Silicon Labs Newsroom

Silicon Labs Streamlines Energy Harvesting Product Development for Battery-Free IoT

Silicon Labs' most energy-efficient Wireless SoC to date with energy harvesting-ready capabilities

AUSTIN, Texas, April 22, 2024 /PRNewswire/ -- Silicon Labs (NASDAQ: SLAB), a leader in secure, intelligent wireless technology for a more connected world, today announced their new xG22E family of Wireless SoCs, Silicon Labs' first-ever family designed to operate within the ultra-low power envelope required for battery-free, energy harvesting applications. The new family consists of the BG22E, MG22E, and FG22E. As Silicon Labs' most energy-efficient SoCs to date, all three SoCs will enable IoT device makers to build high-performance, Bluetooth Low Energy (LE), 802.15.4-based, or proprietary 2.4GHz. wireless devices for battery-optimized and battery-free devices that can harvest energy from external sources in their environments like indoor or outdoor ambient light, ambient radio waves, and kinetic motion.

To help device manufacturers build a complete energy harvesting solution, Silicon Labs is also announcing their partnership with e-peas, a provider of industry-leading Power Managed Integrated Circuits (PMICs) designed for energy harvesting. Through this partnership, Silicon Labs and e-peas co-developed two energy harvesting shields for Silicon Labs' new, energy-optimized xG22E Explorer Kit. To better develop within the tight constraints that energy harvesting requires, the new xG22E Explorer Kit allows developers to customize the peripherals and debugging options that best match their application and get highly accurate measurements to better build their applications and devices with the energy harvesting shields. The energy harvesting shields are each tuned and optimized for different energy sources and energy storage technologies. They are custom-fit to slot onto the Explorer Kit. Notably, one of the shields uses e-peas' latest AEM13920 dual-harvester, which allows it to pull energy simultaneously from two distinct energy sources, like indoor or outdoor light, thermal gradients, and electromagnetic waves without sacrificing on energy conversion efficiency. The second co-developed shield is based on e-peas' AEM00300 shield, and is dedicated to harvesting power from random pulsed energy sources.

"As the market for energy harvesting and low-power solutions grows, Silicon Labs remains dedicated to enhancing our wireless MCU and radio stack capabilities to advance the development of battery-free IoT solutions," said Ross Sabolcik, Senior Vice President for the Industrial and Commercial Business Unit at Silicon Labs. "Our efforts to prioritize energy efficiency and increase device longevity underscore our commitment to fostering a more sustainable IoT ecosystem."

xG22E Designed to Address Energy Efficiency Challenges for the IoT
The evolution and widespread deployment of the Internet of Things (IoT) faces a significant challenge related to powering low-complexity, small-form-factor devices. Traditional sources like mains power or batteries pose scalability and maintenance issues. The emergence of the Ambient IoT addresses this challenge by introducing a class of connected devices primarily powered through energy harvesting from ambient sources like radio waves, light, motion, and heat.

Silicon Labs aims to build a device that can address one of the significant challenges in Ambient IoT: creating a platform that can optimize its energy consumption and prolong its lifespan. The xG22E family comes equipped with several features designed to minimize energy use and make it the platform of choice for energy harvesting, including:

- **Ultra-fast, low-energy cold start** for applications starting from a zero-energy state to transmit packets and then rapidly return to sleep. An xG22E device wakes up in only eight milliseconds and uses only 150 micro-Joules, or roughly 0.003% of the energy needed to power a 60-watt equivalent LED lightbulb for one second.
- **Energy conserving deep sleep swift wake-up** reduces wake-up energy by 78% compared to other Silicon Labs devices.
- **Power-efficient energy mode transition** to smoothly transition in and out of energy modes by mitigating current spikes or inrush, which can harm energy storage capacity.
- **Multiple deep sleep wake-up options**, such as RFSense, GPIO, and RTC wake-up sources from the deepest EM4 sleep mode, are ideal for extended storage.

Energy Harvesting Applications Enable a More Sustainable IoT
Energy harvesting and conservation technologies offer significant benefits across industries, including reduced energy costs, elimination of battery dependence, and reduced operational carbon footprint by changing energy consumption sources and minimizing battery waste. It also complements many existing IoT applications. For example, electronic shelf labels are being rapidly adopted by retailers across the globe to allow for more accurate pricing, inventory management, and even loss prevention. However, with a single location having as many as thousands of labels, they require a lot of batteries. Fortunately, electronic shelf labels do not need a lot of power, nor do they require always-on connectivity, making them an excellent fit for energy harvesting. By using Ambient IoT energy sources, retailers can reduce or eliminate their need for batteries for shelf labels. Other examples in the consumer space include television remote controls that use solar energy and movable, wireless light or appliance switches.

Silicon Labs actively supports companies developing successful low-power devices and pursuing battery-free designs, fostering an environmentally sustainable leadership within their respective fields.

To learn more about how to begin developing battery-free IoT devices using Silicon Labs, be sure to visit:

- The registration page for the May 9th Tech Talk unboxing of the xG22E
- The new Silicon Labs Energy Harvesting page
- The Silicon Labs blog to learn more aboutenergy harvesting

About Silicon Labs
Silicon Labs is a trailblazer in wireless connectivity for the Internet of Things. The corporate values and vision to be a sustainable leader in the semiconductor Industry are the foundation of Silicon Labs' sustainability strategy. Its integrated hardware and software platform, intuitive development tools, and unmatched ecosystem support make Silicon Labs the ideal long-term partner in building advanced industrial, commercial, and home and life applications. Silicon Labs leads the industry in high performance, low power, and security, supporting the broadest set of multi-protocol solutions.

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For further information: Sam Ponedal, sam.ponedal@silabs.com

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