

September 30, 2009

**Epson Toyocom Commercializes Compact 32.768 kHz Crystal Unit with Wide Operating Temperature Range for Automotive Applications**

Epson Toyocom Corporation, the leader in crystal devices, today announced the commercial development of the FC-13A, a tuning-fork crystal unit with operation guaranteed up to a temperature of 125°C, for automotive applications. The FC-13A has an output frequency of 32.768 kHz and measures 3.2 x 1.5 mm, with a maximum thickness of 0.9 mm. The frequency tolerance is  $\pm 20 \times 10^{-6}$ , and the operating temperature range is -40 to 125°C. The new tuning-fork crystal unit will enter volume production in January 2010.

The core component in sub-clocks and time management functions is a 32.768-kHz crystal unit. Market demand for miniature 32.768 kHz crystal units that are reliable in high-temperature environments has grown with the increase in recent years of feature-rich automotive applications. The spread of hybrid cars and electric vehicles has also fueled the growth of new automotive applications, such as battery monitoring functions.

Auto manufacturers further require that components be lead-free, for environmental reasons.

Epson Toyocom has addressed these market needs with its QMEMS<sup>(\*1)</sup> technology, which let the company shrink the FC-13A's package to less than one-tenth the volume of its predecessor, the MC-30A. Original packaging technology enables the FC-13A to support an operating temperature range from -40 to 125°C, with automotive-grade levels of performance and reliability. It is also compliant with the AEC-Q200<sup>(\*2)</sup> quality standard for automotive electronics.

In addition, the lead-free FC-13A conforms to EU RoHS Directive and ELV Directive requirements.

Main specifications

Item		Specifications
External dimensions		3.2 × 1.5 × 0.9t mm, Max.
Nominal frequency range		32.768 kHz
Frequency tolerance		$\pm 20 \times 10^{-6}$ (+25 °C)
Operation temperature range		-40 to 125 °C
Motional resistance (CI value)		80 kΩ, Max.
Temperature characteristics	Turnover temperature	+25 °C $\pm$ 5 °C
	Parabolic coefficient	$-0.04 \times 10^{-6} / \text{°C}^2$ Max.

## Glossary

### (\*1) QMEMS

QMEMS is a combination of “Quartz,” a crystalline material with excellent characteristics such as excellent frequency stability and high precision, and “MEMS” (micro electro mechanical system). QMEMS devices, produced via a microfabrication process on a quartz material instead of on a semiconductor material like MEMS, offer high performance in a compact package.

QMEMS is a registered trademark of Epson Toyocom.

### (\*2) AEC-Q200

The Automotive Electronics Council (AEC) was established by the “Big Three” automobile manufacturers and American auto parts manufacturers for the purpose of defining common standards for the qualification and reliability of automotive electronic components.

AEC-Q200 is a global standard established by the AEC. It is widely used in Europe and America as a standard for passive electronic components used in the automotive industry.

For product enquiries, please locate your regional Epson Toyocom representative at:  
[http://www.epsontoyocom.co.jp/english/company/place/kaigai\\_network.html](http://www.epsontoyocom.co.jp/english/company/place/kaigai_network.html)

### **About Epson Toyocom**

Epson Toyocom Corporation is the global leader in crystal devices, which serve as the heart and pulse for a wide range of electronic products for consumers and industry. Utilizing its innovative hybrid quartz microfabrication technology, QMEMS, Epson Toyocom offers technological expertise in timing, sensing, and optical devices, and maintains its leadership position by providing customer-specific combinations and solutions. <http://www.epsontoyocom.co.jp/english/>