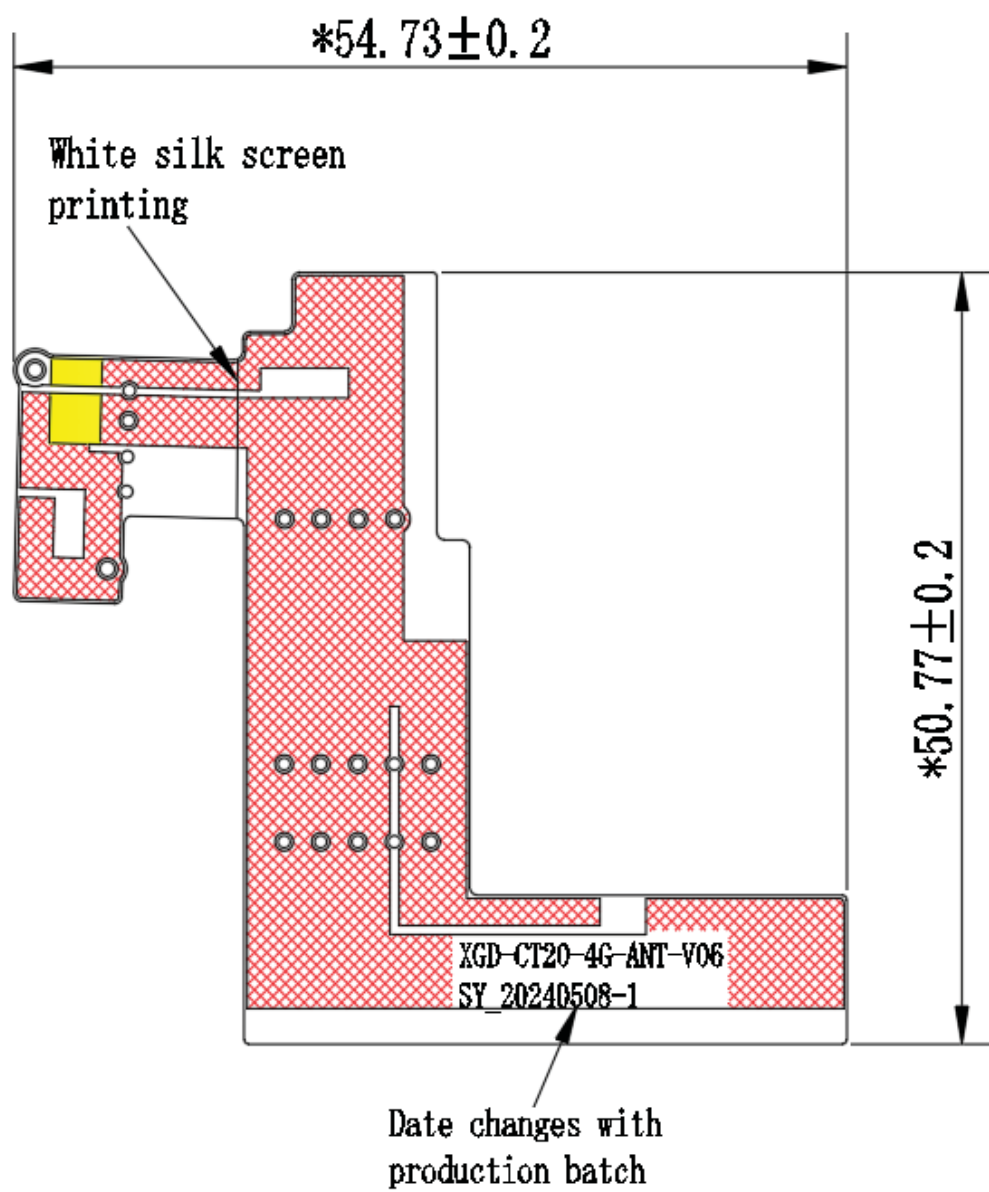


**Manufacturer:**SunnywayTechnology (China)Co.,  
Ltd.

**Address:**Floor 6, Building 5, Nam Tai Inno Park,  
Guangming District, Shenzhen

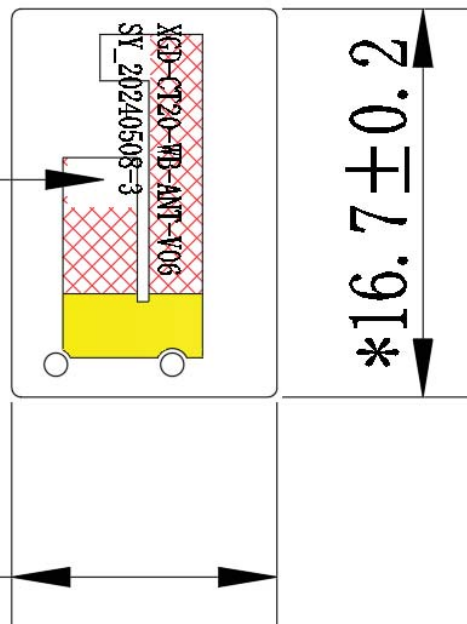
## MAIN ANT



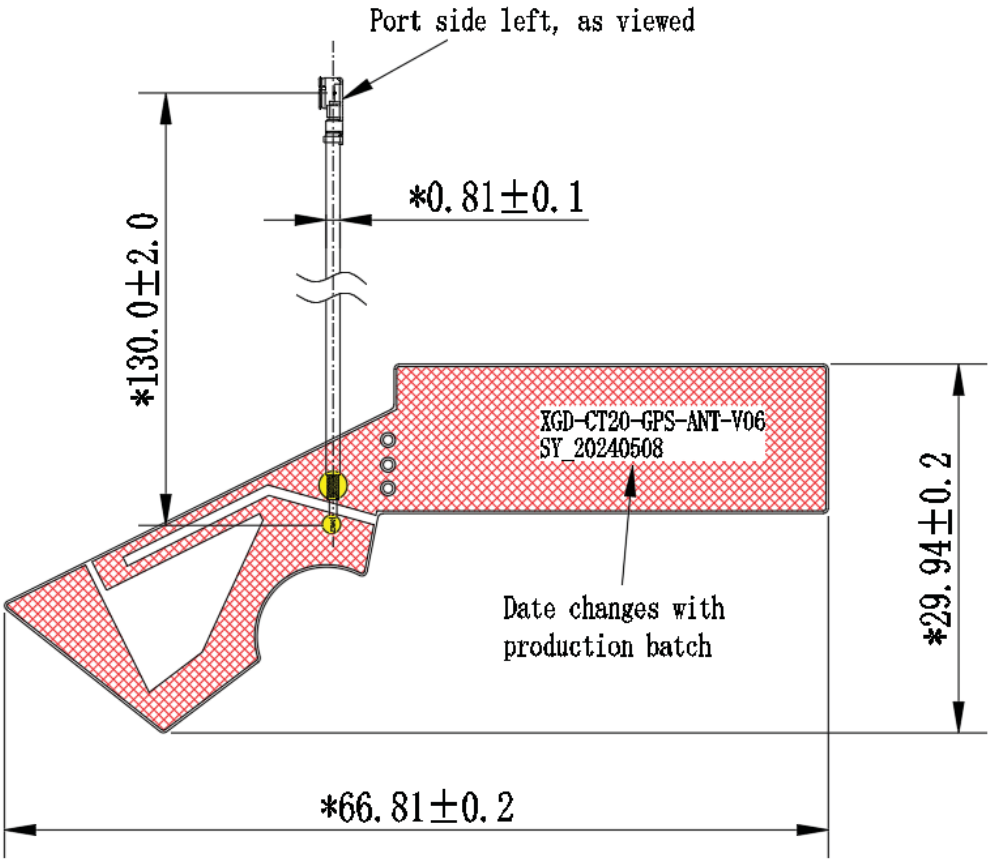
## WiFi ANT

Date changes with  
production batch

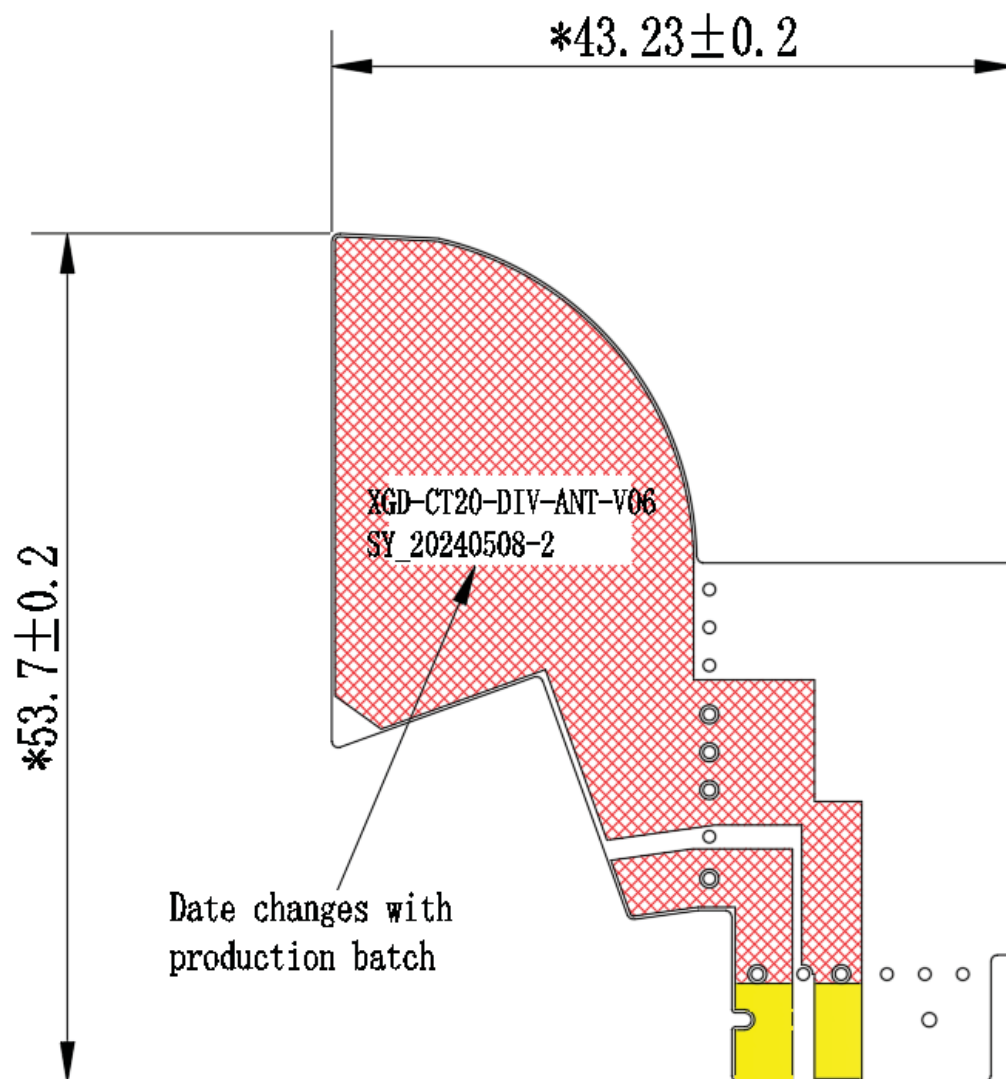
\*11.4±0.2



GPS ANT

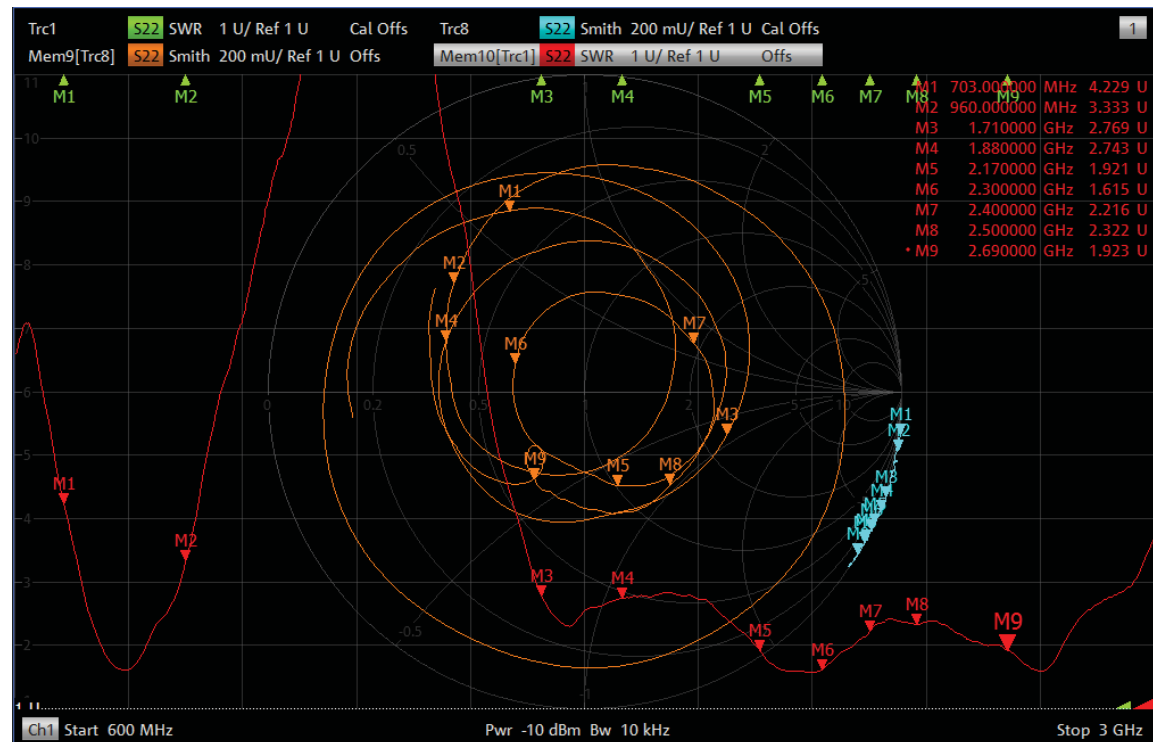


## DIV ANT



# 1、MAIN antenna

## 1、Passive performance test parameters



## 2、antenna passive data :

| Frequency/Mhz | Efficiency / dB | Efficiency / % | MaxGain/dBi |  | Frequency/Mhz | Efficiency / dB | Efficiency / % | MaxGain/dBi |
|---------------|-----------------|----------------|-------------|--|---------------|-----------------|----------------|-------------|
| 700           | -7.06           | 19.68          | -2.44       |  | 1920          | -3.94           | 40.41          | -0.69       |
| 710           | -7.10           | 19.48          | -3.03       |  | 1940          | -3.94           | 40.34          | -0.98       |
| 720           | -6.89           | 20.47          | -3.38       |  | 1960          | -3.83           | 41.41          | -0.67       |
| 730           | -6.53           | 22.25          | -3.23       |  | 1980          | -3.77           | 41.99          | -0.12       |
| 740           | -5.91           | 25.67          | -2.14       |  | 2000          | -3.88           | 40.9           | 0.02        |
| 750           | -5.28           | 29.63          | -0.86       |  | 2020          | -3.99           | 39.92          | -0.06       |
| 760           | -4.65           | 34.27          | 0.04        |  | 2040          | -3.78           | 41.92          | 0.19        |
| 770           | -4.32           | 36.98          | -0.06       |  | 2060          | -3.87           | 41.05          | 0.23        |
| 780           | -4.33           | 36.92          | -0.32       |  | 2080          | -3.72           | 42.51          | 0.5         |
| 790           | -4.12           | 38.77          | -0.07       |  | 2100          | -3.65           | 43.19          | 0.96        |
| 800           | -4.31           | 37.1           | -1.73       |  | 2120          | -3.42           | 45.48          | 1.74        |
| 810           | -4.28           | 37.29          | -1.25       |  | 2140          | -3.48           | 44.91          | 1.57        |
| 820           | -4.40           | 36.3           | -1.31       |  | 2160          | -3.39           | 45.81          | 1.65        |
| 830           | -4.34           | 36.85          | -0.9        |  | 2180          | -3.46           | 45.08          | 1.82        |
| 840           | -4.54           | 35.18          | -1.09       |  | 2200          | -3.54           | 44.28          | 2.11        |
| 850           | -4.75           | 33.5           | -1.15       |  | 2220          | -3.86           | 41.12          | 1.73        |
| 860           | -4.81           | 33.07          | -1.03       |  | 2240          | -4.17           | 38.31          | 1.28        |
| 870           | -4.89           | 32.44          | -0.93       |  | 2260          | -4.36           | 36.61          | 1.32        |
| 880           | -4.96           | 31.93          | -1.21       |  | 2280          | -4.22           | 37.86          | 1.72        |
| 890           | -5.21           | 30.14          | -1.63       |  | 2300          | -4.19           | 38.12          | 1.94        |
| 900           | -5.39           | 28.92          | -2.37       |  | 2320          | -3.76           | 42.06          | 3.06        |
| 910           | -5.73           | 26.71          | -3.14       |  | 2340          | -3.86           | 41.12          | 3.29        |
| 920           | -5.82           | 26.18          | -3.56       |  | 2360          | -3.58           | 43.81          | 3.98        |
| 930           | -5.98           | 25.24          | -3.89       |  | 2380          | -3.66           | 43.04          | 3.92        |
| 940           | -5.88           | 25.85          | -3.71       |  | 2400          | -3.65           | 43.19          | 3.96        |
| 950           | -5.89           | 25.78          | -3.54       |  | 2420          | -3.89           | 40.83          | 3.49        |
| 960           | -5.97           | 25.28          | -3.59       |  | 2440          | -3.67           | 42.96          | 3.58        |
|               |                 |                |             |  | 2460          | -3.85           | 41.19          | 3.18        |
| 1700          | -3.65           | 43.11          | 1.2         |  | 2480          | -3.57           | 43.96          | 3.4         |
| 1720          | -3.49           | 44.75          | 1.25        |  | 2500          | -3.61           | 43.57          | 3.34        |
| 1740          | -3.51           | 44.59          | 0.7         |  | 2520          | -3.51           | 44.59          | 3.29        |
| 1760          | -3.65           | 43.11          | 0.13        |  | 2540          | -3.55           | 44.12          | 3.13        |
| 1780          | -4.15           | 38.44          | -0.71       |  | 2560          | -3.44           | 45.32          | 2.97        |
| 1800          | -4.38           | 36.49          | -1.05       |  | 2580          | -3.52           | 44.51          | 2.82        |
| 1820          | -4.17           | 38.25          | -0.5        |  | 2600          | -3.28           | 46.98          | 2.92        |
| 1840          | -4.20           | 38.05          | -0.25       |  | 2620          | -3.35           | 46.22          | 2.63        |
| 1860          | -4.17           | 38.25          | -0.35       |  | 2640          | -3.11           | 48.9           | 2.66        |
| 1880          | -4.08           | 39.04          | -0.77       |  | 2660          | -3.19           | 47.93          | 2.51        |
| 1900          | -3.99           | 39.92          | -0.78       |  | 2680          | -3.08           | 49.26          | 2.6         |
|               |                 |                |             |  | 2700          | -3.35           | 46.22          | 2.29        |

### 3、 Directional diagram

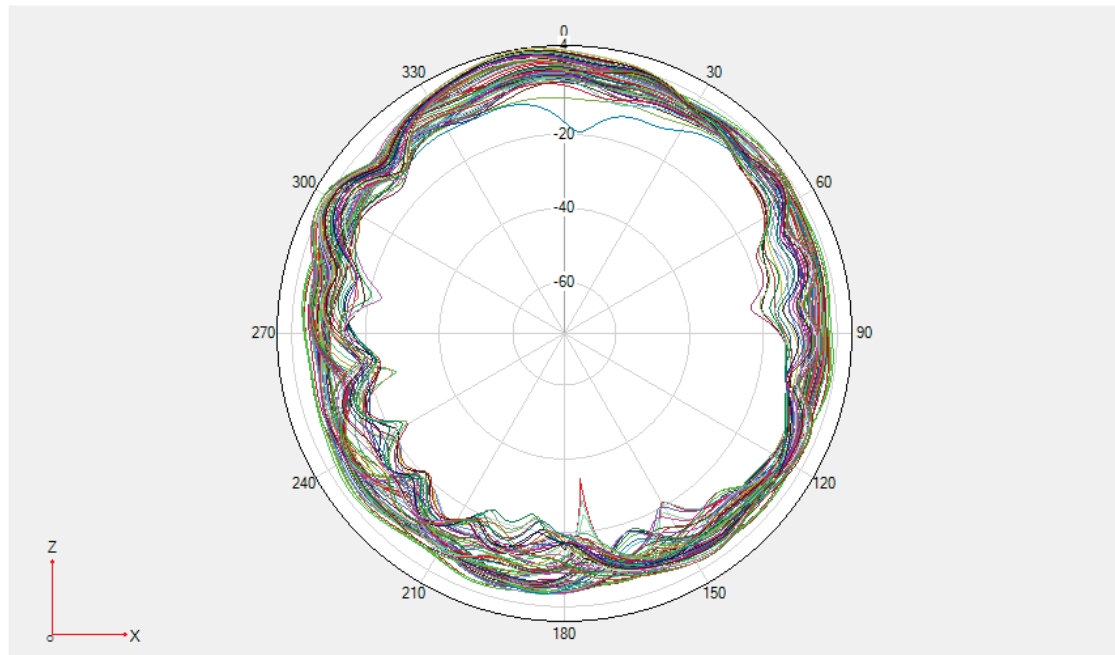


chart 1 Phi 0 2D

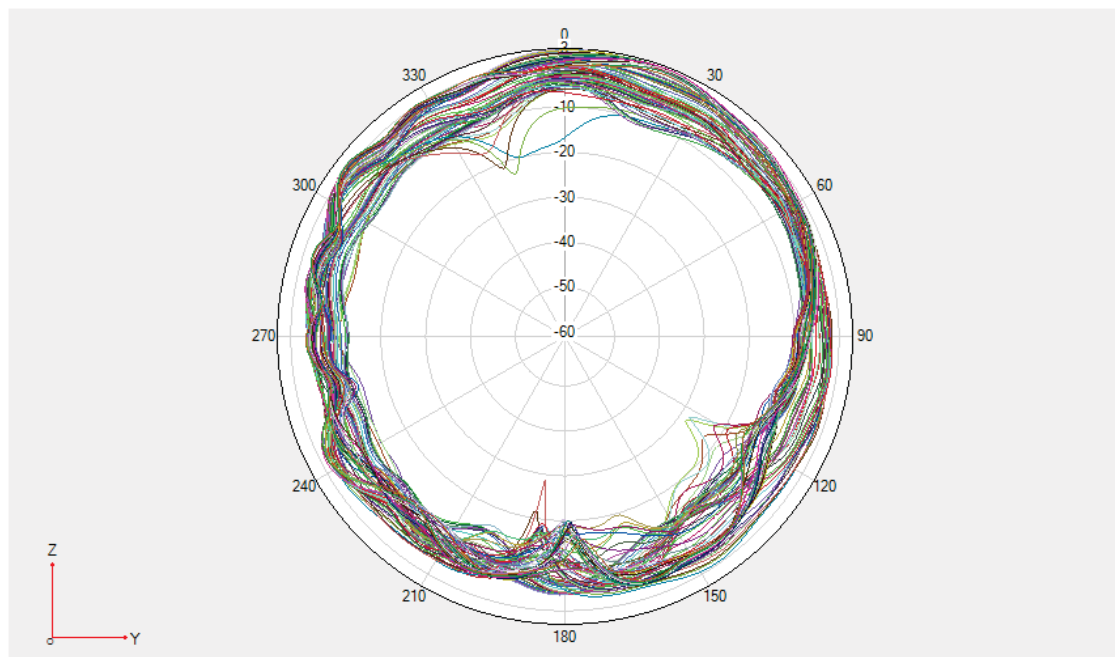


chart 2 Phi 90 2D



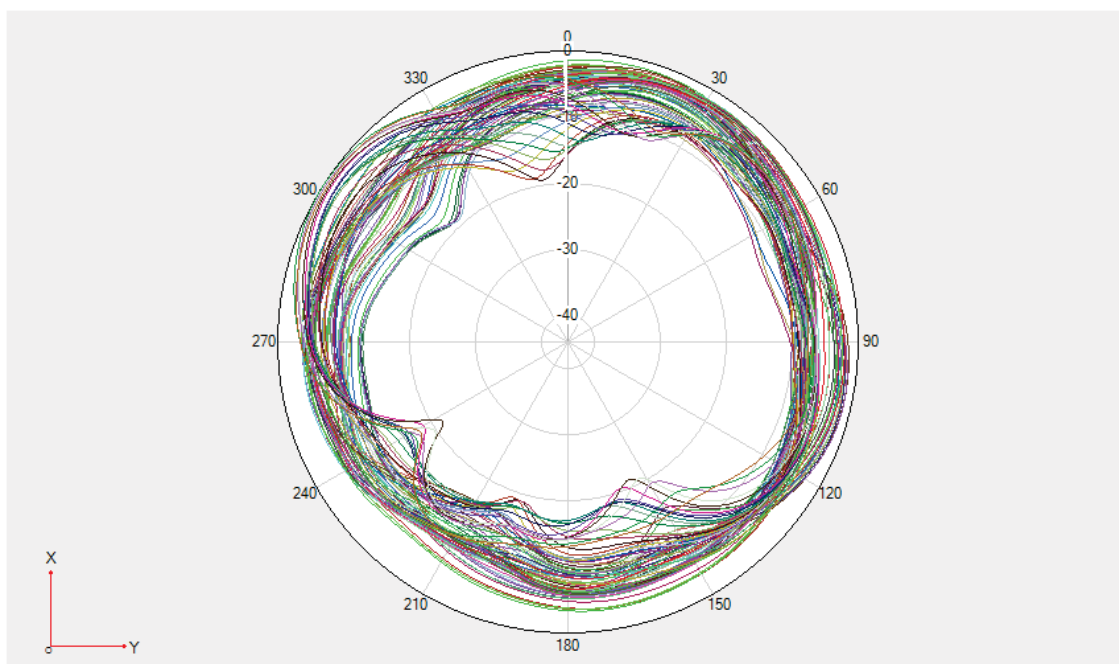


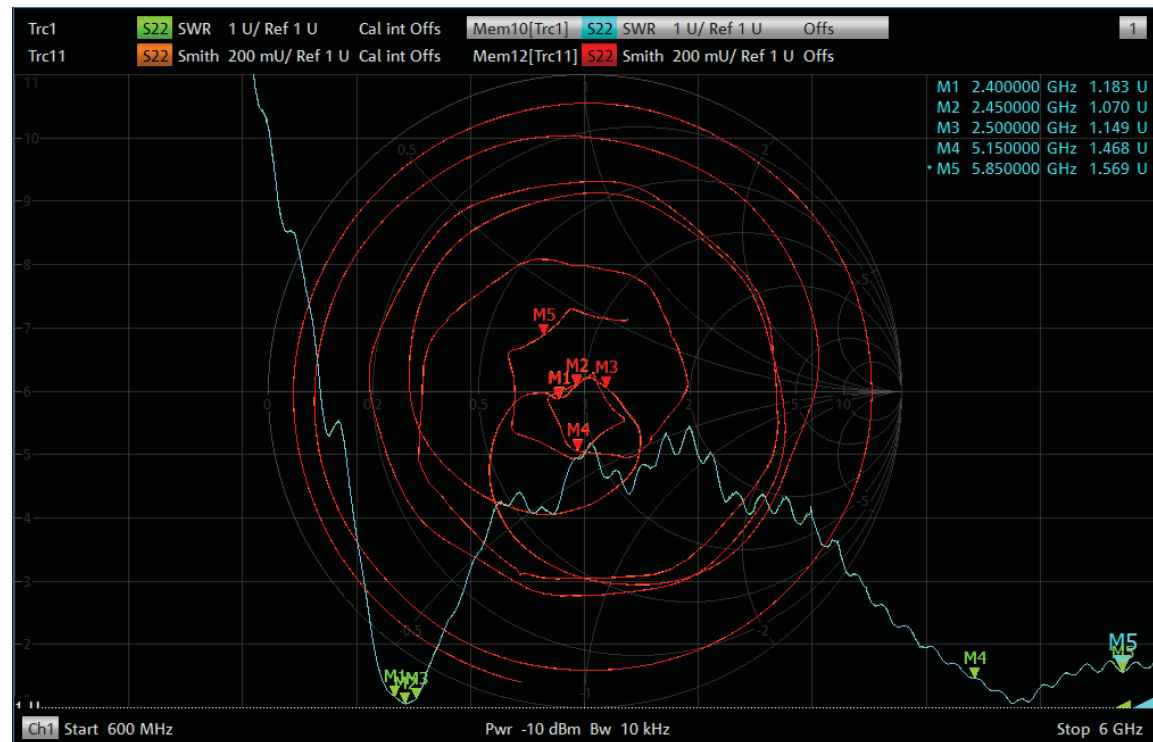
chart 3 Theta 90 2D

#### 4、 antenna OTA data :

| Measurement | Band          | Total(dBm) |  | Measurement | Band           | Total(dBm) |
|-------------|---------------|------------|--|-------------|----------------|------------|
| TRP         | FDD_B1(10MHz) | 20.21      |  | TRP         | FDD_B20(10MHz) | 20         |
| TRP         | FDD_B1(10MHz) | 19.92      |  | TRP         | FDD_B20(10MHz) | 19.09      |
| TRP         | FDD_B1(10MHz) | 20.92      |  | TRP         | FDD_B20(10MHz) | 19.3       |
| TIS(RSSI)   | FDD_B1(10MHz) | -96.12     |  | TIS(RSSI)   | FDD_B20(10MHz) | -91.92     |
| TRP         | FDD_B3(10MHz) | 20.39      |  | TRP         | FDD_B28(10MHz) | 18.46      |
| TRP         | FDD_B3(10MHz) | 21.25      |  | TRP         | FDD_B28(10MHz) | 18.23      |
| TRP         | FDD_B3(10MHz) | 20.73      |  | TRP         | FDD_B28(10MHz) | 18.34      |
| TIS(RSSI)   | FDD_B3(10MHz) | -95.96     |  | TIS(RSSI)   | FDD_B28(10MHz) | -91.94     |
| TRP         | FDD_B5(10MHz) | 19.24      |  | TRP         | TDD_B38(20MHz) | 19.84      |
| TRP         | FDD_B5(10MHz) | 18.84      |  | TRP         | TDD_B38(20MHz) | 20.03      |
| TRP         | FDD_B5(10MHz) | 19.09      |  | TRP         | TDD_B38(20MHz) | 20.23      |
| TIS(RSSI)   | FDD_B5(10MHz) | -93.3      |  | TIS(RSSI)   | TDD_B38(20MHz) | -93.94     |
| TRP         | FDD_B7(10MHz) | 20.47      |  | TRP         | TDD_B40(20MHz) | 20.69      |
| TRP         | FDD_B7(10MHz) | 20.12      |  | TRP         | TDD_B40(20MHz) | 20         |
| TRP         | FDD_B7(10MHz) | 19.38      |  | TRP         | TDD_B40(20MHz) | 19.75      |
| TIS(RSSI)   | FDD_B7(10MHz) | -92.86     |  | TIS(RSSI)   | TDD_B40(20MHz) | -93.98     |
| TRP         | FDD_B8(10MHz) | 19.58      |  | TRP         | TDD_B41(20MHz) | 20.46      |
| TRP         | FDD_B8(10MHz) | 19.31      |  | TRP         | TDD_B41(20MHz) | 20         |
| TRP         | FDD_B8(10MHz) | 18.95      |  | TRP         | TDD_B41(20MHz) | 19.67      |
| TIS(RSSI)   | FDD_B8(10MHz) | -92.71     |  | TIS(RSSI)   | TDD_B41(20MHz) | -91.39     |

## 2、WiFi antenna

### 1、Passive performance test parameters



### 2、antenna passive data :

| Frequency/Mhz | Efficiency / dB | Efficiency / % | MaxGain/dBi |
|---------------|-----------------|----------------|-------------|
| 2400          | -4.84           | 32.81          | 2.49        |
| 2410          | -4.89           | 32.43          | 2.69        |
| 2420          | -5.19           | 30.27          | 2.28        |
| 2430          | -5.02           | 31.48          | 2.66        |
| 2440          | -4.97           | 31.84          | 2.86        |
| 2450          | -4.98           | 31.77          | 3.06        |
| 2460          | -5.21           | 30.13          | 3.07        |
| 2470          | -5.07           | 31.12          | 3.29        |
| 2480          | -5.05           | 31.26          | 3.44        |
| 2490          | -5.14           | 30.62          | 3.39        |
| 2500          | -5.37           | 29.04          | 3.49        |

|      |       |       |      |
|------|-------|-------|------|
|      |       |       |      |
| 5150 | -6.15 | 24.27 | 2    |
| 5170 | -6.19 | 24.04 | 1.87 |
| 5190 | -6.04 | 24.89 | 2.02 |
| 5210 | -6    | 25.12 | 1.89 |
| 5230 | -6.1  | 24.55 | 1.7  |
| 5250 | -5.92 | 25.59 | 1.82 |
| 5270 | -6.11 | 24.49 | 1.59 |
| 5290 | -6.02 | 25    | 1.57 |
| 5310 | -6.08 | 24.66 | 1.63 |
| 5330 | -6.02 | 25    | 1.83 |
| 5350 | -6.23 | 23.82 | 1.56 |
| 5370 | -6.21 | 23.93 | 2.02 |
| 5390 | -6.24 | 23.77 | 2.27 |
| 5410 | -6.21 | 23.93 | 2.35 |
| 5430 | -6.23 | 23.82 | 2.53 |
| 5450 | -6.29 | 23.5  | 2.67 |
| 5470 | -6.02 | 25.01 | 2.61 |
| 5490 | -6.02 | 25.01 | 2.76 |
| 5510 | -6.06 | 24.8  | 2.88 |
| 5530 | -6.17 | 24.18 | 2.68 |
| 5550 | -6.29 | 23.48 | 2.59 |
| 5570 | -6.08 | 24.65 | 2.71 |
| 5590 | -5.92 | 25.61 | 2.84 |
| 5610 | -5.91 | 25.65 | 2.93 |
| 5630 | -5.96 | 25.37 | 2.91 |
| 5650 | -6.08 | 24.68 | 2.57 |
| 5670 | -6.04 | 24.91 | 2.62 |
| 5690 | -5.85 | 26.01 | 2.37 |
| 5710 | -5.86 | 25.92 | 2.2  |
| 5730 | -5.91 | 25.66 | 1.8  |
| 5750 | -5.86 | 25.95 | 1.97 |
| 5770 | -5.94 | 25.46 | 1.81 |
| 5790 | -6.10 | 24.52 | 1.62 |
| 5810 | -6.03 | 24.94 | 1.83 |
| 5830 | -6.19 | 24.03 | 1.57 |
| 5850 | -6.18 | 24.11 | 1.6  |

### 3、Directional diagram

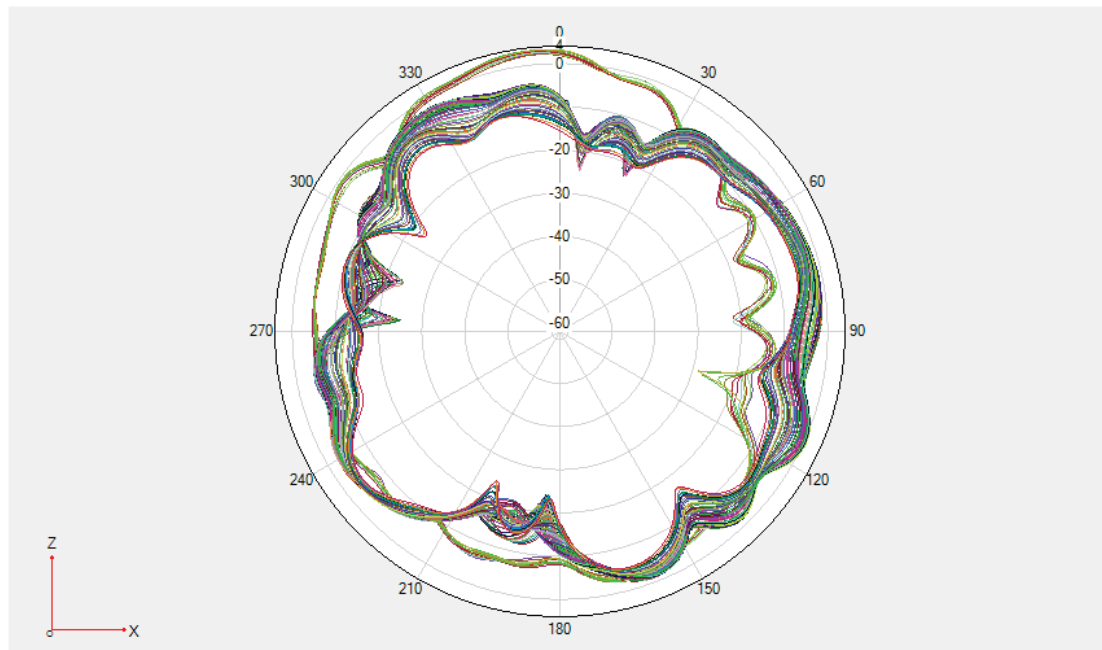


chart 4 Phi 0 2D

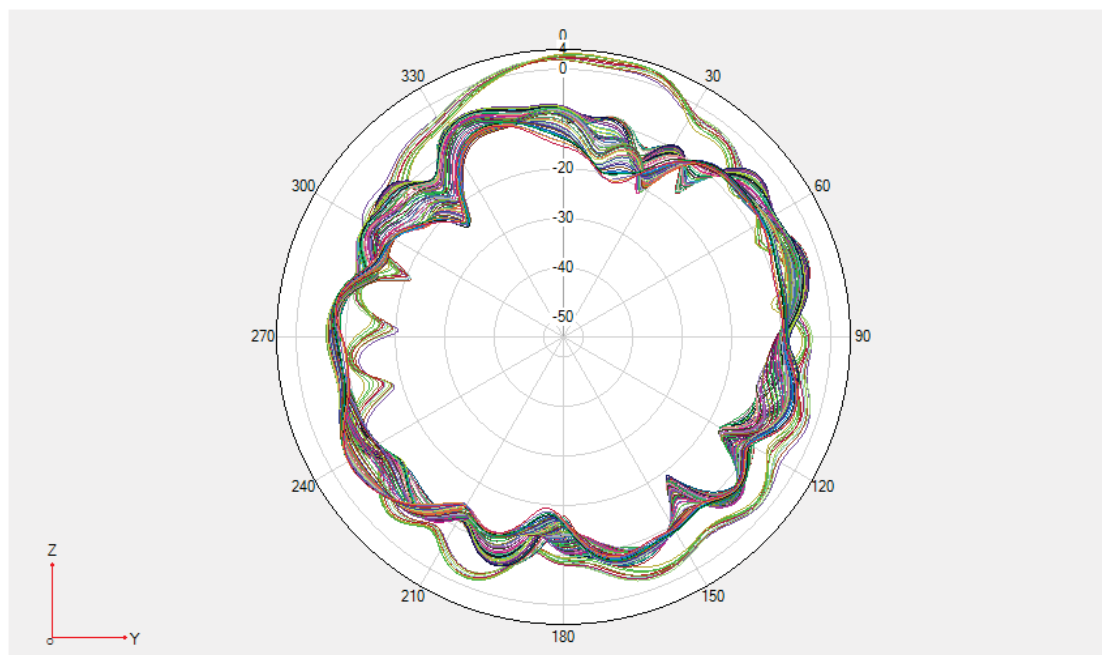


chart 5 Phi 90 2D

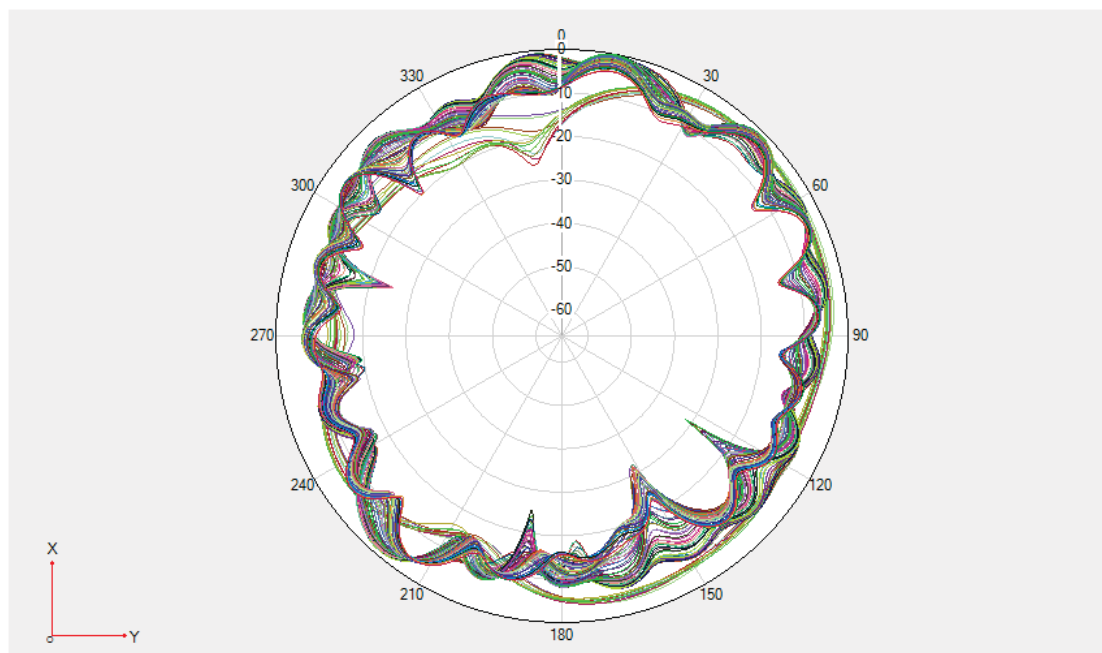


chart 6 Theta 90 2D

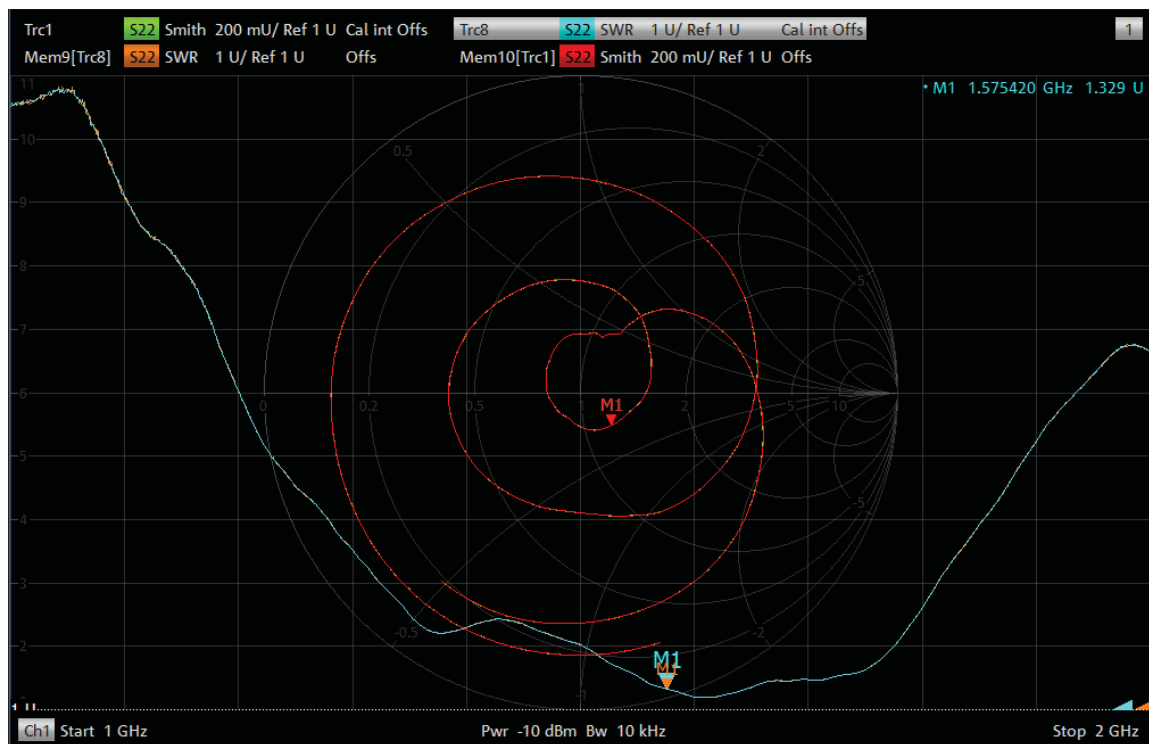
4、 antenna OTA data :

WIFI OTA

| Measurement | Band                 | Channel | Total(dBm) |
|-------------|----------------------|---------|------------|
| TRP         | WIFI_B (11M)         | 1       | 11.87      |
| TRP         |                      | 6       | 12.65      |
| TRP         |                      | 11      | 12.99      |
| TIS(EIRP)   |                      | 11      | -83.06     |
| TRP         | WIFI_G (54M)         | 1       | 11.25      |
| TRP         |                      | 6       | 11.59      |
| TRP         |                      | 11      | 12.18      |
| TIS(EIRP)   |                      | 11      | -70.12     |
| TRP         | WIFI_N_ISM<br>(65M)  | 1       | 10.36      |
| TRP         |                      | 6       | 10.67      |
| TRP         |                      | 11      | 11.14      |
| TIS(EIRP)   |                      | 11      | -67.52     |
| TRP         | WIFI_A (54M)         | 36      | 8.95       |
| TRP         |                      | 149     | 9.35       |
| TRP         |                      | 165     | 8.95       |
| TIS(EIRP)   |                      | 165     | -70.37     |
| TRP         | WIFI_N_UNII<br>(65M) | 36      | 5.81       |
| TRP         |                      | 149     | 7.72       |
| TRP         |                      | 165     | 6.84       |
| TIS(EIRP)   |                      | 165     | -66.41     |

### 3、GPS antenna

#### 1、Passive performance test parameters



#### 2、antenna passive data :

| Frequency/Mhz | Efficiency / dB | Efficiency / % | TopHalfEff/ dB | TopHalfEff / % | MaxGain/dBi |
|---------------|-----------------|----------------|----------------|----------------|-------------|
| 1560          | -3.76           | 42.07          | -6.38          | 23.04          | 3.35        |
| 1561          | -3.74           | 42.27          | -6.35          | 23.19          | 3.36        |
| 1562          | -3.72           | 42.46          | -6.32          | 23.34          | 3.37        |
| 1563          | -3.68           | 42.85          | -6.28          | 23.57          | 3.41        |
| 1564          | -3.65           | 43.15          | -6.22          | 23.88          | 3.45        |
| 1565          | -3.61           | 43.55          | -6.18          | 24.12          | 3.51        |
| 1566          | -3.56           | 44.06          | -6.11          | 24.51          | 3.59        |
| 1567          | -3.54           | 44.26          | -6.08          | 24.67          | 3.62        |
| 1568          | -3.55           | 44.16          | -6.08          | 24.67          | 3.59        |
| 1569          | -3.59           | 43.75          | -6.12          | 24.43          | 3.5         |
| 1570          | -3.64           | 43.25          | -6.19          | 24.04          | 3.36        |
| 1571          | -3.65           | 43.15          | -6.21          | 23.96          | 3.34        |

|      |       |       |       |       |      |
|------|-------|-------|-------|-------|------|
| 1572 | -3.65 | 43.15 | -6.19 | 24.04 | 3.32 |
| 1573 | -3.61 | 43.55 | -6.15 | 24.28 | 3.35 |
| 1574 | -3.55 | 44.16 | -6.05 | 24.83 | 3.44 |
| 1575 | -3.45 | 45.19 | -5.91 | 25.65 | 3.59 |

### 3、Directional diagram

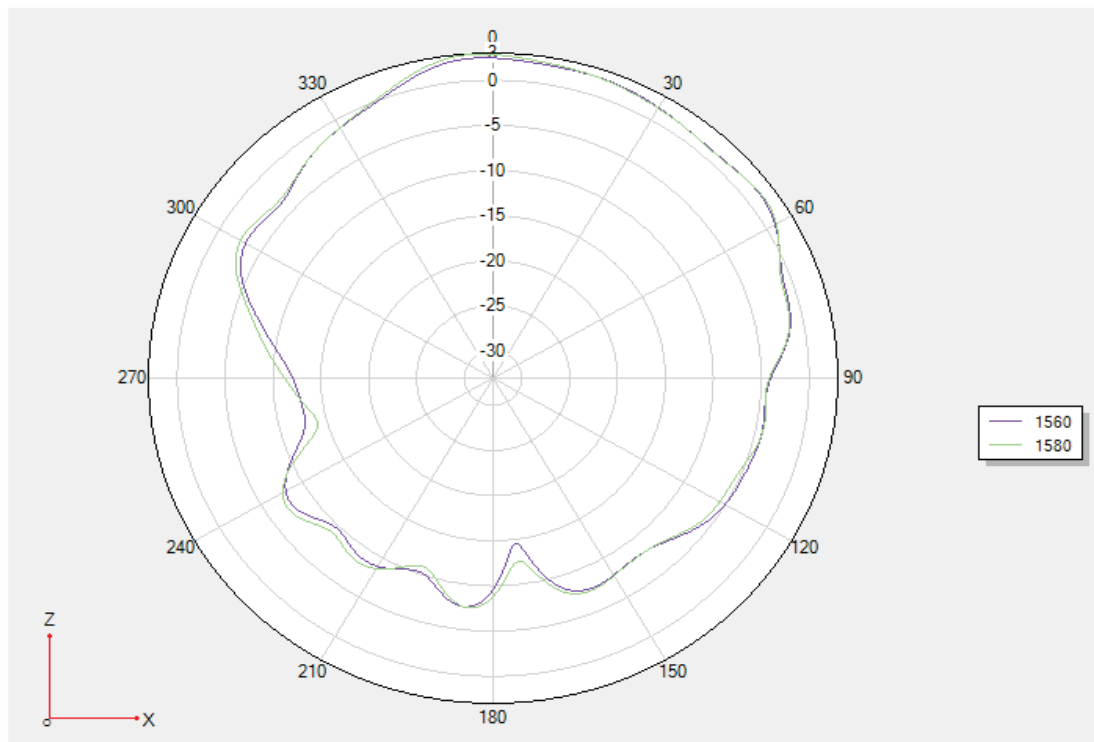


chart 7 Phi 0 2D 图



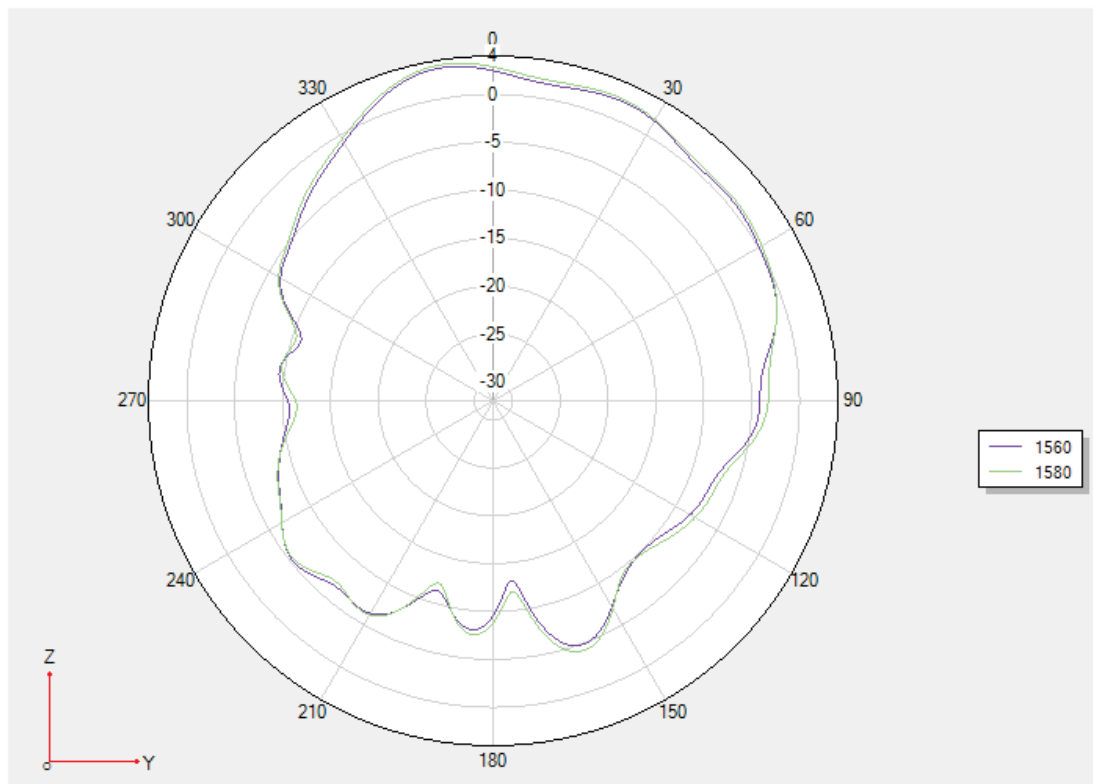


chart 8 Phi 90 2D

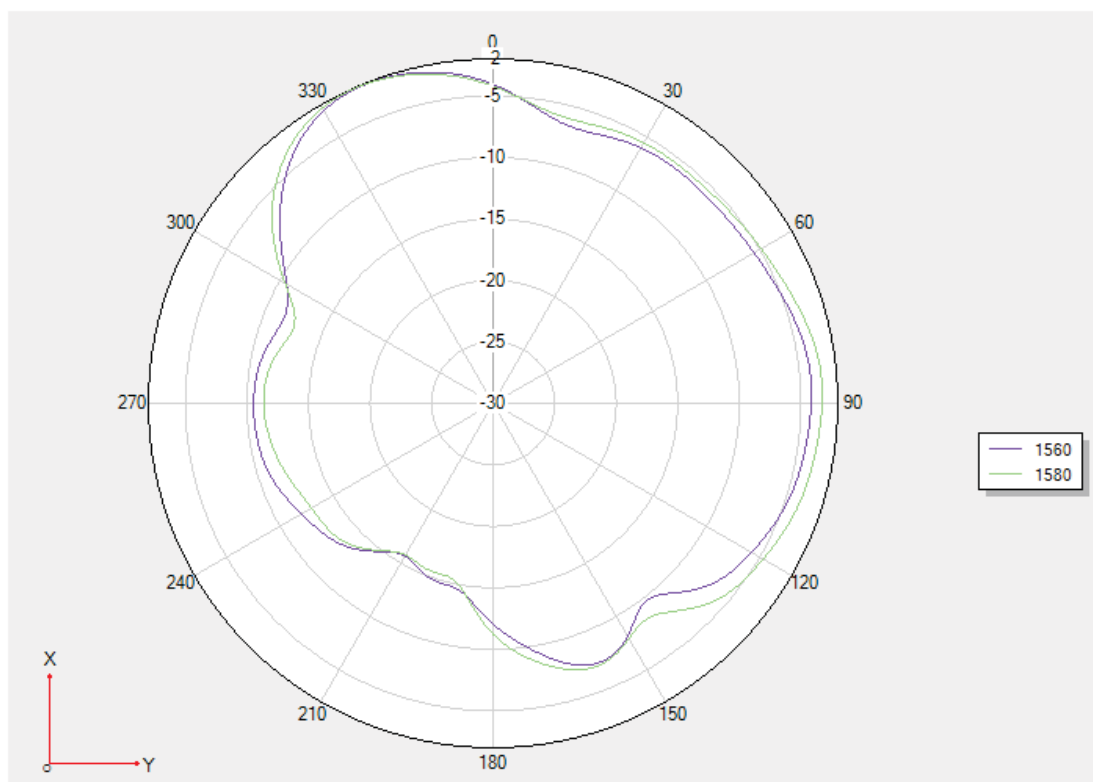


chart 9 Theta 90 2D

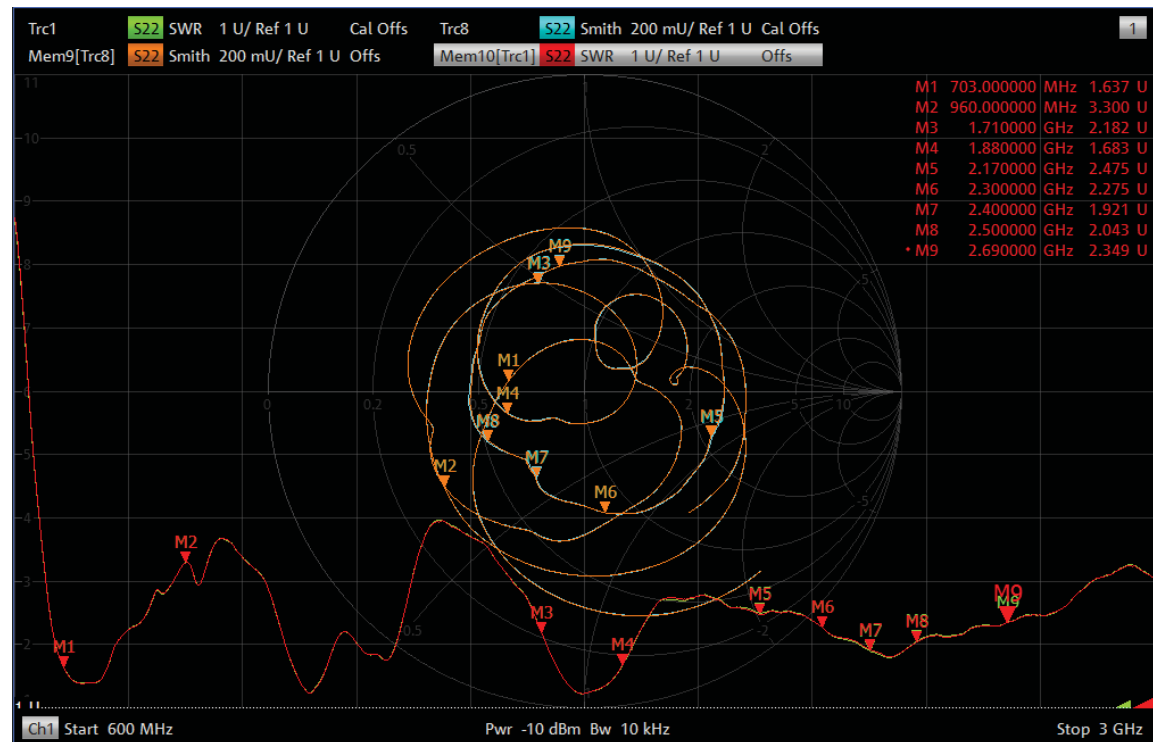
#### 4、 antenna OTA data :

##### GPS OTA

| Type | CNO(dBm) | UHS(dBm) | PIGS(dBm) | TIS(dBm) |
|------|----------|----------|-----------|----------|
| Gps  | 28.08    | -138.28  | -141.62   | -142.85  |

## 4、DIV antenna

### 1、Passive performance test parameters



### 2、antenna passive data :

| Frequency/Mhz | Efficiency / dB | Efficiency / % | MaxGain/dBi |
|---------------|-----------------|----------------|-------------|
| 700           | -5.42           | 28.71          | 0.69        |
| 710           | -5.45           | 28.5           | 0.31        |
| 720           | -5.33           | 29.32          | 0.17        |
| 730           | -5.28           | 29.66          | -0.43       |
| 740           | -5.01           | 31.55          | -0.21       |
| 750           | -4.89           | 32.42          | 0.19        |
| 760           | -4.80           | 33.12          | 0.36        |
| 770           | -4.84           | 32.8           | 0.12        |
| 780           | -5.22           | 30.06          | -0.3        |
| 790           | -5.31           | 29.43          | -0.22       |
| 800           | -5.88           | 25.84          | -2.39       |
| 810           | -6.13           | 24.36          | -2.39       |
| 820           | -6.31           | 23.41          | -2.53       |

|      |       |       |       |
|------|-------|-------|-------|
| 830  | -6.16 | 24.23 | -2.32 |
| 840  | -6.21 | 23.92 | -2.61 |
| 850  | -6.18 | 24.1  | -2.67 |
| 860  | -6.06 | 24.77 | -2.59 |
| 870  | -6.04 | 24.86 | -2.49 |
| 880  | -5.97 | 25.32 | -2.51 |
| 890  | -6.05 | 24.82 | -2.51 |
| 900  | -5.84 | 26.09 | -1.95 |
| 910  | -5.97 | 25.28 | -2.17 |
| 920  | -6.06 | 24.77 | -2.52 |
| 930  | -6.55 | 22.14 | -3.03 |
| 940  | -6.56 | 22.06 | -2.96 |
| 950  | -6.87 | 20.56 | -3.43 |
| 960  | -7.19 | 19.09 | -4.13 |
|      |       |       |       |
| 1700 | -6.46 | 22.62 | -1.37 |
| 1720 | -6.13 | 24.36 | -1.3  |
| 1740 | -5.75 | 26.63 | -1.48 |
| 1760 | -5.04 | 31.36 | -0.47 |
| 1780 | -4.53 | 35.27 | -0.16 |
| 1800 | -4.33 | 36.92 | -0.04 |
| 1820 | -3.82 | 41.48 | 0.6   |
| 1840 | -3.61 | 43.55 | 0.68  |
| 1860 | -3.76 | 42.07 | 0.21  |
| 1880 | -4.09 | 38.96 | 0.03  |
| 1900 | -4.15 | 38.5  | 0.11  |
| 1920 | -4.07 | 39.2  | 0.21  |
| 1940 | -4.32 | 36.99 | -0.15 |
| 1960 | -4.48 | 35.62 | -0.37 |
| 1980 | -4.45 | 35.9  | -0.36 |
| 2000 | -4.52 | 35.34 | -0.88 |
| 2020 | -4.66 | 34.17 | -1.04 |
| 2040 | -4.43 | 36.05 | -0.78 |
| 2060 | -4.44 | 35.97 | -0.92 |
| 2080 | -4.27 | 37.43 | -0.94 |
| 2100 | -4.14 | 38.57 | -0.43 |
| 2120 | -3.95 | 40.24 | 0.26  |
| 2140 | -4.08 | 39.04 | -0.08 |
| 2160 | -4.06 | 39.28 | -0.02 |
| 2180 | -4.03 | 39.51 | 0.26  |
| 2200 | -4.08 | 39.12 | 0.61  |
| 2220 | -4.28 | 37.36 | 0.52  |
| 2240 | -4.43 | 36.05 | 0.47  |

|      |       |       |       |
|------|-------|-------|-------|
| 2260 | -4.52 | 35.34 | 0.41  |
| 2280 | -4.22 | 37.81 | 0.65  |
| 2300 | -4.38 | 36.48 | 0.22  |
| 2320 | -4.22 | 37.81 | 0.77  |
| 2340 | -4.43 | 36.05 | 0.65  |
| 2360 | -4.21 | 37.96 | 1.04  |
| 2380 | -4.40 | 36.33 | 1.03  |
| 2400 | -4.17 | 38.27 | 1.46  |
| 2420 | -4.45 | 35.9  | 1.43  |
| 2440 | -4.38 | 36.48 | 1.62  |
| 2460 | -4.63 | 34.44 | 1.48  |
| 2480 | -4.53 | 35.27 | 1.77  |
| 2500 | -4.76 | 33.44 | 1.63  |
| 2520 | -4.65 | 34.31 | 2     |
| 2540 | -4.86 | 32.67 | 2.03  |
| 2560 | -4.84 | 32.8  | 2     |
| 2580 | -4.97 | 31.85 | 1.57  |
| 2600 | -5.06 | 31.18 | 1.15  |
| 2620 | -5.49 | 28.23 | 0.53  |
| 2640 | -5.36 | 29.1  | 0.73  |
| 2660 | -5.73 | 26.73 | 0.35  |
| 2680 | -5.80 | 26.28 | 0.19  |
| 2700 | -6.07 | 24.72 | -0.33 |

### 3、Directional diagram

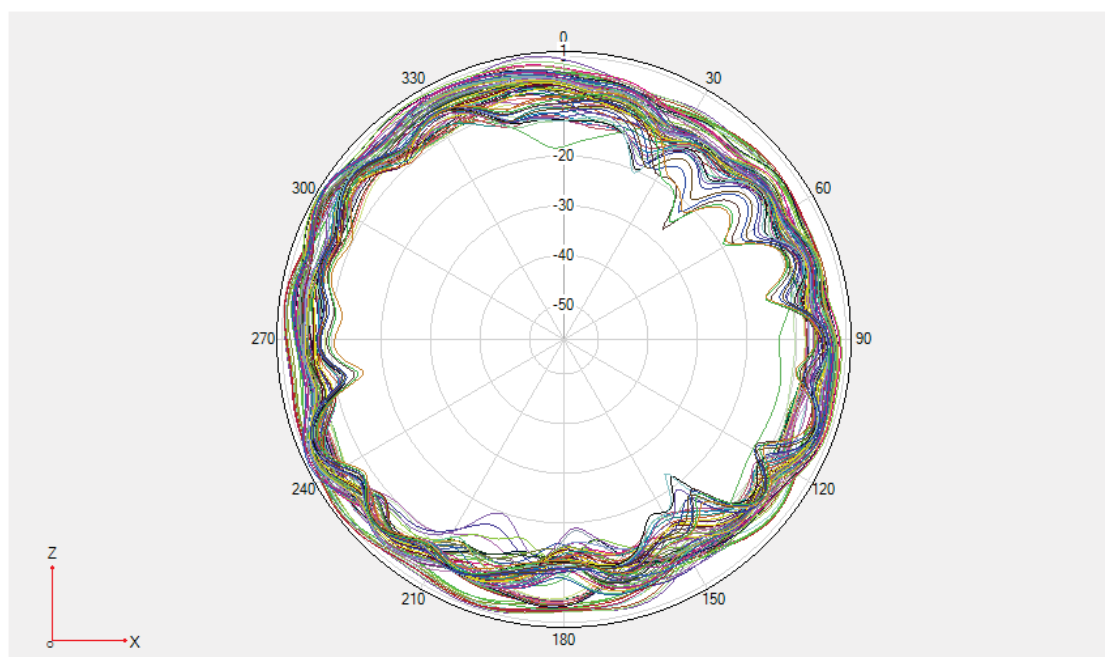


chart 10 Phi 0 2D 图

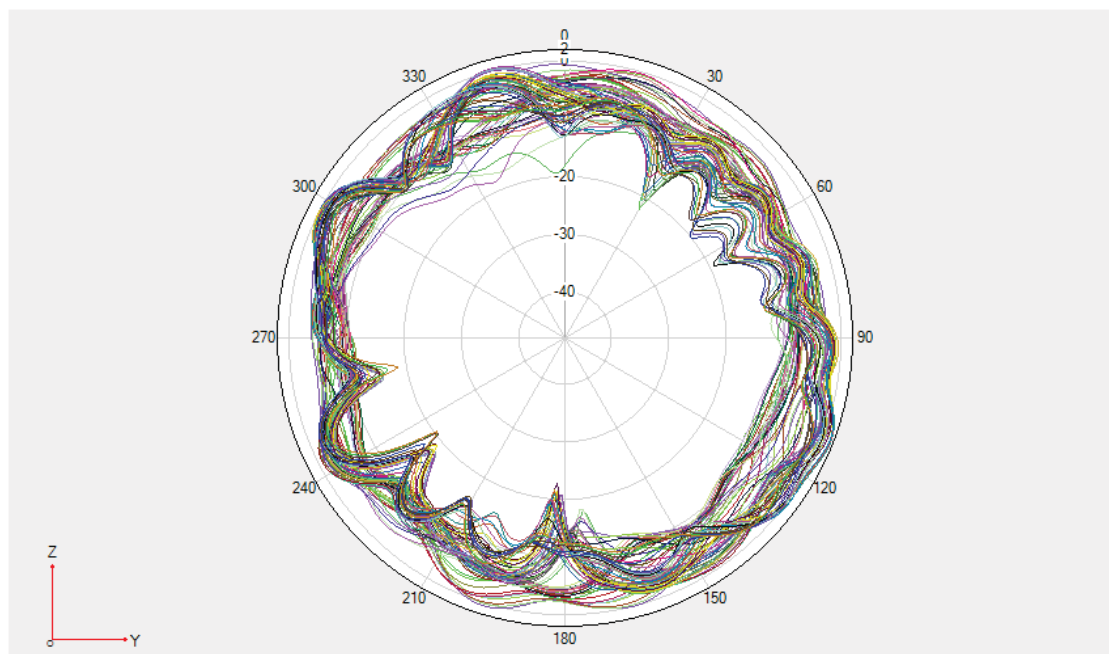


chart 11 Phi 90 2D

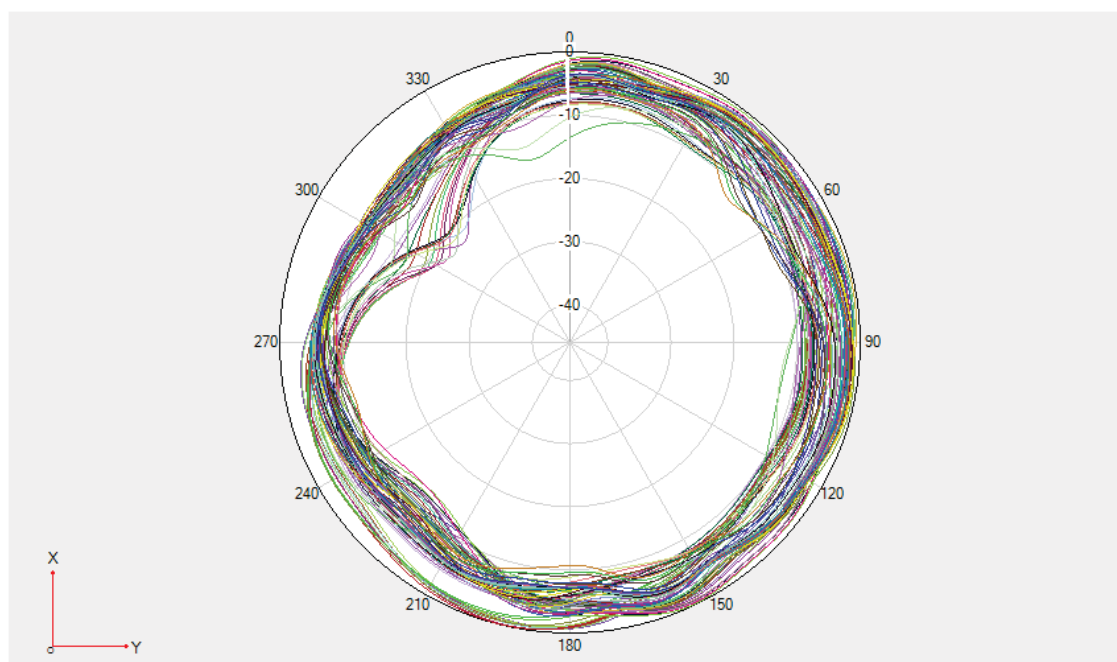


chart 12 Theta 90 2D