




RADIO EXPOSURE TEST REPORT

FCC ID : QXO-AP510INB
Equipment : 802.11ax Access Point
Brand Name : Extreme Networks
Model Name : AP510i
Applicant : Extreme Networks, Inc.
6480 Via Del Oro, San Jose, CA 95119
Manufacturer : Extreme Networks, Inc.
6480 Via Del Oro, San Jose, CA 95119
Standard : 47 CFR Part 2.1091

The product was received on Nov. 03, 2018, and testing was started from Nov. 14, 2018 and completed on Dec. 01, 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 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	-

Note: Reference to Sporton Project No.: 8O1739-01 and 8O1739-02

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: **Vicky Huang**



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) 802.11ax: OFDM (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)

1.1.1 Table for Multiple Listing

The EUT has two radios, the information as following table:

Radio	Function	
	WLAN 2.4GHz	WLAN 5GHz
1	√	√
2	-	√

1.1.2 Table for EUT support function

Function	Support Type	Support Band
AP	Master	WLAN 2.4GHz/WLAN 5GHz Band 1~4
Client	Slave without Radar Detection (Sensor Mode)	WLAN 2.4GHz/WLAN 5GHz Band 1+4
Bridge	Master	WLAN 2.4GHz/WLAN 5GHz Band 1+4
Mesh	Master	WLAN 2.4GHz/WLAN 5GHz Band 1+4

Note: The above information was declared by manufacturer.



1.2 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Radio	Antenna Gain(dBi)
	1TX	2TX	4TX						
1	1	1	1	WNC	Starlord 510i	PIFA	I-PEX	R1-5GHz	Note 1
2	-	2	2	WNC	Starlord 510i	PIFA	I-PEX	R1-5GHz	Note 1
3	-	-	3	WNC	Starlord 510i	PIFA	I-PEX	R1-5GHz	Note 1
4	-	-	4	WNC	Starlord 510i	PIFA	I-PEX	R1-5GHz	Note 1
5	R2-1	R2-1	R1-4 R2-1	WNC	Starlord 510i	PIFA	I-PEX	R1-2.4GHz R2-5GHz	Note 1
6	-	R2-2	R1-3 R2-2	WNC	Starlord 510i	PIFA	I-PEX	R1-2.4GHz R2-5GHz	Note 1
7	-	R1-2	R1-2 R2-3	WNC	Starlord 510i	PIFA	I-PEX	R1-2.4GHz R2-5GHz	Note 1
8	R1-1	R1-1	R1-1 R2-4	WNC	Starlord 510i	PIFA	I-PEX	R1-2.4GHz R2-5GHz	Note 1

Note1:

Ant.	Antenna Gain(dBi)	
	WLAN 2.4GHz	WLAN 5GHz
1	-	5.89
2	-	5.36
3	-	5.67
4	-	5.36
5	3.48	4.57
6	3.80	4.40
7	3.84	4.98
8	3.90	5.18

Note2: The above information was declared by manufacturer.

Note3:

For 2.4GHz function:

For IEEE 802.11b/g/n/ax mode (1TX, 2TX, 4TX/4RX):

For 1TX

Only Port 1 can be use as transmitting antenna.

For 2TX

Port 1 and Port 2 can be use as transmitting antenna.

Port 1 and Port 2 could transmit simultaneously.

For 4TX

Port 1, Port 2, Port 3 and Port 4 can be use as transmitting antenna.

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

For 4RX

Port 1, Port 2, Port 3 and Port 4 can be used as receiving antennas.

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



For 5GHz function:

For IEEE 802.11a/n/ac/ax mode (1TX, 2TX, 4TX/4RX):

For 1TX

Only Port 1 can be use as transmitting antenna.

For 2TX

Port 1 and Port 2 can be use as transmitting antenna.

Port 1 and Port 2 could transmit simultaneously.

For 4TX

Port 1, Port 2, Port 3 and Port 4 can be use as transmitting antenna.

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

For 4RX

Port 1, Port 2, Port 3 and Port 4 can be used as receiving antennas.

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

Note 4: 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	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

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

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

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

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

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

Where ;

G1 = Ant 1 Gain ; G2 = Ant 2 Gain ; G3 = Ant 3 Gain ; G4 = Ant 4 Gain ;

(Radio1_2T2S)

2.4GHz DG = 3.87 dBi

5 GHz U-NII-1 DG = 5.63 dBi

5 GHz U-NII-2A DG = 5.63 dBi

5 GHz U-NII-2C DG = 5.63 dBi

5 GHz U-NII-3 DG = 5.63 dBi

(Radio1_4T1S)

2.4GHz DG = 9.78 dBi

5 GHz U-NII-1 DG = 11.59 dBi

5 GHz U-NII-2A DG = 11.59 dBi

5 GHz U-NII-2C DG = 11.59 dBi

5 GHz U-NII-3 DG = 11.59 dBi



(Radio1_4T4S)

2.4GHz DG = 3.76 dBi

5 GHz U-NII-1 DG = 5.58 dBi

5 GHz U-NII-2A DG = 5.58 dBi

5 GHz U-NII-2C DG = 5.58 dBi

5 GHz U-NII-3 DG = 5.58 dBi

(Radio2_2T2S)

5 GHz U-NII-1 DG = 4.49 dBi

5 GHz U-NII-2A DG = 4.49 dBi

5 GHz U-NII-2C DG = 4.49 dBi

5 GHz U-NII-3 DG = 4.49 dBi

(Radio2_4T1S)

5 GHz U-NII-1 DG = 10.81 dBi

5 GHz U-NII-2A DG = 10.81 dBi

5 GHz U-NII-2C DG = 10.81 dBi

5 GHz U-NII-3 DG = 10.81 dBi

(Radio2_4T4S)

5 GHz U-NII-1 DG = 4.79 dBi

5 GHz U-NII-2A DG = 4.79 dBi

5 GHz U-NII-2C DG = 4.79 dBi

5 GHz U-NII-3 DG = 4.79 dBi

1.3 Accessories

Accessories			
Equipment Name	Brand Holder	Model Name	Rating
Adapter	Powertron Electronics Corp.	PA1045-120HIB300	Input:100-240V~50-60Hz, 1.0A Output: 12V, 3.0A 36W Max
Others			
Plug*6 (US*1, EU*1, UK*1, AU*1, China*1, BZ*1)			
Bracket*1			



1.4 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 26 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

For WLAN Function:

Test Mode: 1T1S

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;G1D (Radio 1)	3.90	22.93	26.83	0.50	27.33	0.54075	26	0.06366	1
5.2G;D1D (Radio 1)	5.89	21.09	26.98	0.50	27.48	0.55976	26	0.06589	1
5.3G;D1D (Radio 1)	5.89	20.39	26.28	0.50	26.78	0.47643	26	0.05608	1
5.6G;D1D (Radio 1)	5.89	18.02	23.91	0.50	24.41	0.27606	26	0.03250	1
5.8G;D1D (Radio 1)	5.89	21.47	27.36	0.50	27.86	0.61094	26	0.07192	1
5.2G;D1D (Radio 2)	4.57	19.62	24.19	0.50	24.69	0.29444	26	0.03466	1
5.3G;D1D (Radio 2)	4.57	20.67	25.24	0.50	25.74	0.37497	26	0.04414	1
5.6G;D1D (Radio 2)	4.57	21.08	25.65	0.50	26.15	0.41210	26	0.04851	1
5.8G;D1D (Radio 2)	4.57	22.84	27.41	0.50	27.91	0.61802	26	0.07275	1

Test Mode: 2T2S

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)	3.87	23.17	27.04	0.50	27.54	0.56754	26	0.06681	1
5.2G;D1D (Radio 1)	5.63	24.09	29.72	0.50	30.22	1.05196	26	0.12383	1
5.3G;D1D (Radio 1)	5.63	23.55	29.18	0.50	29.68	0.92897	26	0.10935	1
5.6G;D1D (Radio 1)	5.63	20.89	26.52	0.50	27.02	0.50350	26	0.05927	1
5.8G;D1D (Radio 1)	5.63	24.48	30.11	0.50	30.61	1.15080	26	0.13547	1
5.2G;D1D (Radio 2)	4.49	22.10	26.59	0.50	27.09	0.51168	26	0.06023	1
5.3G;D1D (Radio 2)	4.49	22.66	27.15	0.50	27.65	0.58210	26	0.06852	1
5.6G;D1D (Radio 2)	4.49	23.76	28.25	0.50	28.75	0.74989	26	0.08827	1
5.8G;D1D (Radio 2)	4.49	25.94	30.43	0.50	30.93	1.23880	26	0.14583	1

**Test Mode: 4T1S**

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;G1D (Radio 1)	3.90	28.09	31.99	0.50	32.49	1.77419	26	0.20885	1
5.2G;D1D (Radio 1)	11.59	24.30	35.89	0.10	35.99	3.97192	26	0.46756	1
5.3G;D1D (Radio 1)	11.59	18.37	29.96	0.03	29.99	0.99770	26	0.11745	1
5.6G;D1D (Radio 1)	11.59	18.38	29.97	0.02	29.99	0.99770	26	0.11744	1
5.8G;D1D (Radio 1)	11.59	24.40	35.99	0.01	36.00	3.98107	26	0.46863	1
5.2G;D1D (Radio 2)	10.81	24.56	35.37	0.50	35.87	3.86367	26	0.45481	1
5.3G;D1D (Radio 2)	10.81	19.15	29.96	0.03	29.99	0.99770	26	0.11744	1
5.6G;D1D (Radio 2)	10.81	19.12	29.93	0.06	29.99	0.99770	26	0.11744	1
5.8G;D1D (Radio 2)	10.81	25.16	35.97	0.02	35.99	3.97192	26	0.46757	1

Test Mode: 4T4S

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)	3.76	25.11	28.87	0.50	29.37	0.86497	26	0.10182	1
5.2G;D1D (Radio 1)	5.58	26.52	32.10	0.50	32.60	1.81970	26	0.21421	1
5.3G;D1D (Radio 1)	5.58	23.90	29.48	0.50	29.98	0.99541	26	0.11717	1
5.6G;D1D (Radio 1)	5.58	23.34	28.92	0.50	29.42	0.87498	26	0.10300	1
5.8G;D1D (Radio 1)	5.58	27.49	33.07	0.50	33.57	2.27510	26	0.26781	1
5.2G;D1D (Radio 2)	4.79	25.03	29.82	0.50	30.32	1.07647	26	0.12672	1
5.3G;D1D (Radio 2)	4.79	23.96	28.75	0.50	29.25	0.84140	26	0.09905	1
5.6G;D1D (Radio 2)	4.79	23.96	28.75	0.50	29.25	0.84140	26	0.09905	1
5.8G;D1D (Radio 2)	4.79	28.38	33.17	0.50	33.67	2.32809	26	0.27405	1



Simultaneous Transmission Analysis Mode:

Mode 1: WLAN 2.4GHz (Radio 1) + WLAN 5GHz (Radio 2)

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;G1D (Radio 1)	3.90	28.09	31.99	0.50	32.49	1.77419	26	0.20885	1	0.20885
5.8G;D1D (Radio 2)	10.81	25.16	35.97	0.02	35.99	3.97192	26	0.46756	1	0.46756
									Sum Ratio	0.67641
									Ratio Limit	1

Mode 2: WLAN 5GHz (Radio 1) + WLAN 5GHz (Radio 2)

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)
5.8G;D1D (Radio 1)	11.59	24.40	35.99	0.00	35.99	3.97192	26	0.46756	1	0.46756
5.8G;D1D (Radio 2)	10.81	25.16	35.97	0.02	35.99	3.97192	26	0.46756	1	0.46756
									Sum Ratio	0.93512
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

————THE END————