Test Report

Verified code: 992299

Report No.: E20221122027601-2

Customer:	Lumi United Technology Co., Ltd
Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China
Sample Name:	LED Strip T1
Sample Model:	LEDS-K02
Receive Sample Date:	Nov.24,2022
Test Date:	Nov.25,2022 ~ Mar.31,2023
Reference Document:	CFR 47, FCC Part 2.1091Radiofrequency radiation exposure evaluation: mobile devices.
Test Result:	Pass

Prepared by: Reviewed by: Approved by:

GRG METROLOGY & TEST GROUP CO., LTD

Issued Date: 2023-04-25

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Statement

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5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20221122027601-2	Original Issue	2023-04-07

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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 DESCRIPTIONOF EQUIPMENTUNDER TEST

Equipment:	LED Strip T1
Model No.:	LEDS-K02
Adding Model:	LEDS-K01, RLS-K01D, RLS-K02D
Difference descriptions:	except sales area and packaging are different. The circuit diagram, PCB LAYOUT, hardware version and software version identical, … are all the same.
Trade Name:	Aqara
FCC ID:	2AKIT-LEDSK02
Power Supply:	DC 24V
Frequency Band:	ZigBee: 2405MHz-2475MHz
Maximum Transmit Power:	6.59dBm
Antenna Specification:	PCB printed antenna with 0.5dBi gain (Max)
Temperature Range:	-10℃~40℃
Hardware Version:	X1
Software Version:	0.0.0_2224
Sample No:	E20221122027601-0001, E20221122027601-0003
Note:	The model LEDS-K02 is the test sample.

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2. 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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3. 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)

Copies of granted accreditation certificates are available for downloading from our web site, http://www.grgtest.com

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4. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

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^2f
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_{20cm} in Formula (4.1).

$$P_{th}\ (\text{mW}) = ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \quad (4,1)$$

In accordance with KDB447498D04 Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated$_k$ term) shall be used to determine exemption for simultaneous transmission according to Formula

MPE Ratio $= \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} < 1$

ERP_j: the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j.

$ERP_{th,j}$: exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π, according to the applicable §1.1307(b)(3)(i)(C) Table 1 formula at the location in question.

the sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance

5. CALCULATION METHOD

Predication of MPE limit at a given distance

EIRP(dBm)= Maximum Tune-up Output power (dBm)+ 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=20cm, as well as the maximum gain of the used as following information, the RF power ERP can be obtained.

Table 1 Antenna Specification

Frequency Band	Antenna type	Maximum antenna gain
ZigBee	PCB printed antenna	0.5dBi

Table 2 Transmit Power

Frequency Band	Maximum Output Power (dBm)	Max.Tune-up Output Power (dBm)
ZigBee	6.59	6.00+1

6. ESTIMATION RESULT

6.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up Output power (dBm)	Antenna Gain (dBi)	Maximum Tune-up EIRP (dBm)	Maximum Tune-up ERP (dBm)	Maximum Tune-up ERP (W)	Threshold ERP (W)
ZigBee	2405-2475	7	0.5	7.5	5.35	0.0034	0.7680

Remark:

1. RF Exposure use distance is 20cm from manufacturer declaration of user manual.
2 ERP=EIRP-2.15
3.Threshold ERP(W)= 19.2R ²(W)=19.2*0.2*0.2(W)=0.7680(W).

7. CONCLUSION

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

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