

# REAL-TIME CLOCK MODULES

## Micro Crystal –

### The Art of Timing for Low Power Devices

Wearable devices represent nowadays important challenges for electronic designers. Power absorption must be kept to a minimum, guaranteeing long battery life to the battery-powered system. This factor influences the choice of components, typically the one of microcontroller, orienting toward low-power solutions with the possibility of operating in low-absorption sleep mode. In many applications, the microcontroller need however a continuous operation in order to keep track of time. The use of Real-Time Clock (RTC) function allows the designer to power down the microcontroller when no task is required, resulting in significant power savings.

When microcontrollers with integrated RTC go into a low-power mode, the clock and the circuitry needs to keep running in order to provide accurate timekeeping and alarm functions.

Microcontroller power consumption, with only the internal RTC function active, is however far above the one of an external RTC. Ultra-low quiescent current in the order of tens of nanoamps achieved by today's RTC modules allows a significantly extended battery life.

RTC module solves the problem of having the always staying on device drawing the lowest power when no other task is required. Even if RTCs were never considered as key components in systems, the always on timekeeping function is a must-have, and RTC choice is conditioning today's design of personal electronics, medical devices, or industrial products where power savings and backup timekeeping are at premium.

The mechanical constraints, related to size and weight, also affect the design activity by favoring the use of low-profile miniaturized components mounted on extremely compact PCBs.

With a range of options that enrich microcontroller-based hardware, the two new Real-Time Clock Modules developed by Micro Crystal are ideal solutions to address this demand.

**RV-3028-C7** Real-time Clock Module sets the new benchmark for lowest power consumption: 45 nA at a supply of 3 V. The high accuracy of  $\pm 1$  ppm at room temperature eliminates any calibration during manufacturing.

With best accuracy of all temperature compensated RTC at  $\pm 3.0$  ppm ( $\pm 0.26$ s/day) over the industrial temperature range; the **RV-3032-C7** has also an ultra-low current consumption of 160nA. The embedded accurate high-resolution temperature sensor, combined with programmable temperature window detection interrupt,

enables times stamp for temperature alarm event.

The extreme low power consumption of these devices, coupled to low operating voltage down to 1.2V, significantly increases the operational life of the back-up supplies and allows the potential use of low cost MLCC capacitors instead of costly batteries or

Supercaps as a short-term backup solution.

As most battery-operated devices have to be very small for portability, these RTC modules are assembled in small size DFN package of only 3.2 x 1.5 x 0.8 mm. In the self-contained solutions proposed by Micro Crystal, integrating the crystal resonator and the RTC circuit, the protection against pressure change, humidity or external chemical contamination, which might affect oscillator stability, is ensured through a perfect sealing under vacuum of the ceramic package with a metal lid.



# REAL-TIME CLOCK MODULES



These RTC's highest time-accuracy in combination with lowest current consumption, make Micro Crystal's RTC modules ideally suited for a wide range of applications:

- Battery operated Wearables / Portable and Medical applications
- IoT, Metering, Data Loggers and embedded Modules
- CCTV, POS systems and Automotive

With this product line, Micro Crystal masters the Art of Timing to meet extreme requirements in terms of size, power consumption, and performance; helping engineers in developing next generations of smart products.

To find more detailed information and to learn more about how Micro Crystal has the solution for you, please visit [microcrystal.com](http://microcrystal.com)