

Regulatory WLAN Antenna Information

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)		
ASUS	Compal		CR1102FG, CR1102FGA			No	Convertible PC		6mm (to edge) 18.4mm (to keyboard)		
****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)			
Luxshare		PIFA			(DC33002SN0S) LA9RF452-CS-H			(DC33002SN0S) LA9RF452-CS-H			
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	2.51	2.93	2.74	2.88	2.55	2.76	N/A	N/A	N/A	N/A	
Aux	2.95	2.98	2.84	2.77	2.85	2.83	N/A	N/A	N/A	N/A	
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	
	PIFA	3.24	3.64	3.73	4.77	4.97	4.72	4.83	4.30	5.37	
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.											

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

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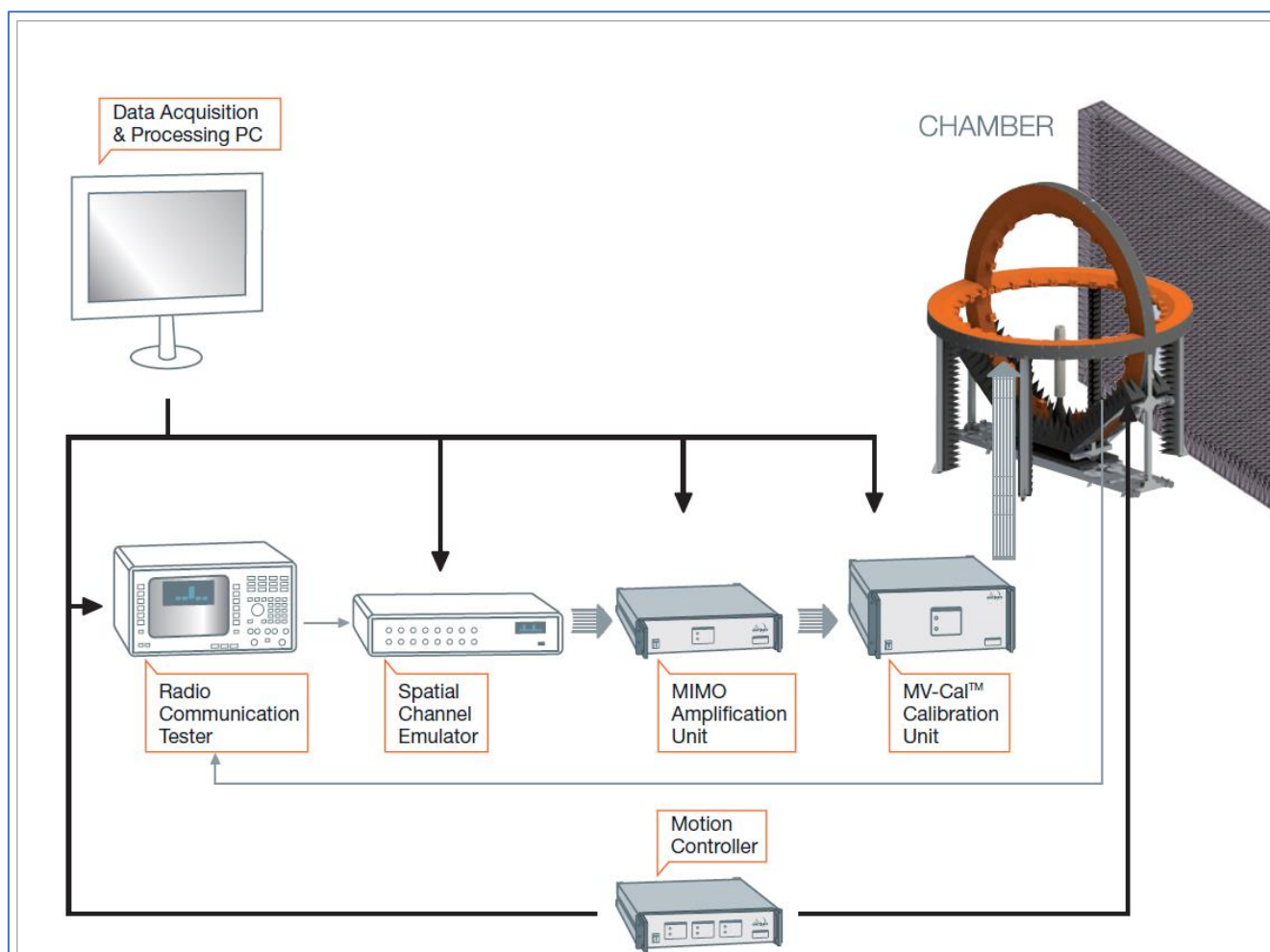
[Section 6. Diagram Example of Co-Location Antenna Separation](#)

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 400MHz 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

The equipment for the antenna measurement we used is as follows:

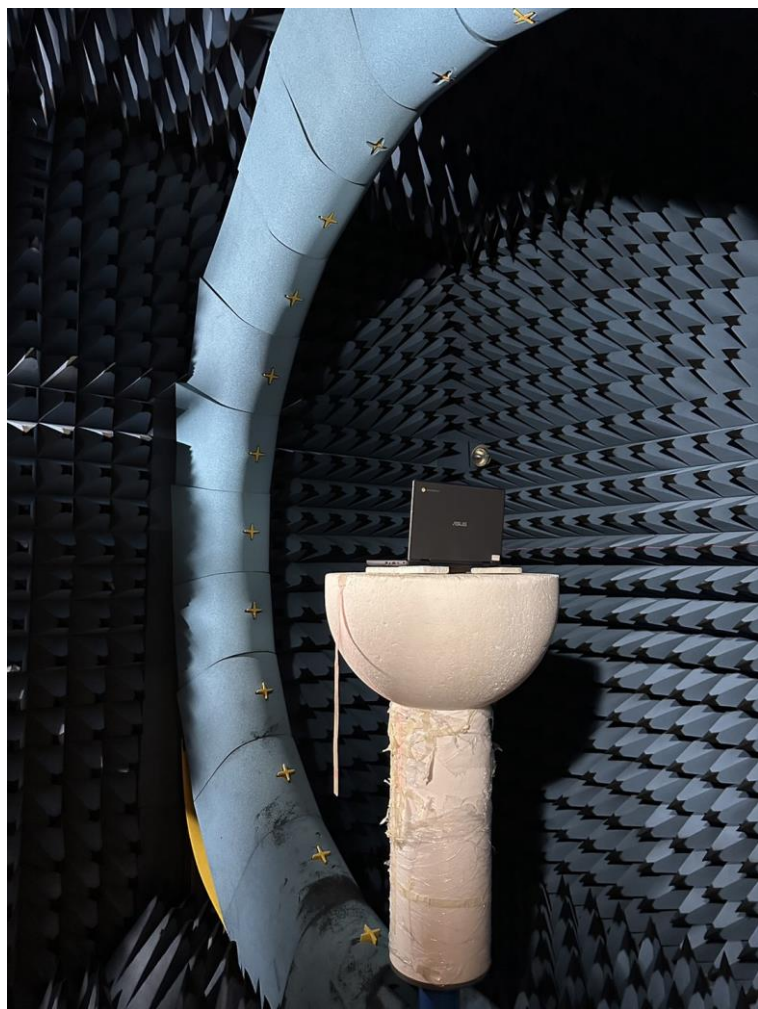
A. Network Analyzer, support up to 8GHz, to measure the VSWR and input impedance of antenna.

B. Three-dimensional anechoic chamber to measure antenna gain and radiation pattern(Standard horn antenna was used to calibrate the chamber)

C. Climatic chamber for mechanical tests.

item	Device	Type/Model	manufacturer	Cal. Date	Cal. Due Date
1.	Measurement system	StarMIMO 2.4m HV	MVG	2022/9/12	2023/9/12
2.	Turntable	Goniometer	MVG	N/A	N/A
3.	Measurement software	Wave Studio	MVG	N/A	N/A
4.	VNA	Agilent N5230C	Agilent (Keysight)	N/A	N/A
5.	Received antenna	StarMIMO 2.4m HV	MVG	2022/9/12	2023/9/12
6.	Position controller	Motion controller	MVG	N/A	N/A
7.	Cable 2.2m 9kHz~18GHz	SPS -AO-2.2m, 1801	AO Tech.	2022/9/12	2023/9/12
8.	Cable 5m 9kHz~18GHz	SPS-AO-5m, 1805	AO Tech.	2022/9/12	2023/9/12

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: DC33002SN0S) Main Antenna	Luxshare	PIFA	Connector: SpeedTeh C87P115-00002-H 50 Ohm Coaxial Length: 392mm Diameter: 1.13mm Type: Normal	2400-2483.5	2.51	3.48	3	0.97
				5150-5250	2.93	4.41	3	1.48
				5250-5350	2.74	4.23	3	1.49
				5470-5725	2.88	4.39	3	1.51
				5725-5850	2.55	4.1	3	1.55
				5850-5895	2.76	4.33	3	1.57
				5925-6425				
				6425-6525				
				6525-6875				
				6875-7125				
(P/N: DC33002SN0S) Aux Antenna	Luxshare	PIFA	Connector: SpeedTeh C87P115-00002-H 50 Ohm Coaxial Length: 537mm Diameter: 1.13mm Type: Low loss	2400-2483.5	2.95	4.28	3	1.33
				5150-5250	2.98	4.99	3	2.01
				5250-5350	2.84	4.87	3	2.03
				5470-5725	2.77	4.85	3	2.08
				5725-5850	2.85	4.99	3	2.14
				5850-5895	2.83	4.99	3	2.16
				5925-6425				
				6425-6525				
				6525-6875				
				6875-7125				

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

Main Antenna Drawing:



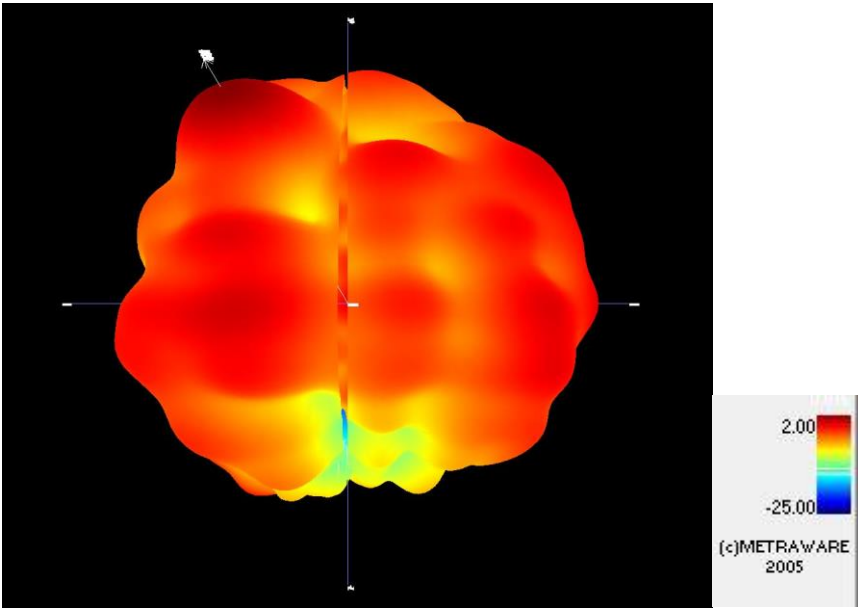


Section 3. Radiation characteristics of antenna loaded in Host Platform (NB Mode)

Main Antenna

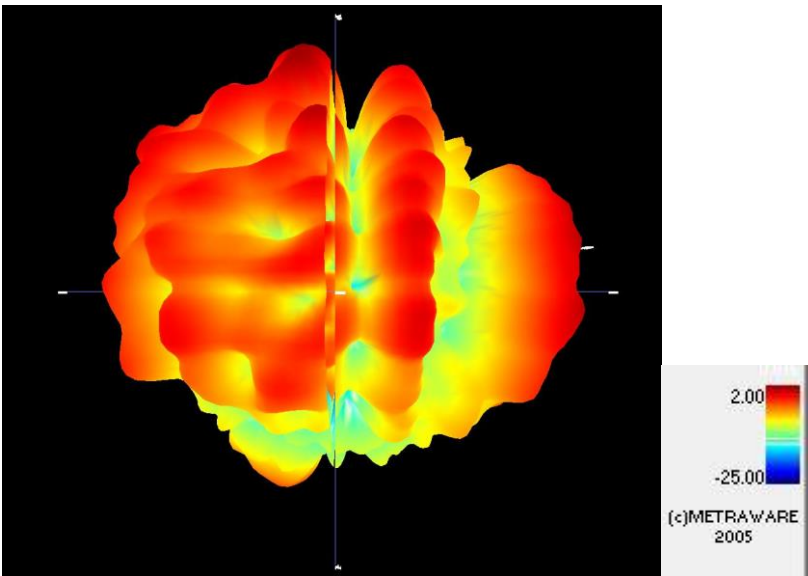
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	2.51



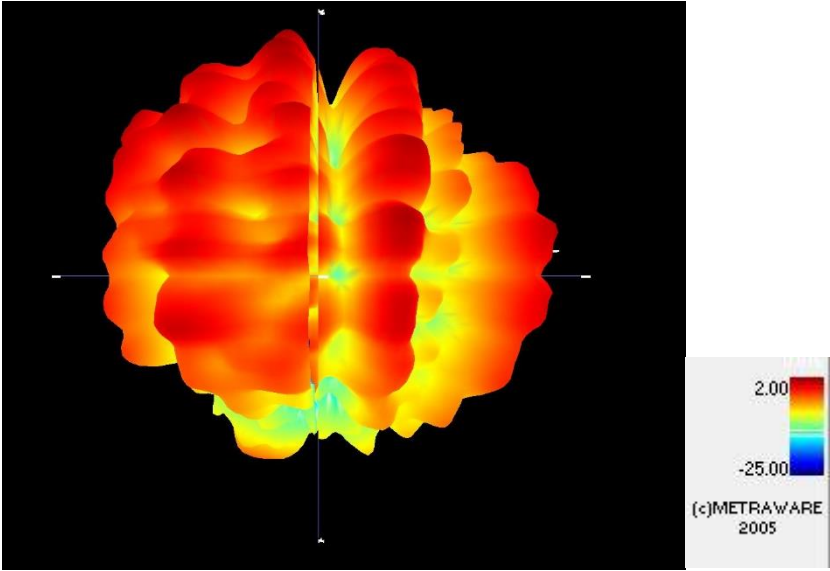
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	2.93



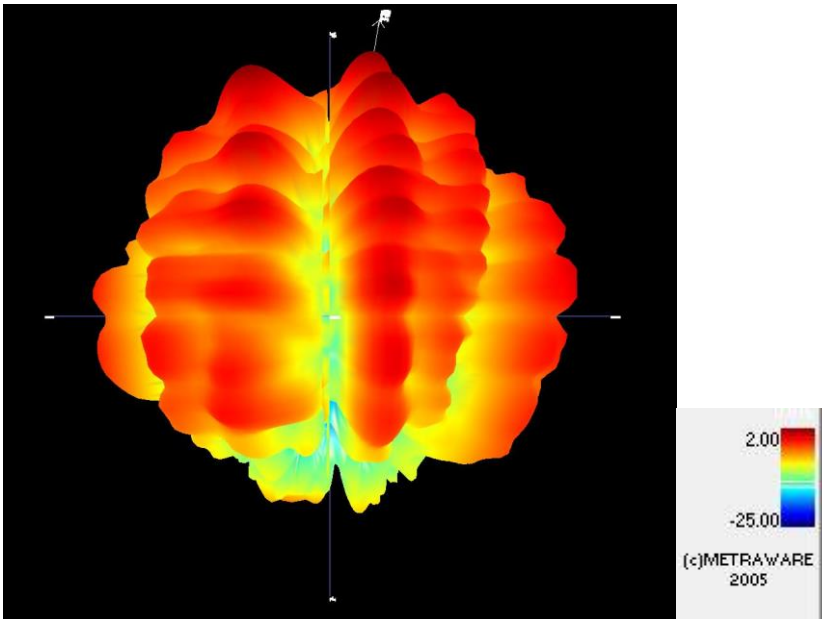
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	2.74



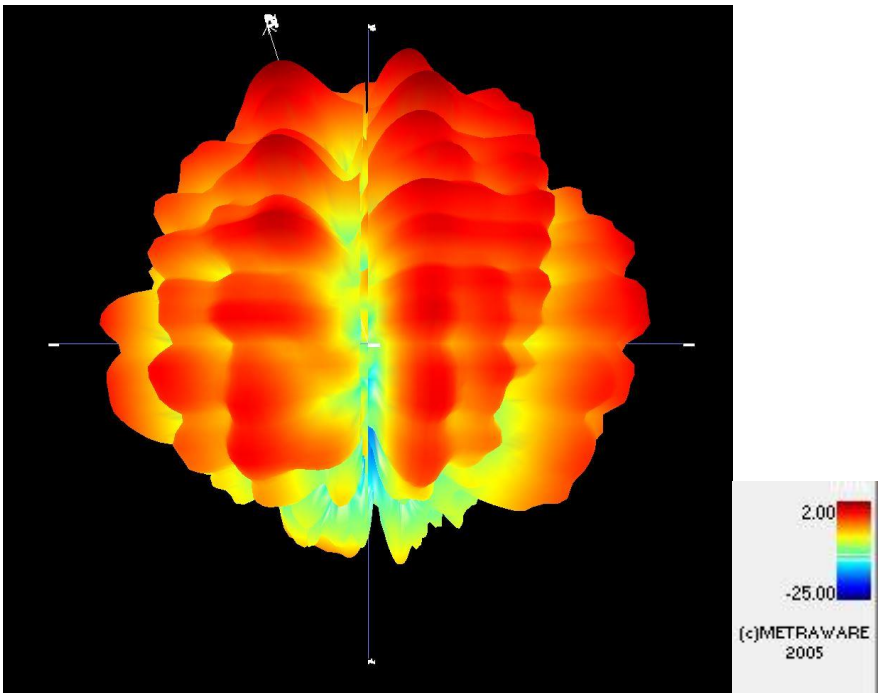
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.88



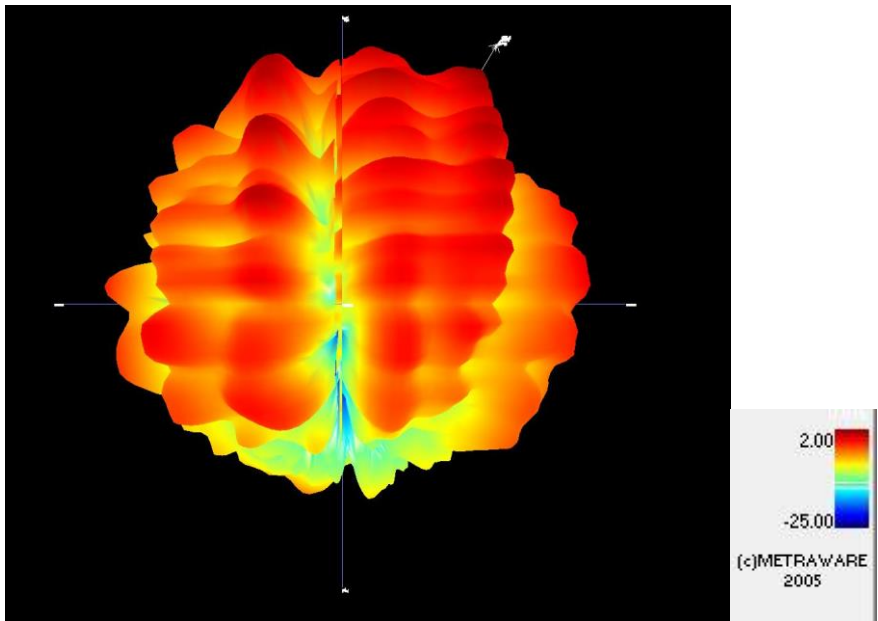
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	2.55



Max Antenna 3D Radiation Pattern 5850-5895 MHz

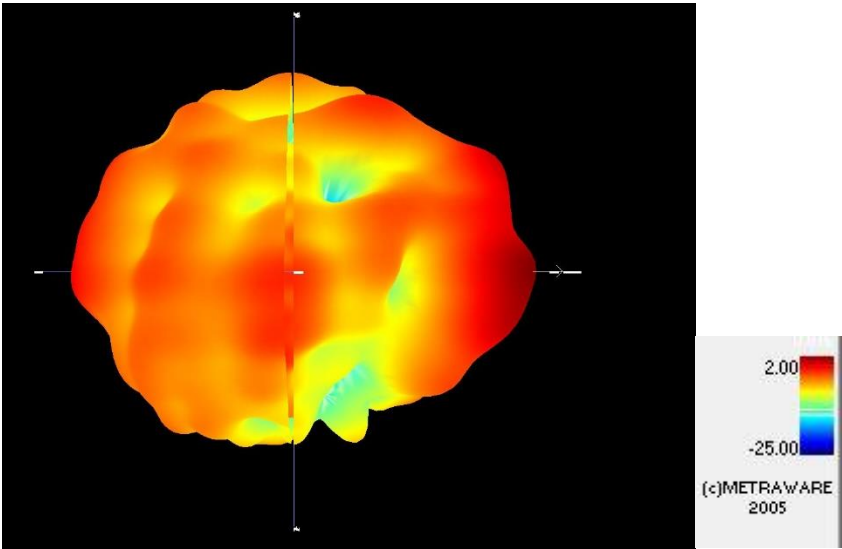
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	2.76



Auxiliary Antenna

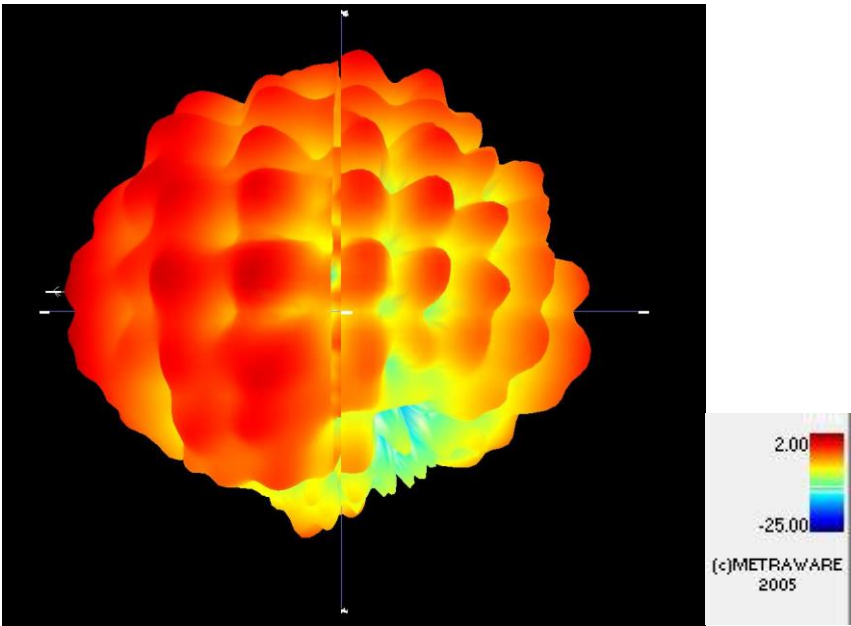
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	2.95



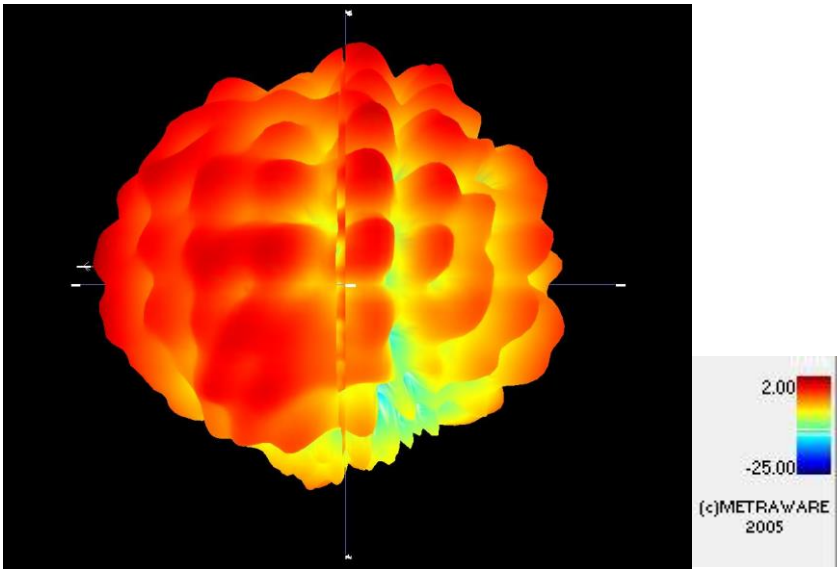
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	2.98



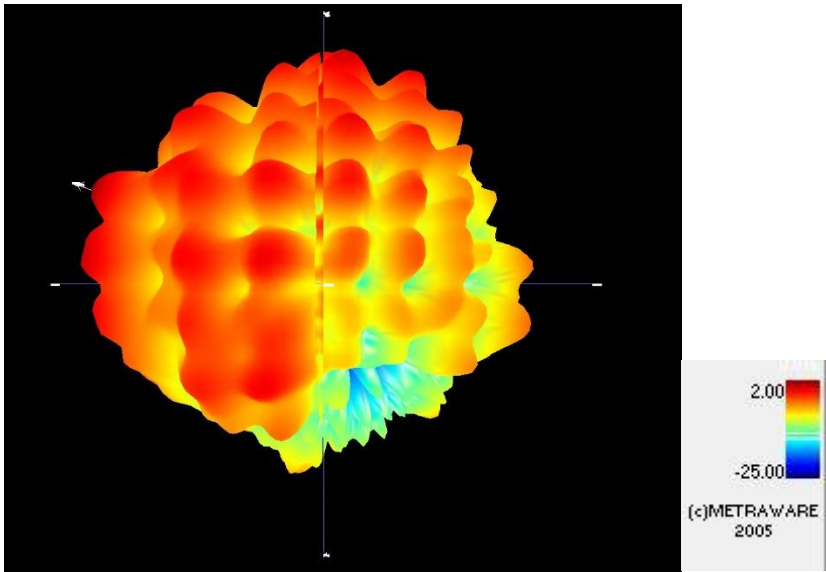
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	2.84



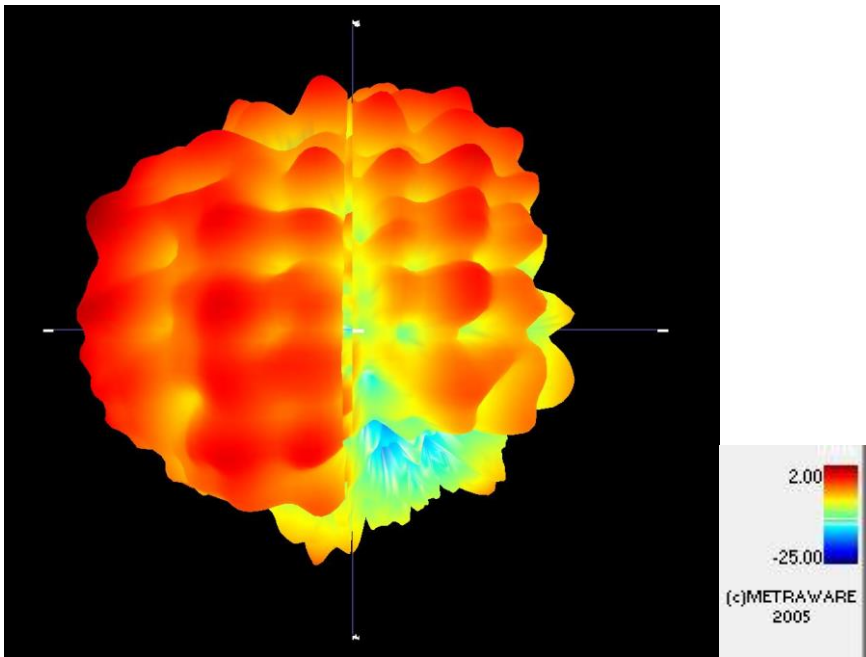
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.77



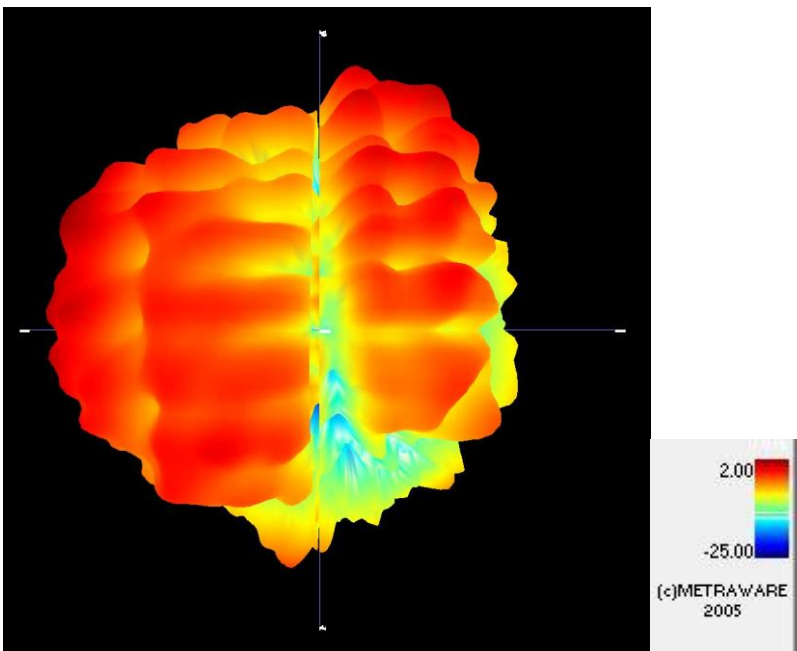
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	2.04



Max Antenna 3D Radiation Pattern 5850-5895 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	1.76

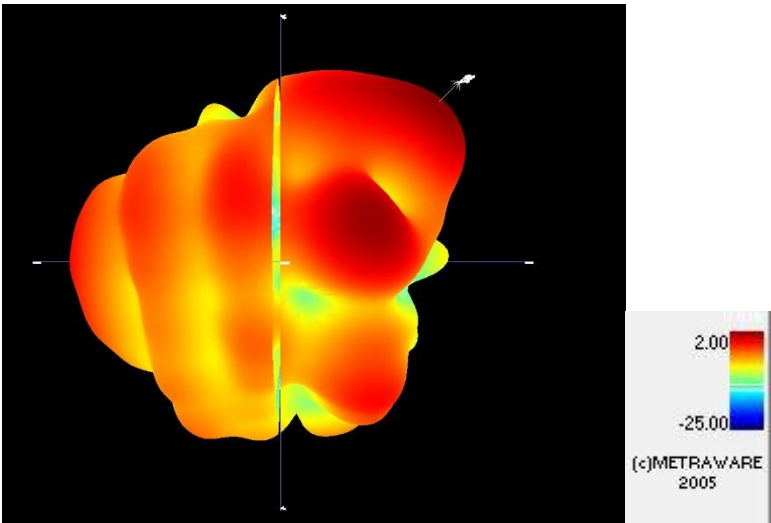


Section 3. Radiation characteristics of antenna loaded in Host Platform (TB mode)

Main Antenna

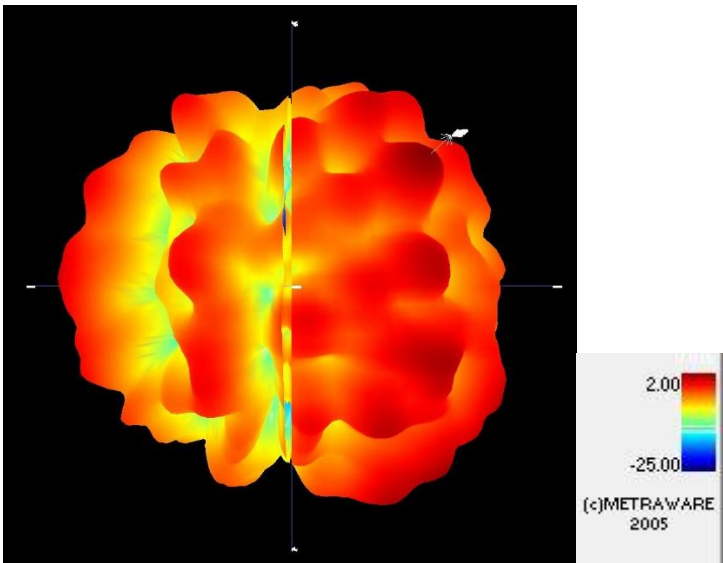
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	2.15



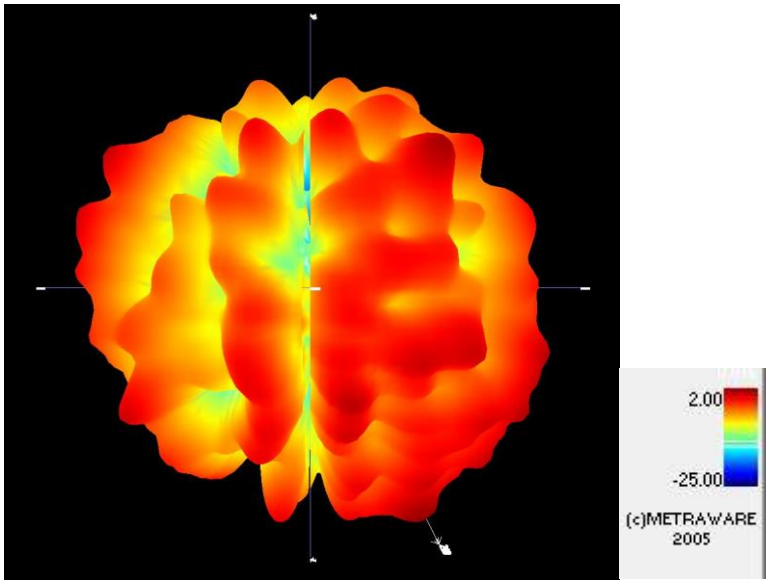
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	1.82



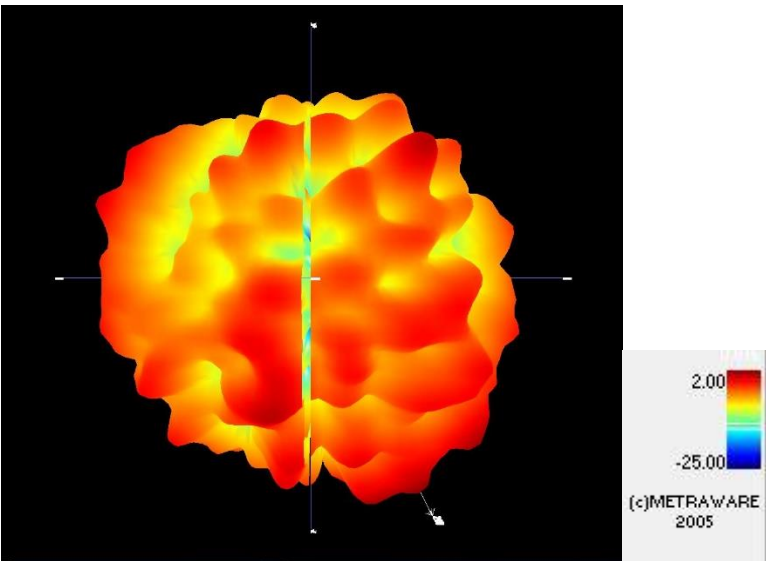
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	2.00



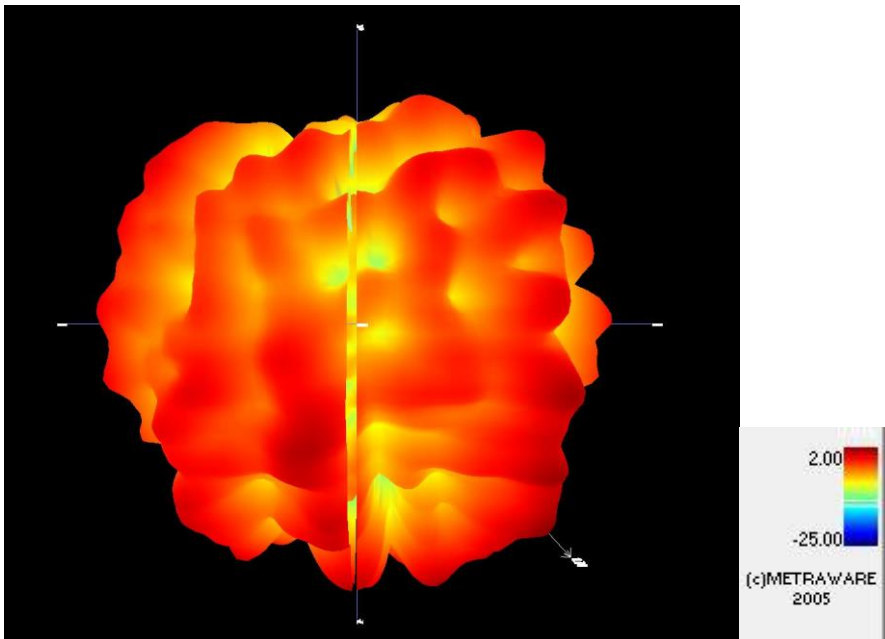
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.08



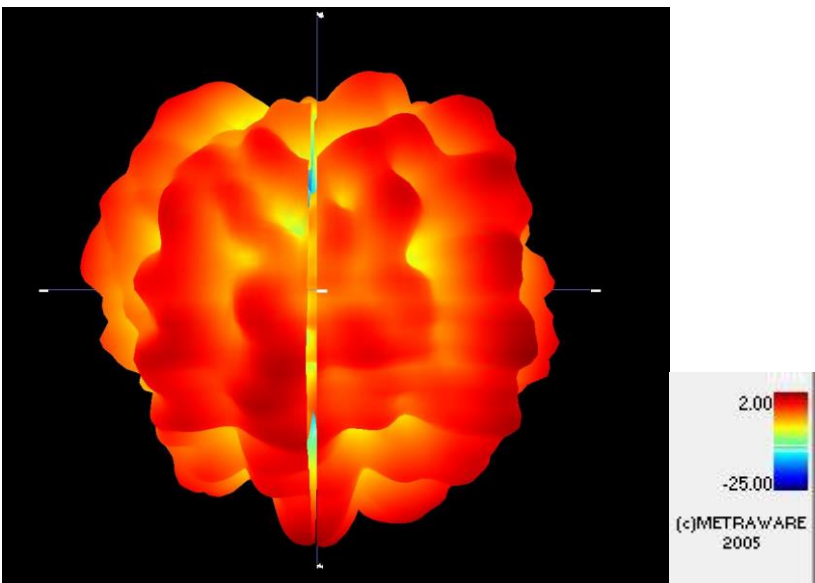
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	1.71



Max Antenna 3D Radiation Pattern 5850-5895 MHz

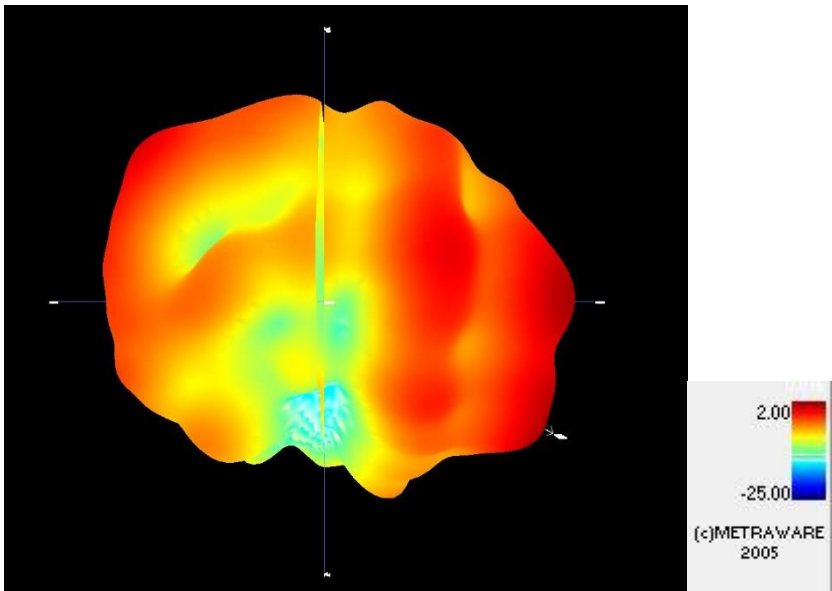
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	1.22



Auxiliary Antenna

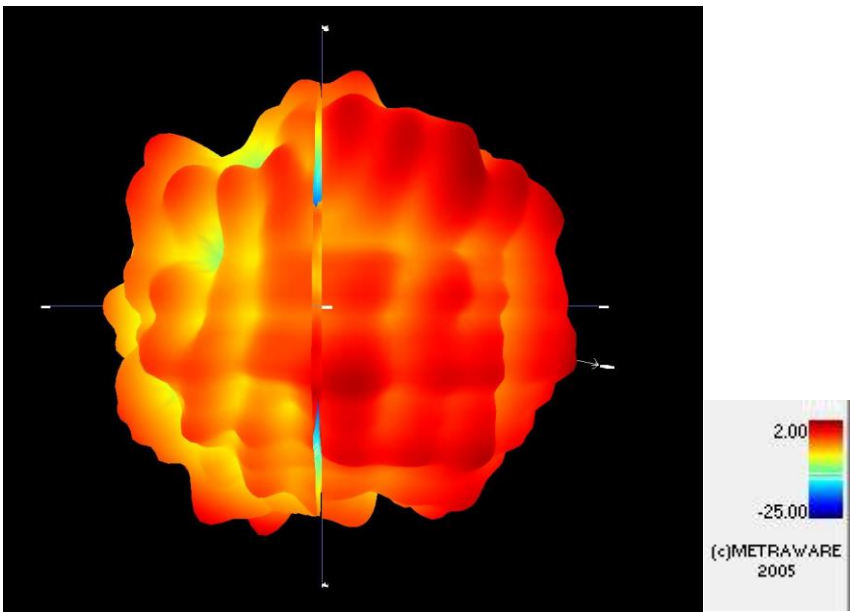
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	1.92



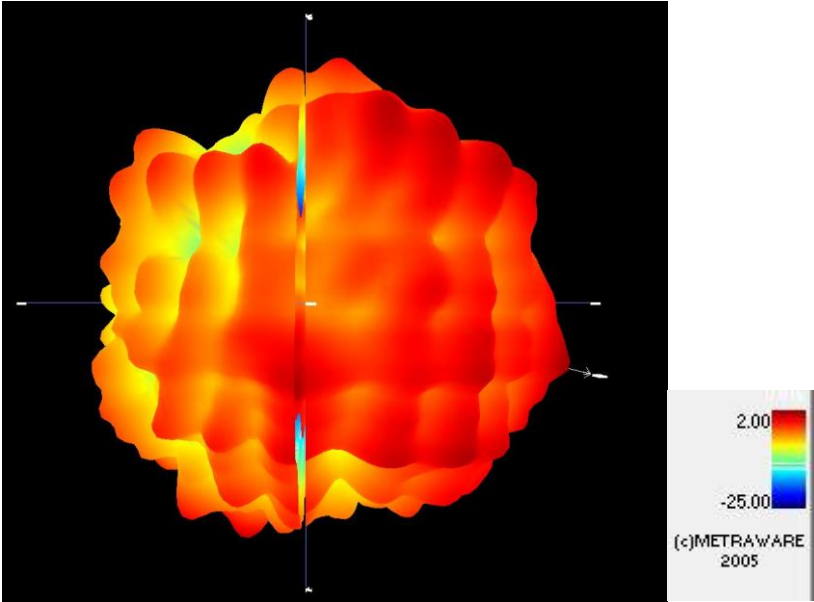
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	1.58



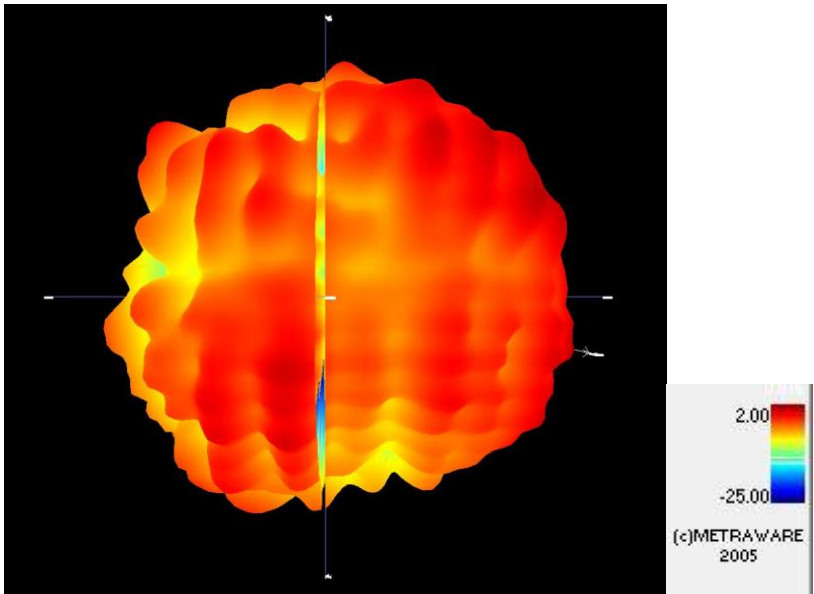
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	1.55



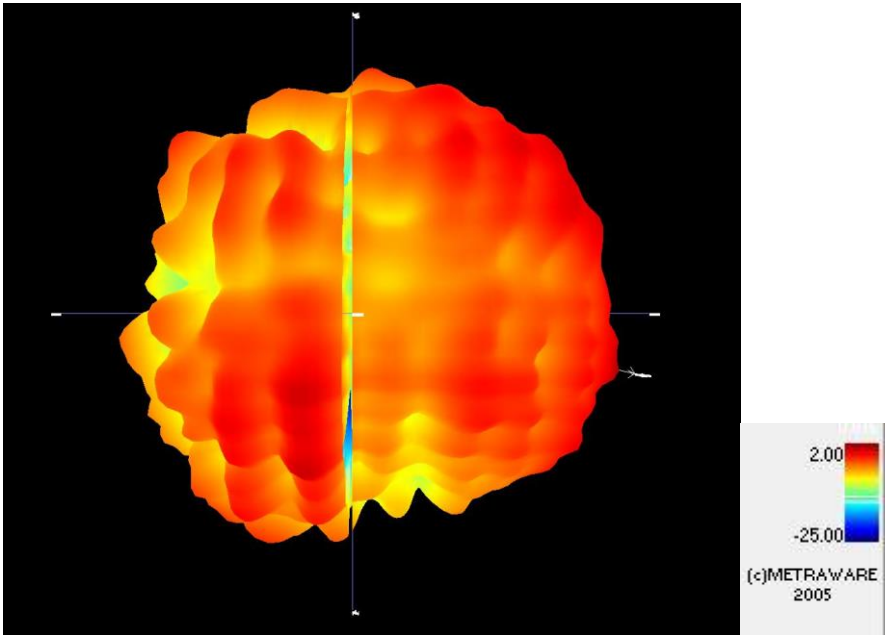
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.22



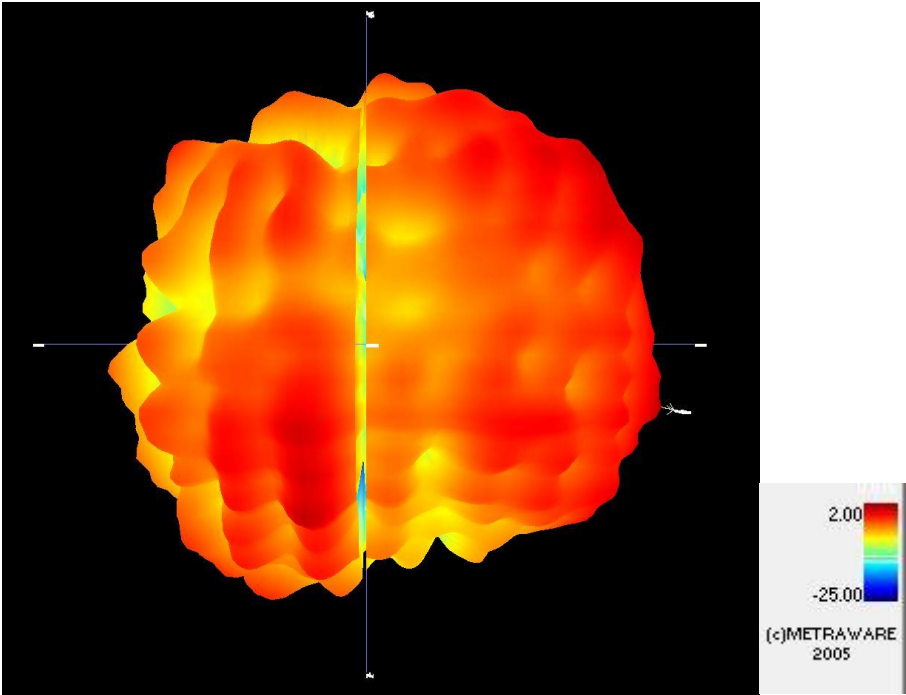
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	2.85



Max Antenna 3D Radiation Pattern 5850-5895 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	2.83



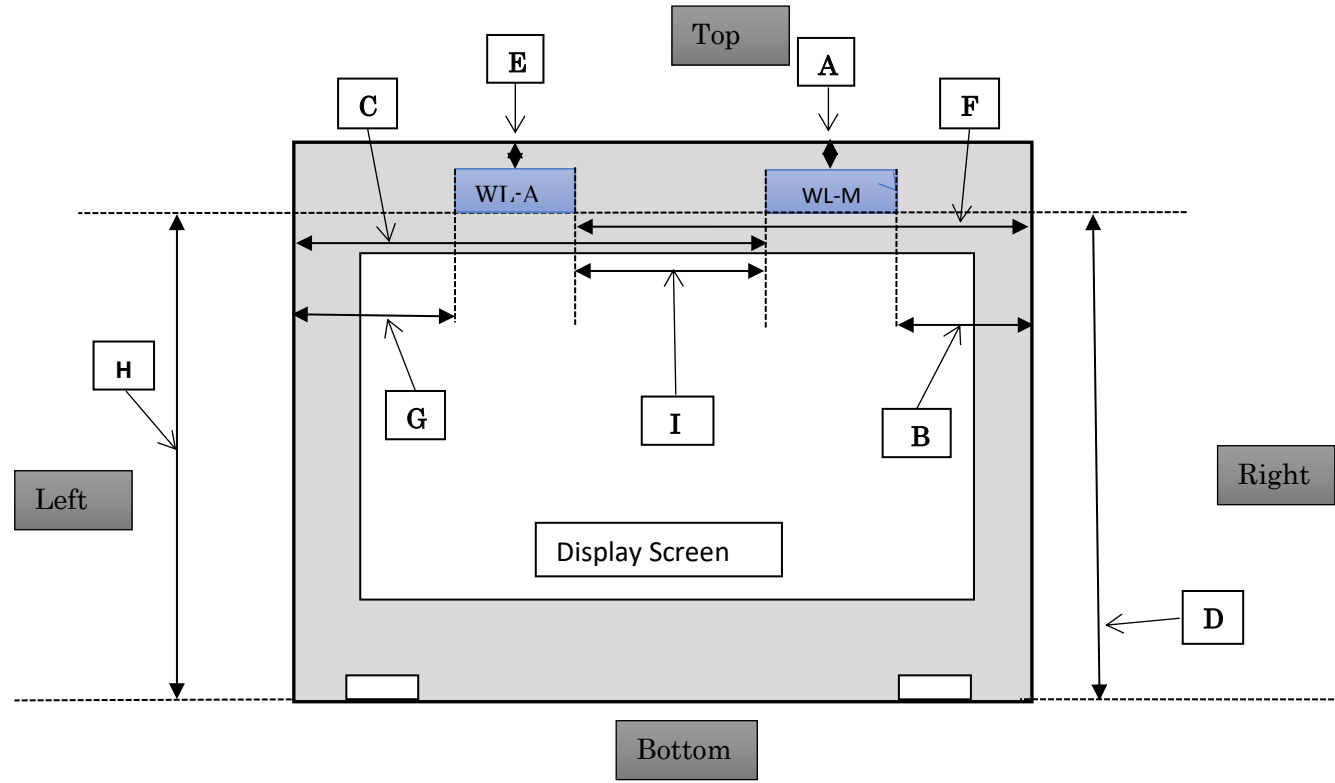
Section 4. Antenna Host Platform Location Information

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

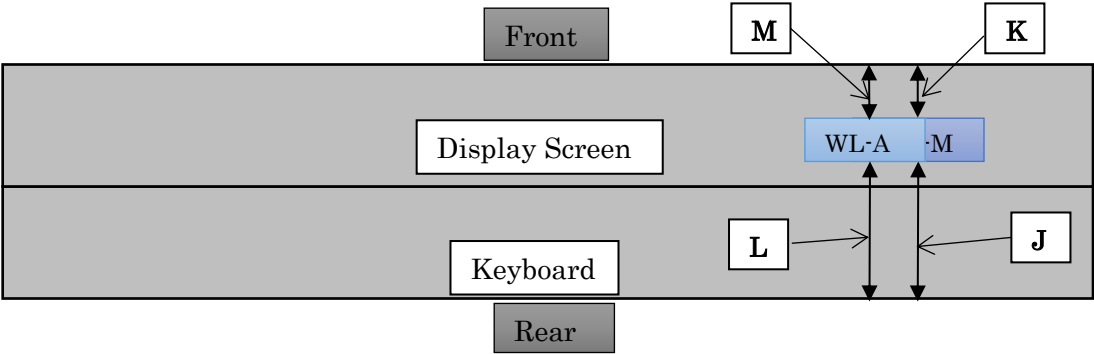
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.

<Convertible PC/Tablet>

Minimum Separation Distance			
Item	Antenna	Position	Distance (mm)
A	WLAN-Main	to Top	6.0
B	WLAN-Main	to Right	60.7
C	WLAN-Main	to Left	202.7
D	WLAN-Main	to Bottom (Not include Keyboard)	189.1
E	WLAN-Aux	to Top	6.0
F	WLAN-Aux	to Right	202.7
G	WLAN-Aux	to Left	60.7
H	WLAN-Aux	to Bottom (Not include Keyboard)	189.1
I	WLAN Main	to WLAN Aux	112
J	WLAN-Main	to Rear (to KB side)	18.4
K	WLAN-Main	to Front (to LCD side)	4.2
L	WLAN-Aux	to Rear (to KB side)	18.4
M	WLAN-Aux	to Front (to LCD side)	4.2

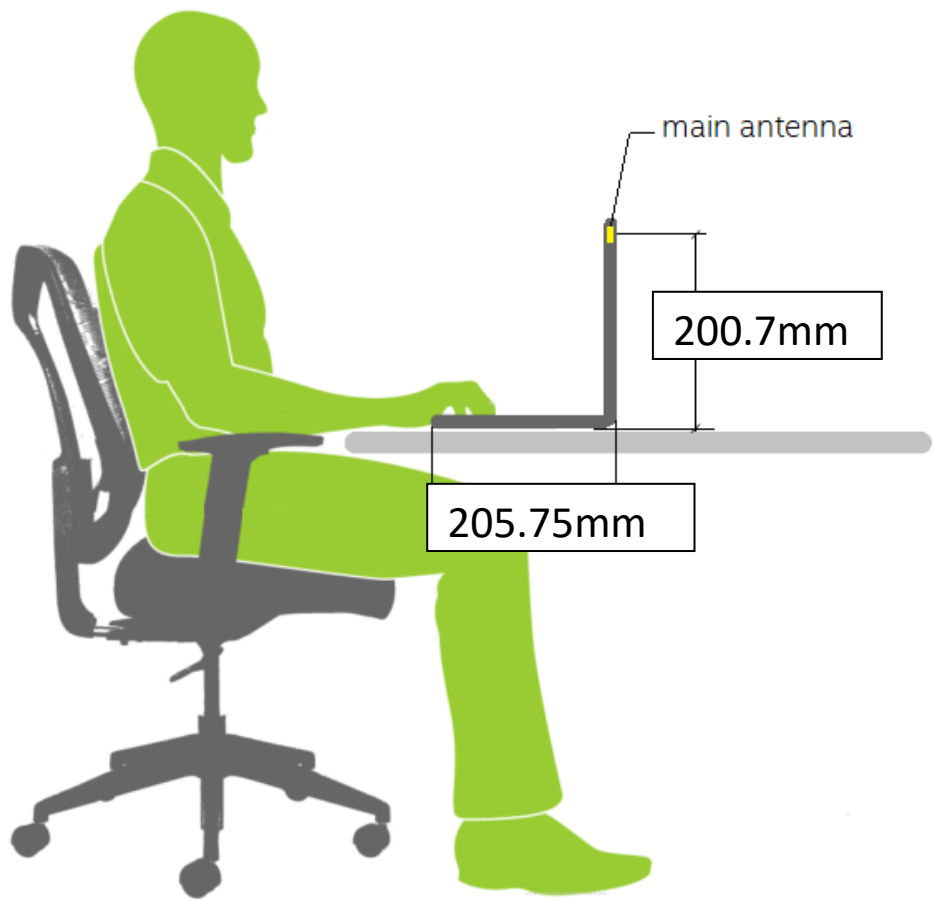


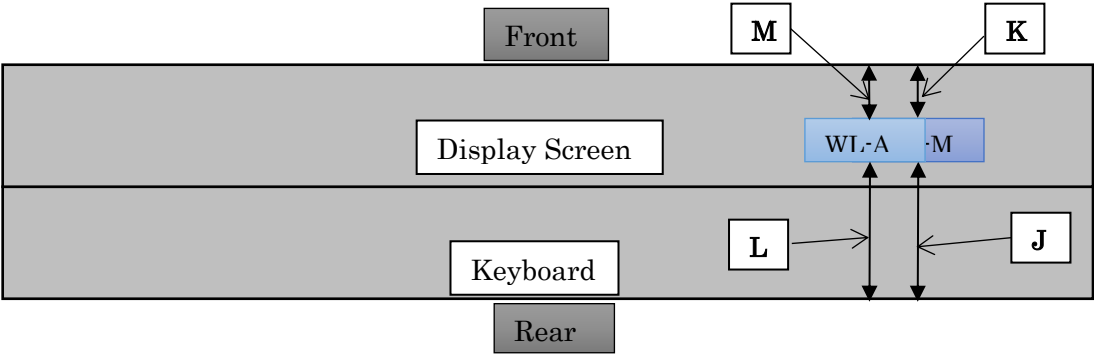
<Tablet Mode(view from bottom)>



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.





Minimum Separation Distance			
Item	Antenna	Position	Distance (mm)
J	WLAN-Main	to Rear (to KB side)	18.4
K	WLAN-Main	to Front (to LCD side)	4.2
L	WLAN-Aux	to Rear (to KB side)	18.4
M	WLAN-Aux	to Front (to LCD side)	4.2

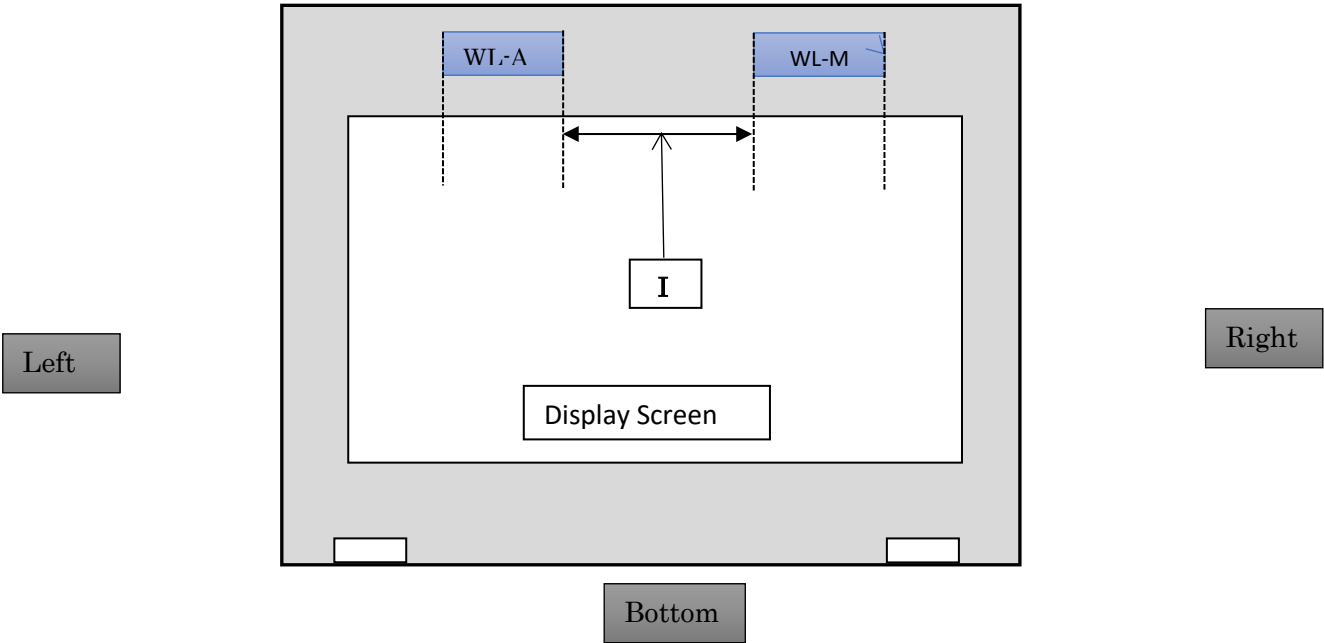
Section 6. Diagram Example of Co-Location Antenna Separation

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,..

<Convertible PC/Tablet>

Minimum Separation Distance			
Item	Antenna	Position	Distance (mm)
I	WLAN Main	to WLAN Aux	112

Top



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