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**EVB-UPD1001DC2  
Evaluation Board  
User's Guide**

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**Object of Declaration:** EVB-UPD1001DC2

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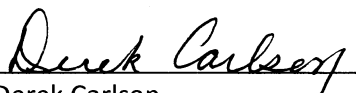
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Derek Carlson  
VP Development Tools



Date

**NOTES:**

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## Preface

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### NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site ([www.microchip.com](http://www.microchip.com)) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXA”, where “XXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

## INTRODUCTION

This chapter contains general information that will be useful to know before using the EVB-UPD1001. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [The Microchip Web Site](#)
- [Development Systems Customer Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

## DOCUMENT LAYOUT

This document describes how to use the EVB-UPD1001DC2 Evaluation Board as a demonstration platform optimized for portable applications:

- **Chapter 1. “Overview”** – Shows a brief description of the EVB-UPD1001DC2 Evaluation Board.
- **Chapter 2. “Getting Started”** – Includes instructions on how to get started with the EVB-UPD1001DC2 Evaluation Board.
- **Chapter 3. “Battery Charging Support”** – Provides information about the EVB-UPD1001DC2 Evaluation Board battery charging features.
- **Appendix A. “EVB-UPD1001DC2 Evaluation Board”** – This appendix shows the EVB-UPD1001DC2 Evaluation Board.
- **Appendix B. “EVB-UPD1001DC2 Evaluation Board Schematics”** – This appendix shows the EVB-UPD1001DC2 Evaluation Board schematics.
- **Appendix C. “EVB-UPD1001DC2 BOM”** – This appendix includes the EVB-UPD1001DC2 Evaluation Board Bill of Materials (BOM).
- **Appendix D. “EVB-UPD1001DC2 PCB Silk Screens”** – This appendix shows the EVB-UPD1001DC2 Top and Bottom Silk Screen images.

## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

Description	Represents	Examples
<b>Arial font:</b>		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u>File&gt;Save</u>
Bold characters	A dialog button	Click <b>OK</b>
	A tab	Click the <b>Power</b> tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
<b>Courier New font:</b>		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets [ ]	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: {   }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }



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- **Emulators** – The latest information on Microchip in-circuit emulators. This includes the MPLAB REAL ICE and MPLAB ICE 2000 in-circuit emulators.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit 3 debug express.
- **MPLAB IDE** – The latest information on Microchip MPLAB IDE, the Windows Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART Plus and PIC-kit 2 and 3.

## CUSTOMER SUPPORT

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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at:

<http://www.microchip.com/support>

### **DOCUMENT REVISION HISTORY**

#### **Revision A (September 2013)**

- Initial Release of this Document.

#### **Revision B (July 2014)**

- Additional Updates

NOTES:

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## Chapter 1. Overview

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### 1.1 INTRODUCTION

The EVB-UPD1001DC2 provides a platform to evaluate the capabilities of the UPD1001 USB Power Delivery Controller from Microchip. The UPD1001 provides multiple power delivery modes with communications using FSK over the VBUS line, and is compliant with the USB Power Delivery Specification. Revision 1.0, Version 1.3. Feb 11, 2014.

The EVB-UPD1001DC2 can be configured to be a USB Power Delivery Provider or a Consumer/Provider with several selectable power configurations. See [Section 1.2 "Features"](#) for more information.

### 1.2 FEATURES

The EVB-UPD1001DC2 provides the following features:

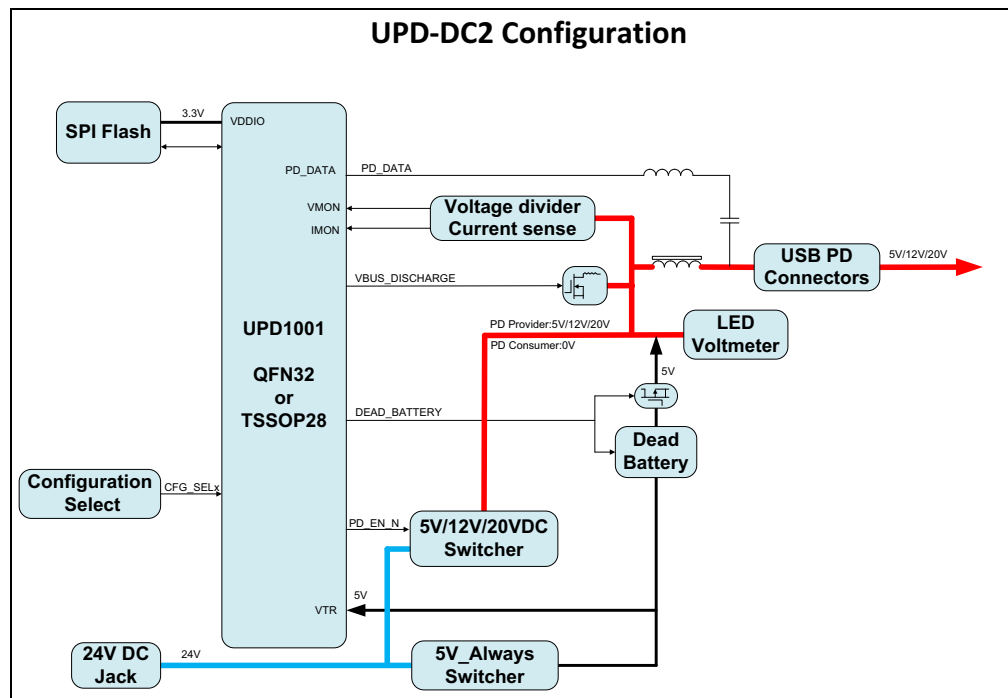
- UPD1001 in either a 32SQFN package or 28TSSOP package.
- Switch Selectable PD Profiles:
  - Provider-Only 5V@2A
  - Provider-Only 5V@3A
  - Provider-Only 5V@5A
  - Provider-Only 5V@2A, 12V@1.5A
  - Provider-Only 5V@2A, 12V@3A
  - Provider-Only 5V@3A, 12V@3A
  - Provider-Only 5V@2A, 12V@3A (PP-200)
  - Provider-Only 5V@2A, 12V@3A, 20V@3A
  - Provider-Only 5V@3A, 12V@3A, 20V@3A
  - Provider-Only 5V@2A, 12V@3A, 20V@3A (PP-200)
  - Provider-Only 5V@2A, 12V@5A, 20V@5A
  - Provider-Only 5V@5A, 12V@5A, 20V@5A
  - Provider-Only 5V@2A, 12V@3A, 20V@5A (PP-200)
  - Consumer 5V@0A, Provider 5V@2A
  - Consumer 5V@0A, Provider 5V@3A
  - Consumer 5V@0A, Provider 5V@5A
  - Consumer 5V@0A, Provider 5V@2A, 12V@1.5A
  - Consumer 5V@0A, Provider 5V@2A, 12V@3A
  - Consumer 5V@0A, Provider 5V@3A, 12V@3A
  - Consumer 5V@0A, Provider 5V@2A, 12V@5A, 20V@3A
  - Consumer 5V@0A, Provider 5V@5A, 12V@5A, 20V@3A
  - Consumer 5V@0A, Provider 5V@2A, 12V@3A, 20V@3A (PP-200)
  - Consumer 5V@0A, Provider 5V@2A, 12V@5A, 20V@5A
  - Consumer 5V@0A, Provider 5V@5A, 12V@5A, 20V@5A
  - Consumer 5V@0A, Provider 5V@2A, 12V@3A, 20V@5A (PP-200)

- User Selectable USB Power Delivery Receptacle:
  - USB3.0-PD Type A with Power Delivery INSERTION\_DETECT and PD\_DETECT signals.
  - USB3.0-PD Type B with Power Delivery ID signal.
- Variable Output Voltage Switching Regulator capable of supplying 5V, 12V, or 20V to the USB Power Delivery receptacle.
- Current limited 5V circuit for support of “dead battery” operation.
- LED power indicator for 5V board power.
- LED status indicators include:
  - Yellow LED indicator to indicate the selected USB PD receptacle.
  - Blue “SPI Active” LED indicators.
  - Red “Overvoltage”, “Overcurrent”, and “Fault\_n” LED indicators.
- LED voltmeter with 4 levels indicates approximate voltage at the PD connector.
- Through-hole test points provide visibility for all critical UPD1001 PD control signals.
- Banana jack connectors for easy connection to bench supply (cables included).
- 4-Pin power jack for +24V DC power supply (not included).

## 1.3 GENERAL DESCRIPTION

Figure 1-1 shows the block diagram of the EVB-UPD1001DC2.

**FIGURE 1-1: EVB-UPD1001DC2 BLOCK DIAGRAM**



The EVB-UPD1001DC2 is an evaluation and demonstration platform featuring the UPD1001 USB Power Delivery Controller on a Printed Circuit Board (PCB). The EVB-UPD1001DC2 is designed to demonstrate the unique features of this device by offering a large number of user-selectable configuration options.

The EVB-UPD1001DC2 features an on-board regulator capable of delivering up to 5A at 5V, 12V, or 20V over USB Power Delivery. A 5V, current limited supply circuit is also included for “dead battery” operation.

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The Power Delivery capabilities are user-selectable via toggle switches. The user can choose between 13 Provider-Only and 12 Consumer-Provider profiles. The correct USB Receptacle must also be selected; USB Standard A for Provider-Only profiles, USB Standard B for Consumer/Provider profiles. The USB receptacles are Power Delivery compatible and include the required Power Delivery specific pins.

Headers for emulating USB Power Delivery cables are available for the user if USB Power Delivery cables are not available.

The EVB-UPD1001DC2 features a large number of LED indicators, including an LED voltmeter, USB receptacle selection indicator, fault indicators, power delivery contract indicators, and a SPI ROM activity indicator.

## 1.4 REFERENCES

- Microchip Technology Inc., UPD1001 Programmable USB Port Power Delivery Controller Datasheet.
- USB-IF, Universal Serial Bus Power Delivery Specification. Revision 1.0, Version 1.3. Feb 11, 2014.

## 1.5 DEFINITIONS

- **PD** - Acronym for Power Delivery.
- **Consumer** - The capability of a PD Port (typically a USB device upstream port) to sink power from the USB VBUS conductor.
- **Provider** - A capability of a PD Port (typically a USB Host, USB Hub, or Wall Wart USB downstream port) to source power over the USB VBUS conductor.
- **Consumer/Provider** - A Consumer with the additional capability to act as a Provider.
- **Source** - A role a USB port is currently taking to supply power over VBUS; most commonly a USB Host or USB Hub Downstream Port.
- **Sink** - The USB port consuming power from VBUS; most commonly a USB device.
- **Provider/Consumer** - A Provider with the additional capability to act as a Consumer.
- **Negotiation** - This is the PD process whereby:
  1. The Source advertises its capabilities.
  2. The Sink requests one of the advertised capabilities.
  3. The Source acknowledges the request and alters its output to satisfy the request.

The result of the negotiation is a contract for power delivery/consumption between the Port Pair.

**NOTES:**

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## Chapter 2. Getting Started

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### 2.1 CONTENTS OF THE KIT

The EVB-UPD1001DC2 kit includes the basic equipment necessary for evaluation. The items include in the kit are:

1. **EVB-UPD1001DC2 Evaluation Board**
2. **(1) Red and (1) Black Banana Cable**
3. **USB PD-Compliant Type A to Type B Cable**

The kit does not include a USB Power Delivery partner. A USB PD compatible Consumer-only or Provider/Consumer that communicates using FSK encoding on the VBUS line is necessary in order to test power delivery power contract negotiation with this board.

### 2.2 BRING-UP AND TESTING

#### 2.2.1 Setup and Requirements

- **Power Supply:** A power supply capable of providing 24V DC at up to 6A is required to operate and test the full feature set of the PIC18F1220/1320. This power supply can be a typical bench top DC power supply or a AC Adaptor with a 4-pin DIN connector. Microchip recommends CUI Inc's ETS240625UC-P51-ET 24VDC 6.25A supply.
- **A Power Delivery USB Cable (included):** A USB PD cable is required to test USB Power Delivery without the use of the emulation jumpers on the board (Cable Mkr. EMU and Cable Det. Emulation). USB Power Delivery cables are different than standard USB cables in two significant ways:
  - **Elongated Type A Plug:** The elongated type a plug makes contact with the PD\_DETECT pins on a USB PD Type A receptacle.
  - **Cable Marker:** A USB PD cable has a capacitive cable marker which allows the power delivery controller to detect the maximum current capability. A USB Power Delivery cable can either be 3A or 5A capable.
- **USB Power Delivery Partner:** In order to test USB PD negotiation a PD partner is required. When testing standard Provider-Only operation, a Consumer-Only or Consumer/Provider PD partner is required. When testing standard Consumer/Provider operation, a Provider/Consumer or Provider-Only PD partner is required.

**Note:** Microchip offers additional UPD100x Evaluation Boards in a variety of configurations. These boards can be used as a PD partner when testing the EVB-UPD1001DC2 Evaluation Board

#### 2.2.2 Standard Provider-Only Operation

Follow these steps in order to test Provider-Only operation:

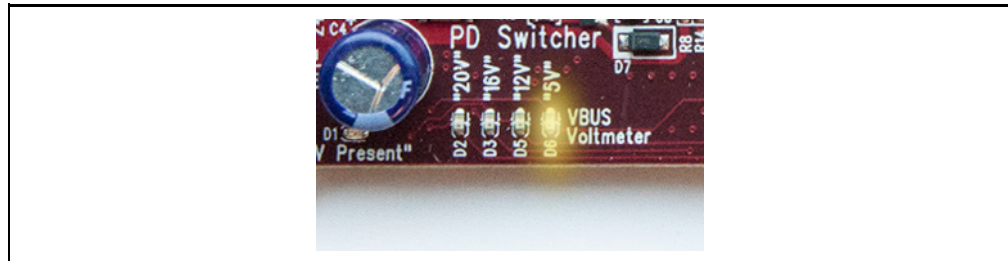
1. Plug in 24V DC Power Supply to either the Banana Jacks or the 4-pin DIN connector. **Always ensure that the main power switch is in the OFF position**



**before inserting a power supply.**

- Slide Conn. Select to the "USB-A" position.
- If a USB-PD Compliant USB cable is not available, shunt J10 ("Cable Det. Emulation").
- Choose the Provider-Only profile you would like to exercise from [Table 2-5](#). Adjust the CfgSel0 and CfgSel1 switches according to the diagram for the selected profile from the table.
- Slide the main power switch into the "ON" position. The board will power on.
- Insert the Type A plug of a USB cable into the Type A receptacle (J12).
- Observe the LEDs of the "VBUS Voltmeter". Only the "5V" (D6) should be illuminated. This indicates that 5V is now being supplied to VBUS.

**FIGURE 2-1: VOLTMETER AT 5V**



- Connect the other end of the USB cable to a Consumer-Only or Consumer/Provider PD partner.
- Power Delivery negotiation will occur. The "PD Contract -A" LED will illuminate. If a profile that exercises a voltage level other than 5V is selected, the change in voltage on VBUS will be shown on the "VBUS Voltmeter".
- The EVB-UPD1001DC2 Evaluation Board will continue to provide the negotiated voltage until one of the following occurs:
  - USB cable is removed from the receptacle.
  - Voltage on VBUS exceeds the negotiated level.
  - Current on VBUS exceeds the negotiated limit.
  - UPD1001 part is reset via the "Reset" switch (SW7).
  - PD partner sends a reset command or ceases PD communication over VBUS.

### 2.2.3 Standard Consumer/Provider Operation

Follow these steps in order to test Consumer/Provider operation:

- Plug in 24V DC Power Supply to either the Banana Jacks or the 4-pin DIN connector. **Always ensure that the main power switch is in the OFF position before inserting a power supply.**
- Slide SW6 to the "USB-B" position.
- If a USB-PD Compliant USB cable is not available, shunt J9 ("Cable Mkr. EMU") to either the "3A" or "5A" position. **Ensure that the cable being used will be adequate for the power selected.**
- Choose the Consumer/Provider profile you would like to exercise from [Table 2-5](#). Adjust SW2-SW5 according to the diagram for the selected profile from the table.
- Slide SW1 into the "ON" position. The board will power on.
- Insert the Type B plug of a USB cable into the Type B receptacle (J11).
- Connect the other end of the USB cable to a powered-on PD Provider/Consumer partner.
- Power Delivery negotiation will occur. The "PD Contract -A" LED will illuminate.

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When the UPD1001 recognizes that a PD partner is connected, it will automatically request a role swap to Provider mode. The UPD1001 will also accept a role swap request from the PD partner at any time. If the PD partner decides that it would like to become a Consumer, it will either accept a role swap request or send a role swap request and request the desired Source Capability from the EVB-UPD1001DC2.

9. The EVB-UPD1001DC2 Evaluation Board will continue to provide or consume the negotiated voltage until one of the following occurs:
  - USB cable is removed from the receptacle.
  - Voltage on VBUS exceeds the negotiated level.
  - Current on VBUS exceeds the negotiated limit.
  - UPD1001 part is reset via the "Reset" switch (SW7).
  - PD partner requests a role swap.
  - PD partner sends a reset command or ceases PD communication over VBUS.

### 2.2.4 Consumer/Provider Dead Battery Operation

Follow these steps in order to test Consumer/Provider Dead Battery operation:

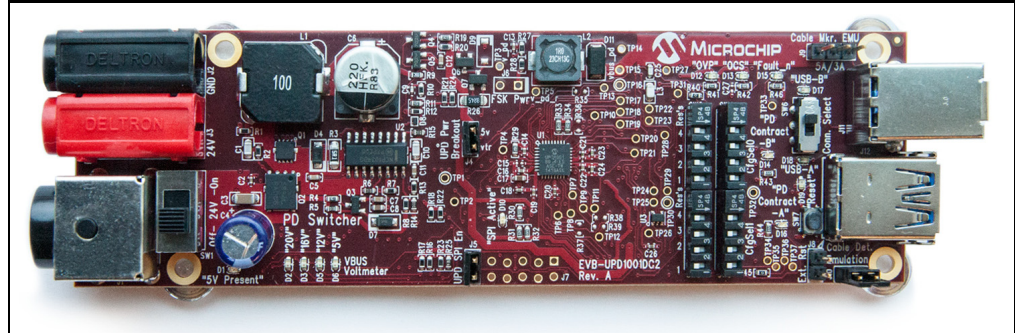
1. Plug in 24V DC Power Supply to either the Banana Jacks or the 4-pin DIN connector. **Always ensure that the main power switch is in the OFF position before inserting a power supply.**
2. Slide SW6 to the "USB-B" position.
3. If a USB-PD Compliant USB cable is not available, shunt J9 ("Cable Mkr. EMU") to either the "3A" or "5A" position. **Ensure that the cable being used will be adequate for the power selected.**
4. Choose the Consumer/Provider profile you would like to exercise from [Table 2-5](#). Adjust SW2-SW5 according to the diagram for the selected profile from the table.
5. Slide SW1 into the "ON" position. The board will power on.
6. Insert the Type B plug of a USB cable into the Type B receptacle (J11).
7. Connect the other end of the USB cable to a powered-off PD Provider/Consumer or Consumer-Only partner. **The PD partner must be capable of Dead Battery operation.**
8. Dead Battery operation will occur. The EVB-UPD1001DC2 Evaluation Board will switch to Provider mode and provide 5V to VBUS for a short duration every 3 seconds. This is done to detect the presence of a PD partner with no power source. If a Dead Battery capable PD partner is connected, it will be powered from the 5V on VBUS and immediately begin to communicate with the EVB-UPD1001DC2 Evaluation Board. PD negotiation will occur and the PD partner will request one of the available Source Capabilities.
9. The EVB-UPD1001DC2 Evaluation Board will continue to provide the negotiated voltage until one of the following occurs:
  - USB cable is removed from the receptacle.
  - Voltage on VBUS exceeds the negotiated level.
  - Current on VBUS exceeds the negotiated limit.
  - UPD1001 part is reset via the "Reset" switch (SW7).
  - PD partner requests a role swap.PD partner sends a reset command or ceases PD communication over VBUS.

**NOTES:**

## Chapter 3. Hardware Configuration

### 3.1 HARDWARE DESCRIPTION

**FIGURE 3-1: EVB-UPD1001DC2**



#### 3.1.1 Power Source

The EVB-UPD1001DC2 can be powered in one of two ways:

1. **Banana Jacks:** 24V can be supplied from a bench power supply to the banana jacks via the include banana cables.
2. **24VDC AC Adapter Power Supply:** A 4-pin, 24V DC power supply can be connected to connector J1 to power the board. The recommended power supply is CUI Inc's ETS240625UC-P51-ET 24VDC 6.25A supply.

**Note:** Always perform the following steps when powering on the EVB-UPD1001DC2:

1. Ensure that the power switch is in the "Off" position.
2. Close UPD Pwr Breakout (install shunt) and leave it in place.
3. Insert the 24 power supply.
4. Flip the switch into the "On" position.
5. Ensure that the "5V Present" LED indicator is illuminated and the "OVP", "OCS", and "Fault\_n" LED indicators are not illuminated before proceeding.

#### 3.1.2 LED Indicators

Table 3-1 describes the LED indicators included on the EVB-UPD1001DC2. Figure 3-2 shows their location on the PCB.

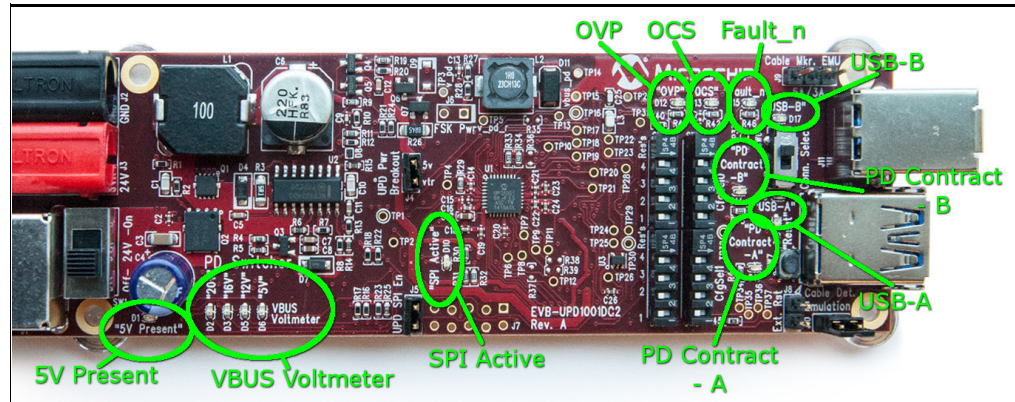
**TABLE 3-1: LED INDICATOR DESCRIPTIONS**

REF. DES.	LABEL	DESCRIPTION
D1	"5V Present"	Indicates that 5V board power is present
D2	"20V"	Indicates that the voltage on VBUS is at or exceeds the 20V range
D3	"16V"	Indicates that the voltage on VBUS is at or exceeds the 16V range
D4	"12V"	Indicates that the voltage on VBUS is at or exceeds the 12V range
D5	"5V"	Indicates that the voltage on VBUS is at or exceeds the 5V range

**TABLE 3-1: LED INDICATOR DESCRIPTIONS**

REF. DES.	LABEL	DESCRIPTION
D10	"SPI Active"	Indicates activity on the SPI ROM Chip Enable (SPI_CE_N) signal
D12	"OVP"	Illuminates when the voltage on VBUS exceeds 22.5V
D13	"OCS"	Illuminates when the current on VBUS exceeds 5.3A
D14	"PD Contract-B"	Indicates that a Power Delivery contract has completed negotiation through the Type B connector.
D15	"Fault_n"	Indicates the state of the FAULT_N pin on the UPD1001
D16	"PD Contract-A"	Indicates that a Power Delivery contract has completed negotiation through the Type A connector.
D17	"USB-B"	Indicates that the USB3.0 Type B Connector is selected for use as the Power Delivery port.
D18	"USB-A"	Indicates that the USB3.0 Type A Connector is selected for use as the Power Delivery port.

**FIGURE 3-2: LED INDICATOR LOCATIONS**



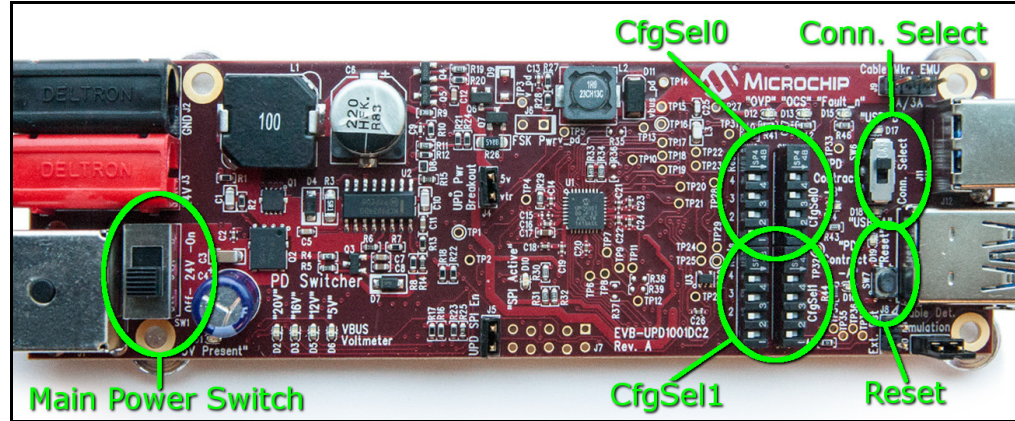
### 3.1.3 Switches

Table 3-2 describes the switches included on the EVB-UPD1001DC2. Figure 3-3 shows their location on the PCB.

**TABLE 3-2: SWITCH DESCRIPTIONS**

REF. DES.	LABEL	DESCRIPTION
SW1	Off - 24V - On	Main 24V Power Switch
SW2	CfgSel0 Res's	CFG_SEL0 RCID Resistor Selector
SW3	CfgSel1 Res's	CFG_SEL1 RCID Resistor Selector
SW4	CfgSel0 Cap's	CFG_SEL0 RCID Capacitor Selector
SW5	CfgSel1 Cap's	CFG_SEL1 RCID Capacitor Selector
SW6	Conn. Select	Selects between the USB3.0 Type A PD Connector and the USB3.0 Type B PD Connector
SW7	Reset	Holds the UPD1001 in reset when pressed

**FIGURE 3-3: SWITCH LOCATIONS**



**3.1.4 Connectors**

The EVB-UPD1001DC2 features user-selectable USB receptacles, two power supply options, and USB Power Delivery cable emulation jumpers. See [Table 3-3](#) for the complete list of connectors. See [Figure 3-4](#) for an image of the connectors on the EVB. For more details, please see [1.1 “Introduction”](#).

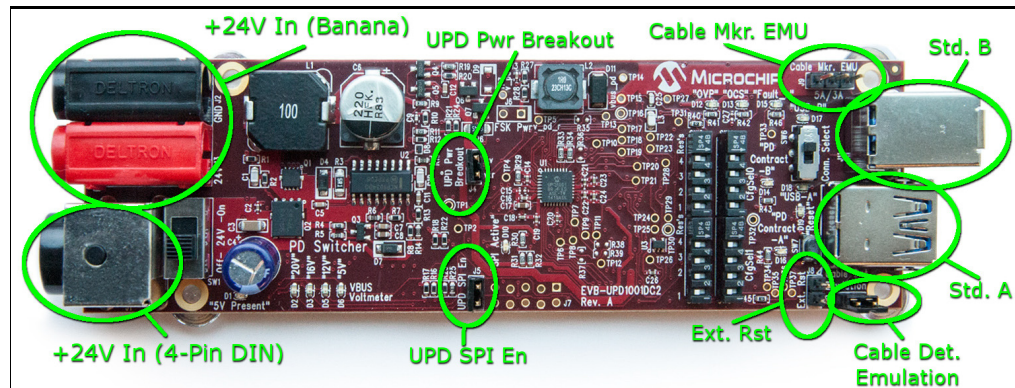
**TABLE 3-3: CONNECTOR DESCRIPTIONS**

REF. DES.	TYPE	LABEL	DESCRIPTION
J1	4-pin DIN	-	This is one of the two connector options for powering the board and is for use with CUI Inc’s ETS240625UC-P51-ET 24VDC 6.25A supply.
J2	Banana	GND	Bench Supply (GND)
J3	Banana	24V	This is one of two connector options for powering the board. Red banana jack J3 (24V) along with black banana jack J2 (GND) provide a convenient connection to a 24V 6A bench power supply.
J4	1x2 Header	UPD Pwr Breakout	Install a shunt to connect the 5V board power to the VTR pin of the UPD1001 (default).
J5	1x2 Header	UPD SPI En	Install a shunt to connect the Chip Enable pin of the SPI ROM to the SPI_CE_N pin on the UPD1001 (default).
J8	1x2 Header	Ext Rst	Install a shunt to hold the UPD1001 part in reset.
J9	1x3 Header	Cable Mkr. EMU	This function is only used when the USB Type B receptacle is selected.  Do not install a shunt if a PD-compliant USB cable is used.  Install a shunt between pins [1-2] to emulate a 5A capable USB-PD cable.  Install a shunt between pins [2-3] to emulate a 3A capable USB-PD cable.

**TABLE 3-3: CONNECTOR DESCRIPTIONS**

REF. DES.	TYPE	LABEL	DESCRIPTION
J10	1x2 Header	Cable Det. Emulation	This function is only used when the USB Type A receptacle is selected.  Do not install a shunt if a PD-compliant USB cable is used.  Install shunt to emulate a USB-PD cable.
J11	USB3.0-PD Type B	-	Type B Power Delivery Receptacle. Select with Conn. Select.  This Receptacle includes the Power Delivery ID Pin.
J12	USB3.0-PD Type A	-	Type A Power Delivery Receptacle. Select with Conn. Select.  This Receptacle includes the Insertion Detection and Power Delivery Detect Pins.

**FIGURE 3-4: CONNECTOR LOCATIONS**



### 3.1.5 Heading

Table 3-4 describes the test points included on the EVB-UPD1001DC2. A header can be permanently installed on the through-hole points if needed.

**TABLE 3-4: TEST POINT DESCRIPTIONS**

REF. DES.	TYPE	DESCRIPTION
TP1	Thru-Hole	GND
TP2	Thru-Hole	IFault pin of UPD1001 28 TSSOP
TP3	Thru-Hole	V_PD (output of 5V/12V/20V switcher)
TP4	Thru-Hole	IFault pin of UPD1001 32 SQFN
TP5	Thru-Hole	V_PD_R (see schematic)
TP6	Thru-Hole	INSERTION_DETECT/BULK_CAP pin of UPD1001 32 SQFN
TP7	Thru-Hole	CHG_EMU_N/NC pin of UPD1001 32 SQFN
TP8	Thru-Hole	PD_DETECT/SAFEDB_EN pin of UPD1001 32 SQFN
TP9	Thru-Hole	VMON pin of UPD1001 32 SQFN
TP10	Thru-Hole	VBUS_DISCHARGE pin of UPD1001 32 SQFN
TP11	Thru-Hole	IMON pin of UPD1001 32 SQFN
TP12	Thru-Hole	CHG_EMU_EN/NC
TP13	Thru-Hole	VSEL3_N pin of UPD1001 32 SQFN

**TABLE 3-4: TEST POINT DESCRIPTIONS**

REF. DES.	TYPE	DESCRIPTION
TP14	Thru-Hole	PD_EN_N
TP15	Thru-Hole	VBUS_PD
TP16	Thru-Hole	GND
TP17	Thru-Hole	VSEL0_N pin of UPD1001 32 SQFN
TP18	Thru-Hole	TEST pin of UPD1001 32 SQFN
TP19	Thru-Hole	FAULT_IN_N pin of UPD1001 28 TSSOP
TP20	Thru-Hole	PD_ID pin of UPD1001 32 SQFN
TP21	Thru-Hole	PD_EN_N pin of UPD1001 32 SQFN
TP22	Thru-Hole	PD_DATA
TP23	Thru-Hole	VSEL1_N pin of UPD1001 32 SQFN
TP24	Thru-Hole	IMON pin of UPD1001 28 TSSOP
TP25	Thru-Hole	PD_ID pin of UPD1001 28 TSSOP
TP27	Thru-Hole	FAULT_IN
TP28	Thru-Hole	PD_DATA pin of UPD1001 32 SQFN
TP29	Thru-Hole	PD_EN_N pin of UPD1001 28 TSSOP
TP30	Thru-Hole	GND
TP31	Thru-Hole	VSEL2_N pin of UPD1001 32 SQFN
TP32	Thru-Hole	GND
TP33	Thru-Hole	FAULT_N
TP34	Thru-Hole	UPD1001 28 TSSOP VSEL0 DeMux
TP35	Thru-Hole	UPD1001 28 TSSOP VSEL1 DeMux
TP36	Thru-Hole	UPD1001 28 TSSOP VSEL2 DeMux
TP37	Thru-Hole	UPD1001 28 TSSOP VSEL3 DeMux
TP38	Surface (back-side)	TEST pin of UPD1001 28 TSSOP
TP39	Surface (back-side)	VBUS_DISCHARGE pin of UPD1001 28 TSSOP
TP40	Surface (back-side)	PD_DATA pin of UPD1001 28 TSSOP
TP41	Surface (back-side)	VMON pin of UPD1001 28 TSSOP

**Note:** TP26, TP44, TP43, TP44 are unused.

## 3.2 BOARD CONFIGURATIONS

### 3.2.1 UPD1001 Package

EVB-UPD1001DC2 is either populated with a 28-pin TSSOP part (located on the bottom-side) or a 32-pin SQFN part (located on the top-side). The functionality of the board does not change with respect to the package that is installed on the board.

### 3.2.2 Power Delivery Profiles

Because the EVB-UPD1001DC2 is not capable of supplying all voltage levels that the UPD1001 is capable of negotiating, only selected profiles are valid and able to be exercised by the board. These profiles are selected by toggling the array of switches on SW2-SW5.



After selecting the desired profile, the appropriate USB receptacle must also be selected.

Finally, the part must be reset by pressing SW7 ("Reset") or by temporarily shunting J8 ("Ext. Rst").

[Table 3-5](#) describes the profiles and associated switch settings that are compatible with the EVB-UPD1001DC2.

After selecting the desired profile, the appropriate USB receptacle must also be selected.

Finally, the part must be reset by pressing SW7 ("Reset") or by temporarily shunting J8 ("Ext. Rst").

[Table 2-5](#) describes the profiles and associated switch settings that are compatible with the EVB-UPD1001DC2

**TABLE 3-5: PROFILE CONFIGURATIONS**

UPD1001 Profile	Switch Settings	Capabilities																								
1	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Provider-Only 5V@2A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
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R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
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R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
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R1	R2	R3	R4	R1	R2	R3	R4																			
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R1	R2	R3	R4	R1	R2	R3	R4																			
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R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
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15	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Provider-Only 5V@2A, 12V@3A (PP-200)
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
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R1	R2	R3	R4	R1	R2	R3	R4																			
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R1	R2	R3	R4	R1	R2	R3	R4																			
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R1	R2	R3	R4	R1	R2	R3	R4																			
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R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
37	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@2A, 12V@1.5A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
39	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@2A, 12V@3A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
40	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@3A, 12V@3A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
43	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@2A, 12V@5A, 20V@3A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
44	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@5A, 12V@5A, 20V@3A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						

**TABLE 3-5: PROFILE CONFIGURATIONS**

UPD1001 Profile	Switch Settings	Capabilities																								
47	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@2A, 12V@3A, 20V@3A (PP-200)
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
48	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@2A, 12V@5A, 20V@5A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
49	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@5A, 12V@5A, 20V@5A
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						
52	<table border="1"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> <td>R1</td><td>R2</td><td>R3</td><td>R4</td> </tr> <tr> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> <td>C1</td><td>C2</td><td>C3</td><td>C4</td> </tr> <tr> <td colspan="4">CfgSel1</td> <td colspan="4">CfgSel0</td> </tr> </table>	R1	R2	R3	R4	R1	R2	R3	R4	C1	C2	C3	C4	C1	C2	C3	C4	CfgSel1				CfgSel0				Consumer 5V@0A, Provider 5V@2A, 12V@3A, 20V@5A (PP-200)
R1	R2	R3	R4	R1	R2	R3	R4																			
C1	C2	C3	C4	C1	C2	C3	C4																			
CfgSel1				CfgSel0																						

**NOTES:**

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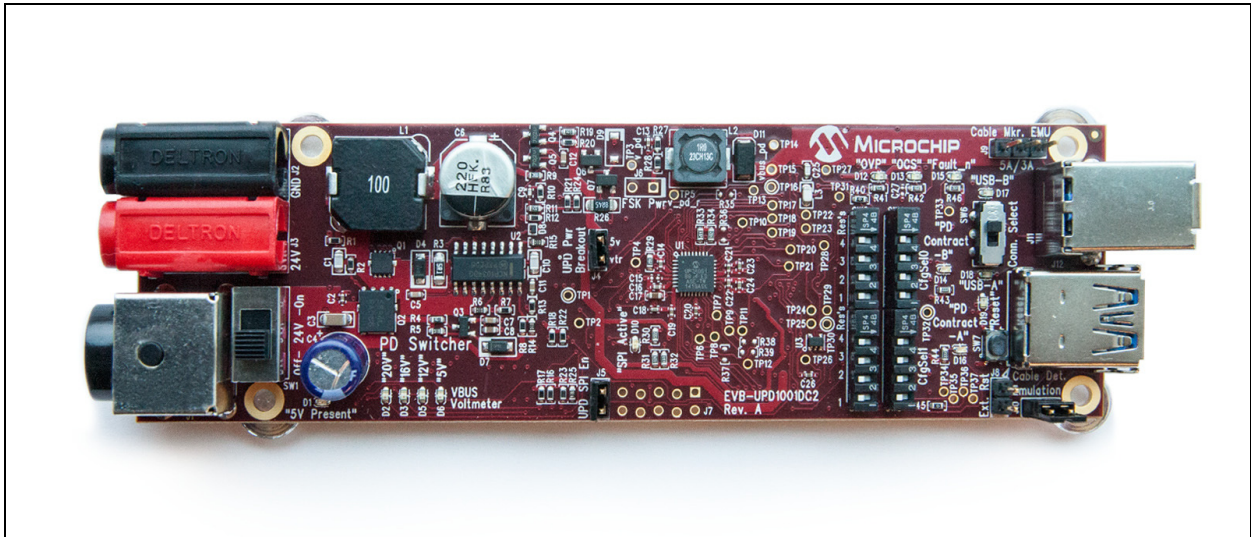
## Appendix A. EVB-UPD1001DC2 Evaluation Board

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### A.1 INTRODUCTION

This appendix shows the EVB-UPD1001DC2 Evaluation Board.

**FIGURE A-1: EVB-UPD1001DC2 EVALUATION BOARD**



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**NOTES:**



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## **Appendix B. EVB-UPD1001DC2 Evaluation Board Schematics**

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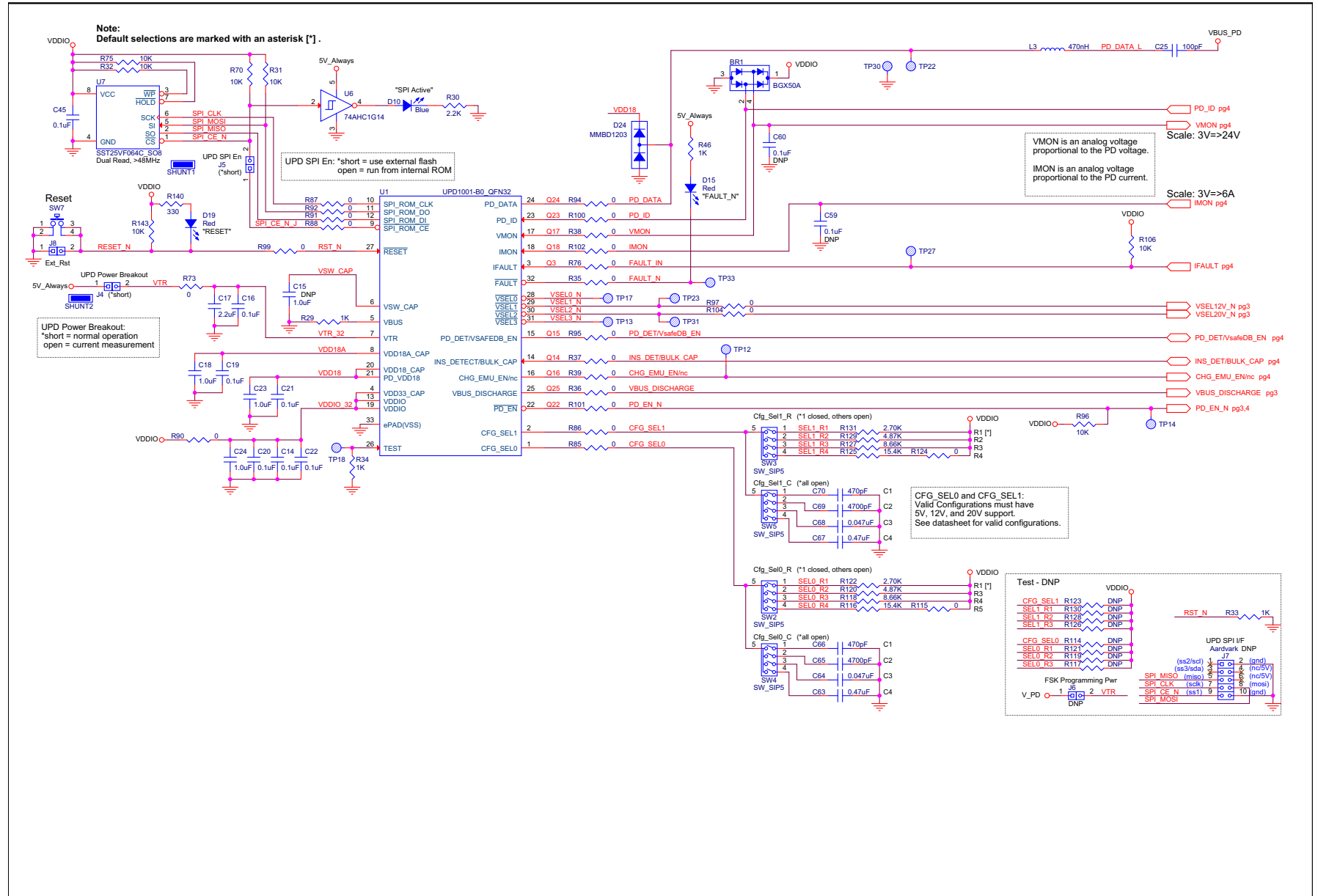
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### **B.1 INTRODUCTION**

This appendix shows the EVB-UPD1001DC2 Evaluation Board Schematics.

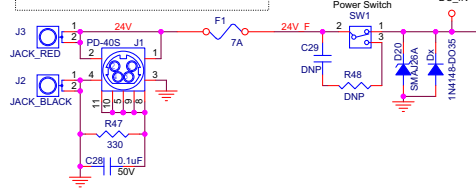


FIGURE B-1: EVB-UPD1001DC2 EVALUATION BOARD SCHEMATIC 1



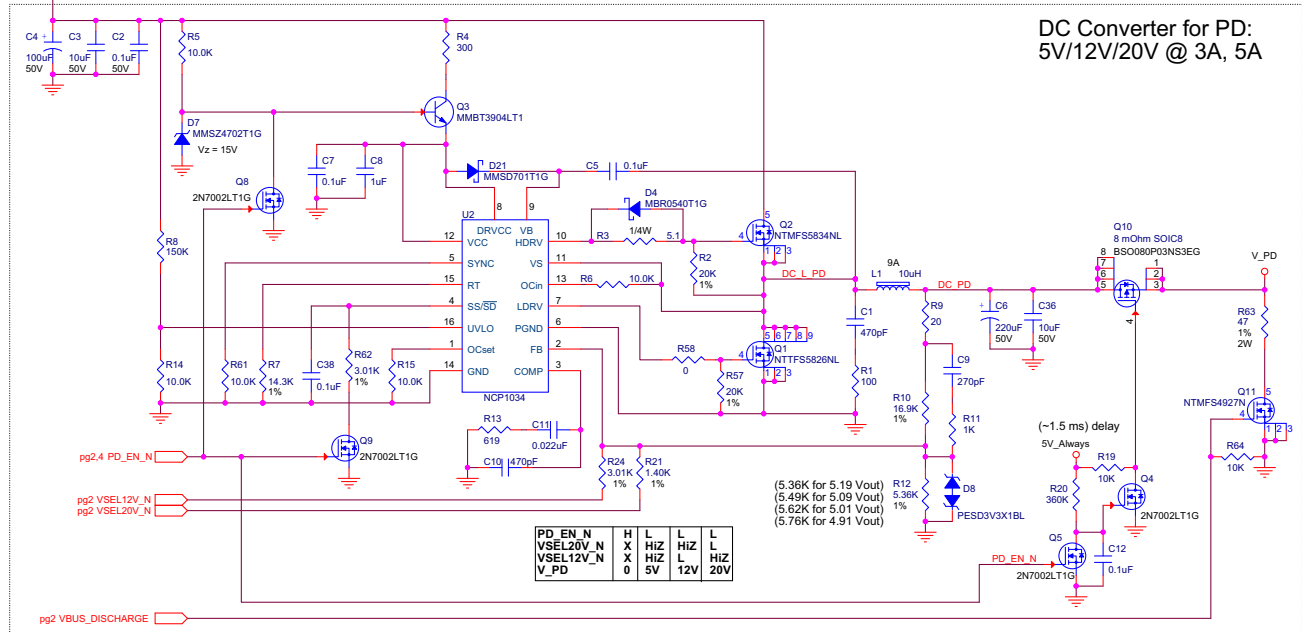
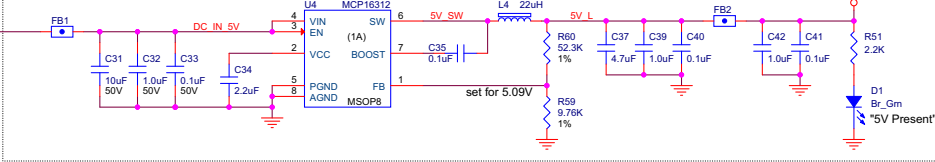
**FIGURE B-2: EVB-UPD1001DC2 EVALUATION BOARD SCHEMATIC 2**

24V Power Options:  
 1. 24VDC Supply ETS240625UC-P51-ET  
 2. 24VDC@6A Bench Supply to Banana Jacks



Pin Mapping to Power Supply  
 ETS240625UC-P51-ET;  
 Signal P/S CUI PD-40(S)  
 +V 1 1  
 +V 4 2  
 gnd 2 3  
 gnd 3 4  
 gnd Shell 5,8,9,10,12

**5V\_Always Supply, Nom. @ 200 mA, Max. @ 1A**



DC Converter for PD:  
 5V/12V/20V @ 3A, 5A

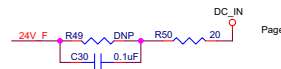
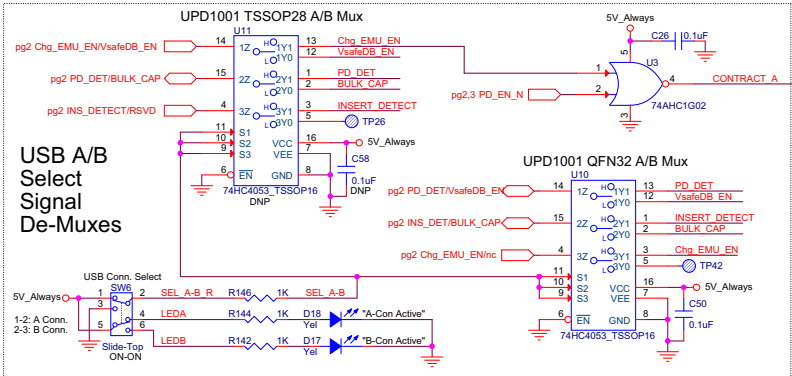
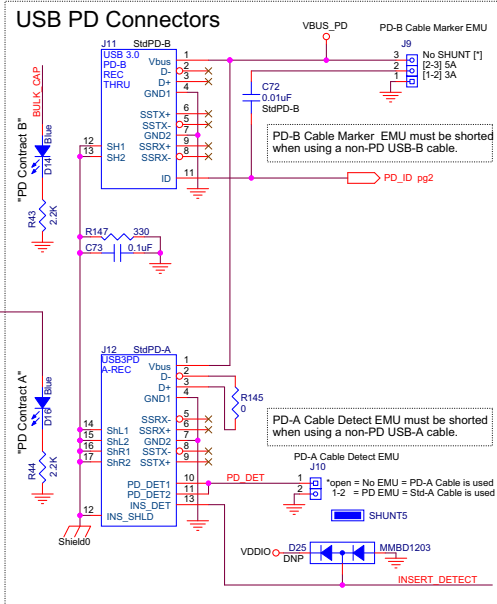
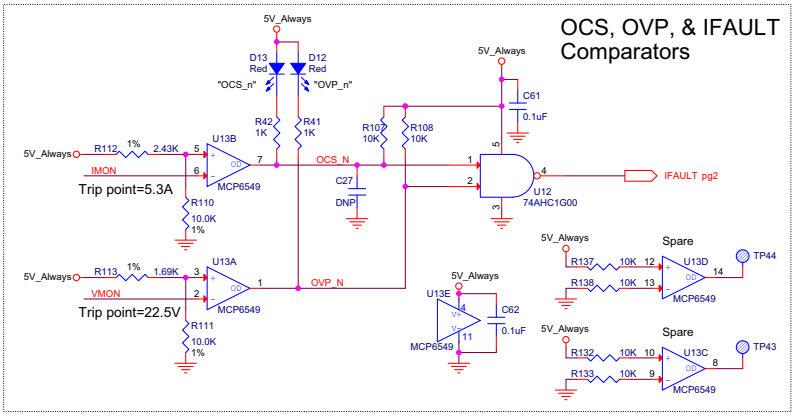
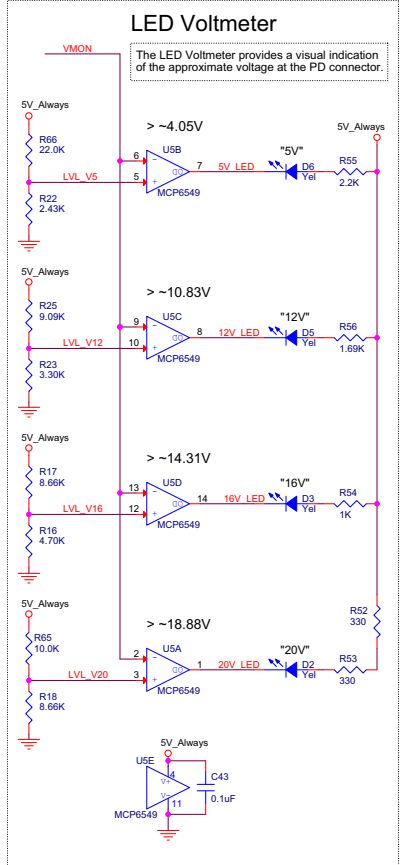
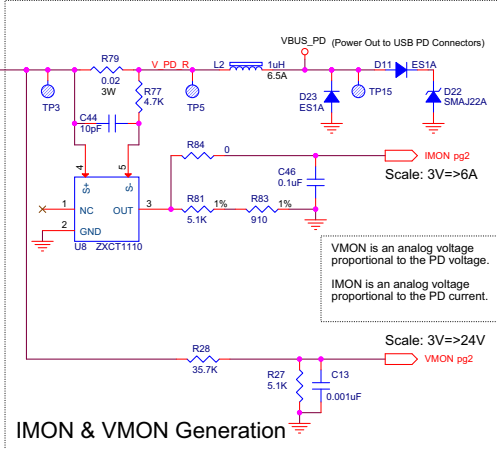
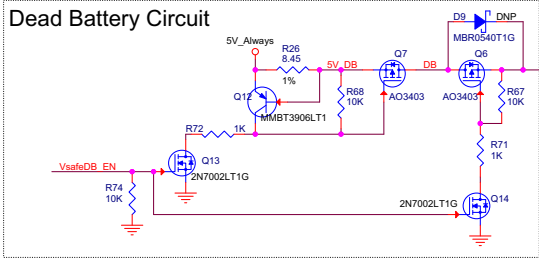


FIGURE B-3: EVB-UPD1001DC2 EVALUATION BOARD SCHEMATIC 3



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**NOTES:**



**EVB-UPD1001DC2  
EVALUATION BOARD  
USER'S GUIDE**

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**Appendix C. EVB-UPD1001DC2 BOM**

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**C.1 INTRODUCTION**

This appendix shows the EVB-UPD1001DC2 Evaluation Bill of Materials

TABLE C-1: EVB-UPD1001DC2 BILL OF MATERIALS

Item	Qty	Qty Pop'd	Reference Designator(s)	Description	Manufacturer	Manufacturer Part Number
1	2	2	C1,C10	Capacitor, 470pF, 50V, 5%, COG, 0805	Murata Electronics	GRM2165C1H471JA01D
2	2	2	C66,C70	Capacitor, 470pF, 50V, 5%,NPO, 0603	TDK Corporation	C1608C0G1H471J080AA
3	11	11	C2,C26,C28,C33,C35,C43,C45,C46,C61,C62,C73	Capacitor, 0.1uF, 50V, 10%, X5R, 0402	Taiyo Yuden	UMK105BJ104KV-F
4	7	7	C14,C16,C19,C20,C21,C22,C50	Capacitor, 0.1uF, 50V, 10%, X5R, 0402	Taiyo Yuden	UMK105BJ104KV-F
5	8	0	C47,C48,C51,C52,C54,C55,C58,C71	Capacitor, 0.1uF, 50V, 10%, X5R, 0402	Taiyo Yuden	UMK105BJ104KV-F
6	2	0	C59,C60	Capacitor, 0.1uF, 50V, 10%, X5R, 0402	Taiyo Yuden	UMK105BJ104KV-F
7	1	1	C30	Capacitor, 0.1uF, 50V, 10%, X7R, 0603	TDK Corporation	C1608X7R1H104K080AA
8	3	3	C3,C31,C36	Capacitor, 10uF, 50V, 10%, X5R, 1206	TDK	C3216X5R1H106K160AB
9	1	1	C4	Capacitor, 100uF, 50VDC, 20%, Aluminum, Radial-TH, 8mm x 11.5mm	Panasonic	ECA-1HM101
10	1	1	C6	Capacitor, 220uF, 50VDC, 20%, Aluminum, Radial, 10.3mm x 10.3mm	Panasonic	EEE-FK1H221GP
11	6	6	C5,C7,C12,C38,C40,C41	Capacitor, 0.01uF, 50V, 10%, X7R, 0603	Murata	GRM188R71H103KA01D
12	1	1	C72	Capacitor, 0.01uF, 50V, 10%, X7R, 0603	Murata	GRM188R71H103KA01D
13	2	2	C8,C32	Capacitor, 1.0uF, 50V, 10%, X5R, 0603	TDK Corporation	C1608X5R1H105K080AB
14	1	1	C9	Capacitor, 270pF, 50V, 5%, NPO, 0402	Murata	GRM1555C1H271JA01D
15	1	1	C11	Capacitor, 0.022uF, 50V, 10%, X7R, 0603	Kemet	C0603C223K5RACTU
16	1	1	C13	Capacitor, 1000pF, 50V, 10%, X7R, 0402	Murata	GRM155R71H102KA01D
17	1	0	C15	Capacitor, 1.0uF, 6.3VDC, 10%, X5R, 0402	Murata	GRM155R60J105KE19D
18	1	1	C17	Capacitor, 2.2uF, 16VDC, 10%, X5R, 0603	TDK Corporation	C1608X5R1C225K080AB
19	1	1	C34	Capacitor, 2.2uF, 16VDC, 10%, X5R, 0603	TDK Corporation	C1608X5R1C225K080AB
20	1	0	C53	Capacitor, 2.2uF, 16VDC, 10%, X5R, 0603	TDK Corporation	C1608X5R1C225K080AB
21	8	8	C18,C23,C24,C39,C42,C49,C56,C57	Capacitor, 1.0uF, 6.3VDC, 10%, X5R, 0402	Murata	GRM155R60J105KE19D

22	1	1	C25	Capacitor, 100pF, 50V, 5%, NPO, 0603	Murata	GCM1885C1H101JA16D
23	1	0	C27	Capacitor, Do Not Populate, 0402		
24	1	0	C29	Capacitor, Do Not Populate, 0603		
25	1	1	C37	Capacitor, 4.7uF, 6.3VDC, 20%, X5R, 0603	Murata	GRM188R60J475KE19D
26	1	1	C44	Capacitor, 10pF, 50V, 5%, NPO, 0603	Murata	GRM1885C1H100JA01D
27	2	2	C63,C67	Capacitor, 0.47uF, 16V, 5%, X7R, 0805	Vishay/Vitramon	VJ0805Y474JXJTW1BC
28	2	2	C64,C68	Capacitor, 0.047uF, 16V, 10%, X7R, 0603	Kemet	C0603C473K4RAC
29	2	2	C65,C69	Capacitor, 4700pF, 50V, 5%, NPO, 0805	Murata Electronics	GRM216R71H472JA01D
30	1	1	D1	LED, Bright Green, 0603	Rohm	SML-412MWT86
31	6	6	D2,D3,D5,D6,D17,D18	LED, Yellow, 0603	Stanley Electric	AY1111C-TR
32	3	3	D10,D14,D16	LED, Blue, 0603	Stanley Electric	DB1111C-TR
33	4	4	D12,D13,D15,D19	LED, Red, 0603	Stanley Electric	BR1111C-TR
34	1	1	BR1	Diode, Bridge, Switching, 50V, 140mA,KCAC, SOT-143	Infineon Tech	BGX50A
35	1	1	D7	Diode, Zener, 15V, 0.5W, SOD123	On Semiconductor	MMSZ4702T1G
36	1	1	D8	Diode, ESD protection, bidirectional, SOD882	NXP Semiconductors	PESD3V3X1BL
37	2	2	D11,D23	Diode, S1A, General Purpose, 50V, 1A, KA, SMA	Fairchild Semiconductor	ES1A
38	1	1	D4	Diode, Schottky, 40V, 0.5A, SOD123	On Semiconductor	MBR0540T1G
39	1	0	D9	Diode, Schottky, 40V, 0.5A, SOD123	On Semiconductor	MBR0540T1G
40	1	1	D21	Diode, Schottky, 70V, 0.2A, SOD123	On Semiconductor	MMSD701T1G
41	1	1	D22	Diode, Transient Voltage Suppression, 22V, DO-214AC	Littelfuse Inc	SMAJ22A
42	1	1	D20	Diode, Transient Voltage Suppression, 26V, DO-214AC	Littelfuse Inc	SMAJ26A
43	1	1	D24	Diode, Dual, MMBD1203, U-Fast Switching, 100VDC, 200mA, AKC, SOT-23	Fairchild Semiconductor	MMBD1203
44	1	0	D25	Diode, Dual, MMBD1203, U-Fast Switching, 100VDC, 200mA, AKC, SOT-23	Fairchild Semiconductor	MMBD1203
45	2	2	FB1,FB2	Ferrite Bead, 220 Ohm, 2A, 0.05DCR, 0603	Murata	BLM18EG221SN1D
46	1	1	F1	Fuse, Omniblock154, 7A, 125V, FB	Littlefuse	0154007.DR
47	1	1	L1	Inductor, 10uH, DCR-25.5mohms, 9A, SMT	Bourns Inc.	PM13560S-100M-RC
48	1	1	L2	Inductor, 1uH, DCR-0.0067, 6.5A, SMT	Coiltronics/Cooper Bussmann	DRA73-1R0-R
49	1	1	L3	Inductor, 470nH, DCR-1.5, 300mA, 0805	Bourns	CE201210-R47J
50	1	1	L4	Inductor, 22uH, DCR-0.770, 0.3A, SMT 1210	TDK Corporation	NLCV32T-220K-PF
51	1	1	R1	Resistor, 100, 1%,1/10W, 0603	Panasonic	ERJ-3EKF1000V

52	2	2	R2,R57	Resistor, 20.0K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF2002V
53	1	1	R3	Resistor, 5.1, 5%, 1/4W, 1206	Panasonic	ERJ-8GEYJ5R1V
54	1	1	R4	Resistor, 300, 5%, 1/10W, 0603	Panasonic	ERJ-3GEYJ301V
55	8	8	R5,R6,R14,R15, R61,R65,R110,R 111	Resistor, 10.0K, 1%, 1/16W, 0603	Rohm	MCR03EZHF1002
56	1	1	R7	Resistor, 14.3K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF1432V
57	1	1	R8	Resistor, 150K, 1%, 1/16W, 0603	Panasonic	ERJ-3EKF1503V
58	2	2	R9,R50	Resistor, 20, 5%, 1/10W, 0603	Panasonic	ERJ-3GEYJ200V
59	1	1	R10	Resistor, 16.9K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF1692V
60	1	1	R12	Resistor, 5.36K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF5361V
61	1	1	R13	Resistor, 619, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF6190V
62	1	1	R16	Resistor, 4.70K, 1%, 1/16W, 0603	Rohm	MCR03EZHF4701
63	4	4	R17,R18,R118,R 127	Resistor, 8.66K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF8661V
64	20	20	R19,R31,R32,R6 4,R67,R68,R70,R 74,R75,R96,R10 3,R106,R107, R108,R132,R133 ,R137,R138,R14 1,R143	Resistor, 10K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ103V
65	1	1	R60	Resistor, 52.3K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF5232V
66	1	1	R20	Resistor, 360K, 5%, 1/10W, 0603	Panasonic	ERJ-3GEYJ364V
67	1	1	R21	Resistor, 1.40K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF1401V
68	2	2	R22,R112	Resistor, 2.43K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF2431V
69	1	1	R23	Resistor, 3.30K, 1%, 1/16W, 0603	Yageo America	9C06031A3301FKHFT
70	2	2	R24,R62	Resistor, 3.01K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF3011V
71	1	1	R25	Resistor, 9.09K, 1%, 1/16W, 0603	Yageo America	9C06031A9091FKHFT
72	1	1	R26	Resistor, 8.45, 1%, 1/4W, 1206	Vishay/Dale	CRCW12068R45FKEA
73	2	2	R27,R81	Resistor, 5.10K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF5101V
74	1	1	R28	Resistor, 35.7K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF3572V
75	1	0	R78	Resistor, 1K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ102V
76	10	10	R11,R41,R42,R4 6,R54,R71,R72,R 142,R144,R146	Resistor, 1K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ102V



77	2	2	R29,R34	Resistor, 1K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ102V
78	1	0	R33	Resistor, 1K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ102V
79	5	5	R30,R43,R44,R51,R55	Resistor, 2.2K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ222V
80	5	5	R58,R84,R115,R124,R145	Resistor, ZERO, 0.1W, 0603	Panasonic	ERJ-3GEY0R00V
81	22	22	R35,R36,R37,R38,R39,R73,R76,R85,R86,R87,R88,R90,R91,R92,R94,R95,R97,R99,R100,R101,R102,R104	Resistor, ZERO, 0.1W, 0603	Panasonic	ERJ-3GEY0R00V
82	14	0	R40,R45,R69,R80,R82,R89,R93,R98,R105,R109,R134,R135,R136,R139	Resistor, ZERO, 0.1W, 0603	Panasonic	ERJ-3GEY0R00V
83	5	5	R47,R52,R53,R140,R147	Resistor, 330, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ331V
84	10	0	R48,R49,R114,R117,R119,R121,R123,R126,R128,R130	Resistor, Do Not Populate, 0603		
85	2	2	R56,R113	Resistor, 1.69K, 1%, 1/16W, 0603	Rohm	MCR03EZHF1691
86	1	1	R59	Resistor, 9.76K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF9761V
87	1	1	R63	Resistor, 47, 1%, 2W, 2512	TE Connectivity	352147RFT
88	1	1	R66	Resistor, 22.0K, 1%, 1/16W, 0603	KOA Speer	RK73H1JLTD2202F
89	1	1	R77	Resistor, 4.7K, 5%, 1/16W, 0603	Panasonic	ERJ-3GEYJ472V
90	1	1	R79	Resistor, 0.020, 1%, 3W, 2512	Bourns Inc.	CRA2512-FZ-R020ELF
91	1	1	R83	Resistor, 910, 1%, 1/10W, 0603	Vishay	CRCW0603910RFKEA
92	2	2	R116,R125	Resistor, 15.4K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF1542V
93	2	2	R120,R129	Resistor, 4.87K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF4871V
94	2	2	R122,R131	Resistor, 2.70K, 1%, 1/10W, 0603	Panasonic	ERJ-3EKF2701V
95	1	1	J1	Connector, Circular Power DIN 4 position receptacle, T/H, R/A	CUI Inc	PD-40S
96	1	1	J2	Connector, Banana Jack, Black, RA, TH	Deltron	571-0100
97	1	1	J3	Connector, Banana Jack, Red, RA, TH	Deltron	571-0500

98	4	4	J4,J5,J8,J10	Header, 1 x 2, 0.1 Inch, Vertical	Samtec	TSW-102-14-L-S
99	1	0	J6	Header, 1 x 2, 0.1 Inch, Vertical	Samtec	TSW-102-14-L-S
100	1	1	J9	Header, 1 x 3, 0.1 Inch, Vertical	Samtec	TSW-103-14-L-S
101	1	0	J7	Header, 2 x 5, 0.1 Inch, Vertical	AMP	146256-5
102	1	1	J11	Receptacle, USB 3.0, Style B, w/ PD ID, Right Angle, TH	Joinsoon Electronics	1211-0404-0023
103	1	1	J12	Receptacle, USB 3.0 PD, Style A, Right Angle, TH	Joinsoon Electronics MFG.	1211-0404-0024
104	1	1	Q1	Transistor, N-Power MOSFET, 60V, 8A, NTTFS5826NL, 8-WDFN	ON Semi	NTTFS5826NLTAG
105	1	1	Q2	Transistor, N-Power MOSFET, 40V, 14A, DFN5	ON Semi	NTMFS5834NLT1G
106	1	1	Q3	Transistor, MMBT3904, NPN, General Purpose, SOT-23	ON Semi	MMBT3904LT1
107	6	6	Q4,Q5,Q8,Q9,Q13,Q14	Transistor, 2N7002, N-Channel MOS-FET, 60V, 115mA, SOT-23	ON Semi	2N7002LT1G
108	2	2	Q6,Q7	Transistor, AO3403, P-Channel MOS-FET, 30V, 2.6A, SOT23-3	Alpha & Omega Semiconductor	AO3403
109	1	1	Q10	Transistor, P-Channel MOS-FET, 30V, 14.8A, 8mOhm, BSO080P03NS3G, SO-8	Infineon Semiconductor	BSO080P03NS3EG
110	1	1	Q11	Transistor, N-Ch Power MOSFET, 30V, 30A, DFN5	ON Semi	NTMFS4927NT1G
111	1	1	Q12	Transistor, 2N3906, PNP, 40V, 350mW, SOT-23	ON Semi	MMBT3906LT1
112	1	1	SW1	Switch, SPDT, Slide, 6A, TH	C&K	1101M2S3CQE2
113	4	4	SW2,SW3,SW4,SW5	Switch Array, SPST, 4 Position, SIP-5	CK	SPA04B
114	1	1	SW6	Switch, DPDT, Slide, Sub-Mini, Top Actuator, TH	C&K	JS202011CQN
115	1	1	SW7	Switch, Momentary, SPST, 50mA, J-lead, NO, MicroMini	C&K Components	PTS810 SJM 250 SMTR LFS
116	1	1	U8	IC, High Side Current Sense Amplifier, 36V, SOT25	Diodes Inc	ZXCT1110W5-7
117	1	1	U2	IC, PWM Buck Controller, 100V, NCP1034, SOIC16	On Semiconductor	NCP1034DR2G
118	1	1	U4	IC, MCP16312, 1A, 0.5MHz Synchronous Buck Regulator, ADJ, MSOP8	Microchip	MCP16312(T)-E/MS
119	2	2	U5,U13	IC, Quad Comparator, OD, 1.6V to 5.5V,TSSOP14	Microchip	MCP6549-E/ST
120	1	1	U7	IC, Flash, SPI, SST25VF064C, 64Mb (8M x 8), 2.7V-3.3V, 75MHz (Dual Read), SO8	Microchip	SST25VF064C-80-4I-S3AE
121	1	1	U1	IC, UPD1001_B0, USB Power Delivery Controller, QFN32	Microchip	UPD1001_B0, QFN32
122	1	0	U9	IC, UPD1001_B0, USB Power Delivery Controller, TSSOP28	Microchip	UPD1001_B0, Std-A
123	1	1	U3	IC, 74AHC1G02, NOR Gate, DCK	TI	SN74AHC1G02DCKR
124	1	1	U6	IC, 74AHC1G14, Inverter, Shottky, DCK	TI	SN74AHC1G14DCKR
125	1	1	U10	IC, 74HC4053, Analog Mux, TSSOP-16	On Semiconductor	MC74HC4053ADTR2G
126	1	0	U11	IC, 74HC4053, Analog Mux, TSSOP-16	On Semiconductor	MC74HC4053ADTR2G

127	1	1	U12	IC, 74AHC1G00, NAND Gate, DCK	TI	SN74AHC1G00DCKR
128	1	0	U14	IC, FST3253MTCX, Dual 4:1 Mux/Demux SW, TSSOP-1	Fairchild	512-FST3253MTCX
129	3	3	SHUNT1,SHUNT 2,SHUNT5	Shunt, Insulated, 0.1 Inch	TE Connectivity	881545-2

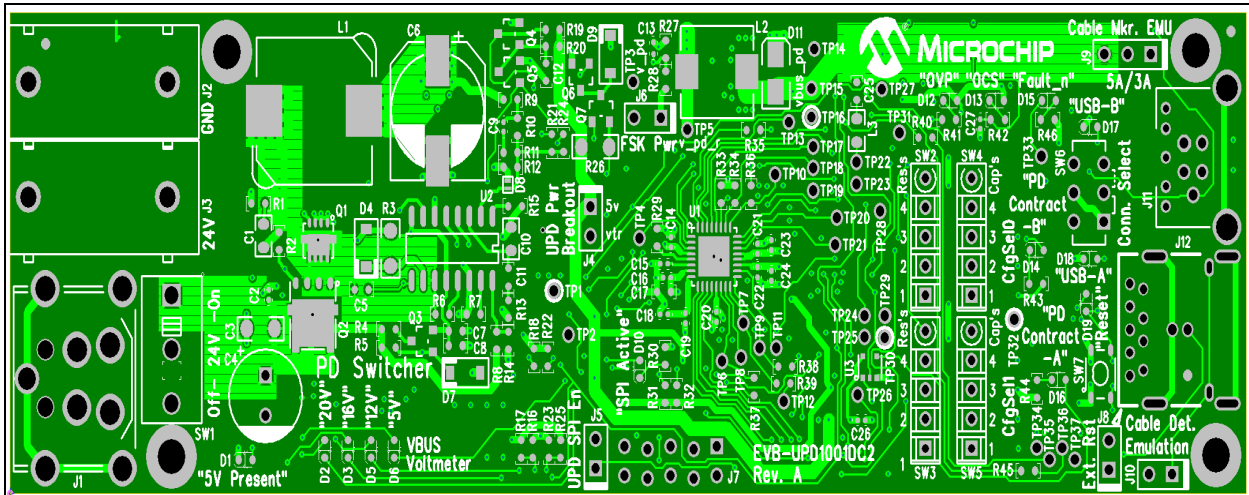
NOTES:

**Appendix D. EVB-UPD1001DC2 PCB Silk Screens**

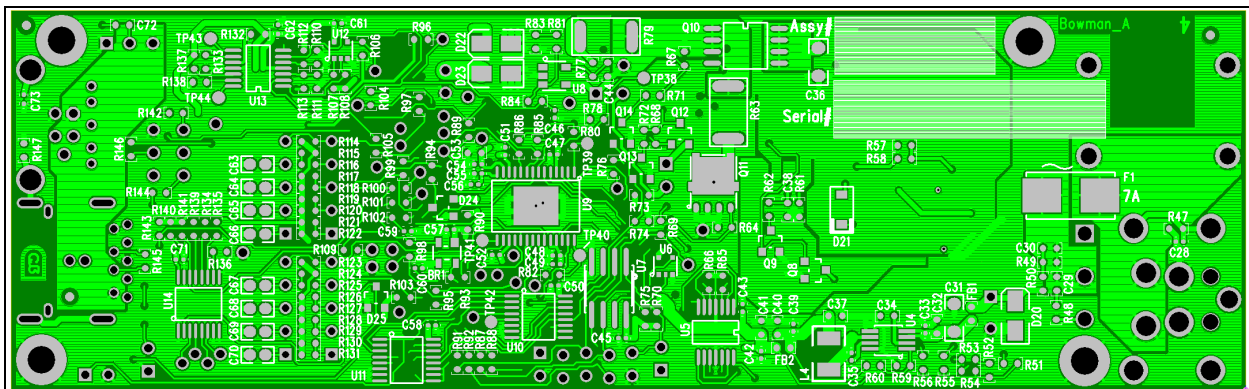
**D.1 INTRODUCTION**

This appendix shows the EVB-UPD1001DC2 Top and Bottom Silk Screen images.

**FIGURE D-1: EVB-UPD1001DC2 TOP SILK SCREEN**



**FIGURE D-2: EVB-UPD1001DC2 BOTTOM SILK SCREEN**



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**NOTES:**



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