



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

Report No.: SHCR230400079103

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### 1 Cover Page

## ***RF Exposure Evaluation Report***

**Application No.:** SHCR2304000791ME  
**FCC ID:** 2AK34-STEMI305CAM  
**IC:** 21444-STEMI305CAM  
**Applicant:** Carl Zeiss Suzhou Co., Ltd.  
**Address of Applicant:** Modern Industrial Square 3-B, NO. 333, Xing Pu Road, SIP, 215216, Suzhou, China  
**Manufacturer:** Carl Zeiss Suzhou Co., Ltd.  
**Address of Manufacturer:** Modern Industrial Square 3-B, NO. 333, Xing Pu Road, SIP, 215216, Suzhou, China  
**Factory:** Carl Zeiss Suzhou Co., Ltd.  
**Address of Factory:** Modern Industrial Square 3-B, NO. 333, Xing Pu Road, SIP, 215216, Suzhou, China

#### **Equipment Under Test (EUT):**

**EUT Name:** Stereo microscope  
**Model No.:** Stemi 305 cam W body  
**Trade Mark:** Zeiss  
**Standard(s) :** FCC Rules 47 CFR §2.1093  
KDB 447498 D04 interim General RF Exposure Guidance v01  
RSS-102 Issue 6 (December 15, 2023)

**Date of Receipt:** 2023-04-21  
**Date of Test:** 2023-05-07 to 2023-06-03  
**Date of Issue:** 2024-01-15

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

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

Parlan Zhan

Parlan Zhan  
Laboratory Manager



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

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Report No.: SHCR230400079103

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| Revision Record |             |            |        |
|-----------------|-------------|------------|--------|
| Version         | Description | Date       | Remark |
| 00              | Original    | 2024-01-15 | /      |
|                 |             |            |        |
|                 |             |            |        |

|                          |  |                             |  |
|--------------------------|--|-----------------------------|--|
| Authorized for issue by: |  |                             |  |
|                          |  | <div>Wade Zhang</div>       |  |
|                          |  | Wade Zhang/Project Engineer |  |
|                          |  | <div>Parlam Zhan</div>      |  |
|                          |  | Parlam Zhan /Reviewer       |  |



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### 3 General Information

#### 3.1 General Description of E.U.T.

|                   |   |
|-------------------|---|
| Power supply:     | DC 5V 2A Max from microscope stand.                 |
| S/N:              | 3948100001  |
| Firmware Version: | V1.0.15   |
| Product Type:     | <input checked="" type="checkbox"/> Portable device |
|                   | <input type="checkbox"/> Mobile device              |
|                   | <input type="checkbox"/> Fixed device               |

#### 3.2 Details of E.U.T.

##### 2.4GHz WiFi

|                      |   |
|----------------------|---|
| Operation Frequency: | 802.11b/g/n(HT20): 2412MHz to 2462MHz;802.11n(HT40): 2422MHz to 2452MHz                             |
| 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  |
| Channel Spacing:     | 5MHz  |
| Antenna Type:        | Antenna 1: FPC Antenna<br>Antenna 2: FPC Antenna  |
| Antenna Gain:        | Antenna 1: 3.40dBi<br>Antenna 2: 3.40dBi<br>(Provided by manufacturer)<br>Directional gain: 6.41dBi |
| Antenna Number:      | 2   |
| Date Rate:           | 802.11b:1/2/5.5/11Mbps<br>802.11g:6/9/12/18/24/36/48/54Mbps<br>802.11n:MCS0-MCS7                    |

##### 5GHz WiFi

| 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                  |
| Modulation Type:     | 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) |                          |                      |                    |
| Date Rate:           | 802.11a:6/9/12/18/24/36/48/54Mbps<br>802.11n:MCS0-MCS7<br>802.11ac:VHT MCS0-MCS7  |                          |                      |                    |
| Channel Spacing:     | 802.11a/n(HT20)/ac(HT20): 20MHz<br>802.11n(HT40)/ac(HT40): 40MHz<br>802.11ac(HT80): 80MHz   |                          |                      |                    |



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|                 |  |
|-----------------|--|
| Antenna Type:   | Antenna 1: FPC Antenna<br>Antenna 2: FPC Antenna   |
| Antenna Gain:   | Antenna 1: 4.89dBi<br>Antenna 2: 4.89dBi<br>(Provided by manufacturer)<br>Directional gain: 7.9dBi |
| Antenna Number: | 2  |
| TPC Function:   | Without TPC function   |

### 3.3 Separation Distance

|   |                                |
|---|--------------------------------|
| Separation distance between the antenna to person (R):  | 4cm(Antenna 1); 9cm(Antenna 2) |
| Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. |                                |



The Antenna 1&2 Location



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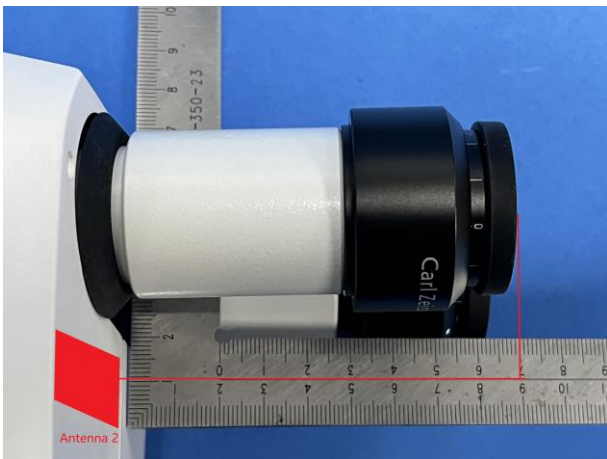
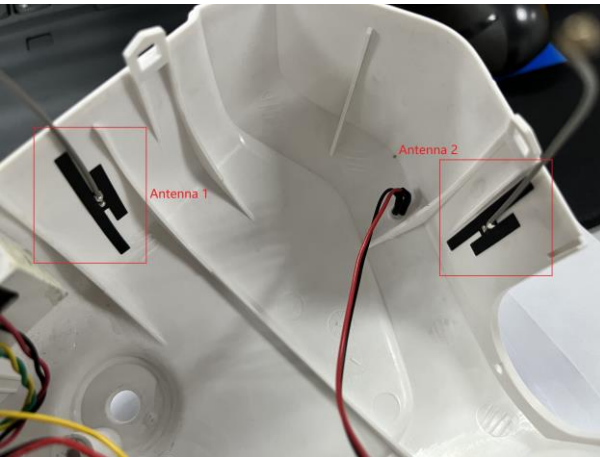
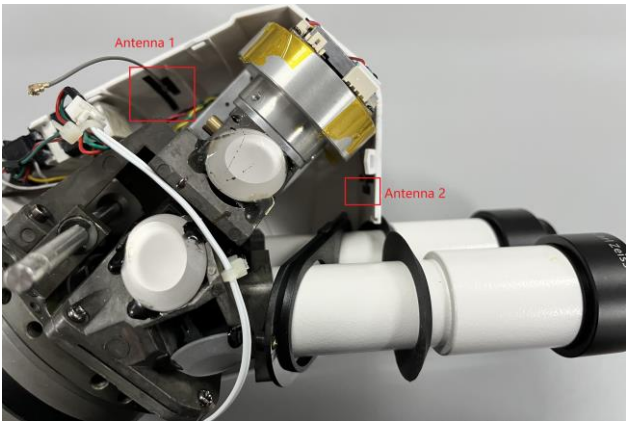
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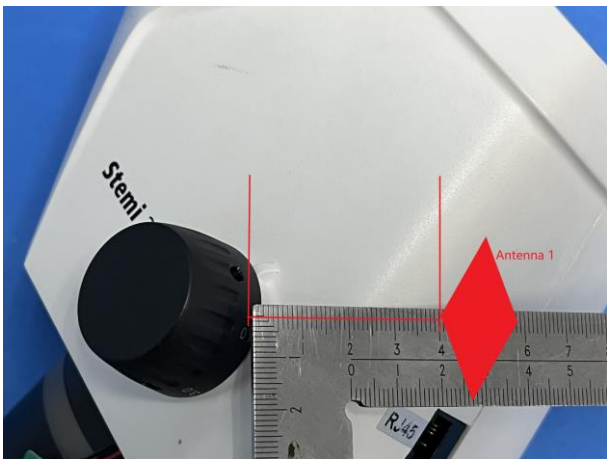
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Distance closest to the Head



Distance closest to the Hand

Antenna Location



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### 3.4 Test Location

All tests were performed at:

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Fax: +86 21 6191 5678

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc ) is provided by the applicant. (if applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).

### 3.5 Test Facility

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

• **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

• **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

• **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 8617A

• **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-13868, C-14336, T-12221, G-10830 respectively.



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## 4 FCC Radiofrequency radiation exposure limits

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

### 4.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

### 4.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz. The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, **R must be at least  $\lambda/2\pi$** , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).



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**Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation**

| RF Source Frequency |   |           | Minimum Distance   |   |                    | Threshold ERP                        |
|---------------------|---|-----------|--------------------|---|--------------------|--------------------------------------|
| $f_L$ MHz           |   | $f_H$ MHz | $\lambda_L / 2\pi$ |   | $\lambda_H / 2\pi$ | W                                    |
| 0.3                 | — | 1.34      | 159 m              | — | 35.6 m             | 1,920 R <sup>2</sup>                 |
| 1.34                | — | 30        | 35.6 m             | — | 1.6 m              | 3,450 R <sup>2</sup> /f <sup>2</sup> |
| 30                  | — | 300       | 1.6 m              | — | 159 mm             | 3.83 R <sup>2</sup>                  |
| 300                 | — | 1,500     | 159 mm             | — | 31.8 mm            | 0.0128 R <sup>2</sup> f              |
| 1,500               | — | 100,000   | 31.8 mm            | — | 0.5 mm             | 19.2R <sup>2</sup>                   |

Subscripts L and H are low and high;  $\lambda$  is wavelength.  
R: Separation distance between the antenna to person

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least  $\lambda/2\pi$ . The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

### 4.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of  $\lambda/4$ .

As for devices with antennas of length greater than  $\lambda/4$  where the gain is not well defined, but always less than that of a half-wave dipole (length  $\lambda/2$ ), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold  $P_{th}$  (mW).

This method shall only be used at separation distances from **0.5cm to 40cm** and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P_{th}$  is given by Formula (B.2).



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$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20 \text{ cm}}$  is per Formula (B.1).

| Limit calculation    |                |       |          |                |
|----------------------|----------------|-------|----------|----------------|
| Frequency range(GHz) | Frequency(GHz) | X     | d(cm)    | Pth (mW)       |
| 1.5~6                | <b>2.462</b>   | 1.903 | <b>4</b> | <b>143.032</b> |
| 1.5~6                | <b>2.462</b>   | 1.903 | <b>9</b> | <b>669.438</b> |
| 1.5~6                | <b>5.24</b>    | 2.067 | <b>4</b> | <b>109.846</b> |
| 1.5~6                | <b>5.24</b>    | 2.067 | <b>9</b> | <b>587.259</b> |

#### 4.4 RF Exposure Test Exemptions for Simultaneous Transmission

The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated $_k$  term) shall be used to determine exemption for simultaneous transmission. In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

$a$  = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.



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**b** = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

**c** = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

**P<sub>i</sub>** = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source *i* at a distance between 0.5 cm and 40 cm (inclusive).

**P<sub>th,i</sub>** = the exemption threshold power (P<sub>th</sub>) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source *i*.

**ERP<sub>j</sub>** = the ERP of fixed, mobile, or portable RF source *j*.

**ERP<sub>th,j</sub>** = exemption threshold ERP for fixed, mobile, or portable RF source *j*, at a distance of at least  $\lambda / 2 \pi$  according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

**Evaluated<sub>k</sub>** = the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.

**Exposure Limit<sub>k</sub>** = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k*, as applicable from § 1.1310 of this chapter.

## 5 IC Radiofrequency radiation exposure limits:

According to RSS-102 issue 6 section 6.3, devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 1, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

Table 1: Power limits for exemption from routine SAR evaluation based on the separation distance

| MHz  | 5  | 10  | 15  | 20  | 25  | 30  | 35  | 40  | 45  | >50 | mm |
|------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| ≤300 | 45 | 116 | 139 | 163 | 189 | 216 | 246 | 280 | 319 | 362 | mW |
| 450  | 32 | 71  | 87  | 104 | 124 | 147 | 175 | 208 | 248 | 296 |    |
| 835  | 21 | 32  | 41  | 54  | 72  | 96  | 129 | 172 | 228 | 298 |    |
| 1900 | 6  | 10  | 18  | 33  | 57  | 92  | 138 | 194 | 257 | 323 |    |
| 2450 | 3  | 7   | 16  | 32  | 56  | 89  | 128 | 170 | 209 | 245 |    |
| 3500 | 2  | 6   | 15  | 29  | 50  | 72  | 94  | 114 | 134 | 158 |    |
| 5800 | 1  | 5   | 13  | 23  | 32  | 41  | 54  | 74  | 102 | 128 |    |

The exemption limits in table 1 Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of



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approximately 0.4 W/kg for 1 g of tissue. For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 1 are multiplied by a factor of 2.5. For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in table 1 are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in table 1, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in table 1, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed. For example, in case of a 7 mm separation distance, either use the exception value for a 5 mm separation distance or interpolate between the limits corresponding to 5 mm and 10 mm separation distances.

For implanted medical devices, the exemption limit for routine SAR evaluation is set at an output power of 1 mW, regardless of frequency.

The practical use condition for this device is as a portable device. So the applicable limit is 10g extremity SAR for antenna 1 and 1g extremity SAR for antenna 2.

For WIFI 2.4G@4cm (Antenna 1), the limit is  $P_{max} \leq 170\text{mW} \times 2.5 = 425\text{mW}$

For WIFI 2.4G@9cm (Antenna 2), the limit is  $P_{max} \leq 245\text{mW}$

For WIFI 5G@4cm (Antenna 1), the limit is  $P_{max} \leq 74\text{mW} \times 2.5 = 185\text{mW}$

For WIFI 5G@9cm (Antenna 2), the limit is  $P_{max} \leq 128\text{mW}$



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## 6 Measurement and Calculation

### 6.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR230400079101& SHCR230400079102.

#### 2.4GHz WIFI:

| Test Mode | Antenna | Channel | Power [dBm] | Power [mW]   |
|-----------|---------|---------|-------------|--------------|
| 11B       | Ant1    | 2412    | 16.10       | 40.74        |
|           | Ant2    | 2412    | 16.50       | <b>44.67</b> |
|           | Ant1    | 2437    | 16.09       | 40.64        |
|           | Ant2    | 2437    | 16.28       | 42.46        |
|           | Ant1    | 2462    | 16.33       | <b>42.95</b> |
|           | Ant2    | 2462    | 16.00       | 39.81        |
| 11G       | Ant1    | 2412    | 15.11       | 32.43        |
|           | Ant2    | 2412    | 15.24       | 33.42        |
|           | Ant1    | 2437    | 15.55       | 35.89        |
|           | Ant2    | 2437    | 15.22       | 33.27        |
|           | Ant1    | 2462    | 15.42       | 34.83        |
|           | Ant2    | 2462    | 15.30       | 33.88        |
| 11N20MIMO | Ant1    | 2412    | 11.10       | 12.88        |
|           | Ant2    | 2412    | 10.94       | 12.42        |
|           | Total   | 2412    | 14.03       | 25.29        |
|           | Ant1    | 2437    | 11.15       | 13.03        |
|           | Ant2    | 2437    | 10.78       | 11.97        |
|           | Total   | 2437    | 13.98       | 25.00        |
|           | Ant1    | 2462    | 11.30       | 13.49        |
|           | Ant2    | 2462    | 11.05       | 12.74        |
| 11N40MIMO | Total   | 2462    | 14.19       | <b>26.24</b> |
|           | Ant1    | 2422    | 10.42       | 11.02        |
|           | Ant2    | 2422    | 10.60       | 11.48        |
|           | Total   | 2412    | 13.52       | 22.49        |
|           | Ant1    | 2437    | 10.59       | 11.46        |
|           | Ant2    | 2437    | 10.62       | 11.53        |
|           | Total   | 2437    | 13.62       | 23.01        |
|           | Ant1    | 2452    | 10.17       | 10.40        |
|           | Ant2    | 2452    | 10.20       | 10.47        |
|           | Total   | 2452    | 13.20       | 20.89        |

#### 5G WIFI:

| Test Mode | Antenna | Channel | Power [dBm] | Power [mW]   |
|-----------|---------|---------|-------------|--------------|
| 11A       | Ant1    | 5180    | 10.04       | 10.09        |
|           | Ant2    | 5180    | 10.48       | 11.17        |
|           | Ant1    | 5220    | 10.54       | 11.32        |
|           | Ant2    | 5220    | 11.31       | 13.52        |
|           | Ant1    | 5240    | 10.86       | <b>12.19</b> |
|           | Ant2    | 5240    | 11.95       | <b>15.67</b> |
| 11N20MIMO | Ant1    | 5180    | 8.76        | 7.52         |
|           | Ant2    | 5180    | 8.63        | 7.29         |



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|            |       |      |       |       |
|------------|-------|------|-------|-------|
|            | Total | 5180 | 11.71 | 14.83 |
|            | Ant1  | 5220 | 8.62  | 7.28  |
|            | Ant2  | 5220 | 9.06  | 8.05  |
|            | Total | 5220 | 11.86 | 15.35 |
|            | Ant1  | 5240 | 8.73  | 7.46  |
|            | Ant2  | 5240 | 9.03  | 8.00  |
|            | Total | 5240 | 11.89 | 15.45 |
| 11N40MIMO  | Ant1  | 5190 | 7.86  | 6.11  |
|            | Ant2  | 5190 | 8.89  | 7.74  |
|            | Total | 5190 | 11.42 | 13.87 |
|            | Ant1  | 5230 | 8.51  | 7.10  |
|            | Ant2  | 5230 | 9.56  | 9.04  |
|            | Total | 5230 | 12.08 | 16.14 |
|            | Ant1  | 5180 | 7.77  | 5.98  |
|            | Ant2  | 5180 | 8.58  | 7.21  |
|            | Total | 5180 | 11.20 | 13.18 |
| 11AC20MIMO | Ant1  | 5220 | 7.60  | 5.75  |
|            | Ant2  | 5220 | 8.52  | 7.11  |
|            | Total | 5220 | 11.09 | 12.85 |
|            | Ant1  | 5240 | 7.90  | 6.17  |
|            | Ant2  | 5240 | 8.86  | 7.69  |
|            | Total | 5240 | 11.42 | 13.87 |
|            | Ant1  | 5190 | 8.40  | 6.92  |
|            | Ant2  | 5190 | 9.22  | 8.36  |
|            | Total | 5190 | 11.84 | 15.28 |
| 11AC40MIMO | Ant1  | 5230 | 9.06  | 8.05  |
|            | Ant2  | 5230 | 9.63  | 9.18  |
|            | Total | 5230 | 12.36 | 17.22 |
|            | Ant1  | 5210 | 8.13  | 6.50  |
|            | Ant2  | 5210 | 8.54  | 7.14  |
|            | Total | 5210 | 11.35 | 13.65 |

## 6.2 RF Exposure Calculation

For FCC :

For single RF source :

|                                     | Evaluation method               | Separation distance between the antenna to person (R) |
|-------------------------------------|---------------------------------|---|
| <input type="checkbox"/>            | Blanket 1 mW Blanket Exemption  | Regardless of separation distance                     |
| <input type="checkbox"/>            | MPE-based Exemption(ERP)        | $R \geq (\lambda / 2 \pi)$                            |
| <input checked="" type="checkbox"/> | SAR-based Exemption( $P_{th}$ ) | $0.5\text{cm} < R < 40\text{cm}$                      |

### 2.4GHz WiFi

The Max Conducted Output Power is 44.67 mW for antenna1, 42.95 mW for antenna2, 26.24 mW for MIMO.

The best case gain of the antenna is 3.40dBi for antenna1 and 3.40dBi for antenna2.

Directional gain: 6.41dBi.

3.40dBi logarithmic terms convert to numeric result is nearly 2.19.

6.41dBi logarithmic terms convert to numeric result is nearly 4.38.



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According to the formula. calculate the EIRP test result:

Antenna1: E.I.R.P.=  $P \times G = 44.67 \text{ mW} \times 2.19 = 97.83\text{mW} < 143.032\text{mW}$

Antenna2: E.I.R.P.=  $P \times G = 42.95 \text{ mW} \times 2.19 = 94.06\text{mW} < 669.438\text{mW}$

In MIMO mode: E.I.R.P.=  $P \times G = 26.24 \text{ mW} \times 4.38 = 114.93\text{mW} < 143.032\text{mW}$

## 5GHz WiFi

The Max Conducted Output Power is 12.19 mW for antenna1, 15.67 mW for antenna2, 17.22mW for MIMO.

The best case gain of the antenna is 4.89dBi for antenna1 and 4.89dBi for antenna2.

Directional gain: 7.9dBi.

4.89dBi logarithmic terms convert to numeric result is nearly 3.08.

7.9dBi logarithmic terms convert to numeric result is nearly 6.17.

According to the formula. calculate the EIRP test result:

Antenna1: E.I.R.P.=  $P \times G = 12.19\text{mW} \times 3.08 = 37.55\text{mW} < 109.846\text{mW}$

Antenna2: E.I.R.P.=  $P \times G = 15.67 \text{ mW} \times 3.08 = 48.26\text{mW} < 587.259\text{mW}$

In MIMO mode: E.I.R.P.=  $P \times G = 17.22\text{mW} \times 6.17 = 106.24\text{mW} < 109.846\text{mW}$

**Remark:** we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

## For IC:

### 2.4GHz WiFi:

Antenna1: E.I.R.P.=  $P \times G = 44.67 \text{ mW} \times 2.19 = 97.83\text{mW} < 425\text{mW}$

Antenna2: E.I.R.P.=  $P \times G = 42.95 \text{ mW} \times 2.19 = 94.06\text{mW} < 245\text{mW}$

In MIMO mode: E.I.R.P.=  $P \times G = 26.24 \text{ mW} \times 4.38 = 114.93\text{mW} < 245\text{mW}$

### 5GHz WiFi:

Antenna1: E.I.R.P.=  $P \times G = 12.19\text{mW} \times 3.08 = 37.55\text{mW} < 185\text{mW}$

Antenna2: E.I.R.P.=  $P \times G = 15.67 \text{ mW} \times 3.08 = 48.26\text{mW} < 128\text{mW}$

In MIMO mode: E.I.R.P.=  $P \times G = 17.22\text{mW} \times 6.17 = 106.24\text{mW} < 128\text{mW}$

So, the device is to qualify for FCC & IC SAR test exemption, the exemption report is in lieu of the SAR report.

**--End of the Report--**



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