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Project No: CB10504131

Maximum Permissible Exposure Report

Applicant's company	Extreme Networks, Inc.
Applicant Address	9 Northeastern Blvd. Salem, NH 03079 USA
FCC ID	QXO-4411OU
Manufacturer's company	Senao Networks, Inc.
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	Apr. 11, 2016
Submission Type	Class II Change

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Testing Laboratory
1190



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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA640141-01	Rev. 01	Initial issue of report	May 04, 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	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

1.2. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FA640141

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" 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	It is not necessary to perform for all tests.
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., Kwei-Shan Hsiang, Tao Yuan Hsien, 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 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 = Peak RF output power (W)

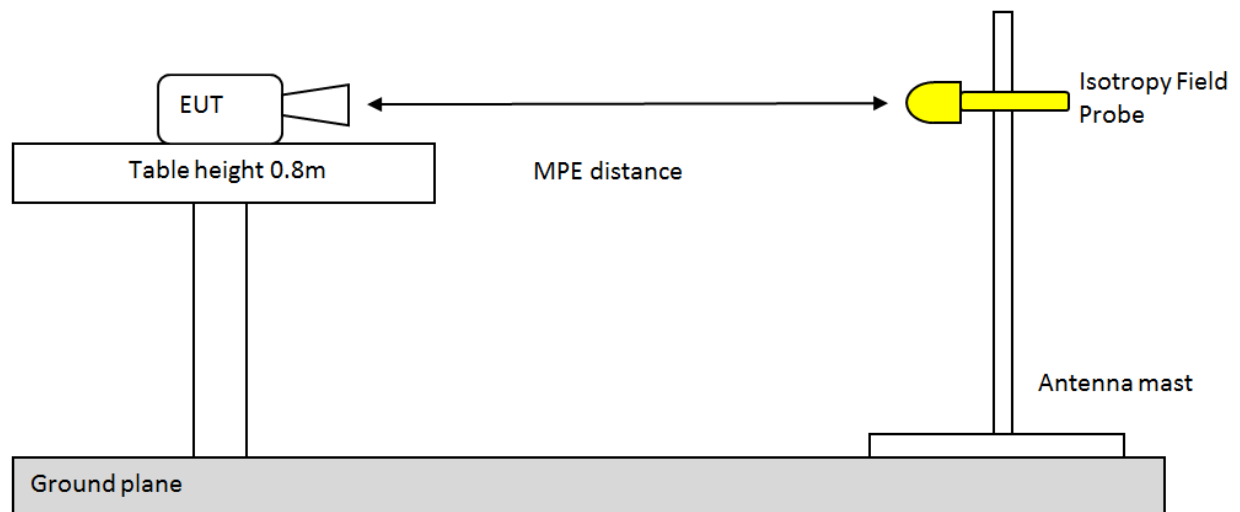
G = EUT Antenna numeric gain (numeric)

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. MPE Measurement Method



Horizontal Plane

1. Align Probe with antenna axis. Probe should same height as Antenna axis.
And take power density measurement with Probe.
 2. Rotate table 45 degree (30 degree if MPE distance is more 60cm).
Take power density measurement again.
 3. Repeat step 2, until complete 360 degree.
- Each measured power density should be less than MPE limit.

Vertical Plane

1. Align Probe with antenna axis. Move probe to height of 10cm above ground plane.
Take power density measurement.
Then repeat measure with 10cm increment of probe height until 180 cm.
 2. Rotate table 45 degree (30 degree if MPE distance is more 60cm).
Repeat the power density measure from 10cm to 180cm
 3. Repeat step 2, until complete 360 degree.
- Spatial Average of same vertical plane should be less then MPE limit.

For Probe or measurement equipment requirement, please see FCC OET Bulletin 65 97-01

Note:

Either peak or spatially averaged results may be applied to determine compliance; and with respect to plane-wave equivalent power density limits when ≥ 300 MHz, and electric and magnetic field strength limits when < 300 MHz.

2.4. Measurement Result and Limit

Test Mode	VHT20 Non-TXBF	Test Frequency (MHz)	2437	MPE Distance (cm)	20	Power Setting	23	
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)
92	0.05685	0.03748	0.03432	0.03156	0.03947	0.05382	0.06562	0.08473
Max PSD (mW/cm ²)	0.08473							
MPE Limit (mW/cm ²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)
10	0.00145	0.00167	0.00192	0.00421	0.00607	0.00435	0.00147	0.00074
20	0.00152	0.00172	0.00205	0.00436	0.00675	0.00447	0.00161	0.00082
30	0.00155	0.00174	0.00211	0.00579	0.00873	0.00735	0.00289	0.00087
40	0.00161	0.00177	0.00274	0.00585	0.00739	0.00826	0.00341	0.00115
50	0.00131	0.00162	0.00452	0.00821	0.01513	0.01583	0.00642	0.00126
60	0.00123	0.00282	0.00874	0.02015	0.02638	0.01978	0.01254	0.00206
70	0.00137	0.00438	0.01509	0.04267	0.05122	0.04035	0.01583	0.00185
80	0.00125	0.00461	0.02396	0.06619	0.09018	0.08739	0.02561	0.00157
90	0.00085	0.00487	0.02952	0.05715	0.06357	0.06641	0.03278	0.00334
100	0.00168	0.00373	0.02395	0.03745	0.04256	0.04182	0.02109	0.00331
110	0.00103	0.00292	0.01206	0.01932	0.02376	0.02331	0.01017	0.00172
120	0.00067	0.00167	0.00586	0.01042	0.01354	0.01278	0.00438	0.00105
130	0.00062	0.00158	0.00396	0.00745	0.00813	0.00797	0.00384	0.00087
140	0.00058	0.00136	0.00314	0.00559	0.00575	0.00521	0.00285	0.00075
150	0.00053	0.00112	0.00287	0.00394	0.00411	0.00362	0.00179	0.00068
160	0.00049	0.00095	0.00182	0.00287	0.00238	0.00243	0.00131	0.00061
170	0.00045	0.00071	0.00105	0.00182	0.00176	0.00103	0.00065	0.00055
180	0.00038	0.00063	0.00092	0.00173	0.00169	0.00091	0.00059	0.00043
Spatial Average (mW/cm ²)	0.001031667	0.002215	0.008126667	0.016953889	0.021061111	0.019626111	0.008290556	0.001312778
Max Spatial Average (mW/cm ²)	0.02106							
MPE Limit (mW/cm ²)	1							

Test Mode	VHT20 Non-TXBF	Test Frequency (MHz)	5785	MPE Distance (cm)	20	Power Setting	25	
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)
85	0.29650	0.09986	0.07289	0.09367	0.08674	0.07473	0.13158	0.28951
Max PSD (mW/cm ²)	0.2965							
MPE Limit (mW/cm ²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)	Max PSD (mW/cm ²)
10	0.00276	0.00574	0.00958	0.00906	0.01564	0.00762	0.00314	0.00133
20	0.00365	0.00752	0.02175	0.02762	0.02785	0.02756	0.00761	0.00118
30	0.00358	0.00805	0.01862	0.01858	0.01325	0.01074	0.00562	0.00196
40	0.00791	0.01745	0.03049	0.03141	0.03881	0.04157	0.01409	0.00291
50	0.00426	0.02115	0.03396	0.05506	0.07889	0.04307	0.02034	0.00438
60	0.00322	0.02443	0.03821	0.07014	0.07097	0.09318	0.06174	0.00485
70	0.00316	0.03595	0.06243	0.07561	0.20152	0.21725	0.10196	0.01038
80	0.00298	0.03814	0.05552	0.07675	0.17715	0.20712	0.07235	0.00883
90	0.00396	0.03071	0.05723	0.05682	0.17322	0.16121	0.03842	0.00554
100	0.00367	0.01256	0.03962	0.06408	0.15026	0.14963	0.02835	0.00331
110	0.00462	0.00768	0.02674	0.03792	0.14768	0.13121	0.01456	0.00305
120	0.00546	0.00637	0.02135	0.02806	0.08724	0.09148	0.01183	0.00269
130	0.00279	0.00624	0.00912	0.01163	0.06535	0.06861	0.00667	0.00164
140	0.00259	0.00378	0.00556	0.01018	0.01471	0.01431	0.00316	0.00124
150	0.00225	0.00238	0.00351	0.00917	0.01159	0.00828	0.00274	0.00109
160	0.00209	0.00226	0.00314	0.00865	0.00979	0.00734	0.00256	0.00098
170	0.00198	0.00207	0.00283	0.00834	0.00885	0.00691	0.00234	0.00087
180	0.00185	0.00196	0.00276	0.00725	0.00762	0.00625	0.00218	0.00081
Spatial Average (mW/cm ²)	0.003487778	0.013024444	0.024578889	0.033685	0.072243889	0.071852222	0.022203333	0.003168889
Max Spatial Average (mW/cm ²)	0.072243889							
MPE Limit (mW/cm ²)	1							

Conclusion:

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

$$MPD1 / LPD1 + MPD2 / LPD2 + \dots\text{etc.} < 1$$

MPD = Measurement power density

LPD = Limit of power density

Therefore, the worst-case situation is $0.08473 / 1 + 0.2965 / 1 = 0.38123$, which is less than "1". This confirmed that the device complies.

2.5. List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Isotropic Probe	ETS-LINDGREN	HI-6105	00130664	100kHz-6GHz	Jun. 03, 2015	03CH01-CB

Note: Calibration Interval of instrument listed above is one year.