

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: Zhongshan Laiyi Lighting Co., Ltd.
Address of applicant: 6F, Block D, No.6, Qinglong Road, Henglan Town, Zhongshan City, Guangdong Province, China

Manufacturer: Zhongshan Laiyi Lighting Co., Ltd.
Address of manufacturer: 6F, Block D, No.6, Qinglong Road, Henglan Town, Zhongshan City, Guangdong Province, China

General Description of EUT:

Product Name: Recessed luminaires
Trade Name: /
Model No.: RoundLA-RC24W12
Adding Model(s): SquareLA-SC24W12
Rated Voltage: AC 120V
FCC ID: 2A54M-LA-RC24W12
Equipment Type: Fixed device

Technical Characteristics of EUT:

Wi-Fi

Support Standards: 802.11b, 802.11g, 802.11n
Frequency Range: 2412-2462MHz for 802.11b/g/n(HT20)
2422-2452MHz for 802.11n(HT40)
RF Output Power: 15.88dBm (Conducted)
Type of Modulation: DBPSK,BPSK,DQPSK,QPSK,16QAM,64QAM
Quantity of Channels: 11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
Channel Separation: 5MHz
Type of Antenna: PCB Antenna
Antenna Gain: 1dBi

Bluetooth

Bluetooth Version: V5.1 (BLE mode)
Frequency Range: 2402-2480MHz
RF Output Power: 3.06dBm (Conducted)
Data Rate: 1Mbps
Modulation: GFSK
Quantity of Channels: 40
Channel Separation: 2MHz
Type of Antenna: PCB Antenna
Antenna Gain: 1dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

1.3 MPE Calculation Method

$$S = (30*P*G) / (377*R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,
the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

For Wi-Fi:

Maximum Tune-Up output power: 16.0 (dBm)

Maximum peak output power at antenna input terminal: 39.81 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain: 1 (dBi)

Directional gain (numeric gain): 1.26

The worst case is power density at prediction frequency at 20cm: 0.0100 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For Bluetooth:

Maximum Tune-Up output power: 3.5 (dBm)

Maximum peak output power at antenna input terminal: 2.24 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2440 (MHz)

Antenna gain: 1.0 (dBi)

Directional gain (numeric gain): 1.26

The worst case is power density at prediction frequency at 20cm: 0.0006 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Result: Pass