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

SPORTON LAB.

Project No: CB10409227

Maximum Permissible Exposure Report

Applicant's company	**Arcadyan Technology Corporation**
Applicant Address	No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan
FCC ID	**RAX-AIOS4-0S**
Manufacturer's company	**Arcadyan Technology Corporation**
Manufacturer Address	No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan

Product Name	HEOS 4.X Platform Module
Brand Name	Arcadyan
Model Name	AIOS4.0S, AIOS4.0V, AIOS4.0R, AIOS4.0F
Ref. Standard(s)	47 CFR FCC Part 2 Subpart J, section 2.1091
Received Date	Jul. 22, 2015
Final Test Date	Sep. 10, 2015
Submission Type	Original Equipment

Sam Chen
SPORTON INTERNATIONAL INC.

TAF
Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA581110-01	Rev. 01	Initial issue of report	Sep. 24, 2015

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)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / π/4-DQPSK / 8DPSK) LE: DSSS (GFSK)

1.2. Table for Multiple Listing

The EUT has four model numbers which are identical to each other in all aspects except for the following table:

Model No.	Description
AIOS4.0S	All the models are identical, the difference model for difference model number as marketing strategy.
AIOS4.0V	
AIOS4.0R	
AIOS4.0F	

From the above models, model: AIOS4.0S was selected as representative model for the test and its data was recorded in this report.

1.3. CPU Information

There are two CPU of EUT, one is CPU 1.25G and the other is CPU 1G.

CPU 1.25G covers CPU 1G, due to it is the highest CPU speed.

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/ 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 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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 1~4:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11ac MCS0/Nss1 (VHT20): 23.75 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)			
20	5785	6.67	4.6455	23.7491	237.0877	0.219225	1	Complies

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

For 2.4GHz Band:

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11g: 21.73 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)			
20	2437	3.10	2.0417	21.7271	148.8366	0.060487	1	Complies

For Bluetooth Function:

Antenna Type : PIFA Antenna

Conducted Power for BR (GFSK) 1 Mbps: 7.56 dBm

Distance (cm)	Test Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power		Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
				(dBm)	(mW)			
20	2441	3.10	2.0417	7.5582	5.6993	0.002316	1	Complies

Conclusion:

1. Both of the Bluetooth + 2.4GHz WLAN 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 0.002316 / 1 + 0.060487 / 1 = 0.062803, which is less than "1". This confirmed that the device complies.

2. Both of the Bluetooth + 5GHz WLAN 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 0.002316 / 1 + 0.219225 / 1 = 0.221541, which is less than "1". This confirmed that the device complies.