SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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1 Cover Page

RF MPE REPORT

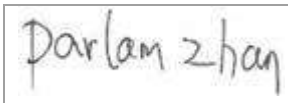
Application No.:	SHEM1702000910CR
Applicant:	Hangzhou EZVIZ Network Co., Ltd
FCC ID:	2ALZF-CS-W2S
IC:	22696-CSW2S
Equipment Under Test (EUT): **NOTE:** The following sample(s) was/were submitted and identified by the client as	
Product Name:	Wireless Relay Gateway
Model No.(EUT):	CS-W2S
Standards:	FCC Rules 47 CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt:	2017-02-28
Date of Test:	2016-03-15 to 2017-05-03
Date of Issue:	2017-05-15
Test Result:	**Pass***

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

Parlam Zhan
E&E Section Manager
SGS-CSTC (Shanghai) Co., Ltd.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00	/	2017-05-15	/	Original

Authorized for issue by:				
Engineer		Eddy Zong **Print Name**		
Clerk		Susie Liu **Print Name**		
Reviewer		Parlam Zhan **Print Name**		

3 Contents

4 General Information

4.1 Client Information

Applicant:	Hangzhou EZVIZ Network Co., Ltd
Address of Applicant:	Floor 7, Building 1, No. 700, Dongliu Road, Binjiang District, Hangzhou, Zhejiang,310052,China.
Manufacturer:	Hangzhou EZVIZ Network Co., Ltd
Address of Manufacturer:	Floor 7, Building 1, No. 700, Dongliu Road, Binjiang District, Hangzhou, Zhejiang,310052,China.
Factory:	1. Hangzhou Hikvision Technology Co., Ltd. 2. Hangzhou Hikvision Electronics Co., Ltd.
Address of Factory:	1. No.700, Dongliu Road, Binjiang District, Hangzhou Ctiy,Zhejiang, 310052, China 2. No.299, Qiushi Road,Tonglu Economic Development Zone,Tonglu County, Hangzhou,Zhejiang,310052,China.

4.1 General Description of E.U.T.

Product Description:	Fixed product with 2.4GHz, 5GHz WiFi & 915MHz function
Brand Name:	EZVIZ
Test Voltage:	AC 120V 60Hz

4.2 Technical Specifications

Operation Frequency:	2.4GHz WiFi: 802.11 b/g/n(HT20): 2412MHz~2462MHz 802.11 n(HT40): 2422MHz~2452MHz 5GHz WiFi: 802.11a/n(HT20)/ac(HT20): 5180-5240MHz, 5745MHz-5825MHz 802.11n(HT40)/ac(HT40): 5190-5230MHz, 5755MHz-5795MHz 802.11ac(HT80): 5210MHz, 5775MHz 915MHz: 906MHz-924MHz
Modulation Technique:	2.4GHz WiFi: 802.11 b: DSSS(CCK, DQPSK, DBPSK) 802.11 g/n(HT20/n(HT40): OFDM(64QAM, 16QAM, QPSK, BPSK) 5GHz WiFi: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK) Remark: 256QAM for 802.11 ac only 915MHz:FSK
Data Rate:	2.4GHz WiFi: 802.11 b: 1/2/5.5/11Mbps 802.11 g: 6/9/12/18/24/36/48/54Mbps 802.11n(HT20)/n(HT40): MCS0-MCS7 5GHz WiFi: 802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-15 802.11ac: MCS0-8
Number of Channel:	2.4GHz WiFi: 802.11 b/g/n(HT20): 11 802.11 n(HT40): 7 5GHz WiFi: 802.11 a/n(HT20)/ac(HT20): 9 Channel 36, 40, 44, 48, 149, 153, 157, 161, 165 802.11 n(HT40)/ac(HT40): 4 Channel 38, 46, 151, 159 802.11 ac(HT80): 2 Channel 42, 155 915MHz: 10
Antenna Type:	Antenna 1:PCB Antenna Antenna 2:PCB Antenna
Antenna Gain:	Antenna 1: 3 dBi Antenna 2: 3 dBi

4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

4.4 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. 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.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868, C-4336, T-2221, G-830 respectively.

5 Test Standards and Limits

5.1 FCC Radiofrequency radiation exposure limits:

According to§1.1310, the limit for general population/uncontrolled exposures

Frequency	Power density(mW/cm^2)	Averaging time(minutes)
300MHz~1.5GHz	f/1500	30
1.5GHz~100GHz	1.0	30

For 915MHz band, the limit of worse case is 0.604 mW/cm^2

For 2.4G and 5G band, the limit is 1.0 mW/cm^2

5.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

• at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;

• at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);

• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

• at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 915MHz band, the limit of worse case is 1.37 W

For 2.4G band, the limit of worse case is 2.68 W

For 5G band, the limit of worse case is 4.53 W

6 Measurement and Calculation

6.1 Maximum transmit power

The Power Data is based on the RF Test Report SHEM170200091003 & SHEM170200091004 &SHEM170200091005

Test mode	Test Frequency (MHz)	Output Power (dBm) Antenna 1	Output Power (dBm) Antenna 2	Output Power (mW) Antenna 1	Output Power (mW) Antenna 2
802.11b	2412	24.47	/	**279.90**	
	2437	24.44	/	277.97	
	2462	23.38	/	217.77	
802.11g	2412	24.19	22.68	262.42	185.35
	2437	24.25	21.98	266.07	157.76
	2462	22.97	21.66	198.15	146.55
802.11 n(HT20)	2412	24.45	22.9	278.61	194.98
	2437	24.31	22.22	269.77	166.72
	2462	23.18	21.85	207.97	153.11
802.11 n(HT40)	2422	24.3	22.29	269.15	169.43
	2437	23.7	21.9	234.42	154.88
	2452	23.37	21.92	217.27	155.60

915MHz

Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Output Power (dBm)	Output Power (mW)
906	93.83	90.38	-4.92	0.32
	85.62	82.17	-13.13	0.05
914	93.88	90.67	-4.63	0.34
	85.62	82.41	-12.89	0.05
924	93.26	90.24	-5.06	0.31
	86.17	83.15	-12.15	0.32

Test Mode	Test Channel	Output Power (dBm) Antenna 1	Output Power (dBm) Antenna 2	Output Power (mW) Antenna 1	Output Power (mW) Antenna 2
11A	5180	15.52	16.23	35.65	41.98
11A	5220	14.83	15.84	30.41	38.37
11A	5240	14.53	15.30	28.38	33.88
11A	5745	19.99	19.15	99.77	82.22
11A	5785	20.77	20.14	119.40	103.28
11A	5825	20.54	21.25	113.24	133.35
11N20	5180	16.19	16.51	41.59	44.77
11N20	5220	15.79	16.29	37.93	42.56
11N20	5240	15.29	15.57	33.81	36.06
11N20	5745	20.41	17.52	109.90	56.49
11N20	5785	20.89	18.42	122.74	69.50
11N20	5825	20.73	19.65	118.30	92.26
11N40	5190	17.85	15.19	60.95	33.04
11N40	5230	16.71	14.88	46.88	30.76
11N40	5755	24.01	15.86	251.77	38.55
11N40	5795	24.65	16.14	291.74	41.11
11AC20	5180	16.42	14.89	43.85	30.83
11AC20	5220	16.19	15.49	41.59	35.40
11AC20	5240	15.57	15.15	36.06	32.73
11AC20	5745	19.56	17.60	90.36	57.54
11AC20	5785	20.33	18.52	107.89	71.12
11AC20	5825	19.88	19.99	97.27	99.77
11AC40	5190	18.22	15.77	66.37	37.76
11AC40	5230	17.29	15.81	53.58	38.11
11AC40	5755	23.47	18.90	222.33	77.62
11AC40	5795	23.87	19.67	243.78	92.68
11AC80	**5210**	17.04	18.41	50.58	69.34
11AC80	5775	25.48	19.73	**353.18**	93.97

6.2 MPE Calculation

The best case gain of the antenna is 3dBi. 3dB logarithmic terms convert to numeric result is nearly 2.

For 2.4GHz WiFi: The Max Conducted Peak Output Power is279.9mW(0.2799W);

For 5GHz WiFi: The Max Conducted Peak Output Power is353.2mW(0.3532W);

For 915MHz: The Max E.I.R.P is 0.34mW(0.00034W).

For FCC:

According to the formula S= $\frac{PG}{4R^2\pi}$, we can calculate S which is MPE.

Note:

1) P (Watts) =Power Input to antenna = $10^{\frac{dBm}{10}}$ / 1000
2) G (Antenna gain in numeric) = 10^ (Antenna gain in dBi /10)
3) R = distance to the center of radiation of antenna (in meter) = 20cm
4) MPE limit = 1mW/cm²

WiFi: S= $\frac{PG}{4R^2\pi} = \frac{353.2\times 2}{4\times 400\times 3.14}$ =0.11406 mW/cm^2

915MHz: S= $\frac{PG}{4R^2\pi} = \frac{0.34}{4\times 400\times 3.14}$ =0.00007 mW/cm^2

915MHz and WiFi modules can simultaneous transmitting, so the maximum rate of MPE is $\frac{0.11406}{1.0}+\frac{0.00007}{0.604}$ =0.11418<=1.0. according to the KDB447498 section 7.2 determine the device is exclusion from SAR test.

For IC:

For 2.4GHz WiFi: E.I.R.P.= P*G= 0.2799×2=0.5598W

For 5GHz WiFi: E.I.R.P.= P*G= 0.3532×2=0.7064W

For 915MHz: E.I.R.P.= 0.00034W

915MHz and 2.4GHz WiFi modules can simultaneous transmitting, so the maximum rate of MPE is $\frac{0.5598}{2.68}+\frac{0.00034}{1.37}$ =0.209<=1.0.

915MHz and 5GHz WiFi modules can simultaneous transmitting, so the maximum rate of MPE is $\frac{0.7064}{4.53}+\frac{0.00034}{1.37}$ =0.156<=1.0.

So the device is exclusion from SAR test.

7 EUT Constructional Details

Refer to the < CS-W2S _External Photos > & < CS-W2S _Internal Photos >.

--End of the Report--