

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-I46C | Convertible PC | | | 204.95 |
| 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) | 1920MHz~1980MHz |
| HONG-BO | PIFA | 6036B0313201 (0-3302700850) | 6036B0313101 (00-3302700950) | 6036B0313301 00-2602750650 | 6036B0313201 (0-3302700850) | 1.17dBi |
| Module information | | | | | | |
| Model | Form factor and suffixes (NGW/ HMW AND AN/ NB/ BN....) | | | | | |
| Kavalan 4 | Fibocom FM350-GL WWAN 4x4 5G NR radio module | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Antenna vendor connect person | |
|-------------------------------|---|
| Antenna Vendor | HONGBO Wireless Communication Technology Co., LTD |
| contact person | Mirabelle Chou |
| E-mail | mirabellechou@hong-bo.com.tw |
| Tel/Mobile | 02-2792-6009 EXT: 683 |
| Web address | https://www.hong-lin.com.cn/index.php |
| Address | 4F., No.143, Sinhu 1st Rd., Neihu Dist., Taipei City, 11494 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 | <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 |

Test location: 1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road NeiHu District, Taipei City 11493, Taiwan
 Testing date: 2022/11/15

Equipment list

| Equipment Description | Manufacturer | Identification no. | Current calibration date | Next calibration date |
|---------------------------------------|--------------|------------------------|--------------------------|-----------------------|
| Network analyzer | Agilent | E5071C | 2022/06/16 | 2023/06/15 |
| 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 |
| Horn antenna | ETS-Lindgren | 3164-10 | N/A | N/A |
| ETS OTA Chamber | ETS-Lindgren | AMS-8500 | N/A | N/A |
| Cable | ETS-Lindgren | RFC SMS-100-NMR Series | N/A | N/A |

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/5G NR FR1 | 1 | 1920 | 1980 | Ant5 : 6036B0313201 | 0-3302700850 | PIFA | 1.17 |
| WCDMA/ LTE/5G NR FR1 | 2 | 1850 | 1910 | | | | -1 |
| LTE/5G NR FR1 | 3 | 1710 | 1785 | | | | -1.3 |
| WCDMA/ LTE | 4 | 1710 | 1755 | | | | -1.3 |
| WCDMA/ LTE/5G NR FR1 | 5 | 824 | 849 | | | | -1.34 |
| LTE/5G NR FR1 | 7 | 2500 | 2570 | | | | -3.4 |
| WCDMA/ LTE/5G NR FR1 | 8 | 880 | 915 | | | | -1.75 |
| LTE | 12 | 699 | 716 | | | | -1.57 |
| LTE | 13 | 777 | 787 | | | | 0.05 |
| LTE | 14 | 788 | 798 | | | | -0.04 |
| LTE | 17 | 704 | 716 | | | | -1.57 |
| LTE | 18 | 815 | 830 | | | | -1.18 |
| LTE | 19 | 830 | 845 | | | | -1.4 |
| LTE/5G NR FR1 | 20 | 832 | 862 | | | | -1.4 |
| LTE/5G NR FR1 | 25 | 1850 | 1915 | | | | -1 |
| LTE | 26 | 814 | 849 | | | | -1.18 |
| LTE/5G NR FR1 | 28 | 703 | 748 | | | | -0.97 |
| LTE/5G NR FR1 | 30 | 2305 | 2315 | | | | -2.47 |
| LTE | 34 | 2010 | 2025 | | | | -0.46 |
| LTE/5G NR FR1 | 38 | 2570 | 2620 | | | | -3.45 |
| LTE | 39 | 1880 | 1920 | | | | -0.62 |
| LTE/5G NR FR1 | 40 | 2300 | 2400 | | | | -2.33 |
| LTE/5G NR FR1 | 41 | 2496 | 2690 | | | | -3.24 |
| LTE | 42 | 3400 | 3600 | | | | -1.68 |
| LTE | 43 | 3600 | 3800 | | | | -0.26 |
| LTE/5G NR FR1 | 66 | 1710 | 1780 | | | | -1.3 |
| LTE/5G NR FR1 | 71 | 663 | 698 | | | | -2.47 |
| 5G NR FR1 | 77 | 3300 | 4200 | | | | 0.07 |
| 5G NR FR1 | 78 | 3300 | 3800 | | | | -0.26 |
| 5G NR FR1 | 79 | 4400 | 5000 | | | | -1.49 |

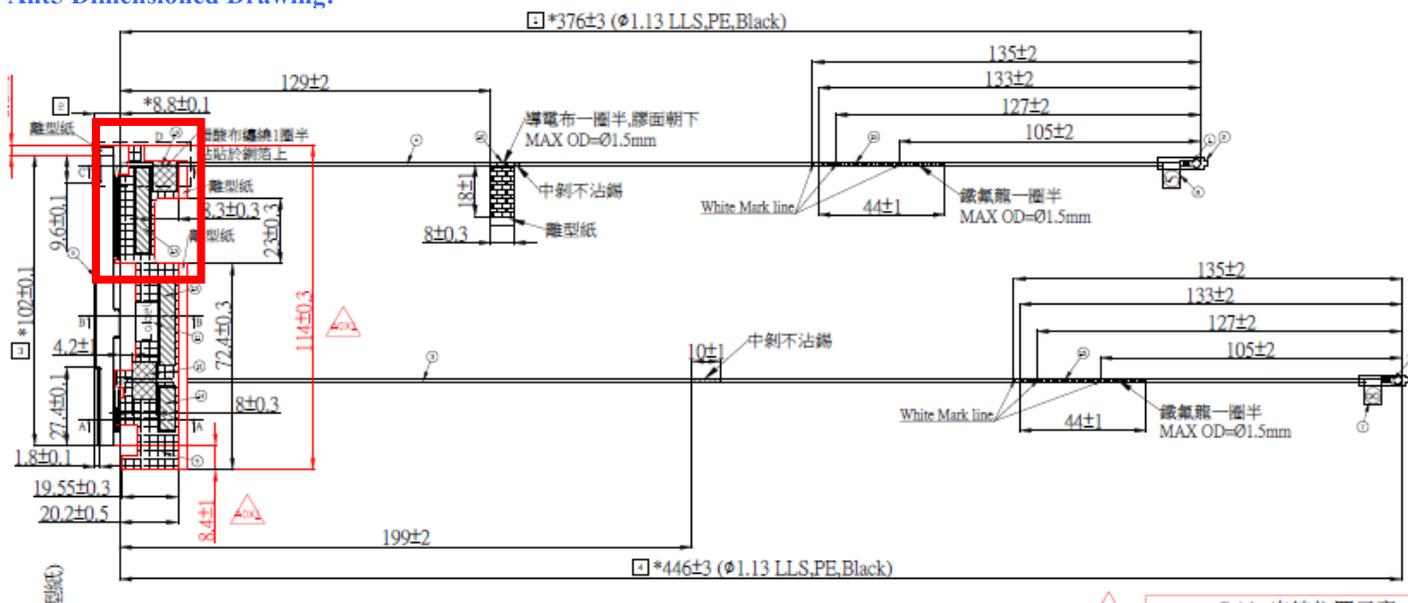
| Communication System | Band | Frequency(MHz) from low to high spectrum | | 1A Part Number for Antenna Assembly | 1B Antenna Manufacturer Name | 1C Description of Antenna Type | 1D Tx Antenna Gain (dBi) Ant8 |
|----------------------|------|--|------|-------------------------------------|------------------------------|--------------------------------|-------------------------------|
| 5G NR FR1 | 1 | 1920 | 1980 | Ant8 : 6036B0313201 | 0-3302700850 | PIFA | 0.61 |
| LTE/5G NR FR1 | 2 | 1850 | 1910 | | | | 0 |
| 5G NR FR1 | 3 | 1710 | 1785 | | | | -1.08 |
| LTE | 4 | 1710 | 1755 | | | | -1.08 |
| 5G NR FR1 | 5 | 824 | 849 | | | | -24.39 |
| LTE/5G NR FR1 | 7 | 2500 | 2570 | | | | -0.41 |
| LTE/5G NR FR1 | 25 | 1850 | 1915 | | | | 0 |
| LTE/5G NR FR1 | 30 | 2305 | 2315 | | | | -1.21 |
| 5G NR FR1 | 38 | 2570 | 2620 | | | | 0.98 |
| 5G NR FR1 | 40 | 2300 | 2400 | | | | -0.11 |
| LTE/5G NR FR1 | 41 | 2496 | 2690 | | | | 0.98 |
| 5G NR FR1 | 48 | 3550 | 3700 | | | | 0.32 |
| LTE/5G NR FR1 | 66 | 1710 | 1780 | | | | -1.08 |
| 5G NR FR1 | 77 | 3300 | 4200 | | | | 0.32 |
| 5G NR FR1 | 78 | 3300 | 3800 | | | | 0.32 |
| 5G NR FR1 | 79 | 4400 | 5000 | -1.83 | | | |

Antenna Peak Gain required being test in system basis.

Section 2. Dimensioned Photos or Drawings of Antennas

| | Ant supplier | Part number | Drawing | Photo |
|------|--------------|---------------|---------|-------|
| Ant5 | 6036B0313201 | 0-3302700850 | V | V |
| Ant6 | 6036B0313101 | 00-3302700950 | V | V |
| Ant7 | 6036B0313301 | 00-2602750650 | V | V |
| Ant8 | 6036B0313201 | 0-3302700850 | V | V |

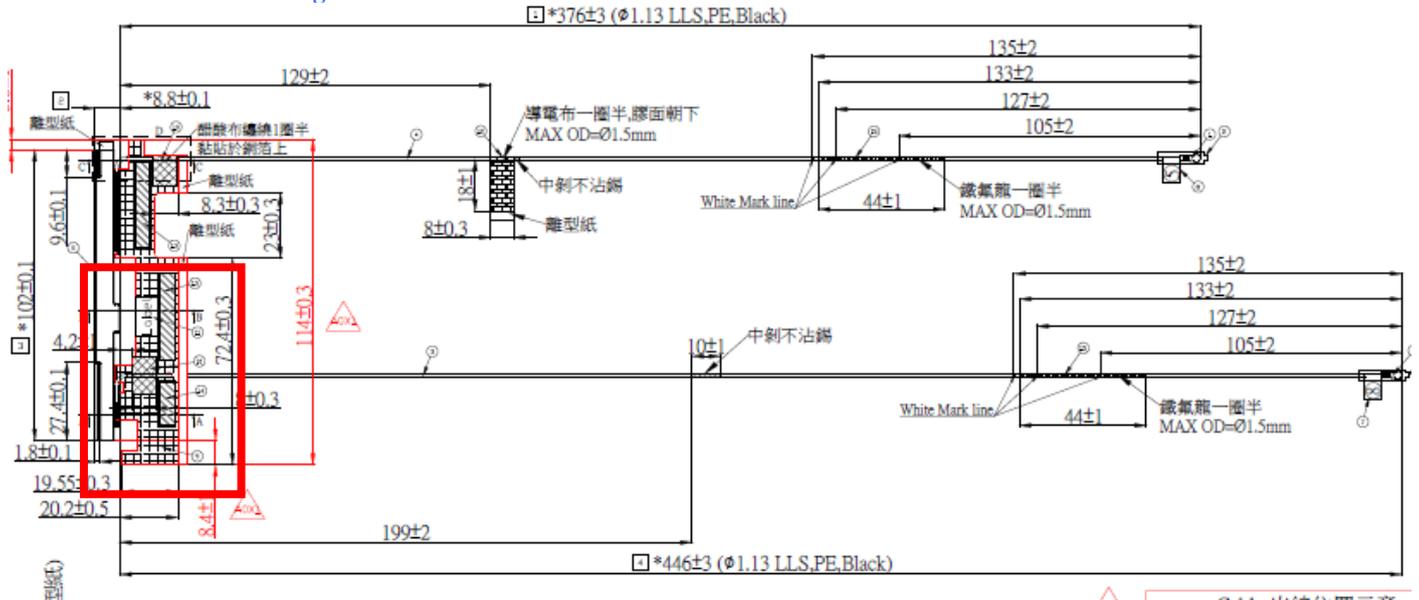
Ant5 Dimensioned Drawing:



Ant5 Photo:



Ant8 Dimensioned Drawing:

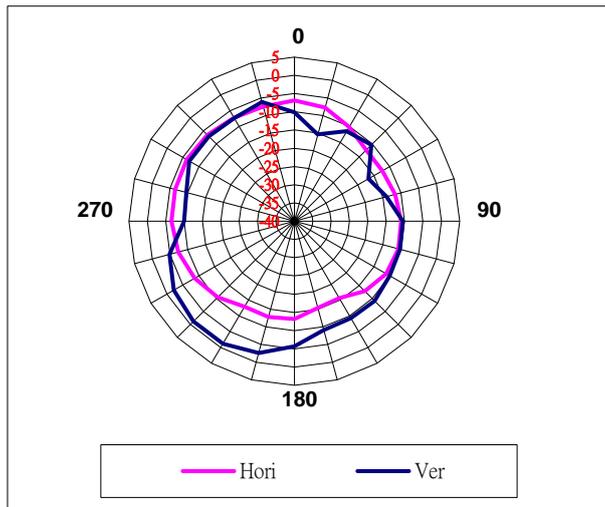


Ant8 Photo:



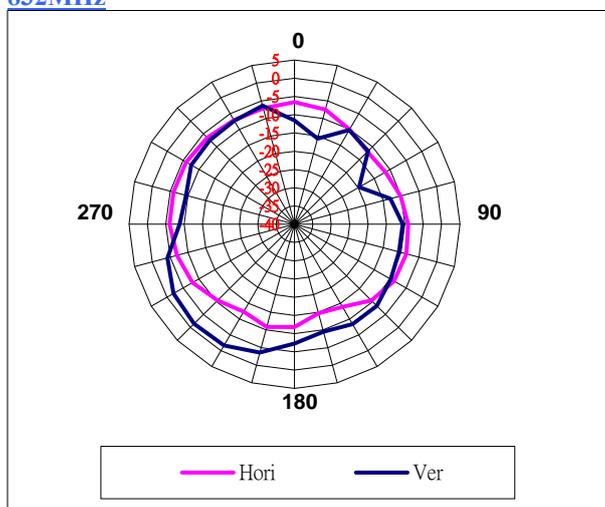
The listed frequency 2D radiation pattern is required

● [Ant5:](#)
[814MHz](#)



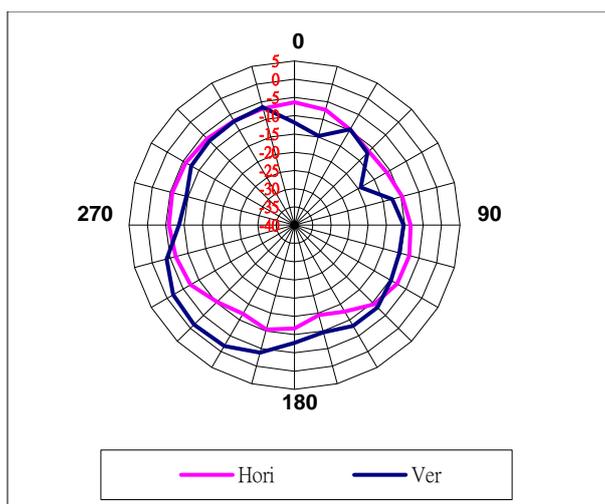
| | |
|-----------------------|---------------|
| Center Frequency | 814MHz |
| Horizontal (dBi) peak | -6.23 |
| Vertical (dBi) peak | -1.18 |

[832MHz](#)



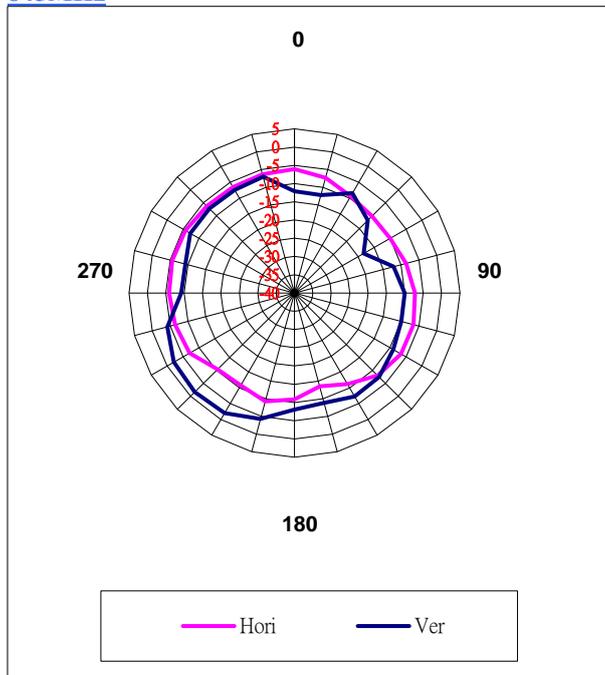
| | |
|-----------------------|---------------|
| Center Frequency | 832MHz |
| Horizontal (dBi) peak | -5.90 |
| Vertical (dBi) peak | -1.40 |

[837MHz](#)



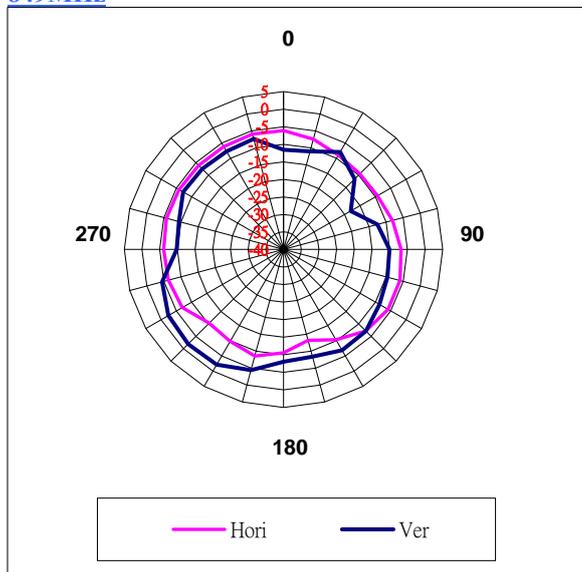
| | |
|-----------------------|---------------|
| Center Frequency | 837MHz |
| Horizontal (dBi) peak | -5.59 |
| Vertical (dBi) peak | -1.42 |

845MHz



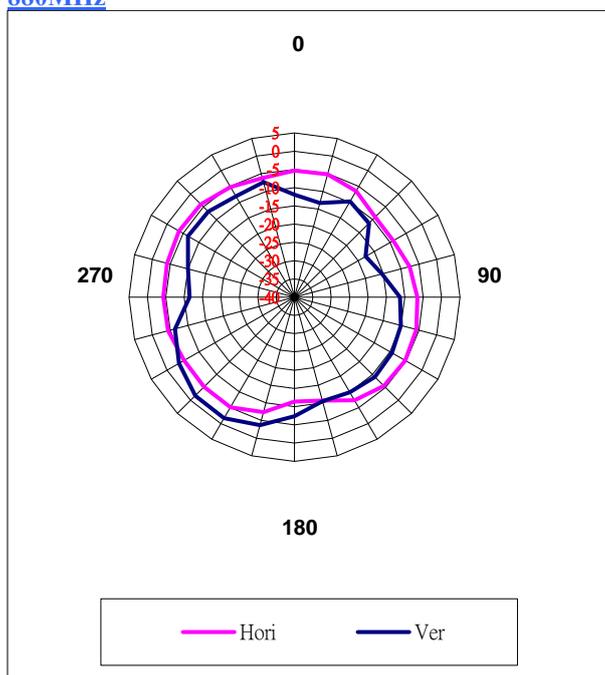
| | |
|-----------------------|---------------|
| Center Frequency | 845MHz |
| Horizontal (dBi) peak | -5.55 |
| Vertical (dBi) peak | -1.65 |

849MHz



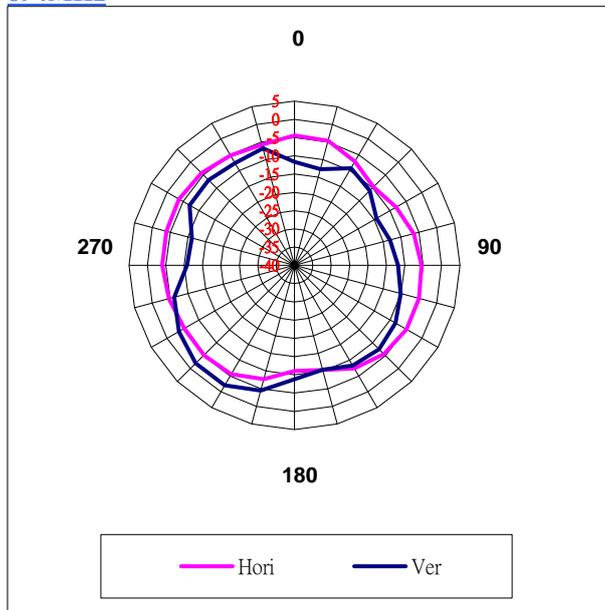
| | |
|-----------------------|---------------|
| Center Frequency | 849MHz |
| Horizontal (dBi) peak | -5.69 |
| Vertical (dBi) peak | -1.87 |

880MHz



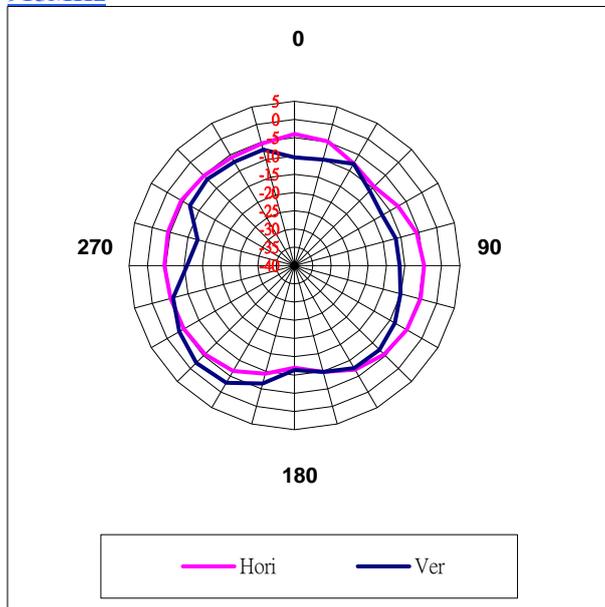
| | |
|-----------------------|---------------|
| Center Frequency | 880MHz |
| Horizontal (dBi) peak | -3.71 |
| Vertical (dBi) peak | -1.75 |

894MHz



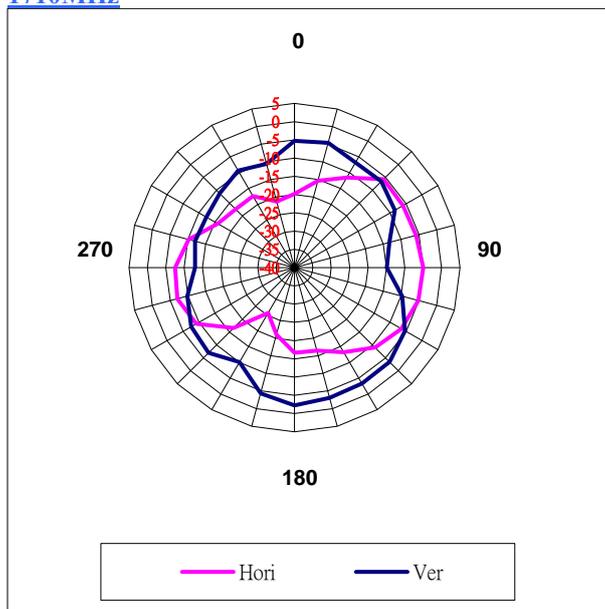
| | |
|-----------------------|---------------|
| Center Frequency | 894MHz |
| Horizontal (dBi) peak | -3.74 |
| Vertical (dBi) peak | -2.02 |

915MHz



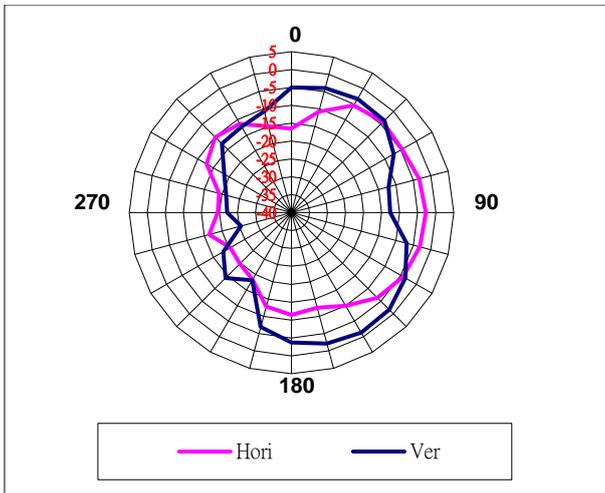
| | |
|-----------------------|---------------|
| Center Frequency | 915MHz |
| Horizontal (dBi) peak | -3.97 |
| Vertical (dBi) peak | -2.27 |

1710MHz



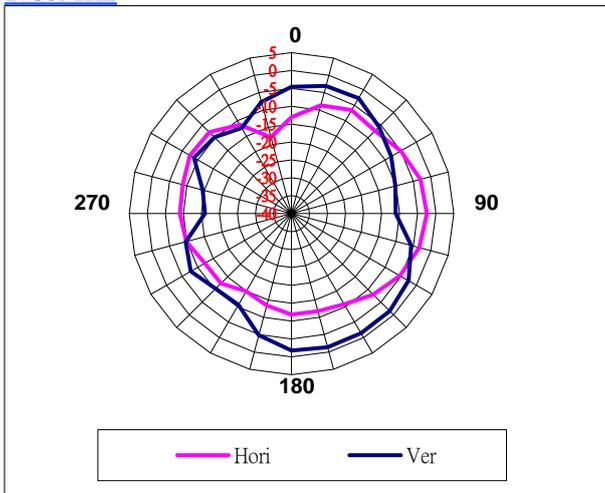
| | |
|-----------------------|----------------|
| Center Frequency | 1710MHz |
| Horizontal (dBi) peak | -4.99 |
| Vertical (dBi) peak | -2.24 |

1750MHz



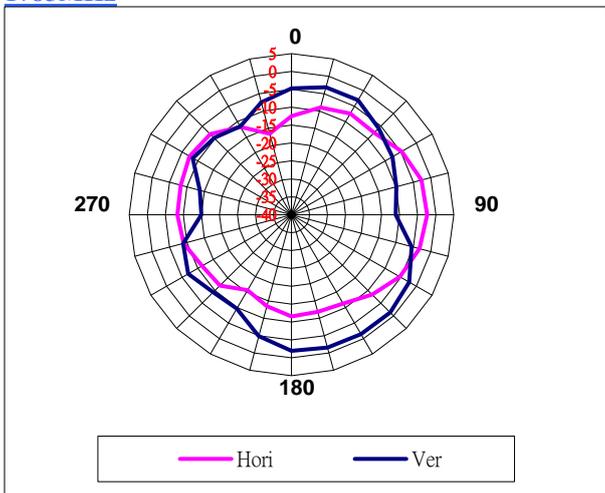
| | |
|-----------------------|---------|
| Center Frequency | 1750MHz |
| Horizontal (dBi) peak | -2.74 |
| Vertical (dBi) peak | -1.30 |

1780MHz



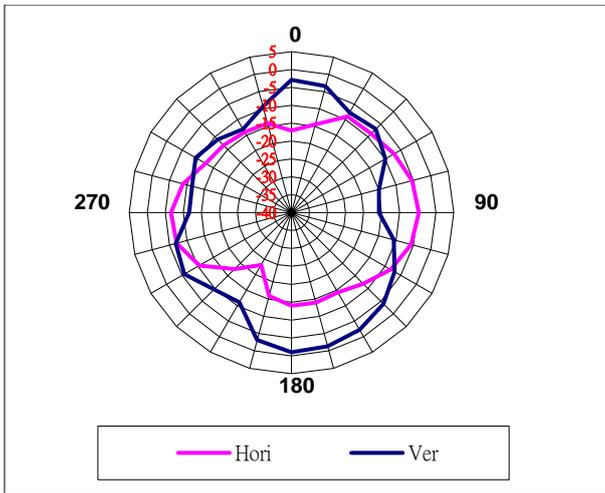
| | |
|-----------------------|---------|
| Center Frequency | 1780MHz |
| Horizontal (dBi) peak | -2.47 |
| Vertical (dBi) peak | -1.34 |

1785MHz



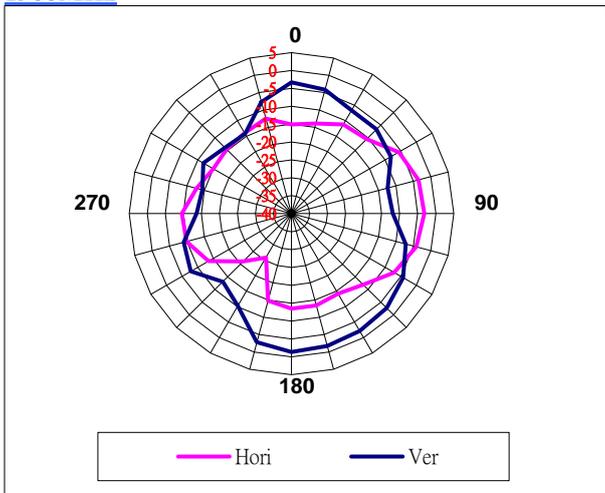
| | |
|-----------------------|---------|
| Center Frequency | 1785MHz |
| Horizontal (dBi) peak | -2.38 |
| Vertical (dBi) peak | -1.33 |

1880MHz



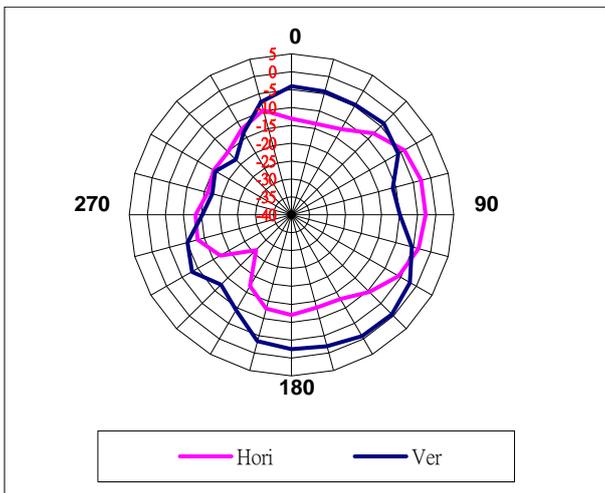
| | |
|-----------------------|----------------|
| Center Frequency | 1880MHz |
| Horizontal (dBi) peak | -4.69 |
| Vertical (dBi) peak | -1.00 |

1900MHz



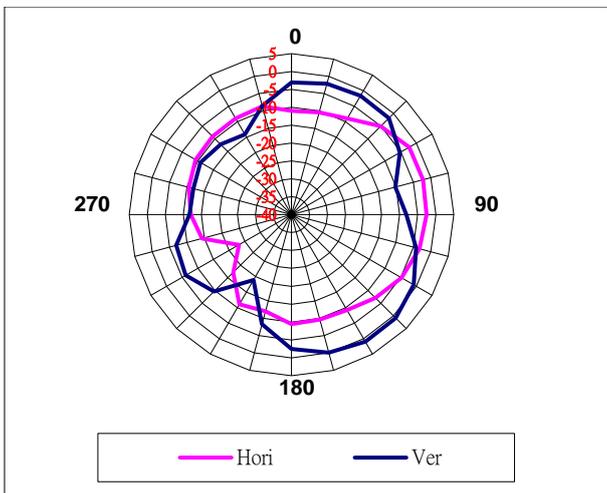
| | |
|-----------------------|----------------|
| Center Frequency | 1900MHz |
| Horizontal (dBi) peak | -3.17 |
| Vertical (dBi) peak | -1.34 |

1920MHz



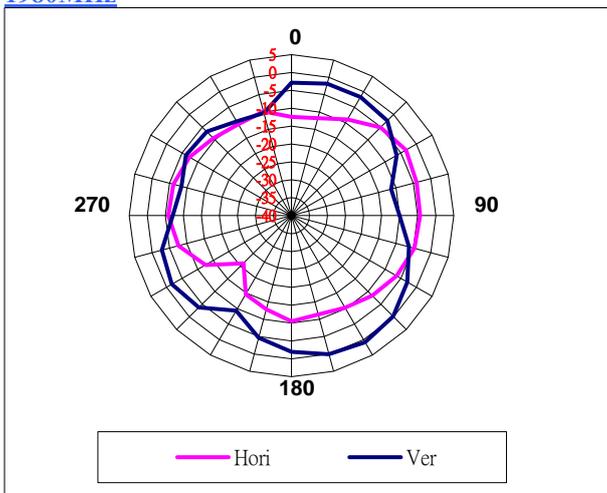
| | |
|-----------------------|----------------|
| Center Frequency | 1920MHz |
| Horizontal (dBi) peak | -2.81 |
| Vertical (dBi) peak | -0.62 |

1950MHz



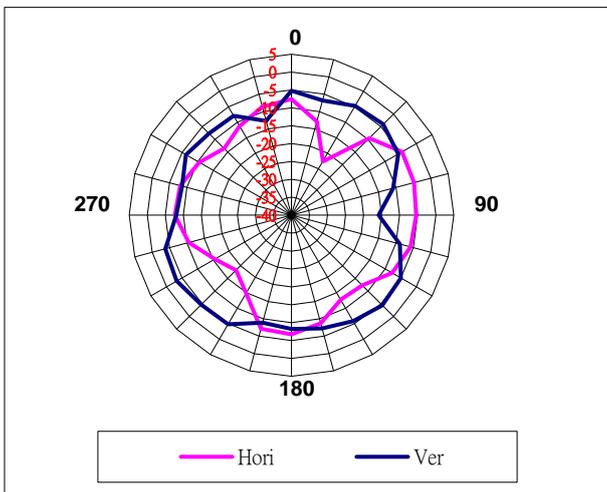
| | |
|-----------------------|----------------|
| Center Frequency | 1950MHz |
| Horizontal (dBi) peak | -2.21 |
| Vertical (dBi) peak | 0.97 |

1980MHz



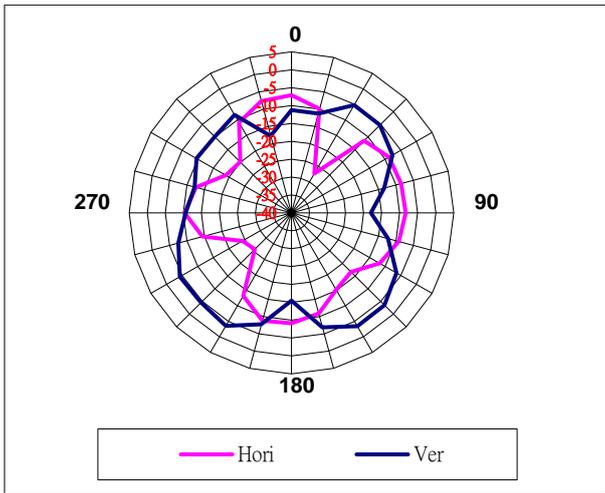
| | |
|-----------------------|----------------|
| Center Frequency | 1980MHz |
| Horizontal (dBi) peak | -3.34 |
| Vertical (dBi) peak | 0.87 |

2496MHz



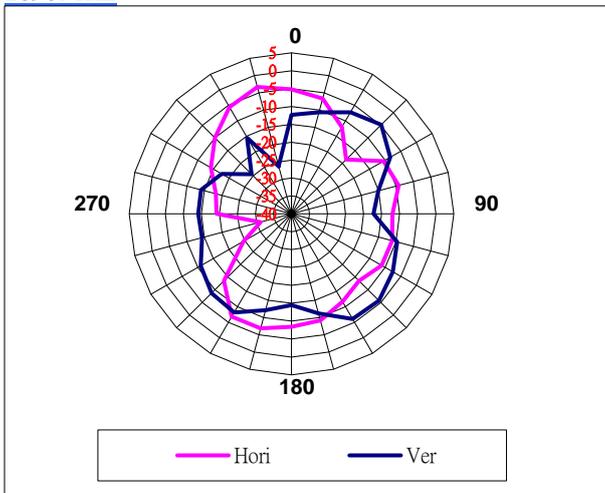
| | |
|-----------------------|----------------|
| Center Frequency | 2496MHz |
| Horizontal (dBi) peak | -4.62 |
| Vertical (dBi) peak | -3.24 |

2595MHz



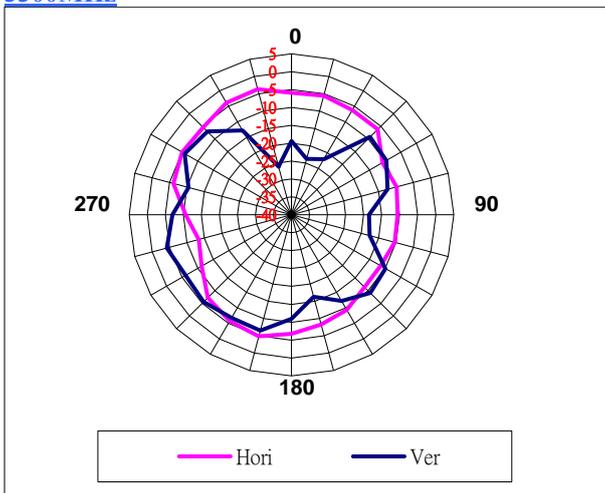
| | |
|-----------------------|----------------|
| Center Frequency | 2595MHz |
| Horizontal (dBi) peak | -7.11 |
| Vertical (dBi) peak | -3.48 |

2690MHz



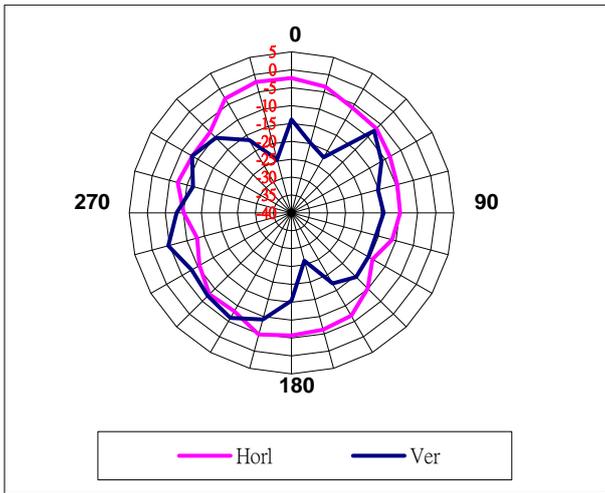
| | |
|-----------------------|----------------|
| Center Frequency | 2690MHz |
| Horizontal (dBi) peak | -3.30 |
| Vertical (dBi) peak | -4.83 |

3300MHz



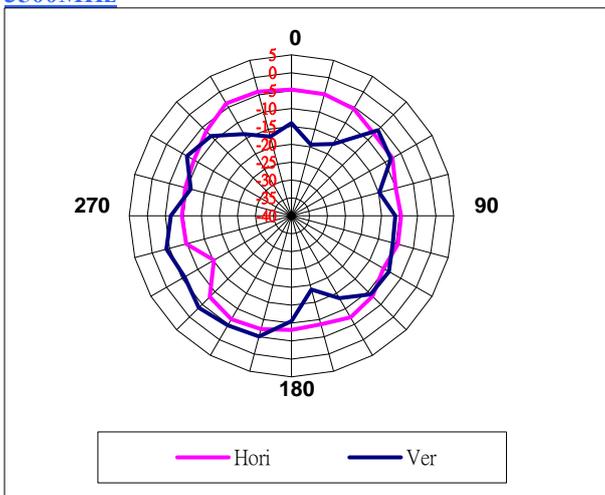
| | |
|-----------------------|----------------|
| Center Frequency | 3300MHz |
| Horizontal (dBi) peak | -3.66 |
| Vertical (dBi) peak | -4.21 |

3400MHz



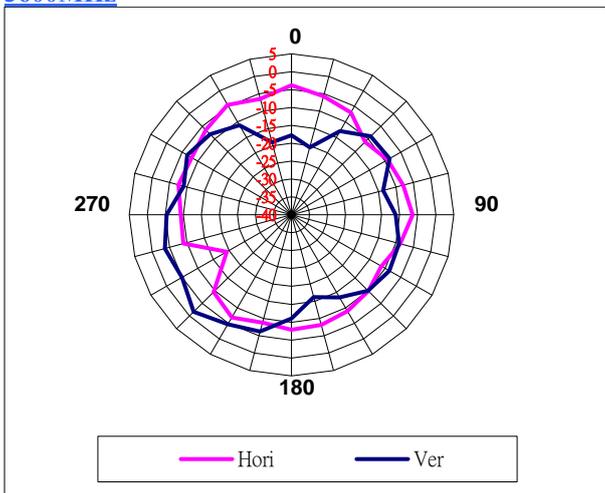
| | |
|-----------------------|----------------|
| Center Frequency | 3400MHz |
| Horizontal (dBi) peak | -2.11 |
| Vertical (dBi) peak | -4.63 |

3500MHz



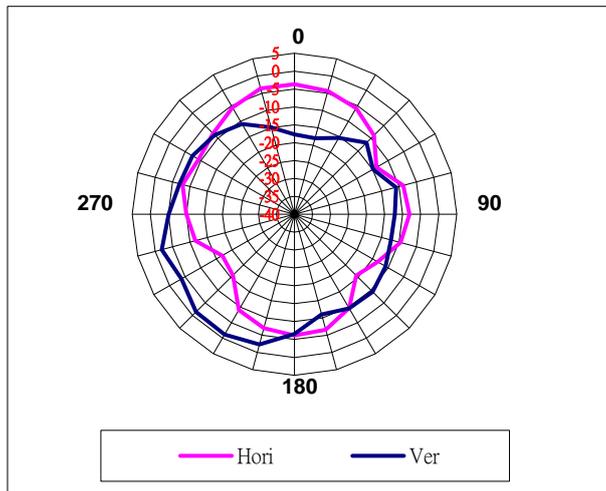
| | |
|-----------------------|----------------|
| Center Frequency | 3500MHz |
| Horizontal (dBi) peak | -3.77 |
| Vertical (dBi) peak | -3.69 |

3600MHz



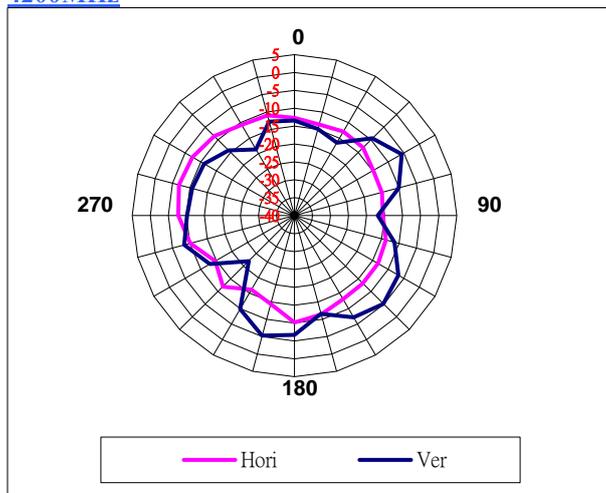
| | |
|-----------------------|----------------|
| Center Frequency | 3600MHz |
| Horizontal (dBi) peak | -3.78 |
| Vertical (dBi) peak | -1.68 |

3750MHz



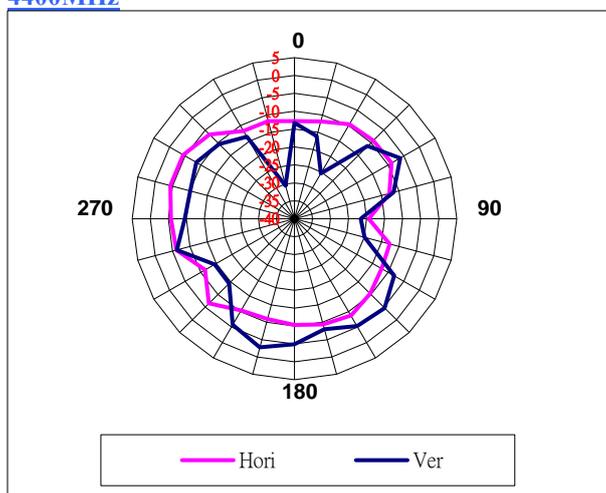
| | |
|-----------------------|----------------|
| Center Frequency | 3750MHz |
| Horizontal (dBi) peak | -3.60 |
| Vertical (dBi) peak | -1.22 |

4200MHz



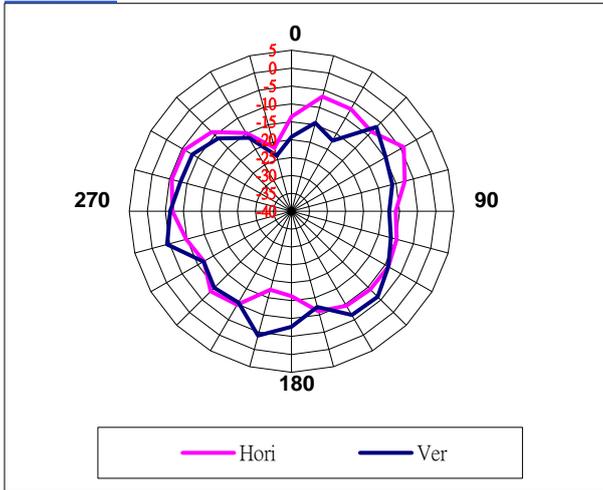
| | |
|-----------------------|----------------|
| Center Frequency | 4200MHz |
| Horizontal (dBi) peak | -6.80 |
| Vertical (dBi) peak | -5.17 |

4400MHz



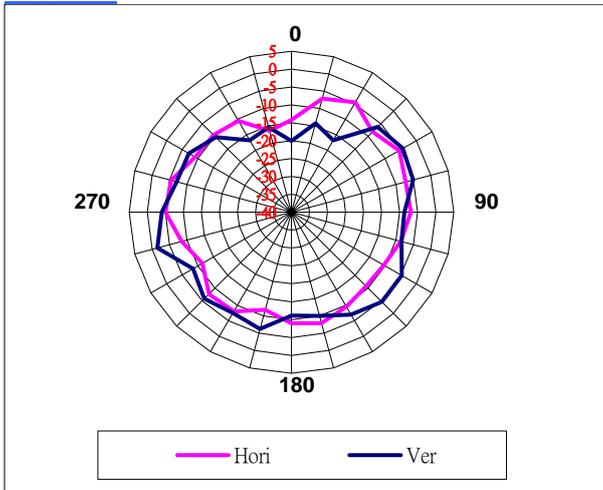
| | |
|-----------------------|----------------|
| Center Frequency | 4400MHz |
| Horizontal (dBi) peak | -4.31 |
| Vertical (dBi) peak | -2.78 |

4800MHz



| | |
|-----------------------|----------------|
| Center Frequency | 4800MHz |
| Horizontal (dBi) peak | -4.07 |
| Vertical (dBi) peak | -4.03 |

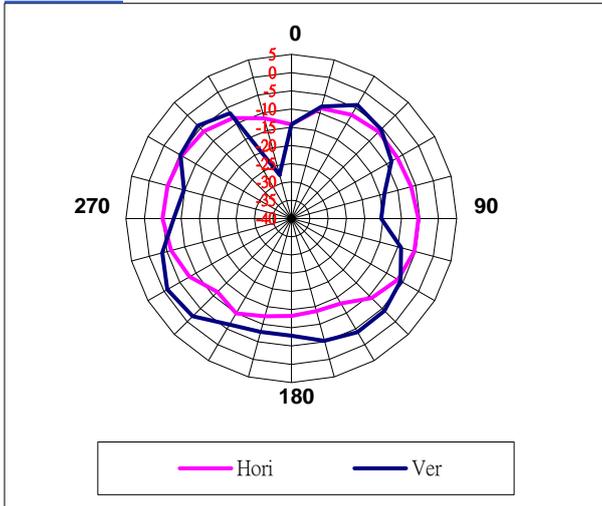
5000MHz



| | |
|-----------------------|----------------|
| Center Frequency | 5000MHz |
| Horizontal (dBi) peak | -4.58 |
| Vertical (dBi) peak | -1.49 |

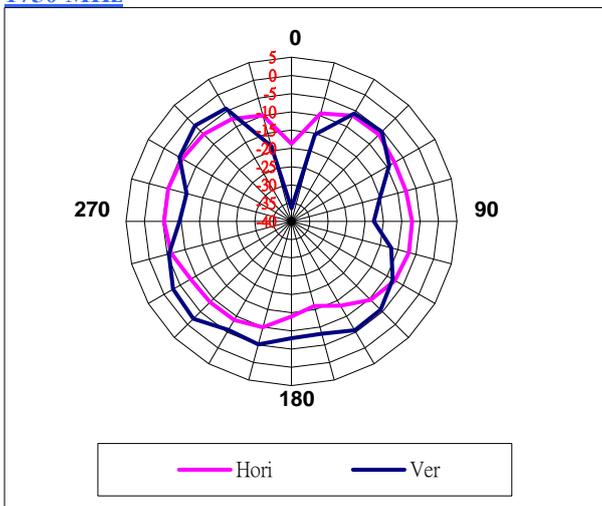
● **Ant8:**

1710 MHz



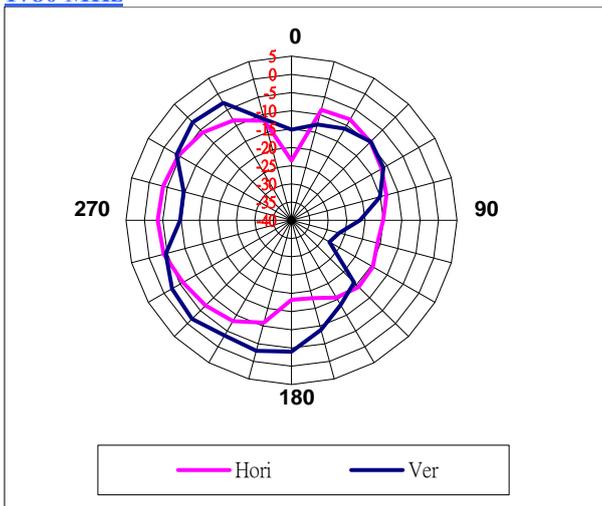
| | |
|-----------------------|----------------|
| Center Frequency | 1710MHz |
| Horizontal (dBi) peak | -4.96 |
| Vertical (dBi) peak | -1.08 |

1750 MHz



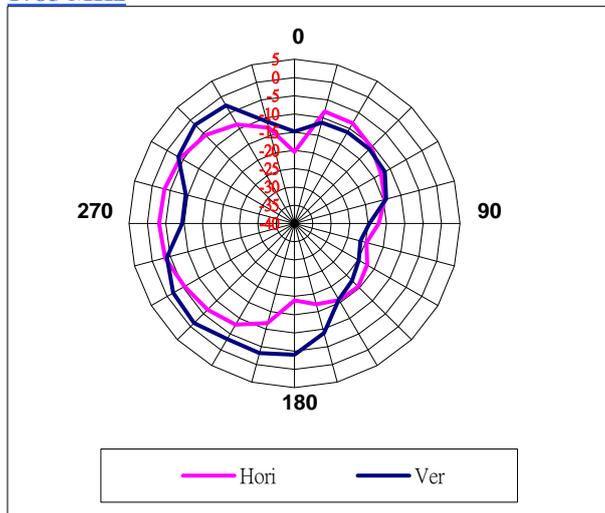
| | |
|-----------------------|----------------|
| Center Frequency | 1750MHz |
| Horizontal (dBi) peak | -5.30 |
| Vertical (dBi) peak | -2.31 |

1780 MHz



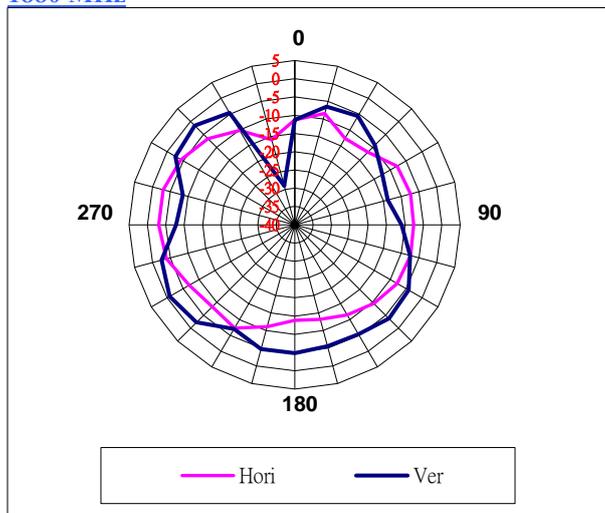
| | |
|-----------------------|----------------|
| Center Frequency | 1780MHz |
| Horizontal (dBi) peak | -3.61 |
| Vertical (dBi) peak | -1.74 |

1785 MHz



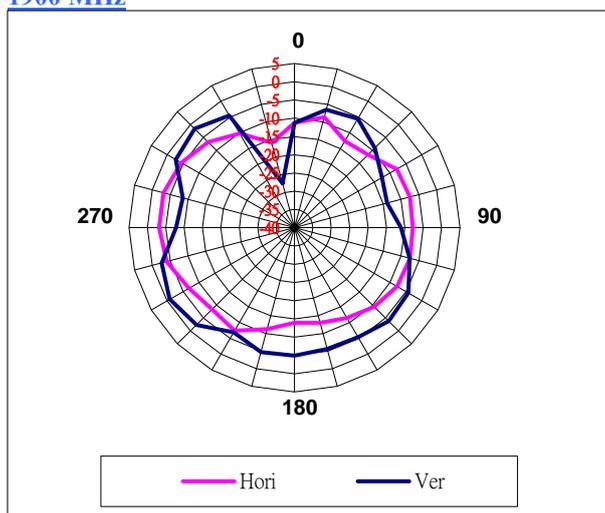
| | |
|-----------------------|----------------|
| Center Frequency | 1785MHz |
| Horizontal (dBi) peak | -3.18 |
| Vertical (dBi) peak | -1.36 |

1880 MHz



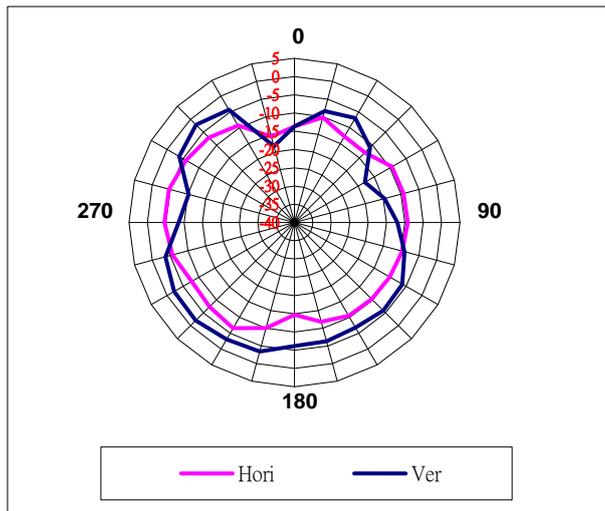
| | |
|-----------------------|----------------|
| Center Frequency | 1880MHz |
| Horizontal (dBi) peak | -3.01 |
| Vertical (dBi) peak | -0.74 |

1900 MHz



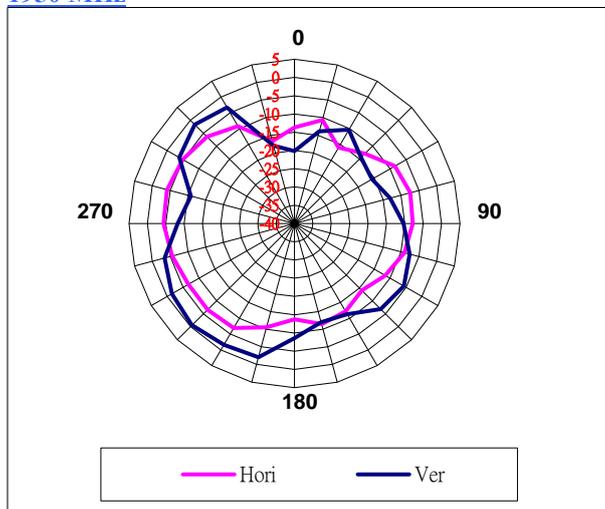
| | |
|-----------------------|----------------|
| Center Frequency | 1900MHz |
| Horizontal (dBi) peak | -3.09 |
| Vertical (dBi) peak | -0.80 |

1920 MHz



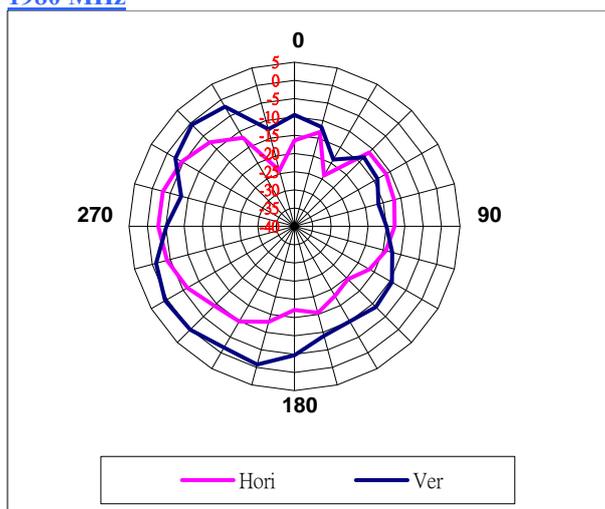
| | |
|-----------------------|----------------|
| Center Frequency | 1920MHz |
| Horizontal (dBi) peak | -4.63 |
| Vertical (dBi) peak | -1.98 |

1950 MHz



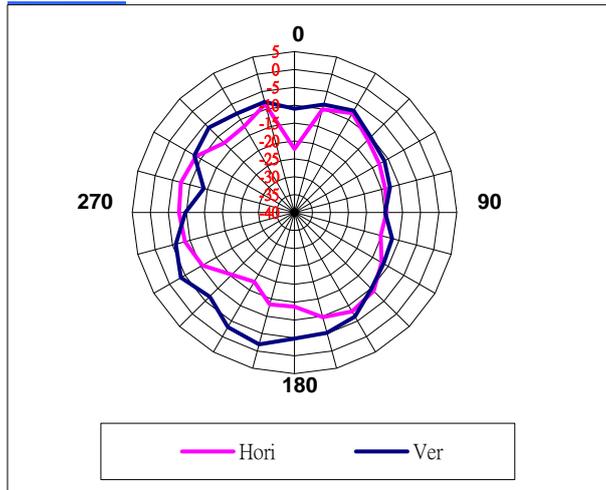
| | |
|-----------------------|----------------|
| Center Frequency | 1950MHz |
| Horizontal (dBi) peak | -4.09 |
| Vertical (dBi) peak | -0.58 |

1980 MHz



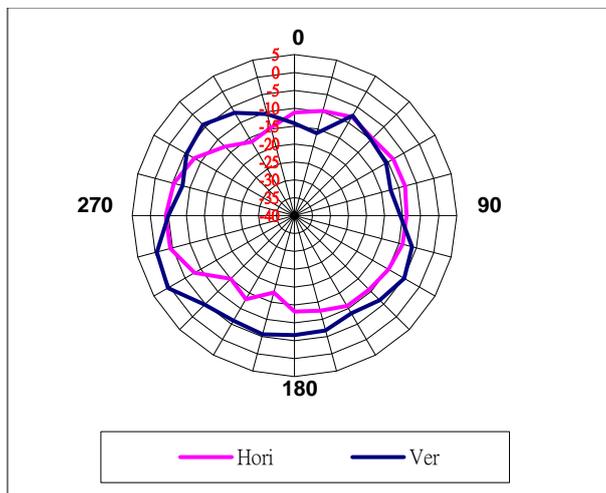
| | |
|-----------------------|----------------|
| Center Frequency | 1980MHz |
| Horizontal (dBi) peak | -2.93 |
| Vertical (dBi) peak | 0.61 |

2496 MHz



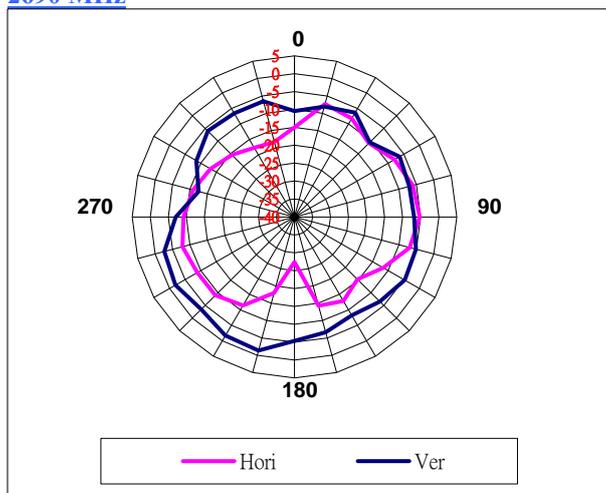
| | |
|-----------------------|----------------|
| Center Frequency | 2496MHz |
| Horizontal (dBi) peak | -7.36 |
| Vertical (dBi) peak | -1.88 |

2595 MHz



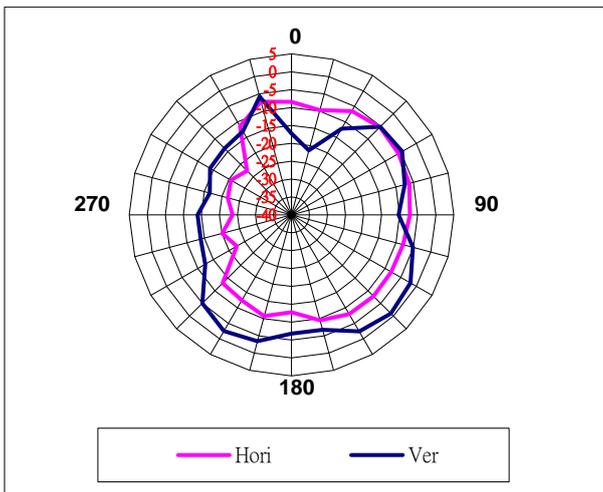
| | |
|-----------------------|----------------|
| Center Frequency | 2595MHz |
| Horizontal (dBi) peak | -4.30 |
| Vertical (dBi) peak | 0.54 |

2690 MHz



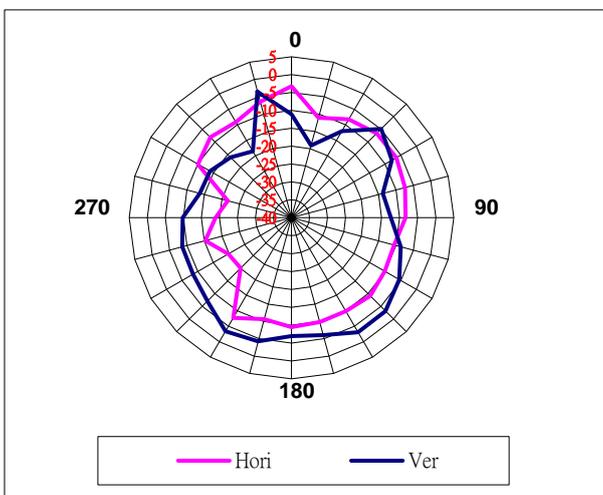
| | |
|-----------------------|----------------|
| Center Frequency | 2690MHz |
| Horizontal (dBi) peak | -5.27 |
| Vertical (dBi) peak | -1.33 |

3300 MHz



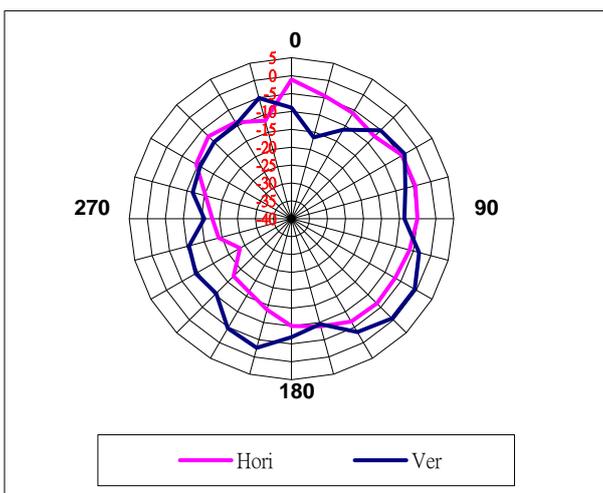
| | |
|-----------------------|----------------|
| Center Frequency | 3300MHz |
| Horizontal (dBi) peak | -5.32 |
| Vertical (dBi) peak | -1.02 |

3400 MHz



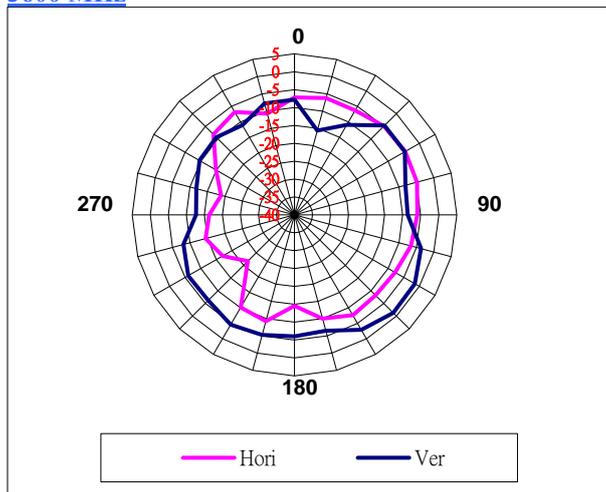
| | |
|-----------------------|----------------|
| Center Frequency | 3400MHz |
| Horizontal (dBi) peak | -3.23 |
| Vertical (dBi) peak | -3.04 |

3500 MHz



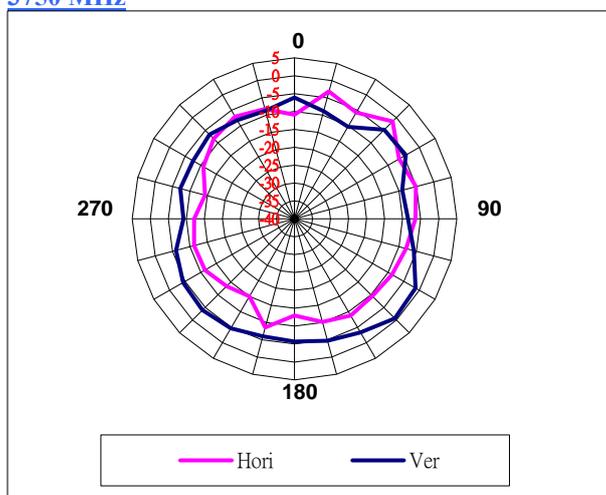
| | |
|-----------------------|----------------|
| Center Frequency | 3500MHz |
| Horizontal (dBi) peak | -1.11 |
| Vertical (dBi) peak | -0.59 |

3600 MHz



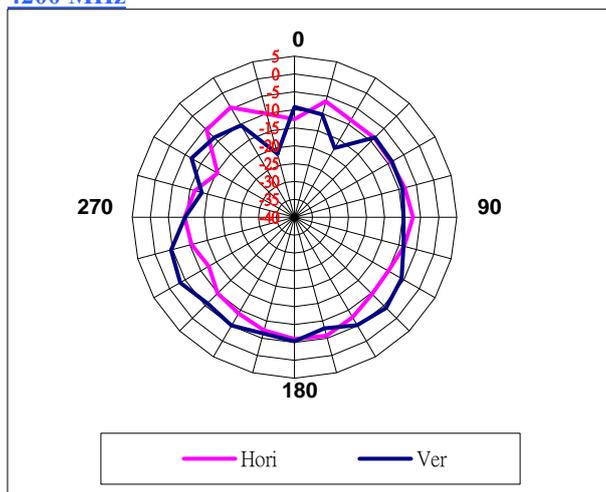
| | |
|-----------------------|----------------|
| Center Frequency | 3600MHz |
| Horizontal (dBi) peak | -4.55 |
| Vertical (dBi) peak | -1.30 |

3750 MHz



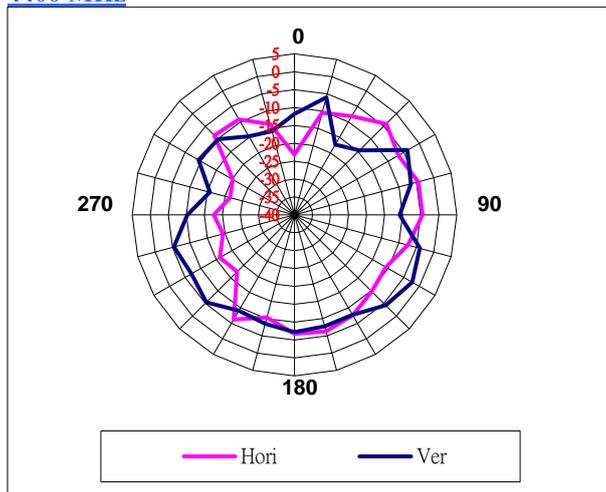
| | |
|-----------------------|----------------|
| Center Frequency | 3750MHz |
| Horizontal (dBi) peak | -1.48 |
| Vertical (dBi) peak | -0.60 |

4200 MHz



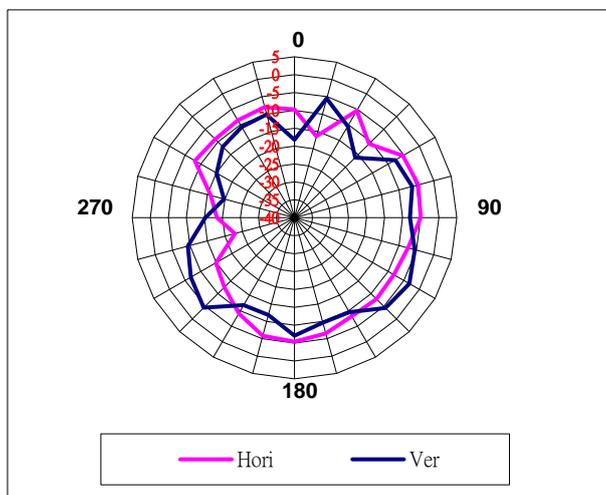
| | |
|-----------------------|----------------|
| Center Frequency | 4200MHz |
| Horizontal (dBi) peak | -4.56 |
| Vertical (dBi) peak | -3.42 |

4400 MHz



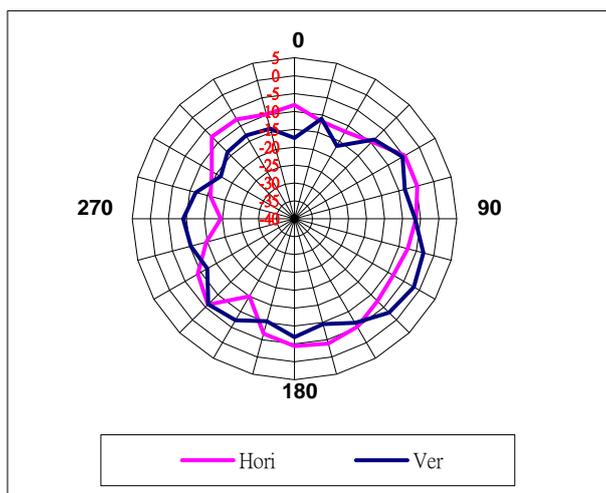
| | |
|-----------------------|----------------|
| Center Frequency | 4400MHz |
| Horizontal (dBi) peak | -3.99 |
| Vertical (dBi) peak | -2.36 |

4800 MHz



| | |
|-----------------------|----------------|
| Center Frequency | 4800MHz |
| Horizontal (dBi) peak | -4.44 |
| Vertical (dBi) peak | -3.19 |

5000 MHz

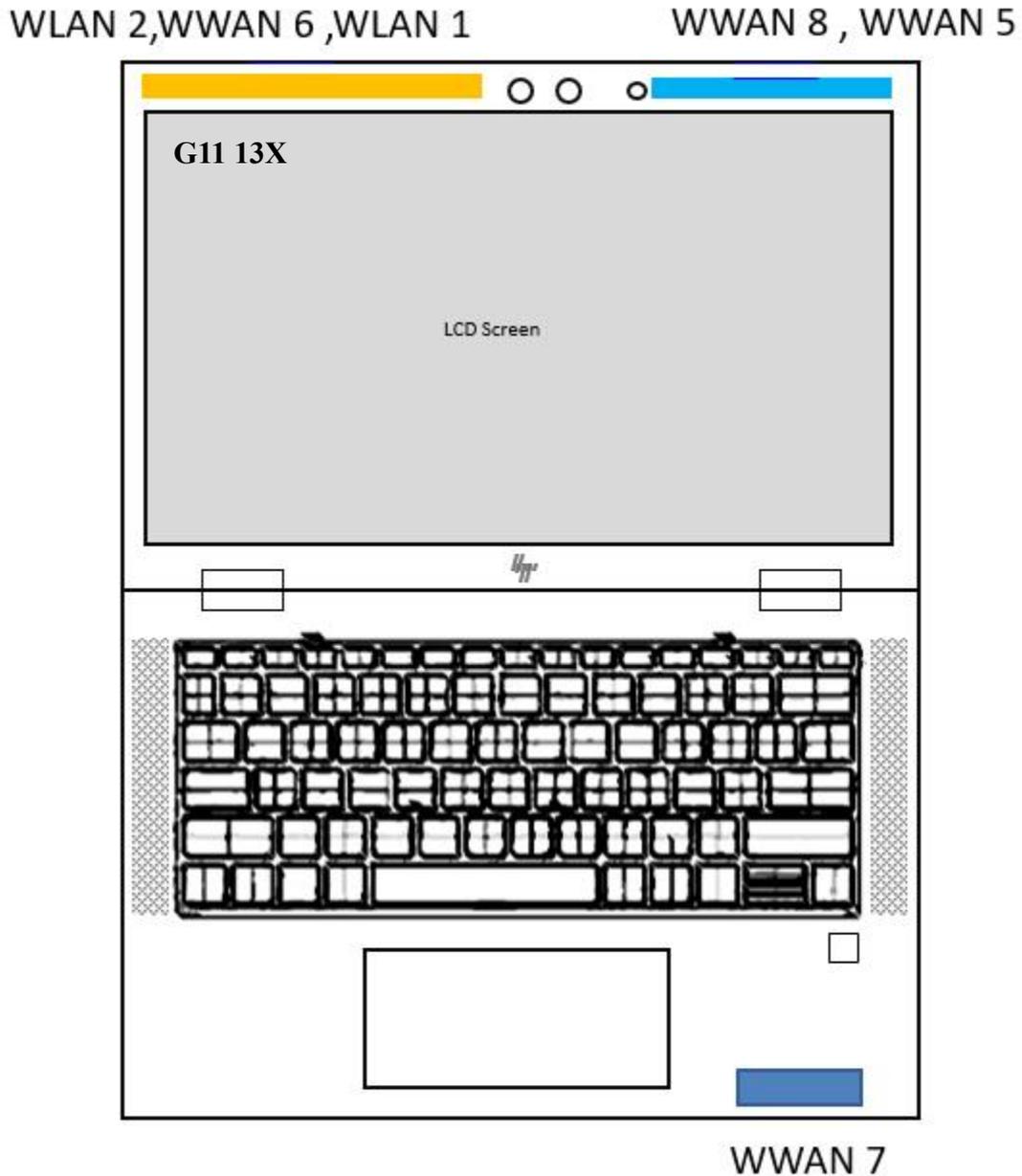


| | |
|-----------------------|----------------|
| Center Frequency | 5000MHz |
| Horizontal (dBi) peak | -3.88 |
| Vertical (dBi) peak | -1.83 |

Section 4. Antenna Host Platform Location Information

Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).

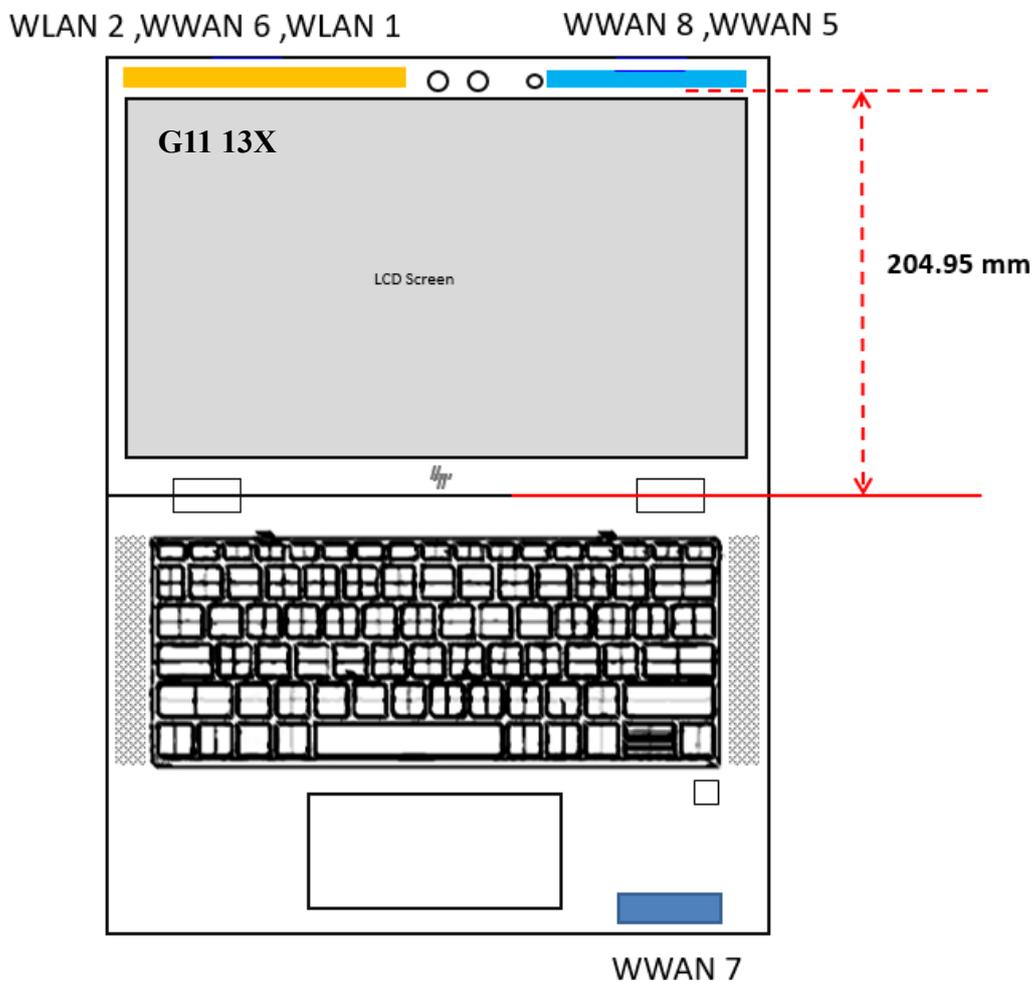
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.

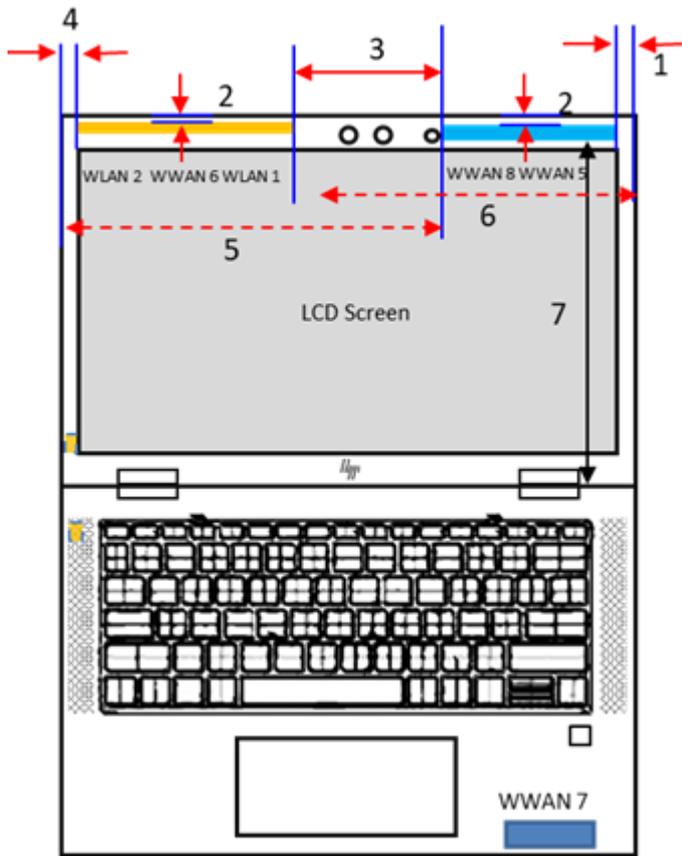


Section 5. Antenna Host Platform Location Information

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.

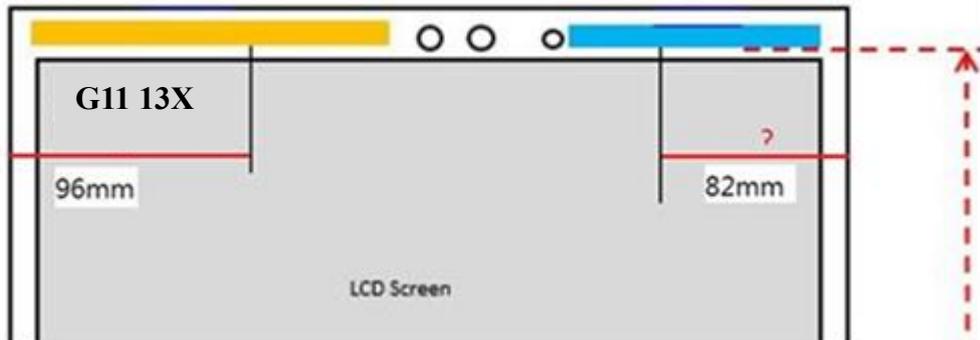




| Plot | (mm) |
|------|---------|
| 1 | 14.146 |
| 2 | 2.05 |
| 3 | 75.825 |
| 4 | 11.796 |
| 5 | 184.05 |
| 6 | 186.375 |
| 7 | 204.95 |

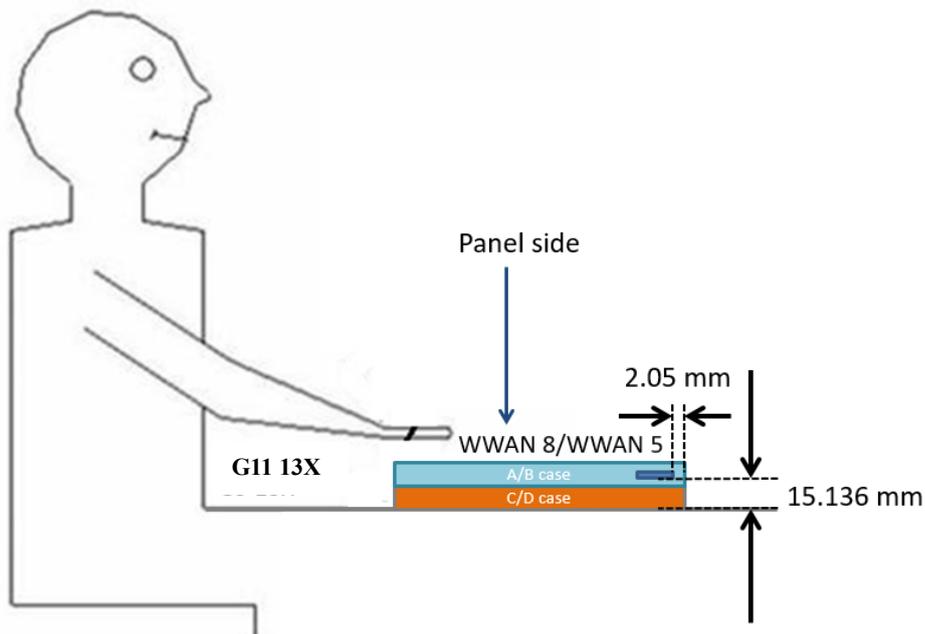
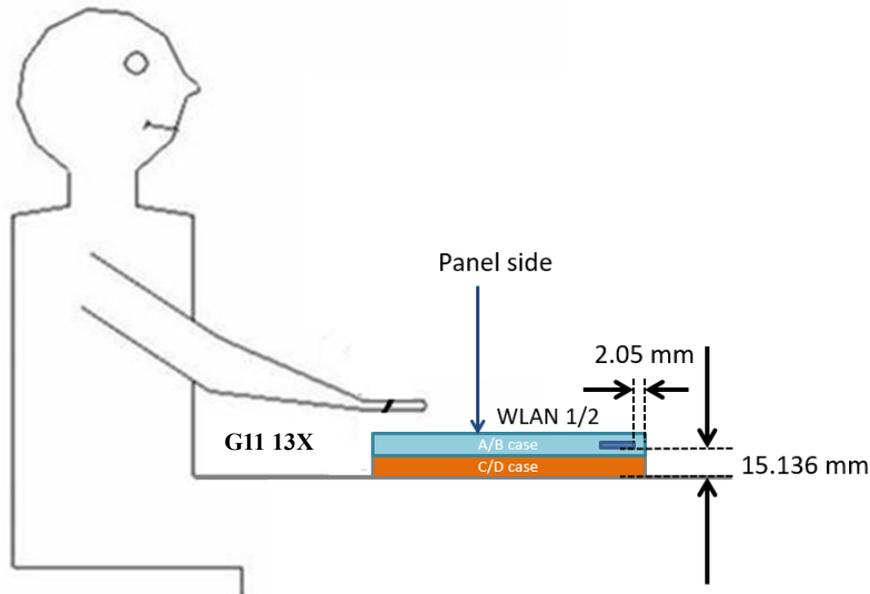
WLAN 2 ,WWAN 6 ,WLAN 1

WWAN 8 ,WWAN 5



Section 6. Antenna dimensional information for SAR evaluation

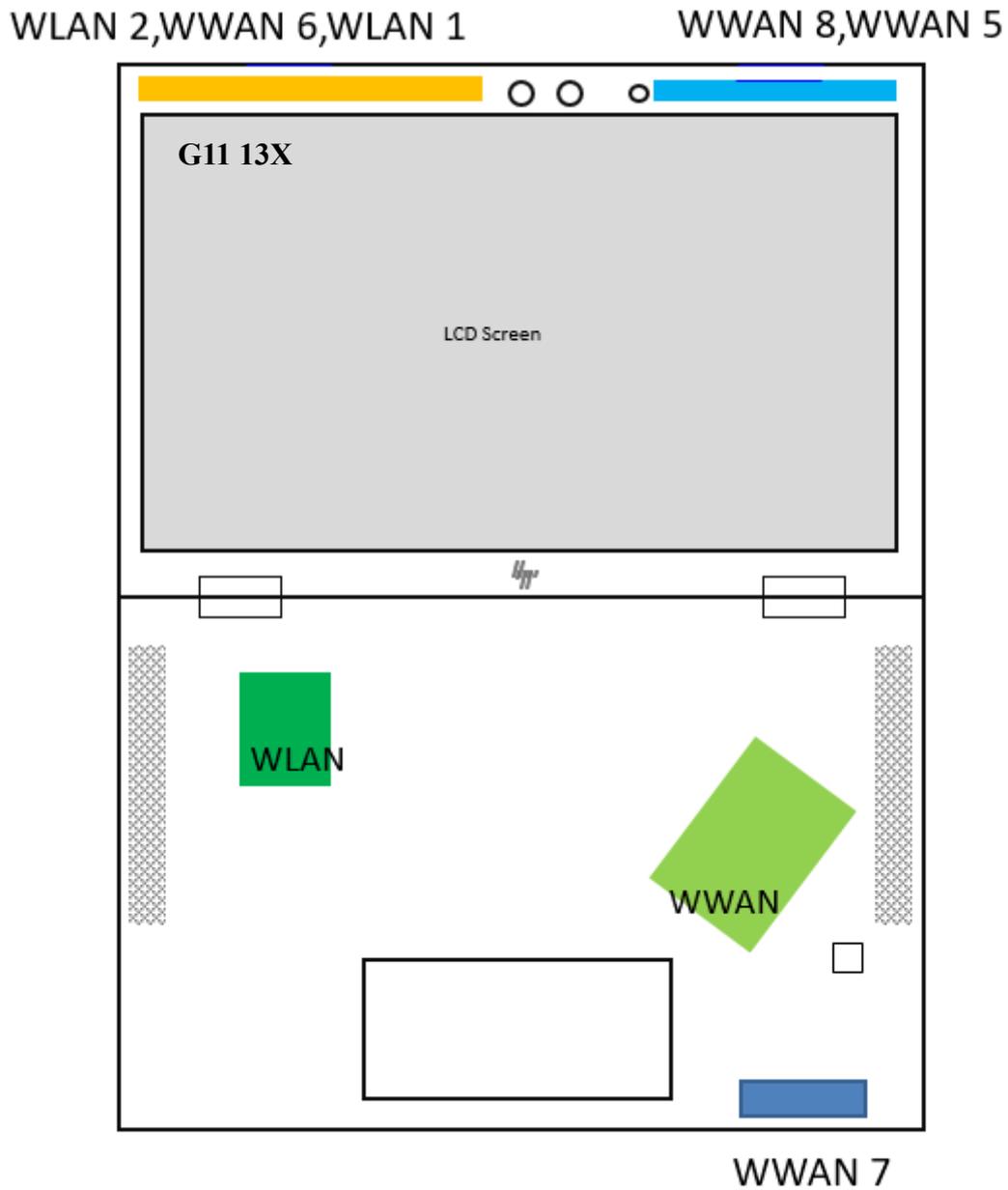
Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary 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 | | | | | | |