SPORTON International Inc.

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Project No: CB10405227

Maximum Permissible Exposure

Applicant's company	Xirrus, Inc.
Applicant Address	2101 Corporate Center Drive, Thousand Oaks, CA 91320 USA
FCC ID	SK6-XDR130
Manufacturer's company	Lite-On Network Communication (Dongguan) Limited
Manufacturer Address	30#Keji Rd.,Yin Hu Industrial Area,Qingxi Town,DongGuan City,Guangdong,China

Product Name	Wireless Access Point Radio module
Brand Name	XIRRUS
Model Name	XDR130
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
EUT Freq. Range	5250 ~ 5350MHz / 5470 ~ 5725MHz
Received Date	Apr. 10, 2015
Final Test Date	May 13, 2015
Submission Type	Class II Change
Operating Mode	Master / Bridge (Client without radar detection)

Sam Chen

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History of This Assessment Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA541029-01	Rev. 01	Initial issue of report	Jun. 17, 2015

1. TABLE FOR MULTIPLE LIST AND CLASS II CHANGE

1.1. Table for Multiple List

There are two RF transceiver sources (QCA9890 & QCA 9880). They are pin to pin compatible. These two RF chipset are electrically identical.

The deviation is F/W and communications protocol so just selects QCA9890 as worse case and recorded in the report.

1.2. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FA541029

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

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

Note: Maximum Permissible Exposure of 2.4GHz Band and 5GHz Band 1/4 are based on original test report.

2. MAXIMUM PERMISSIBLE EXPOSURE

2.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby that distance of at least 0.3 m is normally maintained between the user and the device.

(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/ cm²)	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/ cm²)	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

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

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

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.3m, as well as the gain of the used antenna, the RF power density can be obtained.

2.3. Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For 5GHz Band 1/4:

Antenna Type : Directional Antenna

Conducted Power for IEEE 802.11ac VHT20: 23.14 dBm

Distance (m)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
				(dBm)	(mW)			
0.3	5785	10.50	11.2202	23.1358	205.8631	0.204337	1	Complies

For 5GHz Band 2/3:

Antenna Type : Directional Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 VHT80: 19.41 dBm

Distance (m)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
				(dBm)	(mW)			
0.3	5690	10.50	11.2202	19.4141	87.3792	0.086731	1	Complies

For 2.4GHz Band:

Antenna Type : Directional Antenna

Conducted Power for IEEE 802.11g: 25.92 dBm

Distance (m)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
				(dBm)	(mW)			
0.3	2437	2.30	1.6982	25.9162	390.5025	0.058667	1	Complies

Note: 1. The EUT is a limited module which only limited to the Wireless Access Point (brand: XIRRUS / model: XD4130).

2. The EUT was installed to the Wireless Access Point (brand: XIRRUS / model: XD4130) to perform Maximum Permissible Exposure test.

Conclusion:

The Wireless Access Point (brand: XIRRUS / model: XD4130) will install four radio modules (brand: XIRRUS / model: XDR130 / FCC ID: SK6-XDR130). And there are four co-transmitting configurations:

1. Radio 1 2.4GHz + Radio 2 2.4GHz + Radio 3 2.4GHz + Radio 4 5GHz

2. Radio 1 2.4GHz + Radio 2 5GHz + Radio 3 2.4GHz + Radio 4 5GHz

3. Radio 1 2.4GHz + Radio 2 5GHz + Radio 3 5GHz + Radio 4 5GHz

4. Radio 1 5GHz + Radio 2 5GHz + Radio 3 5GHz + Radio 4 5GHz

The formula of calculatedthe MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ...etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Configuration 1: 0.058667 / 1 + 0.058667 / 1 + 0.058667 / 1 + 0.204337 / 1= 0.380338

Configuration 2: 0.058667 / 1 + 0.204337 / 1 + 0.058667 / 1 + 0.204337 / 1= 0.526008

Configuration 3: 0.058667 / 1 + 0.204337 / 1 + 0.204337 / 1 + 0.204337 / 1= 0.671678

Configuration 4: 0.204337 / 1 + 0.204337 / 1 + 0.204337 / 1 + 0.204337 / 1= 0.817348

The results of all configurations are less than "1". This confirmed that the device complies.