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INTRODUCTION

This chapter contains general information that will be useful to know before using the MCP2515 PIgment™ 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 MCP2515 PIgment™ Demo Board. The manual layout is as follows:

- Chapter 1. “Product Overview” – Important information about the MCP2515 PIgment™ Demo Board.
- Chapter 2. “Installation and Operation” – Includes instructions on how to get started with this evaluation board.
- Appendix A. “Schematics and Layouts” – Shows the schematic and layout diagrams for the MCP2515 PIgment™ Demo Board.
- Appendix B. “Bill of Materials (BOM)” – Lists the parts used to build the MCP2515 PIgment™ Demo Board.
CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

<table>
<thead>
<tr>
<th>DOCUMENTATION CONVENTIONS</th>
<th>Description</th>
<th>Represents</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arial font:</td>
<td>Referenced books</td>
<td><em>MPLAB® IDE User's Guide</em></td>
<td>...is the <em>only</em> compiler...</td>
</tr>
<tr>
<td>Italic characters</td>
<td>Emphasized text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial caps</td>
<td>A window</td>
<td>the Output window</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A dialog</td>
<td>the Settings dialog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A menu selection</td>
<td>select Enable Programmer</td>
<td></td>
</tr>
<tr>
<td>Quotes</td>
<td>A field name in a window or dialog</td>
<td><em>“Save project before build”</em></td>
<td></td>
</tr>
<tr>
<td>Underlined, italic text</td>
<td>A menu path</td>
<td><em>File&gt;Save</em></td>
<td></td>
</tr>
<tr>
<td>with right angle bracket</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bold characters</td>
<td>A dialog button</td>
<td>Click <em>OK</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A tab</td>
<td>Click the <em>Power</em> tab</td>
<td></td>
</tr>
<tr>
<td>N'Rnnnn</td>
<td>A number in verilog format, where N</td>
<td><em>4'b0010, 2'hF1</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>is the total number of digits, R is</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the radix and n is a digit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text in angle brackets</td>
<td>A key on the keyboard</td>
<td>Press &lt;Enter&gt;, &lt;F1&gt;</td>
<td></td>
</tr>
</tbody>
</table>

RECOMMENDED READING

For more information regarding the Stand-Alone Controller Area Network (CAN) controller, CAN I/O Expander and CAN transceiver devices, refer to the appropriate data sheet. Table 1 shows the device and associated Data Sheet (DS) literature number. These documents can be downloaded from the Microchip web site at: www.microchip.com.

<p>| TABLE 1: DEVICES AND DATA SHEET LITERATURE NUMBERS |
|-----------------------------------------------|----------------|----------------|----------------|</p>
<table>
<thead>
<tr>
<th>Device</th>
<th>Literature #</th>
<th>Device</th>
<th>Literature #</th>
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<td>DS21801</td>
<td>MCP2502X/5X</td>
<td>DS21664</td>
</tr>
<tr>
<td>MCP2551</td>
<td>DS21667</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
THE MICROCHIP WEB SITE

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

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

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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support
- Development Systems Information Line

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 (August 2005)

- Initial release of this document.
Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the MCP2515 PICtail™ Demo Board and covers the following topics:

- What is the MCP2515 PICtail™ Demo Board?
- What the MCP2515 PICtail™ Demo Board kit includes

1.2 WHAT IS THE MCP2515 PICtail™ DEMO BOARD?

The MCP2515 PICtail™ Demo Board allows the system designer to quickly evaluate the operation of the MCP2515 Stand-Alone CAN Controller. The board demonstrates the MCP2515 in a CAN bus environment.

In addition, the kit includes an MCP25020 CAN I/O Expander node which demonstrates the device on a CAN bus.

1.3 WHAT THE MCP2515 PICtail™ DEMO BOARD KIT INCLUDES

This MCP2515 PICtail™ Demo Board Kit includes:

- One MCP2515 PICtail™ Demo Board with two CAN nodes
  - One node includes a PIC16F676, a MCP2515 CAN controller and a MCP2551 transceiver.
  - The other node includes a MCP25020 CAN I/O expander and an MCP2551 transceiver.
  - The CAN nodes can be physically separated by snapping them apart at the perforation.
- One power/bus cable for connecting the two PCB sections together
- MCP2515 Data Sheet (DS21801) (electronic version on CD)
- MCP2502X/5X Data Sheet (DS21664) (electronic version on CD)
- MCP2551 Data Sheet (DS21667) (electronic version on CD)
- MCP2515 PICtail™ Demo Board User’s Guide (DS21572) (electronic version on CD)
Chapter 2. Installation and Operation

2.1 INTRODUCTION

This chapter discusses the setup and operation of the MCP2515 PICtail™ Demo Board.

The MCP2515 PICtail™ Demo Board is designed to demonstrate the MCP2515 and MCP25020 as simple, low-cost CAN nodes. Both nodes monitor an input push button and send CAN messages with the button condition at regular intervals. The CAN message is received by the other node, where a LED is set to mirror the button state.

2.2 FEATURES

The MCP2515 PICtail™ Demo Board has the following features:

- Two (2) CAN nodes consisting of:
  - **Node A**: MCP2515, PIC16F676 and a MCP2551 CAN transceiver.
  - **Node B**: MCP25020 CAN I/O Expander and MCP2551 CAN transceiver.
- Each node also has one push button and one LED connected to the I/O.
  - The push button state from each node is sent to the other node via a CAN message.
- Two headers on Node A, used for programming the PICmicro® Microcontroller Unit (MCU) using the programming features of the PICkit™ 1 Flash Starter Kit or PICkit™ 2 Microcontroller Programmer. Neither header is populated. Refer to **Appendix A. “Schematics and Layouts”**.
2.3 GETTING STARTED

The MCP2515 PICtail™ Demo Board is a fully-functional, assembled and tested board for evaluation of the MCP2515 Stand-Alone CAN controller in a simple CAN environment. In addition, the MCP25020 CAN I/O Expander can be observed in operation. The following describes the basic setup and operation (see Figure 2-1):

1. Either connect a power supply (5 V) using the VDD and GND test points, or plug a 9V power supply or power adapter into the plug.
2. Observe that RXCAN, TXCAN, and INT LEDs flash at regular intervals.
3. Node A (MCP2515) samples its input (push button) and sends to Node B instructing it to drive its LED to the input corresponding level of the switch.
4. Node A also requests Node B’s I/O status (push button) at the same interval and drives its LED as required.

2.3.1 PICkit™ 1 Flash Starter Kit and PICkit™ 2 Microcontroller Programmer Connections

The MCP2515 PICtail™ Demo Board has two headers (not populated), which allows the PICkit™ 1 Flash Starter Kit or PICkit™ 2 Microcontroller Programmer to be used to reprogram the PICmicro® MCU. Refer to the PICkit™ 2 Microcontroller Programmer User’s Guide (DS51553) for more information on programming PICmicro MCUs.
2.4 FIRMWARE DESCRIPTION

See Figure 2-2 and Figure 2-3 for a simple firmware flow diagram for Node A (Node B does not contain any firmware).

1. The firmware first configures the PIC16F676 and the MCP2515.
2. The firmware then checks a global flag bit to determine if a message needs to be sent (a message containing the input button value is transmitted once every 224 ms).
   2a. Node A sends a message to Node B requesting I/O status (i.e., push button status).
3. The firmware checks a global receive flag bit to determine if a message has been received by the MCP2515. If yes, the data is read and the LED is set accordingly.
4. The firmware loops back to #2.

FIGURE 2-2: FIRMWARE FLOW DIAGRAM
FIGURE 2-3: SERVICE I/O FIRMWARE FLOW

START

Button Pressed?

TX0D3<4> = 1
(TX0D3 = 0x10)
LED = OFF

RC1 = 1
TX0D3<4> = 0
(TX0D3 = 0x00)
LED = ON

NO
YES

= 1

TXB0
SendMsg

TXB1
SendMsg

Clear gSampleFlag

gRXFlag?

= 0

RXMsg

RC2 = 0
OFF

RC2 = 1
ON

Clear gRXFlag

A
A
A

This flag is set in the ISR when Timer 0 times out 16 times (256 ms).

This is the message that requests the I/O status (i.e., push button status) from Node B (MCP25020).

This flag is set in the ISR for the INT pin.

This flag is set in the ISR when Timer 0 times out 16 times (256 ms).

This is the message that requests the I/O status (i.e., push button status) from Node B (MCP25020).

This flag is set in the ISR when Timer 0 times out 16 times (256 ms).

This is the message that requests the I/O status (i.e., push button status) from Node B (MCP25020).
Appendix A. Schematics and Layouts

A.1 INTRODUCTION

This appendix contains the schematic and PCB layout for the MCP2515 PICtail™ Demo Board. Diagrams included:

- Board Schematic – Sheet 1 of 2
- Board Schematic – Sheet 2 of 2
- Board – Top Layer (with silk-screen)
- Board – Bottom Layer
FIGURE A-2: BOARD SCHEMATIC – SHEET 2 OF 2
## Appendix B. Bill of Materials (BOM)

<table>
<thead>
<tr>
<th>Qty</th>
<th>Reference</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Part Number</th>
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</thead>
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<td>C3, C4, C5, C7, C11</td>
<td>CAP .1 µF 16V CERAMIC X7R 0805</td>
<td>Panasonic® - ECG</td>
<td>ECJ-2VB1C104K</td>
</tr>
<tr>
<td>1</td>
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<td>CAP 1.0 µF 10V CERAMIC X7R 0805</td>
<td>Kemet®</td>
<td>C0805C105K8RACTU</td>
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<tr>
<td>2</td>
<td>C10, C13</td>
<td>CAP 10000PF 50V CERAMIC X7R 0805</td>
<td>Kemet</td>
<td>C0805C103K5RACTU</td>
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<tr>
<td>6</td>
<td>D1, D2, D4, D6, D7, D8, D9</td>
<td>LED RED CLEAR 0805 SMD</td>
<td>Lite-On Trading USA Inc</td>
<td>LTST-C170CKT</td>
</tr>
<tr>
<td>8</td>
<td>GND, GND1, TP1, TP2, TP3, TP4, TP4, VDD, VDD1</td>
<td>PC TEST POINT COMPACT SMT</td>
<td>Keystone Electronics®</td>
<td>5016</td>
</tr>
<tr>
<td>2</td>
<td>J2, J3</td>
<td>CONN HEADER 10POS .100 VERT TIN</td>
<td>Molex®/Waldom® Electronics Corp</td>
<td>10-88-1101</td>
</tr>
<tr>
<td>1</td>
<td>J4</td>
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<td>MCP2551-I/SL</td>
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<td>Microchip Technology Inc.</td>
<td>MCP25020-I/SL</td>
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<td>Murata® Electronics North America</td>
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