

NXP aRTCs PCF2127, PCA2129 & PCF2129

High-precision aRTCs with embedded quartz crystal

These aRTCs integrate a temperature-compensated quartz oscillator, a time stamp, alarms, and advanced power back-up.

KEY FEATURES

- ► Time keeping with accuracy of ±3 ppm (typ) or 0.25 s deviation/day
- ▶ Fully integrated quartz oscillator
- ▶ Time-stamp function
- ▶ Battery back-up circuit
- ▶ System reset generation
- ▶ 512 Bytes of RAM (PCF2127)
- ▶ Factory calibrated
- ▶ Clock operation down to 1.8 V
- ▶ Low supply current: 650 nA at 3.3 V
- ▶ Fast-mode I²C-bus and 6.5 MHz SPI interface

APPLICATIONS

- ▶ Very accurate time references
- ▶ Utility meters
- ▶ Industrial applications
- ▶ Automotive reference time
- ▶ Climate control, HVAC equipment
- ▶ Gambling and gaming machines
- ▶ Alarm systems

The NXP PCF2127, PCA2129, and PCF2129 are highly accurate real-time clock/calendars (known as aRTCs). They integrate a temperature-compensated crystal oscillator (TCXO) that uses a 32.768 kHz quartz crystal for very high precision with very low power consumption. Manufactured in a CMOS process, they support access via the I²C-bus or the SPI bus, and offer special support features like a backup battery switch-over circuit, a programmable Watchdog timer, a time-stamp function, and more. The PCF2127 includes 512 bytes of general-purpose SRAM. The rich functionality and low overall power consumption of these aRTCs allow the usage of smaller batteries and let the microcontroller stay in hibernation mode longer.

The backup battery switch-over circuit ensures a constant supply of power to the RTC. In standard mode, the oscillator supply is switched over to the battery as soon as the supply voltage drops below the battery voltage.



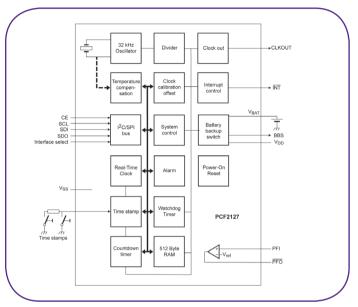
Alternatively, a smart mode allows the usage of a back-up battery with a voltage that is higher or lower than the main supply $V_{\rm DD}$. The aRTC continues to run on $V_{\rm DD}$ until it drops below 2.5 V, then switches over to the connected battery (e.g. a Lithium battery of 4.2 V). The uninterrupted power supply is also available on a device pin and therefore can be used to buffer external circuitry, including RAM memory.

Two different external switches can be monitored and are time-stamped in case their state gets changed. This enables intrusion detection with no external circuitry: In an e-meter application, for example, the time is stamped when the cover of the electronics or the terminals is opened. It is also possible to monitor the time of battery switch-over, too.

The PCF2127T and PCF2129T have a temperature-compensated oscillator that covers the whole industrial temperature range. The PCF2127AT and PCF2129AT offer higher precision over a slightly narrower temperature range. The PCA2129T/Q900/2 is qualified for use in automotive applications.

→ CLKOUT

→ INT



32 kHz
Oscillator

Temperature
compensation

Temperature
compensation

Temperature
compensation

Temperature
compensation

Temperature
compensation

Interrupt
control

System
SDO
SDO
SDO
SDO
SDO
Interface select

Real-Time
Clock
Alarm
Power-On
Reset

PCF2129

PCF2127 block diagram

PCF2129A block diagram



| Feature | PCF2127T | PCF2127AT | PCF2129T | PCF2129AT | PCA2129T/ Q900 |
|---|-------------------|-------------------|-------------------|-------------------|------------------------|
| Temperature range of frequency compensation | -40 to +85 °C | -25 to +65 °C | -40 to +85 °C | -25 to +65 °C | -40 to +85 °C |
| Typical accuracy: 3ppm over temp range of | -30 to + 80 °C | -15 to + 60 °C | -30 to + 80 °C | -15 to + 60 °C | -30 to + 80 °C |
| Watchdog and count-down timer | Yes | Yes | Watchdog only | Watchdog only | Watchdog only |
| RAM | 512 Byte | 512 Byte | - | - | - |
| Quality grade | Industrial | Industrial | Industrial | Industrial | Automotive AEC-Q100 |
| Package | SO16 | SO20 | SO16 | SO20 | SO16 |

Evaluation board OM13513 for PCF2127 and PCF2129A, including back-up battery

Selection guide

www.nxp.com

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