



Radio Frequency Exposure Evaluation Report

FOR:
Visteon Corporation

Brand:
Visteon

Marketing Name:
CSCSDI

Model Number:
CSCSDI

Product Description:

Cell Supervisory Circuit (CSC) is a sensing circuit installed on or adjacent to the cell modules. Their main function is to measure cell voltages and temperatures, as well as perform cell-balancing operations.

FCC ID: NT8-CSCSDI
IC: 3043A-CSCSDI

Per:
CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D04 Interim General RF Exposure Guidance v01
ISED RSS-102 Issue 5

Report number: EMC_VISTE_002_23001_FCC_ISED_RF_Exposure_CSCSDI_Rev1

DATE: 2024-02-20



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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant). In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20 cm distance to the body.

| Company | Description | Model # |
|---------------------|---|---------|
| Visteon Corporation | Cell Supervisory Circuit (CSC) is a sensing circuit installed on or adjacent to the cell modules. Their main function is to measure cell voltages and temperatures, as well as perform cell-balancing operations. | CSCSDI |

Responsible for the Report:

Huang, Guangcheng [CETECOM]

2/20/2024

Compliance

(Senior EMC Test Engineer)

| Date | Section | Name | Signature |
|------|---------|------|-----------|
|------|---------|------|-----------|

2 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

| | |
|------------------------------------|------------------------|
| Company Name: | CETECOM Inc. |
| Department: | Compliance |
| Street Address: | 411 Dixon Landing Road |
| City/Zip Code | Milpitas, CA 95035 |
| Country | USA |
| Telephone: | +1 (408) 586 6200 |
| Fax: | +1 (408) 586 6299 |
| Lab Manager: | Ghanma, Issa |
| Responsible Project Leader: | Baskaran, Akanksha |

1.2 Identification of the Client / Manufacturer

| | |
|------------------------|-------------------------------|
| Client's Name: | Visteon Corporation |
| Street Address: | One Village Center Drive, |
| City/Zip Code | Van Buren Township, MI, 48111 |
| Country | USA |

Identification of the Manufacturer

| | |
|-------------------------------|----------------|
| Manufacturer's Name: | Same as Client |
| Manufacturers Address: | |
| City/Zip Code | |
| Country | |

3 Equipment under Assessment

| | |
|--|---|
| Product Description: | Vehicular device (Wireless Battery Management) |
| Product Application: | Cell Supervisory Circuit (CSC) is a sensing circuit installed on or adjacent to the cell modules. Their main function is to measure cell voltages and temperatures, as well as perform cell-balancing operations. |
| Model Name : | CSCSDI |
| HW Version : | VPRE1F-12B684-CF |
| SW Version : | SWE202-28418-003F00 |
| FCC ID : | NT8-CSCSDI |
| IC : | 3043A-CSCSDI |
| Frequency Range / number of channels: | 2405 - 2480 MHz / Channels 0-15 |
| Bands/Modes Supported | Wireless Technologies Proprietary Protocol: 802.15.4 1 Mbps data rate |
| Modes of Operation: | Proprietary Protocol: 802.15.4 2400 MHz - 2483.5 MHz ISM Band Modulation: GFSK Nominal Channel Bandwidth: 5 MHz |
| Antenna Information as declared: | Peak gain 2.6 dBi Internal Antenna FR4 Antenna Part No : A1001013 CSC |
| Max. Peak Output Power: | Conducted: 7.78 dBm |
| Other Radios included in the device | NA |
| Power Supply/ Rated Operating Voltage Range | Min. 12.5 V, Nom . 29.6 V, Max. 36 V powered by the vehicle battery power system |
| Operating Temperature Range | Low : -40 °C Norm 20 °C High 85 °C |
| Sample Revision | <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production |
| EUT Dimensions | 30 mm x 278 mm x 5 mm |
| Weight | 100 grams |
| EUT Diameter | <input checked="" type="checkbox"/> < 60 cm <input type="checkbox"/> Other _____ |
| Note: All information provided by applicant | |

4 RF Exposure Limits and FCC and IC Basic Rules

4.1 FCC 2.1091

4.1.1 § 2.1091(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for mobile devices with single RF sources having either more than an available maximum time-averaged power of 1 mW or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP_{20cm} in the formula below. If the ERP of a single RF source at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP) in comparison with the following formula 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 (1.64 linear value).

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

4.1.2 § 2.1091(c)(2)

For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

4.1.3 § 1.1307(b)(3)(ii)(B)

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.

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

4.2 ISED RSS-102

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

| Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance ^{4,5} | | | | | |
|---|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Frequency (MHz) | Exemption Limits (mW) | | | | |
| | At separation distance of ≤5 mm | At separation distance of 10 mm | At separation distance of 15 mm | At separation distance of 20 mm | At separation distance of 25 mm |
| ≤300 | 71 mW | 101 mW | 132 mW | 162 mW | 193 mW |
| 450 | 52 mW | 70 mW | 88 mW | 106 mW | 123 mW |
| 835 | 17 mW | 30 mW | 42 mW | 55 mW | 67 mW |
| 1900 | 7 mW | 10 mW | 18 mW | 34 mW | 60 mW |
| 2450 | 4 mW | 7 mW | 15 mW | 30 mW | 52 mW |
| 3500 | 2 mW | 6 mW | 16 mW | 32 mW | 55 mW |
| 5800 | 1 mW | 6 mW | 15 mW | 27 mW | 41 mW |

| Frequency (MHz) | Exemption Limits (mW) | | | | |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
| | At separation distance of 30 mm | At separation distance of 35 mm | At separation distance of 40 mm | At separation distance of 45 mm | At separation distance of ≥50 mm |
| ≤300 | 223 mW | 254 mW | 284 mW | 315 mW | 345 mW |
| 450 | 141 mW | 159 mW | 177 mW | 195 mW | 213 mW |
| 835 | 80 mW | 92 mW | 105 mW | 117 mW | 130 mW |
| 1900 | 99 mW | 153 mW | 225 mW | 316 mW | 431 mW |
| 2450 | 83 mW | 123 mW | 173 mW | 235 mW | 309 mW |
| 3500 | 86 mW | 124 mW | 170 mW | 225 mW | 290 mW |
| 5800 | 56 mW | 71 mW | 85 mW | 97 mW | 106 mW |

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table above are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

4.2.1 Clause 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

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

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 $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (adjusted for tune-up tolerance), where f is in MHz;

5 Evaluations

5.1 FCC RF Exposure

| Radio | Freq-Low [GHz] | Power [dBm] | Power [W] | AG [dBi] | AG [lin] | EIRP [W] | ERP [W] | Threshold ERP [W] | ERP < Threshold ERP [W] |
|-------------|----------------|-------------|-----------|----------|----------|----------|---------|-------------------|-------------------------|
| Proprietary | 2.405 | 7.78 | 0.0060 | 2.6 | 1.82 | 0.011 | 0.007 | 0.77 | Yes |

Conclusion:

The maximum RF emissions from this equipment fulfills the SAR exclusion threshold limits for separation distance between the antenna and the human body greater than 20 cm. SAR is not required.

5.2 ISED RF Exposure

| Radio | Freq-Low [GHz] | Power [dBm] | Power [W] | AG [dBi] | AG [lin] | EIRP [W] | Exemption EIRP limit [W] | Exemption |
|-------------|----------------|-------------|-----------|----------|----------|----------|--------------------------|-----------|
| Proprietary | 2.405 | 7.78 | 0.0060 | 2.6 | 1.82 | 0.011 | 2.68 | Yes |

Conclusion:

The maximum RF emissions from this equipment fulfills the SAR exclusion threshold limits for separation distance between the antenna and the human body greater than 20 cm. SAR is not required.

6 Revision History

| Date | Report Name | Changes to report | Prepared by |
|------------|--|---|------------------|
| 2024-01-25 | EMC_VISTE_002_23001_FCC_ISED_RF_Exposure_CSCSDI | Initial version | Guangcheng Huang |
| 2024-01-25 | EMC_VISTE_002_23001_FCC_ISED_RF_Exposure_CSCSDI_Rev1 | Updated Antenna Gain in Section 3 Updated Calculation in Section 5 | Guangcheng Huang |

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