Operational Description and User Manual
FLAECH TAGE NFC

I. Table of Contents

1 General product overview

1.1.1 Function CA:

There are two different capacitive sensors. The first sensor is used for unlock function. This sensor can distinguish an approach and a touch in SW, but there is only a LIN or UART signalization for unlock touch. The second sensor is used for lock function and is designed as a touch sensor. A SW differentiation between lock approach and lock touch is also

possible, but just as the unlock sensor there is only a LIN or UART signalization for the lock touch.
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.

1.1.2 Function NFC:

To enable communication with an NFC device, the door handle electronics CA + NFC 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 and the data transmission to the vehicle is realized via LIN-Bus interface. ECP is implemented to communicate 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 Environmental conditions

- Operating temperature range: -40 to +85°C
- Storage temperature range: 40 to +105°C
- Repainting temperature: 110°C for 1h, 130°C for 0,25h
- Room temperature: +23°C ± 5°C
- Air humidity: 25% to 90%
- Test temperature for EOL-Test: Room temperature

1.3 General manufacturing instructions

- At the beginning of the production process, the serial number is marked on the PCB.
- An unacceptable deflection of the board while placing components must be avoided.
- PCB separation is a particularly critical process. Torsional stress during separation and impact stress during punching shall be avoided.
- The method for depanelling must ensure that no components be damaged. An evidence of the equipment manufacturer is necessary.
- The soldering process should be reflow soldering and selective wave soldering.
- Active cooling of the board after soldering is not permitted.
- The components specifications concerning the temperature gradients must be adhered.
- A reworking of a SMD component with a soldering iron is prohibited.

1.1 Assembly concept of electronics FLAECH TAGE NFC

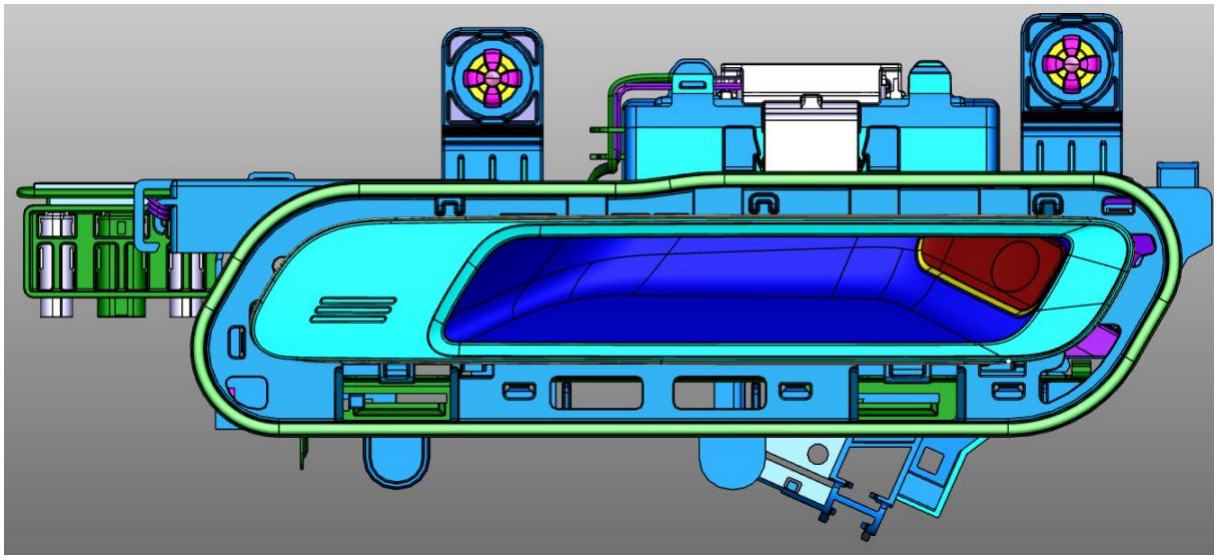

Figure 1: FLAECH TAGE NFC with electronics plugged in bracket

1.1.1 NFC antenna

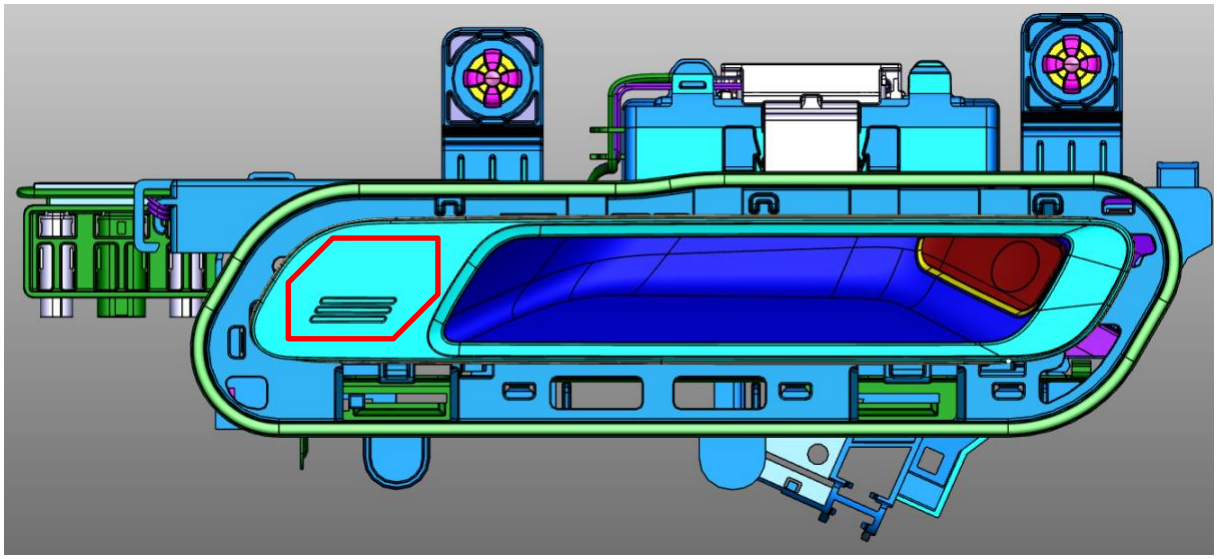

Figure 2: Detection area NFC antenna

1.2 Connector definitions

1.2.1 Connector BMW I20 CA + NFC,FLAECH TAGE NFC

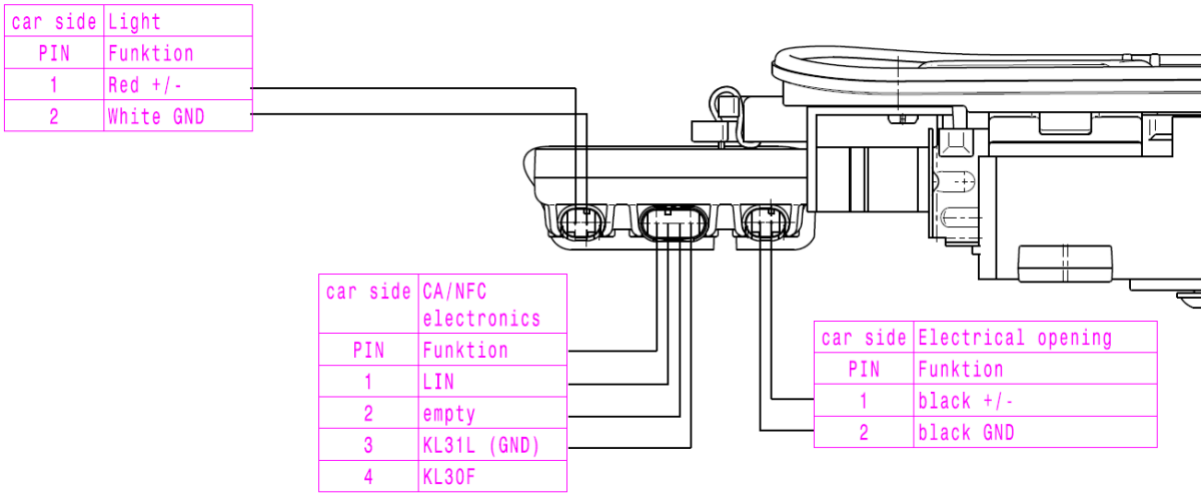

Figure 3: BMW I20 CA and CA + NFC door handle connectors

The BMW I20 CA and CA + NFC electronic module have the following connector pins:

- Pin 1 (yellow) = LIN
- Pin 2 = n.c.
- Pin 3 (brown) = clamp 31 (GND)
- Pin 4 (red) = clamp 30 (+Ubat)

The BMW I20 electrical opening module has the following connector pins:

- Pin 1 (black) = micro switch
- Pin 2 (black) = clamp 31 (GND)
- Pin 3 (brown) = clamp 31 (GND)
- Pin 4 (red) = clamp 30 (+Ubat)

The BMW I20 light module has the following connector pins:

- Pin 1 (red) = positive supply light module
- Pin 2 (white) = clamp 31 (GND)

2 Electrical Characteristics

2.1 Block diagram – BMW I20 CA + NFC, LIN

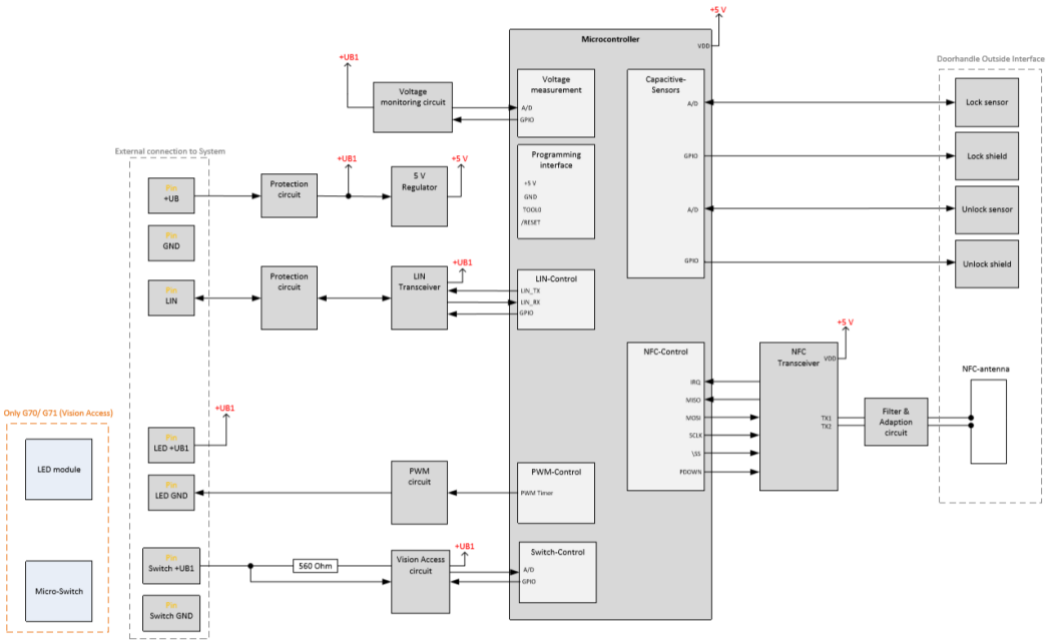

Figure 4: Block diagram – BMW I20 CA + NFC, LIN (SP2021)

2.2 Operating voltages

- Operating voltage range: +Ubat = 9V to 16V DC
- LIN operating voltage range: +Ubat = 8V to 18V DC
- Test voltage for EOL: +Ubat = 12V ± 2% DC

2.3 Current consumption

- Series parts current consumption:
  - Quiescent current: I_{quies} ≤ 400µA for 4 TAGE per vehicle
    I_{quies} ≤ 200µA for 2 TAGE per vehicle
    CA = 65µA
    CA + NFC = 150µA
  - Active current: I_{active} ≤ 250mA
    CA < 10mA
    CA + NFC < 120mA

The final values have to be defined with series parts by Huf-HQ.

2.4 Timing conditions

- Polling rate:

○ CA	20ms
○ CA + NFC	20ms (Kapa), 100ms (NFC)
- NFC-LPCD pulse:	40µs
- Clock rate microcontroller:	
○ Kapaburst (333kHz/ 400kHz)	4MHz
○ A/D conversion + data handling	32MHz
- Baudrate:	
○ UART	4800Bit/s up to 38400Bit/s
○ LIN	9600Bit/s up to 38400Bit/s

3 Regulatory Information

3.1 FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

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:
-Reorient or relocate the receiving antenna.
-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.
CAUTION:
Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment

3.2 Canada, Innovation, Science and Economic Development Canada (ISED) Notices

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Avis du Canada, Innovation, Sciences et Développement économique Canada (ISED)

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;

L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil a également été évalué et montré conforme aux limites d'exposition RF ISED dans des conditions d'exposition mobiles. (Les antennes sont à plus de 20 cm du corps d'une personne).

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。」