

# TEST REPORT

**Applicant:** ZKTECO CO., LTD.  
**Address:** No.32, Pingshan Industrial Road, Tangxia Town,  
Dongguan, China.  
**Equipment Type:** UHF reader  
**Model Name:** UHF 5E lite  
**Brand Name:** N/A  
**Test Standard:** IEEE Std 149-2021  
**Sample Arrival Date:** Apr. 19, 2023  
**Test Date:** Apr. 20, 2023  
**Date of Issue:** May 23, 2023

**ISSUED BY:**

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Mai Jintian**Checked by:** Zou Liu**Approved by:** Tolan Tu  
(Testing Director)*Mai Jintian**Zou Liu**Tolan Tu*

### Revision History

| Version        | Issue Date          | Revisions            |
|----------------|---------------------|----------------------|
| <u>Rev. 01</u> | <u>May 23, 2023</u> | <u>Initial Issue</u> |

## TABLE OF CONTENTS

|         |                                                          |    |
|---------|----------------------------------------------------------|----|
| 1       | GENERAL INFORMATION .....                                | 3  |
| 1.1     | Test Laboratory .....                                    | 3  |
| 1.2     | Test Location.....                                       | 3  |
| 2       | PRODUCT INFORMATION.....                                 | 4  |
| 2.1     | Applicant Information .....                              | 4  |
| 2.2     | Manufacturer Information .....                           | 4  |
| 2.3     | General Description for Equipment under Test (EUT) ..... | 4  |
| 2.4     | Ancillary Equipment .....                                | 4  |
| 2.5     | Technical Information .....                              | 4  |
| 3       | SUMMARY OF TEST RESULTS.....                             | 5  |
| 3.1     | Test Standards.....                                      | 5  |
| 3.2     | Test Verdict .....                                       | 5  |
| 3.3     | Test Uncertainty .....                                   | 5  |
| 4       | GENERAL TEST CONFIGURATIONS.....                         | 6  |
| 4.1     | Test Condition .....                                     | 6  |
| 4.2     | Test Equipment List .....                                | 6  |
| 4.3     | Test Setup.....                                          | 7  |
| ANNEX A | TEST RESULTS.....                                        | 8  |
| A.1     | Gain and Efficiency .....                                | 8  |
| A.2     | VSWR .....                                               | 9  |
| ANNEX B | RADIATION PATTERN.....                                   | 10 |
| ANNEX C | TEST SETUP PHOTOS .....                                  | 13 |
| ANNEX D | EUT PHOTO .....                                          | 13 |

# 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 | ZKTECO CO., LTD.                                                |
| Address   | No.32, Pingshan Industrial Road, Tangxia Town, Dongguan, China. |

### 2.2 Manufacturer Information

|              |                                                                 |
|--------------|-----------------------------------------------------------------|
| Manufacturer | ZKTECO CO., LTD.                                                |
| Address      | No.32, Pingshan Industrial Road, Tangxia Town, Dongguan, China. |

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

|                       |              |
|-----------------------|--------------|
| EUT Name              | UHF reader   |
| Model Name Under Test | UHF 5E lite  |
| Antenna Type          | RFID Antenna |
| Dimensions            | 208*208 mm   |

### 2.4 Ancillary Equipment

Note: Not applicable.

### 2.5 Technical Information

|                  |                                                                                                                                                                                                                        |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Frequencies | 902MHz, 903MHz, 904MHz, 905MHz, 906MHz, 907MHz, 908MHz, 909MHz, 910MHz, 911MHz, 912MHz, 913MHz, 914MHz, 915MHz, 916MHz, 917MHz, 918MHz, 919MHz, 920MHz, 921MHz, 922MHz, 923MHz, 924MHz, 925MHz, 926MHz, 927MHz, 928MHz |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 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

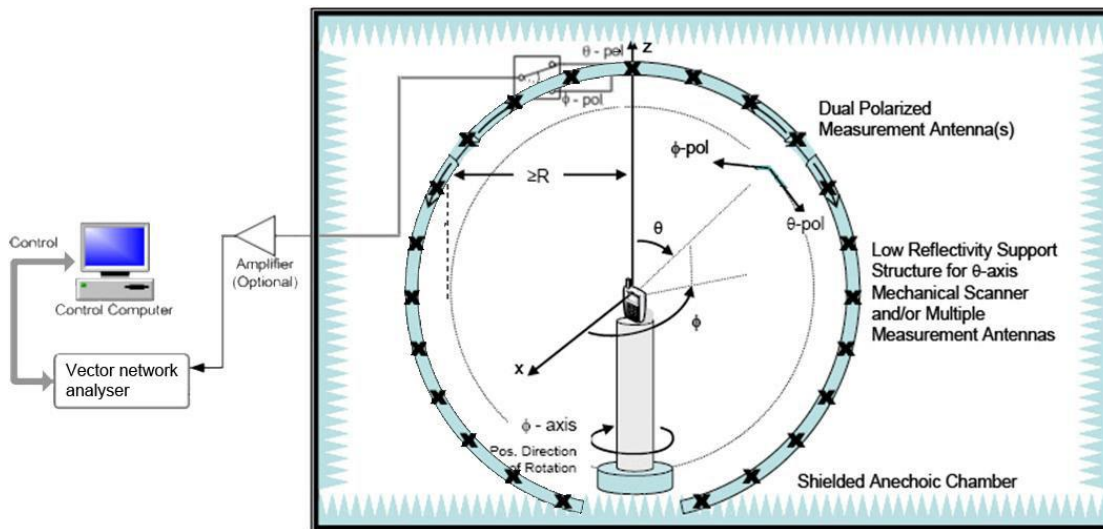
| Environment<br>Parameter                           | Selected Values During Tests |                 |         |                          |
|----------------------------------------------------|------------------------------|-----------------|---------|--------------------------|
|                                                    | Ambient<br>Pressure(KPa)     | Temperature(°C) | Voltage | Relative<br>Humidity (%) |
| Normal<br>Temperature,<br>Normal Voltage<br>(NTNV) | 101                          | 21.4            | N/A     | 44                       |

### 4.2 Test Equipment List

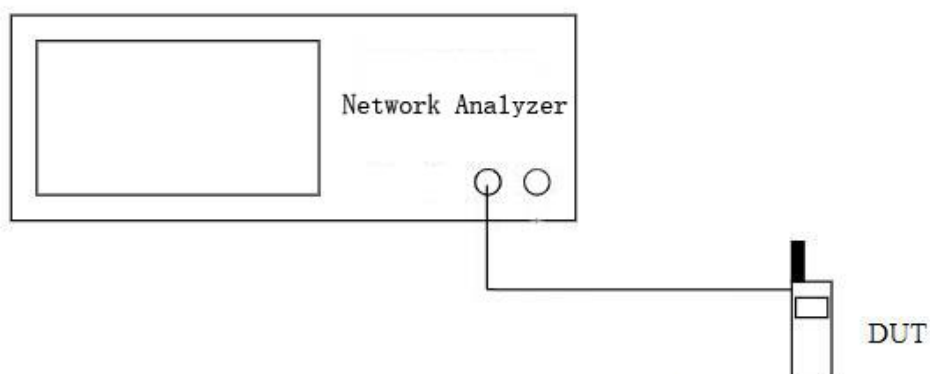
| Description                                       | Manufacturer | Model  | Serial No.       | Cal. Date  | Cal. Due   |
|---------------------------------------------------|--------------|--------|------------------|------------|------------|
| SG24 Multi-probe<br>Antenna Measurement<br>System | SATIMO       | 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



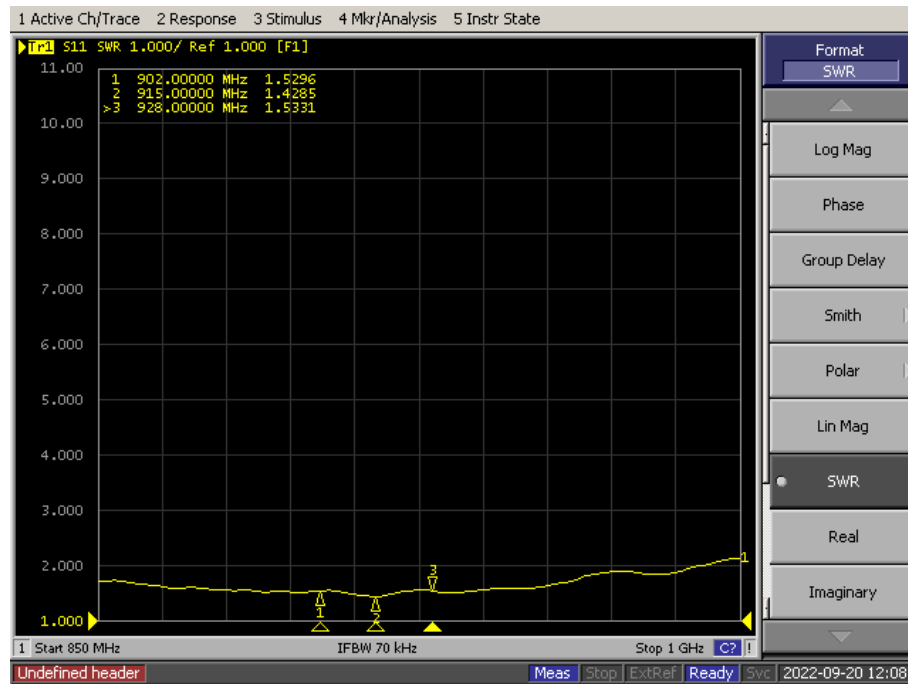
## ANNEX A TEST RESULTS

### A.1 Gain and Efficiency

| Frequency | Gain (dBi)  | Efficiency (%) |
|-----------|-------------|----------------|
| 902MHz    | 1.68        | 40             |
| 903MHz    | 1.67        | 41             |
| 904MHz    | 1.66        | 41             |
| 905MHz    | 1.71        | 41             |
| 906MHz    | 1.75        | 41             |
| 907MHz    | 1.80        | 42             |
| 908MHz    | 1.88        | 42             |
| 909MHz    | 1.95        | 43             |
| 910MHz    | 2.02        | 43             |
| 911MHz    | 2.05        | 43             |
| 912MHz    | 2.08        | 43             |
| 913MHz    | <b>2.09</b> | <b>43</b>      |
| 914MHz    | 2.08        | 43             |
| 915MHz    | 2.03        | 42             |
| 916MHz    | 2.01        | 41             |
| 917MHz    | 2.02        | 41             |
| 918MHz    | 2.02        | 41             |
| 919MHz    | 2.03        | 41             |
| 920MHz    | 2.01        | 41             |
| 921MHz    | 1.98        | 41             |
| 922MHz    | 1.91        | 40             |
| 923MHz    | 1.85        | 40             |
| 924MHz    | 1.82        | 40             |
| 925MHz    | 1.75        | 39             |
| 926MHz    | 1.77        | 40             |
| 927MHz    | 1.78        | 40             |
| 928MHz    | 1.76        | 40             |

## A.2 VSWR

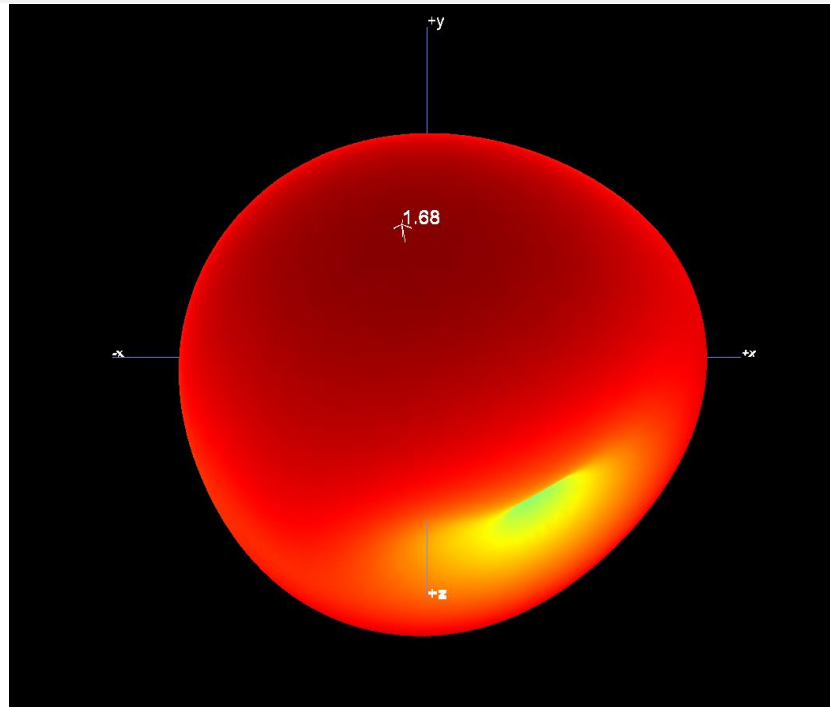
| Frequency | SWR  |
|-----------|------|
| 902MHz    | 1.53 |
| 915MHz    | 1.43 |
| 928MHz    | 1.53 |



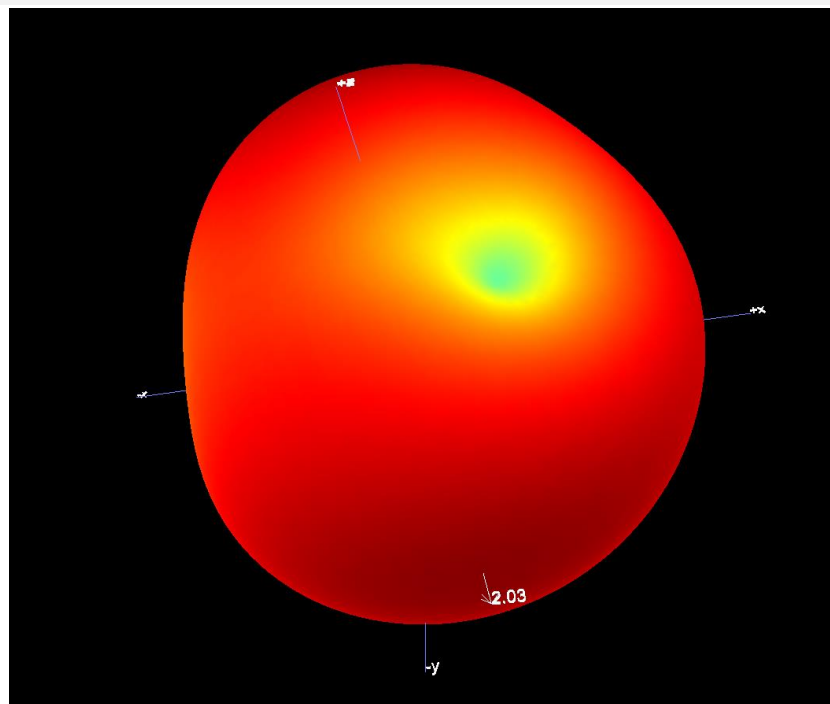
## ANNEX B RADIATION PATTERN

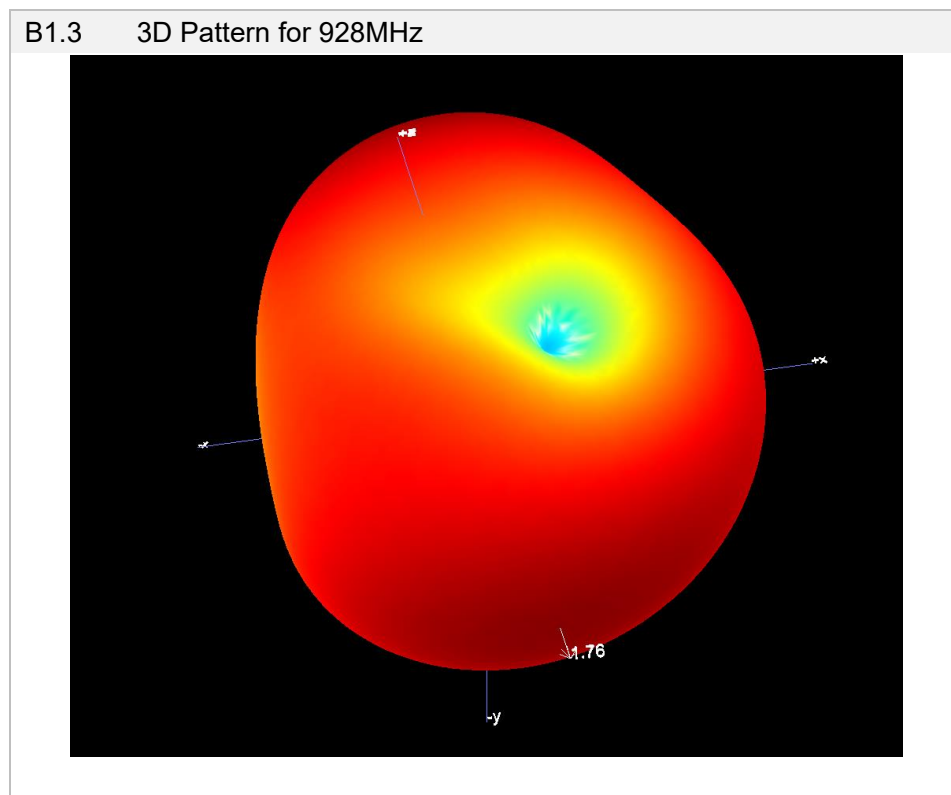
### B.1 3D Pattern

B1.1 3D Pattern for 902MHz



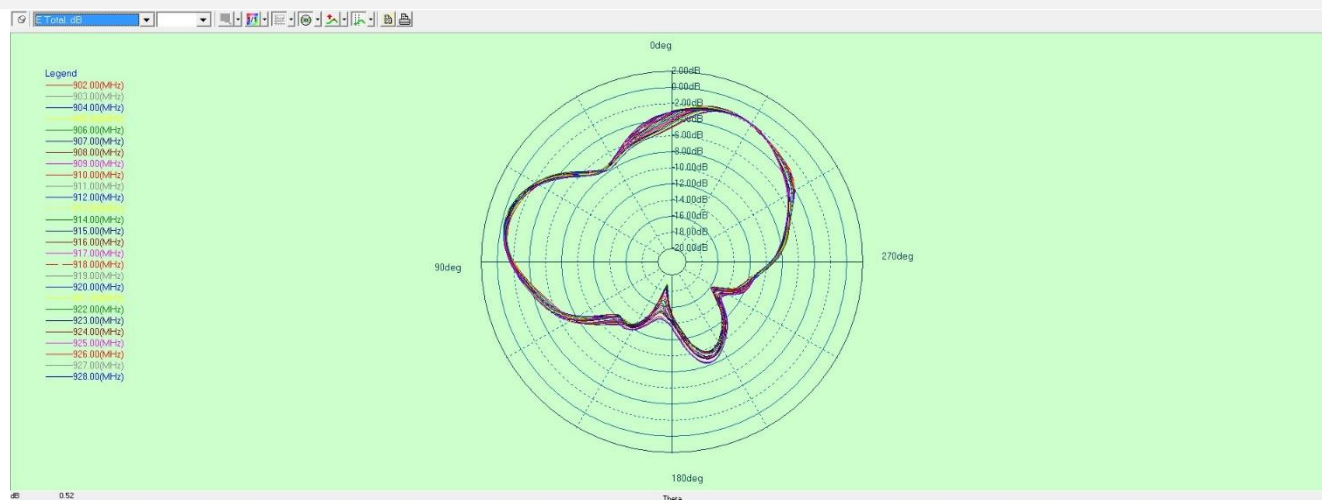
B1.2 3D Pattern for 915MHz



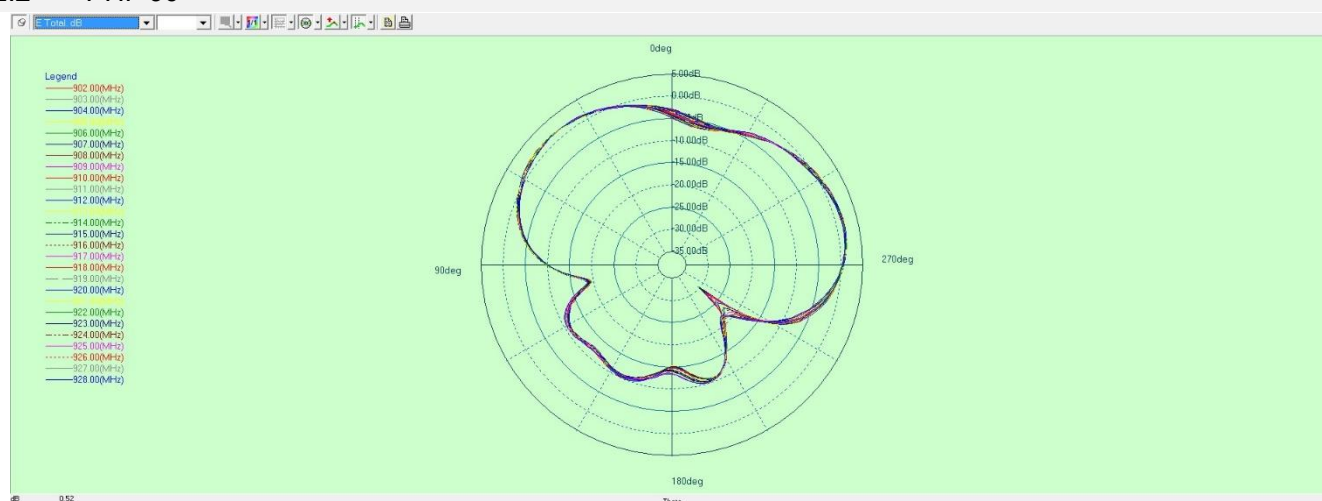


## B.2 1D Radiation Pattern

### B2.1 PHI=0



### B2.2 PHI=90



### B2.3 THETA=90



## **ANNEX C TEST SETUP PHOTOS**

Please refer the document “BL-SZ2340811-AO.PDF”.

## **ANNEX D EUT PHOTO**

Please refer the document “BL-SZ2340811-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--