

# ANTENNA INFORMATION

|                                                           |                                     |
|-----------------------------------------------------------|-------------------------------------|
| OEM                                                       | ASUS                                |
| ODM                                                       | HUAQIN                              |
| Platform model name                                       |                                     |
| Intel platform (ex: Yes, No or NA)                        |                                     |
| Platform type (ex: regular NB, convertible PC, AIO...etc) | Regular NB                          |
| SAR minimum separation (mm)                               | FCC (1g)<br>ISED (1g)<br>ISED (10g) |

|                      |                 |                                                                                   |
|----------------------|-----------------|-----------------------------------------------------------------------------------|
| Antenna manufacturer | Company name    | INNOWAVE                                                                          |
|                      | Address         | Building H, No. 55, Shengchuang Road, Yushan Town, Kunshan City, Jiangsu Province |
| Test location        | Company name    | INNOWAVE                                                                          |
|                      | Address         | Building H, No. 55, Shengchuang Road, Yushan Town, Kunshan City, Jiangsu Province |
| Test Personnel       | Name(Full name) | Sunny Ye                                                                          |
|                      | E-mail          | yexiangyang@innowave.cn                                                           |
|                      | Tel/Mobile      | 17603761603                                                                       |
| Testing date         |                 | 2025/05/06                                                                        |

|                                       |      |                 |
|---------------------------------------|------|-----------------|
| Antenna Part number                   | Main | F001K5213191000 |
|                                       | Aux  | F001K5213191000 |
| Antenna type (ex: PIFA, Dipole...etc) |      | PIFA Antenna    |

| Antenna Peak gain w/ cable loss (dBi)* |            |                              |                        |                        |                        |                        |                        |                        |                        |                        |                         |
|----------------------------------------|------------|------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
|                                        |            | 2.4GHz<br>2400-2483.5<br>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                                   | Peak Gain  | 2.52                         | 2.78                   | 3.01                   | 3.13                   | 3.13                   | 3.21                   | 3.21                   | 3.11                   | 3.46                   | 3.99                    |
|                                        | Cable Loss | 0.54                         | 0.82                   | 0.82                   | 0.85                   | 0.85                   | 0.85                   | 0.88                   | 0.88                   | 0.89                   | 0.89                    |
| Aux                                    | Peak Gain  | 2.55                         | 2.49                   | 2.89                   | 3.06                   | 3.06                   | 3.25                   | 3.22                   | 3.88                   | 3.01                   | 3.76                    |
|                                        | Cable Loss | 0.71                         | 1.07                   | 1.08                   | 1.11                   | 1.12                   | 1.12                   | 1.15                   | 1.16                   | 1.16                   | 1.17                    |

| Cable Assembly Part Number and Information |                 |                  |                    |                |                                  |
|--------------------------------------------|-----------------|------------------|--------------------|----------------|----------------------------------|
|                                            | Cable PN        | Cable length(mm) | Cable diameter(mm) | Impedance(ohm) | Connector type                   |
| Main                                       | S001K5202111000 | 221.75           | 1.13               | 50Ω            | IPEX fourth generation terminals |
| Aux                                        | S001K5202531000 | 290.86           | 1.13               | 50Ω            | IPEX fourth generation terminals |

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

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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

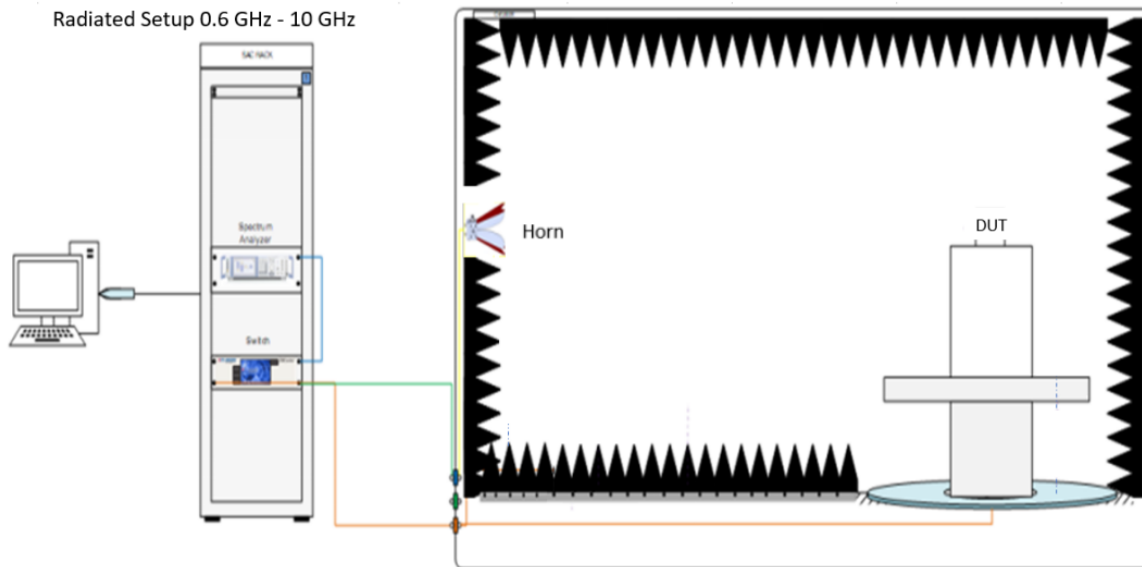
| Revision # | Revision Details | Issued Date |
|------------|------------------|-------------|
| Rev. 00    | First Issue      | 2024.11.01  |

### 3. Test & System Description

#### 3.1 Measurement Method and System

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

#### 3.2 Test setup



### 3.3 Equipment list

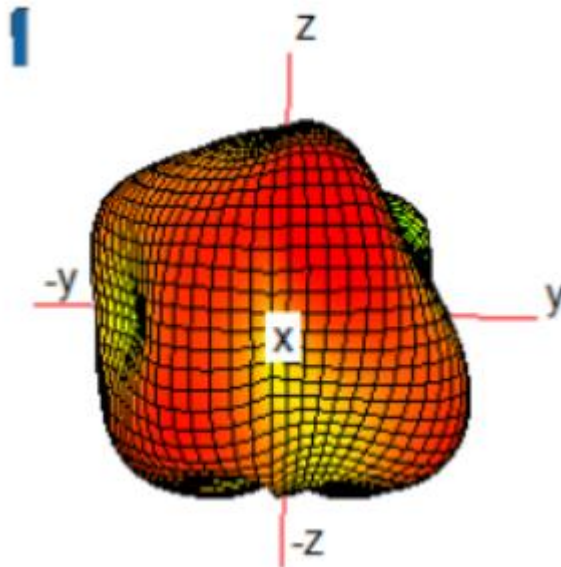
| Number | Device                      | Type/Model            | Serial           | Manufacturer | Cal. Date  | Cal. due. Date |
|--------|-----------------------------|-----------------------|------------------|--------------|------------|----------------|
| 1      | Chamber                     | FATC3                 | 5720             | ETS-Lindgren | 2024/12/25 | 2025/12/24     |
| 2      | Turn table control box      | ETS                   | -                | ETS-Lindgren | N/A        | N/A            |
| 3      | Turn table control computer | Desktop               | LPTPTOP-JQTTOKRA | LENOVO       | N/A        | N/A            |
| 4      | Network Analyzer            | 5071C                 | 5071C            | Keysight     | 2024/12/25 | 2025/12/24     |
| 5      | Hron Antenna                | 3117                  | E00157734        | Bwant        | 2024/12/23 | 2025/12/22     |
| 6      | Test system host            | EMC Center            | 159757           | ETS-Lindgren | N/A        | N/A            |
| 7      | RF Line TX                  | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/20 | 2025/12/19     |
| 8      | RF Line RX                  | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/20 | 2025/12/19     |
| 9      | Cable 2m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/20 | 2025/12/19     |
| 10     | Optical fiber line          | RXY-00727-1603        | -                | Jmtt         | N/A        | N/A            |
| 11     | Cable 2.5m 1GHz-8.5GHz      | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/21 | 2025/12/20     |
| 12     | Cable 1.2m 1GHz-8.5GHz      | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/21 | 2025/12/20     |
| 13     | Cable 1m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/21 | 2025/12/20     |
| 14     | Cable 2m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/21 | 2025/12/20     |
| 15     | Cable 1m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2024/12/13 | 2025/12/12     |
| 16     | Temp&Humidity Logger        | RA12E-TH1-RAS         | RA12-DOEB1A      | Avtech       | 2024/12/20 | 2025/12/19     |

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

##### Main Antenna

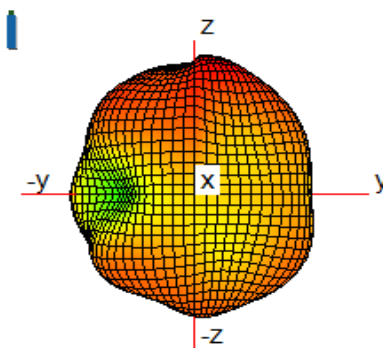
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 2.52                          |



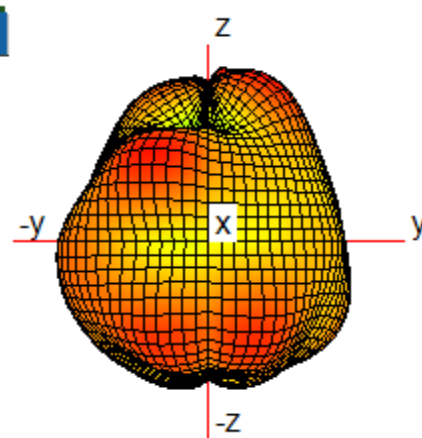
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 2.78                          |



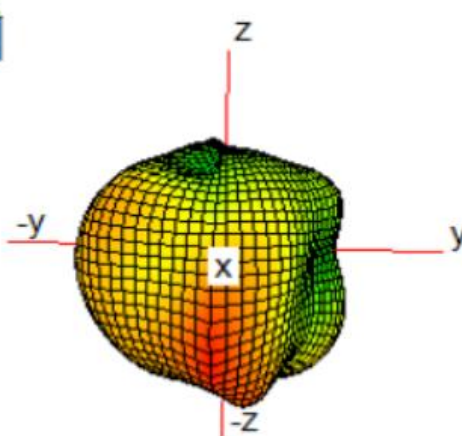
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 3.01                          |



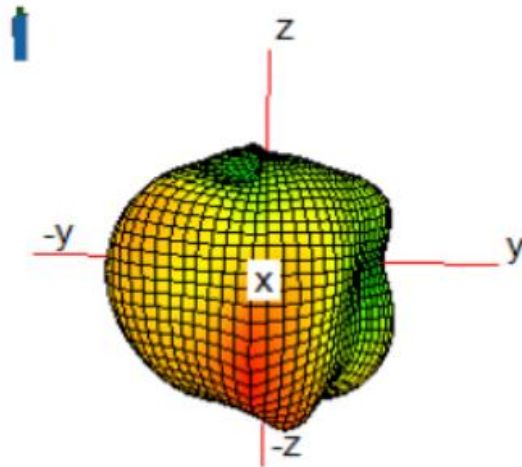
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 3.13                          |



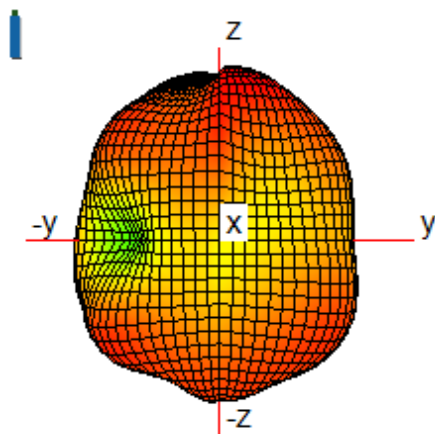
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 3.13                          |



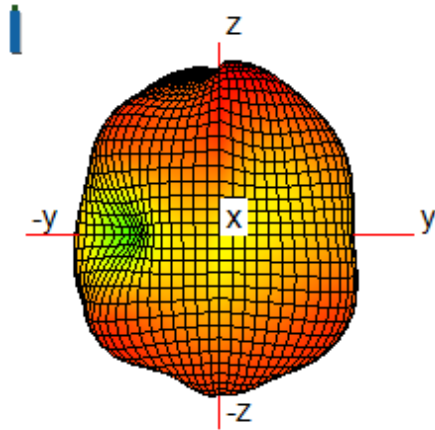
## Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 3.21                          |



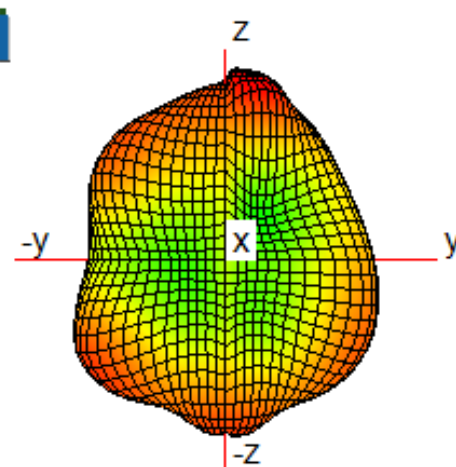
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 3.21                          |



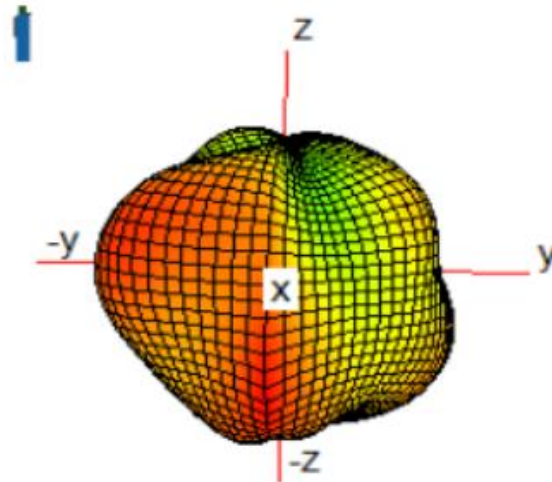
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 3.11                          |



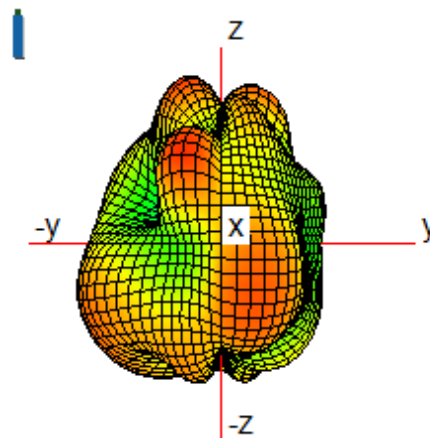
## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 3.46                          |



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

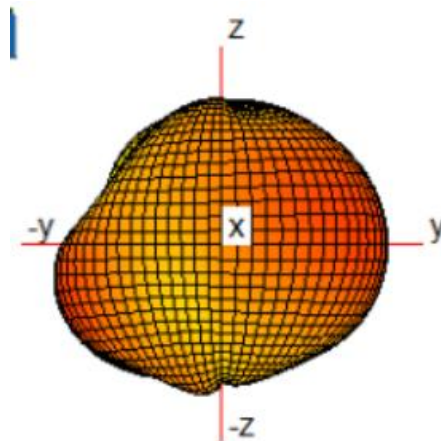
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 3.99                          |



## Auxiliary Antenna

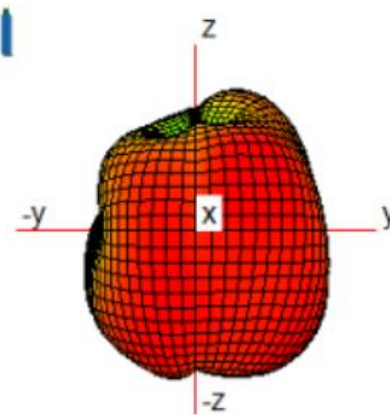
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 2.55                          |



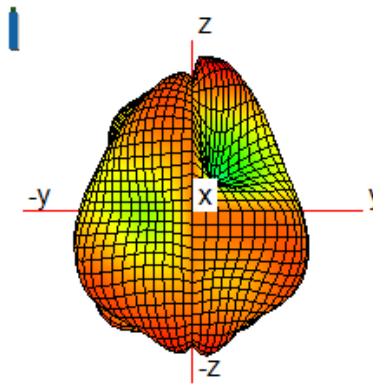
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 2.49                          |



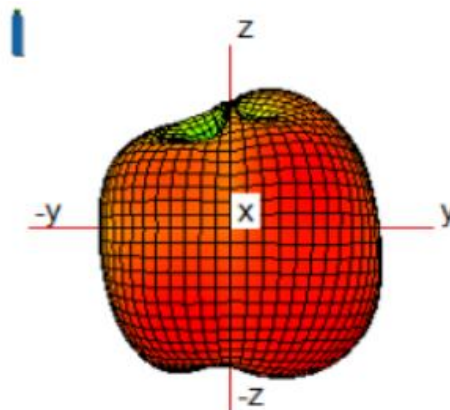
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 2.89                          |



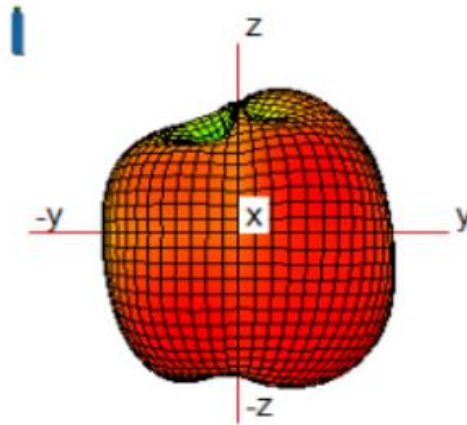
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 3.06                          |



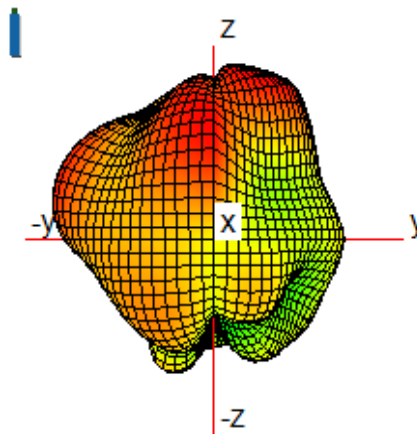
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 3.06                          |



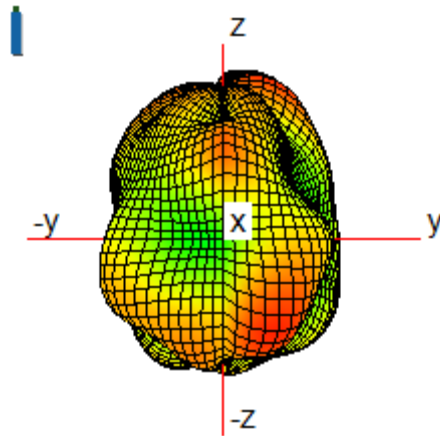
## Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 3.25                          |



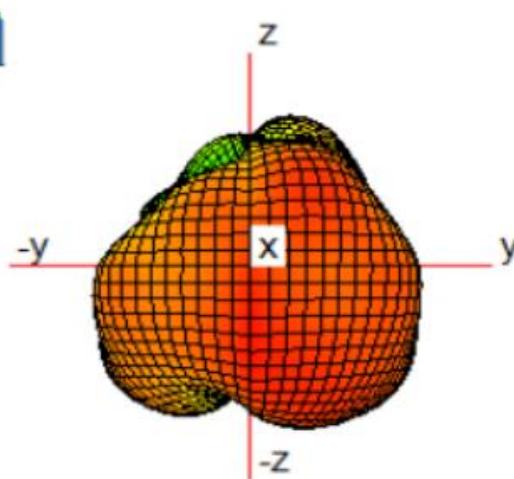
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 3.22                          |



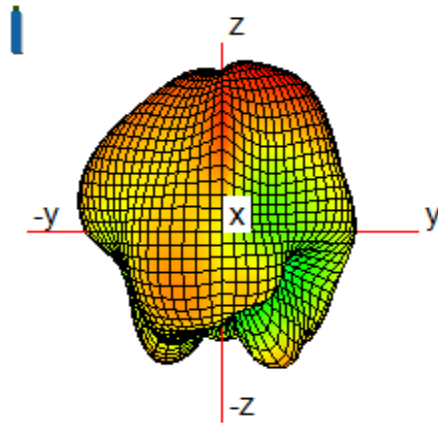
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 3.88                          |



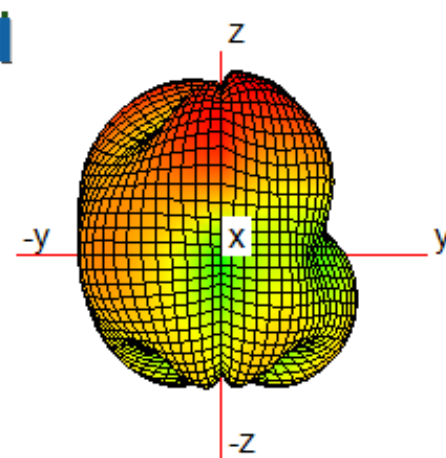
## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 3.01                          |



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

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 3.76                          |

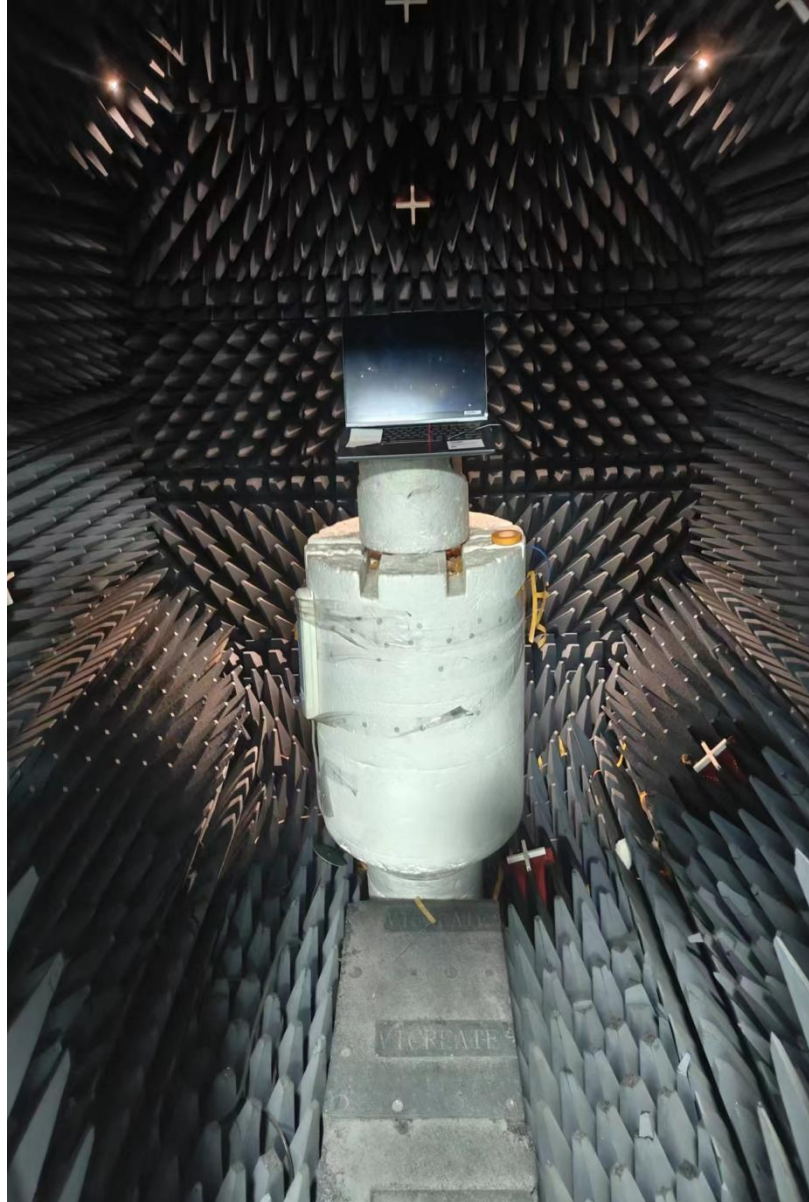


# Annex A. Photographs

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## A.1 Setup Photo

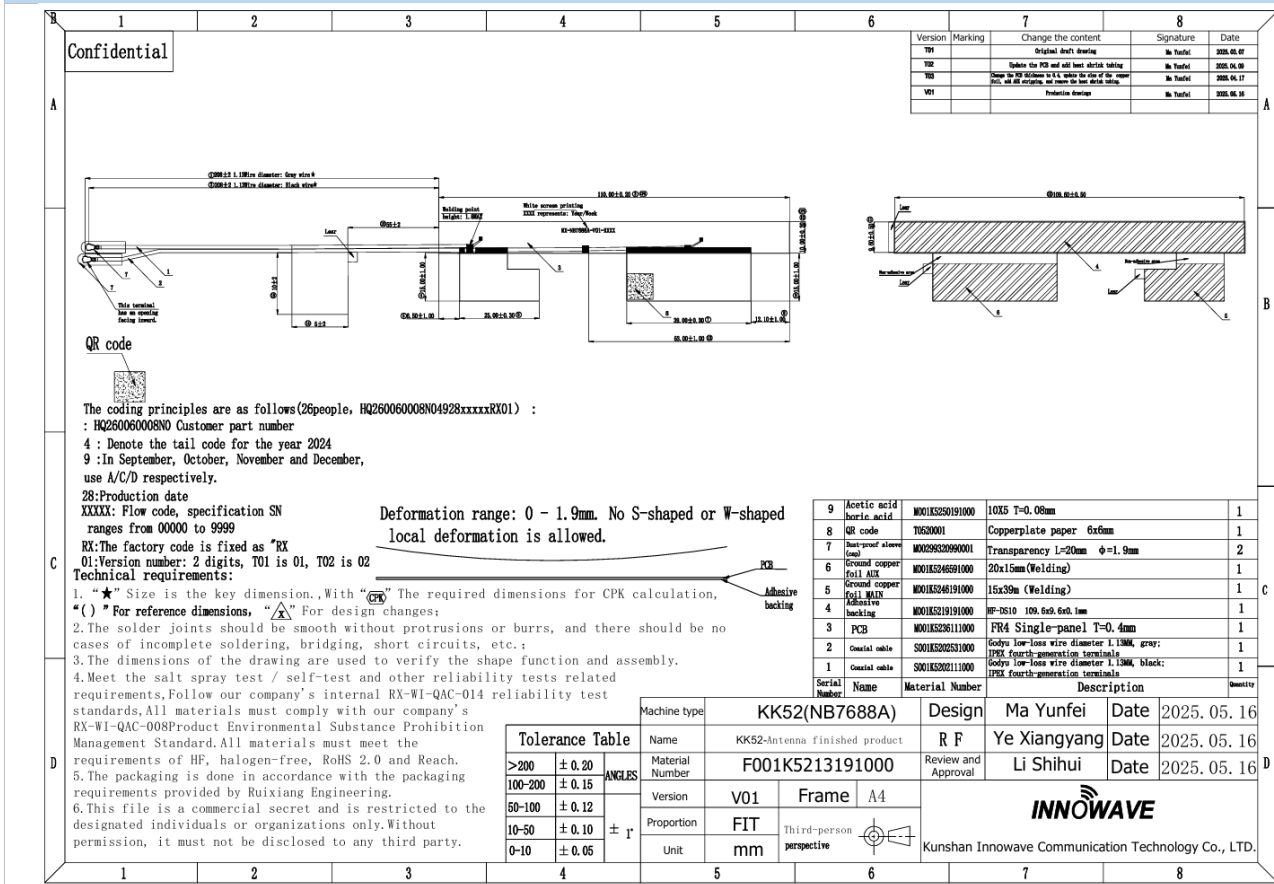
<insert test diagram here for test site utilized>



## A.2 Test sample

## Main Antenna

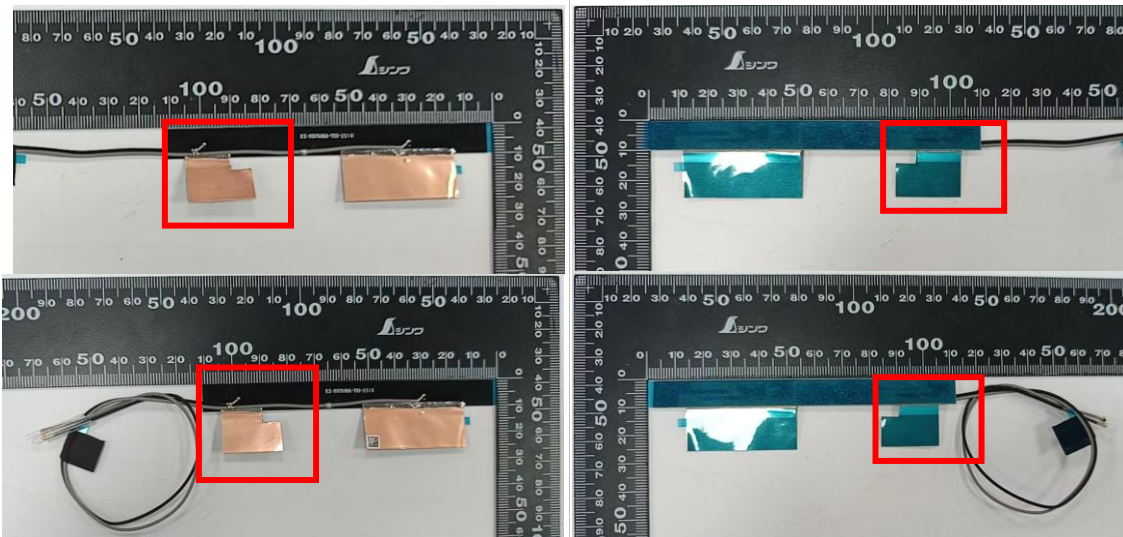
## Antenna Drawing



## Antenna Photo

## Front

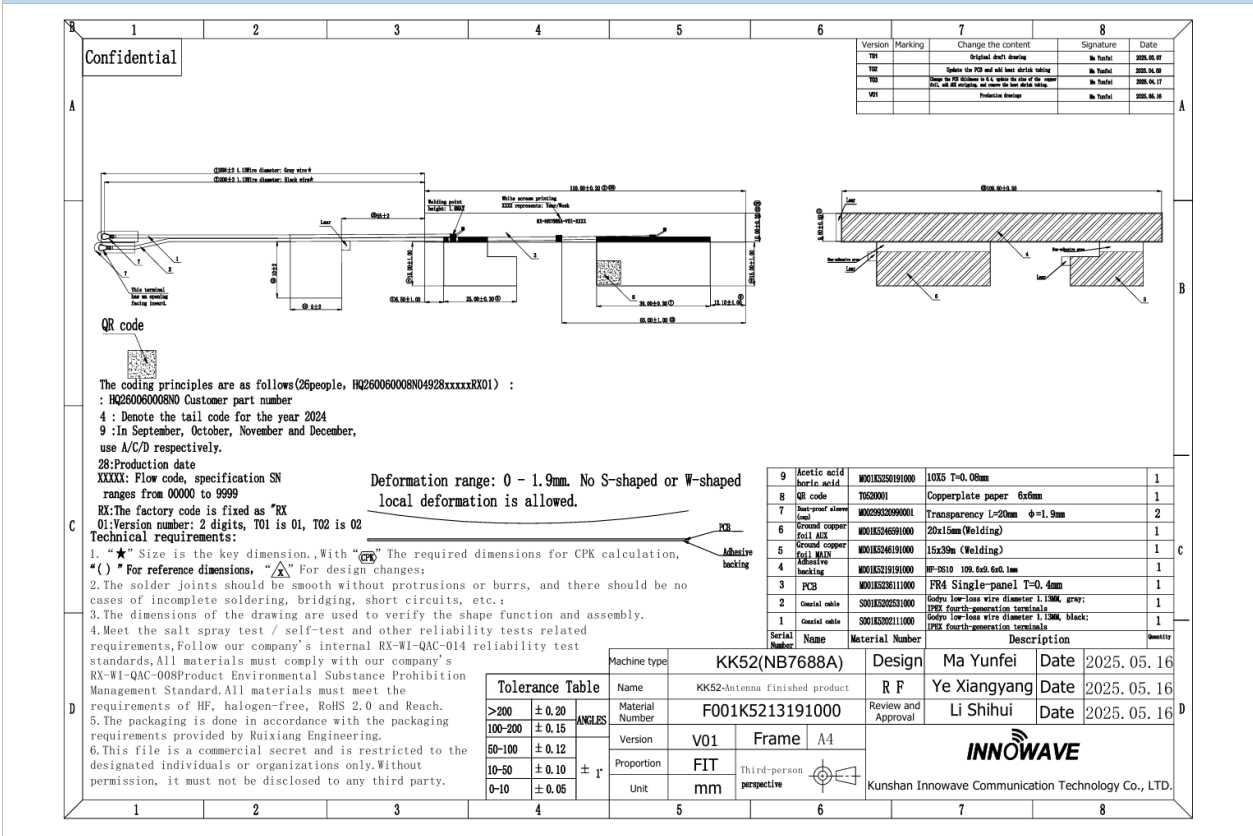
## Back



Note: antenna photo should include L type ruler

Aux Antenna

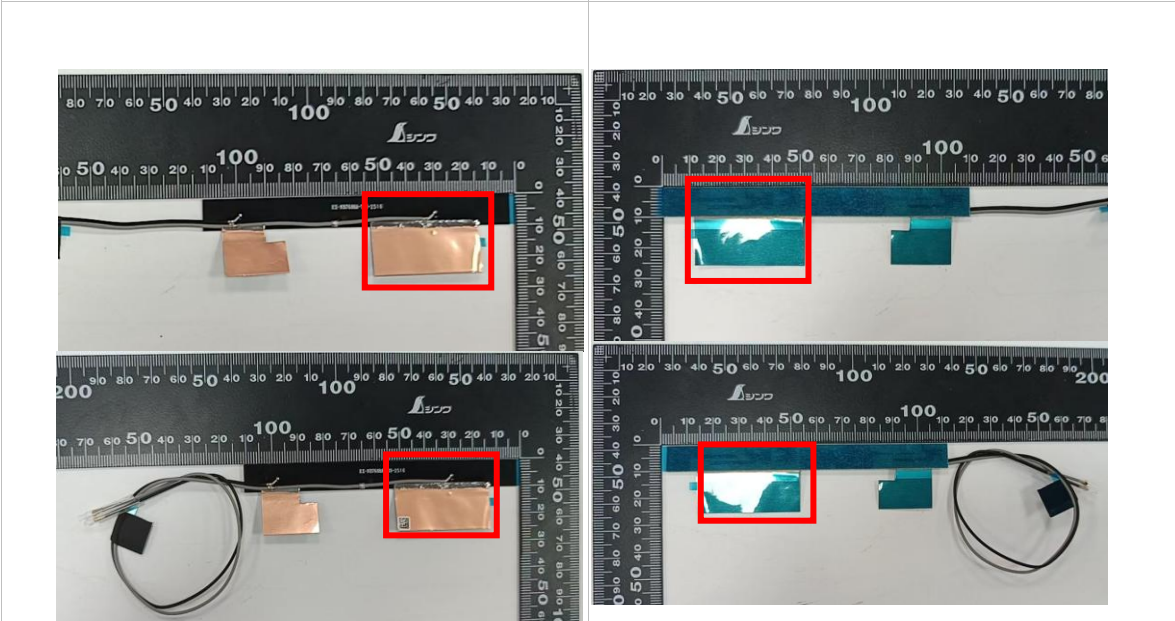
Antenna Drawing



Antenna Photo

Front

Back



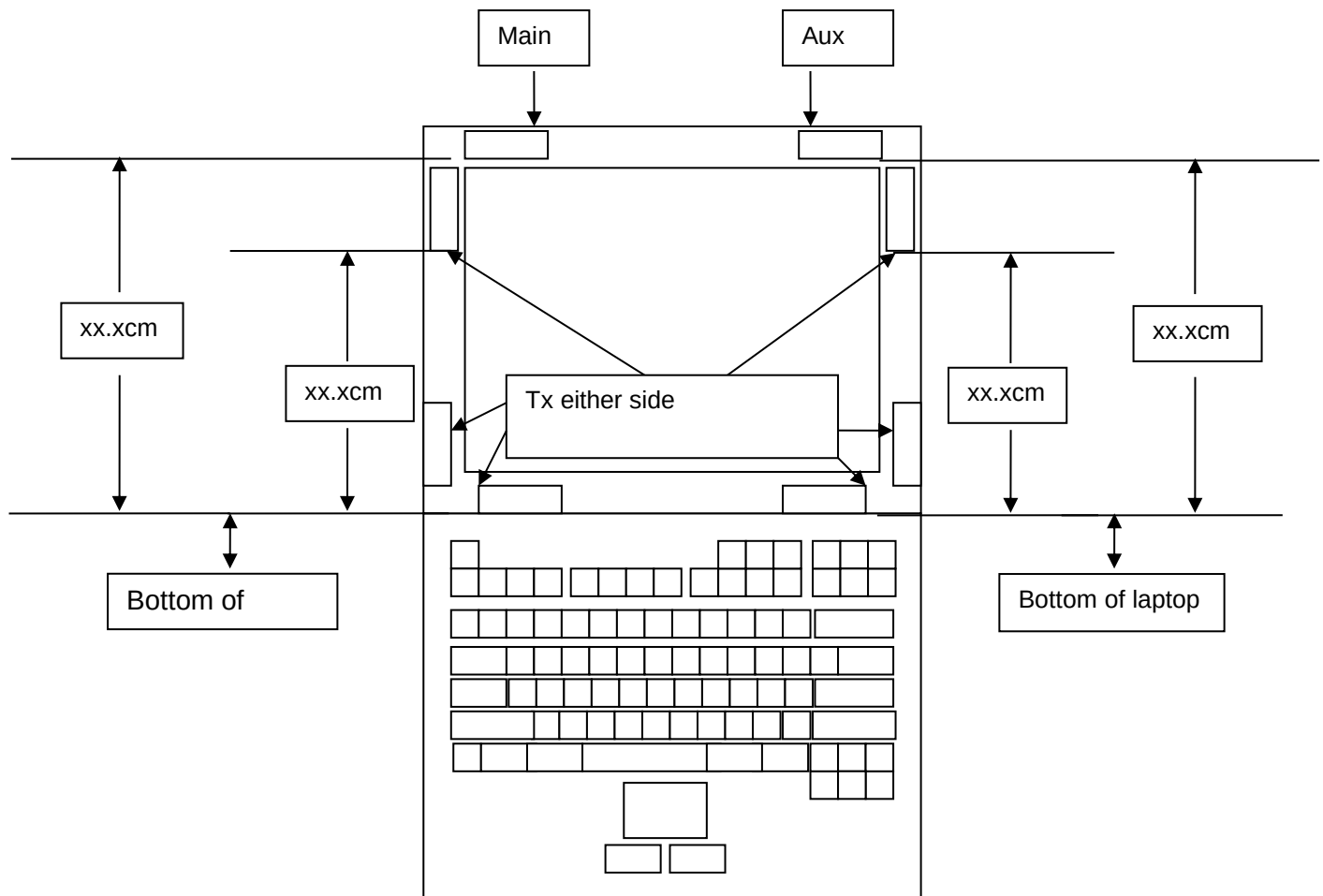
Note: antenna photo should include L type ruler

# 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).

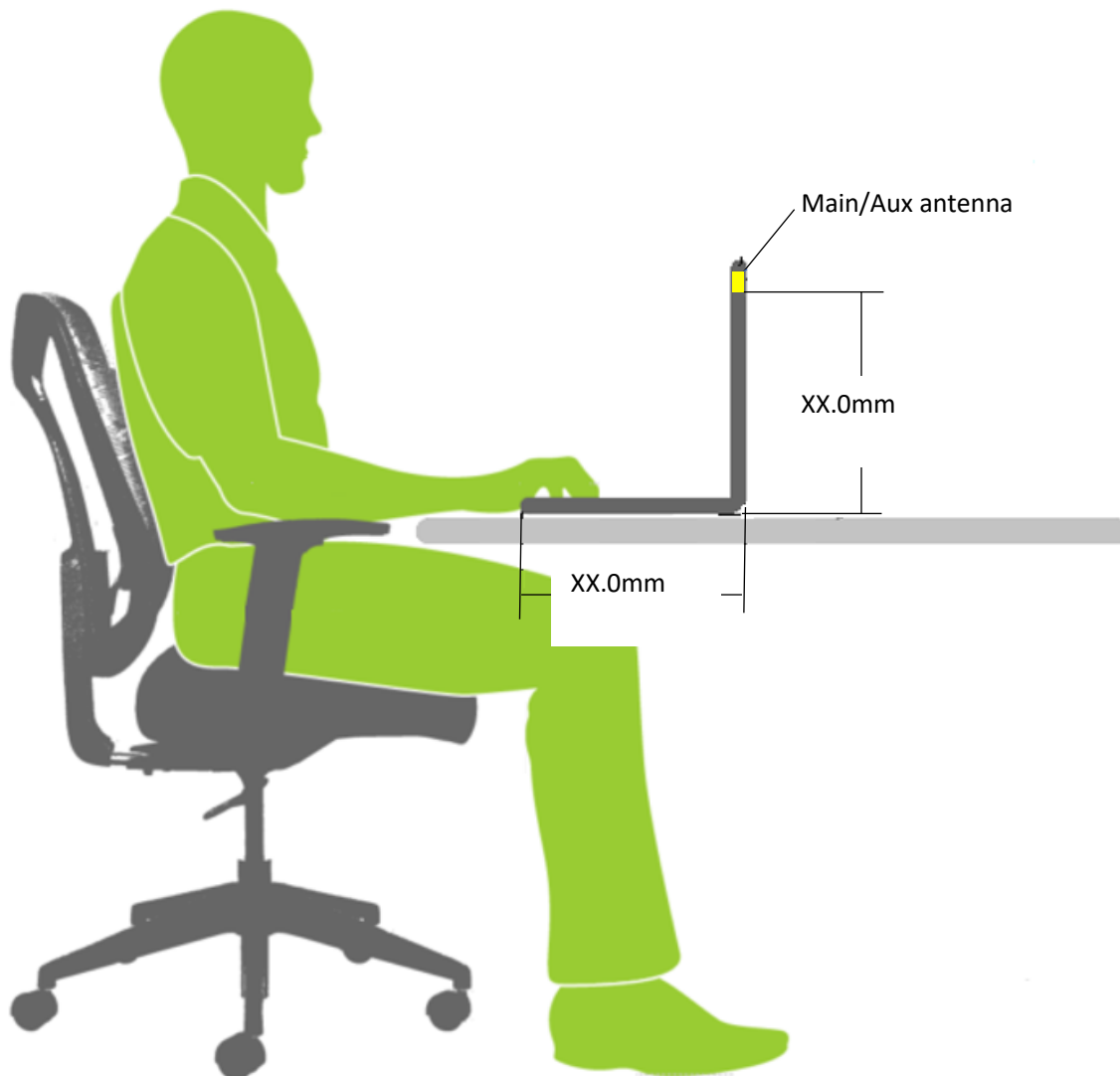
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.



## B.2 Antenna dimensional information for SAR evaluation

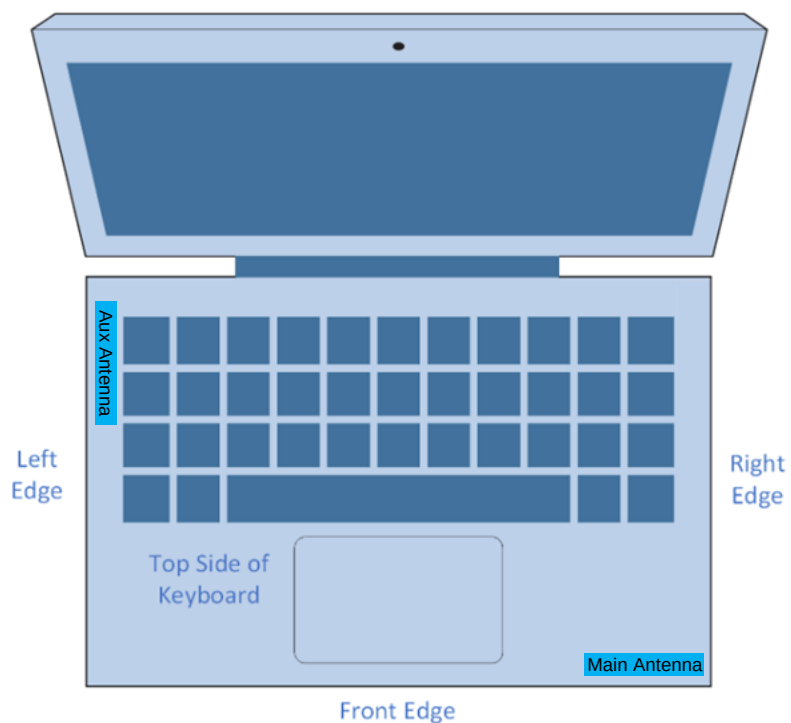
Include a dimensioned photo(s) or dimensioned drawing(s) showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary landscape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



| Measuring Surface | Antenna | Separation Distance(antenna-to- Surface)(mm) | 1g SAR   |
|-------------------|---------|----------------------------------------------|----------|
| Bottom Side       | Main    |                                              | FCC/ISED |
|                   | Aux     |                                              | FCC/ISED |

## Antennas on the keyboard section



| Measuring Surface    | Antenna | Separation Distance(antenna-to-Surface)(mm) | 1g or 10g SAR |
|----------------------|---------|---------------------------------------------|---------------|
| Bottom Side          | Main    |                                             | 1g (FCC/ISED) |
|                      | Aux     |                                             | 1g (FCC/ISED) |
| Front Edge           | Main    |                                             | 1g (ISED)     |
|                      | Aux     |                                             | 1g (ISED)     |
| Left Edge            | Main    |                                             | 10g (ISED)    |
|                      | Aux     |                                             | 10g (ISED)    |
| Right Edge           | Main    |                                             | 10g (ISED)    |
|                      | Aux     |                                             | 10g (ISED)    |
| Top side of Keyboard | Main    |                                             | 10g (ISED)    |
|                      | Aux     |                                             | 10g (ISED)    |