# 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 (ex: Yes, No or NA) | Platform type (ex: regular NB, convertible PC, AIO…etc) | *SAR minimum separation (mm) |
|---|---|---|---|---|---|
| Dell | Wistron | P171G | Yes | regular NB | 3.36 |

*****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) |
|---|---|---|---|
| WNC | PIFA | Antenna P/N: 81EABW15.G15 | Antenna P/N: 81EABW15.G16 |

## Peak gain w/ cable loss (dBi)*

| | 2.4GHz 2400-2483.5 MHz | 5.2GHz 5150-5250MHz | 5.3GHz 5250-5350MHz | 5.6GHz 5470-5725MHz | 5.8GHz 5725-5850MHz | 6.2GHz 5925-6425MHz | 6.5GHz 6425-6525MHz | 6.7GHz 6525-6875MHz | 7.0 GHz 6875-7125MHz |
|---|---|---|---|---|---|---|---|---|---|
| **Main** | 0.11 | 2.93 | 2.85 | 4.04 | 4.1 | 3.43 | 3.11 | 3.7 | 3.93 |
| **Aux** | -1.08 | 2.99 | 2.81 | 4.48 | 3.51 | 3.54 | 2.86 | 4.22 | 4.02 |

## Intel Reference Gain/Type/ Separation distance

| Antenna Type | Antenna Peak gain (In dBi)* | | | | | | | | | Distance to the end user (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2.4GHz 2400-2483.5 MHz | 5.2GHz 5150-5250MHz | 5.3GHz 5250-5350MHz | 5.6GHz 5470-5725MHz | 5.8GHz 5725-5850MHz | 6.2GHz 5925-6425MHz | 6.5GHz 6425-6525MHz | 6.7GHz 6525-6875MHz | 7.0GHz 6875-7125MHz | Generic: refer to modular FCC SAR report<br>Mid-power: ≥ 8 mm<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.

# Table of contents

1. **Applicable test methods**

The gain measurement shall follow by following conditions:

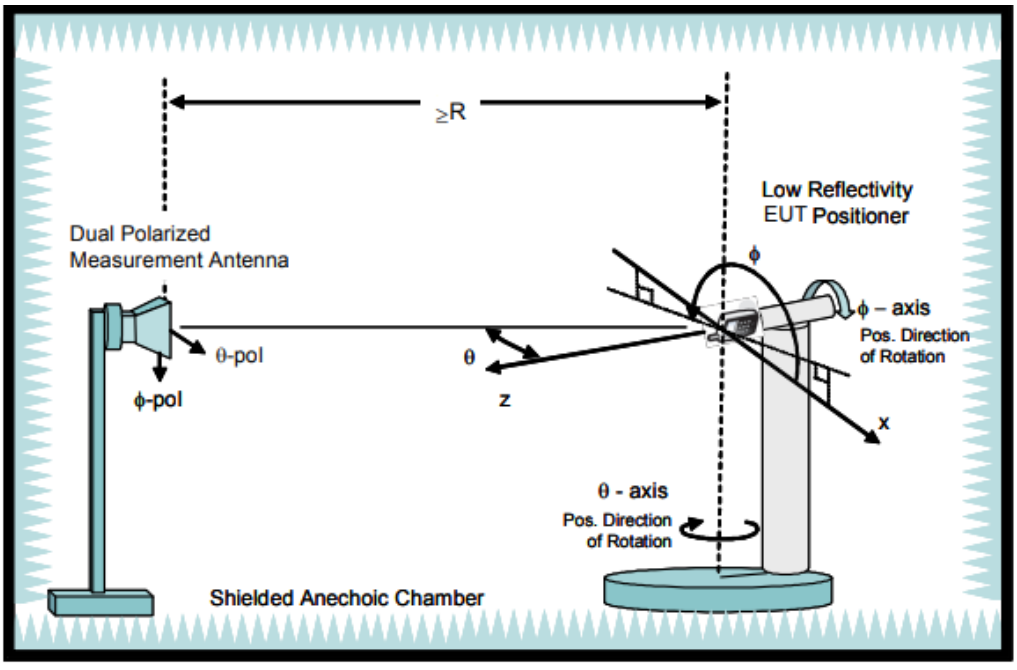
- It is required that all the antenna gain to be measured spherically and computed by spatial average be computed of the resultant gain.
- During gain measurement, all other antennas not under test should be terminated by 50 Ohm load in end of cable.
- Space points of 3D gain measurement are increase by specific steps from Theta 0~180 degrees, and Phi, 0~360 degrees, as figure below. The increments steps are different steps are different by antenna functions.

| | | | |
|---|---|---|---|
| **Theta Start** | 0 degree | Phi Start | 0 degree |
| **Theta Stop** | 165 degree | Phi Stop | 345 degree |
| **Theta Increment** | 15 degree | Phi Increment | 15 degree |

**2. Test & System Description**

a. Test setup

The testing of antenna gain should be made at a CTIA qualified lab with an RF anechoic chamber with at least 3-meter separation from the receive antenna to the antenna under test. The antenna gain report from unqualified lab can't be referenced a passing. Besides, all test equipment including horn antennas, adapters, cables, network analyzers, and receivers shall be calibrated per manufacturer's minimum calibration requirements.



b. Equipment list

| AMS4500 Antenna Measurement System |
| --- |
| Device |
| RF-Shielded Room & Related Components |
| Anechoic Absorber Materials |
| Core Equipment & Software |
| Design, Installation, Integration & Training |
| LTE SISO Test Package |
| WiFi (802-1 lalb/glniac/ax) SISO Test Package |
| WFi 6e SISO Test Package |
| 3126C-3500 Precision Sleeve Dipole (3000 - 4000 MHz) |
| 3126C-4500 Precision Sleeve Dipole (4000 - 5000 MHz) |
| Support Envelope Correlation Calculation [ECCJ |
| Anritsu MT8862A Wireless Connectivity Test Set |

# Antenna Information

## Section 1. Antenna Assembly Specifications

| 1A<br>Antenna Part Number | 1B<br>Manufacturer | 1C<br>Antenna Type | 1D<br>Cable Assembly Part Number and Information | Freq Range<br>MHz | 1E<br>* Peak Gain W/ Cable loss (dBi) | 1F<br>Peak Gain w/o Cable Loss (dBi) | 1G<br>Max VSWR | 1H<br>Cable Loss (dB) |
|---|---|---|---|---|---|---|---|---|
| (P/N: 81EABW15.G15 Main Antenna | WNC | PIFA | 50 ohm Coaxial length: 248mm diameter: 1.13mm Connector：IPEX | 2400-2483.5 | 0.11 | 0.83 | 3.0 | 0.72 |
| | | | | 5150-5250 | 2.93 | 4.00 | 3.0 | 1.07 |
| | | | | 5250-5350 | 2.85 | 3.94 | 3.0 | 1.09 |
| | | | | 5470-5725 | 4.04 | 5.15 | 3.0 | 1.11 |
| | | | | 5725-5850 | 4.1 | 5.24 | 3.0 | 1.14 |
| | | | | 5925-6425 | 3.43 | 4.63 | 3.0 | 1.2 |
| | | | | 6425-6525 | 3.11 | 4.34 | 3.0 | 1.23 |
| | | | | 6525-6875 | 3.7 | 4.96 | 3.0 | 1.26 |
| | | | | 6875-7125 | 3.93 | 5.23 | 3.0 | 1.3 |
| (P/N: 81EABW15.G16 Aux Antenna | WNC | PIFA | 50 ohm Coaxial length: 199mm diameter: 1.13mm Connector：IPEX | 2400-2483.5 | -1.08 | -0.5 | 3.0 | 0.58 |
| | | | | 5150-5250 | 2.99 | 3.86 | 3.0 | 0.87 |
| | | | | 5250-5350 | 2.81 | 3.69 | 3.0 | 0.88 |
| | | | | 5470-5725 | 4.48 | 5.38 | 3.0 | 0.9 |
| | | | | 5725-5850 | 3.51 | 4.44 | 3.0 | 0.93 |
| | | | | 5925-6425 | 3.54 | 4.5 | 3.0 | 0.96 |
| | | | | 6425-6525 | 2.86 | 3.86 | 3.0 | 1 |
| | | | | 6525-6875 | 4.22 | 5.24 | 3.0 | 1.02 |
| | | | | 6875-7125 | 4.02 | 5.07 | 3.0 | 1.05 |

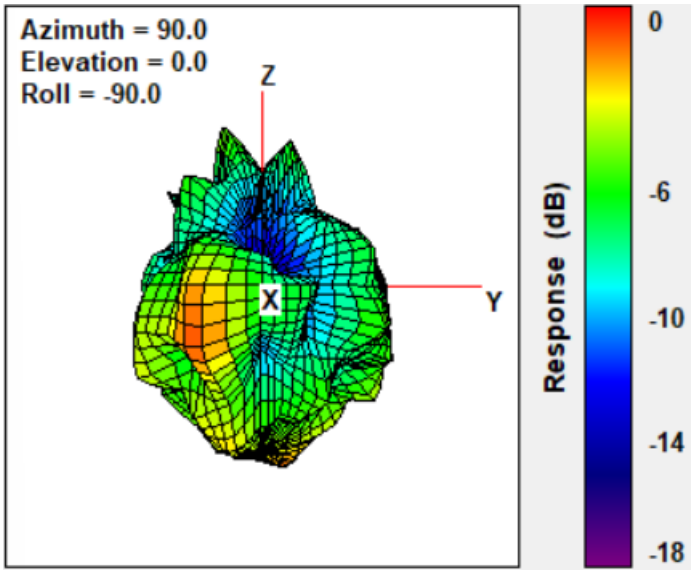
- **3D Antenna Peak Gain required being test in system basis.**

# Section 3. Radiation characteristics of antenna loaded in Host Platform

## Main Antenna

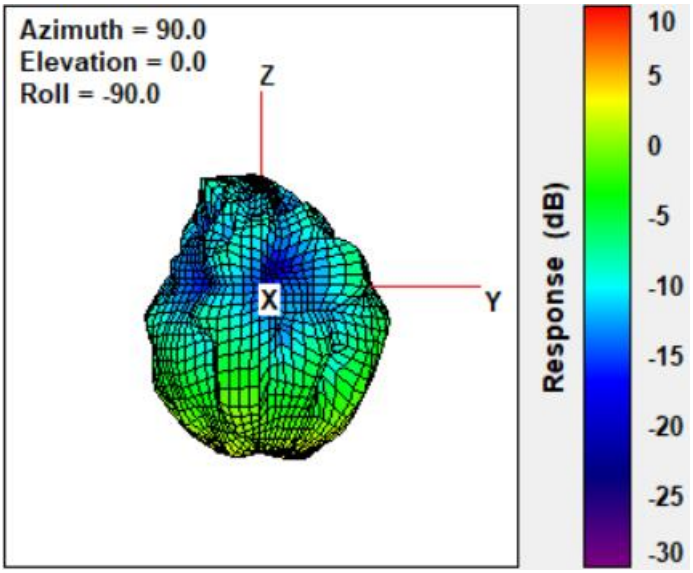
### Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **2400-2483.5** | 0.11 |



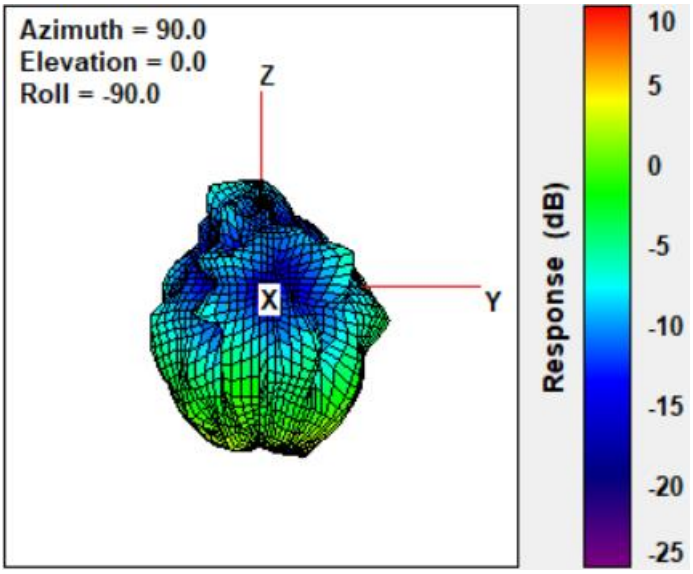

### Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5150-5250** | 2.93 |


Azimuth = 90.0
Elevation = 0.0
Roll = -90.0
Z
X
Y
Response (dB)
10
5
0
-5
-10
-15
-20
-25
-30

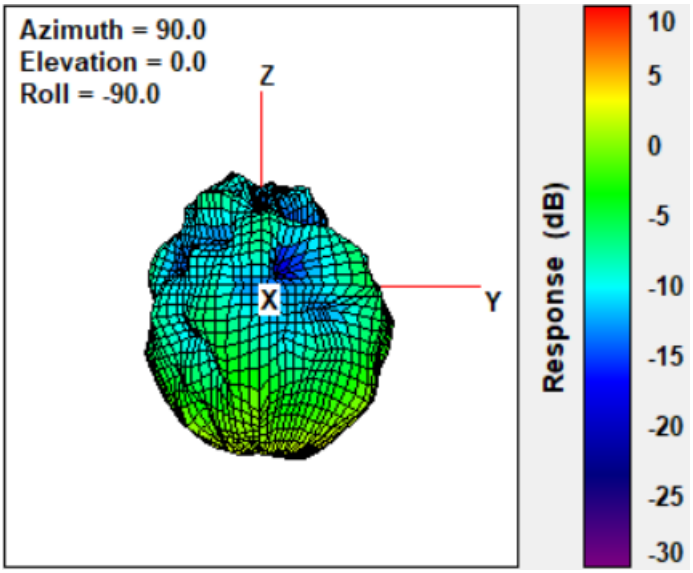
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5250-5350** | 2.85 |



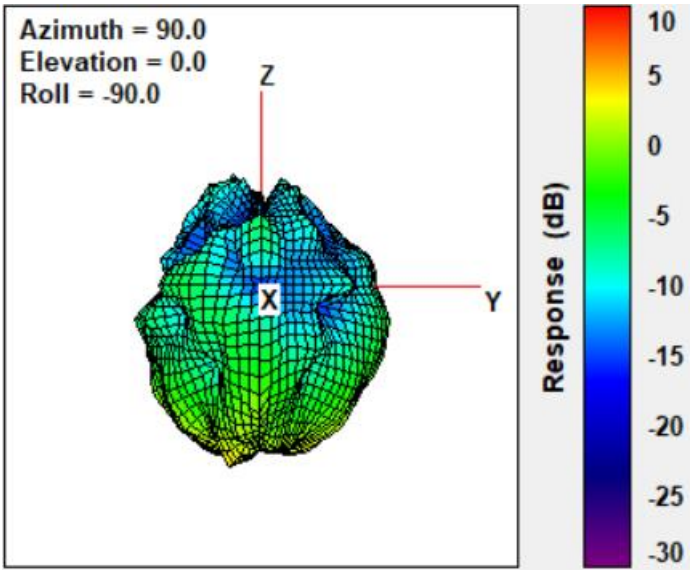

## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5470-5725** | 4.04 |



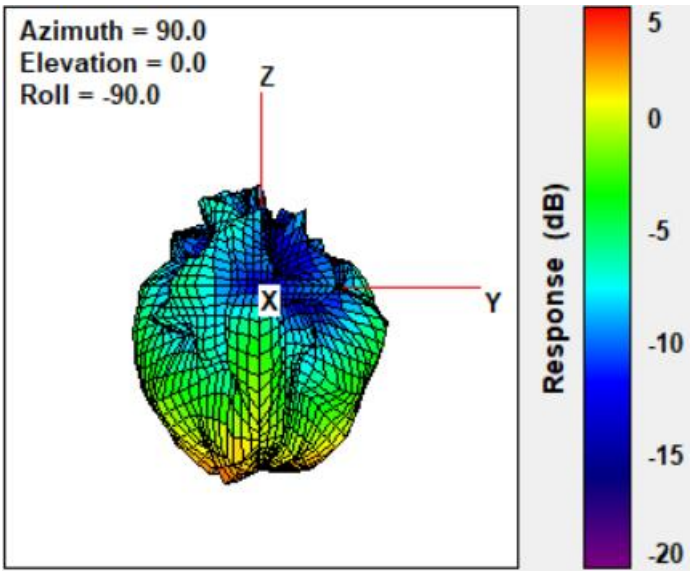
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5725-5850** | 4.10 |



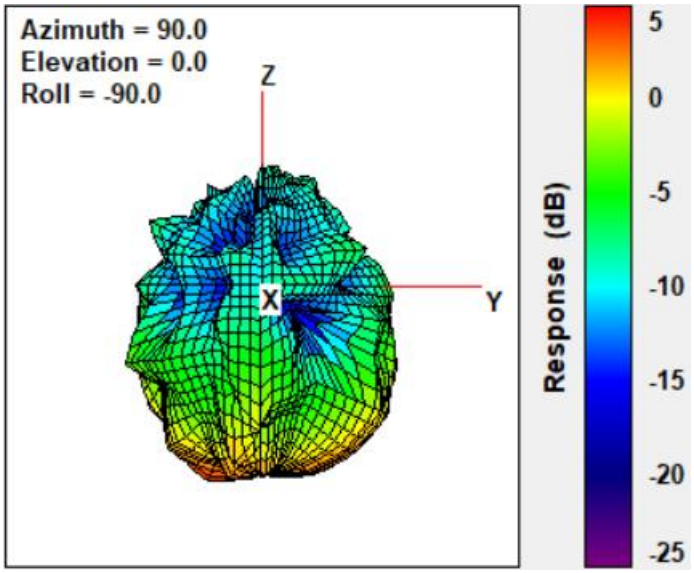

## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5925-6425** | 3.43 |



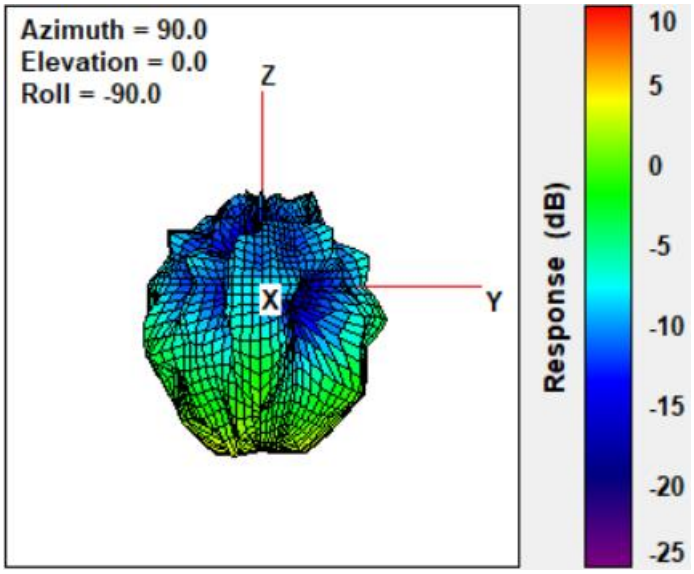
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

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



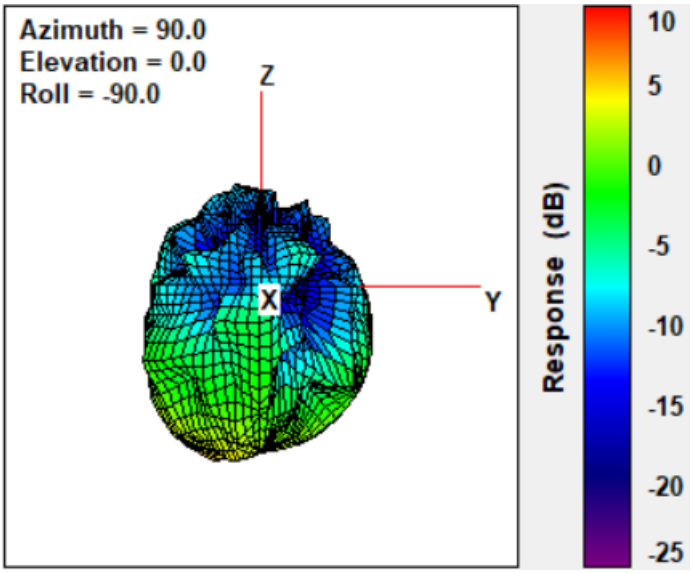

## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **6525-6875** | 3.70 |



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

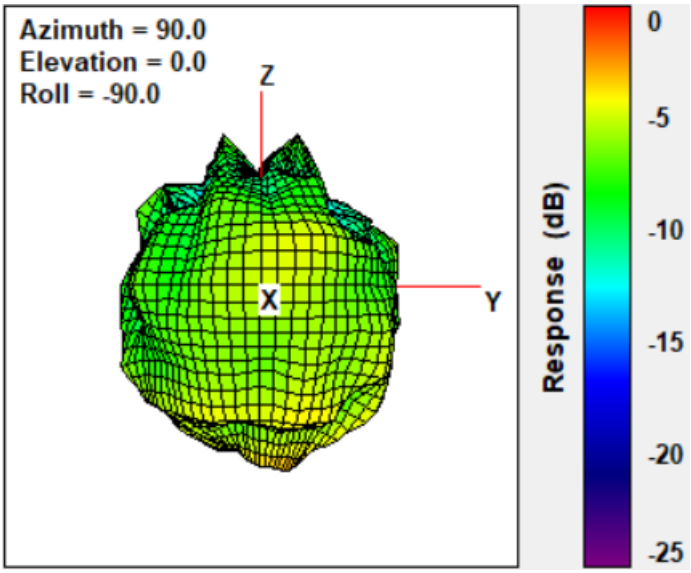
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **6875-7125** | 3.93 |




# Auxiliary Antenna

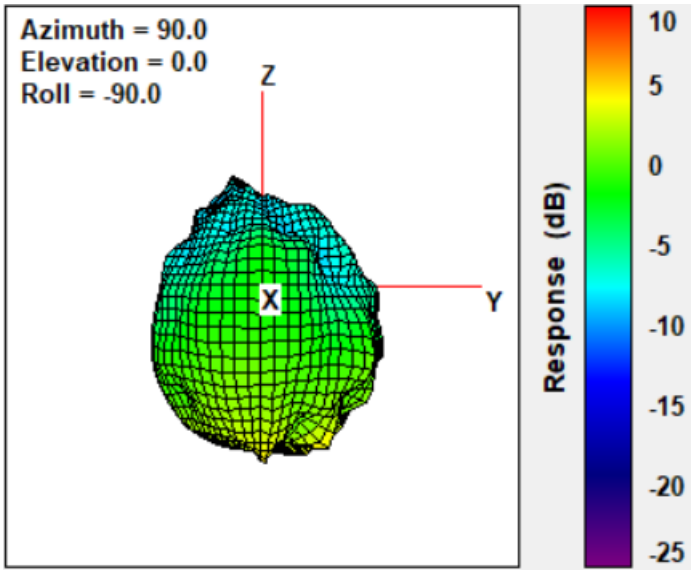
## Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **2400-2483.5** | -1.08 |



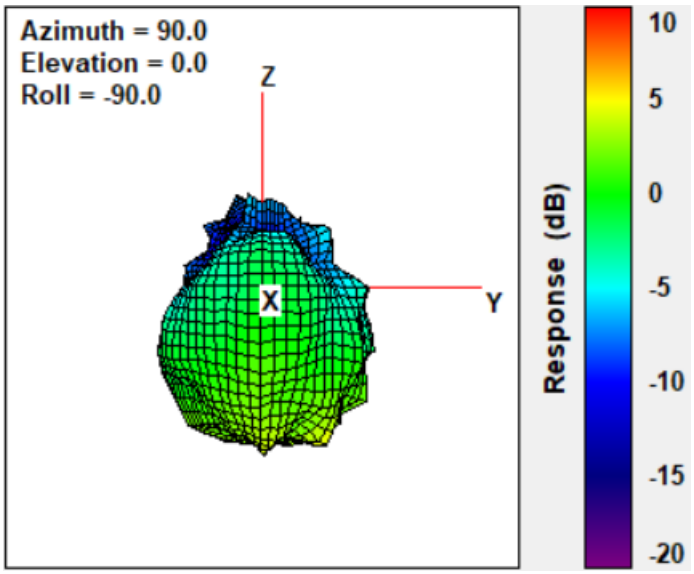
## Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5150-5250** | 2.99 |



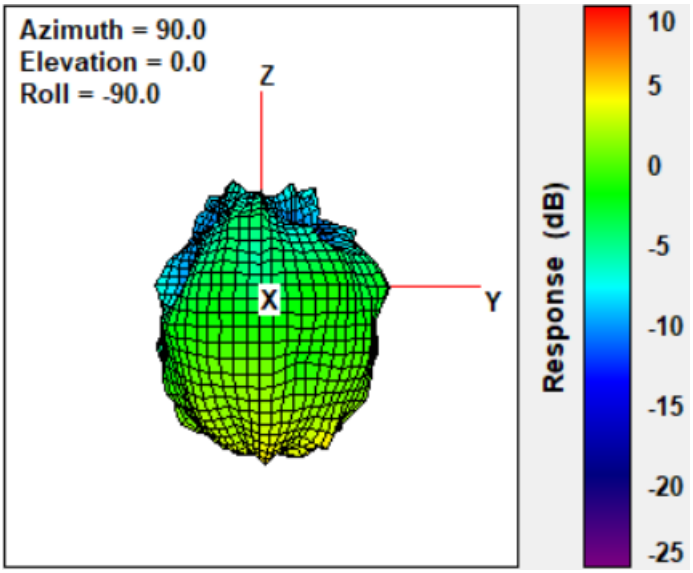

## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5250-5350** | 2.81 |



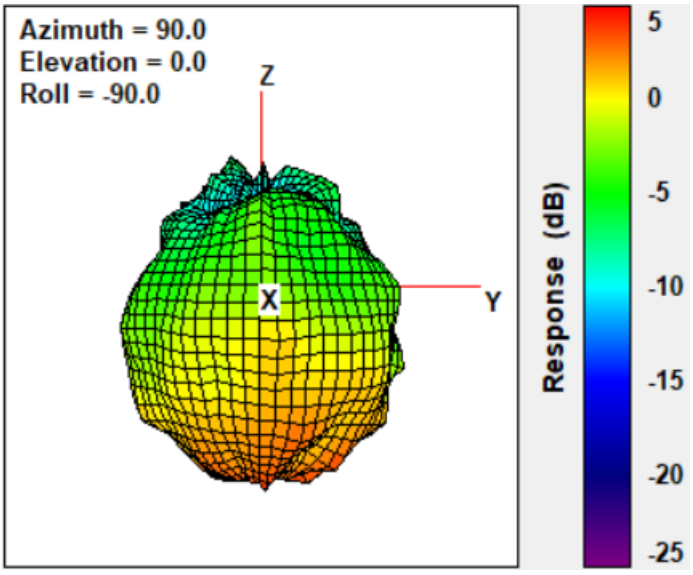
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5470-5725** | 4.48 |



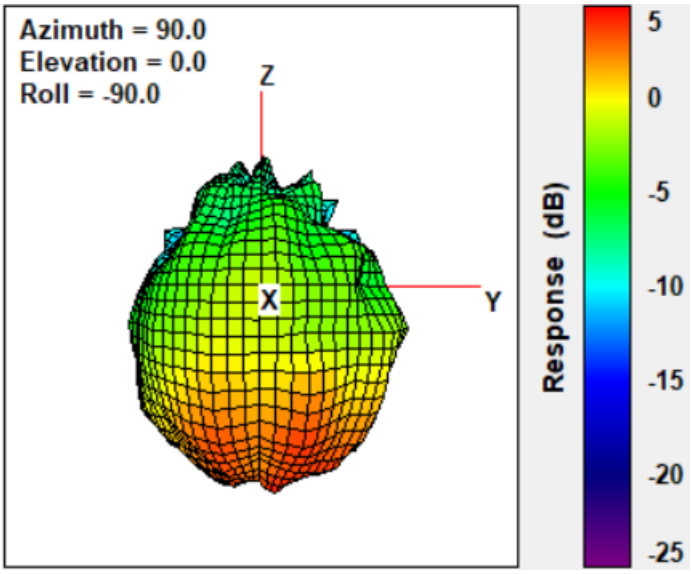

## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5725-5850** | 3.51 |



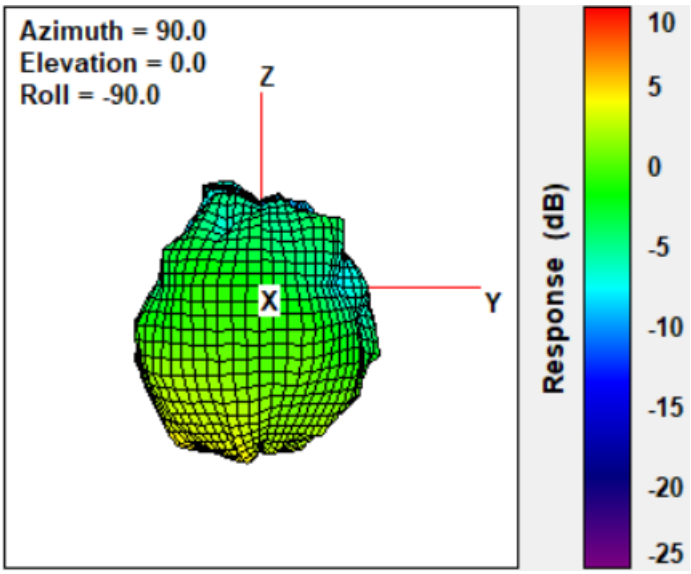
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **5925-6425** | 3.54 |



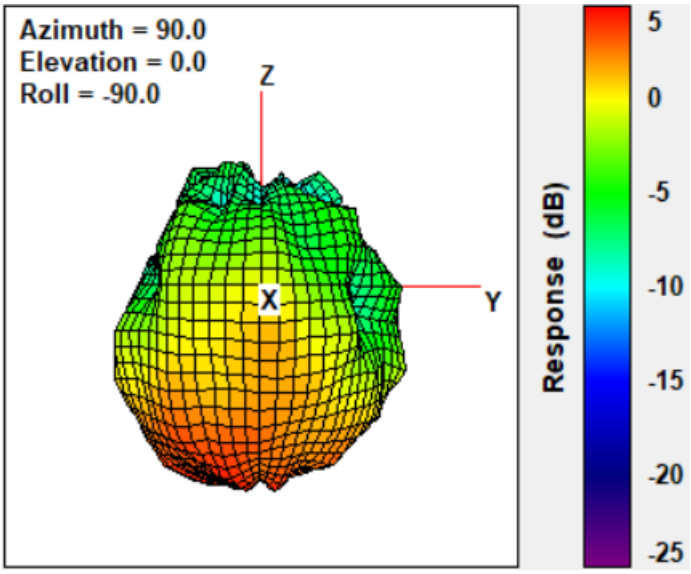

## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **6425-6525** | 2.86 |



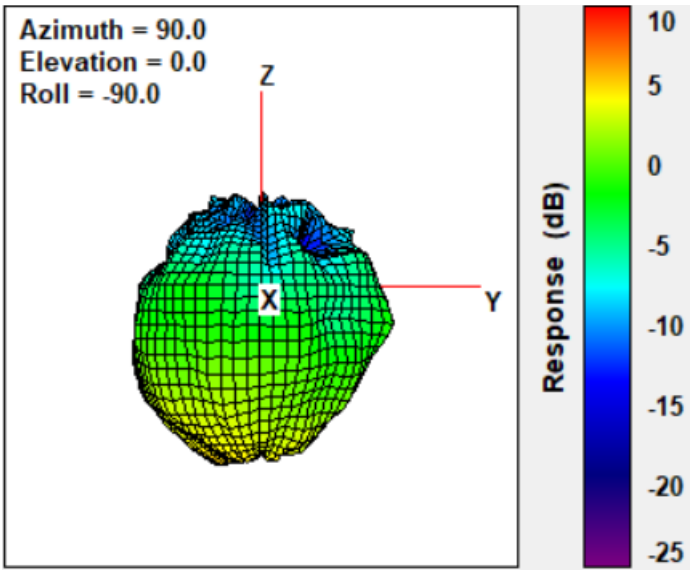
## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **6525-6875** | 4.22 |




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

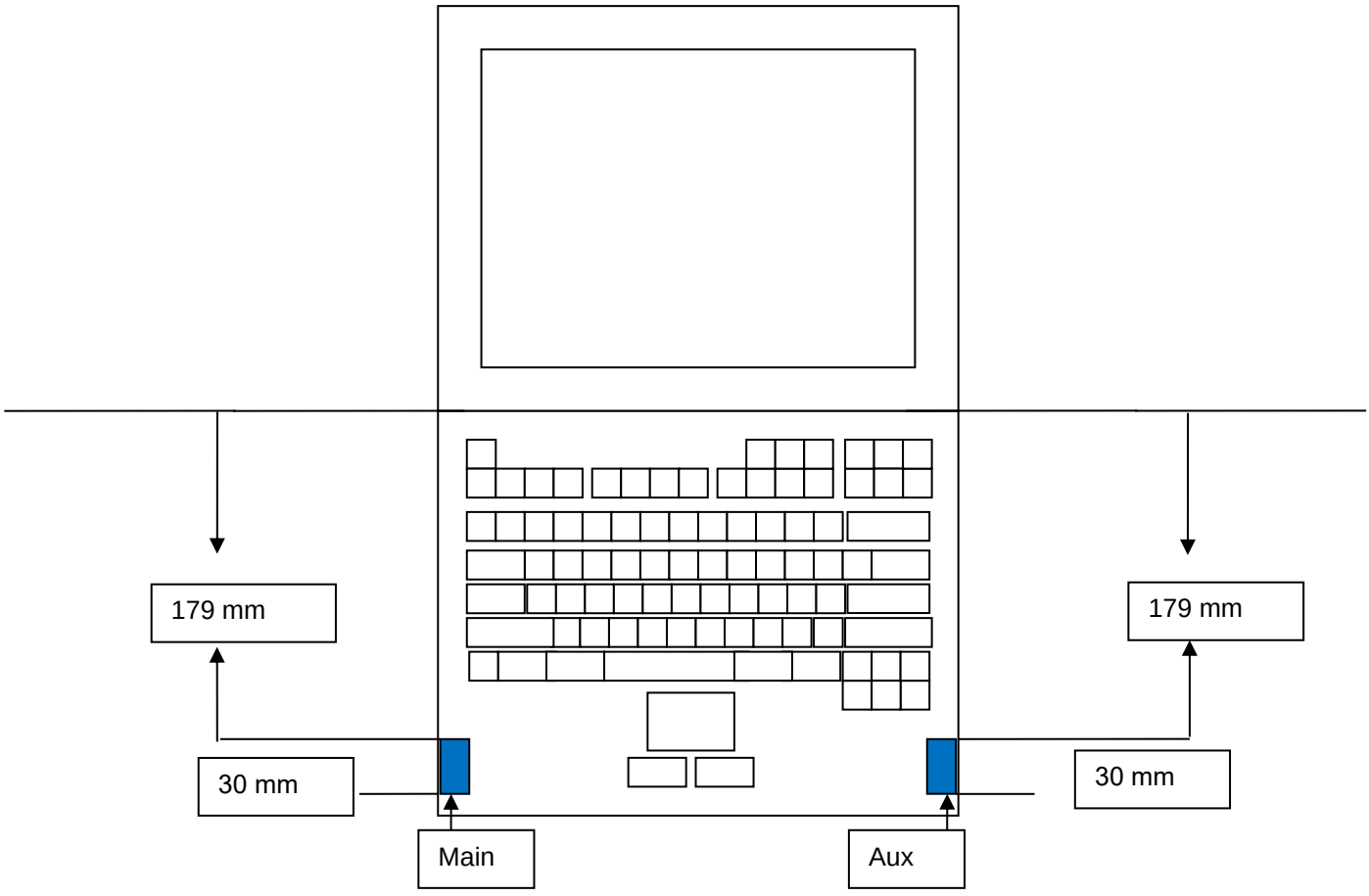
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|---|---|
| **6875-7125** | 4.02 |



# Section 4. Antenna Host Platform Location Information

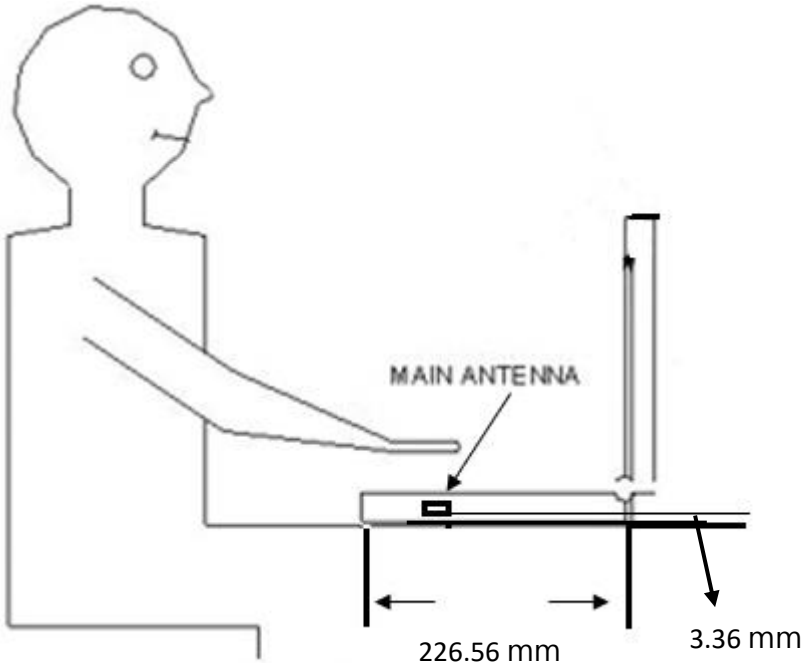
Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

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

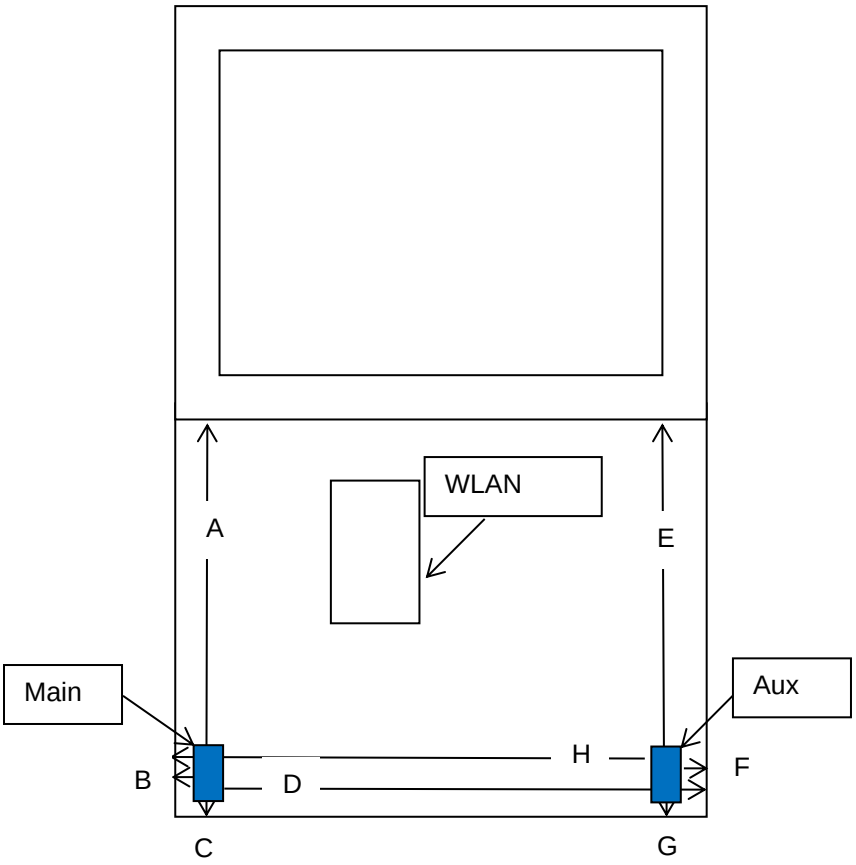
Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary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




| Distance | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| (mm) | 179 | 7.5 | 17.56 | 297.5 | 179 | 7.5 | 17.56 | 297.5 |