

# Testing Report

Customer Name: NINGBO DIYA ELECTRIC APPLIANCE CO.,LTD.

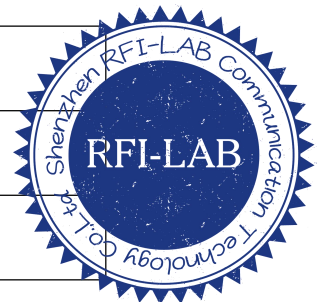
Product Name: 2.4GHz WIFI Antenna

Sample Model: 2.4GHz

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

Issue Date: 2023.02.15

|                 |                   |
|-----------------|-------------------|
| Engineer: Zkm's | Date: 2023. 2. 15 |
| Auditor: Eason  | Date: 2023. 2. 15 |
| Approver: Jaron | Date: 2023. 2. 15 |



## Version

| Version No. | Date       | Description                   | Formulate | Approval |
|-------------|------------|-------------------------------|-----------|----------|
| A0          | 2023.02.15 | For the first time, formulate | Jackson   | Eason    |
|             |            |                               |           |          |
|             |            |                               |           |          |

## Contents

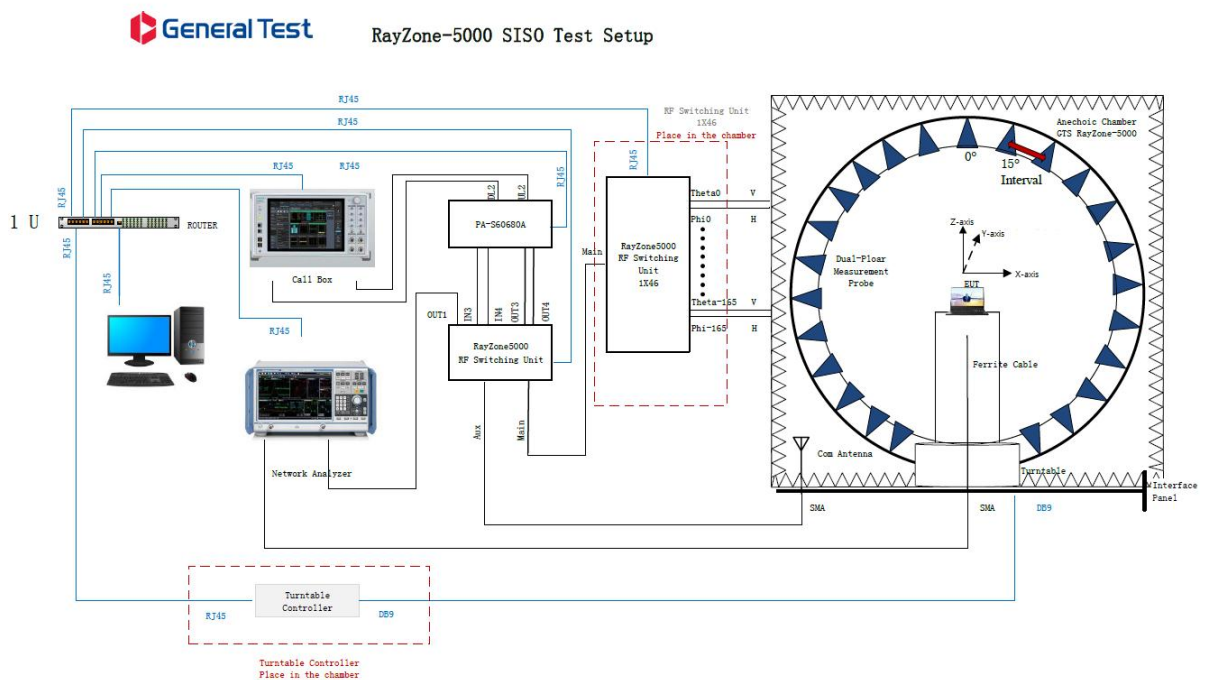
|                                                       |   |
|-------------------------------------------------------|---|
| 1.General Information .....                           | 3 |
| 1.1 General information of testing institutions ..... | 3 |
| 1.2 Testing principle .....                           | 3 |
| 1.3 Test equipment .....                              | 4 |
| 1.4 Test environment .....                            | 4 |
| 1.5 Statement .....                                   | 4 |
| 2.Sample Information .....                            | 5 |
| 2.1 Client information .....                          | 5 |
| 2.2 Description of EUT(S) .....                       | 5 |
| 2.3 EUT appearance .....                              | 6 |
| 2.4 EUT setup photo of free space OTA testing .....   | 6 |
| 3.Test Results .....                                  | 7 |
| 3.1 Test standard .....                               | 7 |
| 3.2 Test uncertainty .....                            | 7 |
| 3.3 Test data .....                                   | 7 |
| 3.3.1 Typical free space efficiency and gain .....    | 7 |
| 3.3.2 Typical free space radiation pattern .....      | 8 |
| (The following is blank) .....                        | 9 |

## 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 Rd, Baoan District, SZ                                                                                                           |
| <b>Tel</b>       | /                                                                                                                                                             |
| <b>E-mail</b>    | /                                                                                                                                                             |
| <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             |

### 1.4 Test environment

|             |           |
|-------------|-----------|
| Temperature | 23.9°C    |
| Humidity    | 57%RH     |
| Pressure    | 100.25kPa |

### 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

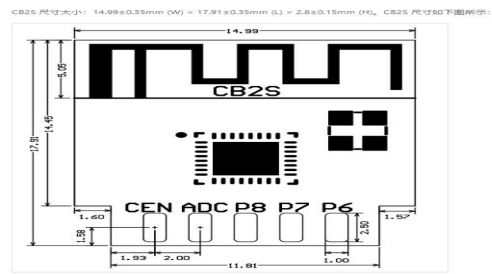
### 2.1 Client information

|              |                                         |
|--------------|-----------------------------------------|
| Name         | NINGBO DIYA ELECTRIC APPLIANCE CO.,LTD. |
| Address      | /                                       |
| Contacts     | /                                       |
| Tel          | /                                       |
| E-mail       | /                                       |
| Manufacturer | /                                       |

### 2.2 Description of EUT(S)

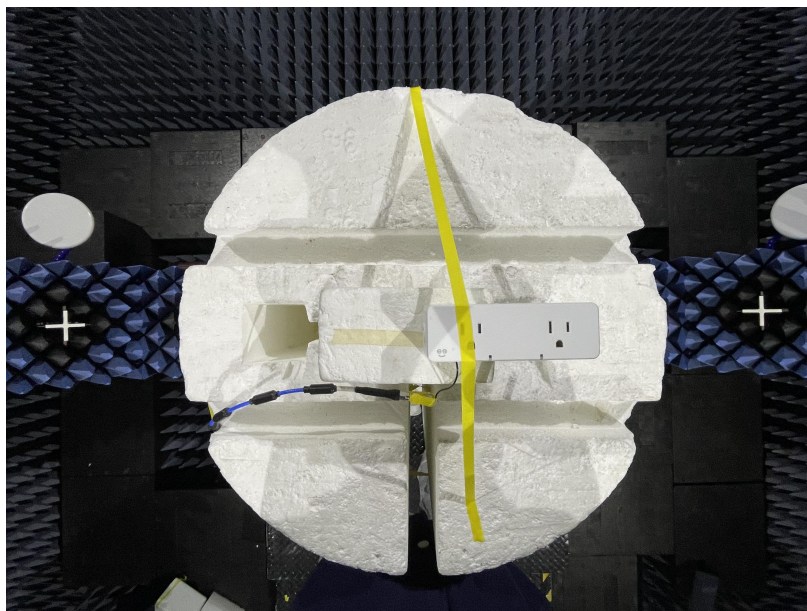
|                 |                                             |
|-----------------|---------------------------------------------|
| Product Name    | 2.4GHz WIFI Antenna                         |
| Sample Model    | 2.4GHz                                      |
| Antenna Size    | /                                           |
| Serial No.      | /                                           |
| Antenna Type    | PCB Antenna                                 |
| Test Item       | Antenna gain; Efficiency; Radiation pattern |
| Frequency Range | 2400-2500MHz                                |
| Received Date   | 2023.02.14                                  |
| Test Date       | 2023.02.15                                  |
| Remark          | The length of the RF cable is 50mm          |

## 2.3 EUT appearance

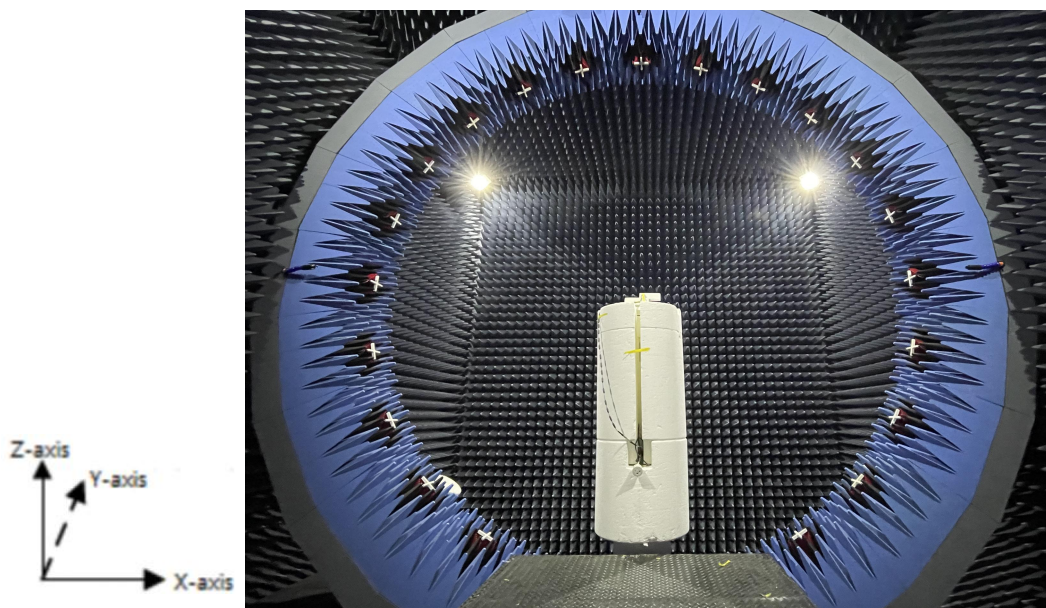


## 2.4 EUT setup photo of free space OTA testing

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    |                                                                      |                        |
| Antenna                      | Radiation efficiency | IEEE Standard Test Procedures for Antennas                           | ANSI/IEEE Std 149-2021 |
|                              | Gain and directivity |                                                                      |                        |

### 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         |
|----------------------|---------------------|
| Antenna gain         | $\pm 0.72\text{dB}$ |
| Radiation efficiency | $\pm 0.72\text{dB}$ |

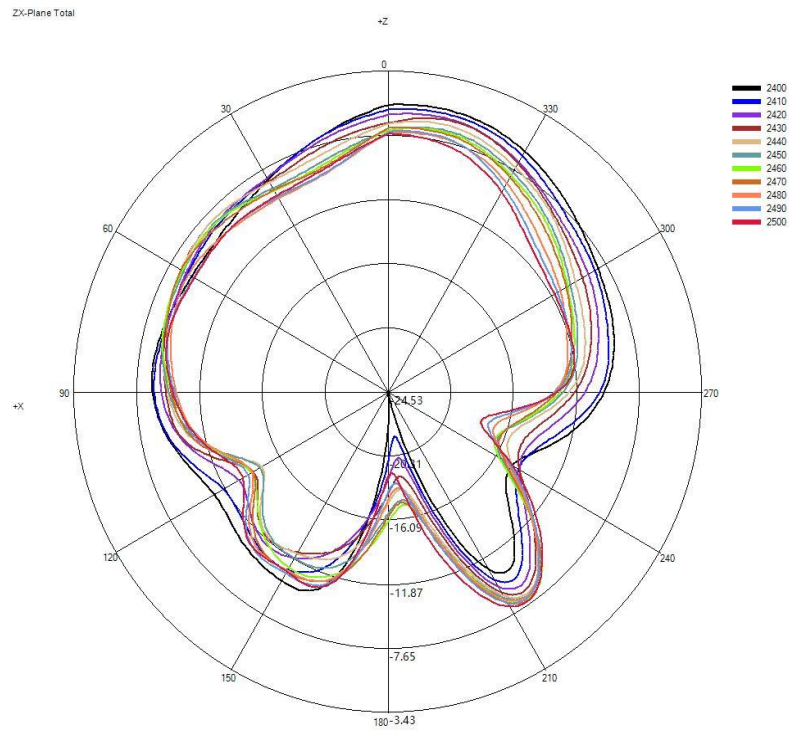
### 3.3 Test data

#### 3.3.1 Typical free space efficiency and gain

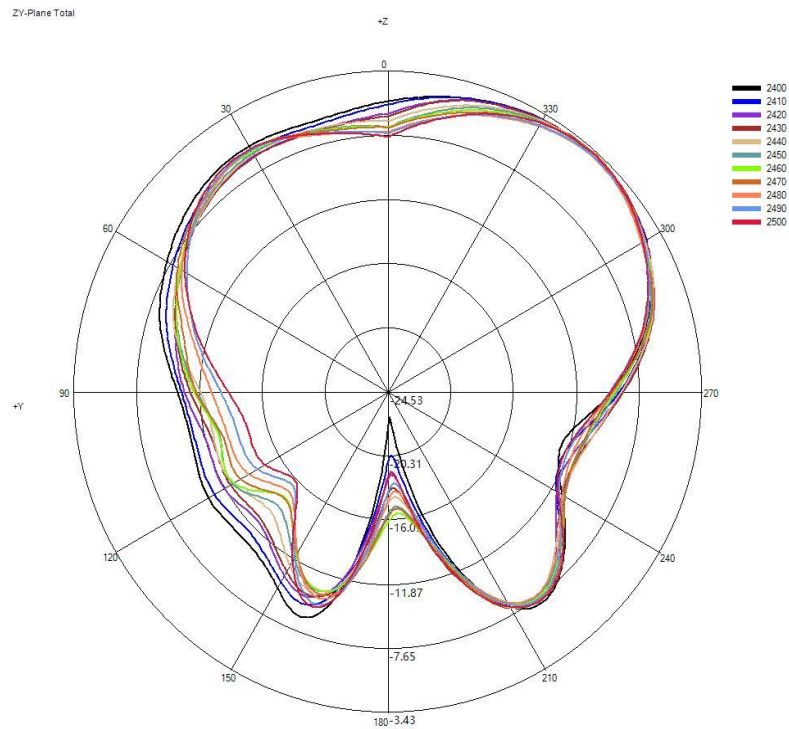
| Frequency/MHz | 2400  | 2410  | 2420  | 2430  | 2440  | 2450  | 2460  | 2470  | 2480  | 2490  | 2500  |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Peak Gain/dBi | -3.50 | -3.60 | -3.72 | -3.65 | -3.73 | -3.83 | -3.65 | -3.59 | -3.78 | -3.78 | -3.70 |
| Efficiency/%  | 14.68 | 14.60 | 14.29 | 14.45 | 14.31 | 13.85 | 13.97 | 13.83 | 12.79 | 12.68 | 12.70 |

### 3.3.2 Typical free space radiation pattern

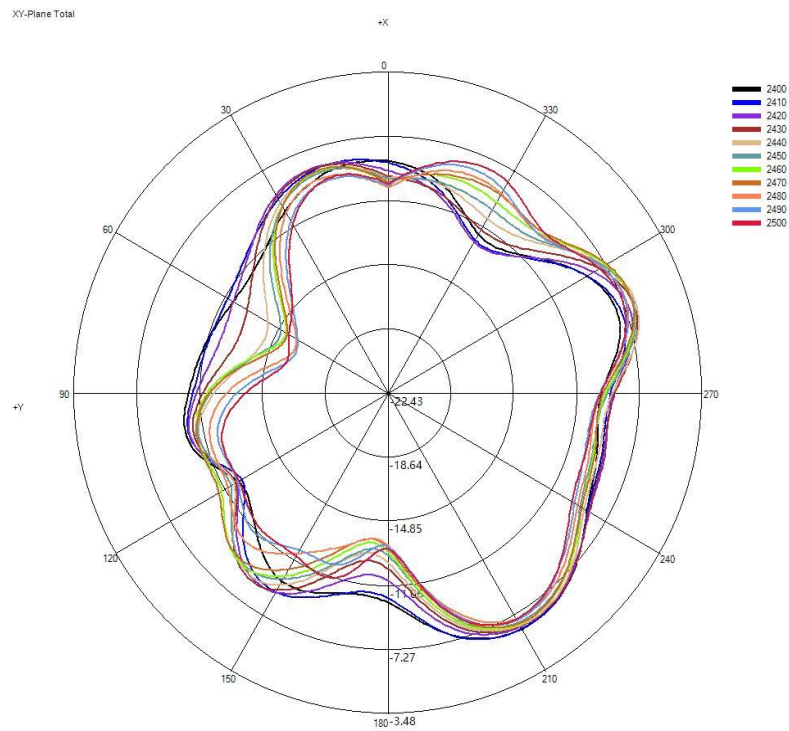
(1) X-Z Plane(unit:dBi):



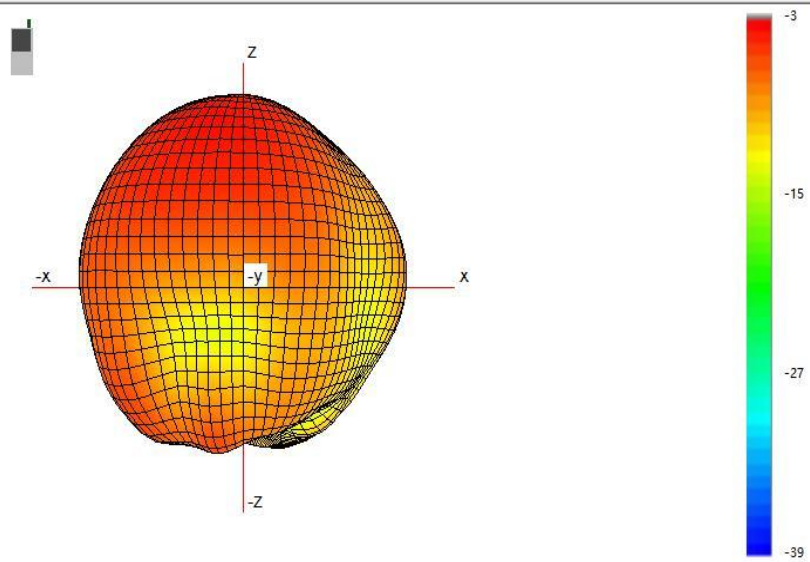
(2) Y-Z Plane(unit:dBi):



(3) X-Y Plane(unit:dBi):



(4) Typical Free Space 3D Radiation Pattern at 2.4GHz(unit:dBi):



-----End-----

(The following is blank)