W817

Antenna Passive Test Report

(6G_Pifa / GNSS_Ceramic)

6nd Jan. , 2025

CONFIDENTIAL

Outlines

- Test Purpose and Test Item
- Test Environment
- Device Under Test
- Antenna placement
- Performance Summary
- Return Loss
- Isolation
- Antenna 3D Radiation Pattern
- Antenna 2D Radiation Pattern
- Antenna Efficiency & Peak Gain

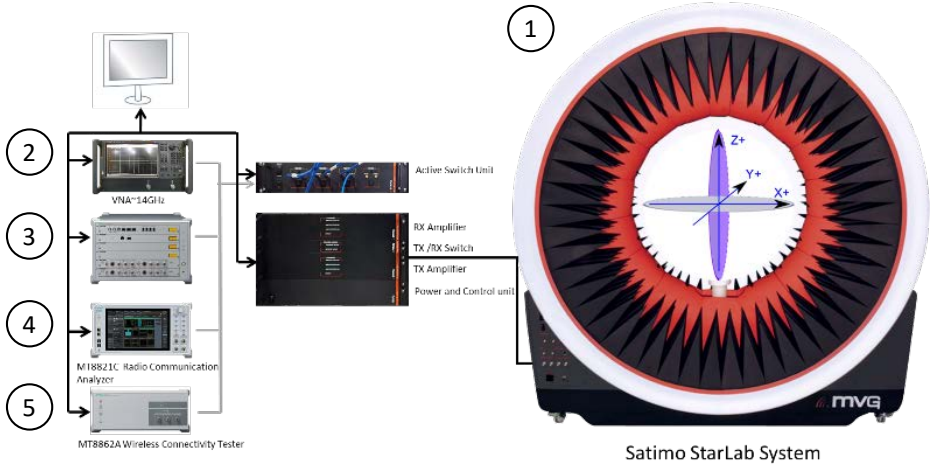
Test Purpose & Test Item

- Test Purpose: Passive testing for Efficiency / Peak Gain / Radiation Pattern
- Device Under Test: (DVT Unit)

  Model: FAP-231K

Testing Environment

MVG 3D Chamber-SATIMO STARLAB Polarization diagram



Satimo StarLab System

ITEM	DESCRIPTION	BRAND / Part number	CALIBRATION DATE
1	StarLab System	MVG	21/Feb/2024
2	Vector Network Analyzer	Keysight 5080B	01/Jan/2024
3	5G Radio Communication Station	Anritsu MT8000A	16/Dec/2024
4	4G Radio Communication Analyzer	MT8821C	16/Dec/2024
5	Wireless Connectivity Tester	MT8862A	06/Dec/2024

Device Under Test

DUT inside Chamber

Manufacture	Grand-Tek Technology
Address	8F., No.233-2, Bao Ciao Rd., Hsin Dian Dist, New Taipei City, 23145 Taiwan

Brand Name	Model Name	Ant. Type	Connector
Grand-Tek	1034G00000500	PIFA	MHF I
Grand-Tek	1034G00000510	PIFA	MHF I
Grand-Tek	1033G00000220	PIFA	MHF I
Grand-Tek	103CG00000560	Alford Loop	MHF I
Grand-Tek	1039G00000050	PIFA	MHF I
Grand-Tek	1031G00000330	PATCH	MHF I

Total Antenna Quantity: 6

Test Setup:

A. Connect testing cable to 1 antenna port.

B. Connect terminator on the other ports

Follow sequence for the other ports.

ARC ANTs placement

- **Antenna Definition and Distribution**
  - **Antenna: 2x[2.4G/5G WiFi] + 2x[6G] + 1x[BLE] +1x [GNSS]**

Manufacture	Grand-Tek Technology
Address	8F., No.233-2, Bao Ciao Rd., Hsin Dian Dist, New Taipei City, 23145 Taiwan

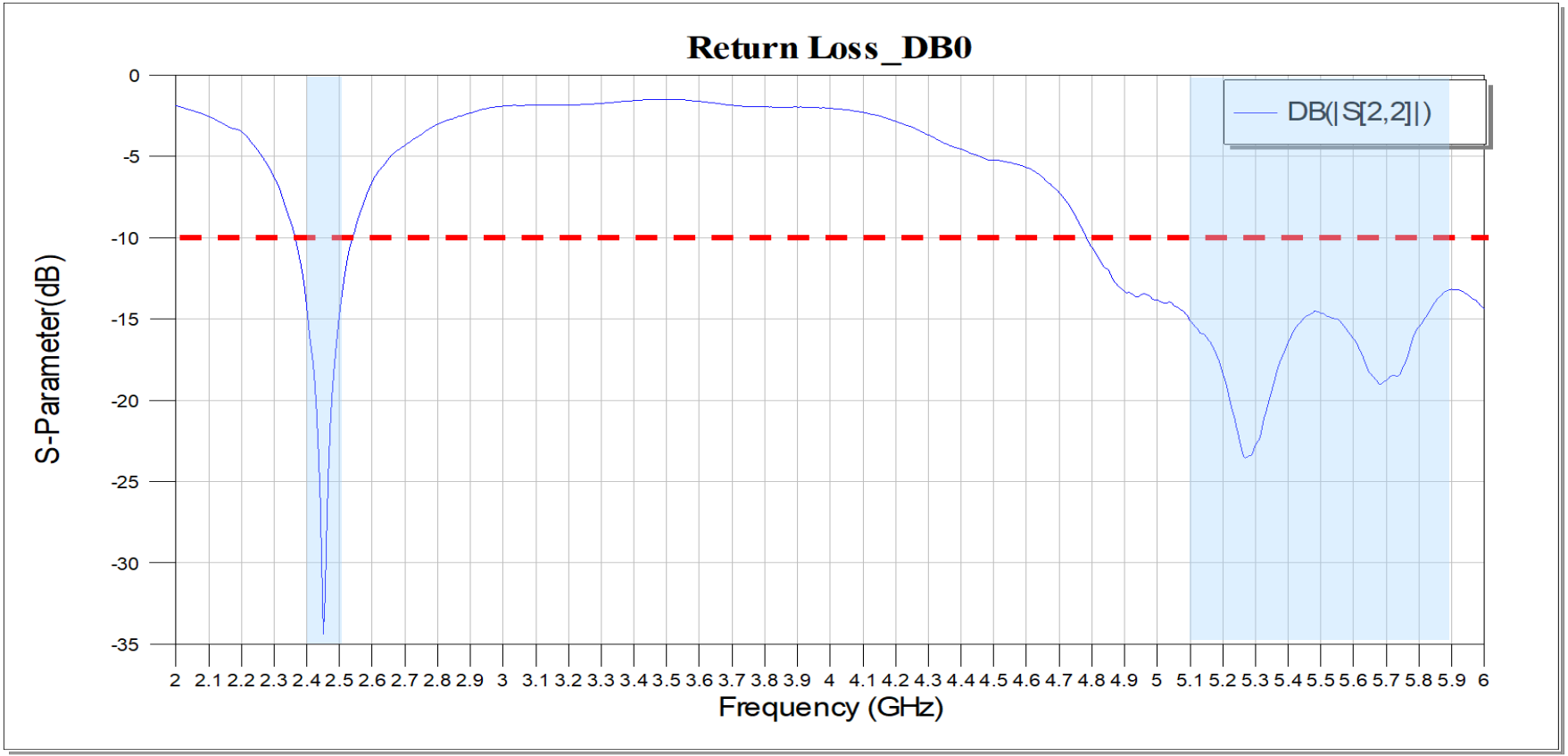
Antenna	Frequency(MHz)	1.37 low loss cable length(mm)
1034G00000500	2400~2500/5100~5900 MHz	190, red
1034G00000510	2400~2500/5100~5900 MHz	124, yellow
1033G00000220	5900~7350 MHz	175, black
103CG00000560	5900~7350 MHz	138, blue
1039G00000050	2400~2500 MHz	220,green
1034G00000330	1575~1602 MHz	105, gray

Antenna Performance Summary

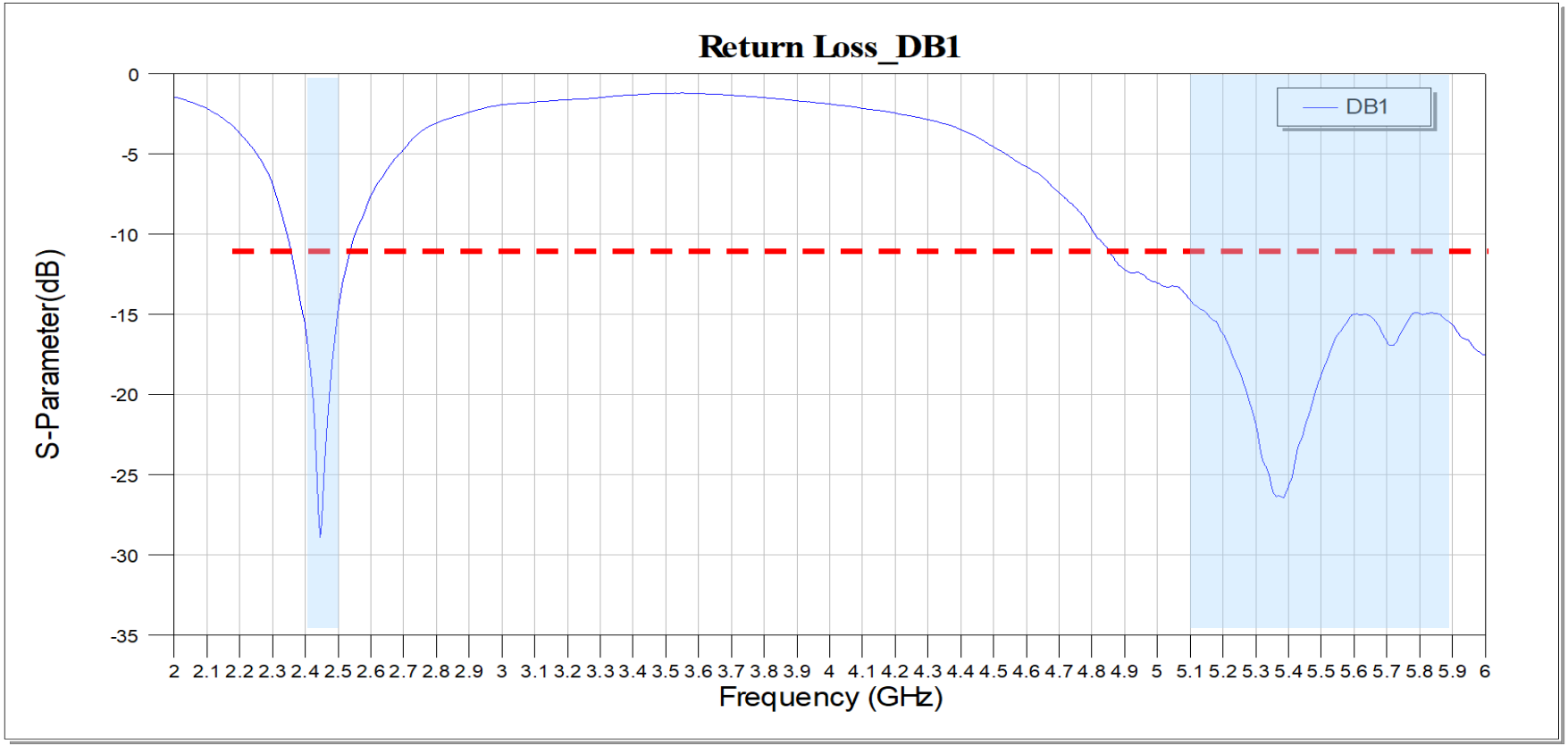
Isolation Summary

	1033G00000220	1034G00000500	103CG00000560	1034G00000510	1039G00000050	1031G00000330
1033G00000220		31.9	39.8	28.2	21.4	31
1034G00000500			32.1	25.4	21.1	26.0
103CG00000560				39	32.5	30.7
1034G00000510					21.1	24.5
1039G00000050						23.1
1031G00000330						

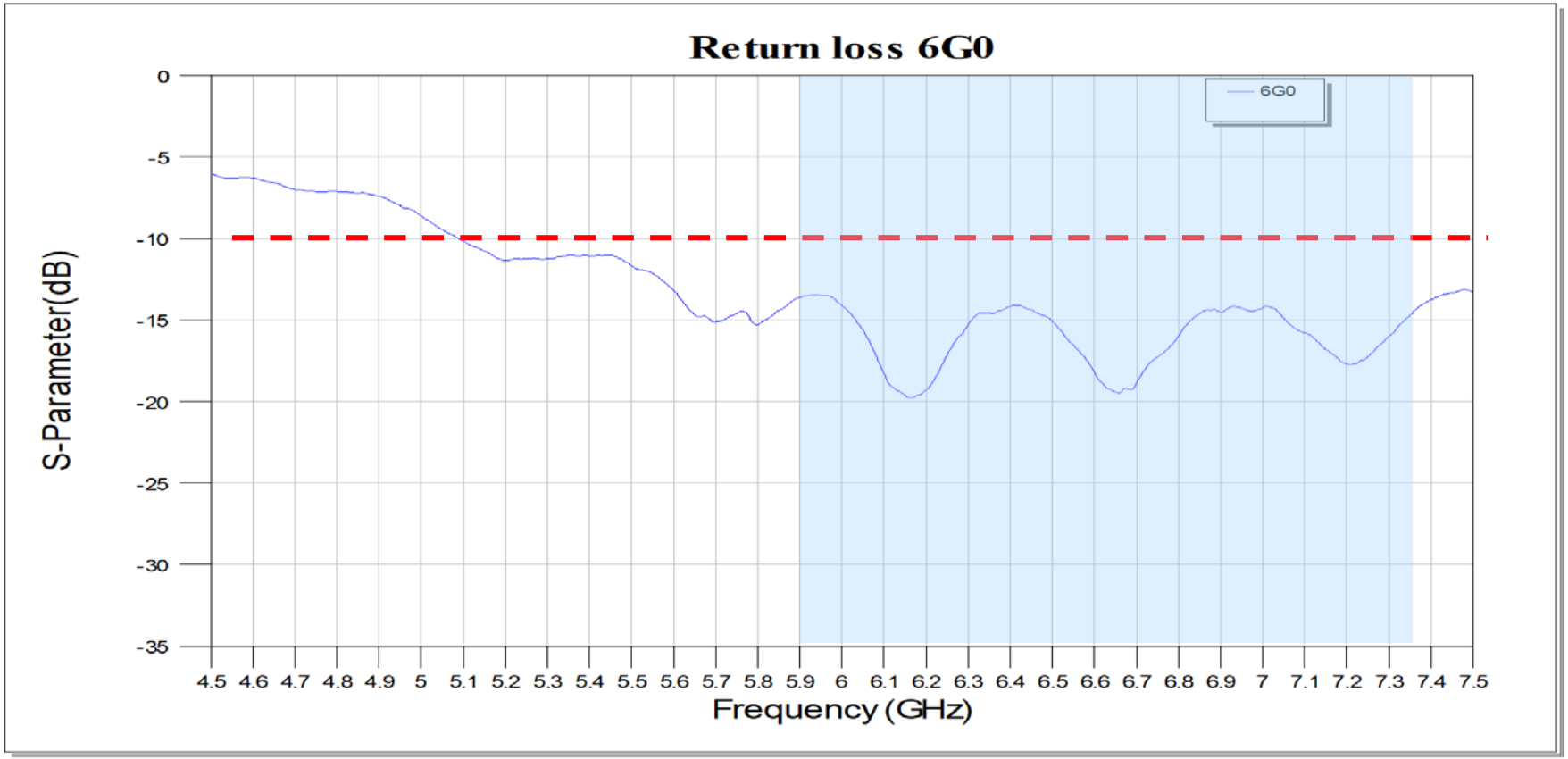
ARC ANTs design_return loss -1034G00000500



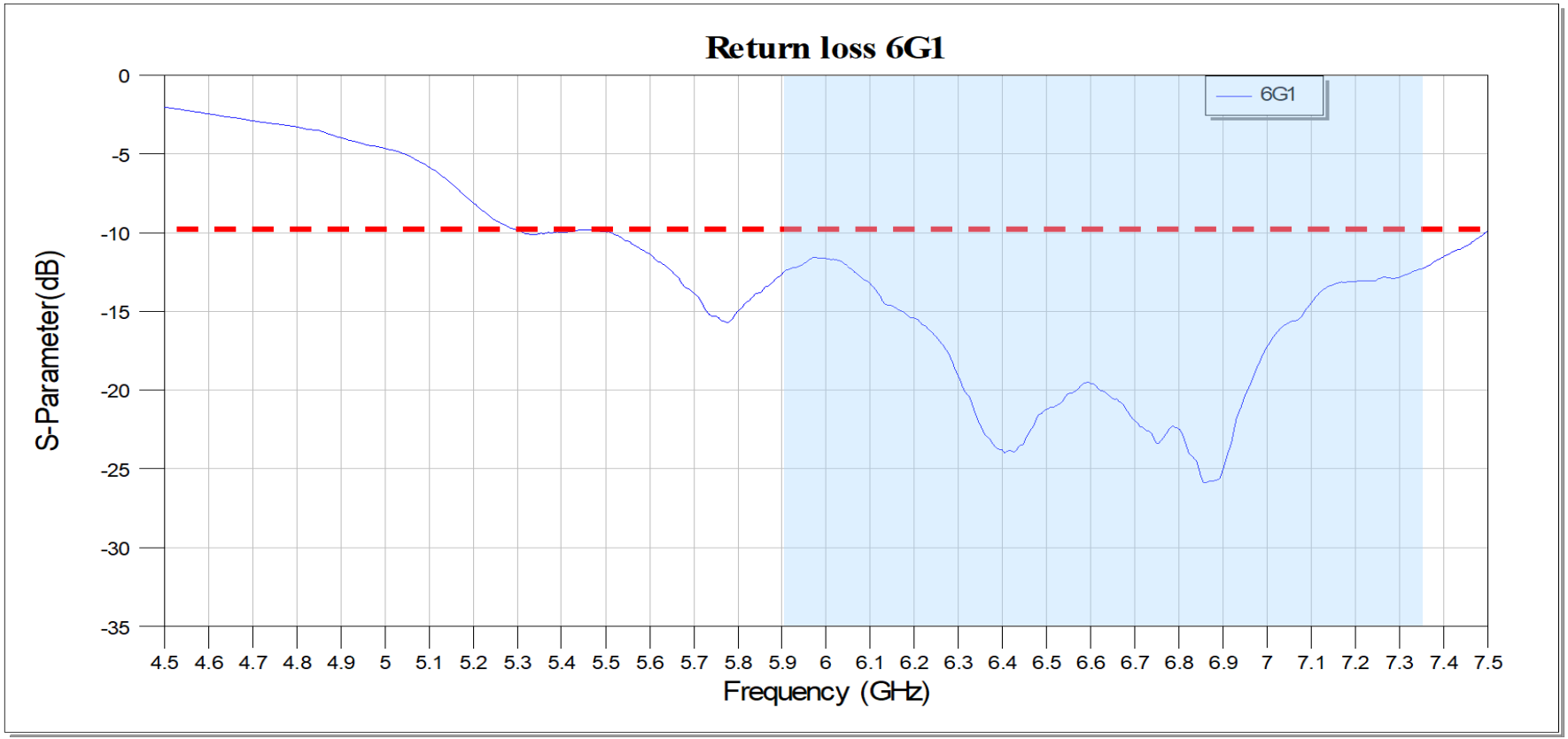
ARC ANTs design_return loss -1034G00000510



ARC ANTs design_return loss -1033G00000220



ARC ANTs design_return loss -103CG00000560



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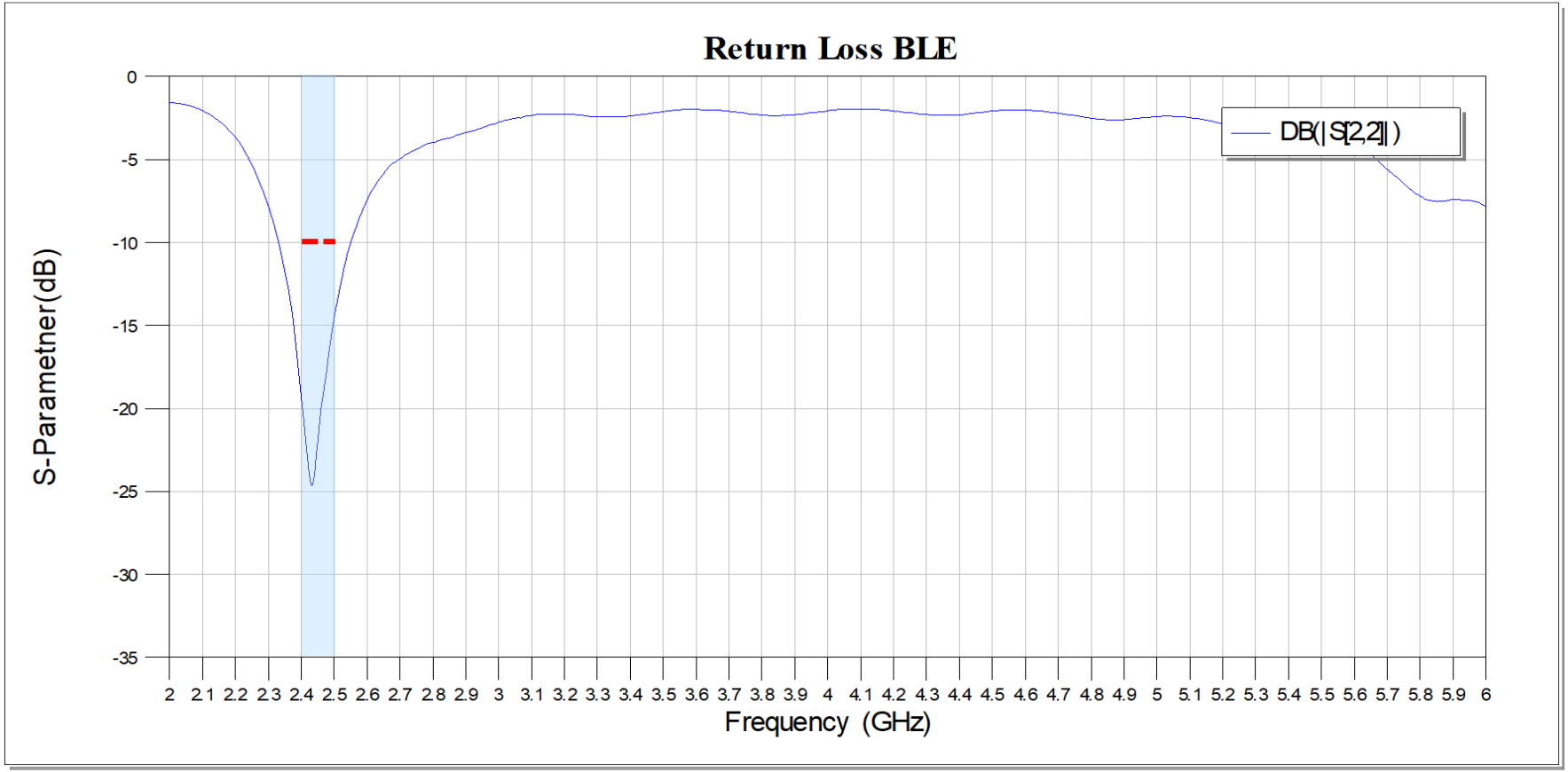
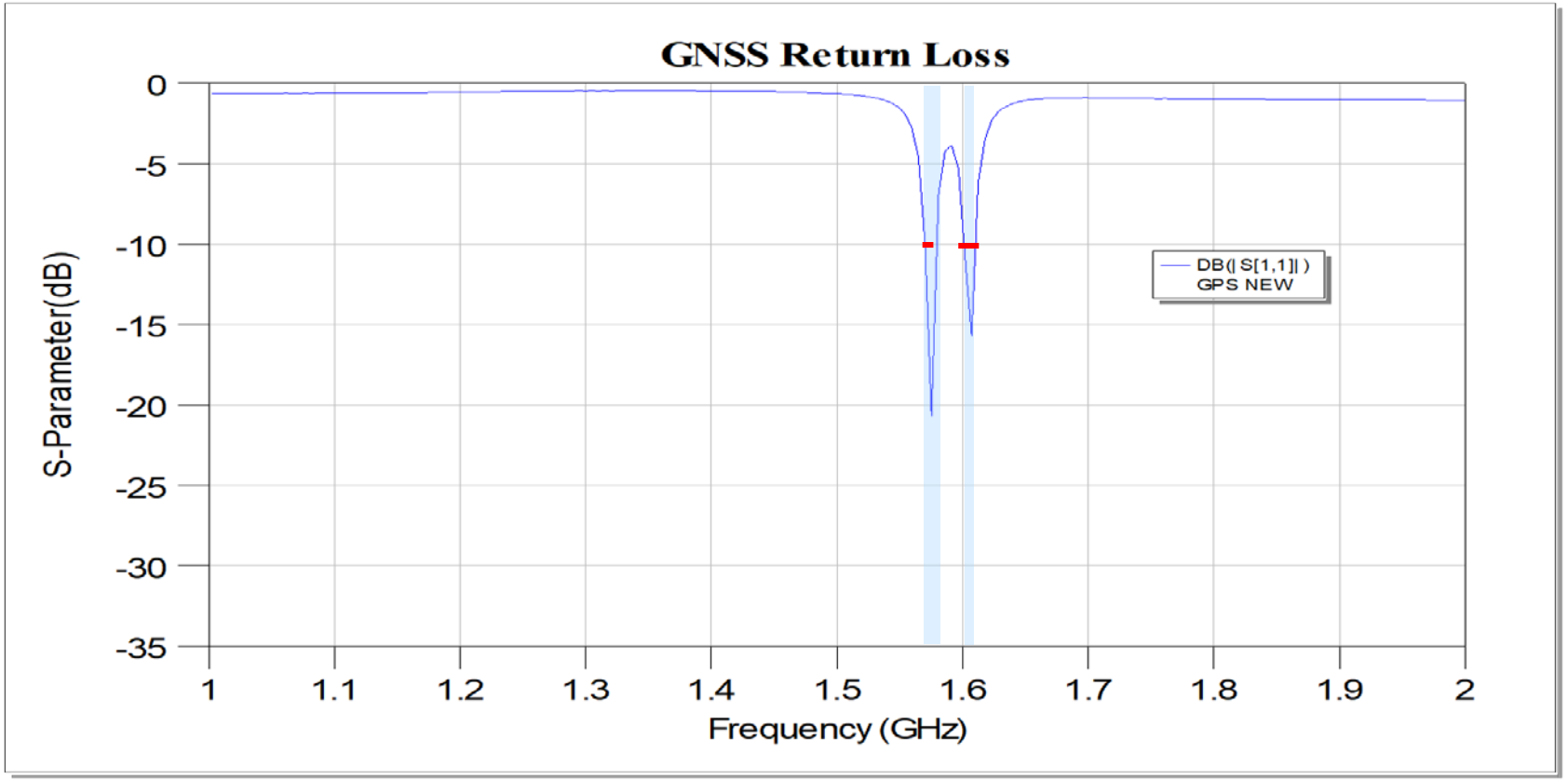
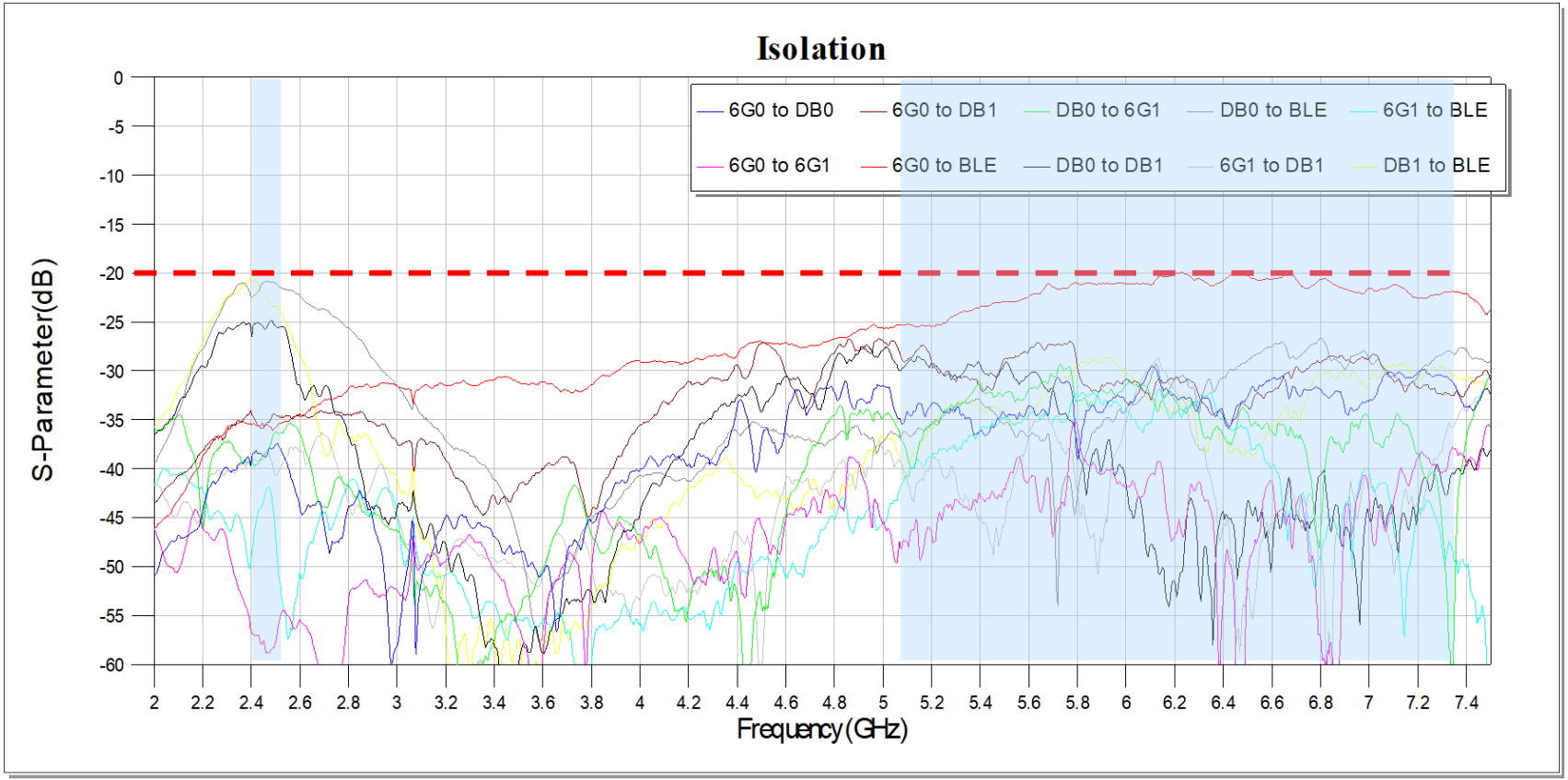


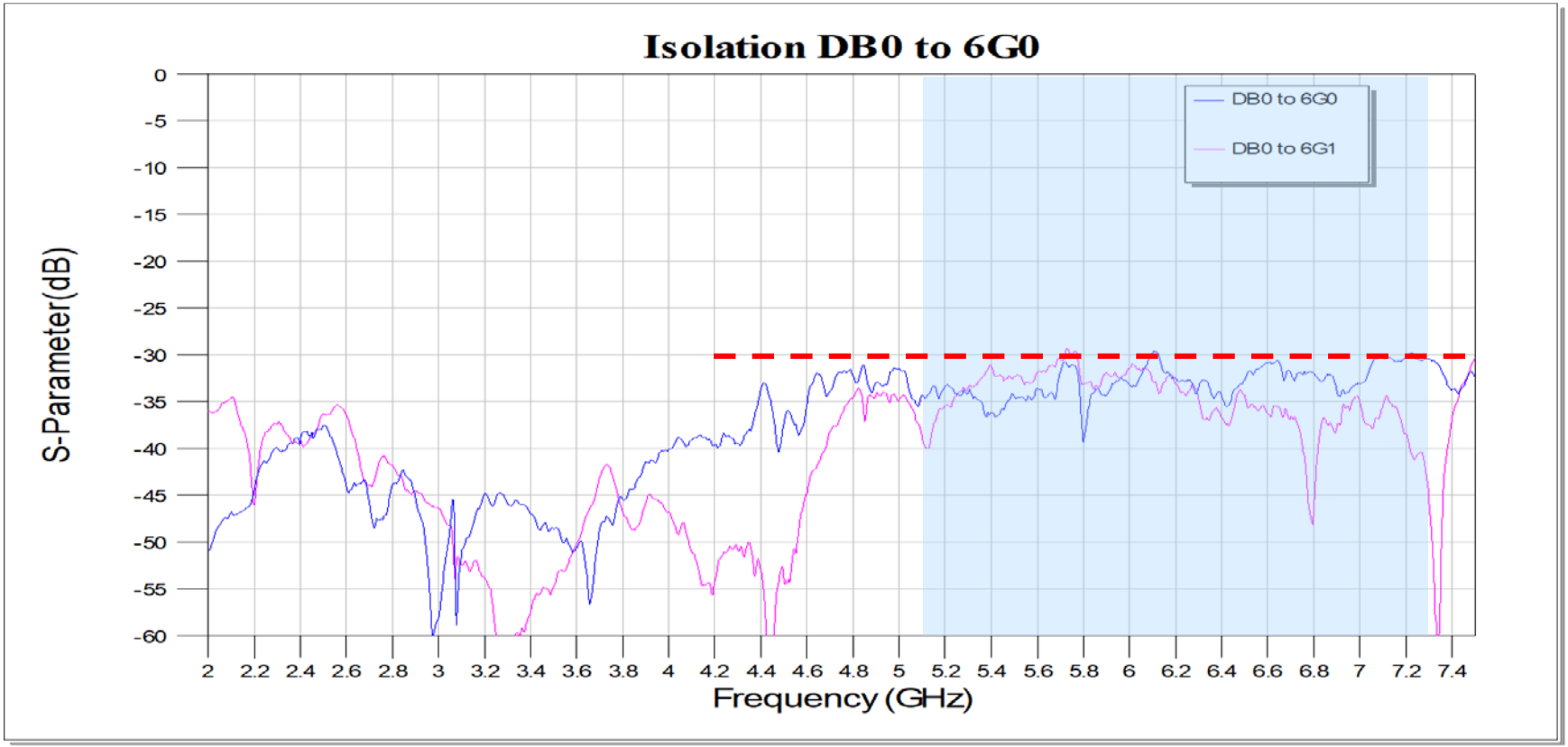
ARC ANTs design_return loss -1031G00000330



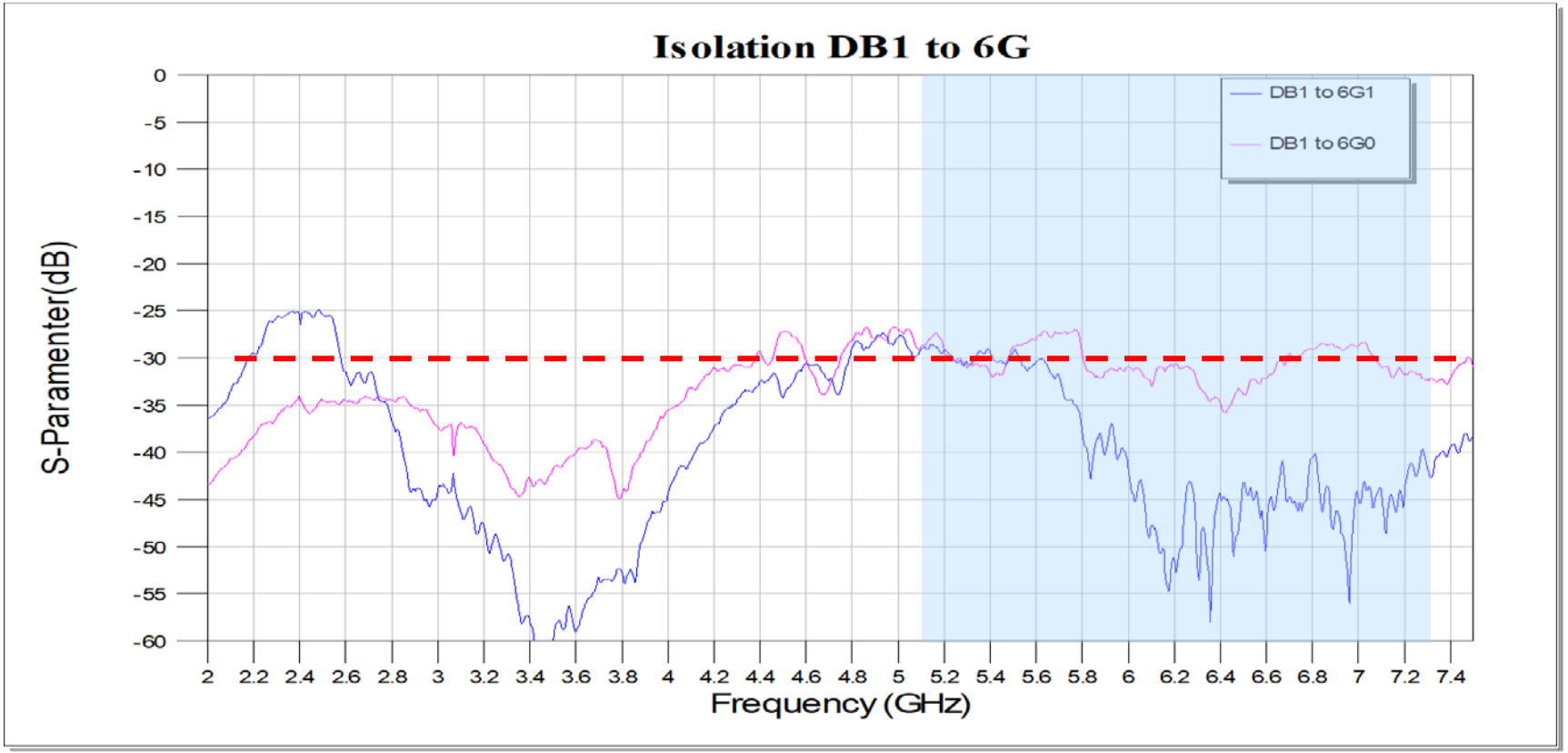
ARC ANTs design_isolation_ALL



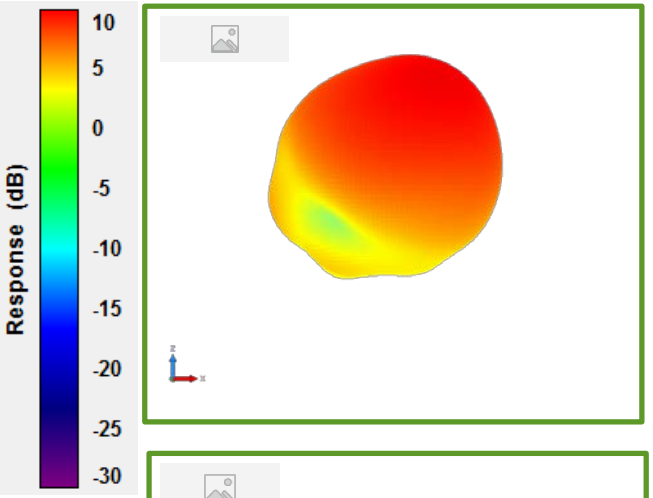
ARC ANTs design_isolation_1034G00000500 to 6G

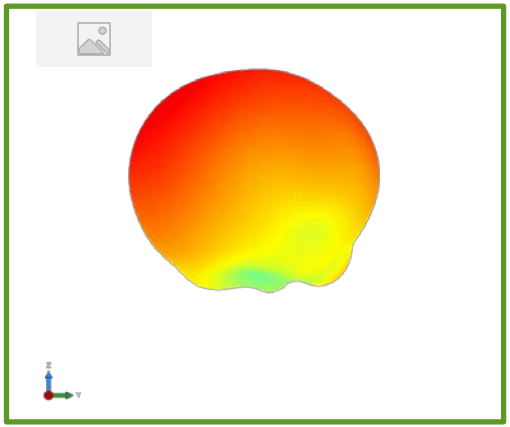


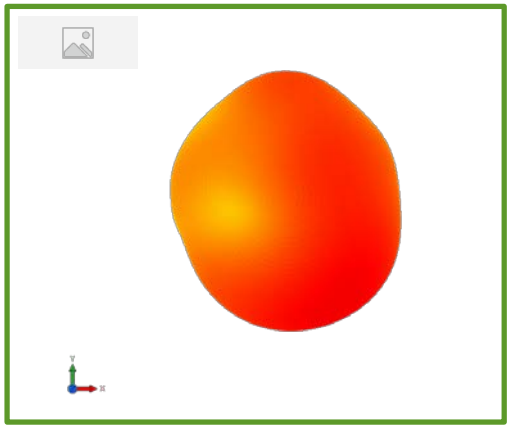
ARC ANTs design_isolation_1034G00000510 to 6G

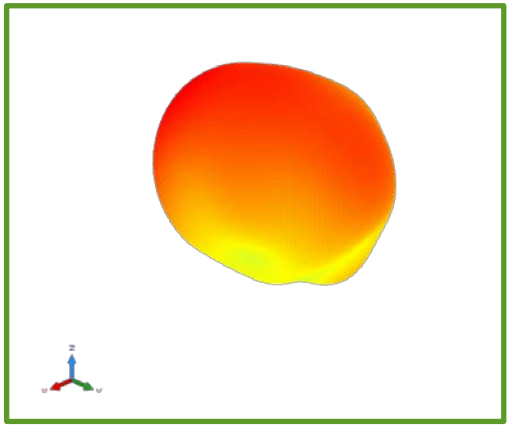


1034G00000500_3D Radiation Pattern of 2.45 GHz

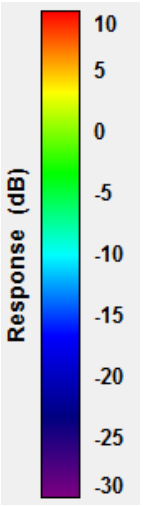


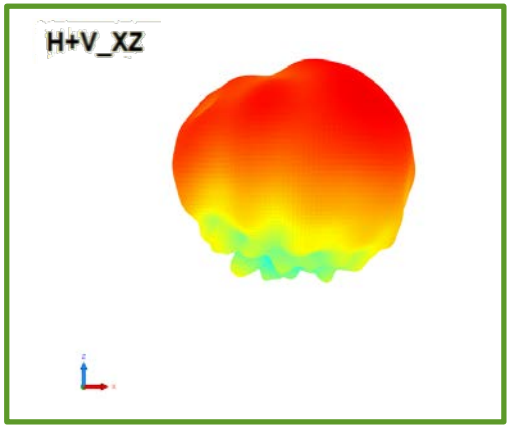


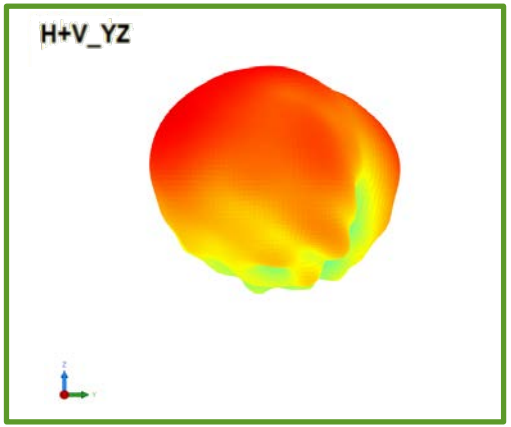


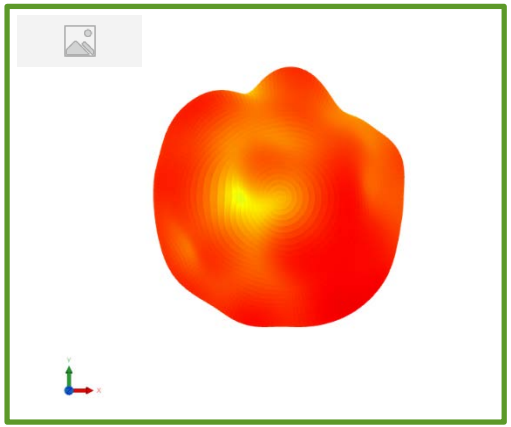


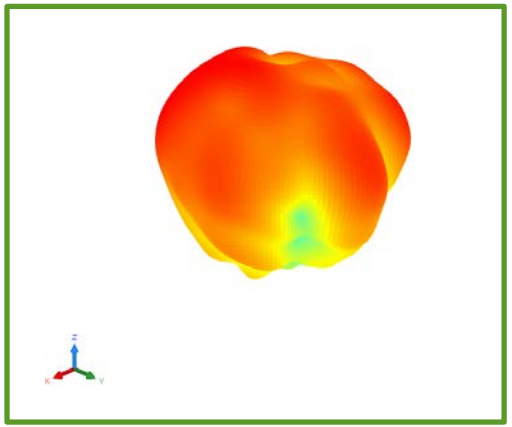
1034G00000500_3D Radiation Pattern of 5.5 GHz



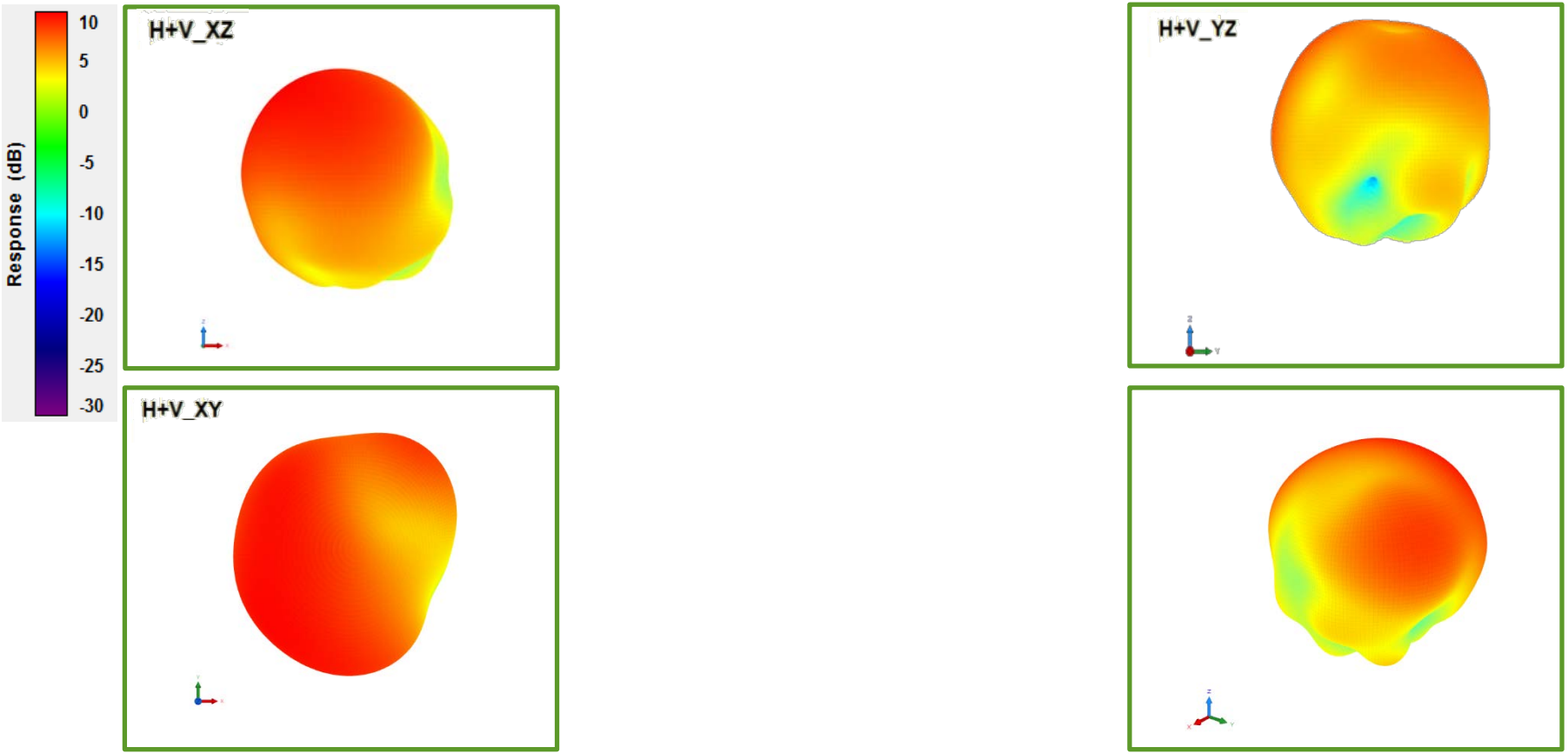




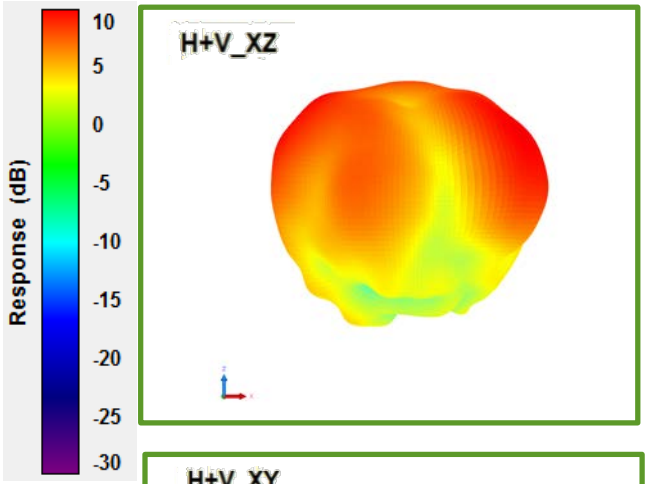


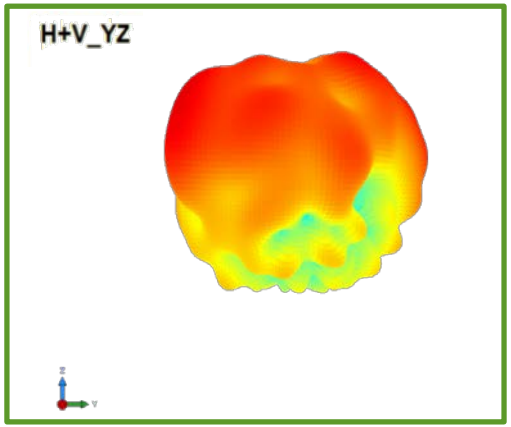


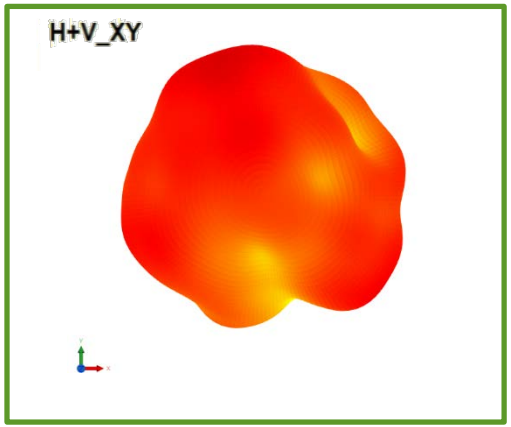
1034G00000510_3D Radiation Pattern of 2.45 GHz

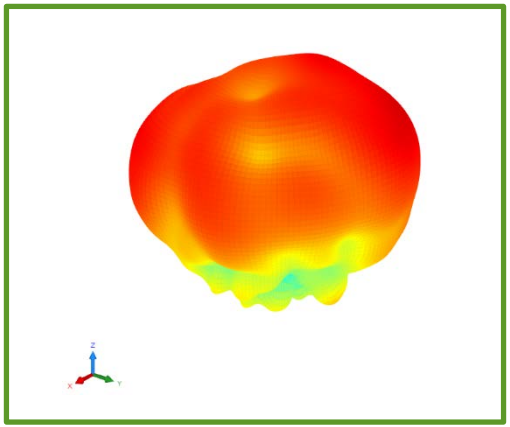


1034G00000510_3D Radiation Pattern of 5.5 GHz

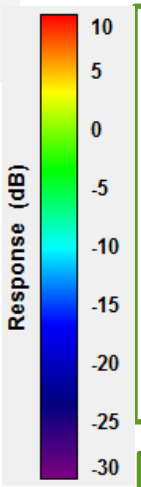


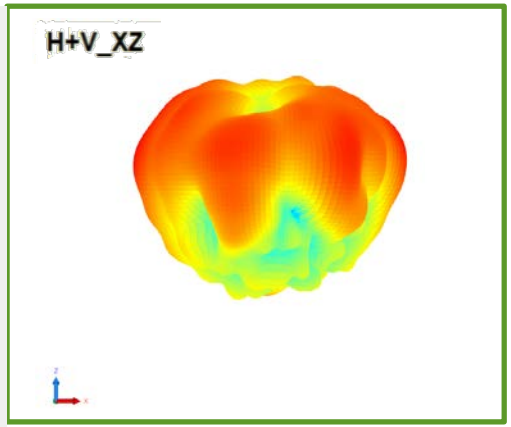


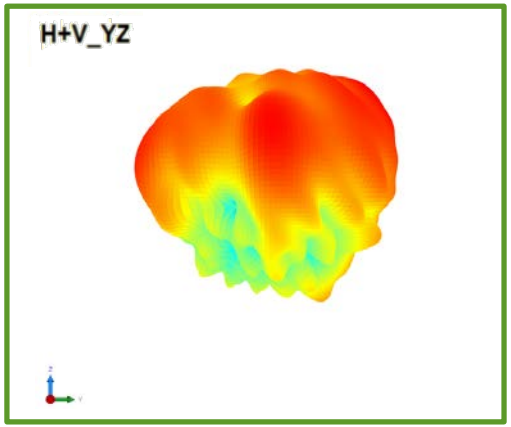


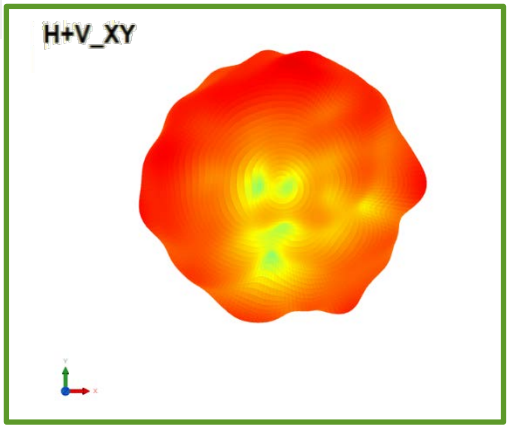


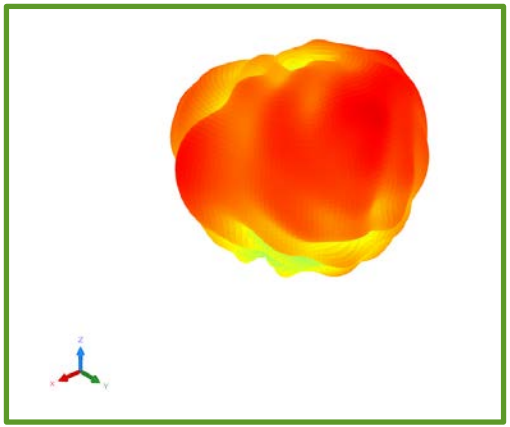
1033G00000220_3D Radiation Pattern of 6.55 GHz



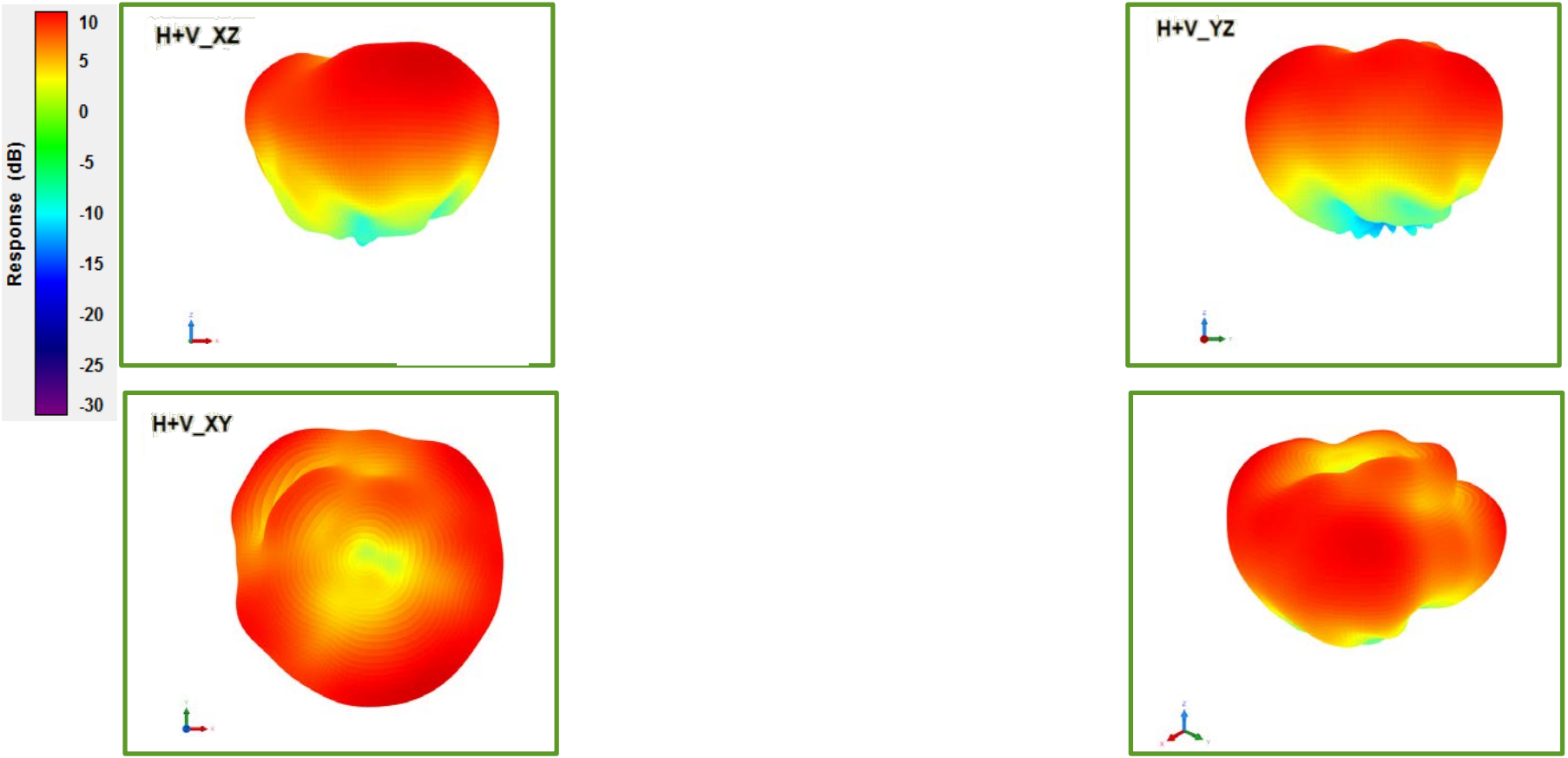




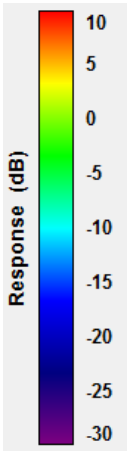


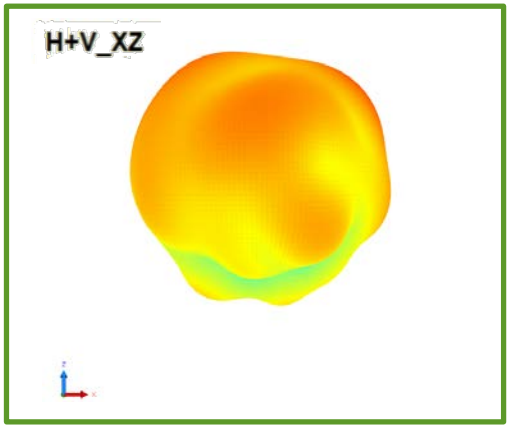


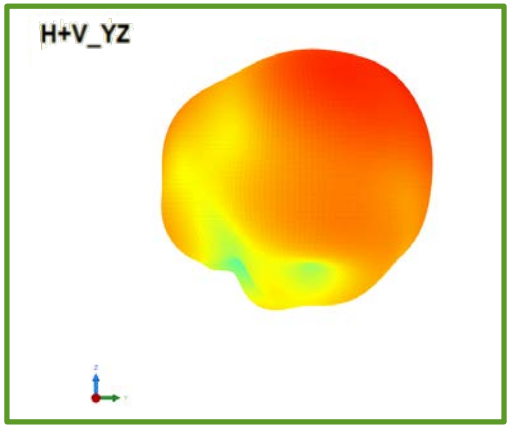
103CG00000560_3D Radiation Pattern of 6.55 GHz

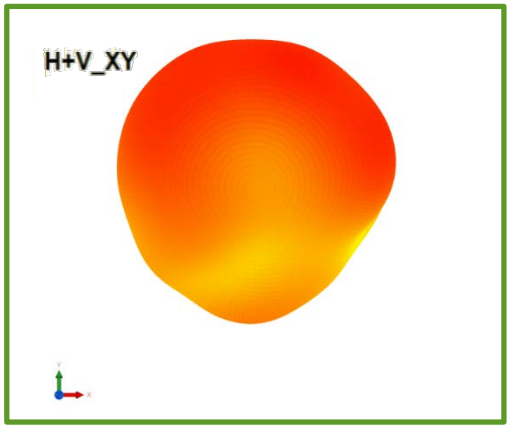


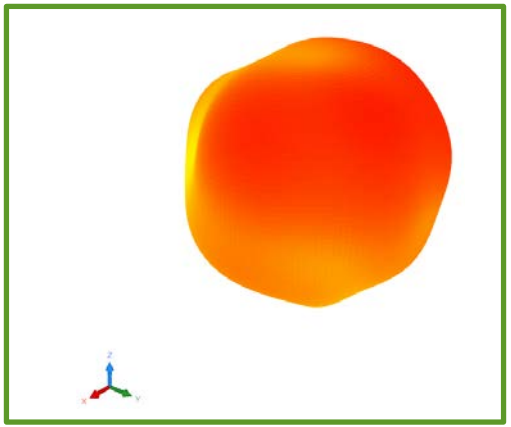
1039G00000050_3D Radiation Pattern of 2.45 GHz



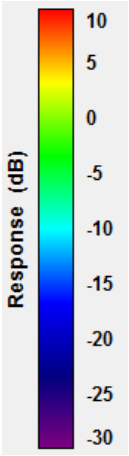


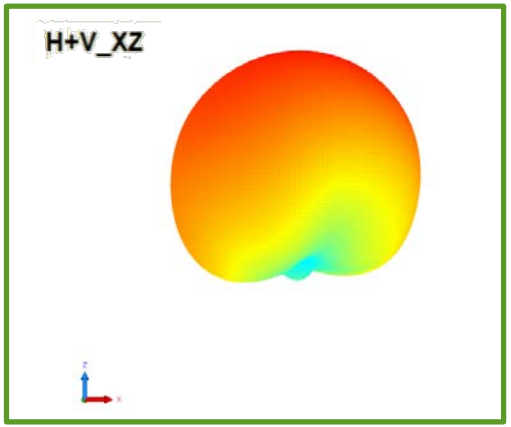


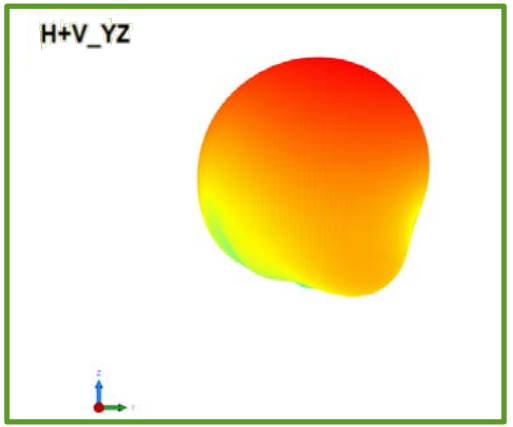


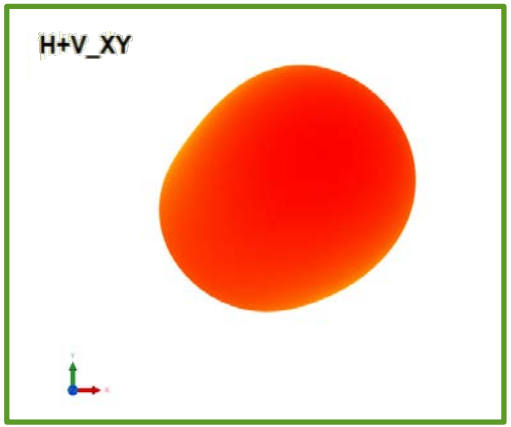


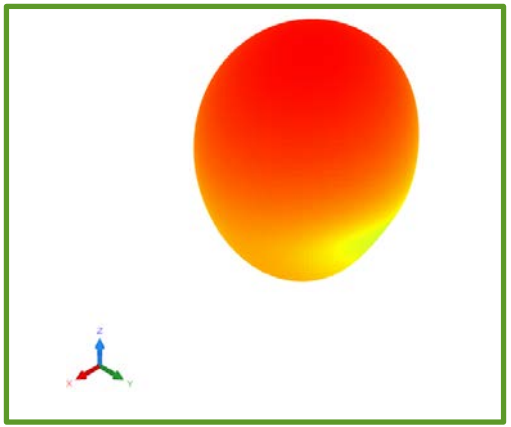
1031G00000330_3D Radiation Pattern of 1.575 GHz



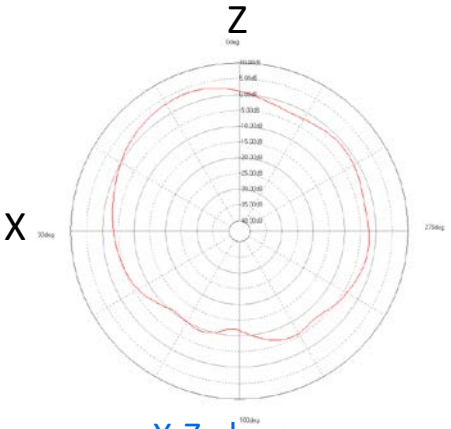




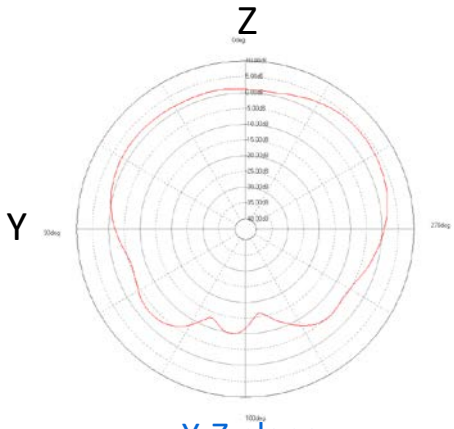




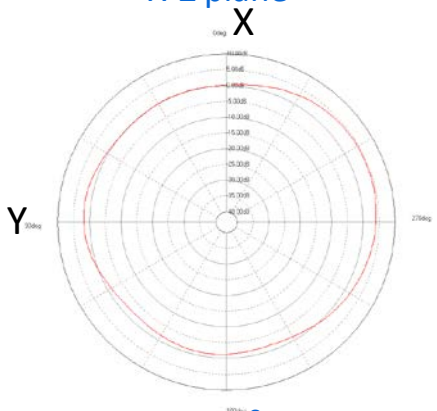
1034G00000500_2D Radiation Pattern of 2.45GHz



X-Z plane



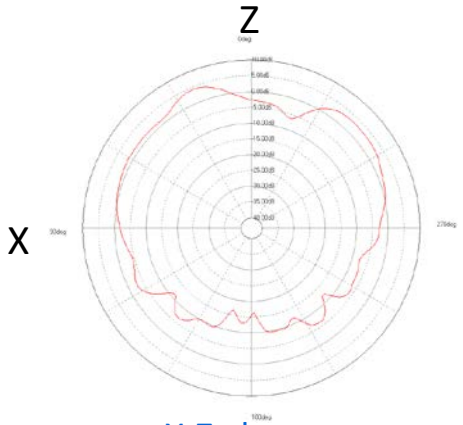
Y-Z plane



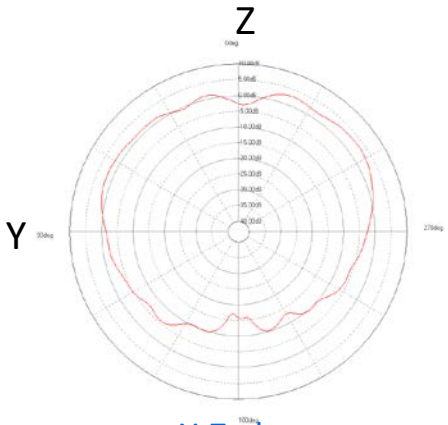
theta 60º plane

Maximum:	10
Minimum:	-40
Step:	5

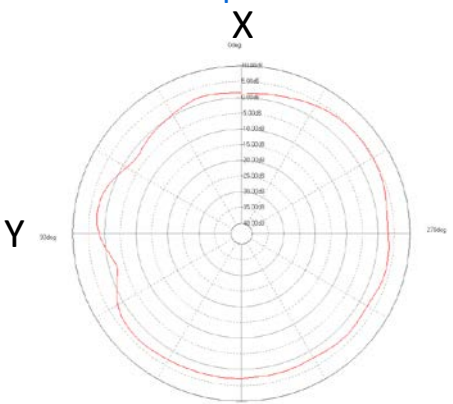
1034G00000500_2D Radiation Pattern of 5.5GHz



X-Z plane



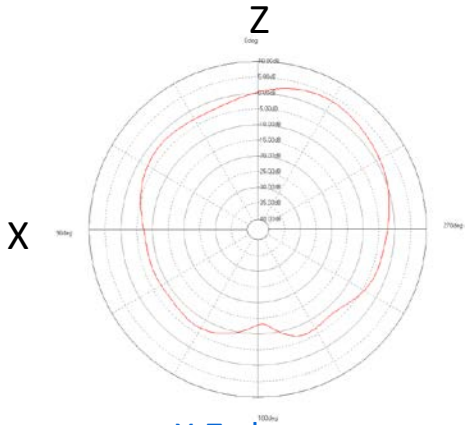
Y-Z plane



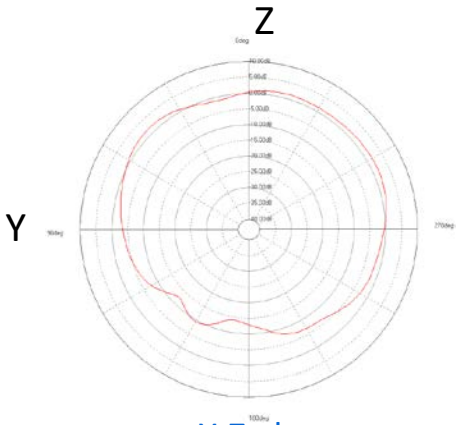
theta 60° plane

Maximum:	10
Minimum:	-40
Step:	5

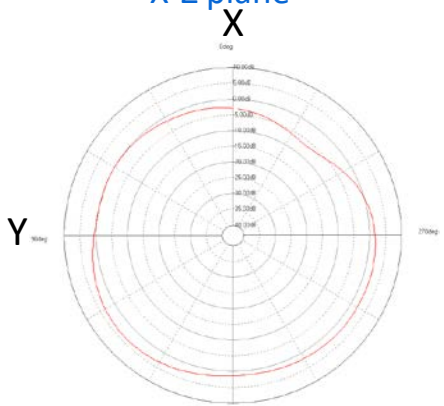
1034G00000510_2D Radiation Pattern of 2.45GHz



X-Z plane



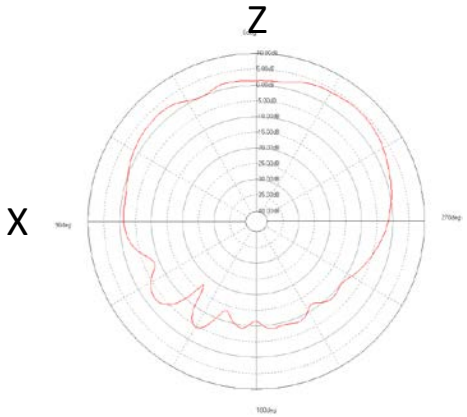
Y-Z plane



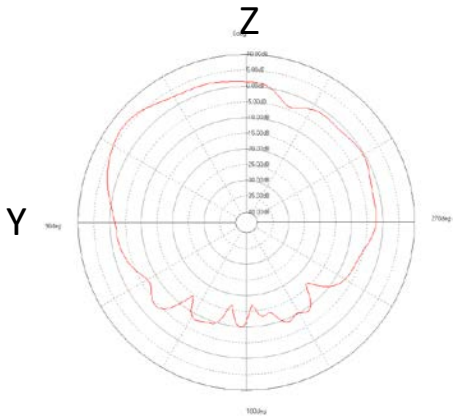
theta 60^{o} plane

Maximum:	10
Minimum:	-40
Step:	5

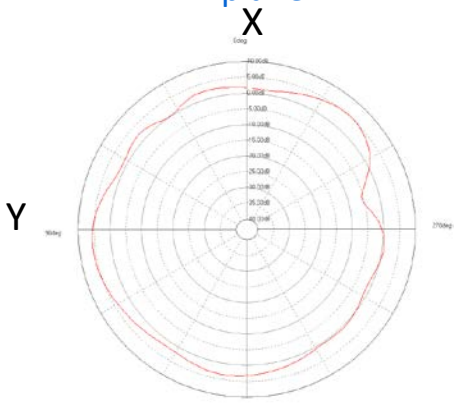
1034G00000510_2D Radiation Pattern of 5.5GHz



X-Z plane



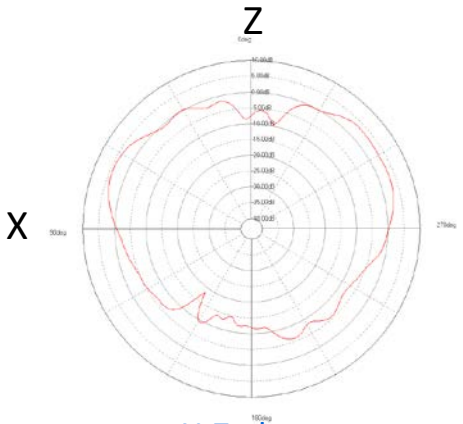
Y-Z plane



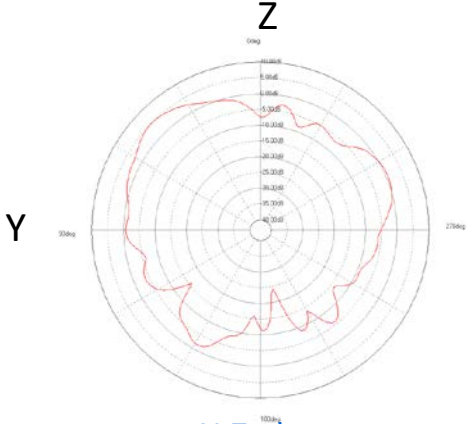
theta 60^{o} plane

Maximum:	10
Minimum:	-40
Step:	5

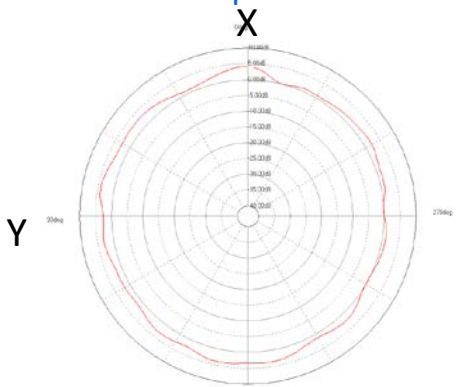
1033G00000220_2D Radiation Pattern of 6.55 GHz



X-Z plane



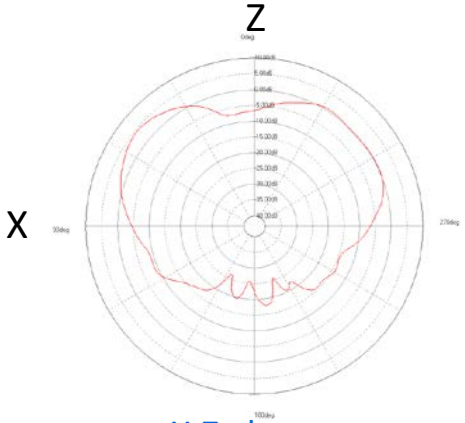
Y-Z plane



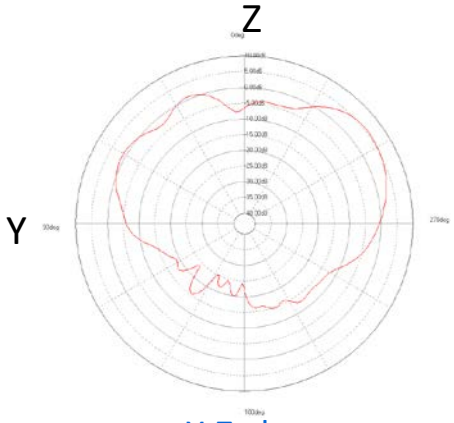
theta 60° plane

Maximum:	10
Minimum:	-40
Step:	5

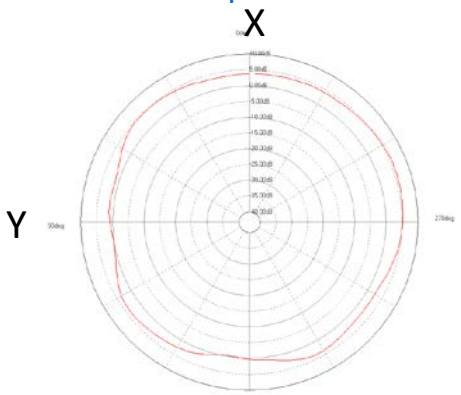
103CG00000560_2D Radiation Pattern of 6.55 GHz



X-Z plane



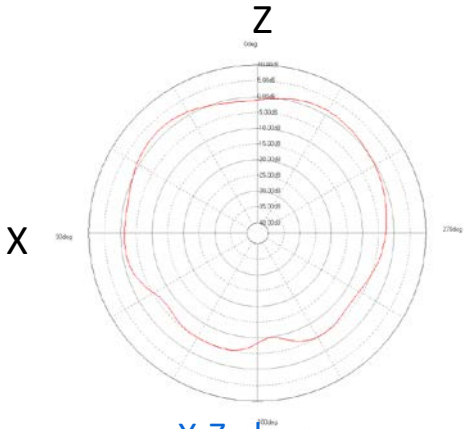
Y-Z plane



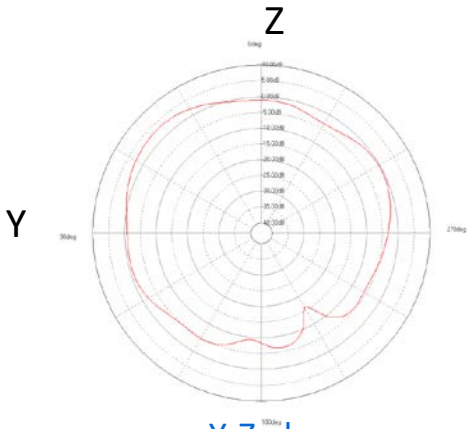
theta 60^{o} plane

Maximum:	10
Minimum:	-40
Step:	5

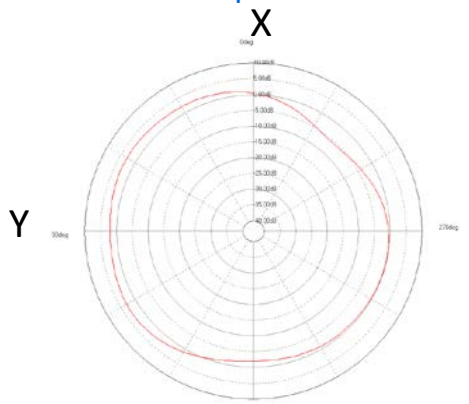
1039G00000050_2D Radiation Pattern of 2.45 GHz



X-Z plane



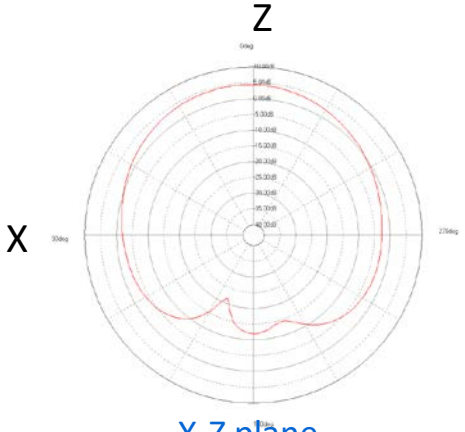
Y-Z plane



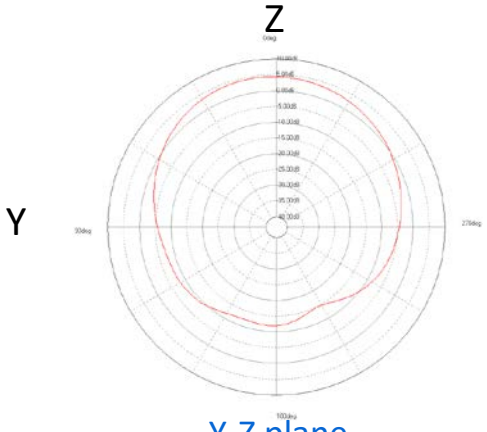
theta 60° plane

Maximum:	10
Minimum:	-40
Step:	5

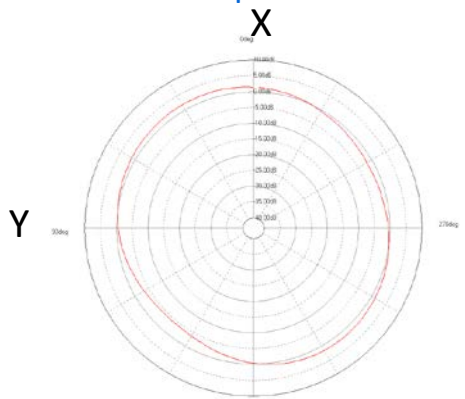
1031G00000330_2D Radiation Pattern of 1.575 GHz



X-Z plane



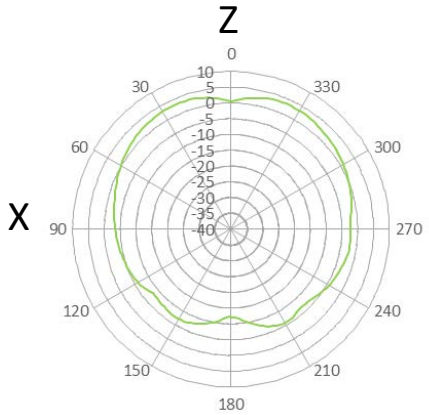
Y-Z plane



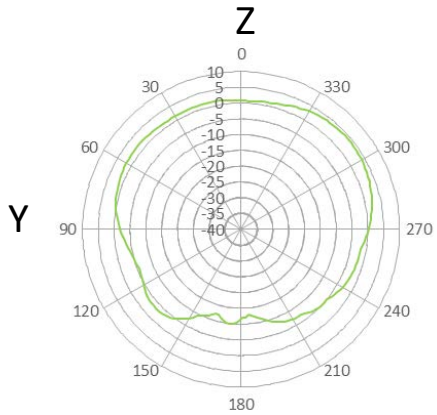
theta 60° plane

Maximum:	10
Minimum:	-40
Step:	5

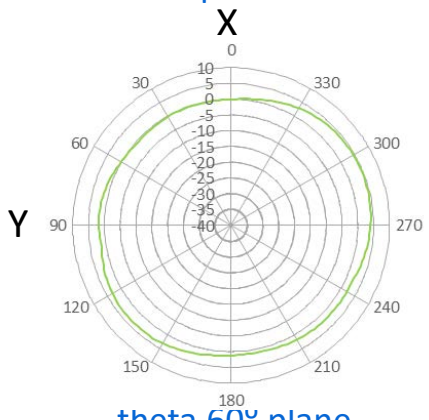
WIFI Antenna Combine Gain of 2.45 GHz



X-Z plane



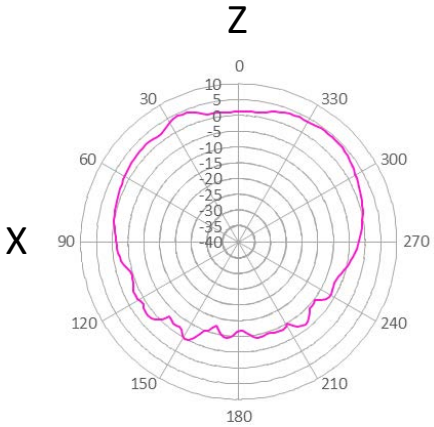
Y-Z plane



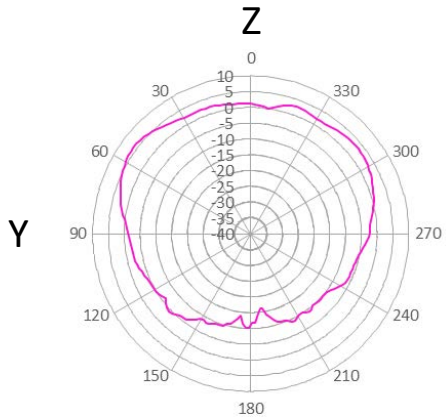
theta 60° plane

Maximum:	10
Minimum:	-40
Step:	5

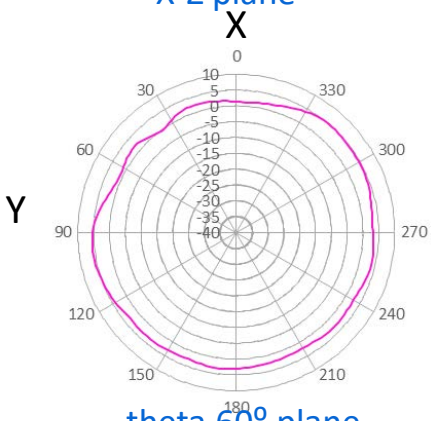
WIFI Antenna Combine Gain of 5.5 GHz



X-Z plane



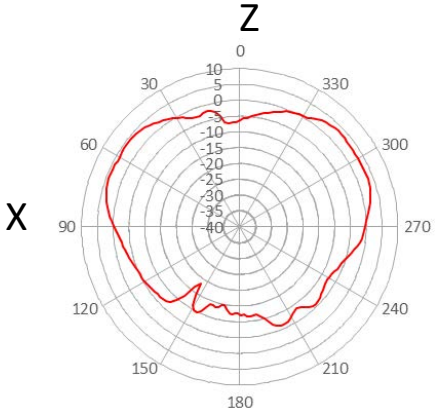
Y-Z plane



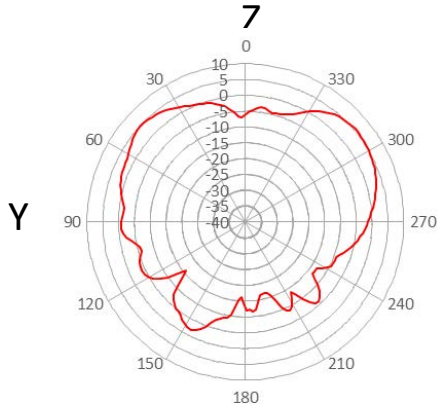
theta 60º plane

Maximum:	10
Minimum:	-40
Step:	5

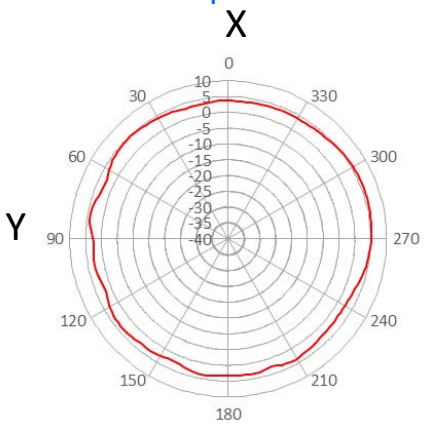
WIFI Antenna Combine Gain of 6.55 GHz



X-Z plane



Y-Z plane



Maximum:	10
Minimum:	-40
Step:	5

Antenna Efficiency & Peak Gain

	2.4G						5G										
Frequency	2400		2450		2500		5100		5350		5500		5650		5900		MHz
1034G00000500	70%	4.7	78%	5.0	74%	5.0	78%	5.0	82%	5.1	81%	5.1	83%	5.1	81%	5.8	Eff./ Peak Gain(dBi)
1034G00000510	74%	4.2	72%	4.2	78%	4.4	80%	5.9	86%	6.1	82%	6.1	86%	5.7	87%	6.0	
1039G00000050	77%	3.8	72%	3.4	71%	3.8											

	6G										
Frequency	5925		6350		6550		6950		7125		MHz
1033G00000220	80%	5.3	76%	5.1	77%	5.2	77%	4.9	77%	5.2	Eff./ Peak Gain(dBi)
103CG00000560	80%	6.0	79%	6.0	77%	6.1	77%	5.6	73%	5.6	

	GNSS(Ceramic)				
Frequency	1575		1602		MHz
1031G00000330	70%	4.5	65%	3.6	Eff./ Peak Gain(dBi)

Broadband ● Multimedia ● Wireless