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# Antenna Test Report

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Report No.: AGC00806240802PA01

**PRODUCT DESIGNATION** : 2.4G Combo

**BRAND NAME** : radioshack

**MODEL NAME** : ST-OPM323, 2607157, ST-606, ST-621, ST-323, ST-803,  
ST-353, ST-168, ST-XYZ(X=0-9, Y=0-9, Z=0-9)  
ST-OPMXYZ(X=0-9, Y=0-9, Z=0-9)

**APPLICANT** : RADIOSHACK WORLDWIDE CORP.

**DATE OF ISSUE** : Aug. 13, 2024

**REPORT VERSION** : V1.0

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**Report Revise Record**

| Report Version | Revise Time | Issued Date   | Valid Version | Notes           |
|----------------|-------------|---------------|---------------|-----------------|
| V1.0           | /           | Aug. 13, 2024 | Valid         | Initial release |

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## 1. PRODUCT INFORMATION

| General information    |                                                                                                                        |
|------------------------|------------------------------------------------------------------------------------------------------------------------|
| Applicant              | RADIOSHACK WORLDWIDE CORP.                                                                                             |
| Address                | AFRA building Ave. Samuel Lewis and 54 th Street Panama City Postal BOX/P.O Box 0816-01085 Panama 5                    |
| Manufacturer           | Shenzhen Star Sources Electronic Technology Co., Ltd.                                                                  |
| Address                | Room 2102, Block 1 st, Yi Luan Building, Xixiang Road 230, BaoAn District, Shenzhen, China                             |
| Factory                | Shenzhen Star Sources Electronic Technology Co., Ltd.                                                                  |
| Address                | Room 2102, Block 1 st, Yi Luan Building, Xixiang Road 230, BaoAn District, Shenzhen, China                             |
| Product Designation    | 2.4G Combo                                                                                                             |
| Brand Name             | radioshack                                                                                                             |
| Test Model             | ST-OPM323                                                                                                              |
| Series Model           | 2607157, ST-606, ST-621, ST-323, ST-803, ST-353, ST-168, ST-XYZ(X=0-9, Y=0-9, Z=0-9)<br>ST-OPMXYZ(X=0-9, Y=0-9, Z=0-9) |
| Difference Description | All the same except for the model name and packing                                                                     |
| Date of test           | Aug. 13, 2024                                                                                                          |
| Report Template        | AGCRT-ER-PA/V1.0                                                                                                       |
| Technical information  |                                                                                                                        |
| Frequency Range        | 2400-2500MHz                                                                                                           |
| Test Frequencies       | 2400MHz, 2410MHz, 2420MHz, 2430MHz, 2440MHz, 2450MHz, 2460MHz, 2470MHz, 2480MHz, 2490MHz, 2500MHz                      |
| Antenna Type           | PCB antenna                                                                                                            |
| Dimensions             | 15mm*5mm                                                                                                               |
| Impedance              | 50 $\Omega$                                                                                                            |
| Maximum test values    | Gain: 0.125dBi; Efficiency: 20.286%; VSWR: 1.087:1                                                                     |

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd.  
The test results of this report relate only to the tested sample identified in this report.

Prepared By Thea Huang  
Thea Huang  
(Project Engineer) Aug. 13, 2024

Reviewed By Calvin Liu  
Calvin Liu  
(Reviewer) Aug. 13, 2024

Approved By Max Zhang  
Max Zhang  
(Authorized Officer) Aug. 13, 2024

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## 2. TEST FACILITY

|           |                                                                                                                                          |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site | Attestation of Global Compliance (Shenzhen) Co., Ltd                                                                                     |
| Location  | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |

## 3. TEST EQUIPMENT LIST

| Equipment                  | Manufacturer | Model               | Cal. Date     | Cal. Due      |
|----------------------------|--------------|---------------------|---------------|---------------|
| ANTENNA MEASUREMENT SYSTEM | ETS-Lindgren | AMS-8600            | Mar. 28, 2024 | Mar. 27, 2025 |
| Network Analyzer           | R&S          | ZVL-6               | Oct. 01, 2023 | Sep. 30, 2024 |
| Test software              | ETS-Lindgren | EMQuest (Ver V1.12) | N/A           | N/A           |

## 4. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of VSWR,  $U_c = \pm 1.5\text{dB}$
- Uncertainty of Gain,  $U_c = \pm 0.8\text{dB}$

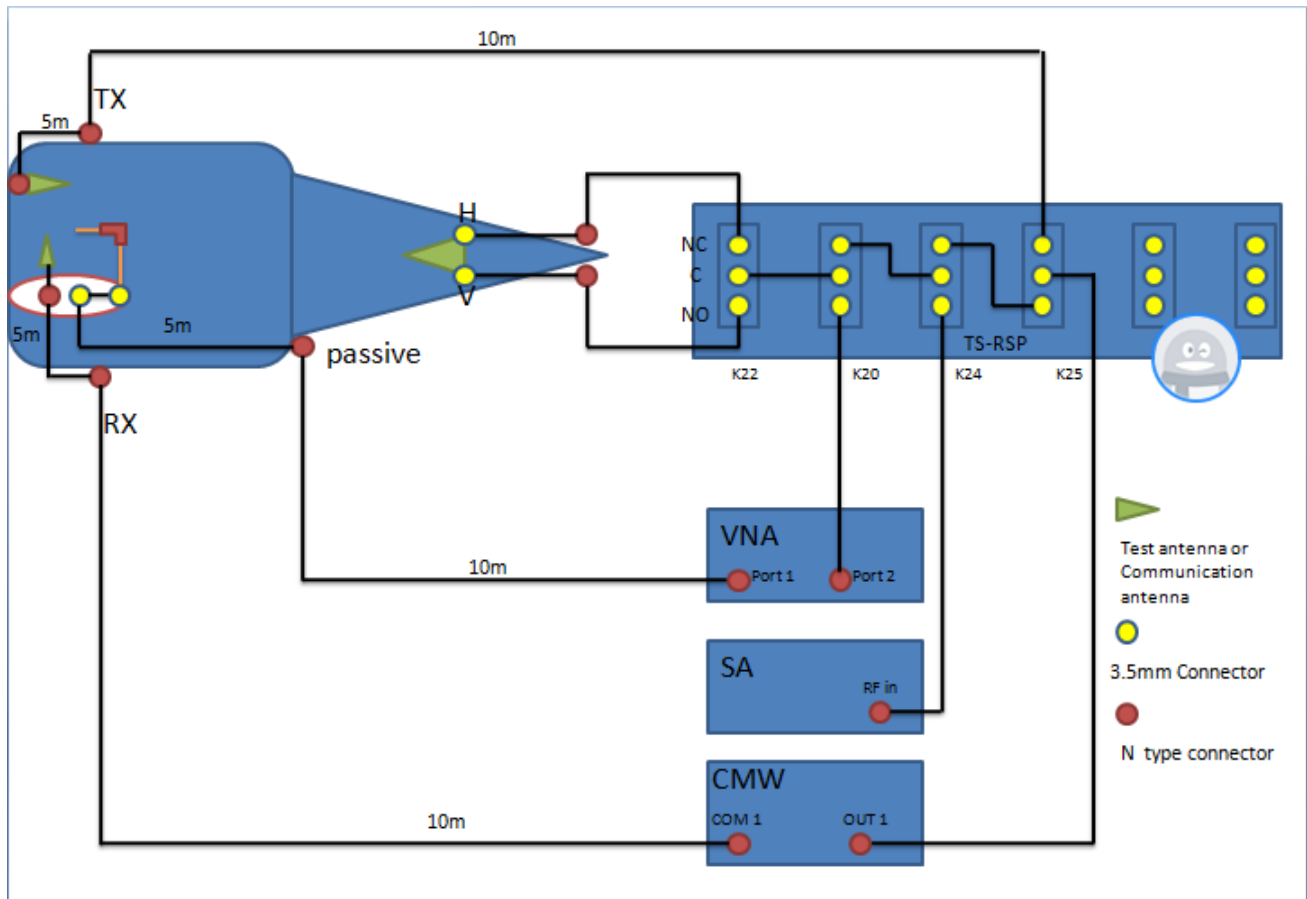
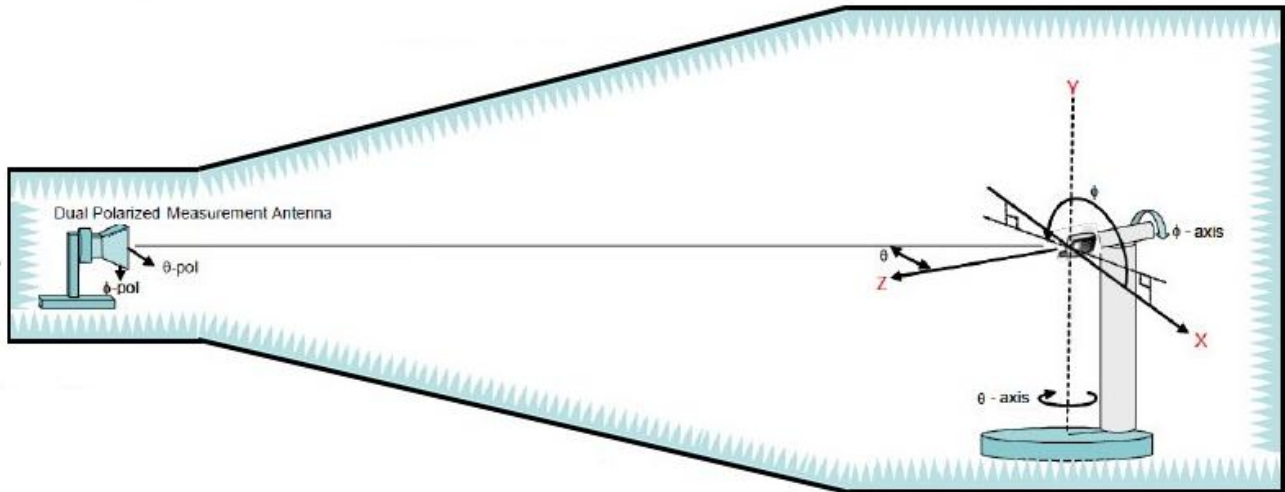
## 5. TEST SUMMARY LIST

| NO. | Test item           | Remark |
|-----|---------------------|--------|
| 1   | VSWR                | --     |
| 2   | Gain and efficiency | --     |
| 3   | Radiation pattern   | --     |

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## 6. TEST SETUP

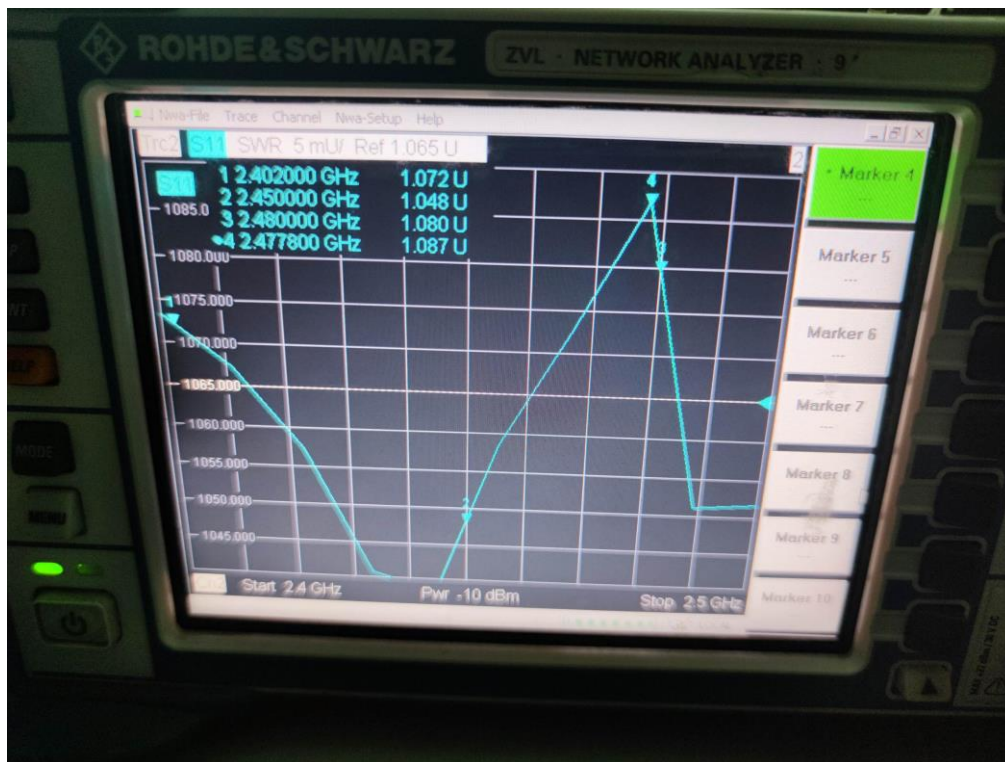


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## 7. TEST RESULTS

### 7.1. VSWR

| Frequency(MHz) | VSWR    |
|----------------|---------|
| 2402           | 1.072:1 |
| 2450           | 1.048:1 |
| 2478           | 1.087:1 |
| 2480           | 1.080:1 |



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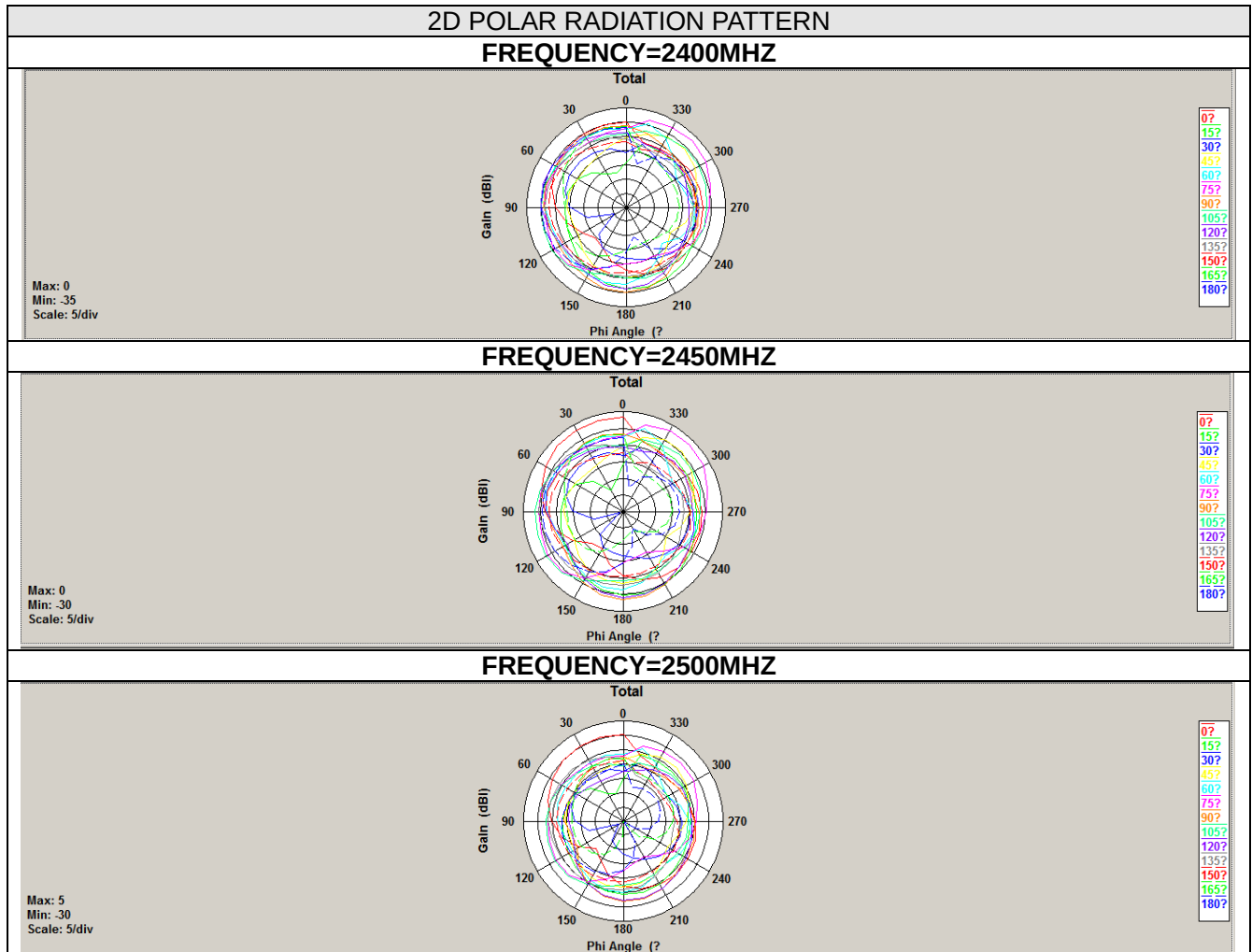
## 7.2. GAIN AND EFFICIENCY

| Frequency(MHz) | Efficiency(dB) | Efficiency (%) | Gain(dBi) |
|----------------|----------------|----------------|-----------|
| 2400           | -8.596         | 13.816         | -2.247    |
| 2410           | -8.605         | 13.788         | -2.355    |
| 2420           | -8.589         | 13.839         | -2.460    |
| 2430           | -8.199         | 15.140         | -2.132    |
| 2440           | -7.949         | 16.037         | -1.882    |
| 2450           | -7.762         | 16.742         | -1.730    |
| 2460           | -7.524         | 17.686         | -1.300    |
| 2470           | -7.514         | 17.725         | -0.994    |
| 2480           | -7.201         | 19.051         | -0.411    |
| 2490           | -7.058         | 19.689         | -0.132    |
| 2500           | -6.928         | 20.286         | 0.125     |

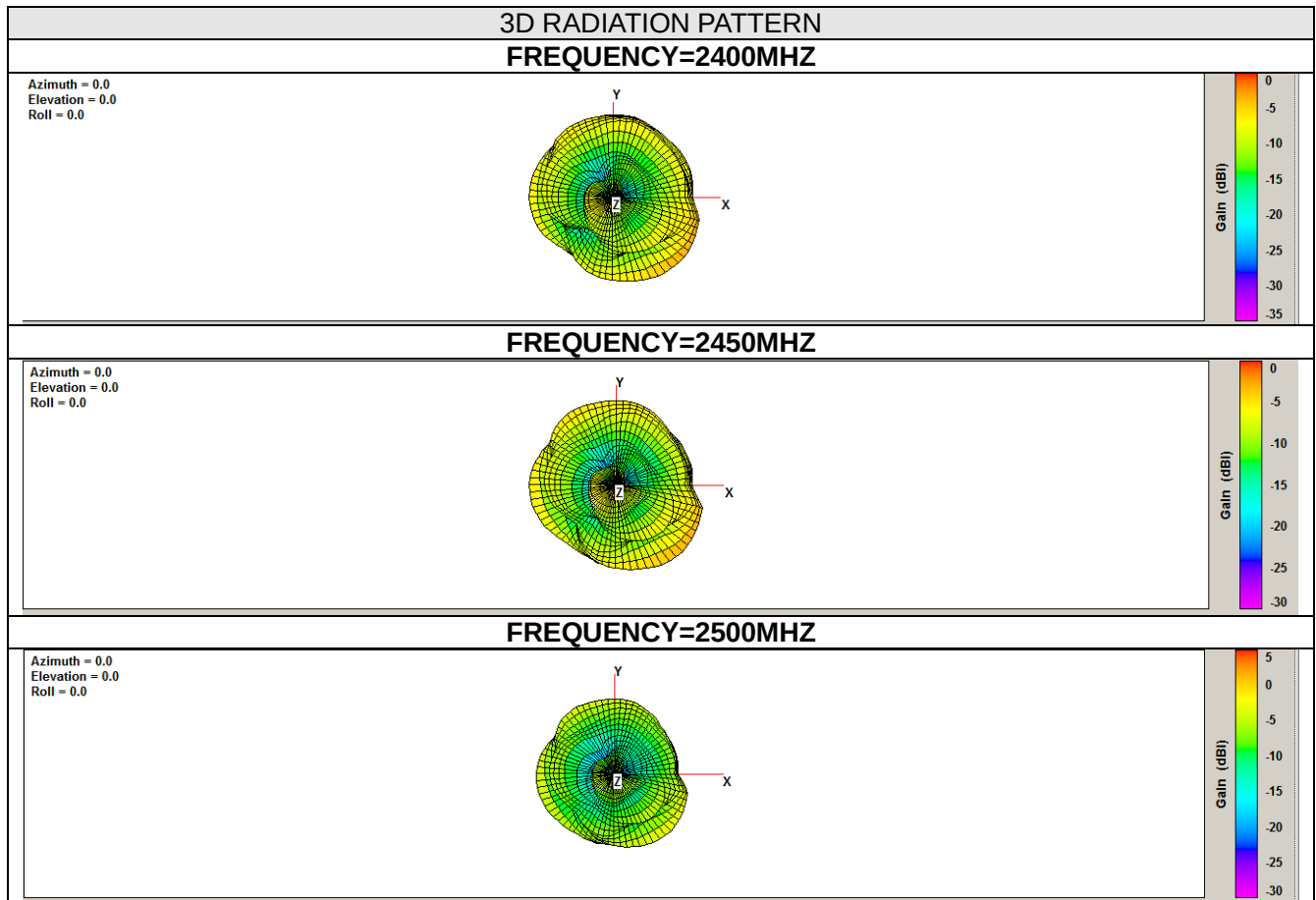
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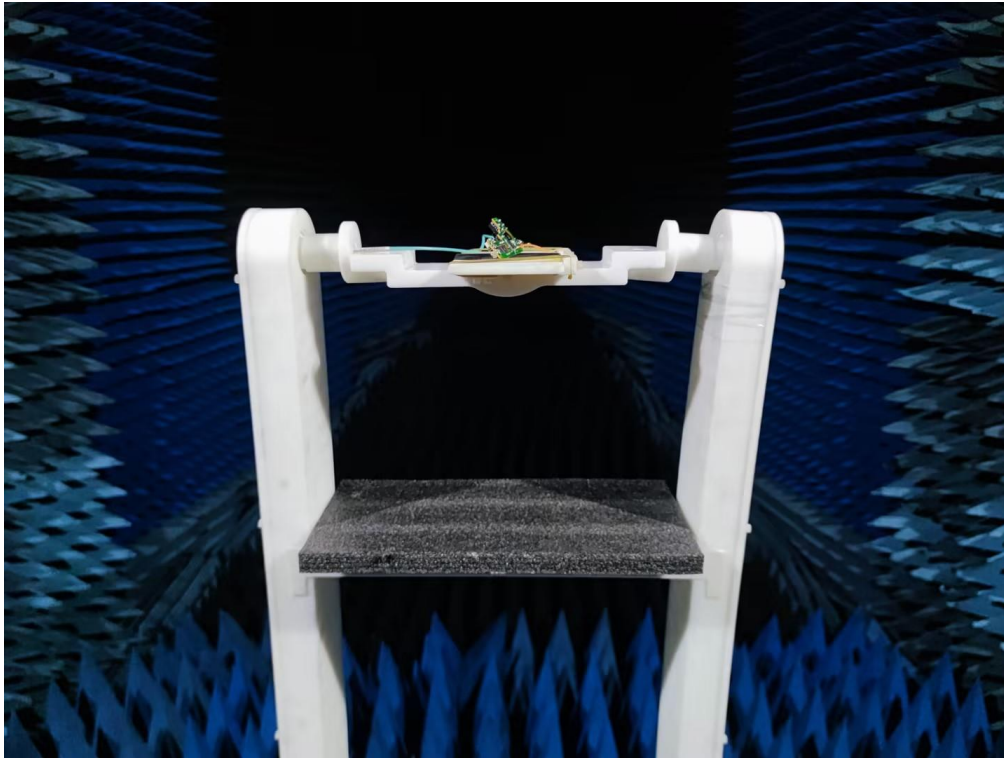
### 7.3. RADIATION PATTERN



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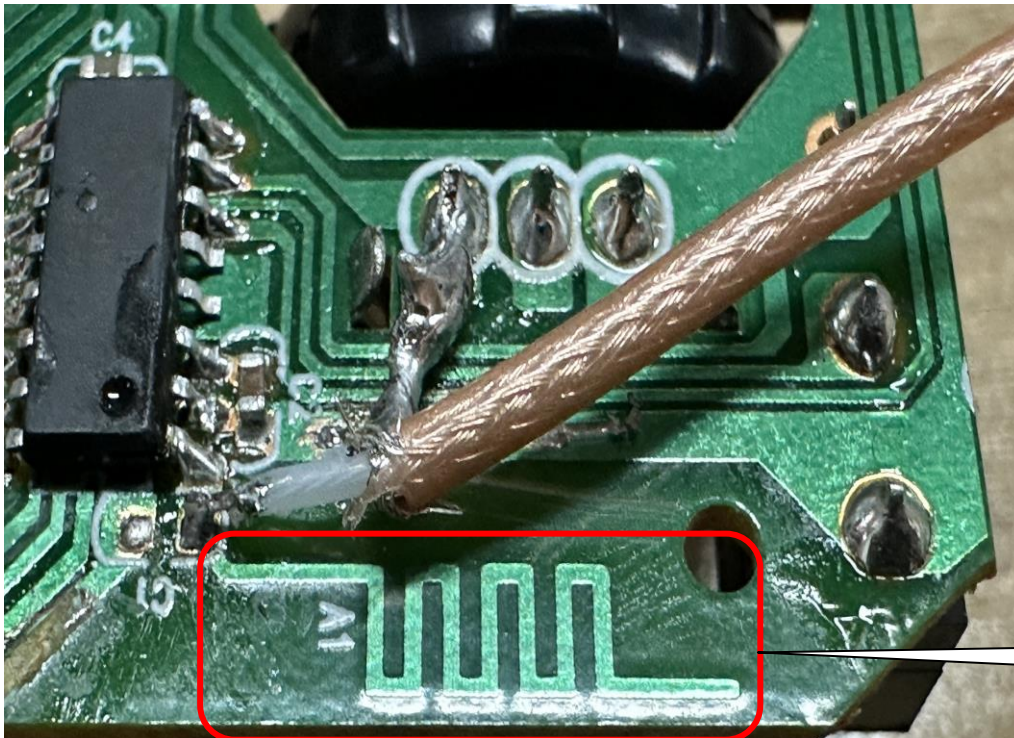
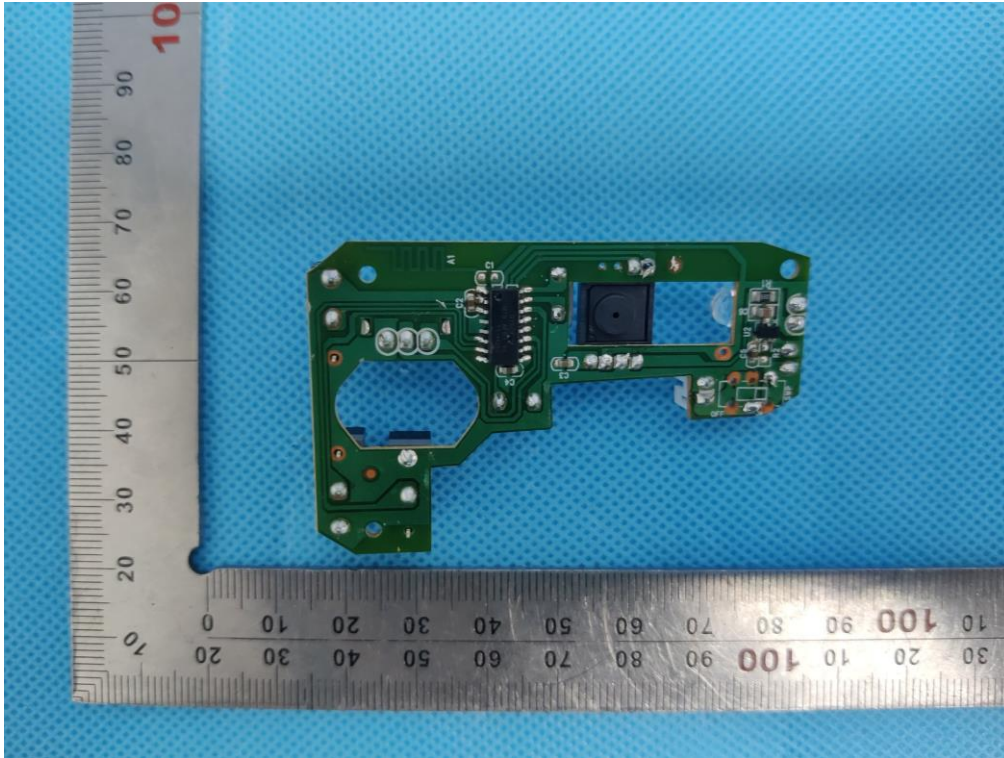
**APPENDIX I: PHOTOGRAPHS OF TEST SETUP**

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## APPENDIX II: PHOTOGRAPHS OF EUT



Antenna

----END OF REPORT----

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2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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