



SPORTON International Inc.

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Project No: CB10508075

Maximum Permissible Exposure Report

Applicant's company	PEGATRON CORPORATION
Applicant Address	5F., NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, Taiwan
FCC ID	VUI-APS1
Manufacturer's company	Maintek Computer (Suzhou) Co., Ltd
Manufacturer Address	233 Jin Feng Rd, Suzhou District Jiangsu China

Product Name	Advanced power supply with WiFi and MoCA
Brand Name	CISCO
Model Name	APS1;APS1v1-C;CA010AAB;MWA1221;XW1;XW1-C
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Dec. 16, 2014
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Submission Type	Class II Change

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA4D1514-02	Rev. 01	Initial issue of report	Nov. 14, 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 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5700 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 numbers in the following table are all refer to the identical product.

Model No.	Description
APS1	All the models are identical, the difference model for difference model number as marketing strategy.
APS1v1-C	
CA010AAB	
MWA1221	
XW1	
XW1-C	

From the above models, model: APS1v1-C was selected as representative model for the test and its data was recorded in this report.

1.3. Table for Class II Change

This product is an extension of original one reported under Sporton project number: 4D1514

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

Description	Performance Checking
1. Changing the Casing of the EUT. 2. Changing the Manufacturer's Address to "233 Jin Feng Rd, Suzhou District Jiangsu China" from "Bldg. 6 NB, 233 Jin Feng Rd, Suzhou District Jiangsu China". 3. Adding Model Names. (APS1v1-C, XW1, XW1-C)	No influence on the test results.
4. Adding 5 GHz Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz) for this device.	It evaluated for Maximum Permissible Exposure.

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

1.4. 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/ 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. Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For 2.4GHz Band:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11g: 24.16 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	2437	2.54	1.7947	24.1575	260.4649	0.0930	1	Complies

For 5GHz Band 1 and Band 4:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 VHT20: 23.75 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	5200	4.88	3.0761	23.7510	237.1940	0.1452	1	Complies

For 5GHz Band 2 and Band 3:

Antenna Type : PCB Antenna

Conducted Power for IEEE 802.11a: 22.36 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	The maximum combined Average Output Power		Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
				(dBm)	(mW)			
20	5300	4.88	3.0761	22.36	172.0699	0.1053	1	Complies

Conclusion:

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

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

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is $0.0930 / 1 + 0.1452 / 1 = 0.2382$, which is less than "1". This confirmed that the device complies.