

MCP2120/22
Developer's 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in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates.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, rfPIC 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, ICEPIC, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, nanoWatt XLP, Omniscient Code Generation, PICC, PICC-18, PICKit, PICDEM, PICDEM.net, PICtail, PIC³² logo, REAL ICE, rfLAB, Select Mode, Total Endurance, TSHARC, 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.

© 2009, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

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

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.



MCP2120/22 DEVELOPER'S BOARD USER'S GUIDE

Table of Contents

Preface	1
Introduction.....	1
Document Layout	2
Conventions Used in this Guide	3
Recommended Reading.....	4
The Microchip Web Site	4
Customer Support	4
Document Revision History	4
Chapter 1. Product Overview	5
1.1 Introduction And Highlights	5
1.2 What is the MCP2120/22 Developer's Board?	5
1.3 MCP2120/22 Developer's Board Features	6
1.4 PC Requirements	14
1.5 What the MCP2120/22 Developer's Board Kit includes:	14
Chapter 2. Installation and Operation	15
2.1 Introduction	15
2.2 The Demo System	16
2.3 MCP212XDM Demos	20
Appendix A. Schematic and Layouts	33
A.1 Introduction	33
A.2 Board - Schematic	34
A.3 Board - Top Silk and Pads	35
A.4 Board - Top Layer plus Silk and Pads	36
A.5 Board - Bottom Layer	37
A.6 Board - Power Layer	38
A.7 Board - Ground Layer	39
Appendix B. Bill Of Materials (BOM)	41
Appendix C. Board Testing	45
C.1 What is Tested	45
C.2 What is NOT Tested	45
Appendix D. Configuring the HyperTerminal® Program	47
D.1 Configuring the Hyperterminal® Program	47
Appendix E. Continuously Transmitted Data Table	51
Appendix F. Programming the MCP212XDM	53
Worldwide Sales and Service	54

MCP2120/22 Developer's Board User's Guide

NOTES:



MCP2120/22 DEVELOPER'S 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 MCP2120/22 Developer's 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

MCP2120/22 Developer's Board User's Guide

DOCUMENT LAYOUT

This document describes how to use the MCP2120/22 Developer's Board. The manual layout is as follows:

- **Chapter 1. "Product Overview"** – Important information about the MCP2120/22 Developer's Board.
- **Chapter 2. "Installation and Operation"** – Includes instructions on how to get started with this user's guide and a description of the user's guide.
- **Appendix A. "Schematic and Layouts"** – Shows the schematic and layout diagrams for the MCP2120/22 Developer's Board.
- **Appendix B. "Bill Of Materials (BOM)"** – Lists the parts used to build the MCP2120/22 Developer's Board.
- **Appendix C. "Board Testing"** – Discusses what is and is not tested on the MCP2120/22 Developer's Board.
- **Appendix D. "Configuring the HyperTerminal® Program"** – Gives aid in the configuration of the HyperTerminal application.
- **Appendix E. "Continuously Transmitted Data Table"** – Shows the data table that the MCP2120/22 Developer's Board transmits.
- **Appendix F. "Programming the MCP212XDM"** – Gives information to assist in the programming of the MCP2120/22 Developer's Board.

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) { ... }

MCP2120/22 Developer's Board User's Guide

RECOMMENDED READING

This user's guide describes how to use MCP2120/22 Developer's Board. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

MCP2120 Data Sheet, "Infrared Encoder/Decoder", DS21618

MCP2122 Data Sheet, "Infrared Encoder/Decoder", DS21894

These data sheets provide detailed information regarding the MCP2120 and MCP2122 product families.

You can also find important information in the following Microchip documents:

- **AN946 - "Interfacing the MCP2122 to the Host Controller", DS00946.**
- **AN923 - "Using the MCP2120 Developer's Board for IR Sniffing", DS00923.**
- **AN756 - "Using the MCP2120 for Infrared Communications", DS00756.**
- **TB073 - "Selecting an MCP21xx Device for IrDA Applications", DS91073.**

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 (June 2009)

- Initial Release of this Document.



MCP2120/22 DEVELOPER'S BOARD USER'S GUIDE

Chapter 1. Product Overview

1.1 INTRODUCTION AND HIGHLIGHTS

This chapter provides an overview of the MCP2120/22 Developer's Boards' features, the system configurations that they can be used in and the system requirements for the tutorials.

Items discussed in this chapter are:

- What is the MCP2120/22 Developer's Board?
- MCP2120/22 Developer's Board Features
- PC Requirements
- What the MCP2120/22 Developer's Board Kit includes:

1.2 WHAT IS THE MCP2120/22 DEVELOPER'S BOARD?

The MCP2120/22 Developer's Board allows for the easy demonstration and development of IrDA applications. The board can be powered via USB or the power test points (VDD and GND). When using the power test points, if JP2 is shorted, the voltage must not exceed the PIC18F65J50 voltage specification.

The preprogrammed PIC18F65J50 firmware generates the MCP2122's clock. The Host interface can be connected to the UART driver device (for IrDA to UART operation), for communication over the DB-9 connector or connected to the PIC18F65J50 for stand alone operation.

The USB interface signals are fully connected to the PIC18F65J50. So programs can be created where the PIC18F65J50 can communicate to the USB Host and to the MCP2122. This would allow the board to be used as an IrDA to USB converter.

MCP2120/22 Developer's Board User's Guide

1.3 MCP2120/22 DEVELOPER'S BOARD FEATURES

The MCP2120/22 Developer's Board has five functional blocks. These are:

- Power
- Host Microcontroller
- MCP212X Device (MCP2120 or MCP2122)
- Optical Transceiver circuitry
- RS-232 circuitry/interface

The MCP2120/22 Developer's Board power can come from either the USB connection or the power test points. The USB power is regulated to 3.3V, due to requirements from the PIC18F65J50. To allow the other circuitry to operate at higher voltages, the MCP2120/22 Developer's Board has two power planes. One for the PIC18F65J50 circuitry and the other for the MCP2120/22/Optical Transceiver/RS-232 Driver circuitry. An LED is used to indicate when power is applied to the MCP2120/22/Optical Transceiver/RS-232 Driver circuitry. A jumper (JP2) is used to tie the two power planes together.

The Host Microcontroller (PIC18F65J50) can be used to drive the MCP2120/22 clock. That is what the default firmware does for both demo programs. This clock can be disconnected from the MCP2120/22, and a standard crystal can be used. The Host Controller can be programmed via the ICSP interface with user developed programs.

CAUTION

The PIC18F65J50 has a maximum operational voltage of 3.6V. If the MCP2120/22 Developer's Board is powered by the VDD and GND Test Points, then care must be taken to ensure that the PIC18F65J50 is not over voltaged. The PIC18F65J50 can be isolated from the MCP2120/22's power plane by removing the jumper shunt on jumpers JP1 and JP2.

The MCP2120/22DM has the MCP2122 device is mounted in a DIP socket. An SOIC footprint is supplied if testing with an SOIC device is desired.

The board supports up to four optical transceivers circuit implementations. Two implementations share the same general circuit layout. Only one optical transceiver circuit is installed at the time of manufacture. The others are for user implementation and evaluation. Jumpers are used to select the optical transceiver that is used by the system.

A MAX3238 compatible level-shifting IC with all the necessary hardware to support connection of a RS-232 host through the DB-9 connector. The port can be connected to a PC using a straight through cable. Refer to the MCP2122 Data Sheet (DS21894) or MCP2120 Data Sheet (DS21618) for more information on the Host Interface signals.

The MCP2120/22 Developer's Board, as shown in Figure 1-1, has the following hardware features:

1. Mini USB connector (for powering the board).
2. Onboard +3.3V regulator for powering PIC18F65J50.
3. Hooks for an external regulated DC supply.
4. Jumper to isolate PIC18F65J50 power signal from the rest of board power. This allows the board to operate at voltages higher than 3.3V.
5. DB-9 connector and associated hardware for direct connection to MCP2120 or MCP2122 UART (DB-9 interface requires RS-232 signal levels).
6. Twelve-pin header connection to Host UART interface.
7. Four jumpers (3-pin) to select source of UART signals. Either DB-9 connector or the PIC18F65J50.
8. External Clock (from PIC18F65J50's ECCP1 pin) Jumper.
9. Green power-on indicator LED.
10. Implemented IR transceiver circuit (two optional optical transceiver circuits implemented but not populated).
11. Reset switch for PIC18F65J50 device.
12. ICSP Header for PIC18F65J50.
13. Jumper option for PIC18F65J50 program selection (not installed).
14. PIC18F65J50 crystal.
15. MCP2120 crystal socket .
16. Jumper to select source of MCP2120/22 Reset signal.
17. Jumper to select source of MCP2120 MODE signal.
18. MCP2120/22 SOIC and DIP Footprints (DIP package is the default installation).

Note: A schematic of the MCP2120/22 Developer's Board is shown in **Section A.2 "Board - Schematic"**

1.3.1 Selecting Clock Source, Power Source, and Optical Transceiver Interface Jumper Descriptions

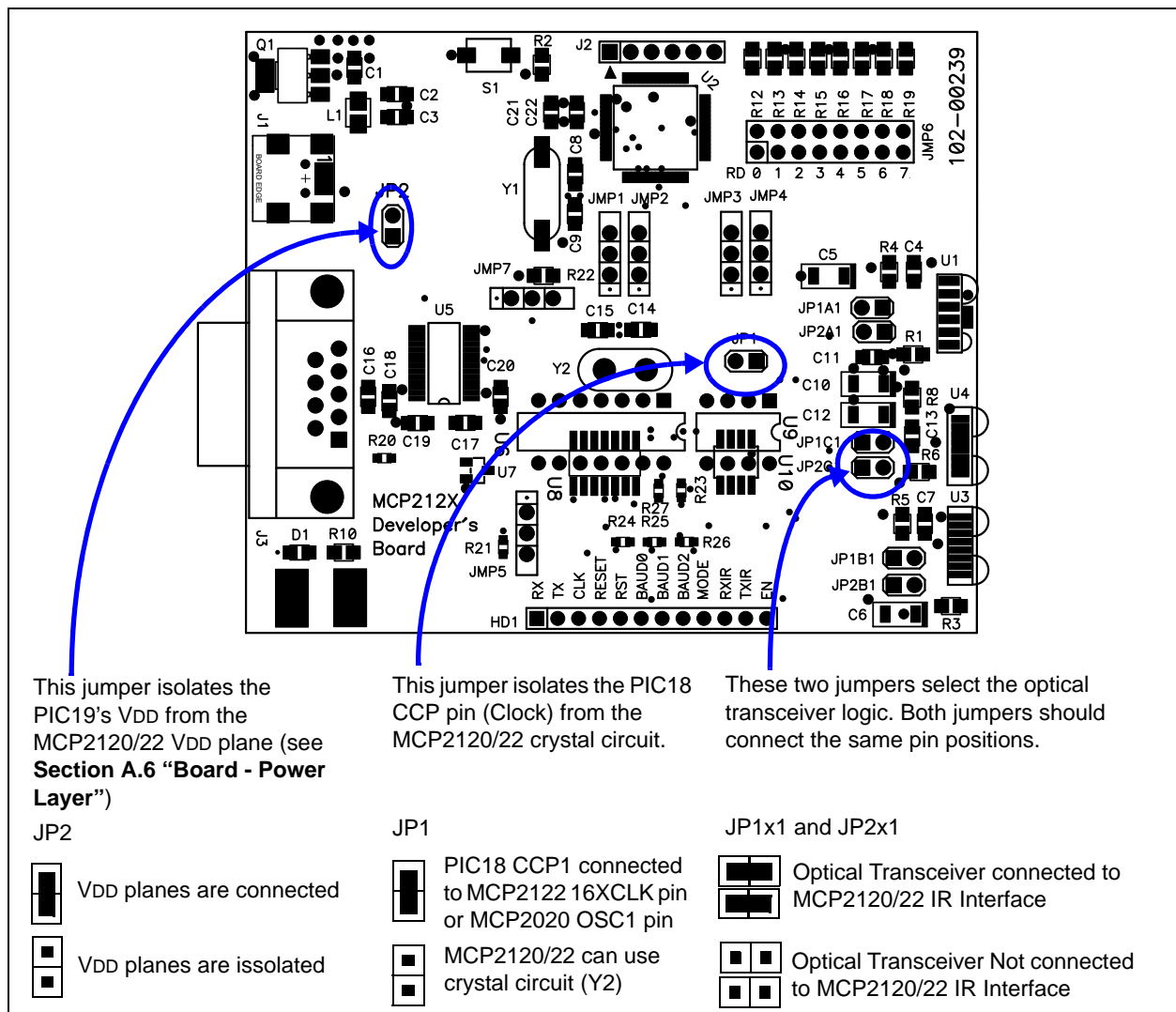
Figure 1-2 shows the jumpers used to control the clock source, the power source, and the optical transceiver used.

Jumper JP1 connects the generated clock signal from the PIC18F65J50's ECCP1 pin to the MCP2120's OSC2 pin. This allows the board not to need the MCP2120's crystal circuitry.

Jumper JP2 connects the board's two power planes. The MCP2120/22 Developer's Board has a power plane for the PIC18F65J50 and related circuitry, and a second power plane for all other circuitry. Removing the jumper allows the MCP2120/22 portion to operate through the full voltage range of the MCP2120 (2.5V to 5.5V) or MCP2122 (1.8V to 5.5V). When JP2 is connected, then the maximum voltage is restricted to the maximum voltage of the PIC18F65J50 device (3.6V). See A.6 "Board - Power Layer" for the power plane layout.

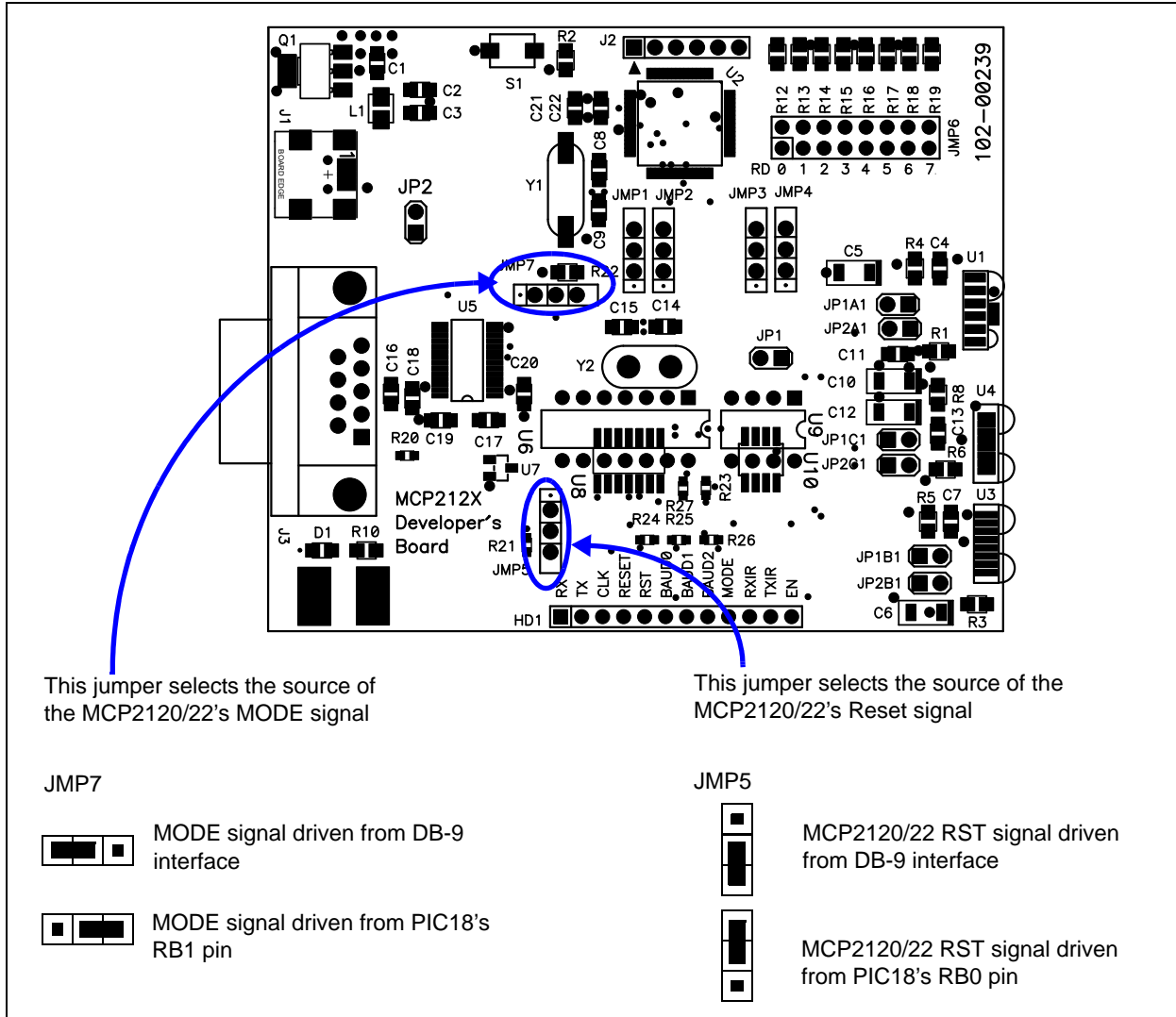
Jumpers JP1C1 and JP2C1 are used to connect the default installed optical transceiver to the MCP2120/22's RXPD and TXIR pins. There are footprints for two other optical transceiver implementations. If either of those implementations are installed, then the jumpers may be switched to the desired optical transceiver.

FIGURE 1-2: MCP2120/22 SELECTING SOURCES



MCP2120/22 Developer's Board User's Guide

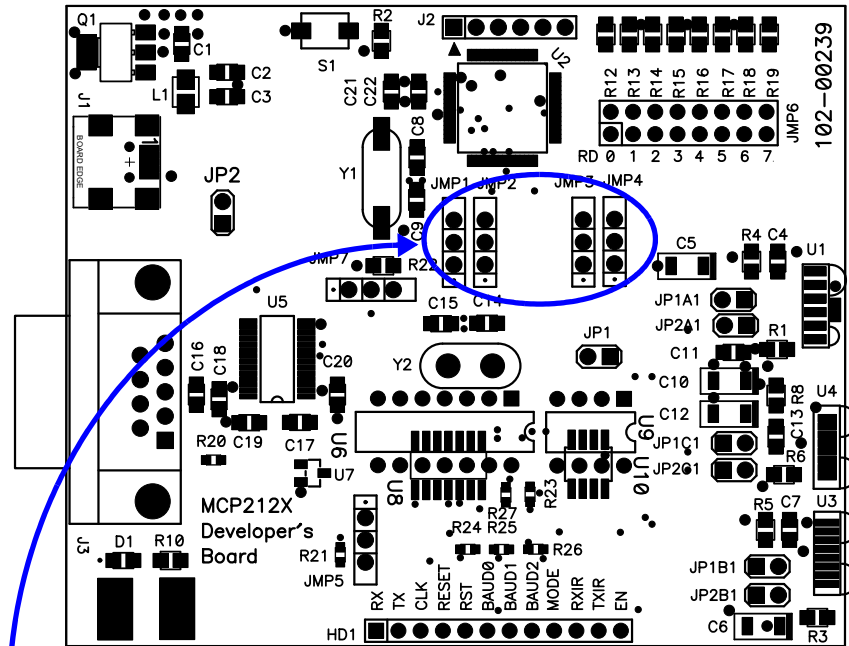
FIGURE 1-3: MCP2120/22 CONTROL SIGNALS



1.3.2 Host UART Interface Connection Jumper Descriptions

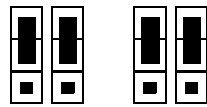
Figure 1-4 shows the five jumpers used to control the connection of the MCP2120/22's Host UART signals.

FIGURE 1-4: MCP2120/22 HOST UART INTERFACE CONNECTION

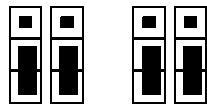


These four jumpers connect the MCP2120/22's Host UART Signals to either the PIC18F65J50 or the UART Driver device (U5)

JMP1:JMP2:JMP3:JMP4:JMP5



MCP2120/22 Host UART Signals connected to PIC18F65J50



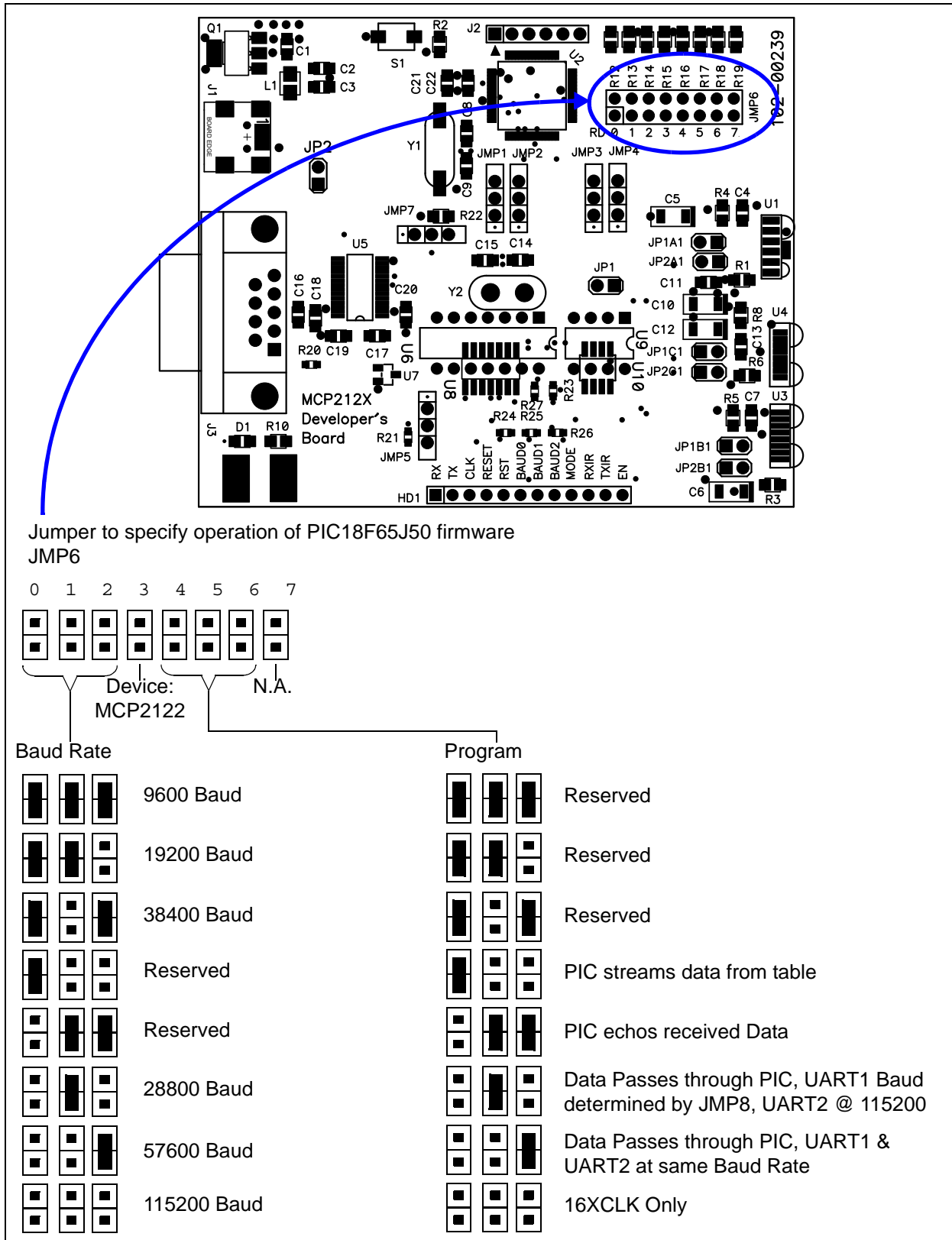
MCP2120/22 Host UART Signals connected to UART Driver (U5)

MCP2120/22 Developer's Board User's Guide

1.3.3 Firmware Program Jumper Descriptions for MCP2122

Figure 1-5 shows the MCP2122 JMP6 program setting for the MCP2120/22 board.

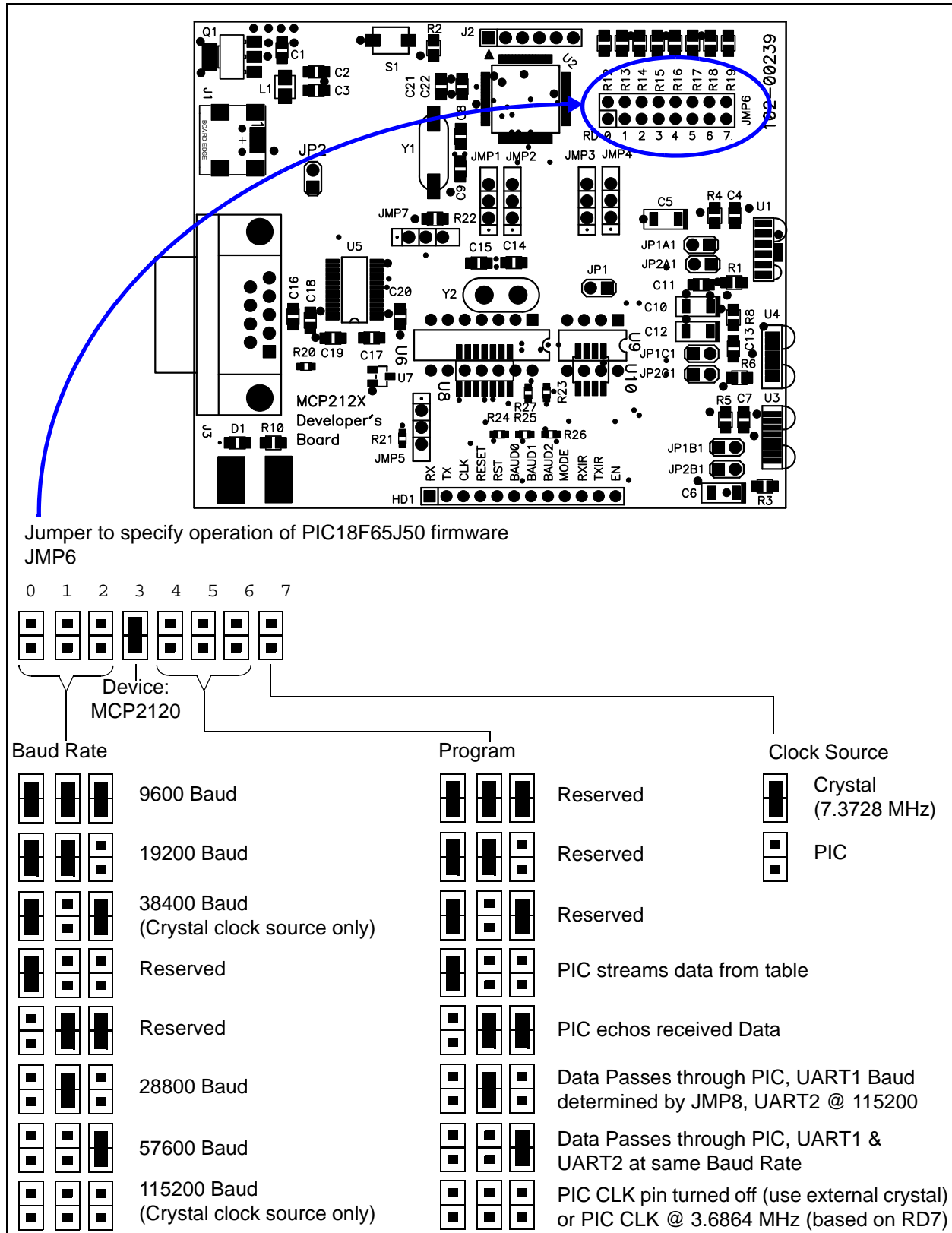
FIGURE 1-5: MCP2122 JMP6 FIRMWARE OPERATION



1.3.4 Firmware Program Jumper Descriptions for MCP2120

Figure 1-5 shows the MCP2120 JMP6 program setting for the MCP2120/22 DM board.

FIGURE 1-6: MCP2120 JMP6 FIRMWARE OPERATION



MCP2120/22 Developer's Board User's Guide

1.4 PC REQUIREMENTS

The PC used has four main requirements. These are:

1. Standard serial port
2. USB port (to power the MCP2120/22 Developer's Board)
3. Terminal emulation program (such as HyperTerminal)
4. IrDA standard driver installed, which treats the IR port as a virtual serial port

A non-legacy-free Intel® compatible model with Windows Operating System (OS) would meet these requirements. The Windows® OS includes a terminal emulation program called Hyperterminal. **Section D.1 "Configuring the Hyperterminal® Program"** shows instructions to configure Hyperterminal and demonstrate the developer's board.

1.4.1 The PC with IR Port

A PC with IR Port can be configured to operate as an encoder/decoder. This User's Guide will not get into implementing this type of system due to the uniqueness of each PC's drivers.

1.5 WHAT THE MCP2120/22 DEVELOPER'S BOARD KIT INCLUDES:

This MCP2120/22 Developer's Board kit includes:

- MCP2120/22 Developer's Board, 102-00239

NOTICE

The Kits no longer ship with CD-ROMs. Any other material is available for download from the Developments Boards product page. This material can include such items as:

- User's Guide
- Firmware
- GUI programs
- Schematic Capture and PCB Layout files

Chapter 2. Installation and Operation

2.1 INTRODUCTION

To demonstrate the operation of the MCP2120/22 Developer's Board, a second Encoder/Decoder board (MCP212XDM, MCP212XEV-DB plus PICDem Board, or the MCP2120 Developer's Board from the MCP2120/50 Developer's Kit (DM163008)) is required.

The MCP2120/22 Developer's Board default firmware program can be used with either the MCP2122 (default device) or the MCP2120. The MCP2122 uses the PIC's PWM pin to generate the 16XCLK signal. If the MCP2120 is used, the program will either source a 3.6864 MHz clock or the MCP2120 will use an external crystal (not installed). The program expects the crystal frequency to be 7.3728 MHz.

Although the MCP212XDM board supports many operational configurations, only a few will be described. The other modes are left for the customer to experiment with. The configurations described are:

- Demo #1 Operation - Direct IR / UART (DB-9) Mode
- Demo #2 Operation - Echo Character Received (Change Case)
- Demo #3 Operation - Data Stream Mode
- Demo #4 Operation - Pass Through Mode 1

The component layout floor plan of the MCP2120/22 Developer's Board (MCP2120/22DM) PCB is shown in Figure 2-1 while Table 2-1 shows the hardware requirements to demonstrate the MCP2120/22 Developer's Board.

TABLE 2-1: DEMO SYSTEM HARDWARE REQUIREMENTS

Qty	Hardware	Purpose
2 ⁽¹⁾	PC with: a) One serial port to communicate to the MCP2120/22 Developer's Board. b) One USB port to power the MCP2120/22 Developer's Board	Each MCP2120/22 Developer's Board is an encoder/decoder and can "talk" to the PC's UART port. The PC's USB port will power the MCP2120/22 Developer's Board. Also: Each PC's UART port will "talk" with the MCP2120/22's UART interface. The PC will run two instances of HyperTerminal, one connected to each of the PC's serial ports (UARTs).
2	Serial Cable	To connect the PC serial ports to the MCP2120/22 Developer's Board serial port.
2	USB Cable	To power the MCP2120/22 Developer's Board from the PC's USB port.
2	MCP2120/22 Developer's Board	These are the units to program and test.

Note 1: Depending on the features of the PC, only one PC may be required. The PC would be required to have two Serial Ports (UARTs) and two USB ports (see Figure 2-1).

Note: To keep the board's cost low, only a portion of the MCP2120/22 Developer's Board is tested. This test covers the major portions of the system. The portions that are and are not tested are shown in **Appendix C. "Board Testing"**.

MCP2120/22 Developer's Board User's Guide

2.2 THE DEMO SYSTEM

The demo system setup requires two encoder/decoders. This can be two MCP2120/22 Developer's Boards or one MCP2120/22 Developer's Board and another encoder/decoder device (such as an USB to IR port dongle with appropriate drivers).

The MCP2120/22 Developer's Board can be powered by one of two sources:

- The USB sourced power
- The Power supply test points

For the demo descriptions, the board will be powered via USB. So a PC with an UART and USB port is required. The USB voltage is regulated to 3.3V, due to the PIC18 device's voltage operating range. The PIC18 generates the clock for the MCP2120/22.

This developer's board can be configured to pass data between the IR interface and the UART interface or to act as a stand alone embedded system.

There are four step by step descriptions for the MCP2120/22 Developer's Board demos. These are:

- Demo #1 Operation - Direct IR / UART (DB-9) Mode
- Demo #2 Operation - Echo Character Received (Change Case)
- Demo #3 Operation - Data Stream Mode
- Demo #4 Operation - Pass Through Mode 1

2.2.1 The PIC18F65J50 Firmware

The PIC18F65J50 firmware program operation is determined by the state of the JMP6 header. See Figure 1-5 and Figure 1-6 for selecting the different programs. Also the signal routing jumper headers need to be properly configured to ensure that the signals to/from the sources/destinations are proper for the selected firmware operation.

The firmware may also generate a clock source which will be used by the MCP2122 and can be used by the MCP2120.

Table 2-2 shows the state of the MODE7, MODE3 and MODE2:0 signals which are used to create the clock source for the MCP2120/22 device.

Table 2-3 shows the state of the MODE7, MODE3 and MODE6:4 signals which are used to specify the program that will be executed.

If the device is the MCP2120, then three output signals will control the state of the MCP2120's BAUD2:0 pins to control the MCP2120's baud rate.

All the other I/O pins will either be left as an input so not to conflict with other signals, or will be configured as an output and driven high or low.

Note: The connectivity of these PIC18F65J50 signals to the MCP2120/22 is dependant on the configuration of the Jumpers JP1 and JMP1 through JMP5.

Installation and Operation

TABLE 2-2: MCP2122 AND MCP2120 BAUD RATE SELECTION

MODE			PWM Frequency	MCP2122 Baud	MCP2120 Baud	Comment
7	3	2:0				
X	1	1 1 1	1,843,200	115,200	Note 1	Designed for use with MCP2122 only
		1 1 0	921,600	57,600	Note 1	Designed for use with MCP2122 only
		1 0 1	460,800	28,800	Note 1	Designed for use with MCP2122 only
		1 0 0	—	Reserved	Note 1	Designed for use with MCP2122 only
		0 1 1	—	Reserved	Note 1	Designed for use with MCP2122 only
		0 1 0	614,400	38,400	Note 1	Designed for use with MCP2122 only
		0 0 1	307,200	19,200	Note 1	Designed for use with MCP2122 only
		0 0 0	153,600	9,600	Note 1	Designed for use with MCP2122 only
1	0	1 1 1	3.6864 MHz	230,400 (Note 3)	Reserved	
		1 1 0			57,600	MCP2120's BAUD2:0 pins = "1 0 0".
		1 0 1			Reserved	
		1 0 0			Reserved	
		0 1 1			Reserved	
		0 1 0			38,400	MCP2120's BAUD2:0 pins = "0 1 0".
		0 0 1			19,200	MCP2120's BAUD2:0 pins = "0 0 1".
		0 0 0			9,600	MCP2120's BAUD2:0 pins = "0 0 0".
0	0	1 1 1	0 MHz	Note 4	115,200	MCP2120's BAUD2:0 pins = "1 0 0". (Note 2)
		1 1 0			57,600	MCP2120's BAUD2:0 pins = "0 1 1". (Note 2)
		1 0 1			Reserved	
		1 0 0			Reserved	
		0 1 1			Reserved	
		0 1 0			38,400	MCP2120's BAUD2:0 pins = "0 1 0". (Note 2)
		0 0 1			19,200	MCP2120's BAUD2:0 pins = "0 0 1". (Note 2)
		0 0 0			9,600	MCP2120's BAUD2:0 pins = "0 0 0". (Note 2)

Legend: X = Undefined (either "1" or "0").

- Note 1:** Baud rate would be dependant on the state of the MCP2120's BAUD2:0 pins.
- 2:** A 7.3728 MHz external crystal must be used.
- 3:** This exceeds the device's maximum specification.
- 4:** The MCP2122 16XCLK signal is static.

MCP2120/22 Developer's Board User's Guide

TABLE 2-3: MCP212XDM FIRMWARE PROGRAM SELECTION

MODE			Program	Comment
7	3	6:4		
0	1	1 1 1	Generate Clock only (determined by RD0:RD2)	MCP2122 uses PIC 16XCLK
	0		No Clock Generation	MCP2120 uses Crystal
1	1		Generate Clock only (determined by RD0:RD2)	MCP2122 uses PIC 16XCLK
	0		Generate Clock only (@ 3.6864 MHz)	MCP212x uses PIC Clock
X	X	1 1 0	Pass Data Through (UART1 <--> UART2)	
		1 0 1	Pass Data Through (UART1 --> UART2) with UART2 fixed at 115,200 Baud	
		1 0 0	Echo Data Received and change case (A --> a, a --> A)	
		0 1 1	Stream a Data Table	See Appendix E.
		0 1 0	RESERVED	
		0 0 1	RESERVED	
		0 0 0	RESERVED	

Legend: X = Undefined (either "1" or "0").

2.2.1.1 FIRMWARE OPERATION - Generate Clock only (determined by RD0:RD2)

The PIC firmware reads the state of the RD7 and RD3 signals. If the signals indicate that the device is the MCP2120 and to use the PIC as the clock source, then the PIC will source a frequency that is determined by the RD2:0 signals.

The PIC firmware reads the state of the RD3 signal to determine if the encoder/decoder device is an MCP2120 or MCP2122.

If the device is the MCP2120, then the PWM output frequency is set to 3.6864 MHz and the PIC drives the MCP2120's BAUD2:0 signals with the selected baud rate from the state of the RD2:0 signals.

If the device is the MCP2122, then the PWM output frequency is determined from the state of the RD2:0 signals.

This mode requires that the MCP2122's TX and RX signals are directly connected to the MAX3238 compatible device.

2.2.1.2 FIRMWARE OPERATION - Generate Clock only (@ 3.6864 MHz)

The PIC firmware reads the state of the RD7 and RD3 signals. If the signals indicate that the device is the MCP2120 and to use the PIC as the clock source, then the PIC will source a 3.6864 MHz clock to be used by the MCP2120 device. The PIC will drive the MCP2120's BAUD2:0 signals with the selected baud rate from the state of the RD2:0 signals.

Although the clock could drive the MCP2122's 16XCLK pin, the frequency is higher than the maximum specification.

This mode requires that the MCP2120's TX and RX signals are directly connected to the MAX3238 compatible device.

2.2.1.3 FIRMWARE OPERATION - No Clock Generation

The PIC firmware reads the state of the RD7 and RD3 signals. If the signals indicate that the device is the MCP2120 and to use a crystal as the clock source, then the PIC will control the state of the MCP2120's MODE2:0 pins based on the state of the RD2:0 signals.

This mode requires that the MCP2122's TX and RX signals are directly connected to the MAX3238 compatible device.

2.2.1.4 FIRMWARE OPERATION - Echo Data Received and Change Case

This mode has the character that is received on UART1 (RX) be converted to the opposite case and transmitted back on UART1 (TX).

2.2.1.5 FIRMWARE OPERATION - Stream a Data Table

In this mode, the PIC waits for a character to be received, and then continuously streams a data table.

2.2.1.6 FIRMWARE OPERATION - Pass Data Through (UART1 <---> UART2)

In this mode, both the PIC's UARTs are used. UART1 communicates with the MCP2120/22 device and UART2 communicates with the DB-9 connector (through the SP3238 device). Data received on RX1 (UART1) is transmitted on TX2 (UART2). Data received on RX2 (UART2) is transmitted on TX1 (UART1). This allows the PIC to monitor all data that is sent across the link. Both UART1 and UART2 operate at the selected baud rate.

2.2.1.7 FIRMWARE OPERATION - Pass Data Through (UART1 --> UART2) with UART2 fixed at 115,200 Baud

This mode is almost identical to the mode described in Section **2.2.1.6 "Firmware Operation - Pass Data Through (UART1 <---> UART2)"**, except that UART2 operates at a fixed 115,200 baud.

So in this mode, both the PIC24's UARTs are used. UART1 communicates with the MCP2120/22 device and UART2 communicates with the DB-9 connector (through the SP3238 device). Data received on RX1 (UART1) is transmitted on TX2 (UART2). Data received on RX2 (UART2) is transmitted on TX1 (UART1). This allows the PIC24 to monitor all data that is sent across the link. UART1 operate at the selected baud rate and UART2 operates at a fixed 115,200 baud.

MCP2120/22 Developer's Board User's Guide

2.3 MCP212XDM DEMOS

A description of the demos, including step-by-step instructions are shown in this section.

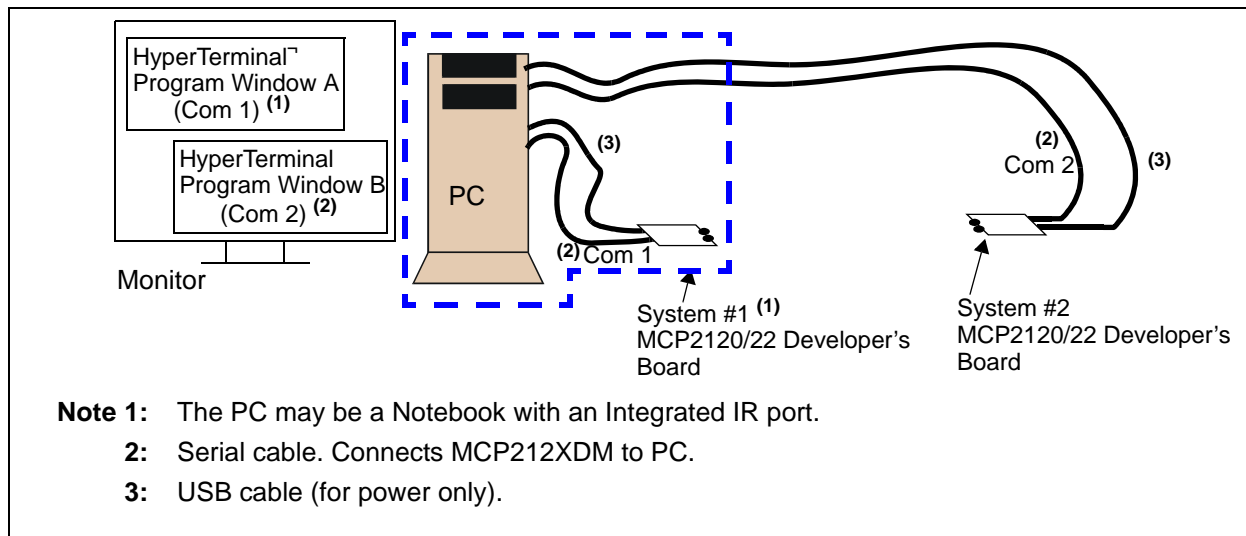
2.3.1 Demo #1 Operation - Direct IR / UART (DB-9) Mode

In Demo #1, the MCP2120/22 Developer's Board #2 will take any data that is received from the IR interface and send it directly out the UART interface to the PC's serial port. Any data that is received from the UART interface will be directly sent out the IR interface.

This shows the MCP2120/22 encoding and decoding data between the IR port and the Host UART port. In this configuration the MCP2120/22 Developer's Board can be used as a IR to UART dongle.

Figure 2-1 shows the system setup for this test, while Figure 2-2 shows the jumper configuration for both of the MCP2120/22 Developer's Boards. Lastly, Table 2-4 shows the steps for Demo #1 operation.

FIGURE 2-1: DEMO #1 SYSTEM BLOCK DIAGRAM⁽¹⁾



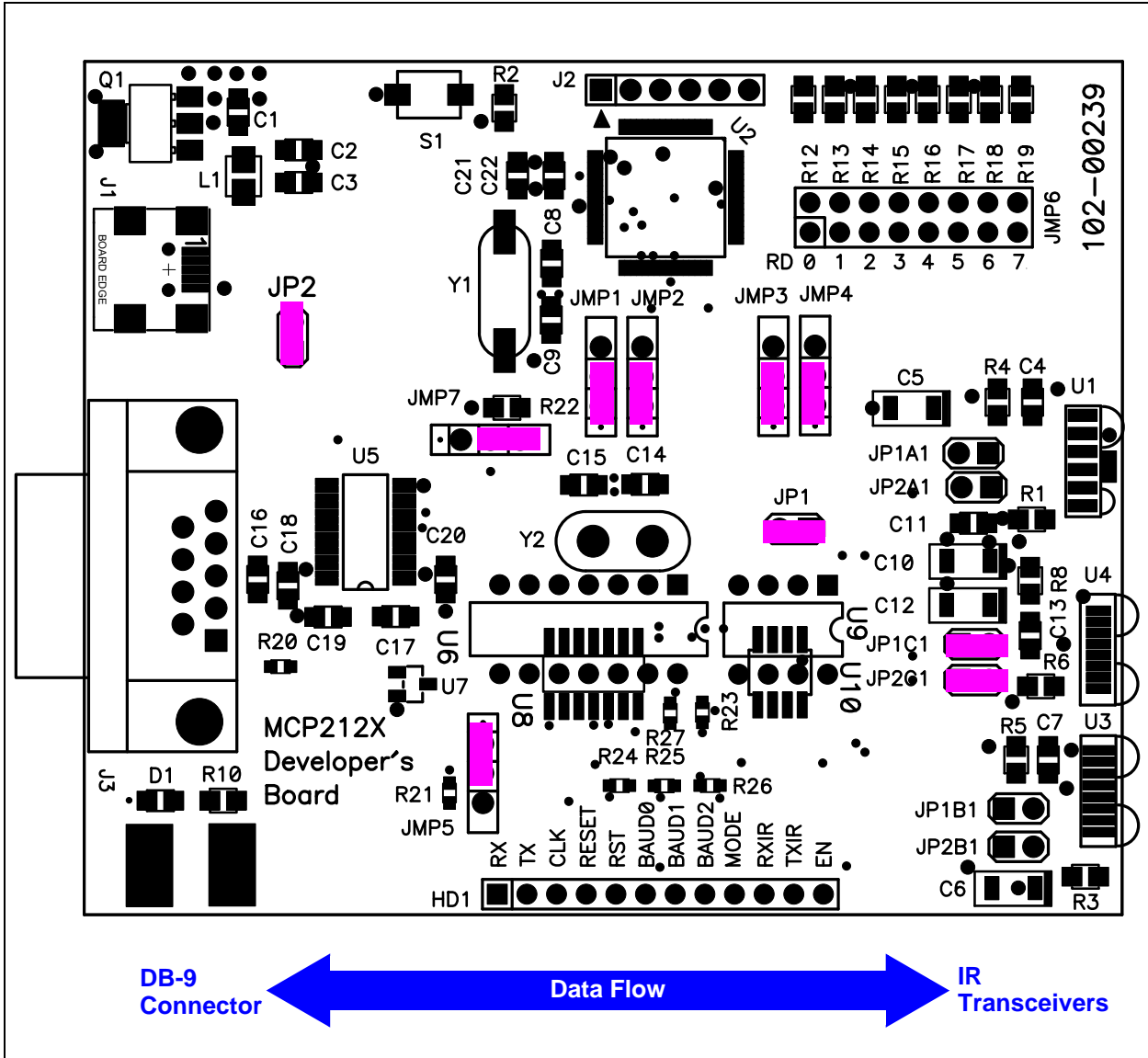
Hyperterminal to Serial Port Settings

The com port settings should be configured as:

- 115200 Baud
- 8-bits
- No Parity
- One Stop
- No Flow Control

Installation and Operation

FIGURE 2-2: DEMO #1 CONFIGURATION - DIRECT TO UART (DB-9) MODE



Note: This is the board configuration shipped to customers.

MCP2120/22 Developer's Board User's Guide

TABLE 2-4: DEMO #1 STEPS - DIRECT TO UART (DB-9)

Step	Action	Result
1	Place the two MCP2120/22 Developer's Boards on a flat surface about 25 cm (10 inches) apart, and with the IR ports facing each other.	—
2	On the MCP2120/22 Developer's Boards: Ensure that the jumpers are configured as in Figure 2-2.	—
3	On the MCP2120/22 Developer's Boards: Apply power to each unit via the USB connector.	On the MCP2120/22 Developer's Boards: The green power LED (D1) will turn on.
4	Connect PC's Serial Ports to the DB-9 connector of each MCP2120/22 Developer's Board.	—
5	On the PC: Open an instance of HyperTerminal program window attached to the PC's Serial Port (such as COM 1) to connect to the MCP2120/22 Developer's Board #1. Ensure that the window indicates that the HyperTerminal program is connected and properly configured.	On the MCP2120/22 Developer's Board: — On the PC: The HyperTerminal window will indicate "connected" and the selected Baud rate settings.
	Note: See D.1 "Configuring the Hyperterminal® Program"	
6	On the PC: Open a second instance of HyperTerminal program window attached to the PC's Serial Port (such as COM 2) to connect to the MCP2120/22 Developer's Board #2. Ensure that the window indicates that the HyperTerminal program is connected and properly configured.	On the MCP2120/22 Developer's Board: — On the PC: The HyperTerminal window will indicate "connected" and the selected Baud rate settings.
	Note: See D.1 "Configuring the Hyperterminal® Program"	
7	On the PC: In one of the HyperTerminal program windows (COM 1), type some characters.	On the PC: In the other HyperTerminal program windows (COM 2), those characters appear.
8	On the PC: In the other HyperTerminal program windows (COM 2), type some characters.	On the PC: In the other HyperTerminal program windows (COM 1), those characters appear.
9	On the PC: In either HyperTerminal program windows, select the Transfer pull-down menu and then the Send Text File ... option. Navigate to the folder that contains the Transmit File.Txt file and select it. Then click Open .	On the PC: In the selected HyperTerminal program window, the displayed data is transmitted and is received and displayed by the other HyperTerminal program window.
10	On the PC: Make this file transfer transmitting from the other HyperTerminal program window.	On the PC: In the selected HyperTerminal program window, the displayed data is transmitted, being received and displayed by the other HyperTerminal program window.
11	Continue steps 7, 8, 9, or 10 for as long as desired.	—

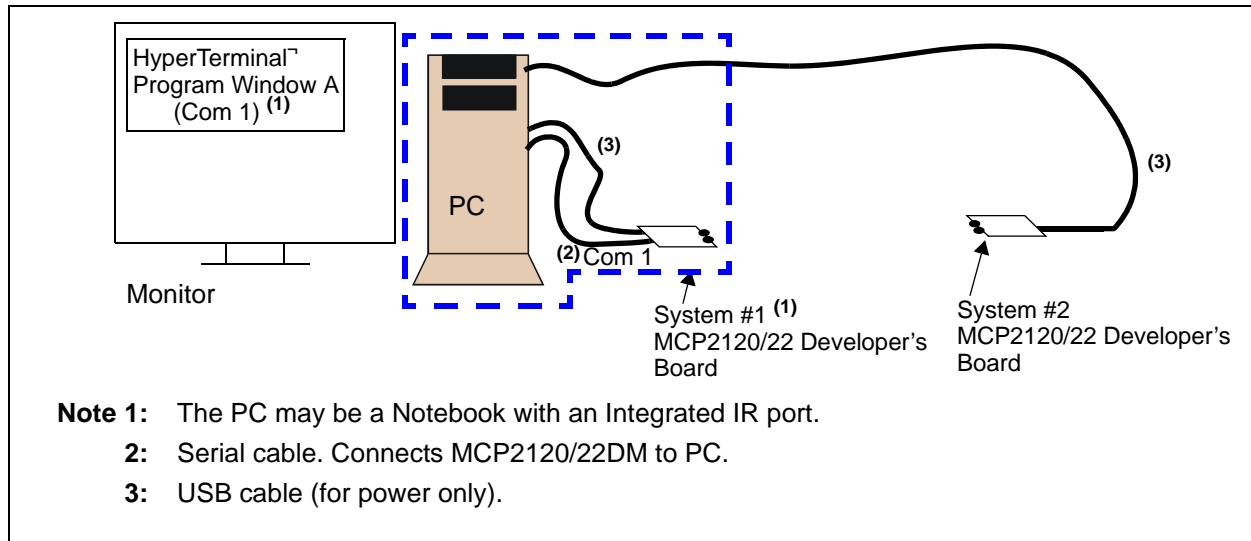
2.3.2 Demo #2 Operation - Echo Character Received (Change Case)

In Demo #2, the MCP2120/22 Developer's Board #2 will echo the alpha character received on the IR interface after changing its case ("a" → "A" and "A" → "a").

This demo shows the MCP212X device in an embedded application.

Figure 2-3 shows the system setup for this test, while Figure 2-4 shows the jumper configuration for the MCP2120/22 board. Lastly, Table 2-5 shows the steps for Demo #2 operation.

FIGURE 2-3: DEMO #2 SYSTEM BLOCK DIAGRAM⁽¹⁾



Hyperterminal to Serial Port Settings

The com port settings should be configured as:

- 115200 Baud
- 8-bits
- No Parity
- One Stop
- No Flow Control

Installation and Operation

TABLE 2-5: DEMO #2 STEPS - ECHO CHARACTER RECEIVED

Step	Action	Result
1	Place the two MCP2120/22 Developer's Boards on a flat surface about 25 cm (10 inches) apart, and with the IR ports facing each other.	—
2	On the MCP2120/22 Developer's Board #1: Ensure that the jumpers are configured as in Figure 2-2.	—
3	On the MCP2120/22 Developer's Board #2: Ensure that the jumpers are configured as in Figure 2-4. Jumpers shown in green are not required and can be left open.	—
4	On the MCP2120/22 Developer's Boards: Apply power to each unit via the USB connector.	On the MCP2120/22 Developer's Boards: The green power LED (D1) will turn on.
5	Connect PC's Serial Ports to the DB-9 connector of each MCP2120/22 Developer's Board.	—
6	On the PC: Open an instance of HyperTerminal program window attached to the PC's Serial Port (such as COM 1) to connect to the MCP2120/22 Developer's Board #1. Ensure that the window indicates that the HyperTerminal program is connected and properly configured.	On the MCP2120/22 Developer's Board: —
	Note: See D.1 "Configuring the Hyperterminal® Program"	On the PC: The HyperTerminal window will indicate "connected" and the selected Baud rate settings.
7	On the PC: In the HyperTerminal program window (COM 1), type some alpha characters, such as "kLwtGh".	On the PC: The HyperTerminal program window will display each character and its switched case version. So "kLwtGh" will show "kKLlWtTGghH"
8	Continue typing any alpha characters (upper or lower case)	The alpha character typed and its opposite case will be displayed (such as "aA", "Aa", "Bb",...)

MCP2120/22 Developer's Board User's Guide

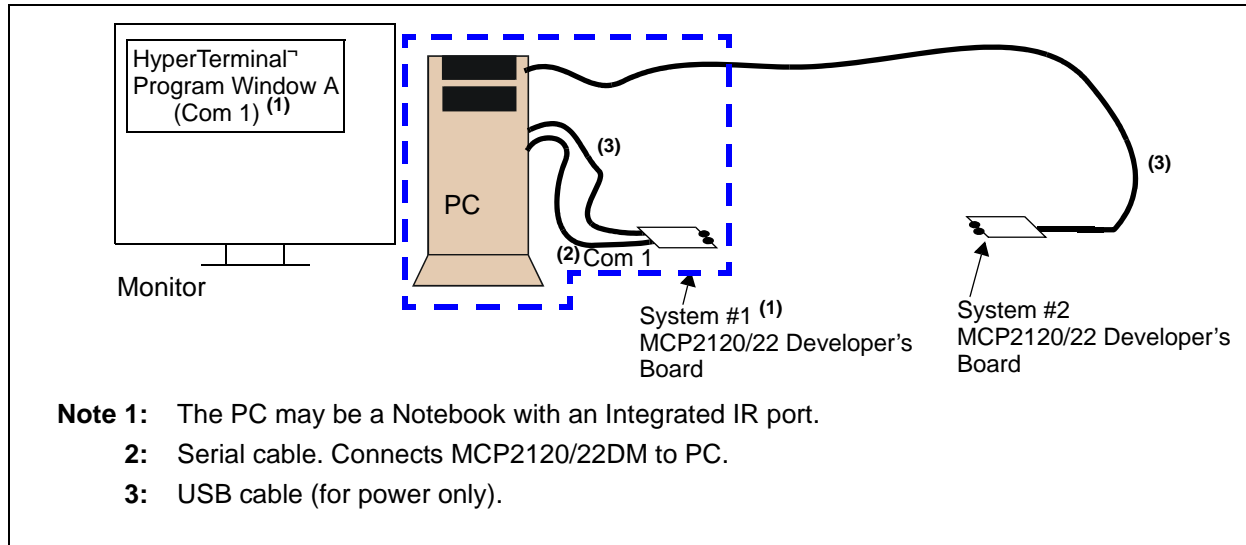
2.3.3 Demo #3 Operation - Data Stream Mode

In Demo #3, once the MCP2120/22 Developer's Board # 2 receives a data byte from the IR interface, the PIC will stream a continuously repeated table (**Figure E-1:**) through the IR port.

This demo shows the MCP212X device in an embedded application.

Figure 2-5 shows the system setup for this test, while Figure 2-6 shows the jumper configuration for the MCP2120/22 board. Lastly, Table 2-6 shows the steps for Demo #3 operation.

FIGURE 2-5: DEMO #3 SYSTEM BLOCK DIAGRAM⁽¹⁾

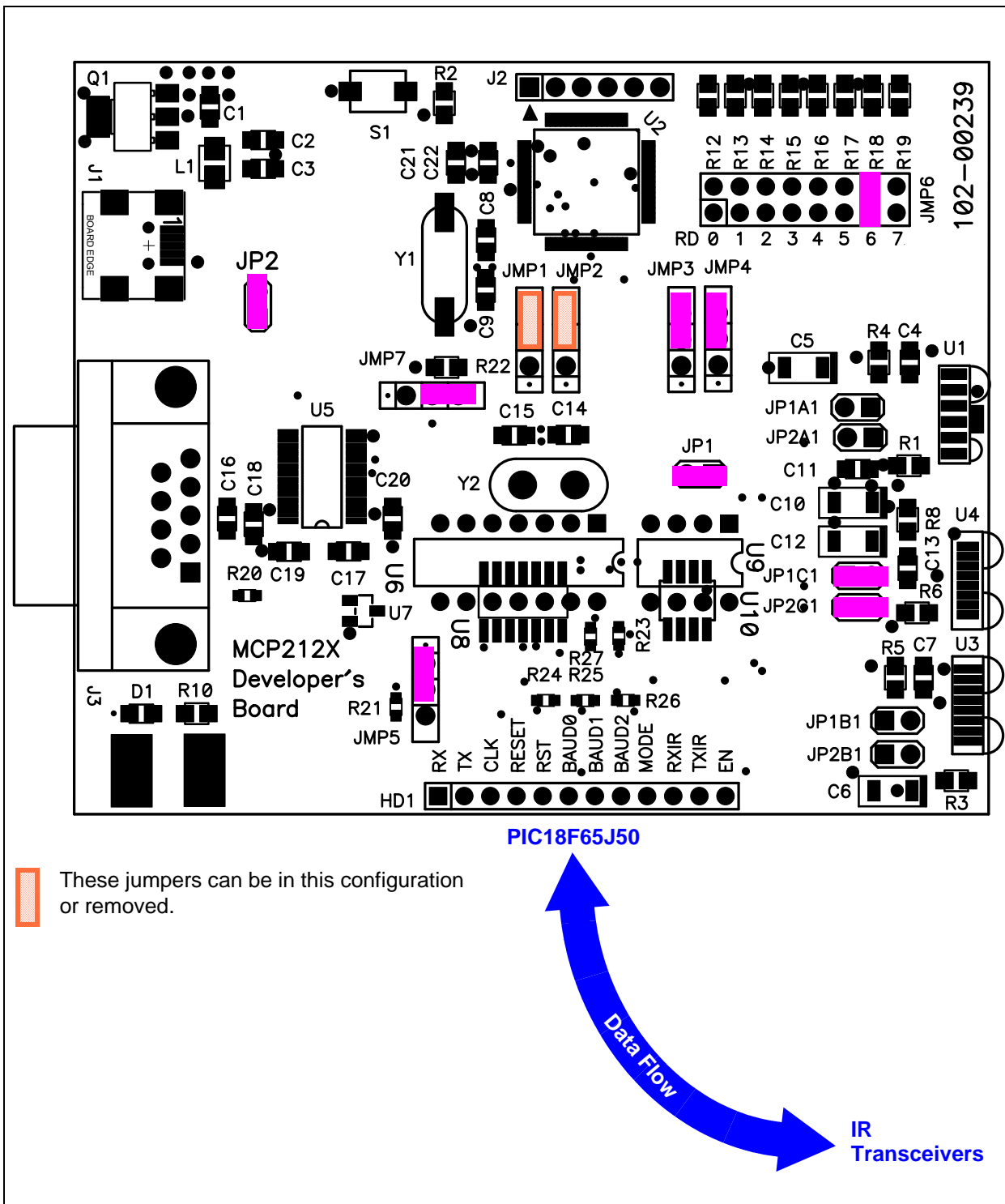


Hyperterminal to Serial Port Settings

The com port settings should be configured as:

- 115200 Baud
- 8-bits
- No Parity
- One Stop
- No Flow Control

FIGURE 2-6: DEMO #3 CONFIGURATION - DATA STREAM MODE



MCP2120/22 Developer's Board User's Guide

TABLE 2-6: DEMO #3 STEPS - DATA STREAM

Step	Action	Result
1	Place the two MCP2120/22 Developer's Boards on a flat surface about 25 cm (10 inches) apart, and with the IR ports facing each other.	—
2	On the MCP2120/22 Developer's Board #1: Ensure that the jumpers are configured as in Figure 2-2.	—
3	On the MCP2120/22 Developer's Board #2: Ensure that the jumpers are configured as in Figure 2-6. Jumpers shown in green are not required and can be left open.	—
4	On the MCP2120/22 Developer's Boards: Apply power to each unit via the USB connector.	On the MCP2120/22 Developer's Boards: The green power LED (D1) will turn on.
5	Connect the PC's Serial Ports to the DB-9 connector of each MCP2120/22 Developer's Board.	—
6	On the PC: Open an instance of HyperTerminal program window attached to the PC's Serial Port (such as COM 1) to connect to the MCP2120/22 Developer's Board #1. Ensure that the window indicates that the HyperTerminal program is connected and properly configured.	On the MCP2120/22 Developer's Board: —
	Note: See D.1 "Configuring the Hyperterminal® Program"	On the PC: The HyperTerminal window will indicate "connected" and the selected Baud rate settings.
7	On the PC: In the HyperTerminal program window (COM 1), type any character.	On the PC: The HyperTerminal program window will display a continuous data table stream. The Data Table is shown in Figure E-1.

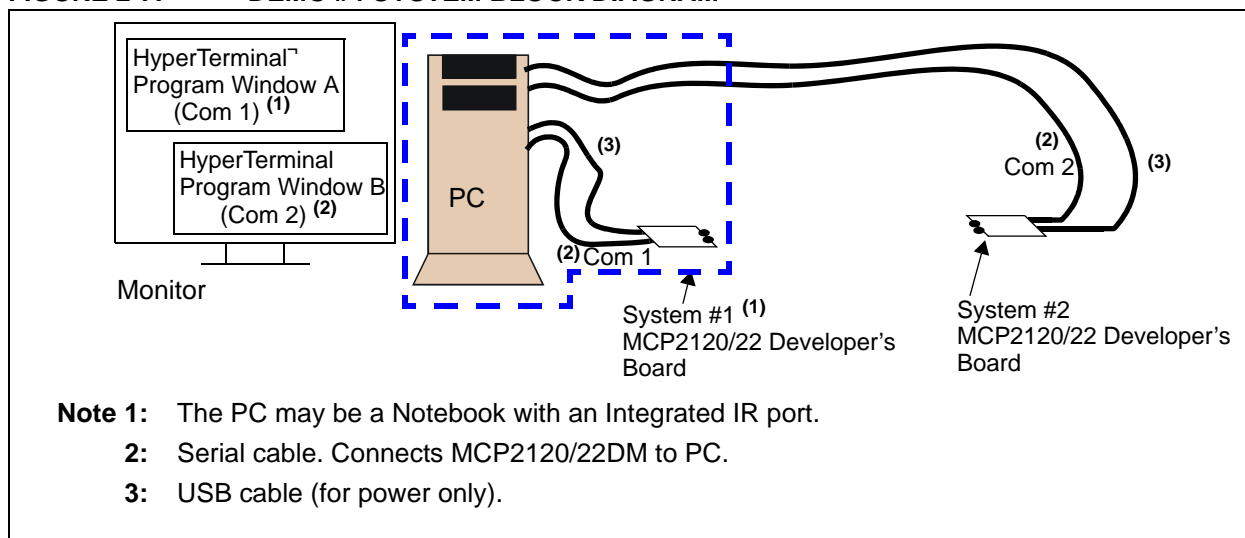
2.3.4 Demo #4 Operation - Pass Through Mode

In Demo #4, the MCP2120/22 Developer's Board #2 will take any data that is received from the IR interface and send it out the UART interface (after passing through the PIC) to the PC's serial port. Any data that is received from the UART interface will be sent out the IR interface (after passing through the PIC).

This shows the MCP2120/22 encoding and decoding data between the IR port and the Host UART port. In this configuration the MCP2120/22 Developer's Board can be used as a IR to UART dongle.

Figure 2-7 shows the system setup for this test, while Figure 2-8 shows the jumper configuration for the MCP2120/22 Developer's Board. Lastly, Table 2-7 shows the steps for Demo #4 operation.

FIGURE 2-7: DEMO #4 SYSTEM BLOCK DIAGRAM (1)



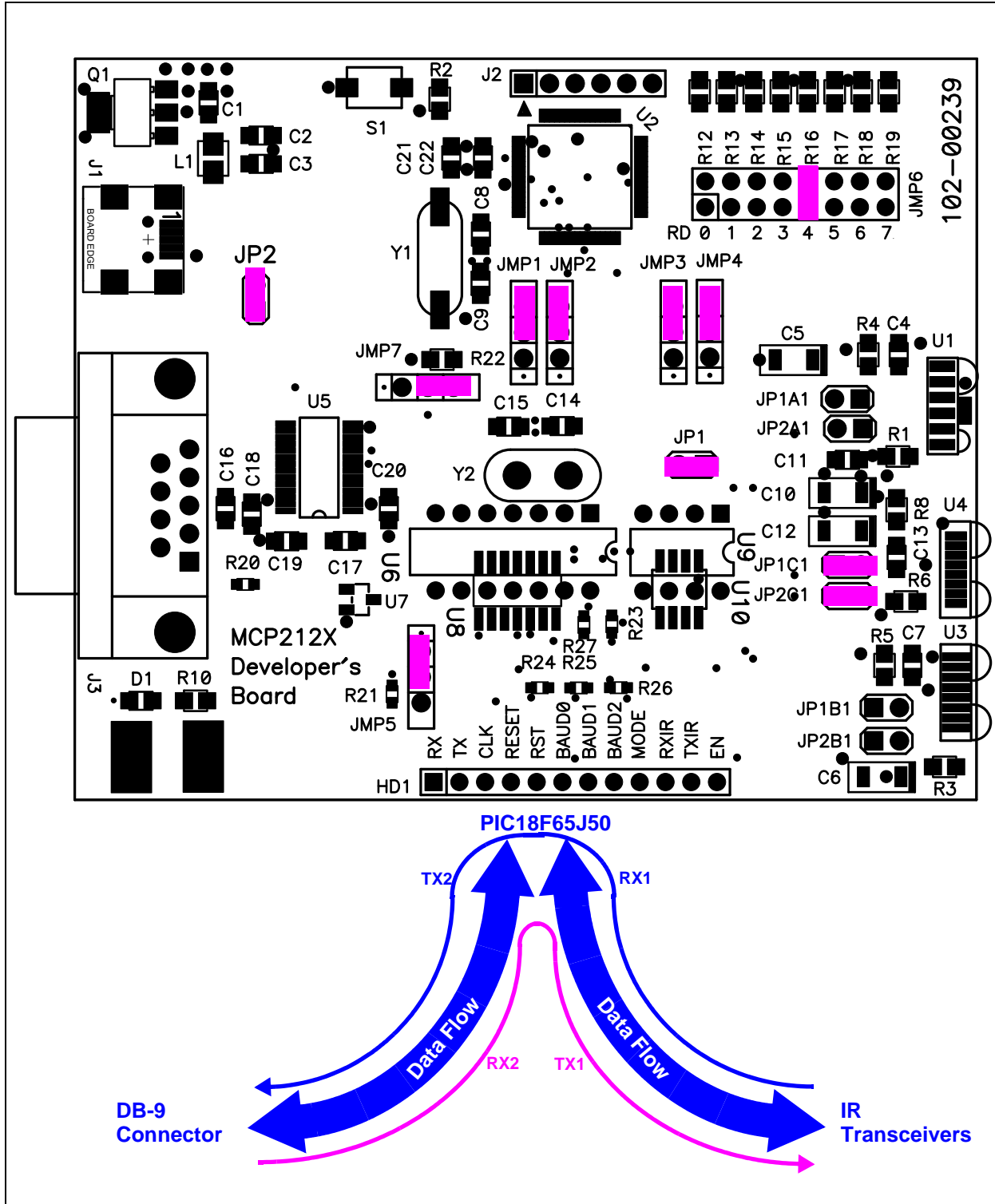
Hyperterminal to Serial Port Settings

The com port settings should be configured as:

- 115200 Baud
- 8-bits
- No Parity
- One Stop
- No Flow Control

MCP2120/22 Developer's Board User's Guide

FIGURE 2-8: DEMO #4 CONFIGURATION - PASS THROUGH MODE



Installation and Operation

TABLE 2-7: DEMO #4 STEPS - PASS THROUGH

Step	Action	Result
1	Place the two MCP2120/22 Developer's Boards on a flat surface about 25 cm (10 inches) apart, and with the IR ports facing each other.	—
2	On the MCP2120/22 Developer's Board #1: Ensure that the jumpers are configured as in Figure 2-2.	—
3	On the MCP2120/22 Developer's Board #2: Ensure that the jumpers are configured as in Figure 2-8.	—
4	On the MCP2120/22 Developer's Boards: Apply power to each unit via the USB connector.	On the MCP2120/22 Developer's Boards: The green power LED (D1) will turn on.
5	Connect the PC's Serial Ports to the DB-9 connector of each MCP2120/22 Developer's Board.	—
6	On the PC: Open an instance of HyperTerminal program window attached to the PC's Serial Port (such as COM 1) to connect to the MCP2120/22 Developer's Board. Ensure that the window indicates that the HyperTerminal program is connected and properly configured.	On the MCP2120/22 Developer's Board: — On the PC: The HyperTerminal window will indicate "connected" and the selected Baud rate settings.
	Note: See D.1 "Configuring the Hyperterminal® Program"	
7	On the PC: Open a second instance of HyperTerminal program window attached to the PC's Serial Port (such as COM 2) to connect to the MCP2120/22 Developer's Board. Ensure that the window indicates that the HyperTerminal program is connected and properly configured.	On the MCP2120/22 Developer's Board: — On the PC: The HyperTerminal window will indicate "connected" and the selected Baud rate settings.
	Note: See D.1 "Configuring the Hyperterminal® Program"	
8	On the PC: In one of the HyperTerminal program windows (COM 1), type some characters.	On the PC: In the other HyperTerminal program windows (COM 2), those characters appear.
9	On the PC: In the other HyperTerminal program windows (COM 2), type some characters.	On the PC: In the other HyperTerminal program windows (COM 1), those characters appear.
10	On the PC: In either HyperTerminal program windows, select the Transfer pull-down menu and then the Send Text File ... option. Navigate to the folder that contains the Transmit File.Txt file and select it. Then click Open .	On the PC: In the selected HyperTerminal program window, the displayed data is transmitted and is received and displayed by the other HyperTerminal program window.
11	On the PC: Make this file transfer transmitting from the other HyperTerminal program window.	On the PC: In the selected HyperTerminal program window, the displayed data is transmitted, being received and displayed by the other HyperTerminal program window.
12	Continue steps 8, 9, 10, or 11 for as long as desired.	—

MCP2120/22 Developer's Board User's Guide

NOTES:

Appendix A. Schematic and Layouts

NOTICE TO CUSTOMERS

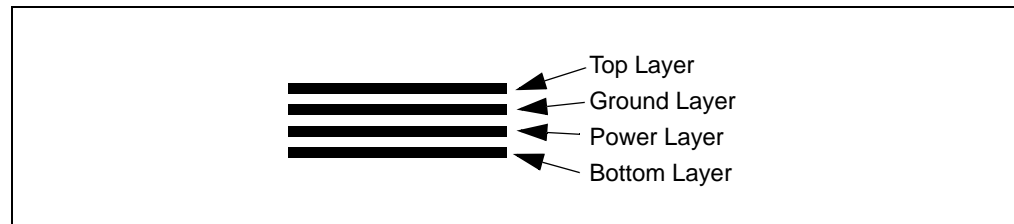
All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some schematics and board layouts may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

A.1 INTRODUCTION

This appendix contains the following schematics and layouts for the MCP2120/22 Developer's Board:

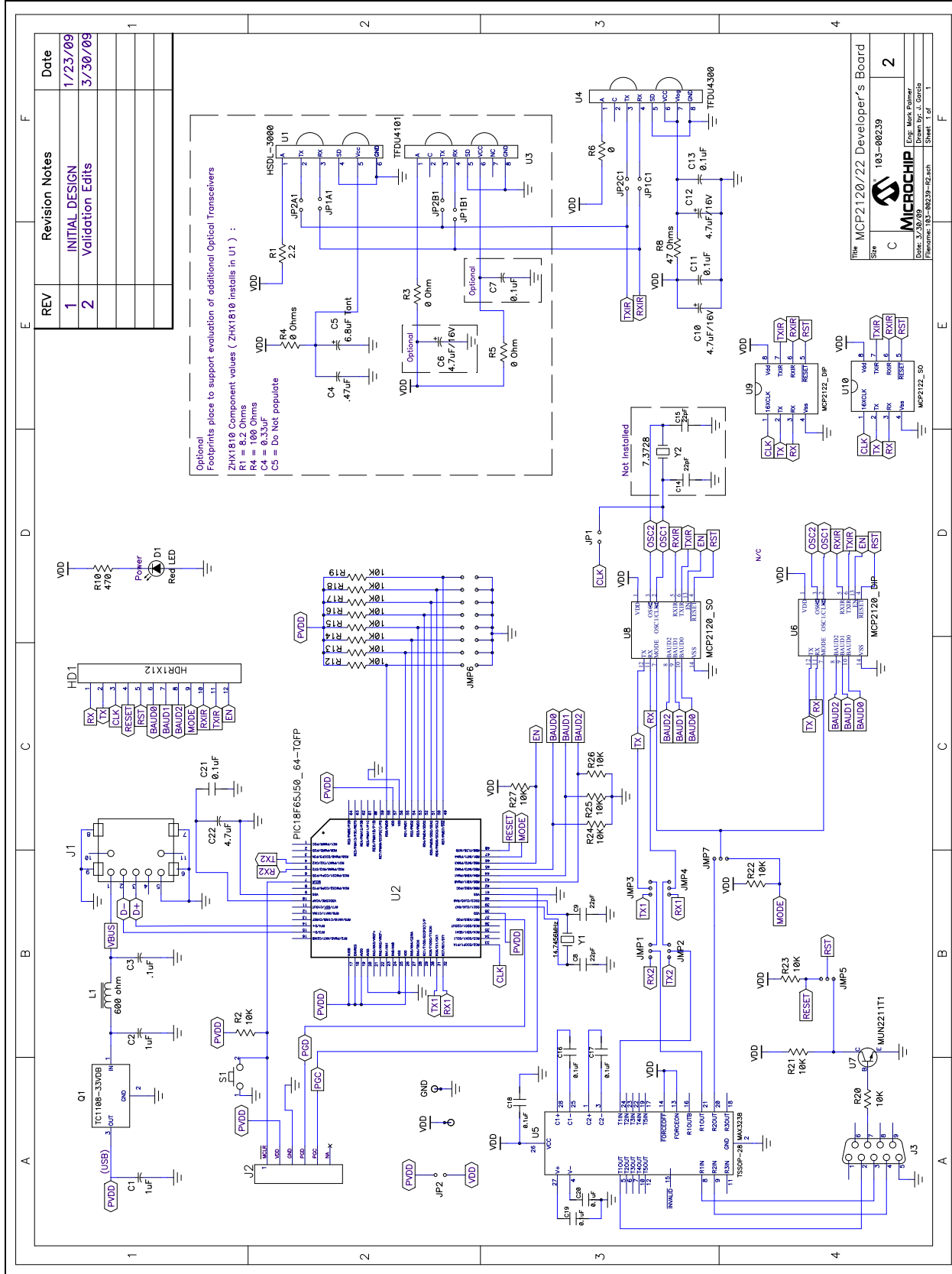
- Board - Schematic
- Board - Top Silk and Pads
- Board - Top layer plus Silk and Pads
- Board - Bottom Layer
- Board - VDD Layer
- Board - Ground Layer

The layer order is shown in Figure A-1.

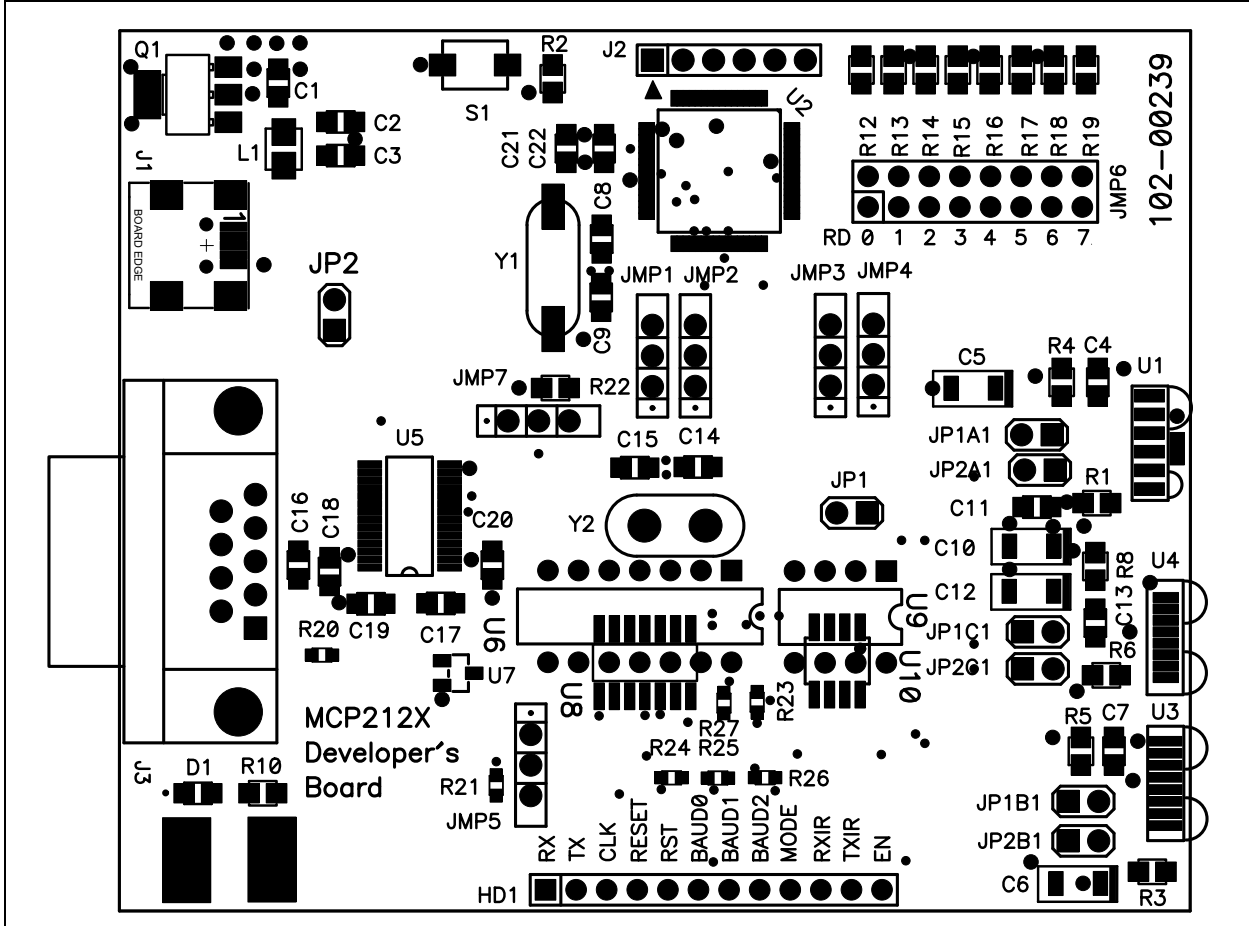
FIGURE A-1: LAYER ORDER

MCP2120/22 Developer's Board User's Guide

A.2 BOARD - SCHEMATIC

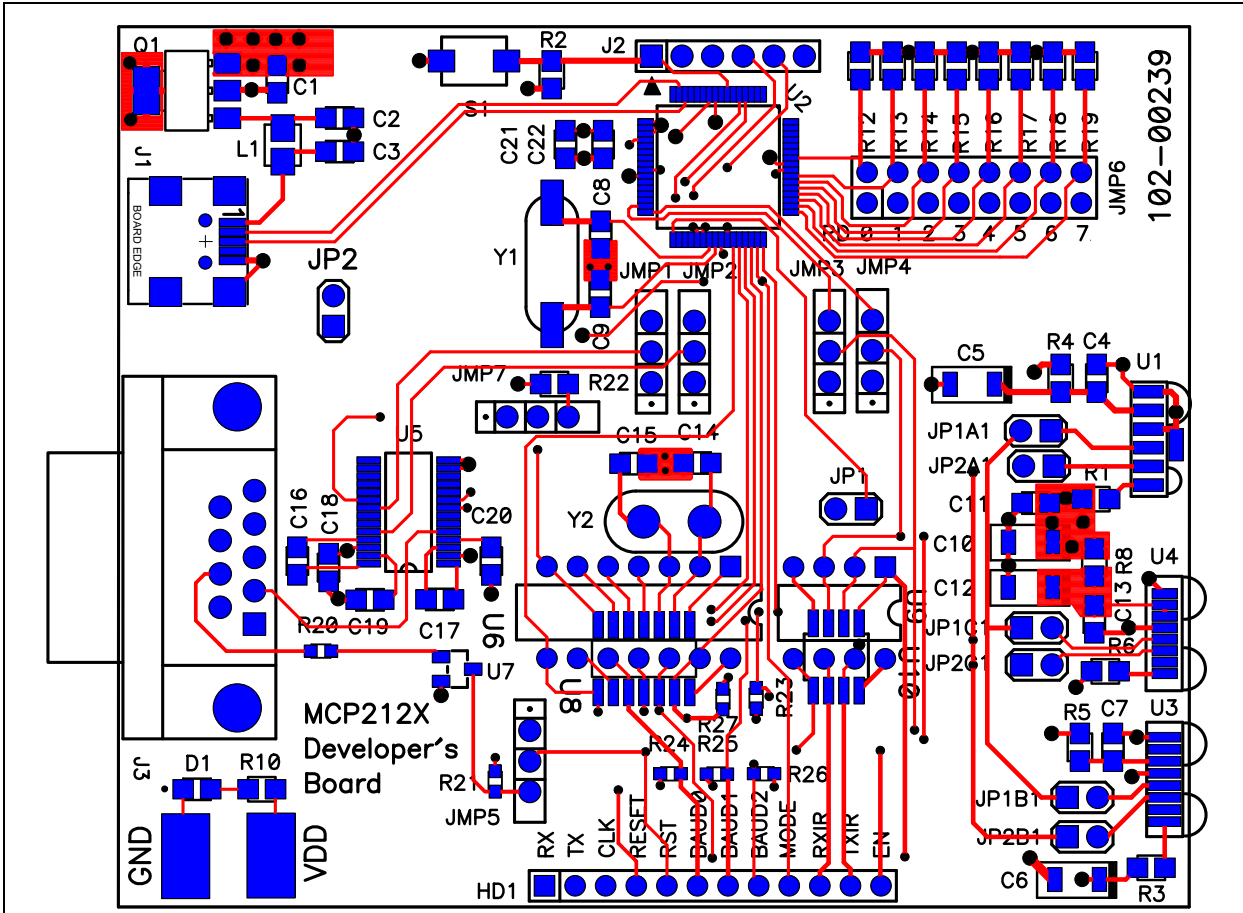


A.3 BOARD - TOP SILK AND PADS

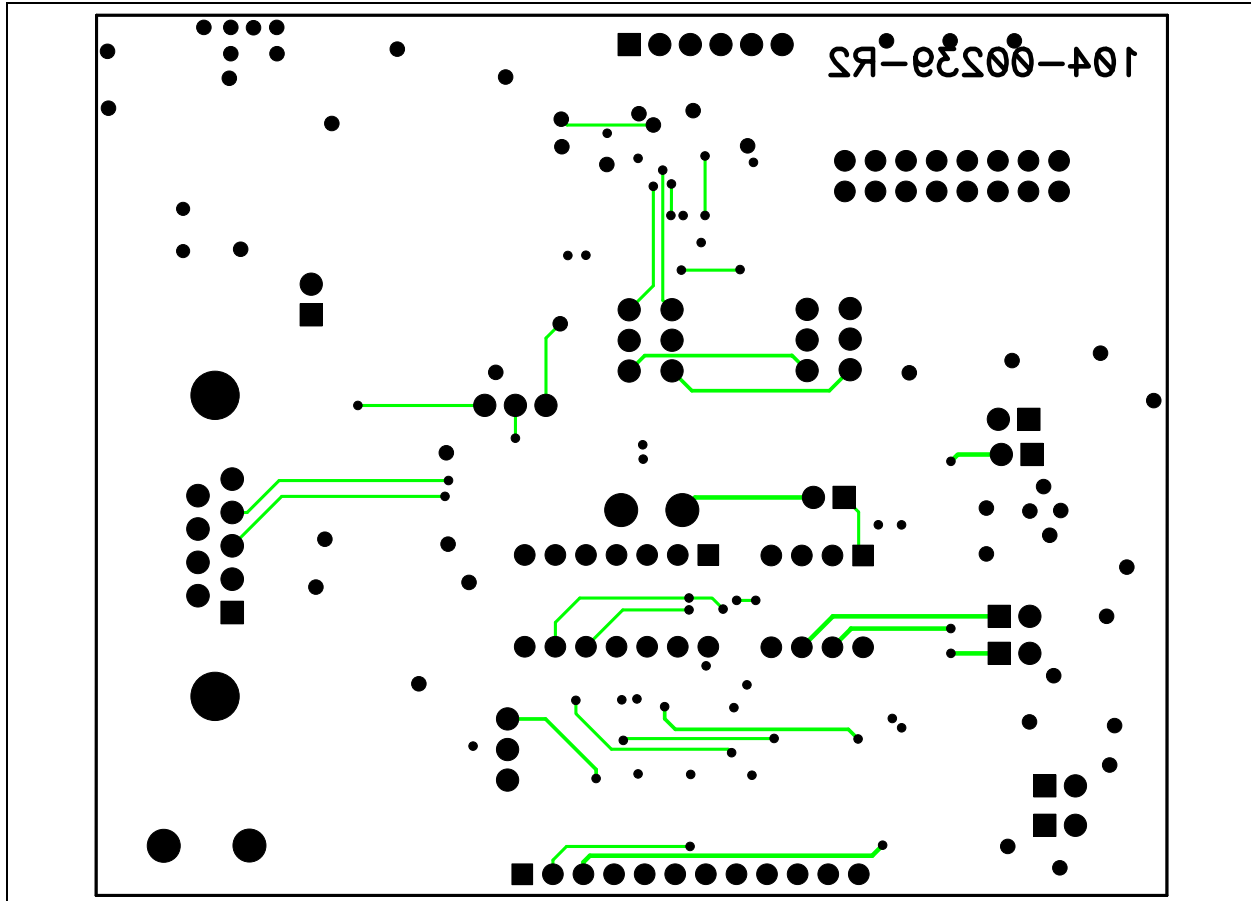


MCP2120/22 Developer's Board User's Guide

A.4 BOARD - TOP LAYER PLUS SILK AND PADS

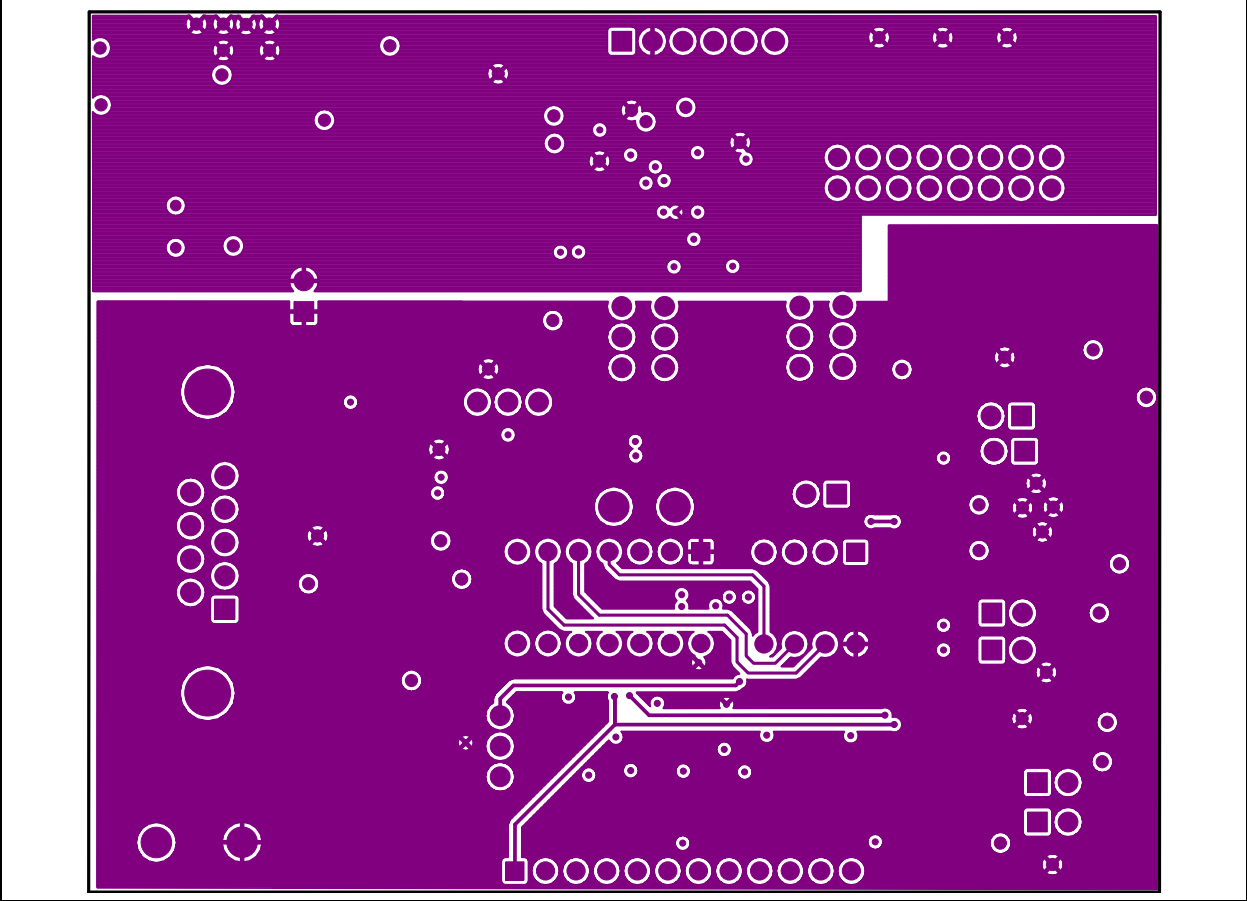


A.5 BOARD - BOTTOM LAYER



MCP2120/22 Developer's Board User's Guide

A.6 BOARD - POWER LAYER



MCP2120/22 Developer's Board User's Guide

NOTES:

Appendix B. Bill Of Materials (BOM)

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 the Bill Of Materials may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

The MCP2120/22 Developer's Board allows the MCP2120/22 device to be evaluated. The board supports customers in the evaluation of three additional optical transceiver devices. This is done with component layout of these additional optical transceiver circuits. The customer would be required to install the desired circuit for testing.

Table B-1 shows the components that are installed in the MCP2120/22 Developer's Board PCB, while Table B-2 shows the components that are NOT installed on the MCP2120/22 Developer's Board PCB.

TABLE B-1: BILL OF MATERIALS (BOM)

Qty	Reference	Description	Manufacturer	Part Number
2	C1,C2	CAP 1.0UF 16V CERAMIC X7R 0805	Kemet [®] Electronics Corp.	C0805C105K4RACTU
9	C3, C11, C13, C16, C17, C18, C19, C20, C21	CAP .1UF 25V CERAMIC X7R 0805	Panasonic [®] - ECG	ECJ-2VB1E104K
2	C8, C9	CAP CERAMIC 22PF 50V NP0 0805	Kemet Electronics Corp.	C0805C220J5GACTU
2	C10, C12	CAPACITOR 4.7UF/10V TEH SER SMD	Panasonic - ECG	ECS-H1AX475R
1	C22	CAP 4.7UF 16V CERAMIC F 0805	Panasonic - ECG	ECJ-2FF1C475Z
1	D1	LED GREEN CLEAR 0805 SMD	LITE-ON [®] Semiconductor Corp.	LTST-C170KGKT
1	HD1	CONN HEADER .100 SINGL STR 12POS	Sullins Connector Solutions	PEC12SAAN
1	J1	CONN RECEPT MINI USB2.0 5POS	Hirose Electronic Co. Ltd	UX60-MB-5ST
1	J2	CONN HEADER .100 SINGL STR 6POS (Note 2)	Sullins Connector Solutions	PEC36SBAN
1	J3	CONN D-SUB RCPT R/A 9POS PCB AU	Amphenol Commercial Products	—
6	JMP1, JMP2, JMP3, JMP4, JMP5, JMP7	CONN HEADER 3POS .100" STR TIN	Molex [®] /Waldom [®] Electronics Corp	90120-0123

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.

2: This connector can be made by cutting a single .100 Single R/A 36POS into six pieces.

MCP2120/22 Developer's Board User's Guide

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

Qty	Reference	Description	Manufacturer	Part Number
1	JMP6	CONN HEADER 2x8 (16 POS) .100" VERT GOLD	Molex®/Waldom® Electronics Corp	10-89-1161
4	JP1, JP2, JP1C1, JP2C1	CONN HEADER 2POS .100 VERT TIN	Molex/Waldom Electronics Corp	22-03-2021
1	L1	INDUCTOR POWER 10UH 1008	TDK® Corporation	NLV25T-100J-PF
1	PCB	RoHS Compliant Bare PCB, MCP2120/22 Developer's Board	—	104-00239
1	Q1	300mA CMOS LDO	Microchip Technology Inc.	TC1108-3.3VDB
10	R2, R12, R13, R14, R15, R16, R17, R18, R19, R22	RES 10K OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ103V
7	R20, R21, R23, R24, R25, R26, R27	RES 10K OHM 1/10W 5% 0603 SMD	Panasonic - ECG	ERJ-3GEYJ103V
1	R6	RES 0.0 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEY0R00V
1	R8	RES 47 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ470V
1	R10	RES 470 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEYJ471V
1	S1	SWITCH LT TOUCH 6X3.5 100GF SMD	Panasonic - ECG	EVQ-PE104K
1	U2	64/80-Pin High-Performance, 1-Mbit Flash USB Microcontrollers	Microchip Technology Inc.	PIC18F86J50-I/PT
1	U4	Infrared Transceivers SIR 115.2 kbits/s	Vishay Semiconductors	TFDU4300-TR3
1	U5	Intelligent +3.0V to +5.5V RS-232 Transceiver	SIPEX	SP3238EEY-L
1	U6	IC SOCKET 14PIN MS TIN/TIN .300	Mill-Max Manufacturing Corp.	110-99-314-41-001000
1	U7	TRANS BRT NPN 100MA 50V SC59	ON Semiconductor	MUN2211T1G
1	U9	IC SOCKET 8PIN MS TIN/TIN .300	Mill-Max Manufacturing Corp.	110-99-308-41-001000
1		MCP2122 Infrared Encoder / Decoder	Microchip Technology Inc.	MCP2122-E/P
2	VDD, GND	TEST POINT PC COMPACT SMT	Keystone® Electronics	5016
1	Y1	CRYSTAL 14.7456 MHZ 20PF SMD	CTS-Frequency Controls	ECS-147.4-20-5P-TR
2	Y2	PIN RECPT .015/.025 DIA 0667 SER (Populate Y2 Location)	Mill-Max Manufacturing Corp.	0667-0-15-01-30-27-10-0
4	Bottom side on Each Corner	BUMPON HEMISPHERE .44X.20 BLACK	3M	SJ-5003 (BLACK)
12	Shunts for JP1, JP2, JP1C1, JP2C1, JMP1-JMP5, JMP7, and JMP6	.100" Shorting Block with Handle	JAMECO® VALUEPRO	2012JH-R
4	Feet	BUMPON HEMISPHERE .44X.20 BLACK	3M	SJ-5003 (BLACK)

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.

2: This connector can be made by cutting a single .100 Single R/A 36POS into six pieces.

Bill Of Materials (BOM)

TABLE B-2: TABLE OF CONTENTS (BOM) – PCB COMPONENTS NOT INSTALLED

Qty	Reference	Description	Manufacturer	Part Number
0	C4	CAP .47UF 16V CERAMIC X7R 080	Panasonic - ECG	ECJ-2YB1C474K
0	C5	AP TANTALUM 6.8UF 16V 20% SMD	Nichicon® Corporation	F931C685MAA
0	C6	CAP 4.7UF 16V CERAMIC F 0805	Panasonic - ECG	ECJ-2FF1C475Z
0	C7	CAP .1UF 25V CERAMIC X7R 0805	Panasonic - ECG	ECJ-2VB1C104K
0	C14, C15	CAP CERAMIC 22PF 50V NP0 0805	Kemet® Electronics Corp.	C0805C220J5GACTU
0	JP1A1, JP1B1, JP2A1, JP2B1	CONN HEADER 2POS .100 VERT TIN	Molex/Waldom Electronics Corp.	22-03-2021
0	HD1	CONN HEADER 12POS .100 VERT TIN	Molex/Waldom Electronics Corp.	22-28-4120
0	JMP6	CONN HEADER 16POS .100 VERT GOLD	Molex/Waldom Electronics Corp.	10-89-1161
0	R1	RES 2.2 OHM 1/8W 1% 0805 SMD	Panasonic - ECG	ERJ-6RQF2R2V
0	R3, R4, R5	RES 0.0 OHM 1/8W 5% 0805 SMD	Panasonic - ECG	ERJ-6GEY0R00V
0	U1	IRDA MODULE 115.2KBPS 6-SMD	LITE-ON Semiconductor Corp.	HSDL-3000#007
0	U3	Infrared Transceivers SIR 115.2 kbits/s	Vishay®	TFDU4101-TR3
0	U7	IC SOCKET 18PIN MS TIN/TIN .300	Mill-Max Manufacturing Corp.	110-99-318-41-001000
0	U8	MCP2120 in SOIC	Microchip Technology Inc.	MCP2120-I/SL
0	U10	MCP2122 in SOIC	Microchip Technology Inc.	MCP2122-I/SL
0	Y2	CRYSTAL 3.6864 MHZ 20PF 49US	ECS Inc.	ECS-36-20-4DN

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.

MCP2120/22 Developer's Board User's Guide

NOTES:

Appendix C. Board Testing

C.1 WHAT IS TESTED

The MCP2120/22 Developer's Board can be used in multiple configurations. Only a subset of these configurations will be tested. The following portions of the board are tested:

- **MCP2122**
- TFDU-4300 (U5) and circuitry (JP1C1, JP2C1)
- USB Power circuitry
- DB-9 Interface and circuitry
- ICSP Header (J2)
- Y1 circuitry (14.7456MHz)
- JP1 and JP2 shorted
- JMP1 (P1 – P2, P2 – P3)
- JMP2 (P1 – P2, P2 – P3)
- JMP3 (P1 – P2, P2 – P3)
- JMP4 (P1 – P2, P2 – P3)
- JMP5 (P1 – P2)
- JMP7 (P2 – P3)
- JMP6 (RD4, RD5, RD6)

C.2 WHAT IS NOT TESTED

The following portions, but not limited to, of the board are NOT tested:

- **MCP2120** and associated crystal circuitry (7.3728 MHz)
- TFDU-4101 (U3) and circuitry
- HSDL-3000 (U1) and circuitry
- Header HD1
- JP1 and JP2 open
- JMP6 (RD0, RD0, RD2, RD3, RD7)
- JMP5 (P2 – P3)
- JMP7 (P1 – P2)
- JP1A1, JP2A1, JP1B1, JP2B1
- USB Data Lines
- Switch S1

MCP2120/22 Developer's Board User's Guide

NOTES:

Appendix D. Configuring the HyperTerminal® Program

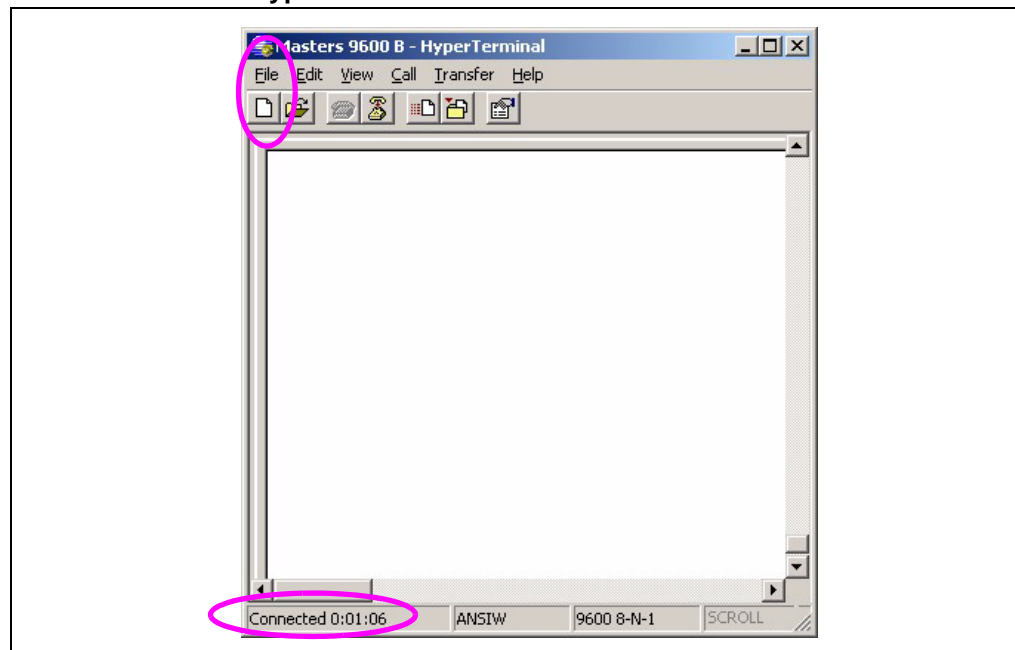
D.1 CONFIGURING THE HyperTerminal® PROGRAM

To ensure that the PC is able to communicate to the PICDEM™ HPC Explorer Demo Board, the HyperTerminal program must be properly configured. This section describes the configuration that the HyperTerminal program should be in.

The screenshots shown in Figure D-1 through Figure D-6 show the settings of the HyperTerminal program in the Windows® operating system.

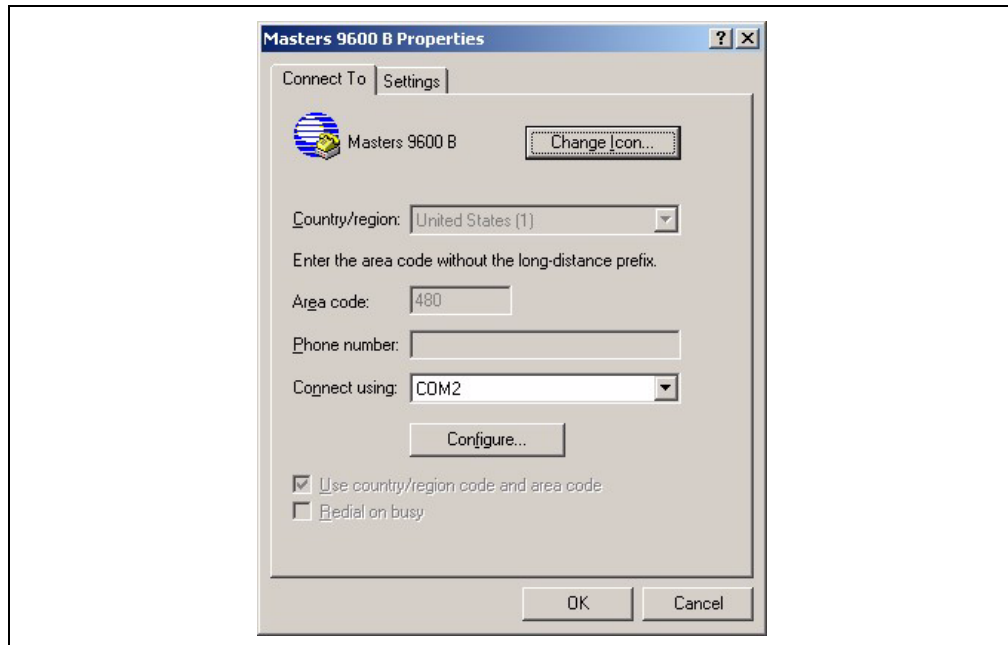
You should save each configuration of the HyperTerminal program in order to easily distinguish which HyperTerminal program window is “talking” with which PICDEM™ HPC Explorer Board.

After opening the HyperTerminal program window, select **Call -> Disconnect**. In the lower-left corner, the HyperTerminal program window will indicate “Disconnected”. Next, in the HyperTerminal program window, select **File -> Properties**. The window in Figure D-2 is shown. Ensure that the appropriate COM port is selected for both the “Golden” unit and the “Testing” unit. Then select the **Configure** button.

FIGURE D-1: HyperTerminal® PROGRAM MAIN WINDOW

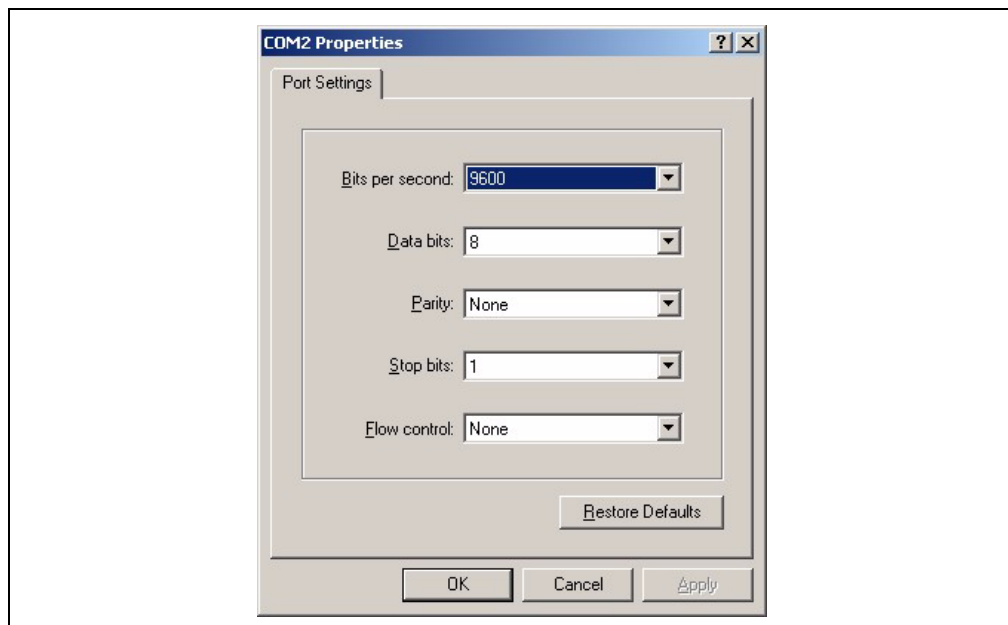
MCP2120/22 Developer's Board User's Guide

FIGURE D-2: HyperTerminal® PROGRAM PROPERTIES CONNECT TO WINDOW



This will open up the Port Settings window. The port settings should be configured as shown in Figure D-3 with the “Bits per second” selected with 115200. After configuring the port settings, select **OK**. The Figure D-2 window will be shown. Select the **Settings** tab.

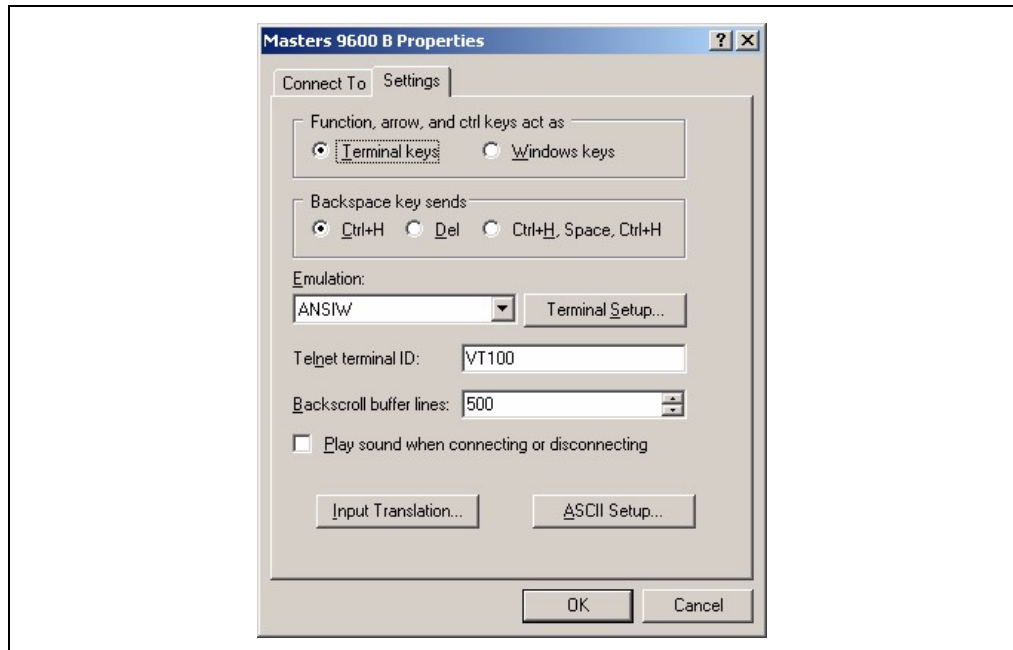
FIGURE D-3: HyperTerminal® PROGRAM PROPERTIES CONFIGURATION WINDOW



Configuring the HyperTerminal® Program

The window will now look as shown in Figure D-4. Ensure that your settings match the settings shown. Select the **ASCII Setup** button. This will open the ASCII Setup window (Figure D-5).

FIGURE D-4: HyperTerminal® PROGRAM PROPERTIES SETTINGS WINDOW



Ensure that your settings match the settings shown. Select the **OK** button. The window in Figure D-4 will again be shown. Select the **Input Translation** button. This will open the Translation Button window (Figure D-6). Click **OK** and close each window. After these “property” windows are closed, you may wish to save each configuration with a name that you can remember (one for COM1 and the other for COM2).

FIGURE D-5: HyperTerminal® PROGRAM ASCII SETUP WINDOW

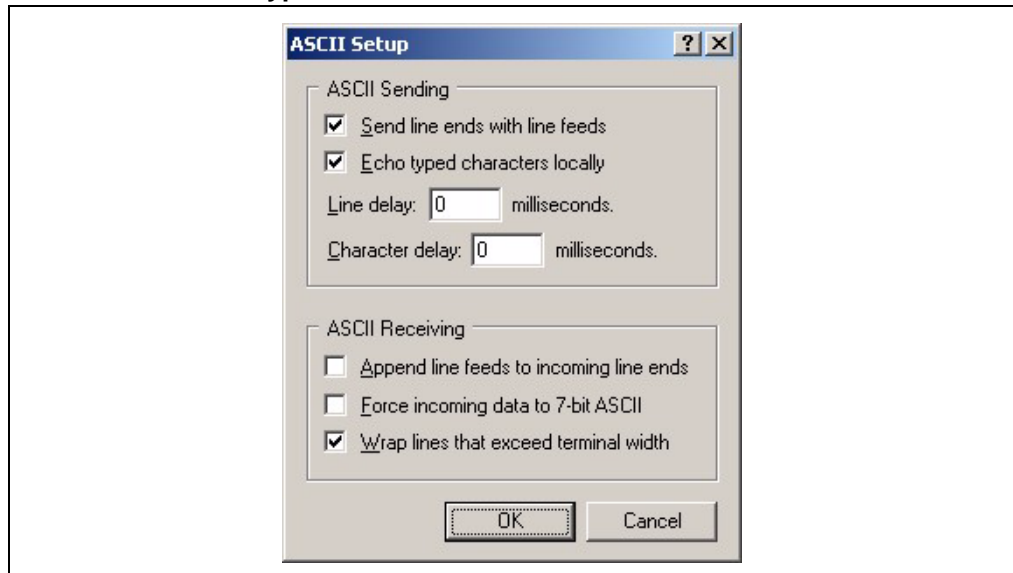
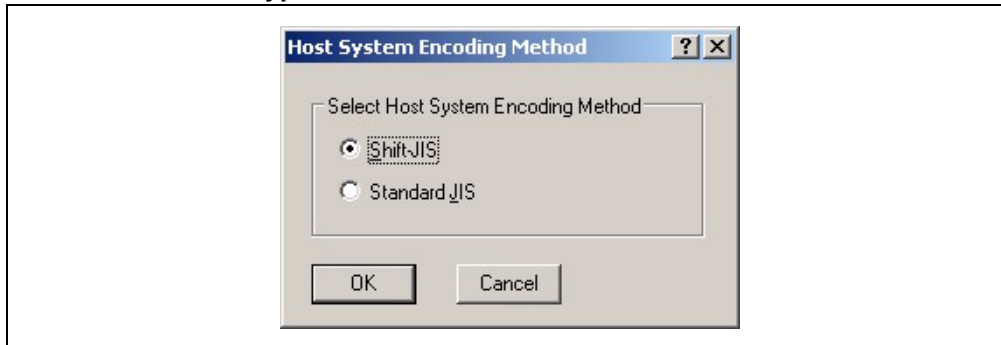


FIGURE D-6: HyperTerminal® PROGRAM INPUT TRANSLATION WINDOW



Appendix E. Continuously Transmitted Data Table

FIGURE E-1: CONTINUOUSLY TRANSMITTED DATA TABLE

"12345678", 0x0D, 0x0A	; 10 Characters - 10
"2BCDEFGH", 0x0D, 0x0A	; 10 Characters - 20
"32345678", 0x0D, 0x0A	; 10 Characters - 30
"4bcdefgh", 0x0D, 0x0A	; 10 Characters - 40
"52345678", 0x0D, 0x0A	; 10 Characters - 50
"6BCDEFGH", 0x0D, 0x0A	; 10 Characters - 60
"72345678", 0x0D, 0x0A	; 10 Characters - 70
"8bcdefgh", 0x0D, 0x0A	; 10 Characters - 80
"92345678", 0x0D, 0x0A	; 10 Characters - 90
"ABCDEFGH", 0x0D, 0x0A	; 10 Characters - 100
"B2345678", 0x0D, 0x0A	; 10 Characters - 110
"Cbcdefgh", 0x0D, 0x0A	; 10 Characters - 120
"D2345678", 0x0D, 0x0A	; 10 Characters - 130
"EBCDEFGH", 0x0D, 0x0A	; 10 Characters - 140
"F2345678", 0x0D, 0x0A	; 10 Characters - 150
"1bcdefgh", 0x0D, 0x0A	; 10 Characters - 160
"22345678", 0x0D, 0x0A	; 10 Characters - 170
"3BCDEFGH", 0x0D, 0x0A	; 10 Characters - 180
"42345678", 0x0D, 0x0A	; 10 Characters - 190
"5bcdefgh", 0x0D, 0x0A	; 10 Characters - 200
"62345678", 0x0D, 0x0A	; 10 Characters - 210
"7BCDEFGH", 0x0D, 0x0A	; 10 Characters - 220
"82345678", 0x0D, 0x0A	; 10 Characters - 230
"9bcdefgh", 0x0D, 0x0A	; 10 Characters - 240
"a2345678", 0x0D, 0x0A	; 10 Characters - 250

NOTE: 0x0D = Carriage Return, 0x0A = Line Feed

MCP2120/22 Developer's Board User's Guide

NOTES:

Appendix F. Programming the MCP212XDM

Note: The MCP212XDM is shipped with the default demonstration firmware programmed into the PIC18F65J50.

The user may reprogram the PIC18F65J50 with their application firmware or the supplied demo firmware.

The programming will require the following items:

- 1 PC USB port for programming
- 1 MPLAB ICD 2 module (with USB cable)
- 1 RJ-11 to ICSP Adapter (AC164110)
- ".HEX" file to program into device (00239 - CLKGen.HEX)

Figure F-1 shows a high level block diagram for programming the MCP2120/22 Developer's Board. How to program is described in the appropriate MPLAB-IDE and MPLAB-ICD2 documentation.

FIGURE F-1: PROGRAMMING BLOCK DIAGRAM

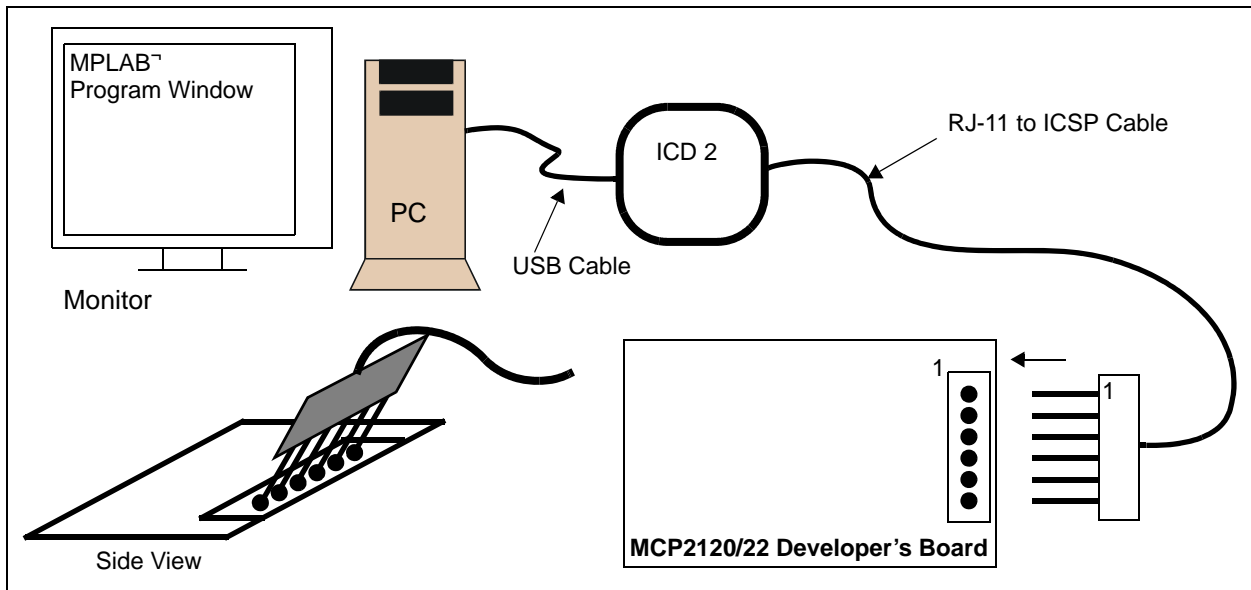


TABLE 6-1: SYSTEM HARDWARE REQUIREMENTS

Qty	Hardware	Purpose
1	PC with one USB port	To run MPLAB-IDE and communicate to the ICD or ICE hardware.
1	ICD2, ICD3, or Real ICE	To program the MCP2120/22 Developer's Board PIC18F65J50 device.
1	RJ-11 to ICSP Adapter (AC164110)	Converts RJ-11 connector of ICD 2 to pins to use for programming the PICkit interface on the MCP2120/22 Developer's Board.
—	MCP2120/22 Developer's Board	The board to program



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

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

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

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4080

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

03/26/09