

# **User Manual**

**of the**

**Siemens VDO**

**Radio Frequency Transmitter**

**type 5WK4 9244**

## 1. GENERAL DESCRIPTION OF THE RF TRANSMITTER

The RF remote control system consists of a RF transmitter and a LF receiver mounted on a control unit. The RF transmitter is mechanically integrated in the head of the key. This transmitter is used to transmit information for locking or unlocking the vehicle by a unidirectional RF transmission line for normal remote operation by pressing a button. Also is implemented the function of the Immobilizer in the transmitter with a bidirectional LF – transmission (passive).

In general the following functions are provided:

- Lock the car
- Unlock the car
- Unlock the boot lid of the car
- Approach light
- Panic alarm
- Immobilizer

## 2. POWER SUPPLY

The transmitter is provided with 1 lithium battery (CR 2032) that gives a power supply of +3V.

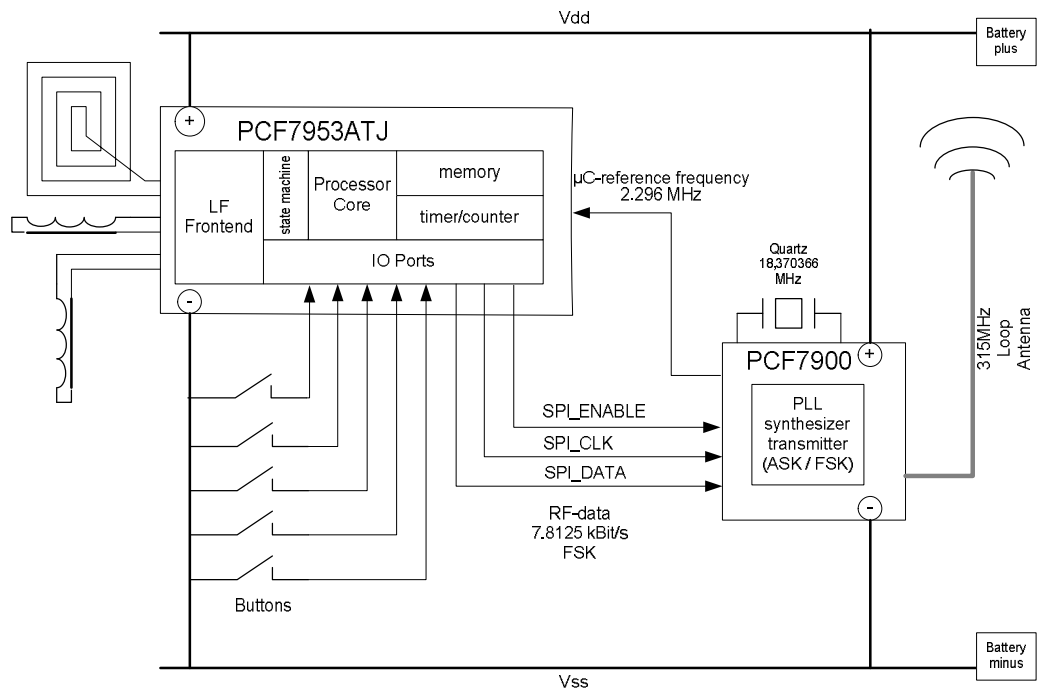
## 3. BUTTONS

There are five buttons with following functions:

Action:	Usage:
Pressing the lock button	Central locking
	Activation of Alarm system
	Deactivation of Panic Alarm
Pressing the lock button for 1,5 sec.	Comfort closing
Pressing the unlock button	Central unlocking
	Deactivation of Alarm system
	Deactivation of Panic Alarm
Pressing the unlock button for 1,5 sec.	Comfort opening
Pressing the unlock button twice within 10 sec.	Two-step unlocking
Pressing the approach light button	De-/activation of Approach Light
	Deactivation of Panic Alarm
Pressing the approach light button for 1,5 sec.	
Pressing the boot lid button	Unlocking of Boot lid
	Deactivation of Panic Alarm
Pressing the panic button for 3 sec or pressing it twice within 3 sec.	Activation of Panic Alarm
	Deactivation of Panic Alarm

During activation, the button is forced to the ground via a “pull-up” within the microcontroller.

## 4. BLOCK DIAGRAM OF THE TRANSMITTER



### Circuit description:

The central elements of the Transmitter are the controller and LF receiver IC PCF 7953ATJ and the synthesizer PLL – RF-Transmitter PCF7900 from Philips

### Controller PCF 7953

The PCF7953 is a high performance single chip Security Transponder, Keyless Entry and RISC Controller, ideally suited for automotive applications with combined vehicle Immobilization and Keyless Entry/Start functions. Unless other products, the device comes with a package integrated Transponder LF coil used in combination with the Security Transponder or and Keyless Entry function. The Security Transponder features secure contactless authentication, employing a Secret Key and a random number in order to cipher any communication between the device and the basestation. The basic transponder operation is emulated utilizing the on-chip RISC and may feature a customized operation or may use the built in Transponder Library functions, that offer HT2 compatible operation (e.g. PCF7936). Neither other external components nor an additional battery supply is needed. Keyless Entry operation incorporates a high sensitive 3D LF front-end that offers low power LF Wake-Up detection and LF data communication. To

support key localization, the received LF field strength can be evaluated. Device operation is controlled by a ROM or E-ROM programmable (FLASH like features) low power 8 Bit RISC controller. The RISC employs a 2 stage pipeline architecture in order to execute an instruction in a single clock cycle. Device timing is derived from an on-chip low tolerance RC Oscillator and programmable system clock, with a frequency up to 2 MHz. The system clock may also be derived from the transponder interface (LF Field clock) or an external clock source. 17 general purpose I/Os are provided for command buttons, LED, or control of an external RF transmitter/transceiver circuitry. Device authentication or rolling code generation may employ the hardwired Calculation Unit that can operate in standard HT2 (48 bit Secret Key) or HT2-Enhanced (64 bit Secret key) mode. In addition an AES compliant operation with a 128 bit Secret Key is provided. Depending on the operation mode, the RISC is powered from the external battery or derives its power supply by inductive coupling (transponder mode) to the LF Field generated by the basestation. The PCF7953ATJ incorporates an advanced power management that supports battery voltage measurement and optional battery charging from the LF Field. The device comes in a 36 pin Leaded Stick Package (LSP). The device is available as E-ROM (FLASH like Features) and in-circuit programming and debugging is supported.

## **Synthesizer PLL –RF Transmitter PCF7900**

The UHF ASK/FSK Fractional-N Transmitter IC (FraNTIC) is a single-chip Fractional-N based Phase Locked Loop (PLL) frequency synthesizer and a power amplifier to drive an external antenna, utilizing a sophisticated CMOS process. FRANTIC is especially designed for use in the ISM frequency bands (315/434/868/915 MHz). Fine-tuning of the reference oscillator by means of fractional-N synthesis allows compensation of manufacturing tolerances of the crystal. The device also provides an adjustable output power. FRANTIC can be used for both ASK and FSK modulation with data rates up to 40 kBit/s. Due to the high level of integration, only few external components are needed to build up a complete transmitter.

### **General Function:**

The function of the key was mainly realized by the use of two integrated circuits from Philips. The PCF7953 contains the LF Front-end where the three receiving tanks are connected. One of these tanks is inside the housing of the PCF7953ATJ and also used for transponder communication. By the use of a capacitor these coils are tuned to a 125 kHz resonant circuit. LF Front-end and state machine of the PCF7953 are always supplied by the battery. If these part of the PCF7953 detects a 125 kHz Manchester coded LF-signal which contains a valid Wake Up Pattern (WUP), the microprocessor starts the execution of the application program. The WUP is unique for each KV-System and is used for PASE communication with the car. The second possibility to wake up the microprocessor is a button press.

Most of the LF requests to the PK are answered by sending a RF-Telegram. The PCF7900 is a synthesizer PLL Transmitter and offers the capabilities to send ASK or FSK modulated RF telegrams on up to four channels. The RF answer to LF requests is FSK modulated with 8kbit/s data rate. The RF answer to a button press is also FSK modulated with 8kbit/s data rate. The wake up pattern which is send after a button press to wake up the receiver is ASK modulated.

The PCF7953 has an internal RC oscillator. This kind of oscillator is not precise enough for generating answer- or baud-rate-timings of RF answers. Therefore the PCF7953 switch on the reference oscillator of the PLL, which deliver a quartz stable timer clock.

## 5. TECHNICAL DATA

Center frequency channel 1:	314.703 MHz $\pm$ 30ppm
Center frequency channel 2:	315.000 MHz $\pm$ 30ppm
Center frequency channel 3:	315.297 MHz $\pm$ 30ppm
Output power:	< 75.6dB $\mu$ V/m
Type of modulation:	ASK for WUP; FSK $\pm$ 20 kHz for data
Method of frequency generation:	Synthesizer PLL
Number of channels:	3
Power supply:	battery (CR 2032)
Type of battery:	lithium
Transmission range:	< 50 m

### NOTE:

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

## 7. LABEL DESIGN CANADA, MEXICO, USA

Siemens VDO  
5WK49244

IC: 267T-5WK49244  
FCC ID:KR55WK49244

### Entry Owners Manual, Canada, USA:

#### NOTE

This device complies with part 15 of the FCC Rules and RSS-210. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept interference received, including interference that may cause undesired operation.

#### CAUTION

Changes or modifications not expressly approved by the manufacturer could avoid the user's authority to operate the equipment.