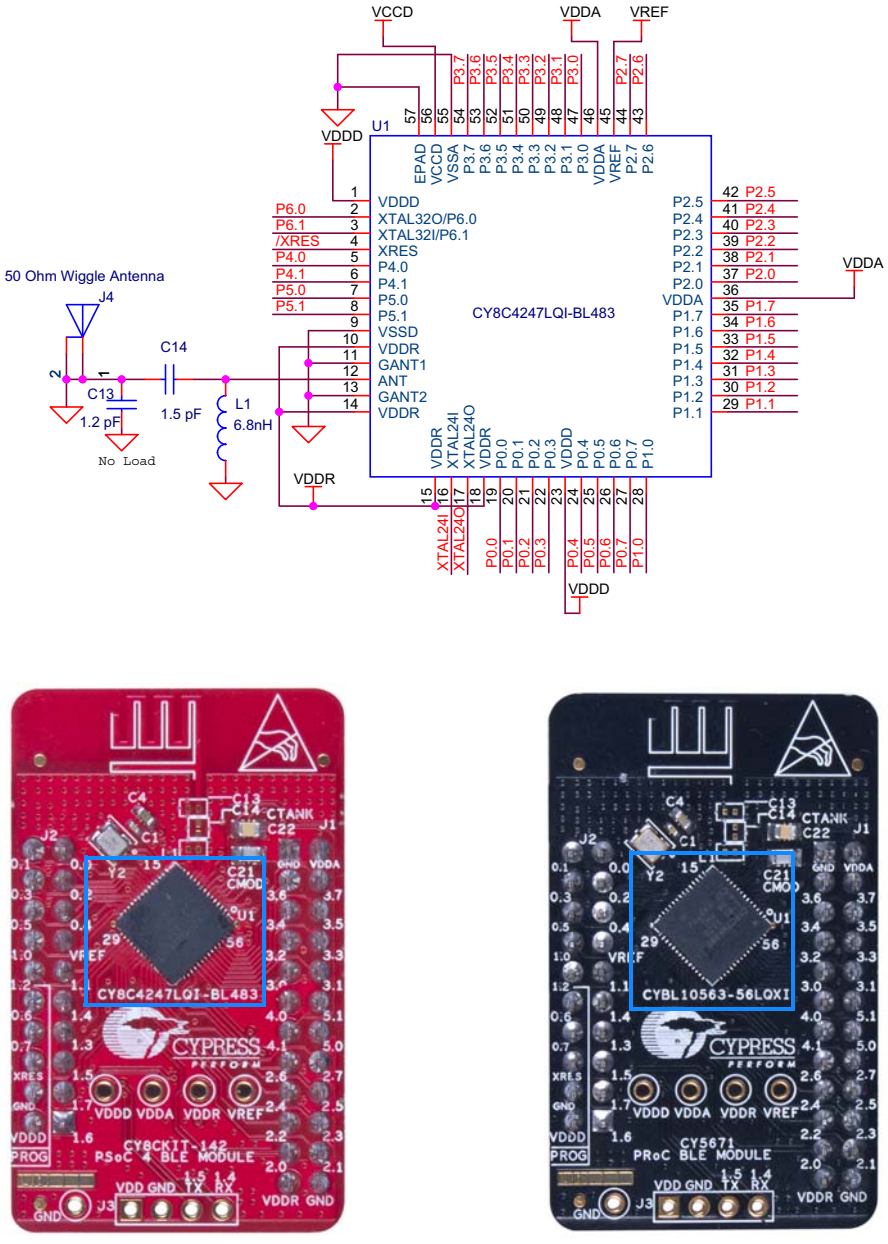
5.2 BLE Module Board

5.2.1 PSoC 4 BLE or PRoC BLE

The PRoC BLE or PSoC 4 BLE is the main component on the BLE Module. It provides the RF interface and analog and digital capability. The PRoC BLE or PSoC 4 BLE pins are mapped to the Bluetooth module headers (see Figure 5-20). For more information, refer to the BLE web page.

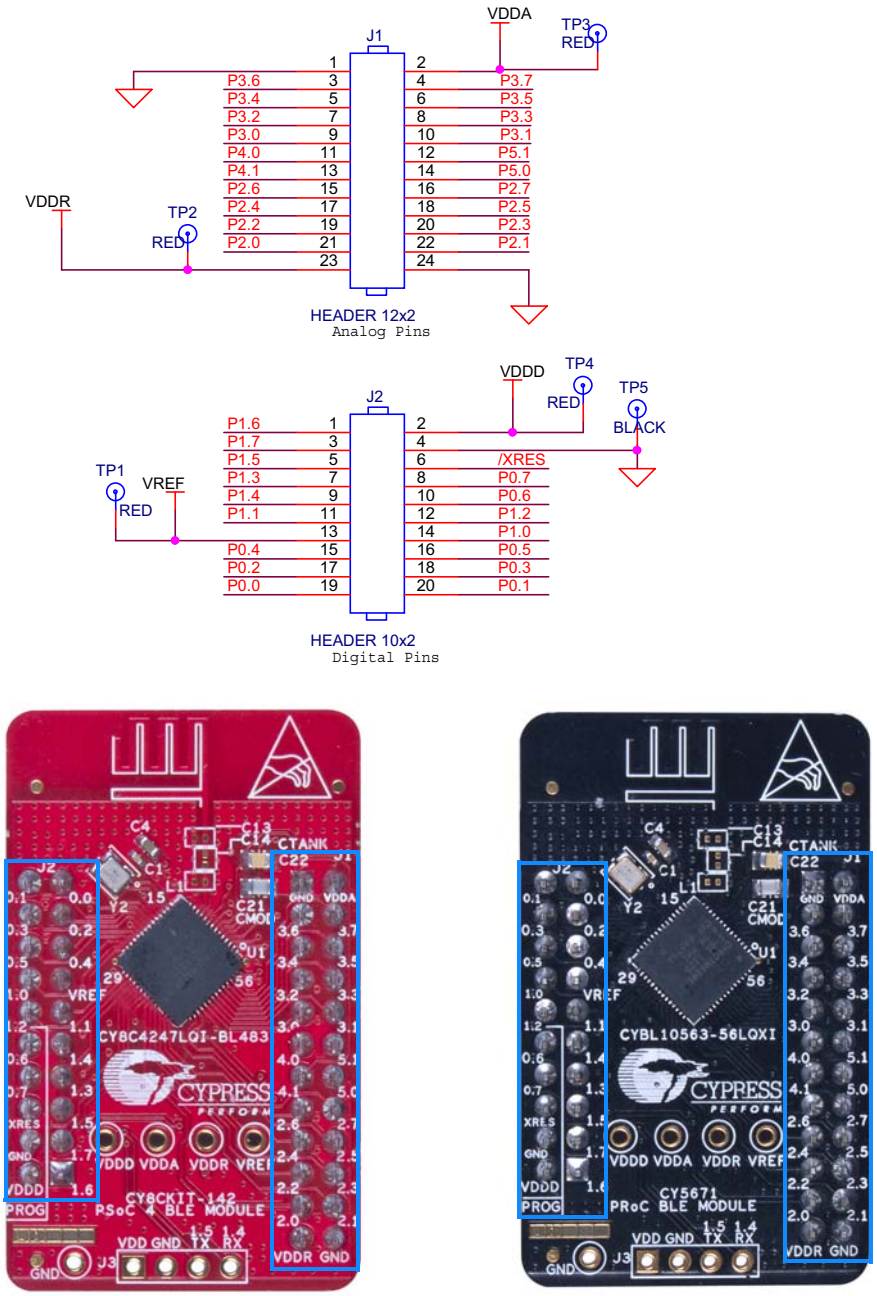
Figure 5-20. Schematics and Board Highlight of Bluetooth Module Headers for BLE Pins



5.2.2 Bluetooth Module Headers (20-Pin and 24-Pin Headers)

The PSoC 4 BLE and PRoC BLE Modules connect to the Pioneer board using the two (20-pin and 24-pin) Bluetooth module headers (Figure 5-21). All GPIOs and power domains are brought out to these headers. These headers are the counterparts of the connectors in section 5.1.4.

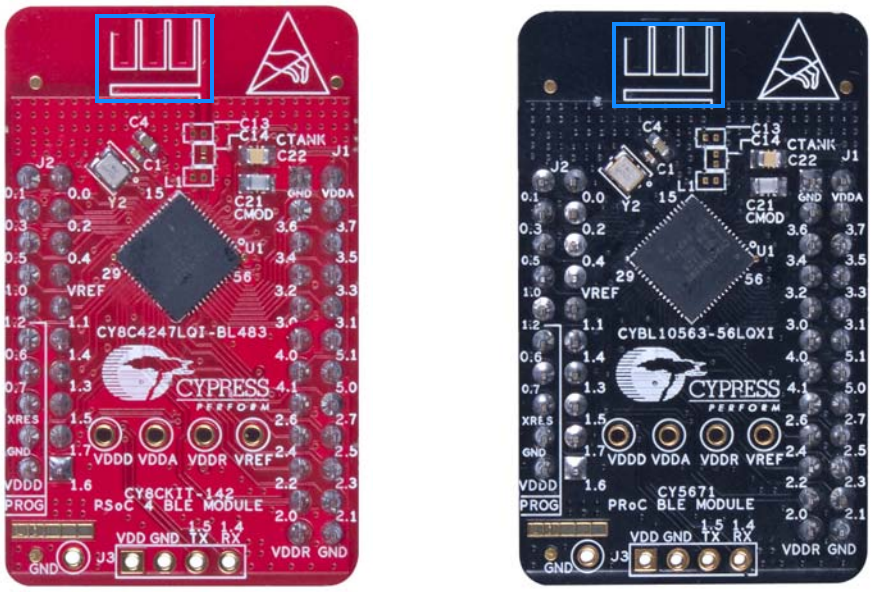
Figure 5-21. Schematics and Board Highlight of Headers



5.2.3 Wiggle Antenna

Both the modules use the wiggle antenna. Refer to the Antenna Design Guide (AN91445) for details.

Figure 5-22. Board Highlight of Wiggle Antenna

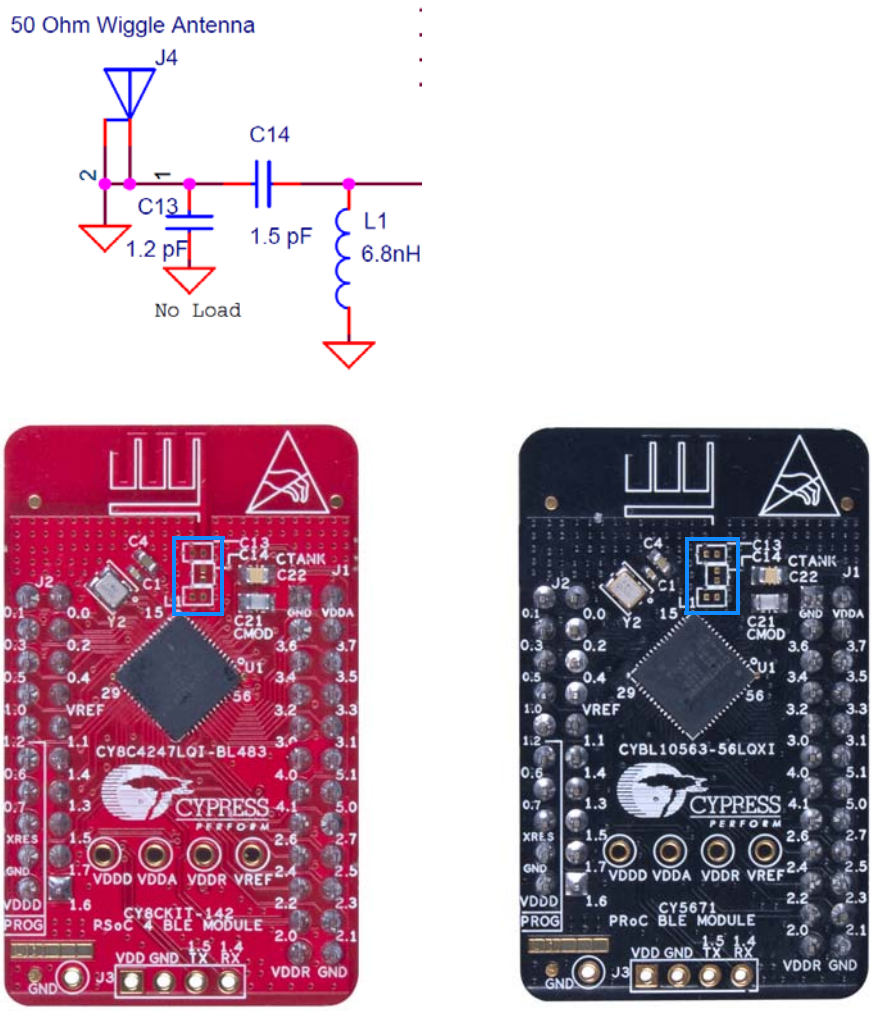


5.2.4 Antenna Matching Network

An Antenna Matching Network is required between the BLE device and the antenna to achieve optimum performance (Figure 5-23). The matching network has four main tasks:

- Transform the balanced output of the radio to an unbalanced connection to the antenna (balun).
- Transform the output impedance of the radio to a 50-ohm antenna.
- Suppress harmonics to a level below the regulations level in TX mode.
- Suppress the local oscillator (LO) leakage in RX mode.

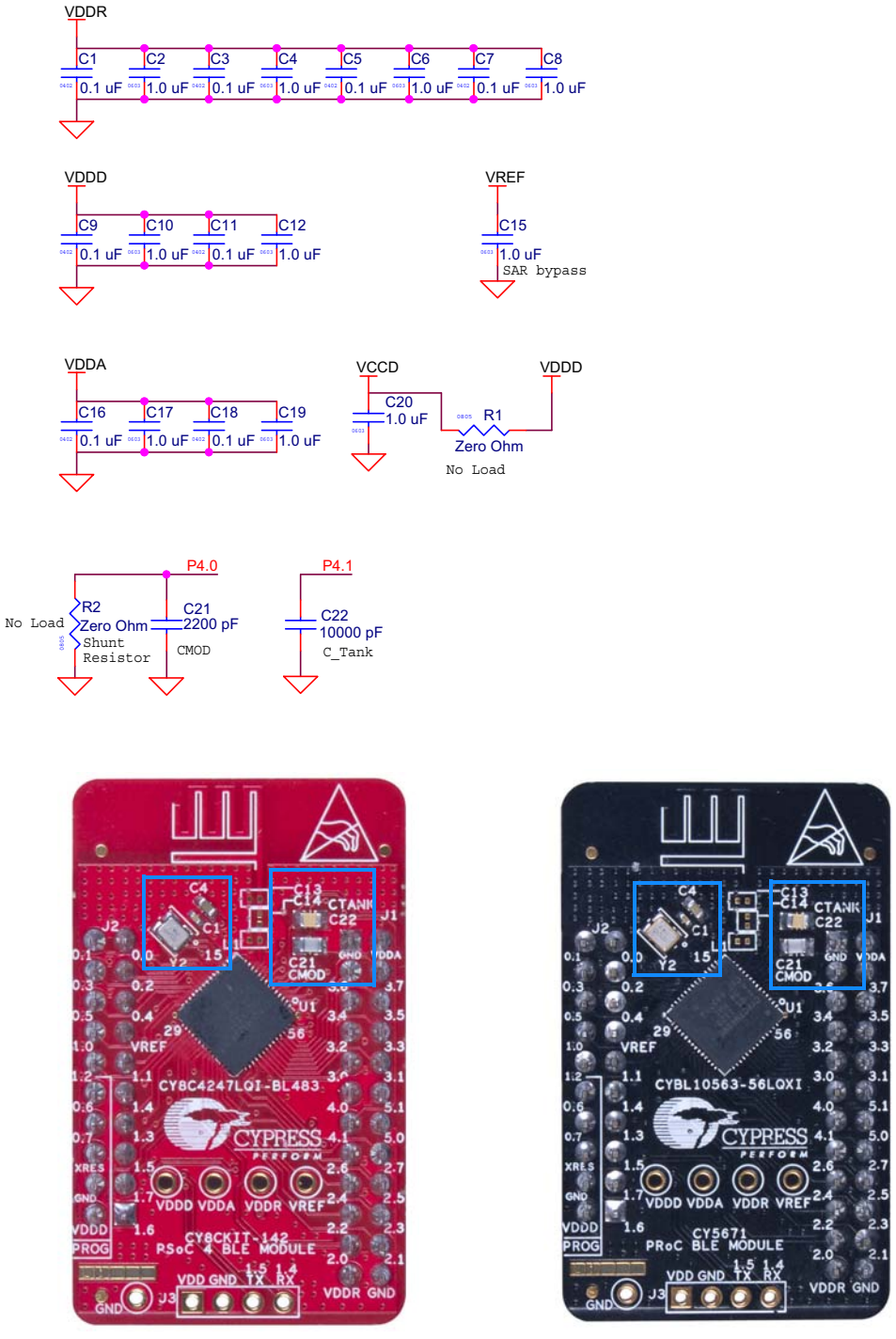
Figure 5-23. Schematics and Board Highlight of Antenna Matching Network and Antenna



5.2.5 BLE Passives

Module boards include a 24-MHz crystal and a 32-kHz crystal, the CMOD and shield (CTANK) circuit for CapSense, a SAR bypass capacitor, and adequate decoupling capacitors for all the power domains, as shown in Figure 5-24.

Figure 5-24. Schematics and Board Highlight of External Crystal, CMOD, CTANK, Decaps, Jumpers



5.2.6 Test Points

All power domains are brought out as test points for easy probing.

5.3 BLE Dongle Board

See PSoC 4 BLE or PRoC BLE on page 106.

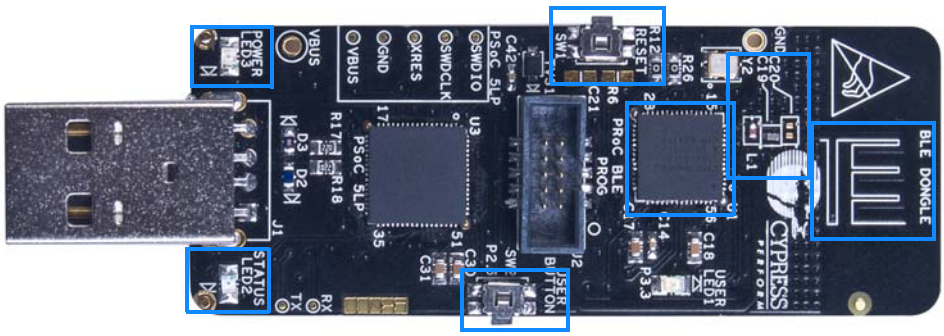
See Wiggle Antenna on page 108.

See Antenna Matching Network on page 109.

See Pioneer Board LEDs on page 101.

See Push Buttons on page 102.

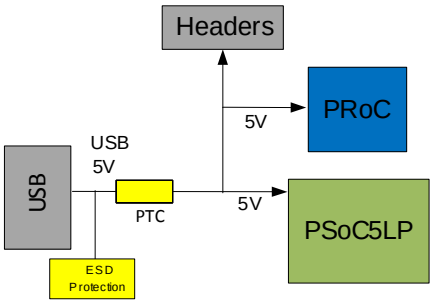
Figure 5-25. Board Highlight



5.3.1 Power System

The board is powered directly using 5 V from the USB port, as shown in Figure 5-26.

Figure 5-26. Power Supply Block Diagram With Protection Circuits



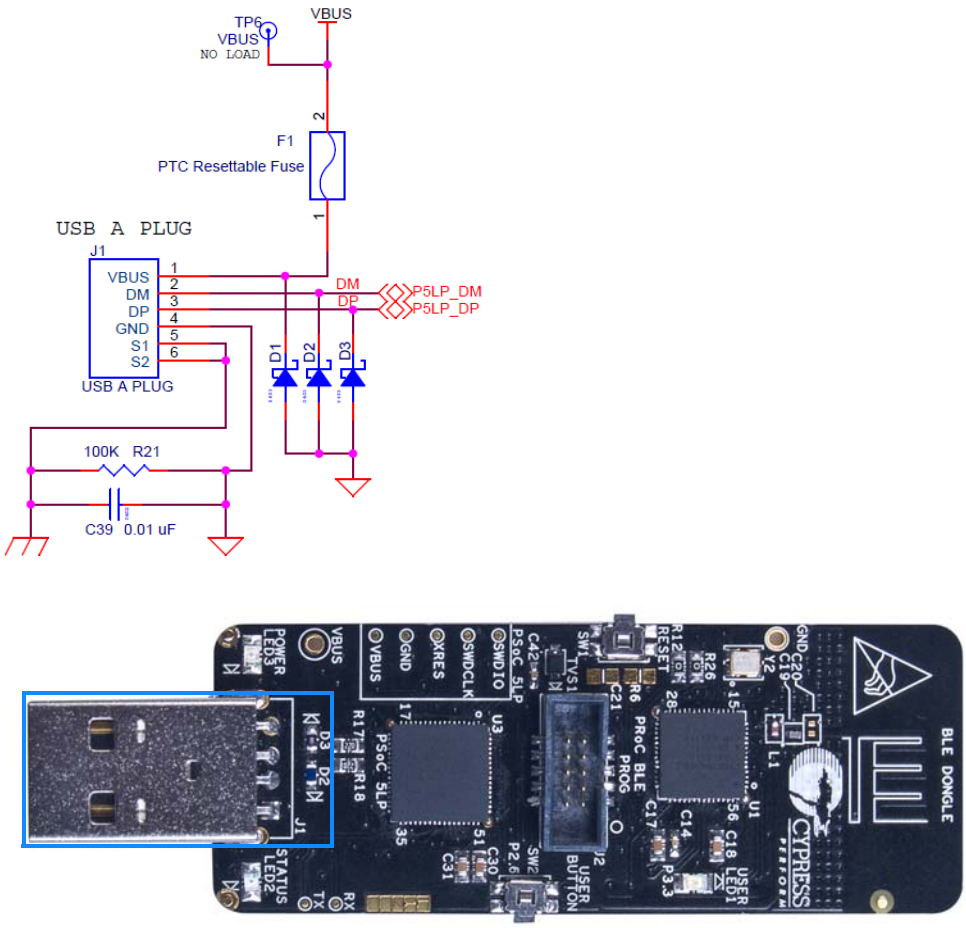
5.3.1.1 Protection Circuits

The PTC resettable fuse is connected to protect the computer's USB ports from shorts and overcurrent.

5.3.2 USB Type A Plug

The PSoC 5LP connects to the USB port of a PC through a USB type A plug (Figure 5-27). This plug can also be used to power the board. A resettable polyfuse is used to protect the computer's USB ports from shorts and overcurrent. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed. The VBUS, D+, and D– lines from the USB connector are also protected against ESD events using TVS diodes.

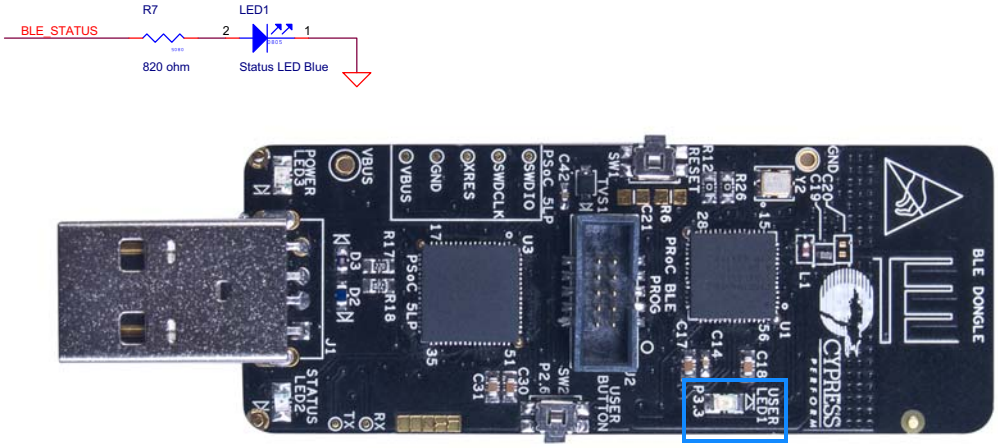
Figure 5-27. Schematics and Board Highlight of USB Type A Plug



5.3.3 User LED

A user LED is provided to indicate status from the PRoC BLE device (Figure 5-28). It is also used to show the bind status.

Figure 5-28. Schematics and Board Highlight of User LED



6. Advanced Topics

This chapter describes advanced features of the BLE Pioneer kit as well as the corresponding projects. It can be used as reference to exploit these features for other applications, according to project requirements.

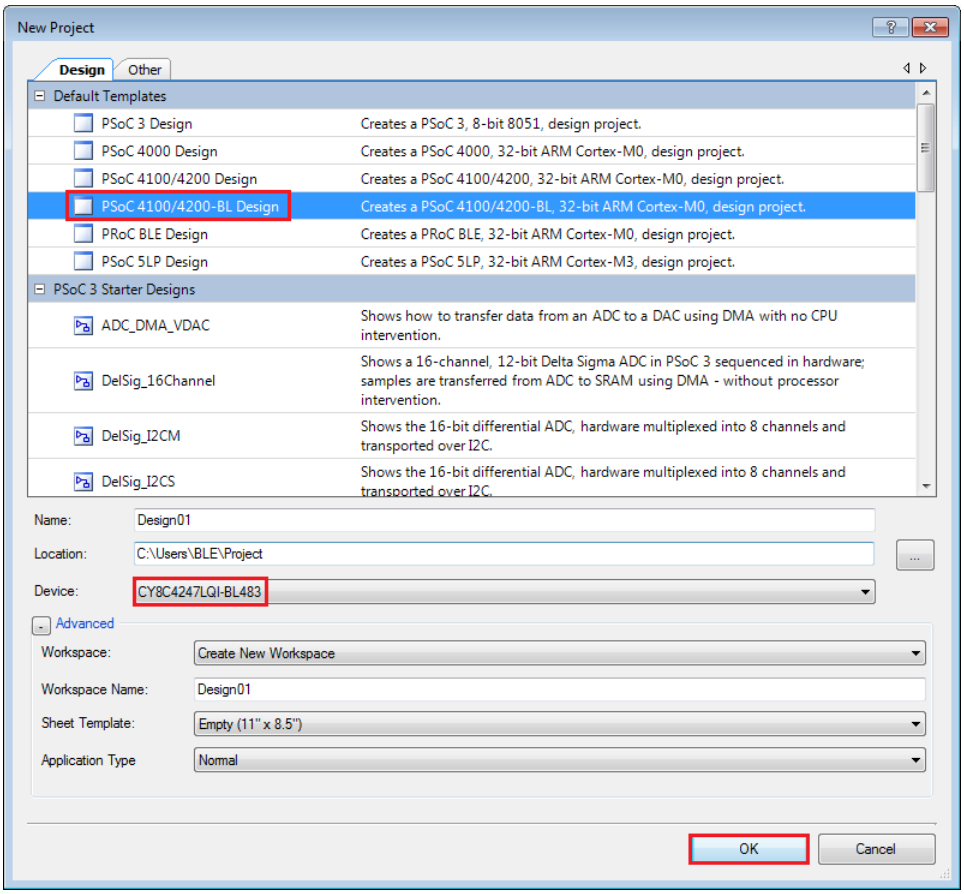
6.1 Using PSoC 5LP as USB-UART Bridge

The PSoC 5LP serves as a USB-UART bridge, which can communicate with the COM terminal software. This section explains how to create a PSoC 4 BLE code example to communicate with the COM terminal software.

Users who have a Windows operating system that does not have HyperTerminal can use an alternative terminal software such as PuTTY.

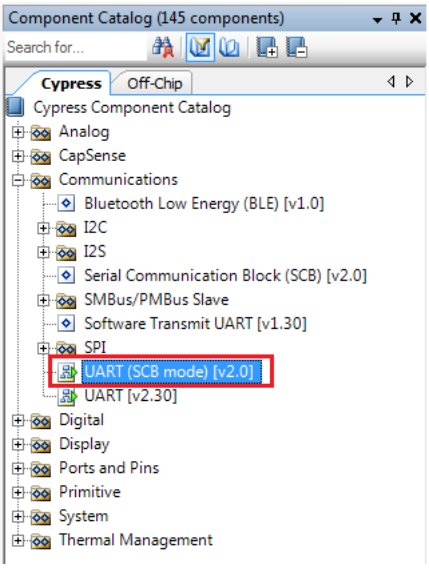
1. Create a new PSoC 4 BLE project in PSoC Creator, as shown in Figure 6-1. Select an appropriate location for your project and rename the project as required.

Figure 6-1. Create New Project in PSoC Creator



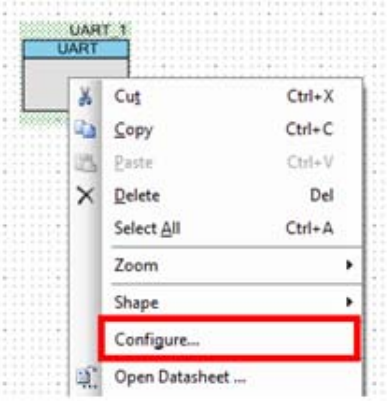
2. Drag and drop a UART (SCB) component (Figure 6-2) to the TopDesign.

Figure 6-2. UART Component in Component Catalog



3. To configure the UART, double-click or right-click the UART component and select **Configure**, as shown in Figure 6-3.

Figure 6-3. Open UART Configuration Window



4. Change the instance name to **UART**. Configure the UART as shown in Figure 6-4, Figure 6-5, and Figure 6-6. Click **OK**.

Figure 6-4. UART Configuration Tab Window

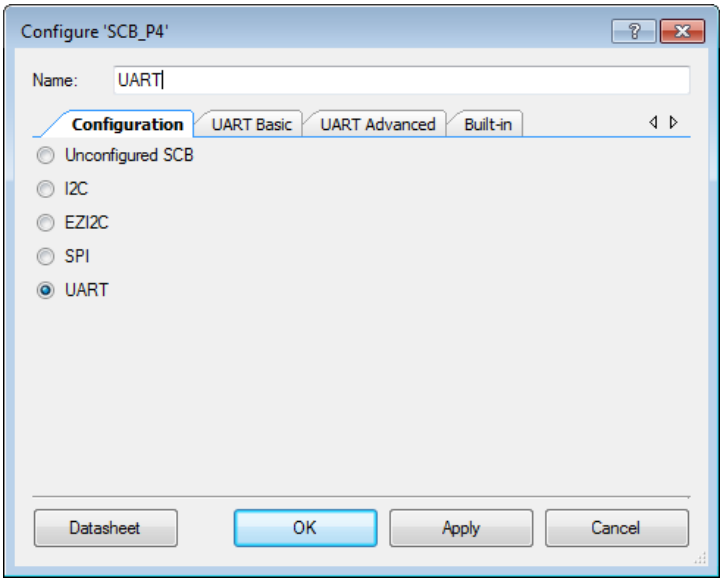


Figure 6-5. UART Basic Tab Window

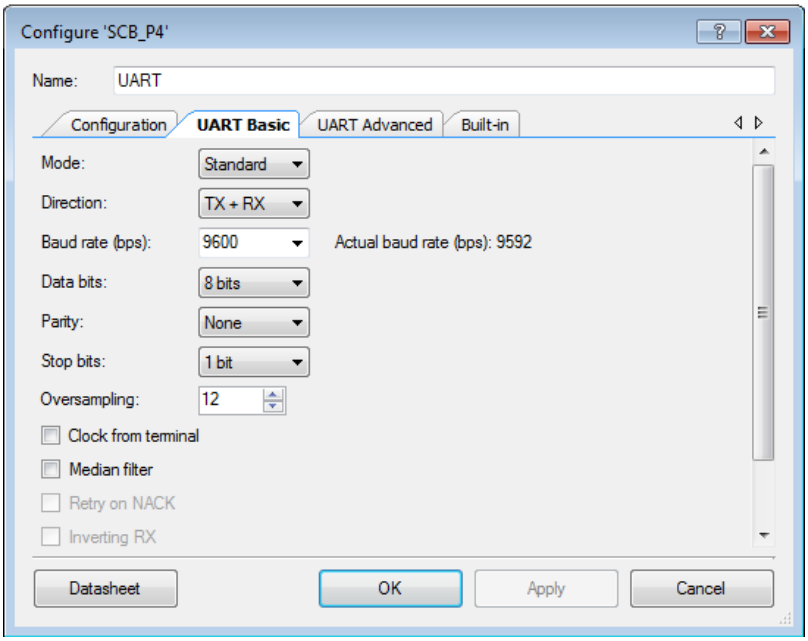
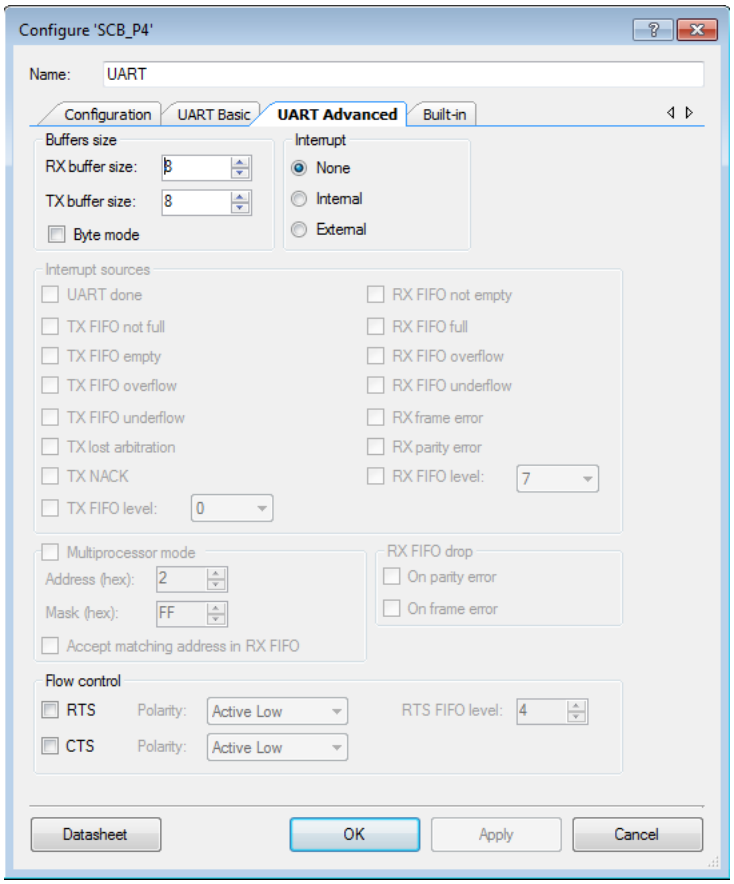


Figure 6-6. UART Advanced Tab Window



5. Select P1[4] for UART RX and P1[5] for UART TX in the **Pins** tab of *<Project_Name>.cydwr*, as shown in Figure 6-7.

Figure 6-7. Pin Selection

Alias	Name	Port	Pin	Lock
	\UART_1:rx\	P1[4] OA3:vminus, TCPWM2:line_out, SCB0:uart_rx, SCB0:i2c_sda, SCB0:spi_mosi	32	☑
	\UART_1:tx\	P1[5] OA3:vplus, TCPWM2:line_out_compl, SCB0:uart_tx, SCB0:i2c_scl, SCB0:spi_miso	33	☑

6. Place the following code in your *main.c* project file. The code will echo any UART data received.

```
int main()
{
    uint8 ch;

    /* Start SCB UART TX+RX operation */
    UART_Start();

/* Transmit String through UART TX Line */
UART_UartPutString("CY8CKIT-042-BLE USB-UART");

    for(;;)
    {
        /* Get received character or zero if nothing has been received yet
*/
        ch = UART_UartGetChar();

        if(0u != ch)
        {
 /* Send the data through UART. This function is blocking and waits until
there is an entry into the TX FIFO. */
            UART_UartPutChar(ch);
        }
    }
}
```

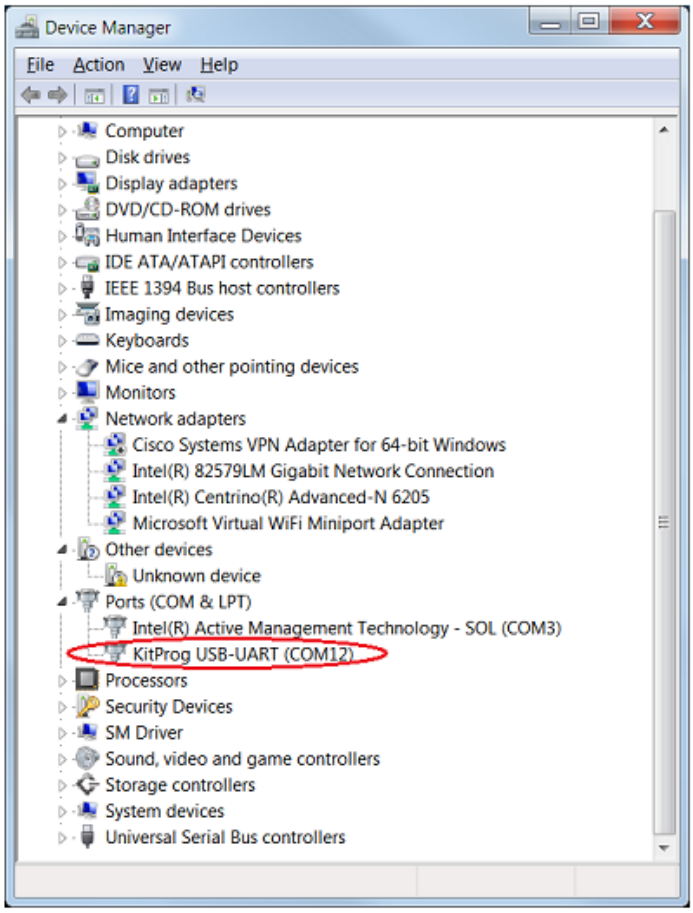
7. Build the project by clicking **Build > Build {Project Name}** or **[Shift][F6]**. After the project is built without errors and warnings, program (by choosing **Debug > Program**) the project to PSoC 4 BLE/PRoC BLE through the PSoC 5LP USB programmer or MiniProg3.

   Note: UART RX and UART TX can be routed to any digital pin on PSoC 4 BLE/PRoC BLE based on the configuration of the UART component. An SCB implementation of UART will route the RX and TX pins to one of the following subsets: (P0[0], P0[1] or P0[4], P0[5] or P1[4], P1[5] or P3[0], P3[1] or P3[4], P3[5] or P5[0], P5[1]).

To communicate with the PSoC 4 from the terminal software, follow this procedure:

1. Connect USB mini-B to J13. The kit enumerates as a **KitProg USB-UART** and is available in the **Device Manager, Ports (COM & LPT)**. A communication port is assigned to the **KitProg USB-UART**, as shown in Figure 6-8.

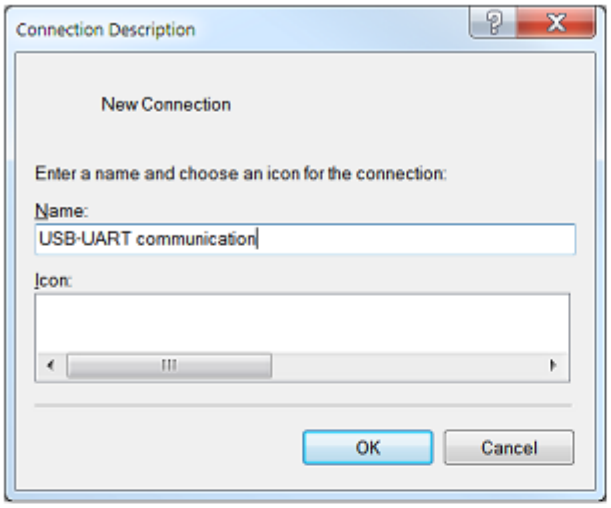
Figure 6-8. KitProg USB-UART in Device Manager



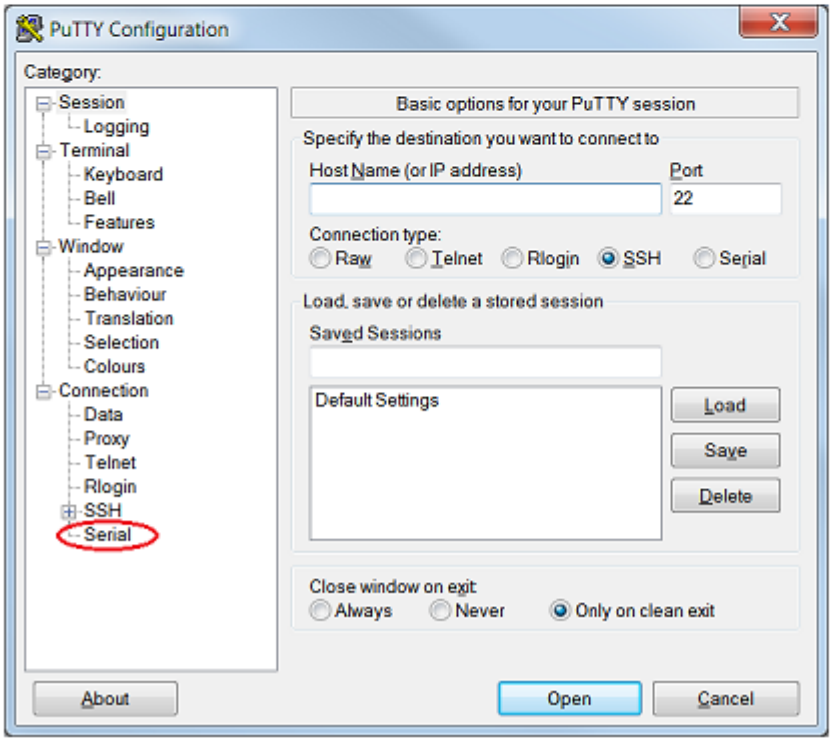
2. Open HyperTerminal and choose **File > New Connection** and enter a name for the new connection and click **OK**, as shown in Figure 6-9. For PuTTY, double-click the PuTTY icon and select **Serial** under **Connection**.

Figure 6-9. Open New Connection

HyperTerminal



PuTTY

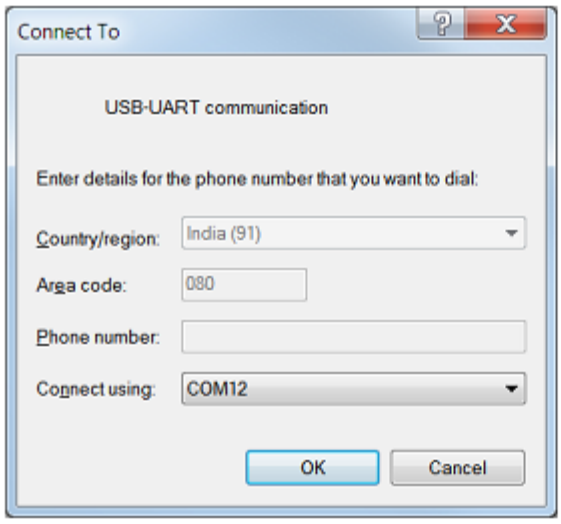


3. A new window opens, where the communication port can be selected.

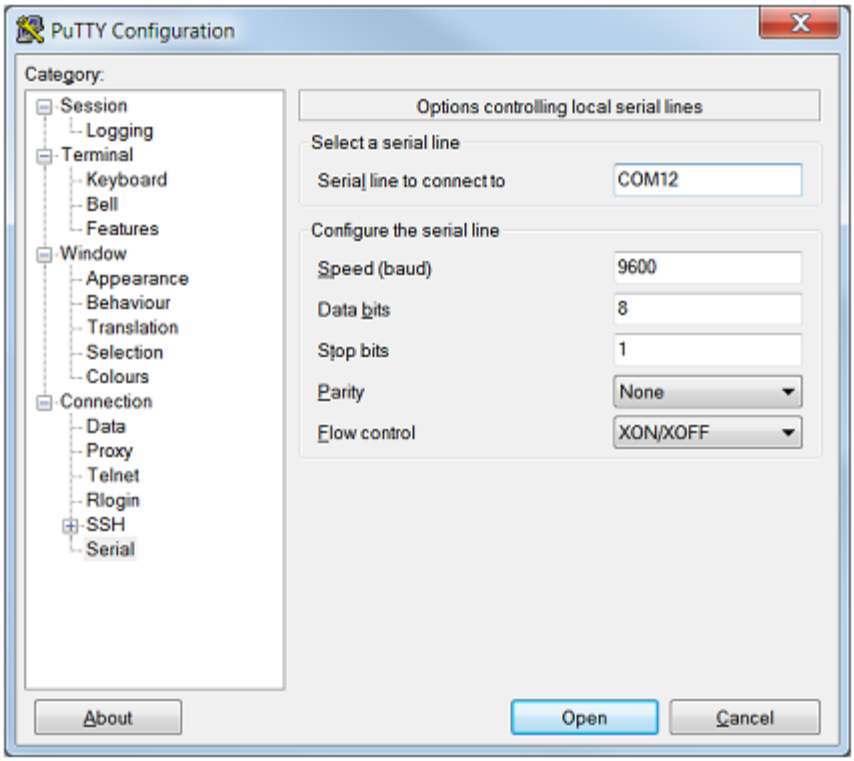
   In HyperTerminal, select COMx (or the specific communication port that is assigned to the Kit-Prog USB-UART) in **Connect using** and click **OK**, as shown in Figure 6-10. In PuTTY enter the COMx in **Serial line to connect to**. This code example uses **COM12**.

Figure 6-10. Select Communication Port

HyperTerminal



PuTTY

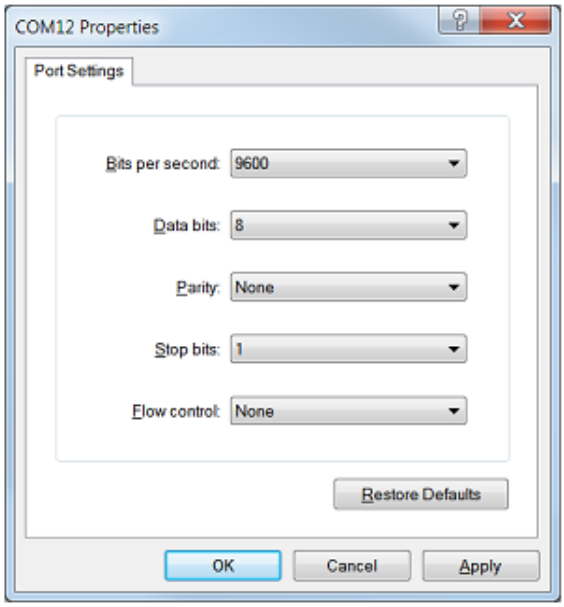


4. In HyperTerminal, select **Bits per second**, **Data bits**, **Parity**, **Stop bits**, and **Flow control** under **Port Settings** and click **OK**, as shown in Figure 6-11. Make sure that the settings are identical to the UART settings configured for the BLE device.

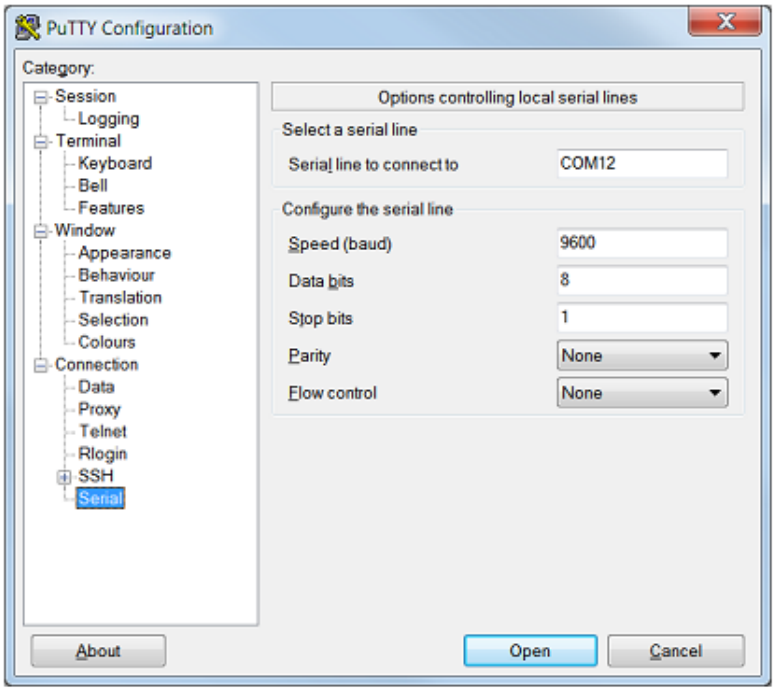
   In PuTTY select **Speed (baud)**, **Data bits**, **Stop bits**, **Parity** and **Flow control** under **Configure the serial line**. Click **Session** and select **Serial** under **Connection type**. **Serial line** shows the communication port (COM12) and **Speed** shows the baud rate selected. Click **Open** to start the communication.

Figure 6-11. Configure the Communication Port

HyperTerminal



PuTTY



5. Enable **Echo typed characters locally** in **File > Properties > Settings > ASCII Setup**, to display the typed characters on HyperTerminal, as shown in Figure 6-12. In PuTTY, select **Force on** in **Terminal > Line discipline options** to display the typed characters on PuTTY, as shown in Figure 6-13.

Figure 6-12. Enable Echo of Typed Characters in HyperTerminal

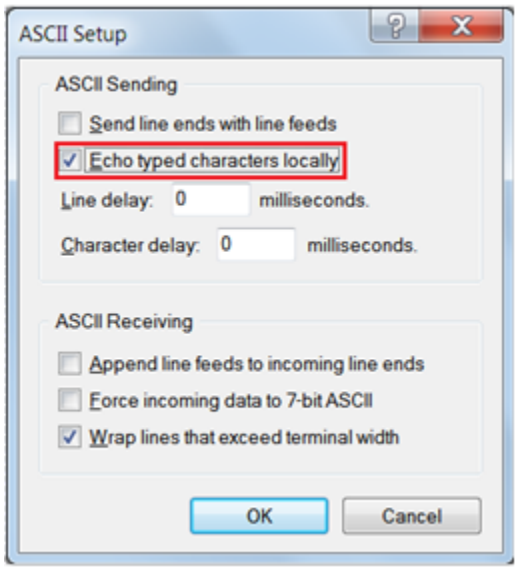
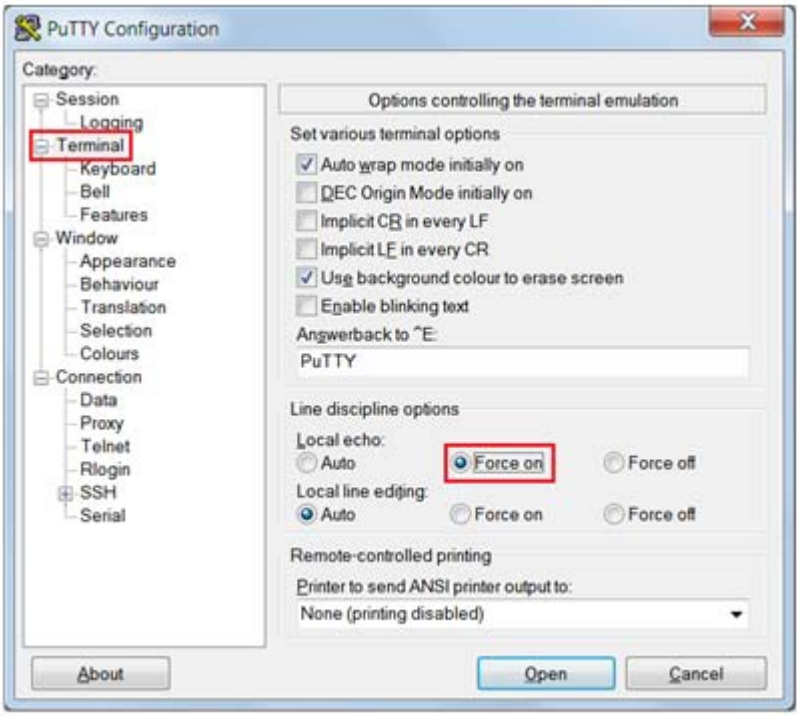


Figure 6-13. Enabling Echo of Typed Characters in PuTTY



6. The COM terminal software displays both the typed data and the echoed data from the PSoC 4 BLE or PRoC BLE UART, as shown in Figure 6-14 and Figure 6-15.

Figure 6-14. Data Displayed on HyperTerminal

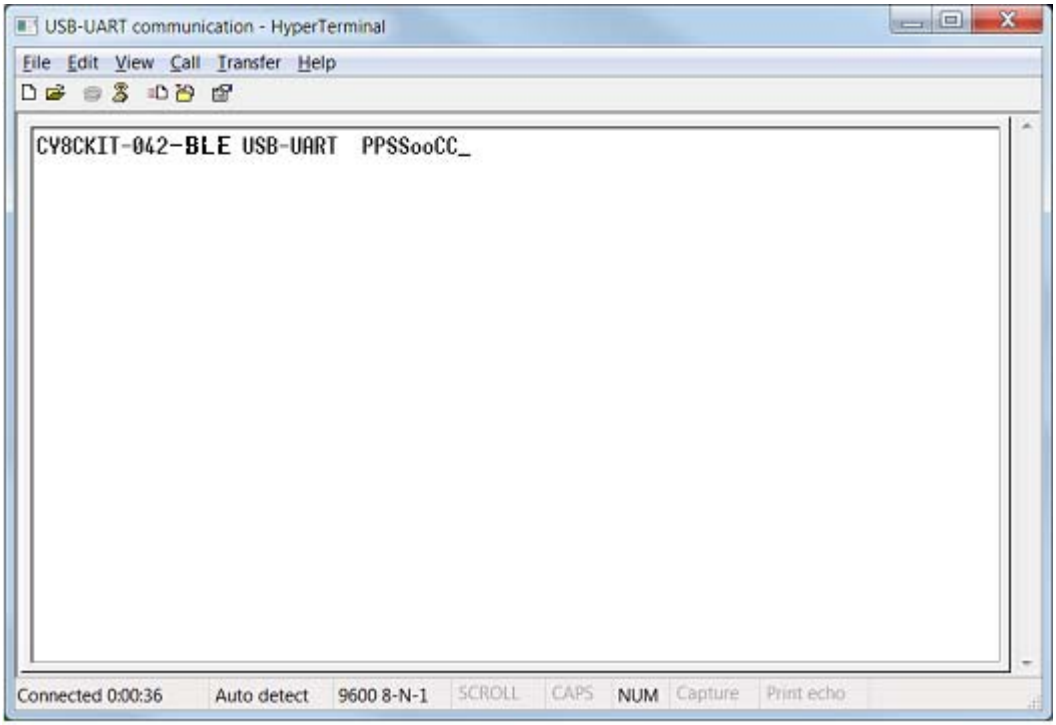
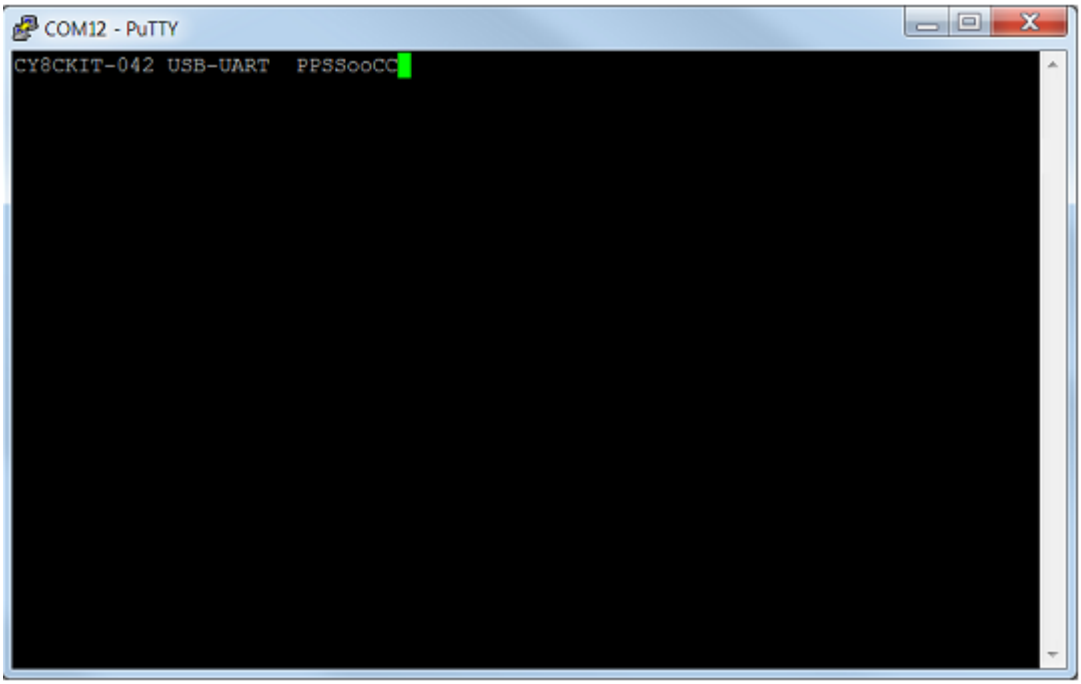


Figure 6-15. Data Displayed on PuTTY

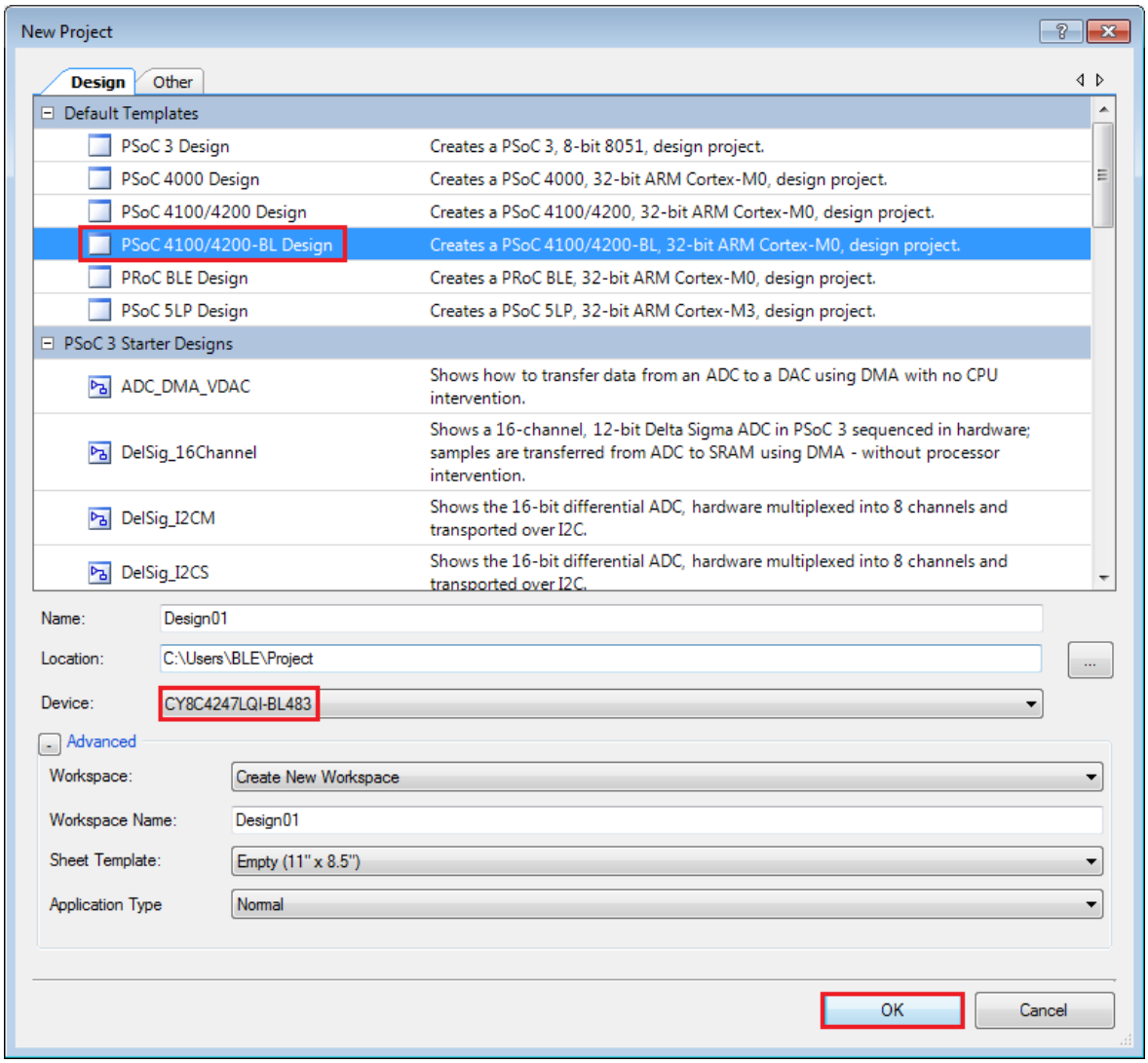


6.2 Using PSoC 5LP as USB-I²C Bridge

The PSoC 5LP serves as a USB-I²C bridge that can be used to communicate with the USB-I²C software running on the PC. The following steps describe how to use the USB-I²C bridge, which can communicate between the BCP and the PSoC 4 BLE/PRoC BLE.

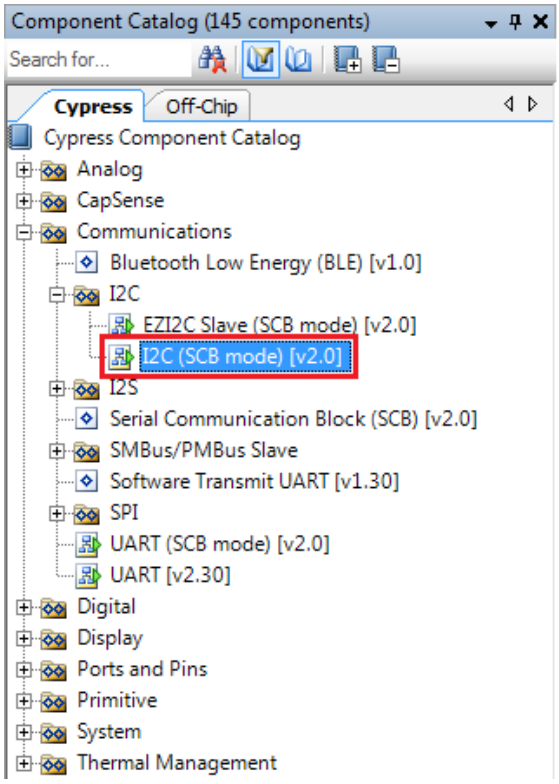
1. Create a new project targeting the PSoC 4 BLE/PRoC BLE device in PSoC Creator, as shown in Figure 6-16.

Figure 6-16. Create New Project in PSoC Creator



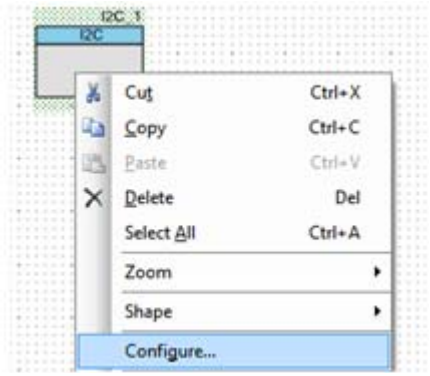
2. Drag and drop an I²C component (Figure 6-17) to the TopDesign.

Figure 6-17. I²C Component in Component Catalog



3. To configure the I²C component, double-click or right-click the I²C component and select **Configure**, as shown in Figure 6-18.

Figure 6-18. Open I²C Configuration Window



4. Change the instance name to **I2C**. Configure the I^{2}C component according to the settings in Figure 6-19 and Figure 6-20 and click **OK**.

Figure 6-19. Configuration Tab

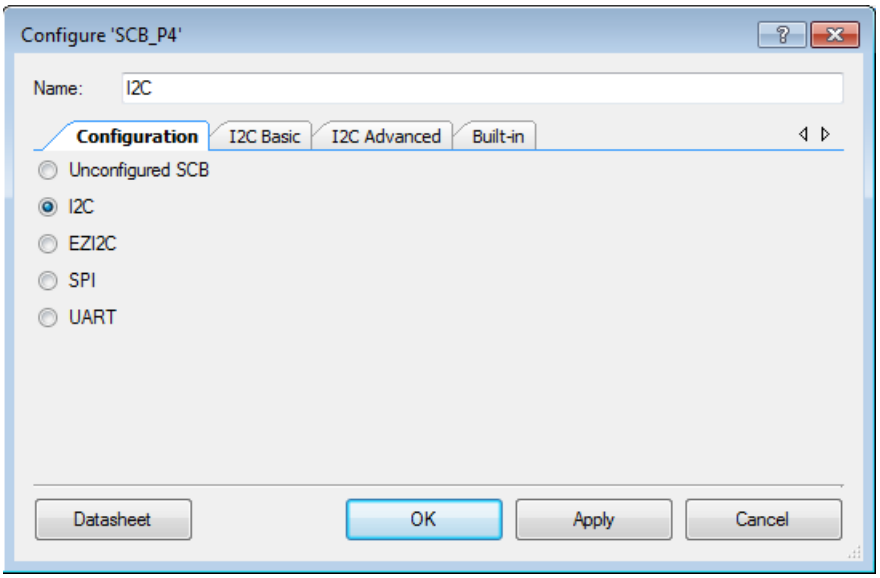
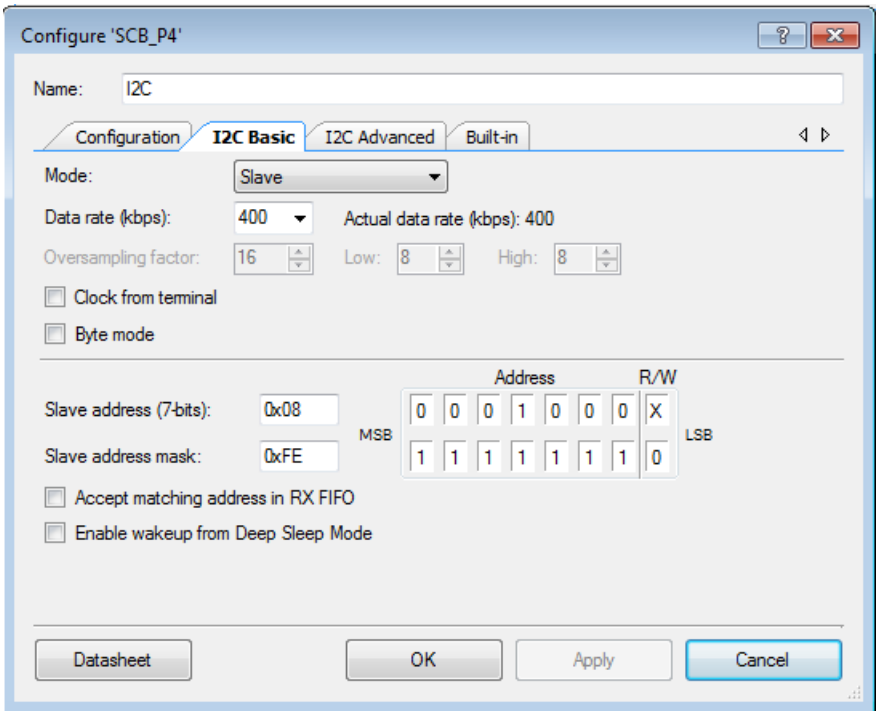
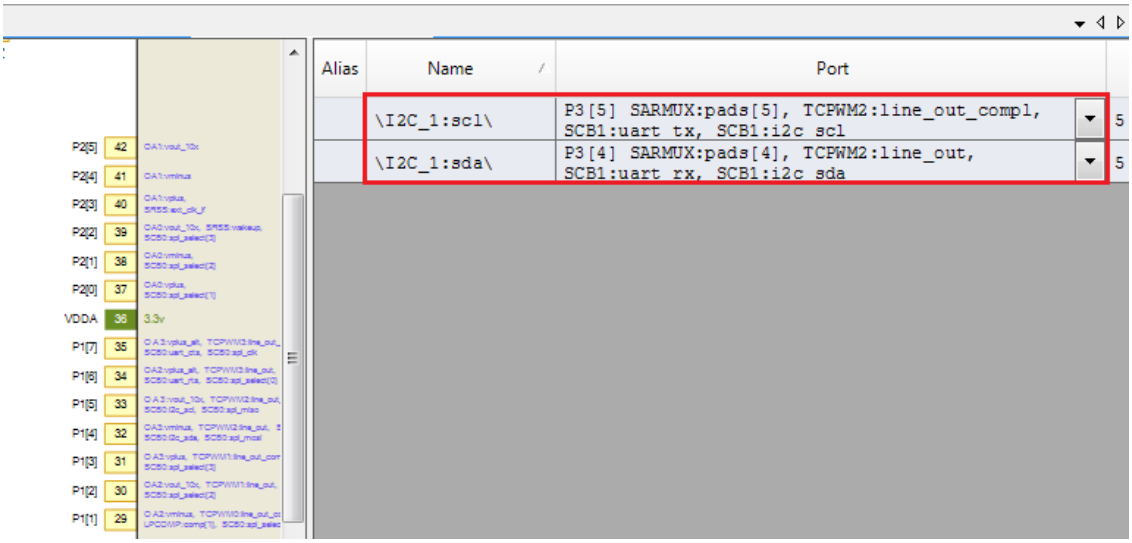


Figure 6-20. I^{2}C Basic and Advanced Tabs



5. Select pin P3[5] for the I²C SCL and pin P3[4] for the I²C SDA in the **Pins** tab of *<Project_Name>.cydwr*, as shown in Figure 6-21.

Figure 6-21. Pin Selection_USBI2C



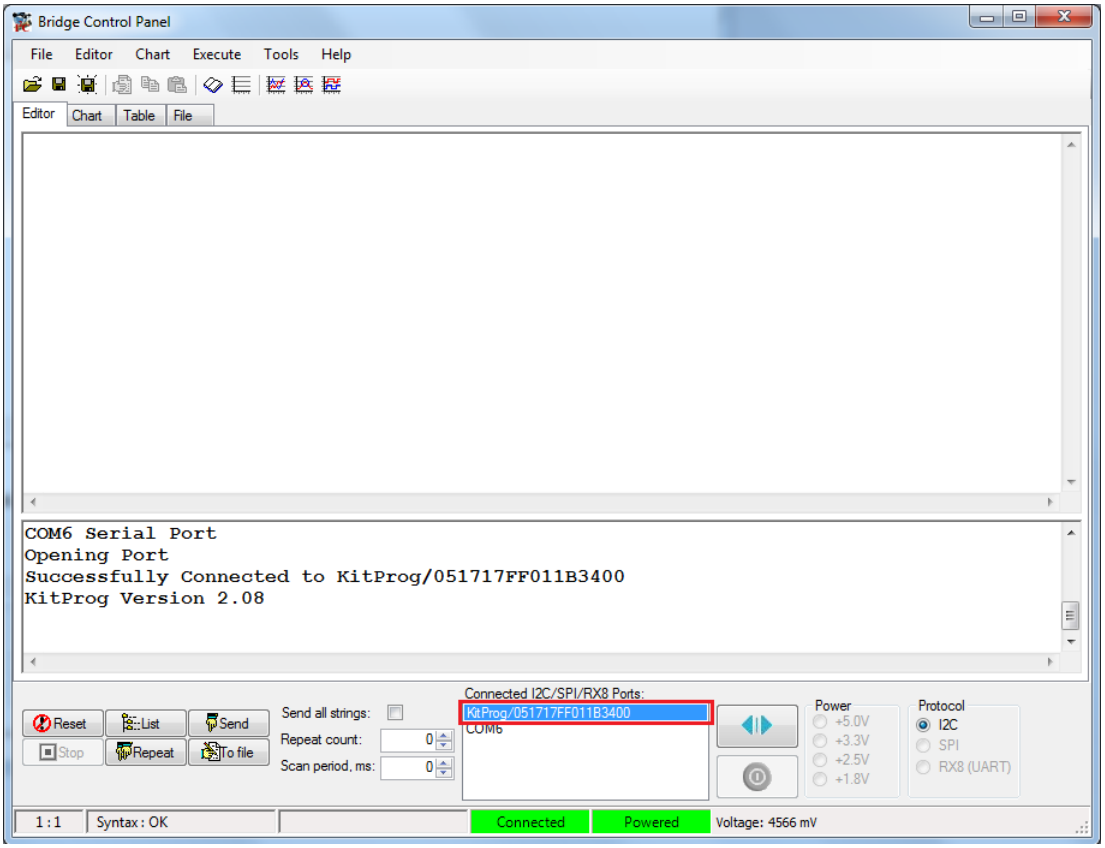
6. Place the following code in your *main.c* project file. The code will enable the PSoC 4 BLE/PRoC BLE device to transmit and receive I²C data to and from the BCP application.

```
int main()
{

uint8 wrBuf[10];  /* I2C write buffer */
uint8 rdBuf[10];  /* I2C read buffer */
uint8 indexCntr;
uint32 byteCnt;

/* Enable the Global Interrupt */
CyGlobalIntEnable;

/* Start I2C Slave operation */
I2C_Start();

/* Initialize write buffer */
I2C_I2CSlaveInitWriteBuf((uint8 *) wrBuf, 10);

/* Initialize read buffer */
I2C_I2CSlaveInitReadBuf((uint8 *) rdBuf, 10);

for(;;) /* Loop forever */
{

 /* Wait for I2C master to complete a write */
```

```
if(0u != (I2C_I2CSlaveStatus() & I2C_I2C_SSTAT_WR_CMPLT))
{

      /* Read the number of bytes transferred */
      byteCnt = I2C_I2CSlaveGetWriteBufSize();

      /* Clear the write status bits*/
      I2C_I2CSlaveClearWriteStatus();

/* Move the data written by the master to the read buffer so that the
      master can read back the data */
      for(indexCntr = 0; indexCntr < byteCnt; indexCntr++)
      {
rdBuf [indexCntr] = wrBuf[indexCntr]; /* Loop back the data to the read
            buffer */
      }

/* Clear the write buffer pointer so that the next write operation will
      start from index 0 */
      I2C_I2CSlaveClearWriteBuf();

/* Clear the read buffer pointer so that the next read operations starts
      from index 0 */
      I2C_I2CSlaveClearReadBuf();
}
/* If the master has read the data , reset the read buffer pointer to 0
 and clear the read status */
 if(0u != (I2C_I2CSlaveStatus() & I2C_I2C_SSTAT_RD_CMPLT))
 {
/* Clear the read buffer pointer so that the next read operations starts
 from index 0 */
      I2C_I2CSlaveClearReadBuf();

      /* Clear the read status bits */
      I2C_I2CSlaveClearReadStatus();
 }
}

}
```

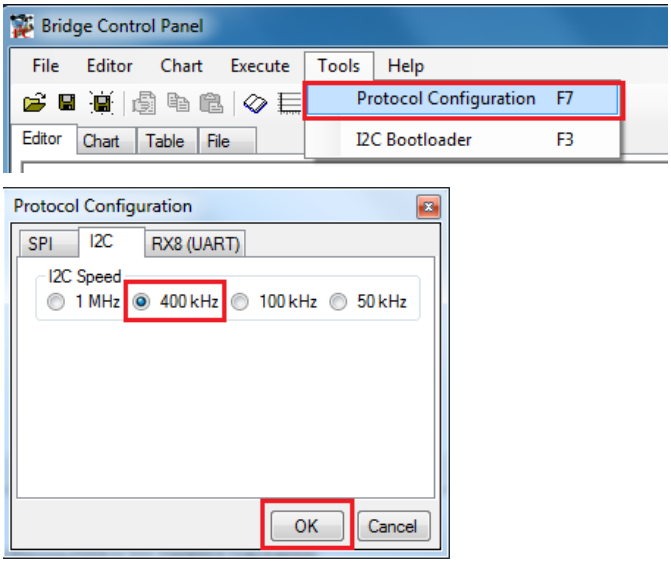
7. Build the project by choosing **Build > Build Project** or **[Shift] [F6]**. After the project is built without errors and warnings, program (**[Ctrl] [F5]**) this code onto the PSoC 4 BLE/PRoC BLE through the PSoC 5LP programmer or MiniProg3.
8. Open the BCP from **Start > All Programs > Cypress > Bridge Control Panel <version number>**.
9. Connect to **KitProg/** under **Connected I2C/SPI/RX8 Ports**, as shown in Figure 6-22.

Figure 6-22. Connecting to KitProg/ in BCP



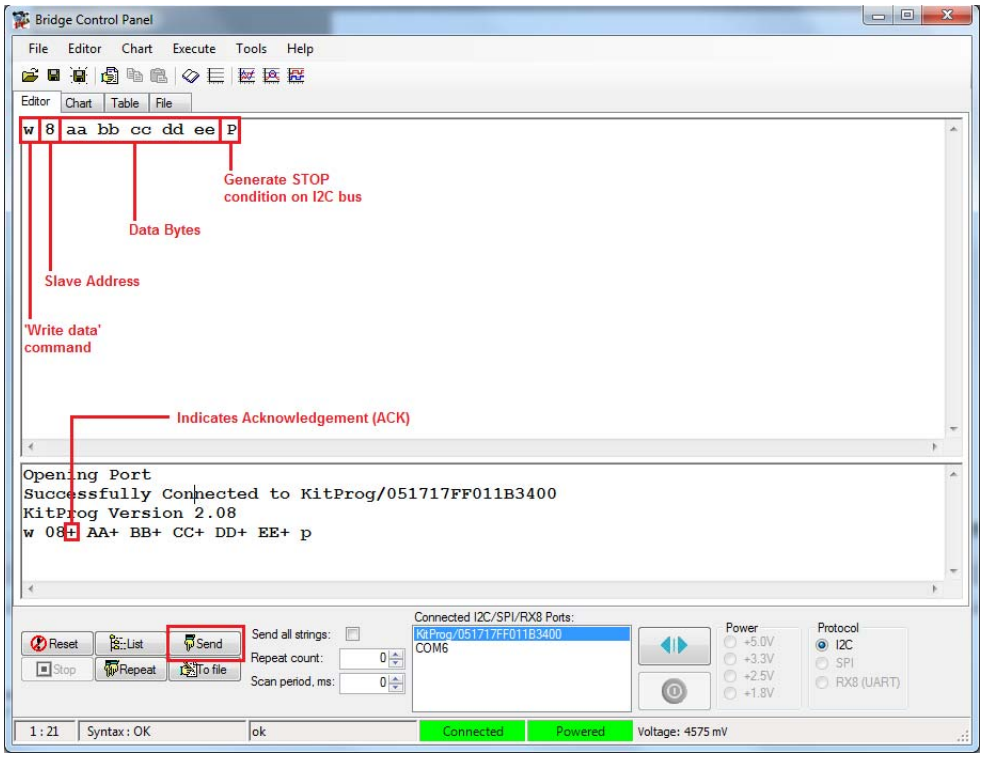
10. Open **Protocol Configuration** from the **Tools** menu and select the appropriate **I2C Speed**, as shown in Figure 6-23. Make sure the I²C speed is the same as the one configured in the I²C component. Click **OK** to close the window.

Figure 6-23. Opening Protocol Configuration Window in BCP



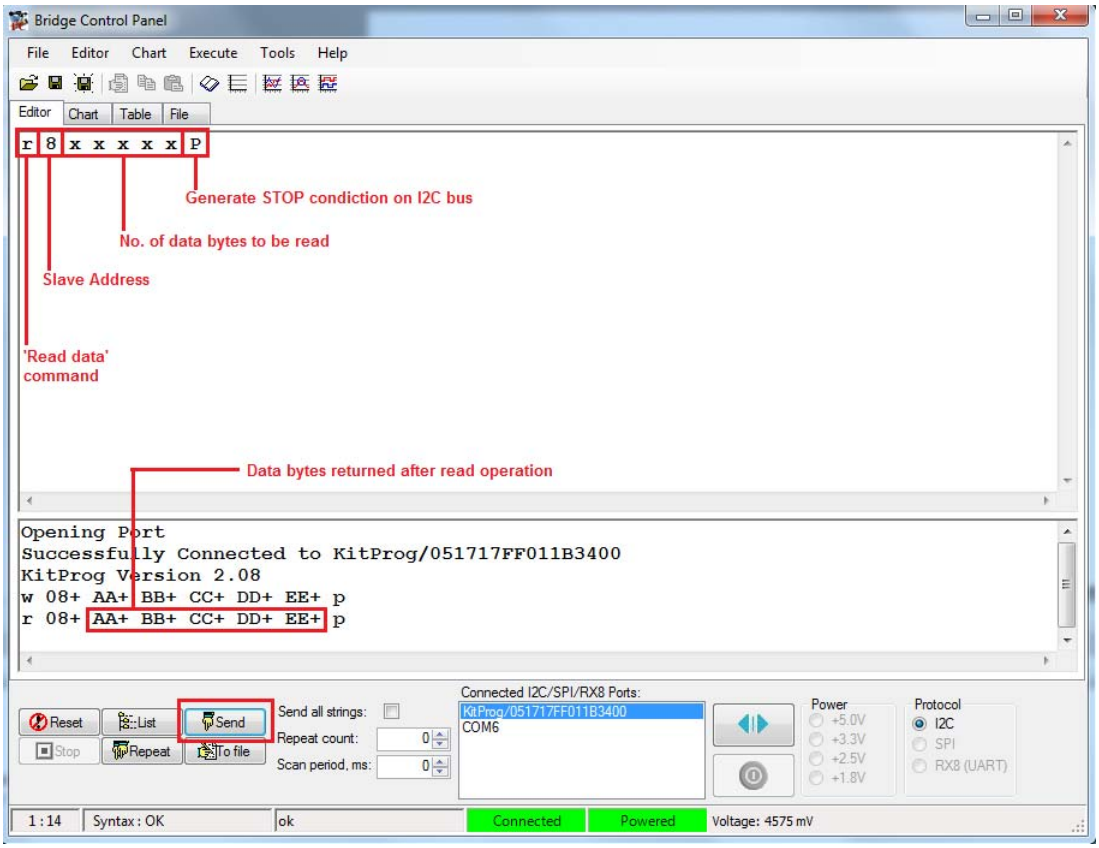
11. From the BCP, transfer five bytes of data to the I²C device with slave address 0x08. Type the command shown in Figure 6-24 and press **[Enter]** or click the **Send** button in the BCP. The log shows whether the transaction was successful. A '+' indication after each byte indicates that the transaction was successful and a '–' indicates that the transaction was a failure.

Figure 6-24. Entering Commands in BCP



12. From the BCP, read five bytes of data from the I²C slave device with slave address 0x08. The log shows whether the transaction was successful, as shown in Figure 6-25.

Figure 6-25. Read Data Bytes from BCP



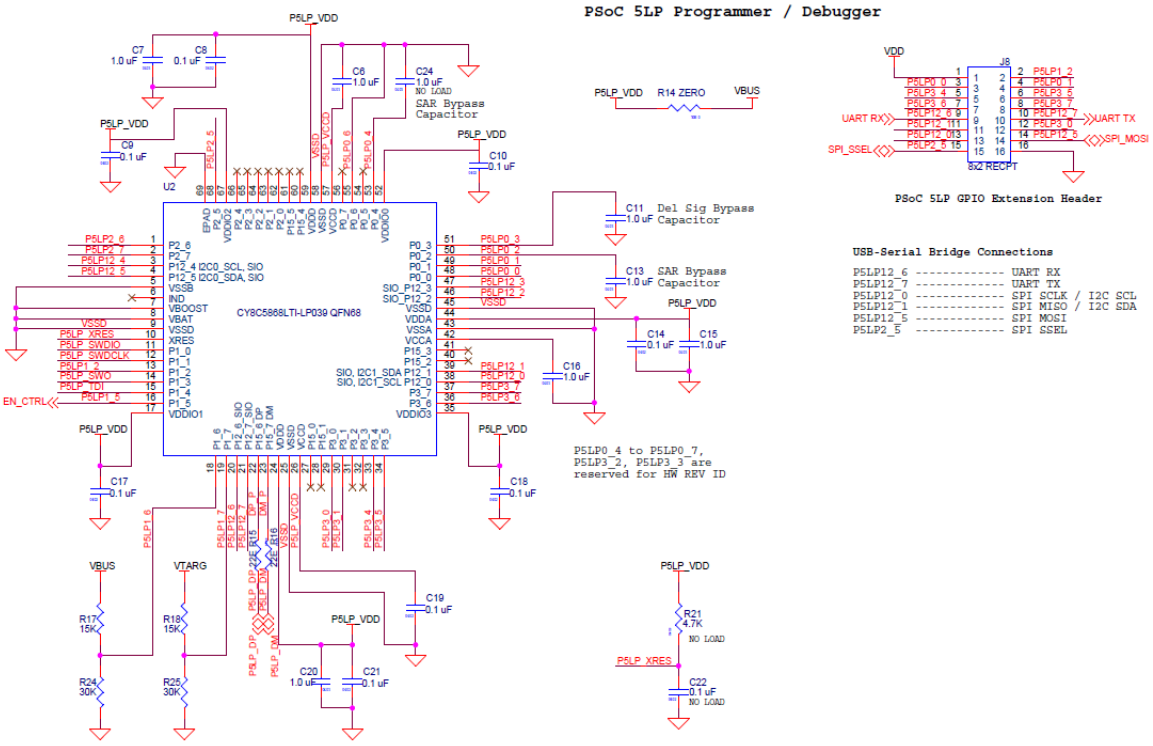
Note: Refer to **Help Contents** under **Help** in BCP or press **[F1]** for details of I²C commands.

6.3 Developing Applications for PSoC 5LP

The BLE Pioneer kit has an onboard PSoC 5LP whose primary function is that of a programmer and a bridge. You can build either a normal project or a bootloadable project using the PSoC 5LP.

The PSoC 5LP connections in the Pioneer board are summarized in Figure 6-26. J8 is the I/O connector. The USB (J13) is connected and used as the PC interface. However, you can still use this USB connection to create customized USB designs.

Figure 6-26. PSoC 5LP Connections on BLE Pioneer Kit



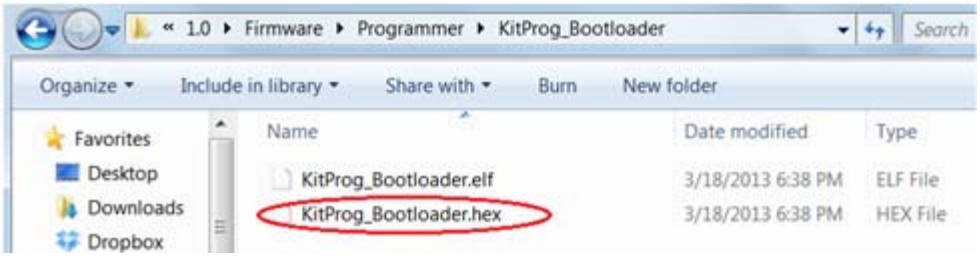
The programming header (J7) is meant for standalone programming. This header needs to be populated. See the 'No Load Components' section in Bill of Materials (BOM) on page 184.

6.3.1 Building a Bootloadable Project for PSoC 5LP

All bootloadable applications developed for the PSoC 5LP should be based on the bootloader hex file, which is programmed onto the kit.

The hex files are included in the following kit installer directory:
`<Install_Directory>\CY8CKIT-042-BLE Kit\<version>\Firmware\Programmer\KitProg_Bootloader`

Figure 6-27. KitProg Bootloader Hex File Location



To build a bootloadable application for the PSoC 5LP, follow this procedure:

1. In PSoC Creator, choose **New > Project > PSoC 5LP,** click the expand button adjacent to **Advanced,** select **Launch Device Selector** to bring up the **Select Device Window** and select the **Device** as **CY8C5868LTI-LP039,** as shown in Figure 6-28. Select the **Application Type** as **Bootloadable** from the drop-down list and click **OK**.

Figure 6-28. Create New Project in PSoC Creator_PSoC 5LP

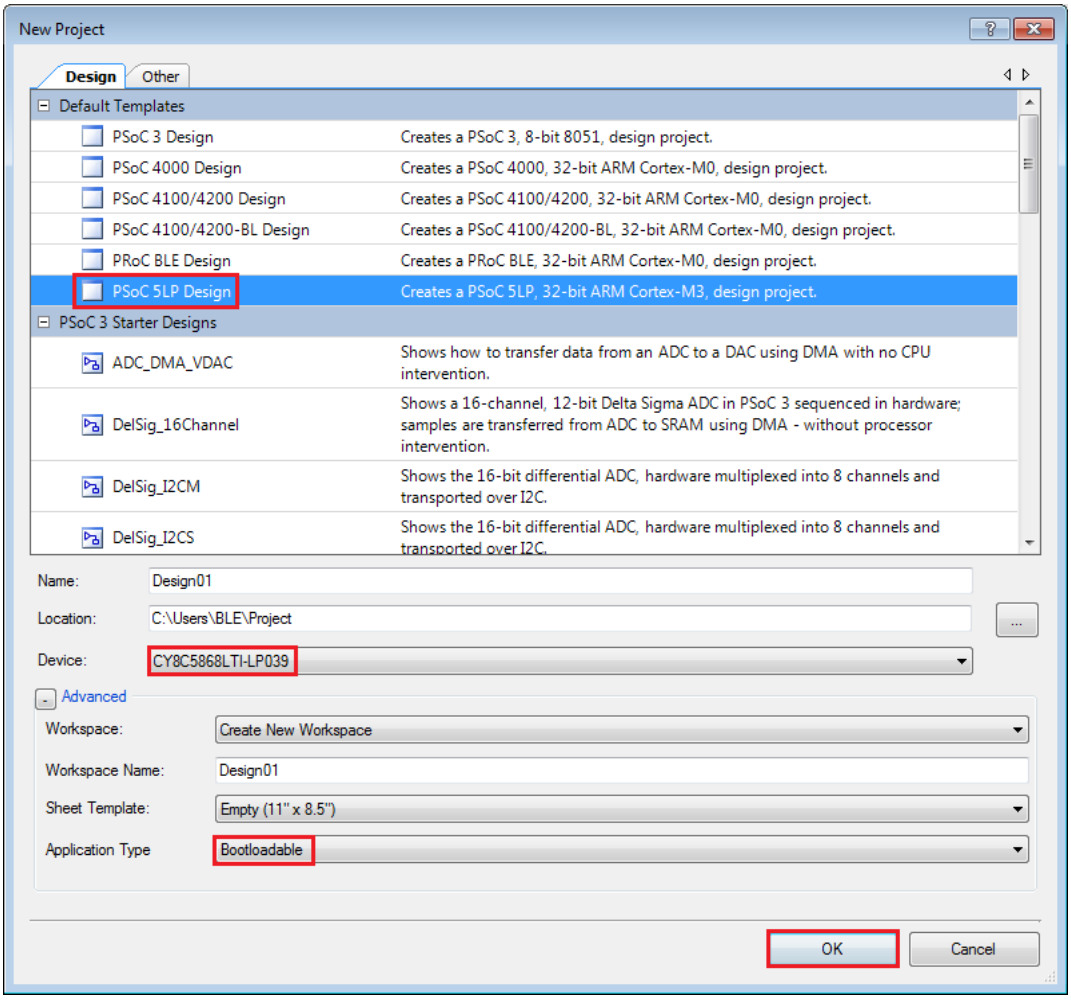
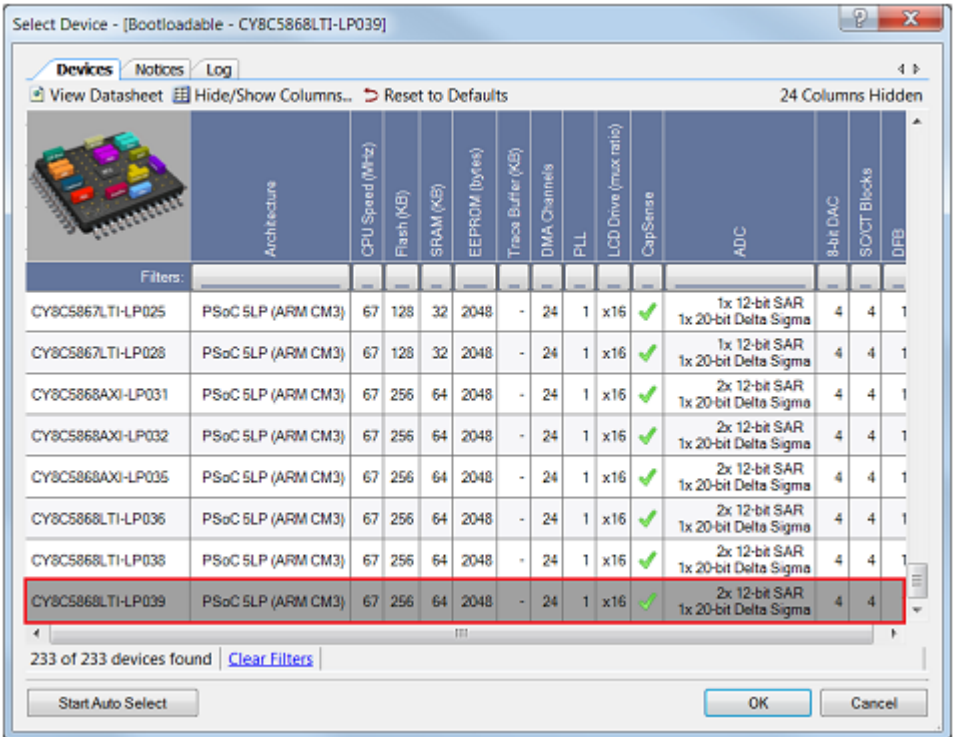
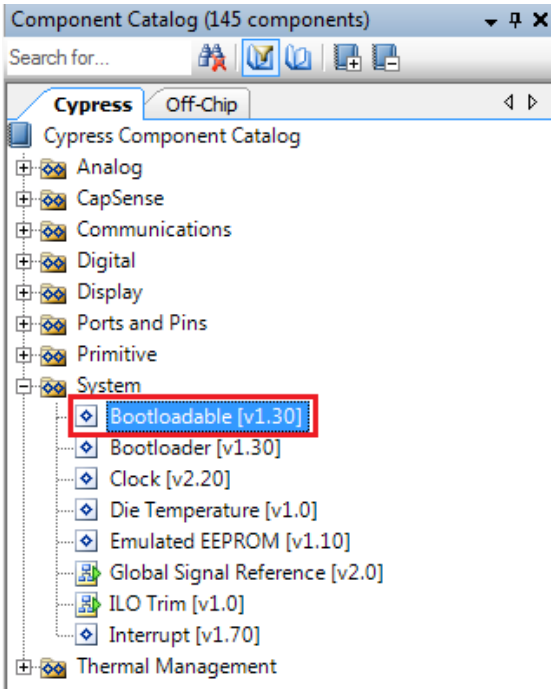


Figure 6-29. Select Device in PSoC Creator



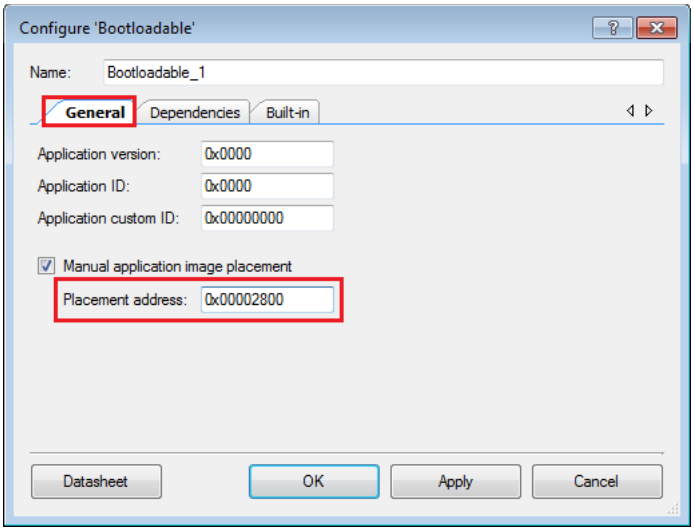
2. Navigate to the Schematic view and drag and drop a Bootloadable component (Figure 6-30) on the TopDesign.

Figure 6-30. Bootloadable Component in Component Catalog



To configure the Bootloadable, double-click or right-click the Bootloadable component and select **Configure**. In the **General** tab, enable the check box for **Manual application image placement** and set the **Placement address** to '0x00002800'.

Figure 6-31. Configuration Window of Bootloadable Component in "General" Tab Setting



Set the dependency of the Bootloadable component by selecting the **Dependencies** tab in the configuration window and clicking the **Browse** button, as shown in Figure 6-32. Select the *KitProg_Bootloader.hex* (Figure 6-33) and *KitProg_Bootloader.elf* files (Figure 6-34); click **Open**.

Figure 6-32. Configuration Window of Bootloadable Component in the Dependencies Tab

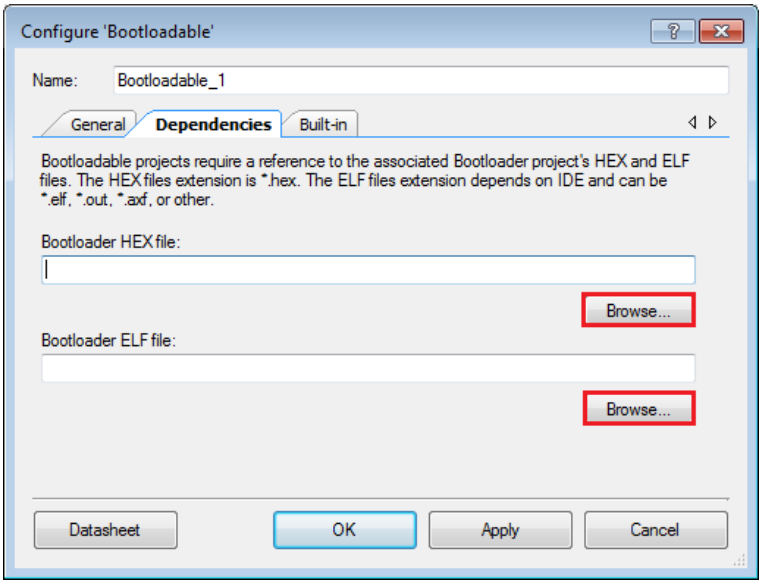


Figure 6-33. Select KitProg Bootloader Hex File

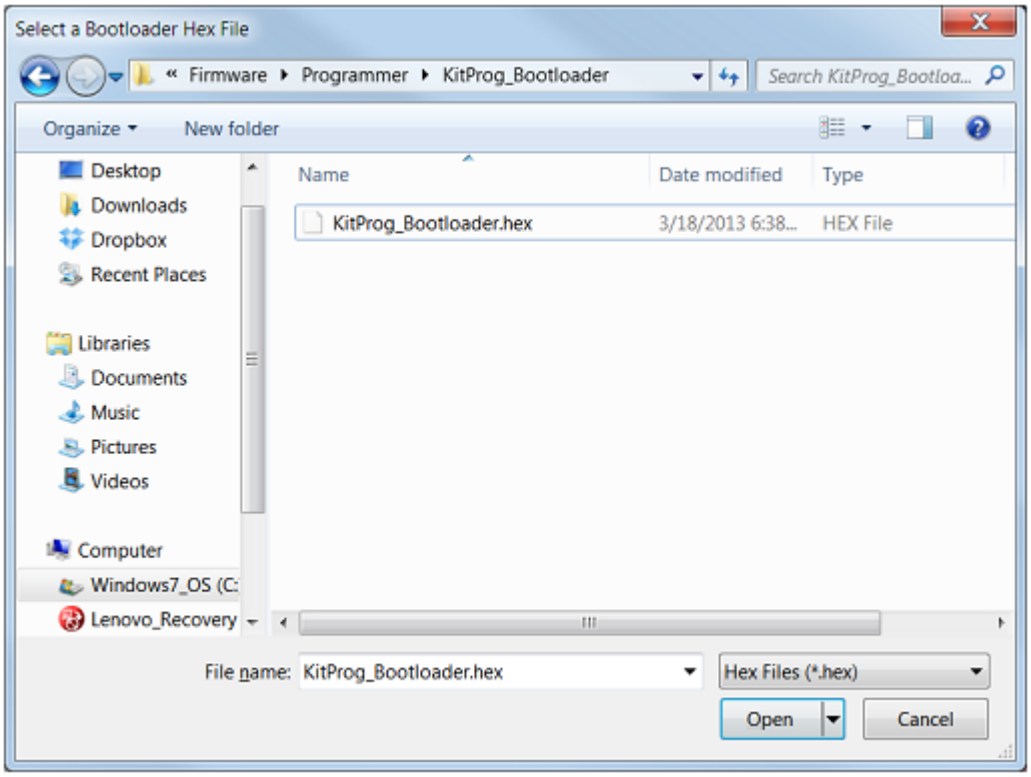
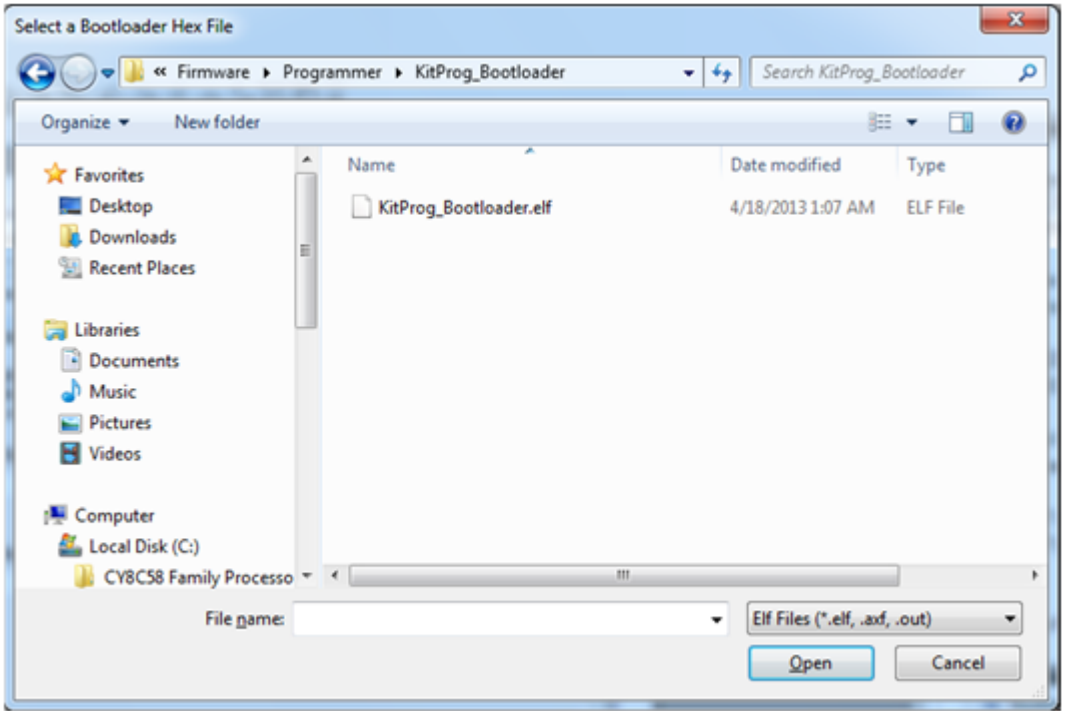


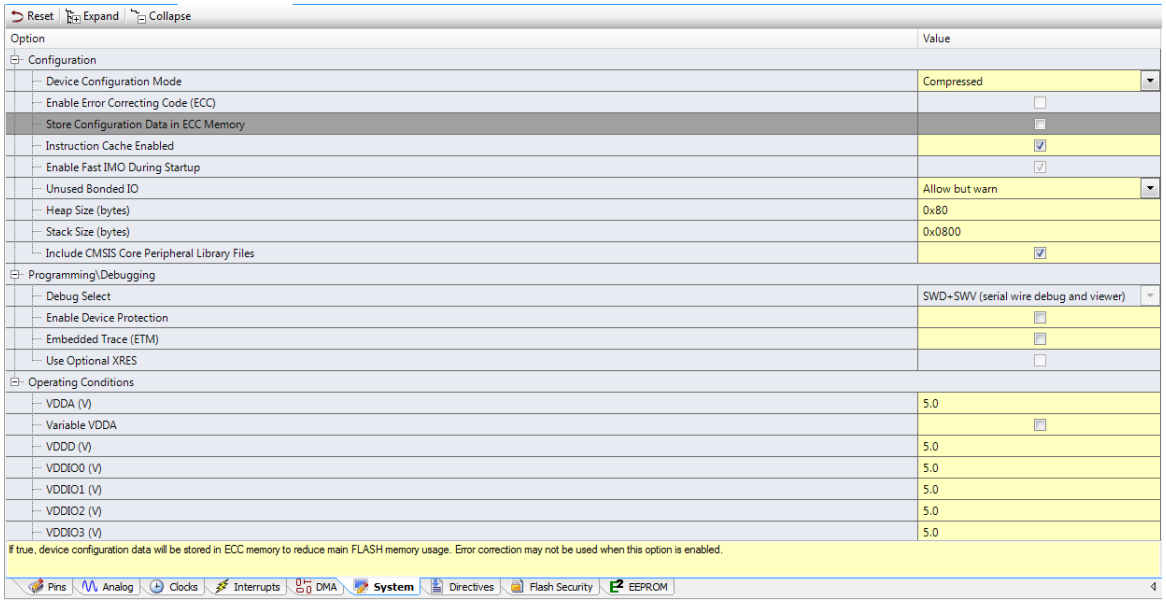
Figure 6-34. Select KitProg Bootloader Elf File



3. Develop your custom project.

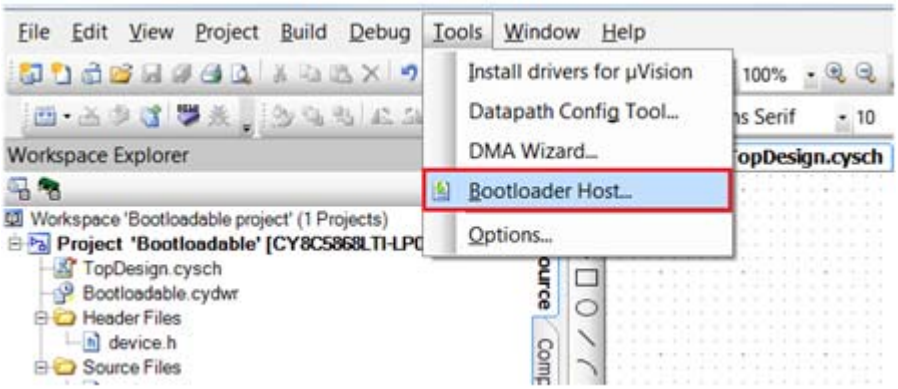
4. Make sure that the NVL setting of the Bootloadable project and the KitProg_Bootloader project is the same. Figure 6-35 shows the *KitProg_Bootloader.cydwr* system settings.

Figure 6-35. KitProg Bootloader System Settings



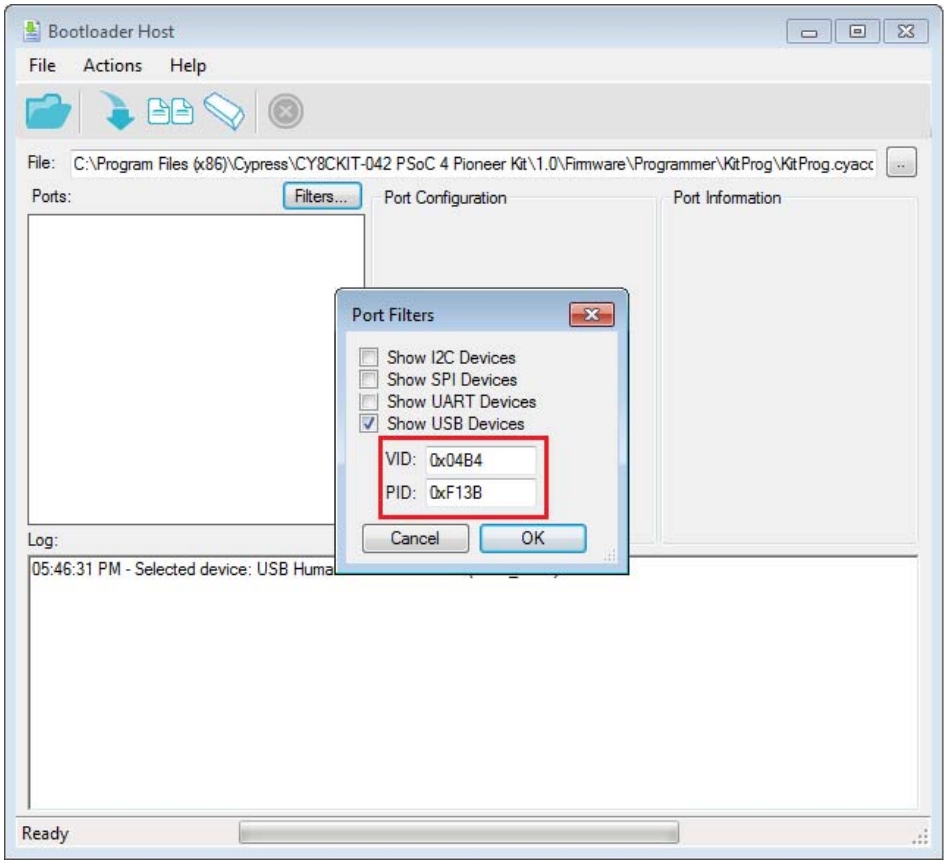
5. Build the project in PSoC Creator by choosing **Build > Build Project** or **[Shift] [F6]**.
6. To download the project onto the PSoC 5LP device, open the Bootloader Host tool, which is available in PSoC Creator. Choose **Tools > Bootloader Host**, as shown in Figure 6-36.

Figure 6-36. Open Bootloader Host Tool in PSoC Creator



7. In the Bootloader Host tool, click **Filters** and add a filter to identify the USB device. Ensure that the check box for **Show USB Devices** is enabled. Set VID as **0x04B4**, PID as **0xF13B**, and click **OK**, as shown in Figure 6-37.

Figure 6-37. Port Filters Tab in Bootloader Host Tool



8. In the Bootloader Host tool, click the **Open File** button (Figure 6-38) to browse to the location of the bootloadable file (*.cyacd), as shown in Figure 6-38.

Figure 6-38. Open Bootloadable File in Bootloader Host Tool

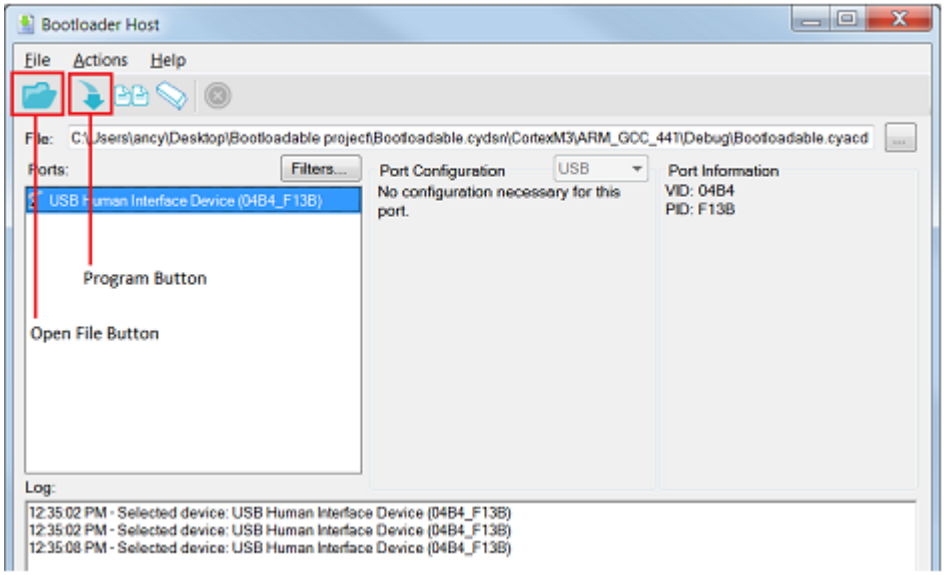
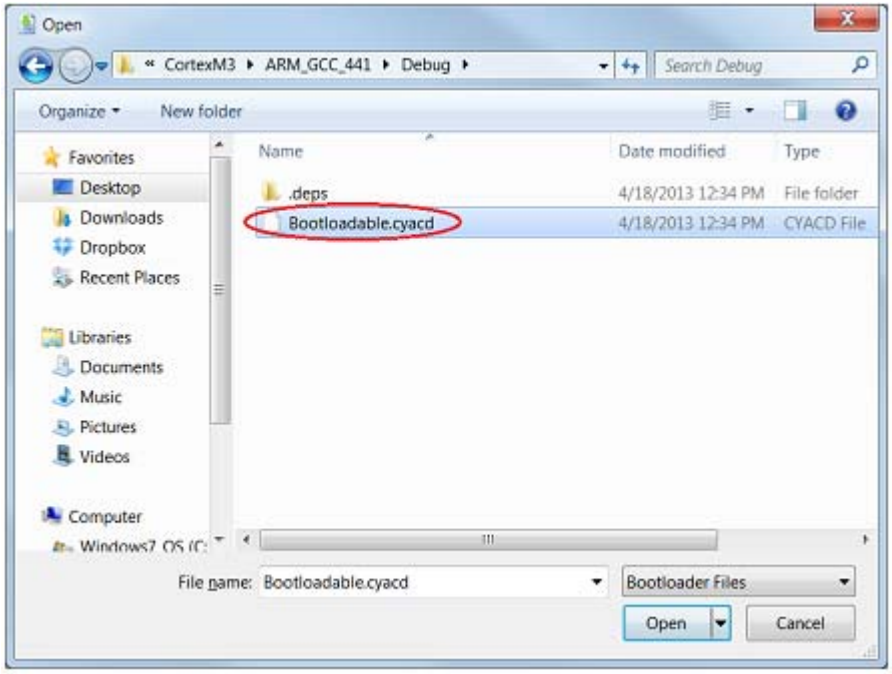


Figure 6-39. Select Bootloadable .cyacd File in Bootloader Host



9. Keep the reset switch (**SW1**) pressed and plug in the USB mini-B connector. If the switch is pressed for more than 100 ms, the PSoC 5LP enters into bootloader. Click the **Program** button (Figure 6-38) in the Bootloader Host tool to program the device.

10. If bootload is successful, the log of the tool displays “Programming Finished Successfully”; otherwise, it displays “Failed” and a reason for the failure.

Notes:

- The PSoC 5LP pins are brought to the PSoC 5LP GPIO header (J8). These pins are selected to support high-performance analog and digital projects. See PSoC 5LP GPIO Header (J8) on page 97 for pin information.
- Take care when allocating the PSoC 5LP pins for custom applications. For example, P2[0]–P2[4] are dedicated for programming the PSoC 4 BLE/PRoC BLE. See Schematics on page 168 before allocating the pins.
- When a custom project is programmed onto the PSoC 5LP, the initial capability of the PSoC 5LP to act as a programmer, USB-UART bridge, or USB-I^2C bridge in not available.
- The status LED does not function unless used by the custom project.

For additional information on bootloaders, refer to Cypress application note, AN73503 - *USB HID Bootloader for PSoC 3 and PSoC 5LP*.

6.3.2 Building a Normal Project for PSoC 5LP

A normal project is a completely new project created for the PSoC 5LP device on the CY8CKIT-042. Here the entire flash of the PSoC 5LP is programmed, overwriting all bootloader and programming code. To recover the programmer, reprogram the PSoC 5LP device with the factory-set *KitProg.hex* file, which is shipped with the kit installer.

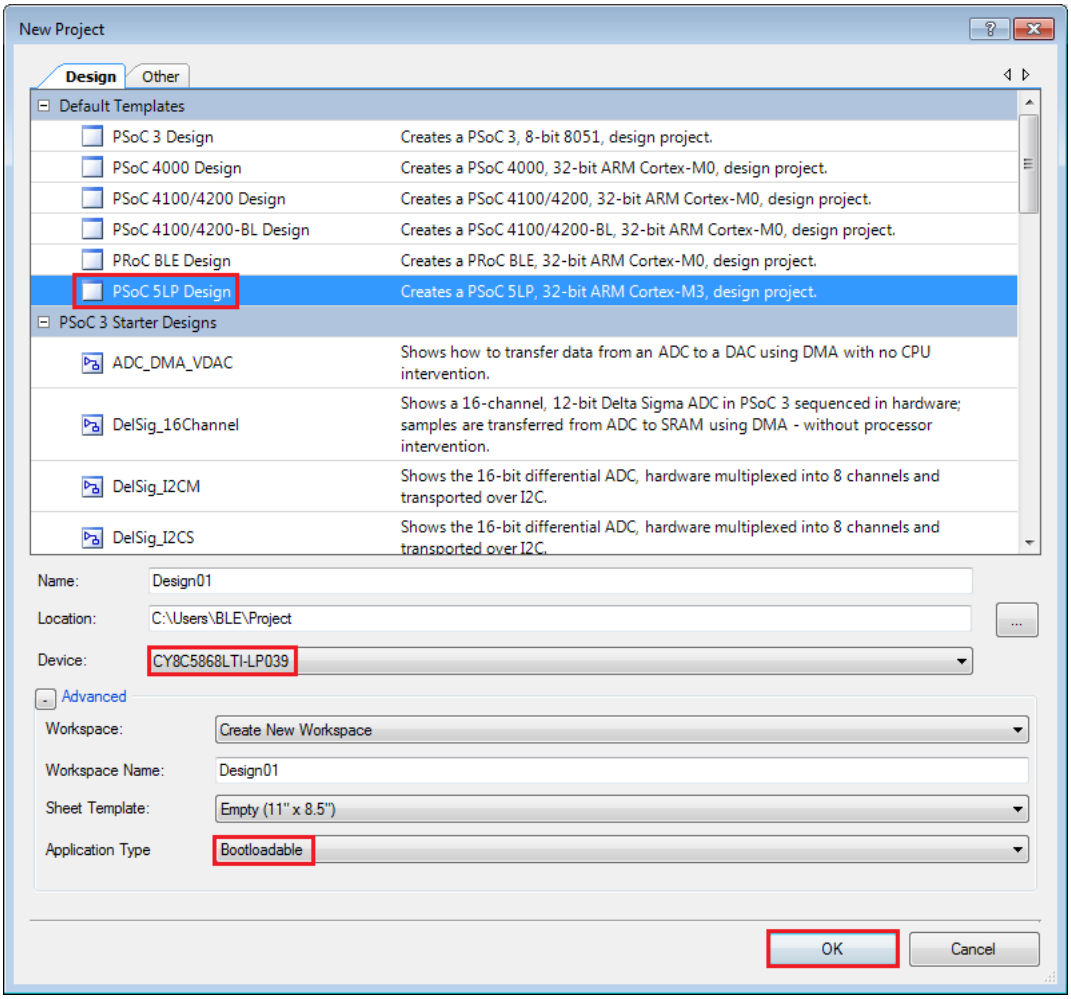
The *KitProg.hex* file is available at the following location:
`<Install_Directory>\CY8CKIT-042-BLE Kit\<version>\Firmware\Programmer\KitProg`

This advanced functionality requires a MiniProg3 programmer, which is not included with this kit. The MiniProg3 can be purchased from www.cypress.com/go/CY8CKIT-002.

To build a normal project for the PSoC 5LP, follow these steps:

1. In PSoC Creator, choose **New > Project > PSoC 5LP**, click the expand button adjacent to **Advanced**, select **Device** as **CY8C5868LTI-LP039**, and select **Application Type** as **Normal** from the drop-down list, as shown in Figure 6-40.

Figure 6-40. Create New Project in PSoC Creator_PSoC 5LP



2. Develop your custom project.
3. Build the project in PSoC Creator by choosing **Build > Build Project** or pressing **[Shift] [F6]**.

4. Connect the 10-pin connector of MiniProg3 to the onboard 10-pin SWD debug and programming header J7 (which needs to be populated).
5. To program the PSoC 5LP with PSoC Creator, choose **Debug > Program** or press **[Ctrl] [F5]**. If the Programming window appears and shows MiniProg3 and the selected device in the project under it (CY8C5868LTI-LP039); click on the device and click **Connect** to program.

Notes:

- The 10-pin SWD debug and programming header (J7) is not populated. See the 'No Load Components' section of A.3 Bill of Materials (BOM) for details.
- The PSoC 5LP pins are brought to the PSoC 5LP GPIO header (J8). These pins are selected to support high-performance analog and digital projects. See PSoC 5LP GPIO Header (J8) on page 97 for pin information.
- Take care when allocating the PSoC 5LP pins for custom applications. For example, P2[0]–P2[4] are dedicated for programming the PSoC 4. Refer to A.1 Schematics before allocating the pins.
- When a normal project is programmed onto the PSoC 5LP, the initial capability of the PSoC 5LP to act as a programmer, USB-UART bridge, or USB-I^2C bridge is not available.
- The status LED does not function unless it is used by the custom project.

6.4 PSoC 5LP Factory Program Restore Instructions

The BLE Pioneer Kit features a PSoC 5LP device that comes factory-programmed as the onboard programmer and debugger for the PSoC 4 BLE/PRoC BLE device.

In addition to creating applications for the BLE device, you can also create custom applications for the PSoC 5LP device on this kit. For details, see section Developing Applications for PSoC 5LP on page 134. Reprogramming or bootloading the PSoC 5LP device with a new flash image will overwrite the factory program and forfeit the ability to use the PSoC 5LP device as a programmer/debugger for the BLE device. Follow the instructions to restore the factory program on the PSoC 5LP and enable the programmer/debugger functionality.

6.4.1 PSoC 5LP is Programmed with a Bootloadable Application

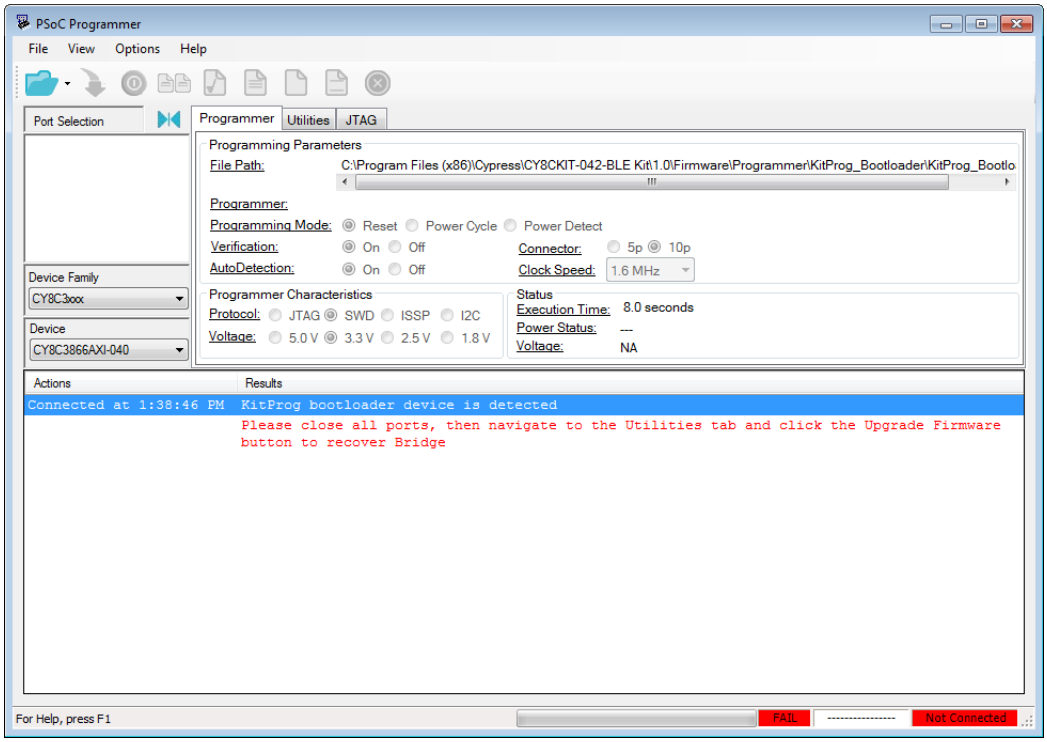
If the PSoC 5LP is programmed with a bootloadable application, restore the factory program by using one of the following two methods.

6.4.1.1 Restore PSoC 5LP Factory Program Using PSoC Programmer

1. Launch **PSoC Programmer 3.21.1** or later from **Start > Cypress > PSoC Programmer**.
2. Configure the BLE Pioneer Kit in service mode. To do this, while holding down the reset button (SW1 Reset), plug in the BLE Pioneer Kit to the computer using the included USB cable (USB A to mini-B). This puts the PSoC 5LP into service mode, which is indicated by the blinking green status LED.

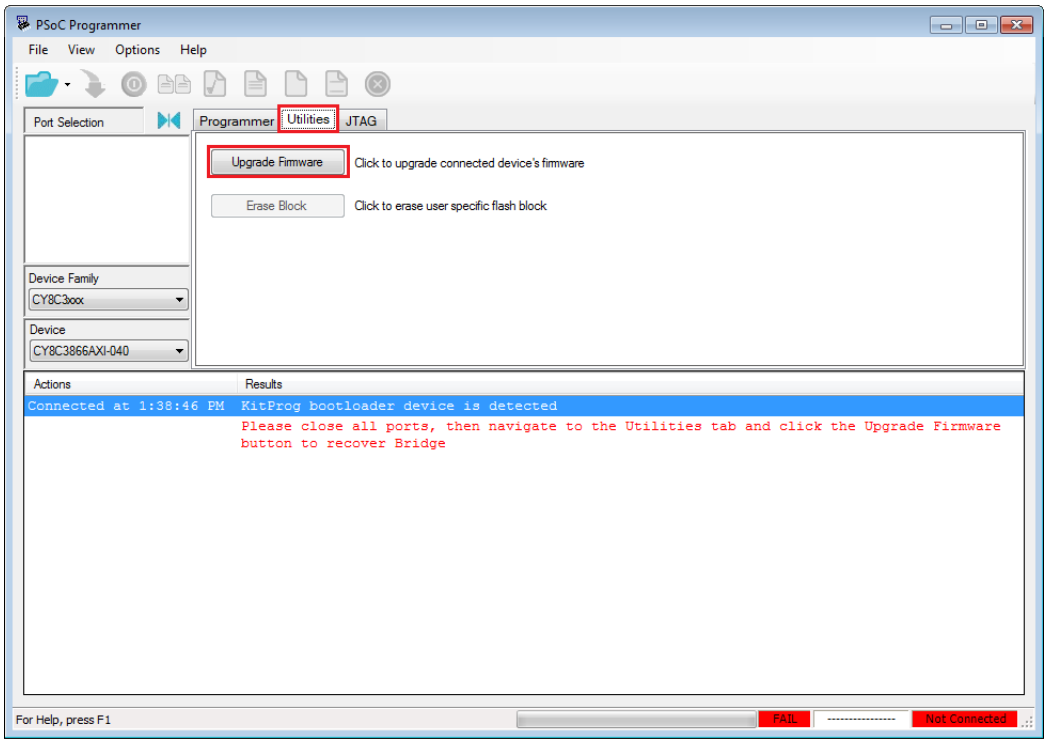
3. The following message appears in the PSoC Programmer **Results** window, as shown in Figure 6-41: “KitProg Bootloader device is detected”.

Figure 6-41. PSoC Programmer Results Window



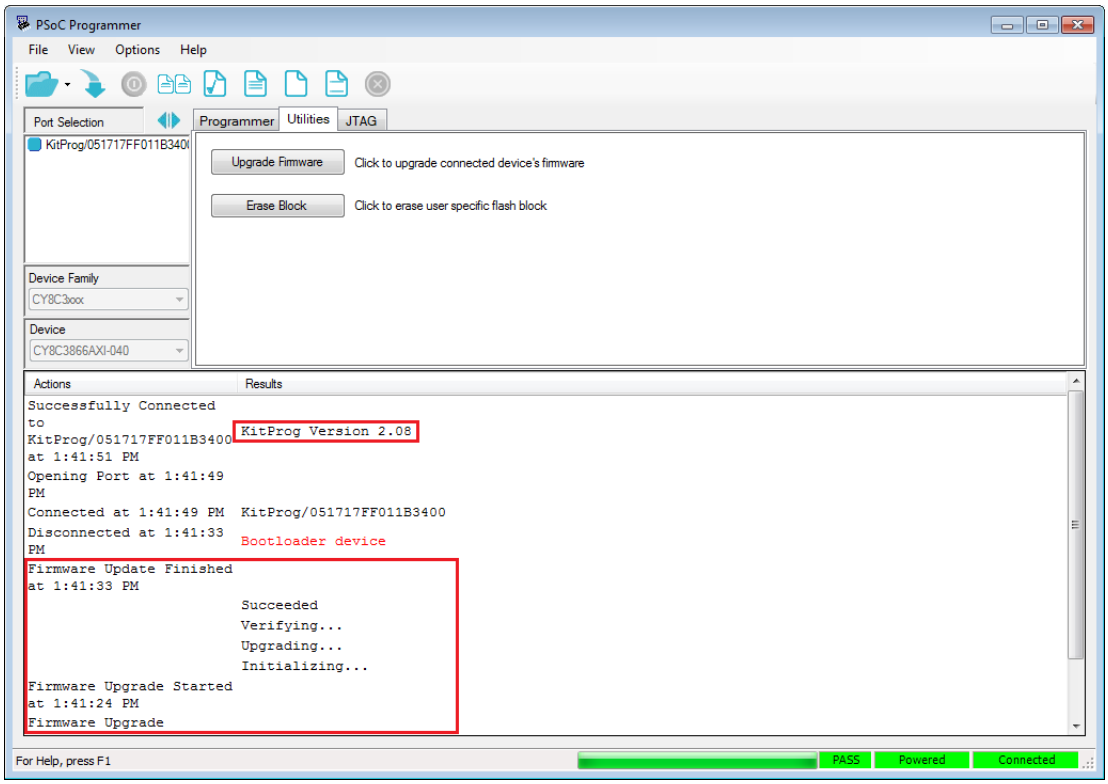
4. Switch to the **Utilities** tab in PSoC Programmer and press the **Upgrade Firmware** button, as shown in Figure 6-42. Unplug all other PSoC programmers (such as MiniProg3 and DVKProg) from the PC before pressing the **Upgrade Firmware** button.

Figure 6-42. Upgrade Firmware



5. After programming has completed, the following message appears, as shown in Figure 6-43: “Firmware Update Finished at <time>”.

Figure 6-43. Firmware Update Completed

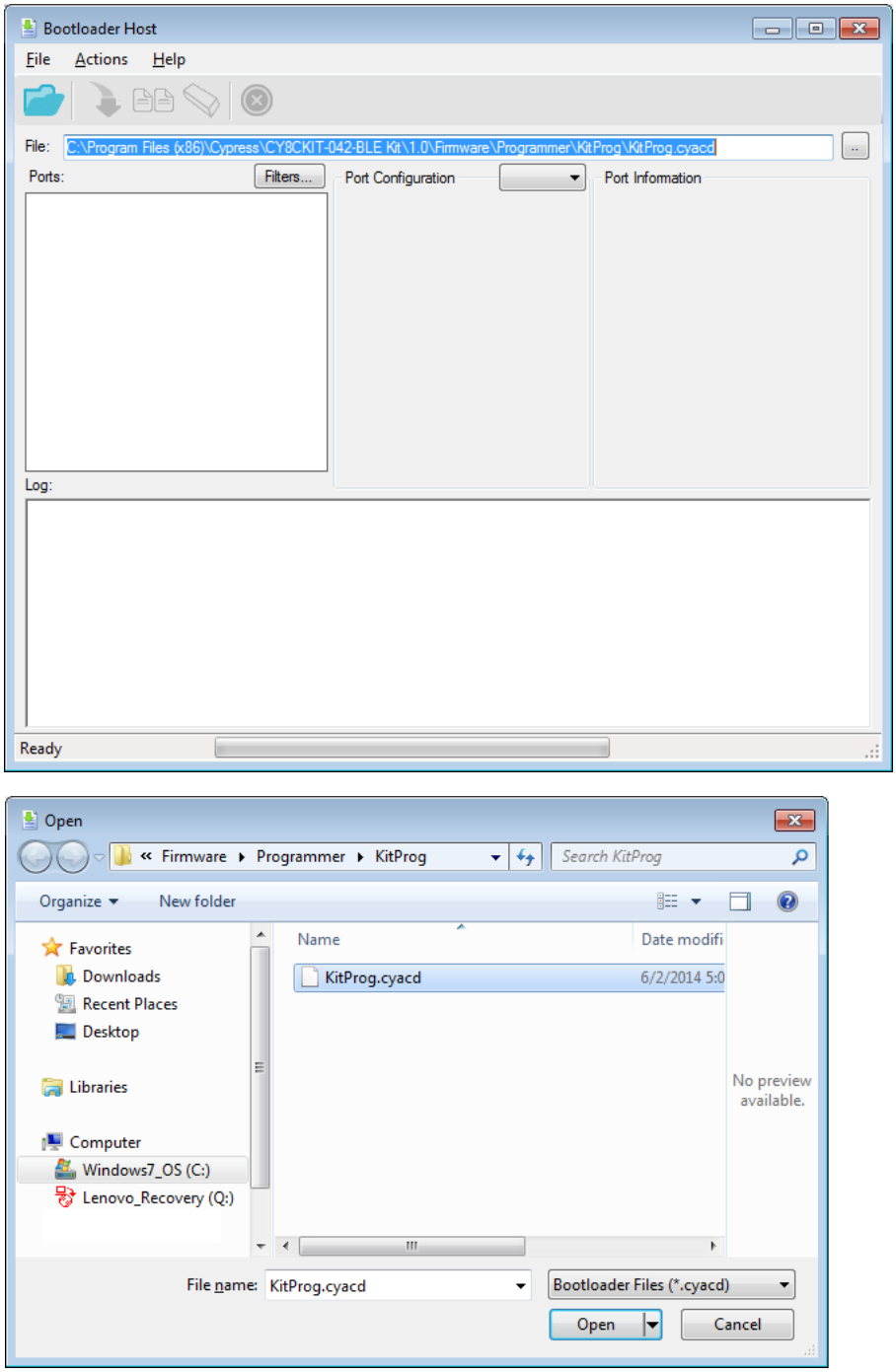


6. The factory program is now successfully restored on the PSoC 5LP. It can be used as the programmer/debugger for the PSoC 4 BLE or PRoC BLE device.

6.4.1.2 *Restore PSoC 5LP Factory Program Using Bootloader Host Tool*

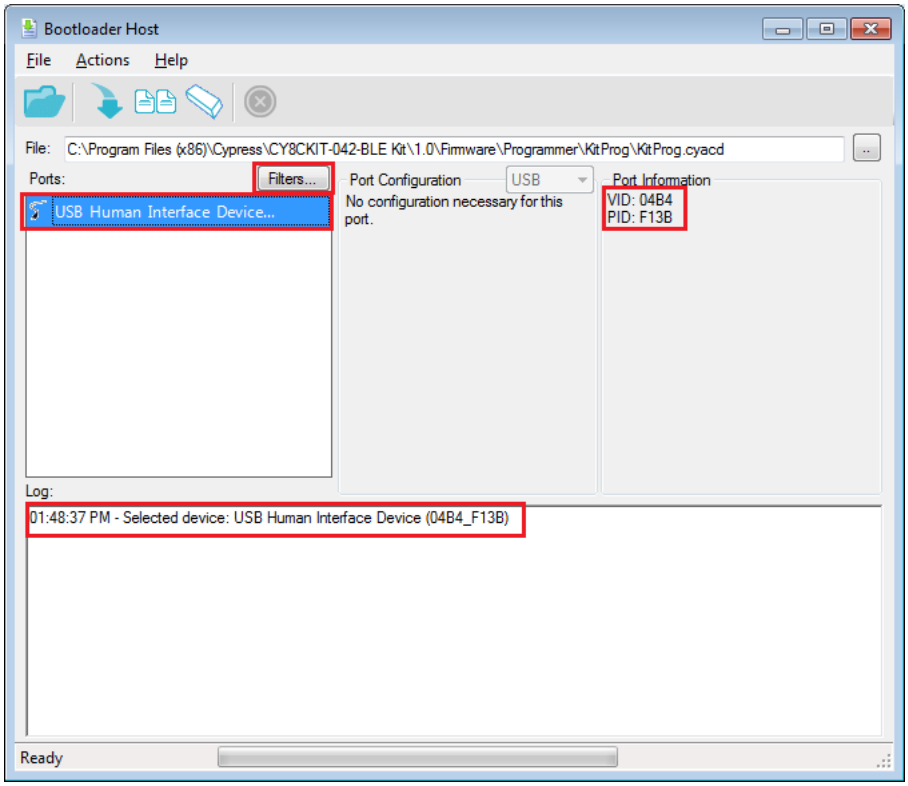
1. Launch the Bootloader Host tool from **Start > Cypress > PSoC Creator**.
2. Using the **File > Open** menu, load the *KitProg.cyacd* file, which is installed with the kit software, as shown in Figure 6-44. The default location for this file is: <Install_Directory>\ `CY8CKIT-042-BLE Kit\<version>\Firmware\Programmer\KitProg\KitProg.cyacd`

Figure 6-44. Load KitProg.cyacd File



3. Configure the Pioneer Kit in service mode. To do this, while holding down the reset button (SW1 Reset), plug in the BLE Pioneer Kit to the computer using the included USB cable (USB A to mini-B). This puts the PSoC 5LP into service mode, which is indicated by the blinking green status LED.
4. In the Bootloader Host tool, set the filters for the USB devices with VID: **04B4** and PID: **F13B**. The **USB Human Interface Device** port appears in the **Ports** list. Click that port to select it, as shown in Figure 6-45.

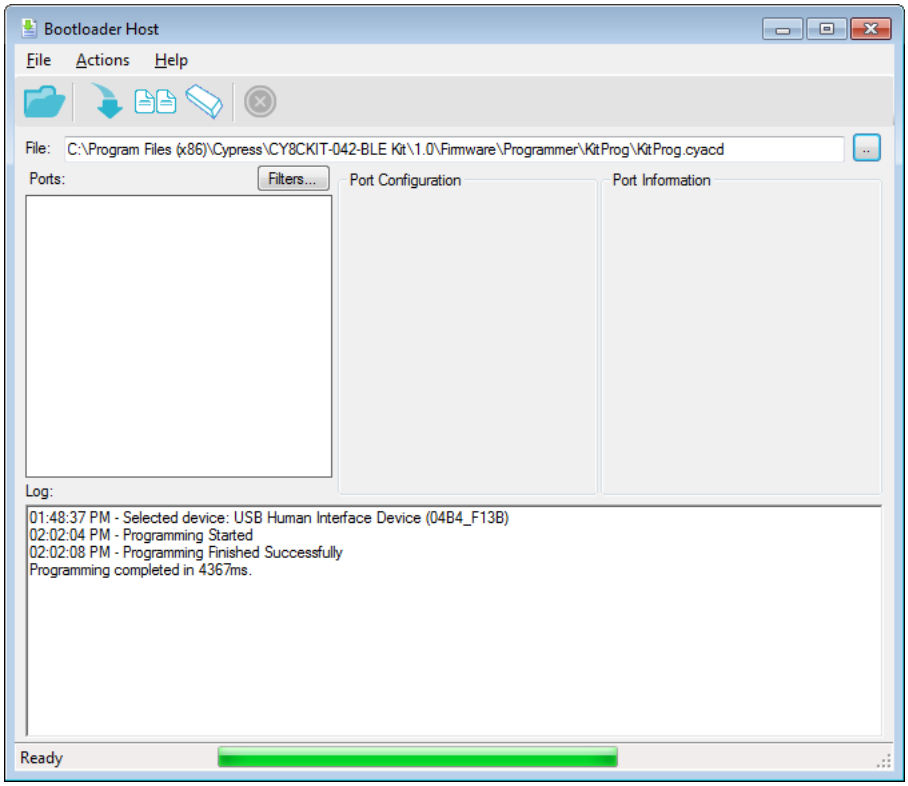
Figure 6-45. Select USB Human Interface Device



5. Click the **Program** button (or choose **Actions > Program**) to restore the factory-program by bootloading it onto the PSoC 5LP.

6. After programming has completed, the following message appears, as shown in Figure 6-46: “Programming Finished Successfully”.

Figure 6-46. Programming Finished Successfully



7. The factory program is now successfully restored on the PSoC 5LP. It can be used as the programmer/debugger for the PSoC 4 BLE/PRoC BLE device.

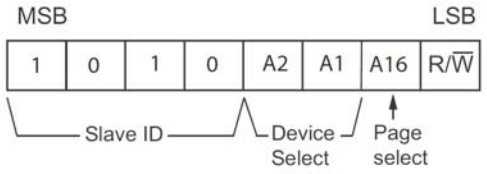
6.5 Using FM24V10 F-RAM

The BLE Pioneer board has an onboard ferroelectric RAM chip that can hold up to 1 Mb of data. The chip provides an I^2C communication interface for data access. It is hardwired to the I^2C lines (P3_4 and P3_5); the same lines are also routed to the PSoC 5LP I^2C lines. Because the F-RAM device is an I^2C slave, it can be accessed or shared among various I^2C masters on the same line. For more details on the F-RAM device, refer to the device datasheet.

6.5.1 Address Selection

The slave address of the F-RAM device consists of three parts, as shown in Figure 6-47: slave ID, device select, and page select. Slave ID is an F-RAM family-specific ID located in the datasheet of the particular F-RAM device. For the device used in BLE Pioneer board (FM24V10), the slave ID is 1010b. Device select bits are set using the two physical pins A2 and A1 in the device. The setting of these two pins on the BLE Pioneer board is controlled by resistors R32/R36 (A1) and R33/R37 (A2). Because the memory location in F-RAM is divided into two pages of 64 KB each, the page select bit is used to refer to one of the two pages in which the read or write operations will take place.

Figure 6-47. F-RAM I^{2}C Address Byte Structure



6.5.2 Write/Read Operation

The device's datasheet includes details on how to perform a write/read operation with the F-RAM. Figure 6-48 and Figure 6-49 provide a snapshot of the write/read packet structure as a quick reference.

Figure 6-48. F-RAM Single-Byte and Multiple-Byte Write Packet Structure

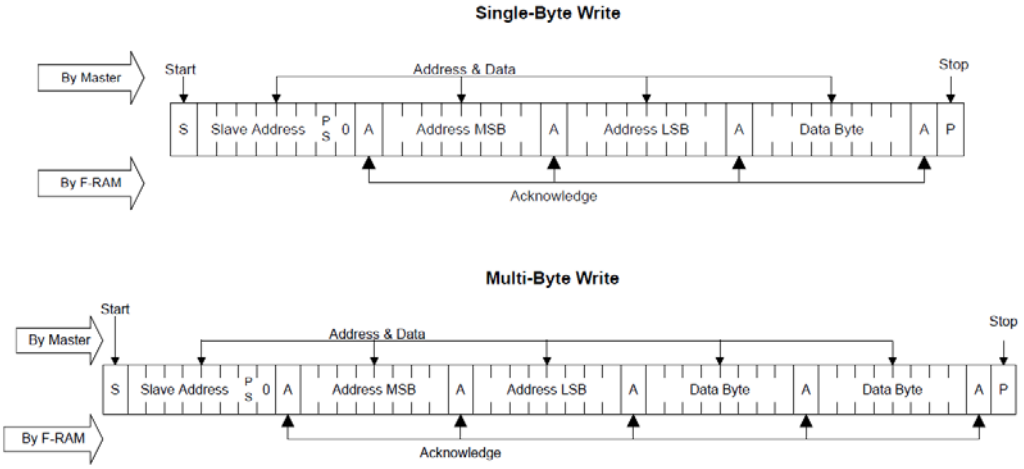
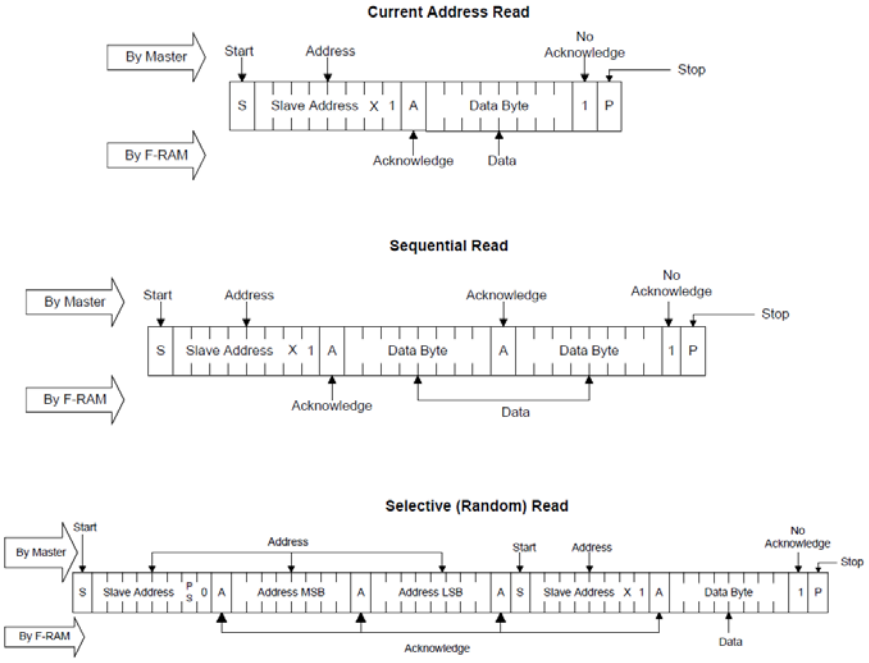


Figure 6-49. F-RAM Single-Byte and Multiple-Byte Read Packet Structure



As shown in the figures, all operations start with the slave address followed by the memory address. For write operations, the bus master sends each byte of data to the memory, and the memory generates an acknowledgement condition. For read operations, after receiving the complete slave address and memory address, the memory begins shifting data from the current address on the next clock.

6.6 CySmart iOS/Android Application

The CySmart mobile application is a powerful tool that allows the mobile device (iOS/Android) with BLE capability to connect to a BLE peripheral device and communicate with it. It supports various standard BLE services along with two custom services for CapSense and LED control. It also provides a common support for all profiles, standard or custom.

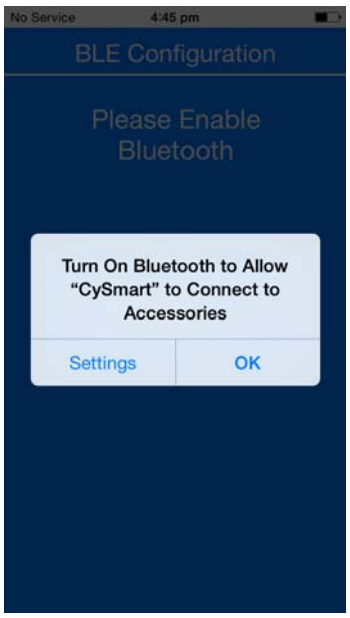
This app is free. You can download and install it for Apple iOS devices from the App Store and for Android Devices from Play Store. Make sure that the mobile device being used supports BLE.

To verify the example project using the CySmart mobile app, follow these steps.

1. Plug the BLE Pioneer Kit into the PC for power, using the J13 USB connector.
2. Program the kit with the desired BLE example project.
3. Open the app on the mobile device.

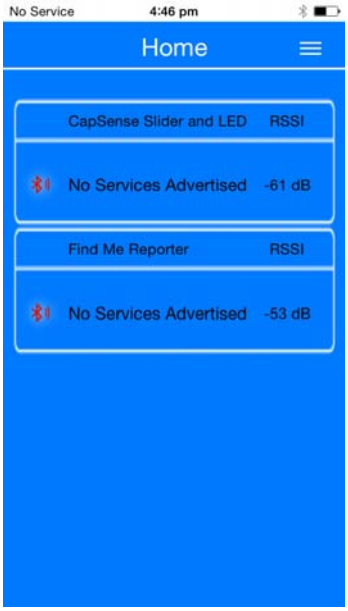
4. If Bluetooth is not enabled on the device, the app will ask to enable it, as shown in Figure 6-50.

Figure 6-50. Turn on Bluetooth on Device



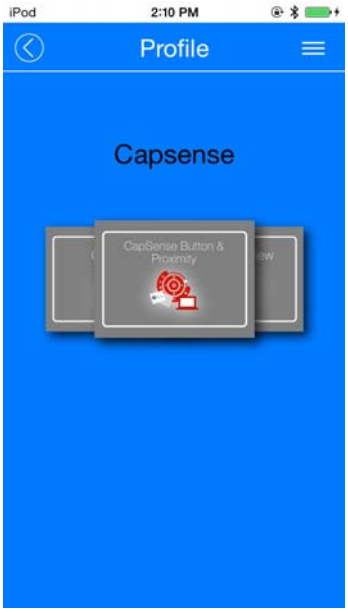
5. After Bluetooth is enabled, the app will automatically search for available BLE peripherals and list them, as shown in Figure 6-51. Select the BLE Pioneer Kit peripheral in the list. The name displayed in the list will be the same as that set in the BLE Component.

Figure 6-51. Peripheral Connections Page



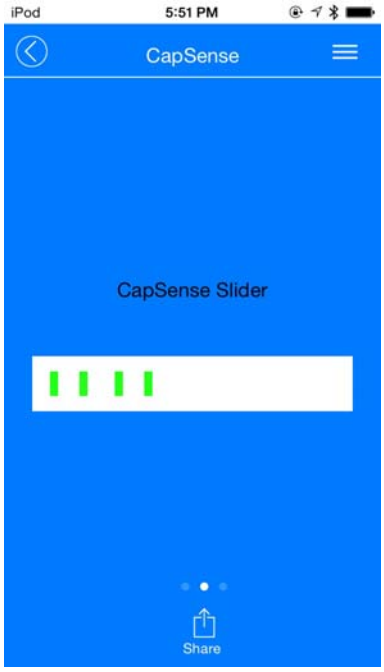
6. When connected, the app will list the supported profiles by the peripherals, as shown in Figure 6-52. Tap on the desired profile.

Figure 6-52. Profiles Page



7. Depending on the type of profile chosen, the app will display options for the profile. Figure 6-53 shows an example for the CapSense slider custom profile, where swiping a finger on the CapSense slider of the BLE Pioneer Kit is reflected in the app. See Pioneer Baseboard on page 88.

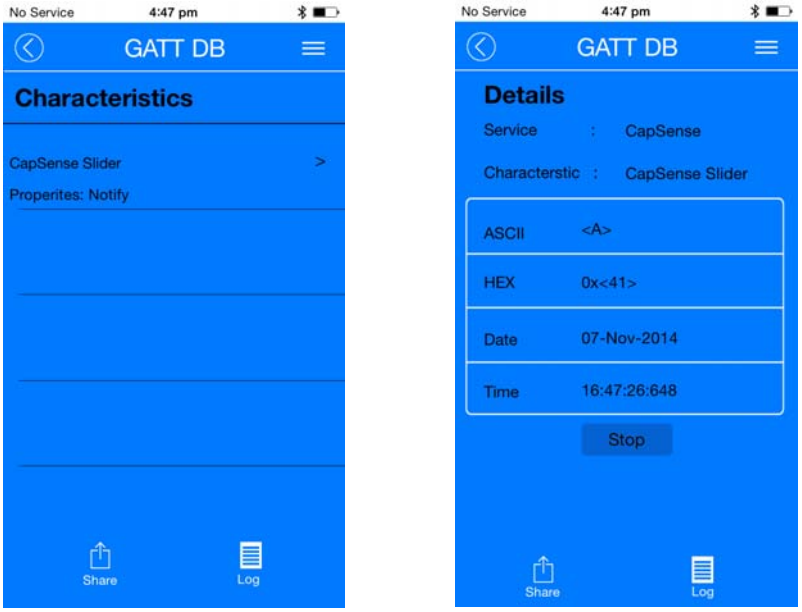
Figure 6-53. CapSense Slider GUI



8. To go to a different service, go back to the service page in the GUI.

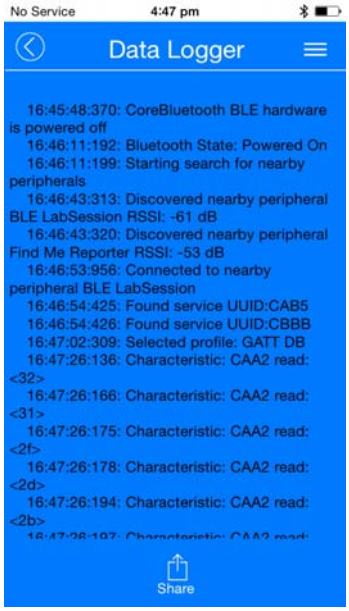
9. To connect to a new BLE peripheral, go back to home page and swipe the screen below to scan for devices.
10. To transfer data/notifications through any other profile that is not listed on the Profiles page after connecting to the peripheral, go to the **GATT DB** option on the Profiles page. The GATT DB allows you to access the services and characteristics of a profile directly, as shown in Figure 6-54, and to modify or receive values through BLE.

Figure 6-54. GATT DB GUI for Characteristics



The **Data Logger** option provides a textual form of all the events that has happened with a particular BLE peripheral device, including scanning and connection.

Figure 6-55. Data Logger

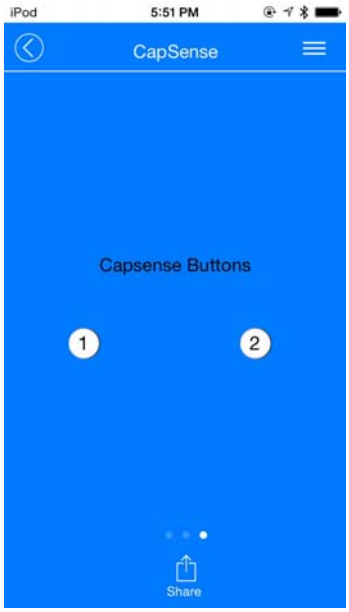


Two custom profiles are created for demonstrating the BLE Pioneer Kit features: the CapSense profile and the RGB LED profile. Both these profiles are integrated into the CySmart mobile app, as easy-to-use GUI.

The CapSense profile GUI supports three CapSense functionalities.

- CapSense Buttons: After connecting to the BLE peripheral, the CapSense Buttons service page displays the number of CapSense buttons supported by the peripheral, as shown in Figure 6-56. Any touch on one of the CapSense buttons on the peripheral is reflected in the CySmart GUI.

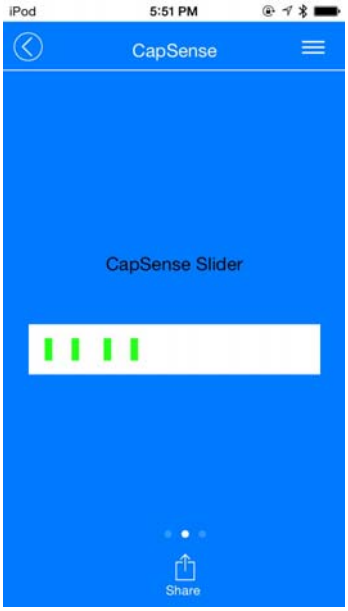
Figure 6-56. CapSense Buttons GUI Page



- CapSense Slider: After connecting to the BLE peripheral, the CapSense Slider service page displays the CapSense slider as supported by the peripheral, as shown in Figure 6-57. Swiping a finger on the CapSense slider on the peripheral is reflected in the CySmart GUI.

  For example, the CapSense_Slider_LED project (CapSense Slider and LED on page 47) will show this utility on the app.

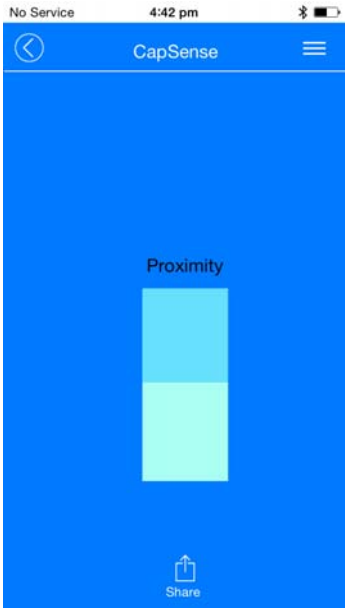
Figure 6-57. CapSense Slider GUI Page



- CapSense Proximity: After connecting to the BLE peripheral, the CapSense Proximity service page displays the CapSense proximity supported by the peripheral, as shown in Figure 6-58. A change in proximity on the proximity sensor (such as a wire) on the peripheral is reflected in the CySmart GUI.

  For example, the CapSense_Proximity project (CapSense Proximity on page 62) will show this utility on the app.

Figure 6-58. CapSense Proximity GUI Page

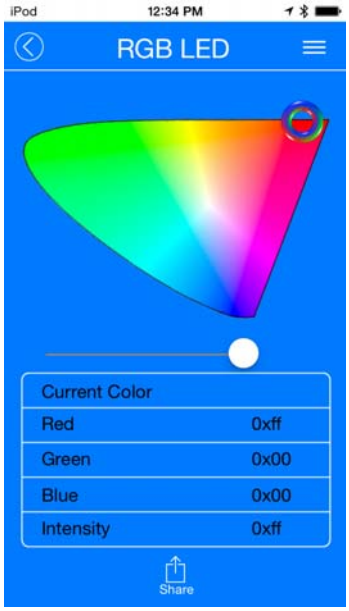


The RGB LED profile allows you to control the color and intensity of the BLE Pioneer Kit onboard RGB LED, as shown in Figure 6-59. Pressing any part of the color gamut on the GUI is reflected on the BLE peripheral device with the onboard RGB LED.

Note: The onboard RGB LED color range depends on the LED being used. It is possible that the complete color gamut is not reflected on the onboard RGB LED due to limitations on the LED itself.

For example, the CapSense_Slider_LED project (CapSense Slider and LED on page 47) will show this utility on the app.

Figure 6-59. RGB LED Profile



6.7 CySmart PC Tool

The CySmart PC tool is a BLE Central host emulation tool that, along with the dongle, allows you to connect to a BLE peripheral device and transfer data over BLE services. Also, it displays all the packets that are involved during the connection, which can be analyzed for details.

The CySmart PC tool is installed as part of the BLE Pioneer Kit installer. To launch the software, choose **Start > All Programs > Cypress > CySmart <version> > CySmart <version>**.

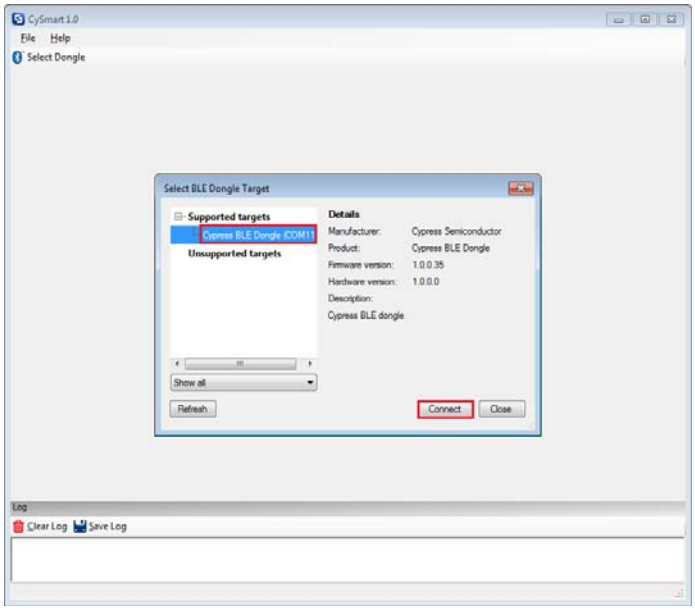
Follow these steps to connect to a BLE peripheral device using the dongle and CySmart PC tool and to transfer data.

1. Connect the dongle to one of the USB ports on the PC.

Figure 6-60. Connect Dongle to USB Port

2. Start the CySmart PC tool on the PC. You will see a list of dongles connected to it. Select the dongle you want to use and click **Connect**, as shown in Figure 6-61.

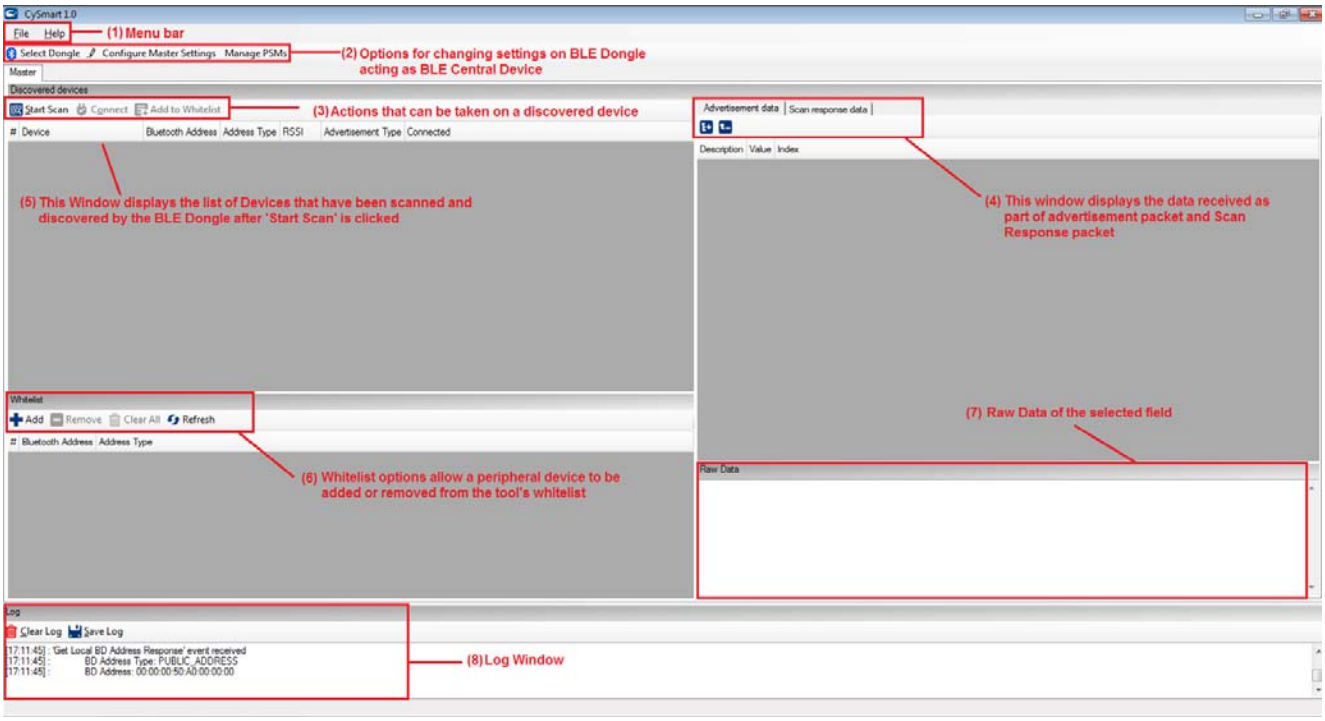
Figure 6-61. Selecting Dongle in CySmart PC Tool



3. The CySmart PC tool can be used to connect to any BLE peripheral device, including the BLE Pioneer kit. To connect to the BLE Pioneer kit, power the kit through the J13 USB connector and program the appropriate BLE peripheral project to it. Follow the steps according to the project description to start advertising.

4. When the dongle is selected and connected to, the main window shown in Figure 6-62 opens up.

Figure 6-62. CySmart PC Tool Main Window

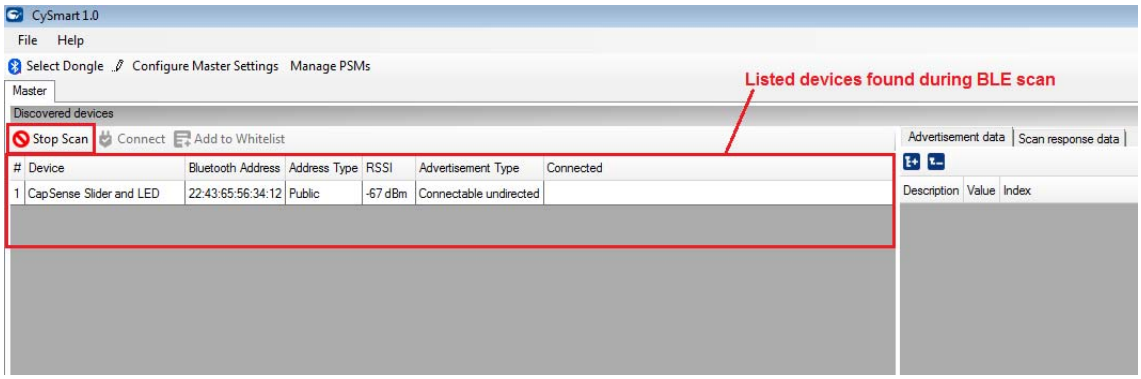


The important parts of this window are as follows:

- **Menu bar:** This contains options to exit or find help about the CySmart PC tool.
- **Dongle settings:** These settings comprise of **Select Dongle**, **Configure Master Settings**, and **Manage PSMs**. Select the dongle allows to connect to a dongle that is listed by the system. If a different dongle needs to be connected, then this option can be used. Configure Master Settings option allows to modify the various settings that the dongle requires to act as a BLE Central device such as connection parameters, scan parameters, or security parameters. Manage PSMs allows to register for PSM or modify them.
- **Discovered devices options:** The **Master** tab provides three options by default: **Start Scan**, **Connect**, and **Add to Whitelist**. The Start Scan button allows the tool to start scanning for available BLE peripheral devices and list them in the Discovered Devices window. This option also allows to stop an ongoing scan. The Connect option allows to connect to a particular BLE peripheral device that is listed in the Discovered Device window. Add to Whitelist allows to add a selected device address to the whitelist.
- **Advertisement Data/Scan response data tabs:** These tabs provide the description of the data received in the advertisement packet and scan response packet from the selected device.
- **Discovered Devices window:** This window lists all the peripheral devices found after starting a scan. Selecting any device populates the information on advertisement data and scan response data on the right side window.
- **Whitelist window:** This window lists the devices that have been added as whitelist and provides options to add, remove, or clear devices from the whitelist.
- **Raw Data window:** This window displays the raw data (in hexadecimal) of the field selected.
- **Log window:** This window displays all the activities that occur on the dongle and the data communicated. This feature is also useful for debugging.

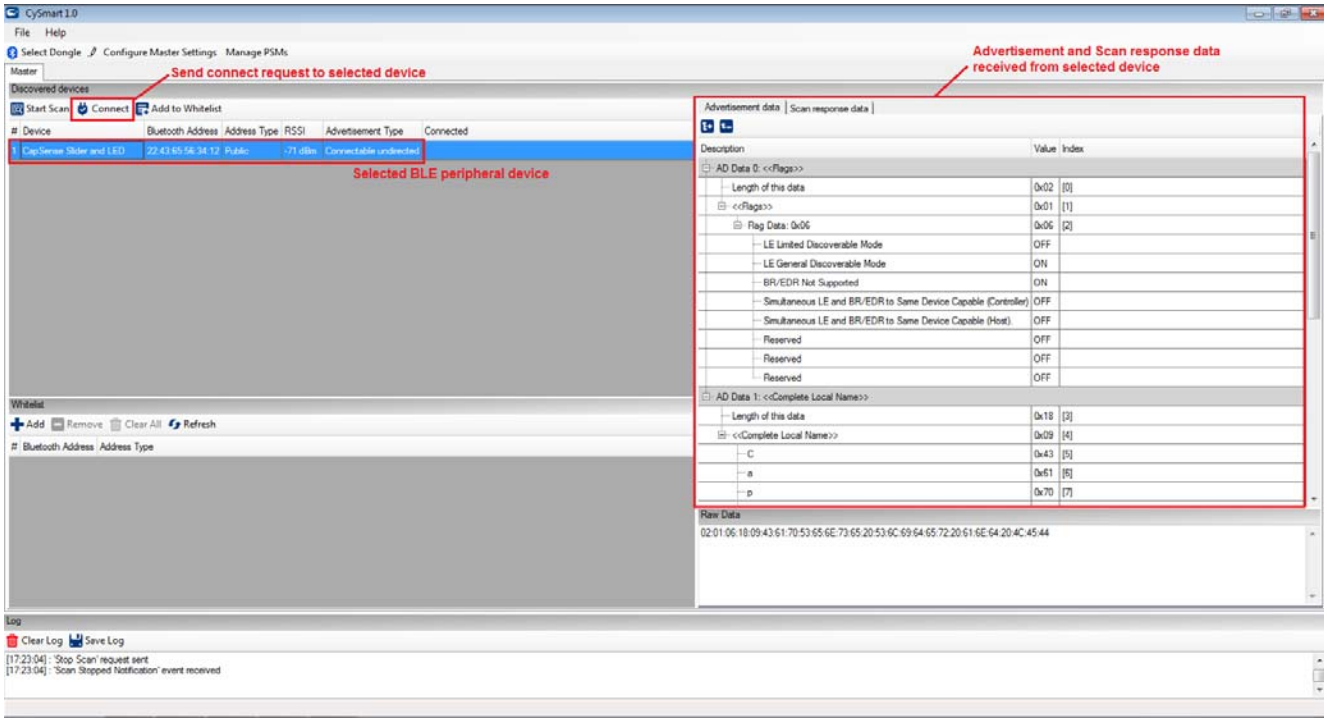
1. Click **Start Scan** to see the list of available BLE peripheral devices, as shown in Figure 6-63.

Figure 6-63. Scanned Devices Listed in CySmart PC Tool



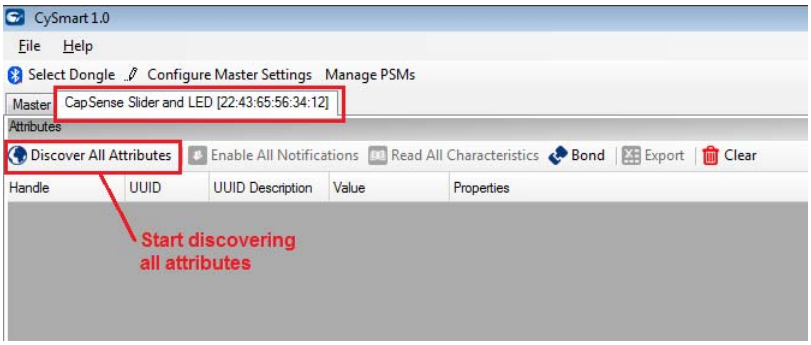
2. After the available devices are listed, choose the desired peripheral and double-click **Connect**, as shown in Figure 6-64.

Figure 6-64. Start Connection with Selected Device



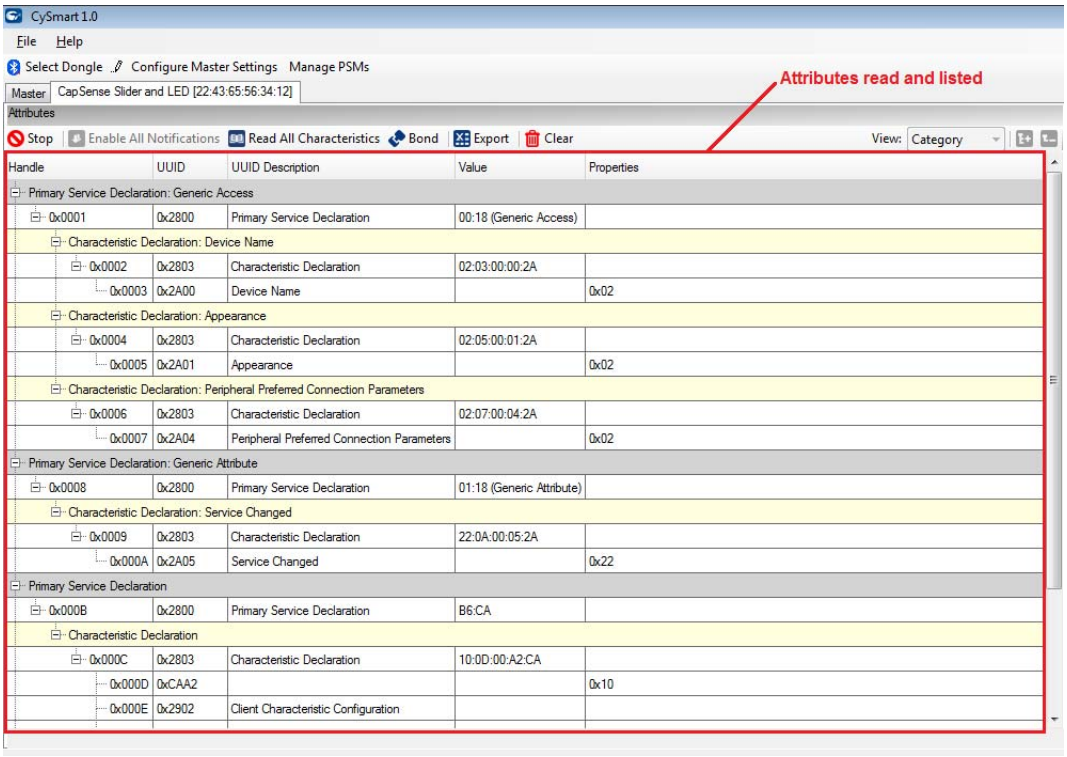
3. If the connection is successful, you will see another tab opening besides the Master tab. This tab provides options with respect to the connected BLE device, as shown in Figure 6-65.

Figure 6-65. Connected Device Tab



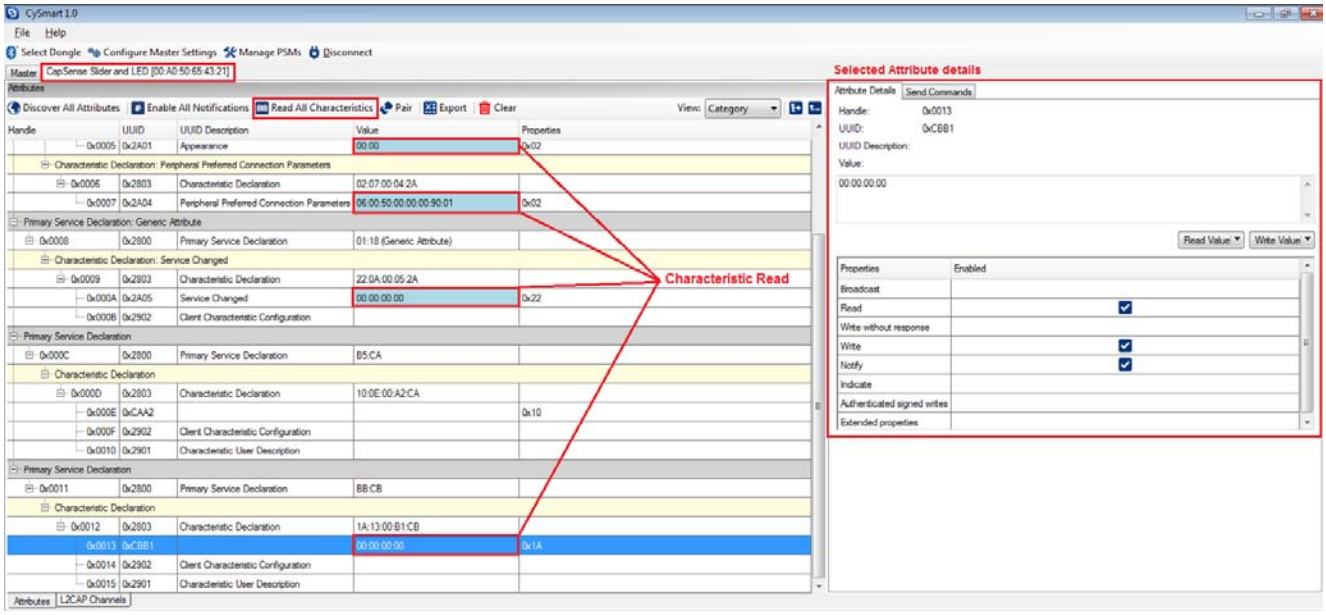
4. On the device tab, click **Discover All Attributes** to find the supported attributes by the connected BLE device. This action populates the list of services and characteristics in the Attribute window along with their values, if any, as shown in Figure 6-66.

Figure 6-66. Discover All Attributes



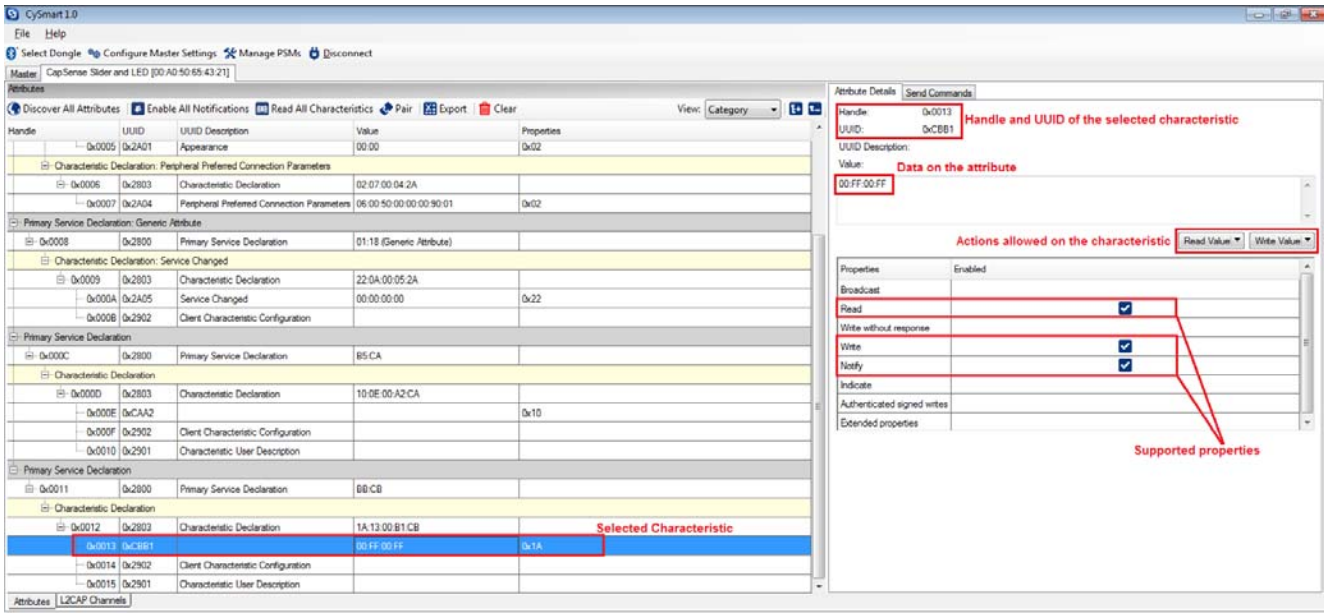
5. You can read the characteristics individually or you can use the **Read All Characteristics** option to update the values for all readable characteristics, as shown in Figure 6-67.

Figure 6-67. Read All Characteristics



6. To modify the value of a characteristic individually, select the particular characteristic from the attribute list. The Attribute Details window on the right will display the properties of the selected characteristics as well as the options to modify or read the values, as shown in Figure 6-68.

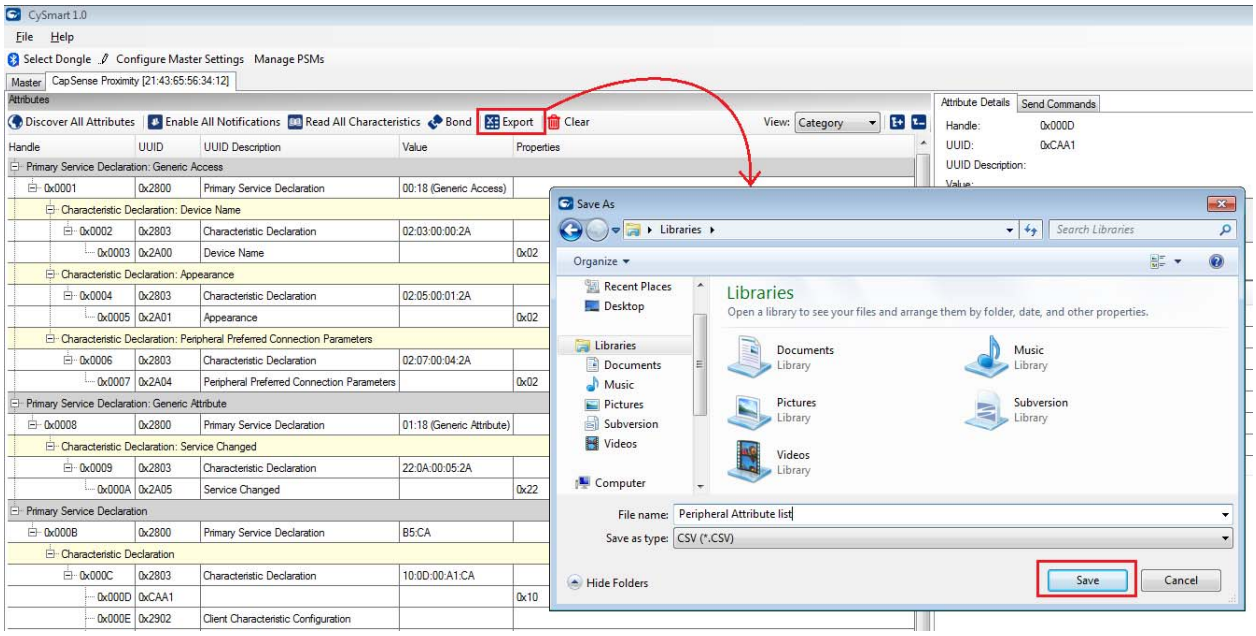
Figure 6-68. Modify a Characteristic



7. Similarly, notifications or indications can be enabled on the characteristics that support those properties.

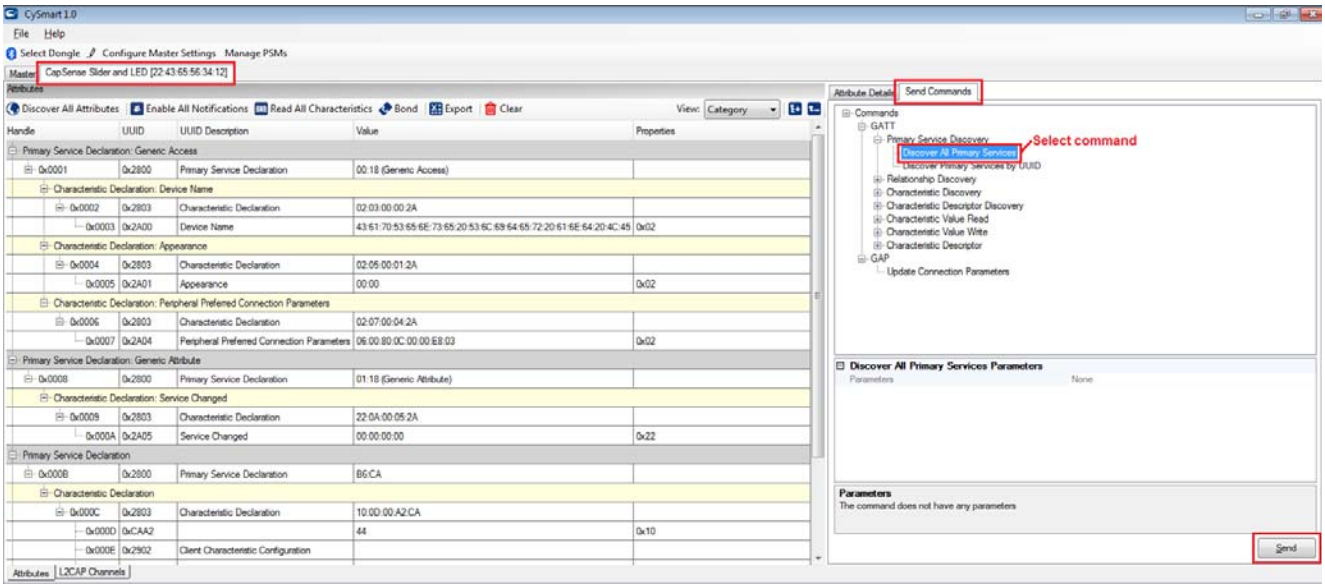
8. The list of attributes of the connected BLE device can also be saved in *.csv* format for later use. For this, click the **Export** button on the device tab and select the location where you want the file to be saved, as shown in Figure 6-69.

Figure 6-69. Save Attribute List to a File



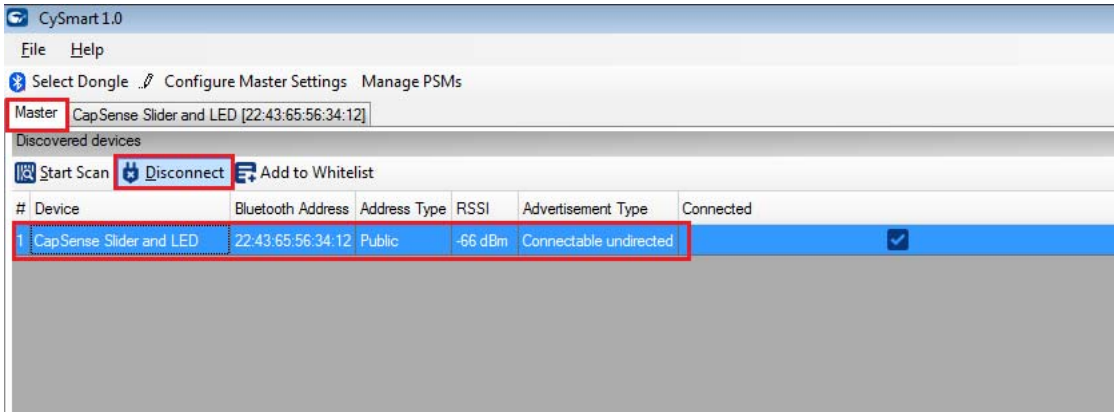
9. The tool also allows sending specific commands to the BLE peripheral device. These commands are present in the **Send Commands** tab on the device window. Select the command to be sent from the list and click **Send**, as shown in Figure 6-70.

Figure 6-70. Send Commands



10. To disconnect from the device, go to the **Master** tab, select the connected device, and click **Disconnect**, as shown in Figure 6-71.

Figure 6-71. Disconnect BLE Device

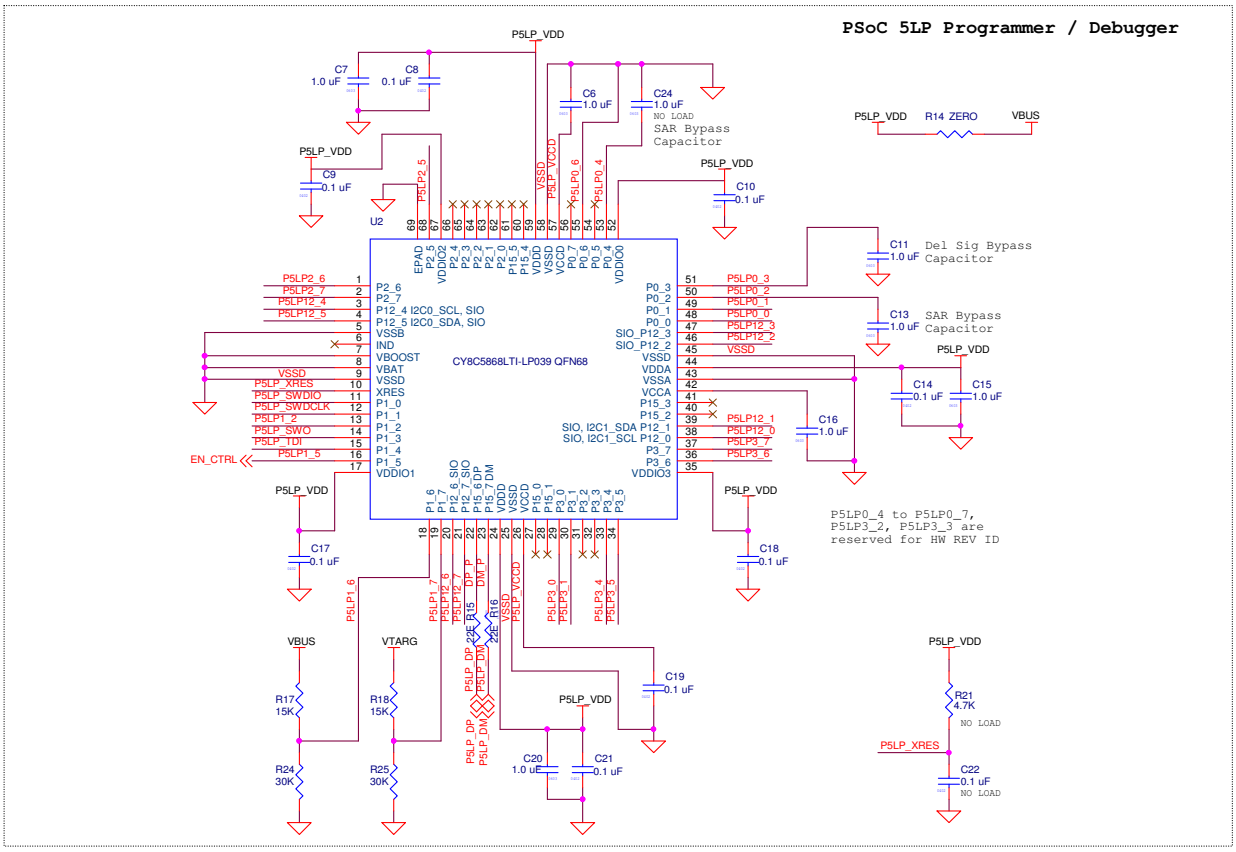


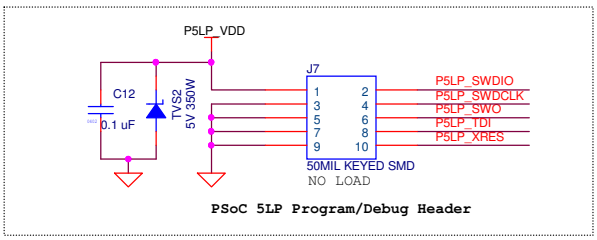
Note: Refer to the CySmart PC tool user guide for more information. To access the user guide from the tool, go to **Help > Help Topics**.

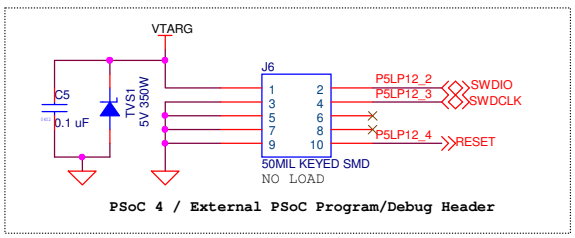
A. Appendix

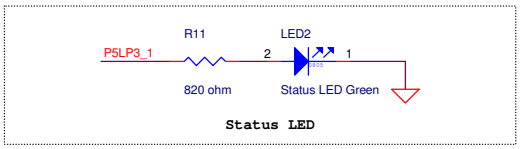
A.1 Schematics

A.1.1 BLE Pioneer Board

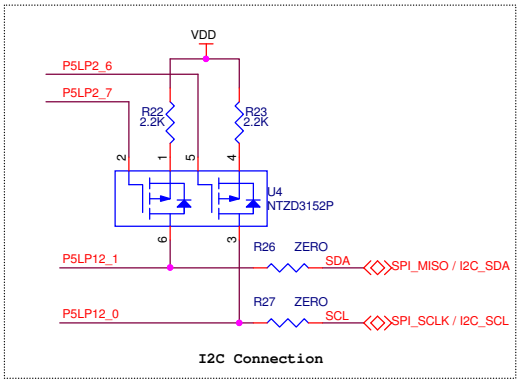




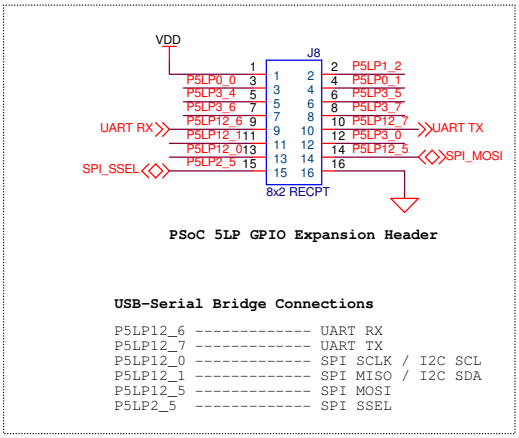




Status LED



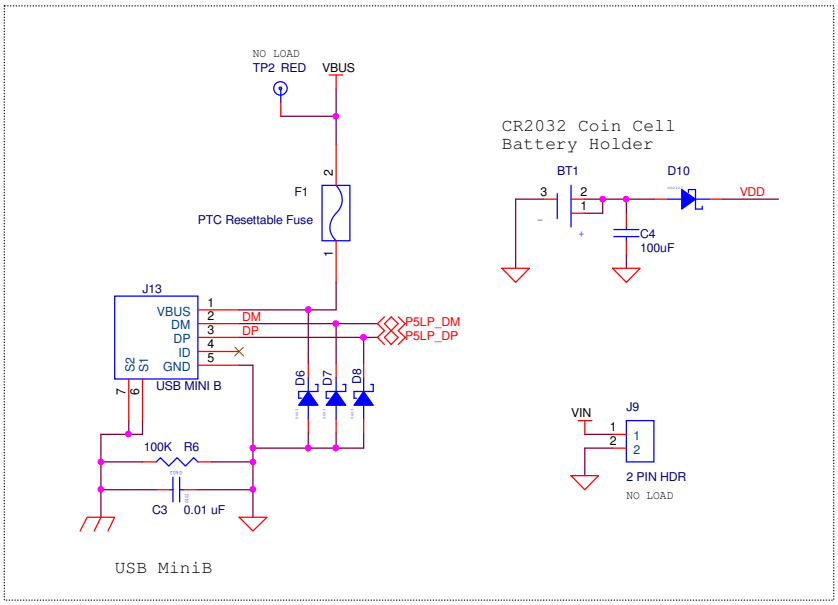
I2C Connection

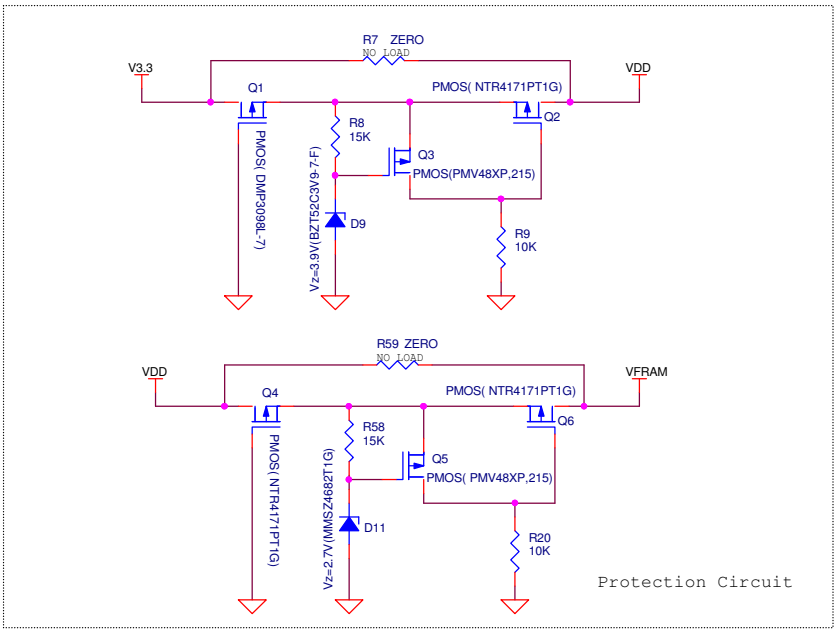


PSoC 5LP GPIO Expansion Header

USB-Serial Bridge Connections

```
P5LP12_6 ------------- UART RX
P5LP12_7 ------------- UART TX
P5LP12_0 ------------- SPI SCLK / I2C SCL
P5LP12_1 ------------- SPI MISO / I2C SDA
P5LP12_5 ------------- SPI MOSI
P5LP2_5  ------------- SPI SSEL
```





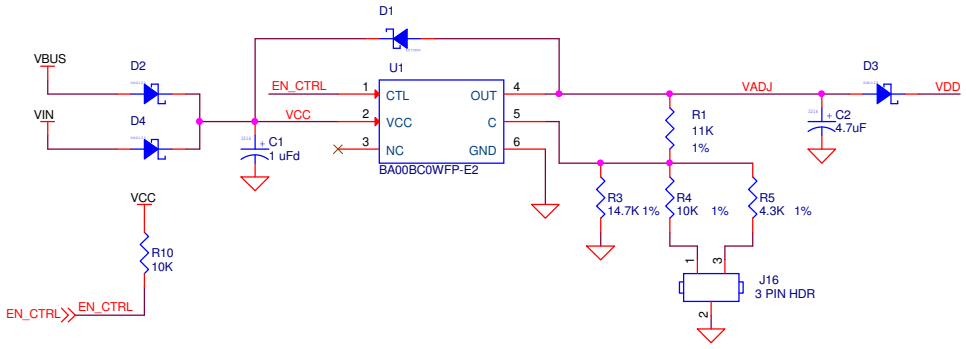
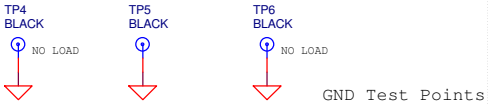


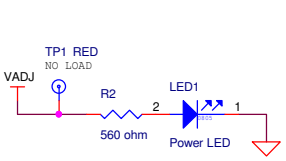
TABLE: LDO PIN FUNCTIONS

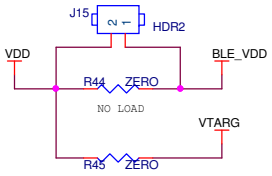
Pin No.	Symbol	Function
1	CTL	Output Voltage ON / OFF control
2	VCC	Power supply voltage input
3	N.C.	Unconnected terminal
4	OUT	Voltage output
5	C	Output voltage regulation terminal
6	GND	Ground

TABLE: VOLTAGE SELECTION JUMPER SETTINGS

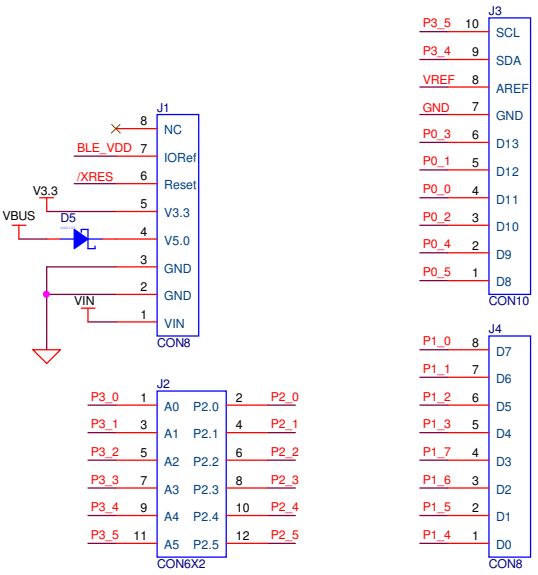
JUMPER SETTING	O/P VOLTAGE
SHORT 2 & 3	5V
SHORT 1 & 2	3.3V
REMOVE JUMPER	1.9V



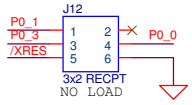




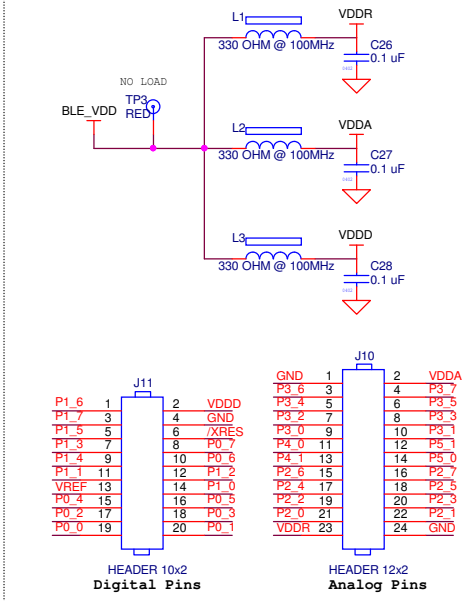
Current Measurement Jumper



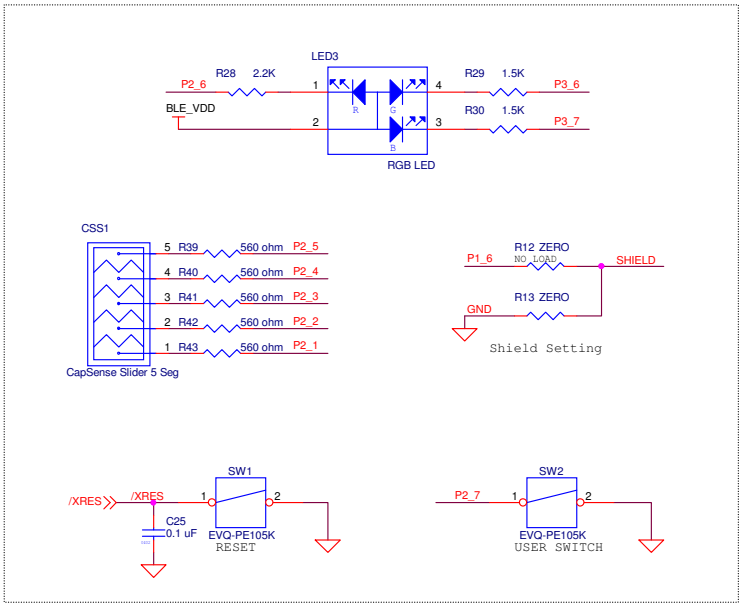
(J1- J4) Arduino Connectors

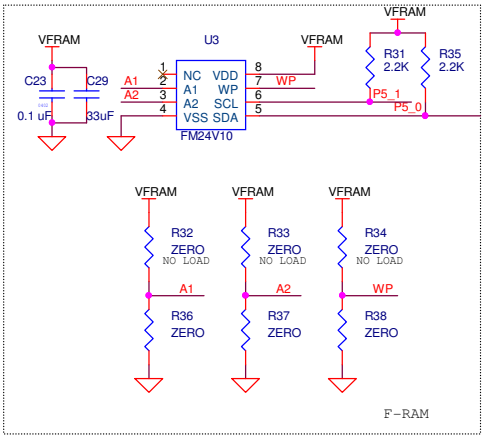


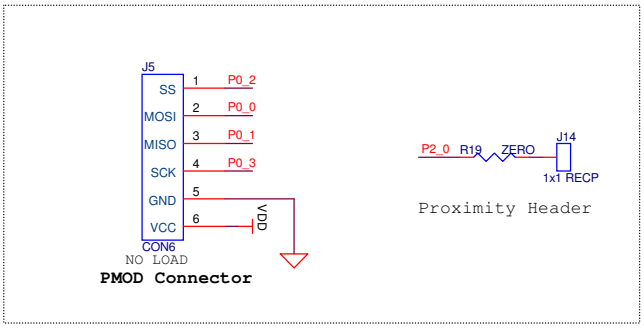
J12 Arduino ICSP compatible header
for SPI Interface

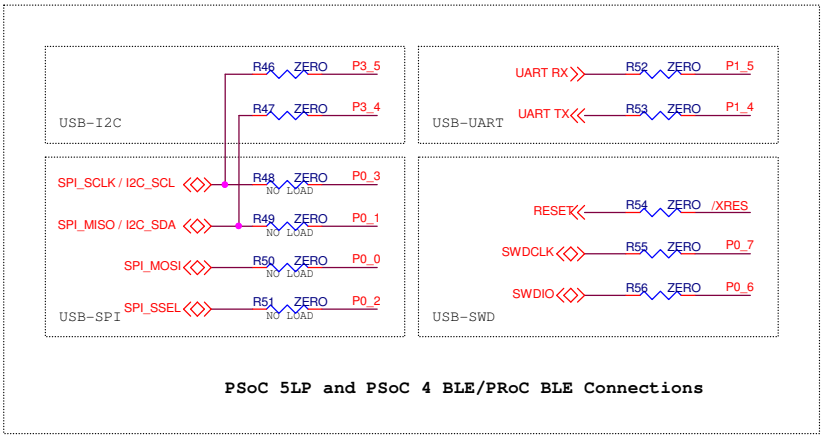


PSoC 4 BLE/PRoC BLE I/O Headers

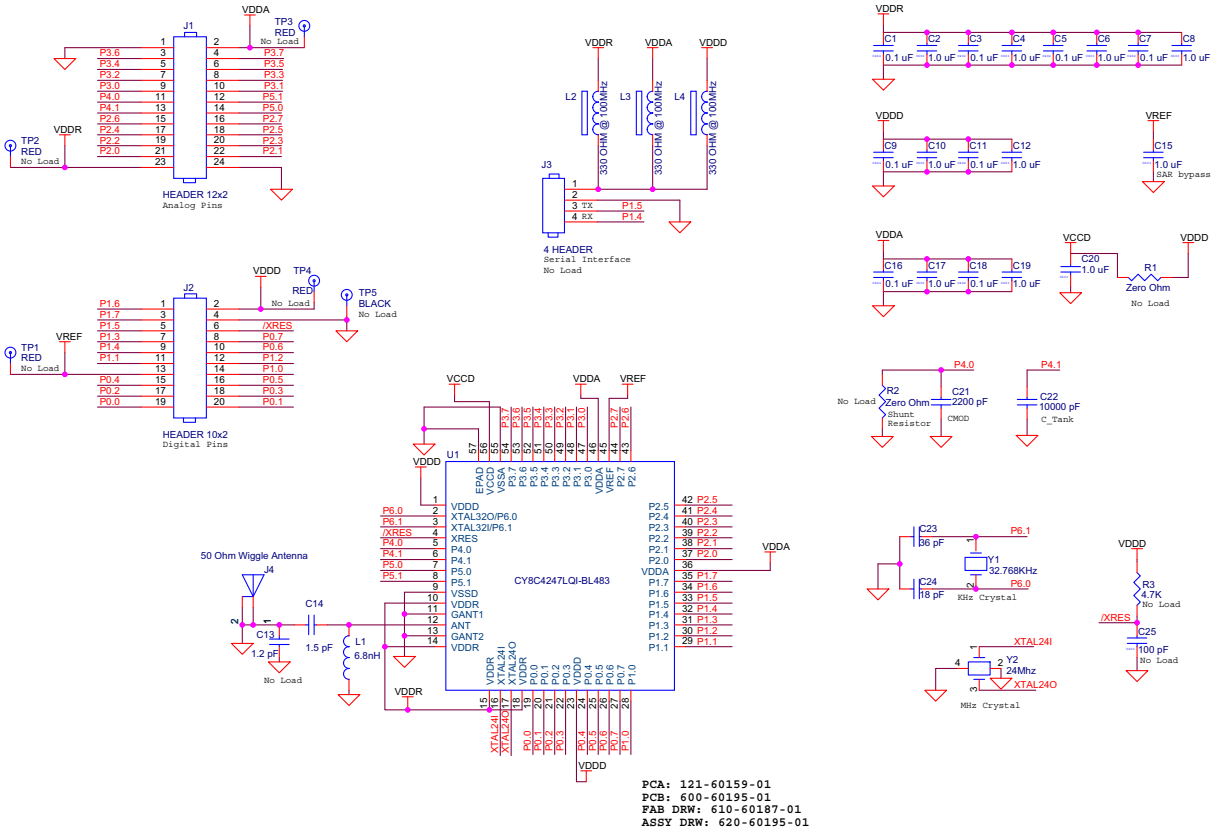

LED3
R28 2.2K
P2_6
BLE_VDD
R29 1.5K
P3_6
R30 1.5K
P3_7
RGB LED
CSS1
5 R39 560 ohm P2_5
4 R40 560 ohm P2_4
3 R41 560 ohm P2_3
2 R42 560 ohm P2_2
1 R43 560 ohm P2_1
CapSense Slider 5 Seg
P1_6
R12 ZERO
NO LOAD
SHIELD
R13 ZERO
GND
Shield Setting
/XRES
SW1
C25
0.1 uF
EVQ-PE105K
RESET
P2_7
SW2
EVQ-PE105K
USER SWITCH


VFRAM
U3
C23
C29
0.1 uF
33uF
NC VDD
A1 WP
A2 SCL
VSS SDA
FM24V10
R31 2.2K
R35 2.2K
P5_1
P5_0
R32 ZERO NO LOAD
R33 ZERO NO LOAD
R34 ZERO NO LOAD
R36 ZERO
R37 ZERO
R38 ZERO
F-RAM

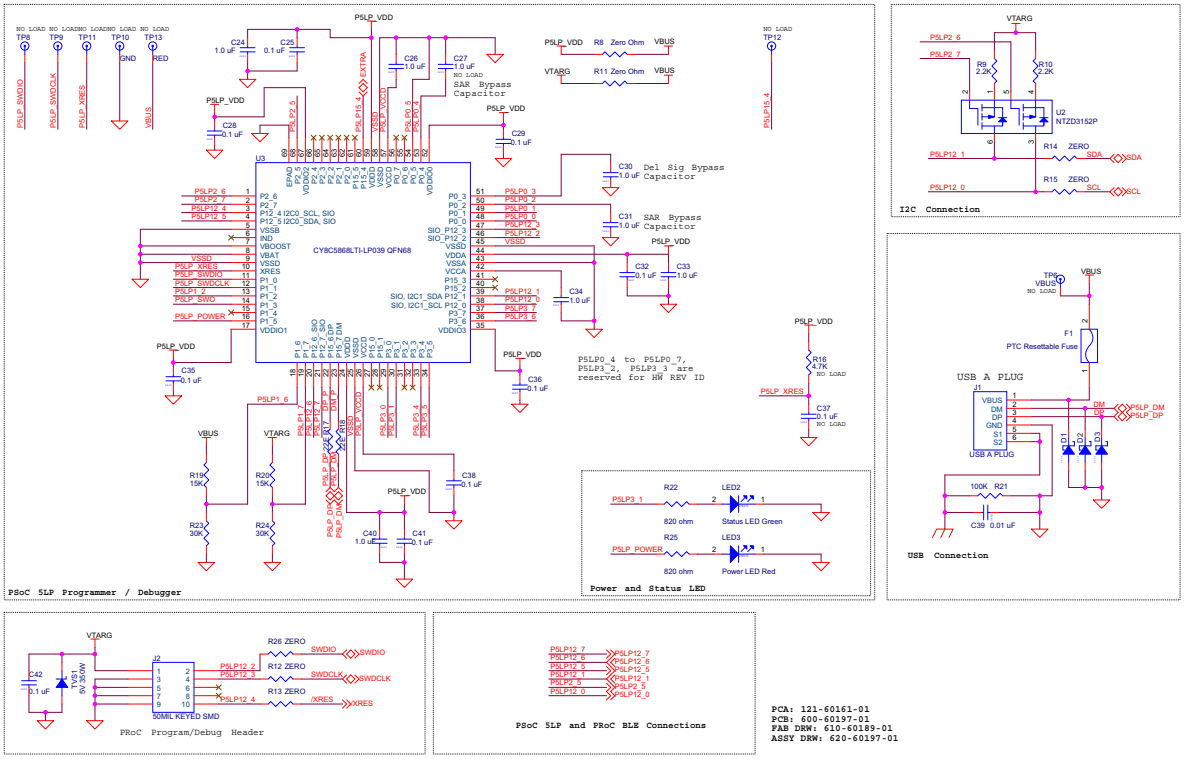

J5
SS
MOSI
MISO
SCK
GND
VCC
P0_2
P0_0
P0_1
P0_3
VDD
CON6
NO LOAD
PMOD Connector
P2_0 R19 ZERO
J14
1x1 RECP
Proximity Header

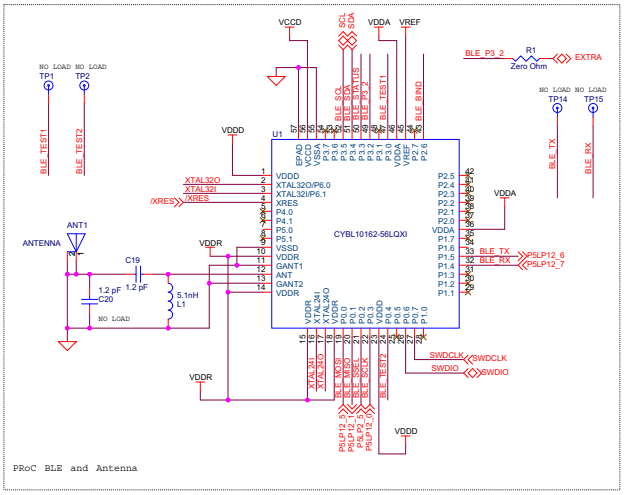

USB-I2C
R46 ZERO P3_5
R47 ZERO P3_4
USB-UART
UART RX
R52 ZERO P1_5
UART TX
R53 ZERO P1_4
SPI_SCLK / I2C_SCL
R48 ZERO P0_3
SPI_MISO / I2C_SDA
R49 ZERO P0_1
SPI_MOSI
R50 ZERO P0_0
SPI_SSEL
R51 ZERO P0_2
NO LOAD
USB-SPI
RESET
R54 ZERO /XRES
SWDCLK
R55 ZERO P0_7
SWDIO
R56 ZERO P0_6
USB-SWD
PSoC 5LP and PSoC 4 BLE/PRoC BLE Connections

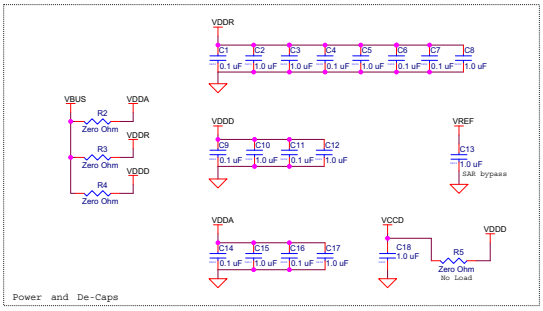
A.1.2 BLE Module

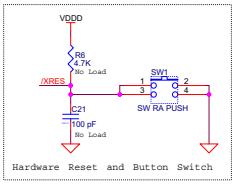


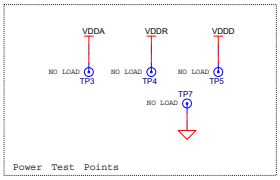
A.1.3 Dongle

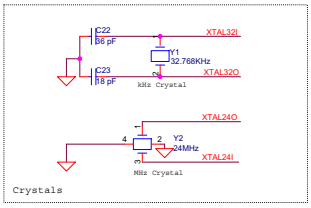

PSoC 5LP Programmer / Debugger
CY8C5868LTI-LP039 QFN68
P5LP_VDD
P5LP_SWDIO
P5LP_SWDCLK
P5LP_XRES
P5LP_POWER
P5LP_SWO
VBUS
VTARG
SAR Bypass Capacitor
Del Sig Bypass Capacitor
P5LP0_4 to P5LP0_7, P5LP3_2, P5LP3_3 are reserved for HW REV ID
Power and Status LED
Status LED Green
Power LED Red
I2C Connection
USB A PLUG
USB Connection
PTC Resettable Fuse
PSoC 5LP and PRoC BLE Connections
PRoC Program/Debug Header
50MIL KEYED SMD
PCA: 121-60161-01
PCB: 600-60197-01
FAB DRW: 610-60189-01
ASSY DRW: 620-60197-01

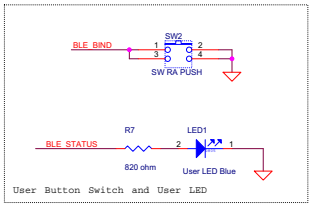












PCA: 121-60161-01
PCB: 600-60197-01
FAB DRW: 610-60189-01
ASSY DRW: 620-60197-01

A.2 Board Layout

A.2.1 BLE Pioneer Board

Figure A-1. Primary Side of BLE Pioneer Board

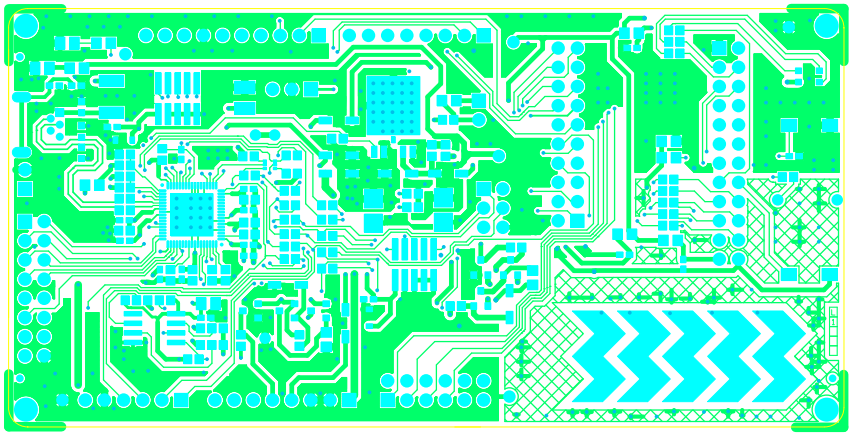


Figure A-2. Ground Layer of BLE Pioneer Board

Figure A-3. Power Layer of BLE Pioneer Board

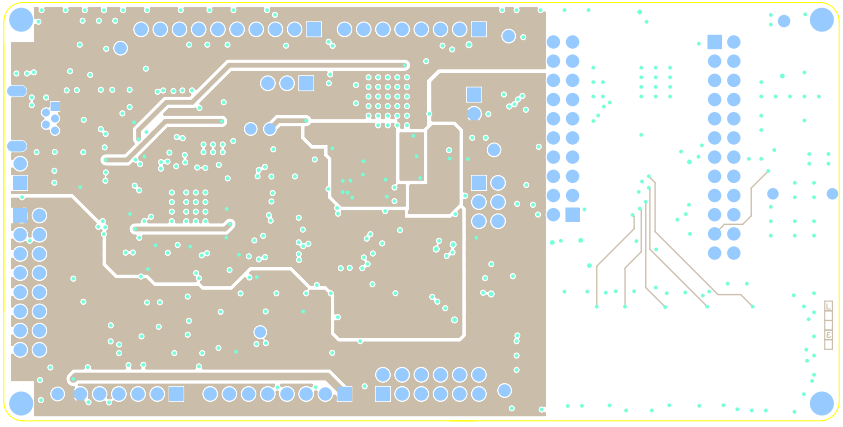


Figure A-4. Secondary Side of BLE Pioneer Board

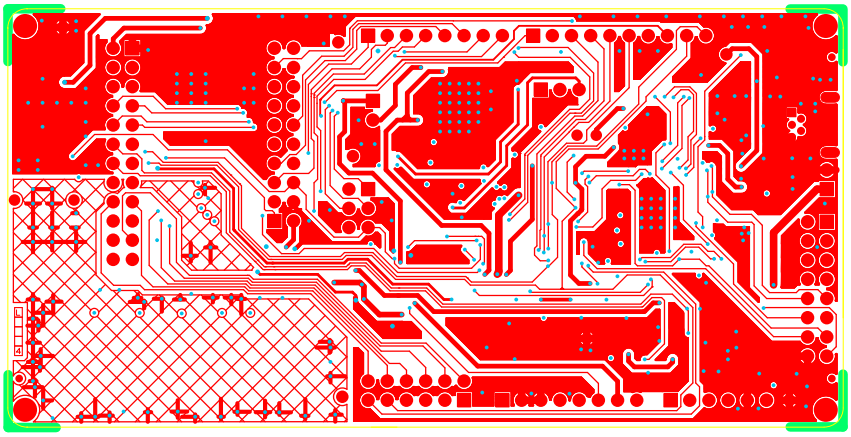


Figure A-5. Primary Silkscreen of BLE Pioneer Board

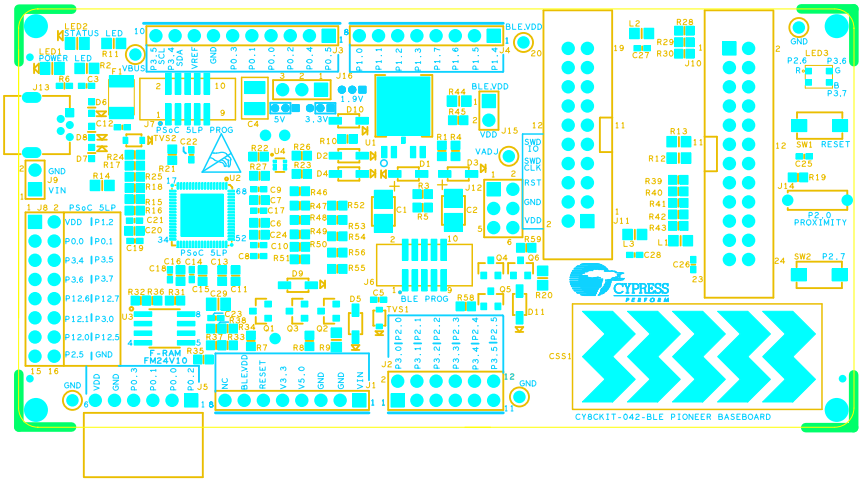
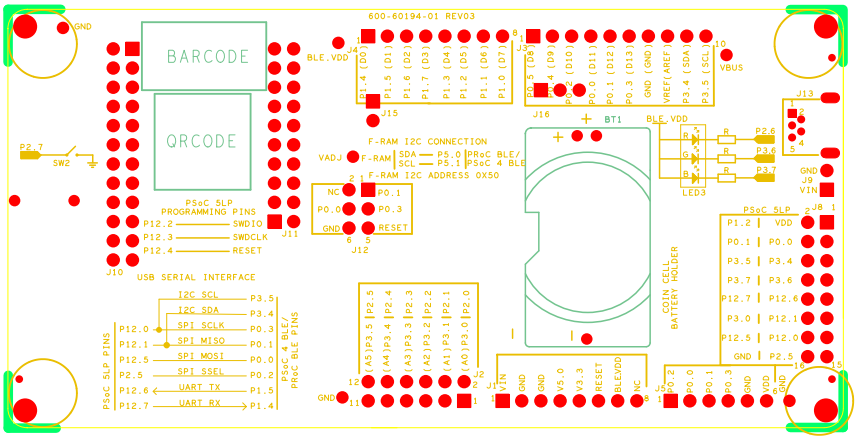


Figure A-6. Secondary Silkscreen of BLE Pioneer Board



A.2.2 PRoC BLE Module

Figure A-7. Primary Side of PRoC BLE Module

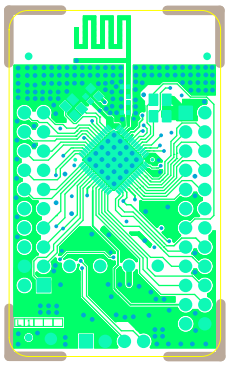


Figure A-8. Ground Layer of PRoC BLE Module

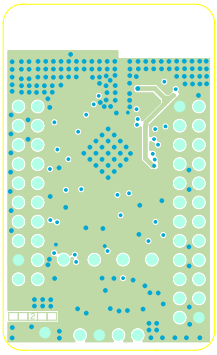


Figure A-9. VCC Layer of PRoC BLE Module

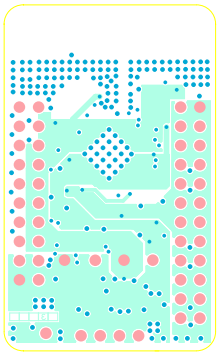


Figure A-10. Secondary Side of PRoC BLE Module

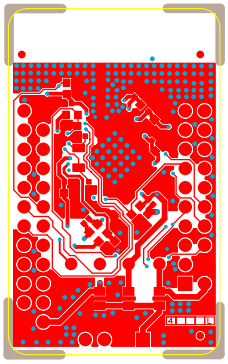


Figure A-11. Primary Silkscreen of PRoC BLE Module

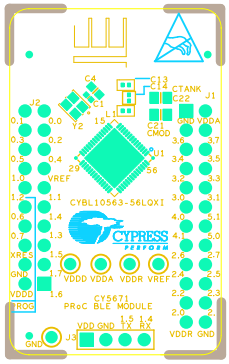
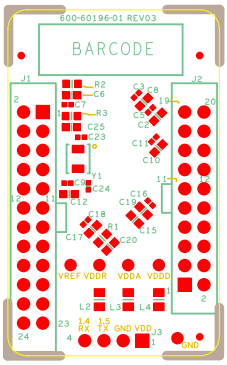


Figure A-12. Secondary Silkscreen of PRoC BLE Module



A.2.3 PSoC 4 BLE Module

Figure A-13. Primary Side of PSoC 4 BLE Module

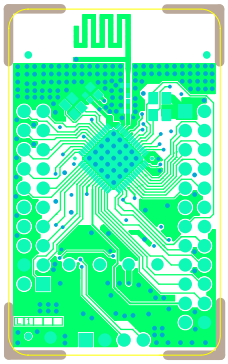


Figure A-14. Ground Layer of PSoC 4 BLE Module

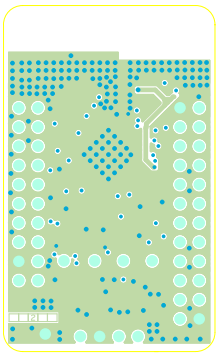


Figure A-15. VCC Layer of PSoC 4 BLE Module

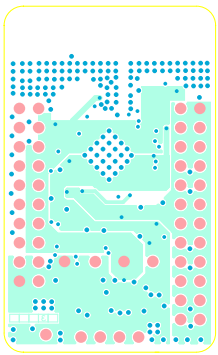


Figure A-16. Secondary Side of PSoC 4 BLE Module

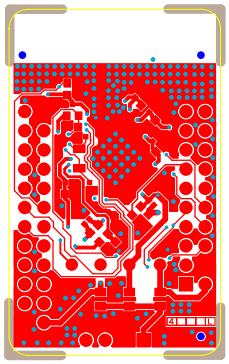


Figure A-17. Primary Silkscreen of PSoC 4 BLE Module

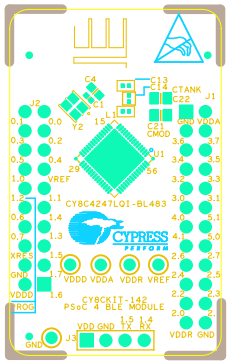
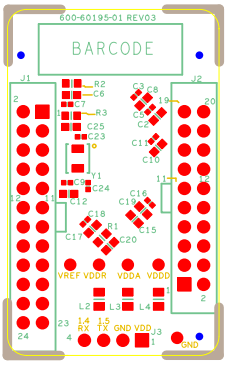


Figure A-18. Secondary Silkscreen of PSoC 4 BLE Module



A.2.4 Dongle

Figure A-19. Primary Side of Dongle

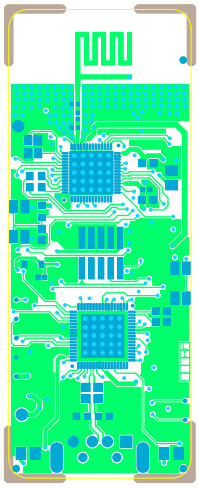


Figure A-20. Ground Layer of Dongle

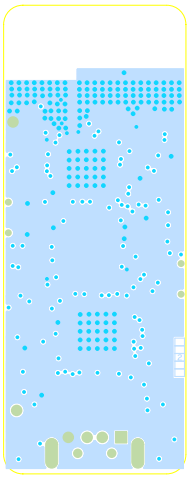


Figure A-21. Power Layer of Dongle

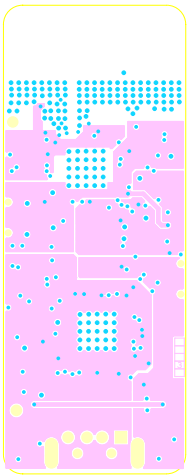


Figure A-22. Secondary Side of Dongle

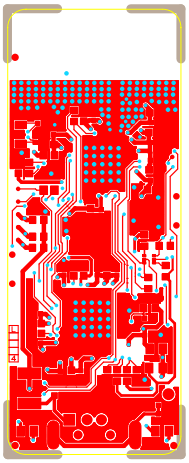


Figure A-23. Primary Silkscreen of Dongle

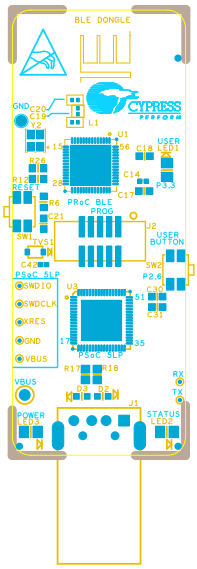
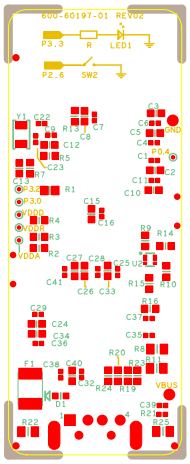


Figure A-24. Secondary Silkscreen of Dongle



A.3 Bill of Materials (BOM)

A.3.1 BLE Pioneer Board

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
1			-	PCB, 106.22 mm x 53.34 mm, High Tg, ENIG finish, 4 layer, Color = RED, Silk = WHITE.	Cypress	
2	1	BT1	CR2032 Battery Holder	HOLDER COIN CELL CR2032 EJECT	MPD	BA2032
3	1	C1	1.0 uF	CAP TANT 1UF 35V 10% 1210	AVX Corporation	TAJB105K035RNJ
4	1	C2	4.7 uF	CAP TANT 4.7UF 20V 10% 1210	AVX Corporation	TAJB475K020RNJ
5	1	C3	0.01 uFd	CAP 10000PF 16V CERAMIC 0402 SMD	TDK Corporation	C1005X7R1C103K050BA
6	1	C4	100 uFd	CAP CER 100UF 6.3V 20% X5R 1210	TDK Corporation	C3225X5R0J107M250AC
7	15	C5,C8,C9,C10,C12,C14,C17,C18,C19,C21,C23,C25,C26,C27,C28	0.1 uFd	CAP .1UF 16V CERAMIC X5R 0402	TDK Corporation	C1005X5R1A104K050BA
8	7	C6,C7,C11,C13,C15,C16,C20	1.0 uFd	CAP CERAMIC 1.0UF 25V X5R 0603 10%	Taiyo Yuden	TMK107BJ105KA-T
9	1	C29	33 uF	CAP CER 33UF 6.3V 20% X5R 0805	TDK Corporation	C2012X5R0J336M125AC
10	6	D1,D2,D3,D4,D5,D10	MBR0520L	DIODE SCHOTTKY 0.5A 20V SOD-123	Fairchild Semiconductor	MBR0520L
11	3	D6,D7,D8	ESD diode	SUPPRESSOR ESD 5VDC 0603 SMD	Bourns Inc.	CG0603MLC-05LE
12	1	D9	3.9V Zener	DIODE ZENER 3.9V 500MW SOD12	Diodes Inc	BZT52C3V9-7-F
13	1	D11	2.7V Zener	DIODE ZENER 2.7V 500MW SOD123	ON Semiconductor	MMSZ4682T1G
14	1	F1	FUSE	PTC RESETTABLE .50A 15V 1812	Bourns	MF-MSMF050-2
15	2	J1, J4	8x1 RECP	CONN HEADER FEMALE 8POS .1" GOLD	Protectron Electromech	P9401-08-21
16	1	J2	6x2 RECP	CONN HEADER FMAL 12PS.1" DL GOLD	Protectron Electromech	P9403-12-21
17	1	J3	10x1 RECP	CONN HEADER FMALE 10POS .1" GOLD	Protectron Electromech	P9401-10-21
18	1	J8	8X2 RECP	CONN HEADER FMAL 16PS.1" DL GOLD	Protectron Electromech	P9403-16-21
19	1	J10	12X2 RECP	CONN HEADER 2.54MM 24POS GOLD	Sullins Connector Solutions	SBH11-PBPC-D12-ST-BK
20	1	J11	10X2 RECP	CONN HEADER 2.54MM 20POS GOLD	Sullins Connector Solutions	SBH11-PBPC-D10-ST-BK
21	1	J13	USB MINI B	MINI USB RCPT R/A DIP	TE Connectivity	1734510-1

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
22	1	J14	1X1 RECP	CONN RCPT 1POS .100" SNGL HORZ	Samtec Inc	BCS-101-L-S-HE
23	1	J15	2p_jumper	CONN HEADR BRKWAY .100 2POS STR	Protectron Electro-mech	P9101-02-12-1
24	1	J16	3p_jumper	CONN HEADR BRKWAY .100 3POS STR	Protectron Electro-mech	P9101-03-12-1
25	1	LED1	Power LED Amber	LED 595NM AMB DIFF 0805 SMD	Avago Technologies	HSMA-C170
26	1	LED2	Status LED Green	LED GREEN CLEAR 0805 SMD	Chicago Miniature	CMD17-21VGC/TR8
27	1	LED3	RGB LED	LED RED/GREEN/BLUE PLCC4 SMD	Cree, Inc.	CLV1A-FKB-CJ1M1F1BB7R4S3
28	3	L1,L2,L3	330 OHM @ 100MHz	FERRITE CHIP 330 OHM 0805	Murata	BLM21PG331SN1D
29	3	Q2,Q4,Q6	PMOS	MOSFET P-CH 30V 2.2A SOT23	ON Semiconductor	NTR4171PT1G
30	1	Q1,	PMOS	MOSFET P-CH 30V 3.8A SOT23-3	Diodes Inc	DMP3098L-7
31	2	Q3,Q5	PMOS	MOSFET P-CH 20V 3.5A SOT23	NXP Semiconductors	PMV48XP,215
32	1	R1	11K 1%	RES 11K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1102V
33	1	R2	560 ohm	RES 560 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ561V
34	1	R3	14.7K 1%	RES 14.7K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1472V
35	1	R4	10K 1%	RES 10K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1002V
36	1	R5	4.3K 1%	RES 4.3K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF4301V
37	1	R6	100K	RES 100K OHM 1/10W 5% 0402 SMD	Panasonic - ECG	ERJ-2GEJ104X
38	14	R19,R26,R27,R36,R37,R38,R45,R46,R47,R52,R53,R54,R55,R56	ZERO	RES 0.0 OHM 1/10W 0603 SMD	Panasonic - ECG	ERJ-3GEY0R00V
39	2	R8,R58	15K	RES 15K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1502V
40	2	R9,R20	10K 1%	RES 10K OHM 1/8W 1% 0805 SMD	Stackpole Electronics Inc	RMCF0805FT10K0
41	1	R10	10K	RES 10K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ103V
42	1	R11	820 ohm	RES 820 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ821V
43	2	R13,R14	ZERO	RES 0.0 OHM 1/8W 0805 SMD	Panasonic-ECG	ERJ-6GEY0R00V
44	2	R15,R16	22E	RES 22 OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF22R0V
45	2	R17,R18	15K	RES 15K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ153V

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
46	5	R22,R23,R28,R31,R35	2.2K	RES 2.2K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ222V
47	2	R24,R25	30K	RES 30K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ303V
48	2	R29,R30	1.5K	RES 1.5K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ152V
49	5	R39,R40,R41,R42,R43	560 ohm	RES 560 OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ561V
50	2	SW1,SW2	SW PUSH-BUTTON	SWITCH TACTILE SPST-NO 0.05A 12V	Panasonic - ECG	EVQ-PE105K
51	1	TP5	BLACK	TEST POINT PC MINI .040"D Black	Keystone Electronics	5001
52	2	TVS1,TVS2	5V 350W	TVS UNIDIR 350W 5V SOD-323	Dioded Inc.	SD05-7
53	1	U1	LDO	IC REG LDO ADJ 1A TO252-5	Rohm Semiconductor	BA00BC0WFP-E2
54	1	U2	PSoC 5LP	68QFN PSoC 5LP chip for USB debug channel and USB-Serial interface	Cypress Semiconductor	CY8C5868LTI-LP039
55	1	U3	F-RAM	F-RAM 1-Mbit (128K X 8) I2C interface	Cypress Semiconductor	FM24V10-G
56	1	U4	DUAL PMOS	MOSFET 2P-CH 20V 430MA SOT-563	ON Semiconductor	NTZD3152PT1G
Install on Bottom of PCB As per the Silk Screen in the Corners						
57	4	N/A	N/A	BUMPER CYLIN 0.375" DIA BLK	3M	SJ61A4
Special Jumper Installation Instructions						
58	2	J15,J16	Install jumper across pins 1 and 2	Rectangular Connectors MINI JUMPER GF 6.0MM CLOSE TYPE BLACK	Kobiconn	151-8010-E
Label						
59	1	N/A	N/A	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60158-01 Rev 04 (YYWWVVXXXXX)	Cypress Semiconductor	
60	1	N/A	N/A	LBL, QR code, 12mm X 12mm	Cypress Semiconductor	
No load components						
61	1	C22	0.1 uFd	CAP .1UF 16V CERAMIC Y5V 0402	TDK Corporation	C1005X5R1A104K050BA
62	1	C24	1.0 uFd	CAP CERAMIC 1.0UF 25V X5R 0603 10%	Taiyo Yuden	TMK107BJ105KA-T
63	9	R7,R59,R32,R33,R34,R48,R49,R50,R51	Zero Ohm	RES 0.0 OHM 1/10W JUMP 0603	TE Connectivity	1623094-1
64	1	R21	4.7K	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ472V
65	2	J7,J6	50MIL KEYED SMD	CONN HEADER 10 PIN 50MIL KEYED SMD	Samtec	FTSH-105-01-L-DV-K

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
66	1	J9	2 PIN HDR	CONN HEADER FEMALE 2POS .1" GOLD	Sullins Connector Solutions	PPPC021LFBN-RC
67	2	TP4,TP5	BLACK	TEST POINT 43 HOLE 65 PLATED BLACK	Keystone Electron-ics	5001
68	3	TP1,TP2,TP3	RED	TEST POINT 43 HOLE 65 PLATED RED	Keystone Electron-ics	5000
69	2	R44,R12	ZERO	RES 0.0 OHM 1/8W 0805 SMD	Panasonic-ECG	ERJ-6GEY0R00V
70	1	J12	3x2 RECPT	CONN HEADER FMAL 6PS .1" DL GOLD	Sullins Connector Solutions	PPPC032LFBN-RC
71	1	J5	6X1 RECP RA	CONN FEMALE 6POS .100" R/A GOLD	Sullins Connector Solutions	PPPC061LGBN-RC

A.3.2 BLE Module

A.3.2.1 CY5671 PRoC BLE Module

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
1	1	600-60196-01	-	PRoC BLE Module printed circuit board	Cypress qualified vendor	600-60196-01 Rev03
2	8	C1,C3,C5,C7,C9,C11,C16,C18	0.1 uF	CAP .1UF 16V CERAMIC Y5V 0402	Samsung Electro-Mechanics America, Inc	CL05F104ZO5NNNC
3	10	C2,C4,C6,C8,C10,C12,C15,C17,C19,C20	1.0 uF	CAP CERAMIC 1.0UF 25V X5R 0603 10%	TDK Corporation	C1608X5R1E105K080AC
4	1	C21	2200 pF	CAP CER 2200PF 50V 5% NP0 0805	Murata Electronics	GRM2165C1H222JA01D
5	1	C22	10000 pF	CAP CER 10000PF 50V 5% NP0 0805	Murata Electronics	GRM2195C1H103JA01D
6	1	C23	36 pF	CAP CER 36PF 50V 5% NP0 0402	Murata Electronics	GRM1555C1H360JA01D
7	1	C24	18 pF	CAP CER 18PF 50V 1% NP0 0402	Murata Electronics	GRM1555C1H180FA01D
8	1	C14	1.5 pF	CAP CER 1.5PF 50V NP0 0402	Johanson Technology Inc	500R07S1R5BV4T
9	1	J1	HEADER 24	CONN HEADR FMALE 24POS .1" DL AU	Sullins Connector	SFH11-PBPC-D12-ST-BK
10	1	J2	HEADER 20	CONN HEADR FMALE 20POS .1" DL AU	Sullins Connector	SFH11-PBPC-D10-ST-BK
11	1	L1	6.8nH	CER INDUCTOR 6.8NH 0402	Johanson Technology Inc	L-07C6N8JV6T
12	3	L2,L3,L4	330 Ohm @100 MHz	FERRITE CHIP 330 OHM 0805	Murata Electronics	BLM21PG331SN1D
13	1	U1	PRoC BLE	56 QFN PRoC BLE	Cypress Semiconductor	CYBL10563-56LQXI
14	1	Y1	32.768KHz	CRYSTAL 32.768KHZ 12.5PF SMD	ECS Inc	ECS-.327-12.5-34B
15	1	Y2	24MHz	CRYSTAL 24.000 MHZ 8PF SMD	ECS Inc	ECS-240-8-36CKM
16	1	LBL	-	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60160-01 Rev 04 (YYWWV-VXXXXX)	Cypress qualified vendor	-
No Load components						
17	1	C13	1.2 pF	CAP CER 1.2PF 50V NP0 0402	Johanson Technology Inc	500R07S1R2BV4T
18	1	C25	100pF	CAP CER 100PF 50V 10% X7R 0603	Kemet	C0603C101K5RACTU

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
19	1	R1	Zero Ohm	RES 0.0 OHM 1/8W 0605 SMD	TE Connectivity	1623094-1
20	1	R2	Rbleed	No Load	-	-
21	1	R3	4.7K	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ472V
22	1	J3	4 HEADER	CONN HEADER 4POS .100 R/A 15AU	FCI	68016-204HLF
23	4	TP1,TP2,TP3,TP4	RED	TEST POINT 43 HOLE 65 PLATED RED	Keystone Electronics	5000
24	1	TP5	BLACK	TEST POINT 43 HOLE 65 PLATED BLACK	Keystone Electronics	5001

A.3.2.2 CY8CKIT-142 PSoC 4 BLE Module

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
1	1	600-60195-01	-	PSoC 4 BLE Module printed circuit board	Cypress qualified vendor	600-60195-01 Rev03
2	8	C1,C3,C5,C7,C9, C11,C16,C18	0.1 uF	CAP .1UF 16V CERAMIC Y5V 0402	Samsung Electro-Mechanics America, Inc	CL05F104ZO5NNNC
3	10	C2,C4,C6,C8,C10 ,C12,C15,C17,C19,C20	1.0 uF	CAP CERAMIC 1.0UF 25V X5R 0603 10%	TDK Corporation	C1608X5R1E105K080AC
4	1	C21	2200 pF	CAP CER 2200PF 50V 5% NP0 0805	Murata Electronics	GRM2165C1H222JA01D
5	1	C22	10000 pF	CAP CER 10000PF 50V 5% NP0 0805	Murata Electronics	GRM2195C1H103JA01D
6	1	C23	36 pF	CAP CER 36PF 50V 5% NP0 0402	Murata Electronics	GRM1555C1H360JA01D
7	1	C24	18 pF	CAP CER 18PF 50V 1% NP0 0402	Murata Electronics	GRM1555C1H180FA01D
8	1	C14	1.5 pF	CAP CER 1.5PF 50V NP0 0402	Johanson Technology Inc	500R07S1R5BV4T
9	1	J1	HEADER 24	CONN HEADR FMALE 24POS .1" DL AU	Sullins Connector	SFH11-PBPC-D12-ST-BK
10	1	J2	HEADER 20	CONN HEADR FMALE 20POS .1" DL AU	Sullins Connector	SFH11-PBPC-D10-ST-BK
11	1	L1	6.8nH	CER INDUCTOR 6.8NH 0402	Johanson Technology Inc	L-07C6N8JV6T
12	3	L2,L3,L4	330 Ohm @100 MHz	FERRITE CHIP 330 OHM 0805	Murata Electronics	BLM21PG331SN1D
13	1	U1	PSoC 4BLE	56 QFN PSoC 4 BLE	Cypress Semiconductor	CY8C4247LQI-BL483
14	1	Y1	32.768K Hz	CRYSTAL 32.768KHZ 12.5PF SMD	ECS Inc	ECS-.327-12.5-34B
15	1	Y2	24MHz	CRYSTAL 24.000 MHZ 8PF SMD	ECS Inc	ECS-240-8-36CKM
16	1	LBL	-	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60159-01 Rev 04 (YYWWVVXXXXX)	Cypress qualified vendor	-
No Load components						
17	1	C13	1.2 pF	CAP CER 1.2PF 50V NP0 0402	Johanson Technology Inc	500R07S1R2BV4T
18	1	C25	100pF	CAP CER 100PF 50V 10% X7R 0603	Kemet	C0603C101K5RACTU
19	1	R1	Zero Ohm	RES 0.0 OHM 1/10W JUMP 0603	TE Connectivity	1623094-1
20	1	R2	Rbleed	No Load	-	-

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
21	1	R3	4.7K	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ472V
22	1	J3	4 HEADER	CONN HEADER 4POS .100 R/A 15AU	FCI	68016-204HLF
23	4	TP1,TP2,TP3,TP4	RED	TEST POINT 43 HOLE 65 PLATED RED	Keystone Electronics	5000
24	1	TP5	BLACK	TEST POINT 43 HOLE 65 PLATED BLACK	Keystone Electronics	5001

A.3.3 Dongle

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
1	1	600-60197-01	-	PCB, 60 mm x 30 mm, High Tg, ENIG finish, 2 layer, Color = BLACK, Silk = WHITE.	Cypress qualified vendor	600-60197-01 Rev02
2	17	C1,C4,C6,C7,C9,C11,C14,C16,C25,C28,C29,C32,C35,C36,C38,C41,C42	0.1 uFd	CAP .1UF 16V CERAMIC Y5V 0402	TDK Corporation	C1005X5R1A104K050BA
3	17	C2,C3,C5,C8,C10,C12,C13,C15,C17,C18,C24,C26,C30,C31,C33,C34,C40	1.0 uFd	CAP CERAMIC 1.0UF 25V X5R 0603 10%	Taiyo Yuden	TMK107BJ105KA-T
4	1	C19	1.2 pFd	CAP CER 1.2PF 50V NP0 0402	Johanson Technology Inc	500R07S1R2BV4T
5	1	C22	36 pF	CAP CER 36PF 50V 5% NP0 0402	Murata Electronics	GRM1555C1H360JA01D
6	1	C23	18 pF	CAP CER 18PF 50V 1% NP0 0402	Murata Electronics	GRM1555C1H180FA01D
7	1	C39	0.01 uFd	CAP 10000PF 16V CERAMIC 0402 SMD	TDK Corporation	C1005X7R1C103K050BA
8	3	D1,D2,D3	ESD diode	SUPPRESSOR ESD 5VDC 0603 SMD	Bourns Inc.	CG0603MLC-05LE
9	1	F1	FUSE	PTC RESETTABLE .50A 15V 1812	Bourns	MF-MSMF050-2
10	1	J1	USB A PLUG	CONN PLUG USB 4POS RT ANG PCB	Molex Inc	480370001
11	1	J2	50MIL KEYED SMD	CONN HEADER 10POS DUAL SHRD SMD	FCI	20021521-00010T1LF
12	1	LED1	Status LED Blue	LED BLUE CLEAR THIN 0805 SMD	LiteOn Inc	LTST-C171TBKT
13	1	LED2	Status LED Green	LED GREEN CLEAR 0805 SMD	Chicago Miniature	CMD17-21VGC/TR8
14	1	LED3	Power LED Red	LED SUPER RED CLEAR 0805 SMD	LiteOn Inc	LTST-C170KRKT
15	1	L1	5.1 nH	CER INDUCTOR 5.1NH 0402	Johanson Technology Inc	L-07C5N1SV6T
16	2	R8,R11	Zero Ohm	RES 0.0 OHM 1/8W 0805 SMD	Panasonic-ECG	ERJ-6GEY0R00V
17	1	R7	820 ohm	RES 820 OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ821V
18	2	R22,R25	820 ohm	RES 820 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ821V
19	2	R9,R10	2.2K	RES 2.2K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ222V

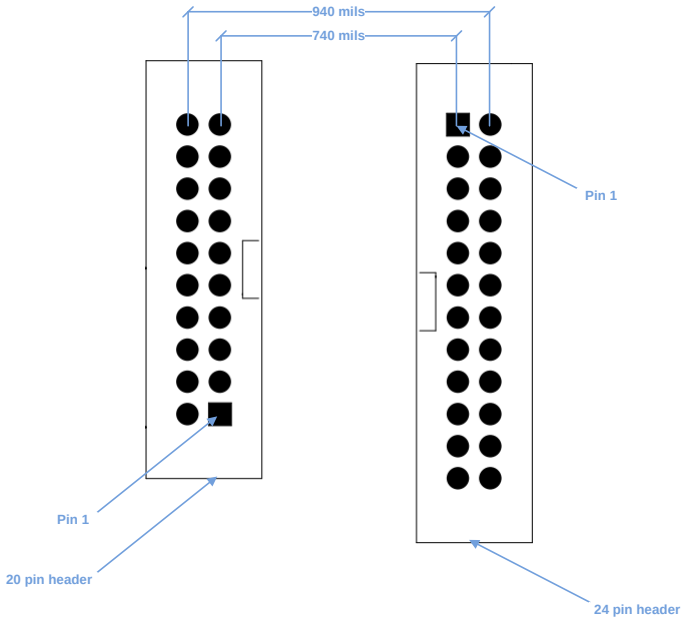
Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
20	9	R1,R2,R3,R4,R12,R13,R14,R15,R26	ZERO	RES 0.0 OHM 1/10W 0603 SMD	Panasonic - ECG	ERJ-3GEY0R00V
21	2	R17,R18	22E	RES 22 OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF22R0V
22	1	R21	100K	RES 100K OHM 1/10W 5% 0402 SMD	Panasonic - ECG	ERJ-2GEJ104X
23	2	R19,R20	15K	RES 15K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ153V
24	2	R23,R24	30K	RES 30K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ303V
25	2	SW1,SW2	SW RA PUSH	SWITCH TACTILE SPST-NO 0.05A 12V	Panasonic - ECG	EVQ-P3401P
26	1	TVS1	5V 350W	TVS UNIDIR 350W 5V SOD-323	Diodes Inc.	SD05-7
27	1	U1	PRoC BLE	PRoC BLE, Programmable Radio on Chip, 56QFN	Cypress Semiconductor	CYBL10162-56LQXI
28	1	U2	DUAL PMOS	MOSFET 2P-CH 20V 430MA SOT-563	ON Semiconductor	NTZD3152PT1G
29	1	U3	PSoC 5LP	PSoC 5LP Programmable System on Chip, 68QFN	Cypress Semiconductor	CY8C5868LTI-LP039
30	1	Y1	32.768K Hz	CRYSTAL 32.768KHZ 12.5PF SMD	ECS Inc	ECS-.327-12.5-34B
31	1	Y2	24MHz	CRYSTAL 24.000 MHZ 8PF SMD	ECS Inc	ECS-240-8-36CKM
32	1	N/A	N/A	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60161-01 Rev 03 (YYWWVVXXXXX); Only barcode	Cypress qualified vendor	-
No load components						
33	1	C20	1.2 pF	CAP CER 1.2PF 50V NP0 0402	Johanson Technology Inc	500R07S1R2BV4T
34	1	C21	100pF	CAP CER 100PF 50V 10% X7R 0603	Kemet	C0603C101K5RACTU
35	1	C37	0.1 uFd	CAP .1UF 16V CERAMIC Y5V 0402	TDK Corporation	C1005X5R1A104K050BA
36	1	C27	1.0 uFd	CAP CERAMIC 1.0UF 25V X5R 0603 10%	Taiyo Yuden	TMK107BJ105KA-T
37	1	R5	Zero Ohm	RES 0.0 OHM 1/10W JUMP 0603	TE Connectivity	1623094-1
38	2	R6,R16	4.7K	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ472V
39	15	TP1,TP2,TP3,TP4,TP5,TP6,TP7,TP8,TP9,TP10,TP11,TP12,TP13,TP14,TP15	No load	No load	-	-

A.4 KitProg Status LED States

	User Indication	Scenario	Action Required by user
1	LED blinks fast: Time period = 0.25 s	LED starts blinking at power up, if bootloadable file is corrupt.	Bootload the *KitProg.cyacd* file: in PSoC Programmer, connect to the kit, open the **Utilities** tab and press **Upgrade Firmware** button.
2	LED blinks slow: Time period = 1.50 s	Entered Bootloader mode by holding the PSoC 4 Reset button during kit power-up.	Release the Reset button and re-plug power if you entered this mode by mistake. If the mode entry was intentional, bootload the new.cyacd file using the Bootloader Host tool shipped with PSoC Creator.
3	LED blinks very fast: Time period = 0.67 s	SWD operation is in progress. Any I2C traffic. Kit's COM port connect/disconnect event (one blink).	In PSoC Programmer, watch the log window for status messages for SWD operations. In the Bridge Control Panel, the LED blinks on I2C command requests. In BCP or any other serial port terminal program, distinguish the kit's COM port number by the blinking LED when the port is connected or disconnected.
4	LED is ON.	USB enumeration successful. Kit is in the idle state waiting for commands.	The kit functions can be used by PSoC Creator, PSoC Programmer, Bridge Control Panel, and any serial port terminal program.
5	LED is OFF.	Power LED is ON.	This means that the USB enumeration was unsuccessful. This can happen if the kit is not powered from the USB host or the kit is not connected to the USB host through the USB cable. Verify the USB cable and check if PSoC Programmer is installed on the PC.

A.5 Adding BLE module compatible headers on your own baseboard

The baseboard should have two headers, one 20-pin and another 24-pin. Dimension of these connects are detailed below.



You can get these at Digikey.

#	Description	Manufacturer	Mfr Part Number	Digikey part #
1	CONN HEADER 2.54MM 24POS GOLD	Sullins Connector Solutions	SBH11-PBPC-D12-ST-BK	SBH11-PBPC-D12-ST-BK-ND
2	CONN HEADER 2.54MM 20POS GOLD	Sullins Connector Solutions	SBH11-PBPC-D10-ST-BK	S9172-ND

Revision History

CY8CKIT-042-BLE Bluetooth® Low Energy (BLE) Pioneer Kit Guide Revision History

Document Title: CY8CKIT-042-BLE Bluetooth® Low Energy (BLE) Pioneer Kit Guide Document Number: 001-93731			
Revision	**Issue Date**	**Origin of Change**	**Description of Change**
**	11/10/2014	ROIT	New kit guide.
*A		ROIT	Updated Safety Information chapter on page 6: Updated entire section. Updated Software Installation chapter on page 20: Updated “Before You Begin” on page 20: Updated description. Updated Example Projects chapter on page 42: Updated “CapSense Slider and LED” on page 47: Updated “Flow Chart” on page 51: Updated Figure 4-11. Updated “Verify Output” on page 52: Updated “CySmart PC Tool” on page 52: Updated Figure 4-17. Updated Figure 4-24. Updated “CySmart iOS/Android App” on page 58: Replaced “iOS” with “iOS/Android” in heading. Updated “CapSense Proximity” on page 62: Updated “Project Description” on page 62: Updated Figure 4-33. Updated “Flow Chart” on page 66: Updated Figure 4-38. Updated “Verify Output” on page 67: Updated “CySmart PC Tool” on page 67: Updated Figure 4-45, Figure 4-48. Updated “CySmart iOS/Android App” on page 71: Replaced “iOS” with “iOS/Android” in heading and in all other instances. Updated “Direct Test Mode (DTM)” on page 84: Updated “Hardware Connection” on page 86: Updated description. Updated “Verify Output” on page 87: Updated description.

CY8CKIT-042-BLE Bluetooth® Low Energy (BLE) Pioneer Kit Guide Revision History *(continued)*

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Revision	**Issue Date**	**Origin of Change**	**Description of Change**
*A (cont.)		ROIT	Updated Hardware chapter on page 88: Updated “Pioneer Baseboard” on page 88: Updated “Power System” on page 88: Updated description. Updated Figure 5-1. Updated “Protection Circuits” on page 90: Updated Figure 5-4. Updated “Current Measurement Jumper” on page 92: Updated description. Updated “Expansion Connectors” on page 95: Updated “Arduino Compatible Headers (J1, J2, J3, J4, and J12-unpopulated)” on page 95: Updated Figure 5-8. Removed figure “Schematics of Arduino Connectors”. Updated Figure 5-9. Updated “Pioneer Board LEDs” on page 101: Updated description. Updated Figure 5-15. Updated “Cypress Ferroelectric RAM (F-RAM)” on page 103: Updated description. Updated “Serial Interconnection Between PSoC 5LP and BLE Module” on page 104: Updated description. Updated “Bluetooth Module Headers” on page 105: Updated description. Updated “BLE Module Board” on page 106: Updated “Wiggle Antenna” on page 108: Updated description. Updated “BLE Passives” on page 110: Updated description. Updated “BLE Dongle Board” on page 111: Updated description. Updated Advanced Topics chapter on page 115: Updated “CySmart iOS/Android Application” on page 152: Replaced “iOS” with “iOS/Android” in heading and in all other instances. Updated description.

CY8CKIT-042-BLE Bluetooth® Low Energy (BLE) Pioneer Kit Guide Revision History *(continued)*

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Revision	**Issue Date**	**Origin of Change**	**Description of Change**
*A (cont.)		ROIT	Updated Appendix chapter on page 168: Updated "Schematics" on page 168: Updated entire section. Updated "Bill of Materials (BOM)" on page 184: Updated "BLE Pioneer Board" on page 184: Updated entire section. Updated "BLE Module" on page 188: Updated "CY5671 PRoC BLE Module" on page 188: Updated entire section. Updated "CY8CKIT-142 PSoC 4 BLE Module" on page 190: Updated entire section. Updated "Dongle" on page 192: Updated entire section. Added "Adding BLE module compatible headers on your own baseboard" on page 195.