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**MCP2200**  
**USB to UART with Isolation**  
**Demo Board**  
**User's Guide**

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USA

This declaration of conformity is issued by the manufacturer.

The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not intended to be a finished appliance, nor is it intended for incorporation into finished appliances that are made commercially available as single functional units to end users. This development/evaluation tool complies with EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8<sup>th</sup> February 2010).

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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

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# MCP2200 USB TO UART WITH ISOLATION DEMO BOARD USER'S GUIDE

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# MCP2200 USB to UART with Isolation Demo Board User's Guide

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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 "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 MCP2200 USB to UART with Isolation Demo Board. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Recommended Reading
- The Microchip Web Site
- Customer Support
- Revision History

## DOCUMENT LAYOUT

This document describes how to use the MCP2200 USB to UART with Isolation Demo Board as a development tool to emulate and debug firmware on a target board. The document is organized as follows:

- **Chapter 1. "Product Overview"**– Important information about the MCP2200 USB to UART with Isolation Demo Board.
- **Chapter 2. "Installation and Operation"** – This chapter includes a detailed description of each function of the demo board and instructions for how to begin using the board.
- **Appendix A. "Schematics and Layouts"** – Shows the schematic and layout diagrams for the MCP2200 USB to UART with Isolation Demo Board.
- **Appendix B. "Bill of Materials (BOM)"** – Lists the parts used to build the MCP2200 USB to UART with Isolation Demo Board.

## 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<sup>®</sup> 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</u> > <i>Save</i>
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) { ... }



## RECOMMENDED READING

This user's guide describes how to use MCP2200 USB to UART with Isolation Demo Board. Another useful document is listed below. The following Microchip document is available and recommended as a supplemental reference resource:

- **MCP2200 Data Sheet - “USB 2.0 to UART Protocol Converter with GPIO” (DS22228)**

This data sheet provides detailed information regarding the MCP2200 product.

## THE MICROCHIP WEB SITE

Microchip provides online support via our web site at [www.microchip.com](http://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
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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>.

## REVISION HISTORY

### Revision A (May 2015)

Original release of this document.

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# MCP2200 USB TO UART WITH ISOLATION DEMO BOARD USER'S GUIDE

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## Chapter 1. Product Overview

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### 1.1 INTRODUCTION

This chapter provides an overview of the MCP2200 USB to UART with Isolation Demo Board and covers the following topics:

- What is the MCP2200 USB to UART with Isolation Demo Board?
- What the MCP2200 USB to UART with Isolation Demo Board kit contains

### 1.2 WHAT IS THE MCP2200 USB TO UART WITH ISOLATION DEMO BOARD?

The MCP2200 USB to UART with Isolation Demo Board is a USB to UART development and evaluation board for the MCP2200 device. This board is powered from the host's USB port. Two of the MCP2200 GPIO pins (GP6 and GP7) are connected to LEDs used to indicate the USB to UART traffic when the associated pins are configured as TxLED and RxLED pins, respectively. The isolated side is powered externally with 3V to 5.5V. The board offers 3.75 kV AC of electrical isolation for power and UART signals.

Microchip Technology Inc. provides a software package to be used with this board that can be downloaded from Microchip's web site. This PC software is used to evaluate/demonstrate the MCP2200 as a Virtual Com Port (VCP) device. This software also allows custom device configurations.

A DLL is included to allow the development of the custom configurations and software applications to control the GPIOs, that can be downloaded from the product/board web page.

### 1.3 WHAT THE MCP2200 USB TO UART WITH ISOLATION DEMO BOARD KIT CONTAINS

The MCP2200 USB to UART with Isolation Demo Board kit includes:

- MCP2200 USB to UART with Isolation Demo Board (ADM00276)
- Mini USB Cable
- ABS Protective Case
- Important Information Sheet

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## Chapter 2. Installation and Operation

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### 2.1 INTRODUCTION

The MCP2200 USB to UART with Isolation Demo Board is designed to demonstrate the device in a VCP environment, where an electrical isolation is needed between the USB host and the targeted UART system.

The MCP2200 USB to UART with Isolation Demo Board has the following features:

- Dedicated Tx LED (green) and Rx LED (red) to indicate the USB to UART traffic
- Isolated power LED (green) that indicates the presence of power on the isolated side
- Mini USB connector
- 6-pin PICkit™ Serial header with the UART (Tx and Rx) signals and power signals (V<sub>DD</sub> and GND)
- Isolated transceiver powered externally from the isolated side with 3V to 5.5V that can be used as a voltage level translator

### 2.2 SOFTWARE SETUP

To set up the board software, first download the support material (software and drivers) from the board's page on the Microchip web site.

1. Connect the board to a USB port on a Windows or Linux system. Wait for the operating system to detect and install the device.
2. For Linux machines, the driver installation is not required unless the support for USB CDC ACM class is not present. Please read the `Linux Driver Readme` file on the board's web page for more details.
3. For MAC OS read the MCP2200/MCP2221 Mac Driver Information from the product web page.
4. If required, the MCP2200 Configuration Utility software can be installed.

- Note 1:** If the software fails to start and the message box indicates a "Code 10 error" message, a Microsoft update may be required. The update (KB943198) can be downloaded from <http://support.microsoft.com/kb/943198>.
- 2:** The default VID is 0x04D8, licensed to Microchip. The default PID for the MCP2200 is 0x00DF. Changing the VID assumes you own a license from the USB consortium, while changing the PID assumes you have licensed one from Microchip.
- 3:** Please consult the `MCP2200 Windows Driver Readme` document on the MCP2200 webpage for a complete list of known windows installation issues.



**FIGURE 2-1:** MCP2200 USB to UART with Isolation Demo Board

## 2.3 SOFTWARE OPERATION

The board operates as a USB to UART converter. In addition, the software can be used to control the I/O lines and set custom configurations.

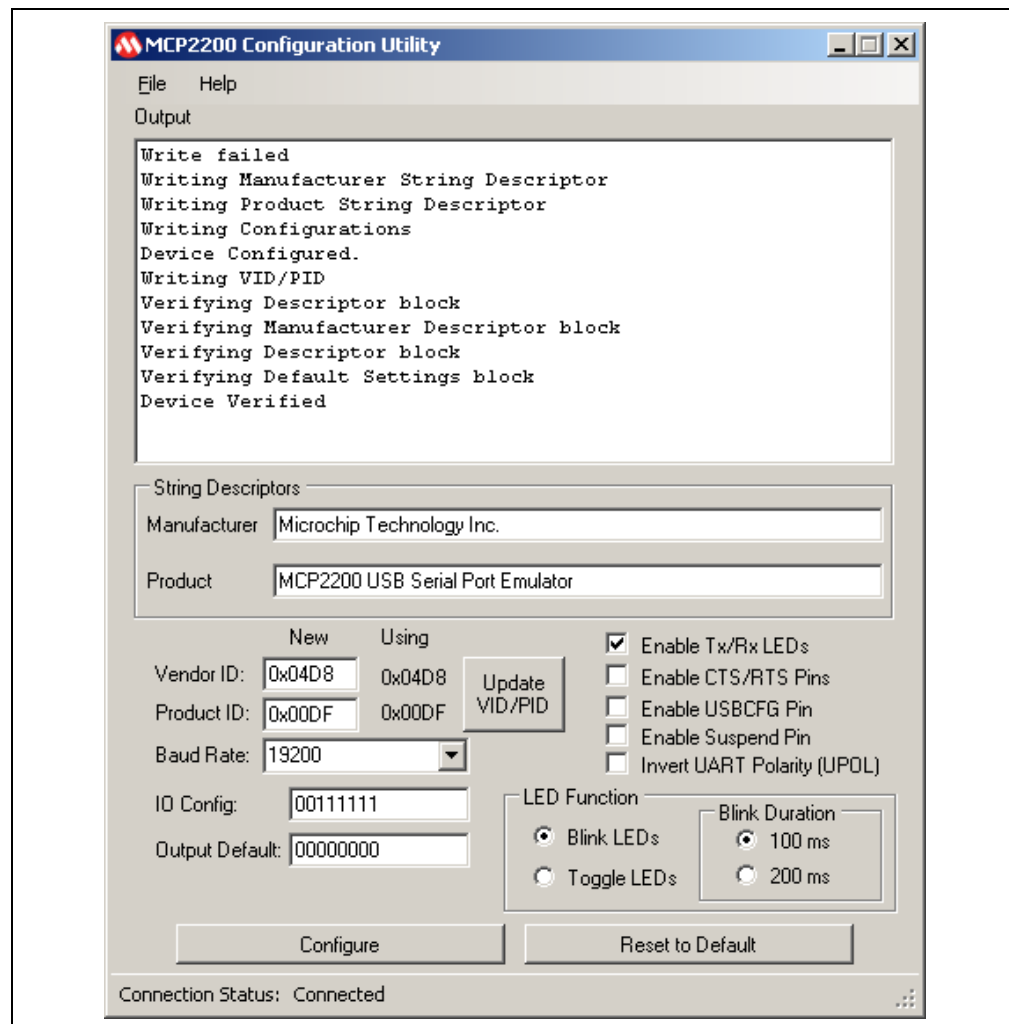
### 2.3.1 USB to UART Operation

The board can be connected to a USB host and to a UART signal (or signals) of the targeted system. If the host application sends a "Set Line Coding" command (sets the UART baud rate), the MCP2200 will automatically switch to the correct baud rate.

MCP2200 supports the following UART data format: eight data bits, one stop bit, no parity. Setting other parameters than the supported ones will not return an error, but the board will still operate using eight data bits, one stop bit and no parity. The "no error return" behavior was chosen in order to prevent crashes from certain terminal software that cannot handle properly the rejection of the selected parameters.

### 2.3.2 Configuration Software

The PC software allows the user to evaluate functionality and set custom configurations. [Figure 2-2](#) shows the main screen.



**FIGURE 2-2:** Main Software Screen

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The software is designed to help in the development of custom configurations. The following functionalities can be modified to meet the custom/user's requirements:

- **Vendor ID (VID) and Product ID (PID):** The default VID is 0x04D8, which is assigned to Microchip by the USB IF. The VID can be changed to another VID if authorized by the owner of the assignment. Contact the USB IF for more information. The default PID for the MCP2200 device is 0x00DF and can be used "as-is". Microchip's Vendor ID can be sublicensed by obtaining a new Product ID from Microchip Technology Inc. See the product or board page for link and instructions to the sublicensing agreement. This is required only if the Microchip's Vendor ID is used. Changing the Vendor ID to another assigned and authorized VID does not require any sublicensing from Microchip.
- **Baud rate:** A pull-down box allows a selection of the most commonly used baud rates.
- **I/O Config:** This function is a binary 8-bit value that configures the I/O port to input (logic '1') or output (logic '0').
- **Output Default:** It is the default value for the port pins configured as output. This is also an 8-bit binary value.
- **Tx/Rx LEDs:** By checking this box, the LED functions are enabled on GP6 and GP7. The "LED Function" and "Blink Duration" must be configured.
- **Hardware Flow Control:** This function enables the RTS and CTS pins for UART handshaking. Not used on this board since the pins are not connected.
- **USBCFG Pin:** Enables the USBCFG pin on GP1. Not used on this board since the pin is not connected.
- **Suspend Pin:** Enables the SSPND pin functionality on GP0. Not used on this board since the pin is not connected.
- **UART Polarity:** Enables the inverse polarity for the UART pins.
- **String Descriptors:** Enter custom Manufacturer and Product string descriptors.
- **Update VID/PID Button:** This button updates the software to use the VID and PID in the "New" boxes. For example, if the PID is changed to 0xFFFF, the software will keep using the original 0x00DF until the **Update VID/PID** button is pressed. After this, the software will switch to the 0xFFFF PID.

CAUTION
Care must be taken when changing the VID or PID because the software will be unable to communicate to the board if a mismatch occurs.

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# MCP2200 USB TO UART WITH ISOLATION DEMO BOARD USER'S GUIDE

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## Appendix A. Schematics and Layouts

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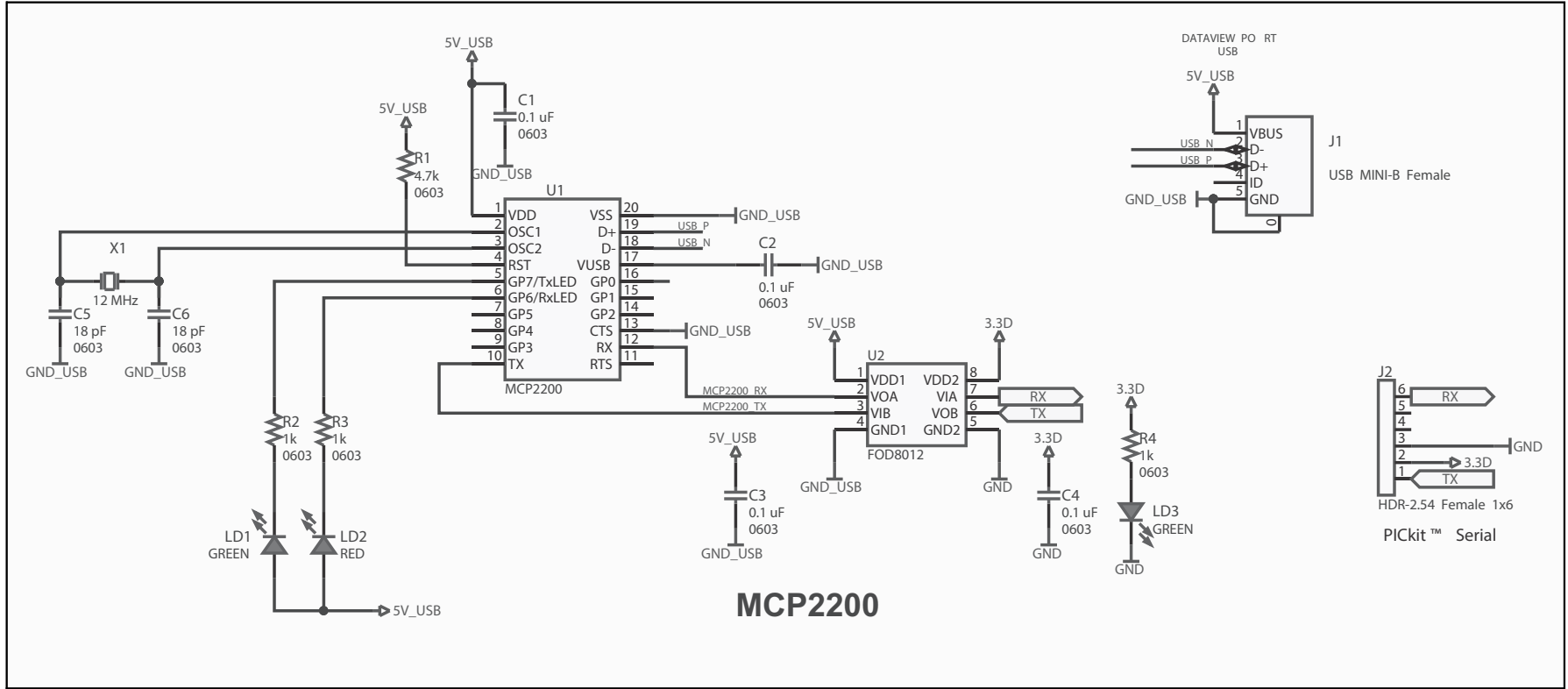
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### A.1 INTRODUCTION

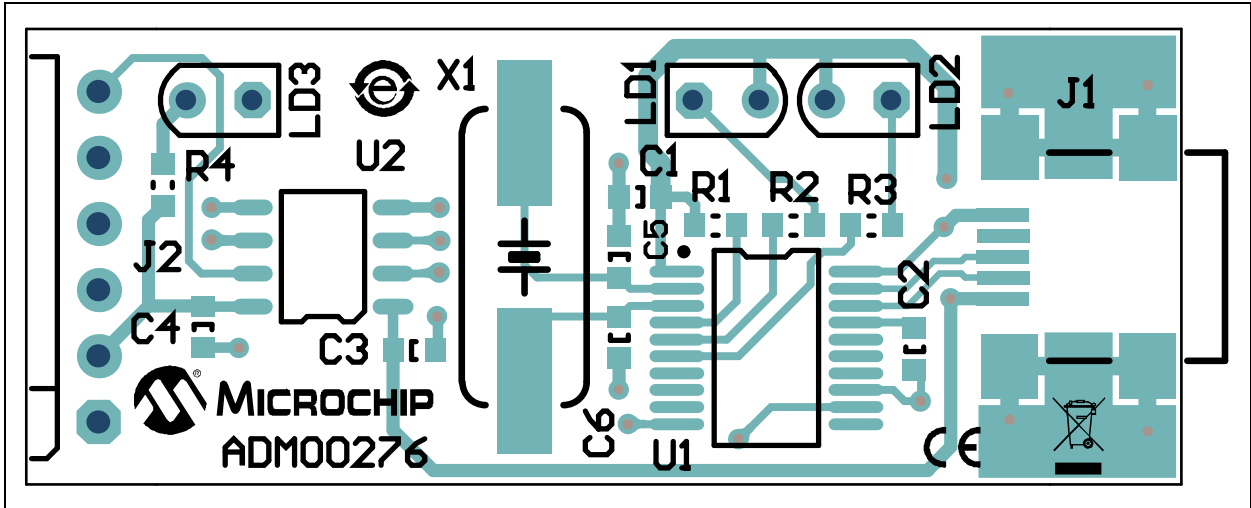
This appendix contains the following schematics and layouts for the MCP2200 USB to UART with Isolation Demo Board:

- Board – Schematic
- Board – Top Copper and Silk
- Board – Top Copper
- Board – Bottom Copper

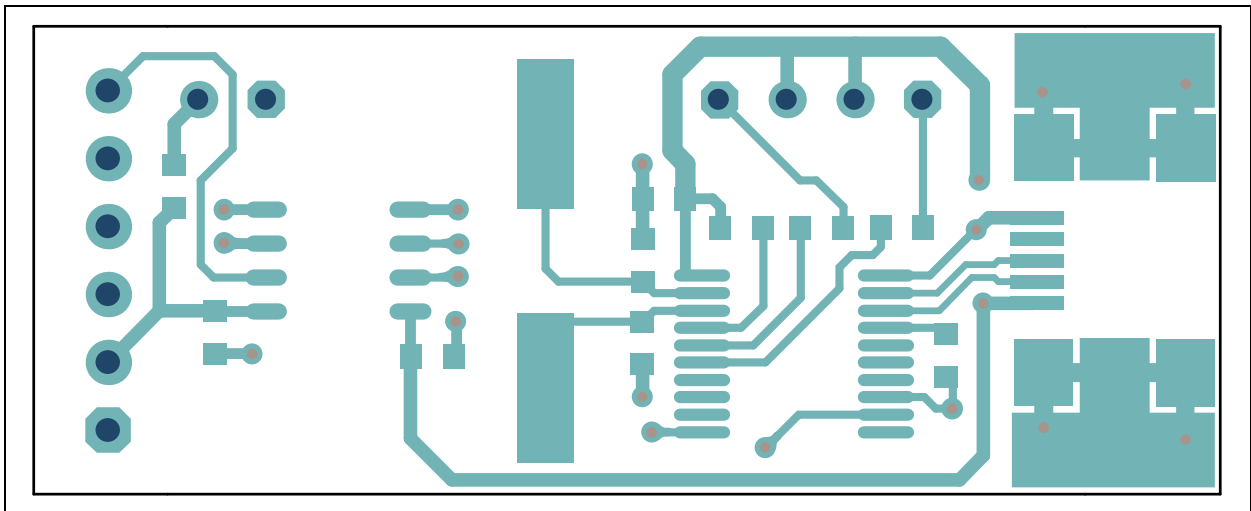
## A.2 BOARD – SCHEMATIC



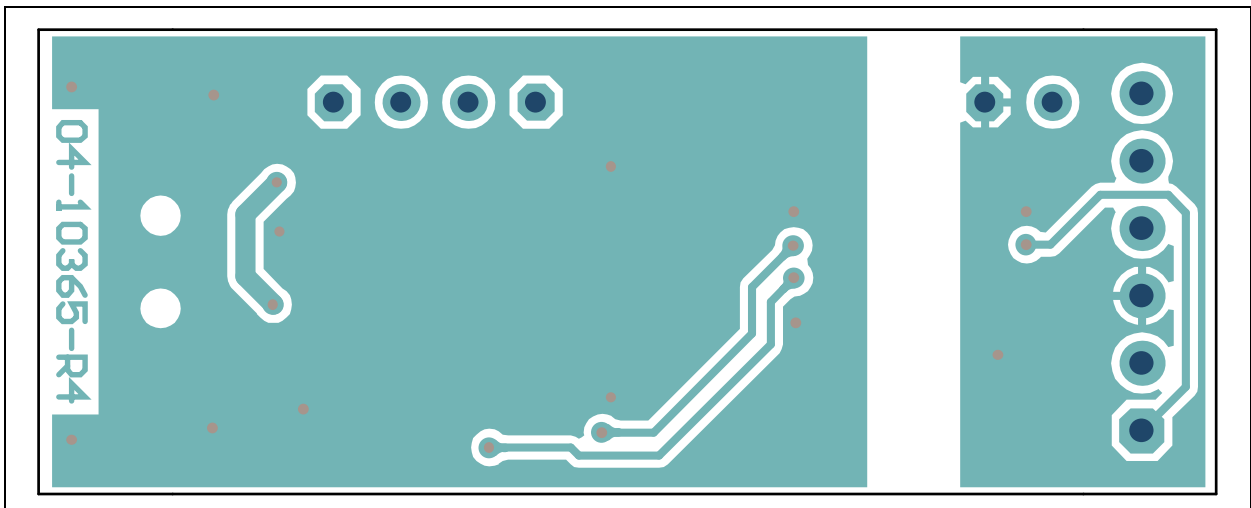
### A.3 BOARD – TOP COPPER AND SILK



### A.4 BOARD – TOP COPPER



### A.5 BOARD – BOTTOM COPPER



NOTES:

**Appendix B. Bill of Materials (BOM)**

**TABLE B-1: BILL OF MATERIALS (BOM)**

Qty	Reference	Description	Manufacturer	Part Number
4	C1, C2, C3, C4	Cap. ceramic 0.1 µF 16V 10% X7R SMD 0603	Samsung Electro-Mechanics America, Inc.	CL10B104KO8NNNC
2	C5, C6	Cap. ceramic 18 pF 50V 5% NP0 SMD 0603	Kemet®	C0603C180J5GACTU
1	CBL1	Mech. HW cable USB-A Male to Mini USB-B Male 3 ft Black	Katerno	10UM-02103BK
1	J1	Conn. USB Mini-B Female SMD R/A	Hirose Electric Co., Ltd.	UX60-MB-5ST
1	J2	Conn. HDR-2.54 Female 1x6 Gold TH R/A	Sullins Connector Solutions	PPPC061LGBN-RC
2	LD1, LD3	Diode LED Green 2.2V 25 mA 10 mcd Diffuse RAD 1.8 mm	Kingbright Corp.	WP4060GD
1	LD2	Diode LED Red 1.85V 30 mA 200 mcd Diffuse RAD 1.8 mm	Kingbright Corp.	WP4060SRD
3	M1, M2, M3	Mech. HW stand-off LED T1-3/4 0.120" Black	Bivar, Inc.	LTM-120
1	R1	Res. TKF 4.7k 5% 1/10W SMD 0603	Yageo Corporation	RC0603JR-074K7L
3	R2, R3, R4	Res. TKF 1k 5% 1/10W SMD 0603	Panasonic® - ECG	ERJ-3GEYJ102V
1	U1	MCHP Interface USB UART MCP2200-I/SS SSOP-20	Microchip Technology Inc.	<b>MCP2200-I/SS</b>
1	U2	IC Photo FOD8012 Bi-Dir 3.3V and 5V SOIC-8	Fairchild Semiconductor®	FOD8012
1	X1	Crystal 12 MHz 18 pF SMD HC49/US	Abracon® Corporation	ABLS-12.000MHZ-B4-T
1	Enclosure	Custom Enclosure	—	N/A

**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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