

System-Description

CarAccessSystem (CAS)

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1. General system description

1.1. Function

The BMW CAS control module contains the following important functions:

- Authentification of transponders via a coil
- Release of the immobiliser for the engine electronics
- Electronic terminal control
- Receipt of the signals from the remote control key via a radio receiver
- Central door locking system and window winder control

The transponder chip in the key is comprised of a wireless, writable/readable EEPROM. It is supplied with power by the CAS control module via the integrated coil. The power is supplied inductively with a frequency of 125 kHz.

Data transmission from the CAS to the transponder is carried out via amplitude modulation; the transmission of the data from the key to the CAS control module is achieved via attenuation modulation, i.e. energy is periodically withdrawn from the coil field in accordance with the data which are to be transmitted. The range for reading and writing is approximately 2 cm.

The key contains identification data for releasing the starter and the engine electronics. The accuracy of these identification data is checked prior to starting the engine, the starter is then initialised and the engine control module is released via a unidirectional data lead.

1.2. Charging the accumulator in the transponder

The voltage for the radio remote control system integrated into the transponder key is supplied via a rechargeable 3V lithium vanadium battery VL 2020. The rechargeable battery voltage is monitored by the transponder and its energy is recharged via the CAS coil if necessary.

1.3. Microcontroller

The microcontroller (Motorola 68HC912DG128) used in the CAS contains RAM, flash-ROM, EEPROM and ADCs. It is timed by a 4 MHz quartz. In order to save energy, a quiescent current circuit is implemented.

1.4. Transmission/reception stage

The transmission stage for the coil is implemented via the so-called BaseStation (Phillips PCF7991AT). The BaseStation (BS) is also timed by a 4 MHz quartz. A serial data lead within the CAS control module is used to transmit data from the microcontroller to the BS, and via the coil using ASK modulation. The coil's oscillating circuit is determined predominantly via the condenser C658 (1.2 nF) and the coil inductivity (1.33 mH). The reception stage in the BS is coupled to the coil circuit via the resistor R651 (309 kOhm).

1.5. Mechanical design

The CAS is predominantly comprised of the following components:

- Aluminium housing base
- Mechanical system for key insertion and start-stop button
- CAS printed circuit board
- Housing cover with integrated, illuminated button

1.6. Transmission mode

A power supply cable is enclosed with the approval samples. Transmission mode can be activated via the switch which is located on the power supply cable. The active mode is then indicated via a light-emitting diode.

2. Technical data

CAS voltage range:	6.0V...16.0V
BaseStationIC rated voltage:	5V
CAS quiescent current:	max. 1.3 mA
BaseStationIC quiescent current:	max. 20 µA
Coil charge current:	max. 63 mA
Operating temperature:	-40°C...+85°C
Type of modulation:	ASK
HF level pre-oscillation time:	max. 10 ms
Transmission frequency:	125 kHz
Output power:	-xx dBm
Number of coil turns:	150
Coil wire diameter:	0.15 mm ²
Coil DC resistance:	20.8 Ohm
Coil inductivity:	1.33 mH
Coil quality (f = 125 kHz):	33.9