

Regulatory WLAN Antenna Information

English Language Required for Intel Regulatory Review / Approval

Platform information											
Brand	ODM	****End product model name	Intel platform (ex: Yes, No or NA)	Platform type (ex: regular NB, convertible PC, AIO...etc)	*SAR minimum separation (mm)						
Lenovo	LCFC	TP00145A, TP00145B ThinkPad X13 Gen 4	Yes	Regular NB	210mm						
****Please fill in exact product model name and make sure the model name is visible on product cover or any parts for end users recognize for authority inspection.											
Antenna information											
Vendor	Type	Antenna Part number (Main)	Antenna Part number (Aux)								
Amphenol Taiwan Corporation	PIFA	DC33001YS10	DC33001YS20								
Name	Mail	Address	Name								
George Chiu	george.chiu@amphenolmcp.com	No.71 , Lane 956 , Jungshan Rd. , Taoyuan City 330									
Peak gain w/ cable loss (dBi)*											
	2.4GHz 2400-2483.5 MHz	5.2GHz 5150-5250MHz	5.3GHz 5250-5350MHz	5.6GHz 5470-5725MHz	5.8GHz 5725-5850MHz	5.9GHz 5850-5895MHz	6.2GHz 5925-6425MHz	6.5GHz 6425-6525MHz	6.7GHz 6525-6875MHz	7.0 GHz 6875-7125MHz	
Main	1.83	0.53	0.61	0.88	0.85	0.52	1.17	0.70	1.58	1.72	
Aux	1.82	0.49	-0.13	1.32	0.33	0.12	0.46	0.99	1.89	2.06	
Intel Reference Gain/Type/ Separation distance											
Antenna Type	Antenna Peak gain (In dBi)*										Distance to the end user (mm)
	2.4GHz 2400-2483.5 MHz	5.2GHz 5150-5250MHz	5.3GHz 5250-5350MHz	5.6GHz 5470-5725MHz	5.8GHz 5725-5850MHz	5.9GHz 5850-5895MHz	6.2GHz 5925-6425MHz	6.5GHz 6425-6525MHz	6.7GHz 6525-6875MHz	7.0GHz 6875-7125MHz	Generic: refer to modular FCC SAR report Mid-power: ≥ 8 mm Low power: ≥ 5 mm
Design	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
PIFA	3.24	3.64	3.73	4.77	4.97	4.72	4.83	4.30	5.37	5.59	
Dipole	2.89	2.92	3.19	4.41	4.22	4.22	4.83	4.30	4.49	5.34	
Notes (marked with *)											
* SAR minimum separation (mm)											
- Regular NB: Minimum antenna-to-body (from antenna bottom to the bottom of the device)											
- Tablet / Convertible PC: Minimum antenna-to-edge (5 sides of the device)											
- Mini-tablet: Minimum antenna-to-edge (6 sides of the device)											
* 3D Peak Antenna gain should be equal or greater than -2 dBi											
- If a host integrator plans to use a lower gain antenna of the same type, additional CBP(FCC)/EDT(EU) testing need to be performed while the module is installed in the host.											

Table of contents

1. Applicable test method
2. Test & System Description
 - a. Test setup
 - b. Equipment list

3. Setup photo

[Section 1. Antenna Assembly Specifications](#)

[Section 2. Dimensioned Photos or Drawings of Antennas](#)

[Section 3. Radiation characteristics of antenna loaded in Host Platform](#)

[Section 4. Antenna Host Platform Location Information](#)

[Section 5. Antenna dimensional information for SAR evaluation](#)

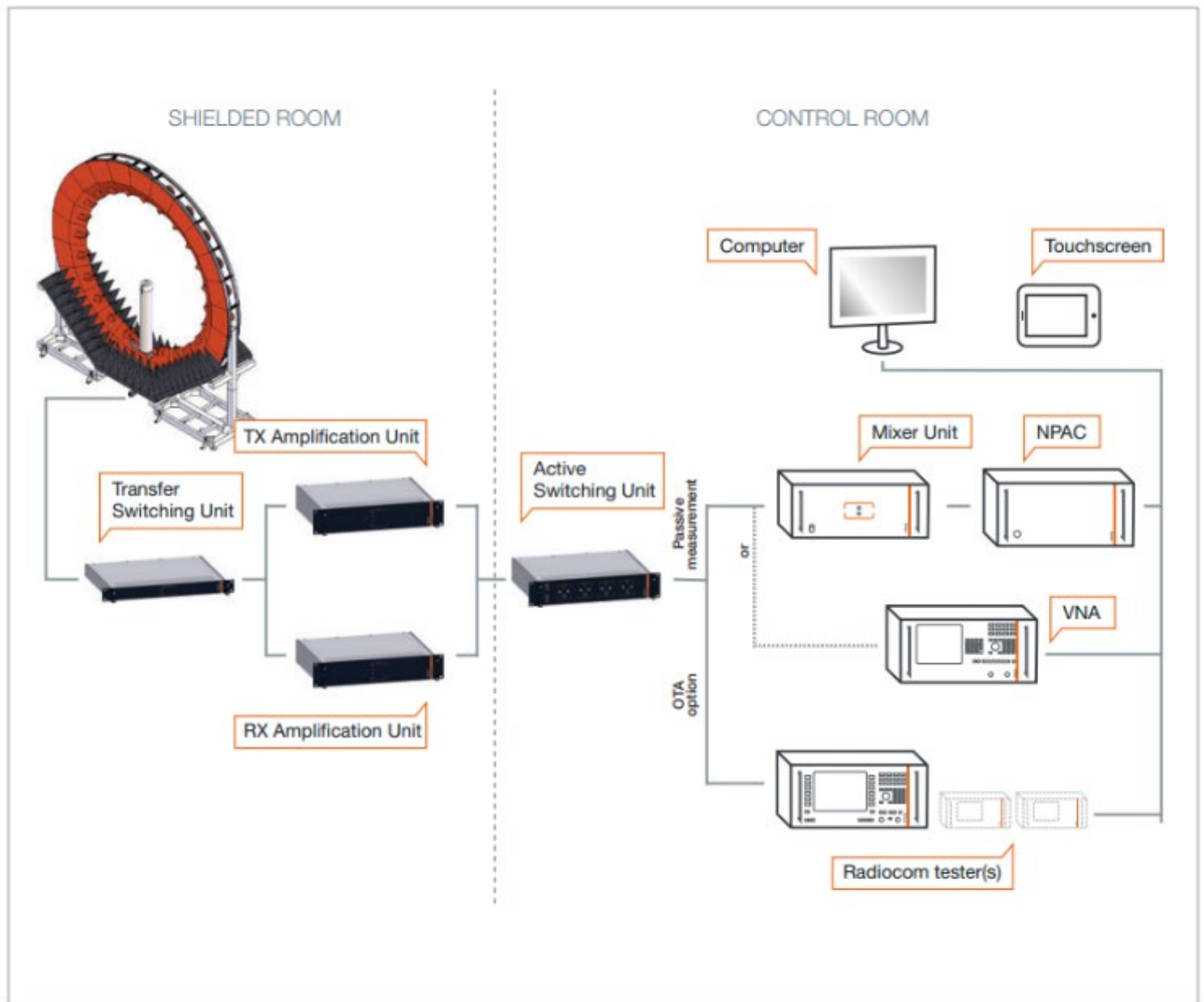
[Section 6. Diagram Example of Co-Location Antenna Separation](#)

1. Applicable test methods

This test report is prepared for host antenna testing under a Full Anechoic Chamber.

2. Test & System Description

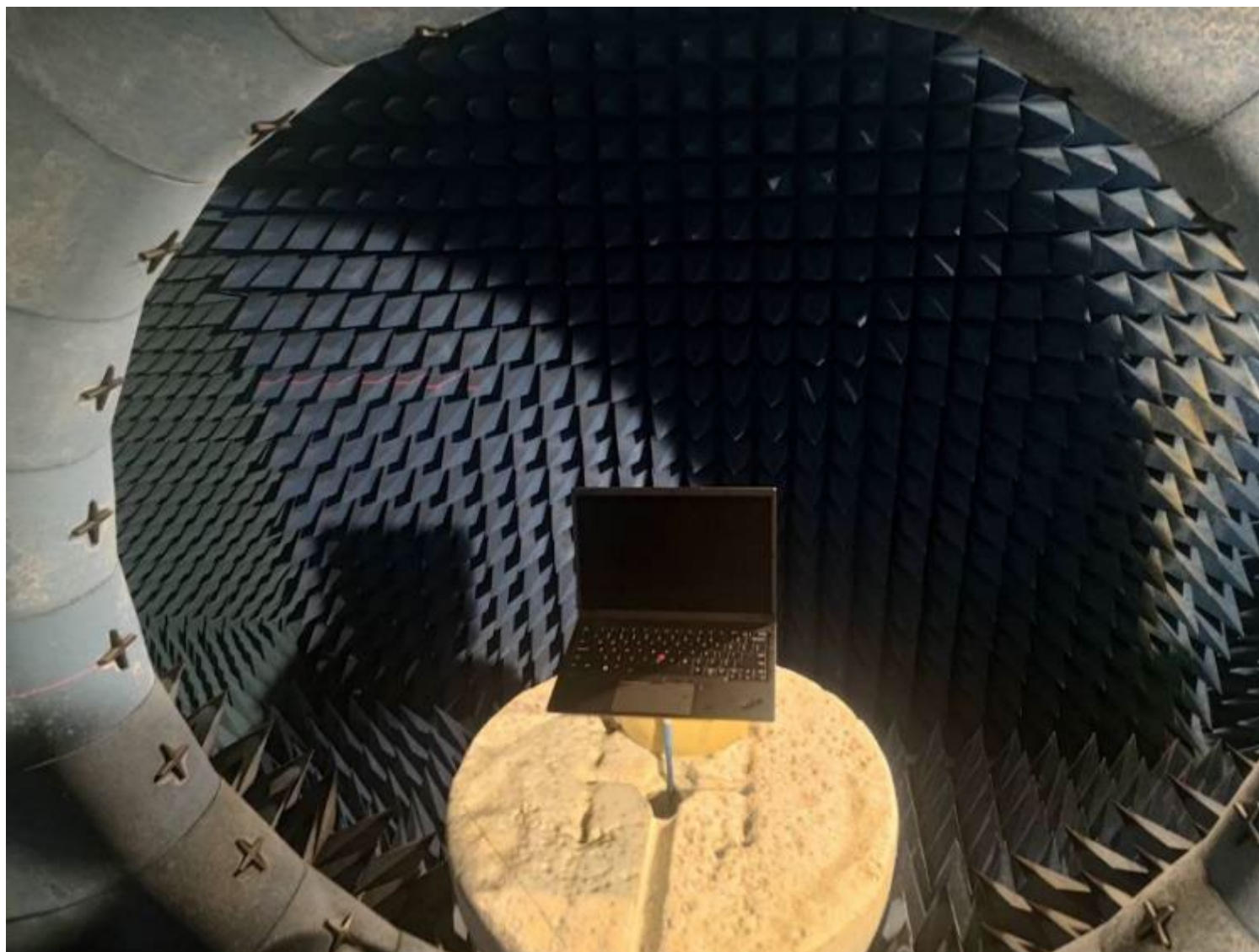
a. Test setup



b. Equipment list

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0001	Anechoic Chamber	SG24	-	SATIMO	2022-11-11	2023-11-11
0002	Turn Table	SATIMO	-	SATIMO	N/A	N/A
0003	Switch & Positioning systems	SATIMO	-	SATIMIO	N/A	N/A
0004	Horn antenna	SH400	-	SATIMIO	N/A	N/A
0005	Dipole antenna	SD740 SD880 SD1575 SD1800 SD2050 SD2450 SD5000 WD6000	-	SATIMIO	N/A	N/A
0006	Cable 1m – 40MHz to 26.5GHz	SUCOFLEX_101_PE	-	HUBER+SUHNER	N/A	N/A
0007	Spectrum Analyzer	N5230a	-	Agilent	2022-6-5	2023-6-5

3. Setup photo



Antenna Information

Section 1. Antenna Assembly Specifications

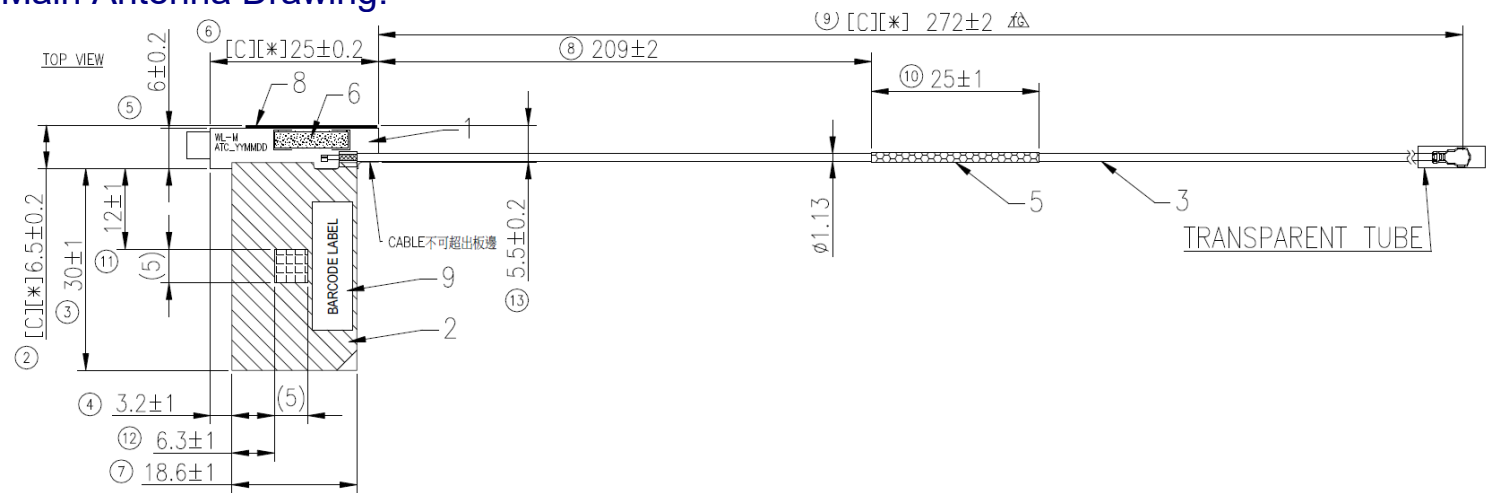
1A	1B	1C	1D		1E	1F	1G	1H
Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Freq Range MHz	* Peak Gain W/ Cable loss (dBi)	Peak Gain w/o Cable Loss (dBi)	Max VSWR	Cable Loss (dB)
P/N: DC33001YS10 Main Antenna	Amphenol Taiwan Corporation	PIFA	(P/N: LX5942-16-001-C) 50 ohm Coaxial length: 272 mm diameter: 1.13mm Connector Type: i-pex(MHF)	2400-2483.5	1.83	2.51	3.0	0.68
				5150-5250	0.53	1.56	3.0	1.03
				5250-5350	0.61	1.66	3.0	1.05
				5470-5725	0.88	1.94	3.0	1.06
				5725-5850	0.85	1.92	3.0	1.07
				5850-5895	0.52	1.60	3.0	1.08
				5925-6425	1.17	2.28	3.0	1.11
				6425-6525	0.70	1.82	3.0	1.12
				6525-6875	1.58	2.71	3.0	1.13
				6875-7125	1.72	2.86	3.0	1.14
P/N: DC33001YS20 Aux Antenna	Amphenol Taiwan Corporation	PIFA	(P/N: LX5942-16-002-C) 50 ohm Coaxial length: 445 mm diameter: 1.13mm Connector Type: i-pex(MHF)	2400-2483.5	1.82	2.91	3.0	1.09
				5150-5250	0.49	2.15	3.0	1.66
				5250-5350	-0.13	1.56	3.0	1.69
				5470-5725	1.32	3.04	3.0	1.72
				5725-5850	0.33	2.06	3.0	1.73
				5850-5895	0.12	1.86	3.0	1.74
				5925-6425	0.46	2.24	3.0	1.78
				6425-6525	0.99	2.79	3.0	1.80
				6525-6875	1.89	3.69	3.0	1.80
				6875-7125	2.06	3.87	3.0	1.81

- 3D Antenna Peak Gain required being test in system basis.

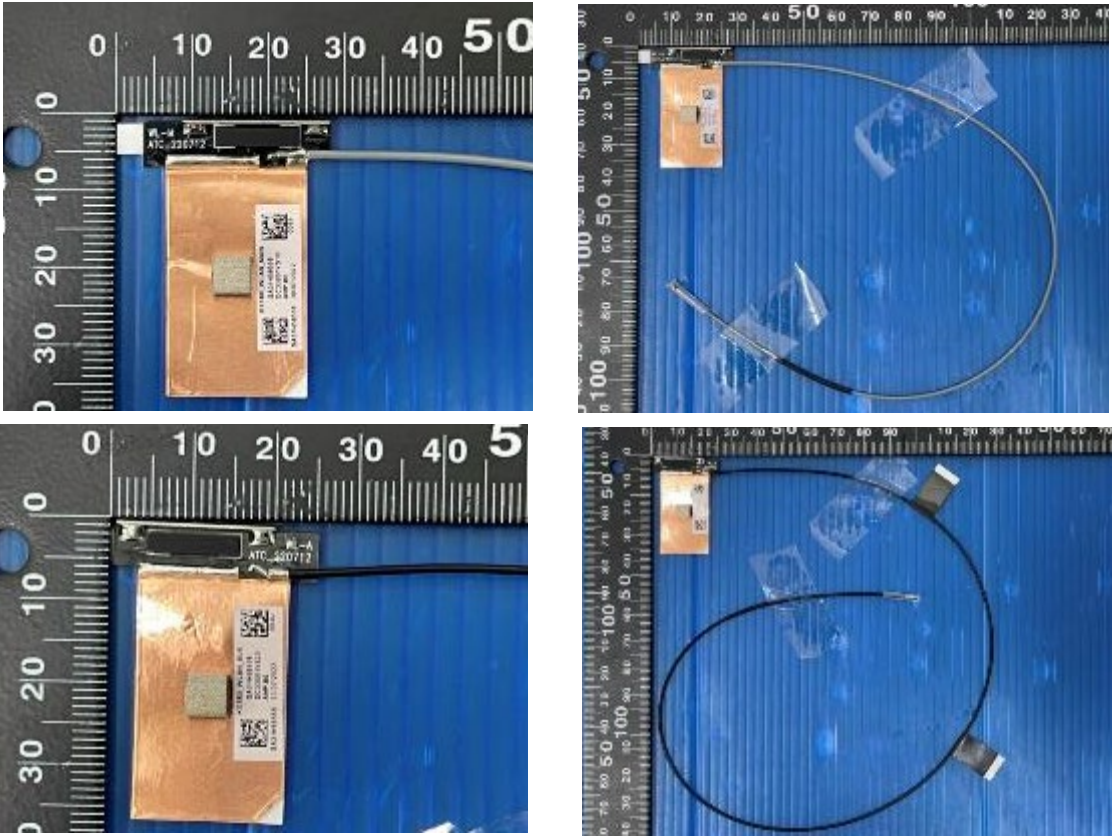
Section 2. Dimensioned Photos and Drawings of Antennas

Include the dimensioned photo and drawing of Main antenna here.

Main Antenna Drawing:



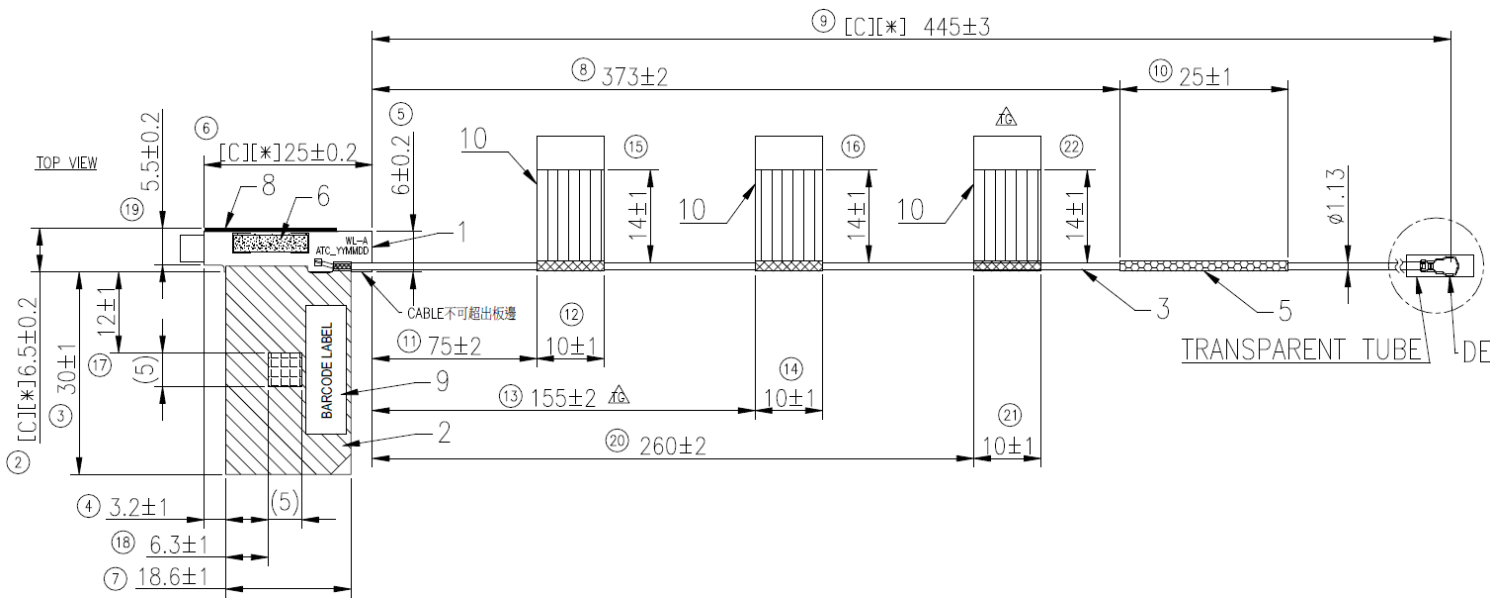
Main Antenna Photo (Front/Back):



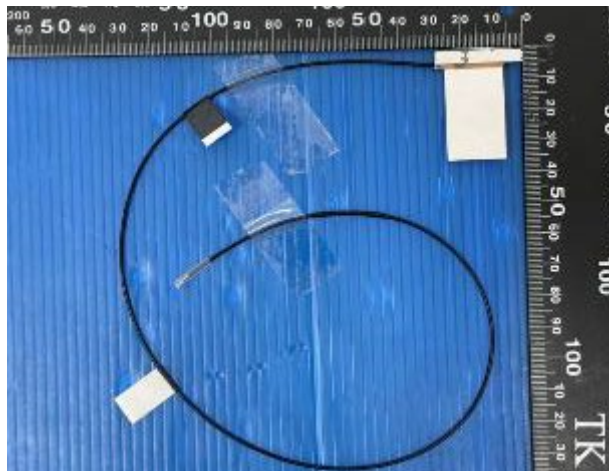
Note: antenna photo should include L type ruler

Include the dimensioned photo and drawing of Aux antenna here.

Aux Antenna Drawing:



Aux Antenna Photo (Front/Back):



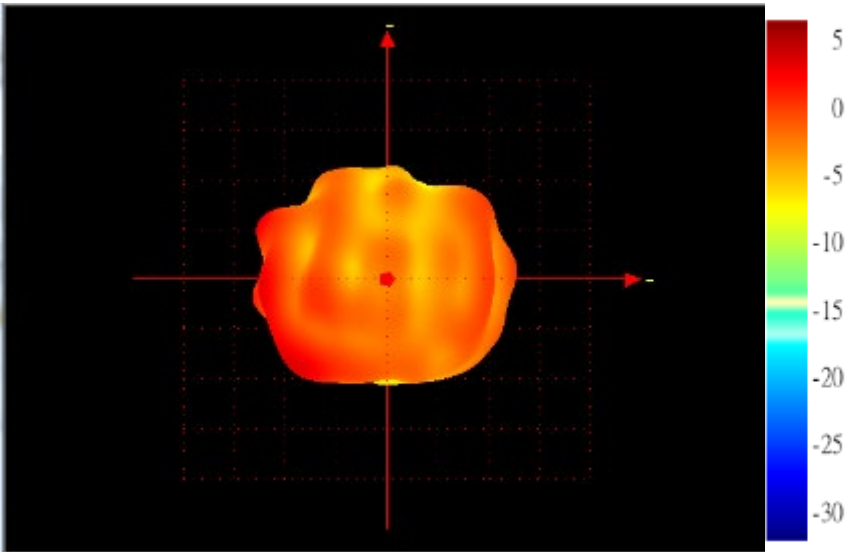
Note: antenna photo should include L type ruler

Section 3. Radiation characteristics of antenna loaded in Host Platform

Main Antenna

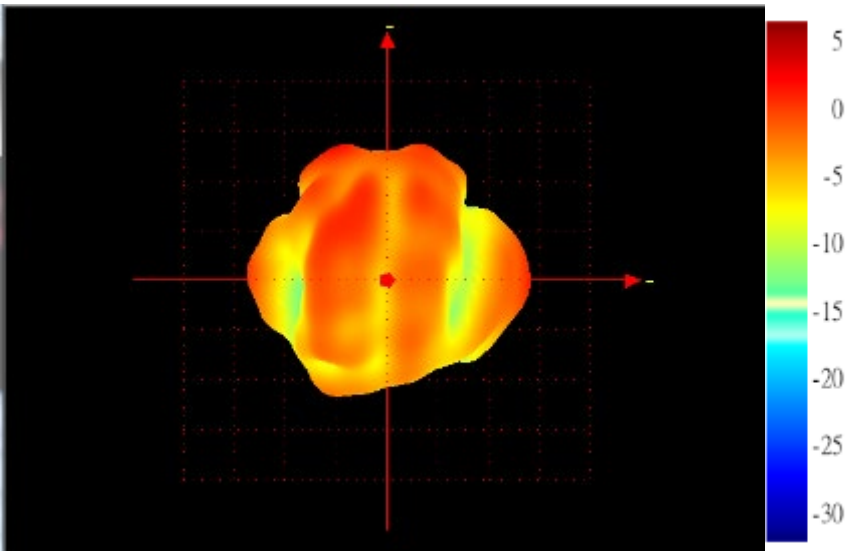
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	1.83



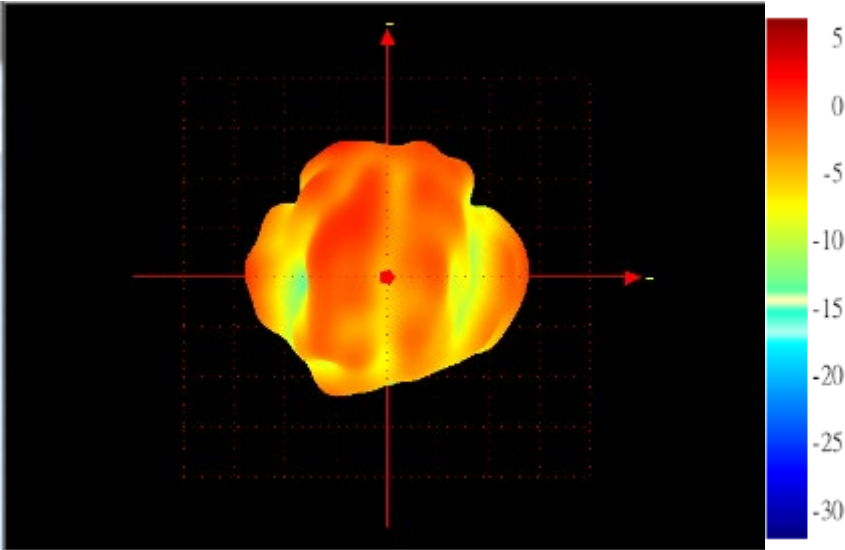
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	0.53



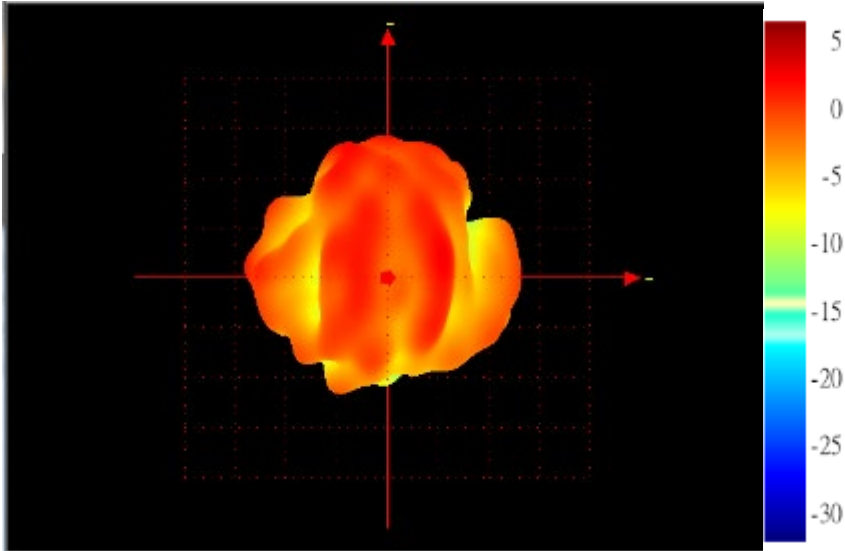
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	0.61



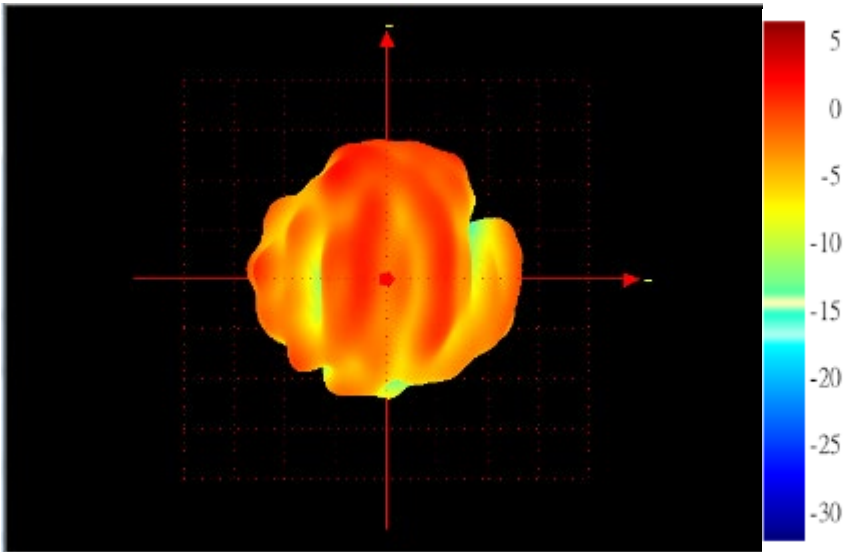
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	0.88



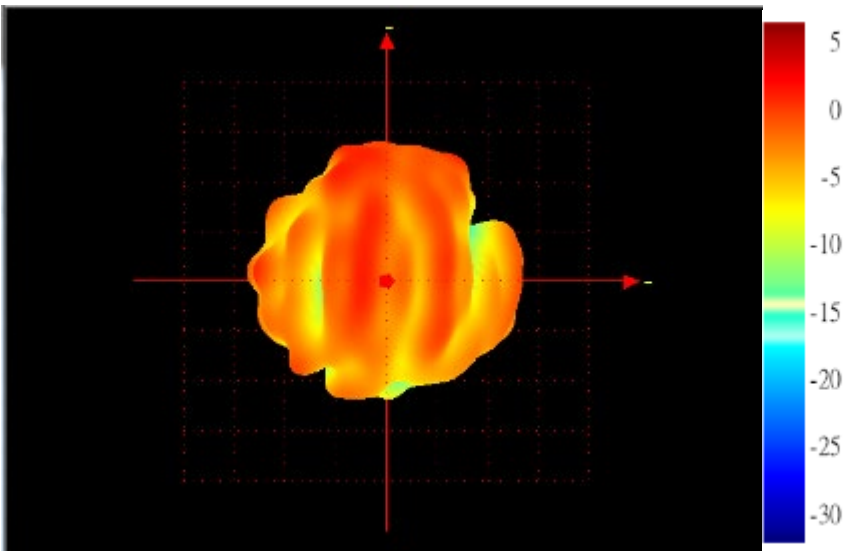
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	0.85



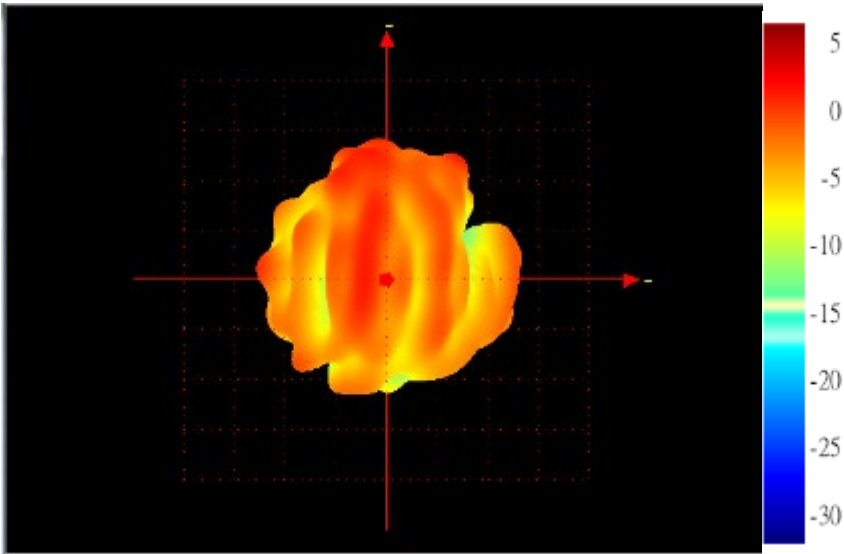
Max Antenna 3D Radiation Pattern 5850-5895 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	0.52



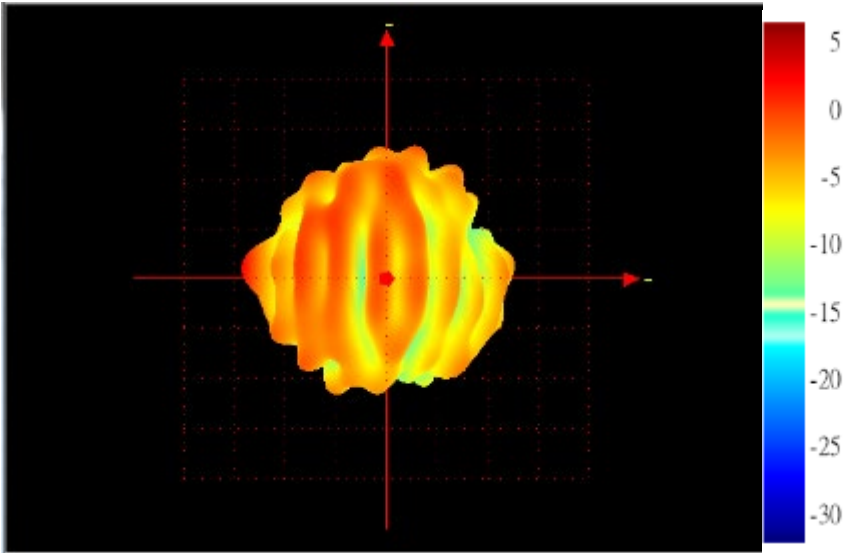
Max Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5925-6425	1.17



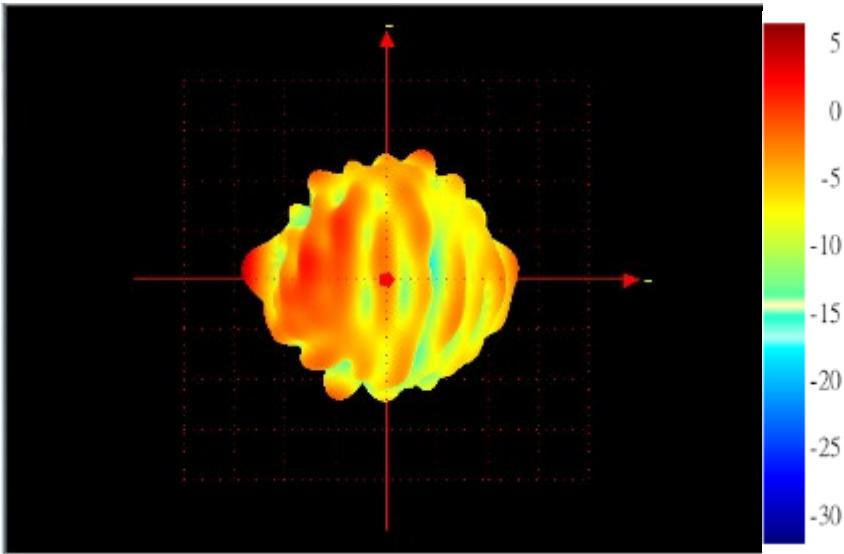
Max Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6425-6525	0.70



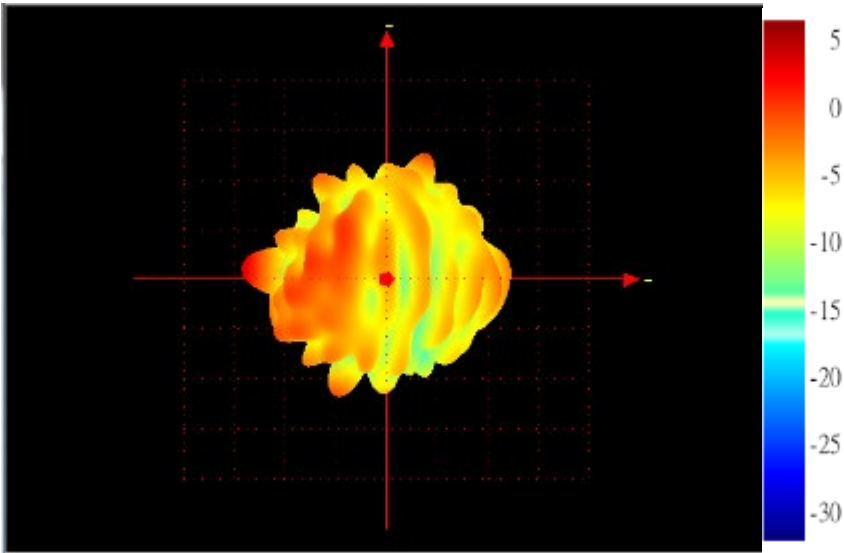
Max Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6525-6875	1.58



Max Antenna 3D Radiation Pattern 6875-7125 MHz

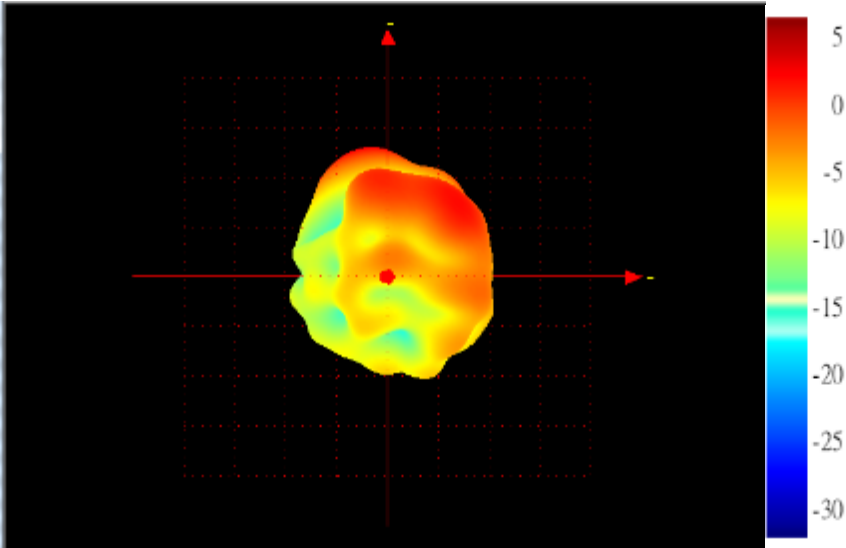
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6875-7125	1.72



Auxiliary Antenna

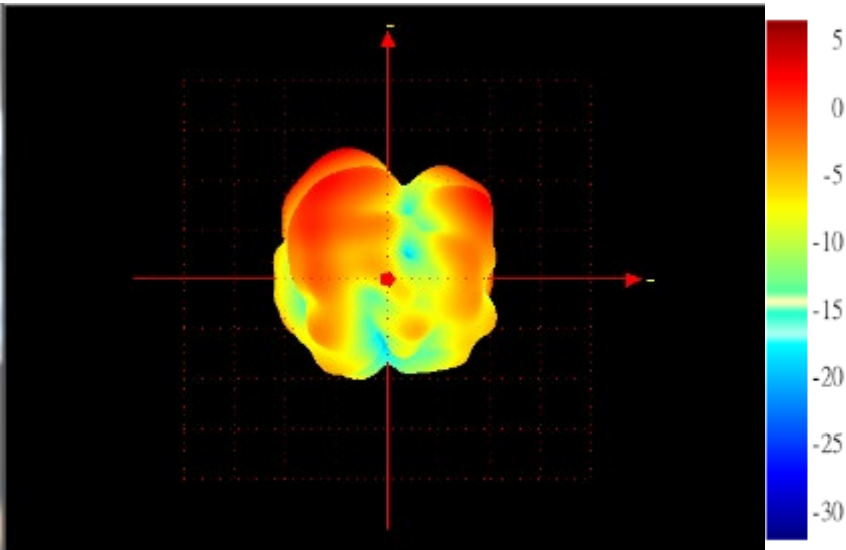
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	1.82



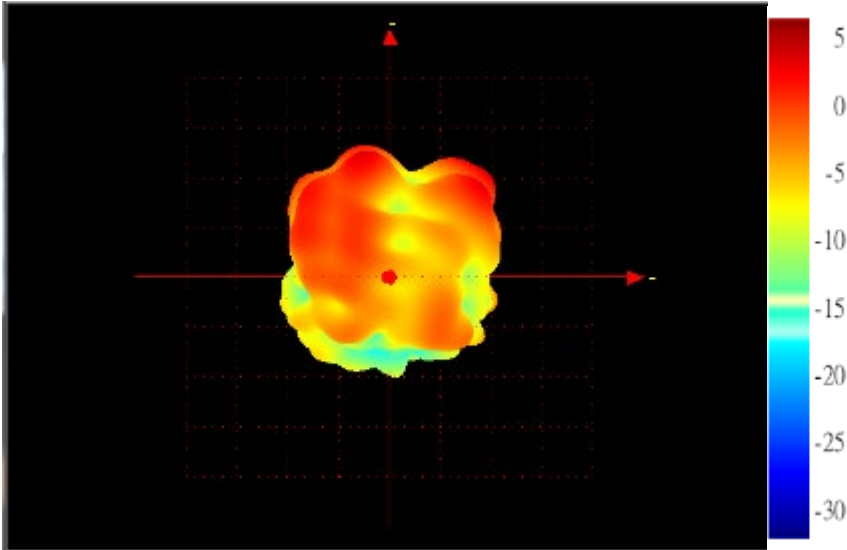
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	0.49



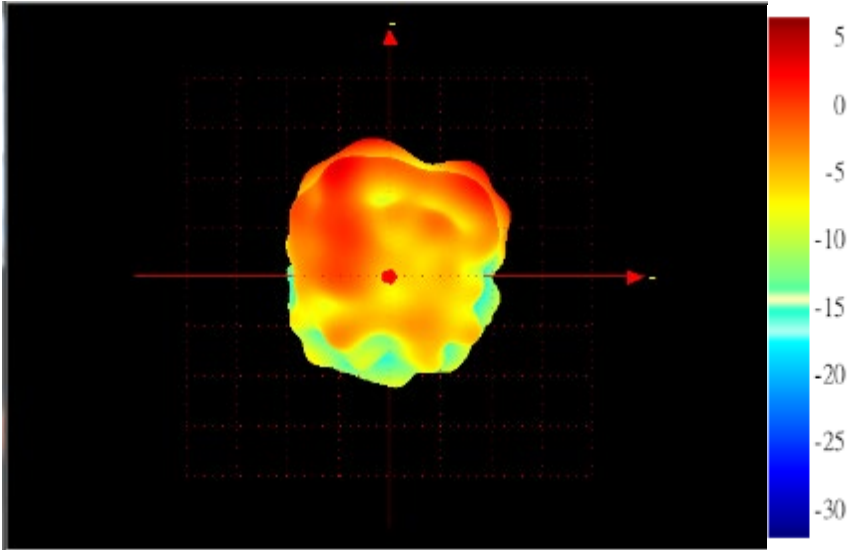
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	-0.13



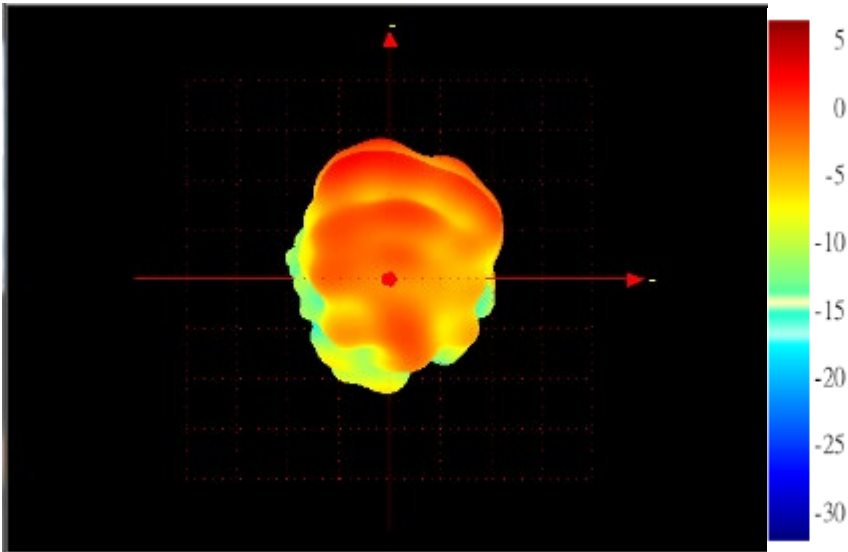
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	1.32



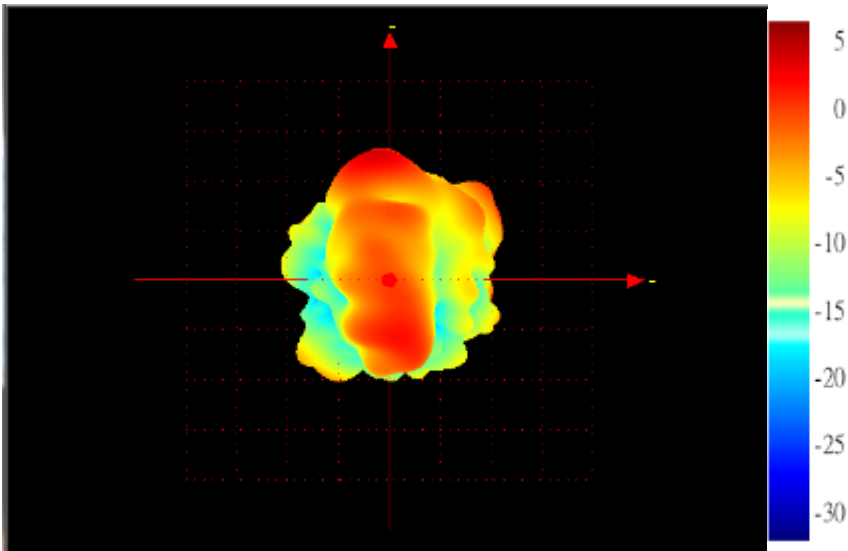
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	0.33



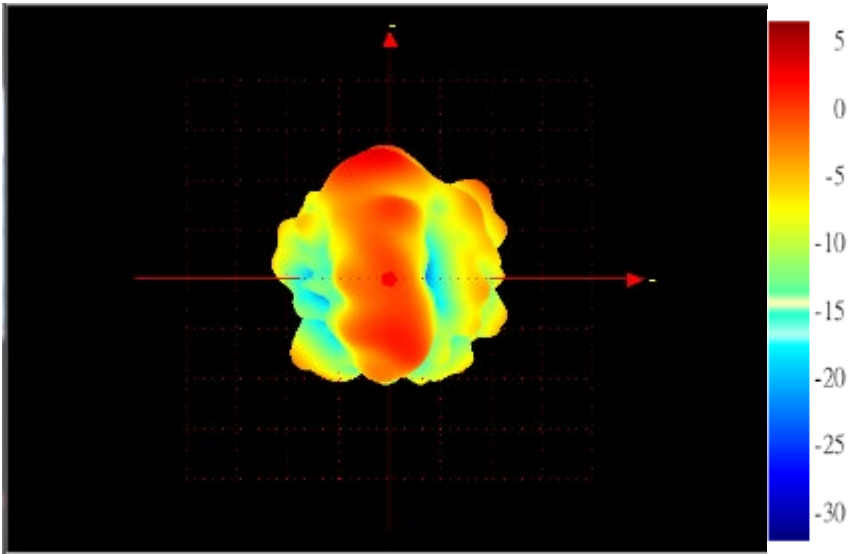
Max Antenna 3D Radiation Pattern 5850-5895 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	0.12



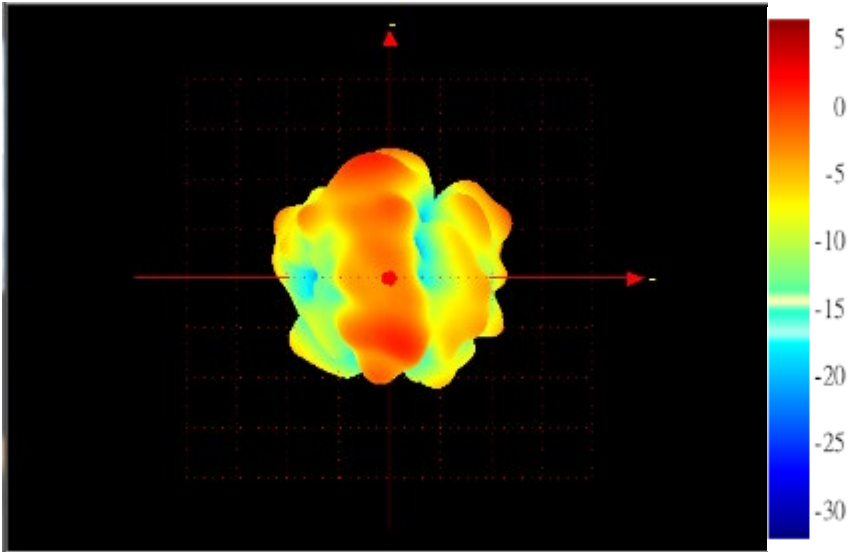
Max Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5925-6425	0.46



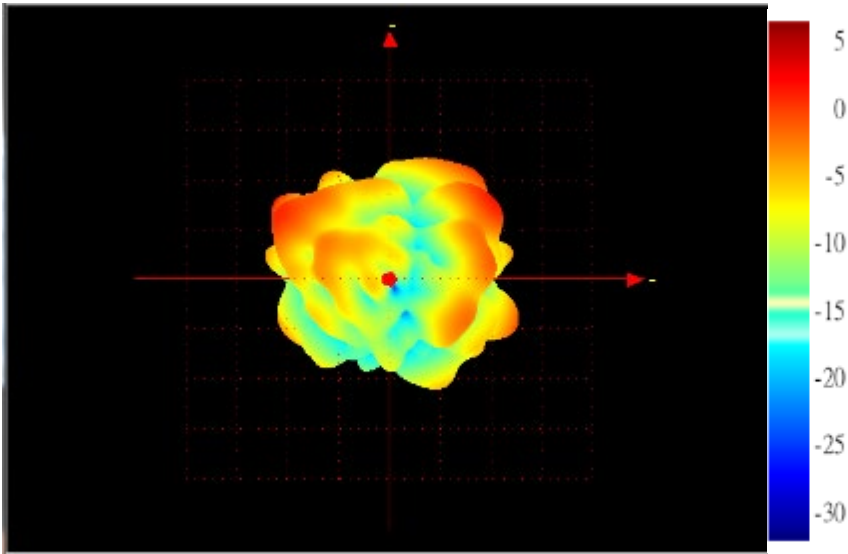
Max Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6425-6525	0.99



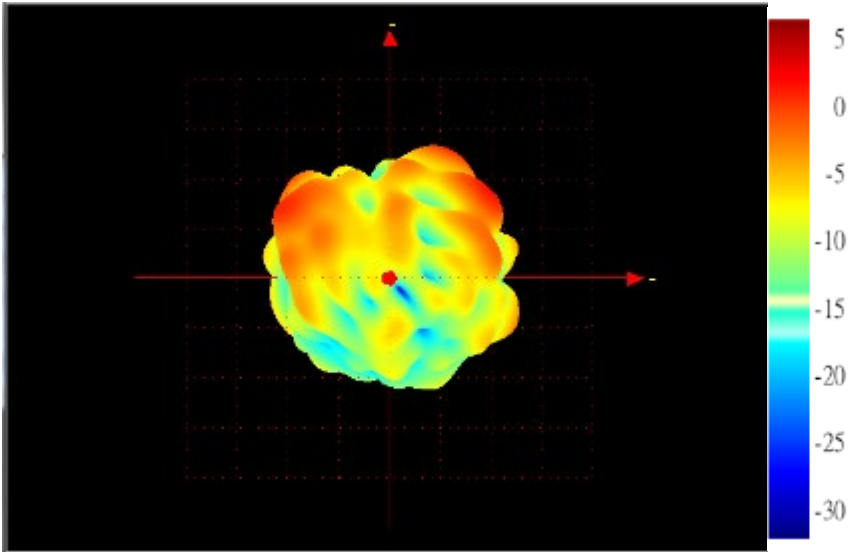
Max Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6525-6875	1.89



Max Antenna 3D Radiation Pattern 6875-7125 MHz

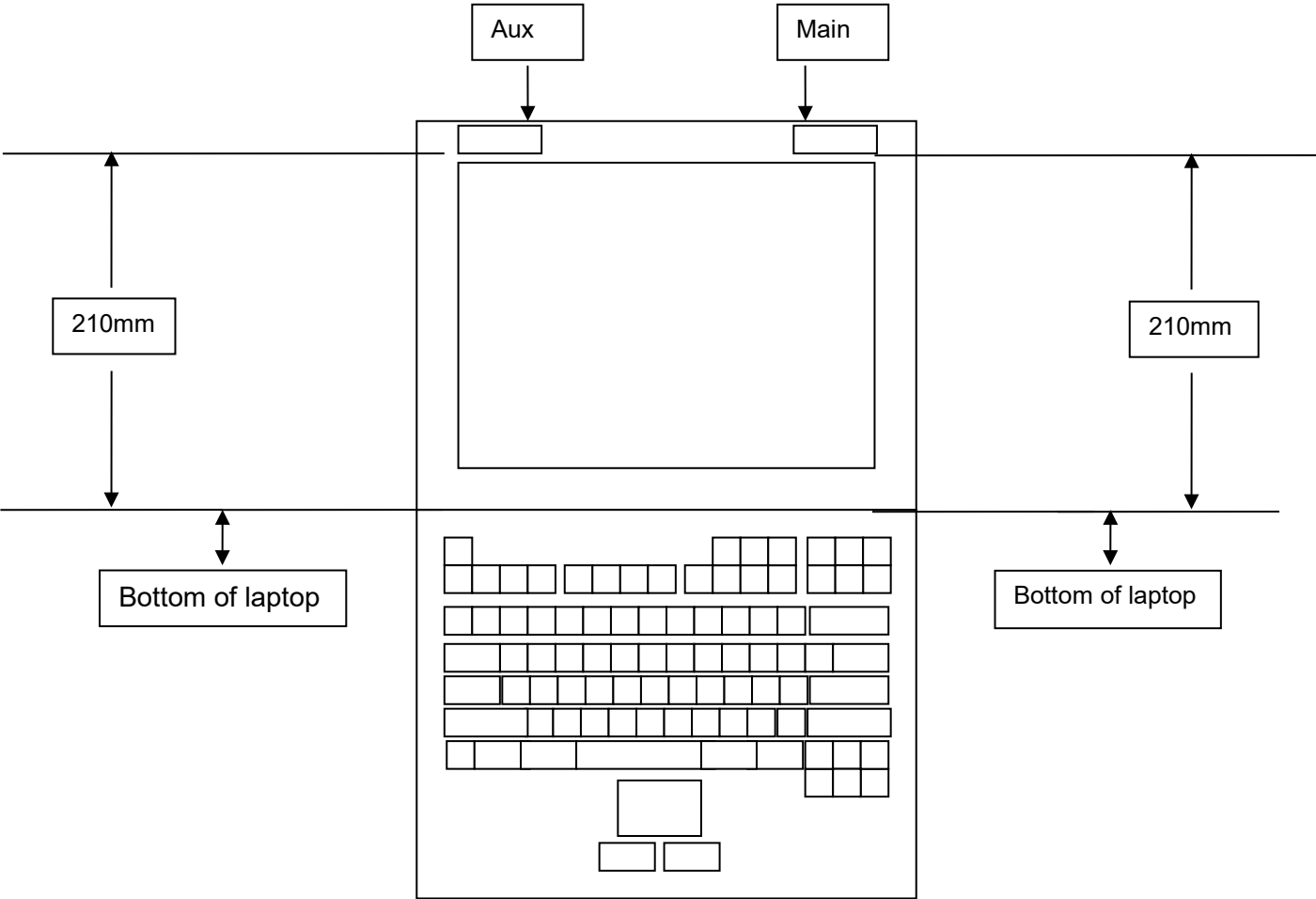
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6875-7125	2.06



Section 4. Antenna Host Platform Location Information

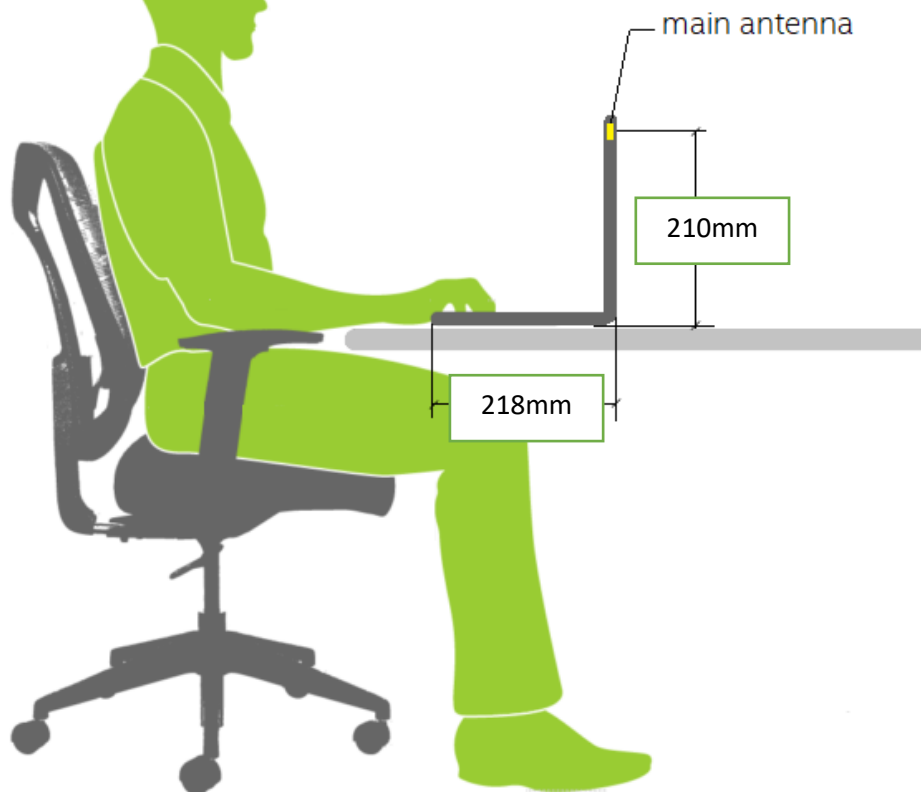
Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

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

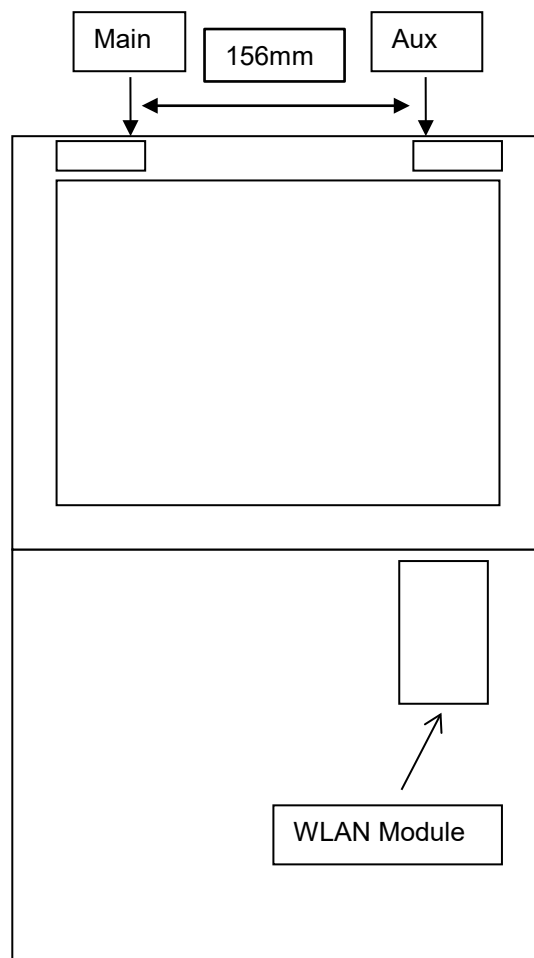
Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary 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)



Revision History

Revision	Description	Date
10.3	<u>Page2-5</u> Add Applicable test method, Test & System Description and Setup photo	July 24, 2022
10.4	<u>Cover page</u> Add Intel 5.9GHz reference antenna gain <u>Cover page/Section1/Section3</u> Add 5.9GHz antenna gain information	September 15, 2022