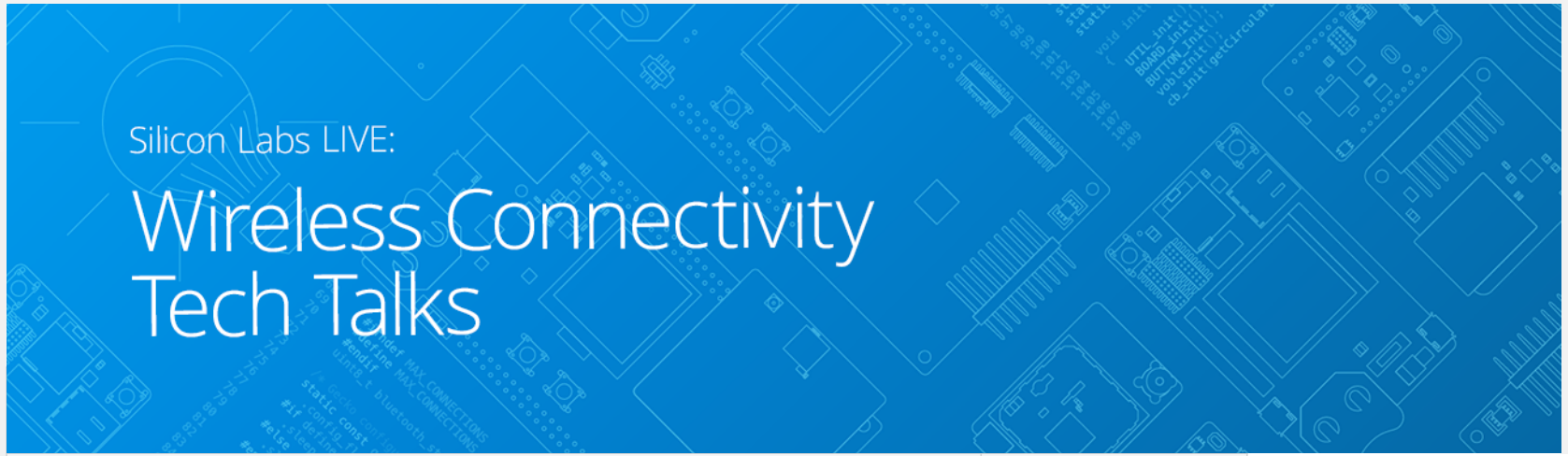
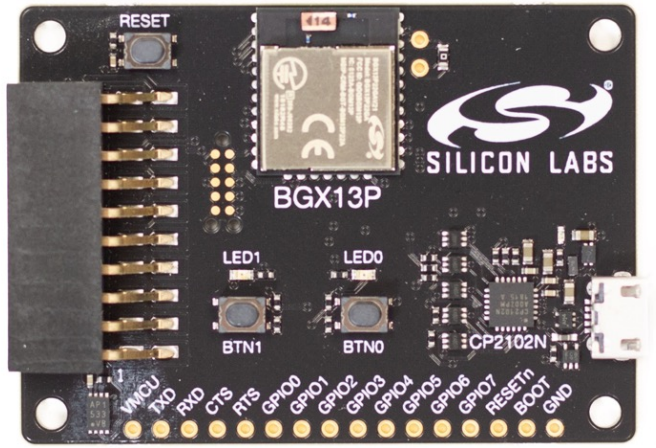
Tech Talks LIVE Schedule – Presentation will begin shortly



How to Measure and Debug Network Performance - Using Silicon Labs Network Analyzer	Thursday, May 7
RF Regulatory and Qualification Testing for Bluetooth, Zigbee & Z-Wave	Tuesday, May 12
Simplicity Studio Tips & Tricks: Our FAEs Know All The Tricks - Improve Your Life in Simplicity Studio	Thursday, May 14
Wireless Module vs Wireless SoC Tradeoffs and Decision Making Criteria	Tuesday, May 19
Thunderboard BG22 Unboxing. You Have Our Kit… What Can You Do With It?	Thursday, May 21
Designing in Bluetooth using Bluetooth Xpress Modules with Minimal Code Writing	**Tuesday, May 26**
Overview of Silicon Labs Wi-Fi Solutions (Including Redpine Signals Wi-Fi Solutions)	Thursday, May 28



Find Past Recorded Sessions at:
https://www.silabs.com/support/training

WELCOME

Silicon Labs LIVE:

Wireless Connectivity Tech Talks

Bluetooth Design with Minimal Code Writing using Bluetooth Xpress Modules

MAY 2020

A Silicon Labs Bluetooth Solution For Every Customer

SoC

Maximum design flexibility

Serves full range of use cases

Programming required

Certification required

Module

Design flexibility

Serves full range of use cases

Programming required

Pre-certified

Wireless Xpress

Complete configurable solution

Optimized for select use cases

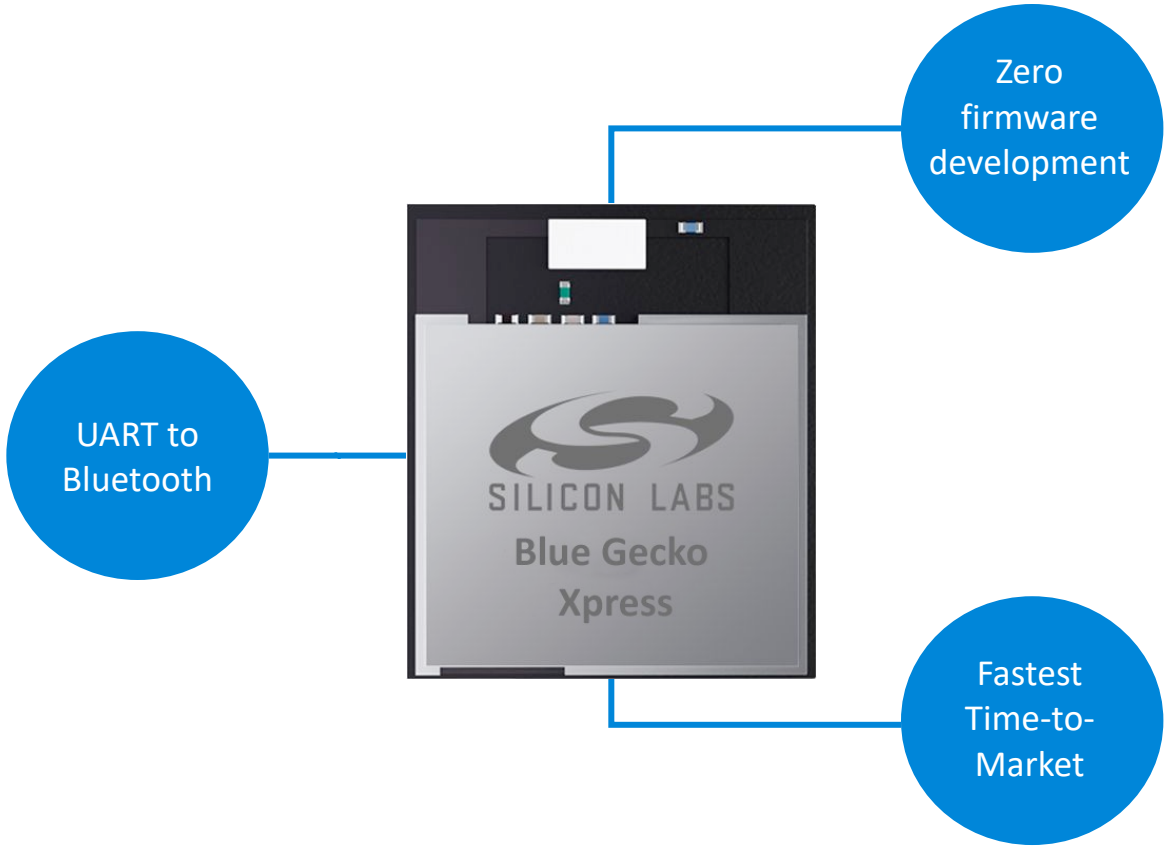
Zero programming

Pre-certified

Design flexibility ⟷ Time-to-market

Blue Gecko Xpress - Introducing BGX13S and BGX13P

*Bluetooth that **just works.***



- **BGX13P and BGX13S**
- **Bluetooth LE features**
  - Bluetooth 5: 1M, 2M, LR Coded PHY (125K/500K)
  - Multiset advertising
  - LE Secure connections and privacy
  - Xpress Streaming service for data
  - Operates in either central or peripheral role
  - Transmit at +8 dBm
- **Interface functionality**
  - UART with flow control for data streaming
  - Xpress command API for configuration and control
  - Additional pins for connection state control
  - Configurable BLE performance, GPIO and status LEDs
  - NEW: I2C master support
  - NEW: Event Monitoring and User Functions

Bluetooth Xpress Modules

- Fully integrated
  - Blue Gecko Xpress silicon
  - RF Matching + Shield + Antenna
- Pre-certified (FCC, IC, CE)
  - Fast time-to-market
  - Reduced development cost
- SiP and PCB modules
  - SiP offers industry-smallest form factor
  - PCB module for easiest manufacturing option

	BGX13P	BGX13S
Description	Bluetooth 5 PCB module	Bluetooth 5 SiP module
Size	12.9 × 15.0 × 2.2 mm	6.5 × 6.5 × 1.4 mm

Bluetooth Xpress Key Specs

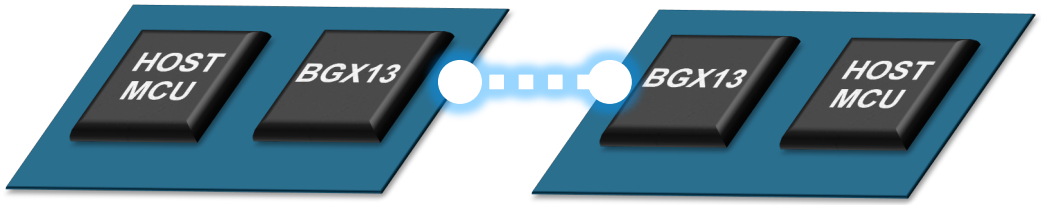
- Key link specifications
  - Encrypted communication only
  - Configure to enable/disable/clear bonds
  - Selectable advertising on 1M and/or LE Coded PHY
  - Preferred PHY configurable to 1M/2M/125K/500K
  - Adjustable scan/connection intervals
  - Just works and passkey pairing
  - Adjustable TX power
  - Current specs
    - Sleep mode, radio off: 2.8 uA
    - Sleep mode, advertising interval 500 ms: 90 uA
    - Connected, baud 9600, interval 1 s: 16 uA
    - Connected, baud 9600, interval 7.5 ms: 1.3 mA
    - Connected, baud >9600, interval 7.5 ms: 4.0 mA

Link type	Max throughput (ack/noack)
BGX-to-BGX	131/1000 kbits/s (2M PHY)
BGX-to-Android	87/1000 kbits/s (2M PHY)
BGX-to-iOS	48/575 kbits/s (2M PHY)

Throughput measurements
(full characterization at https://docs.silabs.com/gecko-os/1/bgx/latest/throughput)

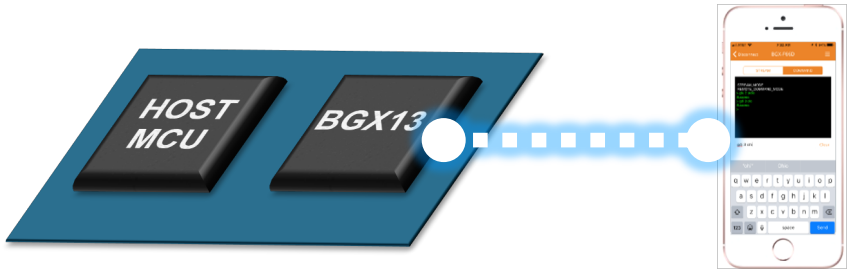
Note: as of version 1.2, no-ack transfers provide in-channel acknowledgement to prevent packet loss

Use case 1: Cable replacement with BGX13



- Embedded UART-to-BLE
  - Host MCU only needs a UART
  - Optional flow control
- Wireless cable replacement
  - BGX13 end-to-end BLE support
  - Configurable as central or peripheral
- Central role simplified
  - Scan and connect in two commands
  - Data stream identical for peripheral and central

Use case 2: Easy BLE smartphone connections with BGX



- Low-level BLE controlled by BGX
  - BGX13 handles advertising and connection
  - Optional control I/O and command interface
- Mobile app development simplified
  - iOS and Android Mobile Xpress library
  - Mobile framework API to connect and communicate

BGX can switch between BGX-to-phone and BGX-to-BGX in the same design

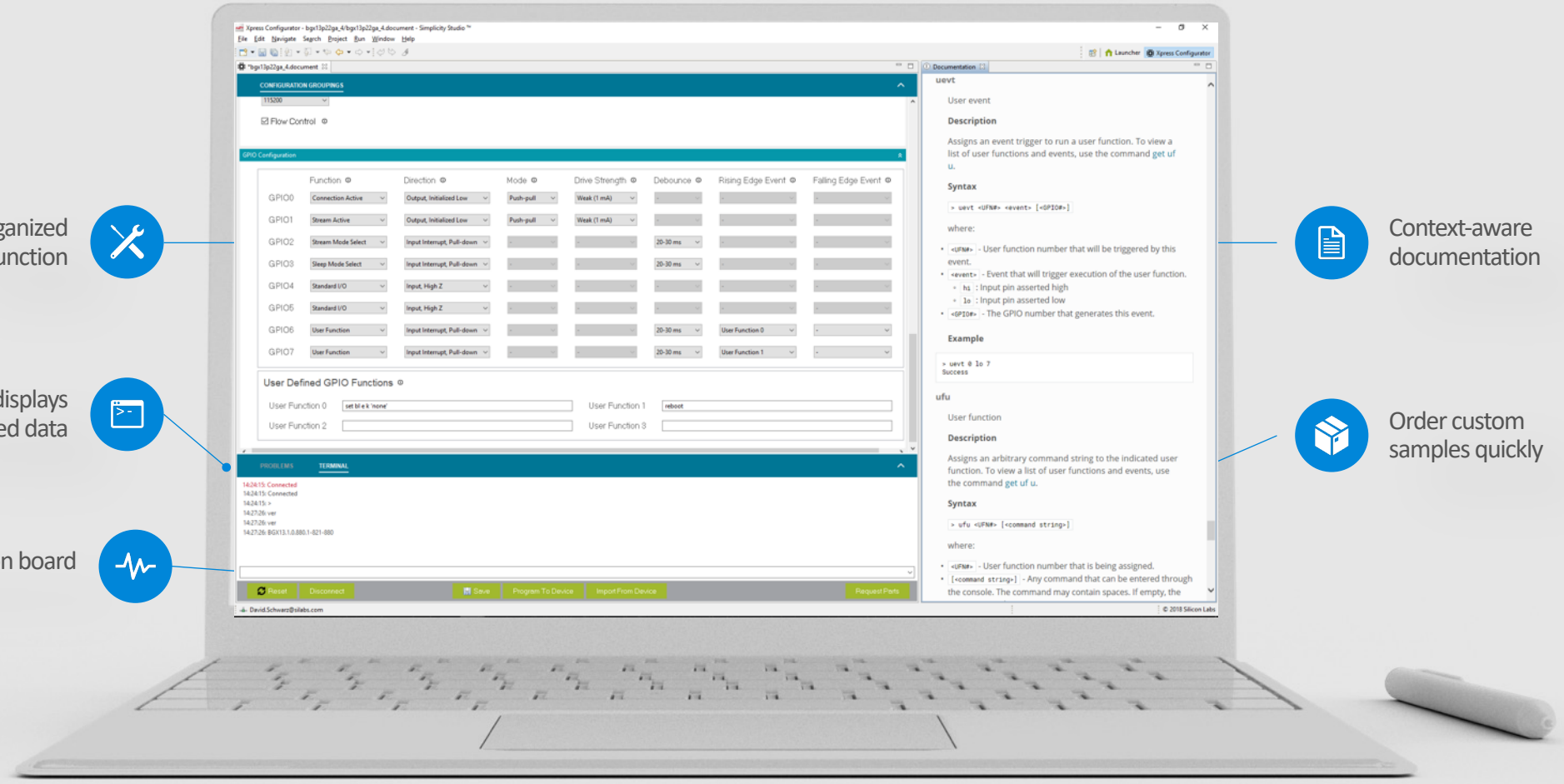
Example: BGX-to-BGX star network design with phone app for product configuration

Xpress Configurator Makes Wireless Connectivity Easy

Parameters organized by function

Terminal window displays transmitted data

Test on evaluation board



Context-aware documentation

Order custom samples quickly

BGX Xpress command interface simplifies control

- BGX13 provides a simple interface for key BLE connect and communicate features

Xpress command mode connection in 2 steps

Host → `scan`

BGX →
```
Success
> !   # RSSI BD_ADDR           Device Name
#   1   -50 d0:cf:5e:82:8e:53 BGX-8E53
#   2   -38 d0:cf:5e:82:8d:fd BGX-8DFD
```

Host → `con 1`

BGX →
```
Success
> STREAM_MODE
```

BGX stream mode App-specific communication

Host 1 → `enable sensor`

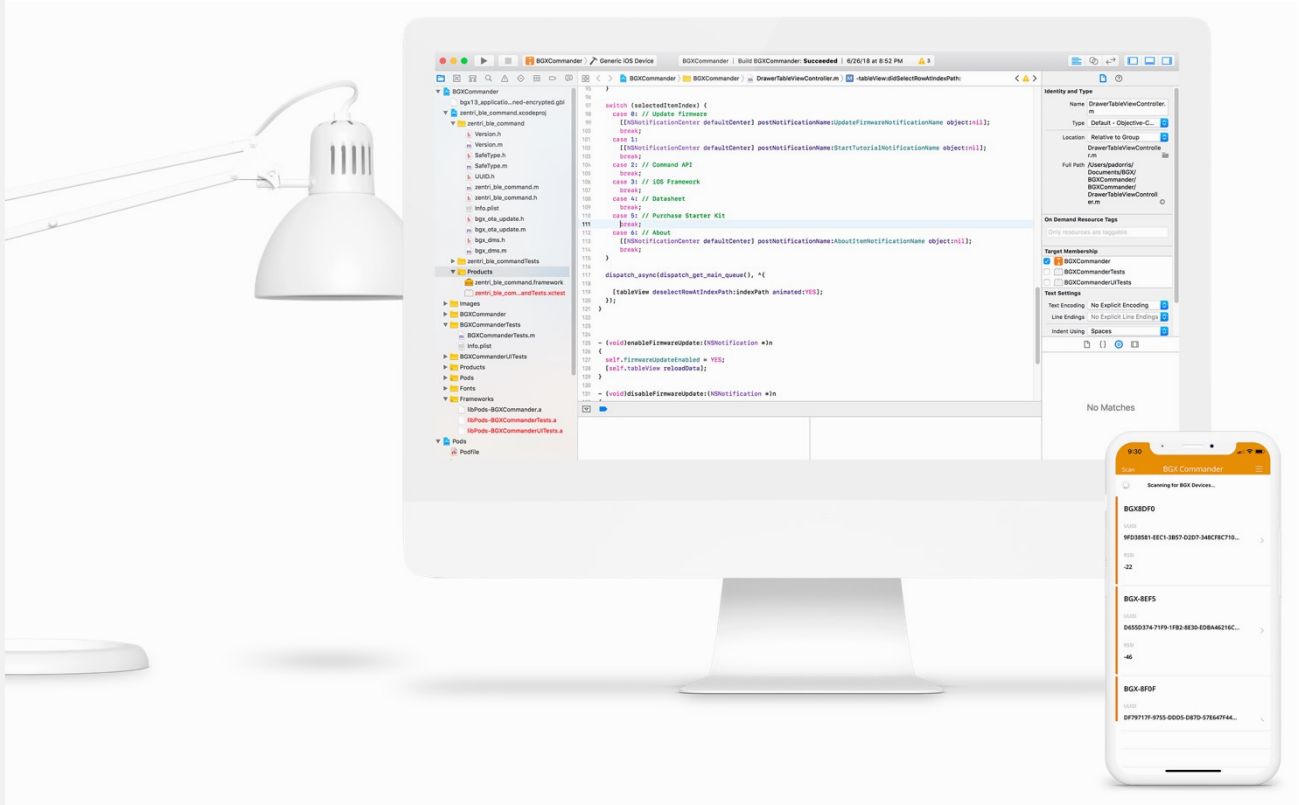
Host 2 → `sensor: enabled`

Host 1 → `read sensor value`

Host 2 → `value: 23.4`

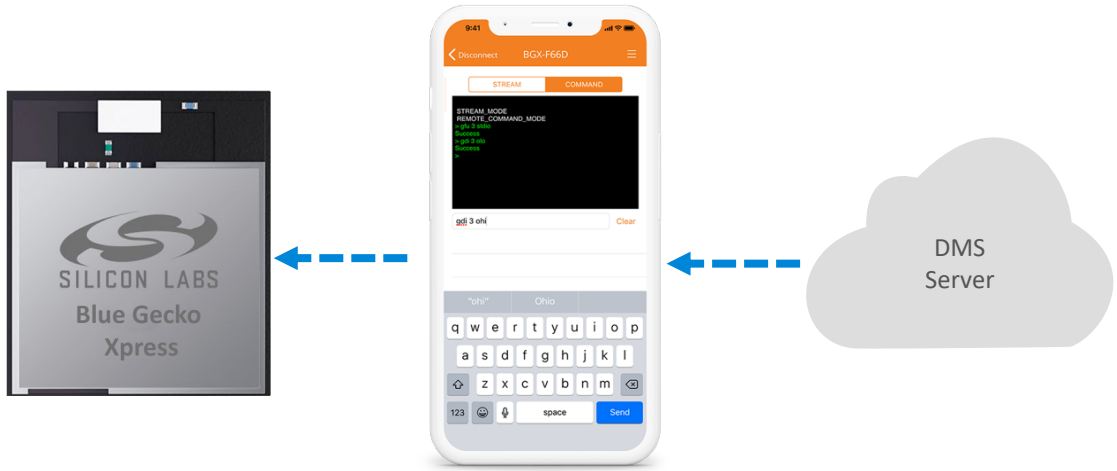
- BGX13 provides a robust and reliable link that just works
- Application specific wireless communication made easy
- Command API documentation available at docs.silabs.com

Xpress Mobile Framework Speeds App Development



- Available for iOS and Android
- Mobile framework API includes:
  - **Connect:** `connect()/disconnect()`
  - **Write:** `writeData()`
  - **Read:** `dataReadDelegate()`
  - **Modify port pins:** `writeCommand()`
- APIs for over-the-air updates
- Supports Xpress interface I2C read/write commands
- Source code for apps available on Github:
  - Github.com/SiliconLabs/wireless-xpress

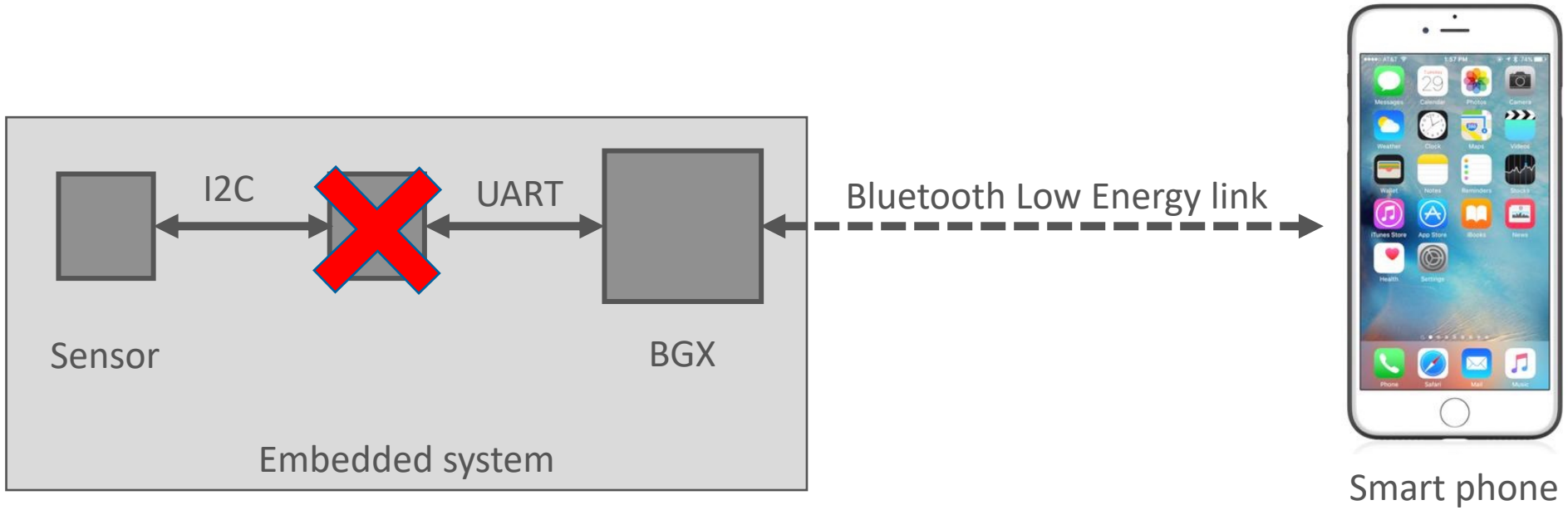
BGX Firmware and OTA Updates



https://docs.silabs.com/gecko-os/1/bgx/latest/release-notes

- Bluetooth Xpress run a closed firmware image
- BGX Modules are debug locked and can only run firmware images signed and encrypted by Silicon Labs
- BGX Modules can be updated using the BGX Commander smartphone application
- Custom User applications can access also access firmware updates using the Xpress Mobile Framework

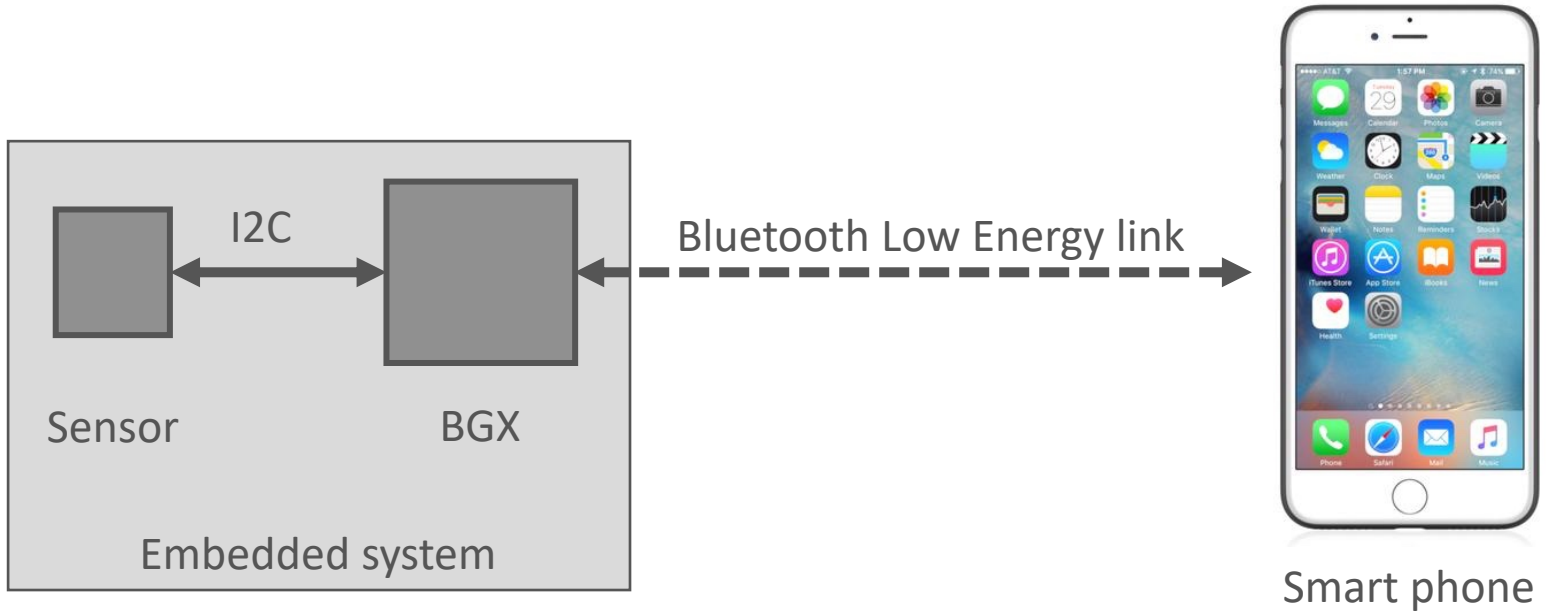
Bluetooth Xpress operation without an embedded host in some cases



- Before version 1.2, all Bluetooth Xpress use cases required an embedded host
- With I2C and event monitoring in version 1.2, the embedded host isn't always need

Version 1.2 features enable Bluetooth Xpress to function without an embedded host

Bluetooth Xpress operation without an embedded host in some cases



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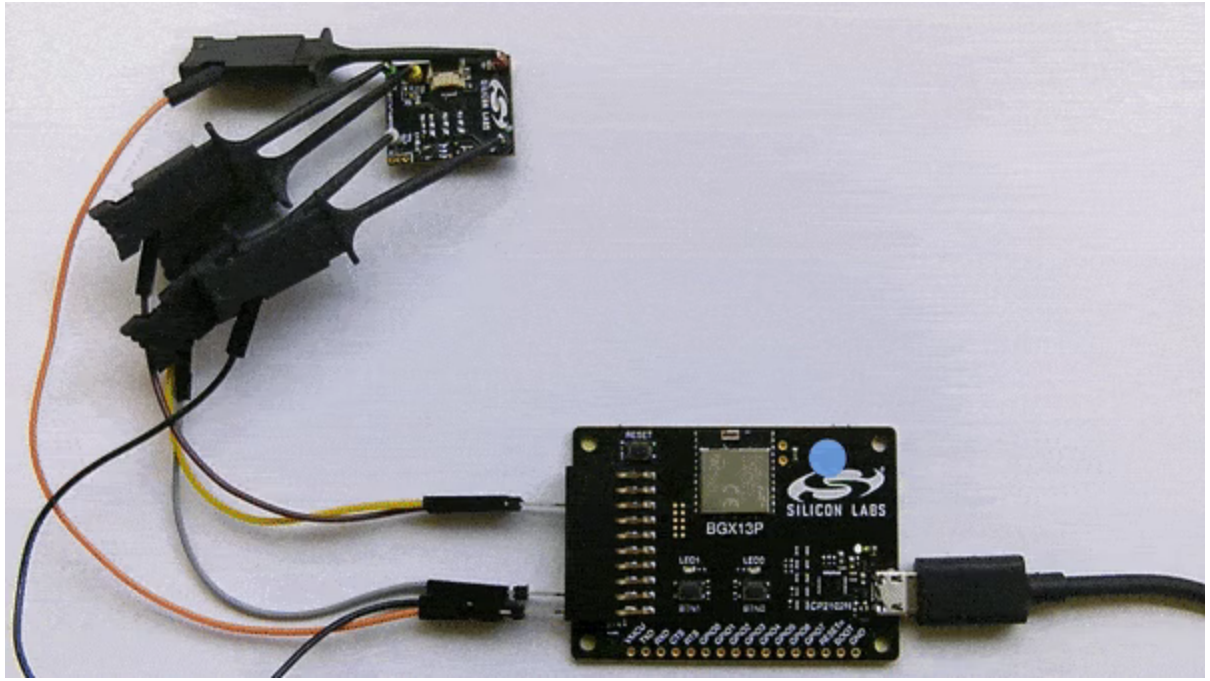
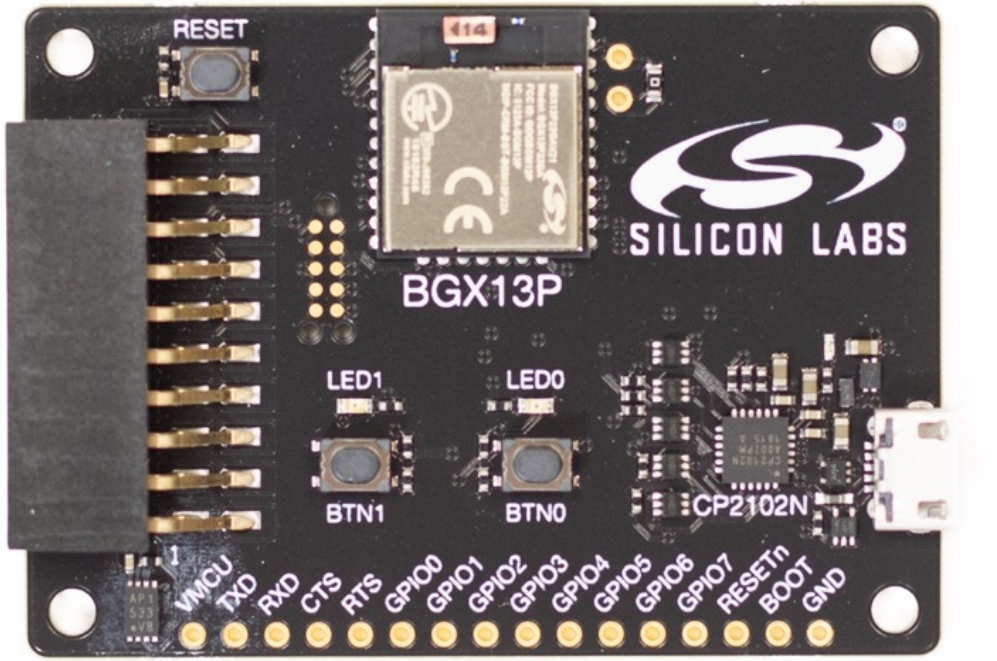
Version 1.2 features enable Bluetooth Xpress to function without an embedded host

BLE-enabled Hall Effect Sensor Demo using Si7210



Get Started with Bluetooth Xpress Development



- Purchase Bluetooth Xpress evaluation kit
- Download BGX commander app for Android and iOS
- Install latest version of Simplicity Studio to get Xpress Configurator
- Explore docs.silabs.com/bgx/ demos such as:
  - BGX-to-phone temperature sensor
  - BGX-to-BGX long range PHY controller
  - Contact sensor interface with BGX I2C
  - Xpress connect feature overview

Get started at silabs.com/start-bgx

MCU Host Examples in Simplicity Studio

EFM8UB1 Universal Bee Starter Kit (SLSTK2000A)

Preferred SDK: 8051 SDK v4.1.7.0
Click here to change the preferred SDK.

New Project | Recent Projects

Getting Started | Documentation | Compatible Tools | Resources

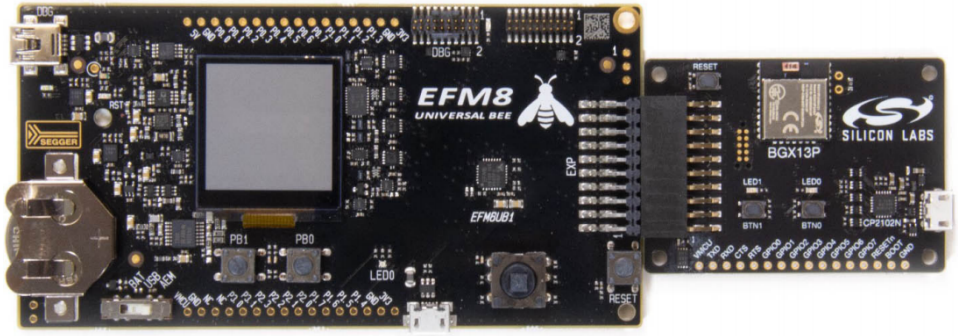
Demos

- 8051 SDK v4.1.7.0
  - ADC
  - BGX
    - **EFM8UB1 BGX Demo**
      This example demonstrates the stream and command functionality of the BGX in Peripheral and
  - Blinky
  - CPT_Demo
  - General
  - USB

Software Examples

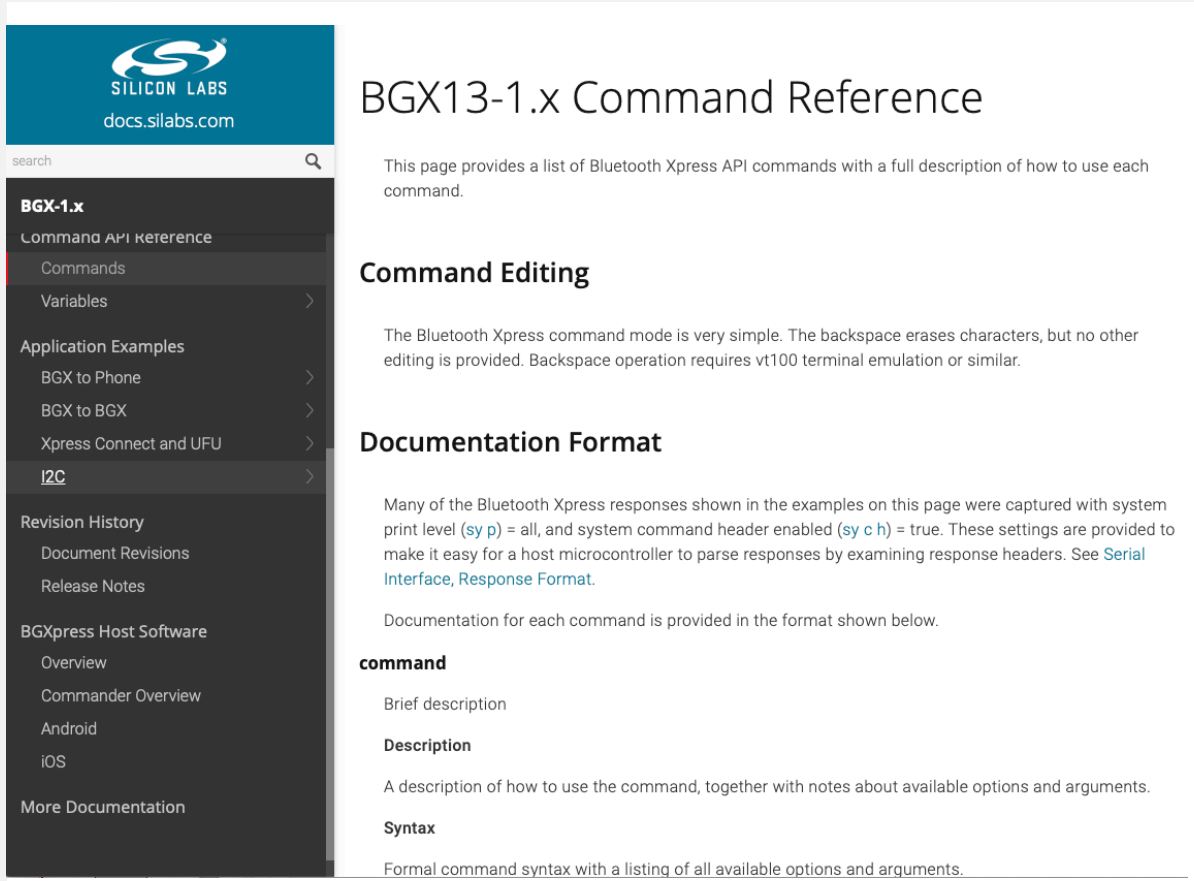
- 8051 SDK v4.1.7.0
  - ADC
  - Blinky
  - Bootloaders
  - Demos
    - **EFM8UB1 BGX**
      Create the EFM8UB1 BGX project for the BRD5000A.

This example demonstrates the stream and command functionality of the BGX in Peripheral and Central mode using the STK, LCD, push buttons, joystick, and the Silabs BGX Commander mobile app.

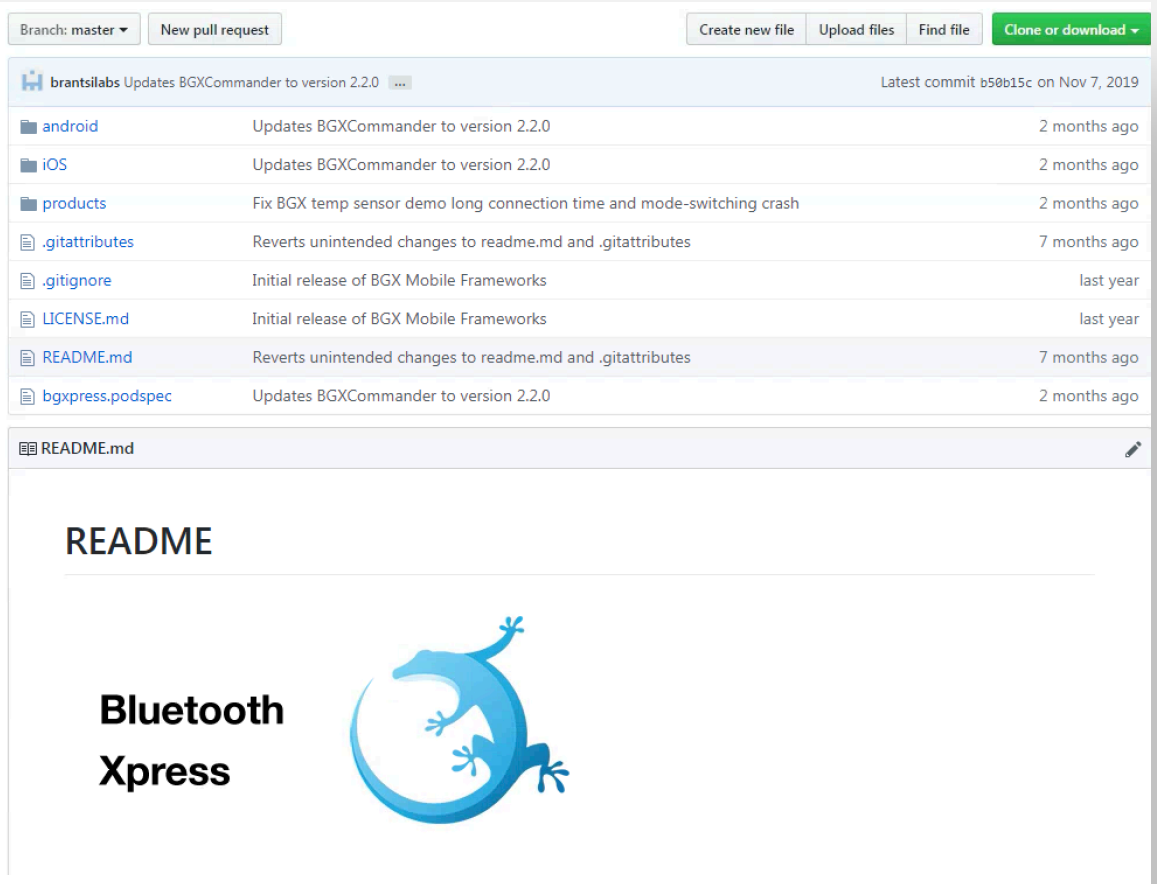


Get started at silabs.com/start-bgx

Bluetooth Xpress Online Resources



- https://docs.silabs.com/gecko-os/1/bgx/latest/



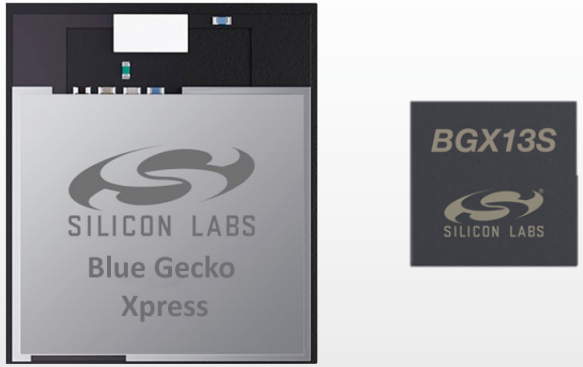
GitHub for interfacing code examples

- https://github.com/SiliconLabs/wireless-xpress

BGX Live Demo

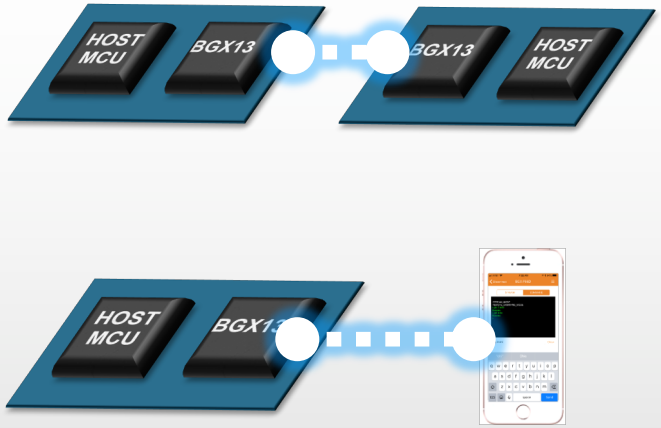
BGX: In Summary

EASY HARDWARE DESIGN



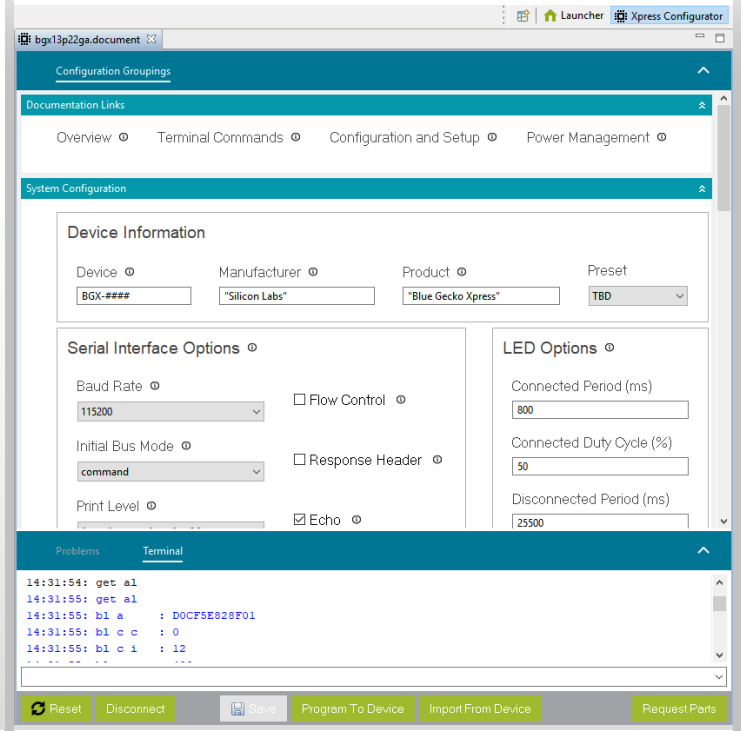
PCB and SIP Modules
Easy PCB Layout
Regulatory Certification

COMMON USE CASES



Wire Replacement
BGX-to-BGX
BGX-to-Phone

NO FIRMWARE DEVELOPMENT



Xpress Configurator
Xpress Streaming Service
Xpress Mobile Framework
Event Monitoring

BG22 Virtual Workshop

Learn how to develop and deploy more powerful, efficient, and secure IoT products with your own BG22 Thunderboard – free for all registrants!

New Sessions Opening in June

10:00AM –11:30 AM CST - T, W, Th

(Other sessions available for Asia Pacific and Europe)

Register today! https://www.silabs.com/about-us/events/virtual-bluetooth-workshop

Join Us: “What’s the Future of Smart Retail” Panel

Register at silabs.com/applications/smart-industry

Questions?

WWW.SILABS.COM

Useful Links

- https://www.silabs.com/start-bgx
- https://docs.silabs.com/gecko-os/1/bgx/latest/
- https://www.silabs.com/documents/public/application-notes/an1157-developing-prod-using-bluetooth-xpress.pdf
- https://www.silabs.com/documents/public/quick-start-guides/qsg161-bgx13p-22ga-quick-start-guide.pdf
- https://github.com/SiliconLabs/wireless-xpress
- https://docs.silabs.com/bluetooth/latest/