



# OTA TEST REPORT

**Applicant**      Espressif System (Shanghai) Co.,Ltd  
**Product**        ESP32-C3-MINI-1  
**Model**          ESP-ANT D-H  
**Report No.**     Y2102A0260-T2  
**Issue Date**    March 9, 2021

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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Approved by: Kai Xu

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## 1. Test Laboratory

### 1.1. Notes of the Test Report

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### 1.2. Test facility

#### A2LA (Certificate Number: 3857.01)

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

### 1.3. Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China  
City: Shanghai  
Post code: 201201  
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E-mail: [xukai@ta-shanghai.com](mailto:xukai@ta-shanghai.com)



#### 1.4. Laboratory Environment

|                   |                        |         |
|-------------------|------------------------|---------|
| Temperature       | Min. =19℃ , Max. = 25℃ |         |
| 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-MINI-1                         |
| Model                                                                                                                                                                                                                                                                                                                                                                                          | ESP-ANT D-H                             |
| HW Version:                                                                                                                                                                                                                                                                                                                                                                                    | ESP32-C3-MINI-1 V1.1                    |
| SW Version:                                                                                                                                                                                                                                                                                                                                                                                    | esp32c3_phy_20210225_no_sleep_and_ampdu |
| Antenna Type:                                                                                                                                                                                                                                                                                                                                                                                  | PCB Antenna                             |
| Antenna Manufacturer:                                                                                                                                                                                                                                                                                                                                                                          | Espressif System (Shanghai) Co.,Ltd     |
| Test Frequency:                                                                                                                                                                                                                                                                                                                                                                                | 2402MHz ~ 2502MHz                       |
| Note: The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.<br>All indications of Pass/Fail in this report are opinions expressed by 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. |                                         |

Test lab. of the antenna gain and radiation pattern measurement: 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

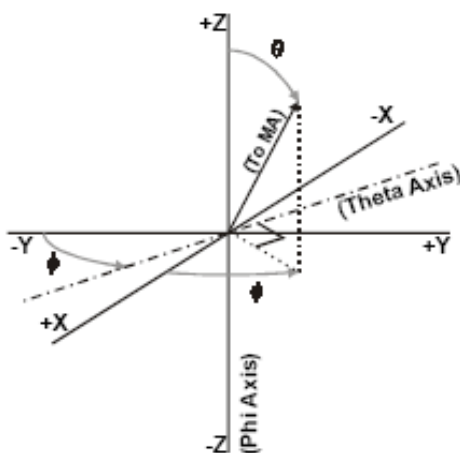
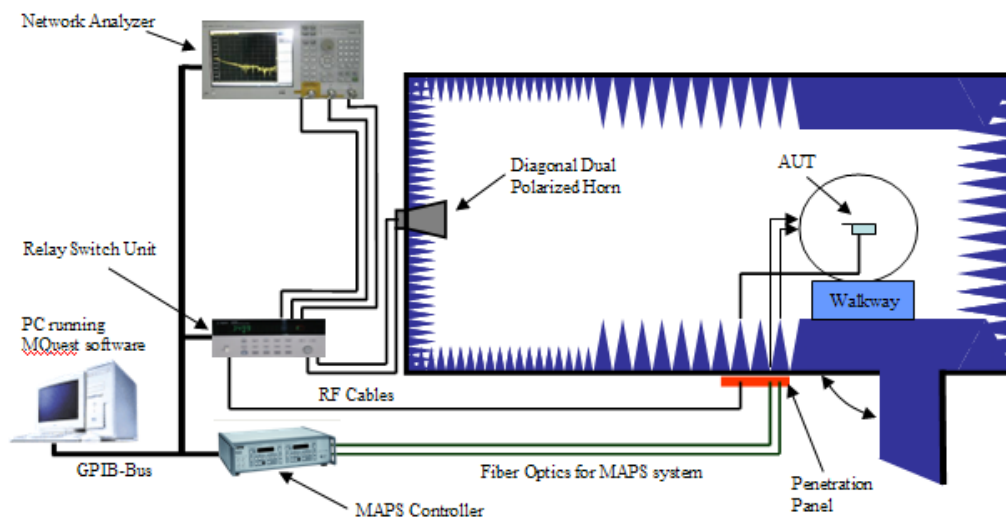


Figure 1 Test coordinate system

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 D-H | Free Space | 2402            | -2.18           | 60.51          | 2.91       | 5.09              | 15°  |
|             |            | 2407            | -1.99           | 63.17          | 3.28       | 5.28              |      |
|             |            | 2412            | -1.91           | 64.40          | 2.84       | 4.75              |      |
|             |            | 2417            | -1.82           | 65.70          | 3.17       | 5.00              |      |
|             |            | 2422            | -1.82           | 65.70          | 2.88       | 4.70              |      |
|             |            | 2427            | -1.99           | 63.21          | 2.92       | 4.92              |      |
|             |            | 2432            | -2.07           | 62.07          | 3.11       | 5.18              |      |
|             |            | 2437            | -1.96           | 63.67          | 3.11       | 5.07              |      |
|             |            | 2442            | -2.06           | 62.23          | 3.33       | 5.39              |      |
|             |            | 2447            | -2.08           | 61.90          | 3.40       | 5.48              |      |
|             |            | 2452            | -2.07           | 62.11          | 3.59       | 5.66              |      |
|             |            | 2457            | -2.05           | 62.41          | 3.62       | 5.67              |      |
|             |            | 2462            | -2.02           | 62.88          | 3.75       | 5.77              |      |
|             |            | 2467            | -2.27           | 59.35          | 3.65       | 5.92              |      |
|             |            | 2472            | -2.41           | 57.41          | 3.70       | 6.11              |      |
|             |            | 2477            | -2.21           | 60.18          | 3.70       | 5.91              |      |
|             |            | 2482            | -2.26           | 59.45          | 3.96       | 6.21              |      |
|             |            | 2487            | -2.28           | 59.22          | 4.05       | 6.33              |      |
|             |            | 2492            | -2.12           | 61.39          | 3.92       | 6.03              |      |
|             |            | 2497            | -2.03           | 62.71          | 4.16       | 6.19              |      |
|             |            | 2502            | -2.08           | 61.91          | 4.03       | 6.12              |      |

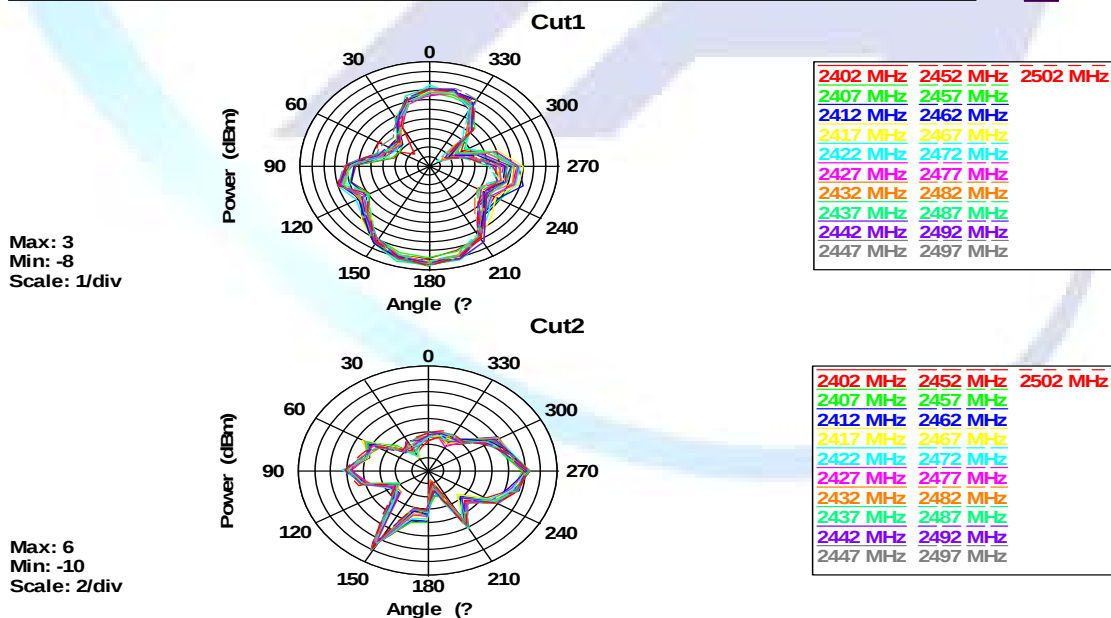
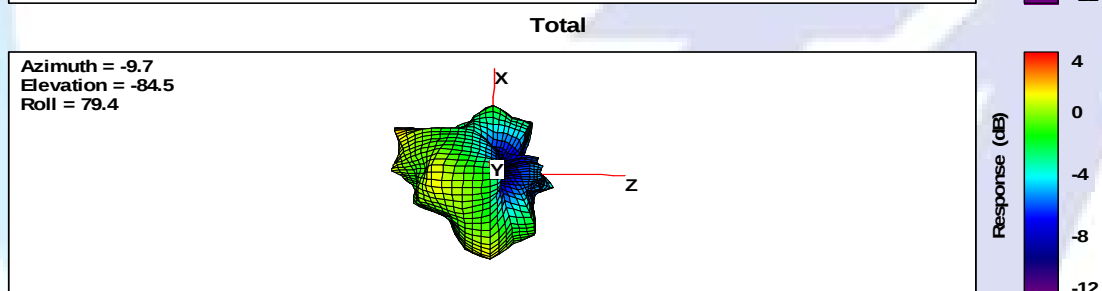
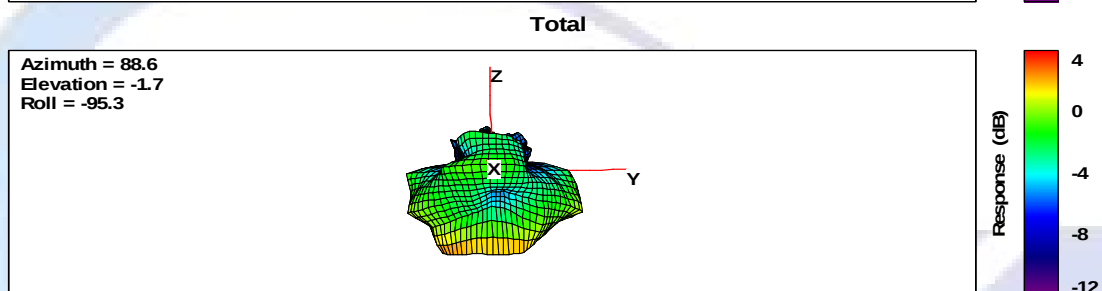
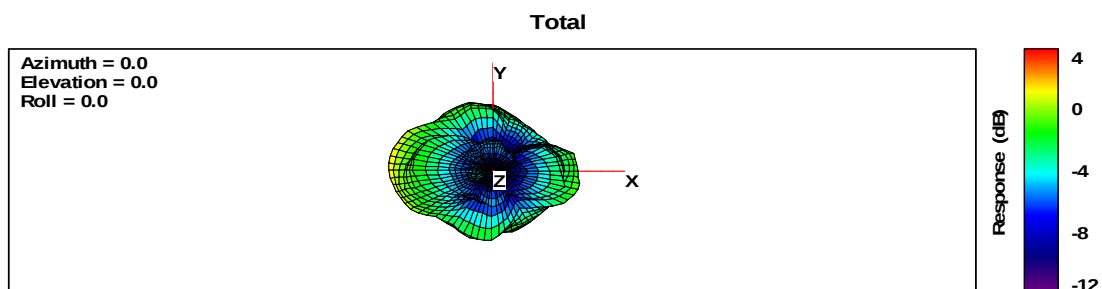


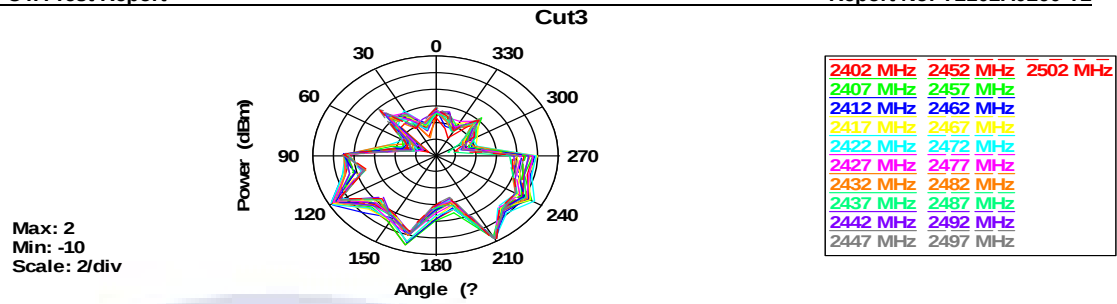
## 5. Equipment List

| 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             |



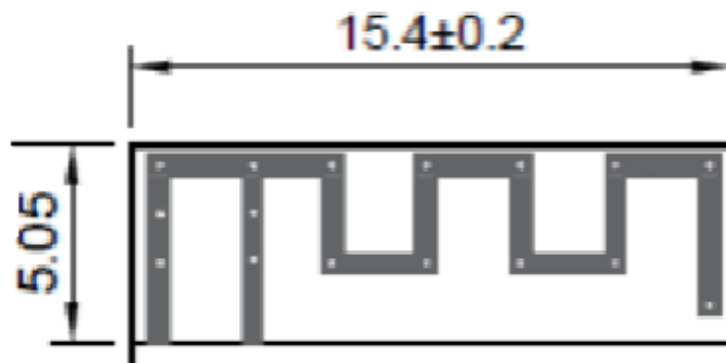
## ANNEX A 3-D Pattern Plots





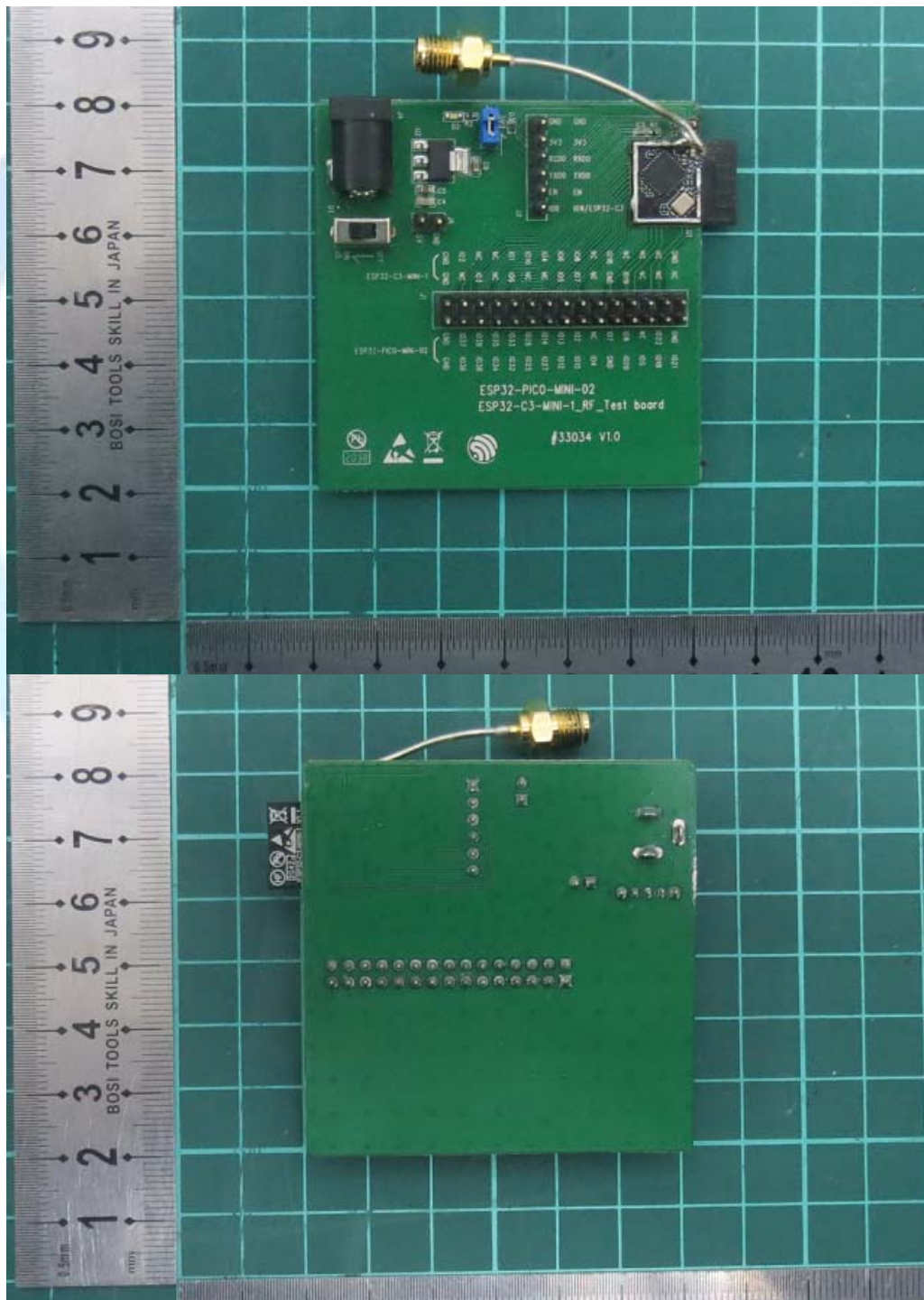
2402MHz ~2502 MHz Wi-Fi 2.4G 3D Gain

Antenna Size (mm)



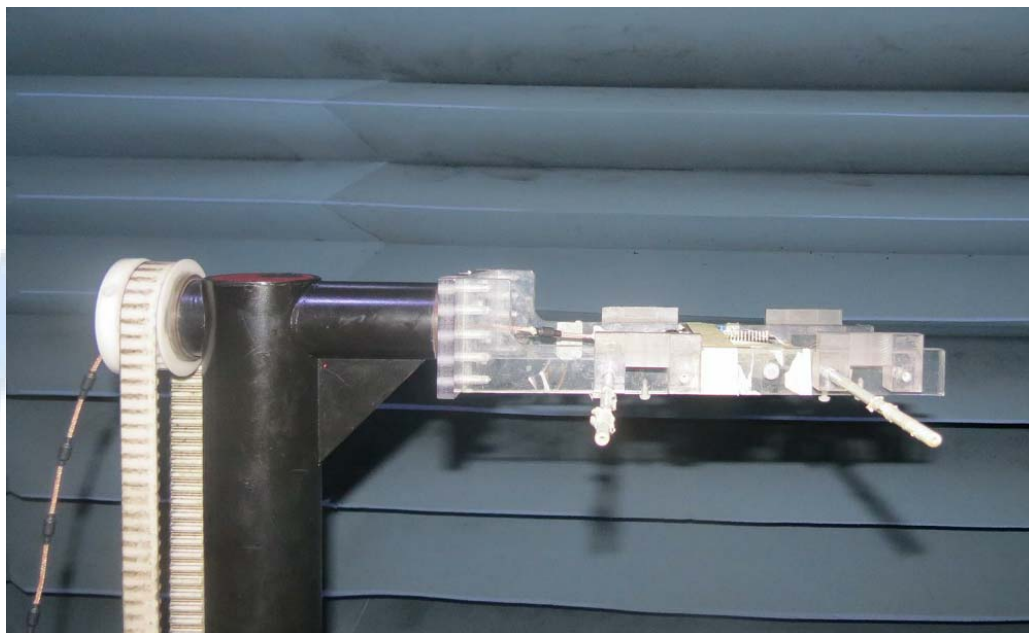
## ANNEX B: The EUT Appearance and Test Configuration

### B.1 EUT Appearance



Picture 1 Constituents of EUT

## B.2 Test Configuration



Picture 2 Test Setup

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