DEKRA Certification, Inc.
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United States of America

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
4109REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (2018) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Sense Line Assembly (SLA)
(*) Trademark	Visteon
(*) Model and /or type reference	SLA12
Other identification of the product	FCC ID: FCC ID: NT8-SLA12 IC: IC: 3043A-SLA12 HVIN: 1.7 HW version: VPRAMU-14B115-CA SW version: SWO100-28104-004F00
(*) Features	Cell Monitoring Unit in Wireless Battery Management
Manufacturer	Visteon Corporation One Village Center Drive, Van Buren Township, MI 48111, USA
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (2018) ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US
Date of issue	2023-05-31
Report template No	(*) “Data provided by the client”

Index

Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
MP	Measurement Point
OM	Operation Mode
S/	Sample
V	Verdict

Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000.

	Frequency (MHz)	U (k=2)	Units
Radiated emission	30 - 1000	5.94	dB
	1000-18000	5.89	dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of a Sense Line Assembly (SLA). Electronic module intended to monitor battery module cell groups voltages and module temperatures from the High Voltage battery bus in addition to activate cell balancing to improve battery cells life.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	4109/03	Sense Line Assembly (SLA)	SLA12	1122257ZSLA03383	2023-05-05	Element Under Test
S/01	Dekra 56	DC power cables				Auxiliary Element

Test sample description

Test Sample description (compulsory information for EMC and RF testing services

Ports…… :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
Supplementary information to the ports…… :	.....					
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: Minimum 26.4 V , Nominal 43.8 V , Maximum 52.8 V.					
	[ ]	DC:					
Rated Power .....:	6 mA						
Clock frequencies.....:	40 MHz						
Other parameters .....:	.....						
Software version .....:	SWO100-28104-004F00						
Hardware version .....:	VPRAMU-14B115-CA						
Dimensions in cm (W x H x D) ....:	80.365 x 26.617 x 2.4						
Mounting position .....:	[ ]	Table top equipment					
	[ ]	Wall/Ceiling mounted equipment					
	[ ]	Floor standing equipment					
	[ ]	Hand-held equipment					
	[X]	Other: Integrated in-side electric vehicle battery pack.					
Modules/parts.....:	Module/parts of test item		Type		Manufacturer	
	.....		.....		.....	
	.....		.....		.....	
	.....		.....		.....	
Accessories (not part of the test item) .....:	Description		Type		Manufacturer	
	Harness		.....		.....	
	UART dongle connector		.....		.....	
	Fixtures		.....		.....	
	.....		.....		.....	

Documents as provided by the applicant.....:	Description	File name	Issue date
	Setup instructions	Setup instruction	Nov 29th, 2022
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....

(3) Only for Medical Equipment

Identification of the client

Visteon Corporation
One Village Center Drive, Van Buren Township, MI 48111, USA

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-05-23
Date (finish)	2023-05-24

Document history

Report number	Date	Description
4109REM.001	2023-05-31	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Qi Zhang, Koji Nishimoto, & Victor Albrecht.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P
Partial Passed	P*

Summary

Test Specification	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B(2018) & ICES-003 Issue 7 (October 2020)	Radiated emission electromagnetic field – Unintentional radiators	P	-
	Continuous conducted emission on Power leads - Unintentional radiators	N/A	(1), (2)

Supplementary information and remarks:

(1) According with the requirements of FCC Rules and Regulations, title 47, Chapter I, Subchapter A, Part 15, Subpart B, §15.107 Conducted limits, (d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

(2) Exemptions from the scope of ICES-003, clause 1.5.1 ICES-003 does not apply to the following types of equipment (a) ITE or digital apparatus factory-installed in vehicles, boats or devices equipped with internal combustion engines, traction batteries or both (subject to ICES-002). ITE or digital apparatus not factory-installed in vehicles, boats or devices equipped with internal combustion engines, traction batteries or both do not qualify for this exemption.

List of equipment used during the test

FCC 47 CFR Part 15B

Test Equipments for RE

Control Num	Equipment	Manufacturer	Serial	Model	Next calibration
980	Low Noise Preamplifier (0.03-6ghz)	Bonn Elektronik	1711156A	BLNA0360-01N	2023-10-13
981	Low Noise Preamplifier (0.1-18ghz)	Bonn Elektronik	1711156B	BLMA0118-2A	2023-11-10
1012	ESR26 Emi Test Receiver	Rohde & Schwarz	101478	ESR26	2025-03-10
1014	FSV40 Signal Analyzer 40GHz	Rohde & Schwarz	101626	FSV40	2024-08-01
1057	3115 Double-Ridged Waveguide Horn Antenna (750 Mhz-18 Ghz)	ETS Lindgren	211373	3115	2023-06-20
1064	3142E Biconilog Antenna	ETS Lindgren	208600	3142E	2024-12-12
1108	Ethernet SNMP Thermometer	HW GROUP	60038026954	HWg-STE Plain	2024-10-18
1111	Ethernet SNMP Thermometer	HW GROUP	60038026577	HWg-STE Plain	2024-10-18
1314	Wireless measurement soft. EMC 32	Rohde & Schwarz	1040OT102236	---	---

Appendix A: Test results

Appendix A content

Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself.

The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM/01	DUT ON. Device in IDLE mode. Power supply 43.8 Vdc

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (2018) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	Radiated emission electromagnetic field - Unintentional radiators
	ANSI C63.4 (2014)	Continuous conducted emission on Power leads - Unintentional radiators

TEST CONDITIONS

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30-100 MHz (Bilog antenna) and 1-18 GHz (Double ridge horn antenna).

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

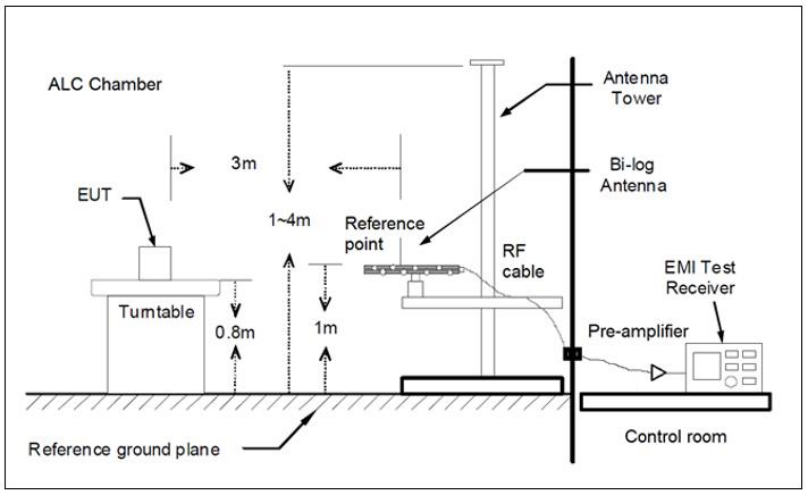


Fig A1: Generic setup for measurements from 30 to 1000 MHz

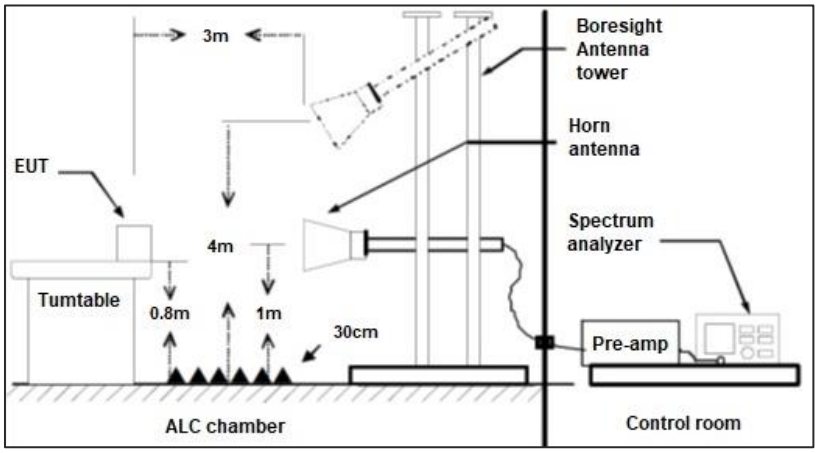


Fig A2: Generic setup for measurements from 1 to 18 GHz

Test Cases Details

FCC 47 CFR Part 15B

Radiated emission electromagnetic field – Unintentional radiators

Limits

Limits of interference Class B
The applied limit for radiated emissions, according to the requirements of:

- **FCC Rules and Regulations 47 CFR Part 15, Subpart B, Secs. 15.109 (a):** [54 FR 17714, Apr. 25, 1989, as amended at 56 FR 373, Jan. 4, 1991; 58 FR 51249, Oct. 1, 1993; 66 FR 19098, Apr. 13, 2001; 67 FR 48993, July 29, 2002; 69 FR 2849, Jan. 21, 2004; 80 FR 33447, June 12, 2015].
- **ICES-003 Issue 7, Secs 3.2.2, table 2 & 4 (October 2020).**

Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(µV/m)	(dBµV/m)	(µV/m)	(dBµV/m)	(dBµV/m)	(dBµV/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46	---	---
230 to 960	200	46	224	47		
960 to 1000	500	54	500	54	---	---
Above 1000	---	---	---	---	74	54

Limits according to FCC Part 15B, are equal or more stringent than those of ICES-003 Issue 7.

Code: REmmnnRR

- RE: Radiated Emission,
- mm: Sample number,
- nn: Operation mode,
- RR: Frequency range Low Range = LR: [30, 1000];
  High Range = HR: [1000, 18000]

Results

S/	OM	Code	Freq Rng (MHz)	V
01	OM/01	RE0101LR	[30, 1000]	P
01	OM/01	RE0101HR	[1000, 18000]	P

Verdict

Pass

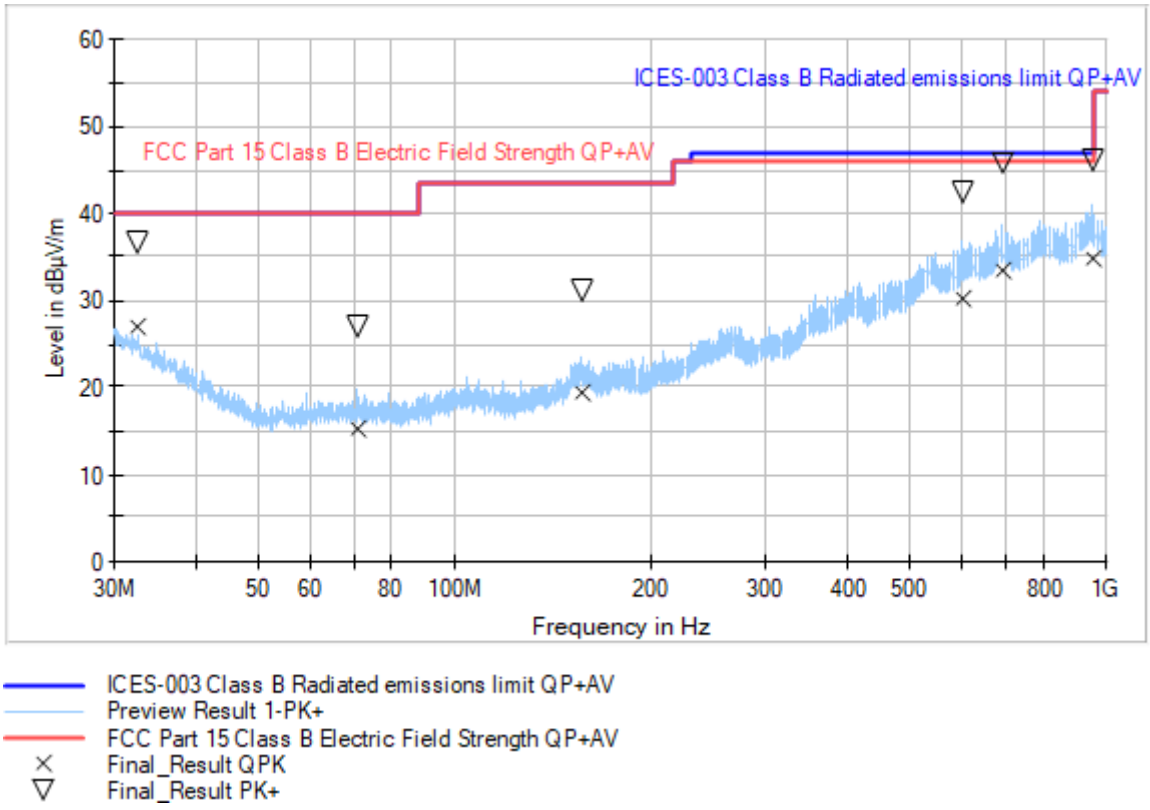
Attachments

EMC Test Code = RE0101LR Frequency Range MHz = [30, 1000]

Sample ID: S/01

Operation Mode: OM/01. DUT ON. Device in IDLE mode. Power supply 43.8 Vdc

Images:



Tables:

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
32.336000	26.93	36.76	40.00	13.07	V	-77.0
70.817000	15.25	27.08	40.00	24.75	H	-1.0
155.887500	19.37	31.15	43.50	24.13	V	14.0
601.143500	30.31	42.48	46.00	15.69	V	-10.0
692.875000	33.51	45.81	46.00	12.49	V	11.0
951.311500	34.88	46.26	46.00	11.12	V	-171.0

Spectrum Analyzer Parameters

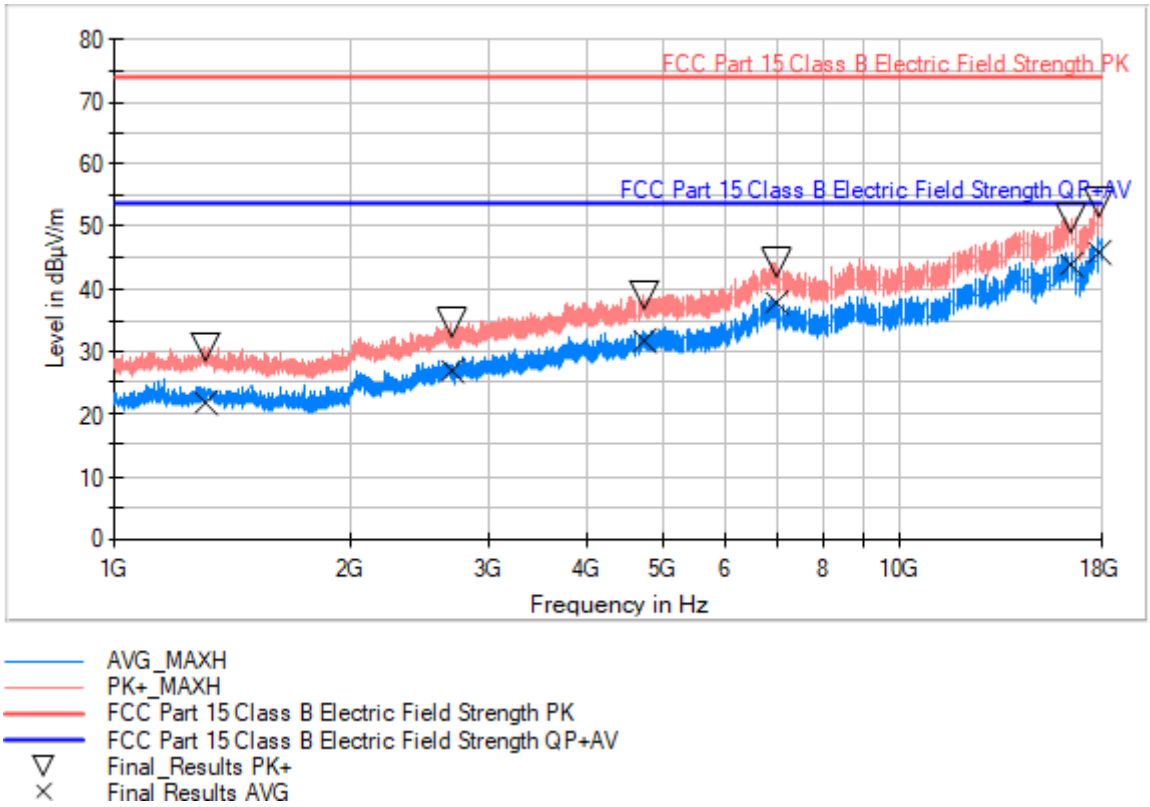
Subrange	Step Size	Detectors	Bandwidth	Sweep Time
30 MHz - 1 GHz	48.5 kHz	PK+	100 kHz	1 s

EMC Test Code = RE0101HR Frequency Range MHz = [1000, 18000]

Sample ID: S/01

Operation Mode: OM/01. DUT ON. Device in IDLE mode. Power supply 43.8 Vdc

Images:



Tables:

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - PK+(dB)	Limit - PK+(dBµV/m)	Margin - AVG(dB)	Limit - AVG(dBµV/m)
1303.500000	30.8	21.8	V	43.1	73.9	32.1	53.9
2686.000000	34.6	27.1	V	39.3	73.9	26.8	53.9
4726.500000	39.1	31.9	H	34.8	73.9	22.0	53.9
6946.000000	44.4	38.0	H	29.5	73.9	15.9	53.9
16449.000000	51.5	44.0	H	22.4	73.9	9.9	53.9
17910.000000	54.1	45.8	V	19.8	73.9	8.1	53.9

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
1 GHz - 3 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s
3 GHz - 18 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s