

MPE TEST REPORT

Applicant Espressif Systems (Shanghai) Co.,Ltd.

FCC ID 2AC7Z-ESPC3MINI1

Product Wi-Fi & Bluetooth Internet of Things Module

Brand ESPRESSIF

Model ESP32-C3-MINI-1

Report No. R2103A0270-M1V1

Issue Date June 8, 2021

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: Yu Wang

Approved by: Guangchang Fan

Guangchang Fan

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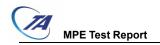


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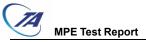
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Version	Revision description	Issue Date
Rev.0	Initial issue of report.	May 19, 2021
Rev.1	Update FCC ID	June 8, 2021

Note: This revised report (Report No. R2103A0270-M1V1) supersedes and replaces the previously issued report (Report No. R2103A0270-M1). Please discard or destroy the previously issued report and dispose of it accordingly.



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Test Laboratory

Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of 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

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 1.3

Company:

TA Technology (Shanghai) Co., Ltd.

Address:

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

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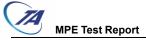
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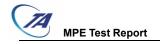


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1.4 Laboratory Environment

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

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 Park, 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-1
Lab internal SN	R2103A0270/S01
Hardware Version	V1.4
Software Version	V1.1.3.0
Date of Testing:	April 4, 2021 ~ April 30, 2021

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.

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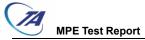


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3 Maximum conducted output power (measured) and antenna Gain

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		Antenna Gain	Numeric gain
		(dBm)	(mW)	(dBi)	
	802.11b	20	100.00	3.96	2.489
2.4G	802.11g	19	79.43	3.96	2.489
2.40	802.11n HT20	19	79.43	3.96	2.489
	802.11n HT40	18.5	70.79	3.96	2.489
Bluetooth (Low Energy)		6	3.98	3.96	2.489



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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)

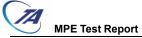
Frequency Range	Electric Field	Magnetic Field	Power Density	Averaging Time
(MHz)	Strength	Strength		120
A-5-000	(V/m)	(AVm)	(mW/cm2)	(minutes)
	(A) Limits for Occu	upational/Controlle	Exposures	
0.3-3.0	614	1.63	*(100)	6
3-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			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			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.

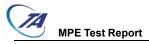
^{* =} Plane-wave equivalent power density



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

Band	The maximum permissible exposure (mW/cm²)
802.11b	1.000
802.11g	1.000
802.11n HT20	1.000
802.11n HT40	1.000
Bluetooth (Low Energy)	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	PG (mW)	Test Result (mW/cm²)	Limit Value (mW/cm²)	Conclusion
802.11b	248.886	0.050	1.000	Pass
802.11g	197.697	0.039	1.000	Pass
802.11n HT20	197.697	0.039	1.000	Pass
802.11n HT40	176.198	0.035	1.000	Pass
Bluetooth (Low Energy)	9.908	0.002	1.000	Pass

Note: $\mathbf{R} = 20 \text{cm}$ $\mathbf{\pi} = 3.1416$

BT antenna and Wi-Fi 2.4G antenna antenna can't transmit simultaneously.

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

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

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ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

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