



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.

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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 |
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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 ²) | Averaging Time E ² , H ² 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 ²) | Averaging Time E ² , H ² 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 ²) | Limit of Power Density (S) (mW/cm ²) | 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 ²) | Limit of Power Density (S) (mW/cm ²) | 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:

$$CPD1 / LPD1 + CPD2 / LPD2 +etc. < 1$$

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.