

# **Regulatory WLAN Antenna Information HTL017**

**Intel Corporation**

## Antenna Sample / Antenna Data Requirements for worldwide regulatory approval

| Section | Description of Required OEM / ODM Antenna Information                                                                                                                                                            | US / IC  | EU       | Japan    | Taiwan   | Korea    |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|
| 1A      | Part Number for Antenna only                                                                                                                                                                                     | Required | Required | Required | Required | Required |
| 1B      | Antenna Manufacturer Name                                                                                                                                                                                        | Required | Required | Required | Required | Required |
| 1C      | Description of Antenna Type                                                                                                                                                                                      | Required | N/A      | N/A      | N/A      | N/A      |
| 1D      | Part number of Antenna Assembly / cable impedance, length & diameter.                                                                                                                                            | Required | Desired  | Desired  | Desired  | Desired  |
| 1E      | Main & Aux antenna (Peak Gain W/ cable loss)                                                                                                                                                                     | Required | Required | Required | Required | Required |
|         | 1E OR 1F, 1G, 1H                                                                                                                                                                                                 |          |          |          |          |          |
| 1F      | Main & Aux antenna (Peak Gain only)                                                                                                                                                                              | Required | Required | Required | Required | Required |
| 1G      | VSWR of cable including connector                                                                                                                                                                                | Required | Required | Required | Required | Required |
| 1H      | Main & Aux antenna (Cable loss W/ connector)                                                                                                                                                                     | Required | Required | Required | Required | Required |
| 2       | Dimensioned Photographs or Drawings of main & auxiliary antennas                                                                                                                                                 | Required | Required | Required | Required | Required |
| 3       | Radiation patterns of antennas loaded in the host platform.                                                                                                                                                      | Required | Desired  | Required | N/A      | Required |
| 4       | Platform model name / number - correlated to antenna manufacturer and antenna part number                                                                                                                        | Required | Required | Desired  | Required | Desired  |
| 5       | Photograph(s) or Drawings showing location of antennas in platform.                                                                                                                                              | Required | Required | Desired  | Required | Desired  |
| 6       | Mech. drawings / photos with dimensions of antenna locations and distance from end-user (For evaluation of SAR testing requirement).                                                                             | Required | N/A      | N/A      | N/A      | N/A      |
| 7       | Photograph(s) or Drawings showing the location of all antennas (WLAN, BT, other) and distance between those transmitting antennas. Information will be used to evaluate whether co-location testing is required. | Required | N/A      | N/A      | N/A      | N/A      |

# Antenna Information

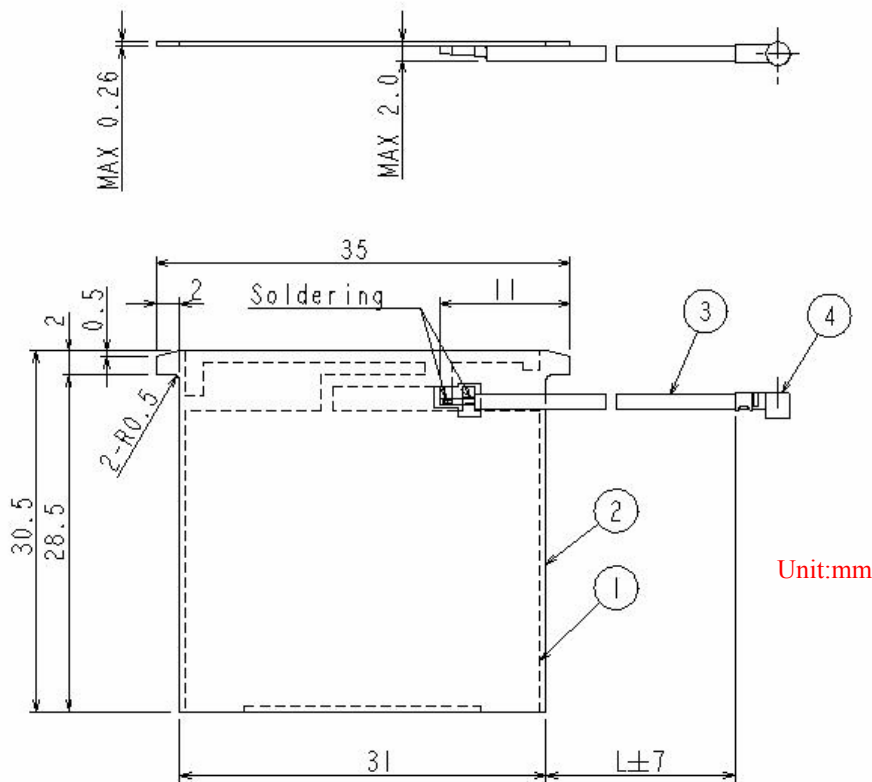
## Section 1. Antenna Assembly Specifications

Antenna Assembly Summary:

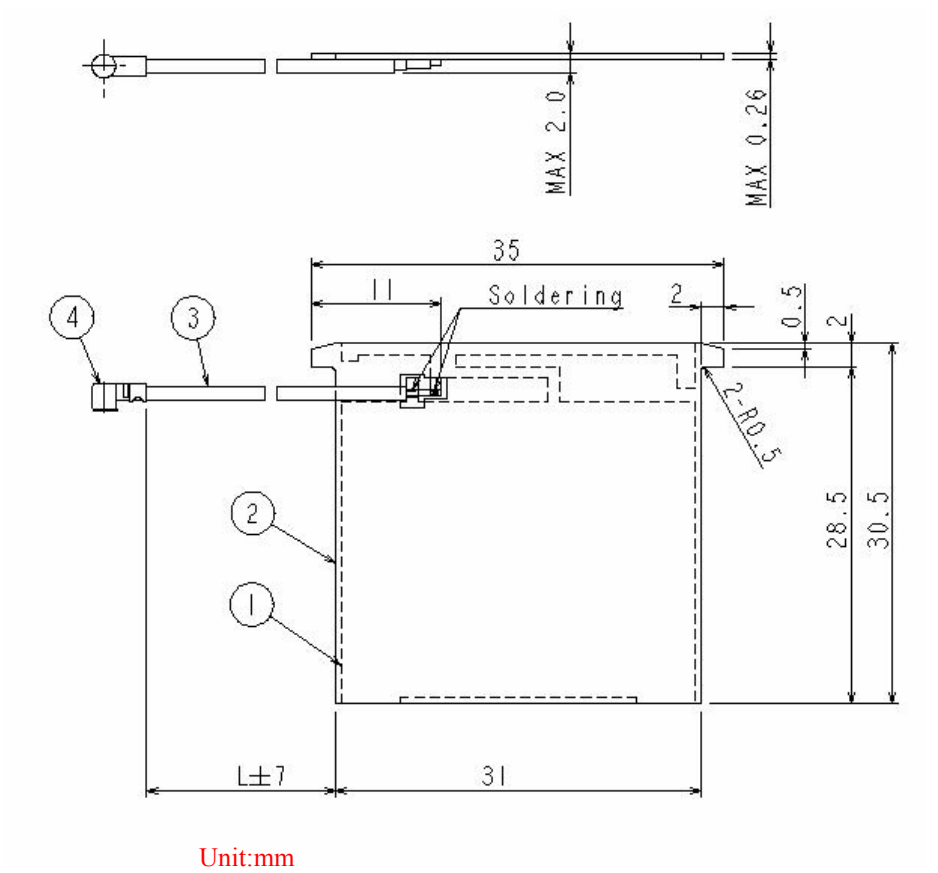
| 1A<br>Antenna Part Number | 1B<br>Manufacture   | 1C<br>Antenna Type       | 1D<br>Cable Assembly Part Number and Information                                      | 1E<br>Peak Gain W/ Cable loss (dBi) | 1F<br>Peak Gain w/o Cable Loss (dBi) | 1G<br>VSWR               | 1H<br>Cable Loss (dBi)          |
|---------------------------|---------------------|--------------------------|---------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------|--------------------------|---------------------------------|
| HTL017                    | Hitachi Cable, Ltd. | 2.4GHz:PIFA<br>5GHz:PIFA | P/N: HTL017<br>50 ohm Coaxial.<br>length: 306mm<br>diameter: 1.0mm<br>Connector: IPEX | 2400-2500MHz<br>-1.36 dBi (peak)    | 2400-2500MHz<br>-0.50 dBi (peak)     | 2400-2500MHz<br>1.30 max | 2400-2500MHz<br>0.86 dBi (peak) |
|                           |                     |                          |                                                                                       | 5150-5350MHz<br>1.00 dBi (peak)     | 5150-5350MHz<br>2.26 dBi (peak)      | 5150-5350MHz<br>1.30 max | 5150-5350MHz<br>1.26 dBi (peak) |
|                           |                     |                          |                                                                                       | 5470-5725MHz<br>2.92 dBi (peak)     | 5470-5725MHz<br>4.18 dBi (peak)      | 5470-5725MHz<br>1.30 max | 5470-5725MHz<br>1.26 dBi (peak) |
|                           |                     |                          |                                                                                       | 5725-5850MHz<br>1.97 dBi (peak)     | 5725-5850MHz<br>3.23 dBi (peak)      | 5725-5850MHz<br>1.30 max | 5725-5850MHz<br>1.26 dBi (peak) |
| HTL017                    | Hitachi Cable, Ltd. | 2.4GHz:PIFA<br>5GHz:PIFA | P/N: HTL017<br>50 ohm Coaxial.<br>length: 306mm<br>diameter: 1.0mm<br>Connector: IPEX | 2400-2500MHz<br>-1.27 dBi (peak)    | 2400-2500MHz<br>-0.41 dBi (peak)     | 2400-2500MHz<br>1.30 max | 2400-2500MHz<br>0.86 dBi (peak) |
|                           |                     |                          |                                                                                       | 5150-5350MHz<br>-0.74 dBi (peak)    | 5150-5350MHz<br>0.52 dBi (peak)      | 5150-5350MHz<br>1.30 max | 5150-5350MHz<br>1.26 dBi (peak) |
|                           |                     |                          |                                                                                       | 5470-5725MHz<br>-0.36 dBi (peak)    | 5470-5725MHz<br>0.90 dBi (peak)      | 5470-5725MHz<br>1.30 max | 5470-5725MHz<br>1.26 dBi (peak) |
|                           |                     |                          |                                                                                       | 5725-5850MHz<br>-0.21 dBi (peak)    | 5725-5850MHz<br>1.05 dBi (peak)      | 5725-5850MHz<br>1.30 max | 5725-5850MHz<br>1.26 dBi (peak) |

## Section 2. Dimensioned Photos or Drawings of Antennas

Include a dimensioned photo or dimensioned drawing of main antenna here.



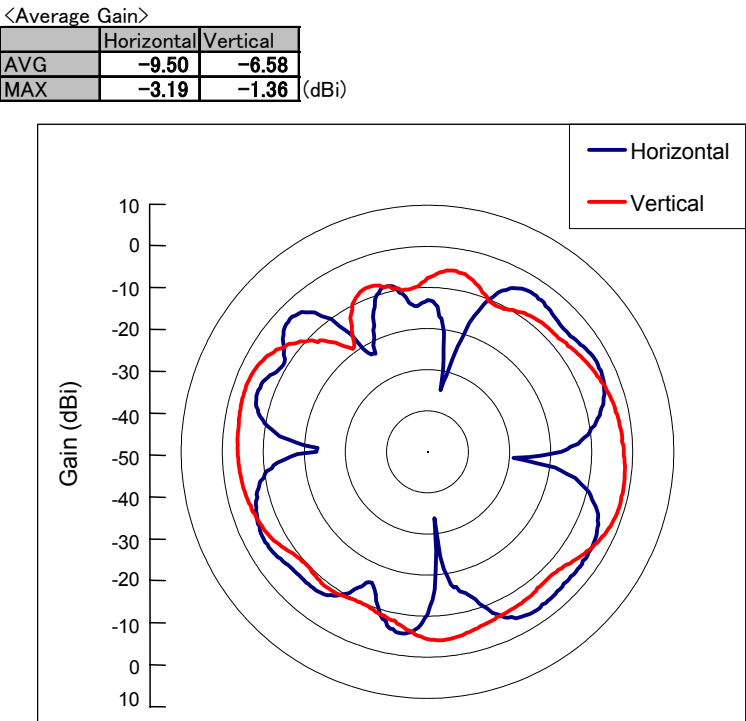
Include a dimensioned photo or dimensioned drawing of aux antenna here.



**Section 3. Radiation characteristics of antennae Loaded in Host Platform**

**2400-2500MHz radiation characteristic**

**Main antenna: 2400 MHz**

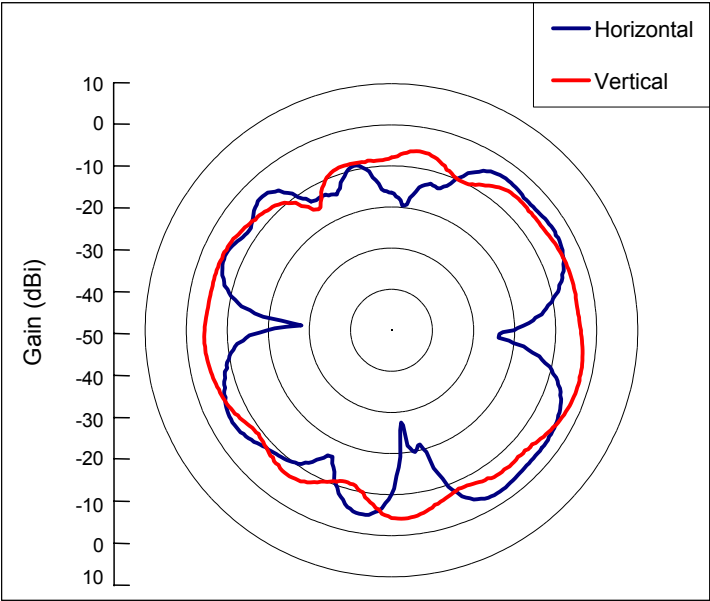


|                       |          |
|-----------------------|----------|
| Center Frequency      | 2400 MHz |
| Horizontal (dBi) peak | -3.19    |
| Vertical (dBi) peak   | -1.36    |
| Horz+Vert (dBi) peak  | -1.36    |

Main antenna: 2450 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -9.45      | -6.59    |
| MAX            | -2.66      | -2.56    |

(dBi)

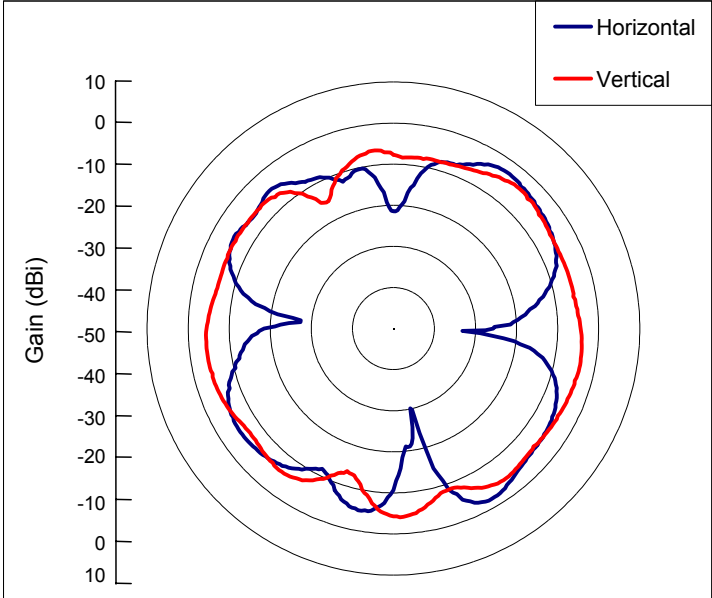


|                       |          |
|-----------------------|----------|
| Center Frequency      | 2450 MHz |
| Horizontal (dBi) peak | -2.66    |
| Vertical (dBi) peak   | -2.56    |
| Horz+Vert (dBi) peak  | -2.56    |

Main antenna: 2500 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -9.51      | -6.38    |
| MAX            | -2.12      | -3.72    |

(dBi)

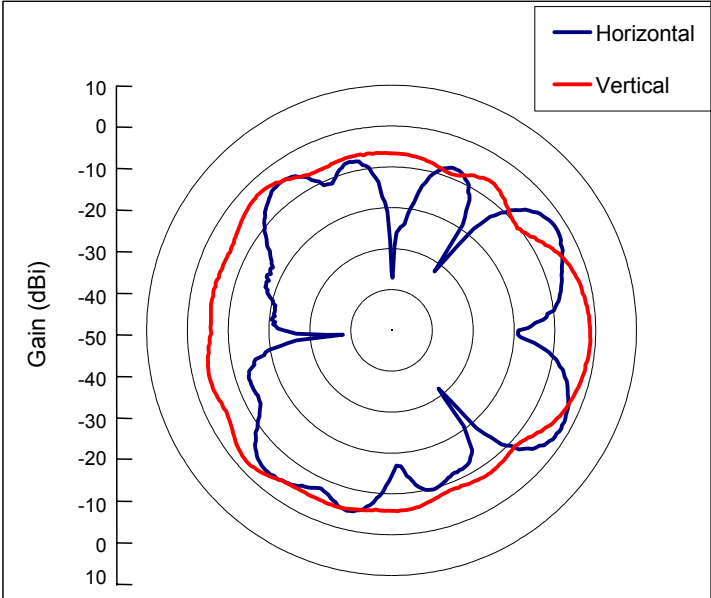


|                       |          |
|-----------------------|----------|
| Center Frequency      | 2500 MHz |
| Horizontal (dBi) peak | -2.12    |
| Vertical (dBi) peak   | -3.72    |
| Horz+Vert (dBi) peak  | -2.12    |

Auxiliary antenna: 2400 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -11.37     | -5.53    |
| MAX            | -2.03      | -1.27    |

(dBi)

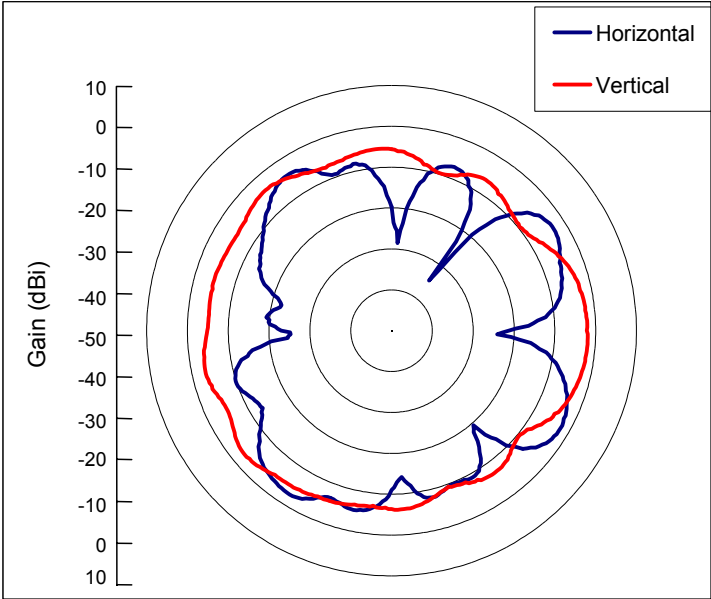


|                       |          |
|-----------------------|----------|
| Center Frequency      | 2400 MHz |
| Horizontal (dBi) peak | -2.03    |
| Vertical (dBi) peak   | -1.27    |
| Horz+Vert (dBi) peak  | -1.27    |

Auxiliary antenna: 2450 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -10.36     | -5.73    |
| MAX            | -2.22      | -1.93    |

(dBi)

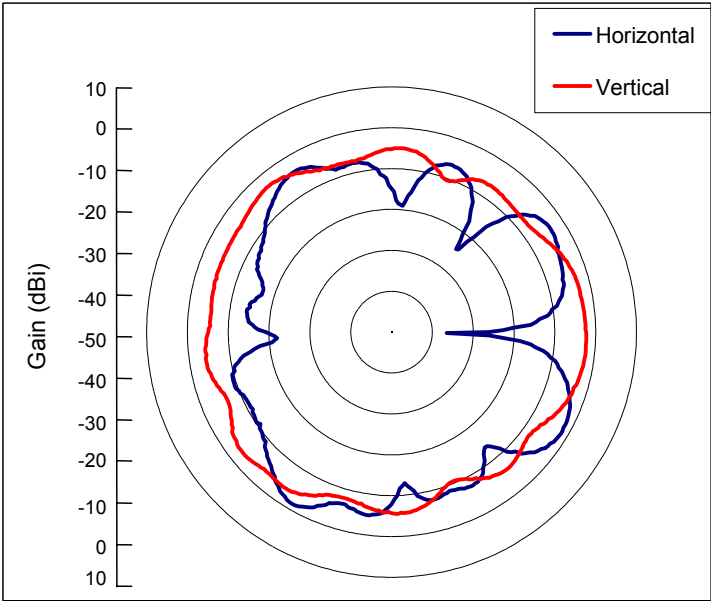


|                       |          |
|-----------------------|----------|
| Center Frequency      | 2450 MHz |
| Horizontal (dBi) peak | -2.22    |
| Vertical (dBi) peak   | -1.93    |
| Horz+Vert (dBi) peak  | -1.93    |

Auxiliary antenna: 2500 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -9.34      | -5.66    |
| MAX            | -1.50      | -2.26    |

(dBi)



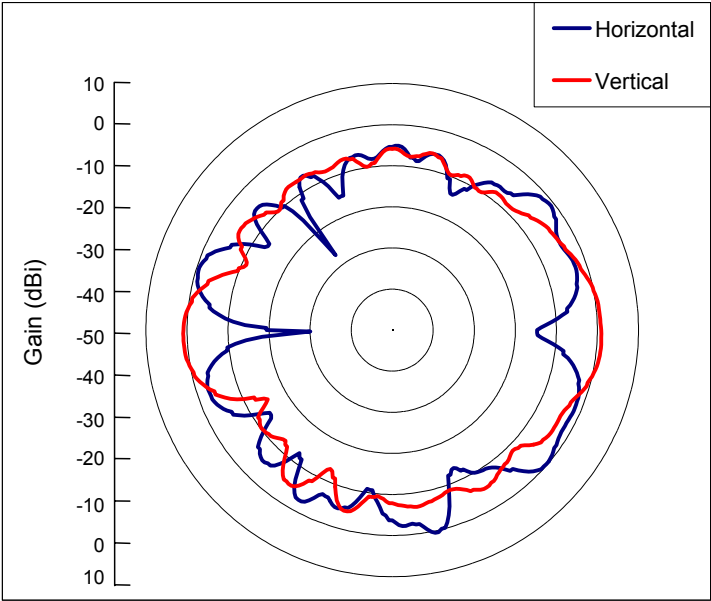
|                       |          |
|-----------------------|----------|
| Center Frequency      | 2500 MHz |
| Horizontal (dBi) peak | -1.50    |
| Vertical (dBi) peak   | -2.26    |
| Horz+Vert (dBi) peak  | -1.50    |

5150-5350 MHz radiation characteristic

Main antenna: 5150 MHz

|                |            |          |
|----------------|------------|----------|
| <Average Gain> |            |          |
|                | Horizontal | Vertical |
| AVG            | -6.64      | -6.01    |
| MAX            | 0.43       | 1.00     |

(dBi)

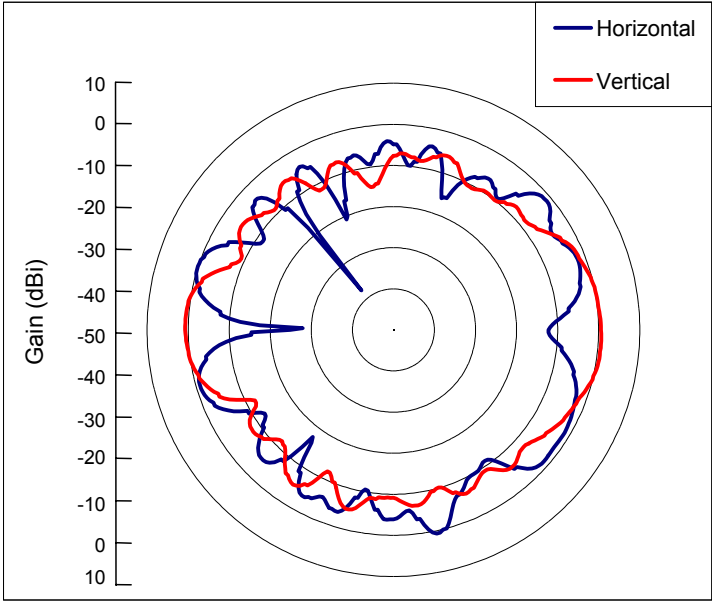


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5150 MHz |
| Horizontal (dBi) peak | 0.43     |
| Vertical (dBi) peak   | 1.00     |
| Horz+Vert (dBi) peak  | 1.00     |

Main antenna: 5250 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -6.42      | -6.11    |
| MAX            | 0.67       | 0.73     |

(dBi)

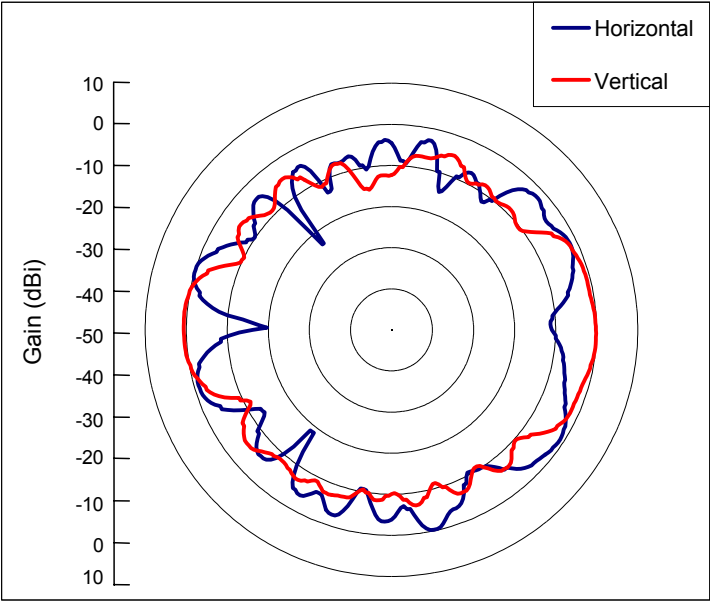


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5250 MHz |
| Horizontal (dBi) peak | 0.67     |
| Vertical (dBi) peak   | 0.73     |
| Horz+Vert (dBi) peak  | 0.73     |

Main antenna: 5350 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -6.31      | -6.27    |
| MAX            | -0.02      | 0.62     |

(dBi)

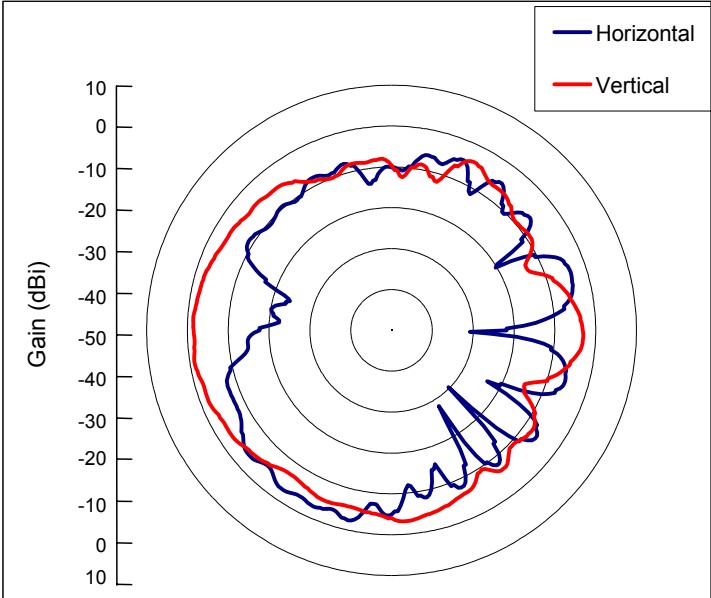


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5350 MHz |
| Horizontal (dBi) peak | -0.02    |
| Vertical (dBi) peak   | 0.62     |
| Horz+Vert (dBi) peak  | 0.62     |

Auxiliary antenna: 5150 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -9.74      | -6.26    |
| MAX            | -2.35      | -1.12    |

(dBi)

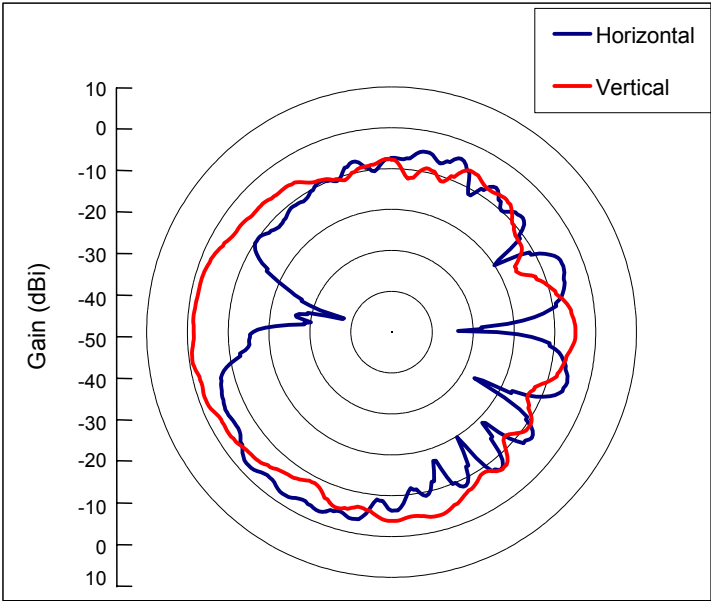


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5150 MHz |
| Horizontal (dBi) peak | -2.35    |
| Vertical (dBi) peak   | -1.12    |
| Horz+Vert (dBi) peak  | -1.12    |

Auxiliary antenna: 5250 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -10.18     | -6.81    |
| MAX            | -2.18      | -0.74    |

(dBi)

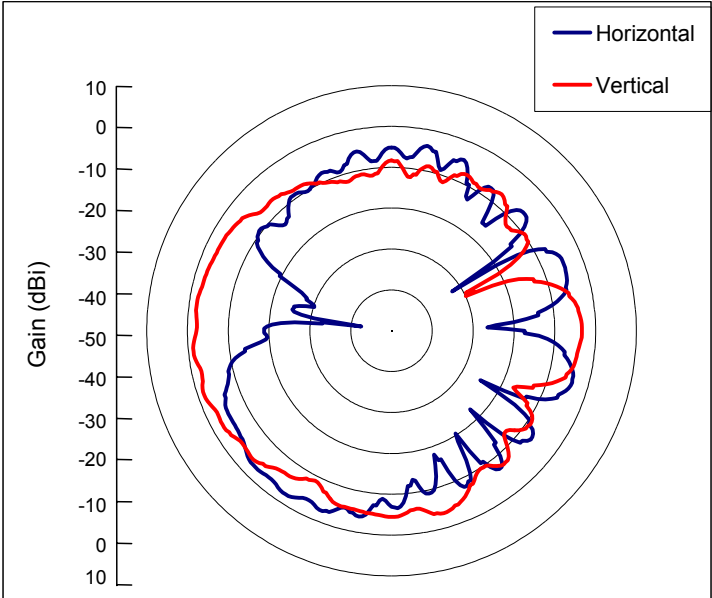


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5250 MHz |
| Horizontal (dBi) peak | -2.18    |
| Vertical (dBi) peak   | -0.74    |
| Horz+Vert (dBi) peak  | -0.74    |

Auxiliary antenna: 5350 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -10.14     | -7.18    |
| MAX            | -2.32      | -1.23    |

(dBi)



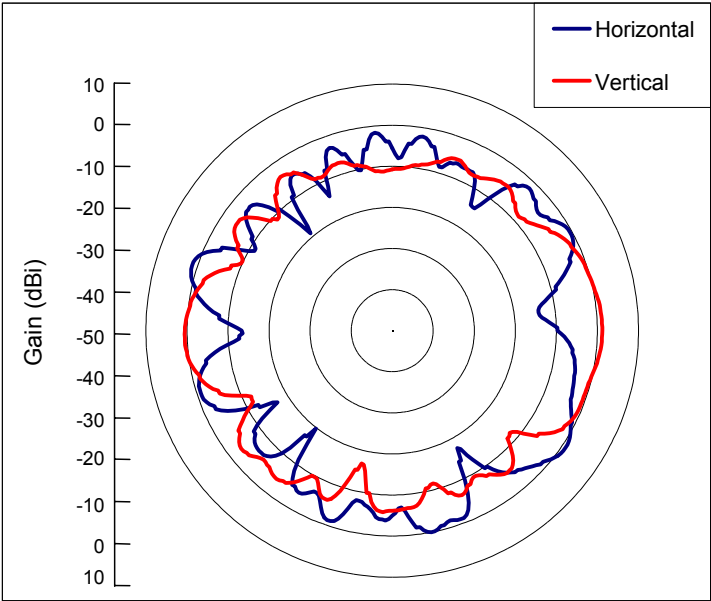
|                       |          |
|-----------------------|----------|
| Center Frequency      | 5350 MHz |
| Horizontal (dBi) peak | -2.32    |
| Vertical (dBi) peak   | -1.23    |
| Horz+Vert (dBi) peak  | -1.23    |

5470-5725MHz radiation characteristic

Main antenna: 5470 MHz

|                |            |          |
|----------------|------------|----------|
| <Average Gain> |            |          |
|                | Horizontal | Vertical |
| AVG            | -5.82      | -5.66    |
| MAX            | 1.25       | 1.20     |

(dBi)

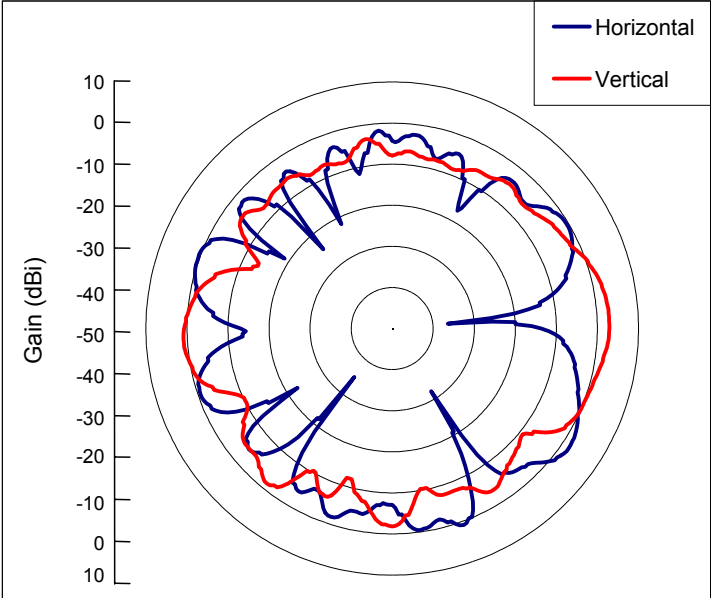


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5470 MHz |
| Horizontal (dBi) peak | 1.25     |
| Vertical (dBi) peak   | 1.20     |
| Horz+Vert (dBi) peak  | 1.20     |

Main antenna: 5597.5 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -5.97      | -4.76    |
| MAX            | 1.93       | 2.92     |

(dBi)

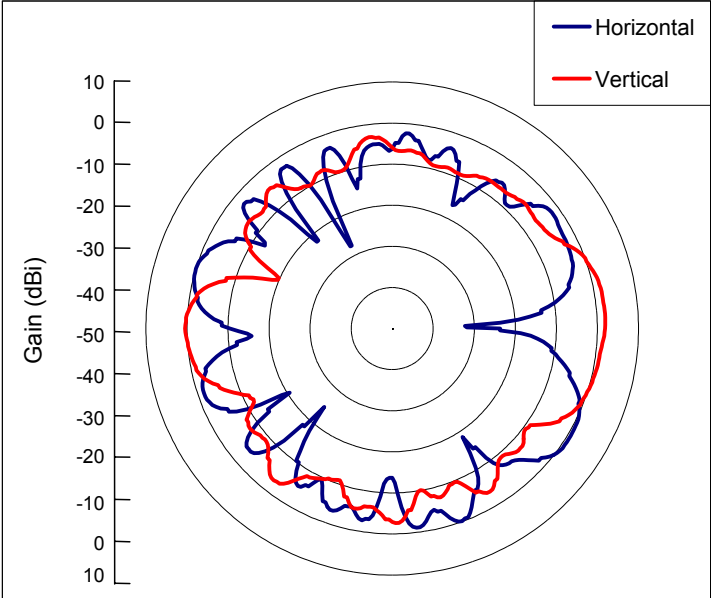


|                       |            |
|-----------------------|------------|
| Center Frequency      | 5597.5 MHz |
| Horizontal (dBi) peak | 1.93       |
| Vertical (dBi) peak   | 2.92       |
| Horz+Vert (dBi) peak  | 2.92       |

Main antenna: 5725 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -6.79      | -5.72    |
| MAX            | 0.70       | 1.97     |

(dBi)

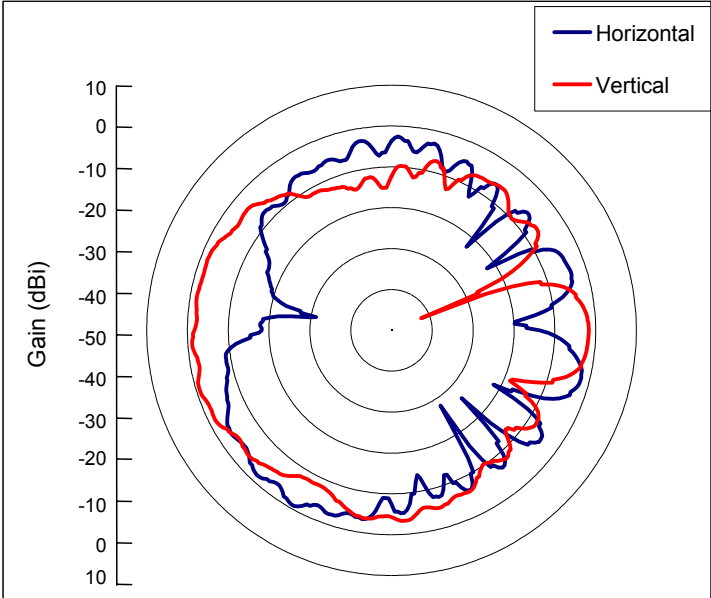


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5725 MHz |
| Horizontal (dBi) peak | 0.70     |
| Vertical (dBi) peak   | 1.97     |
| Horz+Vert (dBi) peak  | 1.97     |

Auxiliary antenna: 5470 MHz

|                |            |          |
|----------------|------------|----------|
| <Average Gain> |            |          |
|                | Horizontal | Vertical |
| AVG            | -8.52      | -7.00    |
| MAX            | -0.86      | -0.82    |

(dBi)

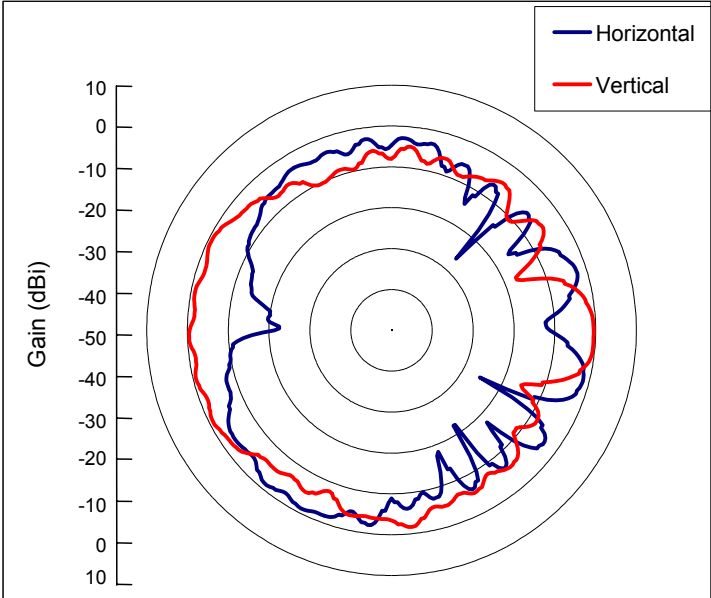


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5470 MHz |
| Horizontal (dBi) peak | -0.86    |
| Vertical (dBi) peak   | -0.82    |
| Horz+Vert (dBi) peak  | -0.82    |

Auxiliary antenna: 5597.5 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -7.47      | -5.40    |
| MAX            | -1.16      | -0.42    |

(dBi)

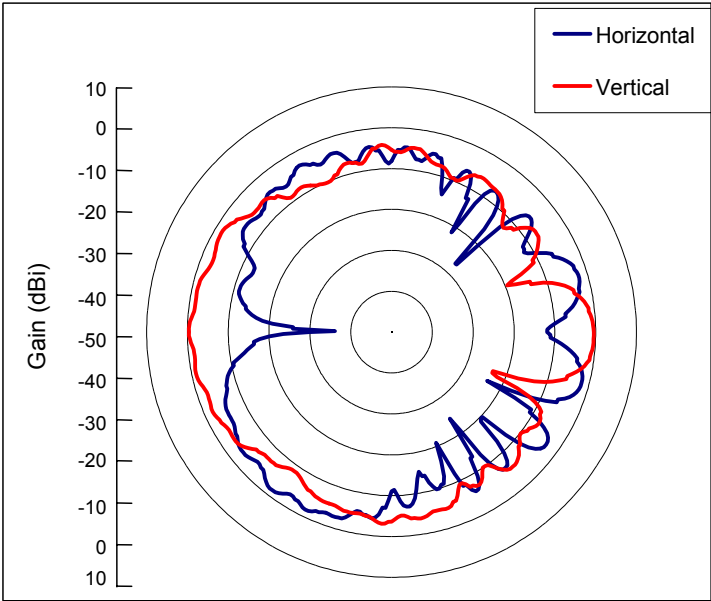


|                       |            |
|-----------------------|------------|
| Center Frequency      | 5597.5 MHz |
| Horizontal (dBi) peak | -1.16      |
| Vertical (dBi) peak   | -0.42      |
| Horz+Vert (dBi) peak  | -0.42      |

Auxiliary antenna: 5725 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -8.06      | -6.01    |
| MAX            | -1.56      | -0.36    |

(dBi)



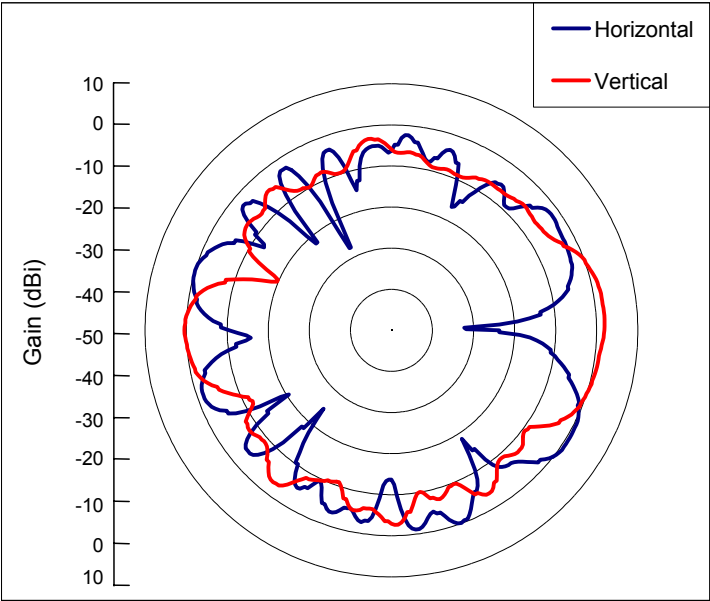
|                       |          |
|-----------------------|----------|
| Center Frequency      | 5725 MHz |
| Horizontal (dBi) peak | -1.56    |
| Vertical (dBi) peak   | -0.36    |
| Horz+Vert (dBi) peak  | -0.36    |

5725-5850 MHz radiation characteristic

Main antenna: 5725 MHz

|                |            |          |
|----------------|------------|----------|
| <Average Gain> |            |          |
|                | Horizontal | Vertical |
| AVG            | -6.79      | -5.72    |
| MAX            | 0.70       | 1.97     |

(dBi)

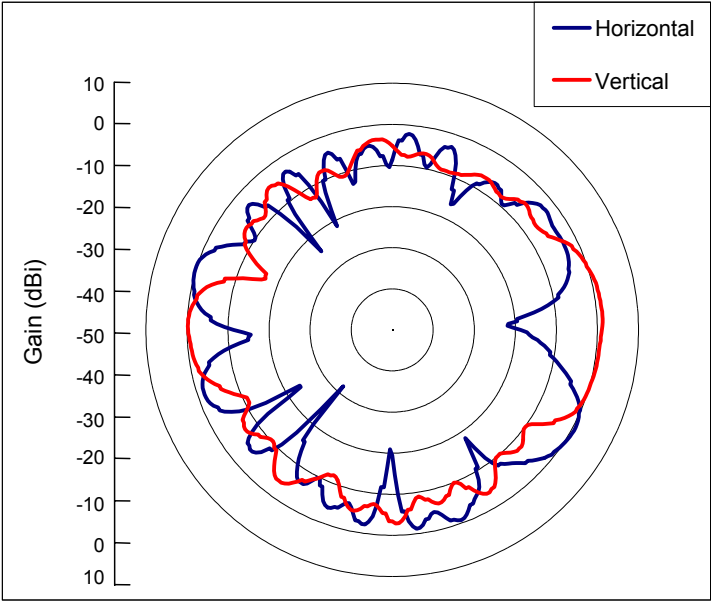


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5725 MHz |
| Horizontal (dBi) peak | 0.70     |
| Vertical (dBi) peak   | 1.97     |
| Horz+Vert (dBi) peak  | 1.97     |

Main antenna: 5785 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -6.95      | -5.91    |
| MAX            | 0.61       | 1.33     |

(dBi)

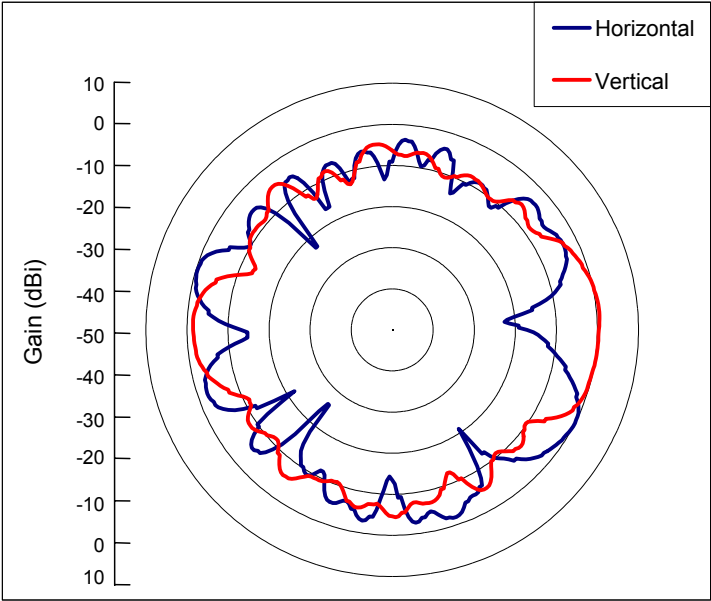


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5785 MHz |
| Horizontal (dBi) peak | 0.61     |
| Vertical (dBi) peak   | 1.33     |
| Horz+Vert (dBi) peak  | 1.33     |

Main antenna: 5850 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -7.58      | -6.67    |
| MAX            | -0.05      | 0.60     |

(dBi)

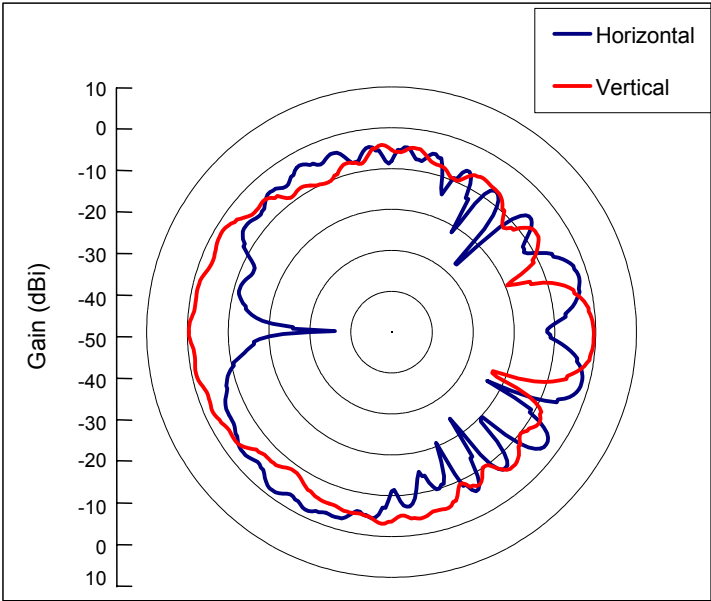


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5850 MHz |
| Horizontal (dBi) peak | -0.05    |
| Vertical (dBi) peak   | 0.60     |
| Horz+Vert (dBi) peak  | 0.60     |

Auxiliary antenna: 5725 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -8.06      | -6.01    |
| MAX            | -1.56      | -0.36    |

(dBi)

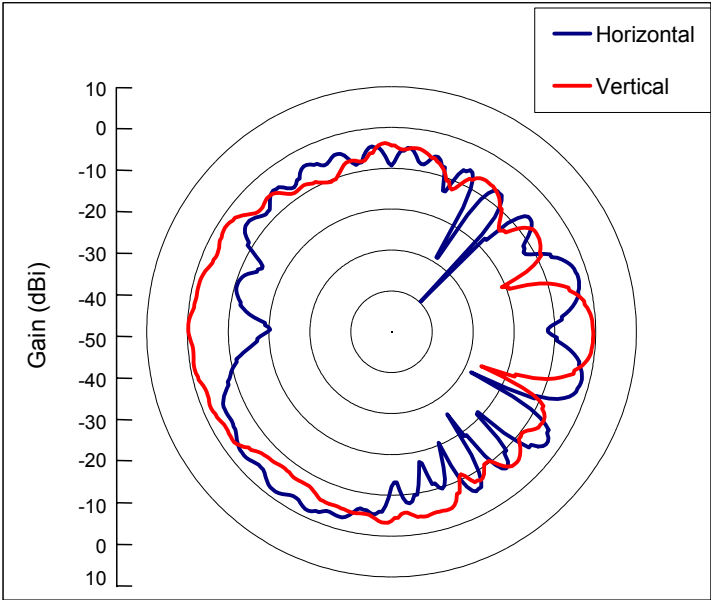


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5725 MHz |
| Horizontal (dBi) peak | -1.56    |
| Vertical (dBi) peak   | -0.36    |
| Horz+Vert (dBi) peak  | -0.36    |

Auxiliary antenna: 5785 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -8.18      | -6.05    |
| MAX            | -1.64      | -0.21    |

(dBi)

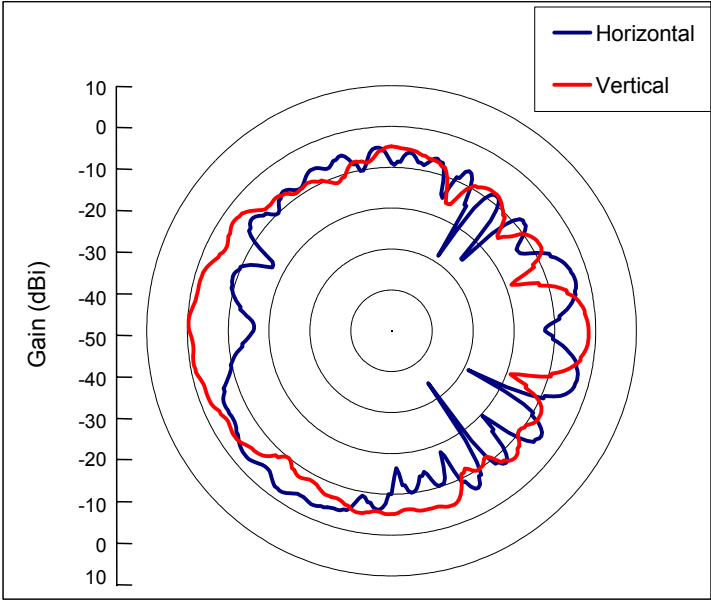


|                       |          |
|-----------------------|----------|
| Center Frequency      | 5785 MHz |
| Horizontal (dBi) peak | -1.64    |
| Vertical (dBi) peak   | -0.21    |
| Horz+Vert (dBi) peak  | -0.21    |

Auxiliary antenna: 5850 MHz

| <Average Gain> |            |          |
|----------------|------------|----------|
|                | Horizontal | Vertical |
| AVG            | -8.77      | -6.85    |
| MAX            | -2.27      | -0.25    |

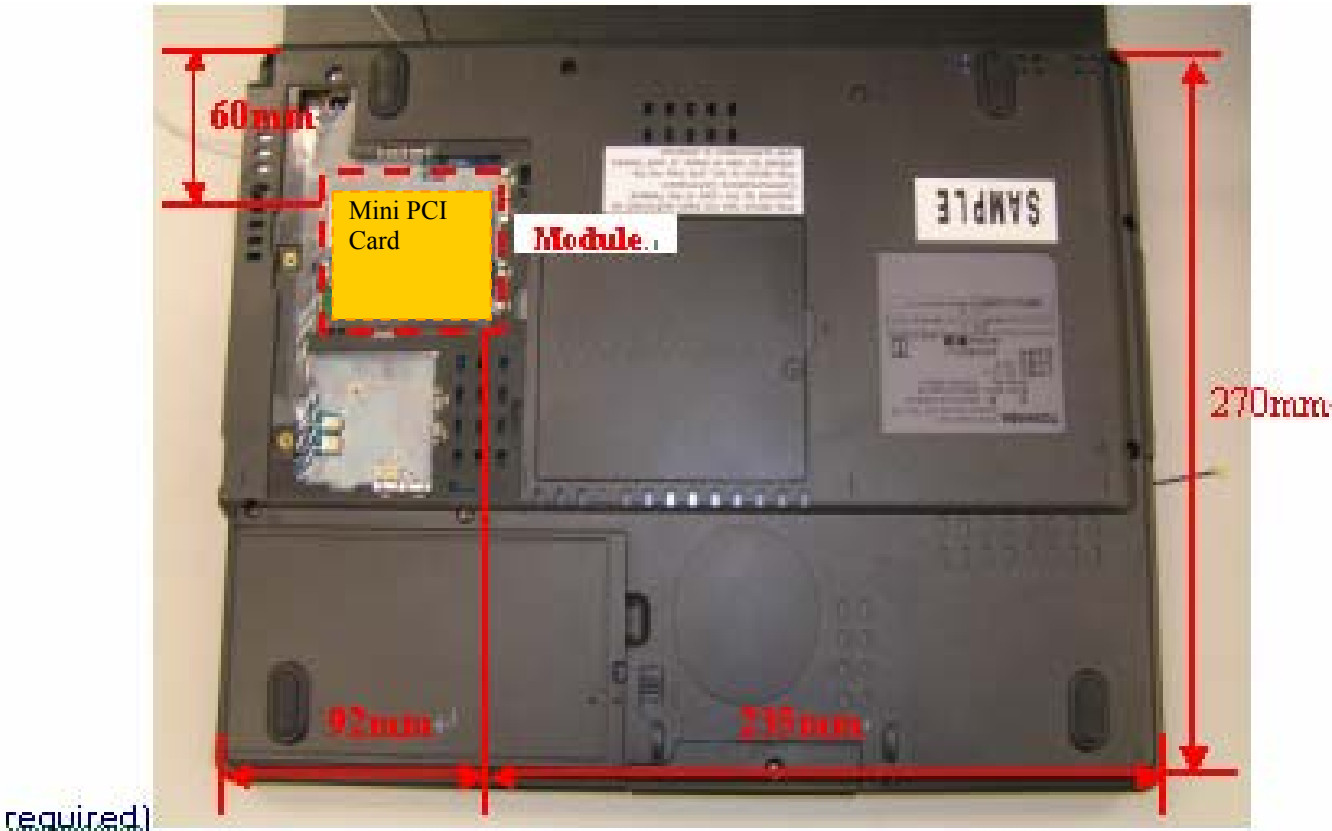
(dBi)



|                       |          |
|-----------------------|----------|
| Center Frequency      | 5850 MHz |
| Horizontal (dBi) peak | -2.27    |
| Vertical (dBi) peak   | -0.25    |
| Horz+Vert (dBi) peak  | -0.25    |

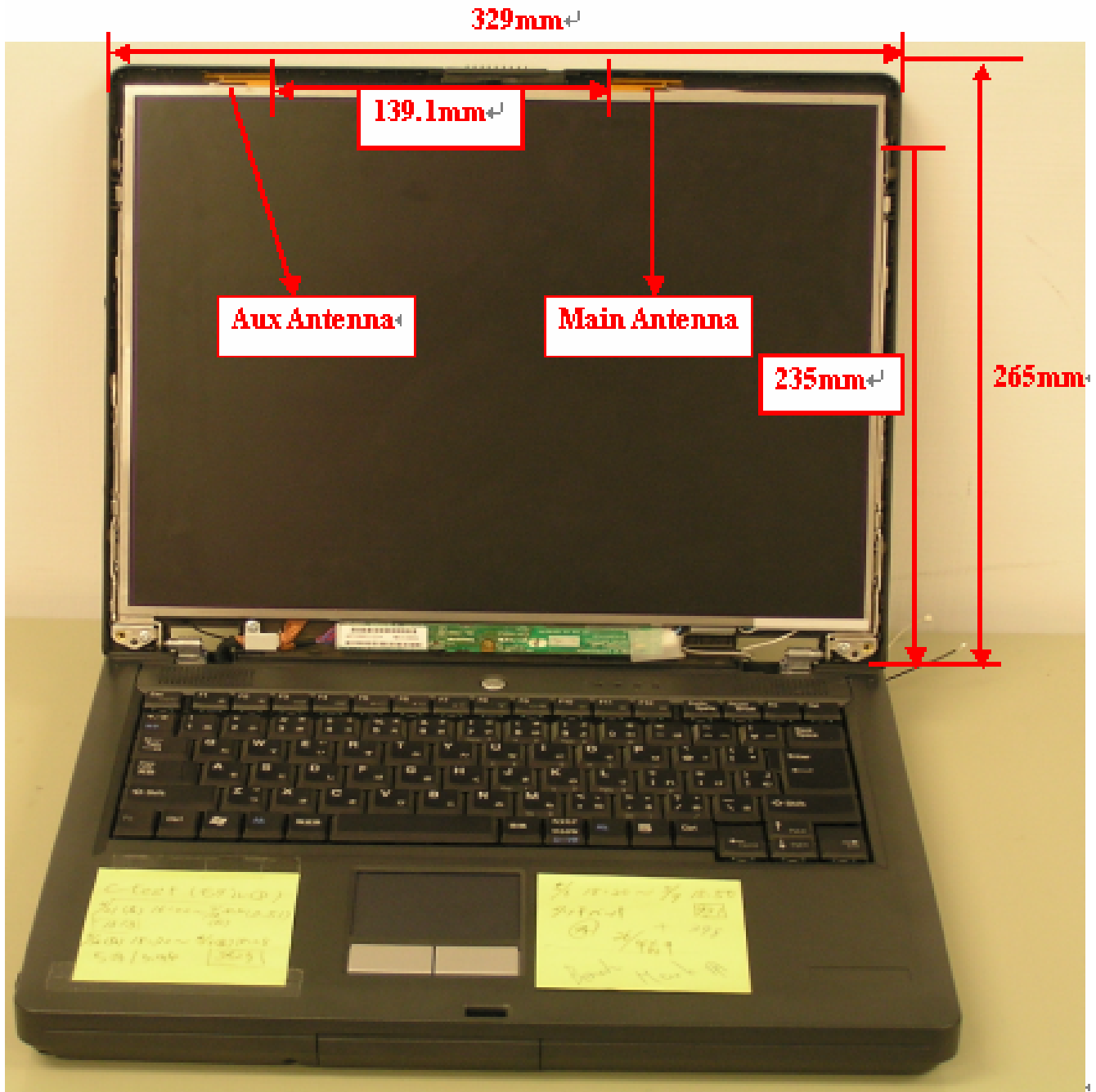
Section 4. Host Platform Information

Module Location Photo:



## Section 5. Antenna Host Platform Location Information

Include a **dimensioned photo** or **dimensioned drawing** of main and auxiliary antenna placements.



## Section 6. Antenna dimensional information for SAR evaluation

Include a **dimensioned photo or dimensioned drawing** showing the distance (mm) between the transmit (main) antenna and the user (excluding hands, wrist, feet, and ankle)

