TEST REPORT

Product Name : LED Bulb T2
Model Number : LB-L01E
FCC ID : 2AKIT-LBL01E

Prepared for	:	Lumi United Technology Co., Ltd.
Address	:	Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China
Prepared by	:	EMTEK (DONGGUAN) CO., LTD.
Address	:	-1&2/F.,Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China TEL: +86-0769-22807078 FAX: +86-0769-22807079
Report Number	:	EDG2408010102E00108R
Date(s) of Tests	:	August 01, 2024 to November 23, 2024
Date of issue	:	November 23, 2024

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1. TEST RESULT CERTIFICATION

Applicant	:	Lumi United Technology Co., Ltd.
Address	:	Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China
Manufacturer	:	Lumi United Technology Co., Ltd.
Address	:	Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China
Factory	:	NINGBO SIYING OPTOELECTRONIC LIGHTING SCIENCE&TECHNOLOGY CO,.LTD
Address	:	No.9 Anda road, Fengshan street, Yuyao city, ZIP code 315400, Zhejiang Province, China
EUT	:	LED Bulb T2
Model Name	:	LB-L01E
Trademark	:	Aqara

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
§ 15.247(i), § 2.1093,1.1307(b)(1)	**PASS**

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules FCC § 15.247(i), § 2.1093, 1.1307(b)(1).
The test results of this report relate only to the tested sample identified in this report

Date of Test : August 01, 2024 to November 23, 2024

Prepared by : Warren Deng

Warren Deng /Editor

Reviewer : Galen Xiao

Galen Xiao /Supervisor

Approve & Authorized Signer :

Sam Lv / Manager

Modified History

Version	Report No.	Revision Date	Summary
	EDG2408010102E00108R	/	Original Report

2. EUT Specification

Characteristics	Description
Product:	LED Bulb T2
Model Number:	LB-L01E
Sample:	2#
Device Type:	BLE, zigbee
Modulation:	O-QPSK for BLE GFSK for zigbee
Operating Frequency Range(s) :	2402-2480 MHz for BLE 2405-2480 MHz for zigbee & thread
Number of Channels:	40 channels for BLE 16 channels for zigbee & thread
Transmit Power Max:	8.60 dBm(0.007244 W) for BLE 7.00 dBm(0.005012 W) for zigbee 8.31 dBm(0.006776 W) for thread
Antenna Gain:	-1.1 dBi for BLE and zigbee & thread
Power supply:	100-240V, 50/60Hz
Evaluation applied:	☒ MPE Evaluation ☐ SAR Evaluation

3. Test Requirement:

RF EXPOSURE EVALUATION

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission formula: Pd= (Pout*G)\ (4*pi*R^2)

Where

Pd= Power density in mW/cm^2

Pout=output power to antenna in mW

G= Numeric gain of the antenna relative to isotropic antenna

Pi=3.1416

R= distance between observation point and center of the radiator in cm

Pd the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the nd total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

4. Measurement Result

Antenna gain:
2.4G: -1.1 dBi

zigbee

Channel	Output Power(dBm)	E.I.R.P(dBm)	Target Power W/tolerance (dBm)	Max tune up power(dBm) tolerance	Max tuneup power(mW) tolerance	Power Density at R=20cm (mW/cm2)	Power density Limits (mW/cm2)
1	7	5.9	7±1	8	6.31	0.000974	1
8	6.87	5.77	6±1	7	5.01	0.000774	1
15	6.16	5.06	6±1	7	5.01	0.000774	1

thread

Channel	Output Power(dBm)	E.I.R.P(dBm)	Target Power W/tolerance (dBm)	Max tune up power(dBm) tolerance	Max tuneup power(mW) tolerance	Power Density at R=20cm (mW/cm2)	Power density Limits (mW/cm2)
1	8.31	7.21	8±1	9	7.94	0.001227	1
8	7.94	6.84	7±1	8	6.31	0.000974	1
15	7.42	6.32	7±1	8	6.31	0.000974	1

BLE

Mode	Frequency (MHz)	Output Power(dBm)	E.I.R.P(dBm)	Target Power W/tolerance (dBm)	Max tune up power(dBm) tolerance	Max tuneup power(mW) tolerance	Power Density at R=20cm (mW/cm2)	Limit (mW/cm2)
1M	2402	8.59	7.49	8±1	9	7.94	0.001227	1
	2440	8.43	7.33	8±1	9	7.94	0.001227	1
	2480	7.86	6.76	7±1	8	6.31	0.000974	1
2M	2402	8.6	7.5	8±1	9	7.94	0.001227	1
	2440	8.44	7.34	8±1	9	7.94	0.001227	1
	2480	7.93	6.83	7±1	8	6.31	0.000974	1

According to KDB 447498, no stand-alone required for zigbee & BLE antenna, and no simultaneous SAR measurement is required.

According to KDB 447498 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,[30] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[31]
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

b) For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following (also illustrated in Appendix B):[32]

1) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):[33]

1) For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/$f_{(MHz)}$)]

2) For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

3) SAR measurement procedures are not established below 100 MHz.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to quality for TCB approval.
One antenna is available for the EUT. The minimum separation distance is 5mm.

According to ANSI C63.10-2013
9.5 Equations to calculate EIRP
Calculate the EIRP from the radiated field strength in the far field using Equation (22):
EIRP = E + 20log (d) −104.7 (22)
where
EIRP is the equivalent isotropically radiated power, in dBm
E is the field strength of the emission at the measurement distance, in dBμV/m
d is the measurement distance, in m

NFC

Channel Freq. (MHz)	Max Field Strength (dBuV/m)	peak output power (dBm)	Tune upPower (dBm)	Max tune up power(dBm)	Max tuneup power(mW) tolerance	Power Density at R=20cm (mW/cm2)	Limit
13.56	30.68	-64.4776	-65±1	-64	3.98107E-07	7.92411E-11	--

According to KDB 447498, no stand-alone required for NFC antenna, and no simultaneous SAR measurement is required.

*** End of Report ***