

Regulatory WiMAX Antenna Information

(English Language Required for Intel Regulatory Review / Approval)

| | |
|--------------------|--|
| Platform | |
| Platform Owner | Compal Corporation |
| Brand Name | Lenovo |
| Model Name | 20017(4186) |
| ODM | Compal Corporation |
| Target Launch Date | 2009/08/21 |
| | |
| Antenna | |
| Brand Name | WNC |
| Part Number | <input checked="" type="checkbox"/> Tx1 (Main Antenna) Antenna:81.EJS15.008 <input checked="" type="checkbox"/> Tx2 (AUX Antenna) Antenna:81.EJS15.008 <input checked="" type="checkbox"/> Tx3 (MIMO Antenna) Antenna:81.EJS15.008 |
| | |
| Module | |
| With WLAN Module | <input type="checkbox"/> 512AN MMW |
| (Check Box) | <input type="checkbox"/> 533AN MMW |
| | <input type="checkbox"/> WM3945ABG |
| | <input checked="" type="checkbox"/> 622AN Family |
| | <input checked="" type="checkbox"/> 633AN Family |
| | <input checked="" type="checkbox"/> 622ANX Family |
| | <input checked="" type="checkbox"/> 512ANX Family |
| | <input checked="" type="checkbox"/> 533AN Family |
| | <input checked="" type="checkbox"/> 512AN Family |

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 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 | Tx1, Tx2 & Tx3 antenna (Peak Gain W/ cable loss) * | Required | Required | Required | Required | Required |
| | 1E OR 1F, 1G, 1H | | | | | |
| 1F | Tx1, Tx2 & Tx3 antenna (Peak Gain only) * | Required | Required | Required | Required | Required |
| 1G | VSWR of cable including connector | Required | Required | Required | Required | Required |
| 1H | Tx1, Tx2 & Tx3 antenna (Cable loss W/ connector) * | Required | Required | Required | Required | Required |
| 2 | Dimensioned Photographs <u>and</u> Drawings of Tx1, Tx2, and Tx3 (or Rx3) 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. (S. Korea requires <u>photographs of antennas for approval submission</u>). Taiwan requires pictures of each antenna type shown in the system. | Required | Required | Desired | <u>Required (Photos)</u> | <u>Required (Photos)</u> |
| 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 |

NOTE:

(*) if 3rd antenna is Rx only (e.g. receive only for 4965AGN) then peak gain and cable loss not required

Antenna Information

Section 1. Antenna Assembly Specifications

Antenna Assembly Summary:

| 1A Antenna Part Number | 1B Manufacture | 1C Antenna Type | 1D Cable Assembly Part Number and Information | 1E Peak Gain W/ Cable loss (dBi) | 1F Peak Gain w/o Cable Loss (dBi) | 1G VSWR | 1H Cable Loss (dBi) |
|---|---------------------------|--------------------|--|---|---|--------------------------------|--|
| TX1 (WLAN Main) (WNC P/N:81.EJS15.008) (customer P/N:DC33000HS40) | Wistron Neweb Corporation | PIFA | P/N: 57.EJS15.008 50 ohm Coaxial. length: 658 mm diameter: 1.37 mm Connector: IPEX | 2400-2500MHz 1.26 dBi (peak) | 2400-2500MHz 2.87 dBi (peak) | 2400-2500MHz 2.0 max | 2400-2500MHz 1.61 dBi (peak) |
| | | | | 5150-5350MHz 0.54 dBi (peak) | 5150-5350MHz 3.08 dBi (peak) | 5150-5350MHz 2.0 max | 5150-5350MHz 2.54 dBi (peak) |
| | | | | 5470-5725MHz -0.19 dBi (peak) | 5470-5725MHz 2.50 dBi (peak) | 5470-5725MHz 2.0 max | 5470-5725MHz 2.68 dBi (peak) |
| | | | | 5725-5825MHz -0.56 dBi (peak) | 5725-5825MHz 2.16 dBi (peak) | 5725-5825MHz 2.0 max | 5725-5825MHz 2.72 dBi (peak) |
| TX2 (WLAN AUX) (WNC P/N:81.EJS15.008) (customer P/N:DC33000HS40) | Wistron Neweb Corporation | PIFA | P/N: 57.EJS15.008 50 ohm Coaxial. length: 747 mm diameter: 1.37 mm Connector: IPEX | 2400-2500MHz 1.48 dBi (peak) | 2400-2500MHz 3.28 dBi (peak) | 2400-2500MHz 2.0 max | 2400-2500MHz 1.80 dBi (peak) |
| | | | | 5150-5350MHz 0.86 dBi (peak) | 5150-5350MHz 3.71 dBi (peak) | 5150-5350MHz 2.0 max | 5150-5350MHz 2.85 dBi (peak) |
| | | | | 5470-5725MHz 0.45 dBi (peak) | 5470-5725MHz 3.46 dBi (peak) | 5470-5725MHz 2.0 max | 5470-5725MHz 3.01 dBi (peak) |
| | | | | 5725-5825MHz -0.32 dBi (peak) | 5725-5825MHz 2.74 dBi (peak) | 5725-5825MHz 2.0 max | 5725-5825MHz 3.06 dBi (peak) |
| TX3 (MIMO Antenna) (WNC P/N:81.EJS15.008) (customer P/N:DC33000HS40) | Wistron Neweb Corporation | PIFA | P/N: 57.EJS15.008 50 ohm Coaxial. length: 328 mm diameter: 1.37 mm Connector: IPEX | 2400-2500MHz -2.04 dBi (peak) | 2400-2500MHz -1.14 dBi (peak) | 2400-2500MHz 2.0 max | 2400-2500MHz 0.90 dBi (peak) |
| | | | | 5150-5350MHz -1.11 dBi (peak) | 5150-5350MHz 0.27 dBi (peak) | 5150-5350MHz 2.0 max | 5150-5350MHz 1.38 dBi (peak) |
| | | | | 5470-5725MHz -0.01 dBi (peak) | 5470-5725MHz 1.45 dBi (peak) | 5470-5725MHz 2.0 max | 5470-5725MHz 1.46 dBi (peak) |
| | | | | 5725-5825MHz -0.37 dBi (peak) | 5725-5825MHz 1.11 dBi (peak) | 5725-5825MHz 2.0 max | 5725-5825MHz 1.48 dBi (peak) |

NOTE:

(*) If Rx2/Rx3 only (2nd or 3rd antenna receives only, e.g. for 512 family & 4965AGN) then the information marked with * is not required

Antenna Peak Gain Table:

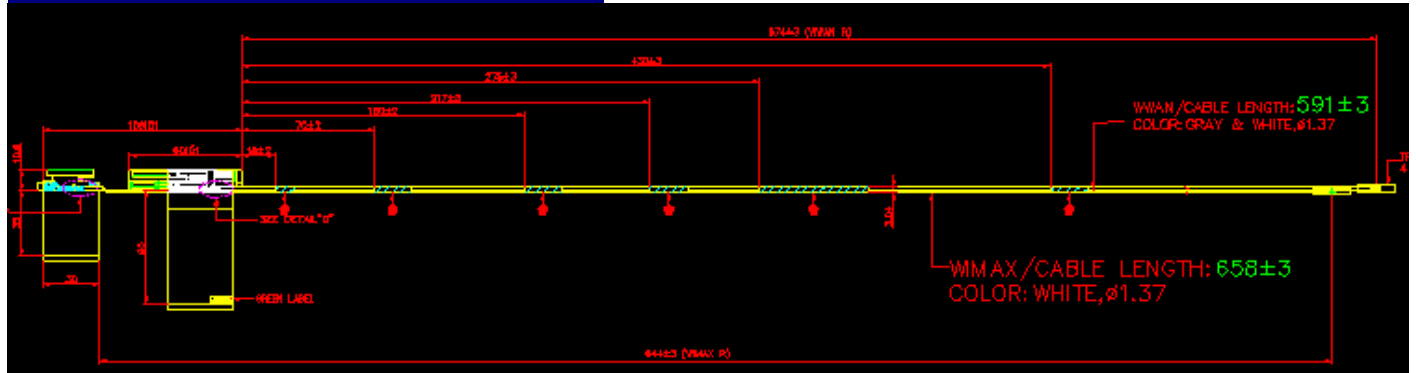
| Frequency (MHz) | TX1 (WLAN Main) | | TX2 (WLAN AUX) | | TX3 (MIMO) | |
|-----------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|
| | Horizontal (dBi) | Vertical (dBi) | Horizontal (dBi) | Vertical (dBi) | Horizontal (dBi) | Vertical (dBi) |
| 2400 | 1.26 | -1.83 | 0.25 | -0.52 | -4.05 | -2.17 |
| 2450 | -0.45 | -2.81 | 0.32 | -1.49 | -3.72 | -2.04 |
| 2500 | -0.87 | -1.02 | 1.48 | -0.92 | -3.14 | -2.25 |
| 5150 | 0.54 | -2.69 | 0.86 | -0.76 | -1.54 | -1.53 |
| 5250 | -0.70 | -2.10 | -0.17 | -2.42 | -2.37 | -1.64 |
| 5350 | -0.20 | -0.82 | 0.15 | -2.53 | -1.71 | -1.11 |
| 5470 | -0.58 | -0.19 | 0.45 | -1.80 | -0.31 | -0.18 |
| 5600 | -3.47 | -0.32 | -0.20 | -1.87 | -0.01 | -1.15 |
| 5725 | -2.60 | -0.78 | -0.32 | -1.39 | -0.40 | -1.19 |
| 5785 | -3.19 | -0.70 | -2.16 | -1.17 | -0.37 | -1.29 |
| 5850 | -2.42 | -0.56 | -3.03 | -1.29 | -0.95 | -0.85 |

- Antenna Peak Gain required being test in system basis.
- 1E frame contend absolutely peak antenna gain include H/V
- If Rx2 only (2nd antenna receives only, e.g. for 512 family) then the information is not required for Rx2.
- If Rx3 only (3rd antenna receives only, e.g. for 4965AGN) then the information is not required for Rx3.

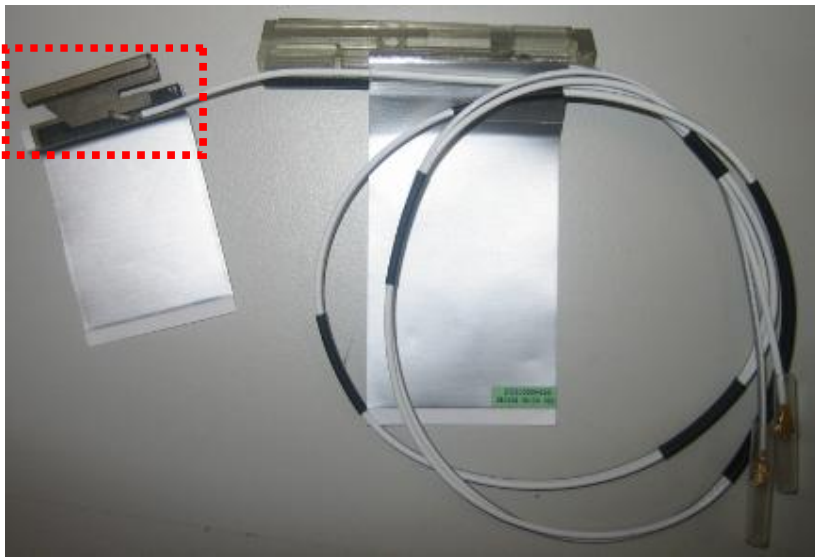
Section 2. Dimensioned Photos or Drawings of Antennas

Include a dimensioned photo and dimensioned drawing of Tx1 (WLAN Main) here.

Tx1 (WIMAX Main) Dimensioned Drawing:

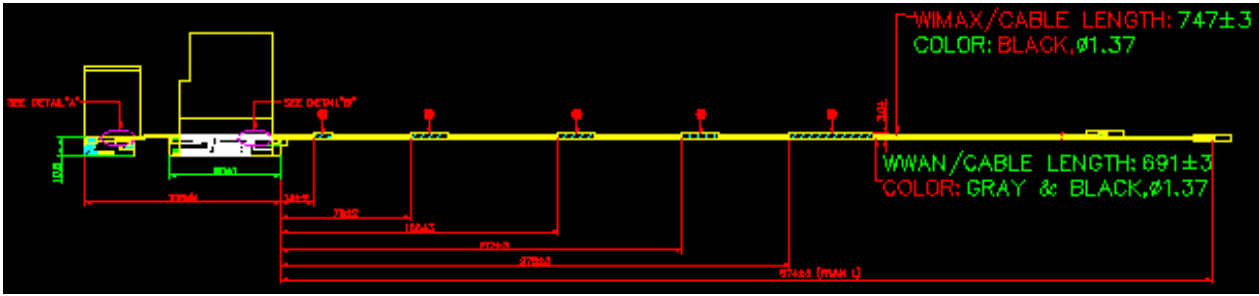


Tx1 (WIMAX Main) Antenna Photo:

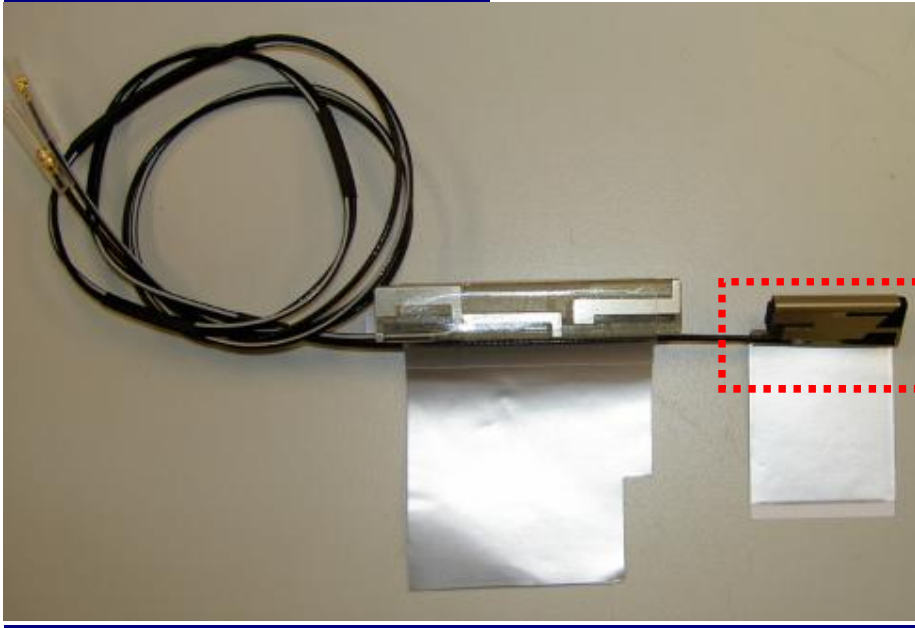


Include a dimensioned photo and dimensioned drawing of Tx2 (WLAN AUX) here.

Tx2 (WIMAX AUX) Dimensioned Drawing:

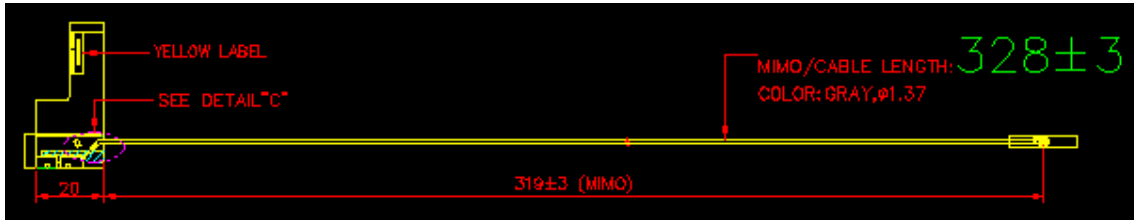


Tx2 (WIMAX AUX) Antenna Photo:

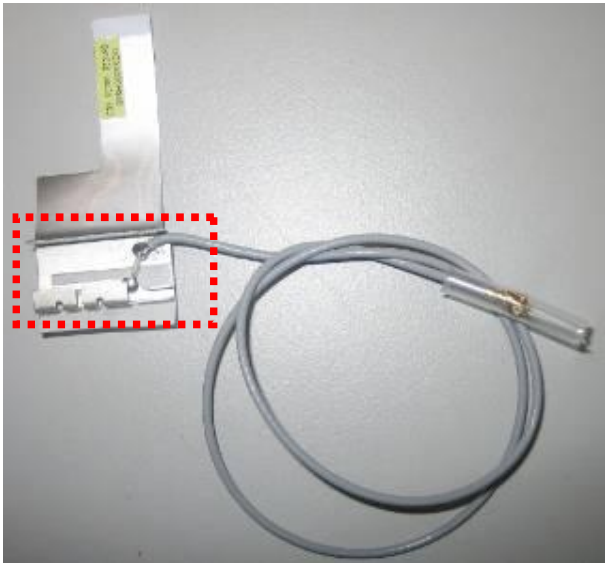


Include a dimensioned photo and dimensioned drawing of Tx3 (or Rx3) antenna here.

Tx3 (MIMO) Antenna Dimensioned Drawing:



Tx3 (MIMO) Antenna Photo:



Include front view photo of all 3 antennas here.

Antenna Manufacturer: WLAN
Antenna Part Number: 81.EJS15.008 Tx1 (WIMAX Main), 81.EJS15.008 Tx2 (WIMAX AUX),
81.EJS15.008 Tx3 (WLAN MIMO)



Include back view photo of all 3 antennas here.

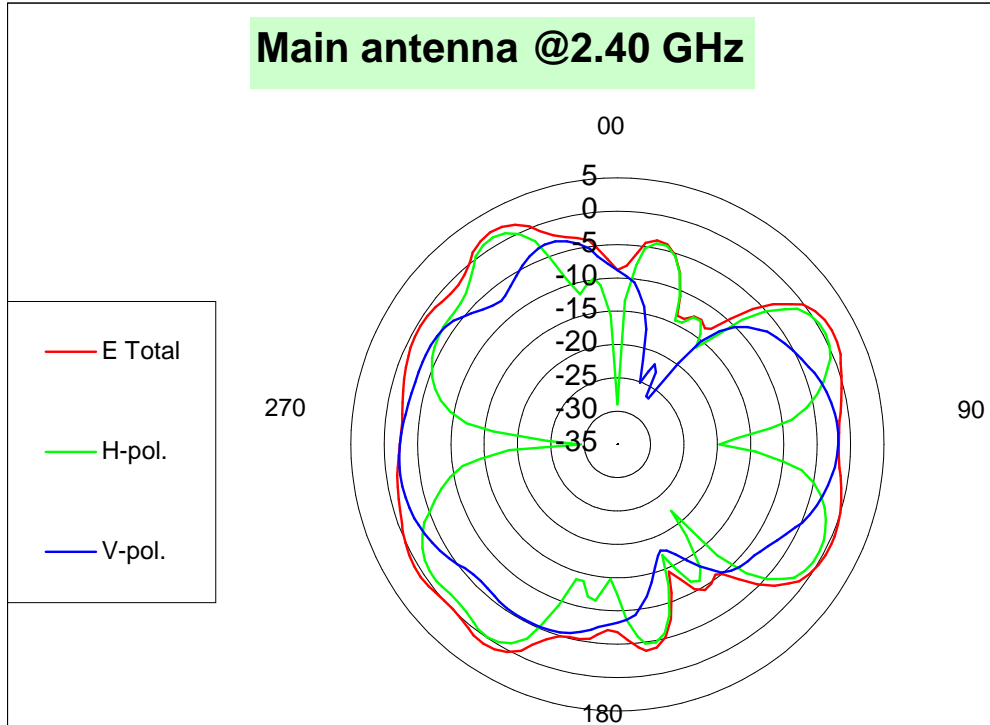
Antenna Manufacturer: WLAN
Antenna Part Number: 81.EJS15.008 Tx1 (WIMAX Main), 81.EJS15.008 Tx2 (WIMAX AUX),
81.EJS15.008 Tx3 (WLAN MIMO)



Section 3. Radiation characteristics of antennae Loaded in Host Platform

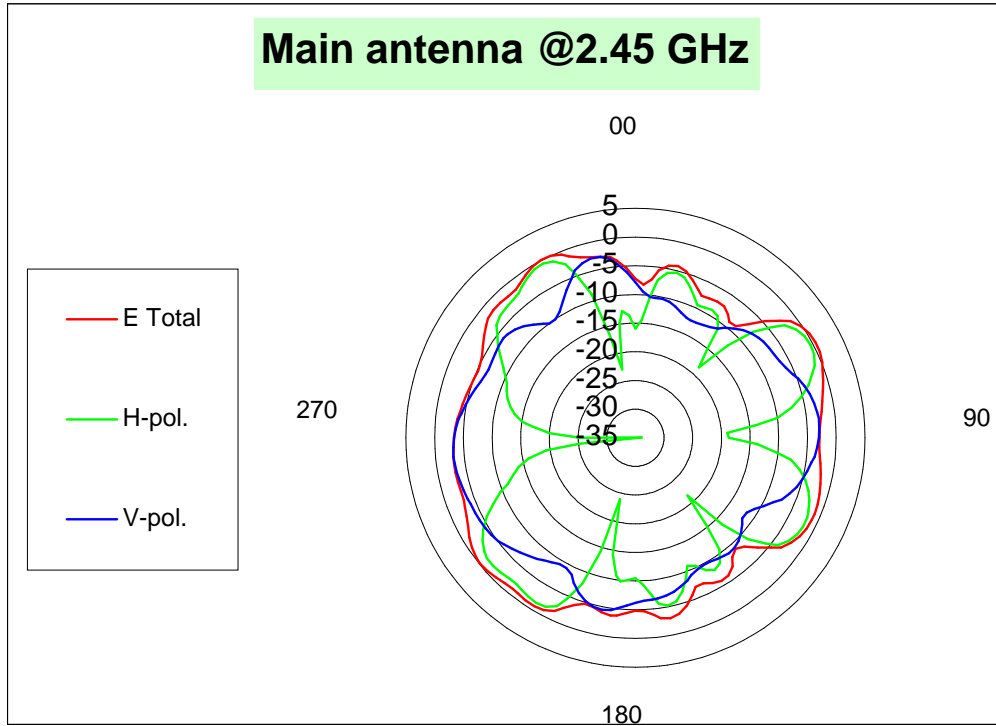
2400-2500MHz radiation characteristic

Tx1 antenna: 2400 MHz



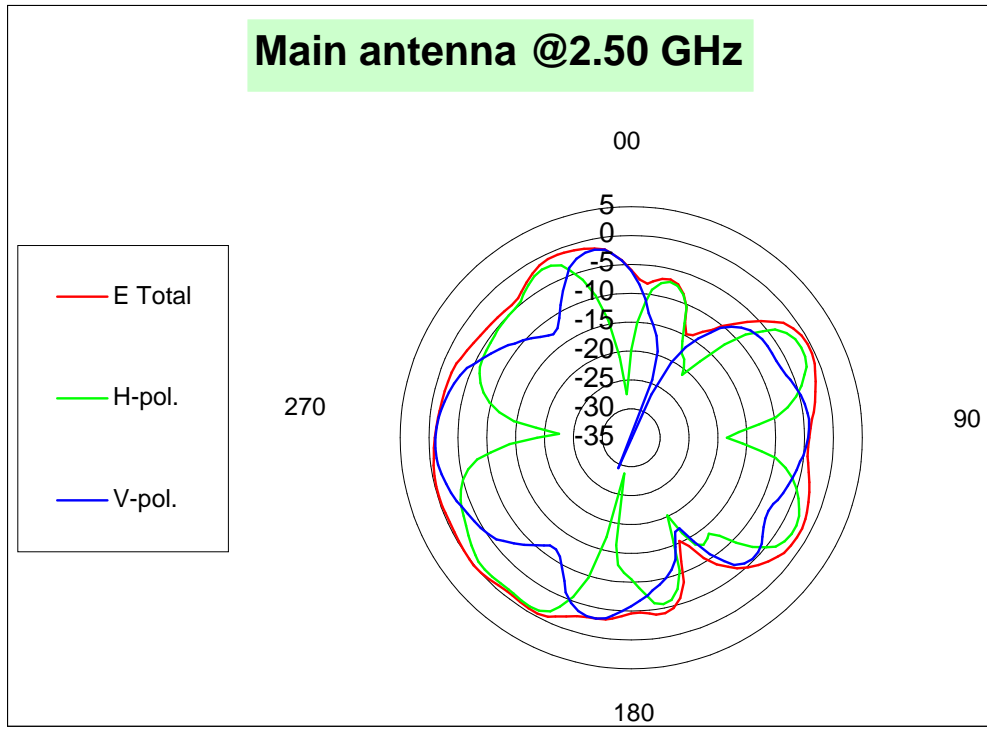
| | H-pol | V pol |
|------------------|-------------|--------------|
| Peak Gain | 1.26 | -1.83 |

Tx1 antenna: 2450 MHz



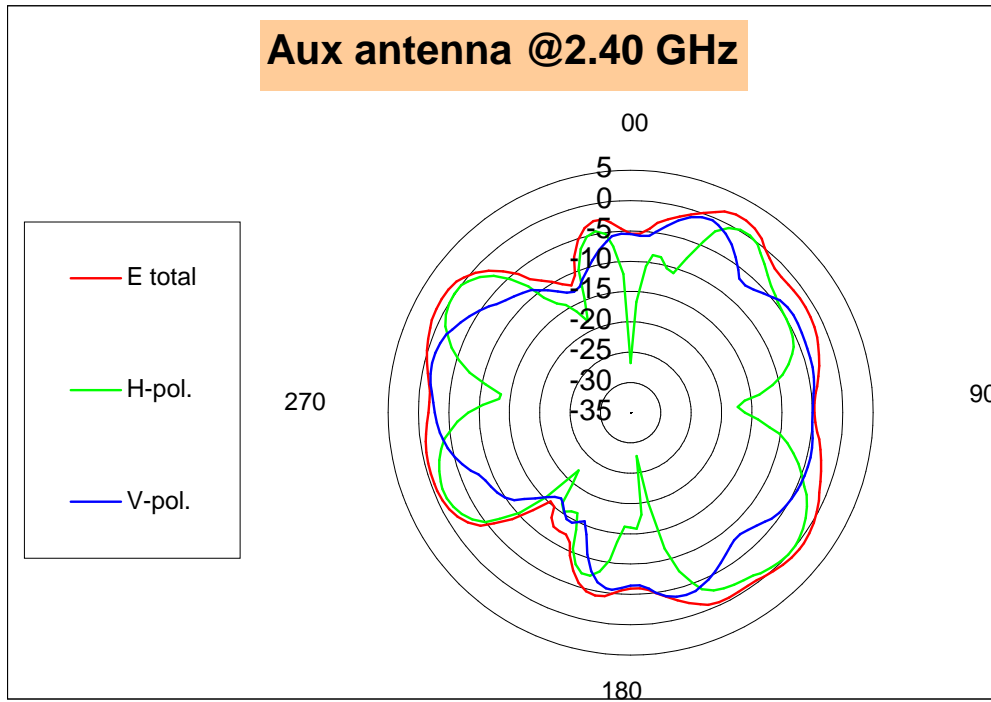
| | H-pol | V pol |
|-----------|--------------|--------------|
| Peak Gain | -0.45 | -2.81 |

Tx1 antenna: 2500 MHz



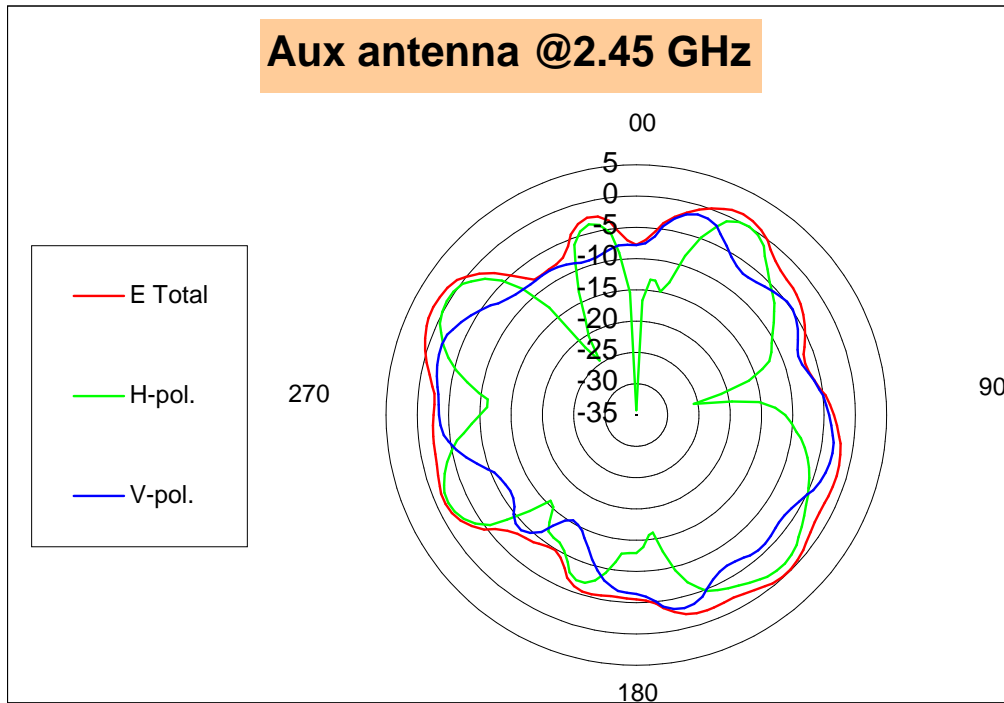
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.87 | -1.02 |

Tx2 (or Rx2) antenna: 2400 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



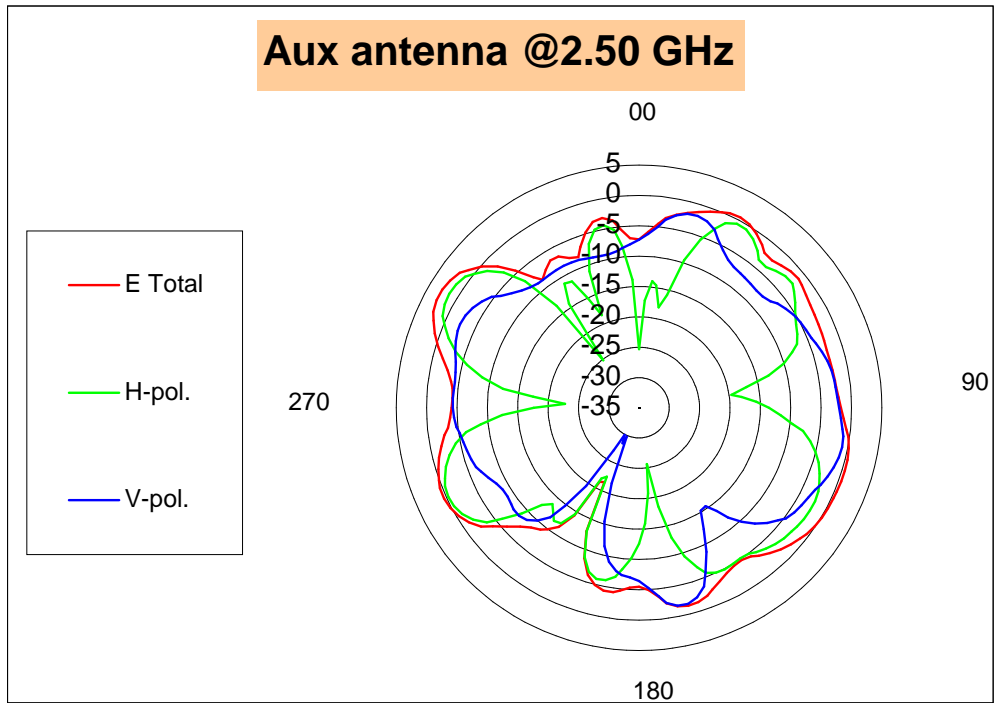
| | H-pol | V pol |
|------------------|-------------|--------------|
| Peak Gain | 0.25 | -0.52 |

Tx2 (or Rx2) antenna: 2450 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



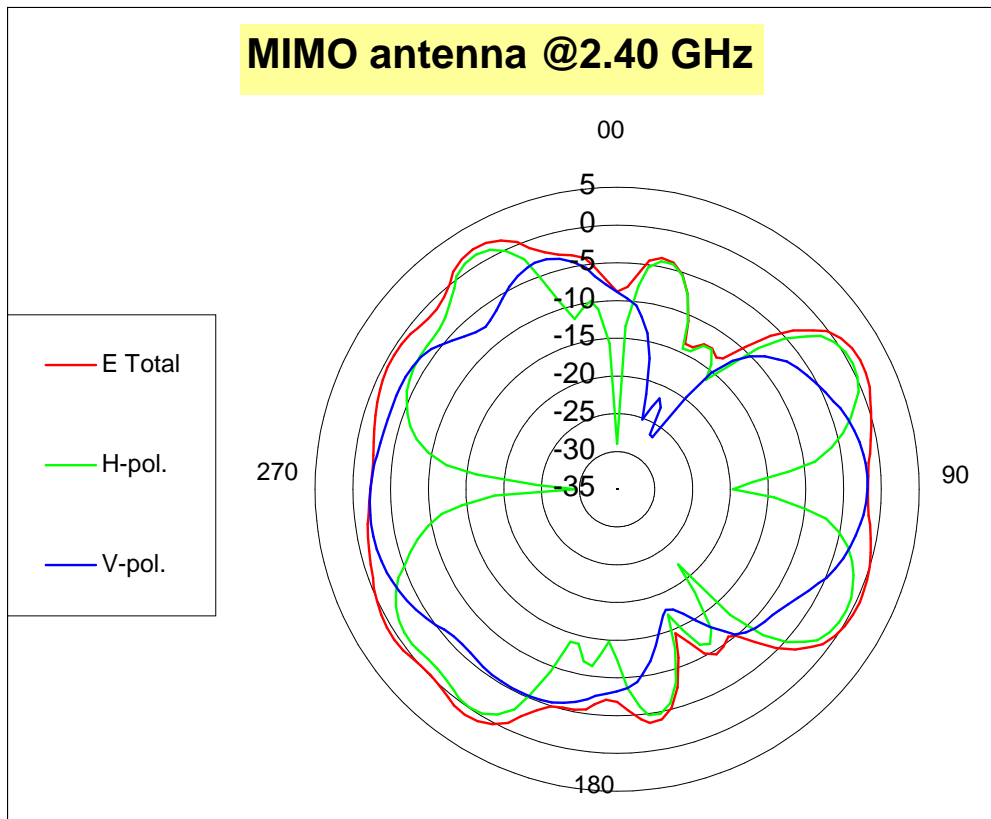
| | H-pol | V pol |
|------------------|-------------|--------------|
| Peak Gain | 0.32 | -1.49 |

Tx2 (or Rx2) antenna: 2500 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



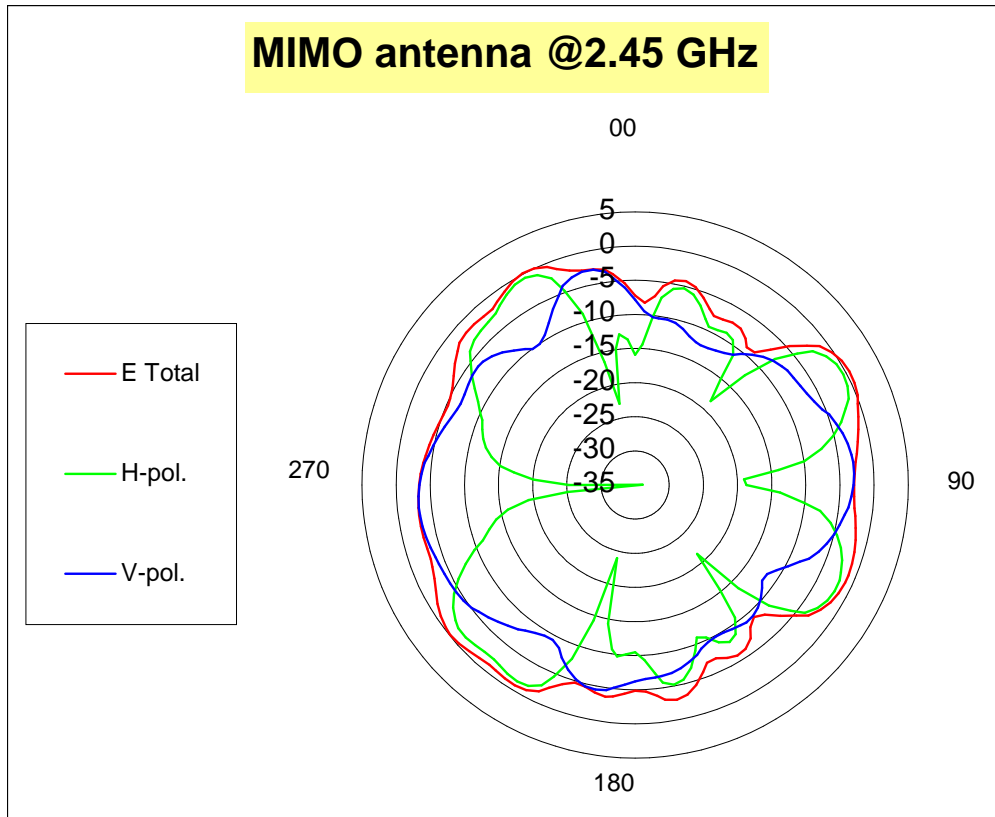
| | H-pol | V pol |
|------------------|-------------|--------------|
| Peak Gain | 1.48 | -0.92 |

Tx3 (or Rx3) antenna: 2400 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



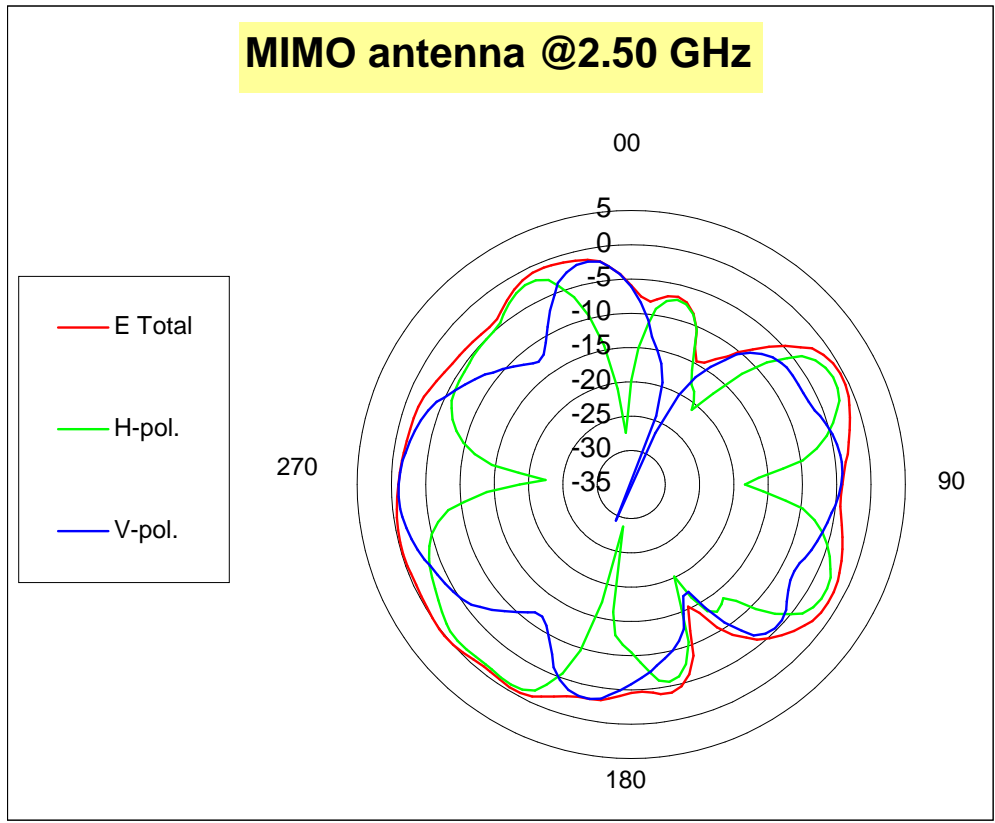
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -4.05 | -2.17 |

Tx3 (or Rx3) antenna: 2450 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -3.72 | -2.04 |

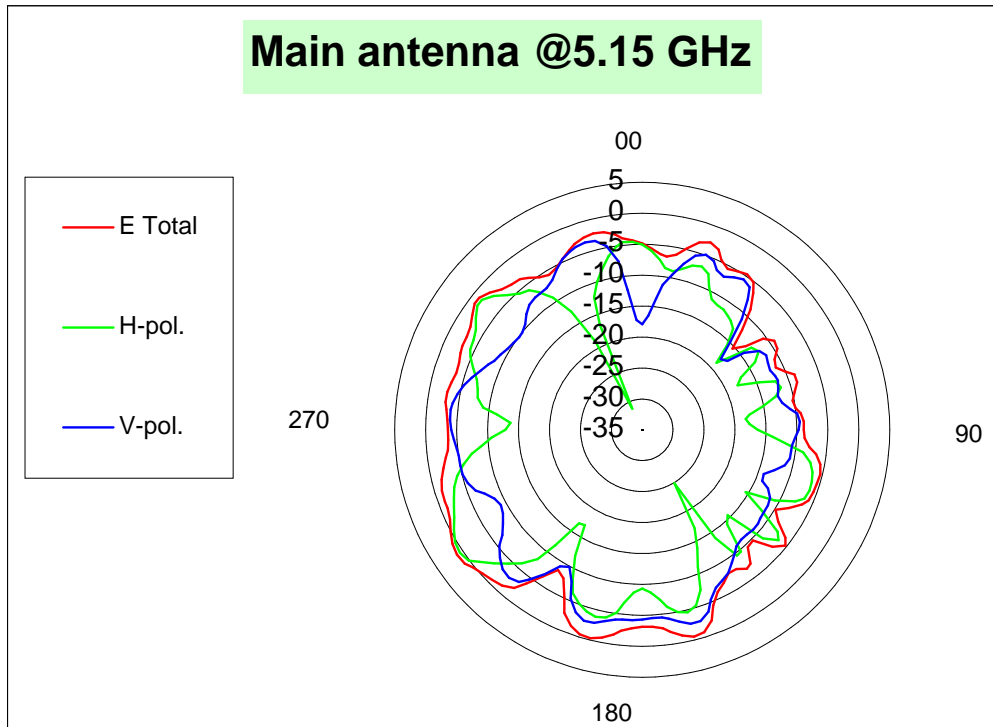
Tx3 (or Rx3) antenna: 2500 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -3.14 | -2.25 |

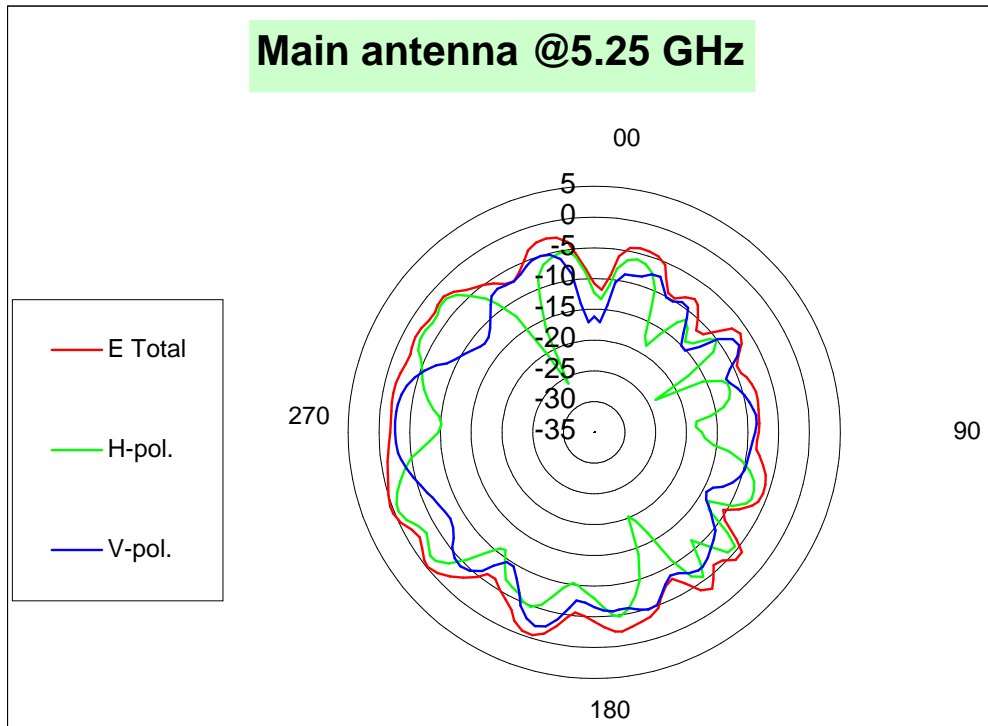
5150-5350 MHz radiation characteristic

Tx1 antenna: 5150 MHz



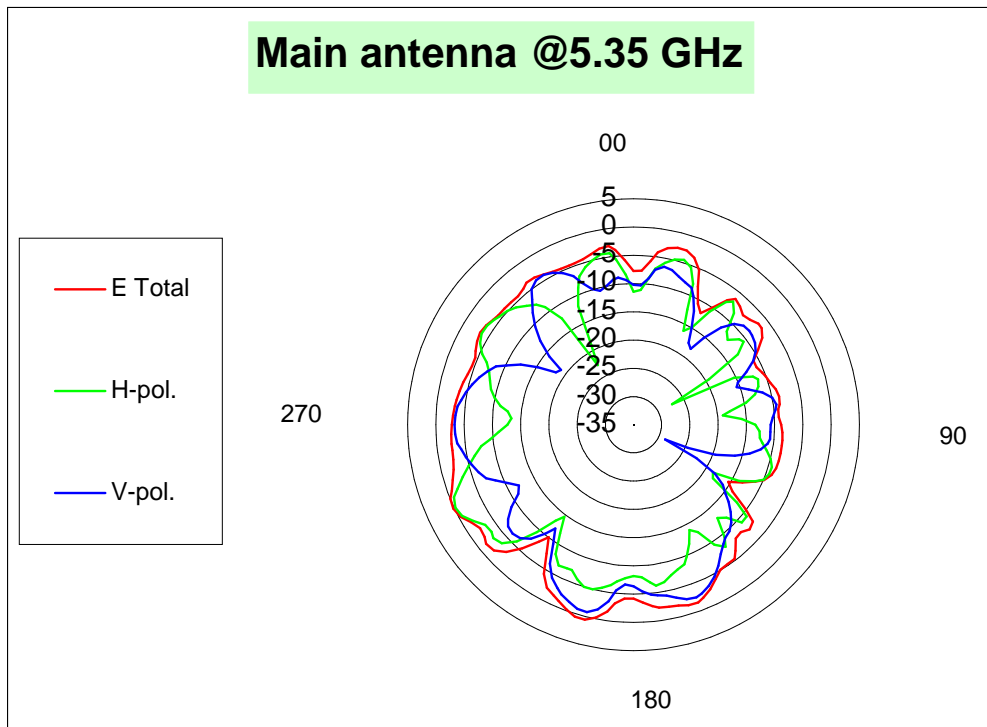
| | H-pol | V pol |
|-----------|-------|-------|
| Peak Gain | 0.54 | -2.69 |

Tx1 antenna: 5250 MHz



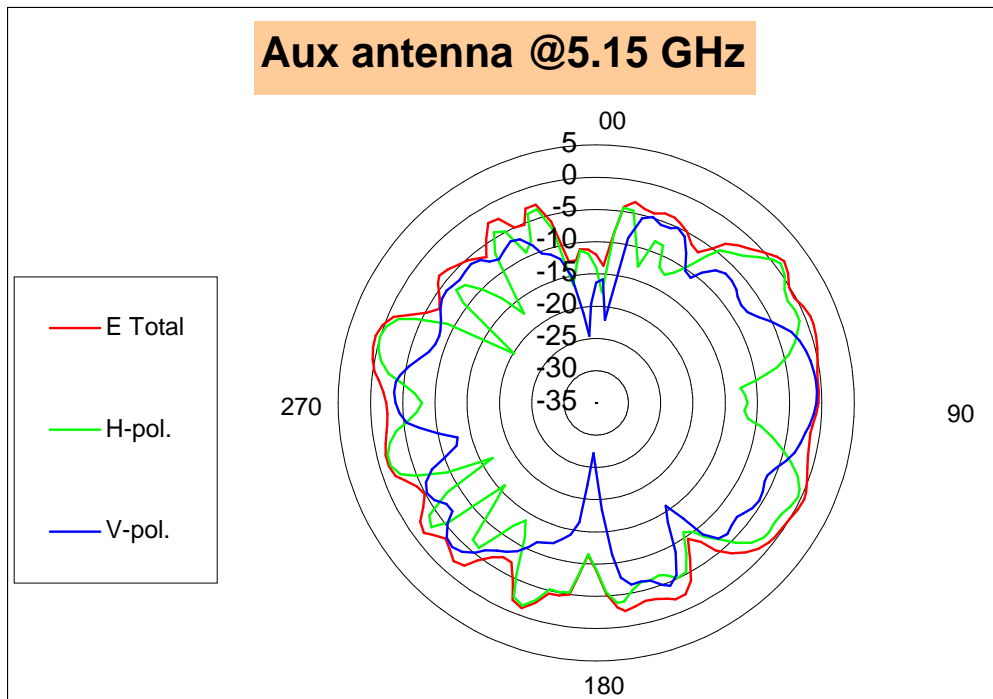
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.70 | -2.10 |

Tx1 antenna: 5350 MHz



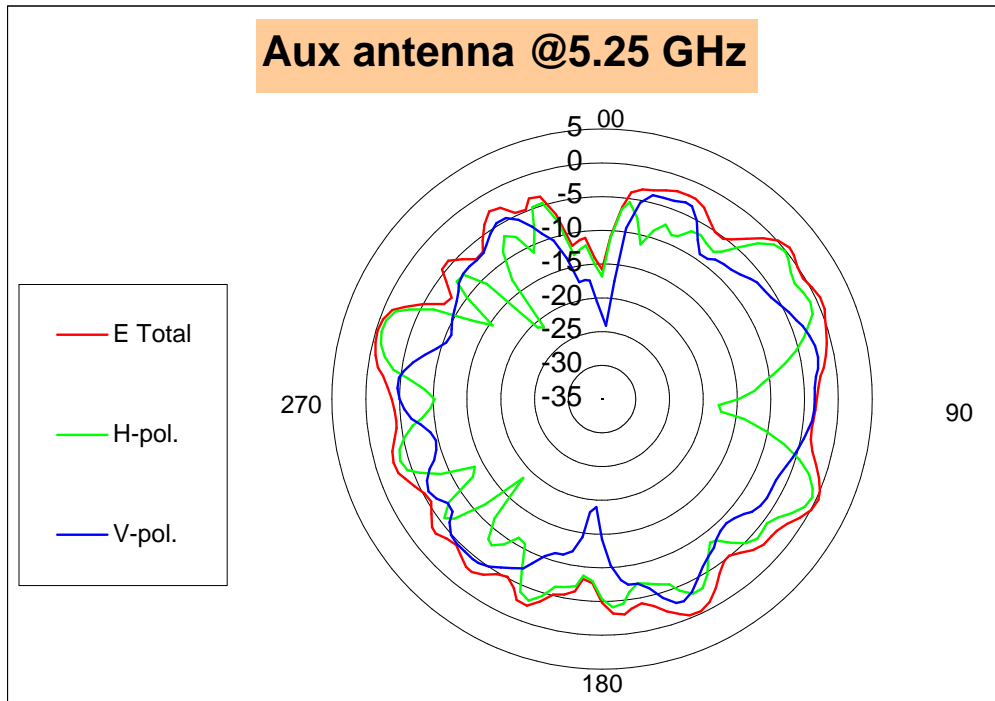
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.20 | -0.82 |

Tx2 (or Rx2) antenna: 5150 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



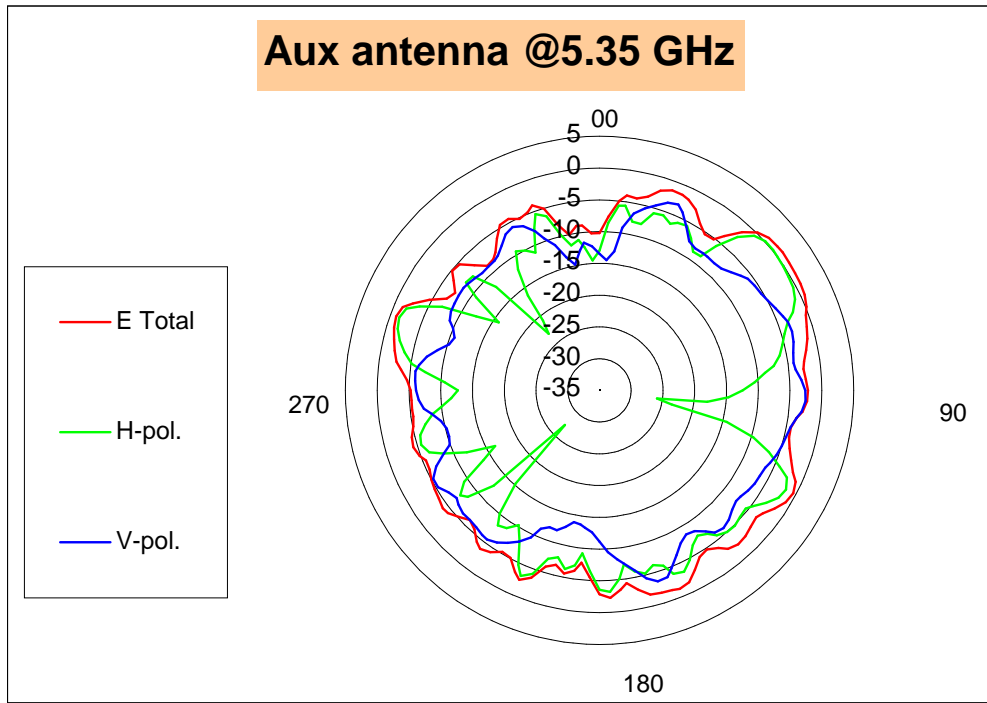
| | H-pol | V pol |
|-----------|-------|-------|
| Peak Gain | 0.86 | -0.76 |

Tx2 (or Rx2) antenna: 5250 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



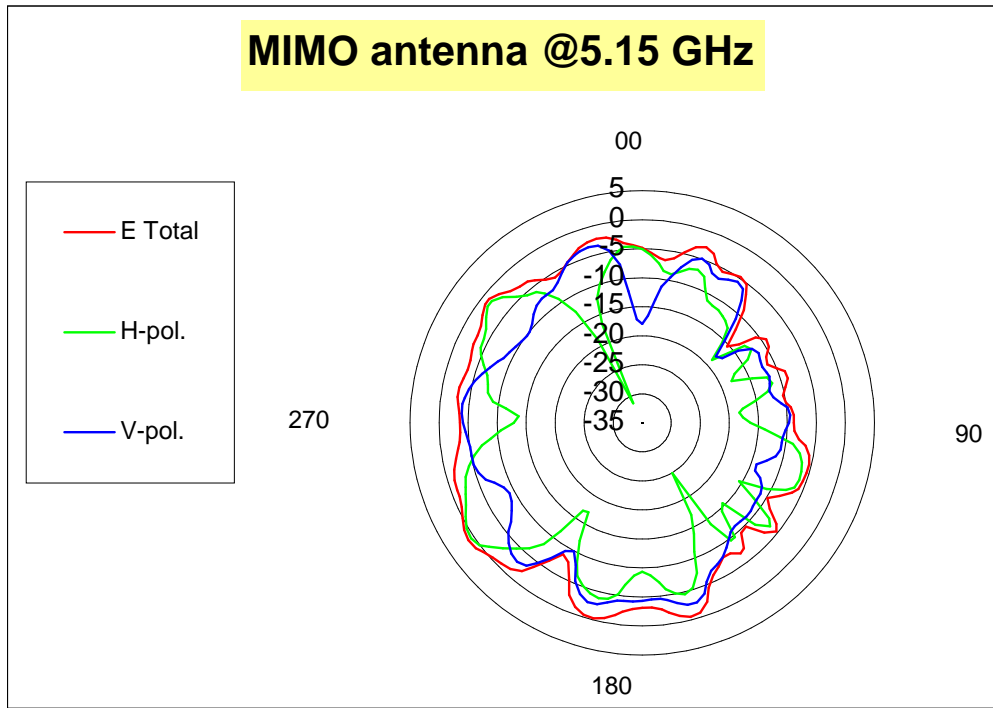
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.17 | -2.42 |

Tx2 (or Rx2) antenna: 5350 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



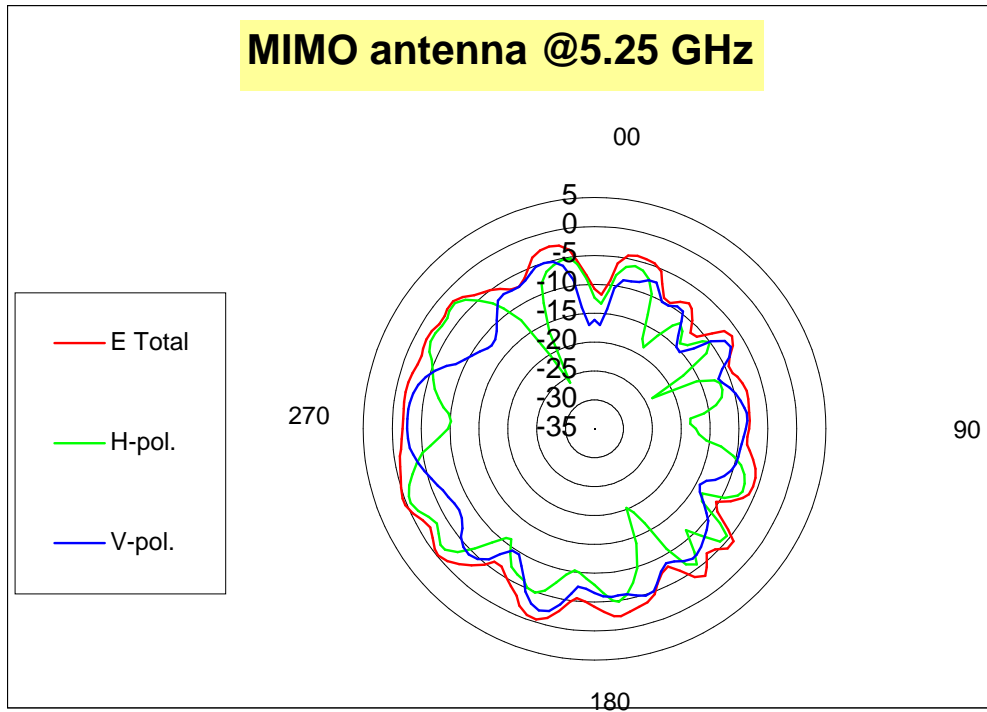
| | H-pol | V pol |
|------------------|-------------|--------------|
| Peak Gain | 0.15 | -2.53 |

Tx3 (or Rx3) antenna: 5150 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



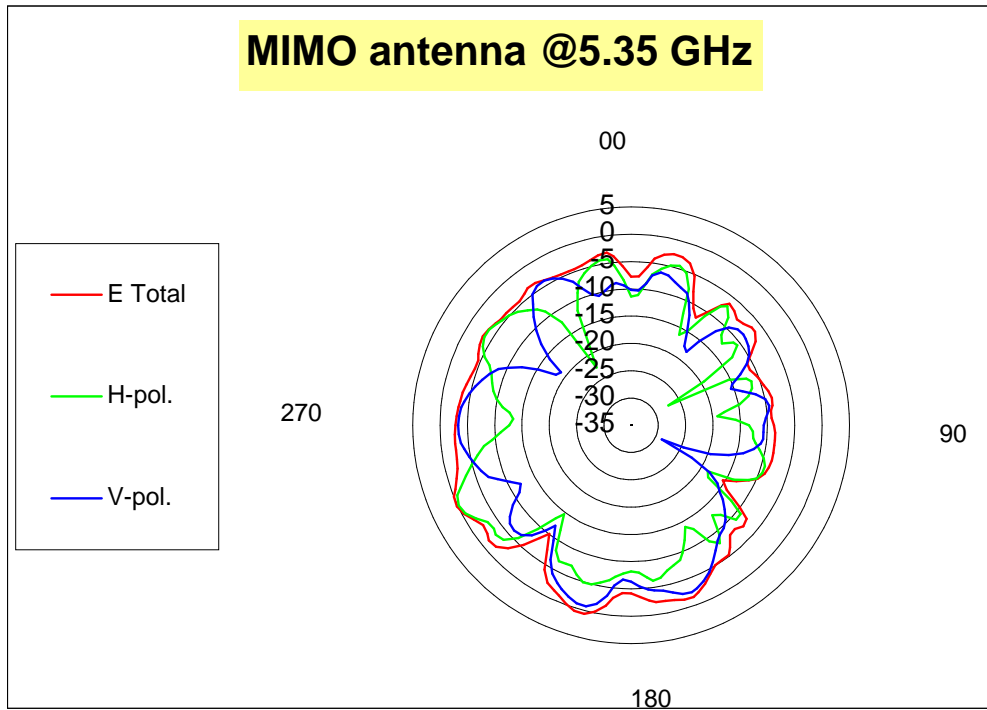
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -1.54 | -1.53 |

Tx3 (or Rx3) antenna: 5250 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -2.37 | -1.64 |

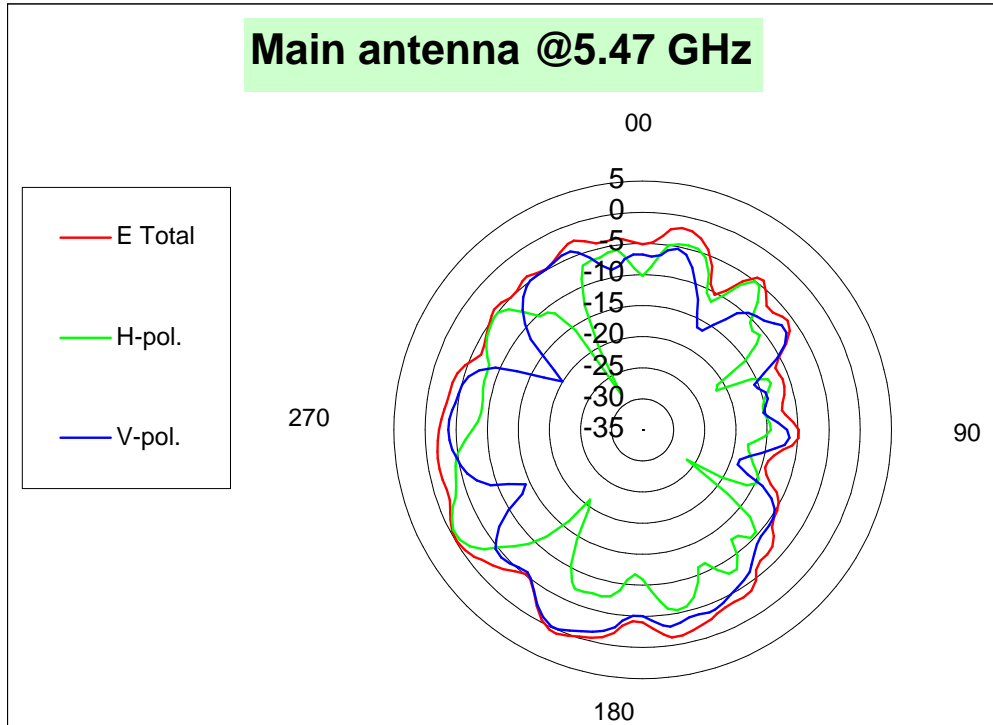
Tx3 (or Rx3) antenna: 5350 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -1.71 | -1.11 |

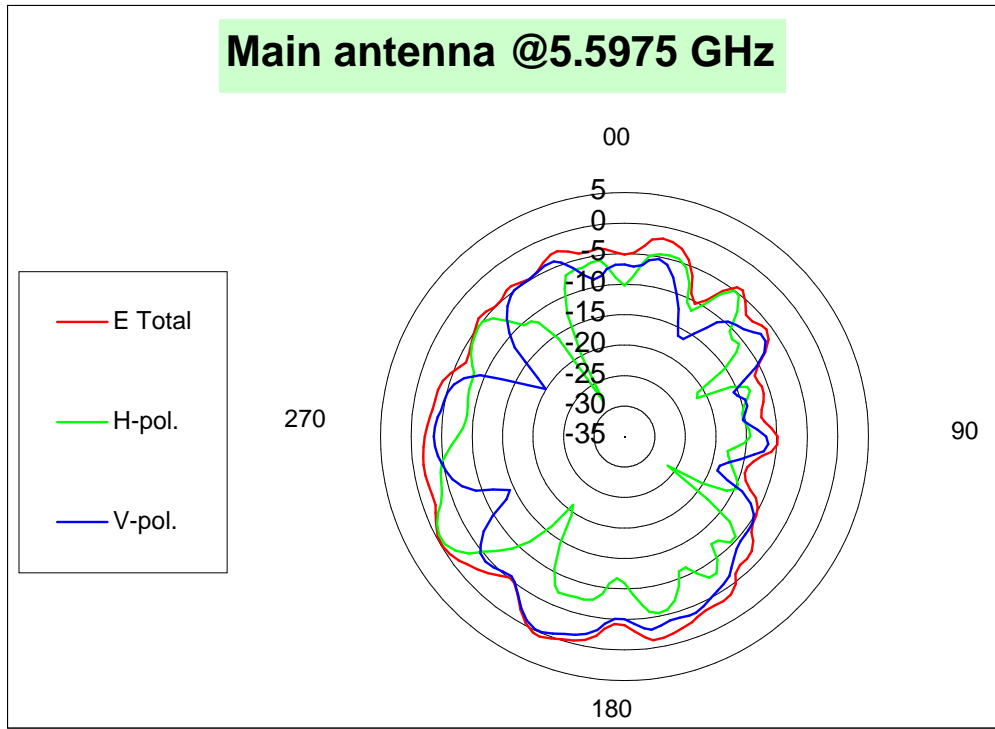
5470-5725MHz radiation characteristic

Tx1 antenna: 5470 MHz



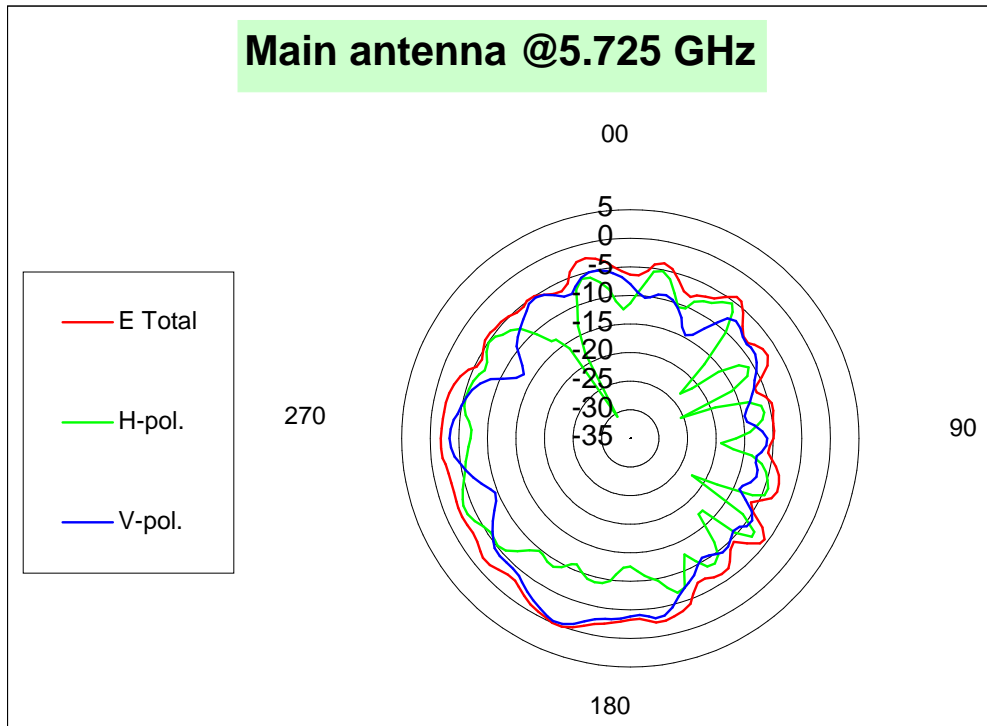
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.58 | -0.19 |

Tx1 antenna: 5597.5 MHz



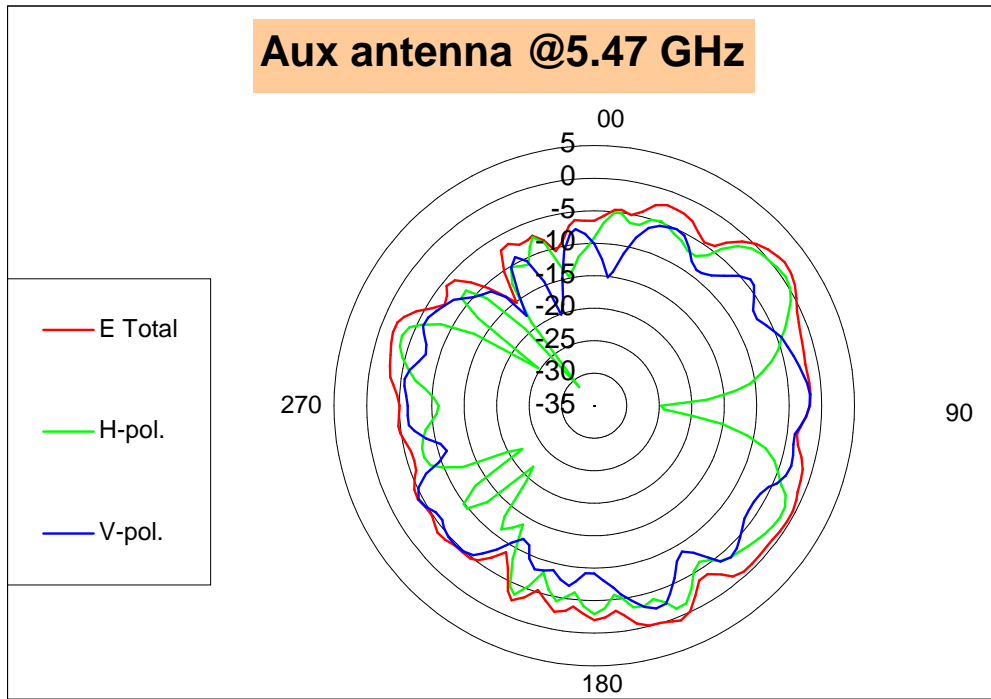
| | H-pol | V pol |
|-----------|-------|-------|
| Peak Gain | -3.47 | -0.32 |

Tx1 antenna: 5725 MHz



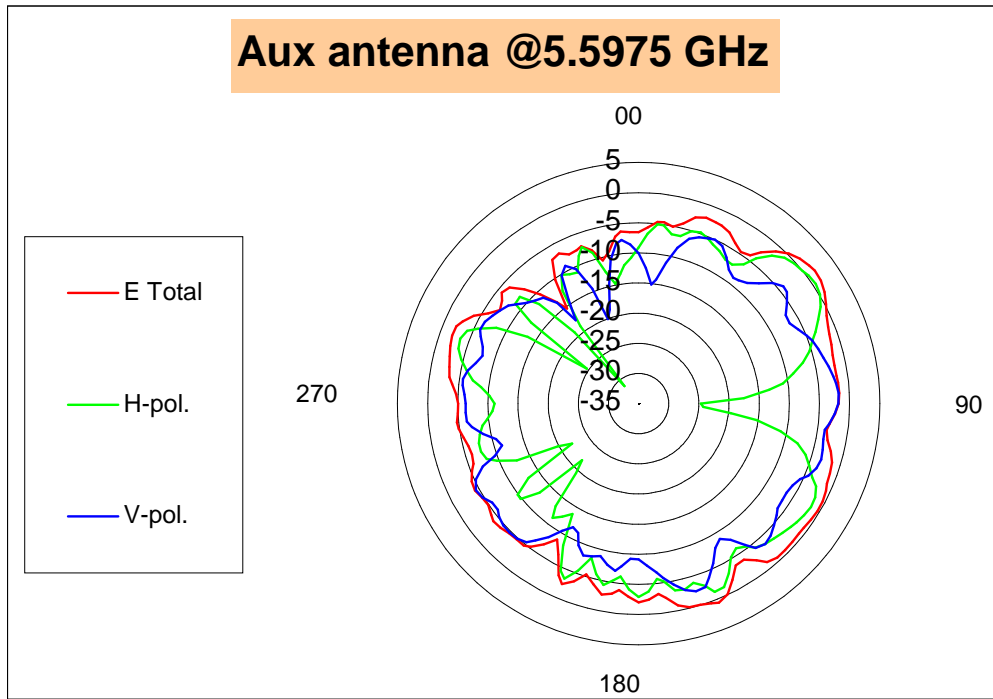
| | H-pol | V pol |
|-----------|-------|-------|
| Peak Gain | -2.60 | -0.78 |

Tx2 (or Rx2) antenna: 5470 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



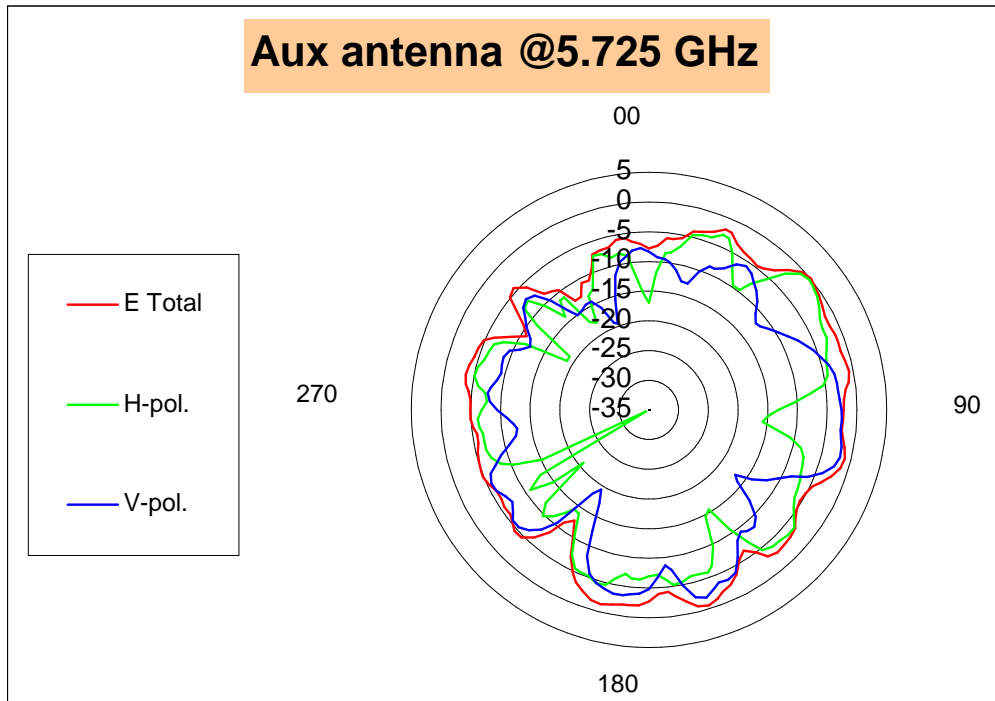
| | H-pol | V pol |
|------------------|-------------|--------------|
| Peak Gain | 0.45 | -1.80 |

Tx2 (or Rx2) antenna: 5597.5 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)

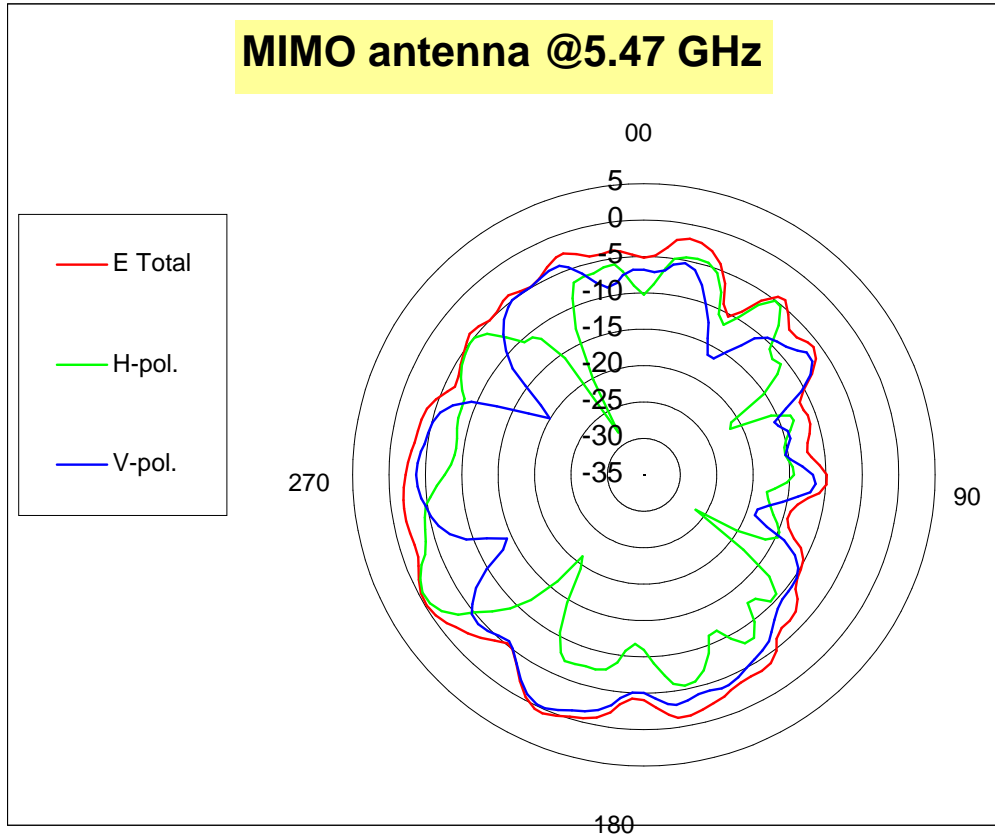


| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.20 | -1.87 |

Tx2 (or Rx2) antenna: 5725 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)

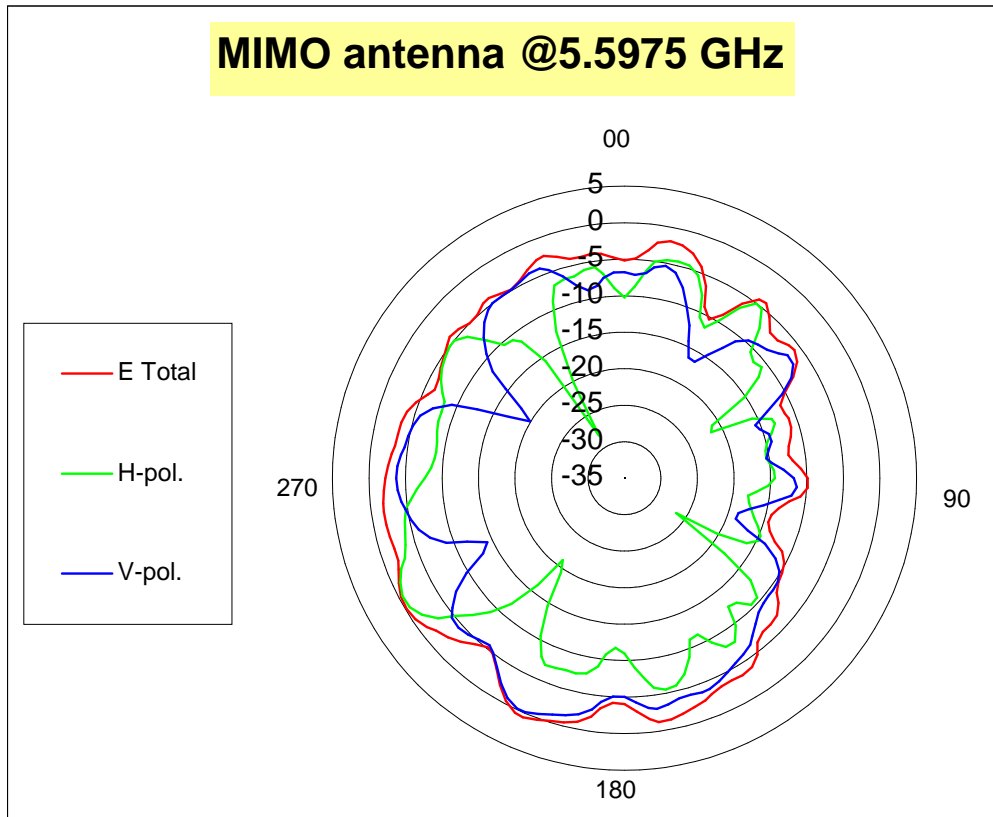


| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.32 | -1.39 |



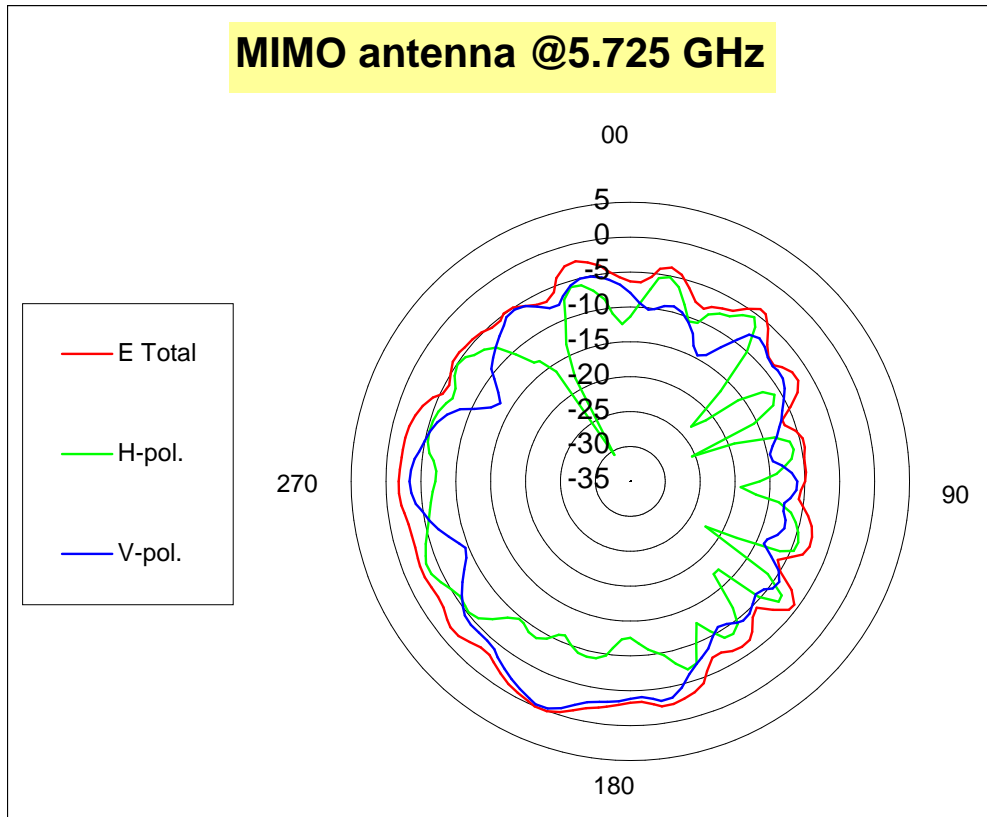
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.31 | -0.18 |

Tx3 (or Rx3) antenna: 5597.5 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.01 | -1.15 |

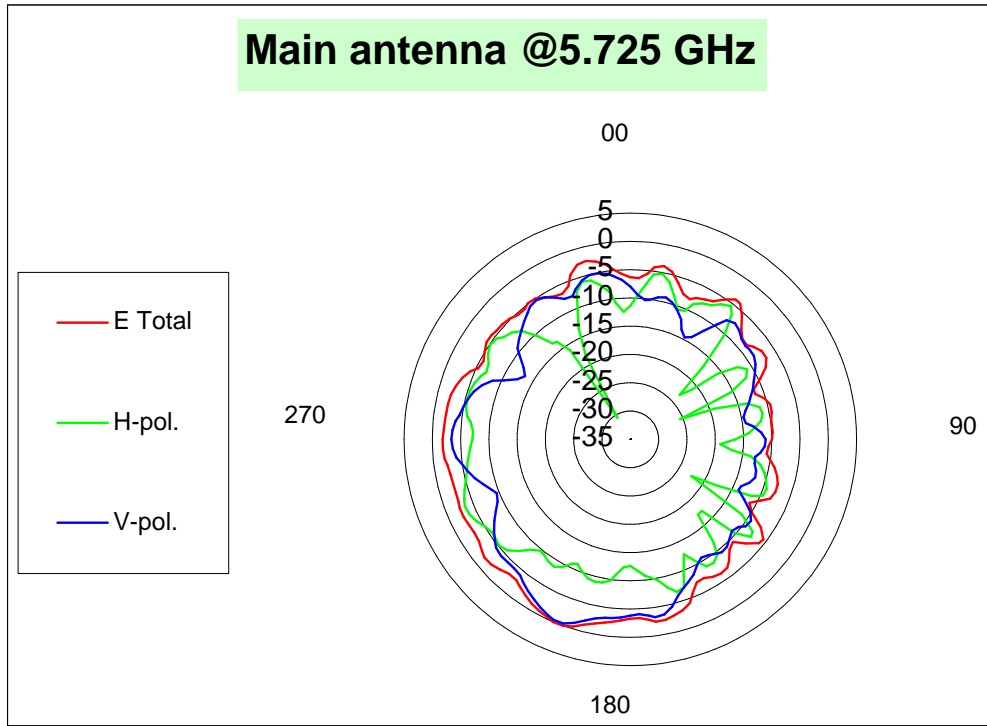
Tx3 (or Rx3) antenna: 5725 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.40 | -1.19 |

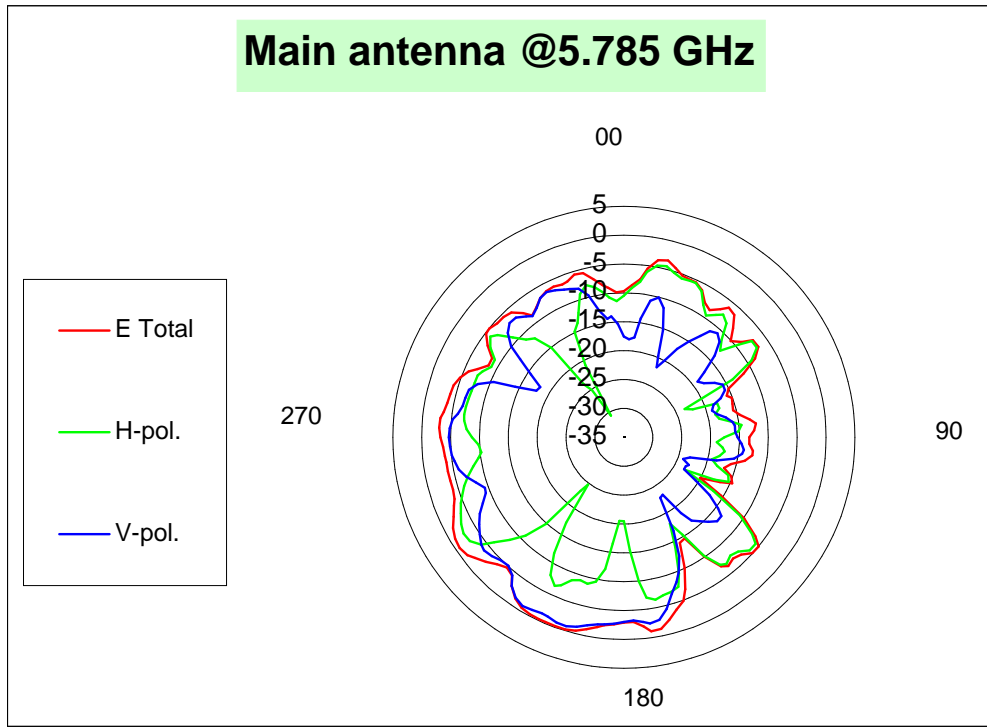
5725-5850 MHz radiation characteristic

Tx1 antenna: 5725 MHz



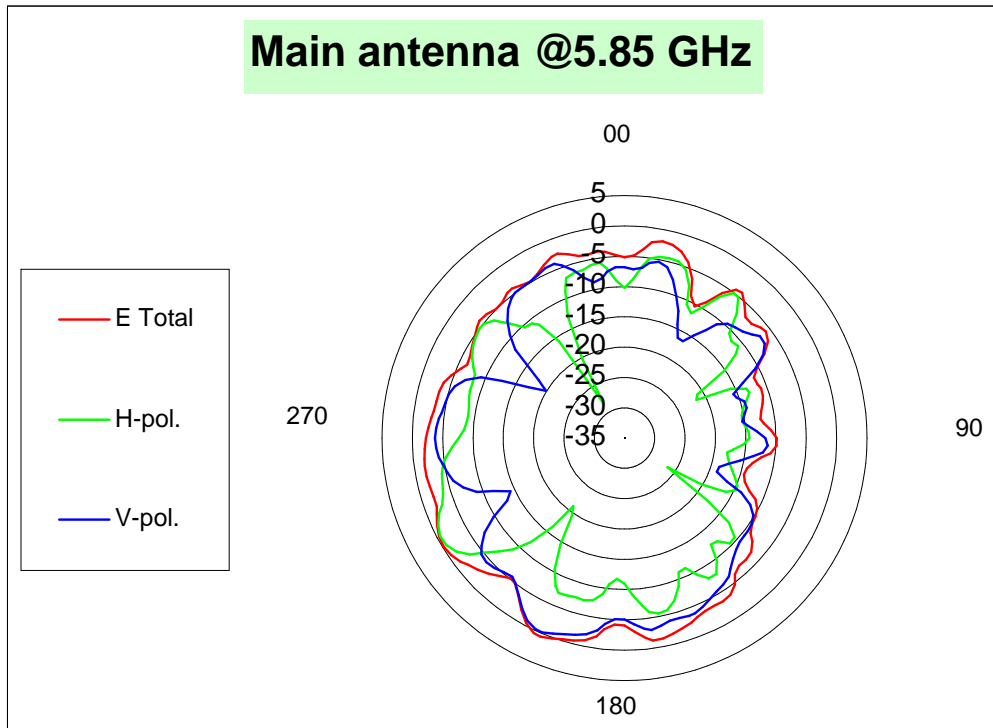
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -2.60 | -0.78 |

Tx1 antenna: 5785 MHz



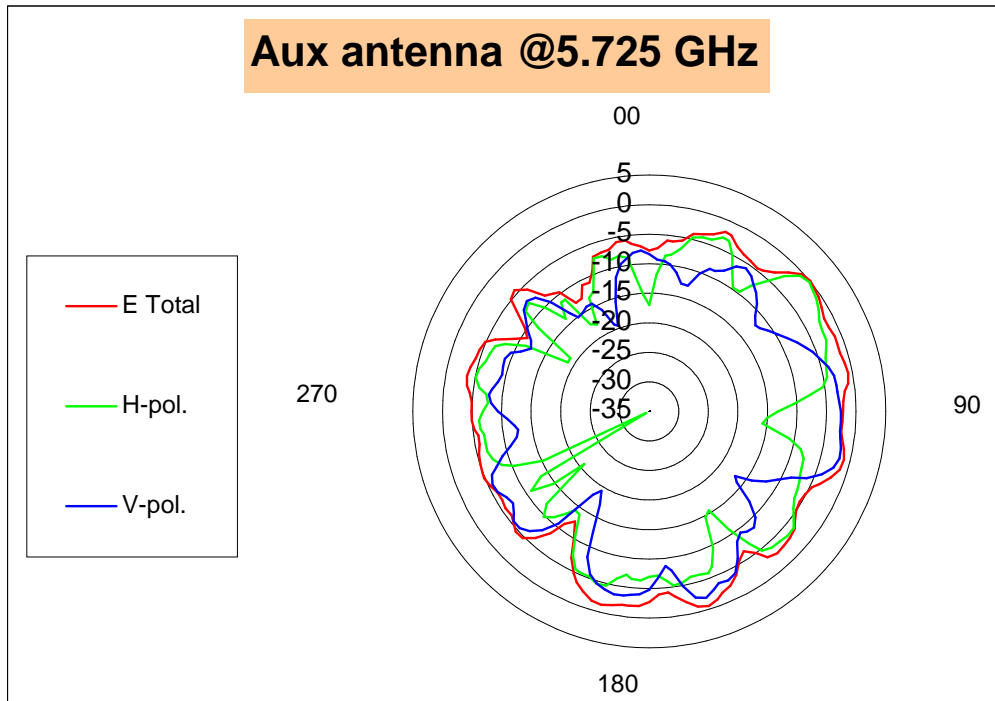
| | H-pol | V pol |
|-----------|-------|-------|
| Peak Gain | -3.19 | -0.70 |

Tx1 antenna: 5850 MHz



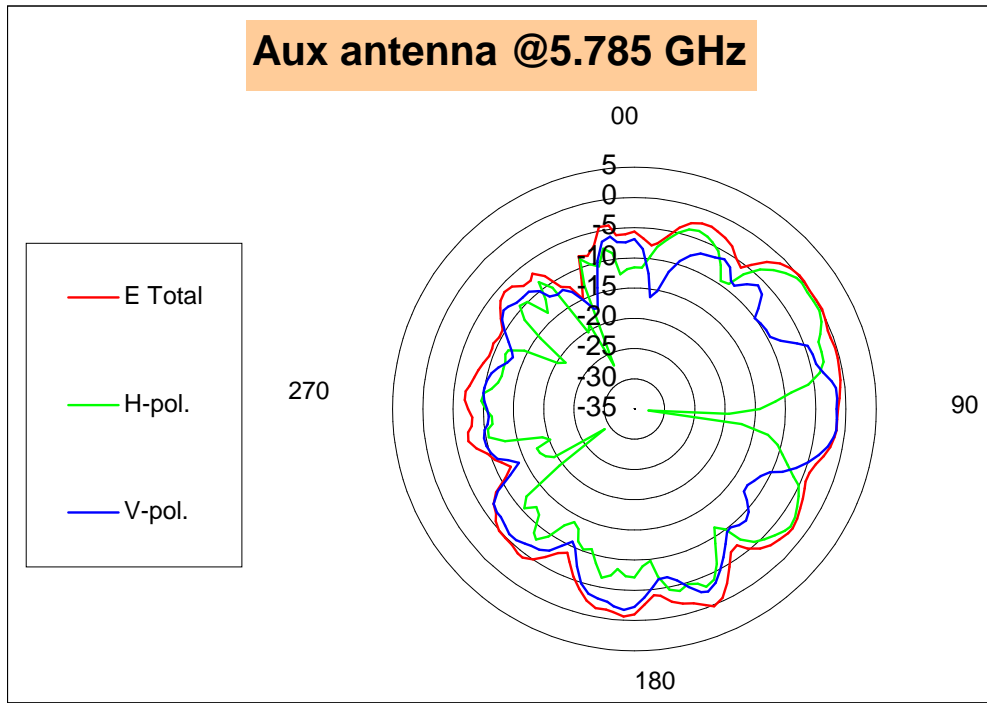
| | H-pol | V pol |
|-----------|-------|-------|
| Peak Gain | -2.42 | -0.56 |

Tx2 (or Rx2) antenna: 5725 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



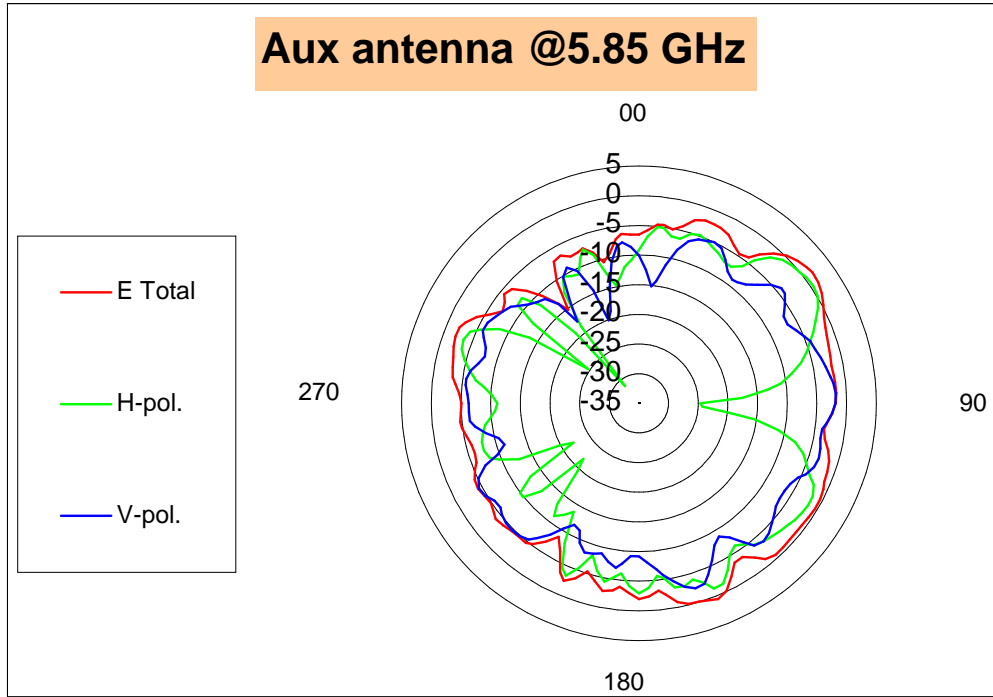
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.32 | -1.39 |

Tx2 (or Rx2) antenna: 5785 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



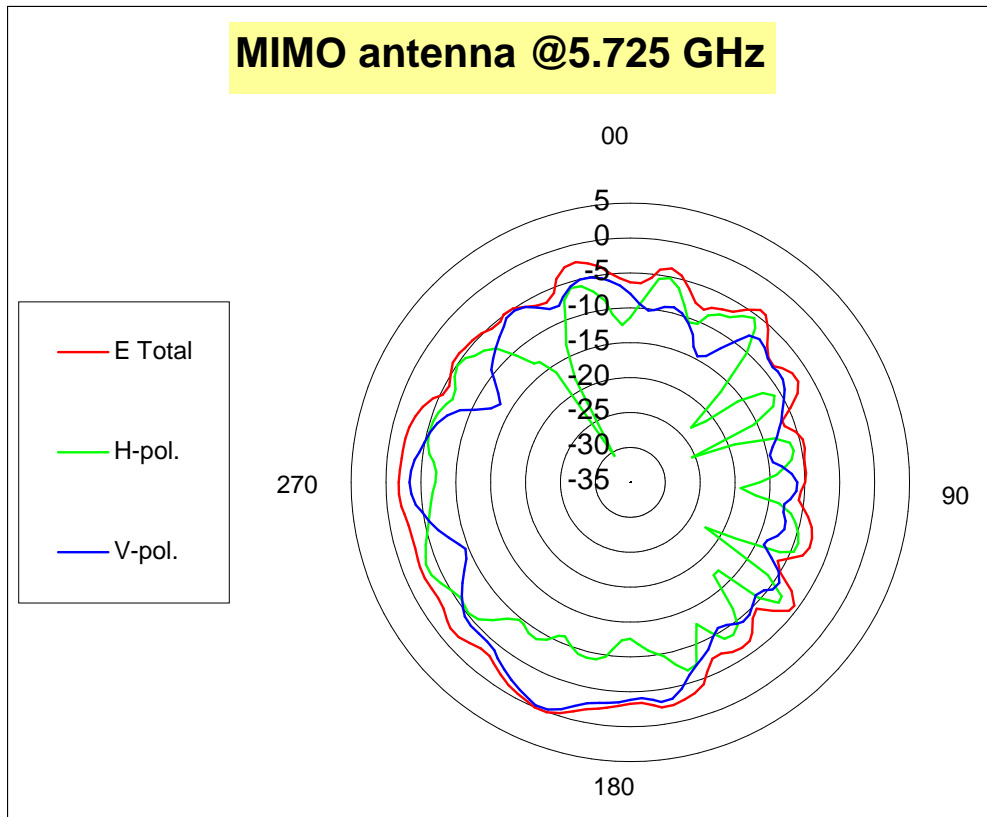
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -2.16 | -1.17 |

Tx2 (or Rx2) antenna: 5850 MHz (Plot is not required if 2nd Antenna is receive only e.g. Rx2 for 512 family)



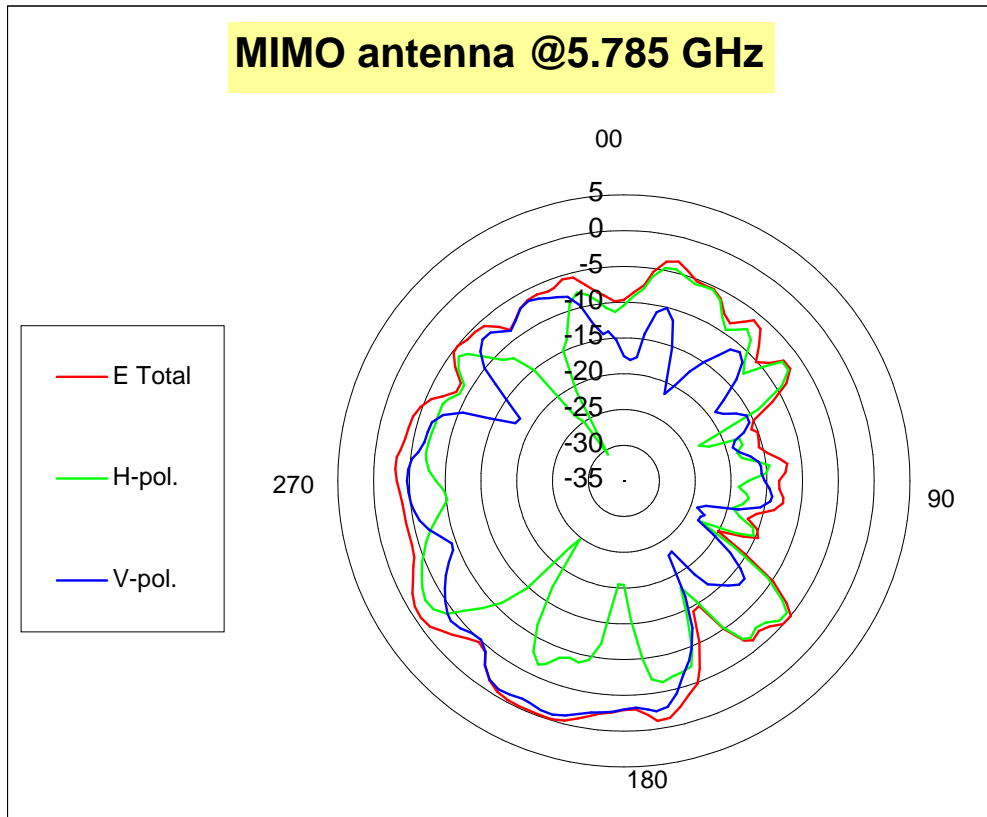
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -3.03 | -1.29 |

Tx3 (or Rx3) antenna: 5725 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



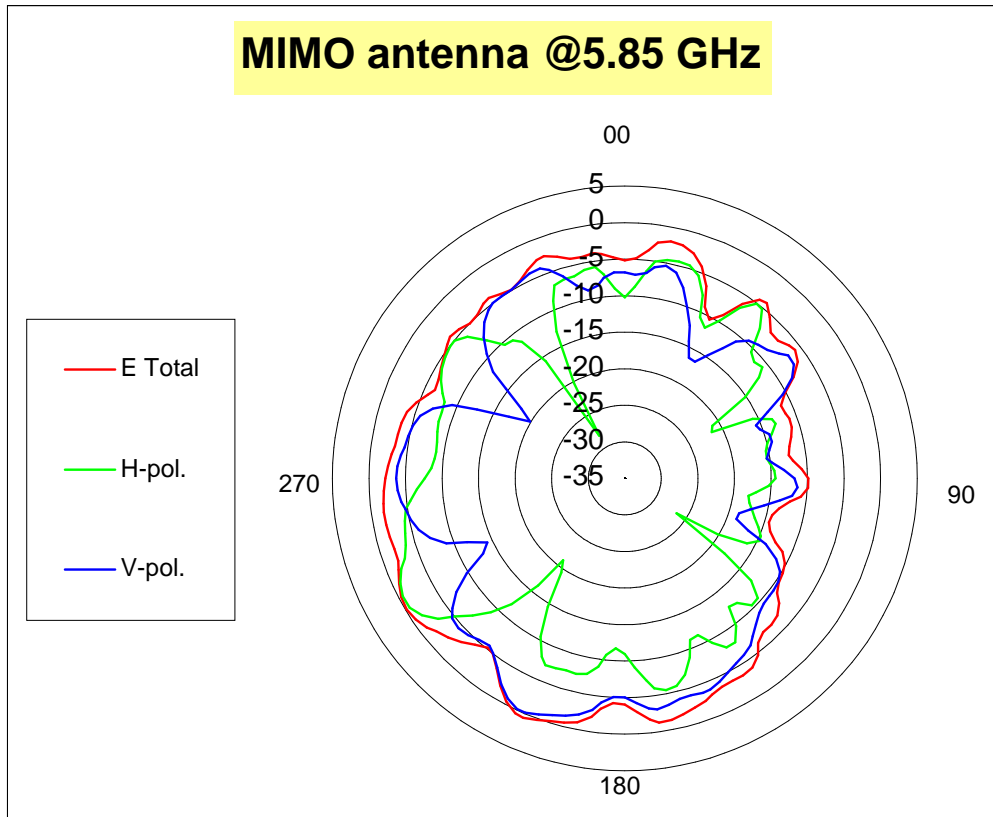
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.40 | -1.19 |

Tx3 (or Rx3) antenna: 5785 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx3 for 4965AGN)



| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.37 | -1.29 |

Tx3 (or Rx3) antenna: 5850 MHz (Plot is not required if 3rd Antenna is receive only e.g. Rx 3 for 4965AGN)



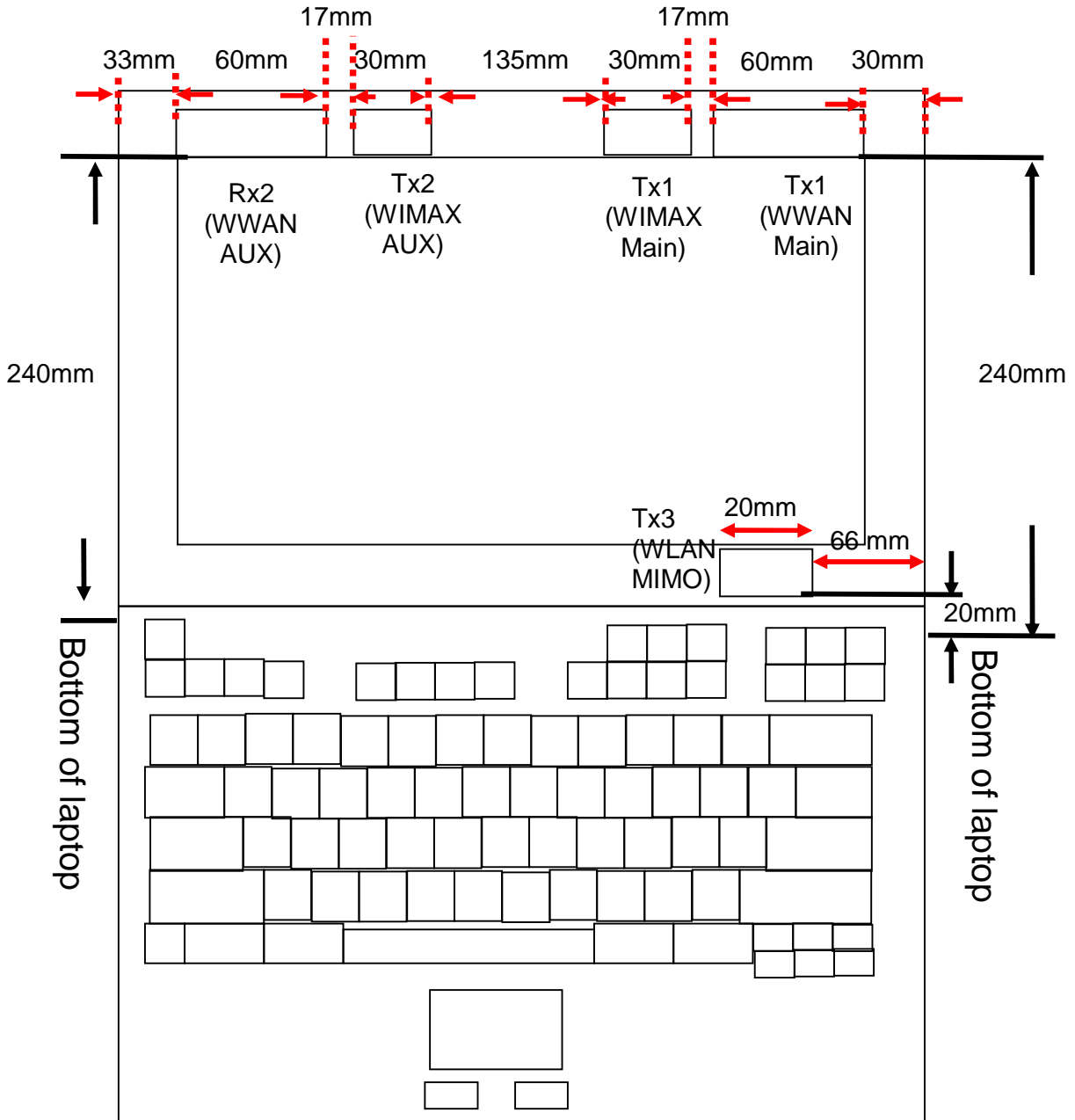
| | H-pol | V pol |
|------------------|--------------|--------------|
| Peak Gain | -0.95 | -0.85 |

Section 4. Host Platform Information

OEM / ODM Host platform: (XXXXXXX) platform correlated to antenna data
Rating Label Photo:

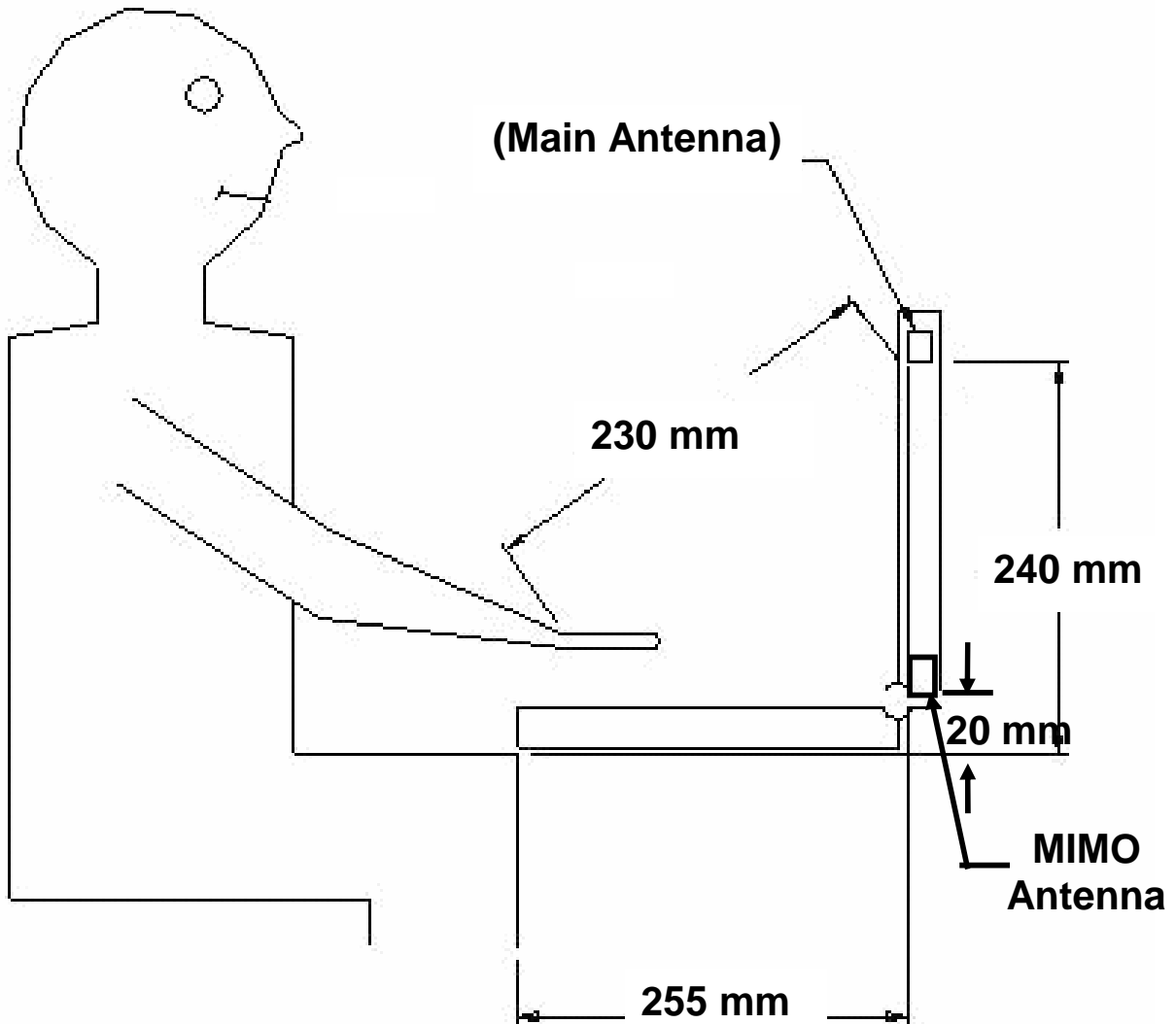
Section 5. Antenna Host Platform Location Information

Include a **dimensioned photo or dimensioned drawing** of Tx1 (WLAN Main), Tx2 (WLAN AUX) and Tx3 (MIMO) antenna placements (measurements are not required for receive-only antenna). Any antenna that transmits must show dimensions to bottom of laptop.



Section 6. Antenna dimensional information for SAR evaluation

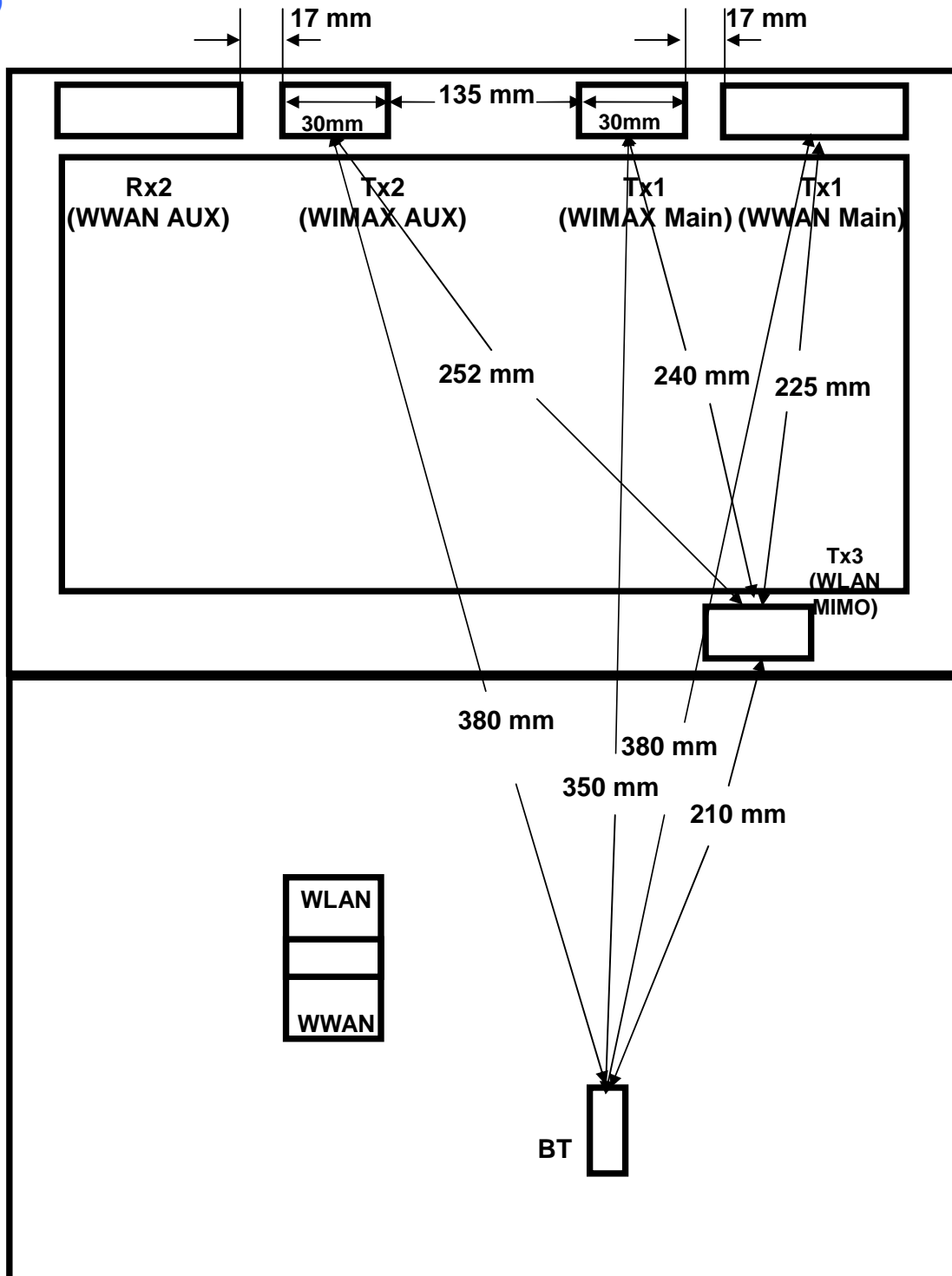
Include a **dimensioned photo or dimensioned drawing** showing the distance (mm) between the transmit antennas and the user (excluding hands, wrist, feet, lap/ thigh, and ankle)



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 | | | | | | |
| Brazil | | | | | | |
| Indonesia | | | | | | |
| Israel | | | | | | |
| Malaysia | | | | | | |
| Mexico | | | | | | |
| Singapore | | | | | | Telecommunication Equipment Dealer License Required |
| South Africa | | | | | | |
| USA, Canada | | | | | | |