



HuiZhou Speed Wireless Technology CO., LTD.
Taiwan Speed Wireless Technology CO.,LTD.

Antenna Specification Datasheet

Customer Name : Hitron Technologies Inc.

Date : 2022.06.14.

OEM P/N	3930000306E6
SPEED P/N	F-0Q-49-6003-001-00
Version	A

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Revision History

Date	Revision	Description of changes
2022-06-14	A	First release

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1. Test Criteria

Test Criteria

Radiation gain measurement shall be made with the antennas installed in the intended notebook system. This specification evaluates performance of antenna at a system level with the antennas operating in a manner similar to customer use.

1.1 Test setup, Processes and Criteria

The gain measurement shall follow by following conditions:

- It is required that all the antenna gain to be measured spherically and computed by spatial average be computed of the resultant gain.
- During gain measurement, all other antennas not under test should be terminated by 50 Ohm load in end of cable.
- Space points of 3D gain measurement are increase by specific steps from Theta 0~180 degrees, and Phi, 0~360 degrees, as figure below. The increment steps are different steps are different by antenna functions, besides WiMAX defined in sections of WiMax antenna gain specifications, gain measurement to other function of antennas s should following steps table below.

Theta Start	15 degree	Phi Start	0 degree
Theta Stop	165 degree	Phi Stop	360 degree
Theta Increment	15 degree	Phi Increment	15 degree

1.2. Test Environment

The testing of antenna gain should be made at a CTIA qualified lab with an RF anechoic chamber with at least 3-meter separation from the receive antenna to the antenna under test. The antenna gain report from unqualified lab can't be referenced a passing. Besides, all test equipment including horn antennas, adapters, cables, network analyzers, and receivers shall be calibrated per manufacturer's minimum calibration requirements.

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2. Antenna Gain Specification

In order to ensure compliance with customers and worldwide carrier specification, it's required that antenna gain should be measured to meet customers antenna specification. It should be measured spherically and spatial average be computed of the resultant gain, and cover all the necessary required frequencies listed in the latest antenna format.

2.1 Antenna Requirements

This specification evaluates performance of antenna at a system level with the antennas operating in a manner similar to customer use. It is required that all the antenna gain should be measured spherically and a spatial average be computed of the resultant gain.

2.2 WiFi Antenna Frequency Bands

The following table documents the frequency requirements of WLAN antenna assemblies for customers products.

Description	Application	Bands	Frequency
WiFi	WiFi 11b, g, n	2.4GHz	2.4~2.485GHz
	WiFi 11a, n,ac,ax	5GHz	5.15~5.85GHz
	WiFi 6E	6GHz	5.925~7.125 GHz

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3. S-Parameter Measurement Result

3.1. Reflection coefficient :

(1) Instrument : Network Analyzer.

(2) Setup :

(3) Calibrate the Network Analyzer by one port calibration using O.S.L.
calibration kits.

(4) Connect the antenna under test to the Network Analyzer.

(5) Measure the S11(reflection coefficient) shown in Fig. 1.

(6) Generally, the S11 is less than -10dB to ensure the 90% power into
antenna and only less than 10% power back to system.

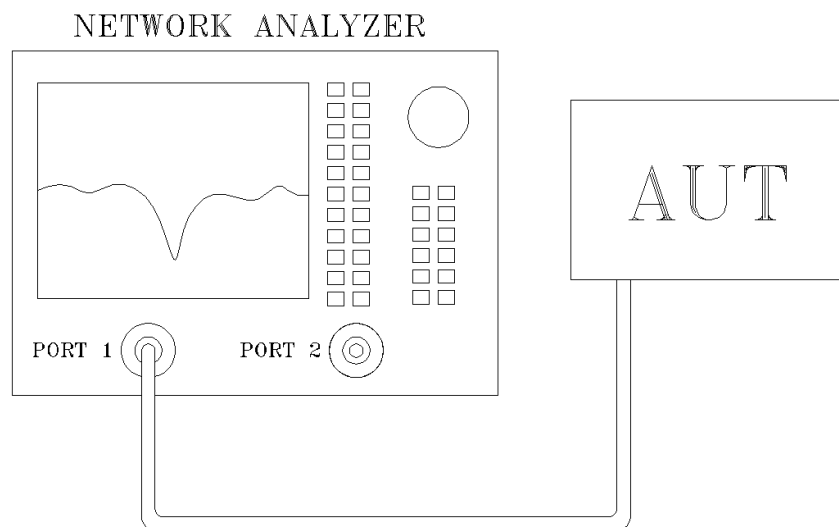
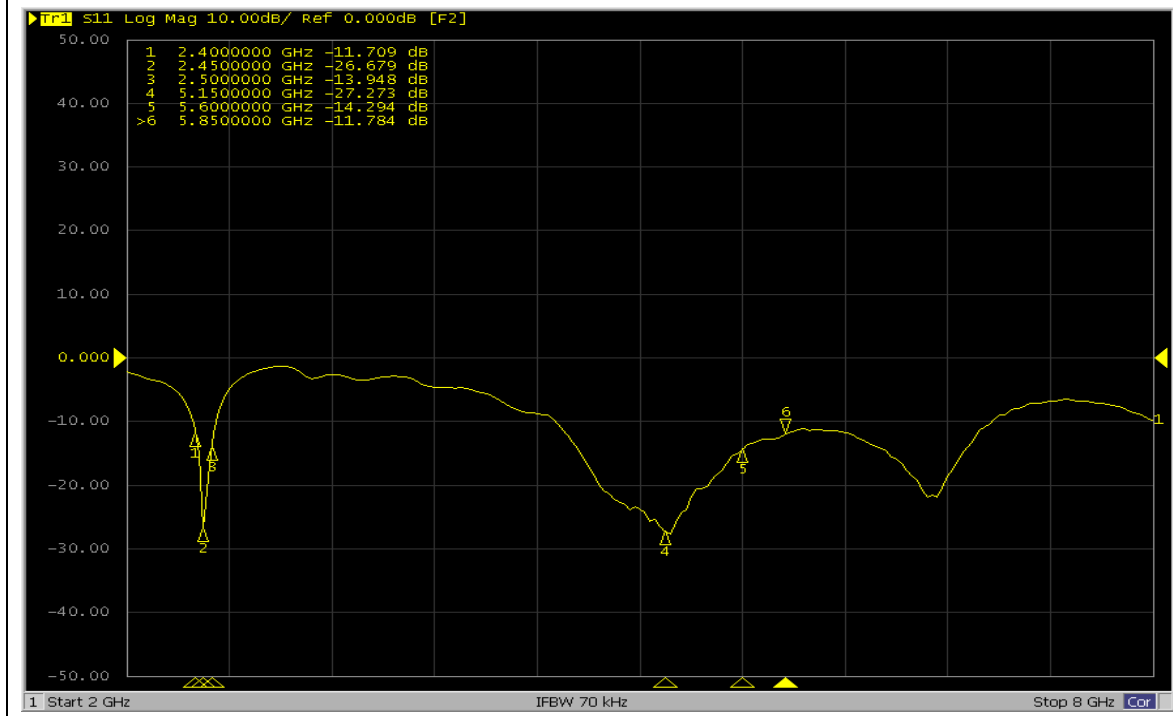


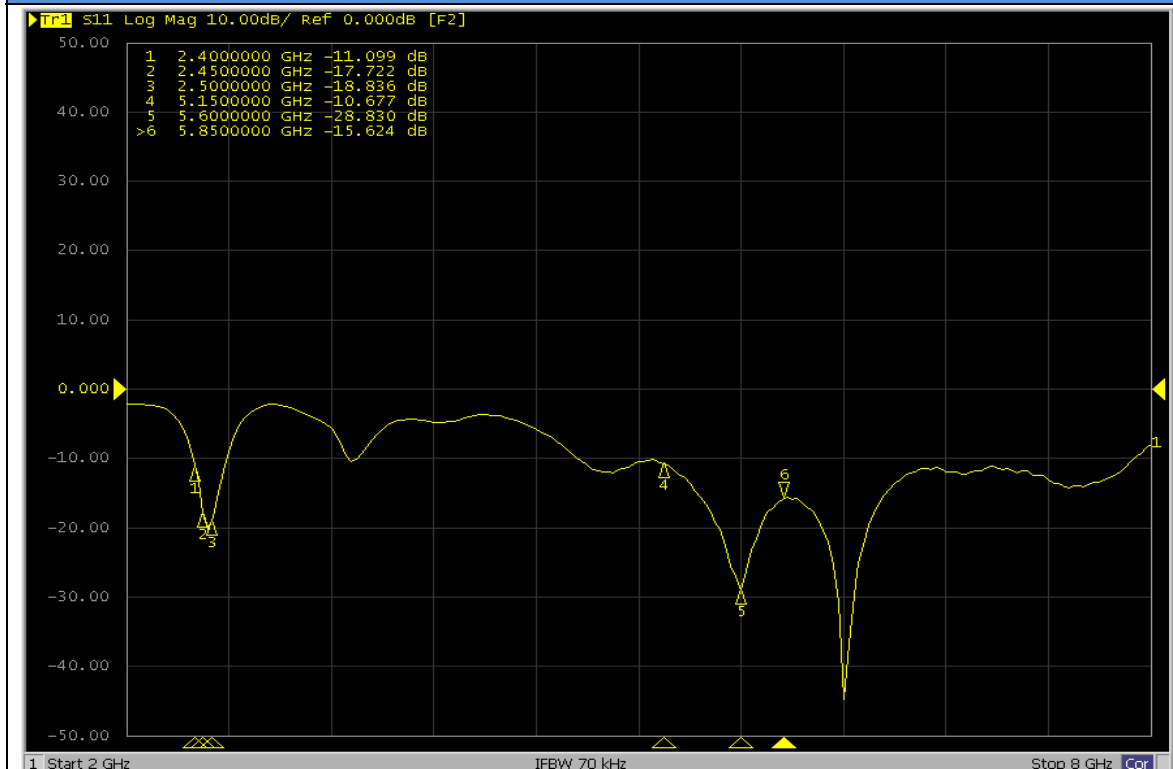
Fig.1 Antenna measured in Network Analyzer

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2.4/5G Ant1 Return Loss

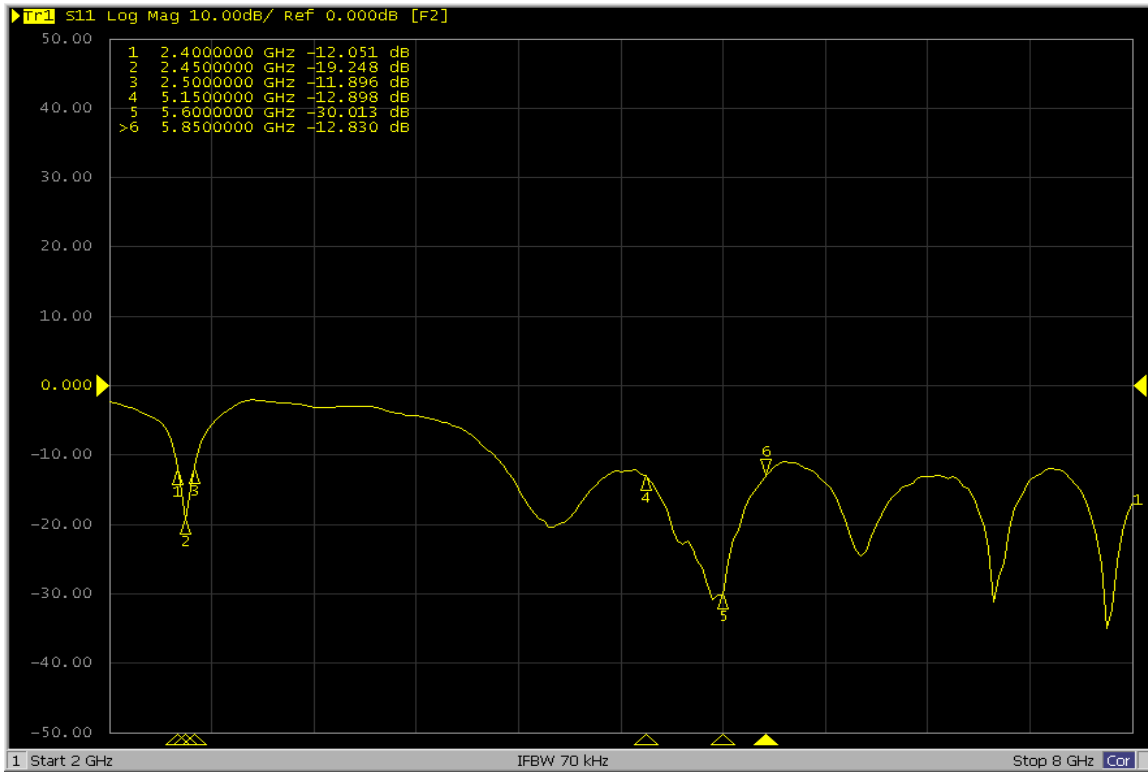


2.4/5G Ant2 Return Loss

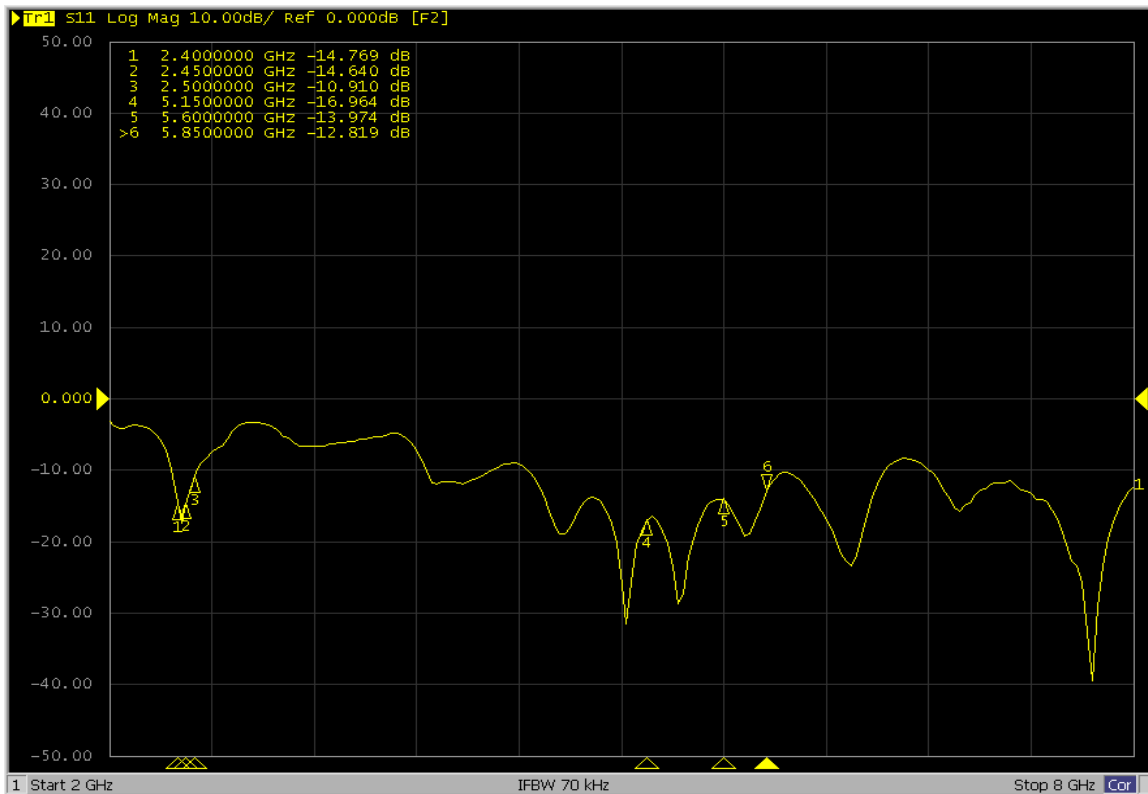


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2.4/5G Ant3 Return Loss



2.4/5G Ant4 Return Loss



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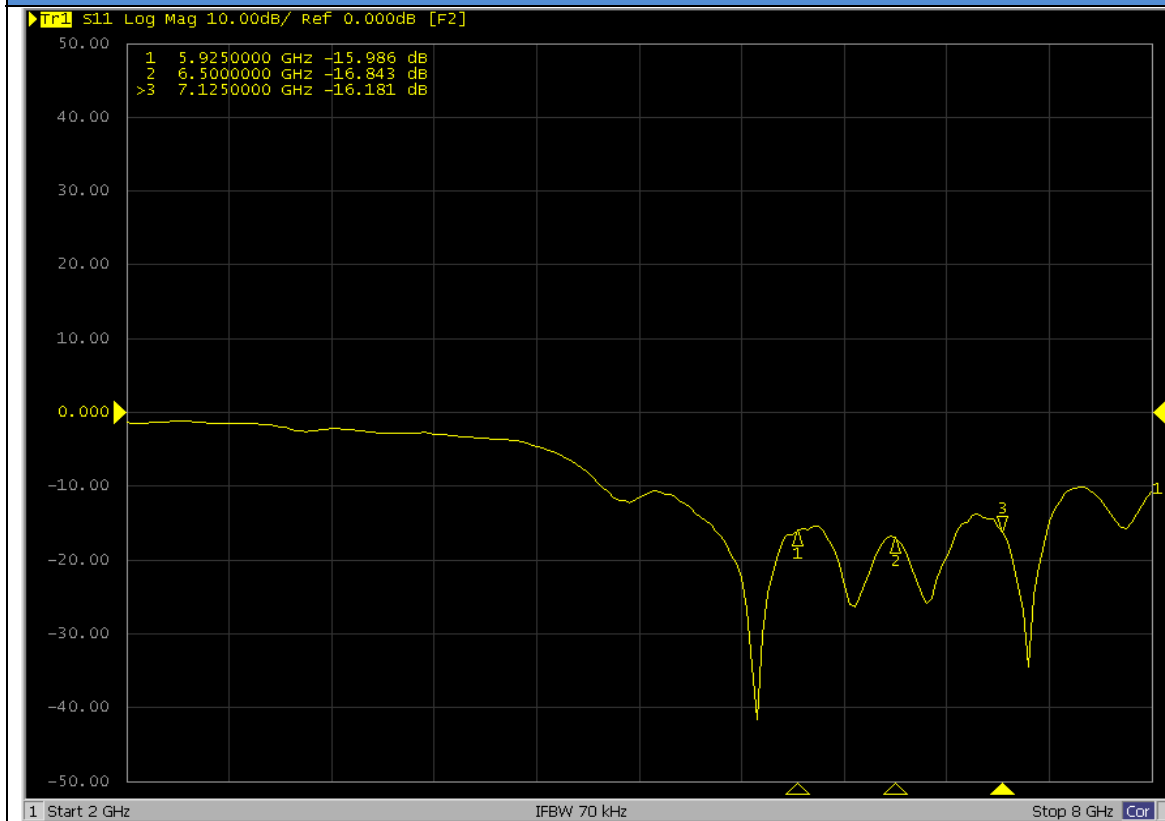
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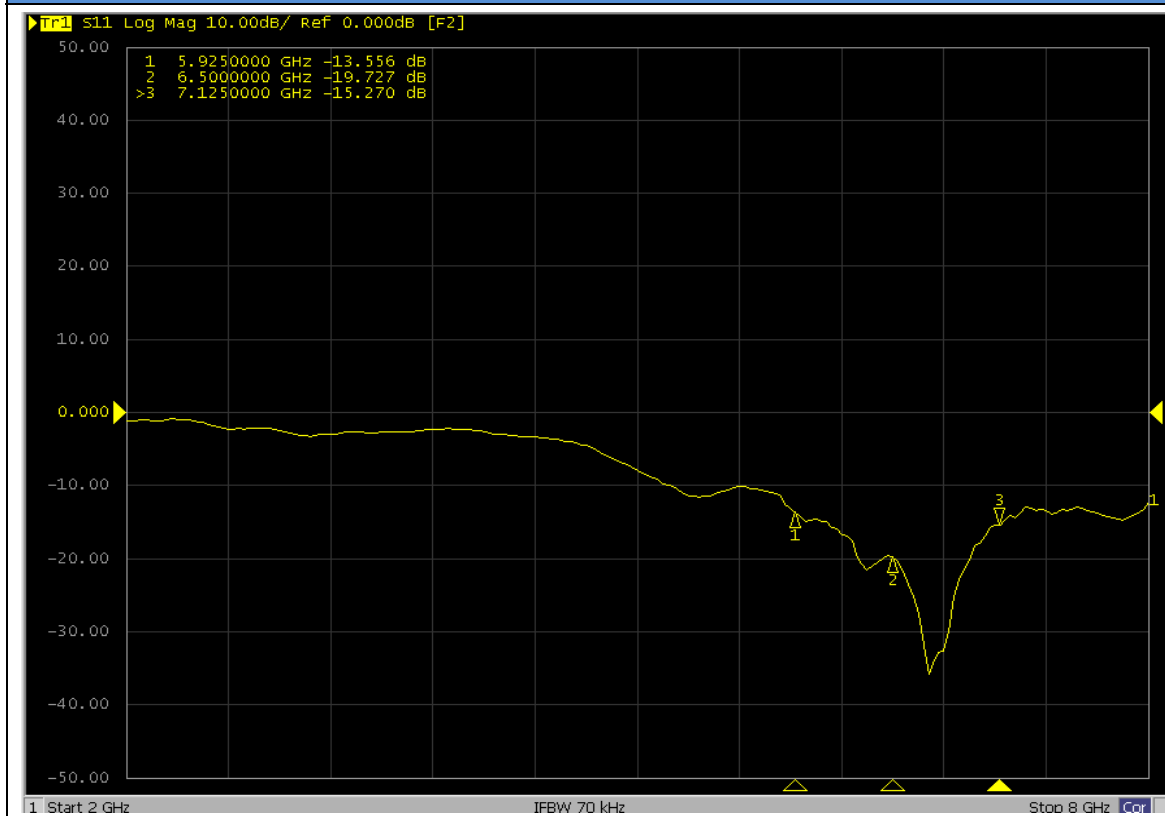
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6G Ant1 Return Loss



6G Ant2 Return Loss



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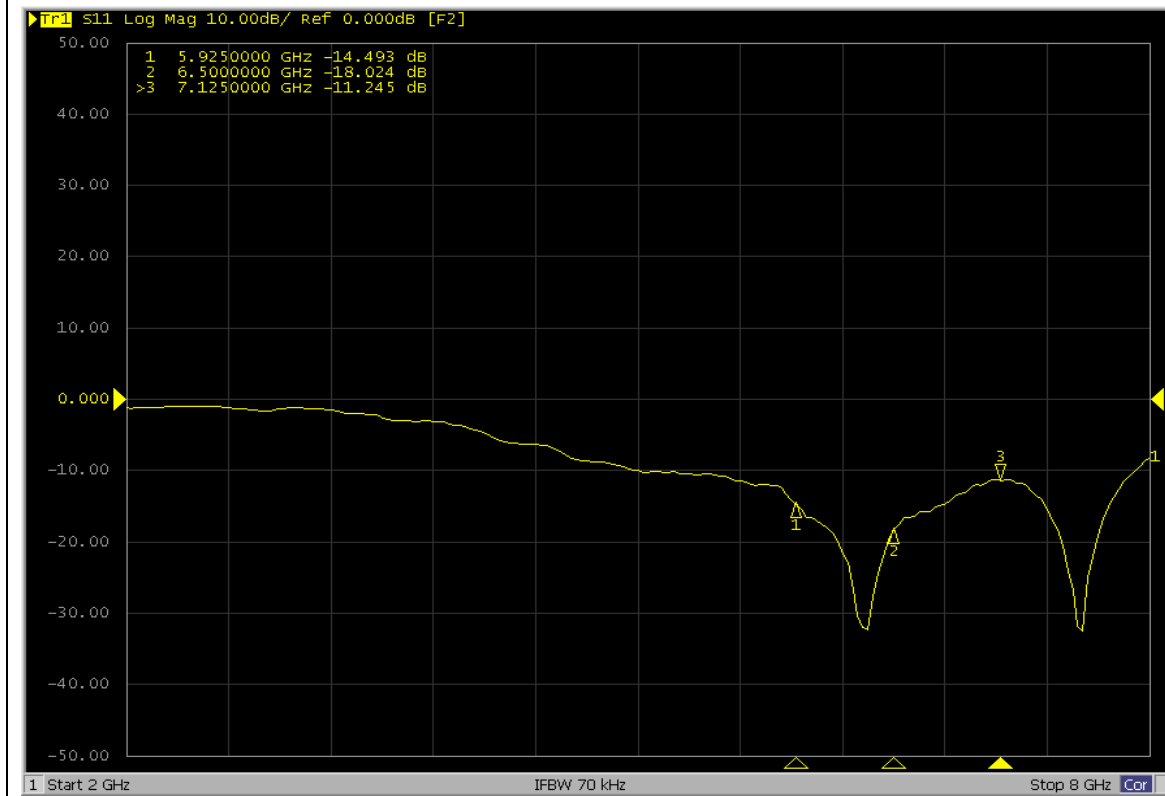
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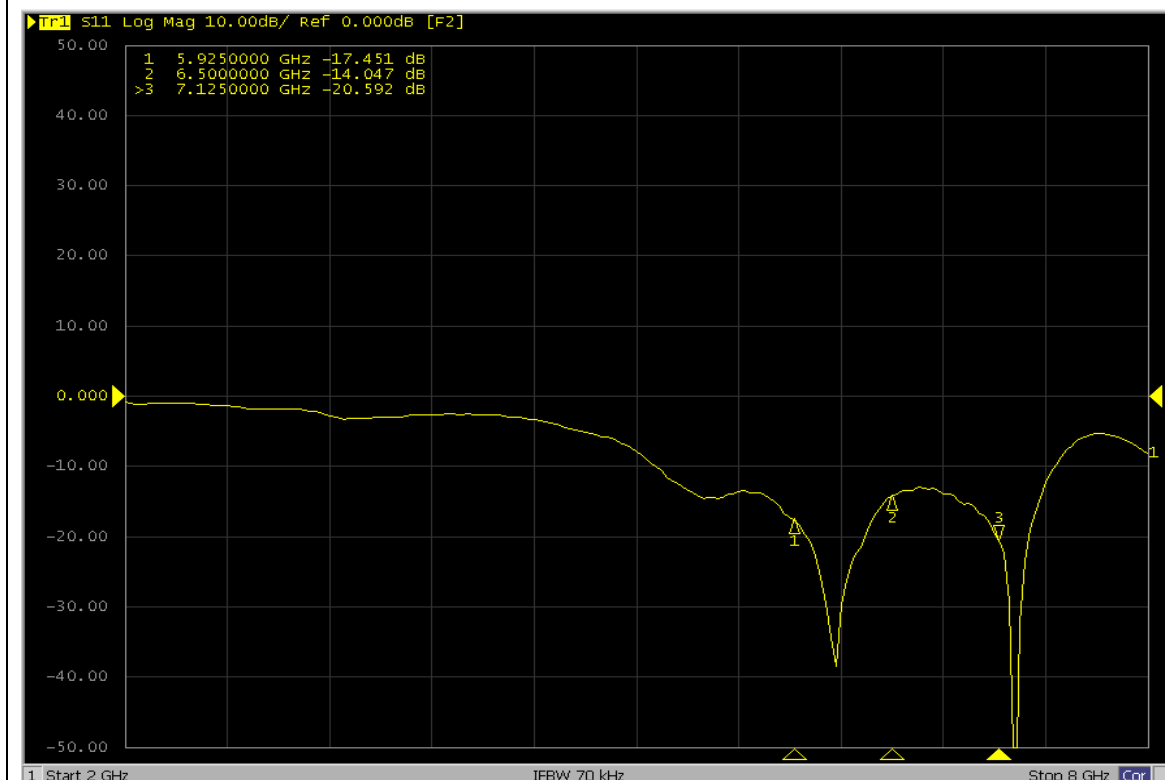
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6G Ant3 Return Loss

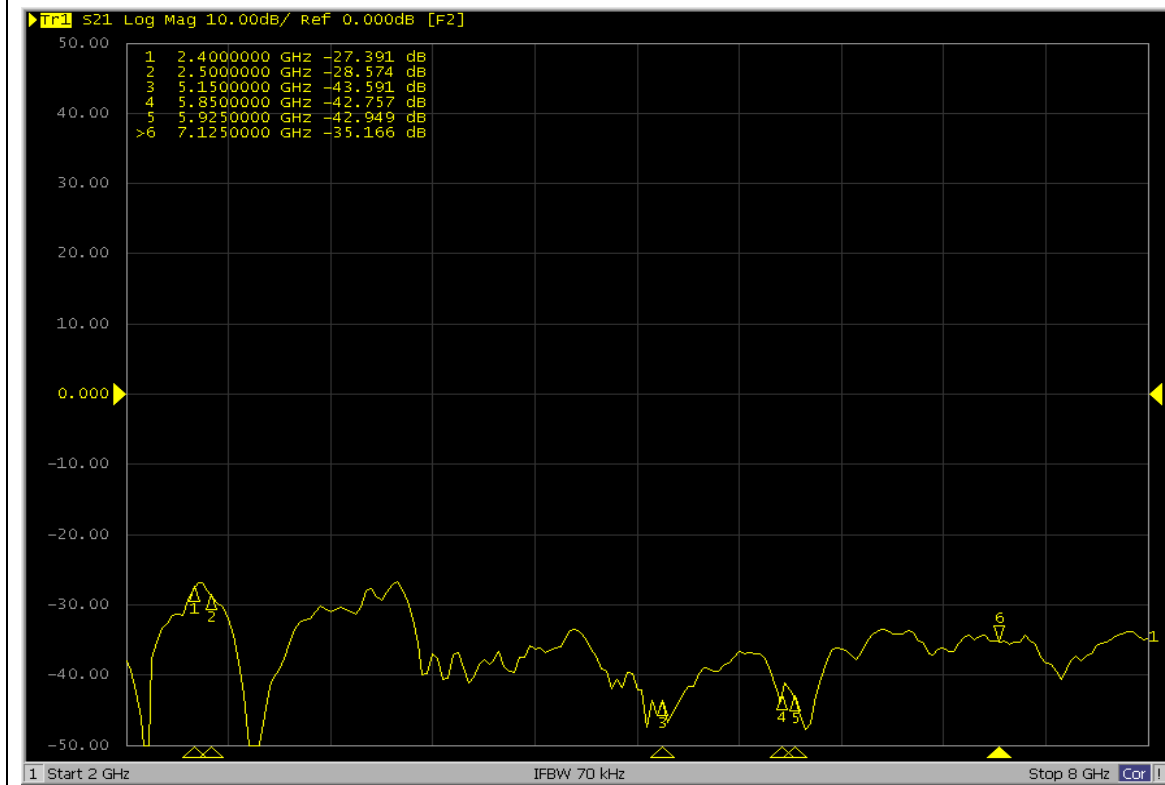


6G Ant4 Return Loss

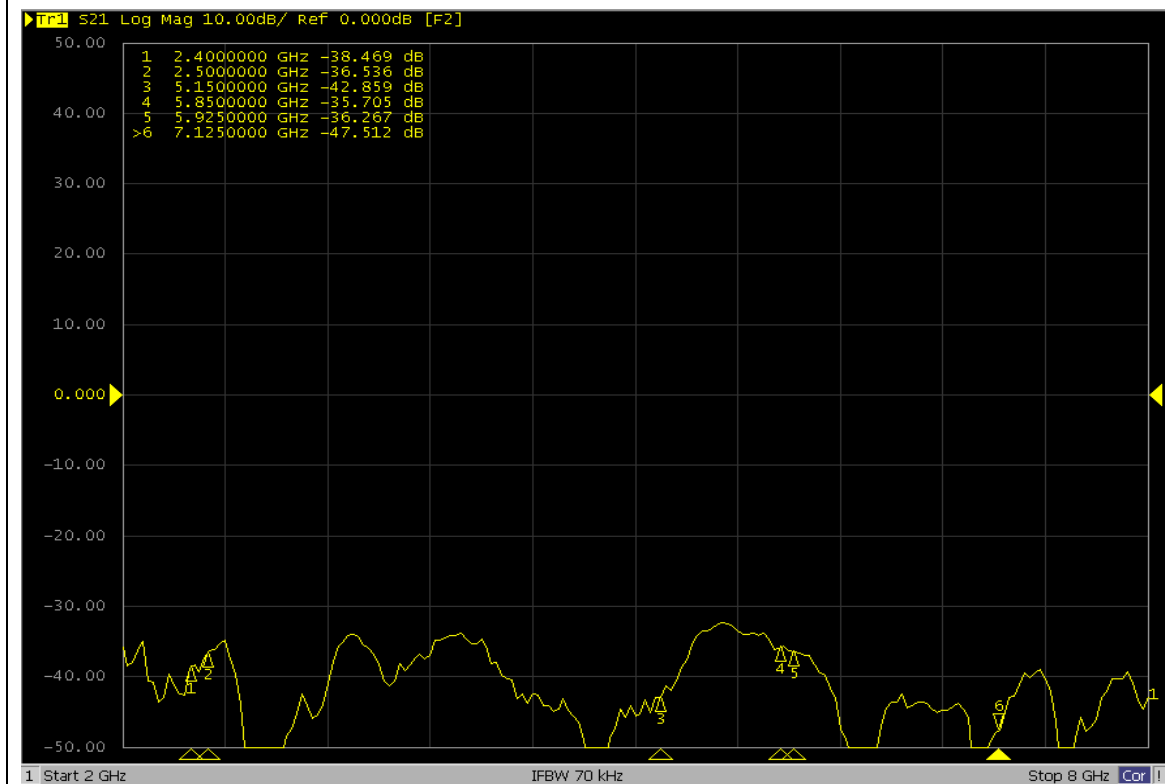


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2.4/5G Ant4 & 2.4/5G Ant3 Isolation



2.4/5G Ant4 & 2.4/5G Ant2 Isolation



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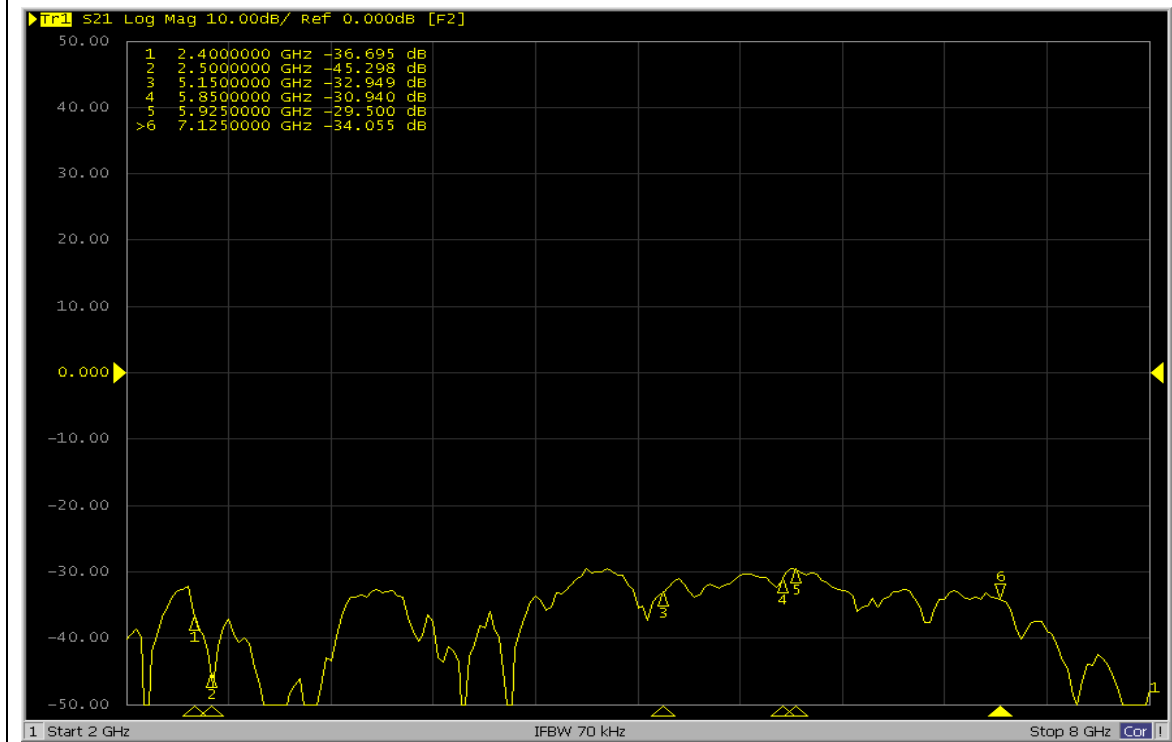
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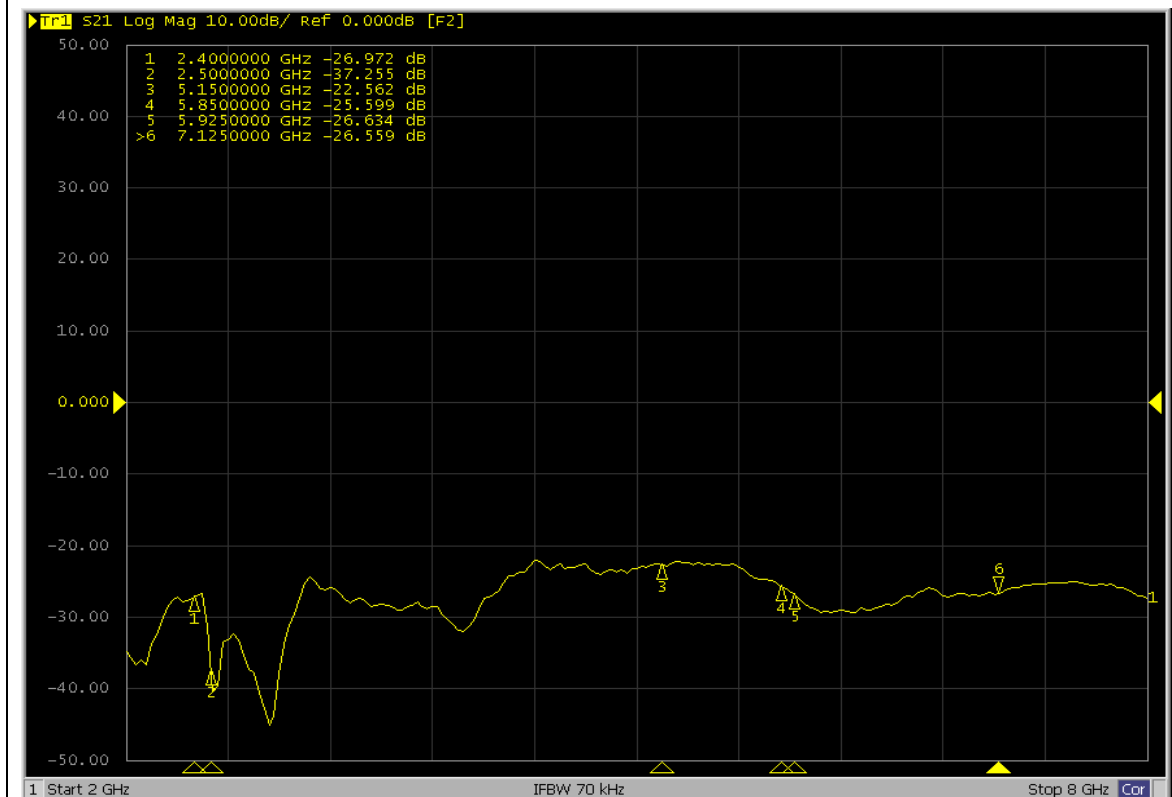
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2.4/5G Ant4 & 2.4/5G Ant1 Isolation

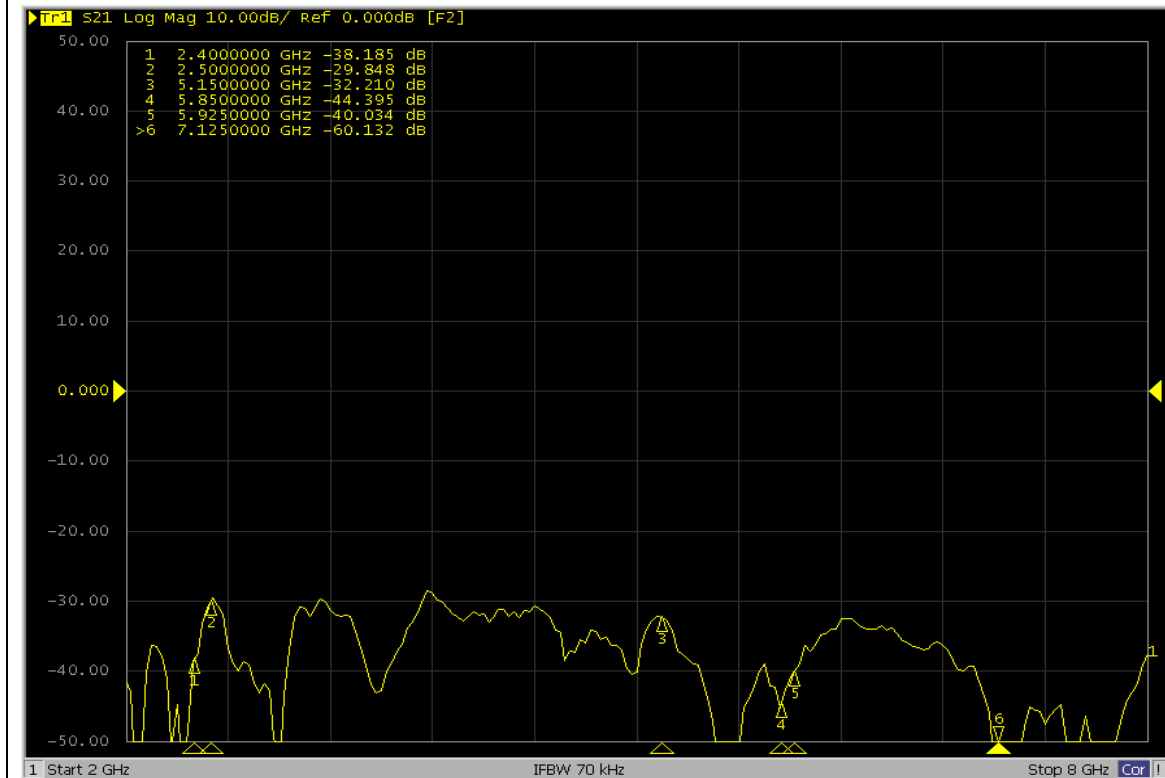


2.4/5G Ant3 & 2.4/5G Ant2 Isolation

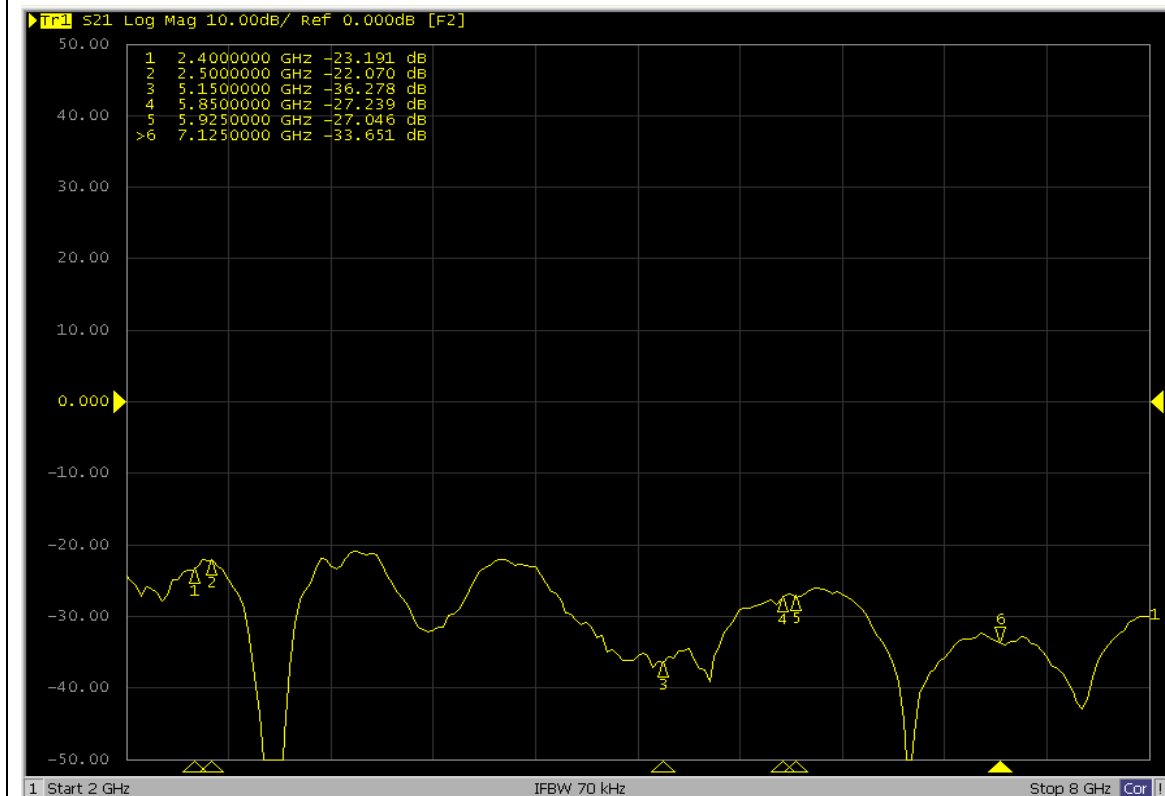


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2.4/5G Ant3 & 2.4/5G Ant1 Isolation



2.4/5G Ant2 & 2.4/5G Ant1 Isolation



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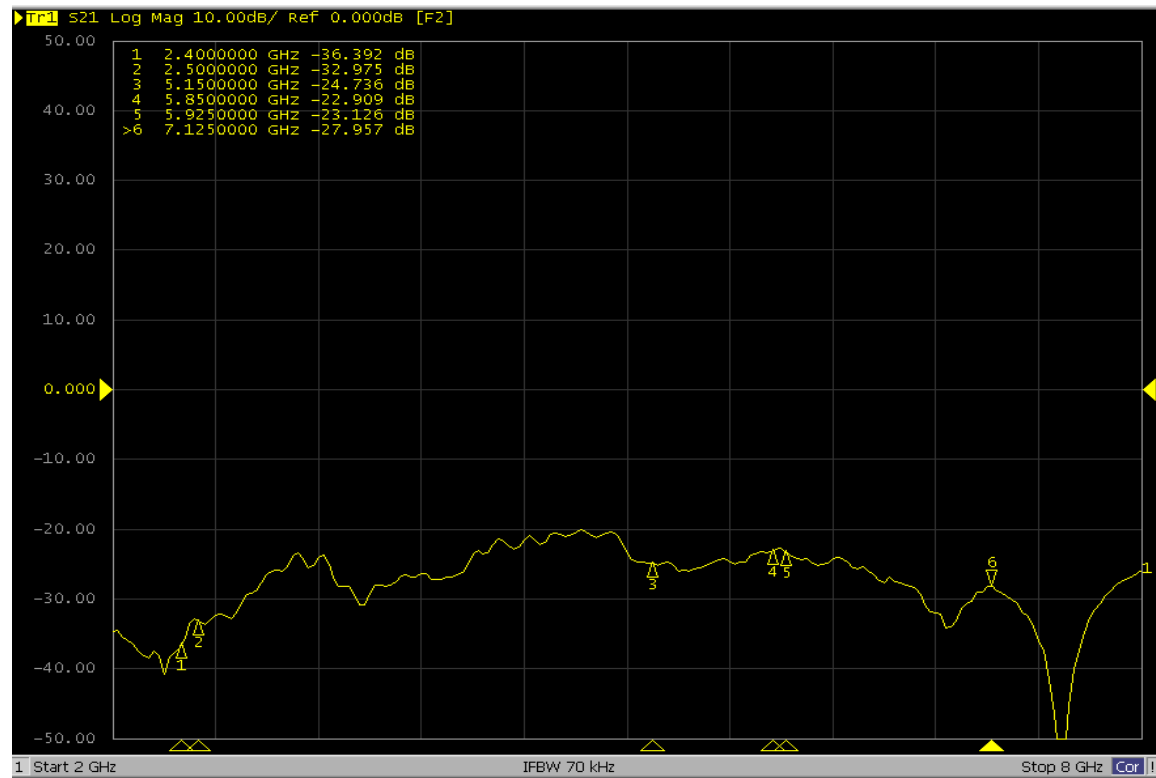
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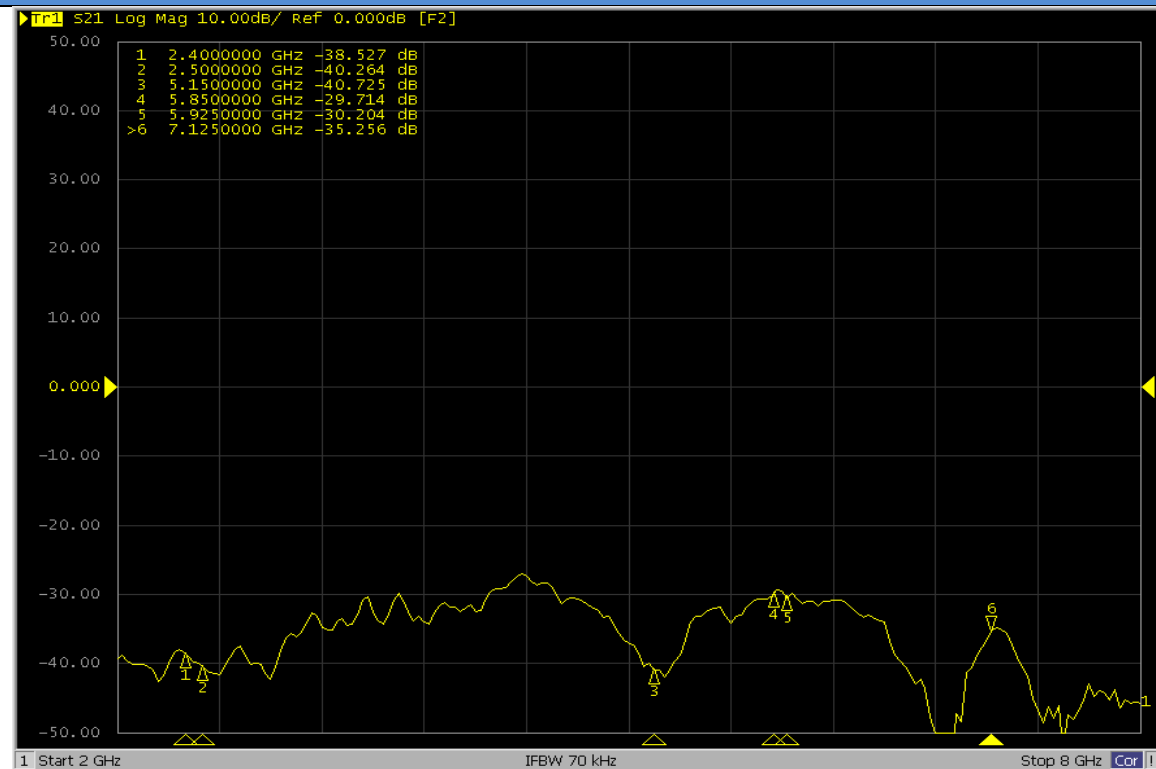
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6G Ant2 & 6G Ant1 Isolation

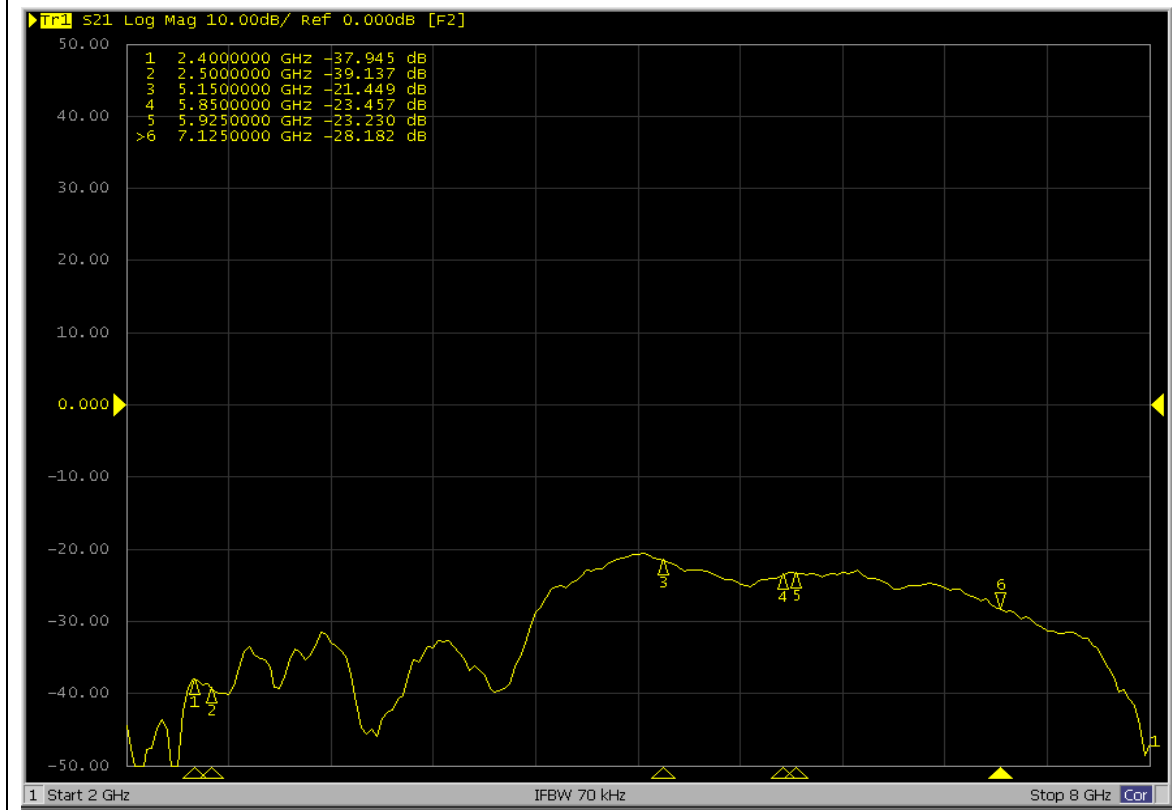


6G Ant3 & 6G Ant1 Isolation

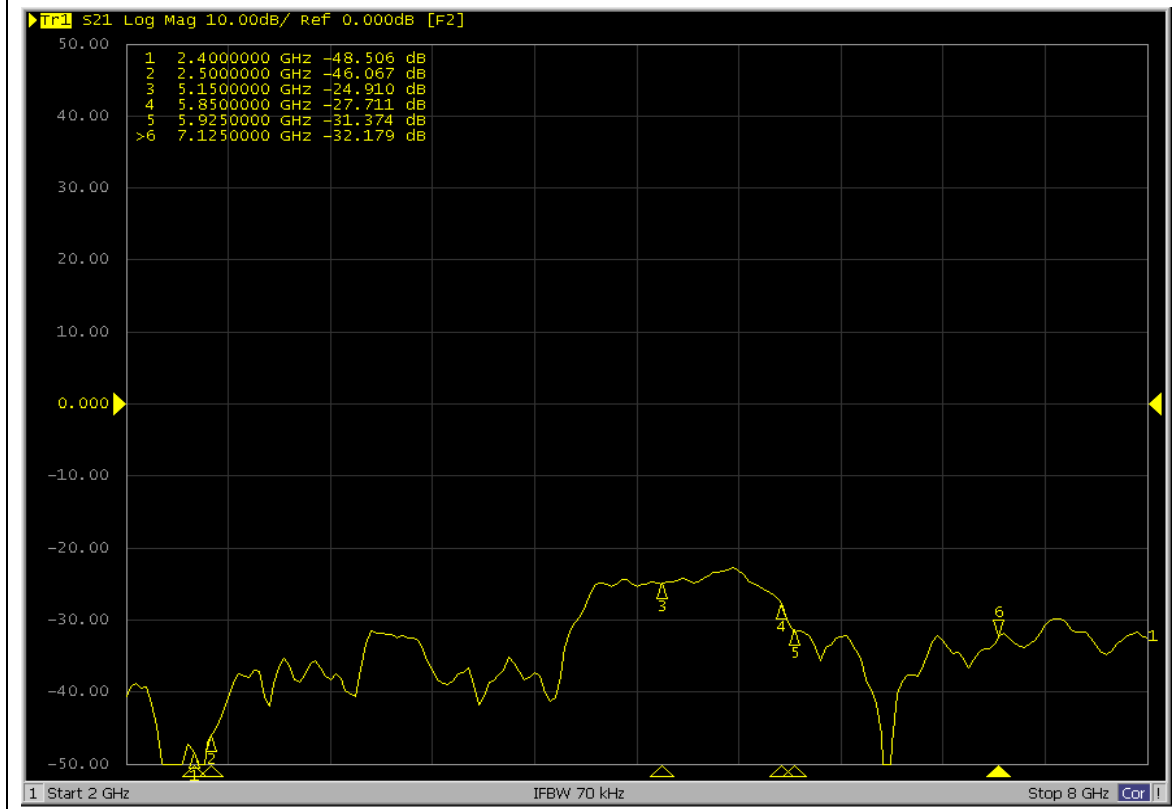


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6G Ant3 & 6G Ant2 Isolation



6G Ant4 & 6G Ant1 Isolation



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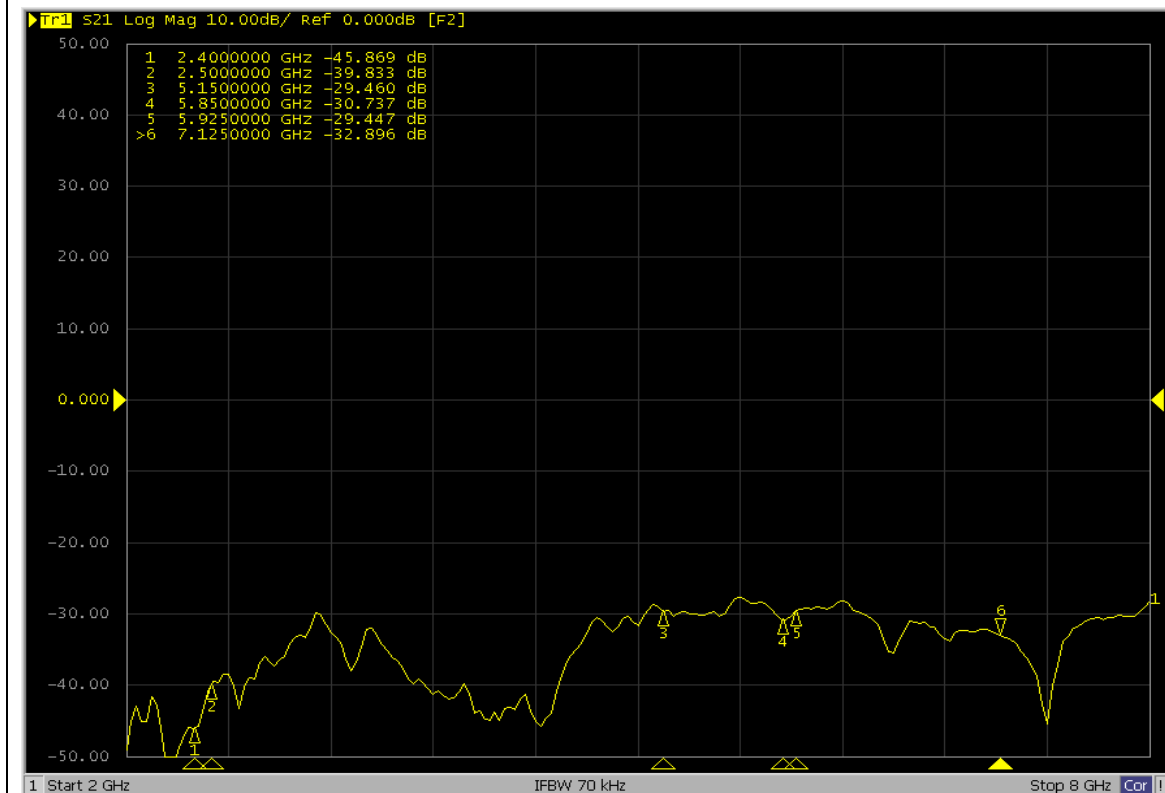
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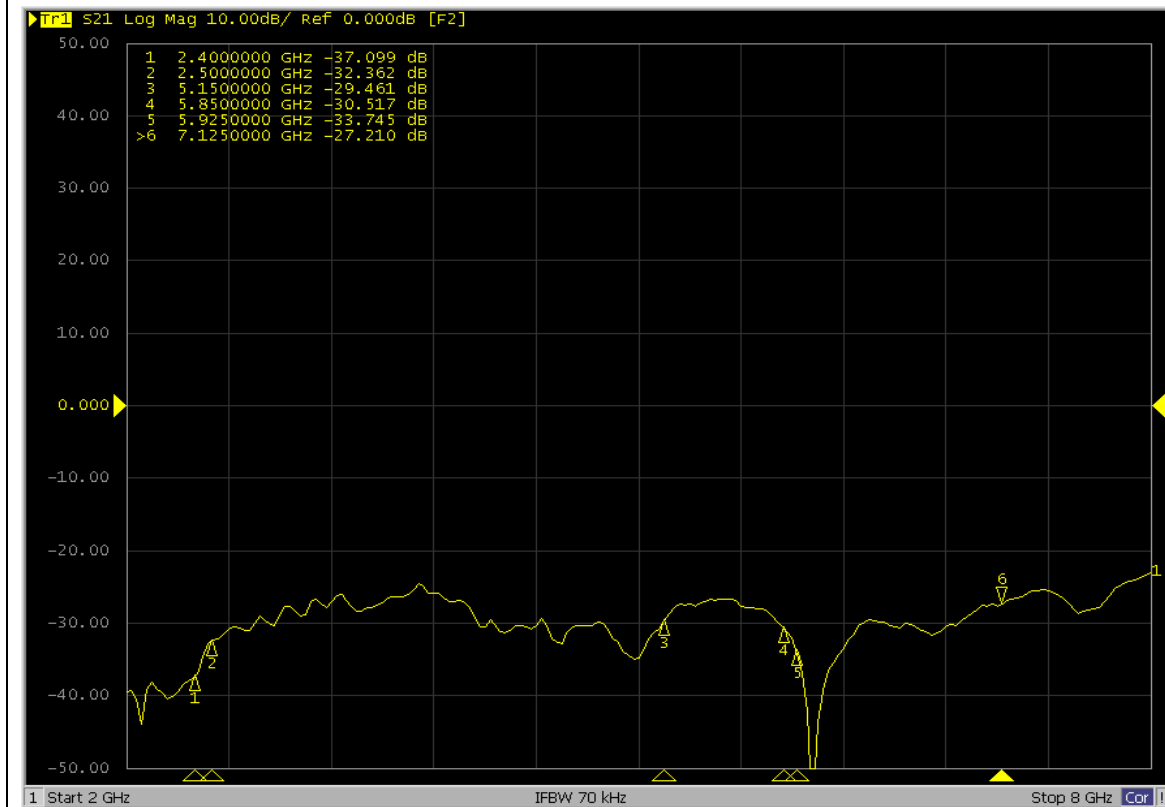
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6G Ant4 & 6G Ant2 Isolation



6G Ant4 & 6G Ant3 Isolation



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4. Antenna Performance Test

4.1 Antenna Measurement Antenna Gain Value

2.4/5G Ant 1

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
2400	2.7	-2.22	60
2450	2.8	-1.49	71
2500	1.8	-2.01	63
5150	3.0	-1.74	67
5250	3.5	-1.37	73
5350	3.8	-0.71	85
5470	2.9	-2.01	63
5600	3.4	-2.08	62
5725	2.5	-1.61	69
5785	3.0	-1.55	70
5850	2.9	-1.31	74

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2.4/5G Ant 2

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
2400	2.5	-2.22	60
2450	3.9	-2.01	63
2500	3.8	-2.22	60
5150	3.0	-1.49	71
5250	3.6	-1.19	76
5350	3.4	-0.56	88
5470	3.9	-1.19	76
5600	3.6	-1.31	74
5725	3.8	-0.97	80
5785	3.6	-0.97	80
5850	3.9	-0.86	82

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2.4/5G Ant 3

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
2400	1.5	-1.87	68
2450	2.0	-1.37	71
2500	1.4	-1.61	60
5150	2.7	-1.94	68
5250	3.0	-1.87	72
5350	3.3	-1.49	81
5470	2.4	-2.22	69
5600	2.6	-2.15	67
5725	3.6	-2.15	75
5785	3.8	-2.15	75
5850	3.7	-1.80	79

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2.4/5G Ant 4

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
2400	1.2	-1.87	65
2450	2.1	-1.37	73
2500	2.0	-1.61	69
5150	1.5	-1.94	64
5250	2.0	-1.87	65
5350	3.1	-1.49	71
5470	1.6	-2.22	60
5600	1.1	-2.15	61
5725	2.4	-2.15	61
5785	1.9	-2.15	61
5850	2.1	-1.80	66

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6G Ant 1

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
5925	4.4	-1.94	64
6125	4.2	-1.94	64
6225	5.0	-1.43	72
6325	3.5	-1.37	73
6425	3.7	-1.61	69
6525	2.3	-1.87	65
6625	3.4	-1.55	70
6725	3.0	-2.08	62
6875	4.1	-1.55	70
6925	3.6	-1.74	67
7125	3.8	-2.22	60

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6G Ant 2

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
5925	5.8	-0.92	81
6125	5.3	-1.25	75
6225	5.6	-1.02	79
6325	3.6	-1.55	70
6425	5.1	-1.87	65
6525	3.6	-1.94	64
6625	5.9	-1.31	74
6725	5.0	-1.49	71
6875	5.8	-1.19	76
6925	4.5	-1.80	66
7125	5.0	-1.31	74

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6G Ant 3

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
5925	5.3	-1.7	68
6125	4.1	-1.9	65
6225	4.8	-1.2	76
6325	2.8	-1.3	73
6425	4.6	-1.3	74
6525	4.7	-2.15	61
6625	5.4	-1.3	74
6725	5.1	-1.7	68
6875	5.6	-1.49	71
6925	5.8	-1.8	67
7125	5.3	-1.8	66

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6G Ant 4

Frequency (MHz)	Peak Gain (dBi)	Avg Gain (dB)	Efficiency (%)
5925	3.1	-1.8	67
6125	2.5	-1.8	66
6225	2.9	-1.4	72
6325	1.6	-1.2	76
6425	3.2	-1.3	74
6525	2.5	-2.15	61
6625	3.8	-2.0	64
6725	3.5	-2.1	62
6875	3.2	-1.5	71
6925	3.2	-1.4	72
7125	3.1	-2.1	61

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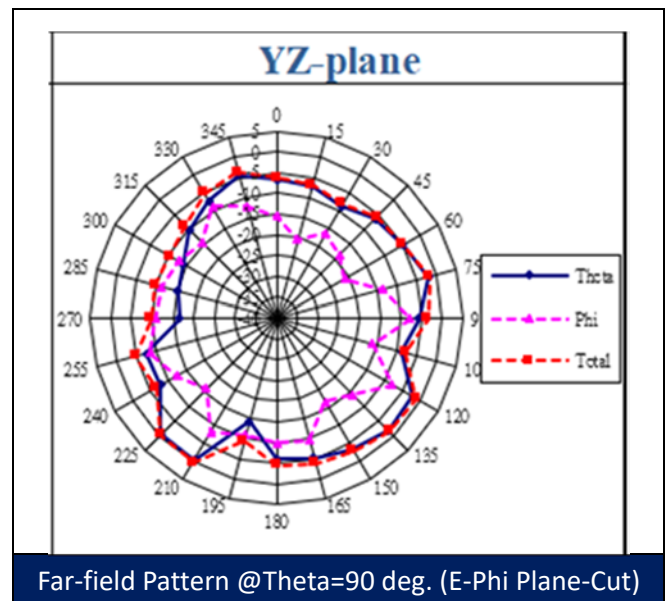
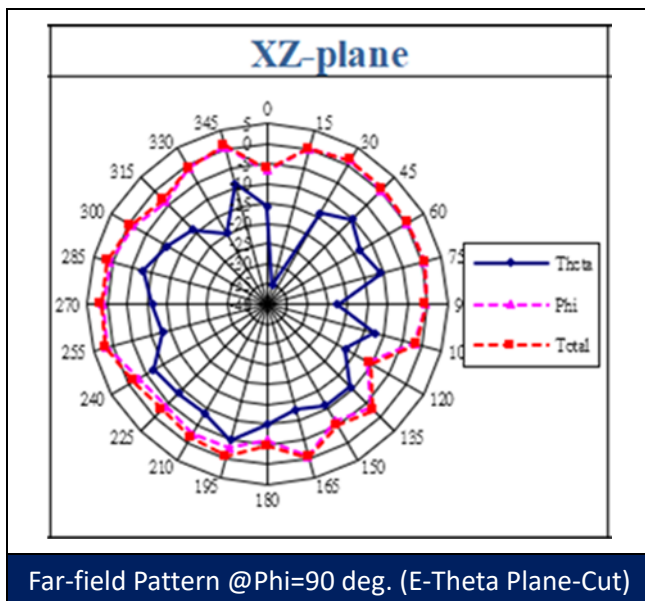
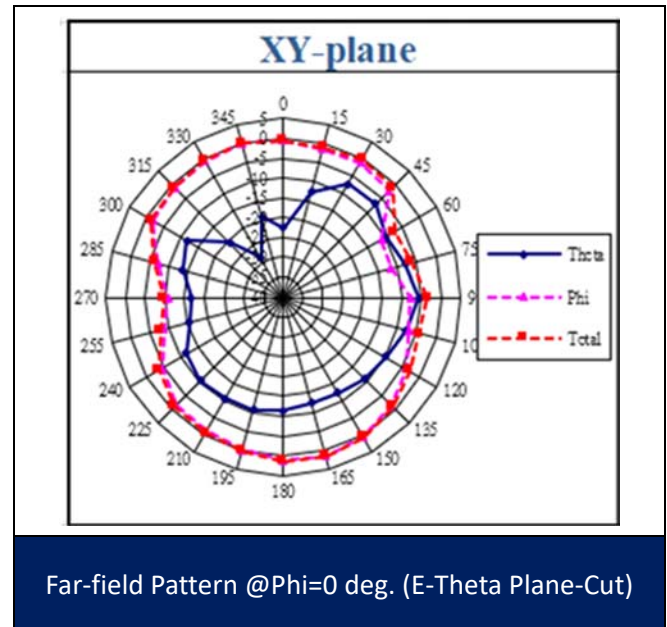
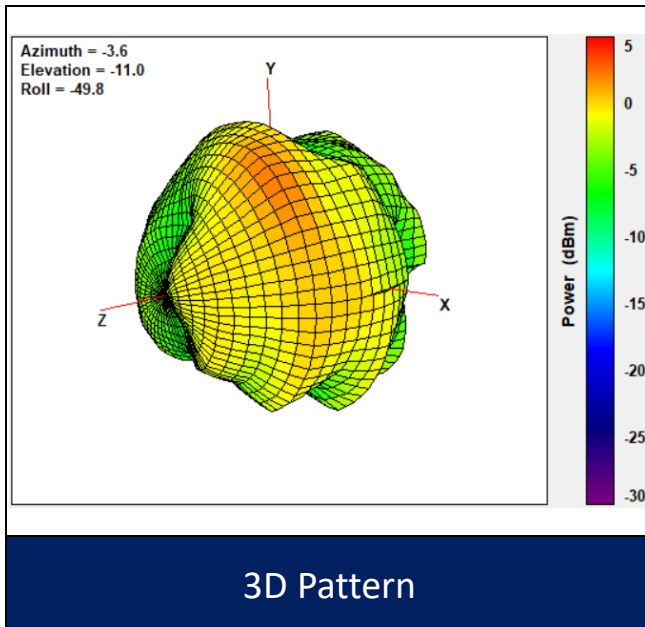
Appendix

Radiation characteristics of antennae Loaded in Host Platform

Radiation characteristic

2.4/5G Ant 1

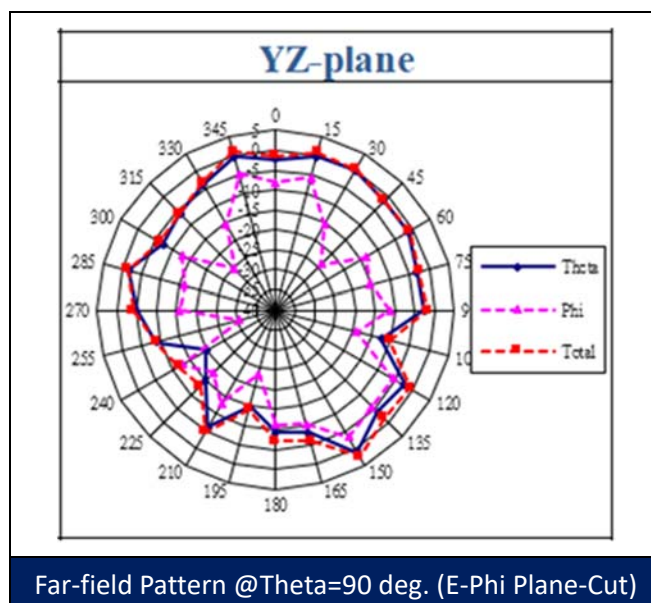
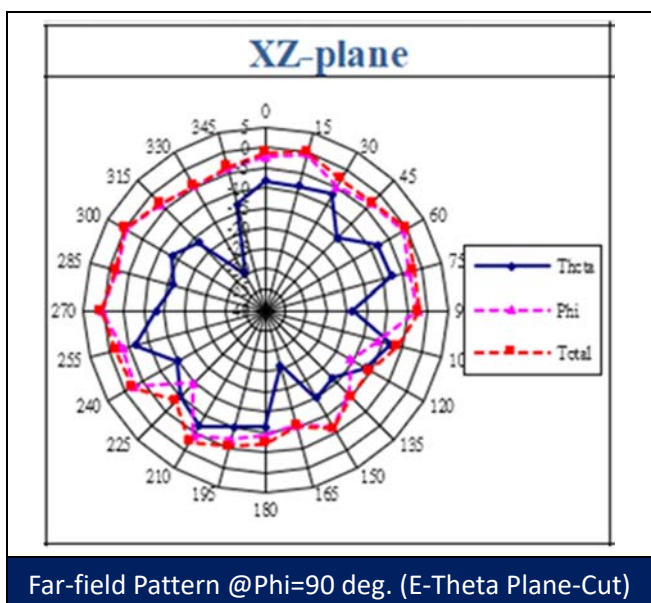
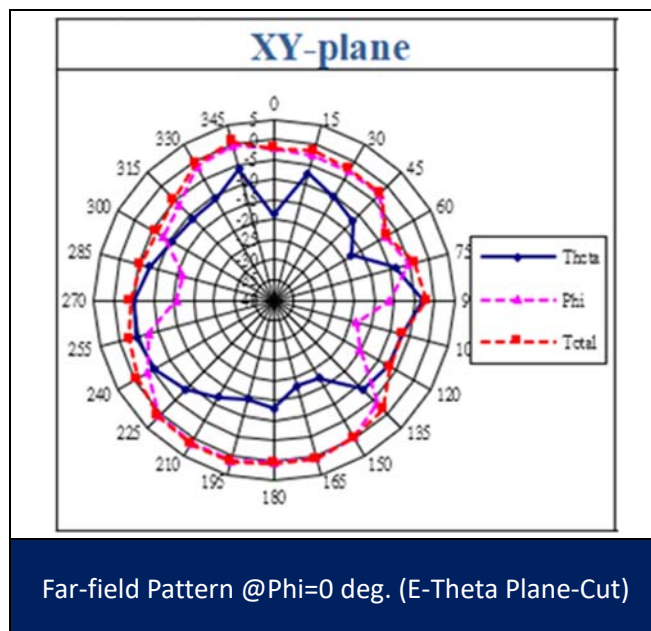
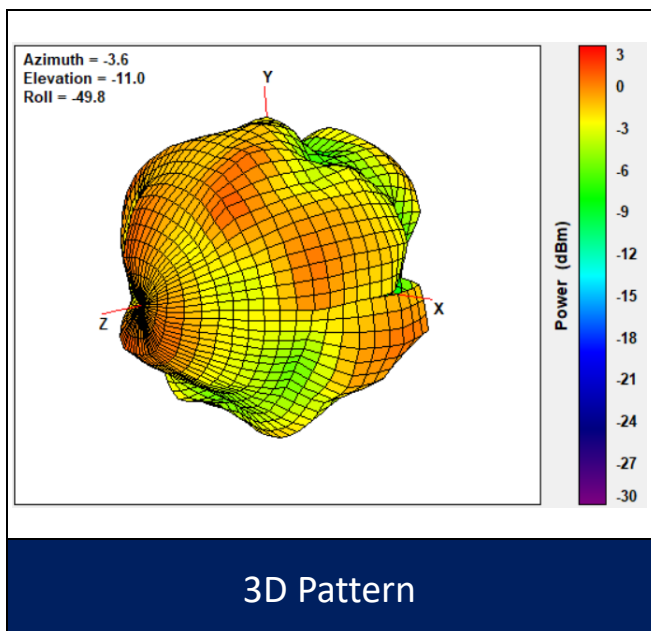
2450MHz



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2.4/5G Ant 1

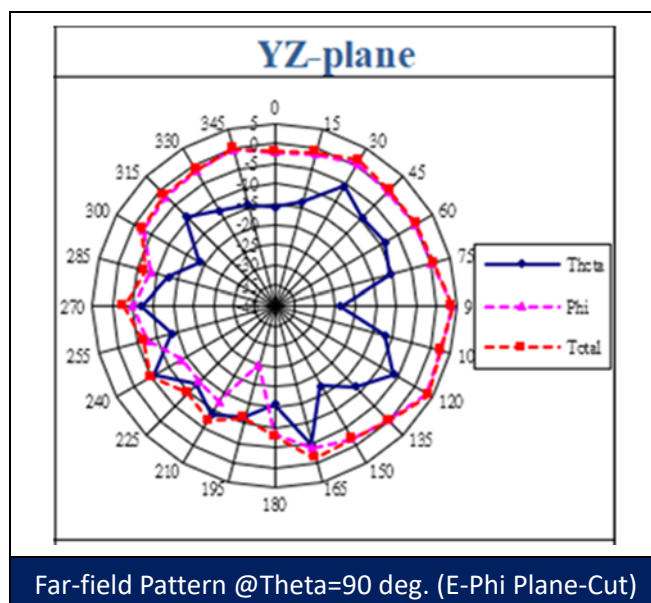
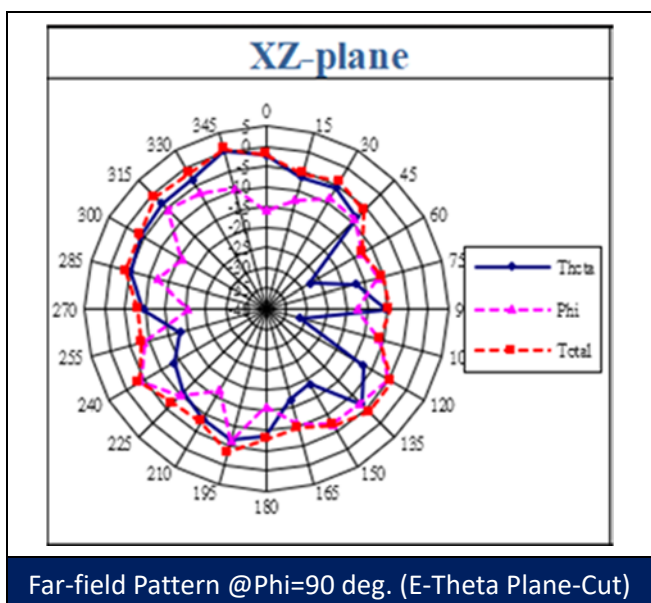
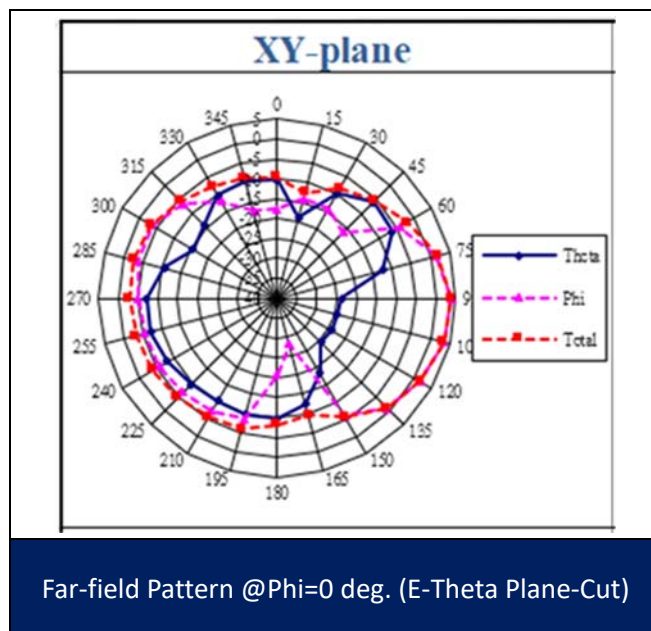
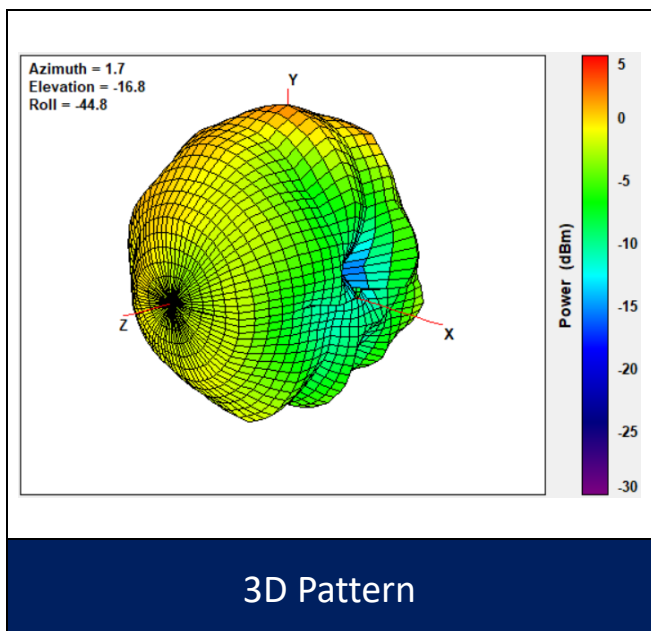
5600MHz



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2.4/5G Ant 2

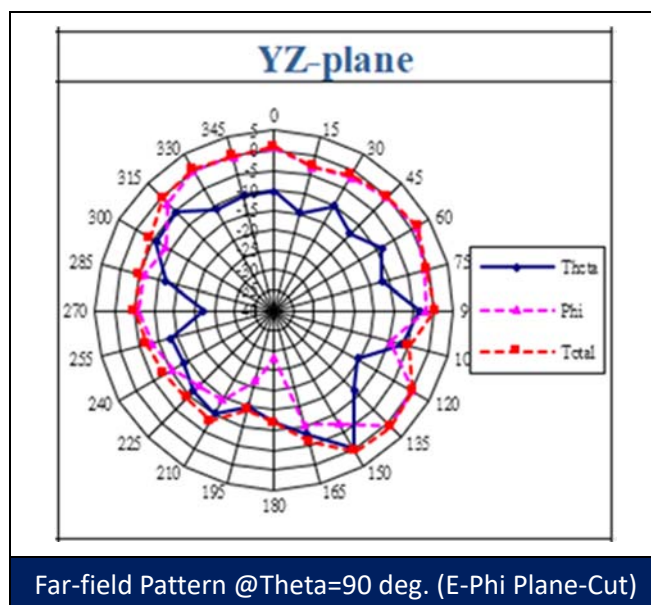
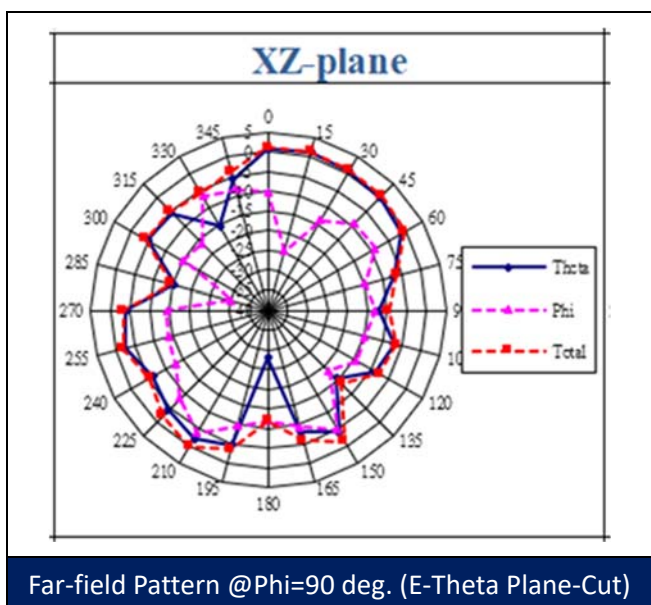
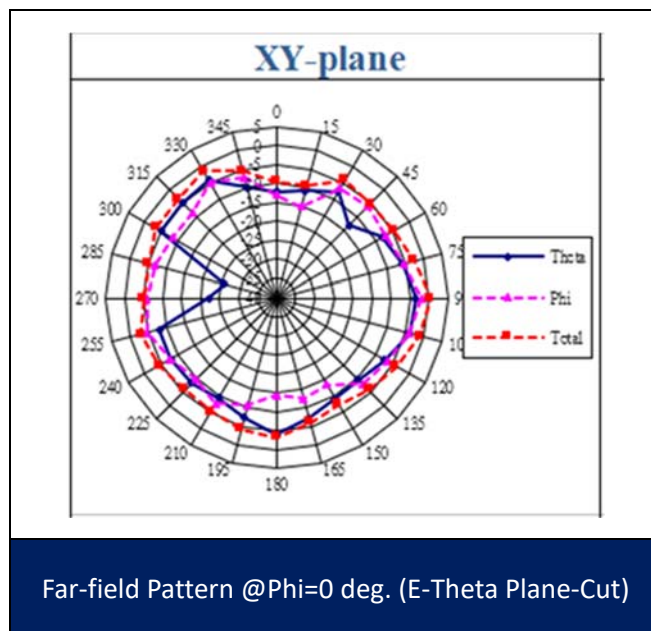
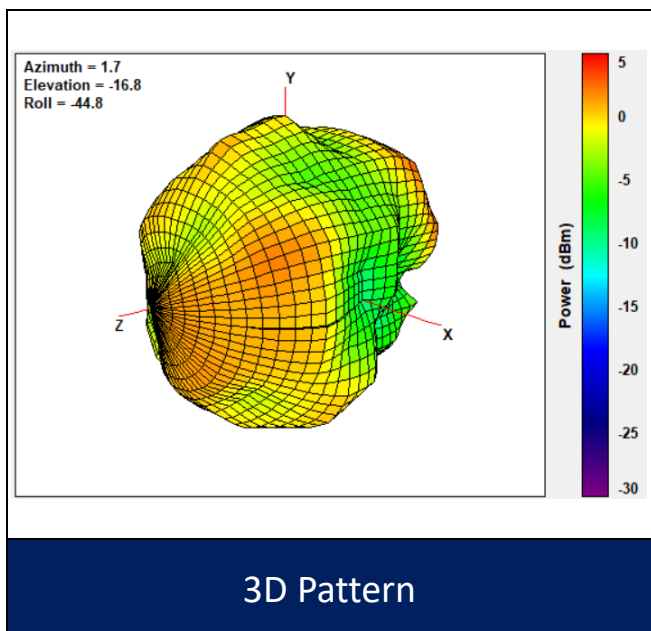
2450MHz



Project Name : coda5834	Author : Wippen	File Name : 3930000306E6(F-0Q-49-6003-001-00)
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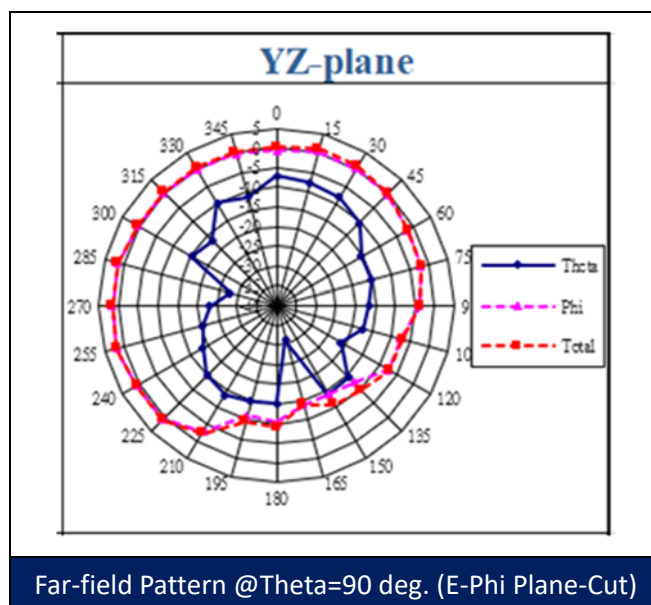
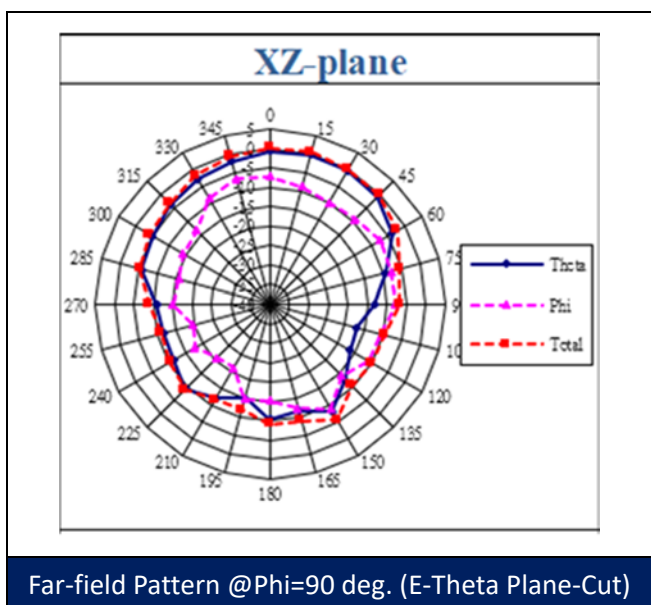
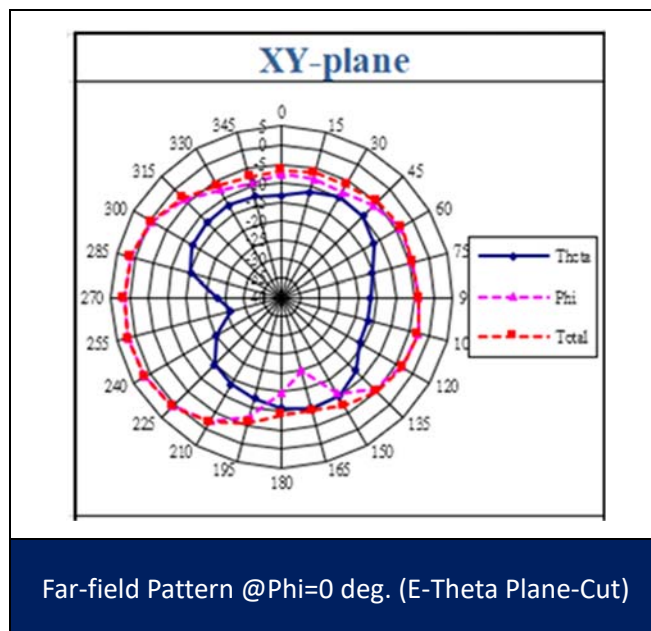
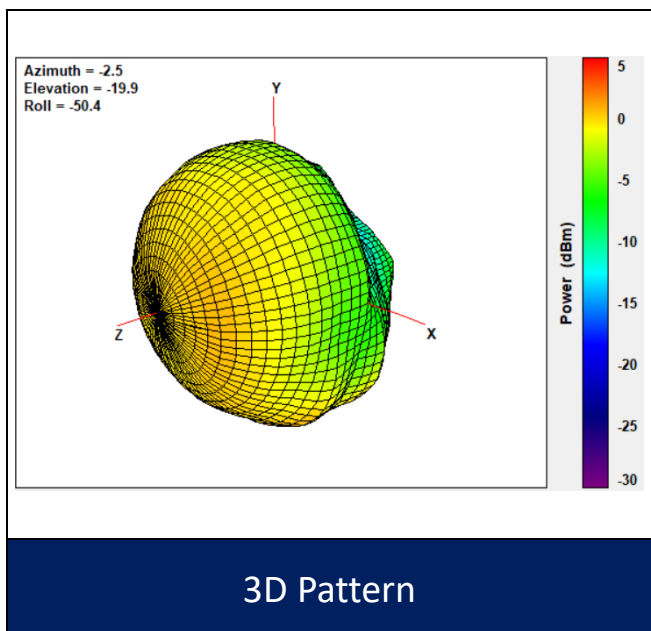
2.4/5G Ant 2

5600MHz



Project Name : coda5834	Author : Wippen	File Name : 3930000306E6(F-0Q-49-6003-001-00)
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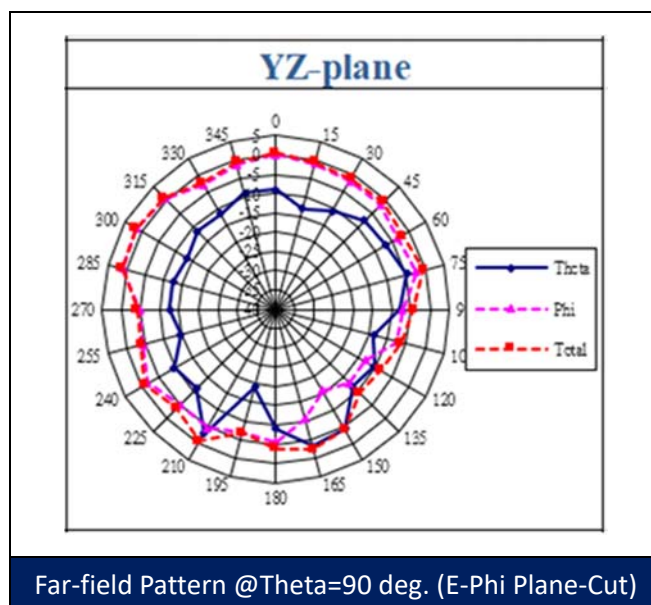
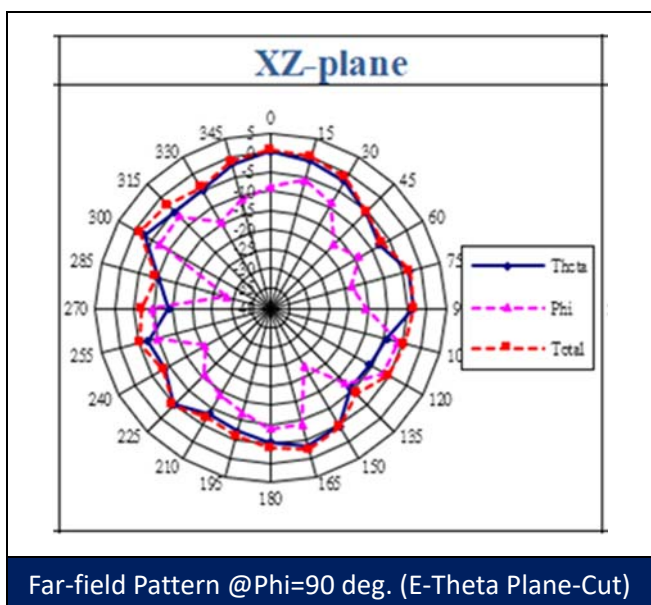
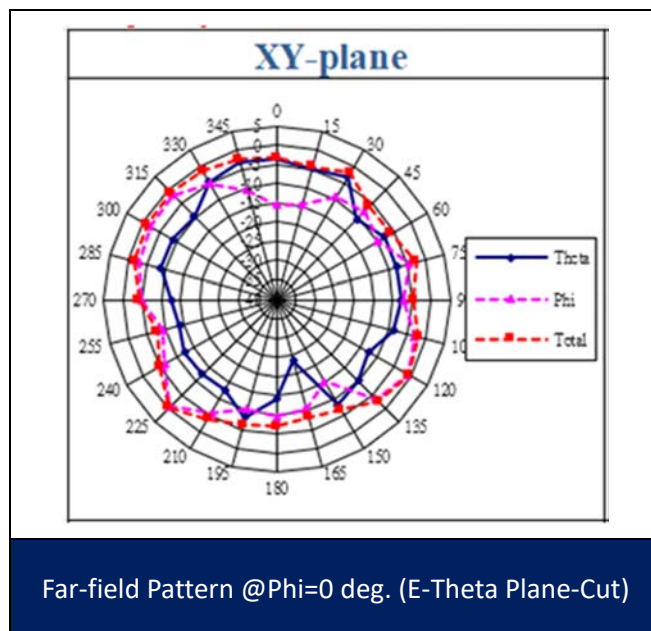
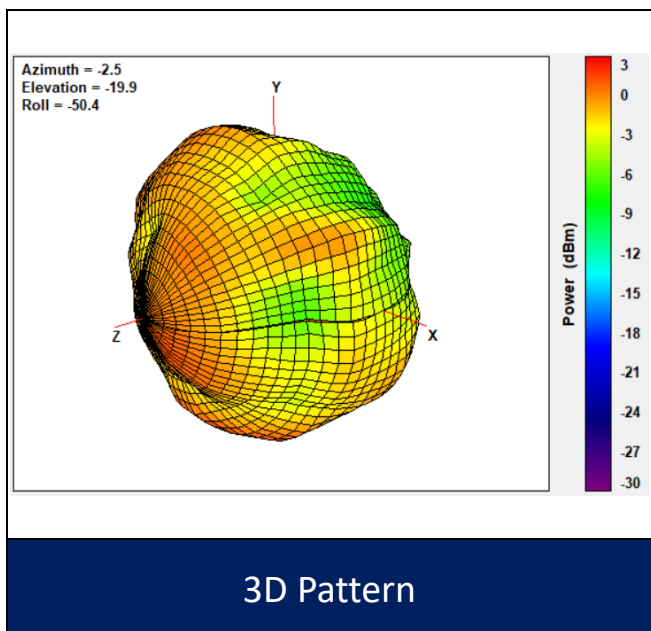
2.4/5G Ant 3 2450MHz



Project Name : coda5834	Author : Wippen	File Name : 3930000306E6(F-0Q-49-6003-001-00)
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2.4/5G Ant 3

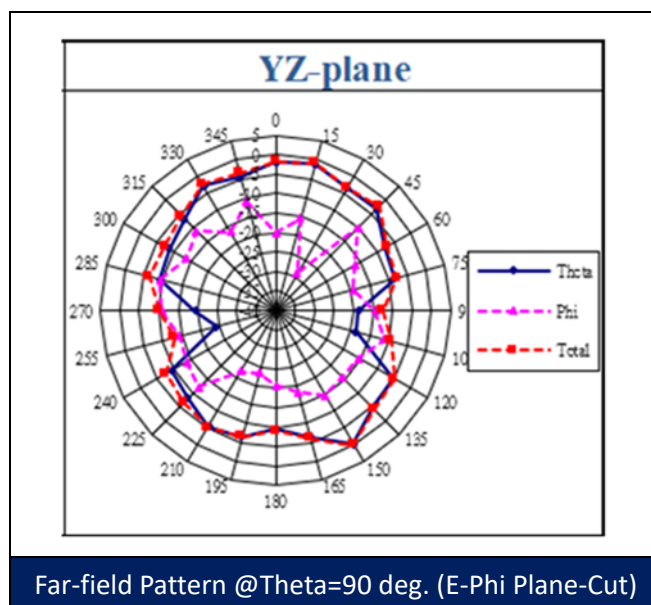
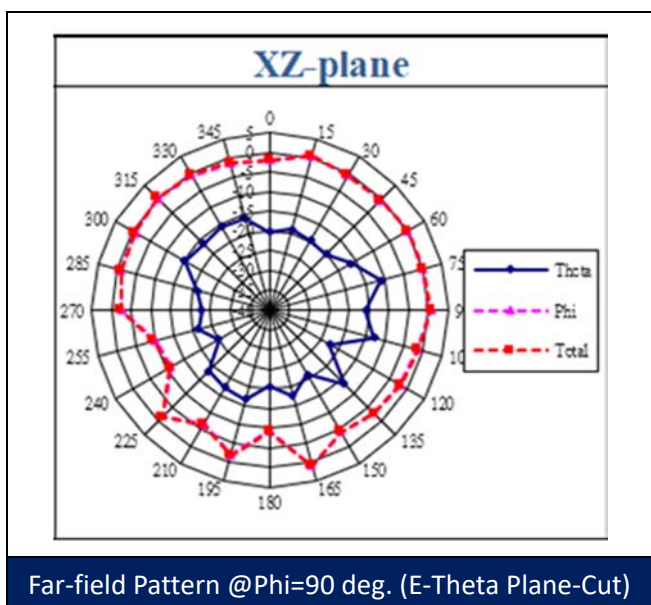
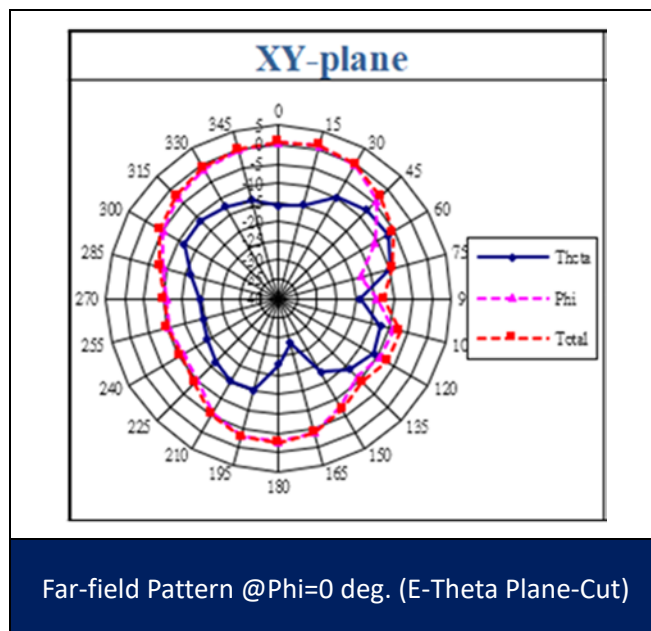
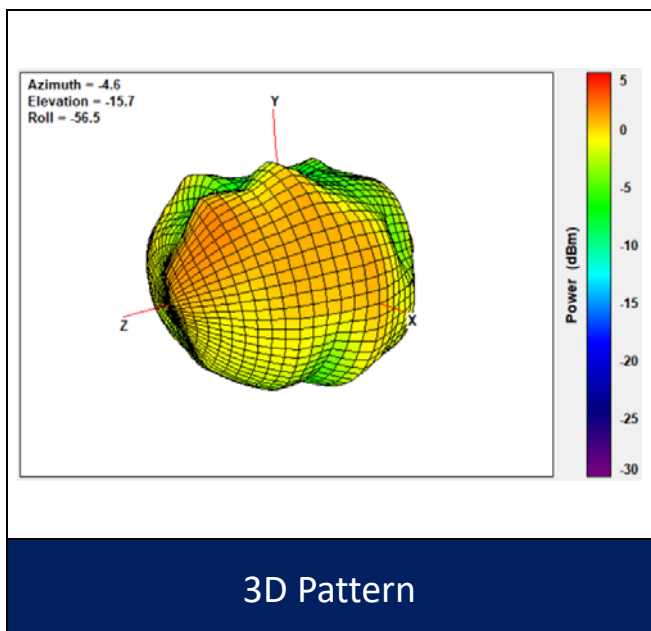
5600MHz



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2.4/5G Ant 4

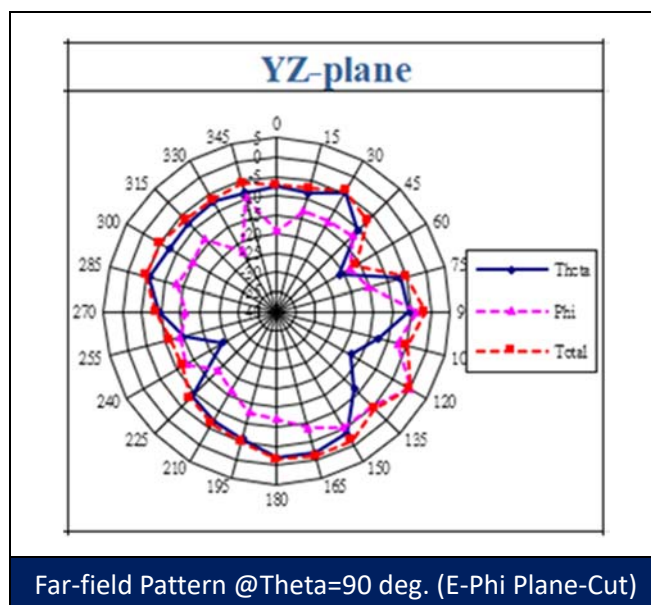
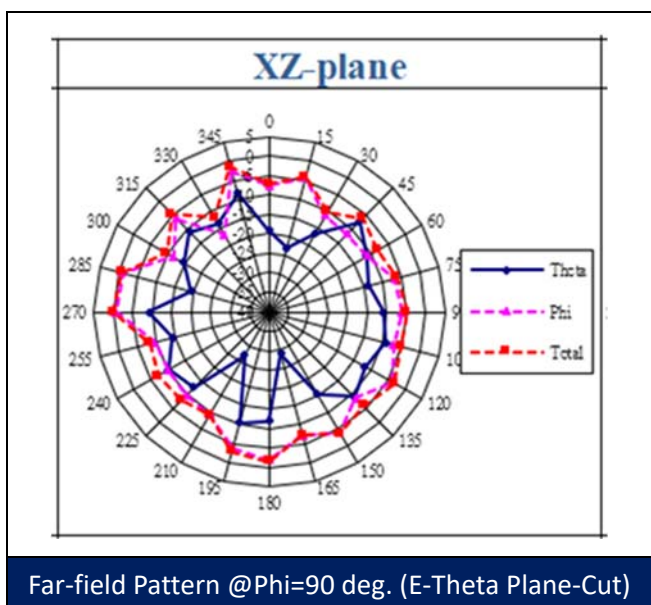
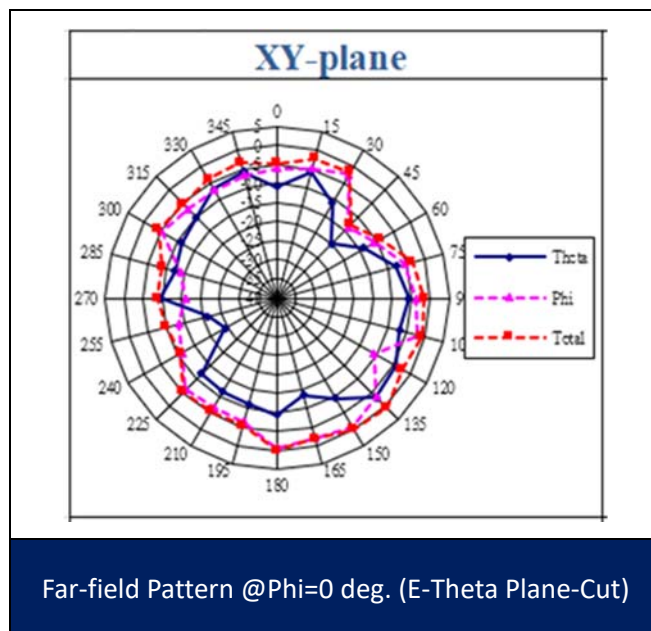
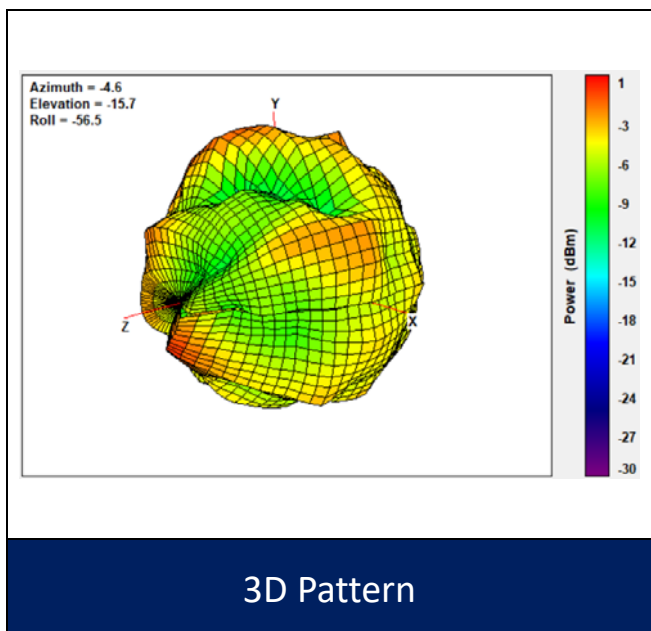
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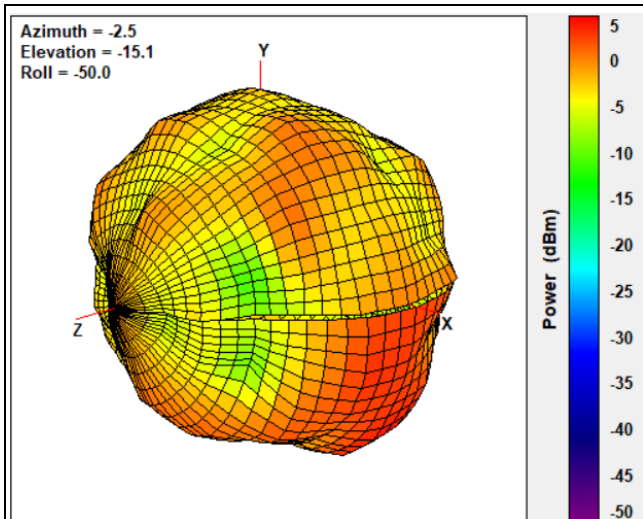
2.4/5G Ant 4

5600MHz

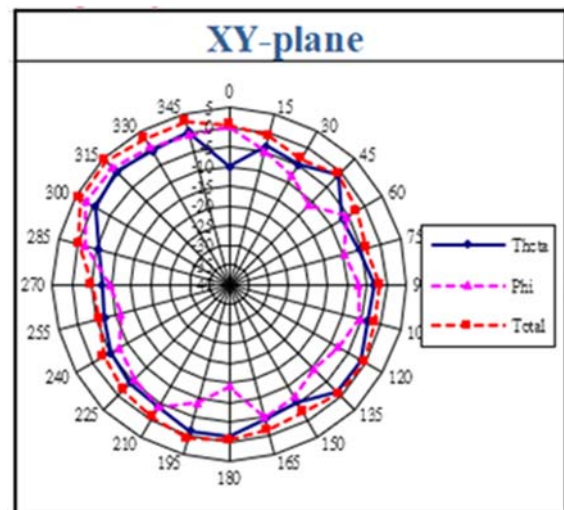


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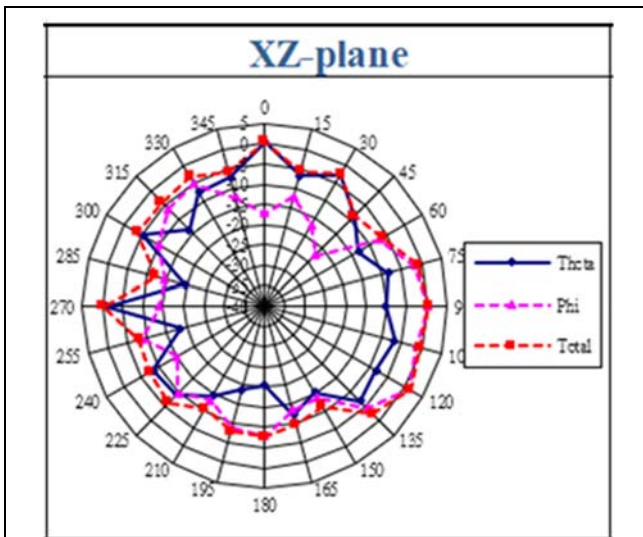
6G Ant 1
5925MHz



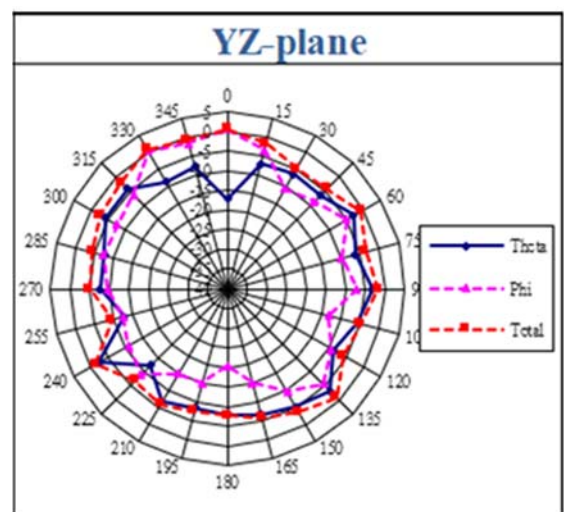
3D Pattern



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



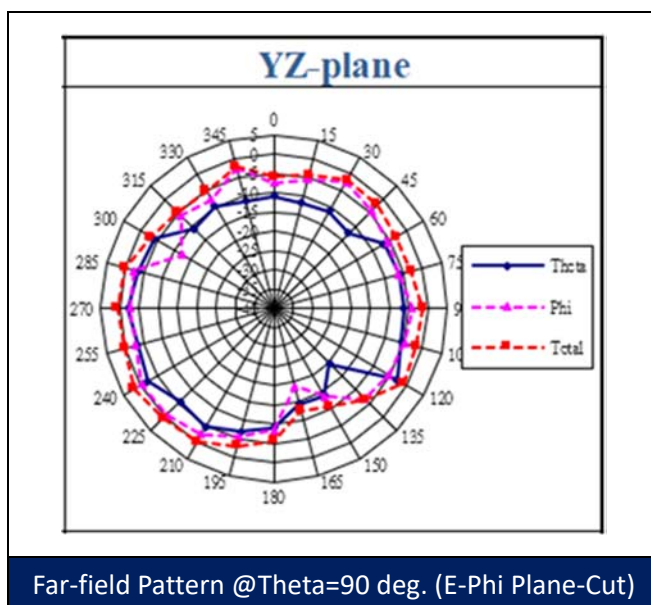
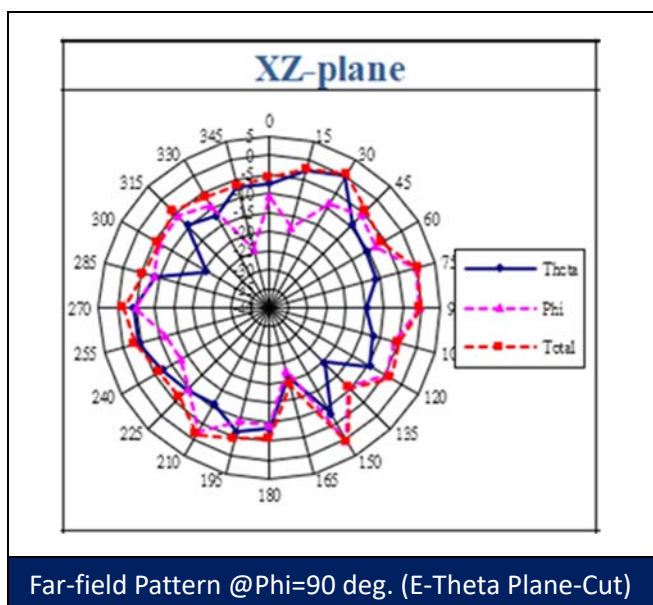
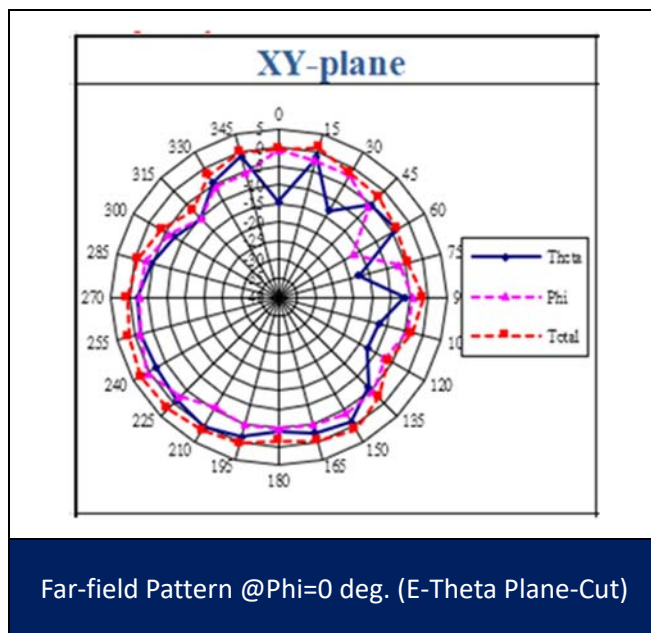
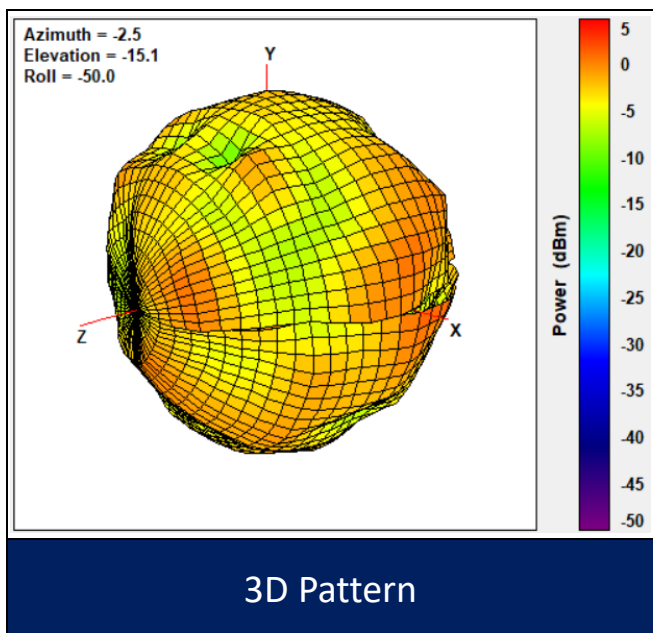
Far-field Pattern @Phi=90 deg. (E-Theta Plane-Cut)



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

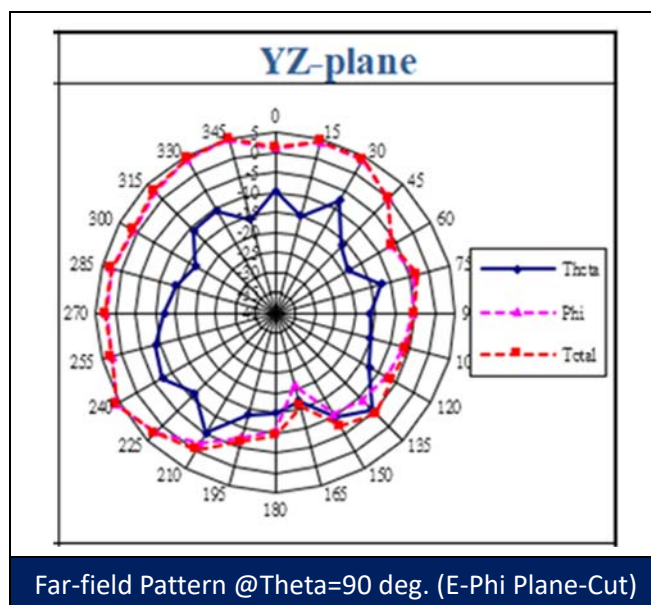
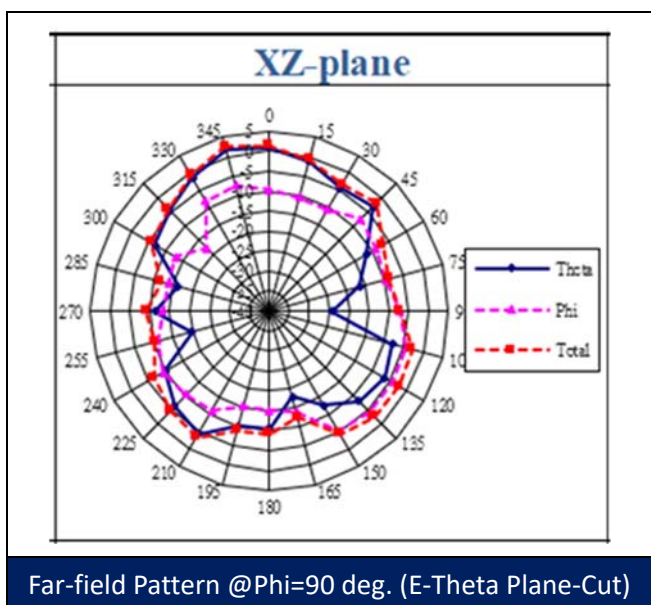
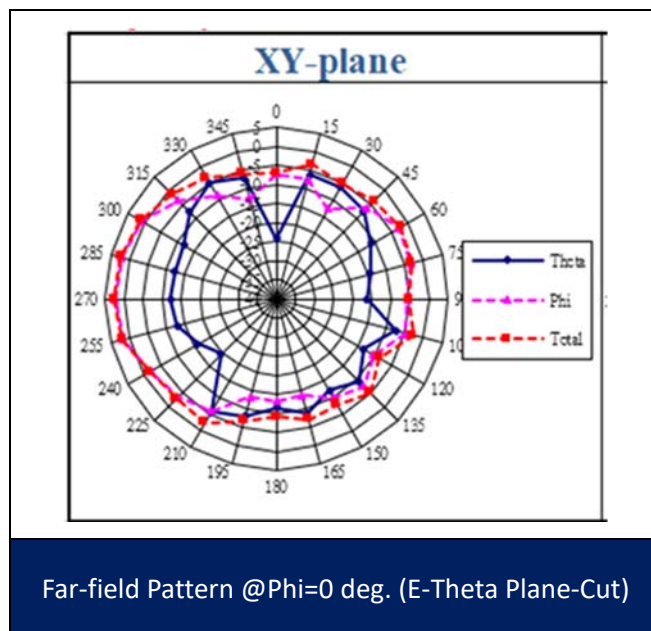
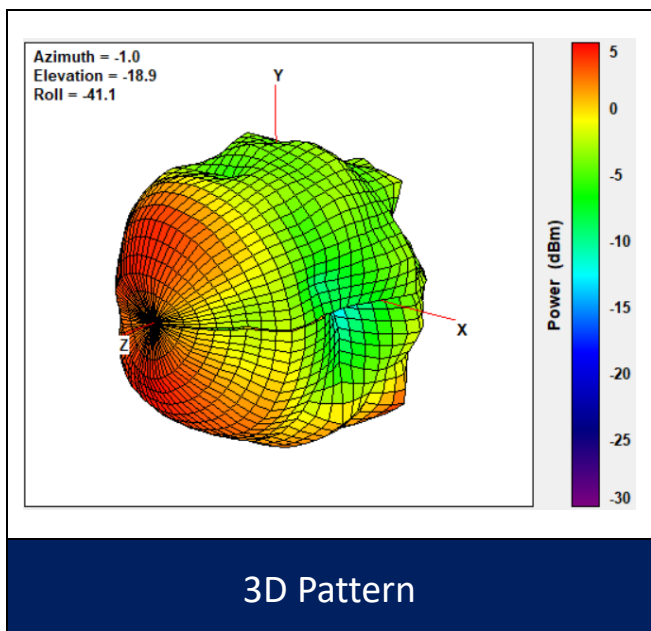
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6G Ant 1
7125MHz



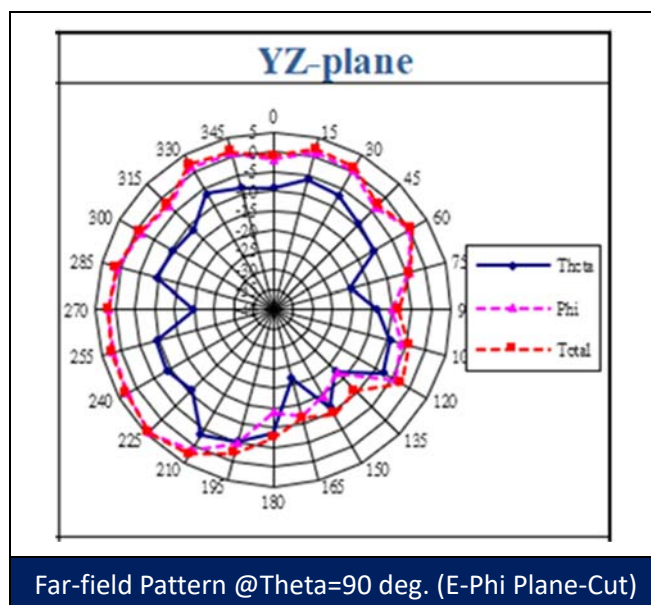
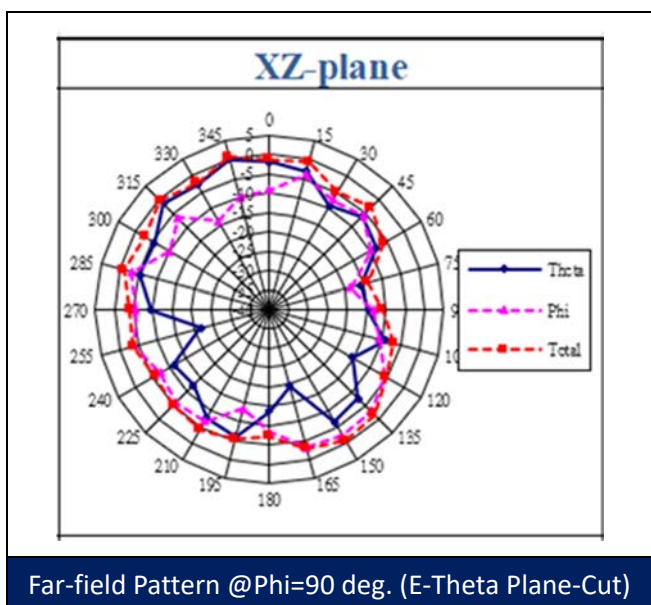
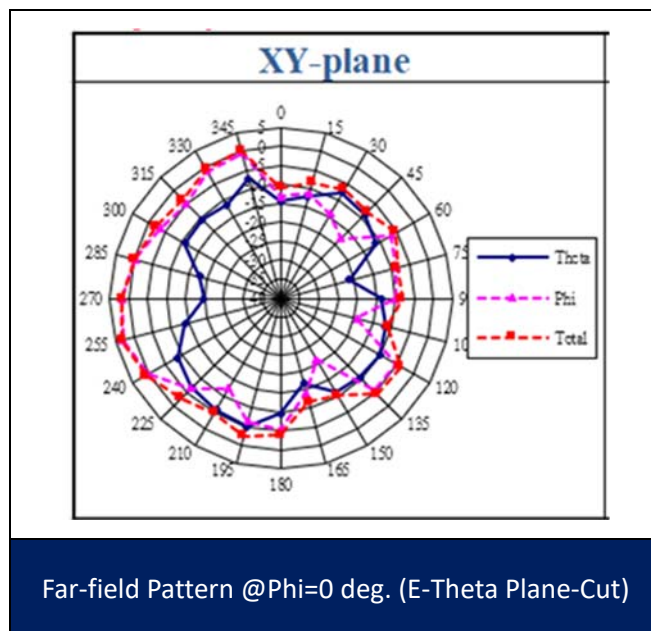
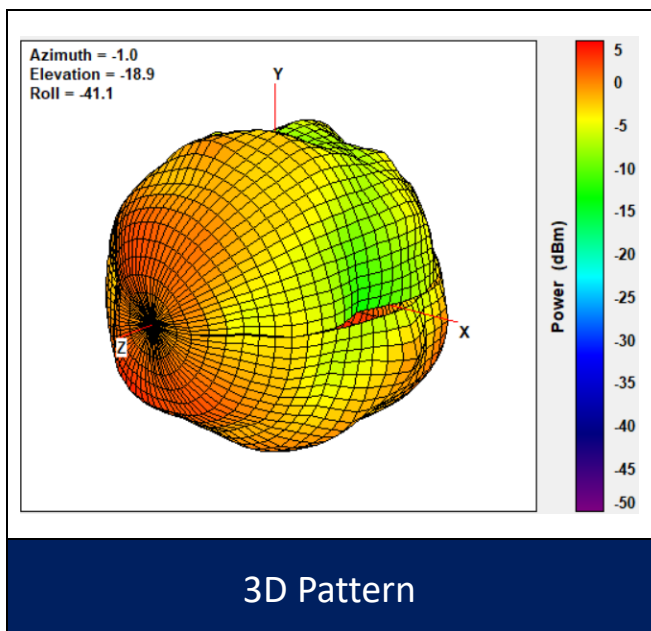
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6G Ant 2
5925MHz



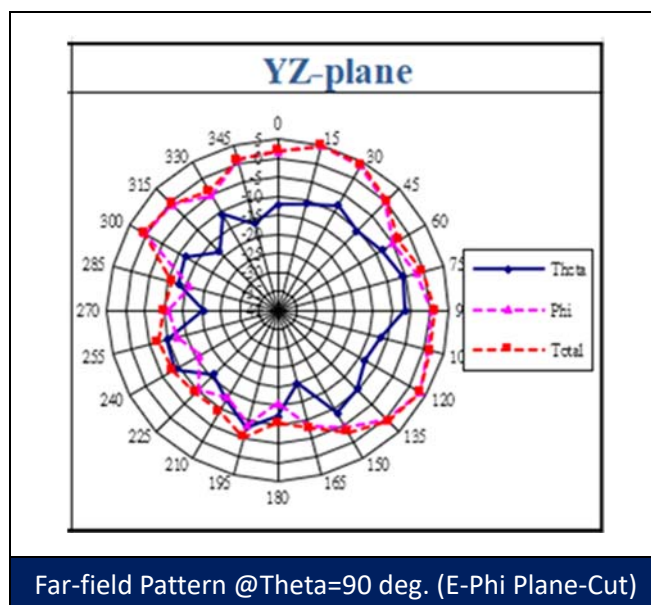
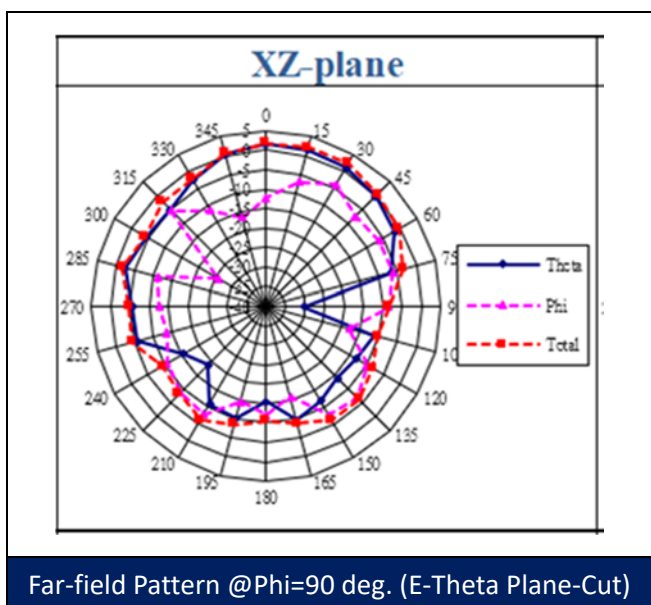
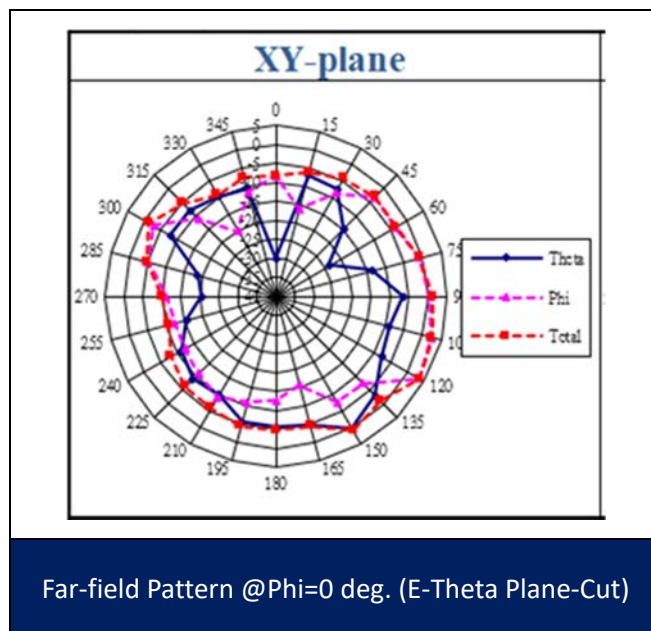
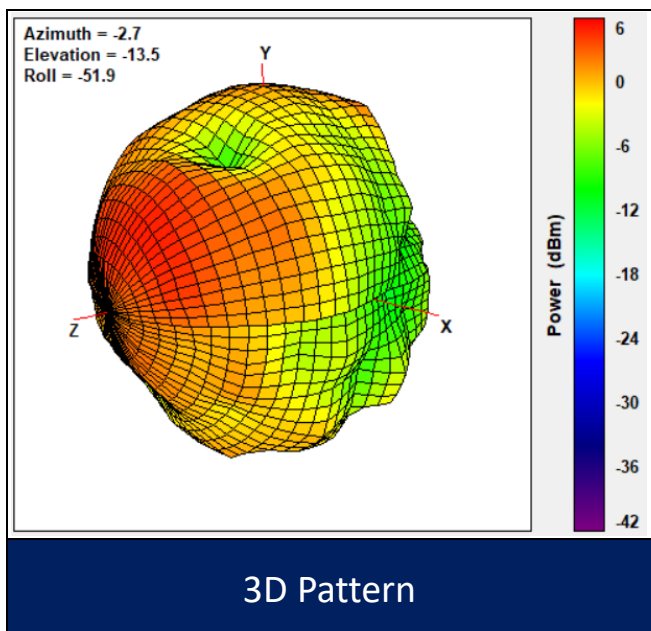
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6G Ant 2
7125MHz



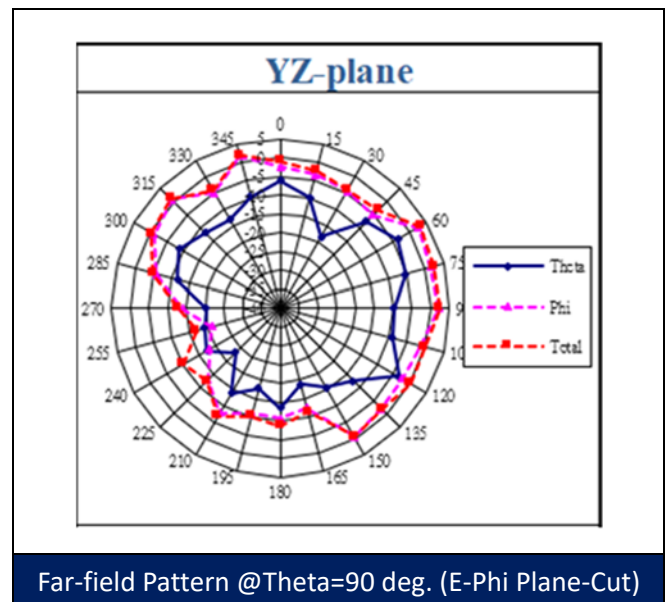
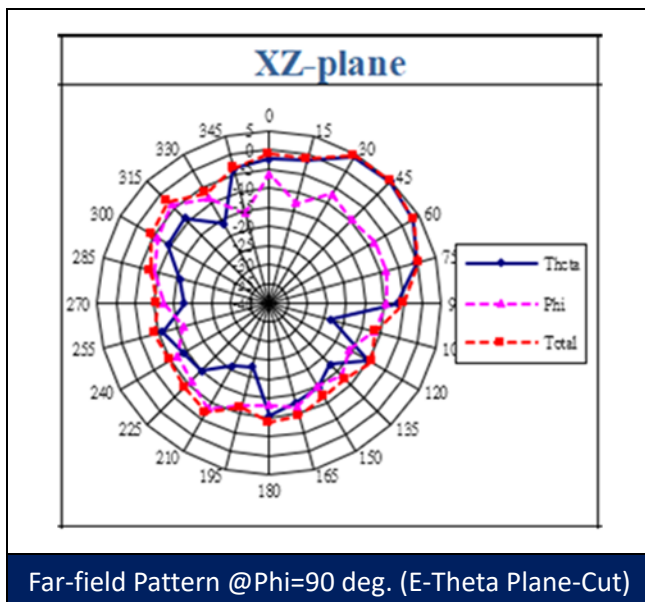
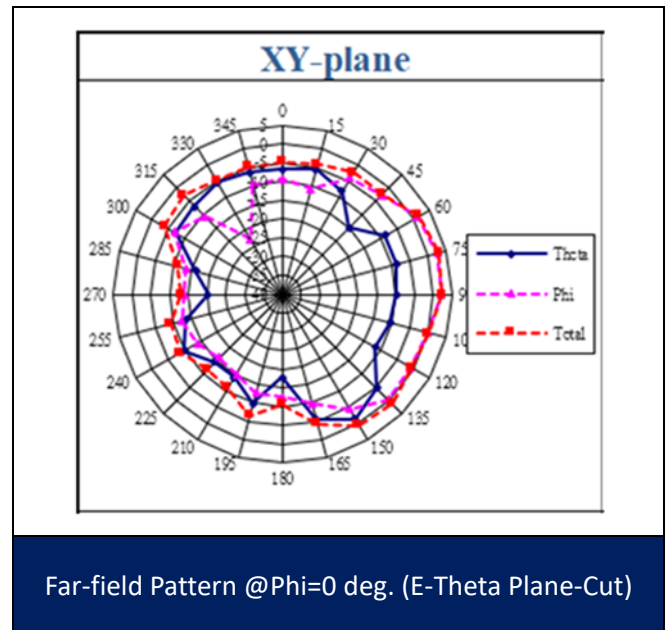
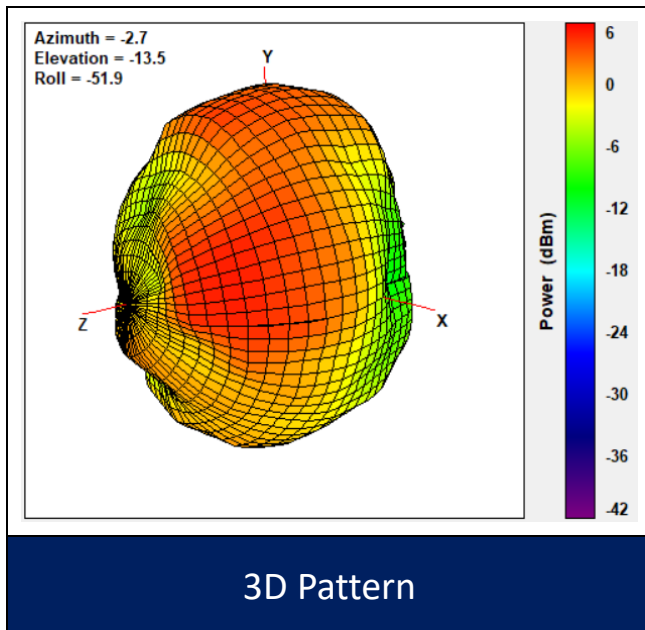
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6G Ant 3
5925MHz



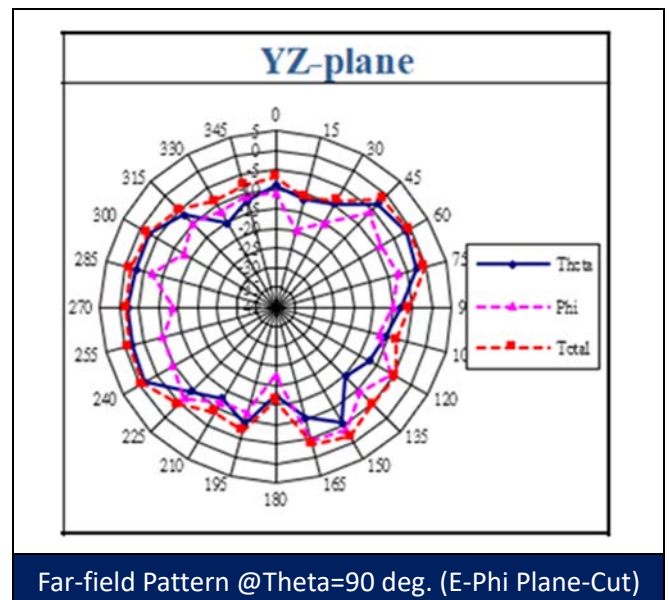
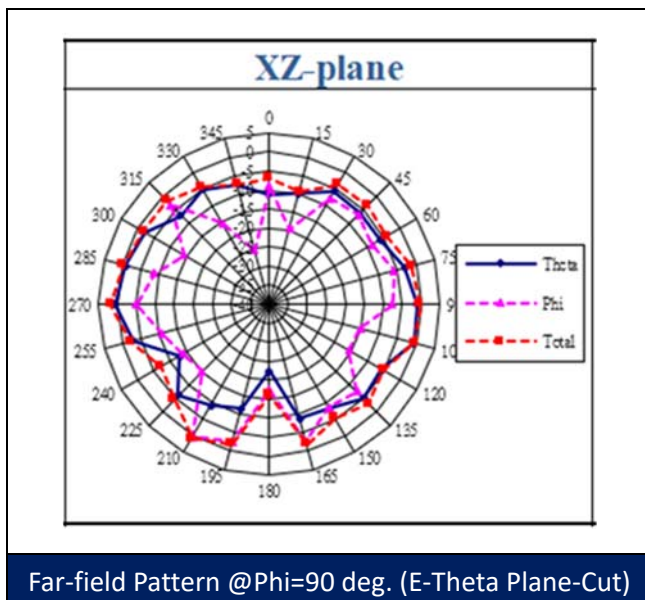
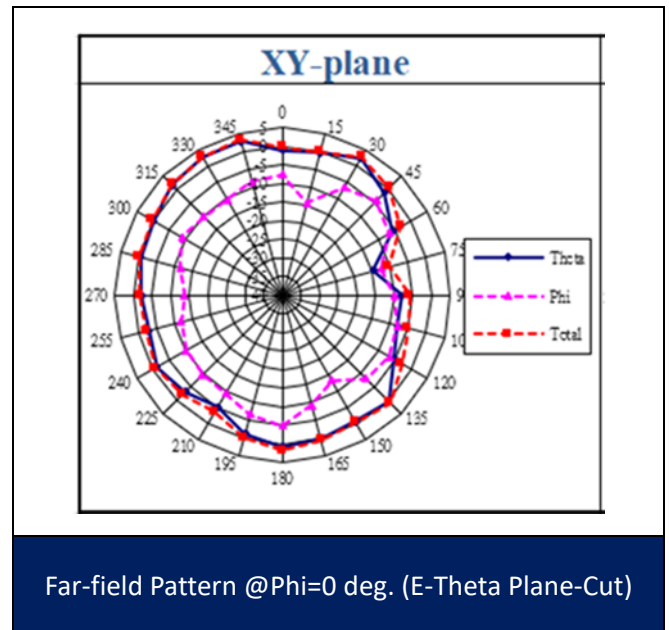
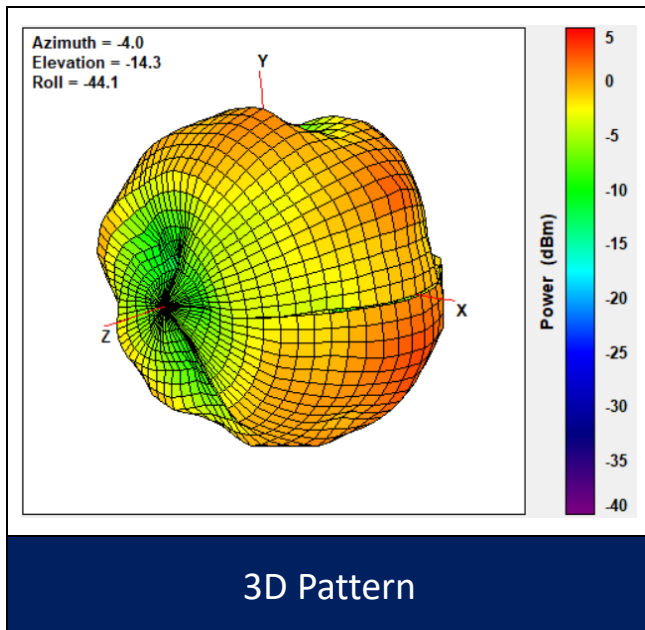
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6G Ant 3
7125MHz



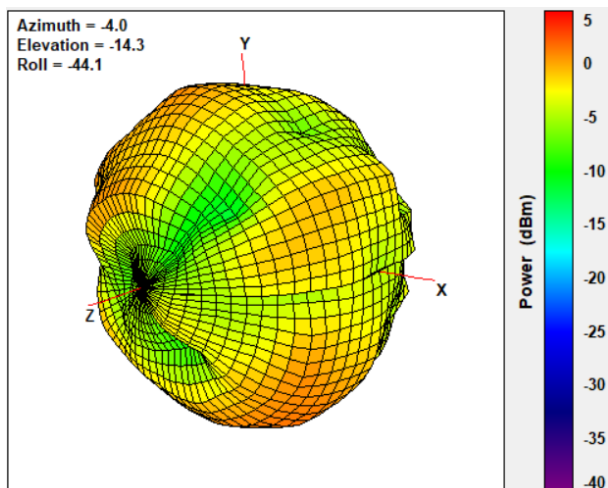
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6G Ant 4
5925MHz

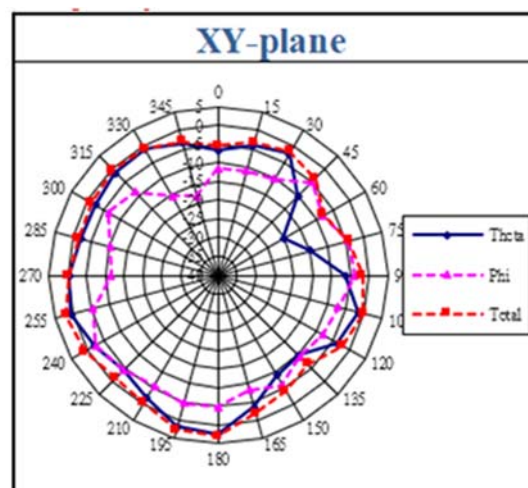


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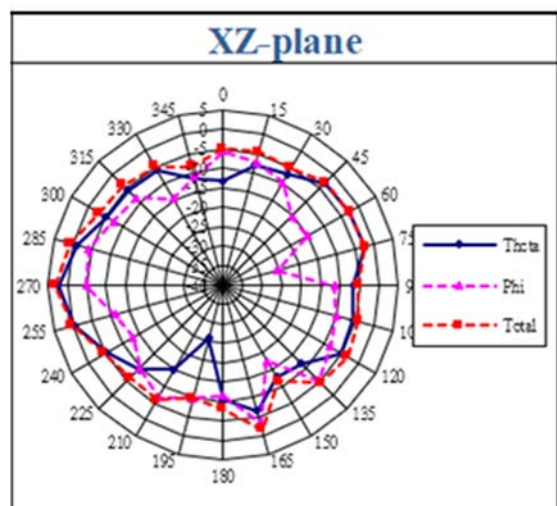
6G Ant 4
7125MHz



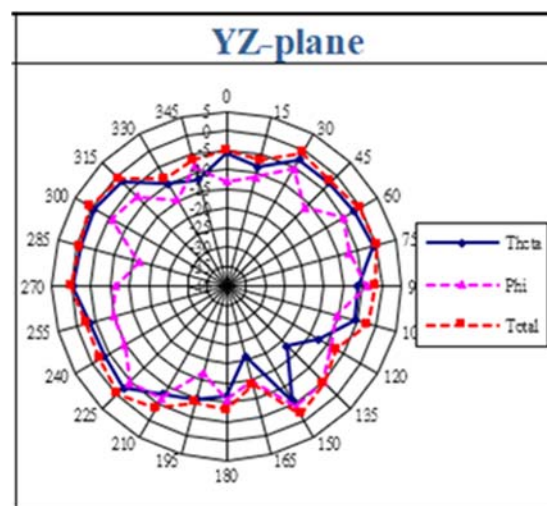
3D Pattern



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



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

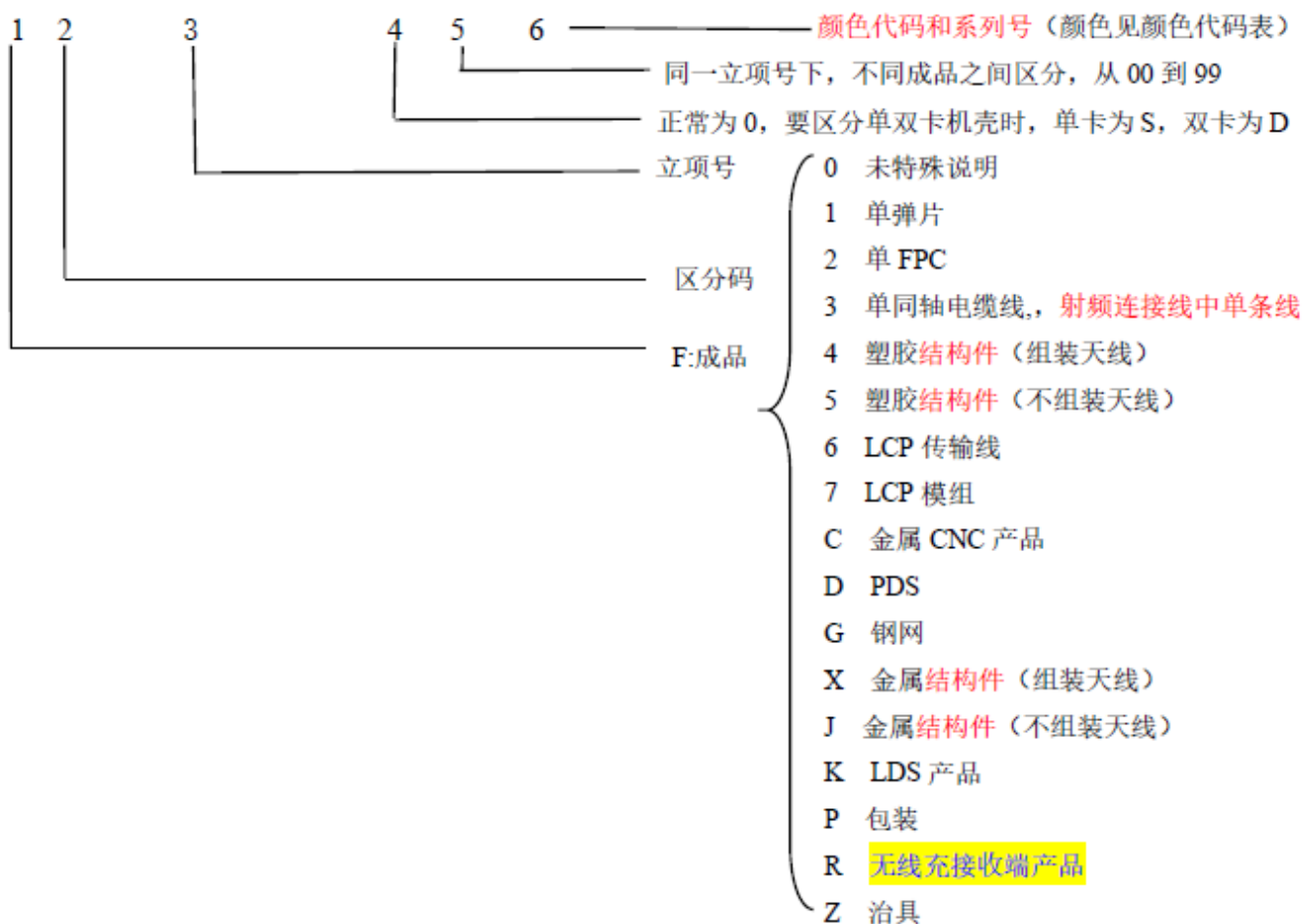


Far-field Pattern @Theta=90 deg. (E-Phi Plane-Cut)

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Coding principles

□-□ □-□□-□□□□-□ □□-□□



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The details of the antenna are as follows :

1. Model :

2. Quantity : 10

3. Results :

Name	Failure Rate	MTBF
F-0Q-49-6003-001-00	3678.2	31.0353 Years

*Fits (Failure Unit)=Failure Per Hour(10^9)

Failure Rate(λ)= 1×10^9 Hours (FITs)

MTBF= $1/\lambda$

Bellcore Method I – Case 1 Equations

Device Steady – State Failure rate = λ_{SSi}

Where:

$\lambda_{SSi} = \lambda_{Gi} \pi_{Qi} \pi_{Si} \pi_{Ti}$

λ_{Gi} =Generic steady-state failure rate for the ith device

π_{Ti} =Temperature Factor based on 40°C temperature(value of 1.0)

π_{Si} =Stress Factor =based on 50% stress(value of 1.0)

π_{Qi} =Quality Factor for the ith device

Part Number	Description	Q'ty	λ_{Gi}	π_{Ti}	π_{Si}	π_{Qi}	λ_{SSi}	MTBF
	F-0Q-49-6003-001-00	1	3678.2	1	1	1	3678.2	31.0353 Years

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5	SGS of Holder	63
6	SGS of Cable	69
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