EPSON TOYOCOM

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# Epson Toyocom Develops Real-Time Clock Module with Time-Stamp Function

Epson Toyocom Corporation today announced the development of the RX-5412SF, a real-time clock module (*1) equipped with a time-stamp function for recording and storing the times and dates of abnormal events such as system errors and warning signals. Commercial development is scheduled for fiscal 2008, ending March 31, 2009.

The time-stamp function built into the RX-5412SF detects and records signals generated when an error or emergency event occurs. Time-stamping improves system reliability and can be applied in a wide range of fields, from quality control to security.
The demand for time-stamping has been accelerating in recent years, driven by, among other things, an intensified interest in security technologies in response to the spread of a diverse range of computer crimes, and by public concern about the safety and traceability of food supplies.
Time-stamping generally is provided by microprocessor systems. However, with CPU resources limited, the task of developing complex software that is also reliable has been a major burden.
To alleviate this burden, Epson Toyocom developed the RX-5412SF real-time clock module so that time-stamping can easily be incorporated into a system. In addition to giving customers added freedom in the use of CPU resources and reducing time and effort spent in software development, the RX-5412SF will help save costs and improve system reliability.

The RX-5412SF has four input pins and can record the date and time along with identifying information for each pin. This RTC module is also loaded with a host of other features, including general-purpose memory, a 256-byte SRAM chip that can be used as a time-stamp memory, a watchdog timer (*2), a general-purpose timer and power switching.

Despite this abundance of features, the module has a low-power design and consumes only 0.5 µA of current. A backup battery enables timekeeping and time-stamping to continue even if a system goes down on a weekend, at night, or during a power failure. The RX-5412SF will thus offer enhanced reliability while simultaneously allowing downsizing of batteries.

**Main Specifications**

| Item | Specification |
|---|---|
| Supply voltage | 2.5 V to 5.5 V |
| Clock voltage | 1.4 V to 5.5 V |
| Standby current consumption | 0.5 μA (Typ.) / 3 V |
| Frequency precision | $5 \pm 23 \times 10^{-6}$ |
| Interface | 4-wire serial |
| External dimensions | 10.2 × 5.4 × 2.0t mm (24-pin SSOP) |

- Full calendar and clock functions with automatic leap year correction
- Built-in 32.768 kHz crystal unit eliminates the need for clock accuracy adjustments
- Alarms settable for dates, days of the week, hours and minutes
- A fixed-cycle timer that can be set for any time between 244.14 micro-seconds and 4095 minutes
- Power switching function for automatically switching to a backup power source when the voltage of the main power supply drops
- Built-in general-purpose memory and 256-bytes of RAM that can be used for time-stamp memory
- Capable of 4-input event detection with adjustable chattering-free (*3) sensitivity, and able to output interrupt signals during input detection
- Watchdog timer settable from 1.95 ms to 468.75 ms

**Glossary**

(*1) Real-time clock module
A product that integrates in a single package an IC with clock and calendar functions and a 32,768-kHz crystal unit. They are used in computers, fax machines and other electronic equipment that requires time management. RTC modules not only benefit users by eliminating the need to design oscillator circuits and adjust clock accuracy, they also offer more efficient use of the limited space available on circuit boards.

(*2) Watchdog timer
A function that monitors whether a system is operating normally. A watchdog timer uses a regular signal that is sometimes called a "watchdog operation" to determine whether a system is hung, and can then reset the system and restore normal operations if the system is in an abnormal state.

(*3) Chattering-free
The operation of a push-button switch generates a phenomenon called “chattering.” Chattering is caused by electrical signals being generated many times by repeated electrical contact within a very short period of time when a switch is turned on or off. An operation to generate one signal ends up generating multiple signals, causing errors when directly connected to an electric circuit. The chattering-free input circuit deals with this phenomenon by using a filter circuit designed to eliminate short signals under a certain duration contained within the input of a switch signal.