

天线规格书  
Antenna specification for approval

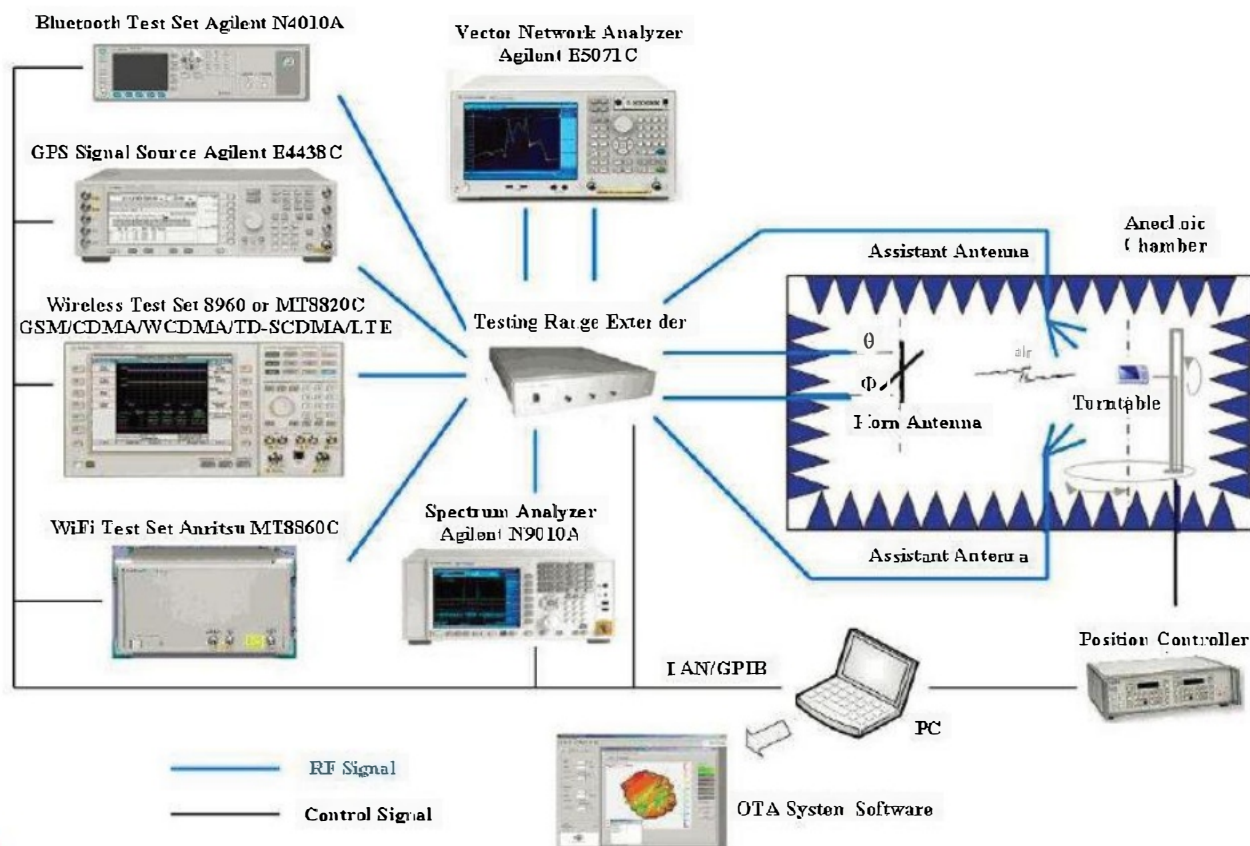
|                                        |                                                  |                                         |                  |
|----------------------------------------|--------------------------------------------------|-----------------------------------------|------------------|
| 客户名称<br>Customer name                  | Jingsha                                          |                                         |                  |
| 机型<br>Model                            | MINIPC-H1-61852BE 模块<br>MINIPC-H1-61852BE Module |                                         |                  |
| 天线频段<br>Antenna frequency              | 2.4GHZ&5GHz                                      |                                         |                  |
| 天线功能<br>Antenna function               | WIFI&BT&5Gwifi(1) 天线Antenna                      |                                         |                  |
| 天线材质<br>Antenna material               | FPC                                              | FPC 颜色<br>FPC color                     | 黑色Black          |
| 型号<br>model                            | SF2036B-1B2-A                                    |                                         |                  |
| 料号<br>Material number                  | SF2036B-1R24G-140-A                              |                                         |                  |
| 客户料号<br>Customer Part Number           |                                                  |                                         |                  |
| 索沃德承认签章<br>Ward accepted the signature |                                                  | 客户承认签章<br>Client acknowledges signature |                  |
| 结构<br>structure                        |                                                  | 采购<br>Purchase                          |                  |
| 文控<br>Document control                 |                                                  | 结构<br>structure                         |                  |
| 射频<br>radio frequency                  |                                                  | 工程<br>engineering                       |                  |
| 审核<br>To examine                       |                                                  | 品质<br>QC                                |                  |
| 承办人<br>Responsible 李婷婷                 |                                                  | 审核<br>To examine                        |                  |
| 日期 date<br>2023.11.17                  | 盖章区<br>Seal area                                 | 日期 date<br>2023.11.17                   | 盖章区<br>Seal area |

| 序号No. | 认证编号Certificate No. | 材质类型Material Type           | 发证日期Issue Date | 备注Mark   |
|-------|---------------------|-----------------------------|----------------|----------|
| 1     | A2230173541101001E  | 镀锡铜Tin Plate<br>Copper Wire | 2023-04-24     | 一年1 Year |
| 2     | CANEC2227657302     | 卤素Halogen                   | 2022-12-28     | 一年1 Year |
| 3     | CANEC2227657303     | 背胶Adhesive                  | 2022-12-28     | 一年1 Year |
| 4     | SHAEC23000346911    | FEP 护套PEP Sheath            | 2023-01-13     | 一年1 Year |
| 5     | SHAEC22004639301    | FEP 绝缘 PEP Isulated         | 2022-12-15     | 一年1 Year |
| 6     | SZXEC2203054804     | 锡线 Tin Wire                 | 2022-09-19     | 一年1 Year |
| 7     | SZXEC2203054808     | 锡条Tin Bar                   | 2022-09-19     | 一年1 Year |
| 8     | ETR23701480         | 印刷油墨Printing Ink            | 2023-07-13     | 一年1 Year |
| 9     | A2230173918101001E  | 基材Base Material             | 2023-04-18     | 一年1 Year |
| 10    | CANEC2227574118     | EVA 泡棉 EVA Foam             | 2023-01-03     | 一年1 Year |
| 11    | A2230383826101003   | 导电布Conductive Fabric        | 2023-08-04     | 一年1 Year |
| 12    | CANEC23002609908    | 金镀层Gold Plate               | 2023-05-11     | 一年1 Year |

## Content

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## 一: Device Support & Testable Antenna Type



| 天线功能                                | 频率范围                                                      | 测试仪器                              | 测试方式                          | 测试标准       |
|-------------------------------------|-----------------------------------------------------------|-----------------------------------|-------------------------------|------------|
| 2G天线 (GSM)                          | 824MHz-960MHz,<br>1710MHz-1990MHz                         | 5071B、8960、<br>OTA暗室              | 有源测试、无源测试                     | 索沃德标准、客户要求 |
| 3G天线 (WCDMA/TDSCDMA/CDMA-EVDO/2000) | 824MHz-960MHz,<br>1710MHz-2170MHz                         | 5071B、8960、<br>OTA暗室              | 有源测试、无源测试                     | 索沃德标准、客户要求 |
| 4G天线 (LTE-FDD/LTE-TDD)              |                                                           | 5071B、CMW500、<br>SP8011、OTA暗室     | 有源测试、无源测试                     | 索沃德标准、客户要求 |
| WIFI天线                              | 2.4GHz-2.48GHz,<br>5.15GHz-5.35GHz,<br>5.725GHz-5.825GHz  | 5071B、CMW500、<br>OTA暗室、路由器、<br>PC | 有源测试、无源测试、<br>APK实测、吞吐量<br>测试 | 索沃德标准、客户要求 |
| BT天线                                | 2.4GHz-2.48GHz                                            | 5071B、OTA暗室、<br>蓝牙音箱              | 无源测试、实测                       | 索沃德标准、客户要求 |
| 定位天线 (GPS、GLONASS、北斗、伽利略)           | 1575.42MHz±10MHz<br>1602MHz±0.5625MHz<br>1561MHz±2.046MHz | 5071B、OTA暗室、<br>APK               | 无源测试、实测                       | 索沃德标准、客户要求 |
| NFC天线                               | 13.56MHz                                                  | 5071B、专用测试<br>治具、OTA暗室、<br>APK    | 无源测试、实测                       | 索沃德标准、客户要求 |
| 遥控天线                                | 433MHz                                                    | 5071B、OTA暗室                       | 无源测试、实测                       | 索沃德标准、客户要求 |

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Tel/电话: 0755-29985185 Fax/传真: 0755-27487028

## 二:Summary

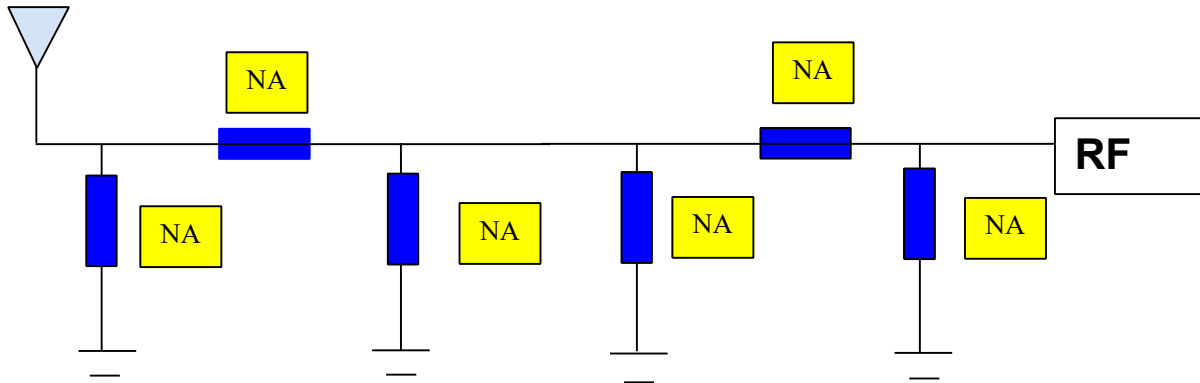
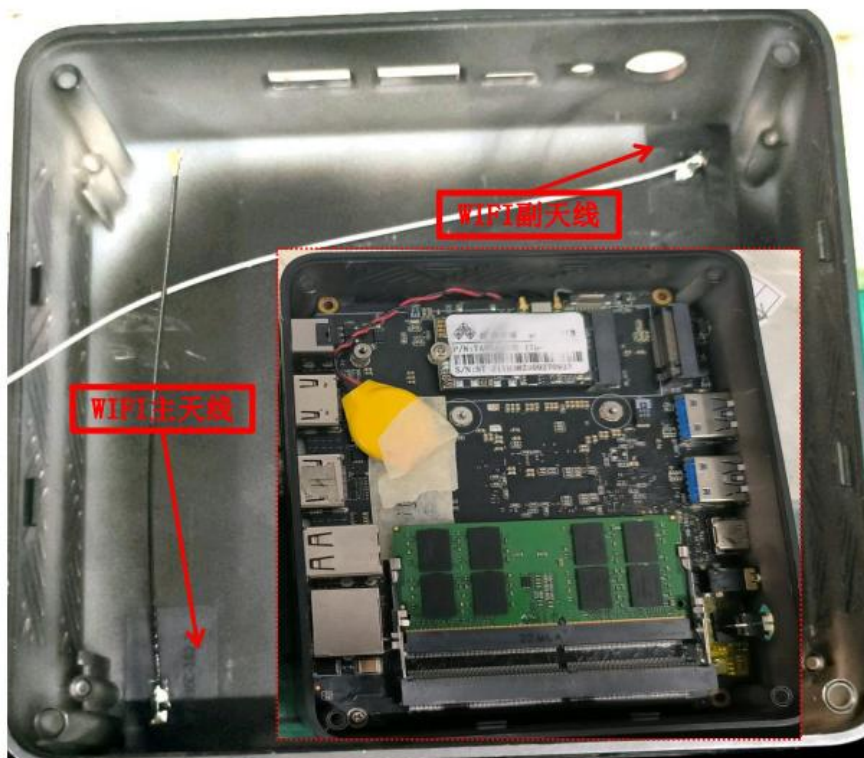
### (1)Antenna performance

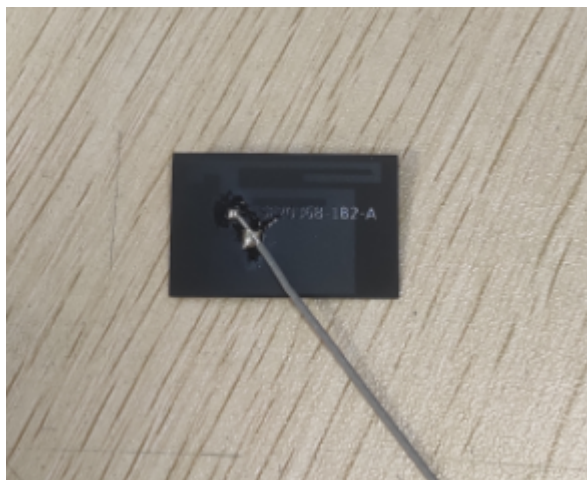
- 1.This approval sheet supports for MID project. FPC antennas include in this project. This report is for the performance of WIFI&BT antenna.
- 2.Antenna shape size: Meet the requirement of MID
- 3.Antenna band: 2.4GHz~5GHz
- 4.Antenna material: Antenna material meet the requirement of MID
- 5.Adhesive performance: Adhesive performance meet the requirement of MID
- 6.Antenna performance meet the spec below:

| Description            | 2.4GHz~5GHz               | Units |
|------------------------|---------------------------|-------|
| VSWR                   | $\leq 2.0$                |       |
| Average Antenna Gain   | $\geq -4.5$               | dB    |
|                        |                           |       |
| Feed Impedance         | 50 ohms                   |       |
| Operating Temperature  | -40 to +85 deg C          |       |
| Polarization / Azimuth | Linear / Omni-directional |       |

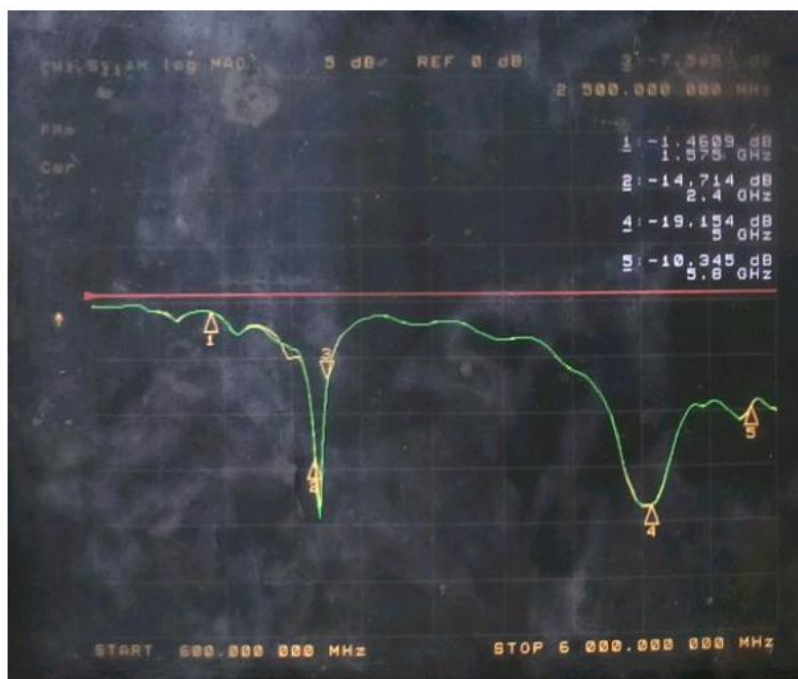
### (2)Mechanical Information

| Mechanical Dimension  |                           |
|-----------------------|---------------------------|
| Cable Length          | 140mm/GRAY                |
| Description           | WIFI&BT antenna           |
| Material              | FPC                       |
| Coaxial Cable         | 50 $\Omega$ /O. D. 0.81mm |
| Environmental         |                           |
| Operation Temperature | -40 to +85 deg C          |
| Storage Temperature   | -40 to +85 deg C          |

**三: Matching Circuit Photo&Machine Photo&Antenna Photo****(1) Matching Circuit****(2) Device Photo&Antenna Photo**



#### 四:VSWR&Antenna Efficiency



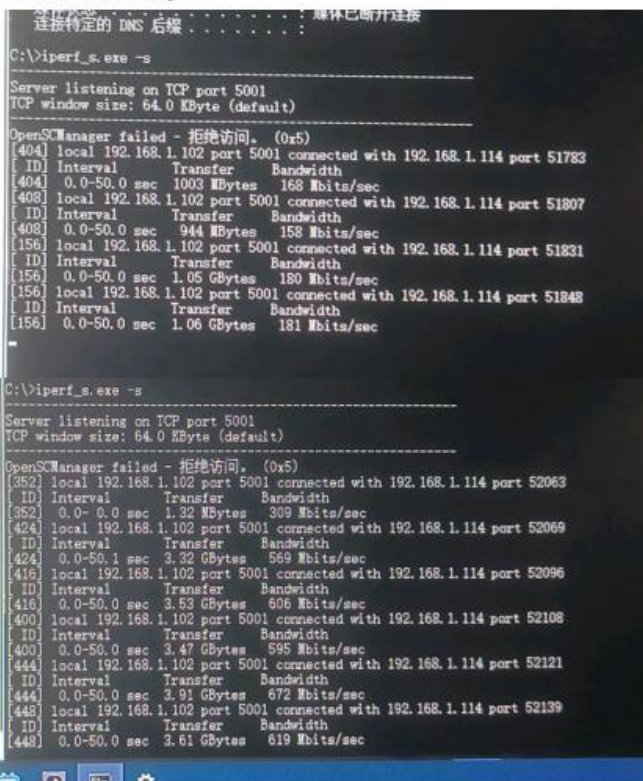
| Passive Test For 2.4Gwifi |       |       |       |       |        |        |      |        |
|---------------------------|-------|-------|-------|-------|--------|--------|------|--------|
| Freq                      | Effi  | Effi  | Gain  | Gain  | UHS    | DHS    | Max  | Min    |
| (MHz)                     | (%)   | (dB)  | (dBi) | (dBd) | (%)    | (%)    | (dB) | (dB)   |
| 2400                      | 38.11 | -4.19 | 0.97  | -1.18 | 13.878 | 24.232 | 0.97 | -14.37 |
| 2410                      | 41.26 | -3.85 | 1.59  | -0.56 | 15.662 | 25.595 | 1.59 | -14.75 |
| 2420                      | 42.96 | -3.67 | 2.2   | 0.05  | 16.719 | 26.24  | 2.2  | -15.34 |
| 2430                      | 45.37 | -3.43 | 2.77  | 0.62  | 18.589 | 26.781 | 2.77 | -15.13 |
| 2440                      | 46.25 | -3.35 | 3.28  | 1.13  | 19.509 | 26.738 | 3.28 | -14.2  |
| 2450                      | 43.74 | -3.59 | 3.34  | 1.19  | 19.206 | 24.539 | 3.34 | -13.42 |
| 2460                      | 40.7  | -3.9  | 3.3   | 1.15  | 18.307 | 22.389 | 3.3  | -12.54 |
| 2470                      | 38.05 | -4.2  | 3.19  | 1.04  | 17.578 | 20.476 | 3.19 | -14.7  |
| 2480                      | 38.88 | -4.1  | 3.47  | 1.32  | 18.258 | 20.621 | 3.47 | -17.48 |
| 2490                      | 43.57 | -3.61 | 4.07  | 1.92  | 20.942 | 22.632 | 4.07 | -20.1  |
| 2500                      | 47.8  | -3.21 | 4.61  | 2.46  | 23.42  | 24.383 | 4.61 | -22.6  |

| Passive Test For 5Gwifi |       |       |       |       |        |        |      |        |
|-------------------------|-------|-------|-------|-------|--------|--------|------|--------|
| Freq                    | Effi  | Effi  | Gain  | Gain  | UHS    | DHS    | Max  | Min    |
| (MHz)                   | (%)   | (dB)  | (dBi) | (dBd) | (%)    | (%)    | (dB) | (dB)   |
| 5000                    | 54.63 | -2.63 | 4.03  | 1.88  | 29.863 | 24.764 | 4.03 | -15.72 |
| 5100                    | 55.41 | -2.56 | 4.22  | 2.07  | 30.612 | 24.795 | 4.22 | -16.74 |
| 5200                    | 59.98 | -2.22 | 3.97  | 1.82  | 32.532 | 27.446 | 3.97 | -17.18 |
| 5300                    | 71.13 | -1.48 | 3.61  | 1.46  | 37.051 | 34.082 | 3.61 | -12.98 |
| 5400                    | 70.46 | -1.52 | 3.15  | 1     | 34.9   | 35.559 | 3.15 | -11.72 |
| 5500                    | 71.55 | -1.45 | 3.83  | 1.68  | 33.278 | 38.272 | 3.83 | -12.07 |
| 5600                    | 56.21 | -2.5  | 3.72  | 1.57  | 28.451 | 27.757 | 3.72 | -12.88 |
| 5700                    | 64.66 | -1.89 | 5.13  | 2.98  | 33.662 | 30.999 | 5.13 | -12.1  |
| 5800                    | 65.74 | -1.82 | 4.75  | 2.6   | 33.723 | 32.016 | 4.75 | -22.48 |
| 5900                    | 59.49 | -2.26 | 3.74  | 1.59  | 31.093 | 28.397 | 3.74 | -20.23 |
| 6000                    | 68    | -1.68 | 4.51  | 2.36  | 37.654 | 30.343 | 4.51 | -13.01 |

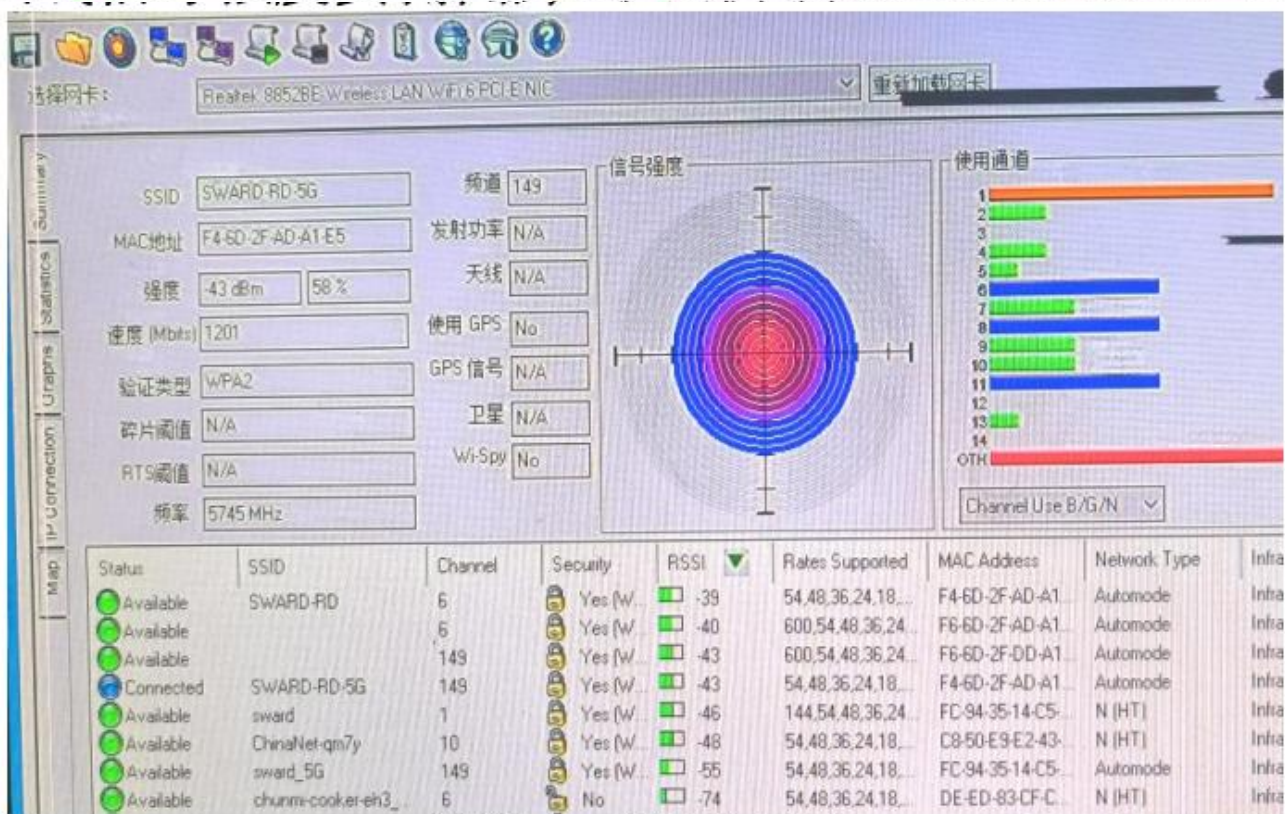
## 五:ThroughPut Test

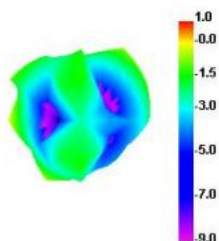
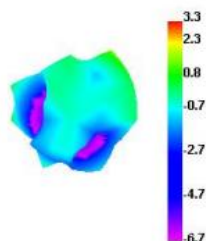
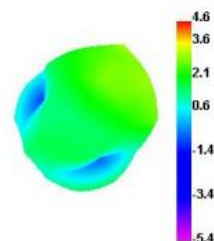
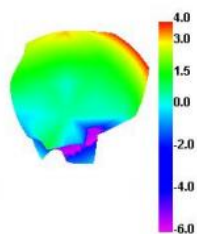
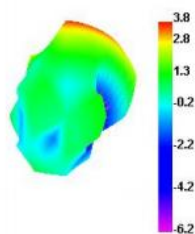
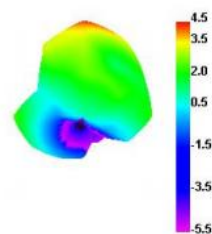
| Iperf吞吐量测试 |           |                        |           |                     |                     |           |
|------------|-----------|------------------------|-----------|---------------------|---------------------|-----------|
| 机型         | MINIPC-H1 | 模块                     | 61852BE模块 | 软件版本                | Windows_Iperf       |           |
| 机型编号       | 频段        | 距离                     | 测试角度      | 测试数据 (TX)<br>lmin均值 | 测试数据 (RX)<br>lmin均值 | 备注 (掉包次数) |
| 1          | 2.4G      | 2.4G WIFI<br>(研发测试15m) | 0°        | 36.9 Mbps           | 168 Mbps            | 0         |
|            |           |                        | 90°       | 33.9 Mbps           | 158 Mbps            | 0         |
|            |           |                        | 180°      | 35.3 Mbps           | 180 Mbps            | 0         |
|            |           |                        | 270°      | 30.1 Mbps           | 181 Mbps            | 0         |
|            |           | -                      |           |                     |                     |           |
|            |           |                        |           |                     |                     |           |
|            |           |                        |           |                     |                     |           |
|            |           |                        |           |                     |                     |           |
|            | 5G        | 5G WIFI<br>(研发测试15m)   | 0°        | 370 Mbps            | 569 Mbps            | 0         |
|            |           |                        | 90°       | 398 Mbps            | 606 Mbps            | 0         |
|            |           |                        | 180°      | 446 Mbps            | 595 Mbps            | 0         |
|            |           |                        | 270°      | 380 Mbps            | 672 Mbps            | 0         |

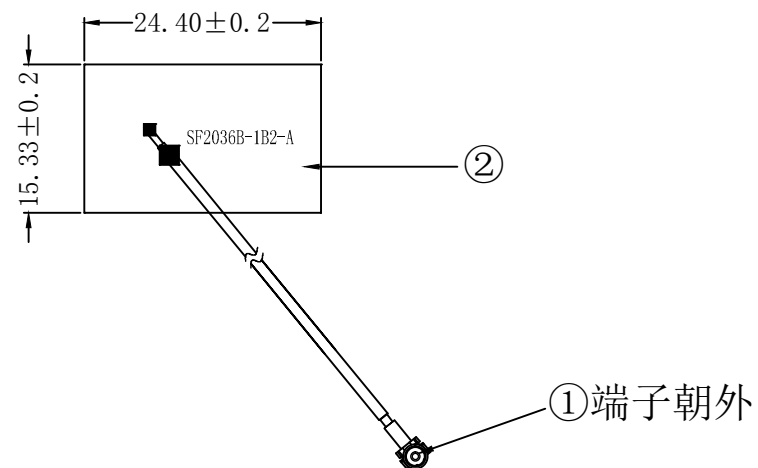
测试数据2.4Gwifi/5.8Gwifi (对应连接速率为 573 / 1201 Mbps)



## 六:Signal Strength Test



**七:3D pattern****2400.000MHz****2450.000MHz****2500.000MHz****5000.000MHz****5500.000MHz****6000.000MHz****八:Structure Drawings**



1. 打\*为重点尺寸；
2. 尺寸符合图纸要求；
3. 焊点无虚焊、假焊。要求圆润、饱满。
4. 网分测试通过（出现指定波形）。
5. 线形尺寸未注公差按照SJ/T 10628 1995 6级，公差值由上下偏差均分；

SWD-FM-RD-012 A. 0/2019. 12