

# 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                                      |                                                                                        | RMN                                   |                                                 | Intel platform<br><small>(ex: Yes, No or NA)</small> |                                       | Platform type<br><small>(ex: regular NB, convertible PC, AIO...etc)</small> |                                       | *SAR minimum separation (mm)          |                                        |
| HP Inc.                                                                                                                                                              | Wistron                                  |                                                                                        | (TPN-W155)                            |                                                 | Yes                                                  |                                       | convertible PC                                                              |                                       | 3.1                                   |                                        |
| *****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<br><small>(Aux/Tx1)</small> |                                                      |                                       | Antenna Part number<br><small>(Main/Tx2)</small>                            |                                       |                                       |                                        |
| High-Tek Electronics Co., Ltd                                                                                                                                        |                                          | PIFA                                                                                   |                                       | 025.901ZV.0001<br>(0ACAR021015N)                |                                                      |                                       | 025.901ZU.0001<br>(0ACAR021016N)                                            |                                       |                                       |                                        |
| Peak gain w/ cable loss (dBi)*                                                                                                                                       |                                          |                                                                                        |                                       |                                                 |                                                      |                                       |                                                                             |                                       |                                       |                                        |
|                                                                                                                                                                      | 2.4GHz<br><small>2400-2483.5 MHz</small> | 5.2GHz<br><small>5150-5250MHz</small>                                                  | 5.3GHz<br><small>5250-5350MHz</small> | 5.6GHz<br><small>5470-5725MHz</small>           | 5.8GHz<br><small>5725-5850MHz</small>                | 5.9GHz<br><small>5850-5895MHz</small> | 6.2GHz<br><small>5925-6425MHz</small>                                       | 6.5GHz<br><small>6425-6525MHz</small> | 6.7GHz<br><small>6525-6875MHz</small> | 7.0 GHz<br><small>6875-7125MHz</small> |
| Main                                                                                                                                                                 | -0.84                                    | -1.56                                                                                  | -1.26                                 | -0.75                                           | -0.79                                                | -0.79                                 | 1.91                                                                        | 1.91                                  | 0.58                                  | -1.21                                  |
| Aux                                                                                                                                                                  | -0.69                                    | -1.60                                                                                  | -1.08                                 | -0.89                                           | -1.66                                                | -1.66                                 | 0.77                                                                        | 0.56                                  | 2.22                                  | 0.44                                   |
|                                                                                                                                                                      |                                          |                                                                                        |                                       |                                                 |                                                      |                                       |                                                                             |                                       |                                       |                                        |
| Module Information                                                                                                                                                   |                                          |                                                                                        |                                       |                                                 |                                                      |                                       |                                                                             |                                       |                                       |                                        |
| Model                                                                                                                                                                |                                          | Form factor and suffixes                                                               |                                       |                                                 |                                                      |                                       |                                                                             |                                       |                                       |                                        |
| AX211NGW (Garfield Peak 2)                                                                                                                                           |                                          | Intel Wi-Fi 6E AX211 + BT5.2 (802.11ax 2x2, MU-MIMO, supporting gigabit data rate) M.2 |                                       |                                                 |                                                      |                                       |                                                                             |                                       |                                       |                                        |
|                                                                                                                                                                      |                                          |                                                                                        |                                       |                                                 |                                                      |                                       |                                                                             |                                       |                                       |                                        |

# Table of contents

1. Applicable test method
2. Test & System Description
  - a. Test setup
  - b. Equipment list
3. Setup photo

[Section 1. Antenna Assembly Specifications](#)

[Section 2. Dimensioned Photos or Drawings of Antennas](#)

[Section 3. Radiation characteristics of antenna loaded in Host Platform](#)

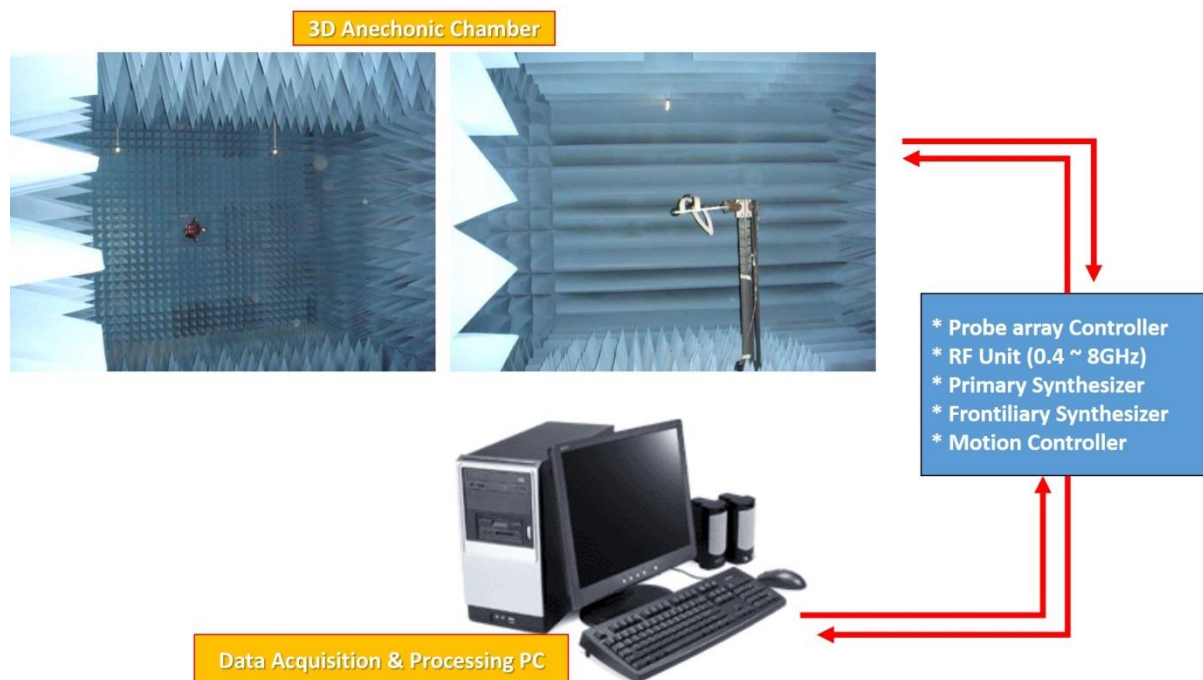
[Section 4. Antenna Host Platform Location Information](#)

[Section 5. Antenna dimensional information for SAR evaluation](#)

[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  $-30\text{dB}$  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. Figure 2 shows the schematic diagram for measuring radiation pattern and Gain.



## 2. Test & System Description

### a. Test setup

#### 1. Frequency Range

2400~2500MHz, for WLAN application.

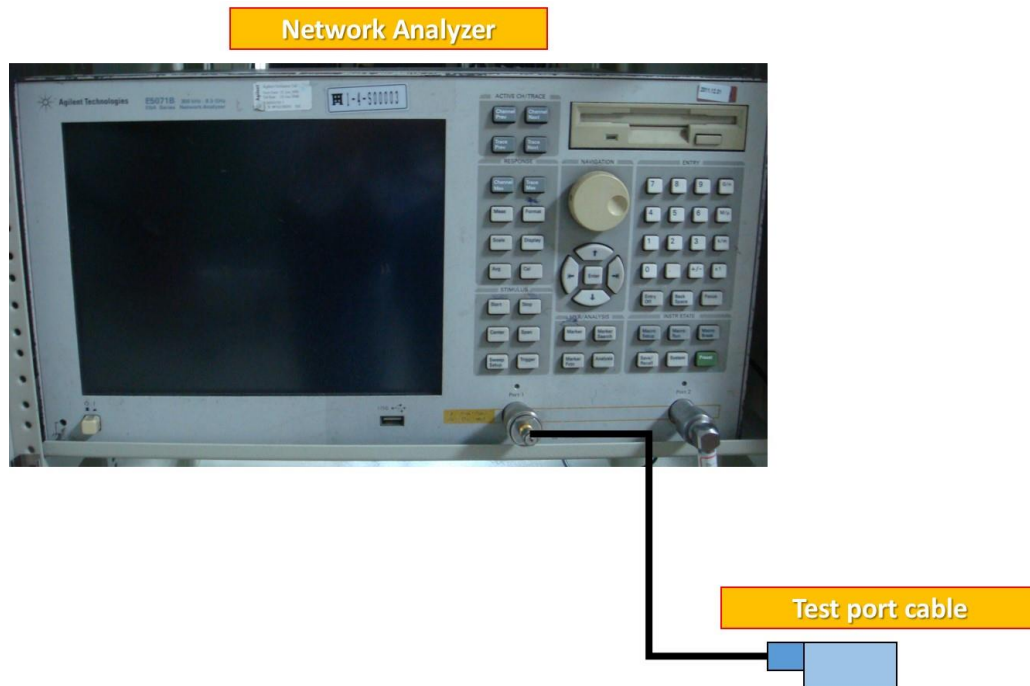
5150~5850MHz, for WLAN application

#### 2. Antenna Configuration

The antenna basically has two parts; the stamping and the cable assembly with the connector on one side. The detailed drawing is attached.

#### 3. VSWR

The VSWR is measured with network analyzer that support up to 8GHz. All the measurements are performed with the customer provided fixture. Figure 1 shows the typical schematic diagram for measuring VSWR.



**Figure 1. The schematic diagram for measuring VSWR**

**b. Equipment list**

**Test Equipment**

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. Digital caliper to measure the dimensions.
- D. Climatic chamber for mechanical tests.

**Radiated Setup**

| item | Device                                                                                                | Type/Model     | manufacturer | Cal. Date  | Cal. Due Date |
|------|-------------------------------------------------------------------------------------------------------|----------------|--------------|------------|---------------|
| 1    | Anechoic Chamber                                                                                      | AMS-8500       | ETS-Lindgren | 2021/12/20 | 2022/12/20    |
| 2    | Turn Table                                                                                            | ETS            | ETS-Lindgren | N/A        | N/A           |
| 3    | Measurement SW                                                                                        | EMQuest1.08    | ETS-Lindgren | N/A        | N/A           |
| 4    | Vector Network Analyzer                                                                               | Agilent E5071B | Agilent      | 2021/12/17 | 2022/12/17    |
| 5    | Receive Antenna<br>Absorber Nested Dual-<br>Polarized Dual-Vivaldi Array<br>Antenna<br>700MHz to 6GHz | EMCO 3164-08   | ETS-Lindgren | N/A        | N/A           |
| 6    | Multi Axis Positioning System<br>(MAPS™)                                                              | EMCO 2115CR    | ETS-Lindgren | N/A        | N/A           |
| 7    | MAPS™ Controller                                                                                      | MECO 2090      | ETS-Lindgren | N/A        | N/A           |
| 8    | Horn antenna                                                                                          | 3164-08        | ETS-Lindgren | 2021/12/15 | 2022/12/15    |
| 9    | Cable 0.5m - 700MHz~10GHz                                                                             | RG316          | Senyu        | 2021/12/21 | 2022/12/21    |

N/A : Not Applicable

**3. Setup photo**



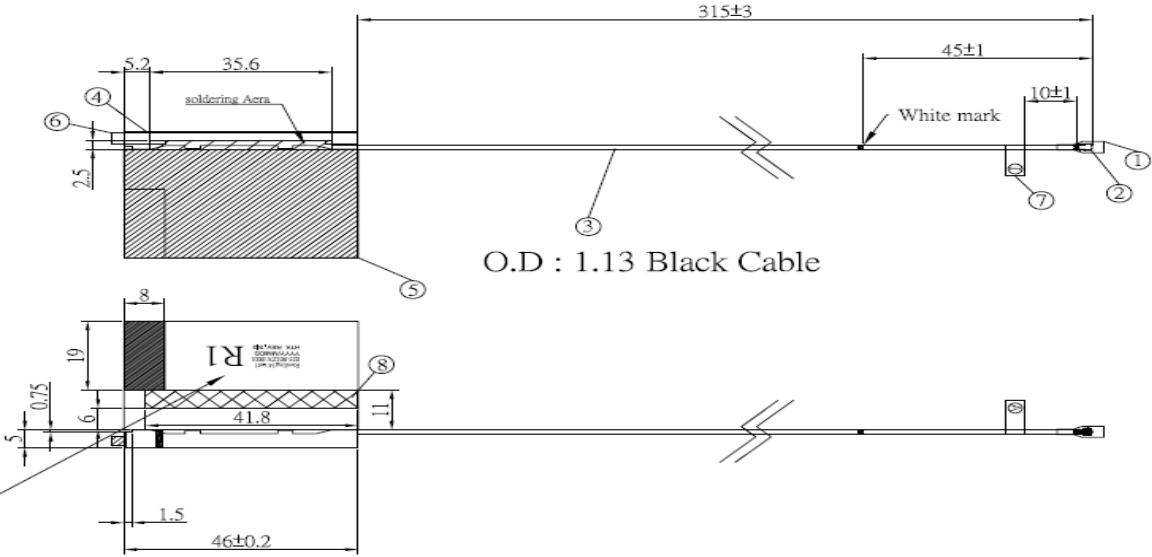
# Antenna Information

## Section 1. Antenna Assembly Specifications

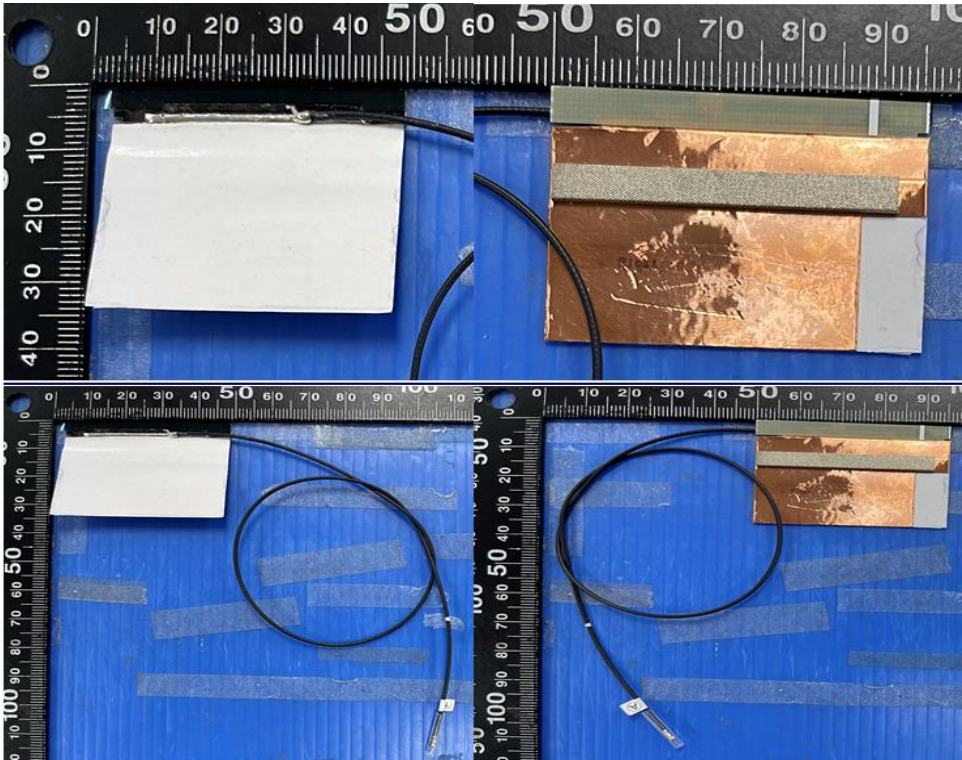
| 1A                                                                   | 1B                            | 1C           | 1D                                                                                                     |                | 1E                              | 1F                             | 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:<br>025.901ZV.0001<br>(0ACAR021015N)<br>Aux<br>Antenna<br>(TX1)  | High-Tek Electronics Co., Ltd | PIFA         | Connector: Caimei<br>958-C413-W-B-Bu-A0<br>50 Ohm Coaxial Cable<br>Length: 315 mm<br>Diameter: 1.13 mm | 2400-2495      | -0.84                           | 0.11                           | 3.00     | 0.95            |
|                                                                      |                               |              |                                                                                                        | 5150-5250      | -1.56                           | -0.20                          | 3.00     | 1.36            |
|                                                                      |                               |              |                                                                                                        | 5250-5350      | -1.26                           | 0.10                           | 3.00     | 1.36            |
|                                                                      |                               |              |                                                                                                        | 5470-5725      | -0.75                           | 0.71                           | 3.00     | 1.46            |
|                                                                      |                               |              |                                                                                                        | 5725-5850      | -0.79                           | 0.69                           | 3.00     | 1.48            |
|                                                                      |                               |              |                                                                                                        | 5850-5895      | -0.79                           | 0.70                           | 3.00     | 1.49            |
|                                                                      |                               |              |                                                                                                        | 5925-6425      | 1.91                            | 3.45                           | 3.00     | 1.54            |
|                                                                      |                               |              |                                                                                                        | 6425-6525      | 1.91                            | 3.47                           | 3.00     | 1.56            |
|                                                                      |                               |              |                                                                                                        | 6525-6875      | 0.58                            | 2.18                           | 3.00     | 1.60            |
|                                                                      |                               |              |                                                                                                        | 6875-7125      | -1.21                           | 0.48                           | 3.00     | 1.69            |
| P/N:<br>025.901ZU.0001<br>(0ACAR021016N)<br>Main<br>Antenna<br>(TX2) | High-Tek Electronics Co., Ltd | PIFA         | Connector: Caimei<br>958-C413-W-B-Bu-A0<br>50 Ohm Coaxial Cable<br>Length: 315 mm<br>Diameter: 1.13 mm | 2400-2495      | -0.69                           | 0.26                           | 3.00     | 0.95            |
|                                                                      |                               |              |                                                                                                        | 5150-5250      | -1.60                           | -0.24                          | 3.00     | 1.36            |
|                                                                      |                               |              |                                                                                                        | 5250-5350      | -1.08                           | 0.28                           | 3.00     | 1.36            |
|                                                                      |                               |              |                                                                                                        | 5470-5725      | -0.89                           | 0.57                           | 3.00     | 1.46            |
|                                                                      |                               |              |                                                                                                        | 5725-5850      | -1.66                           | -0.18                          | 3.00     | 1.48            |
|                                                                      |                               |              |                                                                                                        | 5850-5895      | -1.66                           | -0.17                          | 3.00     | 1.49            |
|                                                                      |                               |              |                                                                                                        | 5925-6425      | 0.77                            | 2.31                           | 3.00     | 1.54            |
|                                                                      |                               |              |                                                                                                        | 6425-6525      | 0.56                            | 2.12                           | 3.00     | 1.56            |
|                                                                      |                               |              |                                                                                                        | 6525-6875      | 2.22                            | 3.82                           | 3.00     | 1.60            |
|                                                                      |                               |              |                                                                                                        | 6875-7125      | 0.44                            | 2.13                           | 3.00     | 1.69            |

Section 2. Dimensioned Photos and Drawings of Antennas  
Include the dimensioned photo and drawing of Main antenna here.

Main Antenna Drawing:



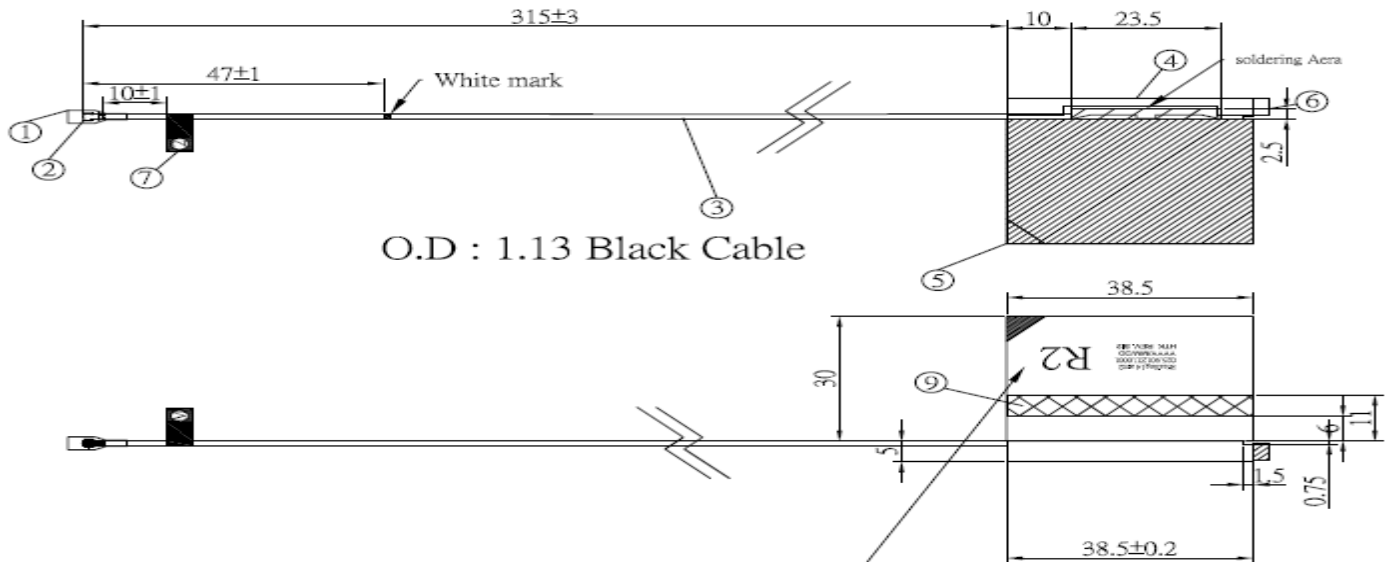
Main Antenna Photo (Front/Back):



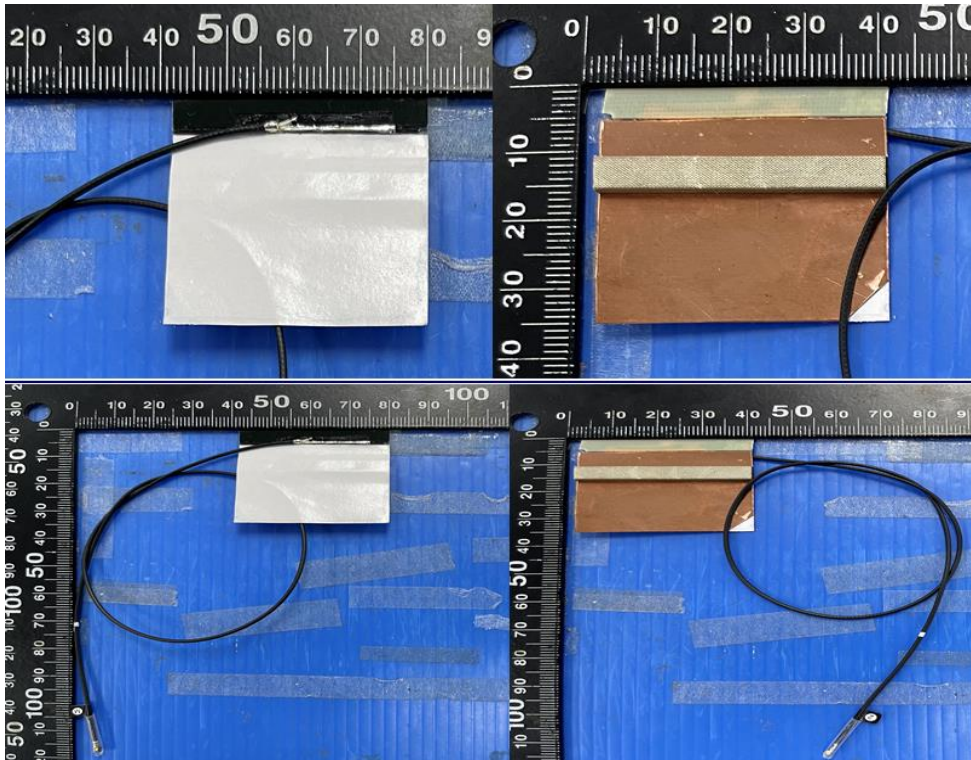
Note: antenna photo should include L type ruler

Include the dimensioned photo and drawing of Aux antenna here.

Aux Antenna Drawing:



Aux Antenna Photo (Front/Back):



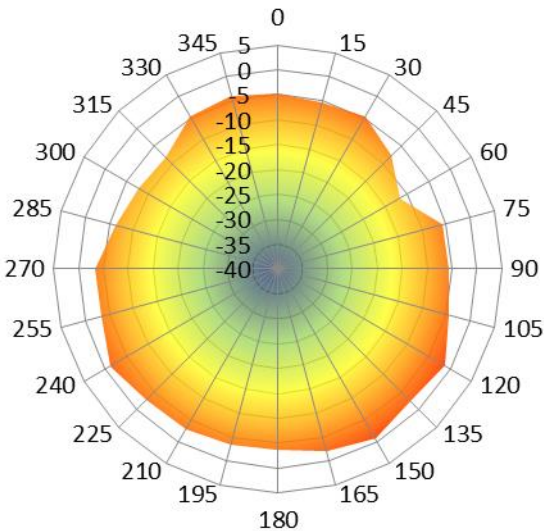
Note: antenna photo should include L type ruler

Section 3. Radiation characteristics of antenna loaded in Host Platform

Main Antenna

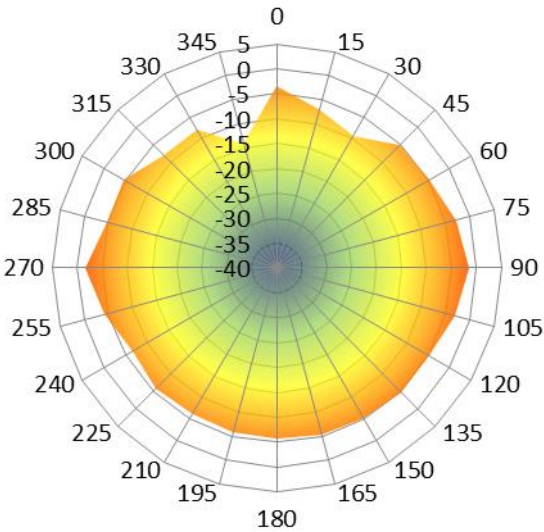
Max Antenna 2D Radiation Pattern 2400 – 2495 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 2400-2495       | -0.84                                 |



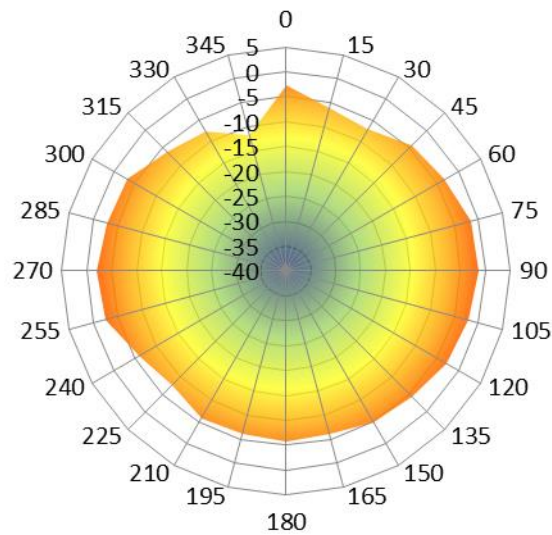
Max Antenna 2D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5150-5250       | -1.56                                 |



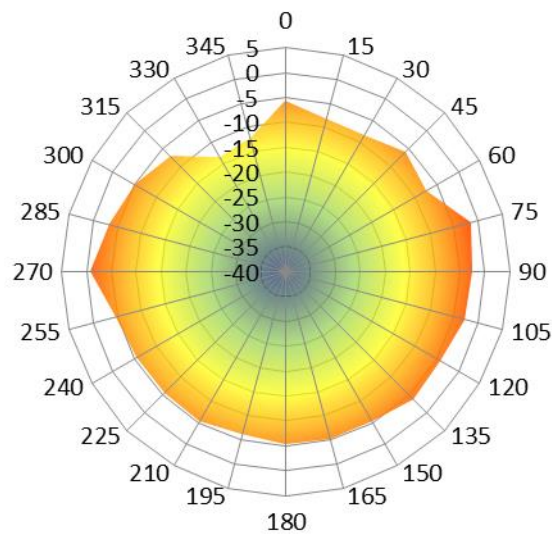
Max Antenna 2D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5250-5350       | -1.26                                 |



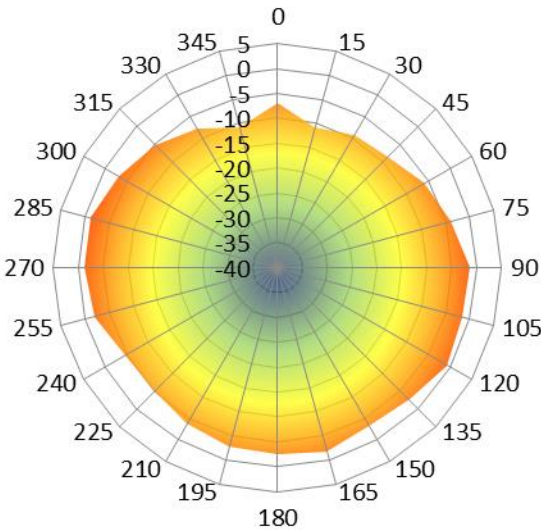
Max Antenna 2D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5470-5725       | -0.75                                 |



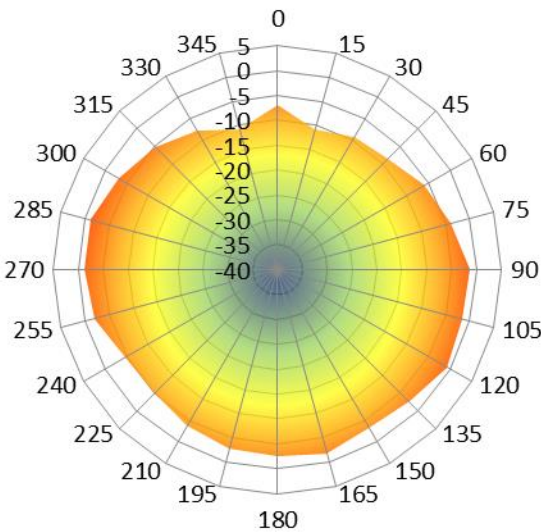
Max Antenna 2D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5725-5850       | -0.79                                 |



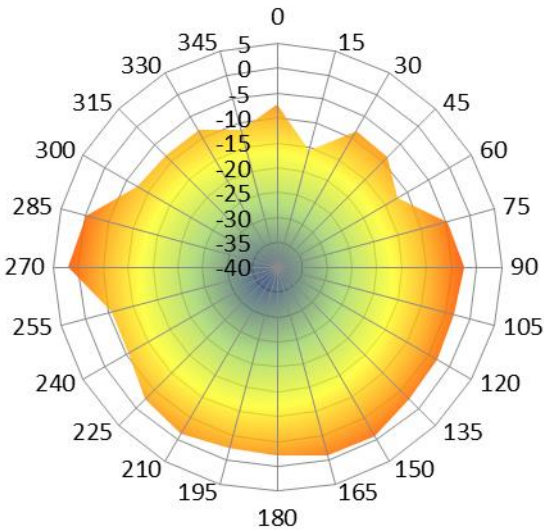
Max Antenna 2D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5850-5895       | -0.79                                 |



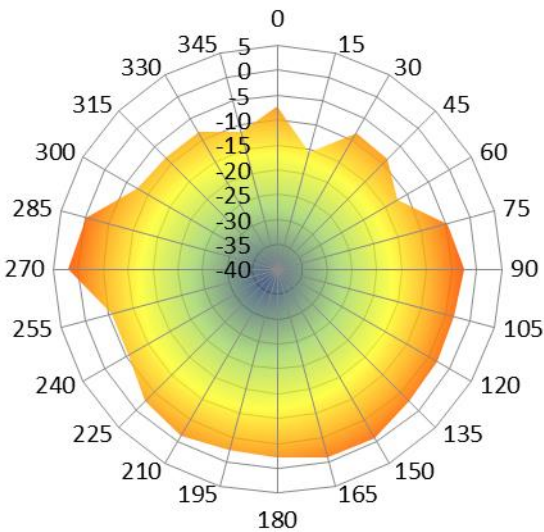
Max Antenna 2D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5925-6425       | 1.91                                  |



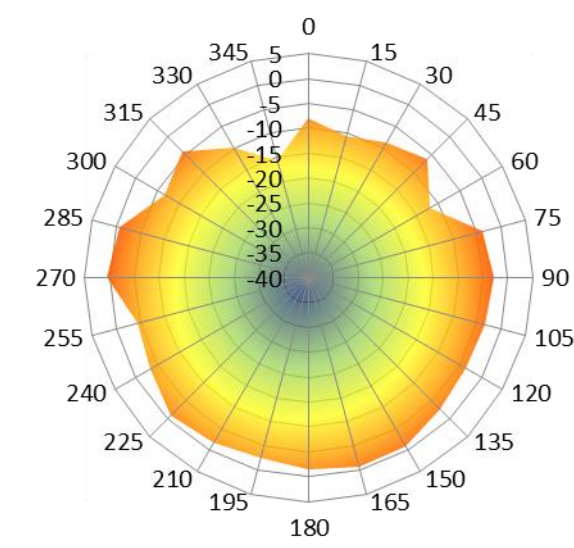
Max Antenna 2D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 6425-6525       | 1.91                                  |



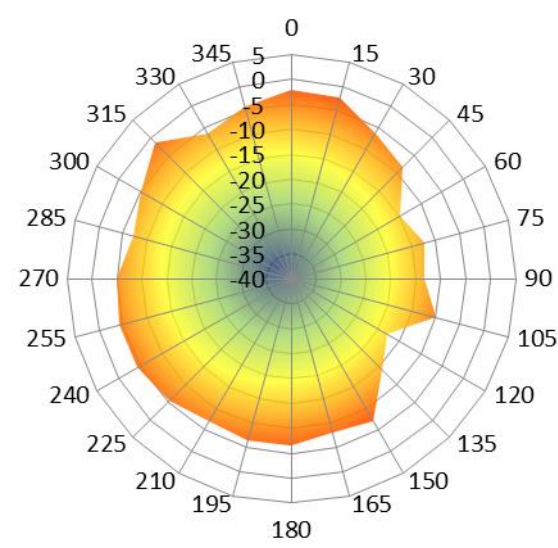
Max Antenna 2D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 6525-6875       | 0.58                                  |



Max Antenna 2D Radiation Pattern 6875-7125 MHz

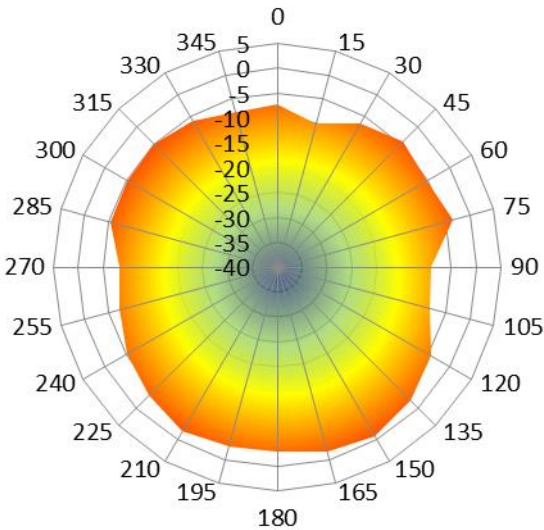
| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 6875-7125       | -1.21                                 |



Auxiliary Antenna

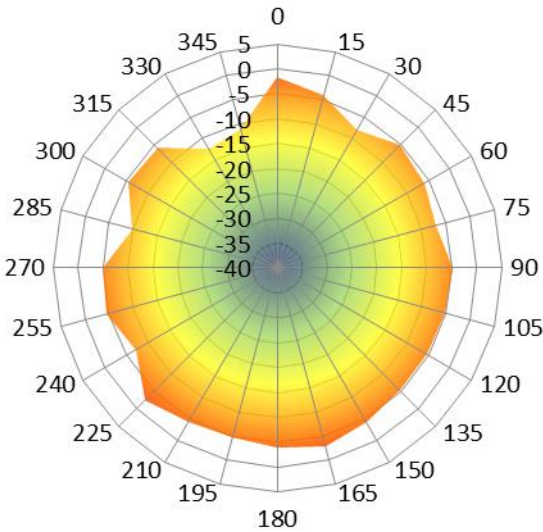
Max Antenna 2D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 2400-2483.5     | -0.69                                 |



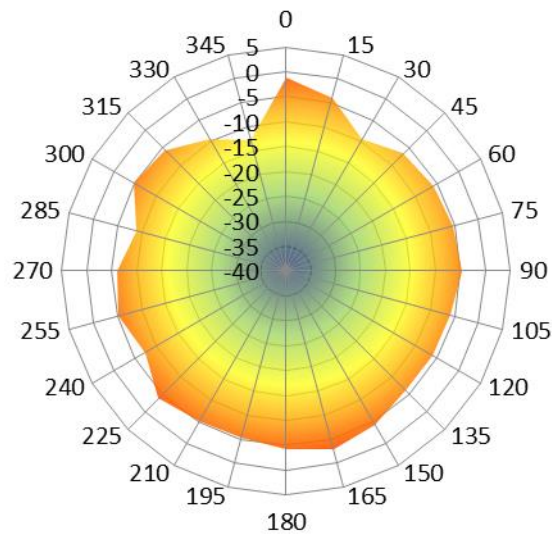
Max Antenna 2D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5150-5250       | -1.60                                 |



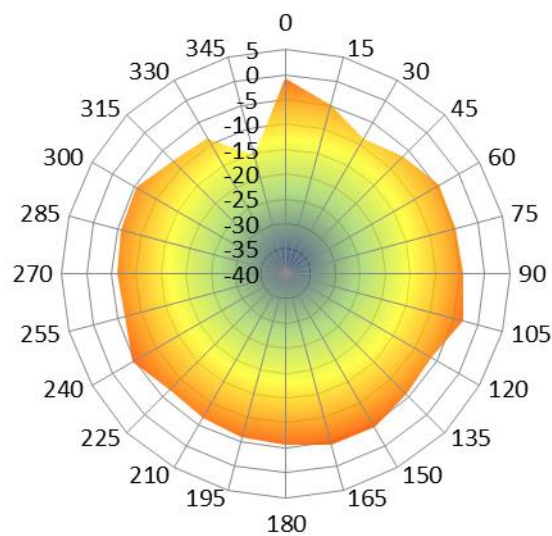
Max Antenna 2D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5250-5350       | -1.08                                 |



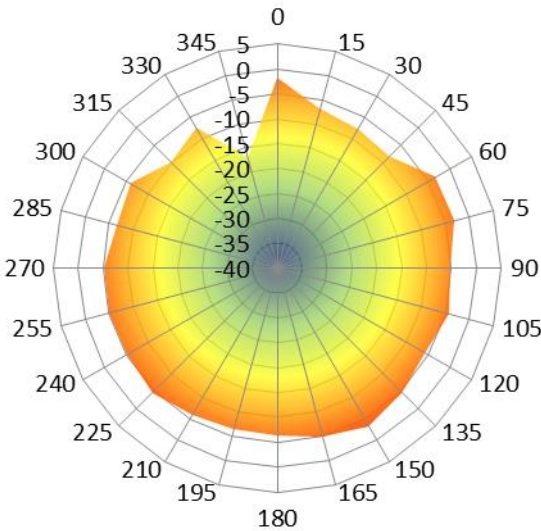
Max Antenna 2D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5470-5725       | -0.89                                 |



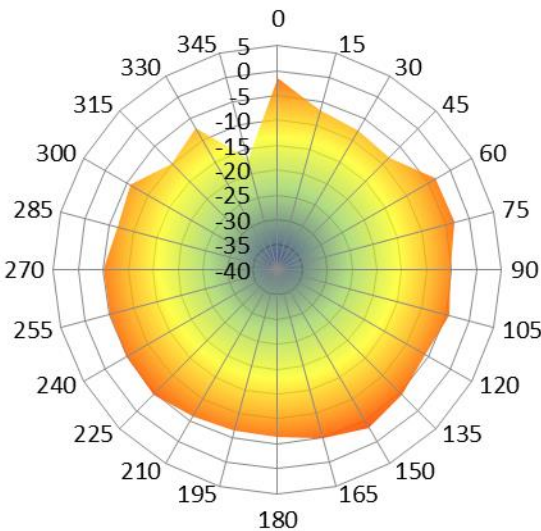
Max Antenna 2D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5725-5850       | -1.66                                 |



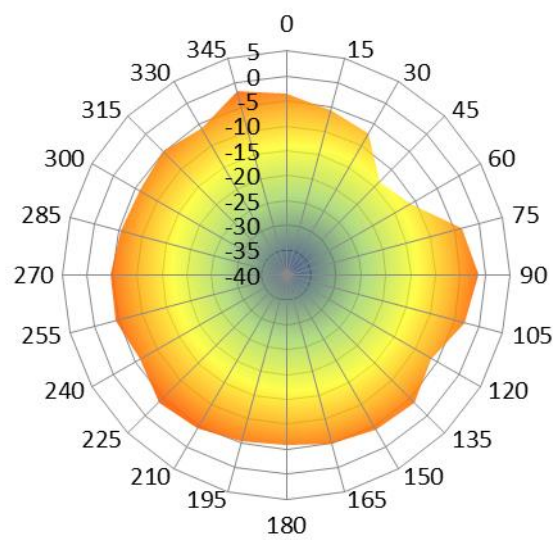
Max Antenna 2D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5850-5895       | -1.66                                 |



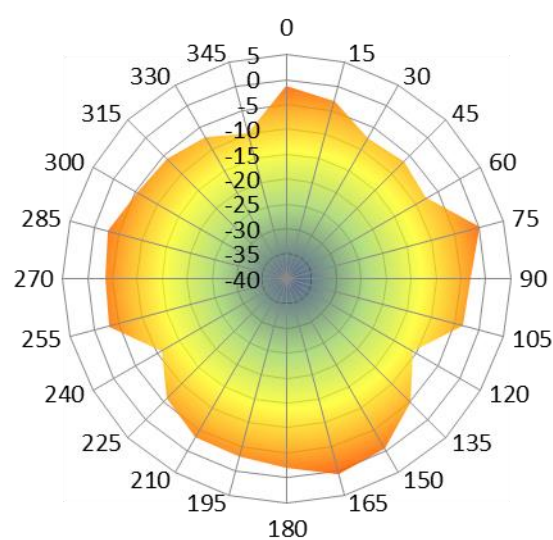
Max Antenna 2D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 5925-6425       | 0.77                                  |



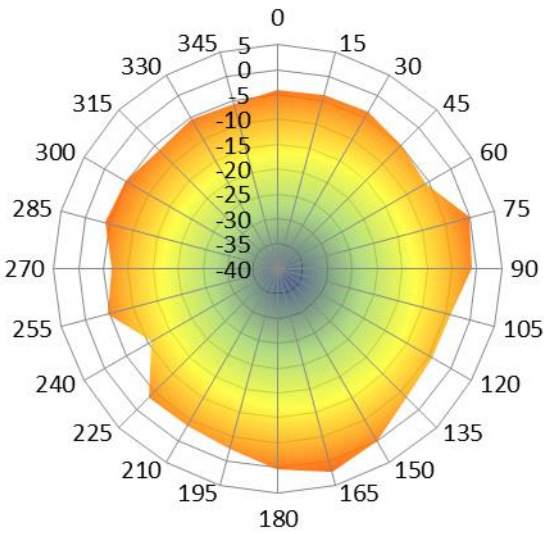
Max Antenna 2D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 6425-6525       | 0.56                                  |



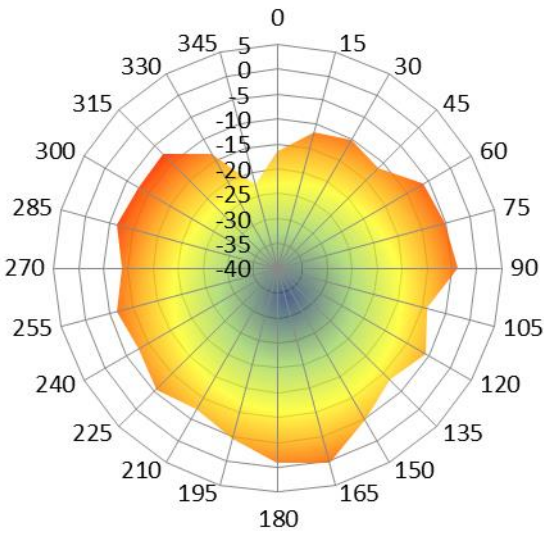
Max Antenna 2D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 6525-6875       | 2.22                                  |



Max Antenna 2D Radiation Pattern 6875-7125 MHz

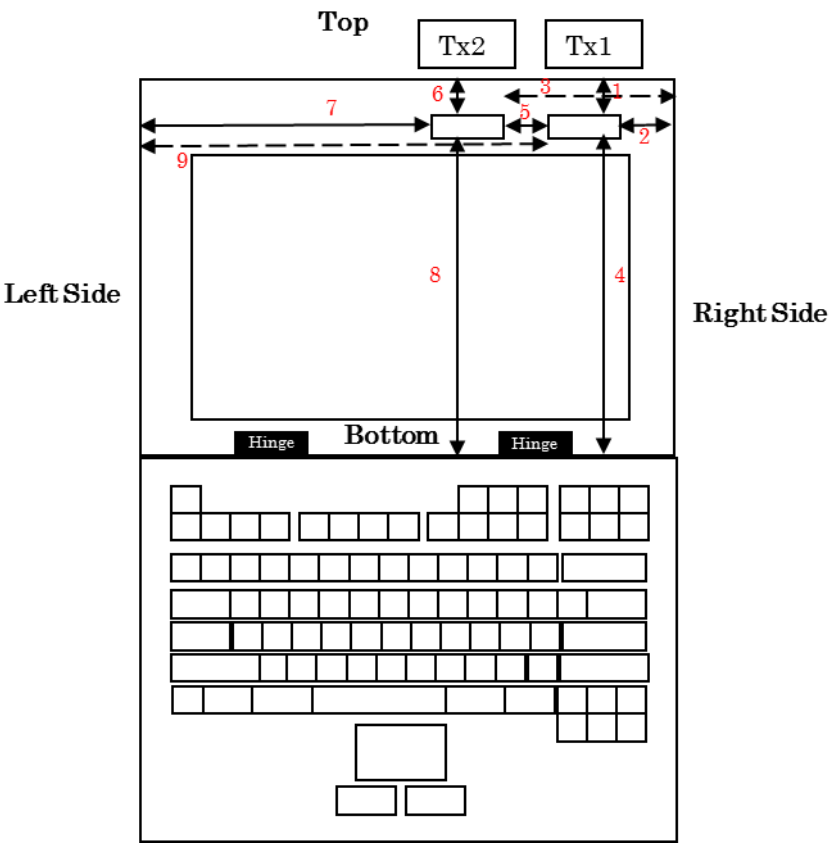
| Frequency (MHz) | Horizontal+ Vertical (dBi) peak (dBi) |
|-----------------|---------------------------------------|
| 6875-7125       | 0.44                                  |



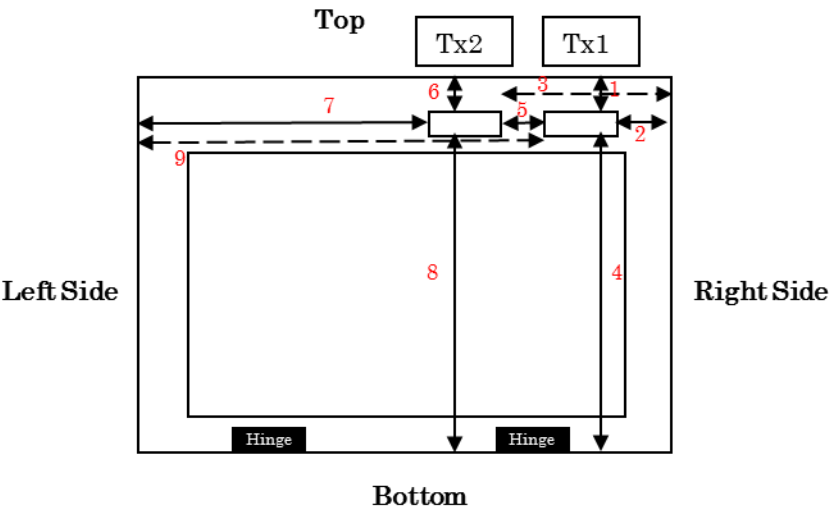
Section 4. Antenna Host Platform Location Information

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.



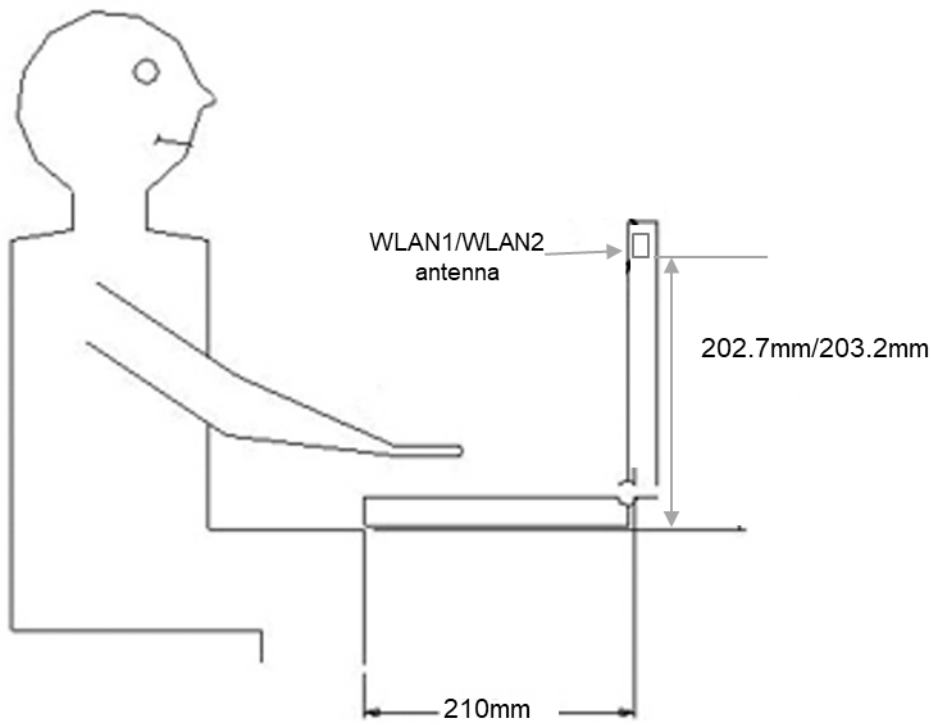
|            |     |   |    |       |    |     |       |       |     |
|------------|-----|---|----|-------|----|-----|-------|-------|-----|
| Dimension: | 1   | 2 | 3  | 4     | 5  | 6   | 7     | 8     | 9   |
| (mm)       | 3.1 | 4 | 69 | 201.8 | 19 | 3.1 | 214.5 | 201.8 | 272 |



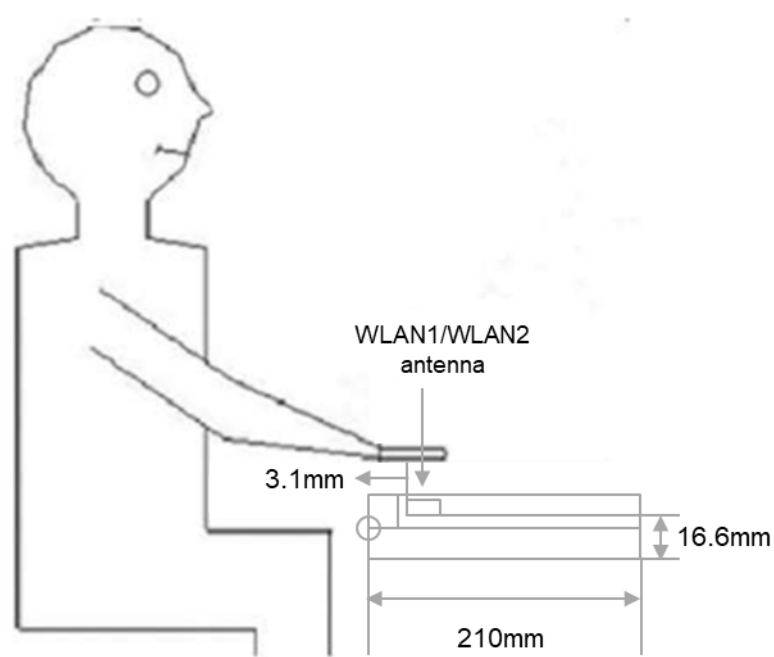
|            |     |   |    |       |    |     |       |       |     |
|------------|-----|---|----|-------|----|-----|-------|-------|-----|
| Dimension: | 1   | 2 | 3  | 4     | 5  | 6   | 7     | 8     | 9   |
| (mm)       | 3.1 | 4 | 69 | 201.8 | 19 | 3.1 | 214.5 | 201.8 | 272 |

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.



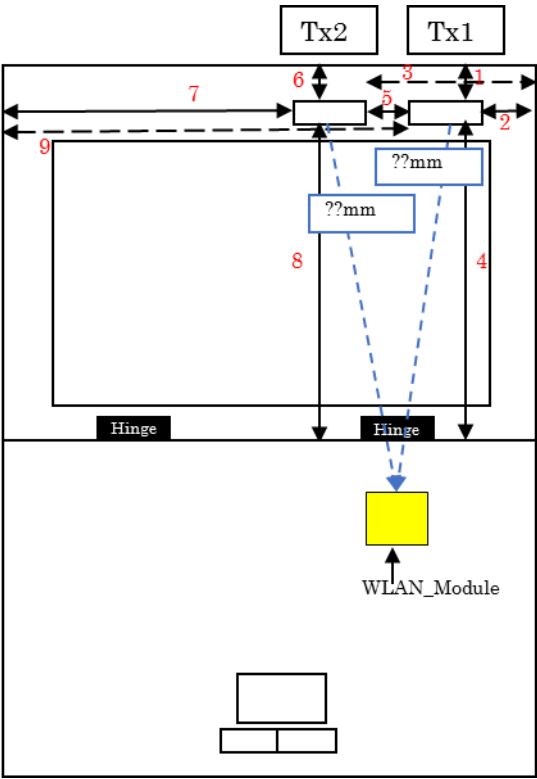
Without rubber foot: 202.7mm  
With rubber foot: 203.2mm



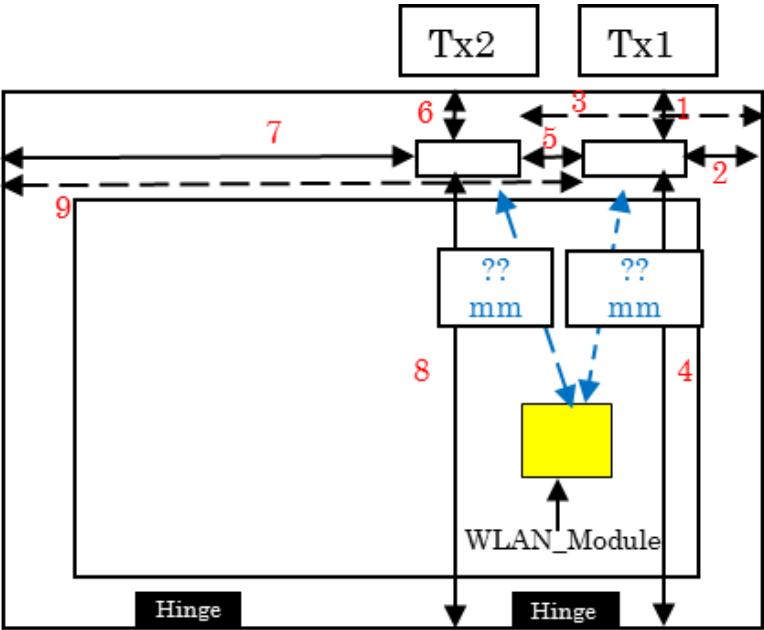
Section 6. Diagram Example of Co-Location Antenna Separation

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)



|                          |                    |       |
|--------------------------|--------------------|-------|
| NB<br>Dimension:<br>(mm) | WLAN module to TX1 | 199.7 |
|                          | WLAN module to TX2 | 199.5 |



|                          |                    |       |
|--------------------------|--------------------|-------|
| NB<br>Dimension:<br>(mm) | WLAN module to TX1 | 133.8 |
|                          | WLAN module to TX2 | 134.1 |