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C.I.F. A29 507 456

Test report No:
NIE: 70499RAN.002A2

Test report
RF EXPOSURE REPORT ACCORDING TO
IEEE Std C95.3-2021

(*) Identification of item tested	Door Handle Sensor with NFC Reader
(*) Trademark	Vitesco
(*) Model and /or type reference	DHSEQ5NFC
(*) Other identification of the product	HW Version: AAA2064150000 HVIN: AAA2064150000 SW Version: X190 – AUN119__ FCC ID: 2A6TC-DHSEQ5NFC IC ID: 28616-DHSEQ5NFC
(*) Features	NFC
(*) Manufacturer	Vitesco Technologies 44 Avenue du General de Croutte, Toulouse, France 31100
Test method requested, standard	IEEE Std C95.3-2021: "IEEE Recommended Practice for Measurements and Computations of Electric, Magnetic and Electromagnetic Fields With Respect to Such Fields, 0 Hz–300 GHz". FCC 47 CFR Part 2.1093 Radiofrequency radiation exposure evaluation: portable devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager  2022.11.28 15:26:39 +01'00'
Date of issue	2022-11-28
Report template No	FDT08_24 (*) "Data provided by the client"

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Competences and guarantees

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Uncertainty

Uncertainty (factor k=2) was calculated according to the documents:

1. IEEE Std C95.3-2021: “IEEE Recommended Practice for Measurements and Computations of Electric, Magnetic and Electromagnetic Fields With Respect to Such Fields, 0 Hz–300 GHz”.
2. DEKRA Testing and Certification, S.A.U. internal documents PODT000 and FAN40.

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", “Other identification of the product”, “Features”, “Manufacturer” and “Test sample description”).

2. Use distance between the nearby user and the device antenna.

DEKRA Testing and Certification, S.A.U. 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

Sample M/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
70499/012	Door Handle Sensor	DHSEQ5NFC	95169924366859	2022/06/09
70499/023	Harness	-	-	2022/07/05
70499/040	Control Box	-	-	2022/09/05

1. Sample M/01 has undergone the test(s) specified in subclause “Test method requested”.

Test sample description

The EUT under test consist of a door handle sensor which is a standalone module with capacitive and NFC functions. This module is integrated into a door handle, and used in Keyless Entry System, enabling “key-free” Vehicle Unlocking and Locking.

Identification of the client

Company name: Vitesco Technologies

Postal address: 44 Avenue du General de Croutte, Toulouse, France 31100

Contact person: Stacie Allen

Telephone / e-mail: +1 248 613 7268 / stacie.allen@vitesco.com

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-10-04
Date (finish)	2022-10-05

Document history

Report number	Date	Description
70499RAN.002	2022-10-11	First release
70499RAN.002A1	2022-11-24	Second release: The HW version name has been changed by customer request. This modification test report cancels and replaces the test report 70499RAN.002.
70499RAN.002A2	2022-11-28	Third release: Other identification of the product field has been updated on the cover page. This modification test report cancels and replaces the test report 70499RAN.002A1.

Environmental conditions

Date	Max. Temp. ºC	Min. Temp. ºC	Max. Hum. %	Min. Hum. %	Limit
From 2022-10-04 to 2022-10-05	27.71	23.87	41.58	35.02	10-40 ºC, 0-90 %

Remarks and comments

The tests have been performed by the technical personnel: Francisco J. Sánchez.

The instrumentation utilized to perform the tests covered in this test report is listed in the following table:

	Equipment	Equipment	Cal. due date	Control Nº
1.	Narda EHP-200A E and H Field Analyzer	2021/12	2023/12	7860
2.	Low Dielectric Tripod Manfrotto H-491009-01	-	-	5261
3.	Temperature and humidity logger HW GROUP HWg-STE	2022/04	2023/04	5780

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC 47 CFR § 2.1093	**VERDICT**			
	N/A	**P**	**F**	NM
NFC 13.56 MHz		P		

Appendix A: FCC RF Exposure

General description of the device under evaluation

The test sample consists of a door handle sensor which is a standalone module with capacitive and NFC functions. This module is integrated into a door handle, and used in Keyless Entry System, enabling “key-free” Vehicle Unlocking and Locking.

According to the manufacturer, during its normal use, the separation distance between the device and the body of nearby users will be smaller than 20 cm.

RF Exposure evaluation for the NFC 13.56 MHz has been conducted through field measurements (see FCC NFC 13.56 MHz Evaluation section below).

Evaluation Results

Following results correspond to maximum measured field values:

Technology	Frequency (MHz)	Max. E-field (V/m)	Max. H-field (A/m)	E-field Limit (V/m)	H-field Limit (A/m)	Verdict
NFC 13.56 MHz	13.5663	0.73	-	60.74	-	**PASS**
	13.5565	-	0.018	-	0.162	**PASS**

Table 1: Max H-field and E-field results

FCC NFC 13.56 MHz Evaluation

Measurements have been made from all sides of the device with a separation distance of 0 cm measured from the center of the probe to the edge of the device (due to the field probe dimensions, 4.5cm is the closest distance between the device edges and the measurement field probe center). Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. Measurements were performed using the equipment listed in the “Used Instrumentation” paragraph of this document using a commercial sample provided by the manufacturer:

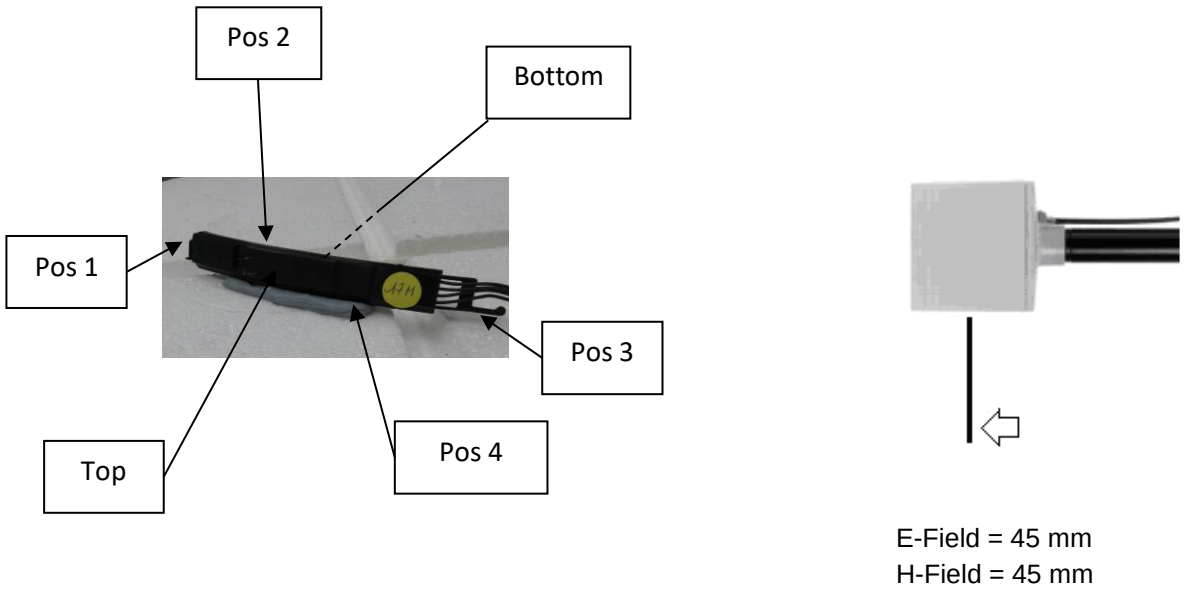


Figure 1: E and H field measurement setup

Following results correspond to maximum measured field values:

Test side	Distance to DUT (cm)	Frequency (MHz)	H-Field (A/m)	Limit (A/m)	% Limit	Verdict
Top	0 (4.5)[1]	13.5565	0.018	0.162	10.8	**Pass**
Top	0.5 (5)	13.5603	0.016	0.162	9.9	**Pass**
Top	1.5 (6)	13.5520	0.013	0.162	7.8	**Pass**
Back	0 (4.5)	13.5595	0.008	0.162	5.0	**Pass**
Pos 1	0 (4.5)	13.5445	0.001	0.162	0.5	**Pass**
Pos 2	0 (4.5)	13.5625	0.004	0.161	2.2	**Pass**
Pos 3	0 (4.5)	13.5640	0.001	0.161	0.6	**Pass**
Pos 4	0 (4.5)	13.5595	0.002	0.162	1.1	**Pass**

Table 2: H-field measurement values

Test side	Distance to DUT (cm)	Frequency (MHz)	E-Field (V/m)	Limit (V/m)	% Limit	Verdict
Top	0 (4.5)	13.5550	0.19	60.79	0.3	**Pass**
Back	0 (4.5)	13.5648	0.14	60.75	0.2	**Pass**
Pos 1	0 (4.5)	13.5753	0.07	60.70	0.1	**Pass**
Pos 2	0 (4.5)	13.5580	0.09	60.78	0.1	**Pass**
Pos 3	0 (4.5)	13.6615	0.06	60.32	0.1	**Pass**
Pos 4	0 (4.5)	13.5663	0.73	60.74	1.2	**Pass**
Pos 4	0.5 (5)	13.5633	0.31	60.75	0.5	**Pass**
Pos 4	1.5 (6)	13.6150	0.07	60.52	0.1	**Pass**

Table 3: E-field measurements values

All H-Field and E-Field values are in compliance to values shown into §1.1310, paragraph (e), “Table 1: limits for Maximum Permissible Exposure (MPE).

[1] See “FCC NFC 13.56 MHz Evaluation” section remark about the measurement distance due to the probe dimensions.

Appendix B: RF Exposure Information

FCC RF Exposure evaluation for portable devices

When a device qualifies for the categorical exclusion provision of § 2.1093(c), the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to §1.1310 Radiofrequency radiation exposure limits, paragraph (e), the limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields are:

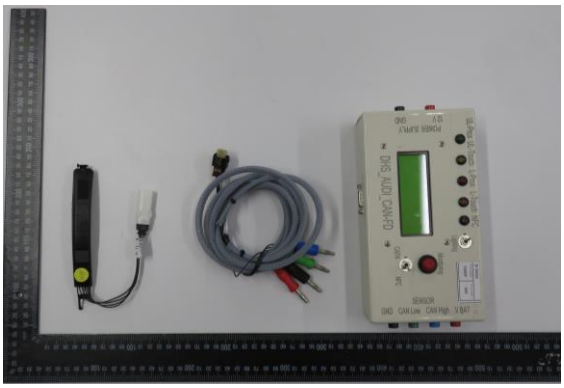
TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*100	6
3.0–30	1842/f	4.89/f	$*900/f^2$	6
30–300	61.4	0.163	1.0	6
300–1,500	.....	.....	f/300	6
1,500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*100	30
1.34–30	824/f	2.19/f	$*180/f^2$	30
30–300	27.5	0.073	0.2	30
300–1,500	.....	.....	f/1500	30
1,500–100,000	.....	.....	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

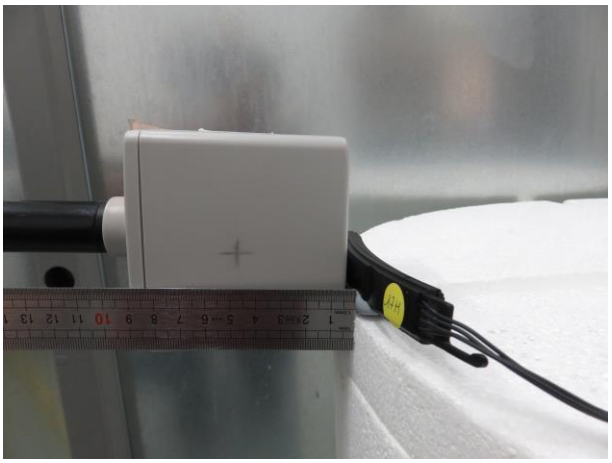
Appendix C: Photographs

Equipment view

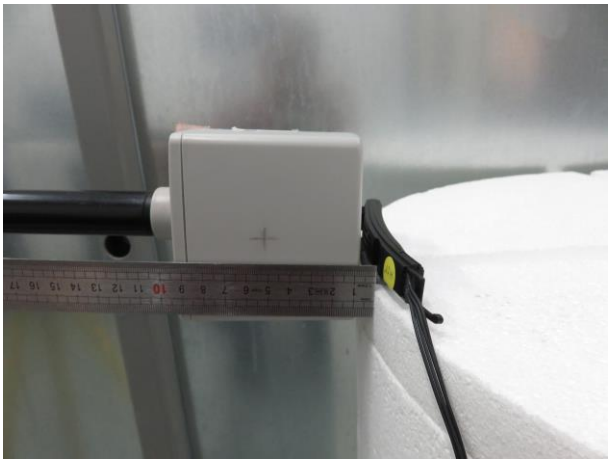


H-Field and E-Field measurement setup views

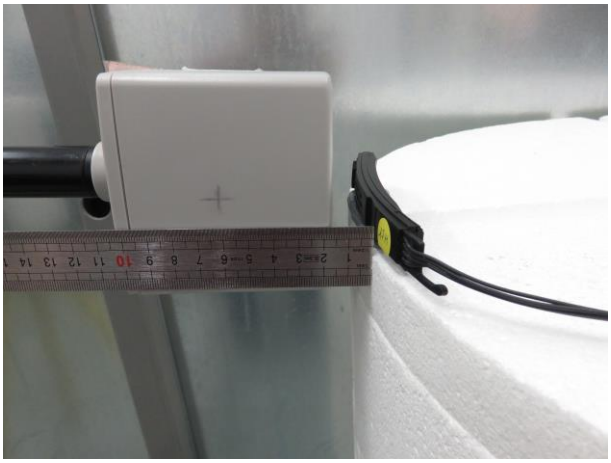
Top – 0 cm (4.5 cm)



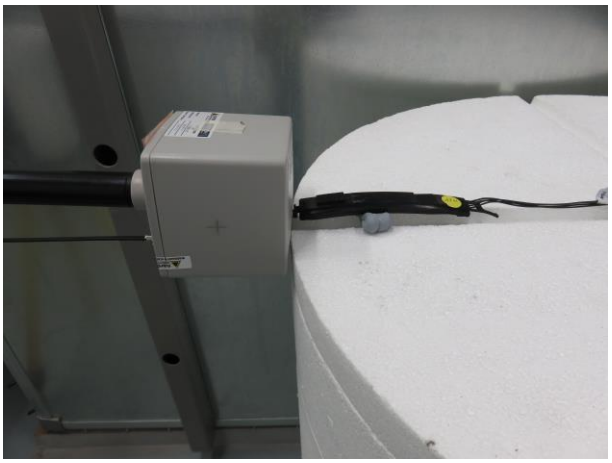
Top – 0.5 cm (5 cm)



Top – 1.5 cm (6 cm)



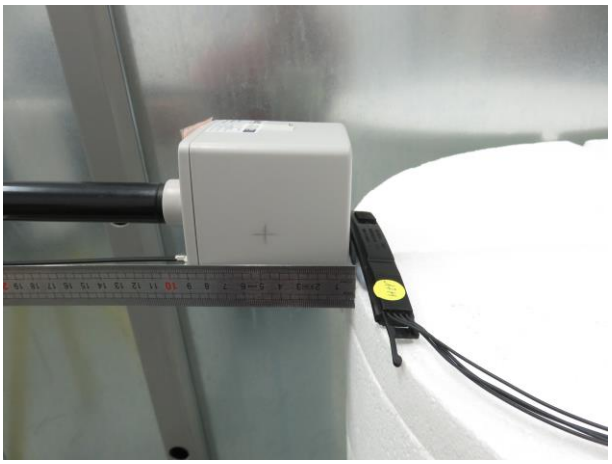
Pos 1 – 0 cm (4.5 cm)



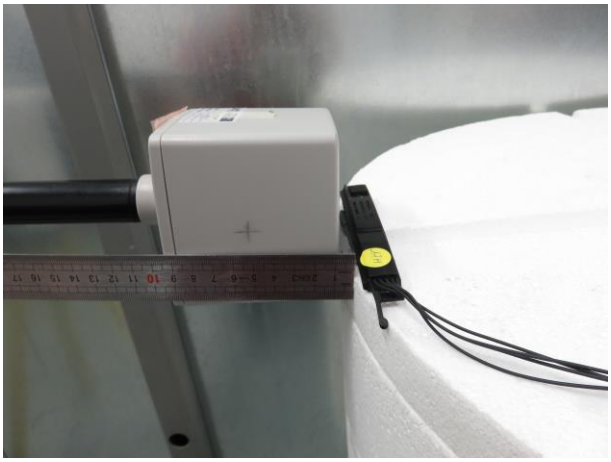
Pos 2 – 0 cm (4.5 cm)

Pos 3 – 0 cm (4.5 cm)

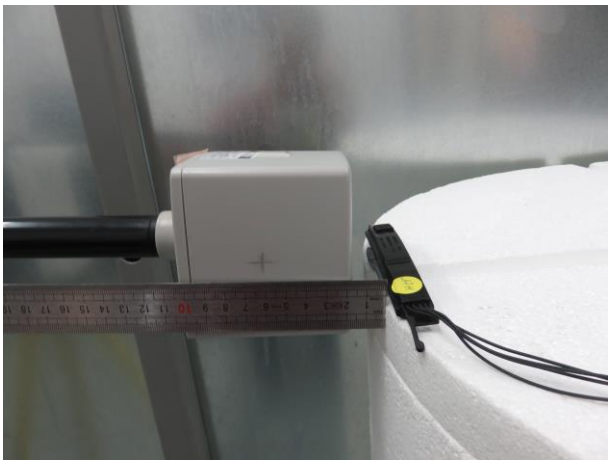
Pos 4 – 0 cm (4.5 cm)



Pos 4 – 0.5 cm (5 cm)



Pos 4 – 1.5 cm (6 cm)



Back – 0 cm (4.5 cm)