1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant: Zhongshan Linde Electronic Technology Co., Ltd.

Address of applicant: One Of The 5th Floor Slabs Of Building A Hua Yuan Road 2, Xiaolan

Town Zhongshan, Guangdong, CHINA 528400

Manufacturer: Zhongshan Linde Electronic Technology Co., Ltd.

Address of manufacturer: One Of The 5th Floor Slabs Of Building A Hua Yuan Road 2, Xiaolan

Town Zhongshan, Guangdong, CHINA 528400

General Description of EUT:

Product Name: RGBW ROCK LIGHT

Trade Name /

Model No.: LD-RL-RGBW-4 POD Adding Model(s): LD-RL-RGBW-8 POD

Rated Voltage: DC12V

Power Adapter: /

FCC ID: 2BBHC-LD-RL-RGBW

Equipment Type: Mobile device

Technical Characteristics of EUT:

Bluetooth

Bluetooth Version: V4.0 (BLE mode)
Frequency Range: 2402-2480MHz

RF Output Power: -3.52dBm (Conducted)

Data Rate: 1Mbps
Modulation: GFSK
Quantity of Channels: 40
Channel Separation: 2MHz

Type of Antenna: PCB Antenna

Antenna Gain: 3.43dBi

1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, 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.

Option A: FCC Rule Part 1.1307 (b)(3)(i)(A):The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

Option B: FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 cm} (d/20 \text{ cm})^x & d \le 20 \text{ cm} \\ ERP_{20 cm} & 20 \text{ cm} < d \le 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz};$$

and

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

d = the separation distance (cm);

Option C: FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation				
RF Source frequency (MHz) Threshold ERP (watts)				
0.3-1.34 1,920 R ²				
1.34-30	3,450 R ² /f ²			
30-300	3.83 R ²			
300-1,500	0.0128 R ² f			
1,500-100,000	19.2R ²			

For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

1.3 Calculated Result

Radio	Prediction	Output	Antenna	Duty	Tune-Up	ERP	
Access	Frequency	Power	Gain	Cycle	Time-Averaged Power	ERF	
Technology	(MHz)	(dBm)	(dBi)	(%)	(dBm)	(dBm)	
Bluetooth	2402	-3.52	3.43	100	-3.00	-1.72	

Frequency	Option	Min. Distance	Max.	Max. Power Exposure Limit		Ratio	Result
(MHz)	Option	(cm)	(dBm)	(mW)	(mW)	Katio	Pass/Fail
2402	С	20.00	-1.72	0.67	768.00	0.01	Pass

Note: 1. Time-Averaged Power=Output Power * Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB

- 2. Option A, B and C refers as clause 1.2.
- 3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;
- 4. For option B, P_{th} (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).
 - 5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)

Mode for Simultaneous Multi-band Transmission:

Radio Access	Dotio 1	Ratio 2	Simultaneous	Limit	Result
Technology	Ratio 1		Ratio		Pass/Fail

Result: Pass