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
Model Number	:	REG-PL-E510
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 Dec. 25, 2019, and testing was started from Dec. 25, 2019 and completed on Jan. 06, 2020. 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: Sam Chen

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
FA870416-11	01	Initial issue of report	Feb. 24, 2020

Summary of Test Result

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

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
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: Cindy Peng

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)
4.9GHz	4940-4990	4950-4980	QPSK

Note 1: For 2.4GHz and 5GHz, while frame-based mechanism is implemented, the test procedure is the same with regular IEEE 802.11a/n/ac devices.
Note 2: For 4.9GHz, it supports 20 MHz bandwidth only.

1.2 Table for Multiple Listing

The difference for each equipment names/model names is shown as below:

Equipment Name	Model Name	Model Number	Description
cnPilot e510 Outdoor	REG-PL-E510	REG-PL-E510	The difference served as marketing strategy.
cnVision Hub 360r integrated 8dBi omni	cnVision Hub 360r integrated 8dBi omni	REG-PL-E510	
ePMP 5 GHz MP 3000 MicroPOP Radio	ePMP 5 GHz MP 3000 MicroPOP Radio	REG-PL-E510	
cnPilot e510 Outdoor	REG-PL-E510	REG-PL-E510	

Note 1: The above information was declared by manufacturer.
Note 2: From the above models, model: REG-PL-E510 was selected as representative model for the test and its data was recorded in this report.

1.3 Table for Class III Change

This product is an extension of original one reported under Sporton project number: FA870416-07.

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

Modifications	Performance Checking
1. Adding 4.9G function for Ant. 3 and Ant. 4 “model name: 120G00000196A and 120G00000197A, gain: 8.9dBi”, and supports 20 MHz bandwidth only.	Maximum Permissible Exposure.
2. Adding one model number “REG-PL-E510”.	It does not need to test.

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

1.4 Testing Location

Testing Location			
☐	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
☒	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.

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/ cm²)	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/ cm²)	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 (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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
4.9G;D1D	8.90	19.80	28.70	0.50	29.20	0.83176	22	0.13675	1.00000

Simultaneous Transmission Analysis Mode:

1. 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

2. WLAN 2.4GHz + 4.9GHz

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
4.9G;D1D	8.90	19.80	28.70	0.50	29.20	0.83176	22	0.13675	1.00000	0.13675
									Sum Ratio	0.41985
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

———THE END———