



## SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.  
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / [www.sporton.com.tw](http://www.sporton.com.tw)

Project No: CB10507167

### Maximum Permissible Exposure Report

Applicant's company	Wally Labs LLC
Applicant Address	1415 NE 45th St, Seattle, Washington, US, 98105
FCC ID	2AH7VHUB1
Manufacturer's company	CyberTAN Technology, Inc.
Manufacturer Address	No. 99, Park Avenue III, Science-based Industrial Park, Hsinchu, 308 Taiwan

Product Name	wallyHOME Hub
Brand Name	Wally
Model Name	Hub
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Jun. 17, 2016
Final Test Date	Jul. 18, 2016
Submission Type	Original Equipment



Sam Chen

SPORTON INTERNATIONAL INC.



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## History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA661622	Rev. 01	Initial issue of report	Jul. 27, 2016

## 1. GENERAL DESCRIPTION

### 1.1. EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: DSSS (GFSK)
Zigbee	2400-2483.5	2405-2480	DSSS (O-QPSK)
Z-wave	902-928	908.4, 916	GFSK

### 1.2. Testing Location

Testing Location		
<input type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
<input checked="" type="checkbox"/>	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

## 2. MAXIMUM PERMISSIBLE EXPOSURE

### 2.1. Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 2.2. MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

### 2.3. Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For WLAN:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11b: 16.19 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
20	2462	3.59	2.2856	16.19	41.5911	0.0189	1	Complies

For Bluetooth:

Antenna Type : PIFA Antenna

Conducted Power for Bluetooth 1DH5: 7.95 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
20	2402	3.59	2.2856	7.95	6.2373	0.002838	1	Complies

For Zigbee:

Antenna Type : PIFA Antenna

Conducted Power for Zigbee: 20.34 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
20	2405	3.59	2.2856	20.34	108.1434	0.0491	1	Complies

For Z-wave

Antenna Type : PIFA Antenna

Conducted Power for Z-wave: -11.02

OBW (MHz)	Conducted power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Distance (m)	Factor (dB)	Max. Field Strength (dBuV/m)
0.27	-11.02	3.56	-7.46	3	95.2	93.44

Distance (m)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
20	916.0	3.56	2.2699	-11.02	0.0791	0.0000357	0.6106667	Complies

**Conclusion:**

2.4GHz WLAN function, Bluetooth function, Zigbee and Z-wave function can transmit simultaneously, the formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

**CPD = Calculation power density**

**LPD = Limit of power density**

Therefore, the worst-case situation is  $0.0189000 / 1 + 0.0028376 / 1 + 0.0491000 / 1 + 0.0000357 / 0.6106667 = 0.0708000$ , which is less than "1". This confirmed that the device complies.