Silicon Labs Enables Lowest 32-Bit System Power with Microcontroller Architecture Breakthroughs

Power-Aware Precision32™ Tools for New SiM3L1xx MCUs Allow Developers to Optimize System-Level Power Consumption

“Momentum has been building around the implementation of a wide variety of power-sensitive, connected devices that comprise the Internet of Things”

AUSTIN, Texas--(BUSINESS WIRE)--Silicon Laboratories Inc. (NASDAQ: SLAB), a leader in high-performance, analog-intensive, mixed-signal ICs, today introduced the industry’s lowest power ARM® Cortex™-M3 processor-based microcontroller (MCU) family and first-of-a-kind “power-aware” development tools. The Precision32 SiM3L1xx MCUs and development environment leverage mixed-signal innovations to enable developers to reduce power consumption to 175 µA/MHz in active mode and less than 250 nA in sleep mode with the real-time clock (RTC) enabled at 3.6 V. The new ultra-low-power mixed-signal MCUs are ideal for smart metering, utility monitoring, home automation, wireless security, asset tracking, personal medical devices and other power-sensitive applications to enable the Internet of Things (IoT).

Ultra-low-power MCUs are key building blocks of IP-enabled devices being connected to the IoT. Experts believe the IoT will comprise an estimated 50 billion intelligent devices by 2020, autonomously sensing, monitoring, processing, controlling and communicating over wireless networks. Because many of these intelligent end nodes will be powered by batteries or harvested energy sources, they require exceptionally energy-efficient MCUs such as the SiM3L1xx devices that enable developers to optimize system-level power consumption.

The SiM3L1xx family is the industry’s most power-efficient line of 32-bit MCUs, designed to achieve ground-breaking ultra-low-power operation based on an ARM Cortex-M3 processor operating at up to 50 MHz. The new Precision32 mixed-signal MCUs include power-saving peripheral and architectural innovations that can reduce current consumption below that of many 8-bit MCUs, enabling developers to use higher performance 32-bit cores in their low-power embedded designs without the tradeoff of reduced battery life.

Active mode power reduction is achieved through a number of key innovations. For example, dynamic voltage scaling adjusts the internal device voltage in response to changing conditions. An integrated, high-efficiency dc-dc buck converter reduces active mode power by 40 percent compared to competing 32-bit MCUs. Dedicated peripherals such as a data transfer manager, AES encryption block and run-time encoder accelerate the processing of RF protocol for wireless applications without CPU intervention, greatly reducing system power.

Enhanced direct memory access (DMA) can reduce protocol-related power by 90 percent, and RAM and register state retention enables a fast 4 microsecond wake-up time. The MCU family also features a patented LCD controller with a charge redistribution architecture that reduces the display’s power consumption by nearly 40 percent without compromising performance.

The SiM3L1xx MCUs also achieve significant reduction in sleep-mode power by optimizing on-chip peripherals (charge pump, RTC, sensor interface, sleep mode UART, comparator and LCD controller) for the lowest power consumption. The charge pump generates a power-efficient input voltage for the device circuits in sleep mode, which reduces analog sleep currents by 35 percent and digital sleep currents by 50 percent. SiM3L1xx MCUs support a multi-alarm RTC for clocking and interrupts, a sleep-mode UART for low-power device communication, and an integrated sensor interface that provides sensor stimulus and measurement while the MCU is in sleep mode. The autonomous sensor interface continues to count in sleep mode and can wake the MCU after a count overflow or when the count reaches a programmable threshold.

The SiM3L1xx and supporting development tools were designed with the overall system power budget in mind. To minimize system-level power, the SiM3L1xx MCUs feature patented voltage conversion technology, as well as advanced peripherals that reduce the power consumed by other ICs in the system. For example, the high-efficiency dc-dc converter reduces the operating current of the entire system. Configuring the output voltage to the lowest acceptable setting of the other IC components connected to the MCU minimizes overall power consumption. This technique is especially useful in battery-powered applications such as smart meters where this innovation can extend the battery’s lifetime to 20 years.

Power-Aware Precision32 Development Tools

Silicon Labs' complimentary Eclipse-based IDE and AppBuilder software include new, first-of-a kind capabilities for estimating power consumption and providing configuration guidance to achieve the lowest system power:

- *Power Estimator* provides a graphical representation of the total supply current and additive currents for enabled peripherals. The raw current values of each peripheral clearly show where power is being consumed, and a pie chart shows the percentage of each peripheral's power usage relative to the total current. *Power Estimator* automatically updates the design with configuration changes, allowing designers to optimize each mode for the lowest power.
- *Power Tips* provides software configuration guidance that helps developers minimize current consumption. The feature automatically appears within AppBuilder when the cursor hovers over a configurable setting. Having the ability to see power optimization tips while configuring the MCU saves considerable development time.

AppBuilder software also makes the developer's job easier by streamlining peripheral selection, initialization and pin-out customization for Precision32 MCUs.

"Low-power design is especially challenging because developers must consider many different application-specific optimizations to meet their desired low-power targets," said Mike Salas, vice president and general manager of Silicon Labs' microcontroller products. "The new Precision32 mixed-signal MCU family is unique in the industry because it provides an unprecedented combination of advanced peripherals, innovative architecture and power-aware design tools to give developers the flexibility to optimize their designs for the lowest system-level power."

"Momentum has been building around the implementation of a wide variety of power-sensitive, connected devices that comprise the Internet of Things," said Richard York, director of embedded processors, ARM. "Silicon Labs is addressing this major industry trend by delivering an exceptionally energy-efficient range of microcontrollers based on the ARM Cortex-M3 processor. We are encouraged by the continued innovation in this market as advanced MCUs, such as the Precision32 SiM3L1xx family from Silicon Labs, will help develop the Internet of Things market."

Pricing and Availability

Production quantities of Silicon Labs' SiM3L1xx MCUs are available now in QFN and TQFP packages as small as 5.5 mm x 5.5 mm with 32 to 256 kB flash sizes. Product pricing for the SiM3L1xx MCUs in 10,000-unit quantities begins at $2.55 (USD). Comprehensive unified development kits include the SiM3L1XX-B-DK kit (without LCD) and the SiM3L1XXLCD-B-DK LCD kit, each priced at $99.00 (USD MSRP).

For additional SiM3L1xx MCU product information, samples and development tools, please visit www.silabs.com/pr/32bit-mcu. Download Silicon Labs' free Parametric Search iPad app to find the right Precision32 MCU solution for your embedded design.

Silicon Laboratories Inc.

Silicon Laboratories 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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