



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

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rPIC and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MXDEV, MXLAB, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Octopus, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICKit, PICtail, REAL ICE, rLAB, Select Mode, Total Endurance, TSHARC, UniWinDriver, WiperLock and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

All other trademarks mentioned herein are property of their respective companies.

© 2010, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

ISBN: 978-1-60932-147-5

Microchip received ISO/TS-16949:2002 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949:2002 ==**



MCP2200 USB TO RS-232 DEMO BOARD USER'S GUIDE

Table of Contents

| | |
|---|-----------|
| Preface | 5 |
| Chapter 1. Product Overview | |
| 1.1 Introduction | 9 |
| 1.2 What is the MCP2200 USB to RS-232 Demo Board? | 9 |
| 1.3 MCP2200 USB to RS-232 Demo Board Kit Contents | 9 |
| Chapter 2. MCP2200 USB to RS-232 Demo Board | |
| 2.1 Introduction | 11 |
| 2.2 Setup | 11 |
| 2.3 Operation | 12 |
| Appendix A. Schematic and Layouts | |
| A.1 Introduction | 15 |
| A.2 Board – Schematic | 16 |
| A.3 Board – Top Copper, Silk and Pads | 17 |
| A.4 Board – Top Copper and Pads | 17 |
| A.5 Board – Top Silk and Pads | 18 |
| A.6 Board – Bottom Copper and Pads | 18 |
| Appendix B. Bill of Materials (BOM) | |
| Worldwide Sales and Service | 20 |

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

NOTES:



MCP2200 USB TO RS-232 DEMO BOARD USER'S GUIDE

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 "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 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 | <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 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:

- **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

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- 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://support.microchip.com>

DOCUMENT REVISION HISTORY

Revision A (April 2010)

- Initial Release of this Document.

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

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)

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

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

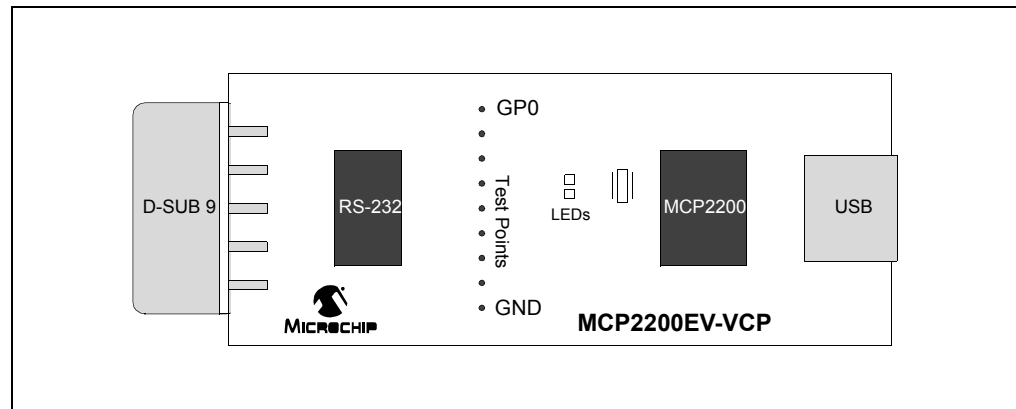
2.2 SETUP

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



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

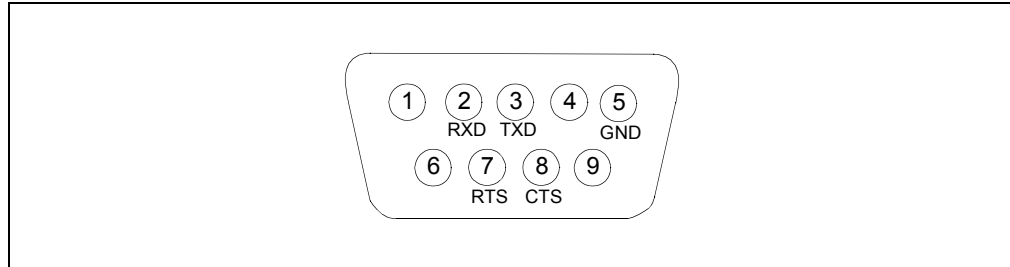
2.3 OPERATION

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.

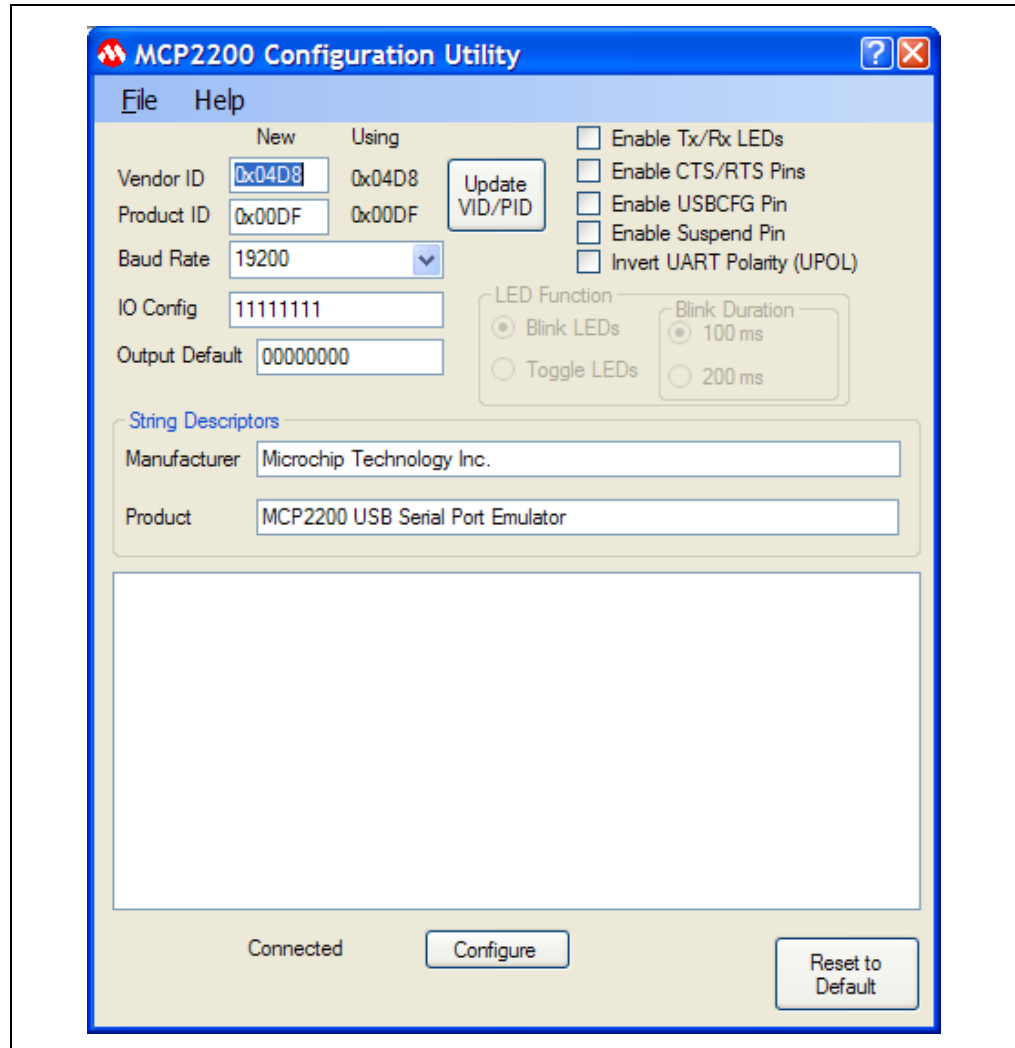
String Descriptors: Here you can enter custom Manufacturer and Product string descriptors.

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.

MCP2200 USB to RS-232 Demo Board

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



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

NOTES:



MCP2200 USB TO RS-232 DEMO BOARD USER'S GUIDE

Appendix A. Schematic and Layouts

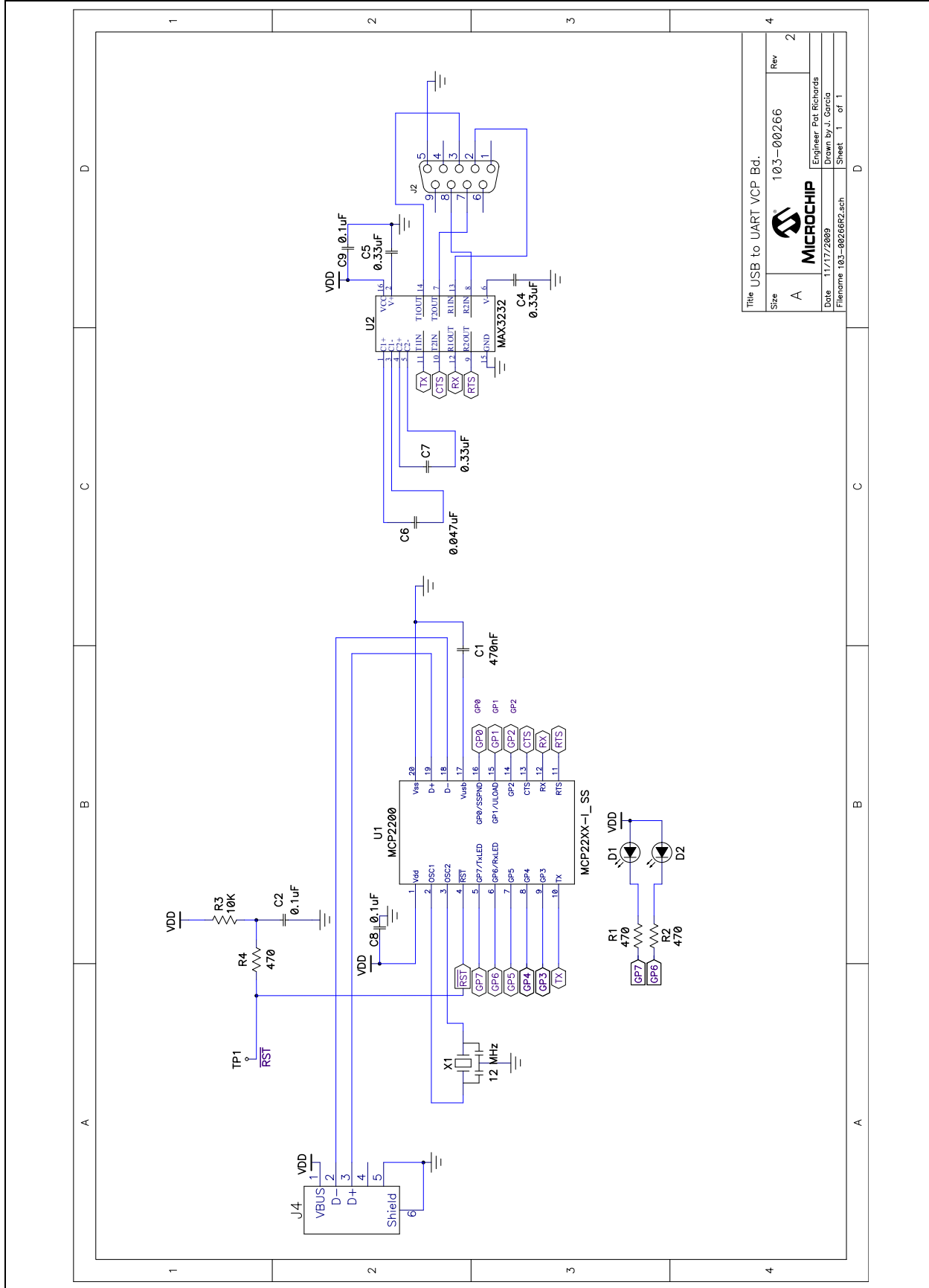
A.1 INTRODUCTION

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

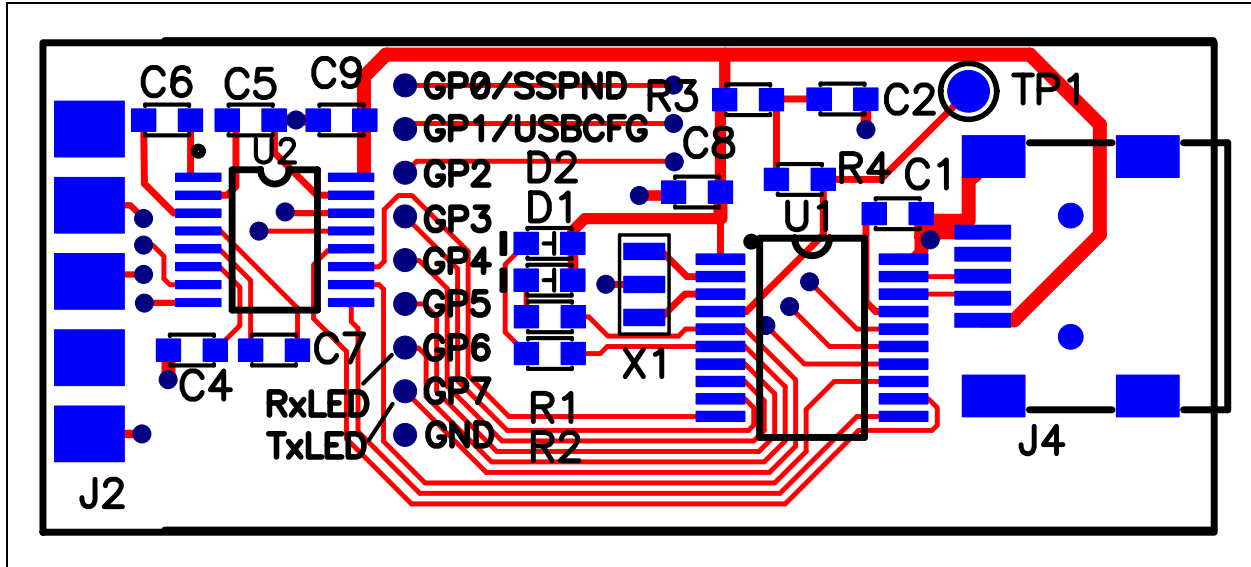
MCP2200 USB to RS-232 Demo Board User's Guide

A.2 BOARD – SCHEMATIC

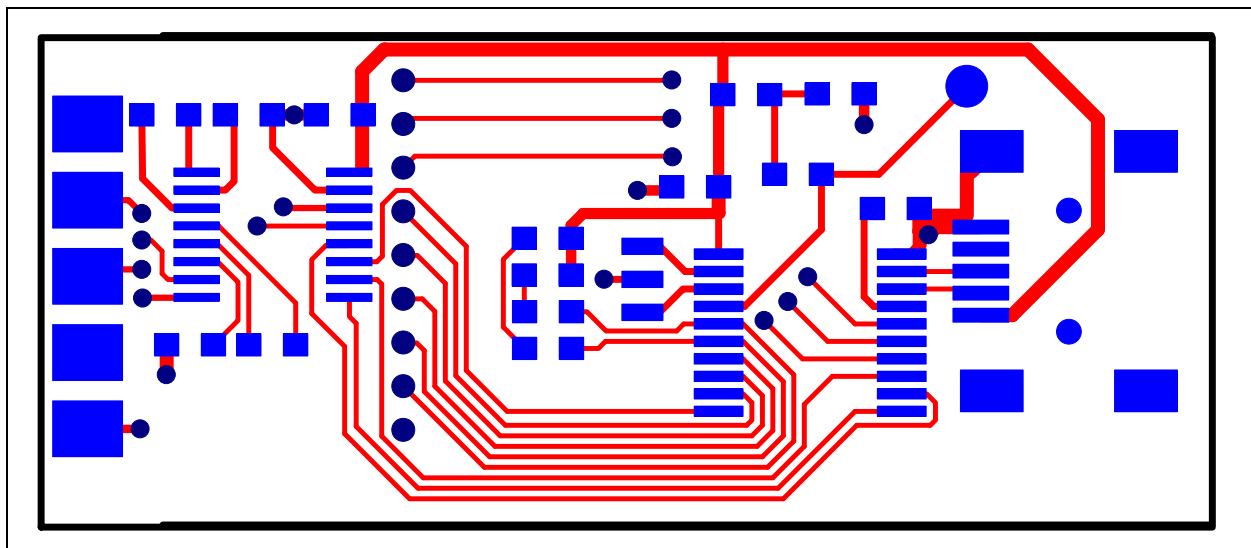


| | |
|----------------------------|------------------------|
| Title: USB to UART VCP Bd. | |
| Size: A | Rev: 2 |
| MICROCHIP | |
| Date: 11/17/2009 | Engineer: Pat Richards |
| Filename: 103-002662.sch | Drawn by: J. Garcia |
| | Sheet: 1 of 1 |

A.3 BOARD – TOP COPPER, SILK AND PADS

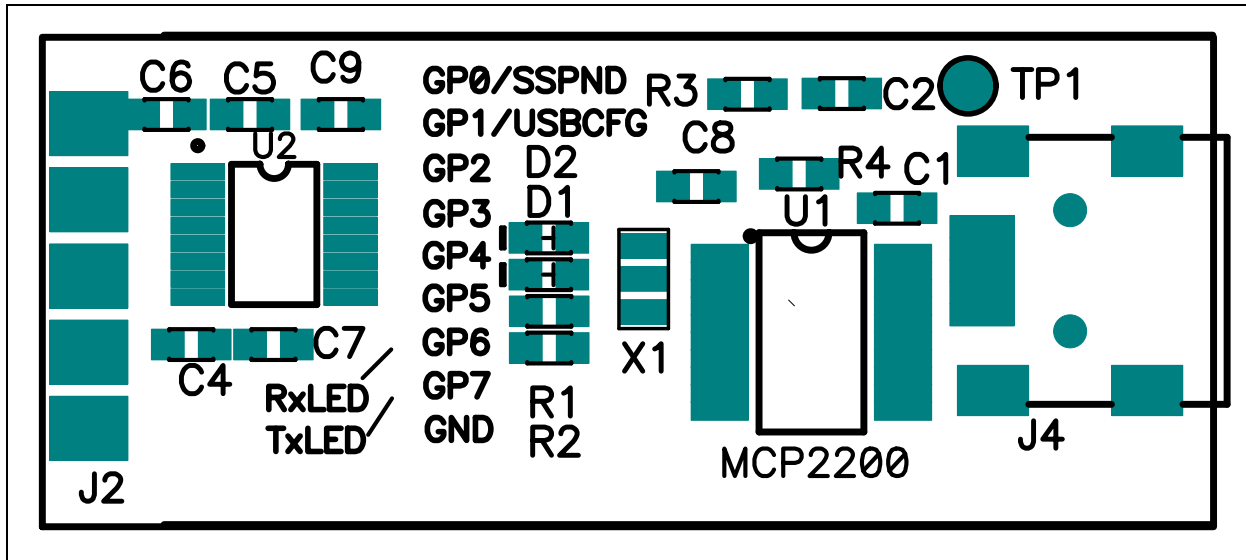


A.4 BOARD – TOP COPPER AND PADS

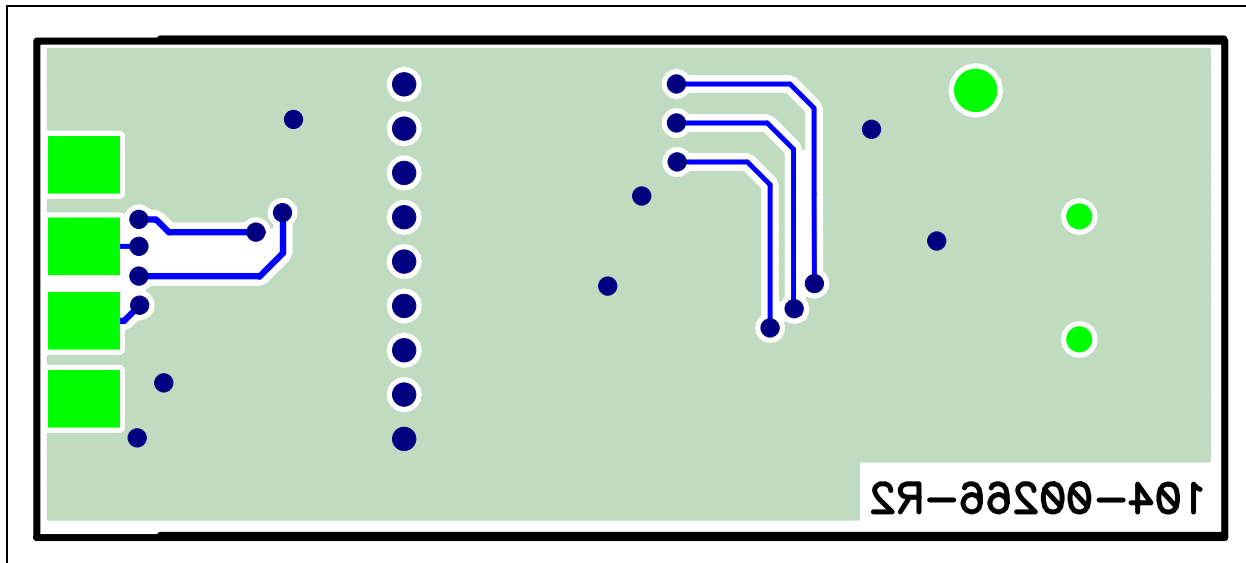


MCP2200 USB to RS-232 Demo Board User's Guide

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.



WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://support.microchip.com>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

Kokomo
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

Santa Clara
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8528-2100
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hong Kong SAR
Tel: 852-2401-1200
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8203-2660
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Yokohama
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-6578-300
Fax: 886-3-6578-370

Taiwan - Kaohsiung
Tel: 886-7-536-4818
Fax: 886-7-536-4803

Taiwan - Taipei
Tel: 886-2-2500-6610
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820

01/05/10