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Epson Toyocom Announces World's First* High-Stability SAW Oscillator with Cubic-Curve Frequency/Temperature Coefficient on a Par with AT Crystal

Epson Toyocom Corporation, the world leader in crystal devices, today announced that it has used its unique technology to achieve the world's first SAW resonator with a frequency/temperature coefficient that is represented by a cubic curve. (Figure 1) This resonator is used in the newly developed EG-4101/4121CA, a high-frequency, low jitter^(*1) and low phase noise^(*2) SAW oscillator that provides outstanding frequency stability over a wide temperature range.

Samples will become available in December 2009, and commercialization is planned for March 2010.

In recent years the amount of heat generated within electronic equipment has increased, not only because of the higher reference clock frequencies needed to support faster transmission speeds, but also because of the diminishing size of equipment enclosures, as epitomized by blade servers. Higher internal temperatures are giving rise to heightened need for electronic devices that operate over larger temperature ranges and at higher stability. Also needed are electronic devices that provide stable operation for extended periods in environments subject to hot and cold temperature extremes, such as outdoor wireless base stations.

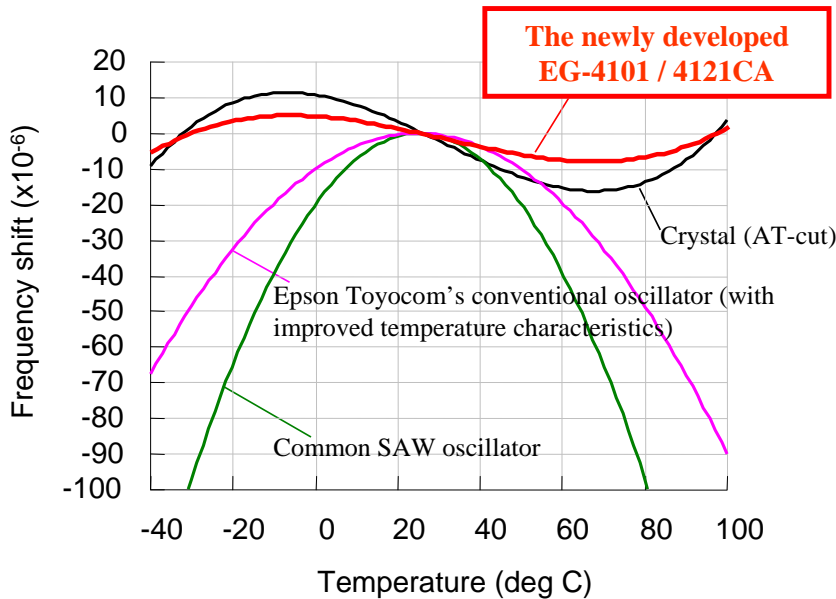
To respond to these market trends, Epson Toyocom leveraged its original SAW design approach to develop a SAW oscillator for LAN^(*3) and SAN^(*4) equipment with high-speed interfaces. The new EG-4101/4121CA offers dramatically improved performance as the world's first SAW oscillator to have a frequency/temperature coefficient that is represented by a cubic curve. This means that, when operated at a high-frequency (100 to 700 MHz) fundamental mode, this SAW oscillator exhibits low jitter and low phase noise and, moreover, has a frequency/temperature coefficient that is equivalent to an AT oscillator having good stability.

The EG-4101/4121CA will help further increase system reliability and quality in server/network devices and wireless communications applications requiring a highly stable, high-frequency clock with low jitter and low phase noise that can operate over a wide temperature range.

Using this newly developed key technology, Epson Toyocom will expand and enhance its lineup of SAW oscillators to meet demand in a wide range of applications.

* For a SAW oscillator. Based on Epson Toyocom research.

Figure 1. Frequency-Temperature Coefficient Comparison



There are two ways to obtain a high-frequency reference clock signal. One way is to use a SAW oscillator at a high-frequency fundamental mode between 100 and 700 MHz to achieve outstanding jitter and phase noise characteristics. The other way is to multiply the signal of an AT oscillator with a circuit, resulting in exceptional temperature characteristics but increased jitter and phase noise.

SAW resonators having temperature characteristics that are represented by a quadratic curve did not have a frequency/temperature coefficient as good as that of AT crystal units having cubic curve coefficients. This prompted Epson Toyocom to launch an effort to develop a SAW oscillator with an improved frequency/temperature coefficient. The resulting product boasts outstanding jitter and phase noise characteristics as well as a frequency/temperature coefficient that is equal to or better than that of an AT oscillator.

Main Features

- 1) High stability (frequency tolerance of $\pm 50 \times 10^{-6}$) provided by Epson Toyocom's proprietary high-stability SAW resonator
- 2) Supports a wide operating temperature range of $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ (standard) or $-40\text{ }^{\circ}\text{C}$ to $+90\text{ }^{\circ}\text{C}$ (option)
- 3) Low-phase noise and low jitter due to oscillation at the crystal's fundamental frequency
- 4) Supports multiple output load conditions (differential LV-PECL, LVDS, HCSL)
- 5) Thin design (thickness: 1.2 mm)

Main specifications

Item	Specification		
Output load condition	LV-PECL	LVDS	HCSL
Output frequency range	100 MHz to 700 MHz		100 MHz to 500 MHz
Operating temperature range	-40 °C to +85 °C (standard) / -40 °C to +90 (C (option)		
Storage temperature range	-55 (C to +125 (C		
Supply voltage	2.5 ±0.125 V / 3.3 ±0.33 V		
Current consumption	100 mA Max. / 80 mA Max.	30 mA Max. / 45 mA Max.	80 mA Max. / 75 mA Max.
Frequency tolerance	±50x10 ⁻⁶		
Phase jitter	0.2 ps Max. (@622.08 MHz, 12 kHz to 20 MHz)		
External dimensions	7.0 x 5.0 x 1.2t mm		

Glossary

(*1) Jitter

Fluctuation among clock cycles, which can cause jittery images or bit errors during data transfers.

(*2) Phase noise

Energy that is radiated near the oscillation frequency, and that occurs due to the internal and external environmental factors (noise) of a crystal oscillation circuit. Wireless signal transmission errors can occur when this noise value is too high.

(*3) LAN (local area network)

A network that interconnects computers and peripherals within a small geographic area, such as an office or building, and that is used for sharing information and for intercommunications. LANS are typically based on the Ethernet standard and transmission rates have accelerated in recent years.

(*4) SAN (storage area network)

A network that connects remote storage devices to servers. Capable of storing and handling large volumes of data, these systems most often utilize the Fibre Channel standard.

For product enquiries, please locate your regional Epson Toyocom representative at:
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/>