

# 1. RF Exposure Requirements

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## 1.1 General Information

### Client Information

Applicant: Hangzhou BroadLink Technology Co., Ltd.  
Address of applicant: Building C, 57 Jiang'er Road, Binjiang, Hangzhou, 310052, P.R.China

Manufacturer: Hangzhou BroadLink Technology Co., Ltd.  
Address of manufacturer: Building C, 57 Jiang'er Road, Binjiang, Hangzhou, 310052, P.R.China

### General Description of EUT:

Product Name: Smart Bulb  
Trade Name: /  
Model No.: LB4E26F  
Adding Model(s): LB4E27F, LBNE26X, LBNE27X; (N=1, 2, 3..., X=A, B, C...)  
Rated Voltage: AC 110-130V  
Power Adapter: /  
FCC ID: 2ATEV-LB4E26F  
Equipment Type: Fixed device

### Technical Characteristics of EUT:

#### Bluetooth

Bluetooth Version: V5.0 (BLE mode)  
Frequency Range: 2402-2480MHz  
RF Output Power: 3.23dBm (Conducted)  
Data Rate: 1Mbps  
Modulation: GFSK  
Quantity of Channels: 40  
Channel Separation: 2MHz  
Type of Antenna: PCB Antenna  
Antenna Gain: 2.79dBi

## 1.2 RF Exposure Exemption

According to §1.1307(b)(3) and 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:

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

Where

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

and

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

$d$  = 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  $\lambda$  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	$19.2 R^2$

**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.

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

### 1.3 Calculated Result

Radio Access Technology	Min. Frequency	Max. Output Power	Max. Tune-Up Output Power	Antenna Gain	Duty Cycle	Tune-Up EIRP
	(MHz)	(dBm)	(dBm)	(dBi)	(%)	(dBm)
Bluetooth	2402	3.23	4.0	2.79	100	6.79

Frequency (MHz)	Option	Min. Distance	Tune-Up ERP		Exposure Limit	Ratio	Result
		(cm)	(dBm)	(mW)	(mW)		Pass/Fail
2402	C	20.00	4.64	2.91	768.00	0.01	Pass

Note: 1.  $ERP = EIRP - 2.15dB$ ;  $EIRP = Output Power + Antenna gain$

2. Option A, B and C refers as clause 1.2.

3. For option B,  $P_{th}(mW)$  convert to  $Exposure Limit(mW)$ ; For option C,  $ERP(W)$  convert to  $Exposure Limit(mW)$ .

4.  $Ratio = Tune-Up ERP(mW) / Exposure Limit (mW)$

#### Mode for Simultaneous Multi-band Transmission:

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