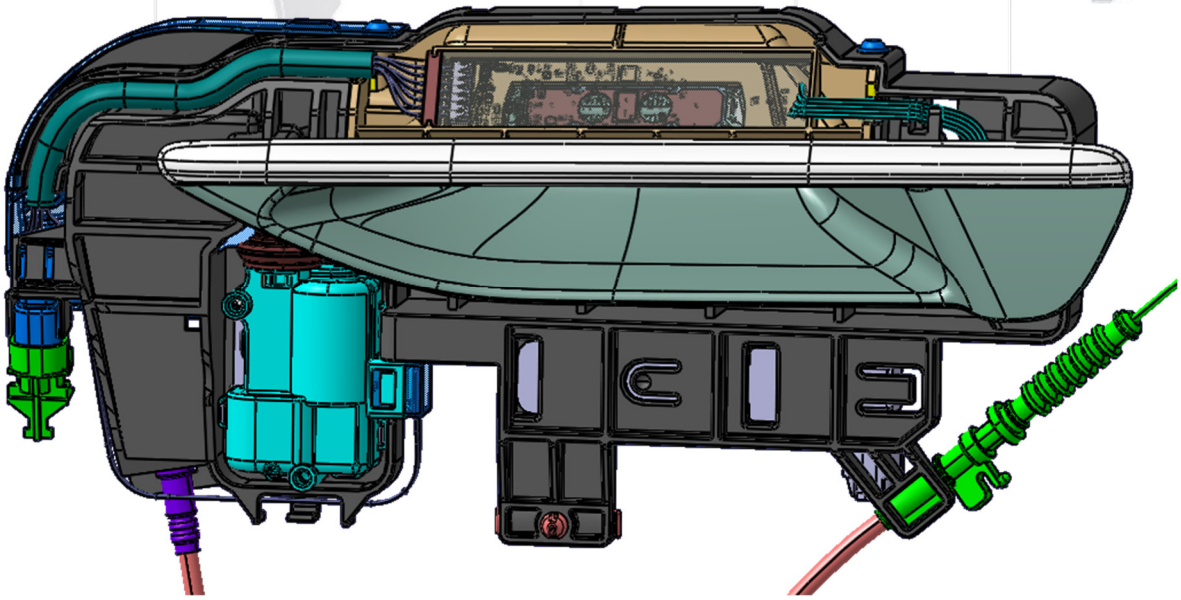
Technical Datasheet & User Manual
Audi NFCETAB 1

Huf project number.:	3025.002
Huf project name:	Audi / AU513/4 / Bracket - eTAB
Customer:	Audi
Model name:	NFCETAB1
Component:	eTAB V5 for homologation
Vehicles	E6, B10, C9
HW-Version:	HW05
SW-Version:	NFC_V5.24



I. Change History

Index	Changes	Date
000	Initial version	10.02.2023

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III. List of abbreviations

AM	Amplitudenmodulation
ASK	Amplitude shift keying
CW	Continuous wave
ECU	Electronic Control Unit
eTSG	eTür-Steuer-Gerät
ETSI	European Telecommunications Standards Institute
Huf	Huf Hülsbeck & Fürst GmbH & Co. KG
IEC	International Electro technical Commission
ISO	International Organization for Standardization
LPCD	Low Power Card Detection
MECVD	Multipuls Enhanced Capacitive Voltage Divider
NFC	Near Field Communication
OEM	Original Equipment Manufacturer
OOK	On/ Off Keying
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PCD	Proximity coupling device
PICC	Proximity integrated circuit card
RED	Radio Equipment Directive
RF	Radio-Frequency

1 Product Overview

1.1 Technical data

- **Temperature:**
  - Operating temperature range: -40°C to +80°C
  - Storage temperature range: -40°C to +90°C
  - Repainting temperature: 110°C for 1h, 130°C for 0,25h

- **Operating voltage range:**
  - CAN-FD 6,5 – 18V (± 2%)
  - LIN 8 – 18V (± 2%)
  - Function 9V – 16V (±2%)

- **Quiescent current:**
  - Standby-Mode V1/V4 100µA
  - Aktiv-Mode V1/V4 < 20mA
  - Standby-Mode V5 300µA
  - Aktiv-Mode V5 < 200mA

- **Measuring cycle:**
  - Capacative 25ms
  - Inductive 200ms
  - NFC 100ms (adjustable up to 800ms)
  - NFC-LPCD pulse: 40 - 50µs

- **Working frequencies:**
  - Burst MECVD 333/ 400kHz
  - µC Burst activation 4MHz
  - µC ADC + data handling 32MHz
  - Inductive Sensor 3,94MHz
  - NFC carrier frequency 13,56MHz

- **Baud rates:**
  - LIN 19,2kBit/s
  - CAN-FD 500kBit/s

- **NFC:**
  - Mode NFC initiator in Reader-Writer Mode
  - Communication Role Proximity Coupling Device (PCD)
  - Communication Range ≤ 3cm
  - Standard ISO/IEC 14443 Type A + Apple ECP
  - Type of modulation 100% ASK modified Miller (PCD to PICC)
Load Modulation OOK (PICC to PCD)
  - Bit rate 13,56MHz/128 ≈ 106kBaud
  - Frequency 13,56MHz +/- 7kHz
  - Crystal Stability +/- 30ppm

1.2 Functional description

1.2.1 Function capacitive sensors:

There are two different capacitive sensors. The first sensor is used for unlock function and designed as an approach sensor. The second sensor is used for lock function and is designed as a touch sensor.
Keyless access is enabled by activating the sensors on the door handle in combination with the door handle-ECU, whereby the vehicle can be unlocked or locked.

1.2.2 Function inductive sensors:

An unlock touch function to open the door electrically is implemented via two inductive sensing channels on the main PCBA in combination with a metallic target (2k button). Changing the distance of the metallic target to the resonant sensors on the PCBA (parallel resonant circuit) causes frequency shifts, which will be detected by an inductance-to-digital converter (LDC).

1.2.3 Function NFC:

To enable communication with an NFC device, the door handle electronics variant V5 has a highly integrated transceiver IC for contactless communication at 13,56MHz for automotive applications. This reader has a gateway function, the possibility to buffer required data and various diagnostic information can be provided as well.
The data is transferred to the NFC device according to ISO/IEC 14443-A. The data transmission to the vehicle is realized via a high-speed CAN-FD interface. ECP according to Car Keys specification is implemented to communicate also with Apple NFC devices.
In LPCD mode the door handle electronics checks the magnetic field for amplitude or phase change. This LPCD polling takes place in adjustable interval lengths.

1.2.4 Function Actuator:

It is used in case of emergency (crash), the higher level ECU will send a command to activate the actuator which will release the Bowden cable and the door can be opened from outside by hand.

1.2.5 Function Lighting:

Light function can be requested by the higher level ECU via the communication interface. The LED control happens on the main PCBA. A slow rise and fade of the light is implemented.

1.2.6 Function eTSG:

The eTSG function is an interface between eTSG and door handle with the possibility to activate the actuator circuit, when the door handle is not powered in case of emergency.

2 Declaration of Conformity, product Label

2.1 Radio equipment authorization to FCC in USA

FCC ID:YGONFCETAB1

The transmitter will be supplied as an original equipment device to the car manufacturer.

According to 47 CFR 15.19 (labelling requirements) the car manufacturer will print the following text in the appropriate User's Manual of the car:

> 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.
>
> Usually this is followed by the following FCC caution:
> Any changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

2.2 Radio equipment authorization to RSS-210 in Canada

IC ID: 4008C-NFCETAB1

The transmitter will be supplied as an original equipment device to the car manufacturer.

According to RSS-210 (labelling requirements) the car manufacturer will print the following text in the appropriate User's Manual of the car:

> This device complies with Industry Canada licence-exempt RSS standard(s). 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.
>
> Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
> (1) l'appareil ne doit pas produire de brouillage, et
> (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, mêmesi le brouillage est susceptible d'en compromettre le fonctionnement.
>
> Usually this is followed by the following RSS caution:
> Any changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

3 Regulatory Information

3.1 USA:

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.

Any changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

3.2 Kanada:

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, mêmesi le brouillage est susceptible d'en compromettre le fonctionnement.

Any changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

3.3 Taiwan

「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