

# TEST REPORT

**Applicant:** Shen Zhen Broadwell Technology co. ltd  
**Address:** 719 Mintai Mansion, Minkang Road, Minzhi,  
Shenzhen, 518000, China  
**Equipment Type:** 2.4G BT WIFI PCB Antenna  
**Model Name:** ANT-BT-WIFI-04  
**Brand Name:** N/A  
**Test Standard:** IEEE Std 149-2021  
**Sample Arrival Date:** Dec. 11, 2023  
**Test Date:** Dec. 13, 2023 - Dec. 14, 2023  
**Date of Issue:** Dec. 19, 2023

**ISSUED BY:**

Shenzhen BALUN Technology Co., Ltd.

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

### Revision History

| Version        | Issue Date           | Revisions            |
|----------------|----------------------|----------------------|
| <u>Rev. 01</u> | <u>Dec. 19, 2023</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

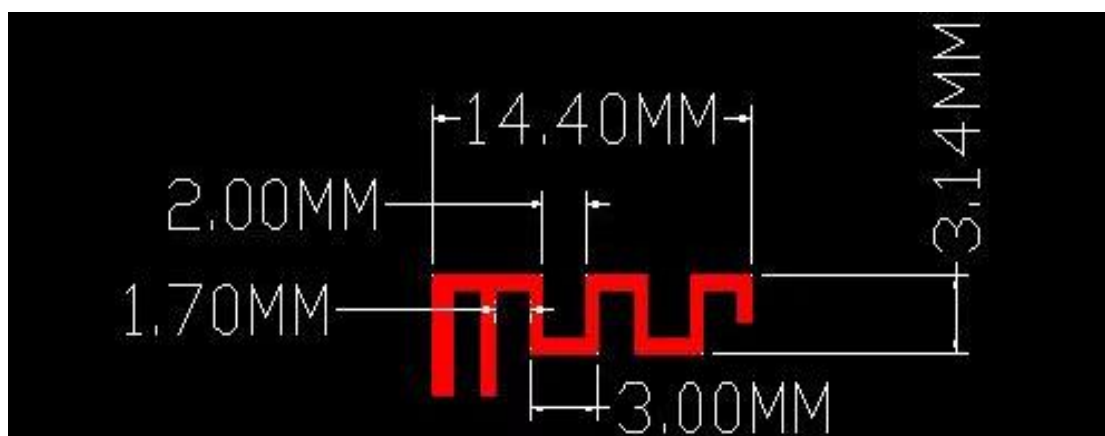
|           |                                                                   |
|-----------|-------------------------------------------------------------------|
| Applicant | Shen Zhen Broadwell Technology co. ltd                            |
| Address   | 719 Mintai Mansion, Minkang Road, Minzhi, Shenzhen, 518000, China |

### 2.2 Manufacturer Information

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

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

|                       |                          |
|-----------------------|--------------------------|
| EUT Name              | 2.4G BT WIFI PCB Antenna |
| Model Name Under Test | ANT-BT-WIFI-04           |
| Antenna Type          | PCB Antenna              |
| Dimensions            | 14.40*5.50 mm            |



## 2.4 Ancillary Equipment

Note: Not applicable.

## 2.5 Technical Information

|                  |                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Frequencies | 2402MHz, 2404MHz, 2406MHz, 2408MHz, 2410MHz, 2412MHz, 2414MHz, 2416MHz, 2418MHz, 2420MHz, 2422MHz, 2424MHz, 2426MHz, 2428MHz, 2430MHz, 2432MHz, 2434MHz, 2436MHz, 2438MHz, 2440MHz, 2442MHz, 2444MHz, 2446MHz, 2448MHz, 2450MHz, 2452MHz, 2454MHz, 2456MHz, 2458MHz, 2460MHz, 2462MHz, 2464MHz, 2466MHz, 2468MHz, 2470MHz, 2472MHz, 2474MHz, 2476MHz, 2478MHz, 2480MHz, 2482MHz, 2483MHz |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 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 A.2      | VSWR                | --     |
| 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         |
|-----------|---------------------|
| Gain      | $\pm 1.92\text{dB}$ |
| VSWR(S11) | $\pm 0.61$          |

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Condition

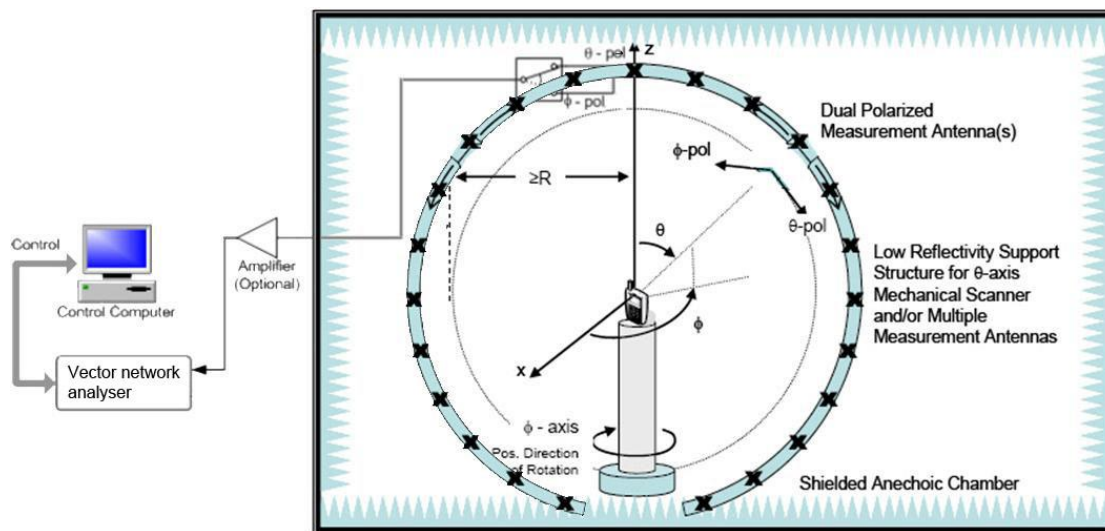
| Environment<br>Parameter                           | Selected Values During Tests |                     |         |                          |
|----------------------------------------------------|------------------------------|---------------------|---------|--------------------------|
|                                                    | Ambient Pressure<br>(KPa)    | Temperature<br>(°C) | Voltage | Relative Humidity<br>(%) |
| Normal<br>Temperature,<br>Normal Voltage<br>(NTNV) | 101                          | 21.6                | N/A     | 44                       |

### 4.2 Test Equipment List

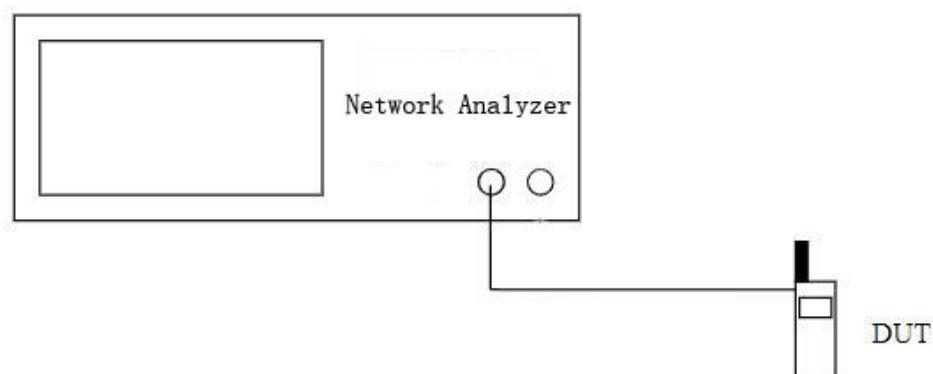
| Description                                       | Manufacturer | Model  | Serial No.       | Cal. Date  | Cal. Due   |
|---------------------------------------------------|--------------|--------|------------------|------------|------------|
| SG24 Multi-probe<br>Antenna Measurement<br>System | SATIMO       | SG24-L | 1101855-<br>0001 | 2021.11.12 | 2024.11.11 |
| Vector Network<br>Analyzer                        | Agilent      | E5071B | MY42404001       | 2023.03.26 | 2024.03.25 |
| 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



#### 4.3.2 S11 parameter test setup



## ANNEX A TEST RESULTS

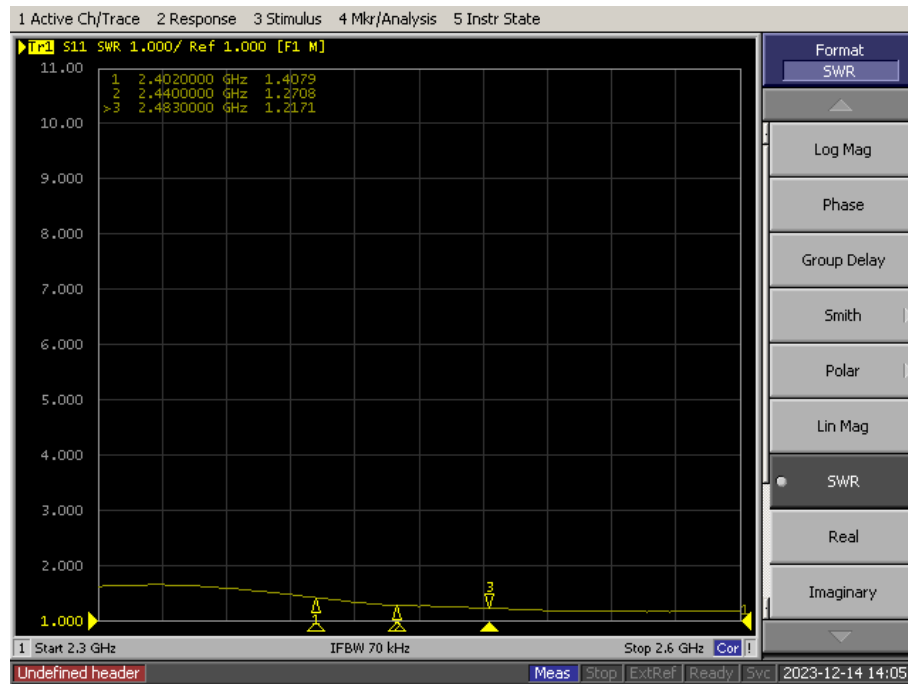
### A.1 Gain and Efficiency

| Frequency | Gain (dBi)  | Efficiency (%) |
|-----------|-------------|----------------|
| 2402MHz   | 1.70        | <b>66</b>      |
| 2404MHz   | 1.60        | 64             |
| 2406MHz   | 1.63        | 63             |
| 2408MHz   | 1.60        | 62             |
| 2410MHz   | 1.54        | 61             |
| 2412MHz   | 1.49        | 60             |
| 2414MHz   | 1.45        | 59             |
| 2416MHz   | 1.48        | 58             |
| 2418MHz   | 1.46        | 58             |
| 2420MHz   | 1.45        | 58             |
| 2422MHz   | 1.45        | 58             |
| 2424MHz   | 1.48        | 59             |
| 2426MHz   | 1.59        | 60             |
| 2428MHz   | 1.65        | 60             |
| 2430MHz   | 1.72        | 61             |
| 2432MHz   | 1.81        | 62             |
| 2434MHz   | 1.91        | 62             |
| 2436MHz   | 1.89        | 62             |
| 2438MHz   | 1.98        | 62             |
| 2440MHz   | 2.07        | 62             |
| 2442MHz   | 2.10        | 62             |
| 2444MHz   | 2.15        | 62             |
| 2446MHz   | 2.20        | 61             |
| 2448MHz   | 2.22        | 61             |
| 2450MHz   | 2.24        | 61             |
| 2452MHz   | 2.26        | 60             |
| 2454MHz   | <b>2.27</b> | 60             |
| 2456MHz   | 2.20        | 60             |
| 2458MHz   | 2.19        | 60             |
| 2460MHz   | 2.17        | 60             |
| 2462MHz   | 2.13        | 59             |
| 2464MHz   | 2.10        | 59             |
| 2466MHz   | 2.03        | 59             |
| 2468MHz   | 2.00        | 59             |
| 2470MHz   | 1.96        | 59             |
| 2472MHz   | 1.93        | 59             |
| 2474MHz   | 1.91        | 59             |
| 2476MHz   | 1.97        | 59             |

|         |      |    |
|---------|------|----|
| 2478MHz | 1.98 | 59 |
| 2480MHz | 1.97 | 59 |
| 2482MHz | 1.93 | 58 |
| 2483MHz | 1.93 | 58 |

## A.2 VSWR

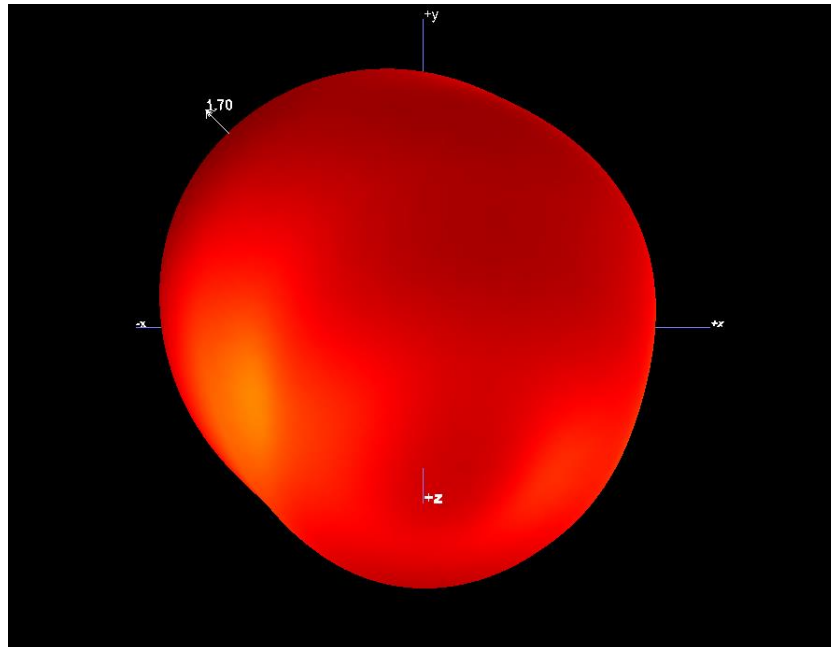
| Frequency | SWR  |
|-----------|------|
| 2402MHz   | 1.41 |
| 2440MHz   | 1.27 |
| 2483MHz   | 1.22 |



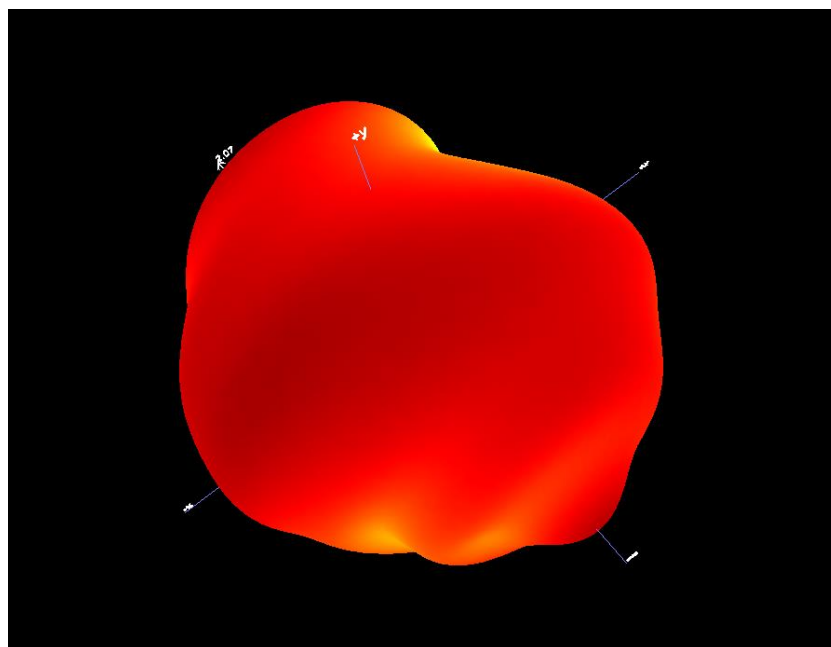
## ANNEX B RADIATION PATTERN

### B.1 3D Pattern

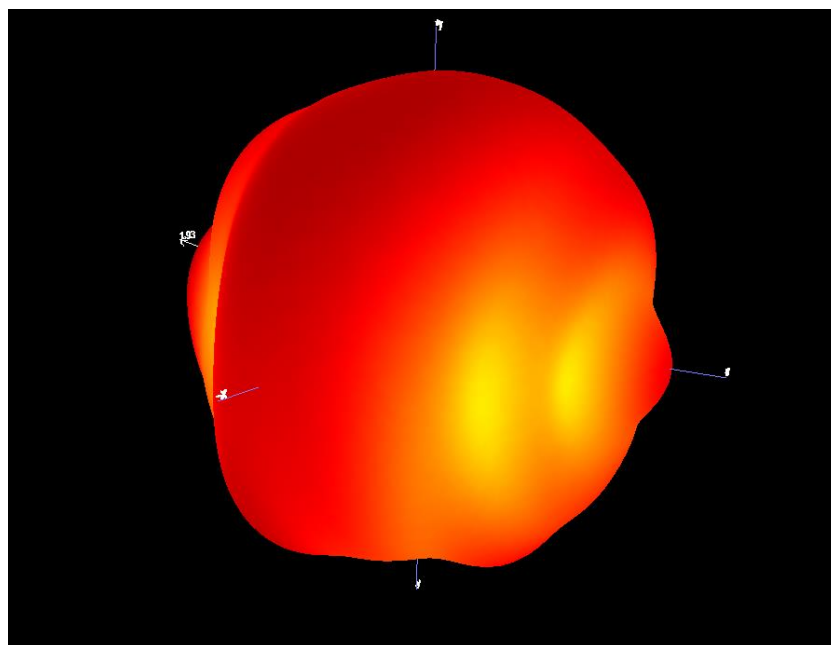
B1.1 3D Pattern for 2402MHz



B1.2 3D Pattern for 2440MHz

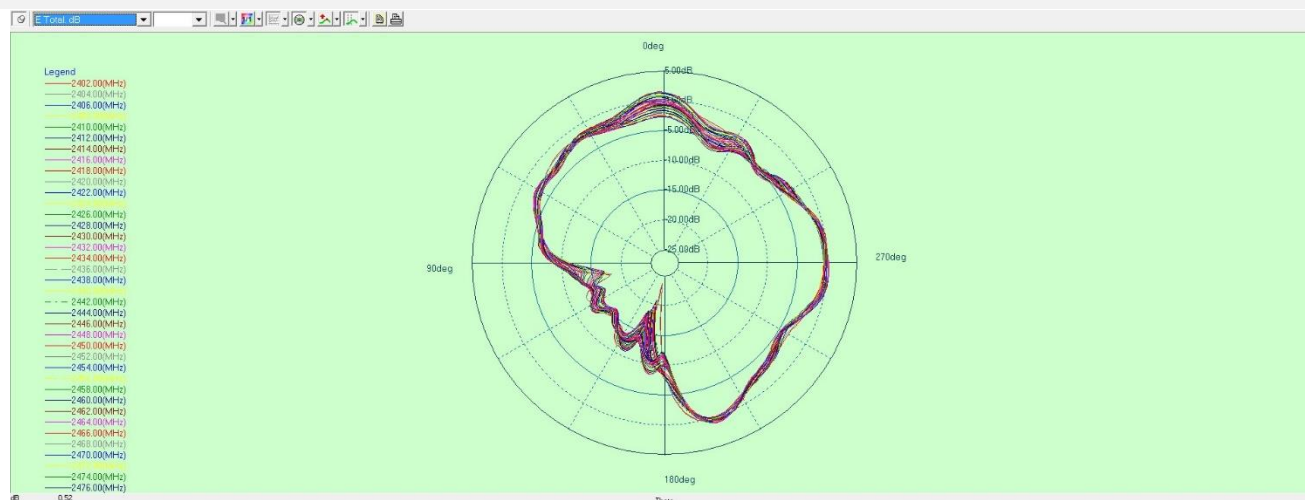


B1.3 3D Pattern for 2483MHz

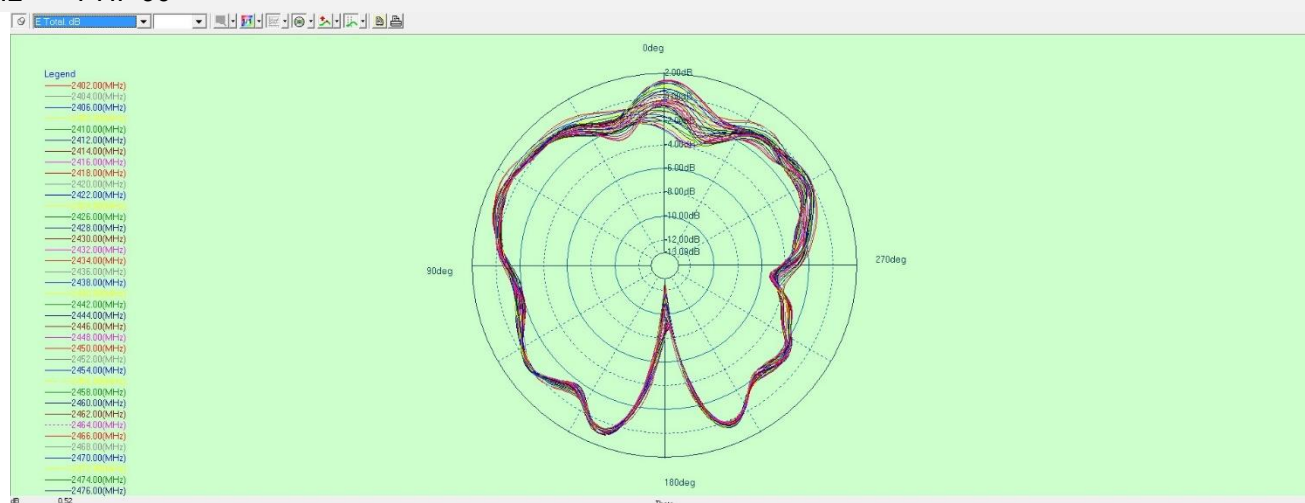


## B.2 1D Radiation Pattern

### B2.1 PHI=0



### B2.2 PHI=90



### B2.3 THETA=90



## **ANNEX C TEST SETUP PHOTOS**

Please refer the document “BL-SZ23C0625-AO-1.PDF”.

## **ANNEX D EUT PHOTO**

Please refer the document “BL-SZ23C0625-AA-1.PDF”.

## Statement

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--END OF REPORT--