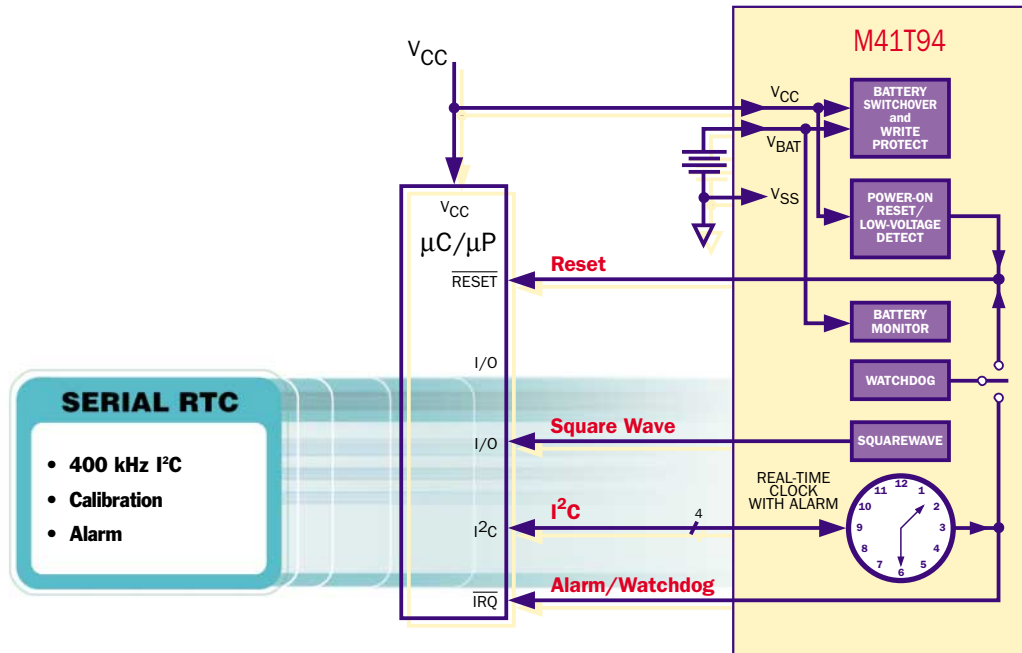# Serial Real-Time Clock M41T94 with SPI and Supervisor Function

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## Timekeeping and microprocessor supervision

The M41T94 combines a low-cost serial Real-Time Clock (RTC) with microprocessor supervisor functions, which include a watchdog and power-on reset / low-voltage detect. It also features a Serial Peripheral Interface (SPI) bus for use with many popular microprocessors and microcontrollers.
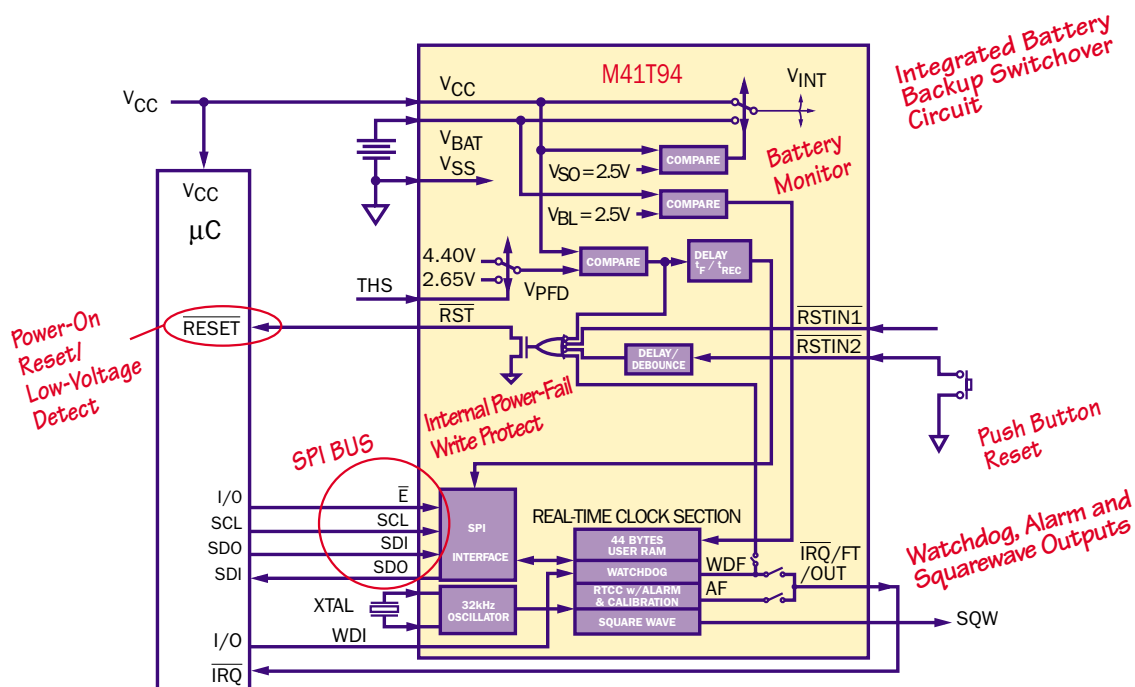
Its integral battery switch-over and write-protect circuits automatically keep the RTC alive when Vcc drops and maintain the contents of the 44 bytes of internal user RAM.

RTC functions include century, year, month, day-of-week, date, hours, minutes, seconds and tenths and hundredths of seconds. Other features include a programmable square wave output and two reset inputs, one of which includes debounce circuitry for use as a push-button reset.

The alarm features a programmable repeat mode while the watchdog timeout period is also programmable. The serial interface supports SPI modes 0 and 3 and the RTC includes a calibration feature enabling the user to adjust the timekeeping accuracy to within 2 seconds per month.

The M41T94 operates from 2.7V to 5.5V over the industrial temperature range of -40°C to +85°C. Two types of packages are available: a thin SO16 operating with a user supplied battery and crystal and the SOH28 for use with STMicroelectronics' removable/replaceable SNAPHAT® battery/crystal top (available with 48mA or 120mA battery).

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# Serial Real-Time Clock M41T94 with SPI and Supervisor Function



## Key Features

- **Serial RTC features:**
  - Counters for tenths and hundredths of seconds, seconds, minutes, hours, day, date, month, year and century
  - Serial Peripheral Interface (SPI)
  - Battery-backed programmable alarm with repeat mode
  - RTC calibration
  - 44 bytes of NVRAM
  - Programmable square wave generator - 1Hz to 32kHz
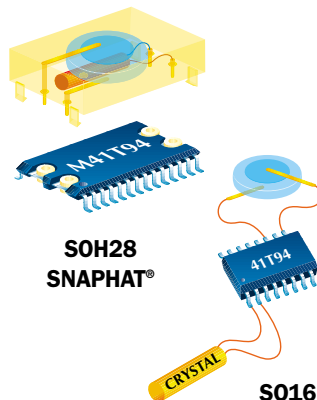  - Integrated automatic battery switch-over and write-protect
- **Processor supervisory features:**
  - Power-on reset/low-voltage detection with two selectable levels:
    - $4.20V \leq V_{PFD} \leq 4.50V$
    - $2.55V \leq V_{PFD} \leq 2.70V$
  - Programmable watchdog - 62.5ms to 128s
  - 2 reset inputs - one for push-button reset
  - Battery monitor
- **2.7V to 5.5V operation**
- **-40°C to +85°C temperature range**
- **SO16 and SOH28 SNAPHAT® packages**



**SOH28 SNAPHAT®**



**SO16**

## Main Applications

The M41T94 can be found in applications such as:

- Metering
- Home automation equipment
- Industrial automation equipment
- Energy management
- Medical equipment
- Telecom systems
- Mass storage systems
- Consumer appliances

## SNAPHAT® Tops

| Part number | Description | Package type |
|---|---|---|
| M4T28-BR12SH1 | SNAPHAT® top with crystal and 48mAh battery | SH |
| M4T32-BR12SH1 | SNAPHAT® top with crystal and 120mAh battery | SH |

## Product Selector

| Part number | Description | $V_{CC}$ | Package type |
|---|---|---|---|
| M41T94MQ6 | Serial RTC with SPI, alarm, square wave, watchdog, two reset inputs, | 2.7 to 5.5V | SO16 |
| M41T94MH6 | power-on reset/low-voltage detect, push-button reset, industrial temperature range (-40°C to +85°C) | | SOH28 (1) |

*(1) SNAPHAT® battery/crystal top has to be ordered separately*

**For selected STMicroelectronics sales offices fax:**
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**Full product information at www.st.com**