44-PIN DEMO BOARD
USER'S GUIDE

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

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• 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.

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Preface

NOTICE TO CUSTOMERS

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

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE on-line help. Select the Help menu, and then Topics to open a list of available on-line help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the 44-Pin Demo Board. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Warranty Registration
- Recommended Reading
- The Microchip Web Site
- Development Systems Customer Change Notification Service
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to use the 44-Pin Demo Board as a development tool to emulate and debug firmware on a target board. The manual layout is as follows:

- **Chapter 1. "44-Pin Demo Board Overview"** – This chapter provides an overview of the 44-Pin Demo Board for Microchip's 44-pin Thin Quad Flatpack (TQFP) PICmicro® Microcontroller Units (MCU).
- **Appendix A. "Hardware Schematics"** – Illustrates the 44-Pin Demo Board hardware schematic diagram, PCB layout and Bill of Materials.

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CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	`#define START`
	Filenames	`autoexec.bat`
	File paths	`c:\mcc18\h`
	Keywords	`_asm, _endasm, static`
	Command-line options	`-Opa+, -Opa-`
	Bit values	`0, 1`
	Constants	`0xFF, 'A'`
Italic Courier New	A variable argument	`file`.o, where `file` can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options] file [options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`

	Represents code supplied by user	`void main (void)`
		`{ ...`
		`}`

WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending in the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available at the Microchip web site.

RECOMMENDED READING

This user's guide describes how to use the 44-Pin Demo Board. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

PIC16F91X Data Sheet (DS41250)

Consult this document for information regarding the PIC16F91X 28/40/44-Pin Flash-Based, 8-Bit CMOS Microcontrollers with LCD Driver and nanoWatt Technology device specification.

PICkit™ 2 Microcontroller Programmer User's Guide (DS51553)

Consult this document for instructions on how to use the PICkit 2 Microcontroller Programmer software and hardware.

MPLAB® ICD User's Guide (DS51184)

Consult this document for more information pertaining to the features and functions of the MPLAB In-Circuit Debugger (ICD) software.

MPLAB® IDE Simulator, Editor User's Guide (DS51025)

Consult this document for more information pertaining to the installation and features of the MPLAB Integrated Development Environment (IDE) Software.

Readme Files

For the latest information on using other tools, read the tool-specific Readme files in the Readmes subdirectory of the MPLAB IDE installation directory. The Readme files contain update information and known issues that may not be included in this user's guide.

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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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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools. These include the MPLAB C18 and MPLAB C30 C compilers; MPASM™ and MPLAB ASM30 assemblers; MPLINK™ and MPLAB LINK30 object linkers; and MPLIB™ and MPLAB LIB30 object librarians.
- **Emulators** – The latest information on Microchip in-circuit emulators.This includes the MPLAB ICE 2000 and MPLAB ICE 4000.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debugger, MPLAB ICD 2.
- **MPLAB® IDE** – The latest information on Microchip MPLAB IDE, the Windows® Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB SIM simulator, MPLAB IDE Project Manager and general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include the MPLAB PM3 and PRO MATE® II device programmers and the PICSTART® Plus and PICkit® 1 development programmers.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- 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 2006)

Initial release of this document.

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Chapter 1. 44-Pin Demo Board Overview

1.1   INTRODUCTION

The 44-Pin Demo Board is a small and simple demonstration PCB for Microchip's 44-pin Thin Quad Flatpack (TQFP) PICmicro® Microcontroller Units (MCU). It is populated with a PIC16F917 MCU, eight LEDs, push button and potentiometer. The demo board has several test points to access the I/O pins of the MCU and a surface mount prototyping area. The MCU can be programmed with the PICkit™ 2 Microcontroller Programmer or the MPLAB® ICD 2 using the RJ-11 to 6-pin inline adapter (AC164110).

1.2   HIGHLIGHTS

This chapter discusses:

* Devices supported by the 44-Pin Demo Board
* The 44-Pin Demo Board Overview
* Running the Default Demonstration

1.3   DEVICES SUPPORTED BY THE 44-PIN DEMO BOARD

The 44-Pin Demo Board can be used with virtually any 44-pin Thin Quad Flatpack (TQFP) PICmicro MCU. The assembled 44-Pin Demo Board is populated with a PIC16F917-I/PT microcontroller.

Additional 44-Pin Demo Boards can be ordered from Microchip Technology and distributors. Part number, DM164120-2, comes with one assembled and two blank 44-Pin Demo Boards. The blank demo board can be used for evaluating or prototyping circuits using any of the 44-pin devices listed below.

44-pin TQFP Flash Devices:

• PIC16F74	• PIC16F747	• PIC16F77
• PIC16F777	• PIC16F871	• PIC16F874A
• PIC16F877A	• PIC16F917	• PIC18F4220
• PIC18F4320	• PIC18F4331	• PIC18F4410
• PIC18F4420	• PIC18F4431	• PIC18F4450
• PIC18F4455	• PIC18F4480	• PIC18F44J10
• PIC18F4510	• PIC18F4515	• PIC18F4520
• PIC18F4525	• PIC18F4550	• PIC18F4580
• PIC18F4585	• PIC18F45J10	• PIC18F4610
• PIC18F4620	• PIC18F4680	

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1.4   44-PIN DEMO BOARD OVERVIEW

The 44-Pin Demo Board is populated with a PIC16F917 MCU (U1), eight LEDs (DS1-DS8), push button (SW1) and potentiometer (RP1). The board layout is shown in Figure 1-1. The demo board has several test points to access the I/O pins of the MCU and a surface mount prototyping area. The MCU can be programmed with the PICkit™ 2 Microcontroller Programmer from header P1.

FIGURE 1-1:   44-PIN DEMO BOARD
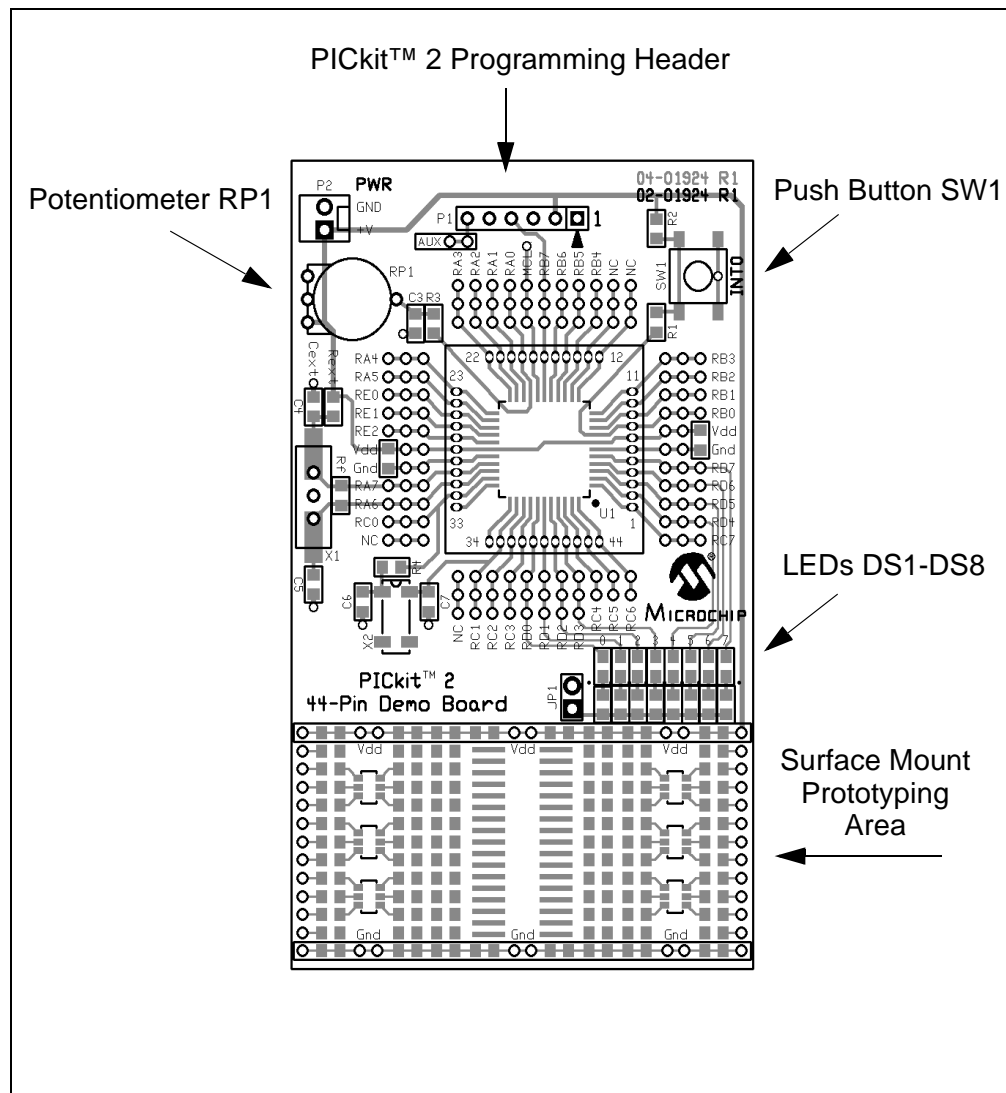

1.5   RUNNING THE DEFAULT DEMONSTRATION

The assembled 44-Pin Demo Board comes preprogrammed with a demonstration program. To use this program, power the demo board (3.0 - 5.5VDC) using a PICkit™ 2 Microcontroller Programmer, or a bench power supply connected to header P2. To use the PICkit™ 2 Microcontroller Programmer, connect it to a PC USB port using the USB cable. Start the PICkit™ 2 Microcontroller Programmer PC application and click on the target power box to apply power to the demo board. The demo program will blink the eight red lights in succession. Press the push button switch, labeled SW1, and the sequence of the lights will reverse. Rotate the potentiometer, RP1, and the light sequence will blink at a different rate.

Appendix A. Hardware Schematics

A.1 INTRODUCTION

This appendix contains the 44-Pin Demo Board schematic, PCB layout and Bill of Materials.

FIGURE A-1: 44-PIN DEMO BOARD SCHEMATIC DIAGRAM
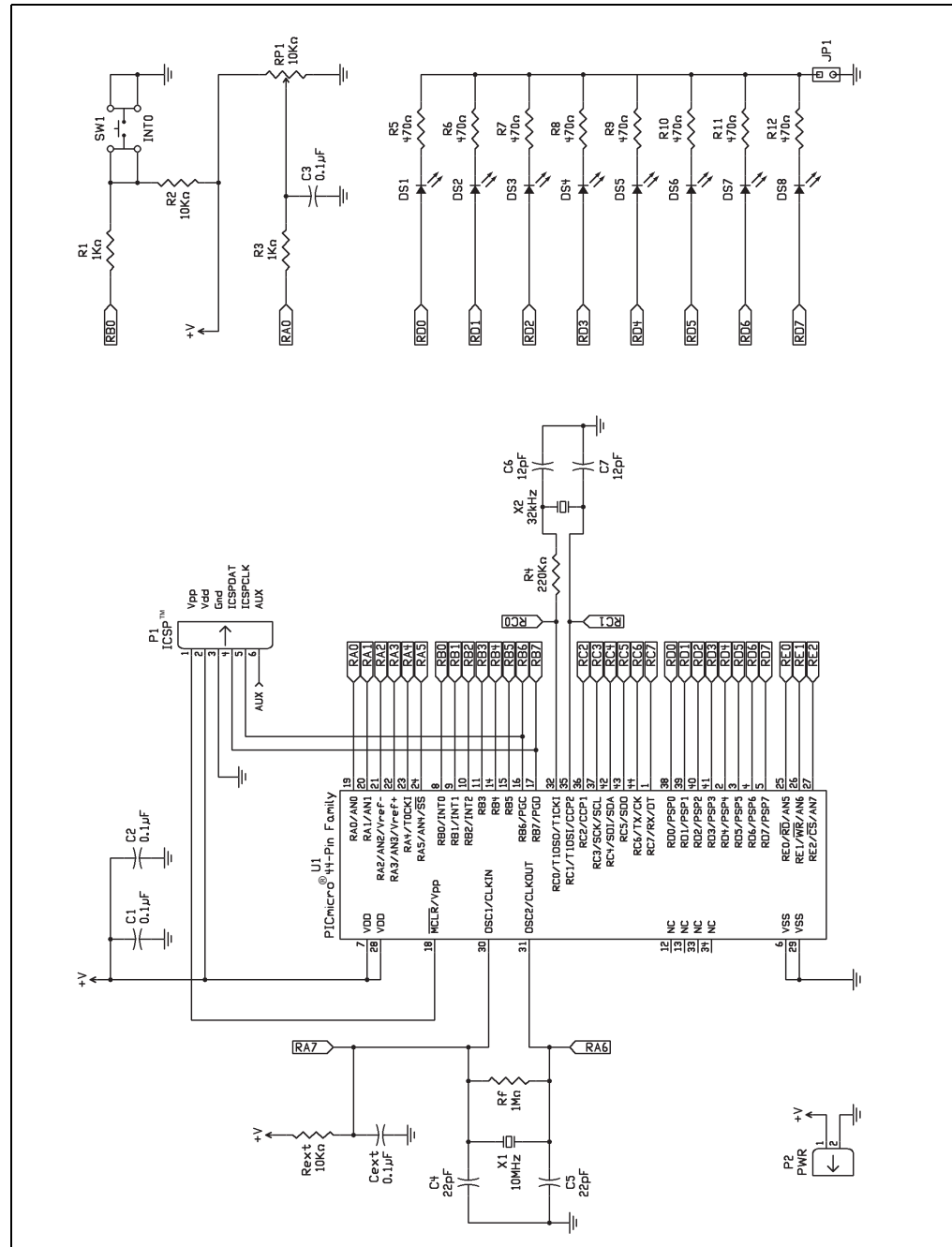
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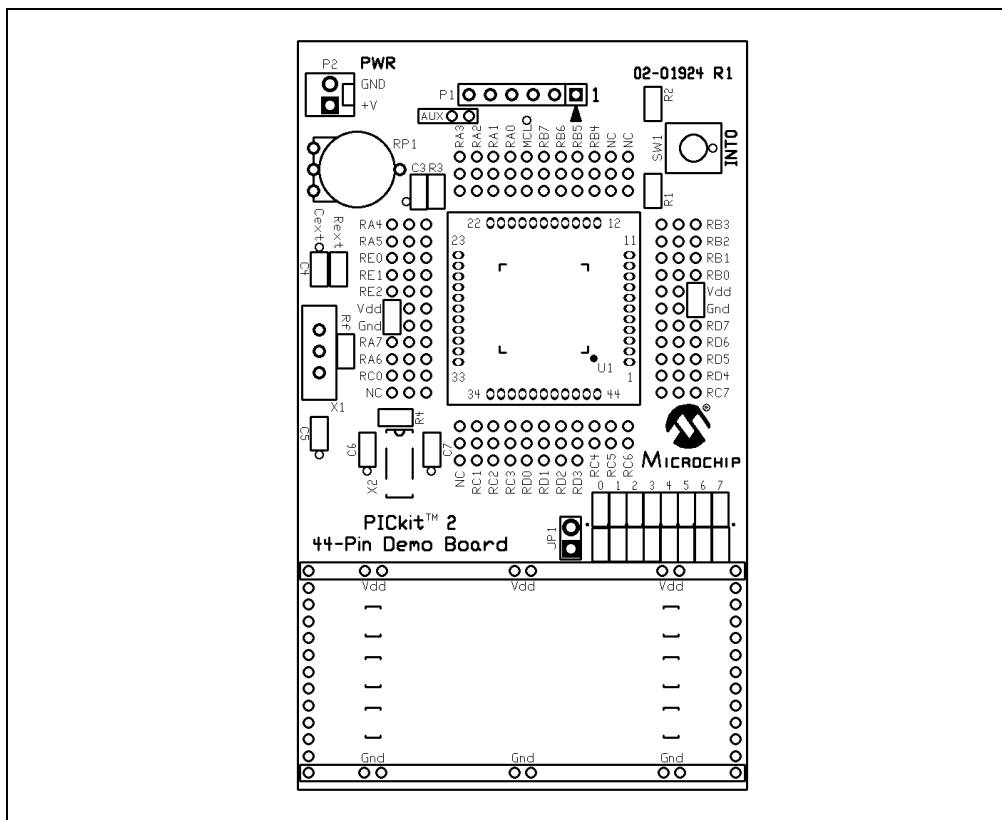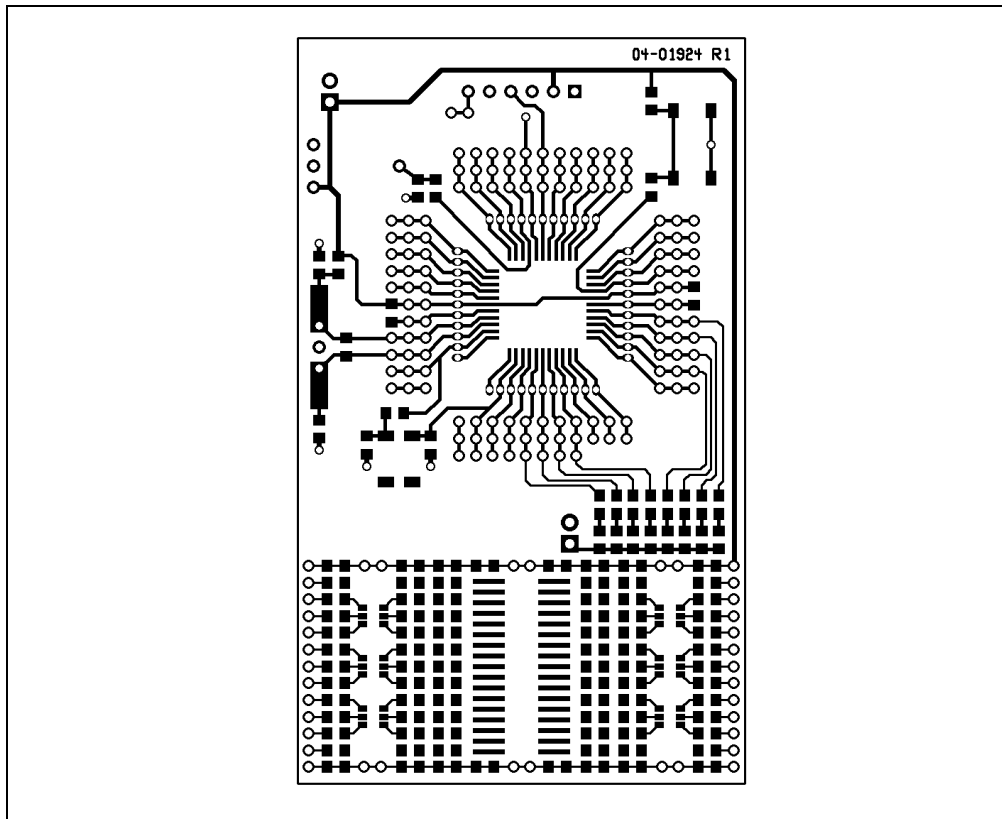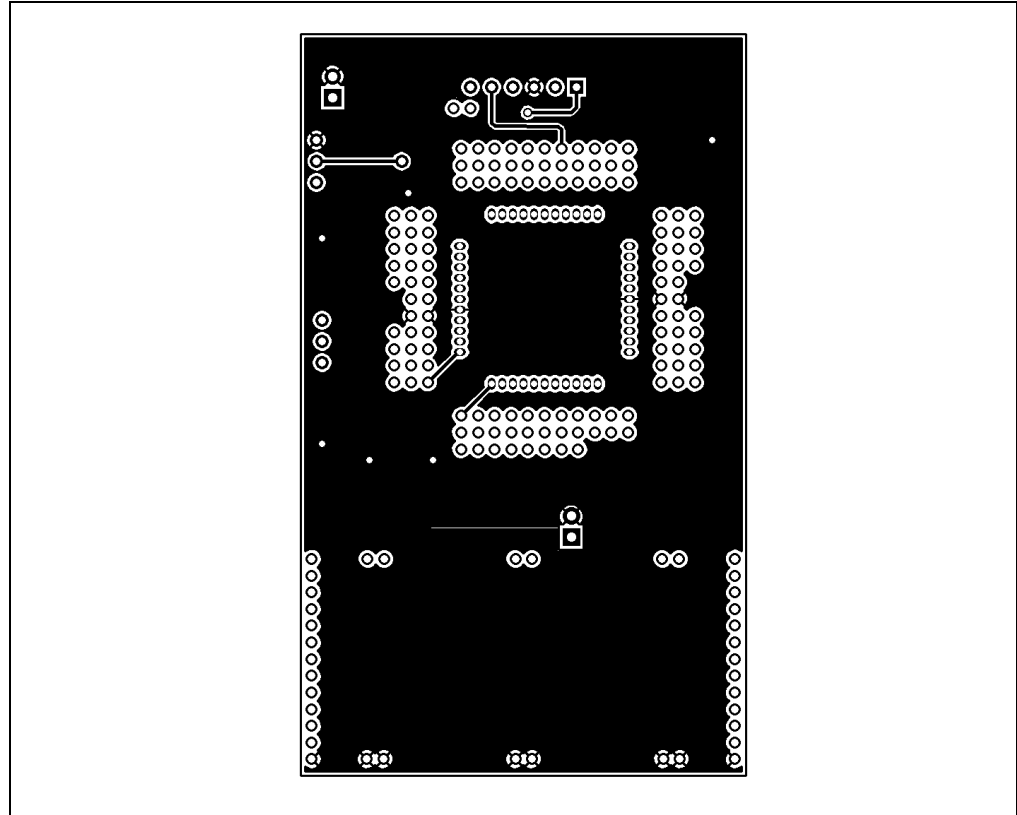**FIGURE A-2:** **44-PIN DEMO BOARD SILKSCREEN**

FIGURE A-3: **44-PIN DEMO BOARD TOP COPPER**

Hardware Schematics

FIGURE A-4:   44-PIN DEMO BOARD BOTTOM COPPER

TABLE A-1:   44-PIN DEMO BOARD BILL OF MATERIALS

Bill of Materials		
Designation	**Qty**	**Description**
C1, C2, C3	3	Capacitor, Ceramic, 0805 SMT, 0.1 µF, 16V, 5%, X7R
R5-R12	8	Resistor, 0805 SMT, 470Ω, 5%, 1/8W
R1, R3	2	Resistor, 0805 SMT, 1 kΩ, 5%, 1/8W
R2	1	Resistor, 0805 SMT, 10 kΩ, 5%, 1/8W
RP1	1	Potentiometer 10 kΩ, thumbwheel
DS1-DS8	8	LED, 0805 SMT, Red Clear
SW1	1	Switch, push button, momentary
U1 – Microcontroller	1	44-pin PICmicro® MCU
P1	1	Connector, header, right-angle, 6-pin, 0.100" spacing, 0.025" square
JP1	1	Connector, header, 2-pin, 0.100" spacing, 0.025" square
Rubber feet	4	Bumpon square, 0.40 x 0.10, black

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