

March 17, 2009

Epson Toyocom Develops World's Smallest 32.678-kHz Crystal Oscillator

Epson Toyocom Corporation, the leader in crystal devices, has developed the world's smallest* 32.768-kHz crystal oscillator^(*1). The maximum dimensions of the new crystal oscillator, known as the SG-3050BC, are just 2.2 mm x 1.4 mm x 1.0t mm. With a footprint and cubic volume that are 70% and 75% smaller, respectively, than its predecessor, the new crystal oscillator will help electronic equipment manufacturers further downsize their products while boosting performance. Samples of the SG-3050BC will be available from March 2009.

In today's world 32.768-kHz crystal devices are indispensable as clocks, microcontroller subclocks and timer functions in a variety of applications, including compact portable consumer products such as cell phones and digital still cameras. They are also essential for industrial measuring instruments and machine tools and for in-vehicle systems such as navigation systems, GPS modules, and engine control units. Moreover, 32.768-kHz reference clocks are also combined with 32.768-kHz tuning-fork crystal units and oscillation circuits for use in a single package.

In recent years heightened awareness of the need to reduce environmental impacts has been driving demand for ever more compact electronic devices that maintain greater functionality while consuming fewer raw materials and less power. As tuning-fork crystal units and oscillation circuits become smaller it is becoming increasingly difficult to design combinations with equal or superior stability and power consumption compared to their predecessors. There is demand for smaller oscillators that satisfy such performance requirements.

Epson Toyocom has responded by developing the ultra-compact 32.768-kHz SG-3050BC crystal oscillator. Epson Toyocom has already previously released industry-leading, ultra-compact 32.768-kHz tuning-fork crystal units, like the FC-12M, with maximum dimensions of 2.0 mm x 1.2 mm x 0.6t mm, and established services to support oscillation circuit design, such as "The Latest in Low-Frequency Oscillation Circuits!" (http://www.epsontoyocom.co.jp/english/tech/note/pdf/latest_lfo.pdf). With the addition of the SG-3050BC to the lineup, Epson Toyocom now offers comprehensive solutions for both ultra-compact crystal units and oscillators.

The SG-3050BC, equipped with an ultra-compact QMEMS^(*2) crystal chip, is the world's smallest 32.768-kHz crystal oscillator with built-in crystal unit. Epson Toyocom was able to shrink the size of this oscillator by using a new structure. The new structure applies Epson Toyocom's original NPO (New Platform Oscillator) structure^(*3), wherein a crystal unit in a ceramic package is sealed together with an oscillation circuit in a molded plastic housing. Combining a compact crystal unit with an oscillation circuit rather than providing them separately significantly shrinks the space required. The crystal oscillators will also pay dividends in the form of greater system reliability and quality, since the crystal unit's characteristics will be assured prior to shipment,

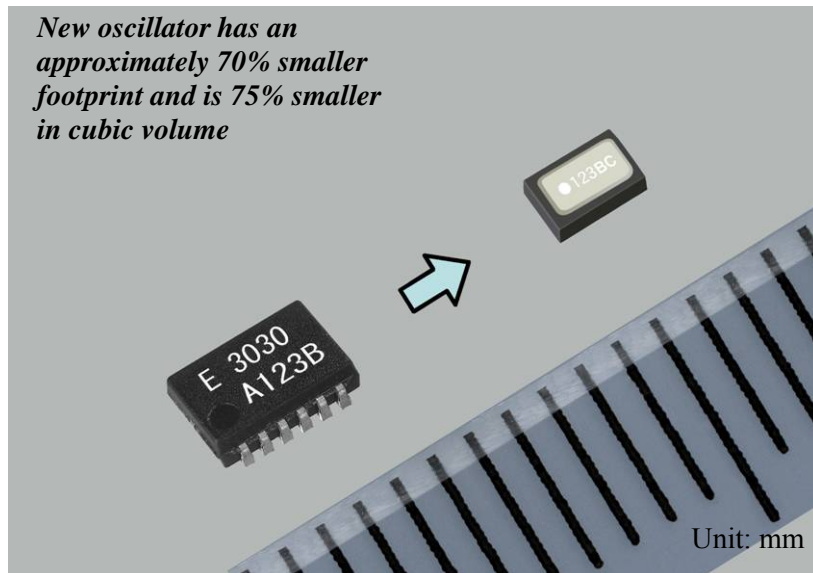
alleviating the need for customers to design oscillation circuits or adjust output frequencies.

The SG-3050BC also outperforms the previous SG-3030 series, boasting an operating voltage range of 1.2 to 5.5 V and initial frequency tolerance of $5.0 \pm 5.0 \times 10^{-6}$.

Epson Toyocom's SG-3050BC is a total solution that will help customers add value to their systems by allowing them to use space more efficiently in feature-rich electronic equipment.

* Smallest Crystal Oscillator with integrated 32.678-kHz crystal unit as of March 17, 2009. Based on Epson Toyocom research.

Size comparison between the newly developed SG-3050BC and the conventional SG-3030LC



Right: Newly developed SG-3050BC (2.2 × 1.4 × 1.0t mm)
Left: Conventional SG-3030LC (3.6 × 2.8 × 1.2t mm)

Main Specifications

Item	SG-3050BC
Max. external dimensions	2.2 x 1.4 x 1.0t mm (SON-6 pin)
Supply voltage	1.2 V to 5.5 V
Operating temperature range	-40 °C to +85 °C
Current consumption	2.0 μA (Max.) / 3 V
Frequency tolerance	AA accuracy: $5.0 \pm 5.0 \times 10^{-6}$ Max. B accuracy: $5.0 \pm 23.0 \times 10^{-6}$ Max.

Glossary

(*1) 32.768 kHz crystal oscillator

A product that integrates an oscillation circuit and a 32.768 kHz crystal unit in a single package.

32.768 kHz crystal oscillators not only benefit users by eliminating the need to design oscillation circuits and regulate frequency stability, they also offer more efficient use of the limited space available on circuit board.

(*2) QMEMS

QMEMS is a combination of “Quartz,” a crystalline material with excellent characteristics such as high stability and high accuracy, and “MEMS” (micro electro mechanical system). QMEMS quartz devices are created using quartz material instead of the semiconductors used by MEMS. We perform precision microfabrication on the quartz material to offer high performance in a compact package.

QMEMS is a registered trademark of Epson Toyocom.

(*3) NPO (New Platform Oscillator) Structure

An oscillator that combines a ceramic packaged crystal unit and an oscillator circuit in a plastic mold. Better heat stress absorption and vibration resistance give the NPO structure higher throughput in batch processing than ceramic packages.