

Regulatory WLAN Antenna Information (Template)

English Language Required for Intel Regulatory Review / Approval

(OEM/ODM or antenna vendor is required to complete this document with platform antenna information.

Remove Intel references and make this your own document)

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	Compal Electronics Inc.	ThinkBook 14 G4 IAP	Yes	Regular NB	6.37					
*****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)				
SOUTHSTAR TECHNOLOGY CO.,LTD		PIFA	DC33002O000 (N12-7952-ROA)			DC33002O000 (N12-7952-ROA)				
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	6.2GHz 5925-6425MHz	6.5GHz 6425-6525MHz	6.7GHz 6525-6875MHz	7.0 GHz 6875-7125MHz	
Main	1.66	2.68	2.68	2.66	2.5	2.47	1.86	2.35	2.31	
Aux	1.61	1.54	1.93	2.47	2.23	2.53	2.49	2.34	2.33	
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	6.2GHz 5925-6425MHz	6.5GHz 6425-6525MHz	6.7GHz 6525-6875MHz	7.0GHz 6875-7125MHz	
Design	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	Generic: refer to modular FCC SAR report Mid-power: ≥ 8 mm Low power: ≥ 5 mm
PIFA	3.24	3.64	3.73	4.77	4.97	4.83	4.30	5.37	5.59	
Dipole	2.89	2.92	3.19	4.41	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.										

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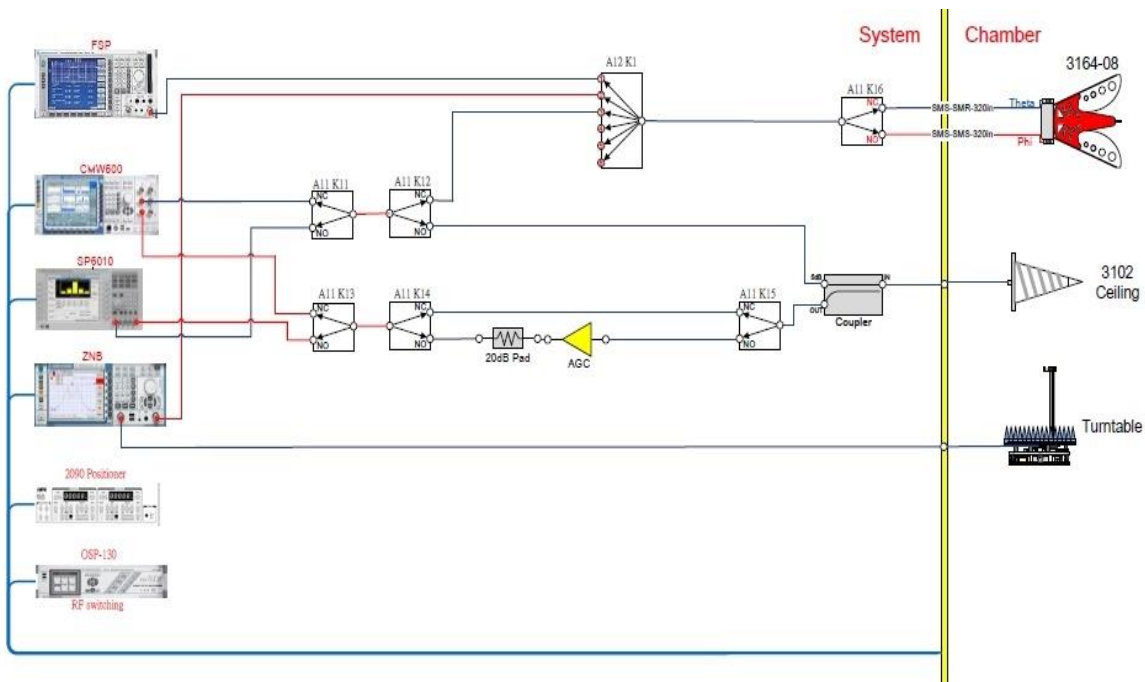
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1. Applicable test methods

The radiation pattern of antenna is measured in both horizontal polarization and vertical polarization. The radiation pattern measurements are performed in the three-dimensional anechoic chamber. The chamber provides less than -30dB reflectivity from 800MHz through 8GHz . The chamber is calibrated using both standard dipole antenna and horn antenna. The Gain here is expressed as dBi that standardizes the isotropic antenna. The Gain measurements and antenna radiation pattern are also performed in the same chamber described previously.

2. Test & System Description

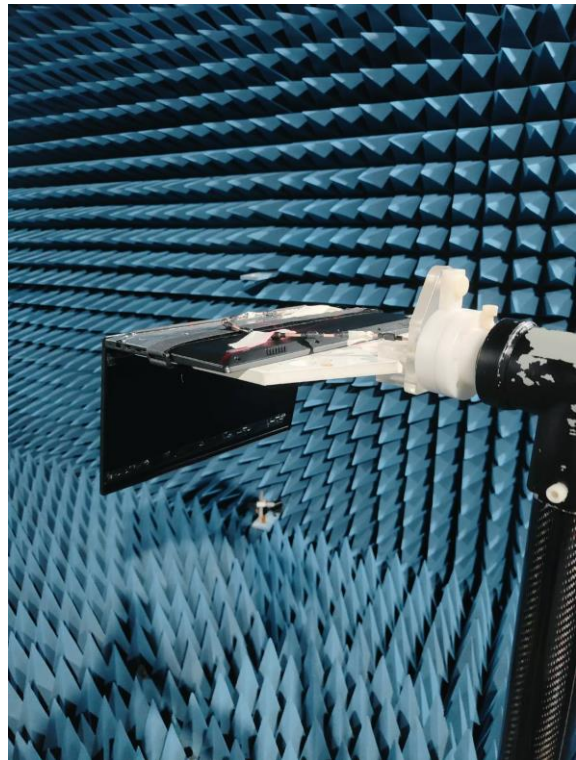
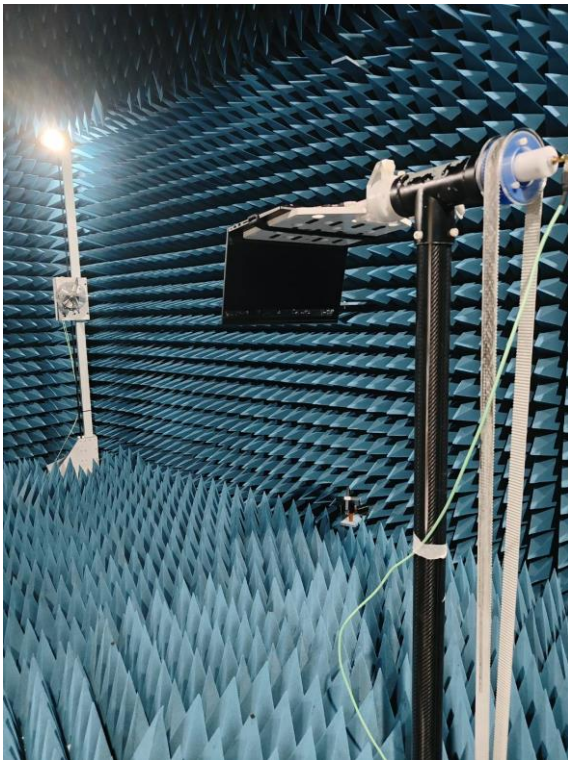
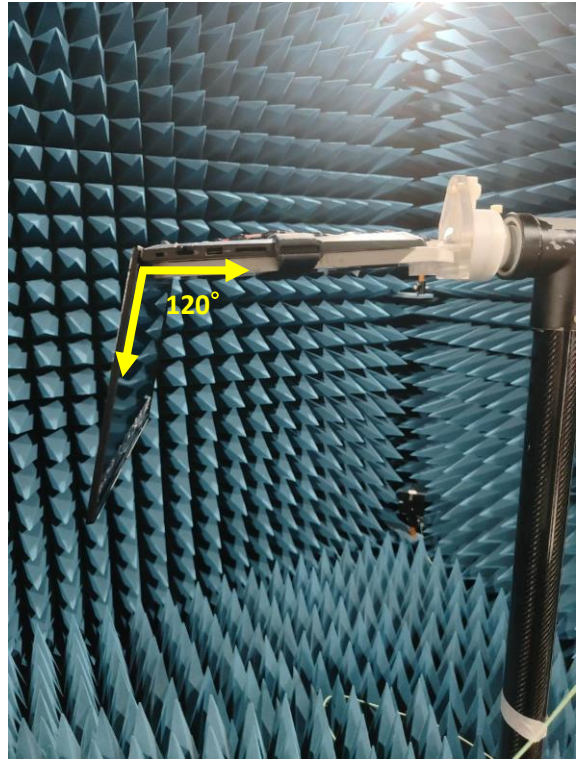
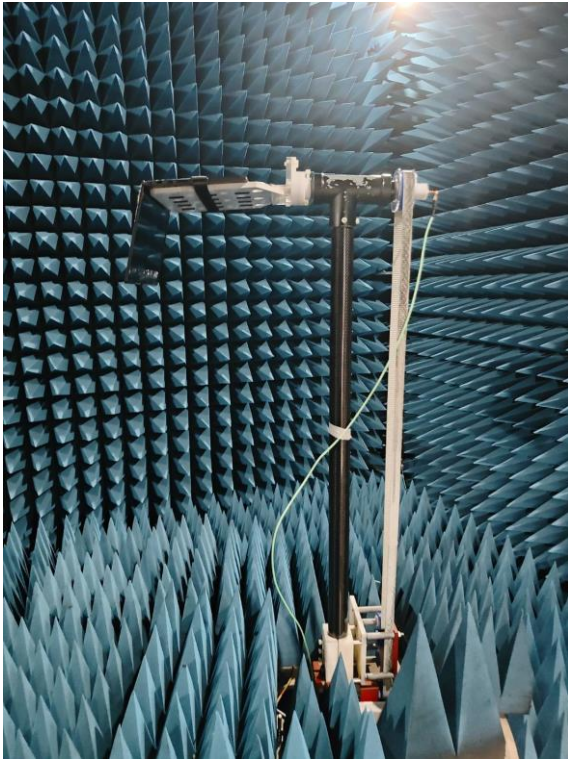
a. Test setup



b. Equipment list

ID#	Device	Type/Model	Serial#	Manufacturer	Cal.Date	Cal.Due Date
	Customized Switch Module	BWant		BWant	N/A	N/A
	Programmable Attenuator	PATT-121-4		BWant	N/A	N/A
	Horn Antenna	700MHz-10GHz		BWant	2021.11.19	2023.11.19
	Network Analyzer	ZNB 20 (20GHz)		ROHDE&SCHWARZ	2022.1.10	2024.1.10
		MS46524B (43.5GHz)		Anritsu	2022.2.12	2024.2.12
	Cable	LL 142		Fairview Microwave	2022.3.17	2023.9.17
	Turn table	BWant		BWant	N/A	N/A
	Anechoic Chamber	MS10 700-8GHz		BWant	2022.5.10	2023.5.10
		MM6 24-42GHz		BWant	2022.3.1	2023.3.1
		MM5 24-42GHz For mmWave AiP		BWant	2022.3.1	2023.3.1
	Noise Floor Measurement System	SLB-8G-P		BWant	2022.1.1	2022.12.31
	Digital Caliper	CD-P8S		Mitutoyo	N/A	N/A
	Three-dimensions Anechoic Chamber	N/A		N/A	N/A	N/A
	Boresight antenna mast	N/A		N/A	N/A	N/A
	Spectrum analyzer	MS2830A		Anritsu	2021.10.20	2023.10.21
	Biconical antenna	N/A		N/A	N/A	N/A
	Horn Antenna + Amplifier + HPF6.4	HAD-0710		BWant	2020.12.28	2022.12.25

3. Setup photo



Antenna Information

Section 1. Antenna Assembly Specifications

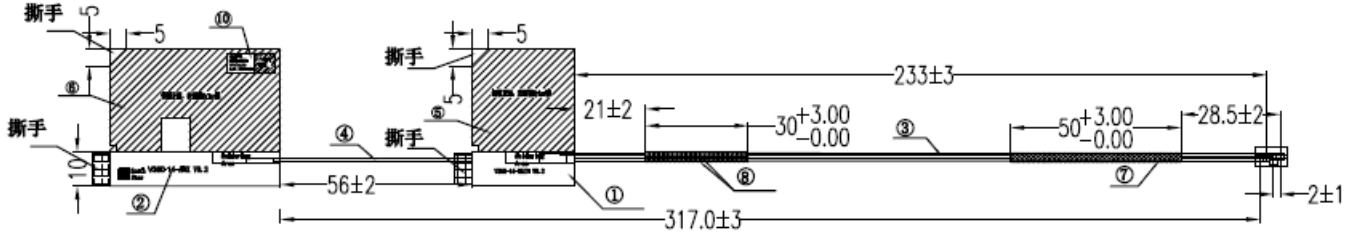
1A	1B	1C	1D	1E	1F	1G	1H	
Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Freq Range MHz	* Peak Gain W/ Cable loss (dBi)	Peak Gain w/o Cable Loss (dBi)	Max VSWR	Cable Loss (dB)
DC33002O000 (N12-7952-R0A) Main Antenna	Shenzhen South Star Technology Ltd	PIFA	50 ohm Coaxial length: 233cm diameter : 1.13mm_LLS Connector : I-PEX4 Kangshuo MHF-B13-N-01	2400-2483.5	1.66	2.31	3	0.65
				5150-5250	2.68	3.66	3	1.06
				5250-5350	2.68	3.66	3	1.06
				5470-5725	2.66	3.65	3	0.99
				5725-5850	2.50	3.51	3	1.01
				5925-6425	2.47	3.53	3	1.06
				6425-6525	1.86	2.94	3	1.08
				6525-6875	2.35	3.45	3	1.10
			6875-7125	2.31	3.45	33	1.14	
DC33002O000 (N12-7952-R0A) Aux Antenna	Shenzhen South Star Technology Ltd	PIFA	50 ohm Coaxial length: 317cm diameter : 1.13mm_LLS Connector : I-PEX4 Kangshuo MHF-B13-N-01	2400-2483.5	1.61	2.49	3	0.88
				5150-5250	1.54	3.12	3	1.22
				5250-5350	1.93	3.12	3	1.22
				5470-5725	2.47	3.83	3	1.35
				5725-5850	2.23	3.60	3	1.37
				5925-6425	2.53	3.97	3	1.44
				6425-6525	2.49	3.96	3	1.47
				6525-6875	2.34	3.84	3	1.50
			6875-7125	2.33	3.88	3	1.55	

- 3D Antenna Peak Gain required being test in system basis.
- The antenna gain was measure in Anechoic Chamber.

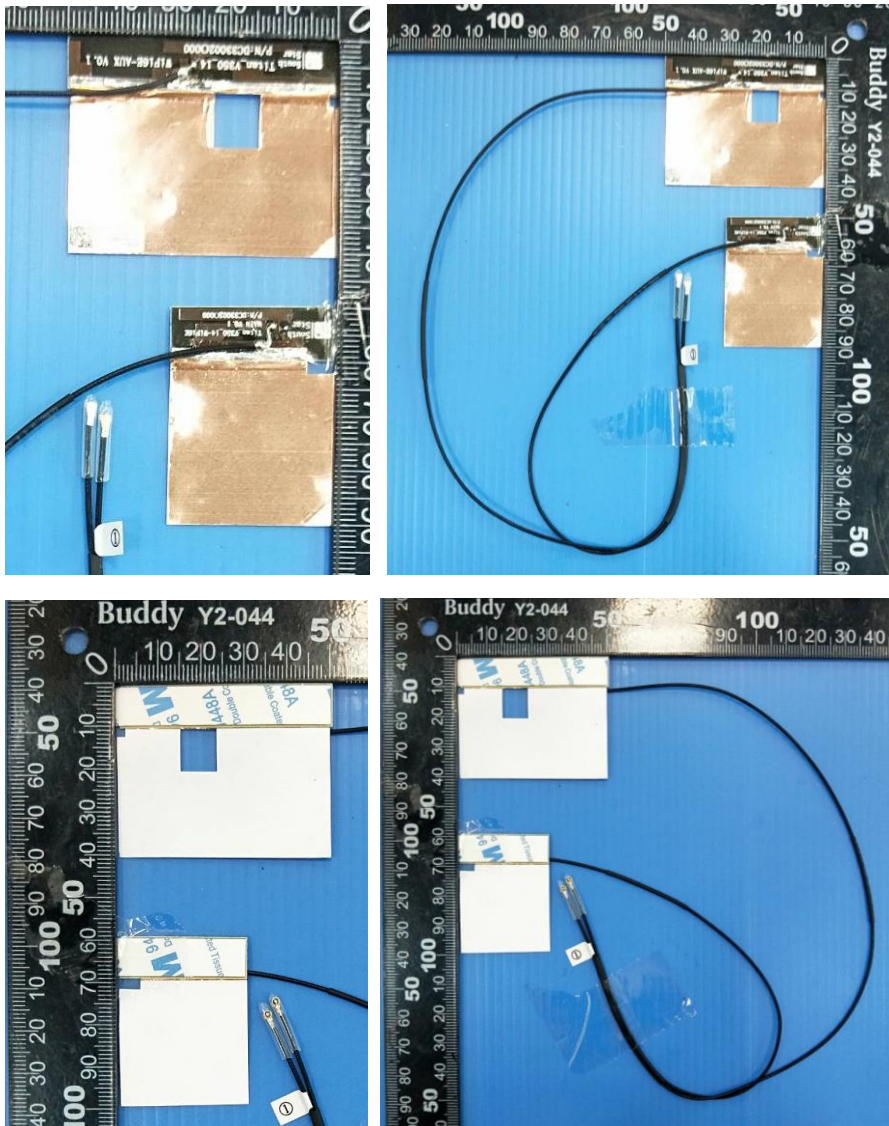
Section 2. Dimensioned Photos and Drawings of Antennas

Include the dimensioned photo and drawing of Main antenna here.

Main Antenna Drawing:



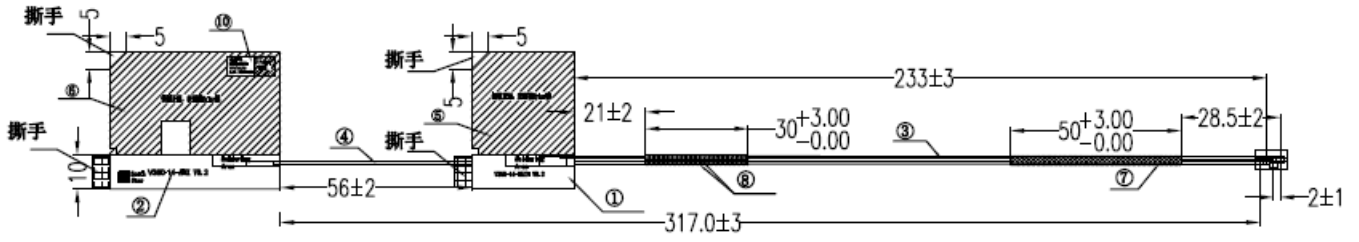
Main Antenna Photo (Front/Back):



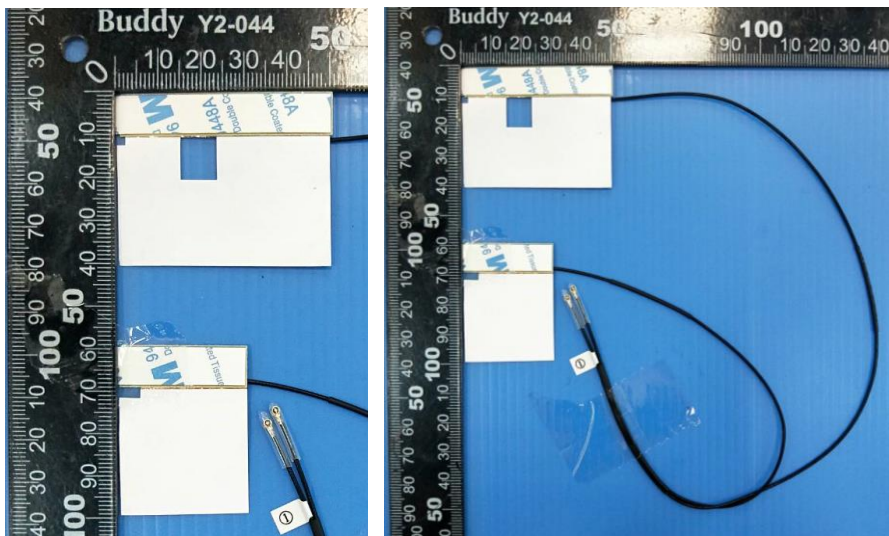
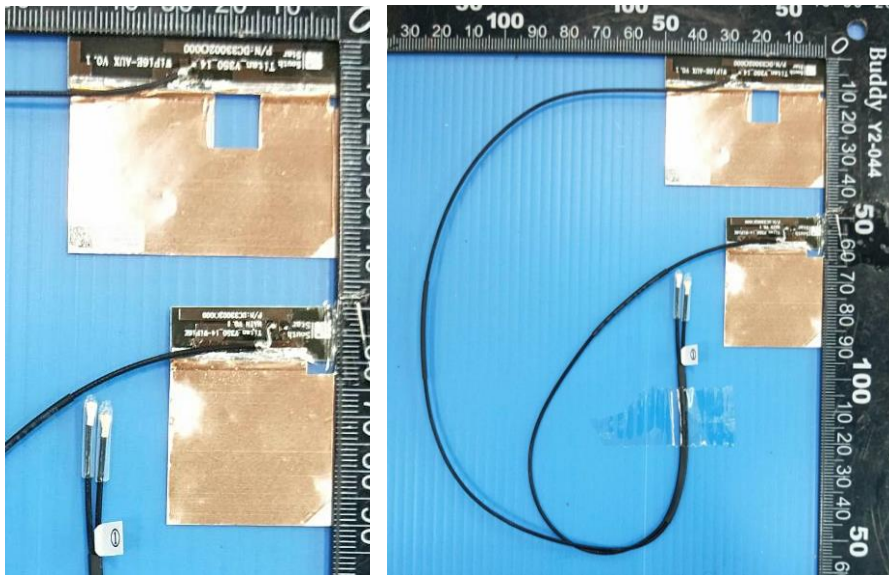
Note: antenna photo should include L type ruler

Include the dimensioned photo and drawing of Aux antenna here.

Aux Antenna Drawing:



Aux Antenna Photo (Front/Back):



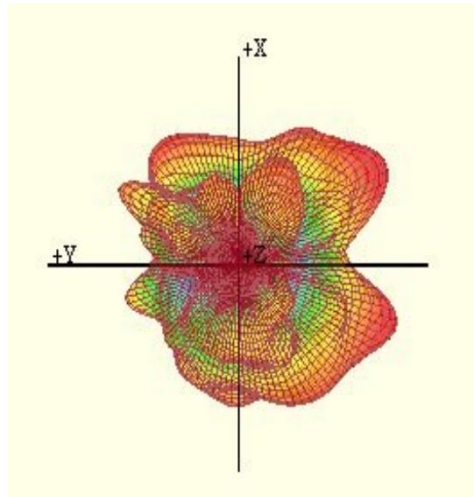
Note: antenna photo should include L type ruler

Section 3. Radiation characteristics of antenna loaded in Host Platform

Main Antenna

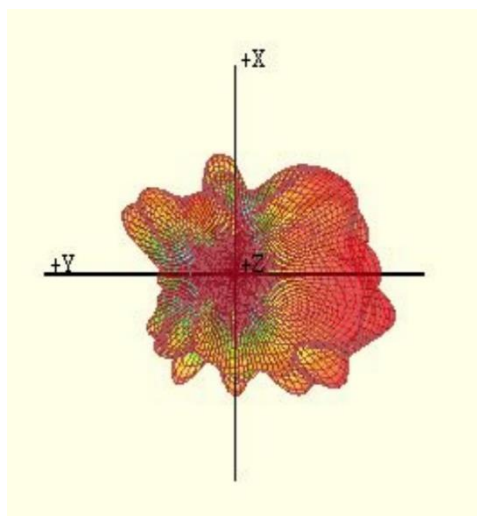
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	1.66



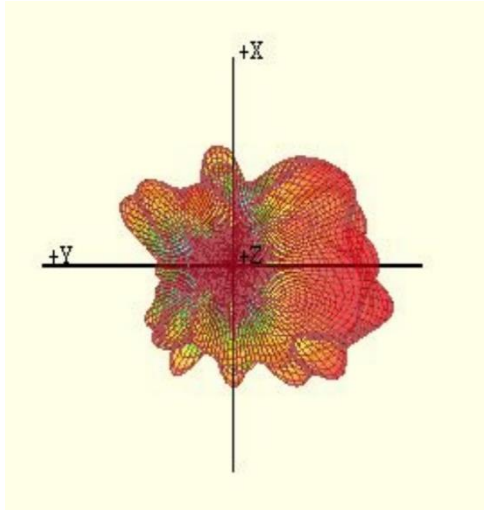
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	2.68



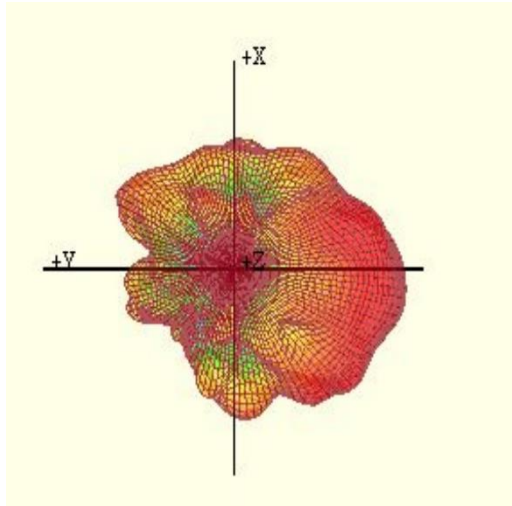
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	2.68



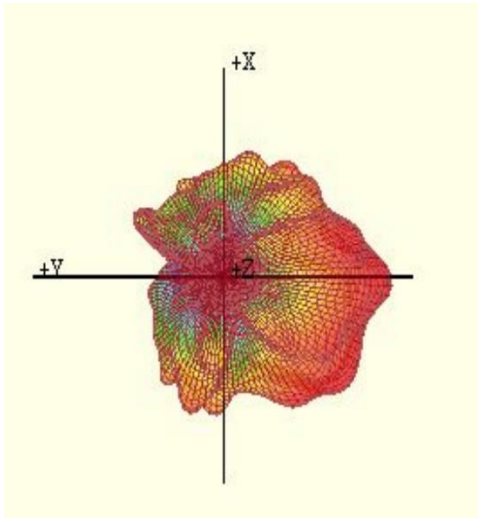
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.66



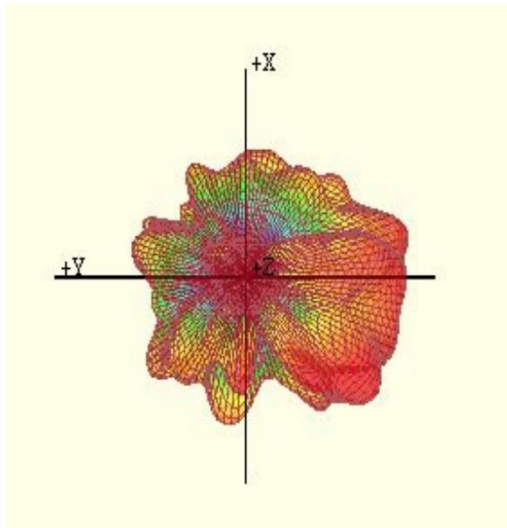
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	2.50



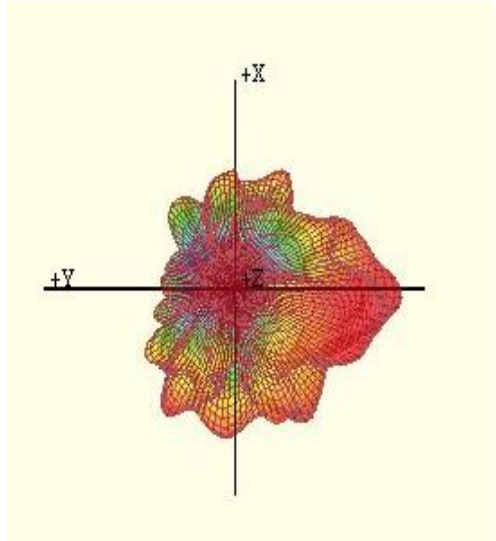
Max Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5925-6425	2.47



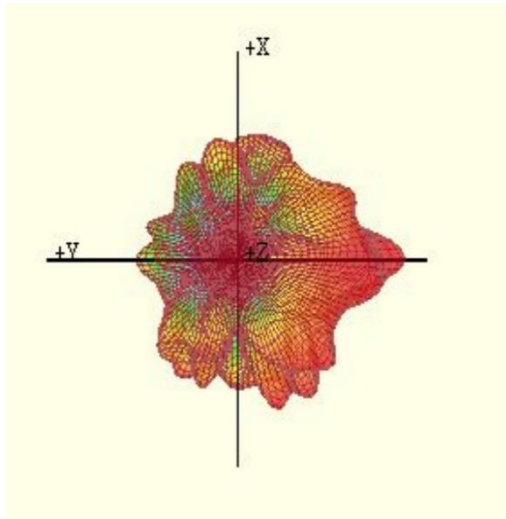
Max Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6425-6525	1.86



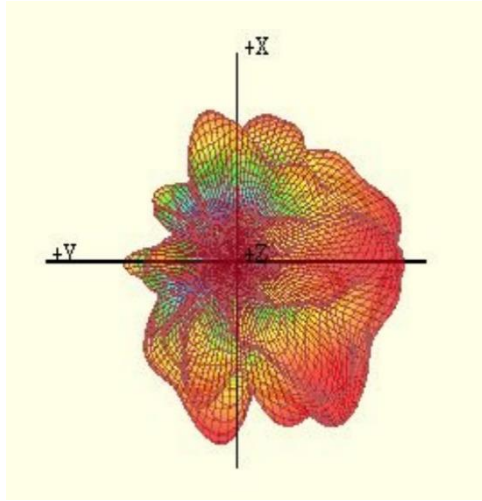
Max Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6525-6875	2.35



Max Antenna 3D Radiation Pattern 6875-7125 MHz

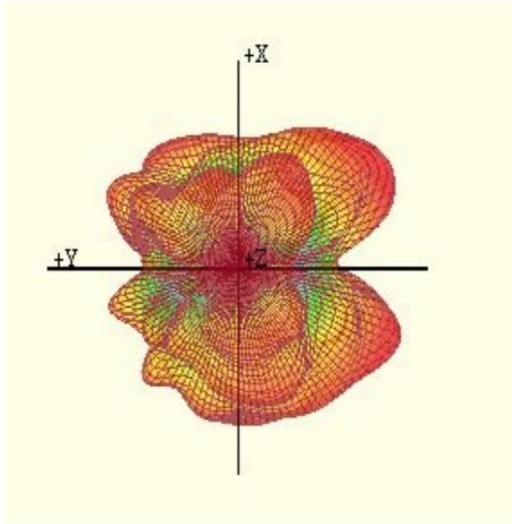
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6875-7125	2.31



Auxiliary Antenna

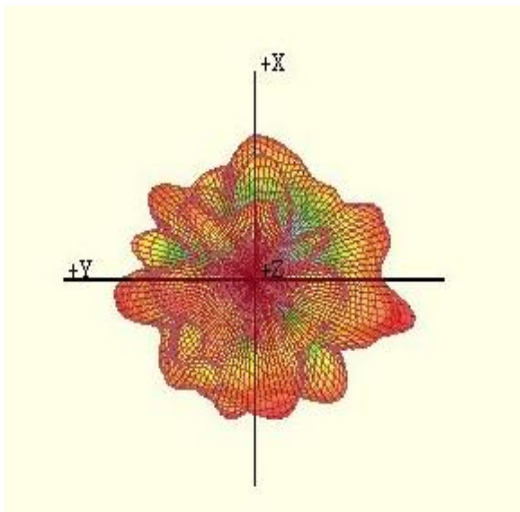
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	1.61



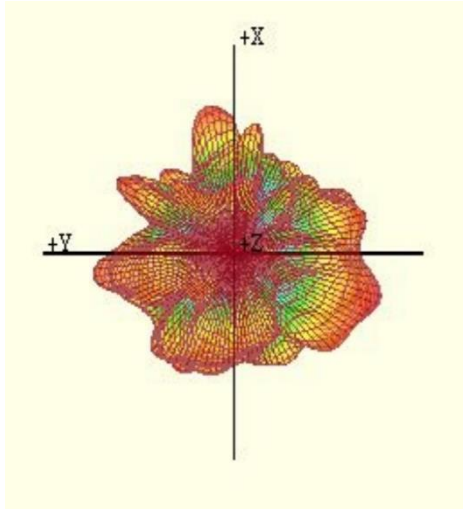
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	1.54



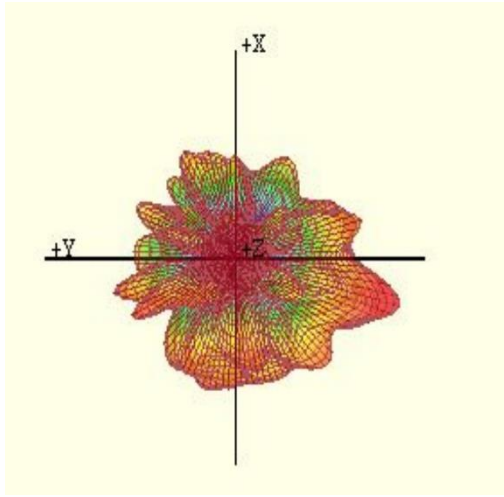
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	1.93



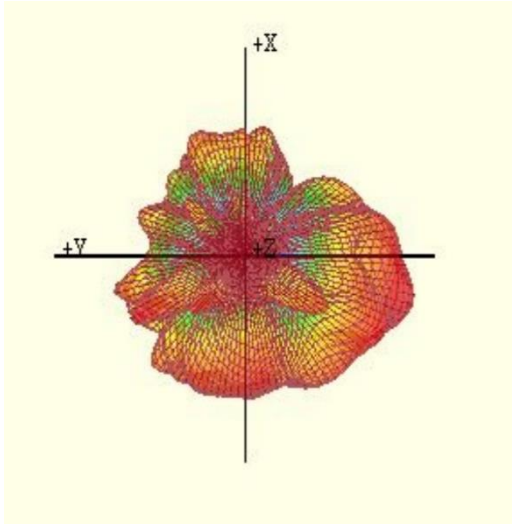
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.47



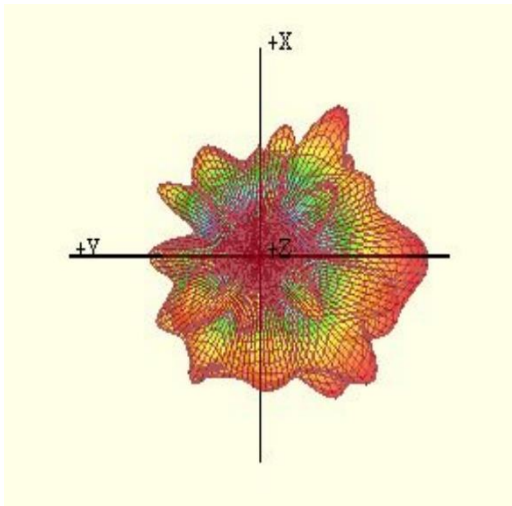
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	2.23



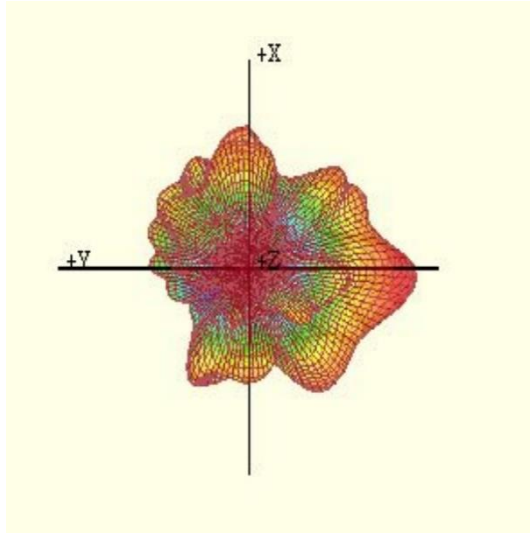
Max Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5925-6425	2.53



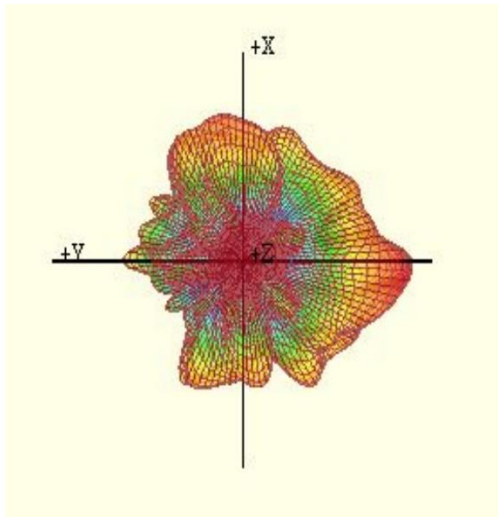
Max Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6425-6525	2.49



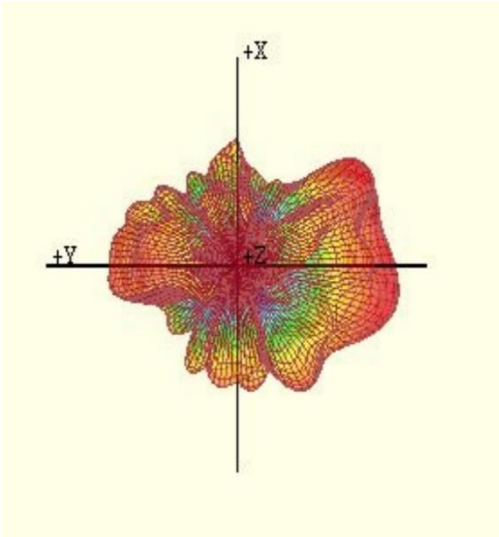
Max Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6525-6875	2.34



Max Antenna 3D Radiation Pattern 6875-7125 MHz

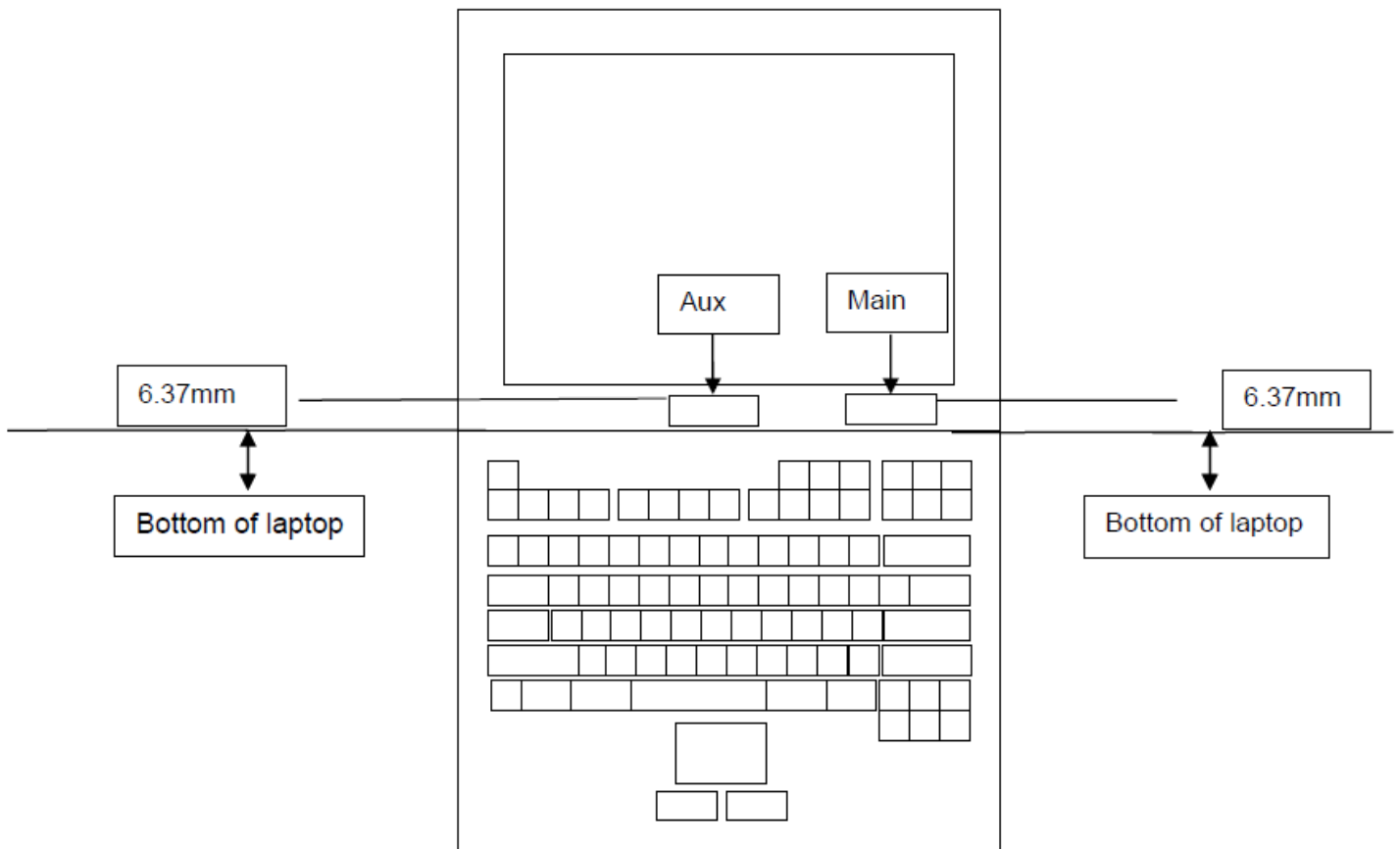
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6875-7125	2.33



Section 4. Antenna Host Platform Location Information

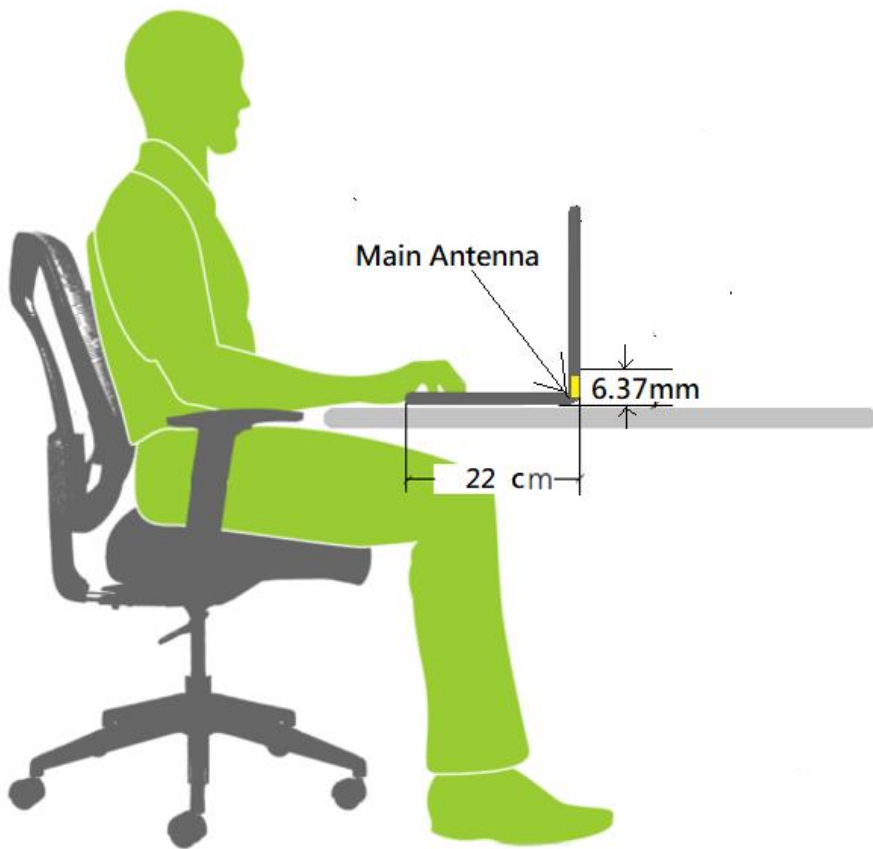
Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

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)

