



RADIO EXPOSURE TEST REPORT

FCC ID : Z8H89FT0085

Equipment : X7-35X Indoor Wi-Fi 7 2x2 Access Point

Brand Name : Cambium Networks

Model Name : X7-35X

Applicant : Cambium Networks Inc.
3800 Golf Road Suite 360 Rolling Meadows IL
United States 60008

Manufacturer : Cambium Networks Inc.
3800 Golf Road Suite 360 Rolling Meadows IL
United States 60008

Standard : 47 CFR Part 2.1091

The product was received on Nov. 24, 2023, and testing was started from Dec. 08, 2023 and completed on Mar. 03, 2024. 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 variant 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

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Photographs of EUT v01



Summary of Test Result

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

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Sophia Shiung



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) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5720 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) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
6GHz WLAN	5925-7125	5955-7115	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Bluetooth	2400-2483.5	2402-2480	LE: GFSK
Zigbee	2400-2483.5	2405-2480	O-QPSK



1.2 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	2.4GHz /5GHz	6GHz	Bluetooth/ Zigbee					
1	2	-	-	INPAQ	3010001479GD	PIFA Antenna	I-PEX	Note 1
2	1	-	-	INPAQ	3010001479GD	PIFA Antenna	I-PEX	
3	-	2	-	INPAQ	3010001479GD	PIFA Antenna	I-PEX	
4	-	1	-	INPAQ	3010001479GD	PIFA Antenna	I-PEX	
5	-	-	1	INPAQ	3010001479GD	Dipole Antenna	I-PEX	

Note 1:

Ant.	Port			WLAN 2.4GHz (dBi)	WLAN 5GHz (dBi)				WLAN 6GHz (dBi)				Bluetooth/ Zigbee (dBi)
	2.4GHz /5GHz	6GHz	Bluetooth/ Zigbee		UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 5	UNII 6	UNII 7	UNII 8	
1	2	-	-	2.35	3.32	3.7	4.67	4.73	-	-	-	-	-
2	1	-	-	2.23	3.5	3.57	5.19	4.82	-	-	-	-	-
3	-	2	-	-	-	-	-	-	5.29	5.95	5.95	5.30	-
4	-	1	-	-	-	-	-	-	5.69	5.80	5.80	5.45	-
5	-	-	1	-	-	-	-	-	-	-	-	-	5.6

Directional Gain (dBi)											
WLAN 2.4GHz		WLAN 5GHz UNII 1		WLAN 5GHz UNII 2A		WLAN 5GHz UNII 2C		WLAN 5GHz UNII 3			
2T1S	2T2S	2T1S	2T2S	2T1S	2T2S	2T1S	2T2S	2T1S	2T2S	2T1S	2T2S
5.01	2.35	4.34	3.5	5.36	3.7	6.89	5.19	6.2	4.82		

Note 2: The above information (excepting WLAN 2.4GHz/5GHz gain) was declared by manufacturer.

<For 2.4GHz function>

For IEEE 802.11b/g/n/VHT/ax/be (2TX/2RX):

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For 5GHz function>

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For 6GHz function>

For IEEE 802.11ax/be (2TX/2RX):

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For Bluetooth/Zigbee function> (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

Port 1 could transmit/receive simultaneously.



1.3 Table for EUT Supports Function

Function	Supports Type	Supports Bands
AP	Master	2.4GHz / 5GHz UNII 1~3 / 6GHz UNII 5~8
Mesh	Master	2.4GHz / 5GHz UNII 1~3
Slave	Slave without Radar detection	2.4GHz / 5GHz UNII 1~3

Note: The above information was declared by manufacturer.

1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA3N2319.

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

Modifications	Performance Checking
1. Enable 5GHz UNII 2A~UNII 2C. 2. Enable bandwidth 160MHz for 5GHz function. 3. Enable 6GHz UNII 5~UNII 8 for Low-power Indoor Access Point (6ID) mode.	RF Exposure

Note: Other test results were based on original report.

1.5 Accessories

Accessories
Bracket type 1*1
Bracket type 2*1



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

1.7 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.



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 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/ 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 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 41 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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 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.

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

Where

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

and

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

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 $R > \lambda / 2 \pi$.

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 ² f.
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)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.01	27.06	29.92	0.50	1101.539	41	C	3227.6	0.3414
5.2G;D1D	4.34	26.34	28.53	0.50	799.834	41	C	3227.6	0.2479
5.3G;D1D	5.36	23.33	26.54	0.50	505.825	41	C	3227.6	0.1568
5.6G;D1D	6.89	23.01	27.75	0.09	608.135	41	C	3227.6	0.1885
5.8G;D1D	6.20	27.08	31.13	0.50	1455.459	41	C	3227.6	0.4511
6.2G;D1D	5.69	-	24.69	0.50	330.370	41	C	3227.6	0.1024
6.4G;D1D	5.80	-	24.38	0.50	307.610	41	C	3227.6	0.0953
6.7G;D1D	5.80	-	24.61	0.50	324.340	41	C	3227.6	0.1005
7.0G;D1D	5.45	-	22.29	0.50	190.108	41	C	3227.6	0.0589
2.4G;BT-LE	5.60	19.42	22.87	0.50	217.270	41	C	3227.6	0.0673
2.4G;G1D_Zigbee	5.60	19.12	22.57	0.50	202.768	41	C	3227.6	0.0628

Simultaneous Transmission Analysis Mode:

Mode 1: Bluetooth + WLAN 2.4GHz + WLAN 5GHz + WLAN 6GHz

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.01	27.06	29.92	0.50	1101.539	41	C	3227.6	0.3414
5.8G;D1D	6.20	27.08	31.13	0.50	1455.459	41	C	3227.6	0.4511
6.2G;D1D	5.69	-	24.69	0.50	330.370	41	C	3227.6	0.1024
2.4G;BT-LE	5.60	19.42	22.87	0.50	217.270	41	C	3227.6	0.0673
Sum TL Ratio_C	0.9622								
Ratio Limit	1								

Mode 2: Zigbee + WLAN 2.4GHz + WLAN 5GHz + WLAN 6GHz

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.01	27.06	29.92	0.50	1101.539	41	C	3227.6	0.3414
5.8G;D1D	6.20	27.08	31.13	0.50	1455.459	41	C	3227.6	0.4511
6.2G;D1D	5.69	-	24.69	0.50	330.370	41	C	3227.6	0.1024
2.4G;G1D_Zigbee	5.60	19.12	22.57	0.50	202.768	41	C	3227.6	0.0628
Sum TL Ratio_C	0.9577								
Ratio Limit	1								

Note: The above antenna gain was declared by manufacturer.

————THE END————