



SPORTON International Inc.

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Project No: CB10505164

Maximum Permissible Exposure Report

Applicant's company	Cambium Networks Inc.
Applicant Address	3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA
FCC ID	Z8H89FT0023
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 Outdoor E500
Brand Name	Cambium Networks
Model Name	cnPilot Outdoor E500
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Mar. 10, 2016
Final Test Date	May 09, 2016
Submission Type	Class III Change




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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA570719-07	Rev. 01	Initial issue of report.	May 12, 2016
FA570719-07	Rev. 02	1. Changing the product name to "cnPilot Outdoor E500" from "cnPilot™ Outdoor E500". 2. Changing the model number to "cnPilot Outdoor E500" from "cnPilot™ Outdoor E500".	May 23, 2016
FA570719-07	Rev. 03	Revising the description of Class III Change.	Jun. 16, 2016

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 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5700 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

1.2. Table for Class III Change

This product is an extension of original one reported under Sporton project number: FA570719-06

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Adding 5GHz band 2, band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.	Maximum Permissible Exposure.

Note: Maximum Permissible Exposure of 5GHz band 1, band 4 and 2.4GHz band are based on original test report.

1.3. 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 1, band 4:

Antenna Type : Embedded

Conducted Power for IEEE 802.11ac MCS0/Nss1 VHT40: 29.81 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	5755	5.01	3.1696	29.81	956.1644	0.4766	1	Complies

For 5GHz band 2, band 3:

Antenna Type : Embedded

Conducted Power for IEEE 802.11ac MCS0/Nss1 VHT80: 23.91 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	5610	5.01	3.1696	23.91	246.1816	0.1553	1	Complies

For 2.4GHz band:

Antenna Type : Embedded

Conducted Power for 802.11n MCS0 HT20: 29.84 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	5.37	3.4435	29.84	964.1026	0.5221	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 $0.5221 / 1 + 0.4766 / 1 = 0.9987$, which is less than "1". This confirmed that the device complies.