

# RF EXPOSURE EVALUATION REPORT

**Application No.:** GZCR2205000639AT  
**Applicant:** SYBER SENSE IOT COMPANY LIMITED  
**Address of Applicant:** FLAT/RM 10 BLK A 16/F HI TECH INDUSTRIAL CENTRE 5-21 PAK TIN PAR STREET TSUEN WAN Hong Kong China  
**Manufacturer:** Rui chuang ke Digital Co., Limited  
**Address of Manufacturer:** 3/F, Building A, Hanhaida High-tech Park, DatianYang C District, Shiwei Community, Matian Street, Guangming New District, Shenzhen, China.  
**Factory:** Rui chuang ke Digital Co., Limited  
**Address of Factory:** 3/F, Building A, Hanhaida High-tech Park, DatianYang C District, Shiwei Community, Matian Street, Guangming New District, Shenzhen, China.  
**Equipment Under Test (EUT):**  
**EUT Name:** SS Flood Temperature Sensor(XPF01)  
**Model No.:** XPF01-E-1433-00  
**Trade Mark:** Syber Sense  
**Standard(s) :** FCC Rules 47 CFR §2.1091  
KDB 447498 D04 interim General RF Exposure Guidance v01  
**Date of Receipt:** 2022-05-18  
**Date of Evaluation:** 2022-05-19 to 2022-05-25  
**Date of Issue:** 2022-05-31

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



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

Kobe Jian  
EMC Laboratory Manager



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SGS-CSTC Standards Technical Services Co., Ltd. No.198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
Guangzhou Branch EMC Laboratory. 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

| <i>Revision Record</i> |                |             |                 |               |
|------------------------|----------------|-------------|-----------------|---------------|
| <i>Version</i>         | <i>Chapter</i> | <i>Date</i> | <i>Modifier</i> | <i>Remark</i> |
| 01                     |                | 2022-05-31  |                 | Original      |
|                        |                |             |                 |               |
|                        |                |             |                 |               |

|                                |  |   |  |
|--------------------------------|--|---|--|
| <b>Authorized for issue by</b> |  |   |  |
|                                |  |  |  |
|                                |  | <hr/> <b>Curry Wu/Project Engineer</b>  |  |
|                                |  |  |  |
|                                |  | <hr/> <b>Ricky Liu/Reviewer</b>   |  |



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## 2 Evaluation Summary

**Note:**

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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## 4 General Information

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

|               |   |
|---------------|---|
| Product Type: | <input type="checkbox"/> Portable device          |
|               | <input checked="" type="checkbox"/> Mobile device |
|               | <input type="checkbox"/> Fixed device             |

### 4.2 Details of E.U.T.

Power supply: 3V DC (3.0Vx1"CR2450" Size Battery)  
 Operation Frequency: 433.95MHz  
 Modulation Type: OOK  
 Number of Channels: 1  
 Antenna Gain: -3.5dBi  
 Antenna Type: PIFA Antenna

### 4.3 Separation Distance

|   |      |
|---|------|
| Minimum test separation distance:   | 20cm |
| 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. |      |



#### 4.4 Evaluating Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
 198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,  
 Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

#### 4.5 Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

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.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

#### 4.6 Deviation from Standards

None



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#### **4.7 Abnormalities from Standard Conditions**

None



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## 5 Technical Requirements Specification

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

### 5.1 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.

### 5.2 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.

**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.

From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

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



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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.

For mobile devices that are not exempt per Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than  $ERP_{20\text{cm}}$  in Formula (B.1) [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

$$P_{\text{th}} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only 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.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

| Limit calculation |                |                        |                  |
|-------------------|----------------|------------------------|------------------|
| Frequency range   | Frequency(MHz) | R( $\lambda/2\pi$ )(m) | Threshold ERP(W) |
| 300~1500MHz       | <b>433.95</b>  | 0.1101                 | 0.067            |
| 1500~10000MHz     | <b>2480</b>    | 0.0193                 | 0.007            |

### 5.3 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.



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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 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P_{th}$  is given by Formula (B.2).

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

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).

Example values shown in Table B.2 are for illustration only.

**Table B.2—Example Power Thresholds (mW)**

| Frequency (MHz) | Distance(mm) |    |    |     |     |     |     |     |     |     |
|-----------------|--------------|----|----|-----|-----|-----|-----|-----|-----|-----|
|                 | 5            | 10 | 15 | 20  | 25  | 30  | 35  | 40  | 45  | 50  |
| 300             | 39           | 65 | 88 | 110 | 129 | 148 | 166 | 184 | 201 | 217 |
| 450             | 22           | 44 | 67 | 89  | 112 | 135 | 158 | 180 | 203 | 226 |
| 835             | 9            | 25 | 44 | 66  | 90  | 116 | 145 | 175 | 207 | 240 |
| 1900            | 3            | 12 | 26 | 44  | 66  | 92  | 122 | 157 | 195 | 236 |
| 2450            | 3            | 10 | 22 | 38  | 59  | 83  | 111 | 143 | 179 | 219 |
| 3600            | 2            | 8  | 18 | 32  | 49  | 71  | 96  | 125 | 158 | 195 |
| 5800            | 1            | 6  | 14 | 25  | 40  | 58  | 80  | 106 | 136 | 169 |

| Limit calculation    |                |       |              |               |
|----------------------|----------------|-------|--------------|---------------|
| Frequency range(GHz) | Frequency(GHz) | X     | Distance(cm) | Pth (mW)      |
| 0.3~1.5              | <b>0.43395</b> | 0.988 | <b>0.5</b>   | <b>23.164</b> |
| 1.5~6                | <b>2.48</b>    | 1.905 | <b>0.5</b>   | <b>2.717</b>  |



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## 6 Measurement and Calculation

### 6.1 Maximum transmit power

The Power Data is based on the RF Test Report GZCR220500063901

The Max. power (including tune-up tolerance) is -25.06 dBm on the channel 0.43395GHz(\*)  
 -25.06 dBm logarithmic terms convert to numeric result is nearly 0.003119 mW

Note:  $ERP = pt \times gt = (E \times d)^2 / 49.2$  (According to ANSI C63.10 Annex G.2).

where

pt is the transmitter output power in watts

gt is the numeric gain of the transmitting antenna (dimensionless)

E is the electric field strength in V/m

d is the measurement distance in meters (m)

$V/m = 10^{(((dBmV/m) - 120) / 20)}$

### 6.2 RF Exposure Calculation

The Max. power (including tune-up tolerance) is -25.06dBm on the channel 0.43395GHz(\*)  
 -25.06 dBm logarithmic terms convert to numeric result is nearly 0.003119 mW

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

|                                     | Evaluation method               | Exempt Limit(mW) | Verdict |
|-------------------------------------|---------------------------------|------------------|---------|
| <input checked="" type="checkbox"/> | Blanket 1 mW Blanket Exemption  | 1mW              | Yes     |
| <input type="checkbox"/>            | MPE-based Exemption(ERP)        | 7mW(ERP)         | N/A     |
| <input type="checkbox"/>            | SAR-based Exemption( $P_{th}$ ) | 2.7mW            | N/A     |

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



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## 7 EUT Constructional Details (EUT Photos)

Refer to appendix - external and internal photos for GZCR2205000639AT

- End of the Report -



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