



Radio Frequency Exposure Evaluation Report

FOR:
Visteon Corporation

Model Number:
CSCLG

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-CSCLG
IC: 3043A-CSCLG

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: VISTE_002_23001_FCC_ISED_RF_Exposure_CSCLG_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.	CSCLG

Responsible for the Report:

Huang, Guangcheng [CETECOM]

2/20/2024

Compliance

(Senior EMC Test Engineer)

Date	Section	Name	Signature
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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 :	CSCLG
HW Version :	VPRE1F-12B684-CF
Firmware Version Identification Number (FVIN):	N/A
Hardware Version Identification Number (HVIN):	CSCLG
Product Marketing Name (PMN):	CSCLG
SW Version :	SWE202-28418-003F00
FCC ID :	NT8-CSCLG
IC :	3043A-CSCLG
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:	NA
Antenna Information as declared:	Peak gain 2.6 dBi Internal Antenna FR4 Antenna Part No : A1001013 CSC
Max. Peak Output Power:	Conducted: 8.05 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	☐ Production ☒ Pre-Production
EUT Dimensions	30 mm x 278 mm x 5 mm
Weight	100 grams
EUT Diameter	☒ < 60 cm ☐ 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 $1.31 \times 10^{-2} f^{0.6834}$ 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	8.05	0.0064	2.60	1.82	0.012	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	8.05	0.0064	2.60	1.82	0.012	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
2024-01-22	VISTE_002_23001_FCC_ISED_RF_Exposure_CSCLG	Initial version	Guangcheng Huang
2024-02-20	VISTE_002_23001_FCC_ISED_RF_Exposure_CSCLG_Rev1	Updated Antenna Gain in Section 3 Updated Calculation in Section 5	Guangcheng Huang

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