



# EFM8™

## 8-bit microcontrollers without compromise

PRODUCT SELECTOR GUIDE



### EFM8 MCUs

Fast, low-power 8-bit solutions featuring fully-integrated analog functionality and peripherals.

# EFM8 Applications



## Industrial

- POS equipment
- Smart meters
- Power converters
- Control & automation
- Optical modules

## Consumer

- Data cables
- Gaming
- LED wristbands

## Home and Building

- Fire and safety
- Sensors
- Automation

## Health and Fitness

- Medical
- Wearables
- Precision instrumentation

## Motor Control

- Model vehicles
- Small motors
- Electric tools
- Appliances

EFM8 microcontrollers are based on the popular 8051 core. The 8051 architecture ecosystem represents nearly 25% of the existing MCU market.

### Select a secure architecture

The EFM8 is based on a Harvard architecture, allowing it to only execute code fetched from program memory and allows locking of program memory to prevent unauthorized examination. These are two advantages in the EFM8 hardware that protect a product from security attacks.

### Select a low latency system

Variations in interrupt response time can cause adverse effects in some applications, causing, for example, audio distortion or motor noise and vibration. With the EFM8 it's easy to work "close to the metal" and have full control over the entire system.

### Select a simple solution

The EFM8 microcontroller is ideal for processing 8-bit data that comes from port I/O or sensor inputs. A great many applications don't require complex mathematics processing and benefit significantly from the code density advantages of an 8-bit processor when not tasked with 16-bit or 32-bit mathematics. Human interface functions, sensor interfaces, and distributed processing functions are examples that easily benefit from the simplicity of the EFM8 solutions.

**"Sub- $\$$ 0.50 MCU prices, tiny footprints, ultra-low power, low software overhead and design simplicity, all prerequisites for IoT devices. Silicon Labs designed the new EFM8 family to deliver best-in-class features and functionality in each of these application-critical areas."**

- IHS, 2015

# 8 factors that make EFM8 the world's only no-compromise 8-bit microcontroller.



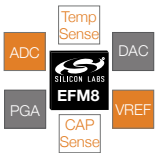
## Fast Processor Core

With up to 72 MHz operation and with 70% of the instructions executing in less than 1 or 2 clock cycles, the EFM8 MCUs offer an economical solution that satisfy the performance needs of embedded applications. Also, the efficient architecture reduces memory requirements of the application.



## Efficient Digital Peripherals

Autonomous digital peripherals reduce the processor overhead and the configurable logic reduces surrounding chip logic. The EFM8 MCUs include high-performance timers, higher resolution PWMs and fast serial communication peripherals including 12 Mbps SPI, 3 Mbps UART and 3.4 Mbps I2C.



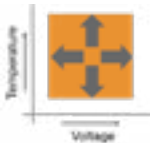
## High Performance Analog

The EFM8 family of MCUs offer high-performance analog peripherals such as 14 bit ADCs at 900 Ksps, 12 bit ADCs at 1 Msps, and 10 bit ADCs at 1.125 Msps, high noise immune capacitive sensing peripherals and temp sensors that reduce the system cost and simplify designs.



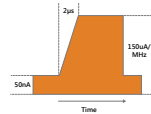
## Highly Integrated

The EFM8 family features high-precision oscillators, integrated on-board voltage regulator, USB charger detect circuitry and high performance peripherals in packages as small as 1.65x1.78 mm to reduce the PCB area and BOM cost.



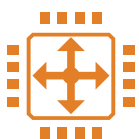
## No Performance Compromise

The EFM8 MCUs provide no-compromise peripherals that are fully characterized with guaranteed performance over temperature and voltage.



## Ultra Low Power

EFM8 extends battery life with ultra-low sleep currents down to 50 nA with brown out detection, fast wake up times with less than 2  $\mu$ s, active currents as low as 150  $\mu$ A/MHz and Low energy USB module for power consumption reduction of up to 90%.



## Digital Crossbar and Analog Multiplexer

Silicon Labs' patented crossbar technology enables maximum flexibility and unparalleled ease of development, allowing designers to select any peripherals with no conflicts in pin-out or PCB layout.



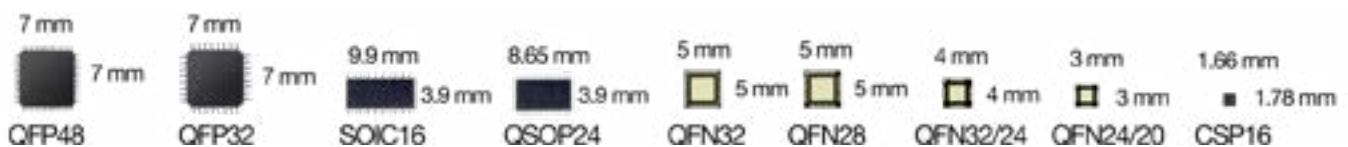
## Simplicity Studio™ Software

Free Simplicity Studio with integrated IDE, free unlimited code size Keil Compiler, demos, libraries and example codes, energy and Capsense Profiler tools, configurators, easily updated support packages, software and documentation, all at your fingertips.

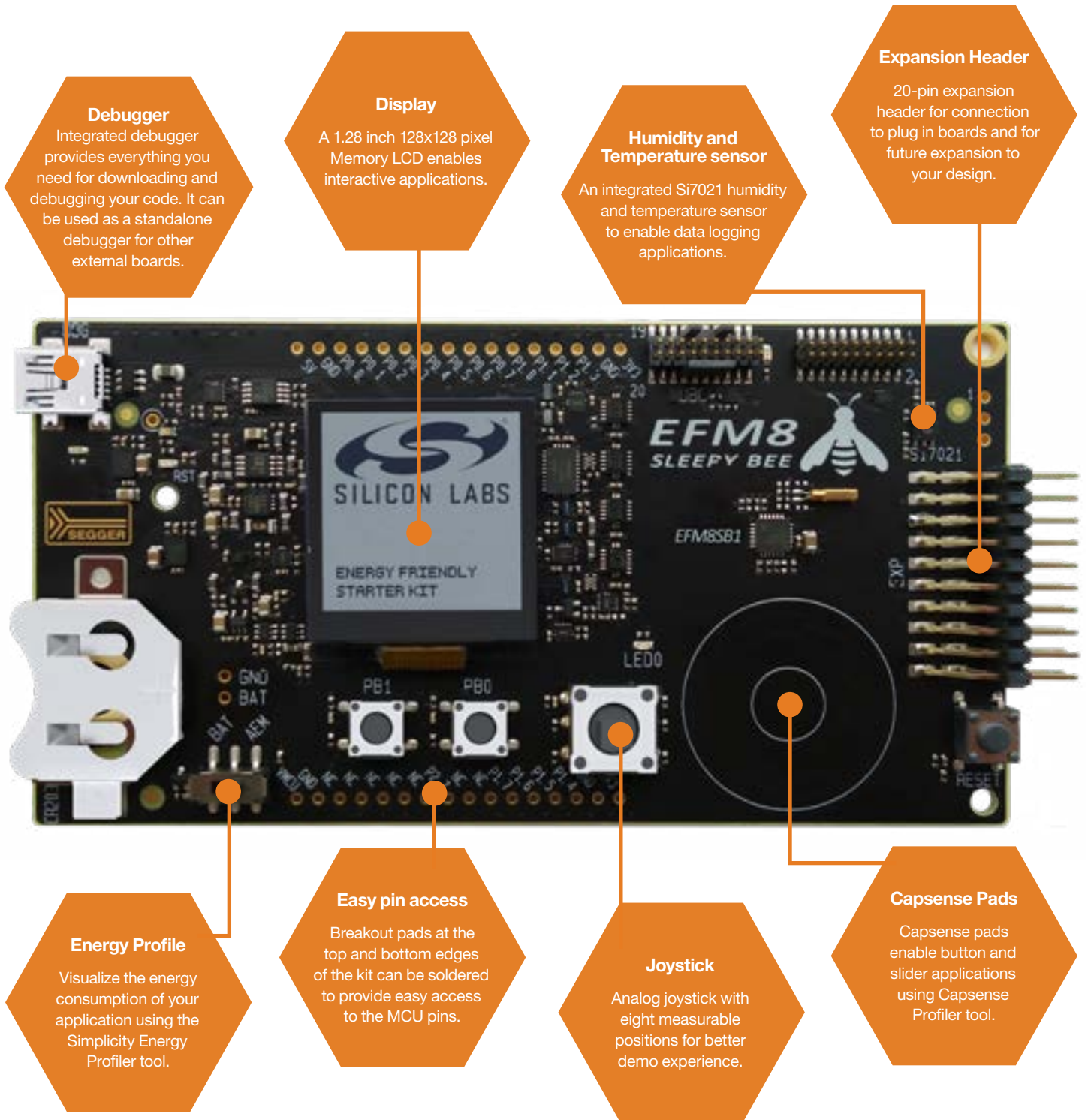
PART NUMBER	FLASH (KB)	RAM (B)	MHZ	GPIO	SPI	UART	I2C	EMIF	ADC	COMPARATOR	INTERNAL OSC	TIMERS	DAC	CLU	PCA/PWM CHANNELS	RTC	CAPACITIVE SENSE	LFO	OPERATING VOLTAGE (V)	PACKAGE	SMALLEST PACKAGE	GRADE
<b>LASER BEE - PRECISION ANALOG</b>																						
EFM8LB10F16E	16	1280	72	20, 29	1	2	2	-	14-bit, 12/20-ch.	2	2%	6	-	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C
EFM8LB10F16E	16	1280	72	28, 21	1	2	2	-	14-bit, 20/13-ch.	2	2%	6	-	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
EFM8LB11F16E	16	2304	72	20, 20	1	2	2	-	14-bit, 12/20-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C
EFM8LB11F16E	16	2304	72	28, 21	1	2	2	-	14-bit, 20/13-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
EFM8LB11F32E	32	2304	72	20, 29	1	2	2	-	14-bit, 12/20-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C
EFM8LB11F32E	32	2304	72	28, 21	1	2	2	-	14-bit, 20/13-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
EFM8LB12F32E	32	4352	72	20, 29	1	2	2	-	14-bit, 12/20-ch.	2	2%	6	4	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C
EFM8LB12F32E	32	4352	72	28, 21	1	2	2	-	14-bit, 20/13-ch.	2	2%	6	4	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
EFM8LB12F64E	64	4352	72	20, 29	1	2	2	-	14-bit, 12/20-ch.	2	2%	6	4	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C
EFM8LB12F64E	64	4352	72	28, 21	1	2	2	-	14-bit, 20/13-ch.	2	2%	6	4	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
<b>UNIVERSAL BEE - USB</b>																						
EFM8UB10F8G	8	2304	48	13	1	2	2	-	12-bit, 11-ch.	2	1.5%	5	-	-	3	-	-	√	2.2 to 5.25	QFN20	3x3mm	C
EFM8UB10F16G	16	2304	48	13, 22	1	2	2	-	12-bit, 11/20-ch.	2	1.5%	5	-	-	3	-	-	√	2.2 to 5.25	QFN20, QFN28	3x3mm	C
EFM8UB11F16G	16	2304	48	17	1	2	2	-	12-bit, 15-ch.	2	1.5%	5	-	-	3	-	-	√	2.2 to 5.25	QSOP24	8x4mm	C
EFM8UB20F32G	32	2304	48	25, 40	1	2	2	√	10-bit, 20/32-ch.	2	1.5%	6	-	-	5	-	-	√	2.7 - 5.25	QFN32, QFP32, QFP48	5x5mm	C
EFM8UB20F64G	64	4352	48	25, 40	1	2	2	√	10-bit, 20/32-ch.	2	1.5%	6	-	-	5	-	-	√	2.7 - 5.25	QFN32, QFP32, QFP48	5x5mm	C
EFM8UB30F40G	40	3328	48	13	1	1	1	-	10-bit, 12-ch	2	1.50%	6	-	4	3	-	-	√	2.7-5.25	QFN20	3x3mm	C
EFM8UB31F40G	40	3328	48	17	1	1	1	-	10-bit, 16-ch	2	1.50%	6	-	4	3	-	-	√	2.7-5.25	QFN24, QSOP24	3x3mm	C
<b>SLEEPY BEE - LOW POWER</b>																						
EFM8SB10F2G	2	256	25	16	1	1	1	-	12-bit, 9-ch.	1	2%	4	-	-	3	√	13	√	1.8 to 3.6	QFN20	3x3mm	C, A
EFM8SB10F4G	4	512	25	16	1	1	1	-	12-bit, 9-ch.	1	2%	4	-	-	3	√	13	√	1.8 to 3.6	QFN20	3x3mm	C, A
EFM8SB10F8G	8	512	25	16, 17	1	1	1	-	12-bit, 9/10-ch.	1	2%	4	-	-	3	√	13, 14	√	1.8 to 3.6	QFN20, QFN24, QSOP24	3x3mm	C, A
EFM8SB10F8G	8	512	25	13	1	1	1	-	12-bit, 9-ch.	1	2%	4	-	-	3	√	12	√	1.8 to 3.6	CSP16	1.78x1.65mm	C
EFM8SB20F16G	16	4352	25	16	2	1	1	-	10-bit, 15-ch.	2	2%	4	-	-	6	√	-	√	1.8 to 3.6	QFN24	4x4mm	C
EFM8SB20F32G	32	4352	25	16, 24	2	1	1	-	10-bit, 15/23-ch.	2	2%	4	-	-	6	√	-	√	1.8 to 3.6	QFN24, QFN32, QFP32	4x4mm	C
EFM8SB20F64G	64	4352	25	16, 24	2	1	1	-	10-bit, 15/23-ch.	2	2%	4	-	-	6	√	-	√	1.8 to 3.6	QFN24, QFN32, QFP32	4x4mm	C
<b>BUSY BEE - GENERAL PURPOSE</b>																						
EFM8BB10F2G	2	256	25	16	1	1	1	-	12-bit, 15-ch.	2	2%	4	-	-	3	-	-	√	2.2 to 3.6	QFN20	3x3mm	C, I, A
EFM8BB10F4G	4	512	25	16	1	1	1	-	12-bit, 15-ch.	2	2%	4	-	-	3	-	-	√	2.2 to 3.6	QFN20	3x3mm	C, I, A
EFM8BB10F8G	8	512	25	13, 16, 18	1	1	1	-	12-bit, 12/15/16-ch	2	2%	4	-	-	3	-	-	√	2.2 to 3.6	SOIC16, QFN20, QSOP24	3x3mm	C, I, A
EFM8BB21F16G	16	2304	50	16, 21	1	2	2	-	12-bit, 15/20-ch.	2	1.5%	5	-	-	3	-	-	√	2.2 to 3.6	QFN20, QSOP24	3x3mm	C, I, A
EFM8BB22F16G	16	2304	50	22	1	2	2	-	12-bit, 20-ch.	2	1.5%	5	-	-	3	-	-	√	2.2 to 5.25	QFN28	5x5mm	C, I, A
EFM8BB31F16G	16	2304	50	20, 29	1	2	1	-	12-bit, 12/20-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFN20, QFN32	3x3mm	C, I, A
EFM8BB31F16G	16	2304	50	28, 21	1	2	1	-	12-bit, 20/13-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
EFM8BB31F32G	32	2304	50	20, 29	1	2	1	-	12-bit, 12/20-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C, I, A
EFM8BB31F32G	32	2304	50	28, 21	1	2	1	-	12-bit, 20/13-ch.	2	2%	6	2	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C
EFM8BB31F64G	64	4352	50	20, 29	1	2	1	-	12-bit, 12/20-ch.	2	2%	6	4	4	6	-	-	√	2.2 to 3.6	QFN24, QFN32	3x3mm	C, I, A
EFM8BB31F64G	64	4352	50	28, 21	1	2	1	-	12-bit, 20/13-ch.	2	2%	6	4	4	6	-	-	√	2.2 to 3.6	QFP32, QSOP24	7x7mm	C

LASER BEE	UNIVERSAL BEE	SLEEPY BEE	BUSY BEE
Precision analog up to 72 MHz	USB up to 48 MHz	Low power up to 25 MHz	General purpose up to 50 MHz
Flash 16 - 64 KB RAM 1 - 4 KB	Flash 8 - 64 KB RAM 2 - 4 KB	Flash 2 - 64 KB RAM 0.5 - 4 KB	Flash 2 - 64 KB RAM 0.5 - 4 KB
<b>HIGHLIGHTS</b> 72 MHz MCU in 3x3 mm <sup>2</sup> package – high integration ADC/4xDAC/2x comparator – state-of-the-art analog ±3 °C temperature sensor – eliminate calibration Configurable Logic – eliminate external glue logic UART or SMBus bootloader	<b>HIGHLIGHTS</b> No external crystal or regulator needed for USB Low energy USB - up to 90% power reduction USB charger detect circuit (USB-BCS 1.2) 2x UART (3 Mbps), 1x SPI (12 Mbps), 2x I2C (3.4 Mbps) USB bootloader and configurable logic	<b>HIGHLIGHTS</b> Energy friendly – 50 nA sleep mode with BOD Active mode - 150 µA/MHz Fast wake up - < 2 µs Capacitive sense - < 1 µA wake on touch average UART bootloader	<b>HIGHLIGHTS</b> SAR ADC - 12-bit at 350 ksp/s; 10-bit at 1.125 Msps 2x low-current comparators with built-in DAC 2x UART (3 Mbps), 1x SPI (12 Mbps), 2x I2C (3.4 Mbps) "Priority crossbar" – simplifies PCB design UART bootloader

## Package Options



# Get started with EFM8 today

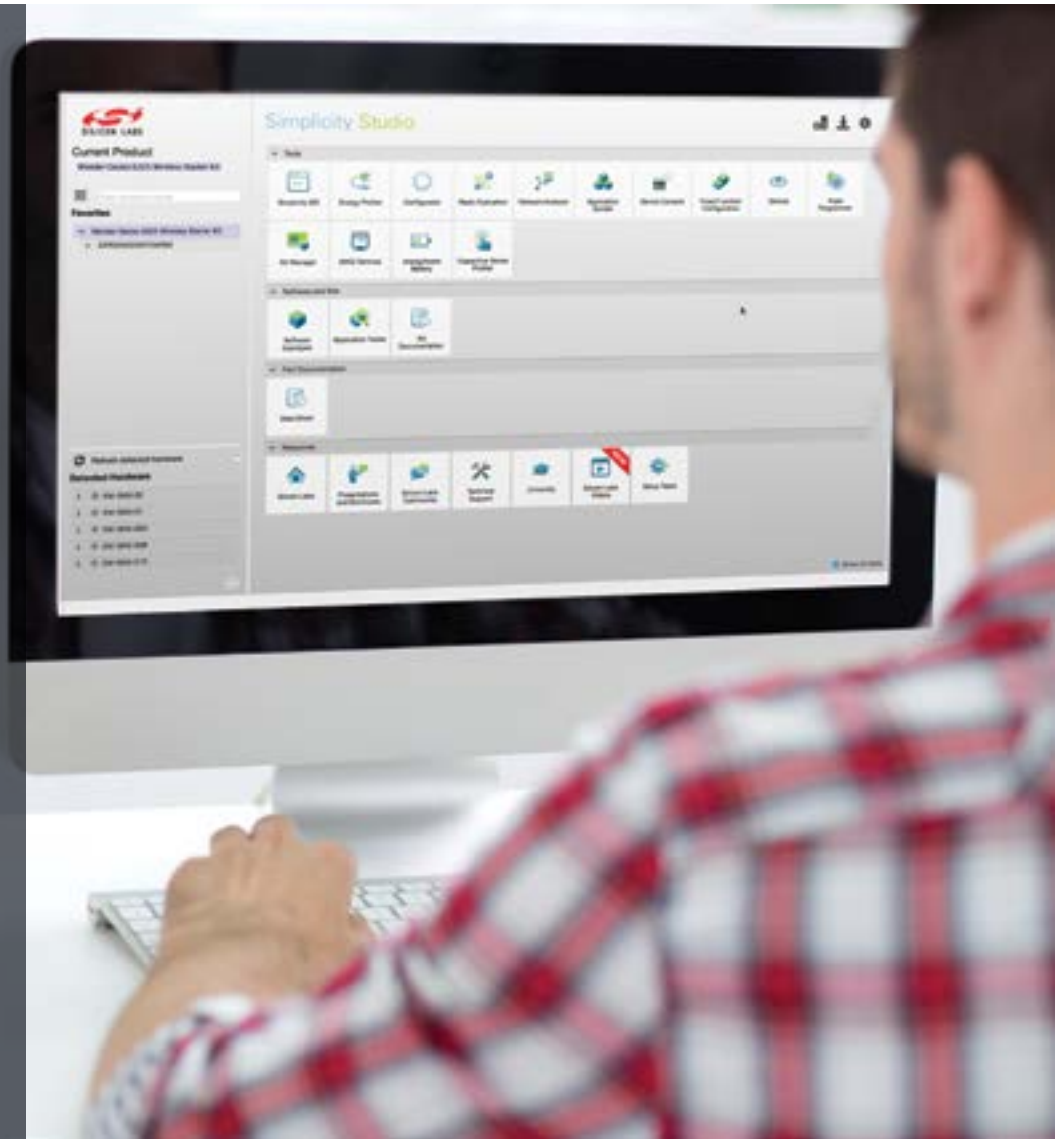


## EFM8 Starter Kits

Silicon Labs offers 8 different starter kits to get started with the EFM8 family of MCUs. All the kits are priced at \$29.99.

PART NUMBER	DESCRIPTION	DEMO HIGHLIGHTS	TOOLS
SLSTK2030A	EFM8LB1 Family Starter Kit	ADC, DAC, Temperature sensor, Configurable logic units	Energy Profiler, Configurator
SLSTK2000A	EFM8UB1 Family Starter Kit	Low energy USB, Charger Detect	Energy Profiler, Configurator
SLSTK2001A	EFM8UB2 Family Starter Kit	USB HID, USB-UART bridge	Energy Profiler, Configurator
SLSTK2010A	EFM8SB1 Family Starter Kit	Capsense, Low energy modes	Capsense Profiler, Energy Profiler, Configurator
SLTB005A	EFM8UB3 Family Starter Kit	Low energy USB, USB HID	Energy profiler, Configurator
SLSTK2011A	EFM8SB2 Family Starter Kit	Low energy modes, Temperature sensor	Energy Profiler, Configurator
SLSTK2020A	EFM8BB1 Family Starter Kit	ADC, Temperature sensor, Fast core	Energy Profiler, Configurator
SLSTK2021A	EFM8BB2 Family Starter Kit	ADC, Temperature sensor, Fast core	Energy Profiler, Configurator
SLSTK2022A	EFM8BB3 Family Starter Kit	ADC, DAC, Configurable logic	Energy Profiler, Configurator

Silicon Labs  
Simplicity  
Studio tools  
make EFM8  
development  
fast and simple.



### Simplicity Studio

Easy access to the Simplicity IDE, configuration tools, demos, examples, datasheets, application notes, community forum and Silicon Labs support, plus an unlimited code size Keil compiler, all free of charge.

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

### DEVELOPMENT TOOLS



#### EFM8 Starter Kits

This \$29.99 kit is an excellent starting point to get familiar with EFM8 microcontrollers.

[silabs.com/efm8-kits](http://silabs.com/efm8-kits)



#### Capacitive Sense Profiler

This tool simplifies the fine tuning of buttons, sliders, wheels, touch pads and proximity sensors.



#### Configurator

This tool greatly simplifies EFM8 peripheral initialization by presenting peripherals and peripheral properties in a graphical user interface.



#### Longevity Commitment

Silicon labs is committed to a minimum 10-year life cycle.



Find your nearest distributor, or buy or sample online.  
See details at [silabs.com/efm8](http://silabs.com/efm8)