



# SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.  
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

Project No: CB10505049

## Maximum Permissible Exposure Report

Applicant's company	Linksys LLC
Applicant Address	121 Theory Drive, Irvine, CA 92617, USA
FCC ID	Q87-EA9200

Product Name	AC3200 Tri-Band Smart Wi-Fi Router
Brand Name	LINKSYS
Model Name	EA9200
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Apr. 22, 2014
Final Test Date	Mar. 31, 2016
Submission Type	Class II Change



Testing Laboratory  
1190

Sam Chen

SPORTON INTERNATIONAL INC.



## Table of Contents

<b>1. GENERAL DESCRIPTION.....</b>	<b>1</b>
1.1. EUT General Information .....	1
1.2. Table for Class II Change .....	1
1.3. Testing Location.....	1
<b>2. MAXIMUM PERMISSIBLE EXPOSURE.....</b>	<b>2</b>
2.1. Limit of Maximum Permissible Exposure .....	2
2.2. MPE Calculation Method.....	3
2.3. Calculated Result and Limit.....	3



## 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: 482206

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

Modifications	Performance Checking
1. Updating the Brand Name from "Linksys LLC" to "LINKSYS". 2. Adding an adapter (Model No.: DA-48T12)	Do not effect the test results.
3. Updating 5GHz Band 4 to "New Rules" from "Old Rules".	Maximum Permissible Exposure.

Note: Maximum Permissible Exposure of 2.4GHz and 5GHz Band1 is based on original report.

### 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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 27 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. Calculated Result and Limit

**Exposure Environment: General Population / Uncontrolled Exposure**

**For 5GHz Band (Band 1):**

**Antenna Type : Dipole**

**Conducted Power for IEEE 802.11ac VHT40: 24.69dBm**

Distance (cm)	Test Freq. (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
27	5230	7.87	6.1252	24.6851	294.1097	0.1967	1	Complies

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

**For 5GHz Band (Band 4):**

**Antenna Type : Dipole**

**Conducted Power for IEEE 802.11ac VHT40: 23.49dBm**

Distance (cm)	Test Freq. (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
27	5795	7.82	6.0551	23.4874	223.2233	0.1476	1	Complies

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

For 2.4GHz Band:

Antenna Type : Dipole

Conducted Power for IEEE 802.11ac VHT20: 26.70 dBm

Distance (cm)	Test Freq. (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
				(dBm)	(mW)			
27	2437	6.58	4.5512	26.6979	467.5039	0.2323	1	Complies

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

**Conclusion:**

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

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is  $0.2323 / 1 + 0.1967 / 1 + 0.1476 / 1 = 0.5766$ , which is less than "1".

This confirmed that the device complies.