

Document : **User Manual for BES Fob**

Project : **BES Fob ( CM/VG/ etc.. )**

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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 / Block Diagram

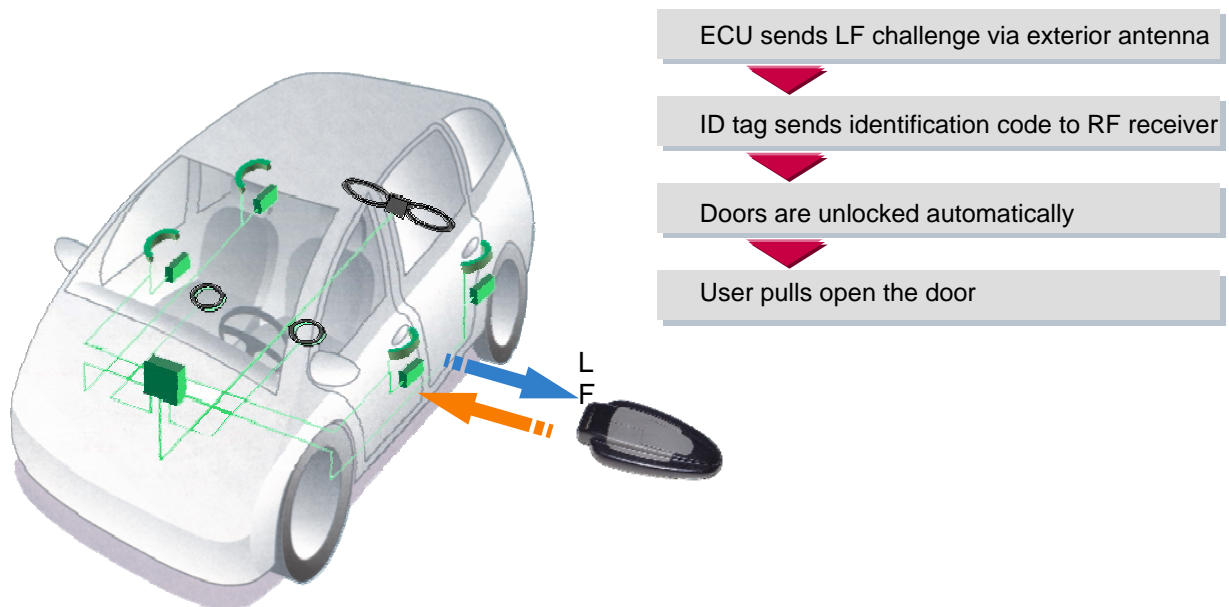


Figure 1: Principle of Communication

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## 2 Smart Key Fob for homologation

### 2.1 Button operation for homologation

- 1<sup>st</sup> time button pressing : Low side Frequency (Carrier wave continueous mode)
- 2<sup>nd</sup> time button pressing : High side Frequency (Carrier wave continueous mode)
- 3<sup>rd</sup> time button pressing : FSK Modulation (Modulated wave continueous mode)
- 4<sup>th</sup> time button pressing : Stop operation.

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### FCC ID: SY5CMFNA03

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

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.

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

### IC Certification : 267AL-CMFNA03

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.

The term "IC:" before the certification/registration number only signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

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