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Report No.: SHEM180900784504

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1 Cover Page

RF MPE REPORT

Application No.:	SHEM1809007845CR
Applicant:	Hangzhou Ezviz Software Co., Ltd.
FCC ID:	2APV2-CSDB1
IC:	23928- CSDB1
Equipment Under Test (EUT):	
NOTE: The following sample(s) was/were submitted and identified by the client as	
EUT Name:	WiFi Doorbell Camera
Model No.:	CS-DB1
Add Model No.:	CS-DB1i, CS-DB1C, CSDB1S, CS-DB1Si
Brand Name:	eZVIZ
Standards:	FCC Rules 47 CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt:	2018-10-19
Date of Test:	2018-10-19 to 2018-10-25
Date of Issue:	2018-10-25
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.

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Revision Record			
Version	Description	Date	Remark
00	/	2018-09-14	Original

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



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3 General Information

3.1 Client Information

Applicant:	Hangzhou Ezviz Software Co., Ltd.
Address of Applicant:	Floor 16,Unit B,Building 1, No. 555, Qianmo Road, Binjiang District, Hangzhou City,Zhejiang Province
Manufacturer:	Hangzhou Ezviz Software Co., Ltd.
Address of Manufacturer:	Floor 16,Unit B,Building 1, No. 555, Qianmo Road, Binjiang District, Hangzhou City,Zhejiang Province
Factory:	Hangzhou Hikvision Electronics Co., Ltd.
Address of Factory:	No.299, Qiushi Road, Tonglu Economic Development Zone, Tonglu County, Hangzhou.

3.1 General Description of E.U.T.

Power supply:	AC 8~24V
Test voltage:	AC 12V

3.2 Technical Specifications

2.4G:

Antenna Gain	0.5 dBi
Antenna Type	Integral
Channel Spacing	5MHz
Modulation Type	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
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	1 dBi
Antenna Type	Integral Antenna
DFS Function	Slave without Radar detection
TPC Function	Not Support

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 II-A	802.11a/n(HT20)/ac(HT20)	5260-5320	4
		802.11n(HT40)/ac(HT40)	5270-5310	2
		802.11ac(HT80)	5290	1
	UNII Band II-C	802.11a/n(HT20)/ac(HT20)	5500-5700	11
		802.11n(HT40)/ac(HT40)	5510-5670	5
		802.11ac(HT80)	5530~5610	2
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			
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-15 802.11ac: MCS0-9			

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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 II-A	The lowest channel (CH52)	5260MHz
	The middle channel (CH60)	5300MHz
	The highest channel (CH64)	5320MHz
U-NII Band II-C	The lowest channel (CH100)	5500MHz
	The middle channel (CH120)	5600MHz
	The highest channel (CH140)	5700MHz
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 II-A	The lowest channel (CH54)	5270MHz
	The highest channel (CH62)	5310MHz
U-NII Band II-C	The lowest channel (CH102)	5510MHz
	The middle channel (CH118)	5590MHz
	The highest channel (CH134)	5670MHz
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 II-A	One channel (CH58)	5290MHz
U-NII Band II-C	The lowest channel (CH106)	5530MHz
	The middle channel (CH122)	5610MHz
U-NII Band III	One channel (CH155)	5775MHz



3.3 Test Location

All tests were performed at:

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

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 4.53W



5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHEM180900784501-2.4GHz.

Test mode	Test Frequency (MHz)	Average Power (dBm)	Average Power (mW)
802.11b	2412	15.91	38.99
	2437	16.14	41.11
	2462	15.97	39.54
802.11g	2412	14.44	27.80
	2437	14.52	28.31
	2462	14.59	28.77
802.11 n(HT20)	2412	14.96	31.33
	2437	14.99	31.55
	2462	14.58	28.71
802.11 n(HT40)	2422	14.50	28.18
	2437	14.60	28.84
	2452	14.50	28.18

The Power Data is based on the RF Test Report SHEM180900784502-5GHz.

FCC

Test Mode	Test Channel	Power [dBm]	Power [mW]
11A	5180	15	31.62
11A	5220	14.12	25.82
11A	5240	14.13	25.88
11A	5260	13.77	23.82
11A	5280	14.03	25.29
11A	5320	12.39	17.34
11A	5500	12.11	16.26
11A	5600	12.01	15.89
11A	5700	11.56	14.32
11A	5745	11.73	14.89
11A	5785	11.49	14.09
11A	5825	11.37	13.71
11N20	5180	15.45	35.08
11N20	5220	14.69	29.44
11N20	5240	14.65	29.17

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11N20	5260	12.29	16.94
11N20	5280	12.51	17.82
11N20	5320	12.86	19.32
11N20	5500	12.55	17.99
11N20	5600	12.39	17.34
11N20	5700	12.05	16.03
11N20	5745	12.1	16.22
11N20	5785	12.01	15.89
11N20	5825	11.74	14.93
11N40	5190	13.4	21.88
11N40	5230	12.29	16.94
11N40	5270	13.7	23.44
11N40	5310	14	25.12
11N40	5510	13.27	21.23
11N40	5590	13.08	20.32
11N40	5670	12.94	19.68
11N40	5755	13.07	20.28
11N40	5795	12.88	19.41
11AC20	5180	15.09	32.28
11AC20	5220	14.85	30.55
11AC20	5240	14.59	28.77
11AC20	5260	14.22	26.42
11AC20	5280	14.77	29.99
11AC20	5320	14.88	30.76
11AC20	5500	14.35	27.23
11AC20	5600	14.68	29.38
11AC20	5700	14.12	25.82
11AC20	5745	14.04	25.35
11AC20	5785	13.71	23.50
11AC20	5825	13.71	23.50
11AC40	5190	13.58	22.80
11AC40	5230	13.24	21.09
11AC40	5270	13.07	20.28
11AC40	5310	13.95	24.83

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11AC40	5510	13	19.95
11AC40	5590	13.08	20.32
11AC40	5670	13.02	20.04
11AC40	5755	12.94	19.68
11AC40	5795	12.92	19.59
11AC80	5210	10.17	10.40
11AC80	5290	14.43	27.73
11AC80	5530	9.55	9.02
11AC80	5610	13.02	20.04
11AC80	5775	9.79	9.53

ISED

Test Mode	Test Channel	Conducted Power [dBm]	EIRP Power [dBm]	EIRP Power [mW]
11A	5180	15	16	39.81
11A	5220	14.12	15.12	32.51
11A	5240	14.13	15.13	32.58
11A	5260	13.77	14.77	29.99
11A	5280	14.03	15.03	31.84
11A	5320	12.39	13.39	21.83
11A	5500	12.11	13.11	20.46
11A	5600	12.01	13.01	20.00
11A	5700	11.56	12.56	18.03
11A	5745	11.73	12.73	18.75
11A	5785	11.49	12.49	17.74
11A	5825	11.37	12.37	17.26
11N20	5180	15.45	16.45	44.16
11N20	5220	14.69	15.69	37.07
11N20	5240	14.65	15.65	36.73
11N20	5260	12.29	13.29	21.33
11N20	5280	12.51	13.51	22.44
11N20	5320	12.86	13.86	24.32
11N20	5500	12.55	13.55	22.65
11N20	5600	12.39	13.39	21.83
11N20	5700	12.05	13.05	20.18

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11N20	5745	12.1	13.1	20.42
11N20	5785	12.01	13.01	20.00
11N20	5825	11.74	12.74	18.79
11N40	5190	13.4	14.4	27.54
11N40	5230	12.29	13.29	21.33
11N40	5270	13.7	14.7	29.51
11N40	5310	14	15	31.62
11N40	5510	13.27	14.27	26.73
11N40	5590	13.08	14.08	25.59
11N40	5670	12.94	13.94	24.77
11N40	5755	13.07	14.07	25.53
11N40	5795	12.88	13.88	24.43
11AC20	5180	15.09	16.09	40.64
11AC20	5220	14.85	15.85	38.46
11AC20	5240	14.59	15.59	36.22
11AC20	5260	14.22	15.22	33.27
11AC20	5280	14.77	15.77	37.76
11AC20	5320	14.88	15.88	38.73
11AC20	5500	14.35	15.35	34.28
11AC20	5600	14.68	15.68	36.98
11AC20	5700	14.12	15.12	32.51
11AC20	5745	14.04	15.04	31.92
11AC20	5785	13.71	14.71	29.58
11AC20	5825	13.71	14.71	29.58
11AC40	5190	13.58	14.58	28.71
11AC40	5230	13.24	14.24	26.55
11AC40	5270	13.07	14.07	25.53
11AC40	5310	13.95	14.95	31.26
11AC40	5510	13	14	25.12
11AC40	5590	13.08	14.08	25.59
11AC40	5670	13.02	14.02	25.23
11AC40	5755	12.94	13.94	24.77
11AC40	5795	12.92	13.92	24.66
11AC80	5210	10.17	11.17	13.09

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11AC80	5290	14.43	15.43	34.91
11AC80	5530	9.55	10.55	11.35
11AC80	5610	13.02	14.02	25.23
11AC80	5775	9.79	10.79	11.99



5.2 MPE Calculation

For 2.4G: The best case gain of the antenna is 0.5dBi. 0.5dB logarithmic terms convert to numeric result is nearly 1.12.

For 5G: The best case gain of the antenna is 1dBi. 1dB logarithmic terms convert to numeric result is nearly 1.26.

For 2.4GHz WiFi:

The Max Conducted average Output Power is 16.14dBm (41.11 mW)

For 5GHz WiFi:

The Max Conducted average Output Power is 15.45dBm (35.08 mW)

The Max EIRP Output Power is 16.45dBm (44.16 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) = $10^{\text{(Antenna gain in dBi / 10)}}$

3) R = distance to the center of radiation of antenna (in meter) = 20cm

4) MPE limit = 1mW/cm²

For 2.4GHz WiFi:

$$S = \frac{PG}{4R^2\pi} = \frac{41.11 \times 1.12}{4 \times 400 \times 3.14} = 0.009 \text{ mW/cm}^2$$

For 5GHz WiFi:

$$S = \frac{PG}{4R^2\pi} = \frac{35.08 \times 1.26}{4 \times 400 \times 3.14} = 0.009 \text{ mW/cm}^2$$

For IC:

2.4GHz WiFi:

$$\text{E.I.R.P.} = P \times G = 0.04111 \times 1.12 = 0.0460 \text{ W} < 2.68 \text{ W}$$

5GHz WiFi:

$$\text{E.I.R.P.} = 0.04416 \text{ W} < 4.53 \text{ W}$$

2.4GHz and 5GHz WiFi modules can't simultaneous transmitting, So, the device is exclusion from SAR test.

--End of the Report--