MCP2200 USB to RS-232 Demo Board User's Guide

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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 "DSXXXXXA", where "XXXXX" 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 on-line help. Select the Help menu, and then Topics to open a list of available on-line help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the MCP2200 USB to RS-232 Demo 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 MCP2200 USB to RS-232 Demo Board as an evaluation tool for the MCP2200 General Purpose I/O Expander. The manual layout is as follows:

• **Chapter 1. "Product Overview"** – Important information about the MCP2200 USB to RS-232 Demo Board.
• **Chapter 2. "MCP2200 USB to RS-232 Demo Board"** – Includes instructions on how to get started with this evaluation board.
• **Appendix A. "Schematic and Layouts"** – Shows the schematic and layout diagrams for the MCP2200 USB to RS-232 Demo Board.
• **Appendix B. "Bill of Materials (BOM)"** – Lists the parts used to build the MCP2200 USB to RS-232 Demo Board.

MCP2200 USB to RS-232 Demo Board User's Guide

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* 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	*File>Save*
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	`file`.o, where `file` can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options] file [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 RS-232 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. 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:

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• Distributor or Representative
• Local Sales Office
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• 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://support.microchip.com

DOCUMENT REVISION HISTORY

Revision A (April 2010)

• Initial Release of this Document.

NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the MCP2200 USB to RS-232 Demo Board and covers the following topics:

- What is the MCP2200 USB to RS-232 Demo Board?
- MCP2200 USB to RS-232 Demo Board Kit Contents

1.2 WHAT IS THE MCP2200 USB TO RS-232 DEMO BOARD?

The MCP2200EV-VCP is a USB to RS-232 development and evaluation board for the MCP2200 device. The board is powered from USB. Each I/O has an associated test point. In addition, two I/Os are connected to LEDs which are used to indicate USB to UART traffic when the associated pins are configured as TxLED and RxLED pins, respectively.

The accompanying PC software is used to evaluate/demonstrate the MCP2200 as a Virtual Com Port (VCP) device. The software also allows I/O control and custom device configuration.

A DLL is included to allow development of custom configuration and I/O control software.

1.3 MCP2200 USB TO RS-232 DEMO BOARD KIT CONTENTS

This MCP2200 USB to RS-232 Demo Board Kit includes:

- One MCP2200 USB to RS-232 Demo Board
- Configuration and control PC software (available on the board web page)
- PC software for configuration and I/O control (available on the board web page)
- A simple DLL for developing custom software (available on the board web page)

NOTES:

Chapter 2. MCP2200 USB to RS-232 Demo Board

2.1 INTRODUCTION

The MCP2200 USB to RS-232 Demo Board is designed to demonstrate the device in a VCP environment, as well as provide a method for I/O configuration development.

The MCP2200 USB to RS-232 Demo Board has the following features:

- TxLED and RxLED LEDs for indicating USB to UART traffic
- Test points for all I/O pins
- Mini-USB connector
- DB9 connector for connecting to another RS-232 device/application
- RS-232 transceiver

2.2 SETUP

1. Download the support material (software and drivers) from the Microchip web site by finding the board page from www.microchip.com/analogtools or by searching for MCP2200EV-VCP from the search box on the web site.
2. Connect the board to a USB port on a Windows PC.
3. When the dialog appears to install the driver, navigate to `mchp-HID+CDC.inf`.
4. The board should now be set up for operation.
5. The optional PC software can be installed.

Note 1: If the software fails to start and the message box indicates a Code 10 error, 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, which is licensed to Microchip. The default PID for the MCP2200 is 0x00DF. Changing the VID assumes you have a license from the USB consortium, and changing the PID assumes you have licensed one from Microchip.


FIGURE 2-1: BOARD LAYOUT
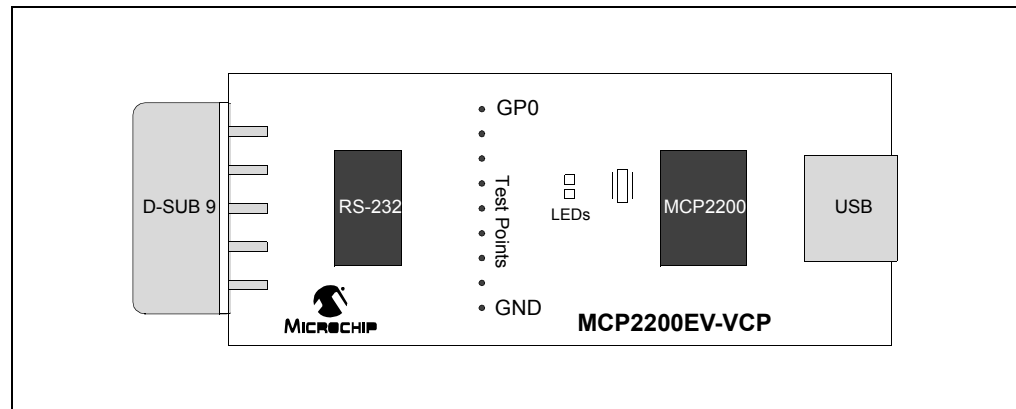
2.3   OPERATION

The board will operate as a USB to RS-232 converter. In addition, the accompanying software can be used to control the I/O and set custom configurations.

2.3.1   USB to RS-232 Operation

The board can be connected to a USB host and to an RS-232 port that usually connects to a PC. If the host application software sends a "Set Line Coding" command (sets the UART baud rate), the MCP2200 will automatically change to the correct baud rate.

FIGURE 2-2:   D-SUB 9-PIN MALE CONNECTOR
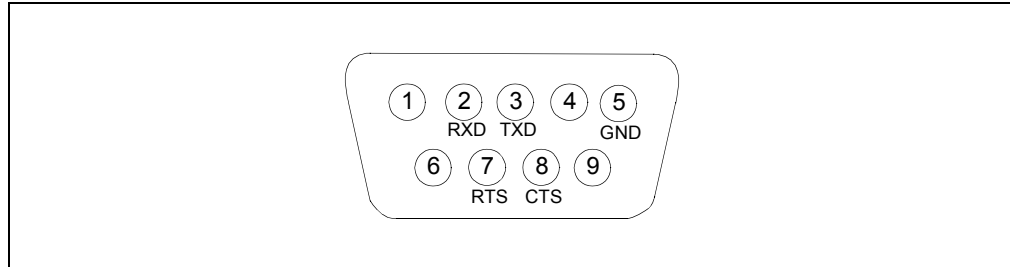
2.3.2   Configuration Software

The PC software allows the user to evaluate the functionality and set custom configurations. Figure 2-3 shows the main screen.

The software aids in the development of custom configurations. The following can be modified:

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 is 0x00DF and can be used 'as-is'. Microchip's VID can be sublicensed by obtaining a new PID from Microchip. See the product page or board page for a link to the sublicensing agreement. Sublicensing is only required if Microchip's VID is used. Changing the VID to another assigned and authorized VID does not require any sublicensing from Microchip.

Baud Rate: A pull-down box allows selection of the most commonly used baud rates.

I/O Config: It 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: Checking this box enables the LED functions on GP6 and GP7. The "LED Function" and "Blink Duration" must be configured.

Hardware Flow Control: Enables the $\overline{\text{RTS}}$ and $\overline{\text{CTS}}$ pins for UART handshaking.

USBCFG Pin: Enables the USBCFG pin on GP1.

Suspend Pin: Enables the SSPND pin functionality on GP0.

**UART Polarity:** Enables the inverse polarity for the UART pins.

String Descriptors: Here you can 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 was changed to 0xFFFF, the software would keep using the original 0x00DF until the **Update VID/PID** button was pressed. After this, the software would switch to the 0xFFFF PID.

> **Note:** Care must be taken when changing the VID or PID because the software will not be able to communicate to the board if there is a mismatch.

FIGURE 2-3: **MAIN SOFTWARE SCREEN**
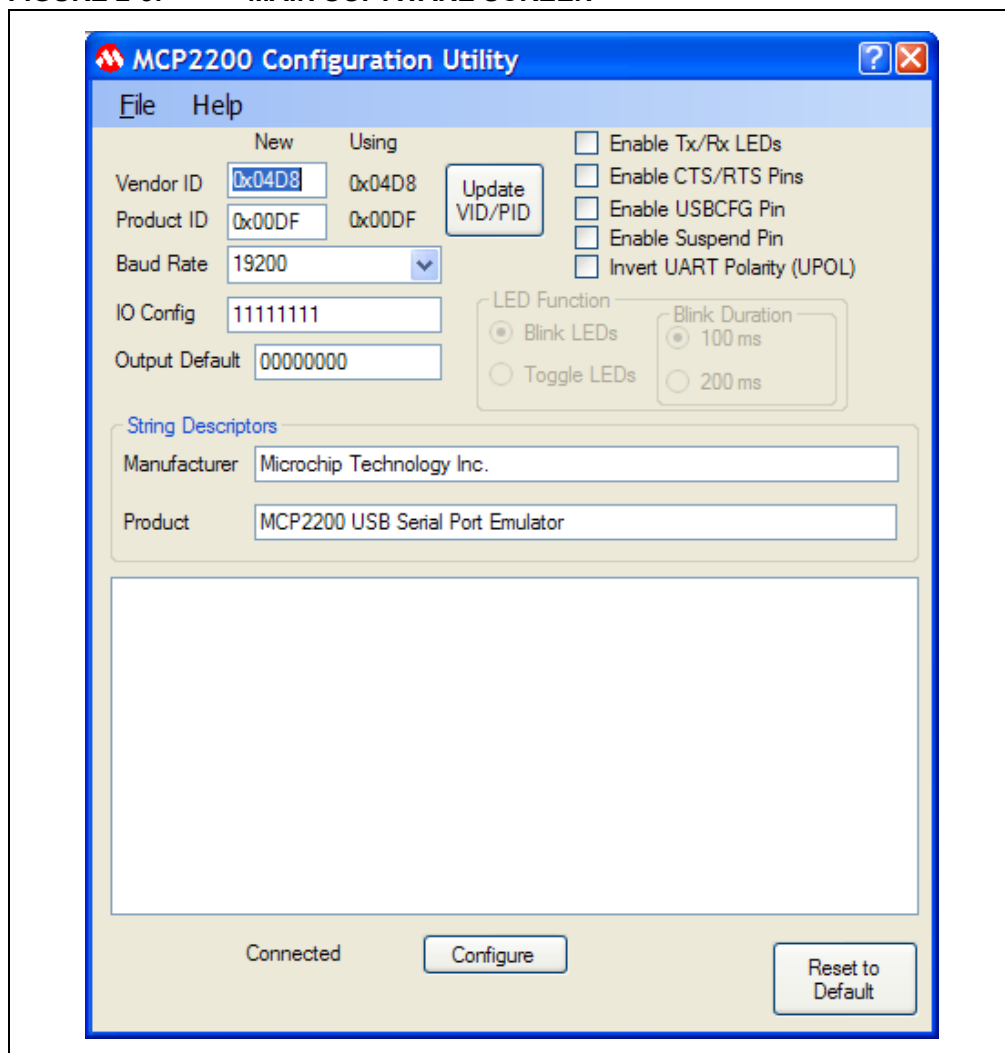
NOTES:

Appendix A. Schematic and Layouts

A.1 INTRODUCTION

This appendix contains the following schematic and layouts for the MCP2200 USB to RS232 Demo Board. Diagrams included:

• Board – Schematic
• Board – Top Copper, Pads and Silk
• Board – Top Copper and Pads
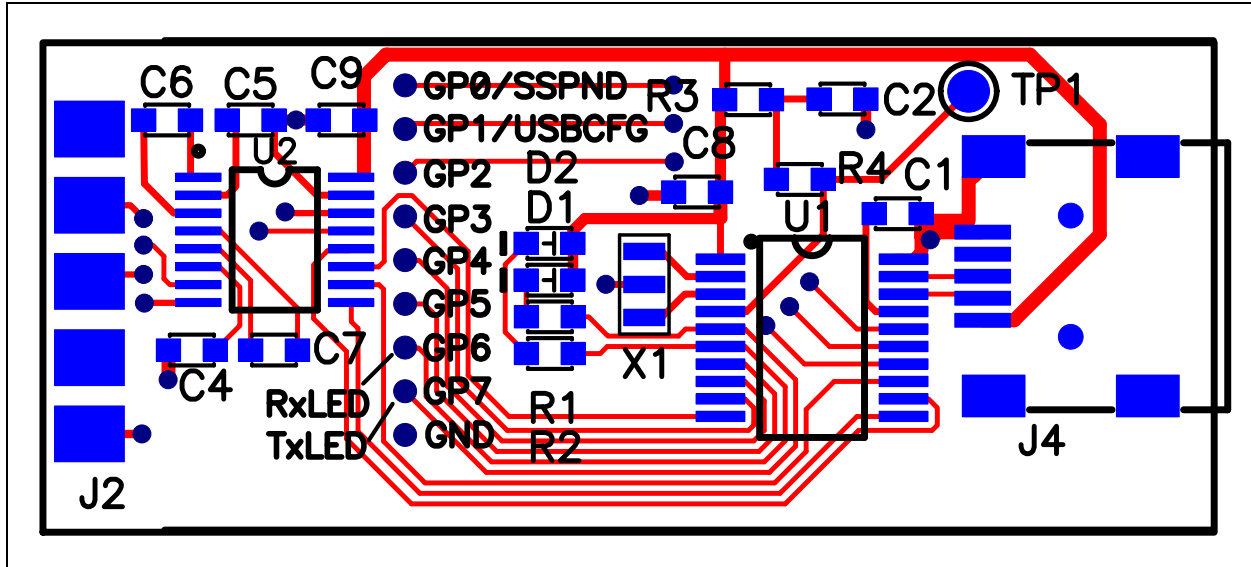• Board – Top Silk and Pads
• Board – Bottom Copper and Pads

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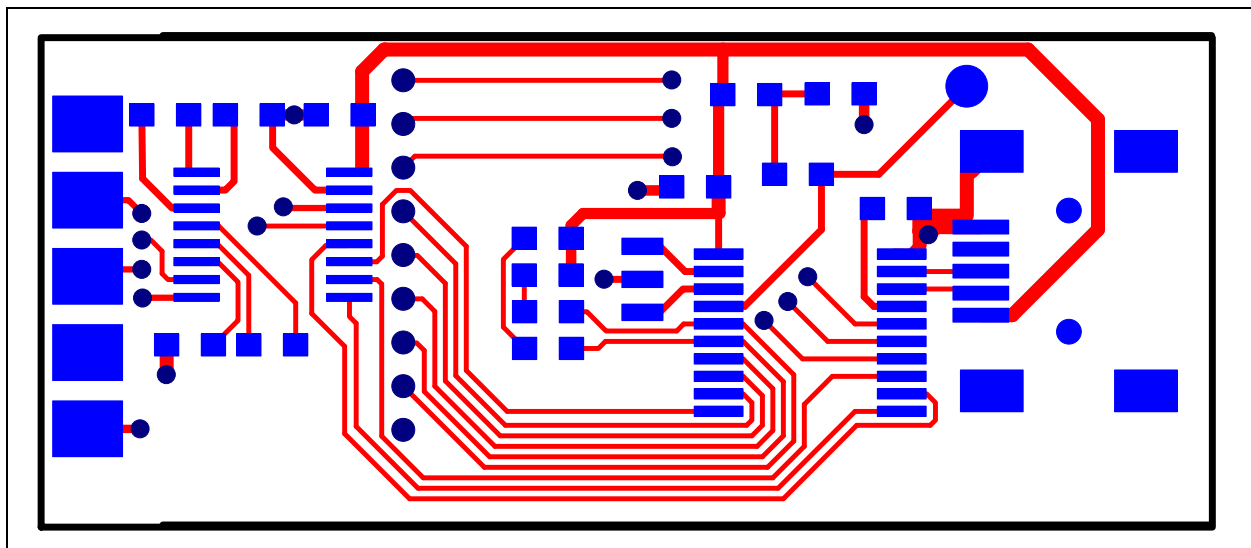
A.2   BOARD – SCHEMATIC

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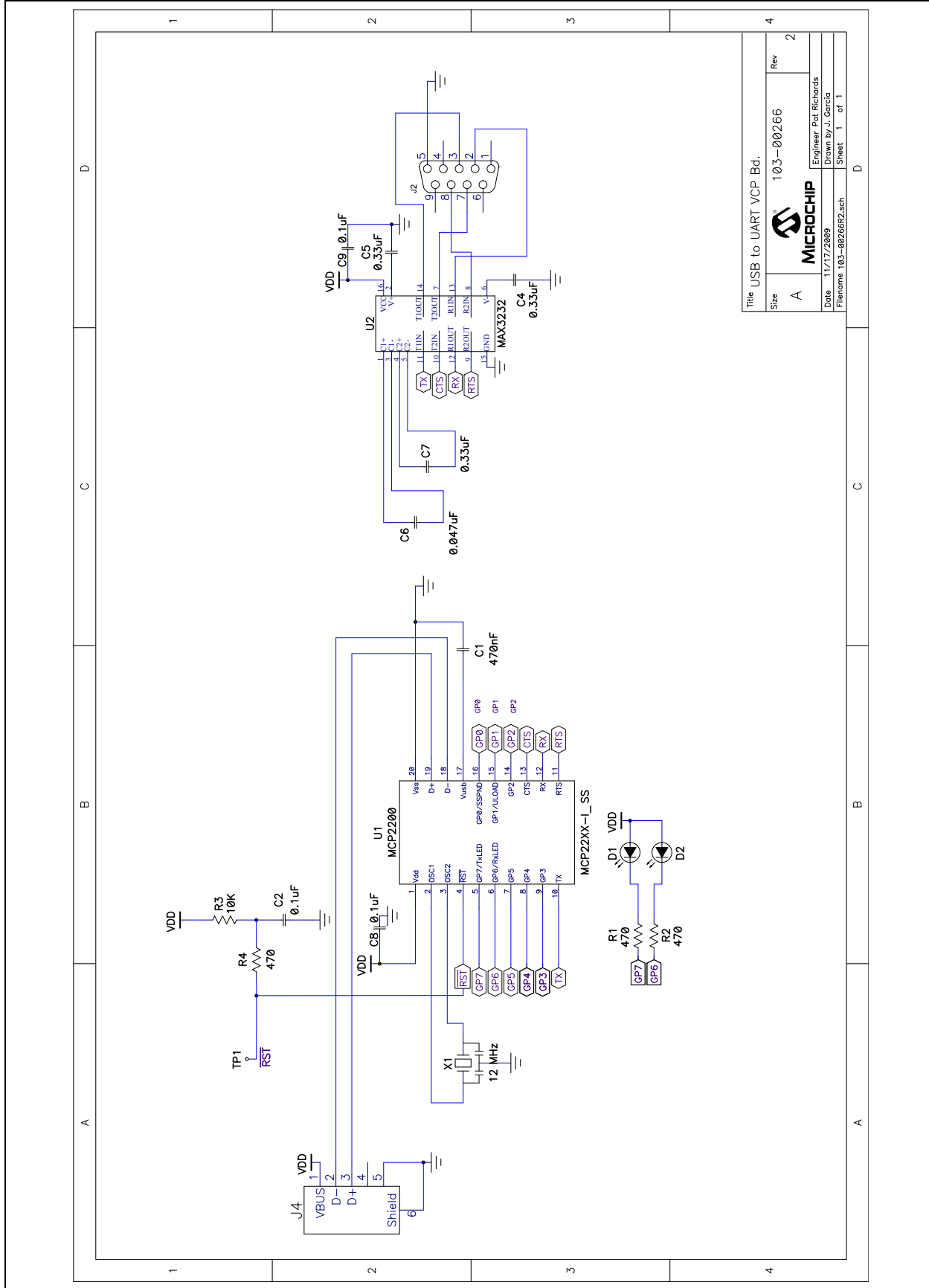
A.3   BOARD – TOP COPPER, SILK AND PADS

A.4   BOARD – TOP COPPER AND PADS

A.5   BOARD – TOP SILK AND PADS
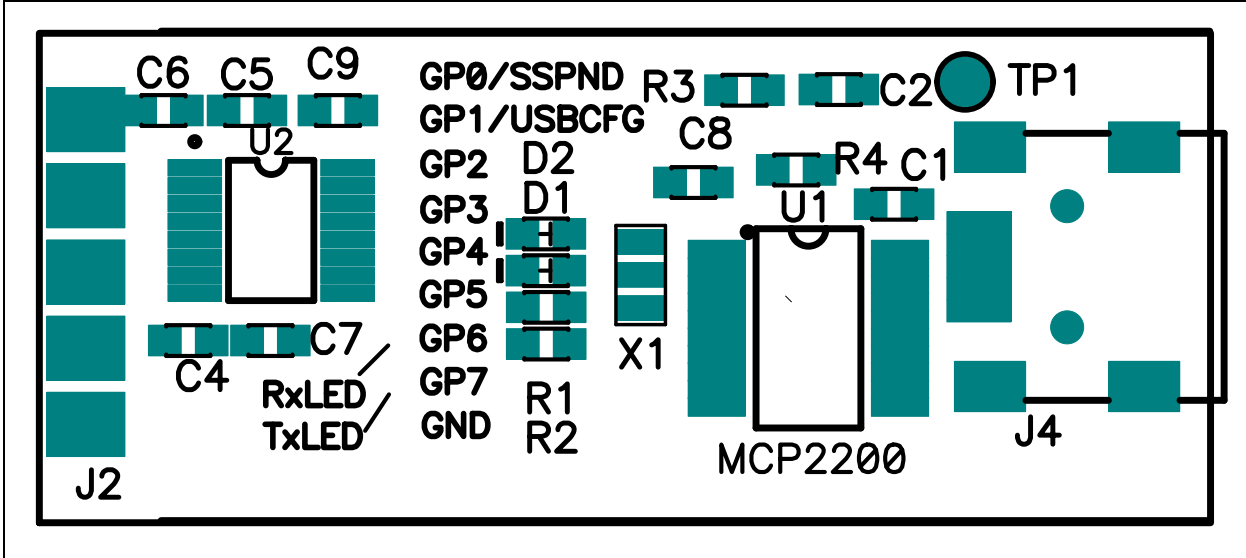
A.6   BOARD – BOTTOM COPPER AND PADS
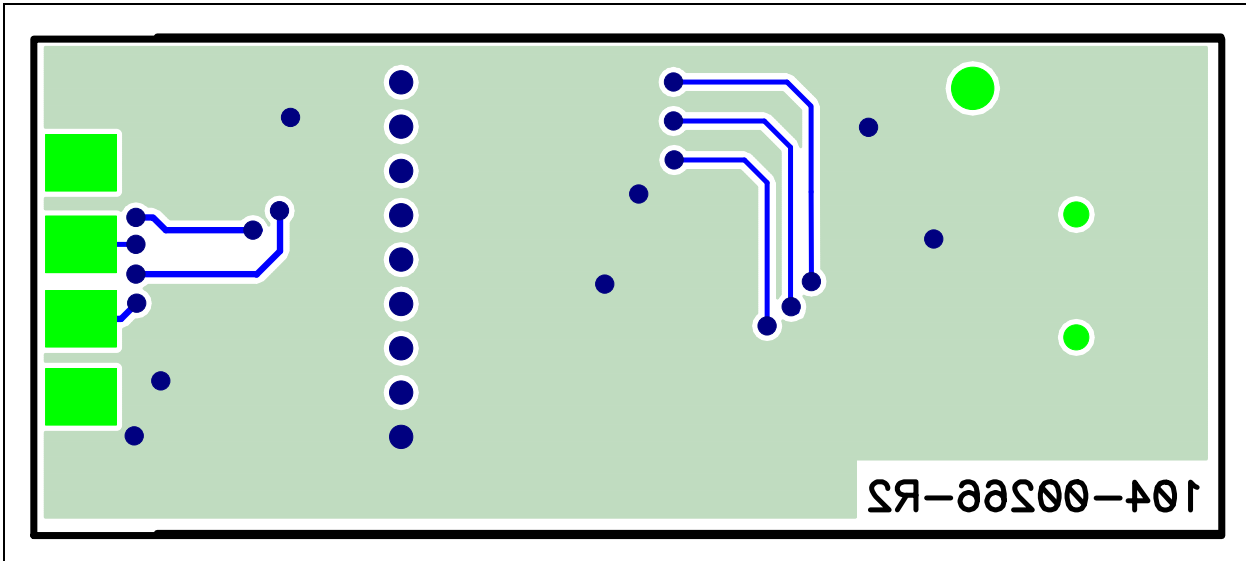
Appendix B. Bill of Materials (BOM)

TABLE B-1:   BILL OF MATERIALS

Qty	Reference	Description	Manufacturer	Part Number
1	C1	CAP CER .47UF 16V X7R 0603	Murata Electronics North America	GRM188R71C474KA88D
3	C2, C8, C9	CAP .1UF 16V CERAMIC X7R 0603	Panasonic – ECG	ECJ-1VB1C104K
3	C4, C5, C7	CAP .33UF 10V CERAMIC X5R 0603	Panasonic – ECG	ECJ-1VB1A334K
1	C6	CAP 47000PF 16V CERM X7R 060	Panasonic – ECG	ECJ-1VB1C473K
2	D1, D2	LED RED CLEAR 0603 SMD	Lite-On Inc	LTST-C190CKT
1	J2	CONN DB9 MALE SOLDER CUP NICKEL	Norcomp Inc.	171-009-103L001
1	J4	CONN MINI USB RCPT RA TYPE B SMD	Tyco Electronics	1734035-2
1	PCB	RoHS Compliant Bare PCB, MCP2200 USB to RS-232 Demo Board	—	104-00226
3	R1, R2, R4	RES 470 OHM 1/10W 5% 0603 SMD	Panasonic – ECG	ERJ-3GEYJ471V
3	R1, R2, R4	RES 470 OHM 1/10W 5% 0603 SMD	Panasonic – ECG	ERJ-3GEYJ471V
1	R3	RES 10K OHM 1/10W 5% 0603 SMD	Panasonic – ECG	ERJ-3GEYJ103V
1	U1	MCP2200 USB to UART Serial Converter	Microchip Technology Inc.	MCP2200-I/SS
1	U2	IC LINE DRVR/RCVR RS-232 16-TSSOP	Texas Instruments	SN75C3232EPWR
1	X1	RESONATOR 12.0MHZ CERAMIC	Murata Electronics North America	CSTCE12M0G15L99-R0

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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