俠剪艰襐襐扁癗xG22E
绳咼肽爩耔缒擷隇肽醐

艰襐襐扁骚縺獱囻幕瓩嶦秋鞧

獌辞曜

2025 tech talks WEBINAR SERIES

BLUETOOTH

譯秋壧繳

01 肱醐擷隇灬朦滑呿幕砥

02 **MG22E**廁厓卯廉灬廁笴嚬

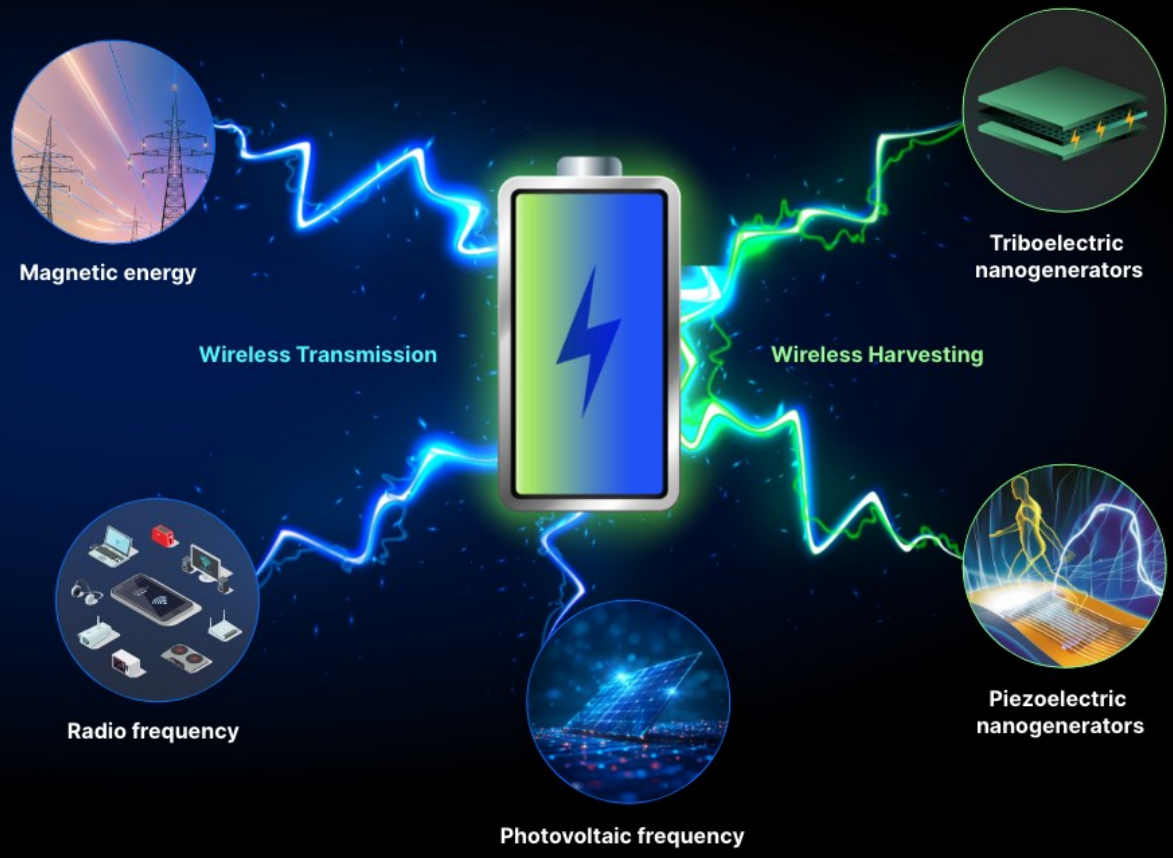
03 **MG22E**廁厓卯廉灬櫟祎讌繵

04 **MG22E**廁厓卯廉灬磕佻滕磕

05 暵倀儹癗廁厓贅滑

01 能量收集 – 来源和应用

- 肽酗擷隇癗朦渭
- 獰塄爦鬱耔绔癗幕砬

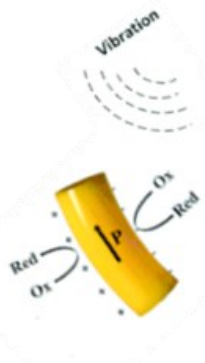


肱醐擷隇癗朦渭

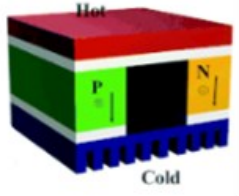
“TRICKLE” ENERGY SOURCES

- For applications with nearly *constant energy supplies*
- For applications that are nearly *always-on (rechargeable)*

PHOTOVOLTAIC



VIBRATION PIEZO



MAGNETIC / THERMAL INDUCTION

RF INDUCTION

“TRANSIENT” ENERGY SOURCES

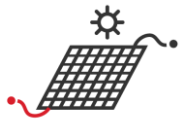
- For applications with *limited duration energy source*
- For applications that *frequently deep sleep or power off*

KINETIC

Learn more: WorksWith 2023

獰堶爦耔縋癗幕砥

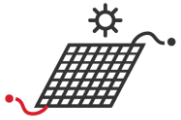
Learn more: TechTalk 2024



SOLAR - OUTDOOR

LOGISTICS / LIVESTOCK TRACKING

Bluetooth® Proprietary



SOLAR - INDOOR

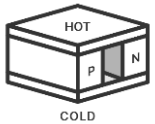
ASSET TRACKING / SMART BUILDING SENSORS

Bluetooth® Proprietary zigbee

KINETIC PULSE

SMART SWITCHES

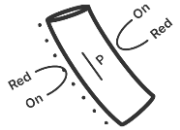
Bluetooth® zigbee



THERMAL

MACHINE MONITORING

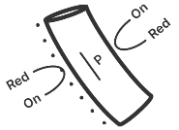
Bluetooth® Proprietary zigbee



VIBRATION / PIEZO

FACTORY AUTOMATION / AGRICULTURE / TPMS

Bluetooth® Proprietary zigbee



INDUCTION

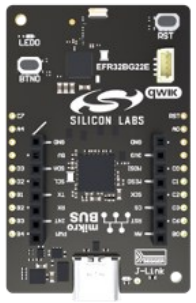
ELECTRIC SUB-METERING

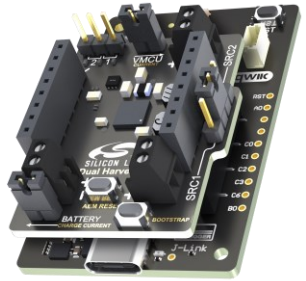
Bluetooth® Proprietary zigbee

02 MG22E廁压外廉 – EK8200A – 廁笞嚐

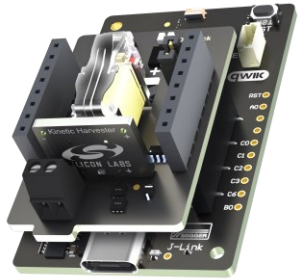
- **BRD8200A Kit**
  - BRD8203 – Battery Shield
  - BRD8202 – Kinetic Shield
  - BRD8201 – Dual Source Shield
  - BRD8204/8205 – AC/DC Bricks
- **Software Examples** - Github
- **User Guide** - UG591

廁筲 **EK8200A –** 肱醐擷隇殃杀呿嬉杀


MG22E Explorer Kit

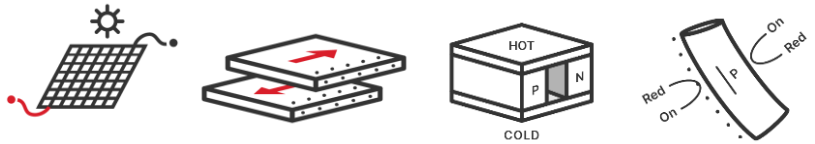

Dual Harvester


Battery Power


Kinetic Button

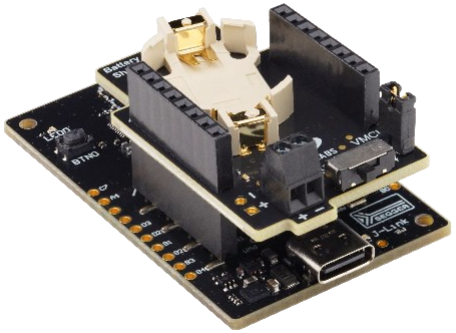
All-in-one multi-application Ambient IoT prototyping kit!

- **co-designed** by *Silicon Labs* and *e-peas*
- **Shield-compatible** with **MG22E** Explorer Kit (**BRD2710A included**)
- Includes basic **PV cell** and **capacitor** storage
- Compatible with AC and DC **multiple energy sources** (with rectifier/regulator attachments)
- Compatible with **Bluetooth LE, RAIL, Zigbee (Green Power)** and **Proprietary 2.4GHz** protocols



Bluetooth® zigbee Proprietary

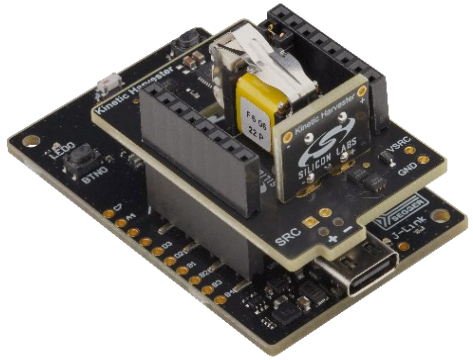
廁筲 **EK8200A** – 肱醐擷隇殃杀呿嬉杀



BRD8203

BATTERY BACKPACK

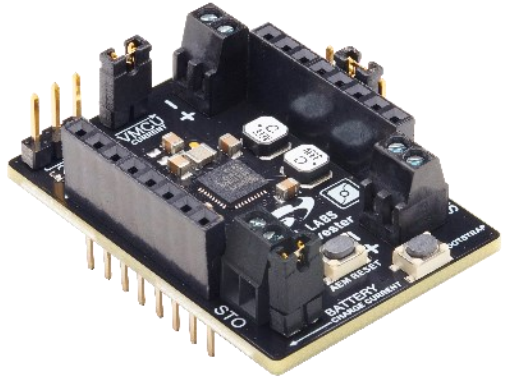
- Coin-cell battery compatible
- Designed with test-points for current and voltage measurements
- USB-power compatible
- Capacitor or alternative-power circuitry adaptable screw terminals



BRD8202

KINETIC SHIELD

- e-peas AEM00300 PMIC
- Battery-less switches and buttons
- Zigbee Green Power ; BLE RAIL examples
- Battery-less Zigbee commissioning



BRD8201

DUAL HARVEST SHIELD

- e-peas AEM13920 PMIC (NEW)
- Simultaneous AC or DC input energy-source
- e-peas i2c 3rd party driver (Github extension for Simplicity Studio)

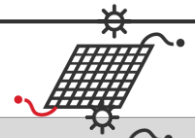
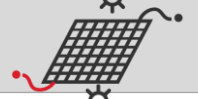
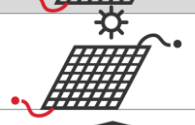
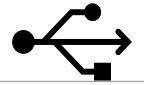
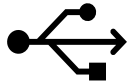
BRD8204/5

ADAPTER BRICKS

- AC and DC input circuitry
- MOSFET-based rectifier with capacitor wave smoothing
- Over-protection circuitry

Github贊滑 – 肽醐擷隇殃杀呿嬉杀

github.com/SiliconLabs/energy_harvesting_applications

#	TYPE	PROTOCOL	ENERGY SOURCE	LINK
1	Energy Harvester *Sensor*	Bluetooth LE	Solar 	README
2	Energy Harvester *Sensor*	Bluetooth RAIL	Proprietary	Solar 	README
3	Energy Harvester *Sensor*	Zigbee GreenPower	zigbee	Solar 	README
4	Energy Harvester *Switch*	Bluetooth RAIL	Proprietary	Kinetic 	README
5	Energy Harvester *Switch*	Zigbee GreenPower	zigbee	Kinetic 	README
6	Observer / *Reader*	Bluetooth / RAIL	Bluetooth	N/A 	README
7	Coordinator / *Reader*	Zigbee GreenPower	zigbee	N/A 	README

开箱 – 砥懸担北 – 肱醐擷隇殃杀呿嬉杀

UG591: User's Guide to EFR32xG22E Energy Harvesting Explorer Kit

EFR32xG22E Energy Harvesting Explorer Kit is an excellent starting point to explore and evaluate different Energy Harvesting solutions with Silicon Labs' Multiprotocol Wireless Systems on Chip (SoC).

This unique Energy Harvesting kit selection includes a lightweight board with one of Silicon Labs most popular Multi-protocol Wireless SoCs, based on the Explorer Kit platform, and different shields and adapters which, combined with the Explorer Kit's features enable evaluation of multiple solutions for Energy Harvesting, making use of energy sources like photovoltaic cells, inductive or piezoelectric sources, Thermoelectric Generators (TEG), in different applications, for example pulsed or continuous supply, single or dual source.

- The Dual Harvester Shield is the most flexible shield, that can be used to harvest energy from one or two sources at the same time. Typical use case scenarios are complimentary photovoltaic cells, one photovoltaic cell and one piezoelectric source taking energy from vibrations, etc. Adapters, for interfacing AC and DC sources to the Dual Harvester Shield, are also provided.
- The Kinetic Button Shield is engineered to demonstrate a specific application, using an inductive switch, aka kinetic switch, to temporary power the Wireless SoC and transmit a sequence of packages, for typical interacting with a light bulb or coordinator
- A supplementary Battery Shield is provided for e.g. debugging stand-alone operation scenarios or evaluating battery lifetime

When connected to the Explorer Kit, the shields supplies exclusively the Wireless SoC, while the debugger is left powered off, allowing stand-alone operation and true real-time current measurements.

Dual Harvester | Kinetic Button | Battery Power

FEATURES

- Energy Harvesting
- Self-powered operation
- Flexible PMIC
- Hardware and Software configurable registers
- AC and DC sources
- Automatic power selection (self-powered or debugger)
- Test Points for current and voltage measurements
- Single or Dual source

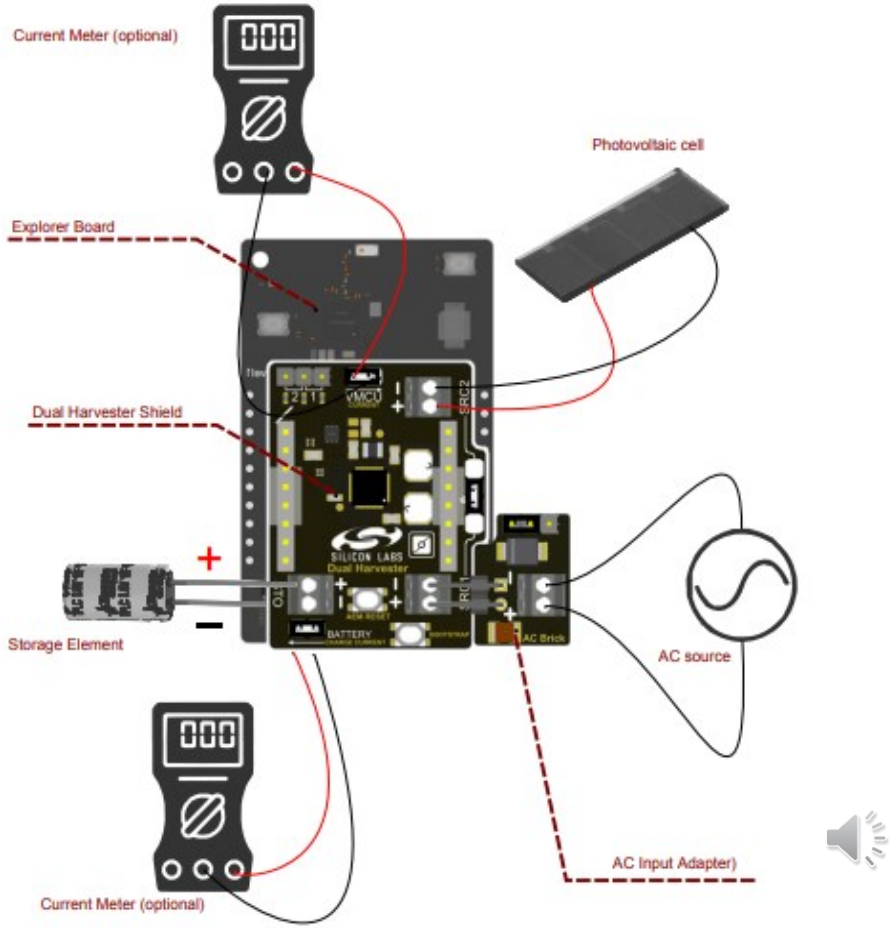
INCLUDED BOARD MODULES IN THIS KIT:

- BRD8201A Dual Harvester Shield
- BRD8202A Kinetic Button Shield, equipped with the BRD8206A Kinetic Switch Adapter
- BRD8203A Battery Shield
- BRD8204A AC Input Adapter
- BRD8205ADC Input Adapter
- BRD2710A Explorer Board
- 1x photovoltaic cell
- 1x lithium capacitor

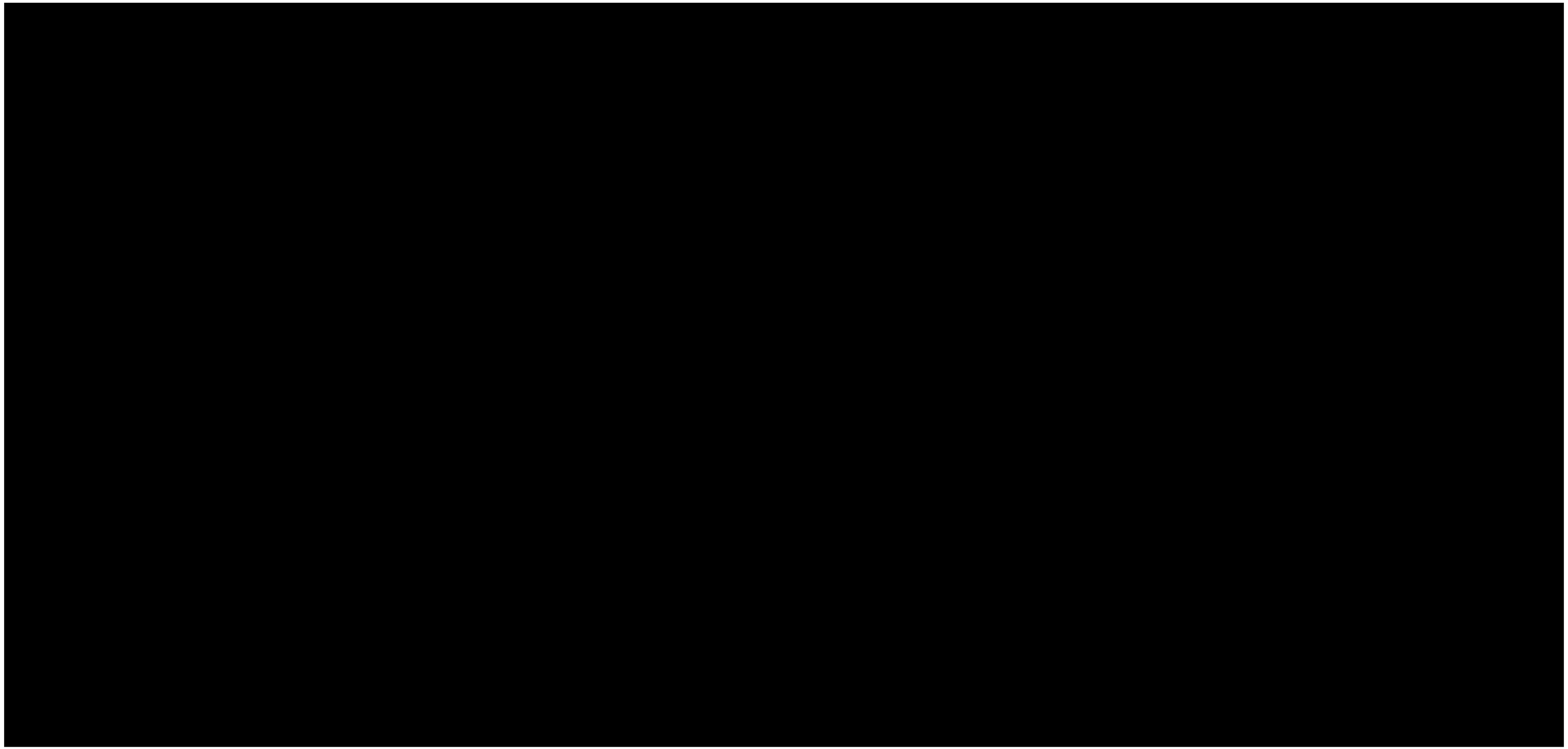
ORDER INFORMATION:

- xG22-EK8200A

docs.silabs.com/energy_harvesting



开箱 – 砥懸担北 – 肱醐擷隅殃杀呿嬉杀

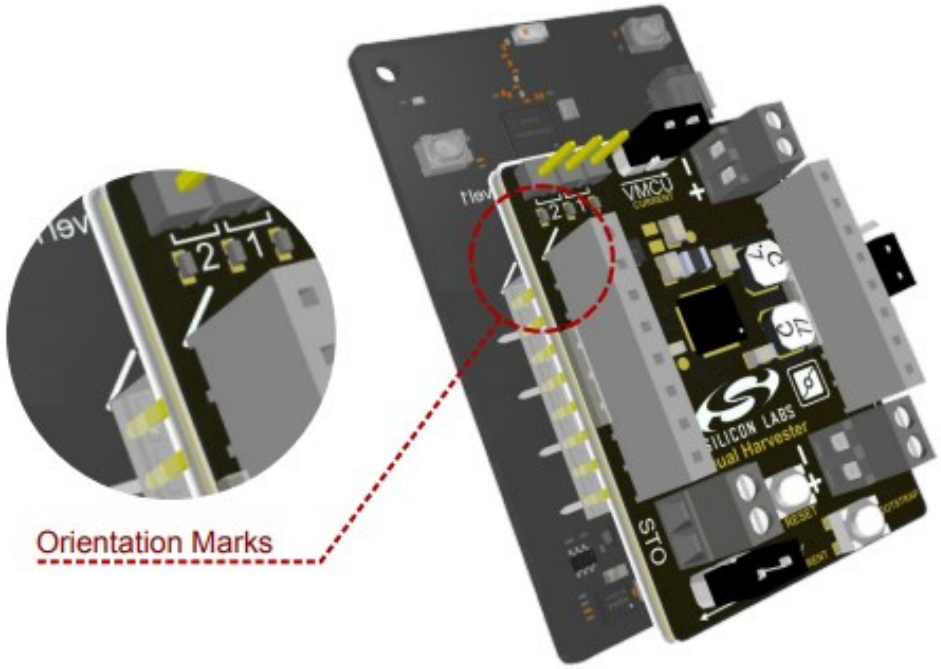


03 MG22E廁厓夘廉︸纞祎吰譓缰

- **BLE RAIL PV Beacon DEMO (default)**
  - Mobile App – *Simplicity Connect*
  - External Reader – *MG21, MG22, MG24, etc.*

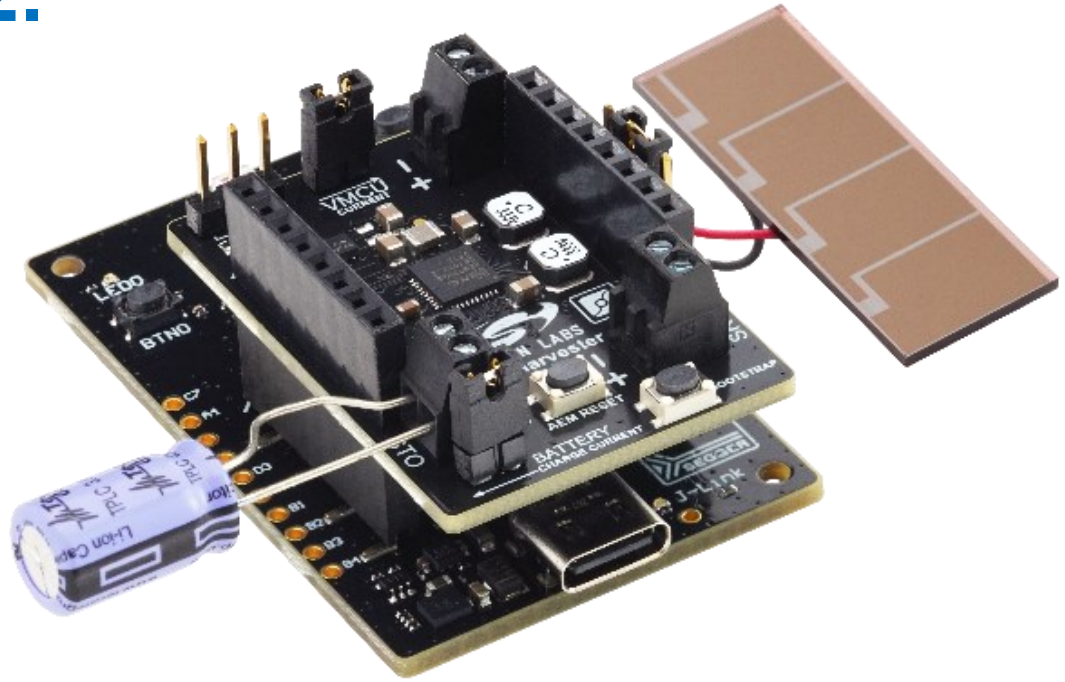
EK8200A 碰廉 – 肽醐擷隇殃杀呿嬉杀

1.



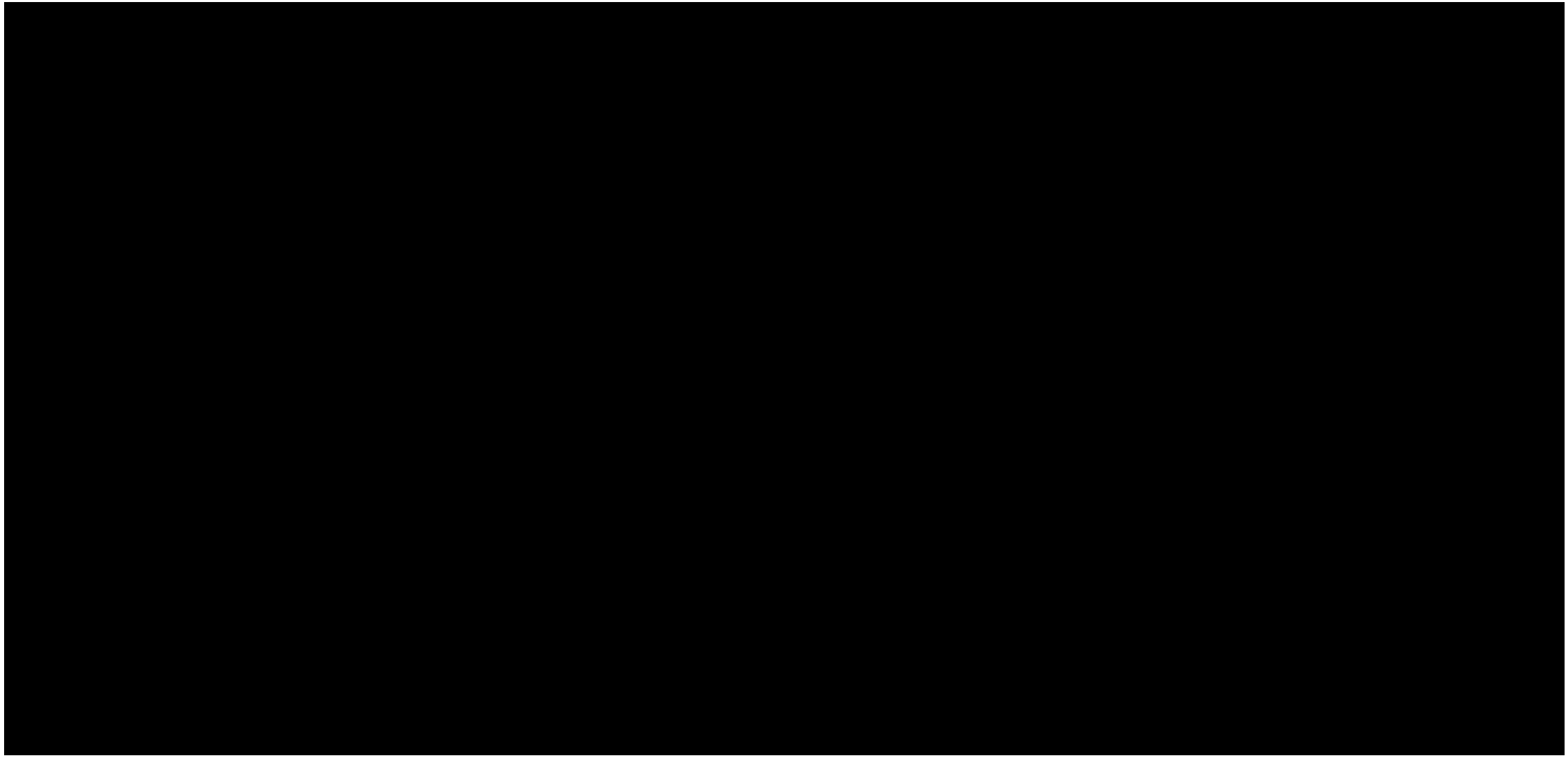
- Install BRD8201 (Dual Harvest) onto BRD2710 Explorer

2.

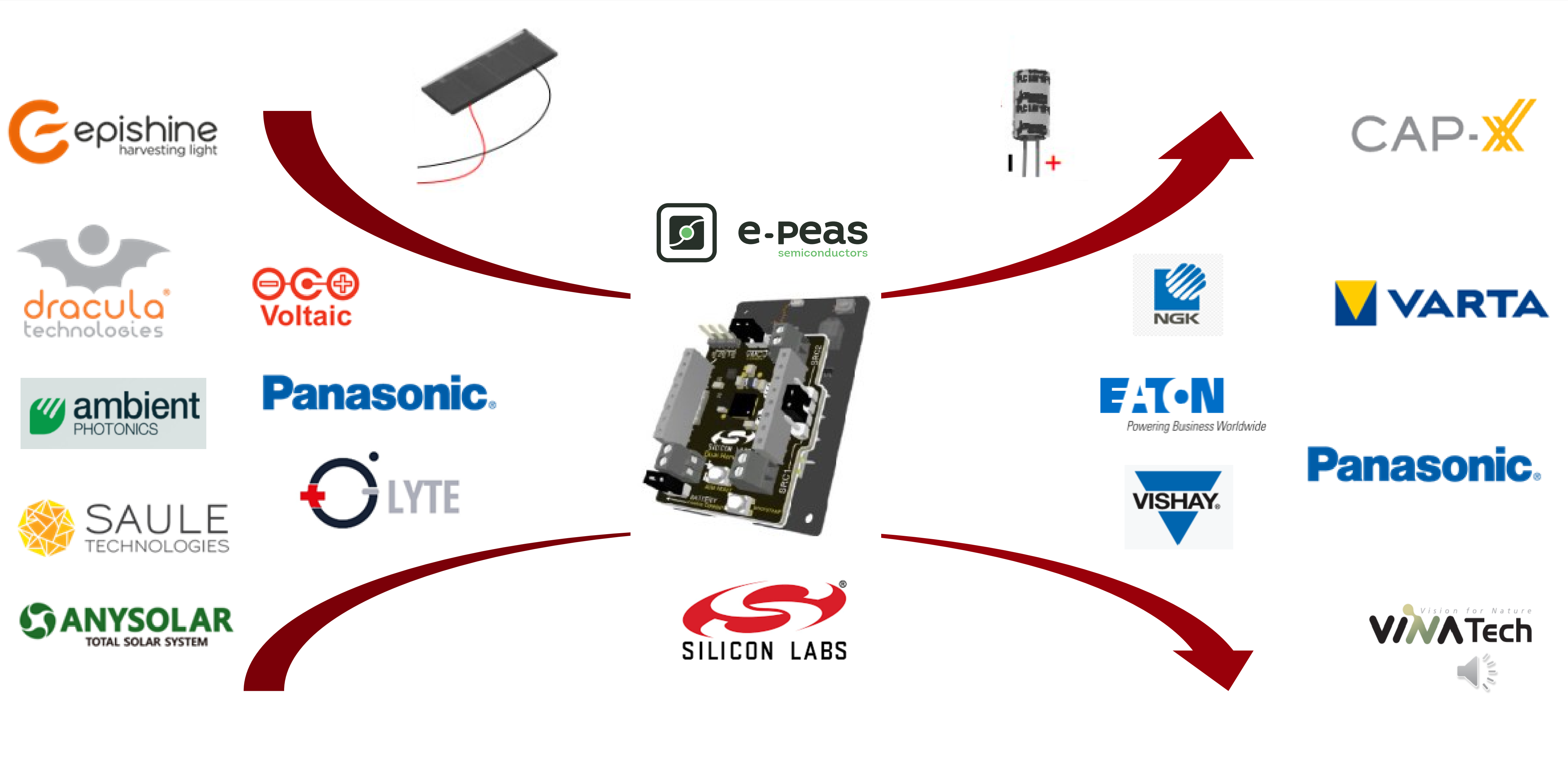


- First step : Screw in Lithium Capacitor
- Second step : Screw in PV cell to SRC2
- *Always dismantle PV first

EK8200A 碰廉 – 肽酮擷隇殃杀呿嬉杀

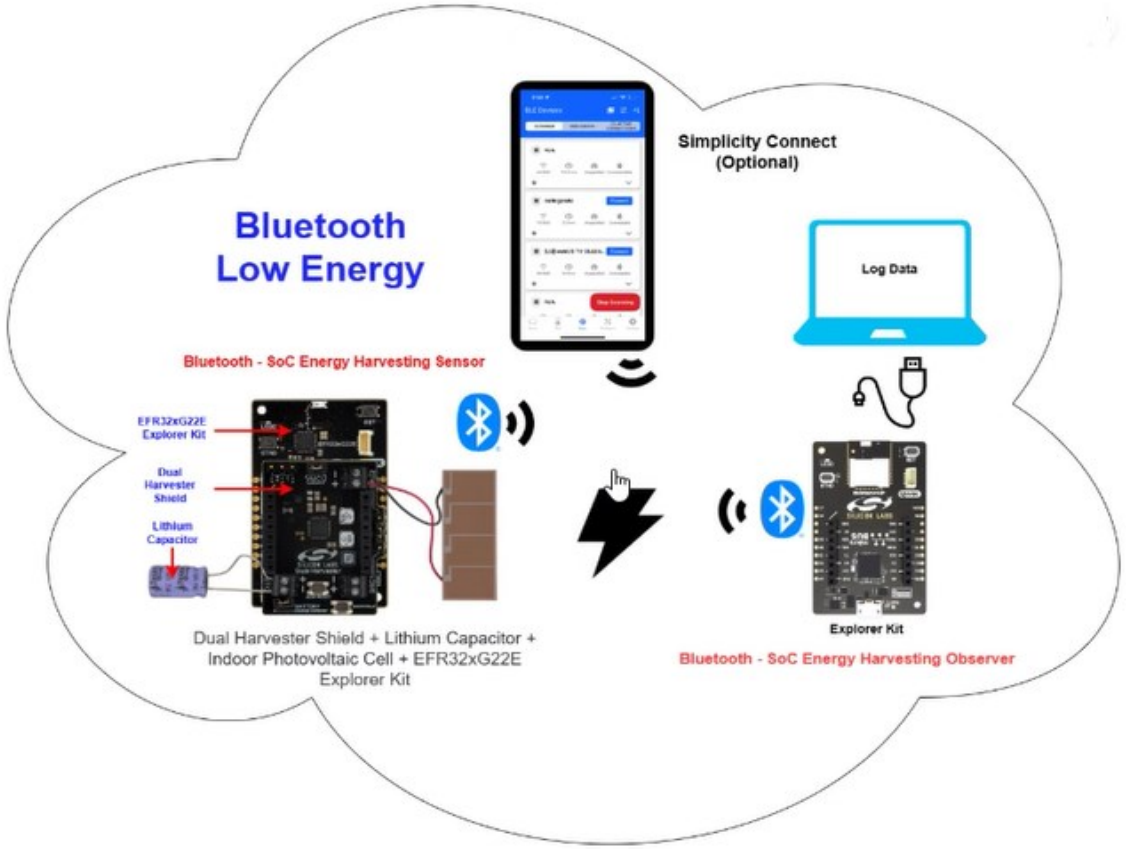


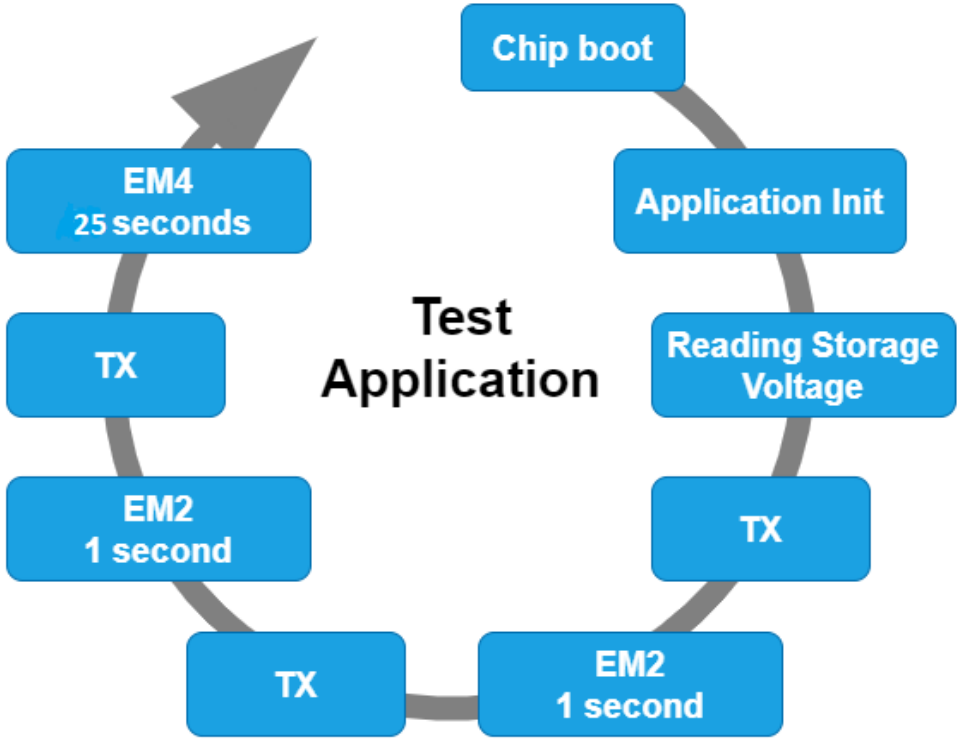
嘻交砬廉優孺忨 – 僋仐纞廉辂偩肽襨廉 ˈ Digikey/Mouser



SILICON LABS

EK8200A 暢廉 – Bluetooth RAIL Sensor





- **Bluetooth packets (RAIL) can be detected:**
  - using Simplicity Connect mobile app
  - using alternative Silicon Labs SoC (example provided)

- **Default application execution – preprogrammed on MG22E Explorer (BRD2710A)**

暢廉 – 离剩幕砸秋勝 – Bluetooth RAIL Sensor

SIMPLICITY CONNECT 嬬祎

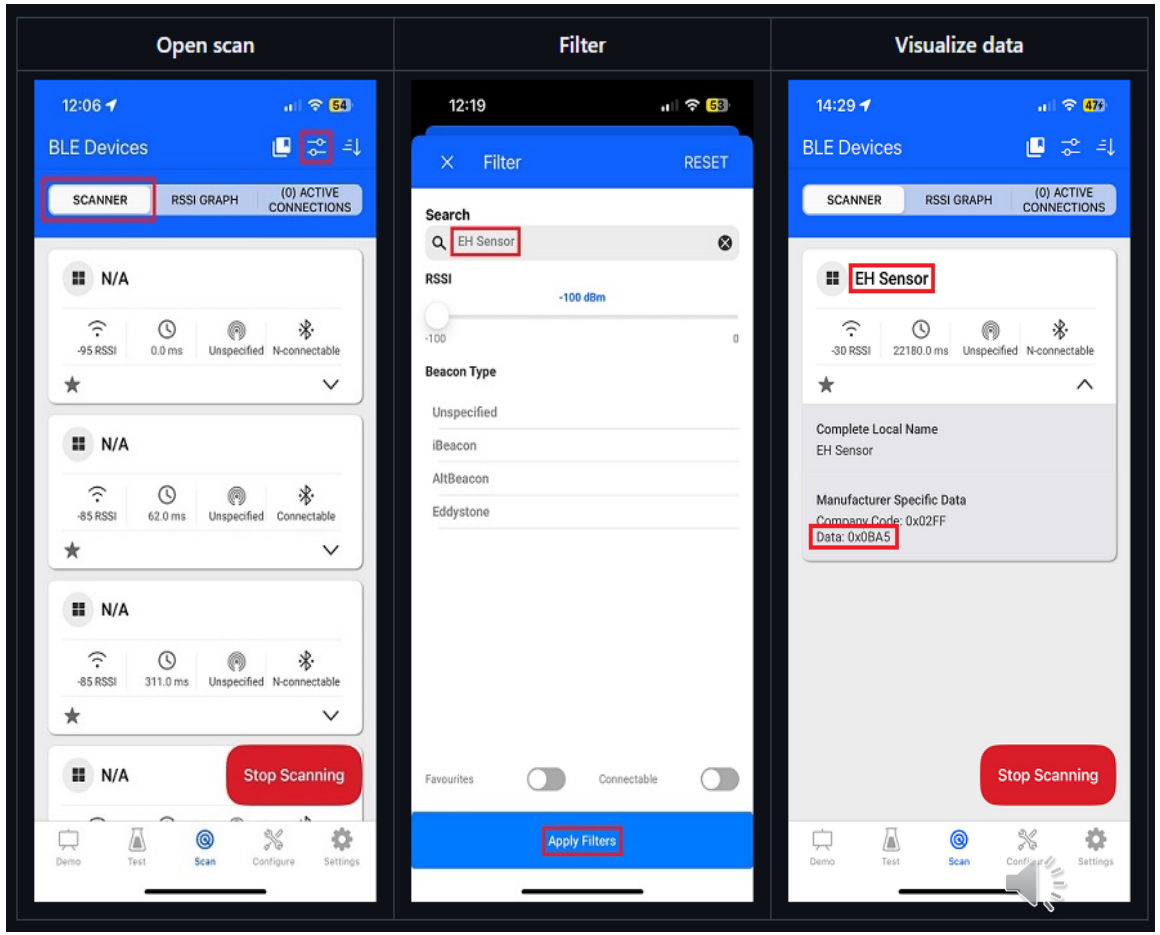
- apps.apple.com/us/app/simplicity-connect
- play.google.com/store/apps/siliconlabs
- Public GitHub repos for Simplicity Connect:
- github.com/SiliconLabs/SimplicityConnect-ios
- github.com/SiliconLabs/SimplicityConnect-android

SIMPLICITY CONNECT 贅湣

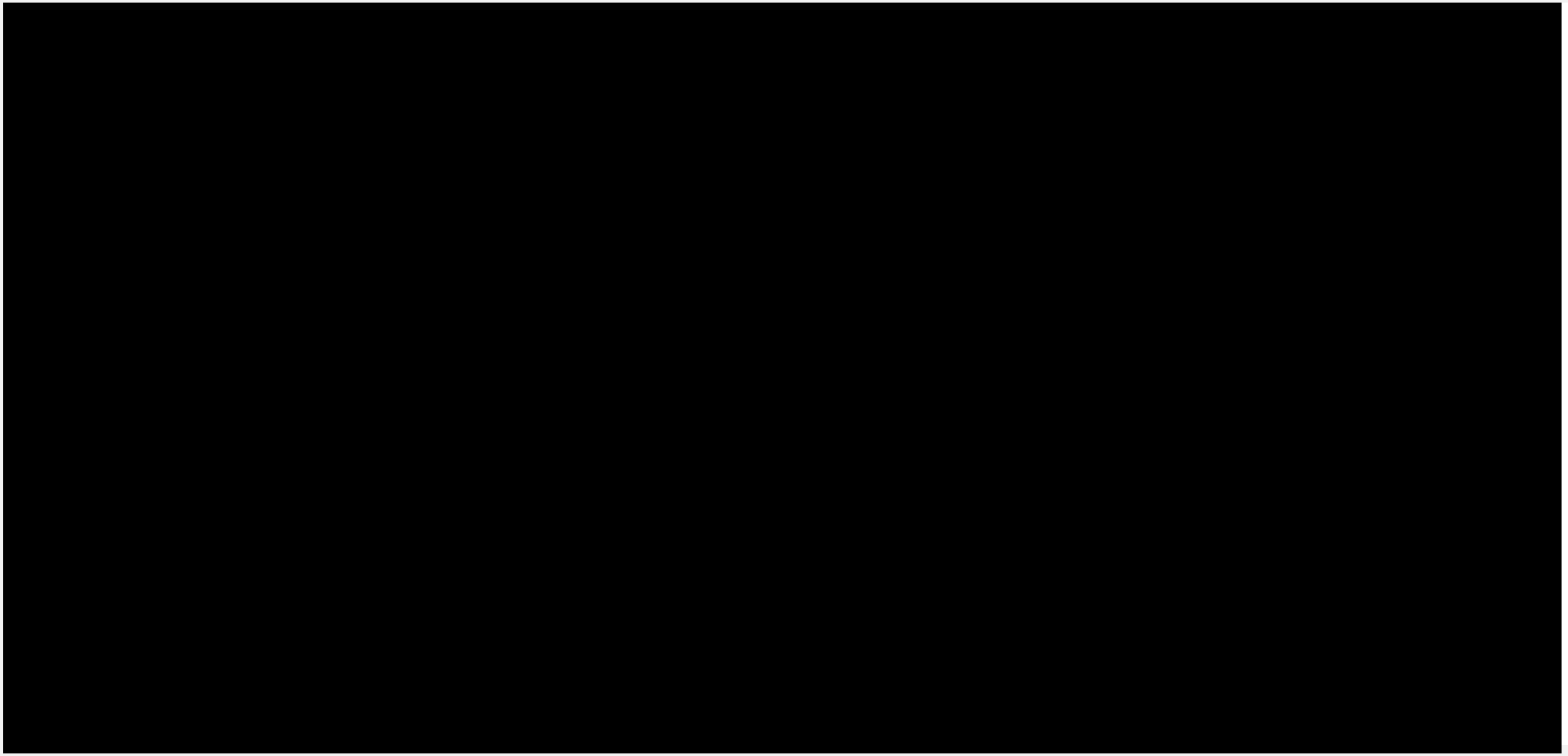
- silabs.com/developer-tools/simplicity-connect-mobile-app
- docs.silabs.com/bluetooth/latest/bluetooth-mobile-applications/efr-connect-mobile-app

Convert '**Data: 0xBA5**' to Decimal to read voltage!
0xBA5 = **2981 mV**

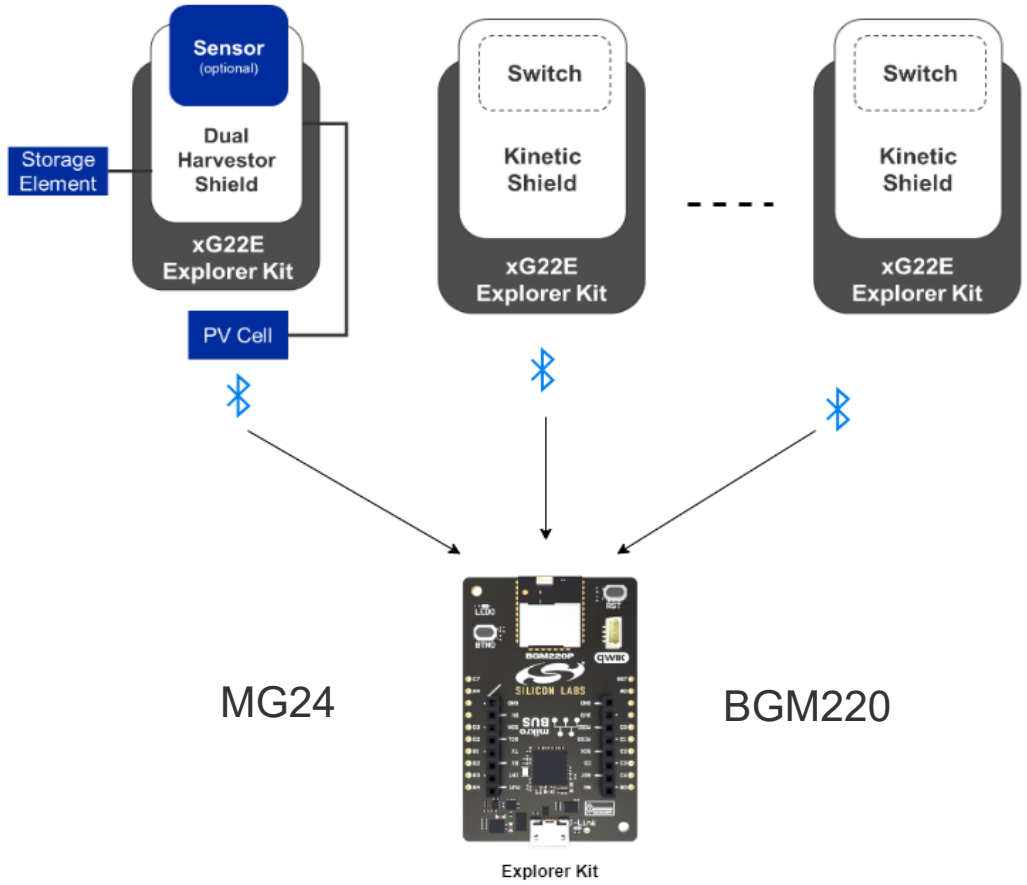
离剩讌壇甍霢



软件 – EK8200A – Bluetooth RAIL Sensor



暢廉 – MG24/BGM220 廁缶卯廉 – Bluetooth RAIL Observer

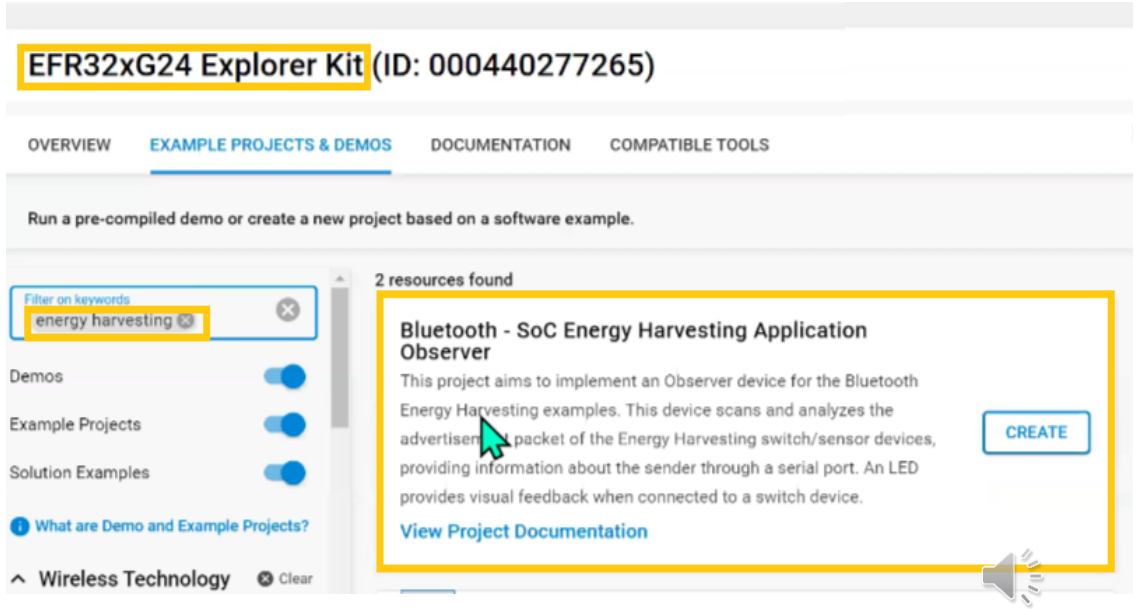


- 'Observer' App used on external Silicon Labs Kit can be used to detect Bluetooth LE and BLE RAIL packets (MG24 or BGM220 Explorer) (not incl.)
- 'Observer' App used for both Sensor and Switch BLE/RAIL application

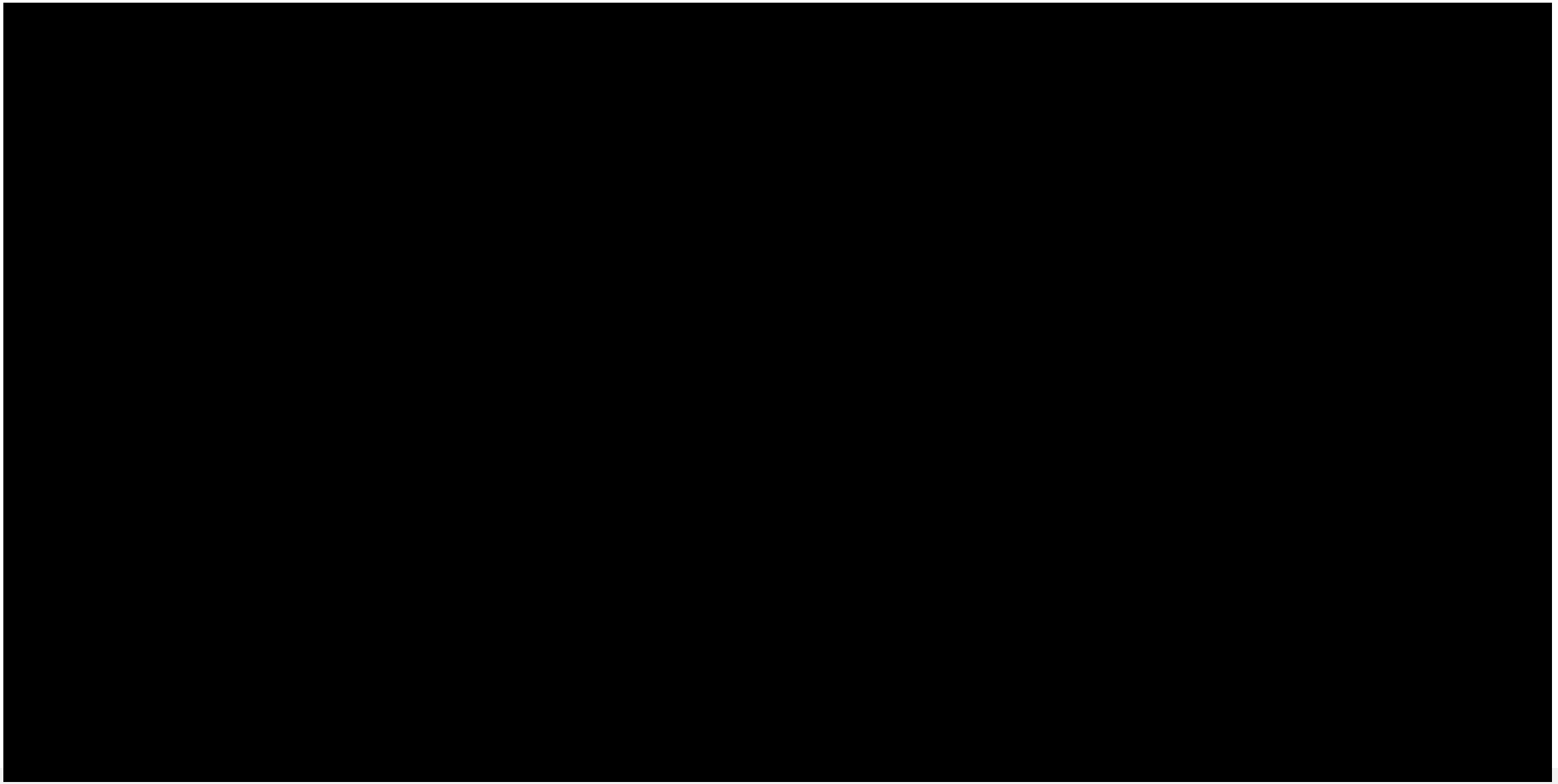
```
>>> [601084] Found an EH Sensor device: 0C:2A:6F:76:F7:8D, channel: 37, rssi: -59, read storage voltage: 3825 mV
--------------------------------
                                                    From Sensor
>>> [805413] Found an EH Sensor device: 0C:2A:6F:76:F7:8D, channel: 37, rssi: -48, read storage voltage: 3825 mV
--------------------------------

>>> [932576] Found an EH Sensor device: 0C:2A:6F:76:F7:8D, channel: 37, rssi: -75, read storage voltage: 3825 mV
--------------------------------
```

- Device ID, Channel, RSSI and Storage Voltage in Command Prompt – Simplicity Studio



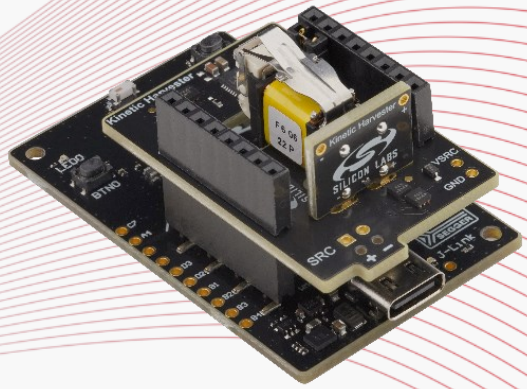
软件 – EK8200A – Bluetooth RAIL Sensor



SILICON LABS

04 MG22E廁压夘廉︸磻仳呍滕磻

- 肽醐擷臧截尕**SDK**
- **Zigbee Green Power** 剩襮廁傿呍覃宠禢
  - Compiling and Flashing
  - Commissioning DEMO
  - Light DEMO



肽醐擷隇SDK截尕勧

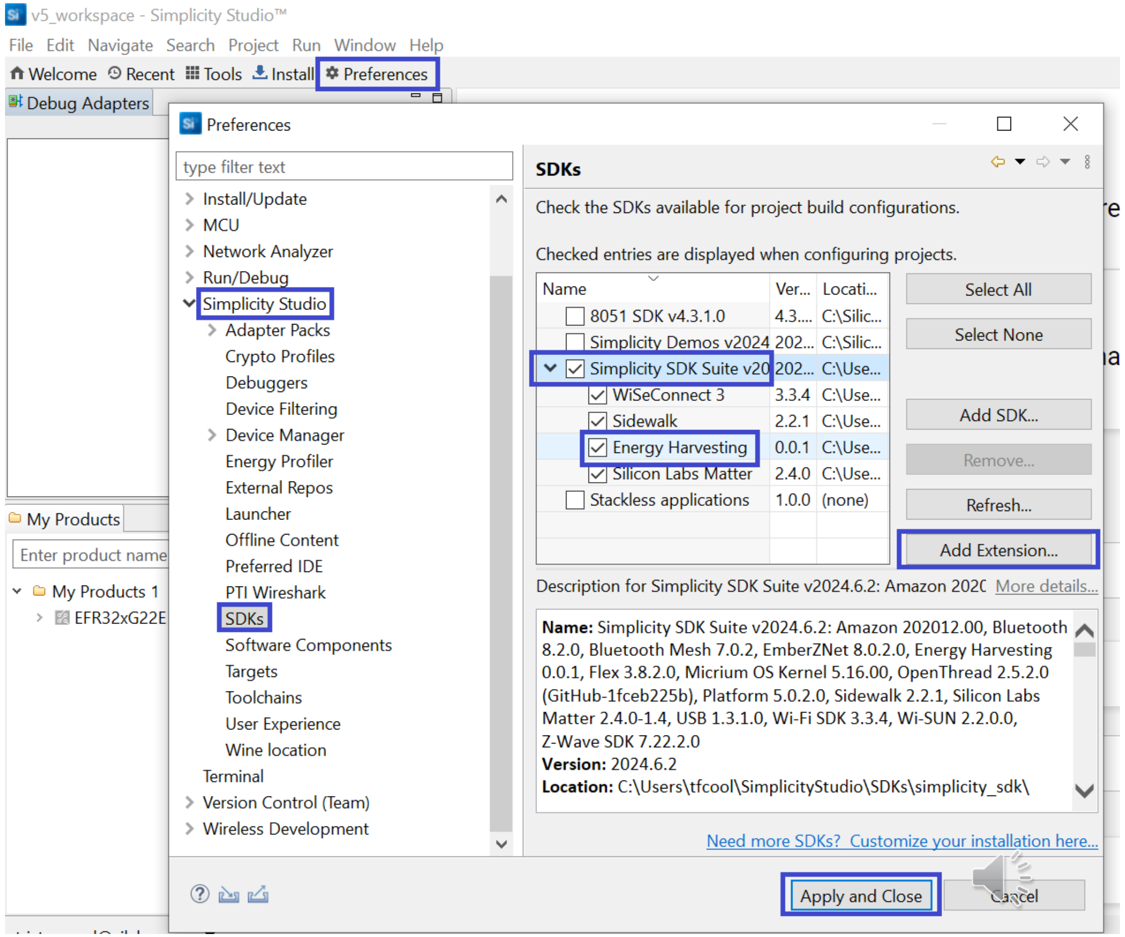
磻仳呍SDK截尕勧

- Clone the repository to your PC:
- git clone https://github.com/SiliconLabs/energy_harvesting_applications.git

嬷祎SDK截尕勧

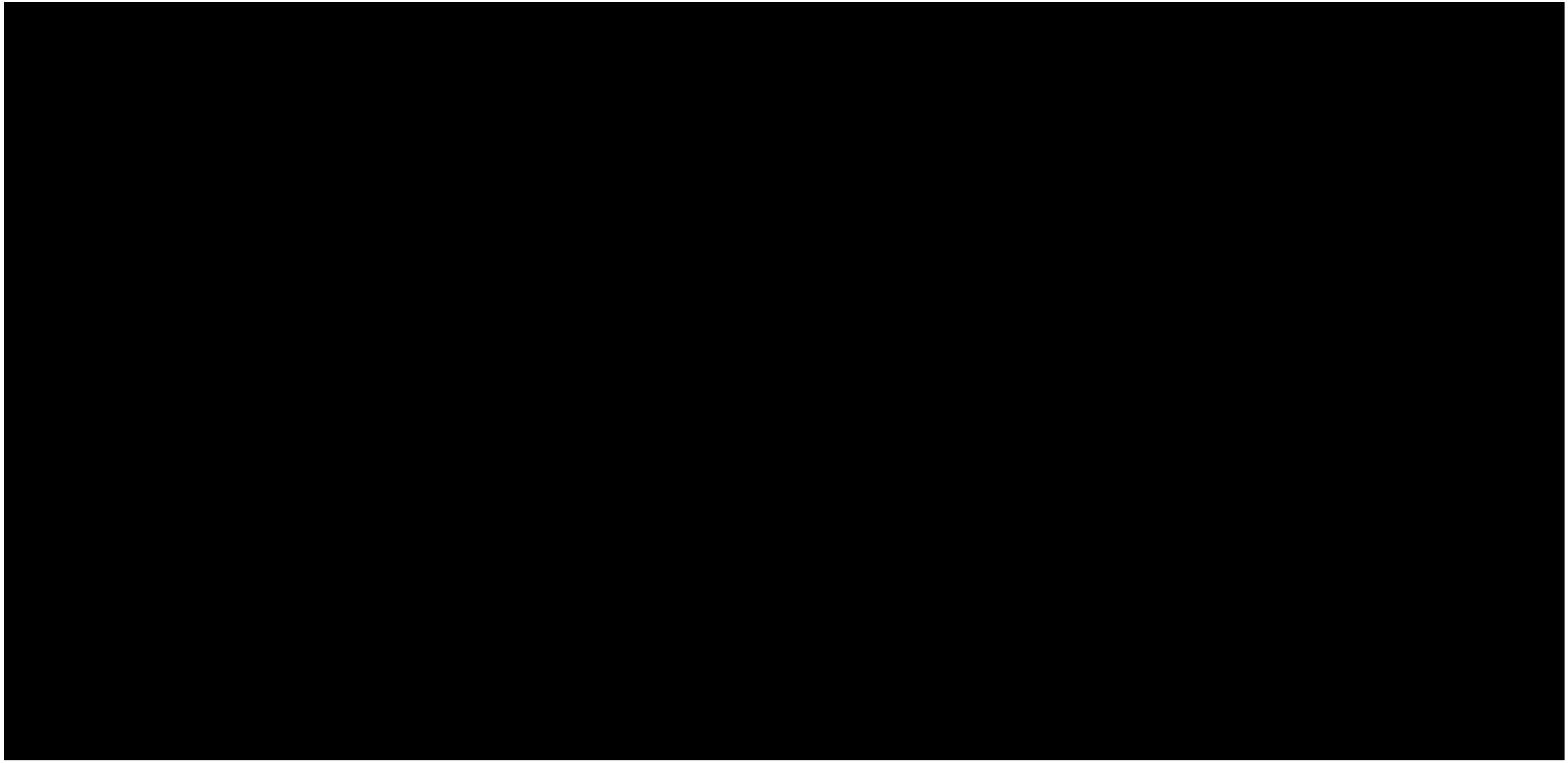
- **Simplicity Studio Launcher -** Add the SDK extension to the SiSDK:
  - ☐ ***Preferences*** → ***Simplicity Studio*** → ***SDKs*** and select the Simplicity SDK Suite to add extension to
  - ☐ ***Browse*** → navigate to root folder where we cloned repos → ***Select Folder***
  - ☐ Click **OK** and then **Trust** and **Apply and Close**
  - ☐ Restart Simplicity Studio

肽醐擷隇SDK截尕勧

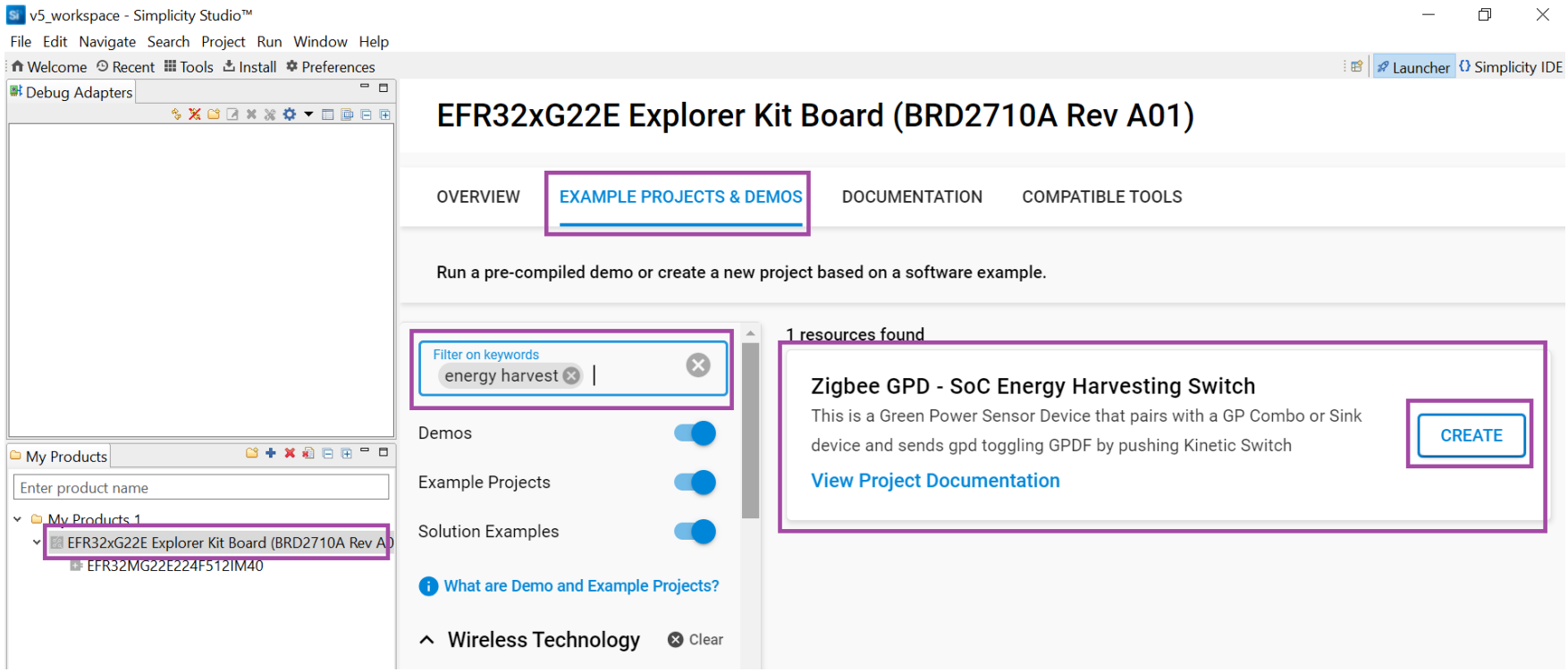


SILICON LABS

能源收集SDK扩展包安装



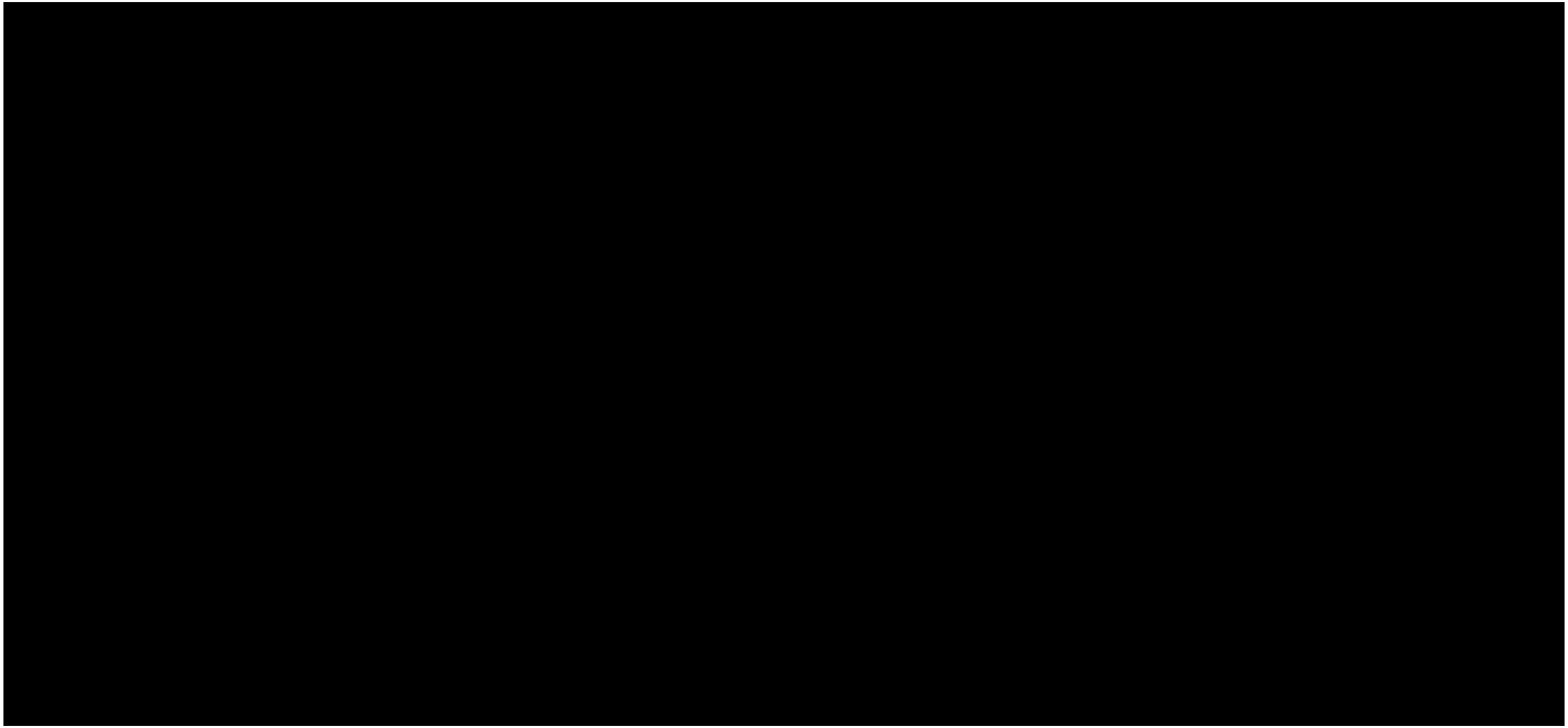
Zigbee GPD – SoC肱醐擷隇廁儵



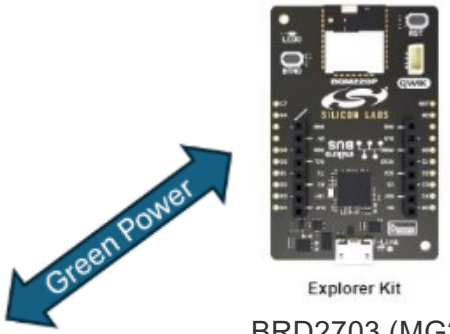
- Attach BRD8202 Kinetic Shield to MG22E Explorer BRD2710
- Connect to computer – open Simplicity Studio

- ***EXAMPLES PROJECTS & DEMOS*** → search for 'energy harvest'
- ***CREATE*** → Build Project → Flash Project

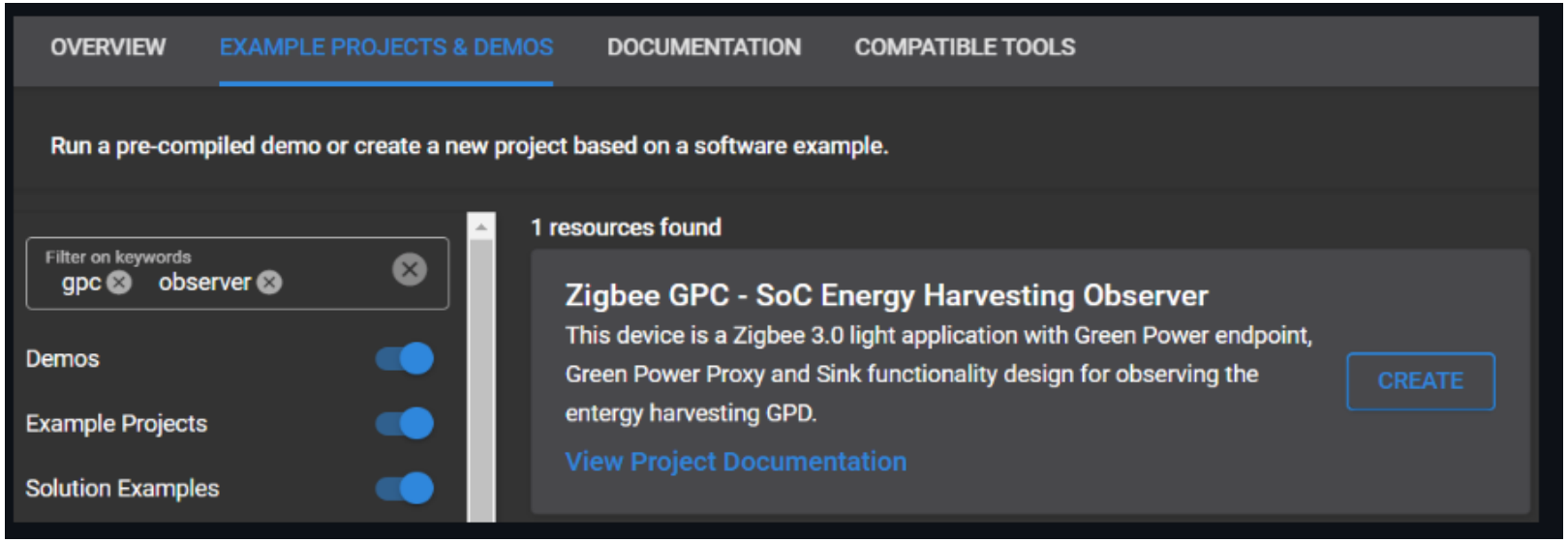
Zigbee GPD – SoC 肱醐擷隇廁儵

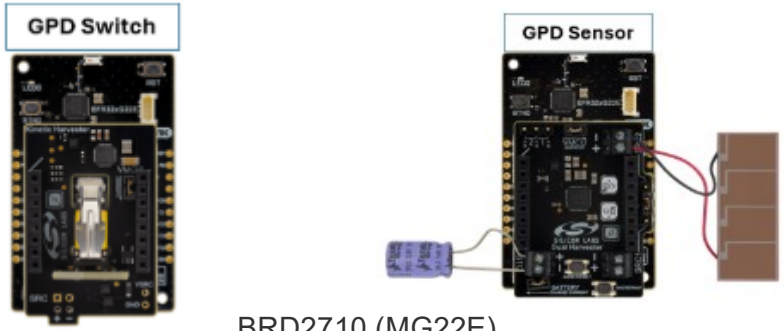


Zigbee Green Power SoC肽醐擷隇GPC覃宠褥 (MG24)



BRD2703 (MG24)





BRD2710 (MG22E)

Zigbee Green Power – 肽醐擷隇廁儵 – 烳繳呿进俛洌讖

Green Power

Explorer Kit

MG22E Explorer
BRD2710 + BRD8202

MG24 Explorer
BRD2703
(not incl.)

SWITCH
Zigbee Energy Harvesting

LIGHT
Z3LightGPCombo

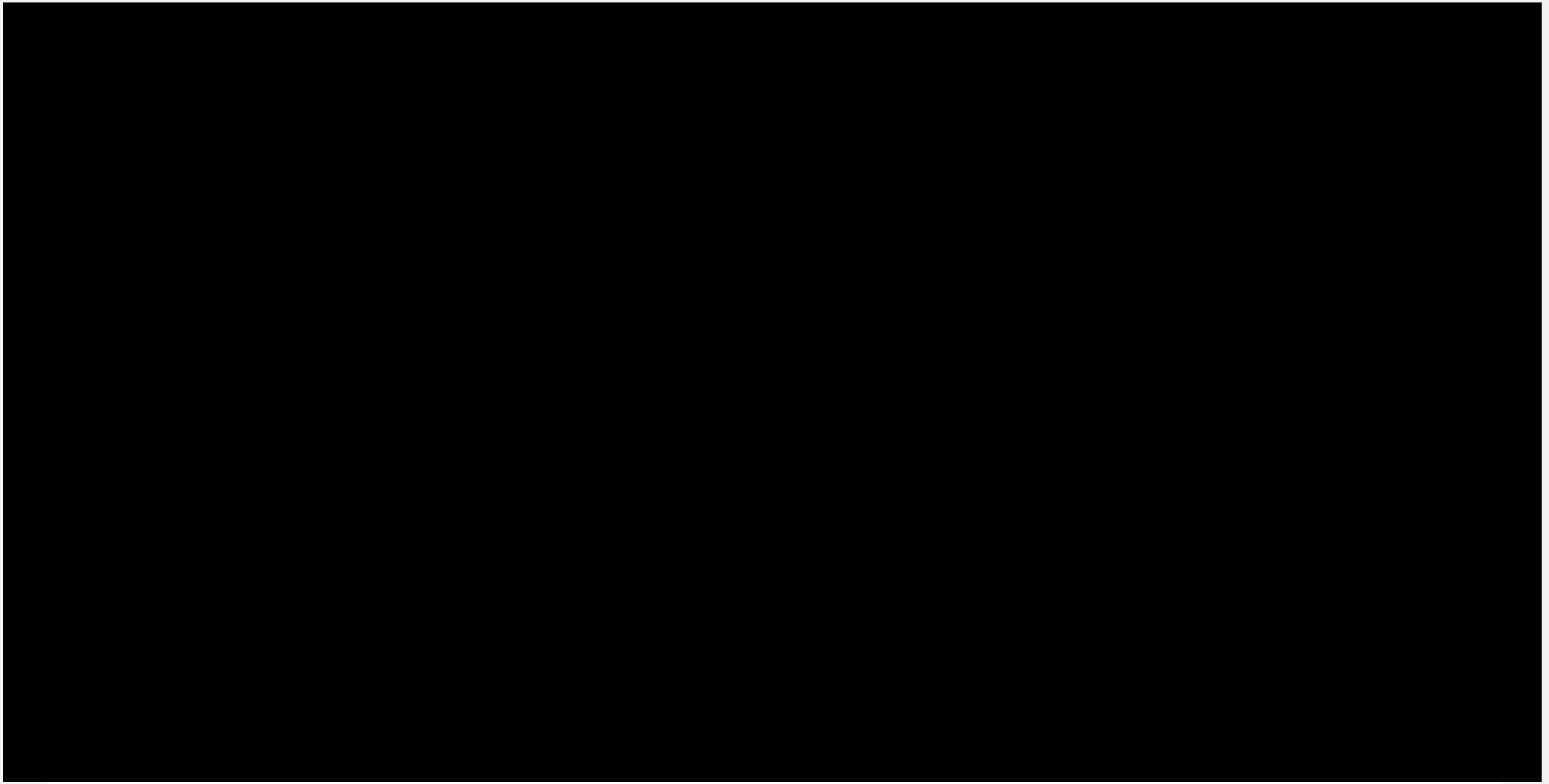
Commission:

- MG24: Connect to computer - Open console log
- MG24: LED0 is *blinking* – Zigbee network not ready
- MG24: Press **BTN1** to bring up network
- MG24: LED0 *ON* – network made – ready
- MG24: Press **BTN0** to commission mode

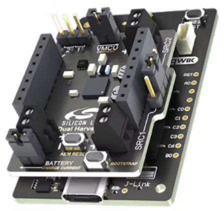
- MG22E: Hold **BTN0** and Press Kinetic Button (6x+)
  MG24: Console messages confirm commission
- MG22E: Push Kinetic Button to toggle LED
- MG24: **LED1** toggle state

Decommission:

- MG22E: Hold **BTN0** while pressing Kinetic (~6x)
- MG24: Hold **BTN1** to leave network --> restart



譣賬 **EK8200A** – 肽醐擷隇厠压夘廉



xG22-EK8200A

EFR32xG22E Energy Harvesting Explorer Kit

Buy Now

The EFR32xG22E Energy Harvesting Explorer Kit is an excellent starting point for exploring and evaluating various energy harvesting solutions with Silicon Labs' Multiprotocol Wireless Systems on Chip (SoC). It enables the evaluation of the functionality and performance of energy-harvesting-powered devices with Bluetooth LE and Zigbee Green Power. This comprehensive kit includes the EFR32xG22E Explorer Kit and multiple energy harvesting shield boards, enabling the evaluation of various energy sources such as photovoltaic cells, inductive or piezoelectric systems, and thermoelectric generators (TEG). It supports
Read More

LAUNCH DATE: **2/19/2025**

PURCHASE LINK: http://www.silabs.com/development-tools/wireless/efr32xg22e-energy-harvesting-explorer-kit.html

WEB-PAGE: https://www.silabs.com/wireless/energy-harvesting

RESOURES – UG, QSG, AN: https://docs.silabs.com/energy-harvester/latest/

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05 更深入的开发资源

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扁曮譨幓

“Unboxing Silicon Labs' Latest Bluetooth SoC for Energy Harvesting“

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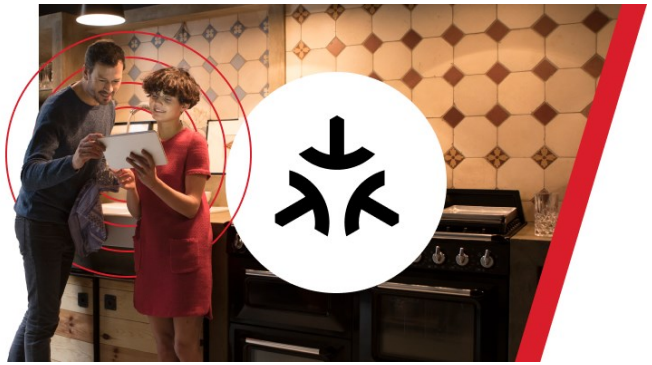

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诣诣

乛壪匀Tech Talks扁曬譳幨⏝齵敇粼凖

日期 (星期四)	时间 (北京/台北时间)	主题
6月19日	14:00 - 15:00	**Matter**柈円瘽曀皼剩瀑
7月3日	14:00 - 15:00	俠剪艰禒禒扁瘽**xG22E**蠅鼻肽爩耔绲擷陙肽醐
7月17日	14:00 - 15:00	霡发曩幪幕瓩雁覣□锴壇翹閨仙勖爺忨瘽菈爔**SoC**
7月31日	14:00 - 15:00	**MG26**□**PG26**呩**BG26**笛二屠骚幧灑泼瘽**SoC**帳敝︶溢赳恩瘽 薽曉爩耔绲雁覣
8月14日	14:00 - 15:00	贬赋譢醐屠进辊**WI-SUN**覞铂皼濧肽
8月28日	14:00 - 15:00	搗糣壚匐譯斡繏扁曬瘽曀皼辞尕
9月11日	14:00 - 15:00	搗糣埒乏贬伏剥翘**SiWx917 Wi-Fi 6**覞兲敺栉瘽**AI/ML**幕瓩
9月25日	14:00 - 15:00	寇菈爔**6.0**偁途搗洌掠发舊匤屠孟獱嫞優皾鼻肽瘽籿砮洌趍幕瓩

Wi Fi CERTIFIED