SPORTON International Inc.

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SPORTON LAB.

Project No: CB10507130

Maximum Permissible Exposure Report

Applicant's company	Mojo Networks, Inc.
Applicant Address	339 N. Bernardo Avenue, Suite #200 Mountain View, CA 94043 United States
FCC ID	TOR-C130
Manufacturer's company	Mojo Networks, Inc.
Manufacturer Address	339 N. Bernardo Avenue, Suite #200 Mountain View, CA 94043 United States

Product Name	802.11a/b/g/n/ac AP
Brand Name	MOJO
Model Name	C-130
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Apr. 13, 2016
Final Test Date	Jul. 13, 2016
Submission Type	Original Equipment

Sam Chen

SPORTON INTERNATIONAL INC.

TAF
Testing Laboratory
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Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA641226-02	Rev. 01	Initial issue of report	Jul. 18, 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. The EUT of radio information as below

Radio	Function
Radio 1	2.4GHz
Radio 2	5GHz
Radio 3	2.4GHz / 5GHz

1.3. Testing Location

Testing Location			
☐ 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
☒ 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/ 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

The MPE was calculated at 50 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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

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

2.3. Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For 5GHz Band:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 Radio 2 / 4TX (VHT20): 24.30dBm

Distance (cm)	Test Freq. (MHz)	Directional 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)			
50	5825	11.67	14.6846	24.30	269.3150	0.1259	1	Complies

Note: $Directional\,Gain = 10\log\left[\dfrac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right] = 11.67\text{dBi}$

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11a Radio 3 / 2TX: 24.85dBm

Distance (cm)	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)			
50	5180	5.77	3.7757	24.85	305.5335	0.0367	1	Complies

For 2.4GHz Band:

Antenna Type : PIFA antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 Radio 1 / 4TX (VHT20): 21.89 dBm

Distance (cm)	Test Freq. (MHz)	Directional 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)			
50	2437	10.72	11.8128	21.89	154.6992	0.0581	1	Complies

Note: $Directional\,Gain = 10\log\left[\dfrac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right] = 10.72\text{dBi}$

Antenna Type : PIFA antenna

Conducted Power for IEEE 802.11b Radio 3 / 2TX: 24.82 dBm

Distance (cm)	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)			
50	2437	4.64	2.9107	24.82	303.0628	0.0280	1	Complies

Conclusion:

Both of the Radio 1 (2.4GHz WLAN function) + Radio 2 (5GHz WLAN function) + Radio 3 (2.4GHz WLAN function) can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.0581 / 1 + 0.1259 / 1 + 0.0280 / 1= 0.2120, which is less than "1". This confirmed that the device complies.

Conclusion:

Both of the Radio 1 (2.4GHz WLAN function) + Radio 2 (5GHz WLAN function) + Radio 3 (5GHz WLAN function) can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.0581 / 1 + 0.1259 / 1 + 0.0367 / 1= 0.2207, which is less than "1". This confirmed that the device complies.