

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

 Email:
 ee.shenzhen@sgs.com

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## **RF Exposure Evaluation Report**

Application No.:	SZEM1611009468CR (SGS GZ No.:GZEM1611007574CR)
Applicant:	Minwa Electronics Co., Ltd.
Manufacturer:	Minwa Electronics Co., Ltd.
Factory	Minwa China (Huizhou) Electronics Co., Ltd.
Product Name:	Smart switch
Model No.(EUT):	MW WFAS01EL
Trade Mark:	MW
FCC ID:	TKQMWWFAS01EL
Standards:	47 CFR Part 1.1307 (2015)
	47 CFR Part 1.1310 (2015)
Date of Receipt:	2016-10-11
Date of Test:	2016-10-20 to 2016-10-24
Date of Issue:	2016-11-10
Test Result :	PASS*

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.

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## 2 Version

	Revision Record					
Version	Chapter	Date	Modifier	Remark		
00		2016-11-10		Original		

Authorized for issue by:		
Tested By	(Bill Chen) /Project Engineer	2016-10-24
Checked By	Eric Fu	2016-11-10
	(Eric Fu) /Reviewer	Date

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## 4 General Information

### 4.1 Client Information

Applicant:	Minwa Electronics Co., Ltd.
Address of Applicant:	22 Floor, Far East Finance Centre, 16 Harcourt Road, Admiralty, Hong Kong
Manufacturer:	Minwa Electronics Co., Ltd.
Address of Manufacturer:	22 Floor, Far East Finance Centre, 16 Harcourt Road, Admiralty, Hong Kong
Factory:	Minwa China (Huizhou) Electronics Co., Ltd.
Address of Factory:	Huizhou Industrial Park, Minwa(Dalian)Industial Park, Ruhu Town, Huicheng, Huizhou, 516169 Guangdong, China

## 4.2 General Description of EUT

Product Name:	smart switch
Model No.:	MW WFAS01EL
Trade Mark:	MW
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	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)
Antenna Type:	Integral
Antenna Gain:	0.5dBi
Test Voltage:	AC120V 60Hz

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### 4.3 Test Location

All tests were performed at:

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

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)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber 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-1, 4620C-2, 4620C-3.

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## 4.5 Deviation from Standards

None.

## 4.6 Abnormalities from Standard Conditions

None.

## 4.7 Other Information Requested by the Customer

None.

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## 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)			
(A) Limits for Occupational/Controlled Exposures							
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f2) 1.0 f/300 5	6 6 6 6			
(B) Limits for General Population/Uncontrolled Exposure							
0.3–1.34 1.34–30 30–300 300–1500	614 824/f 27.5	1.63 2.19/f 0.073	*(100) *(180/f <sup>2</sup> ) 0.2 f/1500	30 30 30 30			

F= Frequency in MHz

Friis Formula

Friis transmission formula:  $Pd = (Pout^{*}G)/(4^{*} Pi^{*} R 2)$ 

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

1500-100,000 .....

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd id 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.

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#### 4.1.3 EUT RF Exposure Evaluation

Antenna Gain:0.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.122 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output	Output Power to Antenna	Power Density at R = 20 cm	Limit	Result
		Power (dBm)	(mW)	(mW/cm <sup>2</sup> )		
Lowest	2412	14.61	28.91	0.0065	1.0	PASS

Note: Refer to report No. SZEM161100946801 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

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