

# ANTENNA INFORMATION

|                                                           |                         |
|-----------------------------------------------------------|-------------------------|
| OEM                                                       | DELL                    |
| ODM                                                       | Compal Corporation      |
| Platform model name                                       | P199G                   |
| Intel platform (ex: Yes, No or NA)                        | Yes                     |
| Platform type (ex: regular NB, convertible PC, AIO...etc) | Regular NB              |
| SAR minimum separation (mm)                               | 5 mm with bumper (3 mm) |

|                      |                 |                                                                     |
|----------------------|-----------------|---------------------------------------------------------------------|
| Antenna manufacturer | Company name    | Hong-Bo Corporation                                                 |
|                      | Address         | 4F., No.143, Sinhu 1st Rd., Neihu Dist., Taipei City, 11494 Taiwan  |
| Test location        | Company name    | SPORTON INTERNATIONAL INC                                           |
|                      | Address         | NO. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) |
| Test Personnel       | Name(Full name) | Kurt Liu                                                            |
|                      | E-mail          | kurtliu@hong-bo.com.tw                                              |
|                      | Tel/Mobile      | 02-2792-6009                                                        |
| Testing date         |                 | 2024/8/23                                                           |

|                                       |      |                                                  |
|---------------------------------------|------|--------------------------------------------------|
| Antenna Part number                   | Main | Compal P/N:DC33002YD1L<br>Antenna P/N: 330-24056 |
|                                       | Aux  | Compal P/N:DC33002YD1L<br>Antenna P/N: 330-24056 |
| Antenna type (ex: PIFA, Dipole...etc) |      | PIFA                                             |

| Antenna Peak gain w/ cable loss (dBi)* |                           |                        |                        |                        |                        |                        |                        |                        |                        |                         |
|----------------------------------------|---------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
|                                        | 2.4GHz<br>2400-2483.5 MHz | 5.2GHz<br>5150-5250MHz | 5.3GHz<br>5250-5350MHz | 5.6GHz<br>5470-5725MHz | 5.8GHz<br>5725-5850MHz | 5.9GHz<br>5850-5895MHz | 6.2GHz<br>5925-6425MHz | 6.5GHz<br>6425-6525MHz | 6.7GHz<br>6525-6875MHz | 7.0 GHz<br>6875-7125MHz |
| Main                                   | 0.39                      | -0.56                  | -0.33                  | 2.62                   | 2.58                   | 1.88                   | 2.62                   | 1.28                   | 2.58                   | 2.88                    |
| Aux                                    | -1.01                     | -0.17                  | 0.06                   | 2.18                   | 2.10                   | 1.00                   | 1.80                   | 0.98                   | 1.06                   | 1.25                    |

| Cable Assembly Part Number and Information |               |                  |                    |                |                     |
|--------------------------------------------|---------------|------------------|--------------------|----------------|---------------------|
|                                            | Cable PN      | Cable length(mm) | Cable diameter(mm) | Impedance(ohm) | Connector type      |
| Main                                       | SY113L/50-143 | 150mm            | 1.13               | 50             | IPEX(20565-001R-13) |
| Aux                                        | SY113L/50-118 | 153mm            | 1.13               | 50             | IPEX(20565-001R-13) |

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

| Cable loss (dBi) |                           |                        |                        |                        |                        |                        |                        |                        |                        |                         |
|------------------|---------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
|                  | 2.4GHz<br>2400-2483.5 MHz | 5.2GHz<br>5150-5250MHz | 5.3GHz<br>5250-5350MHz | 5.6GHz<br>5470-5725MHz | 5.8GHz<br>5725-5850MHz | 5.9GHz<br>5850-5895MHz | 6.2GHz<br>5925-6425MHz | 6.5GHz<br>6425-6525MHz | 6.7GHz<br>6525-6875MHz | 7.0 GHz<br>6875-7125MHz |
| Main             | -0.33                     | -0.53                  | -0.54                  | -0.58                  | -0.59                  | -0.59                  | -0.63                  | -0.62                  | -0.65                  | -0.67                   |
| Aux              | -0.34                     | -0.54                  | -0.55                  | -0.59                  | -0.60                  | -0.60                  | -0.64                  | -0.63                  | -0.66                  | -0.69                   |

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## 1. Intel Reference Gain and Type

| Antenna Peak gain w/ cable loss (dBi) |                         |                                  |                               |                               |                               |                               |                               |                               |                               |                               |                                |
|---------------------------------------|-------------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Band/Frequency                        |                         | <b>2.4GHz</b><br>2400-2483.5 MHz | <b>5.2GHz</b><br>5150-5250MHz | <b>5.3GHz</b><br>5250-5350MHz | <b>5.6GHz</b><br>5470-5725MHz | <b>5.8GHz</b><br>5725-5850MHz | <b>5.9GHz</b><br>5850-5895MHz | <b>6.2GHz</b><br>5925-6425MHz | <b>6.5GHz</b><br>6425-6525MHz | <b>6.7GHz</b><br>6525-6875MHz | <b>7.0 GHz</b><br>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      |             |

## 3. Test & System Description

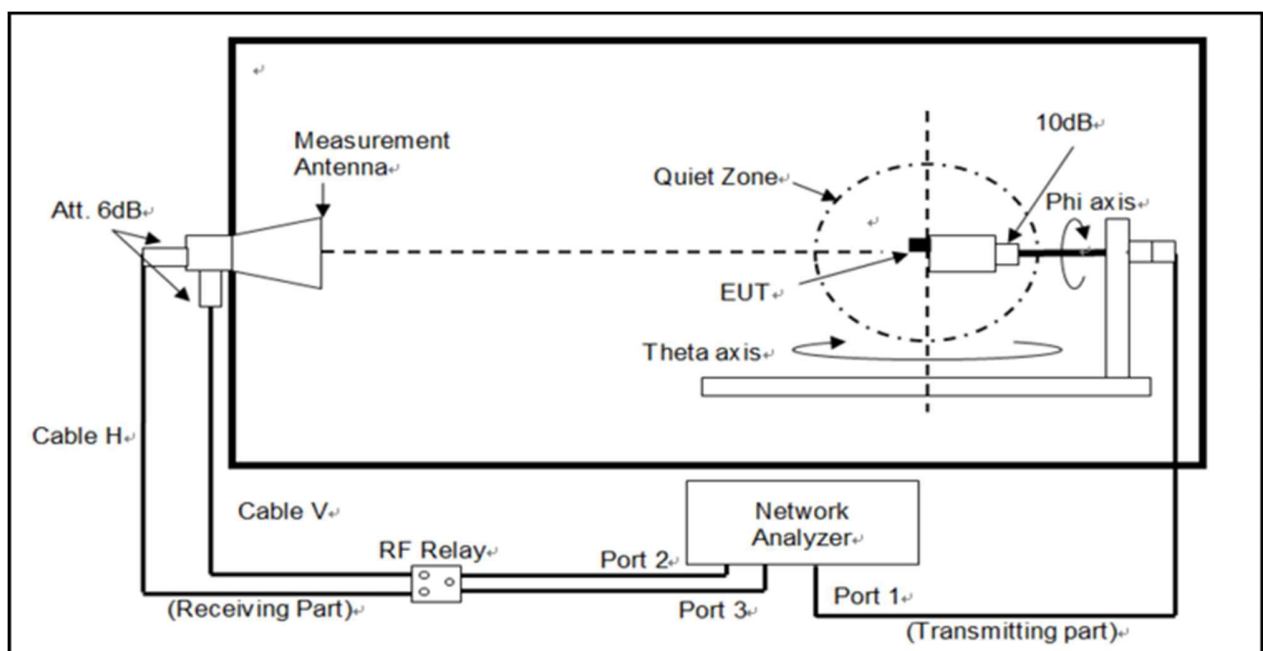
### 3.1 Measurement Method and System

<insert test description here for test method>

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

### 3.2 Test setup

<insert test diagram here for test site utilized>



### 3.3 Equipment list

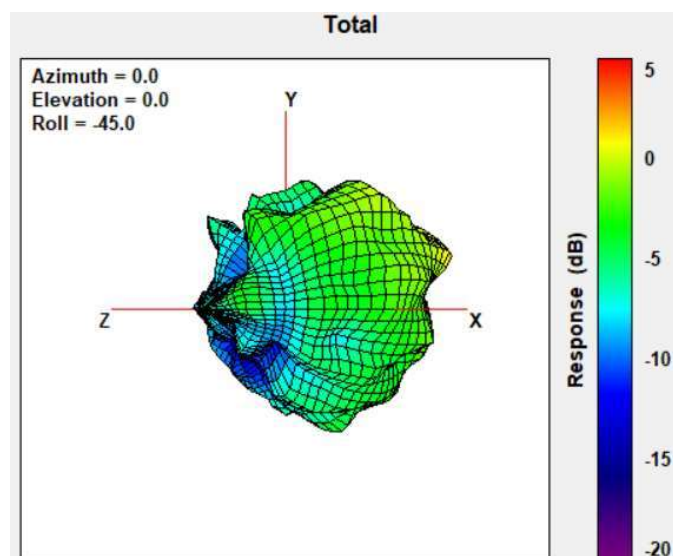
| Huaya-Sporton OTA03                                         |                       |            |               |             |           |
|-------------------------------------------------------------|-----------------------|------------|---------------|-------------|-----------|
| Name                                                        | Manufacturer          | Type/Model | Serial Number | Calibration |           |
|                                                             |                       |            |               | Last Cal.   | Due Date  |
| ENA Series Network Analyzer                                 | Keysight              | E5071C     | MY46100746    | 2023/9/15   | 2024/9/14 |
| RF Switch                                                   | Keysight              | 3499A      | MY42000955    | NCR         | NCR       |
| Multi-Axis Positioner Controller                            | ETS-Lindgren          | 2090       | N/A           | NCR         | NCR       |
| Medium-Duty Positioner                                      | ETS-Lindgren          | 2015       | N/A           | NCR         | NCR       |
| Measurement Horn Antenna                                    | EMCO                  | 3164-08    | 00086722      | NCR         | NCR       |
| Anechoic Chamber                                            | ETS-Lindgren          | AMS-8500   | N/A           | 2024/3/12   | 2025/3/11 |
| 12GHz SMA(M)-SMA(M)+20core for 60cm RG316DS Cable Assembly  | Woken Technology Inc. | RG316DS    | N/A           | N/A         | N/A       |
| 12GHz SMA(M)-SMA(M)+30core for 300cm RG316DS Cable Assembly | Woken Technology Inc. | RG316DS    | N/A           | N/A         | N/A       |
| Note: Chamber calibration included full set of implement.   |                       |            |               |             |           |

#### 4. Radiation characteristics of antenna loaded in Host Platform

##### Main Antenna

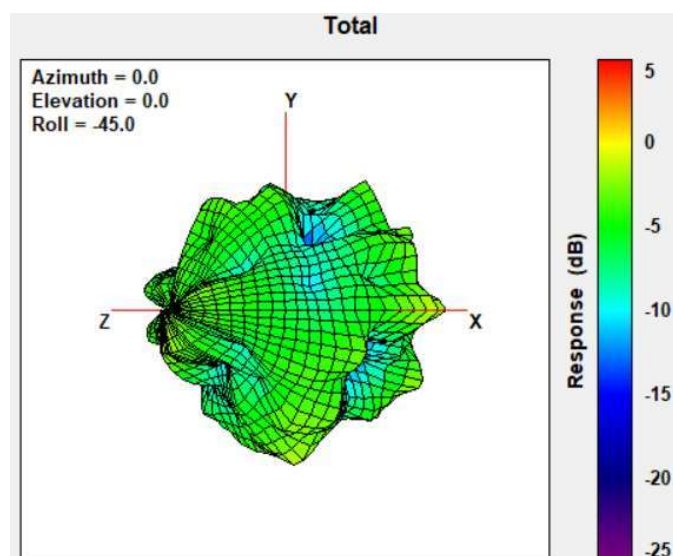
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 0.39                          |



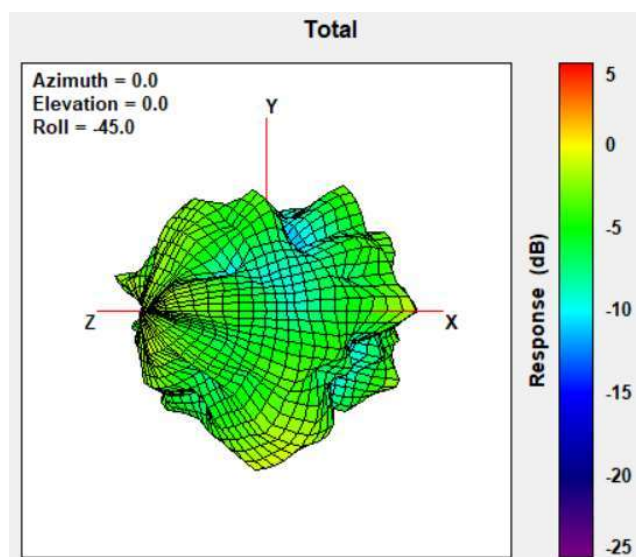
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | -0.56                         |



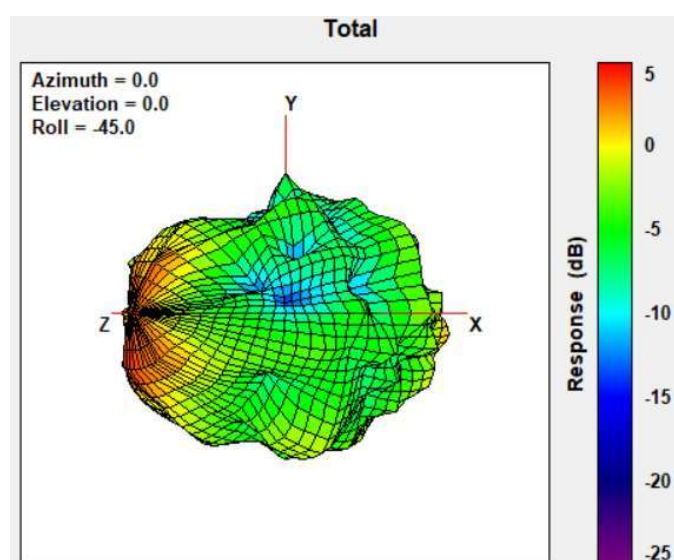
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | -0.33                         |



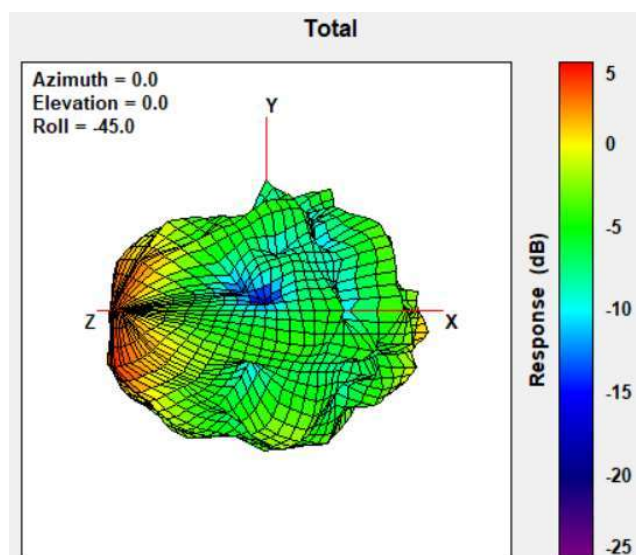
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 2.62                          |



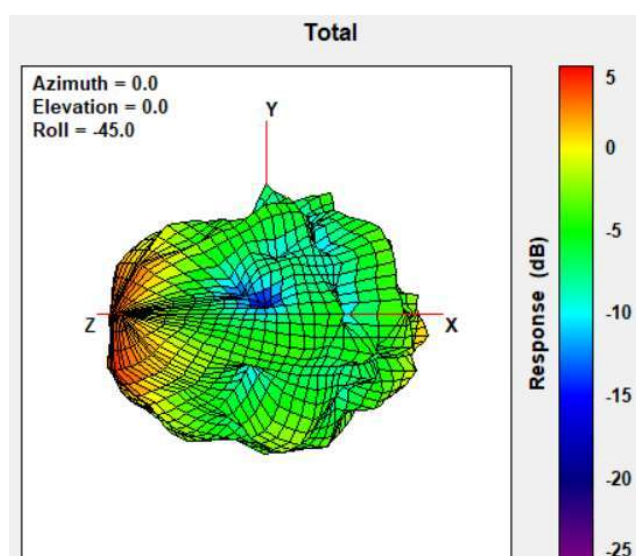
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 2.58                          |



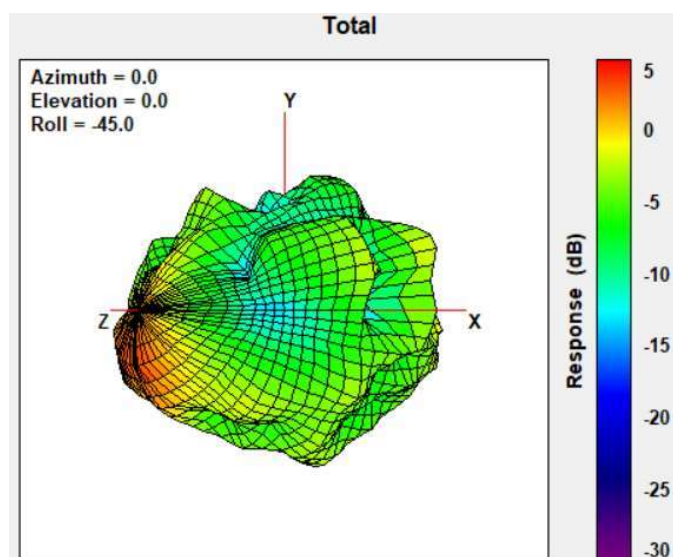
## Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 1.88                          |



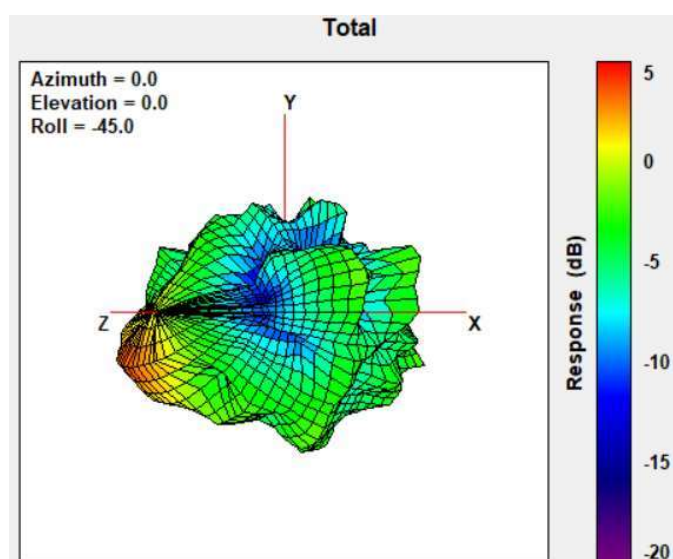
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 2.62                          |



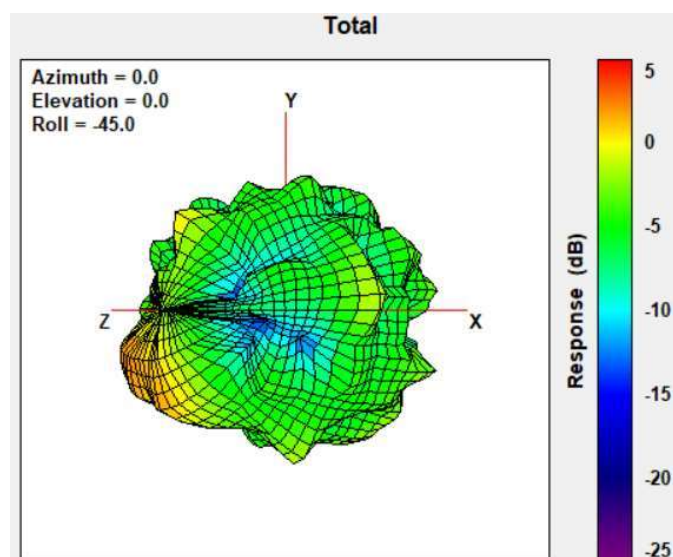
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 1.28                          |



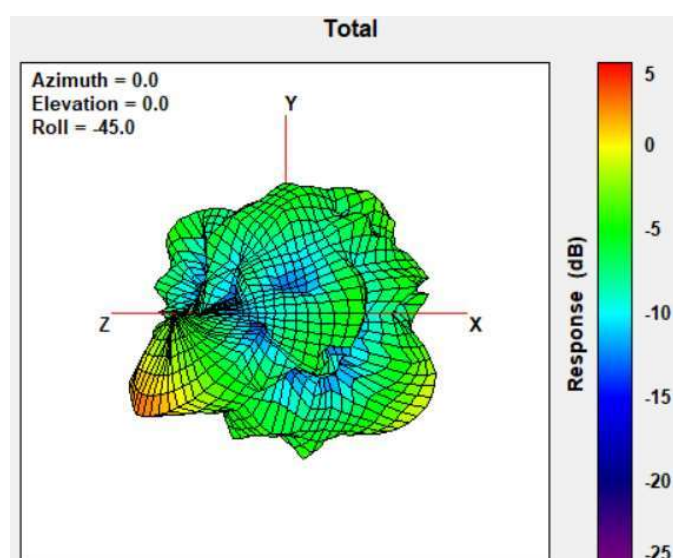
## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 2.58                          |



## Max Antenna 3D Radiation Pattern 6875-7125 MHz

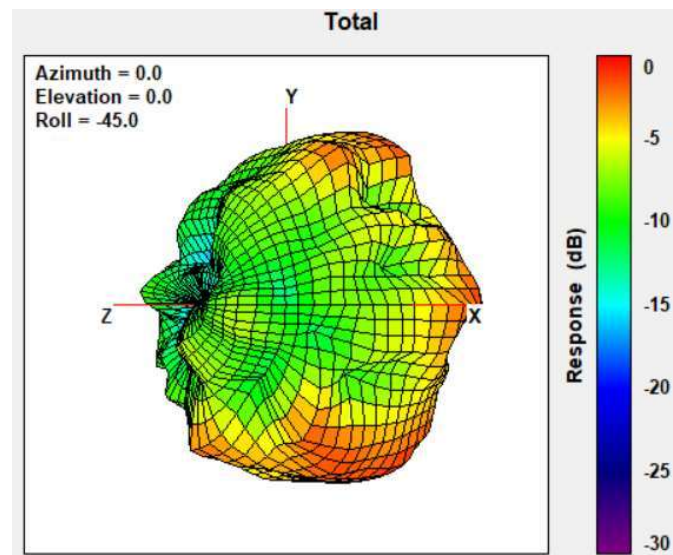
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 2.88                          |



## Auxiliary Antenna

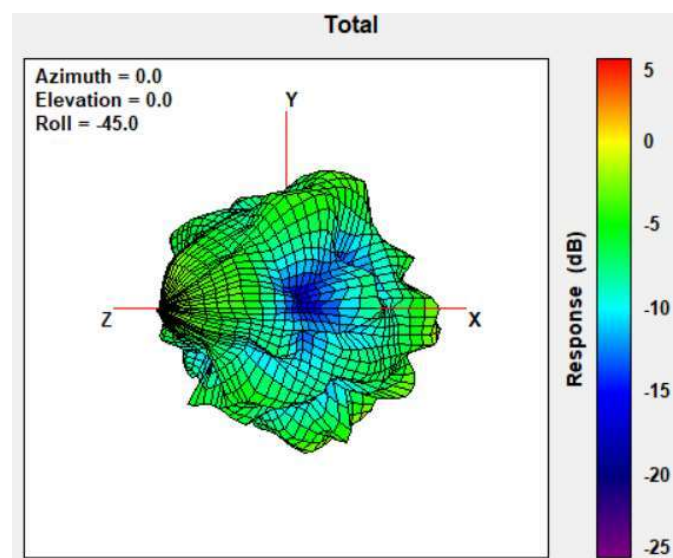
### Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | -1.01                         |



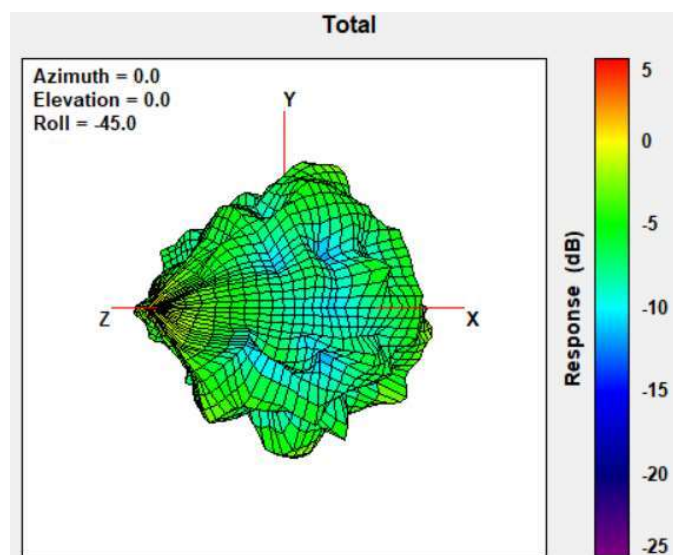
### Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | -0.17                         |



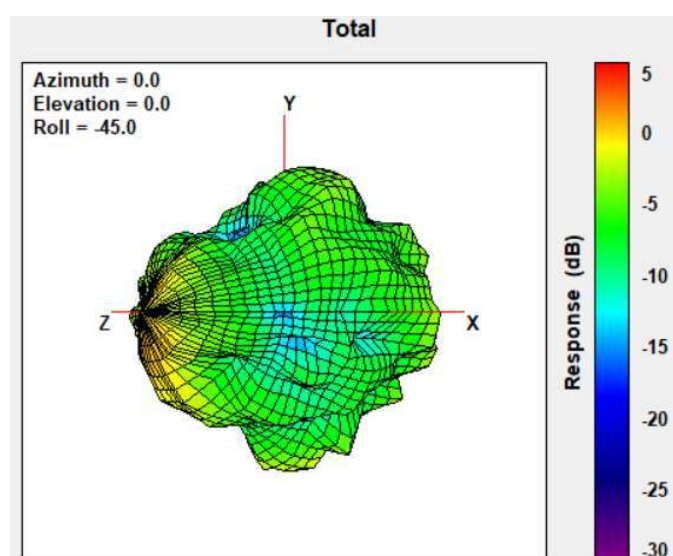
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 0.06                          |



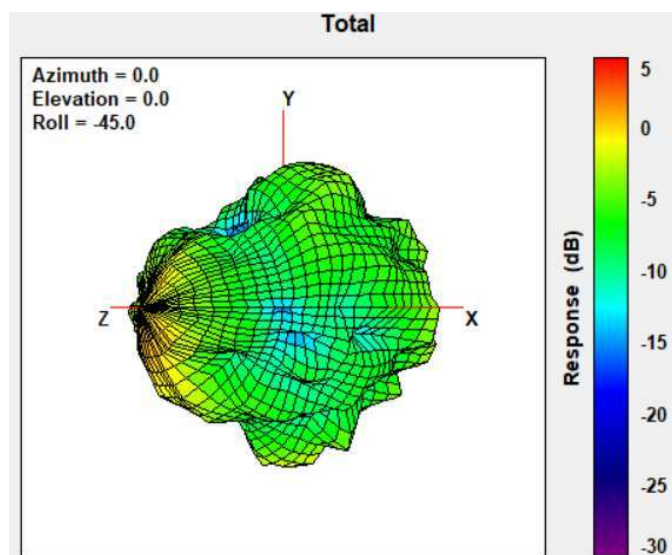
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 2.18                          |



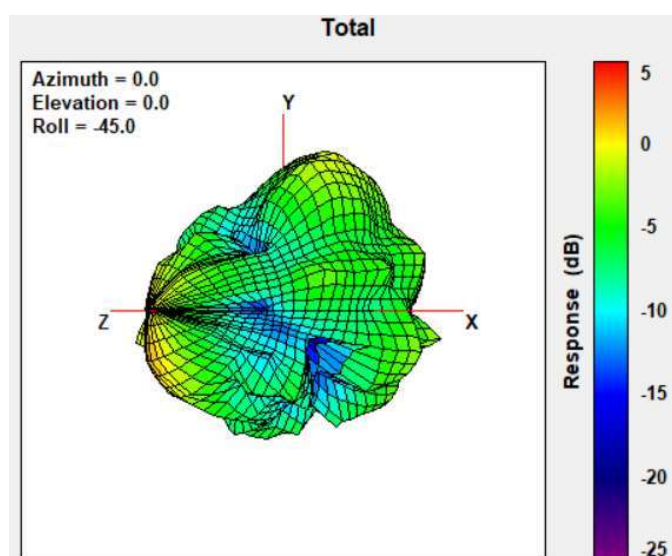
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 2.10                          |



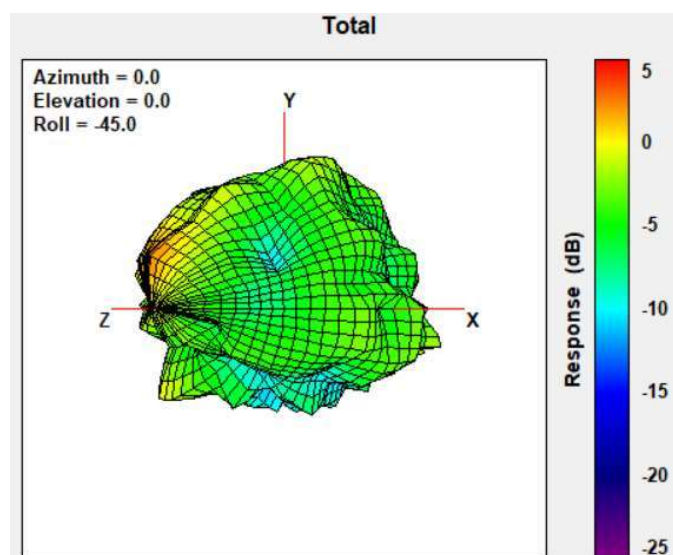
## Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 1.00                          |



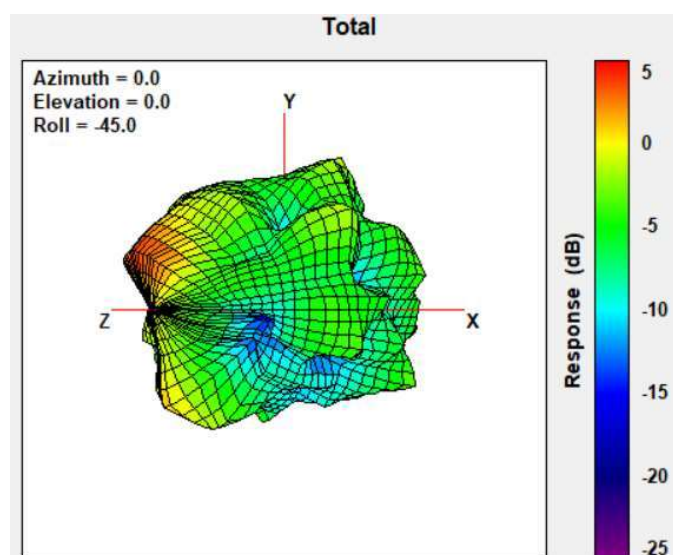
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 1.80                          |



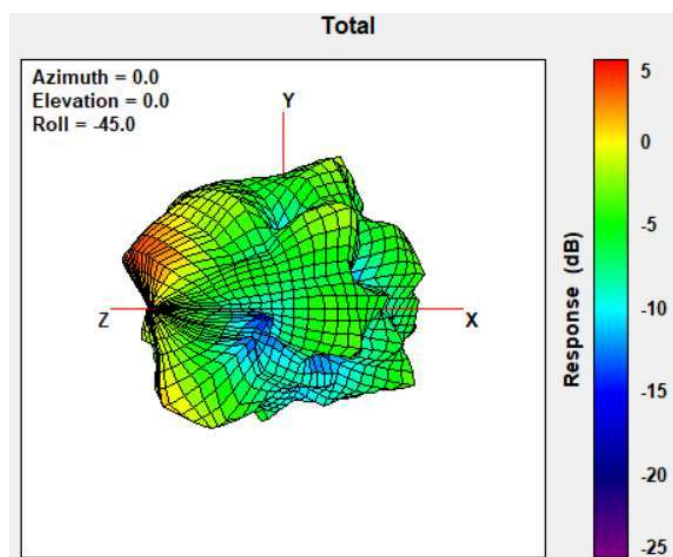
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 0.98                          |



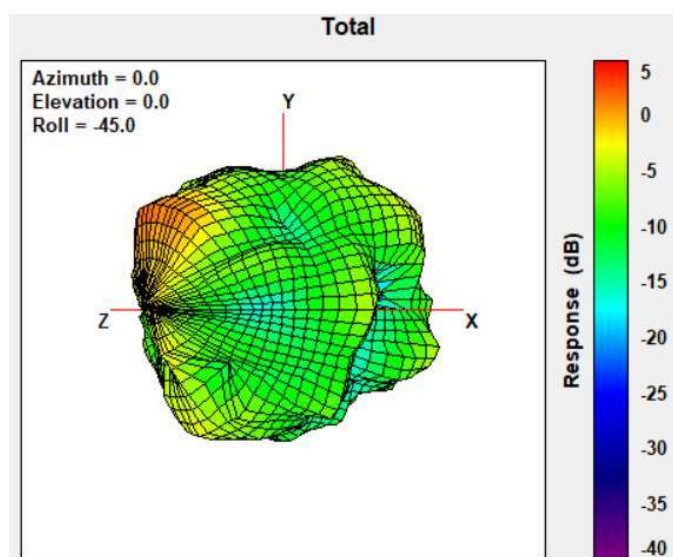
## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 1.06                          |



## Max Antenna 3D Radiation Pattern 6875-7125 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 1.25                          |



# Annex A. Photographs

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## A.1 Setup Photo

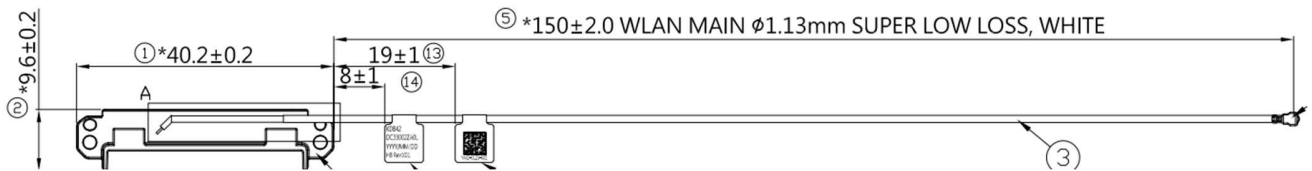
*<insert test diagram here for test site utilized>*

Please refer to the photo file

## A.2 Test sample

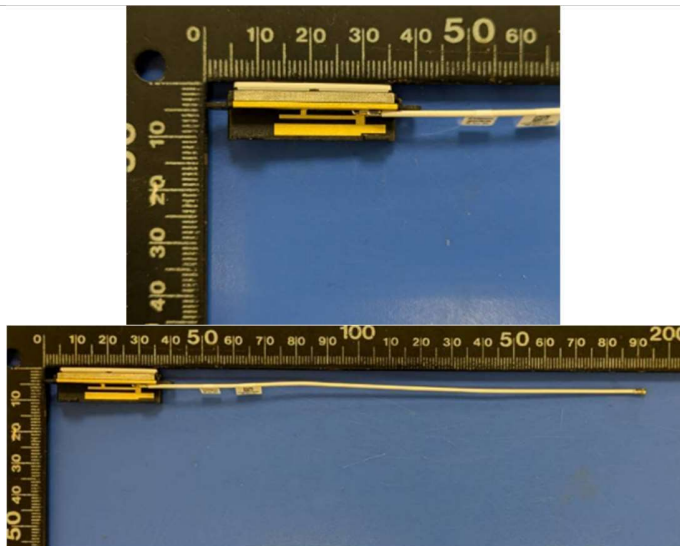
### Main Antenna

#### Antenna Drawing

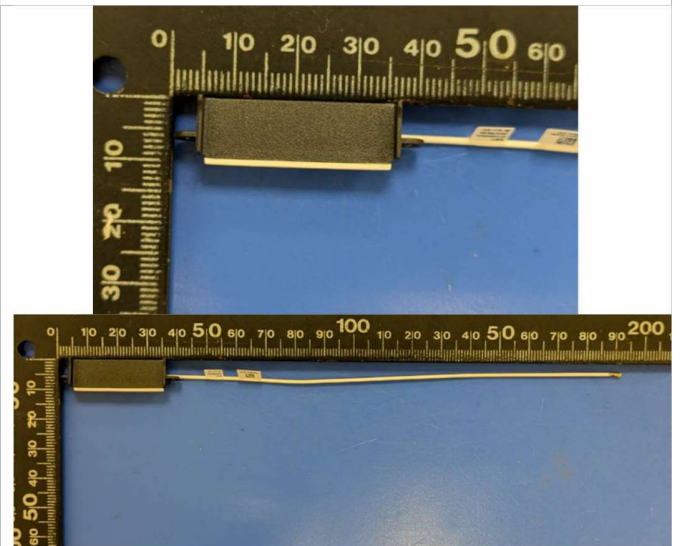


#### Antenna Photo

##### Front



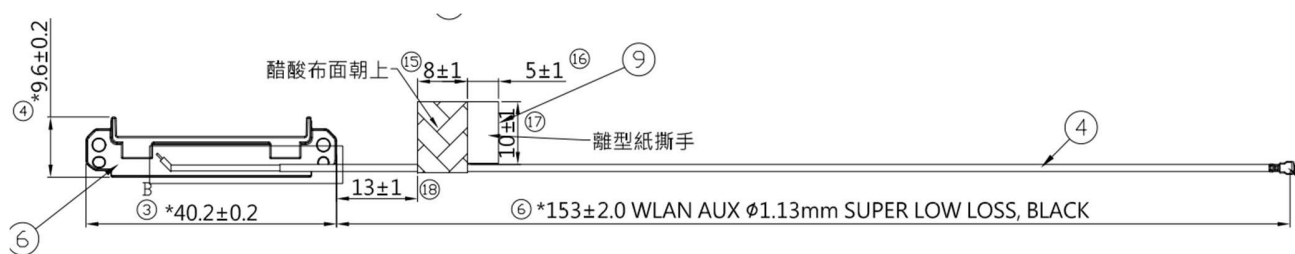
##### Back



**Note: antenna photo should include L type ruler**

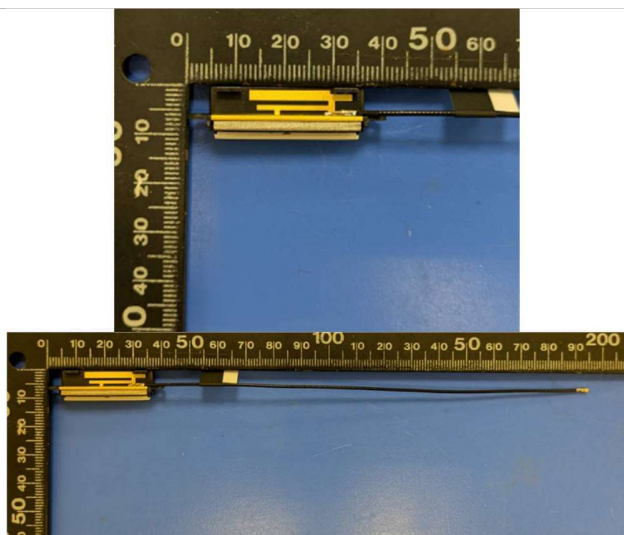
## Aux Antenna

### Antenna Drawing

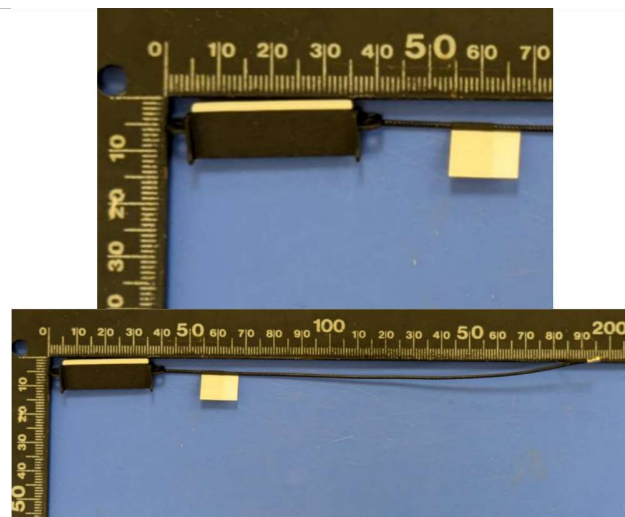


### Antenna Photo

#### Front



#### Back



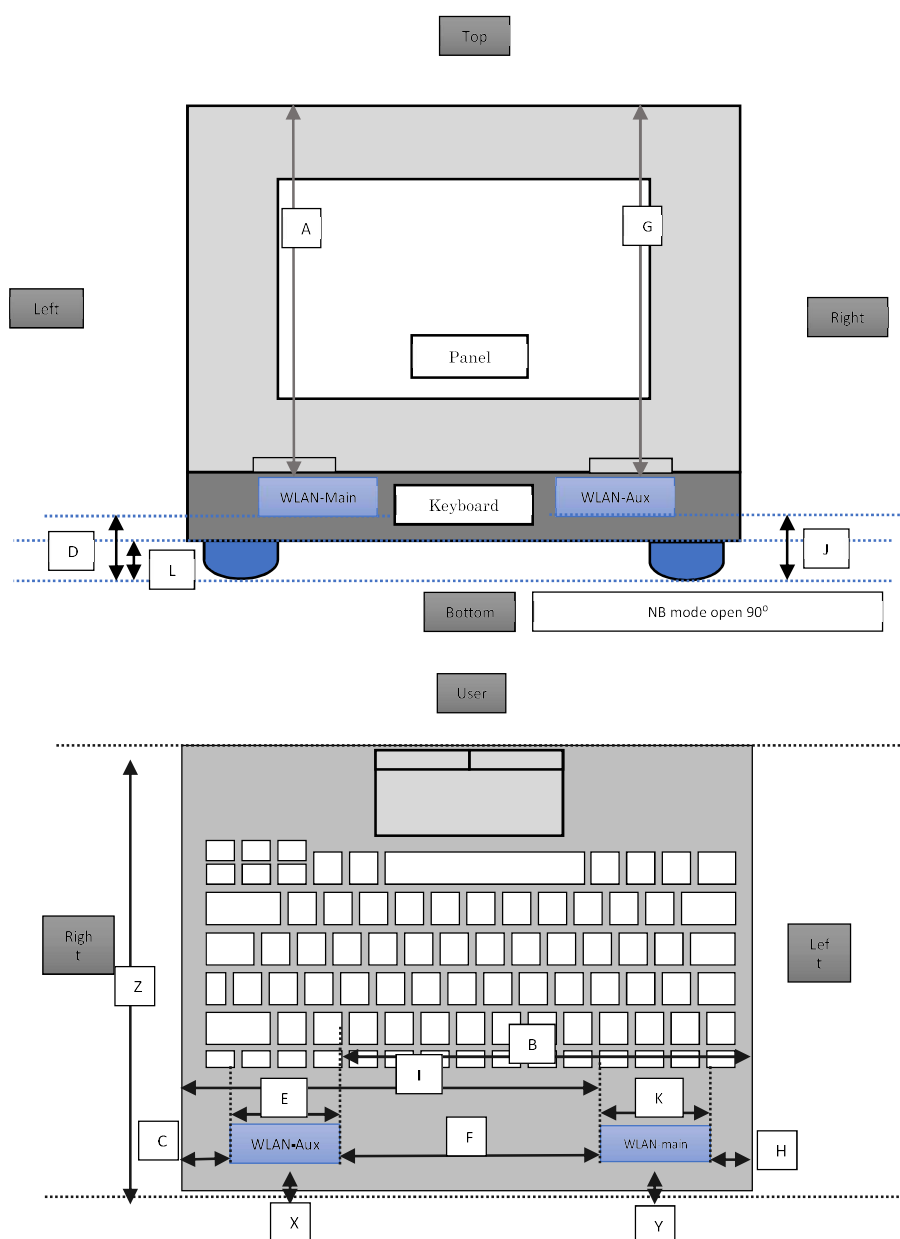
Note: antenna photo should include L type ruler

# 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 coating



| Minimum Separation Distance |           |                     |               |
|-----------------------------|-----------|---------------------|---------------|
| Item                        | Antenna   | Position            | Distance (mm) |
| A                           | WLAN-Aux  | to Top              | 214           |
| B                           | WLAN-Aux  | to Left             | 250           |
| C                           | WLAN-Aux  | to Right            | 20            |
| D                           | WLAN-Aux  | to Bottom           | 5             |
| E                           | WLAN-Aux  | Main Antenna Length | 40            |
| F                           | Main-Aux  | Main to Aux         | 190           |
| G                           | WLAN-main | to Top              | 214           |
| H                           | WLAN-main | to Left             | 20            |
| I                           | WLAN-main | to Right            | 250           |
| J                           | WLAN-main | to Bottom           | 5             |
| K                           | WLAN-main | Aux Antenna Length  | 40            |
| L                           | NB        | Bumper thickness    | 3             |
| X                           | WLAN-Aux  | to hinge            | 15            |
| Y                           | WLAN-Main | to hinge            | 15            |
| Z                           | NB        | Keyboard depth      | 223           |

## 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.

Notebook Mode

