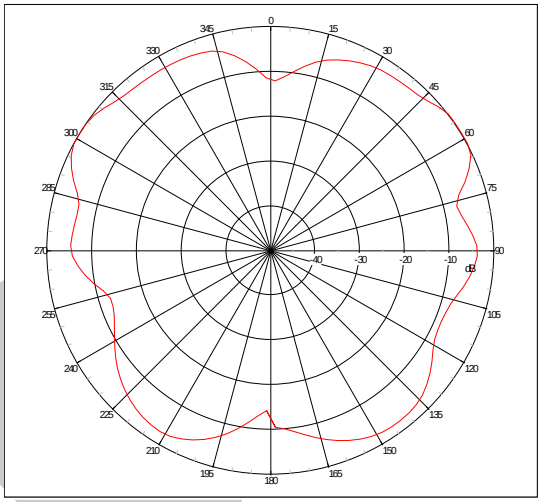
Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

5925 MHz



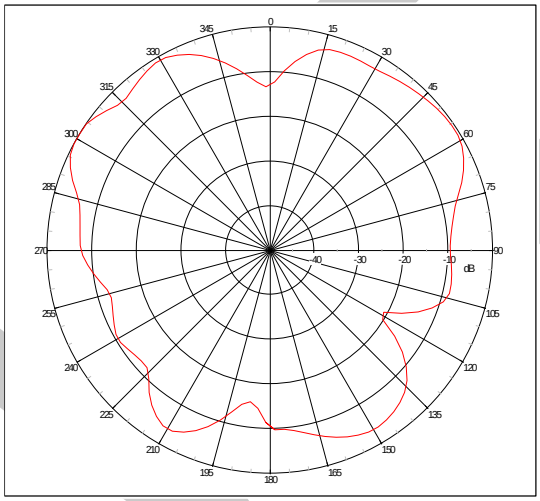
3D Pattern

Z



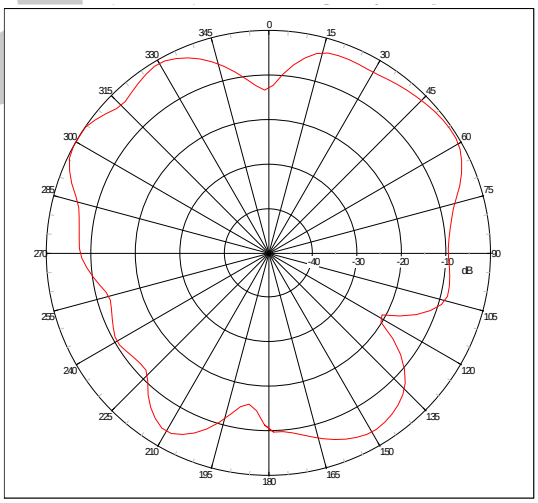
Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)

Z



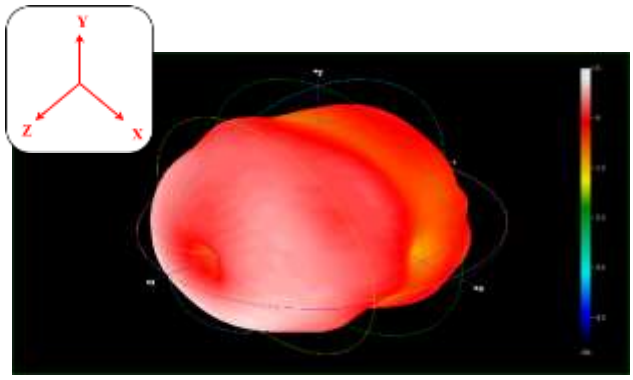
Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)

Y

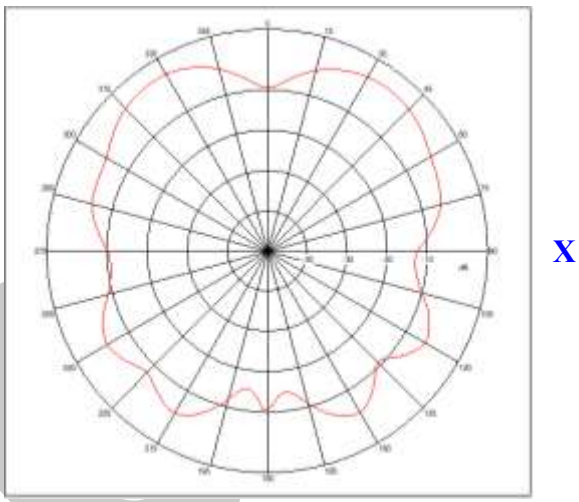


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

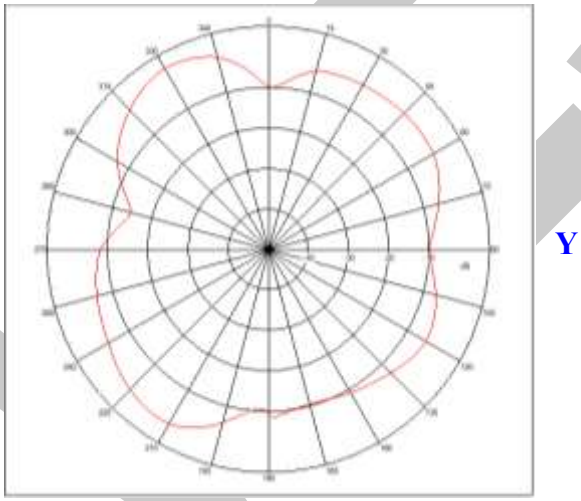
6525 MHz



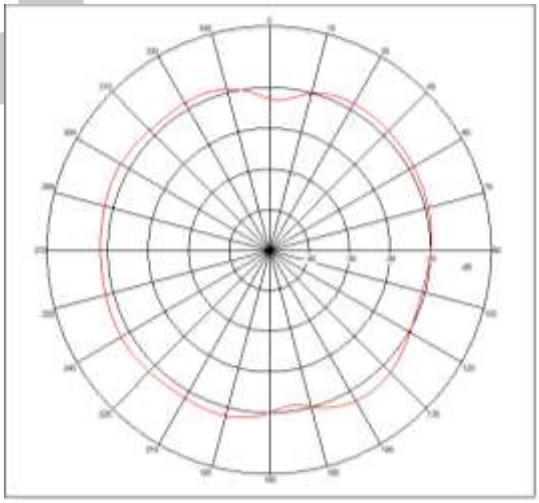
3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)

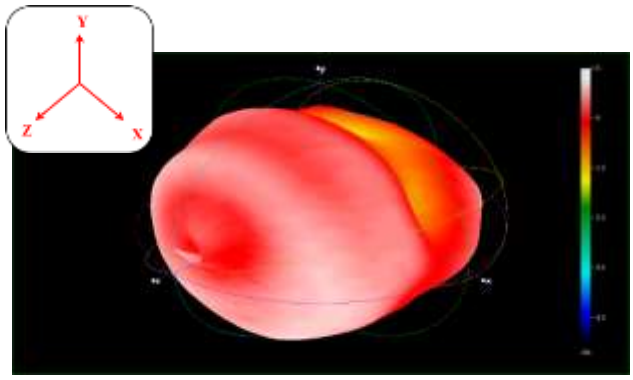


Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)

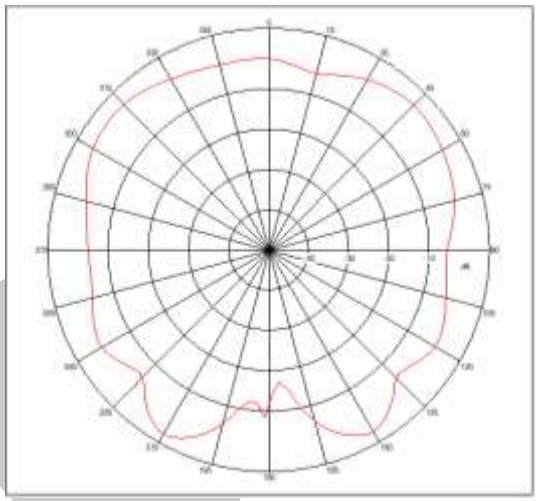


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

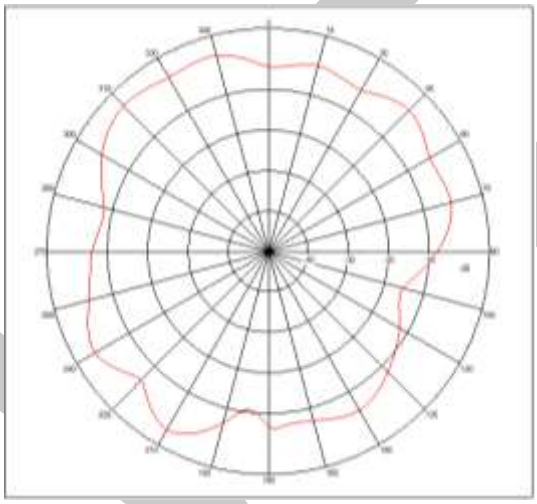
7125 MHz



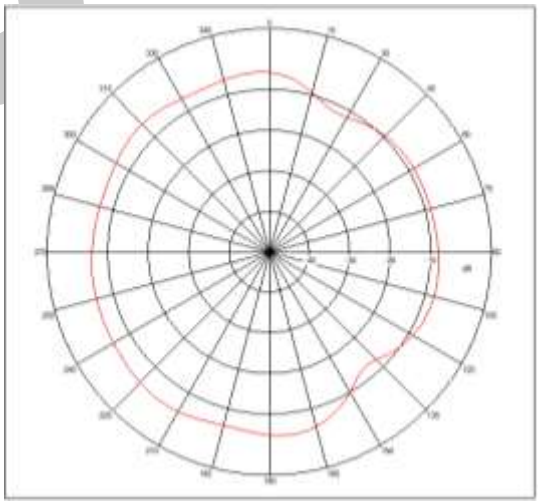
3D Pattern



Far-field Pattern @Phi=0 deg. (E-Theta Plane-Cut)



Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)



Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)