

MPE TEST REPORT

Applicant Espressif Systems (Shanghai)Co.,Ltd.

FCC ID 2AC7Z-ESPC3MINII

Product Wi-Fi & Bluetooth Internet of Things Module

Brand ESPRESSIF

Model ESP32-C3-MINI-1U

Report No. R2107A0598-M1V1

Issue Date May 5, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310.** The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Fangying Wei

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Approved by: Guangchang Fan

Guangchang Fan

TA Technology (Shanghai) Co., Ltd.

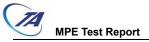
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Table of Contents

1 Test Laboratory	3
1.1 Notes of the Test Report	3
1.2. Test facility	3
1.3 Testing Location	3
1.4 Laboratory Environment	4
2 Description of Equipment under Test	5
3 Maximum conducted output power (measured) and antenna Gain	6
4 Test Result	7
ANNEX A: The EUT Appearance	10



Report No.: R2107A0598-M1V1

Test Laboratory

Notes of the Test Report

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(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

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission

list of test facilities recognized to perform measurements.

Testing Location

Company:

TA Technology (Shanghai) Co., Ltd.

Address:

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

City:

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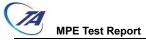
E-mail:

fanguangchang@ta-shanghai.com



1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C		
Relative humidity	Min. = 30%, Max. = 70%		
Ground system resistance	< 0.5		
Ambient noise is checked and found very low and in compliance with requirement of standards.			
Reflection of surrounding objects is minimized and in compliance with requirement of standards.			



2 Description of Equipment under Test

Client Information

Applicant	Espressif Systems (Shanghai) Co.,Ltd.		
Applicant address Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Par Shanghai, China			
Manufacturer	Espressif Systems (Shanghai) Co.,Ltd.		
Manufacturer address	Suite 204, Block 2, 690 Bibo Road, Zhang Jiang Hi-Tech Park, Shanghai, China		

General Technologies

Model	ESP32-C3-MINI-1U	
Lab internal SN	R2107A0598/S01	
Hardware Version	V1.2	
Software Version	V1.1.3.0	
Date of Testing:	April 4, 2022 ~ April 13, 2022	

Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.

2. 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.

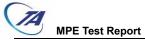


3 Maximum conducted output power (measured) and antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by Numeric gain (G)=10^(antenna gain/10)

Band	Maximum conducted output power (dBm)		Maximum Antonna Coin(dBi)	Numeric gain	
	(dBm)	(dBm)	Antenna Gain(dBi)		
Wi-Fi 2.4G	18.01	63.241	2.33	1.710	
Bluetooth (Low Energy)	7.03	5.047	2.33	1.710	

Report No.: R2107A0598-M1V1



4 Test Result

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following

TABLE 1 – LIMITS FOR MAXIMUN PERMISSIBLE EXPOSURE (MPE)

Frequency Range	Electric Field	Magnetic Field	Power Density	Averaging Time	
(MHz)	Strength	Strength	~	V22 V25	
1000 VO	(V/m)	(A/m)	(mVV/cm2)	(minutes)	
	(A) Limits for Occu	pational/Controlle	d Exposures		
0.3-3.0	614	1.63	*(100)	6	
3-30	1842/f	4.89/f	*(900/f2)	6	
30-300	61.4	0.163	1.0	6	
300-1500			f/300	6	
1500-100,000			5	6	
(B)	Limits for General	Population/Uncont	rolled Exposure		
0.3-1.34	614	1.63	*(100)	30	
1.34-30	824/f	2.19/f	*(180/f2)	30	
30-300	27.5	0.073	0.2	30	
300-1500	nameniamaneniama		f/1500	30	
1500-100,000			1.0	30	

f = frequency in MHz

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

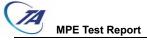
Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

^{* =} Plane-wave equivalent power density



The maximum permissible exposure for 300~1500 MHz is f/1500, for 1500~100,000MHz is 1.0.So

Band	The maximum permissible exposure (mW/cm²)		
Wi-Fi 2.4GHz	1.000		
Bluetooth LE	1.000		



RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 447498 D01 is used in the calculation.

Equation from KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Antenna Gain (dBi)	Maximum conducted output power (dBm)	Maximum EIRP (dBm)	PG (mW)	Test Result (mW/cm²)	Limit Value (mW/cm²)
Wi-Fi 2.4GHz	2.33	18.01	20.34	108.143	0.022	1.000
Bluetooth	2.33	7.03	9.36	8.630	0.002	1.000

Note: **R** = 20cm

 π = 3.1416

The MPE ratio = Mac Test Result ÷ Limit Value

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

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

^{1.} This MPE analysis is applicable to any collocated transmitters with EIRP for Wi-Fi /BT is less than or equal to 26dBm.



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

Report No.: R2107A0598-M1V1