



FCC RADIO EXPOSURE TEST REPORT

FCC ID : Z8H89FT0051

Equipment : cnPilot e510 Outdoor, cnVision Hub 360r integrated
8dBi omni, ePMP 5 GHz MP 3000 MicroPOP Radio

Brand Name : Cambium Networks

Model Name : REG-PL-E510, cnVision Hub 360r integrated 8dBi omni,
ePMP 5 GHz MP 3000 MicroPOP Radio

Applicant : Cambium Networks Inc.
3800 Golf Road, Suite 360 Rolling Meadows, IL 60008,
USA

Manufacturer : Cambium Networks, Ltd.
Ashburton, TQ13 7UP, UK

Standard : 47 CFR Part 2.1091

The product was received on Nov. 01, 2018, and testing was started from Nov. 02, 2018 and completed on Nov. 12, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FA870416-07	01	Initial issue of report	Nov. 15, 2019



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Note: Reference to Sporton Project No.: 870416-04.

Declaration of Conformity:

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang



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)

Note: While frame-based mechanism is implemented, the test procedure is the same with regular IEEE 802.11a/n/ac devices.

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

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.



1.3 Table for Multiple Listing

The EUT has three equipment names/model names which are identical to each other in all aspects except for the following table:

Equipment Name	Model No.	Description
cnPilot e510 Outdoor	REG-PL-E510	All the equipment names/model names are identical, the difference equipment names/model names served as marketing strategy.
cnVision Hub 360r integrated 8dBi omni	cnVision Hub 360r integrated 8dBi omni	
ePMP 5 GHz MP 3000 MicroPOP Radio	ePMP 5 GHz MP 3000 MicroPOP Radio	

Note: Model Name REG-PL-E510 was selected as representative model for the test and its data was recorded in this report.

1.4 Table for Class III Change

This product is an extension of original one reported under Sporton project number: FA870416-03. Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding U-NII-2A and U-NII-2C bands (5250~5350 MHz, 5470~5725 MHz) for this device.	Maximum Permissible Exposure
2. Adding the equipment name: cnVision Hub 360r integrated 8dBi omni, ePMP 5 GHz MP 3000 MicroPOP Radio	Do not affect the test result.
3. Adding the model name: cnVision Hub 360r integrated 8dBi omni, ePMP 5 GHz MP 3000 MicroPOP Radio	
4. Update to frame based from Load Based.	

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



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 22 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 = 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

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	8.40	23.46	31.86	0.50	32.36	1.72187	22	0.28310	1.00000
5.2G;D1D	8.90	18.42	27.32	0.50	27.82	0.60534	22	0.09953	1.00000
5.3G;D1D	8.90	19.96	28.86	0.50	29.36	0.86298	22	0.14189	1.00000
5.6G;D1D	8.90	20.95	29.85	0.14	29.99	0.99770	22	0.16404	1.00000
5.8G;D1D	8.90	27.04	35.94	0.05	35.99	3.97192	22	0.65305	1.00000

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	8.40	23.46	31.86	0.50	32.36	1.72187	22	0.28310	1.00000	0.28310
5.8G;D1D	8.90	27.04	35.94	0.05	35.99	3.97192	22	0.65305	1.00000	0.65305
									Sum Ratio	0.93615
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—————THE END—————