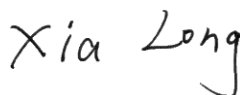


# TEST REPORT

**Applicant:** Shenzhenshi Zhiyuanlian Technology Co., Ltd  
**Address:** 3rd Floor, Building C, Jinhongde E-commerce Industrial Park, Bantian Street, Longgang strict, Shenzhen  
**Equipment Type:** Intelligent voice Bluetooth board  
**Model Name:** IM-180  
**Brand Name:** N/A  
**Test Standard:** IEEE Std 149-2021  
**Sample Arrival Date:** Aug. 22, 2024  
**Test Date:** Aug. 23, 2024  
**Date of Issue:** Sep. 04, 2024

**ISSUED BY:**

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Mai Jintian**Checked by:** Xia Long**Approved by:** Tolan Tu  
(Testing Director)

### Revision History

| Version        | Issue Date           | Revisions            |
|----------------|----------------------|----------------------|
| <u>Rev. 01</u> | <u>Sep. 04, 2024</u> | <u>Initial Issue</u> |

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# 1 GENERAL INFORMATION

## 1.1 Test Laboratory

|              |                                                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------------------------------|
| Name         | Shenzhen BALUN Technology Co., Ltd.                                                                                          |
| Address      | Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6685 0100                                                                                                            |

## 1.2 Test Location

|          |                                                                                                                                                                                                                         |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name     | Shenzhen BALUN Technology Co., Ltd.                                                                                                                                                                                     |
| Location | <input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China                                                        |
|          | <input type="checkbox"/> 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China |

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

|           |                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------|
| Applicant | Shenzhenshi Zhiyuanlian Technology Co., Ltd                                                            |
| Address   | 3rd Floor, Building C, Jinhongde E-commerce Industrial Park, Bantian Street, Longgang strict, Shenzhen |

### 2.2 Manufacturer Information

|              |     |
|--------------|-----|
| Manufacturer | N/A |
| Address      | N/A |

### 2.3 General Description for Equipment under Test (EUT)

|                       |                                   |
|-----------------------|-----------------------------------|
| EUT Name              | Intelligent voice Bluetooth board |
| Model Name Under Test | IM-180                            |
| Antenna Type          | PCB Antenna                       |
| Dimensions            | 14*6 mm                           |

### 2.4 Ancillary Equipment

Note: Not applicable.

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

| No. | Identity          | Document Title                             |
|-----|-------------------|--------------------------------------------|
| 1   | IEEE Std 149-2021 | IEEE Standard Test Procedures for Antennas |

#### 3.2 Test Verdict

| Report Section | Description         | Remark |
|----------------|---------------------|--------|
| ANNEX A.1      | Gain and Efficiency | --     |
| ANNEX B        | Radiation Pattern   | --     |

#### 3.3 Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

| Item      | Uncertainty         |
|-----------|---------------------|
| VSWR(S11) | $\pm 0.61$          |
| Gain      | $\pm 1.92\text{dB}$ |

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Condition

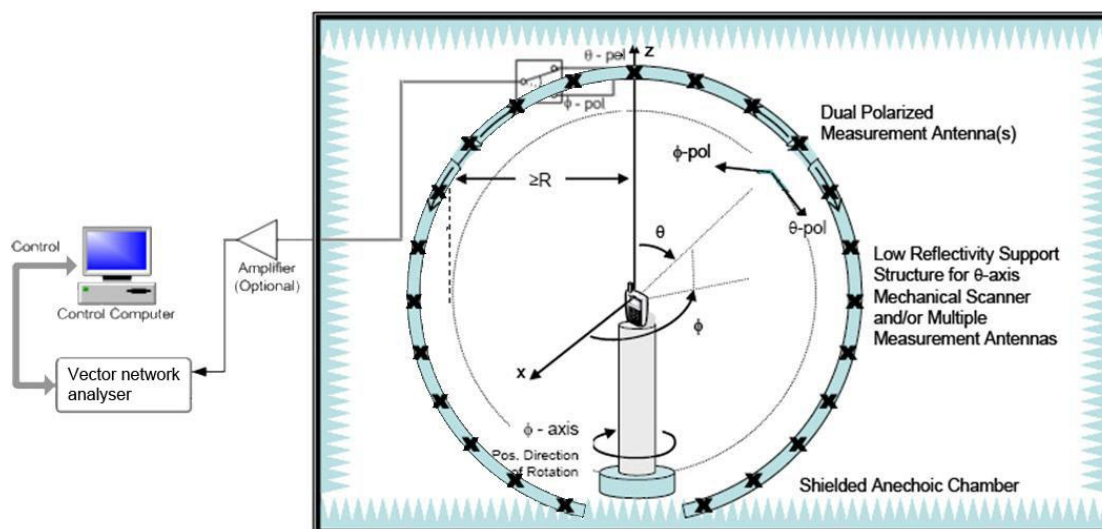
| Environment<br>Parameter                           | Selected Values During Tests |                 |         |                          |
|----------------------------------------------------|------------------------------|-----------------|---------|--------------------------|
|                                                    | Ambient<br>Pressure(KPa)     | Temperature(°C) | Voltage | Relative<br>Humidity (%) |
| Normal<br>Temperature,<br>Normal Voltage<br>(NTNV) | 101                          | 21.6            | N/A     | 46                       |

### 4.2 Test Equipment List

| Description                                       | Manufacturer | Model  | Serial No.       | Cal. Date  | Cal. Due   |
|---------------------------------------------------|--------------|--------|------------------|------------|------------|
| SG24 Multi-probe<br>Antenna Measurement<br>System | SATIMO       | SG24-L | 1101855-<br>0001 | 2021.11.12 | 2024.11.11 |
| Vector Network<br>Analyzer                        | Agilent      | E5071B | MY42404001       | 2024.01.16 | 2025.01.15 |
| Description                                       | Manufacturer | Name   |                  | Version    |            |
| Test Software                                     | MVG          | SPM    |                  | V 1.8      |            |

## 4.3 Test Setup

### 4.3.1 Antenna gain, efficiency and radiation pattern test setup



## 4.4 Test Frequencies

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Frequencies | 2400MHz, 2402MHz, 2404MHz, 2406MHz, 2408MHz, 2410MHz,<br>2412MHz, 2414MHz, 2416MHz, 2418MHz, 2420MHz, 2422MHz,<br>2424MHz, 2426MHz, 2428MHz, 2430MHz, 2432MHz, 2434MHz,<br>2436MHz, 2438MHz, 2440MHz, 2442MHz, 2444MHz, 2446MHz,<br>2448MHz, 2450MHz, 2452MHz, 2454MHz, 2456MHz, 2458MHz,<br>2460MHz, 2462MHz, 2464MHz, 2466MHz, 2468MHz, 2470MHz,<br>2472MHz, 2474MHz, 2476MHz, 2478MHz, 2480MHz, 2482MHz,<br>2484MHz, 2486MHz, 2488MHz, 2490MHz, 2492MHz, 2494MHz,<br>2496MHz, 2498MHz, 2500MHz |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## ANNEX A TEST RESULTS

### A.1 Gain and Efficiency

| Frequency | Gain (dBi)  | Efficiency (%) |
|-----------|-------------|----------------|
| 2400MHz   | <b>0.24</b> | <b>35</b>      |
| 2402MHz   | 0.21        | 35             |
| 2404MHz   | 0.17        | 35             |
| 2406MHz   | 0.14        | 35             |
| 2408MHz   | 0.08        | 35             |
| 2410MHz   | 0.03        | 35             |
| 2412MHz   | -0.04       | 35             |
| 2414MHz   | -0.07       | 34             |
| 2416MHz   | 0.02        | 34             |
| 2418MHz   | -0.02       | 34             |
| 2420MHz   | -0.08       | 34             |
| 2422MHz   | -0.14       | 34             |
| 2424MHz   | -0.19       | 34             |
| 2426MHz   | -0.20       | 34             |
| 2428MHz   | -0.25       | 34             |
| 2430MHz   | -0.33       | 33             |
| 2432MHz   | -0.39       | 33             |
| 2434MHz   | -0.43       | 33             |
| 2436MHz   | -0.48       | 33             |
| 2438MHz   | -0.55       | 33             |
| 2440MHz   | -0.60       | 32             |
| 2442MHz   | -0.63       | 32             |
| 2444MHz   | -0.67       | 32             |
| 2446MHz   | -0.98       | 31             |
| 2448MHz   | -1.04       | 31             |
| 2450MHz   | -1.02       | 31             |
| 2452MHz   | -1.02       | 31             |
| 2454MHz   | -1.05       | 31             |
| 2456MHz   | -1.01       | 30             |
| 2458MHz   | -0.99       | 30             |
| 2460MHz   | -1.01       | 30             |
| 2462MHz   | -1.06       | 30             |
| 2464MHz   | -1.11       | 30             |
| 2466MHz   | -1.06       | 30             |
| 2468MHz   | -1.07       | 30             |
| 2470MHz   | -1.14       | 30             |
| 2472MHz   | -1.19       | 30             |
| 2474MHz   | -1.19       | 30             |

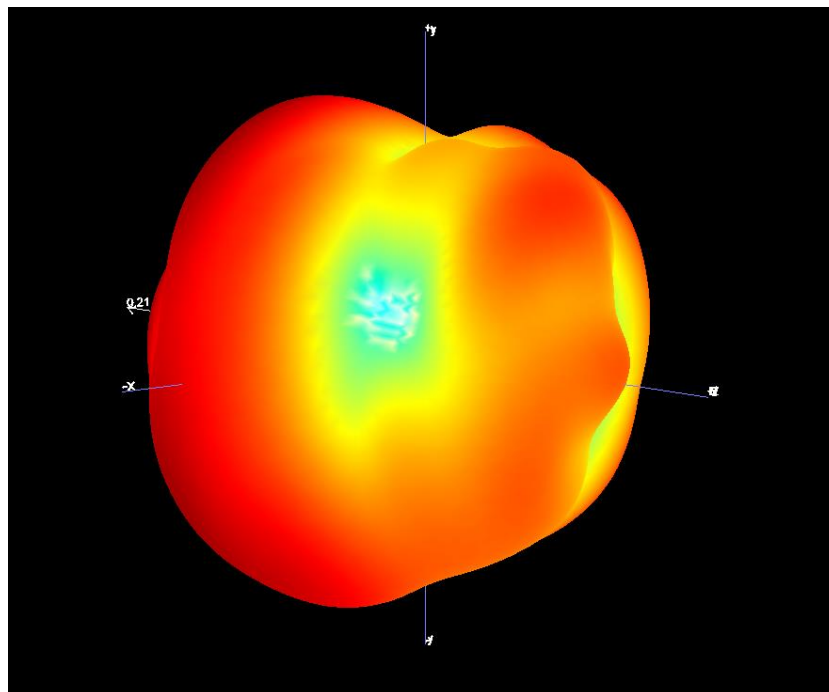


|         |       |    |
|---------|-------|----|
| 2476MHz | -1.23 | 30 |
| 2478MHz | -1.26 | 29 |
| 2480MHz | -1.32 | 29 |
| 2482MHz | -1.41 | 28 |
| 2484MHz | -1.48 | 28 |
| 2486MHz | -1.59 | 27 |
| 2488MHz | -1.66 | 27 |
| 2490MHz | -1.73 | 27 |
| 2492MHz | -1.77 | 27 |
| 2494MHz | -1.82 | 26 |
| 2496MHz | -1.76 | 26 |
| 2498MHz | -1.82 | 26 |
| 2500MHz | -1.88 | 26 |

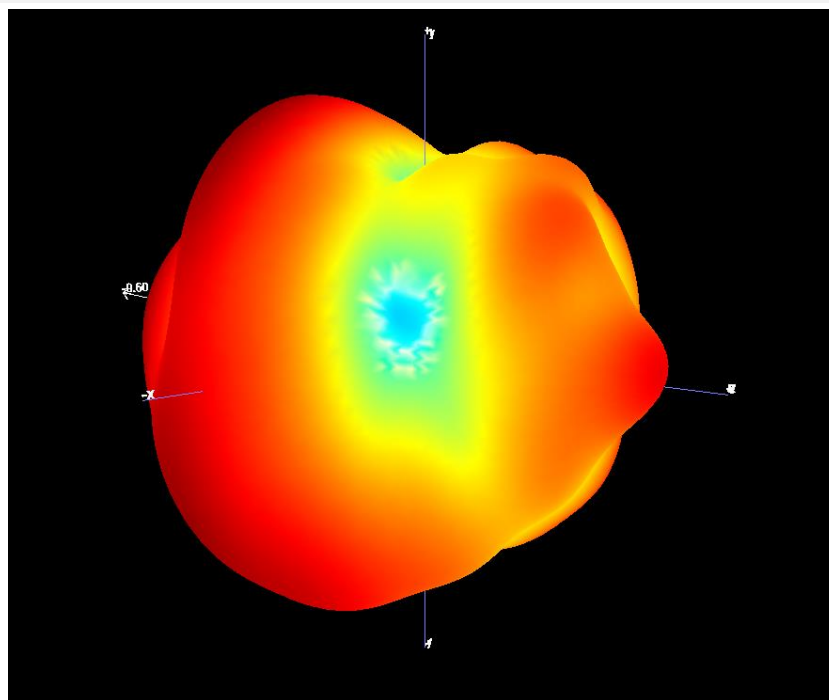
## ANNEX B RADIATION PATTERN

### B.1 3D Pattern

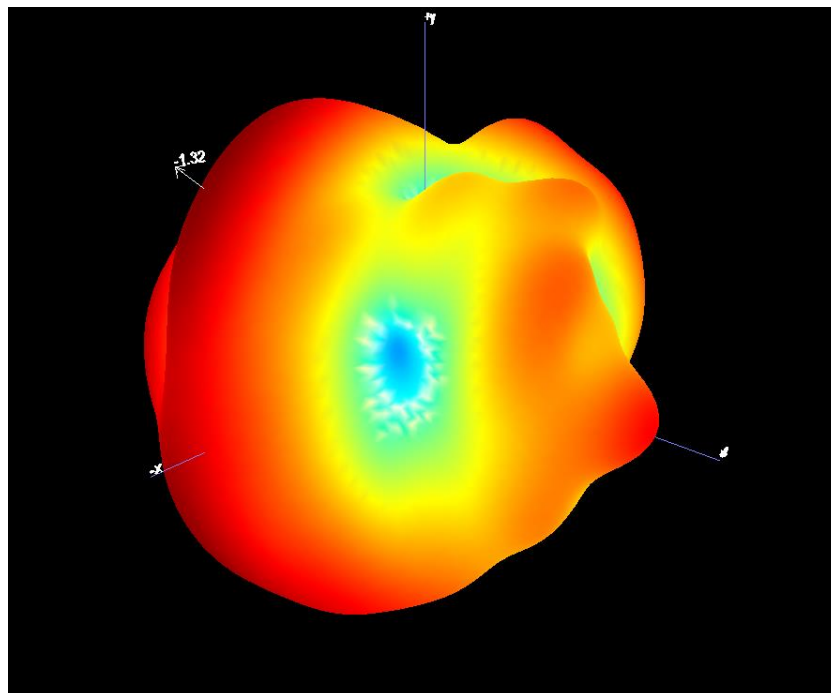
B1.1 3D Pattern for 2402MHz



B1.2 3D Pattern for 2440MHz

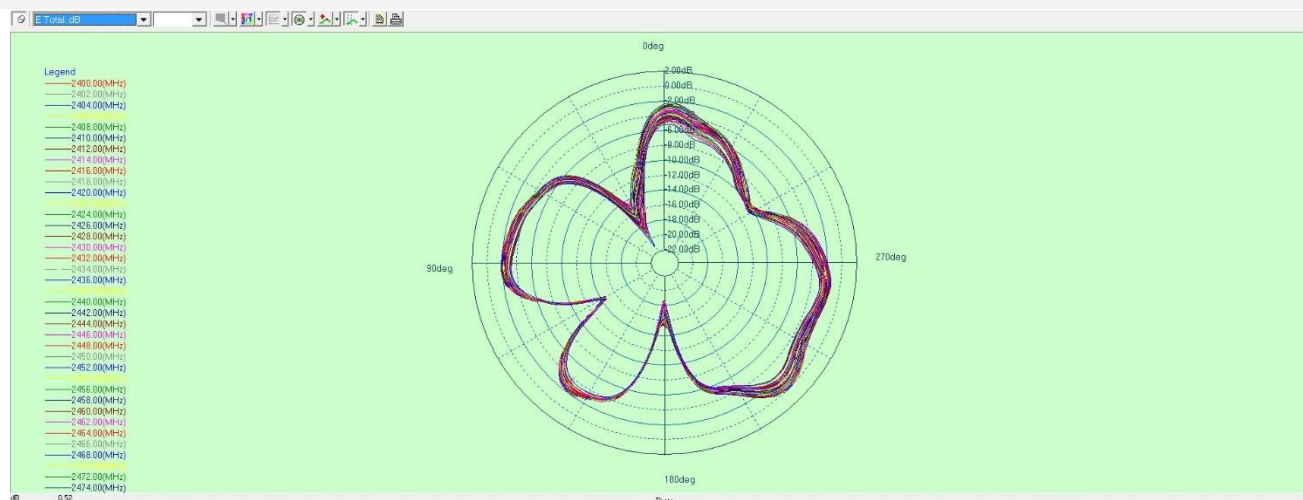


B1.3 3D Pattern for 2480MHz

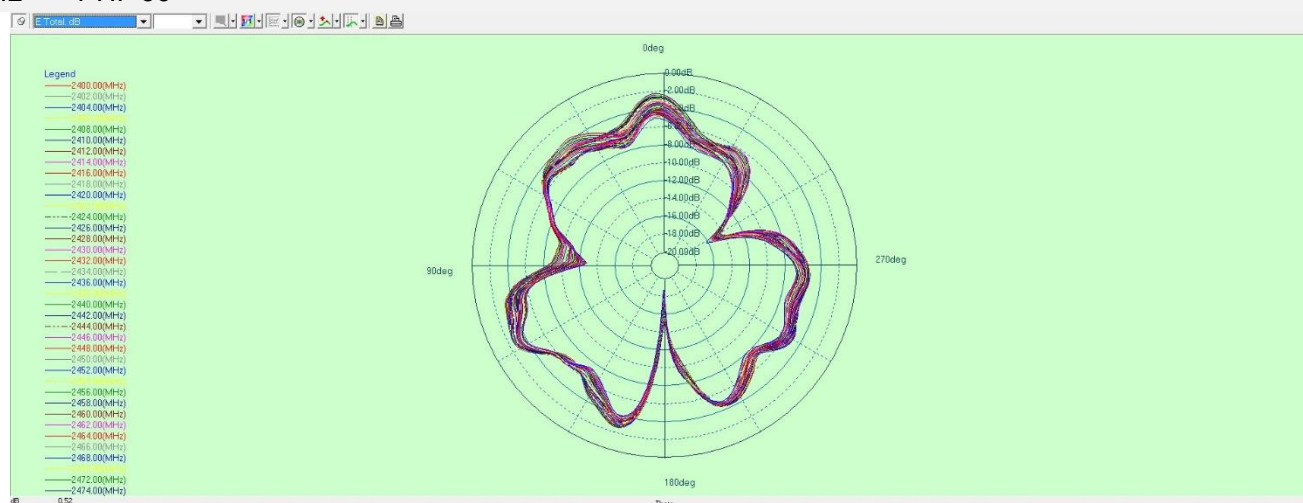


## B.2 1D Radiation Pattern

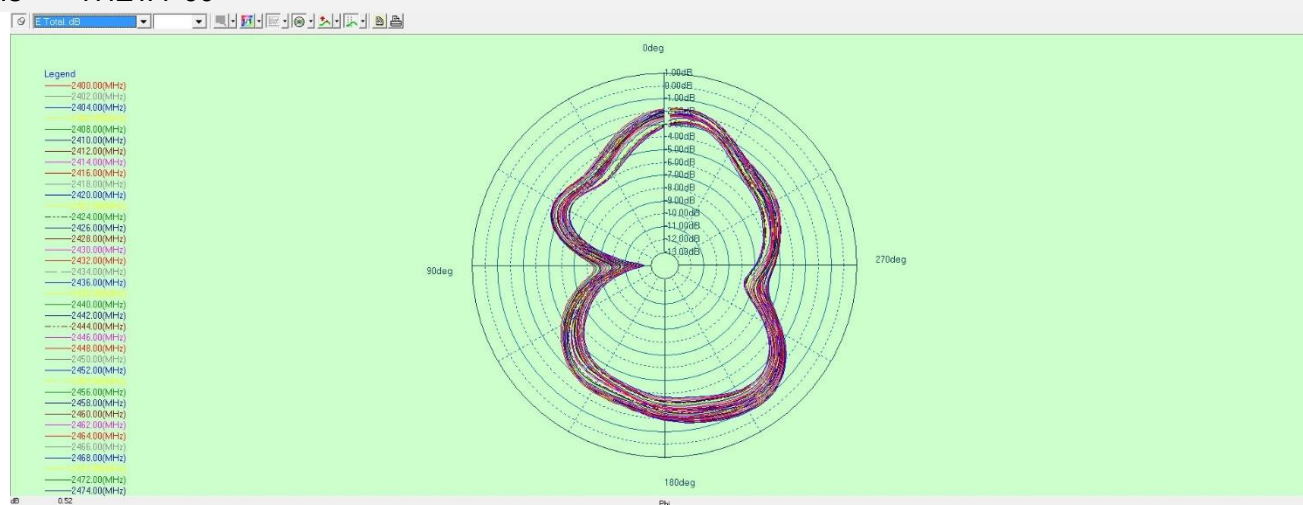
### B2.1 PHI=0



### B2.2 PHI=90



### B2.3 THETA=90



## **ANNEX C TEST SETUP PHOTOS**

Please refer the document “BL-SZ2481008-AO.PDF”.

## **ANNEX D EUT PHOTO**

Please refer the document “BL-SZ2481008-AA.PDF”.

## Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--