

RF EXPOSURE REPORT



FCC Applicant: Shoreline IoT, Inc.
15750 Winchester Blvd., Ste 206, Los Gatos CA, 95030 USA

Product Name: iCastSense

Brand Name: iCastSense

Model No.: iCastSense 1A

Model Difference: N/A

Report Number: ES/2022/20017

FCC ID 2AQSRNS1A

Issue Date: Apr. 01, 2022

Date of EUT Received: Jan. 13, 2022

John Yeh
Approved By _____

John Yeh

We hereby certify that:

The above equipment was evaluated by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §1.1307.

The results of this report relate to the specific sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Revision History

| Report Number | Revision | Description | Issue Date | Revised By | Remark |
|---------------|----------|-------------|---------------|--------------|--------|
| ES/2022/20017 | 00 | Original. | Apr. 01, 2022 | Yi-Shan Tsai | |

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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Contents

| | | |
|---|------------------------------------------------|---|
| 1 | DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)..... | 4 |
| 2 | DETERMINATION OF MPE EXEMPTION..... | 5 |

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

| | |
|-------------------|-----------------------------------------------------|
| Product Name: | iCastSense |
| Brand Name: | iCastSense |
| Model No.: | iCastSense 1A |
| Model Difference: | N/A |
| Hardware Version: | N/A |
| Firmware Version: | N/A |
| EUT Series No.: | 21122006GNS00 (Conducted) PJ221084002 (Radiated) |
| Power Supply: | Battery 3.6Vdc x 2 External power 10Vdc to 26Vdc |

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2 DETERMINATION OF MPE EXEMPTION

2.1 Single RF Source

As per §1.1307(b)(3)(i),

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);
- (B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

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

Where

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

and

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

d = the separation distance (cm);

- (C) Or using Table 1 and 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 λ 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 1 to § 1.1307(b)(3)(i)(C) –
Single RF Sources Subject to Routine Environmental Evaluation

| RF Source frequency (MHz) | | Minimum Distance | | | Threshold ERP (W) | |
|---------------------------|----|--------------------|--------|--------------------|-------------------|----------------|
| fL | fH | $\lambda L / 2\pi$ | | $\lambda H / 2\pi$ | | |
| 0.3 | - | 1.34 | 159m | - | 35.6m | 1920 R^2 |
| 1.34 | - | 30 | 35.6m | - | 1.6m | 3450 R^2/f^2 |
| 30 | - | 300 | 1.6m | - | 159mm | 3.83 R^2 |
| 300 | - | 1500 | 159mm | - | 31.8mm | 0.0128 R^2f |
| 1500 | - | 100000 | 31.8mm | - | 0.5mm | 19.2 R^2 |

R= minimum separation distance in meter

f = frequency in MHz

2.2 Multiple RF Sources

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.

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

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2.3 Single RF Source Evaluation Results

MPE based exemption

| Mode | Frequency (MHz) | Max. tune-up power (dBm) | Peak gain (dBi) | ERP (dBm) | ERP (W) | Permissible Minimum separation distance ($\lambda/2\pi$) (m) | R = actual Minimum separation distance(m) | ERP _{th} (W) | ERP/ERP _{th} |
|-------------|-----------------|--------------------------|-----------------|-----------|---------|----------------------------------------------------------------|-------------------------------------------|-----------------------|-----------------------|
| BLE | 2480 | 0 | 4 | 1.85 | 0.002 | 0.0193 | 0.200 | 0.768 | 0.003 |
| GSM 850 | 849 | 25.97 | 3.53 | 27.35 | 0.543 | 0.0563 | 0.200 | 0.435 | 1.248 |
| GSM 1900 | 1910 | 22.97 | 3.99 | 24.81 | 0.303 | 0.0250 | 0.200 | 0.768 | 0.395 |
| LTE Band 2 | 1910 | 22 | 3.99 | 23.84 | 0.242 | 0.0250 | 0.200 | 0.768 | 0.315 |
| LTE Band 4 | 1755 | 22 | 4.58 | 24.43 | 0.277 | 0.0272 | 0.200 | 0.768 | 0.361 |
| LTE Band 5 | 849 | 22 | 3.53 | 23.38 | 0.218 | 0.0563 | 0.200 | 0.435 | 0.501 |
| LTE Band 12 | 716 | 22 | 2.54 | 22.39 | 0.173 | 0.0667 | 0.200 | 0.367 | 0.471 |
| LTE Band 13 | 787 | 22 | 2.54 | 22.39 | 0.173 | 0.0607 | 0.200 | 0.403 | 0.429 |
| LTE Band 14 | 798 | 22 | 2.54 | 22.39 | 0.173 | 0.0599 | 0.200 | 0.409 | 0.423 |
| LTE Band 25 | 1915 | 22 | 3.99 | 23.84 | 0.242 | 0.0249 | 0.200 | 0.768 | 0.315 |
| LTE Band 26 | 849 | 22 | 3.53 | 23.38 | 0.218 | 0.0563 | 0.200 | 0.435 | 0.501 |
| LTE Band 66 | 1780 | 22 | 4.58 | 24.43 | 0.277 | 0.0268 | 0.200 | 0.768 | 0.361 |
| LTE Band 85 | 716 | 22 | 2.54 | 22.39 | 0.173 | 0.0667 | 0.200 | 0.367 | 0.471 |

SAR based exemption

| Mode | Frequency (MHz) | Distance (cm) | Max. tune-up power (dBm) | Max. tune-up power (mW) | Peak gain (dBi) | ERP (dBm) | ERP (mW) | x | ERP _{20cm} (mW) | P _{th} (mW) | P or ERP /P _{th} |
|---------|-----------------|---------------|--------------------------|-------------------------|-----------------|-----------|----------|-------|--------------------------|----------------------|---------------------------|
| GSM 850 | 849 | 20 | 25.97 | 395.367 | 3.53 | 27.35 | 543.250 | 1.425 | 1731.96 | 1731.96 | 0.314 |

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the minimum separation distance of that band. All the single RF source results (P or ERP) are less than their corresponding threshold (P_{th} or ERP_{th}), so they are exempt from SAR testing.

2.4 Multiple RF Sources Evaluation Results

| Simultaneous transmission modes | \sum ERP/ERP _{th} | Criteria |
|---------------------------------|------------------------------|----------|
| 1 | 0.504 | 1 |

Note:

1. $\Sigma(\text{ERP}/\text{ERP}_{\text{th}})$: This is a summation of $[(\text{ERP of RF source} / \text{exemption threshold ERP for RF source})]$.

Considering the collocated transmitters, the aggregated ($\text{ERP}/\text{ERP}_{\text{th}}$) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~

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