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Report No.: 1508RSU01205
Report Version: V01
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RF Exposure Evaluation Declaration

FCC ID: 2ABX8SH-000000011

APPLICANT: Zhejiang shenghui lighting Co., Ltd. Shanghai Branch

Application Type: Certification

Product: Element hub

Model No.: Z01-hub

Trademark: sengled

FCC Classification: Digital Transmission System (DTS)

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The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date
1508RSU01205	Rev. 01	Initial report	09-06-2015

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	Element hub
Model No.	Z01-hub
Zigbee Specification	
Frequency Range	2405 ~ 2480 MHz
Type of Modulation	O-QPSK
Max Average Output Power	19.24dBm
Antenna Type	PIFA Antenna
Antenna Gain	1.57dBi
Wi-Fi Specification	
Frequency Range	2412 ~ 2462 MHz
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Max Average Output Power	16.69dBm
Antenna Type	PIFA Antenna
Antenna Gain	3.05dBi

2. RF Exposure Evaluation

2.1. Limits

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 (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1mW/cm². 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.

2.2. Test Result of RF Exposure Evaluation

Product	Element hub
Test Item	RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.05dBi for Wi-Fi and 1.57dBi for Zigbee in logarithm scale.

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
802.15.4	2405 ~ 2480	19.24	0.0240	1
802.11b/g/n	2412 ~ 2462	16.69	0.0187	1

CONCLUSION:

Both of the WLAN 2.4GHz Band and Zigbee 2.4GHz Band can transmit simultaneously. Therefore, the Max Power Density at R (20 cm) = $0.0240\text{mW/cm}^2 + 0.0187\text{mW/cm}^2 = 0.0427\text{mW/cm}^2 < 1\text{mW/cm}^2$. So the EUT complies with the requirement.

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