RADIO EXPOSURE TEST REPORT

FCC ID	:	Z8H89FT0065
Equipment	:	ePMP 4500 5 GHz 8x8 Integrated Access Point Radio / ePMP 4500C 5GHz Access Point Radio
Brand Name	:	Cambium Networks
Model Name	:	ePMP 4500 5 GHz 8x8 Integrated Access Point Radio / ePMP 4500C 5GHz Access Point Radio
Model Number	:	C058940P122A / C058940P112A
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 Oct. 14, 2020, and testing was started from Oct. 14, 2020 and completed on Feb. 28, 2023. We, Sporton International Inc. Hsinchu 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 test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FA093027-01	01	Initial issue of report	Mar. 03, 2023
FA093027-01	02	Revising the title for section 2	Mar. 07, 2023

Summary of Test Result

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

Declaration of Conformity:
1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to report "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**
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) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
4.9GHz	4940-4990	4942.5-4987.5	QPSK

1.1.1 Antenna Information

Ant. Set	Port		Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	Radio 1 (TX/RX)	Radio 2 (RX)					
1	5	-	Cambium	5GHz 8x8 Sector Antenna	Sector	MCX	18
	6	-					
	7	-					
	8	-					
	1	-					
	2	1					
	3	2					
	4	-					
2	5	-	Cambium	5GHz Dipole Antenna	Dipole	MCX	2
	6	-					
	7	-					
	8	-					
	1	-					
	2	1					
	3	2					
	4	-					

Note 1: The above information was declared by manufacturer.

The EUT has two antenna sets.

For Radio 1:

For IEEE 802.11a/n/ac/ax (8TX/8RX):

Port 1, Port 2, Pot 3, Port 4, Port 5, Port 6, Port 7 and Port 8 can be used as transmitting/receiving antenna.

Port 1, Port 2, Pot 3, Port 4, Port 5, Port 6, Port 7 and Port 8 could transmit/receive simultaneously.

For Radio 2:

For IEEE 802.11a/n/ac/ax (2RX)

Port 1 and Port 2 can be used as receiving antenna.

Port 1 and Port 2 could receive simultaneously.

Note 2: The arrangement of antennas is MIMO with cross-polarized.

The vertical and horizontal antennas are well designed to be paired with H-V interlaced.

Thus, the array gain is 0dBi.

1.2 Accessories

N/A

1.3 Testing Location

Testing Location Information		
Test Lab.：Sporton International Inc. Hsinchu Laboratory		
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)	
(TAF: 3787)	TEL: 886-3-656-9065	FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.	
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.	

1.4 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Equipment Name / Model Name	Model Number	Description
ePMP 4500 5 GHz 8x8 Integrated Access Point Radio	C058940P122A	All the models are identical, the difference model served as marketing strategy.
ePMP 4500C 5GHz Access Point Radio	C058940P112A	

Note 1: From the above models, model: ePMP 4500 5 GHz 8x8 Integrated Access Point Radio was selected as representative model for the test and its data was recorded in this report.
Note 2: The above information was declared by manufacturer.

1.5 Table for EUT Wireless Function

Radio	Function
1	5GHz, 4.9GHz-Transmiter/Receiver function
2	5GHz (Scan Radio)-Only receiver function
3	GPS

Note: The above information was declared by manufacturer.

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

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^2)	<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^2)	<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 88 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 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ / 2 π.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	**Threshold ERP (watts)**
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.
Note: R is in meters, f is in MHz.	

2.4 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)
5.2G;D1D	18.00	17.96	35.96	0.03	35.99	3.97192	88	0.04081	1.00000
5.8G;D1D	21.00	14.98	35.98	0.01	35.99	3.97192	88	0.04081	1.00000
4.9G	18.00	25.32	43.32	0.50	43.82	24.09905	88	0.24764	1.00000

MPE Exemption Option C							
Frequency (MHz)	λ/2π (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
5230	0.0091	0.88	35.99	33.84	2.421	14.868	Complies
5785	0.0082		35.48	33.33	2.153	14.868	Complies
4950	0.0096		43.82	41.67	14.689	14.868	Complies

Note: The above antenna gain was declared by manufacturer.

———THE END———