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: CB10510369

Maximum Permissible Exposure Report

Applicant's company	**Amped Wireless**
Applicant Address	13089 Peyton Dr. #C307 Chino Hills, CA 91709 USA
FCC ID	**ZTT-ALLYR1900**
Manufacturer's company	**Amped Wireless**
Manufacturer Address	13089 Peyton Dr. #C307 Chino Hills, CA 91709 USA

Product Name	Whole Home Smart Wi-Fi Router
Brand Name	amped wireless
Model Name	ALLY-R1900, ALLY-R1900K, ALLY-R2100K
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Aug. 17, 2016
Final Test Date	Oct. 26, 2016
Submission Type	Original Equipment

Testing Laboratory
1190

Sam Chen
SPORTON INTERNATIONAL INC.

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA681934-01	Rev. 01	Initial issue of report	Nov. 02, 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)
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 Multiple List

The model names in the following table are all refer to the identical product.

Brand Name	Model Name	Description
amped wireless	ALLY-R1900	All the models are identical, just different enclosure color.
	ALLY-R1900K	Everything else is the same.
	ALLY-R2100K	The different model name for different customer.

From the above models, model: ALLY-R1900 was selected as representative model for the test and its data was recorded in this report.

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 23 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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 1:

Antenna Type : Embedded Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT20): 27.72dBm

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)			
23	5200	7.82	6.0551	27.72	591.8004	0.5393	1	Complies

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

For 5GHz Band B4:

Antenna Type : Embedded Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT40): 27.01dBm

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)			
23	5795	8.97	7.8908	27.01	502.7250	0.5970	1	Complies

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

For 2.4GHz Band:

Antenna Type : Embedded Antenna

Conducted Power for IEEE 802.11g: 28.65 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)			
23	2437	2.71	1.8664	28.65	732.5974	0.2721	1	Complies

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 + ...etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.2721 / 1+ 0.5970 / 1=0.8027, which is less than "1". This confirmed that the device complies.