

# 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) |                        |                           |                        |                        |                         |                                                                                            |
| Inventec                                                                                                                                                                       |                             | MOMI13                     | YES                                   | Tablet                                                       |                              |                        |                           |                        |                        |                         |                                                                                            |
| *****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) |                        |                        |                         |                                                                                            |
| INPAQ                                                                                                                                                                          |                             | PIFA                       | WA-F-LE-02-044                        |                                                              |                              |                        | WA-F-LE-01-007            |                        |                        |                         |                                                                                            |
| Peak gain w/ cable loss (dBi)*                                                                                                                                                 |                             |                            |                                       |                                                              |                              |                        |                           |                        |                        |                         |                                                                                            |
|                                                                                                                                                                                | 2.4GHz<br>2400-2483.5 MHz   | 5.2GHz<br>5150-5250MHz     | 5.3GHz<br>5250-5350MHz                | 5.6GHz<br>5470-5725MHz                                       | 5.8GHz<br>5725-5850MHz       | 5.9GHz<br>5850-5895MHz | 6.2GHz<br>5925-6425MHz    | 6.5GHz<br>6425-6525MHz | 6.7GHz<br>6525-6875MHz | 7.0 GHz<br>6875-7125MHz |                                                                                            |
| Main                                                                                                                                                                           | 1.9                         | 3.19                       | 2.75                                  | 3.51                                                         | 3.28                         | 2.36                   | 4.33                      | 3.87                   | 4.66                   | 3.78                    |                                                                                            |
| Aux                                                                                                                                                                            | 1.44                        | 1.38                       | 1.45                                  | 2.9                                                          | 2.9                          | 2.13                   | 4.33                      | 2.5                    | 2.45                   | 1.34                    |                                                                                            |
| 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       | 5.9GHz<br>5850-5895MHz | 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                   | 4.72                      | 4.83                   | 4.30                   | 5.37                    |                                                                                            |
| Dipole                                                                                                                                                                         | 2.89                        | 2.92                       | 3.19                                  | 4.41                                                         | 4.22                         | 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 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**

ETS-Lindgren AMS-8500 system is 3D fully anechoic chamber, it is applied to the “Conical Cut test method”, the detail description is described as below.

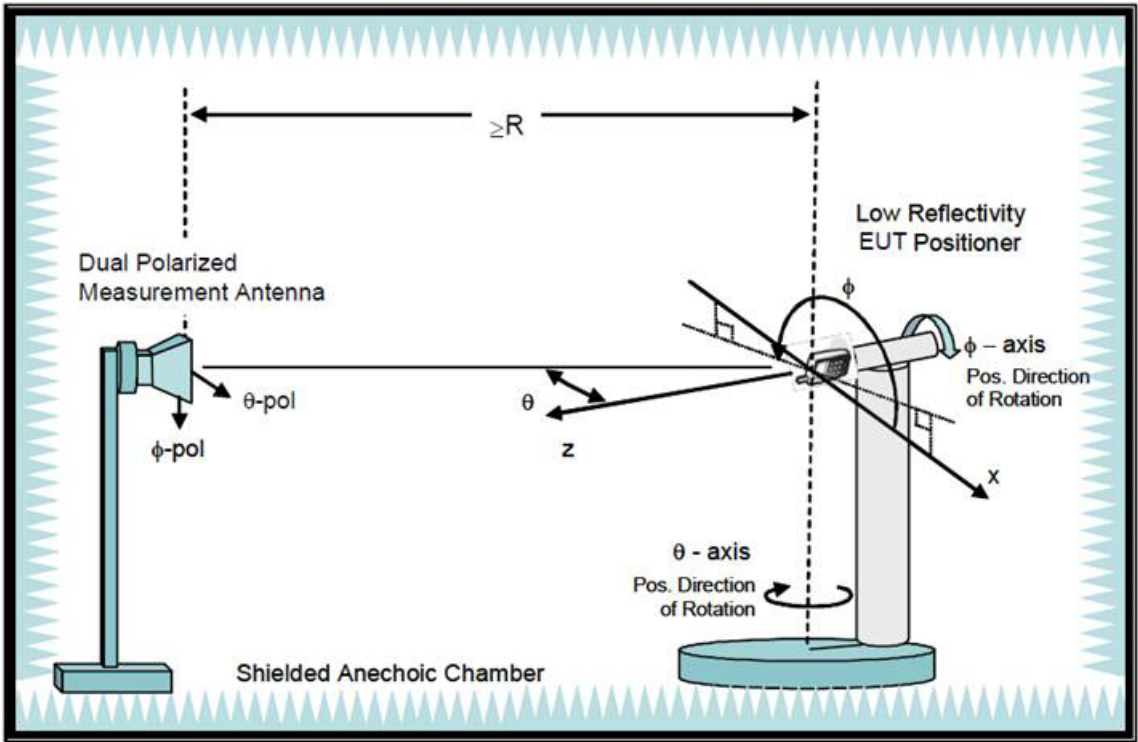
The Conical Cut method requires the ability of the Measurement Antenna to be physically rotated in the theta plane (overhead) of the EUT for implementations using a single Measurement Antenna, Eleven conical cuts are required to capture data at every 15 degrees from the EUT, with the top (0 degrees) and bottom (180 degrees) cuts not being measured. Typically, the EUT will remain affixed to a turntable during the entire measurement process. The Measurement Antenna will be positioned at a starting theta angle. The EUT will then be rotated around the full 360 degrees of phi rotation. The Measurement Antenna will then be positioned at the next theta angle, and the process repeated.

|         |                | $\theta$ -Axis     | $\Phi$ -Axis      |
|---------|----------------|--------------------|-------------------|
| Passive | Step size      | 15°~165° step: 15° | 0°~345° step: 15° |
|         | N / M (Points) | 12                 | 24                |

2. **Test & System Description**

a. Test setup

Typical Setup for ETS-Lindgren AMS-8500:



## b. Equipment list

## Anechoic Chamber

| Equipment Description                 | Manufacturer | Identification no. | Current calibration date | Next calibration date |
|---------------------------------------|--------------|--------------------|--------------------------|-----------------------|
| Network analyzer                      | Agilent      | E5071C             | 2022/01/07               | 2023/01/06            |
| Measurement software                  | ETS-Lindgren | EMQuest            | 2022/03/03               | 2023/03/03            |
| Multi axis positioning system(MAPSTM) | ETS-Lindgren | EMCO 2115          | 2022/03/03               | 2023/03/03            |
| Multi axis positioning system(MAPSTM) | ETS-Lindgren | EMCO 2110          | 2022/03/03               | 2023/03/03            |
| MAPSTM controller                     | ETS-Lindgren | EMCO 2090          | 2022/03/03               | 2023/03/03            |
| Horn antenna                          | ETS-Lindgren | 3164-10            | 2022/03/03               | 2023/03/03            |
| Cable 40cm 18 GHz                     | Jmtt         | 201EH012010400     | 2022/04/07               | 2023/04/07            |
| Cable 6m 18 GHz                       | Jmtt         | 201EH012016000     | 2022/04/07               | 2023/04/07            |
| Cable 6m 18 GHz                       | Jmtt         | 201EH012016000     | 2022/04/07               | 2023/04/07            |
| Cable 3.5m 18 GHz                     | Jmtt         | 201EH012013500     | 2022/04/07               | 2023/04/07            |
| Cable 1.5m 18 GHz                     | Jmtt         | 201EH012011500     | 2022/04/07               | 2023/04/07            |

### 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: WA-F-LE-02-044) Main Antenna | INPAQ        | PIFA         | 50 ohm Coaxial length: 130 mm diameter: 1.13 LowLoss | 2400-2483.5    | 1.9                             | 1.45                           | 3        | 0.45            |
|                                    |              |              |                                                      | 5150-5250      | 3.19                            | 2.52                           | 3        | 0.67            |
|                                    |              |              |                                                      | 5250-5350      | 2.75                            | 2.07                           | 3        | 0.68            |
|                                    |              |              |                                                      | 5470-5725      | 3.51                            | 2.82                           | 3        | 0.69            |
|                                    |              |              |                                                      | 5725-5850      | 3.28                            | 2.57                           | 3        | 0.71            |
|                                    |              |              |                                                      | 5850-5895      | 2.36                            | 1.57                           | 3        | 0.79            |
|                                    |              |              |                                                      | 5925-6425      | 4.33                            | 3.5                            | 3        | 0.83            |
|                                    |              |              |                                                      | 6425-6525      | 3.87                            | 3.02                           | 3        | 0.85            |
|                                    |              |              |                                                      | 6525-6875      | 4.66                            | 3.75                           | 3        | 0.91            |
|                                    |              |              |                                                      | 6875-7125      | 3.78                            | 2.79                           | 3        | 0.99            |
| (P/N: WA-F-LE-01-007) Aux Antenna  | INPAQ        | PIFA         | 50 ohm Coaxial length: 200 mm diameter: 1.13 LowLoss | 2400-2483.5    | 1.44                            | 0.77                           | 3        | 0.67            |
|                                    |              |              |                                                      | 5150-5250      | 1.38                            | 0.37                           | 3        | 1.01            |
|                                    |              |              |                                                      | 5250-5350      | 1.45                            | 0.44                           | 3        | 1.01            |
|                                    |              |              |                                                      | 5470-5725      | 2.9                             | 1.87                           | 3        | 1.03            |
|                                    |              |              |                                                      | 5725-5850      | 2.9                             | 1.85                           | 3        | 1.05            |
|                                    |              |              |                                                      | 5850-5895      | 2.13                            | 1.06                           | 3        | 1.07            |
|                                    |              |              |                                                      | 5925-6425      | 4.33                            | 3.23                           | 3        | 1.10            |
|                                    |              |              |                                                      | 6425-6525      | 2.5                             | 1.38                           | 3        | 1.12            |
|                                    |              |              |                                                      | 6525-6875      | 2.45                            | 1.3                            | 3        | 1.15            |
|                                    |              |              |                                                      | 6875-7125      | 1.34                            | 0.15                           | 3        | 1.19            |

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

## Main Antenna Drawing:



### Aux Antenna Drawing:



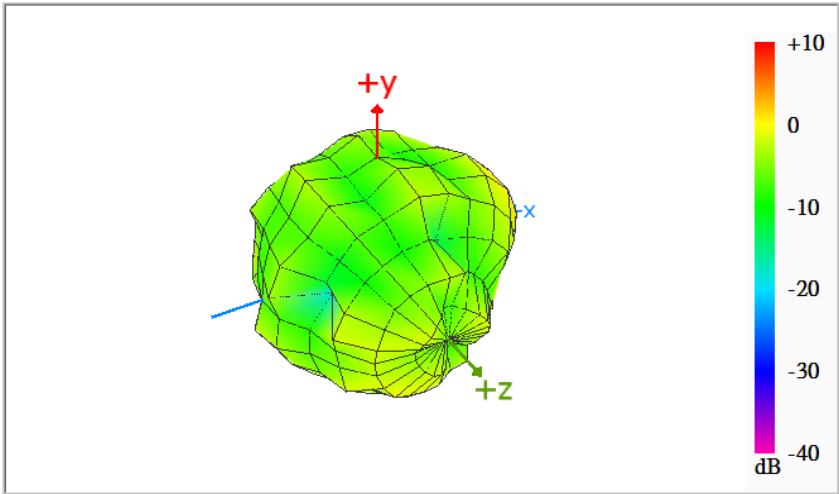
7/21

Section 3. Radiation characteristics of antenna loaded in Host Platform

Main Antenna

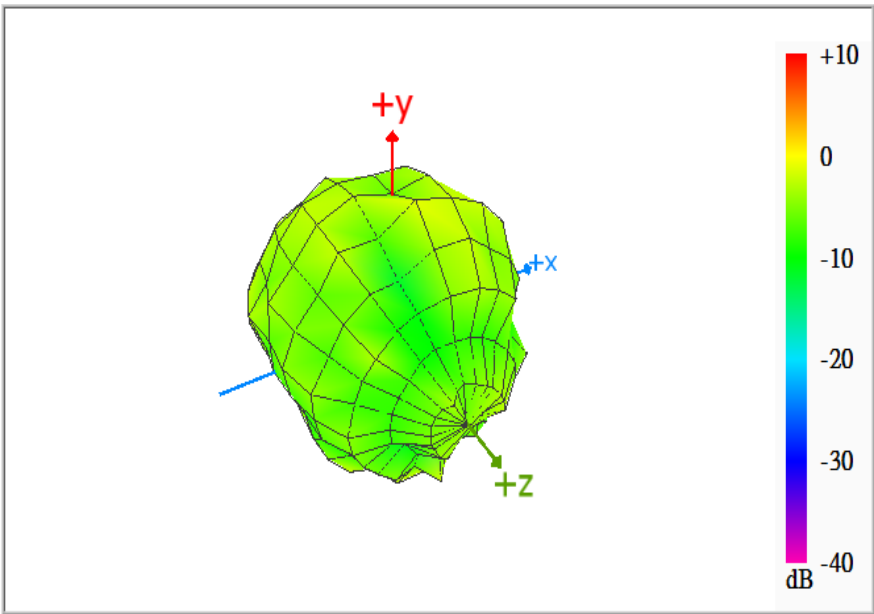
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 1.90                          |



Max Antenna 3D Radiation Pattern 5150-5250 MHz

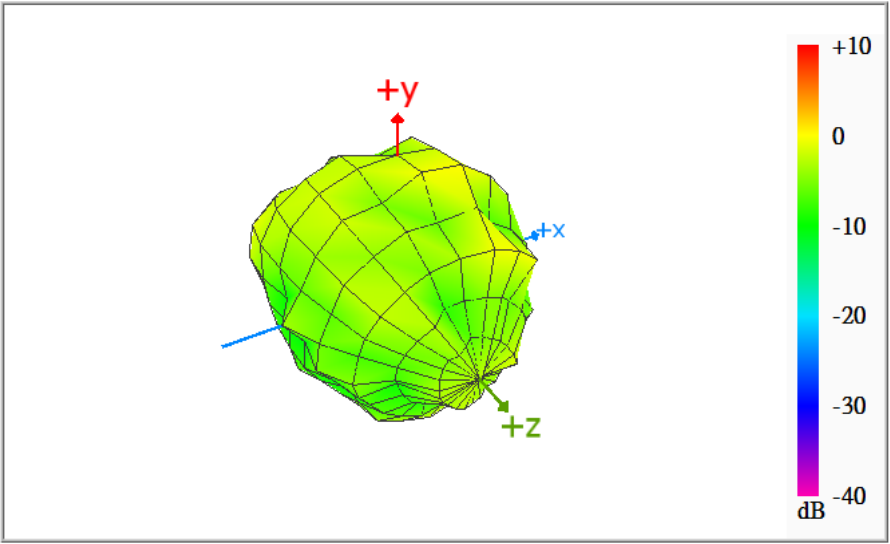
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 3.19                          |





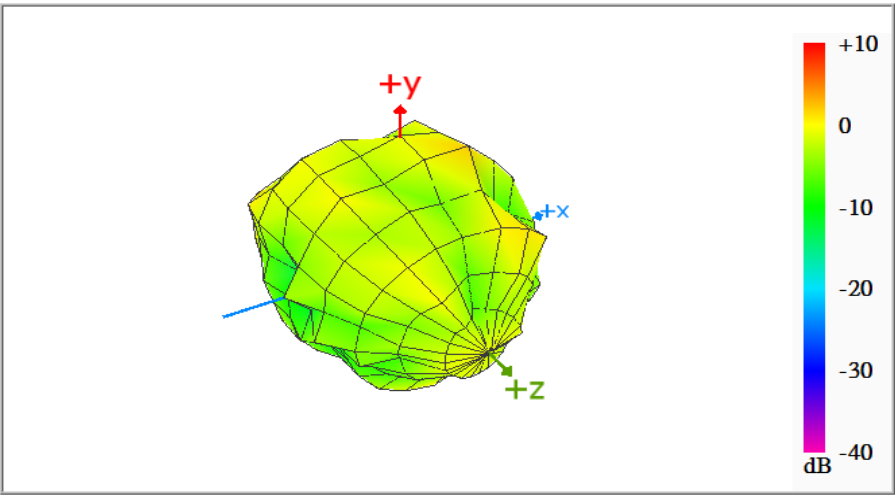
Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 2.75                          |



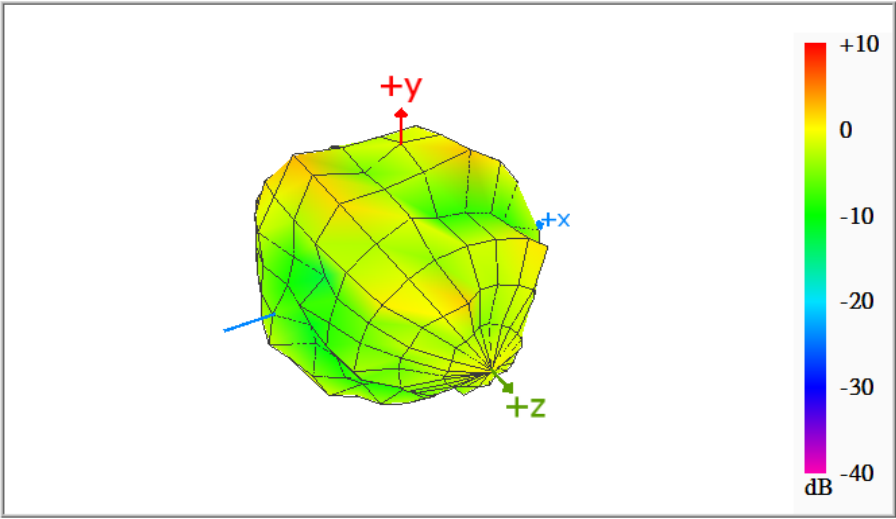
Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 3.51                          |



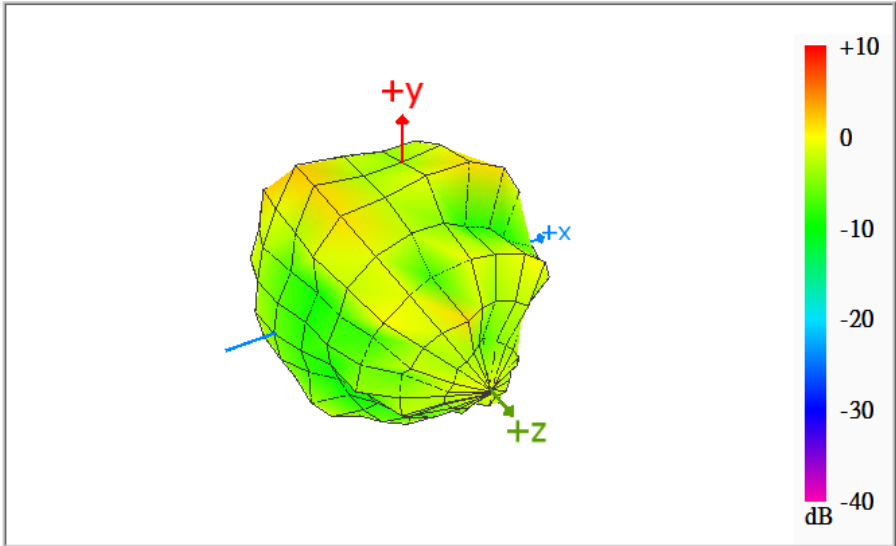
Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 3.28                          |



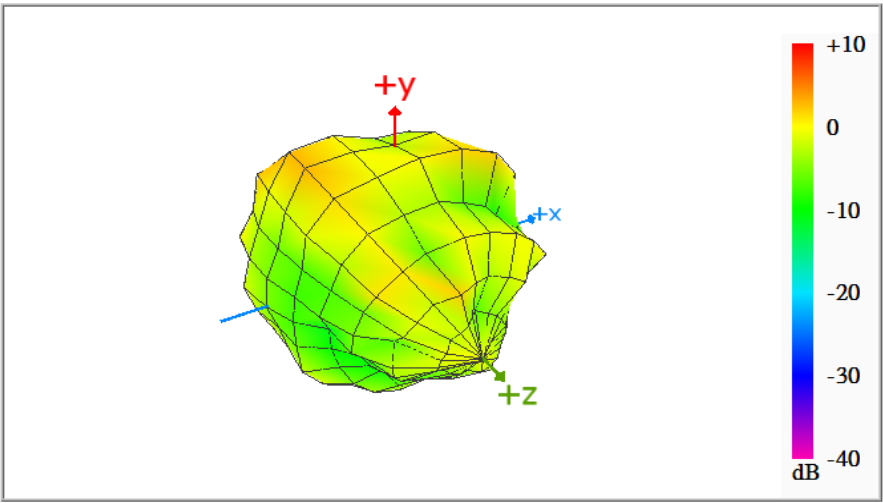
Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 2.36                          |



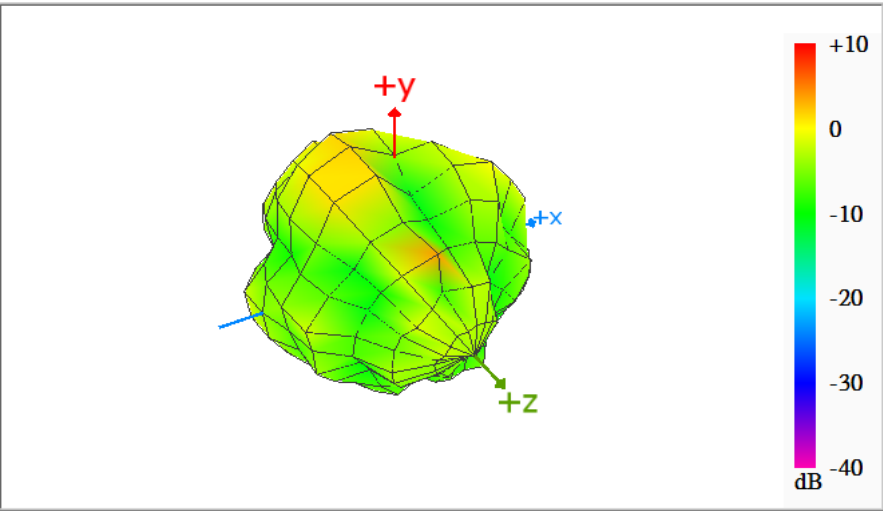
Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 4.33                          |



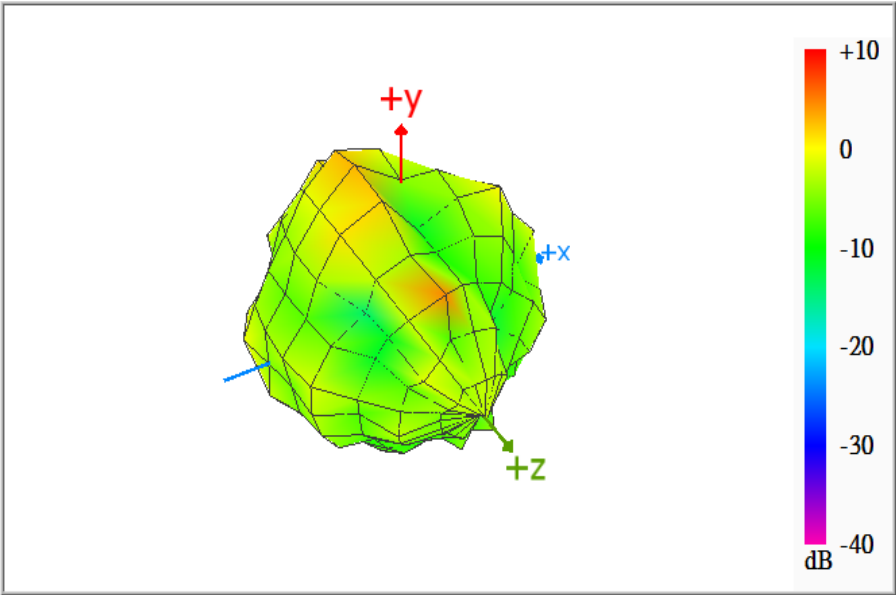
Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 3.87                          |



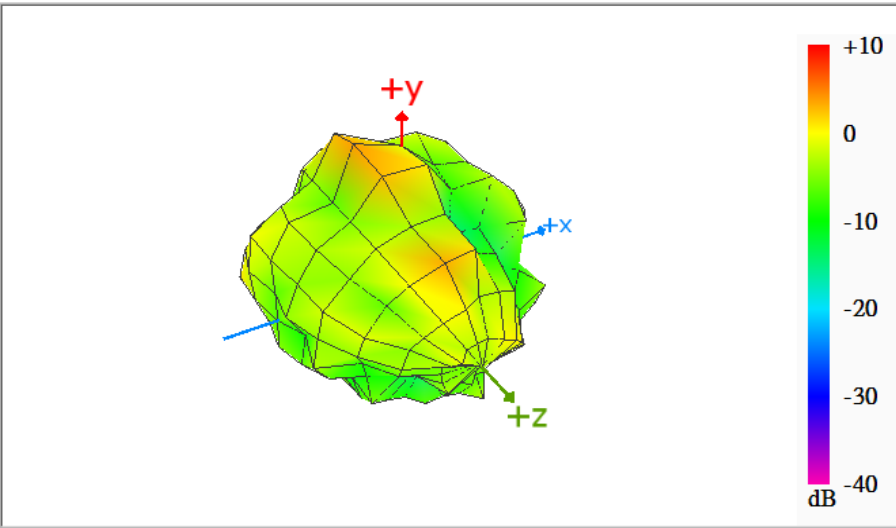
Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 4.66                          |



Max Antenna 3D Radiation Pattern 6875-7125 MHz

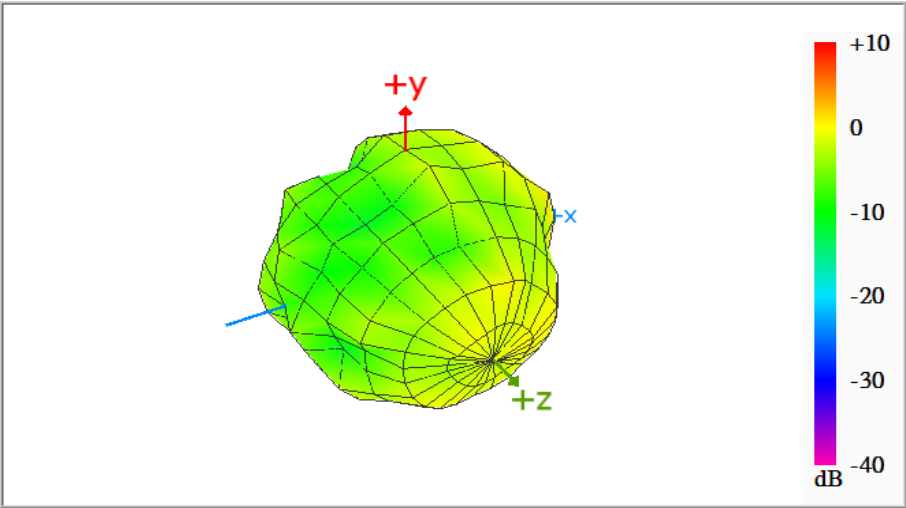
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 3.78                          |



Auxiliary Antenna

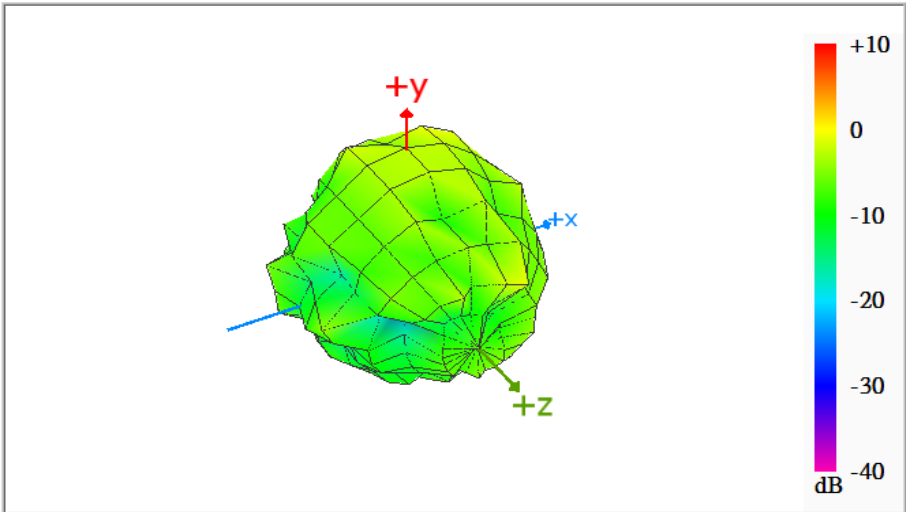
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 1.44                          |



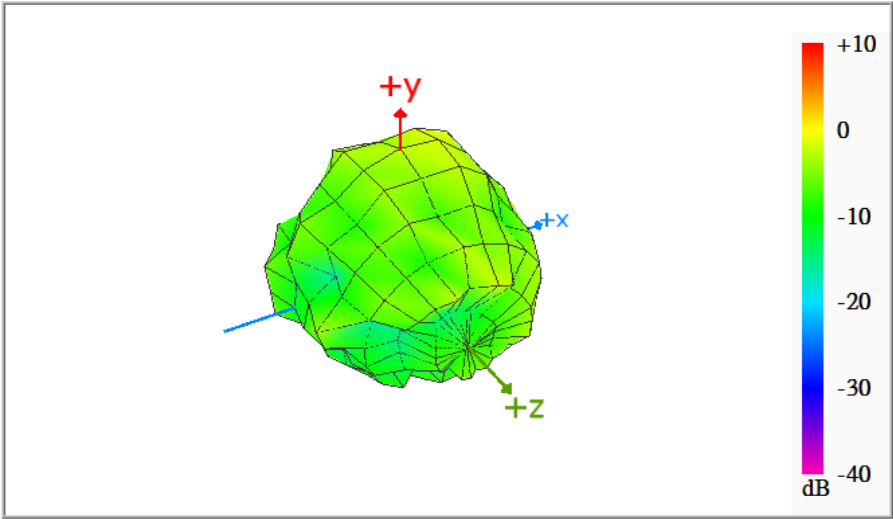
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 1.38                          |



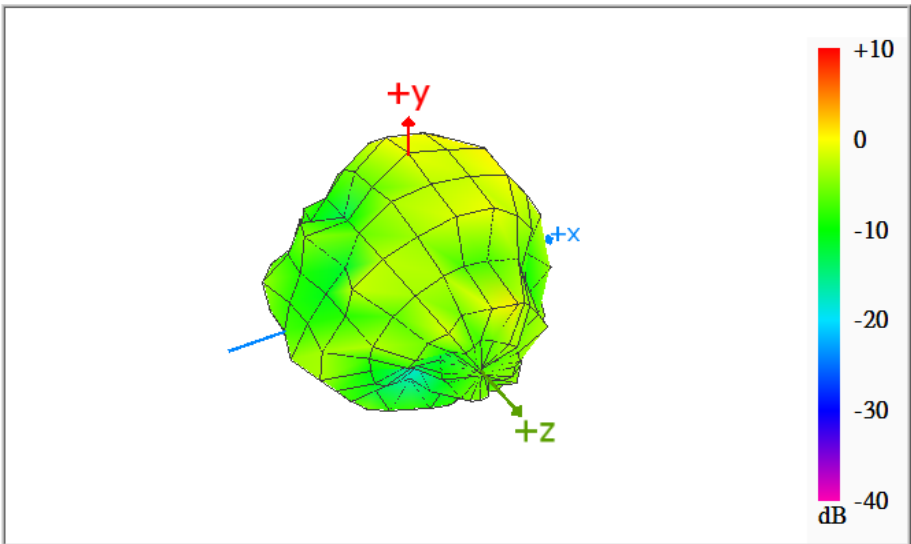
Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 1.45                          |



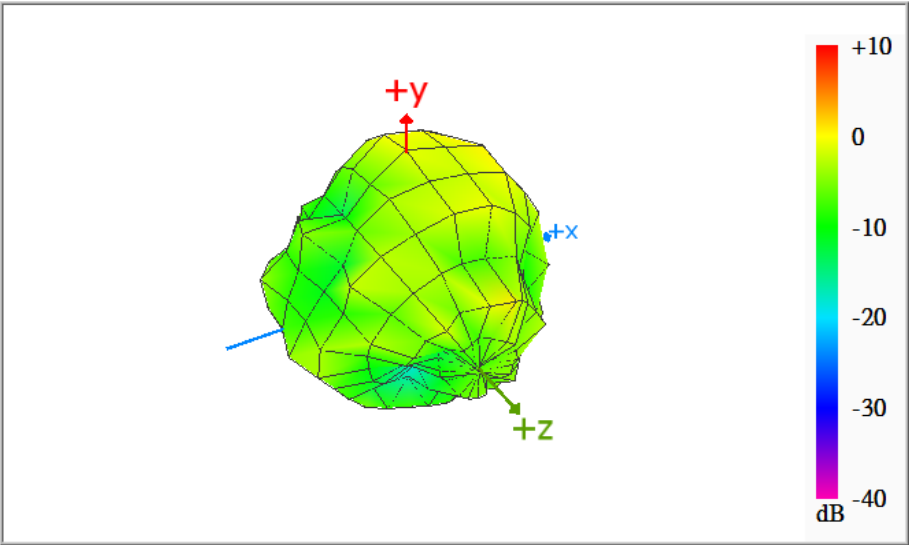
Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 2.90                          |



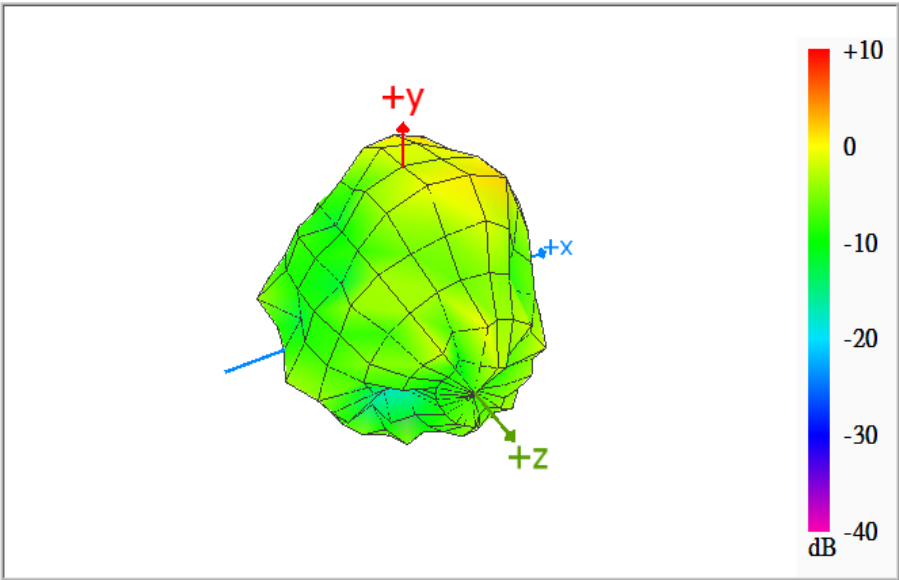
Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 2.90                          |



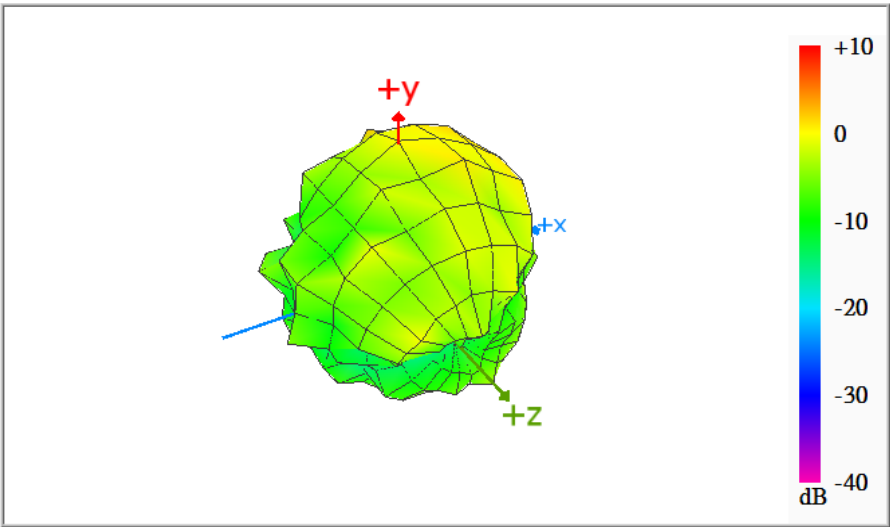
Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 2.13                          |



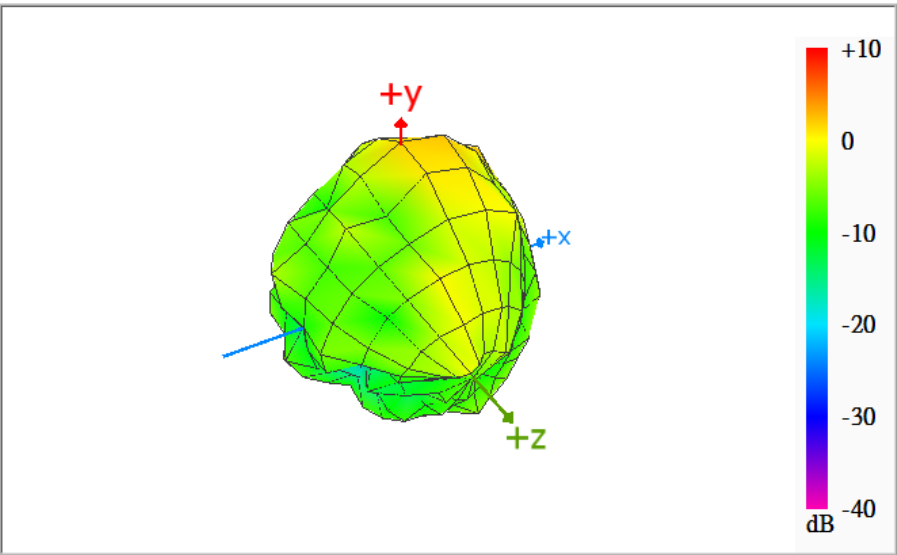
Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 4.33                          |



Max Antenna 3D Radiation Pattern 6425-6525 MHz

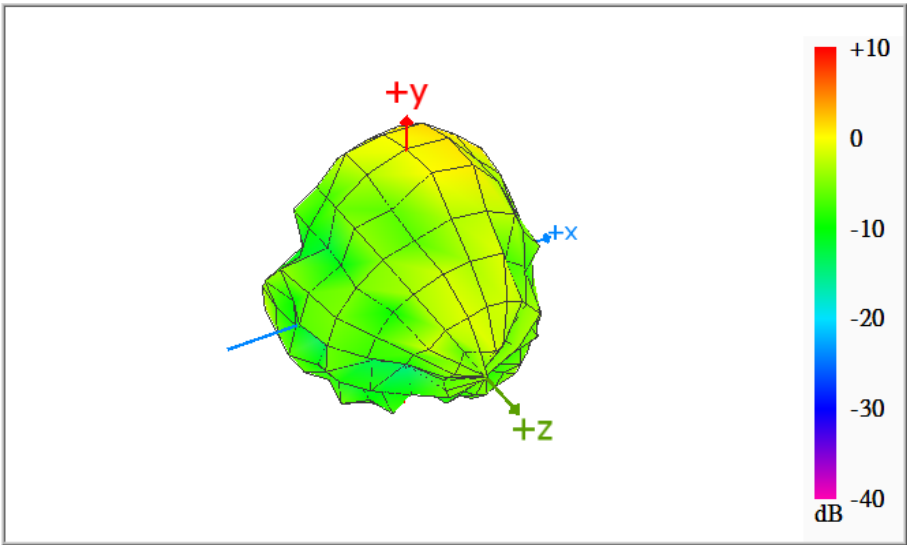
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 2.50                          |





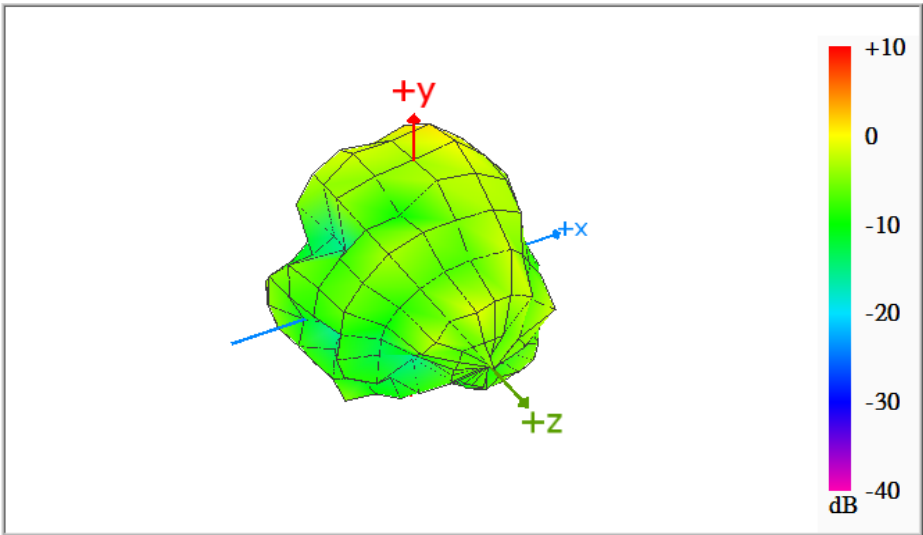
Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 2.45                          |



Max Antenna 3D Radiation Pattern 6875-7125 MHz

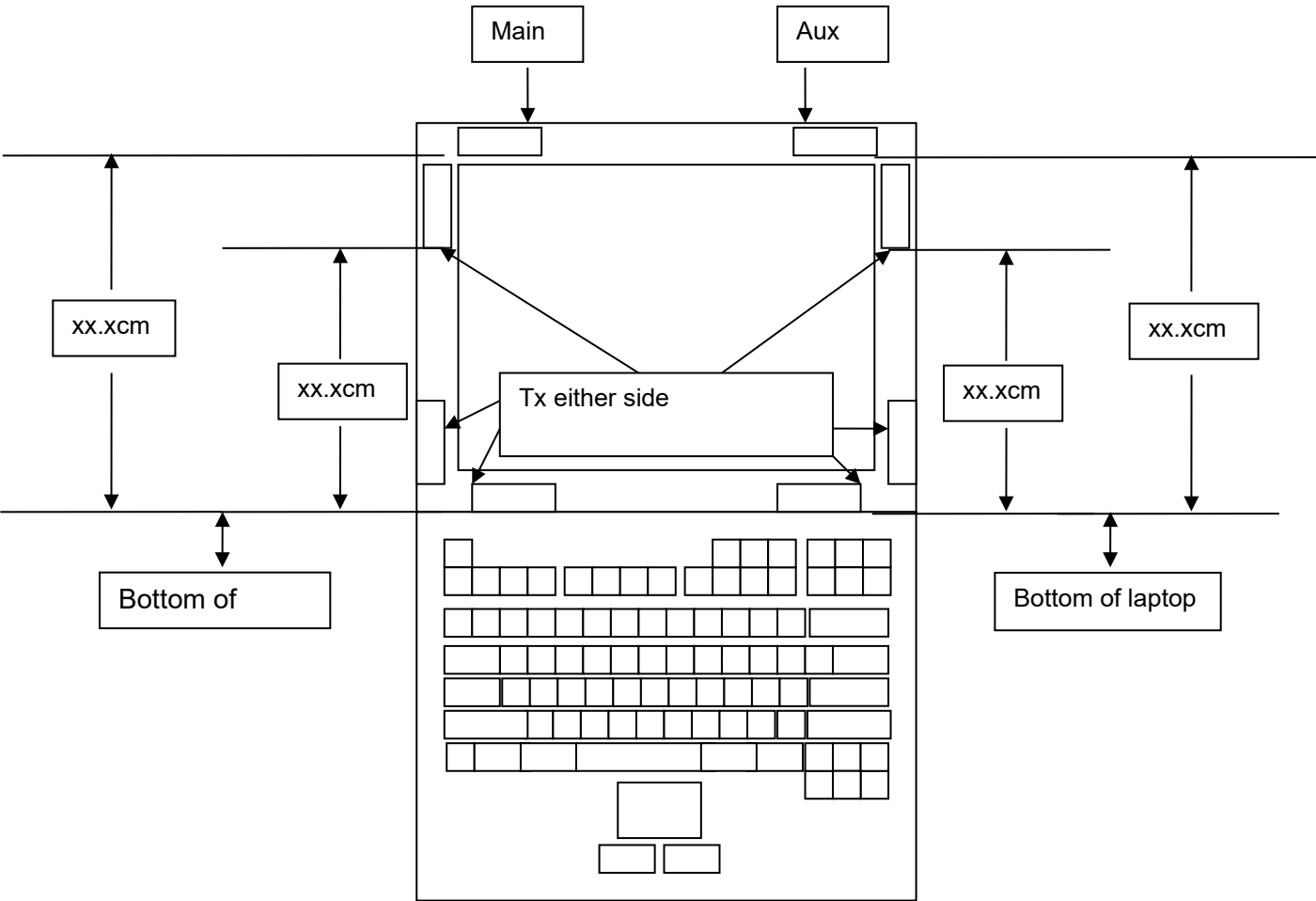
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 1.34                          |



Section 4. Antenna Host Platform Location Information

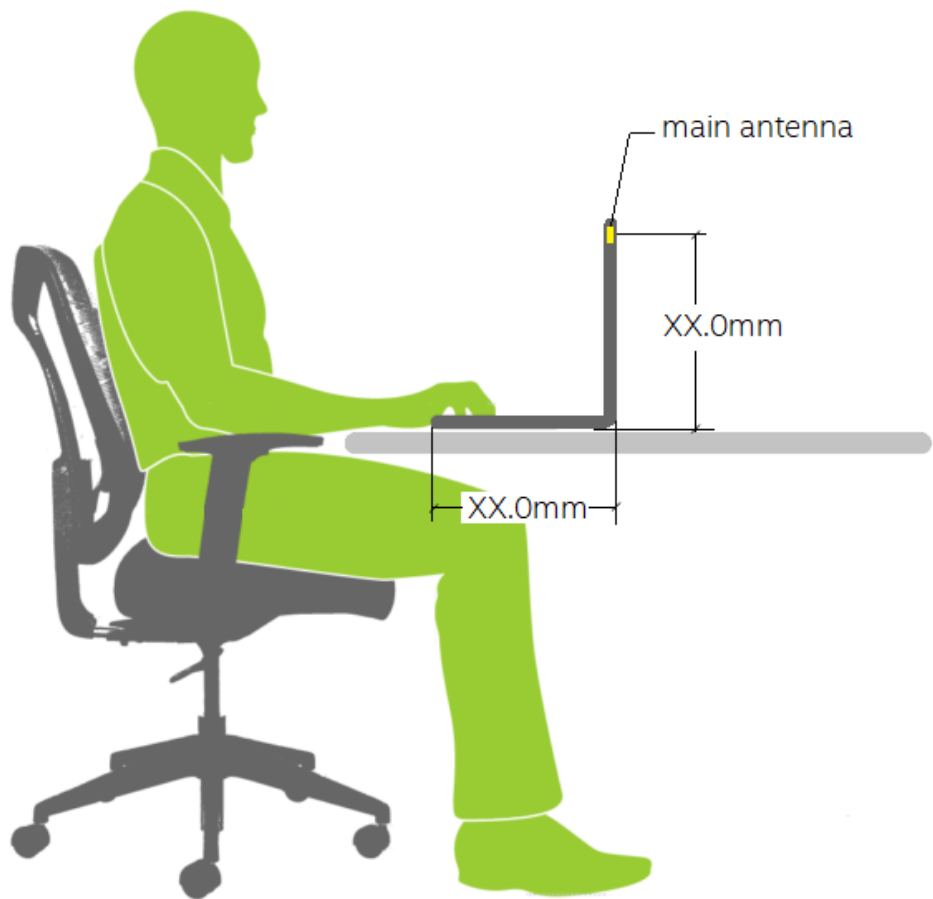
Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

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

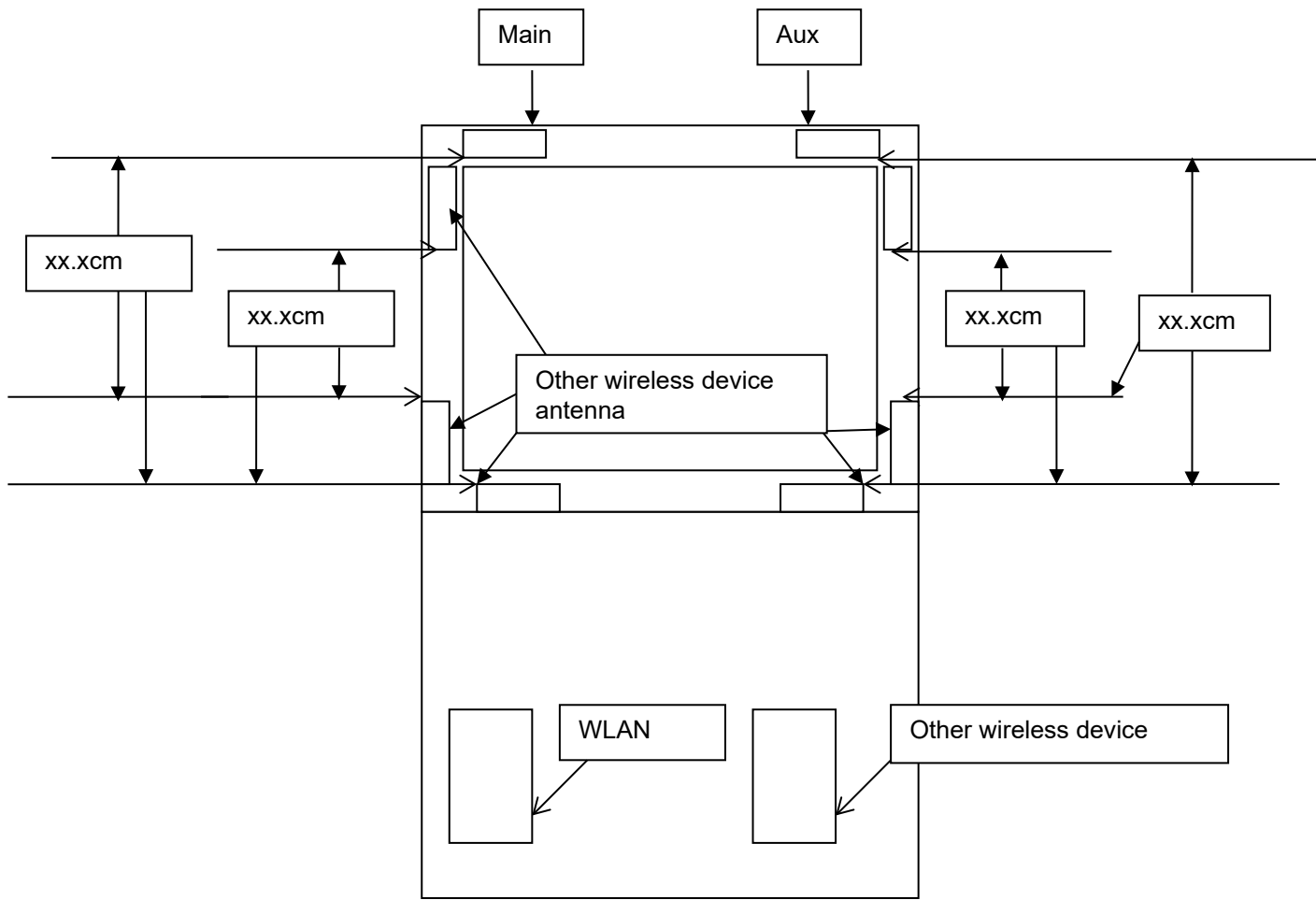
Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary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



## Revision History

| Revision | Description                                                                                                                                | Date               |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 10.3     | <u>Page2-5</u><br>Add Applicable test method, Test & System Description and Setup photo                                                    | July 24, 2022      |
| 10.4     | <u>Cover page</u><br>Add Intel 5.9GHz reference antenna gain<br><u>Cover page/Section1/Section3</u><br>Add 5.9GHz antenna gain information | September 15, 2022 |