Silicon Labs Introduces the Industry's First Single-Die MEMS Oscillator

New Si50x CMEMS® Oscillators Leap Ahead of Quartz-Based Timing Devices with Superior Frequency Stability, Reliability and Programmability

"By leveraging Silicon Labs' expertise in MEMS design, device and process integration and mixed-signal technology, the Si50x family provides a best-in-class general-purpose oscillator solution for cost- and power-constrained embedded, industrial and consumer electronics applications."

AUSTIN, Texas--(BUSINESS WIRE)--Silicon Labs (NASDAQ: SLAB), a leader in high-performance, analog-intensive, mixed-signal ICs, today introduced the industry's most highly integrated MEMS-based oscillators designed to replace general-purpose crystal oscillators (XOs) in cost-sensitive, low-power and high-volume industrial, embedded and consumer electronics applications such as digital cameras, storage and memory, ATM machines, point-of-sale equipment and multi-function printers. The new Si50x oscillators are based on Silicon Labs' patented CMEMS® technology – the first to enable MEMS structures to be built directly on top of standard CMOS wafers in high-volume fabs, resulting in fully integrated, highly reliable monolithic "CMOS+MEMS" IC solutions.

Silicon Labs' Si50x CMEMS oscillator family achieves smaller size, higher reliability, better aging and higher integration than existing frequency control solutions through a patented monolithic architecture that integrates the MEMS resonator together with the CMOS oscillator circuitry on a single die. The benefits of this unprecedented CMOS+MEMS integration combined with Silicon Labs' proven mixed-signal expertise are transformational for the frequency control industry:

- CMEMS oscillators are manufactured in a high-volume CMOS fab with unified foundry lines that support wafer probing of complete oscillator systems for state-of-the-art quality and process control.
- CMEMS technology enables guaranteed data sheet performance with 10 years of frequency stability including solder shift, load pulling, V_{DD} variation, operating temperature range, vibration and shock. This guaranteed operating life performance is 10 times longer than typically offered by comparable crystal and MEMS oscillators.
- CMEMS oscillators tightly couple the MEMS resonator with CMOS temperature sensor and compensation circuitry, ensuring a highly stable frequency output in the face of thermal transients and over the full industrial temperature range. The end result is a predictable, reliable frequency reference over the long operating lifespans of industrial and embedded applications.
- CMEMS resonators are passively compensated, using materials with offsetting temperature behaviors in the design. This enables Silicon Labs to apply its innovative mixed-signal circuit design expertise to create smaller, lower power and more cost-effective oscillators while ensuring excellent frequency and temperature stability and aging performance.

The Si50x CMEMS oscillators support any frequency between 32 kHz and 100 MHz. Frequency stability options include ±20, ±30 and ±50 ppm across extended commercial (-20 to 70 ^{o}C) and industrial (-40 to 85 ^{o}C) operating temperature ranges. The CMEMS oscillators also offer extensive field- and factory-programmable features including low-power and low-period jitter modes, programmable rise/fall times and polarity-configurable output-enable functionality.

The Si50x CMEMS oscillator family frees customers from supply chain problems that are typical for traditional quartz-based solutions. The Si50x oscillators are manufactured at Semiconductor Manufacturing International Corporation (SMIC), one of the world's leading semiconductor foundries and the largest, most advanced foundry in mainland China. This strategic foundry relationship increases manufacturing and supply predictability through the benefits of massive scale and quality control. Because CMEMS oscillators are integrated, monolithic ICs, they are packaged in widely produced, molded-compound 4-pin packages, again ensuring a predictable and reliable supply chain.

"The timing market has reached an inflection point in which the latest-generation MEMS-based oscillators are capable of providing reliable, cost-effective replacements for traditional crystal oscillators," said Jeremie Bouchaud, director and senior principal analyst, MEMS and Sensors, IHS. "Silicon Labs' CMEMS technology provides the most integrated crystal replacement solution to date by combining the MEMS resonator and frequency control circuitry into a single-die device optimized for high-volume electronic system designs."

Like all Silicon Labs oscillator products, the Si50x oscillators are available for web-based customization with short two week sample lead times or optionally available with "0-day" lead time via instantaneous field programming at the customer's site by Silicon Labs' sales channel partners. In addition, the Si50x oscillators are pin- and footprint-compatible with existing quartz or MEMS oscillators, enabling a quick, easy drop-in replacement solution.

The Si50x family includes four products that enable thousands of flexible timing configurations:

- Si501 single-frequency oscillator with output-enable (OE) functionality
- Si502 dual-frequency oscillator with OE and frequency-select (FS) functionality
- Si503 quad-frequency oscillator with FS technology
- Si504 fully programmable oscillator supporting all potential configuration features with a 1-pin interface for fine-tuned frequency adjustments measured in parts per billion

“The Si50x CMEMS oscillator family introduces an important technological step forward in the frequency control market, combining all the manufacturing advantages of a single-die MEMS-based solution while retaining some of the best characteristics of general-purpose crystal oscillators and improving on both reliability and lead times,” said Mike Petrowski, vice president and general manager of Silicon Labs’ timing products. “By leveraging Silicon Labs’ expertise in MEMS design, device and process integration and mixed-signal technology, the Si50x family provides a best-in-class general-purpose oscillator solution for cost- and power-constrained embedded, industrial and consumer electronics applications.”

Pricing and Availability

Production quantities of Silicon Labs’ Si501/2/3/4 CMEMS oscillators are available now in three industry-standard 4-pin DFN package sizes: 2 mm x 2.5 mm, 2.5 mm x 3.2 mm and 3.2 mm x 5 mm. Pricing for Si50x oscillators in 10,000-unit quantities begins at $0.44 (USD). To ease CMEMS oscillator evaluation and application development, Silicon Labs offers the Si501-2-3-4-EVB Evaluation Kit priced at $99 (USD MSRP), featuring a pre-programmed Si504 device and open sockets in each package size for customer evaluation.

For more information about Silicon Labs’ Si50x CMEMS oscillator family (including white papers and characterization and qualification reports) and to order samples and development tools, visit www.silabs.com/CMEMS.

Silicon Labs

Silicon Labs is an industry leader in the innovation of high-performance, analog-intensive, mixed-signal ICs. Developed by a world-class engineering team with unsurpassed expertise in mixed-signal design, Silicon Labs’ diverse portfolio of patented semiconductor solutions offers customers significant advantages in performance, size and power consumption. For more information about Silicon Labs, please visit www.silabs.com.

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This press release may contain forward-looking statements based on Silicon Labs’ current expectations. These forward-looking statements involve risks and uncertainties. A number of important factors could cause actual results to differ materially from those in the forward-looking statements. For a discussion of factors that could impact Silicon Labs’ financial results and cause actual results to differ materially from those in the forward-looking statements, please refer to Silicon Labs’ filings with the SEC. Silicon Labs disclaims any intention or obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

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