



# Gecko<sup>®</sup> MCUs

Energy-friendly microcontrollers for the IoT

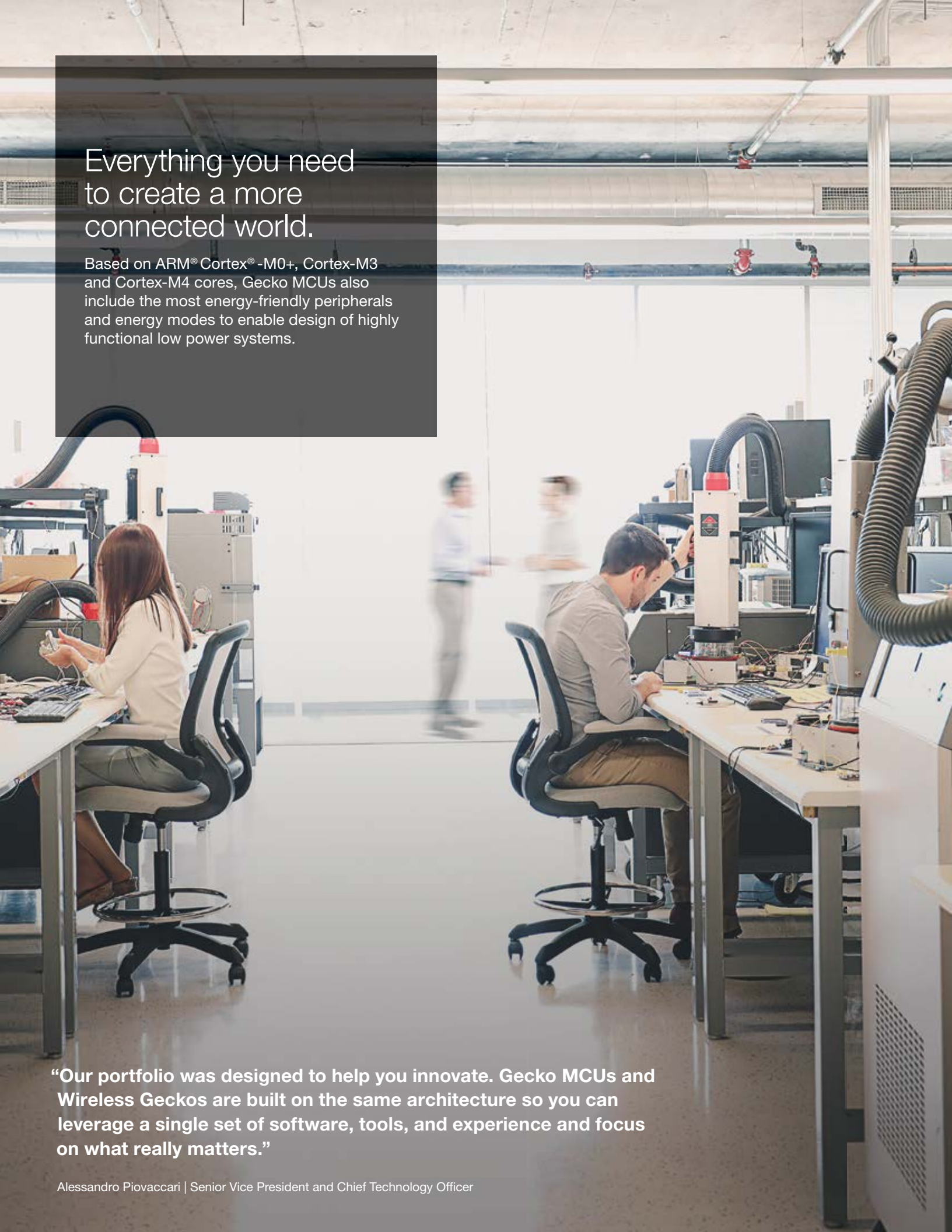
PRODUCT SELECTOR GUIDE



32

**Gecko MCUs**

Complete portfolio of energy-friendly 32-bit microcontrollers



## Everything you need to create a more connected world.

Based on ARM® Cortex® -M0+, Cortex-M3 and Cortex-M4 cores, Gecko MCUs also include the most energy-friendly peripherals and energy modes to enable design of highly functional low power systems.

**“Our portfolio was designed to help you innovate. Gecko MCUs and Wireless Geckos are built on the same architecture so you can leverage a single set of software, tools, and experience and focus on what really matters.”**

Alessandro Piovaccari | Senior Vice President and Chief Technology Officer



## Sense

Intelligent sensor solutions with superb reliability, compact size, high levels of integration and unmatched ease of use for a variety of applications.

Temperature | Humidity | Optical | Touch | Proximity



## Compute

The computing power you need with power efficiency you didn't know was possible.

Autonomous | Low Power | Signal Processing | Mixed Signal | Easy to Use



## Communicate

Connectivity is at the heart of the IoT, and our wireless portfolio is how you achieve it.

Zigbee | Thread | WiFi | Bluetooth® Smart | Proprietary



## Simplify

Get up and running quickly with precompiled demos, application notes and examples. Use advanced tools including energy profiling and network analysis to optimize your MCU and wireless systems.

Simplicity Studio® | Energy Profiler™ | Network Analyzer | Rich Software Ecosystem

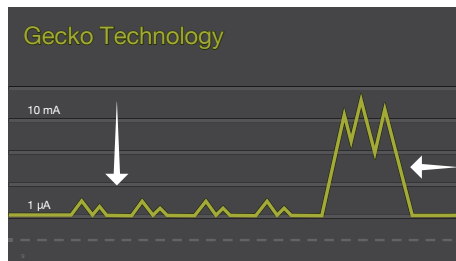
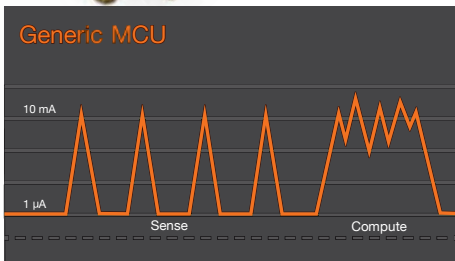
# Low Power. No Compromise.



The Gecko is excellent at conserving energy. Even in a full resting state it can still maintain awareness of its environment.



Built using Gecko Technology  
Gecko MCUs can perform a number of tasks while in deep sleep optimizing battery life for your application



## Usable Sleep Modes

- Fast 2 µs wakeup
- Autonomous communication and sense
- Optimize sleep with the Energy Profiler
- More sleep gives significant savings

## Highly Functional Low Power

- Down to 63 µA/MHz code execution
- DSP and floating point up to 48 MHz
- Highly flexible DMA offloads CPU
- Cryptography for secure communication

## Interfacing with the World

- Broad set of communication peripherals
- Integrated ADCs, DACs, OPAMPs
- Ultra-low energy Sensor Interfaces
- Easy path to radio integration

## Human Interaction

- TFT display engine, up to 320 x 240 pixels
- Low energy segment LCD driver
- Low energy capacitive touch solution

## Small Form Factor

- High integration – few external components
- WLCSP packages for minimum footprint
- Gecko Technology minimizes battery size

## Highly Scalable

- Broad software and pin compatibility
- Same architecture for MCUs and RF SoCs
- Small Cortex M0+ to large Cortex M3 and M4

## Enabling Software

- mbed, FreeRTOS, Segger partner
- Solid RF and communication stacks
- Security through accelerated mbedTLS

## Development Flow

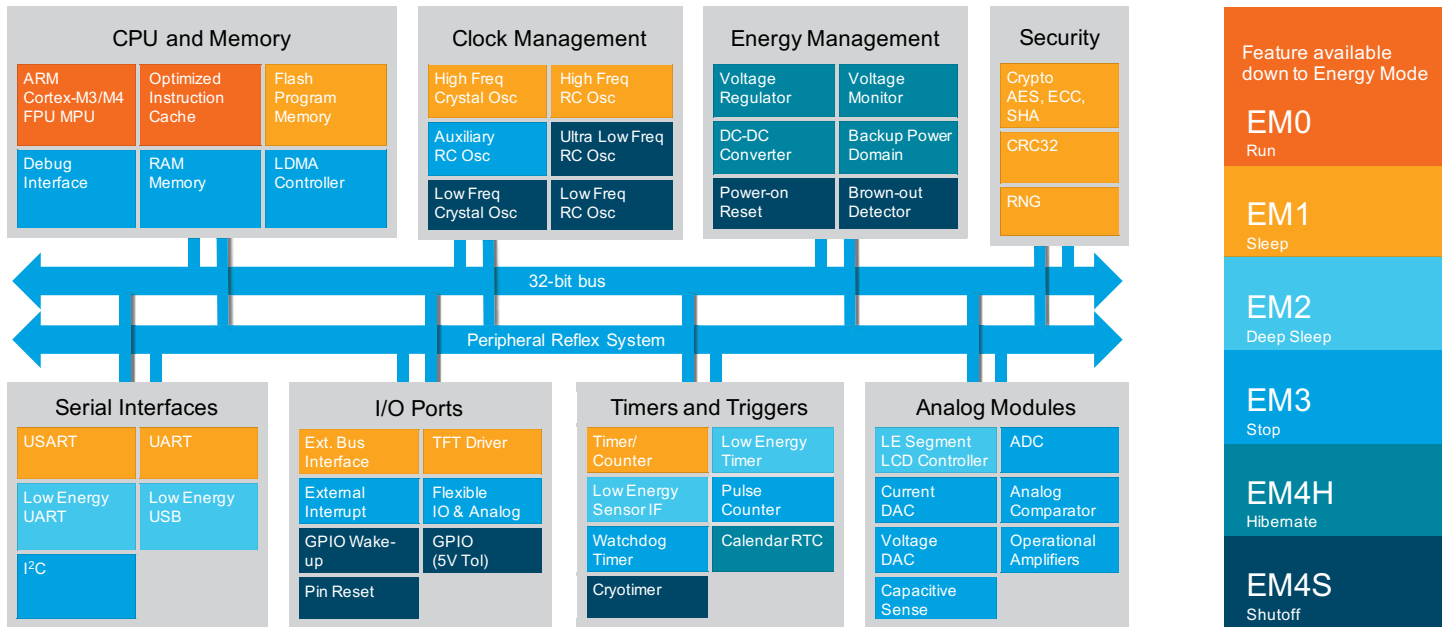
- Centered around the developer
- Intuitive workflow
- Support for your favorite tool

PRODUCT LINE	BASE PART NUMBER	PACKAGES	ARM CORTEX CPU	ACTIVE CURRENT (µA/MHZ)	DEEP SLEEP CURRENT (µA)	FLASH (KB)	RAM (KB)	GPIO (PINS)	CRYPTOGRAPHY	USB	LCD (SEGMENTS)
Zero Gecko	EFM32ZG	QFN24, QFN32, QFP48	M0+	114	0.9	4-32	2-4	17-37	AES128	-	-
Happy Gecko	EFM32HG	QFN24, QFN32, QFP48, CSP36	M0+	132	0.9	32-64	4-8	15-37	AES128	D	-
Tiny Gecko	EFM32TG	QFN24, QFN32, QFN64, QFP48, QFP64, BGA48	M3	150	1	4-32	2-4	17-56	AES128 / 256	-	1-8 x 11-24
Gecko	EFM32G	QFN32, QFN64, QFP48, QFP64, QFP100, BGA112	M3	180	0.9	16-128	8-16	24-90	AES128 / 256	-	1-4 x 22-40
Leopard Gecko	EFM32LG	QFN64, QFP64, QFP100, BGA112, BGA120, CSP81	M3	211	0.95	64-256	32	50-93	AES128 / 256	D/H/O	1-8 x 16-36
Giant Gecko	EFM32GG	QFN64, QFP64, QFP100, BGA112, BGA120	M3	219	1.1	512-1024	128	50-93	AES128 / 256	D/H/O	1-8 x 16-36
Wonder Gecko	EFM32WG	QFN64, QFP64, QFP100, BGA112, BGA120, CSP81	M4	225	0.95	64-256	32	50-93	AES128 / 256	D/H/O	1-8 x 16-36
Jade Gecko	EFM32JG	QFN32, QFN48	M3	63	1.4	128-256	32	20-32	FULL	-	-
Pearl Gecko	EFM32PG	QFN32, QFN48	M4	63	1.4	128-256	32	20-32	FULL	-	-

To see our portfolio of wireless products visit [www.silabs.com/wireless](http://www.silabs.com/wireless)

# Technical Overview

Gecko MCUs were designed for innovation. The diagram below shows an overview of the wide range of functionality available in these MCUs. The color coding represents the lowest energy mode the functions are available down to. The ability for peripherals to operate during deep sleep and below allows significant energy savings in low power applications.



	EM0	EM1	EM2	EM3	EM4H	EM4S
Current consumption	63 – 225 $\mu$ A/MHz	35 – 80 $\mu$ A/MHz	0.9 – 1.4 $\mu$ A	0.5 – 1.1 $\mu$ A	0.15 – 0.6 $\mu$ A	20 nA
Wake-up time	-	0	2 $\mu$ s	2 $\mu$ s	160 $\mu$ s	160 $\mu$ s
CPU (Cortex-M3/M0)	On	-	-	-	-	-
High frequency peripherals	Available	Available	-	-	-	-
Low frequency peripherals	Available	Available	Available	-	Calendar RTC	-
Asynchronous peripherals	Available	Available	Available	Available	-	-
Full CPU and SRAM retention	On	On	On	On	-	-
Wake-up events	Any	Any	32 kHz peripherals and all EM3 wake-ups	Async IRQ, I2C slave, Analog comparators, Voltage comparators	Reset, GPIO rising / falling edge	Reset, GPIO rising / falling edge

USART/SPI (I2S)	Peripheral Availability																
	UART	LEUART	I2C	TIMER (PWM)	LETIMER	RTC	PCNT	WATCHDOG	ADC (PINS)	DAC (PINS)	ACMP (PINS)	IDAC	OPAMP	EBI	TFT	LESENSE	
1 (1)	-	1	1	2 (6)	-	1	1	1	1 (4)	-	1 (5)	1	-	-	-	-	
2 (1)	-	1	1	3 (9)	-	1	1	1	1 (4)	-	1 (5)	1	-	-	-	-	
2 (1)	-	1	1	2 (6)	1	1	1	1	1 (8)	2 (2)	2 (16)	-	3	-	-	Y	
3	1	2	1	3 (9)	1	1	3	1	1 (8)	2 (2)	2 (16)	-	-	Y	-	-	
3 (2)	2	2	2	4 (12)	1	1	3	1	1 (8)	2 (2)	2 (16)	-	3	Y	Y	Y	
3 (2)	2	2	2	4 (12)	1	1	2	1	1 (8)	2 (2)	2 (16)	-	3	Y	Y	Y	
3 (2)	2	2	2	4 (12)	1	1	3	1	1 (8)	2 (2)	2 (16)	-	3	Y	Y	Y	
2 (1)	-	1	1	2 (7)	2	1	1	1	1 (24)	-	2 (24)	1 (24)	-	-	-	-	
2 (1)	-	1	1	2 (7)	2	1	1	1	1 (24)	-	2 (24)	1 (24)	-	-	-	-	

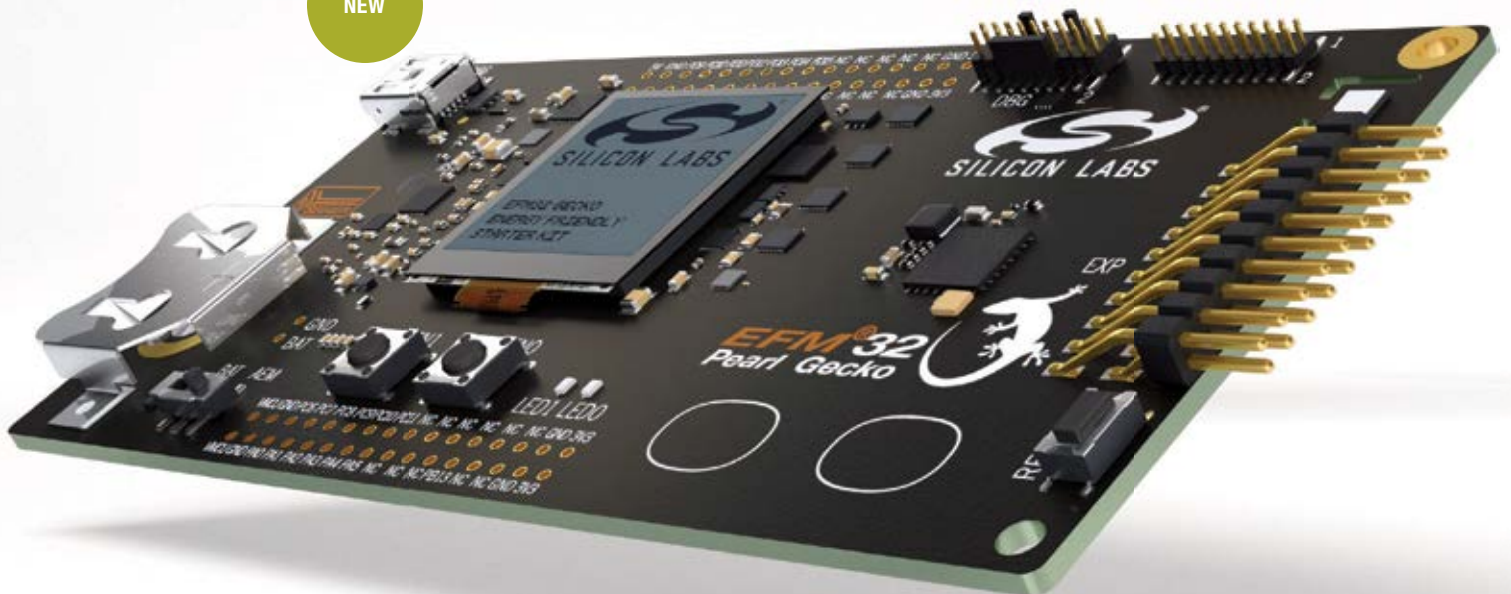
# Pearl and Jade Gecko 32-bit Microcontrollers

Silicon Labs' Pearl and Jade Gecko MCUs feature a powerful 32-bit ARM Cortex-M3 or M4 and a wide selection of peripherals, including a unique cryptographic hardware engine supporting AES, ECC, and SHA.

These features, combined with ultra-low current active mode and short wake-up time from energy-saving modes, make the Pearl and Jade Gecko MCUs well suited for any battery-powered application, as well as other systems requiring high performance and low-energy consumption.



NEW



## Minimize Energy Consumption

- Integrated high efficiency DC-DC
- 200 mA for both MCU and application
- Code execution at 63  $\mu$ A/MHz
- Sample sensors with ADC from deep sleep

## Secure your IoT device

- Advanced built-in cryptography
- ECC / AES / RSA / SHA / CRC
- Random Number Generator (RNG)
- Unique Device Identifier

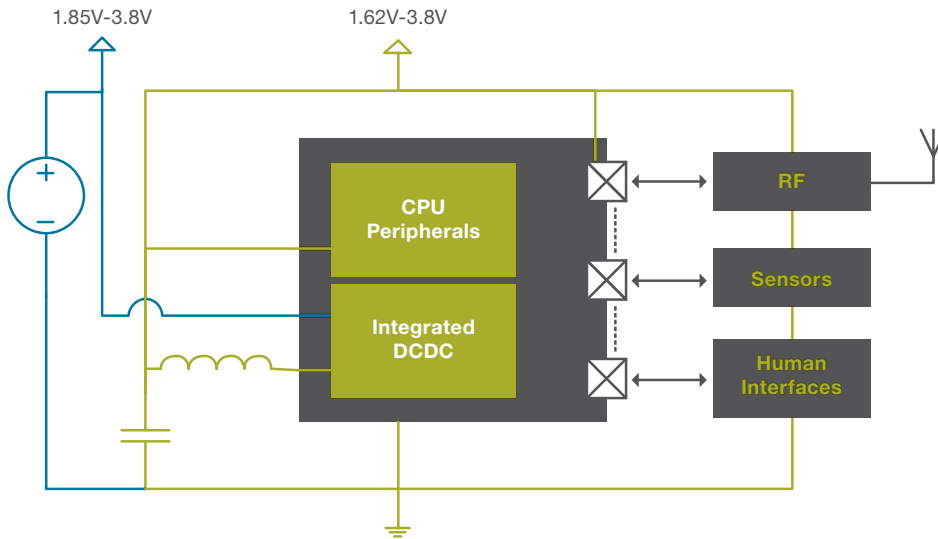
## Next Generation IoT Features

- USART with flexible timing engine
- Powerful and flexible linked-list DMA
- Ultra-low power CRYOTIMER
- 5V tolerant IO

# Efficient Integrated DC-DC Regulator

Pearl and Jade MCUs include a highly efficient integrated DC-DC buck regulator, capable of supplying up to 200 mA to the MCU and surrounding IoT application. The regulator maintains its efficiency even when the system is in deep sleep.

The figure below illustrates one possible DC-DC configuration, driving both MCU and system components, in order to maximize energy efficiency.



## Typical DCDC Configurations

- Drive full system—maximum energy efficiency
- Drive MCU—IO and system at higher voltage
- Disabled—optimize BOM

## Supply Ranges

- Efficient buck operation down to 2.4 V
- Seamless bypass from 2.4 V to 1.85 V
- MCU internals and IO range 1.62 V to 3.8 V

## Flexibility

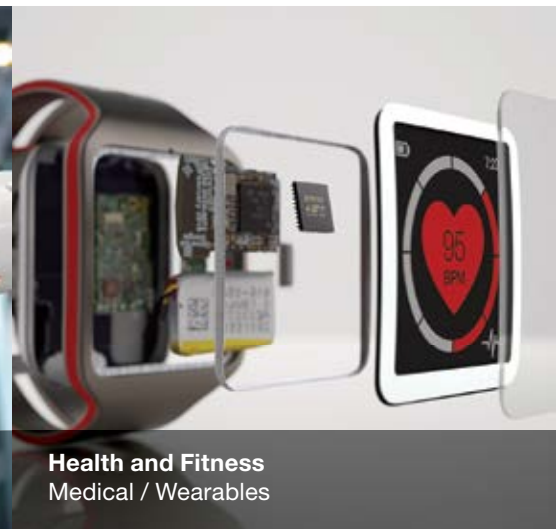
- Work with 1.8 V or 3.3 V system components
- Optimize for BOM or maximum efficiency
- Superior ease of use



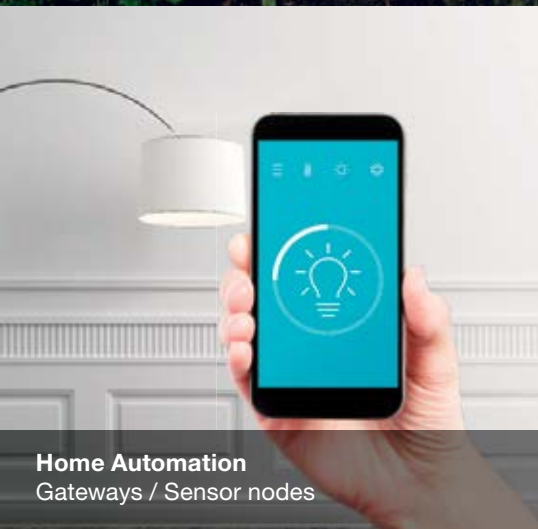
**IoT**  
Sensor nodes / Wireless modules



**Industrial**  
Factory automation gateways



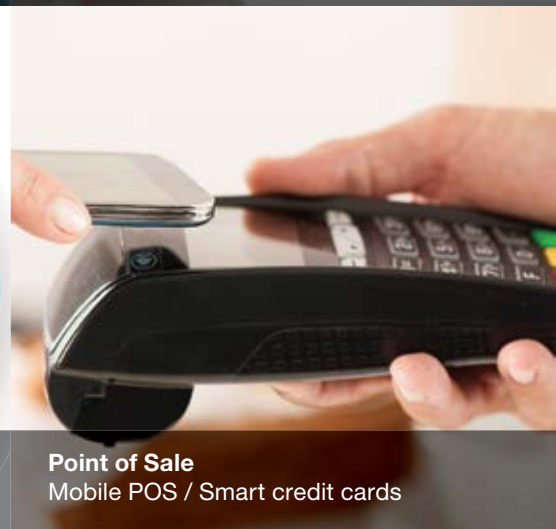
**Health and Fitness**  
Medical / Wearables



**Home Automation**  
Gateways / Sensor nodes



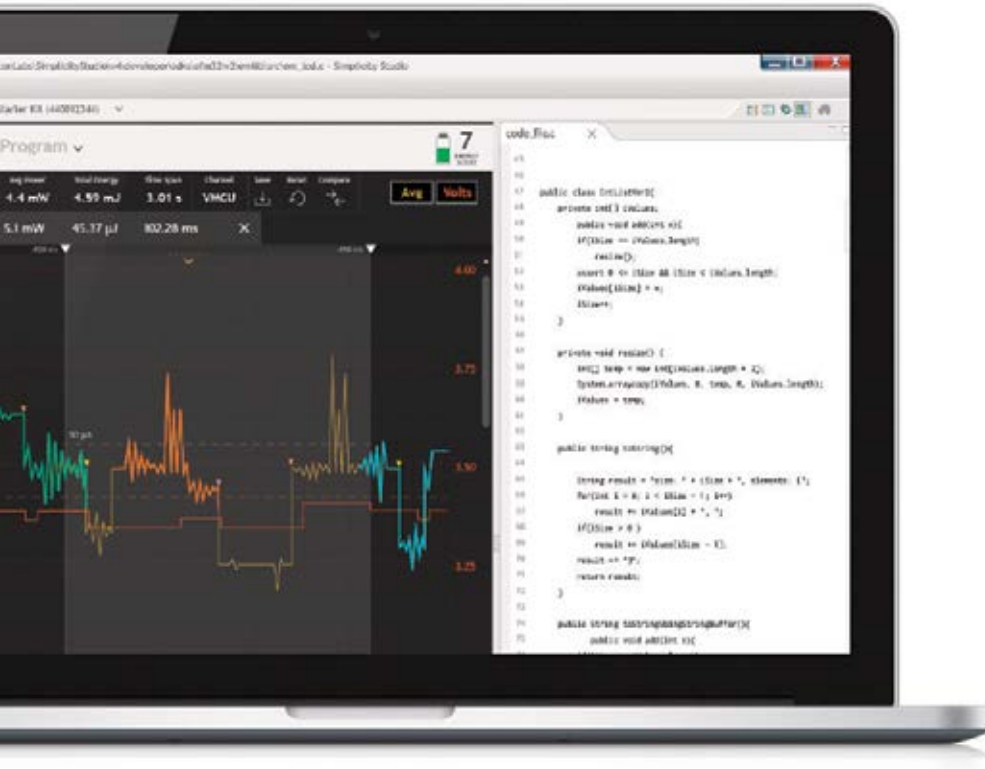
**Security**  
Smart door locks / Home security systems



**Point of Sale**  
Mobile POS / Smart credit cards

# Simplicity Studio

Simplicity Studio provides one-click access to design tools, documentation, software and support and resources for Gecko MCUs, EFM8™, 8051, Wireless Gecko MCUs and SoCs. Simplicity Studio 3.2 now features an enhanced real-time Energy Profiler, 3x faster execution speed and an easier, faster installation process.



## Energy Profiler

- Real-time analysis of energy consumption
- Correlate current consumption to code

## Part Configurator

- Graphical configuration of peripherals and IO
- Automatic validation and code generation

## IDE

- Eclipse framework
- Build tools: Keil®, IAR®, GCC
- 3rd party IDEs also supported

## Documentation

- One-stop destination for all product documentation

## Network Analyzer

- Advanced network debug for wireless products

## Getting Started is Easy

1

Buy a Starter Kit

The easiest way to begin development

[www.silabs.com/efm32](http://www.silabs.com/efm32)

2

Download Simplicity Studio

Get up and running quickly with precompiled demos, application notes and examples.

[www.silabs.com/simplicity](http://www.silabs.com/simplicity)

3

Connect with our Community

Explore, learn and share.

[community.silabs.com](http://community.silabs.com)



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