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**UCS2112
Dual USB Port Power
Evaluation Board
User's Guide**

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Object of Declaration: UCS2112 Dual USB Port Power Evaluation Board

EU Declaration of Conformity

Manufacturer: Microchip Technology Inc.
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USA

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This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA


Derek Carlson
VP Development Tools

12-Sep-14
Date

NOTES:



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Preface

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) 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 “DSXXXXXXXXA”, where “XXXXXXXX” 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 UCS2112 Dual USB Port Power Evaluation Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Web Site](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the UCS2112 Dual USB Port Power Evaluation Board. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the UCS2112 Dual USB Port Power Evaluation Board.
- **Chapter 2. “Installation and Operation”** – Includes instructions on how to install the board.
- **Chapter 3. “Hardware Description”** – Describes the UCS2112 Dual USB Port Power Evaluation Board features and functionalities.
- **Chapter 4. “Software Description”** – Describes the PC Graphical User Interface that operates the UCS2112 Dual USB Port Power Evaluation Board.
- **Appendix A. “Schematic and Layouts”** – Shows the schematic and layout diagrams for the UCS2112 Dual USB Port Power Evaluation Board.
- **Appendix B. “Bill of Materials”** – Lists the parts used to build the UCS2112 Dual USB Port Power Evaluation Board.

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CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
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><i>File>Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power 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>
Courier New font:		
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) { ... }

RECOMMENDED READING

This user's guide describes how to use UCS2112 Dual USB Port Power Evaluation Board. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

- **UCS2112 Data Sheet - “USB Dual-Port Power Switch and Current Monitor” (DS20005424)**
- **USB84604 Data Sheet - “USB 2.0 HSIC Hi-Speed 4-Port Controller Hub” (DS60001295)**
- **MCP19118/19 Data Sheet - “Digitally-Enhanced Power Analog Controller with Integrated Synchronous Driver” (DS20005350)**

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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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 (October 2015)

- Initial Release of this Document.

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NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

This document provides a description of the software and hardware used to evaluate the features of the UCS2112.

The UCS2112 Dual USB Port Power Evaluation Board demonstrates the features of two USB ports, capable of data transferring and charging up to 6A. Charging limits, accumulated current, alerts and attachment status can all be configured, exercised and/or observed on a graphical user interface.

1.2 UCS2112 EVALUATION SYSTEM

The evaluation system has several components, as shown in [Figure 1-1](#).

- Customer-provided Windows® PC
- UCS2112 Demo Software (Graphical User Interface - GUI)
- UCS2112 Dual USB Port Power Evaluation Board
- USB Cable for GUI communications (Standard-A plug to mini-B plug)
- 12V DC power source
- Customer-provided portable device and OEM USB charging cable (with Standard-A plug at board's end)

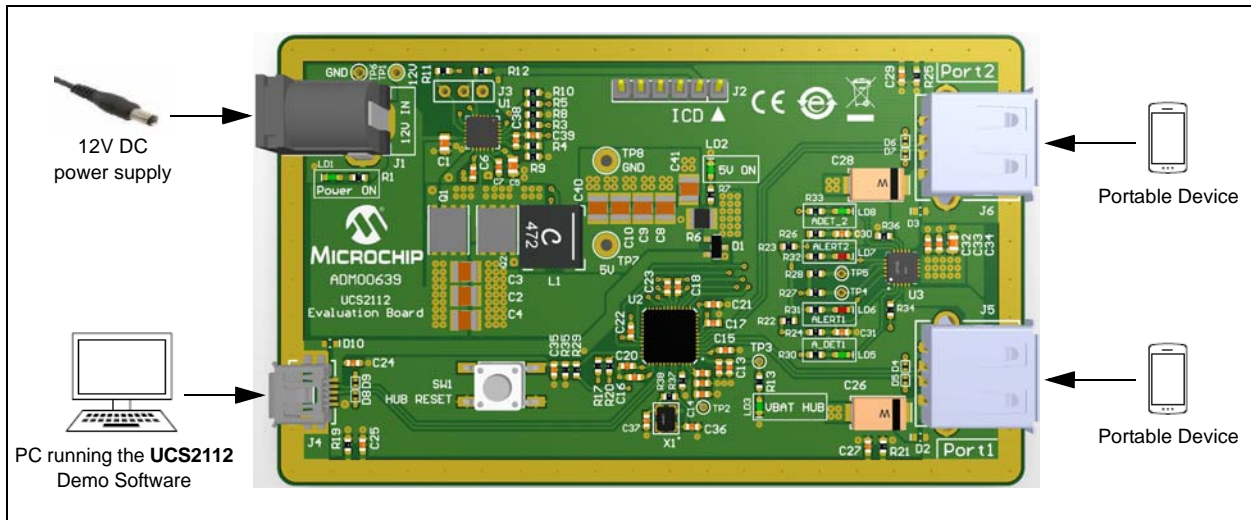


FIGURE 1-1: UCS2112 Evaluation System.

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A block diagram of the UCS2112 Dual USB Port Power Evaluation Board is shown in [Figure 1-2](#) below:

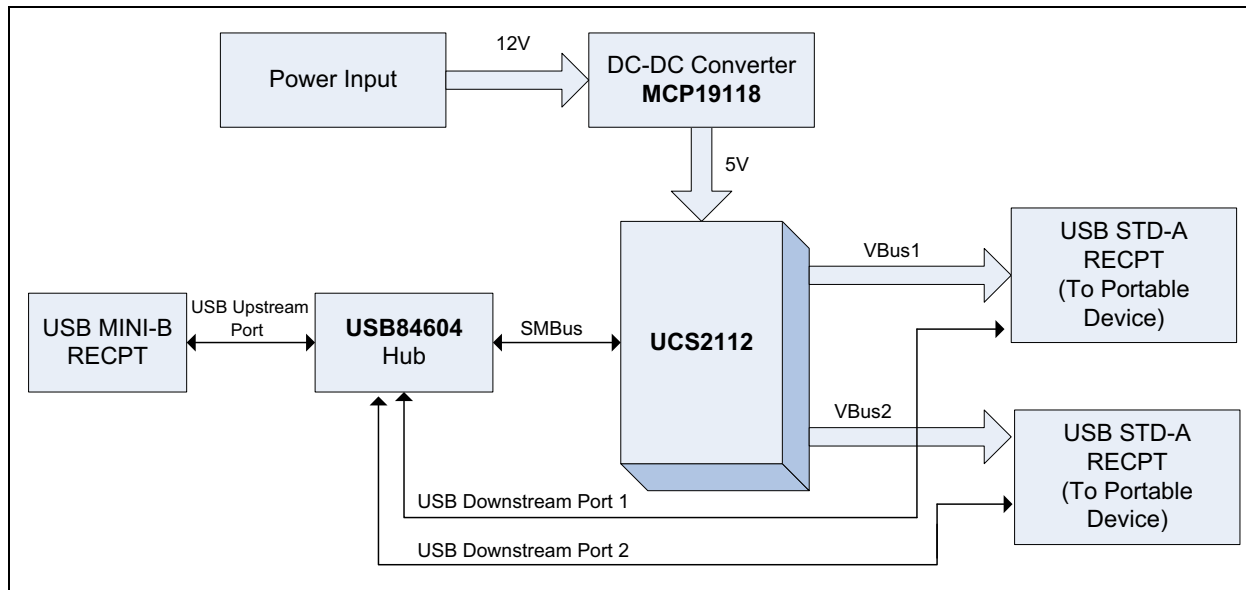


FIGURE 1-2: UCS2112 Dual USB Port Power Evaluation Board Block Diagram.

1.3 WHAT THE UCS2112 DUAL USB PORT POWER EVALUATION BOARD KIT CONTAINS

This UCS2112 Dual USB Port Power Evaluation Board kit includes:

- UCS2112 Dual USB Port Power Evaluation Board (ADM00639)
- 12V AC-DC Wall Adapter
- Standard-A plug to mini-B plug USB Cable
- Important Information Sheet

Chapter 2. Installation and Operation

2.1 INTRODUCTION

This chapter identifies the main connectors, LEDs and test points that can be found on the UCS2112 Dual USB Port Power Evaluation Board. It also explains the steps to install the board's graphical user interface.

2.2 CONNECTORS ON THE EVALUATION BOARD

Figure 2-1 shows the top of the evaluation board and highlights the connectors.

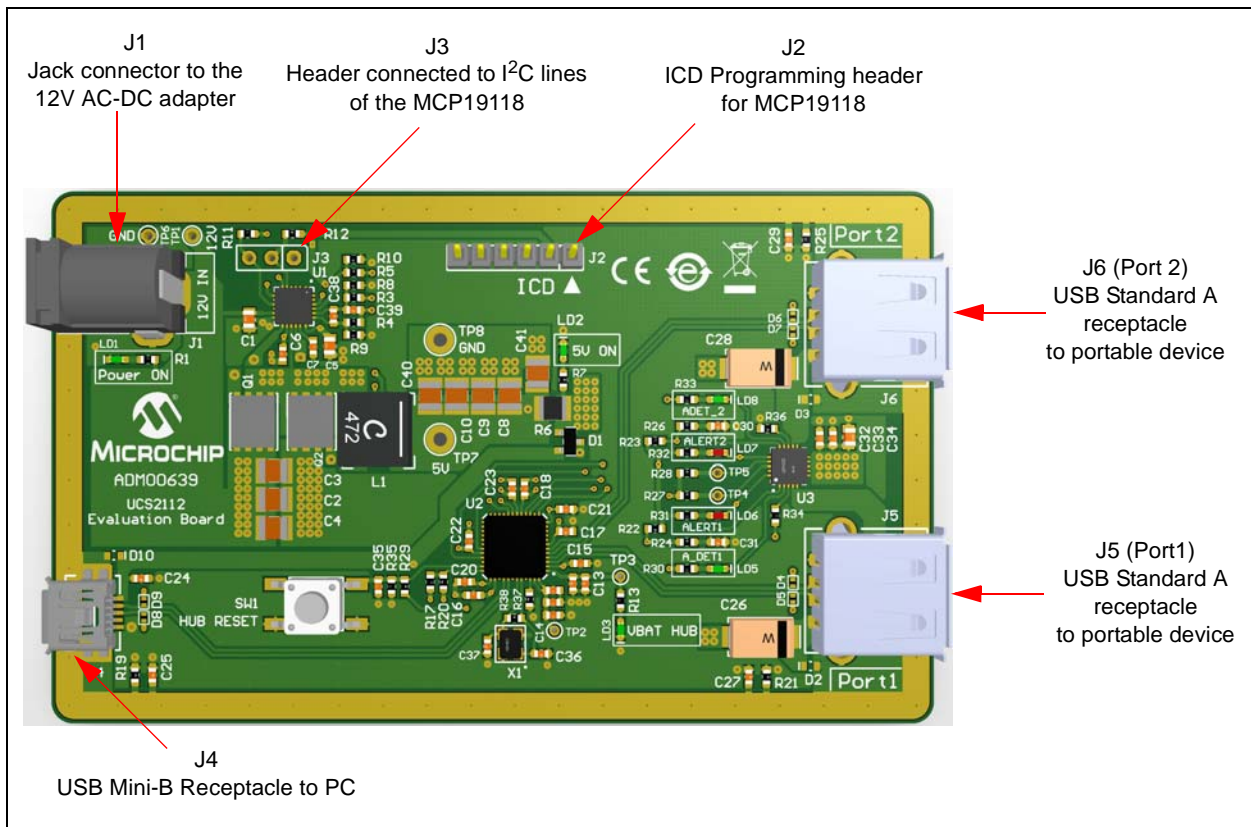


FIGURE 2-1: UCS2112 Dual USB Port Power Evaluation Board Top View - Connectors.

2.3 LEDES ON THE EVALUATION BOARD

Figure 2-2 shows the top of the evaluation board and highlights the LEDs.

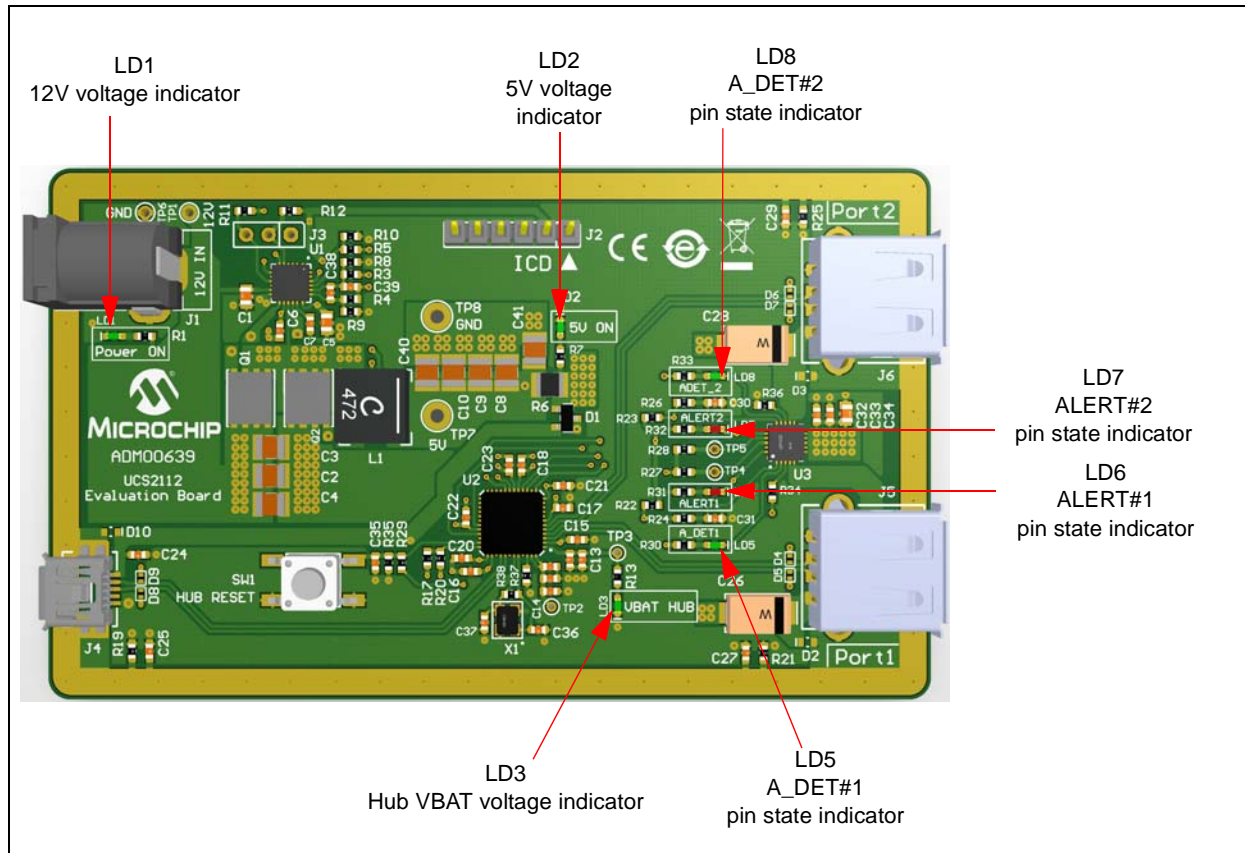


FIGURE 2-2: Evaluation Board Top View - LEDs.

2.4 TEST POINTS ON THE EVALUATION BOARD

Figure 2-3 shows the top of the board and highlights the test points.

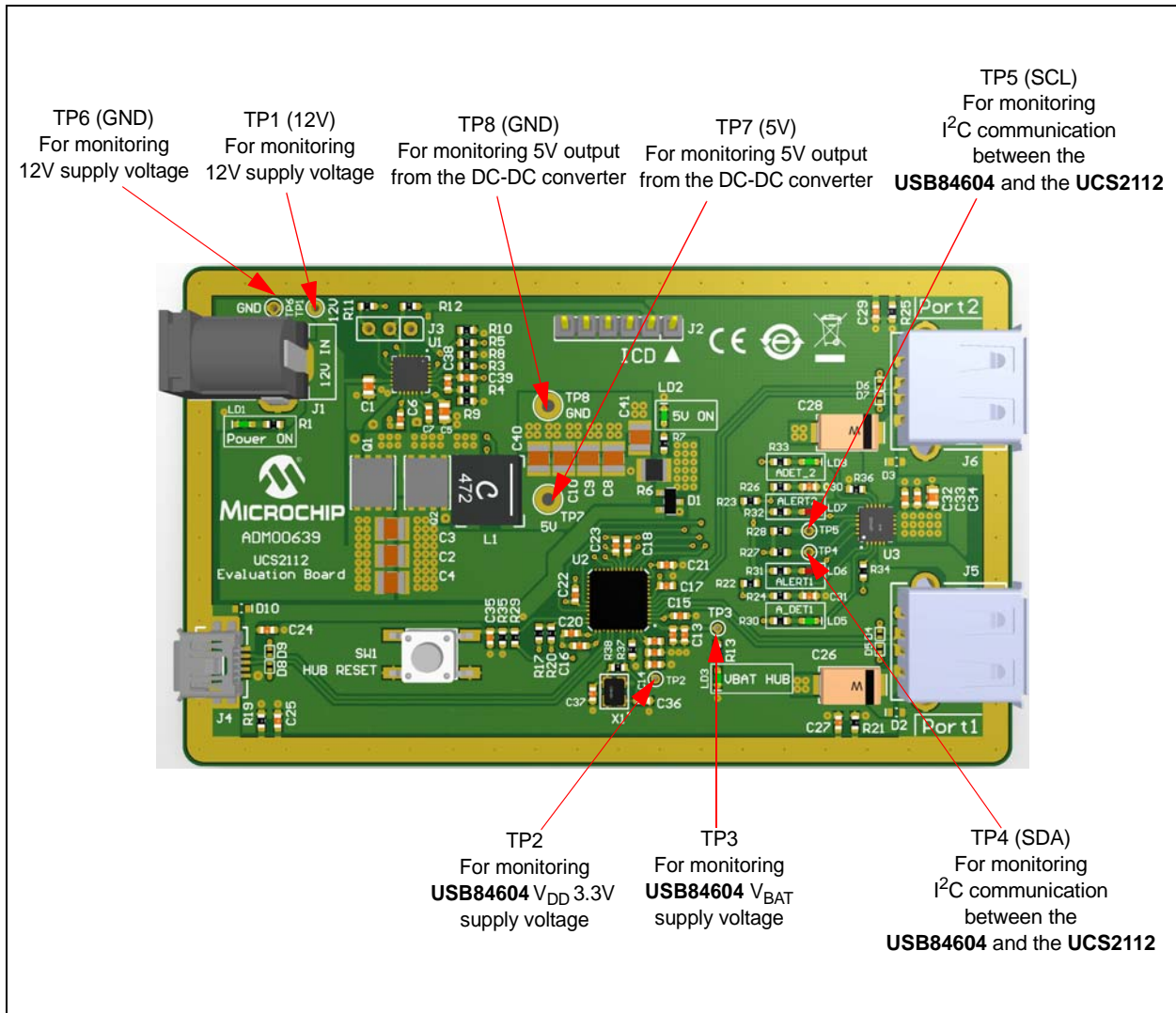


FIGURE 2-3: Evaluation Board Top View - Test Points.

2.5 SOFTWARE INSTALLATION

To begin using the UCS2112 Dual USB Port Power Evaluation Board, a software must be installed on a Windows®-based computer with a USB port.

1. Download the UCS2112 Demo Software archive from the UCS2112 Dual USB Port Power Evaluation Board's web page, unzip, then double-click the executable file to start the installation. Figure Figure 2-4 shows the initial installation screen.

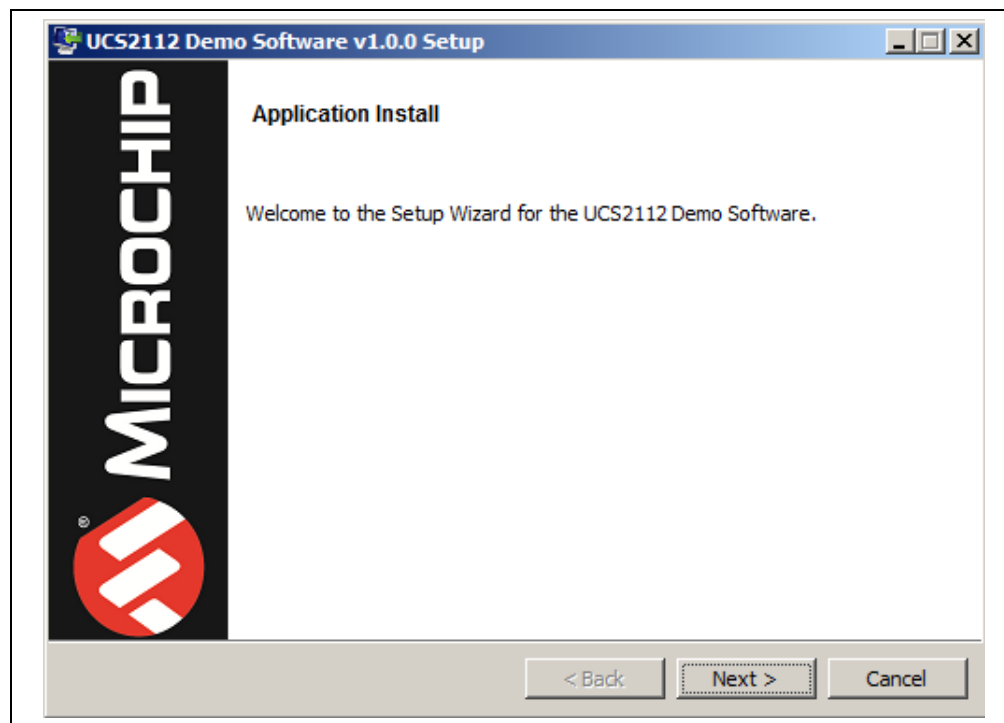


FIGURE 2-4: Setup Wizard.

2. Read and accept the license agreement, then click **Next**.

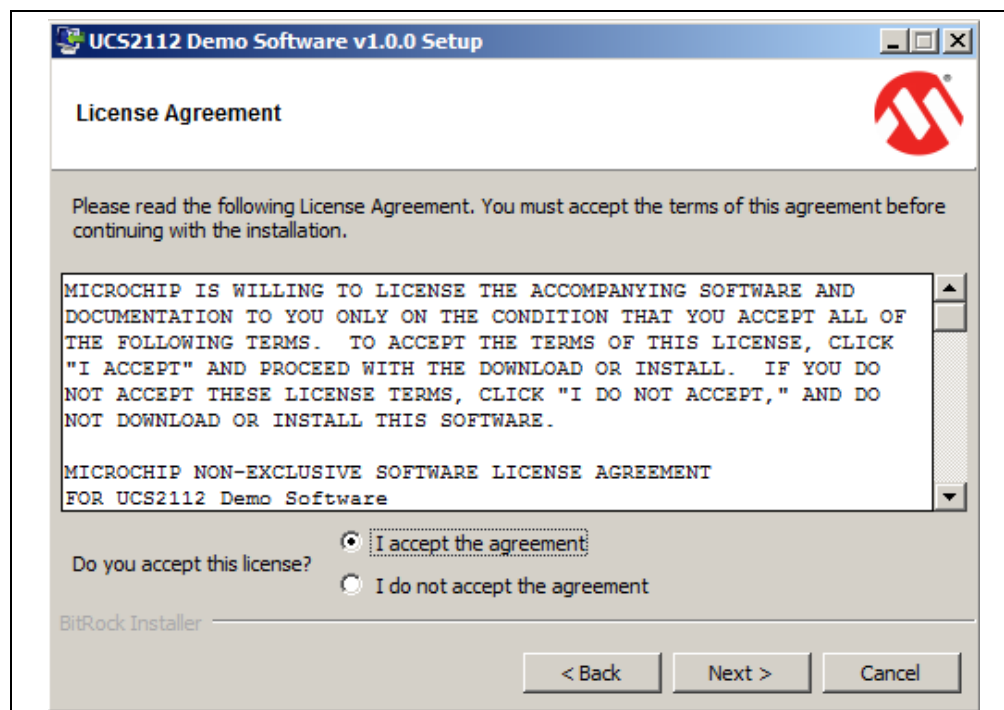



FIGURE 2-5: Software License Agreement.

3. Click the browse icon  to specify the directory where the UCS2112 Demo Software will be installed, then click **Next**.

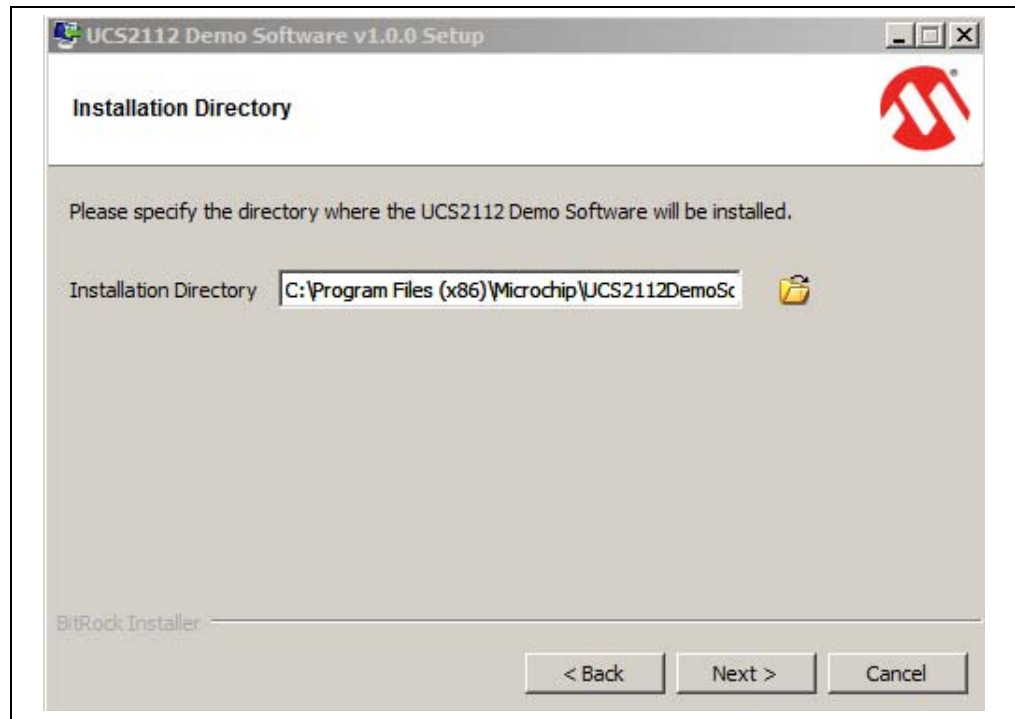


FIGURE 2-6: *Installation Directory.*

4. Click **Next** in the Ready to Install window to begin the software installation. The progress can be observed in the progress bar (see [Figure 2-8](#)).

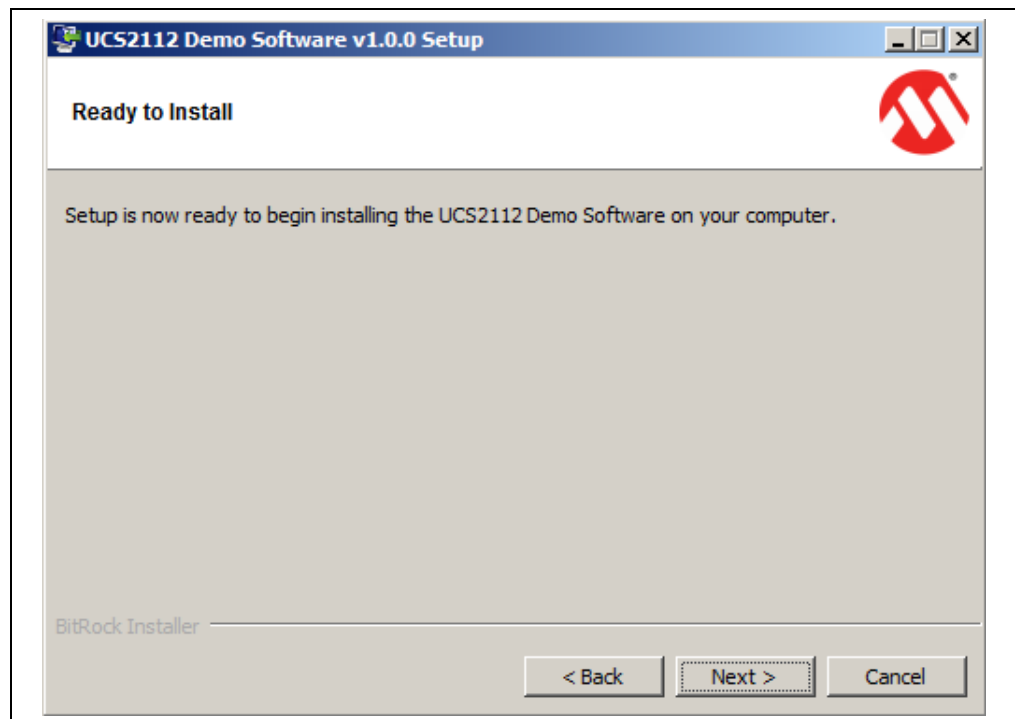


FIGURE 2-7: *Ready to Install.*

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5. During installation, a security pop-up window, requesting approval, will appear on screen. Click **Install** to proceed with the installation

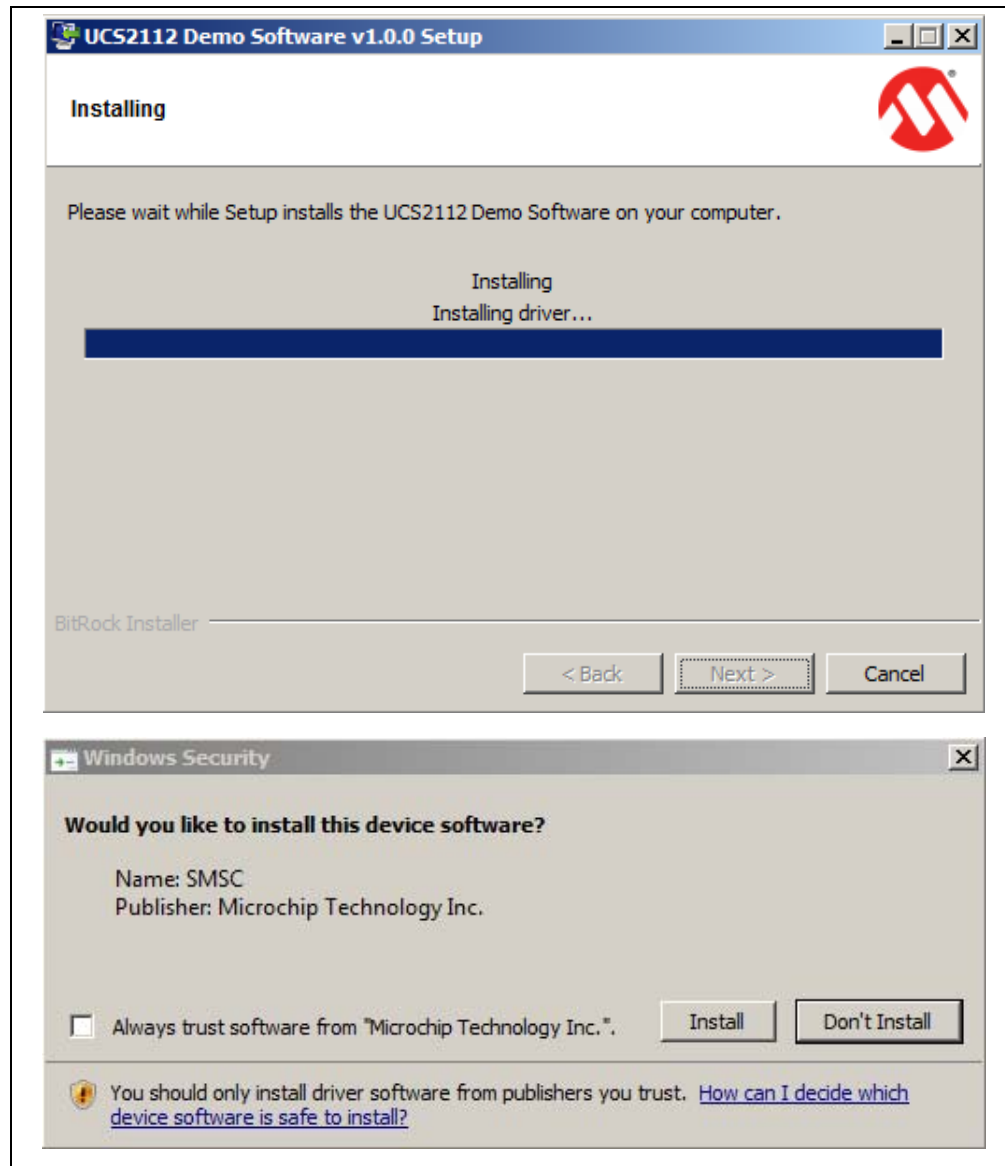


FIGURE 2-8: Installing the GUI.

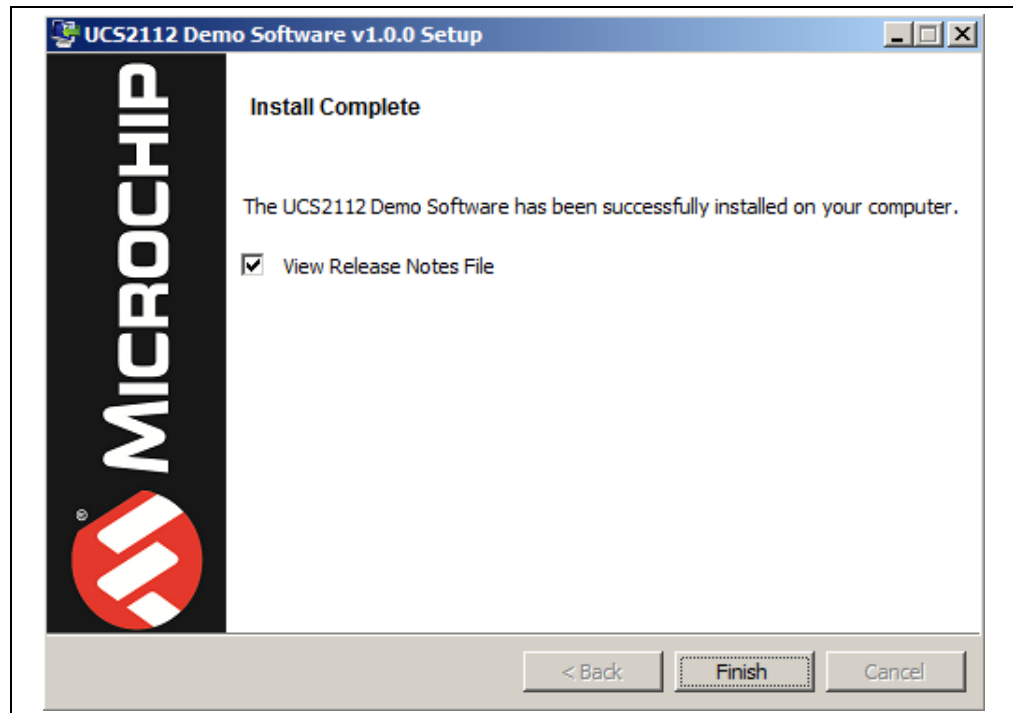


FIGURE 2-9: *The Installation Complete Window.*

Once the installation completes, the **View Release Notes File** box remains checked to display information about the current software version. To skip release notes, deselect this check box. Click **Finish** to end the installation.

To launch the GUI, either click on the desktop icon or browse to [Windows Start>All Programs>Microchip>UCS2112 Demo Software.](#)

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Chapter 3. Hardware Description

3.1 UCS2112 DEVICE OVERVIEW

The UCS2112 is a dual USB port power switch configuration which can provide 3.0A continuous current (3.4A maximum) per V_{BUS} port with precision overcurrent limiting, port power switch enables, auto-recovery fault handling, undervoltage and overvoltage lockout, back-drive protection and dynamic thermal management.

For SMBus applications, the UCS2112 provides per-port current monitoring and eight programmable current limits per switch, ranging from 0.53A to 3.0A continuous current (3.4A maximum). Per-port charge rationing is also provided ranging from 3.8 mAh to 246.3 Ah.

Both power switches include an independent V_{BUS} discharge function and constant current mode limiting for BC1.2 applications.

3.2 USB84604 DEVICE

The USB84604 is a low-power, OEM-configurable, Multi-Transaction Translator (MTT) USB2.0 controller hub with four downstream ports and advanced features for embedded USB applications. The UCS2112 Dual USB Port Power Evaluation Board uses only two downstream ports.

The USB84604 supports downstream battery charging. When an upstream host is connected, the USB84604 allows battery charging with data communication according to the Battery Charging BC1.2 Standard Downstream Port (SDP) or Charging Downstream Port (CDP) specifications, depending on the portable device capability. When an upstream device is not connected, the USB84604 configures the downstream ports as Dedicated Charger Ports, allowing battery charging only.

The USB84604 provides an additional USB endpoint dedicated for use as a USB-to-I²C/SPI interface, allowing external circuits or devices to be monitored, controlled, or configured via the USB interface. The USB84604 controls the UCS2112 via the I²C interface.

3.3 DC-DC CONVERTER WITH MCP19118

The UCS2112 Dual USB Port Power Evaluation Board has a high efficiency, 12V to 5V DC-DC converter, built around the MCP19118.

The MCP19118 is a highly-integrated, mixed signal, analog pulse-width modulation (PWM) current mode controller with an integrated microcontroller core for synchronous DC/DC step-down applications.

The MCP19118 on this board is already programmed and the DC-DC converter is fully functional. The user can program custom firmware using the J2 ICD header. The user can also communicate via the I²C interface with the MCP19118 by populating the J3 header.

The DC-DC converter section can be tested separately from the rest of the board by removing the R6 resistor and connecting a load between the test points TP7 (marked as "5V") and TP8 (marked as "GND").

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Chapter 4. Software Description

4.1 OVERVIEW

To get the graphical interface and the evaluation board running, follow these instructions:

1. Provide 12V to the power jack J1. Connect the USB mini-B end of cable to the board and the USB A-type end to any available USB port on the PC.
2. Start the UCS2112 Demo software: from the Windows Start menu *All Programs>Microchip>UCS2112 Demo Software* or from the desktop icon.

The UCS2112 Dual USB Port Power Evaluation Board interface (Figure 4-1) consists of three tabs (**System Monitoring**, **Advanced Configuration** and **Manual Register Configuration**) as well as the right side section (**UCS2112 Status**), the top buttons (**Start Current Sampling** and **Stop Sampling**) and the Status bar which are always visible.

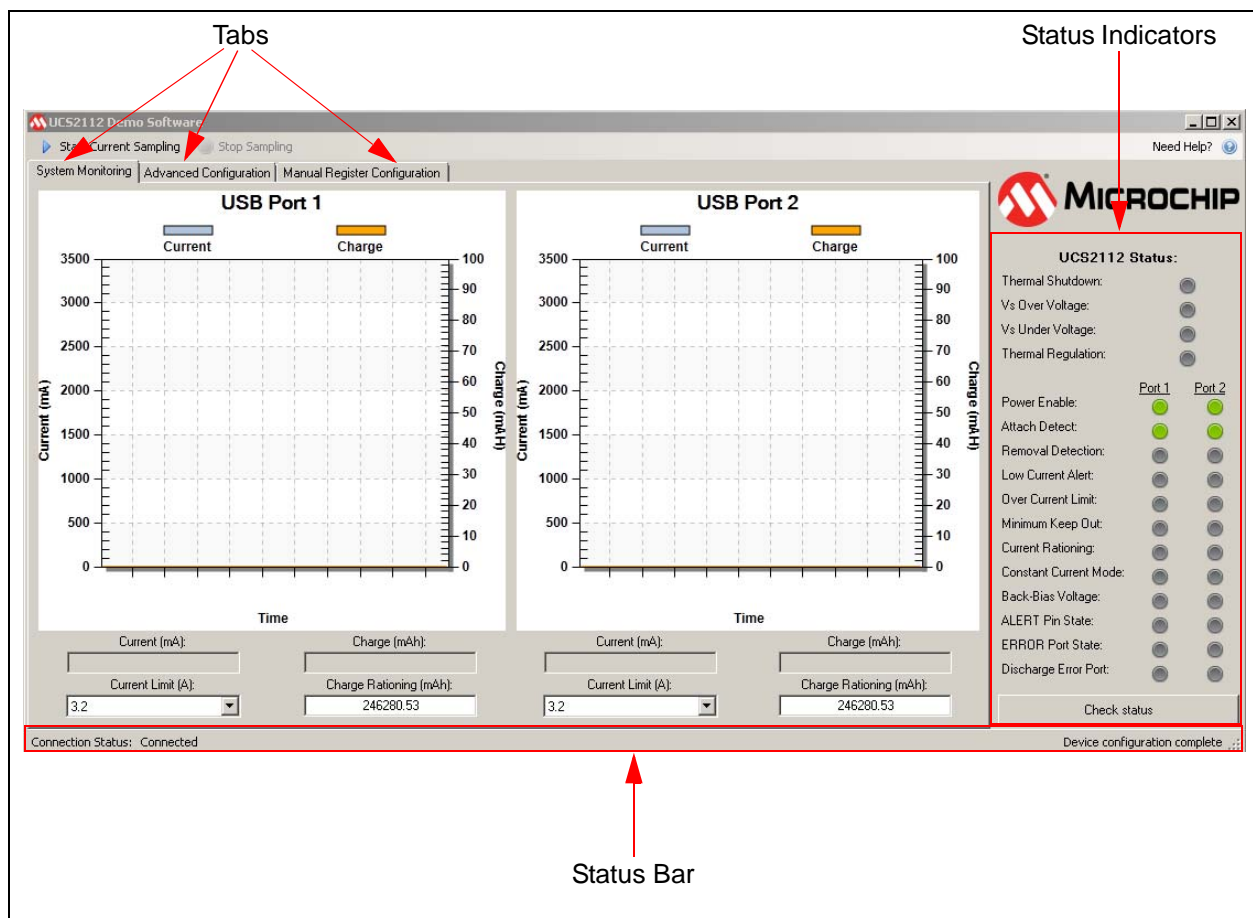


FIGURE 4-1: UCS2112 Demo Software Initial Window.

4.2 INTERFACE DESCRIPTION AND OPERATION

4.2.1 Automated Current Sampling Start/Stop Buttons

On the top of the window there are two buttons that start and stop the automated current sampling (see Figure 4-2). When the Automated Current Sampling is on, the GUI reads the Current Measurement and the Total Accumulated Charge registers periodically for both ports (see Figure 4-4). It also reads the status registers regularly and updates the Status Indicators on the right side panel.

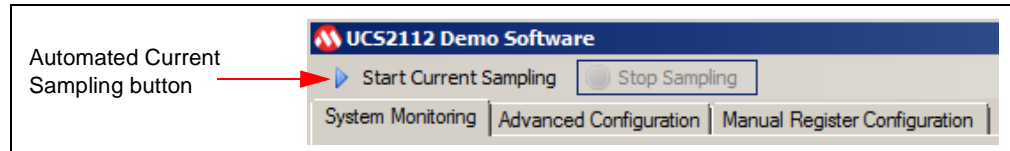


FIGURE 4-2: Automated Current Sampling Start/Stop Buttons.

4.2.2 Status Indicators

The status indicators show the state of the bits from the Interrupt Status and General Status registers. They are grey if the corresponding bits are "0" and green/red if the corresponding bits are set. The green color indicates a change in the status of the charging port and the red color indicates a fault condition (see Figure 4-3 for color assignment on each condition).

Some of the bits are cleared when read and their indication is maintained longer, to be observable by the user.

The status indicators can be updated in two ways: automatically, when the Automated Current Sampling is active, or manually, by pressing the **Check Status** button, when the Automated Current Sampling is disabled.

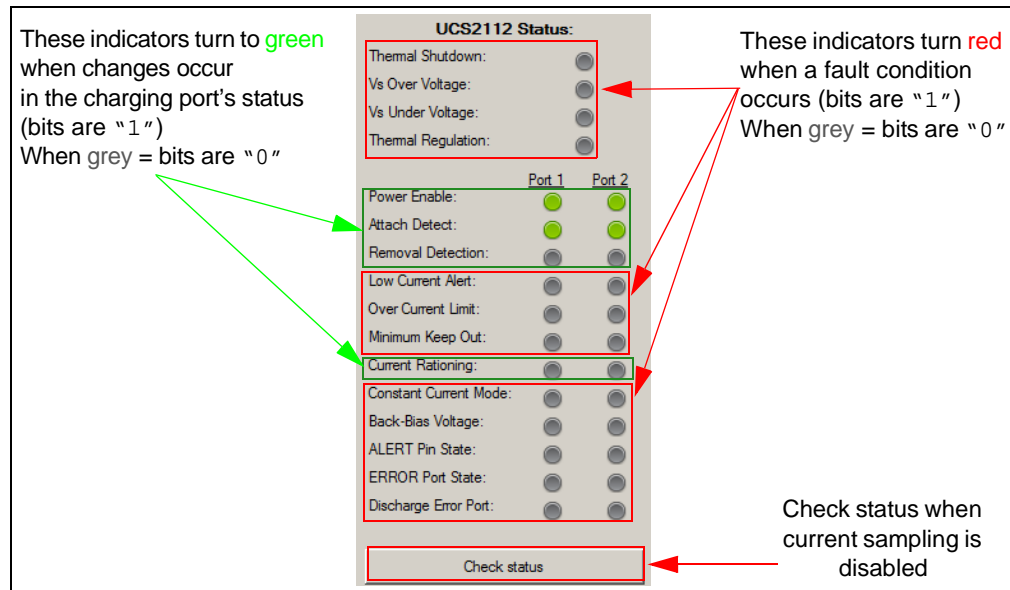


FIGURE 4-3: Status Indicators.

4.2.3 System Monitoring Tab

The **System Monitoring** tab is the first tab displayed when opening the GUI. This tab allows monitoring the instantaneous current measurement and the accumulated charge and also to set the charge rationing threshold (by entering a number in the corresponding box) and the current limit for each port (by selecting one of the values from the drop-down list).

When the Automated Current Sampling is on and the portable devices are attached to Port 1 and/or Port 2, the GUI shows the current measurements over time as shown in [Figure 4-4](#) (blue plot).

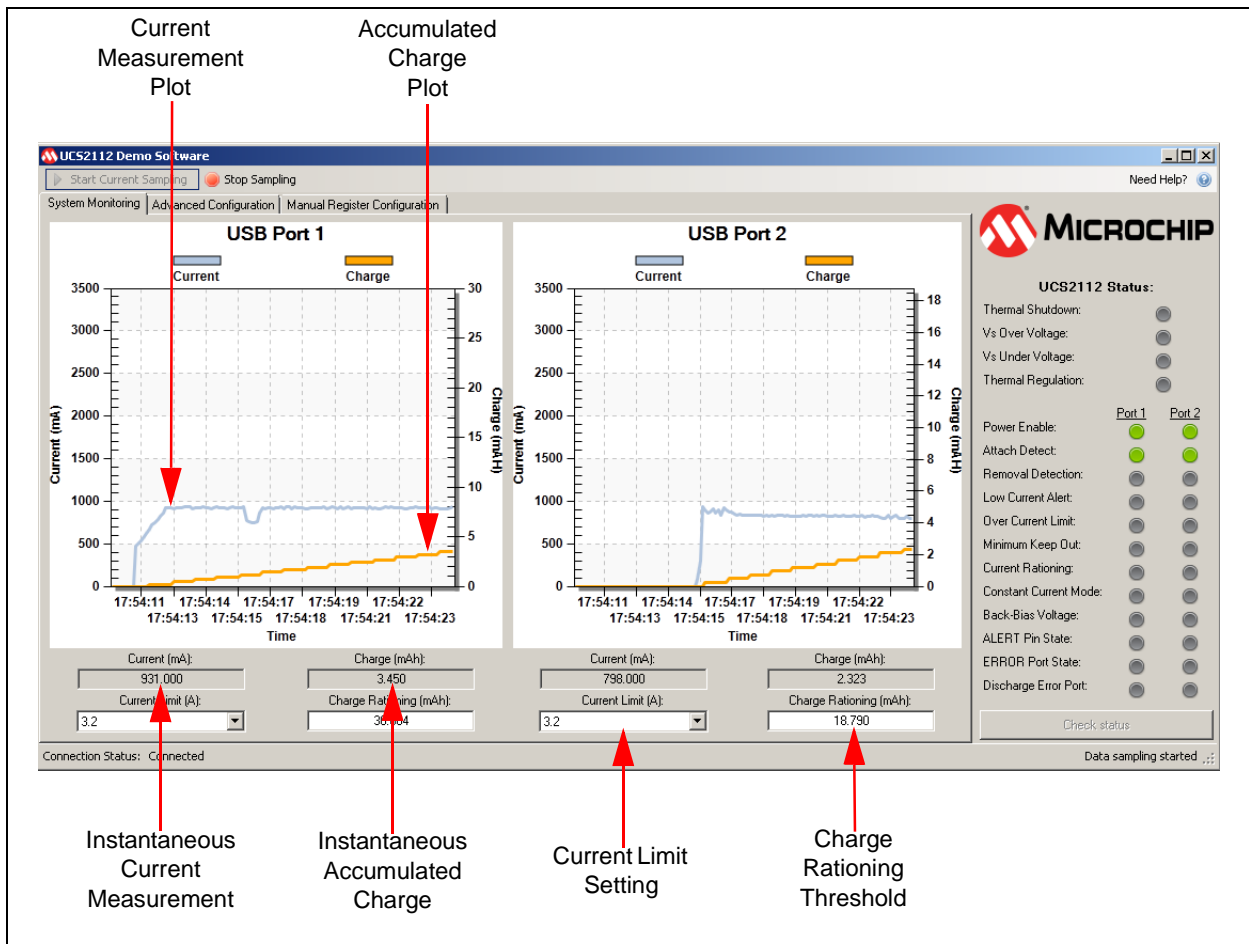


FIGURE 4-4: Monitoring Current Measurement and Charge Accumulation Over Time.

To enable the Accumulated Charge indication, follow these steps:

1. In the **Advance Configuration** tab, select **Enable** on the Charge Rationing group box.

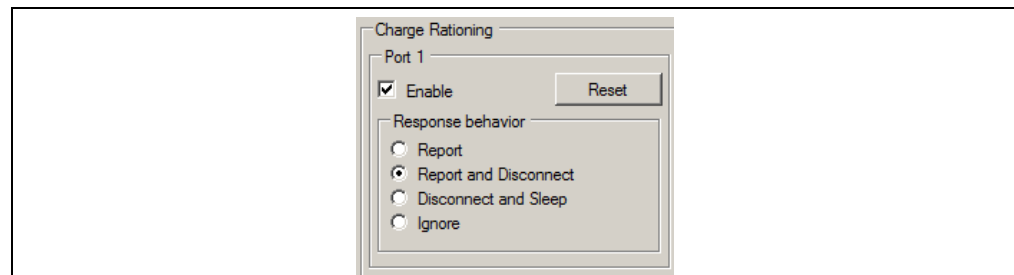


FIGURE 4-5: Advance Configuration Tab - Charge Rationing Group Box.

2. In the **System Monitoring** tab, set the Charge Rationing threshold.

The Charge Rationing threshold value (default set to maximum) can be modified by entering a new number in the corresponding box. After pressing the <Enter> key, the software adjusts the number to the closest value that can be written to the UCS2112 Charge Rationing registers.

In the same tab, the user can set the Current Limit for each Port, by selecting one of the values from the drop-down list (see [Figure 4-4](#)).

4.2.4 ALERT# pin assertion and fault handling

When an ALERT# pin of the UCS2112 device is asserted because is exceeding the Current Limit, reaching the Charge Rationing Limit or any other fault condition mentioned in the UCS2112 data sheet, the on-board hub USB84604 detects this condition as an overcurrent fault in all cases. This fault is signaled by the Windows operating system. The hub disables the corresponding port power switch automatically by setting the corresponding PWR_EN pin low. To enable the power switch back and set the PWR_EN pin high, click on the Windows notification balloon and reset the corresponding port.

To disable the hub from automatically controlling the power switch, check the **Ignore PWR_EN pins** option from the **Advance Configuration** tab (see [Figure 4-6](#)). The PWR_EN controls will be determined only by the state of the PWR_EN1 bit and PWR_EN2 bit, which can be set or cleared in the same section.

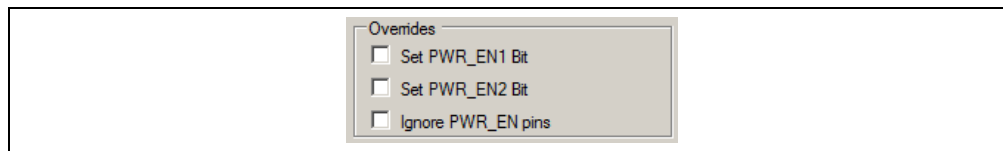


FIGURE 4-6: *Advanced Configuration Tab - PWR_EN Control Overrides.*

4.2.5 Advanced Configuration Tab

The **Advanced Configuration** tab (Figure 4-7) allows the user to modify the default values of the Configuration registers.

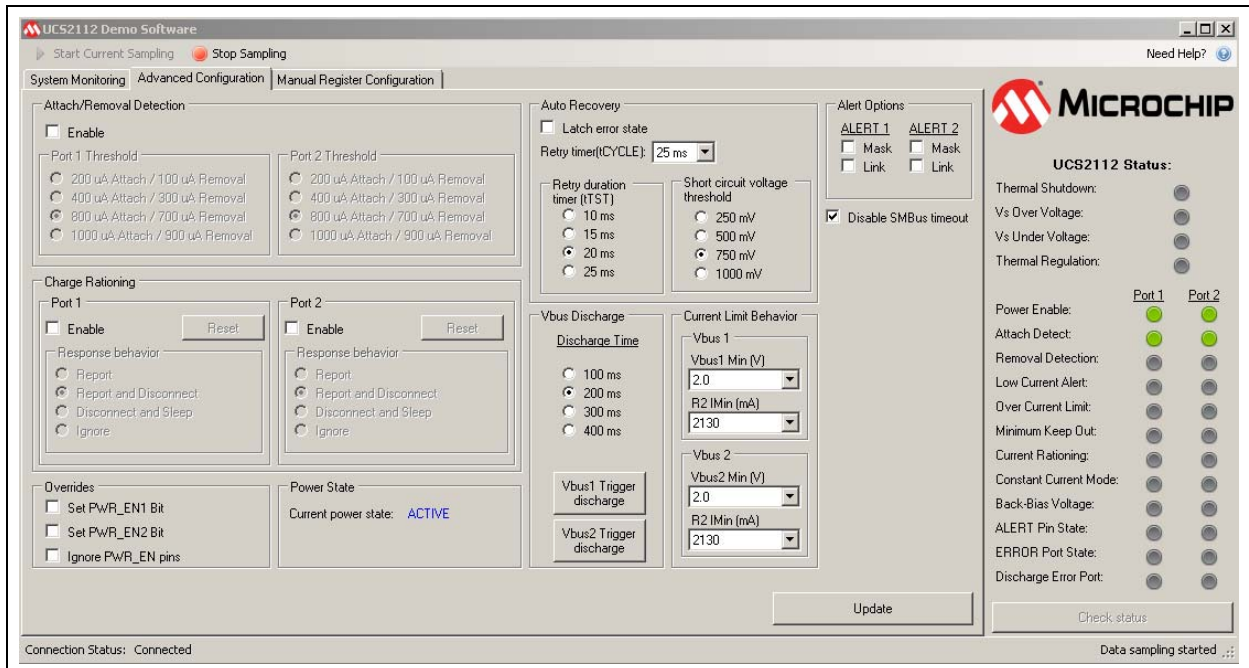


FIGURE 4-7: Advanced Configuration Tab.

4.2.5.1 ATTACH/REMOVAL DETECTION GROUP BOX

The **Enable** check box activates the Attach/Removal Detection functionality. The user can select the Attach/Removal Detection threshold for each port.

4.2.5.2 CHARGE RATIONING GROUP BOX

The Accumulated Charge indication and the Charge Rationing functionality for each port are activated by checking **Enable**.

When the Charge Rationing threshold is reached, UCS2112 responds as specified in the Response behavior group box: Report, Report and Disconnect, Disconnect and Sleep, Ignore.

The **Reset** button sets the RTN_RST1/2 bit to "1" and then to "0" (two consecutive write commands). For a detailed description, see Ration Configuration register in the data sheet.

4.2.5.3 OVERRIDES GROUP BOX

The status of the PWR_EN1/2 pins can be overridden by setting the corresponding PWR_EN1S and PWR_EN2S bits (see General Configuration registers, Addresses 11h and 12h, in the data sheet).

If **Ignore PWR_EN pins** is checked, then the status of PWR_EN1/2 pins is ignored and only the status of PWR_EN1S and PWR_EN2S bits is considered.

4.2.5.4 AUTO RECOVERY GROUP BOX

The Auto Recovery mechanism is active if **Latch error state** is unchecked. Otherwise, the error is latched.

The auto recovery parameters (Retry duration timer and Short circuit voltage threshold) can be changed by selecting one of the available radio buttons (see [Figure 4-8](#)).

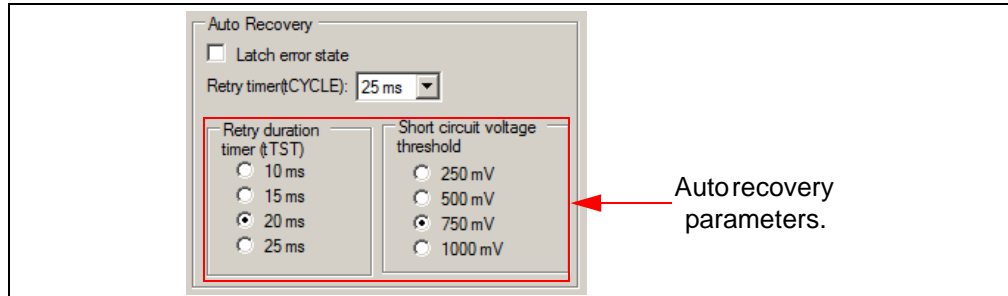


FIGURE 4-8: Advanced Configuration Tab - Auto Recovery Parameters.

4.2.5.5 VBUS DISCHARGE GROUP BOX

The Vbus Discharge Time can be changed by checking one of the available options.

By pressing the **Vbus1 Trigger discharge** and **Vbus2 Trigger discharge** buttons the Vbus is discharged, forcing the portable device to reconnect.

4.2.5.6 CURRENT LIMIT BEHAVIOR GROUP BOX

The Current Limit Behavior parameters can be changed by selecting one of the available options from the drop-down lists (for more information, see Current Limit Behavior registers from the data sheet).

4.2.5.7 ALERT OPTIONS GROUP BOX

There are four ALERT options:

- When ALERT1/2 **Mask** is checked, the ALERT1/2 pins will only be asserted if overcurrent limit and thermal shutdown conditions are detected.
- When ALERT1/2 **Mask** is unchecked, the ALERT1/2 pins will be asserted if any error condition or indicator event is detected.
- When ALERT1/2 **Link** is checked, the ALERT1/2 pins will be asserted if low current indication is detected or the internal temperature has exceeded T_{REG} .
- When ALERT1/2 **Link** is unchecked, the ALERT1/2 pins will not be asserted if low current indication is detected or the internal temperature has exceeded T_{REG} .

4.2.5.8 DISABLE SMBUS TIMEOUT

When **Disable SMBus timeout** is checked, this feature is disabled. This is the default setting. To enable the SMBus timeout feature, uncheck the respective check box.

4.2.5.9 UPDATE BUTTON

This button updates the Configuration registers with the settings modified in the **Advance Configuration** tab.

4.2.6 Manual Register Configuration Tab

This tab allows the user to read and modify the registers of the UCS2112 device.

When opened for the first time, the **Manual Register Configuration** tab is empty. To display the registers, press **Read all registers** button and a table will appear (see [Figure 4-9](#)).

To monitor the value of certain registers, select the corresponding rows in the table and press **Read selected register(s)** button.

To write a register value to the UCS2112 device, type the value in the Value column for the respective register, then press <Enter>.

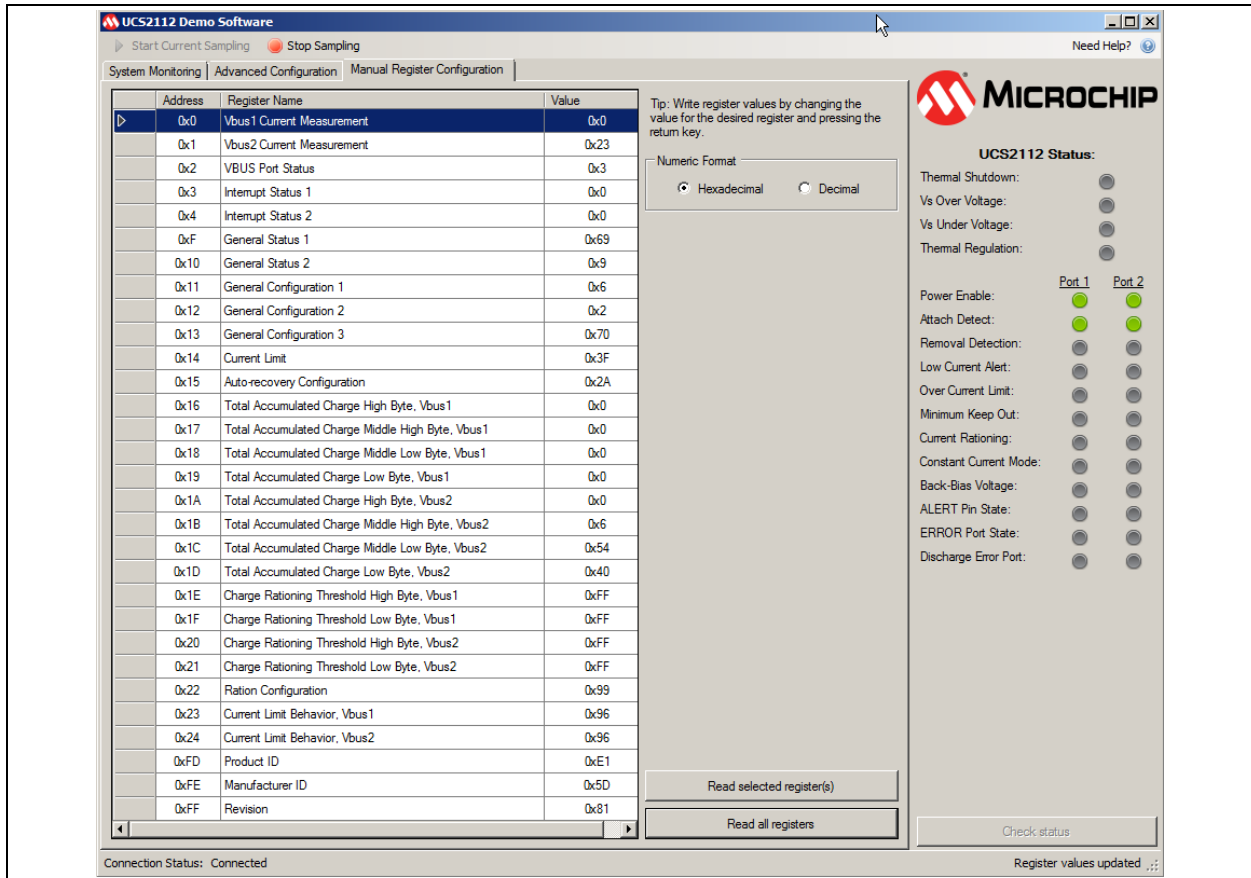


FIGURE 4-9: Manual Register Configuration Tab.

4.2.7 Status Bar

The status bar provides information on the status of the device connected to the PC and also on the status of the device configuration.

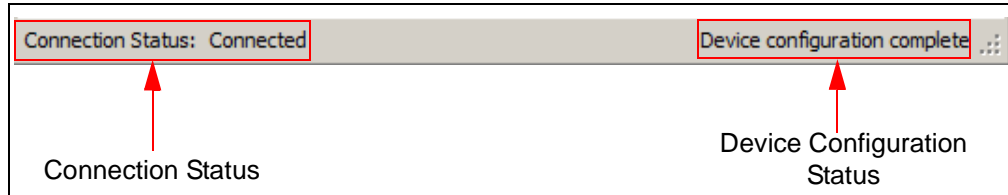


FIGURE 4-10: Status Bar.



UCS2112 DUAL USB PORT POWER EVALUATION BOARD USER'S GUIDE

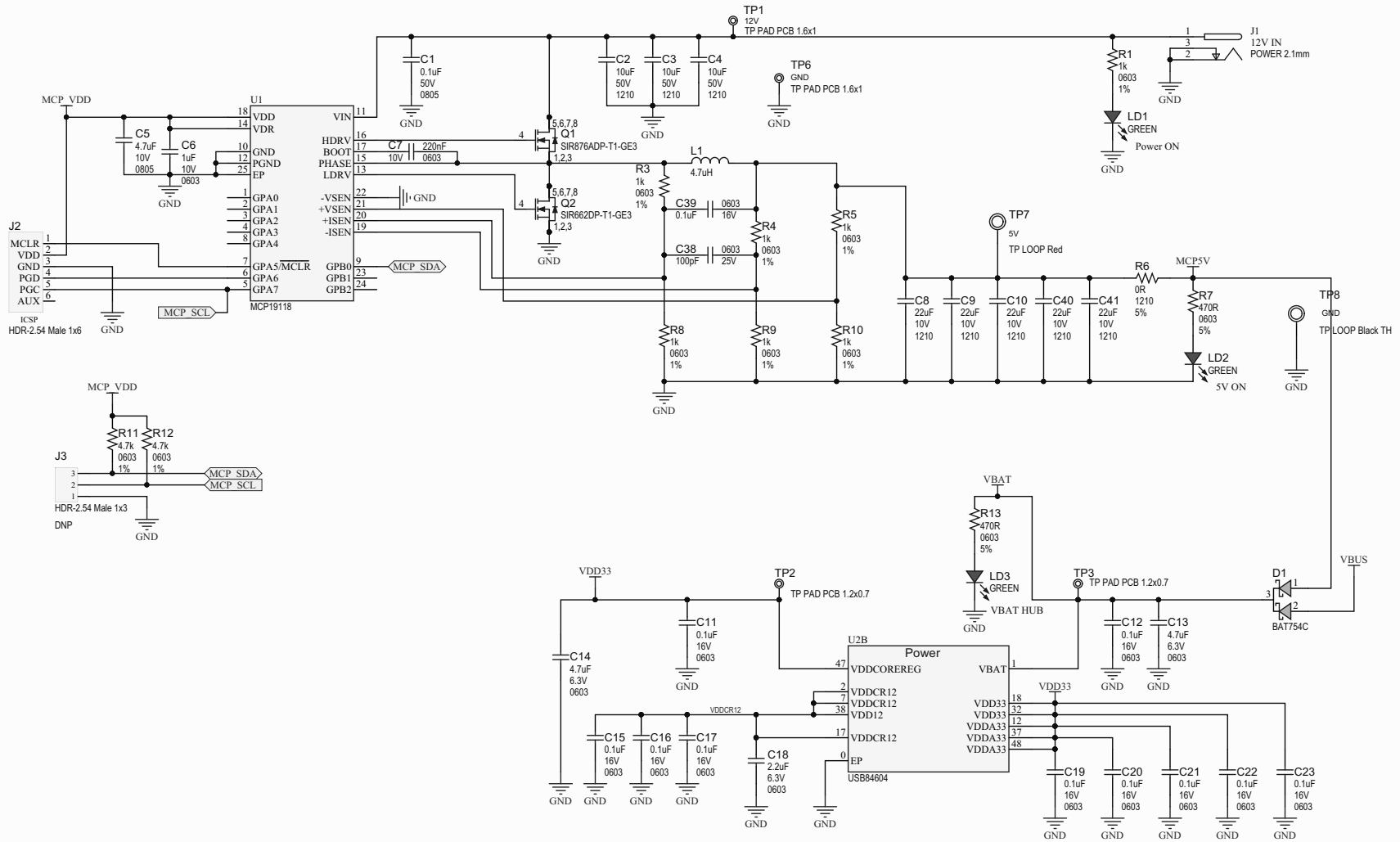
Appendix A. Schematic and Layouts

A.1 INTRODUCTION

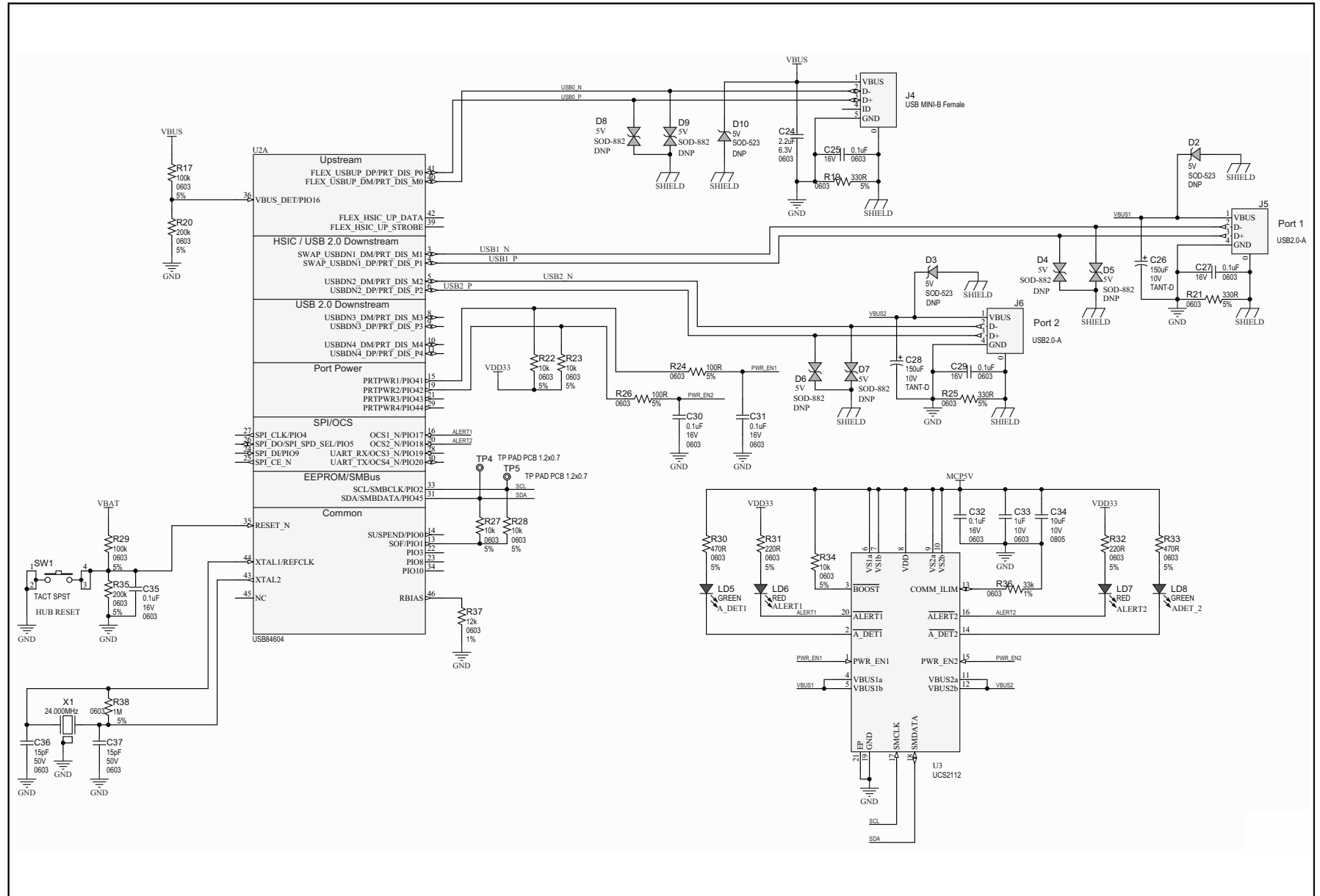
This appendix contains the following schematics and layouts for the UCS2112 Dual USB Port Power Evaluation Board:

- Board – Schematic 1
- Board – Schematic 2
- Board – Top Silk
- Board – Top Copper and Silk
- Board – Top Copper
- Board – Inner 1 - GND
- Board – Inner 2 - Signal
- Board – Bottom Copper
- Board – Bottom Copper and Silk
- Board – Bottom Silk

A.2 BOARD – SCHEMATIC 1

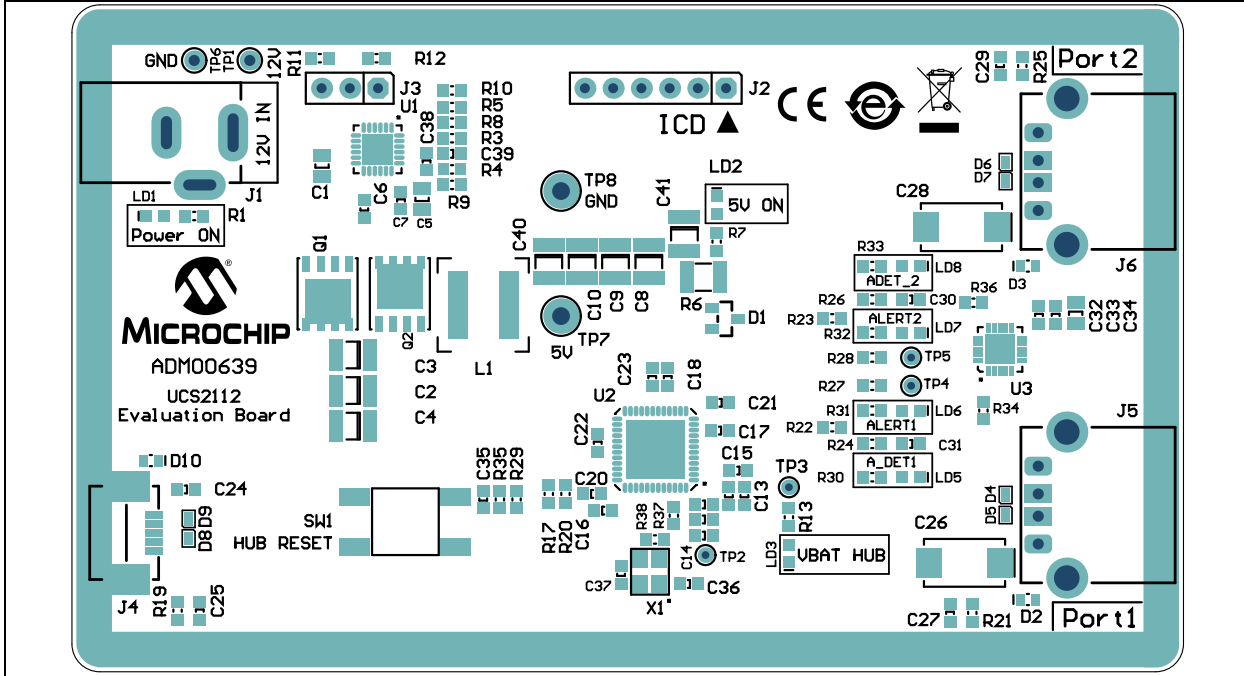


A.3 BOARD – SCHEMATIC 2

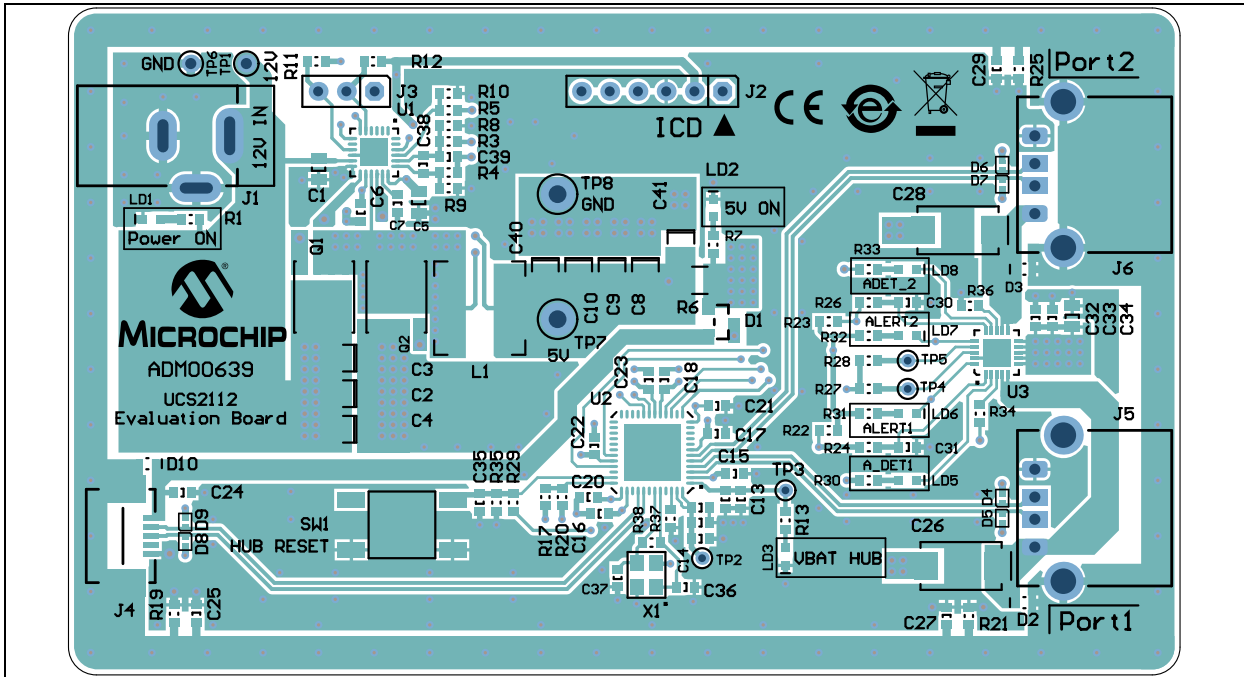


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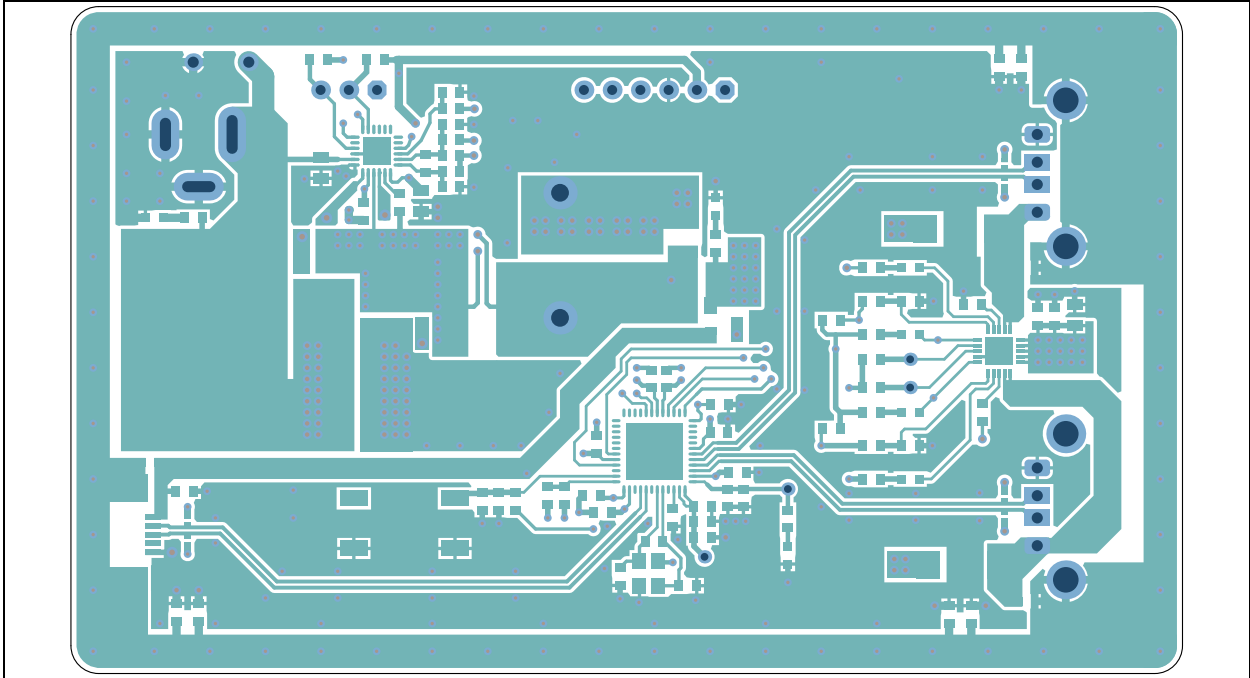
A.4 BOARD – TOP SILK



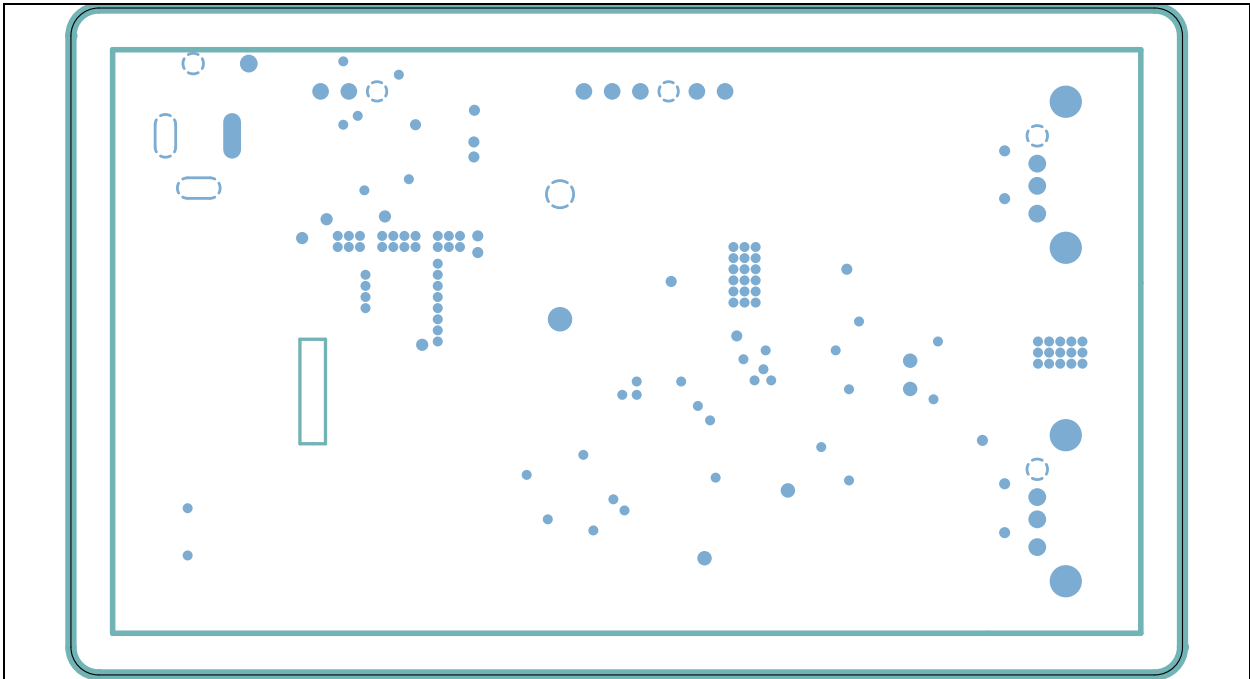
A.5 BOARD – TOP COPPER AND SILK



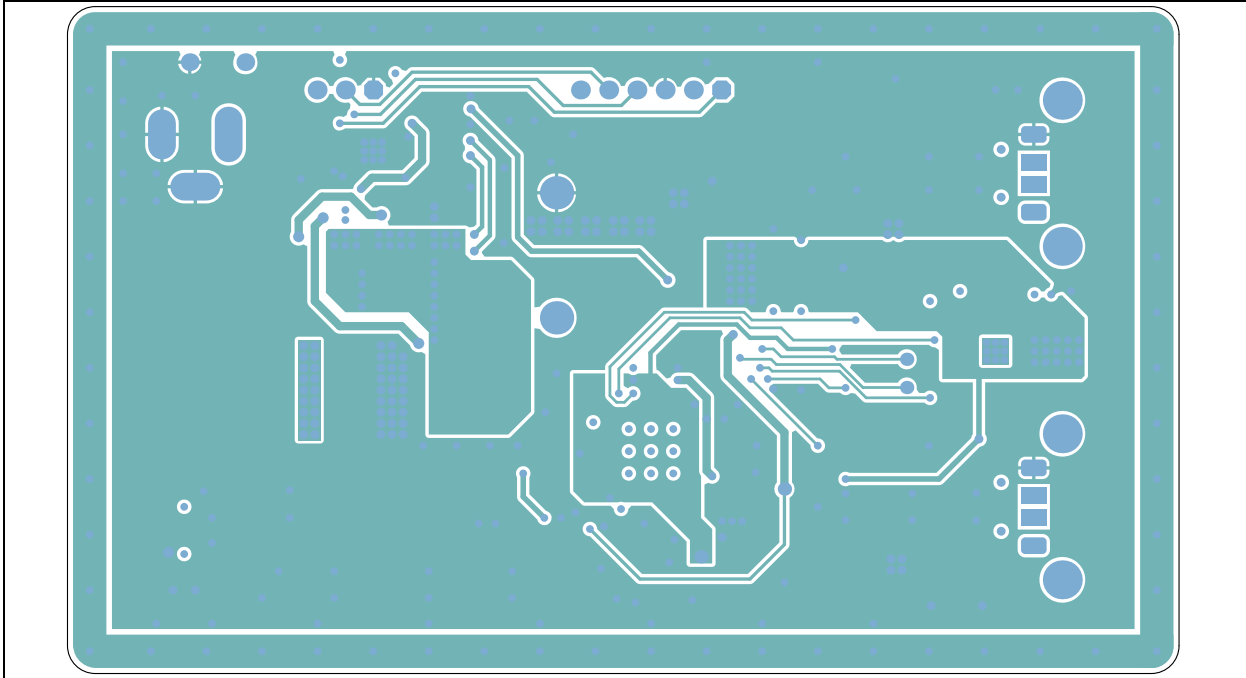
A.6 BOARD – TOP COPPER



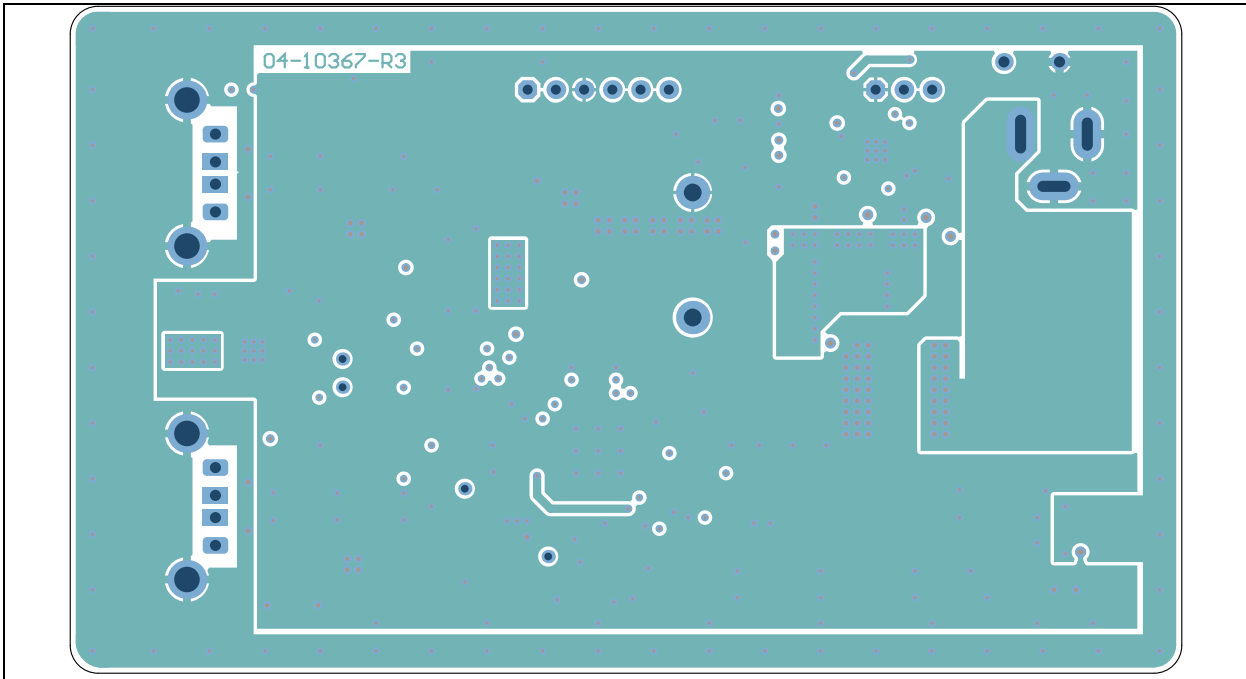
A.7 BOARD – INNER 1 - GND



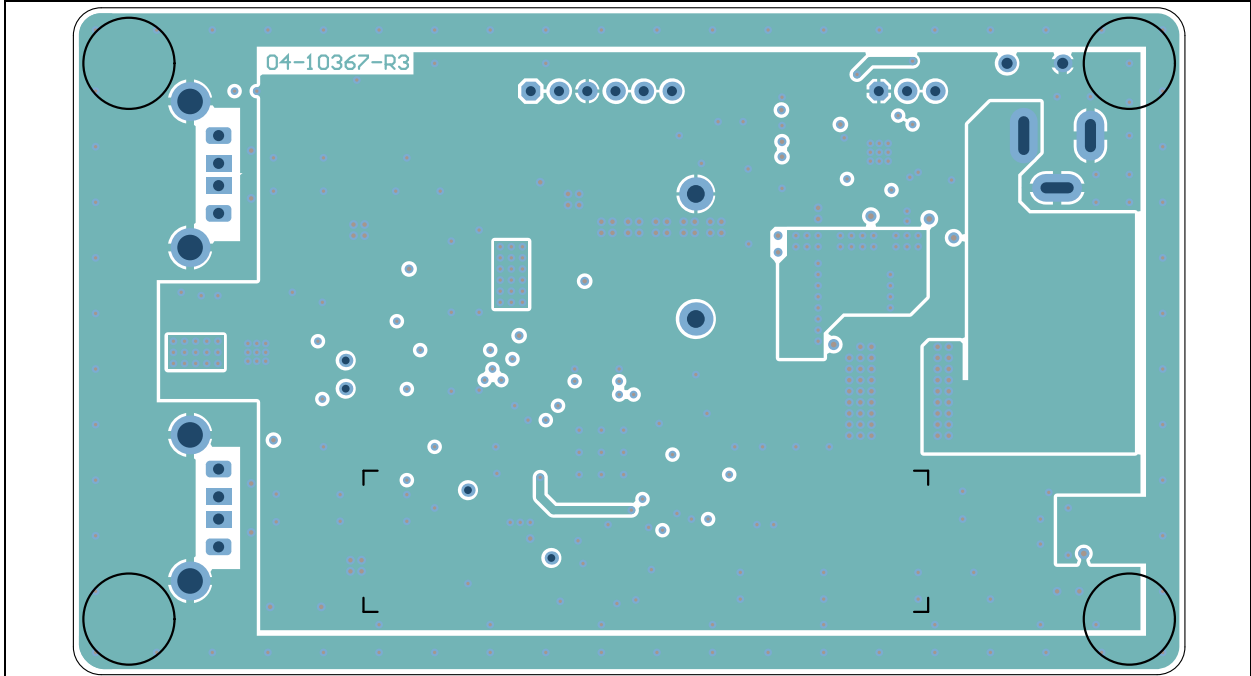
A.8 BOARD – INNER 2 - SIGNAL



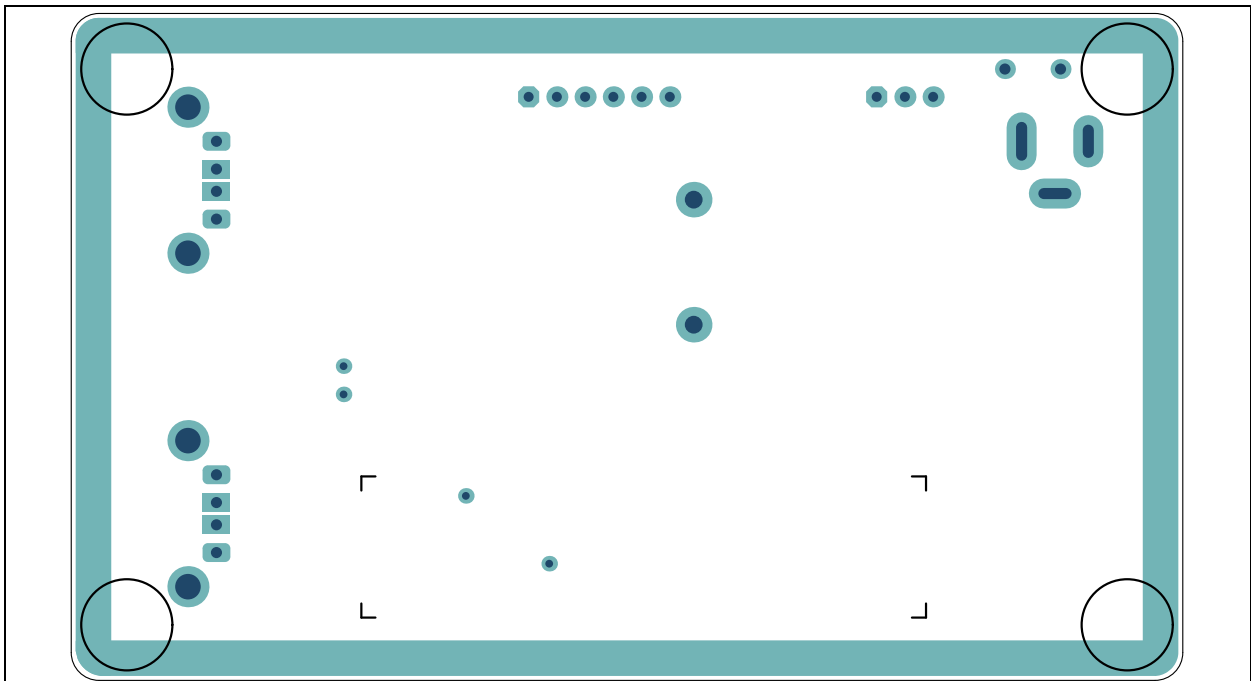
A.9 BOARD – BOTTOM COPPER



A.10 BOARD – BOTTOM COPPER AND SILK



A.11 BOARD – BOTTOM SILK



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NOTES:



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Appendix B. Bill of Materials

TABLE B-1: BILL OF MATERIALS (BOM)

Qty.	Designator	Description	Manufacturer 1	Part Number
1	C1	Cap. ceramic 0.1 μ F 50V 10% X7R SMD 0805	Cal-Chip Electronics Inc.	GMC21X7R104K50NTLF
3	C2, C3, C4	Cap. ceramic 10 μ F 50V 20% X7R SMD 1210	TDK Corporation	C3225X7R1H106M250AC
1	C5	Cap. ceramic 4.7 μ F 10V 20% X7R SMD 0805	TDK Corporation	C2012X7R1A475M125AC
2	C6, C33	Cap. ceramic 1 μ F 10V 20% X7R SMD 0603	TDK Corporation	C1608X7R1A105M
1	C7	Cap. ceramic 0.22 μ F 10V 10% X7R SMD 0603	TDK Corporation	C1608X7R1A224K
5	C8, C9, C10, C40, C41	Cap. ceramic 22 μ F 10V 10% X7R SMD 1210	TDK Corporation	C3225X7R1A226K230AC
18	C11, C12, C15, C16, C17, C19, C20, C21, C22, C23, C25, C27, C29, C30, C31, C32, C35, C39	Cap. ceramic 0.1 μ F 16V 10% X7R SMD 0603	AVX Corporation	0603YC104KAT2A
2	C13, C14	Cap. ceramic 4.7 μ F 6.3V 20% X5R SMD 0603	Panasonic® - ECG	ECJ-1VB0J475M
1	C18	Cap. ceramic 2.2 μ F 6.3V 20% X5R SMD 0603	TDK Corporation	C1608X5R0J225M080AB
1	C24	Cap. ceramic 2.2 μ F 6.3V 10% X7R SMD 0603	TDK Corporation	C1608X7R0J225K
2	C26, C28	Cap. tantalum 150 μ F 10V 10% 100mOhm SMD D	AVX Corporation	TPSD157K010R0100
1	C34	Cap. ceramic 10 μ F 10V 10% X7R SMD 0805	TDK Corporation	C2012X7R1A106K125AC
2	C36, C37	Cap. ceramic 15 pF 50V 5% NP0 SMD 0603	TDK Corporation	C1608C0G1H150J
1	C38	Cap. ceramic 100 pF 25V 10% NP0 SMD 0603	AVX Corporation	06033A101KAT2A
1	CBL1	Mech. HW cable USB-A Male to Mini USB-B Male 3 ft black	Katerno	10UM-02103BK
1	D1	Diode Schottky arr. BAT754C 600 mV 200 mA 30V SOT-23-3	NXP Semiconductor	BAT754C,215
3	D2, D3, D10	Diode Zener T5V0S5-7 5V 150 mW SMD SOD-523 - DO NOT POPULATE	Diodes® Incorporated	T5V0S5-7
6	D4, D5, D6, D7, D8, D9	Diode Zener PESD5V0X1BL 5V SMD SOD-882 - DO NOT POPULATE	NXP Semiconductor	PESD5V0X1BL,315

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

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TABLE B-1: BILL OF MATERIALS (BOM)

Qty.	Designator	Description	Manufacturer 1	Part Number
1	J1	Conn. power 2.1 mm 5.5 mm switch TH R/A	CUI Inc.	PJ-002A
1	J2	Conn. header-2.54 Male 1x6 gold 5.84 MH TH vert.	FCI	68001-106HLF
1	J3	Conn. header-2.54 Male 1x3 gold 5.84 MH TH vert. - DO NOT POPULATE	FCI	68000-103HLF
1	J4	Conn. USB MINI-B Female SMD R/A	Hirose Electric Co., Ltd.	UX60SC-MB-5ST(80)
2	J5, J6	Conn. USB 2.0 STD-A Female TH R/A	TE Connectivity, Ltd.	292303-1
1	L1	Inductor 4.7 uH 13.6A 20% SMD L7.5W7.2H7	Coilcraft	XAL7070-472MEC
5	LD1, LD2, LD3, LD5, LD8	Diode LED green 2.2V 25 mA 15 mcd clear SMD 0603	Kingbright Corp.	APT1608SGC
2	LD6, LD7	Diode LED red 1.95V 30 mA 700 mcd clear SMD 0603	Kingbright Corp.	APTD1608SURCK
4	PAD1, PAD2, PAD3, PAD4	Mech. HW rubber pad cylindrical D7.9 H5.3 black	3M	SJ61A11
1	PCB1	Printed Circuit Board - UCS2112 Dual USB Port Power Evaluation Board	—	04-10367-R3
1	PS1	Mech. HW power supply 12V 3A DC 2.1 mm jack	CUI Inc.	EMSA120300-P5P-SZ
1	Q1	Trans. FET N-CH SIR876ADP-T1-GE3 100V 40A 62.5W PPAK SO-8	Vishay Siliconix	SIR876ADP-T1-GE3
1	Q2	Trans. FET N-CH SIR662DP-T1-GE3 60V 60A 104 PPAK SO-8	Vishay Siliconix	SIR662DP-T1-GE3
7	R1, R3, R4, R5, R8, R9, R10	Resistor TKF 1kΩ 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1001V
1	R6	Resistor TKF 0R 1/3W SMD 1210	Vishay/Dale	CRCW12100000Z0EA
4	R7, R13, R30, R33	Resistor TKF 470Ω 5% 1/10W SMD 0603	Panasonic	ERJ-3GEYJ471V
2	R11, R12	Resistor TKF 4.7kΩ 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF4701V
2	R17, R29	Resistor TKF 100kΩ 5% 1/10W SMD 0603 (Don't Use, Duplicate, Use RSMT0026)	Panasonic	ERJ-3GEYJ104V
3	R19, R21, R25	Resistor MF 330R 5% 1/16W SMD 0603	Panasonic	ERA-V33J331V
2	R20, R35	Resistor TKF 200kΩ 5% 1/10W SMD 0603	Panasonic	ERJ-3GEYJ204V
5	R22, R23, R27, R28, R34	Resistor TKF 10kΩ 5% 1/10W SMD 0603	Panasonic	ERJ-3GEYJ103V
2	R24, R26	Resistor TKF 100Ω 5% 1/10W SMD 0603	Vishay/Dale	CRCW0603100RJNEA
2	R31, R32	Resistor TKF 220Ω 5% 1/10W SMD 0603	NIC Components Corp.	NRC06J221TRF
1	R36	Resistor TKF 33kΩ 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF3302V

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

TABLE B-1: BILL OF MATERIALS (BOM)

Qty.	Designator	Description	Manufacturer 1	Part Number
1	R37	Resistor TKF 12k Ω 1% 1/10W SMD 0603	Yageo Corporation	RC0603FR-0712KL
1	R38	Resistor TKF 1M Ω 5% 1/10W SMD 0603	Yageo Corporation	9C06031A1004JLHFT
1	SW1	Switch TACT SPST 12V 50 mA TL3301AF260QG SMD	E-Switch [®] , Inc.	TL3301AF260QG
1	TP7	Conn. TP loop red TH - DO NOT POPULATE	Keystone Electronics Corp.	5010
1	TP8	Conn. TP loop black TH - DO NOT POPULATE	Keystone Electronics Corp.	5011
1	U1	Microchip analog PWM controller 1.6 MHz MCP19118-E/MJ QFN-24	Microchip Technology Inc.	MCP19118-E/MJ
1	U2	Microchip interface USB Hub/Flash USB84604 QFN-48	Microchip Technology Inc.	USB84604AFT-B-001080
1	U3	Microchip interface USB power switch UCS2112-1-V/G4 QFN-20	Microchip Technology Inc.	UCS2112-1-V/G4
1	X1	Crystal 24 MHz 18 pF SMD ABM8G	Abracon [®] Corporation	ABM8G-24.000MHZ-18-D2Y-T

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.



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