

# Testing Report

Customer Name: Xiamen Hanin Electronic Technology Co.,Ltd.

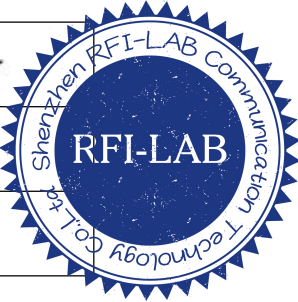
Product Name: WIFI Antenna

Sample Model: Antenna for 2.4G application

Reference Standard: *GB/T 9410-2008; ANSI/IEEE Std 149-2021*

Issue Date: 2022.10.26

|                   |                  |
|-------------------|------------------|
| Engineer: Jackson | Date: 2022.10.24 |
| Auditor: Eason    | Date: 2022.10.26 |
| Approver: Janson  | Date: 2022.10.26 |



## Version

| Version No. | Date       | Description                   | Formulate | Approval |
|-------------|------------|-------------------------------|-----------|----------|
| A0          | 2022.10.26 | For the first time, formulate | Jackson   | Eason    |
|             |            |                               |           |          |
|             |            |                               |           |          |

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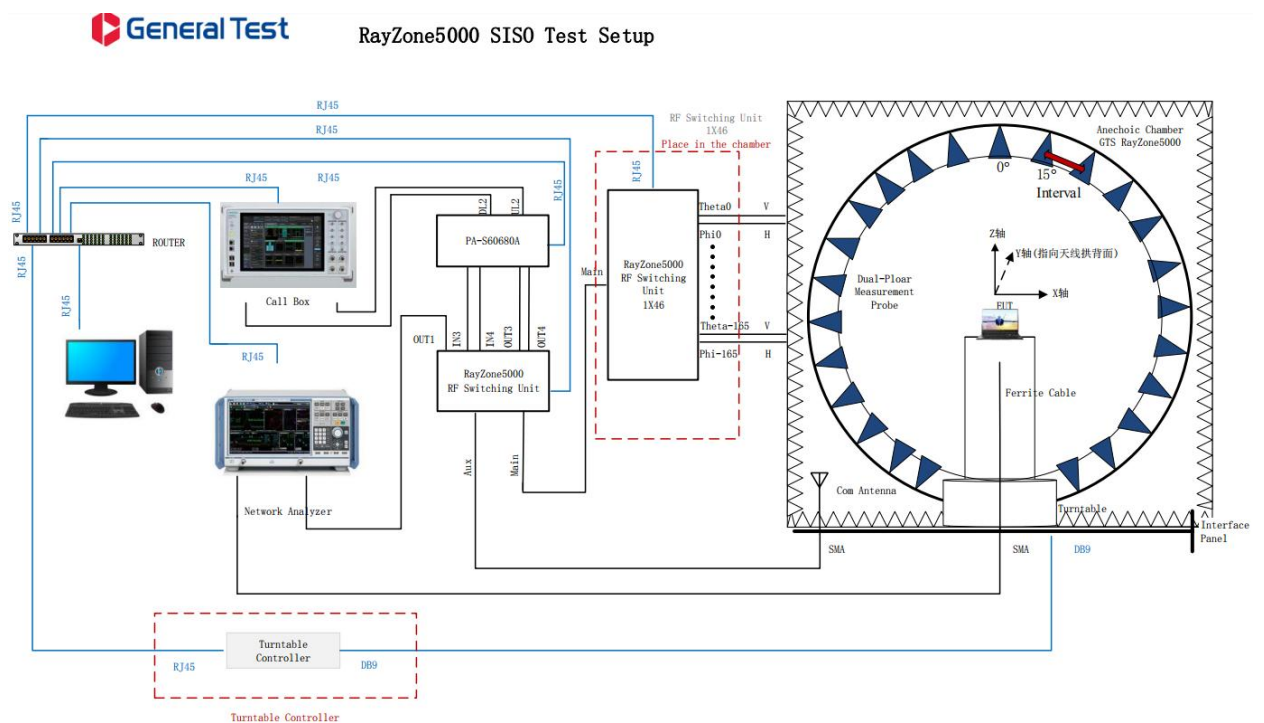
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## 1.General Information

## 1.1 General information of testing institutions

|                  |                                                                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name</b>      | Shenzhen RFI-LAB Communication Technology Co., Ltd.                                                                                                           |
| <b>Address</b>   | 10/F A, Lingyun Bld, Liufang Road, Baoan District, Shenzhen                                                                                                   |
| <b>Tel</b>       | 13631623357                                                                                                                                                   |
| <b>E-mail</b>    | liss@tech-now.com                                                                                                                                             |
| <b>Equipment</b> | All the equipment used in the report is fixed in Zone B, West Side of 1/F, Building 1, Tingwei Industrial Park, No.6 Liufang Road, Bao 'an District, Shenzhen |

## 1.2 Testing principle



### 1.3 Test equipment

| Equipment        | Model No.    | Serial No.     | Manufacturer | Calibration date | Next calibration date |
|------------------|--------------|----------------|--------------|------------------|-----------------------|
| OTA Test System  | RayZone-5000 | RFI-LAB-RF-D00 | GTS          | 2021.3.15        | 2023.3.14             |
| Network Analyzer | E5071C       | RFI-LAB-RF-D01 | KEYSIGHT     | 2022.5.13        | 2023.5.12             |
| Network Analyzer | E5071C       | RFI-LAB-RF-C02 | KEYSIGHT     | 2022.5.13        | 2023.5.12             |

### 1.4 Test environment

|             |           |
|-------------|-----------|
| Temperature | 24.2℃     |
| Humidity    | 59%RH     |
| Pressure    | 100.13kPa |

### 1.5 Statement

- (1) The test results in the report are only applicable to the tested samples and the tested samples work under the environment described in the report.
- (2) Only Shenzhen RFI-LAB Communication Technology Co., Ltd. have the right to modify the report, and the modification information shall be annotated in the revision form.
- (3) Any objection to this report shall be raised within 30 days after formal confirmation of the report.
- (4) This report is invalid if there is any evidence that the sample information provided is falsified.
- (5) The report is invalid without the signature of the auditor and approver.

## 2.Sample Information

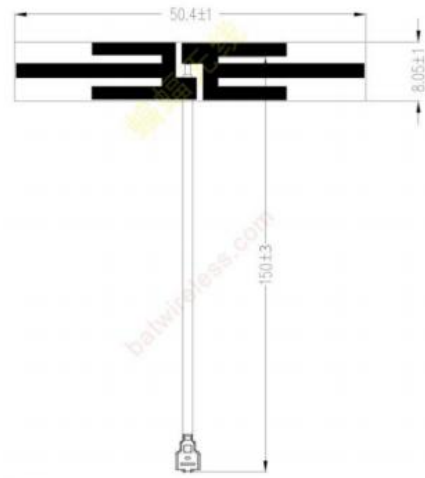
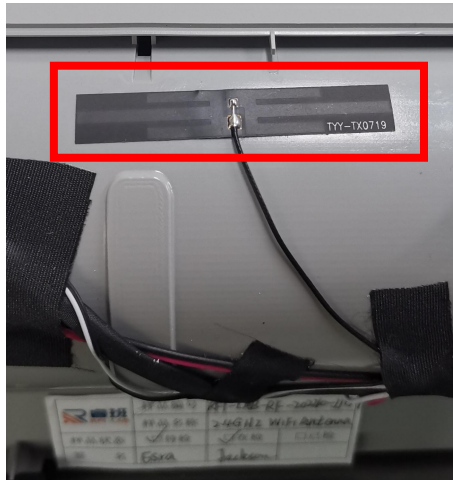
### 2.1 Client information

|                 |                                                                              |
|-----------------|------------------------------------------------------------------------------|
| <b>Name</b>     | Xiamen Hanin Electronic Technology Co.,Ltd.                                  |
| <b>Address</b>  | Room 305A, Angye Building, Pioneering Park,<br>Torch High-tech, Zone, Xiamen |
| <b>Contacts</b> | /                                                                            |
| <b>Tel</b>      | /                                                                            |
| <b>E-mail</b>   | /                                                                            |

### 2.2 Description of EUT(S)

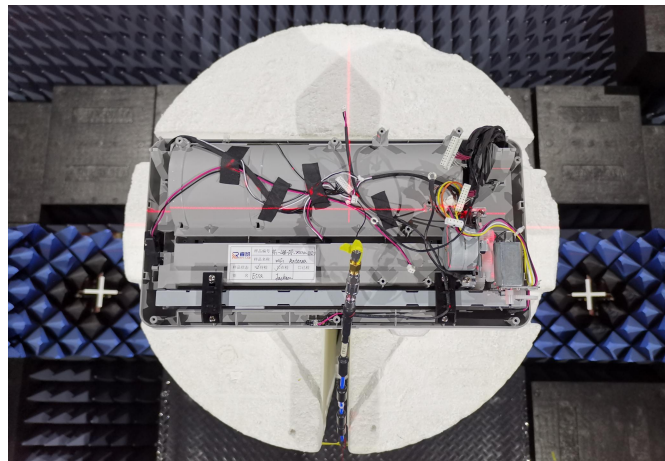
|                        |                                                   |
|------------------------|---------------------------------------------------|
| <b>Product Name</b>    | WIFI Antenna                                      |
| <b>Sample Model</b>    | Antenna for 2.4G application                      |
| <b>Antenna Size</b>    | 50.4*8.05mm                                       |
| <b>Antenna Type</b>    | FPC antenna                                       |
| <b>Serial No.</b>      | /                                                 |
| <b>Test Item</b>       | VSWR; Antenna gain; Efficiency; Radiation pattern |
| <b>Frequency Range</b> | 2400-2500MHz                                      |
| <b>Received Date</b>   | 2022.10.21                                        |
| <b>Test Date</b>       | 2022.10.24                                        |
| <b>Remark</b>          | The length of the RF cable is 150mm               |

## 2.3 EUT appearance

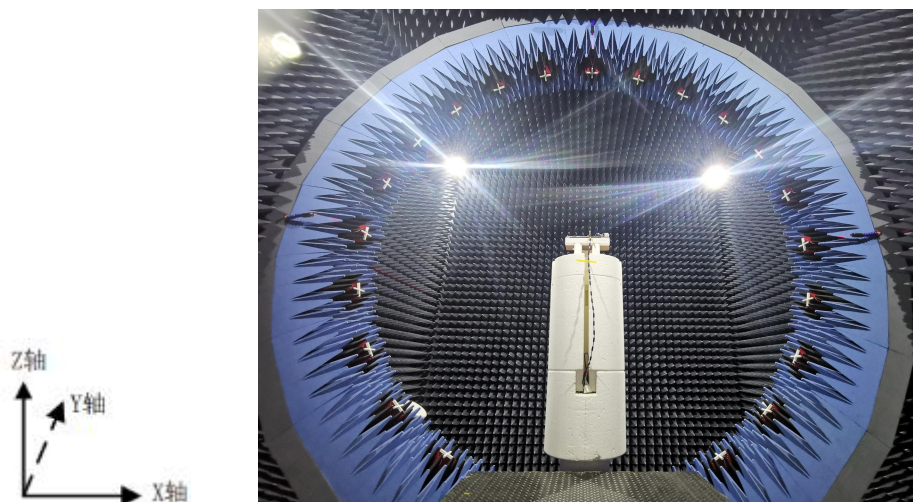


## 2.4 DUT setup photo of free space OTA testing

Planform



Front view



## 3. Test Results

### 3.1 Test standard

| Name                         | Parameter            | Method                                                               | Standard no.           |
|------------------------------|----------------------|----------------------------------------------------------------------|------------------------|
| Mobile communication antenna | Antenna gain         | Generic specification for antennas used in the mobile communications | GB/T 9410-2008         |
|                              | Radiation pattern    |                                                                      |                        |
|                              | VSWR                 |                                                                      |                        |
| Antenna                      | Gain and directivity | IEEE Standard Test Procedures for Antennas                           | ANSI/IEEE Std 149-2021 |
|                              | Radiation efficiency |                                                                      |                        |

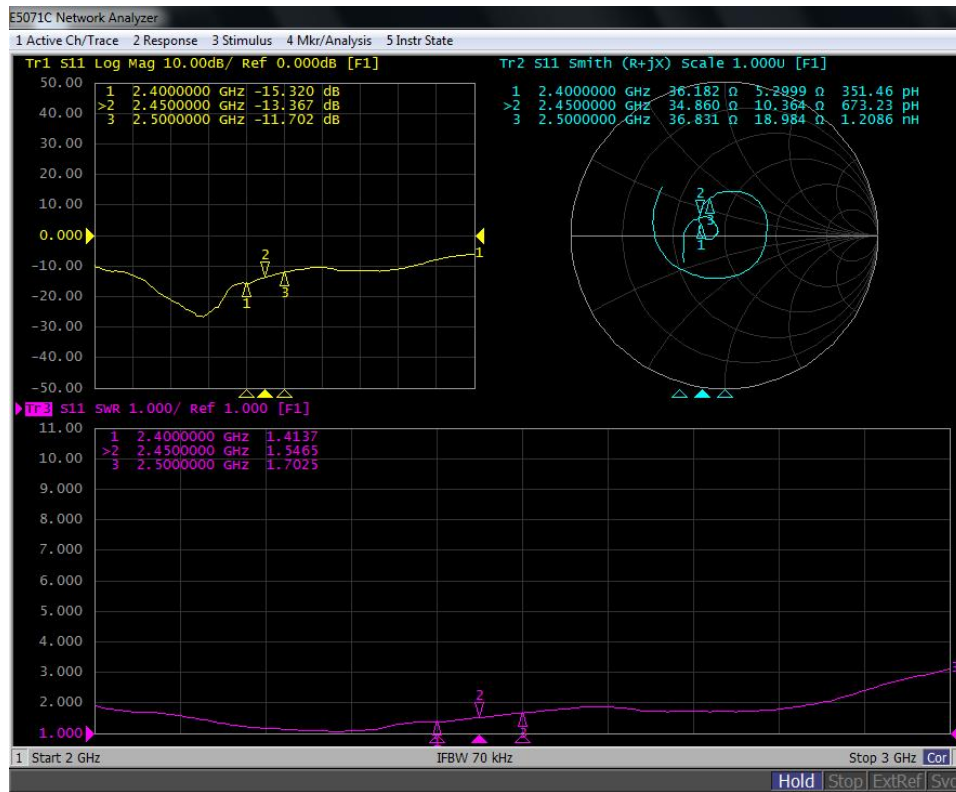
### 3.2 Test uncertainty

The uncertainty was calculated on the basis of the GUM published by ISO, using the inclusion factor of  $K=2$  and the 95% confidence level to express the extended uncertainty.

| Item                 | Uncertainty      |
|----------------------|------------------|
| VSWR                 | $\pm 0.3$        |
| Antenna gain         | $\pm 1\text{dB}$ |
| Radiation efficiency | $\pm 10\%$       |

### 3.3 Test data

#### 3.3.1 S11 parameters



#### 3.3.2 VSWR data

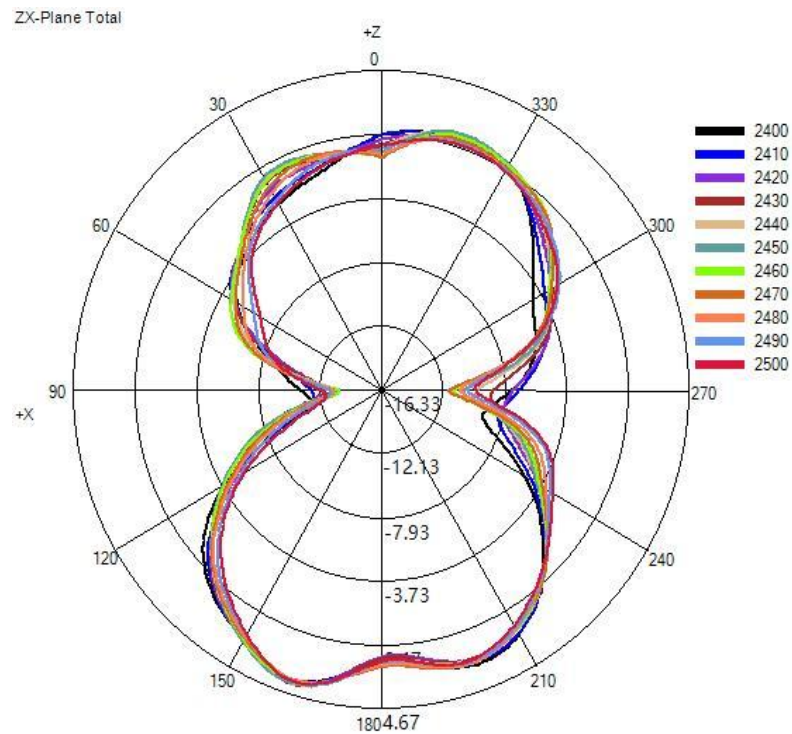
| Frequency/MHz | 2400   | 2450   | 2500   |
|---------------|--------|--------|--------|
| VSWR          | 1.4137 | 1.5465 | 1.7025 |

#### 3.3.3 Typical free space efficiency and gain

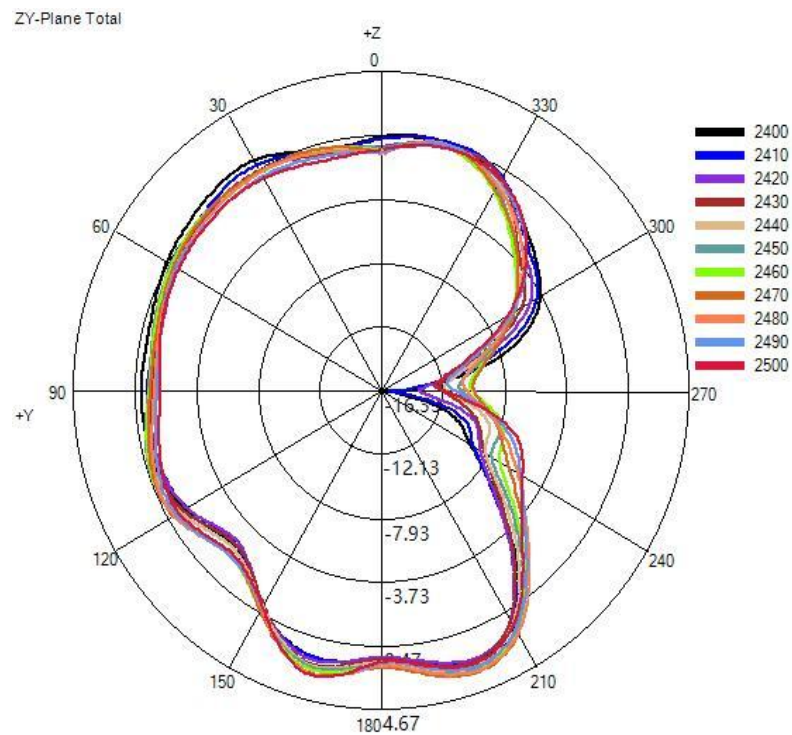
| Frequency/MHz | 2400  | 2410  | 2420  | 2430  | 2440  | 2450  | 2460  | 2470  | 2480  | 2490  | 2500  |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Peak Gain/dBi | 4.23  | 4.20  | 4.29  | 4.39  | 4.41  | 4.52  | 4.58  | 4.65  | 4.61  | 4.58  | 4.53  |
| Efficiency/%  | 67.72 | 66.92 | 66.12 | 66.14 | 66.78 | 67.97 | 67.28 | 66.69 | 65.28 | 63.96 | 62.77 |

### 3.3.4 Typical free space radiation pattern

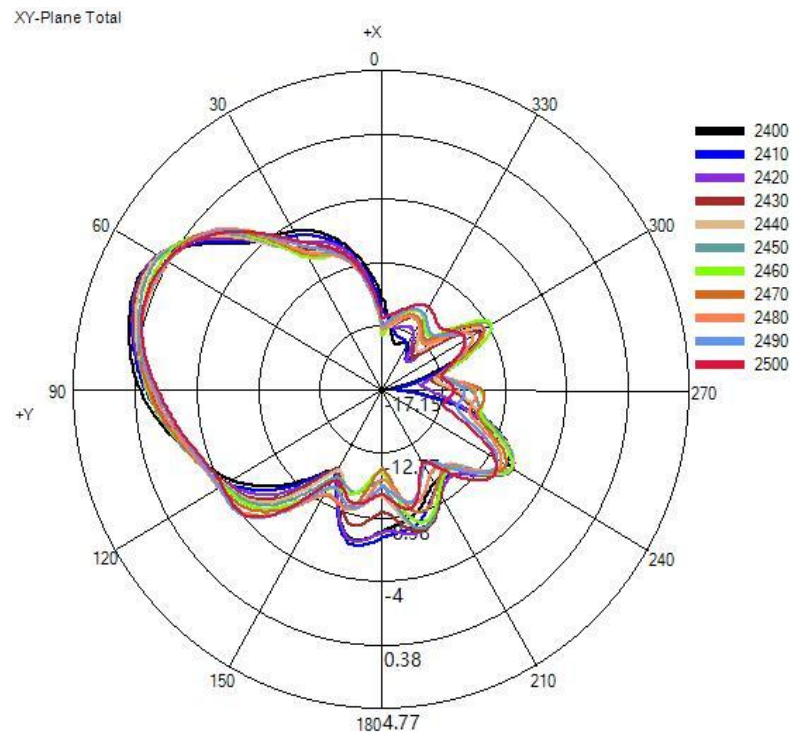
(1) X-Z Plane:



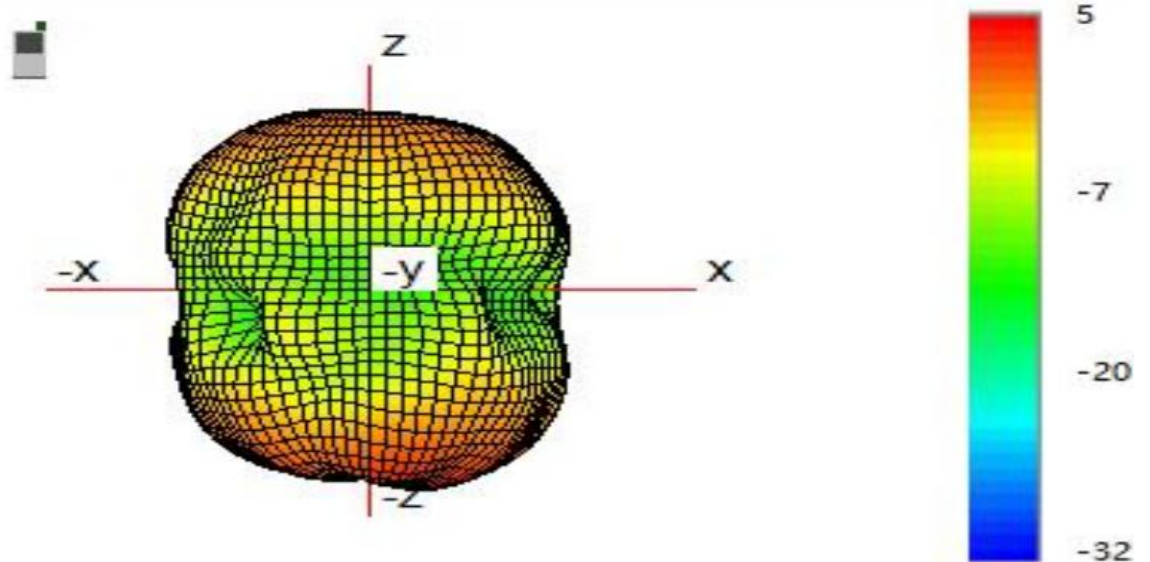
(2) Y-Z Plane:



(3) X-Y Plane:



(4) Typical Free Space 3D Radiation Pattern at 2.45GHz:



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