



CY8CKIT-145-40XX

# PSoC<sup>®</sup> 4000S Prototyping Kit Guide

Doc. # 002-11504 Rev. \*C

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# Contents



<b>Safety Information</b>	<b>5</b>
<b>1. Introduction</b>	<b>6</b>
1.1 Kit Contents .....	7
1.2 Board Details .....	8
1.3 PSoC Creator .....	10
1.3.1 PSoC Creator Code Examples .....	11
1.3.2 Kit Code Examples.....	12
1.3.3 PSoC Creator Help .....	12
1.4 Getting Started.....	13
1.5 Additional Learning Resources .....	13
1.6 Technical Support.....	14
1.7 Documentation Conventions.....	14
1.8 Acronyms .....	15
<b>2. Software Installation</b>	<b>16</b>
2.1 Before You Begin.....	16
2.2 Install Software .....	16
2.3 Uninstall Software .....	19
<b>3. Kit Operation</b>	<b>20</b>
3.1 Theory of Operation.....	20
3.2 KitProg2 .....	23
3.2.1 Programming and Debugging Using PSoC Creator.....	23
3.2.2 Programming Using PSoC Programmer .....	25
3.2.3 Mass Storage Programming .....	25
3.2.4 USB-UART Bridge.....	25
3.2.5 USB-I2C Bridge.....	25
<b>4. Code Examples</b>	<b>26</b>
4.1 Using the Kit Code Examples .....	26
4.1.1 CE210709 CapSense Linear Slider and Buttons .....	28

<b>A. Appendix</b>	<b>29</b>
A.1 Hardware Functional Description.....	29
A.1.1 Board Details.....	29
A.1.2 Hardware Details.....	31
A.2 Schematics .....	48
A.3 Bill of Materials .....	48
A.4 Programming the PSoC 4000S Prototyping Kit Using Minipro3/KitProg2 .....	49
 <b>Revision History</b>	 <b>50</b>

# Safety Information



## Regulatory Compliance

The CY8CKIT-145-40XX PSoC<sup>®</sup> 4000S 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 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 4000S Prototyping Kit, as shipped from the factory, has been verified to meet with the requirements of CE as a Class A product.



The PSoC 4000S 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 PSoC 4000S Prototyping kits in the protective shipping package.



### End-of-Life/Product Recycling

This kit has an end-of life five years from the date of manufacture which is encoded in bar code placed on the pack. 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 an ESD workstation is not available, use appropriate ESD protection by wearing an antistatic wrist strap attached to a grounded metal object.

### Handling Boards

PSoC 4000S Prototyping Kit 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 the board over any surface.

# 1. Introduction



Thank you for your interest in the CY8CKIT-145-40XX PSoC<sup>®</sup> 4000S Prototyping Kit. The PSoC 4000S Prototyping Kit enables customers to evaluate and develop projects using the PSoC 4000S device family.

PSoC 4000S device family is an expansion to the PSoC 4000 device family that offers more flash, GPIOs, and programmable analog and digital blocks. PSoC 4000S device is a programmable embedded system-on chip, integrating custom analog and digital peripheral functions, memory, and an ARM<sup>®</sup> Cortex<sup>®</sup>-M0+ microcontroller on a single chip. The programmable analog and digital peripheral functions allow higher flexibility, in-field tuning of the design, and faster time-to-market.

The PSoC 4000S Prototyping Kit offers an open footprint breakout board to maximize the end utility of the PSoC 4000S device. This kit provides a low-cost alternative to device samples while providing a platform to easily develop and integrate the PSoC 4000S device into your end-system.

The board includes the following features:

- 3 CapSense buttons
- 5-Segment CapSense slider
- LEDs to provide feedback
- Onboard CMOD, CTANK, CintA and CintB capacitors to enable CapSense development
- Bypass capacitor to ensure high-quality analog-to-digital conversions (No Load by default)
- A push button to provide a simple user input
- Load capacitors to connect the 32-kHz external crystal oscillator
- Cypress EZ-BLE<sup>®</sup> PSoC<sup>™</sup> Module
- 5-V operation

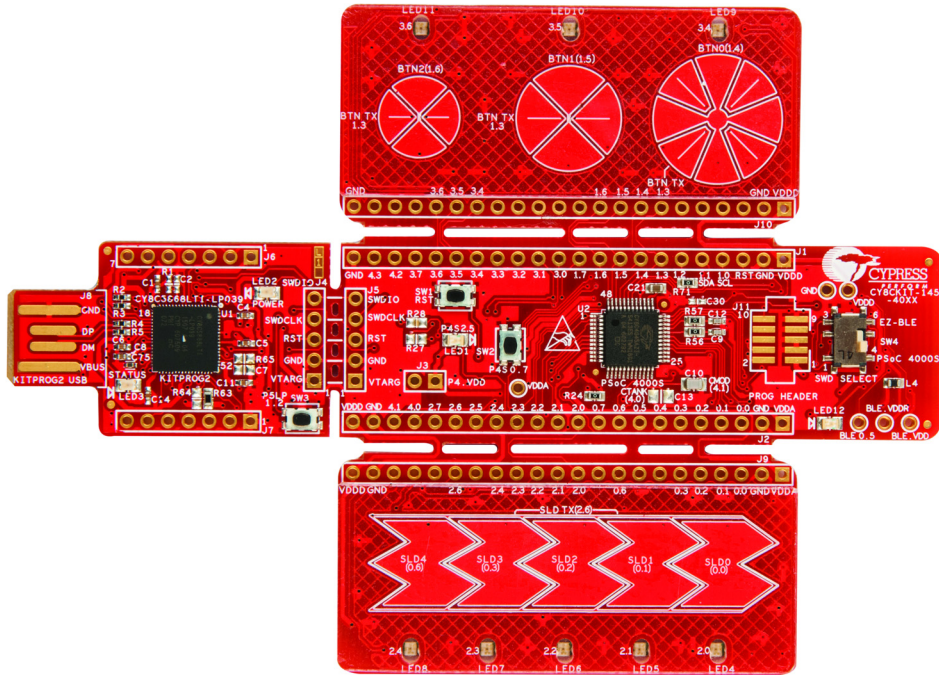
The PSoC 4000S Prototyping Kit also integrates Cypress KitProg2, which enables onboard programming, debugging, and bridging functionality such as USB-UART and USB-I2C. KitProg2 is used to program and debug the target PSoC 4000S/EZ-BLE PSoC device. The PSoC 4000S Prototyping kit is designed to snap away the KitProg2 board from the PSoC 4000S target board.

You will use PSoC Creator<sup>™</sup> to develop and debug your PSoC 4000S device projects. PSoC Creator is Cypress's standard integrated design environment (IDE). If you are new to PSoC Creator, see the documentation on the [PSoC Creator home page](#). You can also refer the application note [AN79953 - Getting Started with PSoC 4](#), which gives an introduction to the PSoC 4 device.

## 1.1 Kit Contents

The PSoC 4000S Prototyping Kit contains PSoC 4000S Prototyping board and Quick Start Guide. The PSoC 4000S Prototyping board is as shown in [Figure 1-1](#).

Figure 1-1. PSoC 4000S Prototyping Board



## 1.2 Board Details

The PSoC 4000S Prototyping board consists of the blocks as shown in Figure 1-2. Also, Figure 1-3 shows the pin mapping for kit headers.

Figure 1-2. PSoC 4000S Prototyping Board Block Diagram

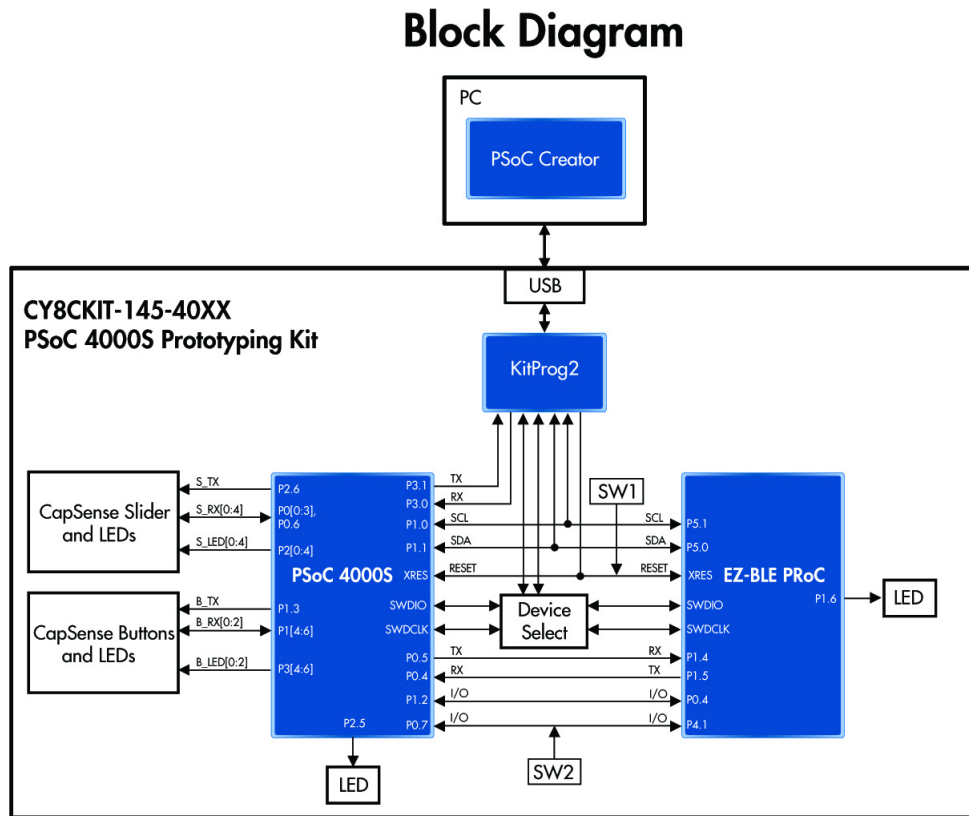
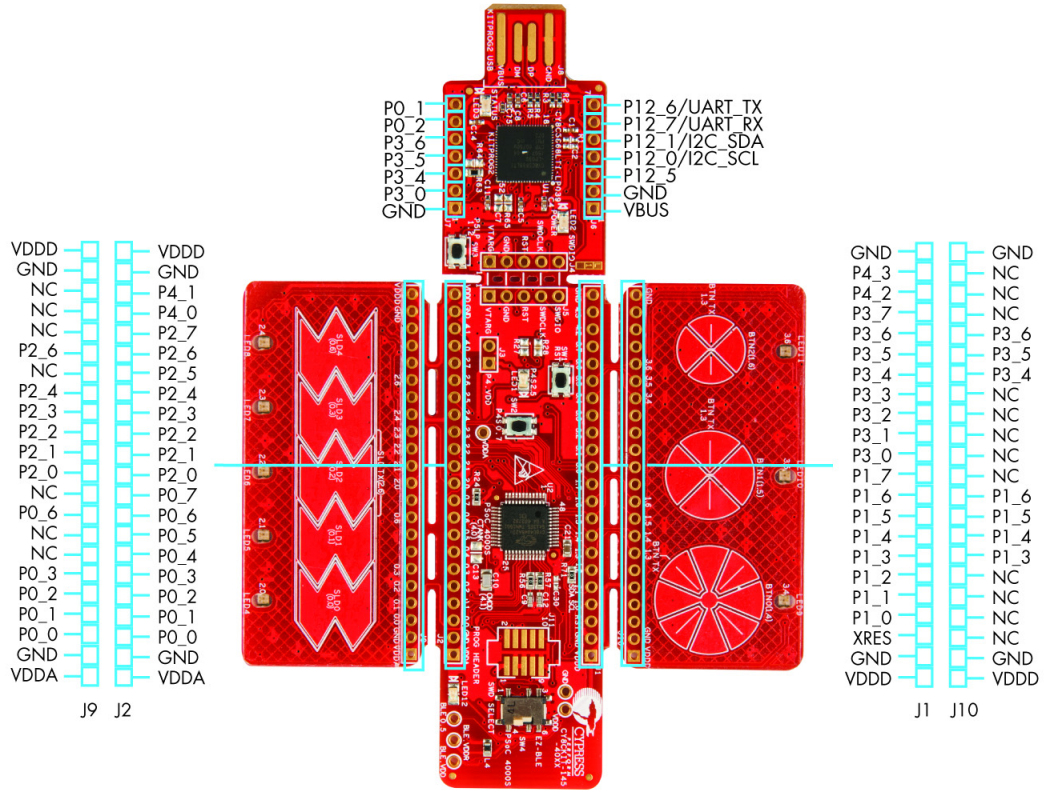




Figure 1-3. PSoC 4000S Prototyping Board Pin Details

## Pinout Description

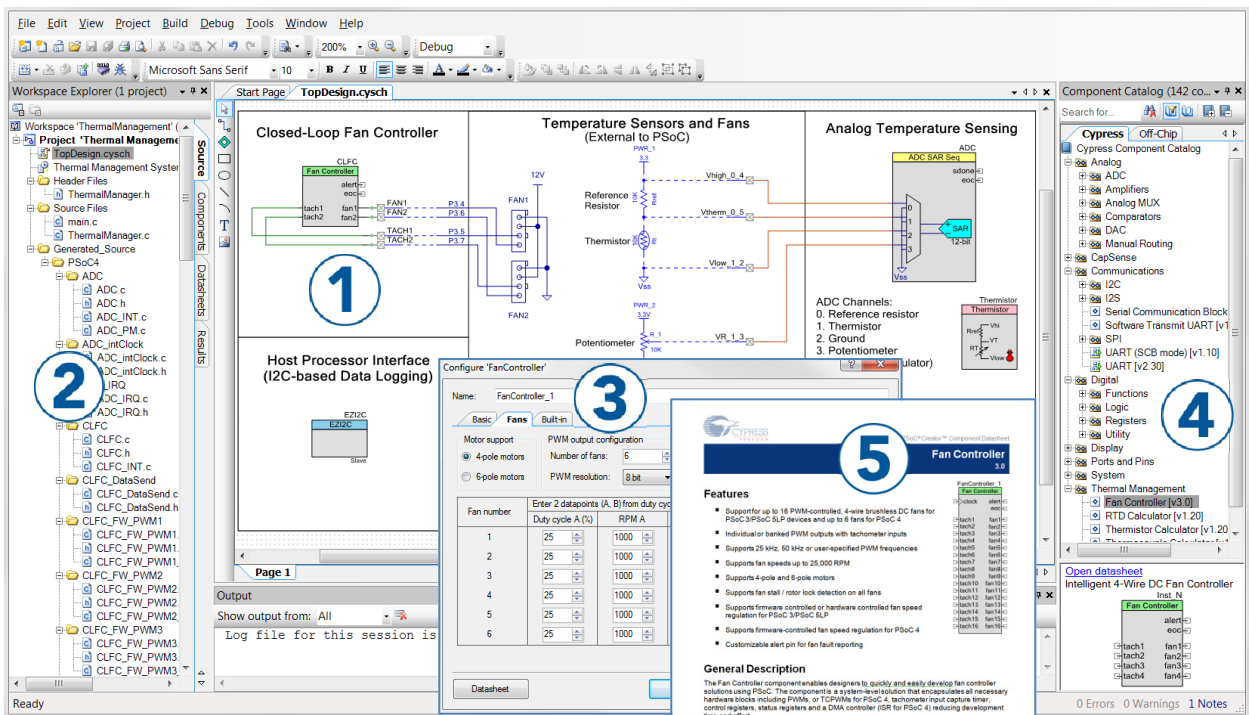


### 1.3 PSoC Creator

PSoC Creator is a state-of-the-art, easy-to-use IDE. It introduces revolutionary hardware and software co-design, powered by a library of fully verified and characterized PSoC Components™, as shown in Figure 1-4. 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. Access Component datasheets

Figure 1-4. PSoC Creator Features



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

For more information, visit [www.cypress.com/psoccreator](http://www.cypress.com/psoccreator).

### 1.3.1 PSoC Creator Code Examples

PSoC Creator includes a large number of code examples. These examples are accessible from the PSoC Creator **Start Page**, as shown in [Figure 1-5](#).

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 to use PSoC Creator Components for various applications. Code examples and documentation are included as shown in [Figure 1-6](#).

In the **Find Code Examples** dialog shown in [Figure 1-6](#), you have several options:

- Filter for examples based on a device family or keyword.
- Select from the list of examples offered based on the **Filter Options**.
- View the project documentation for the selection (on the **Documentation** tab).
- View the code for the selection on the **Sample Code** tab. You can also copy and paste code from this window to your project, which can help speed up code development.
- Create new workspace for the code example or add to your existing workspace. 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 1-5. Code Examples in PSoC Creator

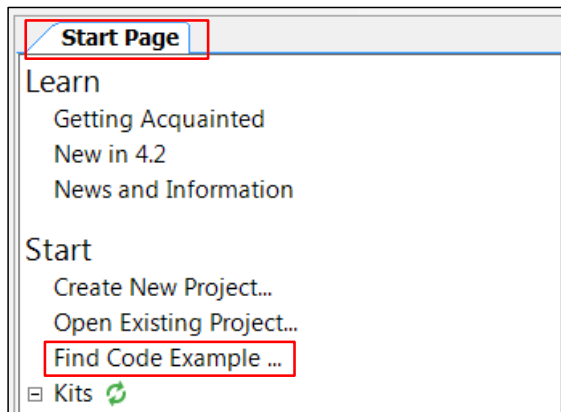
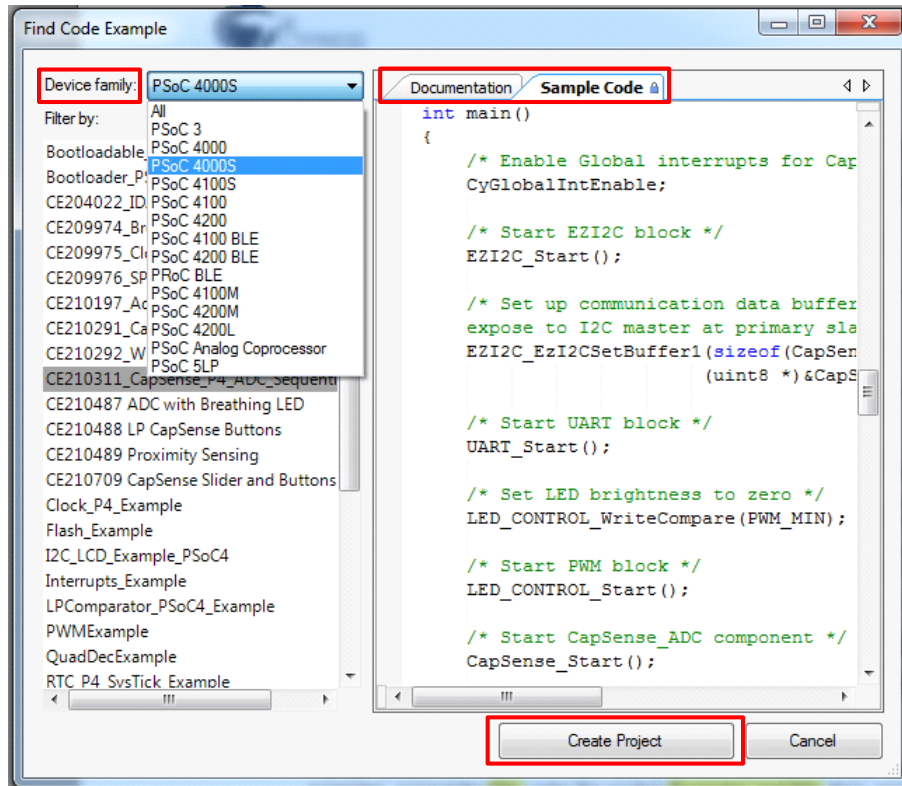


Figure 1-6. Code Examples with Sample Code



### 1.3.2 Kit Code Examples

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

### 1.3.3 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 on the Component in the schematic or in the Component Catalog. Select the **Find Code Example** option 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.
- **Component Datasheets:** Right-click a Component and select **Open Datasheet**. 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 easily find and access the document resources. To open the document manager, choose the menu item **Help > Document Manager**.

## 1.4 Getting Started

This guide will help you be acquainted with the CY8CKIT-145-40XX PSoC 4000S Prototyping Kit:

- The [Software Installation chapter on page 16](#) chapter describes the installation of the kit software. This includes the PSoC Creator IDE to develop and debug the applications, and PSoC Programmer to program the .hex files on to the device.
- The [Kit Operation chapter on page 20](#) chapter describes the major features of the PSoC 4000S Prototyping Kit and functionalities such as programming, debugging, and the USB-UART and USB-I2C bridges.
- The [Code Examples chapter on page 26](#) chapter describes PSoC 4000S code examples that will help you understand how to create your own PSoC 4000S projects.
- The [Appendix chapter on page 29](#) provides the detailed hardware description, kit schematics, and the bill of materials (BOM).

## 1.5 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 4000S](#) device families.
- [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. 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 11](#).
- [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](#), and [CY8CKIT-145-40XX](#) are very low-cost prototyping platform 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/training](http://www.cypress.com/training) for a comprehensive list of video trainings on PSoC Creator.
- Learning from Peers: Visit [www.cypress.com/forums](http://www.cypress.com/forums) to meet enthusiastic PSoC developers discussing the next generation embedded systems on Cypress Developer Community Forums.

## 1.6 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](#)

## 1.7 Documentation 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 Designer User Guide</i> .
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.

## 1.8 Acronyms

Table 1-2. Acronyms Used in this Document

Acronym	Description
ADC	Analog-to-Digital Converter
BLE	Bluetooth Low Energy
BOM	Bill of Materials
CMOD	Modulator Capacitor
CMP	Comparator
CTANK	Shield tank capacitor
DAC	Digital to Analog Converter
DPDT	Double-Pole, Double-Throw
ESD	Electrostatic Discharge
GPIO	General Purpose Input/Output
I2C	Inter-Integrated Circuit
IDAC	Current DAC
IDE	Integrated Development Environment
LED	Light-Emitting Diode
PRoC	Programmable Radio-on-Chip
PSoC	Programmable Systems-on-Chip
TCPWM	Timer, Counter, Pulse Width Modulator
SAR	Successive Approximation Register
SCB	Serial Communication Block
SRAM	Static Random Access Memory
SWD	Serial Wire Debug
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 4000S 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 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 4000S Prototyping Kit software:

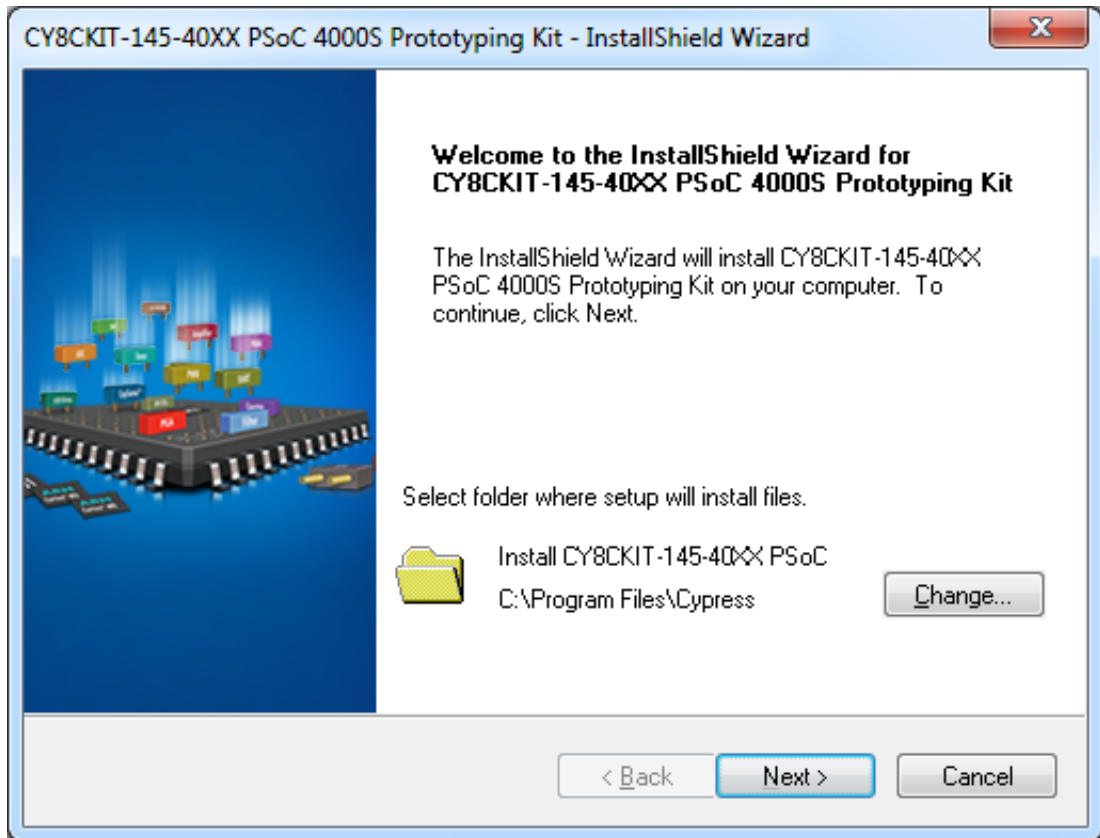
1. Download the PSoC 4000S Prototyping Kit software from [www.cypress.com/CY8CKIT-145-40XX](http://www.cypress.com/CY8CKIT-145-40XX). The kit software is available in three different formats for download.
  - a. **CY8CKIT-145-40XX Kit Only:** This executable file installs only the kit contents, which 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-145-40XX Kit Complete Setup:** This installation package contains the files related to the kit along with Cypress prerequisite software such as 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 computer, the installer directs you to download and install them from the Internet.
  - c. **CY8CKIT-145-40XX DVD ISO:** This file is a complete package, stored in a DVD-ROM image format, which 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 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. 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 the 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" file, then go to step 4 for installation.



3. Click **Install CY8CKIT-145-40XX** to start the kit installation.
4. Select the folder in which you want to install the PSoC 4000S Prototyping kit-related files as shown in [Figure 2-1](#). Choose the directory and click **Next**.

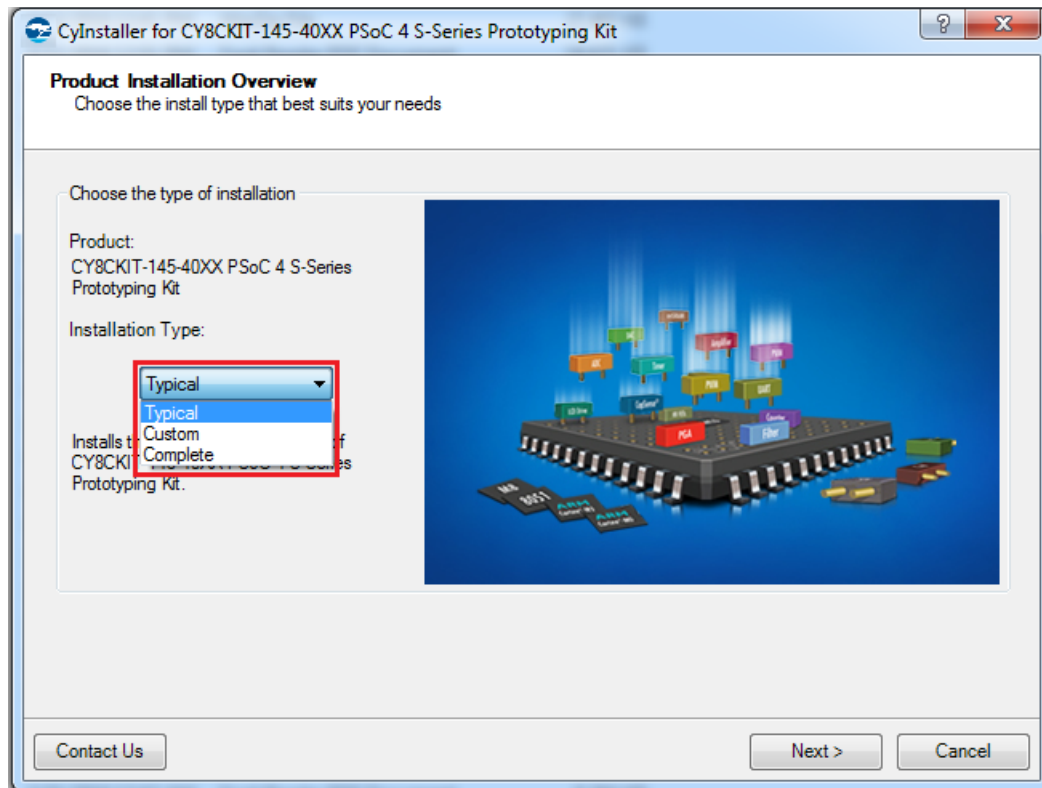
Figure 2-1. Kit Installer Screen



5. When you click **Next**, the installer automatically installs the required software, if it is not present on your computer. Following are the required software:
  - a. PSoC Creator 4.2: This software is available for download separately at [www.cypress.com/psoccreator](http://www.cypress.com/psoccreator). PSoC Creator 4.2 installer automatically installs the following additional software:
    - PSoC Programmer 3.27.1
    - Peripheral Driver Library 3.0.1

- Choose the **Typical**, **Custom**, or **Complete** installation type (select **Typical** if you do not know which one to select) 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.
- Enter your contact information or select the check box **Continue Without Contact Information**. Click **Finish** to complete the CY8CKIT-145-40XX PSoC 4000S Prototyping kit software installation.
- After the installation is complete, the kit contents are available at the following location:  
`<Install_Directory>\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit`  
 Default location:  
 Windows 7 (64-bit): C:\Program Files (x86)\Cypress\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit  
 Windows 7 (32-bit): C:\Program Files\Cypress\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit

**Note:** For Windows 7/8/8.1/10 users, the installed files and the folder are read only. To use the installed code examples, follow the steps outlined in the [Code Examples on page 26](#). These steps will create an editable copy of the example in a path that you choose so the original installed example is not modified.

## 2.3 Uninstall Software

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

Go to **Start > All Programs > Cypress > Cypress Update Manager > Cypress Update Manager** and select the **Uninstall** button that corresponds to the kit software.

Go to **Start > Control Panel > Programs and Features** for Windows 7 or **Add/Remove Programs** for Windows XP; choose the product and select the **Uninstall/Change** button.

# 3. Kit Operation



This chapter introduces you to the various features of the PSoC 4000S Prototyping Kit. It primarily includes the theory of Operation, programming and debugging functionality, KitProg2 USB-UART and USB-I2C bridges.

## 3.1 Theory of Operation

The PSoC 4000S Prototyping Kit is built around the PSoC 4000S device. [Figure 3-1](#) shows the block diagram of the PSoC 4000S device. Refer to the [PSoC 4000S datasheet](#) for details on device features.

Figure 3-1. PSoC 4000S Block Diagram

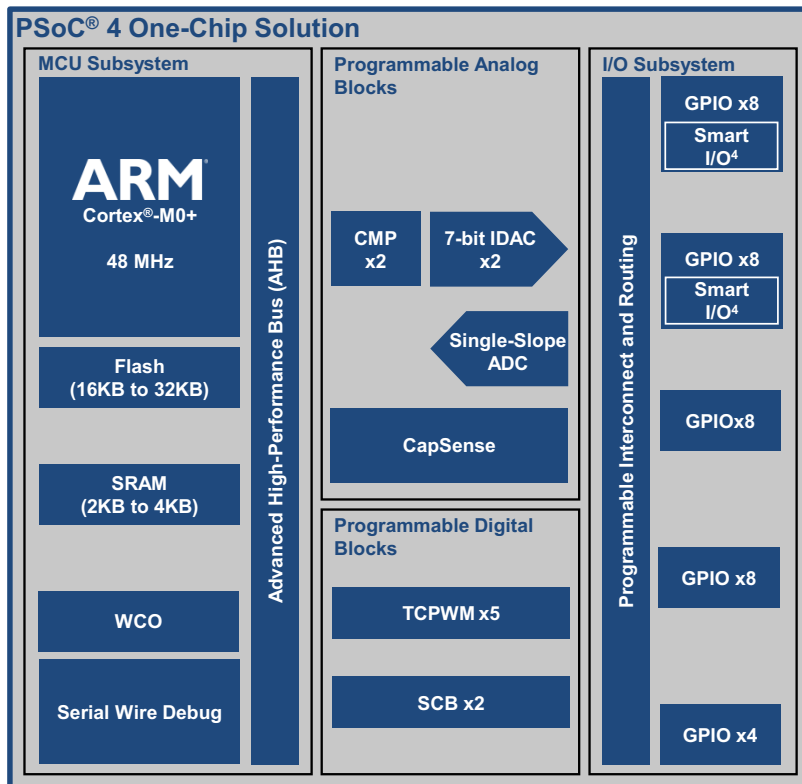
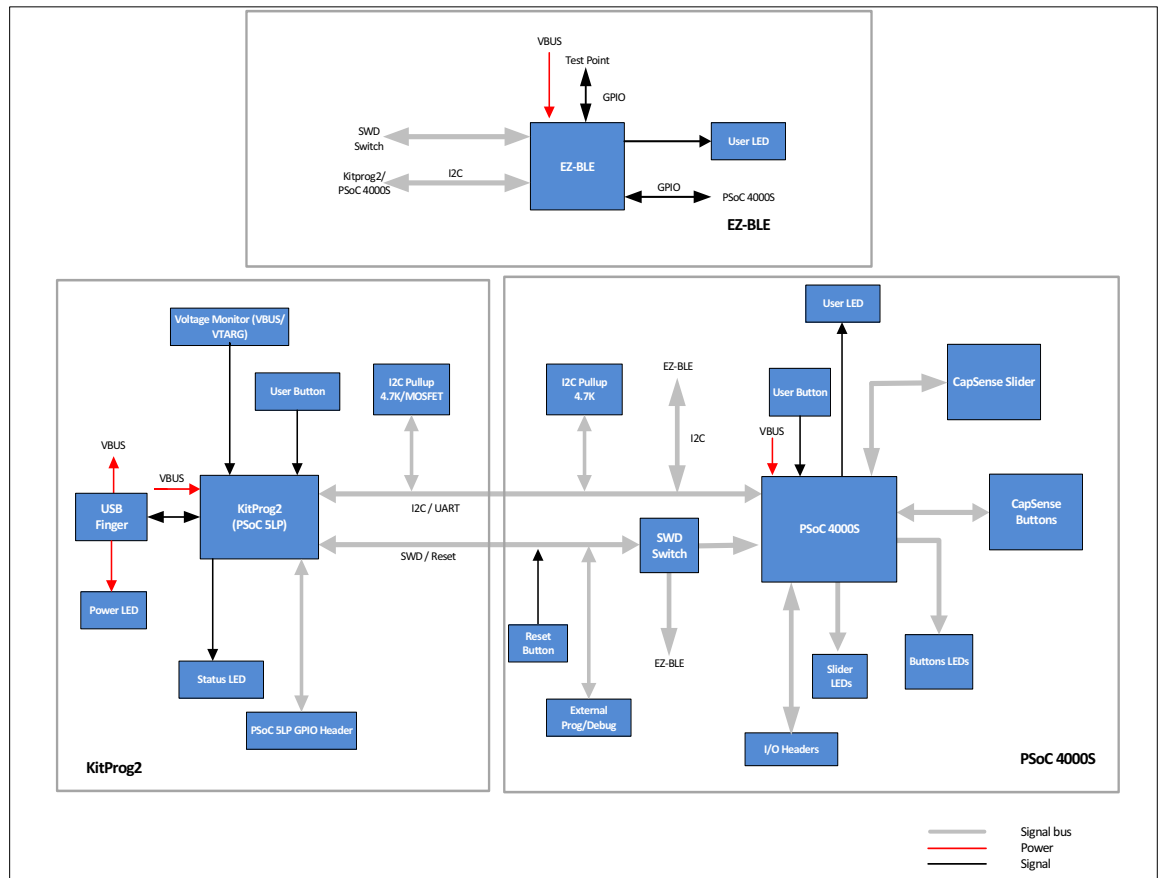


Figure 3-2 shows the block diagram for the PSoC 4000S Prototyping Kit.

Figure 3-2. Block Diagram of PSoC 4000S Prototyping Kit



The PSoC 4000S Prototyping Kit is simple in design and provides complete access to develop applications using the PSoC 4000S device family.

This kit supports the following features:

1. **CapSense Buttons and LEDs:** Three CapSense buttons (BTN0, BTN1, and BTN2) and corresponding LEDs (LED9, LED10, and LED11) are provided on a breakout board to demonstrate the CapSense buttons functionality of the PSoC 4000S device. All the I/Os used for implementing the CapSense Buttons and corresponding LEDs are exposed through the headers J1 and J10.
2. **CapSense Slider and LEDs:** A 5-segment linear slider (SLD0, SLD1, SLD2, SLD3, and SLD4) with corresponding LEDs (LED4, LED5, LED6, LED7, and LED8) are provided on a breakout board to demonstrate the CapSense Slider functionality of the PSoC 4000S device. All the I/Os used for implementing the CapSense Slider and corresponding LEDs are exposed through the headers J2 and J9.
3. **KitProg2 Status LED:** The amber status LED (LED3) indicates the status of KitProg2 (see [KitProg2 on page 23](#)). For more details on the KitProg2 status, refer to the [KitProg2 User Guide](#).

4. **KitProg2 (PSoC 5LP) I/O Headers (J6, J7):** These headers bring out a few GPIO lines of the onboard PSoC 5LP device. These include the KitProg2 USB-I2C bridge lines and USB-UART bridge lines. The additional PSoC 5LP pins are direct connections to the internal programmable analog logic of PSoC 5LP. You can use these pins as General-purpose input/output (GPIO) also.
5. **Power LED (LED2):** The amber power LED is turned on when the kit is connected and powered through the onboard USB connector (J8).
6. **PSoC 4000S I/O Headers (J1, J2):** The PSoC 4000S Prototyping board brings all GPIOs of the target PSoC 4000S device to the two expansion headers, enabling the user to have maximum access to the capabilities of the PSoC 4000S device.
7. **10-pin Programming Header (J11):** This header allows you to program/debug the PSoC 4000S/EZ-BLE devices using an external programmer such as [MiniProg3](#). This header is not populated by default.
8. **EZ-BLE PSoC Module and LED:** The kit includes Cypress EZ-BLE PSoC Module for BLE connectivity and Blue LED (LED12) connected to P1\_6 of its GPIO.
9. **SWD Selection Switch (SW4):** A DPDT switch is provided on the prototyping board to select the SWD lines of either PSoC 4000S or EZ-BLE PSoC Module for programming.
10. **Reset Button (SW1):** This button is used to reset PSoC 4000S and EZ-BLE devices.
11. **PSoC 4000S (U2):** This kit is designed to highlight the features of PSoC 4000S (CY8C4045AZI-S413).
12. **5-pin Programming Headers (J4, J5):** These headers can be used to program/debug the target SWD devices. After the board is snapped, J5 can be used to program/debug the PSoC 4000S/EZ-BLE PSoC Module using an external programmer such as [MiniProg3](#). J4 can be used to program any other external target device using onboard PSoC 5LP (KitProg2).
13. **KitProg2 (PSoC 5LP) Programmer and Debugger (U1):** The CY8C5868LTI-LP039 PSoC 5LP device (U1) serving as KitProg2 is a multi-functional system, which includes a programmer, debugger, USB-I2C bridge, and a USB-UART bridge. Refer to the [KitProg2 User Guide](#) for more details. KitProg2 User Guide can also be found in the installation folder:  

```
<Install_Directory>\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit\  
<version>\Documentation\KitProg2_User_Guide.pdf .
```
14. **User Button (SW2):** This push button can be used to provide an input to the PSoC 4000S/EZ-BLE devices. Note that the switch connects the PSoC 4000S/EZ-BLE device's pin to ground when pressed, so you need to configure the PSoC 4000S/EZ-BLE device's pin as resistive pull-up for detecting the switch press.
15. **KitProg2 Mode Selection Button (SW3):** This push button provides input to the PSoC 5LP device. It can be used to switch between various modes of KitProg2 (SWD Programmer/Debugger, Mass Storage Programmer, Bootloader and Custom Application Modes). Note that the switch connects the PSoC 5LP pin to ground when pressed.
16. **On-board USB connector (J8):** A PCB USB connector is provided to connect the kit to a computer.
17. **Current measurement jumper (J3):** Provision to mount a 2-pin jumper (J3) for measuring the current to the PSoC 4000S device. To measure the current consumption of the PSoC 4000S device, remove the resistor R22, mount a 2-pin jumper (J3) and connect an ammeter across jumper J3. Refer to the [Measure PSoC 4000S Current Consumption on page 33](#) for more details.

## 3.2 KitProg2

KitProg2 is a multi-functional system, which includes a programmer, debugger, USB-I2C bridge, and a USB-UART bridge. The PSoC 4000S Prototyping Kit also supports Mass Storage Programming using KitProg2. A Cypress PSoC 5LP device is used to implement the KitProg2 functionality. The KitProg2 is integrated in most PSoC development kits. For more details on the KitProg2 functionality, refer to the [KitProg2 User Guide](#) in the kit installation directory:

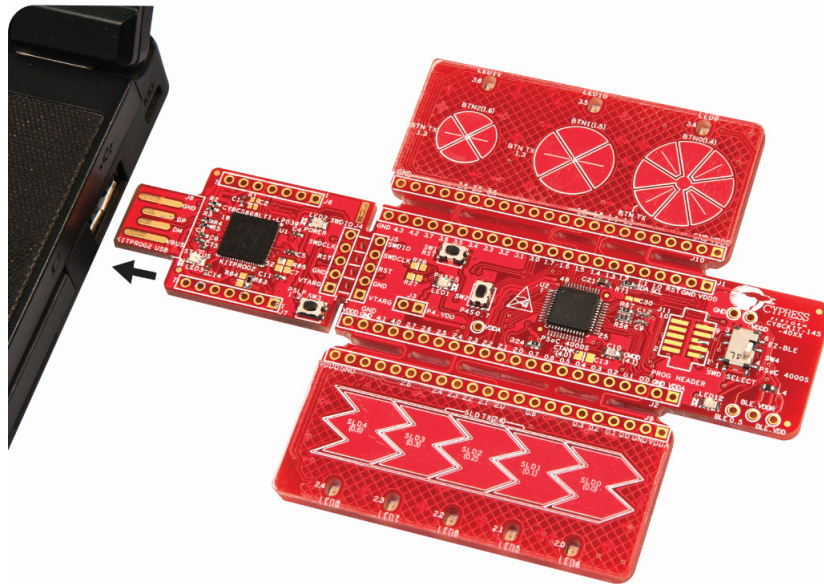
```
<Install_Directory>\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit\  
<version>\Documentation\KitProg2_User_Guide.pdf.
```

The target PSoC 4000S/EZ-BLE device can be programmed and debugged using KitProg2. Before programming the device, ensure that PSoC Creator and PSoC Programmer software are installed on the computer. See the [Software Installation chapter on page 16](#) for more information.

### 3.2.1 Programming and Debugging Using PSoC Creator

1. Connect the prototyping board to the computer through the PCB USB connector (J8), as shown in [Figure 3-3](#). The kit enumerates as a composite device if you are plugging in the PSoC 4000S Prototyping Kit to your PC for the first time. The kit drivers will get installed automatically. Successful enumeration is indicated by Amber Status LED (LED3) ON. If the Amber Status LED (LED3) is not ON, refer to the [KitProg2 User Guide](#) for details on the KitProg2 status and troubleshooting instructions.

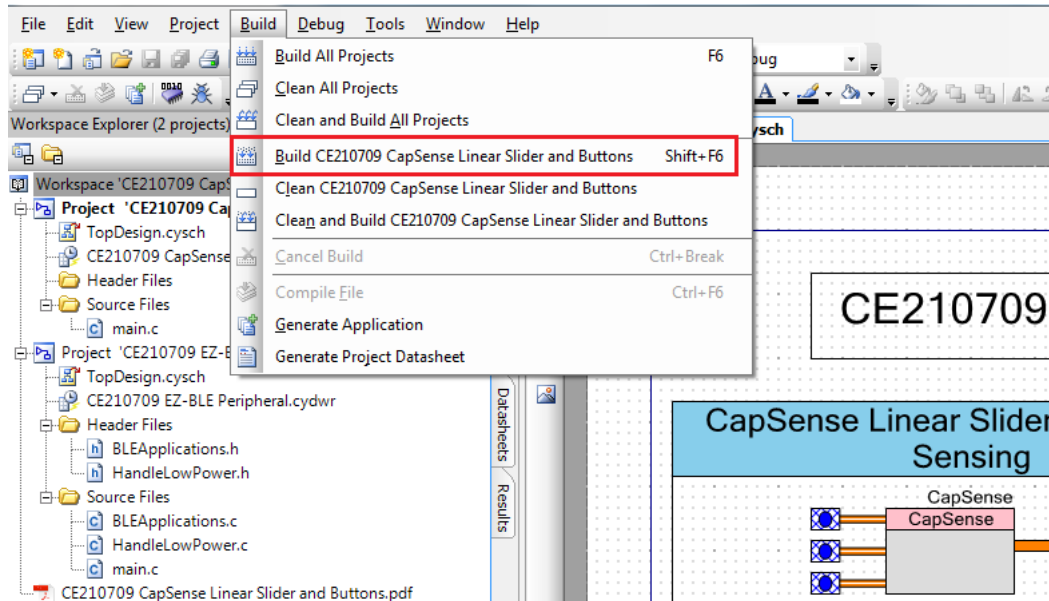
Figure 3-3. Connecting the PSoC 4000S Prototyping Kit to Computer



2. Open the desired project in PSoC Creator. For this, go to **File > Open > Project/Workspace**. This provides the option to browse and open a saved project. To open the code example provided with the kit, follow the instructions specified 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 3-4](#).

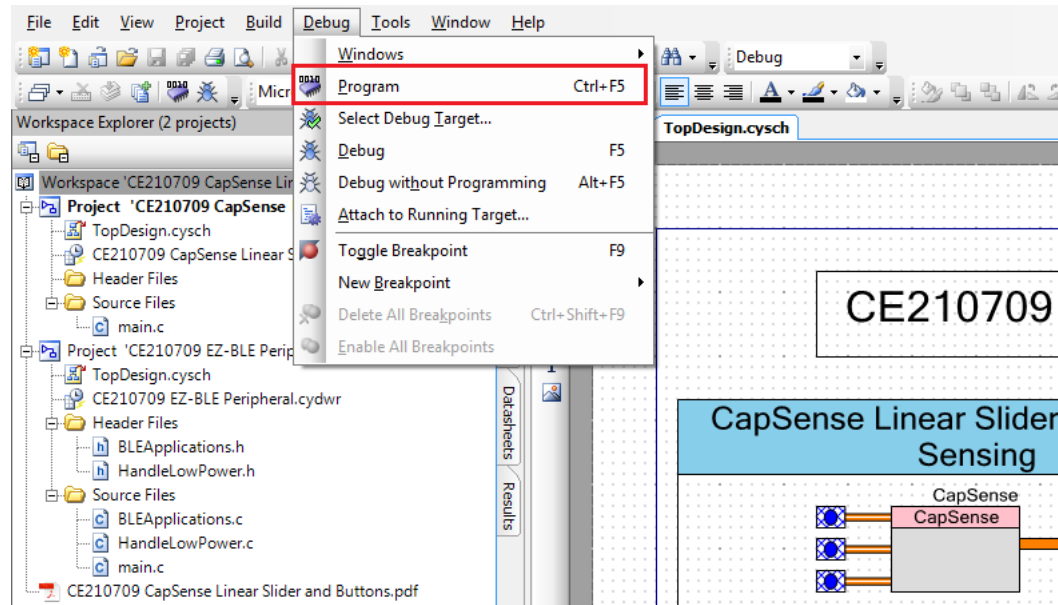
Figure 3-4. Build the Code Example



4. If there are no errors during build, program the firmware into the kit by choosing **Debug > Program** or by pressing **Ctrl + F5** as shown in [Figure 3-5](#). This programs the device on the PSoC 4000S Prototyping board.

PSoC Creator has an integrated debugger. You can start the debugger by selecting **Debug > Debug** or by pressing **[F5]**. Refer to the [Debugging Using PSoC Creator](#) section in the [KitProg2 User Guide](#) for a detailed explanation on how to debug using PSoC Creator.

Figure 3-5. Programming Device from PSoC Creator





### 3.2.2 Programming Using PSoC Programmer

PSoC Programmer (3.27.1 or later) can be used to program existing *.hex* files into the PSoC 4000S Prototyping board. Refer to the **Programming Using PSoC Programmer** section in the *KitProg2 User Guide* for a detailed explanation on how to program using PSoC Programmer.

The KitProg2 firmware normally does not require any update. You can use the PSoC Programmer software to update the KitProg2 firmware. Refer to **KitProg2 Driver Installation** section in the *KitProg2 User Guide* for a detailed explanation on how to update the KitProg2 firmware.

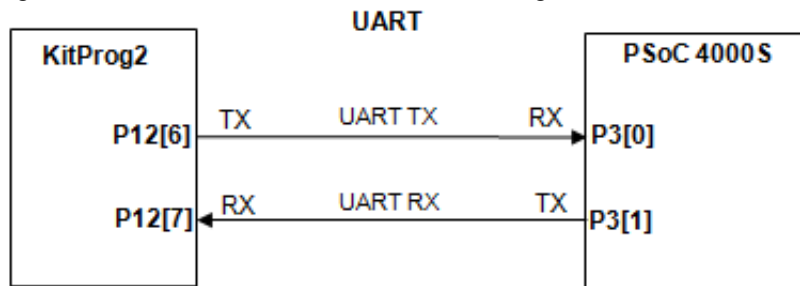
### 3.2.3 Mass Storage Programming

The KitProg2 in PSoC 4000S Prototyping board supports programming through a USB Mass Storage interface. This interface allows you to program the PSoC 4000S/EZ-BLE devices by copying *.hex* files into an emulated USB Mass Storage device. For more details on KitProg2 Mass Storage Programmer, refer to the *KitProg2 User Guide*.

### 3.2.4 USB-UART Bridge

The KitProg2 on the PSoC 4000S Prototyping board can act as a USB-UART bridge. The UART lines between the PSoC 4000S and the KitProg2 are hard-wired on the board, through the snappable area, with UART\_RX assigned to **P3 [1]** and UART\_TX assigned to **P3 [0]** on PSoC 4000S. For more details on the KitProg2 USB-UART functionality, refer to the *KitProg2 User Guide*.

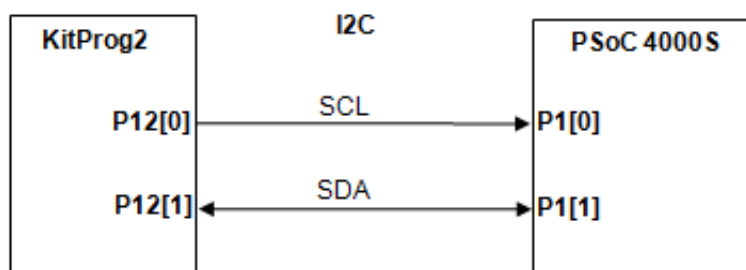
Figure 3-6. UART connection between KitProg2 and PSoC 4000S



### 3.2.5 USB-I2C Bridge

The KitProg2 can function as a USB-I2C bridge and communicate with the Bridge Control Panel (BCP) software utility. The I2C lines between the PSoC 4000S device and KitProg2 are hardwired on the board, through the snappable area, with SCL assigned to P1 [0] and SDA assigned to P1[1] on PSoC 4000S. The USB-I2C supports I2C speeds of 50 kHz, 100 kHz, 400 kHz, and 1 MHz. For more details on the KitProg2 USB-I2C functionality, refer to the *KitProg2 User Guide*.

Figure 3-7. I2C connection between KitProg2 and PSoC 4000S



# 4. Code Examples



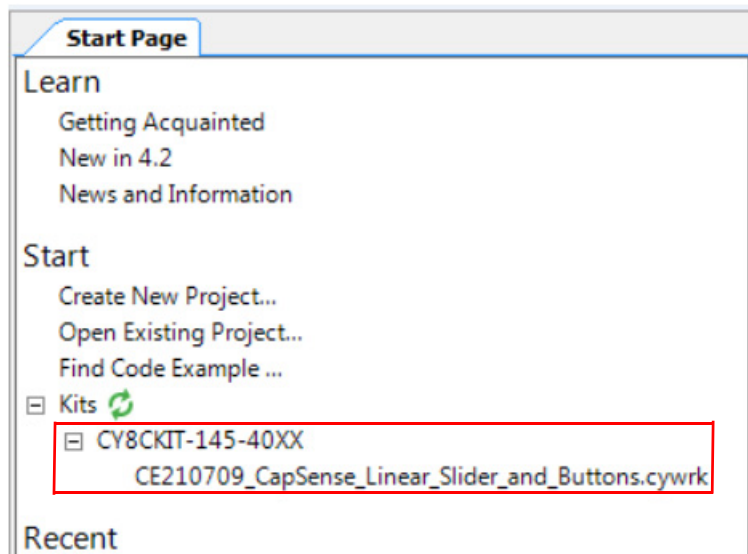
The PSoC 4000S Prototyping Kit includes one code example. To access the code example, download and install the CY8CKIT-145-40XX Kit setup file from [www.cypress.com/CY8CKIT-145-40XX](http://www.cypress.com/CY8CKIT-145-40XX). After installation, the code example can be accessed from the PSoC Creator **Start** page as shown in [Figure 4-1](#). For more code examples, visit [PSoC 3/4/5 Code Examples](#), which lists all PSoC Creator code examples available across application notes, kits, and PSoC Creator.

## 4.1 Using the Kit Code Examples

Follow these steps to open and use the code examples:

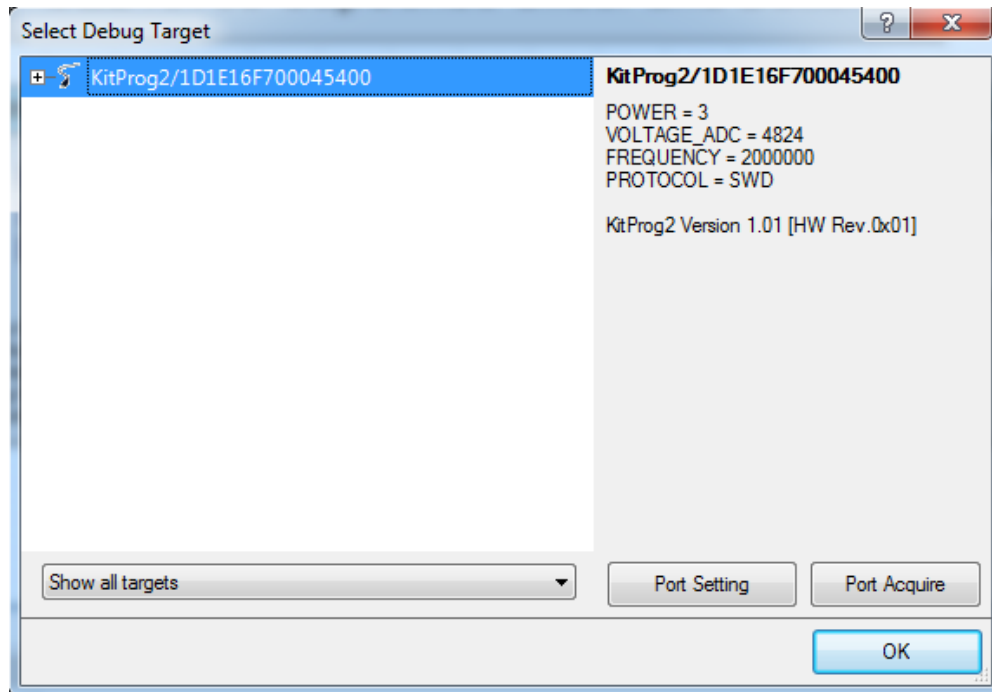
1. Launch PSoC Creator from **Start > All Programs > Cypress > PSoC Creator <version> > PSoC Creator <version>**.
2. On the **Start** page, click **CY8CKIT-145-40XX** under **Start > Kits**. A list of code examples appears, as shown in [Figure 4-1](#).
3. Click on the desired code example, select a location to save the project and click **OK**.

Figure 4-1. Open Code Example from PSoC Creator



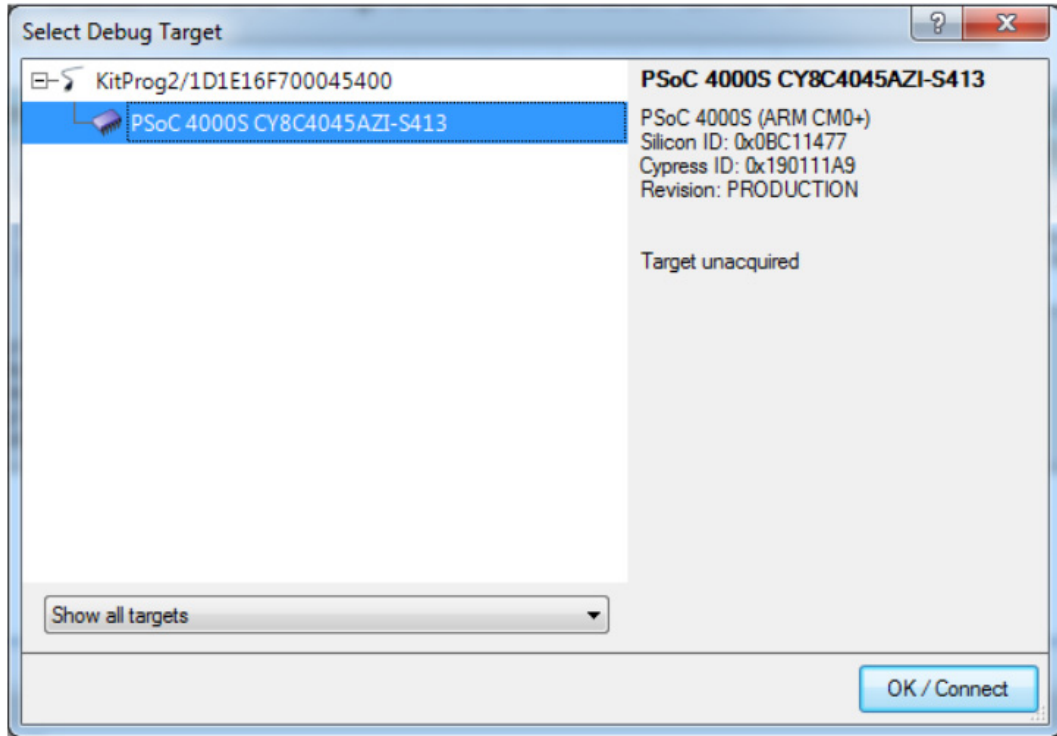
4. Build the code example by choosing **Build > Build <Project Name>**. A *.hex* file is generated after the build process.
5. Connect the PSoC 4000S Prototyping board to the PC using the onboard PCB USB connector J8 as shown in [Figure 3-3](#).
6. Choose **Debug > Program** in PSoC Creator to program the code example.
7. 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 the **Port Acquire** button, as shown in [Figure 4-2](#).

Figure 4-2. Port Acquire



8. After the device is acquired, it is shown in a tree structure below the **KitProg2/<serial\_number>**. Click the **Connect** button and then click **OK** to exit the window and start programming, as shown in [Figure 4-3](#).

Figure 4-3. Connect Device from PSoC Creator and Program



#### 4.1.1 CE210709 CapSense Linear Slider and Buttons

This code example demonstrates the operation of a CapSense linear slider with five segments and three CapSense buttons. CapSense linear slider and buttons data is sent to the CapSense Tuner or EZ-BLE PSoC Module using I2C communication. The CapSense linear slider touch position and buttons status is used to turn ON/OFF corresponding LEDs on the kit. It also demonstrates connectivity between the EZ-BLE PSoC Module (acting as a Peripheral and GATT server device) and mobile device running the CySmart mobile application (acting as a Central and GATT client device). This code example also demonstrates a simple breathing effect of LED with breath-in and breath-out rate of 1 Hz using the SmartIO and PWM Components.

The code example has an associated PDF document containing the project details, which can be accessed from the PSoC Creator (under Workspace Explorer). Please refer to the code example document for more details on the functionality and implementation.

## A.1 Hardware Functional Description

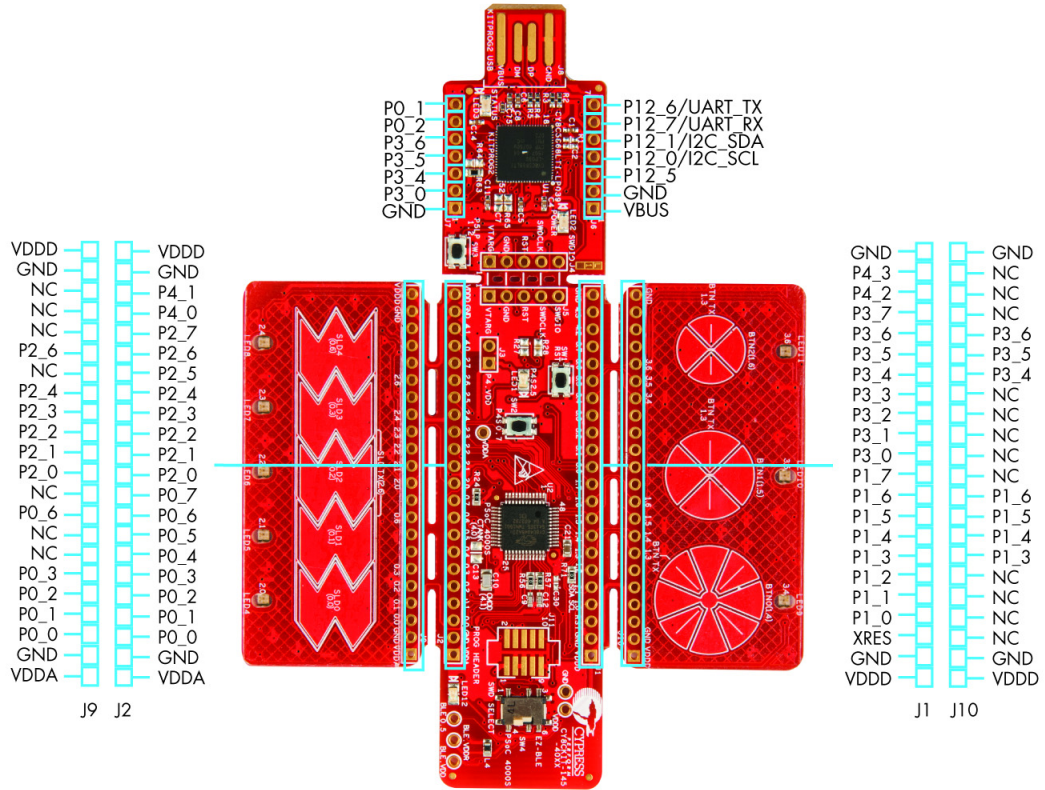
### A.1.1 Board Details

The PSoC 4000S Prototyping board consists of the following:

- PSoC 4000S device U2 (CY8C4045AZI-S413)
- PSoC 4000S I/O headers J1 and J2
- 10-pin program/debug header J11 (footprint only)
- KitProg2 (PSoC 5LP) device U1 (CY8C5868LTI-LP039)
- KitProg2 I/O headers J6 and J7
- 5-pin SWD connection headers J4 and J5
- PCB USB finger connector J8
- EZ-BLE™ PSoC™ Module U4
- One DPDT switch SW4 to select the SWD target device
- One blue LED LED1 (User)
- One amber LED LED2 (Power)
- One amber LED LED3 (KitProg2 Status)
- User push button SW2 connected to GPIO of PSoC 4000S and EZ-BLE devices
- Reset button SW1 connected to XRES pin of PSoC 4000S and EZ-BLE devices
- User push button SW3 connected to GPIO of KitProg2
- Current measurement jumper J3 (footprint only)
- External reference capacitor C3 - SAR ADC bypass (No Load by default)
- CapSense capacitors (CMOD C10, CTANK C13, CintA C36, CintB C35)
- CapSense sensors (three buttons BTN0, BTN1, and BTN2; one linear slider with five segments SLD0, SLD1, SLD2, SLD3, and SLD4)
- LEDs corresponding to CapSense Buttons (LED9, LED10, and LED11) and Slider (LED4, LED5, LED6, LED7, and LED8)
- LED12 for EZ-BLE
- Perforated snappable board design
- Overlay on CapSense buttons and slider

Figure A-1. PSoC 4000S Prototyping Board Pin Details

## Pinout Description

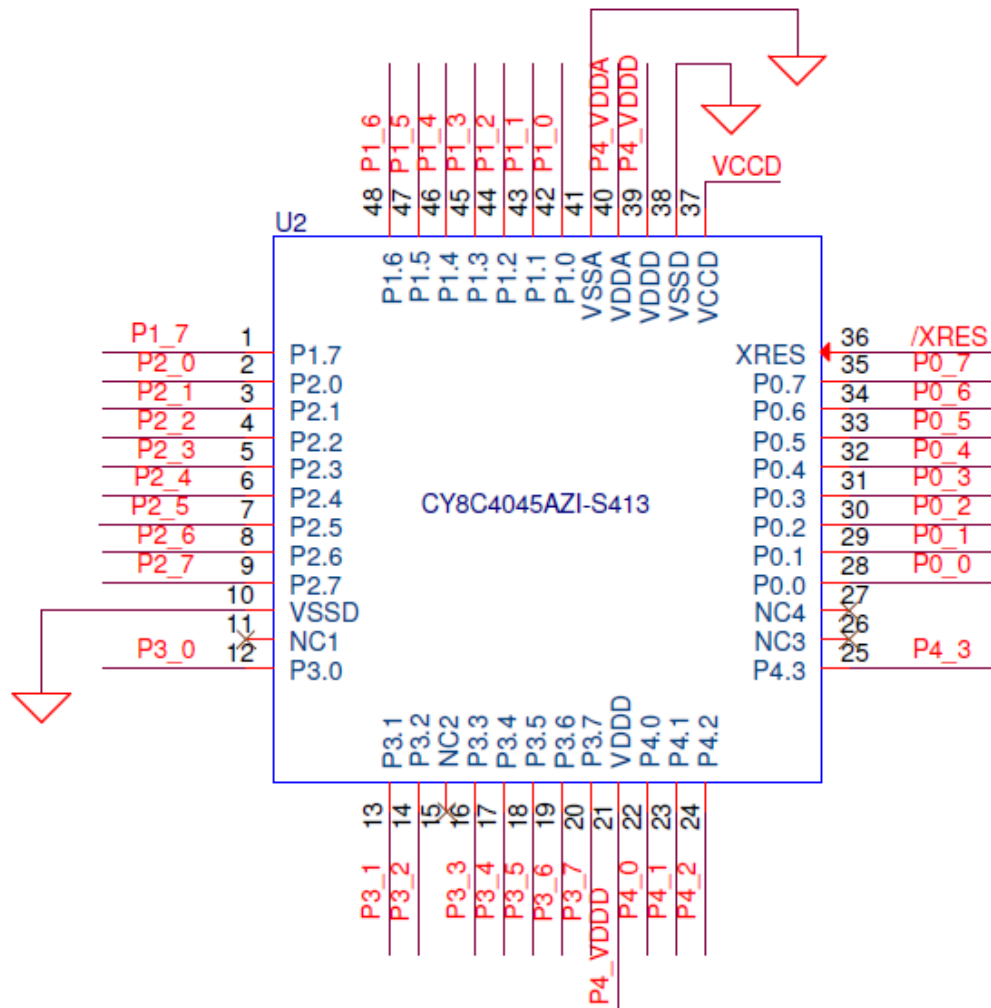


## A.1.2 Hardware Details

### A.1.2.1 Target Board

The target board uses the PSoC 4000S device. PSoC 4000S 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 analog and digital blocks with flexible automatic routing. The PSoC 4000S device family, based on this platform architecture, is a combination of a microcontroller with digital programmable logic, programmable analog, programmable interconnect, high-performance analog-to-digital conversion, opamps with comparator mode, and standard communication and timing peripherals. The PSoC 4000S products are fully compatible with members of the PSoC 4 platform for new applications and design needs. The programmable analog and digital subsystems allow flexibility and in-field tuning of the design. For more information, refer to the [PSoC 4 web page](#) and the [PSoC 4000S Family Datasheet](#).

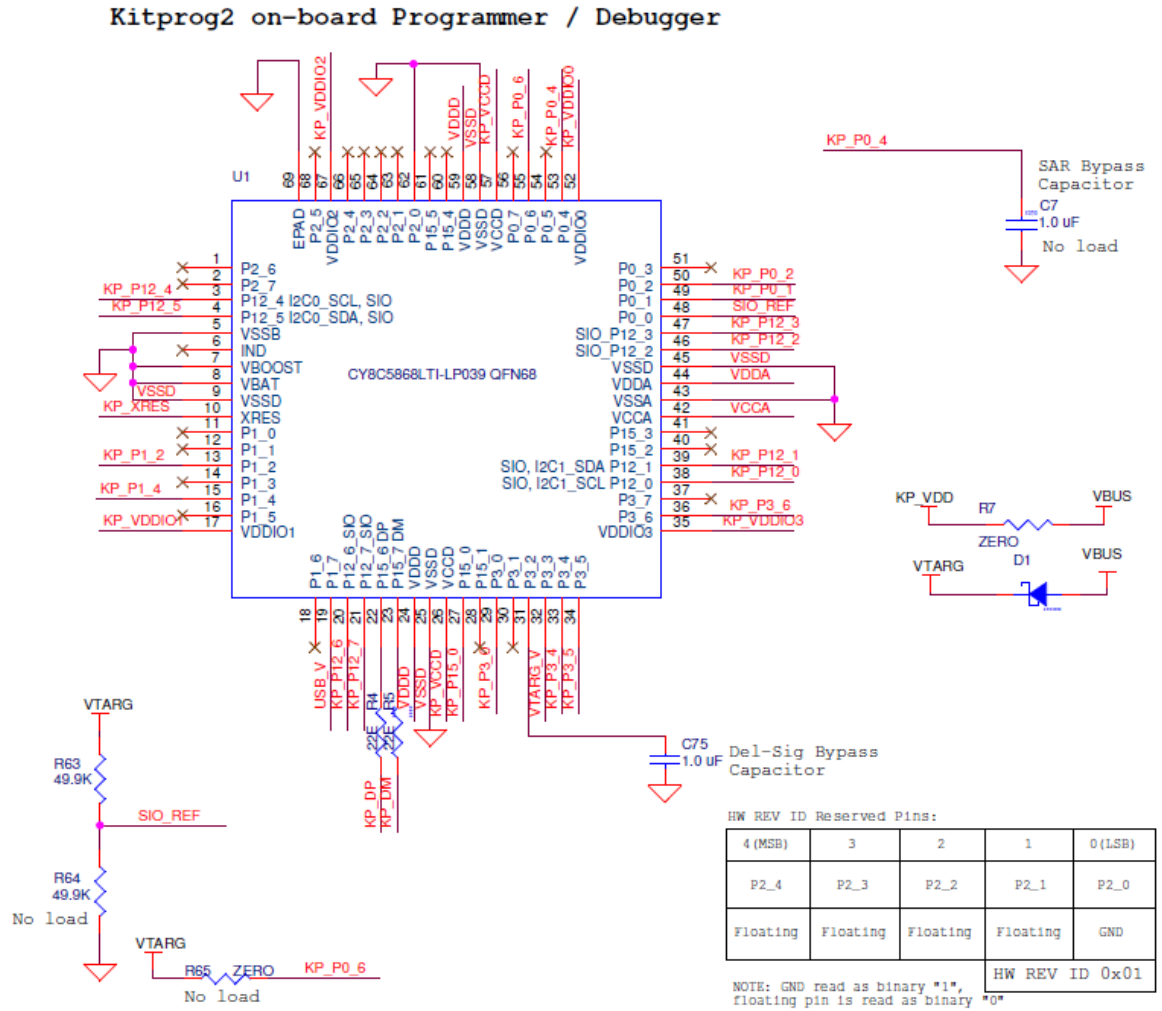
Figure A-2. Schematic of PSoC 4000S (Target)



### A.1.2.2 KitProg2 Board

PSoC 5LP on the KitProg2 board is used to program and debug the target PSoC 4000S device/EZ-BLE PRoC Module. KitProg2 PSoC 5LP connects to the USB port of the computer through the PCB USB connector and to the SWD interface of the target PSoC 4000S device/EZ-BLE PRoC Module. See the [KitProg2 User Guide](#) for additional details and functions provided by the KitProg2.

Figure A-3. Schematic of PSoC 5LP (Kitprog2)





### A.1.2.3 *Power Supply System*

The power supply system on this board is dependent on the 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)
- 3.3 V to 5.5 V from a regulated supply connected to VTARG (this will not power the KitProg2 section of the board)

**Note:** To use an external power supply, while KitProg2 is connected to the PCB USB, remove the D1 diode from the board. This ensures that 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.

**Note that this prototyping kit does not have any onboard ESD protection circuitry. Therefore, the power source for the PSoC 4000S Prototyping board must be of a high quality to ensure that the board is protected from any over-current conditions and swapped-power connections.**

### A.1.2.4 *Measure PSoC 4000S Current Consumption*

You can measure current consumption of the PSoC 4000S device by following the steps below.

1. Remove the resistors R22, R23 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 4000S 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 VDD pins.

After measuring the current consumption, populate the resistors R22 and R23 for normal operation of the kit.

### A.1.2.5 *Board Separation (Snapping)*

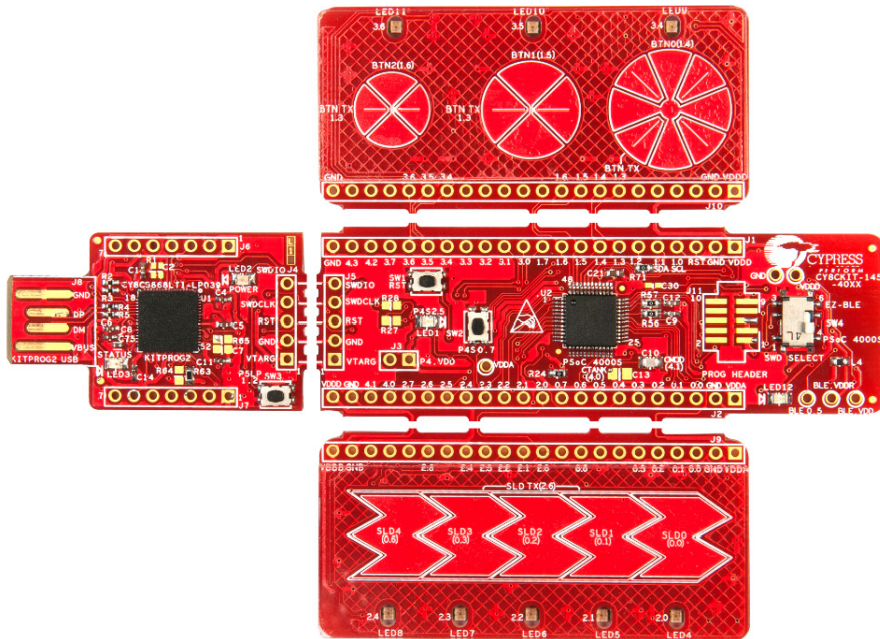
The PSoC 4000S Prototyping board consists of a PSoC 4000S board, a KitProg2 board and two sensor boards.

**CAUTION!** Do not apply excess pressure on the board while snapping as it may damage the on-board components.

To separate the PSoC 4000S and KitProg2 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 shears to clean up the edge of the kit. Note that once the boards are separated, direct UART and I2C connections between the PSoC 4000S 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 I2C lines through header J6.

Follow a similar approach to snap the sensor boards from PSoC 4000S board.

Figure A-4. PSoC 4000S Prototyping Board separated into Four Parts



#### A.1.2.6 Header Connections

The PSoC 4000S Prototyping board supports a number of unpopulated headers on both the KitProg2 and the target PSoC 4 boards.

#### Functionality of J1 and J2 Headers (Target Board)

The target board contains two, single in-line headers (J1 and J2). Both are 1×22 pin headers and include all of the I/Os available on the PSoC 4000S device. These headers support all of the available ports, GND, VDD, 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 any development breadboard. The CapSense Slider signals and the Slider LED signals from header J1 are routed to header J10 on the sensor board. The CapSense Buttons signals and the Button LED signals from header J2 are routed to header J9 on the sensors board.

Figure A-5. J1 and J2 Headers

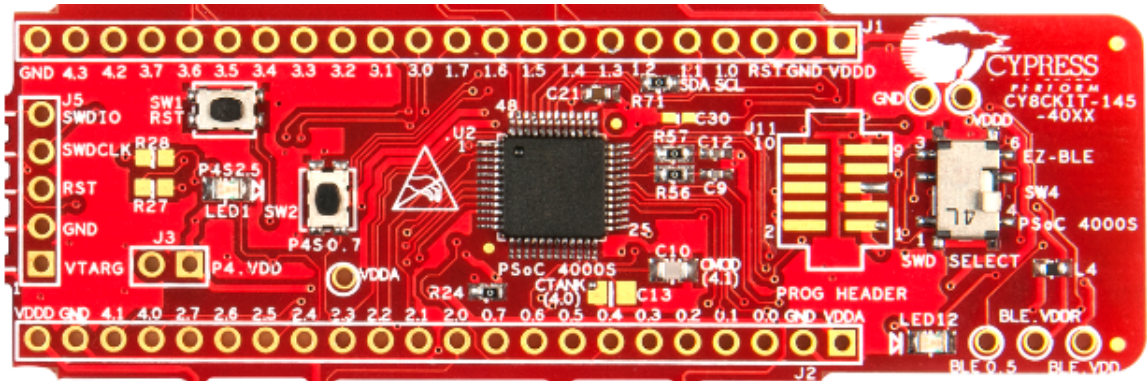


Table A-1. J1 Header Pin Details

PSoC 4000S Prototyping board GPIO (J1)		
Pin	Signal	Description
J1_01	VDDD	Power
J1_02	GND	Ground
J1_03	XRES	XRES
J1_04	P1_0/I2C_SCL	GPIO/I2C Clock
J1_05	P1_1/I2C_SDA	GPIO/I2C Data
J1_06	P1_2	GPIO
J1_07	P1_3/BTN TX	GPIO/Button Tx
J1_08	P1_4/BTN0	GPIO/Button 0 Rx
J1_09	P1_5/BTN1	GPIO/Button 1 Rx
J1_10	P1_6/BTN2	GPIO/Button 2 Rx
J1_11	P1_7	GPIO/SAR ADC Bypass Capacitor
J1_12	P3_0/UART RX	GPIO/UART Receive
J1_13	P3_1/UART TX	GPIO/UART Transmit
J1_14	P3_2/SWDIO	GPIO/SWD Data
J1_15	P3_3SWDCLK	GPIO/SWD Clock
J1_16	P3_4/LED9	GPIO/Button 0 LED
J1_17	P3_5/LED10	GPIO/Button 1 LED
J1_18	P3_6/LED11	GPIO/Button 2 LED
J1_19	P3_7	GPIO
J1_20	P4_2/CintA	GPIO
J1_21	P4_3/CintB	GPIO
J1_22	GND	Power

Table A-2. J2 Header Pin details

PSoC 4000S Prototyping board GPIO (J2)		
Pin	Signal	Description
J2_01	VDDA	Power
J2_02	GND	Ground
J2_03	P0_0/SLD0	GPIO/Slider 0 Rx
J2_04	P0_1/SLD1	GPIO/Slider 1 Rx
J2_05	P0_2/SLD2	GPIO/Slider 2 Rx
J2_06	P0_3/SLD3	GPIO/Slider 3 Rx
J2_07	P0_4/UART_RX	GPIO/UART Receive
J2_08	P0_5/UART_TX	GPIO/UART Transmit
J2_09	P0_6/SLD4	GPIO/Slider 4 Rx
J2_10	P0_7/USER BUTTON	GPIO/User Button
J2_11	P2_0/LED4	GPIO/Slider 0 LED
J2_12	P2_1/LED5	GPIO/Slider 1 LED
J2_13	P2_2/LED6	GPIO/Slider 2 LED
J2_14	P2_3/LED7	GPIO/Slider 3 LED
J2_15	P2_4/LED8	GPIO/Slider 4 LED
J2_16	P2_5/LED1	GPIO/User LED
J2_17	P2_6/SLD TX	GPIO/Slider Tx
J2_18	P2_7	GPIO
J2_19	P4_0/CTANK	GPIO/CTANK
J2_20	P4_1/CMOD	GPIO/CMOD
J2_21	GND	Ground
J2_22	VDDD	Power

### Functionality of J4 and J5 Headers (PSoC 4000S to KitProg2)

KitProg2 and target boards each contains a 1 × 5-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 4000S device/EZ-BLE PSoC Module, power, ground, and reset.

Figure A-6. J4 and J5 Headers

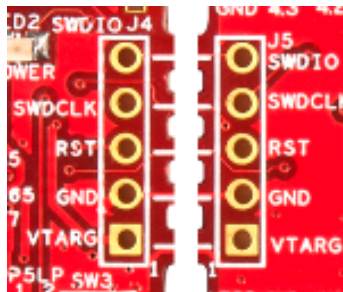


Table A-3. Pin Details of J4 Header

PSoC 5LP KitProg2 Header (J4)		
Pin	Signal	Description
J4_01	VTARG	Power
J4_02	GND	Ground
J4_03	KP_P12_4/RESET	KitProg2 GPIO/Target XRES
J4_04	KP_P12_3/SWDCLK	KitProg2 GPIO/Target SWD Clock
J4_05	KP_P12_2/SWDIO	KitProg2 GPIO/Target SWD Data

Table A-4. Pin Details of J5 Header

PSoC 5LP KitProg2 Header (J5)		
Pin	Signal	Description
J5_01	VTARG	Power
J5_02	GND	Ground
J5_03	XRES	Target device RESET
J5_04	SWDCLK	Target SWD Clock
J5_05	SWDIO	Target SWD Data

### Functionality of J6 and J7 Headers (KitProg2)

The KitProg2 board contains two single in-line headers (J6 and J7). Both are 1×7-pin-headers, used to provide access to several pins of the PSoC 5LP device to support advanced features such as a low-speed oscilloscope and a low-speed digital logic analyzer. These headers also contain the KitProg2 bridge pins (UART and I2C pins of KitProg2 (PSoC 5LP)) 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 any development breadboard.

Figure A-7. J6 and J7 Headers

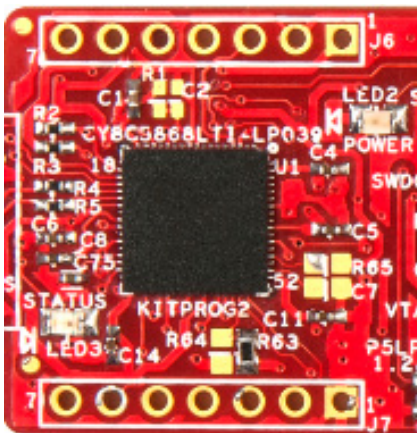


Table A-5. Pin Details of J6 Header

PSoC 5LP KitProg2 Header (J6)		
Pin	Signal	Description
J6_01	VBUS	Power
J6_02	GND	Ground
J6_03	KP_P12_5	GPIO
J6_04	KP_P12_0	I2C_SCL
J6_05	KP_P12_1	I2C_SDA
J6_06	KP_P12_7	UART_RX
J6_07	KP_P12_6	UART_TX

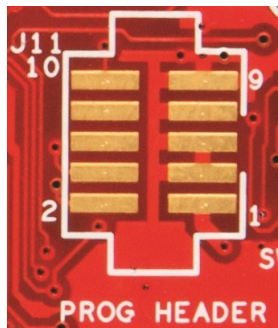
Table A-6. Pin Details of J7 Header

PSoC 5LP KitProg2 Header (J7)		
Pin	Signal	Description
J7_01	GND	Ground
J7_02	KP_P3_0	GPIO
J7_03	KP_P3_4	GPIO
J7_04	KP_P3_5	GPIO
J7_05	KP_P3_6	GPIO
J7_06	KP_P0_2	GPIO
J7_07	KP_P0_1	GPIO

#### A.1.2.7 10-pin Program and Debug Header (J11)

This 10-pin header allows you to program and debug PSoC 4000S and EZ-BLE PRoC module using an external programmer such as MiniProg3. This header is not populated by default.

Figure A-8. 10-pin Program and Debug Header

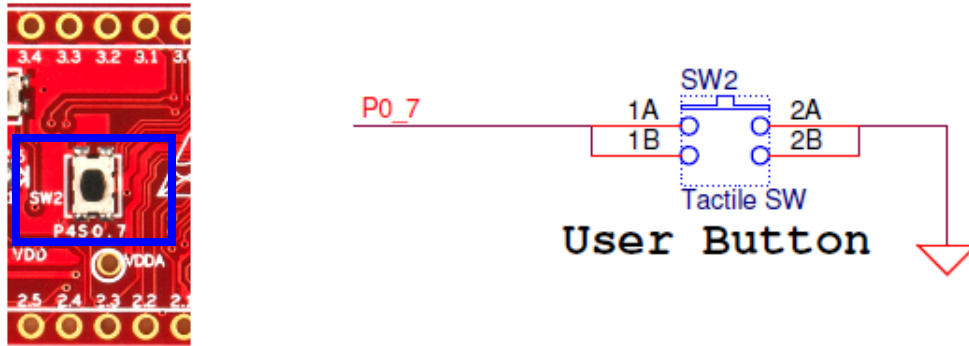


### A.1.2.8 User and Passive Inputs

#### User Button

The target PSoC 4000S Prototyping board contains a single push button (**SW2**) connected to the P0[7] pin on the PSoC 4000S device. It is also connected to P4[1] pin on the EZ-BLE PProC module. This button can be used for general user inputs or to control different states in an application including waking up the device from sleep or deep sleep.

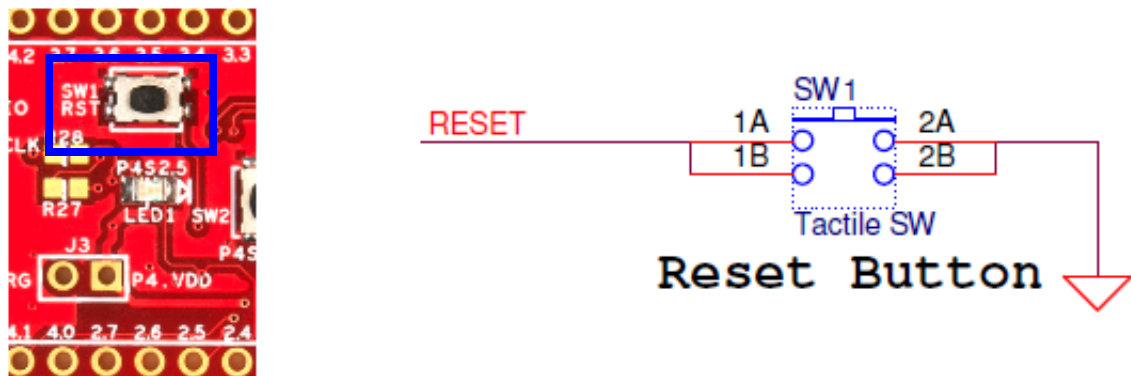
Figure A-9. User Button on the Board



#### Reset Button

The Kit contains a push button (SW1) connected to the XRES pins on the target PSoC 4000S and EZ-BLE devices. When this button is pressed, the XRES lines of the PSoC 4000S and EZ-BLE are connected to ground, which, in turn, resets the devices.

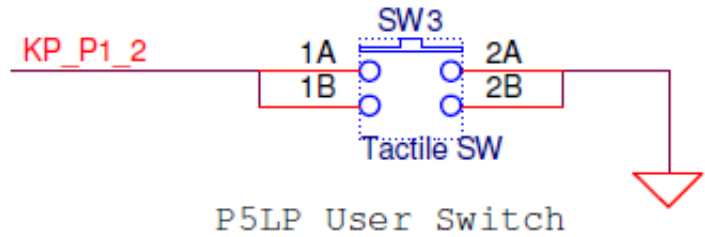
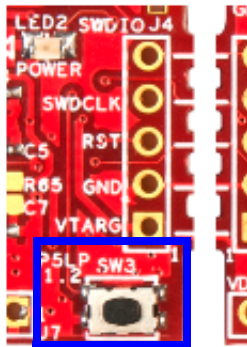
Figure A-10. Reset Button



### PSoC 5LP Mode Switch Button

The kit contains a push button (SW3) connected to P1[2] of the PSoC 5LP device. This can be used to switch between different modes of KitProg2 such as Programmer/Debugger, Mass storage programmer, Bootloader and Custom application. Refer to the [KitProg2 User Guide](#) for more details. This button can also be used as general purpose button in custom application for PSoC 5LP device.

Figure A-11. PSoC 5LP Mode Switch Button

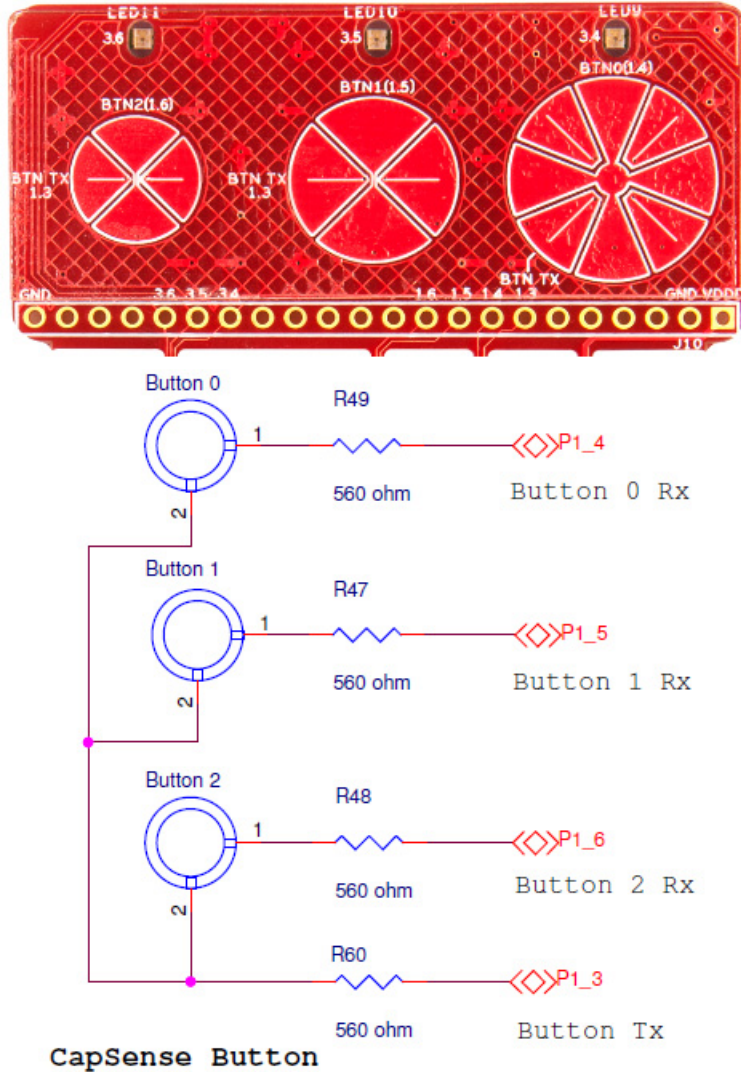




### CapSense Buttons

Three CapSense buttons (BTN0, BTN1 and BTN2) are provided on a breakout board to demonstrate the CapSense button functionality of PSoC 4000S device. All the I/Os used for implementing the CapSense Buttons are exposed through the headers J1 and J10.

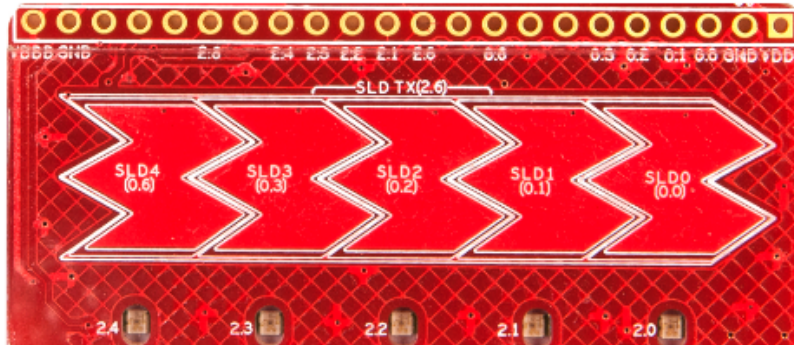
Figure A-12. CapSense Buttons



## CapSense Linear Slider

A 5-segment linear slider (SLD0, SLD1, SLD2, SLD3, and SLD4) is provided on a breakout board to demonstrate the CapSense slider functionality of PSoC 4000S device. All the I/Os used for implementing the CapSense Slider are exposed through the headers J2 and J9.

Figure A-13. CapSense Slider



CapSense Linear Slider 5 Seg

## CapSense Slider

### A.1.2.9 LEDs

The PSoC 4000S Prototyping board contains 12 LEDs:

- The amber Power LED (LED2): Indicates that the board is powered from the PCB USB connector. This LED will not glow when the board is powered from VDD or VTARG directly.
- The amber Status LED (LED3): Indicates the KitProg2 status, connected to P1[4] of the KitProg2 PSoC 5LP device. For more details on the KitProg2 status LED, refer to the [KitProg2 User Guide](#).
- The blue LED (LED1): This is the user LED, connected to P2[5] of the target PSoC 4000S device.
- Slider LEDs (LED4, LED5, LED6, LED7, LED8): The LEDs corresponding to five segments of the slider are connected to P2[0], P2[1], P2[2], P2[3], and P2[4] of PSoC 4000S device.
- Button LEDs (LED9, LED10, LED11): There are 3 button LEDs corresponding to 3 buttons. They are connected to P3[4], P3[5], and P3[6] of the target PSoC 4000S device.
- EZ-BLE Blue LED (LED12): This is the user LED connected to P1[6] of EZ-BLE PRoC Module.

Figure A-14. Power LED

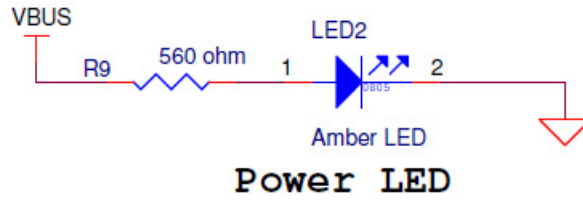
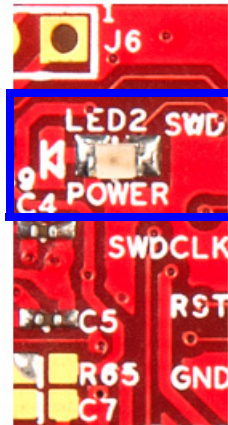


Figure A-15. Status LED

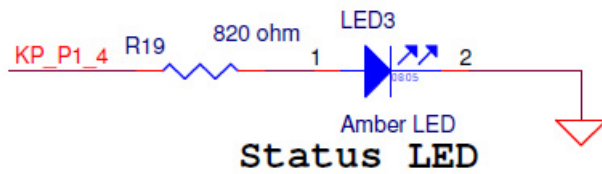
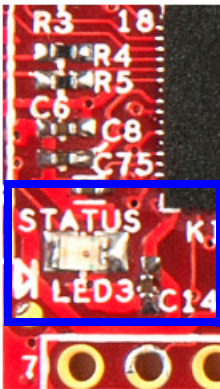


Figure A-16. User LED

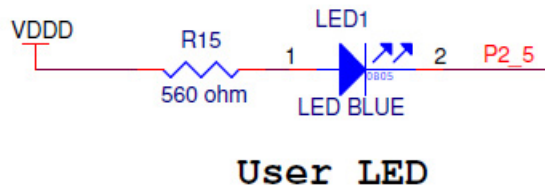
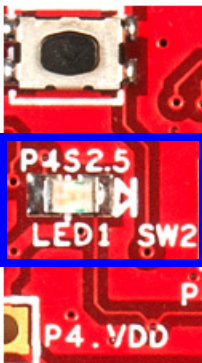


Figure A-17. EZ-BLE LED

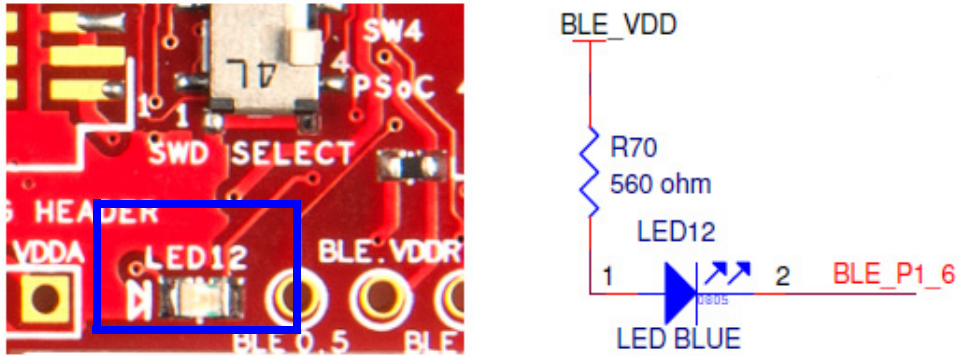


Figure A-18. Slider LEDs

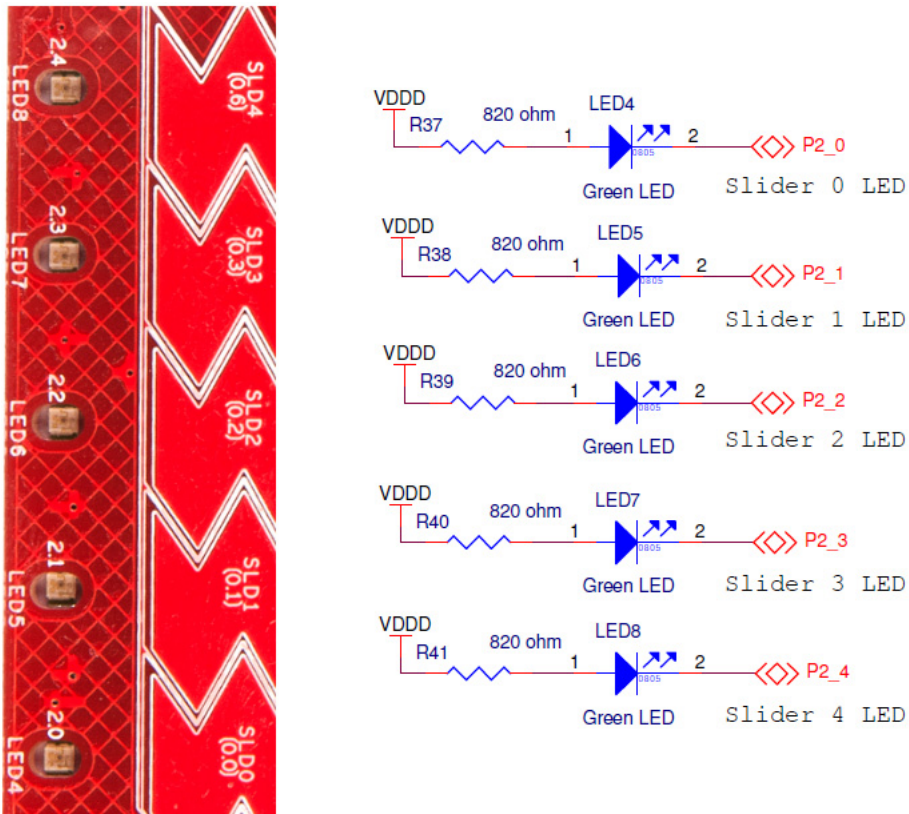
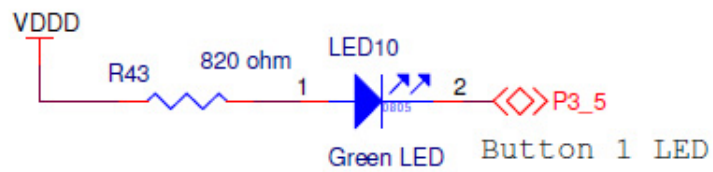
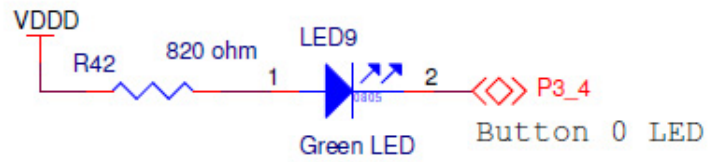


Figure A-19. Button LEDs



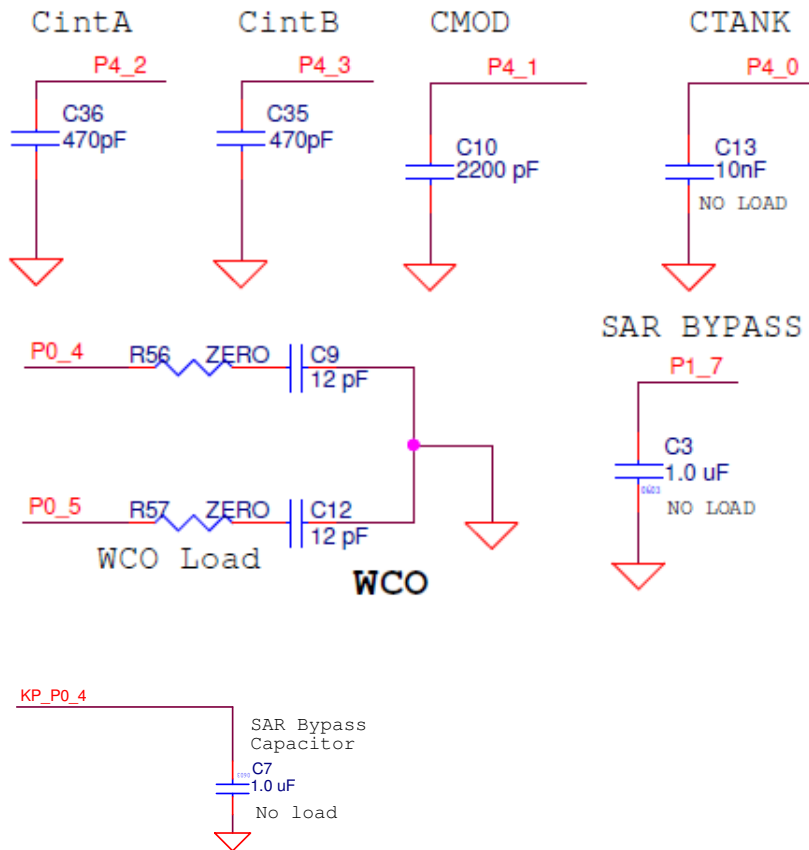
### A.1.2.10 System Capacitors

The PSoC 4000S Prototyping board has eight capacitors in addition to power supply decoupling capacitors:

- Four CapSense capacitors (CMOD, CTANK, CintA, CintB): Required for CapSense functionality of PSoC 4000S device.
- SAR bypass capacitor for PSoC 4000S (C3 - No Load by default) and PSoC 5LP (C7).
- Two biasing capacitors (C9 and C12): Required to interface an external 32-kHz crystal oscillator (WCO).

**Note:** The crystal oscillator is not placed on the board; it can be soldered on pins P0[5] and P0[4] of PSoC 4000S.

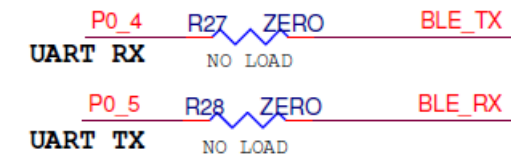
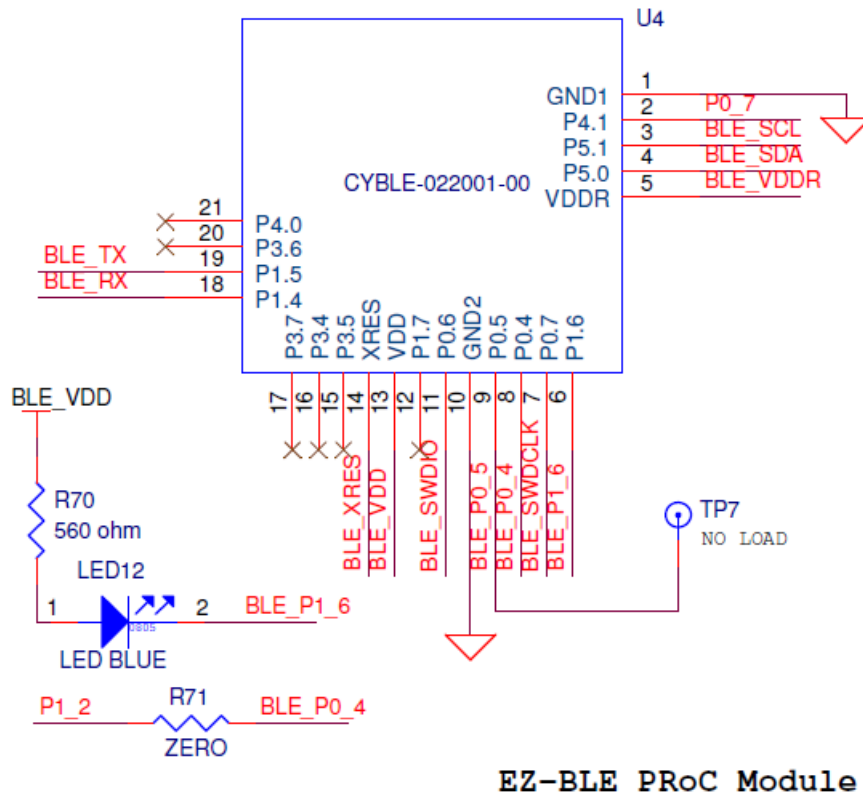
Figure A-20. System Capacitors Circuit Diagram



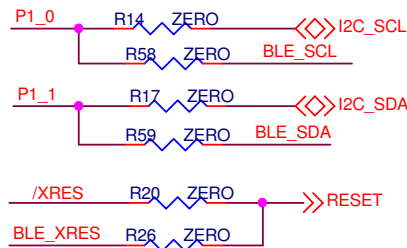
### A.1.2.11 EZ-BLE PRoC Module

The board includes an EZ-BLE PRoC Module, which is loaded by default. The EZ-BLE PRoC 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's PRoC BLE chip, two crystals, chip antenna, shield, and passive components. Refer to [AN96841 - Getting Started With EZ-BLE PRoC Module](#) for more details. Visit [www.cypress.com/ez-bleprocmodule](http://www.cypress.com/ez-bleprocmodule) to buy the EZ-BLE PRoC Module.

Figure A-21. EZ-BLE Connections



### Serial Interconnections



The EZ-BLE PRoC Module includes the following connections to PSoC 4000S and KitProg2:

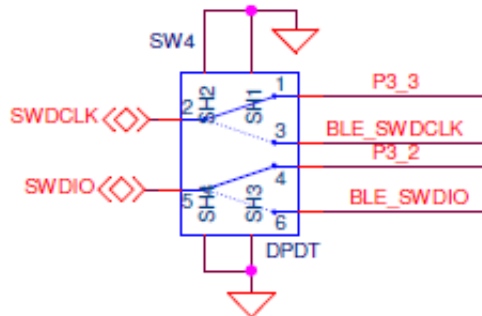
- UART connections to PSoC 4000S through zero-ohm resistors R28 and R27 (see [Figure A-21](#) and [Table A-7](#)). Please note that R28 and R27 are not loaded by default.
- I2C connections to KitProg2 and PSoC 4000S (see [Table A-7](#)).
- SWD connections to KitProg2 through the DPDT switch SW4. The SWD connections are shared between the PSoC 4000S and EZ-BLE devices.

Table A-7. EZ-BLE Connections

EZ-BLE Connections			
EZ-BLE	PSoC 4000S	KitProg2	Description
BLE_TX, P1_5	P0_4	–	UART_RX
BLE_RX, P1_4	P0_5	–	UART_TX
BLE_SDA, P5_0	P1_1	P12_1	I2C_SDA
BLE_SCL, P5_1	P1_0	P12_0	I2C_SCL
BLE_SWDIO, P0_6	–	P12_2	SWDIO
BLE_SWDCCLK, P0_7	–	P12_3	SWDCCLK
P0_4	P1_2	–	GPIO
BLE_XRES	/XRES	P12_4	RESET
BLE_P1_6, P1_6	–	–	BLE LED
P4_1	P0_7	–	User Button

Use DPDT switch SW4 to switch the SWD connections between PSoC 4000S or EZ-BLE PSoC Module as shown in [Figure A-22](#).

Figure A-22. DPDT switch SW4 to select between PSoC 4000S and EZ-BLE



## A.2 Schematics

Refer to the schematic files in the following paths in the installed kit software:

```
<Install_Directory>\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit\  
<version>\Hardware\CY8CKIT-145-40XX Schematic.pdf
```

## A.3 Bill of Materials

Refer to the BOM files in the following paths in the kit software installed:

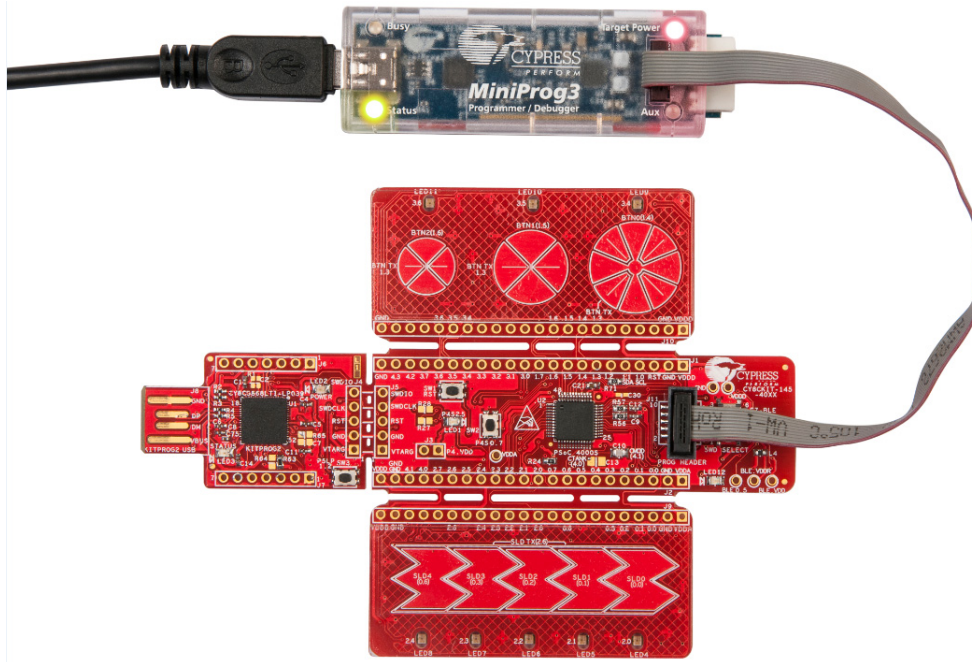
```
<Install_Directory>\CY8CKIT-145-40XX PSoC 4000S Prototyping Kit\  
<version>\Hardware\CY8CKIT-145-40XX PCBA BOM.xlsx
```



## A.4 Programming the PSoC 4000S Prototyping Kit Using MiniProg3/KitProg2

The target board allows you to program the PSoC 4000S/EZ-BLE PRoC Module using a MiniProg3 or an external KitProg2 device via the 10-pin JTAG header or the 5-pin SWD header. To do this, connect wires or a 5-pin 100-mil spaced header to J5 or a 10-pin JTAG header to J11 on the target board. The PSoC 4000S Prototyping Kit supports both power cycle and reset programming modes.

Figure A-23. Connecting CY8CKIT-145-40XX to MiniProg3



**Note:** CY8CKIT-002 MiniProg3 is not part of the PSoC 4000S Prototyping Kit contents and can be purchased from the [Cypress Online Store](#).

# Revision History



## Document Revision History

Document Title: CY8CKIT-145-40XX PSoC® 4000S Prototyping Kit Guide				
Document Number: 002-11504				
Revision	ECN#	Issue Date	Origin of Change	Description of Change
**	5423470	09/01/2016	SSHH	New Kit Guide.
*A	5713267	04/26/2017	SHEA	Updated logo and copyright
*B	5994322	12/14/2017	SRDS	<p>Replaced “example projects” with “code examples” in all instances across the document.</p> <p>Updated <a href="#">Introduction</a> chapter on page 6:</p> <p>Updated “PSoC Creator” on page 10:</p> <p>Updated “PSoC Creator Code Examples” on page 11:</p> <p>Updated <a href="#">Figure 1-5</a>.</p> <p>Updated “Additional Learning Resources” on page 13:</p> <p>Updated description.</p> <p>Updated “Technical Support” on page 14:</p> <p>Replaced “Ext. 2” with “Ext. 3”.</p> <p>Updated <a href="#">Software Installation</a> chapter on page 16:</p> <p>Updated “Install Software” on page 16:</p> <p>Updated description.</p> <p>Updated <a href="#">Figure 2-2</a>.</p> <p>Updated <a href="#">Kit Operation</a> chapter on page 20:</p> <p>Updated “KitProg2” on page 23:</p> <p>Updated “Programming Using PSoC Programmer” on page 25:</p> <p>Updated description.</p> <p>Updated <a href="#">Code Examples</a> chapter on page 26:</p> <p>Updated description.</p> <p>Updated “Using the Kit Code Examples” on page 26:</p> <p>Updated description.</p> <p>Updated <a href="#">Figure 4-1</a>.</p> <p>Updated “CE210709 CapSense Linear Slider and Buttons” on page 28:</p> <p>Updated description.</p> <p>Completing Sunset Review.</p>
*C	6077012	02/22/2018	SAGA	Updated <a href="#">Figure 4-1</a> and <a href="#">Figure 4-3</a> .