# Regulatory WWAN Antenna Information

**(NB Mode)**

| **Platform information** | | | | |
|---|---|---|---|---|
| **Brand** | **ODM** | **Platform model name** | **Platform type (ex: regular NB, convertible PC, AIO…etc)** | **˙SAR minimum separation (mm)** |
| HP Inc. | Inventec | HSN-I61C | Convertible PC | 219.68mm |

| **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 RX)** | **2310MHz (Ant5 TX/RX)** |
| WNC | PIFA | 6036B0345901 (81ELBA15.G02) | 6036B0346001 (81ELBA15.G01) | 6036B0345601 (81ELBA15.G03) | 6036B0345901 (81ELBA15.G02) | 2.05 dBi |

| **Module information** | |
|---|---|
| **Model** | **Form factor and suffixes ( NGW/ HMW AND AN/ NB/ BN….)** |
| Kahlua | Fibocom FM350-GL-16 WWAN 2x2 LTE radio module |
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| | |
| | |

| **Antenna vendor connect person** | |
|---|---|
| **Antenna Vendor** | WNC |
| **contact person** | Annie Lo |
| **E-mail** | annie.lo@wnc.com.tw |
| **Tel/Mobile** | 886-3-666-7799 ext: 3415 |
| **Web address** | https://www.wnc.com.tw |
| **Address** | 20 Park Avenue II, Hsinchu Science Park Hsinchu 300, Taiwan |

# 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 |

Test location: 1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road Neihu District, Taipei City 11493, Taiwan
Testing date: 2023/10/26

Equipment list

| Equipment Description | Manufacturer | Identification no. | Current calibration date | Next calibration date |
|---|---|---|---|---|
| Network analyzer | Agilent | E5071C | 2023/01/7 | 2024/01/6 |
| Measurement software | ETS-Lindgren | EMQuest | N/A | N/A |
| Multi axis positioning system(MAPSTM) | ETS-Lindgren | EMCO 2115 | N/A | N/A |
| Multi axis positioning system(MAPSTM) | ETS-Lindgren | EMCO 2110 | N/A | N/A |
| MAPSTM controller | ETS-Lindgren | EMCO 2090 | N/A | N/A |
| ETS OTA Chamber | ETS-Lindgren | AMS8500 | 2023/03/03 | 2024/03/02 |
| Horn antenna | ETS-Lindgren | 3164-10 | 2023/03/03 | 2024/03/02 |

Note: Chamber calibration included full set of implement

# Antenna Information
## Section 1. Antenna Assembly Specifications

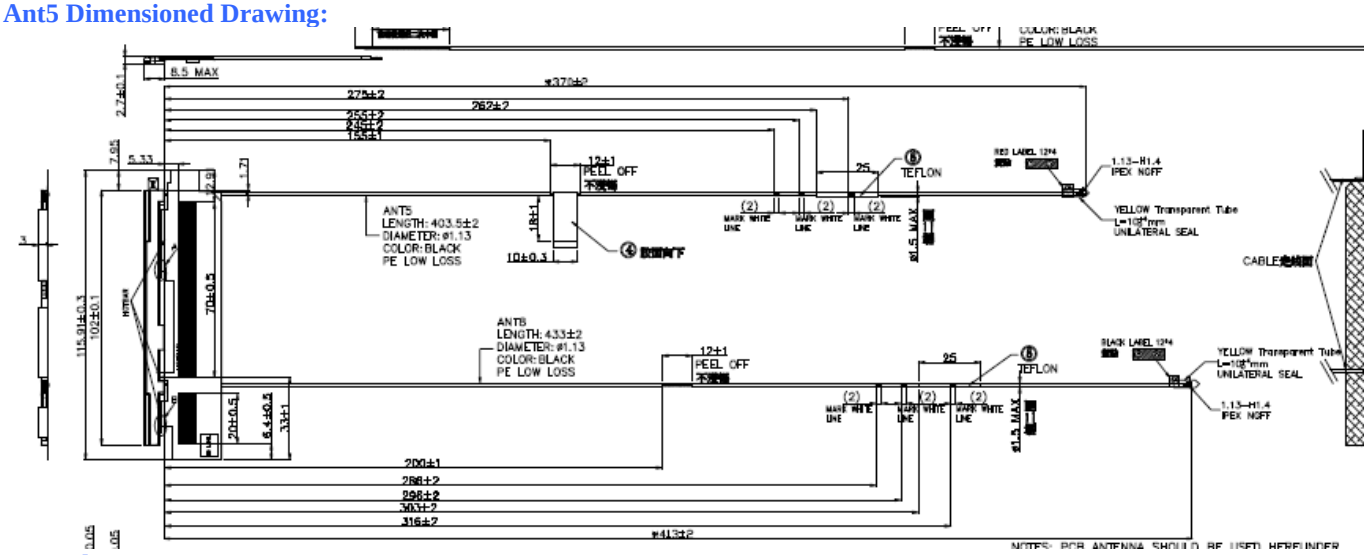
| Communication System | Band | Frequency(MHz) from low to high spectrum | | 1A Part Number for Antenna Assembly | 1B Antenna Manufacturer Name | 1C Description of Antenna Type | 1D Tx Antenna Gain(dBi) Ant5 |
|---|---|---|---|---|---|---|---|
| WCDMA/ LTE | 1 | 1920 | 1980 | Ant5 : 81ELBA15.G02 | WNC | PIFA | 0.24 |
| WCDMA/ LTE | 2 | 1850 | 1910 | | | | 0.14 |
| LTE | 3 | 1710 | 1785 | | | | -0.43 |
| WCDMA/ LTE | 4 | 1710 | 1755 | | | | -0.43 |
| WCDMA/ LTE | 5 | 824 | 849 | | | | -1.33 |
| LTE | 7 | 2500 | 2570 | | | | -0.43 |
| WCDMA/ LTE | 8 | 880 | 915 | | | | -2.15 |
| LTE | 12 | 699 | 716 | | | | -1.56 |
| LTE | 13 | 777 | 787 | | | | -1.44 |
| LTE | 14 | 788 | 798 | | | | -1.07 |
| LTE | 17 | 704 | 716 | | | | -1.56 |
| LTE | 18 | 815 | 830 | | | | -1.29 |
| LTE | 19 | 830 | 845 | | | | -1.37 |
| LTE | 20 | 832 | 862 | | | | -1.53 |
| LTE | 25 | 1850 | 1915 | | | | 0.14 |
| LTE | 26 | 814 | 849 | | | | -1.16 |
| LTE | 28 | 703 | 748 | | | | -0.82 |
| LTE | 30 | 2305 | 2315 | | | | 0.95 |
| LTE | 34 | 2010 | 2025 | | | | -0.41 |
| LTE | 38 | 2570 | 2620 | | | | 1.34 |
| LTE | 39 | 1880 | 1920 | | | | 0.14 |
| LTE | 40 | 2300 | 2400 | | | | 2.05 |
| LTE | 41 | 2496 | 2690 | | | | 1.51 |
| LTE | 42 | 3400 | 3600 | | | | 1.78 |
| LTE | 43 | 3600 | 3800 | | | | 1.78 |
| LTE | 48 | 3550 | 3700 | | | | 0.88 |
| LTE | 66 | 1710 | 1780 | | | | -0.43 |
| LTE | 71 | 663 | 698 | | | | -4.44 |

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

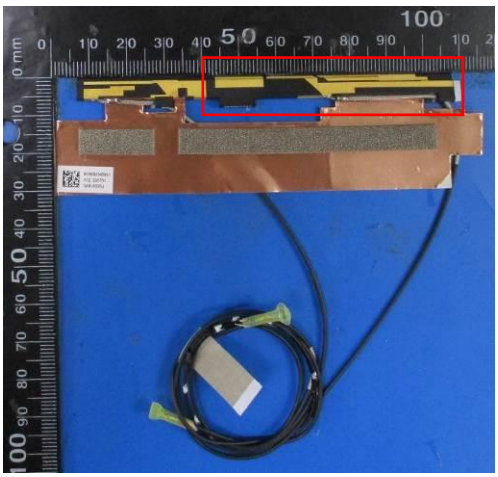
# Section 2. Dimensioned Photos or Drawings of Antennas

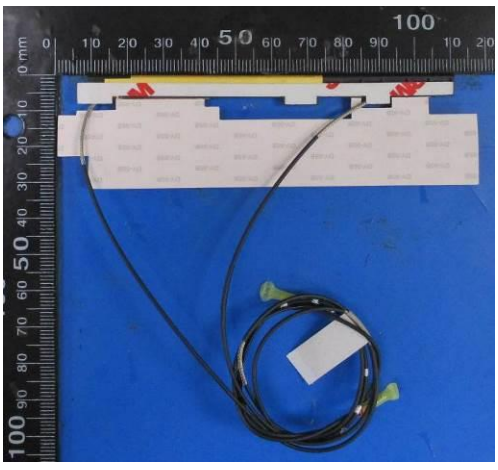
| | Ant supplier | Part number | Drawing | Photo |
|---|---|---|---|---|
| Ant5 | WNC | 81ELBA15.G02 | V | V |
| Ant6 | WNC | 81ELBA15.G01 | V | V |
| Ant7 | WNC | 81ELBA15.G03 | V | V |
| Ant8 | WNC | 81ELBA15.G02 | V | V |

## Ant5 Dimensioned Drawing:

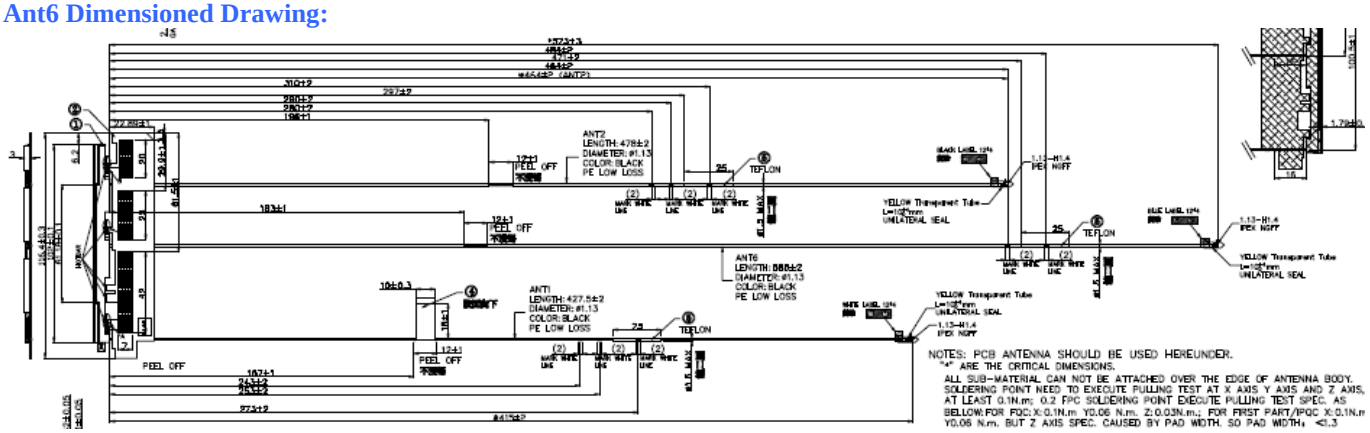



## Ant5 Photo:

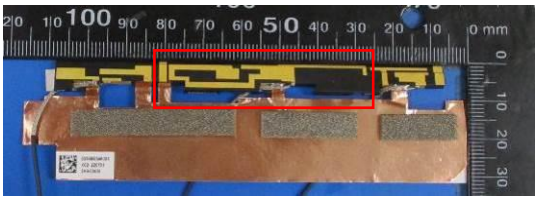


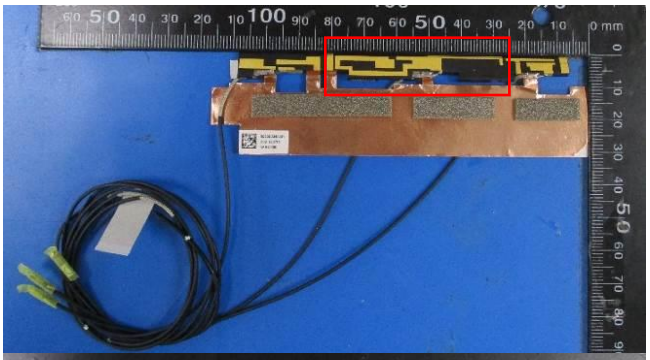


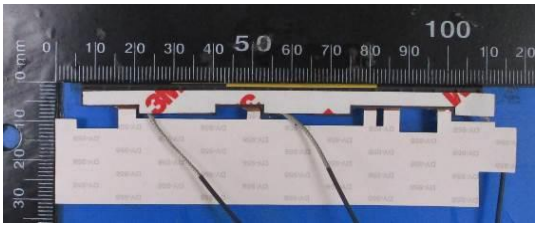
## Ant6 Dimensioned Drawing:



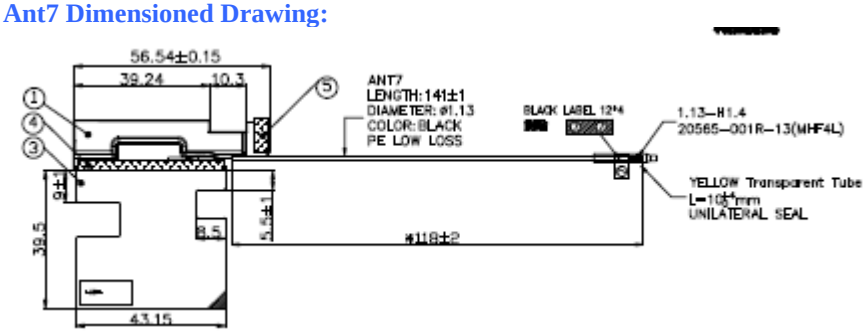

## Ant6 Photo:



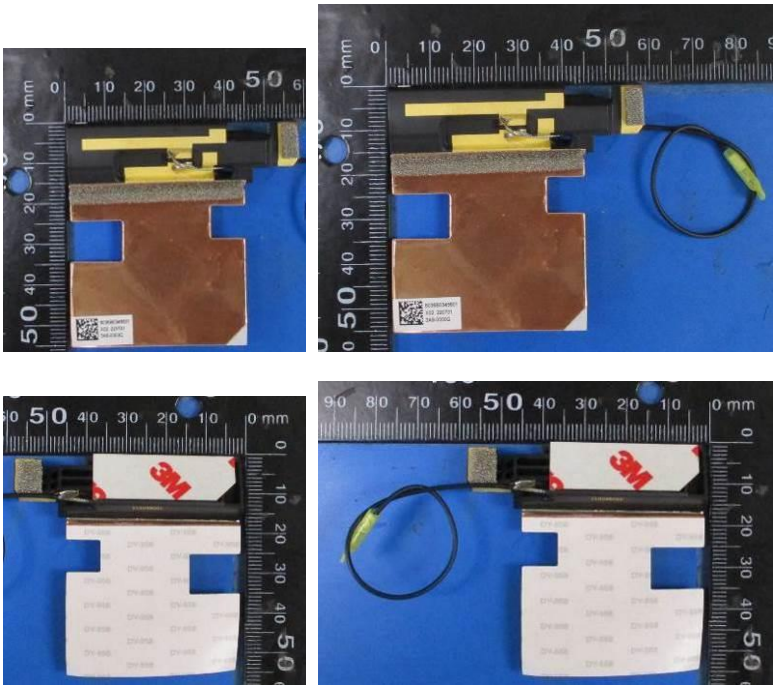




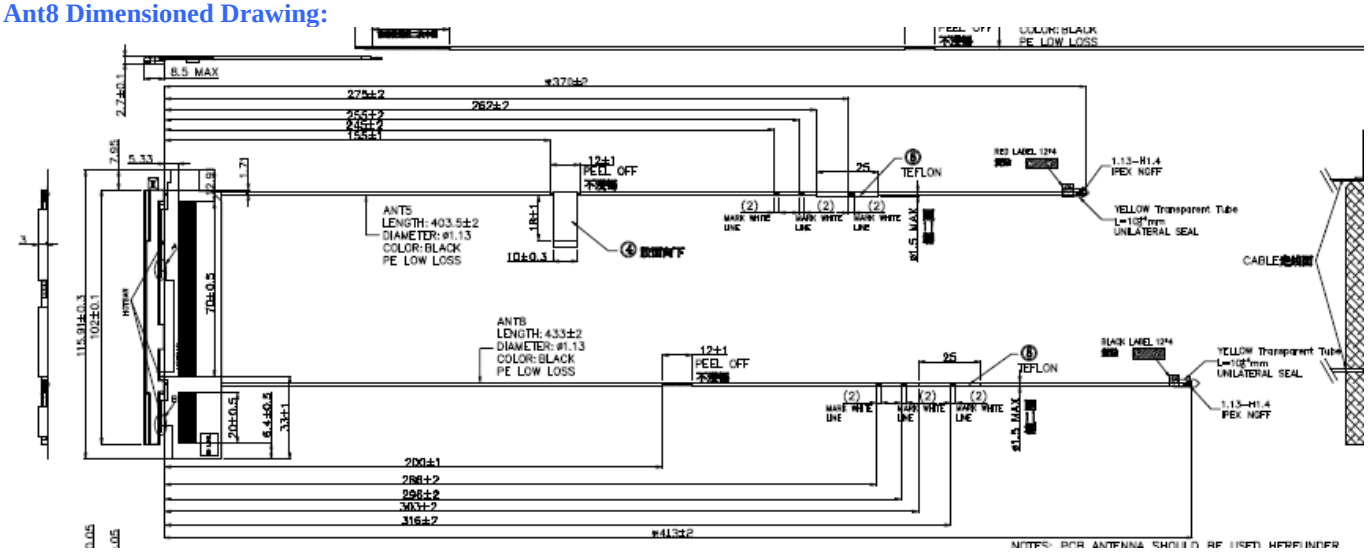
## Ant7 Dimensioned Drawing:



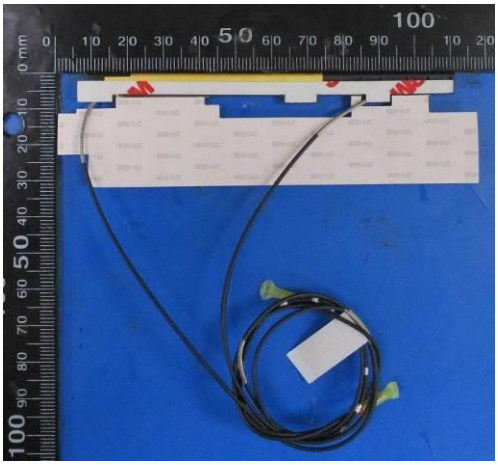

## Ant7 Photo:



## Ant8 Dimensioned Drawing:



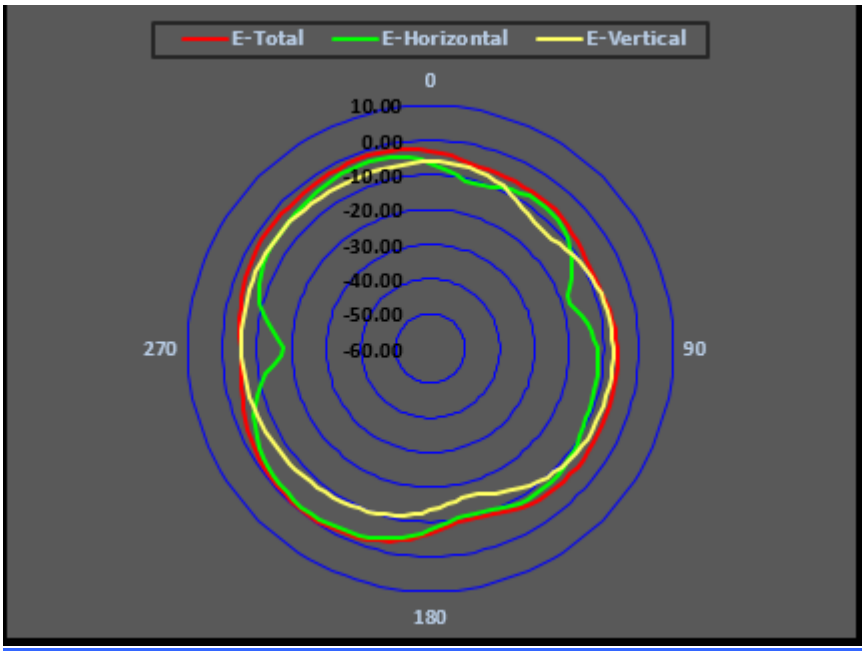

## Ant8 Photo:



**The listed frequency 2D radiation pattern is required**

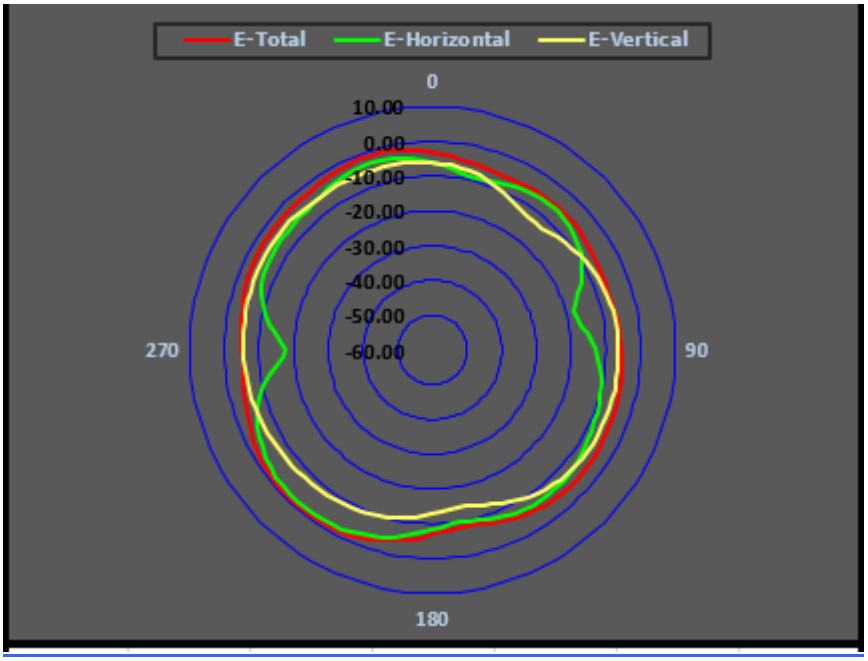
- **Ant5:**

**815MHz**



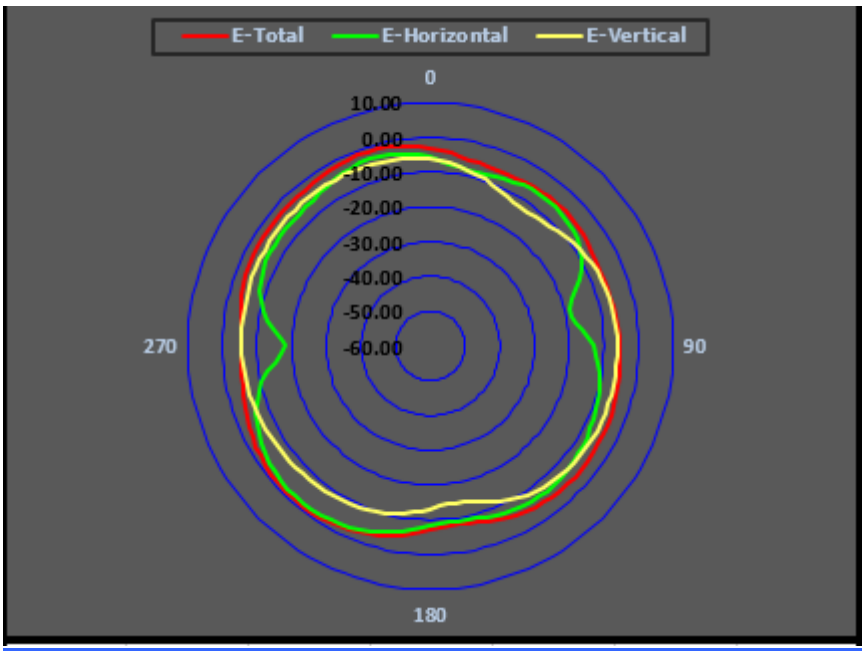

| Center Frequency | **815MHz** |
|---|---|
| Horizontal (dBi) peak | -1.16 |
| Vertical (dBi) peak | -4.98 |

## 832MHz



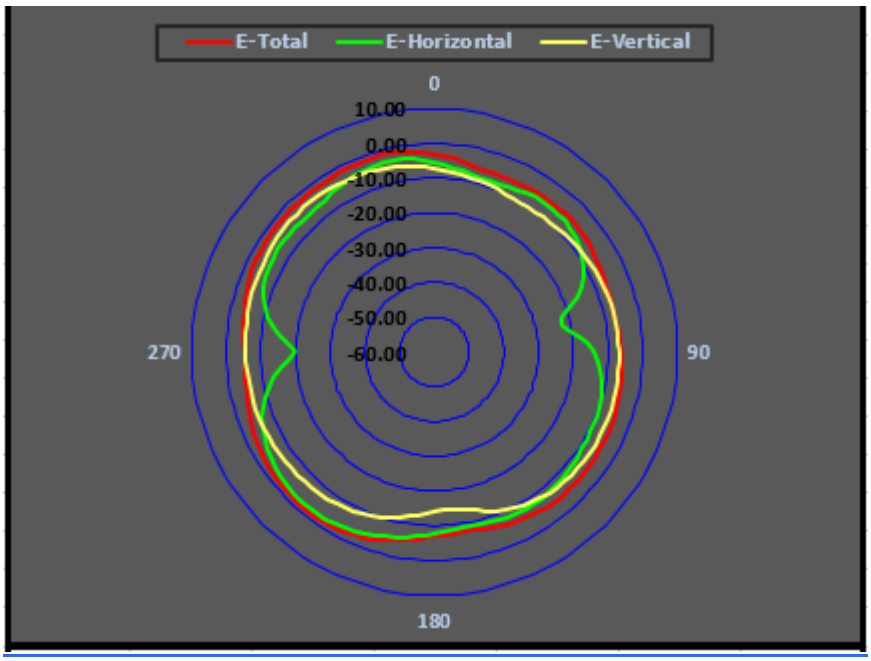

| Center Frequency | **832MHz** |
|---|---|
| Horizontal (dBi) peak | -1.53 |
| Vertical (dBi) peak | -4.68 |

## 837MHz



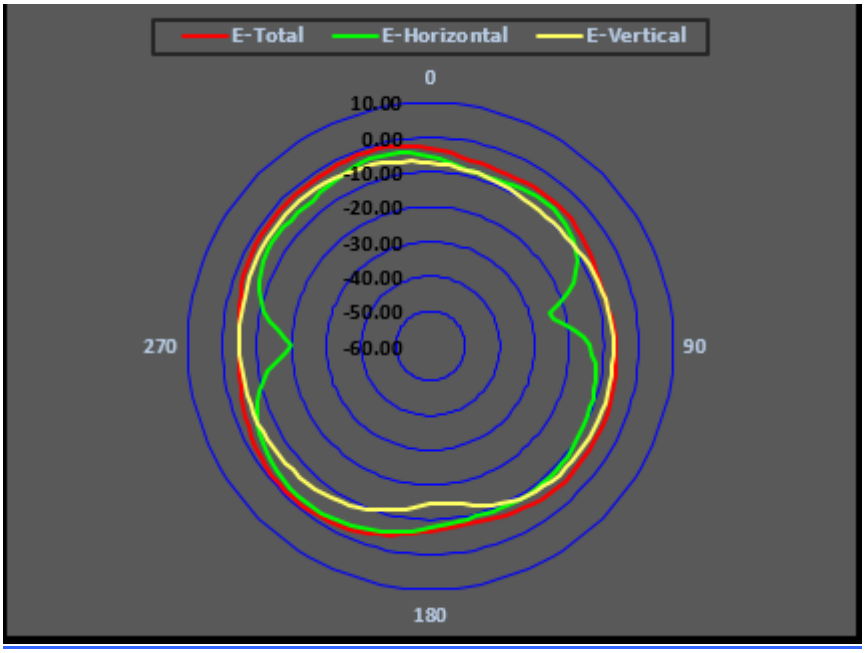

| Center Frequency | **837MHz** |
|---|---|
| Horizontal (dBi) peak | -1.85 |
| Vertical (dBi) peak | -4.68 |

## 845MHz



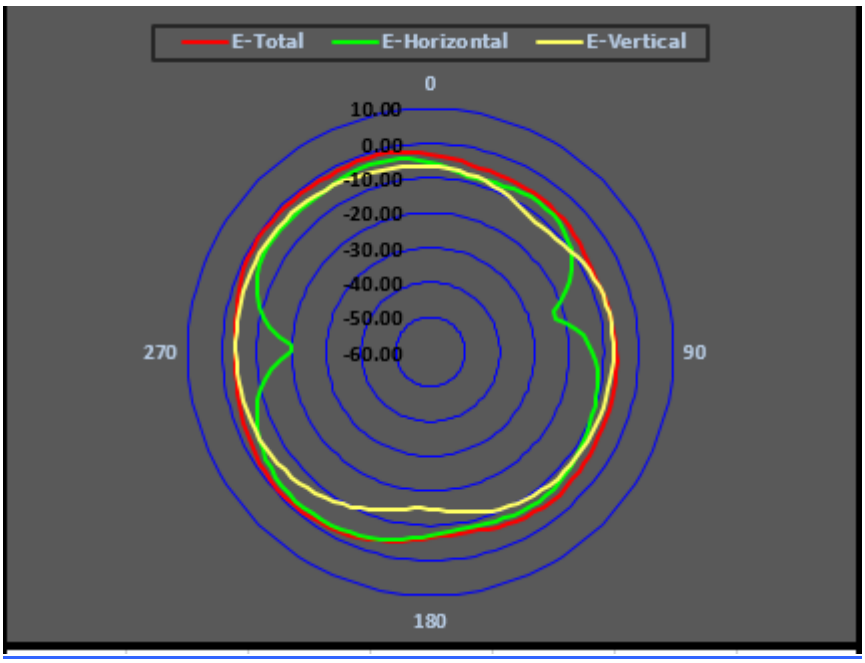

| Center Frequency | **845MHz** |
|---|---|
| Horizontal (dBi) peak | -2.46 |
| Vertical (dBi) peak | -3.92 |

## 849MHz



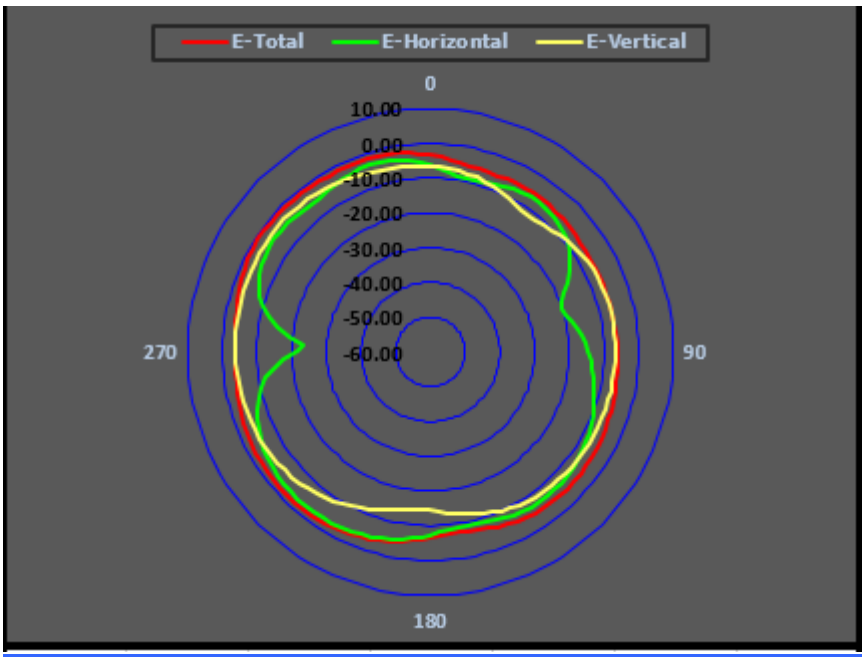

| Center Frequency | **849MHz** |
|---|---|
| Horizontal (dBi) peak | -2.41 |
| Vertical (dBi) peak | -3.69 |

## 880MHz



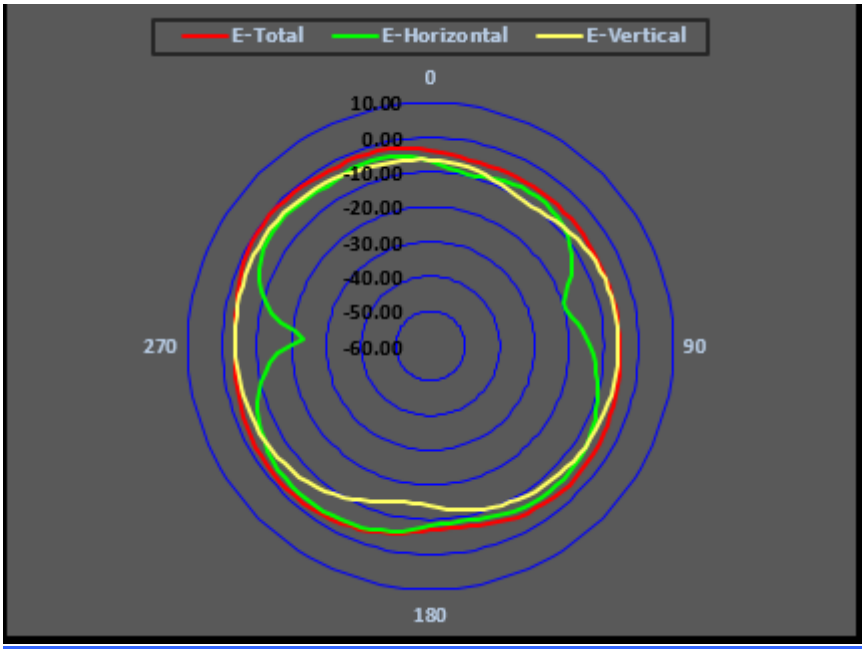

| Center Frequency | **880MHz** |
|---|---|
| Horizontal (dBi) peak | -2.20 |
| Vertical (dBi) peak | -3.23 |

## 894MHz



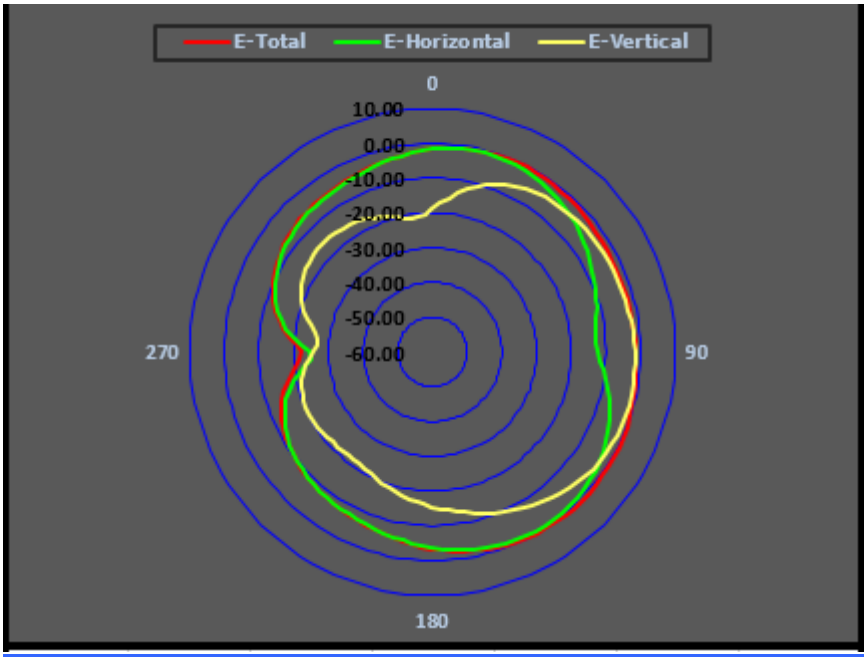

| Center Frequency | **894MHz** |
|---|---|
| Horizontal (dBi) peak | -3.02 |
| Vertical (dBi) peak | -3.01 |

## 915MHz



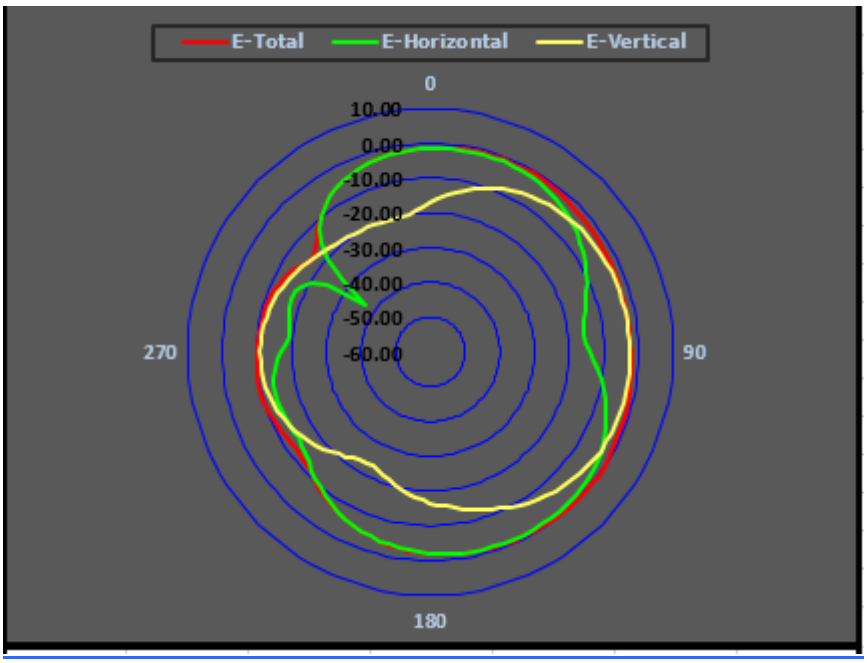

| Center Frequency | **915MHz** |
|---|---|
| Horizontal (dBi) peak | -3.16 |
| Vertical (dBi) peak | -2.85 |

**1710MHz**



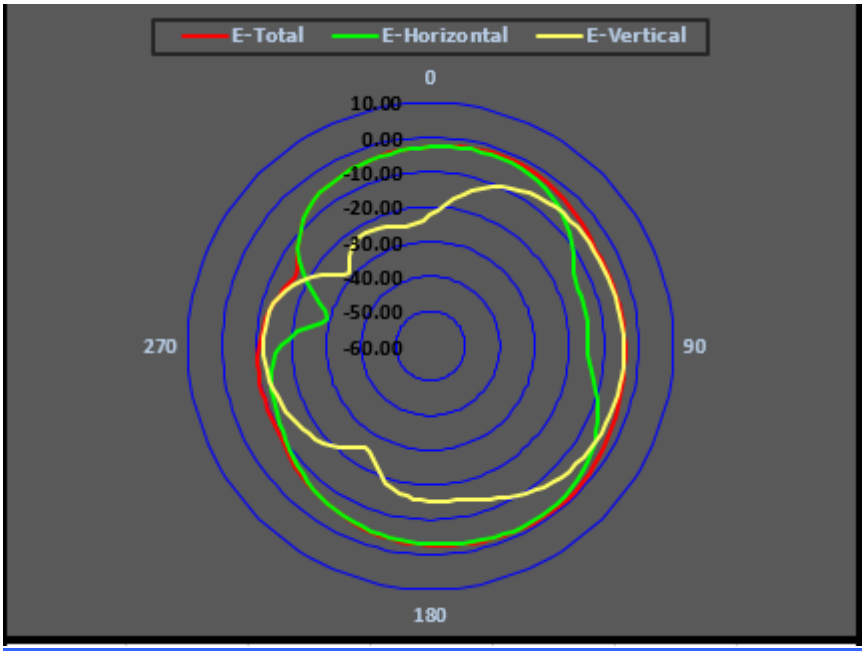

| Center Frequency | **1710MHz** |
|---|---|
| Horizontal (dBi) peak | -0.43 |
| Vertical (dBi) peak | -1.31 |

## 1750MHz



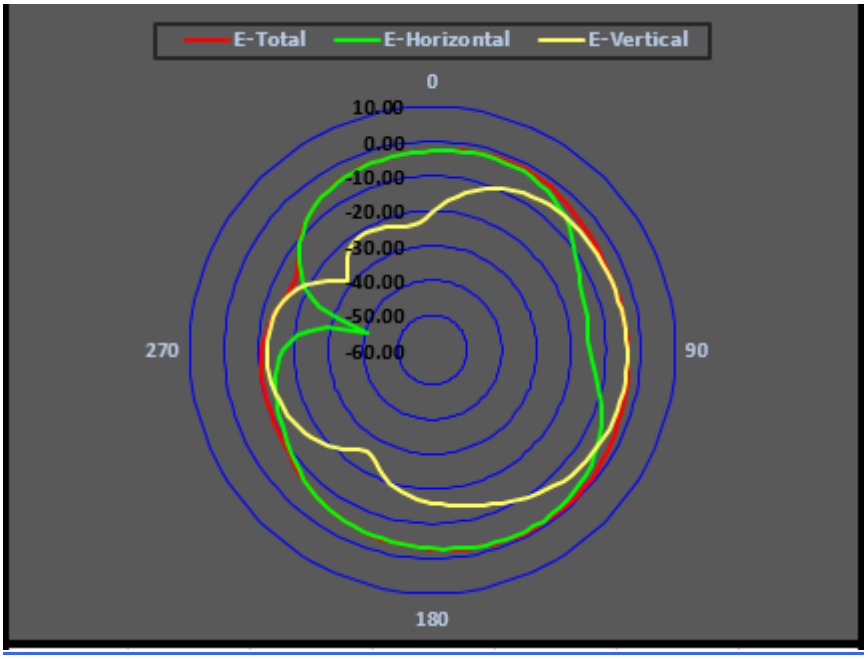

| Center Frequency | **1750MHz** |
|---|---|
| Horizontal (dBi) peak | -0.84 |
| Vertical (dBi) peak | -2.38 |

## 1780MHz



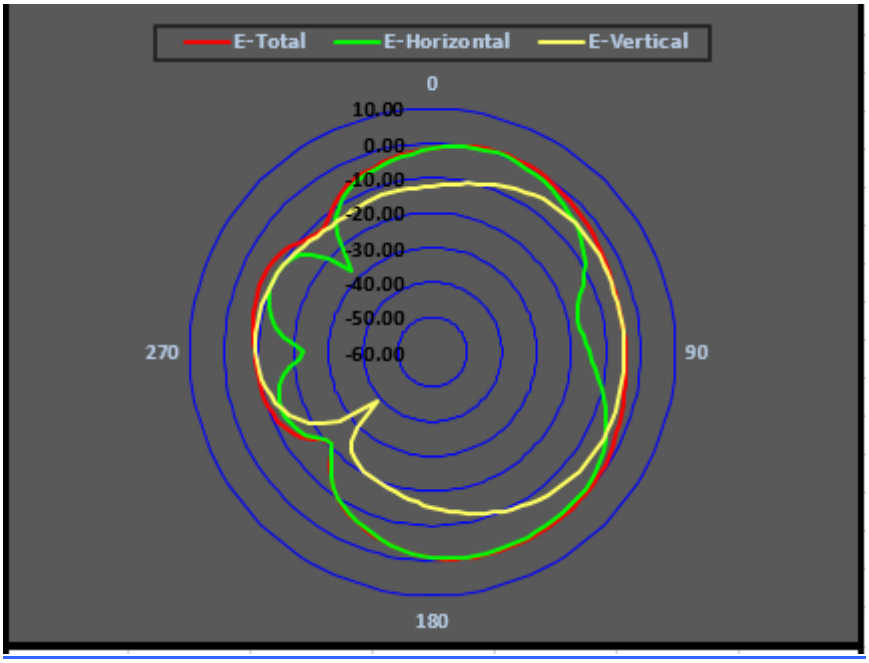

| Center Frequency | **1780MHz** |
|---|---|
| Horizontal (dBi) peak | -1.49 |
| Vertical (dBi) peak | -4.21 |

## 1785MHz



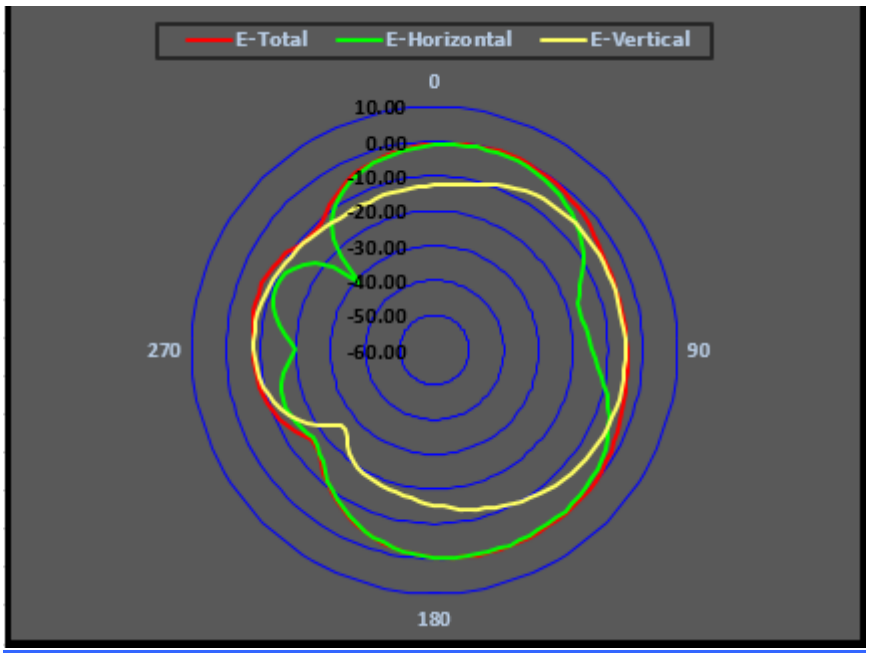

| Center Frequency | **1785MHz** |
|---|---|
| Horizontal (dBi) peak | -1.39 |
| Vertical (dBi) peak | -3.84 |

**1880MHz**



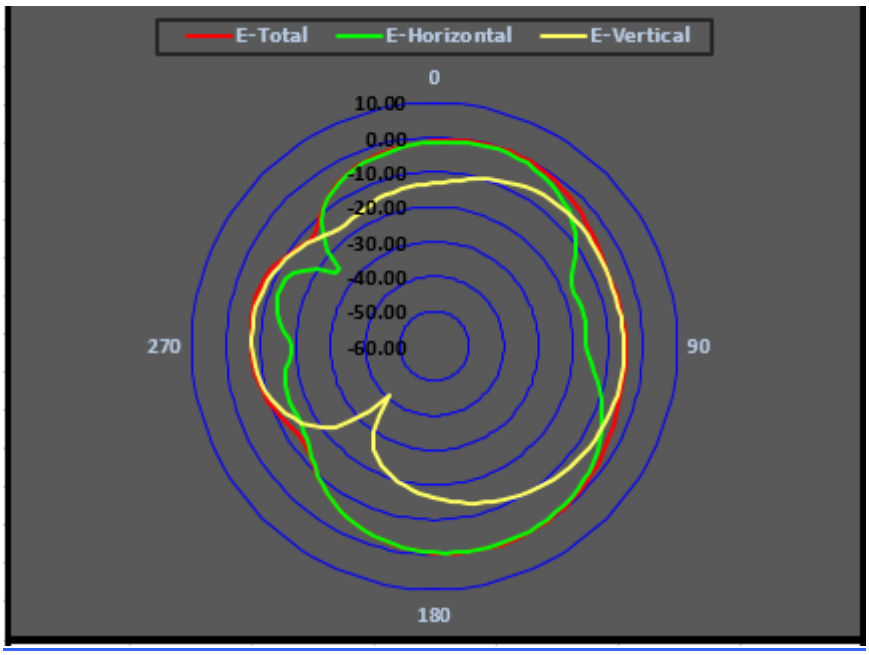

| Center Frequency | **1880MHz** |
|---|---|
| Horizontal (dBi) peak | 0.14 |
| Vertical (dBi) peak | -4.57 |

## 1900MHz



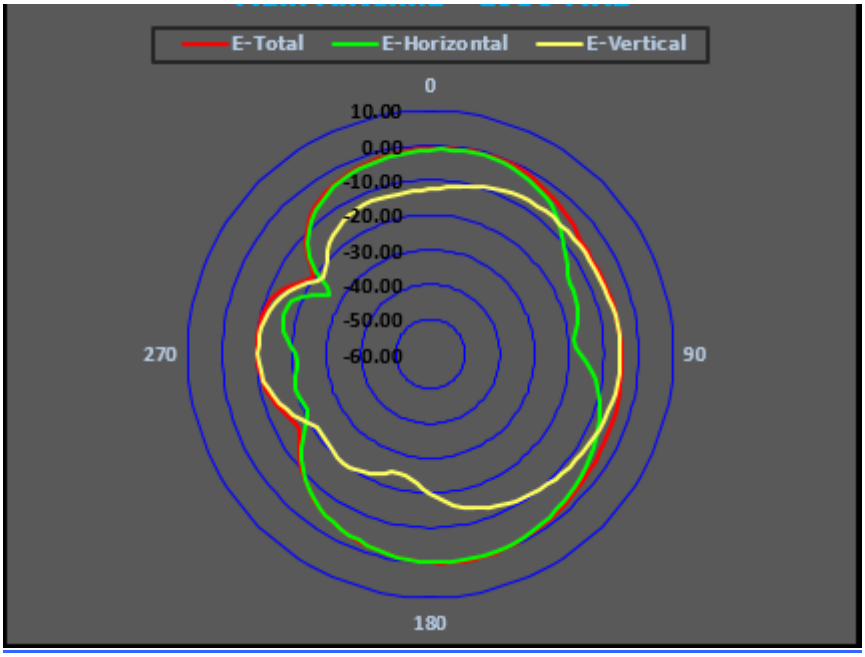

| Center Frequency | **1900MHz** |
|---|---|
| Horizontal (dBi) peak | 0.07 |
| Vertical (dBi) peak | -4.85 |

## 1920MHz



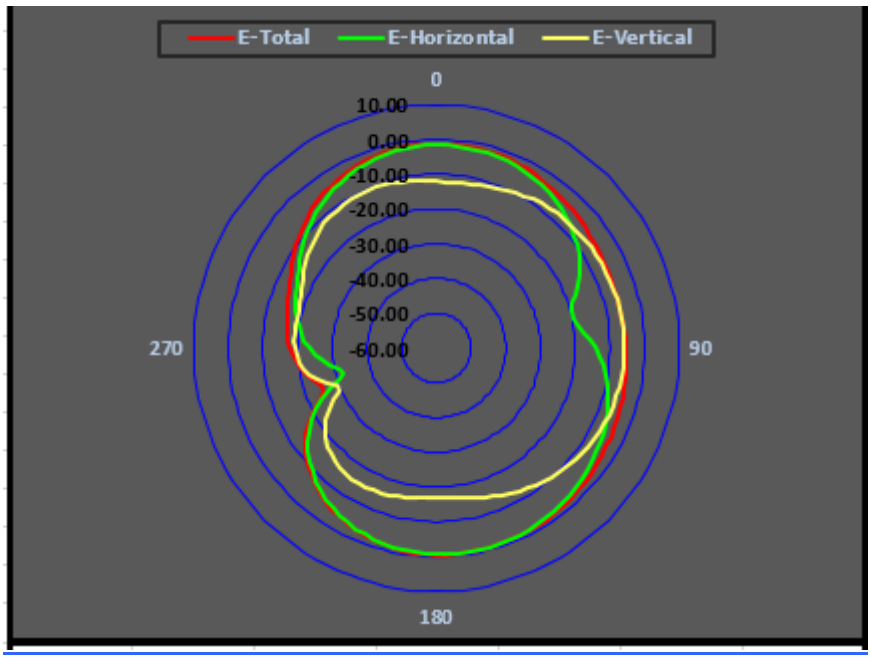

| Center Frequency | **1920MHz** |
|---|---|
| Horizontal (dBi) peak | -0.04 |
| Vertical (dBi) peak | -5.22 |

## 1950MHz



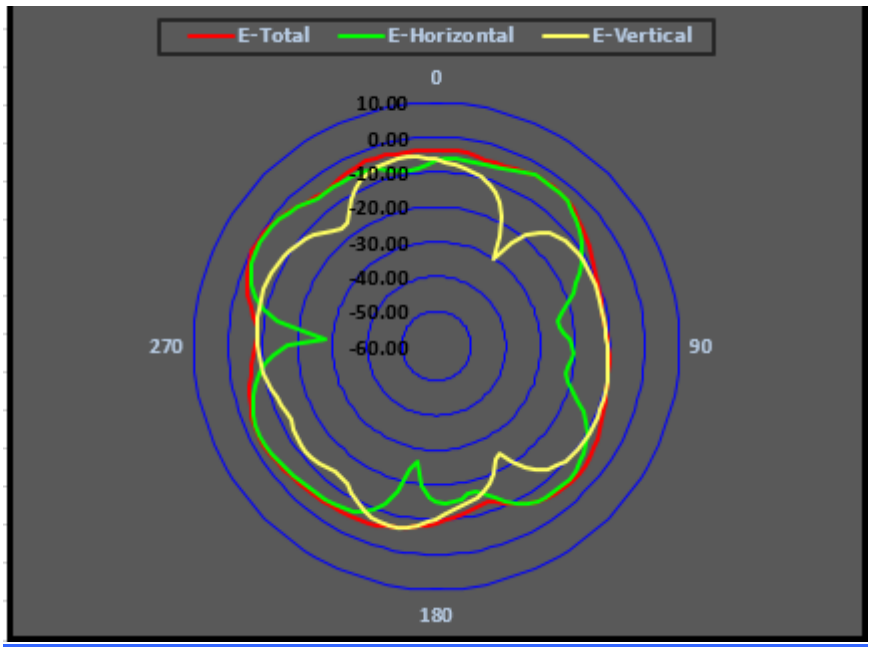

| Center Frequency | **1950MHz** |
|---|---|
| Horizontal (dBi) peak | 0.24 |
| Vertical (dBi) peak | -5.22 |

## 1980MHz



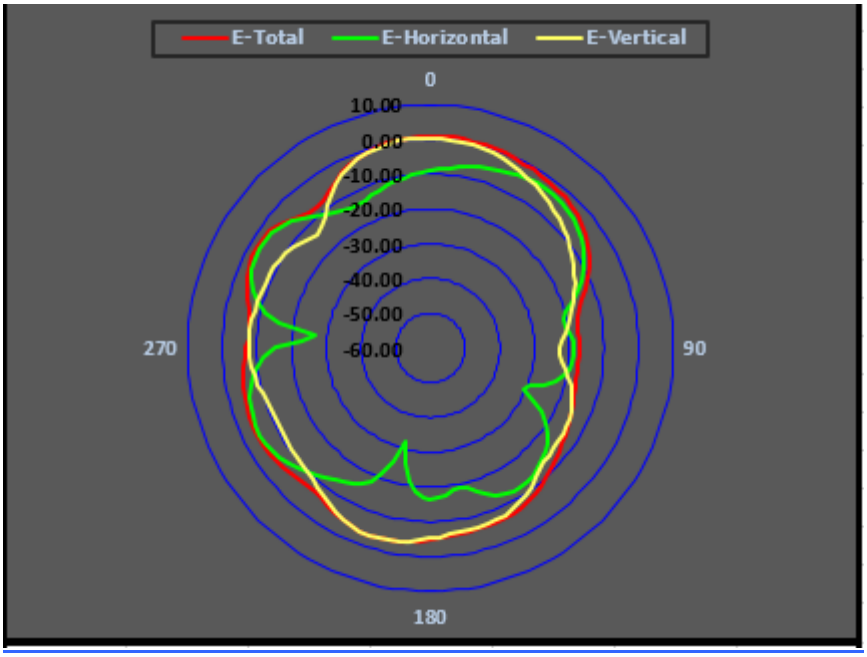

| Center Frequency | **1980MHz** |
|---|---|
| Horizontal (dBi) peak | -0.49 |
| Vertical (dBi) peak | -5.90 |

## 2496MHz



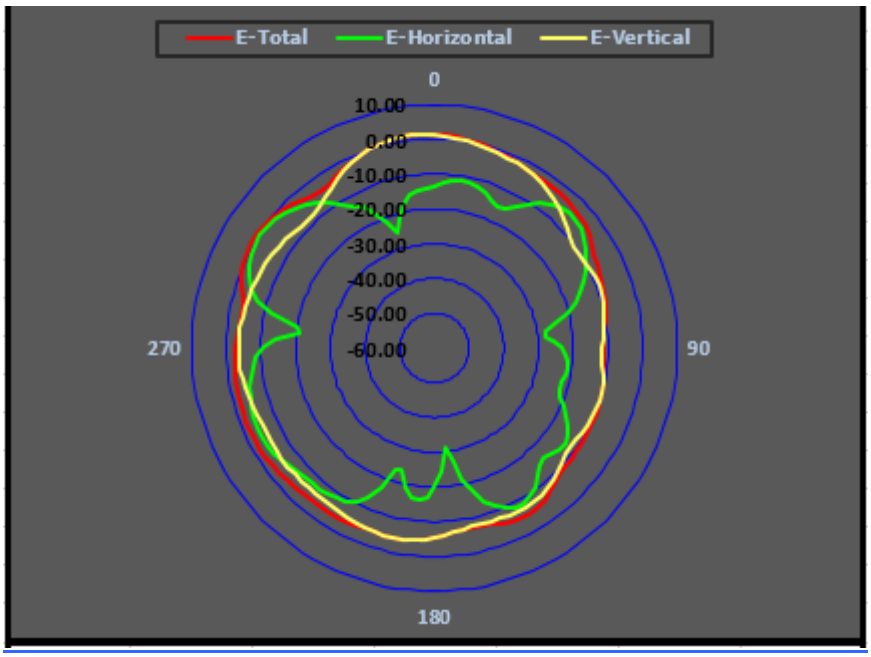

| Center Frequency | **2496MHz** |
|---|---|
| Horizontal (dBi) peak | -0.88 |
| Vertical (dBi) peak | -4.97 |

## 2595MHz



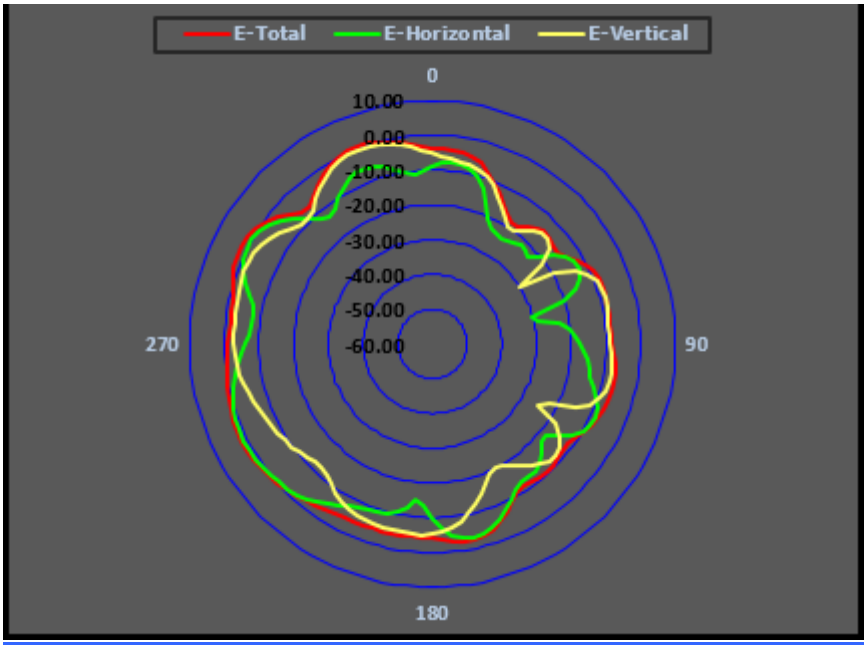

| Center Frequency | **2595MHz** |
|---|---|
| Horizontal (dBi) peak | -2.94 |
| Vertical (dBi) peak | 0.55 |

## 2690MHz



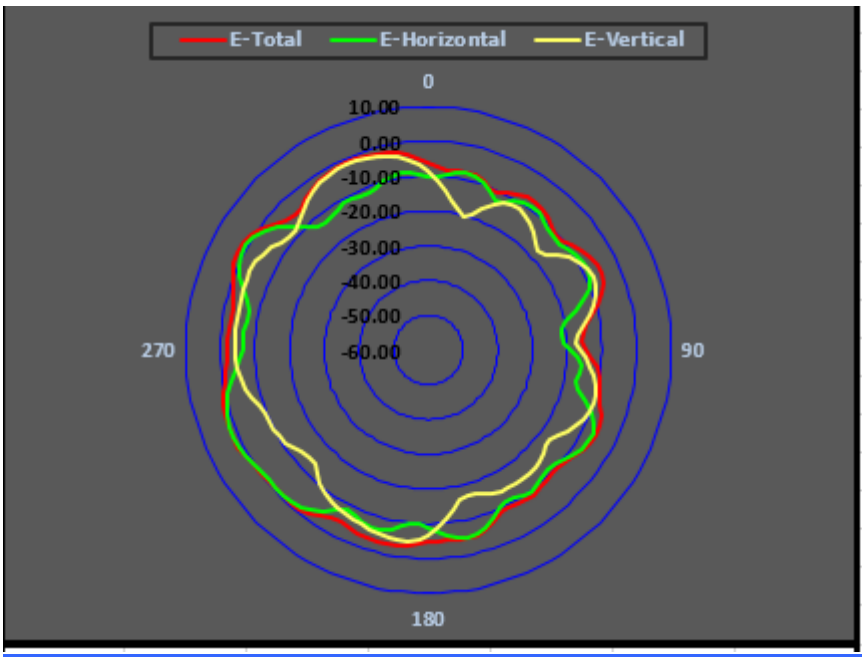

| Center Frequency | **2690MHz** |
|---|---|
| Horizontal (dBi) peak | -0.10 |
| Vertical (dBi) peak | 1.51 |

## 3300MHz



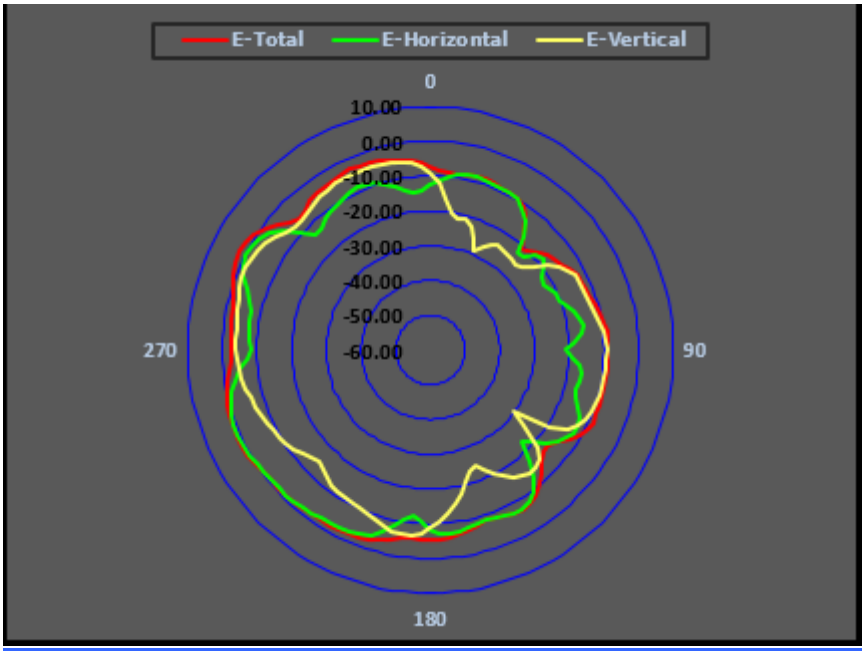

| Center Frequency | **3300MHz** |
|---|---|
| Horizontal (dBi) peak | 1.27 |
| Vertical (dBi) peak | -0.15 |

## 3400MHz



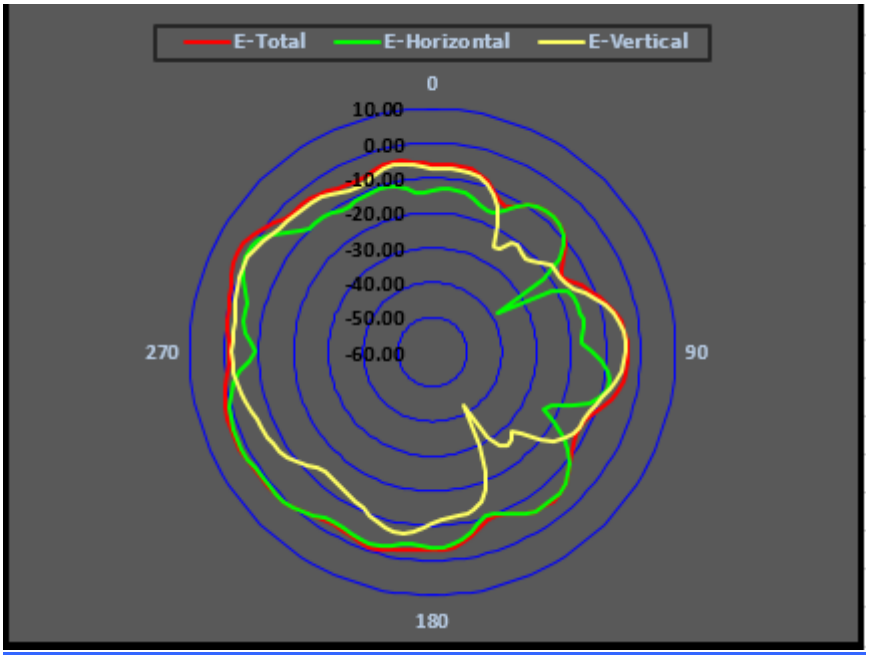

| Center Frequency | **3400MHz** |
|---|---|
| Horizontal (dBi) peak | 1.53 |
| Vertical (dBi) peak | -1.62 |

## 3500MHz



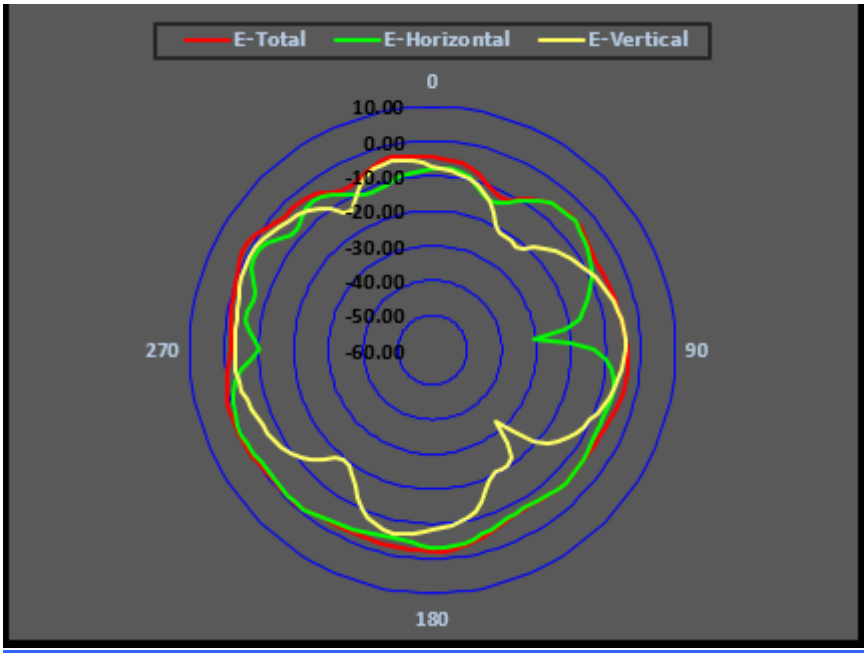

| Center Frequency | **3500MHz** |
|---|---|
| Horizontal (dBi) peak | 0.75 |
| Vertical (dBi) peak | -1.69 |

## 3600MHz



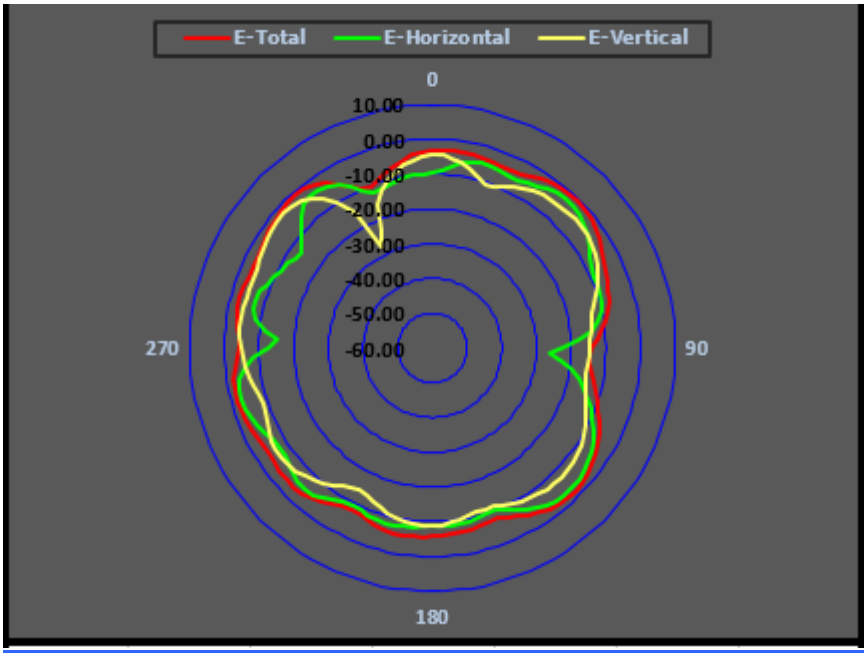

| Center Frequency | **3600MHz** |
|---|---|
| Horizontal (dBi) peak | 0.88 |
| Vertical (dBi) peak | -0.12 |

## 3750MHz



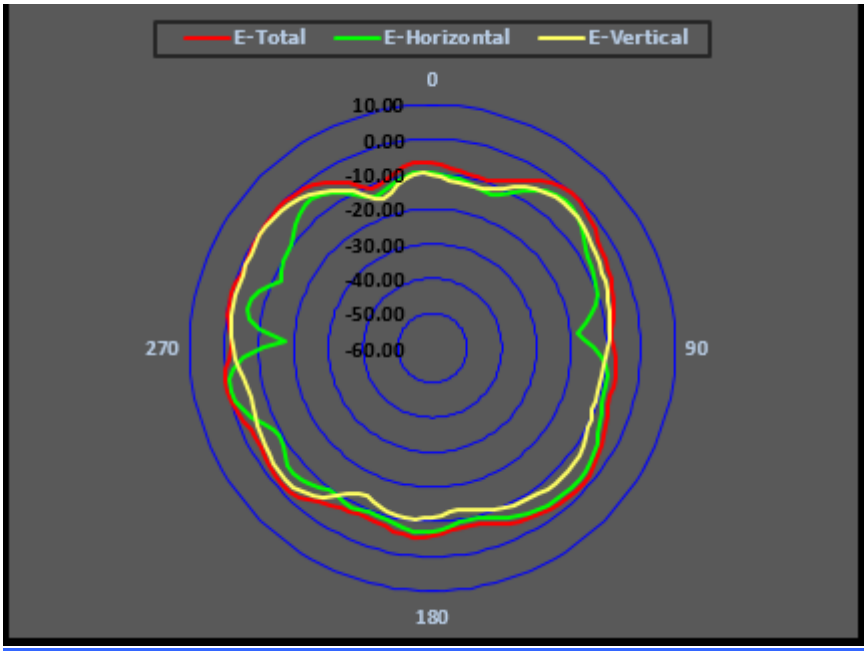

| Center Frequency | **3750MHz** |
|---|---|
| Horizontal (dBi) peak | 0.05 |
| Vertical (dBi) peak | -0.92 |

## 4200MHz



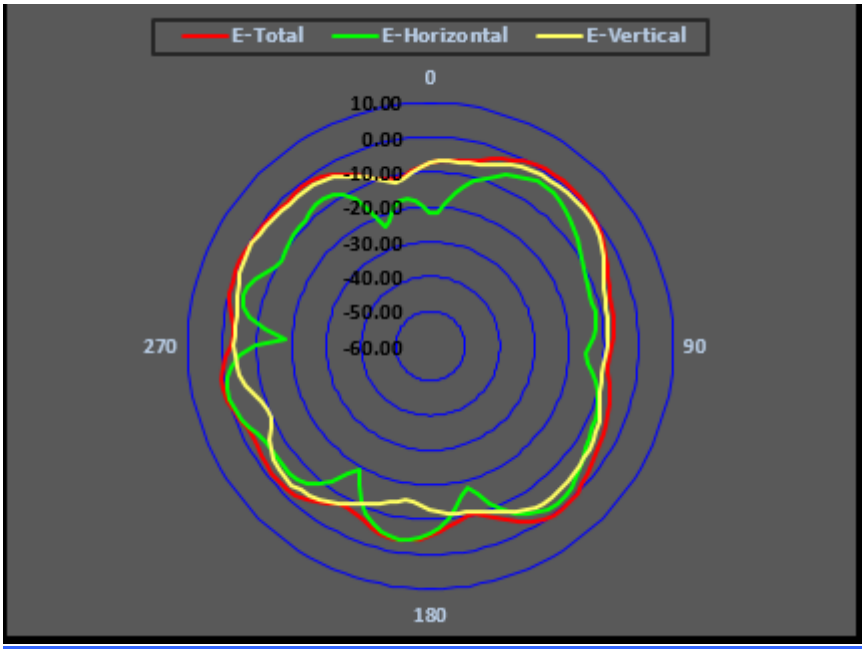

| Center Frequency | **4200MHz** |
|---|---|
| Horizontal (dBi) peak | -2.42 |
| Vertical (dBi) peak | -2.11 |

## 4400MHz



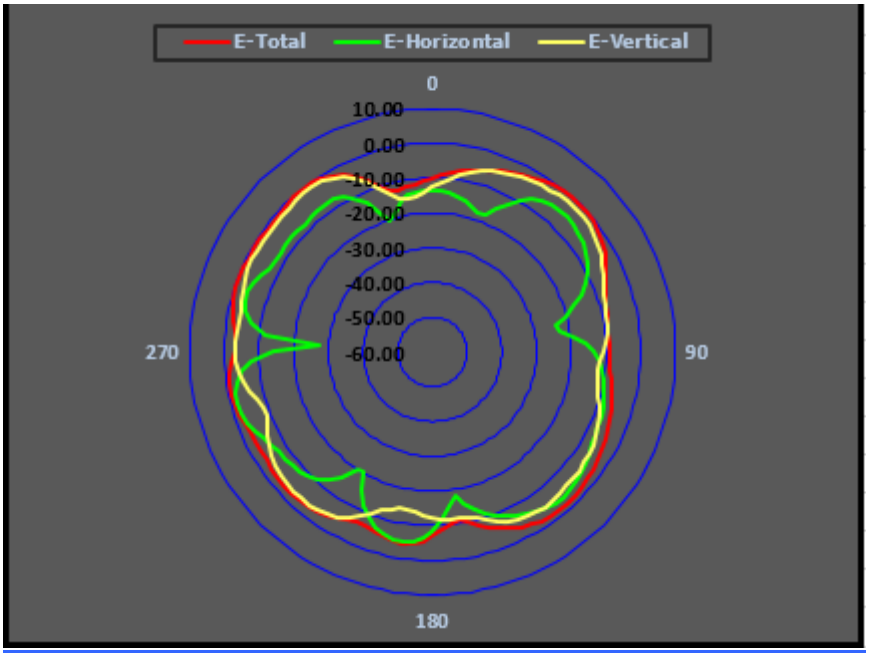

| Center Frequency | **4400MHz** |
|---|---|
| Horizontal (dBi) peak | -0.65 |
| Vertical (dBi) peak | -0.73 |

## 4800MHz




| Center Frequency | **4800MHz** |
|---|---|
| Horizontal (dBi) peak | -0.05 |
| Vertical (dBi) peak | -0.50 |

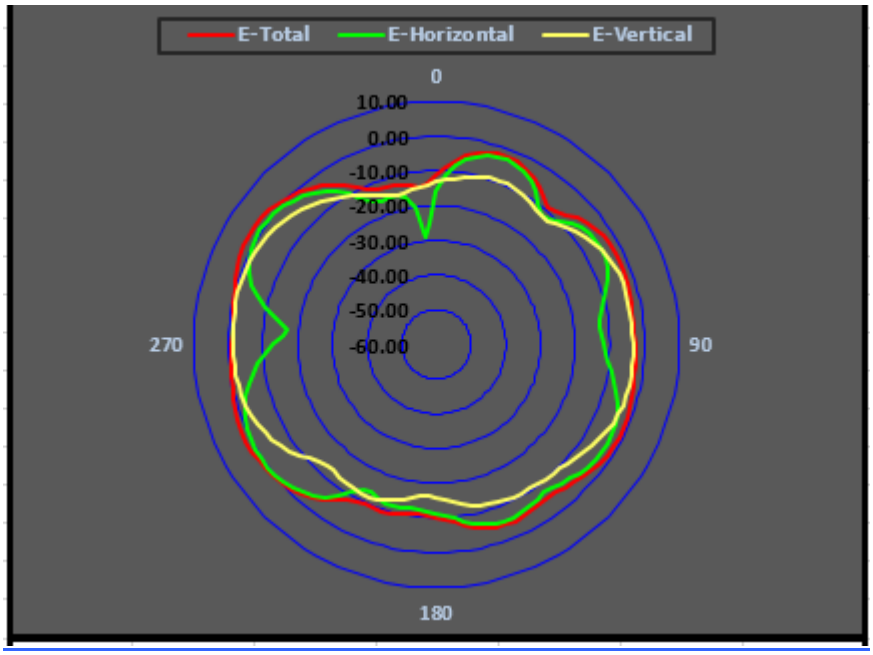
## 5000MHz




| Center Frequency | **5000MHz** |
|---|---|
| Horizontal (dBi) peak | -1.93 |
| Vertical (dBi) peak | -0.96 |

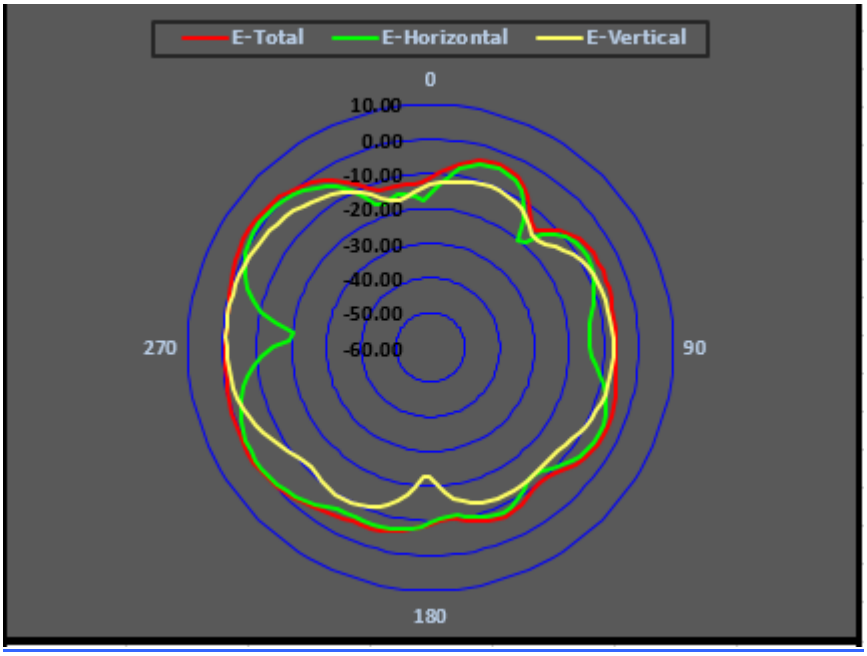
- **Ant8:**

**1710 MHz**



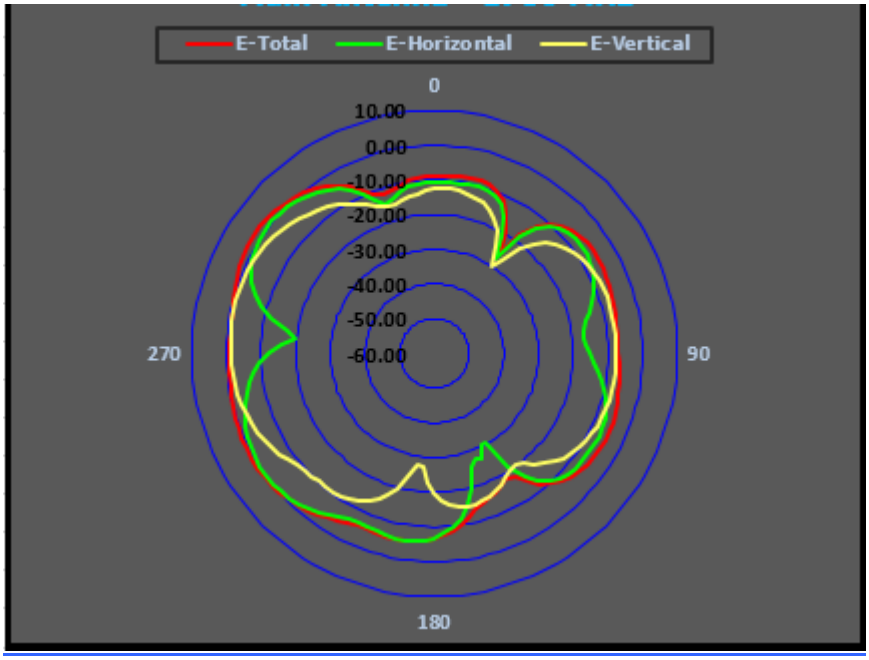

| Center Frequency | **1710MHz** |
|---|---|
| Horizontal (dBi) peak | 0.73 |
| Vertical (dBi) peak | -0.84 |

## 1750 MHz



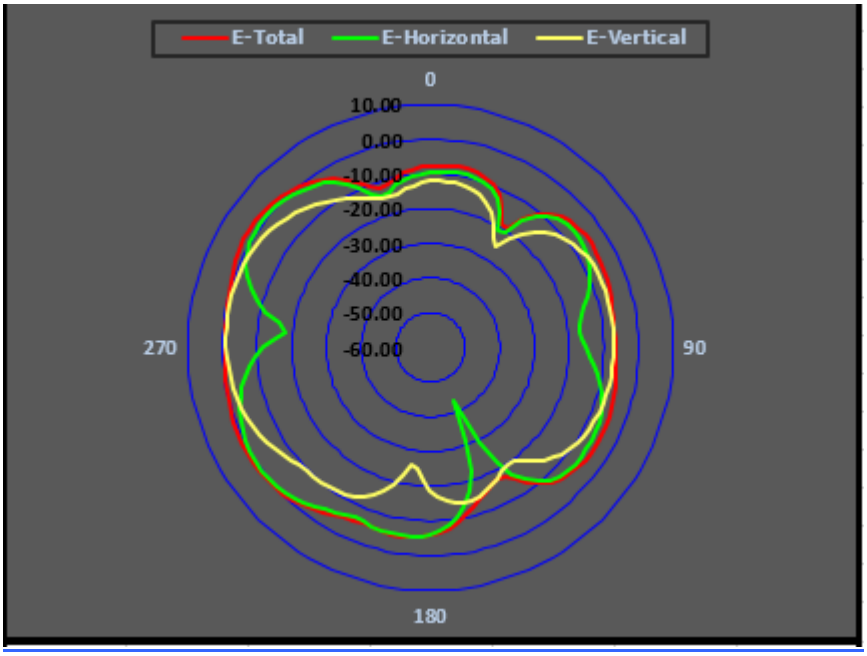

| Center Frequency | **1750MHz** |
|---|---|
| Horizontal (dBi) peak | 0.95 |
| Vertical (dBi) peak | -0.91 |

## 1780 MHz



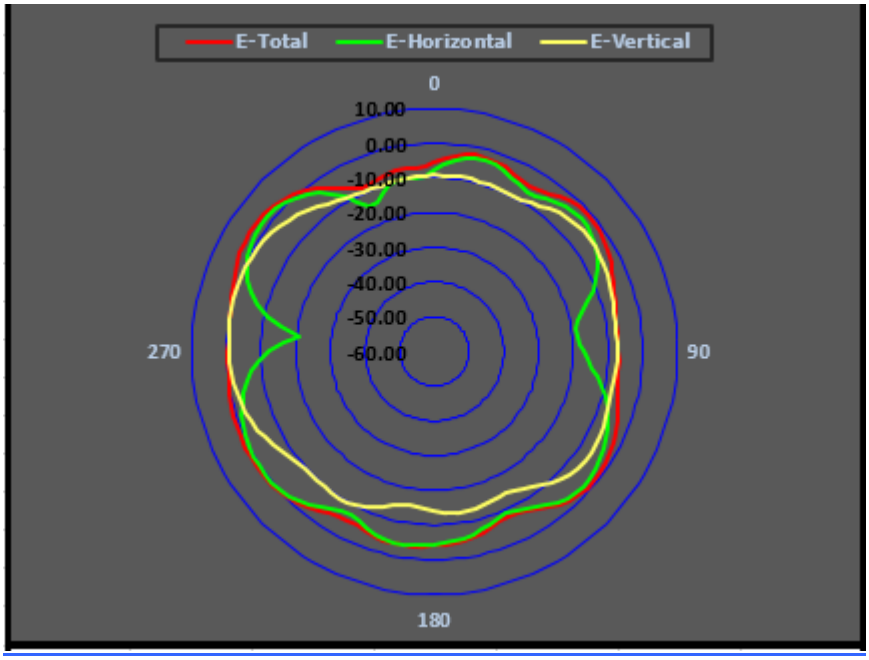

| Center Frequency | **1780MHz** |
|---|---|
| Horizontal (dBi) peak | 0.50 |
| Vertical (dBi) peak | -0.82 |

## 1785 MHz



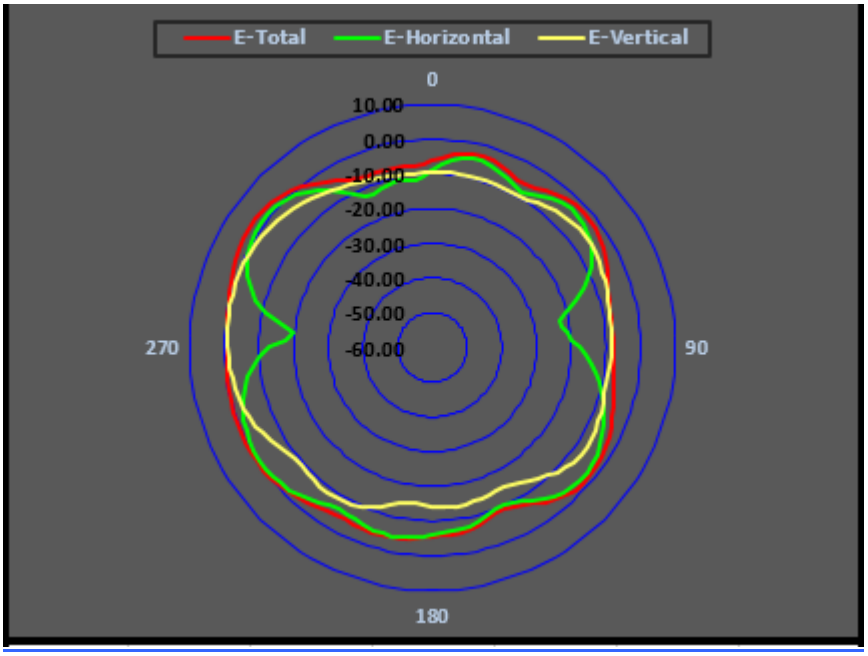

| Center Frequency | **1785MHz** |
|---|---|
| Horizontal (dBi) peak | 0.71 |
| Vertical (dBi) peak | -0.72 |

## 1880 MHz



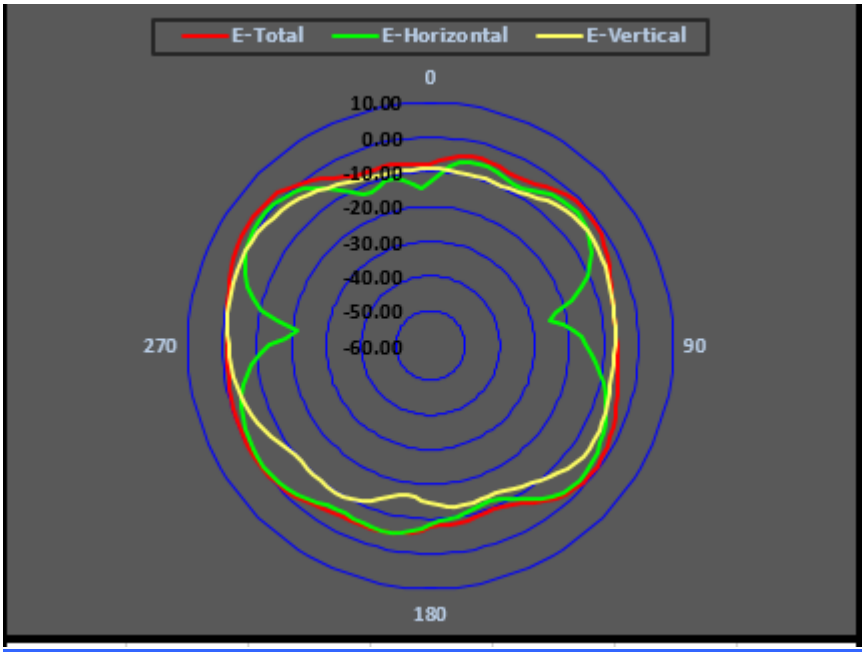

| Center Frequency | **1880MHz** |
|---|---|
| Horizontal (dBi) peak | 1.91 |
| Vertical (dBi) peak | -0.19 |

## 1900 MHz



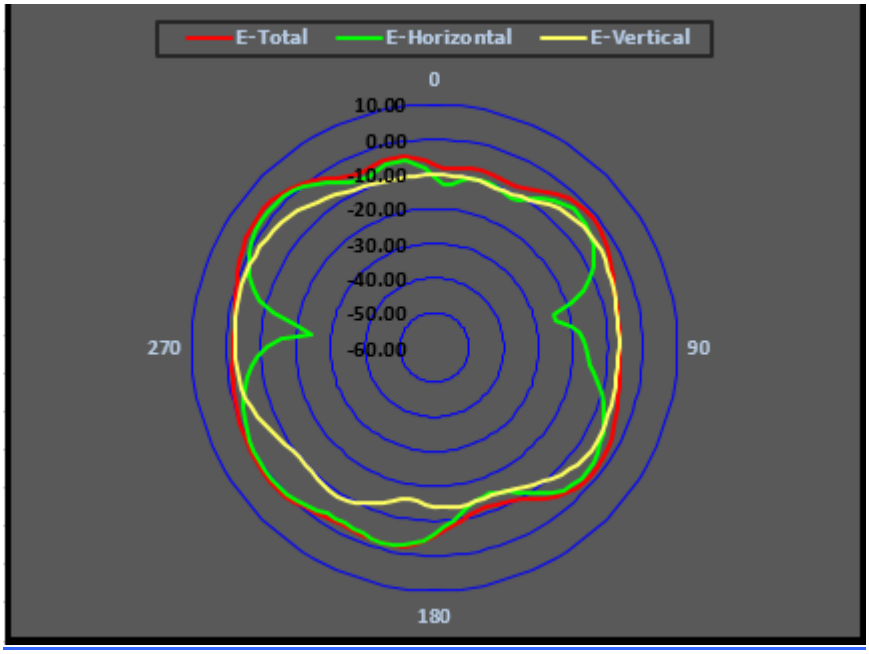

| Center Frequency | **1900MHz** |
|---|---|
| Horizontal (dBi) peak | 1.19 |
| Vertical (dBi) peak | -0.30 |

## 1920 MHz



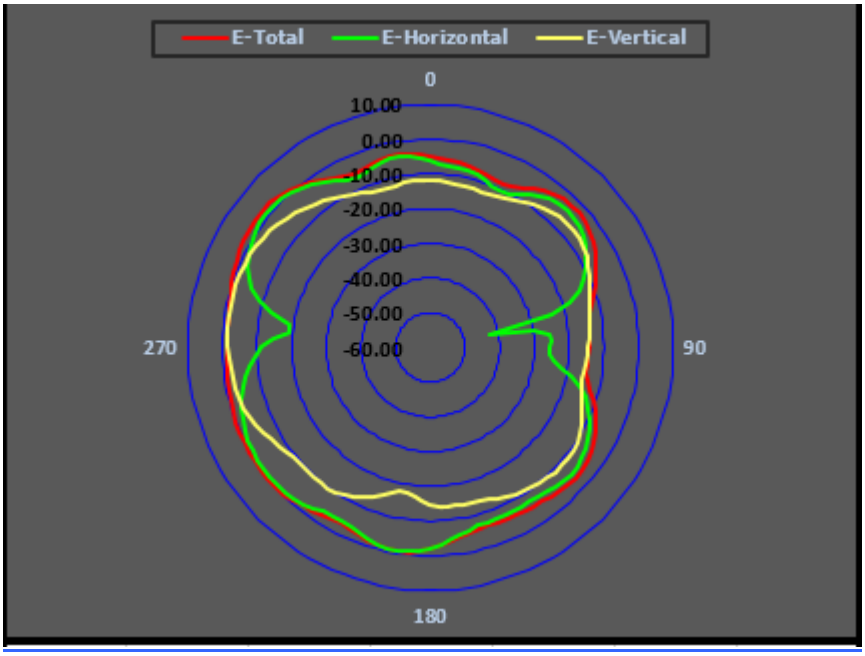

| Center Frequency | **1920MHz** |
|---|---|
| Horizontal (dBi) peak | 1.23 |
| Vertical (dBi) peak | -0.32 |

## 1950 MHz



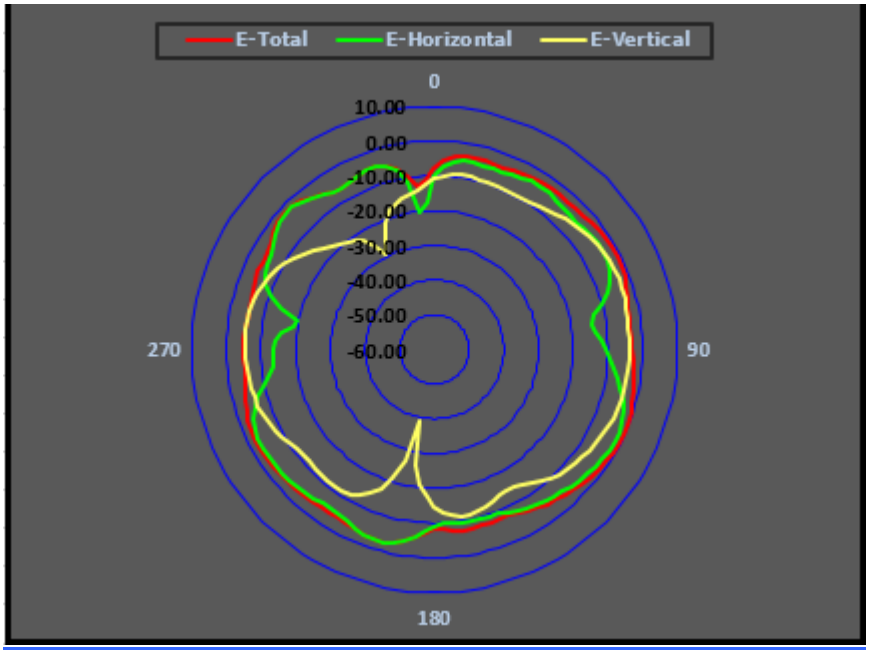

| Center Frequency | **1950MHz** |
|---|---|
| Horizontal (dBi) peak | 2.14 |
| Vertical (dBi) peak | -1.60 |

## 1980 MHz



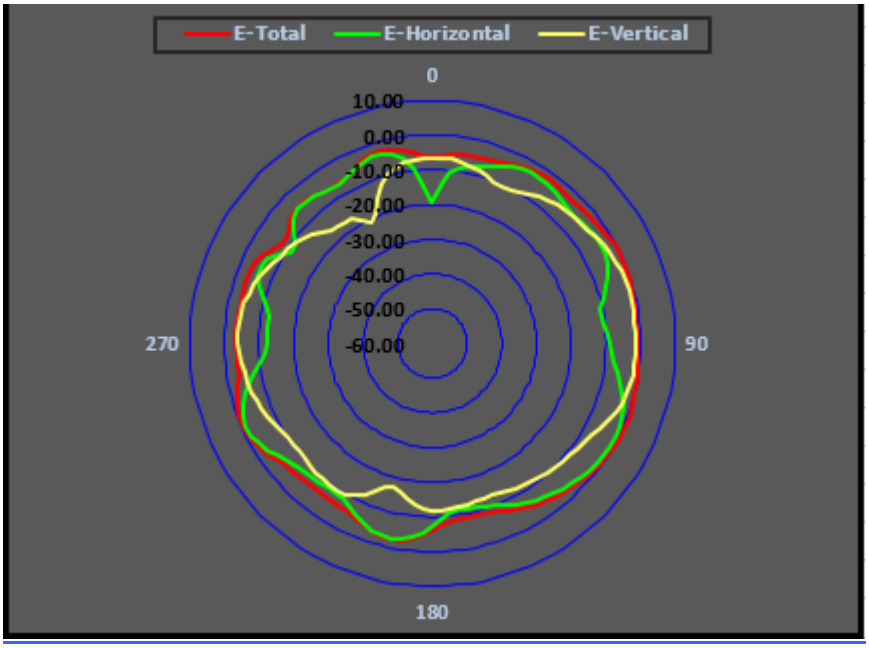

| Center Frequency | **1980MHz** |
|---|---|
| Horizontal (dBi) peak | 1.08 |
| Vertical (dBi) peak | -0.99 |

## 2496 MHz



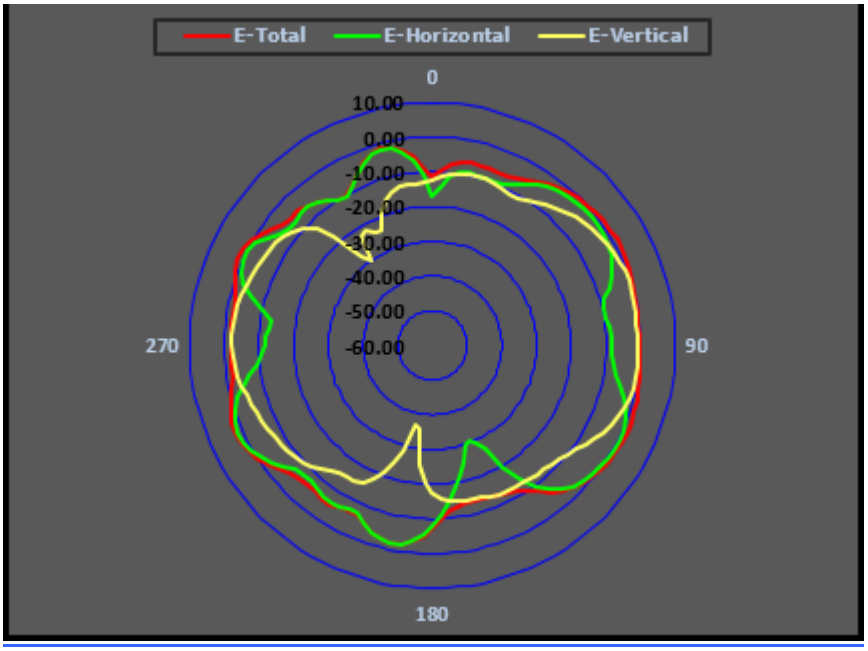

| Center Frequency | **2496MHz** |
|---|---|
| Horizontal (dBi) peak | -1.57 |
| Vertical (dBi) peak | -3.05 |

## 2595 MHz



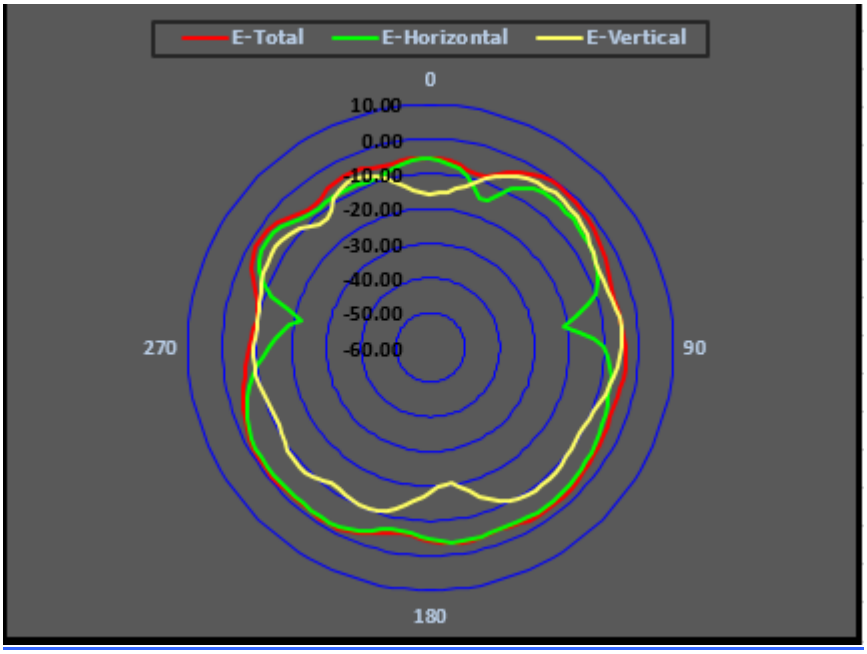

| Center Frequency | **2595MHz** |
|---|---|
| Horizontal (dBi) peak | -0.79 |
| Vertical (dBi) peak | -1.31 |

## 2690 MHz



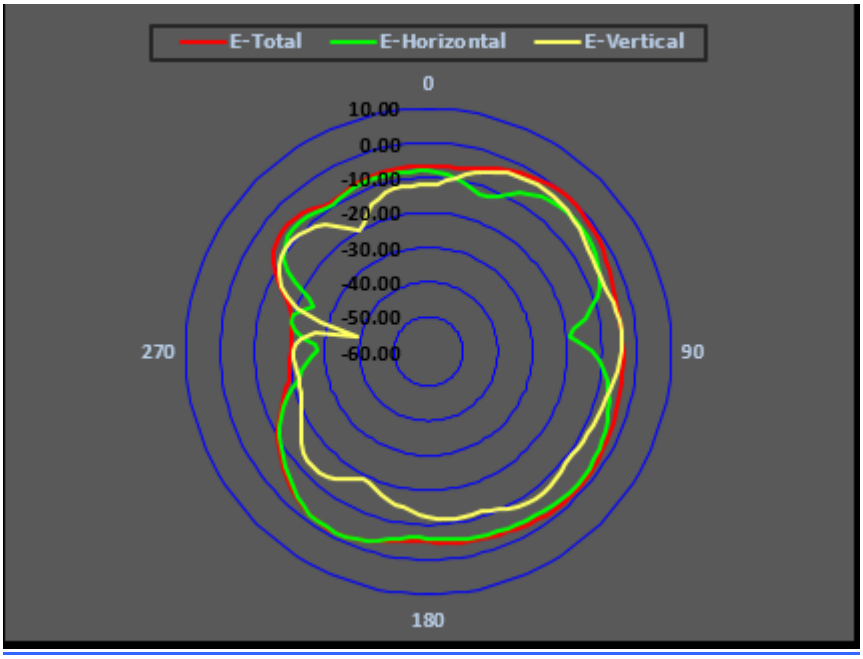

| Center Frequency | **2690MHz** |
|---|---|
| Horizontal (dBi) peak | 1.50 |
| Vertical (dBi) peak | -0.30 |

## 3300 MHz



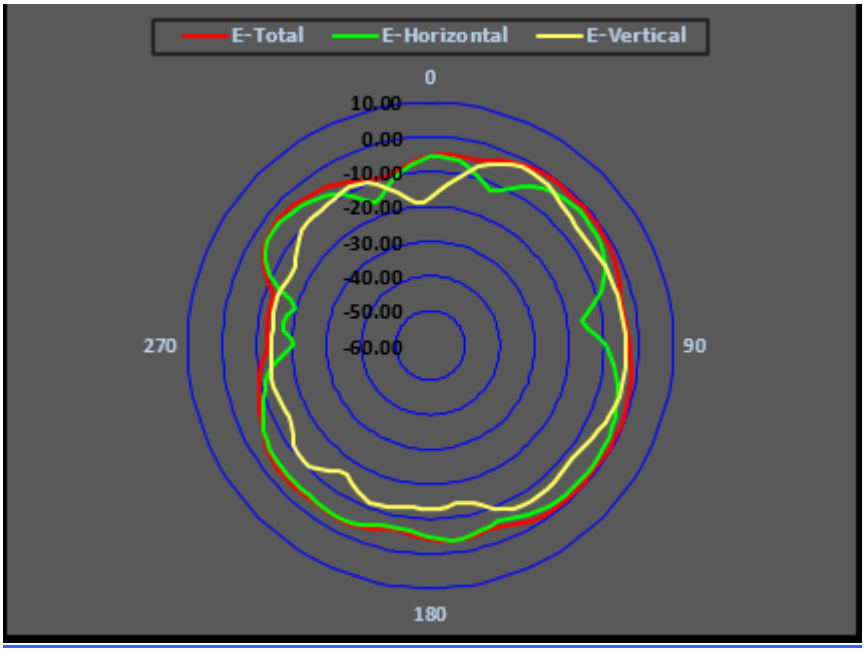

| Center Frequency | **3300MHz** |
|---|---|
| Horizontal (dBi) peak | -1.65 |
| Vertical (dBi) peak | -2.88 |

## 3400 MHz



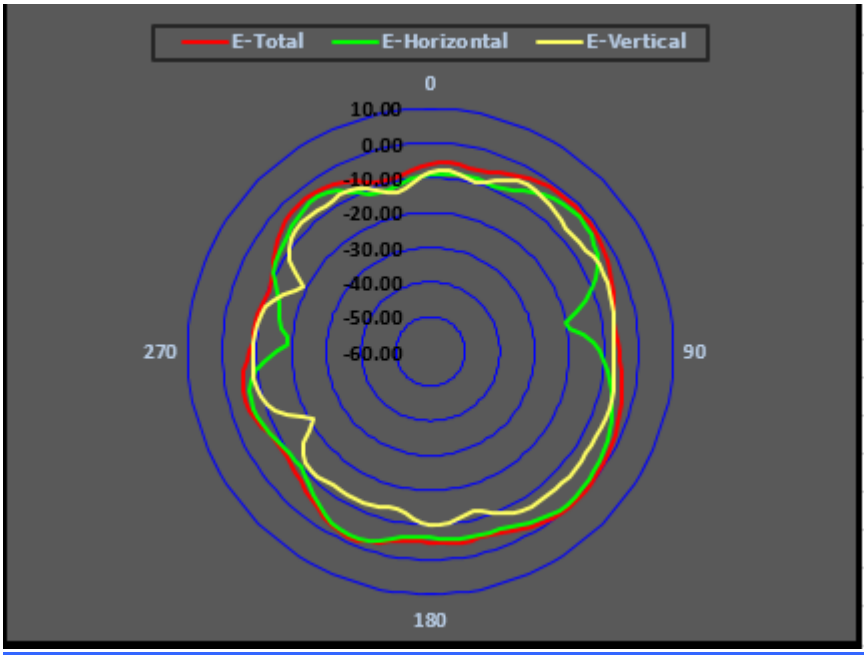

| Center Frequency | **3400MHz** |
|---|---|
| Horizontal (dBi) peak | -1.35 |
| Vertical (dBi) peak | -2.58 |

## 3500 MHz



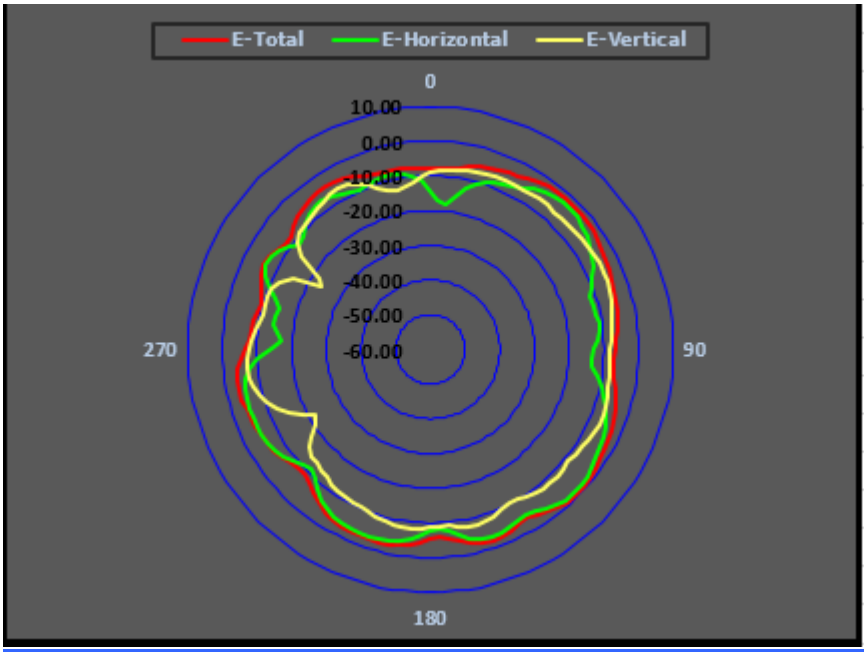

| Center Frequency | **3500MHz** |
|---|---|
| Horizontal (dBi) peak | -1.93 |
| Vertical (dBi) peak | -2.25 |

## 3600 MHz



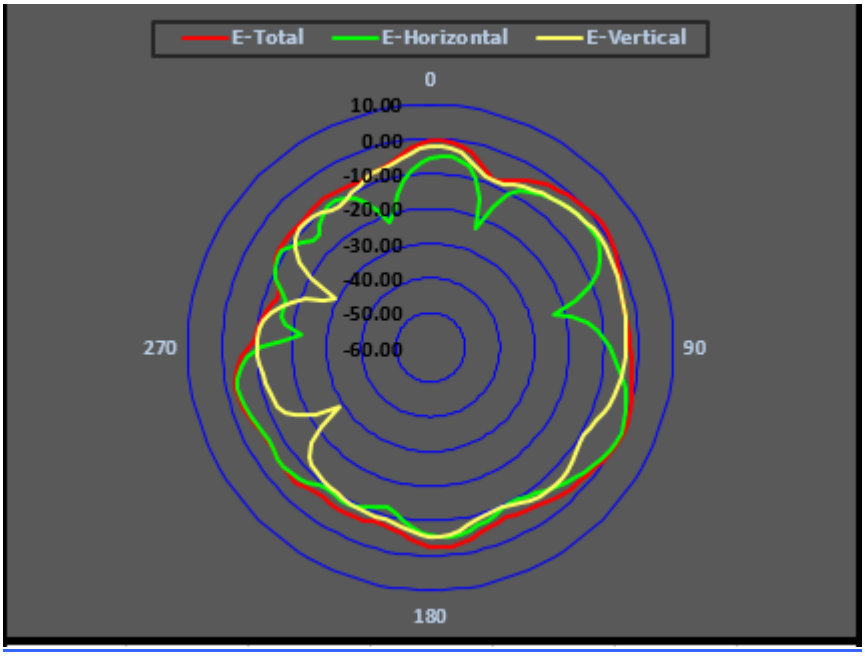

| Center Frequency | **3600MHz** |
|---|---|
| Horizontal (dBi) peak | 0.88 |
| Vertical (dBi) peak | -4.57 |

## 3750 MHz



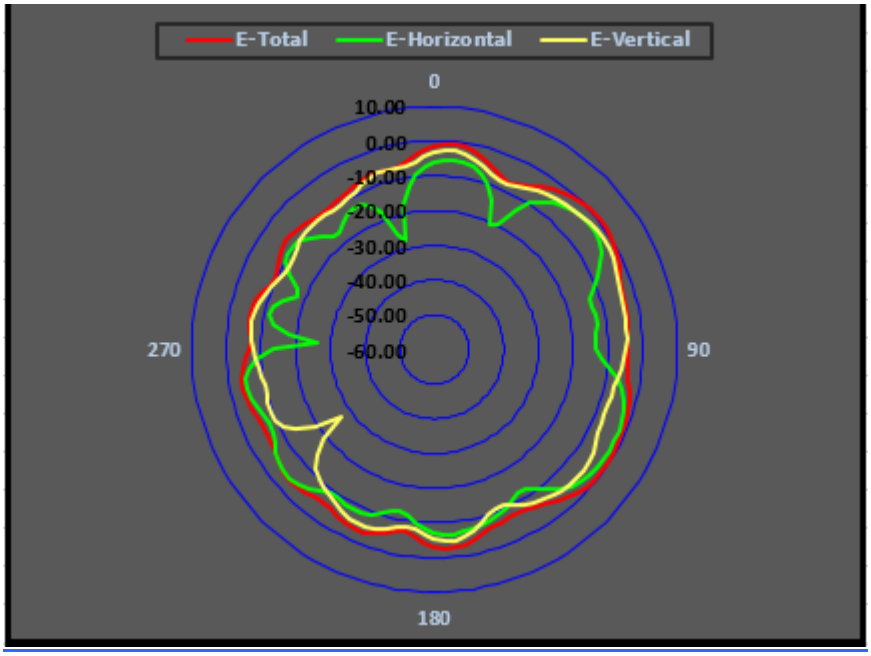

| Center Frequency | **3750MHz** |
|---|---|
| Horizontal (dBi) peak | -1.25 |
| Vertical (dBi) peak | -5.11 |

## 4200 MHz



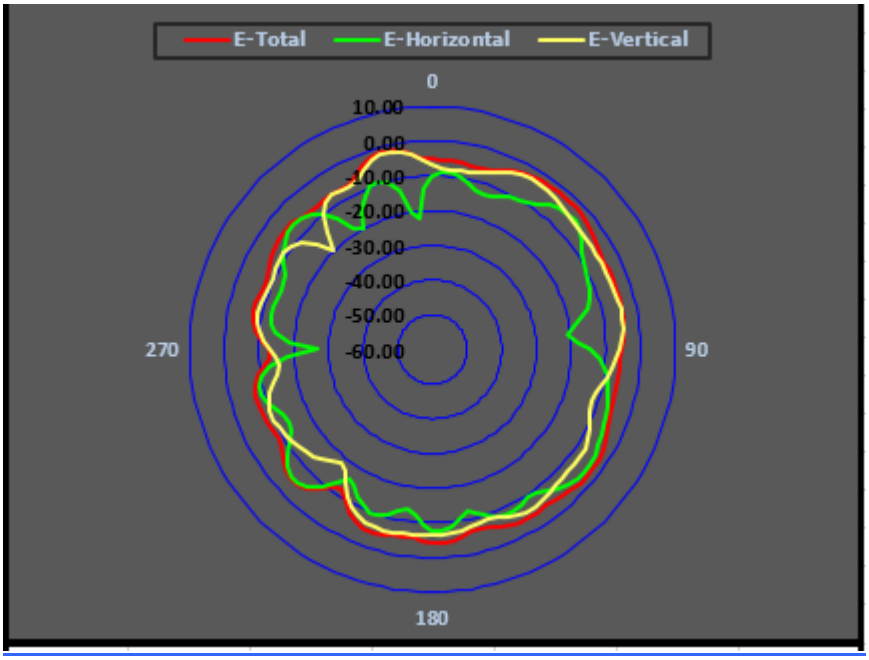

| Center Frequency | **4200MHz** |
|---|---|
| Horizontal (dBi) peak | 0.14 |
| Vertical (dBi) peak | -1.71 |

## 4400 MHz



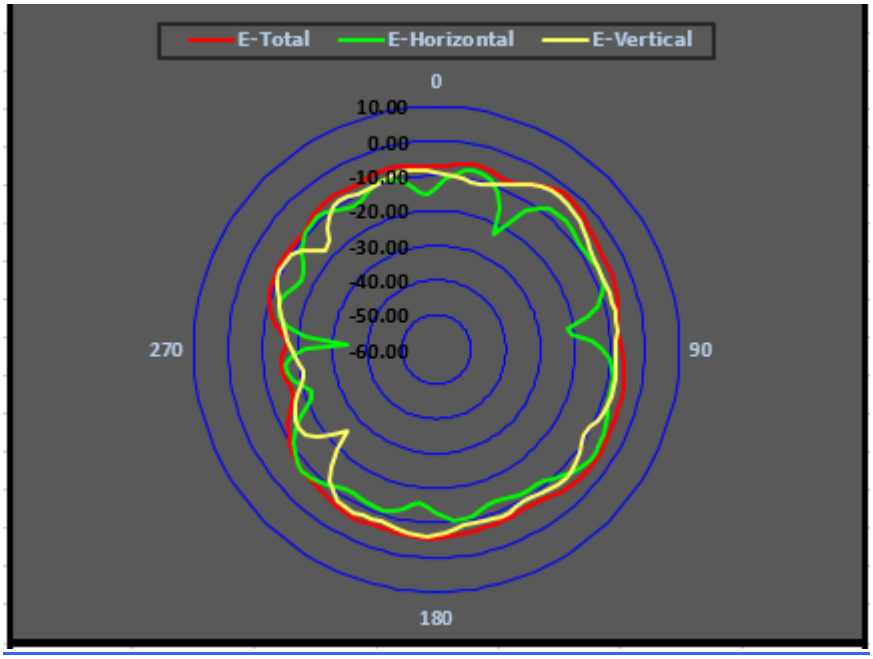

| Center Frequency | **4400MHz** |
|---|---|
| Horizontal (dBi) peak | -1.83 |
| Vertical (dBi) peak | -1.73 |

## 4800 MHz




| Center Frequency | **4800MHz** |
|---|---|
| Horizontal (dBi) peak | -3.56 |
| Vertical (dBi) peak | -1.74 |

## 5000 MHz

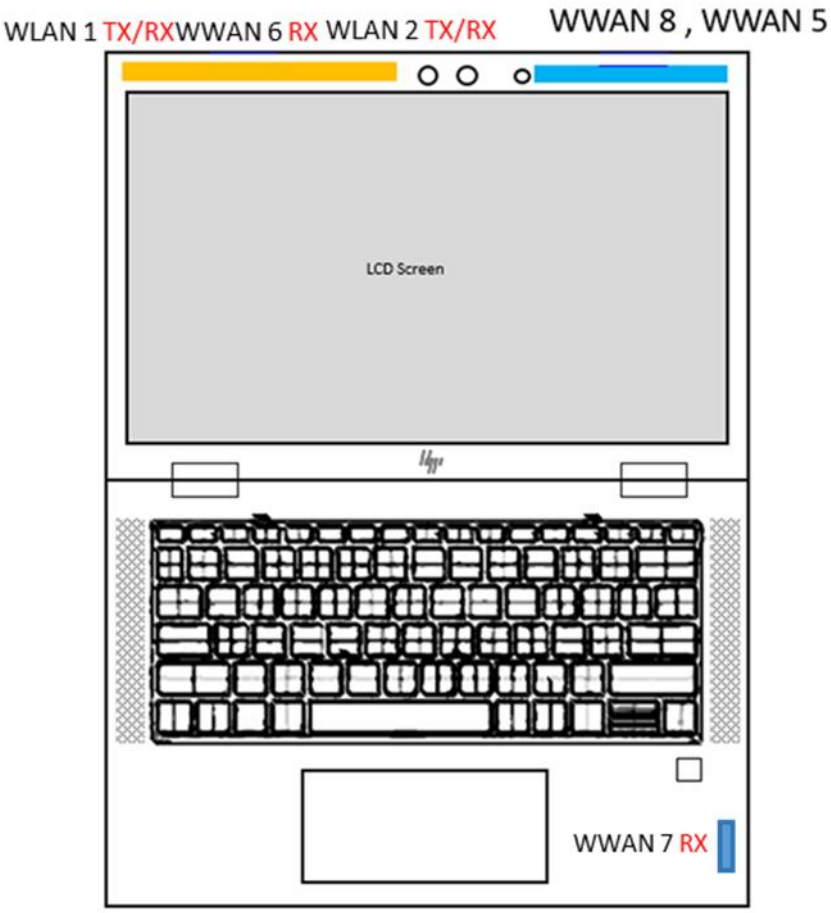



| Center Frequency | **5000MHz** |
|---|---|
| Horizontal (dBi) peak | -5.48 |
| Vertical (dBi) peak | -3.36 |

# Section 4. Host Platform Information

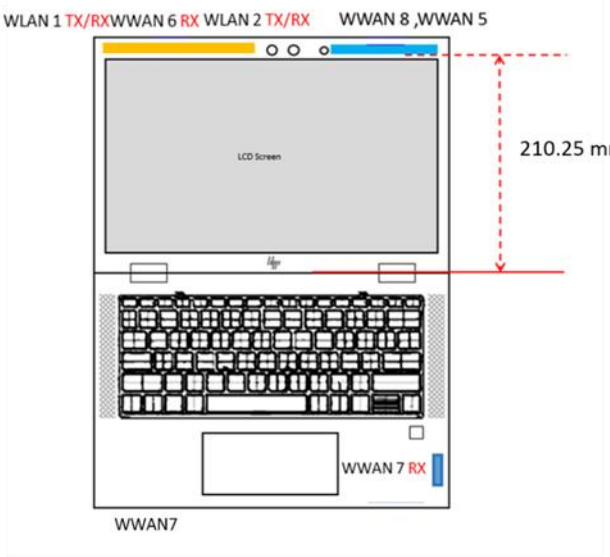
OEM / ODM Host platform:

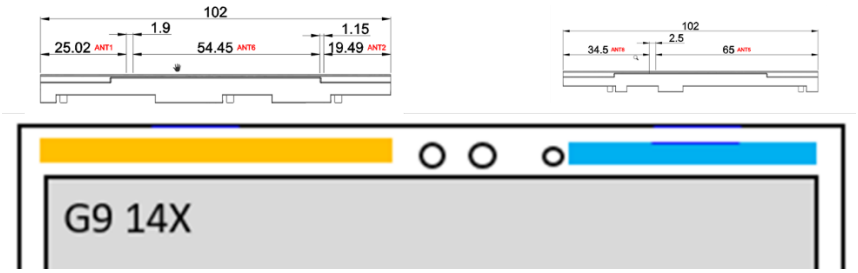
**Rating Label Photo:**

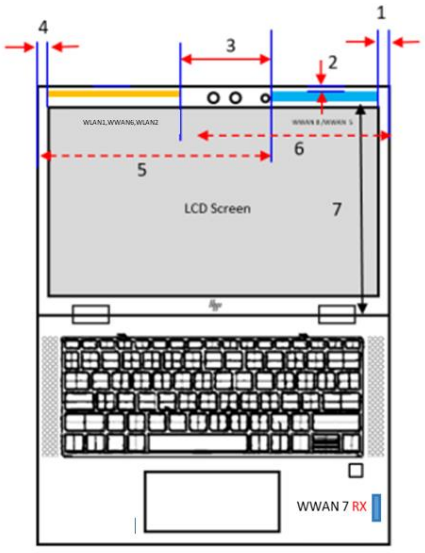


# Section 5. Antenna Host Platform Location Information

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.



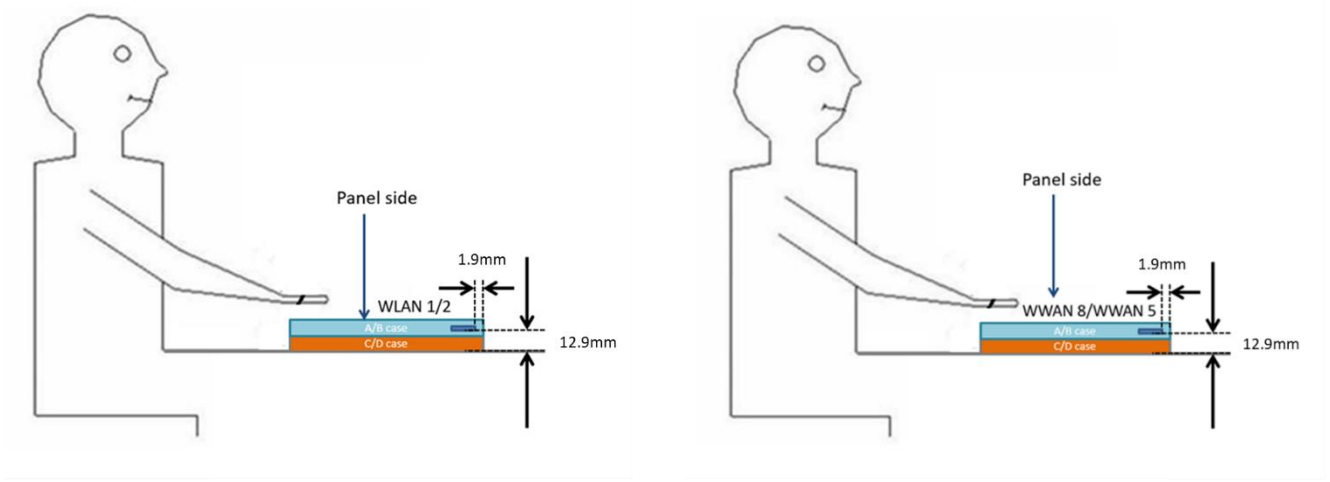



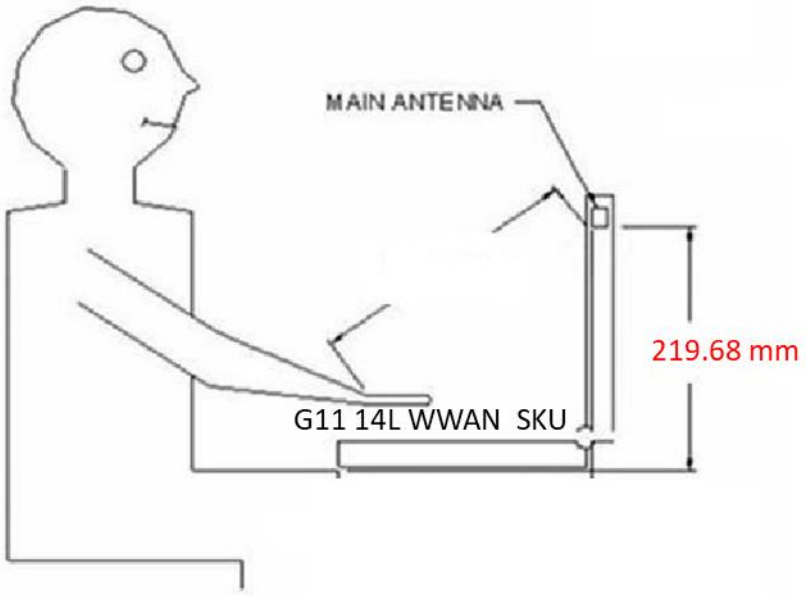




| Plot | (mm) |
|---|---|
| 1 | 13.145 |
| 2 | 1.9 |
| 3 | 84.5 |
| 4 | 12.345 |
| 5 | 198.845 |
| 9 | 199.645 |
| 7 | 210.25 |

# 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.

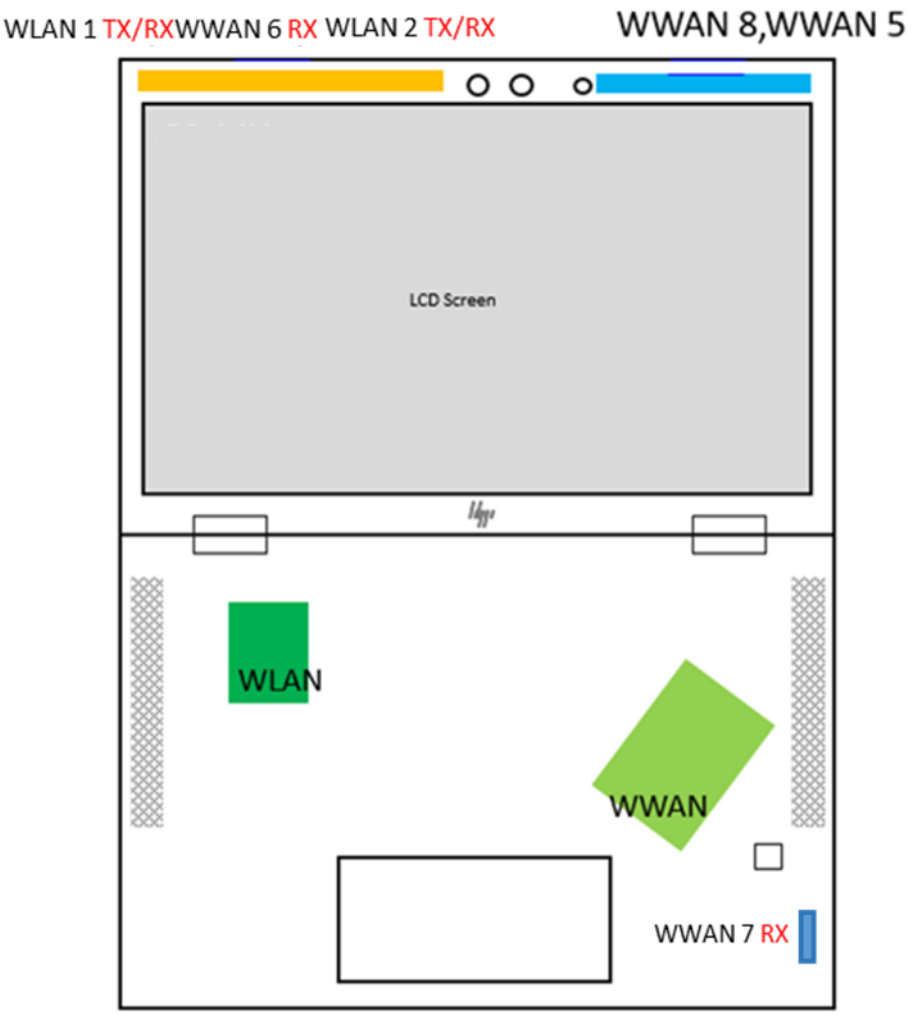


# Section 7. Diagram Example of Co-Location Antenna Separation

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,..

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



# 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** | | | | | | |