

User Manual

FCC ID: 26ATC-DHSEQ5NFC

IC: 28616-DHSEQ5NFC

Model Name: DHSEQ5NFC

Product name	Variant	Model Name	Vitesco Part number	Audi Part number
DHS Audi EQ5 NFC - L	NFC Left	DHSEQ5NFC	AAA2064150000	85E.927.753
DHS Audi EQ5 NFC - R	NFC Right	DHSEQ5RNFC	AAA2116620000	85E.927.754

History:

Date	Version	Maturity	Short description
2020-06-20	AA	Draft	Creation for EQ5 NFC project initial request

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Date Aug 11, 2022 Department : S&A				
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2. General

2.1. Contact

Function:	Name:	Email	Phone
Project Leader	Stacie Allen	Stacie.allen@vitesco.com	(+33) 7 88 99 98 14
Homologation contact	Alberto Rico	Alberto.rico@dekra.com	(34) 95 261 94 06
System Engineer	Thierry Guidet	Thierry.guidet@vitesco.com	(+33) 6 76 17 32 47
System Engineer	Mickaël Saint-Martin	Mickael.saint-martin@vitesco.com	(+33) 6 75 34 32 34

2.2. Glossary

DH:	Door Handle (means Outside Door Handle)
DHS:	Door Handle Sensor Module (Unlock and Lock capacitive sensors)
LF:	Low Frequency (125kHz signal for communication from ECU to Keyfob)
RF:	Radio-Frequency (433 MHz signal for communication from Keyfob to ECU)
ECU:	Electronic Control Unit
BCM:	Body Controller Module
NFC :	Near Field Communication
PCD :	Proximity Coupling Device (the Reader)
PICC :	Proximity Integrated Circuit Card (the Smartcard/the Smartphone)
HW:	Hardware
SW:	Software
RT:	Room Temperature
EMC:	Electro Magnetic Compatibility

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3. User Manual

3.1. Canada – ISED Certification

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This device complies with ISED Canada's license-exempt RSSs. Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

This device complies with the ISED RF exposure limits and has been evaluated in compliance with portable exposure condition. There is no limitation as to which distance can be used from the human body

Note: need to translate in French after draft is OK

3.2. Mexico

Read the manual before installing or operating. (Leer el manual antes de instalar u operar)

Emilio Ruisanchez Castellanos
Representante Legal de Volkswagen de México, S.A. de C.V.
Km.116 Autopista México Puebla, San Lorenzo Almecatla, Cuautlancingo Puebla C.P. 72700

Note the name, address and contact telephone of the importer :

Electrical specifications may be found in the technical specification.

3.3. United States of America

FCC ID: 26ATC-VASEQ5NFC

Caution: the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

"This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

This device complies with the FCC RF exposure limits and has been evaluated in compliance with portable exposure condition. There is no limitation as to which distance can be used from the human body

—Reorient or relocate the receiving antenna.

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—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.”
For systems incorporating several digital devices, this statement needs to be contained only in the instruction manual for the main control unit. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

3.4. EUROPE

- The radio equipment must be accompanied by instructions and safety information in a language which can be easily understood by consumers and other end-users, as determined by the Member State concerned.

- Instructions shall include the information required to use radio equipment in accordance with its intended use. Such information shall include, where applicable, a description of accessories and components, including software, which allow the radio equipment to operate as intended.

- Simplified EU DoC. Manufacturer must include the following sentences in all in the official *languages of all EU member countries* :

English:

Hereby, Vitesco Technologies declares that the radio equipment type DHSEQ5NFC is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

Suomi:

Vitesco Technologie vakuuttaa, että radiolaitetyyppi DHSEQ5NFC on direktiivin 2014/53/EU mukainen.

EU-vaatimusten mukaisuusvakuutuksen täysimittainen teksti on saatavilla seuraavassa internetosoitteessa:

Nederlands:

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Hierbij verklaar ik, Vitesco Technologie dat het type radioapparatuur DHSEQ5NFC conform is met Richtlijn 2014/53/EU.

De volledige tekst van de EU-conformiteitsverklaring kan worden geraadpleegd op het volgende internetadres:

Francais:

Le soussigne, [Name of manufacturer], declare que l'équipement radioélectrique du type DHSEQ5NFC est conforme a la directive 2014/53/UE.

Le texte complet de la declaration UE de conformite est disponible a l'adresse internet suivante:

Svenska:

Harmed forsakrar Vitesco Technologie att denna typ av radioutrustning DHSEQ5NFC överensstämmer med direktiv 2014/53/EU. Den fullständiga texten till EU-försäkran om överensstämmelse finns på följande webbadress:

Dansk:

Hermed erklærer Vitesco Technologie at radioudstyrstypen DHSEQ5NFC er i overensstemmelse med direktiv 2014/53/EU.

EU-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse:

Deutsch:

Hiermit erklart Vitesco Technologie, dass der Funkanlagentyp DHSEQ5NFC der Richtlinie 2014/53/EU entspricht.

Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar:

Ελληνικά:

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Με την παρούσα ο/η Vitesco Technologie, δηλώνει ότι ο ραδιοεξοπλισμός DHSEQ5NFC πληροί την οδηγία 2014/53/ΕΕ.

Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο:

Italiano:

Il fabbricante Vitesco Technologie, dichiara che il tipo di apparecchiatura radio DHSEQ5NFC e conforme alla direttiva 2014/53/UE.

Il testo completo della dichiarazione di conformità UE e disponibile al seguente indirizzo Internet:

Espanol:

Por la presente, Vitesco Technologie declara que el tipo de equipo radioeléctrico DHSEQ5NFC es conforme con la Directiva 2014/53/UE.

El texto completo de la declaración UE de conformidad está disponible en la dirección Internet siguiente:

Portugues:

O(a) abaixo assinado(a) Vitesco Technologie declara que o presente tipo de equipamento de radio DHSEQ5NFC esta em conformidade com a Diretiva 2014/53/UE.

O texto integral da declaracao de conformidade esta disponivel no seguinte endereco de Internet:

Čeština:

Tímto Vitesco Technologie prohlašuje, že typ radiového zařízení DHSEQ5NFC je v souladu se směrnici 2014/53/EU.

Uplně znění EU prohlášení o shodě je k dispozici na této internetové adrese:

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Eesti:

Kaesolevaga deklareerib Vitesco Technologie, et kaesolev raadioseadme

tuup DHSEQ5NFC vastab direktiivi 2014/53/EL nouetele.

ELi vastavusdeklaratsiooni taelik tekst on kattesaadav

jargmisel internetiaadressil:

Magyar:

Vitesco Technologie igazolja, hogy a DHSEQ5NFC típusu radioberendezés megfelel a 2014/53/EU irányelvnek.

Az EU-megfelelősegi nyilatkozat teljes szövege elérhető a következő internetes címen:

Latviešu valoda:

Ar šo Vitesco Technologiedeklarē, ka radioiekārta DHSEQ5NFC atbilst Direktīvai 2014/53/ES.

Pilns ES atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē:

Lietuvių kalba:

Aš, Vitesco Technologie, patvirtinu, kad radijo įrenginių tipas DHSEQ5NFC atitinka Direktyvą 2014/53/ES.

Visas ES atitikties deklaracijos tekstas prieinamas šiuo interneto adresu:

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Malti:

B'dan, Vitesco Technologie, niddikjara li dan it-tip ta' tagħmir tar-radju DHSEQ5NFC huwa konformi mad-Direttiva 2014/53/UE.

It-test kollu tad-dikjarazzjoni ta' konformita tal-UE huwa disponibbli f'dan l-indirizz tal-Internet li ġej:

Slovenčina:

Vitesco Technologie týmto vyhlasuje, že rádiové zariadenie typu DHSEQ5NFC je v súlade so smernicou 2014/53/EÚ.

Úplné EÚ vyhlásenie o zhode je k dispozícii na tejto internetovej adrese:

Slovenščina:

Vitesco Technologie potrjuje, da je tip radijske opreme DHSEQ5NFC skladen z Direktivo 2014/53/EU.

Celotno besedilo izjave EU o skladnosti je na voljo na naslednjem spletnem naslovu:

Romană:

Prin prezenta, Vitesco Technologie declară că tipul de echipamente radio DHSEQ5NFC este în conformitate cu Directiva 2014/53/UE.

Textul integral al declarației UE de conformitate este disponibil la următoarea adresă internet:

български:

С настоящото Vitesco Technologie декларира, че този тип радиосъоръжение DHSEQ5NFC е в съответствие с Директива 2014/53/ЕС.

Цялостният текст на ЕС декларацията за съответствие може да се намери на следния интернет адрес:

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Polski:

Vitesco Technologie niniejszym oświadcza, że typ urządzenia radiowego DHSEQ5NFC jest zgodny z dyrektywą 2014/53/UE.

Pełny tekst deklaracji zgodności UE jest dostępny pod następującym adresem internetowym:

Norsk:

Herved Vitesco Technologie erklærer at radioutstyr type DHSEQ5NFC er i samsvar med direktiv 2014/53/EU.

Den fullstendige teksten i EU-samsvarserklæringen er tilgjengelig på følgende internettadresse:

Islenska:

Hér með Vitesco Technologie lýsir yfir að tegund þráðlausan búnað DHSEQ5NFC er í samræmi við tilskipun 2014/53/ESB.

The fullur texti af ESB-samræmisýfirlýsingu er í boði á eftirfarandi veffangi:

Hrvatski:

Vitesco Technologie ovime izjavljue da je radijska oprema tipa DHSEQ5NFC u skladu s Direktivom 2014/53/EU.

Cjeloviti tekst EU izjave o sukladnosti dostupan je na sljedećoj internetskoj adresi:

Türk:

Burada, Vitesco Technologie radyo ekipmanı türünün DHSEQ5NFC 2014/53/EU direktiflerine uyumlu olduğunu beyan eder.

Uyumu beyanının tam metni belirtilen internet sitesinde mevcuttur:

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- In case the manufacturer data ,Vitesco Technologies, located at 44 Avenue du General de Crouette, Toulouse, France Postcode/Zip Code: 31100 , cannot be included in the radio equipment, this information must be on its packaging, or in a document accompanying the radio equipment.
- In case the importer data (Vitesco Technologies, located at 44 Avenue du General de Crouette, Toulouse, France Postcode/Zip Code: 31100 cannot be included in the radio equipment, this information must be on its packaging, or in a document accompanying the radio equipment.

3.5. TAIWAN

The following information has to be included in the user's manual:

- DHS_EQ5_NFC
- DHSEQ5NFC
- Vitesco Technologies

NCC caution statement for low power devices according to LP0002. The following warning statement must be written in Chinese:

“Without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power or alter original characteristic as well as performance to a approved low power radio-frequency devices. The low power radio-frequency devices shall not influence aircraft security and interfere legal communications; If found, the user shall cease operating immediately until no interference is achieved. The said legal communications means radio communications is operated in compliance with the Telecommunications Management Act. The low power radio-frequency devices must be susceptible with the interference from legal communications or ISM radio wave radiated devices.”

In Chinese language, the warning would be:

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

3.6. UK

Importer company information must be included in final version of the user manual

Import company from Audi

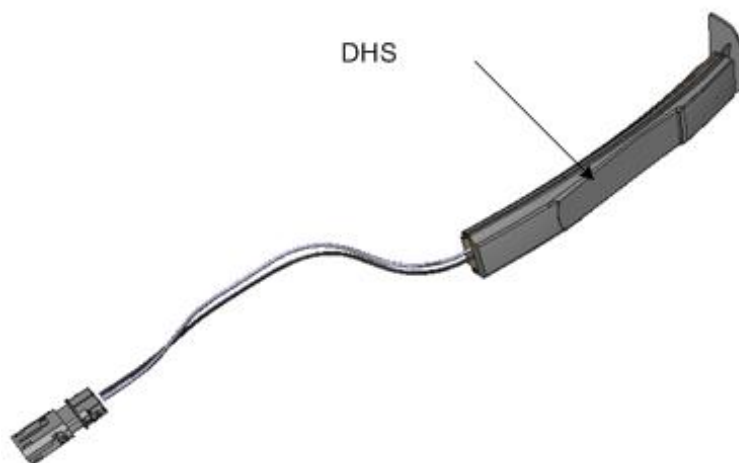
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4. Technical specifications

This sensor is a DHS (Door Handle Sensor).



The DHS is a standalone module with double capacitive sensor and NFC technology.

The module is integrated into a door handle, and used in Keyless Entry System, enabling 'key-free' vehicle unlocking and locking.

4.1. NFC Sensor Functions

Unlock Function: Capacitive detection

Lock function: Capacitive detection

NFC Function : Read/Write function of NFC Smartcards/Smartphones.

4.2. Misuse Protections

After 20 lock/unlock activations in less than 10 seconds the sensor deactivates detection functions for 30s.

After 20 NFC activations with wrong TAG in less than 10 seconds the sensor deactivates NFC function for 30s.

4.3. NFC Reader Principle

The NFC principle is based on electromagnetic coupling between 2 devices at close distance (few cm).

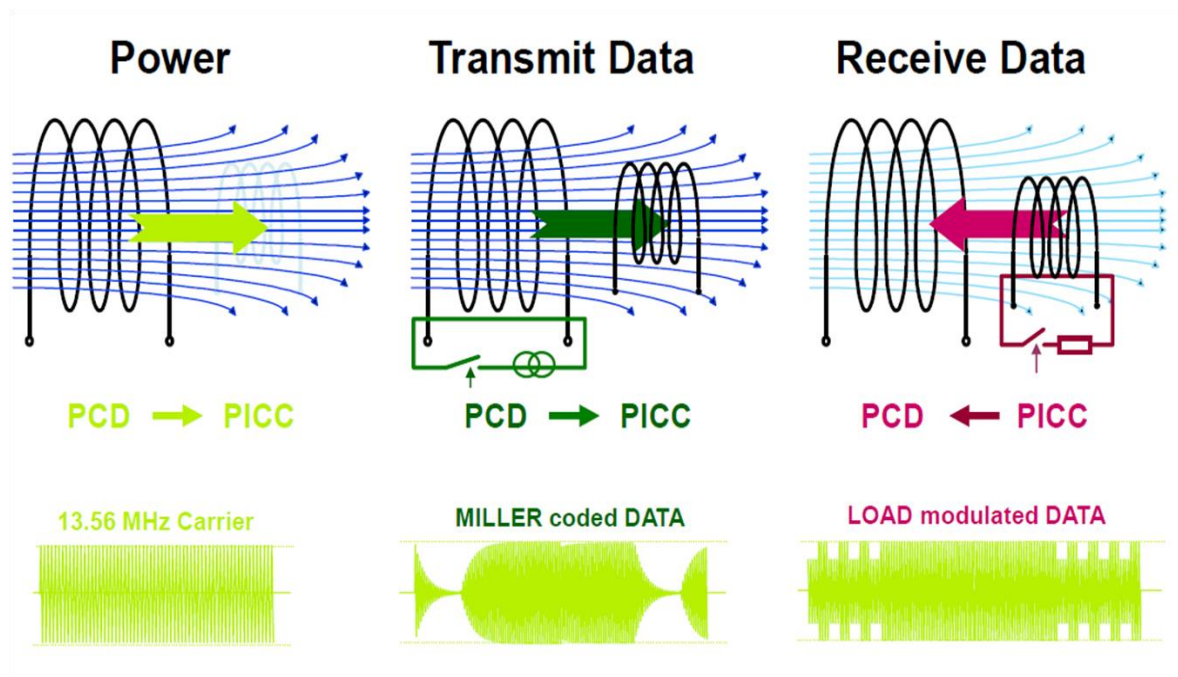
The PCD emits an electromagnetic field on a 13.56 Mhz carrier. It will power the PICC via Induction.

The PCD can transmit data via Miller Coding and receive data back via Load modulation.

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4.4. NFC Communication Module

4.4.1. NFC Communication - Transceiver

The Electronics shall embed a NFC transceiver to enable the NFC bi-directional communication.

4.4.2. NFC Actuator test

The actuator test is used to execute the homologation campaign, setting the NFC discovery mode permanently. Refer to §'Operational mode description' in this document.

5. Operational mode description

5.1. Functional mode

The DHS is designed to send information to the CAN bus on following user events:

- When a card or a smartphone is detected closed to the NFC pad

5.2. NFC test mode

Test mode NFC is activated when setting CAN signal on CAN bus

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When the car driver put his smartphone close to the door handle (*), then the authenticated signal is sent to the BCM.

(*) and authenticated

5.1. Actuation test

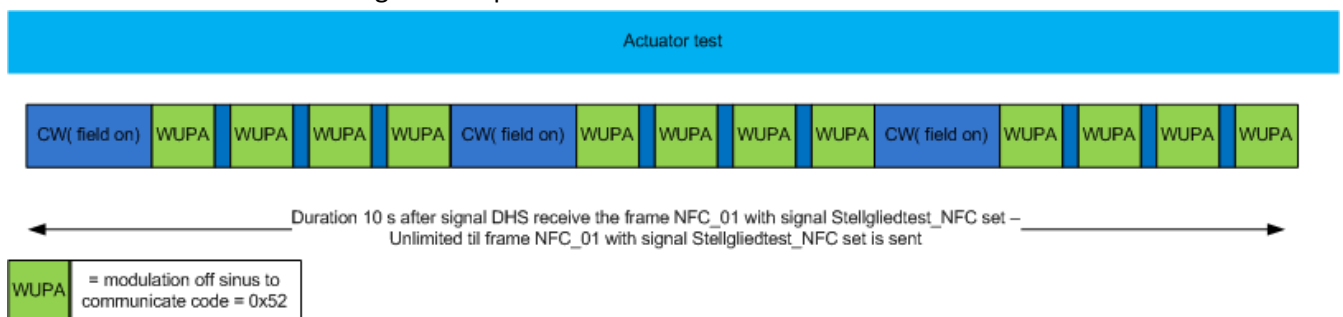
The actuator test is activated by CAN signal.

The DHS shall perform the actuator test requirement as described below :

1. It shall turn on the antenna for a delay set to 10sec., and look for an external device with RF discovery polling rate as short as possible
2. If it finds an appropriate counterpart (NFC-A Type 4), it shall activate and send the SELECT command.
3. It shall feedback the result by changing the parameter "authenticated NFC-counterpart"

The DHS Application shall execute the actuator test (when requested) at any time regardless of the Misuse or K15 State and ESM (Energy Saving Mode)

The field is turned on during the complete duration of the actuator test.



REQA is replaced by WUPA to ensure several communications possible whereas field is kept on.

The DHS shall stop the actuator test if:

- Stopped by Test box
- After 10sec if no Test Box connected to the DUT (Actuator mode test set by CAN, for example)

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6. Homologation setup

6.1. General Test conditions

General test conditions valid for all tests :

- All materials within 100mm around the door handle sensor during the test process (includes Handle fixations - “Sensor fixture” / “Holder”, sockets, base plate, ... -, actuation system – robot, arms, ...-, tester mechanics, ...) shall be made of non conductive material and as electrostatic neutral as possible
- Conductive environment (Robot, arms, jig walls, etc ...) shall be at least 100mm away from Door Handle Assembly throughout the test sequence (except for Targets themselves).
- The DHS shall have its dedicated power supply. This power supply shall be a low noise linear power supply (switch mode power supplies are prohibited)
- No noise shall be visible by oscilloscope on DHS supply line.

7. Sensor operating mode

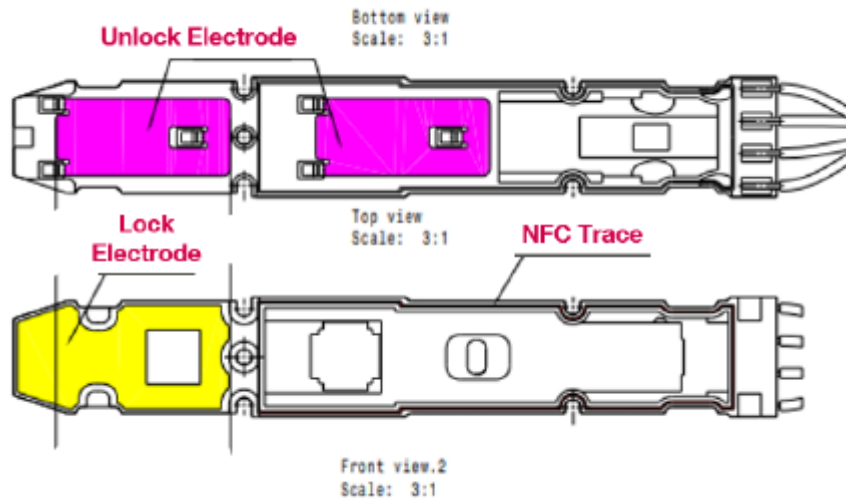
		Number	General description	SW version	Current consumption
TOTAL OF SAMPLES	COMMERCIAL	10	Commercial sensors	Commercial SW (X200)	Idle mode : 0,4mA Lock/Unlock detection (capacitive function) : 33mA NFC detection : between 35-110mA according to NFC device and data exchange
	CONDUCTED	4	Modified samples with SMA connectors + SW for continuous transmission	X200 with continuous transmission	Sensor permanently awakened due to specific SW : 110mA
	RADIATED	3	Commercial sensors with SW for continuous transmission	X200 with continuous transmission	Sensor permanently awakened up due to specific SW : 110mA

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7.1. “COMMERCIAL” sample



- Plug and power up the sensor : sensor goes immediately in idle mode (0.4mA);
- Sensor could be awakened with capacitive function by touching Unlock or Lock area (35mA).
Lock area : sensor returned in idle mode approximately 5s after having removed hand.
Unlock area : sensor returned in idle mode approximately 5s after beginning of detection.
- Sensor could be awakened with NFC function by approaching PICC device on NFC trace (between 35-110mA according to NFC device and data exchange).
Sensor returned in idle mode approximately 5s after having removed PICC device.

7.2. “CONDUCTED” sample

- Plug and power up the sensor : the sensor goes immediately in NFC transmission mode (110mA)

7.3. “RADIATED” sample

- Plug and power up the sensor : the sensor goes immediately in NFC transmission mode (110mA)

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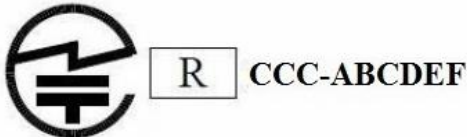
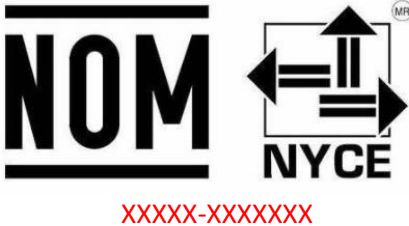
8. Product label design



The product includes the markings shown above:

- Manufacturer Name: Vitesco
- Model Name: DHSEQ5NFC (or DHSEQ5HNFC for Right Hand version)
- IC ID: 28616-VASEQ5NFC
- FCC ID: 26ATC-VASEQ5NFC
- EU : CE marking
- South Korea: KC Marking
- United Kingdom: UKCA Marking

The following markings are not included on the product itself:

Japan (to be updated)	
Malaysia	
Mexico (to be updated)	
Serbia (to be updated)	

Date Aug 11, 2022 Department : S&A				
Designed by Thierry Guidet				
Released by Mickael Saint-Martin				
vitesco TECHNOLOGIES	Designation			
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Singapore (to be updated)	Complies with IMDA Standards [Dealer's Licence No.] Label Size <u>17mm by 9mm</u> (Not to Scale)
South Africa (to be updated)	 TA XXXX-YYYY APPROVED
Taiwan (to be updated)	 CCXXxxYYyyyZzW

Designed by Thierry Guidet Released by Mickael Saint-Martin				
	Designation			
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