

RF Exposure Evaluation Report

Product : seed studio reCamera 2002 Series
Trade mark : Seed Studio
Model/Type reference : See section 3.2
Serial Number : N/A
Report Number : EED32Q81957305
FCC ID : Z4T-RECAMERA2002W
Date of Issue : Dec. 19, 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:

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Check No.: 9744271124

1 Version

Version No.	Date	Description
00	Dec. 19, 2024	Original

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3 General Information

3.1 Client Information

Applicant:	Seeed Technology Co., Ltd
Address of Applicant:	9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen
Manufacturer:	Seeed Technology Co., Ltd
Address of Manufacturer:	9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen
Factory:	Shenzhen Xinxian Technology Co.,Limited
Address of Factory:	F5, Building B17, Hengfeng Industrial City, No. 739 Zhoushi Rd, Baoan District, Shenzhen, Guangdong, P.R.C.

3.2 General Description of EUT

Product Name:	seeed studio reCamera 2002 Series
Model No.(EUT):	reCamera 2002w 64GB, reCamera 2002w 8GB, reCamera Core 2002w 64GB, reCamera Core 2002w 8GB
Test Model No.:	reCamera Core 2002w 64GB
Trade mark:	Seeed Studio

3.3 Product Specification subjective to this standard

Frequency Range:	BLE/BT: 2402MHz to 2480MHz 2.4G Wi-Fi: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz 5G Wi-Fi: U-NII-1: 5150-5250MHz U-NII-2A: 5250-5350MHz U-NII-2C:5500-5700MHz U-NII-3:5745-5825MHz	
Modulation Type:	BLE: GFSK BT: GFSK, $\pi/4$ DQPSK, 8DPSK 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) : 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): OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	
Test Power Grade:	Default	
Test Software of EUT:	MobaXterm_Personal_22.1.exe	
Antenna Type:	PIFA antenna	
Antenna Gain:	BLE/BT/2.4G Wi-Fi: -1.06dBi 5G Wi-Fi: 1.34dBi	
Power Supply:	USB port:	DC 5.0V
Sample Received Date:	Dec. 03, 2024	
Sample tested Date:	Dec. 03, 2024 to Dec. 13, 2024	

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.

Model No.: reCamera 2002w 8GB, reCamera Core 2002w 64GB, reCamera Core 2002w 8GB

Only the model reCamera Core 2002w 64GB was tested. The following description shows the difference between each model and the reCamera 2002w 64GB.

Model	EMMC	Difference description
reCamera 2002w 64GB	64GB	Normal
reCamera 2002w 8GB	8GB	The emmc sizes are different
reCamera Core 2002w 64GB	64GB	No lens board and interface board and supporting structural parts
reCamera Core 2002w 8GB	8GB	The emmc sizes are different and no lens board and interface board and supporting structural parts

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 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.

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:

Frequency (MHz)	Estimation distance (cm)	Max. Conducted Output power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	Limit (mW)	MPE ratio	Result
@BLE	20	7.77	-1.06	4.56	2.8576	3060	0.0009	Pass
@BT	20	8.25	-1.06	5.04	3.1915	3060	0.0010	Pass
@2.4G Wi-Fi	20	24.95	-1.06	21.74	149.2794	3060	0.0488	Pass
@5G Wi-Fi	20	23.64	1.34	22.83	191.8669	3060	0.0627	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 EED32Q81957301, EED32Q81957302, EED32Q81957303, and EED32Q81957304, and only the worst case data was recorded in the report.

For Simultaneous Transmission:

As MPE ratio (2.4G Wi-Fi+5G Wi-Fi)= $0.0488+0.0627=0.1115 < 1$, it's deemed to fulfil the RF exposure requirement.

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*** End of Report ***