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1 General Systemdescription

The BMW immobilizersystem contains 3 components:

Key with transponder
 Coil at steeringwheel-lock
 EWS 3 control-unit (with K-Bus connection, communicates with the enginecontrol-unit)

The transponderchip, integrated in the key, contains mainly a wireless readable and writeable EEPROM. The chip is powered by the EWS 3 control unit via the steeringwheel-lock. The energytransmission is realized by inductive link with a frequency of 125 kHz.

Datatransmission from EWS3 controlunit to the transponder is done by AM, in the opposite direction it is done by damping modulation.

The distance range for reading and writing is appr. 2cm.

The key contains identification data to release the starter.

Before starting the engine, these identification data were checked , than the starter and the engine control-unit are released.

2 Function of transmitter

The PU 99 transmitter has following button functions.

Button 1: Standard central locking
 Comfort locking
 Switching off interior light
 Activating anti theft alert system

Button 2: Standard central unlocking
 Comfort unlocking
 Switching on interior light
 Deactivating anti theft alert system

Button 3: Unlock trunk
 Activating horn
 Switching on interior light

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3 Powersupply

The transmitter is working with a chargeable 3V Lithium Vanadium accumulator VL 2020. The voltage is controlled after each use of a button and utilized by an converter which is integrated in the microcontroller.

A transponder ASIC, mounted on the key PCB, does the charging of the accu. If the voltage drops under a defined value, the μ C is deactivated.

4 Microcontroller

The μ C contains RAM, ROM, EEPROM, and ADCs.

The clock is generated by an 2,6 MHz ceramic resonator .

In order to reduce power consumption, an quiescent current circuit is used.

5 HF Stage

The oscillator is a colpitts type, resonant frequency is stabilized by a SAW resonator.

Transmittingfrequency is 433,92 MHz +/- 125 kHz or 315 kHz +/- 125 kHz.

The resonant circuit contains the PCB antenna, the inductivity L 201 and the capacitors C 200 and C 201.

6 Mechanical Design

The key has three basic components

Bottom part of housing

Top part of housing including three buttons

PCB with components

7 Transmission mode (carrier frequency)

In order to check the carrier frequency, button 2 (open) and button 3 (trunk) have to be pressed simultaneously.

To stop transmission of carrier , both buttons have to be released.

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8 Transmission mode (Modulation)

To get a carrier signal with 1kHz modulation, all three buttons have to be pressed simultaneously.
To stop transmission of the signal, all three buttons have to be released.

9 Technical Data

Nominal voltage	3V
Quiescent current	typ. < 1µA @ 3V and R.T.
Operating current	7mA @ nom volt
Operating temperatur range transponderfunction	-40...+80 °C
Operating temperatur range HF stage	-10...+60°C
Modulationfrequency	1 kHz
Modulation mode	100% On-Off-Keying
Rise time HF stage	max 80µs @ 3V
Transmissionfrequency	433,92 MHz +/- 125kHz @ RT
	315 MHz +/- 125kHz @ RT
	-21 dBm +/- 4dB (ECE)
	-23 dBm +/- -4dB (US)
Output power	typ. 400µA
Charging current ASIC	

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