

# ANTENNA INFORMATION

|                                                           |                 |
|-----------------------------------------------------------|-----------------|
| OEM                                                       | Dell Inc.       |
| ODM                                                       | Wistron         |
| Platform model name                                       | P194G           |
| Intel platform (ex: Yes, No or NA)                        | YES             |
| Platform type (ex: regular NB, convertible PC, AIO...etc) | Regular NB      |
| SAR minimum separation (mm)                               | FCC (1g) 4.42mm |
|                                                           | ISED (1g) N/A   |
|                                                           | ISED (10g) N/A  |

|                      |                 |                                                                                    |
|----------------------|-----------------|------------------------------------------------------------------------------------|
| Antenna manufacturer | Company name    | Wistron NeWeb Corporation                                                          |
|                      | Address         | 20 Park Avenue II (or Yuanchiu 2nd Rd.), Hsinchu Science Park, Hsinchu 300, Taiwan |
| Test location        | Company name    | SPORTON INTERNATIONAL INC.                                                         |
|                      | Address         | No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)         |
| Test Personnel       | Name(Full name) | Roger Peng                                                                         |
|                      | E-mail          | Roger.Peng@wnc.com.tw                                                              |
|                      | Tel/Mobile      | +886-3-666-7799#7652                                                               |
| Testing date         |                 | 2024/09/04                                                                         |

|                                       |      |                               |
|---------------------------------------|------|-------------------------------|
| Antenna Part number                   | Main | 57ELBE15.036 (025.902GQ.0001) |
|                                       | Aux  | 57ELBE15.037 (025.902GR.0001) |
| Antenna type (ex: PIFA, Dipole...etc) |      | PIFA                          |

| Antenna 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                                   | 1.45                      | 2.98                   | 2.81                   | 4.18                   | 4.18                   | 4.06                   | 3.63                   | 3.82                   | 4.48                   | 4.08                    |
| Aux                                    | 0.84                      | 2.39                   | 1.75                   | 4.22                   | 4.13                   | 1.69                   | 4.55                   | 4.29                   | 4.44                   | 4.04                    |

| Cable Assembly Part Number and Information |                      |                  |                    |                |                |
|--------------------------------------------|----------------------|------------------|--------------------|----------------|----------------|
|                                            | Cable PN             | Cable length(mm) | Cable diameter(mm) | Impedance(ohm) | Connector type |
| Main                                       | SY113L/50-143(White) | 188              | 1.13 S.L.L         | 50             | I-PEX(MHF-4L)  |
| Aux                                        | SY113L/50-118(Black) | 185              | 1.13 S.L.L         | 50             | I-PEX(MHF-4L)  |

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

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## 1. Intel Reference Gain and Type

| Antenna Peak gain w/ cable loss (dBi) |                         |                           |                        |                        |                        |                        |                        |                        |                        |                        |                         |
|---------------------------------------|-------------------------|---------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
| Band/Frequency                        |                         | 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 |
| Design                                | EU/UK                   | 3.00                      | 5.00                   | 5.00                   | 5.00                   | 5.00                   | 5.00                   | 5.00                   | 5.00                   | 5.00                   | 5.00                    |
| PIFA                                  | For WiFi 6E and earlier | 3.24                      | 3.64                   | 3.73                   | 4.77                   | 4.97                   | 4.72                   | 4.83                   | 4.30                   | 5.37                   | 5.59                    |
|                                       | From WiFi 7             | 2.95                      | 5.11                   | 4.55                   | 5.15                   | 5.13                   | 4.45                   | 5.02                   | 5.02                   | 4.96                   | 4.96                    |
| Dipole                                | For WiFi 6E and earlier | 2.89                      | 2.92                   | 3.19                   | 4.41                   | 4.22                   | 4.22                   | 4.83                   | 4.30                   | 4.49                   | 5.34                    |
|                                       | From WiFi 7             | 2.95                      | 4.03                   | 4.11                   | 5.15                   | 5.13                   | 4.45                   | 5.02                   | 4.71                   | 4.49                   | 4.96                    |
| Monopole                              | From WiFi 7             | 2.83                      | 4.57                   | 4.44                   | 4.95                   | 4.95                   | 4.43                   | 4.87                   | 4.91                   | 4.91                   | 4.79                    |

### 3D Peak Antenna gain should be equal or greater than -2 dBi

If a host integrator plans to use a lower gain antenna of the same type, additional CBP(FCC)/EDT(EU) testing need to be performed while the module is installed in the host.

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

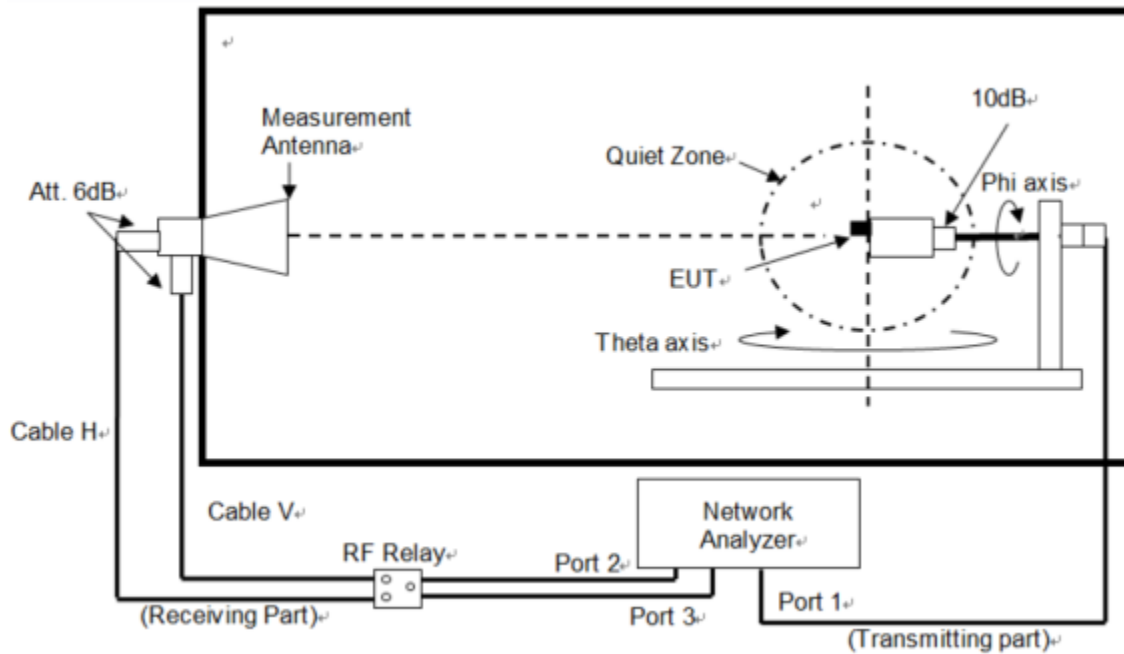
## 2. Document Revision History

### 3. Test & System Description

#### 3.1 Measurement Method and System

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. .

#### 3.2 Test setup



### 3.3 Equipment list

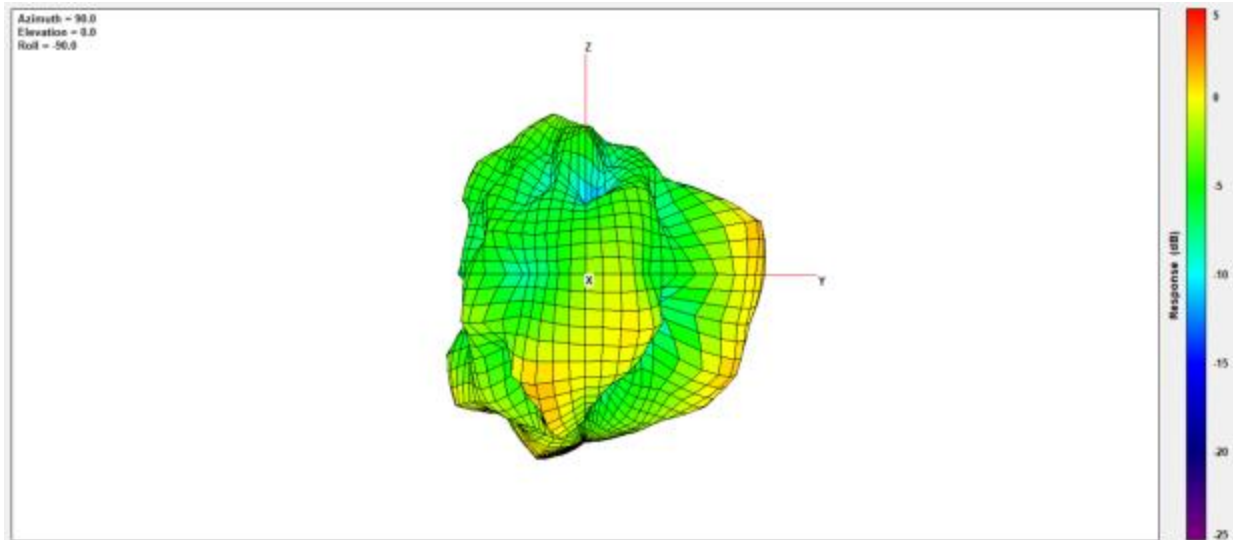
| 4 Device                          | Type/Model                      | Serial #          | Manufacturer | Cal. Date | Cal. Due Date |
|-----------------------------------|---------------------------------|-------------------|--------------|-----------|---------------|
| Anechoic Chamber                  | AMS8500                         | -                 | ETS-Lindgren | 31-May-22 | 10- May-24    |
| Turn Table                        | MODEL-2090                      | T-543-6-11-102-02 | ETS-Lindgren | 31-May-22 | 10- May-24    |
| Switch & Positioning systems      | EMCenter                        | T-543-6-11-102-01 | ETS-Lindgren | 31-May-22 | 10- May-24    |
| Measurement SW                    | EMQuest<br>V1.15<br>build 27347 | T-543-6-11-103-03 | ETS-Lindgren | 31-May-22 | 10- May-24    |
| Horn antenna                      | 3164-10                         | T1-1-1-R-02570    | ETS-Lindgren | 31-May-22 | 10- May-24    |
| Vector Network Analyzer           | E5071C                          | T1-1-1-R-01834    | Keysight     | 31-May-22 | 31-May-23     |
| Cable 7.5m 400MHz to 18GHz(H-pol) | SS402                           | T1-1-1-R-34511    | WOKEN        | 31-May-22 | 31-May-24     |
| Cable 7.5m 400MHz to 18GHz(V-pol) | SS402                           | T1-1-1-R-34512    | WOKEN        | 31-May-22 | 31-May-24     |
| Cable 14m 400MHz to 18GHz         | SS402                           | T1-1-1-R-34513    | WOKEN        | 31-May-22 | 31-May-24     |
| Temp & Humidity Logger            | 830                             | T1-1-1-R-20911    | PROVA        | 30-Jul-22 | 30-Jul-23     |

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

##### Main Antenna

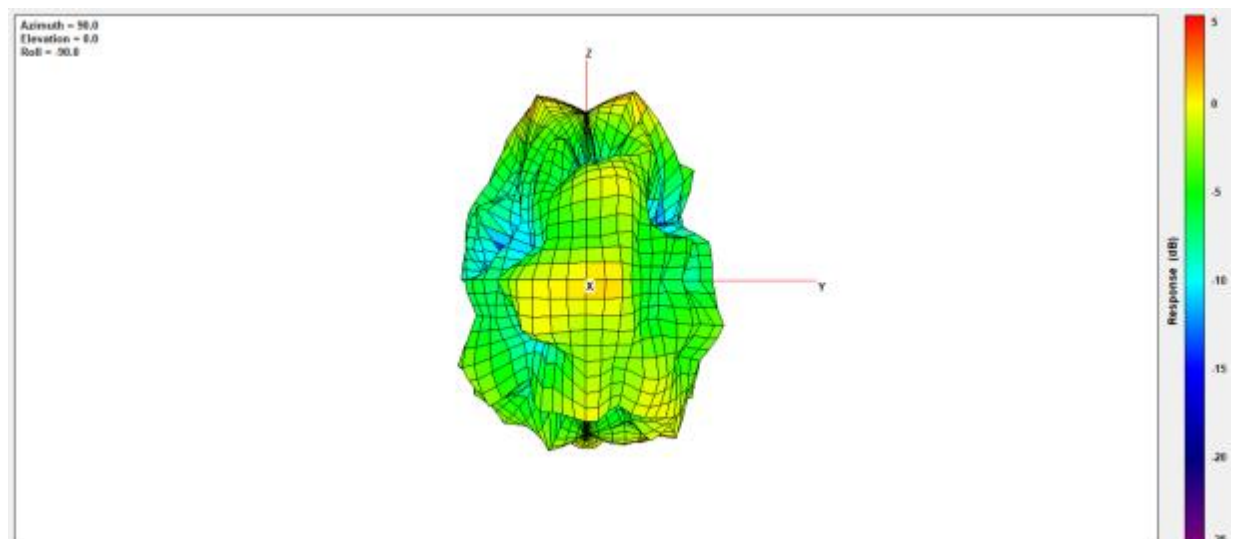
Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 1.45                          |



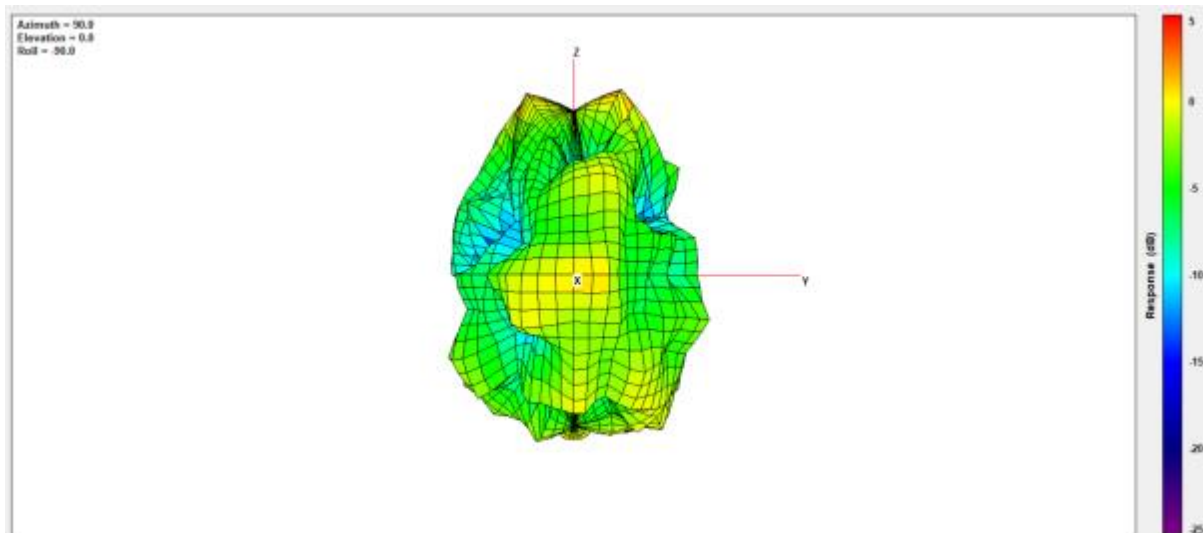
Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 2.98                          |



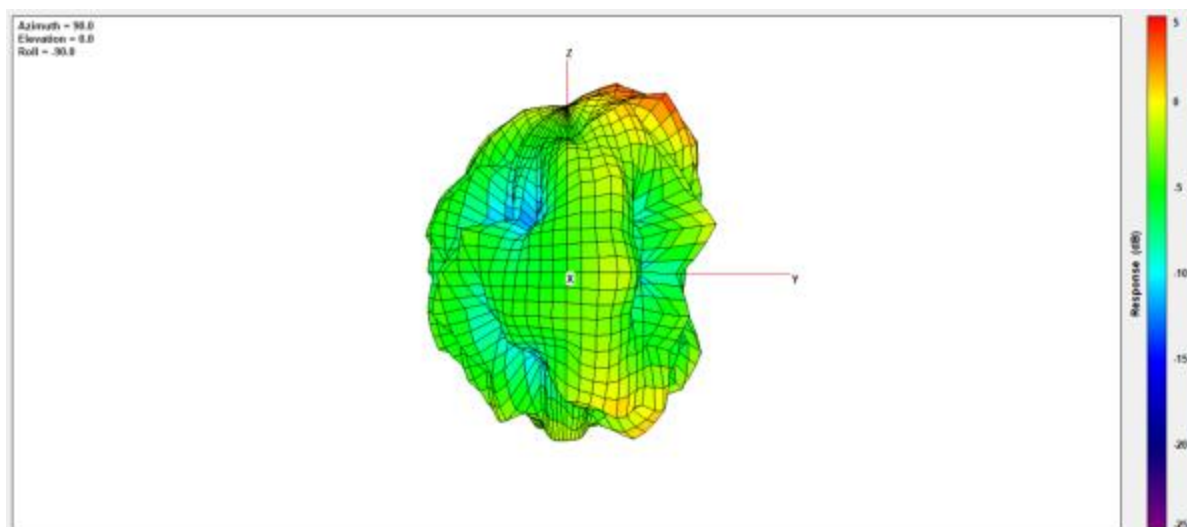
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

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



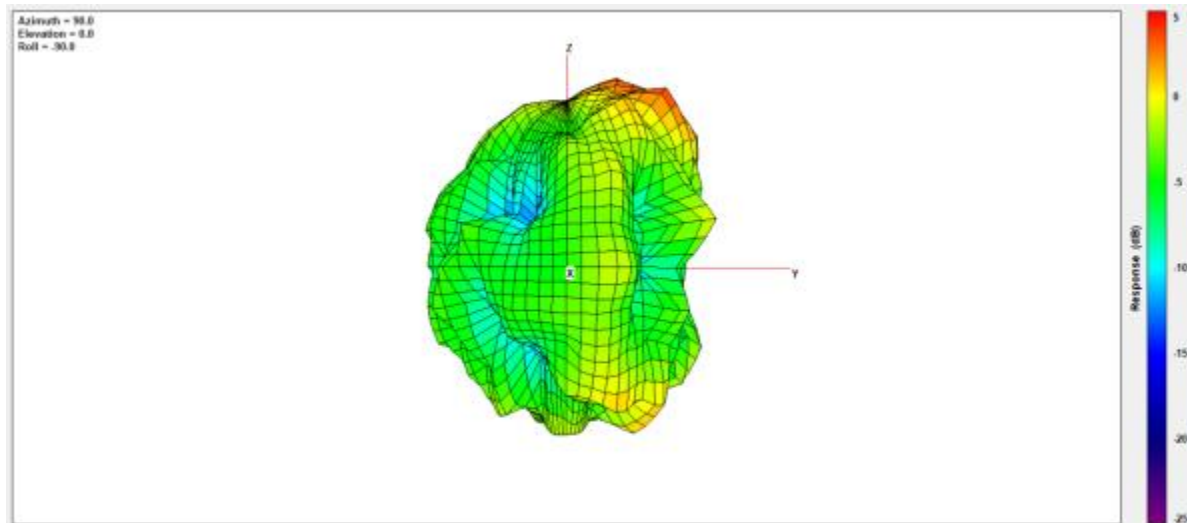
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 4.18                          |



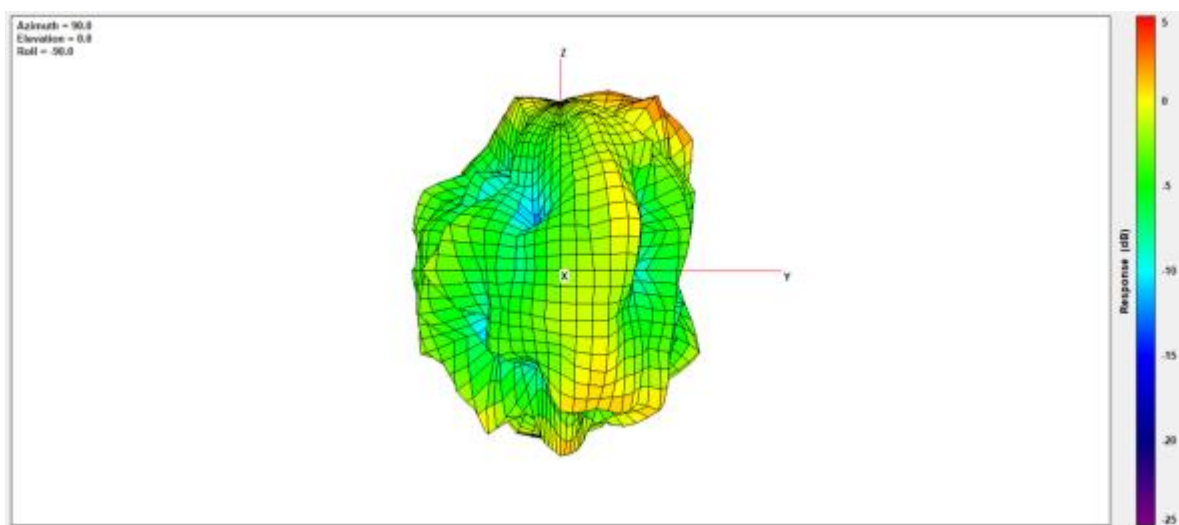
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 4.18                          |



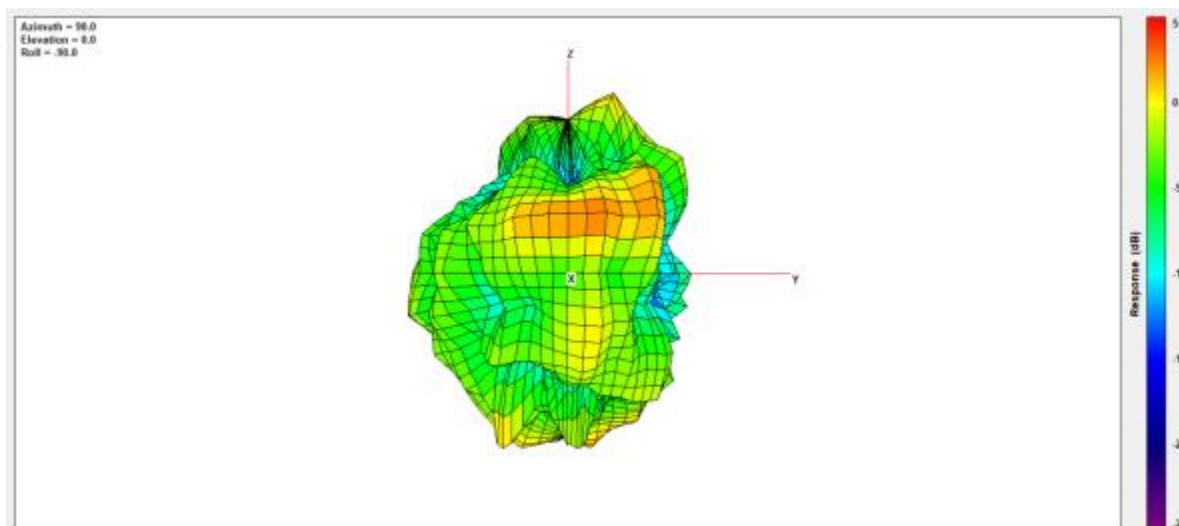
## Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 4.06                          |



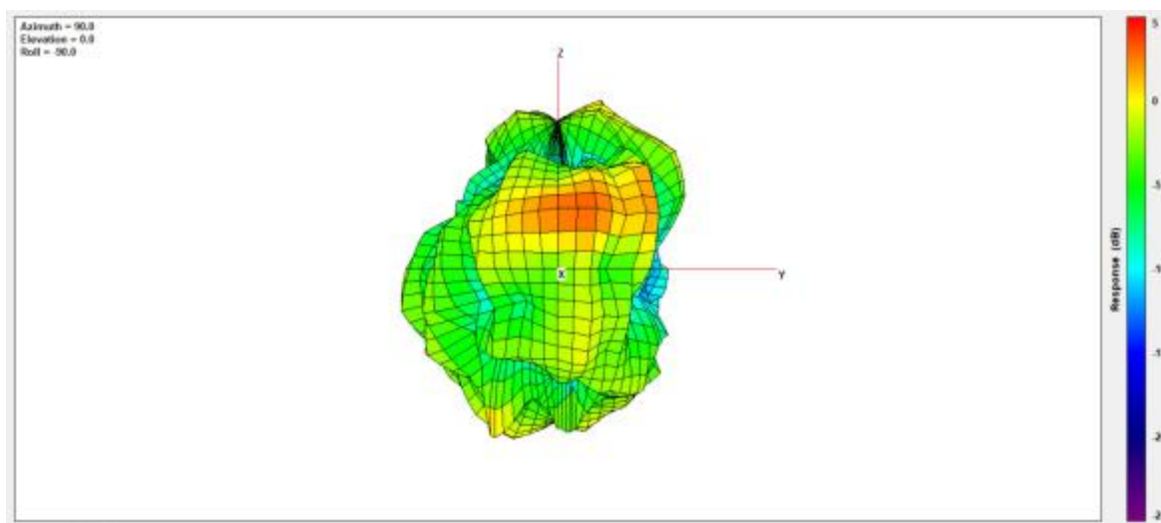
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 3.63                          |



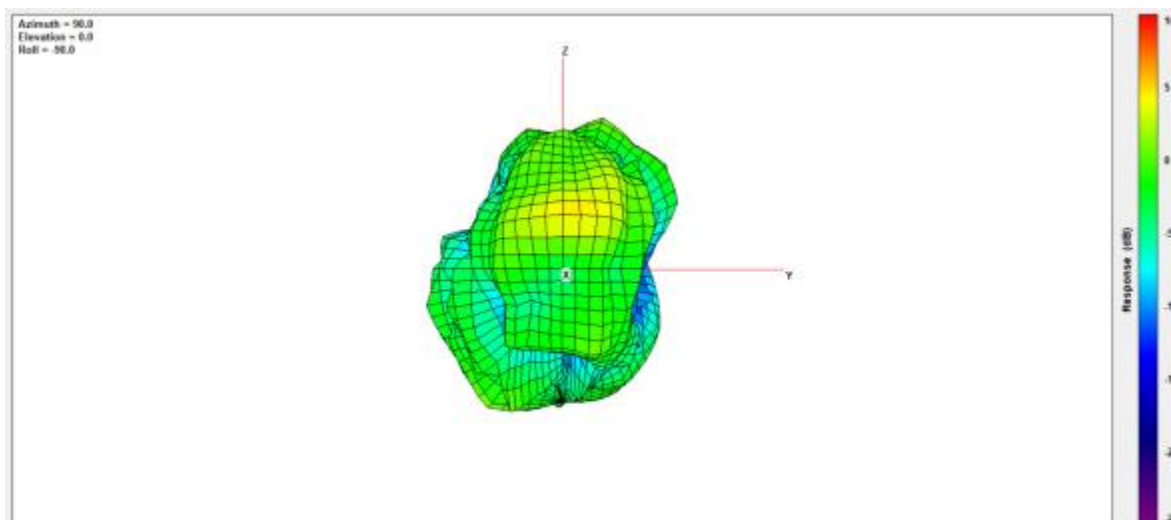
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 3.82                          |



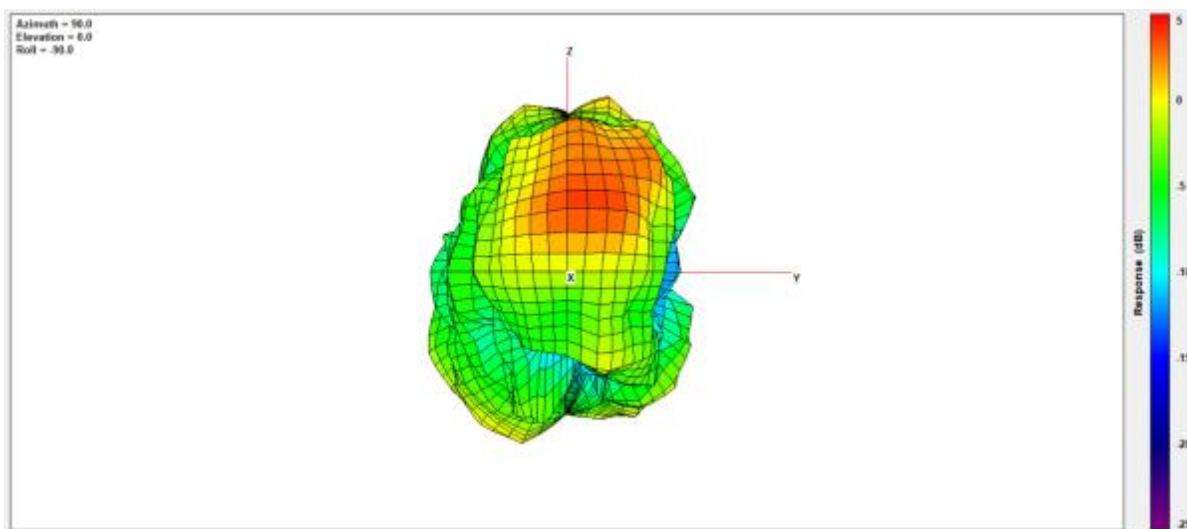
## Max Antenna 3D Radiation Pattern 6525-6875 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 4.48                          |



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

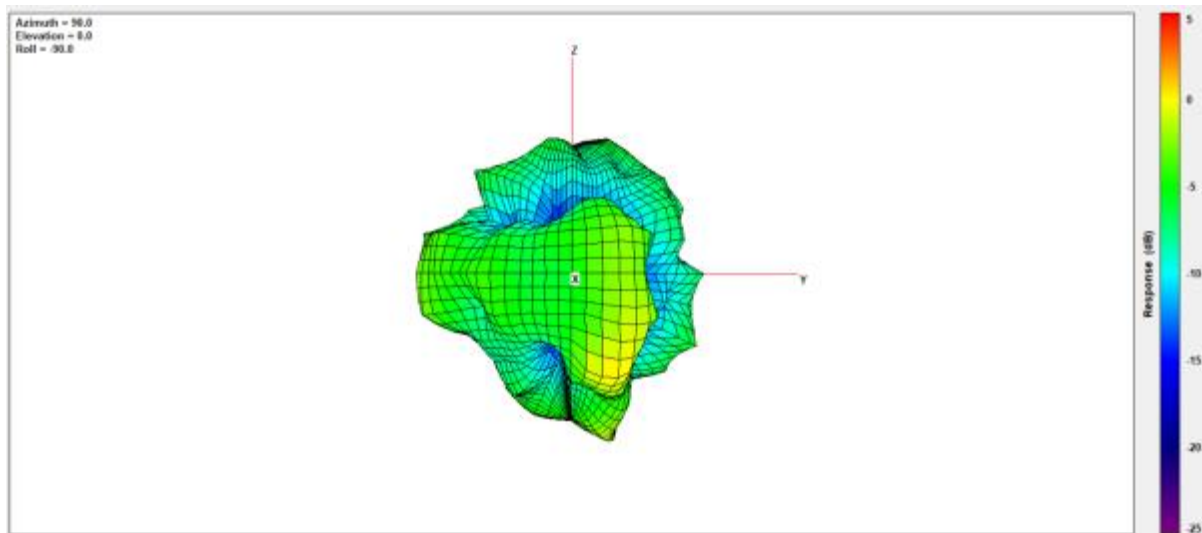
| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 4.08                          |



## Auxiliary Antenna

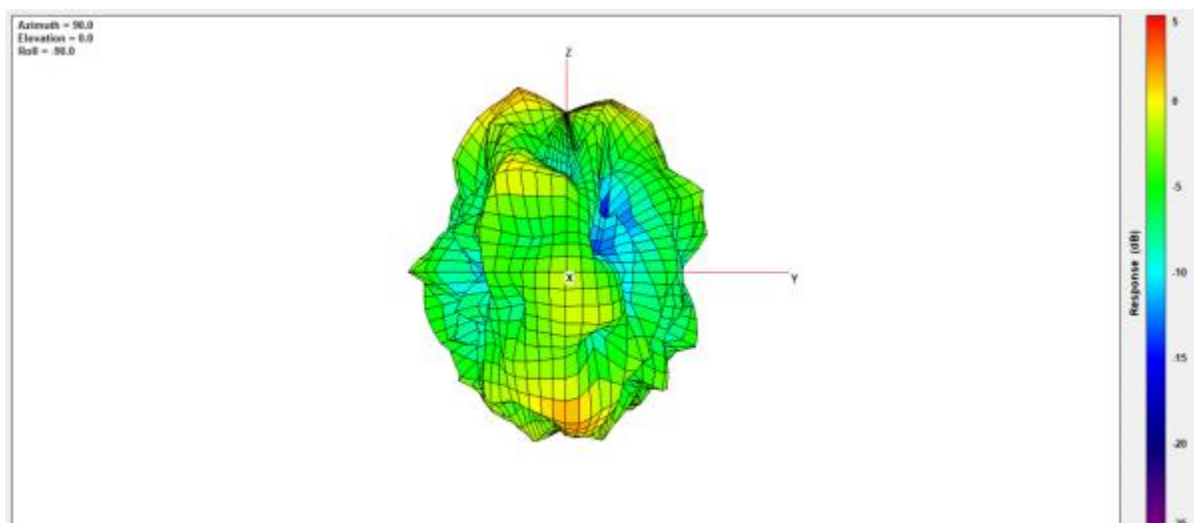
### Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 2400-2483.5     | 0.84                          |



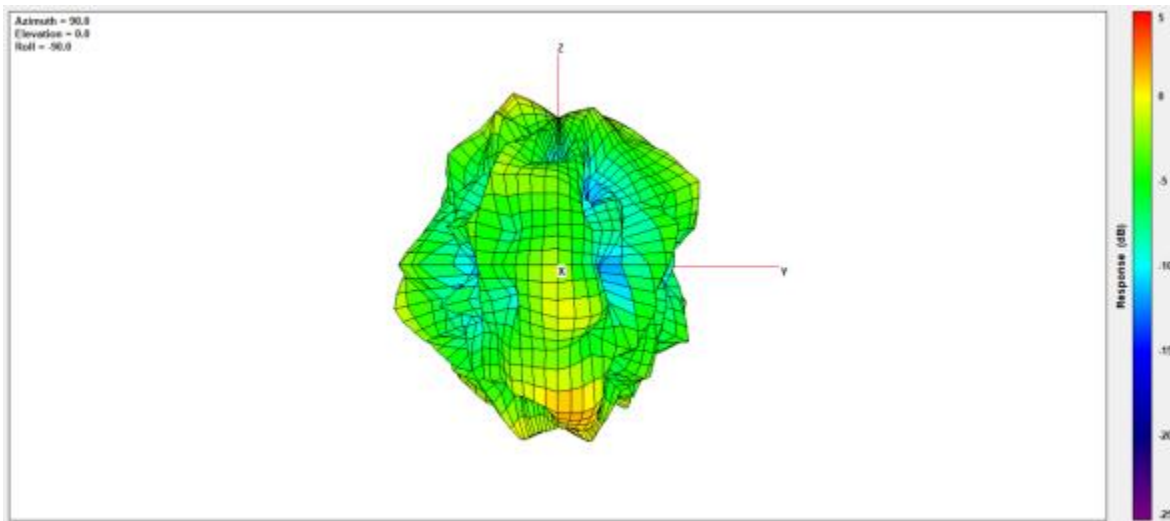
### Max Antenna 3D Radiation Pattern 5150-5250 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5150-5250       | 2.39                          |



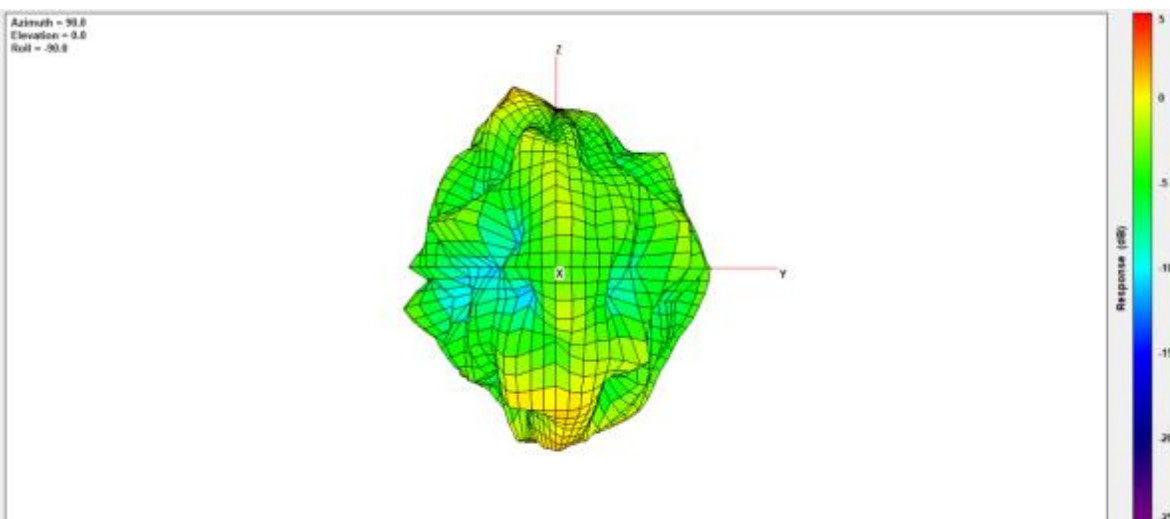
## Max Antenna 3D Radiation Pattern 5250-5350 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5250-5350       | 1.75                          |



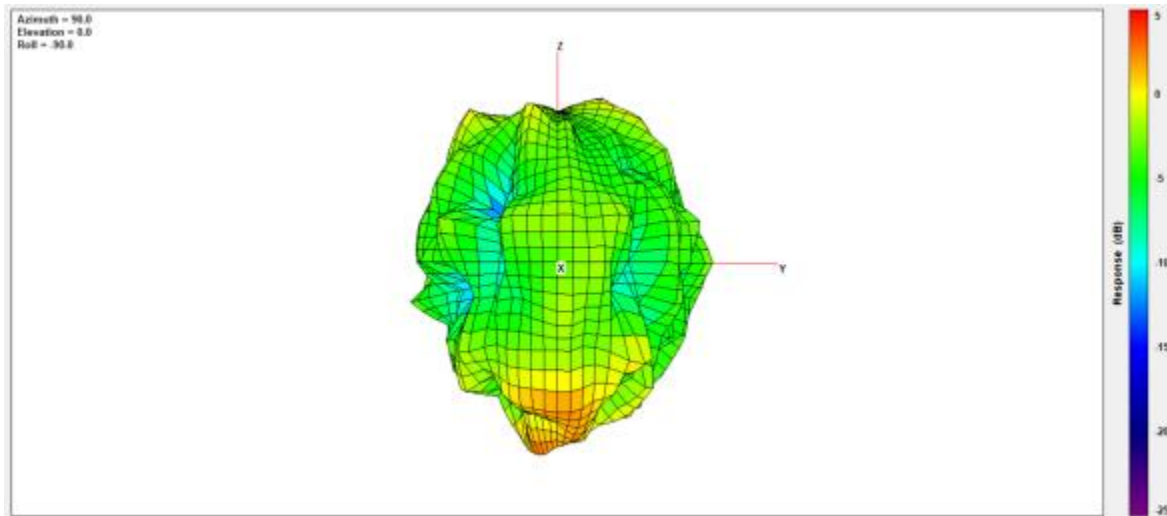
## Max Antenna 3D Radiation Pattern 5470-5725 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5470-5725       | 4.22                          |



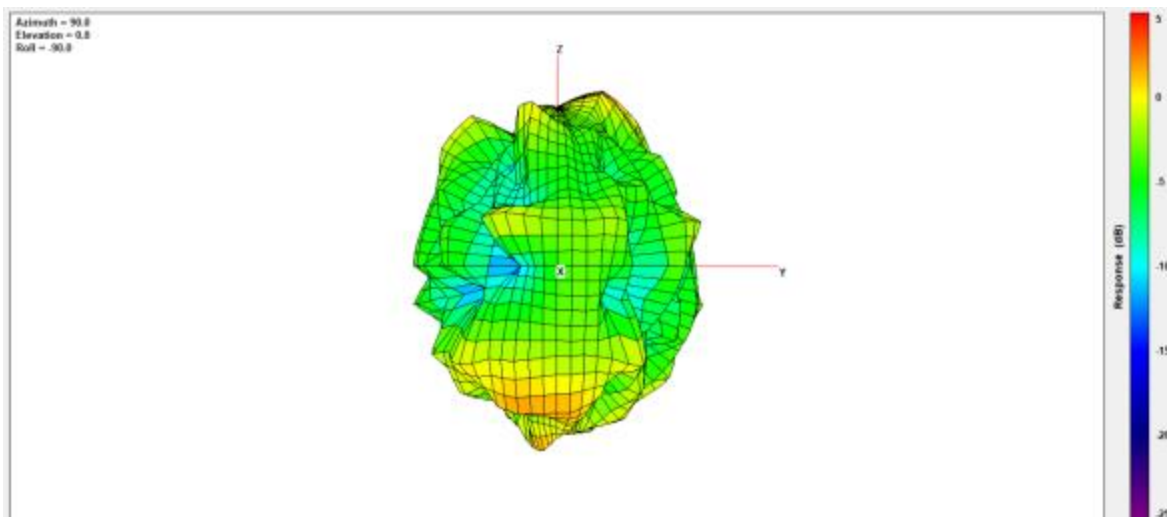
## Max Antenna 3D Radiation Pattern 5725-5850 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5725-5850       | 4.13                          |



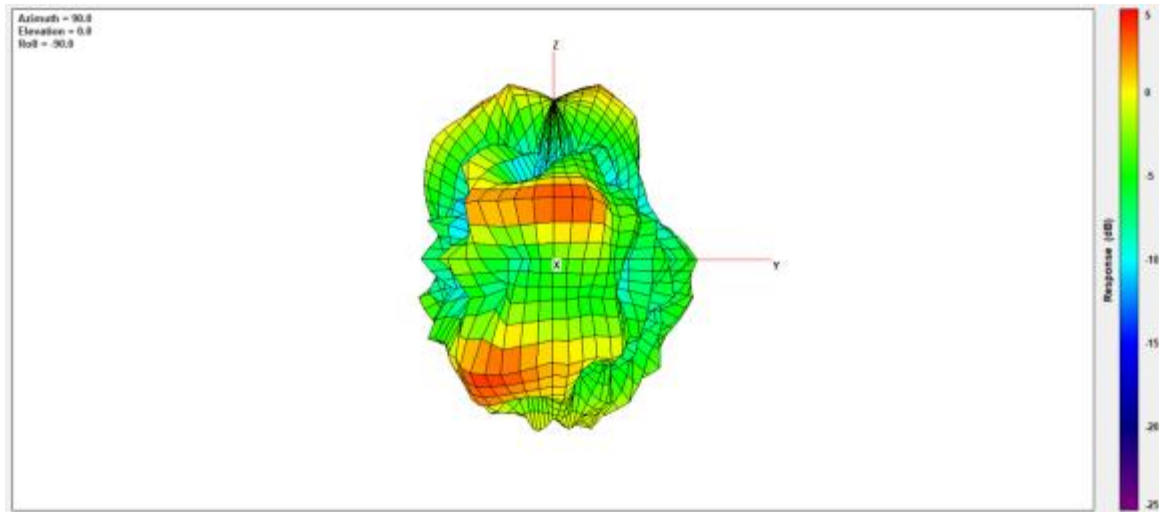
## Max Antenna 3D Radiation Pattern 5850-5895 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5850-5895       | 1.69                          |



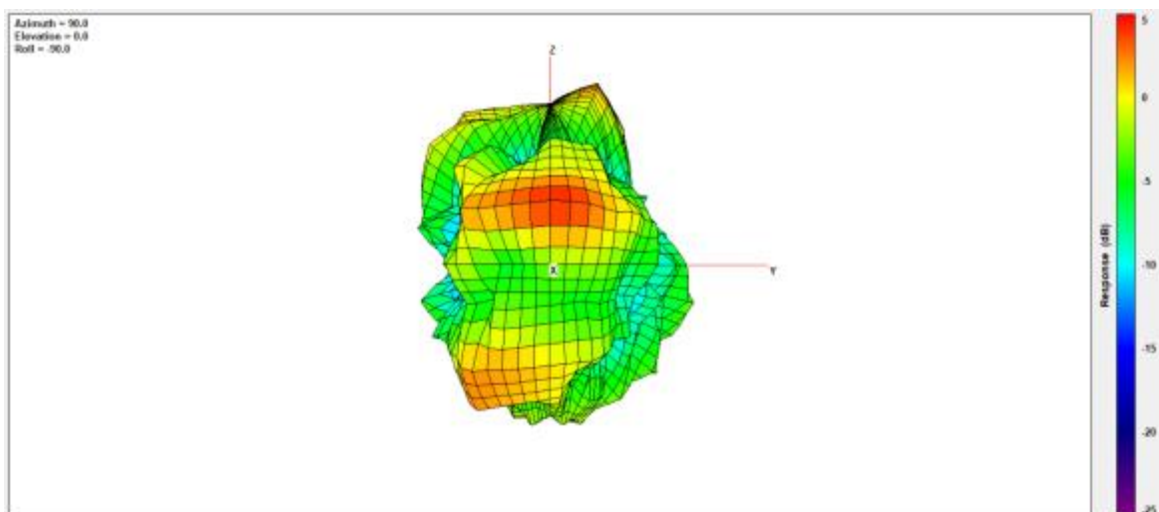
## Max Antenna 3D Radiation Pattern 5925-6425 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 5925-6425       | 4.55                          |



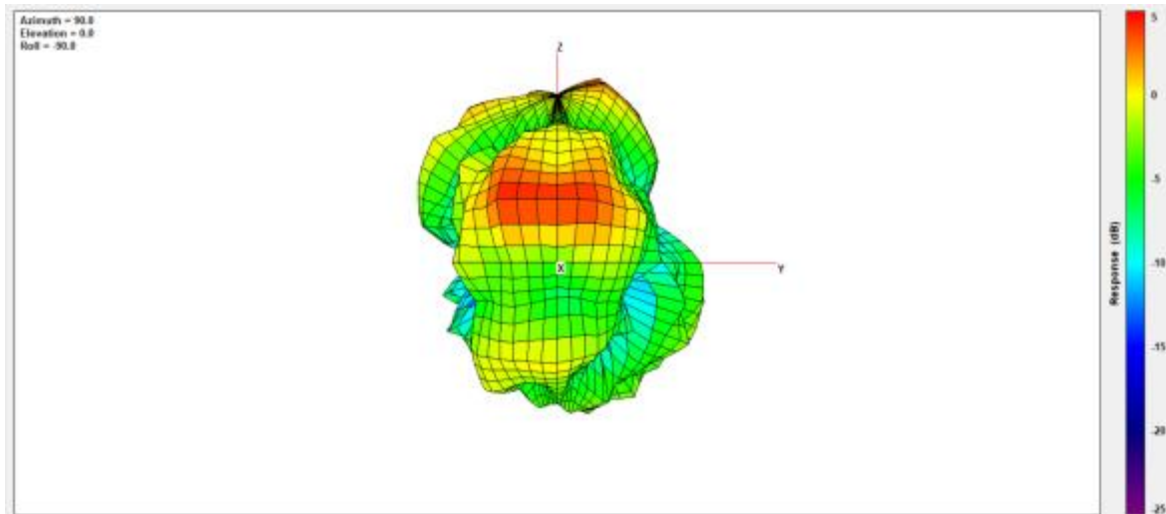
## Max Antenna 3D Radiation Pattern 6425-6525 MHz

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6425-6525       | 4.29                          |



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

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6525-6875       | 4.44                          |



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

| Frequency (MHz) | Peak Gain w/ Cable Loss (dBi) |
|-----------------|-------------------------------|
| 6875-7125       | 4.04                          |

