

MRT Technology (Suzhou) Co., Ltd

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# **RF Exposure Evaluation Declaration**

FCC ID: 2AGN8-Z02HUB

Sengled Co., Ltd. APPLICANT:

**Application Type:** Certification

**Product:** Element hub

Model No.: Z02-hub

Trademark: sengled

FCC Classification: Digital Transmission System (DTS)

April 20 ~ 27, 2016 Test Date:

Reviewed By : Robin Wu )

Approved By : Marlinchen

(Marlin Chen)



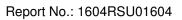


The test results relate only to the samples tested.

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
1604RSU01604	Rev. 01	Initial report	04-27-2016

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## 1. PRODUCT INFORMATION

## 1.1. Equipment Description

Product Name	Element hub	
Model No.	Z02-hub	
Frequency Range	802.15.4: 2405 ~ 2475 MHz	
	802.11b/g/n-HT20: 2412 ~ 2462MHz	
	802.11n-HT40: 2422 ~ 2452MHz	
Type of Modulation	802.15.4: O-QPSK	
	802.11b: DSSS	
	802.11g/n: OFDM	
ZigBee Antenna Gain	2.8dBi	
Wi-Fi Antenna Gain	3.1dBi	

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### 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	Electric Field	Magnetic Field	Power Density	Average Time
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm <sup>2</sup> )	(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:  $Pd = (Pout*G)/(4*pi*r^2)$ 

Where

Pd = power density in mW/cm<sup>2</sup>

Pout = 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

Pd is the limit of MPE, 1mW/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.

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### 2.2. Test Result of RF Exposure Evaluation

Product	Element hub
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band	Maximum Average	Power Density at	Limit
	(MHz)	Output Power	R = 20 cm	(mW/cm <sup>2</sup> )
		(dBm)	(mW/cm <sup>2</sup> )	
802.15.4	2405 ~ 2475	17.86	0.0232	1
802.11b/g/n	2412 ~ 2462	13.28	0.0086	1

#### **CONCULISON:**

Both of the 2.4GHz ZigBee and 2.4GHz WLAN can transmit simultaneously. Therefore, the Max Power Density at R (20 cm) =  $0.0232 \text{mW/cm}^2 + 0.0086 \text{mW/cm}^2 = 0.0318 \text{mW/cm}^2 < 1 \text{mW/cm}^2$ . So the EUT complies with the requirement.

——— The End