



# SPORTON International Inc.

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Project No: CB10408212

## Maximum Permissible Exposure Report

Applicant's company	Cambium Networks Inc.
Applicant Address	3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA
FCC ID	Z8H89FT0018
Manufacturer's company	Joy Technology (Shen Zhen) Co. Ltd
Manufacturer Address	Shangpai, Shangwu, Aiqun Rd., Heng Keng Industrial, Shiyan Town, Shenzhen Guangdong China

Product Name	cnPilot™ Indoor E400
Brand Name	Cambium Networks
Model Name	cnPilot Indoor E400
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Jul. 07, 2015
Final Test Date	Aug. 19, 2015
Submission Type	Original Equipment



Sam Chen

SPORTON INTERNATIONAL INC.





## Table of Contents

<b>1. GENERAL DESCRIPTION</b> .....	<b>1</b>
1.1. EUT General Information .....	1
1.2. Testing Location.....	1
<b>2. MAXIMUM PERMISSIBLE EXPOSURE</b> .....	<b>2</b>
2.1. Limit of Maximum Permissible Exposure .....	2
2.2. MPE Calculation Method .....	2
2.3. Calculated Result and Limit.....	3



### History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA570719-01	Rev. 01	Initial issue of report	Sep. 11, 2015
FA570719-01	Rev. 02	Updating MPE distance unit to "cm" from "m"	Sep. 15, 2015

## 1. GENERAL DESCRIPTION

### 1.1. EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

### 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 5GHz Band:

Antenna Type : Embedded Antenna

Conducted Power for IEEE 802.11a: 26.26dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined 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	5200	4.25	2.6607	26.2605	422.7157	0.223871	1	Complies

For 2.4GHz Band:

Antenna Type : Embedded Antenna

Conducted Power for IEEE 802.11b: 29.19 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined 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	2437	4.55	2.8510	29.1860	829.0870	0.470490	1	Complies

#### Conclusion:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is  $0.470490 / 1 + 0.223871 / 1 = 0.694361$ , which is less than "1". This confirmed that the device complies.