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Report No.: SHEM170200091006

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 Tes | t (EUT): | | | |
| NOTE: The following sa | ample(s) was/were submitted and identified by the client as | | | |
| Product Name: | Wireless Relay Gateway | | | |
| Model No.(EUT): | (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.



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.

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 | 1 | 2017-05-15 | / | Original | | | |
| | | | | | | | |
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| Authorized for issue by: | | |
|--------------------------|-------------|--------------|
| Engineer | Eddy Zong | Eddy Zong |
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| | Print Name | |



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4 General Information

4.1 Client Information

| Applicant: | Hangzhou EZVIZ Network Co., Ltd | | |
|---|---|--|--|
| Address of Applicants | Floor 7, Building 1, No. 700, Dongliu Road, | | |
| Address of Applicant: | Binjiang District, Hangzhou, Zhejiang,310052,China. | | |
| Manufacturer: Hangzhou EZVIZ Network Co., Ltd | | | |
| A I I a see of Many foot and | Floor 7, Building 1, No. 700, Dongliu Road, | | |
| Address of Manufacturer: | Binjiang District, Hangzhou, Zhejiang,310052,China. | | |
| Factory: | Hangzhou Hikvision Technology Co., Ltd. Hangzhou Hikvision Electronics Co., Ltd. | | |
| Address of Factory: | No.700, Dongliu Road, Binjiang District, Hangzhou Ctiy, Zhejiang, 310052, China 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 |



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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 802.11a/n(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 |



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4.3 Test Location

All tests were performed at:

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

588 West Jindu Road, Xingiao, 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.



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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/cm²

For 2.4G and 5G band, the limit is 1.0 mW/cm²

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



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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 |
|--------------------------------|------|------------------------------------|------------------------------------|-----------------------------------|-----------------------------------|
| | 2412 | 24.47 | / | 279.90 | |
| 802.11b | 2437 | 24.44 | / | 277.97 | |
| | 2462 | 23.38 | 1 | 217.77 | |
| | 2412 | 24.19 | 22.68 | 262.42 | 185.35 |
| 802.11g | 2437 | 24.25 | 21.98 | 266.07 | 157.76 |
| | 2462 | 22.97 | 21.66 | 198.15 | 146.55 |
| 000.44 | 2412 | 24.45 | 22.9 | 278.61 | 194.98 |
| 802.11 n(HT20) | 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 |



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| 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 |



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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 is 353.2mW (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:

dBm

- 1) P (Watts) = Power Input to antenna = 10^{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=
$$\frac{PG}{4R^2\pi} = \frac{353.2 \times 2}{4 \times 400 \times 3.14} = 0.11406 \text{ mW/cm}^2$$

915MHz: S=
$$\frac{PG}{4R^2\pi}$$
 = $\frac{0.34}{4 \times 400 \times 3.14}$ =0.00007 mW/cm²

915MHz and WiFi modules can simultaneous transmitting, so the maximum rate of MPE is

$$\frac{0.11406}{1.0} + \frac{0.00007}{0.604} = 0.11418 <= 1.0. \ \text{according to the KDB447498 section 7.2 determine the device is}$$

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.

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7 EUT Constructional Details

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

-- End of the Report--