

# 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                         | ****End product model name |                        |                        | Intel platform<br>(ex: Yes, No or NA) | Platform type<br>(ex: regular NB, convertible PC, AIO...etc) |                        |                           | *SAR minimum separation (mm) |                                                                                            |
| Lenovo                                                                                                                                                                         | 闻泰                          | X80                        |                        |                        | YES                                   | PAD                                                          |                        |                           |                              |                                                                                            |
| ****Please fill in exact product model name and make sure the model name is visible on product cover or any parts for end users recognize for authority inspection.            |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| Antenna information                                                                                                                                                            |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| Vendor                                                                                                                                                                         |                             | Type                       |                        |                        | Antenna Part number (Main)            |                                                              |                        | Antenna Part number (Aux) |                              |                                                                                            |
| INNOWAVE                                                                                                                                                                       |                             | PIFA                       |                        |                        | F002C4512190001                       |                                                              |                        | F002C4512590002           |                              |                                                                                            |
| 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                | 6.2GHz<br>5925-6425MHz                                       | 6.5GHz<br>6425-6525MHz | 6.7GHz<br>6525-6875MHz    | 7.0 GHz<br>6875-7125MHz      |                                                                                            |
| Main                                                                                                                                                                           | 1.21                        | 0.86                       | 1.51                   | 1.19                   | 1.35                                  | 1.61                                                         | 1.58                   | 2.28                      | 1.45                         |                                                                                            |
| Aux                                                                                                                                                                            | 1.68                        | 1.17                       | 1.13                   | 1.37                   | 1.82                                  | 2.24                                                         | 2.79                   | 2.46                      | 1.92                         |                                                                                            |
| Intel Reference Gain/Type/ Separation distance                                                                                                                                 |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| Antenna Type                                                                                                                                                                   | Antenna Peak gain (In dBi)* |                            |                        |                        |                                       |                                                              |                        |                           |                              | Distance to the end user (mm)                                                              |
|                                                                                                                                                                                | 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                | 6.2GHz<br>5925-6425MHz                                       | 6.5GHz<br>6425-6525MHz | 6.7GHz<br>6525-6875MHz    | 7.0GHz<br>6875-7125MHz       | Generic: refer to modular FCC SAR report<br><br>Mid-power: ≥ 8 mm<br><br>Low power: ≥ 5 mm |
| Design                                                                                                                                                                         | 3.00                        | 5.00                       | 5.00                   | 5.00                   | 5.00                                  | 5.00                                                         | 5.00                   | 5.00                      | 5.00                         |                                                                                            |
| PIFA                                                                                                                                                                           | 3.24                        | 3.64                       | 3.73                   | 4.77                   | 4.97                                  | 4.83                                                         | 4.30                   | 5.37                      | 5.59                         |                                                                                            |
| Dipole                                                                                                                                                                         | 2.89                        | 2.92                       | 3.19                   | 4.41                   | 4.22                                  | 4.83                                                         | 4.30                   | 4.49                      | 5.34                         |                                                                                            |
| Notes (marked with *)                                                                                                                                                          |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| * SAR minimum separation (mm)                                                                                                                                                  |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| - Regular NB: Minimum antenna-to-body (from antenna bottom to the bottom of the device)                                                                                        |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| - Tablet / Convertible PC: Minimum antenna-to-edge (5 sides of the device)                                                                                                     |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| - Mini-tablet: Minimum antenna-to-edge (6 sides of the device)                                                                                                                 |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| * 3D Peak Antenna gain should be equal or greater than -2 dBi                                                                                                                  |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |
| - If a host integrator plans to use a lower gain antenna of the same type, additional CBP(FCC)/EDT(EU) testing need to be performed while the module is installed in the host. |                             |                            |                        |                        |                                       |                                                              |                        |                           |                              |                                                                                            |

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## 1. Applicable test methods

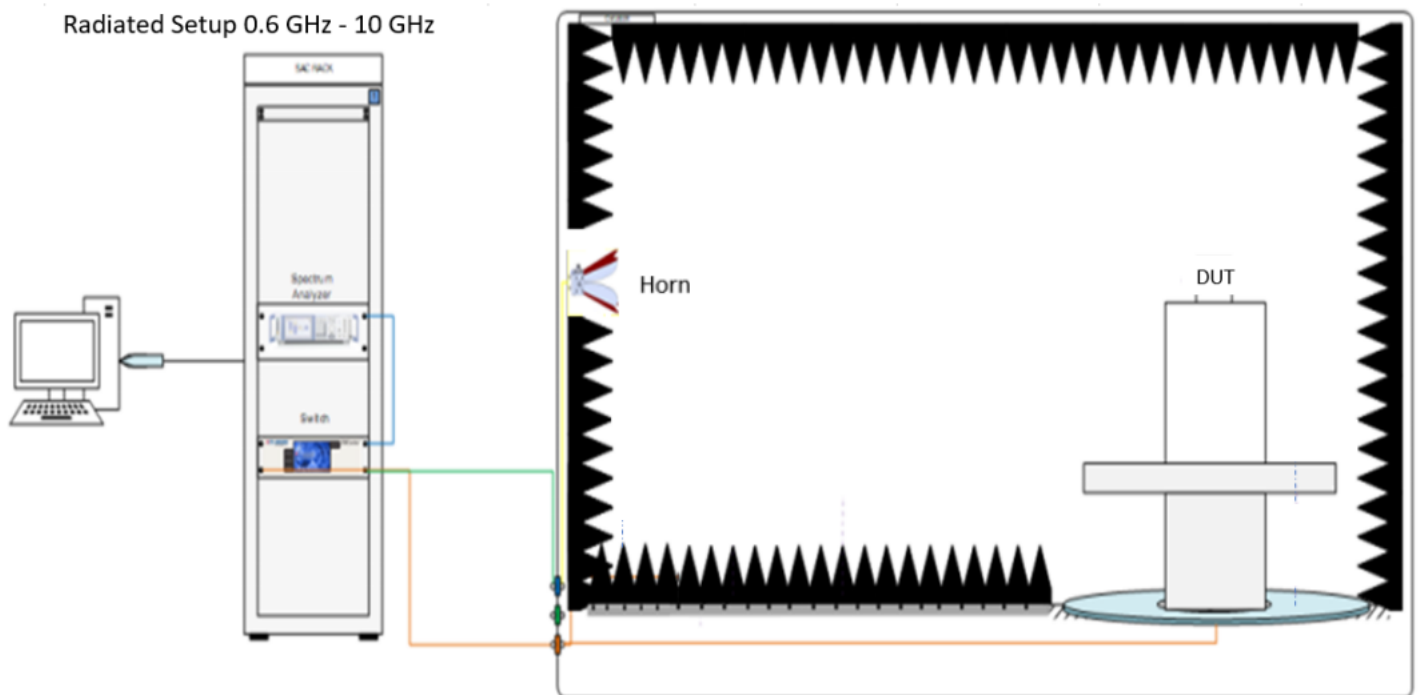
<insert test description here for test method>

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

## 2. Test & System Description

### a. Test setup

<insert test diagram here for test site utilized>



b. Equipment list

<insert test diagram here for test site utilized>

| Number | Device                      | Type/Model            | Serial           | Manufacturer | Cal. Date | Cal. due. Date |
|--------|-----------------------------|-----------------------|------------------|--------------|-----------|----------------|
| 1      | Chamber                     | FATC3                 | 5720             | ETS-Lindgren | 2023/5/15 | 2024/3/15      |
| 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     | 2023/5/18 | 2024/5/18      |
| 5      | Horn Antenna                | 3117                  | E00157734        | Bwant        | 2022/1/23 | 2024/1/23      |
| 6      | Test system host            | EMC Center            | 159757           | ETS-Lindgren | N/A       | N/A            |
| 7      | RF Line TX                  | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2023/5/20 | 2024/5/20      |
| 8      | RF Line RX                  | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2023/5/20 | 2024/5/20      |
| 9      | Cable 2m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2023/5/20 | 2024/5/20      |
| 10     | Optical fiber line          | KXY-00727-1603        | -                | Jmtt         | N/A       | N/A            |
| 11     | Cable 2.5m 1GHz-8.5GHz      | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2022/8/21 | 2023/8/21      |
| 12     | Cable 1.2m 1GHz-8.5GHz      | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2022/8/21 | 2023/8/21      |
| 13     | Cable 1m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2022/8/21 | 2023/8/21      |
| 14     | Cable 2m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2022/8/21 | 2023/8/21      |
| 15     | Cable 1m 1GHz-8.5GHz        | UFA147A-0-0480-200200 | MFR64639223720   | Micro-coax   | 2022/9/13 | 2023/9/13      |
| 16     | Temp&Humidity Logger        | RA12E-TH1-RAS         | RA12-DOEB1A      | Avtech       | 2023/3/20 | 2024/3/20      |

3.Setup photo

Refer to INNOWAVE X80 Antenna report\_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: F002C4512190001)<br>Main Antenna | INNOWAVE     | PIFA         | 1) INNOWAVE<br>2) 50 ohm Coaxial<br>3) length: 257.7mm<br>diameter: 1.13 LL<br>4) Connector PN:<br>康硕四代端子<br>MHF-08-4-N-01 | 2400-2483.5    | 1.21                            | 1.84                           | 3.0      | 0.63            |
|                                        |              |              |                                                                                                                            | 5150-5250      | 0.86                            | 1.80                           | 3.0      | 0.94            |
|                                        |              |              |                                                                                                                            | 5250-5350      | 1.51                            | 2.46                           | 3.0      | 0.95            |
|                                        |              |              |                                                                                                                            | 5470-5725      | 1.19                            | 2.16                           | 3.0      | 0.97            |
|                                        |              |              |                                                                                                                            | 5725-5850      | 1.35                            | 2.34                           | 3.0      | 0.99            |
|                                        |              |              |                                                                                                                            | 5925-6425      | 1.61                            | 2.63                           | 3.0      | 1.02            |
|                                        |              |              |                                                                                                                            | 6425-6525      | 1.58                            | 2.60                           | 3.0      | 1.02            |
|                                        |              |              |                                                                                                                            | 6525-6875      | 2.28                            | 3.31                           | 3.0      | 1.03            |
|                                        |              |              |                                                                                                                            | 6875-7125      | 1.45                            | 2.48                           | 3.0      | 1.03            |
| (P/N: F002C4512590002)<br>Aux Antenna  | INNOWAVE     | PIFA         | 1) INNOWAVE<br>2) 50 ohm Coaxial<br>3) length:178.2mm<br>diameter: 1.13 LL<br>4) Connector PN:<br>康硕四代端子<br>MHF-08-4-N-01  | 2400-2483.5    | 1.68                            | 2.11                           | 3.0      | 0.43            |
|                                        |              |              |                                                                                                                            | 5150-5250      | 1.17                            | 1.82                           | 3.0      | 0.65            |
|                                        |              |              |                                                                                                                            | 5250-5350      | 1.13                            | 1.79                           | 3.0      | 0.66            |
|                                        |              |              |                                                                                                                            | 5470-5725      | 1.37                            | 2.04                           | 3.0      | 0.67            |
|                                        |              |              |                                                                                                                            | 5725-5850      | 1.82                            | 2.51                           | 3.0      | 0.69            |
|                                        |              |              |                                                                                                                            | 5925-6425      | 2.24                            | 2.94                           | 3.0      | 0.70            |
|                                        |              |              |                                                                                                                            | 6425-6525      | 2.79                            | 3.50                           | 3.0      | 0.71            |
|                                        |              |              |                                                                                                                            | 6525-6875      | 2.46                            | 3.17                           | 3.0      | 0.71            |
|                                        |              |              |                                                                                                                            | 6875-7125      | 1.92                            | 2.64                           | 3.0      | 0.72            |

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

### Main Antenna Drawing:

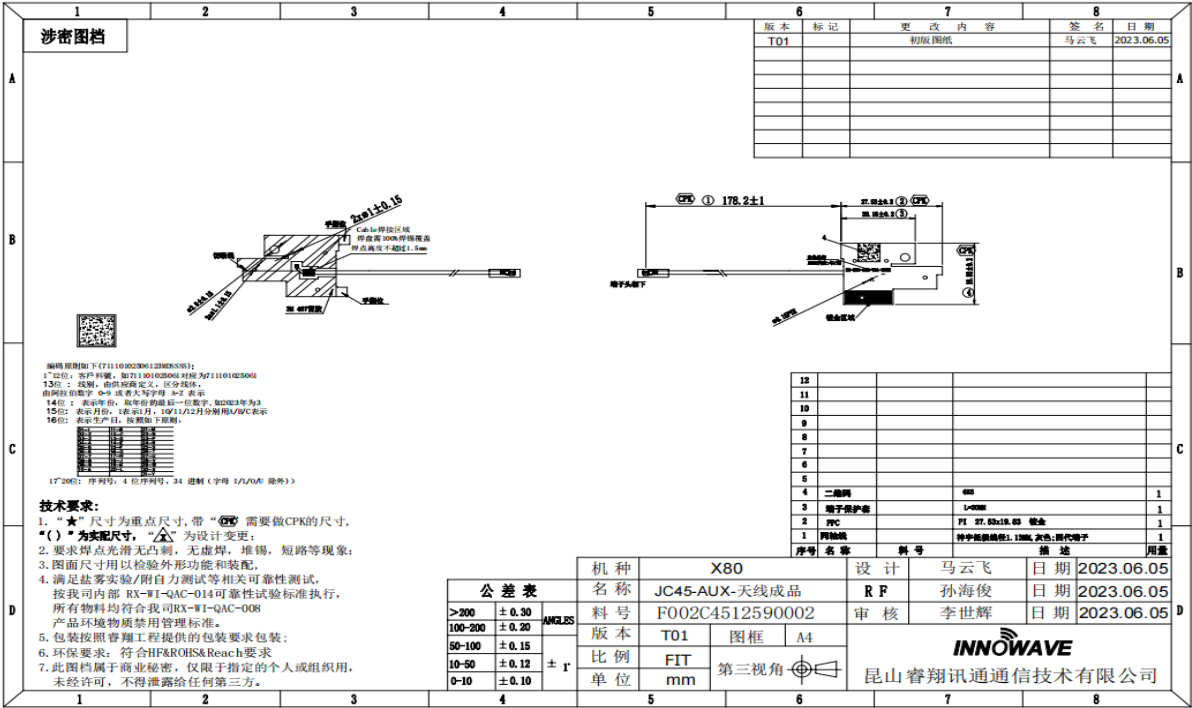
### Main Antenna Photo (Front/Back):



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):



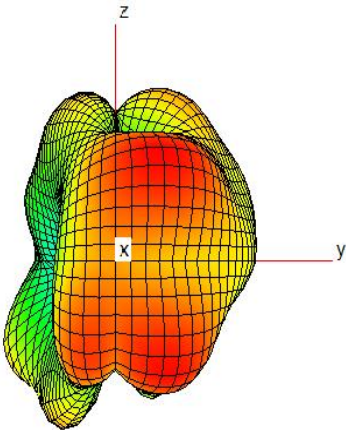
Note: antenna photo should include L type ruler

Section 3. Radiation characteristics of antenna loaded in Host Platform

Main Antenna

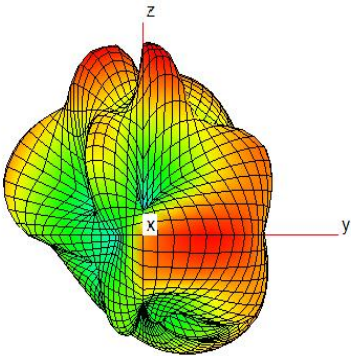
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 1.21                          |



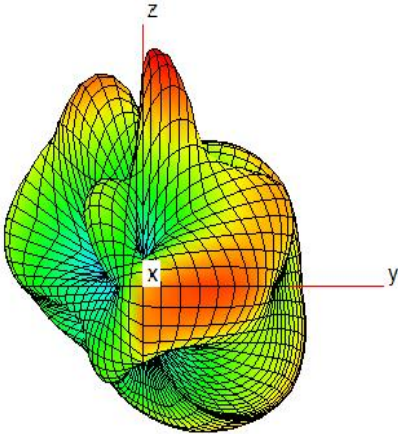
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 0.86                          |



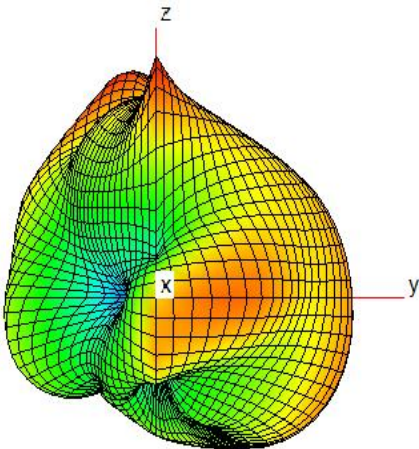
Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency<br>(MHz) | Peak Gain w/ Cable Loss<br>(dBi) |
|--------------------|----------------------------------|
| 5250-5350          | 1.51                             |



Max Antenna 3D Radiation Pattern 5470-5725 MHz

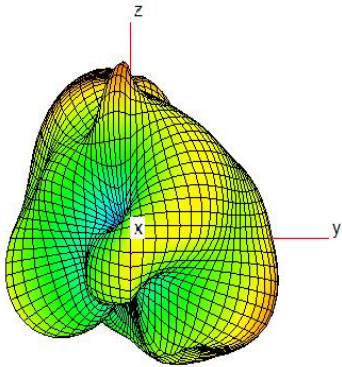
| Frequency<br>(MHz) | Peak Gain w/ Cable Loss<br>(dBi) |
|--------------------|----------------------------------|
| 5470-5725          | 1.19                             |





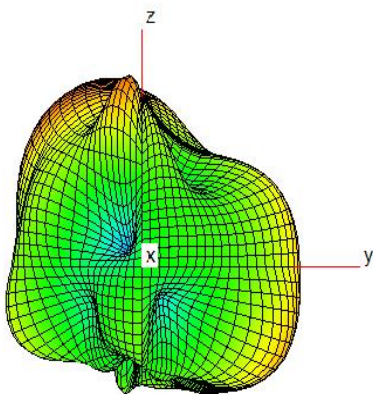
Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 1.35                          |



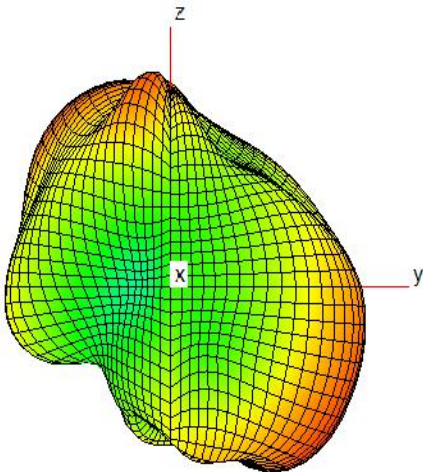
Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 1.61                          |



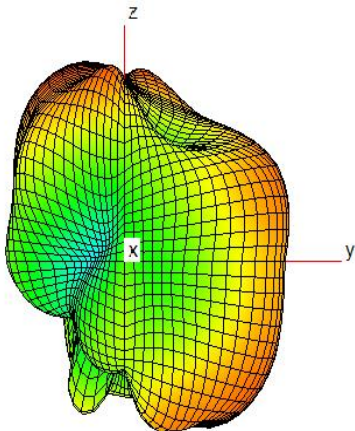
Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 1.58                          |



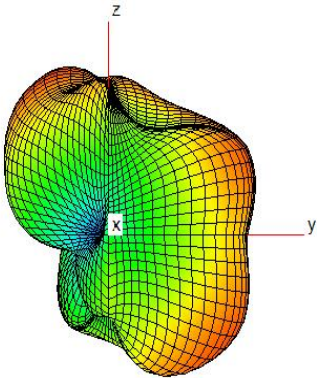
Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 2.28                          |



Max Antenna 3D Radiation Pattern 6875-7125 MHz

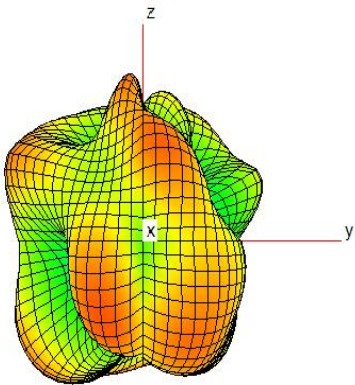
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 1.45                          |



Auxiliary Antenna

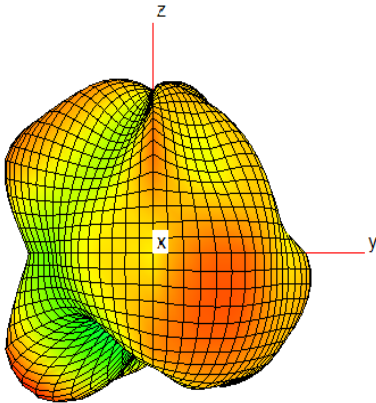
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 1.68                          |



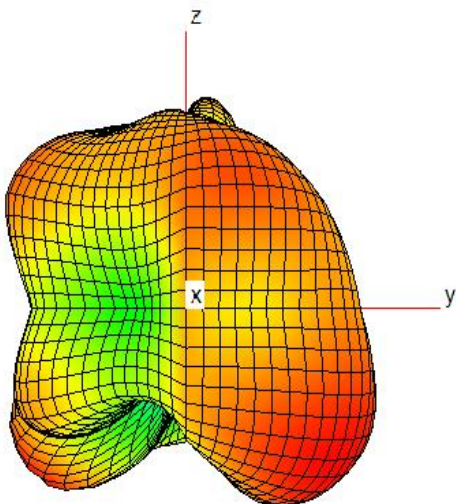
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 1.17                          |



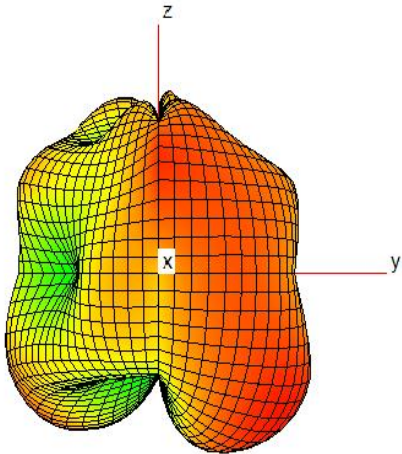
Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 1.13                          |



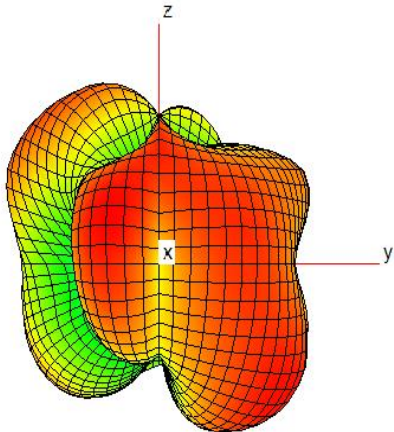
Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency<br>(MHz) | Peak Gain w/ Cable Loss<br>(dBi) |
|--------------------|----------------------------------|
| 5470-5725          | 1.37                             |



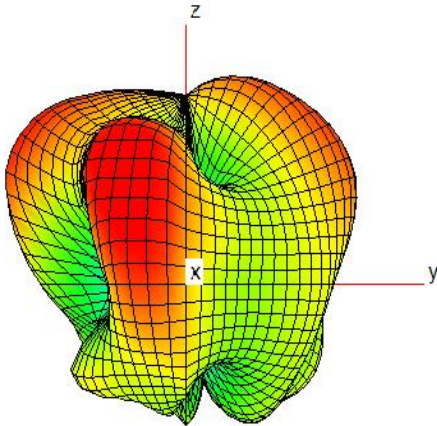
Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency<br>(MHz) | Peak Gain w/ Cable Loss<br>(dBi) |
|--------------------|----------------------------------|
| 5725-5850          | 1.82                             |



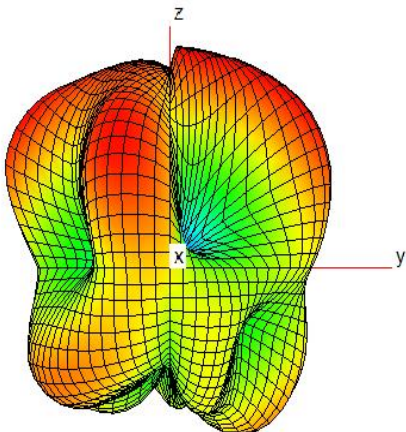
Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 2.24                          |



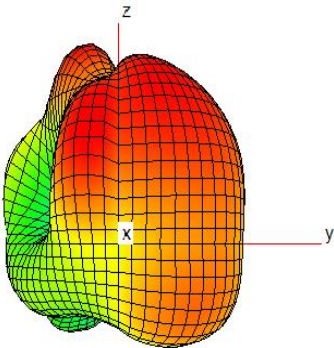
Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 2.79                          |



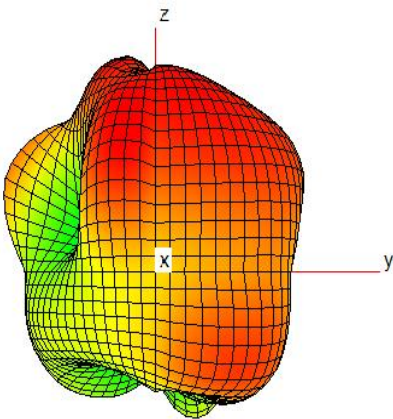
Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 2.46                          |



Max Antenna 3D Radiation Pattern 6875-7125 MHz

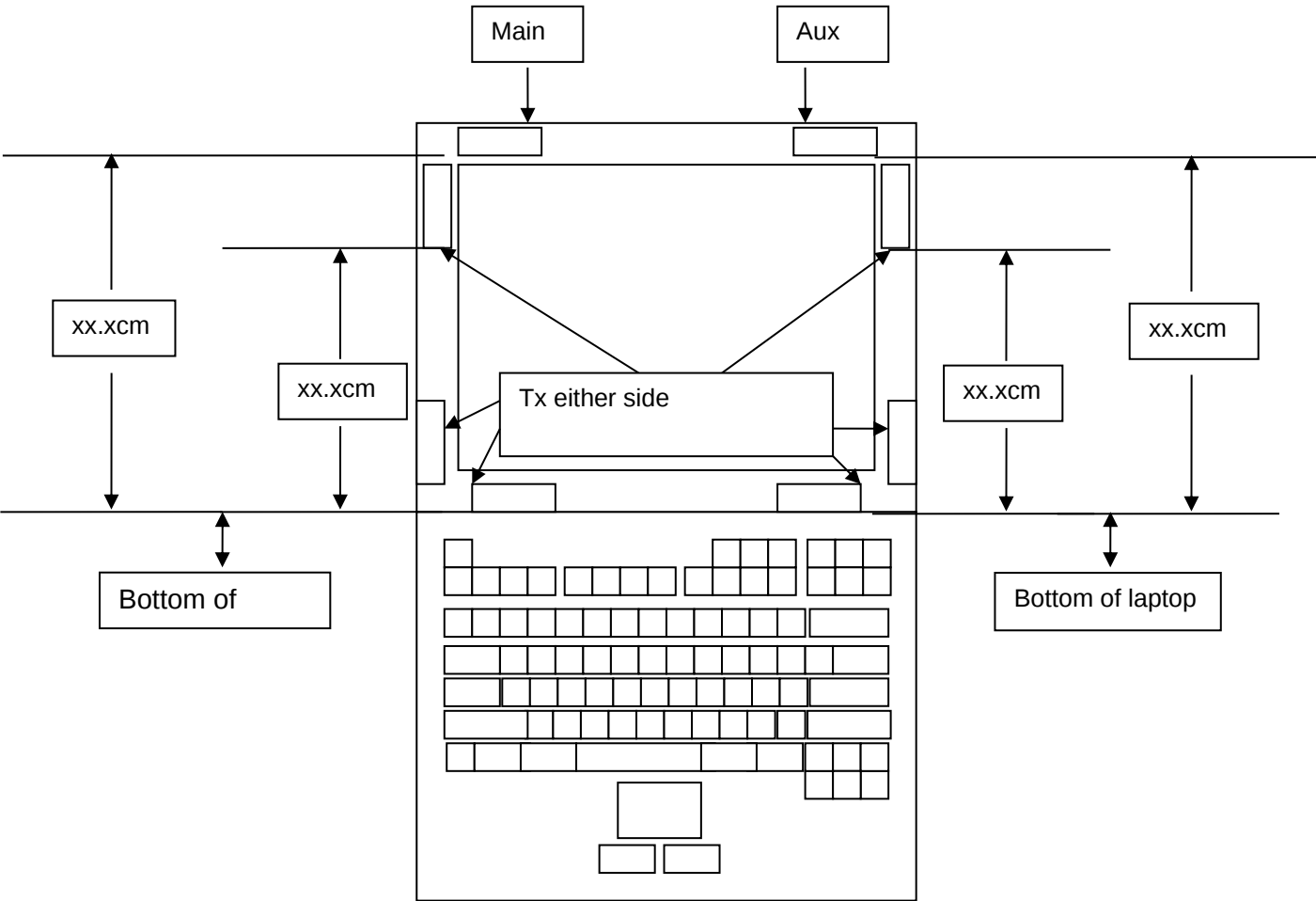
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 1.92                          |



Section 4. Antenna Host Platform Location Information

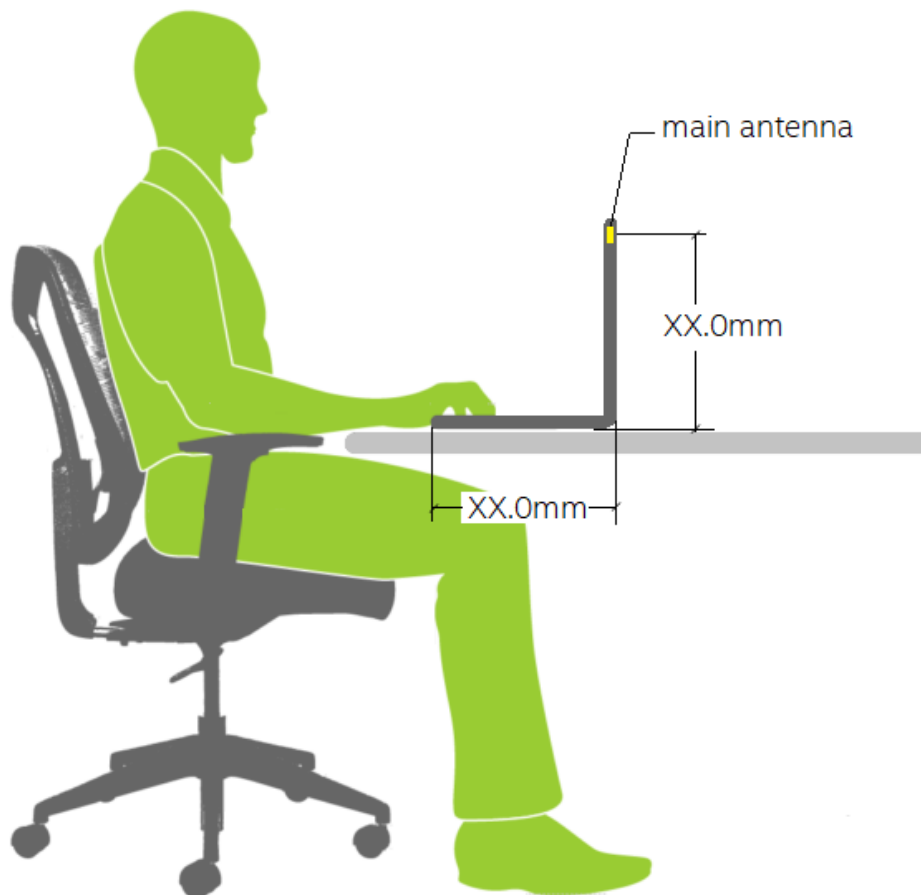
Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

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.



## 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.



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)

