

ANTENNA INFORMATION

OEM	DELL
ODM	Wistron
Platform model name	P135F
Intel platform (ex: Yes, No or NA)	Yes
Platform type (ex: regular NB, convertible PC, AIO...etc)	Regular NB
SAR minimum separation (mm)	FCC (1g) 5.25mm
	ISED (1g) N/A
	ISED (10g) N/A

Antenna manufacturer	Company name	HongBo
	Address	4F., No. 143, Xinhua 1st Rd., Neihu Dist., Taipei City 114758 , Taiwan (R.O.C.)
Test location	Company name	SPORTON
	Address	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)
Test Personnel	Name(Full name)	OTA03
	E-mail	rickhuang@hong-bo.com.tw
	Tel/Mobile	03-6688-340 #206
Testing date		2024.08.23

Antenna Part number	Main	330-29032 (025.902GU.0001)
	Aux	330-29034 (025.902GV.0001)
Antenna type (ex: PIFA, Dipole...etc)		PIFA

Antenna 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	1.19	1.95	2.01	2.38	1.31	1.28	2.5	3.16	3.28	2.74
Aux	2.27	0.58	0.93	1.19	1.28	1.77	2.53	2.92	3.12	3.07

Cable Assembly Part Number and Information					
	Cable PN	Cable length(mm)	Cable diameter(mm)	Impedance(ohm)	Connector type
Main	SY113L/50-143	234mm	1.13mm	50	IPEX
Aux	SY113L/50-118	211mm	1.13mm	50	IPEX

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

Table of Contents

Cover page.....	1
1. Intel Reference Gain and Type.....	3
2. Document Revision History.....	3
3. Test & System Description	
3.1 Measurement Method and System.....	4
3.2 Test setup.....	4
3.3 Equipment list.....	5
4. Radiation characteristics of antenna loaded in Host Platform.....	6
Annex A. Photographs	
A.1 Setup Photo.....	16
A.2 Test sample.....	17
Annex B. Antenna Location	
B.1 Antenna Host Platform Location Information.....	19
B.2 Antenna dimensional information for SAR evaluation.....	20

1. Intel Reference Gain and Type

Antenna Peak gain w/ cable loss (dBi)											
Band/Frequency		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
Design	EU/UK	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
PIFA	For WiFi 6E and earlier	3.24	3.64	3.73	4.77	4.97	4.72	4.83	4.30	5.37	5.59
	From WiFi 7	2.95	5.11	4.55	5.15	5.13	4.45	5.02	5.02	4.96	4.96
Dipole	For WiFi 6E and earlier	2.89	2.92	3.19	4.41	4.22	4.22	4.83	4.30	4.49	5.34
	From WiFi 7	2.95	4.03	4.11	5.15	5.13	4.45	5.02	4.71	4.49	4.96
Monopole	From WiFi 7	2.83	4.57	4.44	4.95	4.95	4.43	4.87	4.91	4.91	4.79

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.

2. Document Revision History

Revision #	Revision Details	Issued Date
Rev. 00	First Issue	2024.08.23

3. Test & System Description

3.1 Measurement Method and System

ETS-Lindgren AMS-8500 system is 3D fully anechoic chamber, it is applied to the “Conical Cut test method”, the detail description is described as below.

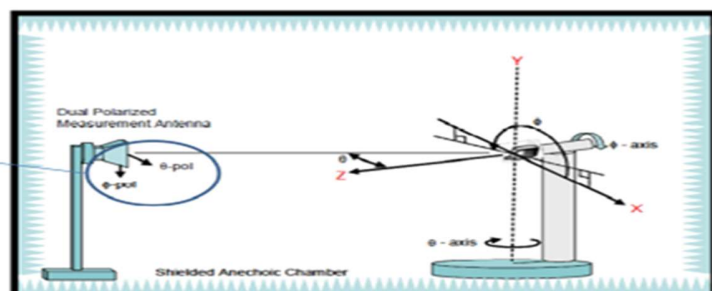
The Conical Cut method requires the ability of the Measurement Antenna to be physically rotated in the theta plane (overhead) of the EUT for implementations using a single Measurement Antenna, Eleven conical cuts are required to capture data at every 15 degrees from the EUT, with the top (0 degrees) and bottom (180 degrees) cuts not being measured. Typically, the EUT will remain affixed to a turntable during the entire measurement process. The Measurement Antenna will be positioned at a starting theta angle. The EUT will then be rotated around the full 360 degrees of phi rotation. The Measurement Antenna will then be positioned at the next theta angle, and the process repeated.

3.2 Test setup

Chamber Coordinate

- Both Theta- and Phi-axis rotate clockwise.
- From center of Quiet Zone
 - To 90-degree Phi → X axis
 - To ceiling → Y axis
 - To 3164 measurement antenna → Z axis

Theta Polarization → Horizontal
Phi Polarization → Vertical



AMS-8500 Basics

- Chamber Size: 24ft L x 12ft W x 12ft H
7.32m x 3.66m x 3.66m
- Test Distance: 4.9 meter
- Frequency: 700MHz – 6GHz
- Fully anechoic covered with EHP-12, 24inch absorbers
- Quiet Zone Diameter:
 - 30cm
 - 50cm
 - per CTIA 2.x / 3.x versions



3.3 Equipment list

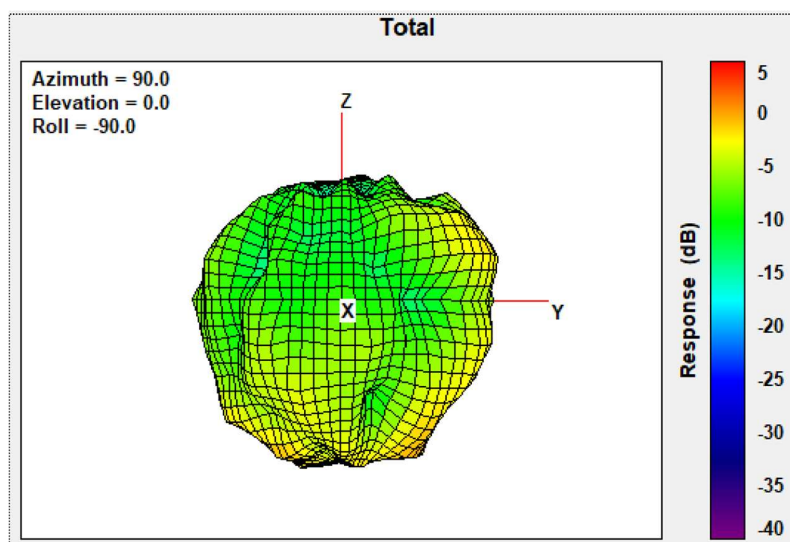
Name	Manufacturer	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
ENA Series Network Analyzer	Keysight	E5071C	MY46900218	2022/8/4	2023/8/3
RF Switch	N/A	N/A	N/A	2022/8/4	2023/8/3
Multi-Axis Positioner Controller	ETS-Lindgren	2090	N/A	2022/8/4	2023/8/3
Medium-Duty Positioner	ETS-Lindgren	2110	N/A	2022/8/4	2023/8/3
Measurement Horn Antenna	EMCO	Aug-64	N/A	2022/8/4	2023/8/3
12GHz SMA(M)-SMA(M)+20core for 60cm RG316DS Cable Assembly	Woken Technology Inc.	RG316DS	N/A	2022/8/4	2023/8/3
12GHz SMA(M)-SMA(M)+30core for 300cm RG316DS Cable Assembly	Woken Technology Inc.	RG316DS	N/A	2022/8/4	2023/8/3

4. Radiation characteristics of antenna loaded in Host Platform

Main Antenna

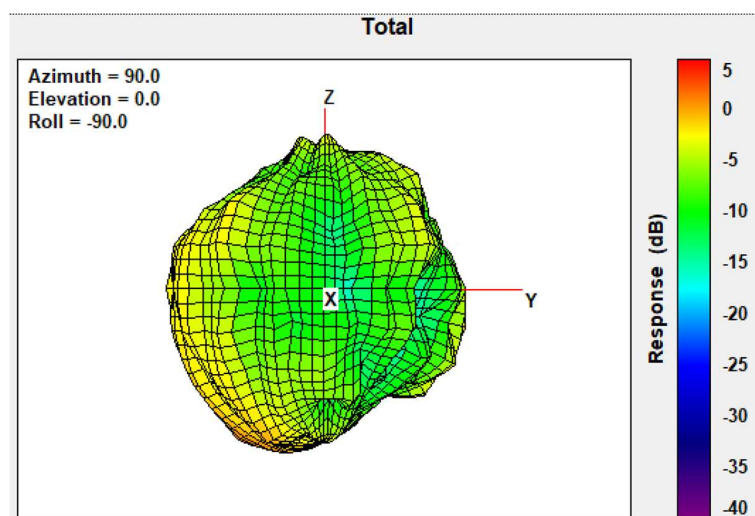
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	1.19



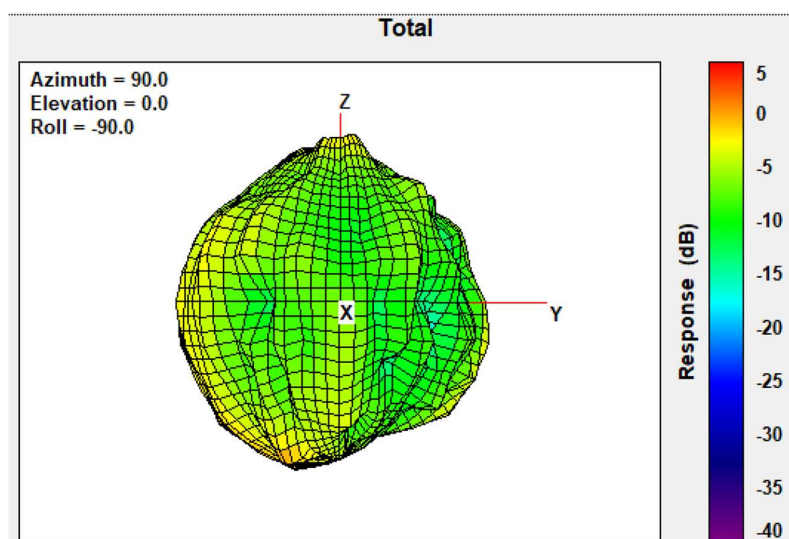
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	1.95



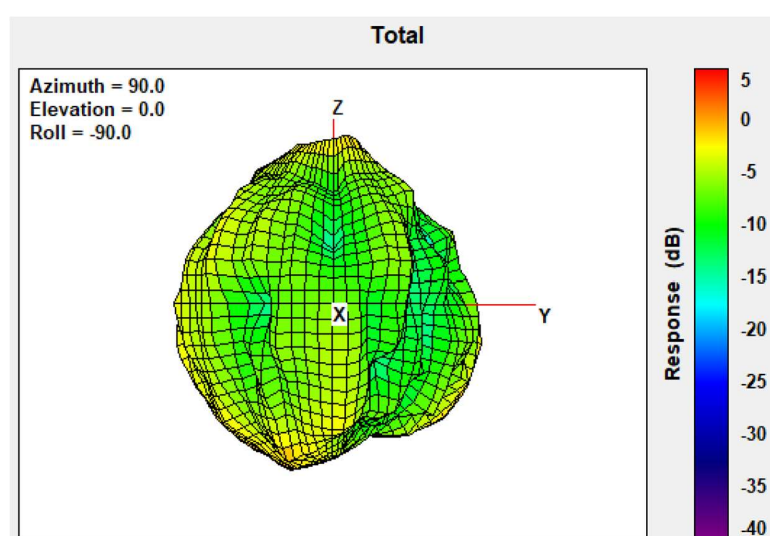
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	2.01



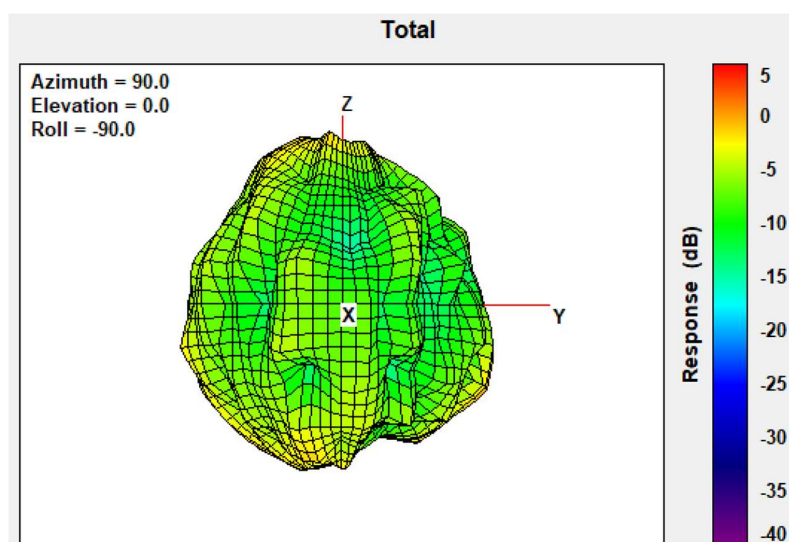
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	2.38



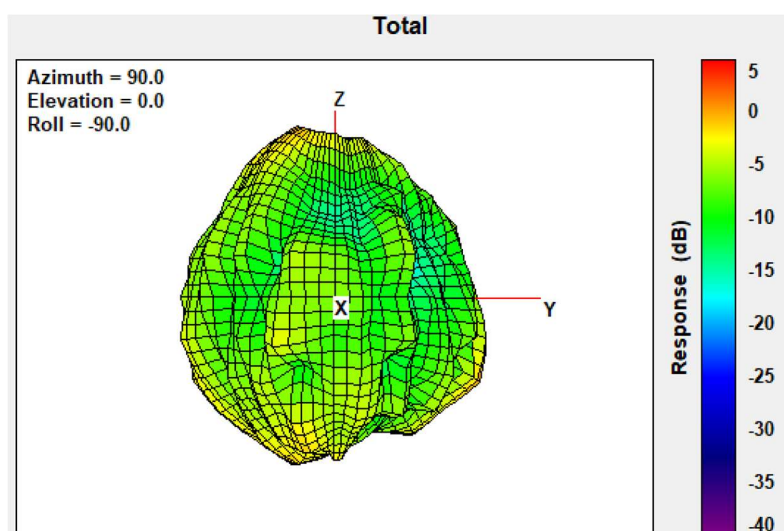
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	1.31



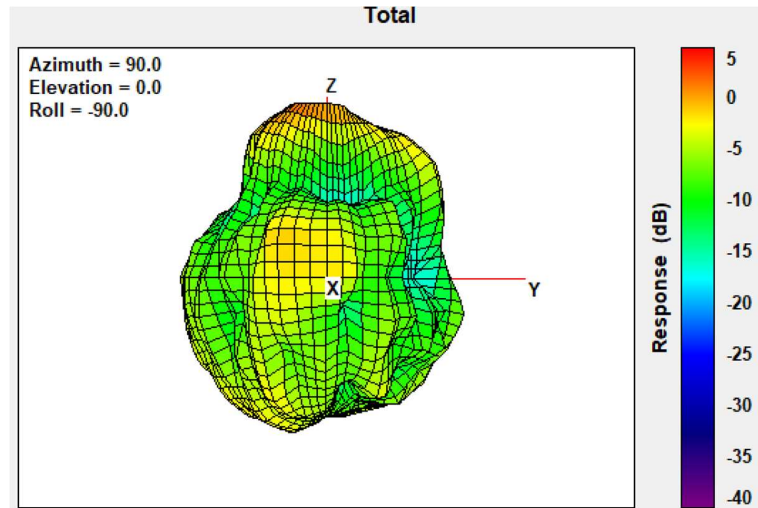
Max Antenna 3D Radiation Pattern 5850-5895 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	1.28



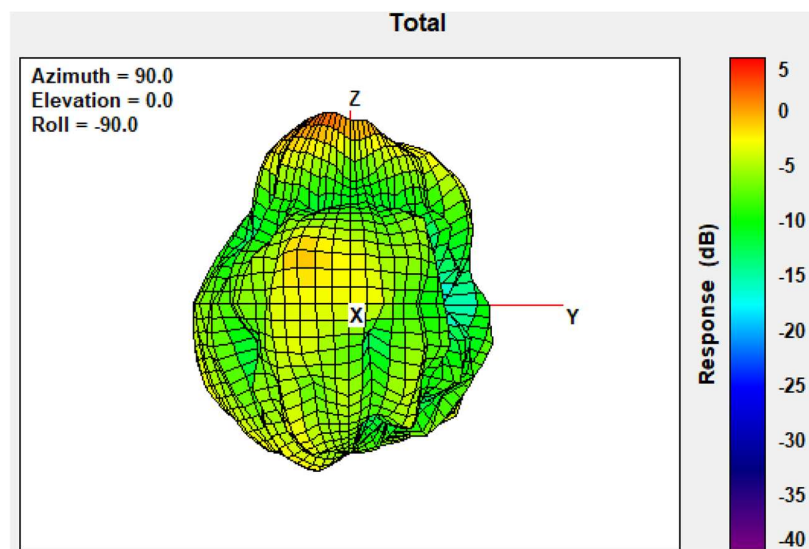
Max Antenna 3D Radiation Pattern 5925-6425 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5925-6425	2.5



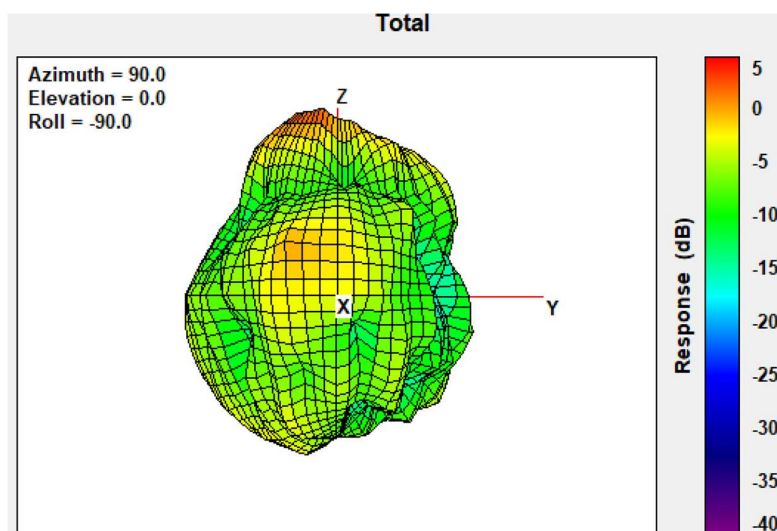
Max Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6425-6525	3.16



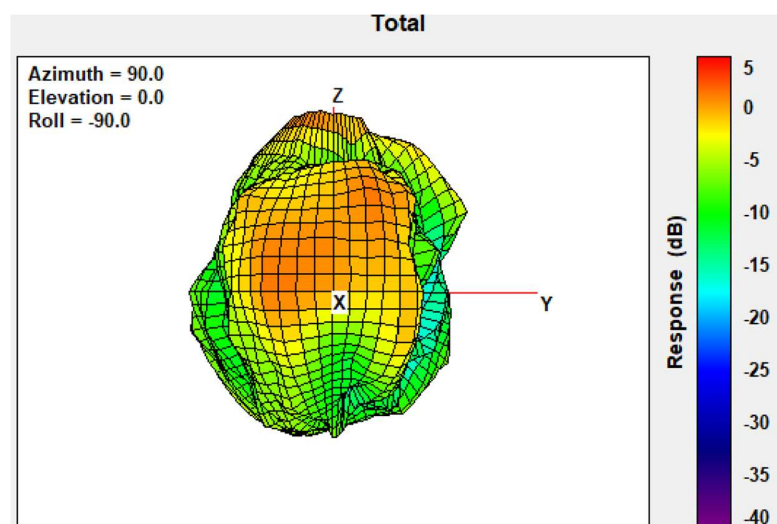
Max Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6525-6875	3.28



Max Antenna 3D Radiation Pattern 6875-7125 MHz

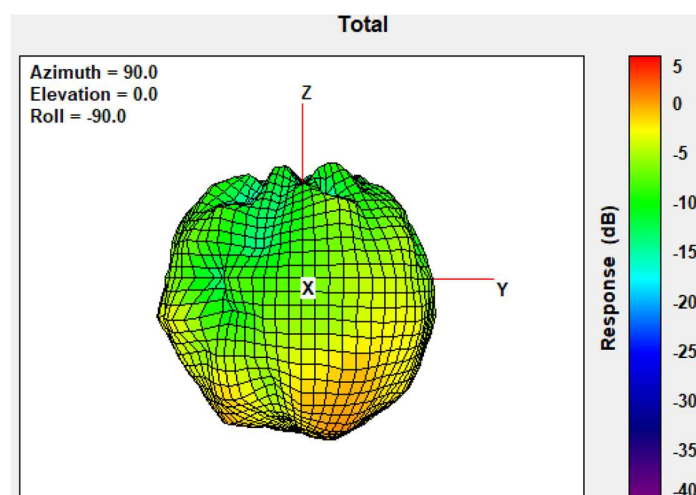
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6875-7125	2.74



Auxiliary Antenna

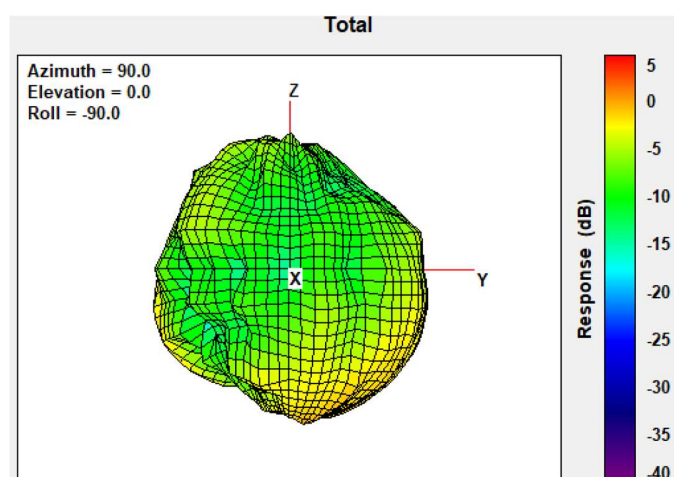
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
2400-2483.5	2.27



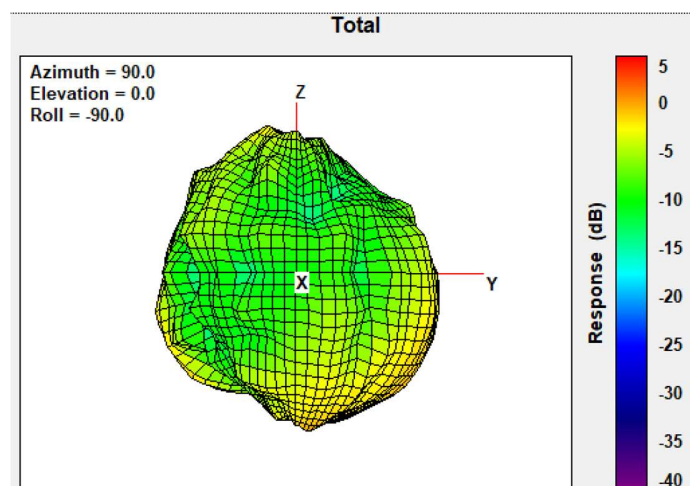
Max Antenna 3D Radiation Pattern 5150-5250 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5150-5250	0.58



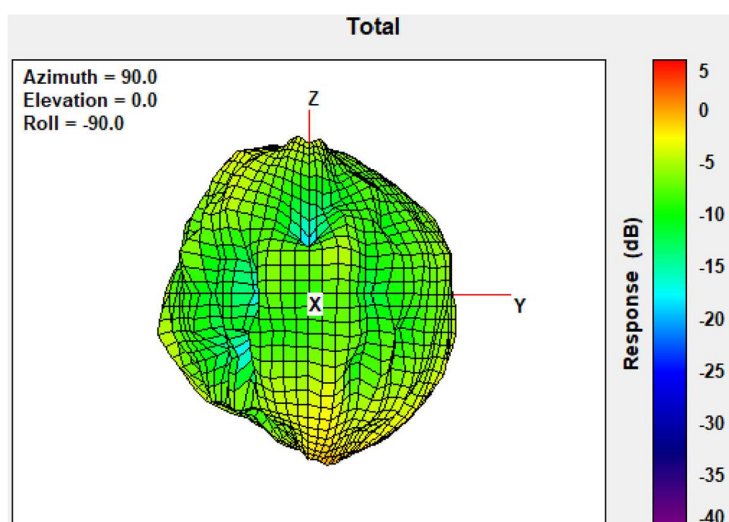
Max Antenna 3D Radiation Pattern 5250-5350 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5250-5350	0.93



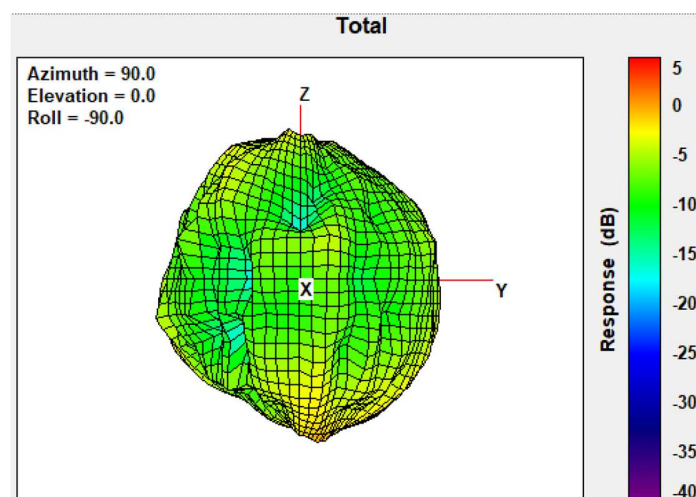
Max Antenna 3D Radiation Pattern 5470-5725 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5470-5725	1.19



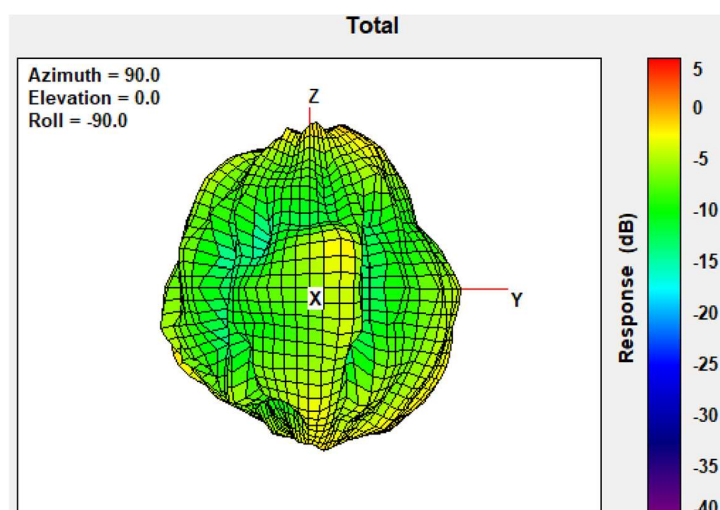
Max Antenna 3D Radiation Pattern 5725-5850 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5725-5850	1.28



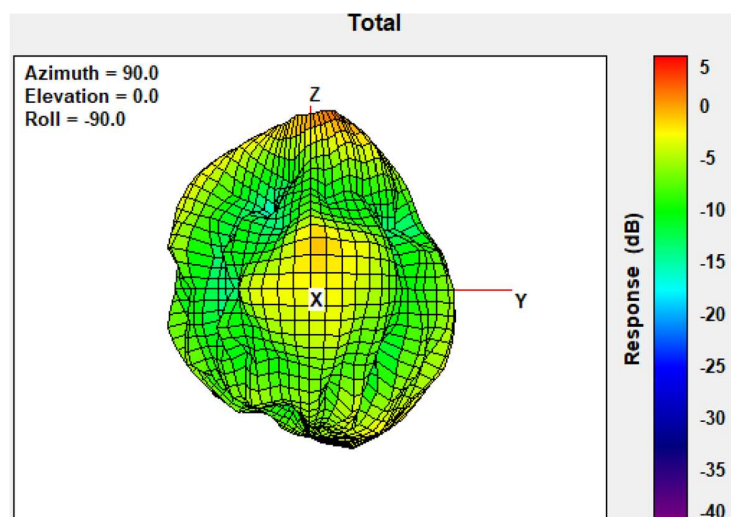
Max Antenna 3D Radiation Pattern 5850-5895 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
5850-5895	1.77



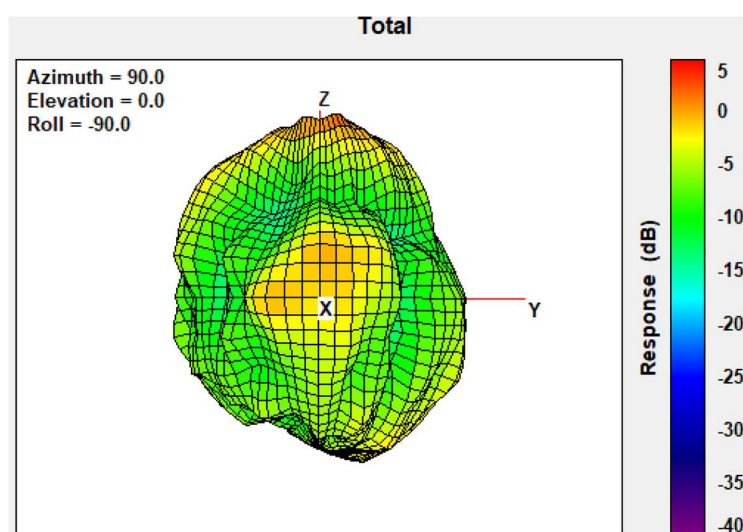
Max Antenna 3D Radiation Pattern 5925-6425 MHz

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



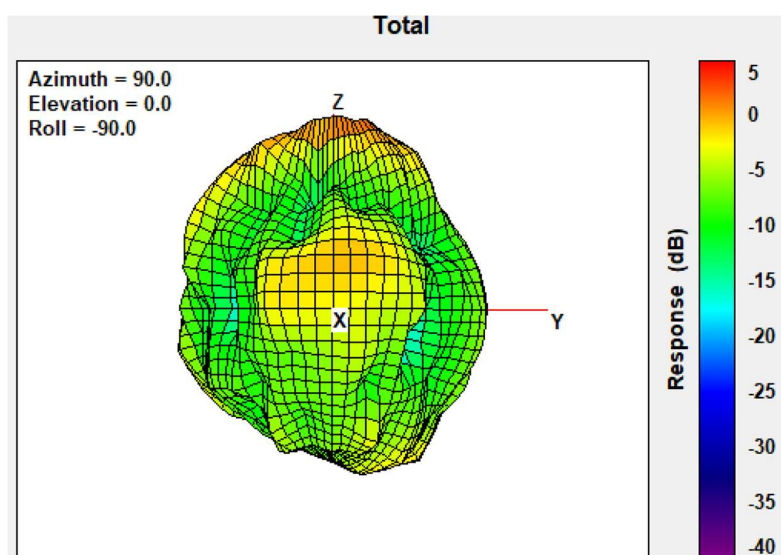
Max Antenna 3D Radiation Pattern 6425-6525 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6425-6525	2.92



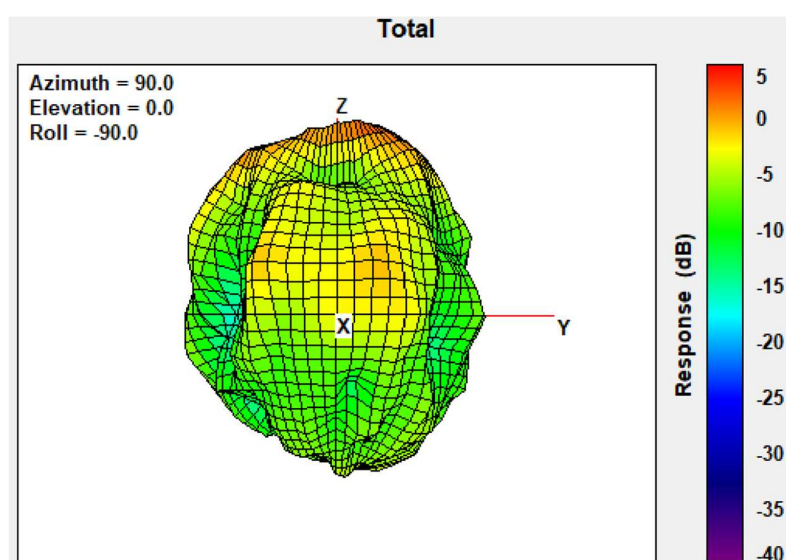
Max Antenna 3D Radiation Pattern 6525-6875 MHz

Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6525-6875	3.12



Max Antenna 3D Radiation Pattern 6875-7125 MHz

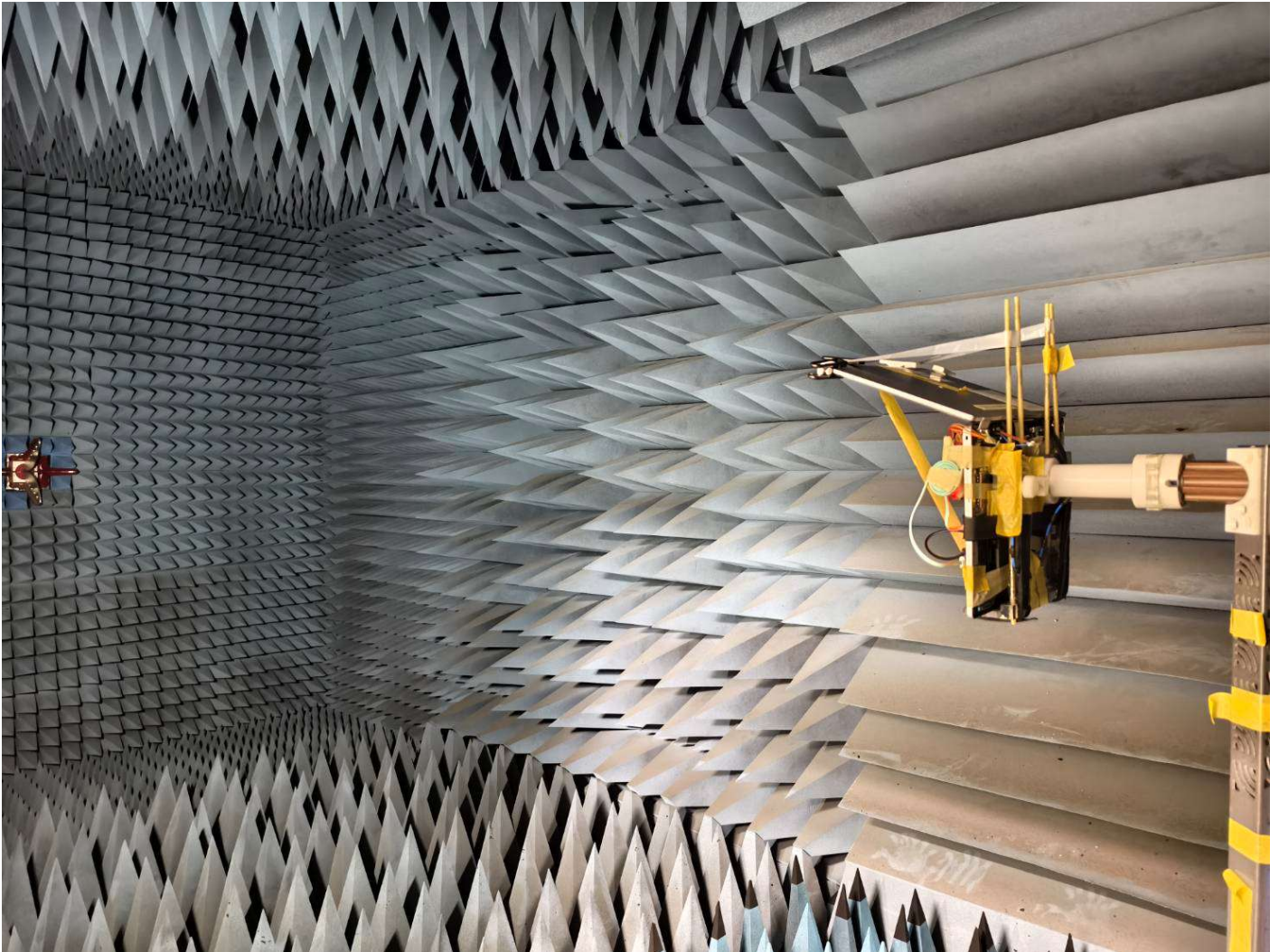
Frequency (MHz)	Peak Gain w/ Cable Loss (dBi)
6875-7125	3.07



Annex A. Photographs

A.1 Setup Photo

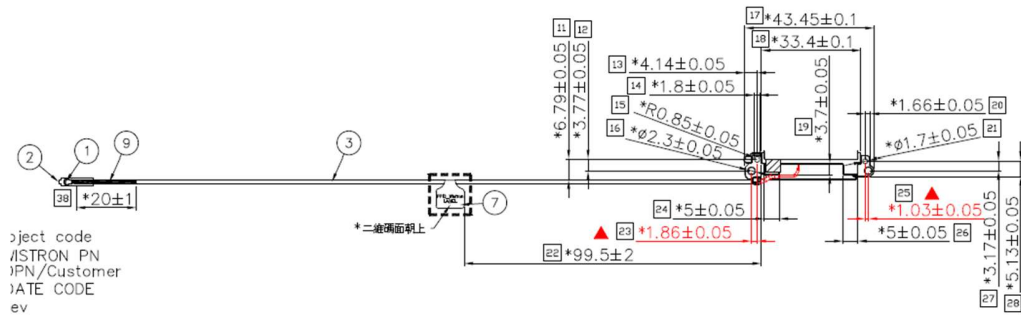
<insert test diagram here for test site utilized>



A.2 Test sample

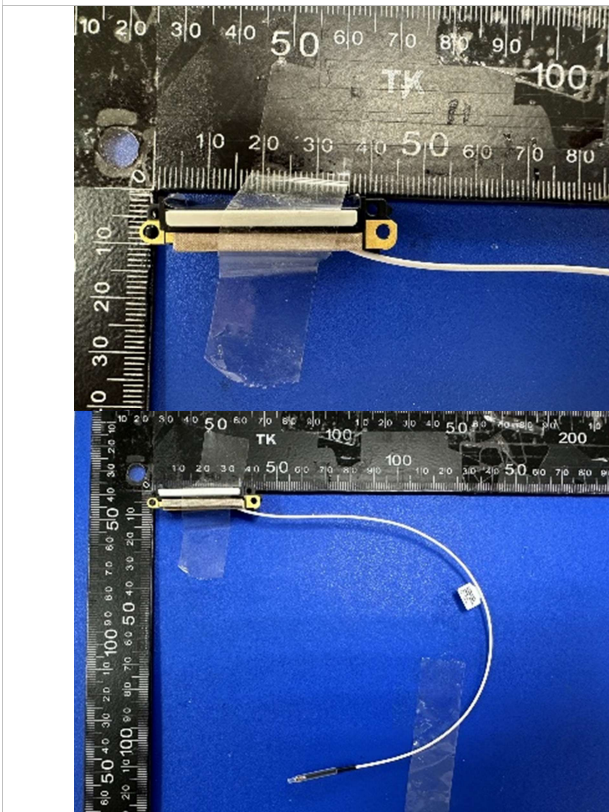
Main Antenna

Antenna Drawing

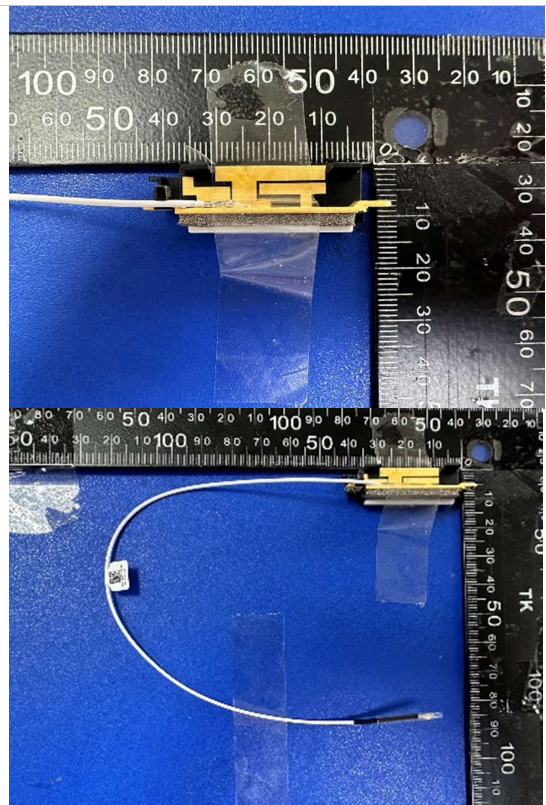


Antenna Photo

Front



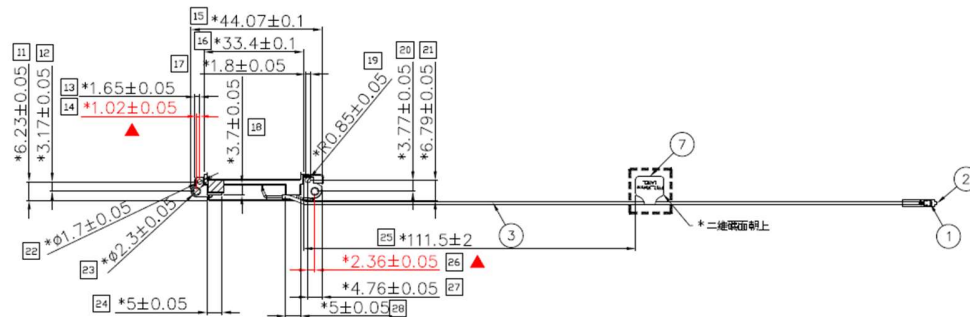
Back



Note: antenna photo should include L type ruler

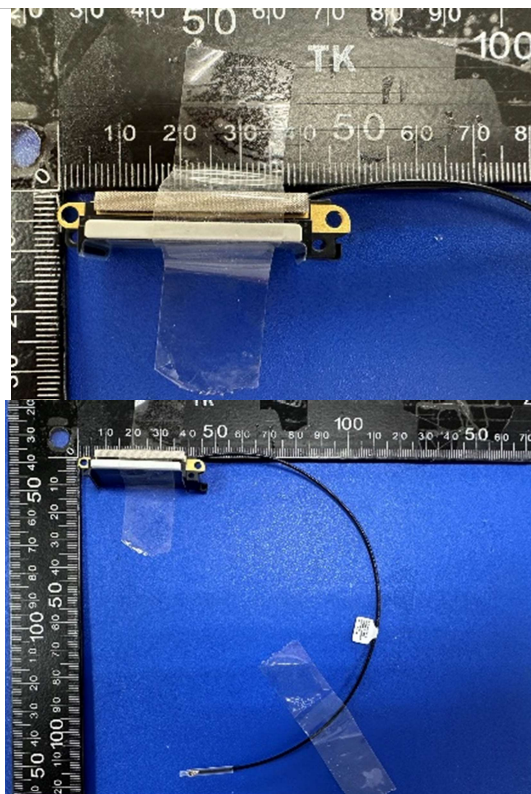
Aux Antenna

Antenna Drawing

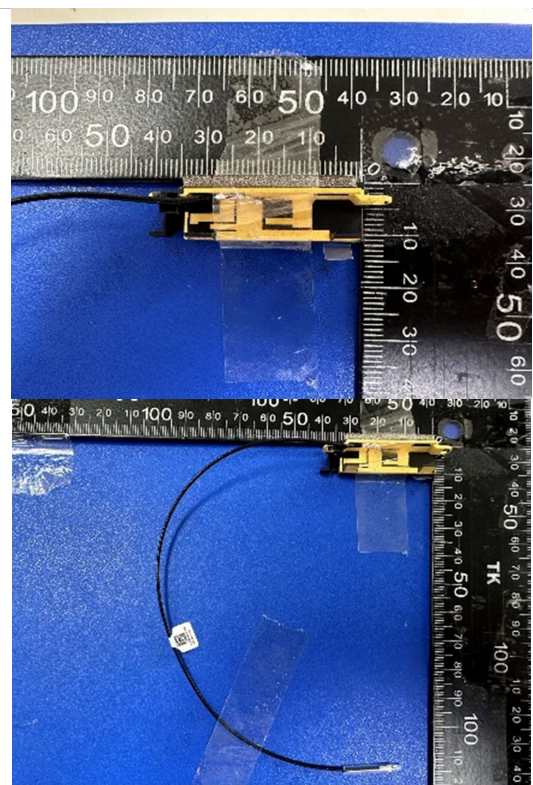


Antenna Photo

Front



Back



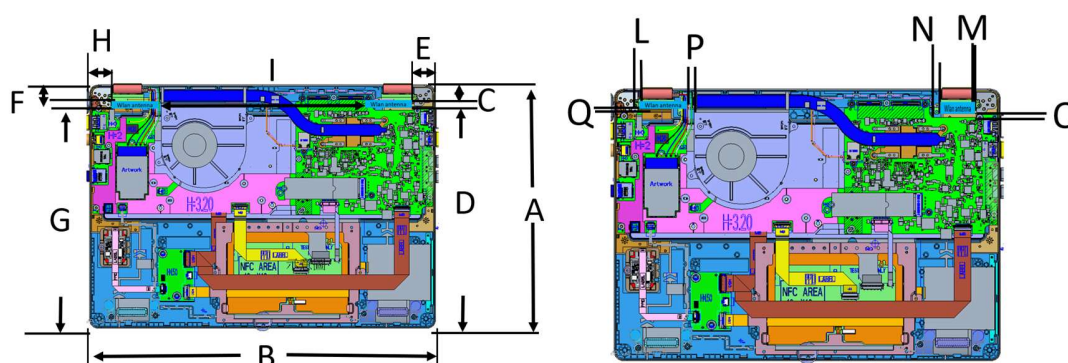
Note: antenna photo should include L type ruler

Annex B. Antenna Location

B.1 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.



Item	Location	distance
A	SYSTEM Y	251.4
B	SYSTEM X	358
C	WLAN-Main to edge	12.89
D	WLAN-Main to edge	238.52
E	WLAN-Main to edge	23.6
F	WLAN-Aux to edge	12.89
G	WLAN-Aux to edge	238.52
H	WLAN-Aux to edge	23.6
I	WLAN-Main to WLAN-Aux	248
J	WLAN to table	5.25
K	WLAN to C cover	4.12
L	WLAN to metal	4.62
M	WLAN to metal	4.62
N	WLAN to metal (eDP cable)	5
O	WLAN to metal (Antenna Wall)	6.92
P	WLAN to metal (ANT cable)	5
Q	WLAN to metal (Antenna Wall)	5.92
R	WLAN to metal (Hinge)	3.25

B.2 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.

Antennas on the panel section

