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

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1 Cover Page

RF MPE REPORT

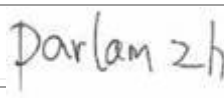
Application No.:	SHEM1806004353CR
Applicant:	Hangzhou Ezviz Software Co., Ltd.
FCC ID:	2APV2-W3
IC:	23928-W3
Equipment Under Test (EUT): **NOTE:** The following sample(s) was/were submitted and identified by the client as	
Product Name:	Multi-Band Wireless Gigabit Router
Model No.(EUT):	CS-W3-WD1200G
Add Model No.:	CS-W3-WD1200GR, CS-W3-WD2600G, CS-W3-WD2600GR
Standards:	FCC Rules 47 CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt:	2018-03-23
Date of Test:	2018-03-27 to 2018-05-07
Date of Issue:	2018-05-08
Test Result:	**Pass***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Parlam Zhan
E&E Section 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.

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2018-05-08	/

Authorized for issue by:				
				
		Vincent Zhu / Project Engineer		
				
		Parlam Zhan /Reviewer		

2 Contents

3 General Information

3.1 Client Information

Applicant:	Hangzhou Ezviz Software Co., Ltd.
Address of Applicant:	2-1-10, No.700 Dongliu Road, Binjiang District, Hangzhou City, Zhejiang Pronice
Manufacturer:	Hangzhou Ezviz Software Co., Ltd.
Address of Manufacturer:	2-1-10, No.700 Dongliu Road, Binjiang District, Hangzhou City, Zhejiang Pronice
Factory:	1. Hangzhou Hikvision Technology Co., Ltd. 2. Hangzhou Hikvision Electronics Co., Ltd.
Address of Factory:	1. No.700, Dongliu Road, Binjiang District, Hangzhou City, Zhejiang, 310052, China 2. No.299, Qiushi Road, Tonglu Economic Development Zone, Tonglu County, Hangzhou, Zhejiang, 310052, China.

3.1 General Description of E.U.T.

Power supply:	DC 12V 1A by Adapter Adapter 1: Model:DSA-12PFT-12 FUS 120100 INPUT:100-240V~50/60Hz 0.5A OUTPUT:+12V 1A Adapter 2: Model:MSA-C2000IC12.0-24P-US/MSA-C2000IC12.0-24P-JP/MSA-C2000IC12.0-24P-MX INPUT:100-240V~50/60Hz 0.7A max OUTPUT:12V 2A
Test voltage:	AC 120V
Cable:	DC Cable 150mm for Adapter(1,2)

3.2 Technical Specifications

2.4G:

Antenna Gain	Antenna 1: 2 dBi Antenna 2: 2dBi
Antenna Type	Dipole Antenna
Channel Spacing	5MHz
Modulation Type	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n(HT20 and HT40):
Number of Channels	802.11b/g/n(HT20):11 802.11n(HT40):7
Operation Frequency	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz

5G:

Antenna Gain	Antenna 3: 2 dBi Antenna 4: 2dBi
Antenna Type	Dipole Antenna

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	802.11a/n(HT20)/ac(HT20)	5180-5240	4
		802.11n(HT40)/ac(HT40)	5190-5230	2
		802.11ac(HT80)	5210	1
	UNII Band III	802.11a/n(HT20)/ac(HT20)	5745-5825	5
		802.11n(HT40)/ac(HT40)	5755-5795	2
		802.11ac(HT80)	5775	1
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			
Channel Spacing:	802.11a/n(HT20)/ac(HT20): 20MHz 802.11n(HT40)/ac(HT40): 40MHz 802.11ac(HT80): 80MHz			

Selected Test Channel for 802.11a/n(HT20)/ac(HT20)		
Band	Channel	Frequency
U-NII Band I	The lowest channel (CH36)	5180MHz
	The middle channel (CH40)	5200MHz
	The highest channel (CH48)	5240MHz
U-NII Band III	The lowest channel (CH149)	5745MHz
	The middle channel (CH157)	5785MHz
	The highest channel (CH165)	5825MHz

Selected Test Channel for 802.11n(HT40)/ac(HT40)		
Band	Channel	Frequency
U-NII Band I	The lowest channel (CH38)	5190MHz
	The highest channel (CH46)	5230MHz
U-NII Band III	The lowest channel (CH151)	5755MHz
	The highest channel (CH159)	5795MHz

Selected Test Channel for 802.11ac(HT80)		
Band	Channel	Frequency
U-NII Band I	One channel (CH42)	5210MHz
U-NII Band III	One channel (CH155)	5775MHz

3.3 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

3.4 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.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program(NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.
Designation Number: CN5033. Test Firm Registration Number: 479755.

- **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-12221,G-10830 respectively.

4 Test Standards and Limits

4.1 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

4.2 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 2.4G device, the limit of worse case is 2.68 W

For 5G device,the limit of worse case is 4.5W

5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHEM180600435301.

Test Mode	Channel	Antenna 1 Power[dBm]	Antenna 2 Power[dBm]	MIMO Power[dBm]	Antenna 1 Power[mW]	Antenna 2 Power[mW]	MIMO Power[mW]
11B	2412	16.05	15.16	NA	**40.27**	32.81	N/A
11B	2437	15.61	15.10	NA	36.39	32.36	N/A
11B	2462	15.50	15.37	NA	35.48	34.43	N/A
11G	2412	14.26	13.70	NA	26.67	23.44	N/A
11G	2437	13.93	13.56	NA	24.72	22.70	N/A
11G	2462	13.65	13.49	NA	23.17	22.34	N/A
11N20SISO	2412	12.31	11.62	14.99	17.02	14.52	**31.55**
11N20SISO	2437	11.99	11.00	14.53	15.81	12.59	28.38
11N20SISO	2462	11.73	10.69	14.25	14.89	11.72	26.61
11N40SISO	2422	11.29	11.04	14.18	13.46	12.71	26.18
11N40SISO	2437	10.97	10.88	13.94	12.50	12.25	24.77
11N40SISO	2452	10.87	10.42	13.66	12.22	11.02	23.23

The Power Data is based on the RF Test Report SHEM180600435302.

Test Mode	Test Channel	Antenna 3 Power[dBm]	Antenna 4 Power[dBm]	MIMO Power [dBm]	Antenna 3 Power[mW]	Antenna 4 Power[mW]	MIMO Power [mW]	Antenna 3 EIRP [mW]	Antenna 4 EIRP [mW]	MIMO EIRP [mW]
11A	5180	16.60	17.35	NA	45.71	54.33	N/A	72.44	86.10	N/A
11A	5220	15.91	17.81	NA	38.99	60.39	N/A	61.80	**95.72**	N/A
11A	5240	16.17	17.76	NA	41.40	59.70	N/A	65.61	94.62	N/A
11A	5745	10.79	11.20	NA	11.99	13.18	N/A	19.01	20.89	N/A
11A	5785	10.39	10.23	NA	10.94	10.54	N/A	17.34	16.71	N/A
11A	5825	10.18	8.46	NA	10.42	7.01	N/A	16.52	11.12	N/A
11N20	5180	12.69	15.31	17.20	18.58	33.96	52.48	29.44	53.83	83.27
11N20	5220	11.79	15.72	17.20	15.10	37.33	52.48	23.93	59.16	83.09
11N20	5240	12.00	15.79	17.31	15.85	37.93	53.83	25.12	60.12	**85.24**
11N20	5745	9.02	11.61	13.52	7.98	14.49	22.49	12.65	22.96	35.61
11N20	5785	8.45	10.66	12.70	7.00	11.64	18.62	11.09	18.45	29.54
11N20	5825	8.15	9.01	11.61	6.53	7.96	14.49	10.35	12.62	22.97

11N40	5190	7.08	9.77	11.64	5.11	9.48	14.59	8.09	15.03	23.12
11N40	5230	6.22	9.37	11.08	4.19	8.65	12.82	6.64	13.71	20.35
11N40	5755	6.42	6.60	9.52	4.39	4.57	8.95	6.95	7.24	14.19
11N40	5795	6.15	5.45	8.82	4.12	3.51	7.62	6.53	5.56	12.09
11AC20	5180	12.62	15.27	17.15	18.28	33.65	51.88	28.97	53.33	82.31
11AC20	5220	11.82	15.71	17.20	15.21	37.24	52.48	24.10	59.02	83.12
11AC20	5240	11.95	15.68	17.21	15.67	36.98	52.60	24.83	58.61	83.45
11AC20	5745	10.03	10.63	13.35	10.07	11.56	21.63	15.96	18.32	34.28
11AC20	5785	9.62	9.73	12.69	9.16	9.40	18.58	14.52	14.89	29.41
11AC20	5825	9.45	8.07	11.82	8.81	6.41	15.21	13.96	10.16	24.12
11AC40	5190	7.02	9.62	11.52	5.04	8.61	14.19	7.98	14.52	22.50
11AC40	5230	6.31	9.35	11.10	4.28	8.63	12.88	6.78	13.65	20.42
11AC40	5755	9.42	9.66	12.55	8.75	7.10	17.99	13.87	14.66	28.53
11AC40	5795	9.35	8.51	11.96	8.61	8.61	15.70	13.65	11.25	24.9
11AC80	5210	4.44	8.14	9.68	2.78	6.52	9.29	4.41	10.33	14.73
11AC80	5775	9.68	9.44	12.57	9.29	8.79	18.07	14.72	13.93	28.65

5.2 MPE Calculation

The best case gain of the antenna is 2dBi. 2dB logarithmic terms convert to numeric result is nearly 1.58. The two antennas completely correlated with each other, so the best case gain of the two antenna in MIMO mode is 5.01dBi, 5.01dB logarithmic terms convert to numeric result is nearly 3.17

For 2.4GHz WiFi:

The Max Conducted average Output Power is 16.05dBm (40.27 mW);

The Max Conducted average Output Power in MIMO mode is 14.99dBm (31.55 mW);

For 5GHz WiFi:

The Max Conducted average Output Power is 17.81dBm (60.39 mW);

The Max Conducted average Output Power in MIMO mode is 17.31dBm (53.83 mW);

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

For 2.4G WiFi:

In SISO mode

S= $\frac{PG}{4R^2\pi} = \frac{40.27\times1.58}{4\times400\times3.14}$ =0.013 mW/cm²

In MIMO mode:

S= $\frac{PG}{4R^2\pi} = \frac{31.55\times3.17}{4\times400\times3.14}$ =0.020 mW/cm²

For 5G WiFi:

in SISO mode

S= $\frac{PG}{4R^2\pi} = \frac{60.39\times1.58}{4\times400\times3.14}$ =0.019 mW/cm²

In MIMO mode:

S= $\frac{PG}{4R^2\pi} = \frac{53.83\times3.17}{4\times400\times3.14}$ =0.034 mW/cm²

2.4G WiFi and 5G WiFi modules can simultaneous transmitting, so the maximum rate of MPE is $\frac{0.020}{1.0}+\frac{0.034}{1.0}$ =0.054<=1.0. according to the KDB447498 section 7.2 determine the device is exclusion from SAR test.

For IC:

2.4G device

SISO Mode:

E.I.R.P.= P*G= 0.04×1.58 =0.06W＜2.68W

MIMO Mode:

E.I.R.P.= P*G= 0.03×3.17=0.10W＜2.68W

5G device

SISO Mode

E.I.R.P.= 0.096W＜4.5W

MIMO Mode

E.I.R.P.= 0.085W＜4.5W

2.4G WiFi and 5GHz WiFi modules can simultaneous transmitting, so the maximum rate of MPE is $\frac{0.10}{2.68}+\frac{0.096}{4.53}$ =0.0585<=1.0.

So the device is exclusion from SAR test.

--End of the Report--