# Antenna Test report

**Model Name: A9-A**
**Date: 18th OCT, 2023**

ANWEI commnuication Technology Co., Ltd.
**www.aw168.cn**

# Catalogue

CO NT E NT

# 01.Project Introducation and  Photoes-Project Introducation

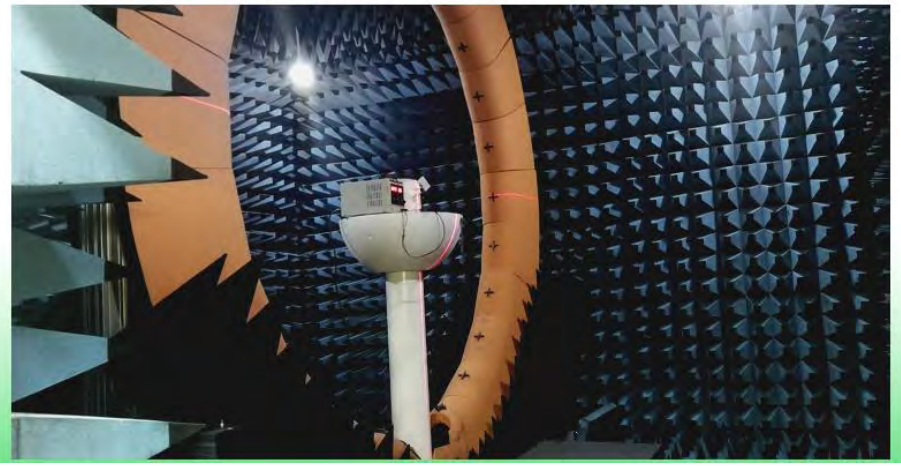
| | | | |
|---|---|---|---|
| RF Engineer | Engineer lei | Email | |
| | | Mobile | 15986728949 |
| Antenna Overview | | | |
| Status of Sample machine | Whole machine | Project Name | A9-A |
| Antenna Type | PIFA | Structure mode | FPC+coaxial line |
| Main Antenna | 4G B1/2/3/4/5/7/8/12/17/20/28/66/38/40/41 2G(850/900/1800/1900)<br>3G 1/2/4/5/8 | | |
| Other Antenna | Diversity Three-in-one antenna | | |

# 02.Report Versions

| Version | Report Time | Commissioning Overview |
|---|---|---|
| A0 | 2023.10.18 | Antenna Test Report |
| A1 | | |
| A2 | | |
| A3 | | |
| A4 | | |
| A5 | | |
| A6 | | |
| A7 | | |
| A8 | | |
| A9 | | |
| A10 | | |

# 04.Introduction of Company and Test Environment-Test Environment



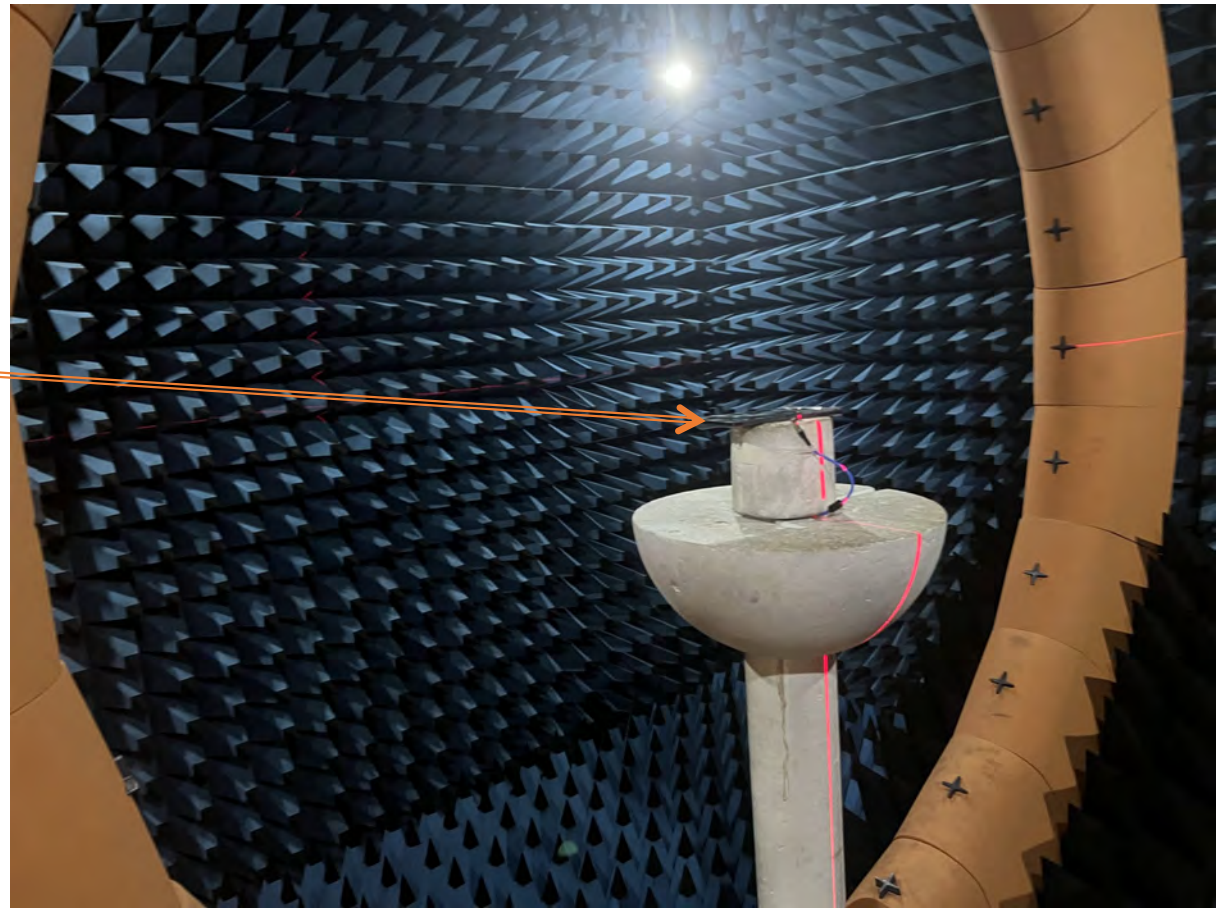


**The company owns several OTA darkrooms whose frequency bands covers from 400mhz to 8.5ghz.**

- Providing OTA test for whole machine which include but not be limited to 5G NSA, SA(trp/tis), WiFi active test (supporting 11b/11g/11n/11ax mode), bluetooth/GPS active test
- Providing antenna gain and efficiency
- Providing2D pattern / Apple chart analysis
- Providing upper and lower hemisphere efficiency
- Providing mutual interference correlation coefficient test items.

# 05.Enviornment Test

Location of Tested Machine



# 06.Antenna correlation data

Main antenna active data

| | Channel | TRP (dBm) | TIS (dBm) |
|---|---|---|---|
| FDD B1 | 18050 | 17.8 | |
| | 18300 | 17.35 | |
| | 18550 | 17.79 | -93.87 |
| FDD B2 | 18650 | 16.21 | |
| | 18900 | 16.88 | |
| | 19150 | 16.62 | -93.06 |
| FDD B3 | 19250 | 16.24 | |
| | 19575 | 16.52 | |
| | 19900 | 16.96 | -92.98 |
| FDD B4 | 20000 | 16.86 | |
| | 20175 | 16.49 | |
| | 20350 | 16.27 | -91.46 |
| FDD B5 | 20450 | 16.34 | |
| | 20525 | 15.85 | |
| | 20600 | 15.54 | -88.36 |
| FDD B7 | 20800 | 14.29 | |
| | 21100 | 15.27 | |
| | 21400 | 16.2 | -91.68 |
| FDD B8 | 21500 | 16.86 | |
| | 21625 | 15.97 | |
| | 21750 | 15.11 | -90.19 |
| FDD B12 | 23060 | 10.4 | |
| | 23095 | 11.7 | |
| | 23130 | 11.8 | -85.79 |

| | Channel | TRP (dBm) | TIS (dBm) |
|---|---|---|---|
| FDD B17 | 23780 | 11.2 | |
| | 23790 | 11.4 | |
| | 23800 | 11.5 | -85.67 |
| FDD B20 | 24200 | 15.24 | |
| | 24300 | 15.89 | |
| | 24400 | 15.82 | -87.17 |
| FDD B28A | 27260 | 11.5 | |
| | 27370 | 11.8 | |
| | 27469 | 12.3 | -87.25 |
| FDD B28B | 27410 | 12.2 | |
| | 27510 | 12.6 | |
| | 27600 | 13.5 | -86.87 |
| FDD B66 | 132022 | 16.3 | |
| | 132322 | 16.4 | |
| | 132622 | 16.6 | -91.0 |
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| | Channel | TRP (dBm) | TIS (dBm) |
|---|---|---|---|
| TDD 38 | 2580 | 16.89 | |
| | 2595 | 17.23 | |
| | 2610 | 16.96 | -90.11 |
| TDD 40 | 38750 | 16.88 | |
| | 39150 | 15.87 | |
| | 39550 | 15.85 | -88.23 |
| TDD 41 | | 16.6 | |
| | 40620 | 16.54 | |
| | | 16.21 | -88.22 |
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# 06.Antenna correlation data

Main antenna active data

| | Channel | TRP (dBm) | TIS (dBm) |
|---|---|---|---|
| GSM 850 | 128 | 25.26 | |
| | 190 | 25.02 | |
| | 251 | 25.22 | -101.5 |
| GSM 900 | 1 | 24.57 | |
| | 62 | 24.07 | |
| | 124 | 23.55 | -100.17 |
| DCS 1800 | 512 | 23.19 | |
| | 698 | 23.09 | |
| | 885 | 22.9 | -101.94 |
| PCS 1900 | 512 | 22.91 | |
| | 661 | 23.11 | |
| | 810 | 22.48 | -101.5 |
| | | | |
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| | Channel | TRP (dBm) | TIS (dBm) |
|---|---|---|---|
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| | Channel | TRP (dBm) | TIS (dBm) |
|---|---|---|---|
| W 1 | 9612 | 17.92 | |
| | 9750 | 17.64 | |
| | 9888 | 17.38 | -104.48 |
| W 2 | 9262 | 16.48 | |
| | 9400 | 16.73 | |
| | 9538 | 16.94 | -101.32 |
| W 4 | 1312 | 17.35 | |
| | 1413 | 17.25 | |
| | 1513 | 17.87 | -103.5 |
| W 5 | 4132 | 16.69 | |
| | 4183 | 16.9 | |
| | 4233 | 16.55 | -102.6 |
| W 8 | 2712 | 15.35 | |
| | 2787 | 15.15 | |
| | 2863 | 14.55 | -100.8 |
| | | | |

# 08. WIFI active data

| BAND | 2.4GWIFI | | | 5.8WIFI | | |
|---|---|---|---|---|---|---|
| CHANNEL | low | medium | high | low | medium | high |
| TRP(dBm) | 12.6 | 12.3 | 12.7 | 9.2 | 9.7 | 10.3 |
| TIS (dBm) | -79.7 | -79.5 | -78.7 | -69.6 | -70.0 | -70.5 |

# 09. Antenna passive data

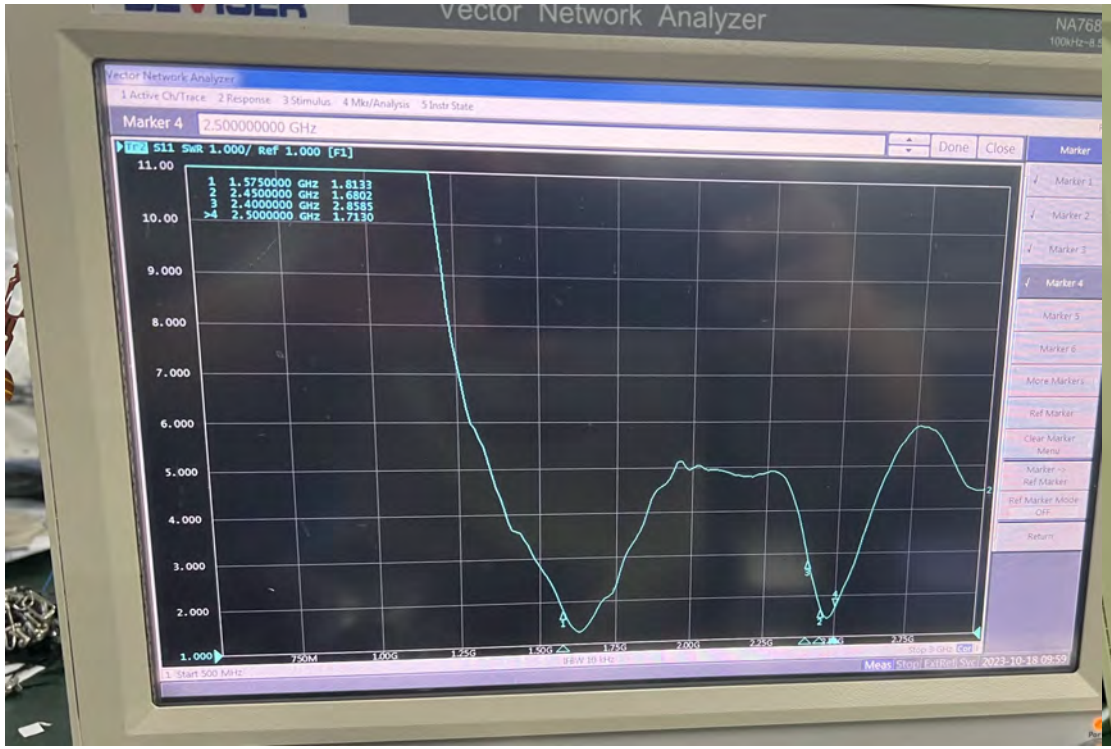
Main antenna gain

| Gain&Efficiency | | | | |
|---|---|---|---|---|
| frequency 频率(MHz) | gain 增益(dB) | mingain 最小增益 | efficiency 效率(dB) | efficiency 效率 |
| 690 | -5.92 | -29.73 | -9.41 | 15.46% |
| 700 | -5.12 | -31.06 | -8.66 | 15.61% |
| 710 | -4.79 | -32.92 | -8.22 | 15.08% |
| 720 | -4.4 | -36.33 | -7.92 | 16.15% |
| 730 | -4.21 | -38.37 | -7.77 | 16.72% |
| 740 | -3.91 | -33.24 | -7.63 | 17.28% |
| 750 | -3.41 | -30.59 | -7.42 | 18.10% |
| 760 | -2.95 | -29.01 | -7.22 | 18.97% |
| 770 | -2.91 | -28.51 | -7.26 | 18.79% |
| 780 | -2.53 | -25.14 | -7.04 | 19.75% |
| 790 | -2.48 | -24.75 | -7.17 | 19.19% |
| 800 | -2.36 | -24.6 | -7.03 | 19.80% |

| Gain&Efficiency | | | | |
|---|---|---|---|---|
| frequency 频率(MHz) | gain 增益(dBi) | mingain 最小增益 | efficiency 效率(dBi) | efficiency 效率(%) |
| 820 | -1.58 | -19.56 | -6.07 | 24.71 |
| 840 | -1.26 | -20.28 | -5.74 | 26.68 |
| 860 | -0.91 | -23.05 | -5.94 | 25.48 |
| 880 | -0.83 | -23.25 | -6.12 | 24.46 |
| 900 | -0.62 | -28.83 | -6.18 | 24.09 |
| 920 | -0.64 | -20.88 | -6.18 | 24.09 |
| 940 | -0.82 | -20.95 | -6.44 | 22.71 |
| 960 | -0.55 | -19.36 | -6.29 | 23.47 |

| frequency 频率(MHz) | gain 增益(dBi) | mingain 最小增益 | efficiency 效率(dBi) | efficiency 效率(%) |
|---|---|---|---|---|
| 1700 | -0.83 | -23.25 | -6.12 | 24.46 |
| 1720 | -0.91 | -23.05 | -5.94 | 25.48 |
| 1740 | -2.46 | -14.31 | -5.79 | 26.38 |
| 1760 | -1.57 | -14.37 | -5.32 | 29.36 |
| 1780 | -2 | -14.64 | -5.7 | 26.91 |
| 1800 | 0.82 | -21.31 | -5.41 | 28.74 |
| 1820 | 0.53 | -18.33 | -5.8 | 26.30 |
| 1840 | 0.43 | -18.61 | -5.87 | 25.88 |
| 1860 | 1.61 | -19.31 | -5.37 | 29.06 |
| 1880 | 2.8 | -19.54 | -4.83 | 32.89 |
| 1900 | -1.1 | -14.99 | -5.06 | 31.20 |
| 1920 | -1.06 | -14.95 | -5.03 | 31.37 |
| 1940 | -0.76 | -15.62 | -5.01 | 31.55 |
| 1960 | -0.82 | -16.36 | -5.15 | 30.55 |
| 1980 | -0.65 | -17.27 | -5.01 | 31.57 |
| 2000 | -0.65 | -16.54 | -5.02 | 31.51 |
| 2020 | -0.75 | -18.48 | -5.19 | 30.24 |
| 2040 | -0.33 | -21.02 | -4.83 | 32.85 |
| 2060 | -0.7 | -20.7 | -4.95 | 32.01 |
| 2080 | -0.46 | -16.67 | -4.65 | 34.31 |
| 2100 | -0.23 | -15.71 | -4.55 | 35.11 |
| 2120 | -0.75 | -15.24 | -4.76 | 33.43 |
| 2240 | 0.42 | -18.69 | -5.67 | 27.10 |
| 2260 | 0.39 | -19.62 | -5.71 | 26.84 |
| 2280 | 0.48 | -21.02 | -5.81 | 26.23 |
| 2300 | 1.21 | -16.13 | -4.79 | 33.16 |
| 2320 | 1.03 | -15.86 | -4.8 | 33.10 |
| 2340 | -0.04 | -16.57 | -5.4 | 28.86 |
| 2360 | 0.5 | -16.91 | -5.24 | 29.93 |
| 2380 | -0.17 | -15.75 | -5.98 | 25.25 |
| 2400 | 0.45 | -17.34 | -5.29 | 29.59 |
| 2420 | -0.33 | -19.88 | -6.04 | 24.90 |
| 2440 | -0.77 | -18.62 | -6.07 | 24.72 |
| 2460 | -1.11 | -20.62 | -6.44 | 22.72 |
| 2480 | -0.91 | -23.61 | -6.14 | 24.32 |
| 2500 | -1.2 | -23.79 | -6.34 | 23.23 |
| 2520 | 0.45 | -19.55 | -5.07 | 31.09 |
| 2540 | -0.35 | -23.37 | -5.76 | 26.54 |
| 2560 | 0.24 | -22.17 | -5.11 | 30.81 |
| 2580 | 0.35 | -23.43 | -5.18 | 30.32 |
| 2600 | 0.64 | -22.43 | -5.09 | 30.95 |
| 2620 | 0.2 | -20.13 | -5.8 | 26.28 |
| 2640 | 1.45 | -20.28 | -4.62 | 34.52 |
| 2660 | 0.88 | -22.09 | -5.33 | 29.30 |
| 2680 | 0.88 | -23.79 | -5.21 | 30.15 |

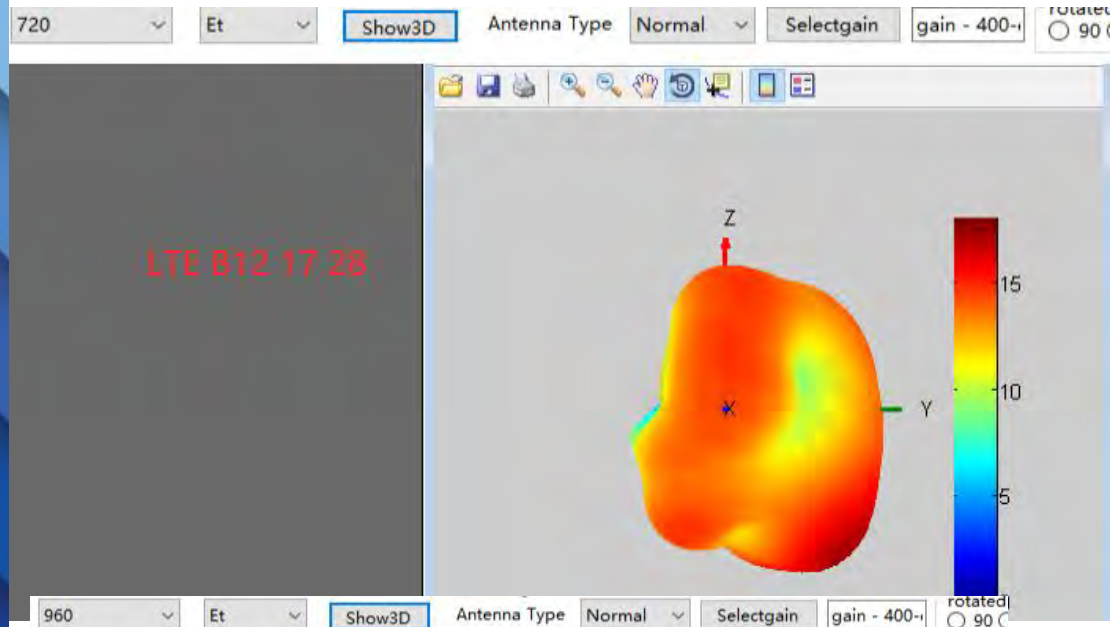
# 09.GPS/WIFI/BT Antenna VSWR/S11

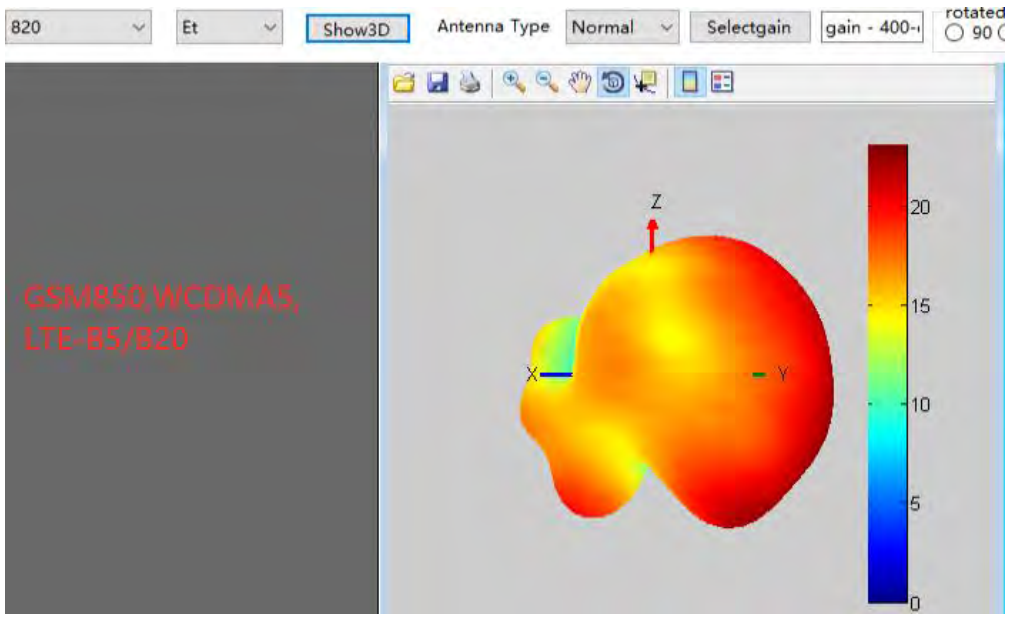


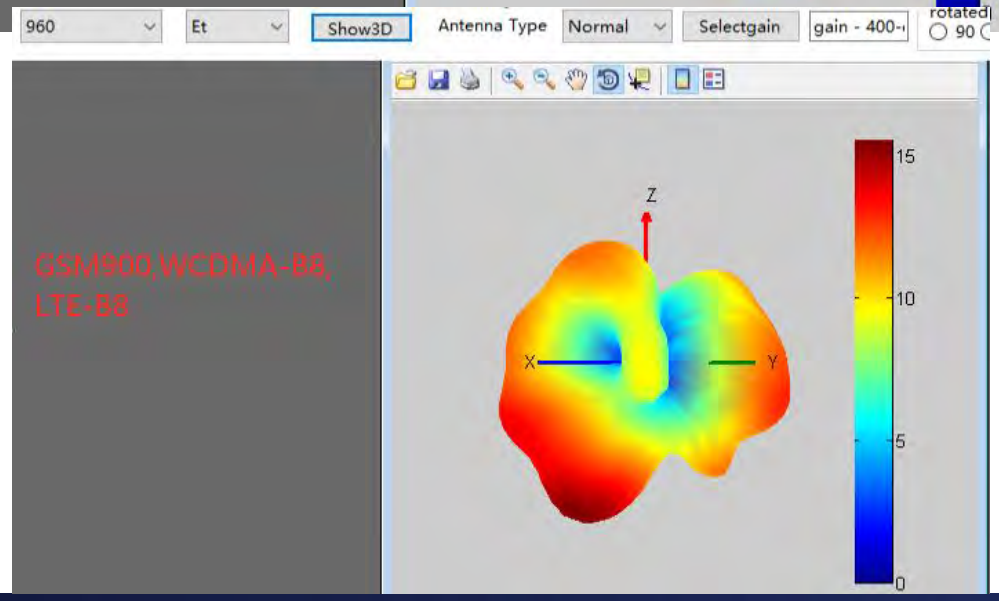

# 10.
# MAIN Antenna
# VSWR/S11


# 10. Antenna correlation data

Main antenna apple pattern and directional pattern

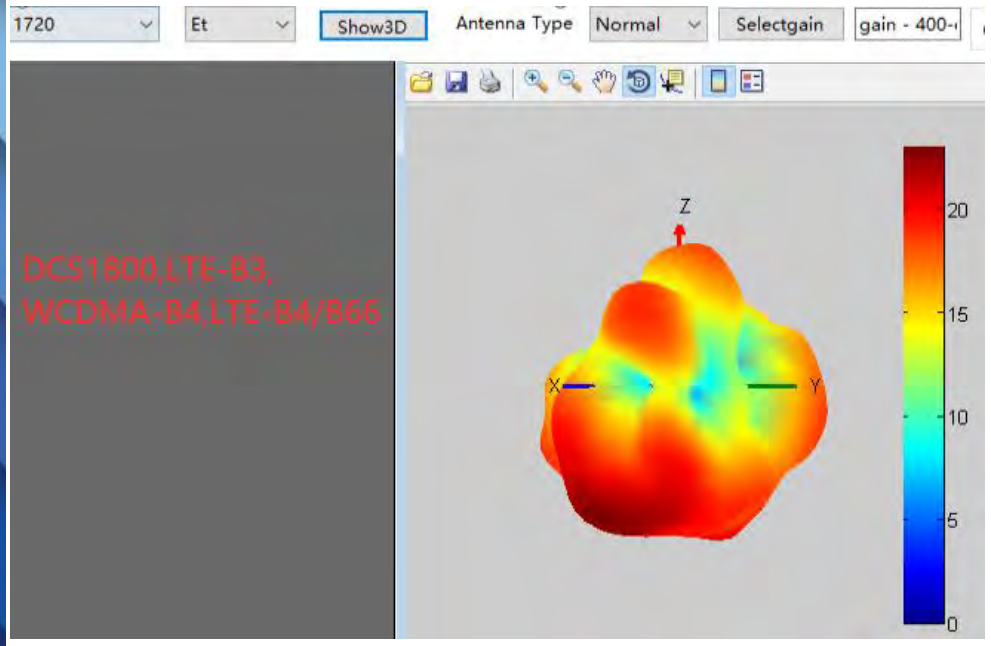


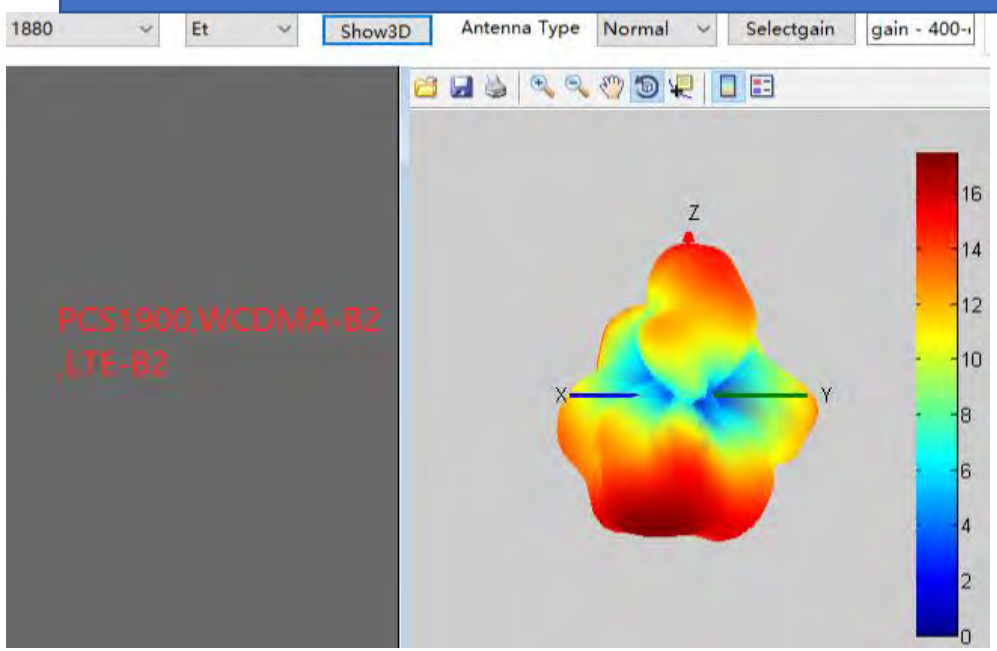



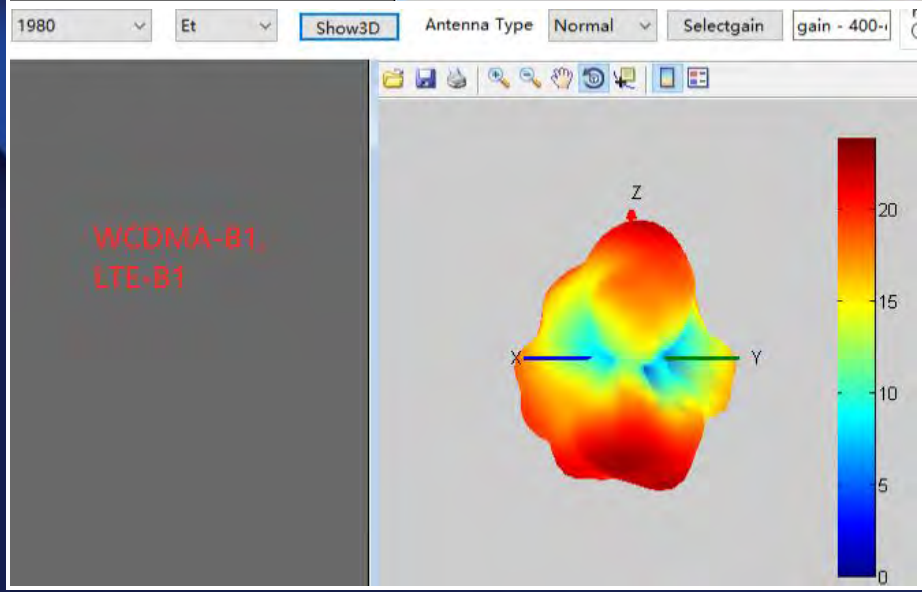



# 10. Antenna correlation data

Main antenna apple pattern and directional pattern

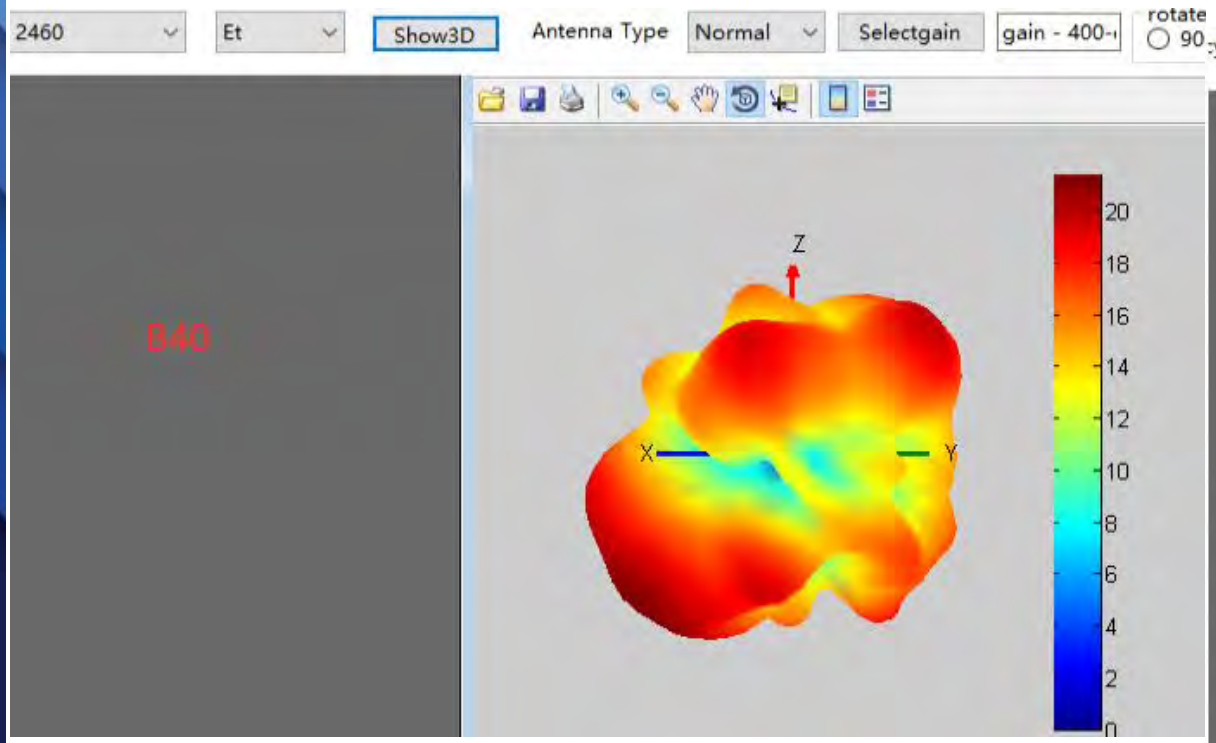


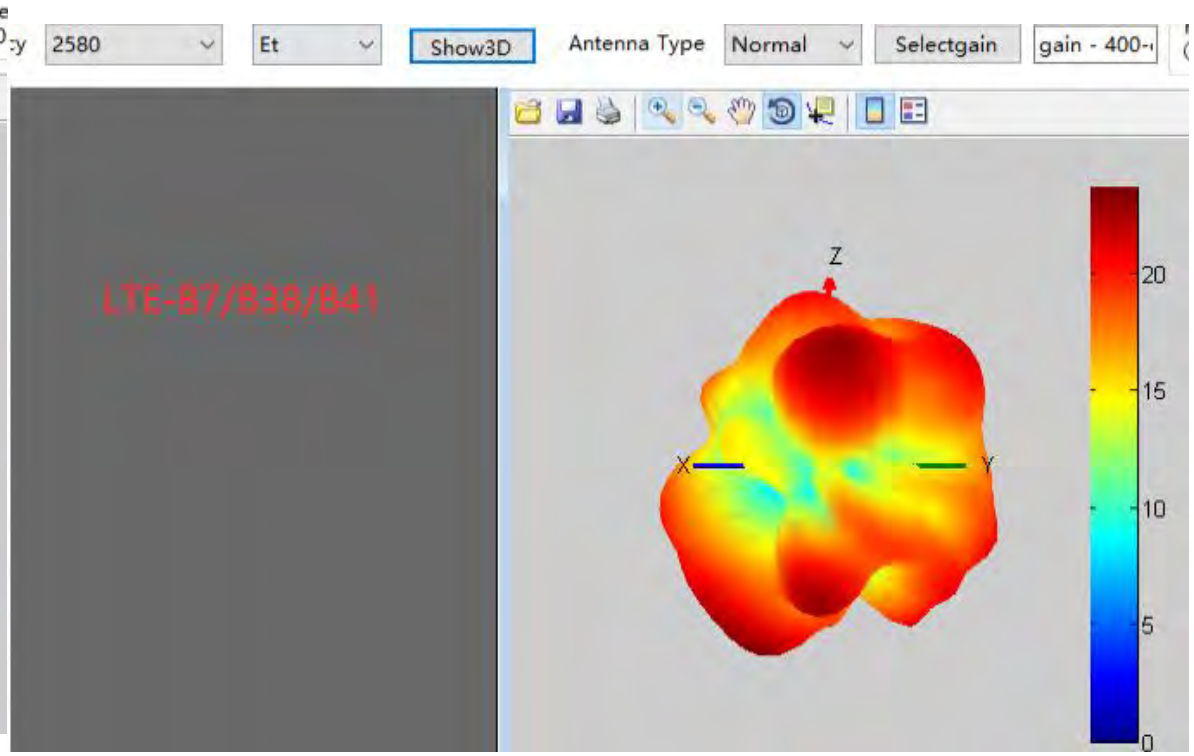



# 10. Antenna correlation data

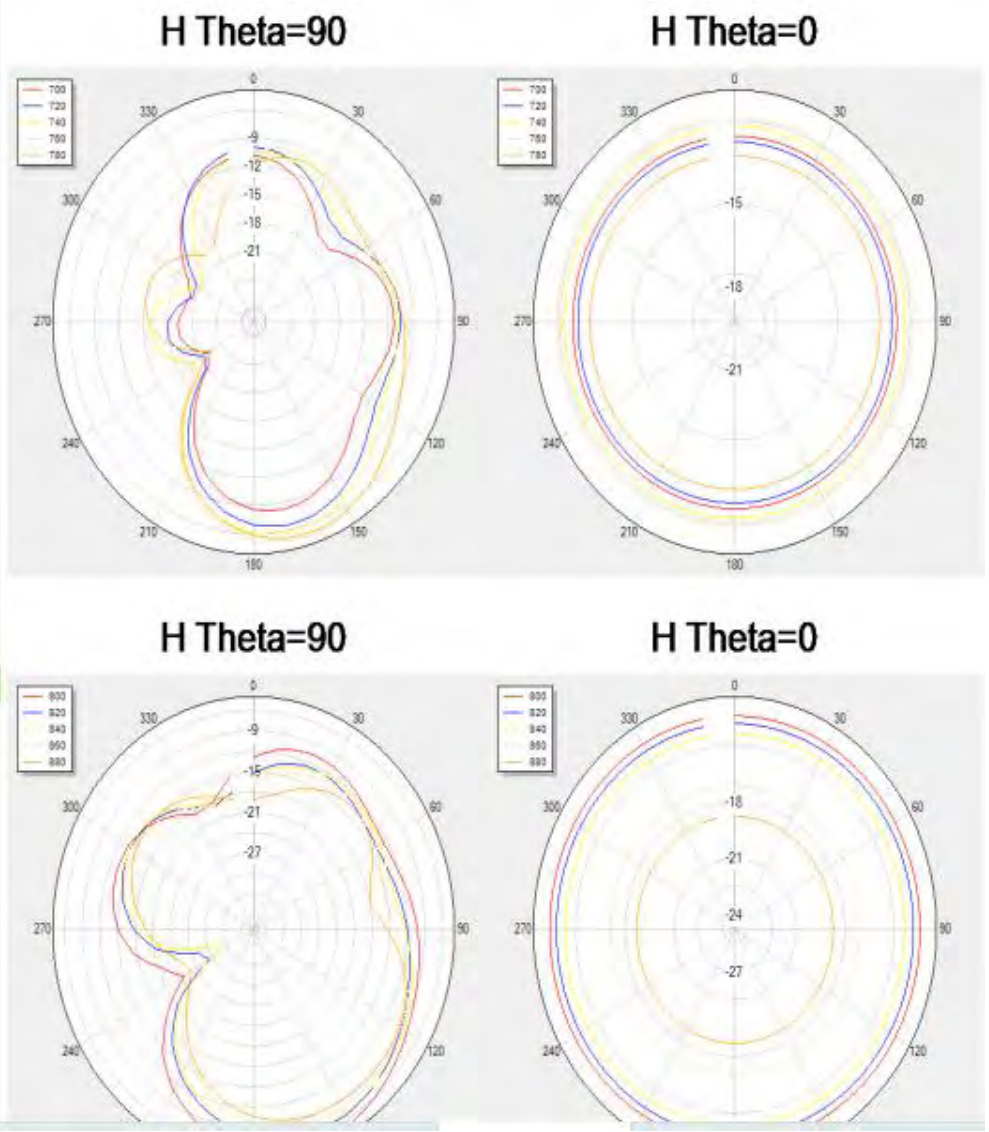
Main antenna apple pattern and directional pattern

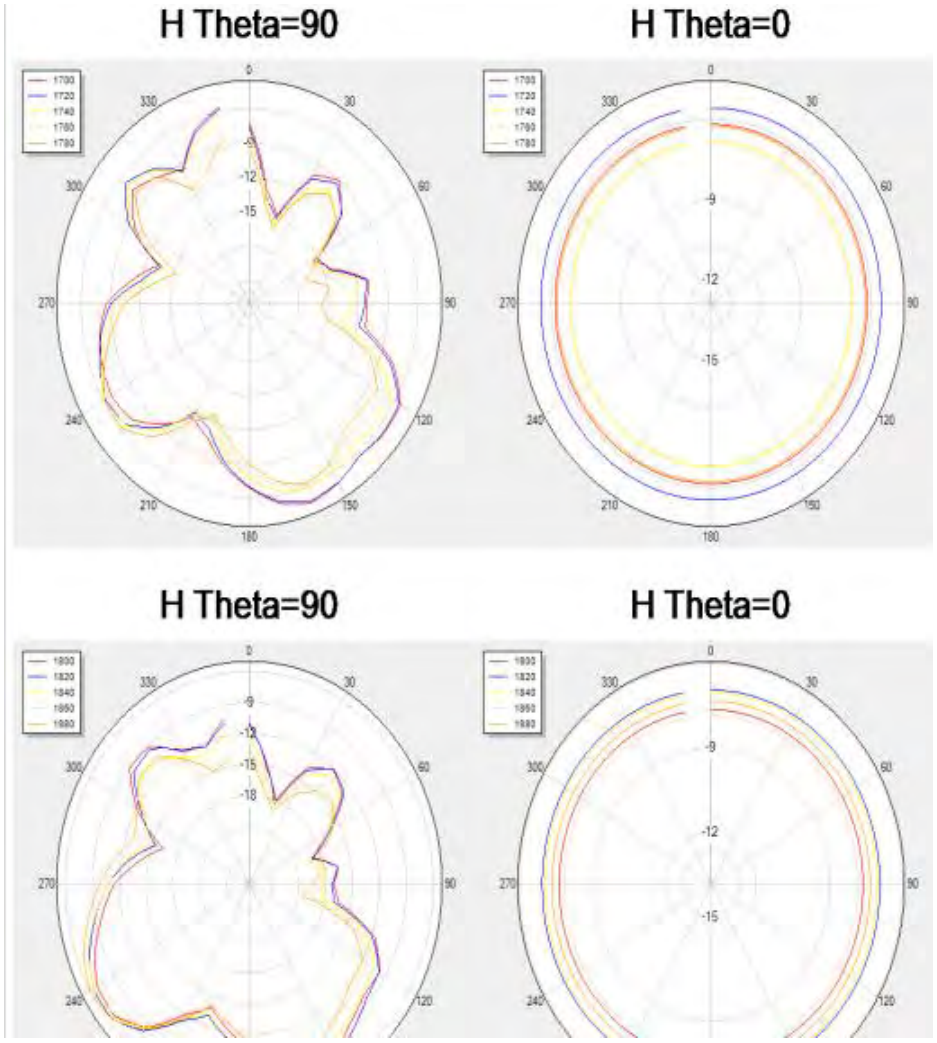


# 10. Antenna correlation data

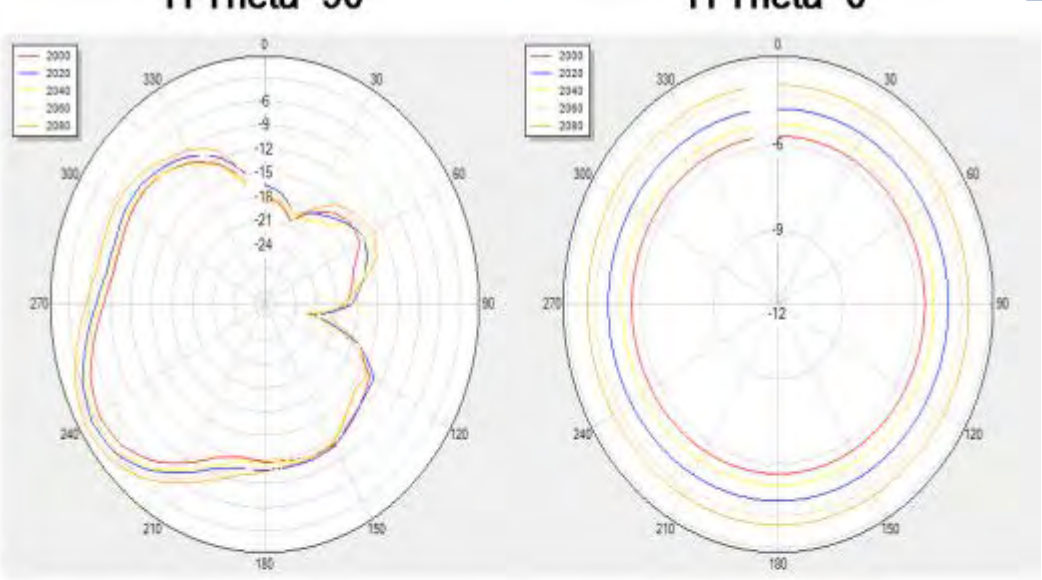
Main antenna apple pattern and directional pattern

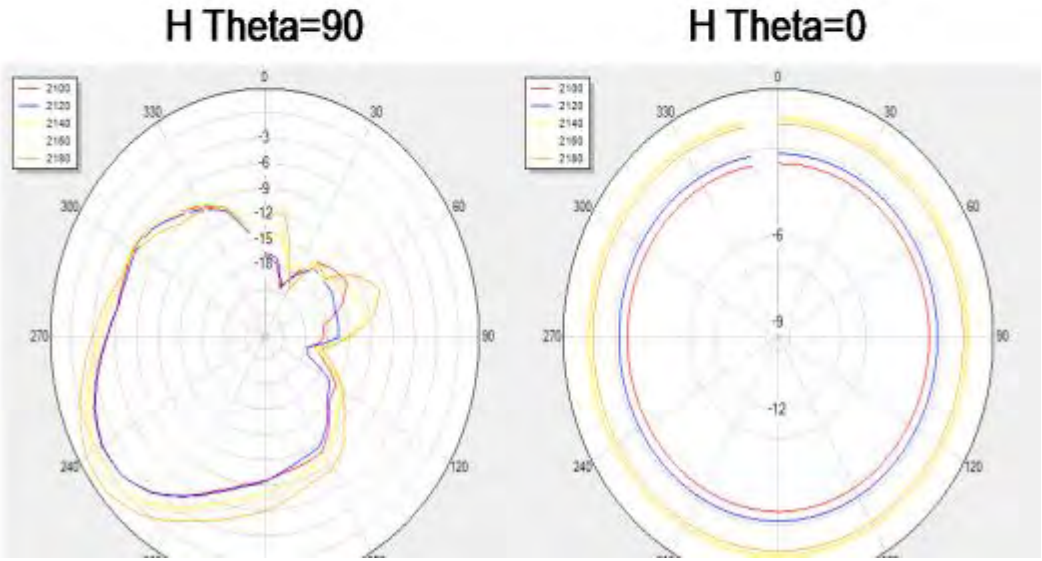


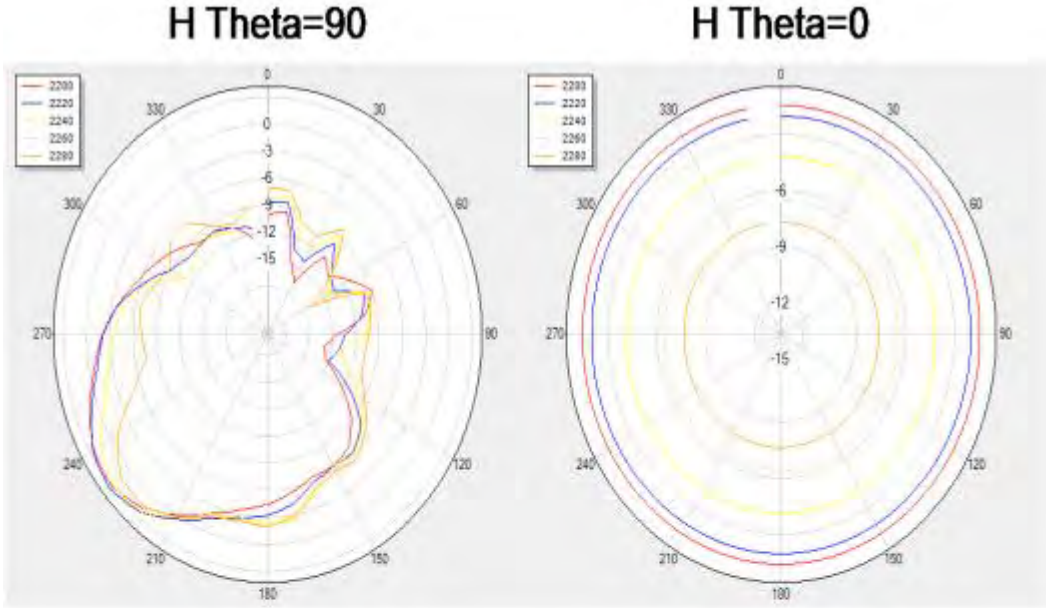



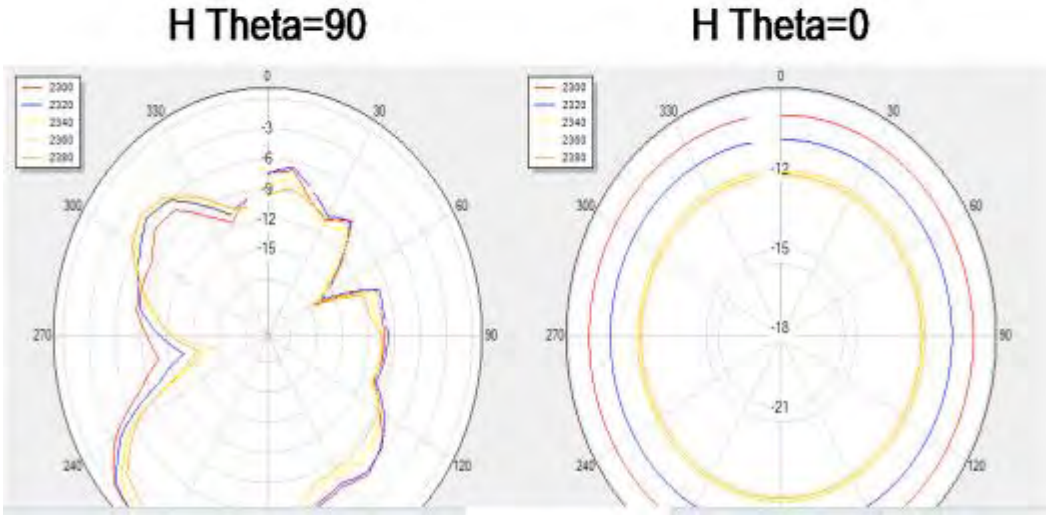
# 10. Antenna correlation data

Main antenna apple pattern and directional pattern

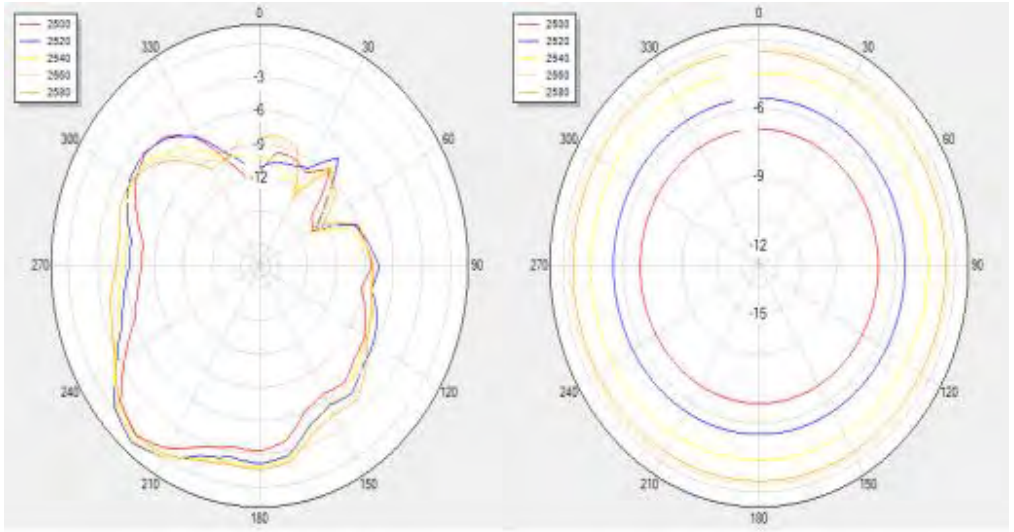


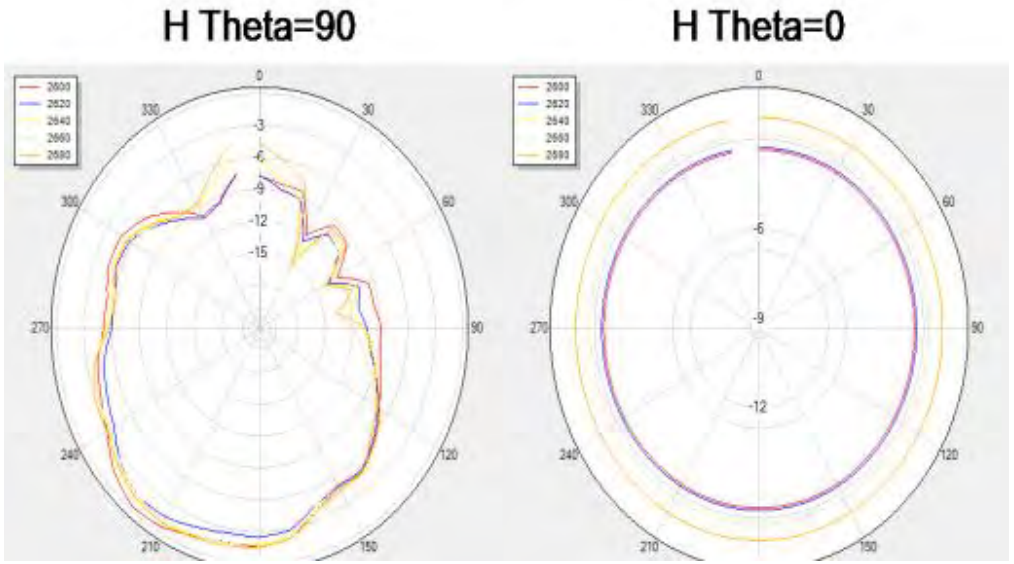


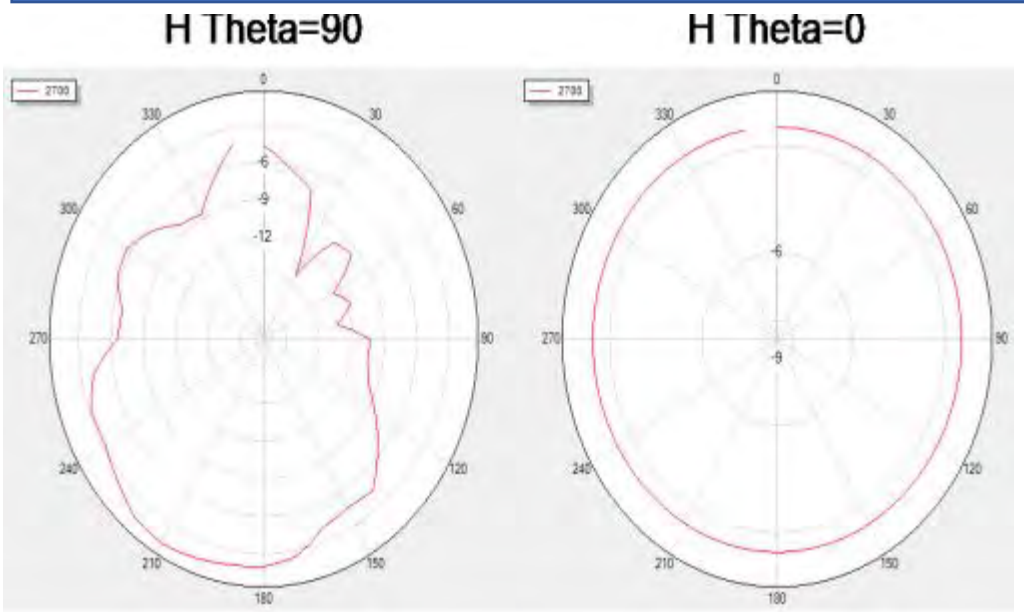



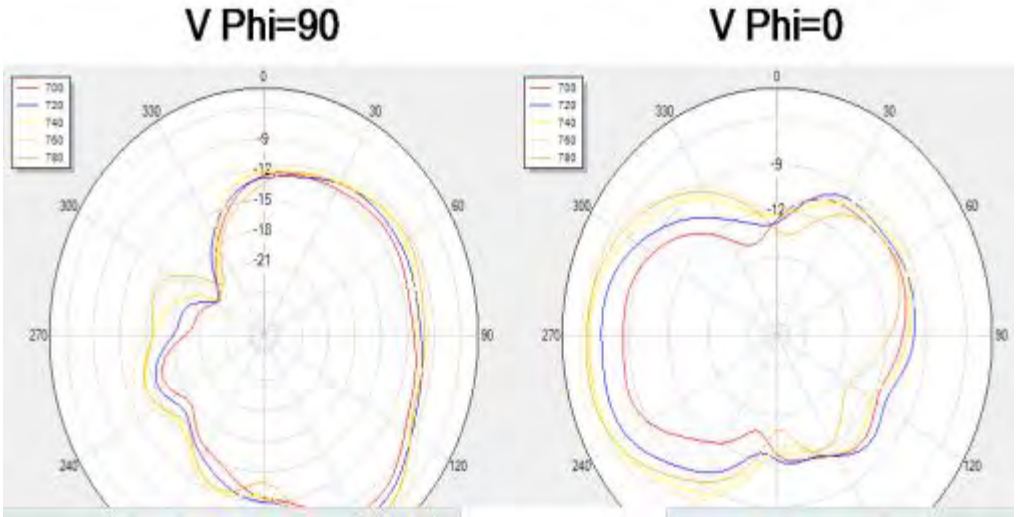
# 10. Antenna correlation data






Main antenna apple pattern and directional pattern

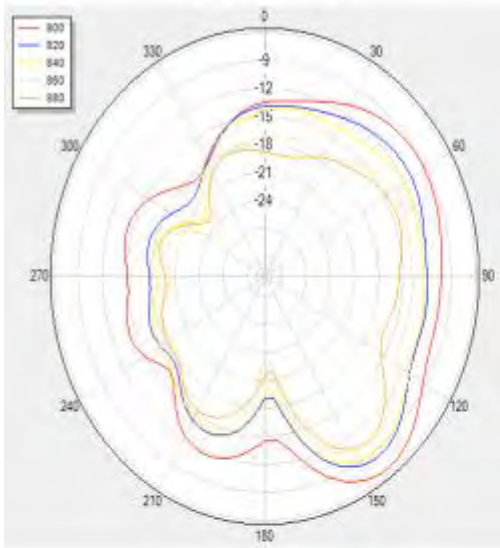


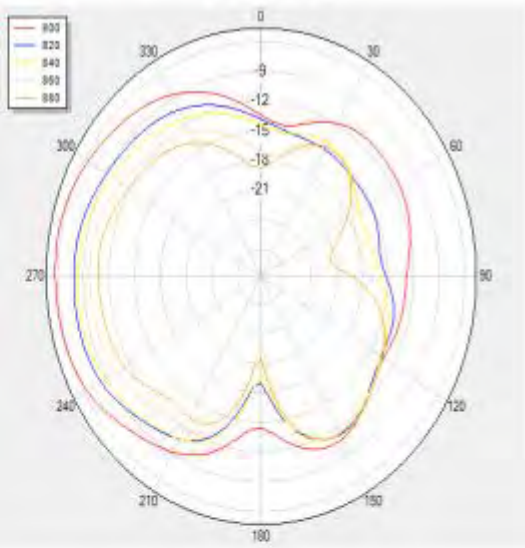
# 10. Antenna correlation data

Main antenna apple pattern and directional pattern

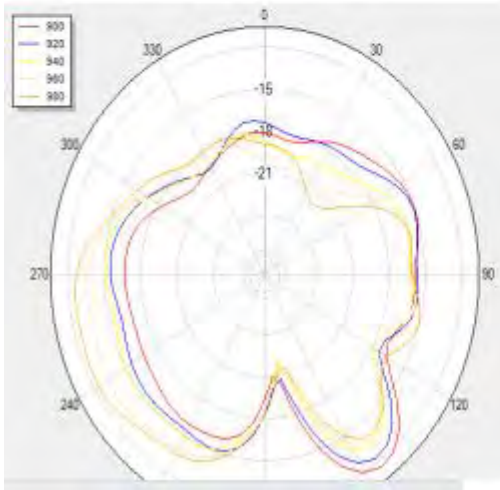
V Phi=90



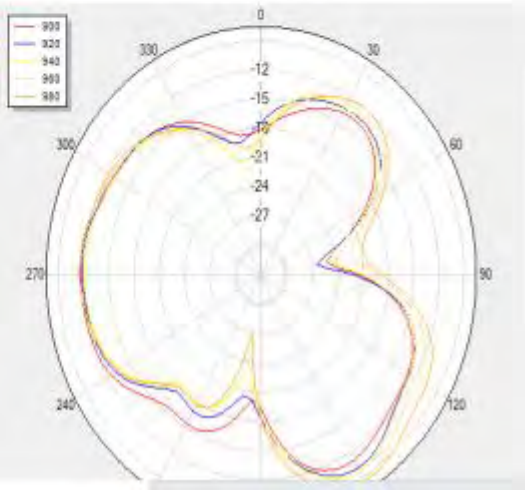
V Phi=0



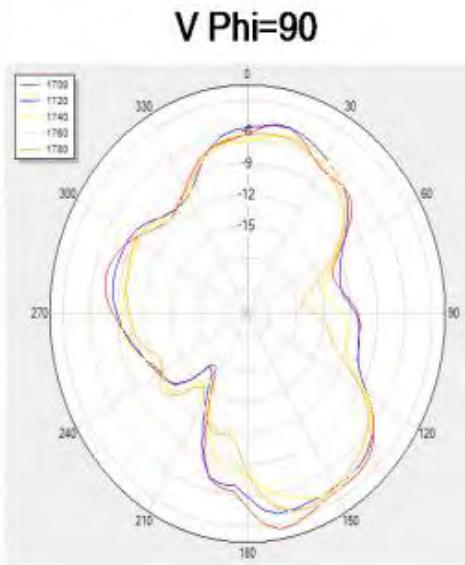
V Phi=90



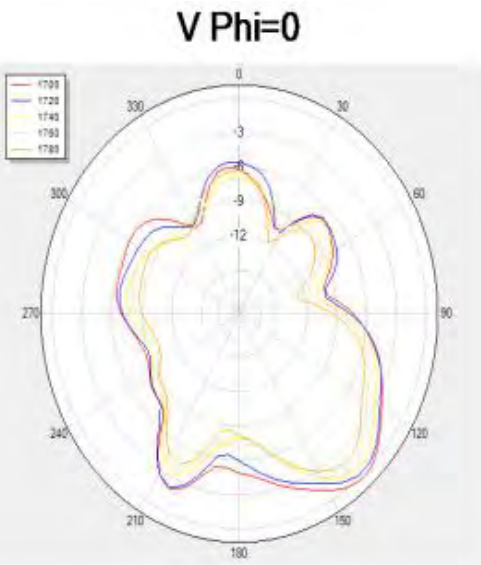
V Phi=0



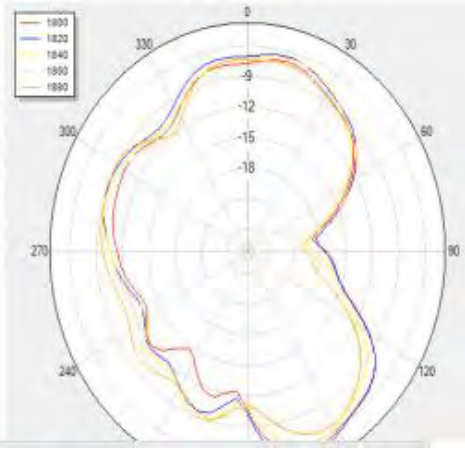
V Phi=90



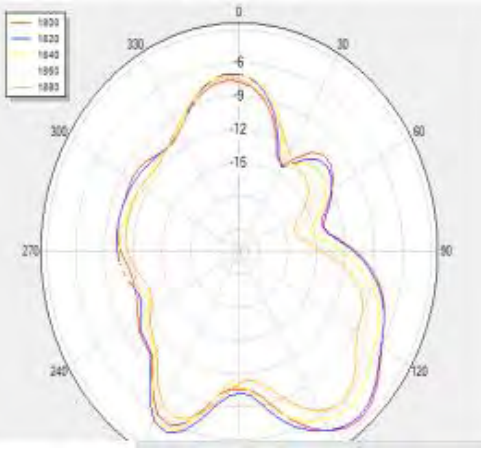
V Phi=0



V Phi=90



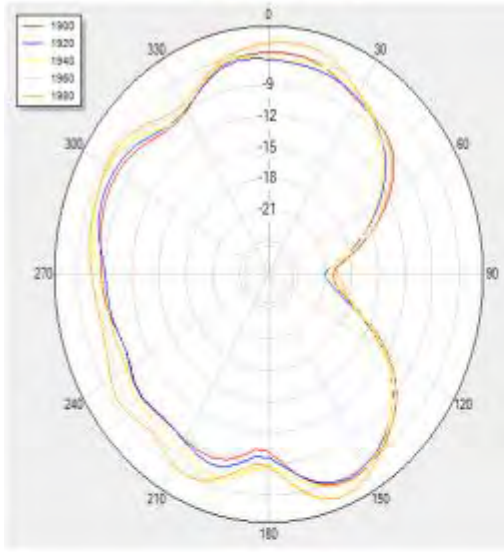
V Phi=0



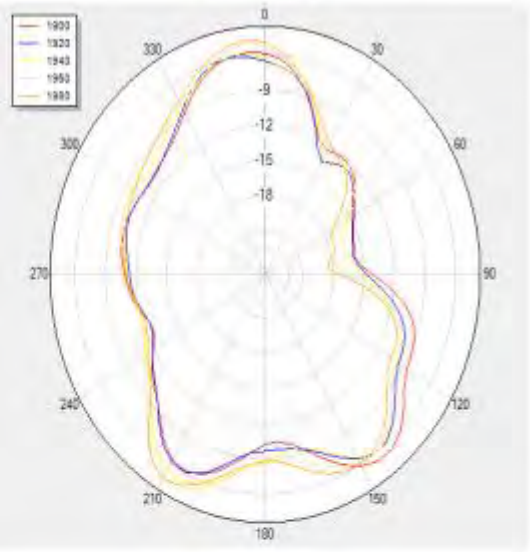
# 10. Antenna correlation data

Main antenna apple pattern and directional pattern

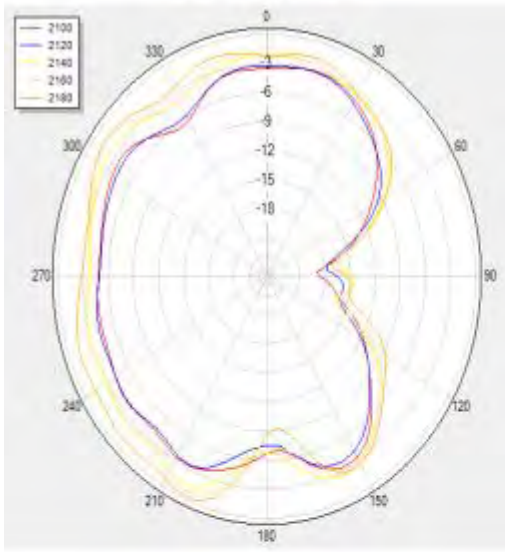
V Phi=90



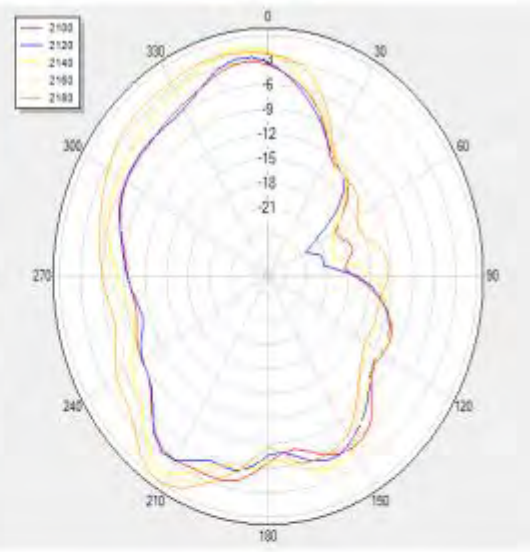
V Phi=0



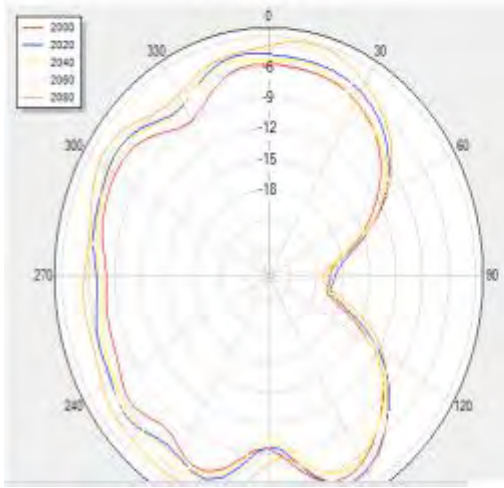
V Phi=90



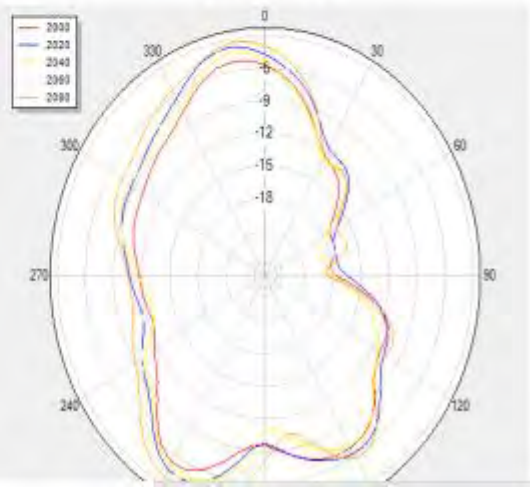
V Phi=0



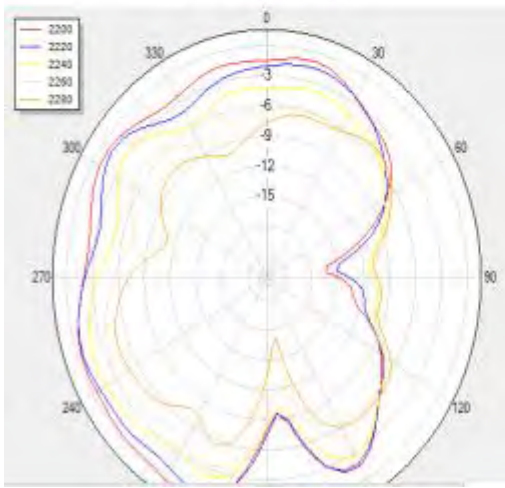
V Phi=90



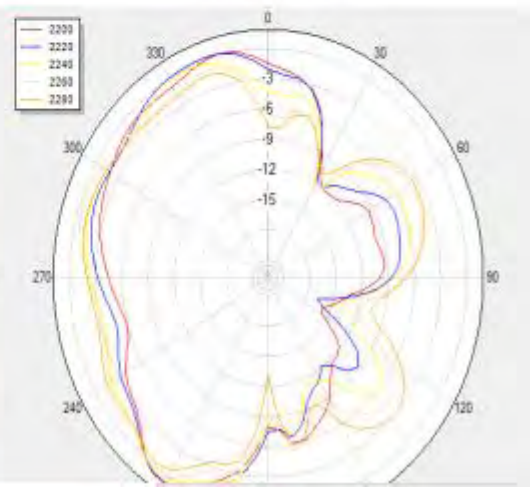
V Phi=0



V Phi=90

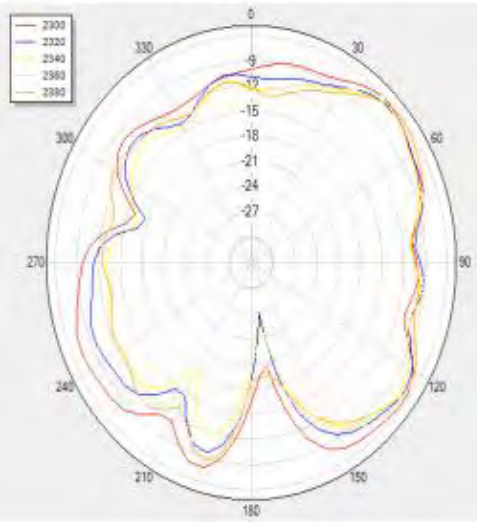


V Phi=0

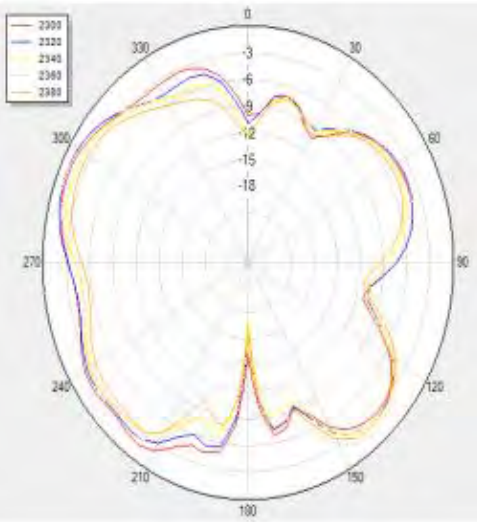


# 10. Antenna correlation data

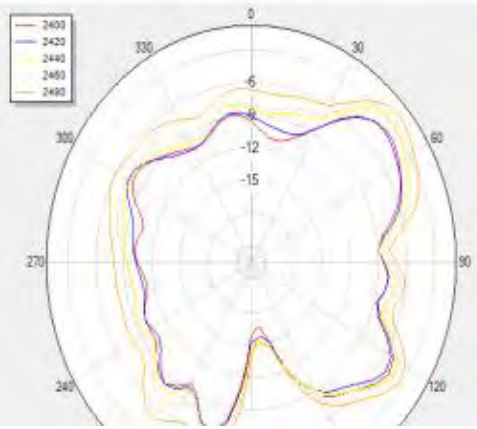
V Phi=90



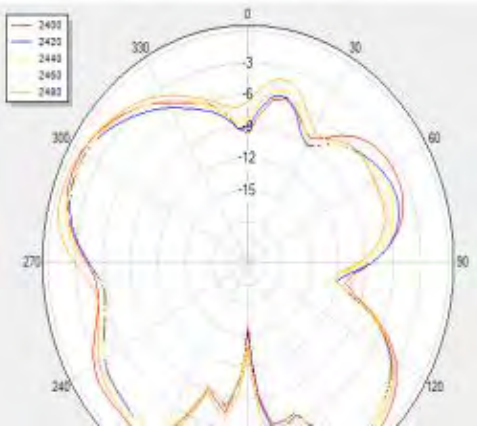
V Phi=0



V Phi=90

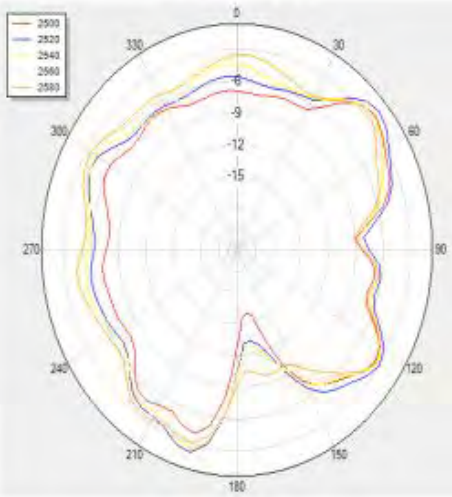


V Phi=0

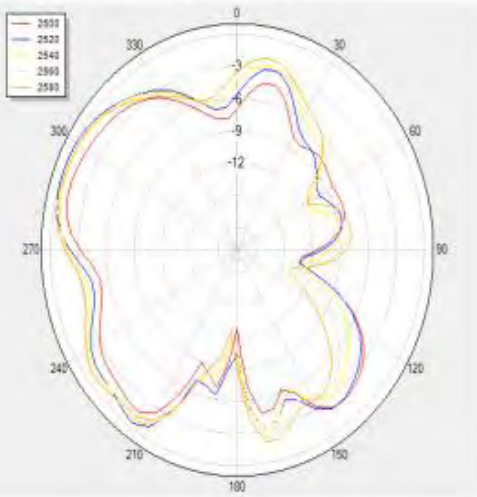


Main antenna apple pattern and directional pattern

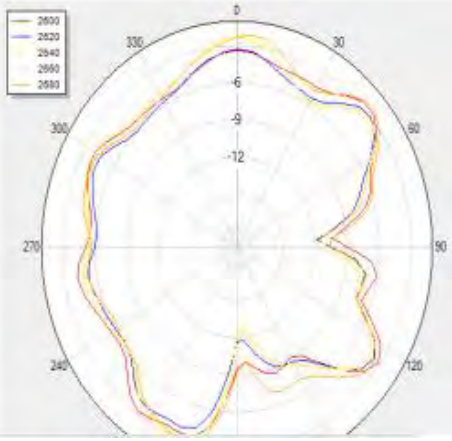
V Phi=90



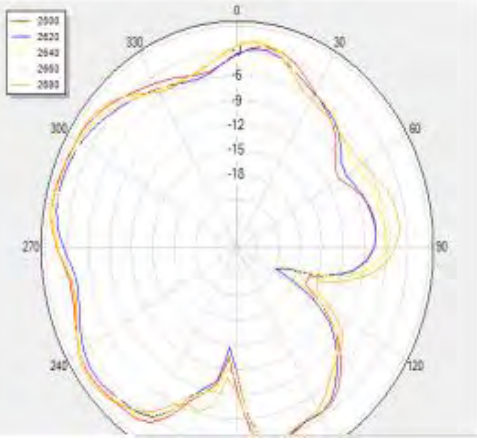
V Phi=0



V Phi=90

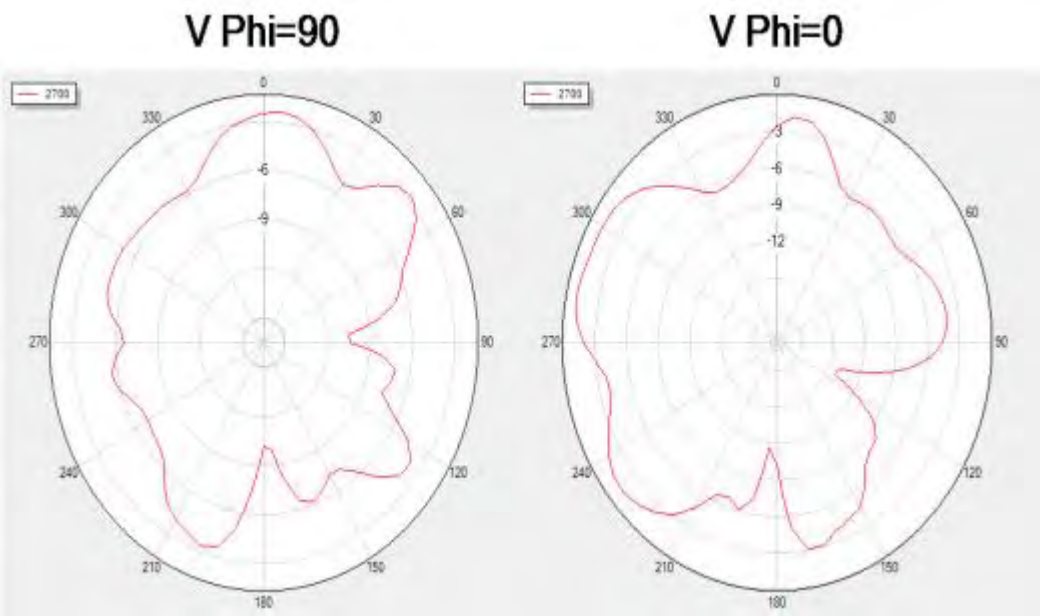


V Phi=0



# 10. Antenna correlation data

Main antenna apple pattern and directional pattern



# 11. Antenna passive data

Three in one antenna gain

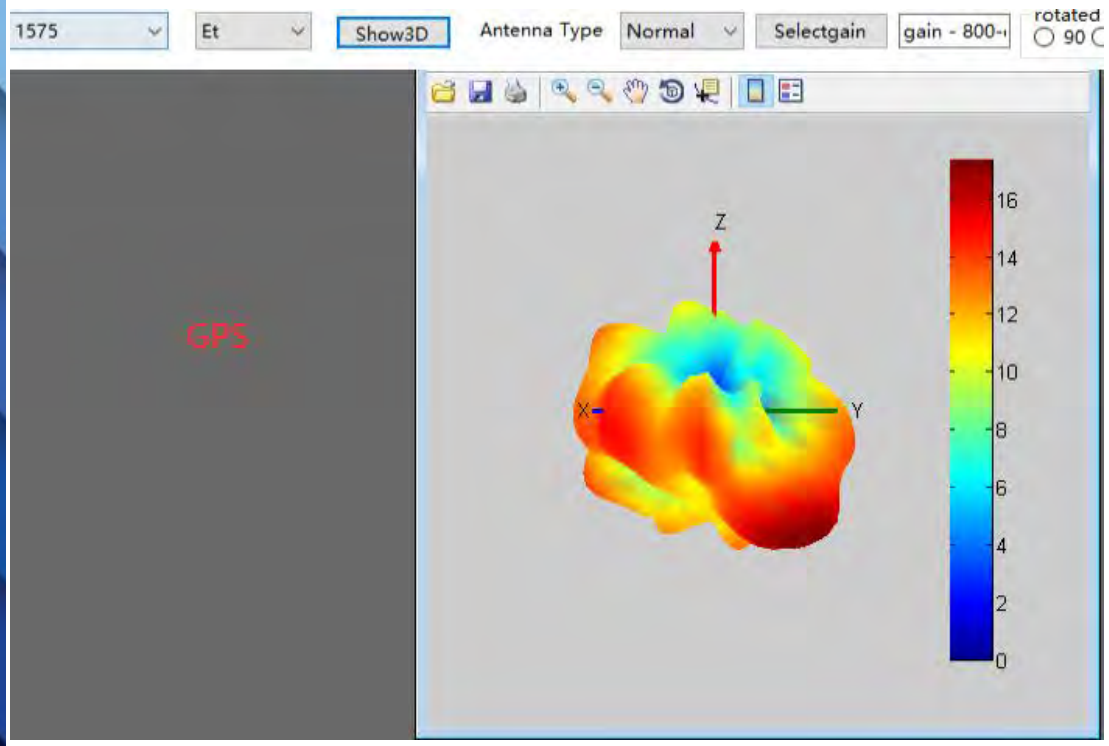
| Gain&Efficiency | | | | |
|---|---|---|---|---|
| frequency 频率(MHz) | gain 增益(dBi) | mingain 最小增益 | efficiency 效率(dBi) | efficiency 效率(%) |
| 1570 | 0.08 | -12.34 | -4.87 | 32.59 |
| 1572 | -0.03 | -12.29 | -4.94 | 32.05 |
| 1573 | -0.05 | -12.3 | -4.93 | 32.17 |
| 1574 | -0.03 | -12.32 | -4.88 | 32.53 |
| 1575 | 0 | -12.28 | -4.79 | 33.16 |
| 1576 | 0.02 | -12.23 | -4.75 | 33.47 |
| 1578 | 0.06 | -11.91 | -4.66 | 34.19 |
| 1579 | 0.08 | -11.69 | -4.62 | 34.54 |
| 1580 | 0.1 | -11.72 | -4.58 | 34.83 |

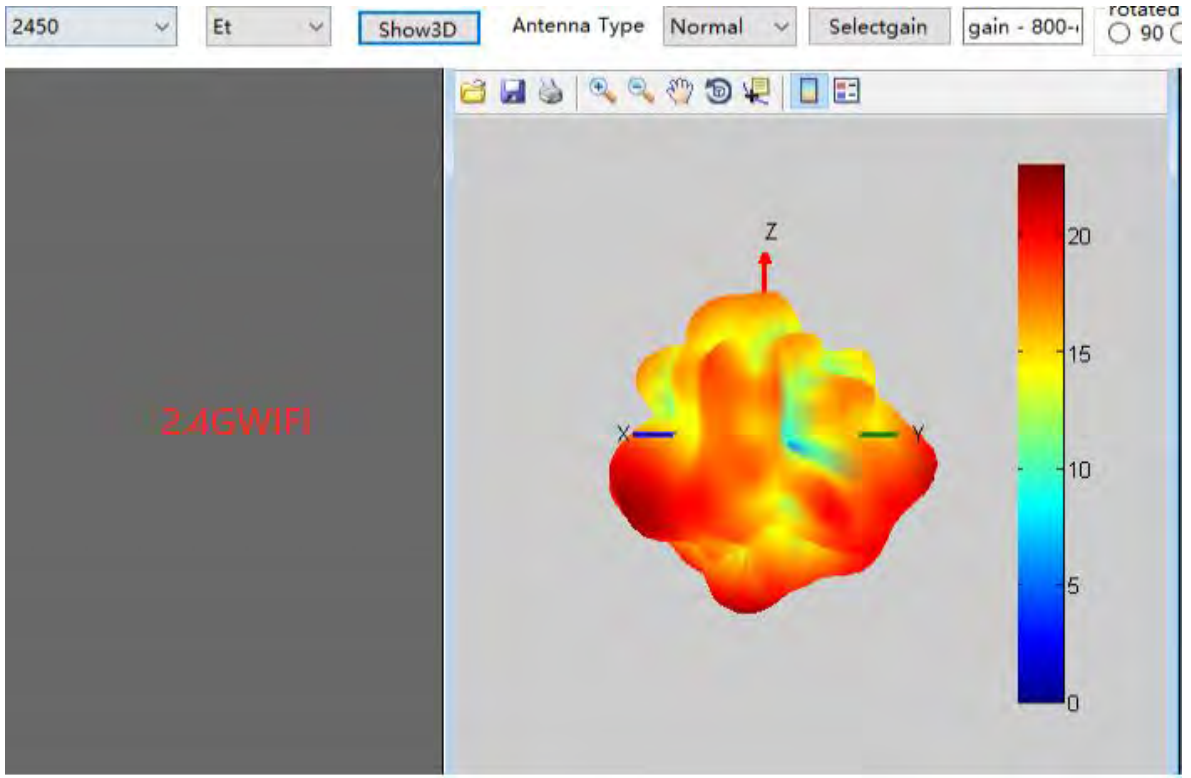
| Gain&Efficiency | | | | |
|---|---|---|---|---|
| frequency 频率(MHz) | gain 增益(dBi) | mingain 最小增益 | efficiency 效率(dBi) | efficiency 效率(%) |
| 2400 | -1.45 | -21.79 | -5.79 | 26.38 |
| 2420 | -1.34 | -24.13 | -5.67 | 27.12 |
| 2440 | -1.71 | -24.09 | -5.95 | 25.41 |
| 2460 | -1.29 | -28.35 | -5.79 | 26.36 |
| 2480 | -0.91 | -33.15 | -5.54 | 27.94 |
| 2500 | -1.15 | -25.54 | -5.66 | 27.14 |

| Gain&Efficiency | | | | |
|---|---|---|---|---|
| frequency 频率(MHz) | gain 增益(dBi) | mingain 最小增益 | efficiency 效率(dBi) | efficiency 效率(%) |
| 5100 | -1.69 | -21.26 | -6.86 | 20.61 |
| 5200 | -0.7 | -27.81 | -6.4 | 22.89 |
| 5300 | -0.78 | -18.6 | -6.1 | 24.53 |
| 5400 | -1.25 | -21.16 | -6.56 | 22.08 |
| 5500 | -1.81 | -19.73 | -6.52 | 22.27 |
| 5600 | -1.68 | -20.62 | -6.15 | 24.25 |
| 5700 | -1.39 | -27.05 | -6.2 | 23.98 |
| 5800 | -0.7 | -21.69 | -6.18 | 24.09 |

# 12. Antenna correlation data

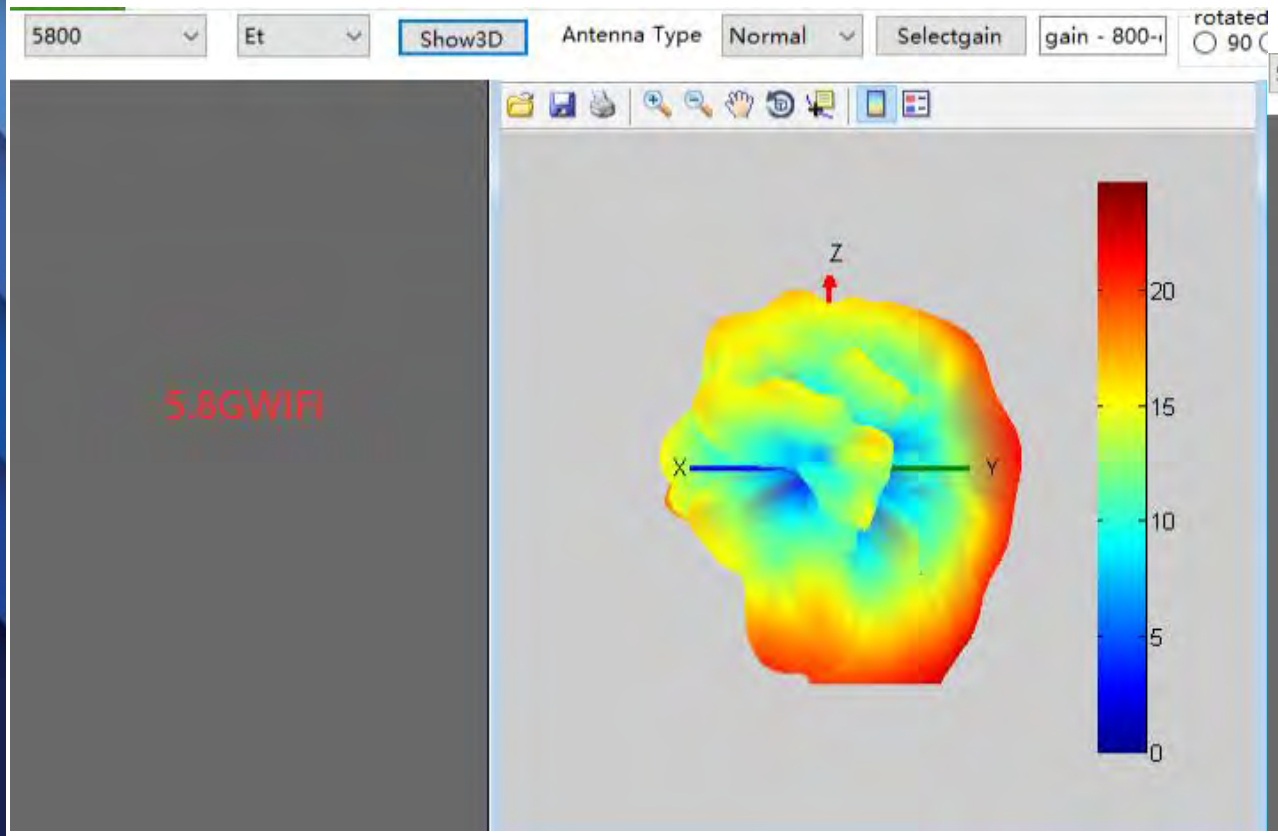
Three in one antenna apple pattern and directional pattern

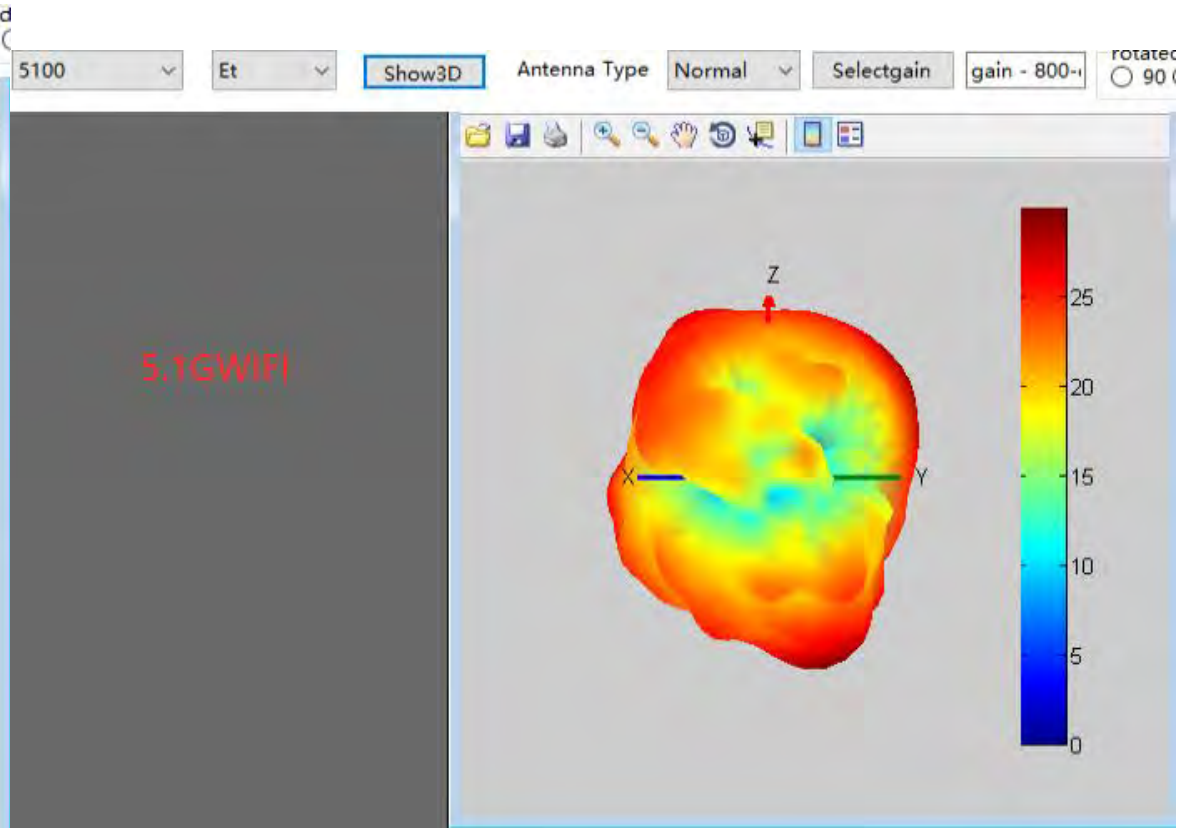


# 12. Antenna correlation data

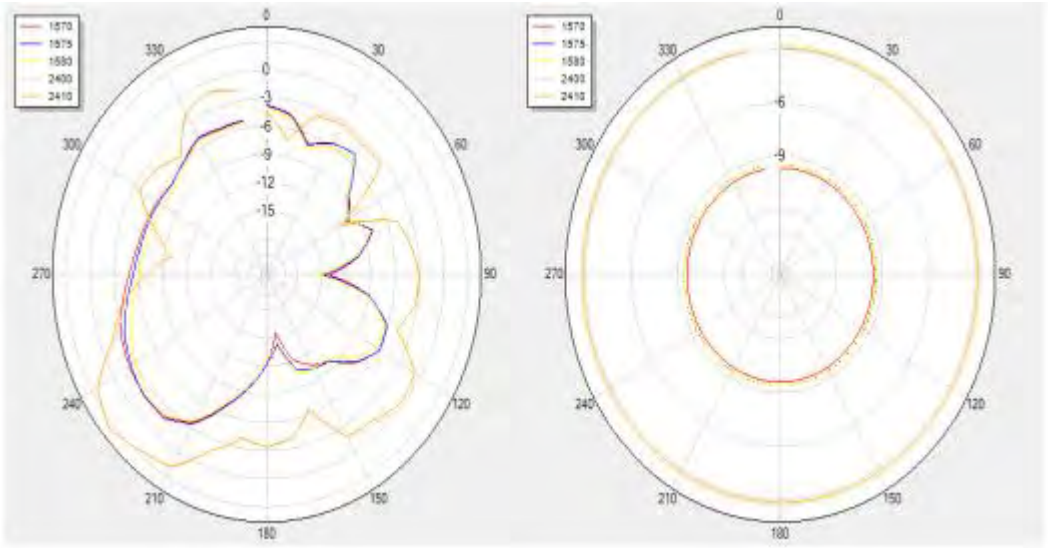
Three in one antenna apple pattern and directional pattern

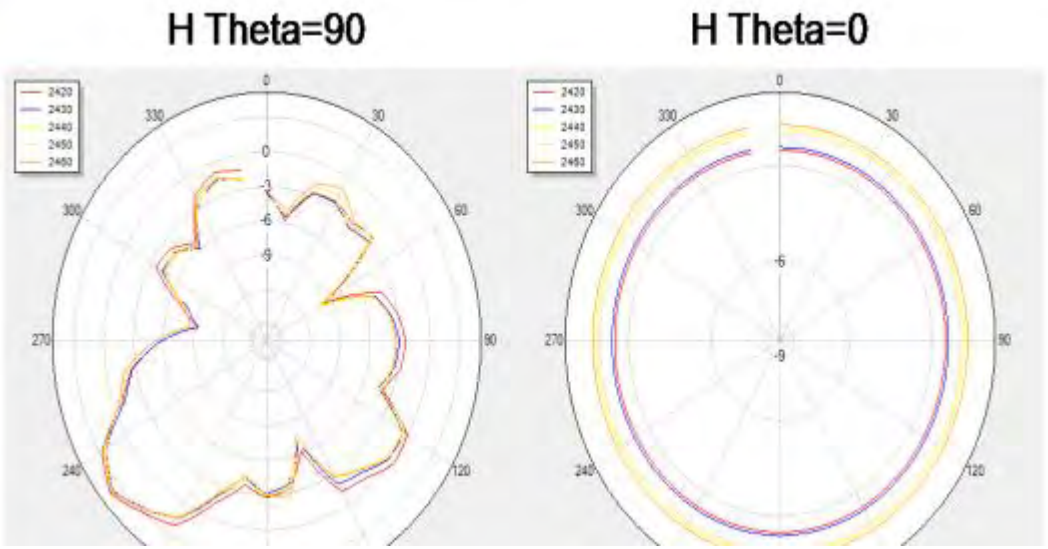


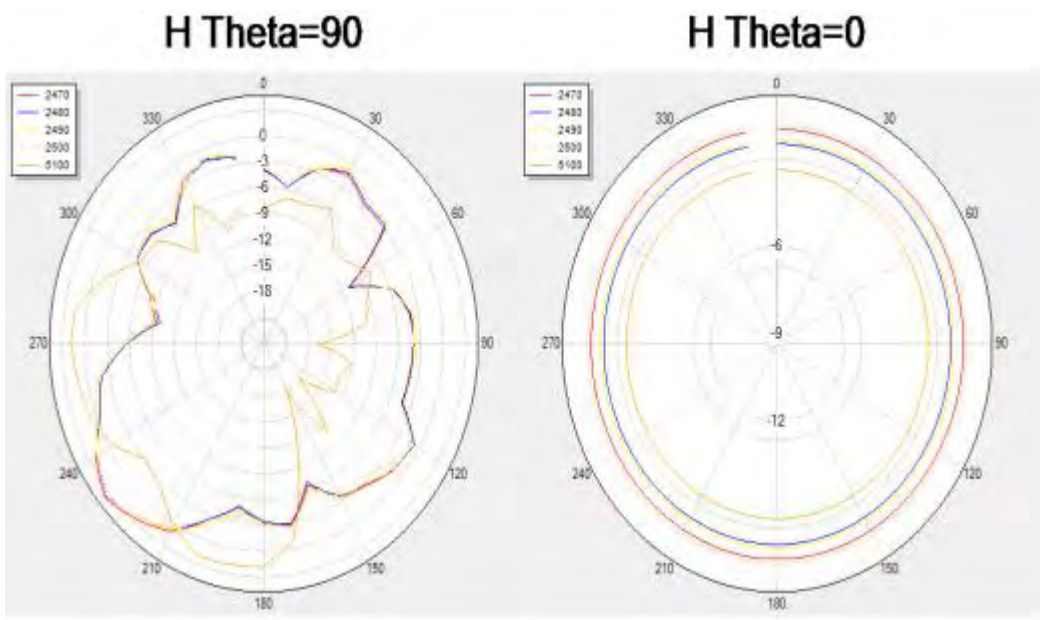



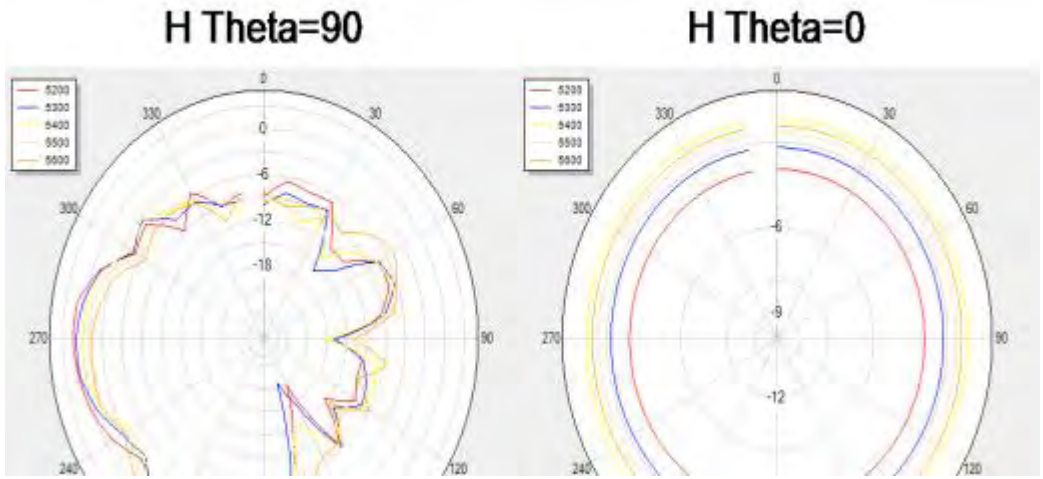
# 12. Antenna correlation data

Three in one antenna apple pattern and directional pattern



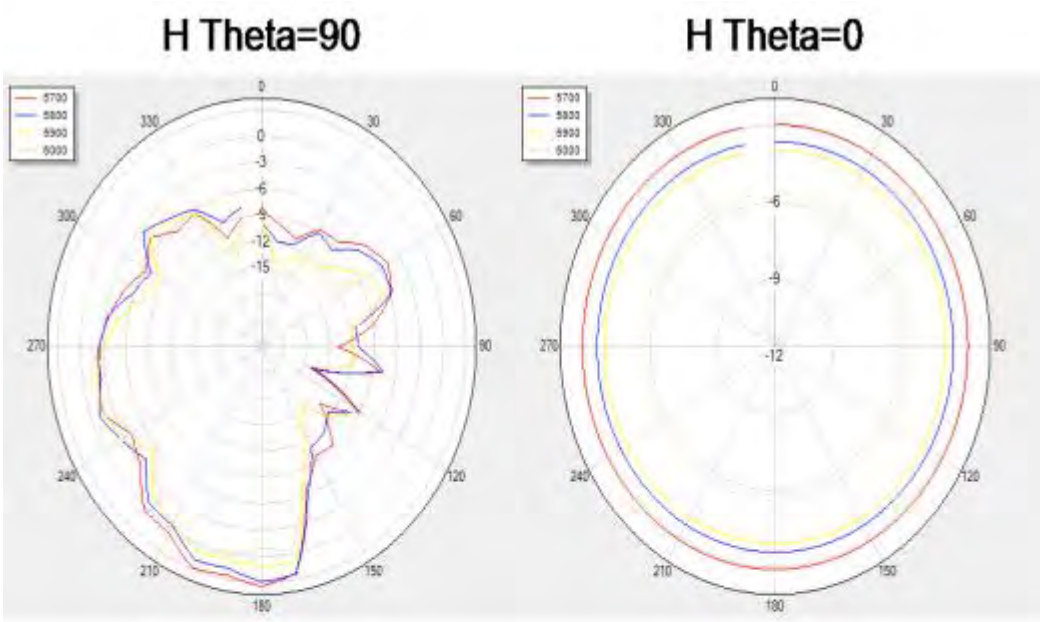


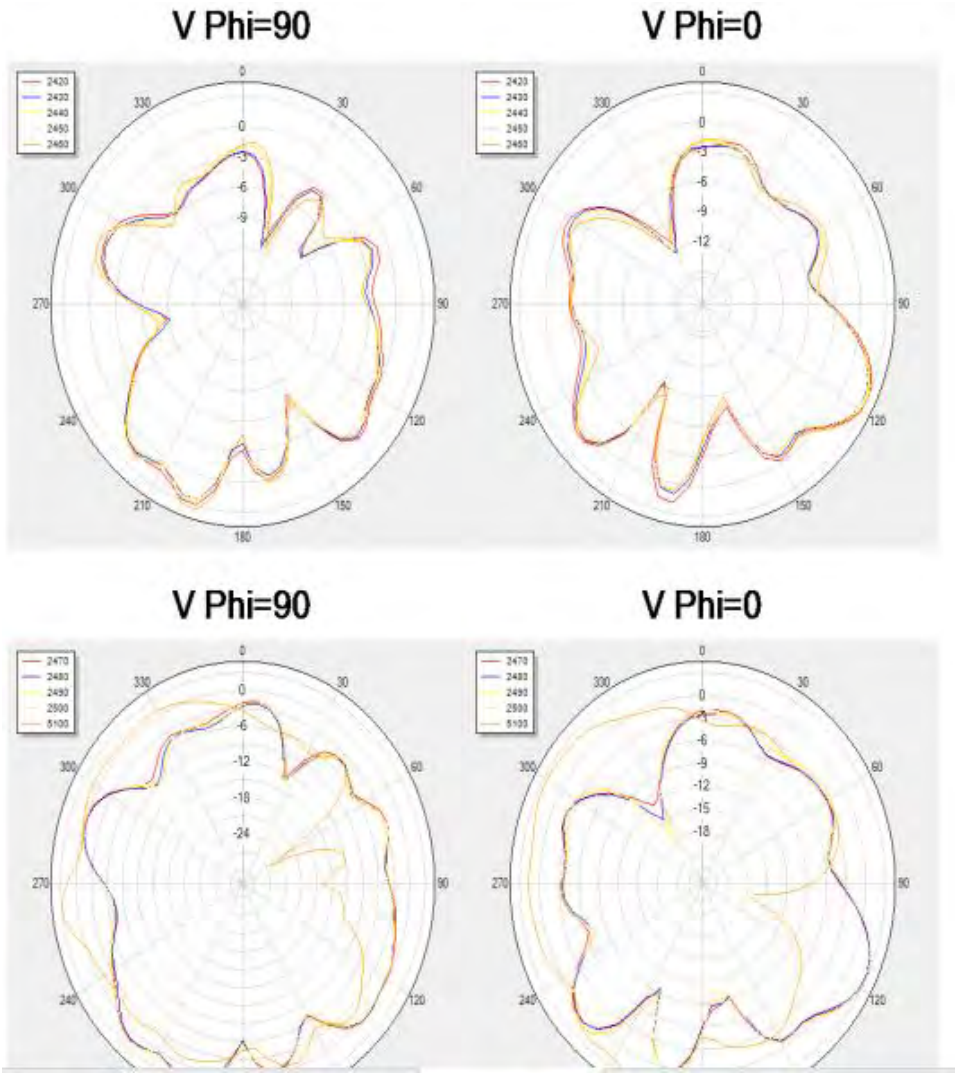



# 12. Antenna correlation data

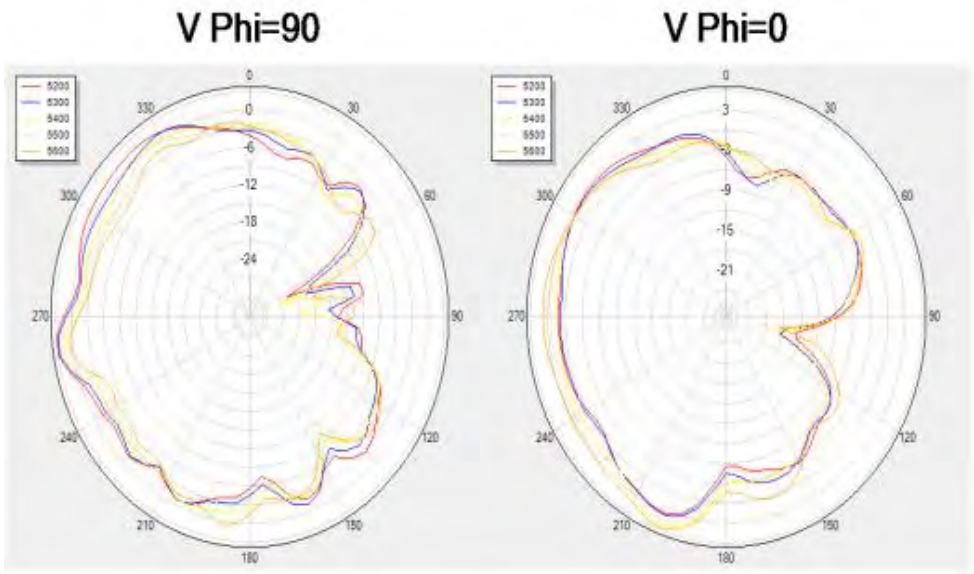
Three in one antenna apple pattern and directional pattern



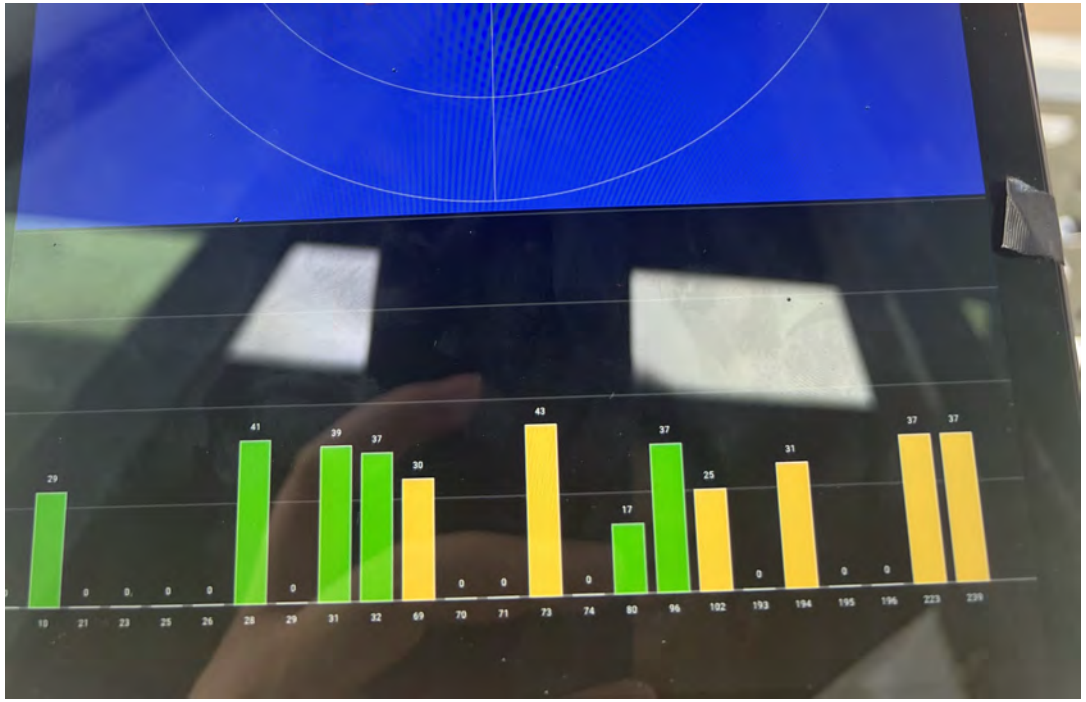



# 12. Antenna correlation data

Three in one antenna apple pattern and directional pattern

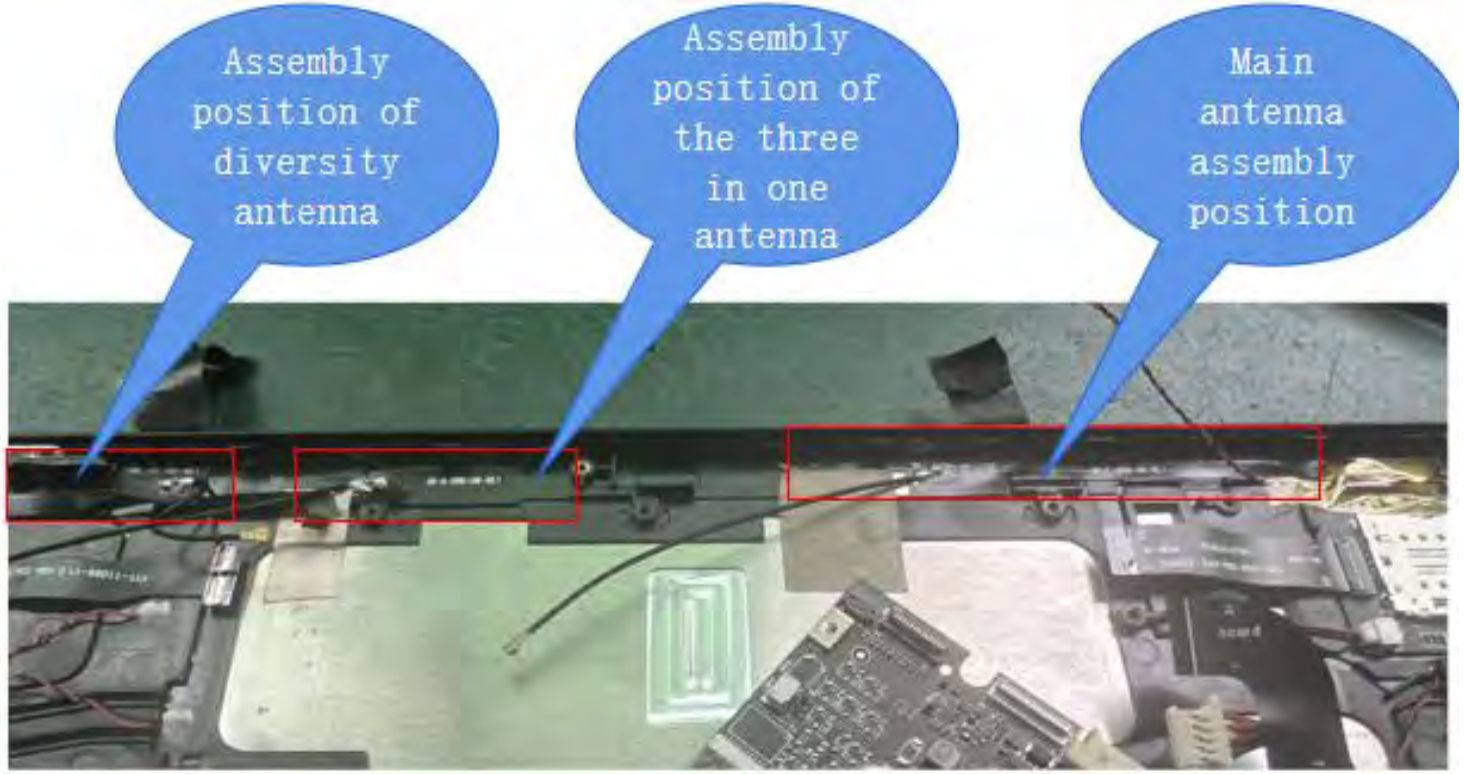


# 13.GPS/BT/ measured data



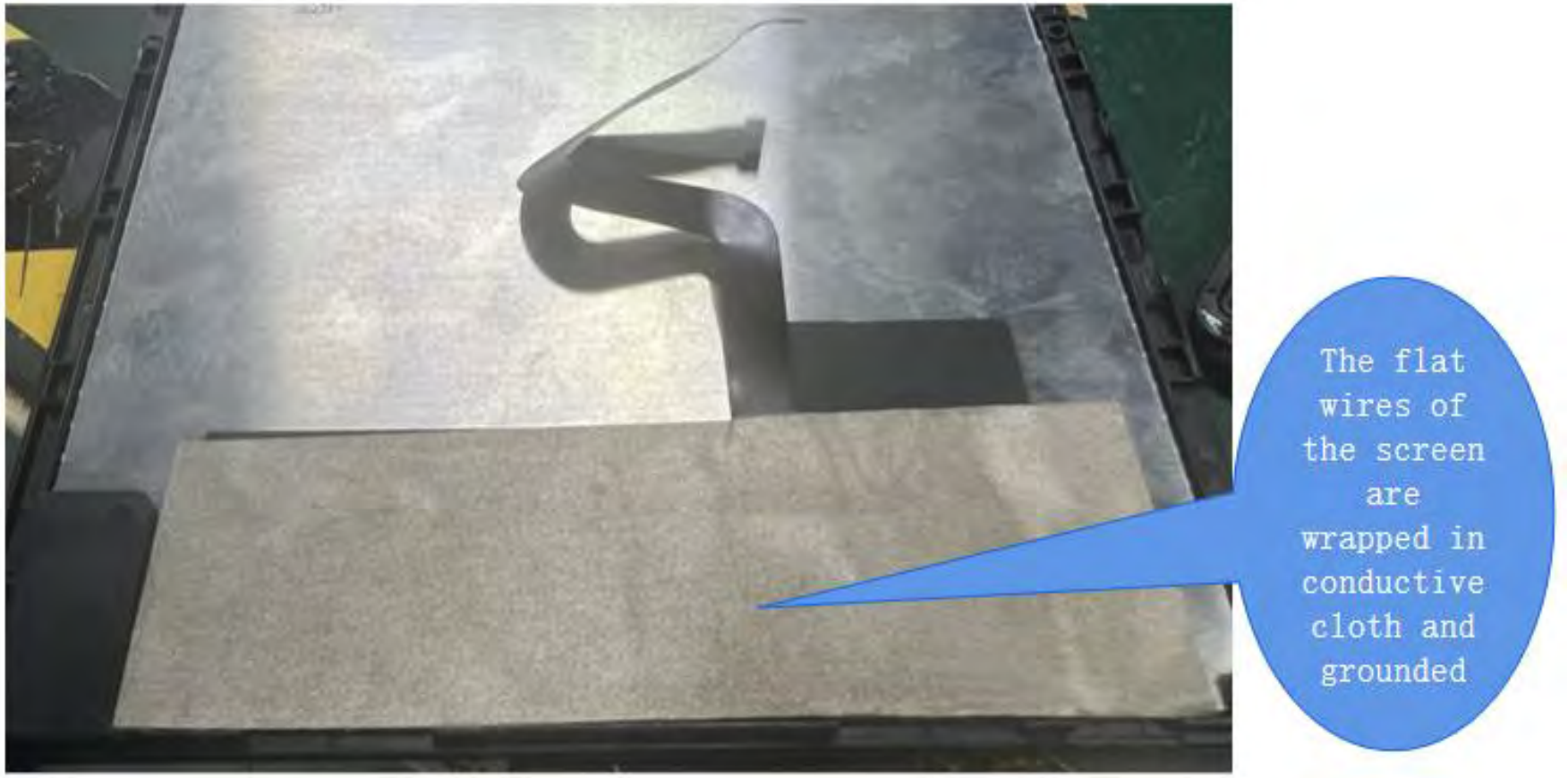

GPS cold start positioning for 65 seconds, C/N value of 42, Bluetooth 13 meters, no noise

# 14.Antenna location diagram

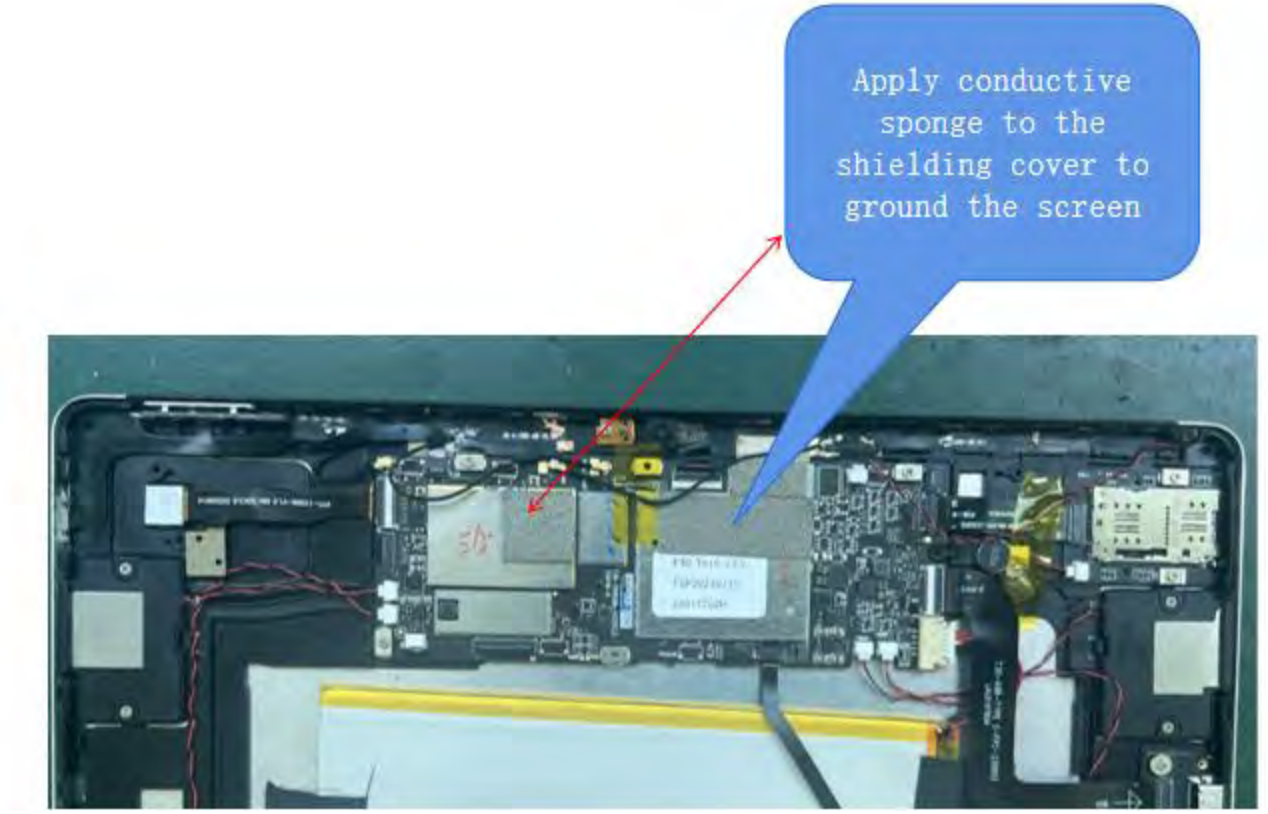


# 15. Environmental treatment

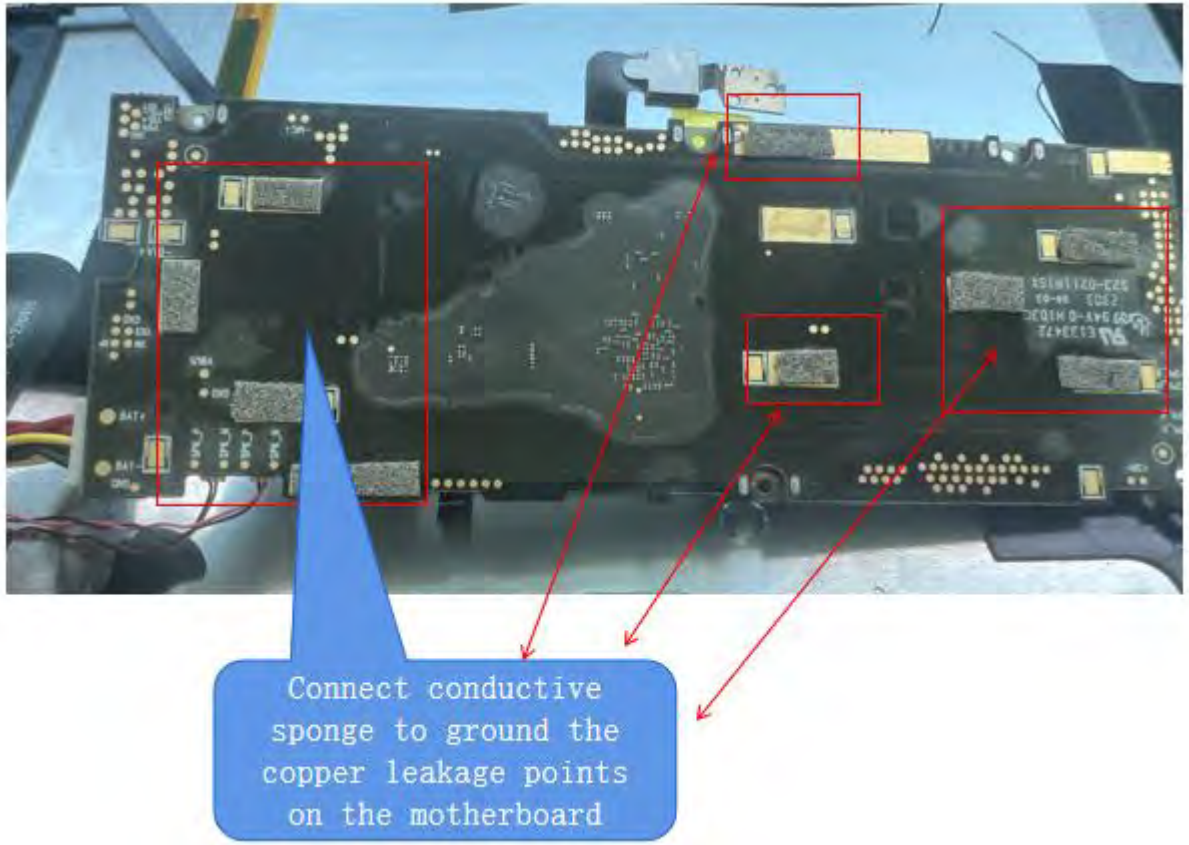
# 16. Environmental treatment



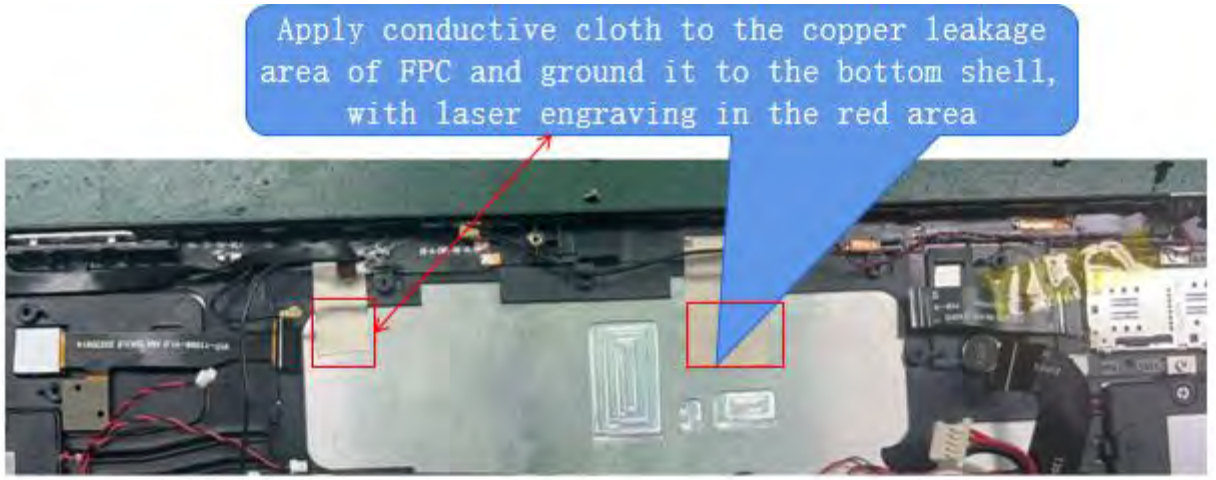
# 16. Environmental treatment



# 16. Environmental treatment

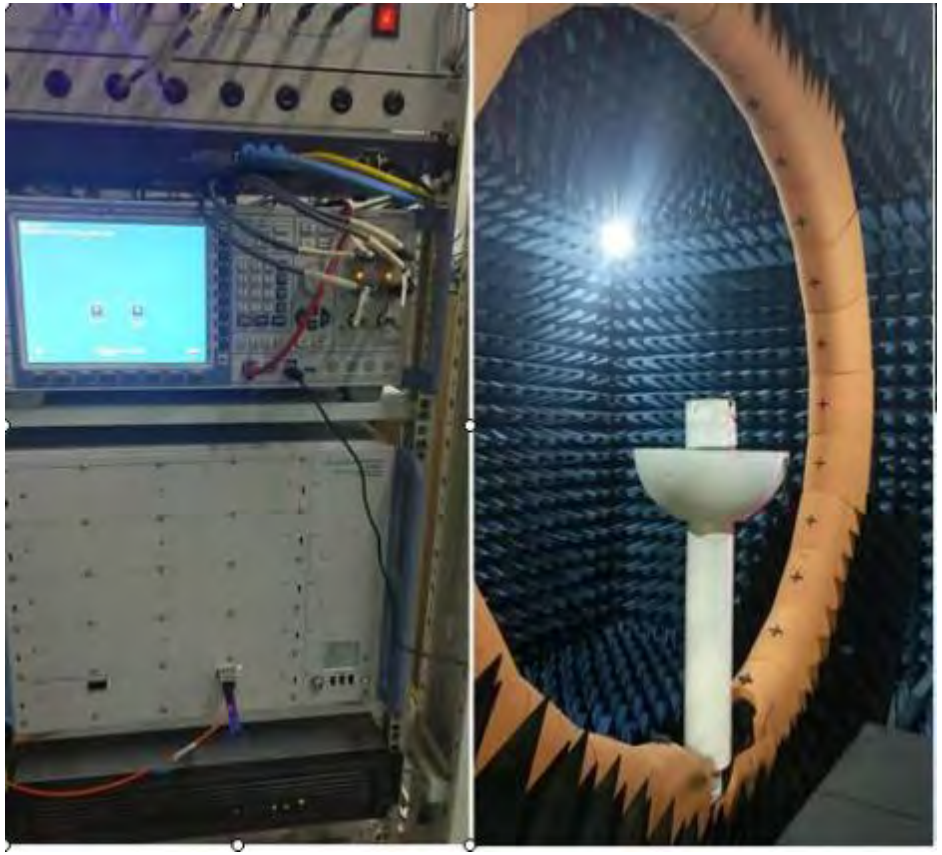


# 16. Environmental treatment

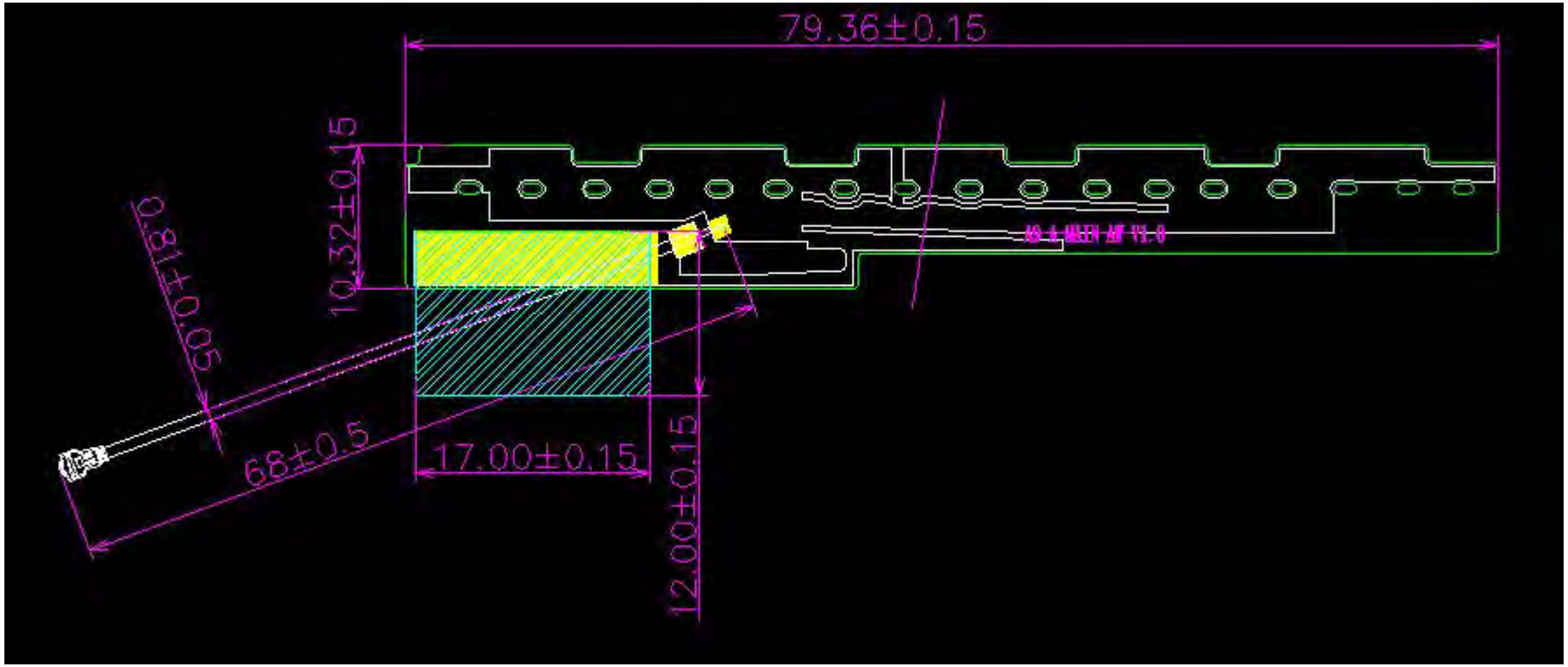


# 17.Conclusion

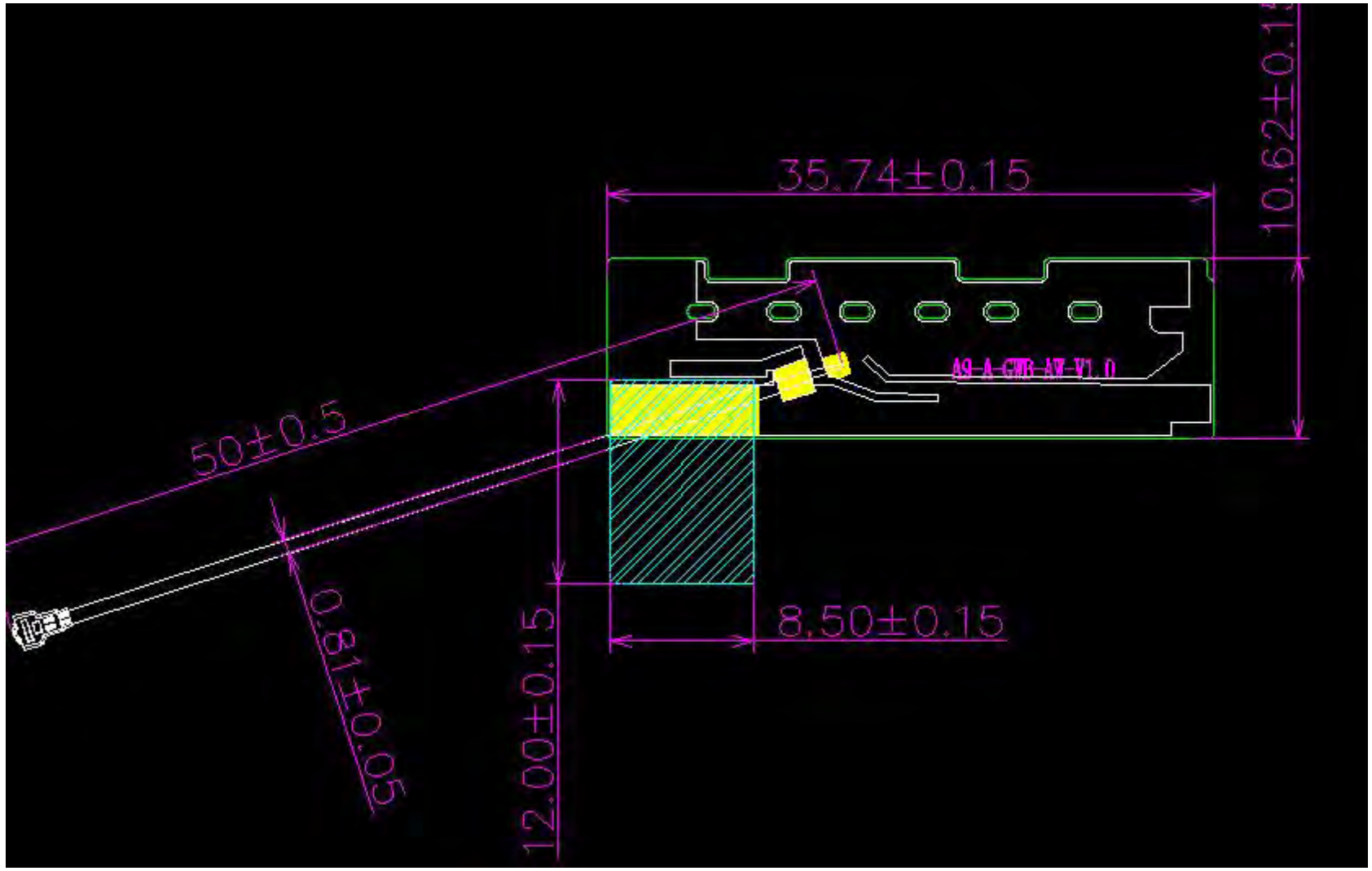
**The software and hardware of batch prodution should be the same as the sample machine.**



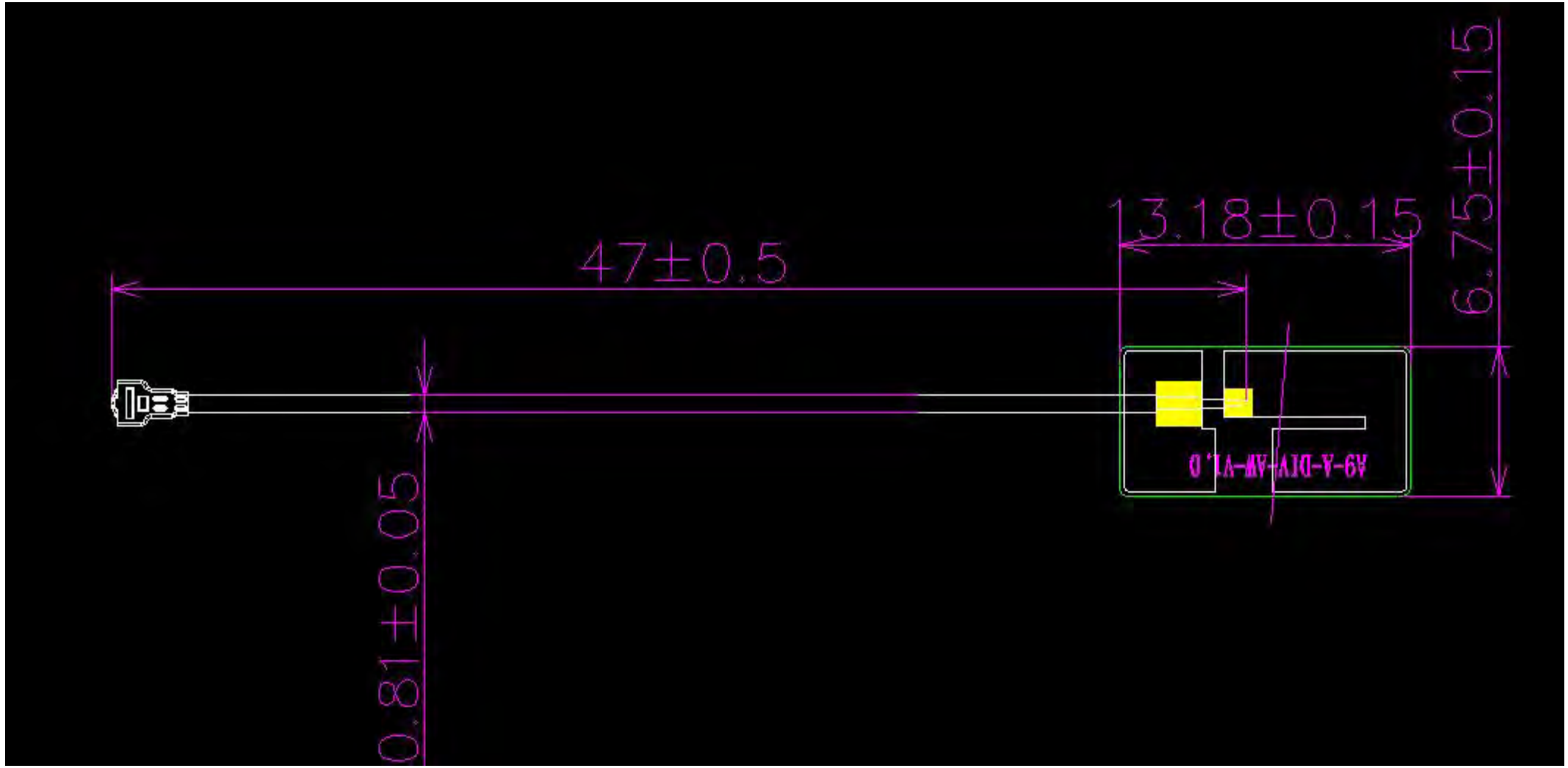
# Main antenna size



# Three in one antenna size



# Diversity antenna size



# THANKS!

ANWEI commnuication Technology Co., Ltd.