

RF Exposure Evaluation Report

Product : Smart Gateway
Trade mark : N/A
Model/Type reference : COSHIP-G2000
Serial Number : N/A
Report Number : EED32O81142006
FCC ID : 2AL2OG2000
Date of Issue : Sep. 28, 2022
Test Standards : 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498 D04 Interim General RF
Exposure Guidance v01
Test result : PASS

Prepared for:

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Road, Nanshan District, Shenzhen, China

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2 Version

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00	Sep. 28, 2022	Original

3 Contents

	Page
1 COVER PAGE.....	1
2 VERSION.....	2
3 CONTENTS.....	3
4 GENERAL INFORMATION.....	4
4.1 CLIENT INFORMATION.....	4
4.2 GENERAL DESCRIPTION OF EUT.....	4
4.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD.....	4
4.4 TEST LOCATION.....	6
4.5 DEVIATION FROM STANDARDS.....	6
4.6 ABNORMALITIES FROM STANDARD CONDITIONS.....	6
4.7 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	6
5 SAR EVALUATION.....	7
5.1 RF EXPOSURE COMPLIANCE REQUIREMENT.....	7
5.1.1 Limits.....	7
5.1.2 Test Procedure.....	7
5.1.3 EUT RF Exposure Evaluation.....	8

4 General Information

4.1 Client Information

Applicant:	SHENZHEN COSHIP ELECTRONICS CO., LTD.
Address of Applicant:	Unit 27, building1, Xunmei Technology Plaza, No.8Keyuan Road, Nanshan District, Shenzhen, China
Manufacturer:	SHENZHEN COSHIP ELECTRONICS CO., LTD.
Address of Manufacturer:	Unit 27,building1,XunmeiTechnologyPlaza,No.8KeyuanRoad, NanshanDistrict,Shenzhen,China
Factory:	Nantong Coship Electronics Co.,Ltd.
Address of Factory:	No.188, Xincheng Road, chongchuan District, Nantong, Chin

4.2 General Description of EUT

Product Name:	Smart Gateway
Model No.(EUT):	COSHIP-G2000
Trade Mark:	N/A

4.3 Product Specification subjective to this standard

Frequency Range:	BLE/BT: 2402MHz~2480MHz 2.4G WIFI: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz 5G WIFI: U-NII-1: 5150-5250MHz,U-NII-3:5745-5825MHz LORA:TX:903.9MHz~905.3MHz,RX:923.3MHz~927.5MHz	
Modulation Type:	BLE: GFSK, BT: GFSK, $\pi/4$ DQPSK, 8DPSK 2.4G WIFI: IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g :OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM,QPSK,BPSK) 5G WIFI: IEEE 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11n(HT20/HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11ac(VHT20/VHT40/VHT80): OFDM (BPSK, QPSK, 16QAM, 64QAM) LORA	
Test Power Grade:	Default	
Test Software of EUT:	SecureCRTPortable	
Antenna Type:	BLE/BT/2.4GWIFI/5G WIFI: internal antenna LORA: external antenna	
Antenna Gain:	BT&BLE&2.4GHz WiFi: 4.62dBi; 5GHz WiFi band 1: 2.65dBi; 5GHz WiFi band 4: 2.58dBi; LORA: 1dBi	
Power Supply:	Adapter:	model: KL-WA120100-B input: 100-240V~50/60Hz,0.6A output: 12.0V,1.0A
Sample Received Date:	Aug. 12, 2022	
Sample tested Date:	Aug. 12, 2022 to Sep. 07, 2022	

Remark:

Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

4.4 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 SAR Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1).

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

The 1 mW Blanket Exemption of § 1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5.1.3 EUT RF Exposure Evaluation

1) For SISO:

① For BLE:

Antenna	Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
ANT2	2402	5.58	5.00±1	6.00	4.62	10.62	8.47	7.03	20	≤3060	PASS
ANT2	2440	5.58	5.00±1	6.00	4.62	10.62	8.47	7.03	20	≤3060	PASS

② For BT:

Antenna	Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
ANT2	2441	1.52	1.00±1	2.00	4.62	6.62	4.47	2.80	20	≤3060	PASS

③ For 2.4GHz Wi-Fi:

Antenna	Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
ANT1	2412	16.80	16.00±1	17.00	4.62	21.62	19.47	88.51	20	≤3060	PASS
ANT2	2467	16.21	16.00±1	17.00	4.62	21.62	19.47	88.51	20	≤3060	PASS

④For 5GHz Wi-Fi:

Antenna	Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
ANT1	5825	14.94	14.00±1	15.00	2.58	17.58	15.43	34.91	20	≤3060	PASS
ANT2	5745	14.96	14.00±1	15.00	2.58	17.58	15.43	34.91	20	≤3060	PASS

④For LORA:

Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
903.9	11.55	11.00±1	12.00	1.00	/	13.00	19.95	20	≤1843.96	PASS

Note:

- 1.EIRP=conducted power+antenna gain;
- 2.ERP=EIRP-2.15;
- 3.Only the worst case was recorded in the report.

2)For MIMO:
①2.4GHz WiFi:

Antenna	Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
Total	2412	14.58	14.00±1	15.00	4.62	19.62	17.47	55.85	20	≤3060	PASS

②5GHz WiFi:

Antenna	Frequency (MHz)	Max. Conducted Output power (dBm)	Tune up tolerance (dBm)	Max. tune up power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Evaluation distance (cm)	Limit (mW)	Result
Total	5825	17.84	17.00±1	18.00	2.58	20.58	18.43	69.66	20	≤3060	PASS

Note:

- 1.EIRP=conducted power+antenna gain;
- 2.ERP=EIRP-2.15;
- 3.Only the worst case was recorded in the report.

3)For Simultaneous Transmission:

As MPE ratio (2.4GHz WiFi+5GHz WiFi+LORA)=(88.51+34.91)/3060+19.95/1843.96=0.05 < 1, it's deemed to fulfil the RF exposure requirement.

Note:

- 1.Only the worst case was recorded in the report.

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*** End of Report ***