

Testing Laboratory
3787

RADIO EXPOSURE TEST REPORT

FCC ID : Z8H89FT0082

Equipment : 6094HH

Brand Name : Cambium Networks

Model Name : 6094HH

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 Sep. 04, 2023, and testing was started from Sep. 04, 2023 and completed on Dec. 20, 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 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



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A1_1 Ver1.1

Page Number : 3 of 12
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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:

1. 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

For WLAN 5GHz:

RF General Information			
Frequency Range (MHz)	Ch. Bandwidth (MHz)	Operating Frequency (MHz)	Modulation Type
5150-5250 5725-5850	5	5156-5244 5731-5844	QPSK
	10	5155-5245 5730-5845	
	15	5158-5242 5733-5842	
	20	5160-5240 5735-5840	
	30	5165-5235 5740-5835	
	40	5170-5230 5745-5830	

For WLAN 6GHz:

RF General Information			
Frequency Range (MHz)	Ch. Bandwidth (MHz)	Operating Frequency (MHz)	Modulation Type
5925-6425 6525-6875	5	5928-6422 6528-6872	QPSK
	40	5945-6405 6545-6855	

1.2 Table for Frequency Combination Mode

Type	Mode	Frequency (MHz)
1	UNII 1 (20+20 MHz) + UNII 3 (20+20 MHz)	UNII 1 (5180+5220) + UNII 3 (5755+5795)
2	UNII 1 (30+30 MHz) + UNII 3 (30+30 MHz)	UNII 1 (5180+5220) + UNII 3 (5755+5795)
3	UNII 1 (40+40 MHz) + UNII 3 (40+40 MHz)	UNII 1 (5175+5225) + UNII 3 (5750+5800)

Note: The above information was declared by manufacturer.



1.3 Antenna Information

For EUT 1

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Cambium	Canopy V Dish Antenna	Dish	RP-SMA	Note 1
	Cambium	Canopy V Dish Antenna	Dish	RP-SMA	
	Cambium	Canopy V Dish Antenna	Dish	RP-SMA	
	Cambium	Canopy V Dish Antenna	Dish	RP-SMA	

Note 1:

Ant.	Port					Gain (dBi)	
	WLAN 5GHz			WLAN 6GHz		WLAN 5GHz	WLAN 6GHz
	R1	R2	R1+R2	R1	R2		
1	-	1	3	-	1	21.922	21.892
	-	2	4	-	2	21.853	21.898
	2	-	2	2	-	21.893	21.893
	1	-	1	1	-	21.851	21.851

For EUT 2

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 5GHz							WLAN 5GHz
	R1	R2	R1+R2					
1	-	1	3	Cambium	Canopy V Patch Antenna	Patch	RP-SMA	3.20
	-	2	4	Cambium	Canopy V Patch Antenna	Patch	RP-SMA	3.20
	2	-	2	Cambium	Canopy V Patch Antenna	Patch	RP-SMA	4.20
	1	-	1	Cambium	Canopy V Patch Antenna	Patch	RP-SMA	4.70

Note 2: An EUT will only be equipped with one type of antenna.

Note 3: The above information was declared by manufacturer.

Note 4: **For 5GHz function:****For Radio 1 (R1) (2TX/2RX):**

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

Port 1~2 could transmit/receive simultaneously.

For Radio 2 (R2) (2TX/2RX):

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

Port 1~2 could transmit/receive simultaneously.

For Radio 1 + Radio 2 (R1+R2) (2TX/2RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 could transmit/receive simultaneously.

For 6GHz function:**For Radio 1 (R1) (2TX/2RX):**

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

Port 1~2 could transmit/receive simultaneously.

For Radio 2 (R2) (2TX/2RX):

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

Port 1~2 could transmit/receive simultaneously.

Note 5: Directional gain information for WLAN 5GHz

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 $N_{ANT} \leq 4$	$Directional\ IGain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ss}} \left\{ \sum_{j=1}^{N_{ANT}} \xi_{i,j} \right\}^2}{N_{ANT}} \right]$
BF	$Directional\ IGain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ss}} \left\{ \sum_{j=1}^{N_{ANT}} \xi_{i,j} \right\}^2}{N_{ANT}} \right]$	$Directional\ IGain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ss}} \left\{ \sum_{j=1}^{N_{ANT}} \xi_{i,j} \right\}^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$Directional\ IGain = 10 \cdot \log \left[\frac{\sum_{i=1}^{N_{ss}} \left\{ \sum_{j=1}^{N_{ANT}} \xi_{i,j} \right\}^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20} ; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}/N_{ss}] \Rightarrow 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

Where ;

Dish Antenna (Cross-Polarized Antenna)

5G UNII-1 G1 = 21.893 dBi; G2 = 21.851 dBi;

5G UNII-3 G1 = 21.922 dBi; G2 = 21.853 dBi;

5G UNII-1 DG = 21.893 dBi

5G UNII-3 DG = 21.922 dBi

Patch Antenna (Cross-Polarized Antenna)

5G UNII-1 G1 = 4.20 dBi; G2 = 4.70 dBi;

5G UNII-3 G1 = 3.20 dBi; G2 = 3.20 dBi;

5G UNII-1 DG = 4.70 dBi

5G UNII-3 DG = 3.20 dBi



1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA380301.

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

Modifications	Performance Checking
For EUT 1, add the UNII 5 and UNII 7 for Fix Client (6FC) and Standard Client (6FX) through SW change which bandwidth is available for 5MHz and 40MHz only.	For EUT 1: RF Exposure for WLAN 6GHz.

Note: Other test results were based on original report.

1.5 Table for EUT Information

EUT	Antenna Type	Support
1	Dish	WLAN 5GHz / 6GHz
2	Patch	WLAN 5GHz

Note: The above information was declared by manufacturer.

1.6 Table for Radio Function

Radio (R)	Function
R1	Support 5GHz UNII 1 and 6GHz UNII 5
R2	Support 5GHz UNII 3 and 6GHz UNII 7

Note: The above information was declared by manufacturer.

1.7 Accessories

Wall bracket*1 (For EUT 1 only)

1.8 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



1.9 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.

Note: The tested sample for EUT 1 for WLAN 6GHz was received on Oct. 18, 2023.



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 108 cm for EUT 1, and at 20 cm for EUT 2 to show compliance with the power density limit. The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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, <= P_{th}.

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

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	$19.2 R^2$.
Note: R is in meters, f is in MHz.	



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For EUT 1

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	Option	TL EIRP (dBm)
5.2G;G7D	21.893	23.20	45.09	0.50	45.59	108	C	45.650
5.8G;G7D	21.922	22.24	44.16	0.50	44.66	108	C	45.650
6.2G;G7D	21.893	-	35.89	0.10	35.99	108	C	45.650
6.7G;G7D	21.893	-	35.82	0.17	35.99	108	C	45.650

For EUT 2

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	Option	TL EIRP (dBm)
5.2G;G7D	4.70	29.83	34.53	0.50	35.03	20	B	37.006
5.8G;G7D	3.20	29.98	33.18	0.50	33.68	20	B	37.006

————THE END————