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Report No.: SZEM150700399303

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RF Exposure Evaluation Report

Application No: SZEM1507003993CR
Applicant: Five Interactive, LLC dba Zendo
Manufacturer/Factory: Sysgration Electronics Technology (HuiZhou) Company, Limited
Product Name: Smart Plug
Model No.(EUT): ASPW-010
Trade Mark: Zendo
FCC ID: 2AD6PASPW010
Standards: 47 CFR Part 1.1307 (2014)
47 CFR Part 1.1310 (2014)
Date of Receipt: 2015-07-31
Date of Test: 2015-07-31 to 2015-09-24
Date of Issue: 2015-09-29

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang
EMC Laboratory Manager

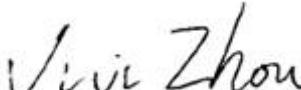
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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2015-09-29		Original

Authorized for issue by:			
Tested By	 (Eric Fu) /Project Engineer		2015-09-24
Prepared By	 (Vivi Zhou) /Clerk		2015-09-29
Checked By	 (Owen Zhou) /Reviewer		2015-09-29

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4 General Information

4.1 Client Information

Applicant:	Five Interactive, LLC dba Zendo
Address of Applicant:	200 South Andrews Avenue, Suite 301 Fort Lauderdale, FL 33301 United States
Manufacturer:	Sysgration Electronics Technology (HuiZhou) Company, Limited
Address of Manufacturer:	YuXin Science Park 3rd Floor, Longshan 7 Rd., XiangShuiHe Industrial Zone, DaYaWan, HuiZhou City, GuangDong Province, China
Factory:	Sysgration Electronics Technology (HuiZhou) Company, Limited
Address of Factory:	YuXin Science Park 3rd Floor, Longshan 7 Rd., XiangShuiHe Industrial Zone, DaYaWan, HuiZhou City, GuangDong Province, China

4.2 General Description of EUT

Product Name:	Smart Plug
Model No.:	ASPW-010
Trade Mark:	Zendo
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Modulation Type:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM,QPSK,BPSK)
Sample Type:	Fixed production
Test software of EUT:	Labtool
Antenna Type and Gain:	Type : Integral antenna Gain : 3.54dBi
Power Supply:	AC 120V 60Hz

4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

- **Industry Canada (IC)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-2, 4620C-3.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	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				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5.1.3 EUT RF Exposure Evaluation

Antenna Gain: 3.54dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.2594 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

For WiFi:

802.11b mode:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	2412	19.95	98.86	0.0444	1.0	PASS

802.11g mode:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	2412	22.50	177.83	0.0799	1.0	PASS

802.11n(HT20) mode:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	2412	22.10	162.18	0.0729	1.0	PASS

Note: Refer to report No. SZEM150700399301 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For BLE:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	2402	-1.71	0.67	3.0116 X 10 ⁻⁴	1.0	PASS

Note: Refer to report No. SZEM150700399302 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.