



MCU

**Presentation
Will Begin
Shortly**

2023
tech talk
WEBINAR SERIES

UPCOMING SESSIONS

NEW

**DEC 5TH | EFM and EFR: A Common MCU Platform
for IoT Development**

**MORE SESSIONS
TO COME NEXT YEAR**

We will begin in:

4:00

2023

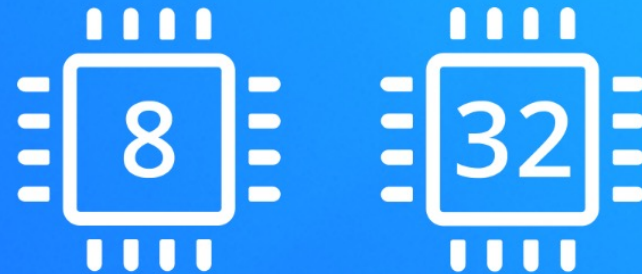


Welcome

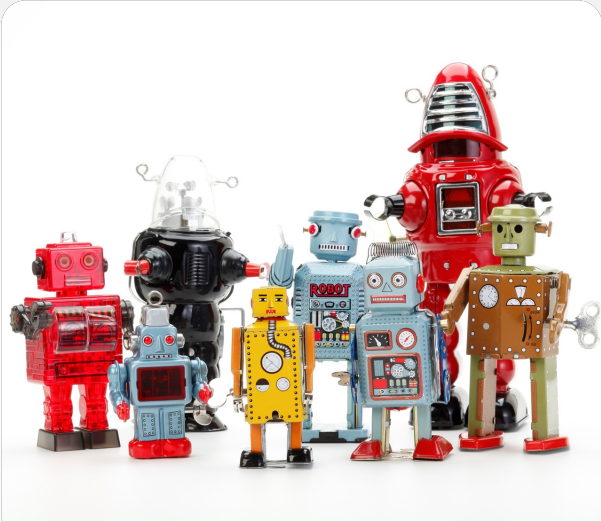
EFM and EFR: A Common MCU Platform for IoT Development

Rich Lysaght, Sr FAE – Central Region

Chad Steider, Sr. Product Marketing Manager



Silicon Labs MCU Portfolio



EFM8

- Low cost, highly integrated 8-bit MCUs
- Comprehensive Support with free IDE, Compiler, and hundreds of code examples



EFM32

- Stand alone MCU offering based on Wireless SoC Platform
- Code compatible with Wireless SoCs



EFR32

- Complete Wireless SoC offering for Sub-GHz and 2.4 GHz needs
- Multi-core architecture for most efficient designs

EFM8 BB5x Family

EFM8 BB5X FEATURES

- **Easy to use, flexible 8-bit family**
 - Simplicity Studio tool integration aligns with both 8-bit and 32-bit families
 - Fully featured Kiel 8-bit compiler allows for optimized code development
- **High performance 8051 Core**
 - Optimized for large number of single cycle instructions to improve efficiency
 - 4 Interrupt levels for faster response
- **Wide Operating Voltages (1.8 – 5.5V)**
 - Allows for use in Lithium powered devices
- **Advanced peripherals for LED and BLDC Control**
 - 16-bit 6ch PWM
 - Separate clock for LED Control
- **Low Power Modes for Battery Applications**
 - Optimized energy modes for best system performance
- **Various package options optimized for size or IO needs**
 - 2x2 QFN12, 2.5x2.5 QFN16, 3x3 QFN20, and 5x5 QFN32
 - SOIC16, TSSOP20 and TSSOP29

APPLICATIONS

- BLDC Control
- LED Lighting
- Personal Hygiene Products
- Sensors
- Keypads
- Toys



EFM32 Series 2

- **Seamlessly transition from connected to non-connected products**
 - Platform compatibility allows for easy transition from EFM32 to EFR32 products
 - Allows for easy creation of good, better, best approach
- **Common Security and AI/ML Subsystems**
 - Enables developers to maintain security scheme for non-connected products
 - Enables re-use of complex and costly AI/ML algorithms
- **Flexible portfolio of devices**
 - Options optimized for power, analog performance, and AI/ML
- **Cost optimized platform**
 - Lower cost than similarly featured Series 1 MCUs



TARGET APPLICATIONS – PG22

- Sensors
- Portable Medical
- Personal Hygiene Products
- Remotes
- Keypads / Switches

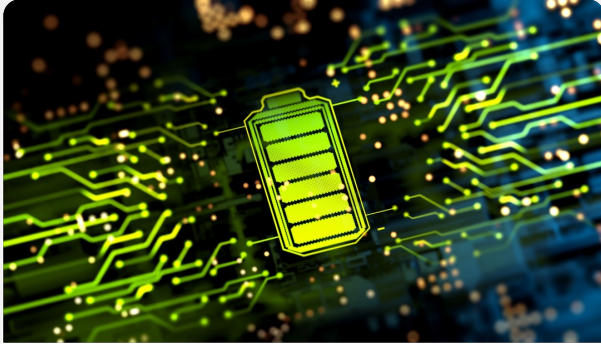
TARGET APPLICATIONS – PG23

- Smart Metering
- Portable Medical
- Personal Hygiene Products
- Sensors
- Building Automation

TARGET APPLICATIONS – PG28

- Smart Lighting
- Garage Door Opener
- Building Automation
- Asset Tracking
- Electronic Shelf Labels
- Smart City

EFM32 Portfolio Value Proposition



PG22

- Optimized for low power
- Small package options for space constrained applications
- Firmware and footprint compatible with xG22 SoCs for simple platform approach



PG23

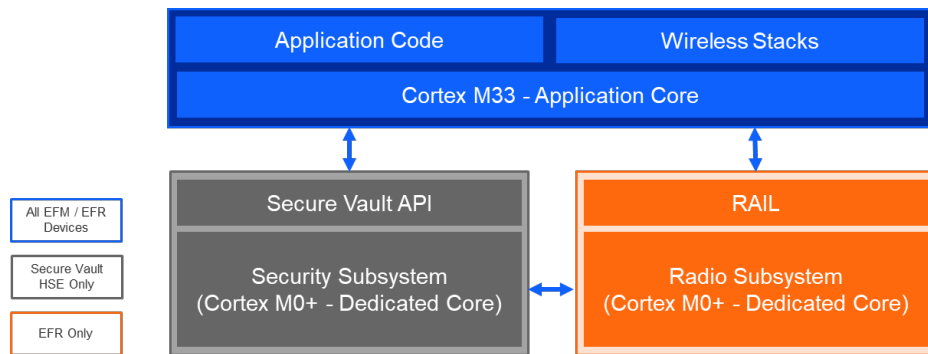
- Secure Vault™ Mid and High options for consistent security architecture
- High performance analog for sensing applications
- Firmware and footprint compatible to xG23 Sub-GHz SoCs



PG28







- AI/ML accelerator for faster, lower power inferencing at the edge
- Larger memory and more GPIOs for better system integration
- Secure Vault™ Mid and High options for consistent security architecture
- Firmware compatible with xG28 sub-GHz and dual band SoCs

EFM and EFR: Multi-core Solutions for IoT Development

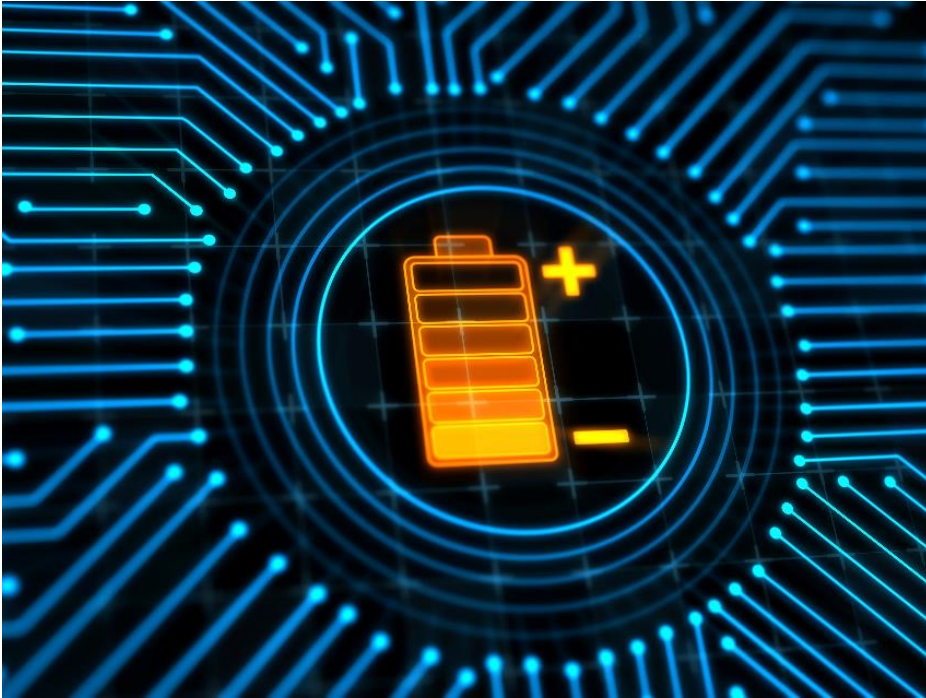


1- EFR32 devices only 2- Secure Vault Hardware Secure Element (HSE) Only

- Multi-core architecture gives design flexibility and optimization across EFM and EFR platforms**
 - Dedicated application, radio¹, and security² cores share system burden for better resource utilization
- Common development platform for connected and non-connected products**
 - Simplicity Studio gives developers a common development platform for entire product portfolio
- Common Security and AI/ML subsystems**
 - Allows for design consistency independent of connectivity needs
- Footprint and firmware compatibility between EFM and EFR families**
 - Simplified SKU management and code base development lowers development cost and complexity

	BG 	MG 	FG 	ZG 	SG 	PG 
xG21	✓	✓				
xG22	✓	✓				✓
xG23			✓	✓	✓	✓
xG24	✓	✓				
xG25			✓			
xG27	✓	✓				
xG28			✓	✓	✓	✓
	EFR Device Families					EFM

Peripherals for Low Power Optimized



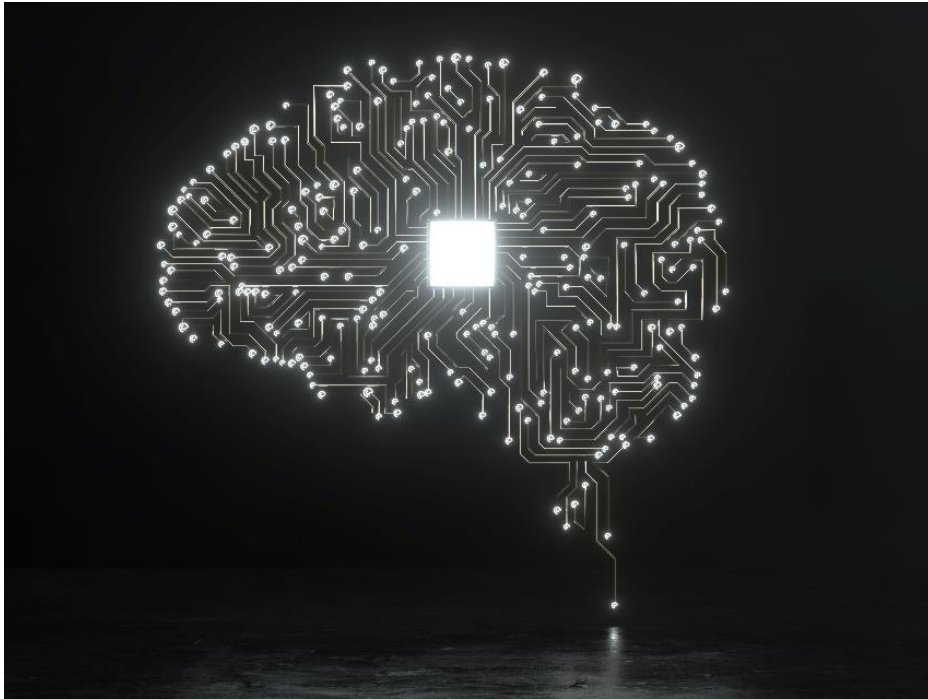
- Autonomous peripherals and subsystems
 - Free up CPU resources and allow for higher sleep duty-cycles
- Peripherals optimized for low power operation
 - Most peripherals available in sleep states to enable best system performance
- Peripheral Reflex System lowers MCU burden without compromising performance
 - Peripherals can trigger actions from other subsystems without application core intervention

Application Optimized for Best Fit

- **Autonomous peripherals and subsystems**
 - Free up CPU resources and allow for higher sleep duty-cycles
- **Peripherals optimized for low power operation**
 - Most peripherals available in sleep states to enable best system performance
- **Peripheral Reflex System lowers MCU burden without compromising performance**
 - Peripherals can trigger actions from other subsystems without application core intervention
- **Broad 8-bit MCU portfolio to meet simple application needs**
 - Flexible, cost optimized platform for systems that don't need 32-bit overhead
 - Hundreds of ready-made software examples to simplify development

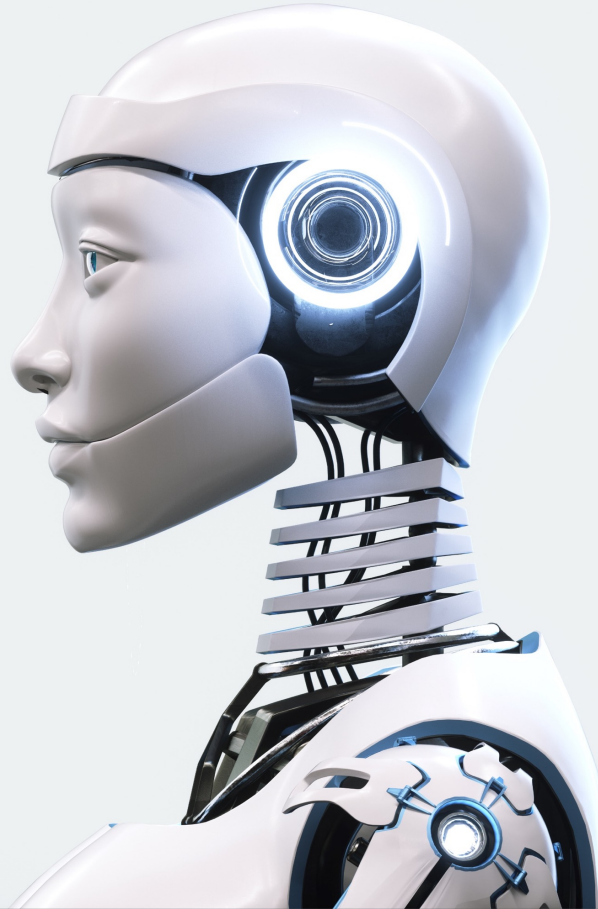
Peripheral	Description	Energy Mode (Lowest Avail)	PRS Mode (Prod / Cons)
MVP	AI/ML H/W Accelerator	EM1	Producer
LCD	Liquid Crystal Display Driver	EM3	Producer
USART	UART/SPI/Smartcard (ISO 7816)/IrDA/I2S	EM1	Producer/Consumer
GPIO	General Purpose I/O	EM4	Producer
EUSART	UART/SPI/IrDA	EM3	Producer / Consumer
TIMER	16/32 Timer/Counter	EM1	Producer / Consumer
LETIMER	24 Bit Timer	EM3	Producer / Consumer
LDMA	Linked Direct Memory Access	EM3	Consumer
ACMP	Analog Comparator	EM3	Producer
IADC	Incremental successive approx. ADC	EM3	Producer / Consumer
VDAC	Voltage DAC	EM3	Producer / Consumer
LESENSE	Low energy sensor Interface	EM3	Producer / Consumer
KEYSCAN	Keypad scanner	EM3	Producer

Common Development Platform



- EFM32 and EFR32 give simplified development platform for connected and non-connected products
 - PG variants of major wireless SoC families give package and code compatibility most of EFR32 portfolio
- Common tools simplify development process
 - Simplicity Studio gives developers a common development platform for entire Silicon Labs portfolio
- Advanced debug and development tools for quicker system integration
 - Tools like Network Analyzer, Energy Profiler, and GUI based configurators help with adoption and troubleshooting

Platformed AI/ML and Security Approach

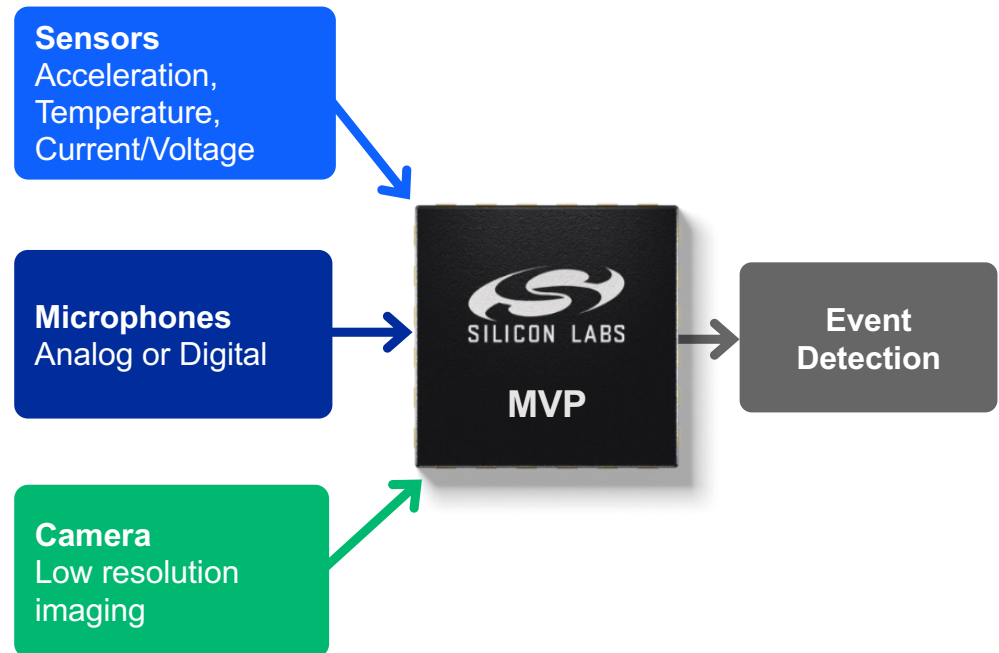


- **EFM32 and EFR32 maintain consistent security and AI/ML subsystems**
 - Allow developers to maintain security and AI/ML consistency for connected and non-connected products
- **Lowers overall development burden**
 - Can maintain a single code base for multiple product SKUs
- **Provides migration path as security needs evolve with Secure Vault subsystem**
 - Mid and High options in both EFM and EFR allow provide drop-in migration path as security needs evolve

AI/ML Hardware Accelerator

AI/ML Hardware Accelerator Key Features

- **Matrix processor accelerates ML inferencing**
 - Multi-dimensional array operations
 - Handles real and complex data
 - Offloads MCU
- **Up to 8x faster inferencing over Cortex-M**
 - Lower latency
- **Up to 6x lower power for inferencing**
 - Longer battery life
- **MVP Math Library**
 - Can be used for non-ML applications



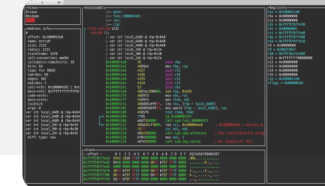
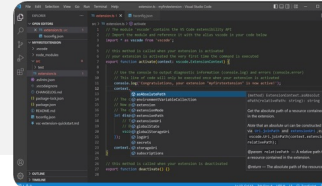
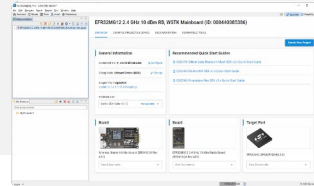
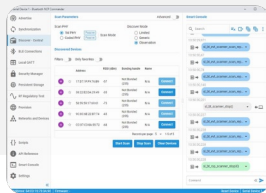
AI/ML Hardware Accelerator enables efficient Edge ML inferencing

Silicon Labs Tools Code Levels

Large variety of customer **expertise levels**:



Matching developer flows, the Silicon Labs **Code Levels**:



Typical developer environment and tools:



SLC (Silicon Labs Configurator) as common foundation

Software and Tool Support

ML Expert

Python scripts and tutorials

 **SILICON LABS**
Machine Learning Toolkit*

siliconlabs.github.io/mltk


↓

TFLite Flatbuffer

TFLite-micro Interpreter

CMSIS-NN Kernels

Silicon Labs HW-
based Kernels

Cortex M

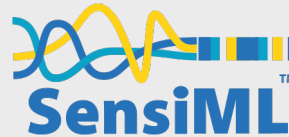
MVP (NPU)

ML Explorer

GUI Developer Tools

 **EDGE IMPULSE**

edgeimpulse.com


SensiMLTM

sensiml.com

TFLite-micro Interpreter

CMSIS-NN Kernels

Silicon Labs HW-
based Kernels

Cortex M

MVP (NPU)

ML Solutions

Solution Libraries

Wake Word /
Voice Command


sensory

sensory.com

Anomaly
Detection


Micro.ai

micro.ai

System Integrators

 **KLIKA-TECH**
GLOBAL IOT SOLUTIONS

 **ATA**
ARTIFICIAL INTELLIGENCE FOR ALL

 **AIZIP**

 **Bellintegrator**
Talent-Technology-Solutions

Cortex M (& MVP)

ML Demo



Live Q&A



2023

tech **t**alks

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Thank You



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silabs.com/training