

RF Exposure Evaluation Report

Product : Industrial Wireless Routers
Trade mark : N/A
Model/Type reference : See section 3.2
Serial Number : N/A
Report Number : EED32Q81626903
FCC ID : 2BLUFEDGE-RX8XX-SFX
Date of Issue : Nov. 20, 2024
Test Standards : 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
47 CFR Part 2.1093
KDB 447498 D04 Interim General RF
Exposure Guidance v01
Test result : PASS

Prepared for:

Tianjin Elco Automation Co., Ltd
**No.12, 4th XEDA Branch Rd, Xiqing Economic-Technological
Development Area, Tianjin**

Prepared by:

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Check No.: 3726141024

1 Version

Version No.	Date	Description
00	Nov. 20, 2024	Original

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3 General Information

3.1 Client Information

Applicant:	Tianjin Elco Automation Co., Ltd
Address of Applicant:	No.12, 4th XEDA Branch Rd, Xiqing Economic-Technological Development Area, Tianjin
Manufacturer:	Tianjin Elco Automation Co., Ltd
Address of Manufacturer:	No.12, 4th XEDA Branch Rd, Xiqing Economic-Technological Development Area, Tianjin
Factory:	Tianjin Elco Automation Co., Ltd
Address of Factory:	No.12, 4th XEDA Branch Rd, Xiqing Economic-Technological Development Area, Tianjin

3.2 General Description of EUT

Product Name:	Industrial Wireless Routers
Model No.:	EDGE-R0831-SF2-01A, EDGE-R series, Model EDGE-R, followed by 0 to 9, followed by 8, followed by 0 to 9, followed by 0 to 9, followed by AL,U,R or vacant , followed by - SF, followed by 0 to 9,followed by - 01A to -09A or vacant.
Test Model No.:	EDGE-R0831-SF2-01A
Trade mark:	N/A

3.3 Product Specification subjective to this standard

Frequency Range:	2.4G Wi-Fi: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz 5G Wi-Fi: U-NII-1: 5150-5250MHz U-NII-3:5745-5825MHz
Modulation Type:	2.4G Wi-Fi: 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 Wi-Fi: 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, 256QAM) IEEE 802.11ax(HE20/HE40/HE80): OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM,1024QAM)
Test Power Grade:	Default
Test Software of EUT:	MobaXterm_Personal_22.1
Antenna Type:	External Antenna
Antenna Gain:	2.4G Wi-Fi: 1.1 dBi 5G Wi-Fi: U-NII-1: 5150-5250MHz 2.57 dBi U-NII-3:5745-5825MHz 3.12 dBi
Power Supply:	DC 30V
Sample Received Date:	Oct. 23, 2024
Sample tested Date:	Oct. 23, 2024 to Nov. 05, 2024

Remark:

N/A: The product is DC power supply.

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

Model No.: EDGE-R0831-SF2-01A, EDGE-R series, Model EDGE-R, followed by 0 to 9, followed by 8, followed by 0 to 9, followed by 0 to 9, followed by AL,U,R or vacant , followed by -SF, followed by 0 to 9,followed by -01A to -09A or vacant.

Only the model EDGE-R0831-SF2-01A was tested, Their have same electrical, PCB and BOM, only the model' s names definition are different for marketing requirements.

3.4 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

3.5 Deviation from Standards

None.

3.6 Abnormalities from Standard Conditions

None.

3.7 Other Information Requested by the Customer

None.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 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 Pth (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). Pth 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 ERP20cm 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.

4.1.2 Test Procedure

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

4.1.3 EUT RF Exposure Evaluation

For Stand alone:

2.4G Wi-Fi:

Frequency (MHz)	Estimation distance (cm)	Max. Conducted Output power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	Limit (mW)	MPE ratio	Result
@2.4GHz	20	15.53	1.1000	14.48	28.0543	3060	0.0092	Pass

5G Wi-Fi:

Frequency (MHz)	Estimation distance (cm)	Max. Conducted Output power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	Limit (mW)	MPE ratio	Result
@5GHz	20	12.82	2.5700	13.24	21.0863	3060	0.0069	Pass

Note:

- ① EIRP=conducted power+antenna gain;
- ② $ERP = EIRP - 2.15$;
- ③ $EIRP(dBm) = \text{Field strength of the fundamental signal}(dBuV/m@3m) - 95.23$;
- ④ $ERP(mW) = 10^{(ERP(dBm)/10)}$;
- ⑤ The estimation distance is 20cm;
- ⑥ The test data please refer to the report of EED32Q81626901, EED32Q81626902 and only the worst case data was recorded in the report.

For Simultaneous Transmission:

As MPE ratio (BLE+2.4G Wi-Fi)= 0.0092+0.0069=0.0161 < 1, it's deemed to fulfil the RF exposure requirement.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.

*** End of Report ***