CY3655-EXT

enCoRe™ II Development Kit Guide

Doc. # 001-70268 Rev.*A

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709

Phone (USA): 800.858.1810
Phone (Intnl): 408.943.2600
http://www.cypress.com

Copyrights

Flash Code Protection

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

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

Contents

1. Introduction

Thank you for your interest in the CY3655-EXT enCoRe™ II Development Kit (DVK). The enhanced Component Reduction (enCoRe) II development system is based on Cypress's PSoC®.For debugging encore II and encore II LV, customers are requested to purchase CY3215-DK.CY3215-DK has an in-circuit emulator (ICE) that works in conjunction with the actual silicon to provide an accurate and efficient development system. The PSoC Designer™ software consists of a graphical user interface, assembler, C compiler, linker, and debugger for a highly integrated code development environment. A compliant USB User Module along with PS/2 and other peripheral user modules simplifies the learning curve and speeds development time.

Getting Started on page 7 of this document describes the installation and configuration of the CY3655-EXT enCoRe™ II DVK. Kit Operation on page 13 describes the kit operation. Hardware on page 17 describes the hardware operation. Code Examples on page 25 describes the code example provided along with the kit. The DrawUSB project is programmed on the enCoRe II device as default project for demonstration purpose. The Appendix on page 29 section provides the schematics and bill of materials (BOM) for the kit.

1.1 Kit Contents

The "CY3655-EXT enCoRe II Development Kit" or "CY3655-EXT enCoRe II DVK" provides the enCoRe II specific items for customers who already have the base in-circuit emulator in the CY3215-DK.

The CY3655-EXT contains:

- Application board
- One enCoRe II pod
- One Wireless enCoRe II pod
- 40, 18, and 16-pin PDIP feet
- 5-pin ISSP header to USB receptacle programming adapter plug (CY3655-PLG)
- "USB A to mini B" or "USB A to B"
- PS/2 male-to-male cable
- Kit CD/DVD with documentation and Firmware sources

Visit http://www.cypress.com/shop for more information. Inspect the contents of the kit. If any parts are missing, contact your nearest Cypress sales office for further assistance.

1.2 Additional Learning Resources

Visit http://www.cypress.com for additional learning resources in the form of data sheets, technical reference manual, and application notes.

1.2.1 Reference Documents

- MiniProg Users Guide and Code Example - http://www.cypress.com/?rID=3412
- PSoC Designer Training - http://www.cypress.com/?rID=40543
- enCoRe II Overview - http://www.cypress.com/?id=182
- CY3655_DVK_Kit Schematic.pdf - http://www.cypress.com/?docID=23090
- enCoRe II Low-Speed USB Solutions - http://www.cypress.com/?docID=8789
- MiniProg - http://www.cypress.com/?rID=37459

1.3 Document History

Revision	PDF Creation Date	Origin of Change	Description of Change
**	07/14/2011	CSAI	Initial version of kit guide
*A	03/28/2012	ELIN	Kit guide updated with OOB review comments.

1.4 Documentation Conventions

Table 1-1. Document Conventions for Guides

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

2. Getting Started

This chapter describes the installation and configuration of the CY3655-EXT enCoRe™ II Development Kit.

2.1 Kit Installation

To install the kit software, follow these steps:

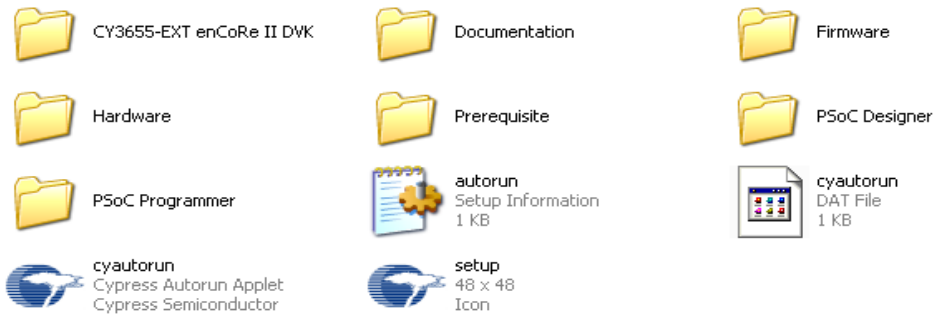
1. Insert the kit CD/DVD into the CD/DVD drive of your PC. The CD/DVD is designed to auto-run and the kit installer startup screen appears.

   You can also download the latest installer from http://www.cypress.com/go/CY3655-EXT. Download the ISO file and create an installer CD/DVD or extract the ISO using WinRar and install the executables.
2. Click **Install CY3655-EXT enCoRe II DVK** to start the installation, as shown in Figure 2-1.

   Figure 2-1. Kit Installer Startup Screen

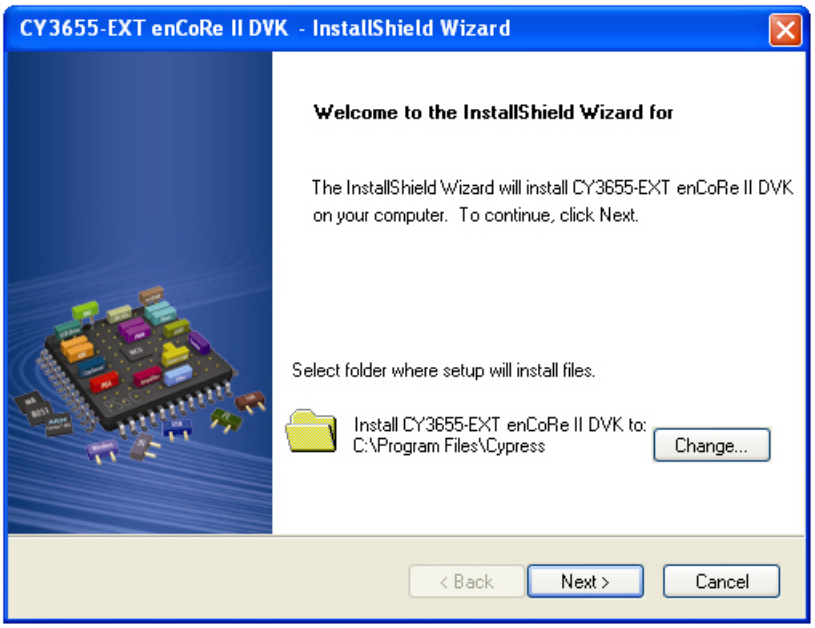
Note: If auto-run does not execute, double-click *cyautorun.exe* in the root directory of the CD, as shown in Figure 2-2.

Figure 2-2. Root Directory of the CD/DVD



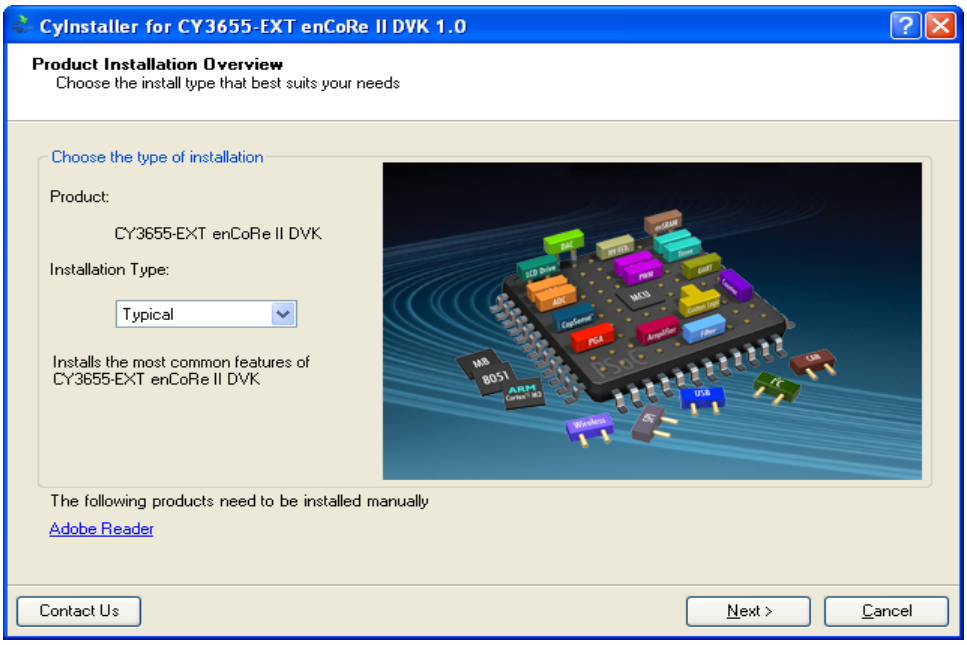
3. The InstallShield Wizard screen appears. The default location for setup is shown on the InstallShield Wizard screen. You can change the location for setup using **Change**, as shown in Figure 2-3.
4. Click **Next** to launch the kit installer.

Figure 2-3. InstallShield Wizard



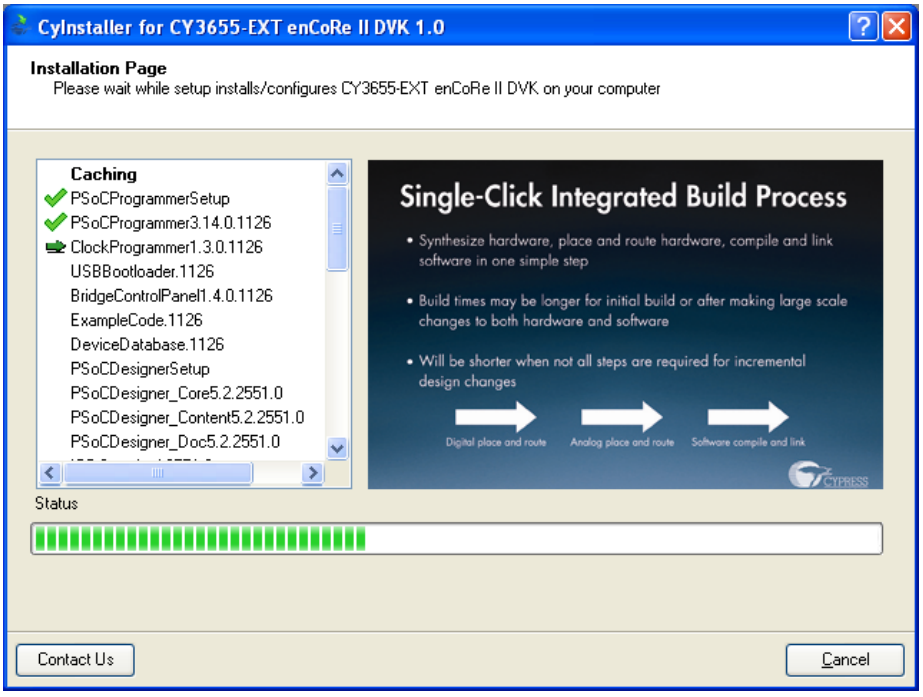
5. On the Product Installation Overview screen, select the installation type that best suits your requirement. The drop-down menu has three options - **Typical**, **Complete**, and **Custom**, as shown in Figure 2-4.
6. Click **Next** to start the installation.

Figure 2-4. Installation Type Options



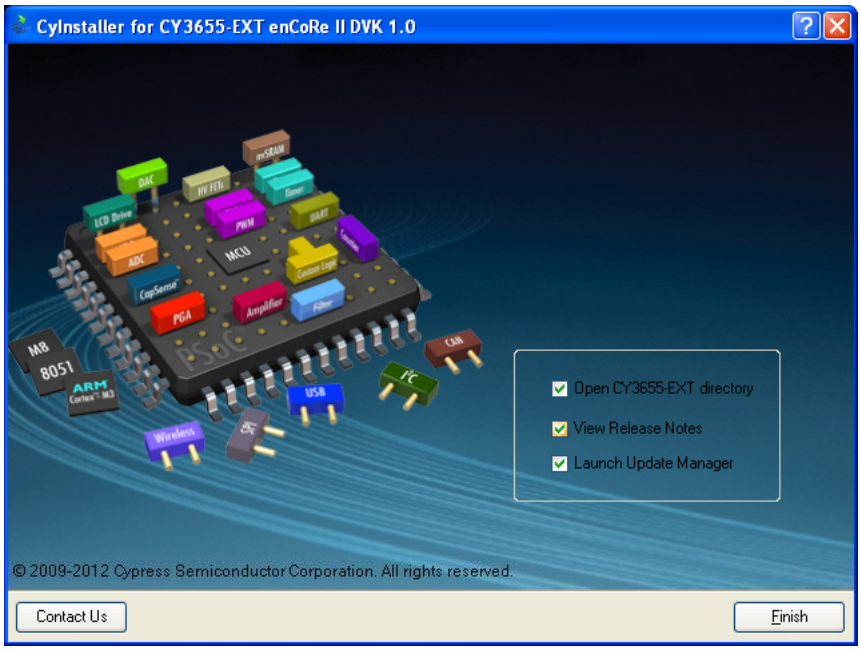
7. When the installation begins, a list of all packages appears on the Installation Page. A green check mark appears adjacent to every package that is downloaded and installed, as shown in Figure 2-5.
8. Wait until all the packages are downloaded and installed successfully.

Figure 2-5. Installation Page



9. Click **Finish** to complete the installation.

Figure 2-6. Installation Completion Page



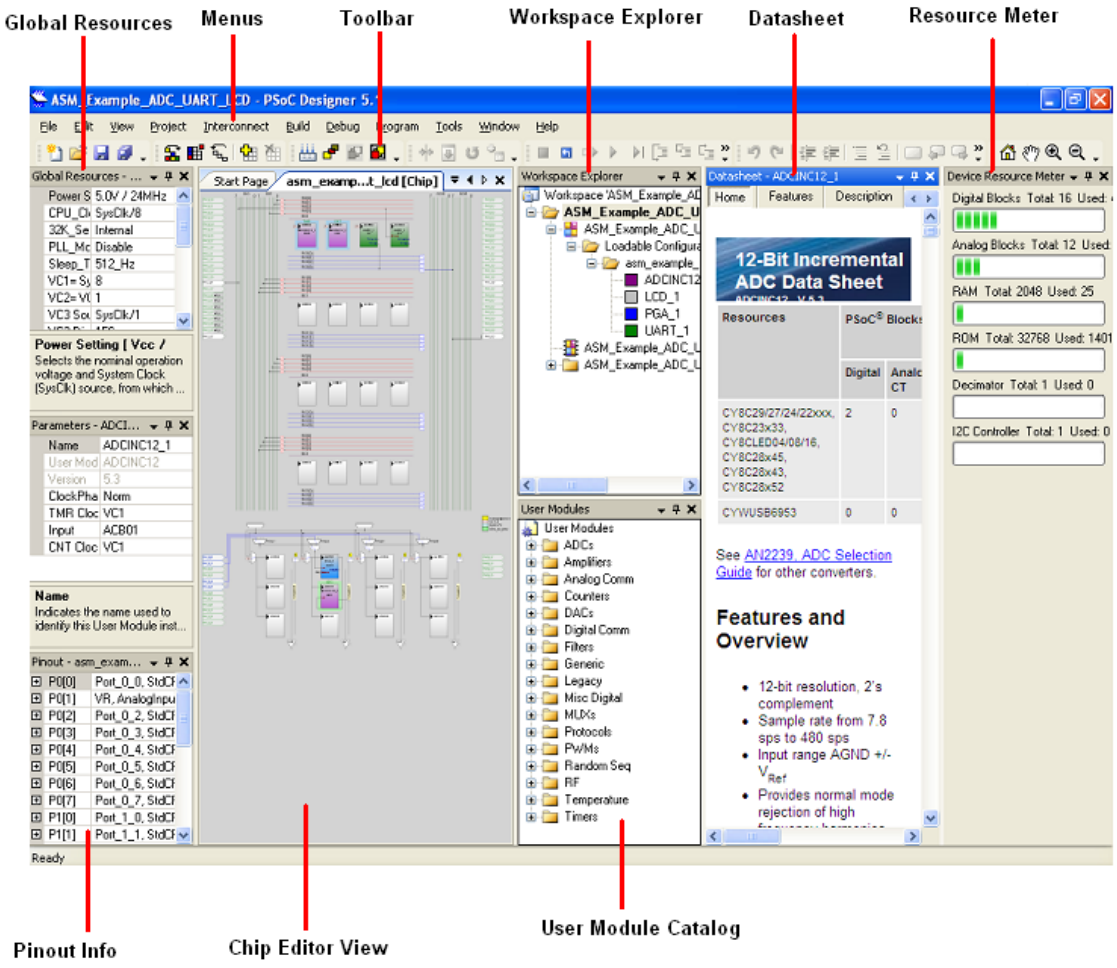
After software installation, verify your installation and setup.

2.2 PSoC Designer

PSoC Designer is the Integrated Design Environment (IDE) that you can use to customize your PSoC application.

1. Click **Start > All Programs > Cypress > PSoC Designer <version> > PSoC Designer <version>**.
2. Click **File > New Project**, to create new project; click **File > Open Project/Workspace** to work with the existing project.

Figure 2-7. PSoC Designer Interconnect View



3. To experiment with the code examples, go to Code Examples on page 25.

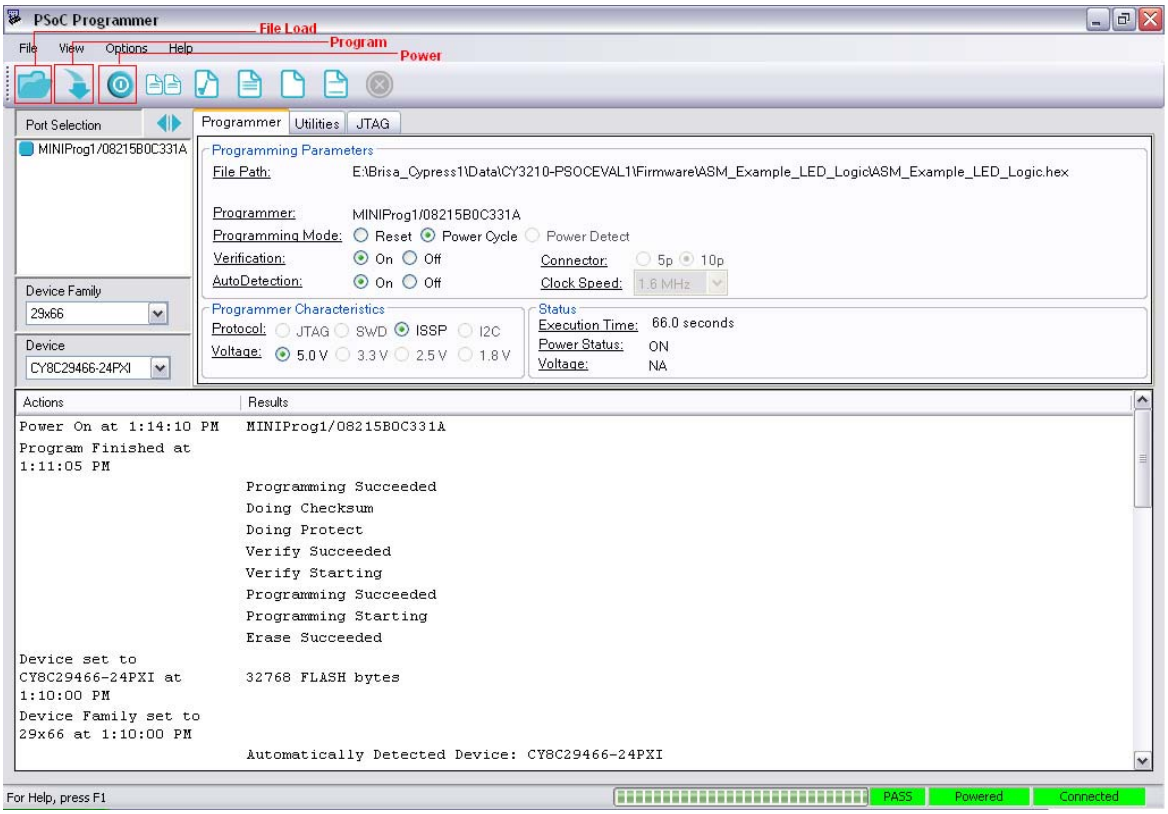
Note For more details on PSoC Designer, see PSoC Designer IDE Guide at the following location: `<Install_Directory>\Cypress\PSoC Designer\<version>\Documentation`.

2.3 PSoC Programmer

PSoC Programmer offers a simple GUI that connects to programming hardware to program and configure PSoC devices.

1. Click **Start > All Programs > Cypress > PSoC Programmer <version> > PSoC Programmer <version>**.
2. Select the **MiniProg** from Port Selection, as shown in Figure 2-8.

Figure 2-8. PSoC Programmer Window



3. Click on **File Load** from the menu bar to navigate and select the hex file.
4. Use the **Program** button to load the hex file onto the chip.
5. When programming is successful, '**Programming Succeeded**' appears in the Actions pane.
6. Close PSoC Programmer.

Note For more details on PSoC Programmer, see the user guide at the following location: `<Install_Directory>\Cypress\Programmer\<version>\Documents`.

2.4 Install Hardware

No hardware installation required for this kit.

3. Kit Operation

The Cypress CY3655-EXT enCoRe II DVK board is a versatile development platform used to develop with the Cypress enCoRe II low-speed USB peripheral controller or Wireless enCoRe II microcontroller.

3.1 Connect enCoRe II Pod to Application Board

Perform the following steps to use the emulator pod:

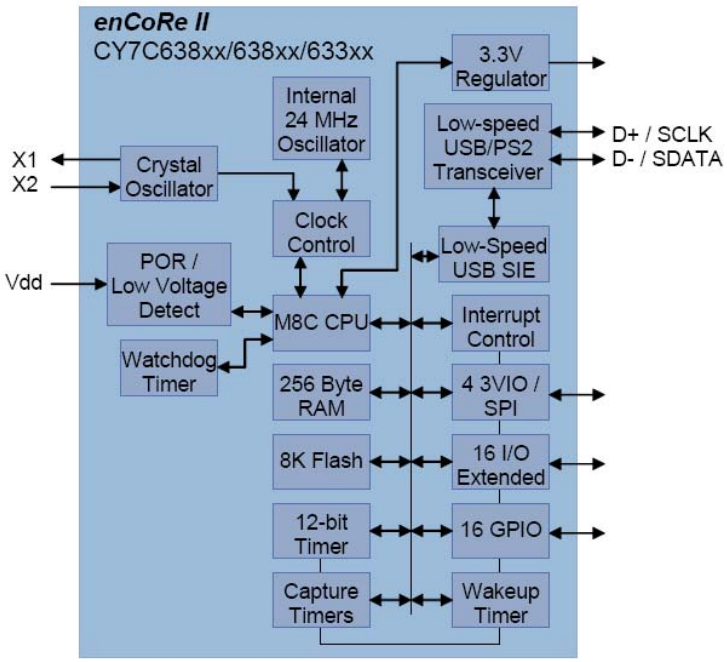
1. Solder or connect a foot adapter to the target system (application board).
2. Connect the pod to the foot and ensure to orient the pin 1 corner of the pod to the pin 1 corner of the foot.

Note: There is an index pin position that is off the normal grid of the pin-grid array on both the pod and the foot. Make sure that the index pin on the pod aligns with the index pin on the foot.

3.2 enCoRe II

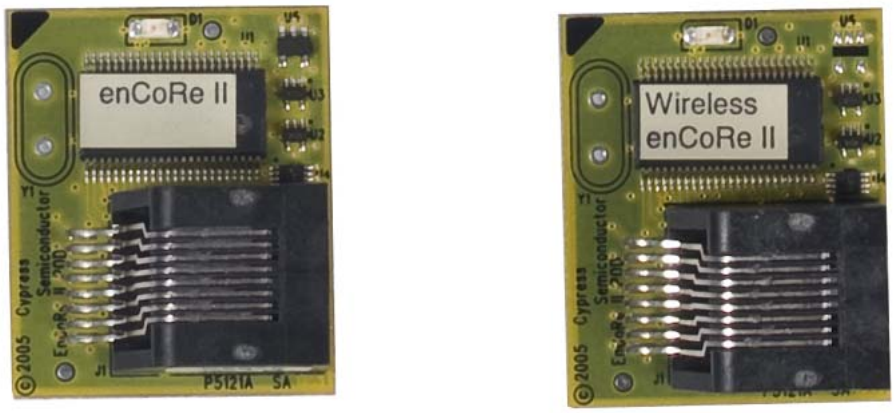
Reinventing its leadership position in the low-speed USB microcontroller market, enCoRe II is an 8-bit RISC flash-based programmable microcontroller with an integrated low-speed USB interface. The enCoRe II eliminates the external crystal or resonator, pull up resistors, wakeup circuitry, and 3.3-V regulator to reduce the overall system cost. enCoRe II features a wide selection of I/O (up to 20 GPIOs) and memory (up to 8 Kbytes of flash for user code and 256 bytes of RAM) options targeted at USB and other embedded applications.

Figure 3-1. enCoRe II Block Diagram



The Cypress enCoRe II emulator pod and the Wireless enCoRe II emulator pod are part of the debugging and emulation system used for development with the Cypress enCoRe II low-speed USB controller and Cypress Wireless enCoRe II controller.

Figure 3-2. enCoRe II and Wireless enCoRe II Pods



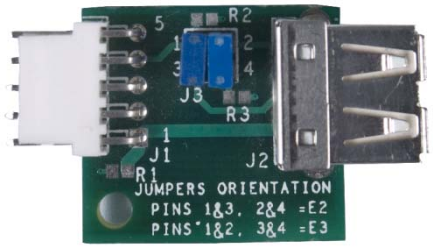
Pod features include:

- Support for enCoRe II emulation for most enCoRe II packages with the appropriate foot adapter and the ICE-Cube emulator.
- Power supplied by either system or ICE.
- 4.0 V to 5.25 V operation for enCoRe II pod.
- 2.7 V to 3.6 V operation for Wireless enCoRe II pod.

3.3 5-Pin to USB Adapter

The 5-Pin to USB adapter is a small board that allows enCoRe II based devices to be programmed through their USB cables using the MiniProg. This adapter is not designed to be used with the ICE-Cube and ISSP cable due to cable length restrictions during programming. Please ensure that the jumper J3 is set for encore II (E2).

Figure 3-3. 5-Pin to USB Adapter



3.4 Pin DIP Foot

The kit is provided with a 40-pin DIP foot and a 24-pin DIP foot. These foots are used to attach the enCoRe II and Wireless enCoRe II pods on the applications board.

3.5 Program enCoRe II and Wireless enCoRe II on Applications Board

3.5.1 Program Using ICE-Cube

enCoRe II devices and Wireless enCoRe II devices can be programmed on the applications board using the ICE-Cube. Follow these steps:

1. Plug the ICE-Cube into a PC using the USB cable. Power up the ICE-Cube.
2. Connect the 5-pin end of the ISSP cable on the 5-pin header (J2) of the applications board and the other end to the ICE-Cube through the RJ45 adapter.
3. Make sure that no external power supply is connected to Vcc or GND on the applications board.
4. Launch PSoC Programmer.
5. Select the ICE-Cube from Port Selection, "USB/xxxxCxxx" where ‘x’ is specific to the USB device ID of your ICE-Cube.
6. Program the hex file onto the enCoRe II device or Wireless enCoRe II device.
7. On successful programming, "**Programming Succeeded**" appears on the Actions pane.

3.5.2 Program Using MiniProg

enCoRe II devices and Wireless enCoRe II devices can be programmed on the applications board using the MiniProg. Follow these steps:

1. Plug the MiniProg programmer into a PC using the USB A to Mini B cable.
2. Place the MiniProg programmer on the 5-pin header (J2) of the applications board.
3. Make sure that no external power supply is connected to Vcc or GND on the applications board.
4. Launch PSoC Programmer.
5. Select the MiniProg from Port Selection.
6. Program the hex file onto the enCoRe II device or Wireless enCoRe II device.

7. On successful programming, "**Programming Succeeded**" appears on the Actions pane.

3.6 Debug enCoRe II and Wireless enCoRe II devices

The ICE-Cube is driven by the Debugger subsystem of PSoC Designer. This software interface enables to debug and view the content of specific memory locations. It also allows to set complex event points. Event points can start and stop the trace memory on the ICE, as well as break the program execution.

To debug an enCoRe II or Wireless enCoRe II device using an ICE-Cube:

1. Connect the ICE-Cube to the PC through a USB A to Mini B cable and power up the ICE-Cube.
2. Connect the enCoRe II or Wireless enCoRe II through the RJ 45 adapter to the ICE-Cube.
3. Open PSoC Designer.
4. Go to Debug tab from the PSoC Designer menu.
5. Click on **Connect / Disconnect** or press **F9**.
6. Right-click on a line in the project from where the debugging process should start; the option Insert/Delete Breakpoint appears.
7. To view Memory, Registers, or Watch at any particular location go to **Debug > Windows**.
8. To start the debugging process go to **Debug > Go** or press **F5**. For more information on using ICE-Cube for debugging, see the CY3215-DK User Guide.

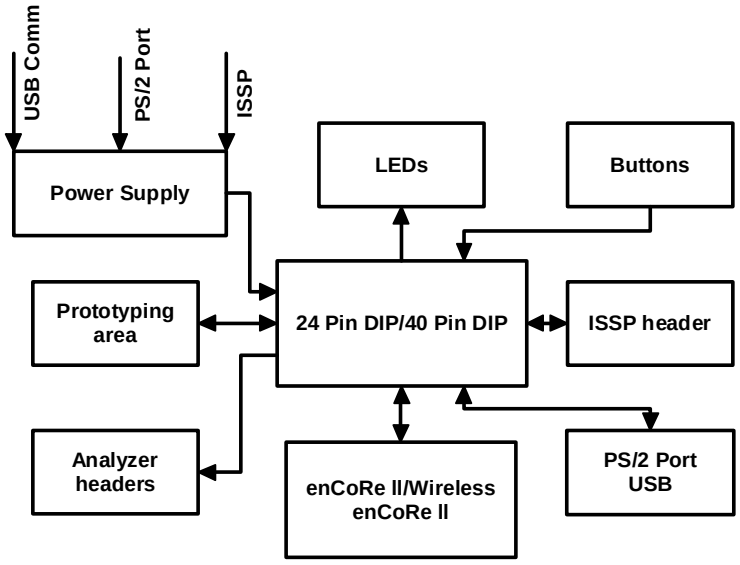
4. Hardware

4.1 System Block Diagram

The CY3655-EXT enCoRe II application board has the following sections:

- DIP socket
- USB connector
- PS/2 port
- ISSP header
- Prototyping area
- Analyzer headers
- Pushbuttons and LEDs

Figure 4-1. System Block Diagram



4.2 Power Supply System

The power supply system on this board is versatile; it takes input supply from the following sources:

- Power from USB B port
- Power from ISSP connector
- Power from PS/2 port

Figure 4-2. Power Supply System Structure

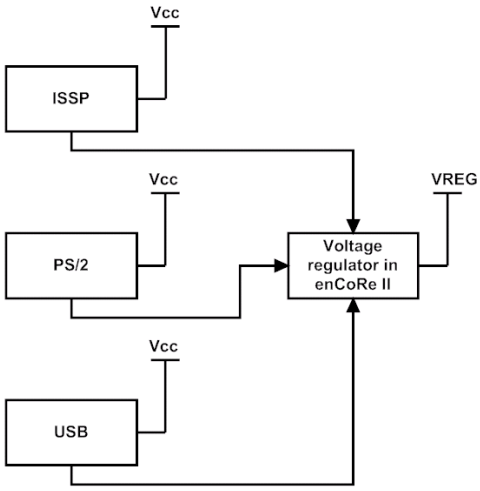
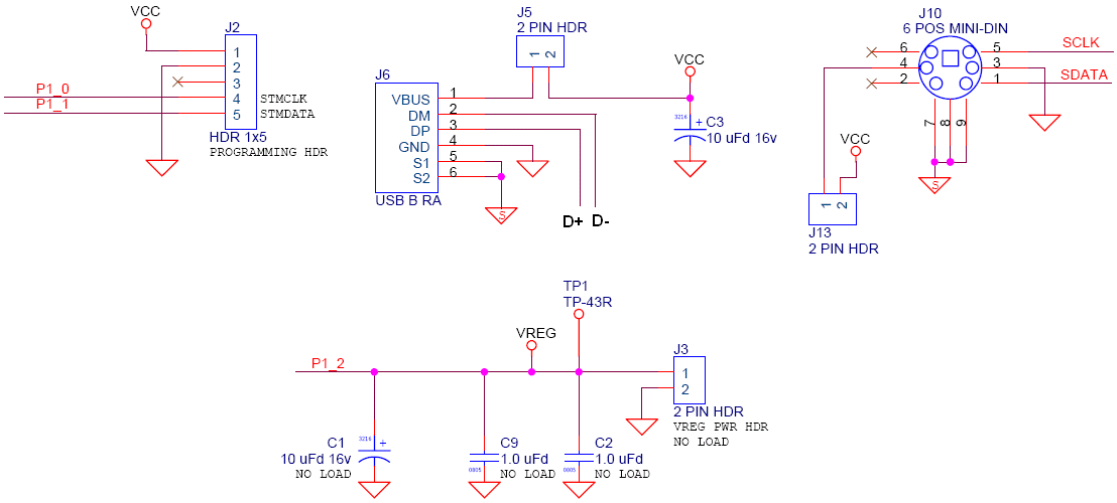


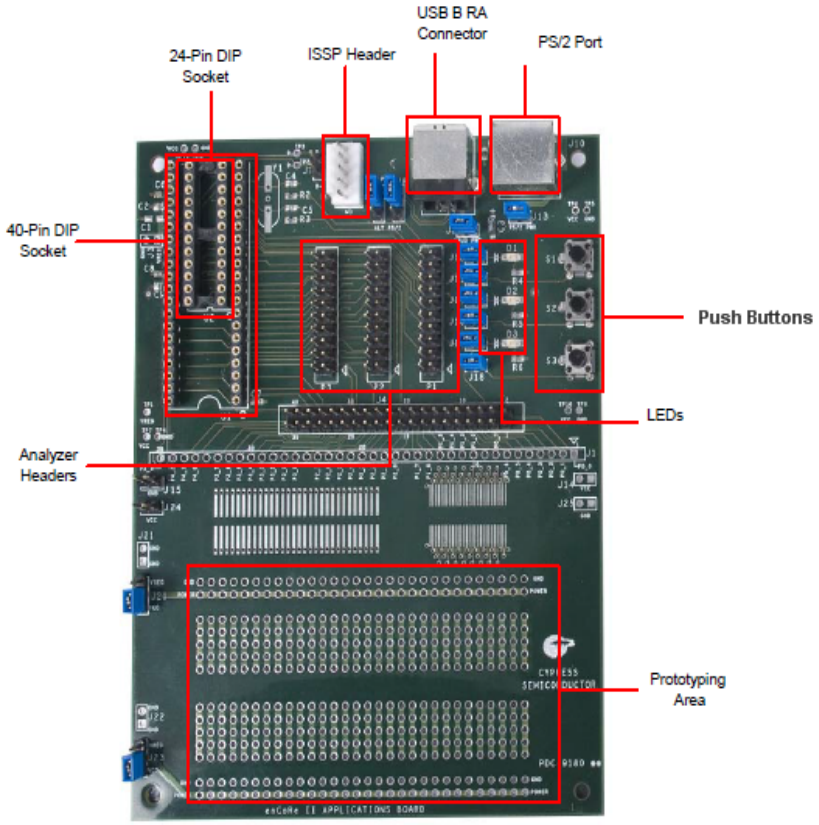
Figure 4-3. Schematic View of Power Supply System Structure



4.3 Functional Description

The following figure shows the different functional blocks on the CY3655-EXT enCoRe II application board.

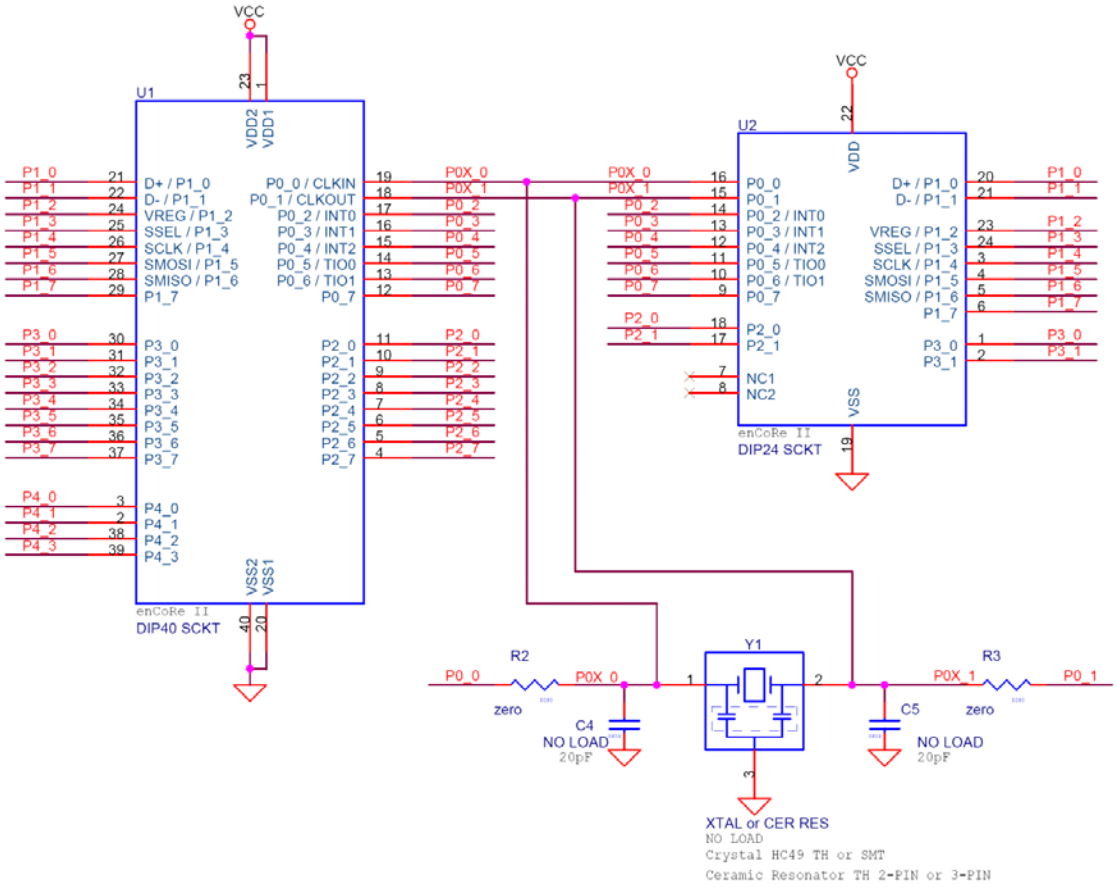
Figure 4-4. enCoRe II Application Board Functional Blocks



4.3.1 DIP Sockets

The applications Board has a 24-pin DIP and a 40-pin DIP socket to connect enCoRe II and Wireless enCoRe II devices.

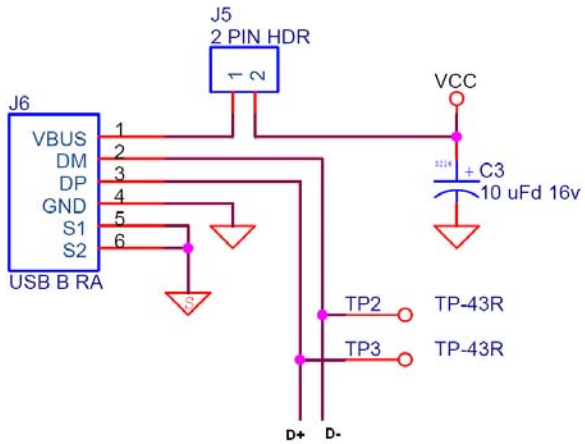
Figure 4-5. Schematic View of 24-Pin and 40-Pin DIP Sockets



4.3.2 USB B Connector

The USB B connector port on the application board is used to communicate with the PC. The power pin of the connector goes to a jumper (J5) labeled "VBUS PWR" to allow USB power to be disconnected from the system for emulator based development.

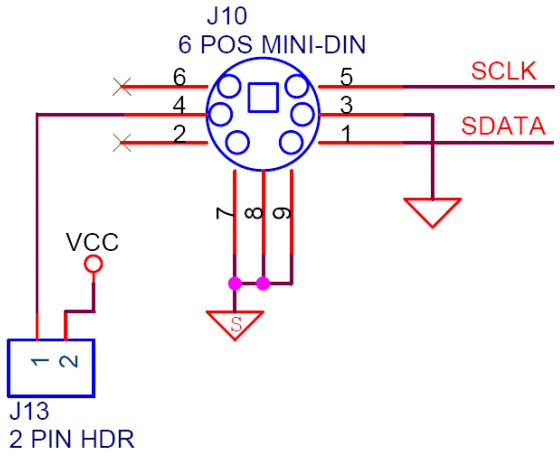
Figure 4-6. Schematic View of USB Connector



4.3.3 PS/2 Port

The PS/2 connector allows a PS/2 connection to a PC using the supplied cable. The power pin of the connector goes to a jumper (J13) labeled ‘PS/2 PWR’ to allow PS/2 power to be disconnected from the system for emulator based development. In addition, the PS/2 signals can be viewed with an oscilloscope or logic analyzer at header J7. The enCoRe II pins used for PS/2 are normally P1.0 and P1.1, but the alternate pins P1.5 and P1.6 can be used by moving the jumpers on J8 and J9 to the side labeled ‘ALT PS/2’.

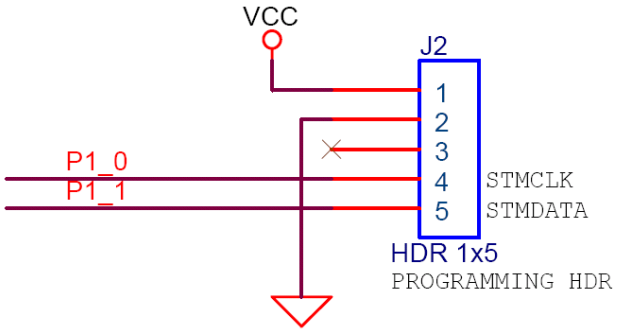
Figure 4-7. Schematic View of PS/2 Port



4.3.4 ISSP Header

In-System Serial Programmer (ISSP) is used to program the device. Programming can be done using the MiniProg programmer device or ICE Cube.

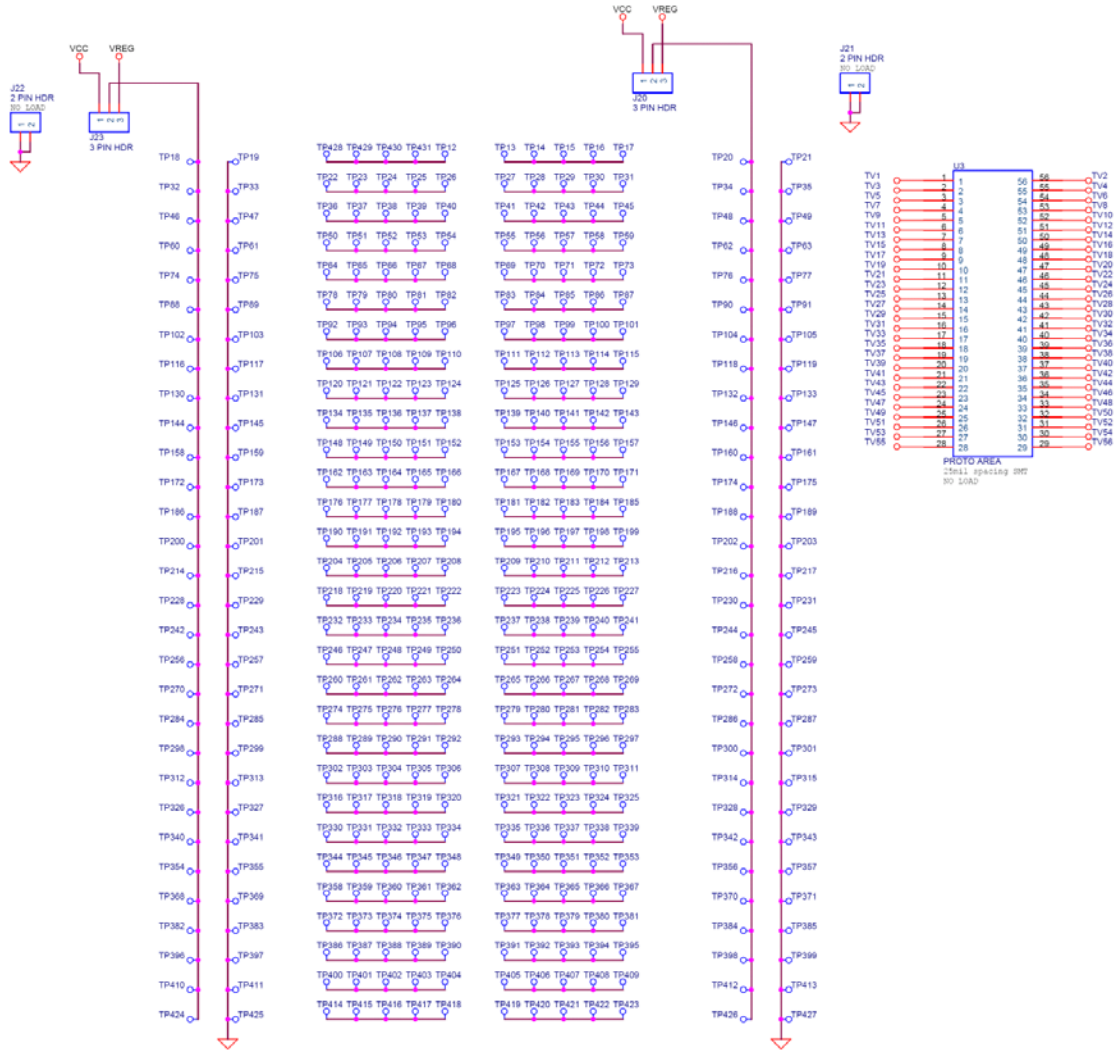
Figure 4-8. Schematic View of ISSP Connector



4.3.5 Prototyping Area

This area on the board is available for customized prototyping. The through-hole area contains 0.1" spaced holes appropriate for DIP devices. On either side of the through-hole area, there is a ground row and a power row. Each power row can be individually configured to use either the board's VCC or the VREG output from the enCoRe II. There is also a surface mount prototype area that accepts either 0.050" pitch parts or 0.025" pitch parts. Holes on the outside of the surface mount pads allow signals to easily be soldered from elsewhere on the board. A single row of signals above the prototype area allows enCoRe II signals to be wired to the prototyping area.

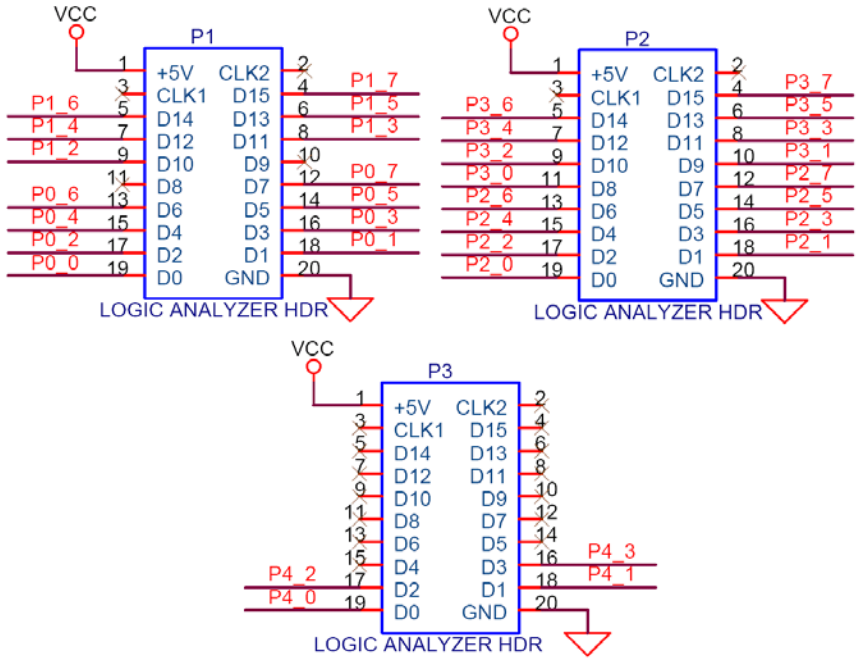
Figure 4-9. Schematic View of Prototyping Area



4.3.6 Analyzer Headers

P1, P2, and P3 are 20-pin headers that are compatible with Agilent logic analyzer terminator adapters. This feature allows for a quick and simple debugging connection.

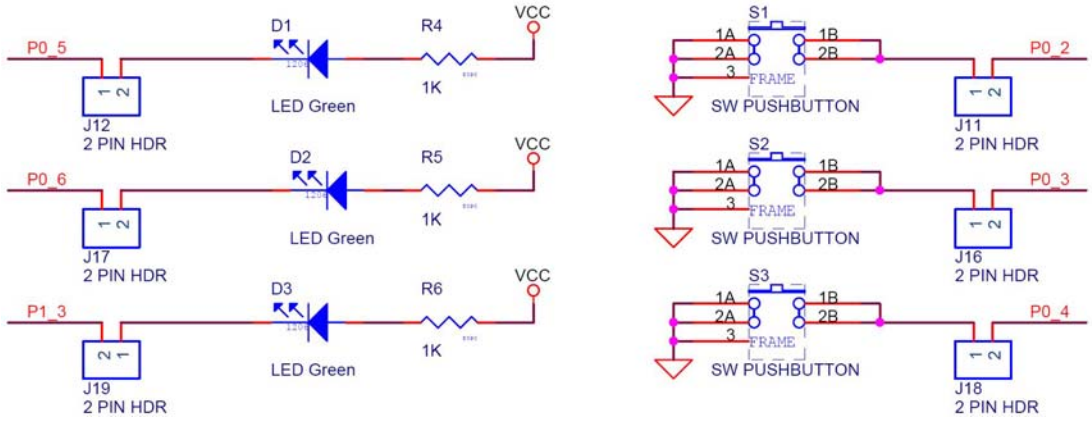
Figure 4-10. Schematic View of Analyzer Headers



4.3.7 Pushbuttons and LEDs

Three pushbuttons and three LEDs are available on the board for general purpose use. The jumpers J12, J17, J19, J11, J16, and J18 can be used to isolate the LED D1, D2, D3 or pushbutton S1, S2, S3 respectively from the enCoRe II, if desired. Note that the LEDs use the same power as the enCoRe II. Driving the enCoRe pin low illuminates the LEDs. To detect pushbutton presses, make the appropriate enCoRe II pin an input with the pull-up enabled. Note that the pushbutton inputs are connected to enCoRe II pins that can be configured as external interrupt pins.

Figure 4-11. Schematic View of Pushbuttons and LEDs



5. Code Examples

The code examples are available on the kit CD or at the following location: `<Installed_directory>\Cypress\CY3655-EXT enCoRe II DVK\<ver>\Firmware\`

5.1 Project1- DrawUSB Example

5.1.1 Project Description

DrawUSB example demonstrates the basic functionality of a USB HID mouse. The example application contains a USB HID mouse descriptor that works on any USB host with HID driver. This example application enumerates as a three button USB mouse (HID class) and moves the mouse cursor in the shape of the letters U, S, and B. It demonstrates the use of the USB User Module API.

Note: Turn off Mouse Accelerator using the Windows Control Panel.

The following user module is used for this project:

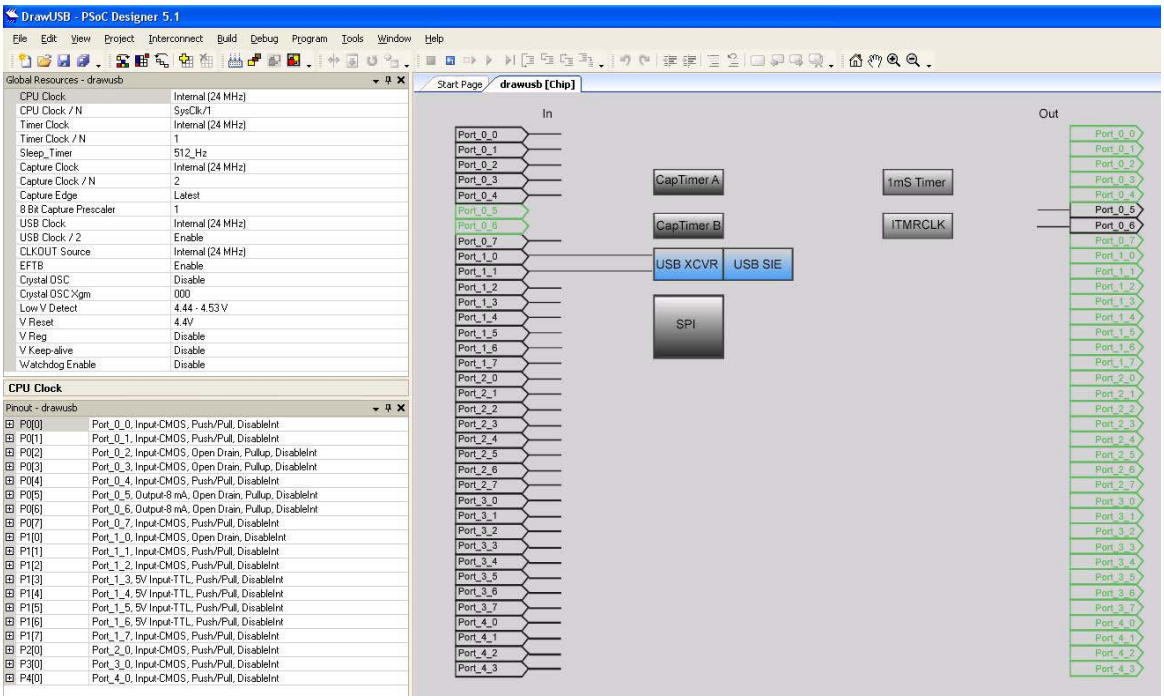
USB: The USB user module provides a low level driver for the control endpoint that decodes and dispatches requests from the USB host. The user module supports the HID class. USB descriptors can be configured with the USB Setup Wizard.

Hardware Connections:

1. Switch S1 is connected to P0.2 (Down = Start Movement; Up = Stop Movement)
2. Switch S2 is connected to P0.3 (Down = Left Button Down; Up = Left Button Up)
3. LED D1 is connected to P0.5 (Tracks S1: On = Down; Off = Up)
4. LED D2 is connected to P0.6 (Tracks S2: On = Down; Off = Up)
5. Place a jumper on J11. Connect button S1 to P0.2.
6. Place a jumper on J16. Connect button S2 to P0.3.
7. Place a jumper on J5. CY3655-EXT enCoRe II application board is powered by VBUS.
8. Go to **Control Panel > Mouse > Pointer Options**; uncheck the **Enhance Pointer Precision** option.
9. Connect the B side of the USB A/B cable to the CY3655 DVK board and the A side of the USB A/B cable to the PC.

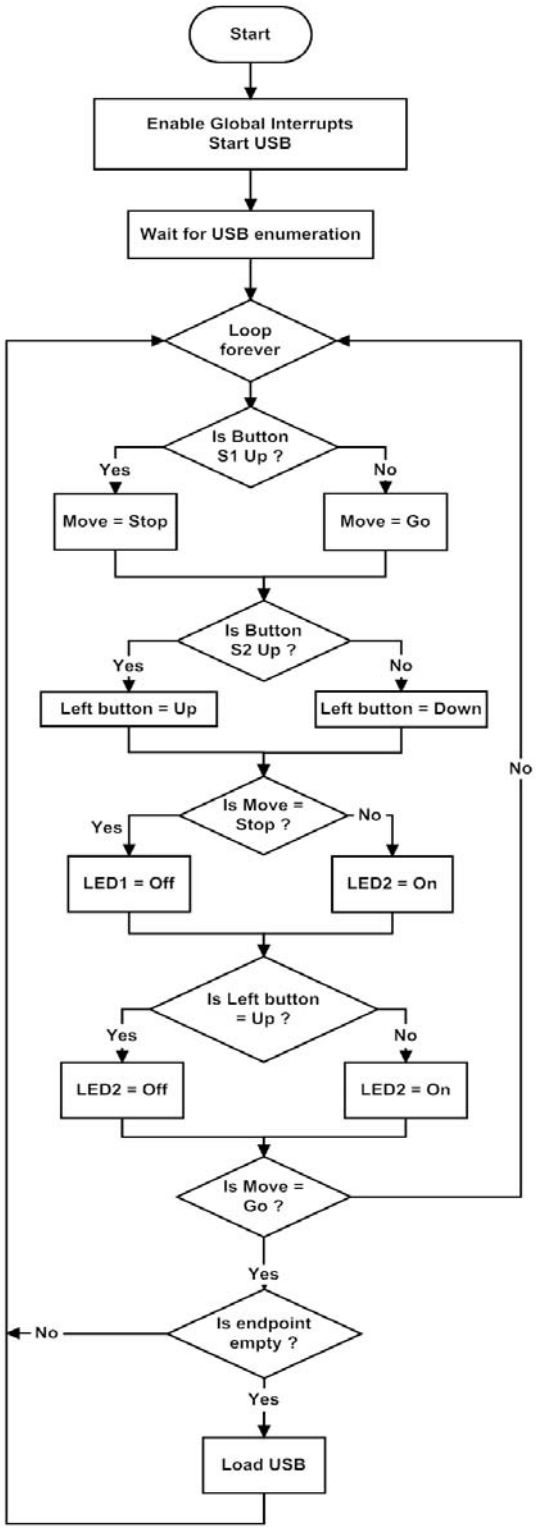
5.1.2 Device Configuration

Figure 5-1. Device Configuration for Project1



5.1.3 Flow Chart

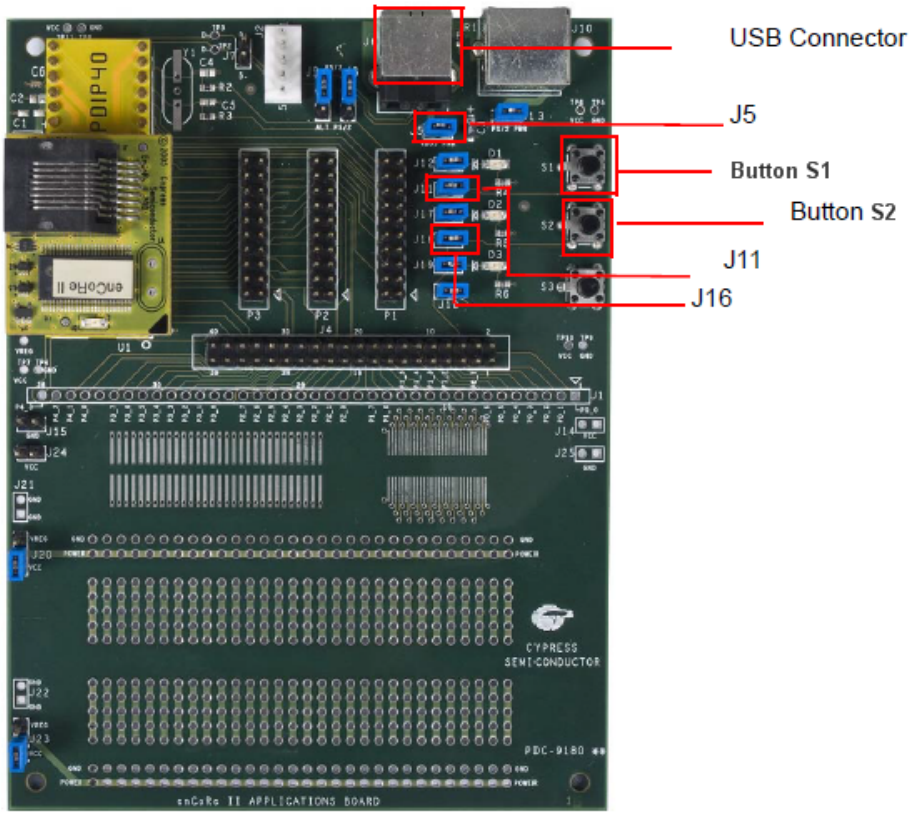
Firmware Architecture



5.1.4 Verify Output

1. The DrawUSB example enumerates on the PC as a USB mouse HID device.
2. On the PC, open a simple drawing application such as Paint.
3. Press the **S1** button on the DVK board to toggle the drawing in the drawing application.
4. Press the **S2** button on the DVK board to toggle the left button of the mouse.

Figure 5-2. Verify Output



A. Appendix

A.1 Schematic

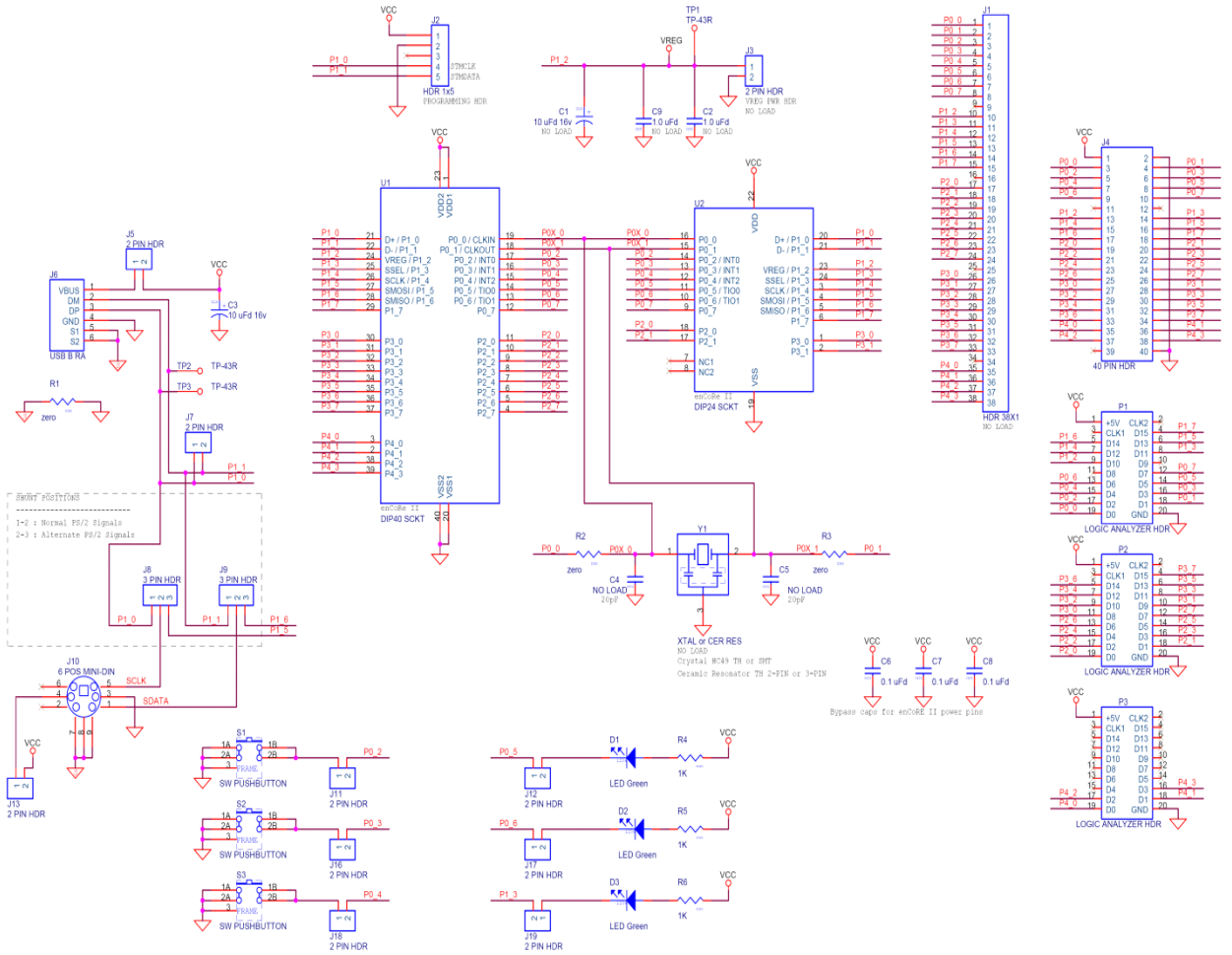
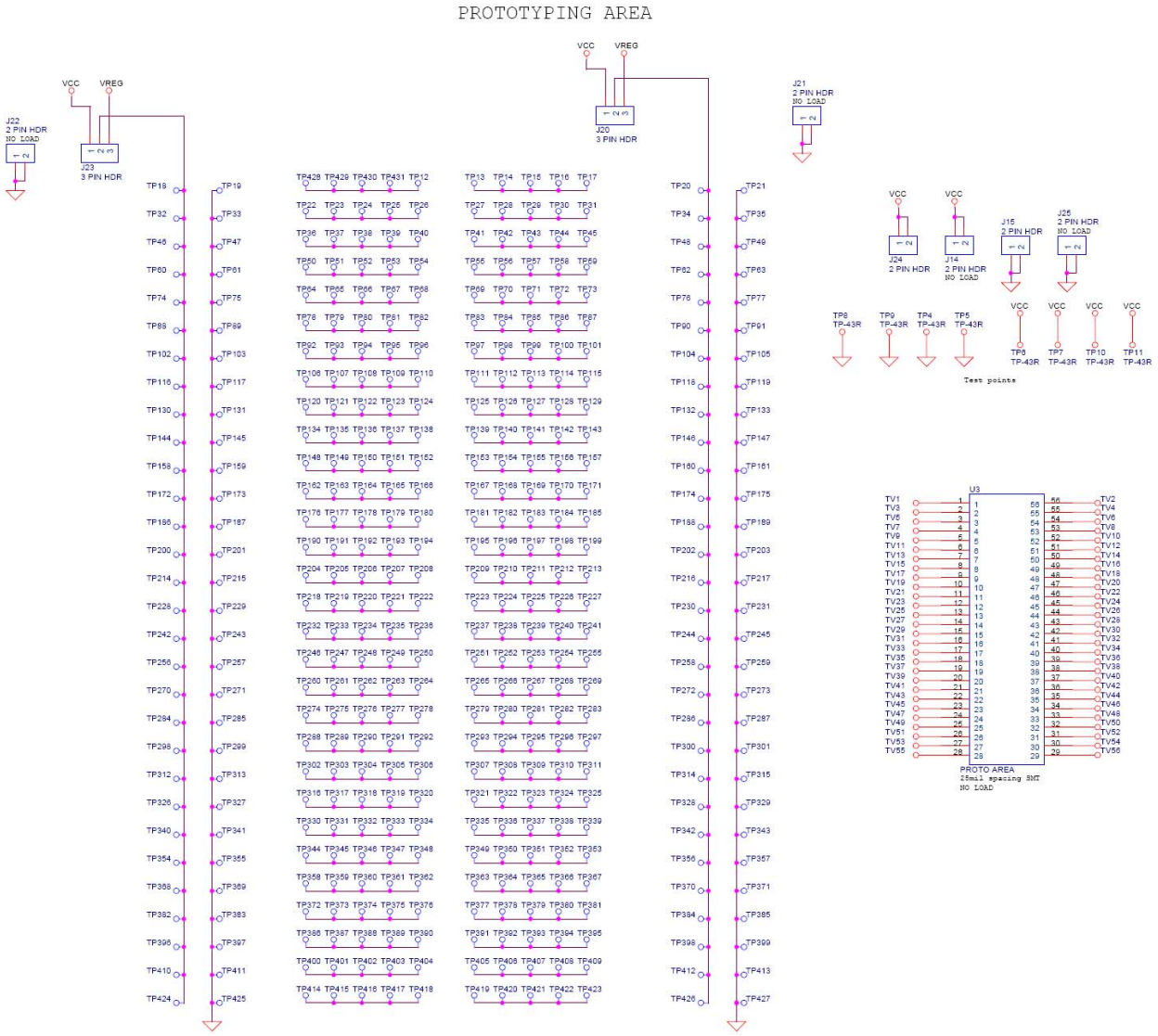
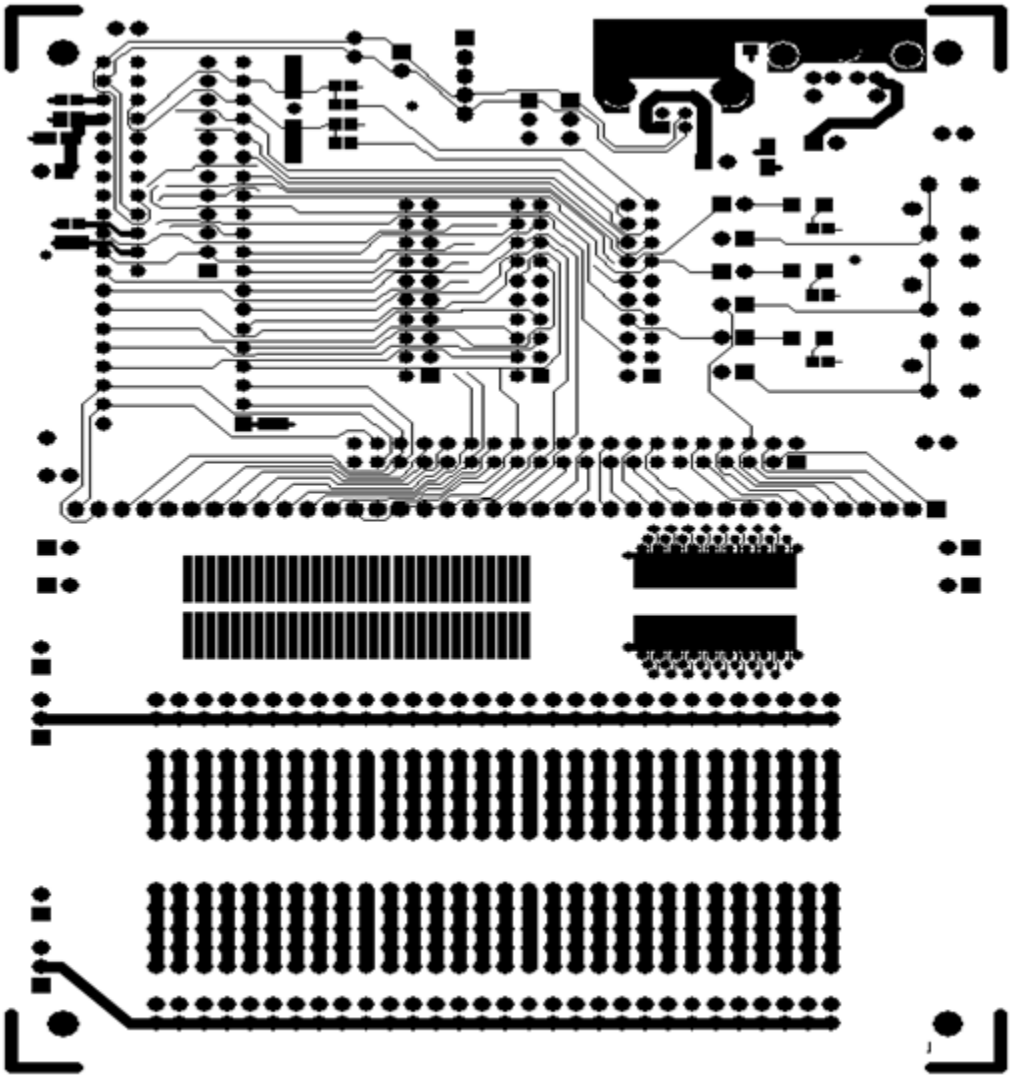


Figure A-1. Prototyping Area

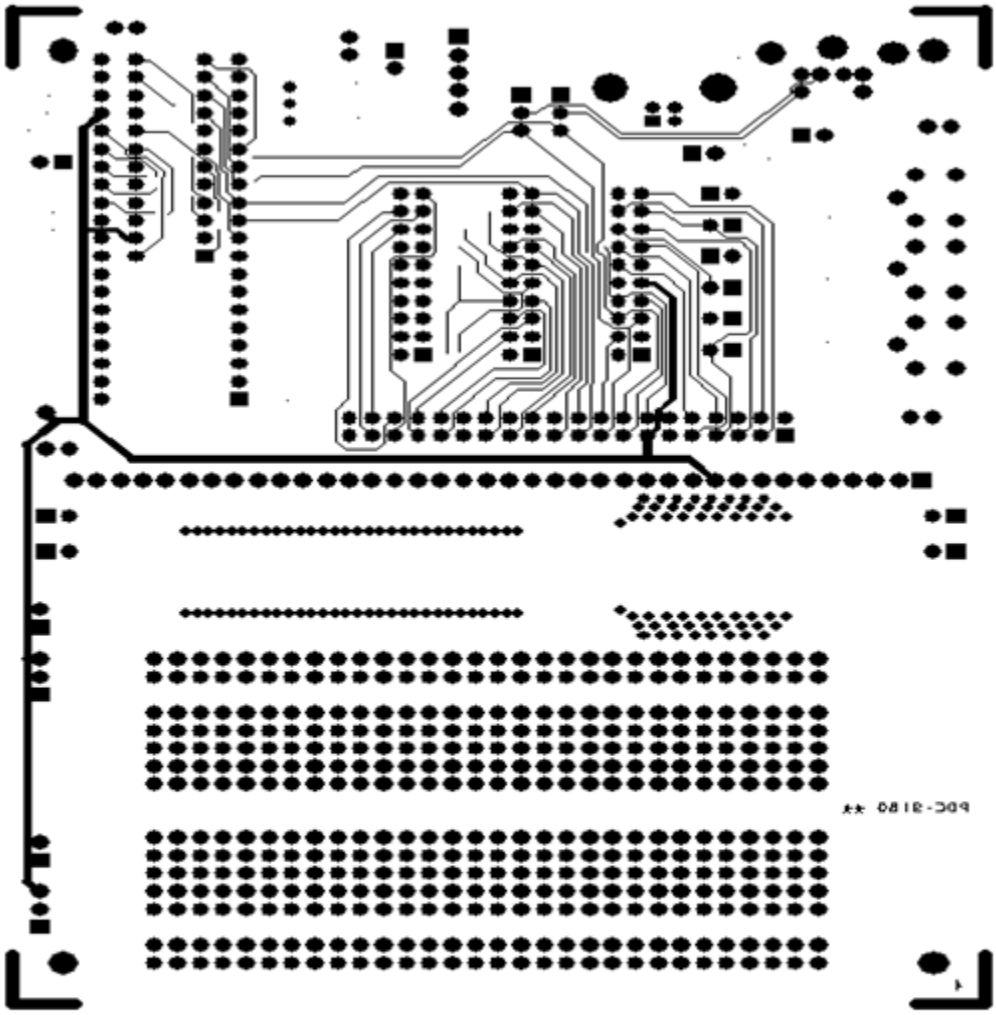


A.2 Board Layout

A.2.1 PDC-9180 Top



A.2.2 PDC-9180 Bottom



A.3 Bill of Materials

Item	Qty	Reference	Description	Manufacturer	Manufacturer Part No.
1	1	C3	CAP 10UF 16V TANTALUM 10% 3216	AVX	TAJA106K016R
2	3	C6,C7,C8	CAP .1UF 50V CERAMIC Y5V 0603	Panasonic - ECG	ECJ-1VF1H104Z
3	3	D1,D2,D3	LED GREEN CLEAR 1206 SMD	Chicago Miniature Lamp, Inc	CMD15-21VGC/TR8
4	1	J2	CONN HEADER 5POS 0.1 VERT KEYED	Molex	22-23-2051
5	11	J5,J7,J11,J12,J13,J15,J16, J17,J18,J19,J24	HEADER 2 POS .100CL	AMP Division of TYCO	103185-2
6	1	J4	CONN HEADER VERT 40 POS .1"	AMP Division of TYCO	2-103186-0
7	1	J6	CONN USB RECEPT TYPE B PCB	AMP/TYCO	787780-1
8	4	J8,J9,J20,J23	HEADER 3POS FRIC STRGHT MTA 100	AMP Division of TYCO	103185-3
9	1	J10	CONN MINI-DIN 6POS FEMALE SHIELD	CUI Stack Inc.	MD-60SGK
10	3	P1,P2,P3	CONN HEADER/RECEPT 20POS DUAL ROW VERT	AMP/TYCO	1-103186-0
11	3	R1,R2,R3	RES ZERO OHM 1/16W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEY0R00V
12	3	R4,R5,R6	RES 1.0K OHM 1/16W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ102V
13	3	S1,S2,S3	LT SWITCH 6MM 100GF H=7MM TH	Panasonic - ECG	EVQ-PBC07K
14	2	U1	Socket strip, 20 position	Mill-Max	310-93-120-41-001
15	1	U2	DIP24 Socket 300 mil	Mill-Max	111-93-324-41-001000
16	1		PCB	Cypress Semiconductor	PCD-9180 Rev **
17	1		PCB label, Year, Work-week, SN		
18	8	J5,J11,J12,J13,J16,J17,J18 , J19	Shunts, 2-pin header jumper	3M	929955-06. Place on 2-pin header
19	4	J8,J9,J20,J23	Shunts, 2-pin header jumper	3M	929955-06. Place on pins 1-2 of 3-pin header
20	1	Reference		Schematic, PCA 121-18000 rev *A for PDC- 9180 Rev **	As per schematic file
21		PCB	Foot pads, white square, .50"W x .23"H	3M	SJ5518
22	1		PCB label, PCA revision		121-18000 *A
23	2	C5,C4	CAP NO LOAD 0603	NA	NA
24	1	C1	CAP NO LOAD	NA	NA
25	2	C2, C9	CAP NO LOAD	NA	NA
26	1	J1	HDR 38X1 Footprint Only	NA	NA
27	5	J3,J14,J21,J22,J25	HDR 2 POS	NA	NA
28	1	U3	PROTO AREA 56-pin 25mil pitch	NA	NA
29	1	Y1	XTAL HC49SMT or CER RES 3-pin	NA	NA