



深圳市星源创科技有限公司

SHENZHEN Xingyuanchuang TECHNOLOGY CO., LTD

# 天线测试报告

Antenna Test Report

*TC: 拓海*

*MN: E20*

*RF: 关巍*

*MD: 黄清清*

*MP: 15112592483*

*Date: 2024. 11. 7.*

*REV :V1. 0*



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## 测试信息

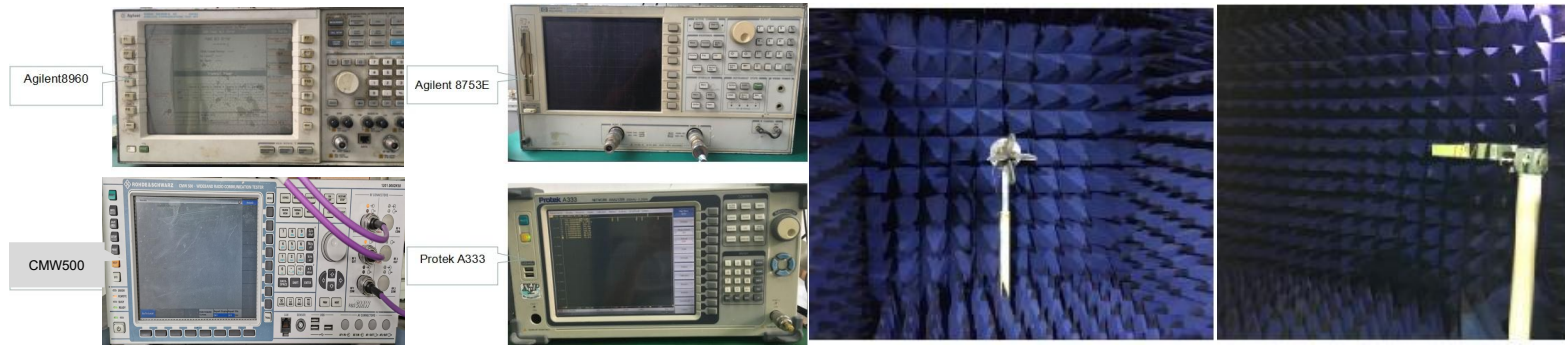
Test information

| Antenna band |         | Antenna state | Antenna form | Matchc hanges | Note |
|--------------|---------|---------------|--------------|---------------|------|
| Main ANT     | 2G      |               |              |               |      |
|              | 3G      |               |              |               |      |
|              | 4G      |               |              |               |      |
| AUX ANT      | BT/WIFI | 2.4G/5G       | FPC          | PIFA          | NO   |
|              | GPS     | 1.575G        | FPC          | PIFA          | NO   |
|              | DIV     |               |              |               |      |

## 测试环境

### Test environment

|                      | 测试项目                                        | 测试设备                                                     |
|----------------------|---------------------------------------------|----------------------------------------------------------|
| S参数<br>(S-parameter) | 1. 电压驻波比 (VSWR)<br>2. 回波损耗 (Rrtun Loss)     | 网络分析仪: Agilent8753ES                                     |
| 2. 有源测试<br>(Active)  | 1. 发射功率 (TRP)<br>2. 接收灵敏度 (TIS)<br>3. 屏灭/屏亮 | 1. 暗室: 5*3*3m (3D) Chamber<br>2. 综测仪: Agilent8960 CMW500 |
| 3. 无源测试<br>(Passive) | 1. 天线增益 (Gain)<br>2. 天线效率 (Efficiency)      | 1. 暗室: 5*3*3m (3D) Chamber<br>2. 网络分析仪: Agilent 8753ES   |





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天线位置

Antenna position



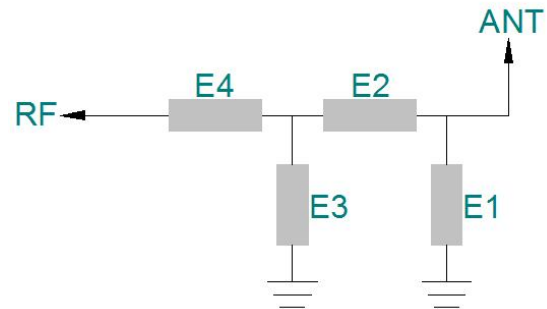


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匹配电路  
Matching circuit



匹配电路原理图&位号图

|          | 电容 (PF) | 电感 (NH) |
|----------|---------|---------|
| E1(0402) |         |         |
| E2(0402) |         |         |
| E3(0402) |         |         |
| E4(0402) |         |         |



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有源测试数据  
Active test data

## 客户原天线测试数据

| 802.11b | Frequency | TRP         |       | TIS          |        |
|---------|-----------|-------------|-------|--------------|--------|
|         | 2412      | CH1 11Mbps  | 17.22 | CH1 11Mbps   | -85.09 |
|         | 2437      | CH6 11Mbps  | 17.69 | CH6 11Mbps   | -84.52 |
|         | 2467      | CH11 11Mbps | 17.26 | CH11 11Mbps  | -79.81 |
| 802.11a |           | TRP         |       | TIS          |        |
|         | 5180      | CH36 6Mbps  | 11.98 | CH36 54Mbps  | -64.42 |
|         | 5300      | CH60 6Mbps  | 12.07 | CH60 54Mbps  | -74.02 |
|         | 5805      | CH161 6Mbps | 12.56 | CH161 54Mbps | -72.78 |



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有源测试数据  
Active test data

| 802.11b | Frequency | TRP         |       | TIS          |        |
|---------|-----------|-------------|-------|--------------|--------|
|         | 2412      | CH1 11Mbps  | 19.58 | CH1 11Mbps   | -85.96 |
|         | 2437      | CH6 11Mbps  | 18.49 | CH6 11Mbps   | -85.23 |
|         | 2467      | CH11 11Mbps | 18.12 | CH11 11Mbps  | -83.19 |
| 802.11a |           | TRP         |       | TIS          |        |
|         | 5180      | CH36 6Mbps  | 14.78 | CH36 54Mbps  | -74.45 |
|         | 5300      | CH60 6Mbps  | 13.46 | CH60 54Mbps  | -75.93 |
|         | 5805      | CH161 6Mbps | 13.51 | CH161 54Mbps | -75.37 |



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GPS搜星测试

GPS star search test

GPS冷启动实测效果以下:

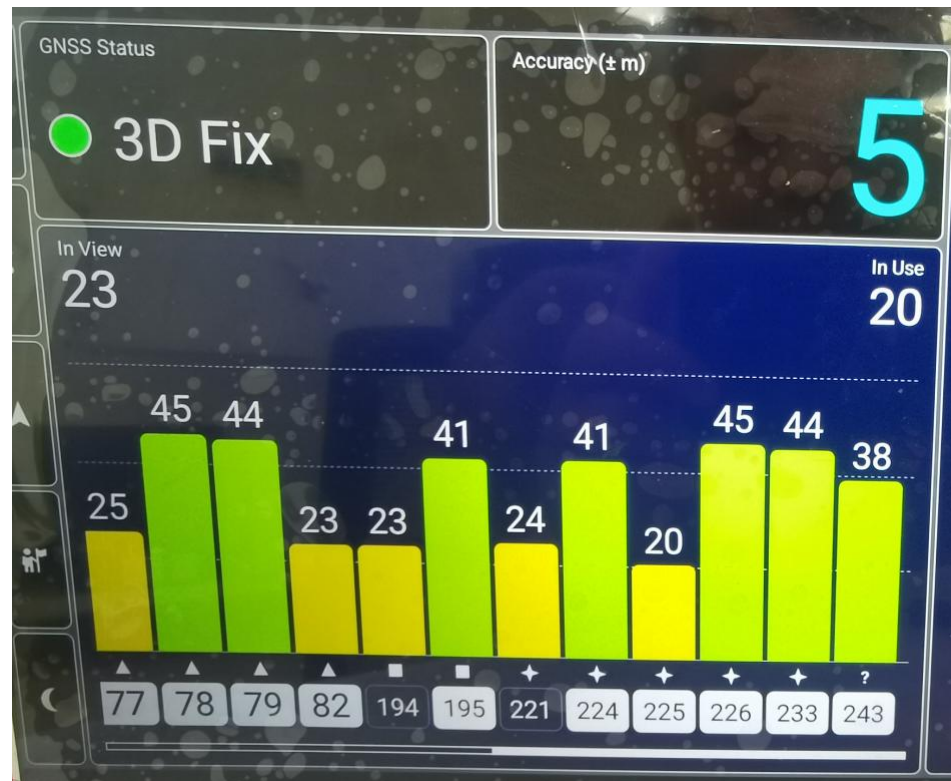
CN值40以上6+颗

CN值35以上7+颗

实际定位10+颗

备注:

GPS搜星测试。会因时间段及地域而存在差异. 以上数据为我司测试（空旷地带）最佳数据





## Wifi天线实测

### Wifi Antenna test

#### WIFI

测试环境：开放空间

测试工具：Wifi Analytical Assistant

测试距离：10m

信号强度：2.4G :-40dBm 5G:-52dBm

测试结果如右图

#### BT

测试环境：开放空间(通道)

测试工具：蓝牙音响

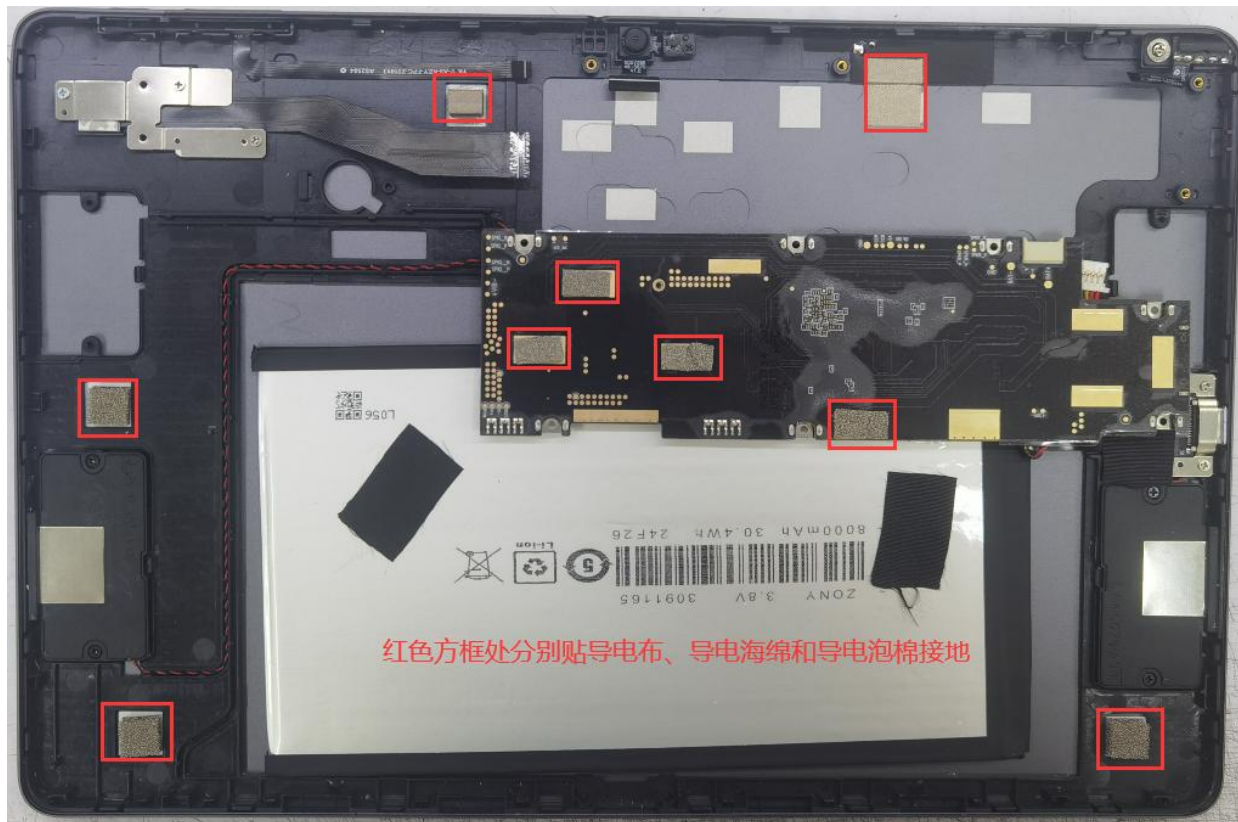
测试距离：10+m

结果：播放音乐流畅，无杂音。

| HOTSPOT LIST         |                   |      |           | MAC     | AP |
|----------------------|-------------------|------|-----------|---------|----|
| SSID                 | DEVICE            | RSSI | FREQUENCY | CHANNEL |    |
| XYC2023              | 70:85:c4:73:7d:ad | -37  | 2422      | 3       |    |
| XYC2022              | TP-LINK           | -40  | 2442      | 7       |    |
| TP-LINK_5G2_9660     | TP-LINK           | -42  | 5805      | 161     |    |
| XYC2023_5G           | 72:85:c4:93:7d:ad | -43  | 5300      | 60      |    |
| ChinaNet-Ht8u        | 00:6b:6f:5f:7e:e8 | -50  | 5180      | 36      |    |
| ←                    | 08:79:8c:1d:57:4c | -53  | 5180      | 36      |    |
| ←                    | 08:79:8c:1d:57:48 | -61  | 2437      | 6       |    |
| ←                    | 00:6b:6f:5f:7e:e4 | -63  | 2462      | 11      |    |
| XYC2022-5G           | TP-LINK           | -52  | 5200      | 40      |    |
| NETGEAR95-5G         | 6c:cd:d6:07:22:e7 | -52  | 5240      | 48      |    |
| < Hidden SSID >      | 08:79:8c:1d:57:4f | -53  | 5180      | 36      |    |
| NETGEAR95            | 6c:cd:d6:07:22:e8 | -54  | 2442      | 7       |    |
| FA523-8EC7           | c4:83:72:53:8e:cd | -61  | 2437      | 6       |    |
| < Hidden SSID >      | 08:79:8c:1d:57:4b | -63  | 2437      | 6       |    |
| GAOFEI               | 9c:2b:a6:cf:a9:e7 | -65  | 2462      | 11      |    |
| 13A08                | 58:b3:8f:5b:94:13 | -68  | 2437      | 6       |    |
| 凤辉星国际                | b8:a1:4a:80:0b:35 | -70  | 2412      | 1       |    |
| XAD_GUEST            | 86:3a:20:c7:56:8d | -74  | 2412      | 1       |    |
| 粤企企融 5G              | 08:79:8c:24:5d:84 | -78  | 5180      | 36      |    |
| ←                    | 00:6b:6f:66:df:1c | -81  | 5180      | 36      |    |
| VAPEFILLINGMACHINE   | 14:ab:02:6f:24:68 | -78  | 2412      | 1       |    |
| augvape              | 00:6b:6f:67:4e:30 | -78  | 2412      | 1       |    |
| IDOID                | b4:5f:84:f9:66:5a | -80  | 2462      | 11      |    |
| AI-THINKER_AE5B41    | 82:64:6f:ae:5b:41 | -81  | 2412      | 1       |    |
| ChinaNet-axRp        | 48:a7:3c:54:41:d1 | -81  | 2422      | 3       |    |
| 粤企企融 2.4G            | 08:79:8c:24:5d:80 | -82  | 2462      | 11      |    |
| 13A08_5G             | 58:b3:8f:5b:94:16 | -83  | 5745      | 149     |    |
| < Hidden SSID >      | 08:79:8c:24:48:03 | -83  | 5180      | 36      |    |
| GAOFEI-5G            | 9c:2b:a6:cf:a9:e8 | -83  | 5240      | 48      |    |
| augvape-5G           | 08:79:8c:24:48:00 | -83  | 5180      | 36      |    |
| XAD_5G_GUEST         | 86:3a:20:c7:56:8e | -86  | 5180      | 36      |    |
| Xiaomi_CS02_5G       | a4:39:b3:b5:c5:04 | -86  | 5745      | 149     |    |
| DESKTOP-6HATVNH 0660 | 2a:6b:35:62:87:61 | -87  | 2437      | 6       |    |
| HUAWEI-R1CGD1502     | 22:e6:04:46:8a:a2 | -89  | 2437      | 6       |    |

## 环境处理

Environmental treatment





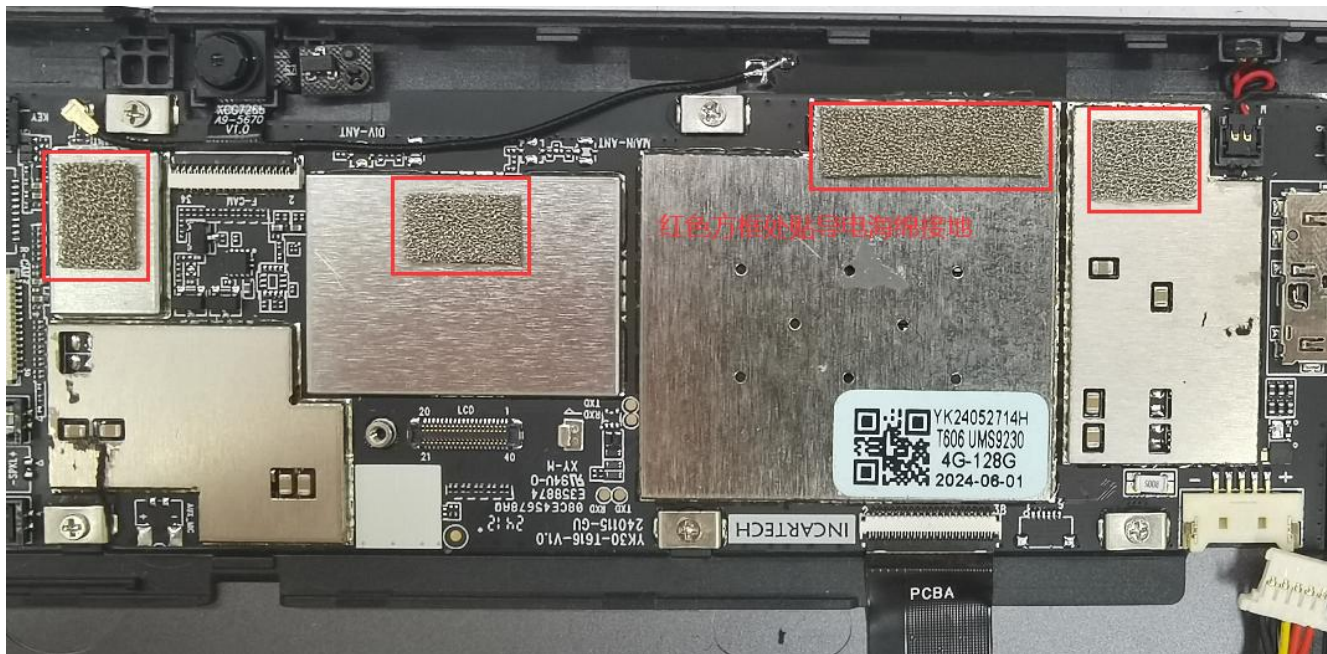
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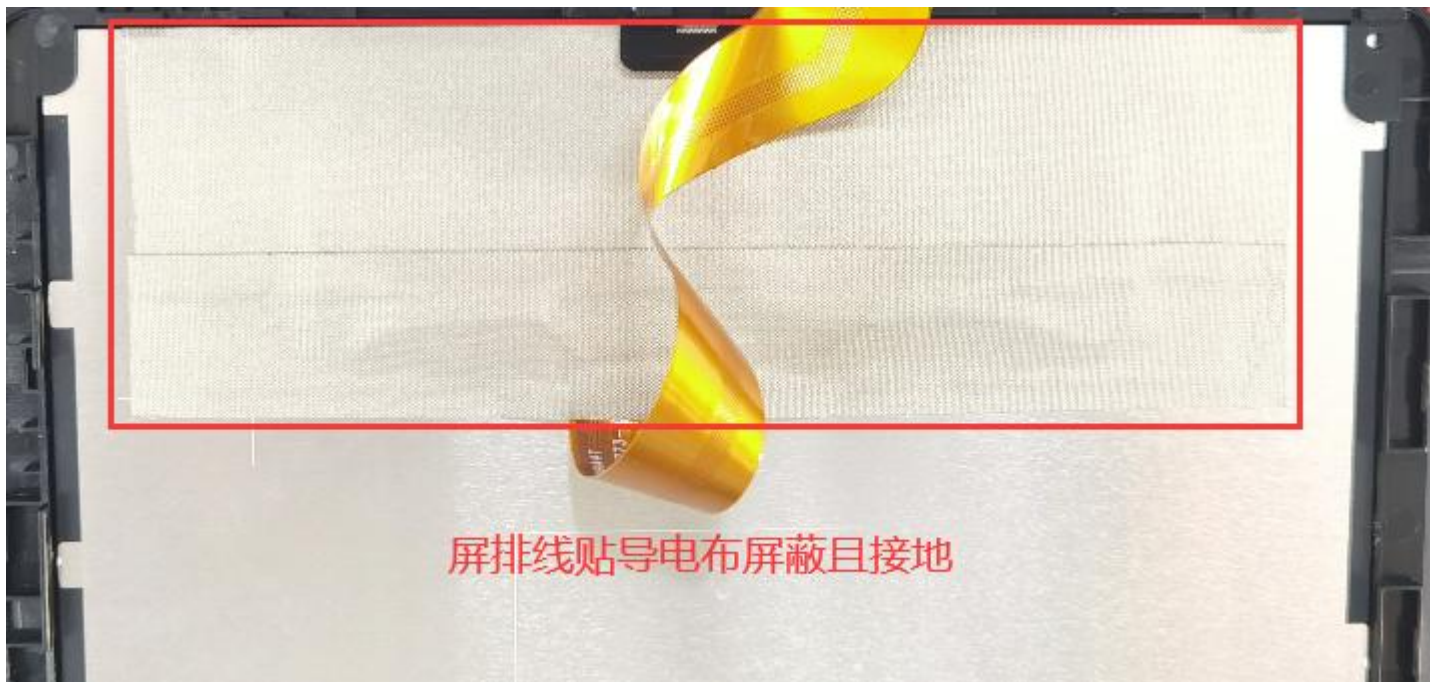
环境处理

Environmental treatment



## 环境处理

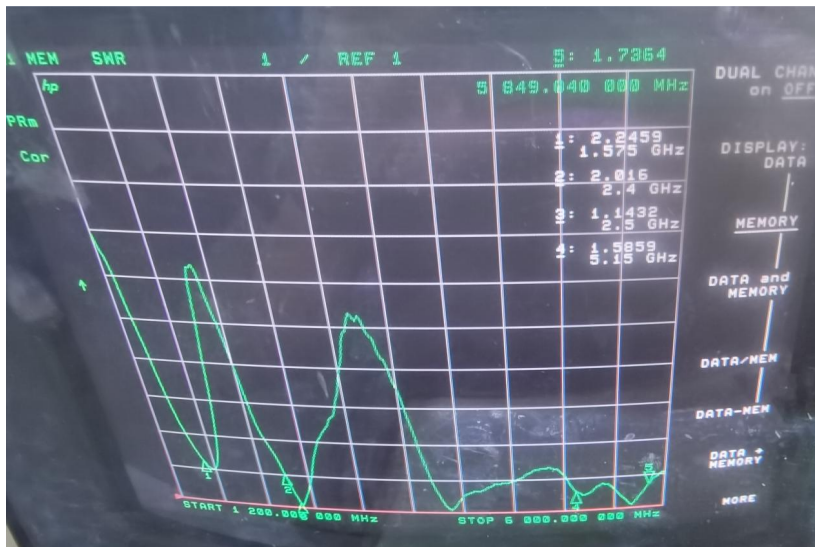
Environmental treatment





## 无源测试数据 Passive test data

### ANT S11-VSWR&Return Loss



| Frequency (MHZ)  | 1575  | 2400  | 2500   | 5150   | 5850   |
|------------------|-------|-------|--------|--------|--------|
| VSWR             | 2.24  | 2.01  | 1.14   | 1.58   | 1.73   |
| Return Loss (DB) | -8.32 | -9.45 | -23.81 | -12.91 | -11.41 |



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无源测试数据

Passive test data

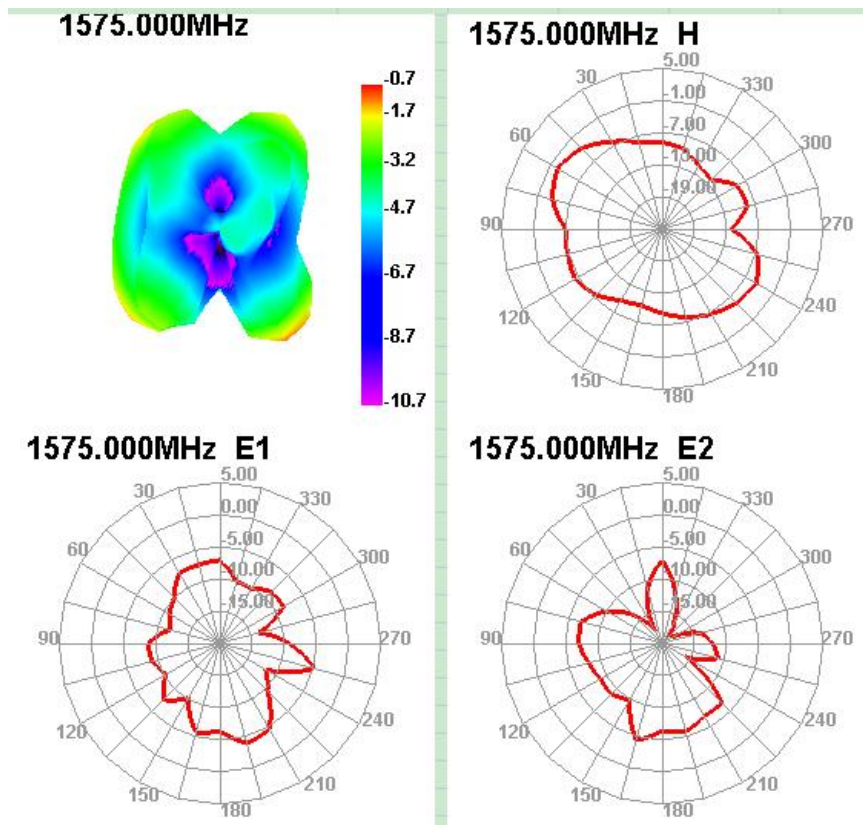
ANT1 GAIN&amp;Efficiency-GPS

| Passive Test For GPS |             |              |               |               |            |            |             |             |                      |                    |              |              |
|----------------------|-------------|--------------|---------------|---------------|------------|------------|-------------|-------------|----------------------|--------------------|--------------|--------------|
| Freq<br>(MHz)        | Effi<br>(%) | Effi<br>(dB) | Gain<br>(dBi) | Gain<br>(dBd) | UHS<br>(%) | DHS<br>(%) | Max<br>(dB) | Min<br>(dB) | Directivity<br>(dBi) | Beamwidth<br>(3dB) | AttH<br>(dB) | AttV<br>(dB) |
| 1560                 | 25.07       | -6.01        | -0.54         | -2.69         | 7.845      | 17.222     | -0.54       | -21.77      | 5.47                 | 45                 | 46.79        | 46.67        |
| 1565                 | 24.19       | -6.16        | -0.65         | -2.8          | 7.615      | 16.575     | -0.65       | -20.38      | 5.51                 | 45                 | 46.82        | 46.71        |
| 1570                 | 23.99       | -6.2         | -0.8          | -2.95         | 7.616      | 16.372     | -0.8        | -19.74      | 5.4                  | 45                 | 46.85        | 46.76        |
| 1575                 | 24.83       | -6.05        | -0.72         | -2.87         | 7.961      | 16.864     | -0.72       | -18.54      | 5.33                 | 45                 | 46.93        | 46.85        |
| 1580                 | 24.51       | -6.11        | -0.85         | -3            | 7.933      | 16.581     | -0.85       | -17.83      | 5.26                 | 45                 | 47.02        | 46.95        |
| 1585                 | 24.75       | -6.06        | -0.98         | -3.13         | 8.047      | 16.706     | -0.98       | -16.75      | 5.08                 | 45                 | 47.12        | 47.06        |
| 1590                 | 25.08       | -6.01        | -1.03         | -3.18         | 8.202      | 16.873     | -1.03       | -16.66      | 4.98                 | 45                 | 47.23        | 47.18        |



无源测试数据  
Passive test data

ANT1 Direction of figure (GPS)





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无源测试数据

Passive test data

ANT1 GAIN&amp;Efficiency-WIFI2.4G/BT

| Passive Test For 2.4G |             |              |               |               |            |            |             |             |                      |                    |              |              |
|-----------------------|-------------|--------------|---------------|---------------|------------|------------|-------------|-------------|----------------------|--------------------|--------------|--------------|
| Freq<br>(MHz)         | Effi<br>(%) | Effi<br>(dB) | Gain<br>(dBi) | Gain<br>(dBd) | UHS<br>(%) | DHS<br>(%) | Max<br>(dB) | Min<br>(dB) | Directivity<br>(dBi) | Beamwidth<br>(3dB) | AttH<br>(dB) | AttV<br>(dB) |
| 2400                  | 47.28       | -3.25        | 2.05          | -0.1          | 27.379     | 19.897     | 2.05        | -21.58      | 5.3                  | 30                 | 52.44        | 52.61        |
| 2410                  | 42.52       | -3.71        | 1.72          | -0.43         | 24.381     | 18.139     | 1.72        | -21.67      | 5.43                 | 30                 | 52.37        | 52.53        |
| 2420                  | 43.73       | -3.59        | 1.92          | -0.23         | 24.82      | 18.908     | 1.92        | -20.06      | 5.52                 | 30                 | 52.38        | 52.56        |
| 2430                  | 43.47       | -3.62        | 1.91          | -0.24         | 24.367     | 19.1       | 1.91        | -17.66      | 5.52                 | 30                 | 52.56        | 52.67        |
| 2440                  | 44.97       | -3.47        | 2.04          | -0.11         | 24.835     | 20.136     | 2.04        | -16.72      | 5.51                 | 30                 | 52.86        | 53.02        |
| 2450                  | 47.27       | -3.25        | 2.2           | 0.05          | 25.705     | 21.56      | 2.2         | -17.36      | 5.45                 | 30                 | 52.73        | 52.84        |
| 2460                  | 46.29       | -3.35        | 1.95          | -0.2          | 24.892     | 21.397     | 1.95        | -17.07      | 5.3                  | 30                 | 52.67        | 52.76        |
| 2470                  | 46.18       | -3.36        | 1.87          | -0.28         | 24.543     | 21.636     | 1.87        | -16.49      | 5.23                 | 30                 | 52.57        | 52.66        |
| 2480                  | 48.35       | -3.16        | 1.86          | -0.29         | 25.569     | 22.778     | 1.86        | -16.13      | 5.02                 | 30                 | 52.78        | 52.88        |
| 2490                  | 50.78       | -2.94        | 1.97          | -0.18         | 26.597     | 24.181     | 1.97        | -16.52      | 4.92                 | 30                 | 53.06        | 53.25        |
| 2500                  | 50.69       | -2.95        | 1.72          | -0.43         | 26.553     | 24.136     | 1.72        | -16.7       | 4.67                 | 30                 | 52.92        | 53.06        |



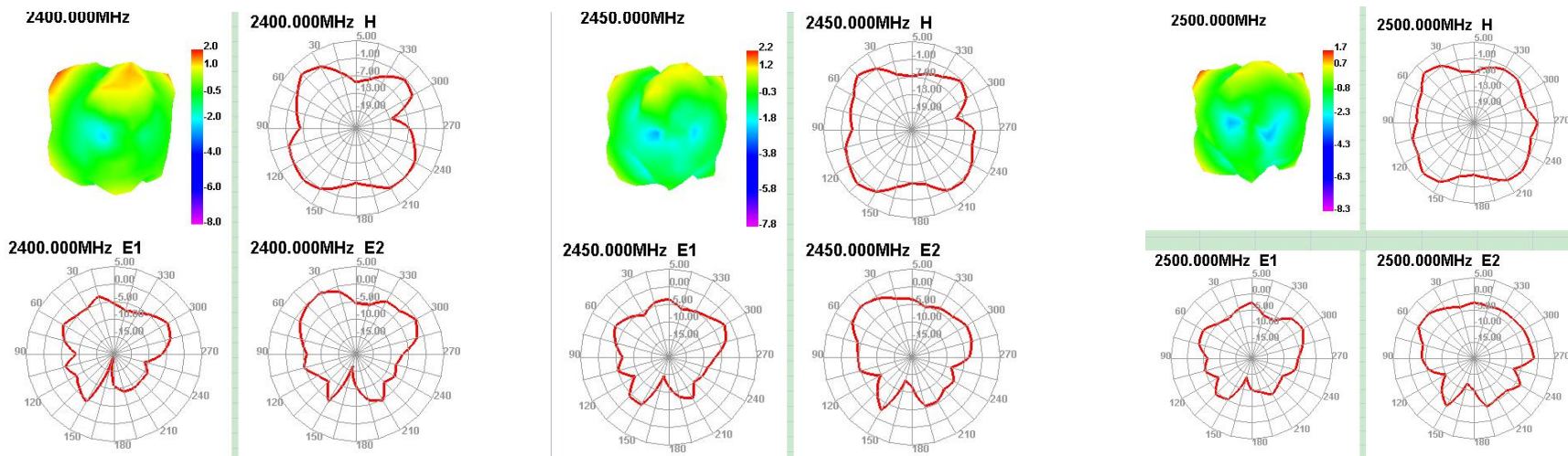
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无源测试数据  
Passive test data

ANT1 Direction of figure(2.4/BT)





## 无源测试数据

### Passive test data

## ANT1 GAIN&Efficiency-WIFI 5G

| Passive Test For 5G |          |           |            |            |         |          |          |          |                 |                 |           |           |
|---------------------|----------|-----------|------------|------------|---------|----------|----------|----------|-----------------|-----------------|-----------|-----------|
| Freq (MHz)          | Effi (%) | Effi (dB) | Gain (dBi) | Gain (dBd) | UHS (%) | DHIS (%) | Max (dB) | Min (dB) | irectivit (dBi) | Beamwidth (3dB) | AttH (dB) | AttV (dB) |
| 5150                | 38.71    | -4.12     | 3.13       | 0.98       | 20.464  | 18.248   | 3.13     | -17.55   | 7.25            | 0               | 62.66     | 62.14     |
| 5170                | 35.01    | -4.56     | 2.52       | 0.37       | 18.401  | 16.614   | 2.52     | -17.82   | 7.07            | 0               | 62.13     | 61.73     |
| 5190                | 31.9     | -4.96     | 1.81       | -0.34      | 16.876  | 15.026   | 1.81     | -18.16   | 6.77            | 15              | 61.9      | 61.56     |
| 5210                | 35.29    | -4.52     | 1.64       | -0.51      | 18.868  | 16.419   | 1.64     | -19.29   | 6.17            | 15              | 62.58     | 62.08     |
| 5230                | 34.58    | -4.61     | 1.54       | -0.61      | 18.677  | 15.899   | 1.54     | -21.68   | 6.15            | 0               | 62        | 61.81     |
| 5250                | 35.45    | -4.5      | 1.62       | -0.53      | 19.341  | 16.108   | 1.62     | -21.63   | 6.13            | 15              | 61.89     | 61.7      |
| 5270                | 32.82    | -4.84     | 1.07       | -1.08      | 18.164  | 14.657   | 1.07     | -21.32   | 5.9             | 15              | 61.76     | 61.41     |
| 5290                | 36.6     | -4.36     | 1.75       | -0.4       | 20.392  | 16.21    | 1.75     | -22.39   | 6.12            | 15              | 61.94     | 61.89     |
| 5310                | 33.46    | -4.76     | 1.23       | -0.92      | 18.81   | 14.646   | 1.23     | -24.26   | 5.98            | 45              | 61.61     | 61.56     |
| 5330                | 34.03    | -4.68     | 1.34       | -0.81      | 19.222  | 14.806   | 1.34     | -22.87   | 6.02            | 45              | 61.83     | 61.76     |
| 5350                | 37.99    | -4.2      | 1.73       | -0.42      | 21.674  | 16.321   | 1.73     | -21.19   | 5.93            | 30              | 62.08     | 62.46     |
| 5370                | 38.84    | -4.11     | 1.9        | -0.25      | 22.184  | 16.66    | 1.9      | -20.64   | 6.01            | 30              | 62.14     | 62.36     |
| 5390                | 35.53    | -4.49     | 1.34       | -0.81      | 20.216  | 15.315   | 1.34     | -19.52   | 5.83            | 30              | 61.64     | 61.88     |
| 5410                | 42.78    | -3.69     | 2.43       | 0.28       | 24.369  | 18.414   | 2.43     | -15.87   | 6.12            | 30              | 62.69     | 63.01     |
| 5430                | 39.95    | -3.98     | 1.95       | -0.2       | 22.705  | 17.245   | 1.95     | -15      | 5.94            | 30              | 62.41     | 62.93     |
| 5450                | 39.64    | -4.02     | 2.14       | -0.01      | 22.224  | 17.417   | 2.14     | -16.76   | 6.15            | 30              | 62.21     | 62.94     |
| 5470                | 37.45    | -4.27     | 1.91       | -0.24      | 21.01   | 16.443   | 1.91     | -16.79   | 6.17            | 30              | 62.56     | 63.24     |
| 5490                | 35.24    | -4.53     | 1.54       | -0.61      | 19.607  | 15.636   | 1.54     | -21.09   | 6.07            | 30              | 63.06     | 63.84     |
| 5510                | 36.98    | -4.32     | 2.08       | -0.07      | 20.474  | 16.507   | 2.08     | -23.1    | 6.4             | 15              | 63.46     | 64.44     |
| 5530                | 38.49    | -4.15     | 2.39       | 0.24       | 21.321  | 17.173   | 2.39     | -19.94   | 6.54            | 30              | 63.75     | 64.89     |
| 5550                | 39.68    | -4.01     | 2.8        | 0.65       | 22.039  | 17.645   | 2.8      | -18.03   | 6.82            | 15              | 64.34     | 65.2      |
| 5570                | 40.5     | -3.93     | 2.86       | 0.71       | 22.548  | 17.954   | 2.86     | -18.77   | 6.78            | 30              | 64.38     | 65.25     |
| 5590                | 38.45    | -4.15     | 2.84       | 0.69       | 21.533  | 16.917   | 2.84     | -17.01   | 6.99            | 45              | 64.47     | 64.74     |
| 5610                | 39.4     | -4.05     | 2.97       | 0.82       | 22.133  | 17.267   | 2.97     | -18.37   | 7.02            | 45              | 64.28     | 65.11     |
| 5630                | 42.65    | -3.7      | 2.96       | 0.81       | 23.818  | 18.837   | 2.96     | -17.85   | 6.66            | 45              | 64.52     | 65.32     |
| 5650                | 42.82    | -3.68     | 2.7        | 0.55       | 23.801  | 19.022   | 2.7      | -17.61   | 6.38            | 45              | 64.43     | 65.08     |
| 5670                | 40.61    | -3.91     | 2.52       | 0.37       | 22.706  | 17.903   | 2.52     | -17.44   | 6.43            | 30              | 64.58     | 65.06     |
| 5690                | 44.71    | -3.5      | 3.67       | 1.52       | 25.056  | 19.651   | 3.67     | -17.03   | 7.16            | 30              | 64.65     | 66        |
| 5710                | 40.12    | -3.97     | 3.06       | 0.91       | 22.539  | 17.584   | 3.06     | -17.95   | 7.03            | 30              | 65.18     | 65.08     |
| 5730                | 46.68    | -3.31     | 3.88       | 1.73       | 26.113  | 20.569   | 3.88     | -20.12   | 7.19            | 30              | 64.91     | 65.55     |
| 5750                | 40.57    | -3.92     | 3.23       | 1.08       | 22.657  | 17.914   | 3.23     | -29.03   | 7.15            | 30              | 64.64     | 64.89     |
| 5770                | 39.85    | -4        | 2.88       | 0.73       | 22.227  | 17.625   | 2.88     | -23.23   | 6.88            | 30              | 64.61     | 65.28     |
| 5790                | 37.5     | -4.26     | 2.68       | 0.53       | 20.883  | 16.615   | 2.68     | -17.51   | 6.94            | 30              | 64.83     | 64.78     |
| 5810                | 40.74    | -3.9      | 2.9        | 0.75       | 22.326  | 18.418   | 2.9      | -16.36   | 6.8             | 30              | 64.97     | 65.66     |
| 5830                | 38.49    | -4.15     | 2.52       | 0.37       | 21.146  | 17.347   | 2.52     | -16.65   | 6.67            | 30              | 65.45     | 66.02     |
| 5850                | 39.85    | -4        | 2.62       | 0.47       | 21.85   | 18.005   | 2.62     | -15.95   | 6.62            | 15              | 65.65     | 66.39     |



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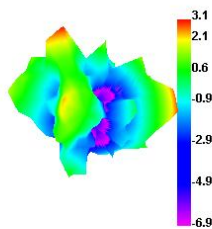
深圳市星源创科技有限公司

SHENZHEN Xingyuanchuang TECHNOLOGY CO., LTD

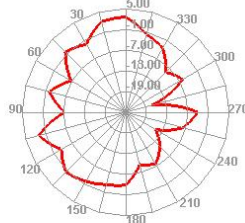
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Passive test data

ANT1 Direction of figure(5G)

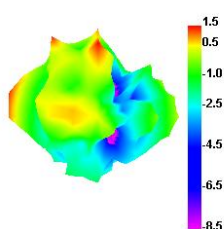
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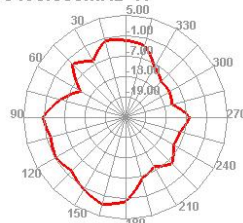
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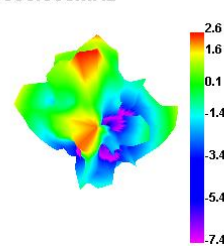
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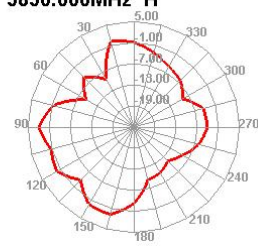
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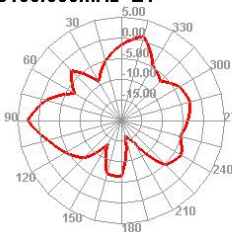
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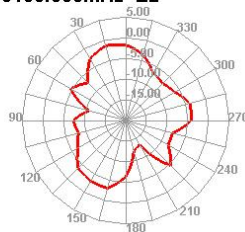
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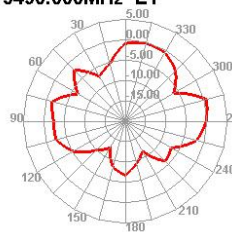
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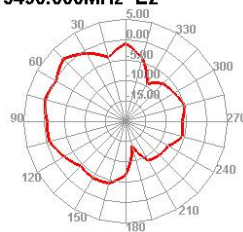
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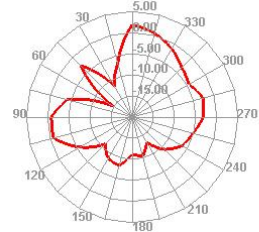
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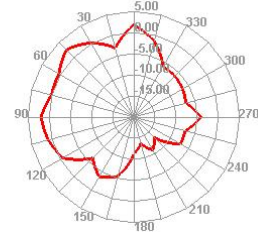
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5850.000MHz E1



5850.000MHz E2





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深圳市星源创科技有限公司

SHENZHEN Xingyuanchuang TECHNOLOGY CO., LTD

附加说明

Additional instructions

01

报告中天线匹配电路是否改动，天线有关的环境处理是否增加，将直接影响天线性能，请仔细确认查看。

02

贵司如有最新试产或更新产品（如软件，**ESD**，物料等）请尽快提供我司进行验证，以确认天线性能是否有变化影响。

03

倘若贵司需要送第三方检测机构复测或客户测试，请务必先与我司进行天线相关测试确认，因主板•装配的一致性，以及天线组装的差异等因素，均可能导致天线参数的偏差。

合作共赢

