CY8CKIT-049-4xxx

PSoC 4 Prototyping Kit Guide

Doc. #: 001-90711 Rev. **

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709
Phone (USA): +1.800.858.1810
Phone (Intnl): +1.408.943.2600
http://www.cypress.com

Flash Code Protection

Cypress products meet the specifications contained in their particular Cypress PSoC Data Sheets. Cypress believes that its family of PSoC products is one of the most secure families of its kind on the market today, regardless of how they are used. There may be methods, unknown to Cypress, that can breach the code protection features. Any of these methods, to our knowledge, would be dishonest and possibly illegal. Neither Cypress nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as 'unbreakable'.

Cypress is willing to work with the customer who is concerned about the integrity of their code. Code protection is constantly evolving. We at Cypress are committed to continuously improving the code protection features of our products.

Contents

Safety Information

Regulatory Compliance

The CY8CKIT-049-4xxx 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 CY8CKIT-049-4xxx Prototyping Kit, as shipped from the factory, has been verified to meet with requirements of CE as a Class A product.

The CY8CKIT-049-4xxx 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-049-4xxx 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 antistatic wrist strap attached to the chassis ground (any unpainted metal surface) on your board when handling parts.

Handling Boards

CY8CKIT-049-4xxx boards are sensitive to ESD. Hold the board only by its edges. After removing the board from its box, place it on a grounded, static-free surface. Use a conductive foam pad if available. Do not slide board over any surface.

1. Introduction

Thank you for your interest in the PSoC® 4 CY8CKIT-049-4xxx family of prototyping kits. The prototyping kit is designed as an easy-to-use and inexpensive prototyping platform for users wishing to rapidly develop products using the PSoC 4 families and use the unique flexibility of the PSoC 4 architecture. Designed for flexibility, these kits offer an open footprint breakout board to maximize the end utility of the PSoC 4 device. These kits provide a low-cost alternative to device samples while providing a platform to easily develop and integrate the PSoC 4 device into your end system. In addition, the board includes the following features:

- Onboard CMOD capacitors to enable CapSense® development
- A bypass capacitor to ensure the high quality ADC conversions
- An LED to provide feedback
- A push button to provide a simple user input and trigger the bootloader programming mode

The CY8CKIT-049-4xxx development kit also supports the Cypress USB-Serial CY7C65211 Full-Speed USB controller that enables PC connectivity and serial interfaces, such as USB-UART, USB-I2C, USB-SPI, and USB-GPIO. The development kit includes a Cypress USB-Serial controller used to bootload the target PSoC 4 device. The PSoC 4 prototyping board is breakable, allowing you to separate the USB-Serial board from the PSoC 4 board.

This kit supports either 5 V or 3.3 V power supply voltages. The device can be programmed using the bootloader or the Cypress MiniProg3 programmer. The PSoC 4 Prototyping Kit supports boards based on the 4100 and 4200 device families, delivering a programmable platform for a wide range of embedded applications at a very low cost. The PSoC 4 is a scalable and reconfigurable platform architecture for a family of mixed-signal programmable embedded system controllers with an ARM® Cortex™-M0 CPU. It combines programmable and reconfigurable analog and digital blocks with flexible automatic routing.

1.1 Kit Contents

This kit contains only the PSoC 4 Prototyping Kit, either the 4100 or 4200 series device.

Figure 1-1. PSoC 4 CY8CKIT-049-4xxx Prototyping Kit

1.2 Getting Started

This user guide helps you to get acquainted with the PSoC 4 Prototyping Kit. The Software Installation chapter on page 9 describes the installation of the PSoC Creator software. The Kit Operation chapter on page 13 explains how to program the kit using a bootloader or a MiniProg3. The Hardware chapter on page 28 details the hardware operation of the kit. The Example Projects chapter on page 37 and USB-Serial Configuration chapter on page 51 walk you through making projects and configuring the USB-Serial device on the kit. The Appendix on page 58 provides the schematics, pin assignment, and bill of materials (BOM).

1.3 Additional Learning Resources

For more information on PSoC, see the following links:

- www.cypress.com/psoc
- www.cypress.com/psoc4
- www.cypress.com/psoccreator
- www.cypress.com/CY8CKIT-049-41xx
- www.cypress.com/CY8CKIT-049-42xx
- www.cypress.com/CY8CKIT-042
- www.cypress.com/go/usbserial

1.4 Technical Support

For assistance, go to our support web page, or contact our customer support:

Phone (USA): +1(800) 541-4736 extension 2

Phone (International): +1 (408) 943-2600, extension 2

1.5 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\`
Italics	Displays file names and reference documentation: Read about the *sourcefile.hex* file in the *PSoC Designer User Guide*.
[**Bracketed, Bold**]	Displays keyboard commands in procedures: [**Enter**] or [**Ctrl**] [**C**]
File > Open	Represents menu paths: File > Open > New Project
Bold	Displays commands, menu paths, and icon names in procedures: Click the **File** icon and then click **Open**.
Times New Roman	Displays an equation: $2 + 2 = 4$
Text in gray boxes	Describes Cautions or unique functionality of the product.

2. Software Installation

2.1 Kit Software

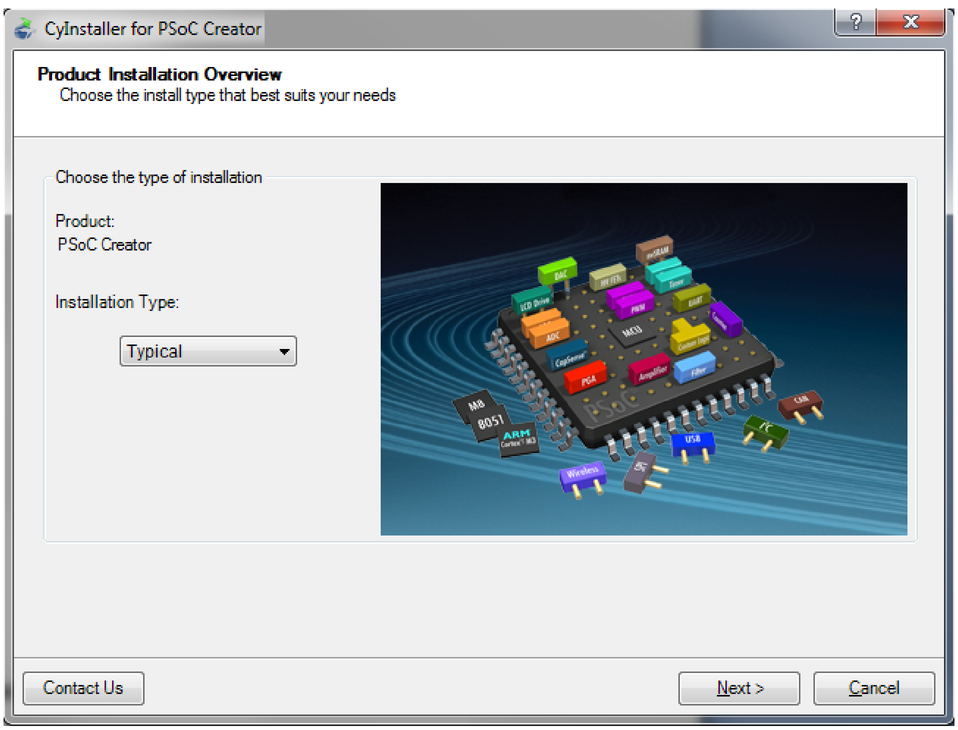
The PSoC 4 Prototyping Kit does not require installation, but it is recommended that you install the following content:

- PSoC Creator™
- EZ-USB Software Development Kit (SDK)

To install PSoC Creator, download the installer from the download table on the PSoC Creator web page and install it.

1. Run the installer and select the folder to install the PSoC Creator files. Choose the directory and click **Next**.
2. Select the Installation type and click **Next**.

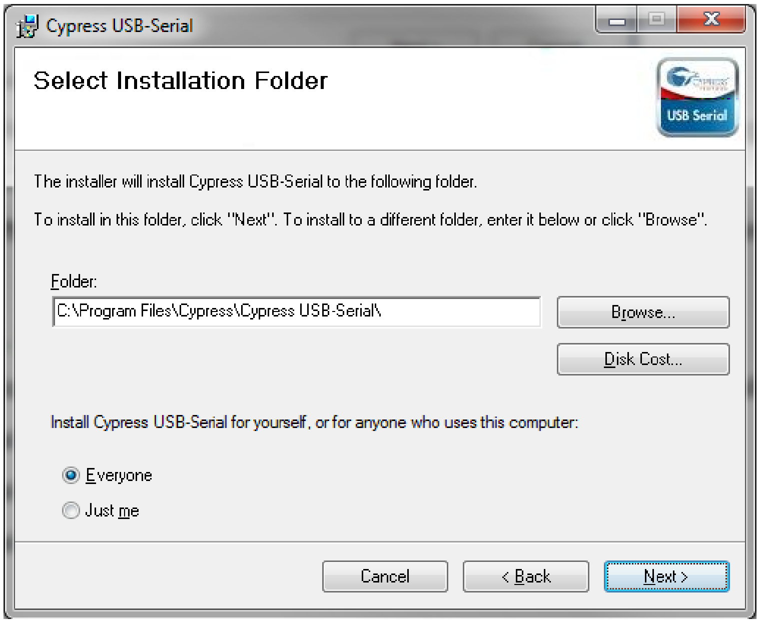
Figure 2-1. PSoC Creator Installation



3. Accept the Software License Agreement. After the installation is complete, the software is available at the following location: `<InstallDirectory>\Cypress\PSoC Creator\<version>`.
4. To install the USB-Serial SDK, download the installer from the web page and run it.

5. Run the installer and select the folder to install the USB-Serial SDK files. Choose the directory and click **Next**.

Figure 2-2. Select Installation Folder for PSoC Creator



6. Accept the Software License Agreement by selecting **I Agree** and then click **Next**.

After the installation is complete, the following software tools are installed on your computer:

- USB-Serial Configuration Utility
- USB-Serial Test Utility

2.2 Install Hardware

There is no additional hardware installation required for this kit.

2.3 Uninstall Software

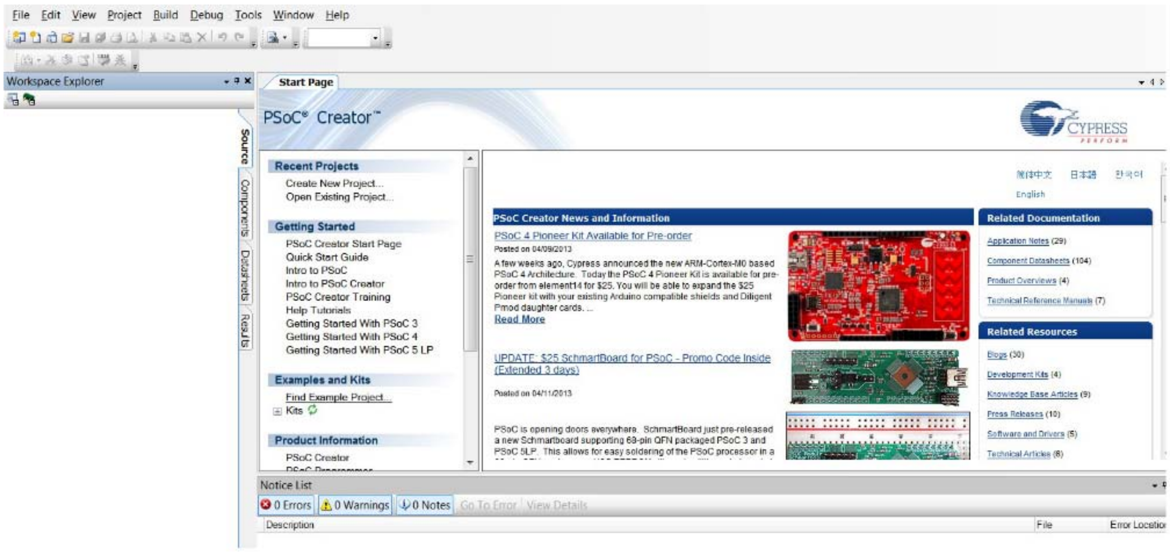
To uninstall the software, do one of the following:

- Go to **Start** > **All Programs** > **Cypress** > **Cypress Update Manager** > **Cypress Update Manager**, and then select **Uninstall**.
- Go to **Start** > **Control Panel** > **Programs and Features**, and then select the **Uninstall/Change**.

2.4 Open the PSoC 4 Code Example Project in PSoC Creator

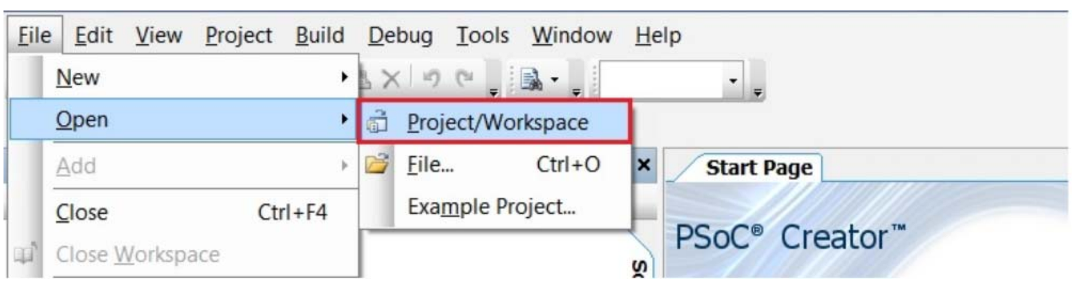
1. Launch the PSoC Creator software from the Start menu.

Figure 2-3. PSoC Creator Start Page



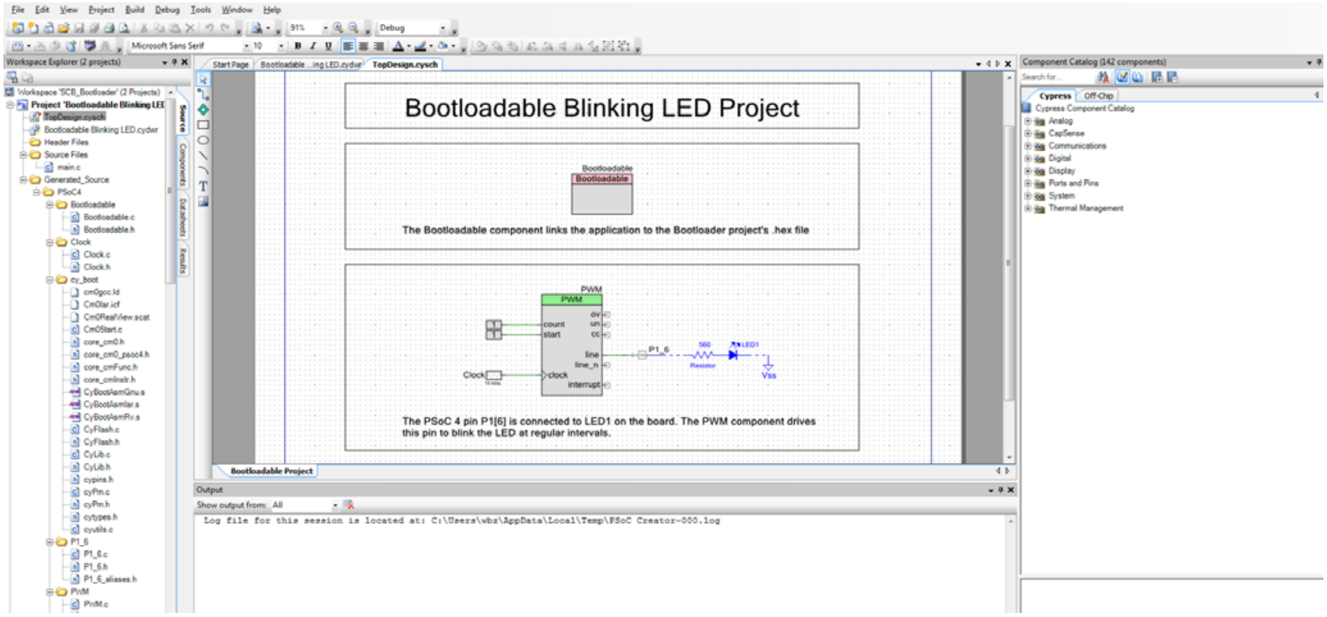
2. Open the example project from the Start Page. Click **File** > **Open** > **Project/Workspace**, and open the example project downloaded from the kit page.

Figure 2-4. Open Project/Workspace



The example project opens and displays the project files in the **Workspace Explorer**. The workspace includes two sample projects linked in the **Workspace Explorer**. Subsequent sections of this user guide show how to build, program, and understand the example projects supplied with this kit.

Figure 2-5. Workspace Explorer



3. Kit Operation

The PSoC 4 Prototyping Kit is simplistic in design and focuses on providing you with complete access to develop applications using the PSoC 4 device family. The development kit supports a number of onboard functions such as an LED, push button, through-hole connections, USB-Serial connectivity to the PC, and a breakable board design to separate the two target boards.

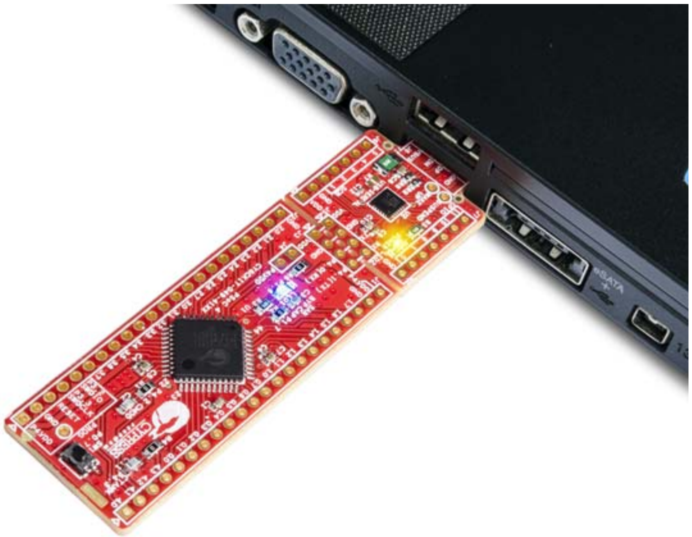
Figure 3-1. PSoC 4 Prototyping Kit

3.1 Connecting the PSoC 4 Prototyping Kit to a Computer

To use the PSoC 4 Prototyping Kit, you need to connect the kit to a target PC. The kit is designed to be connected to the computer through USB. The USB connector will provide power to the target boards and enable serial communication. CY8CKIT-049-4xxx implements a PCB-based USB connector that makes connections to the USB port when plugged in. The amber LED turns on when the board is plugged into the port to indicate power.

Figure 3-2. Connecting the PSoC 4 Prototyping Kit to a Computer

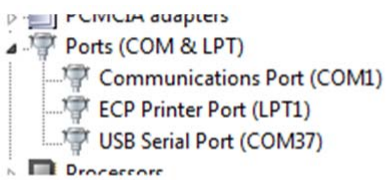
Figure 3-3. PSoC 4 Prototyping Kit Connected to the Computer



3.2 CY8CKIT-049-4xxx USB COM Port

When you connect CY8CKIT-049-4xxx to the PC over a USB interface, it enumerates as a COM port device under the Device Manager window in Windows OS. Often, the COM port number will be higher than any existing COM port value. For example, in the following image the CY8CKIT-049-4xxx enumerates as **COM37**.

Figure 3-4. CY8CKIT-049-4xxx USB COM Port in Device Manager



When connecting your CY8CKIT-049-4xxx to a computer for the first time or to any new USB port, it may take a moment to enumerate because the computer will complete an online check for the latest drivers.

Figure 3-5. Automatic Driver Software Installation for CY8CKIT-049-4xxx

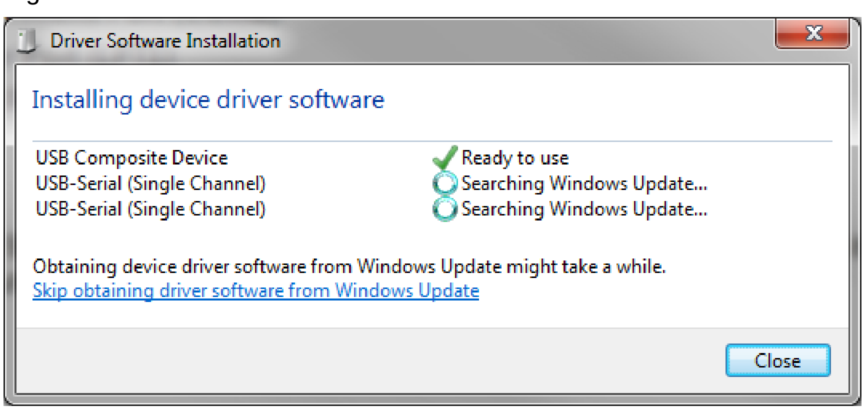
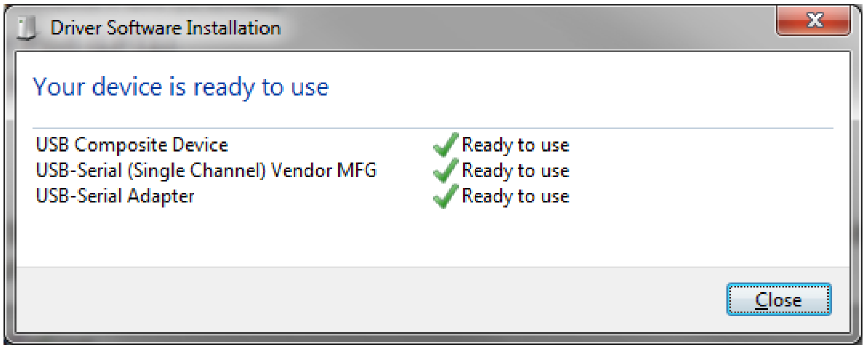


Figure 3-6. Driver Software Installation Complete



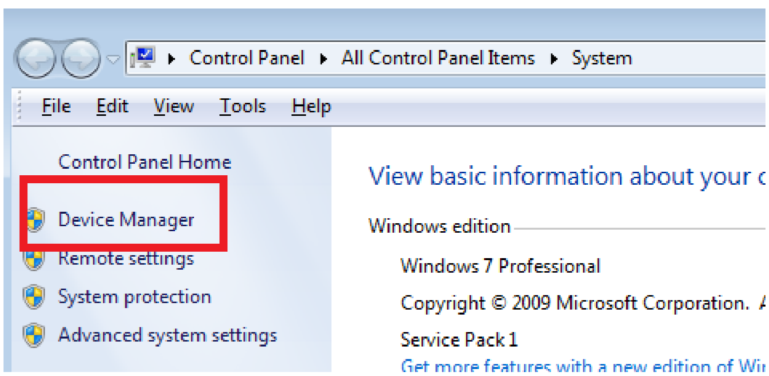
3.2.1 Configuring the COM Port

Different USB COM devices are connected to different USB ports and the PC assigns COM port values to those devices. As more devices are connected, the COM port values will continue to increase. Some applications require the COM port to be less than 10, such as 'COM10'. In the following examples, the Bootloader Host utility requires a COM port number below 10.

To change the assigned COM port number, do the following:

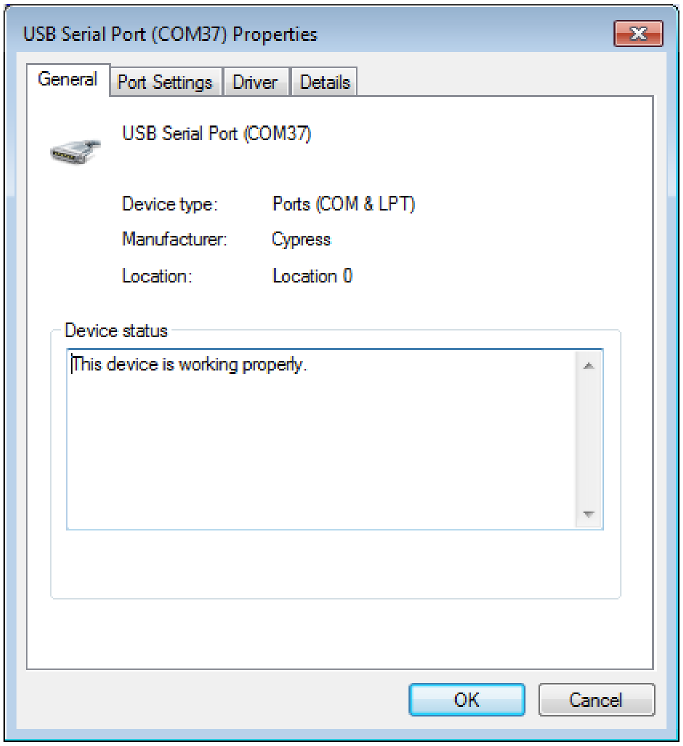
1. Open the **Device Manager** from the Control Panel window.

Figure 3-7. Windows Device Manager



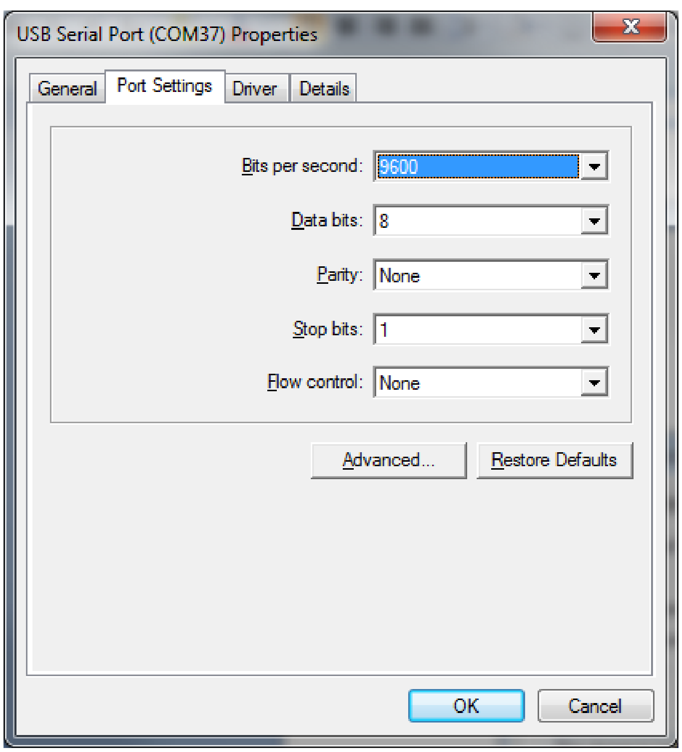
2. On the **Device Manager** window, under **Ports (COM and LPT)**, right-click on the COM port created by the CY8CKIT-049-4xxx kit and select **Properties**.

Figure 3-8. Configuring COM Port for CY8CKIT-049-4xxx



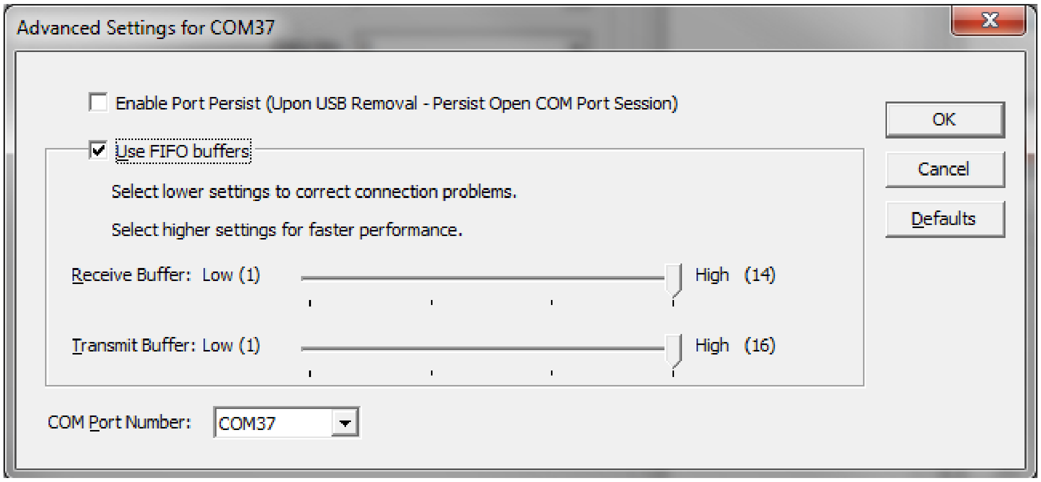
3. Select the **Port Settings** tab and click the **Advanced…** button.

Figure 3-9. Configuring COM Port Settings for CY8CKIT-049-4xxx



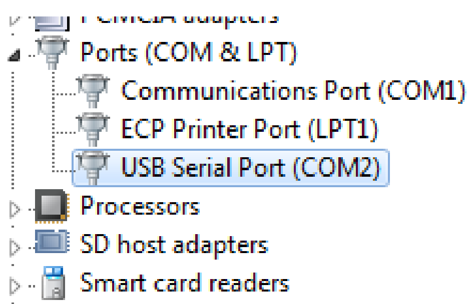
4. Click the **COM Port Number** drop-down menu and select an available COM port; click **OK**. Some COM ports will have the indicator (in use). Select a port that does not have this identifier.

Figure 3-10. Configuring COM Port Settings for CY8CKIT-049-4xxx



The Device Manager window will then display the new COM port value. In the following image, the value changed from COM37 to COM2.

Figure 3-11. Renamed COM Port for CY8CKIT-049-4xxx in Device Manager



3.3 Programming the CY8CKIT-049-4xxx Kit

The CY8CKIT-049-4xxx kits are pre-programmed with firmware containing a bootloader. Therefore, there are two methods of programming the onboard PSoC 4 device:

1. Perform UART bootload programming of the PSoC 4 device using the USB-Serial device as a USB-UART bridge.
2. Use a CY8CKIT-002 MiniProg3 to program and debug the target device directly.

Note that as long as the PSoC 4 device on the kit contains the bootloader, either method of programming can be used. If a project without a bootloader is programmed onto the PSoC 4, then only the second method may be used until the PSoC 4 device is reprogrammed with a bootloader. In other words, any project can be programmed using the MiniProg3 programmer, but only a bootloadable project can be bootloaded using the first method.

See the following sections for an example of a bootloader project and a bootloadable project. See application note AN73854 for additional details on bootloading.

3.3.1 Programming a CY8CKIT-049-4xxx Project Using MiniProg3

To use MiniProg3 for programming, connect wires or a 5-pin 100-mil spaced header to the programming header on the CY8CKIT-049-4xxx board. The programming header is a 5-pin header indicated on the silkscreen and is labeled '**PROG**'. This connector is oriented to mate directly with MiniProg3's 5-pin header. The CY8CKIT-049 supports both power cycle and reset programming modes.

Figure 3-12. Connecting CY8CKIT-049-4xxx to MiniProg3

Note: CY8CKIT-002 MiniProg3 is not part of the PSoC 4 Prototyping Kit contents and can be purchased from the Cypress Online Store.

The following images show the pinout for MiniProg3 and the connections on CY8CKIT-049-4xxx.

Figure 3-13. Pinout for MiniProg3

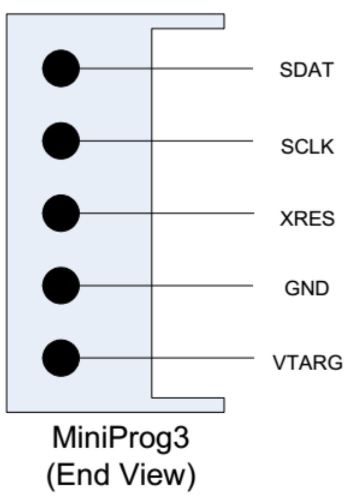
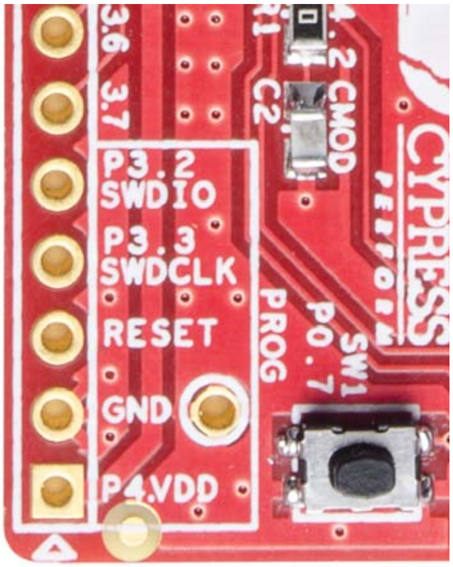


Figure 3-14. CY8CKIT-049-4xxx Connections for MiniProg3

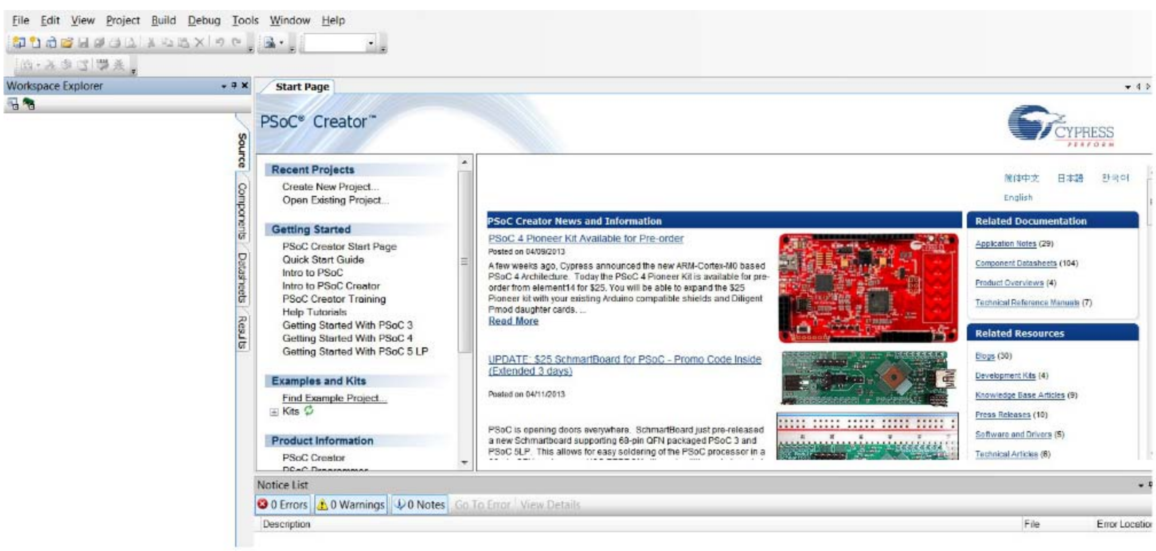


The code examples described in this section show how to bootload new projects into PSoC 4 and create bootloader and bootloadable projects. To access the kit examples, download the examples from the kit web page.

The initial example shows how to program the kit with just a bootloader using MiniProg3. Note that the kit is pre-programmed with a project containing a bootloader, so this step is not necessary to change the application firmware.

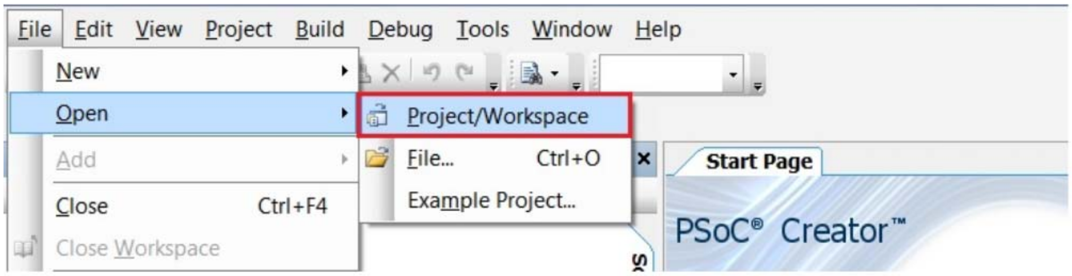
1. Launch PSoC Creator from the Start menu.

Figure 3-15. PSoC Creator Start Page



2. Open the example project workspace from the Start Page. Select **File > Open > Project/Workspace**.
3. Open the workspace by navigating to the example downloaded from the kit page.

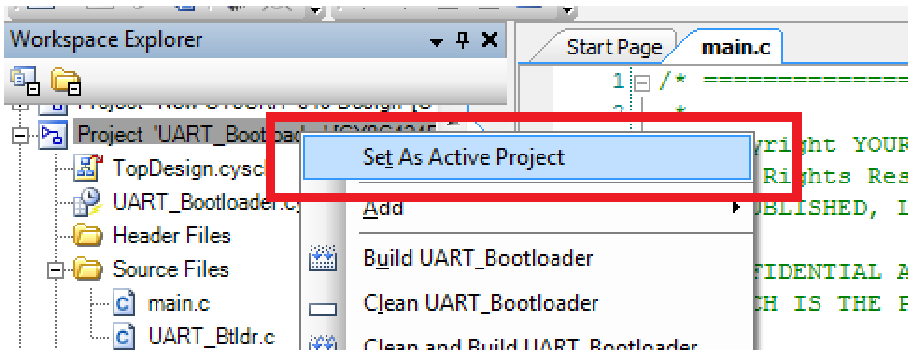
Figure 3-16. Opening the Project in PSoC Creator



The example opens and displays the project files in the Workspace Explorer. The workspace includes two sample projects linked in the Workspace Explorer - a bootloader project and a bootloadable project.

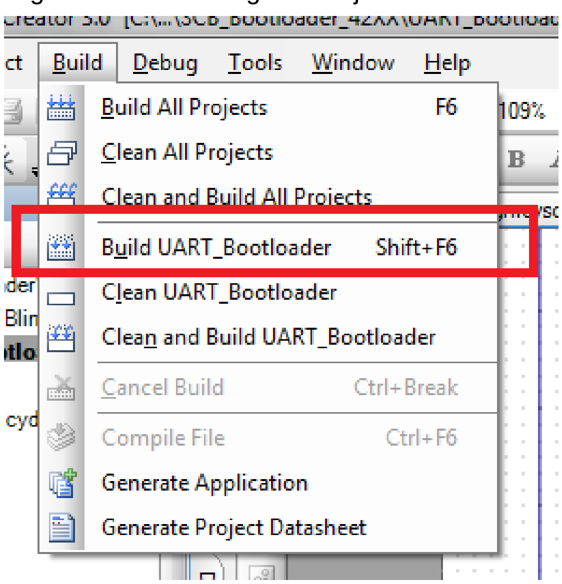
4. Right-click the *UART_Bootloader* project and select **Set As Active Project**.

Figure 3-17. Setting Example Project as Active Project in Workspace Explorer



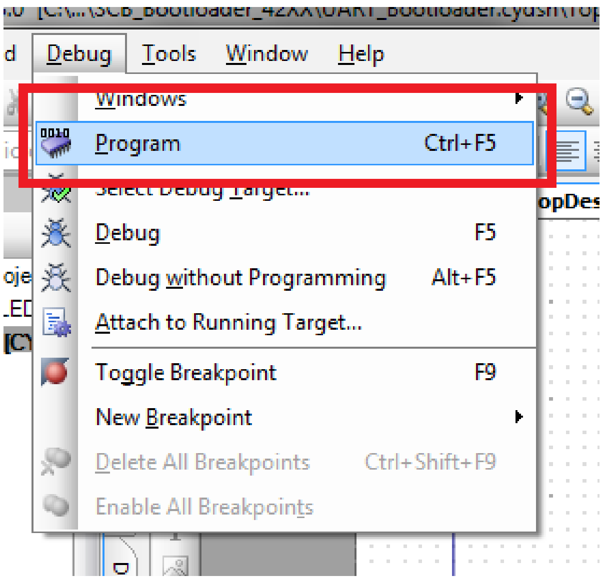
5. Select **Build > Build UART_Bootloader**.

Figure 3-18. Building the Project



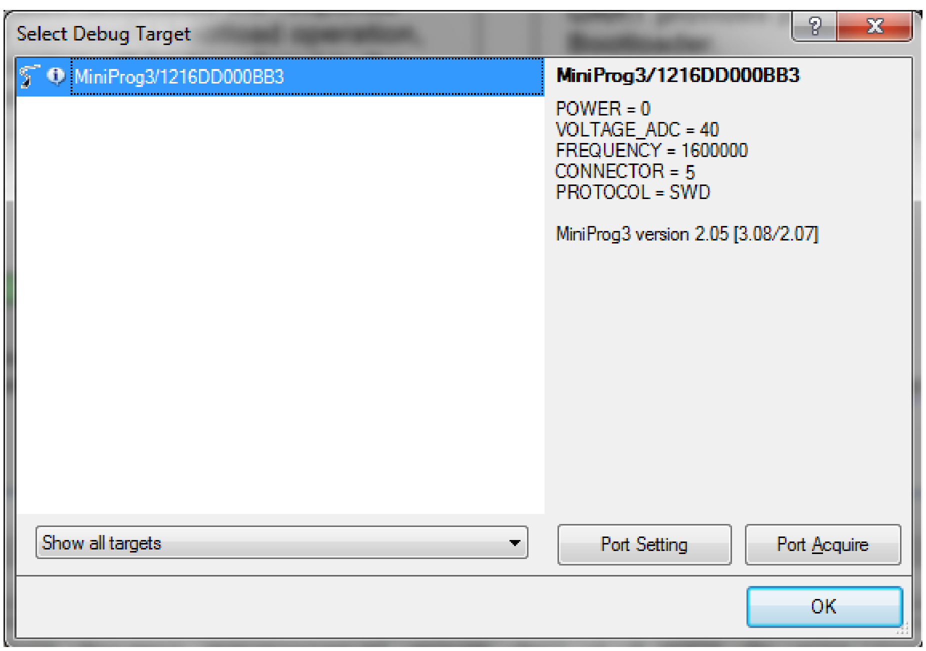
6. Connect MiniProg3 to the CY8CKIT-049-4xxx prototyping board.
7. Select **Debug > Program**.

Figure 3-19. Programming the CY8CKIT-049-4xxx



The Select Debug Target window opens.

Figure 3-20. Debug Target Window



8. Click **Port Settings**, set the connector to **5** pin, and then click **OK**.
9. Click **Port Acquire** to detect the target device, click **Connect**, and then click **OK**.

PSoC Creator programs the target. When programming is complete, the PSoC 4 will contain the bootloader but not any application code.

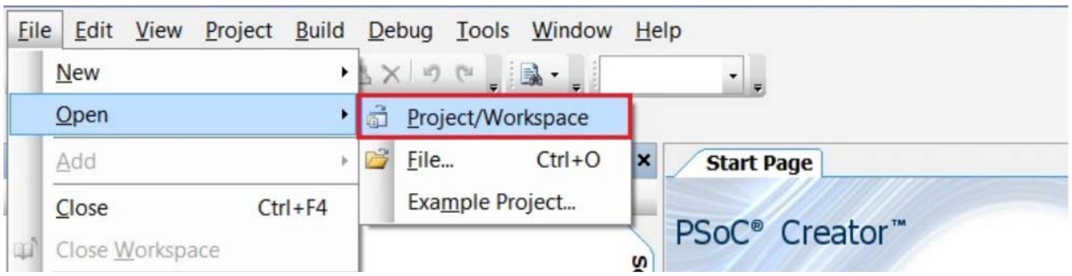
3.3.2 Programming a CY8CKIT-049-4xxx Project Using the Bootloader

The following example shows how to bootload a project into the PSoC 4 with the USB-Serial device, using the Bootloader Host. To use this method, the PSoC 4 device must contain the bootloader and the project must be configured as bootloadable. This is the default programming method for new users.

The following steps use the example project downloaded from the kit web page.

1. Launch PSoC Creator from the Start menu.
2. From the Start Page, select **File > Open > Project/Workspace**.
3. Open the project by navigating to the example project downloaded from the kit page.

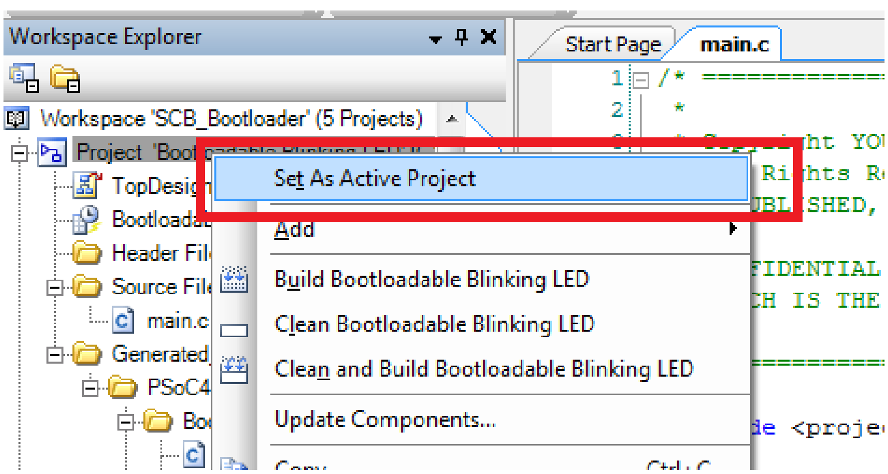
Figure 3-21. Open the Project



The example project opens and displays the project files in the Workspace Explorer. The workspace includes two sample projects linked in the Workspace Explorer.

4. In the Workspace Explorer, right-click the *Bootloadable Blinking LED* project and select **Set As Active Project**.

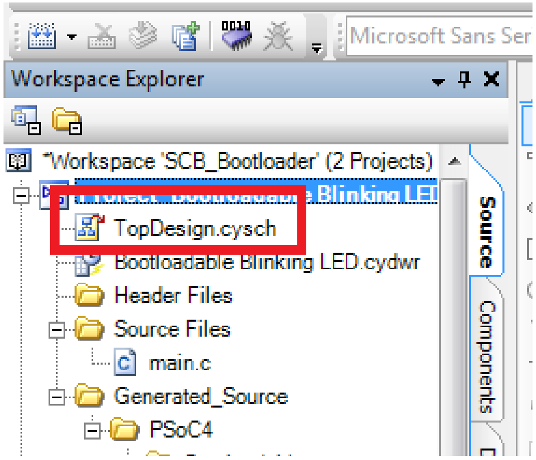
Figure 3-22. Set the Example Project as Active Project



The bootloadable project must be associated with the bootloader project's HEX and ELF files. This will ensure that the firmware code mapping aligns with the code on the target device.

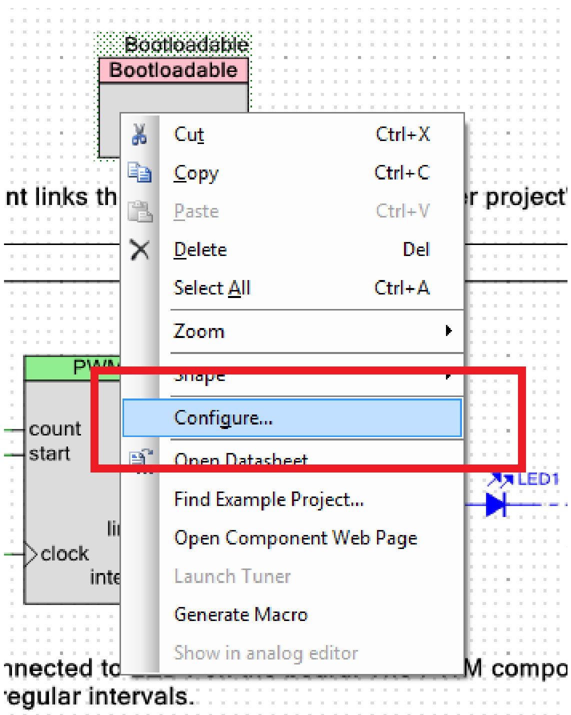
5. Under the 'Bootloadable Blinking LED' example project, double-click the 'TopDesign.cysch' file to open the schematic view. Select the tab for the Bootloadable Project schematic page if it is not already selected.

Figure 3-23. Open Schematic View



6. In the schematic view, right-click the **Bootloadable** component and select **Configure**.

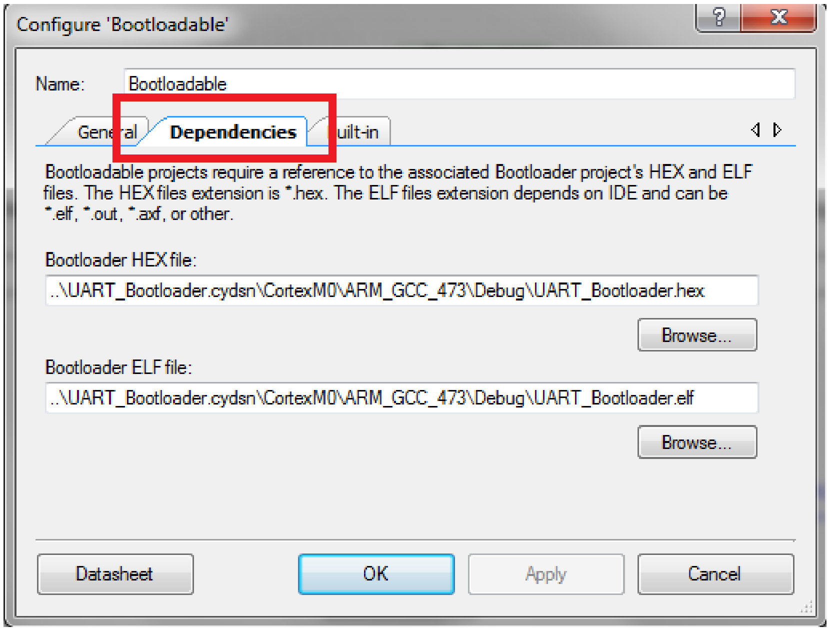
Figure 3-24. Configure the Bootloader Component



7. In the configuration window, select the **Dependencies** tab and click the **Browse** button to point to the HEX and ELF files generated when the bootloader project was built in Programming a CY8CKIT-049-4xxx Project Using MiniProg3 on page 18; click **OK**. The file paths (assuming the 42xx kit) will appear as follows:

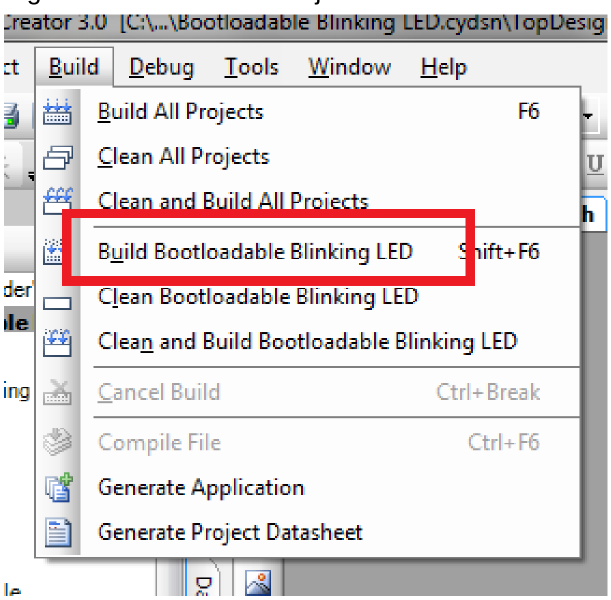
```
[Download_Directory]\SCB_Bootloader_42XX\SCB_Bootloader_42XX\UART_Bootloader.cydsn\CortexM0\ARM_GCC_473\Debug\UART_Bootloader.HEX
[Download_Directory]\SCB_Bootloader_42XX\SCB_Bootloader_42XX\UART_Bootloader.cydsn\CortexM0\ARM_GCC_473\Debug\ UART_Bootloader.ELF
```

Figure 3-25. Configure Dependencies for Bootloader Component



8. Select **Build > Build Bootloadable Blinking LED**.

Figure 3-26. Build the Project

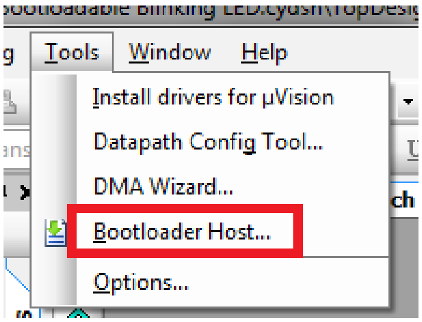


9. Connect the CY8CKIT-049-4xxx prototyping board to the PC. When connecting the kit to the port, depress the **SW1** button as it is plugged in.

   You will notice that the LED begins to blink rapidly; this indicates that the PSoC 4 is in 'Bootloader Mode' and is ready to be loaded with the latest firmware. This must be done each time you bootload the PSoC 4.

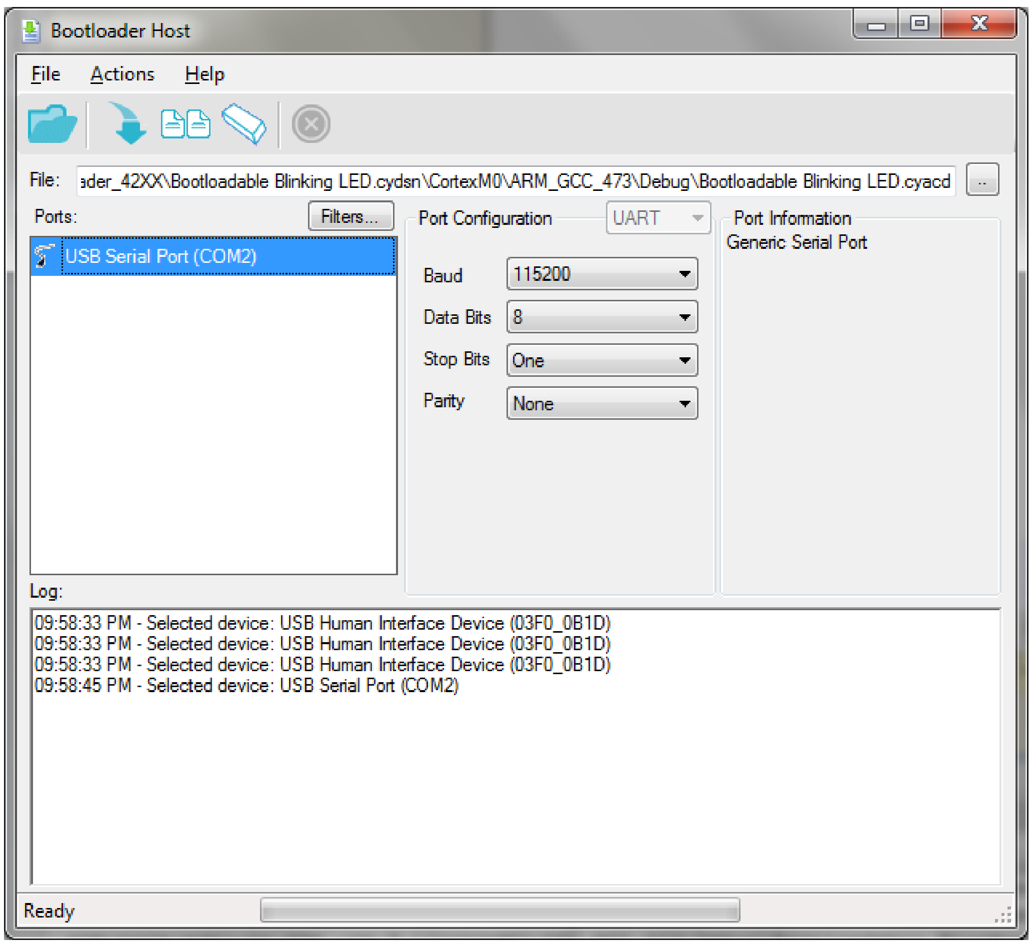
10. Select **Tools > Bootloader Host** to open the Bootloader Host tool.

Figure 3-27. Launch Bootloader Host Tool



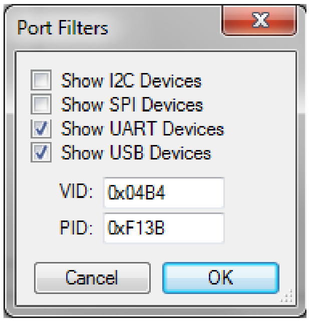
The Bootloader Host tool opens.

Figure 3-28. Bootloader Host Tool



11. Click **Filters** and select the **Show UART Devices** option from the Port Filters window and click **OK**. This lists all COM devices connected to the computer.

Figure 3-29. Port Filters



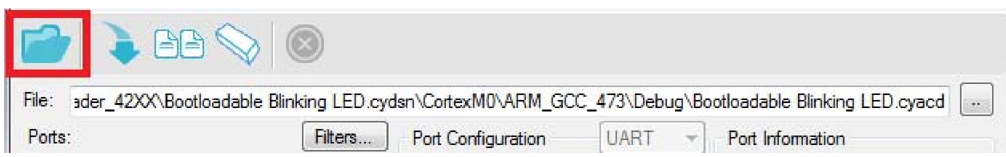
The Bootloader Host tool will now display all of the available UART based COM ports.

12. Click the COM port from the list of available ports and enter the UART configuration such as Baud Rate, Data Bits, Stop Bits, and Parity for the USB-UART configuration on the USB-Serial device.

    The default values for the UART are: 115200 baud rate, 8 data bits, 1 stop bit, and no parity.

13. Click **File > Open** and navigate to the **Bootloadable_Blinking_LED.cyacd** file generated in the CortexM0 folder in your project directory, and click **Open**.

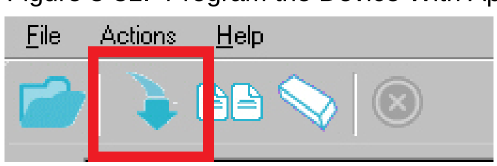
Figure 3-30. Opening the Generated File



14. Click the **Program** button to flash the part with your new application code.

    The status window provides output message and a status bar indicates the programming progress. When bootloading is complete, your application executes with the latest version of the application code.

Figure 3-31. Program the Device With Application Code



Note that the blinking LED firmware created in this section could have been programmed into the PSoC 4 using a MiniProg3 instead of using bootloading if required. In PSoC, a bootloadable project always contains both the application as well as the complete bootloader. Therefore, if the HEX file from the Bootloadable Blinking LED project were to be programmed using a MiniProg3, the resulting device would still be bootloadable.

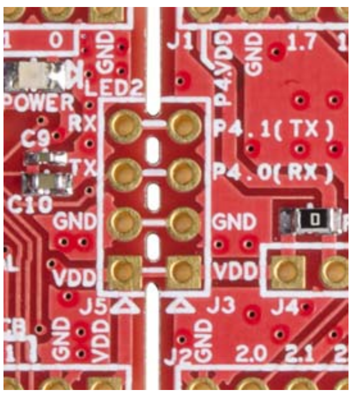
3.4 USB-UART Default Settings

The default configuration of the USB-Serial device on the CY8CKIT-049-4xxx prototyping kit is the USB-UART mode. The CY8CKIT-049-4xxx also enables a default UART connection between the USB-Serial device and the PSoC 4. This connection is indicated by two parallel 4-pin headers in the middle of the board. The default pin connections are shown in Table 3-2.

Table 3-1. Pin Mapping for USB Serial Port and PSoC 4 UART

USB Serial UART	PSoC 4 UART
TX	P4.0 (RX)
RX	P4.1 (TX)
GND	GND
VDD	VDD

Figure 3-32. UART Pin Connections on CY8CKIT-049-4xxx



The USB-Serial device provides the PSoC 4 device with an interface to a PC. The USB-Serial device enumerates as a COM port to allow any terminal software to be used to communicate with the PSoC 4. To use the USB-UART functionality in the COM terminal software, select the corresponding COM port. Note that if the USB-Serial device board is separated from the PSoC 4 board, you will still be able to use the USB-Serial device to communicate with any UART device using the 4-pin header.

The USB-Serial device is by default configured as a USB-UART device with the following specifications. Default values are shown in bold.

Table 3-2. USB-UART Parameters

Parameter	Supported Values
Baud Rate	100, 200, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600, **115200**, 230400, 460800, 921600, 1000000, 3000000
Type	**2 pin**, 4 pin, 6 pin
Data Bits	7 bits, **8 bits**
Stop Bits	**1 bit**, 2 bits
Parity	**None**, Odd, Even, Mark, Space
Drop Packets on RX error	**Disabled,** Enabled
Disable CTS and DSR pull-up during suspend	Disabled, **Enabled**

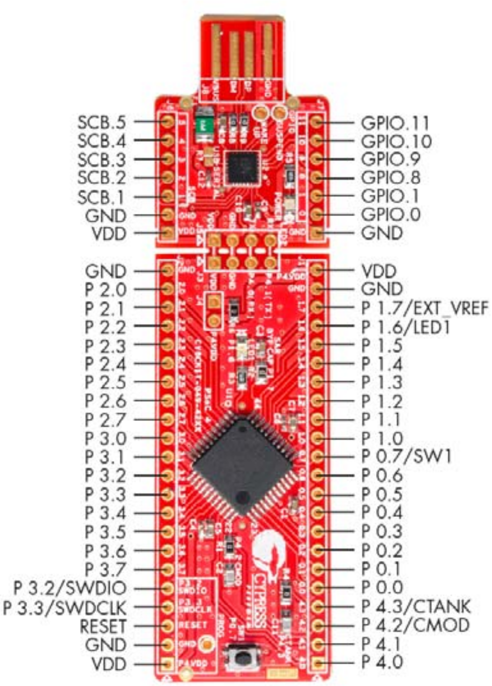
4. Hardware

4.1 Board Details

The PSoC 4 Prototyping Kit consists of the following blocks:

- PSoC 4 device
- PSoC 4 header ports J1 and J2
- USB-Serial device
- USB-Serial header ports J5 and J6 (GPIO)
- UART connection J3 and J4 (SCB and GPIO)
- PCB USB connector
- One amber LED (Power)
- One blue LED (User)
- Push button
- External reference capacitor (ADC Bypass)
- CapSense and shield capacitors (CMOD and CTANK)
- Programming connector
- Perforated 'snappable' board design

Figure 4-1. CY8CKIT-049-4xxx Pin Details



4.2 Theory of Operation

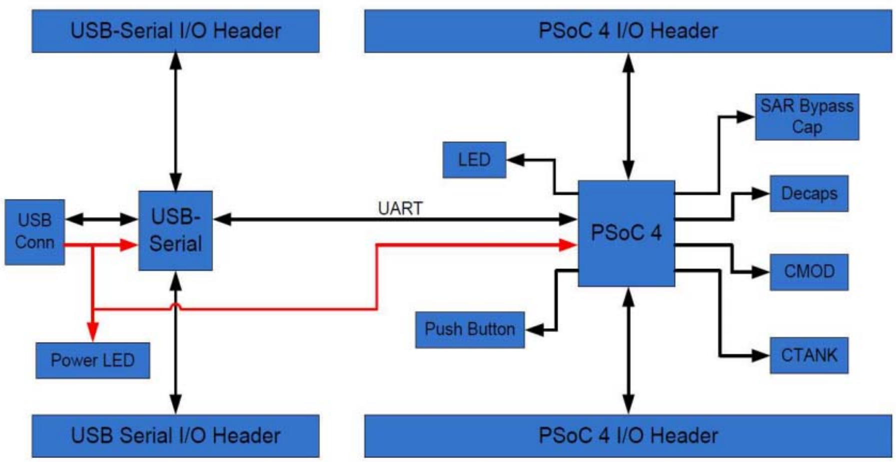
PSoC 4 is a new generation of programmable system-on-chip device from Cypress for embedded applications. It combines programmable analog, programmable digital logic, programmable I/O, and a high-performance ARM Cortex-M0 core. With PSoC 4, you can create the combination of peripherals required to meet your application's specifications.

The PSoC 4 Prototyping Kit features an onboard USB-Serial device, which communicates to a PC through USB to provide serial communication support and serial port debugging.

The PSoC 4 Prototyping Kit has a user LED and a power status LED. This kit includes a button that connects to the PSoC 4 device, which can be used to develop applications. This button is also used to enable the onboard bootloader. The PSoC 4 pins are brought out onto headers J1 to J2 on the kit and support 100-mil breadboard spacing.

The PSoC 4 Prototyping Kit can be powered from USB or an external power supply. The input voltage is either 5 V from USB or a variable supply from an external source.

Figure 4-2. CY8CKIT-049-4xxx Functional Block Diagram



4.3 Functional Description

4.3.1 Power Supply System

The power supply system on this board is dependent on the source of the power. 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 PCB USB
- 1.8-5 V from a regulated supply connected to VDD

It is important to understand that this prototyping kit does not have any onboard ESD protection circuitry. Therefore, the power source for the CY8CKIT-049-4xxx must be of a high quality to ensure that the board is protected from any over-current conditions and swapped-power connections.

4.3.1.1 *Measure PSoC 4 Current Consumption*

You can measure the current consumption of the PSoC 4 device by using one of these methods:

Method 1:

1. Separate the USB-Serial board by 'snapping' the perforated edge between the two boards.
2. Power the remaining prototyping board via any of the VDD terminals.
3. Place an ammeter in series with the VDD connection to measure the current consumption.

Method 2:

1. Remove the resistor R6 and install a 2-pin jumper in the supplied holes of J4.
2. Connect an ammeter across the 2-pin jumper to measure the current to the PSoC 4 device.

This method can be used either with USB power or with power supplied to one of the VDD pins.

4.3.2 Board Separation (Snapping)

CY8CKIT-049-4xxx supports both the PSoC 4 and USB-Serial boards. To separate the two boards for testing or development, break the two boards apart at the built-in perforated edge.

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 USB-Serial device is off the table edge. Press gently on the USB-Serial 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.

Figure 4-3. CY8CKIT-049-4xxx Broken as Two Parts

4.3.3 Header Connections

The CY8CKIT-049-4xxx Prototyping Kit supports a number of unpopulated headers on both the USB-Serial and the PSoC 4 boards.

4.3.3.1 *Functionality of the J1 and J2 Headers (PSoC 4)*

The main PSoC 4 board contains two dual-inline headers (J1 and J2). These headers are both 1×22-pin headers and include all of the I/O available on the PSoC 4 devices. 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 the male connectors to connect the CY8CKIT-049-4xxx to any development breadboard.

Figure 4-4. J1 and J2 Headers

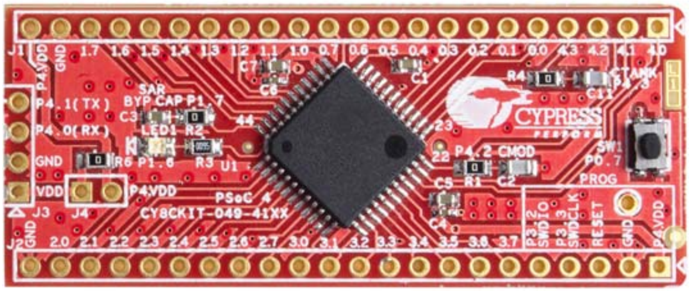


Table 4-1. J1 Header Pin Details

PSoC 4 GPIO Header (J1)		
Pin	**Signal**	**Description**
Pin	Signal	Description
J1_01	P4.0	GPIO
J1_02	P4.1	GPIO
J1_03	P4.2	GPIO/CMOD
J1_04	P4.3	GPIO/CTANK
J1_05	P0.0	GPIO
J1_06	P0.1	GPIO
J1_07	P0.2	GPIO
J1_08	P0.3	GPIO
J1_09	P0.4	GPIO
J1_10	P0.5	GPIO
J1_11	P0.6	GPIO
J1_12	P0.7	GPIO/SW1
J1_13	P1.0	GPIO
J1_14	P1.1	GPIO
J1_15	P1.2	GPIO
J1_16	P1.3	GPIO
J1_17	P1.4	GPIO
J1_18	P1.5	GPIO
J1_19	P1.6	GPIO/LED1
J1_20	P1.7	GPIO/SAR Bypass (EXT_VREF)
J1_21	GND	Ground
J1_22	VDD	Power

Table 4-2. J2 Header Pin Details

PSoC 4 GPIO Header (J2)		
Pin	**Signal**	**Description**
J2_01	VDD	Power
J2_02	GND	Ground
J2_03	RESET	Reset
J2_04	P3.3	GPIO/SWDCLK
J2_05	P3.2	GPIO/SWDIO
J2_06	P3.7	GPIO
J2_07	P3.6	GPIO
J2_08	P3.5	GPIO
J2_09	P3.4	GPIO
J2_10	P3.3	GPIO/SWDCLK
J2_11	P3.2	GPIO/SWDIO
J2_12	P3.1	GPIO
J2_13	P3.0	GPIO
J2_14	P2.7	GPIO
J2_15	P2.6	GPIO
J2_16	P2.5	GPIO
J2_17	P2.4	GPIO
J2_18	P2.3	GPIO
J2_19	P2.2	GPIO
J2_20	P2.1	GPIO
J2_21	P2.0	GPIO
J2_22	GND	Ground

4.3.3.2 *Functionality of J3 and J5 Headers (PSoC 4 to USB-Serial)*

Both the USB-Serial and the PSoC 4 prototyping boards each contain a 1×4-pin header. This header provides a physical connection between the two devices. Specifically, the connection includes the UART (RX and TX), VDD, and GND connections between the two devices. When the boards are separated, this physical connection is broken.

Figure 4-5. J3 and J5 Headers

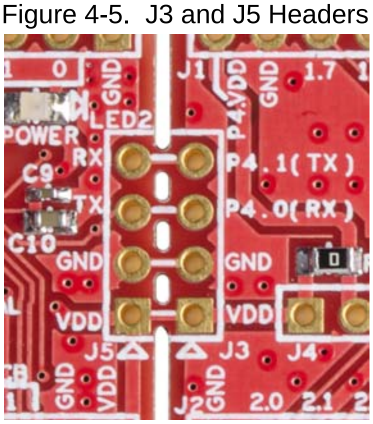


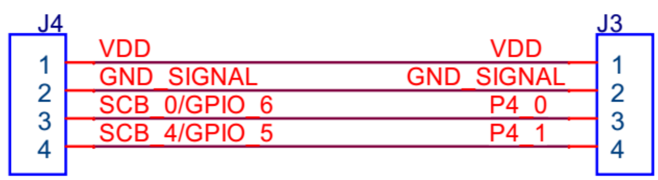
Table 4-3. Pin Details of J3 Header

PSoC 4 to USB-Serial Header (J3)		
Pin	**Signal**	**Description**
J3_01	VDD	Power
J3_02	GND	Ground
J3_03	P4.0	UART RX
J3_04	P4.1	UART TX

Table 4-4. Pin Details of J5 Header

USB-Serial to PSoC 4 Header (J5)		
Pin	**Signal**	**Description**
J4_01	VDD	Power
J4_02	GND	Ground
J4_03	SCB.0/GPIO_6	UART TX
J4_04	SCB.4/GPIO_5	UART RX

Figure 4-6. UART Connection to PSoC 4



4.3.3.3 *Functionality of J6 and J7 Headers (USB-Serial)*

The USB-Serial board contains two dual-inline headers (J6 and J7). These headers are both 1x7-pin headers and include all of the GPIO and SCB connections. These headers support all of the available ports, GND, VDD, and connections to passive elements and user-input devices.

The J6 and J7 headers support 100-mil spacing, so you can solder the male connectors to connect the USB-Serial board to any development breadboard.

Figure 4-7. J6 and J7 Connectors

Table 4-5. Pin Details of J6

USB-Serial Comm/GPIO Header (J6)		
Pin	**Signal**	**Description**
Pin	Signal	Description
J5_01	VDD	Power
J5_02	GND	Ground
J5_03	S SEL	Mode 0-6
J5_04	MISO/SCL	Mode 0-6
J5_05	MOSI/SDA	Mode 0-6
J5_06	SCLK	Mode 0-6
J5_07	SCB.5/GPIO_7	Mode 0-6

Table 4-6. Pin Details of J7

USB-Serial GPIO Header (J7)		
Pin	**Signal**	**Description**
Pin	Signal	Description
J6_01	GND	Power
J6_02	GPIO.0	Ground
J6_03	GPIO.1	Reset
J6_04	GPIO.8	GPIO
J6_05	GPIO.9	GPIO
J6_06	GPIO.10	GPIO
J6_07	GPIO.11	GPIO

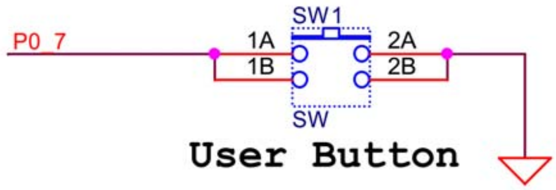
4.3.4 User and Passive Inputs

4.3.4.1 Push Button

The main PSoC 4 board contains a single push button connected to the P0.7 pin on the PSoC 4 device. This button can be used for general user inputs and for triggering the bootloader for programming.

Figure 4-8. Push Button on the Board

Figure 4-9. Push Button Schematic



4.3.4.2 CY8CKIT-049-4xxx LEDs

CY8CKIT-049-4xxx contains two LEDs: the amber LED, which indicates the board is power applied and the blue LED that is directly connected to the PSoC 4 device through the pin P1.6. The blue LED is also used to indicate the bootloader mode by rapidly blinking. The power LED is on the USB-Serial board; if the boards are separated, the PSoC 4 section does not consume current through the power LED.

Figure 4-10. Power LED

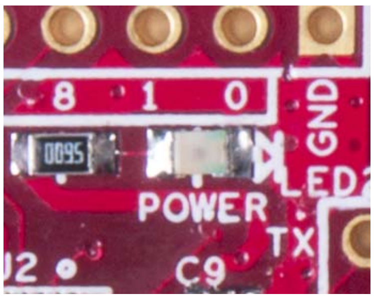


Figure 4-11. User LED

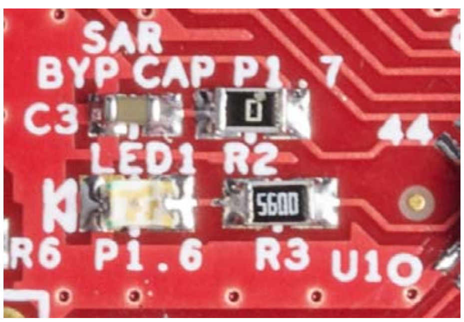


Figure 4-12. Power LED Connection

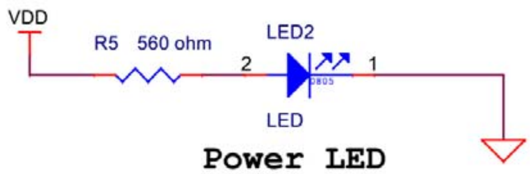
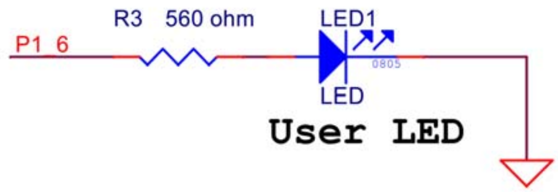


Figure 4-13. User LED Connection

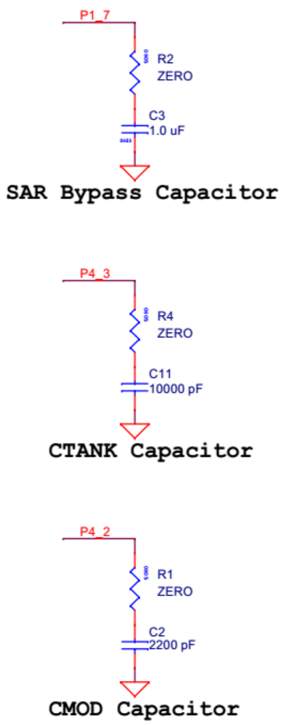


4.3.4.3 *System Capacitors*

The three capacitors on the CY8CKIT-049-4xxx prototyping kit enable proper development of ADC and CapSense example projects. These capacitors are the following:

- A SAR ADC bypass capacitor: Required for proper sampling at high frequencies,
- Two CapSense capacitors (CMOD and CTANK): Required for proper CapSense functionality.

Figure 4-14. System Capacitors Circuit Diagram



5. Example Projects

This section describes how to use the example project included with the kit and how to develop custom bootloadable example projects for new applications.

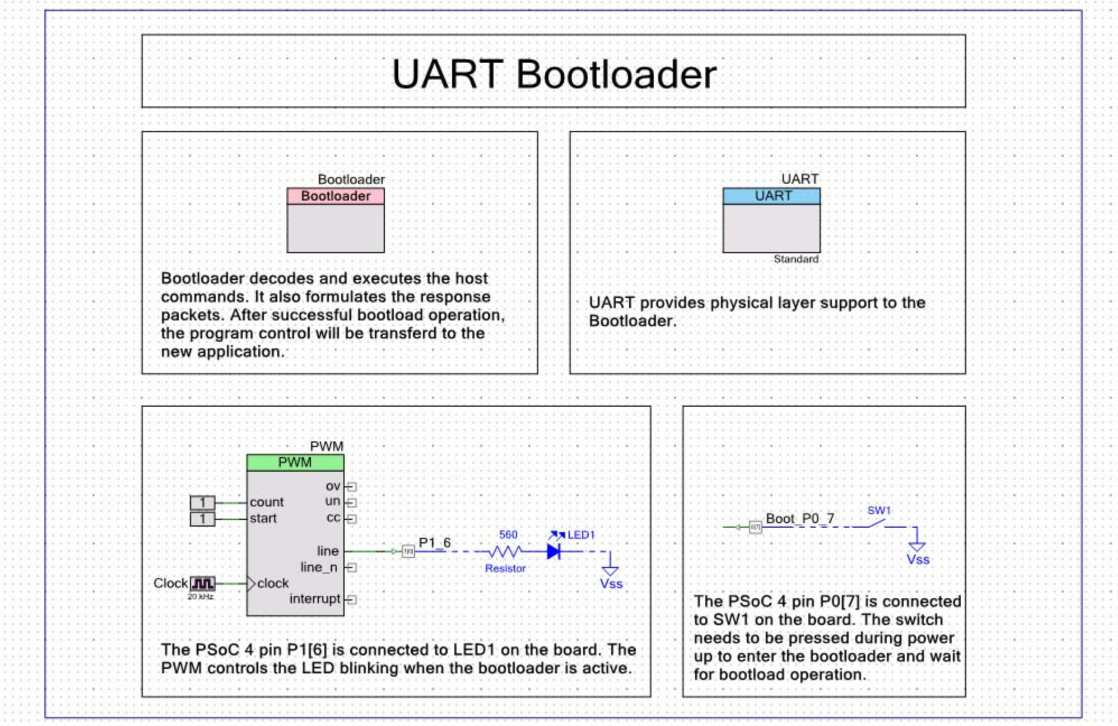
5.1 Bootloader Base Example Project

The CY8CKIT-049-4xxx prototyping board is pre-programmed with a simple blinking LED example project. This example project uses a PWM to slowly blink an LED. Included in the application project is the Bootloader Base project. The Bootloader code is detailed in the UART_Bootloader project available on the kit web page.

In the bootloader example, the device rapidly blinks an LED when the bootloader is active, provides UART communication support for bootloading, and reads the state of the switch (SW1). You can observe the state of the board by noticing the rate at which the LED blinks. The bootloader is activated when you plug in the CY8CKIT-049-4xxx while pressing the SW1 button. The bootloader reads the state of this button during power-up. If the button is not pressed, the bootloader jumps to the user's application code. If the button is pressed, then the bootloader waits for a new application to be transferred. While the bootloader waits for the new application, it rapidly blinks the onboard blue LED.

Note that the bootloader project is fully customizable, so you can use different methods for entering the bootloader mode, and different feedback mechanisms. For example, you can change the project so that it waits at power-up for a specified amount of time for a new application to be loaded rather than through the use of a button press. All resources of the PSoC are available for use by the bootloader project.

Figure 5-1. UART Bootloader



The Bootloader Base Project includes the source code in the *main.c* and the *UART_Btld.c* files, which support bootloading the PSoC 4 device. The source code is available for reference, but is not necessary to create bootloadable applications.

5.2 Bootloadable Example Project

The example in Programming a CY8CKIT-049-4xxx Project Using the Bootloader on page 21 showed how to bootload the application code for a blinking LED project into the device using the USB-Serial controller.

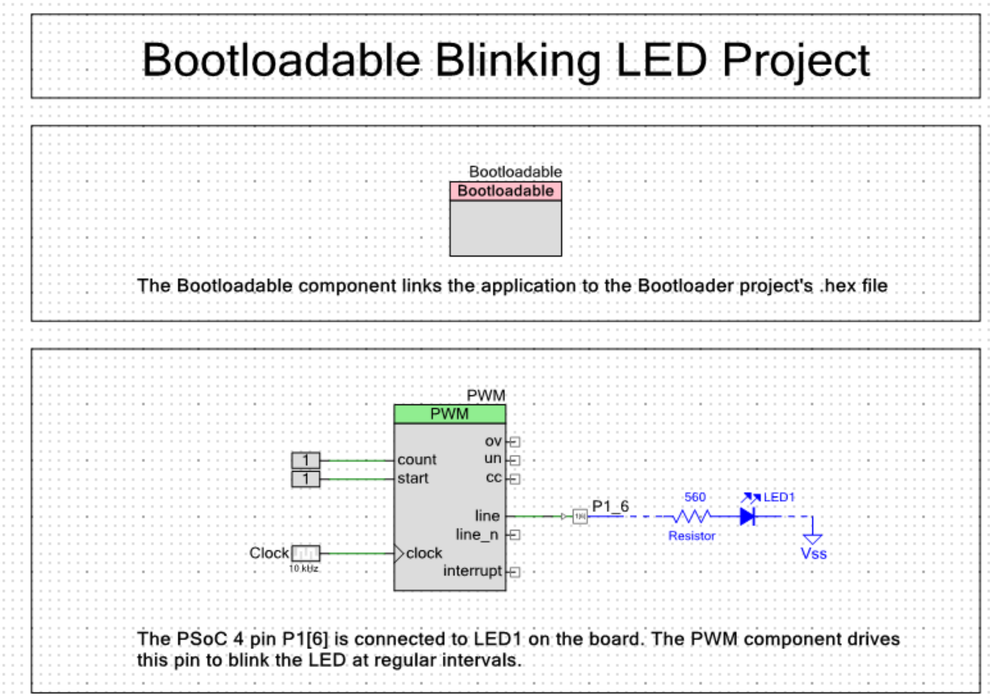
In the bootloadable example project, the following components are used:

- Bootloadable
- PWM
- Clock
- Digital Output Pin
- Digital Constants (logic HIGH/LOW)
- Off-Chip Components (external resistor, LED, and Vss)

In this example project, the PWM component is used to drive an output on a pin connected to the user LED. The bootloadable component is placed to ensure that your application code is correctly mapped to the target PSoC 4 bootloader flash-space mapping.

For more information on how to bootload this project into the base board using the USB-Serial and the USB-Serial Configuration Utility, see the Kit Operation chapter on page 13.

Figure 5-2. Bootloadable Blinking LED Project

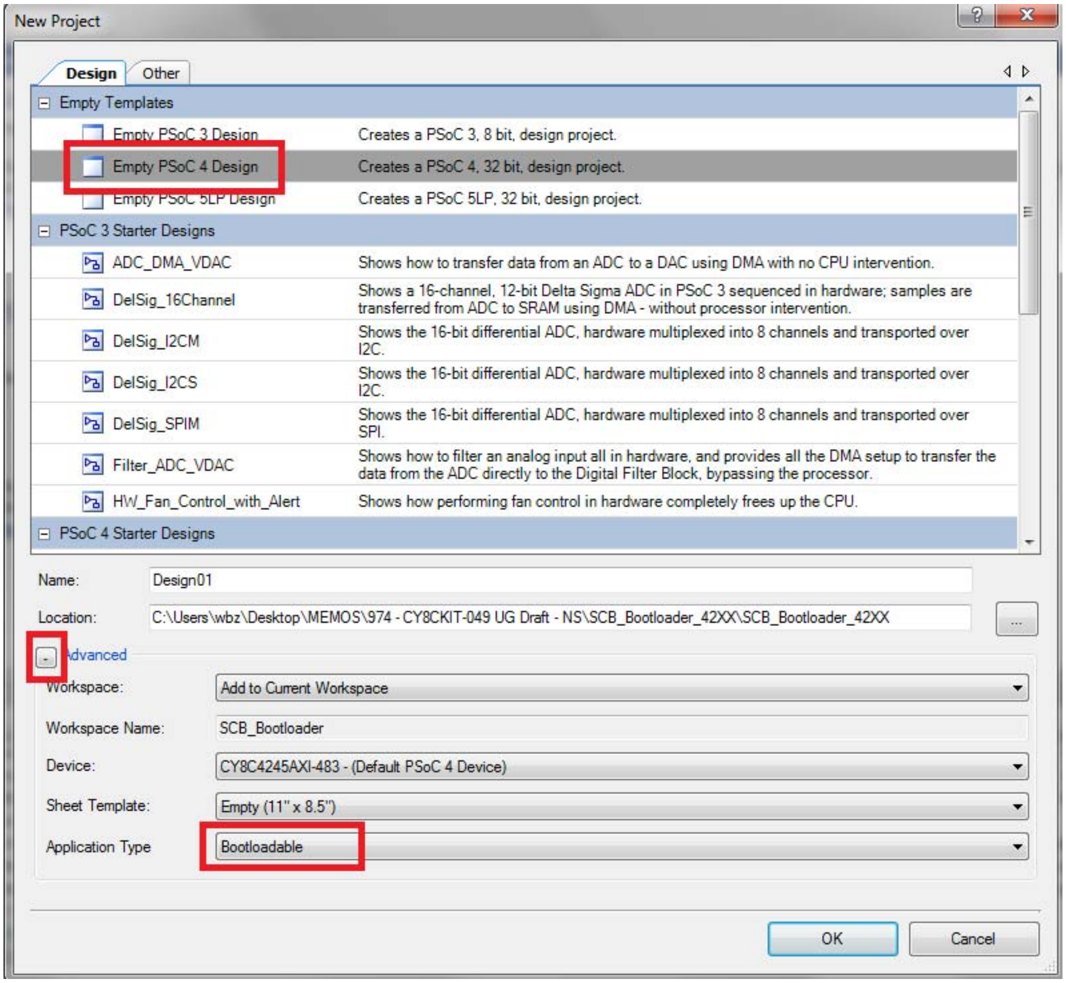


5.3 Creating a New Bootloadable Project

To create a new bootloadable project, do the following:

1. On the **Start Page** of PSoC Creator, click **Create New Project**.
2. On the New Project window, select an **Empty PSoC 4 Design**.
3. Click the **+** button next to **Advanced**, enter a name for the project, and select a workspace. You can either add the new project to an existing workspace or create a new one.
4. Set the device to the PSoC 4 device on your CY8CKIT-049-4xxx. For example, the CY8CKIT-049-42XX kit requires the CY8C4245AXI-483 device.
5. Set the **Application Type** as **Bootloadable**.
6. Click **OK**.

Figure 5-3. Creating a New Bootloadable Project

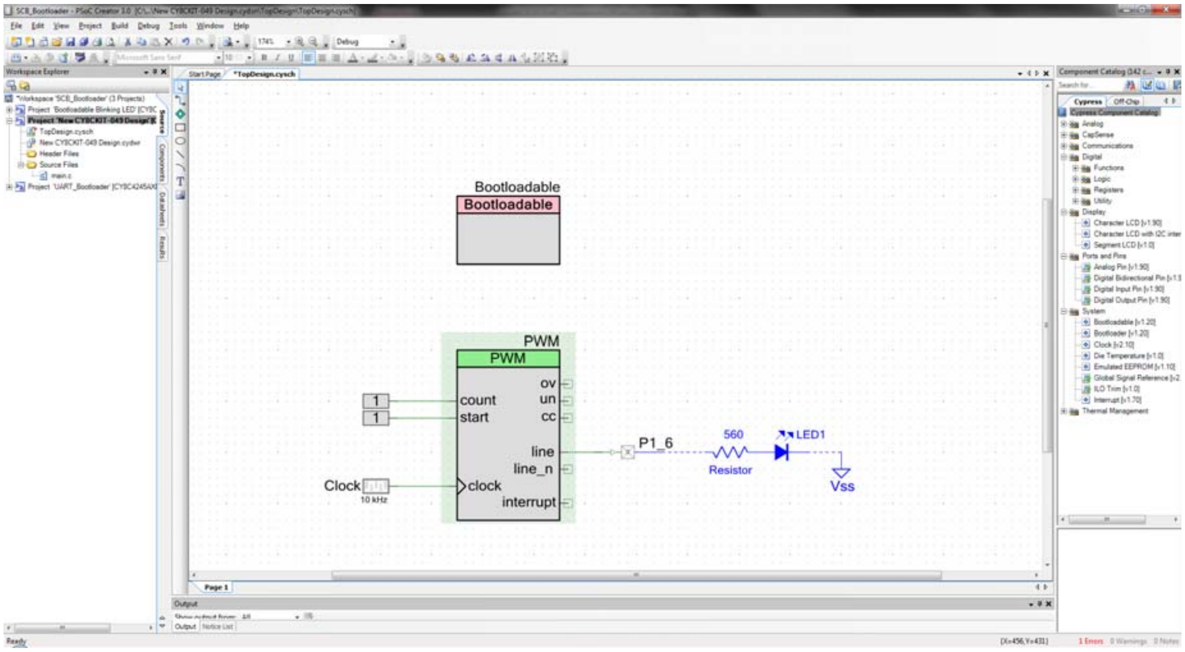


PSoC Creator generates a new project.

7. Navigate to the schematic view to place your components (double-click on the *.cysch* file from the project in Workspace Explorer).

   Select the **Page 1** tab in the schematic if it is not already selected. The key component that must be added is the Bootloadable component, which is used to generate the bootloadable application code.

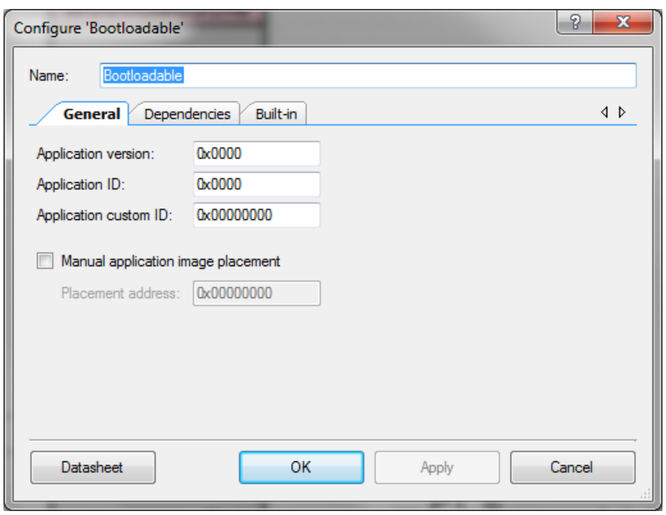
Figure 5-4. Bootloadable Project Schematic



8. Double-click the **Bootloadable** component to configure the selections.

   The selections must be the same as those in the example project. Refer to Programming a CY8CKIT-049-4xxx Project Using the Bootloader on page 21.

Figure 5-5. Configure Bootloadable Component

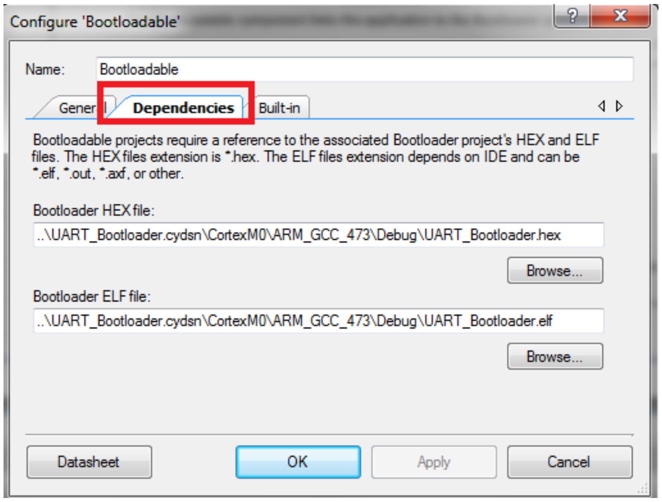


9. Click the **Dependencies** tab to select the HEX and ELF files from the *UART Bootloader* project included with the kit.

   You must always point your bootloadable project to a base bootloader project. The bootloader project can be in the same workspace as your bootloadable project, but this is not necessary. This example project uses the default application shipped with CY8CKIT-049-4xxx.

10. Click **Apply** and then click **OK**.

Figure 5-6. Specifying the References



11. After the project builds without errors, follow the steps shown in Programming a CY8CKIT-049-4xxx Project Using the Bootloader on page 21 to bootload the new code into the target using the Bootloader Host application.

This example does not have any source code, but is a base example project. Follow the steps in the next examples to add functionality to this base project.

5.4 Adapting Projects from 100 Projects in 100 Days

As part of the CY8CKIT-042 PSoC 4 Pioneer Kit release, Cypress provided 100 example projects in 100 days. This section shows you how to import projects to the CY8CKIT-049-4xxx kit that were developed for the CY8CKIT-042 Pioneer Kit on the 100 Projects in 100 Days forum.

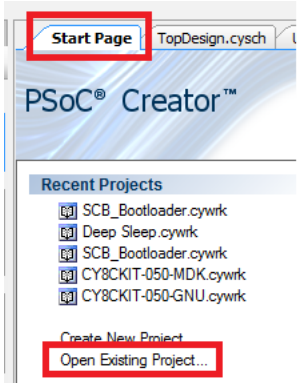
Element14 Web Page - 100 projects in 100 days

5.4.1 LED Blinky (Project #067)

The following example explains how to import a project into your workspace and target the CY8CKIT-049-4xxx development kits. This example is adapted from the following project on the 100 Projects in 100 Days forum: PSoC 4 Pioneer Kit Community Project#067 - PSoC 4 Getting Started Lab 1 (LED Blinky)

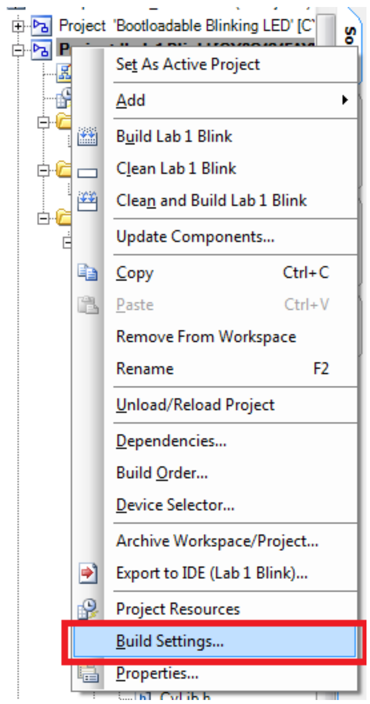
1. Download the example project from the link provided.
2. In PSoC Creator, click **Open Existing Project** from the **Start Page** and navigate to the project to open it.

Figure 5-7. Open Existing Project From PSoC Creator



3. On the Workspace Explorer window, right-click the project and select **Build Settings**.

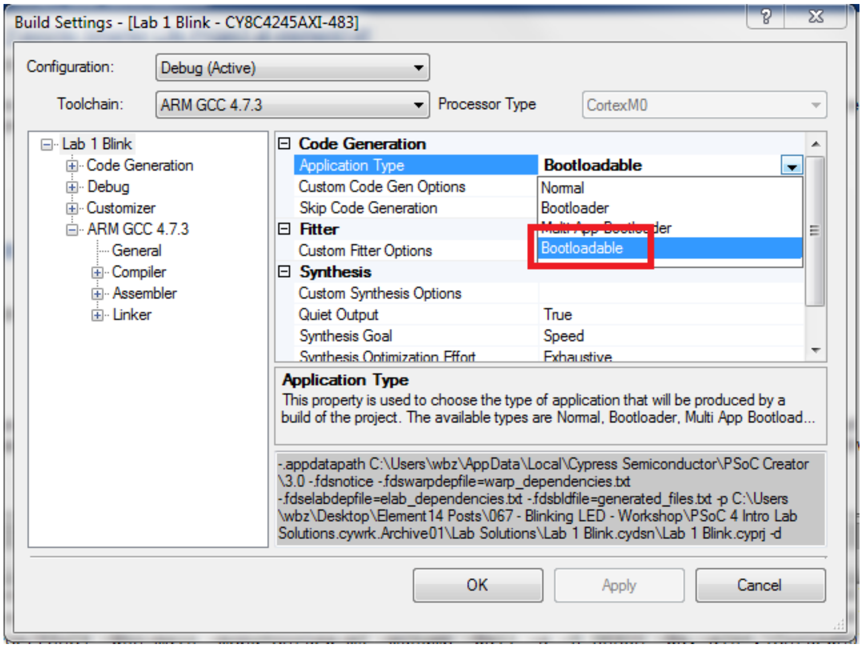
Figure 5-8. Specifying the Build Settings for the Project



4. Under Code Generation, change the **Application Type** to *Bootloadable* from the drop-down list.
5. Click **Apply** and then click **OK**.

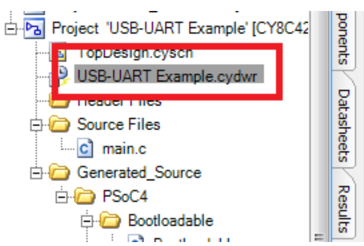
   This step is done because this project was originally set to *Normal* application type.

Figure 5-9. Build Settings for the Project



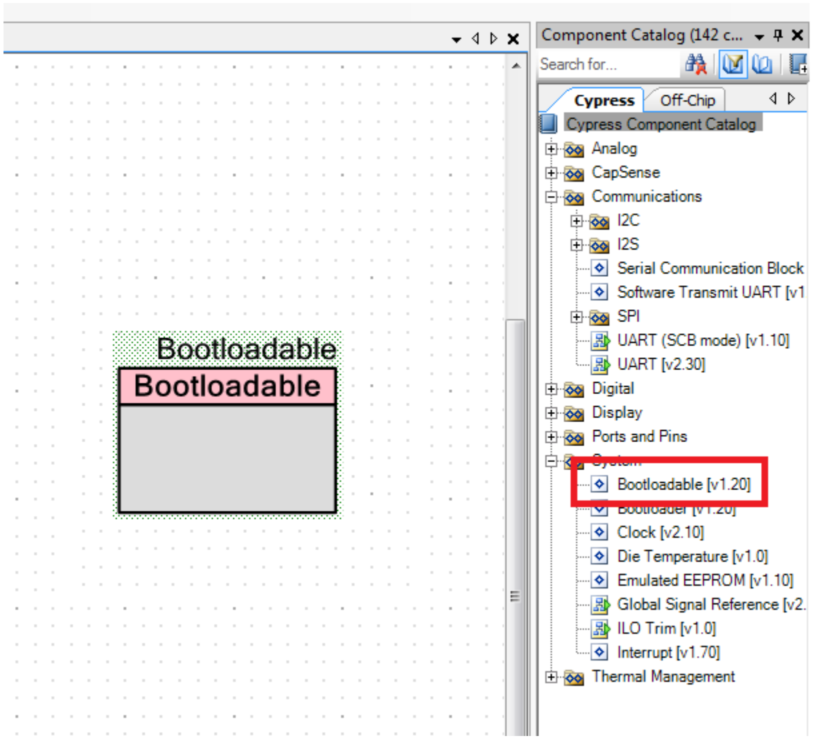
6. Open the schematic view by double-clicking the *.cysch* file from the Workspace Explorer window. Select the **Page 1** tab in the schematic if it is not already selected.

Figure 5-10. Opening the Schematic View



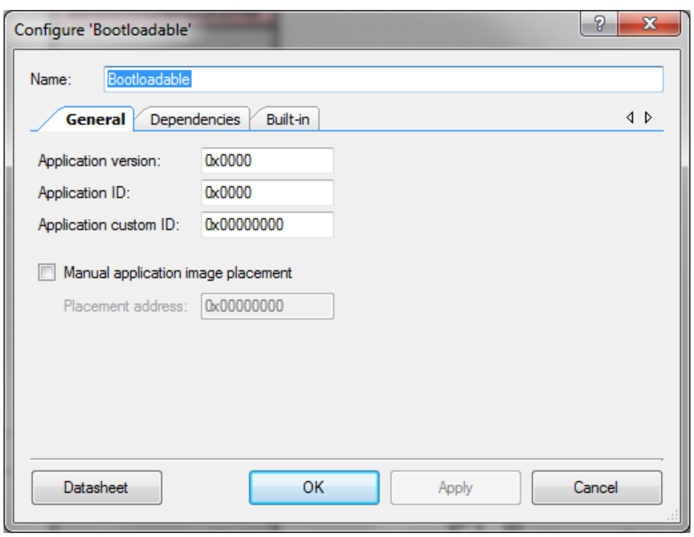
7. Drag and drop the **Bootloadable** component into the schematic window from the **Component Catalog** under **System**.

Figure 5-11. Schematic View



8. Double-click the **Bootloadable** component to configure the selections.

Figure 5-12. Configuring the Bootloadable Component

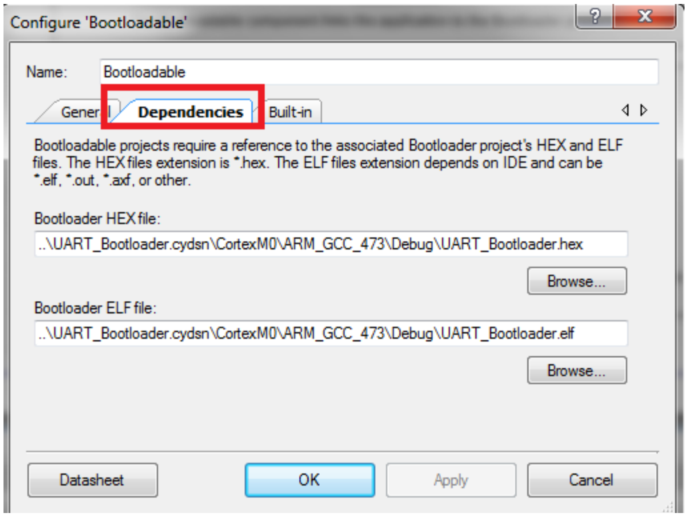


9. Click the **Dependencies** tab to select the *.hex* and *.elf* file from the *UART_Bootloader* project included with the kit.

   You must always point your bootloadable project to a base bootloader project. The bootloader project can be in the same workspace as your bootloadable project, but this is not necessary. This project uses the default application shipped with CY8CKIT-049-4xxx.

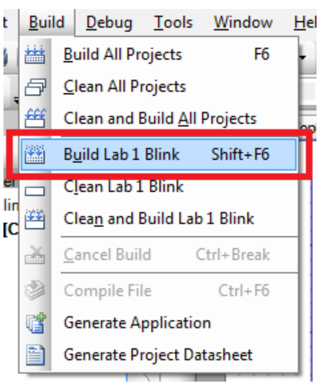
10. Click **Apply** and then click **OK**.

Figure 5-13. Configuring the Bootloadable Component Dependencies



11. Select **Build** > **Build {*Project Name*}** to build the project.

Figure 5-14. Building the Project



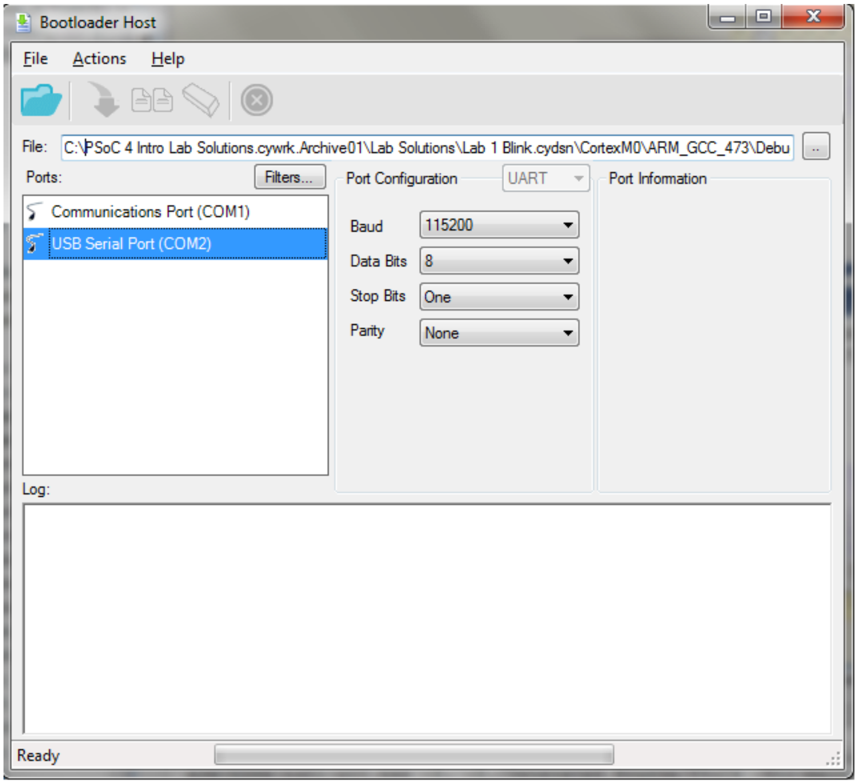
12. Connect the CY8CKIT-049-4xxx kit to the PC while pressing the SW1 button.

    This puts the device into the bootloader mode.

13. From the PSoC Creator menu, select **Tools** > **Bootloader Host** to open the Bootloader Host Utility.

14. Connect to the COM port and make your port configurations. See Programming a CY8CKIT-049-4xxx Project Using the Bootloader on page 21for more information.

Figure 5-15. Bootloader Host Configuration



15. Click the **Open File** button and navigate to the bootloadable project's *.cyacd* file. Typically, the file path is *[Project Path]\Lab 1 Blink.cydsn\CortexM0\ARM_GCC_473\Debug.*
16. Click **Program**.

    When the firmware is programmed, observe that the LED flashing rate has changed. You can go back into your example project and modify the value in the CyDelay function to change the frequency of the LED flashing.

5.4.2 Using the USB-Serial as a USB-UART Bridge (Project#004)

The following example was adapted from the following project on the 100 Projects in 100 Days forum: PSoC 4 Pioneer Kit Community Project#004 - USB-UART Utility

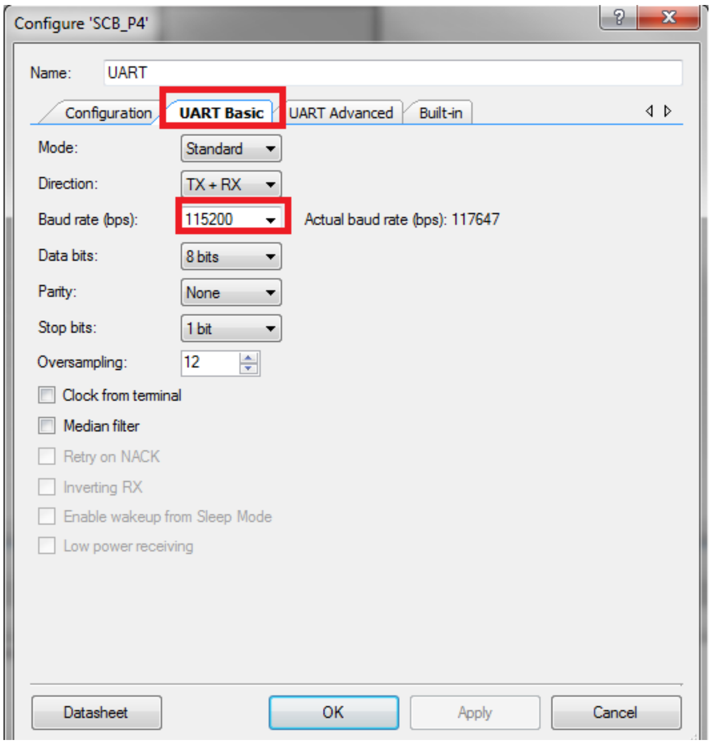
1. Download the example project from the 100 Projects in 100 Days forum link provided.
2. Click **Open Existing Project** from the **Start Page** and navigate to the project to open it.
3. On the Workspace Explorer window, right-click on the project and select **Build Settings**.

   Because this project was originally set as a *Normal* application type, you will need to change it to *Bootloadable*.
4. Under Code Generation, change the **Application Type**, select the drop-down menu and click **Bootloadable**.
5. Click **Apply** and then click **OK**.
6. Open the schematic view by double-clicking the *.cysch* file from the Workspace Explorer window. Select the **Page 1** tab in the schematic if it is not already selected.
7. Drag and drop the **Bootloadable** component into the schematic window from the **Component Catalog** under **System**.
8. Double-click the **Bootloadable** component to configure the selections.

9. Click the **Dependencies** tab to select the *.hex* and *.elf* file from the UART_Bootloader project included with the kit.

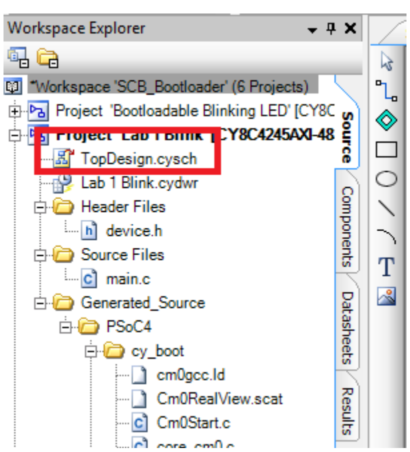
   You must always point your bootloadable project to a base bootloader project. The bootloader project can be in the same workspace as your bootloadable project, but this is not necessary. This project uses the default application shipped with CY8CKIT-049-4xxx.
10. Double-click the **UART** component.
11. Click the **UART Basic** tab and change the *Baud Rate* selection to *115200*.
12. Click **Apply** and then click **OK**.

Figure 5-16. UART Basic Configuration



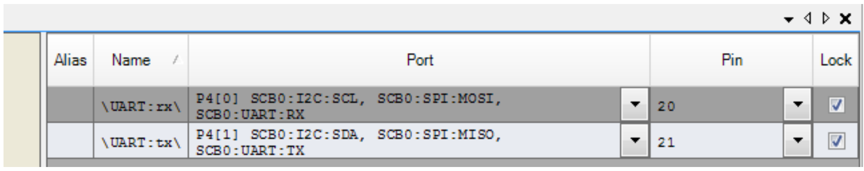
13. Navigate to the **Workspace Explorer** window and open the *.cydwr* file to make changes to the pin selections.

Figure 5-17. Opening the Schematic View



14. Change the UART pin selection to **P4[0]** for **RX** and **P4[1]** for **TX** to align with the default pin connections on CY8CKIT-049-4xxx.

Figure 5-18. Changing Pin Selections



15. Click **Build** > **Build {*Project Name*}**.
16. Connect the CY8CKIT-049-4xxx kit to the PC while pressing the SW1 button.

    This puts the device into the bootloader mode.
17. From the PSoC Creator menu, select **Tools** > **Bootloader Host** to open the *Bootloader Host Utility*.
18. Connect to the COM port and make your port configurations. See Programming a CY8CKIT-049-4xxx Project Using the Bootloader on page 21 for more information.
19. Click the **Open File** button and navigate to the bootloadable projects's *.cyacd* file.

    Typically, this file is located in: `[Project Path]\USB-UARTexample project.cydsn\CortexM0\ARM_GCC_473\Debug`
20. Click **Program**.
21. After the device is programmed, close the bootloader host.
22. Open a terminal emulator program such as PuTTY.
23. Enter the parameters for PuTTY settings. Set your COM object in the **Serial line** (for example, **COM2**), set the **Speed** to **115200**, and click **Open**.

Figure 5-19. PuTTY Session Configuration

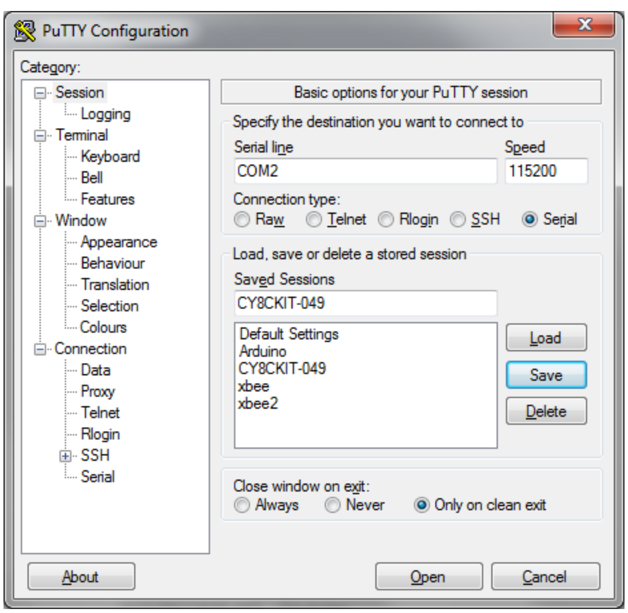
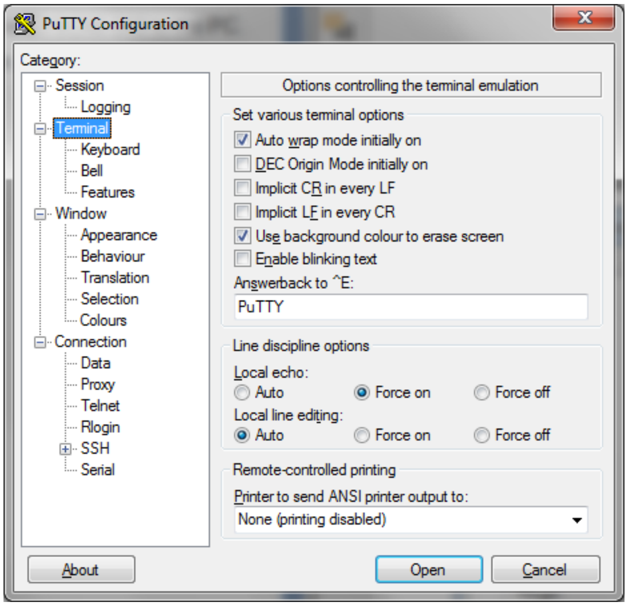
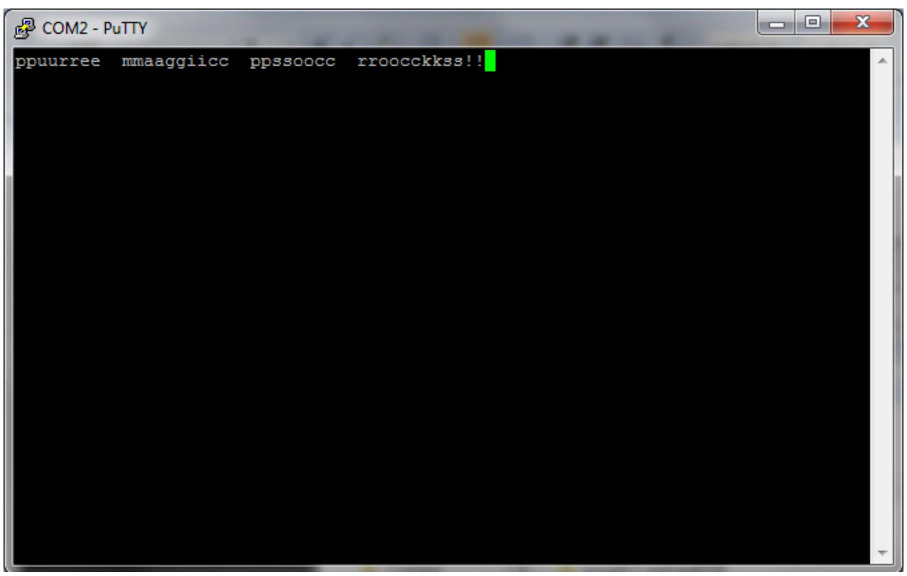


Figure 5-20. PuTTY Terminal Configuration



The COM terminal software displays both the typed data and the echoed data from PSoC 4. Note that in Figure 5-20, local echo is enabled (forced on). This causes the typed value to be displayed along with the returned value so that each key pressed will show up twice in the terminal window.

Figure 5-21. Output in the PuTTY Window



6. USB-Serial Configuration

The CY8CKIT-049-4xxx Prototyping Kits support the CY7C6521x family of USB controller products. The CY7C6521x devices are a family of full-speed USB-Serial bridge controllers. These bridge controllers offer configurable serial channels for UART, I2C, SPI, or GPIO interfaces, with the industry's lowest power consumption in the stand-by mode (5 µA).

USB-Serial bridge controllers integrate the CapSense capacitive-touch sensing technology and USB-IF Battery Charging specification version 1.2. These controllers are ideal for applications such as portable medical devices (such as blood-glucose meters), point-of-sales terminals, serial cables (including USB-to-UART and RS-232 cables) and other applications requiring USB connectivity.

CY8CKIT-049-4xxx development kits use the USB-Serial device to provide connectivity to a PC and to perform USB-UART bootload programming. The following sections provide instructions on how to use and configure the USB-Serial device on the CY8CKIT-049-4xxx kits.

6.1 USB-Serial Resources

Use the following links to access a wide variety of content that includes custom software, utilities, datasheets, and knowledge base articles.

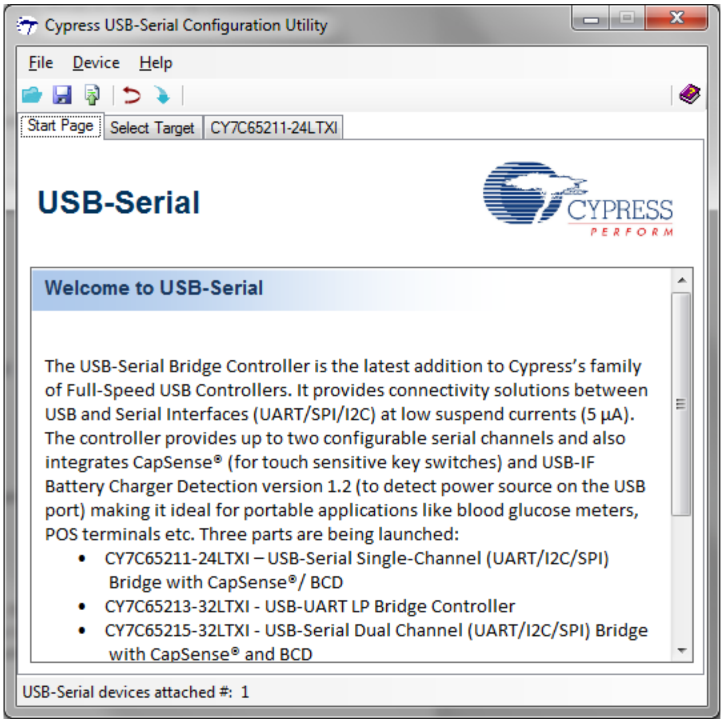
- USB-Serial landing page: www.cypress.com/go/usbserial
- Software and drivers: USB Serial Software Development Kit (SDK)
- Datasheets: CY7C6521x Device Families
- Additional information: Knowledge Base Articles

6.2 USB-Serial Configuration Utility

Cypress USB-Serial Configuration Utility is an application included in the USB-Serial software development kit (SDK) installation. This utility is used to configure the USB-Serial device configuration, and helps use additional capabilities of USB-Serial device such as USB-UART configurations, USB-GPIO controls, and custom development using the USB-I2C and USB-SPI protocols.

After you install the USB-Serial SDK, click **Start** > **All Programs** > **Cypress** > **Cypress USB Serial** > **Cypress USB-Serial Configuration Utility** to launch the USB-Serial Configuration Utility.

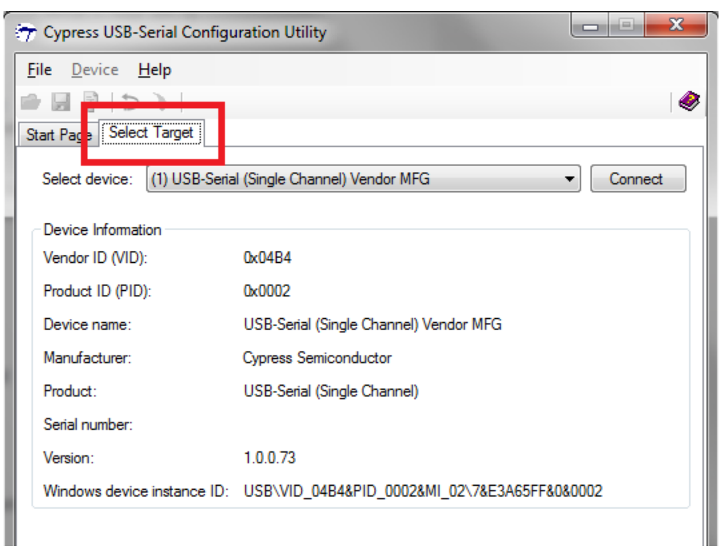
Figure 6-1. USB-Serial Configuration Utility



6.2.1 Connecting to a USB-Serial Device

1. Connect the CY8CKIT-049-4xxx prototyping kit to the PC.
2. Open the USB-Serial Configuration Utility.
3. Select the **Select Target** tab.

Figure 6-2. Selecting the Target in USB-Serial Configuration Utility

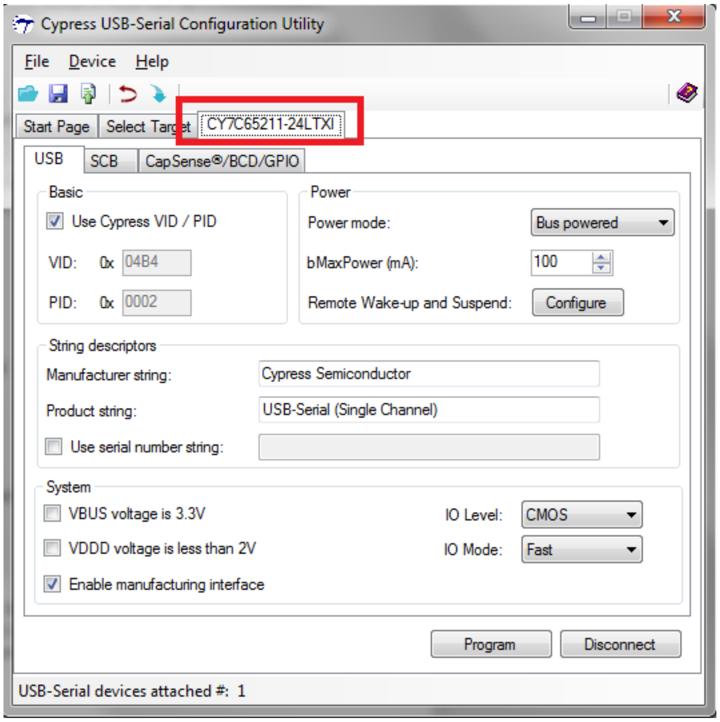


The USB-Serial Configuration Utility will automatically detect that the USB-Serial Device has been connected to the PC and will display the device in the **Select Device** drop-down menu.

4. Click **Connect**.

After connecting to the device, a new tab opens that displays the device marketing part number.

Figure 6-3. Selecting the Connected Device



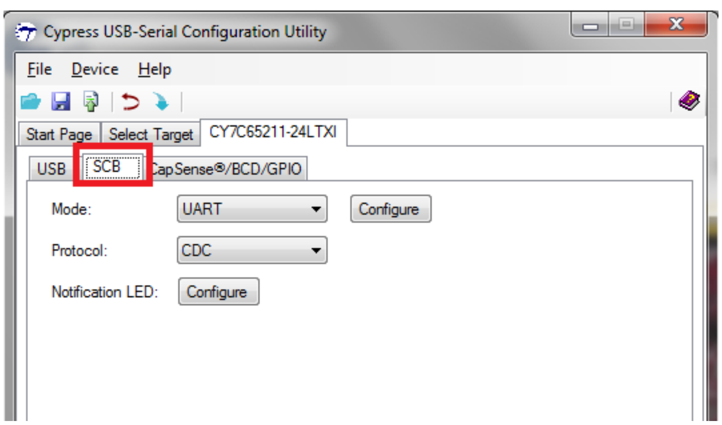
5. Select the new tab and begin configuring the device.

6.2.2 Configuring a Serial Port

The USB-Serial device acts as a USB-UART bridge for the CY8CKIT-049-4xxx development kit. You can use the Configuration Utility to read the default settings and configure new UART settings.

1. After connecting to the USB-Serial device, click the **CY7C65211-24LTXI** tab.
2. Select the **SCB** tab under the **CY7C65211-24LTXI** tab to see the default UART settings on the USB-Serial device.

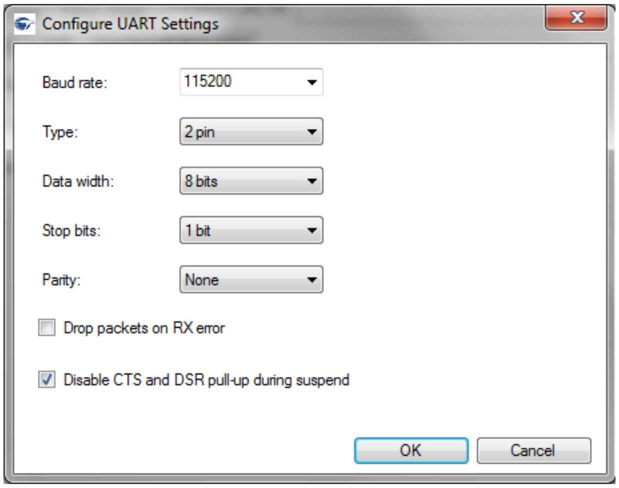
Figure 6-4. Configuring the Serial Port



3. Click **Configure** next to the UART mode select.

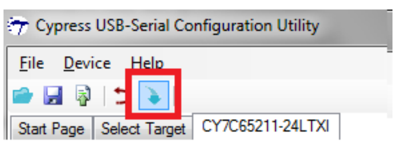
The Configure UART Settings window appears, which displays the default settings for your UART-Serial device.

Figure 6-5. Configuring UART Settings



4. Change the UART settings such as **Baud Rate** or **Type** by selecting the new values from the respective drop-down lists, and click **OK**.
5. Click the **Program Device** button from the menu options at the top of the Configuration Utility to program the device with the new settings.

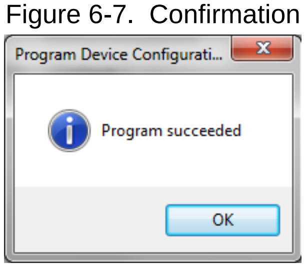
Figure 6-6. Programming the Device With UART Settings



When the configuration has been programmed to the target device, a popup window will be shown letting you know that programming was successful.

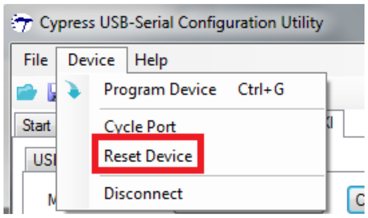
Note: Configurations will not be set immediately. You will need to reset the COM port for the settings to be applied.

Figure 6-7. Confirmation for Device Programming



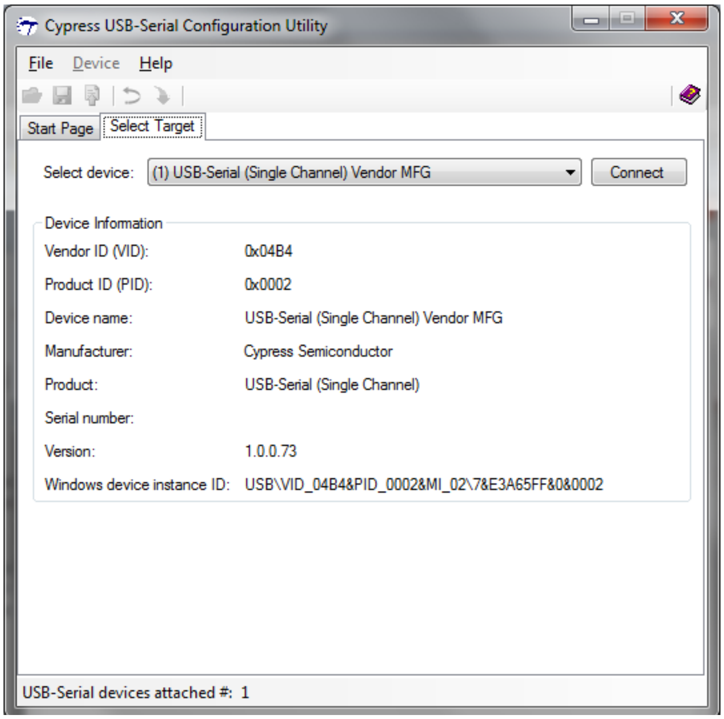
6. To reset the device from the Configuration Utility, navigate to the **Device** menu and select **Reset Device**. This initiates a reset to the device.

Figure 6-8. Resetting the Device



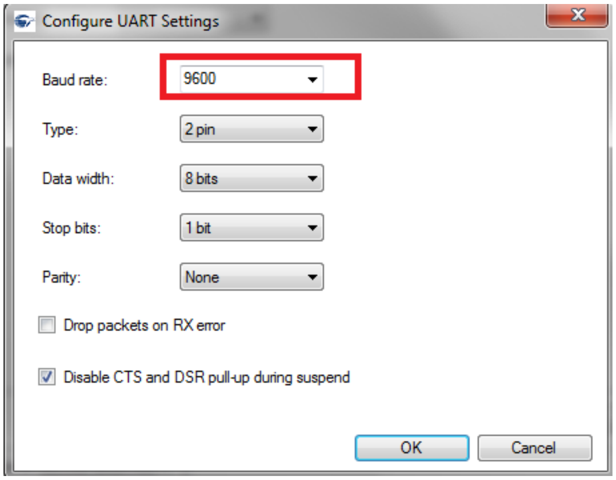
The utility will immediately detect that the device has been reconnected and display the **Select Target** tab.

Figure 6-9. Device After Reconnection



7. Connect to the device and navigate to the UART configuration window to see that the new configuration has been set. In this example, the **Baud Rate** is changed from 115200 to 9600.

Figure 6-10. Device UART Parameters Changed

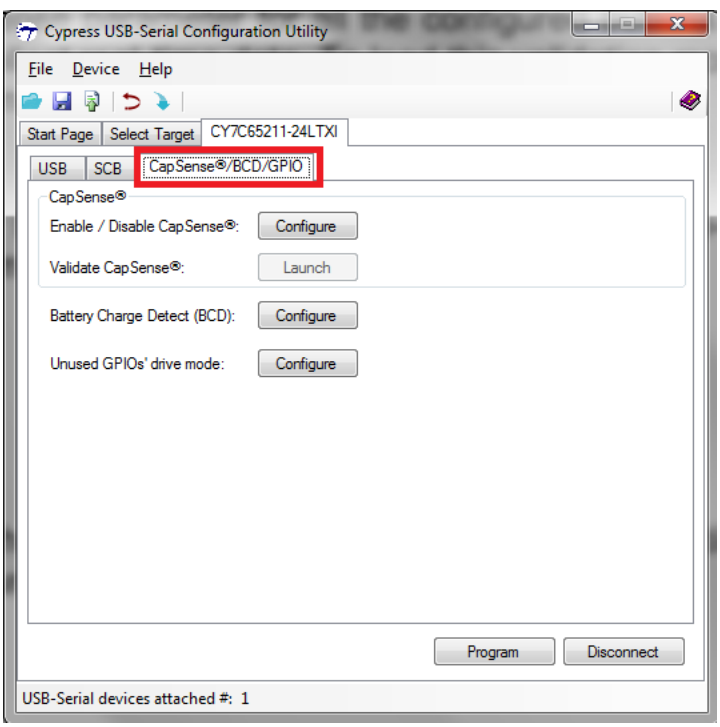


6.2.3 Configuring GPIOs

The USB-Serial device included in the CY8CKIT-049-4xxx Prototyping Kit also supports GPIO controls through the J6 header. Each of the serial protocols requires a different number of GPIO pins. Based on your serial configuration, the number of available GPIOs will change. The Configuration Utility will only display the available GPIOs based on your serial configuration. For more information on the serial configuration and the respective GPIO consumption, refer to the USB-Serial device datasheet.

1. Plug CY8CKIT-049-4xxx into a USB port on the PC, and connect to the USB-Serial device using the Configuration Utility.
2. Navigate to the **CapSense/BCD/GPIO** tab.

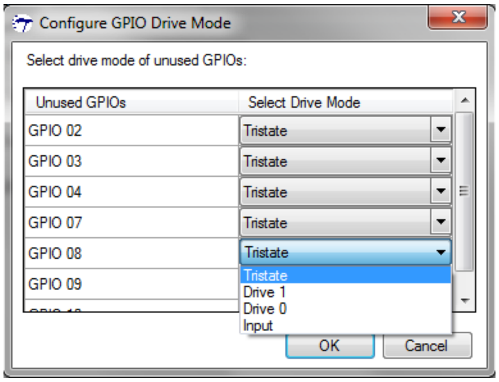
Figure 6-11. Device GPIO



3. Click **Configure** on the **Unused GPIOs** drive mode. This launches the GPIO configuration window.

   This example shows how to change the output mode of the GPIO 08 pin to drive an output. You can connect the pin to the PSoC 4, an LED, or any external circuitry.
4. Click the **Select Drive Mode** drop-down menu for the GPIO 08 pin.

Figure 6-12. Configuring GPIO Drive Mode



5. Select **Drive 1** from the available options and click **OK**. This example makes the pin HIGH.
6. Program the new configuration into the device and cycle the port to see the new configuration applied. For example, if the GPIO 08 pin is connected to an LED, you will see that the LED is on.

6.2.4 Additional Features of the USB-Serial Device

Apart from the UART and the GPIO features described in earlier sections, the USB-Serial device included in the CY8CKIT-049-4xxx provides several other features, such as the following:

- USB-I2C (Master/Slave)
- USB-SPI (Master/Slave)
- Cypress CapSense (up to eight buttons)
- Battery Charging Detect (BCD)

For more information on these features, refer to the device datasheet and the USB-Serial Configuration Utility user guide. (Select **Help > Help Topics**).

Note: USB-UART works in the USB Communication Device Class (CDC), while all other configuration controls such as GPIO, SPI, and I2C use the Cypress vendor driver on the PC. Therefore, COM port tools such as PuTTY or HyperTerminal will only work for the UART bridge. You can use the C++ APIs to create scripts and tools included with the USB-Serial SDK to evaluate and control the other bridge options.

A. Appendix

A.1 CY8CKIT-049-4xxx Schematics

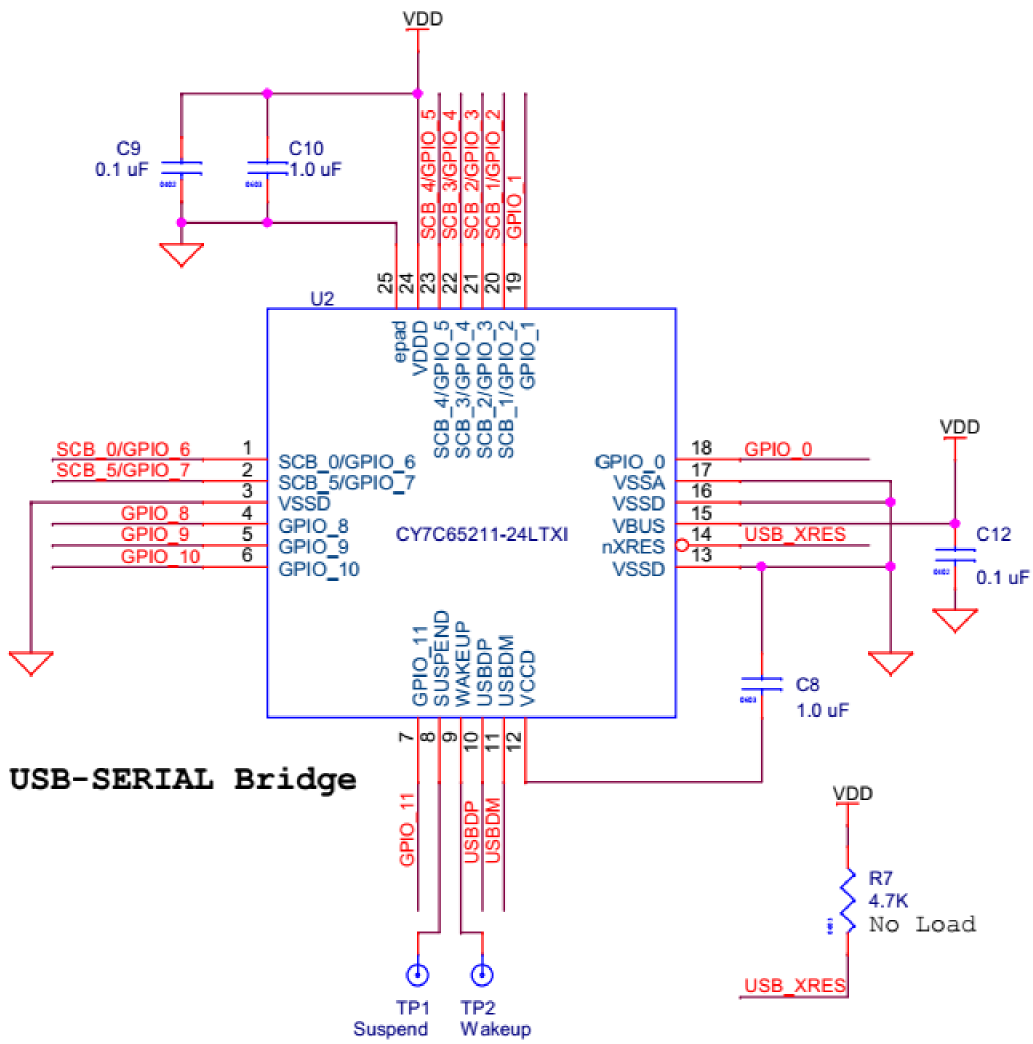


Figure A-1. CY8C4245AXI-483 (CY8CKIT-049-42XX only)

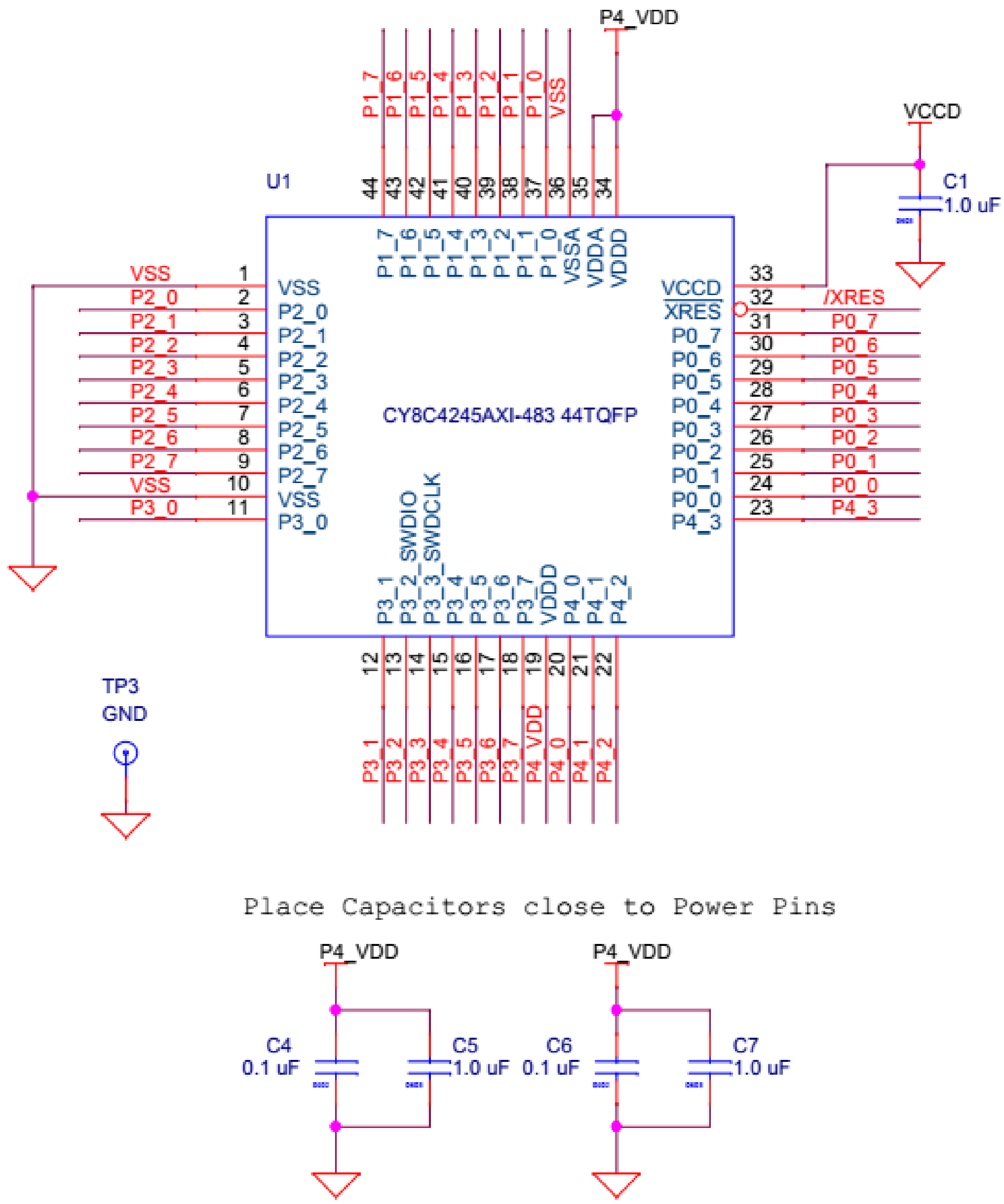
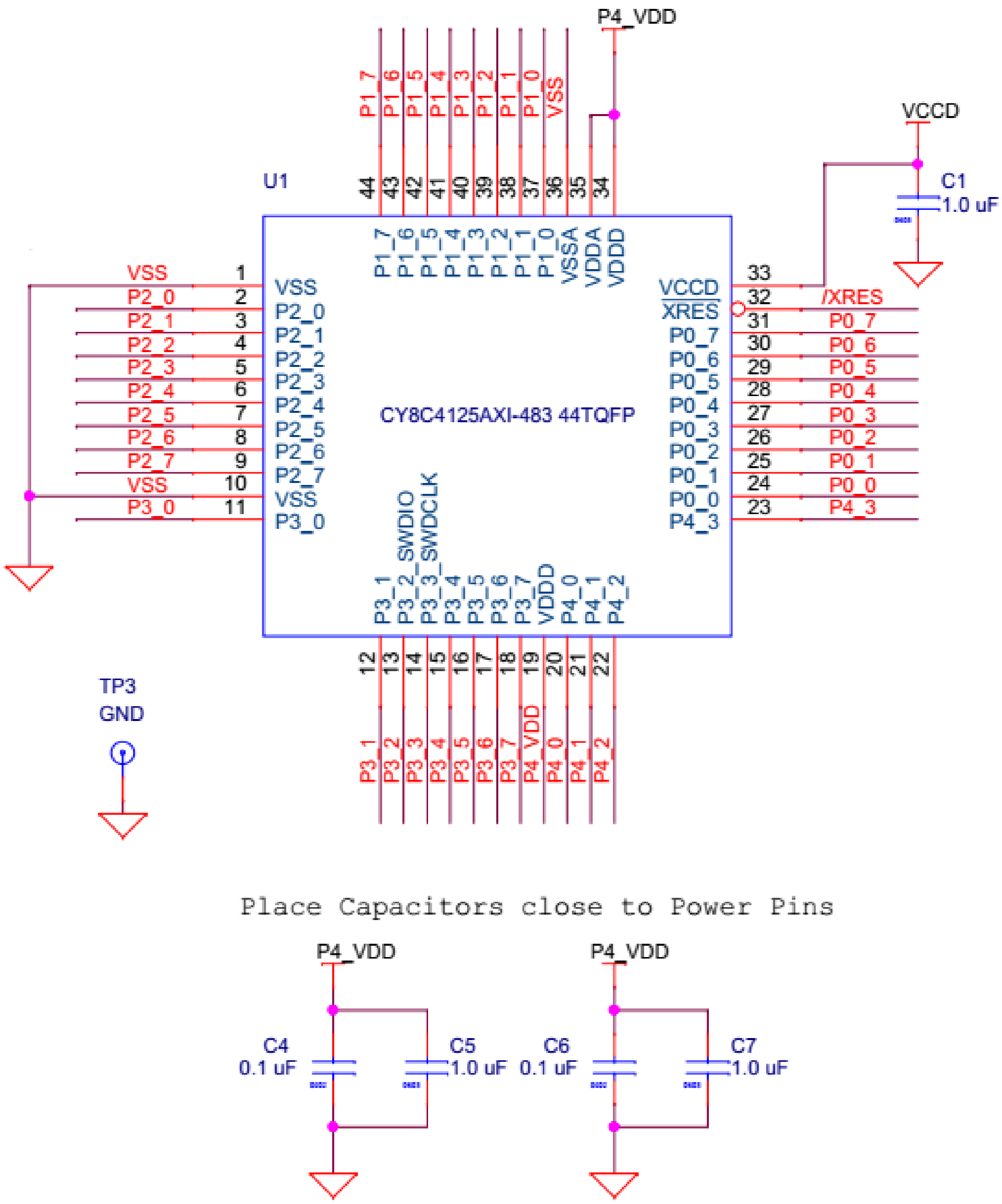
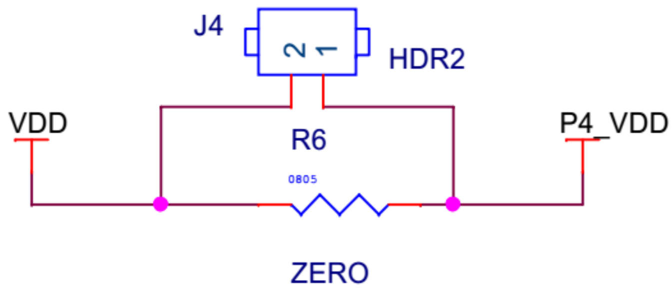
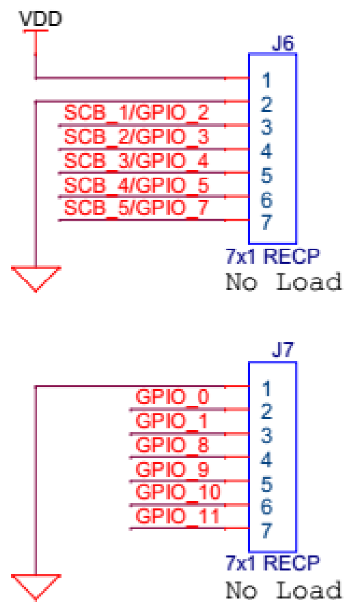


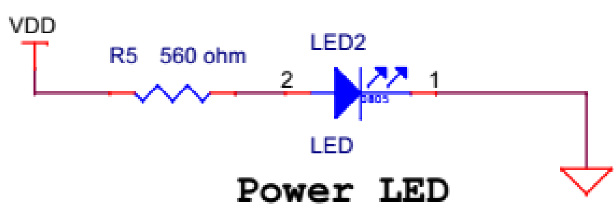
Figure A-2. CY8C4125AXI-483 (CY8CKIT-049-41XX only)



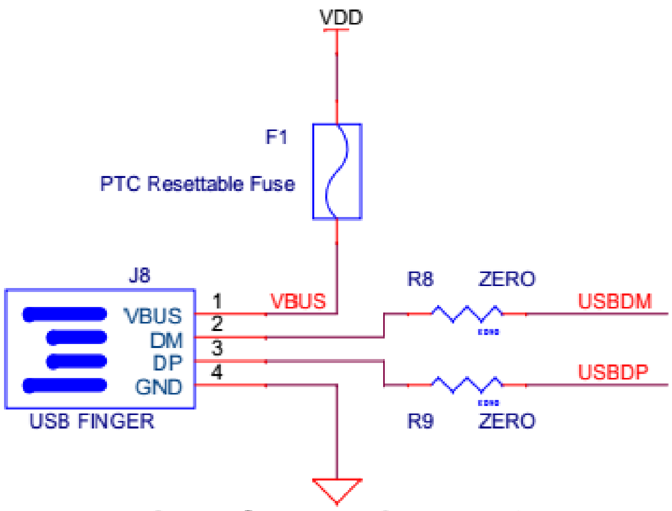




USB-SERIAL Headers

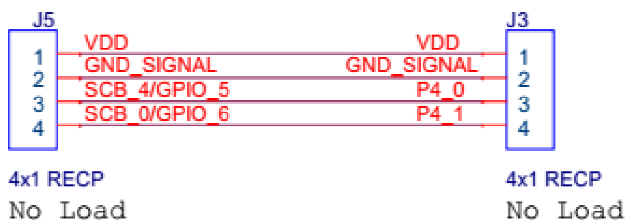


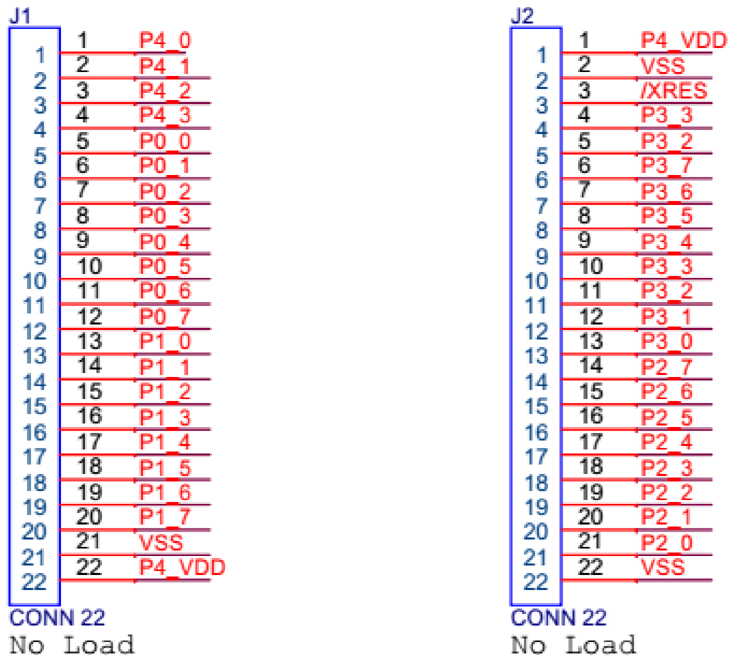
Power LED



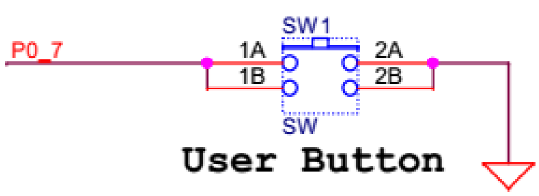
USB Finger Connector

UART connection to PSoC 4

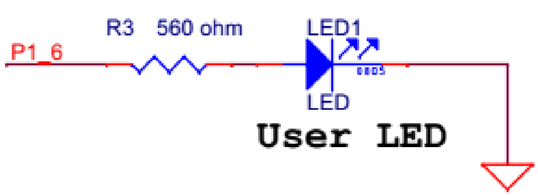




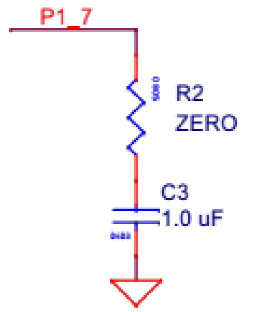
PSoC 4 I/O Headers



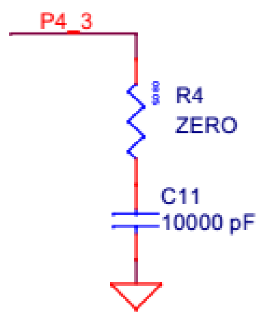
User Button



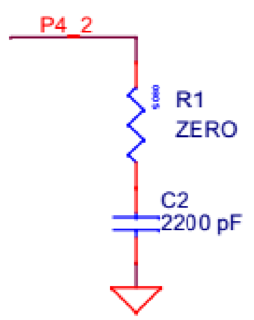
User LED



SAR Bypass Capacitor



CTANK Capacitor



CMOD Capacitor

A.2 Bill of Materials

Table A-1. Bill of Materials

Item	Qty	Reference	Value	Description	Mfr Name	Mfr Part Number
1	1	N/A	N/A	PCB, 92.13mm x 24.13mm, High Tg, ENIG finish, 2 layer, Color = RED, Silk = WHITE	Cypress Semiconductors	600-60178-01
2	6	C1,C3,C5,C7,C8, C10	1.0 uF	CAP CERAMIC 1.0UF 25V X5R 0603 10%	Taiyo Yuden	TMK107BJ105KA-T
3	1	C2	2200 pF	CAP CER 2200PF 50V 5% NP0 0805	Murata	GRM2165C1H222JA01D
4	4	C4,C6,C9,C12	0.1 uF	CAP .1UF 16V CERAMIC Y5V 0402	AVX Corporation	0402YG104ZAT2A
5	1	C11	10000 pF	CAP CER 10000PF 50V 5% NP0 0805	Murata	GRM2195C1H103JA01D
6	1	F1	FUSE	PTC Resettable Fuses 15Volts 100Amps	Bourns	MF-MSMF050-2
7	1	LED1	Blue User LED	LED BLUE CLEAR 0805 SMD	Lite-On Inc	LTST-C170TBKT
8	1	LED2	Power LED Amber	LED AMBER 591NM DIFF LENS 2012	Sharp Microelectronics	LT1ZV40A
9	4	R1, R2, R4, R6	ZERO	RES 0.0 OHM 1/8W 0805 SMD	Panasonic	ERJ-6GEY0R00V
10	2	R3, R5	560	RES 560 OHM 1/8W 5% 0805 SMD	Panasonic	ERJ-6GEYJ561V
11	2	R8, R9	ZERO	RES 0.0 OHM 1/10W 0603 SMD	Panasonic - ECG	ERJ-3GEY0R00V
12	1	SW1	Switch	SWITCH TACTILE SPST-NO 0.05 A 32 V	C&K Components	KMR221GLFS
13	1	U1	PSoC 4	44TQFP PSoC4A target chip	Cypress Semiconductor	CY8C4245AXI-483 (4200 family) CY8C4125AXI-483 (4100 family)
14	1	U2	CY7C65211-24LTXI	24QFN USB Serial Bridge	Cypress Semiconductor	CY7C65211-24LTXI
No Load Components						
15	1	R7	4.7 K	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic-ECG	ERJ-3GEYJ472V
Label						
16	1	N/A	N/A	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60140-01 REV 01 (YYWWVVXXXXX)	Cypress Semiconductor	
17	1	N/A	N/A	LBL, PCBA Anti-Static Warning, 10mm X 10mm	Cypress Semiconductor	

Revision History

CY8CKIT-049-4xxx PSoC 4 Prototyping Kit Guide Revision History

Document Title: CY8CKIT-049-4xxx PSoC 4 Prototyping Kit Guide Document Number: 001-90711			
Revision	**Issue Date**	**Origin of Change**	**Description of Change**
**	02/03/2014	RKAD	New kit guide