



SPORTON International Inc.

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Project No: CB10701026

Maximum Permissible Exposure Report

Applicant's company	Cambium Networks Inc.
Applicant Address	3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA
FCC ID	Z8H89FT0017
Manufacturer's company	Cambium Networks Inc.
Manufacturer Address	3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA

Product Name	ePMP Force300-25
Brand Name	Cambium Networks
Model Name	ePMP Force300-25
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Nov. 16, 2017
Final Test Date	Dec. 08, 2017
Submission Type	Class III Change



Sam Chen

SPORTON INTERNATIONAL INC.





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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA7D0728-01	Rev. 01	Initial issue of report	Jul. 26, 2018
FA7D0728-01	Rev. 02	Removing the band 2 / band 3 80M data for Ant. 3	Jun. 10, 2019

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	802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	20M Band 1	5180 / 5185 / 5190 / 5195 / 5200 / 5205 / 5210 / 5215 / 5220 / 5225 / 5230 / 5235 / 5240
		20M Band 2	5250 / 5260 / 5265 / 5270 / 5275 / 5280 / 5285 / 5290 / 5295 / 5300 / 5305 / 5310 / 5315 / 5320
		20M Band 3	5500 / 5505 / 5510 / 5515 / 5520 / 5525 / 5530 / 5535 / 5540 / 5545 / 5550 / 5555 / 5560 / 5565 / 5570 / 5575 / 5580 / 5585 / 5590 / 5595 / 5600 / 5605 / 5610 / 5615 / 5620 / 5625 / 5630 / 5635 / 5640 / 5645 / 5650 / 5720
		20M Band 4	5745 / 5750 / 5755 / 5760 / 5765 / 5770 / 5775 / 5780 / 5785 / 5790 / 5795 / 5800 / 5805 / 5810 / 5815 / 5820 / 5825
		80M Band 1	5200 / 5210
		80M Band 2	5250 / 5290 / 5300
		80M Band 3	5520 / 5525 / 5530 / 5535 / 5540 / 5545 / 5550 / 5555 / 5560 / 5565 / 5570 / 5575 / 5580 / 5585 / 5590 / 5595 / 5600 / 5605 / 5610 / 5615 / 5620 / 5625 / 5630 / 5635 / 5640 / 5645 / 5650 / 5720
		80M Band 4	5765 / 5770 / 5775 / 5780 / 5785 / 5790 / 5795 / 5800 / 5805

Note: Ant. 3 supports 20MHz only for DFS Band.

1.2. Table for Class III Change

This product is an extension of original one reported under Sporton project number: FA7D0728

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

Description	Performance Checking
1. Adding U-NII-2A and U-NII-2C bands (5250~5350 MHz, 5470~5725 MHz) for 20MHz / 80MHz for Ant. 2.	RF Exposure Evaluation
2. Adding U-NII-2A and U-NII-2C bands (5250~5350 MHz, 5470~5725 MHz) for 20MHz for Ant. 3.	

Note: Maximum Permissible Exposure of 2.4GHz WLAN and 5GHz WLAN band 1 and Band 4 are based on original 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

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086B with Industry Canada.

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 Antenna 1:

For 2.4GHz Band :

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	2437	25.00	316.2278	6.83	4.8195	32.50	1778.2794	0.3539	1	Complies

For Antenna 2:

For 5GHz Band :

<Band 1 + Band 4>

Conducted Power for QPSK, 20M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5180	25.00	316.2278	-9.03	9.53	25.50	354.8134	0.0706	1	Complies
20	5200	25.00	316.2278	-4.19	4.69	25.50	354.8134	0.0706	1	Complies
20	5240	25.00	316.2278	-4.10	4.60	25.50	354.8134	0.0706	1	Complies
20	5745	25.00	316.2278	2.20	0.30	27.50	562.3413	0.1119	1	Complies
20	5785	25.00	316.2278	1.87	0.63	27.50	562.3413	0.1119	1	Complies
20	5825	25.00	316.2278	2.12	0.38	27.50	562.3413	0.1119	1	Complies

Conducted Power for QPSK, 80M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5200	25.00	316.2278	-8.63	5.63	22.00	158.4893	0.0315	1	Complies
20	5210	25.00	316.2278	-8.51	5.51	22.00	158.4893	0.0315	1	Complies
20	5765	25.00	316.2278	-1.57	0.57	24.00	251.1886	0.0499	1	Complies
20	5785	25.00	316.2278	-1.43	0.43	24.00	251.1886	0.0499	1	Complies
20	5805	25.00	316.2278	-1.95	0.95	24.00	251.1886	0.0499	1	Complies

<Band 2+Band 3>
Conducted Power for QPSK, 20M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5260 MHz	25.00	316.2278	4.79	-5.79	24.00	251.1886	0.0499	1	Complies
20	5300 MHz	25.00	316.2278	-1.37	0.37	24.00	251.1886	0.0499	1	Complies
20	5320 MHz	25.00	316.2278	-1.38	0.38	24.00	251.1886	0.0499	1	Complies
20	5500 MHz	25.00	316.2278	-3.98	2.98	24.00	251.1886	0.0499	1	Complies
20	5580 MHz	25.00	316.2278	-2.23	1.23	24.00	251.1886	0.0499	1	Complies
20	5650 MHz	25.00	316.2278	-2.45	1.45	24.00	251.1886	0.0499	1	Complies
20	5250 UNII 1	25.00	316.2278	1.65	0.35	27	501.1872	0.0997	1	Complies
20	5270 UNII 2C	25.00	316.2278	-1.25	3.25	27	501.1872	0.0997	1	Complies
20	5250 UNII 2A	25.00	316.2278	1.70	0.30	27	501.1872	0.0997	1	Complies
20	5270 UNII 3	25.00	316.2278	-6.64	8.64	27	501.1872	0.0997	1	Complies

Conducted Power for QPSK, 80M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5290 MHz	25.00	316.2278	-1.34	1.34	25.00	316.2278	0.0629	1	Complies
20	5300 MHz	25.00	316.2278	-1.49	1.49	25.00	316.2278	0.0629	1	Complies
20	5520 MHz	25.00	316.2278	-3.35	3.35	25.00	316.2278	0.0629	1	Complies
20	5610 MHz	25.00	316.2278	-0.35	0.35	25.00	316.2278	0.0629	1	Complies
20	5650 MHz	25.00	316.2278	-0.51	0.51	25.00	316.2278	0.0629	1	Complies
20	5250 UNII 1	25.00	316.2278	-5.08	2.58	22.5	177.8279	0.0353	1	Complies
20	5270 UNII 2C	25.00	316.2278	-3.07	0.57	22.5	177.8279	0.0353	1	Complies
20	5250 UNII 2A	25.00	316.2278	-5.58	3.08	22.5	177.8279	0.0353	1	Complies
20	5270 UNII 3	25.00	316.2278	-3.02	0.52	22.5	177.8279	0.0353	1	Complies

For Antenna 3:

Exposure Environment: General Population / Uncontrolled Exposure

For 5GHz Band :

<Band 1 + Band 4>

Conducted Power for QPSK, 20M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5180	2.00	1.5849	22.88	7.12	32.00	1584.8932	0.3154	1	Complies
20	5200	2.00	1.5849	29.19	0.81	32.00	1584.8932	0.3154	1	Complies
20	5240	2.00	1.5849	29.81	0.19	32.00	1584.8932	0.3154	1	Complies
20	5745	2.00	1.5849	29.87	0.13	32.00	1584.8932	0.3154	1	Complies
20	5785	2.00	1.5849	29.99	0.01	32.00	1584.8932	0.3154	1	Complies
20	5825	2.00	1.5849	29.98	0.02	32.00	1584.8932	0.3154	1	Complies

Conducted Power for QPSK, 80M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5200	2.00	1.5849	17.14	7.86	27.00	501.1872	0.0997	1	Complies
20	5210	2.00	1.5849	17.68	7.32	27.00	501.1872	0.0997	1	Complies
20	5765	2.00	1.5849	24.34	0.66	27.00	501.1872	0.0997	1	Complies
20	5785	2.00	1.5849	24.41	0.59	27.00	501.1872	0.0997	1	Complies
20	5805	2.00	1.5849	23.44	1.56	27.00	501.1872	0.0997	1	Complies

<Band 2+Band 3>
Conducted Power for QPSK, 20M

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power	Tolerance	Tune-up EIRP		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(dB)	(dBm)	(mW)			
20	5260 MHz	2.00	1.5849	23.61	0.89	26.50	446.6836	0.0889	1	Complies
20	5300 MHz	2.00	1.5849	23.62	0.88	26.50	446.6836	0.0889	1	Complies
20	5320 MHz	2.00	1.5849	23.88	0.62	26.50	446.6836	0.0889	1	Complies
20	5500 MHz	2.00	1.5849	23.64	0.86	26.50	446.6836	0.0889	1	Complies
20	5580 MHz	2.00	1.5849	23.53	0.97	26.50	446.6836	0.0889	1	Complies
20	5650 MHz	2.00	1.5849	23.59	0.91	26.50	446.6836	0.0889	1	Complies
20	5250 UNII 1	2.00	1.5849	20.54	2.46	25.00	316.2278	0.0629	1	Complies
20	5270 UNII 2C	2.00	1.5849	22.61	0.39	25.00	316.2278	0.0629	1	Complies
20	5250 UNII 2A	2.00	1.5849	20.71	2.29	25.00	316.2278	0.0629	1	Complies
20	5270 UNII 3	2.00	1.5849	17.01	5.99	25.00	316.2278	0.0629	1	Complies