



CY8CKIT-149

# PSoC<sup>®</sup> 4100S Plus Prototyping Kit Guide

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# Safety Information



## Regulatory Compliance

The CY8CKIT-149 PSoC 4100S Plus Prototyping Kit is intended for use as a development platform for hardware or software in a laboratory environment. The board is an open system design, which does not include a shielded enclosure. This may cause interference to other electrical or electronic devices in close proximity. In a domestic environment, this product may cause radio interference. In such cases, you may be required to take adequate preventive measures. In addition, this board should not be used near any medical equipment or RF devices.

Attaching additional wiring to this product or modifying the product operation from the factory default settings may affect its performance and cause interference with other apparatus in the immediate vicinity. If such interference is detected, suitable mitigating measures should be taken.



The PSoC 4100S Plus Prototyping Kit, as shipped from the factory, has been verified to meet with requirements of CE as a Class A product.



The CY8CKIT-149 PSoC 4100S Plus Prototyping Kit contains electrostatic discharge (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-149 PSoC 4100S Plus Prototyping Kit boards in the protective shipping package.



### End-of-Life/Product Recycling

This kit has an end-of life five years from the date of manufacture mentioned on the back of the box. Contact your nearest recycler for discarding the kit.

## General Safety Instructions

### ESD Protection

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

### Handling Boards

The CY8CKIT-149 PSoC 4100S Plus Prototyping Kit board is 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 board over any surface.

# 1. Introduction



Thank you for your interest in the CY8CKIT-149 PSoC 4100S Plus Prototyping Kit. The PSoC 4100S Plus Prototyping Kit is designed as an easy-to-use and inexpensive prototyping platform. The PSoC 4100S Plus Prototyping Kit supports the PSoC 4100S Plus device, delivering a complete system solution for a wide range of embedded applications at a very low cost. The PSoC 4100S Plus device is a true programmable embedded system-on chip, integrating custom digital peripheral functions, memory, and an ARM® Cortex®-M0+ MCU on a single chip with flexible automatic routing. The programmable digital peripheral functions allow higher flexibility, in-field tuning of the design, and faster time-to-market. It is a combination of MCU with standard communication and timing peripherals, and a capacitive touch sensing system with best in class performance.

The PSoC 4100S Plus Prototyping Kit offers an open footprint breakout board to maximize the end-utility of the PSoC 4100S Plus device. This kit provides a low-cost alternative to device samples while providing a platform to easily develop and integrate the PSoC 4100S Plus device into your end-system. In addition, the board includes the following features:

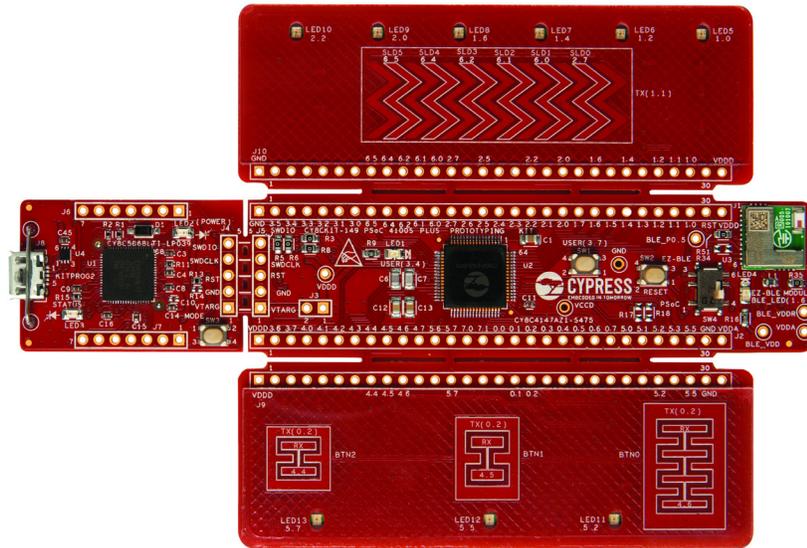
- Two LEDs to provide feedback (One each for 4100S Plus device and EZ-BLE device)
- A push button to provide a simple user input
- Three CapSense buttons of different sizes with feedback LEDs
- Six segment slider with feedback LEDs
- EZ-BLE Module with feedback LED
- External ECO crystal (4 MHz)
- External WCO crystal (32.768 kHz)
- 1.8 V to 5 V operation

The CY8CKIT-149 PSoC 4100S Plus prototyping kit also integrates Cypress KitProg2 that enables onboard programming, debugging, and bridging functionalities, such as USB-UART and USB-I2C. KitProg2 is used to program and debug the target PSoC 4100S Plus device and EZ-BLE Module (see [Figure 1-1](#)). The prototyping kit allows you to separate the KitProg2 board from the target PSoC 4100S Plus board.

## 1.1 Kit Contents

The PSoC 4100S Plus Prototyping Kit contains a PSoC 4100S Plus Prototyping board and Quick Start Guide.

Figure 1-1. CY8CKIT-149 PSoC 4100S Plus Prototyping Kit

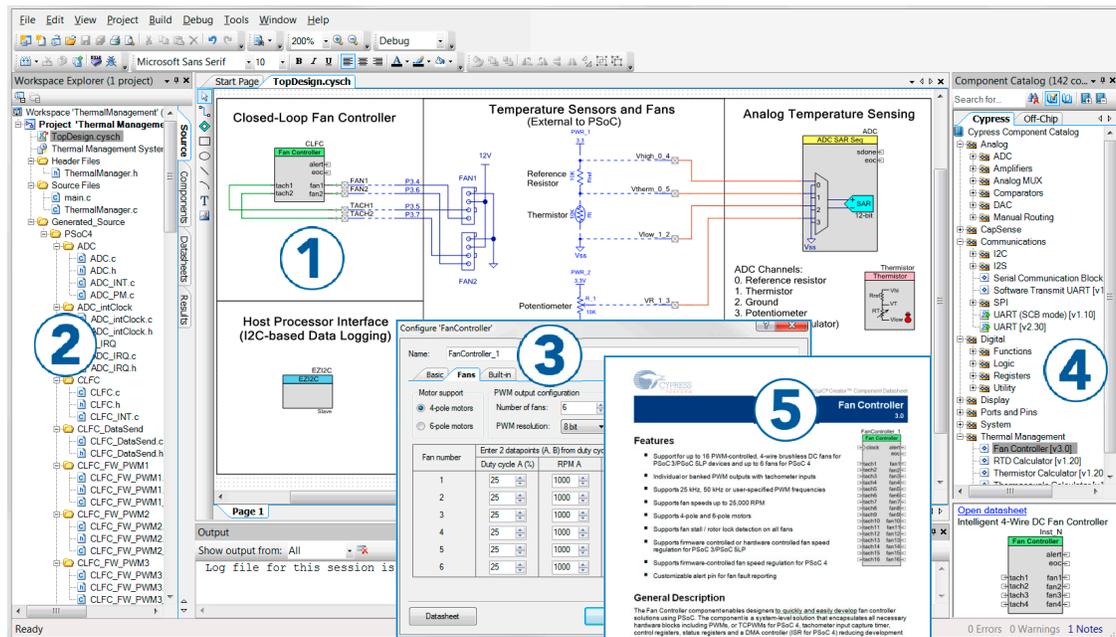


## 1.2 PSoC Creator

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. Co-design 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 1-2. PSoC Creator Features



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

For more information, visit [www.cypress.com/psoccreator](http://www.cypress.com/psoccreator). Visit the [PSoC Creator Video Training Page](#) for video tutorials on learning and using PSoC Creator.

### 1.2.1 PSoC Creator Code Examples

PSoC Creator includes a large number of code examples. These examples are available from the PSoC Creator Start Page, as shown in [Figure 1-3](#) or from the menu **File > Code Example....**

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 1-4 on page 11](#).

From the **Find Code Example** dialog shown in [Figure 1-4 on page 11](#), you can

- 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 list of examples offered based on the **Filter Options**
- Review the code example’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 1-3. Code Examples in PSoC Creator

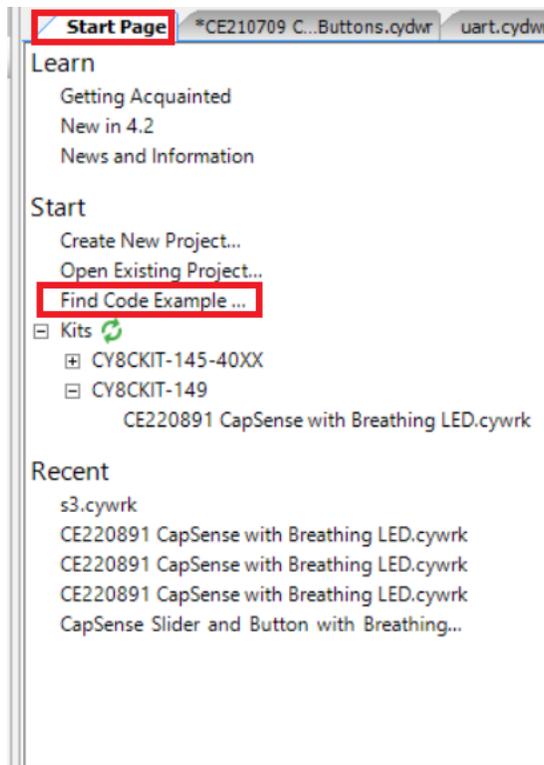
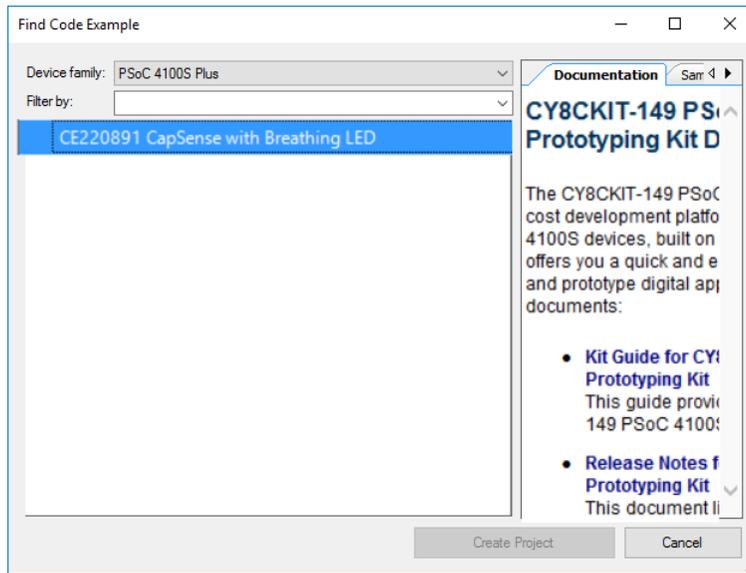


Figure 1-4. Code Example Projects with Sample Code



### 1.2.2 Kit Code Examples

You can access the installed kit code examples from the PSoC Creator Start Page. To access these examples, expand **Kits** under **Start**; then, expand the specific kit to see the code examples. For a list of code examples that you can use on this kit, see the [Code Examples chapter on page 26](#).

### 1.2.3 PSoC Creator Help

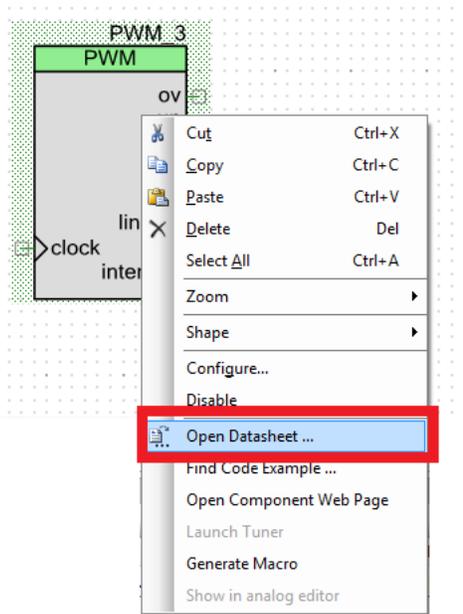
Launch PSoC Creator and navigate to the following items:

- **Quick Start Guide:** Choose **Help > Documentation > Quick Start Guide**. This guide gives you the basics for developing PSoC Creator projects.
- **Simple Component Code Examples:** Choose **File > Code Example**. These examples demonstrate how to configure and use PSoC Creator Components. To access examples related to a specific Component, right-click the Component in the schematic or in the Component Catalog. Select **Find Code Example** in the context menu that appears.
- **System Reference Guide:** Choose **Help > System Reference Guides**. This guide lists and describes the system functions provided by PSoC Creator.

### 1.2.4 Component Datasheets

Right-click a Component and select **Open Datasheet** (see [Figure 1-5](#)).

Figure 1-5. Opening Component Datasheet



## 1.3 Getting Started

This guide will help you get acquainted with the PSoC 4100S Plus Prototyping Kit:

- The [Software Installation chapter on page 16](#) describes the installation of the kit software. This includes installation of the PSoC Creator IDE for development and debugging the applications, and PSoC Programmer for programming hex files.
- The [Kit Operation chapter on page 20](#) describes the major features of the PSoC 4100S Plus Prototyping Kit and functionalities such as programming, debugging, and the USB-UART and USB-I2C bridges.
- The [Code Examples chapter on page 26](#) describes multiple code examples that will help you understand how to create your own PSoC 4100S Plus projects.
- The [Appendix chapter on page 32](#) describes the hardware content of the kit and the hardware operation, details about programming the kit using MiniProg3, Kit Schematics, and the bill of materials (BOM).

## 1.4 Additional Learning Resources

Cypress provides a wealth of data at [www.cypress.com](http://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](#). The following is an abbreviated list for PSoC 4:

- Overview: [PSoC Portfolio](#) and [PSoC Roadmap](#).
- Product Selectors: [PSoC 4 Product Selector](#). In addition, [PSoC Creator](#) includes a device selection tool.
- Datasheets: Describe and provide electrical specifications for the [PSoC 4000](#), [PSoC 4100](#), [PSoC 4200](#), [PSoC 4100M](#), [PSoC 4200M](#), [PSoC 4200L](#), and [PSoC 4100S Plus](#) devices.
- [CapSense Design Guide](#): Learn how to design capacitive touch-sensing applications with the PSoC 4 and PSoC Analog Coprocessor family of devices.
- [Application Notes](#) and [Code Examples](#): Cover a broad range of topics, from basic to advanced. Many of the application notes include code examples. Visit the [PSoC 3/4/5 Code Examples](#) web page 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 10](#).
- [Technical Reference Manuals \(TRM\)](#): Provide detailed descriptions of the architecture and registers in each PSoC 4 device family.
- [Development Kits](#):
  - [CY8CKIT-041](#), [CY8CKIT-046](#), [CY8CKIT-044](#), [CY8CKIT-042](#), and [CY8CKIT-040](#) are easy-to-use and inexpensive development platforms. These kits include connectors for Arduino™ compatible shields and Digilent Pmod Peripheral Modules.
  - [CY8CKIT-043](#), [CY8CKIT-049](#), [CY8CKIT-145](#), [CY8CKIT-146](#), [CY8CKIT-149](#), are very low-cost prototyping platforms for sampling PSoC 4 devices.
  - [CY8CKIT-001](#) is a common development platform for all PSoC family devices.
  - The [MiniProg3](#) device provides an interface for flash programming and debug.
- [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](http://www.cypress.com/go/creatorstart/creatortraining) for a comprehensive list of video training on PSoC Creator.
- Learning from Peers: Visit [community.cypress.com/welcome](http://community.cypress.com/welcome) to meet enthusiastic PSoC developers discussing the next-generation embedded systems on Cypress Developer Community Forums.

## 1.5 Technical Support

For assistance, visit [Cypress Support](#) or contact customer support at +1 (800) 541-4736 Ext. 3 (in the USA) or +1 (408) 943-2600 Ext. 3 (International).

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

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

## 1.6 Document Conventions

Table 1-1. 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> .
[ <b>Bracketed, Bold</b> ]	Displays keyboard commands in procedures: <b>[Enter]</b> or <b>[Ctrl] [C]</b>
File > Open	Represents menu paths: File > Open > New Project
<b>Bold</b>	Displays commands, menu paths, and icon names in procedures: Click the <b>File</b> icon and then click <b>Open</b> .
Times New Roman	Displays an equation: $2 + 2 = 4$
Text in gray boxes	Describes Cautions or unique functionality of the product.

## 1.7 Acronyms

Table 1-2. Acronyms Used in this Document

Acronym	Description
ADC	Analog-to-Digital Converter
BCP	Bridge Control Panel
BLE	Bluetooth Low Energy
BOM	Bill of Materials
CE	Code Example
CMOD	Modulator Capacitor
CMP	Comparator
CTANK	Shield tank capacitor
DAC	Digital to Analog Converter
DPDT	Double-Pole, Double-Throw
ECO	External Crystal Oscillator
ESD	Electrostatic Discharge
GPIO	General Purpose Input/Output
I2C	Inter-Integrated Circuit
IDAC	Current DAC
IDE	Integrated Design Environment
KBA	Knowledge Based Article
LED	Light-Emitting Diode
PSoC	Programmable Systems-on-Chip
SAR	Successive Approximation Register
SCB	Serial Communication Block
SRAM	Static Random Access Memory
SWD	Serial Wire Debug
TCPWM	Timer, Counter, Pulse Width Modulator
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
WCO	Watch Crystal Oscillator

## 2. Software Installation



This chapter describes the steps to install the software tools and packages on a PC for using the PSoC 4100S Plus Prototyping Kit. This includes the IDE on which the projects will be built and used for programming.

### 2.1 Before You Begin

To install Cypress software, you will require administrator privileges. However, they are not required to run the software that is already installed. 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 PSoC 4100S Plus Prototyping kit software:

1. Download the PSoC 4100S Plus Prototyping kit software from [www.cypress.com/CY8CKIT-149](http://www.cypress.com/CY8CKIT-149). The kit software is available in three formats for download.
  - a. **CY8CKIT-149 Kit Only:** This executable file installs only the kit contents, which include kit 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 PC.
  - b. **CY8CKIT-149 Kit Setup:** This installation package contains the files related to the kit including PSoC Creator and PSoC Programmer. However, it does not include the Windows Installer or Microsoft .NET framework packages. If these packages are not on your PC the installer will direct you to download and install them from the Internet.
  - c. **CY8CKIT-149 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 like a virtual CD/DVD using virtual drive programs such as Virtual CloneDrive and MagicISO. This package includes all the required software, utilities, drivers, hardware files, and user documents.
2. If you have downloaded the ISO file, mount it in a virtual drive. Extract the ISO contents if you do not have a virtual drive to mount. 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 PC. The installation window will appear automatically.

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

- Click **Install CY8CKIT-149 Kit** to start the kit installation as shown in Figure 2-1.

Figure 2-1. Kit Installer Screen

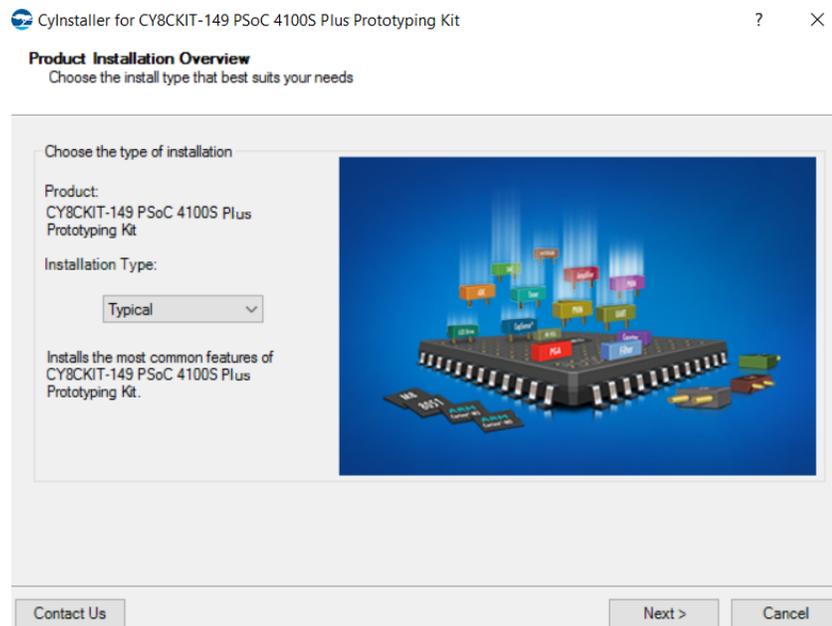


- Select the directory in which you want to install the PSoC 4100S Plus Prototyping Kit-related files. Choose the directory and click **Next**.
- When you click **Next**, the PSoC 4100S Plus Prototyping kit installer automatically installs the required software, if it is not present on your PC. Following are the required software:
  - PSoC Creator 4.2 or later: This software is available for download separately at [www.cypress.com/psoccreator](http://www.cypress.com/psoccreator).
  - PSoC Programmer 3.27 or later: This is installed as part of PSoC Creator installation ([www.cypress.com/programmer](http://www.cypress.com/programmer)).

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

**Note:** Typical installation is recommended, however you can choose according to your requirement.

Figure 2-2. Product Installation Overview



- Read the License agreement and select **I accept the terms in the license agreement** to continue with the 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.
- Enter your contact information or select the check box **Continue Without Contact Information**. Click **Finish** to complete the PSoC 4100S Plus Prototyping kit installation.

After the installation is complete, the kit contents are available at the following location:

<Install\_Directory>\CY8CKIT-149 PSoC 4100S Plus Prototyping Kit

Default location:

Windows OS (64-bit):

C:\Program Files (x86)\Cypress\CY8CKIT-149 PSoC 4100S Plus Prototyping Kit

Windows OS (32-bit):

C:\Program Files\Cypress\CY8CKIT-149 PSoC 4100S Plus Prototyping Kit

**Note:** For Windows 7/8/8.1 and later users, the installed files and the folder are read-only. To use the installer code examples, follow the steps outlined in the [Code Examples chapter on page 26](#).

## 2.3 Uninstall Software

The software can be uninstalled using one of the following methods:

1. Go to **Start > All Programs > Cypress > Cypress Update Manager** and select **Uninstall**.
2. Go to **Start > Control Panel > Programs and Features for Windows 7** or **Add/Remove Programs for Windows XP** and select **Uninstall/Change**.

## 3. Kit Operation

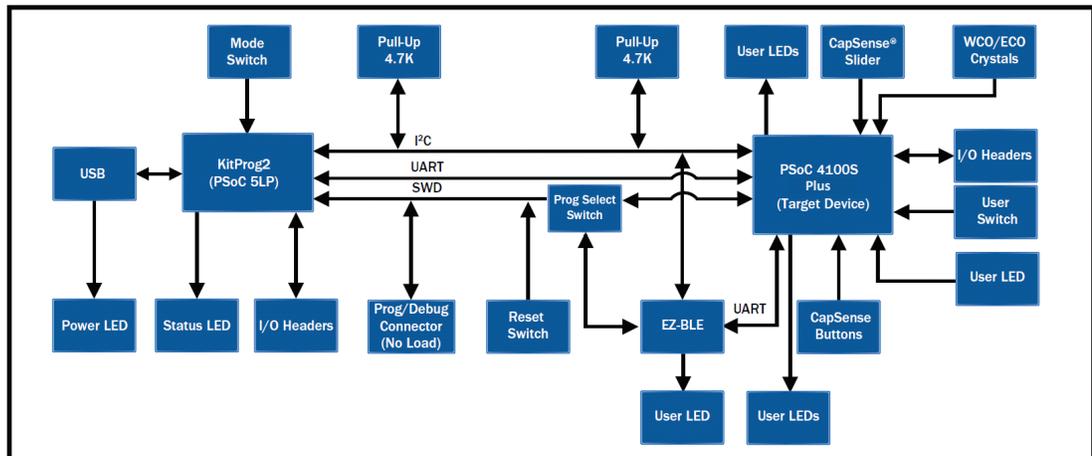


This chapter introduces you to different features of the PSoC 4100S Plus Prototyping Kit. This primarily includes the programming and debugging functionalities, KitProg2 USB-UART and USB-I2C bridges, and the procedure to update the KitProg2 firmware.

### 3.1 Theory of Operation

Figure 3-1 shows the block diagram for the PSoC 4100S Plus Prototyping Kit.

Figure 3-1. Block Diagram of PSoC 4100S Plus Prototyping Kit



The PSoC 4100S Plus Prototyping Kit is simplistic in design and focuses on providing you with complete access to develop applications using the PSoC 4100S Plus device. This kit supports the following features:

- **PSoC 4100S Plus I/O Headers:** The PSoC 4100S Plus Prototyping board brings all GPIOs of the target PSoC 4100S Plus device to the two expansion headers. This provides maximum access to the capabilities of the PSoC 4100S Plus device.
- **User LEDs:** The onboard LEDs, LED1 and LED4 can be used to display outputs from the PSoC 4100S Plus device and EZ-BLE Module respectively. This includes modulating the brightness of the LED to notify different states of the device.
- **User Button:** This kit has a push button, which can be used to provide an input to the PSoC 4100S Plus device.  
**Note:** The switch connects the PSoC 4100S Plus device pin (P3.7) to ground when pressed. Therefore, you need to configure the PSoC 4100S Plus device pin as 'resistive pull-up' for detecting the switch press.
- **Six Segment CapSense Slider with Feedback LEDs:** A six-segment CapSense Slider is provided in the snappable area of the kit. To evaluate the slider, six green LEDs are provided for feedback in the snappable area of the kit. The slider can perform in both Mutual Capacitance and Self Capacitance modes.

- **Three CapSense Buttons with User LEDs:** Three CapSense buttons of different sizes are provided with this kit in the snappable area. To evaluate the buttons, three green LEDs are provided for feedback in the snappable area of the kit. These buttons can perform in both Self Capacitance and Mutual Capacitance modes.
- **EZ-BLE Module with User LED:** EZ-BLE Module from Cypress is loaded on this kit with blue User LED connected to one of its GPIO. Using this module, you can work on various Bluetooth Low Energy (BLE) applications.
- **ECO Crystal:** A 4-MHz crystal is loaded onboard for precision clock applications.
- **WCO Crystal:** A 32.768-kHz crystal footprint is provided which can be loaded for precision clock applications.
- **Reset Button:** This button is used to reset the PSoC 4100S Plus device when pressed.
- **Power LED:** This LED indicates power is being supplied to the board.
- **PSoC 4100S Plus Device:** This is the target device (CY8C4147AZI-S475) on the board.
- **5-pin Programming Headers:** These are external programming headers that can be used to program the PSoC 4100S Plus device using a MiniProg3. Typically this connection is not required since the kit contains an integrated KitProg2.
- **PSoC 5LP IO Headers:** Using these headers, you can evaluate the PSoC 5LP (CY8C5868LTI-LP039) device. The PSoC 5LP is used to implement the KitProg2 functionality by default.
- **Current Measurement Jumper:** Using this jumper, you can measure the current consumed by the PSoC 4100S Plus device. This jumper is not populated by default. To use this jumper, you must remove the zero ohm resistor R53.
- **USB 2.0 Micro-B Connector:** Using this USB Micro-B connector (J8), you can connect the kit to a PC using USB 2.0 Type-A to Micro-B Cable.
- **KitProg2:** This is an onboard programmer/debugger utilizing a PSoC 5LP (CY8C5868LTI-LP039), which enables you to program and debug the target PSoC 4100S Plus device. It can also act as a USB-UART and UART-I2C bridge. When used as a standalone module, KitProg2 can be used to program devices of PSoC 3, PSoC 4, or PSoC 5LP families through the SWD interface. For more details on the KitProg2 functionality, see the [KitProg2 User Guide](#).
- **KitProg2 Mode Selection Button:** This button is used to switch between the KitProg2 modes as shown in [Table 3-1](#). You can also use this button to provide an input to the PSoC 5LP in custom applications. Note that the switch connects the PSoC 5LP pin to ground when pressed. For more details, see the [KitProg2 User Guide](#).
- **KitProg2 Status LED:** This LED gives the programming/mode status of KitProg2.

Table 3-1. KitProg2 Mode Switching

KitProg2 Programming Modes *	Status LED (LED3)
KitProg2 Program/Debug Mode (PPCOM mode) (default)	ON
CMSIS-DAP & Mass Storage Programming Mode	OFF

\***Note:** Toggling between programming modes can be done by pressing mode switch SW3.

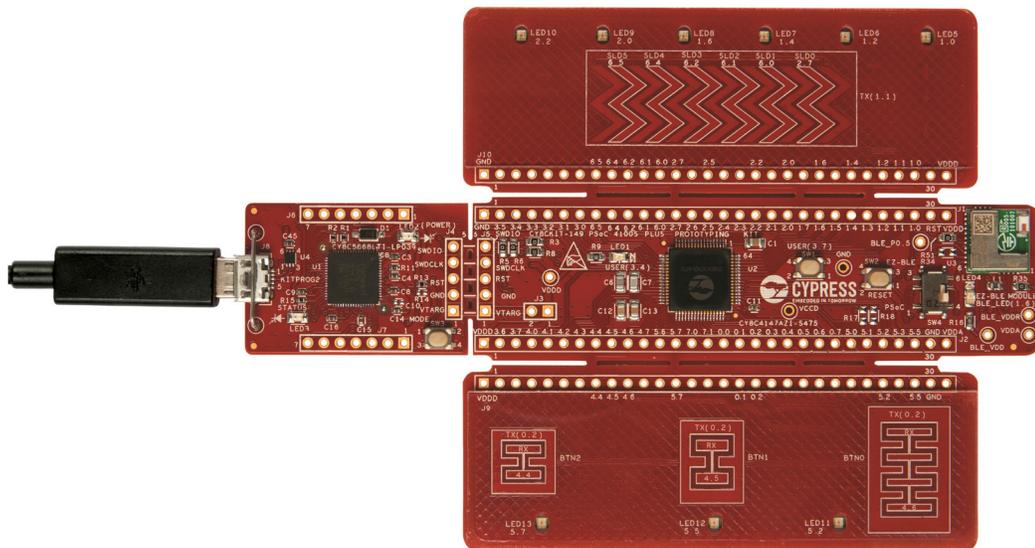
## 3.2 Programming and Debugging the Target PSoC 4100S Plus Device

The target PSoC 4100S Plus device can be programmed and debugged using the KitProg2. Before programming the device, make sure that PSoC Creator and PSoC Programmer software are installed on the PC. See [Install Software on page 16](#) for more information.

### 3.2.1 Programming Using PSoC Creator

1. Make sure SW4 is switched to PSoC side. Connect the prototyping board to the PC through the USB Micro-B Connector (**J8**) as shown in [Figure 3-2](#). The kit enumerates as a composite device. If you are plugging in the PSoC 4100S Plus Prototyping Kit to your PC for the first time, the kit drivers will get installed automatically. The amber status LED (LED3) will turn ON to indicate successful enumeration. If the amber status LED (LED3) is OFF, see the [KitProg2 User Guide](#) for details on the KitProg2 status and troubleshooting instructions.

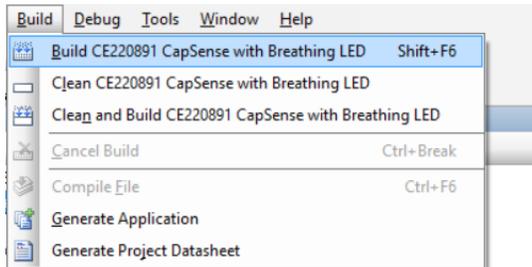
Figure 3-2. Connecting the PSoC 4100S Plus Prototyping Kit to a Computer



2. Open the desired project in PSoC Creator. From the PSoC Creator, go to **File > Open > Project/Workspace**. You can browse and open a previously saved project. If you want to open one of the code examples provided with the kit, follow the instructions in the [Code Examples chapter on page 26](#).

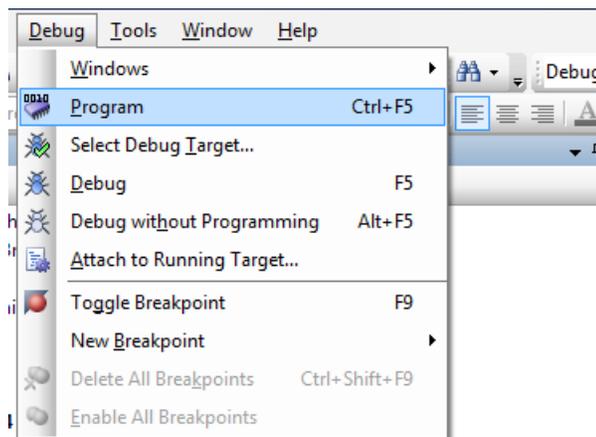
3. Select the option **Build > Build <Project\_Name>** or press **[Shift] [F6]** to build the project as shown in [Figure 3-3](#).

Figure 3-3. Build a Code Example



4. If there are no errors during build, program the firmware onto the kit by choosing **Debug > Program** or press **[Ctrl] [F5]**, as shown in [Figure 3-4](#). This programs the target PSoC 4100S Plus device on the PSoC 4100S Plus Prototyping Kit, and the kit is ready to use.

Figure 3-4. Program Device in PSoC Creator



### 3.2.2 Debugging Using PSoC Creator

For debugging the project using PSoC Creator, follow steps 1–3 from [Programming Using PSoC Creator on page 22](#) followed by:

1. Click the **Debug** icon  or press **[F5]**. Alternatively, you can use the option **Debug > Debug**.
2. Once the PSoC Creator opens in Debug mode, use the buttons on the toolbar to debug your application.

For more details on using the debug features, see section 3.3 of the [KitProg2 User Guide](#).

### 3.2.3 Programming Using PSoC Programmer

PSoC Programmer (3.27.0 or later) can be used to program existing `.hex` files into the PSoC 4100S Plus Prototyping Kit. For a detailed explanation on how to program using PSoC Programmer, see the **Programming Using PSoC Programmer** section in the [KitProg2 User Guide](#).

### 3.2.4 Mass Storage Programming

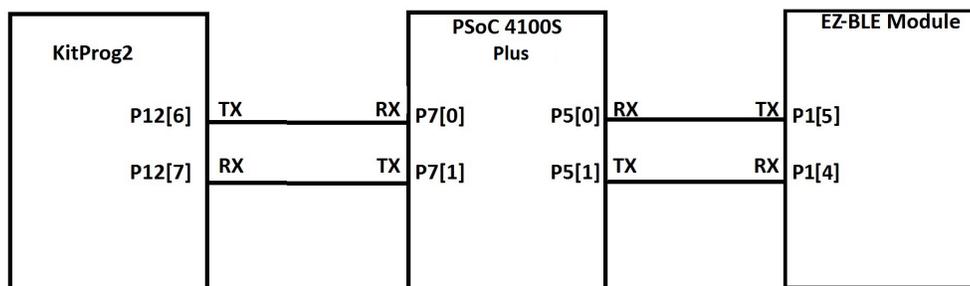
The KitProg2 in the CY8CKIT-149 PSoC 4100S Plus Prototyping Kit supports programming through a USB Mass Storage interface. This interface allows you to program the PSoC 4100S Plus device by copying `.hex` files into an emulated USB Mass Storage device. For more details on using KitProg2 as a Mass Storage Programmer, see the [KitProg2 User Guide](#).

**Note:** Mass Storage Programming is only supported in KitProg2 v1.05 and later for PSoC 4100S Plus devices.

## 3.3 USB-UART Bridge

The KitProg2 on the PSoC 4100S Plus Prototyping Kit can act as a USB-UART bridge. The UART lines between the KitProg2 and the target are hard-wired on the board, through the snappable area, with UART\_RX assigned to **P7[0]** and UART\_TX assigned to **P7[1]** on target PSoC 4100S Plus device. For more details on the KitProg2 USB-UART functionality, see the **USB-UART Bridge** section in the [KitProg2 User Guide](#).

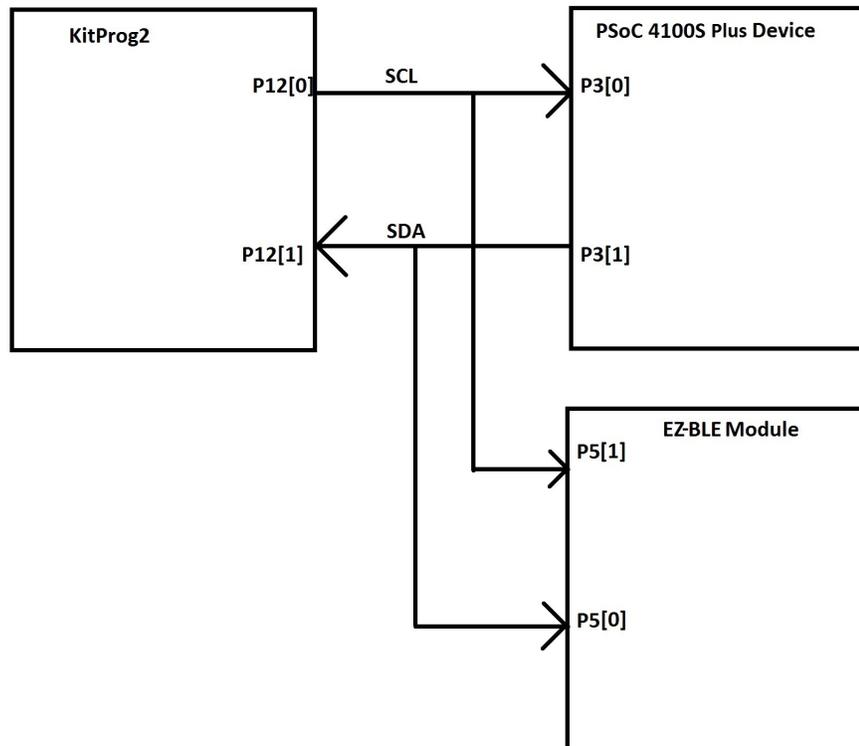
Figure 3-5. UART Connection between KitProg2, PSoC 4100S Plus Device, and EZ-BLE Module



### 3.4 USB-I2C Bridge

The KitProg2 can function as a USB-I2C bridge and communicate with the software utility Bridge Control Panel (BCP). The I<sup>2</sup>C lines on target PSoC 4100S Plus device are **P3[1] (SDA)** and **P3[0] (SCL)**, which are hardwired on the board to the I<sup>2</sup>C lines of the KitProg2. The USB-I2C supports I<sup>2</sup>C speeds of 50 kHz, 100 kHz, 400 kHz, and 1 MHz. For more details on the KitProg2 USB-I2C functionality, see the **USB-I2C Bridge** section in the [KitProg2 User Guide](#).

Figure 3-6. I2C Connection between KitProg2, PSoC 4100S Plus Device, and EZ-BLE Module



### 3.5 Updating the KitProg2 Firmware

The KitProg2 firmware normally does not require any update. You can use the PSoC Programmer software to update the KitProg2 firmware if necessary. For a detailed explanation on how to update the KitProg2 firmware, see **Updating the KitProg2 Firmware** in the [KitProg2 User Guide](#).

# 4. Code Examples



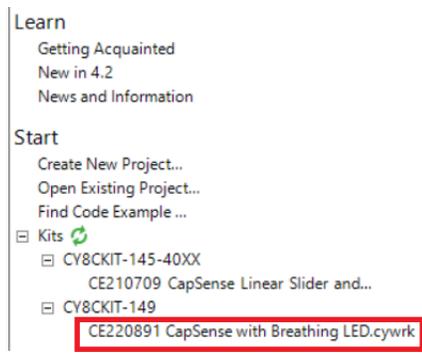
This chapter explains the code examples provided along with the PSoC 4100S Plus Prototyping Kit. To access these code examples, download and install the CY8CKIT-149 PSoC 4100S Plus Prototyping Kit setup file from the kit web page: [www.cypress.com/CY8CKIT-149](http://www.cypress.com/CY8CKIT-149). After installation, you can access the code example from the PSoC Creator **Start** Page as shown in [Figure 4-1](#).

## 4.1 Using the Kit Code Examples

Follow these steps to open and use the code examples.

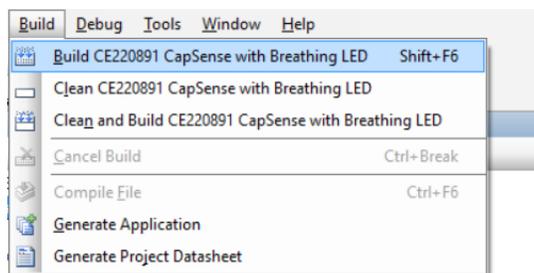
1. Launch PSoC Creator from the Windows Start menu (**Start > All Programs > Cypress > PSoC Creator <version> > PSoC Creator <version>**).
2. On the **Start** page, select **Start > Kits > CY8CKIT-149**. A list of code example appears as shown in [Figure 4-1](#).
3. Click the desired code example and save it at a desired location. For the remaining steps, *CExxxx.cywrk* is used as a reference.

Figure 4-1. Open Code Example from PSoC Creator



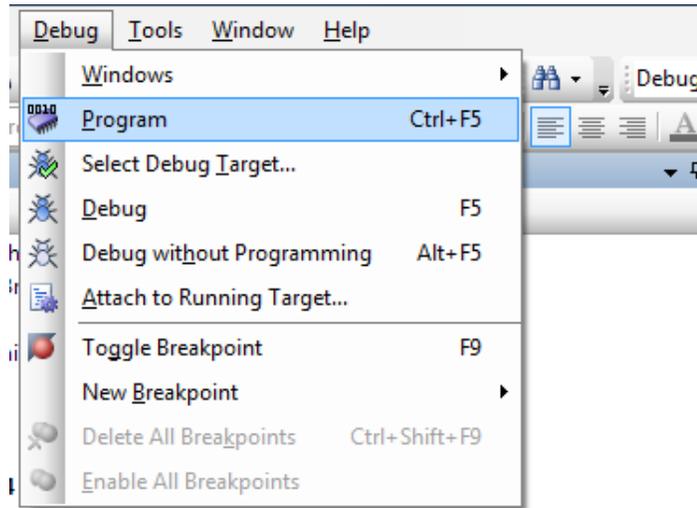
4. Build the code example by choosing **Build > Build <Project Name>** as shown in [Figure 4-2](#). A *.hex* file is generated after a successful build process.

Figure 4-2. Build Code Example from PSoC Creator



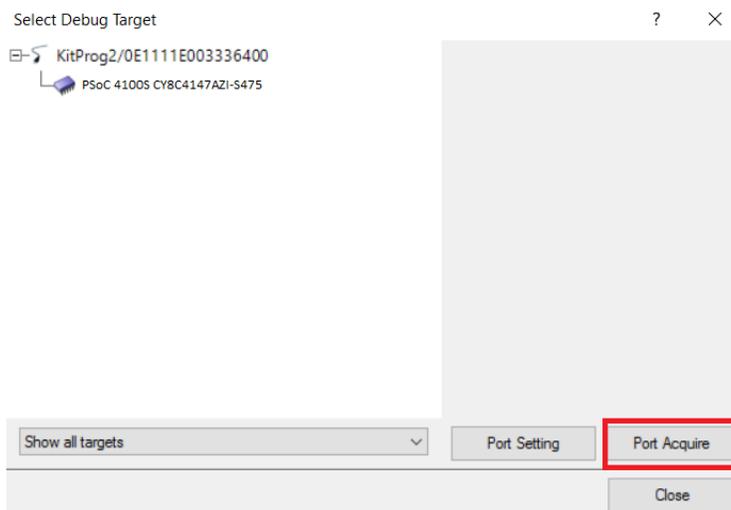
5. Make sure switch position of SW4 is on PSoC side.
6. Connect the PSoC 4100S Plus Prototyping kit to the PC using the KitProg2 USB Micro-B connector **J8** as described in [Programming Using PSoC Creator chapter on page 22](#) to program the kit with this code example. If you are connecting the kit to the PC for the first time, wait for driver installation to complete before proceeding to the next step.
7. Choose **Debug > Program** in PSoC Creator as shown in [Figure 4-3](#).

Figure 4-3. Program Device in PSoC Creator



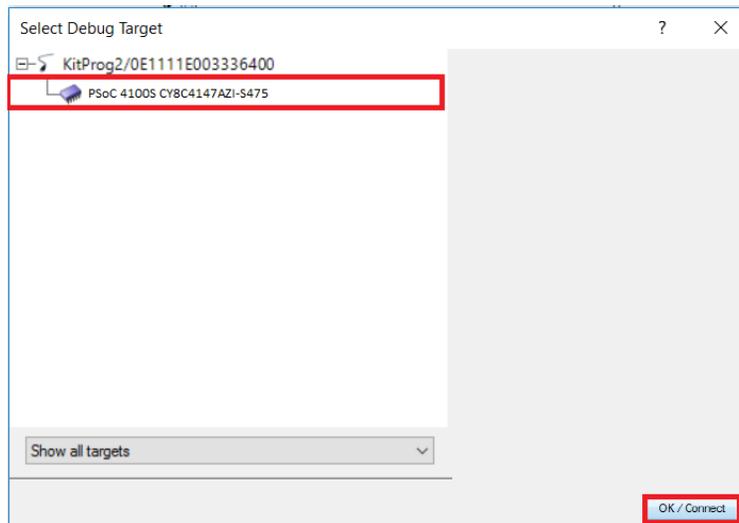
8. If the device is already acquired, programming will complete automatically and the result will appear in the PSoC Creator status bar at the bottom left side of the screen. If the device is yet to be acquired, the Select Debug Target window will appear. Select **KitProg2/<serial number>** and click **Port Acquire** as shown in [Figure 4-4](#).

Figure 4-4. Port Acquire



- After the device is acquired, it appears in the tree structure below the **KitProg2/<serial number>**. Click **OK / Connect** to exit the window and start programming as shown in [Figure 4-5](#).

Figure 4-5. Connect Device from PSoC Creator and Program

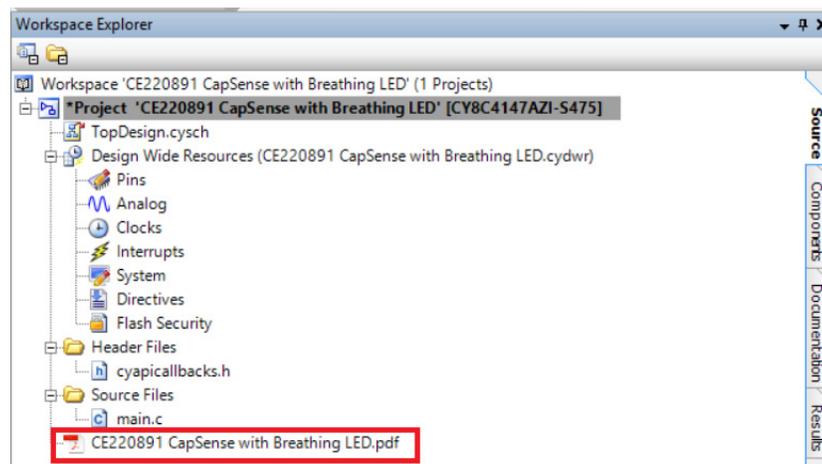


- Code Example Operation:

This code example demonstrates the operation of a CapSense linear slider with six segments and three CapSense buttons. Data from the CapSense linear slider and buttons is sent to the CapSense Tuner using I<sup>2</sup>C communication. The CapSense button status is used to turn ON/OFF the corresponding LEDs on the kit. The CapSense slider is used to tun ON the LEDs relative to the position of touch. This code example also demonstrates a simple breathing effect of the LED with breath-in and breath-out rate of 1 Hz using the SmartIO and PWM Components.

- To understand detailed operation of the code example, open *CE220891 CapSense with Breathing LED.pdf* as shown in [Figure 4-6](#).

Figure 4-6. Project Datasheet - *CE220891 CapSense with Breathing LED.pdf*

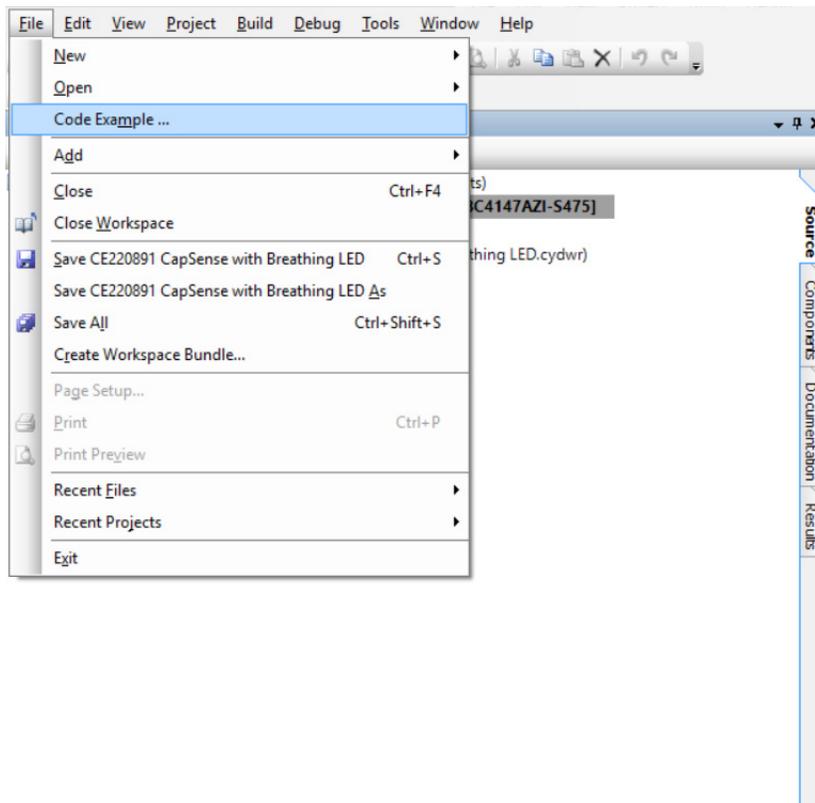


## 4.2 Using Built-in PSoC Creator Code Examples with the Kit

Follow these steps to open and use the built-in PSoC Creator examples.

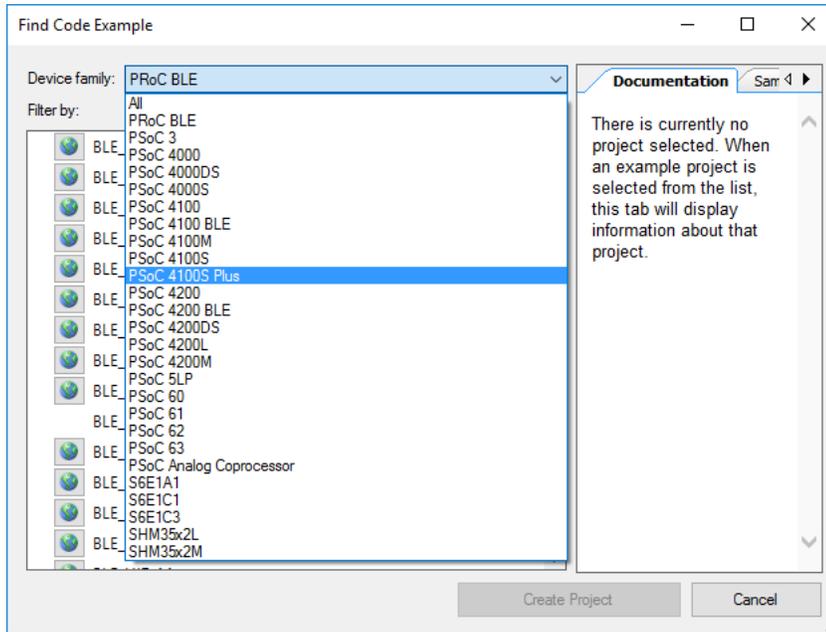
1. Launch PSoC Creator from **Start > All Programs > Cypress > PSoC Creator<version> > PSoC Creator <version>**.
2. On the Start page, click **Find Code Example...** under **Start** or follow the menu **File > Code Example...** as shown in [Figure 4-7](#).

Figure 4-7. PSoC Creator Find Code Example...



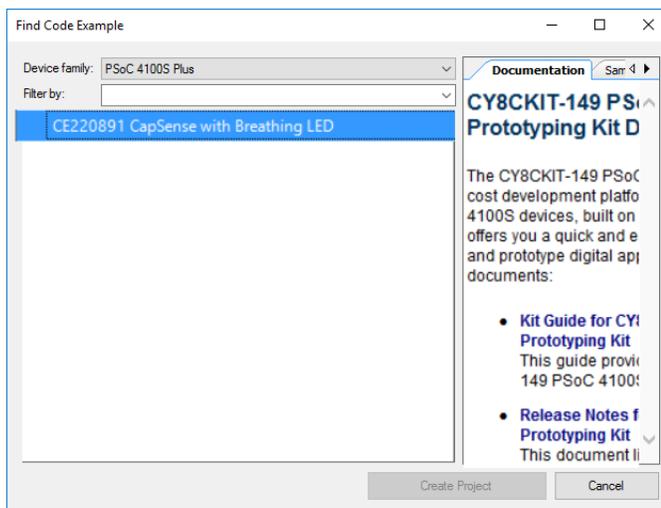
- In the Find Code Example window, set the **Device family** to **PSoC 4100S** as shown in Figure 4-8.

Figure 4-8. Selecting PSoC 4100S Device in Find Code Example Window



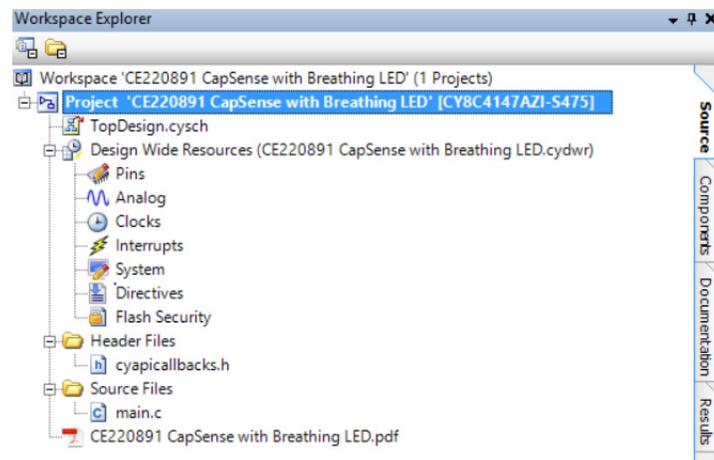
- You can select the *CE220891 CapSense with Breathing LED* project and see how to use it with the CY8CKIT-149 kit.
- Select the *CE220891 CapSense with Breathing LED* project and click **Create Project** as shown in Figure 4-9. Save the workspace to a desired location.  
**Note:** The code example that appears in PSoC Creator with installer package is same as the code example which is extracted using these steps.

Figure 4-9. CE220891 CapSense with Breathing LED Code Example



- Open *CE220891 CapSense with Breathing LED.pdf* from the Workspace Explorer to learn more about the code example and its configuration. See [Figure 4-10](#).

Figure 4-10. Project Datasheet: *CExxxx*



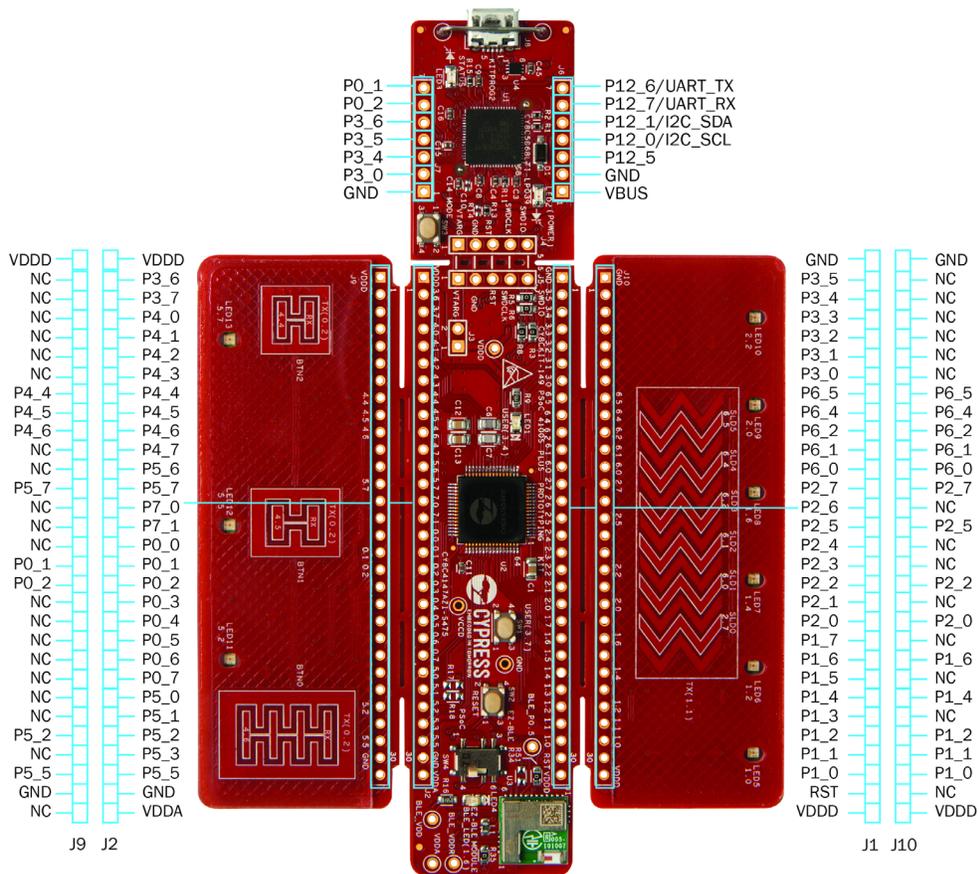


## A.1 Board Details

The PSoC 4100S Plus Prototyping kit consists of the following blocks:

- PSoC 4100S Plus device (CY8C4147AZI-S475)
- PSoC 4100S Plus I/O headers J1 and J2
- KitProg2 (PSoC 5LP) device (CY8C5868LTI-LP039)
- KitProg2 I/O headers J6 and J7
- SWD connection headers J4 and J5
- USB 2.0 Micro-B connector J8
- One amber LED, LED2 (Power)
- One amber LED, LED3 (KitProg2 Status)
- One blue LED, LED1 (User)
- One blue LED, LED4 (EZ-BLE User)
- Six Green LEDs (LED5, LED6, LED7, LED8, LED9, LED10) (CapSense Slider User)
- Three Green LEDs (LED11, LED12, LED13) (CapSense Button User)
- EZ-BLE Module
- ECO Crystal (4 MHz)
- WCO Crystal (32.768 kHz)
- One Push Button SW1 (User)
- One Push Button SW2 (Reset)
- One Push Button SW3 (KitProg2 Mode)
- Current Measurement Jumper J3 (foot-print only) (shorted by zero ohm resistor R53)
- Perforated 'snappable' board design

Figure A-1. PSoC 4100S Plus Prototyping Kit Pin Details

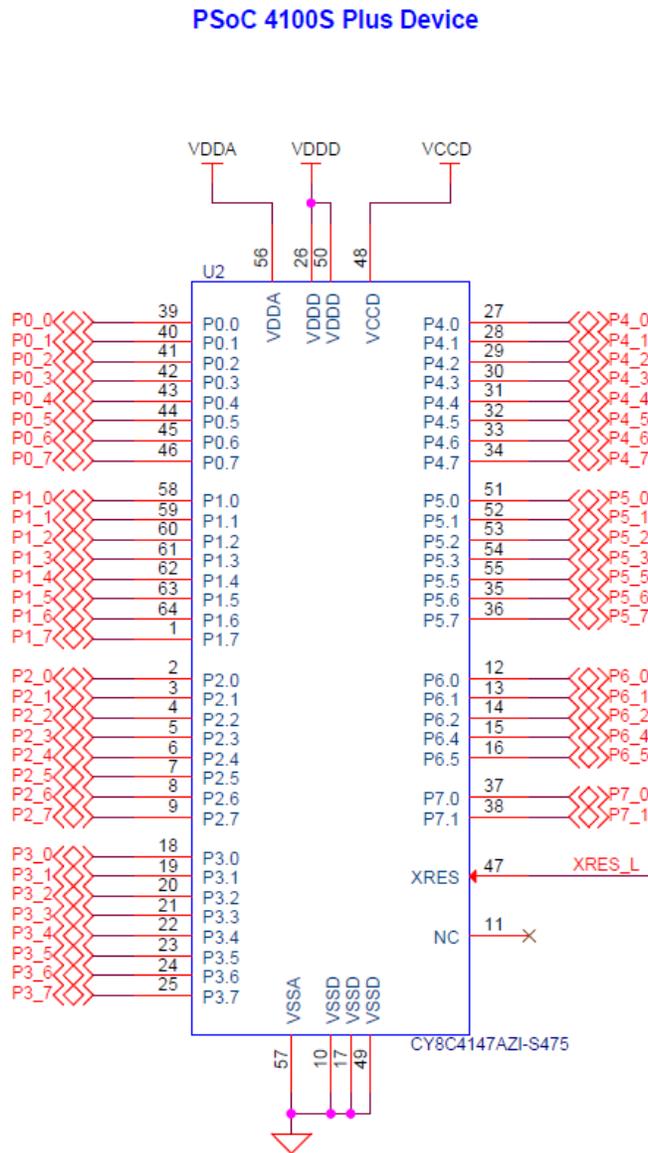


## A.2 Hardware Details

### A.2.1 Target Board

The target board uses the PSoC 4100S Plus device. PSoC 4100S Plus is a scalable and reconfigurable platform architecture for a family of programmable embedded system controllers with an ARM Cortex-M0+ CPU. It combines programmable and reconfigurable digital blocks with flexible automatic routing. The PSoC 4100S Plus device, based on this platform architecture, is a combination of a MCU with digital programmable logic, programmable interconnect, and standard communication and timing peripherals. The PSoC 4100S Plus will be fully compatible with members of the PSoC 4 platform for new applications and design needs. The digital subsystems allow flexibility and in-field tuning of the design. For more information, see the [PSoC 4100S Plus webpage](#) and the [PSoC 4100S Plus Datasheet](#).

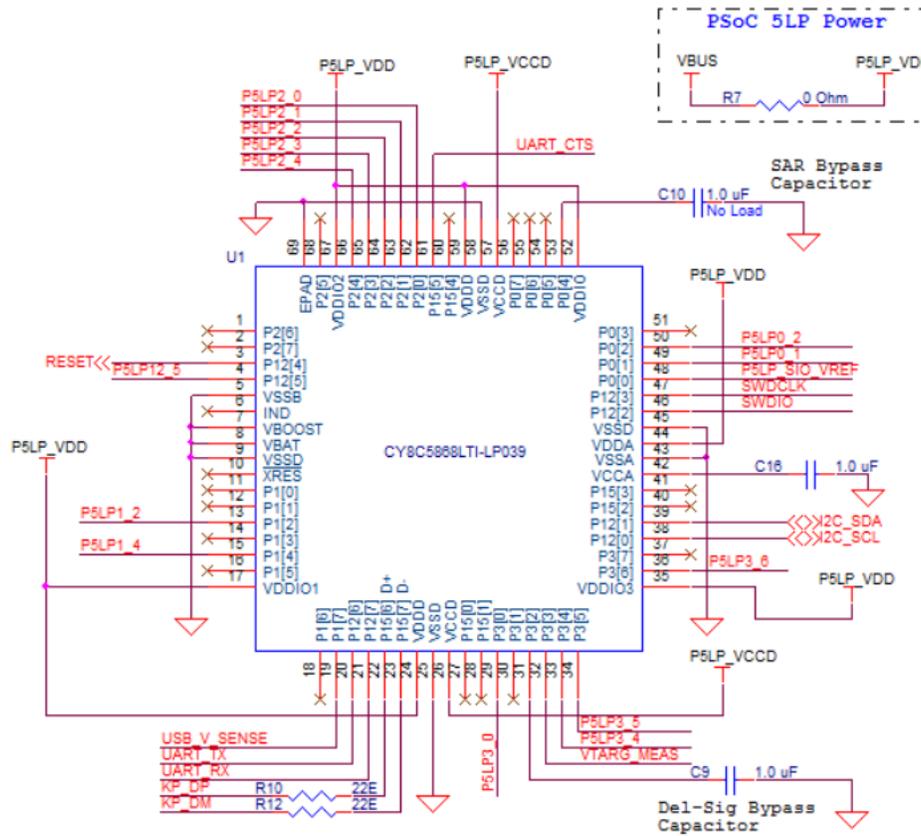
Figure A-2. Schematic of PSoC 4100S Plus Device (Target)



## A.2.2 KitProg2 Board

A PSoC 5LP on the KitProg2 board is used to program and debug the target PSoC 4100S Plus device. The KitProg2 PSoC 5LP connects to the USB port of the PC through the USB 2.0 Micro-B connector and to the SWD interface of the target PSoC 4100S Plus device.

Figure A-3. Schematic of PSoC 5LP (KitProg2)



### A.2.3 Power Supply System

The power supply system on this board is dependent on a power source for most applications, you can use the 5 V supply from the USB connection to power the system. You can also connect an external power supply to the board for low-voltage applications. The kit supports the following connections:

- 5 V from the KitProg2 USB (**J8**)
- 1.8 V to 5.0 V from a regulated supply connected to VTARG or VDDD

**Note:** To use an external power supply with the KitProg2 also connected to the PC USB, first remove diode D1 from the board. This ensures that the VTARG supply from KitProg2 is not supplied to the target device. KitProg2 measures the target voltage and adjusts the logic levels on the programming pins accordingly.



**Caution:** It is important to understand that this prototyping kit does not have any onboard ESD protection circuitry. Therefore, the power source for the PSoC 4100S Plus Prototyping Kit must be of high quality to make sure that the board is protected from any over-current conditions and swapped-power connections.

#### A.2.3.1 Measure PSoC 4100S Plus Device Current Consumption

Follow these steps to measure the current consumption of the PSoC 4100S Plus device:

1. Remove the resistor R53 and install a 2-pin jumper in the supplied holes of **J3**.
2. Connect an ammeter across the 2-pin jumper to measure the current to the PSoC 4100S Plus device.

This method can be used either with USB power or with the power supplied to one of the VTARG pins but NOT when supplying power to one of the VDDD pins.

After measuring the current consumption, populate resistor R53 or place a shorting jumper across the two jumper pins for normal operation of the kit.

**Note:** After removing R53, system may have some leakage power. Below are some of the probable paths for leakage:

1. Communication circuitry between KitProg2 and Target (I2C, UART, SWDIO)
2. Inductive Beads for BLE power circuitry
3. Reset switch between KitProg2 and target device along with BLE device

To get rid of the leakage power completely, remove the 0 ohm connection and inductive beads.

## A.2.4 Board Separation (Snapping)

The PSoC 4100S Plus Prototyping Kit consists of a PSoC 4100S Plus and a KitProg2 board. To separate the two boards for evaluation or development, break the two boards apart at the built-in perforated edge between **J4** and **J5**.

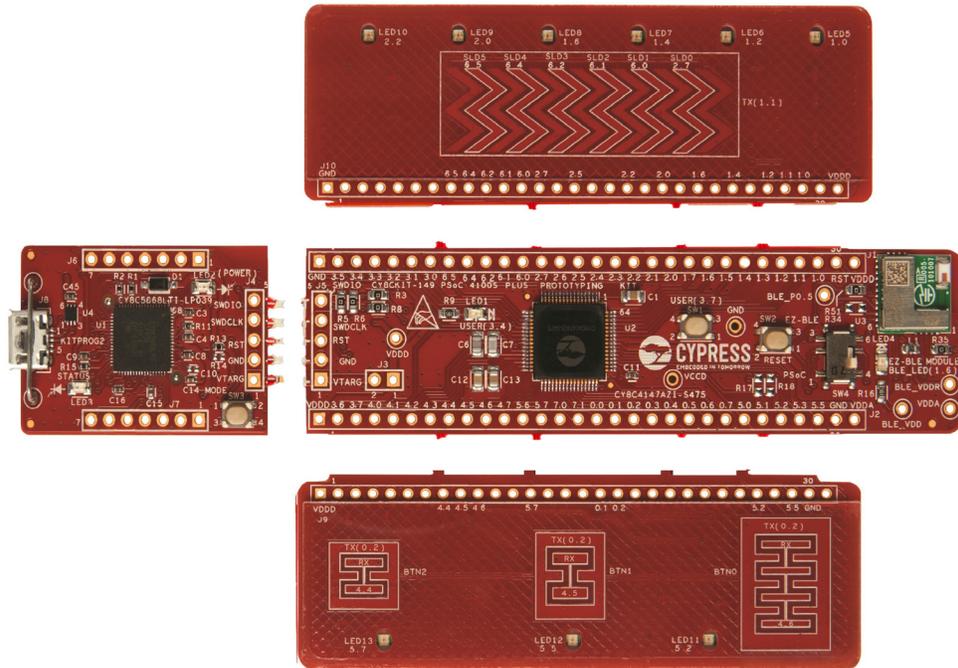
The easiest method of separating the two boards is to place the kit on the edge of a table, where the edge of the table is directly below the perforated edge and the smaller KitProg2 board is off the table edge. Press gently on the KitProg2 board and snap the two boards apart. If any material is removed from the edge of the boards, use sheers to clean up the edge of the kit.



**Caution:** Once the boards are separated, direct UART and I2C connections between the PSoC 4100S Plus device and KitProg2 are lost. This is because the traces connecting the UART and I2C lines are cut off during the separation. However, you can access KitProg2's UART and I<sup>2</sup>C lines through header **J6**.

The CapSense Slider and buttons can also be snapped out and used for standalone applications. To reconnect the snapped CapSense boards, you can connect Male Berg Strips on the header and connect the central board with CapSense Board.

Figure A-4. PSoC 4100S Plus Prototyping kit Broken into Four Parts



## A.2.5 Header Connections

The PSoC 4100S Plus Prototyping kit supports a number of unpopulated headers on both the Kit-Prog2 and the target PSoC 4100S Plus boards.

### A.2.5.1 *Functionality of the J1 and J2 Headers (Target Board)*

The target PSoC 4100S Plus board contains two single inline headers (J1 and J2). These headers are both 1×30-pin headers and include all of the I/Os available on the PSoC 4100S Plus device. These headers support all of the available ports, GND, VDDD, VDDA, and connections to passive elements and user-input devices.

The **J1** and **J2** headers support 100-mil spacing, so you can solder connectors to connect the target board to a development breadboard.

Figure A-5. J1 and J2 Headers

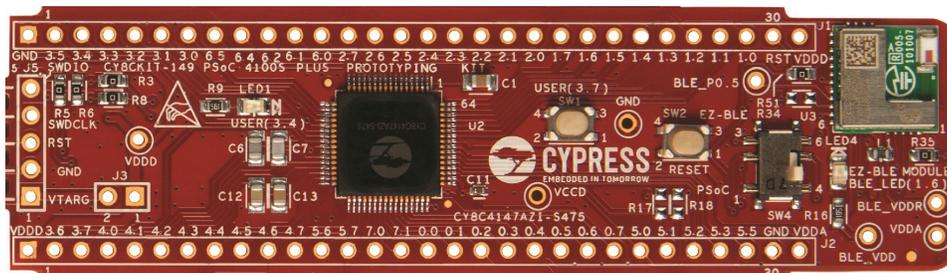


Table A-1. J1 Header Pin Details

PSoC 4100S Plus Prototyping kit GPIO Header		
Pin	Signal	Description
J1_01	GND	Ground
J1_02	P3_5	GPIO
J1_03	P3_4	GPIO/User LED
J1_04	P3_3	GPIO/SWDCLK
J1_05	P3_2	GPIO/SWDIO
J1_06	P3_1	GPIO/I2C_SDA
J1_07	P3_0	GPIO/I2C_SCL
J1_08	P6_5	GPIO/SLD_5
J1_09	P6_4	GPIO/SLD_4
J1_10	P6_2	GPIO/SLD_3
J1_11	P6_1	GPIO/SLD_2
J1_12	P6_0	GPIO/SLD_1
J1_13	P2_7	GPIO/SLD_0
J1_14	P2_6	GPIO
J1_15	P2_5	GPIO/SLD_SHIELD
J1_16	P2_4	GPIO
J1_17	P2_3	GPIO
J1_18	P2_2	GPIO/LED_10
J1_19	P2_1	GPIO
J1_20	P2_0	GPIO/LED_9
J1_21	P1_7	GPIO/SAR Bypass
J1_22	P1_6	GPIO/LED_8
J1_23	P1_5	GPIO
J1_24	P1_4	GPIO/LED_7
J1_25	P1_3	GPIO
J1_26	P1_2	GPIO/LED_6
J1_27	P1_1	GPIO/SLD_TX
J1_28	P1_0	GPIO/LED_5
J1_29	RESET	RESET
J1_30	VDDD	POWER

Table A-2. J2 Header Pin Details

PSoC 4100S Plus Prototyping kit GPIO Header		
Pin	Signal	Description
J2_01	VDDD	POWER
J2_02	P3_6	GPIO
J2_03	P3_7	GPIO/User Switch
J2_04	P4_0	GPIO
J2_05	P4_1	GPIO
J2_06	P4_2	GPIO
J2_07	P4_3	GPIO
J2_08	P4_4	GPIO/BTN2_RX0
J2_09	P4_5	GPIO/BTN1_RX0
J2_10	P4_6	GPIO/BTN0_RX0
J2_11	P4_7	GPIO
J2_12	P5_6	GPIO
J2_13	P5_7	GPIO/LED_13
J2_14	P7_0	GPIO/UART_RX
J2_15	P7_1	GPIO/UART_TX
J2_16	P0_0	GPIO
J2_17	P0_1	GPIO/BTN_SHIELD
J2_18	P0_2	GPIO/BTN_TX
J2_19	P0_3	GPIO
J2_20	P0_4	GPIO/WCO_IN
J2_21	P0_5	GPIO/WCO_OUT
J2_22	P0_6	GPIO/ECO_IN
J2_23	P0_7	GPIO/ECO_OUT
J2_24	P5_0	GPIO/BLE RX
J2_25	P5_1	GPIO/BLE TX
J2_26	P5_2	GPIO/LED_11
J2_27	P5_3	GPIO
J2_28	P5_5	GPIO/LED_12
J2_29	GND	GROUND
J2_30	VDDA	POWER

### A.2.5.2 Functionality of J4 and J5 Headers (PSoC 4100S Plus to KitProg2)

The KitProg2 and target boards each contain a 1x5-pin header. These headers provide a physical connection between the two devices. Specifically, the connection includes the SWD interface, required to program/debug the target PSoC 4100S Plus device and EZ-BLE Module, power, ground, and reset.

Figure A-6. J4 and J5 Headers

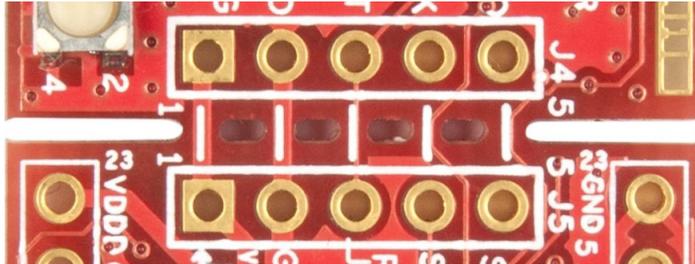


Table A-3. Pin Details of J4 Header

PSoC 5LP KitProg2 Header (J4)		
Pin	Signal	Description
J4_01	VTARG	Power
J4_02	GND	Ground
J4_03	P12.4	Reset
J4_04	P12.3	SWD_CLK
J4_05	P12.2	SWD_IO

Table A-4. Pin Details of J5 Header

PSoC 4100S Plus device Header (J5)		
Pin	Signal	Description
J5_01	VTARG	Power
J5_02	GND	Ground
J5_03	XRES	Reset
J5_04	P3.3	SWD_CLK
J5_05	P3.2	SWD_IO

When the boards are separated, the KitProg2 board can be used to program any other PSoC 3, PSoC 4, PSoC 5LP family of devices via **J4**.

### A.2.5.3 Functionality of J6 and J7 Headers (KitProg2)

The KitProg2 board contains two single inline headers (**J6** and **J7**). Both are 1x7-pin-headers, used to pull out several pins of the PSoC 5LP to support advanced features like a low-speed oscilloscope and a low-speed digital logic analyzer. This header also contains the KitProg2 bridge pins that can be used when the two boards are separated.

The **J6** and **J7** headers support 100-mil spacing, so you can solder connectors to connect the KitProg2 board to a development breadboard.

Figure A-7. J6 and J7 Headers

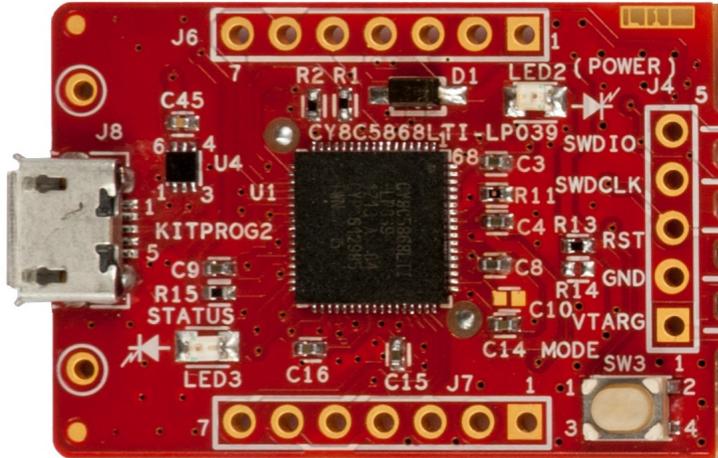


Table A-5. Pin Details of J6

PSoC 5LP KitProg2 Header (J6)		
Pin	Signal	Description
J6_01	VBUS	Power
J6_02	GND	Ground
J6_03	P12.5	GPIO
J6_04	P12.0	GPIO/I2C_SCL
J6_05	P12.1	GPIO/I2C_SDA
J6_06	P12.7	GPIO/UART_RX
J6_07	P12.6	GPIO/UART_TX

Table A-6. Pin Details of J7

PSoC 5LP KitProg2 Header (J7)		
Pin	Signal	Description
J7_01	GND	Ground
J7_02	P3.0	GPIO
J7_03	P3.4	GPIO
J7_04	P3.5	GPIO
J7_05	P3.6	GPIO
J7_06	P0.2	GPIO
J7_07	P0.1	GPIO

#### A.2.5.4 *Functionality of Connector J8 (USB 2.0 Micro-B Connector)*

This connector on the kit enables the user to connect the kit to PC using USB 2.0 Type-A to Micro-B Cable on J8 (USB Micro-B connector).

Figure A-8. USB 2.0 Micro-B connector J8

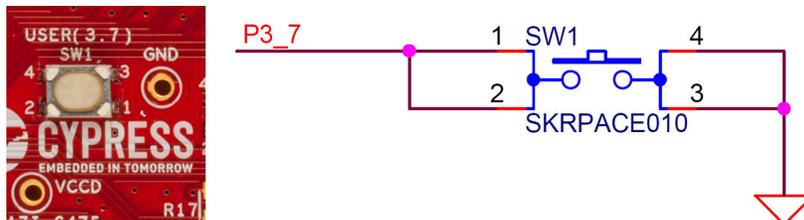


#### A.2.6 User and Passive Inputs

##### A.2.6.1 *User Switch*

The target PSoC 4100S Plus board contains a switch connected to the **P3[7]** pin on the PSoC 4100S Plus device. This switch can be used for general user inputs or to control different states in an application.

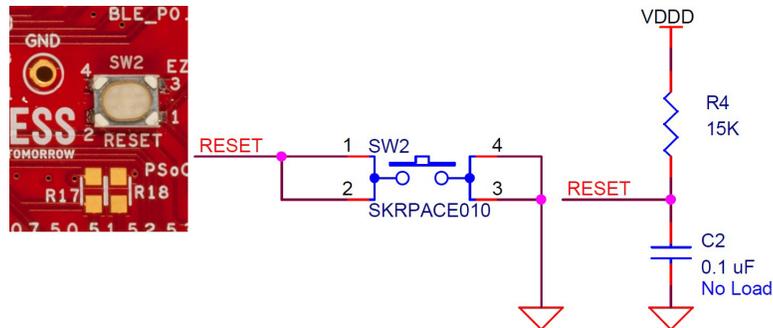
Figure A-9. User Switch on the Board



### A.2.6.2 Reset Switch

When the Reset button is pressed, the XRES line of the PSoC 4100S Plus device is pulled to ground, which resets the target device.

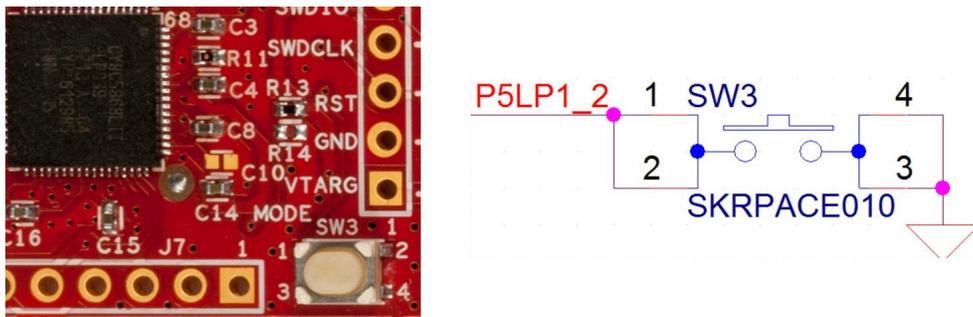
Figure A-10. Reset (RST) Switch



### A.2.6.3 Mode Switch (KitProg2)

The KitProg2 board contains a push button connected to P1.2 of the PSoC 5LP. When this button is pressed, it toggles between KitProg2 mode and CMSIS-DAP/Mass Storage Mode. For more details, see the [KitProg2 User Guide](#).

Figure A-11. Mode Switch

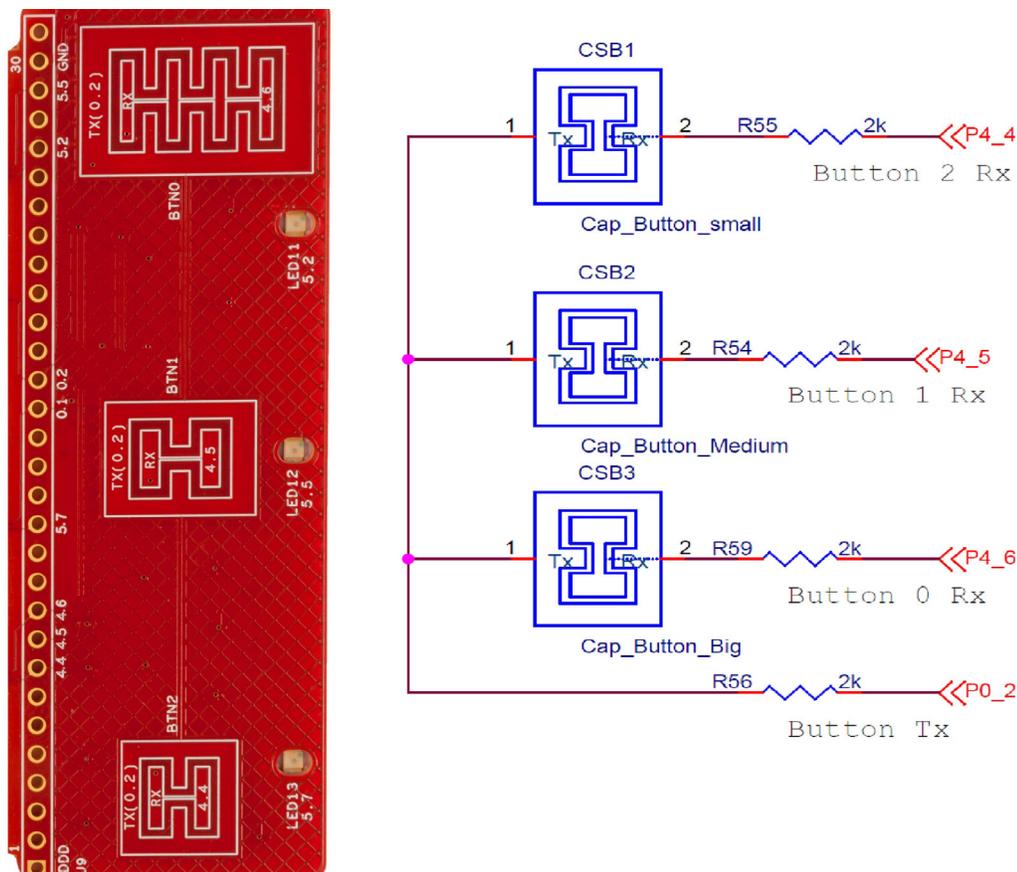


### A.2.6.4 CapSense Buttons

Three CapSense buttons (BTN0, BTN1, and BTN2) are provided on a breakout board to demonstrate the CapSense button functionality of PSoC 4100S Plus device. All the I/Os used for implementing the CapSense buttons are exposed through the headers **J2** and **J9**. Shield for button is connected to ground by default. If you want to connect it to port (P0.1), remove R57 and load R58.

**Note:** CapSense Buttons and Slider are covered with Acrylic overlay of 1mm thickness. This is important parameter for tuning.

Figure A-12. CapSense Buttons



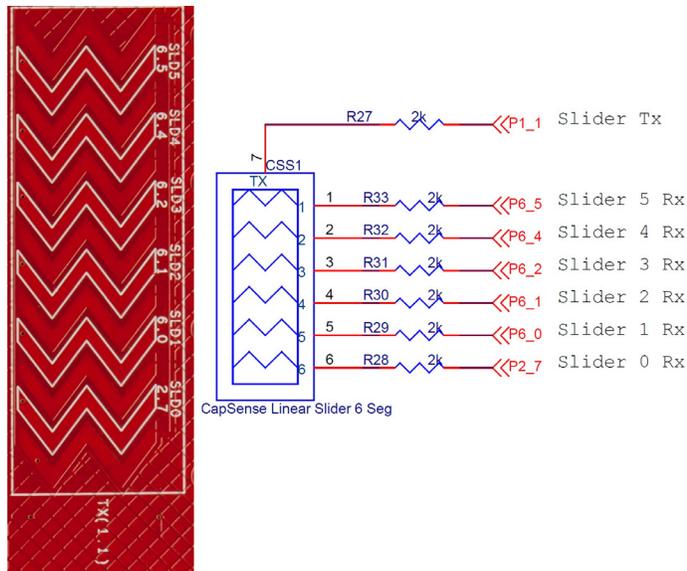
**Note:** Touching CapSense buttons and slider for about 2 sec will auto-reset the sensor, turning off LEDs. This is due to the auto-reset feature enabled in CapSense component for the Code example provided with the kit.

### A.2.6.5 CapSense Linear Slider

A 6-segment linear slider (SLD0, SLD1, SLD2, SLD3, SLD4, and SLD5) is provided on a breakout board to demonstrate the CapSense slider functionality of PSoC 4100S Plus device. All the I/Os used for implementing the CapSense Slider are exposed through the headers **J1** and **J10**. Shield for slider is connected to ground by default. If you want to connect it to port (P2.5), remove R26 and load R25.

**Note:** CapSense Buttons and Slider are covered with Acrylic overlay of 1mm thickness. This is important parameter for tuning.

Figure A-13. CapSense Slider



**Note:** Touching CapSense buttons and slider for about 2 sec will auto-reset the sensor, turning off LEDs. This is due to the auto-reset feature enabled in CapSense component for the Code example provided with the kit.

### A.2.6.6 LEDs

The PSoC 4100S Plus Prototyping kit contains thirteen LEDs:

- The Amber Power LED (LED2): Indicates that the board is powered from the USB 2.0 Micro-B connector. This LED will not glow when the board is powered from VDDD or VTARG directly.
- The Amber Status LED (LED3): Indicates the KitProg2 status connected to **P1[4]** of the KitProg2 PSoC 5LP device. See [Table A-7](#) below for a summary of the status LED states. For more details on the KitProg2 status LED, see the [KitProg2 User Guide](#).
- The blue LED (LED1): This is the user LED connected to **P3[4]** of the target PSoC 4100S Plus device.
- One blue LED, LED4 (EZ-BLE User): This is the user LED connected to GPIO of EZ-BLE Module.
- Six Green LEDs (LED5, LED6, LED7, LED8, LED9, LED10) (CapSense Slider User): These are feedback LEDs for six segment slider.
- Three Green LEDs (LED11, LED12, LED13) (CapSense Button User): These are feedback LEDs for CapSense buttons.

Table A-7. LED status for KitProg2 Modes

KitProg2 Programming Modes *	Status LED (LED3)
KitProg2 Program / Debug Mode (PPCOM mode) (default)	ON
CMSIS-DAP & Mass Storage Programming Mode	OFF

**\*Note:** Toggling between programming modes can be done by pressing mode switch SW3.

**Note:** User LEDs i.e. LED1 and LED4 will not work at 1.8V, other LEDs may work with very low brightness.

Figure A-14. Power LED



Figure A-15. Status LED

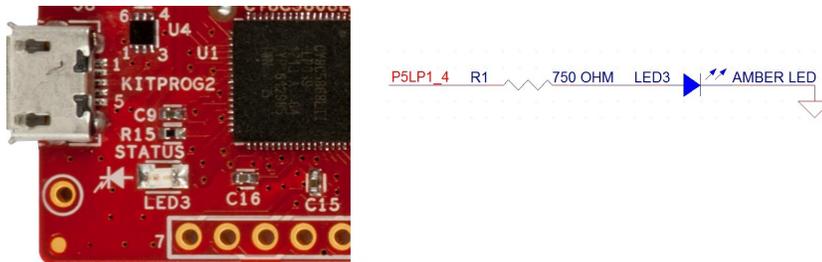


Figure A-16. User LED

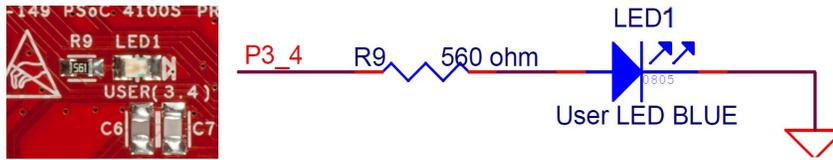


Figure A-17. Feedback LEDs for CapSense Button

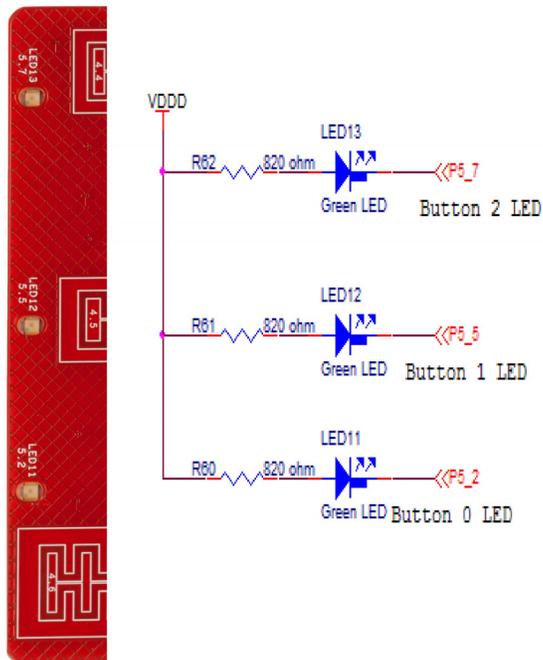
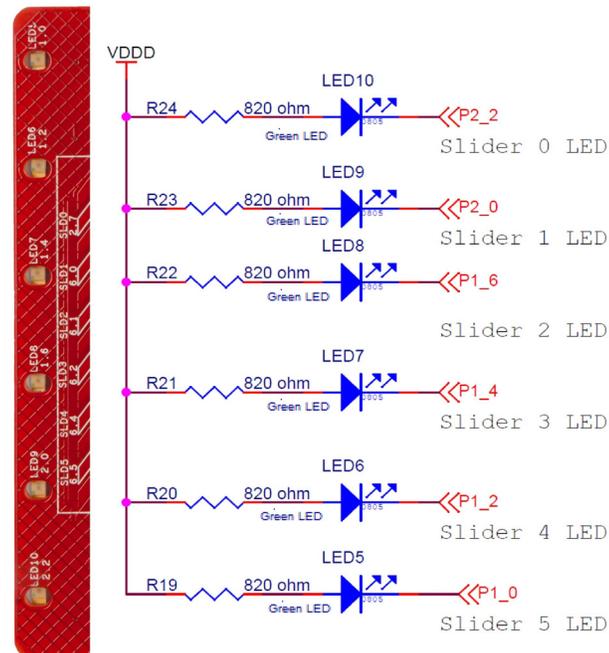


Figure A-18. Feedback LEDs for CapSense Slider

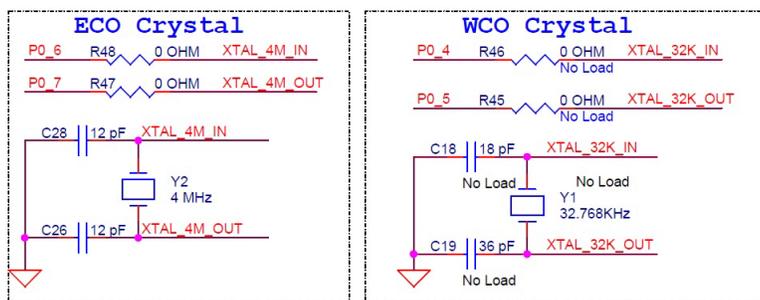


### A.2.6.7 System Capacitors

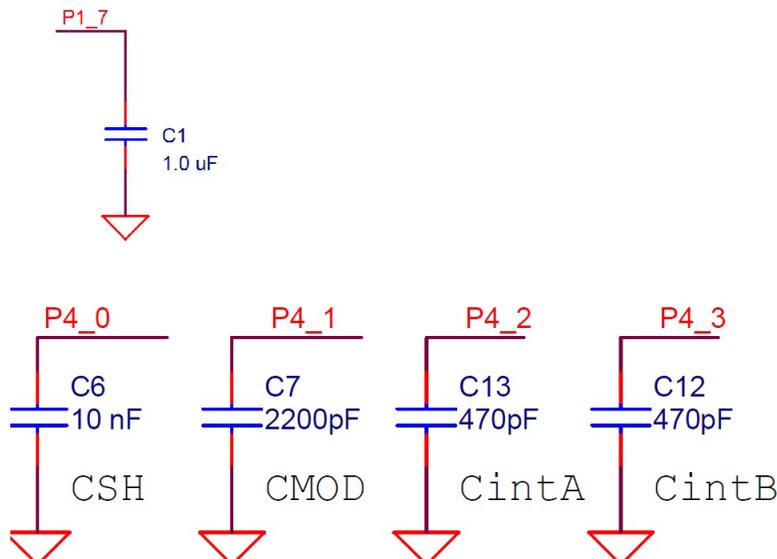
The CY8CKIT-149 PSoC 4100S Plus Prototyping Kit has eight capacitors in addition to power supply decoupling capacitors:

- Four CapSense capacitors (CMOD, CSH, CintA, CintB): Required for CapSense functionality of PSoC 4100S Plus device.
- SAR bypass capacitor for PSoC 4100S Plus device (C1 - Loaded by default). To use port P1.7 as GPIO desolder C1.
- Two biasing capacitors (C18 and C19 (No Load)): Required to interface an external 32.768 kHz crystal oscillator (WCO).
- Two biasing capacitors (C28 and C26 (Loaded)): Required to interface an external 4 MHz crystal oscillator (ECO).

Figure A-19. System Capacitors Circuit Diagram



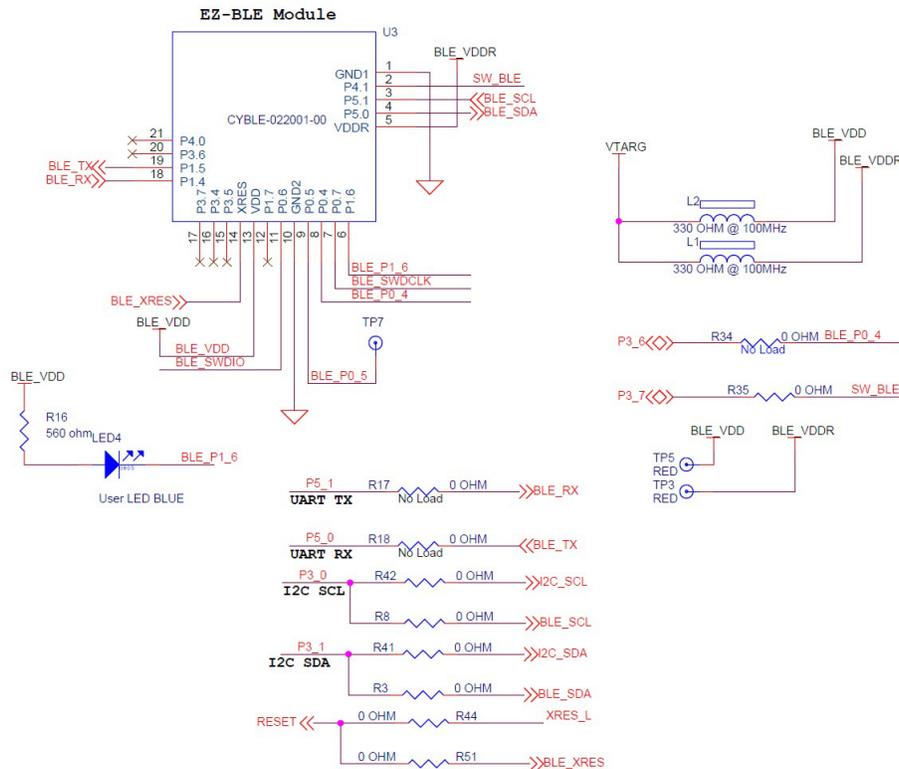
SAR bypass  
Capacitor



### A.2.6.8 EZ-BLE Module

The board includes an EZ-BLE Module, which is loaded by default. The EZ-BLE Module is a fully integrated, 10 × 10 × 1.8 mm, fully certified, programmable module designed for ease-of-use and reduced time-to-market. It contains Cypress' BLE chip, two crystals, chip antenna, shield, and passive components. For more details, see [AN96841 - Getting Started With EZ-BLE Module](#). Visit [www.cypress.com/ez-ble-module](http://www.cypress.com/ez-ble-module) to buy the EZ-BLE Module.

Figure A-20. EZ-BLE Connections



The EZ-BLE Module includes the following connections to PSoC 4100S Plus and KitProg2:

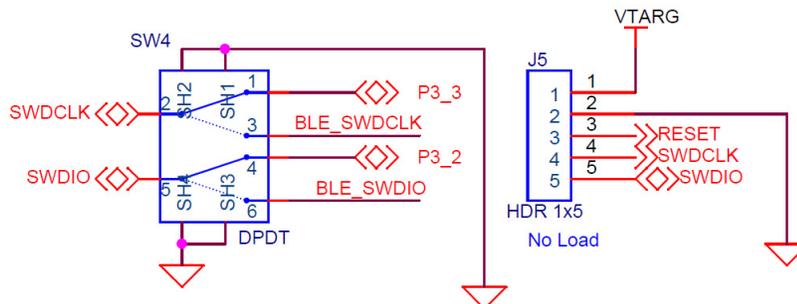
- UART connections to PSoC 4100S Plus through zero-ohm resistors R17 and R18 (see [Figure A-20](#) and [Table A-8](#)). Note that R17 and R18 are not loaded by default.
- I<sup>2</sup>C connections to KitProg2 and PSoC 4100S Plus device (see [Table A-8](#)).
- SWD connections to KitProg2 through the DPDT switch SW4. The SWD connections are shared between the PSoC 4100S Plus and EZ-BLE devices.

Table A-8. EZ-BLE Connections

EZ-BLE Connections			
EZ-BLE	PSoC 4100S Plus	KitProg2	Description
BLE_TX, P1_5	P5_0	–	UART_RX
BLE_RX, P1_4	P5_1	–	UART_TX
BLE_SDA, P5_0	P3_1	P12_1	I2C_SDA
BLE_SCL, P5_1	P3_0	P12_0	I2C_SCL
BLE_SWDIO, P0_6	–	P12_2	SWDIO
BLE_SWDCCLK, P0_7	–	P12_3	SWDCCLK
P0_4	P3_6	–	GPIO
BLE_XRES	RESET	P12_4	RESET
P1_6	–	–	BLE LED
P4_1	P3_7	–	User Button

Use DPDT switch SW4 to switch the SWD connections between PSoC 4100S Plus or EZ-BLE Module as shown in [Figure A-21](#).

Figure A-21. DPDT Switch SW4 to Select between PSoC 4100S Plus and EZ-BLE



### A.3 PSoC 4100S Plus Prototyping Kit Schematics

Refer to the schematic file in the following path in the kit software installed:

```
<Install_Directory>\CY8CKIT-149 PSoC 4100S Plus Prototyping Kit\  
<version>\Hardware\CY8CKIT-149 Schematic.pdf
```

## A.4 Bill of Materials

Refer to the BOM file in the following path in the kit software installed:

```
<Install_Directory>\CY8CKIT-149 PSoC 4100S Plus Prototyping Kit\  
<version>\Hardware\CY8CKIT-149 PCBA BOM.xlsm
```

## A.5 Programming PSoC 4100S Plus Prototyping Kit Using MiniProg3/KitProg2

The target board provides a provision to program the PSoC 4100S Plus device using MiniProg3 or an external KitProg2 via the 5-pin SWD header. To do this, connect wires or a 5-pin 100-mil spaced header to **J5**. The PSoC 4100S Plus Prototyping Kit supports both power cycle and reset programming modes.

Figure A-22. Connecting the CY8CKIT-149 to a MiniProg3



**Note:** [CY8CKIT-002 MiniProg3](#) is not part of the PSoC 4100S Plus Prototyping Kit contents and can be purchased from the [Cypress Online Store](#).

# Revision History



## Document Revision History

Document Title: CY8CKIT-149 PSoC® 4100S Plus Prototyping Kit Guide				
Document Number: 002-20729				
Revision	ECN#	Issue Date	Origin of Change	Description of Change
**	5891431	09/26/2017	NMIT	New kit guide.
*A	5909768	10/05/2017	NMIT	Updated Document Title to read as "CY8CKIT-149 PSoC® 4100S Plus Prototyping Kit Guide".
*B	5955319	11/02/2017	NMIT	Updated <a href="#">Introduction chapter on page 7</a> : Updated "Kit Contents" on page 8: Updated <a href="#">Figure 1-1</a> . Updated "PSoC Creator" on page 9: Updated "PSoC Creator Code Examples" on page 10: Updated <a href="#">Figure 1-4</a> . Updated <a href="#">Software Installation chapter on page 16</a> : Updated "Install Software" on page 16: Updated <a href="#">Figure 2-2</a> . Updated <a href="#">Kit Operation chapter on page 20</a> : Updated "Programming and Debugging the Target PSoC 4100S Plus Device" on page 22: Updated "Programming Using PSoC Creator" on page 22: Updated <a href="#">Figure 3-2</a> . Updated "USB-UART Bridge" on page 24: Updated <a href="#">Figure 3-5</a> . Updated "USB-I2C Bridge" on page 25: Updated <a href="#">Figure 3-6</a> . Updated <a href="#">Code Examples chapter on page 26</a> : Updated "Using Built-in PSoC Creator Code Examples with the Kit" on page 29: Updated <a href="#">Figure 4-9</a> .

## Document Revision History (*continued*)

Document Title: CY8CKIT-149 PSoC® 4100S Plus Prototyping Kit Guide				
Document Number: 002-20729				
Revision	ECN#	Issue Date	Origin of Change	Description of Change
*B (cont.)	5955319	11/02/2017	NMIT	Updated <a href="#">Appendix chapter on page 32</a> : Updated “Board Details” on page 32: Updated <a href="#">Figure A-1</a> . Updated “Hardware Details” on page 34: Updated “Board Separation (Snapping)” on page 37: Updated <a href="#">Figure A-4</a> . Updated “Header Connections” on page 38: Updated “Functionality of the J1 and J2 Headers (Target Board)” on page 38: Updated <a href="#">Figure A-5</a> .
*C	5968892	11/16/2017	NMIT	Updated <a href="#">Introduction chapter on page 7</a> : Updated “PSoC Creator” on page 9: Updated “PSoC Creator Code Examples” on page 10: Updated <a href="#">Figure 1-4</a> . Updated <a href="#">Code Examples chapter on page 26</a> : Updated “Using Built-in PSoC Creator Code Examples with the Kit” on page 29: Updated <a href="#">Figure 4-8</a> . Updated <a href="#">Figure 4-9</a> .
*D	5980437	12/05/2017	NMIT	Updated <a href="#">Introduction chapter on page 7</a> : Updated “Technical Support” on page 13: Replaced “Ext. 2” with “Ext. 3”. Updated <a href="#">Kit Operation chapter on page 20</a> : Updated “Theory of Operation” on page 20: Updated <a href="#">Table 3-1</a> . Updated <a href="#">Code Examples chapter on page 26</a> : Updated “Using Built-in PSoC Creator Code Examples with the Kit” on page 29: Updated description. Updated <a href="#">Appendix chapter on page 32</a> : Updated “Hardware Details” on page 34: Updated “User and Passive Inputs” on page 42: Updated “LEDs” on page 46: Updated <a href="#">Table A-7</a> .
*E	6005754	12/26/2017	NMIT	Updated <a href="#">Appendix chapter on page 32</a> : Updated “Hardware Details” on page 34: Updated “Power Supply System” on page 36: Updated “Measure PSoC 4100S Plus Device Current Consumption” on page 36: Updated description.

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