



FCC RADIO EXPOSURE TEST REPORT

FCC ID : Z8H89FT0058

Equipment : Wireless Access Point

Brand Name : Cambium Networks

Model Name : REG-XV3-8

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. 23, 2019, and testing was started from Oct. 20, 2019 and completed on Feb. 07, 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 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: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Report Template No.: CB-A1_1 Ver1.0



Summary of Test Result

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

Note: Reference to Sporton Project No.: 912418-03.

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

<DBS mode>

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	5180-5240 5260-5320 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)

<SBS mode>

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 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)

<Scan Radio>

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)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

**<Bluetooth Radio>**

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
Bluetooth	2400-2483.5	2402-2480	LE: GFSK



1.2 Antenna Information

Radio	Ant.	Port		Brand	Model Name	Type	Connector	Gain (dBi)								Function
1	1	1		ANGeei	120G00000325A	PIFA	I-PEX	5.13								WLAN 2.4GHz (DBS mode)
	2	2		ANGeei	120G00000325A	PIFA	I-PEX	5.13								
	3	3		ANGeei	120G00000325A	PIFA	I-PEX	5.13								
	4	4		ANGeei	120G00000325A	PIFA	I-PEX	5.13								
Radio	Ant.	Port		Brand	Model Name	Type	Connector	Gain (dBi)								Function
		DBS mode	SBS mode					DBS mode				SBS mode				
								B1	B2	B3	B4	B1	B2	B3	B4	
2	5	1	1	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	-	-	6.16	6.70	WLAN 5GHz (DBS mode or SBS mode)
	6	2	2	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	-	-	6.16	6.70	
	7	3	3	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	-	-	6.16	6.70	
	8	4	4	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	-	-	6.16	6.70	
3	9	5	1	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	6.19	6.14	-	-	
	10	6	2	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	6.19	6.14	-	-	
	11	7	3	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	6.19	6.14	-	-	
	12	8	4	ANGeei	120G00000325A	PIFA	I-PEX	6.72	6.50	6.16	6.70	6.19	6.14	-	-	
Radio	Ant.	Port		Brand	Model Name	Type	Connector	Gain (dBi)								Function
								2.4GHz				5GHz				
4	13	1		ANGeei	120G00000325A	PIFA	I-PEX	5.08				6.27				WLAN 2.4GHz/ 5GHz (Scan Radio)
Radio	Ant.	Port		Brand	Model Name	Type	Connector	Gain (dBi)								Function
5	14	1		WIESON	GT128V007S-001	PIFA	I-PEX	4.90								Bluetooth



For Composite Gain:

Radio	Ant.	Port	Composite Gain (dBi) / Beamforming mode				Function
1	1~4	1~4	9.25				WLAN 2.4GHz (DBS mode)
Radio	Ant.	Port	Composite Gain (dBi) / Beamforming mode				Function
			B1	B2	B3	B4	
2+3	5~12	1~8	11.66	11.47	11.00	11.41	WLAN 5GHz (DBS mode)
Radio	Ant.	Port	Composite Gain (dBi) / Beamforming mode				Function
			B1	B2	B3	B4	
2	5~8	1~4	-	-	8.93	8.79	WLAN 5GHz High Band (SBS mode)
3	9~12	1~4	9.58	8.66	-	-	WLAN 5GHz Low Band (SBS mode)

Note1: The above information was declared by manufacturer.

Note2: The EUT has fourteen antennas.

Note3: The non-beamforming mode follows $10\log(N)$ and beamforming mode follows composite gain for Directional Gain.

<DBS mode>

Radio	Ant.	Port	WLAN 2.4GHz function
1	1~4	1~4	IEEE 802.11b/g/n/VHT/ax mode (4TX/4RX): Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.
Radio	Ant.	Port	WLAN 5GHz functions
2	5~8	1~4	IEEE 802.11a/n/ac/ax mode (8TX/8RX): Port 1, Port 2, Port 3, Port 4, Port 5, Port 6, Port 7 and Port 8 could transmit/receive simultaneously.
3	9~12	5~8	

<SBS mode>

Radio	Ant.	Port	WLAN 5GHz High Band function
2	5~8	1~4	IEEE 802.11a/n/ac/ax mode (4TX/4RX): Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.
Radio	Ant.	Port	WLAN 5GHz Low Band function
3	9~12	1~4	IEEE 802.11a/n/ac/ax mode (4TX/4RX): Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

**<Scan Radio>**

Radio	Ant.	Port	WLAN 2.4GHz function
4	13	1	IEEE 802.11b/g/n/VHT mode (1TX/1RX): Only Port 1 can be used as transmitting/receiving.
Radio	Ant.	Port	WLAN 5GHz functions
4	13	1	IEEE 802.11a/n/ac mode (1TX/1RX): Only Port 1 can be used as transmitting/receiving.

<Bluetooth Radio>

Radio	Ant.	Port	Bluetooth function (1TX/1RX)
5	14	1	Only Port 1 can be used as transmitting/receiving.

1.3 Testing Location

Testing Location		
☐	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei 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.

1.4 Table for Class III Change

This product is an extension of original one reported under Sporton project number: FA912418-02

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

Modifications	Performance Checking
Adding 5GHz band 2 and band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.	Maximum Permissible Exposure.

Note: Maximum Permissible Exposure of WLAN 2.4GHz, Bluetooth and 5GHz band 1, 4 are based on original test report.



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 31 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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

<DBS mode>

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	9.25	24.28	33.53	0.50	34.03	2.52930	31	0.20944	1.00000
5.2G;D1D	11.66	17.74	29.40	0.50	29.90	0.97724	31	0.08092	1.00000
5.3G;D1D	11.47	18.25	29.72	0.27	29.99	0.99770	31	0.08261	1.00000
5.6G;D1D	11.00	18.97	29.97	0.02	29.99	0.99770	31	0.08261	1.00000
5.8G;D1D	11.41	24.54	35.95	0.04	35.99	3.97192	31	0.32889	1.00000

<SBS mode>

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	9.58	25.69	35.27	0.50	35.77	3.77572	31	0.31265	1.00000
5.3G;D1D	8.66	21.01	29.67	0.32	29.99	0.99770	31	0.08261	1.00000
5.6G;D1D	8.93	20.94	29.87	0.12	29.99	0.99770	31	0.08261	1.00000
5.8G;D1D	8.79	27.02	35.81	0.18	35.99	3.97192	31	0.32889	1.00000

<Scan Radio>

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	5.08	25.32	30.40	0.50	30.90	1.23027	31	0.10187	1.00000
5.2G;D1D	6.27	19.96	26.23	0.50	26.73	0.47098	31	0.03900	1.00000
5.3G;D1D	6.27	18.58	24.85	0.50	25.35	0.34277	31	0.02838	1.00000
5.6G;D1D	6.27	17.96	24.23	0.50	24.73	0.29717	31	0.02461	1.00000
5.8G;D1D	6.27	19.32	25.59	0.50	26.09	0.40644	31	0.03366	1.00000

<Bluetooth Radio>

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;BT-LE	4.90	8.29	13.19	0.50	13.69	0.02339	31	0.00194	1.00000

**Simultaneous Transmission Analysis Mode:****1. DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (2.4GHz) + Bluetooth Radio**

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	9.25	24.28	33.53	0.50	34.03	2.52930	31	0.20944	1.00000	0.20944
5.8G;D1D	11.41	24.54	35.95	0.04	35.99	3.97192	31	0.32889	1.00000	0.32889
2.4G;D1D	5.08	25.32	30.40	0.50	30.90	1.23027	31	0.10187	1.00000	0.10187
2.4G;BT-LE	4.90	8.29	13.19	0.50	13.69	0.02339	31	0.00194	1.00000	0.00194
									Sum Ratio	0.64214
									Ratio Limit	1

2. DBS Mode (2.4GHz) + DBS Mode (5GHz) + Scan Radio (5GHz) + Bluetooth Radio

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	9.25	24.28	33.53	0.50	34.03	2.52930	31	0.20944	1.00000	0.20944
5.8G;D1D	11.41	24.54	35.95	0.04	35.99	3.97192	31	0.32889	1.00000	0.32889
5.2G;D1D	6.27	19.96	26.23	0.50	26.73	0.47098	31	0.03900	1.00000	0.03900
2.4G;BT-LE	4.90	8.29	13.19	0.50	13.69	0.02339	31	0.00194	1.00000	0.00194
									Sum Ratio	0.57927
									Ratio Limit	1

3. SBS Mode (5GHz low band) + SBS Mode (5GHz high band) + DBS Mode (2.4GHz) + Scan Radio (2.4GHz) + Bluetooth Radio

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)
5.2G;D1D	9.58	25.69	35.27	0.50	35.77	3.77572	31	0.31265	1.00000	0.31265
5.8G;D1D	8.79	27.02	35.81	0.18	35.99	3.97192	31	0.32889	1.00000	0.32889
2.4G;D1D	9.25	24.28	33.53	0.50	34.03	2.52930	31	0.20944	1.00000	0.20944
2.4G;D1D	5.08	25.32	30.40	0.50	30.90	1.23027	31	0.10187	1.00000	0.10187
2.4G;BT-LE	4.90	8.29	13.19	0.50	13.69	0.02339	31	0.00194	1.00000	0.00194
									Sum Ratio	0.95479
									Ratio Limit	1

4. SBS Mode (5GHz low band) + SBS Mode (5GHz high band) + DBS Mode (2.4GHz) + Scan Radio (5GHz) + Bluetooth Radio

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)
5.2G;D1D	9.58	25.69	35.27	0.50	35.77	3.77572	31	0.31265	1.00000	0.31265
5.8G;D1D	8.79	27.02	35.81	0.18	35.99	3.97192	31	0.32889	1.00000	0.32889
2.4G;D1D	9.25	24.28	33.53	0.50	34.03	2.52930	31	0.20944	1.00000	0.20944
5.2G;D1D	6.27	19.96	26.23	0.50	26.73	0.47098	31	0.03900	1.00000	0.03900
2.4G;BT-LE	4.90	8.29	13.19	0.50	13.69	0.02339	31	0.00194	1.00000	0.00194
									Sum Ratio	0.89192
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—THE END—