5. Hardware

This chapter describes the contents of the BLE Pioneer Kit hardware and its different blocks, such as the power block, USB connection, Arduino-compatible headers, module connectors, and CapSense slider.

The schematic and board layouts are available at the following location:
`<Install_Directory>\Cypress\CY8CKIT-042-BLE-A Kit\<version>\Hardware`.

5.1 BLE Pioneer Baseboard

5.1.1 PSoC 5LP

An onboard PSoC 5LP contains the KitProg, which is used to program and debug the BLE device. The PSoC 5LP connects to the USB port of the computer through a USB Mini-B connector and to the SWD interface of the BLE device. PSoC 5LP is a true system-level solution providing MCU, memory, analog, and digital peripheral functions in a single chip. The CY8C58LPxx family offers a modern method of signal acquisition, signal processing, and control with high accuracy, high bandwidth, and high flexibility. The analog capability spans the range from thermocouples (near DC voltages) to ultrasonic signals.

For more information, visit the PSoC 5LP web page.

See Serial Interconnection between KitProg and Module on page 105 for more details.

5.1.2 Power System

The power supply system on the BLE Pioneer Baseboard is versatile, allowing the input supply to come from the following sources:

- 5-V power from the onboard USB connector
- 5-V to 12-V VIN power from the Arduino power header (J1)
- 3-V from the CR2032 coin cell

An adjustable LDO is used to output three different voltage levels (1.9 V, 3.3 V, and 5 V) to power the module. These voltages are selected with the J16 jumper, as shown in Figure 5-1.

Figure 5-1. Schematics and Board Highlight of LDO and Power Selection Jumper

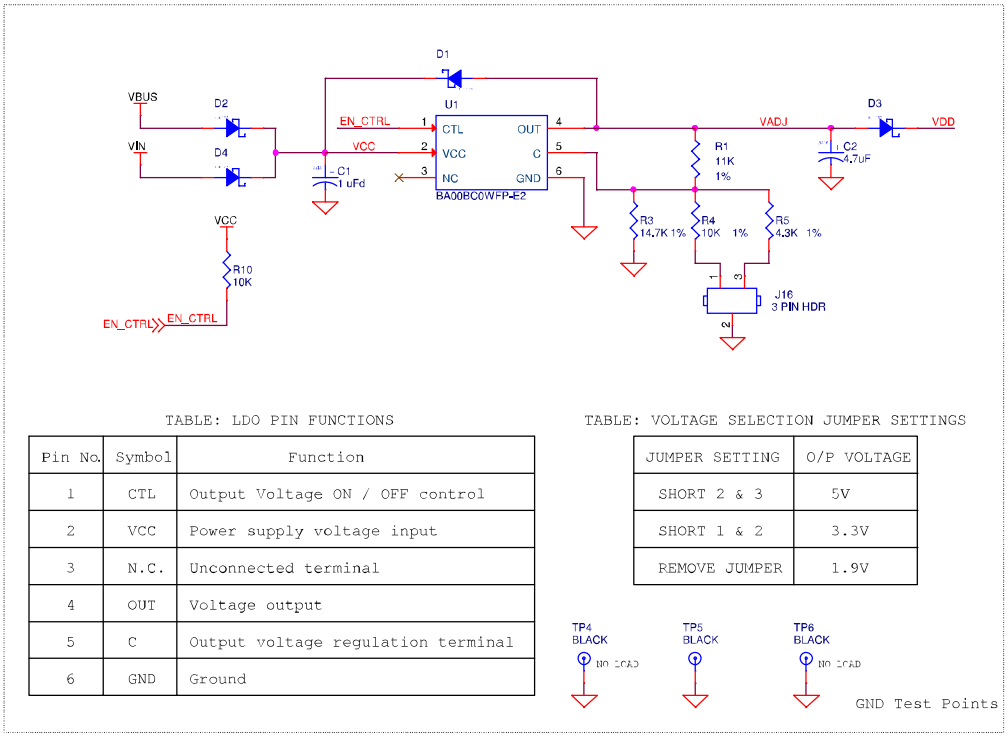
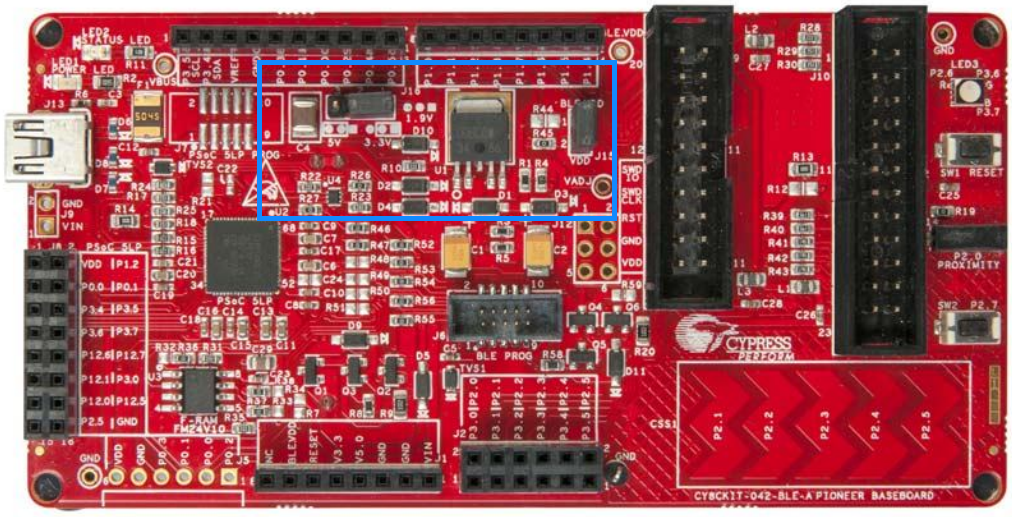


TABLE: LDO PIN FUNCTIONS

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

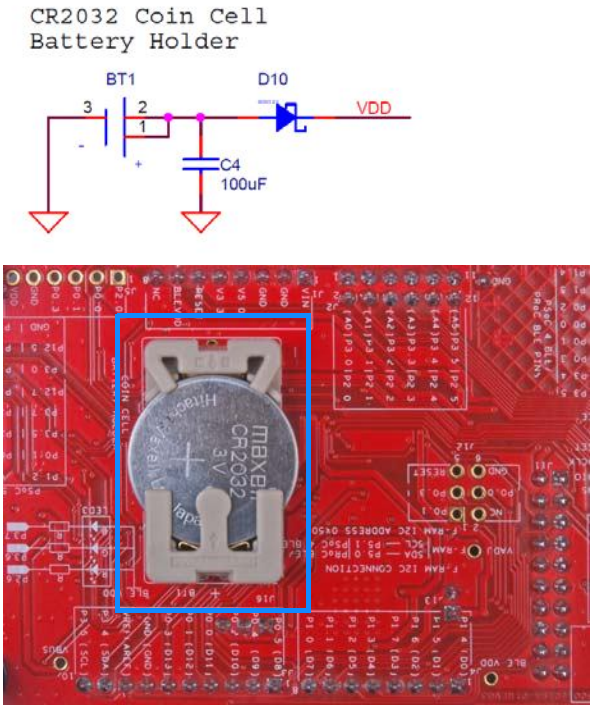


The input to the LDO can come from either the USB, the VIN pin in the Arduino header J1, or header J9.

Note: The typical dropout voltage of the selected LDO is 0.3 V at 500-mA output current. This gives a minimum output of 4.6 V from the input voltage of 5 V from the VBUS. This drop also considers the voltage drop across the Schottky diode connected at the output of the LDO to protect against voltage applied at the output terminal of the regulator. An input voltage supply over 12 V can damage the board.

The BLE Pioneer Baseboard also contains a CR2032 coin cell holder to power it using a coin cell, as shown in Figure 5-2.

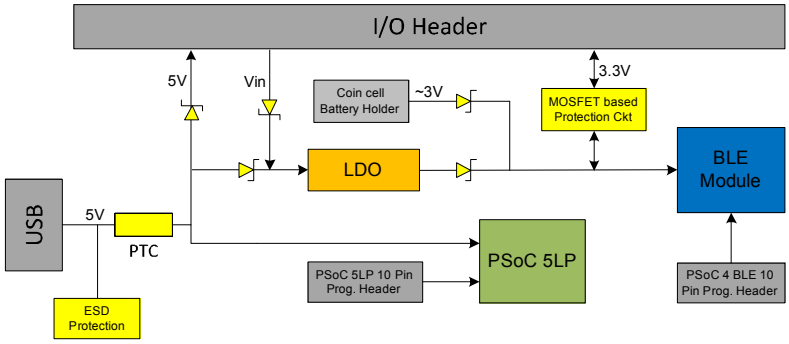
Figure 5-2. Schematics and Board Highlight of Coin Cell Holder



5.1.2.1 *Protection Circuits*

The power supply rail has reverse-voltage, overvoltage, short circuits, and excess current protection features, as shown in Figure 5-3.

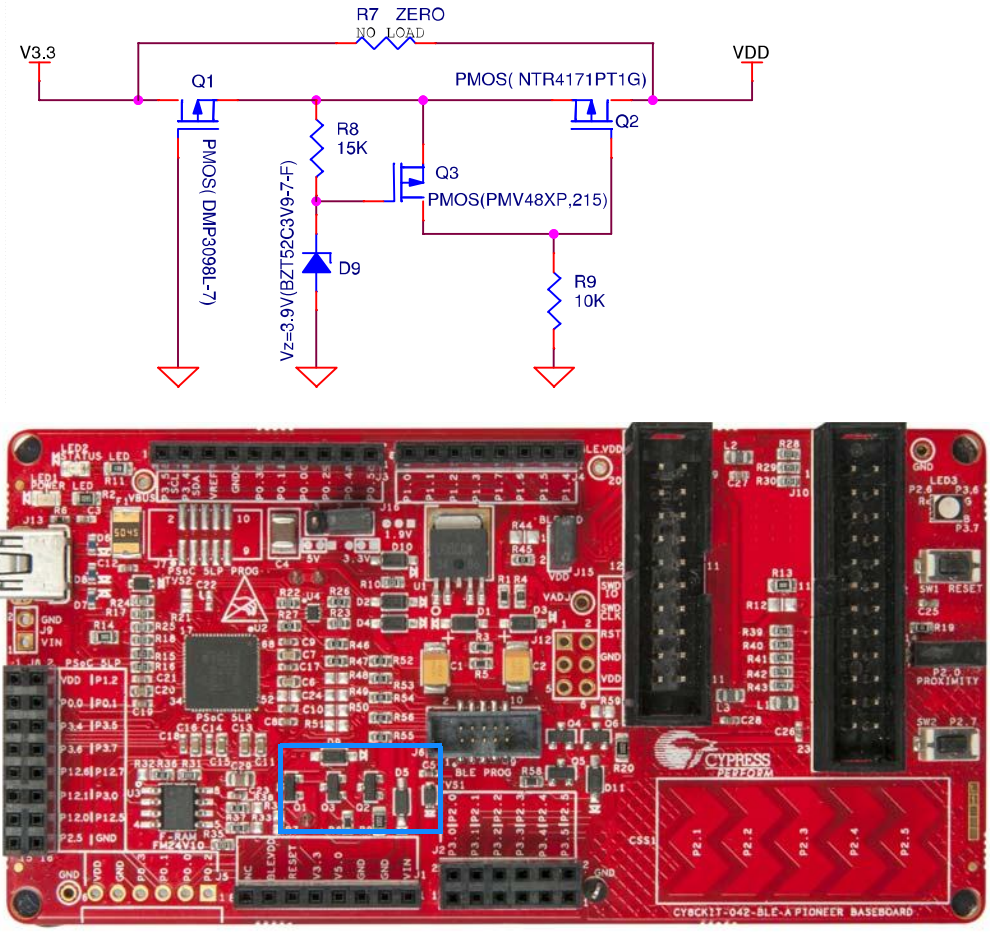
Figure 5-3. Power Supply Block Diagram With Protection Circuits



- A PTC resettable fuse is connected to protect the computer's USB ports from shorts and overcurrent.
- ORing diodes prevent damage to components when the BLE Pioneer Baseboard is powered from different voltage sources at the same time.
- ESD protection is provided for the USB Mini-B connector.

- A MOSFET-based protection circuit is provided for overvoltage and reverse-voltage protection for the 3.3-V rail from J1.5, as shown in Figure 5-4.

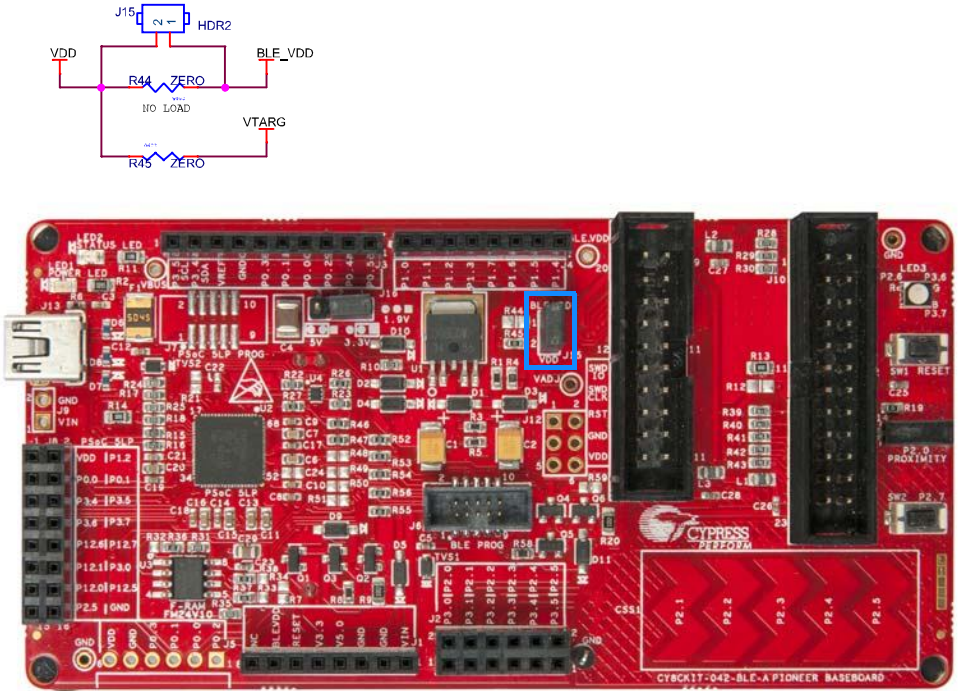
Figure 5-4. Schematics and Board Highlight of MOSFET Protection Circuit for 3.3-V Rail from J1.5



5.1.2.2 *Current Measurement Jumper*

To demonstrate the low power consumption of PSoC 4 BLE/PRoC BLE Module, a two-pin header (J15) is populated in series with the power supply to the module. This can be used to measure current using an ammeter without the need to desolder any component from the BLE Pioneer Baseboard, as shown in Figure 5-5.

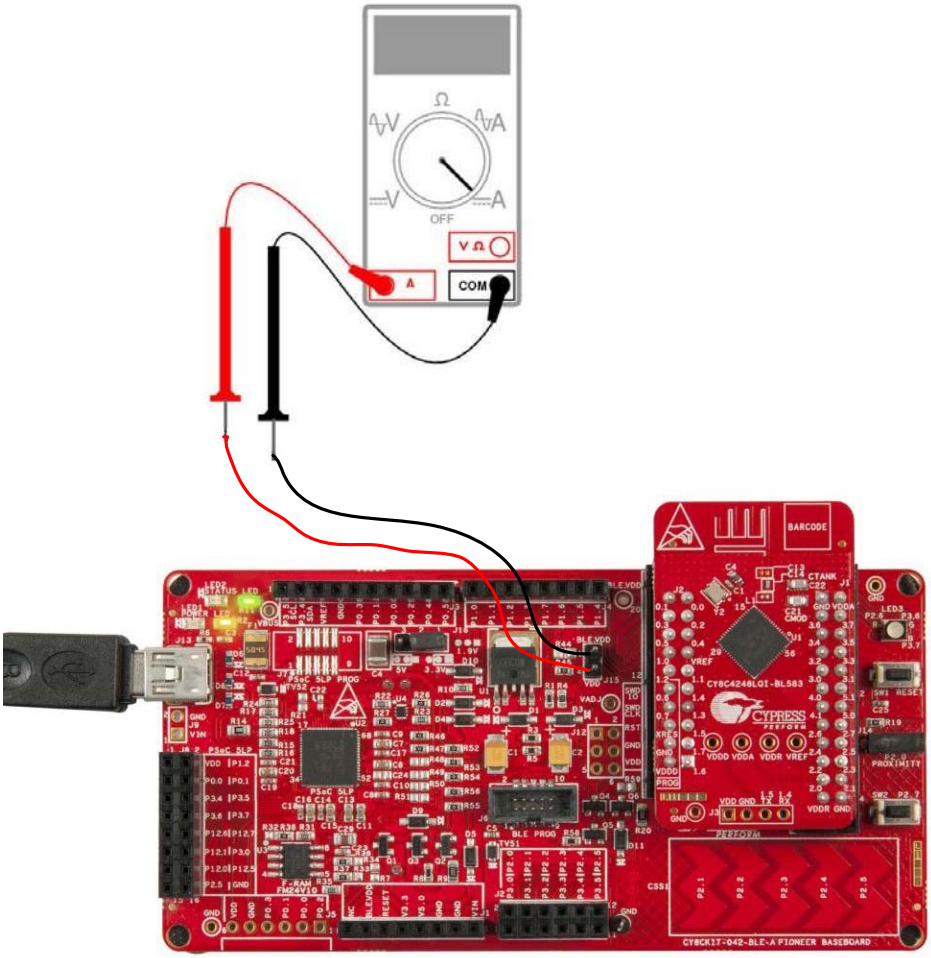
Figure 5-5. Schematics and Board Highlight of Current Measurement Jumper



The following methods are supported for measuring the current consumption of the module.

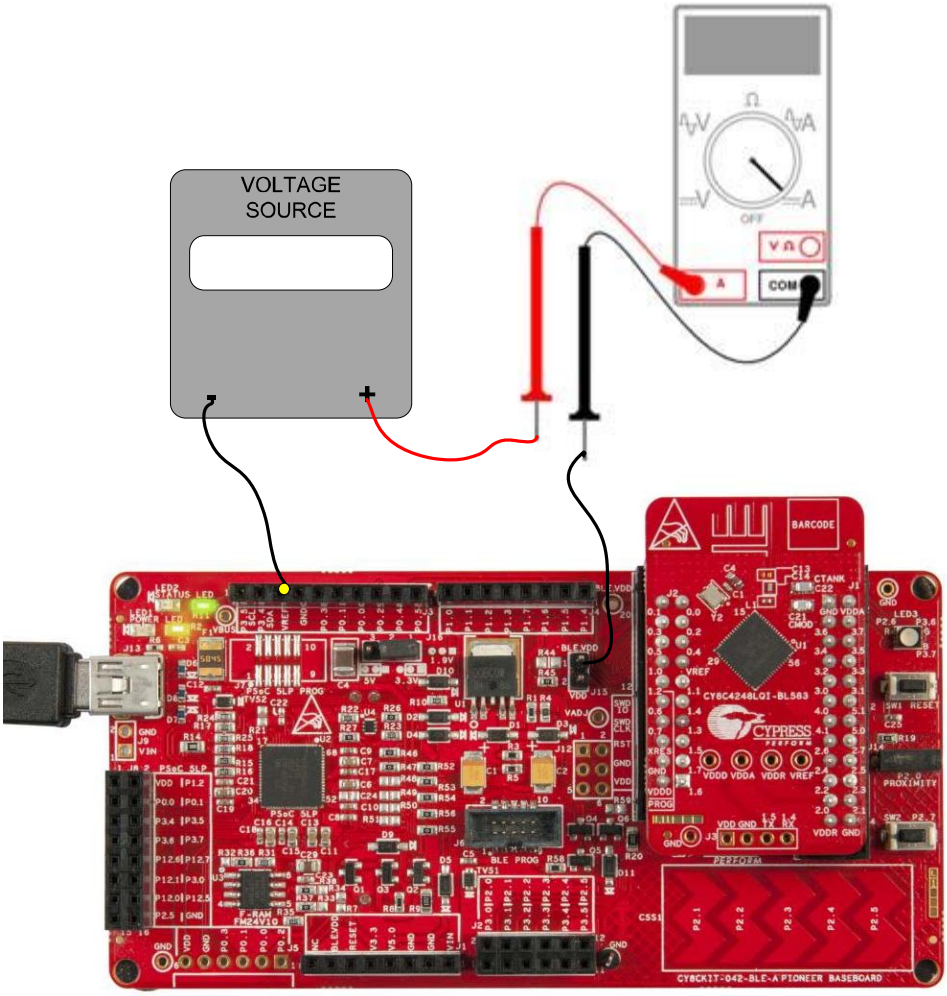
- When the BLE Pioneer Baseboard is powered through the USB port (J13), remove jumper J15 and connect an ammeter, as shown in Figure 5-6.

Figure 5-6. Current Measurement when Powered from USB Port



- When the BLE Pioneer Baseboard is powered from an external voltage supply, remove the USB cable from J13. Connect the positive terminal of the external voltage supply to the positive terminal of the ammeter and the negative terminal of the ammeter to the upper pin of J15. Connect the negative terminal of the external voltage supply to an onboard GND pin. Figure 5-7 shows the required connections.

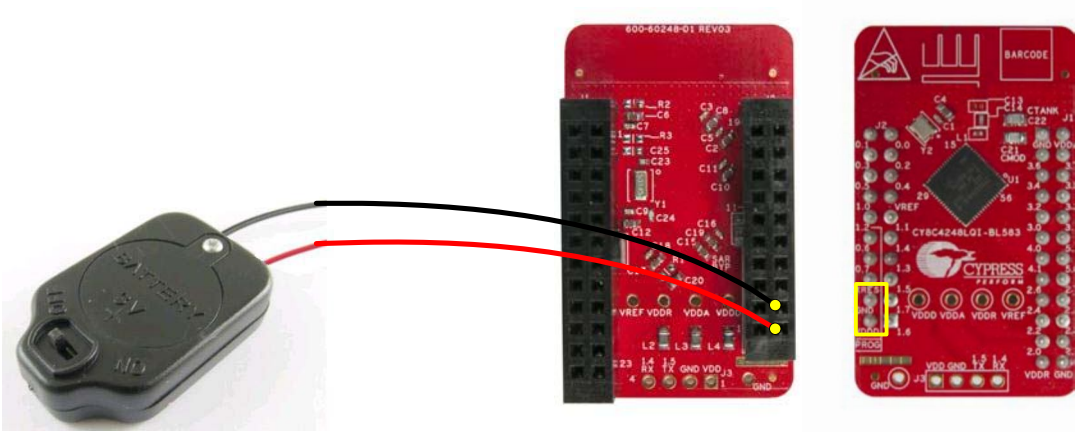
Figure 5-7. Current Measurement when Powered Separately



To measure the power consumption of only the module with coin cell, connect the coin cell directly to the modules, as shown in Figure 5-8. The BLE Pioneer Baseboard is designed with additional circuits to protect the BLE device and the F-RAM in an Arduino environment. Note that power consumption measurements on the BLE Pioneer Baseboard will also include the power consumed by these additional circuits.

Connect the positive terminal of the coin cell to pin J2.2 and negative terminal to pin J2.4 using wires.

Figure 5-8. Powering the Module using a Coin Cell



5.1.3 Programming Interface

The BLE Pioneer Kit allows you to program and debug the PSoC 4 BLE/PRoC BLE in two ways:

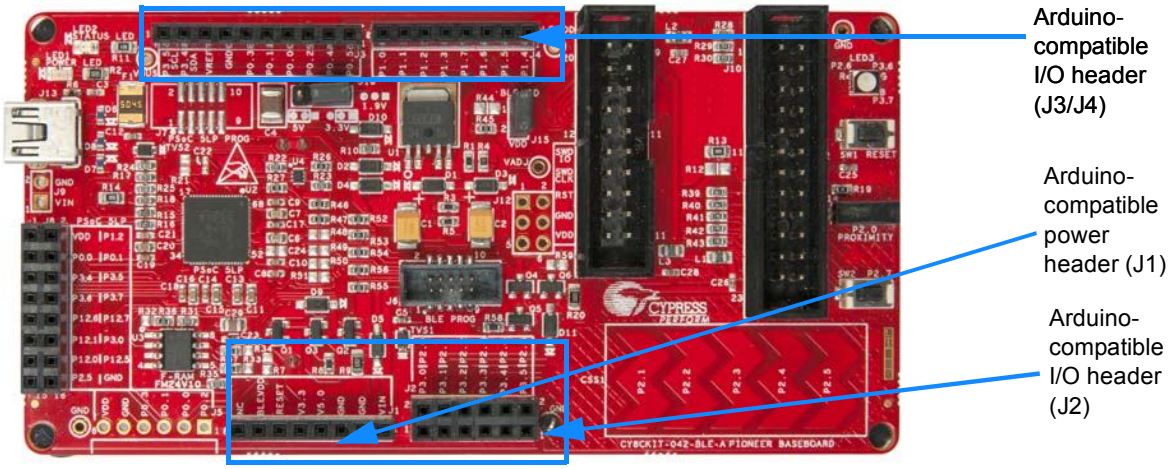
- Using the onboard KitProg
- Using a CY8CKIT-002 MiniProg3 programmer and debugger

5.1.4 Expansion Connectors

5.1.4.1 Arduino-Compatible Headers (J1, J2, J3, J4, and J12-unpopulated)

The BLE Pioneer Kit has five Arduino-compatible headers: J1, J2, J3, J4, and J12, as shown in Figure 5-9. You can develop applications based on the Arduino shield's hardware.

Figure 5-9. Arduino Headers



The J1 header contains I/O pins for reset, I/O reference voltage (IOREF), and power supply line. The J2 header is an analog port that contains I/O pins for SAR ADC, comparator, and opamp. The J3 header is primarily a digital port that contains I/O pins for PWM, I^2C, SPI, and analog reference. The J4 header is also a digital port that contains I/O pins for UART and PWM. The J12 header is an Arduino ICSP-compatible header for the SPI interface and is not populated. Refer to the “No Load Components” section of Bill of Materials (BOM) on page 118 for the header part number.

Note: Take care when powering the Arduino shields via Arduino-compatible power header (J1). The V3.3 pin will output 5 V when the board is powered from USB/VIN and the system power supply jumper (J16) is set to 5 V operation.

Additional Functionality of Header J2

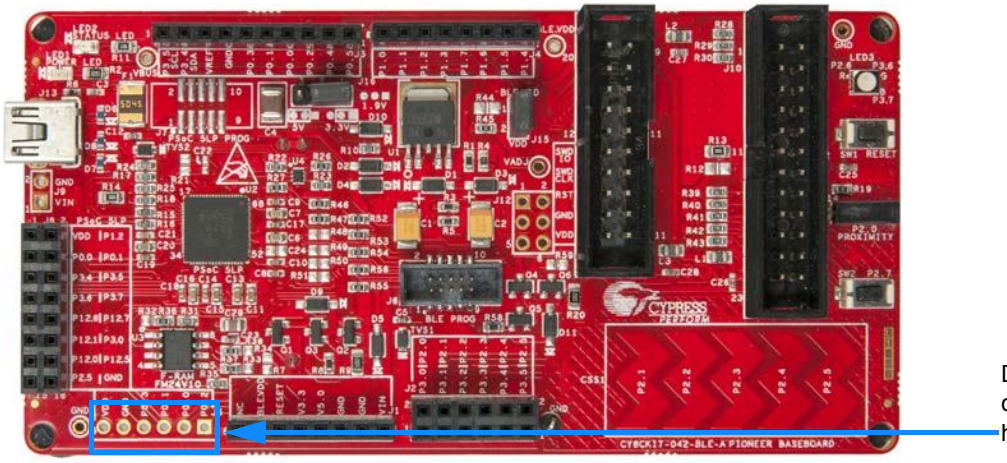
The J2 header is a 6×2 header that supports Arduino shields. The Port 2 and Port 3 pins of PSoC 4BLE and PRoC BLE are brought to this header. The Port 2 pins also connect to the onboard CapSense slider through 560-ohm resistors. When the CapSense feature is not used, remove these resistors to help ensure better performance with these pins.

5.1.4.2 Pmod Connector - Digilent Pmod Compatible (J5-unpopulated)

This port supports Digilent Pmod modules (see Figure 5-10). Pmods are small I/O interfaces that connect with the embedded control boards through either 6- or 12-pin connectors. The BLE Pioneer Kit supports the 6-pin Pmod Type 2 (SPI) interface. For Digilent Pmod cards, go to www.digilentinc.com.

This header is not populated on the BLE Pioneer Baseboard. You must populate this header before connecting the Pmod daughter cards. Refer to the “No Load Components” section of Bill of Materials (BOM) on page 118 for the header part number.

Figure 5-10. Schematics and Board Highlight of Pmod Connector

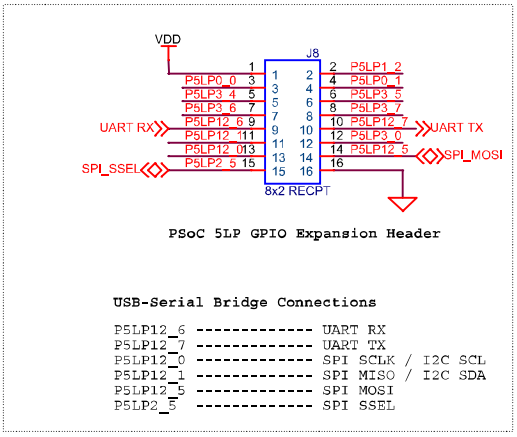


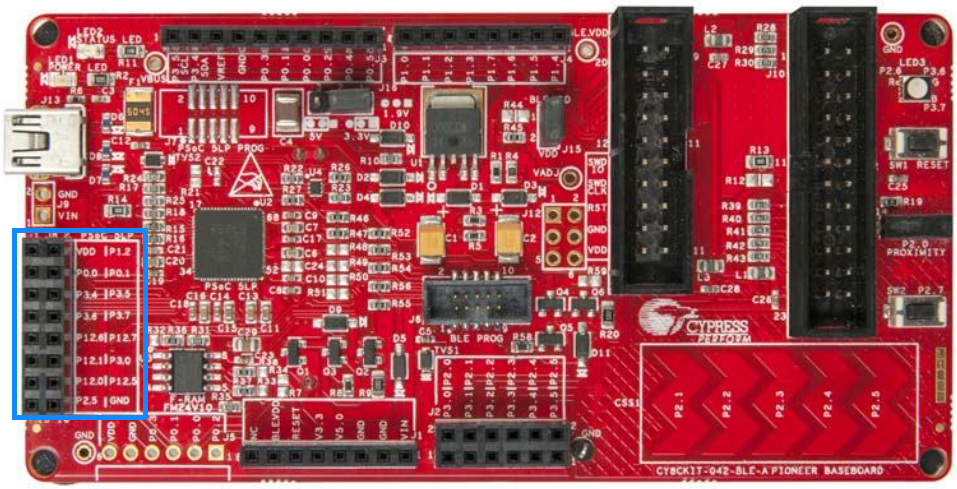
5.1.4.3 PSoC 5LP GPIO Header (J8)

An 8×2 header is provided on the BLE Pioneer Baseboard to pull out several pins of PSoC 5LP to support advanced features such as a low-speed oscilloscope and a low-speed digital logic analyzer (see Figure 5-11). This header also contains the USB-Serial interface pins that can be used when these pins are not accessible on the Arduino headers because a shield is connected.

Note: You can use PSoC 5LP for your own custom firmware.

Figure 5-11. Schematics and Board Highlight of PSoC 5LP GPIO Expansion Header

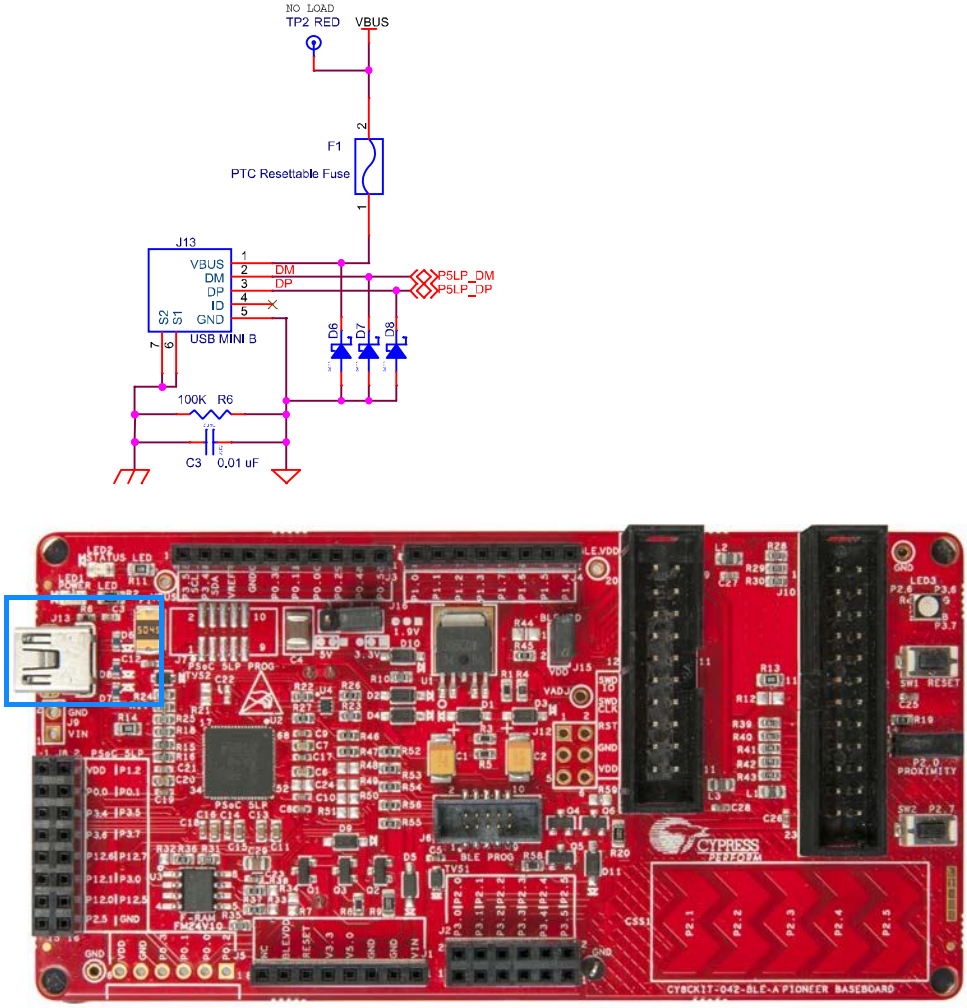




5.1.5 USB Mini-B Connector

The PSoC 5LP connects to the USB port of a computer through a Mini-B connector (see Figure 5-12), which can also be used to power the BLE Pineer Baseboard. A resettable polyfuse is used to protect the computer's USB ports from shorts and overcurrent. If more than 500 mA is drawn from the USB port, the fuse will automatically break the connection until the short or overload is removed.

Figure 5-12. Schematics and Board Highlight of USB Mini-B Connector

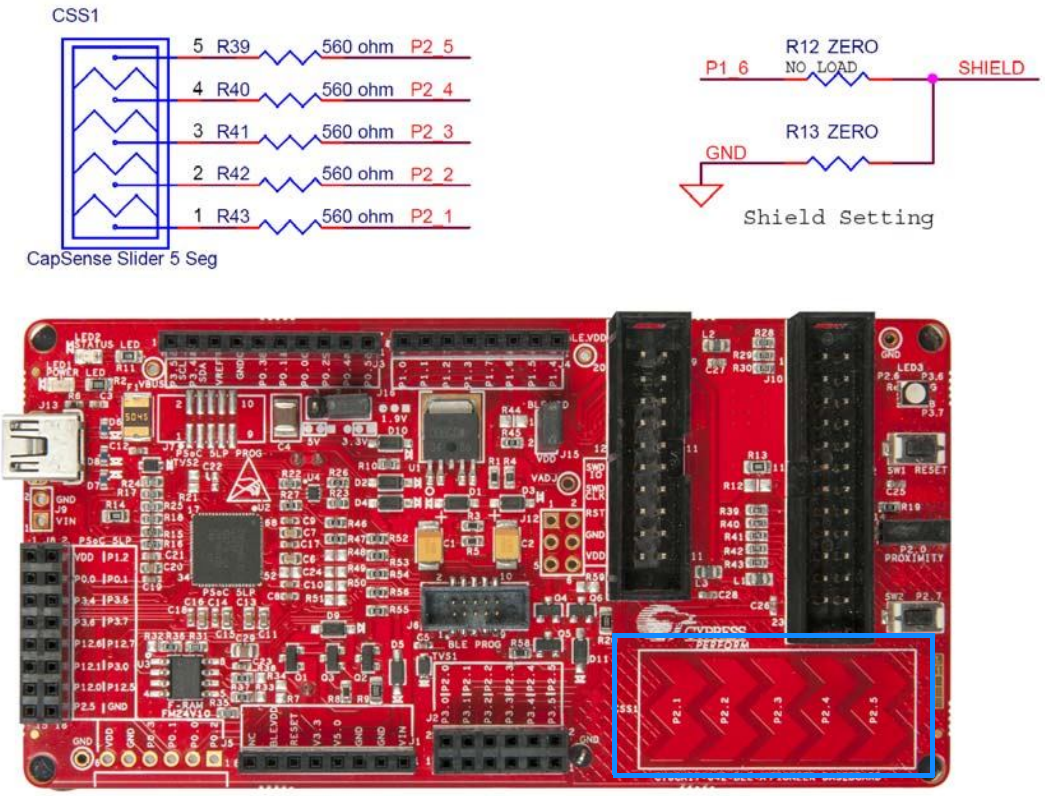


5.1.6 CapSense Circuit

5.1.6.1 CapSense Slider

The BLE Pioneer Kit has a five-segment linear capacitive touch slider, which is connected to the PSoC 4 BLE/PRoC BLE Module pins (see Figure 5-13). The CMOD and CTANK capacitors are required for CapSense functionality and are provided on the modules (see Module Board on page 107). A 2.2-nF capacitor is present on the CMOD pin, P4[0], for CapSense operation. BLE Pioneer Kit also supports CapSense designs that enable waterproofing. The connection of the shield to the pin or to ground is made by resistors R12 and R13, respectively. By default, R13 is mounted on the BLE Pioneer Baseboard, which connects the shield to ground. Populate R12 and remove R13 when evaluating waterproofing designs, which will connect the shield to the designated pin, P1[6].

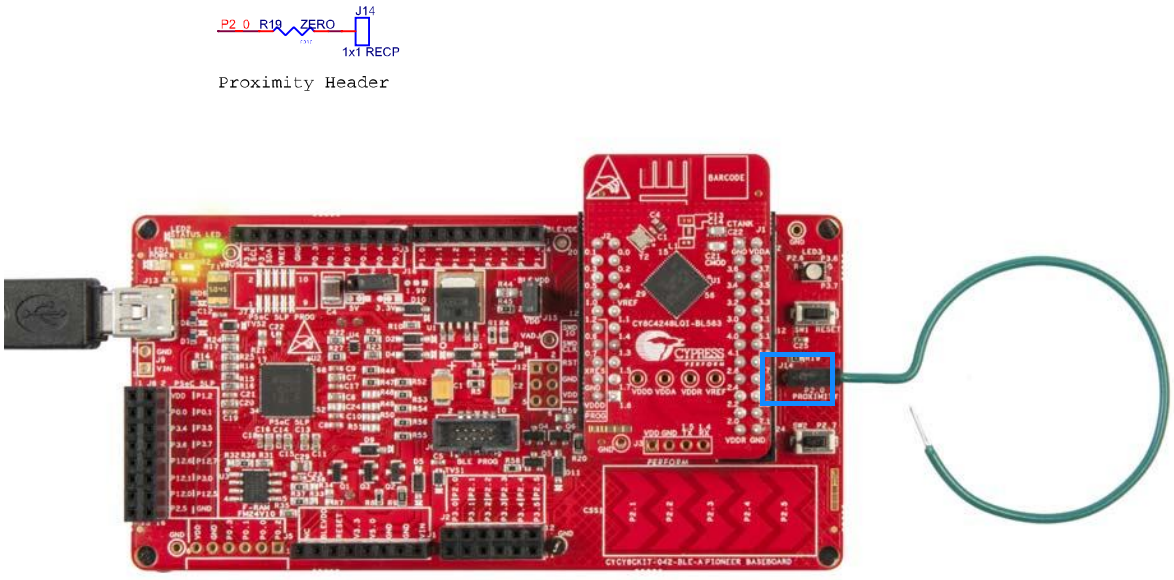
Figure 5-13. Schematics and Board Highlight of CapSense Slider and Shield Setting



5.1.6.2 Proximity Header

The BLE Pioneer Baseboard contains a header (J14) for CapSense proximity wire connection (see Figure 5-14).

Figure 5-14. Schematics and Board Highlight of Proximity Header



5.1.7 BLE Pioneer Baseboard LEDs

The BLE Pioneer Baseboard has three LEDs. A green LED (LED2) indicates the status of the programmer. An amber LED (LED1) indicates the status of power supplied to the board. The BLE Pioneer Kit also has a general-purpose tricolor LED (LED3) for user applications. These are connected to P2_6 (red LED), P3_6 (green LED) and P3_7 (blue LED). Figure 5-15 and Figure 5-16 show the schematics of these LEDs.

Figure 5-15. Schematics of Status and Power LED

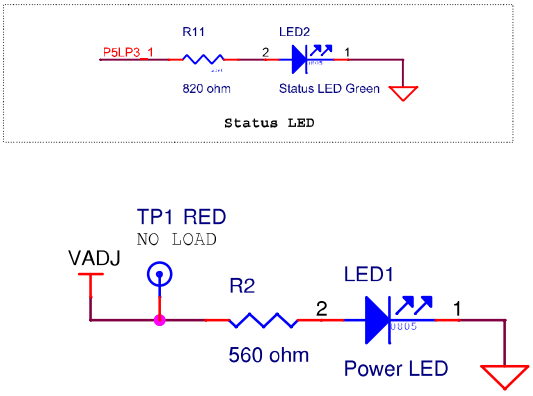
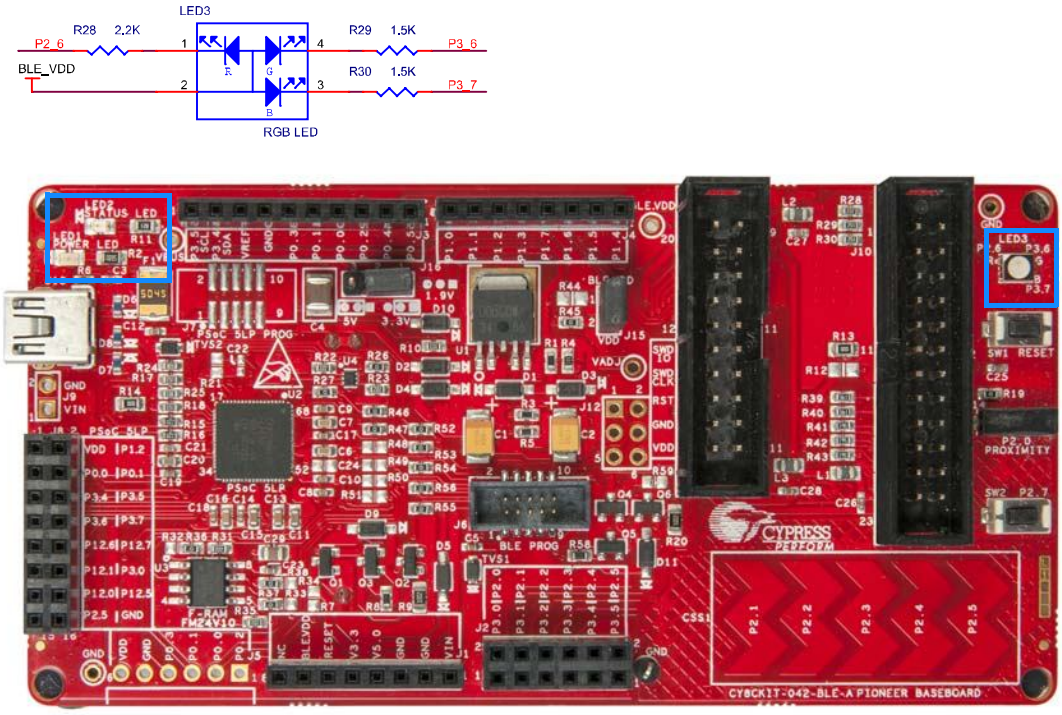


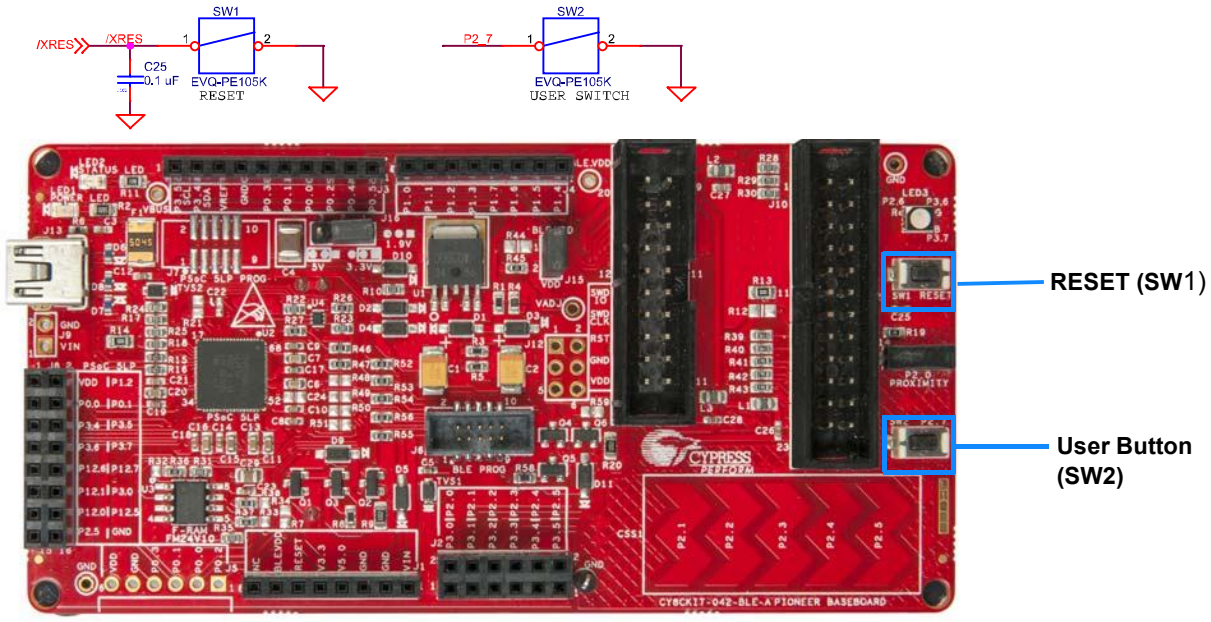
Figure 5-16. Schematics and Board Highlight of RGB LED



5.1.8 Push-Buttons

The BLE Pioneer Baseboard contains a reset push-button and a user push-button, as shown in Figure 5-17. The reset button is connected to the XRES pin of BLE device and is used to reset it. The user button is connected to P2[7] of the BLE device. Both the buttons connect to ground on activation (active low).

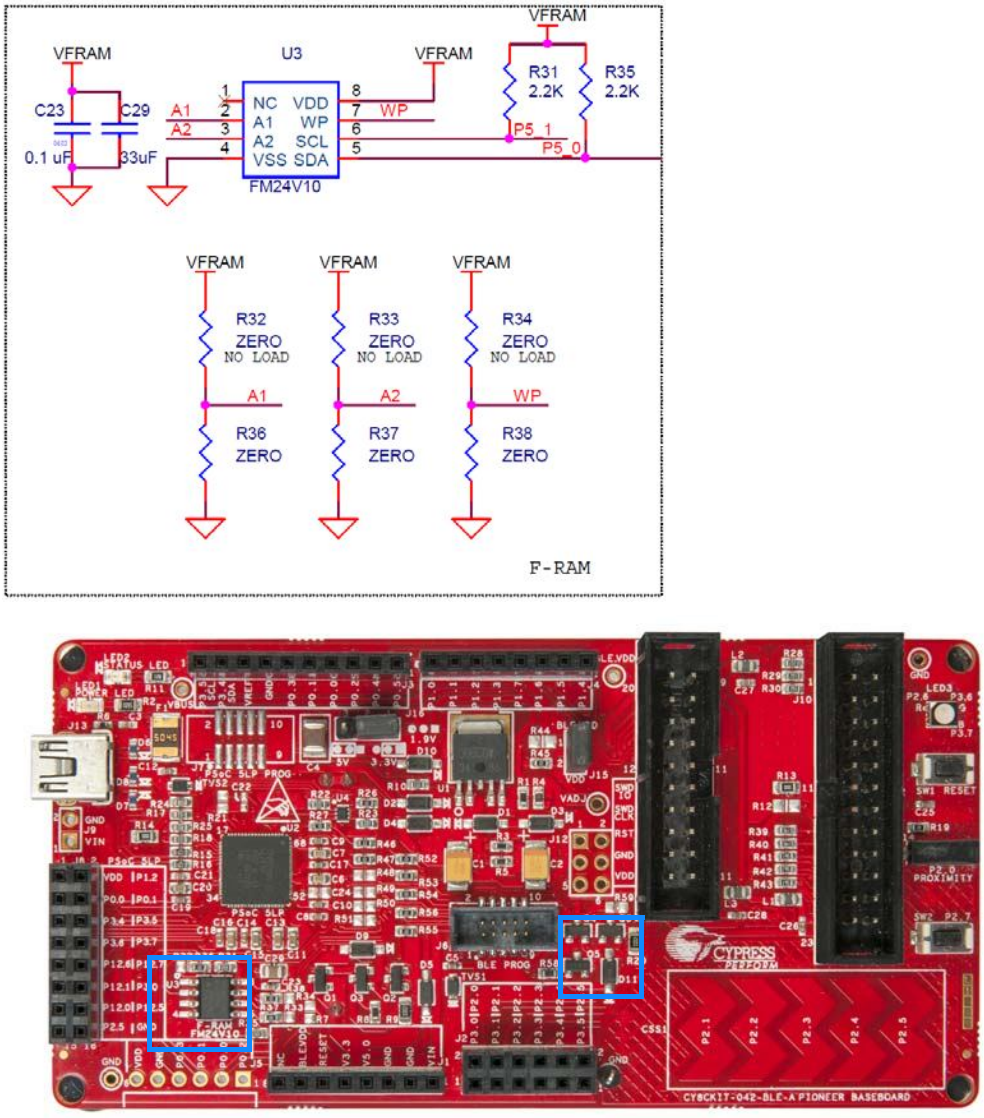
Figure 5-17. Schematics and Board Highlight of Reset Button and User Button



5.1.9 Cypress Ferroelectric RAM (F-RAM)

The BLE Pioneer Baseboard contains the FM24V10-G F-RAM device (see Figure 5-18), which can be accessed through I^2C lines P5[0] and P5[1] of the PSoC 4 BLE/PRoC BLE Module. The F-RAM is 1-Mbit (128KB) with an I^2C speed up to 1 Mbps. The I^2C slave address of the F-RAM device is seven bits wide, and the LSB two bits are configurable through physical pins and are hardwired to 00 on the board. By default, the address of the F-RAM device used on the BLE Pioneer Baseboard is 0x50. This address can be modified by changing the R32/R36 and R33/R37 pairs. The operating voltage range of the F-RAM is between 2 V and 3.6 V. To prevent the application of 5 V from the adjustable LDO regulator on the BLE Pioneer Baseboard, a MOSFET-based protection circuit similar to the one used for the 3.3-V rail is connected between the output of the regulator and the VDD pin of the F-RAM. The protection circuit cuts off the power to the F-RAM when the output of the regulator is greater than 3.6 V.

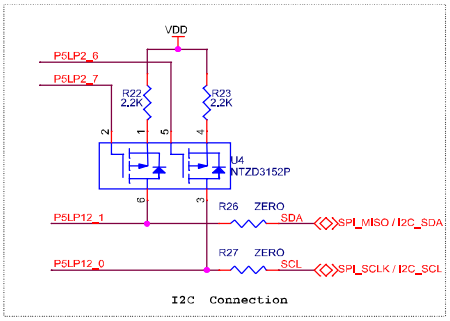
Figure 5-18. Schematics and Board Highlight of F-RAM

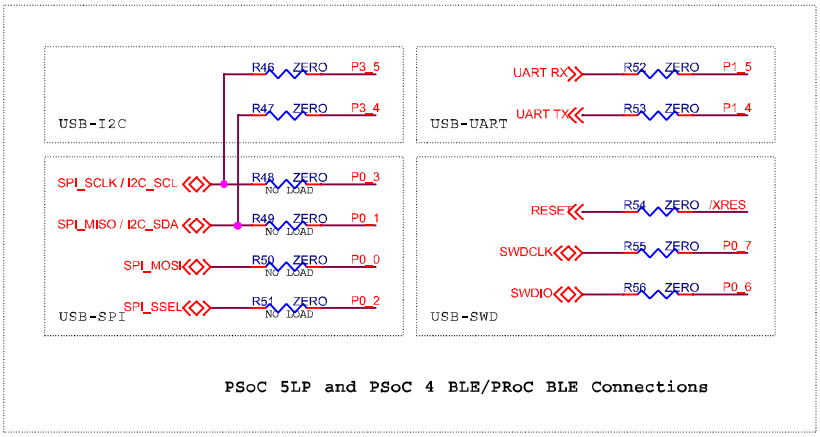


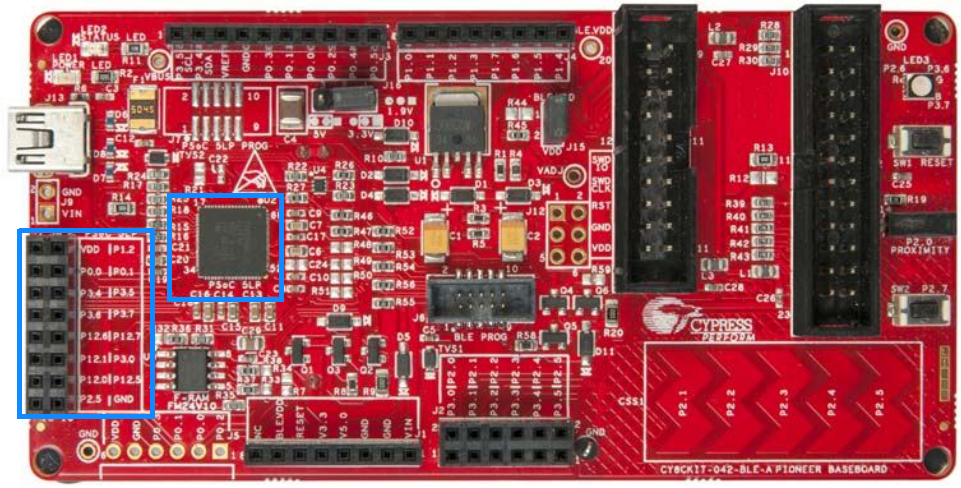
5.1.10 Serial Interconnection between KitProg and Module

The KitProg is also a USB-Serial interface. It supports USB-UART and USB-I^{2}C bridges (see Figure 5-19). The pull-up resistors on the I^{2}C bus are enabled when the protocol is selected from the user interface (such as Bridge Control Panel). The USB-Serial pins of the KitProg are also available on the Arduino header; therefore, it can be used to control Arduino shields with the SPI/I^{2}C/UART interface. Refer USB-UART Bridge on page 34 and USB-I2C Bridge on page 35 for more information on how to use these serial interconnections.

Figure 5-19. Schematics and Board Highlight of Serial Interface and I^{2}C Pull-Up via FET



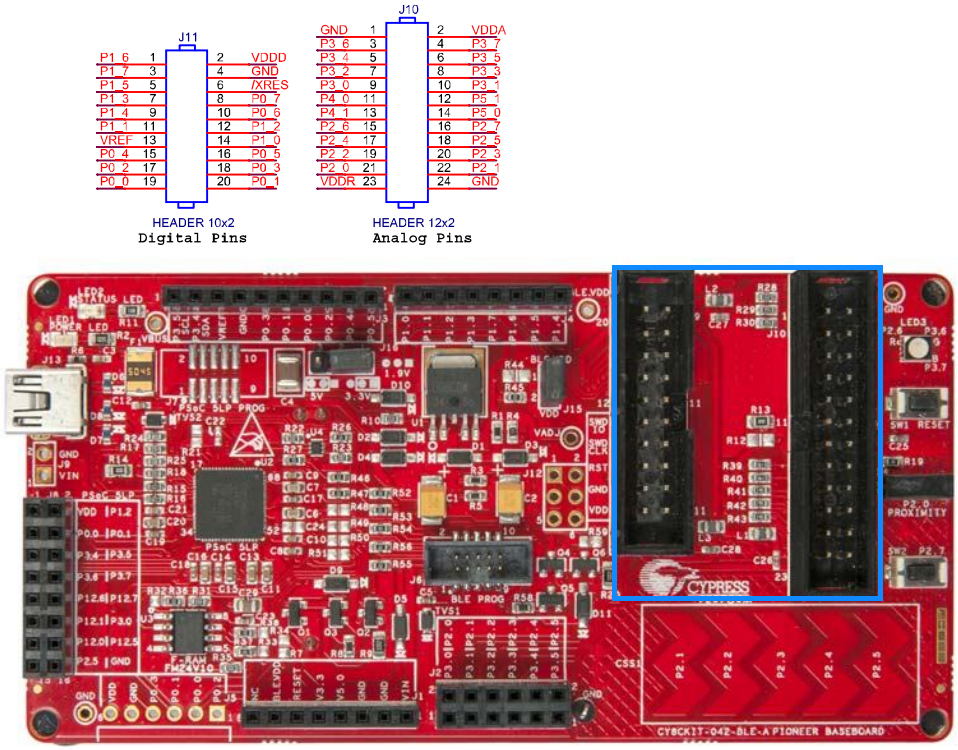




5.1.11 Module Headers

The PSoC 4 BLE and PRoC BLE Modules are connected to the BLE Pioneer Baseboard using the two (24-pin and 20-pin) module headers, as shown in Figure 5-20.

Figure 5-20. Schematics and Board Highlight of Module Headers



For information on how to add these on your own board, refer to Adding BLE Module-Compatible Headers on Your Baseboard on page 128.

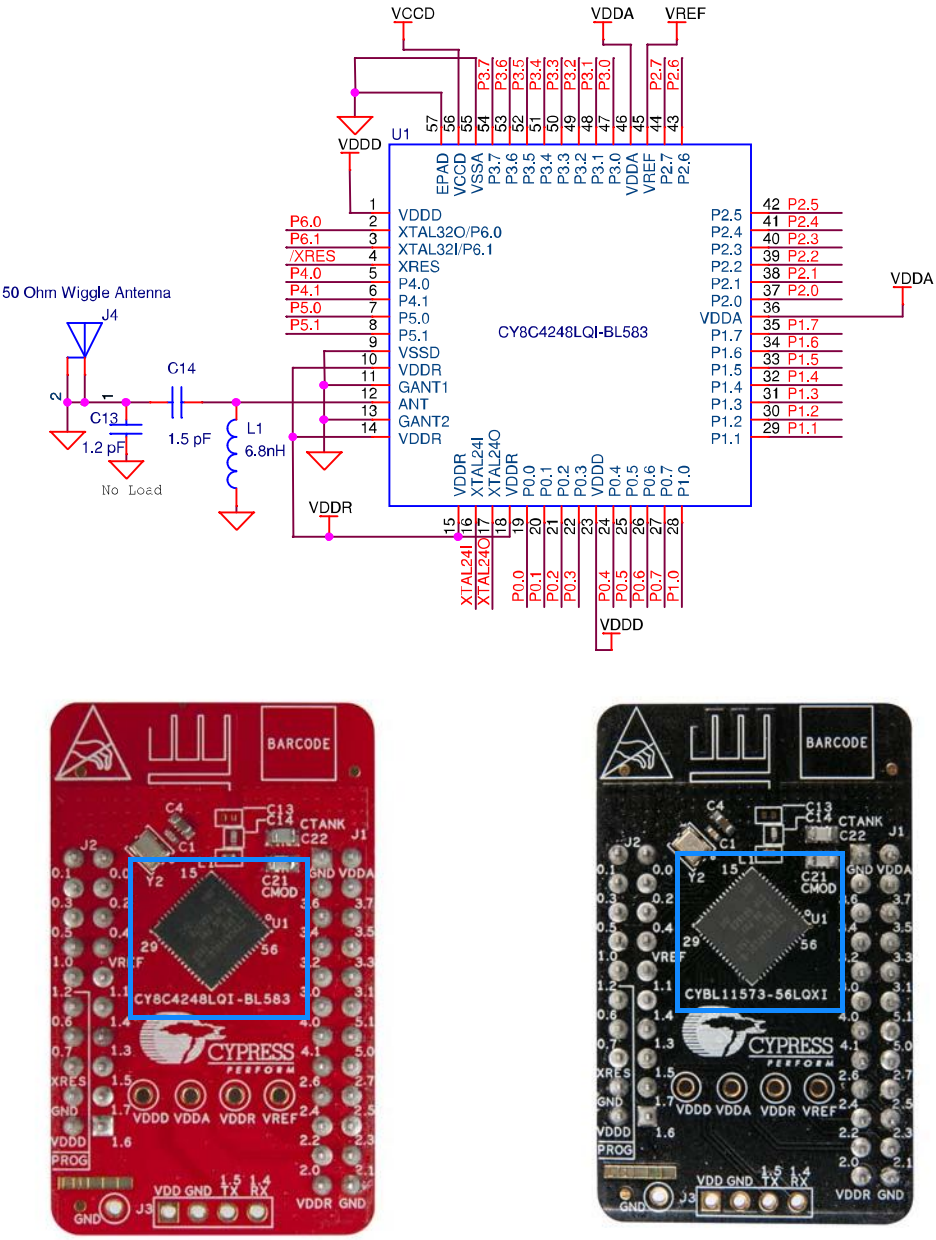
5.2 Module Board

5.2.1 PSoC 4 BLE or PRoC BLE Device

The PRoC BLE or PSoC 4 BLE device is the main component on the module. It provides the RF interface and analog and digital capability. The PRoC BLE or PSoC 4 BLE pins are mapped to the module headers (see Figure 5-21). For more information, refer to the BLE web page.

See BLE Modules and BLE Dongles Compatible with the BLE Pioneer Kit on page 130 for details.

Figure 5-21. Schematics and Board Highlight of Module Headers for BLE Pins

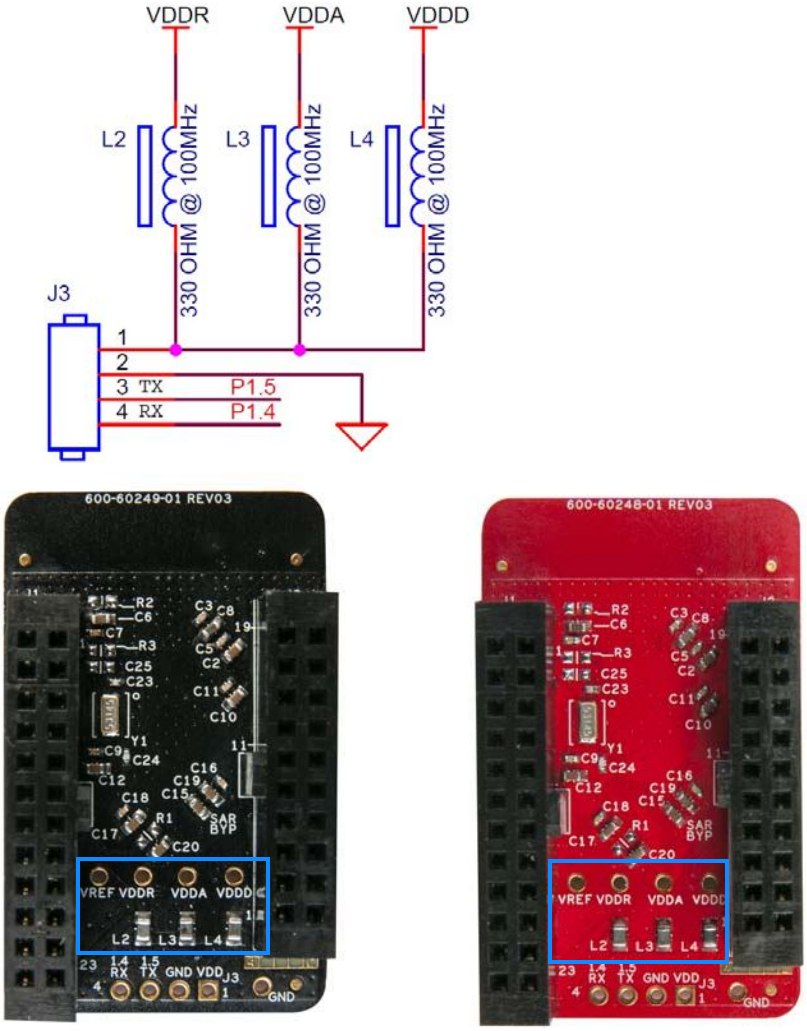


5.2.2 Module Power Connections

The module has three power domains: VDDD, VDDA, and VDDR. The VDDD connection supplies power for digital device operation, VDDA supplies power for analog device operation, and VDDR connection supplies power for the device radio. By default, these domains are shorted using a 330-ohm, 100-MHz ferrite bead. The domains are shorted for standalone usage scenarios of module, such as programming the module using MiniProg 3 or using the module as a standalone data acquisition unit.

It is recommended to place the ferrite bead between the supply to avoid ripple between VDDR and the other two domains. If the supply ripple is less that 100 mV, these can be changed to a zero-ohm resistor.

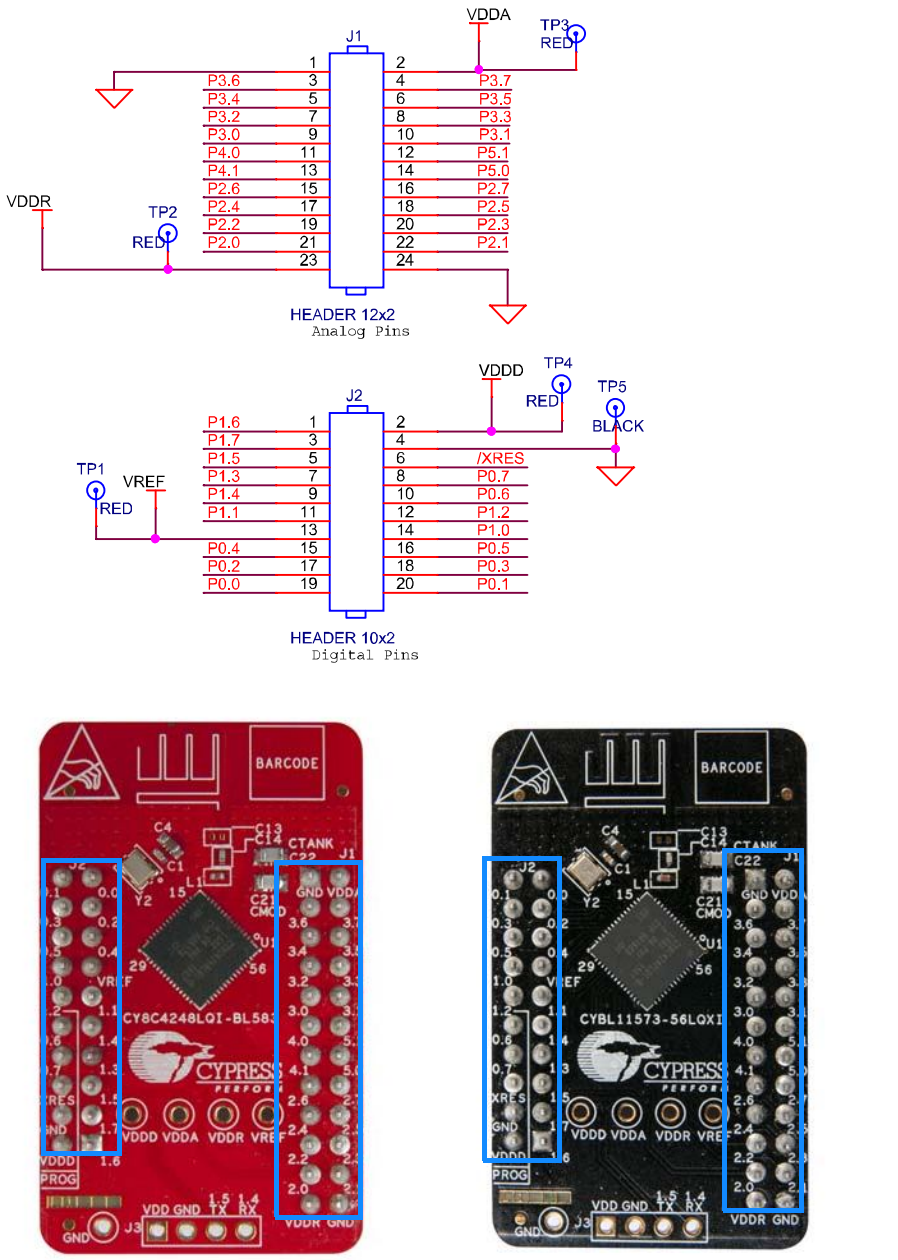
Figure 5-22. Schematics and Board Highlight of Ferrite Bead and Power Pin



5.2.3 Module Headers (20-Pin and 24-Pin Headers)

The PSoC 4 BLE and PRoC BLE Modules connect to the BLE Pioneer Baseboard using two (20-pin and 24-pin) module headers (Figure 5-23). All GPIOs and power domains are brought out to these headers. These headers are the counterparts of the connectors in Expansion Connectors on page 96.

Figure 5-23. Schematics and Board Highlight of Headers



5.2.4 Wiggle Antenna

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

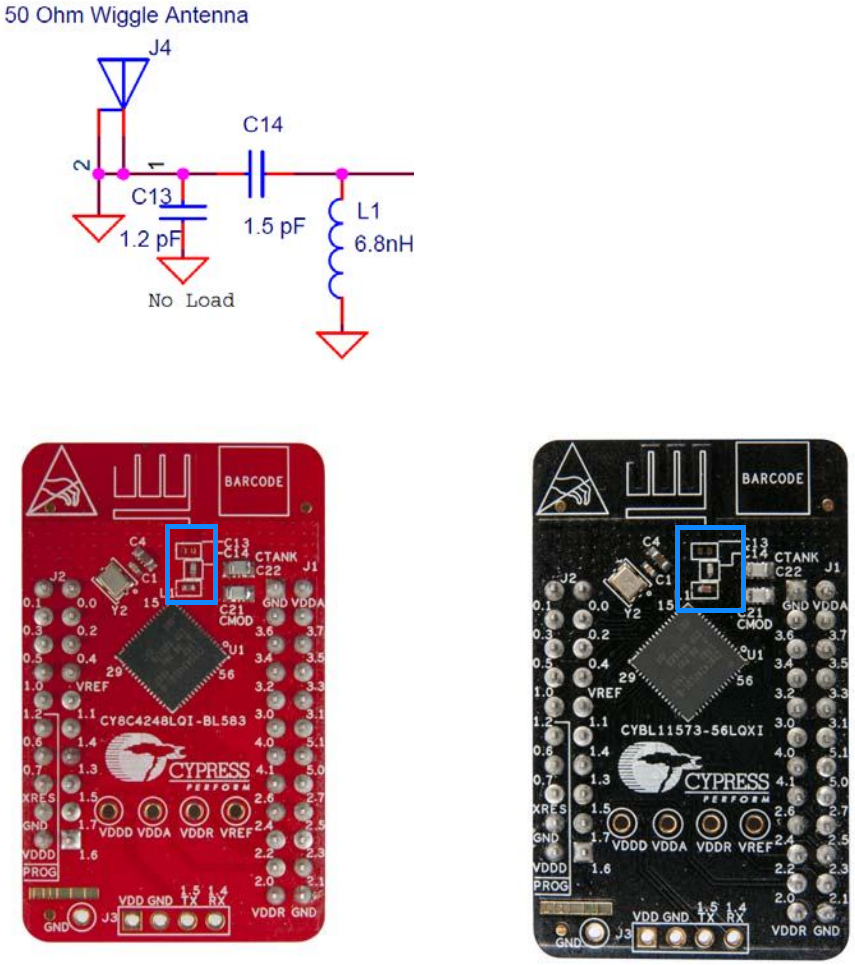
Figure 5-24. Board Highlight of Wiggle Antenna

5.2.5 Antenna Matching Network

An Antenna Matching Network is required between the BLE device and the antenna to achieve optimum performance (Figure 5-25). 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.

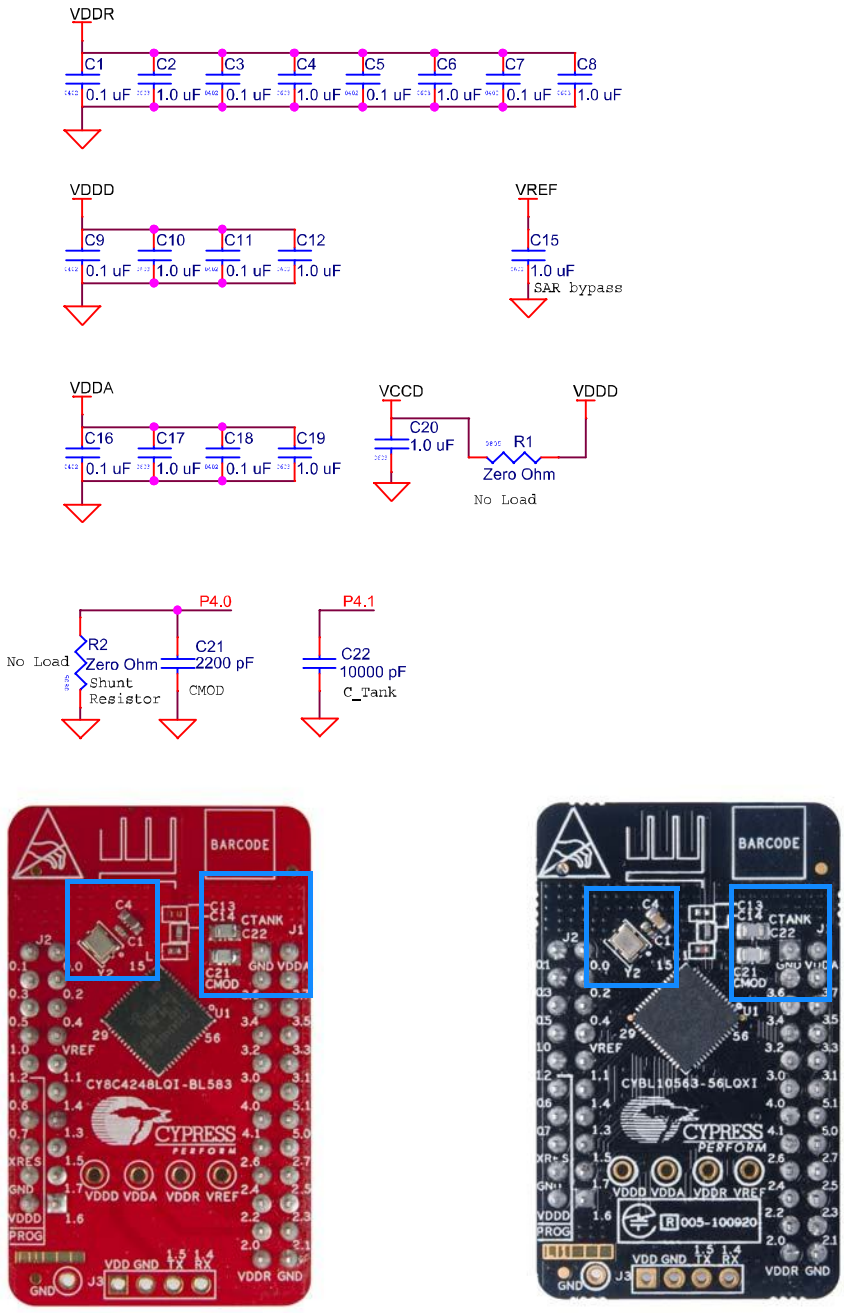
Figure 5-25. Schematics and Board Highlight of Antenna Matching Network and Antenna

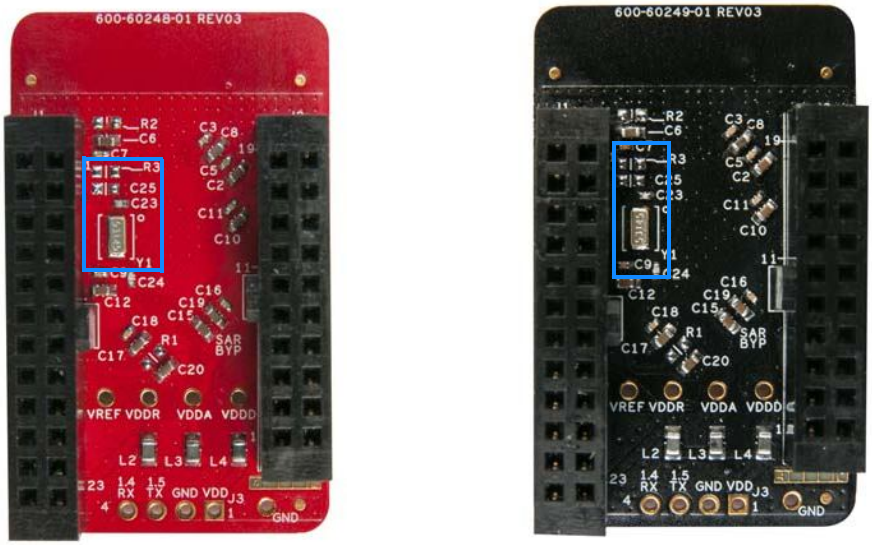


5.2.6 BLE Passives

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 5-26.

Figure 5-26. Schematics and Board Highlight – External Crystal, CMOD, CTANK, Decaps, Jumpers





5.2.7 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 Device on page 107 for schematics of PRoC BLE pins.

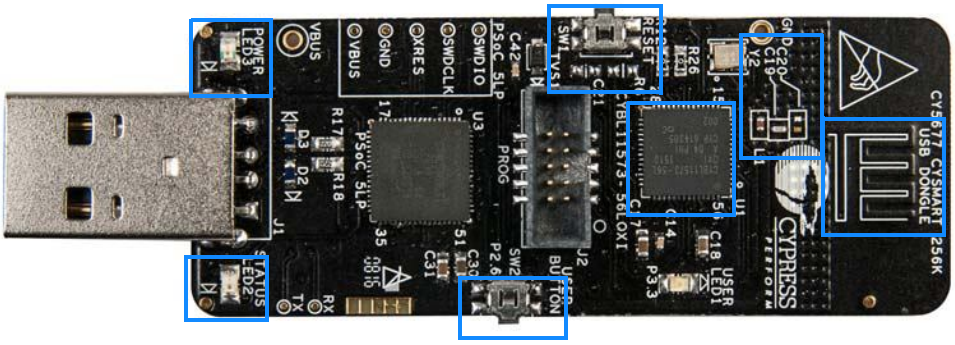
See Wiggle Antenna on page 110 for schematics of wiggle antenna.

See Antenna Matching Network on page 111 for schematics of antenna matching network.

See BLE Pioneer Baseboard LEDs on page 101 for schematics of power and status LED.

See Push-Buttons on page 103 for schematics of push-buttons.

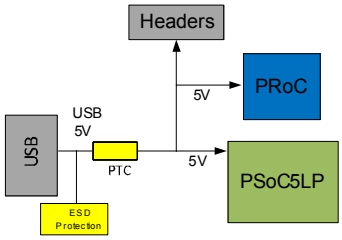
Figure 5-27. Board Highlight



5.3.1 Power System

The BLE Dongle is powered directly using 5 V from the USB port, as shown in Figure 5-28.

Figure 5-28. Power Supply Block Diagram With Protection Circuits



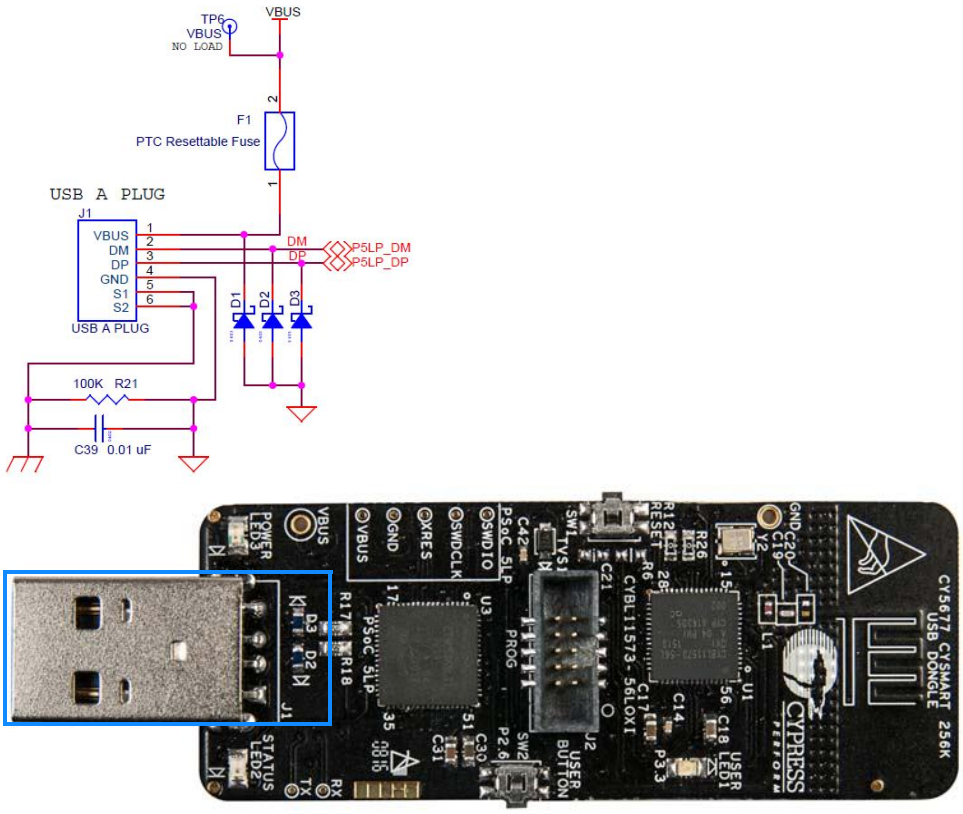
5.3.1.1 Protection Circuits

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 KitProg on the BLE Dongle connects to the USB port of a computer through a USB Type-A plug (Figure 5-29). The BLE Dongle is powered using the same plug. 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.

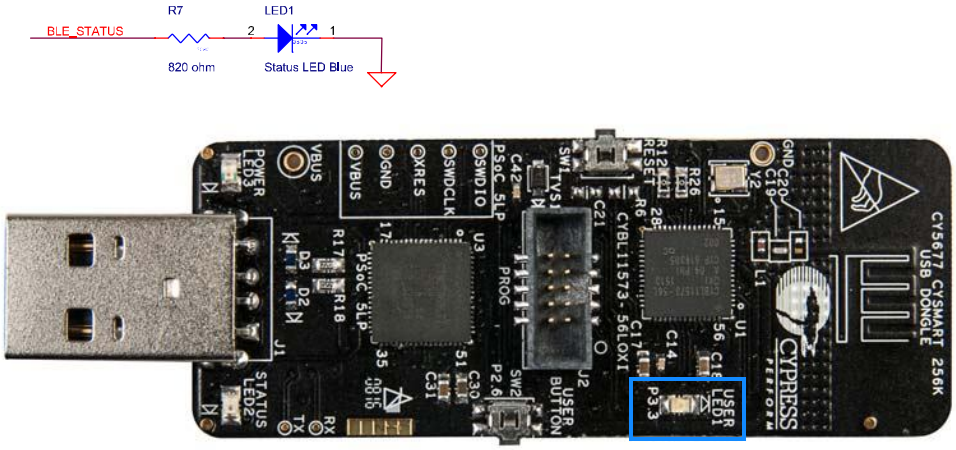
Figure 5-29. Schematics and Board Highlight of USB Type-A Plug



5.3.3 User LED

A user LED is provided to indicate status from the PRoC BLE device (Figure 5-30). It is also used to show the bind status.

Figure 5-30. Schematics and Board Highlight of User LED



6. Advanced Topics

This chapter describes the functionality of the FM24V10 F-RAM in the BLE Pioneer Kit.

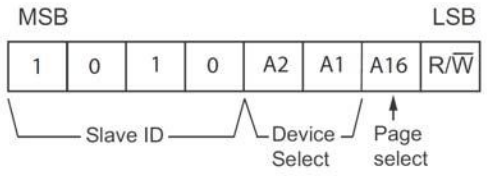
6.1 Using FM24V10 F-RAM

The BLE Pioneer Baseboard 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 (P5_0 and P5_1). 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.

6.1.1 Address Selection

The slave address of the F-RAM device consists of three parts, as shown in Figure 6-1: 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 the BLE Pioneer Baseboard (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 Baseboard is controlled by resistors R32/R36 (A1) and R33/R37 (A2). Because the memory location in F-RAM is divided into two pages of 64KB 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 6-1. F-RAM I^2C Address Byte Structure



6.1.2 Write/Read Operation

The device datasheet includes details on how to perform a write/read operation with the F-RAM. Figure 6-2 and Figure 6-3 provide a snapshot of the write/read packet structure as a quick reference.

Figure 6-2. F-RAM Single-Byte and Multiple-Byte Write Packet Structure

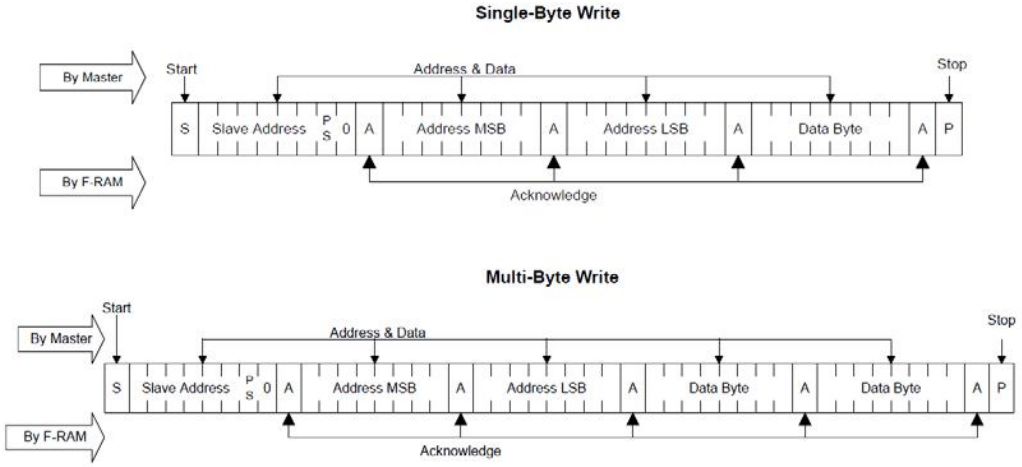
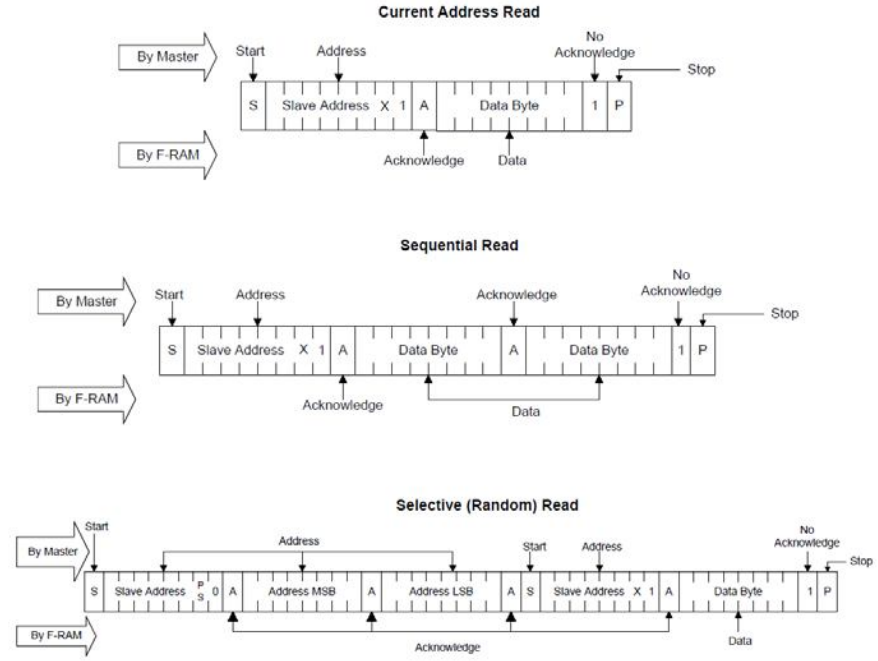


Figure 6-3. F-RAM Single-Byte and Multiple-Byte Read Packet Structure



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.

A. Appendix

A.1 Bill of Materials (BOM)

A.1.1 BLE Pioneer Baseboard

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
1	1	PCB	-	Printed circuit board	Cypress	600-60194-01, Rev04
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

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
17	1	J3	10x1 RECP	CONN HEADER FMALE 10POS .1" GOLD	Protectron Electro-mech	P9401-10-21
18	1	J6	50MIL KEYED SMD	CONN HEADER 10 PIN 50MIL KEYED SMD	Samtec	FTSH-105-01-L-DV-K
19	1	J8	8X2 RECP	CONN HEADER FMAL 16PS.1" DL GOLD	Protectron Electro-mech	P9403-16-21
20	1	J10	12X2 RECP	CONN HEADER 2.54MM 24POS GOLD	Sullins Connector Solutions	SBH11-PBPC-D12-ST-BK
21	1	J11	10X2 RECP	CONN HEADER 2.54MM 20POS GOLD	Sullins Connector Solutions	SBH11-PBPC-D10-ST-BK
22	1	J13	USB MINI B	MINI USB RCPT R/A DIP	TE Connectivity	1734510-1
23	1	J14	1X1 RECP	CONN RCPT 1POS .100" SNGL HORZ	Samtec Inc	BCS-101-L-S-HE
24	1	J15	2p_jumper	CONN HEADR BRKWAY .100 2POS STR	Protectron Electro-mech	P9101-02-12-1
25	1	J16	3p_jumper	CONN HEADR BRKWAY .100 3POS STR	Protectron Electro-mech	P9101-03-12-1
26	1	LED1	Power LED Amber	LED 595NM AMB DIFF 0805 SMD	Avago Technologies	HSMA-C170
27	1	LED2	Status LED Green	LED GREEN CLEAR 0805 SMD	Chicago Miniature	CMD17-21VGC/TR8
28	1	LED3	RGB LED	LED RED/GREEN/BLUE PLCC4 SMD	Cree, Inc.	CLV1A-FKB-CJ1M1F1BB7R4S3
29	3	L1,L2,L3	330 OHM @ 100MHz	FERRITE CHIP 330 OHM 0805	Murata	BLM21PG331SN1D
30	3	Q2,Q4,Q6	PMOS	MOSFET P-CH 30V 2.2A SOT23	ON Semiconductor	NTR4171PT1G
31	1	Q1,	PMOS	MOSFET P-CH 30V 3.8A SOT23-3	Diodes Inc	DMP3098L-7
32	2	Q3,Q5	PMOS	MOSFET P-CH 20V 3.5A SOT23	NXP Semiconductors	PMV48XP,215
33	1	R1	11K 1%	RES 11K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1102V
34	1	R2	560 ohm	RES 560 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ561V
35	1	R3	14.7K 1%	RES 14.7K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1472V
36	1	R4	10K 1%	RES 10K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1002V
37	1	R5	4.3K 1%	RES 4.3K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF4301V
38	1	R6	100K	RES 100K OHM 1/10W 5% 0402 SMD	Panasonic - ECG	ERJ-2GEJ104X
39	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

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
40	2	R8,R58	15K	RES 15K OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF1502V
41	2	R9,R20	10K 1%	RES 10K OHM 1/8W 1% 0805 SMD	Stackpole Electronics Inc	RMCF0805FT10K0
42	1	R10	10K	RES 10K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ103V
43	1	R11	820 ohm	RES 820 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ821V
44	2	R13,R14	ZERO	RES 0.0 OHM 1/8W 0805 SMD	Panasonic-ECG	ERJ-6GEY0R00V
45	2	R15,R16	22E	RES 22 OHM 1/10W 1% 0603 SMD	Panasonic - ECG	ERJ-3EKF22R0V
46	2	R17,R18	15K	RES 15K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ153V
47	5	R22,R23,R28,R31,R35	2.2K	RES 2.2K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ222V
48	2	R24,R25	30K	RES 30K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ303V
49	2	R29,R30	1.5K	RES 1.5K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ152V
50	5	R39,R40,R41,R42,R43	560 ohm	RES 560 OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ561V
51	2	SW1,SW2	SW PUSH-BUTTON	SWITCH TACTILE SPST-NO 0.05A 12V	Panasonic - ECG	EVQ-PE105K
52	1	TP5	BLACK	TEST POINT PC MINI .040"D Black	Keystone Electronics	5001
53	2	TVS1,TVS2	5V 350W	TVS UNIDIR 350W 5V SOD-323	Dioded Inc.	SD05-7
54	1	U1	LDO	IC REG LDO ADJ 1A TO252-5	Rohm Semiconductor	BA00BC0WFP-E2
55	1	U2	PSoC 5LP	68QFN PSoC 5LP chip for USB debug channel and USB-Serial interface	Cypress Semiconductor	CY8C5868LTI-LP039
56	1	U3	F-RAM	F-RAM 1-Mbit (128K X 8) I2C interface	Cypress Semiconductor	FM24V10-G
57	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						
58	4	N/A	N/A	BUMPER CYLIN 0.375" DIA BLK	3M	SJ61A4
Special Jumper Installation Instructions						
59	2	J15,J16	Install jumper across pins 1 and 2	Rectangular Connectors MINI JUMPER GF 6.0MM CLOSE TYPE BLACK	Kobiconn	151-8010-E

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
Label						
60	1	N/A	N/A	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60329-01 Rev 04 (YYWWVVXXXXX)	Cypress Semiconductor	
61	1	N/A	N/A	LBL, QR code, 12mm X 12mm	Cypress Semiconductor	
No load components						
62	1	C22	0.1 uFd	CAP .1UF 16V CERAMIC Y5V 0402	TDK Corporation	C1005X5R1A104K050BA
63	1	C24	1.0 uFd	CAP CERAMIC 1.0UF 25V X5R 0603 10%	Taiyo Yuden	TMK107BJ105KA-T
64	9	R7,R59,R32,R33,R34,R48,R49,R50,R51	Zero Ohm	RES 0.0 OHM 1/10W JUMP 0603	TE Connectivity	1623094-1
65	1	R21	4.7K	RES 4.7K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ472V
66	1	J7	50MIL KEYED SMD	CONN HEADER 10 PIN 50MIL KEYED SMD	Samtec	FTSH-105-01-L-DV-K
67	1	J9	2 PIN HDR	CONN HEADER FEMALE 2POS .1" GOLD	Sullins Connector Solutions	PPPC021LFBN-RC
68	2	TP4,TP5	BLACK	TEST POINT 43 HOLE 65 PLATED BLACK	Keystone Electronics	5001
69	3	TP1,TP2,TP3	RED	TEST POINT 43 HOLE 65 PLATED RED	Keystone Electronics	5000
70	2	R44,R12	ZERO	RES 0.0 OHM 1/8W 0805 SMD	Panasonic-ECG	ERJ-6GEY0R00V
71	1	J12	3x2 RECPT	CONN HEADER FMAL 6PS .1" DL GOLD	Sullins Connector Solutions	PPPC032LFBN-RC
72	1	J5	6X1 RECP RA	CONN FEMALE 6POS .100" R/A GOLD	Sullins Connector Solutions	PPPC061LGBN-RC

A.1.2 Module

A.1.2.1 CY5676A PRoC BLE 256KB Module

Item	Qty	Reference	Value	Description	Mfr_Name	Mfr_Part_Number
1	1	PCB	-	PRoC BLE 256KB Module printed circuit board	Cypress qualified vendor	600-60249-01 Rev 03
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 - 256KB	Cypress Semiconductor	CYBL11573-56LQXI
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 121-60216-01 Rev 01 (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
19	1	R1	Zero Ohm	RES 0.0 OHM 1/8W 0605 SMD	TE Connectivity	1623094-1

Item	Qty	Reference	Value	Description	Mfr_Name	Mfr_Part_Number
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.1.2.2 CY8CKIT-143A PSoC 4 BLE 256KB Module

Item	Qty	Reference	Value	Description	Mfr_Name	Mfr_Part_Number
1	1	PCB	-	PSoC 4 BLE 256KB Module printed circuit board	Cypress qualified vendor	600-60248-01 Rev 03
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 - 256KB	Cypress Semiconductor	CY8C4248LQI-BL583
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

Item	Qty	Reference	Value	Description	Mfr_Name	Mfr_Part_Number
16	1	LBL	-	LBL, PCA Label, Vendor Code, Datecode, Serial Number 121-60215-01 Rev 01 (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	-	-
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.1.3 CY5677 CySmart BLE 4.2 USB Dongle

Item	Qty	Reference	Value	Description	Manufacturer	Mfr Part Number
1	1	-	-	BLE Dongle Printed circuit board	Cypress qualified vendor	600-60326-01 Rev01
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, 56QFN 256KB	Cypress Semiconductor	CYBL11573-56LQXI
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	32.768KHz	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 (YYWWV-VXXXXX); 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	-	-

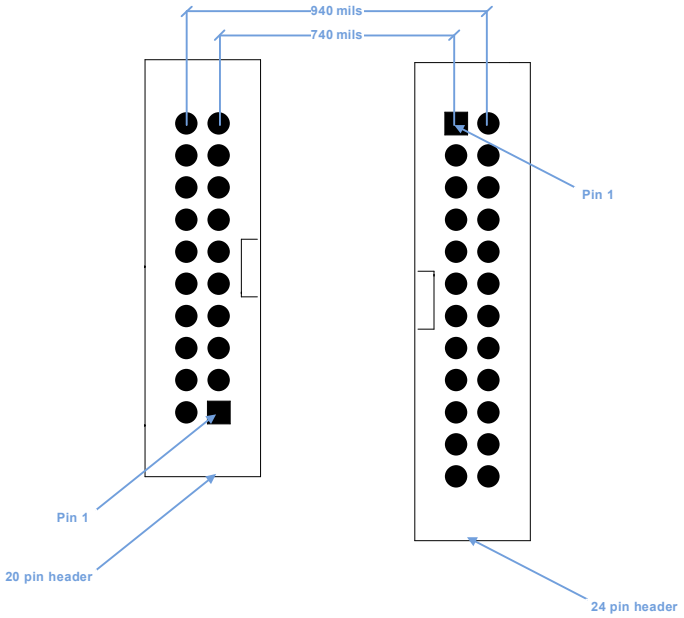
A.2 KitProg Status LED States

User Indication	Scenario	Action Required by user
LED blinks fast: Frequency = 4.00 Hz	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 the **Upgrade Firmware** button.
LED blinks slow: Frequency = 0.67 Hz	Entered Bootloader mode by holding the Reset button of the BLE Pioneer Kit/BLE Dongle during kit power up.	Release the Reset button and replug 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.
LED blinks very fast: Frequency = 15.0 Hz	SWD operation is in progress. Any I^2C 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 I^2C command requests. In Bridge Control Panel 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.
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.
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.3 Adding BLE Module-Compatible Headers on Your Baseboard

The baseboard should have a 20-pin header and a 24-pin header. Dimension of these connectors are given here.

Figure A-1. Connectors on BLE Pioneer Kit Baseboard



These headers are available for purchase from Digikey.

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

A.4 Programming BLE Modules via MiniProg3

If the BLE Modules are to be used without the BLE Pioneer Baseboard, they can be programmed using MiniProg3. The J2 header has five adjacent pins – VDDD, GND, XRES, P0[7], and P0[6]. These pins can be used to program the BLE Module using MiniProg3.

Figure A-2. Programming a BLE Module via MiniProg3

Follow these steps to program the module:

1. Connect the MiniProg3 to the J2 connector, with the VDD of the MiniProg3 aligned to the VDDD on the module.
2. Click **Start** > **All Programs** > **Cypress** > **PSoC Programmer <version>** > **PSoC Programmer <version>**.
3. Open the desired *.hex* file in PSoC Programmer.
4. On the **Programmer** tab, set the **Programming Mode** to **Reset**.
5. Set **AutoDetection** to **On**.
6. Set **Programmer Characteristics > Protocol** to **SWD**.
7. Set **Programmer Characteristics > Voltage** to the desired value.
8. Click the **Toggle Power** icon below the menu bar to power the module.
9. Click the **Program** icon below the menu bar to program the module.

A.5 BLE Modules and BLE Dongles Compatible with the BLE Pioneer Kit

Different BLE modules and BLE dongles can work with the BLE Pioneer Kit, as listed in the following tables.

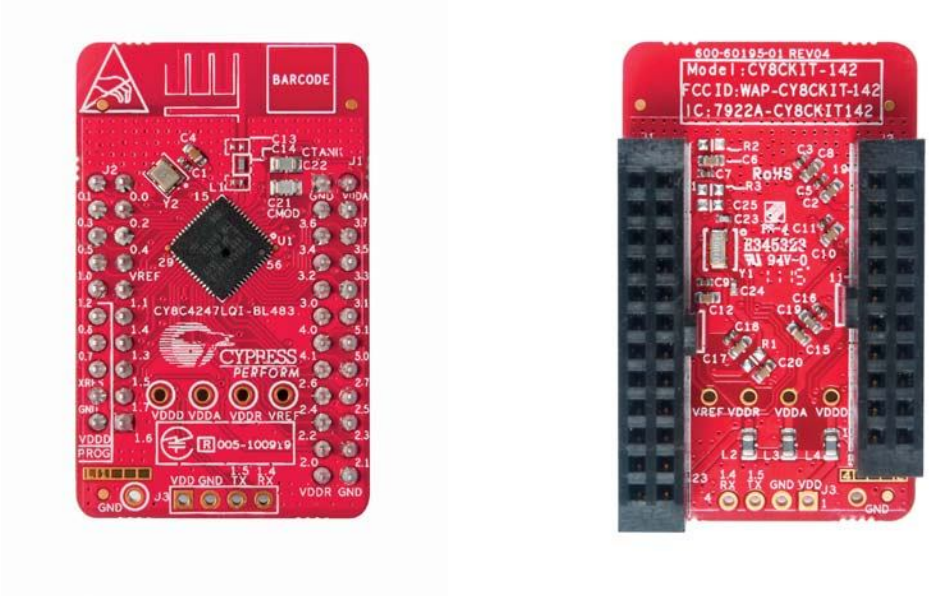
BLE Module	Availability	Flash Size	Bluetooth Version
CY8CKIT-142 PSoC 4 BLE Module	Available separately	128KB	Bluetooth 4.1
CY8CKIT-141 PSoC 4 BLE SMA Module	Available separately	128KB	Bluetooth 4.1
CY8CKIT-143 PSoC 4 BLE 256KB Module	Available separately	256KB	Bluetooth 4.1
CY8CKIT-143A PSoC 4 BLE 256KB Module	As part of the kit	256KB	Bluetooth 4.2
CY5671 PRoC BLE Module	Available separately	128KB	Bluetooth 4.1
CY5674 PRoC BLE SMA Module	Available separately	128KB	Bluetooth 4.1
CY5676 PRoC BLE 256KB Module	Available separately	256KB	Bluetooth 4.1
CY5676A PRoC BLE 256KB Module	As part of the kit	256KB	Bluetooth 4.2

BLE Dongle	Availability	Flash Size	Bluetooth Version
CY5670 CySmart USB Dongle (BLE Dongle)	Available separately	128KB	Bluetooth 4.1
CY5677 CySmart BLE 4.2 USB Dongle (BLE Dongle)	As part of the kit	256KB	Bluetooth 4.2

A.5.1 CY8CKIT-142 PSoC 4 BLE Module

This is the lower flash version of the PSoC 4 BLE Module. It can be ordered separately. This module has the CY8C4247LQI-BL483 silicon, with 128KB flash and 16KB RAM. It supports Bluetooth 4.1.

Figure A-3. CY8CKIT-142 PSoC 4 BLE Module



A.5.2 CY8CKIT-141 PSoC 4 BLE SMA Module

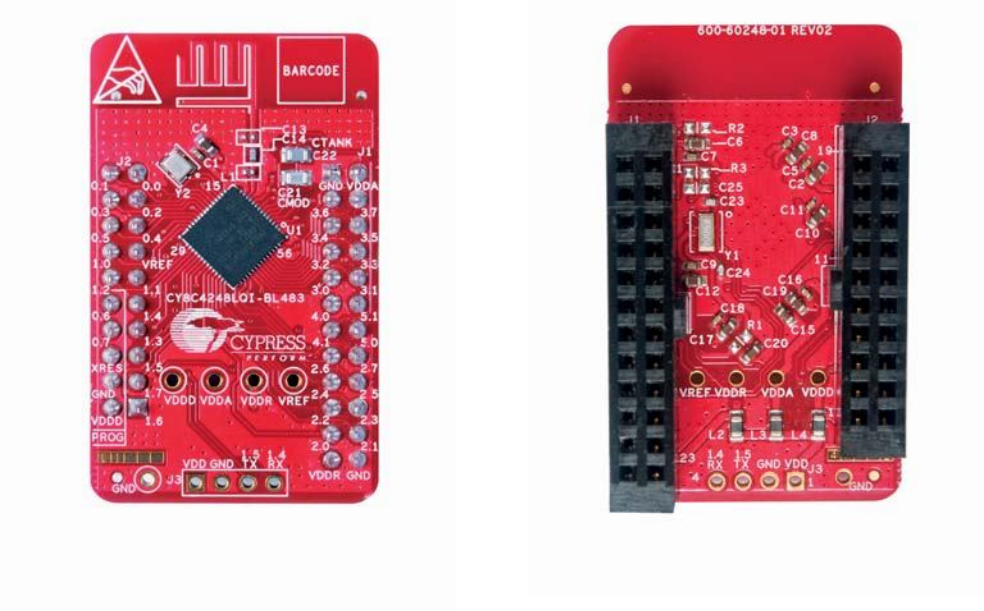
This module is identical to the CY8CKIT-142 PSoC 4 BLE Module, except that it has an SMA connector instead of a wiggle antenna; this connector can be used to connect to an external antenna. This module can be ordered separately.

Figure A-4. CY8CKIT-141 PSoC 4 BLE SMA Module

A.5.3 CY8CKIT-143 PSoC 4 BLE 256KB Module

This is the Bluetooth 4.1 equivalent of the CY8CKIT-143A PSoC 4 BLE 256KB Module. It has the CY8C4248LQI-BL483 silicon, with 256KB flash and 32KB RAM. It can be ordered separately.

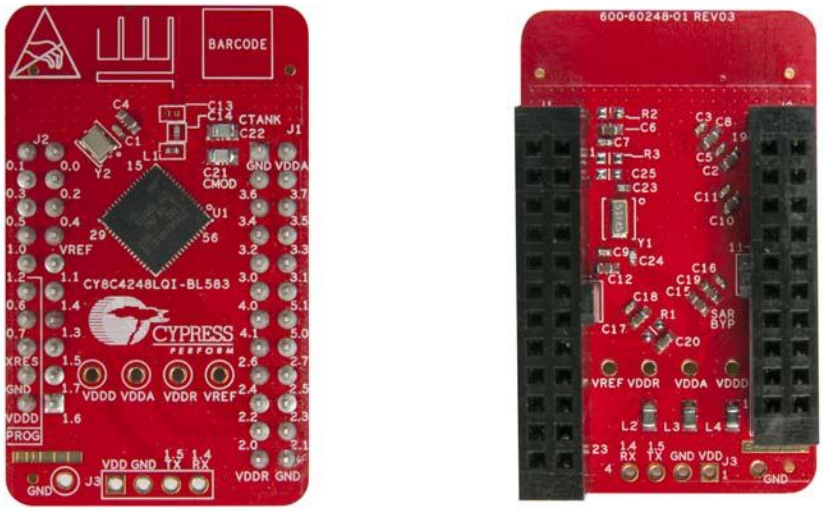
Figure A-5. CY8CKIT-143 PSoC 4 BLE 256KB Module



A.5.4 CY8CKIT-143A PSoC 4 BLE 256KB Module

This is the default PSoC 4 BLE Module shipped as part of the BLE Pioneer Kit. It supports Bluetooth 4.2 features and DMA. It has the CY8C4248LQI-BL583 silicon, with 256KB flash and 32KB RAM.

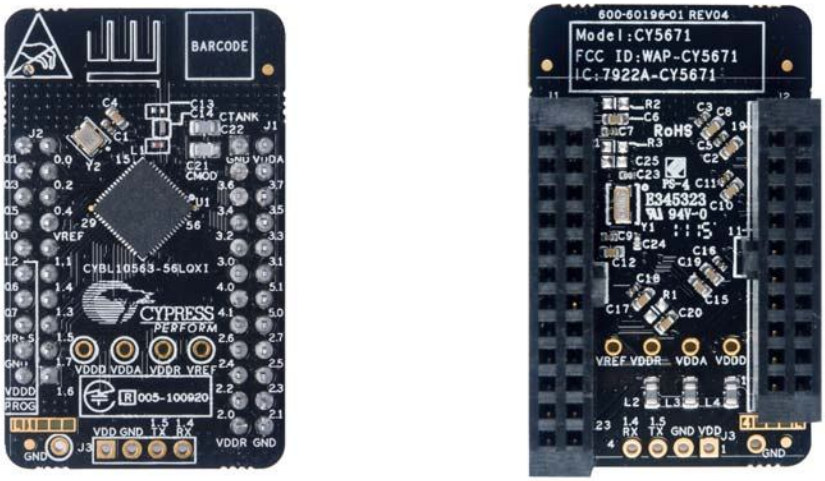
Figure A-6. CY8CKIT-143A PSoC 4 BLE 256KB Module



A.5.5 CY5671 PRoC BLE Module

This is the lower flash version of the PRoC BLE Module. It can be ordered separately. This module has the CYBL10563-56LQXI silicon, with 128KB flash and 16KB RAM. It supports Bluetooth 4.1.

Figure A-7. CY5671 PRoC BLE Module



A.5.6 CY5674 PRoC BLE SMA Module

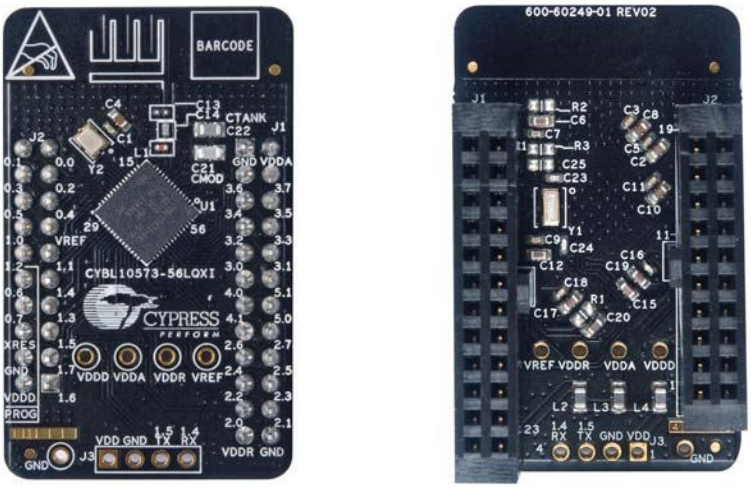
This module is identical to the CY5671 PRoC BLE Module, except that it has an SMA connector instead of a wiggle antenna; this connector can be used to connect to an external antenna. This module can be ordered separately.

Figure A-8. CY5674 PRoC BLE SMA Module

A.5.7 CY5676 PRoC BLE 256KB Module

This is the Bluetooth 4.1 equivalent of the CY5676A PRoC BLE 256KB Module. It has the CYBL10573-56LQXI silicon, with 256KB flash and 32KB RAM. It can be ordered separately.

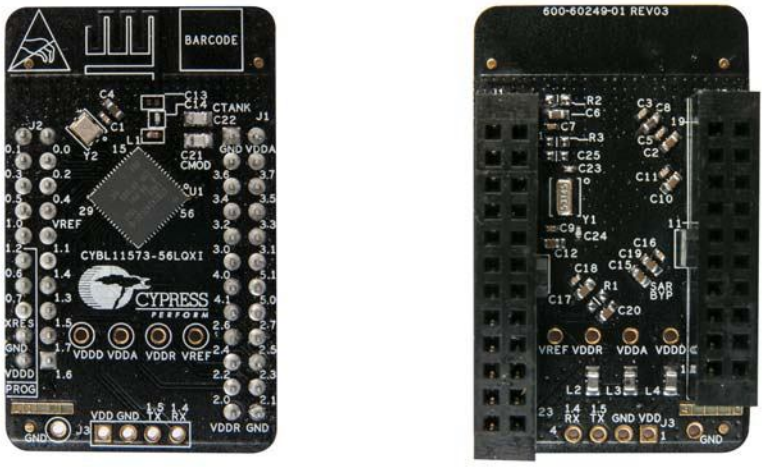
Figure A-9. CY5676 PRoC BLE 256KB Module



A.5.8 CY5676A PRoC BLE 256KB Module

This is the default PRoC BLE Module shipped as part of the BLE Pioneer Kit. It supports Bluetooth 4.2 features and DMA. It has the CYBL11573-56LQXI silicon, with 256KB flash and 32KB RAM.

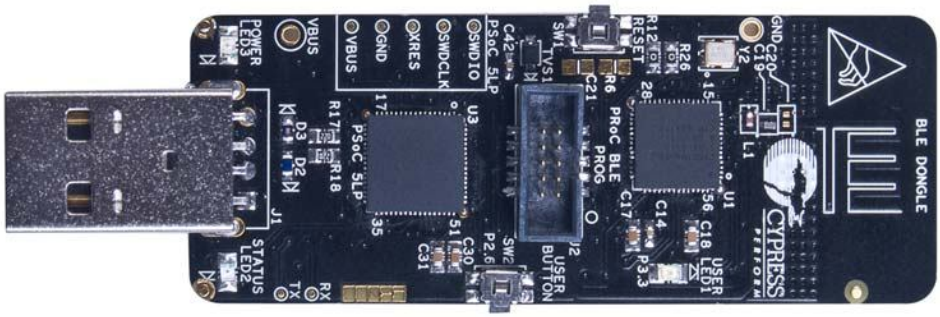
Figure A-10. CY5676A PRoC BLE 256KB Module



A.5.9 CY5670 CySmart USB Dongle (BLE Dongle)

This is the lower flash equivalent of the CY5677 CySmart BLE 4.2 USB. It can be ordered separately. This dongle has the CYBL10162-56LQXI silicon, with 128KB flash and 16KB RAM. It supports Bluetooth 4.1.

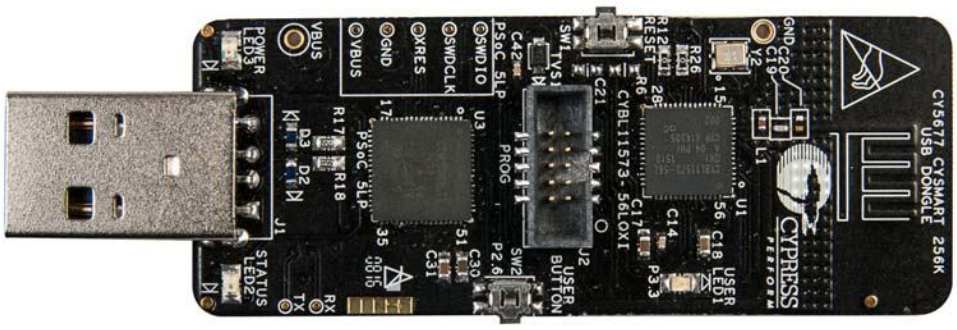
Figure A-11. CY5670 CySmart USB Dongle (BLE Dongle)



A.5.10 CY5677 CySmart BLE 4.2 USB Dongle (BLE Dongle)

This is the default BLE Dongle shipped as part of the BLE Pioneer Kit. It has the CYBL11573-56LQXI silicon, with 256KB flash and 32KB RAM. It supports Bluetooth 4.2 and DMA.

Figure A-12. CY5677 CySmart BLE 4.2 USB Dongle (BLE Dongle)

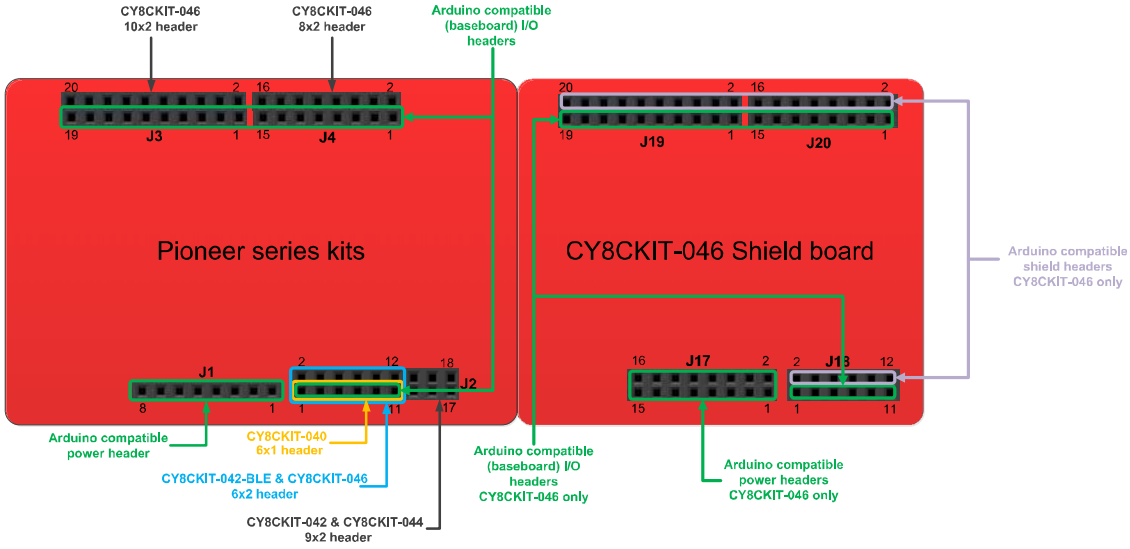


A.6 Migrating Projects Across Different Pioneer Series Kits

All Cypress Pioneer series kits are Arduino Uno-compatible and have some common onboard peripherals such as RGB LED, CapSense, and a user switch. However, the pin mapping in each of the boards is different due to differences in pin functions of the PSoC device used. This guide lists the pin maps of the Pioneer series kits to allow easy migration of projects across different kits.

In some cases, the pins available on the Pioneer kit headers are a super set of the standard Arduino Uno pins. For example, J2 contains only one row of pins on the Arduino Uno pinout while it contains two rows of pins on many of the Pioneer series kits.

Figure A-13. Pioneer Series Kits Pin Map



A.6.1 Arduino Uno-Compatible Headers

J1 Arduino-Compatible Header Pin Map						
Pin #	Arduino Pin	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	VIN	VIN	VIN	VIN	VIN	VIN
2	GND	GND	GND	GND	GND	GND
3	GND	GND	GND	GND	GND	GND
4	5V	V5.0	V5.0	V5.0	V5.0	V5.0
5	3.3V	V3.3	V3.3	V3.3	V3.3	V3.3
6	RESET	RESET	RESET	RESET	RESET	RESET
7	IOREF	P4.VDD	P4.VDD	BLE.VDD	P4.VDD	P4L.VDD
8	NC	NC	NC	NC	NC	NC

J2 Arduino-Compatible Header Pin Map						
Pin #	Arduino Pin	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	A0	P2[0]	P0[0]	P3[0]	P2[0]	P2[0]
2	–	P0[2][a]	–	P2[0]	P2[6][a]	P3[6][a]
3	A1	P2[1]	P0[1]	P3[1]	P2[1]	P2[1]
4	–-	P0[3][a]	–	P2[1][a]	P6[5][a]	P3[7][a]
5	A2	P2[2]	P0[2][a]	P3[2]	P2[2]	P2[2]
6	–	P4_VDD	–	P2[2][a]	P0[6][a]	P9[0]
7	A3	P2[3]	P0[4][a]	P3[3]	P2[3]	P2[3]
8	–	P1[5][a]	–	P2[3][a]	P4[4][a]	P9[1]
9	A4	P2[4]	P1[3]	P3[4]	P2[4]	P2[4]
10	–	P1[4][a]	–	P2[4][a]	P4[5][a]	P9[2]
11	A5	P2[5]	P1[2]	P3[5]	P2[5]	P2[5]
12	–	P1[3][a]	–	P2[5][a]	P4[6][a]	P9[3]
13	–	P0[0]	–	–	P0[0]	–
14	–	GND	–	–	GND	–
15	–	P0[1]	–	–	P0[1]	–
16	–	P1[2][a]	–	–	P3[4][a]	–
17	–	P1[0]	–	–	P0[7][a]	–
18	–	P1[1][a]	–	–	P3[5][a]	–

a. These pins are also used for onboard peripherals. See the tables in "Onboard Peripherals" on page 140 for connection details.

J3 Arduino-Compatible Header Pin Map						
#	Arduino Pin	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	D8	P2[6]	P1[4]	P0[5]	P0[2]	P0[2]
2	-	-	-	-	-	P3[4]
3	D9	P3[6]	P1[5]	P0[4]	P0[3]	P0[3]
4	-	-	-	-	-	P6[5]
5	D10	P3[4]	P1[6]	P0[2]	P2[7]	P6[3]
6	-	-	-	-	-	P6[3]
7	D11	P3[0]	P1[1][a]	P0[0]	P6[0]	P6[0]
8	-	-	-	-	-	P6[0]
9	D12	P3[1]	P3[1]	P0[1]	P6[1]	P6[1]
10	-	-	-	-	-	P6[1]
11	D13	P0[6]	P1[7]	P0[3]	P6[2]	P6[2]
12	-	-	-	-	-	P6[2]
13	GND	GND	GND	GND	GND	GND
14	-	-	-	-	-	GND
15	AREF	P1[7]	NC	VREF	P1[7]	VREF
16	-	-	-	-	-	VREF
17	SDA	P4[1]	P1[3]	P3[4]	P4[1]	P4[1]
18	-	-	-	-	-	P4[1]
19	SCL	P4[0]	P1[2]	P3[5]	P4[0]	P4[0]
20	-	-	-	-	-	P4[0]

a. These pins are also used for onboard peripheral connections. Refer to the A.6.2 Onboard Peripherals section for connection details.

J4 Arduino-Compatible Header Pin Map						
#	Arduino Pin	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	D0	P0[4]	P0[5]	P1[4]	P3[0]	P3[0]
2	-	-	-	-	-	P8[0]
3	D1	P0[5]	P0[6]	P1[5]	P3[1]	P3[1]
4	-	-	-	-	-	P8[1]
5	D2	P0[7][a]	P0[7]	P1[6]	P1[0]	P1[0]
6	-	-	-	-	-	P8[2]
7	D3	P3[7]	P3[2][a]	P1[7]	P1[1]	P1[1]
8	-	-	-	-	-	P8[3]
9	D4	P0[0]	P0[3]	P1[3]	P1[2]	P1[2]
10	-	-	-	-	-	P8[4]
11	D5	P3[5]	P3[0]	P1[2]	P1[3]	P1[3]
12	-	-	-	-	-	P8[5]
13	D6	P1[0]	P1[0]	P1[1]	P5[3]	P5[6]
14	-	-	-	-	-	P8[6]
15	D7	P2[7]	P2[0][a]	P1[0]	P5[5]	P5[5]
16	-	-	-	-	-	P8[7]

a. These pins are also used for onboard peripheral connections. Refer to the A.6.2 Onboard Peripherals section for connection details.

A.6.2 Onboard Peripherals

#	CapSense Pin	Pioneer Series Kits				
		CY8CKIT-042 (Linear Slider)	CY8CKIT-040	CY8CKIT-042-BLE (Linear Slider)	CY8CKIT-044 (Gesture Pad)	CY8CKIT-046 (Gesture Pad with Radial Slider)[a]
1	CapSense Sensor 1	P1[1]/ CS_LS_E0	–	P2[1]/CS_LS_E0	P4[4]/ CS_GES_CR	P0[6]/ CS_GES_CR
2	CapSense Sensor 2	P1[2]/ CS_LS_E1	–	P2[2]/CS_LS_E1	P4[5]/ CS_GES_UP	P4[5]/ CS_GES_LT
3	CapSense Sensor 3	P1[3]/ CS_LS_E2	–	P2[3]/CS_LS_E2	P4[6] /CS_GES_LT	P4[4]/ CS_GES_UP
4	CapSense Sensor 4	P1[4]/ CS_LS_E3	–	P2[4]/CS_LS_E3	P3[4]/ CS_GES_DN	P4[7]/ CS_GES_RT
5	CapSense Sensor 5	P1[5]/ CS_LS_E4	–	P2[5]/CS_LS_E4	P3[5]/ CS_GES_RT	P4[6]/ CS_GES_DN
6	CapSense Sensor 10	–	–	–	–	P7[4]/ CS_RS_E0
7	CapSense Sensor 11	–	–	–	–	P7[5]/ CS_RS_E1
8	CapSense Sensor 12	–	–	–	–	P7[6]/ CS_RS_E2
9	CapSense Sensor 13	–	–	–	–	P7[7]/ CS_RS_E3
10	CapSense Sensor 6	–	–	–	–	P0[0]/ CS_RS_E4
11	CapSense Sensor 7	–	–	–	–	P0[1]/ CS_RS_E5
12	CapSense Sensor 8	–	–	–	–	P7[2]/ CS_RS_E6
13	CapSense Sensor 9	–	–	–	–	P7[3]/ CS_RS_E7
14	CMOD[b]	P4[2]	P0[4]	P4[0]	P4[2]	P4[2]
15	CTANK[b]	P4[3]	P0[2]	P4[1]	P4[3]	P4[3]
16	CMOD[b]	–	–	–	–	P5[0]
17	CTANK[b]	–	–	–	–	P5[1]
18	CapSense Shield	P0[1]	–	P1[6]	P0[1]	P0[2]

a. The CapSense elements are present on the CY8CKIT-046 shield board. The radial slider (CapSense sensors 6 to 13) is symmetric and the sensor order can be shifted to fit your requirement, that is, the desired zero position on the slider.
b. CMOD0, CTANK0, CMOD1, and CTANK1 are only present in the CY8CKIT-046 PSoC 4 L-Series Pioneer Kit.

Proximity Header Pin Map						
Pin #	Description	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	PROXIMITY	–	P2[0]	P2[0]	P3[7]	P9[4]
2		–	–	–	P3[6]	P9[5]

RGB LED Pin Map						
Pin #	Color	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	Red	P1[6]	P3[2]	P2[6]	P0[6]	P5[2]
2	Green	P0[2]	P1[1]	P3[6]	P2[6]	P5[3]
3	Blue	P0[3]	P0[2]	P3[7]	P6[5]	P5[4]

User Switch Pin Map						
Pin #	Description	Pioneer Series Kits				
		CY8CKIT-042	CY8CKIT-040	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
1	SW2	P0[7]	–	P2[7]	P0[7]	P0[7]

Revision History

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

Document Title: CY8CKIT-042-BLE-A Bluetooth® Low Energy (BLE) Pioneer Kit Guide Document Number: 002-11468				
Revision	**ECN Number**	**Issue Date**	**Origin of Change**	**Description of Change**
**	5162292	03/04/2016	UDYG	New kit guide.
*A		05/25/2016	AARA	Updated Safety Information chapter on page 6: Added "Regulatory Compliance Information" on page 8. Updated to new template.