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**Epson Toyocom Develops Low Jitter, Low Phase Noise SAW Oscillators
Supporting HCSL Output for High-Speed Interfaces**

Epson Toyocom Corporation (Epson Toyocom), the leader in crystal devices, has developed two new HCSL^(*1) output SAW oscillators, the EG-2102CA HCSL and the EG-2121CA HCSL. Featuring low jitter^(*2) and low phase noise^(*3), these oscillators are ideal for PCI Express^(*4) and FB-DIMM^(*5) applications.

The use of high-speed interfaces (PCI Express) for PCs and workstations and FB-DIMM is expanding. Oscillators that operate at frequencies exceeding 100 MHz and generate HCSL output are in demand as reference clocks in these devices. In workstations and other high-end applications, there is also demand for low jitter, low phase noise oscillators to reduce bit errors during data transmission. Epson Toyocom has provided its EG series of low jitter, low phase noise SAW oscillators, which generate oscillations at the fundamental frequency, for high-speed interfaces in LAN^(*6) and SAN^(*7) devices.

By adding HCSL output crystal oscillators to our existing line of products that offer CMOS, differential LV-PECL, and LVDS output, Epson Toyocom will help expand the use of PCI Express and other high-speed interfaces. Epson Toyocom plans to develop and commercialize space-saving, high-frequency crystal devices that offer outstanding precision and stability for the next-generation network^(*8) market, which will provide a variety of services, such as voice, data, TV telephony and video, over IP.

Main Features

- 1) Supports fundamental frequency outputs as high as 500 MHz owing to Epson Toyocom's high-stability SAW devices.
- 2) With low jitter and low phase noise characteristics at the fundamental frequency, typical phase jitter^(*9) is 0.3 ps (offset frequency of 12 kHz - 20 MHz, and output frequency of 100 MHz).
- 3) HCSL output support, making them ideal for PCI Express and FB-DIMM clocks.
- 4) Slim design (typically 7.0 x 5.0 x 1.25t mm).

Main Specifications

	EG-2102CA HCSL	EG-2121CA HCSL
Frequency tolerance	$\pm 100 \times 10^{-6}$ Max. / $\pm 50 \times 10^{-6}$ Max.	
Operating temperature range	-5 to +85°C / -20 to +70°C / 0 to +70°C	
Output frequency range	100 to 500 MHz	
Supply voltage	3.3 V \pm 0.3 V	2.5 V \pm 0.125 V
Current consumption	85 mA Max.	80 mA Max.
Output voltage	0 to +0.75 V Typ.	
Phase jitter	0.3 ps Typ. (Offset frequency: 12 kHz to 20 MHz)	
External dimensions	7.0 \times 5.0 \times 1.25t mm Typ.	

Glossary

(*1) HCSL (high-speed current-steering logic)

A type of differential output scheme used in reference clocks for PCI Express and FB-DIMM. With a typical amplitude of 0.7V, the HCSL standard will support low-voltage and low-noise ICs of the future.

(*2) Jitter

This refers to fluctuation among clock cycles, which can cause jittery images or bit errors during data transfers.

(*3) Phase noise

This refers to useless 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.

(*4) PCI Express (peripheral component interconnect express)

An I/O serial transmission interface established by the PCI-bus standardization group PCI-SIG in 2002 as a replacement for PCI bus. PCI Express provides high bandwidth and high-speed transmission rates.

(*5) FB-DIMM (fully buffered DIMM)

A type of DRAM dual inline memory module (DIMM) standardized by JEDEC (the Joint Electron Device Engineering Council), an industry group that promotes standardization of electronic components in the United States. With a serial high-speed interface similar to that of PCI Express, FB-DIMM is a high-speed memory standard for high-end servers.

(*6) 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.

(*7) 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.

(*8) NGN (next-generation networks)

Networks of the future that are being built primarily by Japanese and European telecommunications providers. They are able to provide a variety of services, such as voice, data, TV telephony and video, over IP. Groups such as ITU-T (International Telecommunications Union Telecommunications Standardization Sector) are developing standards for NGNs.

(*9) Phase jitter

A metric used to express jitter, phase jitter is a value found by integrating phase noise across an offset frequency in a predetermined range.