

Test Report

Verified code: 192480

Report No.: E20240605493601-4

Customer: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District,
Nanshan District, Shenzhen, China

Sample Name: Valve Controller T1

Sample Model: VC-X01E

Receive Sample Date: Jun.06,2024

Test Date: Jun.07,2024 ~ Jun.15,2024

Reference Document: CFR 47, FCC Part 2.1091 Radio frequency radiation exposure evaluation:
mobile devices.

Test Result: Pass

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GRG METROLOGY & TEST GROUP CO., LTD

Issued Date: 2024-07-10

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240605493601-4	Original Issue	2024-07-08

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1. GENERAL DESCRIPTION OF EUT

1.1. APPLICANT

Name: Lumi United Technology Co., Ltd
Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

1.2. MANUFACTURER

Name: Lumi United Technology Co., Ltd
Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

1.3. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Valve Controller T1

Model No.: VC-X01E

Adding Model: VC-X01D

Model difference descriptions: They have the same technical construction including circuit diagram, PCB layout, hardware version and software version identical, only the model name is different.

Trade Name: Aqara

Power Supply: 6V DC power by battery(AA*4)

Battery Specification: AA LR6 1.5V No.3151B

FCC ID: 2AKIT-VCX01

Frequency Range: ZigBee: 2405MHz-2480MHz

Conducted maximum output Power: 8.08dBm

Modulation type: O-QPSK

Antenna Specification: FPC antenna 3.08dBi gain (Max.)

Temperature Range: -10 °C ~ +50 °C

Hardware Version: V32

Software Version: 4.2.8

Sample No: E20240605493601-0001, E20240605493601-0004

Note: The basic description of the EUT is provided by the applicant. This report is made Solely on the basis of such data and/or information. We accept no

responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions. The test model is VC-X01E.

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2. LABORATORY AND ACCREDITATIONS

2.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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2.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLEDEXPOSURE

According to the KDB 447498 D04 Interim General RF Exposure Guidance v01, General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table 4.1 to support an exemption from further evaluation from 300 kHz through 100 GHz.

TABLE 4.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R ²

Subscripts L and H are low and high; λ is wavelength.
From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

For mobile devices that are not exempt per Table 4.1 at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than $ERP_{20\text{cm}}$ in Formula (4.1).

Formula (4.1):

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

4. CALCULATION METHOD

Predication of MPE limit at a given distance

$EIRP(dBm) = \text{Maximum Tune-up Output power (dBm)} + \text{Maximum antenna gain(dBi)}$

$ERP(dBm) = EIRP(dBm) - 2.15$

R=minimum distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, $d=20\text{cm}$, as well as the maximum gain of the used as following information, the RF power ERP can be obtained.

Table 1 Antenna Specification

Mode	Antenna type	Maximum antenna gain
ZigBee	Internal antenna	3.08dBi

Table 2 Transmit Power

Mode	Frequency(MHz)	Peak Conducted Output Power (dBm)	Target (dBm)	Tolerance \pm (dB)
ZigBee	2405	8.08	9.00	1.0
	2440	7.80	8.00	1.0
	2480	7.44	8.00	1.0

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5. ESTIMATION RESULT

5.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up Output power (dBm)	Antenna Gain (dBi)	Maximum Tune-up EIRP (dBm)	ERP (dBm)	Maximum Tune-up ERP (W)	Threshold ERP(W)
ZigBee	2405- 2480	9.0	3.08	12.08	9.93	0.010	0.768

Remark:

1. RF Exposure use distance is 20cm from manufacturer declaration of user manual.
2. Threshold ERP(W)= $19.2R^2(W)=19.2*0.2*0.2(W)=0.768(W)$.
3. ERP(dBm)=EIRP(dBm)-2.15.

6. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

----- End of Report -----