

## OTA TEST REPORT

**Applicant**      Espressif System (Shanghai) Co.,Ltd  
**Product**        ESP32-C3-WROOM-02  
**Model**          ESP-ANT B  
**Report No.**      Y2102A0260-T3V2  
**Issue Date**     February 19, 2025

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **ANSI/IEEE Std 149-2008**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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| Version                                                                                                                                                                                                                         | Revision description                 | Issue Date         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------|
| Rev.0                                                                                                                                                                                                                           | Initial issue of report.             | March 9, 2021      |
| Rev.1                                                                                                                                                                                                                           | Update information in Page 6 and 14. | September 21, 2022 |
| Rev.2                                                                                                                                                                                                                           | Update description.                  | February 19, 2025  |
| Note: This revised report (Report No. Y2102A0260-T3V2) supersedes and replaces the previously issued report (Report No. Y2102A0260-T3V1). Please discard or destroy the previously issued report and dispose of it accordingly. |                                      |                    |

## 1. Test Laboratory

### 1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **Eurofins TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

### 1.2. Test Facility

#### A2LA (Certificate Number: 3857.01)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

### 1.3. Testing Location

Company: Eurofins TA Technology (Shanghai) Co., Ltd.  
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E-mail: Kain.Xu@cpt.eurofinscn.com

### 1.4. Laboratory Environment

|                   |                         |         |
|-------------------|-------------------------|---------|
| Temperature       | Min. =19°C, Max. = 25°C |         |
| Relative humidity | Min. =40%, Max. =72%    |         |
| Shield effect     | 0.7-6GHz                | > 100dB |
| Ground resistance | <0.5Ω                   |         |

## 2. General Description of Equipment under Test

### 2.1. Applicant and Manufacturer Information

|                             |                                                                             |
|-----------------------------|-----------------------------------------------------------------------------|
| <b>Applicant Name</b>       | Espressif System (Shanghai) Co.,Ltd                                         |
| <b>Applicant address</b>    | Suite 204 Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China |
| <b>Manufacturer Name</b>    | Espressif System (Shanghai) Co.,Ltd                                         |
| <b>Manufacturer address</b> | Suite 204 Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China |

### 2.2. General information

| EUT Description                                                                                                                                                                                                                                                                                                                                                                                                             |                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Product Name:                                                                                                                                                                                                                                                                                                                                                                                                               | ESP32-C3-WROOM-02                       |
| Model                                                                                                                                                                                                                                                                                                                                                                                                                       | ESP-ANT B                               |
| HW Version:                                                                                                                                                                                                                                                                                                                                                                                                                 | ESP32-C3-WROOM-02 V1                    |
| SW Version:                                                                                                                                                                                                                                                                                                                                                                                                                 | esp32c3_phy_20210225_no_sleep_and_ampdu |
| Antenna Type:                                                                                                                                                                                                                                                                                                                                                                                                               | PCB Antenna                             |
| Antenna Size:                                                                                                                                                                                                                                                                                                                                                                                                               | 6*16*0.8 mm                             |
| Antenna Manufacturer:                                                                                                                                                                                                                                                                                                                                                                                                       | Espressif System (Shanghai) Co.,Ltd     |
| Test Frequency:                                                                                                                                                                                                                                                                                                                                                                                                             | 2402MHz ~ 2502MHz                       |
| <p>Note: The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant.</p> <p>All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.</p> |                                         |

**Test lab. of the antenna gain and radiation pattern measurement: Eurofins TA Technology (Shanghai) Co., Ltd.**

### 2.3. Test Date

The test is performed from February 25, 2021 to March 4, 2021.

### 2.4. Receiving Date

The sample was received on February 25, 2021.

## 2.5. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test Method: **ANSI/IEEE Std 149-2008**

## 3. Test Conditions

### 3.1. Test Configuration

Great-Circle-Cut method is used to measure the antenna 3D GAIN of EUT in OTA qualified anechoic chamber. Equipment Under Test (EUT) geometry centre vertical projection at the centre of platform, the distance from EUT to measurement antenna is 5m.

### 3.2. Test Measurement

#### Spherical coordinate system

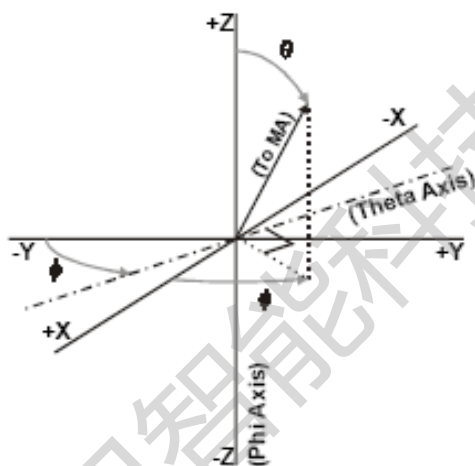
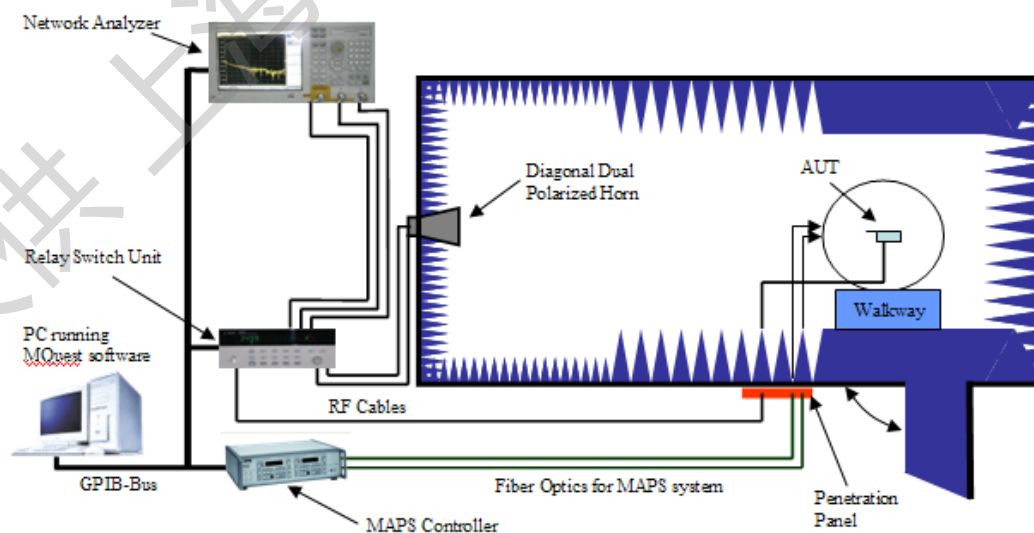


Figure 1 Test coordinate system

Note: Theta is from 0~180 degree. Phi is from 0~360. Rotate the EUT and record the Data, the step of rotation is 15 degree.

#### Test Setup



## 4. Test Results

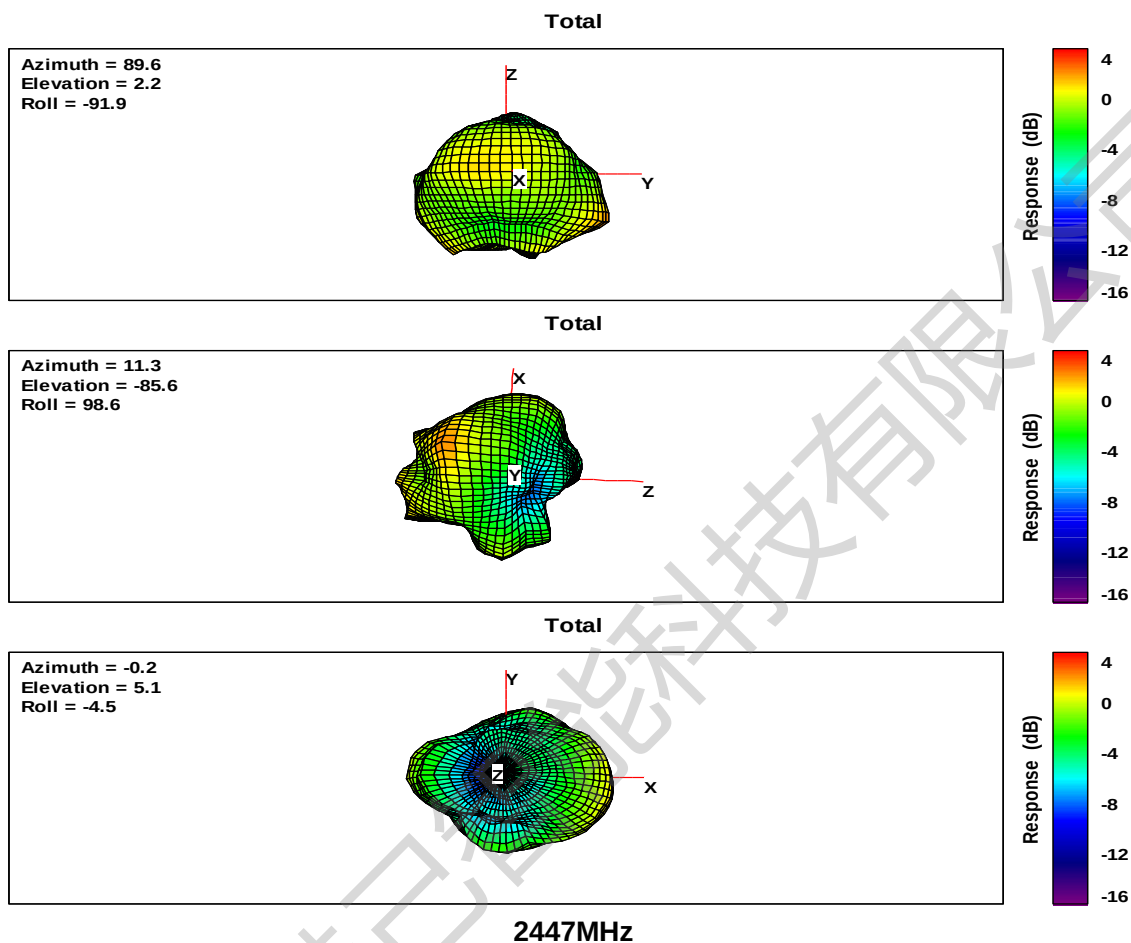
### 4.1. Gain and Efficiency

| Model     | Test State | Frequency (MHz) | Efficiency (dB) | Efficiency (%) | Gain (dBi) | Directivity (dBi) | Note |
|-----------|------------|-----------------|-----------------|----------------|------------|-------------------|------|
| ESP-ANT B | Free Space | 2402            | -1.98           | 63.44          | 2.73       | 4.70              | 15°  |
|           |            | 2407            | -1.76           | 66.66          | 2.73       | 4.50              |      |
|           |            | 2412            | -1.70           | 67.68          | 3.16       | 4.85              |      |
|           |            | 2417            | -1.60           | 69.11          | 2.92       | 4.53              |      |
|           |            | 2422            | -1.61           | 68.95          | 2.79       | 4.41              |      |
|           |            | 2427            | -1.77           | 66.48          | 2.29       | 4.06              |      |
|           |            | 2432            | -1.83           | 65.54          | 2.54       | 4.37              |      |
|           |            | 2437            | -1.73           | 67.21          | 2.46       | 4.19              |      |
|           |            | 2442            | -1.77           | 66.46          | 2.56       | 4.34              |      |
|           |            | 2447            | -1.79           | 66.25          | 2.69       | 4.48              |      |
|           |            | 2452            | -1.75           | 66.81          | 2.95       | 4.70              |      |
|           |            | 2457            | -1.76           | 66.73          | 2.96       | 4.71              |      |
|           |            | 2462            | -1.68           | 67.91          | 2.99       | 4.67              |      |
|           |            | 2467            | -1.95           | 63.90          | 3.17       | 5.11              |      |
|           |            | 2472            | -2.07           | 62.14          | 3.08       | 5.14              |      |
|           |            | 2477            | -1.87           | 65.00          | 3.18       | 5.05              |      |
|           |            | 2482            | -1.94           | 63.96          | 3.26       | 5.20              |      |
|           |            | 2487            | -1.98           | 63.35          | 3.37       | 5.35              |      |
|           |            | 2492            | -1.82           | 65.80          | 3.35       | 5.17              |      |
|           |            | 2497            | -1.72           | 67.34          | 3.17       | 4.88              |      |
|           |            | 2502            | -1.75           | 66.79          | 3.18       | 4.94              |      |

## 5. Equipment List

| Type of Equipment           | Manufacture  | Model Number                               | S/N                     | Calibration Date | Expiration Time |
|-----------------------------|--------------|--------------------------------------------|-------------------------|------------------|-----------------|
| Network Analyzer            | Key sight    | E5071B                                     | MY42404014              | 2020-05-17       | 2021-05-16      |
| Switch Control System       | ETS          | 7006/7001                                  | 00059957/MY<br>42001152 | N/A              | N/A             |
| Dual polarized horn antenna | ETS          | 3164-04                                    | 00062743                | 2020-04-14       | 2021-04-13      |
| Software                    | ETS-lindgren | EMQ-100 Pattern<br>Measurement<br>software | 1.09                    | N/A              | N/A             |

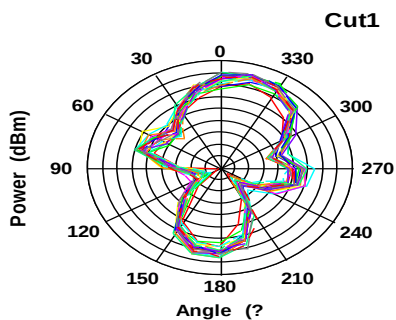
# ANNEX A: 3-D Pattern Plots



## ANNEX B: 2-D Pattern Plots

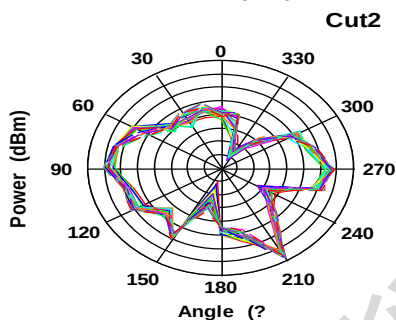
**GAIN**

Max: 3  
Min: -6  
Scale: 1/div



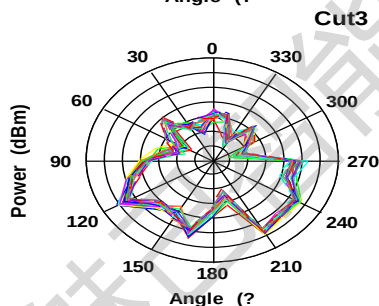
|          |          |          |
|----------|----------|----------|
| 2402 MHz | 2452 MHz | 2502 MHz |
| 2407 MHz | 2457 MHz |          |
| 2412 MHz | 2462 MHz |          |
| 2417 MHz | 2467 MHz |          |
| 2422 MHz | 2472 MHz |          |
| 2427 MHz | 2477 MHz |          |
| 2432 MHz | 2482 MHz |          |
| 2437 MHz | 2487 MHz |          |
| 2442 MHz | 2492 MHz |          |
| 2447 MHz | 2497 MHz |          |

Max: 4  
Min: -12  
Scale: 2/div



|          |          |          |
|----------|----------|----------|
| 2402 MHz | 2452 MHz | 2502 MHz |
| 2407 MHz | 2457 MHz |          |
| 2412 MHz | 2462 MHz |          |
| 2417 MHz | 2467 MHz |          |
| 2422 MHz | 2472 MHz |          |
| 2427 MHz | 2477 MHz |          |
| 2432 MHz | 2482 MHz |          |
| 2437 MHz | 2487 MHz |          |
| 2442 MHz | 2492 MHz |          |
| 2447 MHz | 2497 MHz |          |

Max: 4  
Min: -10  
Scale: 2/div

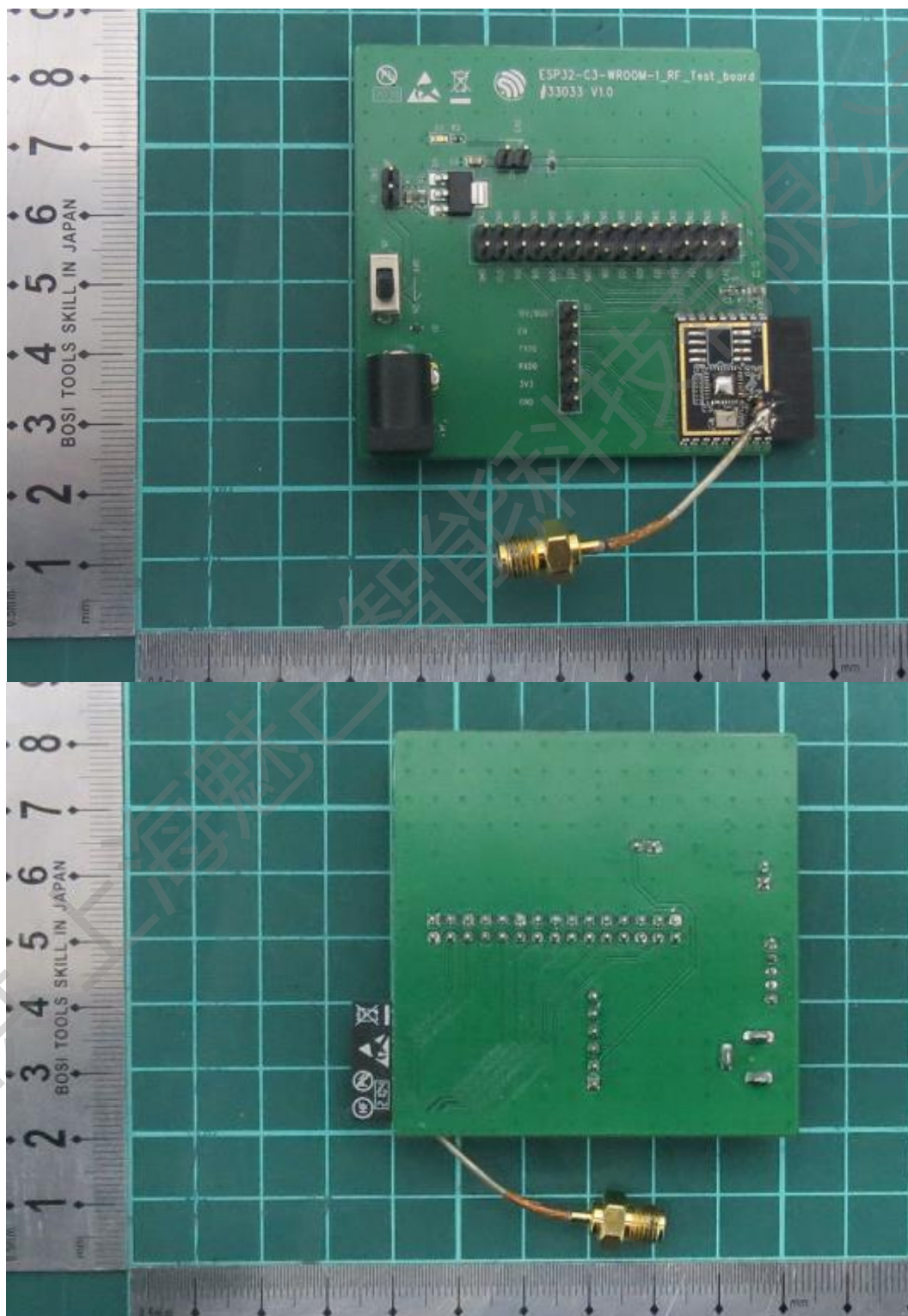


|          |          |          |
|----------|----------|----------|
| 2402 MHz | 2452 MHz | 2502 MHz |
| 2407 MHz | 2457 MHz |          |
| 2412 MHz | 2462 MHz |          |
| 2417 MHz | 2467 MHz |          |
| 2422 MHz | 2472 MHz |          |
| 2427 MHz | 2477 MHz |          |
| 2432 MHz | 2482 MHz |          |
| 2437 MHz | 2487 MHz |          |
| 2442 MHz | 2492 MHz |          |
| 2447 MHz | 2497 MHz |          |

2402MHz - 2502 MHz

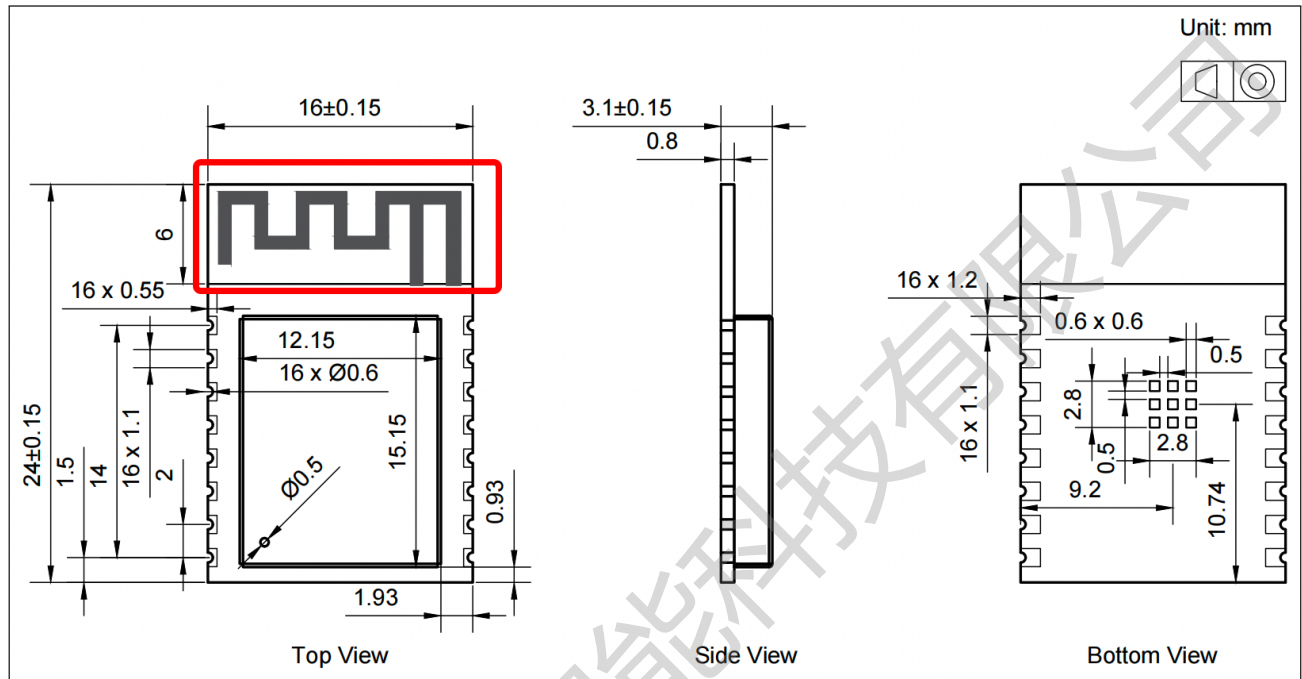
## ANNEX C: The EUT Appearance, Antenna plots and Test Configuration

### C.1 EUT Appearance



Picture 1 Constituents of EUT

## C.2 Antenna plots



Picture 2 Antenna plots

### C.3 Test Configuration



Picture 3 Test Setup

\*\*\*\*\*END OF REPORT \*\*\*\*\*