

安諾電子股份有限公司
Amphenol Taiwan Corporation

APPROVAL SHEET

Customer Name: BYD COMPANY LIMITED

Date: October 19, 2022

Customer P/N	13893823-00
Amphenol P/N	BY5962-15-001-C
Description	WWLAN MAIN & AUX ANTENNA
Version	A

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Revision History

DATE	Revision	Description of changes
Oct 19	A	PVT Release

1. Description.....	3
2. Specification.....	5
3. Antenna Performance Test.....	8
4. Drawing.....	TBD
5. FirstArticleInspection.....	TBD
6. Cp/CpkAnalysis.....	TBD
7. Reliability report.....	TBD
8. GP(RoHs & REACH)	TBD
9. QCP.....	TBD
10. Package.....	TBD

Antenna Description

1.1. Location of antenna in test fixture



1.2. Picture of the antenna

Top View



WLAN Main Antenna Structure
1. PCB
2. PIFA type

Top View



WLAN Aux Antenna Structure
1. PCB
2. PIFA type

2. Product Specification

2.1. VSWR (Voltage Standing Wave Ratio)

The VSWR over the frequencies stated in Table 1 below shall be measured at the connector end of the cable for each antenna assembly. The VSWR are measured with the antennas installed on platform. The VSWR shall be 100% tested in production.

Test Parameter	2400 MHz to 2500 MHz	5150 MHz to 7125 MHz
WLAN Main VSWR	2.5:1 max	2.5:1 max

2.2. Test environment

The radiation pattern and antenna gain shall be tested either with a conventional far field anechoic chamber or a near field anechoic chamber such as a **Satimo StarGate 64**.

For a far field anechoic chamber, the gain measurements shall be made within an RF anechoic chamber with at least 3-meter separation from the receive antenna to the antenna under test (AUT). The RF anechoic chamber must be lined with absorptive material rated as a minimum frequency range from 500MHz to 6GHz. The notebook with the antenna assemblies installed shall be placed on a non-conductive structure at a sufficient height to be in the ‘quiet zone’ of the chamber. All test equipment including horn antennas, adapters, cables, network analyzers, and receivers shall be calibrated per manufacturer’s minimum calibration requirements.

For a near field anechoic chamber, the AUT test must be place in the center (and within the admissible offset) of the probe array elements. The RF anechoic chamber must be lined with absorptive material rated as a minimum frequency range from 500MHz to 6GHz. The notebook with the antenna assemblies installed shall be placed on a non-conductive structure.

2.3. Antenna radiation measurement

In order to ensure compliance with network carrier specifications, it is required to measure a 3-D gain measurement for WiFi Antenna.

Table 3 specifies the details of the 3-D gain measurement points

Theta Start: 15°	Phi Start: 0°
Theta Stop: 165°	Phi Stop: 345°
Theta increment: 15°	Phi Increment: 15°

Table 3 3-D gain measurement points

The table above specifies the minimum 64 measurement points (x2 polarizations) for each measurement frequency.

The axis and AUT orientation for gain measurements are outlined below in Figure 1.

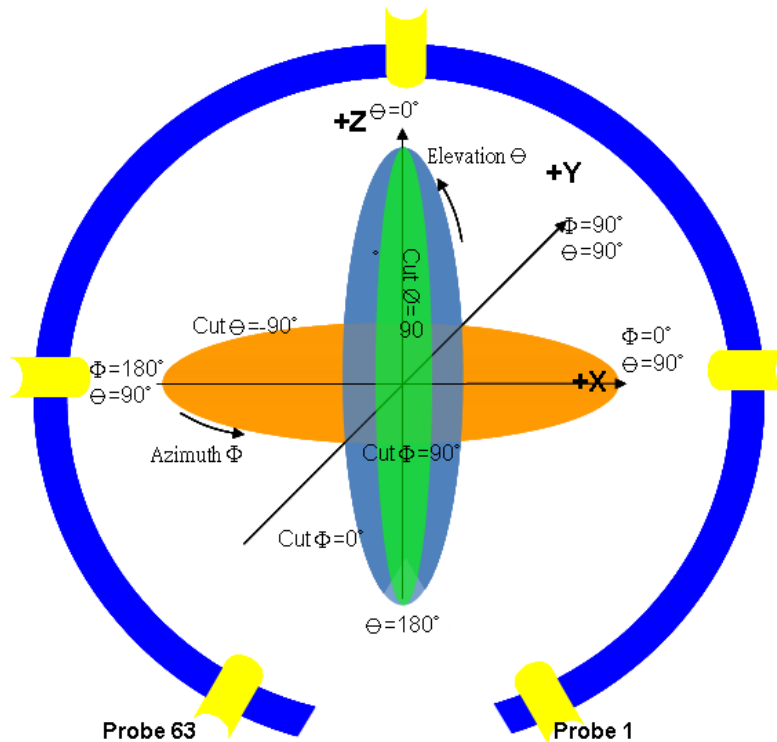
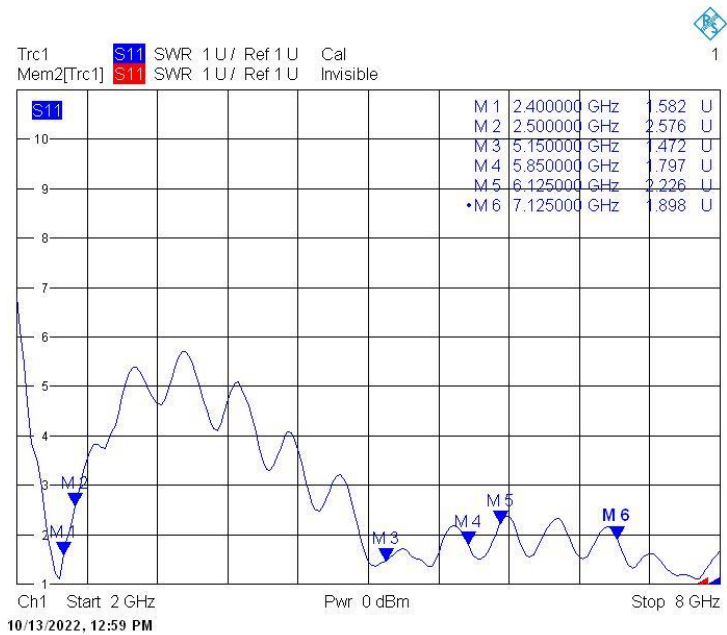


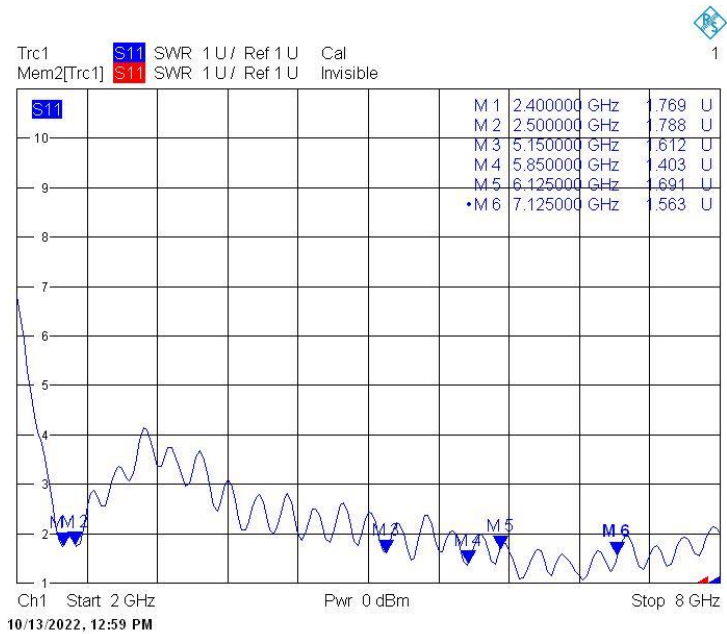
Figure 1 AUT orientation and axis definition

3. Antenna Performance Test

3.1. VSWR of WLAN Main Antenna



3.1. VSWR of WLAN Aux Antenna



3.2 Efficiency of Antenna

Main				
Band / Frequency (MHz)		Gain(dB)	Efficiency(%)	Peak Gain(dB)
802.11b/g/n	2400	-3.0	51	2.79
	2450	-3.2	48	2.98
	2500	-4.3	37	2.05
2G average			45	
802.11a/ac	5150	-4.1	38	3.36
	5250	-3.7	42	3.22
	5350	-3.0	50	3.62
	5470	-3.4	46	2.95
	5600	-4.2	38	2.82
	5725	-3.7	42	3.04
	5785	-4.0	40	2.49
	5800	-3.8	42	2.79
	5850	-3.9	41	2.28
5G average			42	
802.11a/ac	5925	-4.3	37	2.01
	6175	-5.0	32	1.69
	6425	-3.7	42	2.43
	6525	-4.2	38	2.51
	6700	-4.7	34	2.49
	6875	-3.4	46	4.27
	7000	-3.8	41	3.99
	7125	-4.1	39	3.65
6G average			39	

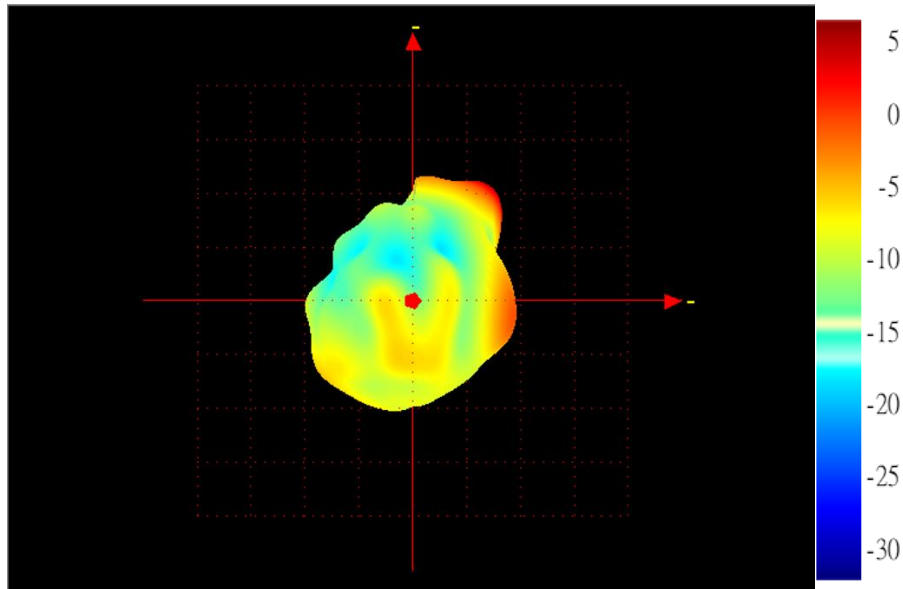
Aux				
Band / Frequency (MHz)		Gain(dB)	Efficiency(%)	Peak Gain(dB)
802.11b/g/n	2400	-4.5	35	1.67
	2450	-4.1	39	2.28
	2500	-3.5	45	2.73
2G average			40	
802.11a/ac	5150	-4.3	37	3.43
	5250	-4.4	36	3.53
	5350	-3.4	46	3.61
	5470	-4.1	39	3.42
	5600	-4.3	37	3.36
	5725	-3.6	43	3.50
	5785	-3.6	44	3.44
	5800	-3.4	46	3.48
	5850	-3.5	45	3.35
5G average			42	
802.11a/ac	5925	-4.7	34	2.11
	6175	-4.5	36	2.50
	6425	-4.1	39	2.39
	6525	-4.8	33	3.08
	6700	-4.3	37	3.76
	6875	-4.3	37	4.40
	7000	-4.3	37	4.71
	7125	-4.5	35	4.01
6G average			36	

3.3 Radiation Pattern and Gain

Main Antenna

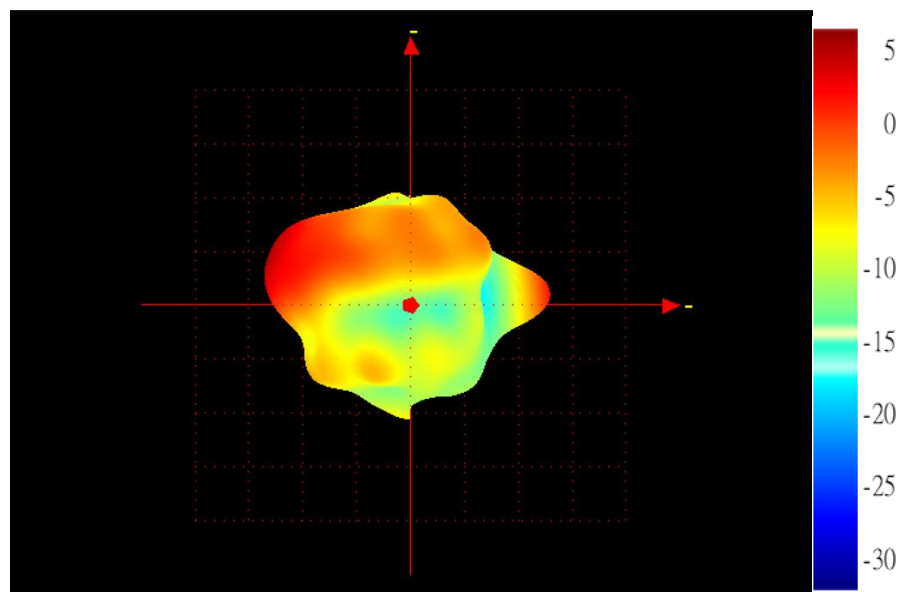
Main Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
2400-2483.5	2.98



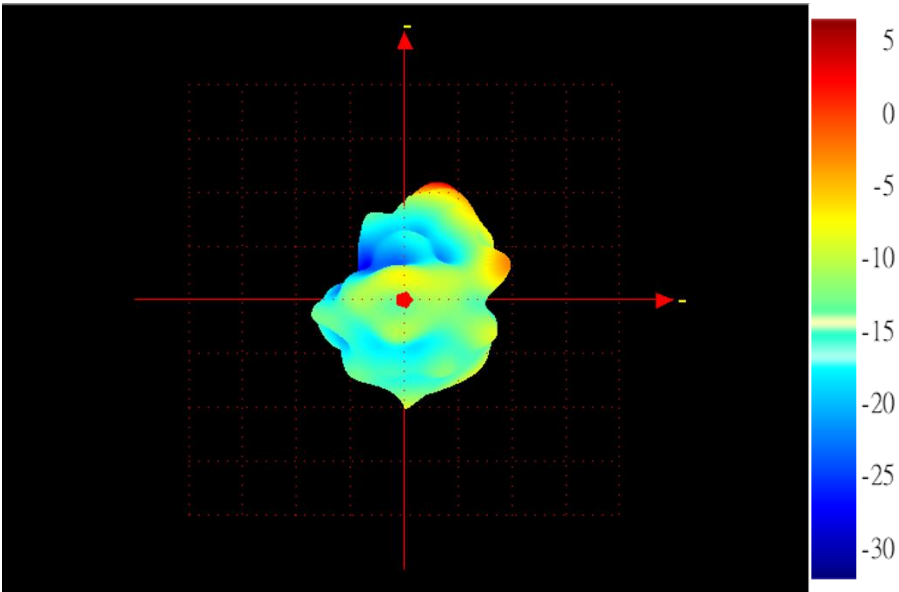
Main Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5150-5250	3.36



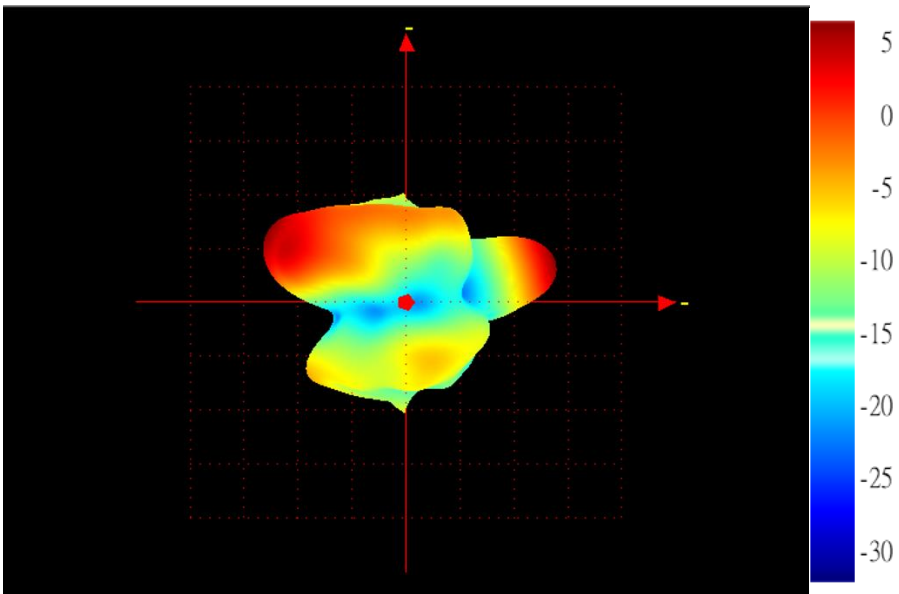
Main Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5250-5350	3.62



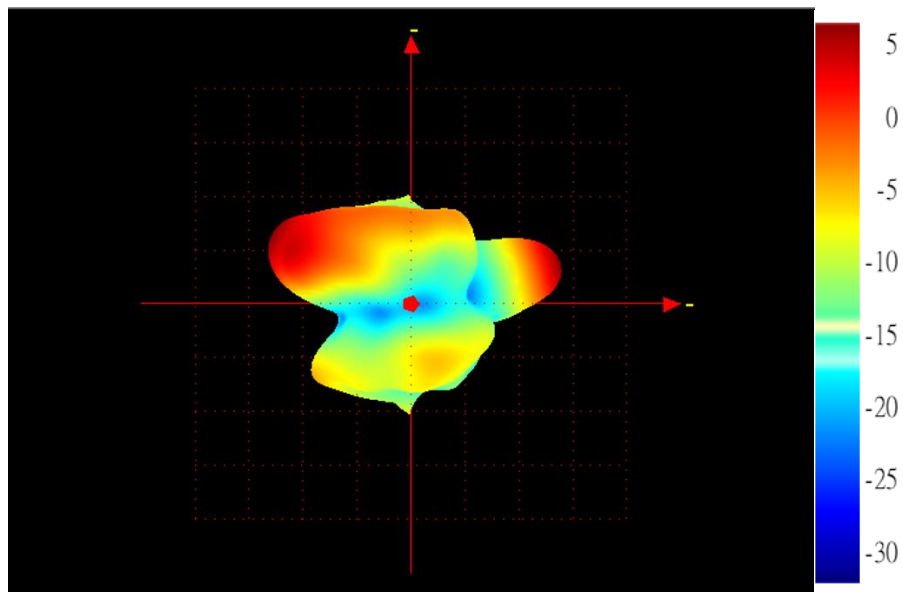
Main Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5470-5725	3.04



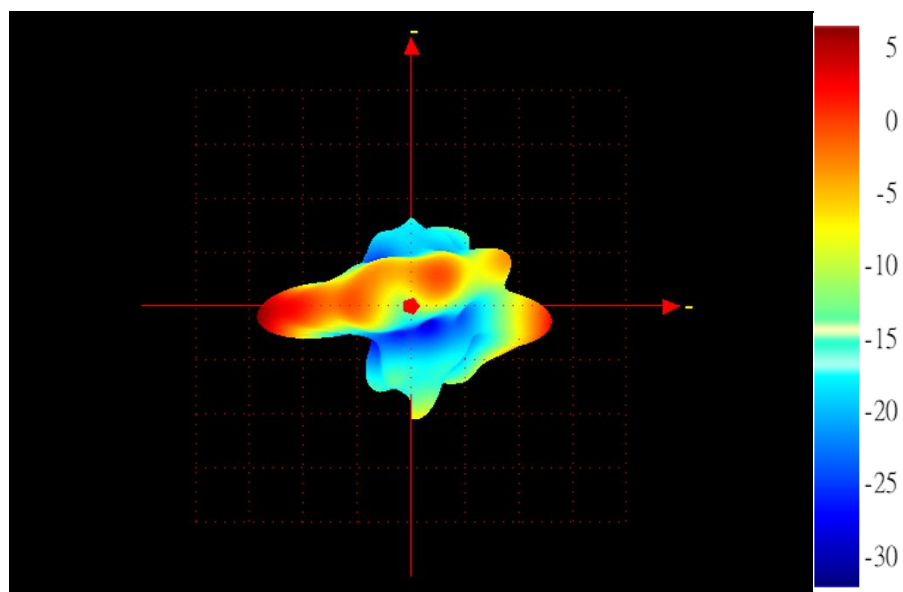
Main Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5725-5850	3.04



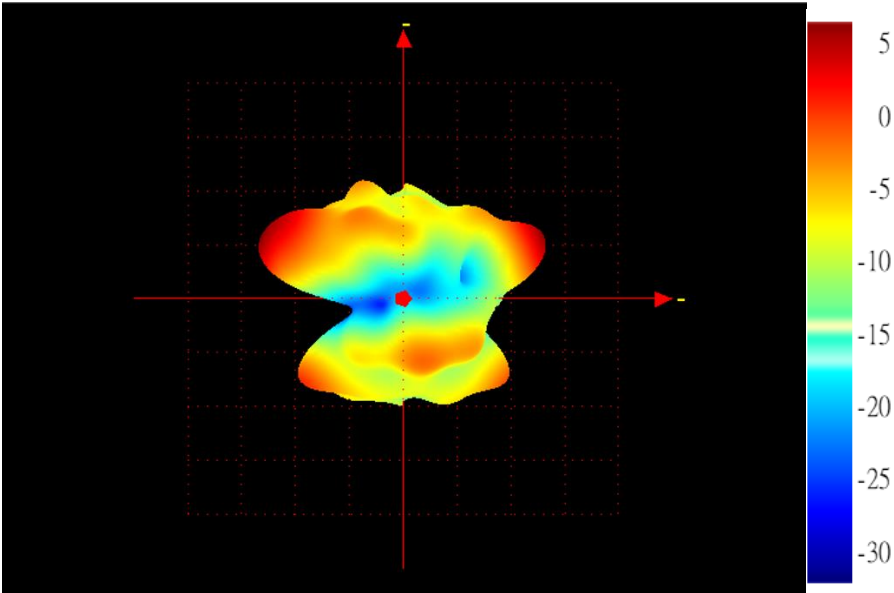
Main Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5925-6425	2.43



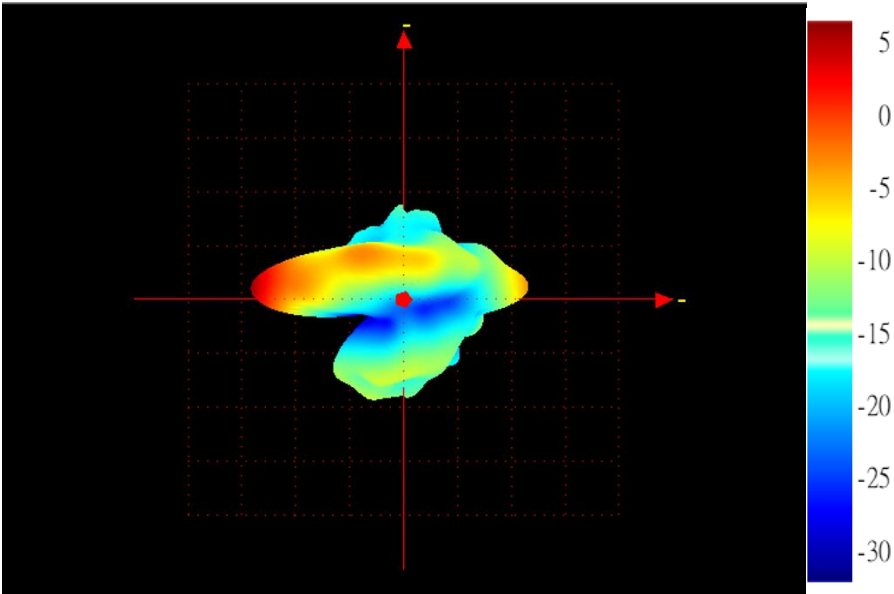
Main Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
6425-6525	2.51



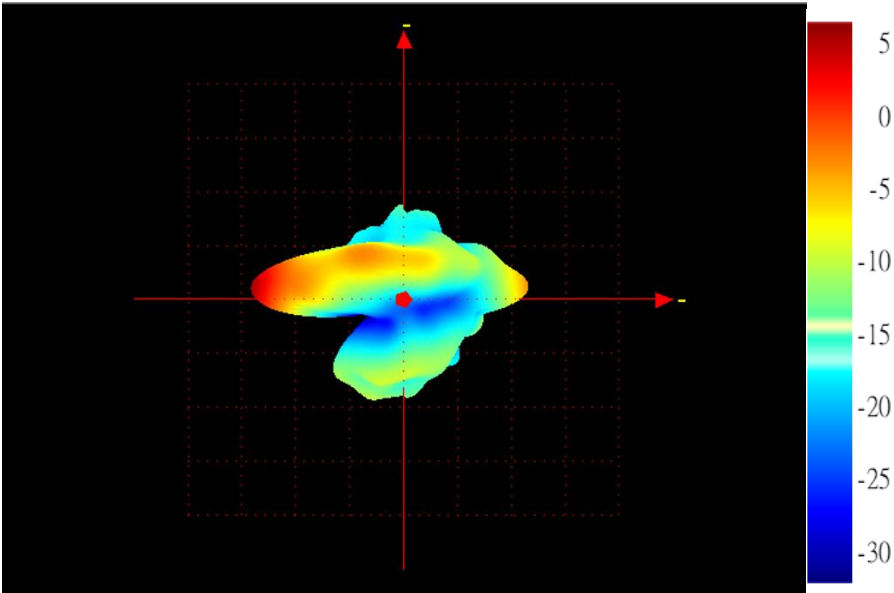
Main Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
6525-6875	4.27



Main Antenna 3D Radiation Pattern 6875-7125 MHz

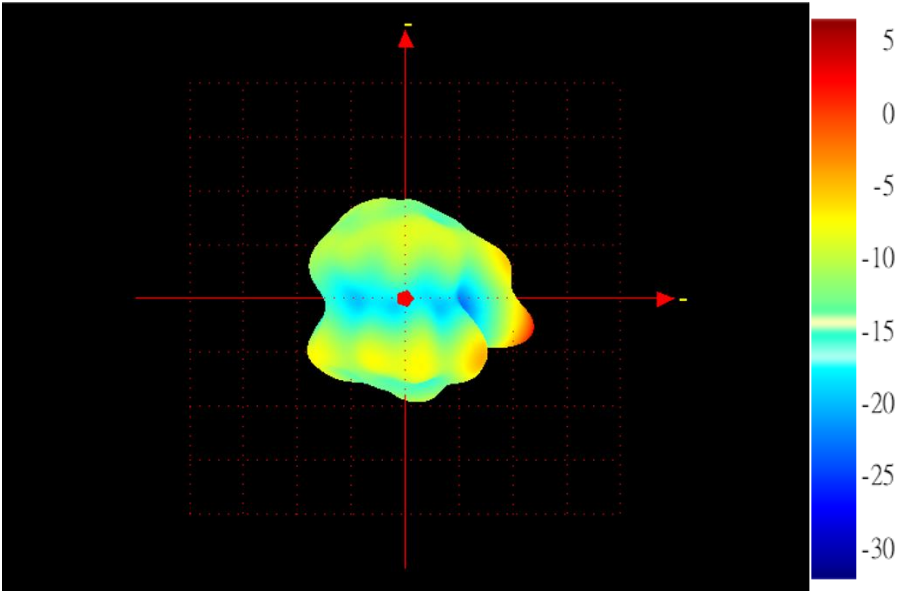
Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
6875-7125	4.27



Aux Antenna

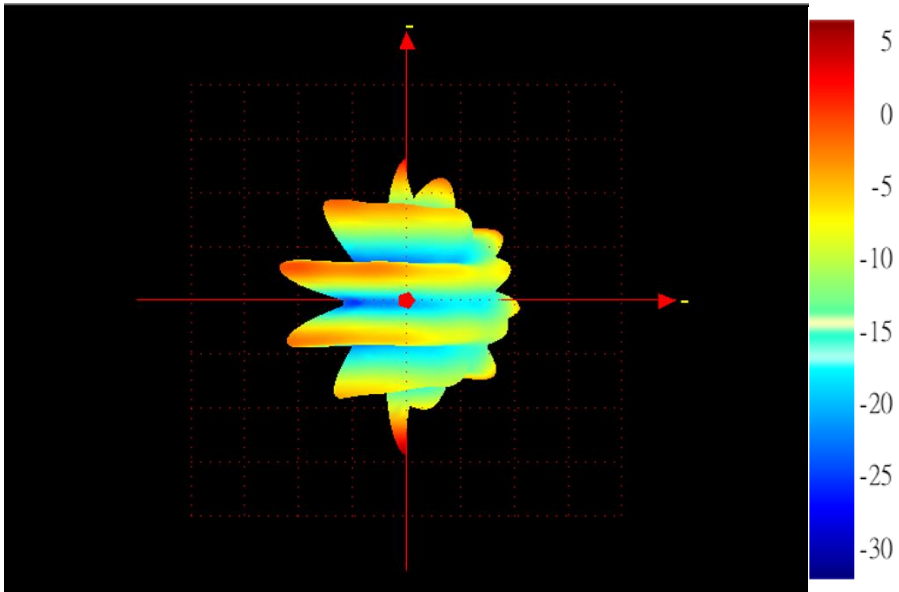
Aux Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
2400-2483.5	2.73



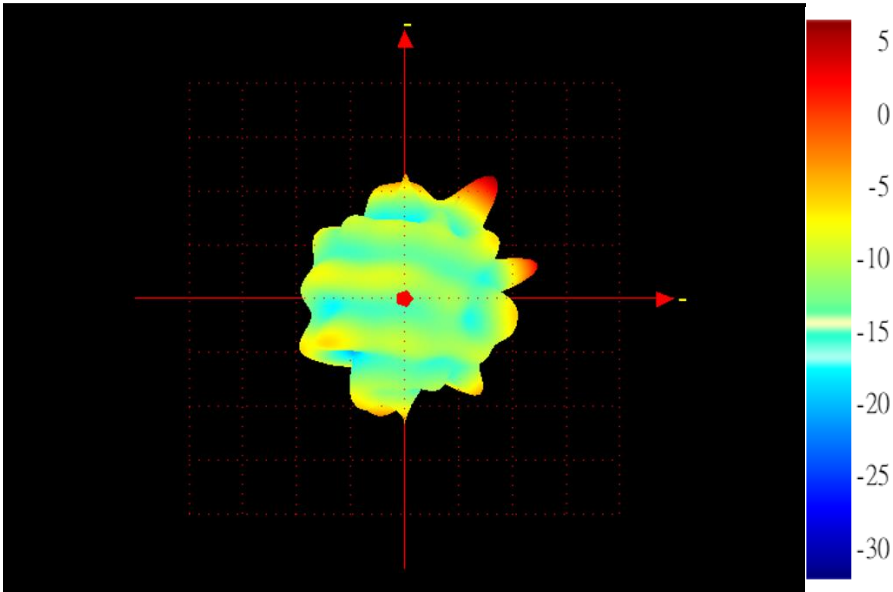
Aux Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5150-5250	3.53



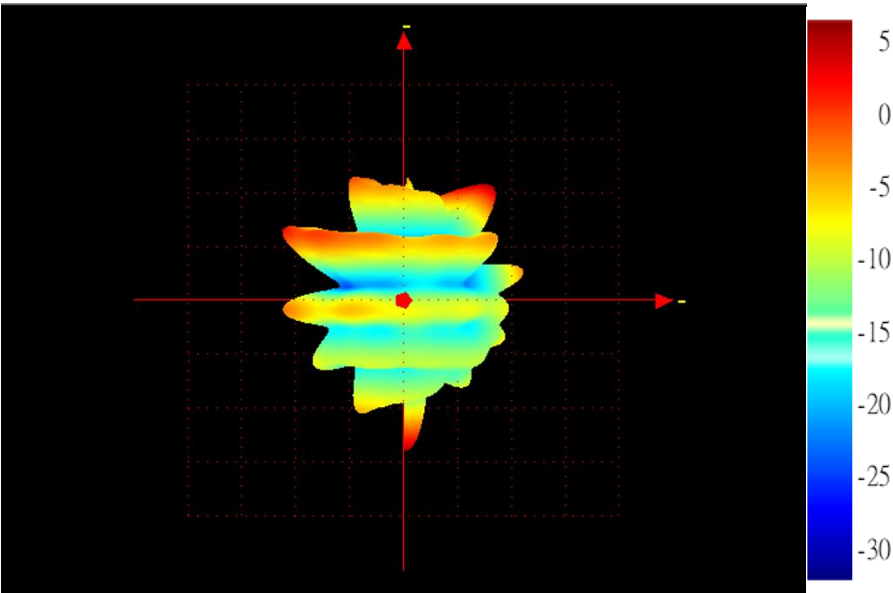
Aux Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5250-5350	3.61



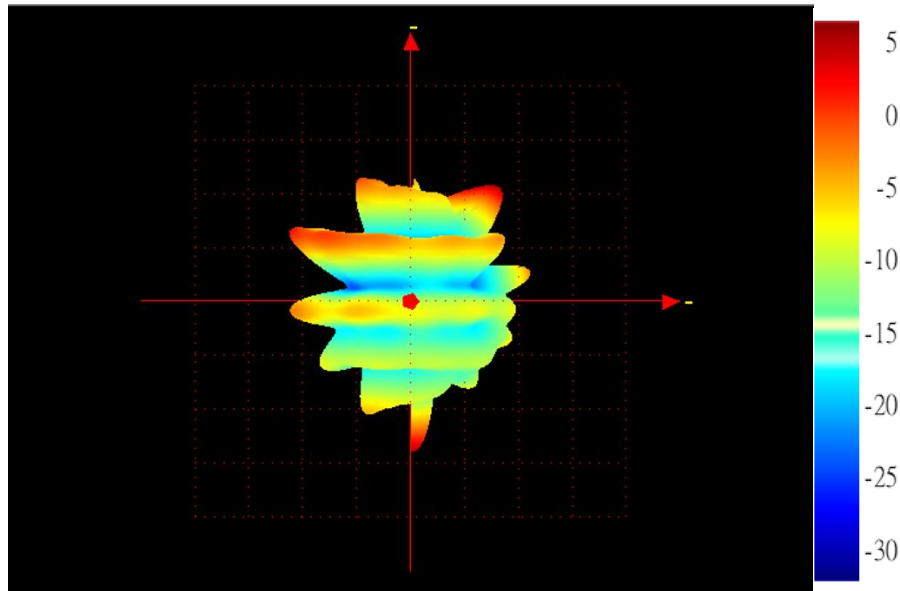
Aux Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5470-5725	3.50



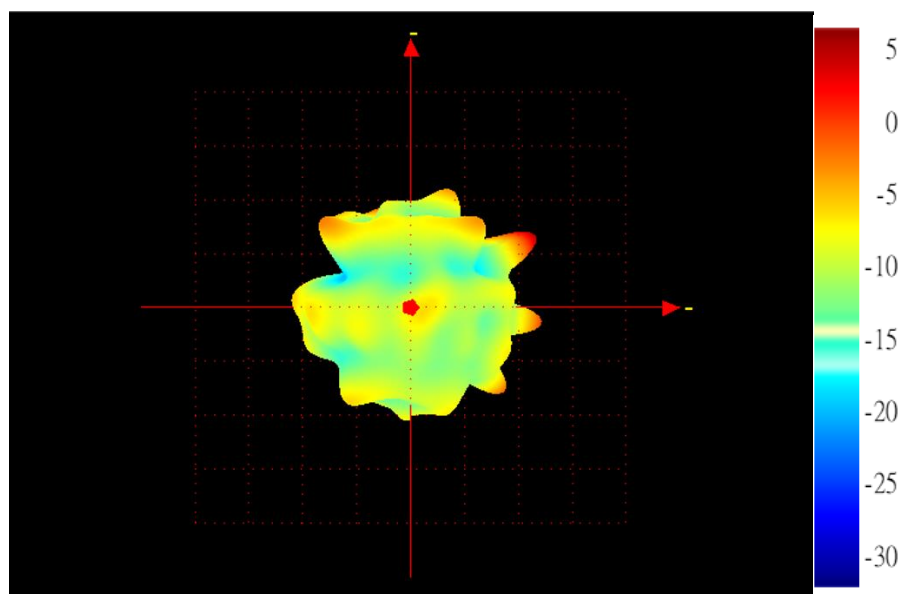
Aux Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5725-5850	3.50



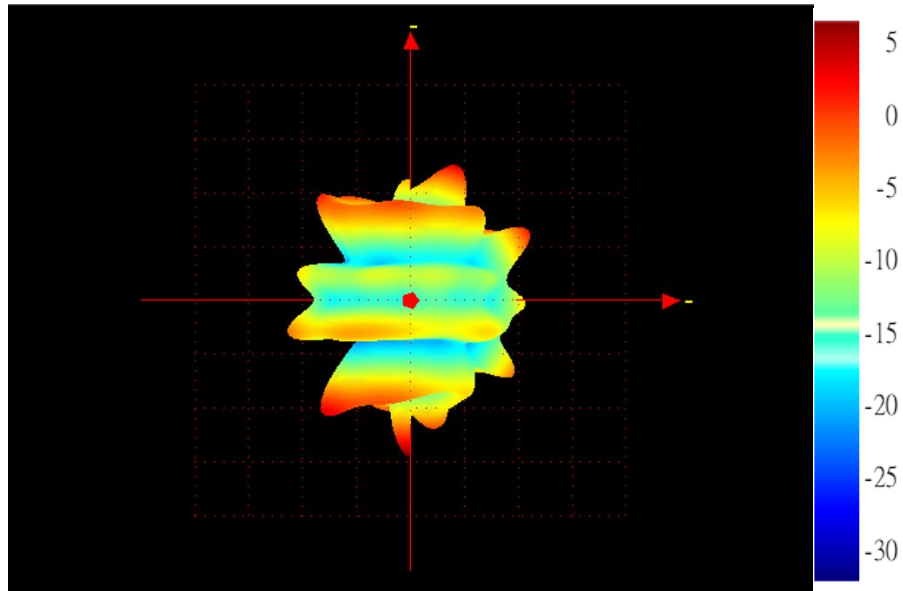
Aux Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
5925-6425	2.50



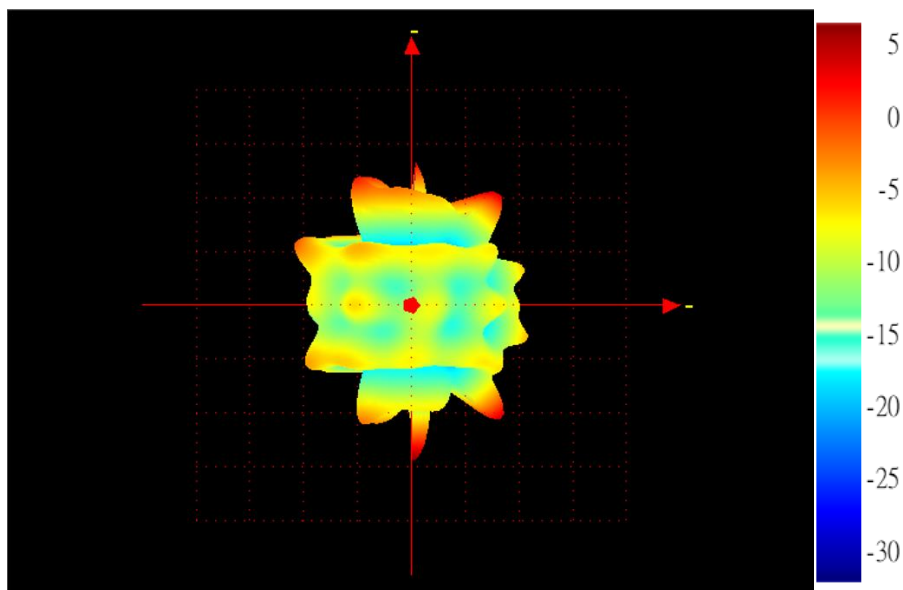
Aux Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
6425-6525	3.08



Aux Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
6525-6875	4.40



Aux Antenna 3D Radiation Pattern 6875-7125 MHz

Frequency (MHz)	Peak Gain w/o Cable Loss (dBi)
6875-7125	4.71

