



RADIO EXPOSURE TEST REPORT

FCC ID : Z8H-89FT0067
Equipment : XE3-4 Wi-Fi 6e Indoor Access Point
Brand Name : Cambium Networks
Model Name : XE3-4
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 Aug. 13, 2021, and testing was started from Aug. 17, 2021 and completed on Oct. 30, 2021. 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	-

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: **Wendy Pan**



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)
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)
6GHz	5925-7125	5955-7115	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	LE: GFSK

1.2 Antenna Information

Ant.	Port				Brand	Model Name	Antenna Type	Connector	Gain (dBi)				Remark
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Blue tooth					WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Blue tooth	
1	2	2	-	-	Accton	EAP9219A-6 E-1120-CAM	PIFA	I-PEX	4.85	5.60	-		Radio 1
2	1	1	-	-	Accton	EAP9219A-6 E-1120-CAM	PIFA	I-PEX	4.85	5.40	-		Radio 1
3	-	4	4	-	Accton	EAP9219A-6 E-1120-CAM	PIFA	I-PEX	-	Note 1	5.84		Radio 2
4	-	2	2	-	Accton	EAP9219A-6 E-1120-CAM	PIFA	I-PEX	-		6.29		Radio 2
5	-	3	3	-	Accton	EAP9219A-6 E-1120-CAM	PIFA	I-PEX	-		6.06		Radio 2
6	-	1	1	-	Accton	EAP9219A-6 E-1120-CAM	PIFA	I-PEX	-		5.99		Radio 2



Ant.	Port				Brand	Model Name	Antenna Type	Connector	Gain (dBi)				Remark
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Blue tooth					WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	Blue tooth	
7	-	-	-	1	Accton	EAP9219A-6 E-1120-CAM	Chip	N/A	-	-	-	3.39	Radio 3

Note1:

Ant.	Port	Antenna Gain (dBi)				Remark
		UNII 1	UNII 2A	UNII 2C	UNII 3	
3	4	2.3	4.22	3.57	5.21	Radio 2
4	2	4.12	4.62	3.15	4.93	Radio 2
5	3	2.91	3.22	2.85	2.81	Radio 2
6	1	3.88	4.46	2.58	4.24	Radio 2

Radio 2 / Directional Gain (dBi)			
WLAN 5GHz UNII 1, 4T1S	WLAN 5GHz UNII 2A, 4T1S	WLAN 5GHz UNII 2C, 4T1S	WLAN 5GHz UNII 3, 4T1S
4.55	4.78	5.38	5.95

Note2: The above information was declared by manufacturer.

WLAN 2.4GHz, 5GHz (Radio 1), 6GHz: The directional gain is calculated which follows the procedure of KDB 662911 D01.

WLAN 5GHz (Radio 2): The directional gain is measured which follows the procedure of KDB 662911 D03. The antenna report is provided in the operational description for this application.

For Radio 1:

For 2.4GHz function:

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

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

Port 1 and Port 2 could transmit/receive simultaneously.

For Radio 2:

For 5GHz function:

For IEEE 802.11a/n/ac/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.



For 6GHz function:

For IEEE 802.11ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For Bluetooth Function:

For Bluetooth mode (1TX/1RX)

Only Port 1 can be use as transmit and receive antenna.

Note3: WLAN 2.4GHz, 5GHz (Radio 1) Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$
BF	$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$	$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) / N_{ANT})] \Rightarrow 10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$$

Where ;

G1 = Ant 1 Gain ; G2 = Ant 2 Gain

(Radio1)

2.4GHz DG = 7.86 dBi

5 GHz U-NII-1 DG = 8.51 dBi

5 GHz U-NII-2A DG = 8.51 dBi

5 GHz U-NII-2C DG = 8.51 dBi

5 GHz U-NII-3 DG = 8.51 dBi



1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA140924-01

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

Modifications	Performance Checking
1. Adding UNII 2A and UNII 2C (5250~5350 MHz, 5470~5725 MHz) for this device. 2. Adding 160MHz bandwidth to 5GHz Radio 2.	UNII 2A and UNII 2C MPE

For WLAN 2.4GHz and WLAN 5GHz UNII 1, UNII 3 and WLAN 6GH MPE results were based on original report.

1.4 Accessories

Wall Bracket*1

1.5 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) 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 30 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 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 (Radio 1)	7.86	26.04	33.90	0.50	34.40	2.75423	30	0.24353	1.00000
5.2G;D1D (Radio 1)	8.51	27.39	35.90	0.09	35.99	3.97192	30	0.35119	1.00000
5.3G;D1D (Radio 1)	5.60	23.89	29.49	0.50	29.99	0.99770	30	0.08822	1.00000
5.6G;D1D (Radio 1)	5.60	23.96	29.56	0.43	29.99	0.99770	30	0.08822	1.00000
5.8G;D1D (Radio 1)	5.60	29.93	35.53	0.46	35.99	3.97192	30	0.35119	1.00000
5.2G;D1D (Radio 2)	4.12	28.74	32.86	0.50	33.36	2.16770	30	0.19167	1.00000
5.3G;D1D (Radio 2)	4.78	23.78	28.56	0.50	29.06	0.80538	30	0.07121	1.00000
5.6G;D1D (Radio 2)	5.38	23.83	29.21	0.50	29.71	0.93541	30	0.08271	1.00000
5.8G;D1D (Radio 2)	5.95	29.32	35.27	0.50	35.77	3.77572	30	0.33384	1.00000
6.2G;D1D (Radio 2)	6.29	-	23.45	0.50	23.95	0.24831	30	0.02196	1.00000
6.4G;D1D (Radio 2)	6.29	-	22.61	0.50	23.11	0.20464	30	0.01809	1.00000
6.7G;D1D (Radio 2)	6.29	-	22.21	0.50	22.71	0.18664	30	0.01650	1.00000
7.0G;D1D (Radio 2)	6.29	-	21.81	0.50	22.31	0.17022	30	0.01505	1.00000
2.4G;BT-LE (Radio 3)	3.39	8.63	12.02	0.50	12.52	0.01786	30	0.00158	1.00000



Simultaneous Transmission Analysis Mode:

Radio 1: WLAN 2.4GHz + WLAN 5GHz + Radio 2: WLAN 5GHz + WLAN 6GHz + Radio 3: Bluetooth

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 (Radio 1)	7.86	26.04	33.90	0.50	34.40	2.75423	30	0.24352	1.00000	0.24352
5.8G-I;D1D (Radio 1)	5.60	29.93	35.53	0.46	35.99	3.97192	30	0.35119	1.00000	0.35119
5.8G;D1D (Radio 2)	5.95	29.32	35.27	0.50	35.77	3.77572	30	0.33384	1.00000	0.33384
6.2G;D1D (Radio 2)	6.29	-	23.45	0.50	23.95	0.24831	30	0.02196	1.00000	0.02196
2.4G;BT-LE (Radio 3)	3.39	8.63	12.02	0.50	12.52	0.01786	30	0.00158	1.00000	0.00158
									Sum Ratio	0.95209
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

————THE END————