



## Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: [www.cqa-cert.com](http://www.cqa-cert.com)

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# RF Exposure Evaluation Report

**Report No. :** CQASZ20180700101E-02

**Applicant:** Zengge Co., Limited

**Address of Applicant:** F13A, The Torch Building, No.284 Jin'ou Road, Jianghai District, Jiangmen, China

**Manufacturer:** Zengge Co., Limited

**Address of Manufacturer:** F13A, The Torch Building, No.284 Jin'ou Road, Jianghai District, Jiangmen, China

**Equipment Under Test (EUT):**

**Product:** Smart Led Bulb

**All Model No.:** ZJ-WFBH-RGBW, ZJ-WFBH-CCT, ZJ-WFBH-W, ZJ-WFBI-RGBW, ZJ-WFBI-CCT, ZJ-WFBI-W, ZJ-WFBG-R95, ZJ-WFBJ-RGBW, ZJ-WFBJ-RGBWW, ZJ-WFBJ-CCT, ZJ-WFBJ-W, ESP-M2, ZJ-W-AD01

**Test Model No.:** ZJ-WFBH-RGBW

**Brand Name:** ZENGGE

**FCC ID:** 2AGGW-ZJWFA

**Standards:** 47 CFR Part 1.1307  
47 CFR Part 1.1310  
KDB447498D01 General RF Exposure Guidance v06

**Date of Test:** 2018-08-03 to 2018-10-24

**Date of Issue:** 2018-10-24

**Test Result :** PASS\*

**Tested By:**

*Tiny You*

(Tiny You)

**Reviewed By:**

*Aaron Ma*

(Aaron Ma)

**Approved By:**

*Jack Ai*

(Jack Ai)



\* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

## 1 Version

### Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20180700101E-02	Rev.01	Initial report	2018-10-24

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### 3 General Information

#### 3.1 Client Information

Applicant:	Zengge Co., Limited
Address of Applicant:	F13A, The Torch Building, No.284 Jin'ou Road, Jianghai District, Jiangmen, China
Manufacturer:	Zengge Co., Limited
Address of Manufacturer:	F13A, The Torch Building, No.284 Jin'ou Road, Jianghai District, Jiangmen, China

#### 3.2 General Description of EUT

Product Name:	Smart Led Bulb
All Model No.:	ZJ-WFBH-RGBW, ZJ-WFBH-CCT, ZJ-WFBH-W, ZJ-WFBI-RGBW, ZJ-WFBI-CCT, ZJ-WFBI-W, ZJ-WFBG-R95, ZJ-WFBJ-RGBW, ZJ-WFBJ-RGBWW, ZJ-WFBJ-CCT, ZJ-WFBJ-W, ESP-M2, ZJ-W-AD01
Test Model No.:	ZJ-WFBH-RGBW
Trade Mark:	ZENGGE
Hardware Version:	V1.0
Software Version:	V1.0
Sample Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Power Supply:	120V/60Hz

#### 3.3 General Description of WIFI

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (64QAM, 16QAM,QPSK,BPSK)
Test Software of EUT:	RF test (manufacturer declare )
Antenna Type:	PCB antenna
Antenna Gain:	1.2dBi

Note:

1. All model: ZJ-WFBH-RGBW, ZJ-WFBH-CCT, ZJ-WFBH-W, ZJ-WFBI-RGBW, ZJ-WFBI-CCT, ZJ-WFBI-W, ZJ-WFBG-R95, ZJ-WFBJ-RGBW, ZJ-WFBJ-RGBWW, ZJ-WFBJ-CCT, ZJ-WFBJ-W, ESP-M2, ZJ-W-AD01
2. Only the model ZJ-WFBH-RGBW was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

## 4 RF Exposure Evaluation

### 4.1 RF Exposure Compliance Requirement

#### 4.1.1 Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30–300 .....	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

#### 4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

## 4.2 1.1.3 EUT RF Exposure Evaluation

### 1) For WIFI

Antenna Gain: 1.2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.32 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

#### Measurement Data

802.11b mode	
Test channel	Average Output Power (dBm)
Lowest(2412MHz)	12.5
Middle(2437MHz)	12.95
Highest(2462MHz)	12.79
802.11g mode	
Test channel	Average Output Power (dBm)
Lowest(2412MHz)	10.35
Middle(2437MHz)	10.63
Highest(2462MHz)	10.63
802.11n(HT20)mode	
Test channel	Average Output Power (dBm)
Lowest(2412MHz)	10.53
Middle(2437MHz)	10.7
Highest(2462MHz)	10.84

#### 802.11b(worst case)

Channel	Frequency (MHz)	Max Conducted average Output Power (dBm)	Output Power to Antenna (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit	Result
Middle	2437	12.95	19.724	1.2	0.0051728	1.0	PASS

Note: 1) Refer to report No. CQASZ20180700101E-01 for EUT test Max Conducted average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (19.724 * 1.32) / (4 * 3.1416 * 20^2) = 0.0051728$$