



CY8CKIT-042-BLE-A

Bluetooth[®] Low Energy (BLE)
Pioneer Kit Guide

Doc. # 002-11468 Rev. *A

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709
Phone (USA): 800.858.1810
Phone (Intl): +1.408.943.2600
www.cypress.com

Copyrights

© Cypress Semiconductor Corporation, 2016. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC ("Cypress"). This document, including any software or firmware included or referenced in this document ("Software"), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you under its copyright rights in the Software, a personal, non-exclusive, nontransferable license (without the right to sublicense) (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units. Cypress also grants you a personal, non-exclusive, nontransferable, license (without the right to sublicense) under those claims of Cypress's patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely to the minimum extent that is necessary for you to exercise your rights under the copyright license granted in the previous sentence. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage ("Unintended Uses"). A critical component is any component of a device or system whose failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whole or in part, and Company shall and hereby does release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. Company shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.

CySmart, F-RAM, PRoC, Programmable System-on-Chip, and PSoC Creator are trademarks of Cypress Semiconductor Corporation.

Contents



Safety Information	6
1. Introduction	10
1.1 Kit Contents	1 1
1.2 BLE Pioneer Baseboard Details	12
1.3 PSoC Creator	14
1.3.1 PSoC Creator Code Examples	15
1.3.2 Kit Code Examples.....	16
1.3.3 PSoC Creator Help	16
1.3.4 Component Datasheets	17
1.4 Getting Started.....	17
1.5 Additional Learning Resources.....	17
1.5.1 Bluetooth Learning Resources.....	18
1.5.2 Other Related Resources.....	18
1.6 Technical Support.....	19
1.7 Documentation Conventions.....	19
1.8 Acronyms.....	1 9
2. Software Installation	21
2.1 Before You Begin.....	21
2.2 Install Software	21
2.3 Windows 8.1 and Windows 10 USB Selective Suspend Setting	24
3. Kit Operation	25
3.1 Theory of Operation.....	25
3.2 KitProg.....	27
3.3 BLE Pioneer Kit USB Connection.....	27
3.4 Placing Modules on Baseboard.....	28
3.5 Programming and Debugging BLE Device	29
3.5.1 Programming using PSoC Creator.....	29
3.5.2 Debugging using PSoC Creator.....	30
3.5.3 Programming using PSoC Programmer.....	30
3.6 Updating BLE Dongle for CySmart Central Emulation Tool	32
3.7 USB-UART Bridge	34
3.8 USB-I2C Bridge	35
3.9 Updating the KitProg Firmware.....	36
4. Example Projects	37
4.1 Using Example Projects.....	37
4.2 CapSense Slider and LED	41
4.2.1 Project Description	41
4.2.2 Hardware Connections.....	44

- 4.2.3 Flow Chart45
- 4.2.4 Verify Output46
- 4.3 CapSense Proximity54
 - 4.3.1 Project Description54
 - 4.3.2 Hardware Connections.....57
 - 4.3.3 Flow Chart.....59
 - 4.3.4 Verify Output60
- 4.4 BLE Central Mode65
 - 4.4.1 Project Description65
 - 4.4.2 Hardware Connections.....68
 - 4.4.3 Flow Chart.....69
 - 4.4.4 Verify Output70
- 4.5 Eddystone7 3
 - 4.5.1 Project Description73
 - 4.5.2 Hardware Connection76
 - 4.5.3 Flow Chart.....77
 - 4.5.4 Verify Output77
- 4.6 BLE Dongle and LED Control82
 - 4.6.1 Project Description82
 - 4.6.2 Hardware Connections.....83
 - 4.6.3 Flow Chart.....84
 - 4.6.4 Verify Output85
- 4.7 Direct Test Mode (DTM)85
 - 4.7.1 Project Description85
 - 4.7.2 Hardware Connection87
 - 4.7.3 Verify Output88

5. Hardware 89

- 5.1 BLE Pioneer Baseboard89
 - 5.1.1 PSoC 5LP89
 - 5.1.2 Power System89
 - 5.1.3 Programming Interface.....96
 - 5.1.4 Expansion Connectors96
 - 5.1.5 USB Mini-B Connector99
 - 5.1.6 CapSense Circuit100
 - 5.1.7 BLE Pioneer Baseboard LEDs.....101
 - 5.1.8 Push-Buttons.....103
 - 5.1.9 Cypress Ferroelectric RAM (F-RAM)104
 - 5.1.10 Serial Interconnection between KitProg and Module105
 - 5.1.11 Module Headers.....106
- 5.2 Module Board107
 - 5.2.1 PSoC 4 BLE or PSoC BLE Device107
 - 5.2.2 Module Power Connections108
 - 5.2.3 Module Headers (20-Pin and 24-Pin Headers)108
 - 5.2.4 Wiggle Antenna.....110
 - 5.2.5 Antenna Matching Network111
 - 5.2.6 BLE Passives112
 - 5.2.7 Test Points.....113
- 5.3 BLE Dongle Board113
 - 5.3.1 Power System114
 - 5.3.2 USB Type-A Plug114
 - 5.3.3 User LED.....115

6. Advanced Topics	116
6.1 Using FM24V10 F-RAM.....	116
6.1.1 Address Selection	116
6.1.2 Write/Read Operation	117
A. Appendix	118
A.1 Bill of Materials (BOM).....	118
A.2 KitProg Status LED States.....	127
A.3 Adding BLE Module-Compatible Headers on Your Baseboard	128
A.4 Programming BLE Modules via MiniProg3	129
A.5 BLE Modules and BLE Dongles Compatible with the BLE Pioneer Kit	130
A.6 Migrating Projects Across Different Pioneer Series Kits.....	136
Revision History	142

Safety Information



The CY8CKIT-042-BLE-A Bluetooth® Low Energy (BLE) Pioneer Kit is intended for development purposes only. Users are advised to test and evaluate this kit in an RF development environment.

This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required authorizations are first obtained. Contact support@cypress.com for details.



CY8CKIT-042-BLE-A boards contain ESD-sensitive devices. Electrostatic charges readily accumulate on the human body and any equipment, and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused CY8CKIT-042-BLE-A boards in the protective shipping package.



End-of-Life/Product Recycling

The end-of-life cycle for this kit is five years from the date of manufacture mentioned on the back of the box. Contact your nearest recycler to discard the kit.

General Safety Instructions

ESD Protection

ESD can damage boards and associated components. Cypress recommends that the user perform procedures only at an ESD workstation. If an ESD workstation is not available, use appropriate ESD protection by wearing an antistatic wrist strap attached to the chassis ground (any unpainted metal surface) on the board when handling parts.

Handling Boards

CY8CKIT-042-BLE-A boards are sensitive to ESD. Hold the board only by its edges. After removing the board from its box, place it on a grounded, static-free surface. Use a conductive foam pad if available. Do not slide the board over any surface.

Battery Care and Use

- Use the correct size and type of battery specified in this guide.
- Keep battery contact surfaces and battery compartment contacts clean by rubbing them with a clean pencil eraser or a rough cloth each time you replace batteries.
- Remove the battery from a device when it is not expected to be in use for several months.
- Make sure that you insert the battery into your device properly, with the + (plus) and – (minus) terminals aligned correctly.
- Do not place the battery next to metallic objects such as keys and coins.
- Never throw the battery into fire.
- Do not open up the battery.
- Do not short the battery.
- Do not subject the battery to high temperatures or high humidity.
- Store the battery in a dry place.
- Do not recharge a battery unless it is marked “rechargeable.”

Battery Disposal

Batteries can be safely disposed with normal household waste. Never dispose batteries in fire because they can explode. It is important not to dispose large amounts of batteries in a group. Used batteries are often not completely “dead.” Grouping used batteries together can bring these “live” batteries into contact with one another, creating safety risks.



Regulatory Compliance Information

The CY8CKIT-042-BLE-A kit contains devices that transmit and receive radio signals in accordance with the spectrum regulations for the 2.4-GHz unlicensed frequency range.

Cypress Semiconductor Corporation has obtained regulatory approvals for this kit to be used in specific countries. These countries include the United States (FCC Part 15), Canada (IC RSS210), and Japan (JRF/TELEC). Additional regional regulatory agency approval may be required to operate these throughout the world.

This kit, as shipped from the factory, has been tested and found to comply with the limits and requirements for the following compliances:

- As a Class B digital device, pursuant to part 15 of the FCC Rules.
- As a Class B digital apparatus, compliant with Canadian ICES-003.

Regulatory Statements and Product Labeling

United States (FCC)

The CY8CKIT-143A PSoC 4 BLE, CY5676A PSoC BLE and CY5677 PSoC BLE transmitter complies with Part 15 of the Federal Communications Commission (FCC) Rules. The FCC ID for these devices are **WAP-CY5677** for CY5677 and **WAP-CY5676A** for CY8CKIT-143A and CY5676A.

Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation.

Canada (IC)

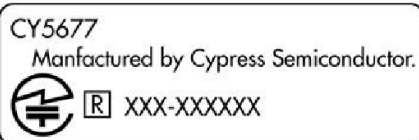
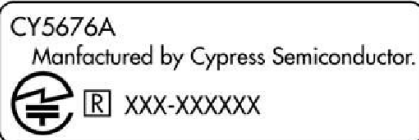
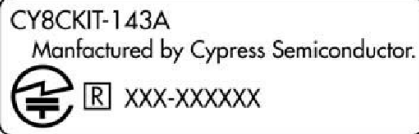
This device complies with the Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

This equipment complies with radio frequency exposure limits set forth by Industry Canada for an Uncontrolled environment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Japan (TELEC)



1. Introduction



Thank you for your interest in the CY8CKIT-042-BLE-A Bluetooth® Low Energy (BLE) Pioneer Kit. The BLE Pioneer Kit enables customers to evaluate and develop BLE projects using the PSoC® 4 BLE and PRoC™ BLE (Programmable Radio-on-Chip) devices.

Bluetooth SMART™ or Bluetooth Low Energy (BLE) is a full-featured, layered, communication protocol that includes a 2.4-GHz radio, a link layer, and an application layer. However, you do not need to understand the complex protocol to implement your projects using PSoC 4 BLE or PRoC BLE. The Cypress BLE solution, which includes the device, the BLE Component, and the BLE firmware stack will take care of it for you. The Cypress BLE firmware stack is royalty free.

You will use two software tools, PSoC Creator™ and CySmart™ Central Emulation Tool, to develop and debug your BLE project. PSoC Creator is Cypress' standard integrated design environment (IDE). The BLE protocol has been abstracted into an easy drag-and-drop BLE Component in PSoC Creator. The CySmart Central Emulation Tool is a host tool for Windows PCs, which provides an easy-to-use GUI to enable customers to test and debug their BLE projects.

The BLE Pioneer Kit offers footprint-compatibility with Arduino™ shields as well as 6-pin Digilent® Pmod™ daughter cards. In addition, the kit features a CapSense® slider, an RGB LED, a push-button switch, an onboard programmer/debugger and the USB-UART/I²C bridge functionality block (KitProg), a coin cell battery holder, and a Cypress F-RAM™. The BLE Pioneer Kit supports 1.9 V, 3 V, 3.3 V, or 5 V as operating voltages. The BLE Pioneer Kit supports two devices:

- PSoC 4 BLE is a 32-bit, 48-MHz ARM® Cortex®-M0 BLE solution with CapSense, 12-bit analog front end (1x SAR ADC, 4x low-power opamps, 2x low-power comparators, and 2x current DACs), 4x TCPWM¹, 2x SCBs², 4x UDBs³, LCD⁴, I²S⁵, and 36 GPIOs. PSoC 4 BLE provides a complete solution for sports and fitness monitors, wearable electronics, medical devices, home automation systems, and sensor-based low-power systems for the Internet of Things (IoT).
- PRoC BLE is a 32-bit, 48-MHz ARM Cortex-M0 BLE solution with CapSense, 12-bit ADC, 4x TCPWM¹, 2x SCBs², LCD⁴, I²S⁵, and 36 GPIOs. PRoC BLE provides a complete solution for BLE connectivity, HID, remote controls, and toys.

Two different versions of the BLE Pioneer Kit are currently available. These kits differ in the BLE modules and the dongle that are included. The baseboard in both kits are identical, so any BLE module can be used interchangeably with either baseboard. [Table 1-1](#) lists the modules and dongle included in each kit.

Table 1-1. Default BLE Modules and BLE Dongle in the Two BLE Pioneer Kits

Kit	PSoC Module	PRoC Module	Dongle	Flash Size	Bluetooth Version
CY8CKIT-042-BLE	CY8CKIT-142	CY5671	CY5670	128 KB	4.1
CY8CKIT-042-BLE-A	CY8CKIT-143A	CY5676A	CY5677	256 KB	4.1 and 4.2

1. Configurable timer, counter, and pulse-width modulator.
2. Serial communication blocks (configurable to I²C, SPI, or UART).
3. Universal digital blocks
4. Configurable liquid crystal display driver.
5. Configurable integrated interchip sound serial bus interface.

1.1 Kit Contents

The BLE Pioneer Kit contains the following items (see [Figure 1-1](#)):

- BLE Pioneer Baseboard preloaded with the CY8CKIT-143A PSoc 4 BLE 256KB Module
- CY5676A PRoC BLE 256KB Module
- CY5677 CySmart BLE 4.2 USB Dongle (BLE Dongle)
- Quick start guide
- USB Standard-A to Mini-B cable
- Four jumper wires (4 inch) and two proximity sensor wires (5 inch)
- Coin cell (3-V CR2032)

Figure 1-1. Kit Contents



If any part of the BLE Pioneer Kit is missing, contact your nearest Cypress sales office for help:
www.cypress.com/go/support

1.2 BLE Pioneer Baseboard Details

The BLE Pioneer Baseboard consists of the blocks shown in [Figure 1-2](#).

1. RGB LED
2. BLE device reset button
3. CapSense proximity header
4. User button
5. CapSense slider
6. Arduino-compatible I/O headers (J2/J3/J4)
7. Arduino-compatible power header (J1)
8. Digilent Pmod-compatible I/O header (J5)
9. Cypress F-RAM 1 Mb (FM24V10-G)
10. PSoC 5LP I/O header (J8)
11. PSoC 5LP programmer and debugger (CY8C5868LTI-LP039)
12. Coin cell holder (bottom side)
13. USB connector (J13)
14. Power LED and Status LED
15. System power supply jumper (J16) - LDO 1.9 V~5 V
16. BLE power supply jumper / current measurement (J15)
17. BLE module headers (J10/J11)

Figure 1-2. BLE Pioneer Baseboard

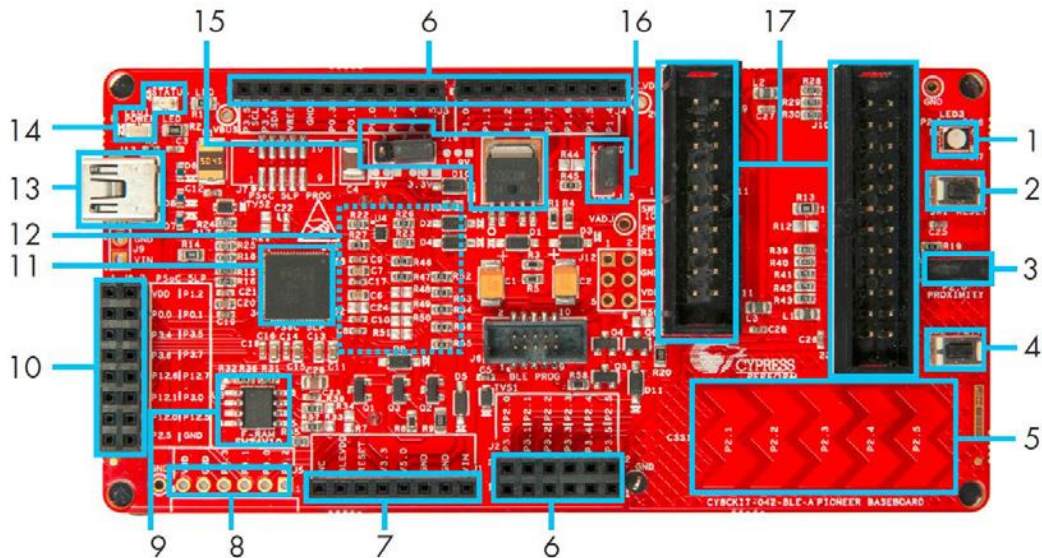


Figure 1-3 shows a markup of the onboard components of the PSoC 4 BLE module (in red) and the PRoC BLE module (in black). See [BLE Modules and BLE Dongles Compatible with the BLE Pioneer Kit on page 130](#) for more details. Figure 1-4 shows the BLE Dongle board blocks.

Figure 1-3. BLE Module Markup

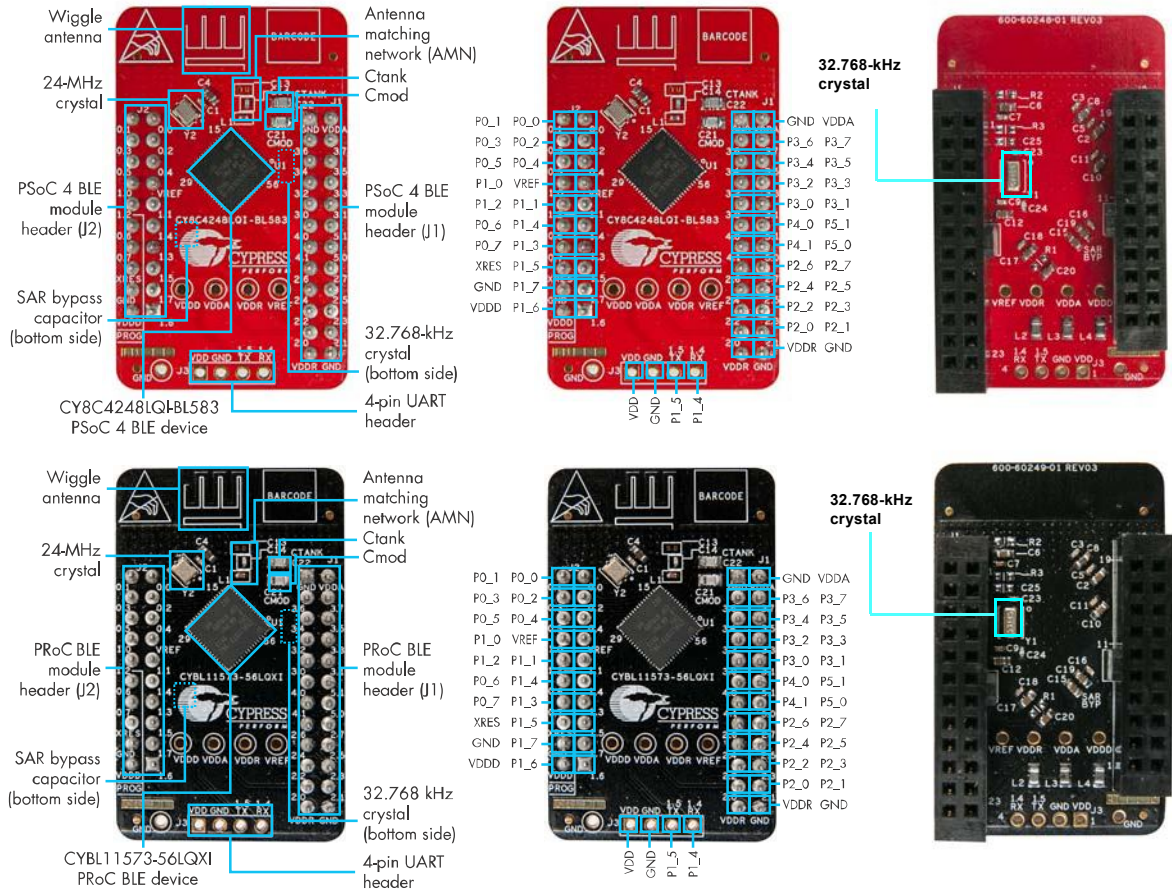
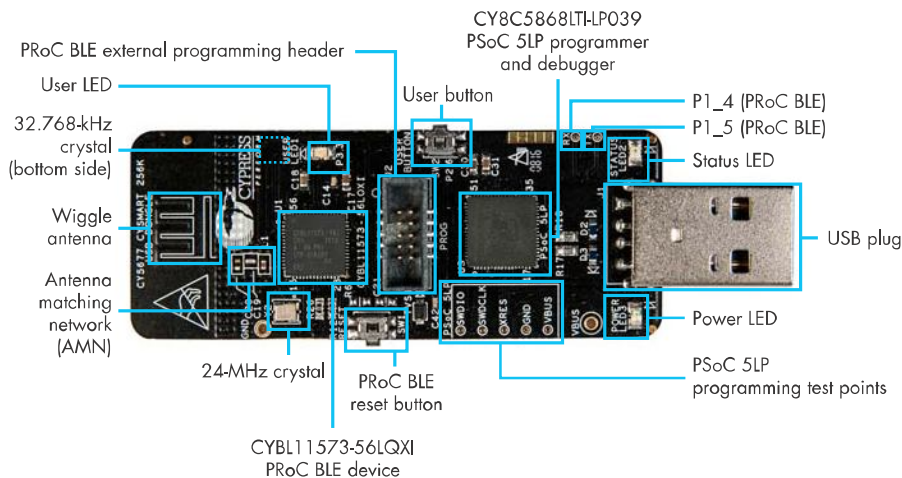


Figure 1-4. BLE Dongle Markup

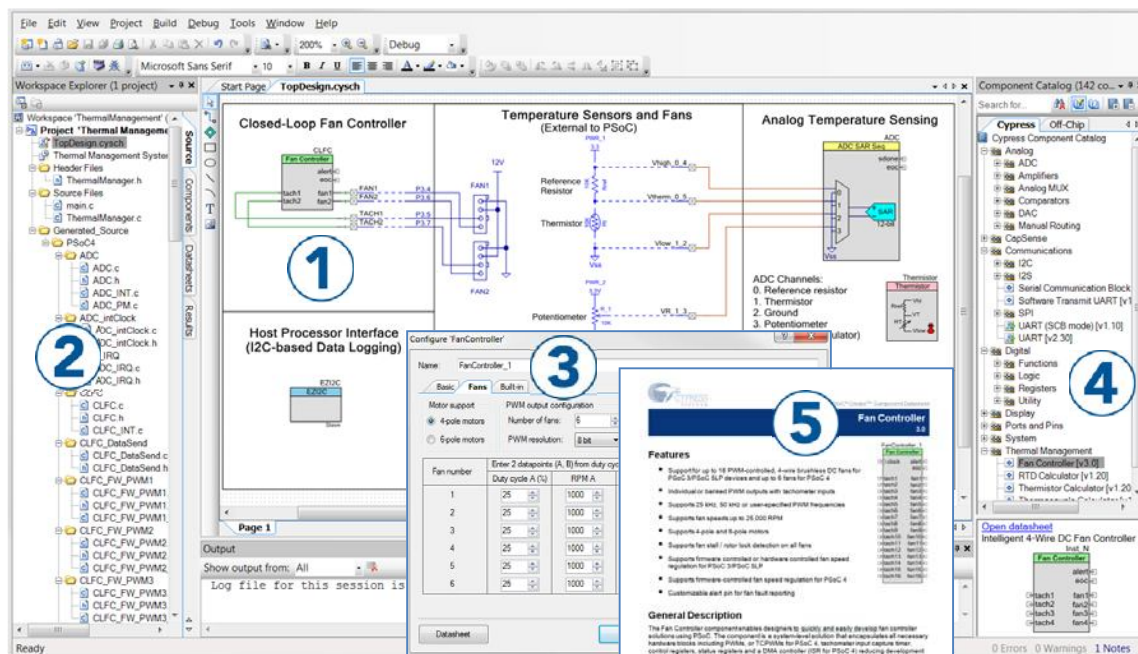


1.3 PSoC Creator

PSoC Creator™ is a state-of-the-art, easy-to-use integrated design environment (IDE). It introduces revolutionary hardware and software co-design, powered by a library of pre-verified and pre-characterized PSoC Components. With PSoC Creator, you can:

1. Drag and drop Components to build your hardware system design in the main design workspace
2. Codesign your application firmware with the PSoC hardware
3. Configure Components using configuration tools
4. Explore the library of 100+ Components
5. Review Component datasheets

Figure 1-5. PSoC Creator Features



PSoC Creator also enables you to tap into an entire tool ecosystem with integrated compiler chains and production programming programmers for PSoC devices.

For more information, visit www.cypress.com/psoccreator. Visit [PSoC Creator training page](#) for video tutorials on learning and using PSoC Creator.

1.3.1 PSoC Creator Code Examples

PSoC Creator includes a large number of code examples. These examples are available from the PSoC Creator Start Page, as [Figure 1-6](#) shows.

Code examples can speed up your design process by starting you off with a complete design, instead of a blank page. The code examples also show how PSoC Creator Components can be used for various applications. Code examples and documentation are included, as shown in [Figure 1-7 on page 17](#).

In the **Find Example Project** dialog shown in [Figure 1-7](#), you have several options:

- Filter for examples based on architecture or device family, that is, PSoC 3, PSoC 4 or PSoC 5LP; project name; or keyword.
- Select from the menu of examples offered based on the **Filter Options**.
- Review the example project's description (on the **Documentation** tab).
- Review the code from the **Sample Code** tab. You can copy the code from this window and paste to your project, which can help speed up code development.
- Create a new project (and a new workspace if needed) based on the selection. This can speed up your design process by starting you off with a complete, basic design. You can then adapt that design to your application.

Figure 1-6. Code Examples in PSoC Creator

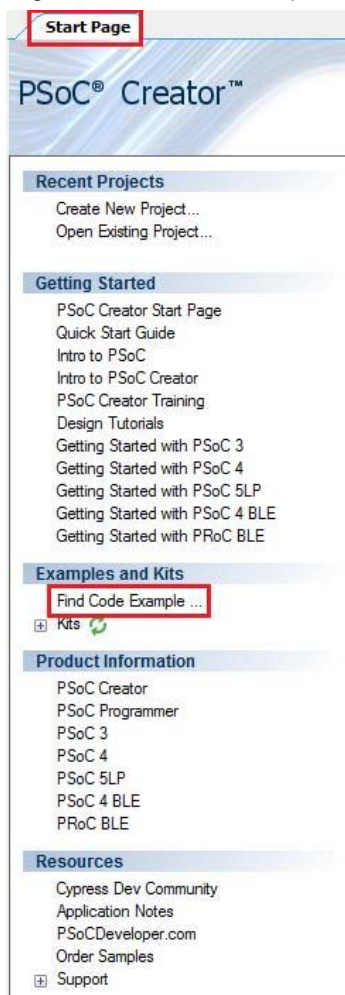
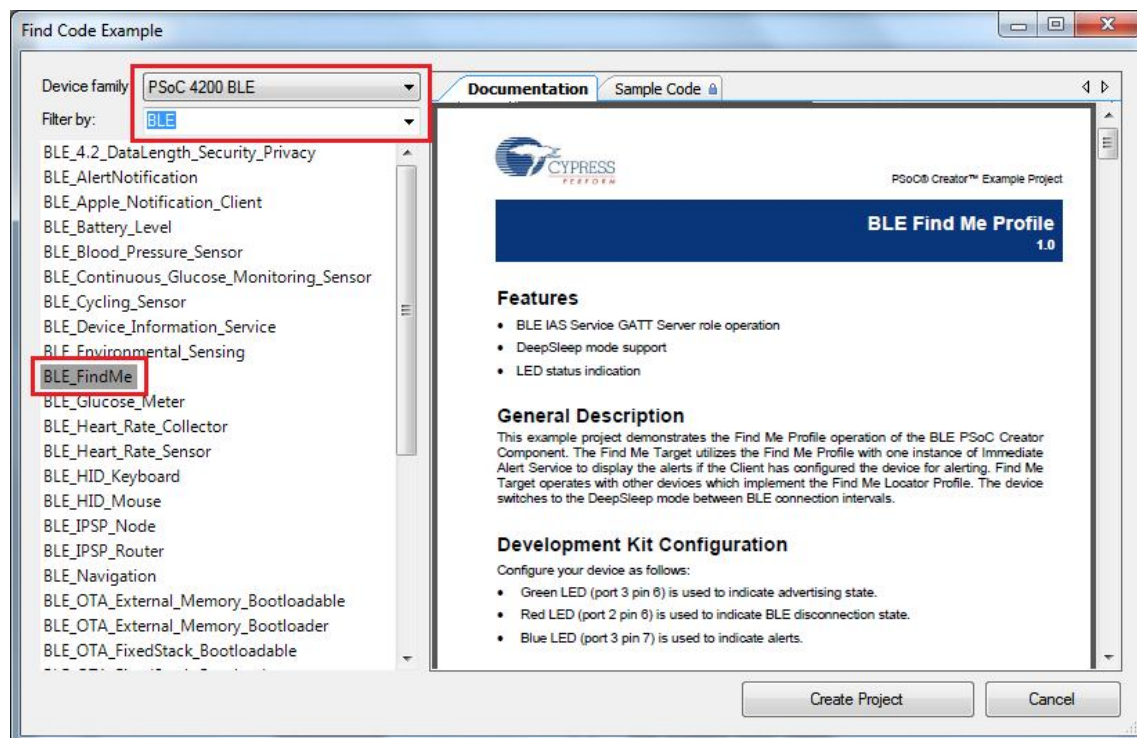


Figure 1-7. Code Example Projects with Sample Code



1.3.2 Kit Code Examples

This kit includes a number of code examples, which can be used to quickly evaluate the functionality of this kit. These examples are described in the [Example Projects chapter on page 37](#).

If you are a beginner in BLE, refer to the PSoC Creator code examples such as BLE_FindMe and BLE_Device_Information_Service as described in [1.3.1 PSoC Creator Code Examples](#). You may also refer the application note [Getting Started with PSoC 4 BLE](#).

The four Kit code examples viz CapSense Slider and LED, CapSense Proximity, BLE Central Mode and Eddystone are intermediary level examples that will help to design a system around the kit. Refer to the [4.2 CapSense Slider and LED](#) and later for details.

The CySmart Dongle code example is an advanced level example that will demonstrate a complete solution around the kit. Refer to [4.6 BLE Dongle and LED Control](#) for details.

1.3.3 PSoC Creator Help

Visit the [PSoC Creator home page](#) to download the latest version of PSoC Creator. Then, launch PSoC Creator and navigate to the following items:

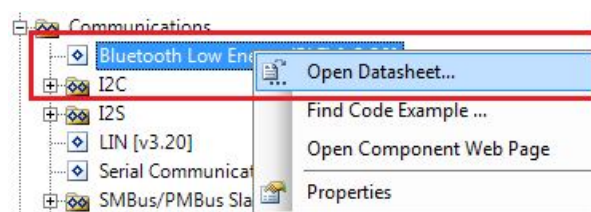
- **Quick Start Guide:** Choose **Help > Documentation > Quick Start Guide**. This guide gives you the basics for developing PSoC Creator projects.
- **Simple Component example projects:** Choose **File > Code Example**. These example projects demonstrate how to configure and use PSoC Creator Components.
- **System Reference Guide:** Choose **Help > System Reference Guide**. This guide lists and describes the system functions provided by PSoC Creator.

- **Component datasheets:** Right-click a Component and select **Open Datasheet**, as shown in [Figure 1-8 on page 18](#). Visit the [PSoC 4 Component Datasheets](#) page for a list of all PSoC 4 Component datasheets.
- **Document Manager:** PSoC Creator provides a document manager to help you to easily find and review document resources. To open the document manager, choose the menu item **Help > Document Manager**.

1.3.4 Component Datasheets

Right-click a Component and select **Open Datasheet** (see [Figure 1-8 on page 18](#)).

Figure 1-8. Opening Component Datasheet



1.4 Getting Started

This guide will help you get acquainted with the BLE Pioneer Kit:

- The [Software Installation chapter on page 21](#) describes the installation of the kit software. This includes the PSoC Creator IDE for development and debugging applications, PSoC Programmer for programming hex files, and the CySmart Central Emulation Tool for BLE Central emulation.
- The [Kit Operation chapter on page 25](#) describes the major features of the BLE Pioneer Kit such as USB-UART and USB-I²C bridges and functionalities such as programming and debugging.
- The [Example Projects chapter on page 37](#) describes multiple PSoC 4 BLE and PSoC BLE code examples that will help you understand how to create your own BLE application using the BLE Component and device.
- The [Hardware chapter on page 89](#) details the hardware content of the BLE Pioneer Kit and BLE Dongle, and the hardware operation.
- The [Advanced Topics chapter on page 116](#) explains the functionality of FM24V10 F-RAM.
- The [Appendix on page 118](#) provides the bill of materials (BOM), KitProg LED states, list of BLE modules and dongles compatible with the BLE Pioneer Kit, migrating projects across Pioneer series kits, and programming BLE modules using MiniProg3.

1.5 Additional Learning Resources

Cypress provides a wealth of information at www.cypress.com to help you to select the right PSoC device for your design, and to help you to quickly and effectively integrate the device into your design. For a comprehensive list of resources, see [KBA86521](#), [How to Design with PSoC 3, PSoC 4, and PSoC 5LP](#).

Visit www.cypress.com/go/psoc4ble and www.cypress.com/procble for additional learning resources including datasheets, technical reference manuals, and application notes. The following is an abbreviated list:

- Overview: [PSoC 4 BLE Portfolio](#) and [PSoC Roadmap](#)
- Product Selectors: [PSoC 1](#), [PSoC 3](#), [PSoC 4](#), or [PSoC 5LP](#). In addition, [PSoC Creator](#) includes a device selection tool.

- **Datasheets:** Describe and provide electrical specifications for the PSoC 4 device family
- **CapSense Design Guide:** Learn how to design capacitive touch-sensing applications with the PSoC 4 family of devices.
- **Application Notes and Code Examples:** Cover a broad range of topics, from basic to advanced level. Many of the application notes include code examples. Visit the [PSoC 3/4/5 Code Examples](#) webpage for a list of all available PSoC Creator code examples. To access code examples from within PSoC Creator, see [PSoC Creator Code Examples on page 16](#).
- **Technical Reference Manuals (TRM):** Provide detailed descriptions of the architecture and registers in each PSoC 4 device family.
- **Development Kits:**
 - [CY8CKIT-040](#), [CY8CKIT-042](#), and [CY8CKIT-044](#) are easy-to-use and inexpensive development platforms. These kits include connectors for Arduino-compatible shields and Digilent Pmod peripheral modules.
 - [CY8CKIT-141](#), [CY8CKIT-142](#), [CY8CKIT-143](#), [CY5671](#), [CY5674](#), and [CY5676](#) are additional BLE Modules compatible with the BLE Pioneer Kit.
 - [CY5670](#) is additional BLE Dongle compatible with the BLE Pioneer Kit.
 - [CY8CKIT-049](#) is a very low-cost prototyping platform for PSoC 4100/4200 families.
 - The [MiniProg3](#) kit provides an interface for flash programming and debug.
 - [CY5672 PSoC BLE Remote Control Reference Design Kit](#) provides a production-ready implementation of a Bluetooth Low Energy remote control.
 - [CY5682 PSoC BLE Touch Mouse Reference Design Kit](#) provides a production-ready implementation of a Bluetooth Low Energy touch mouse.
- **Knowledge Base Articles (KBA):** Provide design and application tips from experts on using the device.
- **PSoC Creator Training:** Visit www.cypress.com/go/creatorstart/creatortraining for a comprehensive list of video trainings on PSoC Creator.
- **Cysmart Central Emulation Tool:** Visit www.cypress.com/go/cysmart for information on the CySmart Central Emulation Tool.
- **Learning From Peers:** Visit www.cypress.com/forums to meet enthusiastic PSoC developers discussing the next generation embedded systems on Cypress Developer Community Forums.

1.5.1 Bluetooth Learning Resources

The [Bluetooth Developer Portal](#) provides material by the Special Interest Group (SIG) for learning various aspects of the Bluetooth Low Energy protocol and systems. Some of them are:

- [Training videos](#)
- [GATT profiles](#)
- [Bluetooth community forum](#)

1.5.2 Other Related Resources

- Digilent Pmod: www.digilentinc.com/pmods/
- Arduino: <http://arduino.cc/en/Main/ArduinoBoardUno>

1.6 Technical Support

If you have any questions, our technical support team is happy to assist you. You can create a support request on the [Cypress Technical Support](#) page.

If you are in the United States, you can talk to our technical support team by calling our toll-free number: +1-800-541-4736. Select option 2 at the prompt.

You can also use the following support resources if you need quick assistance.

- [Self-help](#)
- [Local Sales Office Locations](#)

1.7 Documentation Conventions

Table 1-2. Document Conventions for Guides

Convention	Usage
Courier New	Displays file locations, user entered text, and source code: C:\...\cd\icc\
<i>Italics</i>	Displays file names and reference documentation: Read about the <i>sourcefile.hex</i> file in the <i>PSoC Creator User Guide</i> .
[Bracketed, Bold]	Displays keyboard commands in procedures: [Enter] or [Ctrl] [C]
File > Open	Represents menu paths: File > Open > New Project
Bold	Displays commands, menu paths, and icon names in procedures: Click the File icon and then click Open .
Times New Roman	Displays an equation: $2 + 2 = 4$
Text in gray boxes	Describes cautions or unique functionality of the product.

1.8 Acronyms

Table 1-3. Acronyms Used in this Document

Acronym	Definition
ADC	analog-to-digital converter
API	application programming interface
BD address	Bluetooth device address
BLE	Bluetooth Low Energy
CDC	Communications Device Class
COM	communication port
DLE	data length extension
ECDH	Elliptic Curve Diffie-Hellman
DVD	digital video disc
ESD	electrostatic discharge
F-RAM	ferroelectric random access memory
GATT	generic attribute profile

Table 1-3. Acronyms Used in this Document

Acronym	Definition
GUI	graphical user interface
GPIO	general-purpose input/output
I ² C	inter-integrated circuit
IAS	immediate alert service
IDAC	current output digital-to-analog converter
IDE	integrated development environment
LDO	low drop out (voltage regulator)
LE	low energy
LED	light-emitting diode
LP	low power
LPT	line print terminal
MTU	maximum transmission unit
OTA	over-the-air
PHY	physical layer
PrISM	Precise Illumination Signal Modulation
PRoC	Programmable Radio-on-Chip
PSM	protocol service multiplexer
PSoC	Programmable System-on-Chip
PWM	pulse width modulation
QFN	quad flat no-lead (package)
RDK	reference design kit
RGB	red green blue
SAR	successive approximation register
SIG	special interest group
SMA	SubMiniature version A
SPI	serial peripheral interface
SWD	serial wire debug
TLM	telemetry
UART	universal asynchronous receiver transmitter
UID	universal identifier
URI	uniform resource identifier
URL	uniform resource locator
USB	Universal Serial Bus
UUID	universal unique identifier

2. Software Installation



This chapter describes the steps to install the software tools and packages on a computer for using the BLE Pioneer Kit. This includes the IDE in which the projects will be built and used for programming.

2.1 Before You Begin

All Cypress software installations require administrator privileges. Ensure you have the required privileges on the system for successful installation. Before you install the kit software, close any other Cypress software that is currently running.

2.2 Install Software

Follow these steps to install the BLE Pioneer Kit software:

1. Download the kit software from www.cypress.com/CY8CKIT-042-BLE-A. The software is available in the following formats:
 - a. CY8CKIT-042-BLE-A Kit Complete Setup: This installation package contains the files related to the BLE Pioneer Kit. However, it does not include the Windows Installer or Microsoft .NET framework packages. If these packages are not on your computer, the installer directs you to download and install them from the Internet.
 - b. CY8CKIT-042-BLE-A Kit Only Package: This executable file installs only the BLE Pioneer Kit contents, which include code examples, hardware files, and user documents. This package can be used if all the software prerequisites (listed in step 5) are installed on your computer.
 - c. CY8CKIT-042-BLE-A DVD ISO: This file is a complete package, stored in a DVD-ROM image format, that you can use to create a DVD or extract using an ISO extraction program such as WinZip or WinRAR. The file can also be mounted similar to a virtual CD/DVD using virtual drive programs such as 'Virtual CloneDrive' and 'MagicISO'. This file includes all the required software, utilities, drivers, hardware files, and user documents.
2. If you have downloaded the ISO file, mount it on a virtual drive; if you do not have a virtual drive to mount, extract the ISO contents using the appropriate ISO extractor (such as MagicISO or PowerISO). Double-click **cyautorun.exe** in the root directory of the extracted content or mounted ISO if "Autorun from CD/DVD" is not enabled on the computer. The installation window will appear automatically.

Note: If you are using the "Kit Complete Setup" or "Kit Only Package" file, then go to step 4 for installation.

3. Click **Install CY8CKIT-042-BLE-A Kit** to start the installation, as shown in [Figure 2-1](#).

Figure 2-1. Installer Screen



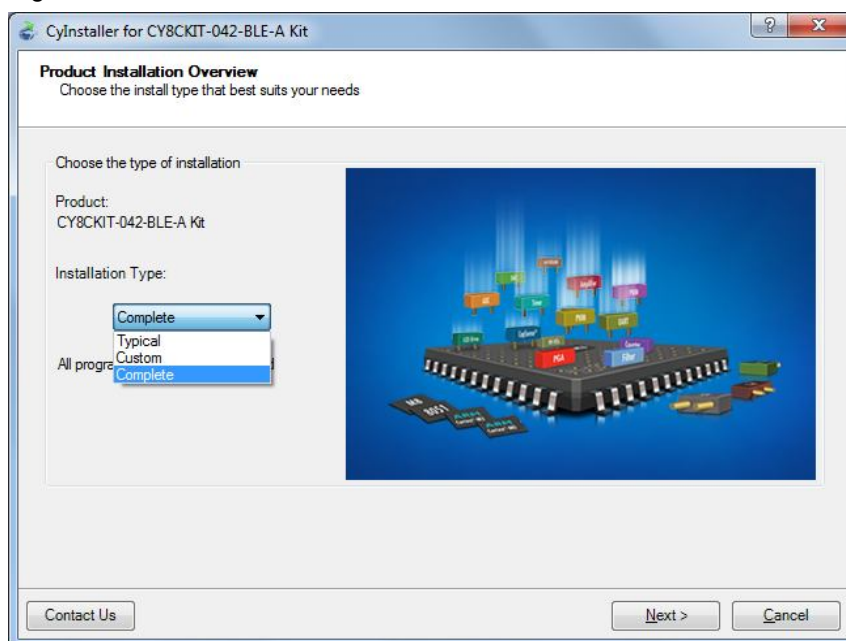
4. Select the folder in which you want to install the CY8CKIT-042-BLE-A kit-related files. Choose the directory and click **Next**.
5. When you click **Next**, the CY8CKIT-042-BLE-A Kit installer automatically installs the required software, if it is not present on your computer. The following software packages are required:

Note: For the Kit Only Package, download and install the following prerequisites.

 - a. PSoC Creator 3.3 or later: Download the latest version from www.cypress.com/psoccreator.
 - b. PSoC Programmer 3.24 or later: This is installed as part of PSoC Creator installation (www.cypress.com/programmer).
 - c. CySmart 1.2 or later: Download the latest version from www.cypress.com/cysmart.

- Choose the Typical/Custom/Complete installation type in the **Product Installation Overview** window, as shown in [Figure 2-2](#). Click **Next** after you select the installation type.

Figure 2-2. Product Installation Overview



- Read the license agreement and select **I accept the terms in the license agreement** to continue with installation. Click **Next**.
- When the installation begins, a list of packages appears on the installation page. A green check mark appears next to each package after successful installation.
- Click **Finish** to complete the CY8CKIT-042-BLE-A kit installation.
- Enter your contact information or select the **Continue Without Contact Information** check box. Click **Finish** to complete the CY8CKIT-042-BLE-A kit installation.
- After the installation is complete, the kit contents are available at the following location:

<Install_Directory>\CY8CKIT-042-BLE-A Kit

Default location:

Windows 7 (64-bit): C:\Program Files (x86)\Cypress\CY8CKIT-042-BLE-A Kit

Windows 7 (32-bit): C:\Program Files\Cypress\CY8CKIT-042-BLE-A Kit

Note: For Windows 7/8/8.1 users, the installed files and the folder are read only. To use the installer example projects, follow the steps outlined in the [Example Projects chapter on page 37](#).

The BLE Pioneer Kit installer also installs the CySmart Central Emulation Tool on your computer. This software, along with the BLE Dongle, allows the computer to emulate as a BLE Central device.

2.3 Windows 8.1 and Windows 10 USB Selective Suspend Setting

The Windows 8.1 and Windows 10 operating systems issue a suspend command to a connected USB device if there is no activity on its USB bus. This may happen to the BLE Pioneer Kit/BLE Dongle if the driver installation is not complete or the driver is not found. In this situation, as a response to the suspend command from the operating system, the KitProg will shut down the onboard LDO to remain within the USB suspend current requirement. Due to this, the BLE Pioneer Kit will not be powered and will not be functional.

To prevent this, do either of the following:

- Install the kit software on the Windows 8.1 or Windows 10 operating system before using the BLE Pioneer Kit.
- Disable the USB selective suspend setting for the BLE Pioneer Kit from Power Options on Windows 8.1, by following these steps:
 - a. From **Control Panel**, go to **Power Options**.
 - b. Click **Change Plan Settings** corresponding to your power plan.
 - c. Click **Change Advanced Power Settings**.
 - d. Under Advanced settings, expand **USB Settings > USB selective suspend setting**.
 - e. Select the **Disabled** option for **Plugged in** and **On battery** operation.
 - f. Click **OK**.