# Regulatory WWAN Antenna Information

| Platform information | | | | |
|---|---|---|---|---|
| **Brand** | **ODM** | **Platform model name** | **Platform type (ex: regular NB, convertible PC, AIO…etc)** | **SAR minimum separation (mm)** |
| HP Inc. | Wistron | TPN-W155 | Convertible PC (NB) | 9.5mm |

| Antenna information | | | | | | Maximum Peak gain |
|---|---|---|---|---|---|---|
| **Vendor** | **Type** | **Antenna Part number (Ant5 TX/RX)** | **Antenna Part number (Ant6 RX)** | **Antenna Part number (Ant7 RX)** | **Antenna Part number (Ant8 TX/RX)** | **3750MHz (Choice TX high peak gain)** |
| INPAQ | PIFA | 025.90206.0001 (WA-P-S6G1-02-013) | 025.90207.0001 (WA-P-S6G1-02-014) | 025.90208.0001 (WA-P-S6G2-02-025) | 025.90209.0001 (WA-P-S6G2-02-026) | 2.06dBi |

| Module information | |
|---|---|
| **Model** | **Form factor and suffixes ( NGW/ HMW AND AN/ NB/ BN….)** |
| Kavalan | Fibocom FM350-GL WWAN 4x4 5G NR radio module |
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# Antenna Sample / Antenna Data
# Requirements for worldwide regulatory approval

| Section | Description of Required OEM / ODM Antenna Information | US / IC | EU | Japan | Taiwan | S.Korea |
|---|---|---|---|---|---|---|
| 1A | Part Number for Antenna Assembly | 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 | Tx antenna Gain (Peak Gain W/ cable loss) * | Required | Required | Required | Required | Required |
| 2 | Dimensioned Photographs and Drawings of Tx and Rx antennas | Required | Required | Required | Required | Required |
| 3 | Radiation patterns of antennas loaded in the host platform. | N/A | Required | Required | Required | N/A |
| 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. (S. Korea requires photographs of antennas for approval submission). Taiwan requires pictures of each antenna type shown in the system. | Required | Required | Desired | Required (Photos) | Required (Photos) |
| 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, 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 |
| 8 | Local representative contact information for LMA/ PARS process. | Required | N/A | N/A | N/A | N/A |

# Antenna Information

## Section 1. Antenna Assembly Specifications

| Communication System | n | Frequency(MHz) from low to high spectrum | | 1A Part Number for Antenna Assembly | 1B Antenna Manufacturer Name | 1C Description of Antenna Type | 1D Tx Antenna Gain (dBi) Ant5 |
|---|---|---|---|---|---|---|---|
| WCDMA/ LTE/5G NR FR1 | 1 | 1920 | 1980 | Ant5 : 025.90206.0001 (WA-P-S6G1-02-013) | INPAQ Corporation | PIFA | 0.41 |
| WCDMA/ LTE/5G NR FR1 | 2 | 1850 | 1910 | | | | 0.93 |
| LTE/5G NR FR1 | 3 | 1710 | 1785 | | | | 1.69 |
| WCDMA/ LTE | 4 | 1710 | 1755 | | | | 1.69 |
| WCDMA/ LTE/5G NR FR1 | 5 | 824 | 849 | | | | -3.79 |
| LTE/5G NR FR1 | 7 | 2500 | 2570 | | | | -2.92 |
| WCDMA/ LTE/5G NR FR1 | 8 | 880 | 915 | | | | -4.75 |
| LTE | 12 | 699 | 716 | | | | -2.27 |
| LTE | 13 | 777 | 787 | | | | -2.23 |
| LTE | 14 | 788 | 798 | | | | -3.24 |
| LTE | 17 | 704 | 716 | | | | -2.53 |
| LTE | 18 | 815 | 830 | | | | -3.92 |
| LTE | 19 | 830 | 845 | | | | -3.79 |
| LTE/5G NR FR1 | 20 | 832 | 862 | | | | -3.79 |
| LTE/5G NR FR1 | 25 | 1850 | 1915 | | | | 0.93 |
| LTE | 26 | 814 | 849 | | | | -3.79 |
| LTE/5G NR FR1 | 28 | 703 | 748 | | | | -2.53 |
| LTE/5G NR FR1 | 30 | 2305 | 2315 | | | | -0.46 |
| LTE | 34 | 2010 | 2025 | | | | -0.34 |
| LTE/5G NR FR1 | 38 | 2570 | 2620 | | | | -2.92 |
| LTE | 39 | 1880 | 1920 | | | | 0.93 |
| LTE/5G NR FR1 | 40 | 2300 | 2400 | | | | -0.46 |
| LTE/5G NR FR1 | 41 | 2496 | 2690 | | | | -2.03 |
| LTE | 42 | 3400 | 3600 | | | | 1.51 |
| LTE | 43 | 3600 | 3800 | | | | 2.06 |
| LTE/5G NR FR1 | 66 | 1710 | 1780 | | | | 1.69 |
| LTE/5G NR FR1 | 71 | 663 | 698 | | | | -1.84 |
| 5G NR FR1 | 77 | 3300 | 4200 | | | | 2.06 |
| 5G NR FR1 | 78 | 3300 | 3800 | | | | 2.06 |
| 5G NR FR1 | 79 | 4400 | 5000 | | | | -2.55 |

| Communication System | Band | Frequency(MHz) from low to high spectrum | | 1A Part Number for Antenna Assembly | 1B Antenna Manufacturer Name | 1C Description of Antenna Type | 1D Tx Antenna Gain (dBi) Ant8 |
|---|---|---|---|---|---|---|---|
| 5G NR FR1 | 1 | 1920 | 1980 | Ant8 : 025.90209.0001 (WA-P-S6G2-02-026) | INPAQ Corporation | PIFA | 0.25 |
| LTE/5G NR FR1 | 2 | 1850 | 1910 | | | | 0.35 |
| 5G NR FR1 | 3 | 1710 | 1785 | | | | 1.84 |
| LTE | 4 | 1710 | 1755 | | | | 1.1 |
| LTE | 5 | 824 | 849 | | | | Disable |
| LTE | 7 | 2500 | 2570 | | | | -2.41 |
| LTE | 25 | 1850 | 1915 | | | | 0.35 |
| LTE | 30 | 2305 | 2315 | | | | -1.58 |
| 5G NR FR1 | 38 | 2570 | 2620 | | | | -2.81 |
| 5G NR FR1 | 40 | 2300 | 2400 | | | | -1.58 |
| LTE/5G NR FR1 | 41 | 2496 | 2690 | | | | -1.73 |
| LTE | 48 | 3550 | 3700 | | | | -2.74 |
| LTE/5G NR FR1 | 66 | 1710 | 1780 | | | | 1.84 |
| 5G NR FR1 | 77 | 3300 | 4200 | | | | -1.13 |
| 5G NR FR1 | 78 | 3300 | 3800 | | | | -1.5 |
| 5G NR FR1 | 79 | 4400 | 5000 | | | | 0.65 |

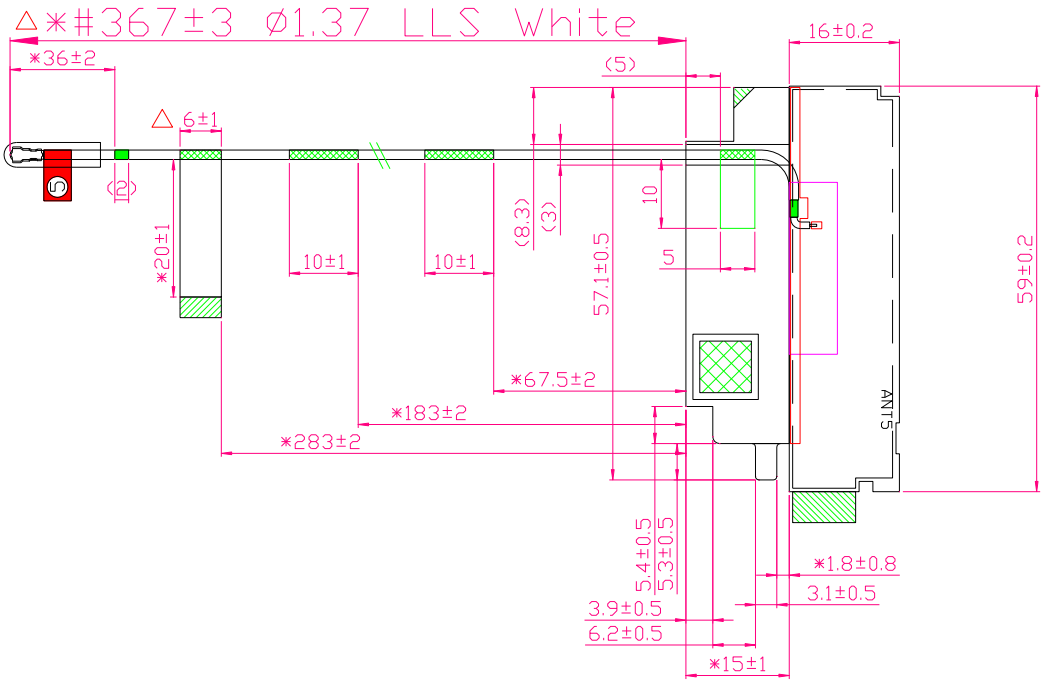
- **Antenna Peak Gain required being test in system basis.**
- **The antenna gain was measured in Anechoic Chamber**

# Section 2. Dimensioned Photos or Drawings of Antennas

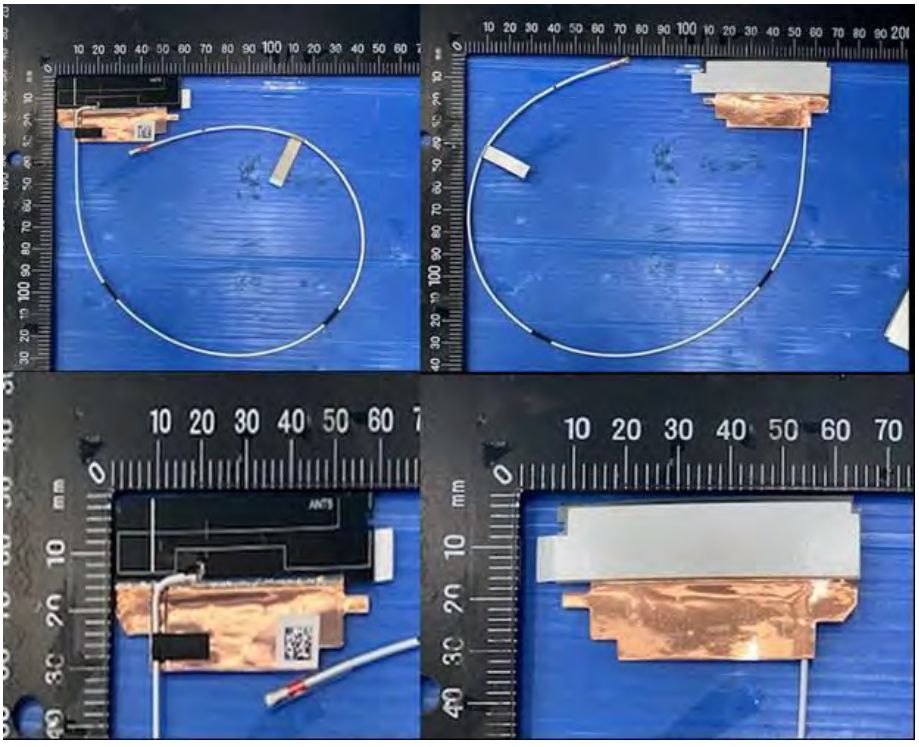
| | Ant supplier | Part number | Drawing | Photo |
|---|---|---|---|---|
| Ant5 | WA-P-S6G1-02-013 | 025.90206.0001 | V | V |
| Ant6 | WA-P-S6G1-02-014 | 025.90207.0001 | V | V |
| Ant7 | WA-P-S6G2-02-025 | 025.90208.0001 | V | V |
| Ant8 | WA-P-S6G2-02-026 | 025.90209.0001 | V | V |

### Ant5 Dimensioned Drawing:

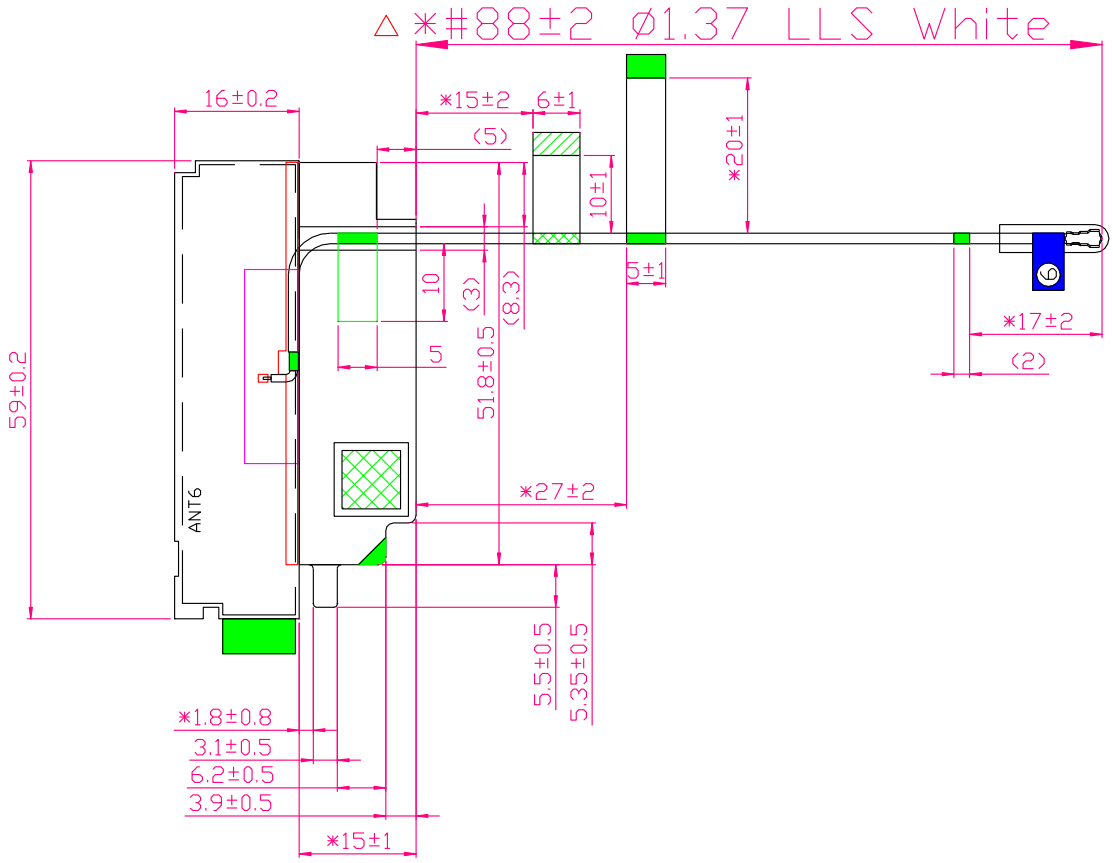
Example



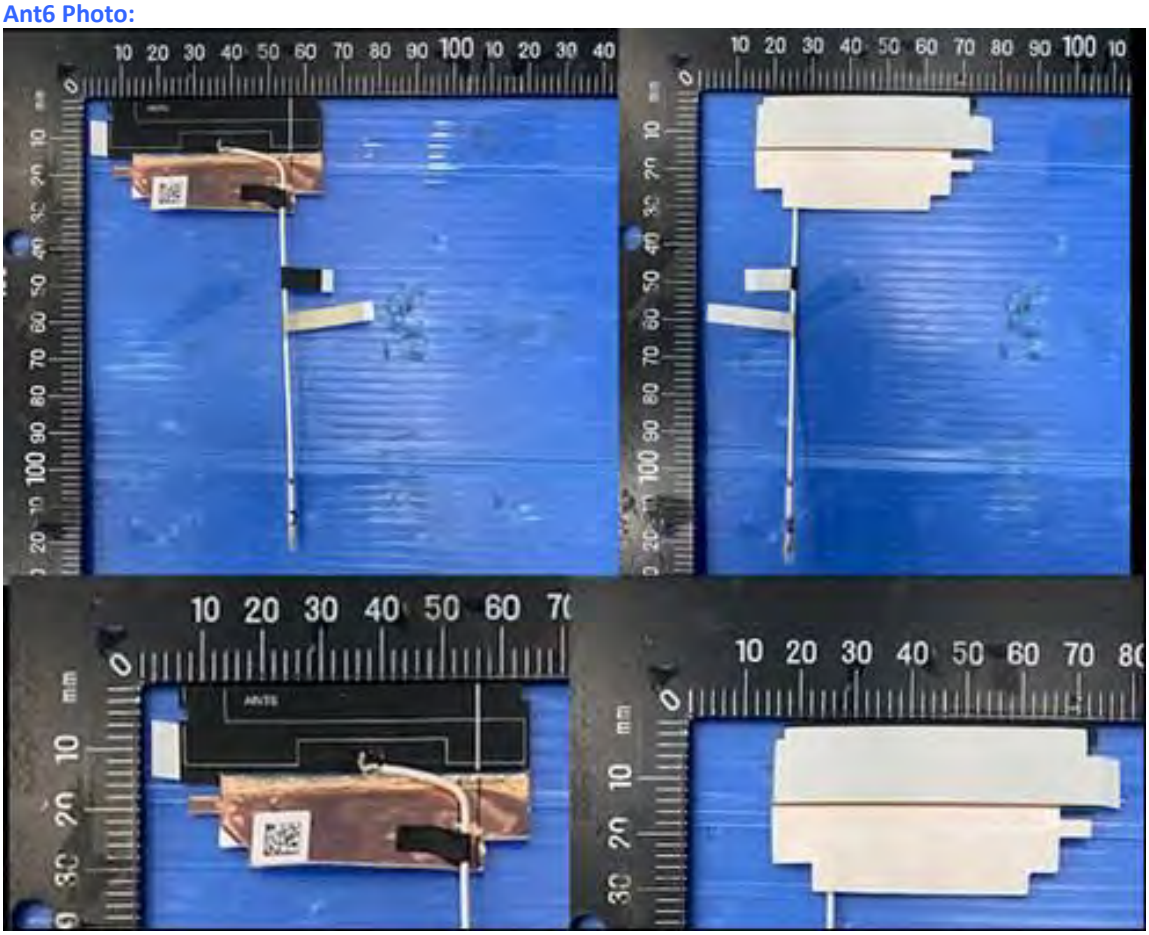

### Ant5 Photo:



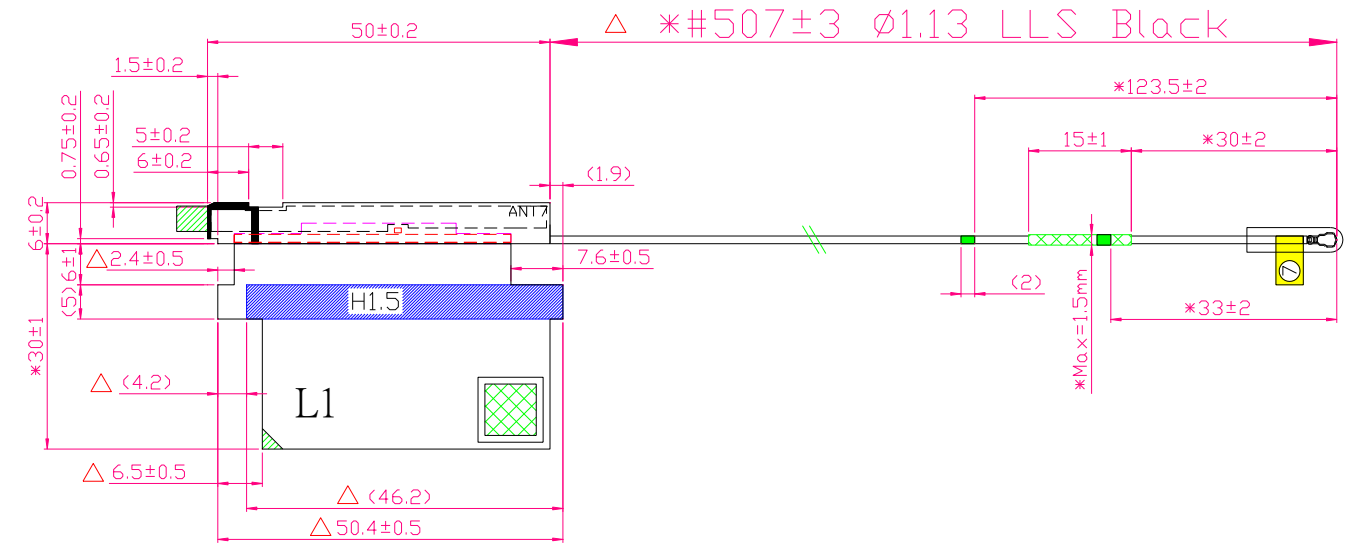
## Ant6 Dimensioned Drawing:



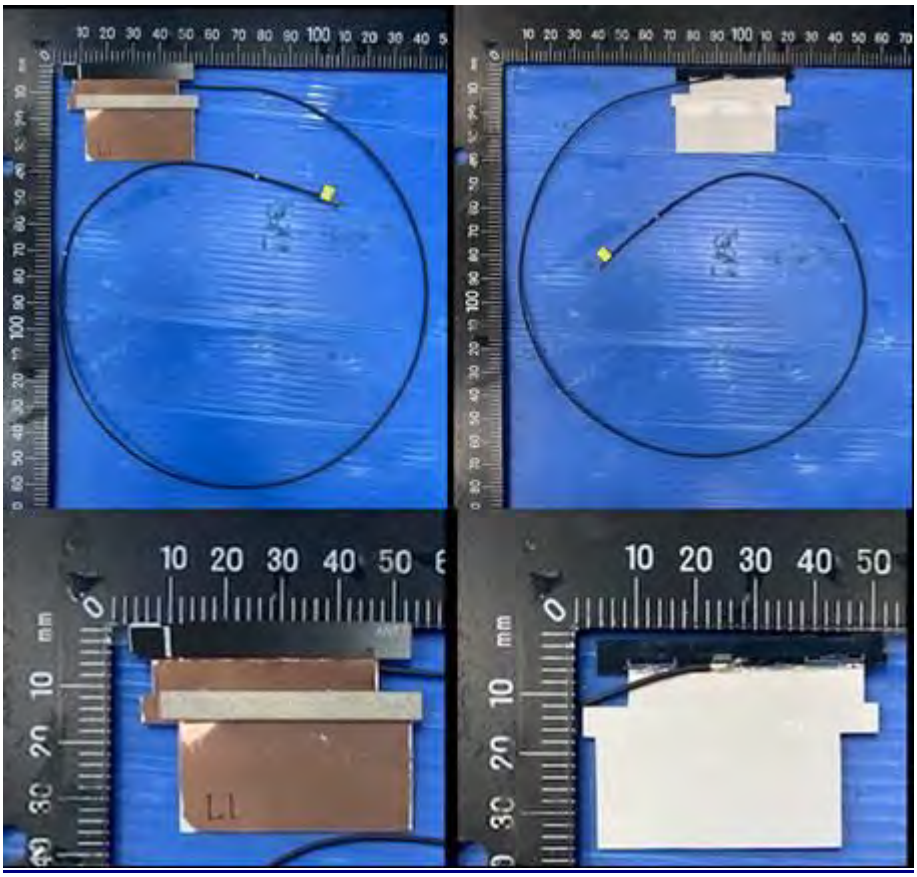

## Ant6 Photo:



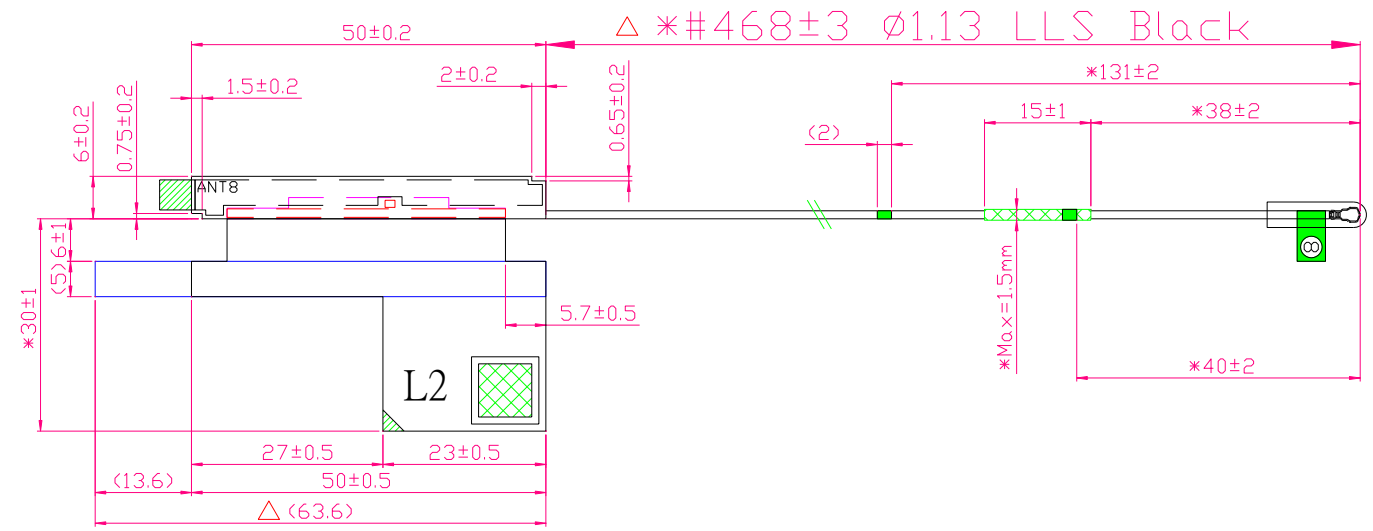
## Ant7 Dimensioned Drawing:


△ *#507±3 Ø1.13 LLS Black
50±0.2
1.5±0.2
0.75±0.2
0.65±0.2
5±0.2
6±0.2
6±0.2
(5)6±1
*30±1
△2.4±0.5
(1.9)
ANT7
7.6±0.5
H1.5
L1
△(4.2)
△6.5±0.5
△(46.2)
△50.4±0.5
*123.5±2
15±1
*30±2
(2)
*Max=1.5mm
*33±2

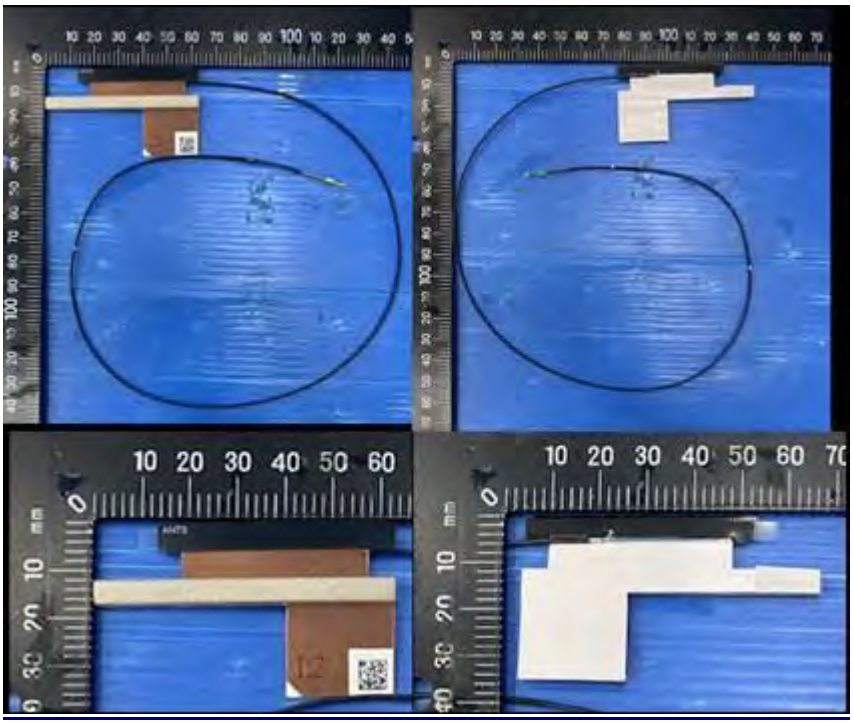
**Ant7 Photo:**



## Ant8 Dimensioned Drawing:




## Ant8 Photo:

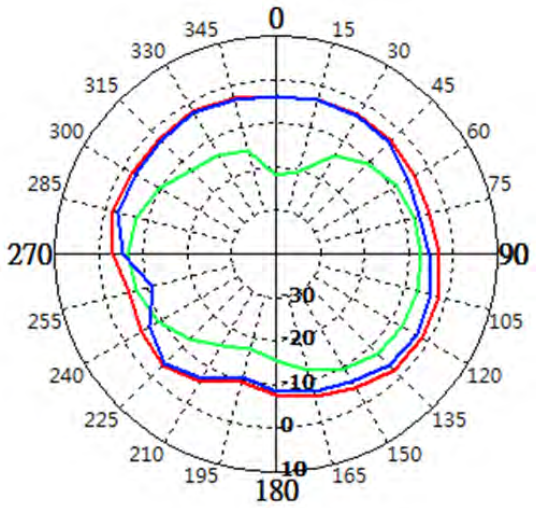


# Section 3. Radiation characteristics of antennae Loaded in Host Platform

- **The listed frequency 2D radiation pattern is required**
- **Ant5:**

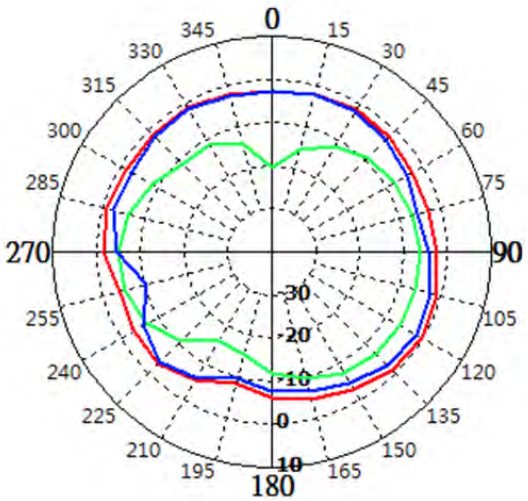
## Example

**663MHz**




| Center Frequency | **663MHz** |
|---|---|
| Horizontal (dBi) peak | -6.67 |
| Vertical (dBi) peak | -2.63 |

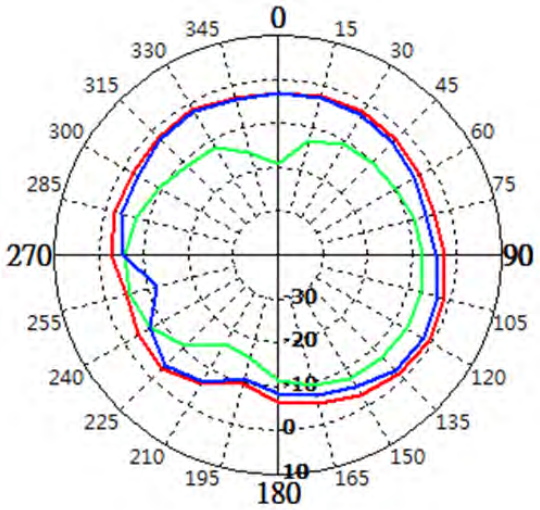
**698MHz**



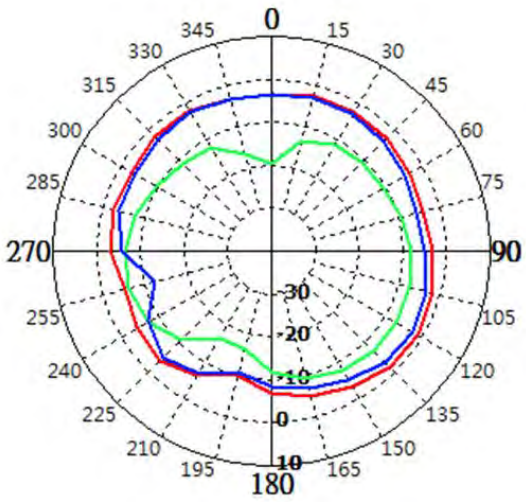

| Center Frequency | **698MHz** |
|---|---|
| Horizontal (dBi) peak | -4.98 |
| Vertical (dBi) peak | -1.84 |

**699MHz**

| Center Frequency | **699MHz** |
|---|---|
| Horizontal (dBi) peak | -5.76 |
| Vertical (dBi) peak | -2.27 |

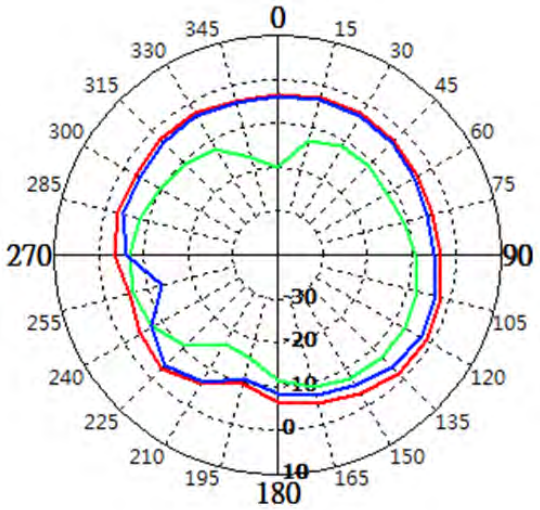



**704MHz**



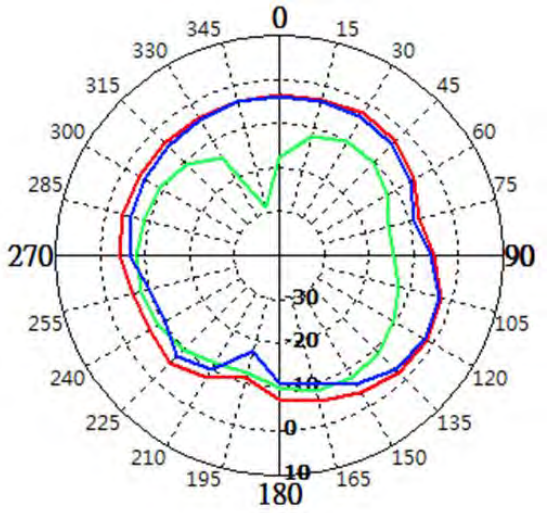

| Center Frequency | **704MHz** |
|---|---|
| Horizontal (dBi) peak | -6.2 |
| Vertical (dBi) peak | -2.53 |

**716MHz**



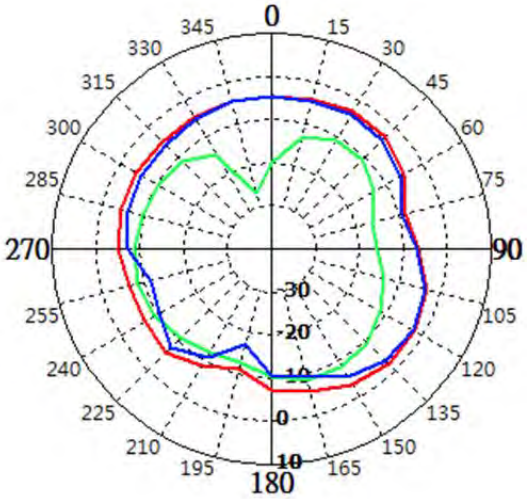

| Center Frequency | **716MHz** |
|---|---|
| Horizontal (dBi) peak | -6.56 |
| Vertical (dBi) peak | -2.88 |

## 777MHz



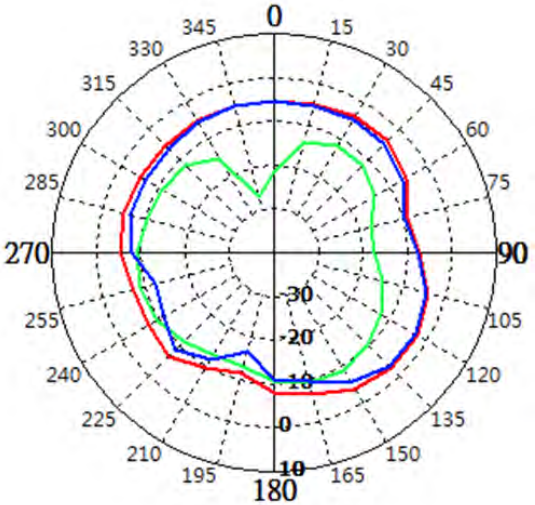

| Center Frequency | **777MHz** |
|---|---|
| Horizontal (dBi) peak | -7.8 |
| Vertical (dBi) peak | -2.23 |

## 787MHz



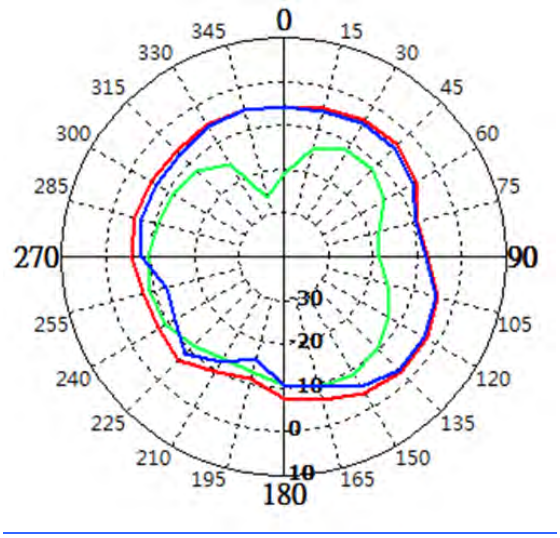

| Center Frequency | **787MHz** |
|---|---|
| Horizontal (dBi) peak | -8.24 |
| Vertical (dBi) peak | -2.64 |

## 788MHz



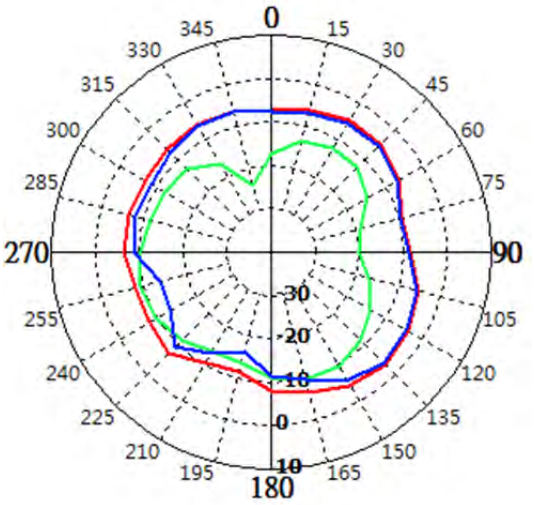

| Center Frequency | **788MHz** |
|---|---|
| Horizontal (dBi) peak | -8.8 |
| Vertical (dBi) peak | -3.24 |

## 798MHz



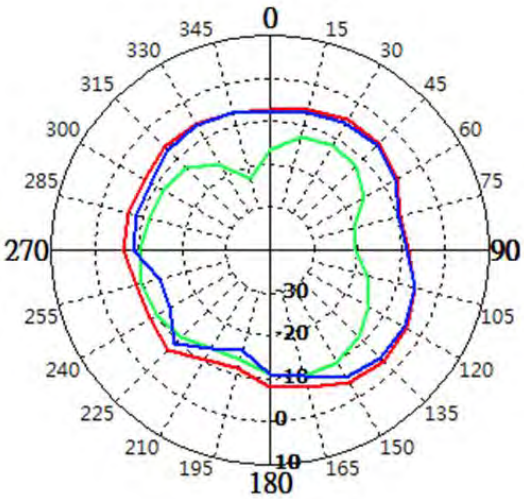

| Center Frequency | **798MHz** |
|---|---|
| Horizontal (dBi) peak | -8.76 |
| Vertical (dBi) peak | -3.33 |

## 814MHz



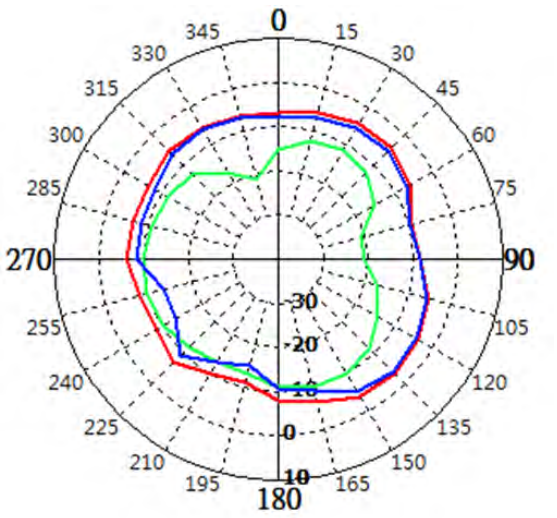

| Center Frequency | **814MHz** |
|---|---|
| Horizontal (dBi) peak | -9.4 |
| Vertical (dBi) peak | -4.08 |

## 815MHz



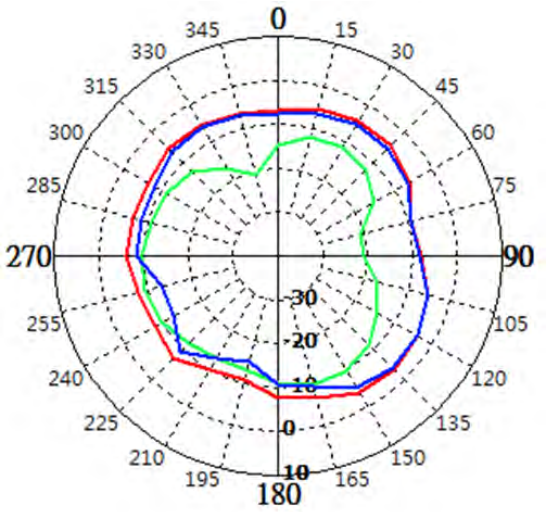

| Center Frequency | **815MHz** |
|---|---|
| Horizontal (dBi) peak | -9.65 |
| Vertical (dBi) peak | -4.14 |

**830MHz**



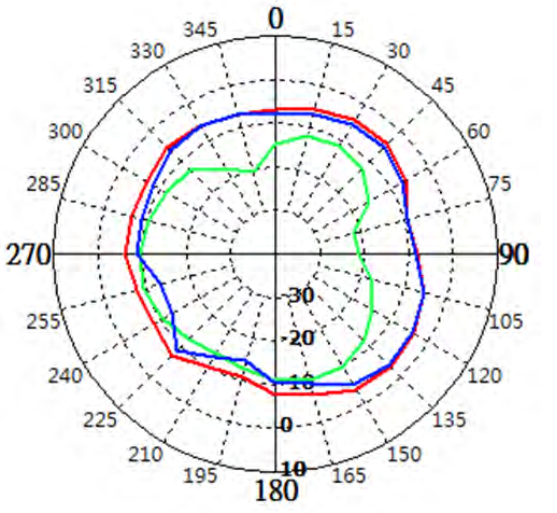

| Center Frequency | **830MHz** |
|---|---|
| Horizontal (dBi) peak | -9.59 |
| Vertical (dBi) peak | -3.92 |

**832MHz**



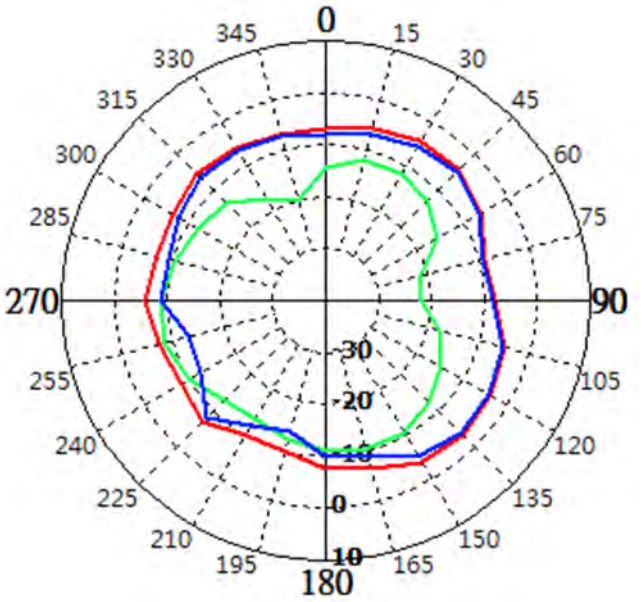

| Center Frequency | **832MHz** |
|---|---|
| Horizontal (dBi) peak | -9.36 |
| Vertical (dBi) peak | -3.79 |

**837MHz**



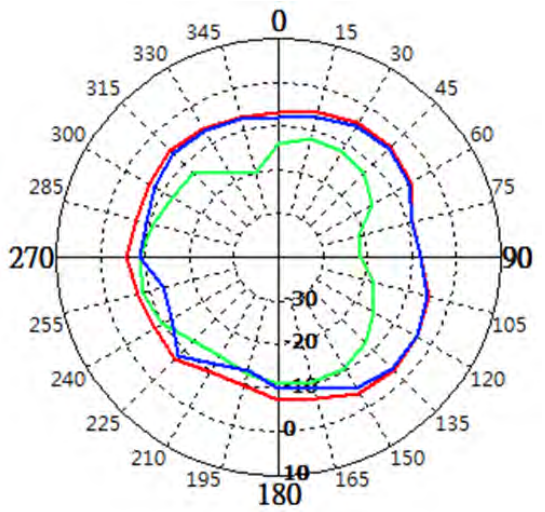

| Center Frequency | **837MHz** |
|---|---|
| Horizontal (dBi) peak | -9.23 |
| Vertical (dBi) peak | -3.85 |

**845MHz**



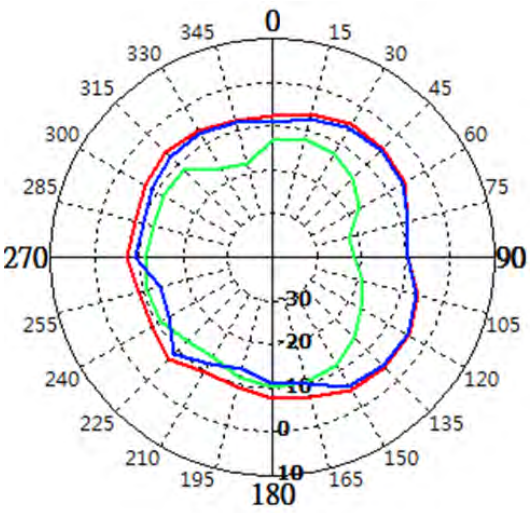

| Center Frequency | **845MHz** |
|---|---|
| Horizontal (dBi) peak | -8.66 |
| Vertical (dBi) peak | -3.9 |

**849MHz**



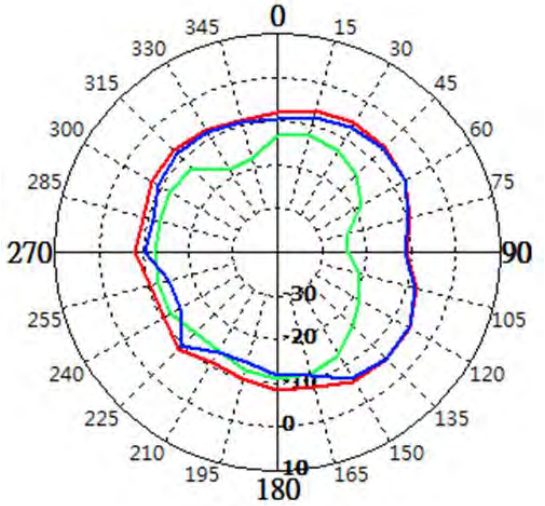

| Center Frequency | **849MHz** |
|---|---|
| Horizontal (dBi) peak | -8.44 |
| Vertical (dBi) peak | -3.86 |

**880MHz**



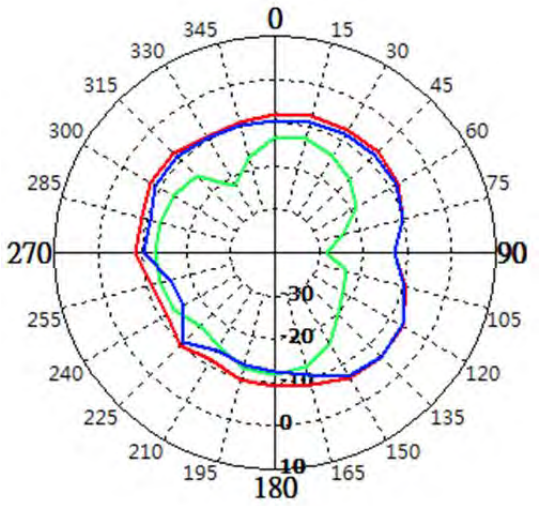

| Center Frequency | **880MHz** |
|---|---|
| Horizontal (dBi) peak | -10.37 |
| Vertical (dBi) peak | -4.75 |

**894MHz**



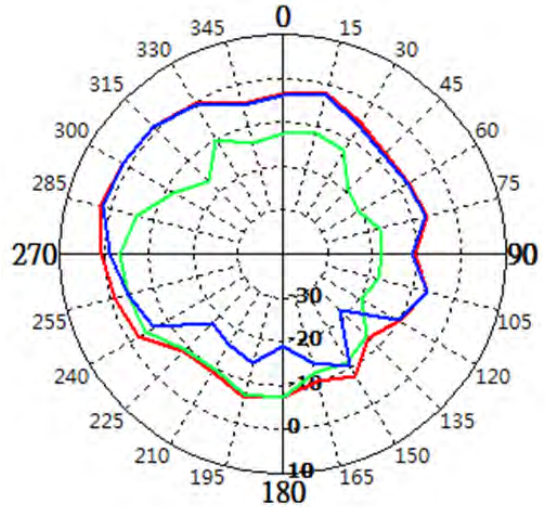

| Center Frequency | **894MHz** |
|---|---|
| Horizontal (dBi) peak | -11.22 |
| Vertical (dBi) peak | -5.63 |

**915MHz**



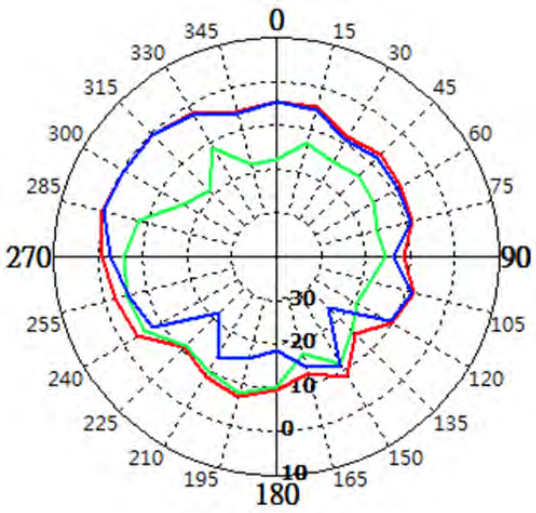

| Center Frequency | **915MHz** |
|---|---|
| Horizontal (dBi) peak | -11.97 |
| Vertical (dBi) peak | -6.11 |

**1710MHz**



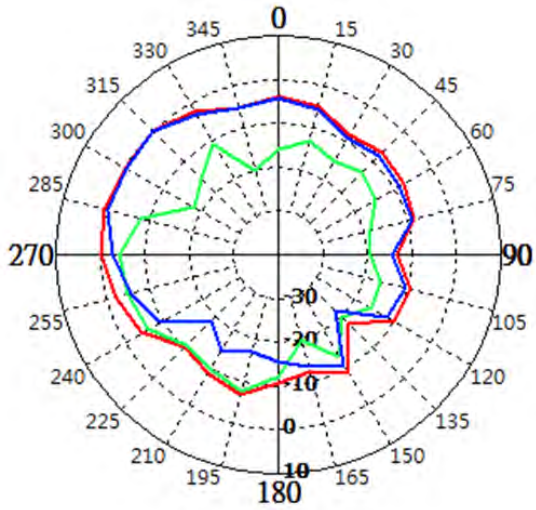

| Center Frequency | **1710MHz** |
|---|---|
| Horizontal (dBi) peak | -3.54 |
| Vertical (dBi) peak | 1.69 |

## 1750MHz



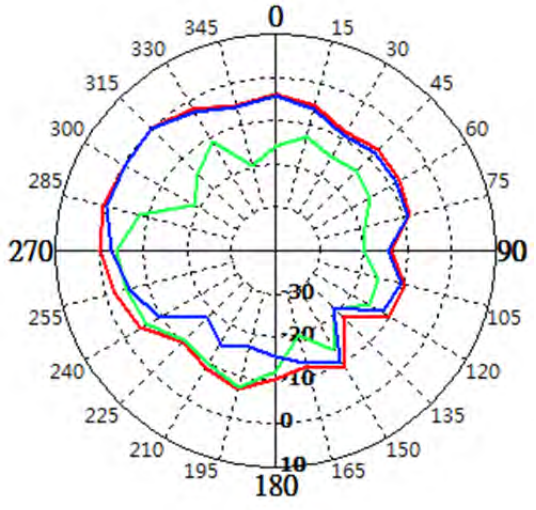

| Center Frequency | **1750MHz** |
|---|---|
| Horizontal (dBi) peak | -5.35 |
| Vertical (dBi) peak | 0.02 |

## 1780MHz



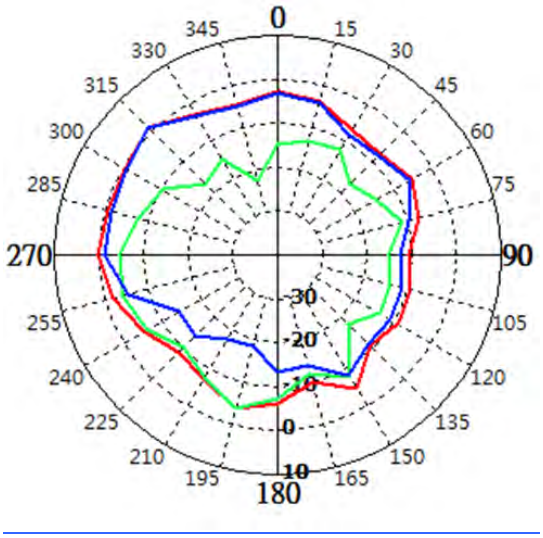

| Center Frequency | **1780MHz** |
|---|---|
| Horizontal (dBi) peak | -4.17 |
| Vertical (dBi) peak | -0.14 |

## 1785MHz



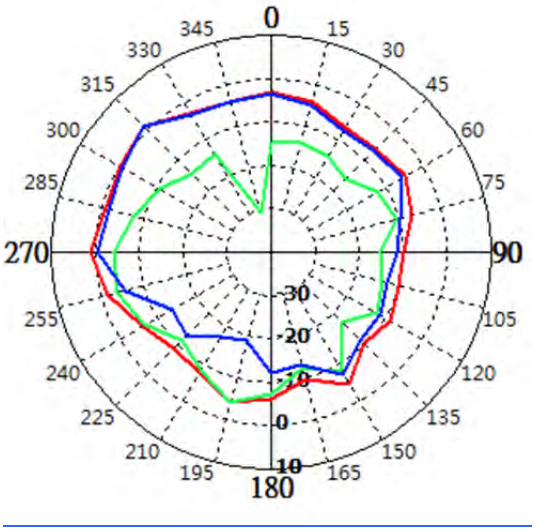

| Center Frequency | **1785MHz** |
|---|---|
| Horizontal (dBi) peak | -3.95 |
| Vertical (dBi) peak | -0.19 |

**1880MHz**



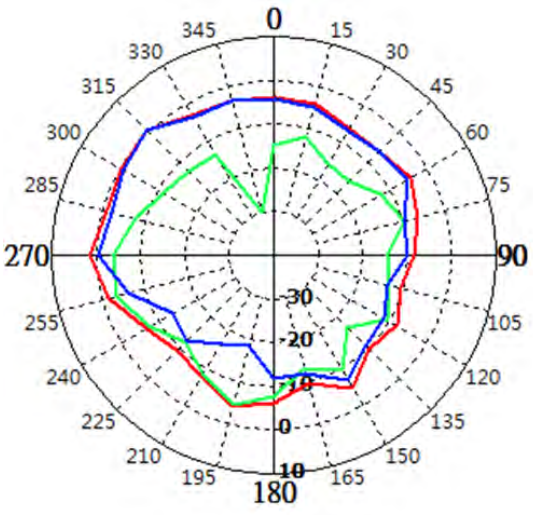

| Center Frequency | **1880MHz** |
|---|---|
| Horizontal (dBi) peak | -3.99 |
| Vertical (dBi) peak | 0.93 |

**1900MHz**



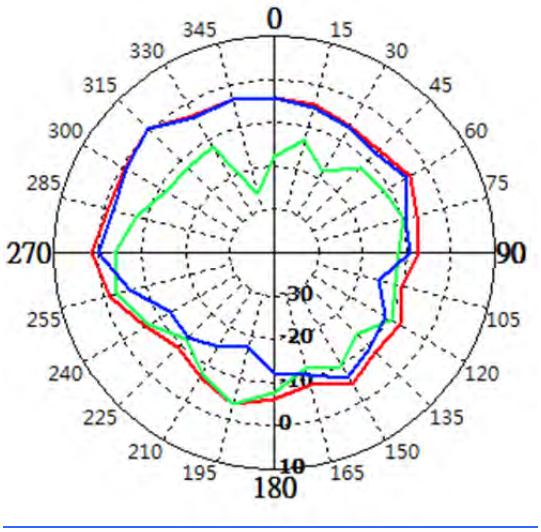

| Center Frequency | **1900MHz** |
|---|---|
| Horizontal (dBi) peak | -3.72 |
| Vertical (dBi) peak | 0.78 |

**1920MHz**



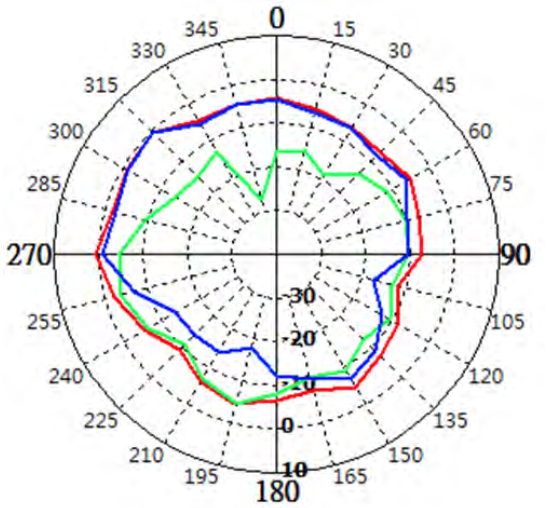

| Center Frequency | **1920MHz** |
|---|---|
| Horizontal (dBi) peak | -3.56 |
| Vertical (dBi) peak | 0.41 |

**1950MHz**



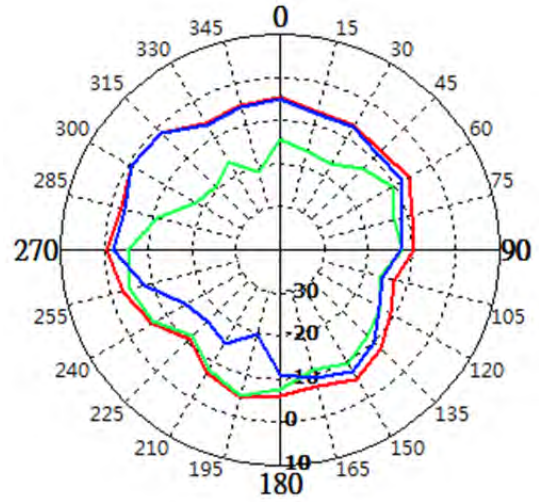

| Center Frequency | **1950MHz** |
|---|---|
| Horizontal (dBi) peak | -3.22 |
| Vertical (dBi) peak | 0.24 |

**1980MHz**



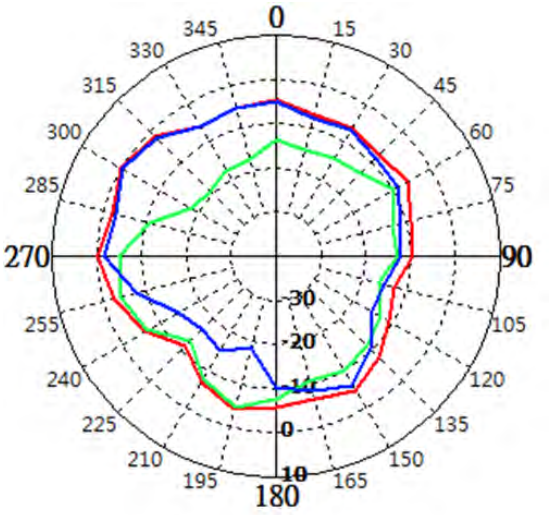

| Center Frequency | **1980MHz** |
|---|---|
| Horizontal (dBi) peak | -3.87 |
| Vertical (dBi) peak | -0.6 |

**2010MHz**



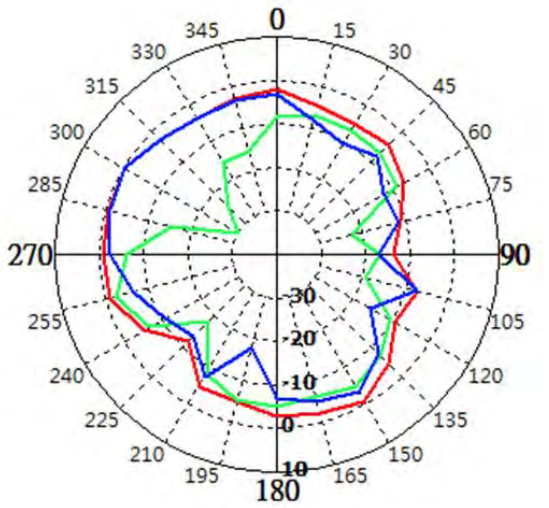

| Center Frequency | **2010MHz** |
|---|---|
| Horizontal (dBi) peak | -4.43 |
| Vertical (dBi) peak | -0.94 |

## 2025MHz



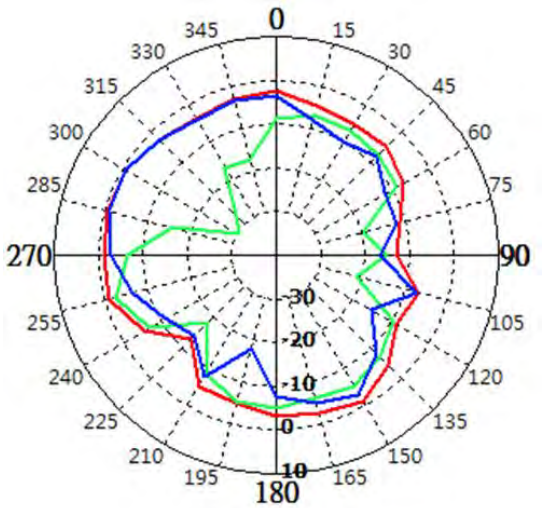

| Center Frequency | **2025MHz** |
|---|---|
| Horizontal (dBi) peak | -4.18 |
| Vertical (dBi) peak | -0.34 |

## 2305MHz



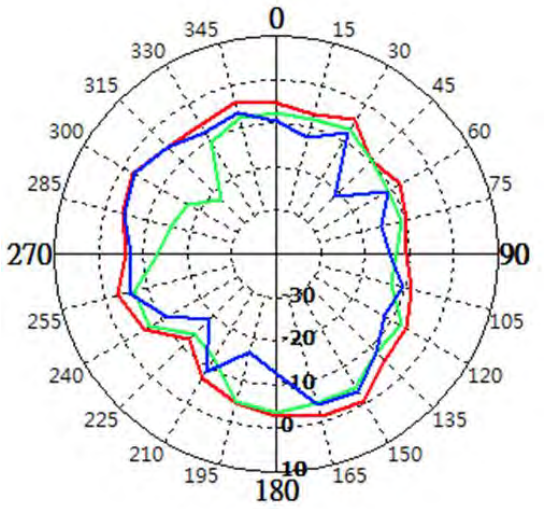

| Center Frequency | **2305MHz** |
|---|---|
| Horizontal (dBi) peak | -2.51 |
| Vertical (dBi) peak | -0.46 |

## 2315MHz



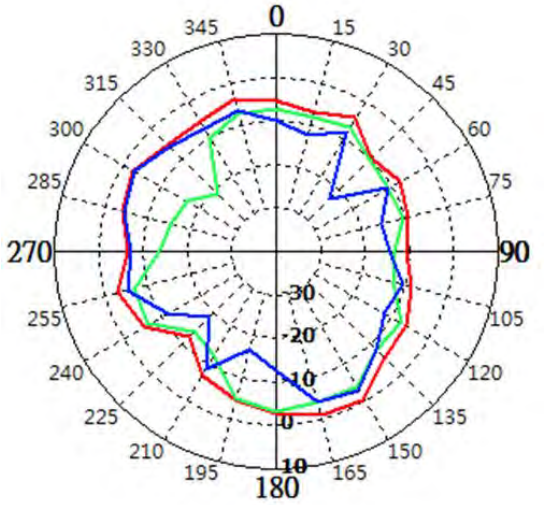

| Center Frequency | **2315MHz** |
|---|---|
| Horizontal (dBi) peak | -2.75 |
| Vertical (dBi) peak | -0.77 |

**2496MHz**



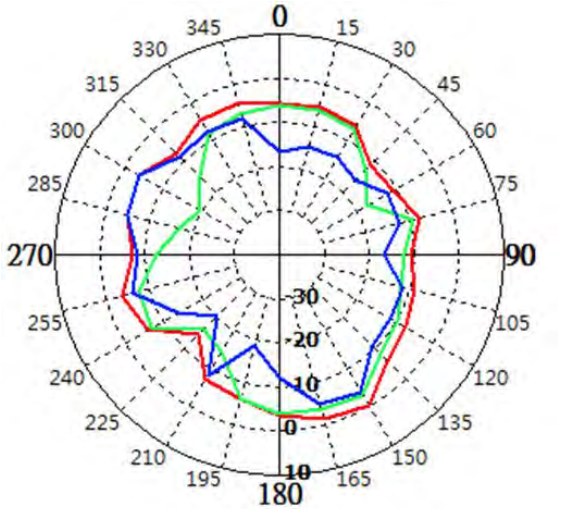

| Center Frequency | **2496MHz** |
|---|---|
| Horizontal (dBi) peak | -3.48 |
| Vertical (dBi) peak | -3.02 |

**2500MHz**



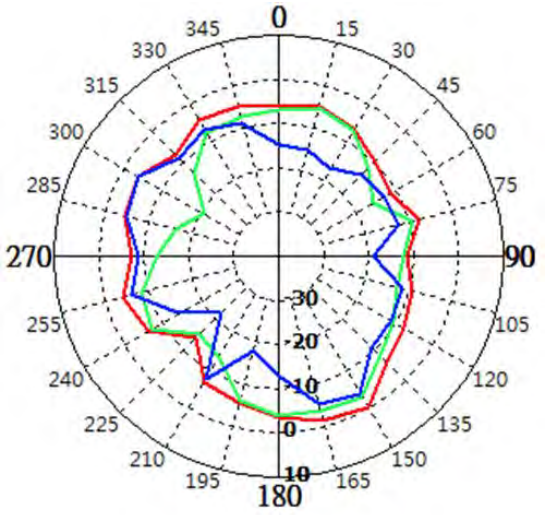

| Center Frequency | **2500MHz** |
|---|---|
| Horizontal (dBi) peak | -3.33 |
| Vertical (dBi) peak | -2.97 |

**2570MHz**



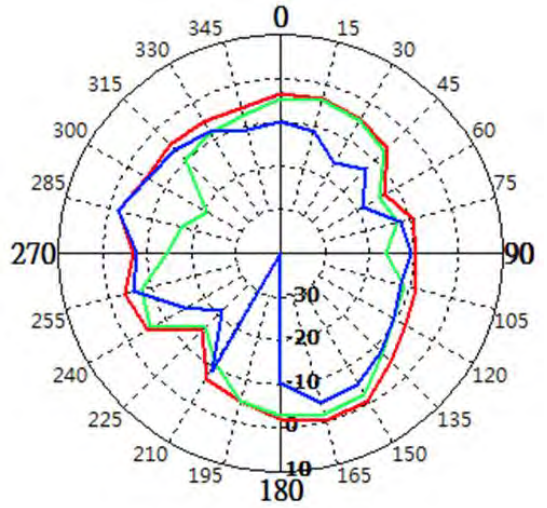

| Center Frequency | **2570MHz** |
|---|---|
| Horizontal (dBi) peak | -2.92 |
| Vertical (dBi) peak | -3.95 |

## 2595MHz



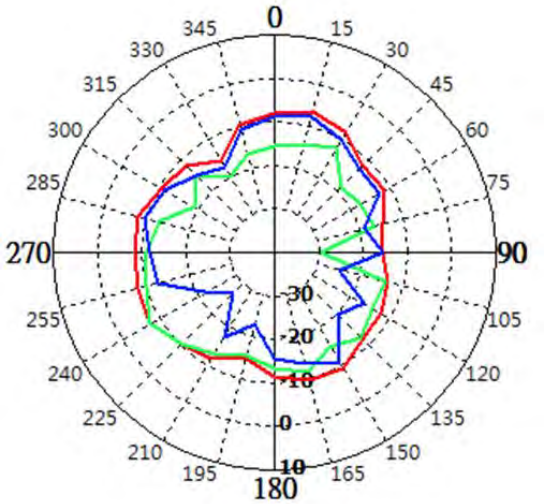

| Center Frequency | **2595MHz** |
|---|---|
| Horizontal (dBi) peak | -3.04 |
| Vertical (dBi) peak | -4.05 |

## 2690MHz



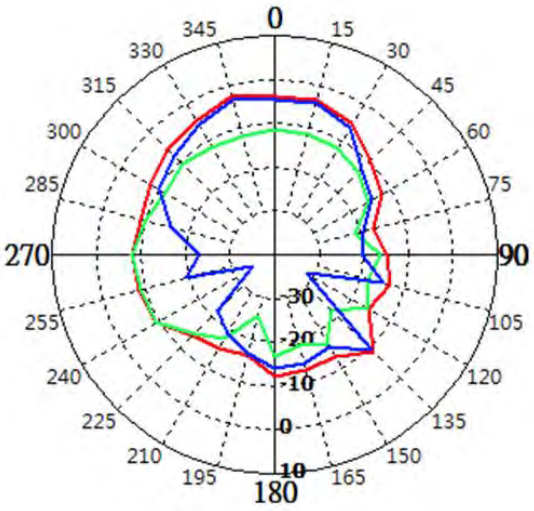

| Center Frequency | **2690MHz** |
|---|---|
| Horizontal (dBi) peak | -2.03 |
| Vertical (dBi) peak | -2.3 |

## 3300MHz



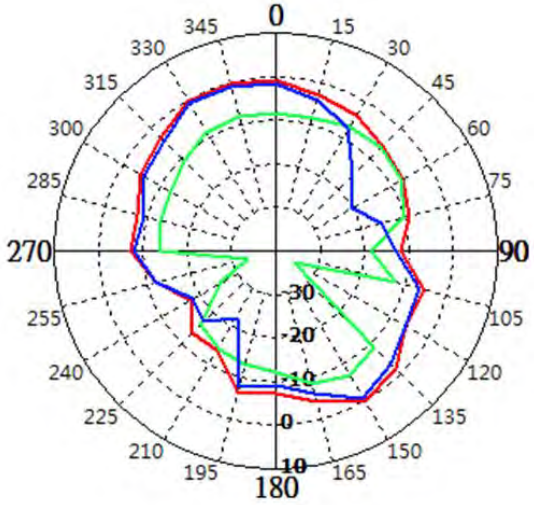

| Center Frequency | **3300MHz** |
|---|---|
| Horizontal (dBi) peak | -7.61 |
| Vertical (dBi) peak | -7.58 |

## 3400MHz



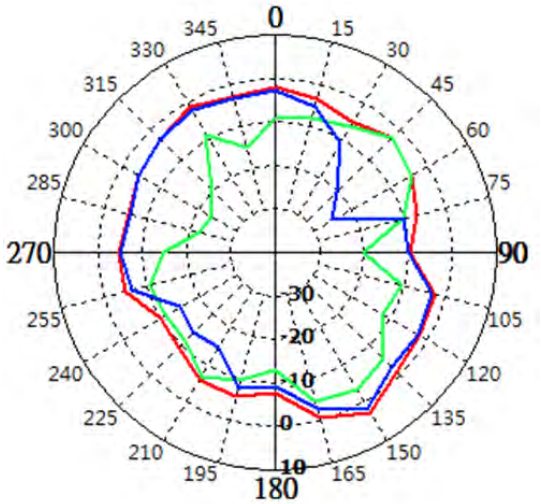

| Center Frequency | **3400MHz** |
|---|---|
| Horizontal (dBi) peak | -8.15 |
| Vertical (dBi) peak | -3.23 |

## 3500MHz



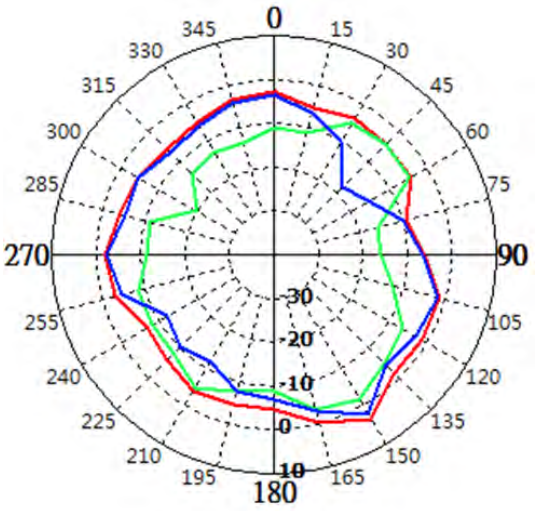

| Center Frequency | **3500MHz** |
|---|---|
| Horizontal (dBi) peak | -6.73 |
| Vertical (dBi) peak | -0.91 |

## 3600MHz



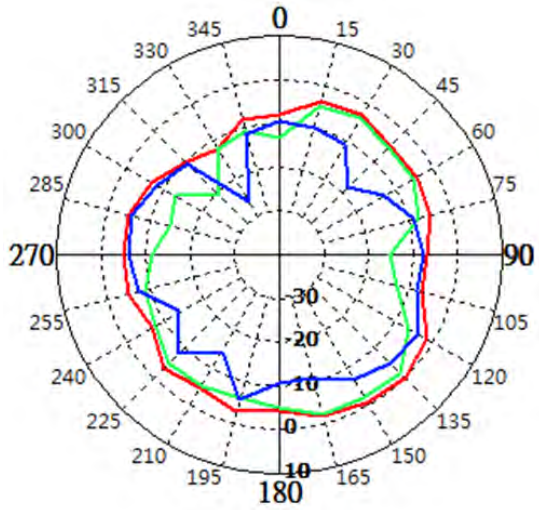

| Center Frequency | **3600MHz** |
|---|---|
| Horizontal (dBi) peak | -2.98 |
| Vertical (dBi) peak | 1.51 |

**3750MHz**



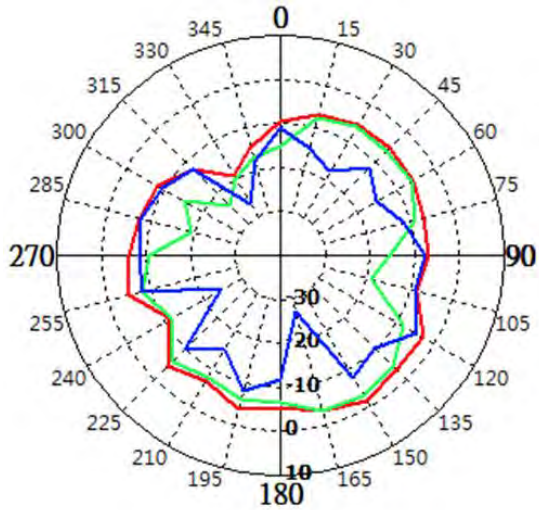

| Center Frequency | **3750MHz** |
|---|---|
| Horizontal (dBi) peak | -1.84 |
| Vertical (dBi) peak | 2.06 |

**4200MHz**



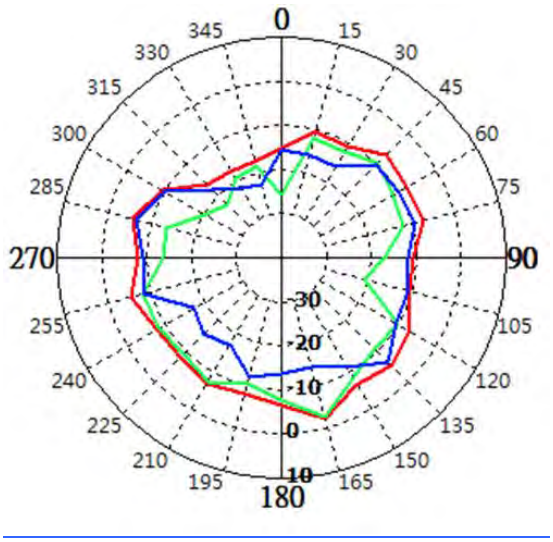

| Center Frequency | **4200MHz** |
|---|---|
| Horizontal (dBi) peak | -1.97 |
| Vertical (dBi) peak | -3.78 |

**4400MHz**



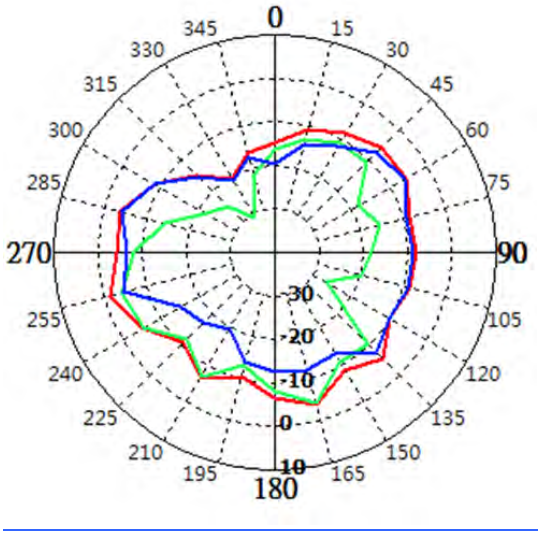

| Center Frequency | **4400MHz** |
|---|---|
| Horizontal (dBi) peak | -2.96 |
| Vertical (dBi) peak | -4.91 |

**4800MHz**



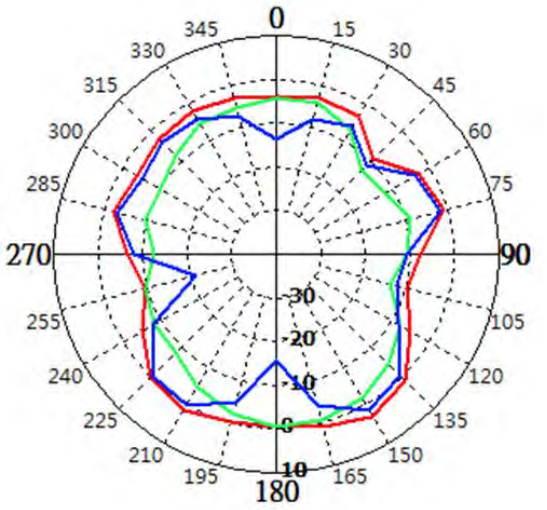

| Center Frequency | **4800MHz** |
|---|---|
| Horizontal (dBi) peak | -2.55 |
| Vertical (dBi) peak | -6.6 |

**5000MHz**



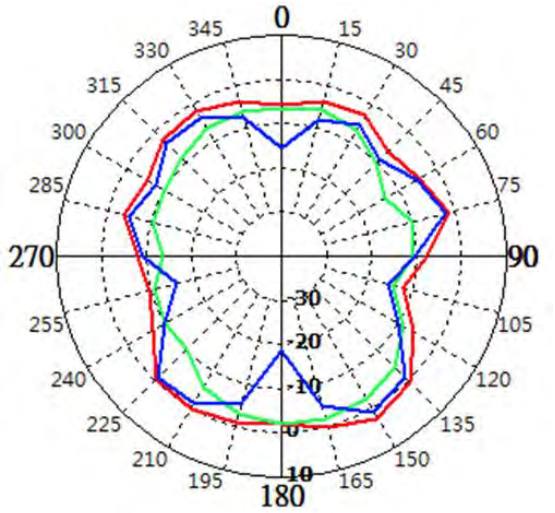

| Center Frequency | **5000MHz** |
|---|---|
| Horizontal (dBi) peak | -4.16 |
| Vertical (dBi) peak | -4.19 |

**Ant8:**
**1710 MHz**



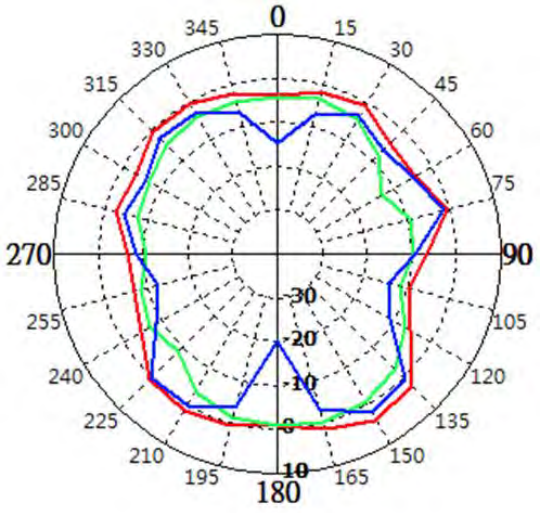

| Center Frequency | **1710MHz** |
|---|---|
| Horizontal (dBi) peak | -0.58 |
| Vertical (dBi) peak | 1.1 |

**1750MHz**



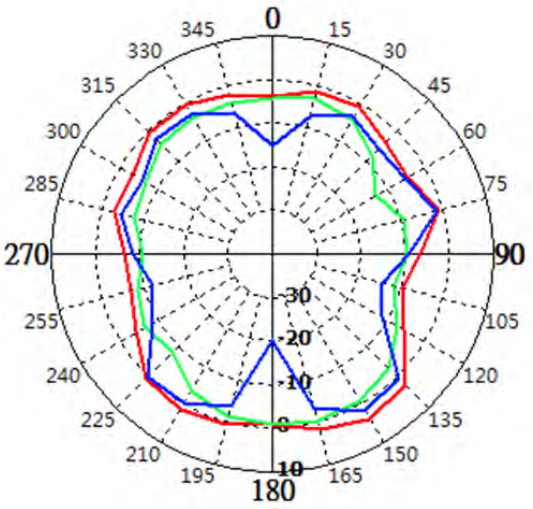

| Center Frequency | **1750MHz** |
|---|---|
| Horizontal (dBi) peak | -1.87 |
| Vertical (dBi) peak | 0.66 |

**1780MHz**



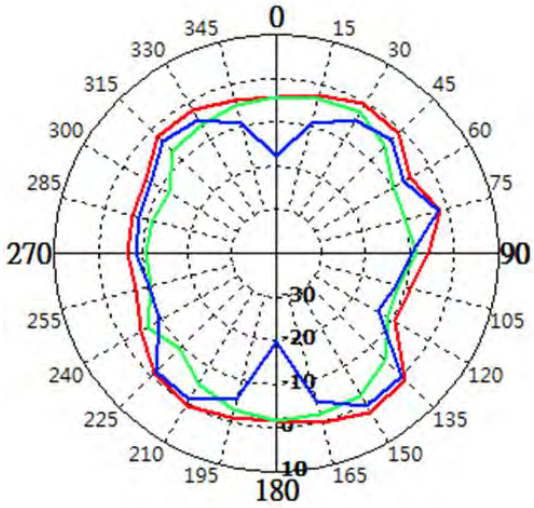

| Center Frequency | **1780MHz** |
|---|---|
| Horizontal (dBi) peak | -0.29 |
| Vertical (dBi) peak | 1.84 |

**1785MHz**



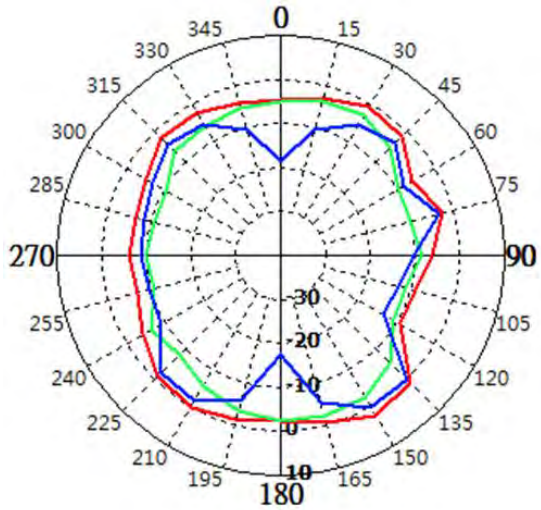

| Center Frequency | **1785MHz** |
|---|---|
| Horizontal (dBi) peak | -0.2 |
| Vertical (dBi) peak | 1.7 |

**1880MHz**



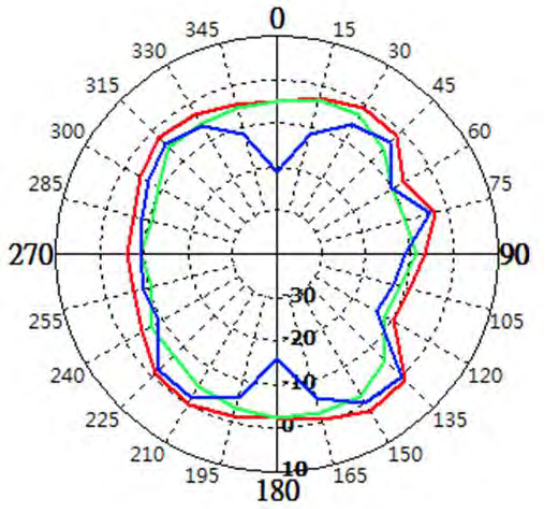

| Center Frequency | **1880MHz** |
|---|---|
| Horizontal (dBi) peak | -1.74 |
| Vertical (dBi) peak | 0.35 |

**1900MHz**



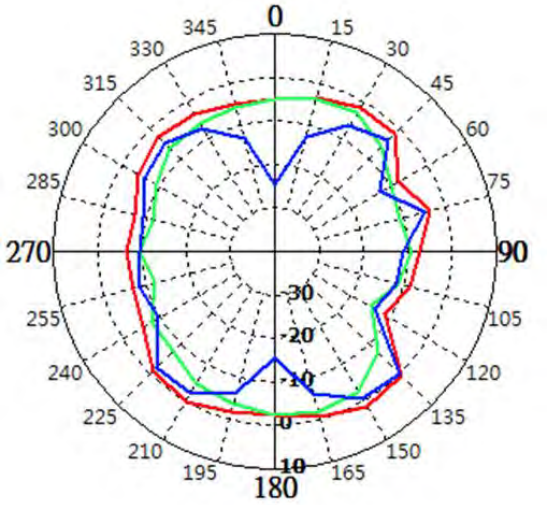

| Center Frequency | **1900MHz** |
|---|---|
| Horizontal (dBi) peak | -2.31 |
| Vertical (dBi) peak | -0.01 |

**1920MHz**



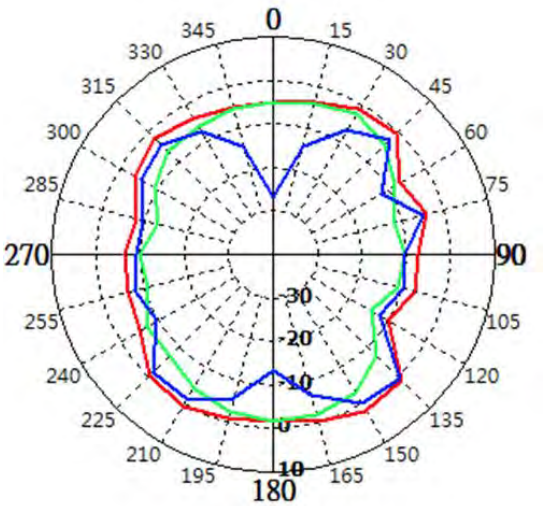

| Center Frequency | **1920MHz** |
|---|---|
| Horizontal (dBi) peak | -2.09 |
| Vertical (dBi) peak | -0.25 |

**1950MHz**



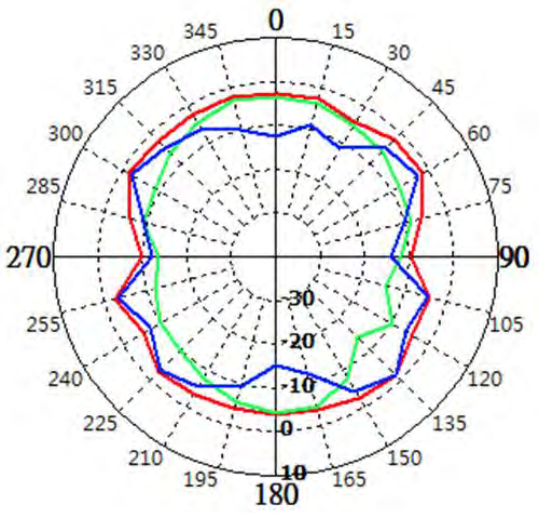

| Center Frequency | **1950MHz** |
|---|---|
| Horizontal (dBi) peak | -1.97 |
| Vertical (dBi) peak | -0.36 |

**1980MHz**



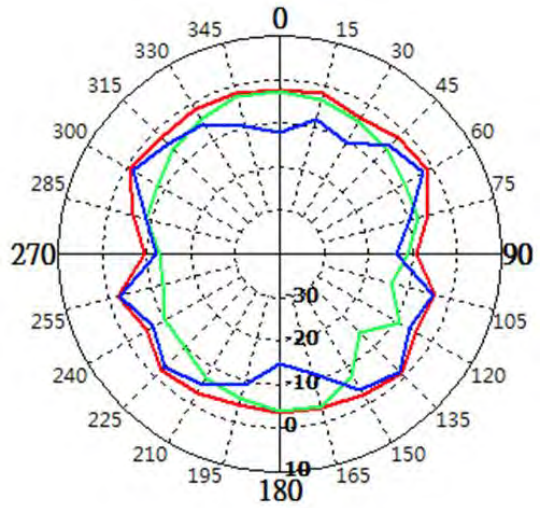

| Center Frequency | **1980MHz** |
|---|---|
| Horizontal (dBi) peak | -1.72 |
| Vertical (dBi) peak | 0.25 |

**2305MHz**



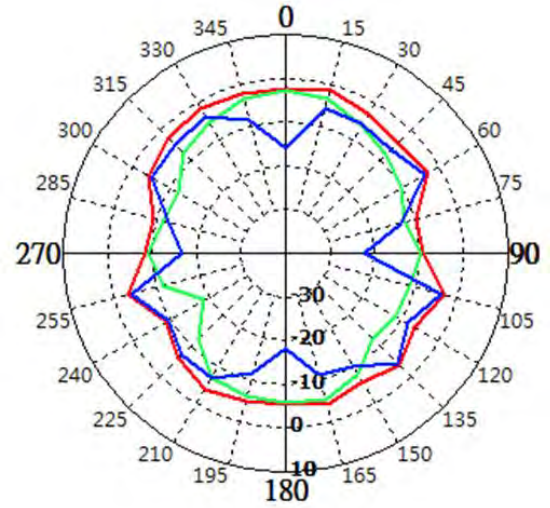

| Center Frequency | **2305MHz** |
|---|---|
| Horizontal (dBi) peak | -2.97 |
| Vertical (dBi) peak | -1.94 |

**2315MHz**



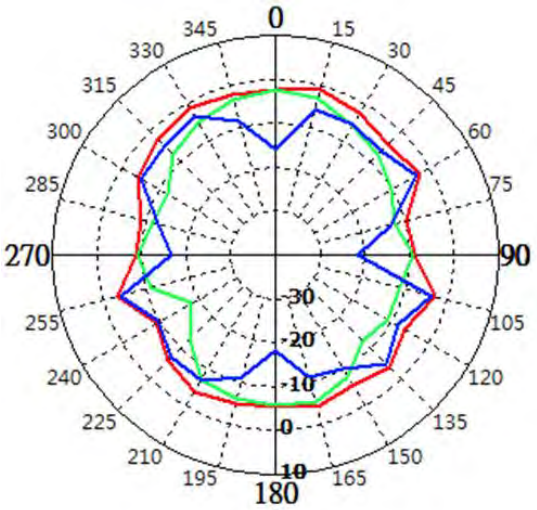

| Center Frequency | **2315MHz** |
|---|---|
| Horizontal (dBi) peak | -2.74 |
| Vertical (dBi) peak | -1.58 |

**2496MHz**



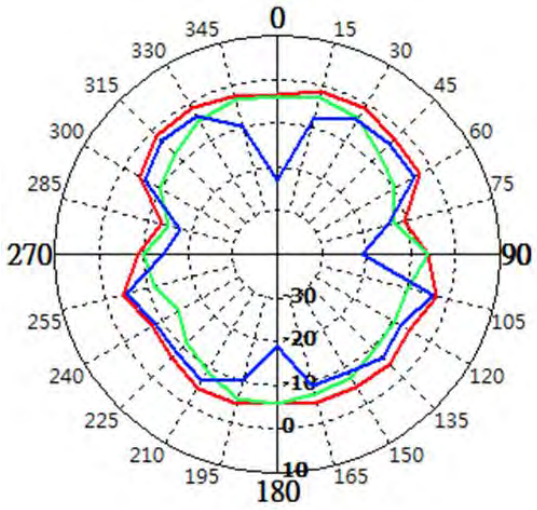

| Center Frequency | **2496MHz** |
|---|---|
| Horizontal (dBi) peak | -2.62 |
| Vertical (dBi) peak | -3.82 |

**2500MHz**



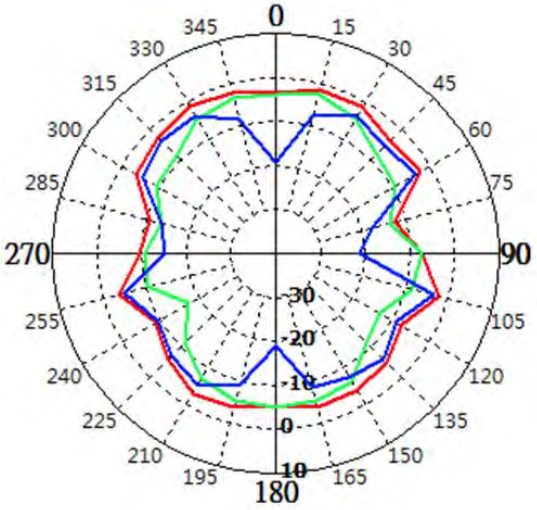

| Center Frequency | **2500MHz** |
|---|---|
| Horizontal (dBi) peak | -2.41 |
| Vertical (dBi) peak | -3.71 |

**2570MHz**



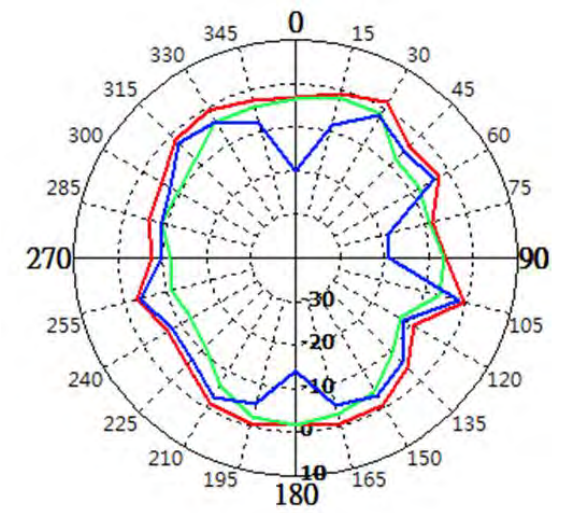

| Center Frequency | **2570MHz** |
|---|---|
| Horizontal (dBi) peak | -2.89 |
| Vertical (dBi) peak | -3.16 |

**2595MHz**



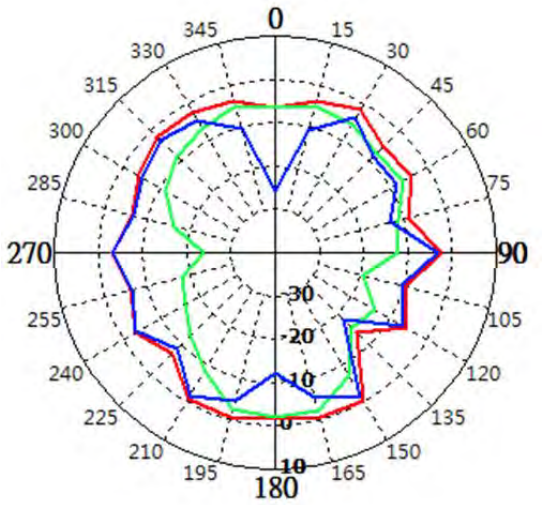

| Center Frequency | **2595MHz** |
|---|---|
| Horizontal (dBi) peak | -2.81 |
| Vertical (dBi) peak | -3.56 |

**2690MHz**



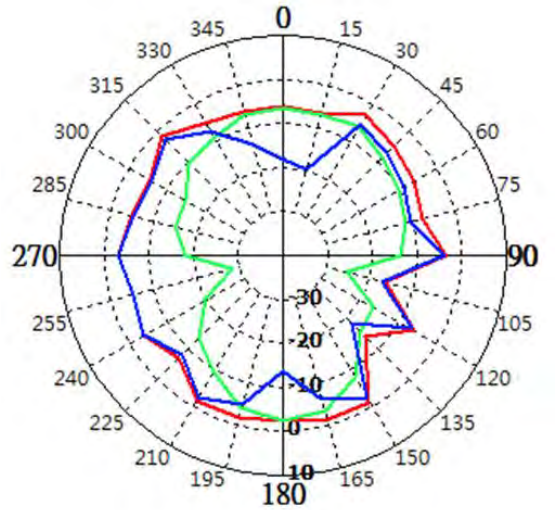

| Center Frequency | **2690MHz** |
|---|---|
| Horizontal (dBi) peak | -1.73 |
| Vertical (dBi) peak | -1.91 |

**3300MHz**



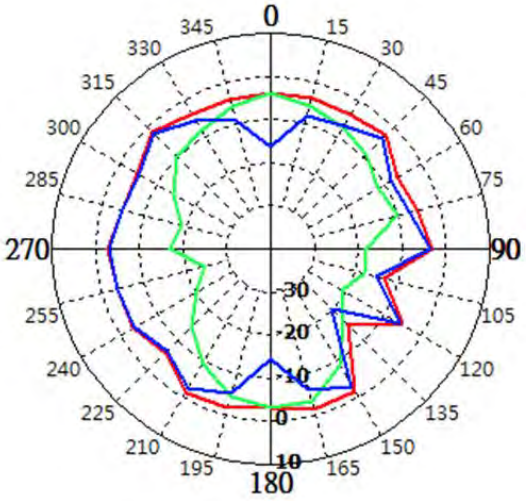

| Center Frequency | **3300MHz** |
|---|---|
| Horizontal (dBi) peak | -1.87 |
| Vertical (dBi) peak | -1.5 |

**3400MHz**



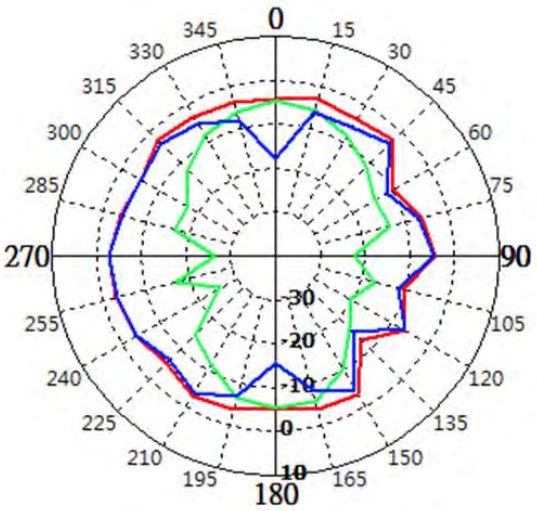

| Center Frequency | **3400MHz** |
|---|---|
| Horizontal (dBi) peak | -2.55 |
| Vertical (dBi) peak | -2.6 |

**3500MHz**



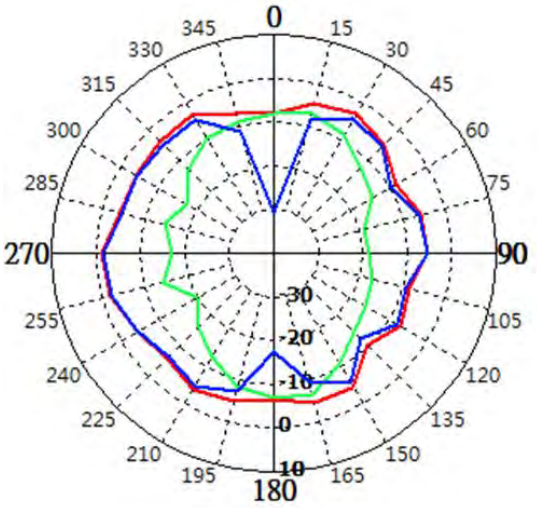

| Center Frequency | **3500MHz** |
|---|---|
| Horizontal (dBi) peak | -3.31 |
| Vertical (dBi) peak | -2.24 |

**3600MHz**



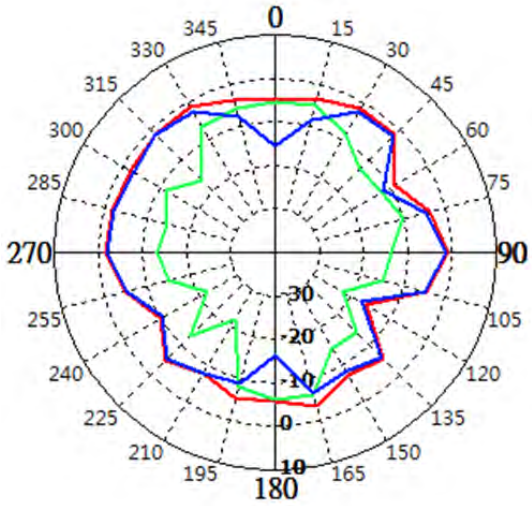

| Center Frequency | **3600MHz** |
|---|---|
| Horizontal (dBi) peak | -4.64 |
| Vertical (dBi) peak | -2.74 |

**3750MHz**



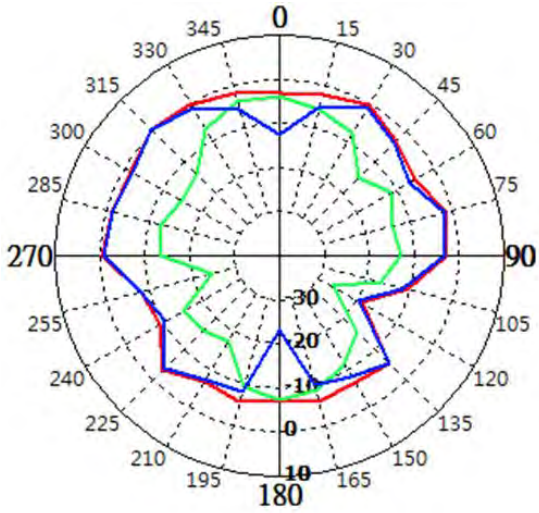

| Center Frequency | **3750MHz** |
|---|---|
| Horizontal (dBi) peak | -6.41 |
| Vertical (dBi) peak | -1.53 |

**4200MHz**



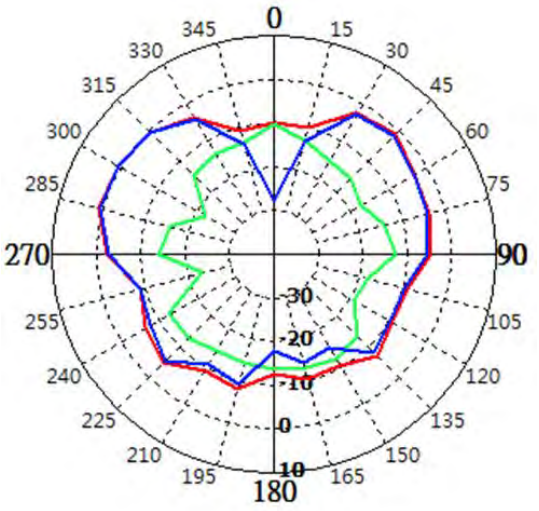

| Center Frequency | **4200MHz** |
|---|---|
| Horizontal (dBi) peak | -5.13 |
| Vertical (dBi) peak | -1.13 |

**4400MHz**



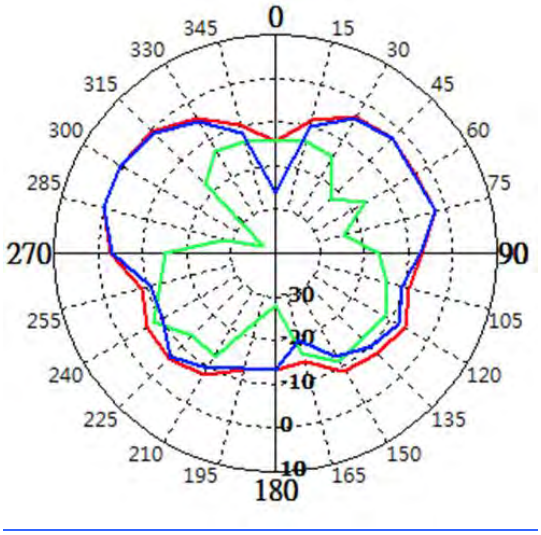

| Center Frequency | **MHz** |
|---|---|
| Horizontal (dBi) peak | -3.75 |
| Vertical (dBi) peak | 0.3 |

**4800MHz**




| Center Frequency | **MHz** |
|---|---|
| Horizontal (dBi) peak | -10.18 |
| Vertical (dBi) peak | 0.65 |

**5000MHz**

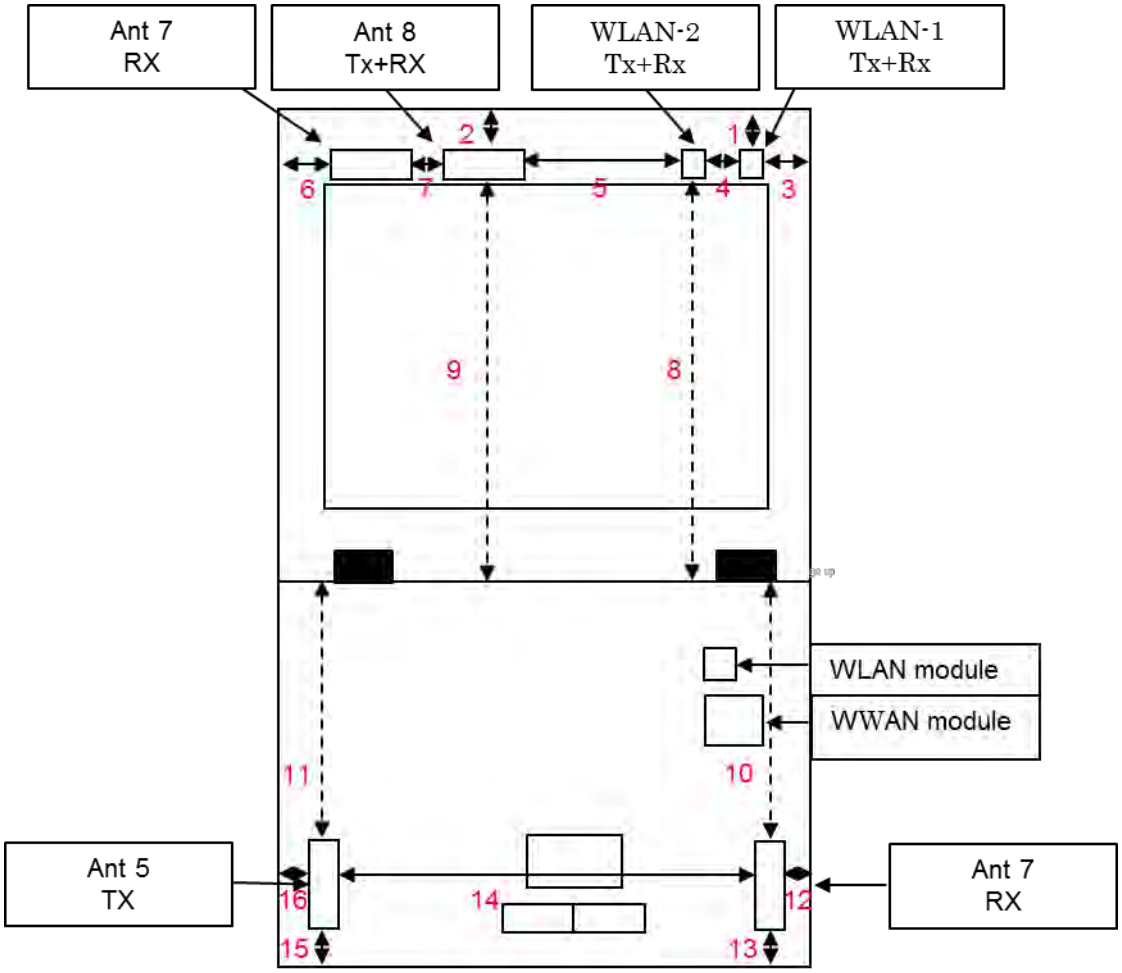



| Center Frequency | **5000MHz** |
|---|---|
| Horizontal (dBi) peak | -8.52 |
| Vertical (dBi) peak | 0.2 |

# Section 4. Host Platform Information

## OEM / ODM Host platform: Example (Quanta/Rainer 1.0) platform correlated to antenna data

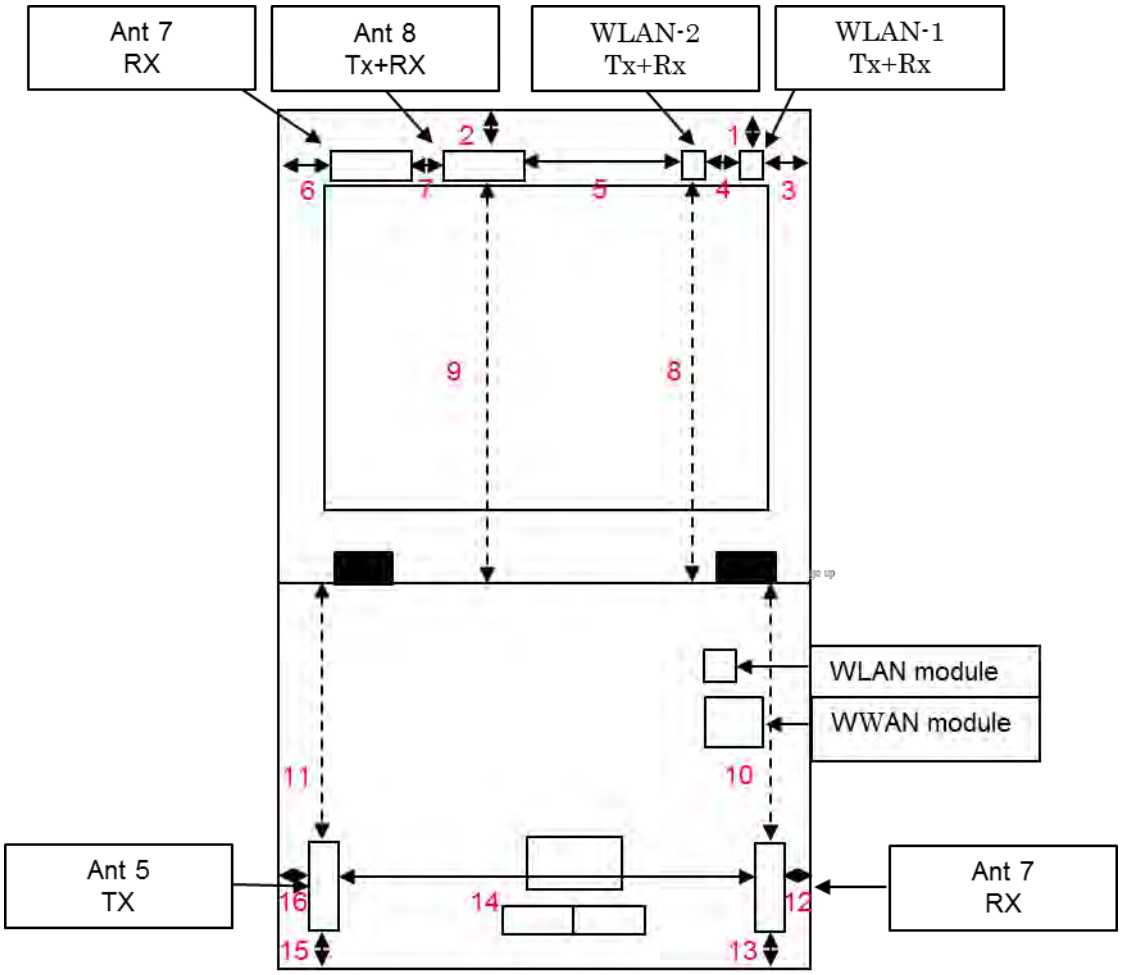
**Rating Label Photo:**



## Section 5. Antenna Host Platform Location Information

Include a **dimensioned photo(s) or dimensioned drawing(s)** of Ant5,Ant6,Ant7,Ant8 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.

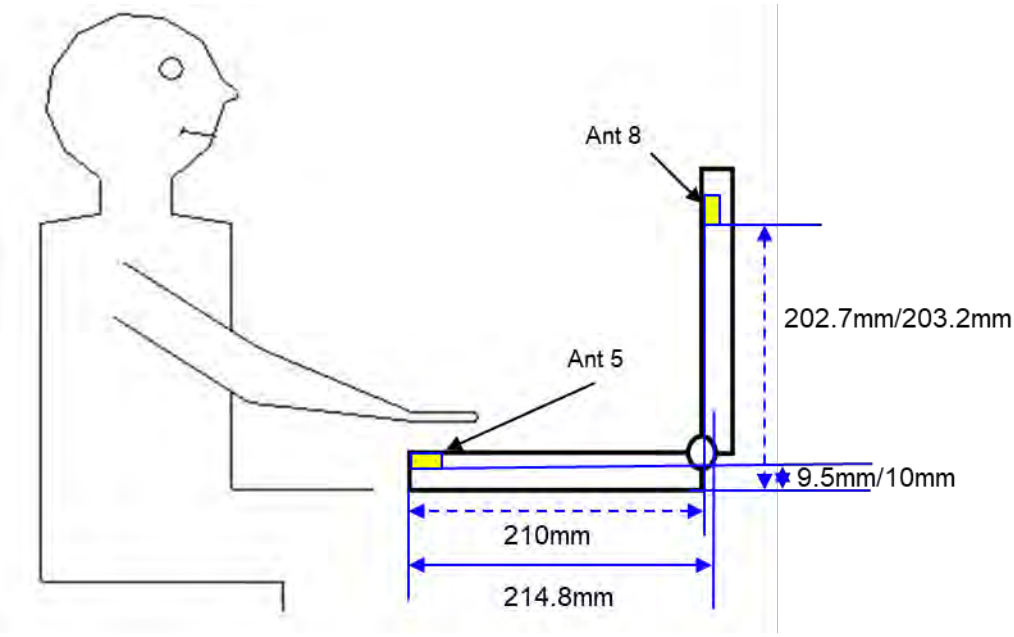
Example:




| Dimension: (mm) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | 3.1 | 2.1 | 4 | 19 | 92 | 4 | 18.5 | 201.8 |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| | 201.8 | 141.2 | 141.2 | 3 | 9.7 | 284 | 9.7 | 3 |

## Section 6. 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 (excluding hands, wrist, feet, and ankle). 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.




Ant 5
Without rubber foot: 9.5 mm
With rubber foot: 10 mm

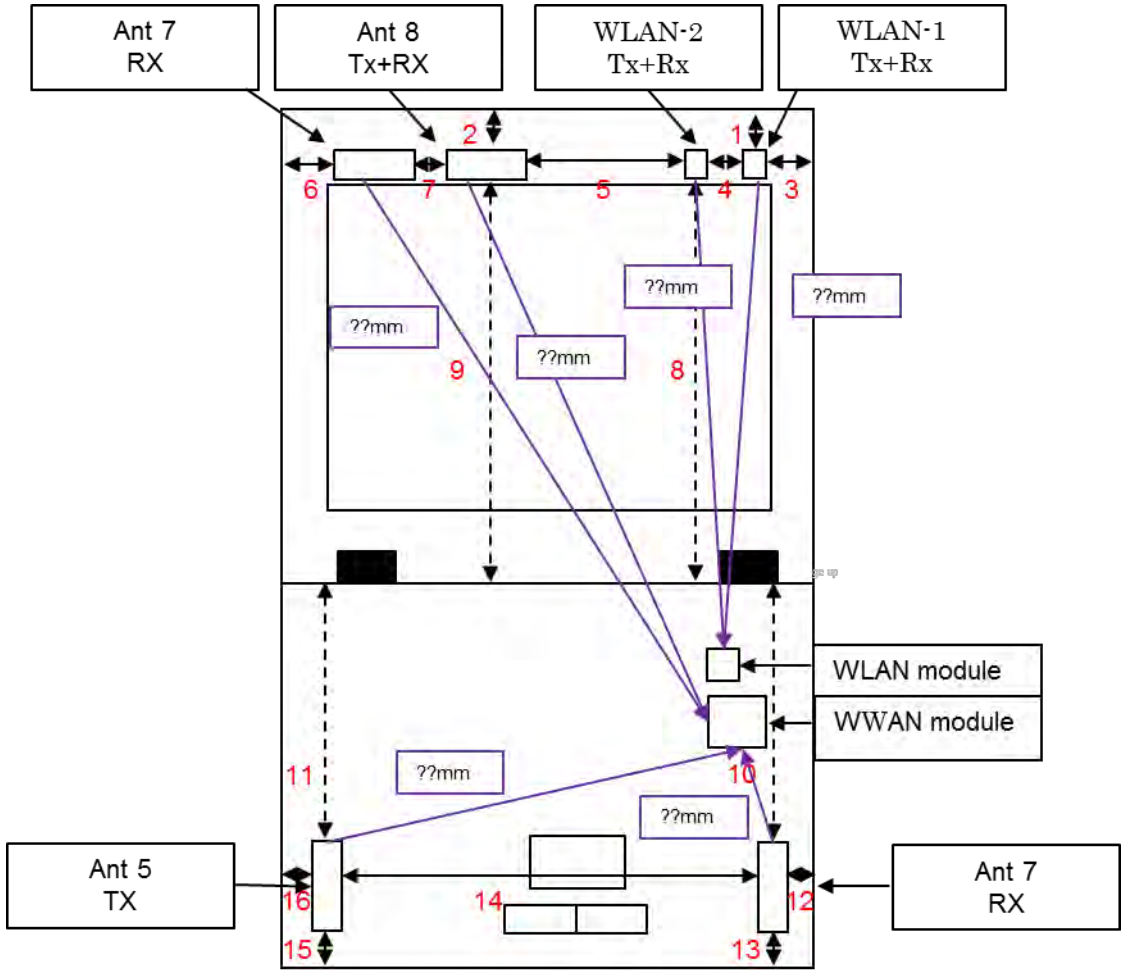
Ant 8
Without rubber foot: 202.7 mm
With rubber foot: 203.2 mm

# Section 7. 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,..

Example:

**(Note: Due to the evolving rules regarding co-location, each platform will need to be reviewed on a case by case basis)**




| | | |
|---|---|---|
| NB Dimension: (mm) | WWAN module to ANT5 | 50.8 |
| | WWAN module to ANT6 | 231 |
| | WWAN module to ANT7 | 281.8 |
| | WWAN module to ANT8 | 241.8 |
| | WLAN module to WLAN-1 | 199.5 |
| | WLAN module to WLAN-2 | 199.7 |

# Section 8. Local representative contact information

## Local representative contact information is required for regulatory support for target countries below.

| | Local company name | Contact name | Phone number | FAX Number | e-Mail Address | Notes |
|---|---|---|---|---|---|---|
| Argentina | | | | | | |
| Azerbaijan | | | | | | |
| Cambodia | | | | | | |
| Indonesia | | | | | | |
| Israel | | | | | | |
| Malaysia | | | | | | |
| Philippines | | | | | | |
| Singapore | | | | | | Telecommunication Equipment Dealer License Required |
| South Africa | | | | | | |
| USA, Canada | | | | | | |
| Vietnam | | | | | | |