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Project : **KH/DM Fob**

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1. System configuration

1.1 Scope of SMART KEY SYSTEM

The System offers the following features:

- passive access for two doors, driver side and passenger side as well as trunk/tailgate
- passive start after interior detection of the SMART KEY FOB (without interior trunk and hat shelf detection)
- LF-RF communication (based on Siemens' SMART KEY system)
- passive access trunk/tailgate via the trunk lid switch at the trunk
- max. 2 SMART KEY FOBs can be handled by the system
- communication to the engine management system via a single line interface
- communication to the ESCL via a single line interface

1.2 Short description of the SYSTEM

1.2.1 General Definition of SMART KEY

The SMART KEY system is a system that allows the user to access and operate a vehicle in a very convenient way. To access the vehicle no traditional key or remote control unit is needed.

The user carries a SMART KEY FOB which itself does not require any conscious actions by the user (e.g. operate a button).

After being triggered the vehicle sends out a request in a limited range. If the SMART KEY FOB receives this request, it automatically sends a response to the vehicle. Then the system decides whether to perform a particular action (unlocking, locking...) or remain inactive.

1.2.2 Wireless Communication

Electromagnetic waves are used to exchange information between the vehicle and the SMART KEY FOB. Both, vehicle and SMART KEY FOB are equipped with a transmitter, a receiver and several antennas.

1.2.3 Concept Description

With this concept it is possible to have a set of interior antennas that covers the vehicle's interior and a set of exterior antennas that covers the vehicle's exterior.

For an unambiguous separation between the vehicle's interior and exterior it is sufficient that at least one area is covered exactly by the corresponding operating ranges of the antennas.

The functions of the SMART KEY system have to be provided in a clearly defined and limited range. For the up-link from the vehicle to the SMART KEY FOB, a magnetic field with a frequency of 125 kHz and ASK modulation is used. Inductive antennas in and at the vehicle radiate the electromagnetic energy.

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Technical aspects of 125 kHz – magnetic field:

- virtually no reflections,
- cubical decrease of field strength → allows good range control,
- released frequency band (ISM),
- high penetration,
- low quiescent current demand due to 125 kHz input stage (SMART KEY FOB),
- less sensitive for detuning compared to higher frequency.

For the down-link from the SMART KEY FOB to the vehicle, the standard radio frequency (RF) is used (similar to the classic remote control functions) with FSK modulation.

1.3 System Overview

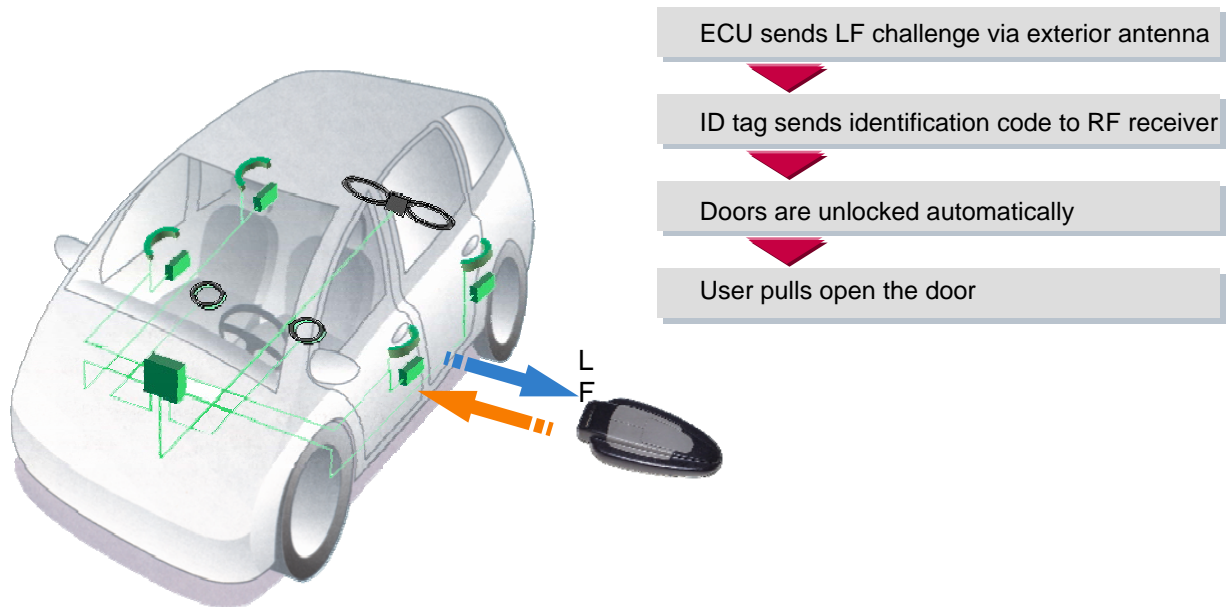
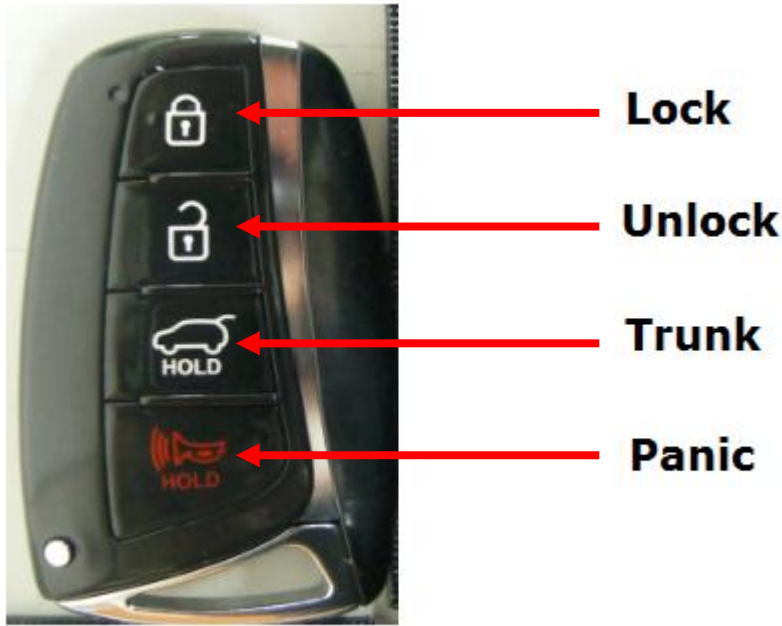


Figure 1: Principle of Communication

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2 Smart Key Fob for homologation

2.1 Button operation for homologation



You can lock, unlock, trunk and panic warning your vehicle with this remote transmitter.

Lock

- When you push this button, all the doors will be locked.
- You can not lock any of the doors with this remote transmitter if any door is open or the key is in the fob holder.

Unlock

- When you push this button, all the doors will be unlocked.
- You can not unlock any of the doors with this remote transmitter if any door is open or the key is in the fob holder.

Trunk

- When you push this button more than 1 second, the trunk will be opened.

Panic

- When you push this button for 1 second, Horn will alarm.

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FCC / IC Statement

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.

The device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. Users are not permitted to make changes or modify the device in any way. Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

RF du FCC d'exposition aux radiations: Cet équipement est conforme à l'exposition de la FCC rayonnements RF limites établies pour un environnement non contrôlé. Cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.

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:

- 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.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

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.

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, même si le brouillage est susceptible d'en compromettre le fonctionnement.