



**SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch**

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan  
District, Shenzhen, Guangdong, China 518057  
Telephone: +86 (0) 755 2601 2053  
Fax: +86 (0) 755 2671 0594  
Email: ee.shenzhen@sgs.com

Report No.: SZEM150700399303  
Page: 1 of 7

## 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

|                      |              |
|----------------------|--------------|
| <b>Test Result :</b> | <b>PASS*</b> |
|----------------------|--------------|

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang  
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

"This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/terms\\_e-document.htm](http://www.sgs.com/terms_e-document.htm). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only."



## 2 Version

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

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



### 3 Contents

|  | Page |
|--|------|
| 1 COVER PAGE .....                                   | 1    |
| 2 VERSION .....                                      | 2    |
| 3 CONTENTS .....                                     | 3    |
| 4 GENERAL INFORMATION .....                          | 4    |
| 4.1 CLIENT INFORMATION.....                          | 4    |
| 4.2 GENERAL DESCRIPTION OF EUT .....                 | 4    |
| 4.3 TEST LOCATION.....                               | 4    |
| 4.4 TEST FACILITY .....                              | 5    |
| 4.5 DEVIATION FROM STANDARDS .....                   | 5    |
| 4.6 ABNORMALITIES FROM STANDARD CONDITIONS.....      | 5    |
| 4.7 OTHER INFORMATION REQUESTED BY THE CUSTOMER..... | 5    |
| 5 RF EXPOSURE EVALUATION .....                       | 6    |
| 5.1 RF EXPOSURE COMPLIANCE REQUIREMENT .....         | 6    |
| 5.1.1 Limits.....                                    | 6    |
| 5.1.2 Test Procedure .....                           | 6    |
| 5.1.3 EUT RF Exposure Evaluation .....               | 7    |



## 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)<br>IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK)<br>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<br>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 <sup>2</sup> ) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3–3.0 .....  | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0–30 .....   | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30–300 .....   | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300–1500 .....   | .....                         | .....                         | f/300                               | 6                        |
| 1500–100,000 .....   | .....                         | .....                         | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3–1.34 .....   | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30 .....  | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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 <sup>2</sup> ) | 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 <sup>2</sup> ) | 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 <sup>2</sup> ) | 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 <sup>2</sup> ) | Limit | Result |
|---------|-----------------|---------------------------------------|------------------------------|--|-------|--------|
| Lowest  | 2402            | -1.71                                 | 0.67                         | $3.0116 \times 10^{-4}$                          | 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.