Tech Talks Upcoming Sessions – Presentation will begin shortly

tech talks

Tuesday, February 8	**Sneak Peek: Unboxing Silicon Labs' New BG24 and MG24 SoCs**
Tuesday, February 22	Proprietary Sub-GHz: Leaping RF Performance and Improving Low Power Performance with FG23
Tuesday, March 8	Wi-Fi: Developing with Matter over Wi-Fi on the RS9116
Tuesday, March 22	Z-Wave: Unboxing the New 800 Series

We will begin in: 0:00

SILICON LABS | tech talks

Welcome

Sneak Peek: Unboxing Silicon Labs' New BG24 and MG24 SoCs

Matt Maupin

SILICON LABS

Tech Talk
xG24 Unboxing

January 2021

Introducing EFR32BG24 and EFR32MG24

Target Applications

- **Smart Home**
  - Gateways, sensors, switches, door locks, smart plugs
- **Building Automation**
  - Gateways, sensors, switches, location services
- **Lighting**
  - LED bulbs, luminaires
- **Portable Medical Devices**
  - Blood glucose meters, pulse oximeters
- **AI/ML**
  - Predictive maintenance, glass break detection

Industry's *Only* Wireless SoC with AI/ML accelerator, 20-bit ADC, and Secure Vault for *IoT Edge Devices*

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BG24 and MG24: Optimized for Battery Powered IoT Mesh Devices

- **High Performance Radio**
  - Up to +19.5 dBm TX
  - -97.5 dBm RX @ BLE 1 Mbps
  - -104.9 dBm RX @ BLE 125 kbps
  - -104.5 dBm RX @ 15.4
  - Wi-Fi Coexistence
  - RX Antenna Diversity
- **ARM® Cortex®-M33**
  - 78 MHz (FPU and DSP)
  - TrustZone®
  - Up to 1536kB of Flash
  - Up to 256kB of RAM
- **Low Power**
  - 5.1 mA TX @ 0 dBm
  - 20 mA TX @ +10 dBm
  - 4.4 mA RX (BLE 1 Mbps)
  - 32 µA/MHz
  - 1.3 µA EM2 with 16 kB RAM
- **Dedicated Security Core**
  - Secure Vault™ - Mid / High

- **AI/ML**
  - AI/ML Hardware Accelerator
- **Low-power Peripherals**
  - EUSART, USART, I2C
  - 20-bit ADC, 12-bit VDAC, ACMP
  - Temperature sensor +/- 1.5°C
- **World Class Software**
  - Matter*
  - OpenThread*
  - Zigbee*
  - Bluetooth (1M/2M/LR)
  - Bluetooth mesh
  - Dynamic multiprotocol*
- **SoCs and Modules**
  - 5x5 QFN40 (26 GPIO)
  - 6x6 QFN48 (28/32 GPIO)
  - 7x7 SiP Module (+10 dBm)
  - 12.9x15.0 PCB Module (+10 dBm)

* Requires MG24

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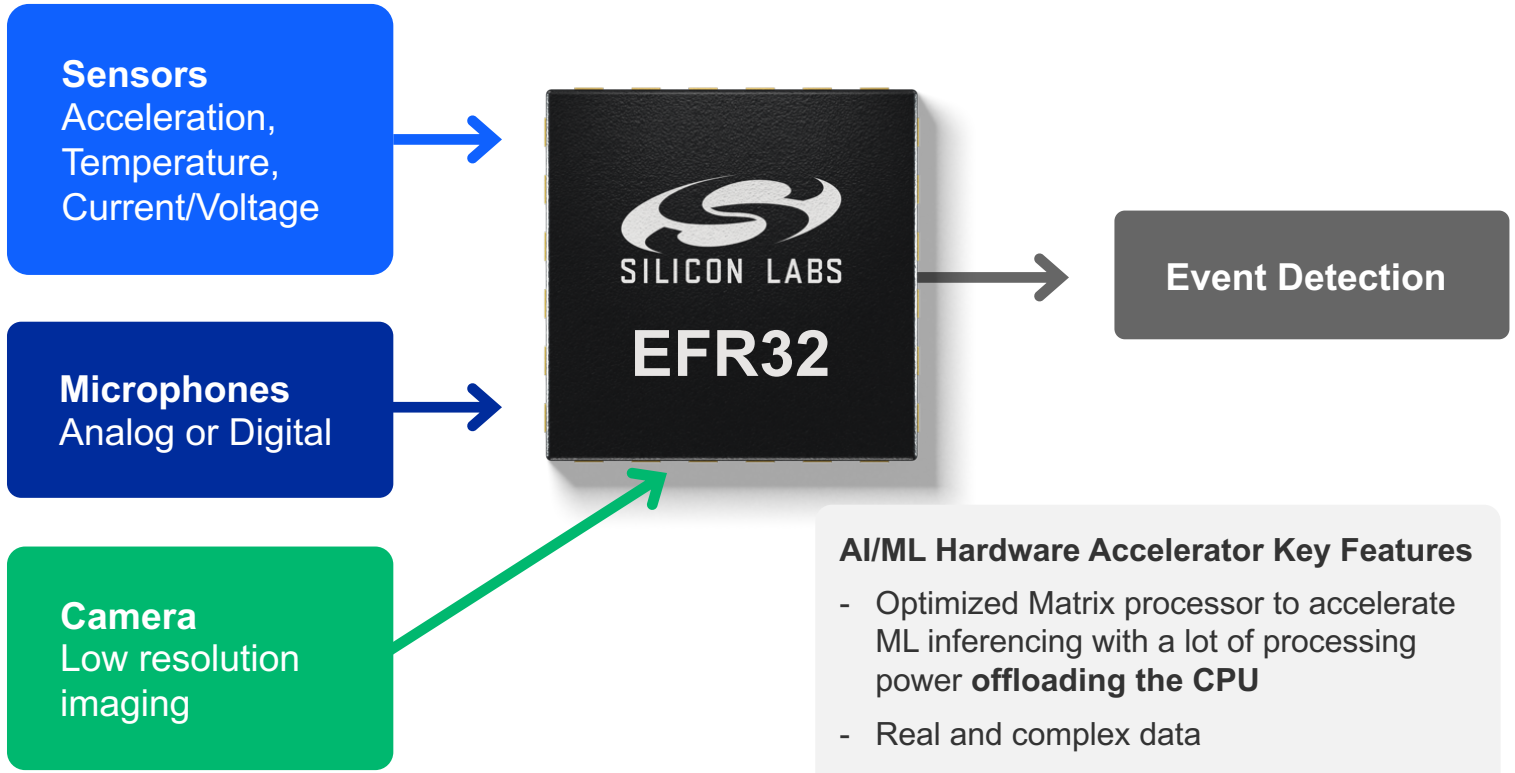
First Silicon Labs IC with AI/ML on Edge Devices

Benefits of processing AI/ML in device

- Lower power
- Save Bandwidth
- Lower Latency
- Ensure Privacy
- Higher Security
- Lower Cost

Use Cases for AI/ML

- Timeseries data on ADC or GPIO
- Audio mic array with beamforming
- Audio mic input with Audio Front End, DSP
- Image capture (incl. fingerprint reader)



AI/ML Hardware Accelerator Key Features

- Optimized Matrix processor to accelerate ML inferencing with a lot of processing power **offloading the CPU**
- Real and complex data
- **2x to 4x faster** inferencing over Cortex-M
- Up to **6x lower power** for inferencing

AI/ML Hardware Accelerator enables efficient Edge ML inferencing

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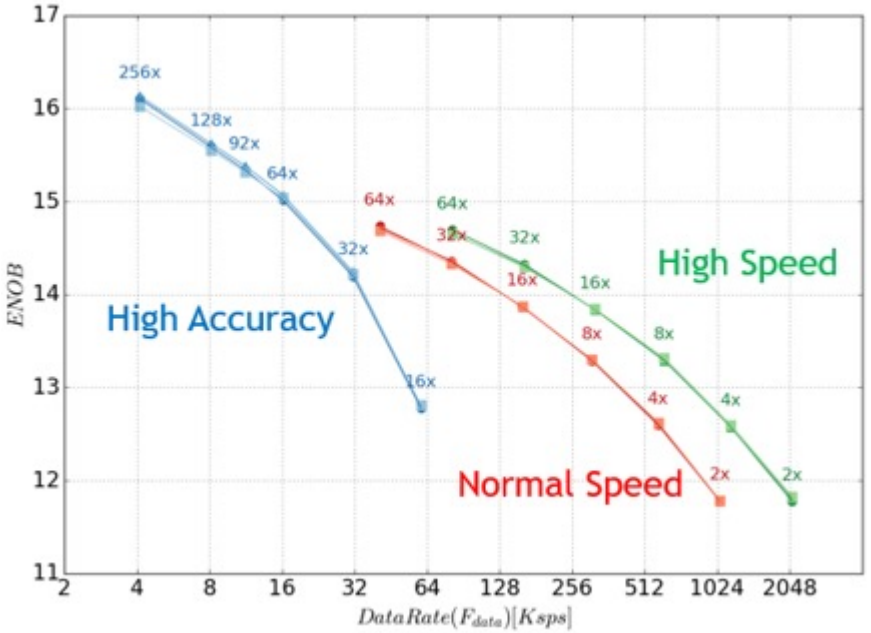
xG24 ADC Performance vs Mode

- **Normal Mode**
  - 12-bit output resolution, 11.7 ENOB @ 1 Msps (OSR = 2)
  - 16-bit output resolution, 14.3 ENOB @ 76.9 ksps (OSR = 32)
- **High-Speed Mode – Double speed, Similar Performance**
  - 12-bit output resolution, 11.7 ENOB @ 2 Msps (OSR =2)
  - 16-bit output resolution, 14.3 ENOB @ 153.8 ksps (OSR = 32)
- **High-Accuracy Mode – Highest performance**
  - Dedicated inputs for full performance across temperature
  - 20-bit output resolution, 15 ENOB @ 15.3 ksps (OSR = 64)
  - 20-bit output resolution, 16 ENOB @ 3.8 ksps (OSR = 256)

Effective Number of Bits, External VREF

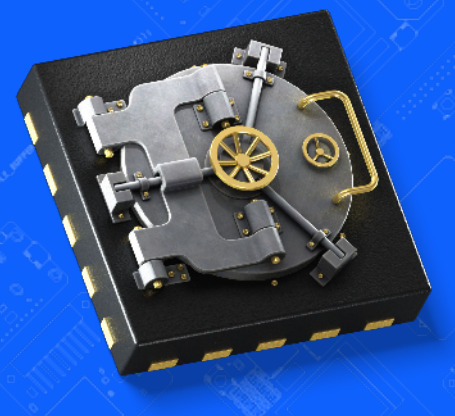


High-Speed and High-Accuracy modes available on select OPNs and require the Dev Kit for demonstration

Oversampling Ratio (OSR) increases resolution and performance in all modes

Secure Vault™ Support in BG24 and MG24 Protecting the IoT Device

Base	Mid	High	Feature
✓	✓	✓	True Random Number Generator
✓	✓	✓	Crypto Engine
✓	✓	✓	Secure Application Boot
—	HSE	HSE	Secure Engine
—	✓	✓	Secure Boot with RTSL
—	✓	✓	Secure Debug with Lock/Unlock
—	✓	✓	DPA Countermeasures
—	—	✓	Anti-Tamper
—	—	✓	Secure Attestation
—	—	✓	Secure Key Management
—	—	✓	Advanced Crypto
	EFR32BG24 EFR32MG24		



Industry Leading IoT Security

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Development Hardware & Software Overview

Claudio Filho

IoT Hardware Development Tools – Feature Comparison

	Explorer Kit	Dev Kit	Pro Kit
Debug Speed	1.6MHz	1.6MHz	8MHz
Debug USB	Full Speed	Full Speed	High Speed
Packet Trace Interface (PTI)	✓	✓	✓ 2x
Breakout Pads	✓	✓	✓
Pushbutton s & User LEDs	✓	✓	✓
Virtual COM	✓	✓	✓
Coin cell battery holder	–	✓	✓
On-board Sensors	–	✓	✓
Battery Pack Connector	–	✓	✓
Radio Board Connectors	–	–	✓
EXP Connector	–	–	✓
Display	–	–	✓
Debug OUT	–	–	EFM8/32, EFR32, EZR32
Debug Ethernet	–	–	100 Mbit/s
Energy Monitor (AEM)	–	–	✓
3rd Party Hardware addons	✓	–	–

XG24 Development Kits

Explorer Kit

- Lowest price point
- On-board debugger and signal breakouts
- Minimal on-board features
- MikroBUS(TM) for 3rd party hardware support

Dev Kit

- Single device development board
- On-board debugger and signal breakouts
- On-board sensors
- Impressive out-of-the-box demos

Pro Kit

- Modular development platform
- Advanced development use cases
- Energy profiling and external device debug
- Ethernet for large network test
- Designed to maximize reuse of EFR32 devices

✓ Supported ✓ Optional or not mounted – Not Supported

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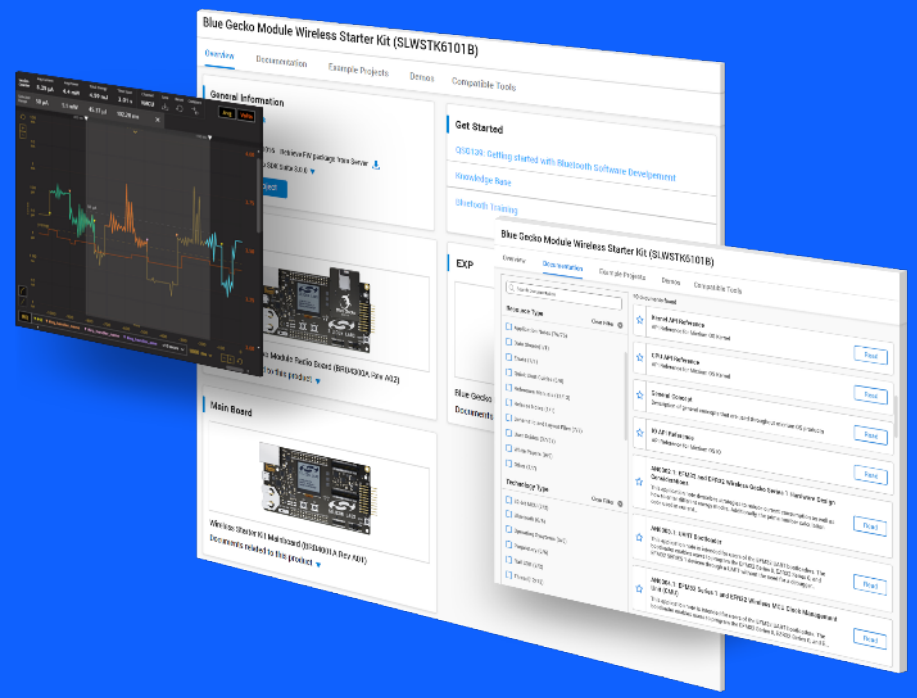
Simplified Developer Experience



Simplicity Studio 5

Simplicity Studio 5

- **Interface**
  - Fresh, new & simplified
  - Intuitive out-of-the-box experience
  - Fast access to developer resources
  - Linux, Mac & Windows
- **Tools**
  - Configuration utilities
  - Compiler
  - Error & validation
  - IDE & command line support
  - Graphical hardware configurator
  - Energy Profiler – visual energy analysis
  - Network Analyzer – packet capture & decode

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QuickTime Player File Edit View Window Help
100% Wed 9:34 AM Claudio Filho

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https://github.com/orgs/SiliconLabs/repositories?language=&q=&sort=&type=public

Apps Lancenet Amex UCSC Extension... Bluetooth API - D... Bluegiga Connect emLib Sales Force OKTA HEAT claudioasfilho · Gi... WebMail GMaps Sheets

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Find a repository... Type Language Sort

79 results for **public** repositories sorted by **last updated**

Clear filter

gecko_sdk Public

The Gecko SDK (GSDK) combines all Silicon Labs 32-bit IoT product software development kits (SDKs) based on Gecko Platform into a single, integrated SDK.

8 37 1 1 Updated 1 hour ago

wfx-firmware Public

Silicon Laboratories WFx Wi-Fi secure embedded firmware images

3 13 0 0 Updated 2 hours ago

ot-efr32 Public

Forked from openthread/ot-efr32

C BSD-3-Clause 16 0 0 3 Updated 11 hours ago

openthread Public

Forked from openthread/openthread

OpenThread released by Nest is an open-source implementation of the Thread networking protocol

C++ BSD-3-Clause 871 11 0 2 Updated 15 hours ago

ot-br-posix Public

Forked from openthread/ot-br-posix

OpenThread Border Router, a Thread border router for POSIX-based platforms.

C++ BSD-3-Clause 144 1 0 3 Updated 21 hours ago

wfx-common-tools Public

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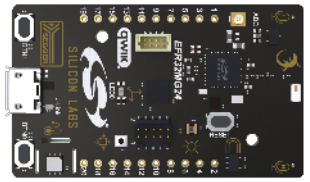
xG24 Dev Kit Overview and Demonstration

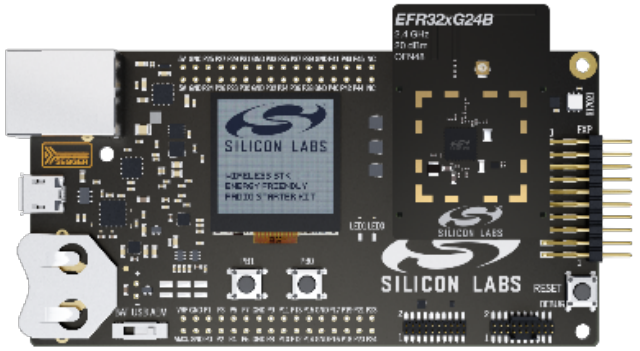
Getting Started with EFR32BG24 and EFR32MG24 SoCs

- **Dev Kit**
  - Low-cost development board
  - On-board debugger
  - Signal breakouts
  - On-board sensors
  - 20-bit ADC
  - AI/ML Accelerator
  - Impressive out-of-box demos
- **Contents**
  - 1 x dev board



Part Number	Description
xG24-DK2601B	xG24 2.4 GHz +10 dev board

- **Pro kits**
  - Modular development platform
  - RF measurements
  - Energy profiling
  - External device debug
  - Ethernet for large network test
- **Contents**
  - 1 x WSTK main board
  - 1 x radio board
  - (2)AA battery holder
  - Mini-simplicity cable



Part Number	Description
xG24-PK4186C	xG24 2.4 GHz +10 dBm Pro Kit
xG24-PK4187C	xG24 2.4 GHz +20 dBm Pro Kit

- **Radio Board kits**
  - Uses existing WSTK boards
  - Uses existing software tools
  - Reference design and design files
- **Contents**
  - 1 x radio board

Part Number	Description
xG24-RB4186C	xG24 2.4 GHz +10 dBm Radio Board
xG24-RB4187C	xG24 2.4 GHz +20 dBm Radio Board
xG24-RB4188A	xG24 +20 dBm Antenna Diversity Board

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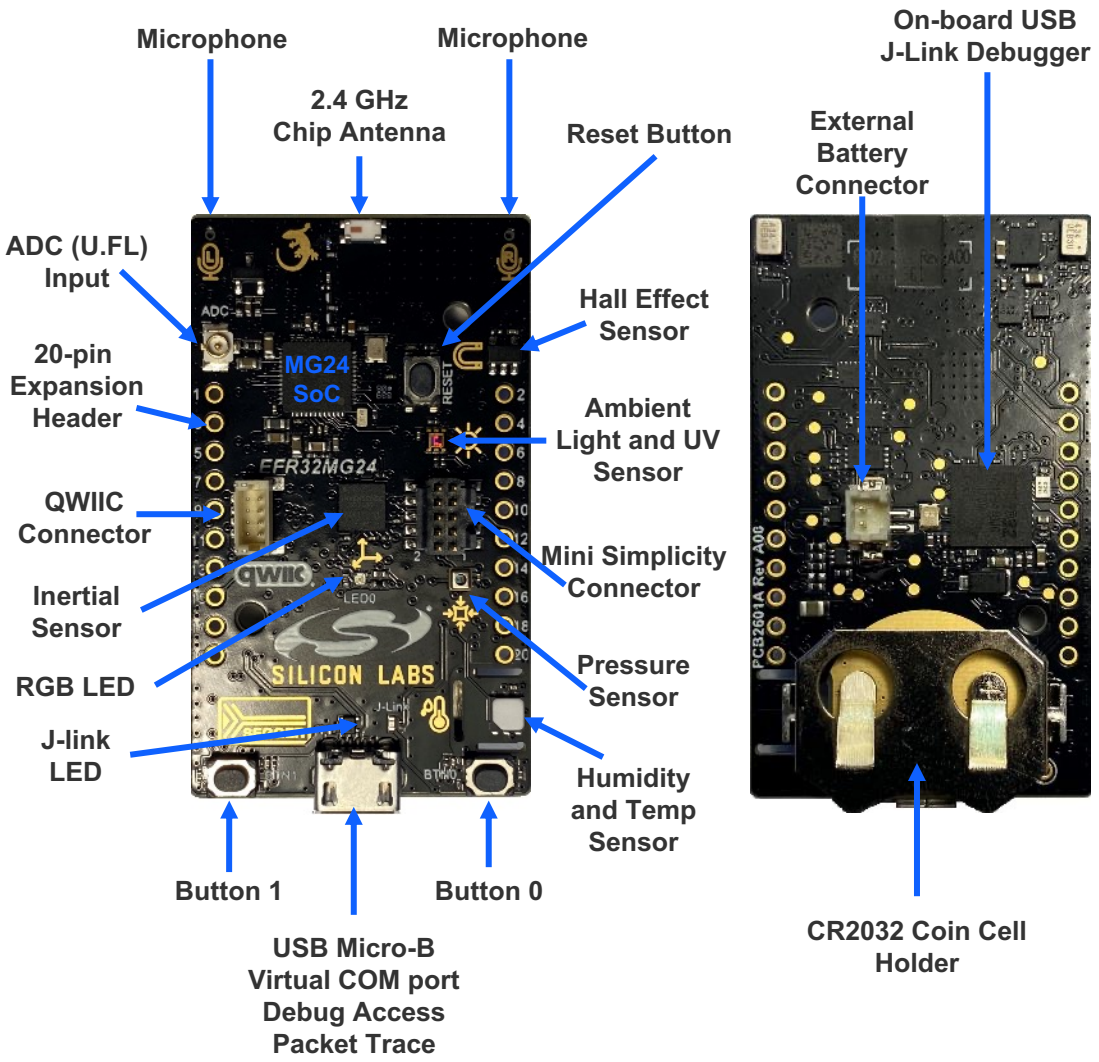
Dev Board Features



- **Features**
  - EFR32MG24B310F1536IM48
  - Wireless SoC with multi-protocol radio
  - Cortex-M33, 1536 kB Flash and 256 kB RAM
- **Advanced Features**
  - AI/ML Hardware Accelerator
  - 20-bit ADC
- **Broad Range of Sensors**
  - 9-axis Inertial Sensor
  - 2 Digital Microphones
  - Pressure Sensor
  - Relative Humidity and Temperature Sensor
  - UV and Ambient Light Sensor
  - Hall-effect Sensor
- **Expansion and User Interface**
  - Breakout pads
  - Qwiic connector
  - LEDs and Push Buttons
- **Kit Contents**
  - BRD2601B dev board

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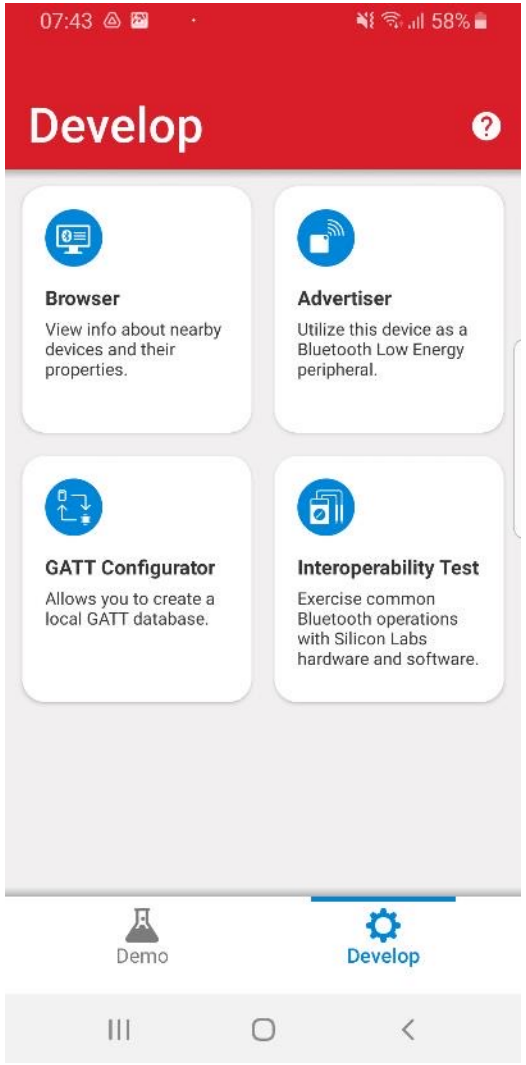
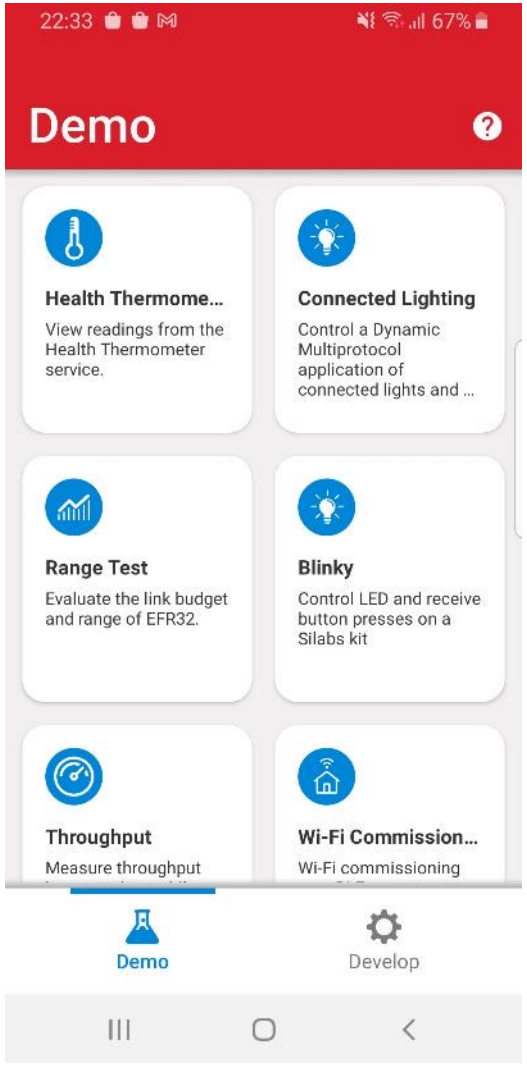
EFR Connect – Demo / Develop





- **EFR Connect combines the smoothest out of box experience with the most advanced developer features for BLE, in a single mobile app**
- **Demo Side**
  - Ready-to-go demos with a matching sample app on GSDK pre-compiled for numerous kits
- **Develop side**
  - A feature rich mobile development tool
  - **Browser** for searching, connecting and interacting with remote devices
  - **Advertiser** to enable the mobile phone as a peripheral
  - **GATT Configurator** to create and modify local GATT databases, enabling the phone as a GATT server
  - **Interoperability Test** (IOP) to assess behavior against Silicon Labs' Bluetooth SW and HW

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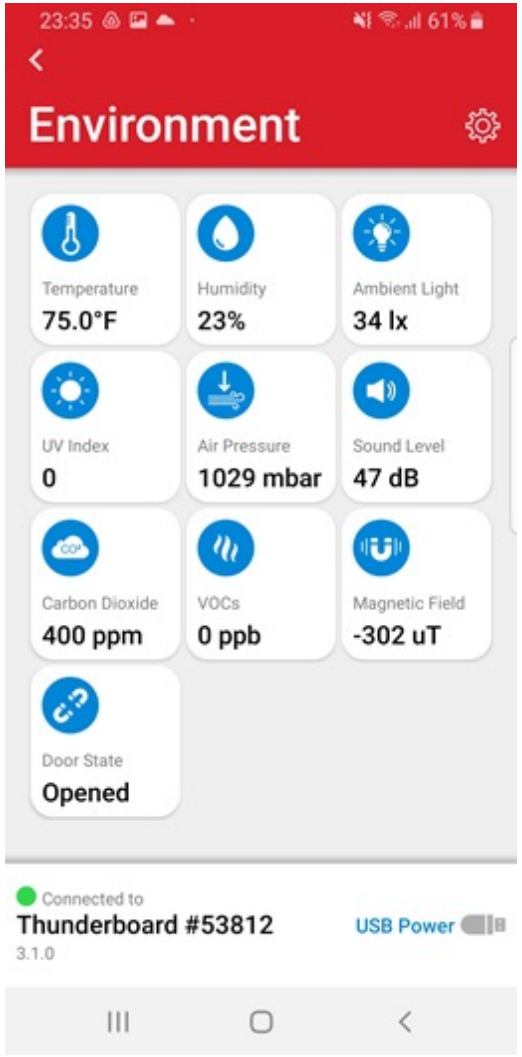
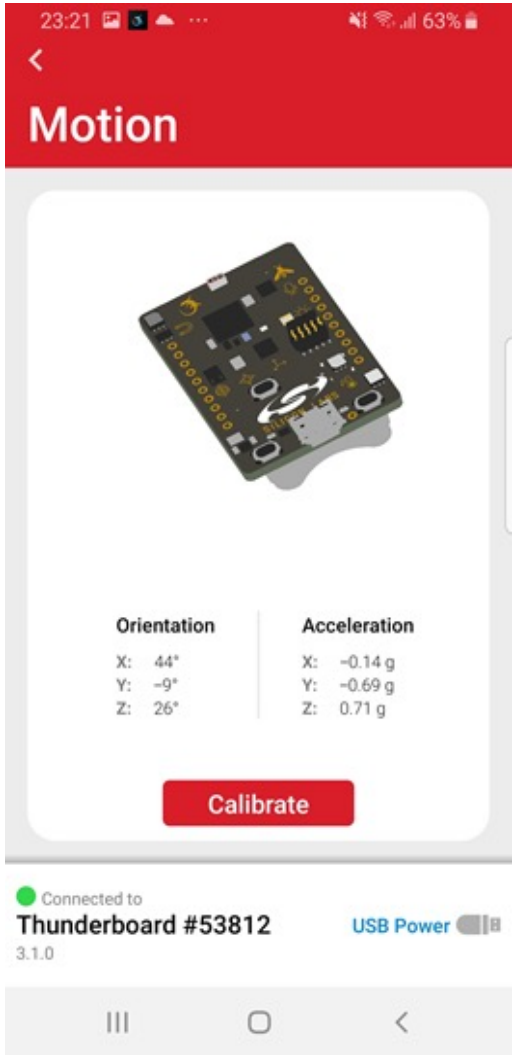
EFR Connect – Out of Box Dev Kit Applications





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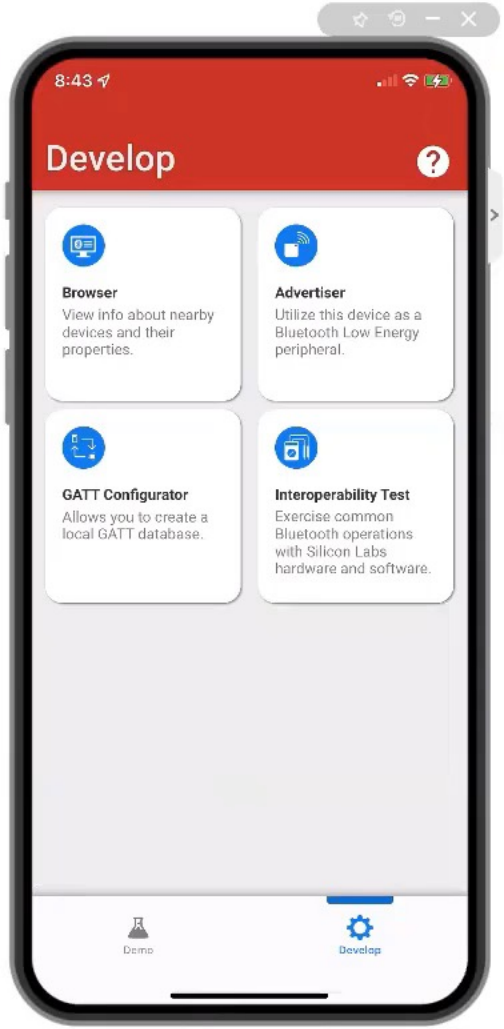
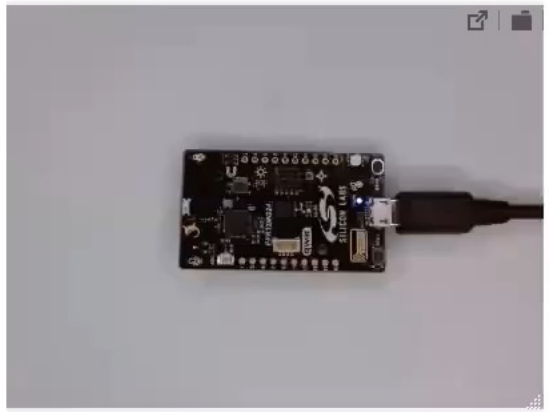
Demo

EFR Connect Mobile App



xG24 Dev Board



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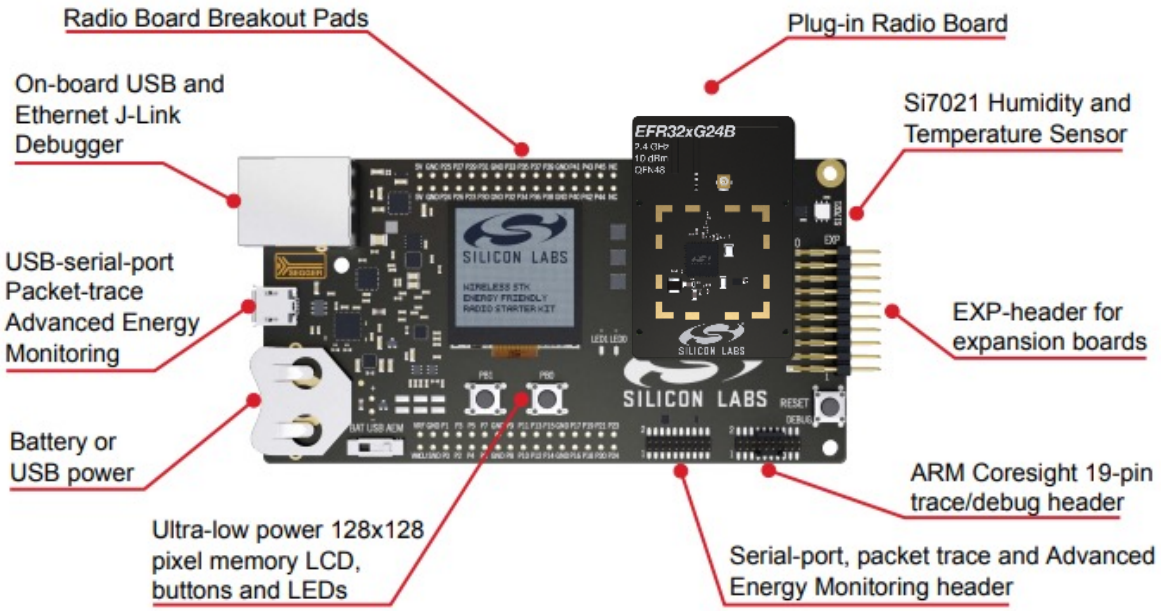
xG24 Pro Kit Overview and Demonstration

Radio Board and Main Board Features



- **xG24 Pro Kit Contents**
  - 1 x WSTK main board (new version)
  - 1 x radio board
  - (2)AA battery holder
  - Mini-simplicity cable

- **Radio Board Features**
  - EFR32MG24B210F1536IM48-B for +10 dBm Kit
  - EFR32MG24B220F1536IM48-B for +20 dBm Kit
  - Cortex-M33, 1536 kB Flash and 256 kB RAM
  - Secure Vault High
  - AI/ML Hardware Accelerator
  - U.FL for RF Measurements
- **Main Board Features**
  - LEDs and Push Buttons
  - Ethernet and USB connectivity
  - Advanced Energy Monitor
  - Packet Trace Interface
  - Breakout pads and expansion header
  - External debug support
  - Si7021 Relative Humidity and Temperature sensor
  - Low Power 128x128 pixel Memory LCD
  - USB, CR2032, and battery pack options for power

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Summary (WiP)

- **MG24 and BG24 are Silicon Labs' most advanced wireless SoC for the IoT edge**
  - Matter, OpenThread, Zigbee and Bluetooth Mesh and Multiprotocol with BLE support
  - AI/ML hardware accelerator
  - Secure Vault™ secures the device from remote and local cyber-attacks
  - High performance RF including +19.5 dBm output power and antenna diversity support
- **Robust set of hardware and software tools simplify development**
  - Multiple options for development hardware
    - Demonstration, development and RF evaluation
    - Design files provided for easier RF layout
  - Simplicity Studio simplifies the developer experience
    - Guided install of SDKs and protocol-specific tools
    - Quick Access to demos, sample projects, documentation and resources
    - Graphical based project configuration for hardware and software
    - Supports 3rd party IDEs
    - Capture and analyze wireless network activity
    - Visualize and correlate current consumption of your target system in real-time
- **ICs and development kits available at distributors in April**

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Resources and Links

BG24 Web Page

- https://www.silabs.com/bg24

MG24 Web Page

- https://www.silabs.com/mg24

Studio 5

- https://www.silabs.com/developers/simplicity-studio

EFR Connect

- https://www.silabs.com/developers/efr-connect-mobile-app

GitHub

- https://github.com/siliconlabs

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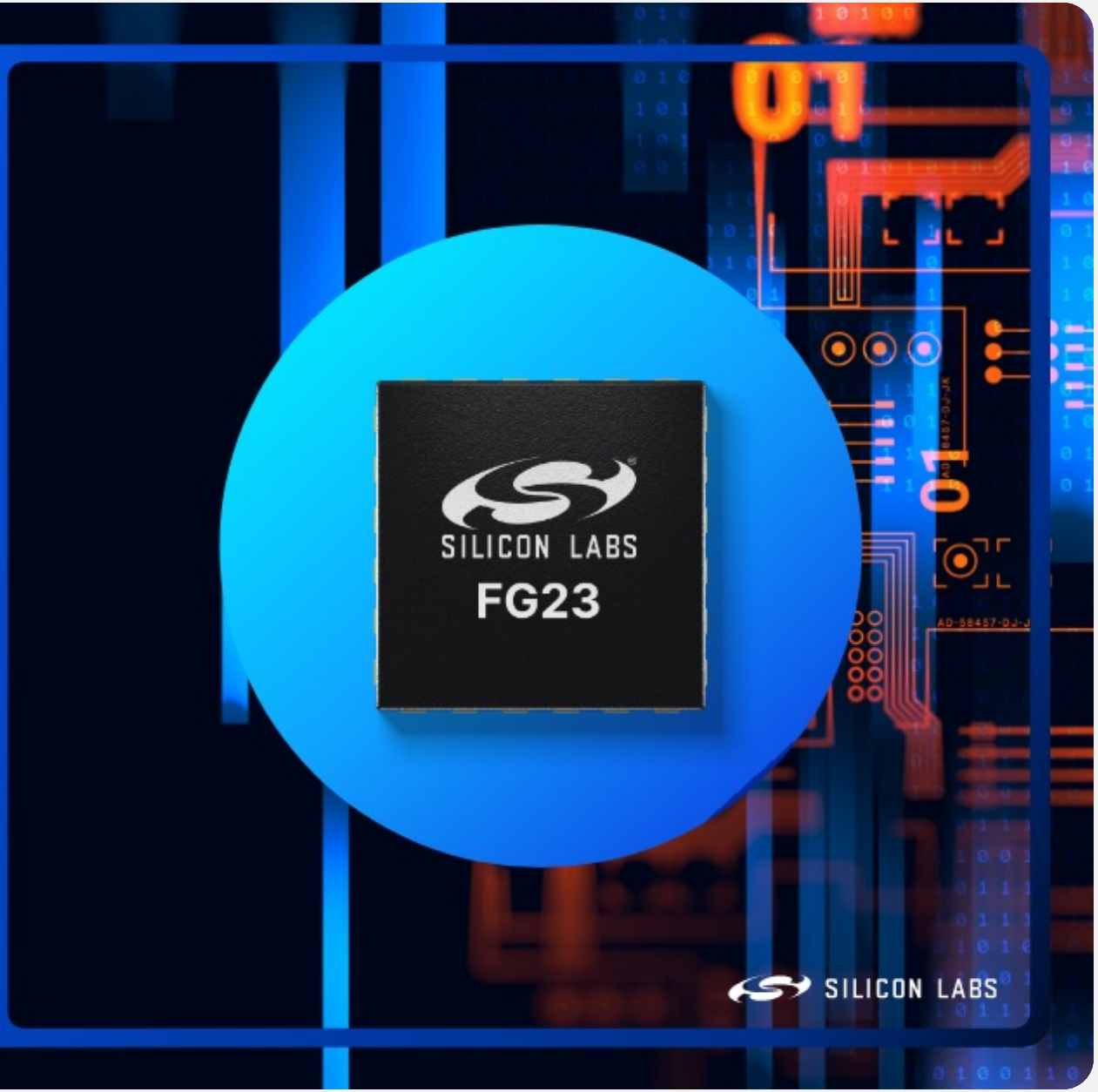
Next Session

tech talks

Proprietary Sub-GHz: Leaping RF Performance and Improving Low Power Performance with FG23

February 22nd, 2022 | 10AM CST



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Thank You

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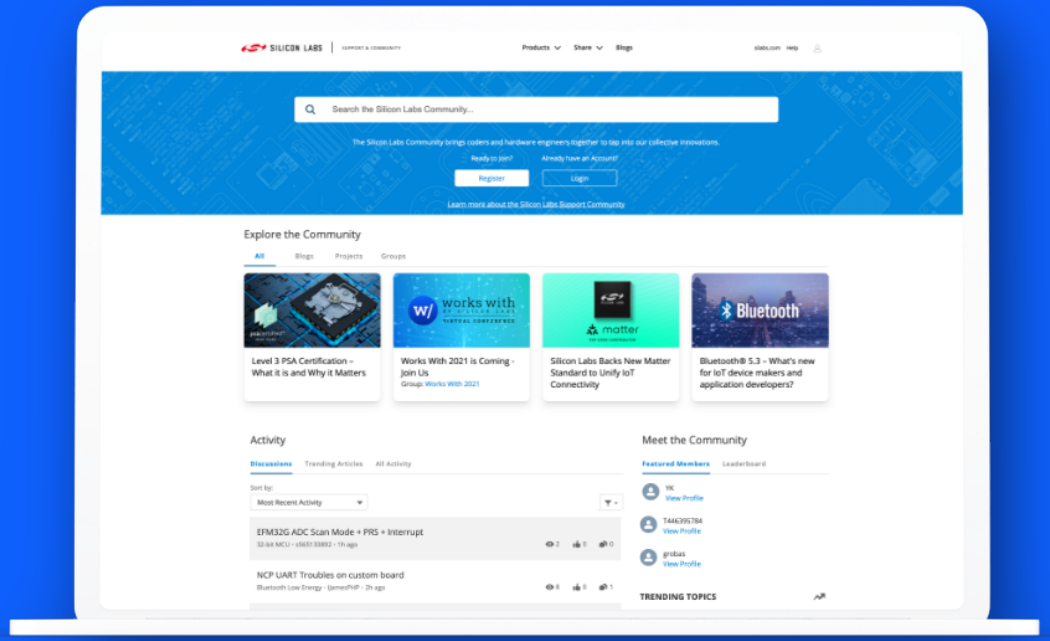
Q&A

Continue Discussion in Our Community!



Think of a question later?

- **Ask it HERE**

How to Navigate:

- "Products" to troubleshooting forums
- "Applications" to discuss IoT
- "Share" to view example projects and existing groups
- "Blogs" to view and discuss thoughts from our specialists