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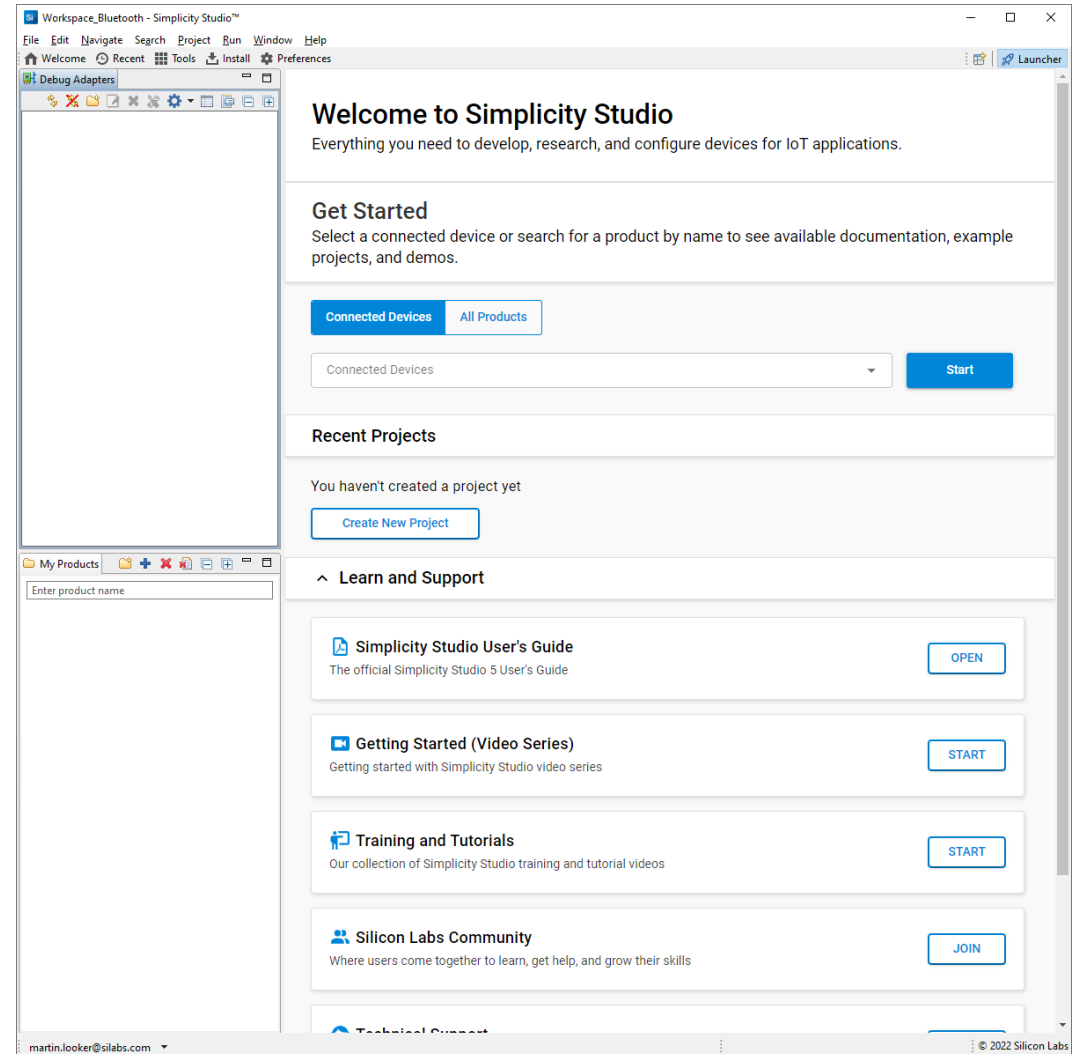
Simplicity Studio Workshop: Overview and Bootloaders

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8th March 2023 – v1.2

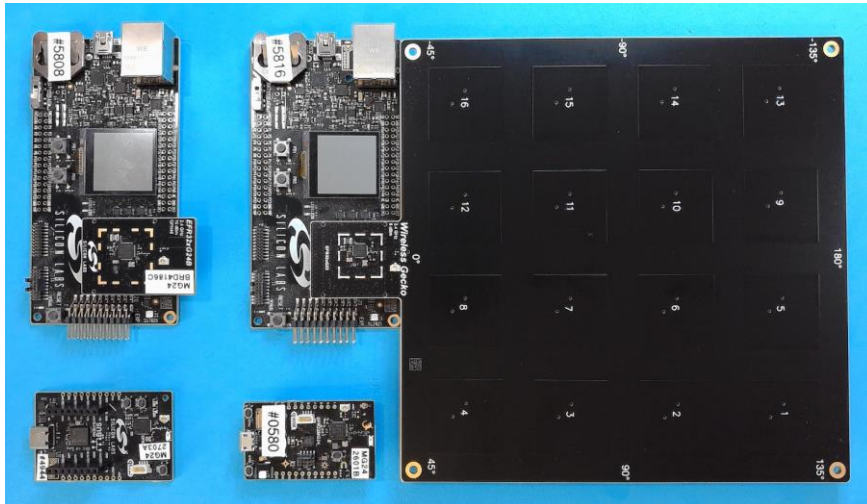
Overview

- Simplicity Studio is the unified development environment for all Silicon Labs technologies which provides:
 - Web resources
 - SDKs
 - Configuration tools
 - An IDE
 - Network and power analysers
- In this session you will learn:
 - How to connect boards to Simplicity Studio
 - How to obtain and configure board information
 - How to access documentation
 - How to access demo and example software and bootloaders
 - How to build and flash firmware to boards



Pre-requisites

- Simplicity Studio v5 installed:
 - Part 1 of this series shows how to download and install Simplicity Studio:
<https://www.brainshark.com/siliconlabs/EW23-Simplicity-Studio-Install>
- Silicon Labs Wireless Kits and Boards
 - Information on multi-protocol kits and boards:
<https://www.silabs.com/wireless/multiprotocol?tab=kits>



Simplicity Studio Software

Simplicity Studio is the unified development environment for all Silicon Labs technologies, SoCs, and modules. It provides you with access to the target device-specific web and SDK resources, software and hardware configuration tools, and an integrated development environment (IDE) featuring industry-standard code editors, compilers, and debuggers. With Simplicity Studio, you get a complete set of advanced value-add tools for network analysis and code-correlated energy profiling.

No matter your experience level, Simplicity Studio takes you through an optimized workflow, enabling quicker project progression, device configuration, and application optimization. Simplicity Studio 5 is built on Eclipse and C/C++ Development Tooling (CDT), adding robustness, improving performance, and allowing you to customize your development experience using plug-ins from the Eclipse Marketplace.

Simplicity Studio version 5 supports Silicon Labs [Secure Vault](#), the most advanced security software suite with the highest [PSA Certification Level 3](#). With Secure Vault, you can protect your IoT devices against escalating threats while conforming to the quickly evolving cyber-security regulations. The IDE also includes a UI engine for modern, responsive, web-like user interfaces.

Download the Full Online Installer Version of Simplicity Studio 5

[Windows Installer >](#) [Mac Installer >](#) [Linux Installer >](#)

[*SS 5 User Guide >](#)

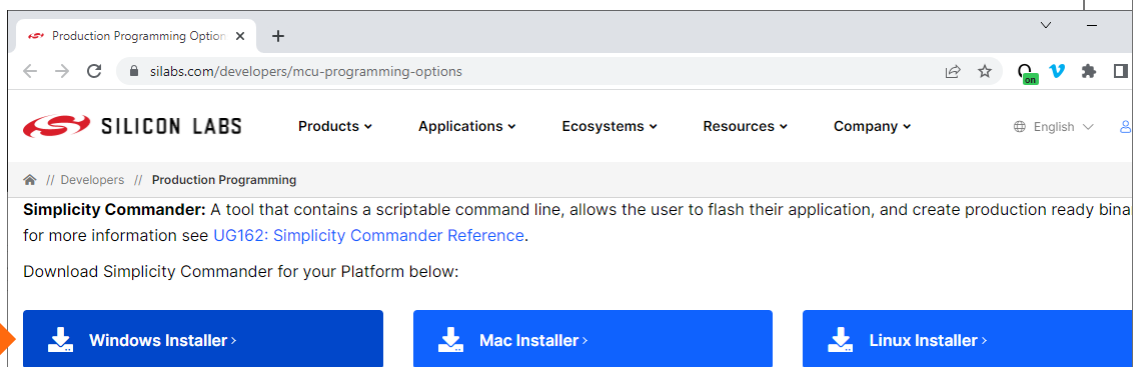
Looking for Release Notes? Visit our [Gecko SDK](#) (GSDK) page or the relevant technology SDK page and look under the Tech Docs tab.

Simplicity Commander

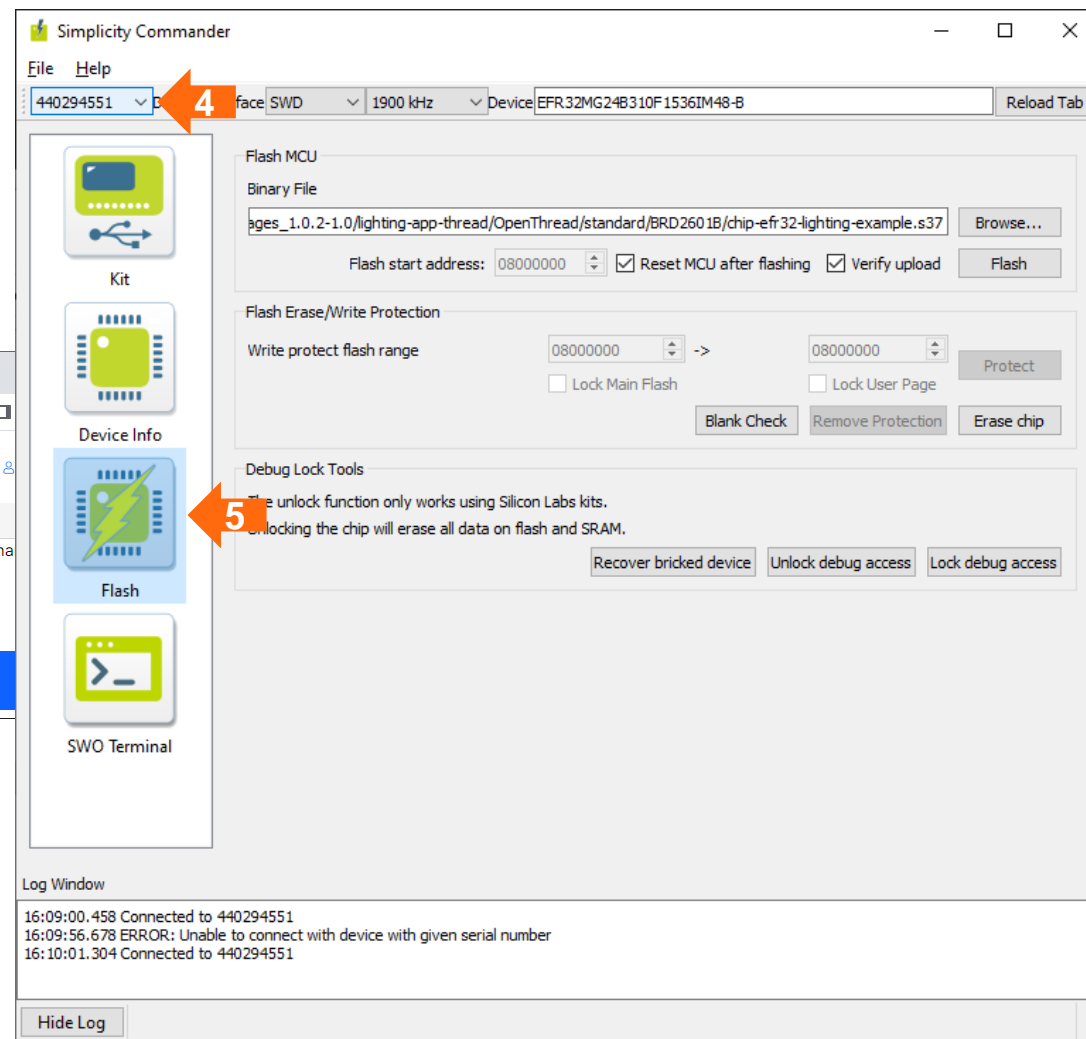
- If Simplicity Studio is not installed, Simplicity Commander can be used to program pre-built binaries:

1. Download the ZIP file, for your system, towards the bottom of:

<https://www.silabs.com/developers/mcu-programming-options>

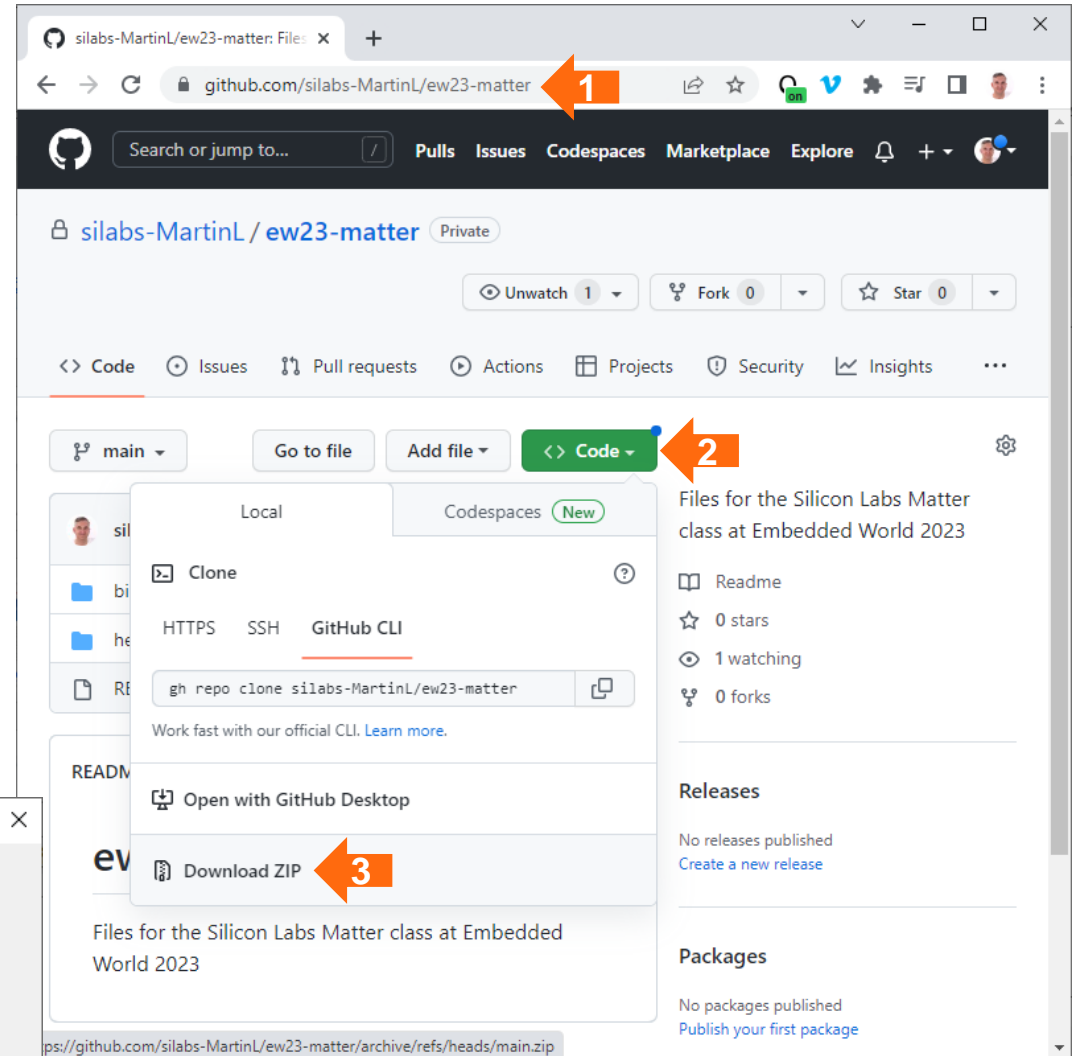
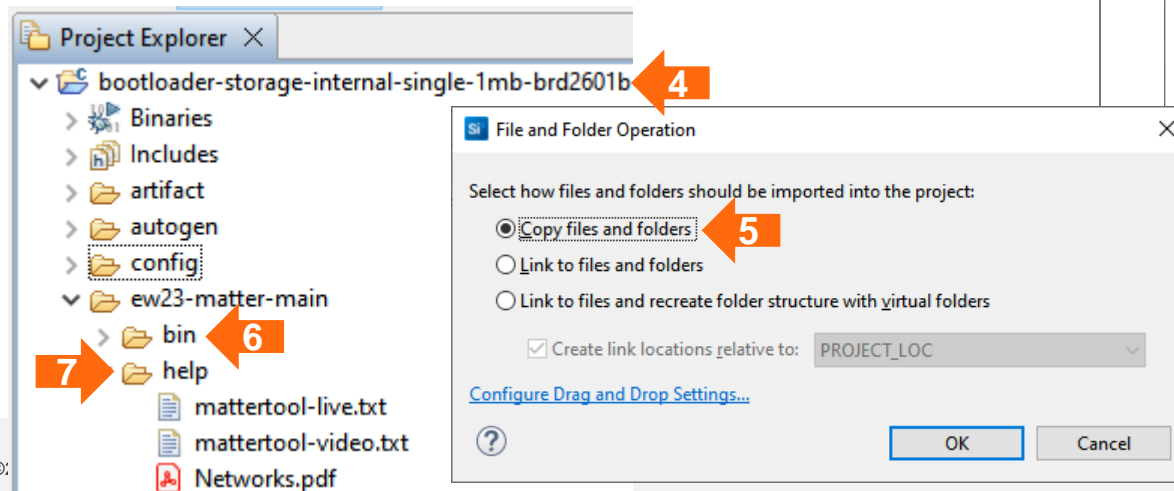


2. Unzip to a folder on your PC
3. Locate and run commander.exe
4. Use the Select Kit dropdown to select a connected board
5. Flashing controls are available from the Flash tab



Downloads

- Files for the class are available on Github:
 - Visit <https://github.com/silabs-MartinL/ew23-matter>
 - Click the **Code** dropdown
 - Click **Download ZIP** (or use your preferred git method)
 - Unzip to your file system, drag and drop the **ew-23-matter-main** folder to your bootloader project in **Simplicity Studio**
 - When prompted select **Copy files and folders** and select **OK**
 - Binaries that we will use later are in the **bin** folder
 - A PDF of this presentation, network settings and text files with commands are in the **help** folder



xG24 and xGM240: Optimized for Battery Powered IoT Mesh Devices



BG24 and MG24 SoC



BGM240S and MGM240S SiP



BGM240P and MGM240P Module

▪ High Performance Radio

- Up to +19.5 dBm TX
- -97.6 dBm RX @ BLE 1 Mbps
- -105.7 dBm RX @ BLE 125 kbps
- -105.4 dBm RX @ 802.15.4
- 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

- 5.0 mA TX @ 0 dBm
- 19.1 mA TX @ +10 dBm
- 4.4 mA RX (BLE 1 Mbps)
- 5.1 mA RX (802.15.4)
- 33.4 μ A/MHz
- 1.3 μ A 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
- 32kHz, 500ppm PLFRCO

▪ World Class Software

- Matter¹
- Thread¹ and Zigbee¹
- Bluetooth (1M/2M/LR)
- Bluetooth mesh
- Dynamic multiprotocol¹
- Proprietary

▪ SoCs and Modules

- 5x5 QFN40 (26 GPIO) +125°C
- 6x6 QFN48 (28/32 GPIO) +125°C
- 7x7 SiP Module
- 12.9x15.0 PCB Module

¹Requires MG24

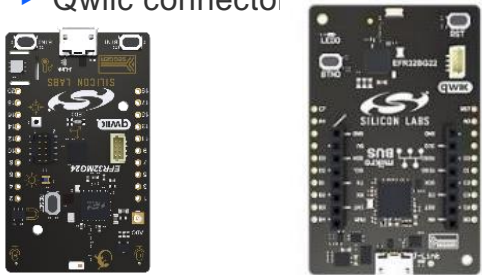
Getting Started with BG24 and MG24 SoCs and Modules

▪ Dev Board

- 1x Development board
 - On-board debugger
 - Signal breakouts
 - On-board sensors
 - 20-bit ADC
 - AI/ML hardware accelerator

▪ Explorer kit

- 1x Explorer board
 - mikroBus socket
 - Qwiic connector



Part Number	Description
xG24-DK2601B	EFR32xG24 2.4 GHz +10 dev board
xG24-EK2703A	EFR32xG24 2.4 GHz +10 explorer board

▪ Pro kits

- 1x radio board
- 1 x WSTK main board
 - Modular development platform
 - Advanced development
 - RF measurements
 - Energy profiling
 - External device debug
 - Ethernet for large network test



Part Number	Description
xG24-PK6009A	EFR32xG24 2.4 GHz +10 dBm Pro Kit
xG24-PK6010A	EFR32xG24 2.4 GHz +20 dBm Pro Kit

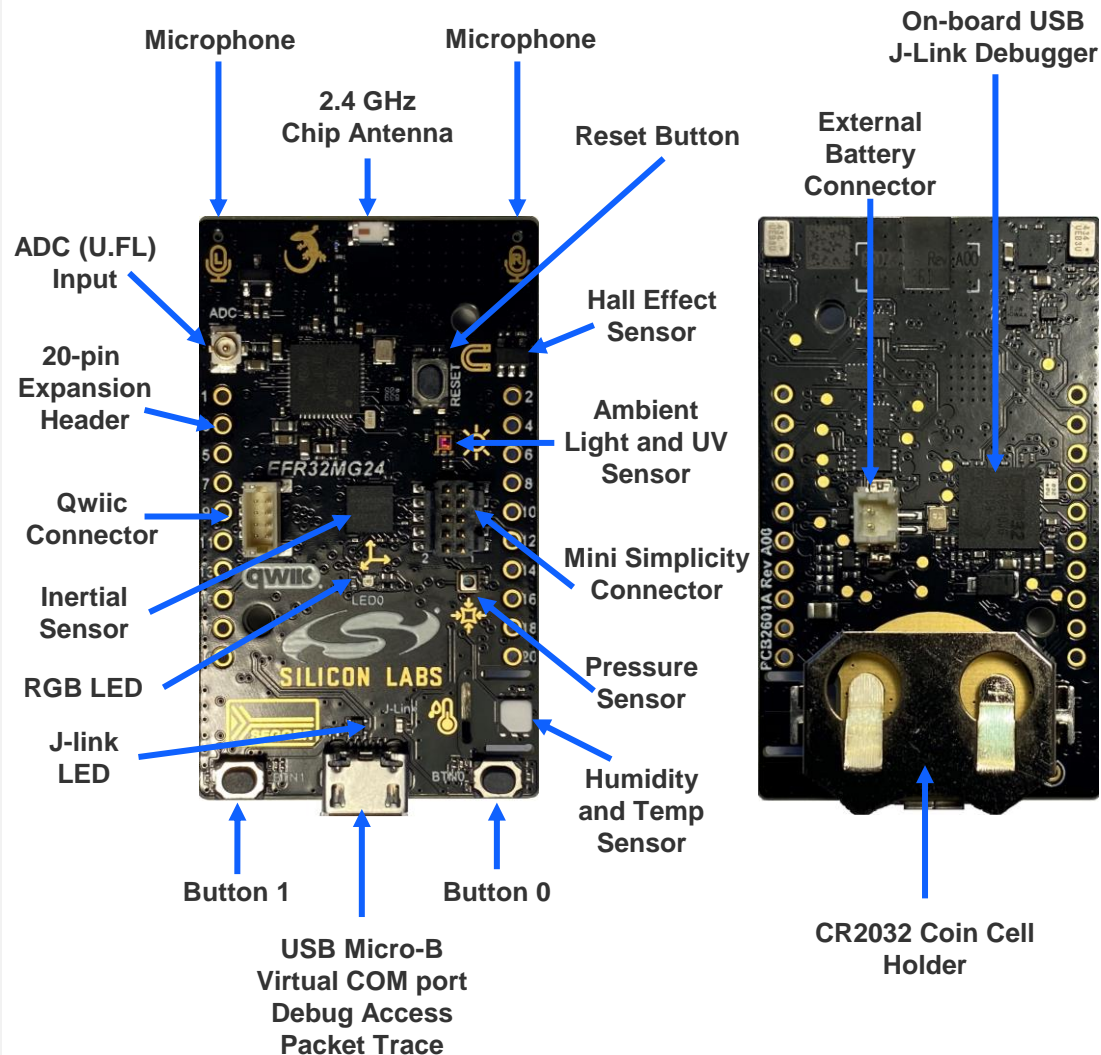
▪ Radio Board kits

- 1x radio board
 - Uses existing WSTK boards
 - Uses existing software tools



Part Number	Description
xG24-RB4186C	EFR32xG24 2.4 GHz +10 dBm Radio Board
xG24-RB4187C	EFR32xG24 2.4 GHz +20 dBm Radio Board
xG24-RB4188A	EFR32xG24 +20 dBm Antenna Diversity Board
XGM240-RB4316A	xGM240P +10 dBm Module Radio Board
XGM240-RB4317A	xGM240P +20 dBm Module Radio Board
XGM240-RB4318A	xGM240S +10 dBm Module Radio Board

Dev Board Features



■ Features

- EFR32MG24B
- Wireless SoC with multi-protocol radio
- Cortex-M33, 1536 kB Flash and 256 kB RAM

■ Advanced Features

- AI/ML Hardware Accelerator
- 20-bit ADC

■ Expansion and User Interface

- Breakout pads
- Qwiic connector
- LEDs and Push Buttons

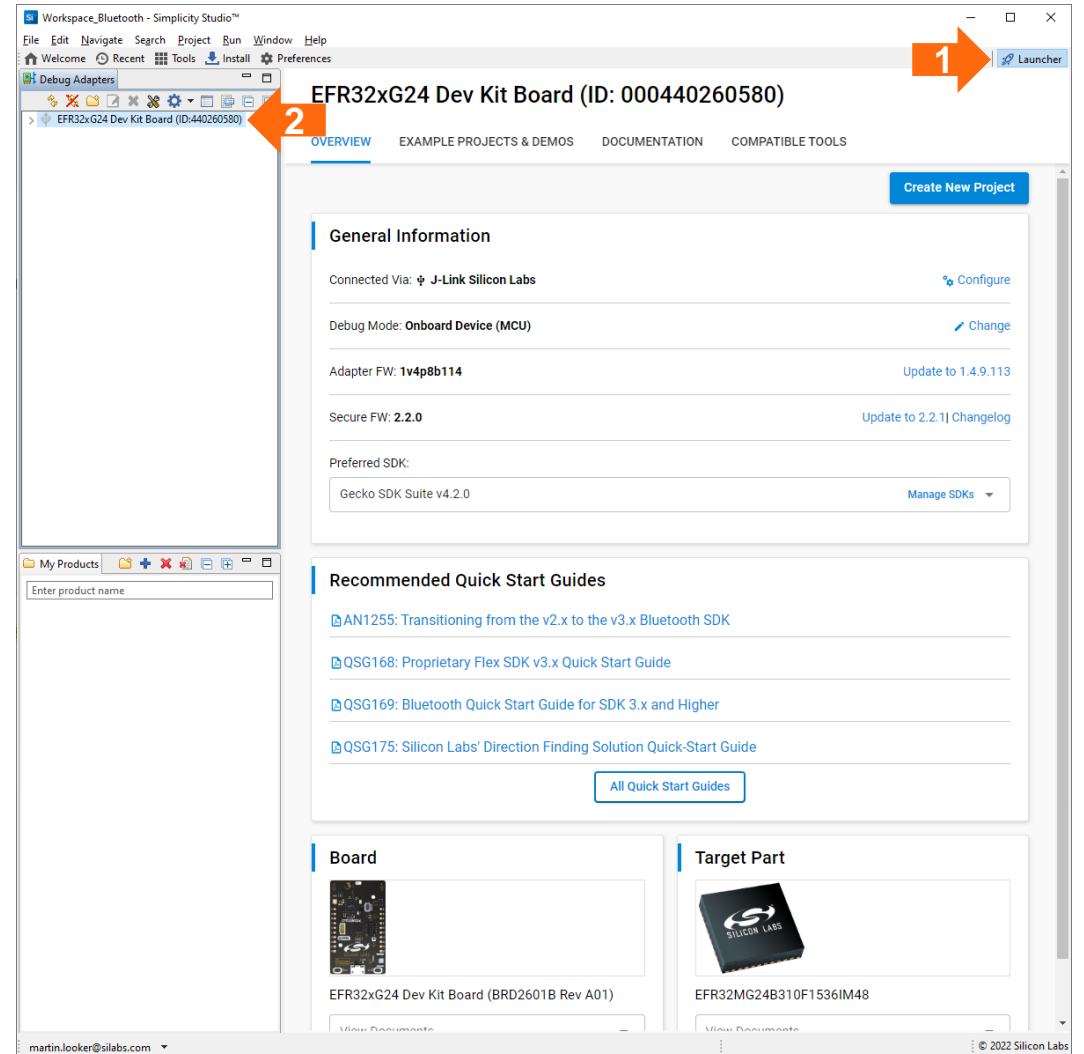
■ Broad Range of Sensors

- 9-axis Inertial Sensor
- 2 Digital Microphones
- Pressure Sensor
- Relative Humidity and Temperature Sensor
- UV and Ambient Light Sensor
- Hall-effect Sensor

<https://www.silabs.com/documents/public/user-guides/ug524-brd2601b-user-guide.pdf>

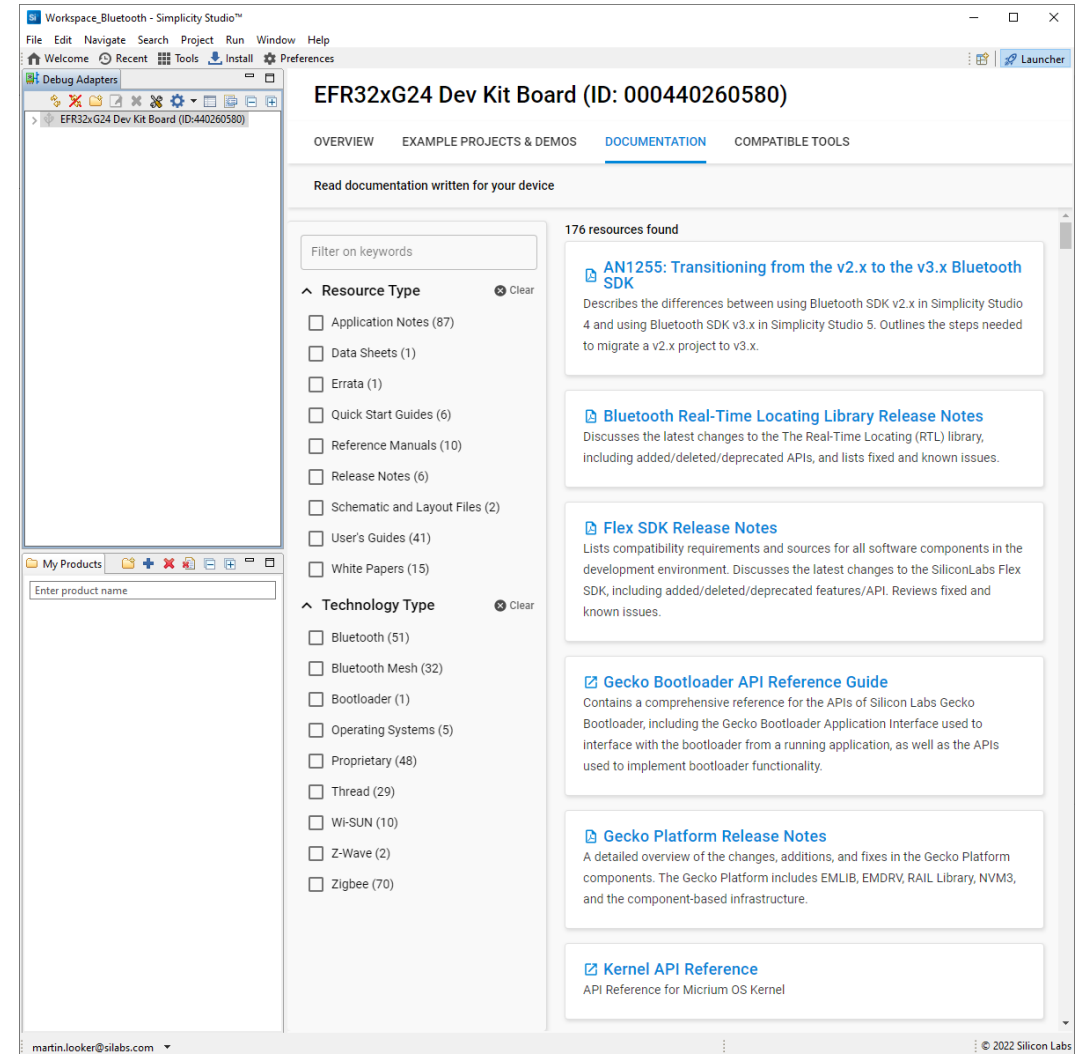
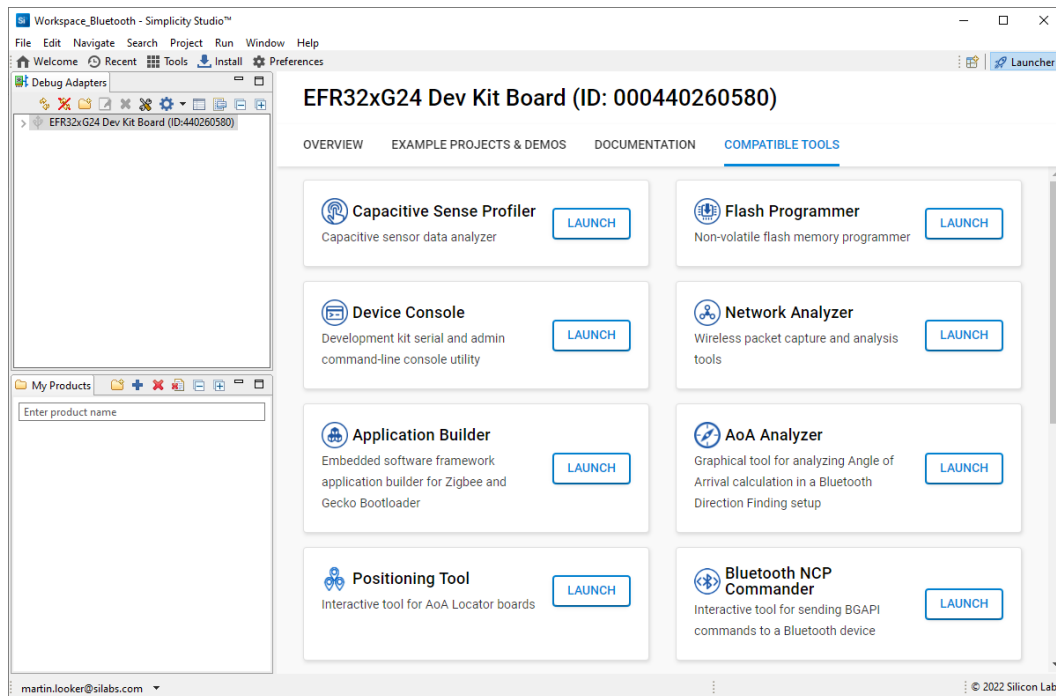
Launcher – Overview

- Connect board via USB
 1. Switch to Launcher perspective
 2. Select **EFR32xG24 Dev Kit Board** from **Debug Adapters** panel
- **Overview:**
 - Information on device
 - Firmware updates
 - SDK version selection
 - Recommended documentation



Launcher – Documentation and Tools

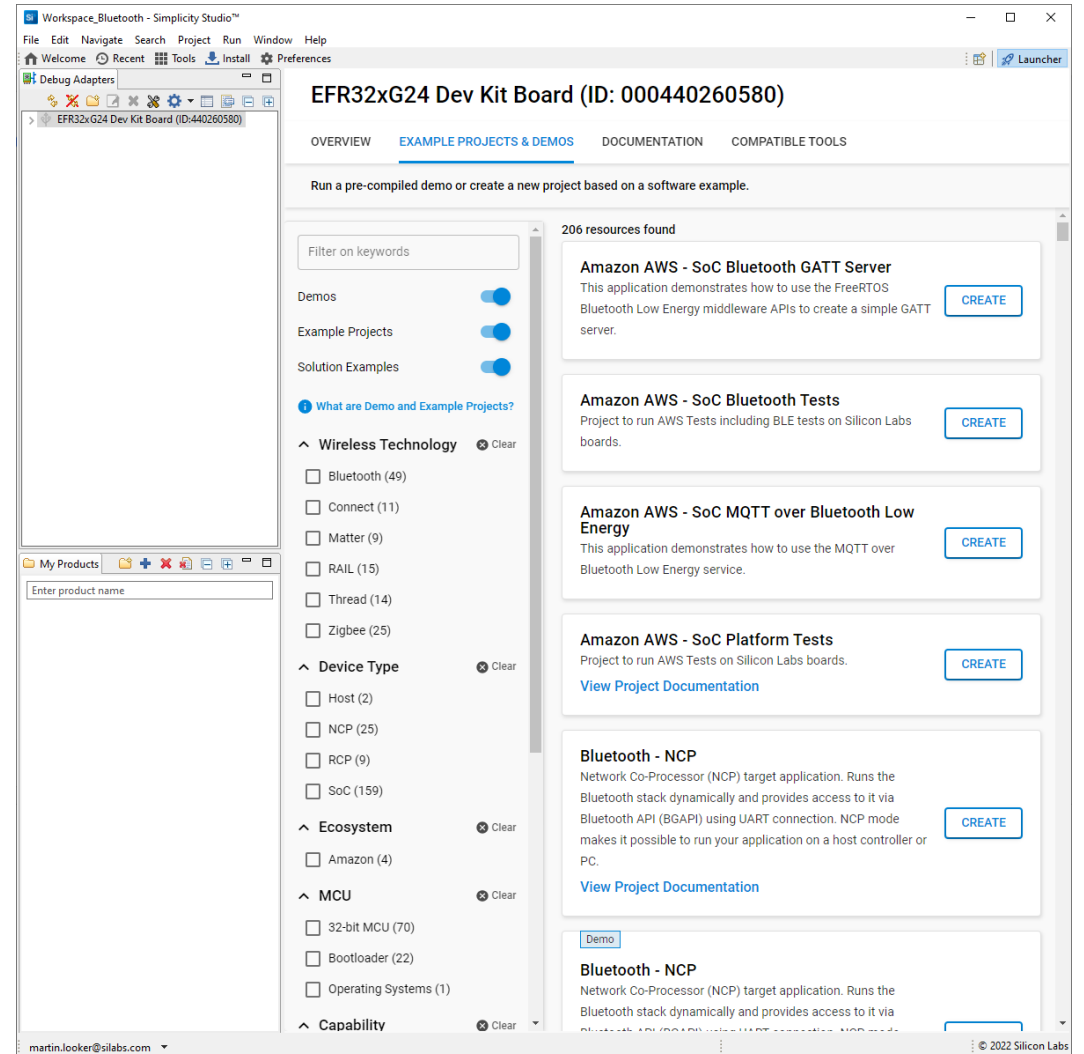
- **Documentation:** a more comprehensive list of documentation
- **Compatible Tools:** has useful tools relevant to the board



Launcher – Example Projects and Demos

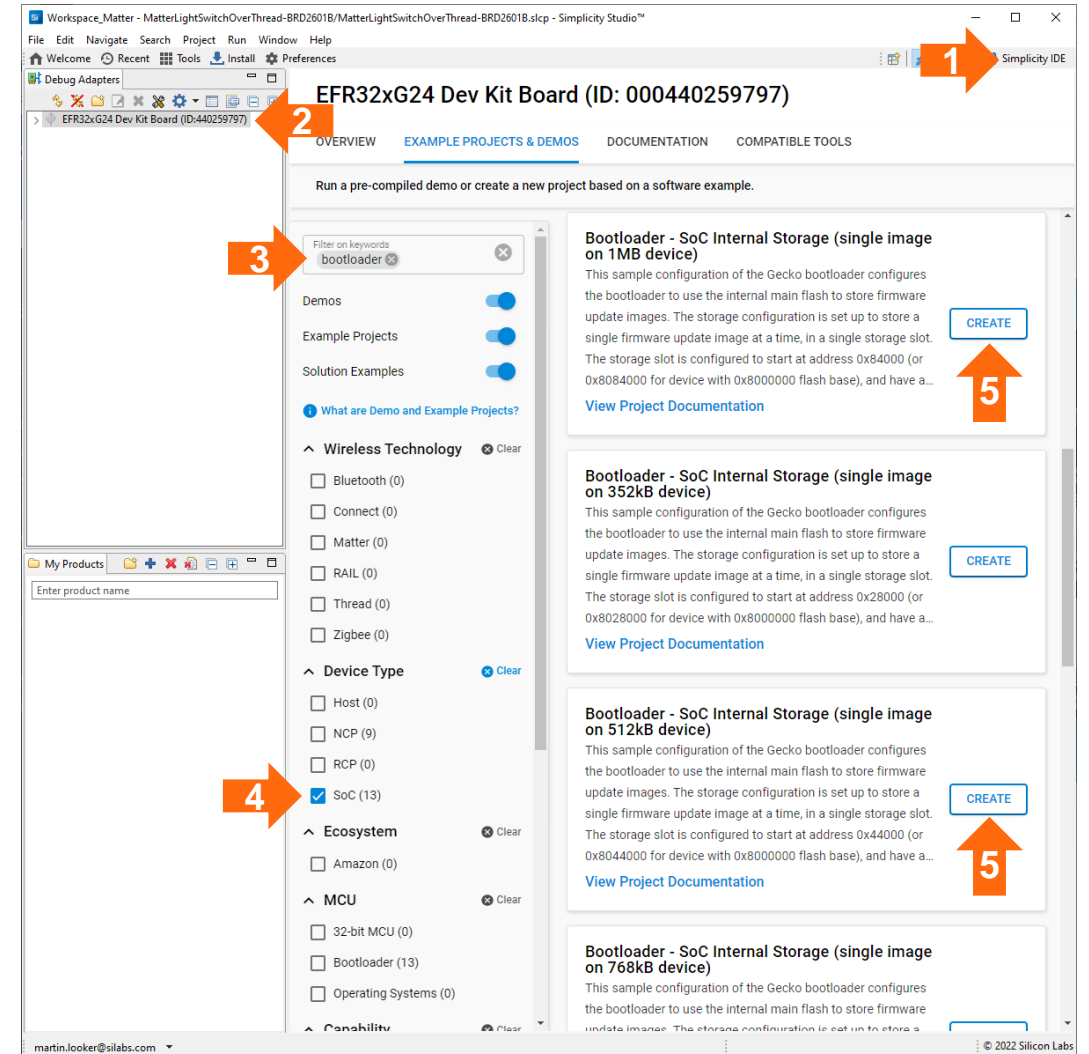
- **Example Projects & Demos** tab:

- Examples create a project with source code in Simplicity Studio
- Demos program and run a pre-built binary (and bootloader)
- Can filter and search examples



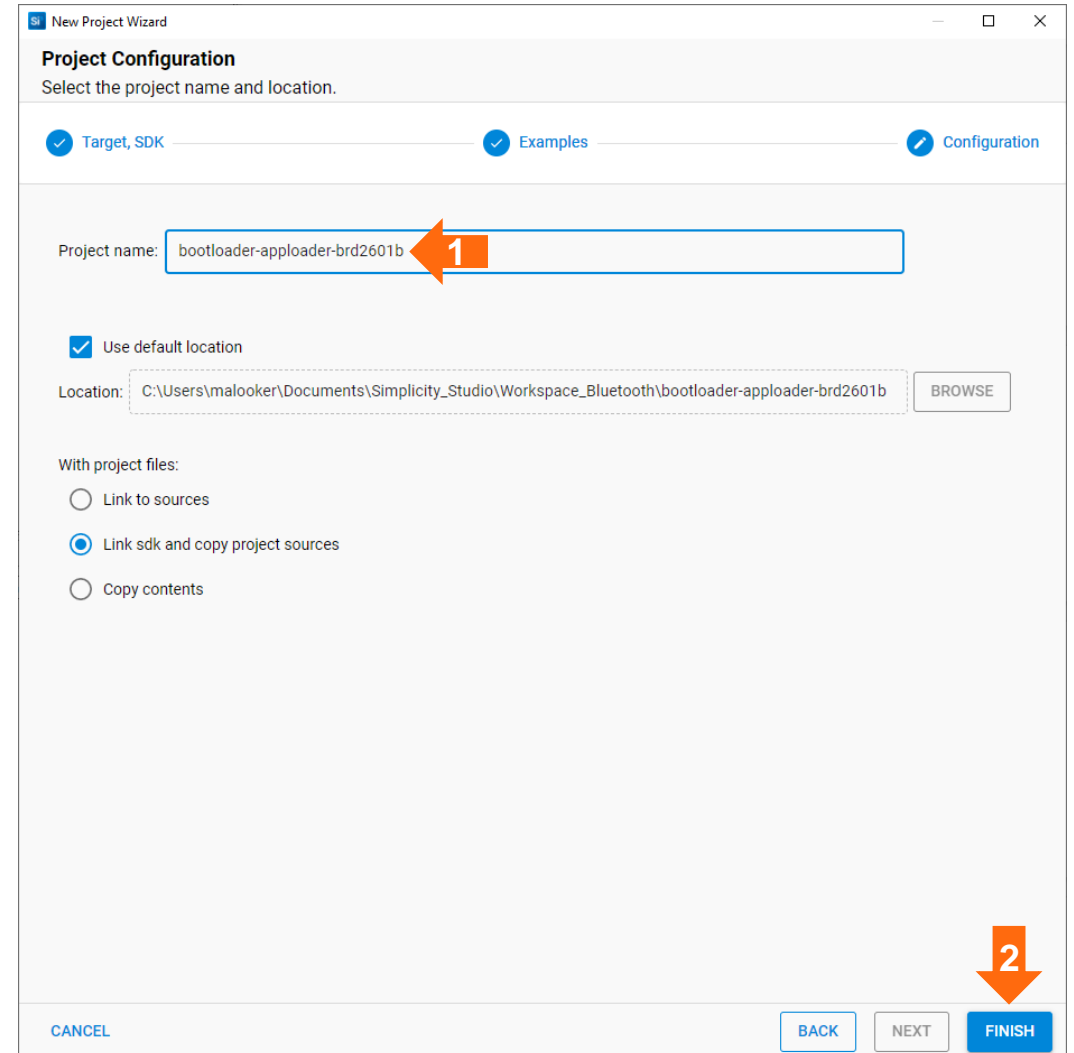
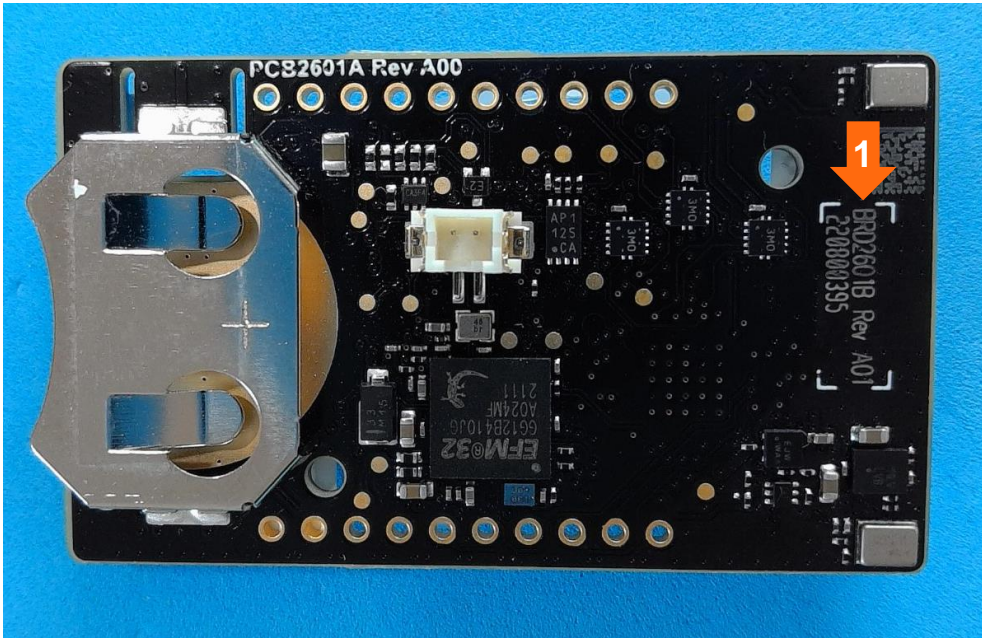
Matter Bootloader – Create Example

- Examples use different bootloaders
 - The Matter documentation specifies the bootloader to use: <https://docs.silabs.com/matter/1.0.1/matter-overview-guides/ota-bootloader>
 - Matter SoC projects use:
Bootloader - SoC Internal Storage (single image on 1MB device)
or
Bootloader - SoC Internal Storage (single image on 512kB device)
- To create the bootloader project:
 1. Select the **Launcher** perspective
 2. Select the connected board in the **Debug Adapters**
 3. Type **bootloader** into the **Filter on keywords** box
 4. Check **SoC** under **Device Type**
 5. In **Bootloader - SoC Internal Storage (single image on 1MB device)** or **Bootloader - SoC Internal Storage (single image on 512kB device)** example, click the **CREATE** button to open the **New Project Wizard**



Bootloader – New Project Wizard

- To complete the wizard:
 1. (Optional) append the board number to the default **Project Name**
 - ▶ Board numbers are printed on each board
 - ▶ This helps when the same example is created for different boards
 2. Click the **FINISH** button



New Project Wizard

Project Configuration
Select the project name and location.

✓ Target, SDK ✓ Examples ✎ Configuration

Project name:

☒ Use default location

Location:

With project files:

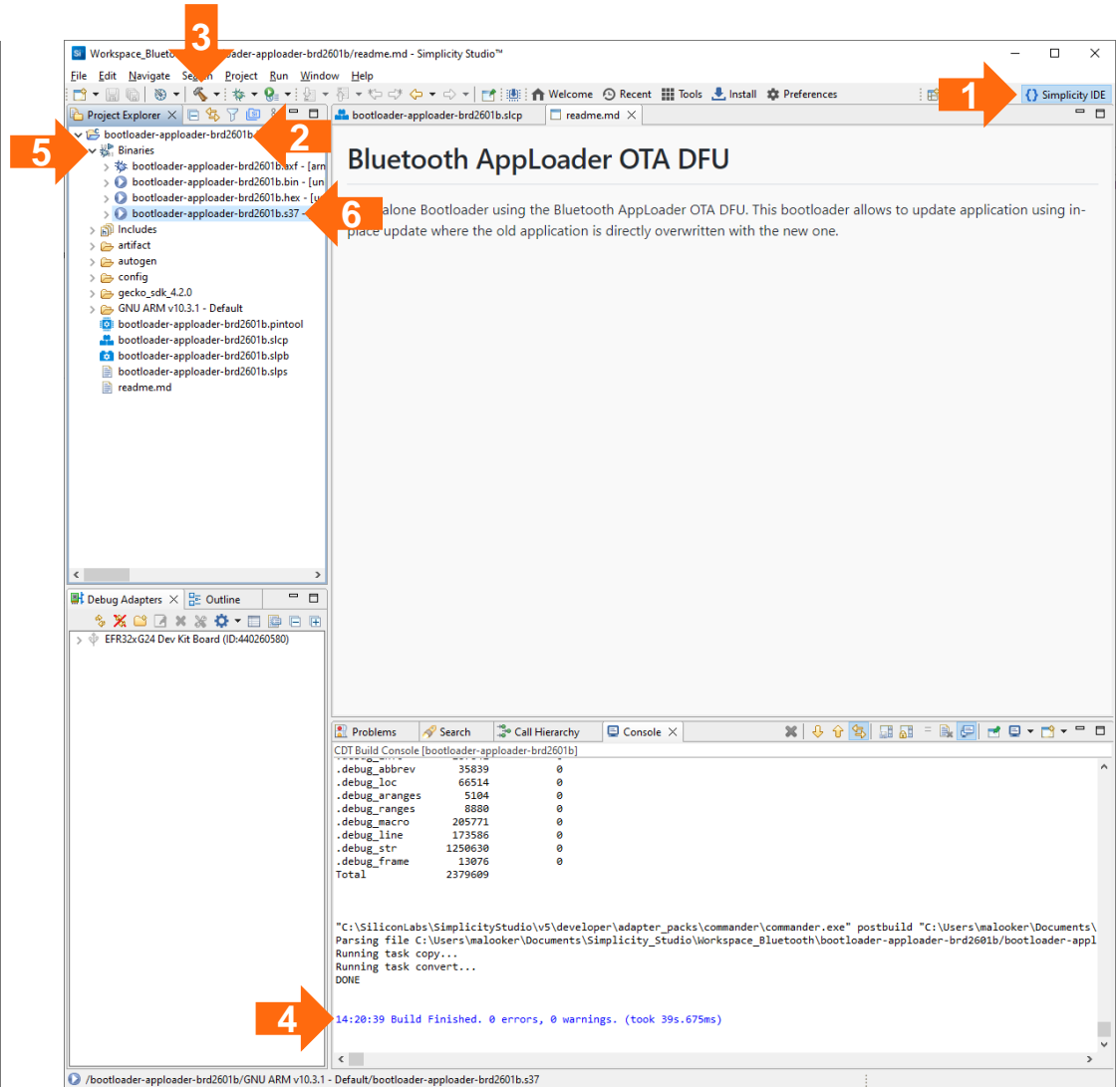
☐ Link to sources

☒ Link sdk and copy project sources

☐ Copy contents

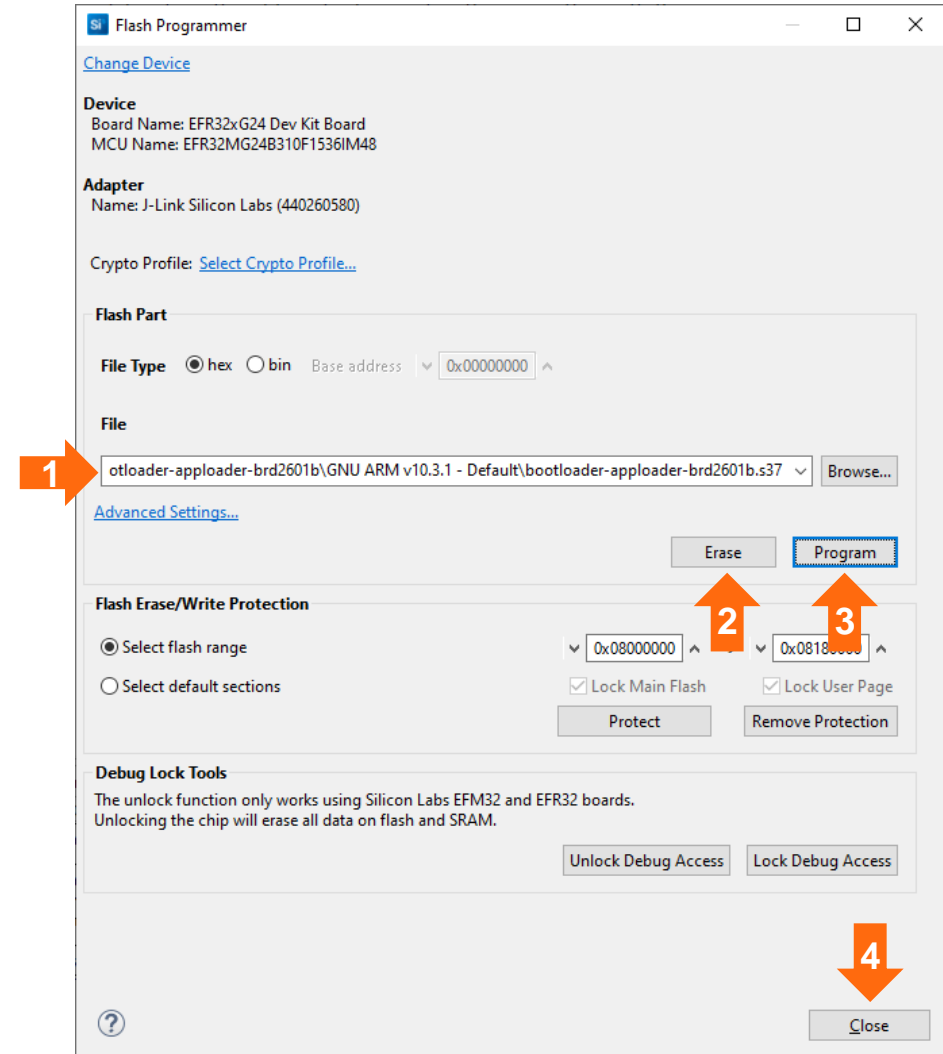
Bootloader – Build

- To build the bootloader:
 1. Switch to the **Simplicity IDE** perspective
This will happen automatically after creating an example project
 2. Select the project in the **Project Explorer**
 3. Click the hammer button in the toolbar to build
 4. Check the build completes successfully in the **Console**
 5. Expand the **Binaries** folder in the **Project Explorer**
 6. Right-click the **.s37** file in the **Binaries** folder then select **Flash to Device...** to open the **Flash Programmer**



Bootloader – Erase and Flash

- To erase and flash the bootloader using the **Flash Programmer**:
 1. Check the `.s37` binary file is displayed in the **File** edit box
 2. Erase the chip using the **Erase** button
 3. Flash the binary using the **Program** button
 4. Close the **Flash Programmer** using the **Close** button



Thank You

- This is part 2/3 of the Silicon Labs Matter-over-Thread workshop series for Embedded World 2023
View online at:
 1. <https://www.brainshark.com/siliconlabs/EW23-Simplicity-Studio-Install>
 2. <https://www.brainshark.com/siliconlabs/EW23-Bootloader-SS>
 3. <https://www.brainshark.com/siliconlabs/EW23-Matter-SS>
- Presentations and other files can be found alongside the online videos in the **Attachments** tab