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Project No: CB10501014

Maximum Permissible Exposure Report

Applicant's company	Extreme Networks, Inc.
Applicant Address	9 Northaste m Blvd. Salem, NH 03079 USA
FCC ID	QXO-44110U
Manufacturer's company	Sena o Networks
Manufacturer Address	3F, No. 529, Chung Cheng Rd., Hsintien, Taipei, Taiwan

Product Name	WS-AP3965i-FCC
Brand Name	Extreme Networks
Model Name	31016
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Nov. 17, 2015
Final Test Date	Dec. 30, 2015
Submission Type	Class II Change

Reviewed by:


Kevin Liang / Assistant Manager



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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA653001	Rev. 01	Initial issue of report	Jun. 08, 2016

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

1.2. Table for Multiple Listing and Class II Change

This product is an extension of original one reported under Sporton project number: FA541521-01

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

Modifications	Performance Checking
1. Updating product name to "WS-AP3965i-FCC" from "Wireless 802.11a/AC+ b/g/n Access Point"	It is not necessary to perform for all tests.
2. Removing three model No.: 31018, 31017, 31019	
3. Removing external antennas - Extreme Part No.: 30714, 30716, 30711, 30718, 30720, 30713, 30717, 30715, 30712, WS-AO-5D23009N, 30724	
4. Changing the RF Exposure evaluated separation distance to 20cm	MPE

1.3. Testing Location

Testing Location		
<input type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
<input checked="" type="checkbox"/>	JHUBEI	ADD : No. 8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

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)*	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)*	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 20 cm for EUT2 to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

E = Electric field (V/m)

P = Peak 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 Non-Beamforming Mode

For 5GHz Band 2 and Band 3:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT80): 23.70dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	5690	6.25	4.2170	23.6963	234.2210	0.196494	1	Complies

For 2.4GHz Band:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT20): 28.63dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	2437	6.45	4.4157	28.6295	729.3666	0.640716	1	Complies

For Beamforming Mode

For 5GHz Band 2 and Band 3:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11ac MCS0/ Nss1 (VHT20): 17.90dBm

Distance (cm)	Test Freq. (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	5500	12.09	16.1673	17.9006	61.6680	0.198343	1	Complies

Note :

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

For 2.4GHz Band:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11ac MCS0/ Nss1(VHT20): 23.91dBm

Distance (cm)	Test Freq. (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	2437	12.04	16.0139	23.9127	246.1917	0.784315	1	Complies

Note :

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

Conclusion:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1 / IPD1 + CPD2 / IPD2 +etc. < 1$$

CPD = Calculation power density

IPD = Limit of power density

Therefore, the worst-case situation is 0.198343 / 1 + 0.784315 / 1 = 0.982658, which is less than "1". This confirmed that the device complies.