



RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2108020804AT
Applicant: Thundercomm Technology Co.,Ltd
Address of Applicant: Building 4, No. 99, Data Valley Middle Road, Xiantao District, Yubei District, Chongqing, China.
Manufacturer: Thundercomm Technology Co.,Ltd
Address of Manufacturer: Building 4, No. 99, Middle Road, Xiantao Data, Yubei District, Chongqing
Factory: ZEGNA DAIDONG LIMITED CORPORATION
Address of Factory: No. 41 Gangjian Road, Changping Town, Dongguan City, Guangdong Province, China.
Equipment Under Test (EUT):
EUT Name: EB5 Edge AI Box
Model No.: EB5
Standard(s) : 47 CFR Part 2.1091
47 CFR Part 1.1310,
47 CFR Part 1.1307
Date of Receipt: 2021-08-02
Date of Evaluation: 2021-08-02 to 2021-08-13
Date of Issue: 2021-08-26

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian

EMC Laboratory Manager



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Report No.: GZCR210802080405

Page: 2 of 12

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-08-26		Original

Authorized for issue by				
				
		Lily Kuang/Project Engineer		
				
		Ricky Liu/Reviewer		



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2 Evaluation Summary

Radio Spectrum Technical Requirement				
Item	Standard	Requirement	Method	Result
RF Exposure	47 CFR Part 2.1091 47 CFR Part 1.1310 47 CFR Part 1.1307	47 CFR Part 1.1310	47 CFR Part 1.1310	PASS



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3 Contents

1	Covers Page	1
2	Evaluation Summary	3
3	Contents	4
4	General Information	5
4.1	Details of E.U.T.	5
4.2	Description of Support Units.....	6
4.3	Test Location.....	6
4.4	Test Facility.....	7
4.5	Deviation from Standards	8
4.6	Abnormalities from Standard Conditions	8
5	Radio Spectrum Technical Requirement	9
5.1	RF Exposure	9
5.1.1	Requirement.....	9
5.1.2	Method.....	10
5.1.3	Conclusion	11
5.2	EUT Constructional Details	12



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4 General Information

4.1 Details of E.U.T.

Power supply: Adapter
Model: HKA09019047-6U
Input: AC 100-240V, 50/60Hz, 1.5A
Output: DC 19.0V, 4.74A, 90.06W

Test voltage: AC 120V, 60Hz or AC 240V, 50Hz
Note: Both nominal AC 120V, 60Hz and AC 240 V, 50Hz are required for testing in accordance with FCC KDB174176, this report only shows the results of the worst test result(AC 120V, 60Hz);

Cable(s): DC cable:145cm with a ferrite core
AC cable:137cm unshielded

Internal source: More than 108MHz

2.4G WiFi

Type of Modulation: 802.11b: DSSS (CCK, DQPSK, DBPSK)
802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n (HT20/HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11ax(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

Operating Frequency: 802.11b/g/n/ax(HT20): 2412MHz to 2462MHz
802.11n/ax(HT40): 2422MHz to 2452MHz

Channel Number: 802.11b/g/11n/ax(HT20): 11 Channels
802.11n/ax(HT40): 7 Channels

Channels Step: Channels with 5MHz step

Sample Type: Fixed devices

Antenna Type: Monopole antenna

Antenna Gain: Antenna1/Antenna2: 3.46dBi
Note: Two antennas can simultaneous transmission.

5G WiFi

Operation Frequency:

Band	Mode	Frequency Range(MHz)	Number of channels
UNII Band I	802.11a/n/ax(HT20)	5180-5240	4
	802.11n/ax(HT40)	5190-5230	2
	802.11ac/ax(HT80)	5210	1
UNII Band II-A	802.11a/n/ax(HT20)	5260-5320	4
	802.11n/ax(HT40)	5270-5310	2



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Report No.: GZCR210802080405

Page: 6 of 12

	802.11ac/ax(HT80)	5290	1
UNII Band II-C	802.11a/n/ax(HT20)	5500-5700	11
	802.11n/ax(HT40)	5510-5670	5
	802.11ac/ax(HT80)	5530-5610	2
UNII Band III	802.11a/n/ax(HT20)	5745-5825	5
	802.11n/ax(HT40)	5755-5795	2
	802.11ac/ax(HT80)	5775	1

Modulation Type: 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
802.11ax: OFDM (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)

DFS Function: Slave without radar detection

TPC Function: Not support

Antenna Type: Monopole Antenna

Antenna Gain: Antenna1: 2.4dBi, Antenna2: 2.4dBi

Note: MIMO for 802.11n/ac/ax.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Test Location

All tests were performed at:
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4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

- **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.5 Deviation from Standards

None

4.6 Abnormalities from Standard Conditions

None



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5 Radio Spectrum Technical Requirement

5.1 RF Exposure

5.1.1 Requirement

In accordance with 47 CFR FCC Part 2.1091, this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

According to 47 CFR FCC Part 1310, the criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in Part1.1307(b).

TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density



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5.1.2 Method

According to IEEE C95.3:2002 section 5.5.1.1, the power density S at a point on the axis at a distance d from a transmitting antenna is given by the Friis free-space transmission formula:

$$S = \frac{PG}{4\pi d^2}$$

S = power density (mW/cm²)
 P = the net power delivered to the antenna (mW)
 G = gain of the antenna in linear scale
 d = distance between observation point and center of the radiator (cm)

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit stated in above table, the minimum distance between the antenna and human body will be calculated.



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5.1.3 Conclusion

For 2.4G WiFi

1. According to the the test report GZCR210802080402, the tested maximum conducted power for 2x2 MIMO is 20.92dBm = 0.12359W = 123.59mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 3.46dBi for single antenna, the Directional gain is 6.47dBi.
3. The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Power Density at R=20cm (mW/cm ²)
4.44	123.59	1	0.1091

For 5G WiFi

1. According to the the test report GZCR210802080403, the tested maximum conducted power for 2x2 MIMO is 18.99dBm = 0.07925W = 79.25mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 2.4dBi for single antenna, the Directional gain is 5.41dBi.
3. The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Power Density at R=20cm (mW/cm ²)
3.48	79.25	1	0.0548

Note: the 2.4G WLAN antenna and 5G WLAN antenna cannot synchronous transmission at the same time.



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5.2 EUT Constructional Details

Refer to Appendix - external and internal photos for GZCR2108020804AT.

- End of the Report -



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