



MCP1710
Demo Board
User's Guide

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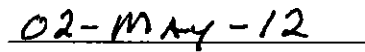
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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA



Derek Carlson
VP Development Tools



Date

MCP1710 Demo Board User's Guide

NOTES:

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NOTES:

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 online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the MCP1710 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 MCP1710 Demo Board. The manual layout is as follows:

- **Chapter 1. “Product Overview”** – Important information about the MCP1710 Demo Board.
- **Chapter 2. “Installation and Operation”** – Includes instructions on how to get started with the MCP1710 Demo Board and a description of the user's guide.
- **Appendix A. “Schematic and Layouts”** – Shows the schematic and layout diagrams for the MCP1710 Demo Board.
- **Appendix B. “Bill of Materials”** – Lists the parts used to build the MCP1710 Demo 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) { ... }

RECOMMENDED READING

This user's guide describes how to use the MCP1710 Demo Board. Another useful document is listed below. The following Microchip document is available and recommended as a supplemental reference resource:

- **MCP1710 Data Sheet – “Ultra-Low Quiescent Current LDO Regulator” (DS25158)**

THE MICROCHIP WEB SITE

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- **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
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- Distributor or Representative
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- 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://www.microchip.com/support>.

DOCUMENT REVISION HISTORY

Revision A (October 2012)

- Initial Release of this Document.

NOTES:

Chapter 1. Product Overview

1.1 INTRODUCTION

This chapter provides an overview of the MCP1710 Demo Board and covers the following topics:

- MCP1710 Short Overview
- What Is the MCP1710 Demo Board?
- MCP1710 Demo Board Kit Contents

1.2 MCP1710 SHORT OVERVIEW

The MCP1710 is a 200 mA for $V_{OUT} < 3.5V$, 100 mA for $V_{OUT} > 3.5V$, Low Dropout (LDO) linear regulator that provides high-current and low-output voltages, while maintaining an ultra-low 20 nA of quiescent current while the device is running. The MCP1710 also can be shutdown for an even lower 0.1 nA (typical) supply current draw. The MCP1710 comes in five standard fixed-output voltage versions 1.2V, 1.8V, 2.5V, 3.3V and 4.2V. The 200 mA output current capability, combined with the low output voltage capability, make the MCP1710 a good choice for new ultra-long-life LDO applications that have high-current demands but require ultra-low power consumption while operating in sleep mode.

The MCP1710 is stable using ceramic output capacitors that inherently provide lower output noise and reduce the size and cost of the entire regulator solution. Only 1 μF (2.2 μF recommended) of output capacitance is needed to stabilize the LDO.

The MCP1710's ultra-low quiescent and shutdown current allows it to be paired with other ultra-low current draw devices like Microchip's XLP nanoWatt technology devices, for a complete ultra-low power solution.

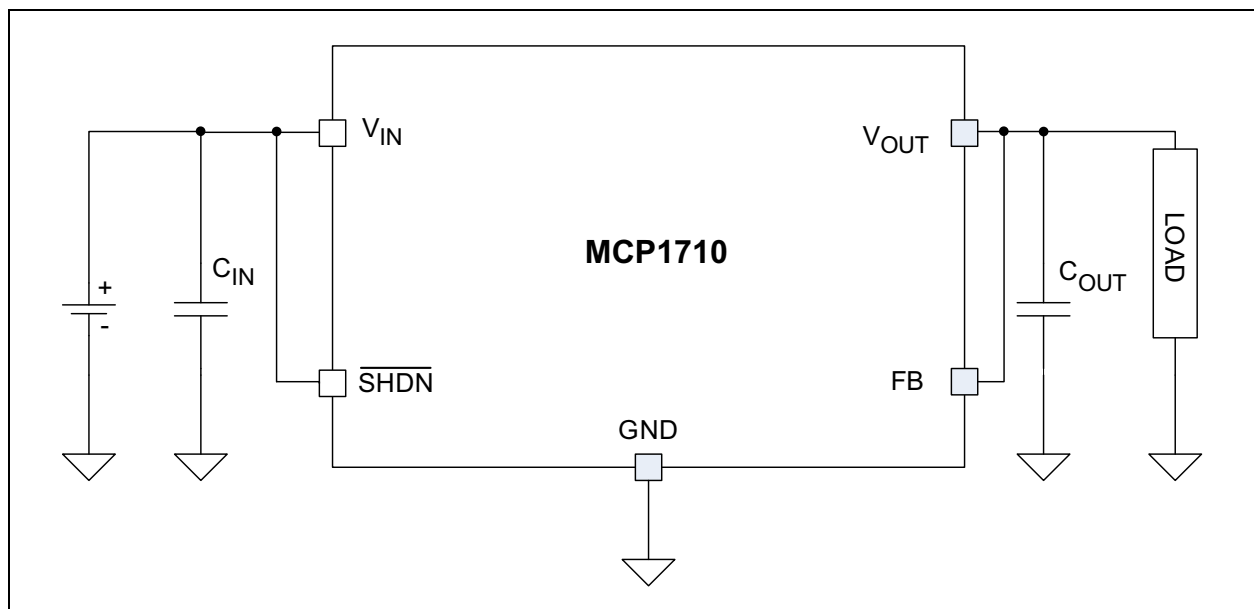


FIGURE 1-1: Typical MCP1710 Application.

1.3 WHAT IS THE MCP1710 DEMO BOARD?

The MCP1710 Demo Board is designed to operate from a 2.7V to 5.5V input and regulate the output voltage to a specified fixed value. Test points for input voltage and output voltage are provided to demonstrate the capability of the demo board over the entire range. The MCP1710 Demo Board was designed using small surface-mount components to show application size for an ultra-low power, high-current, voltage regulator application.

1.4 MCP1710 DEMO BOARD KIT CONTENTS

This MCP1710 Demo Board kit includes the following items:

- MCP1710 Demo Board
- Important Information Sheet

Chapter 2. Installation and Operation

2.1 INTRODUCTION

2.1.1 MCP1710 Features

The MCP1710 device has been developed to provide ultra-low power applications with a precise, regulated rail.

The key features of the MCP1710 include:

- Ultra-low 20 nA (typical) quiescent current
- Ultra-low shutdown supply current: 0.1 nA (typical)
- 200 mA output current capability for $V_{OUT} < 3.5V$
- 100 mA output current capability for $V_{OUT} > 3.5V$
- Input operating voltage range: 2.7V to 5.5V
- Standard output voltages:
 - 1.2V, 1.8V, 2.5V, 3.3V, 4.2V
- Low dropout voltage: 450 mV (maximum) at 200 mA
- Stable with 1.0 μF ceramic output capacitor
- Over-current protection
- Space-saving, 8-lead plastic 2x2 VDFN-8

2.1.1.1 MCP1710 DEMO BOARD FEATURES

The MCP1710 Demo Board is developed to demonstrate how the MCP1710 device operates over a wide input voltage and load range. Test points are provided for input and output, allowing the demo board to be connected directly to a system.

A copper via connected to the EN input can be used to turn the MCP1710 on and off. Turning the device on, ($EN > 70\%$ of V_{IN}) will enable the device. When the EN pin is less than 30% of V_{IN} , the device output is turned off.

2.2 GETTING STARTED

The MCP1710 Demo Board is fully assembled and tested to evaluate and demonstrate the MCP1710.

2.2.1 Power Input and Output Connection

2.2.1.1 POWERING THE MCP1710 DEMO BOARD

The MCP1710 Demo Board is fully assembled, tested and ready to begin evaluation. Apply positive input voltage to the V_{IN} terminal and its return to the GND terminal. The maximum input voltage should not exceed 5.5V. An electronic load or resistive load can be used for evaluation or the intended system load can be connected. Electronic loads can attempt to sink current at 0V during startup, therefore a resistive load or constant resistance is recommended for startup evaluation. Connect the positive voltage terminal of the load to the V_{OUT} terminal on the demo board, and connect the negative, or return side of the load, to the GND terminal.

2.2.1.2 BOARD TESTING

To test the board, follow these steps:

1. Apply input voltage.
2. An internal pull up resistor is connected from V_{IN} to the EN input of the MCP1710. Once the input voltage is greater than the set output voltage plus $V_{DROPOUT}$ (DS), and after a 30 ms startup delay, the output voltage will be in regulation.
3. Adjusting the input voltage and load should not cause the output to vary more than a few mV over the operating range of the converter.

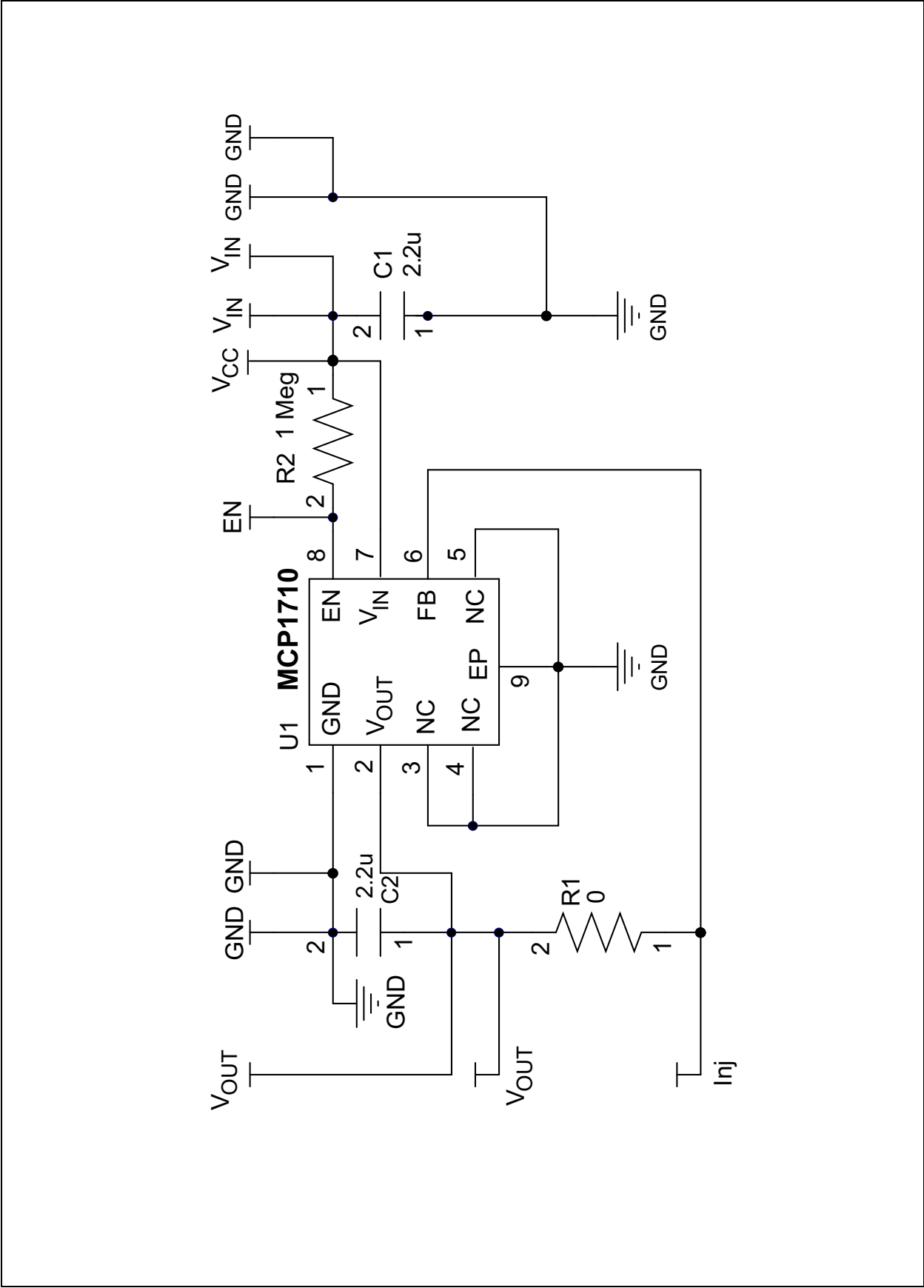
Appendix A. Schematic and Layouts

A.1 INTRODUCTION

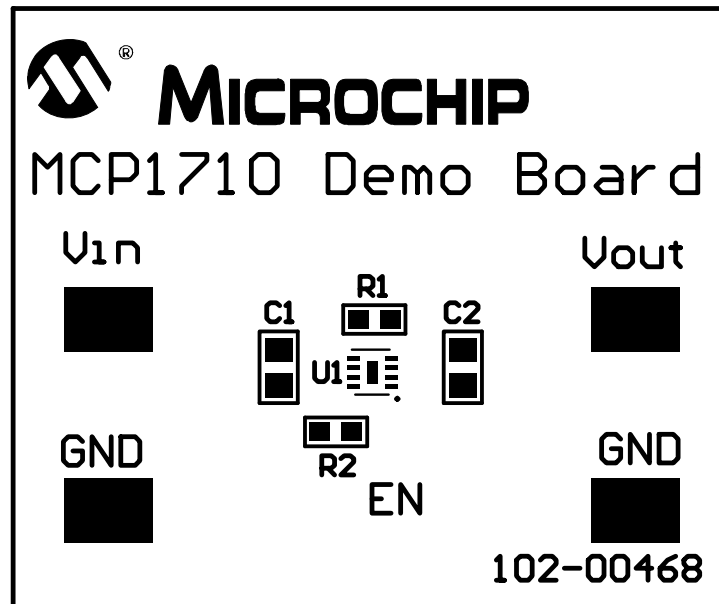
This appendix contains the following schematics and layouts for the MCP1710 Demo Board:

- Board – Schematic
- Board – Top Layer
- Board – Top Copper
- Board – Bottom Copper

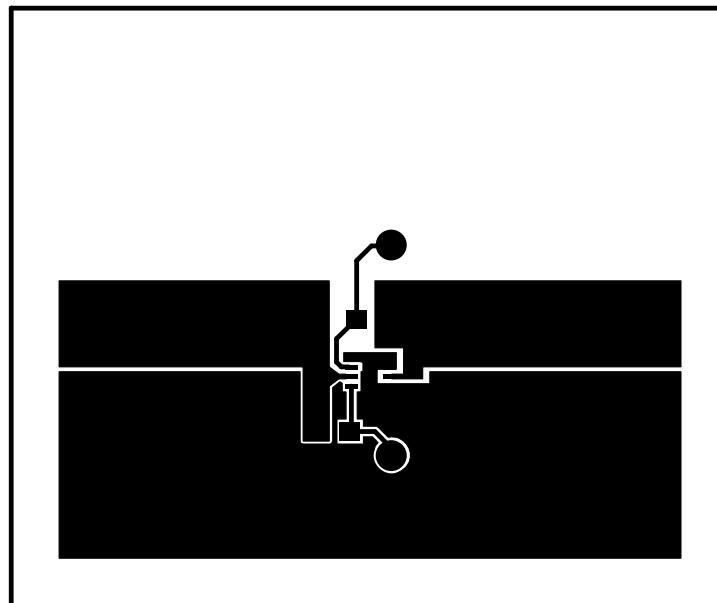
A.2 BOARD – SCHEMATIC



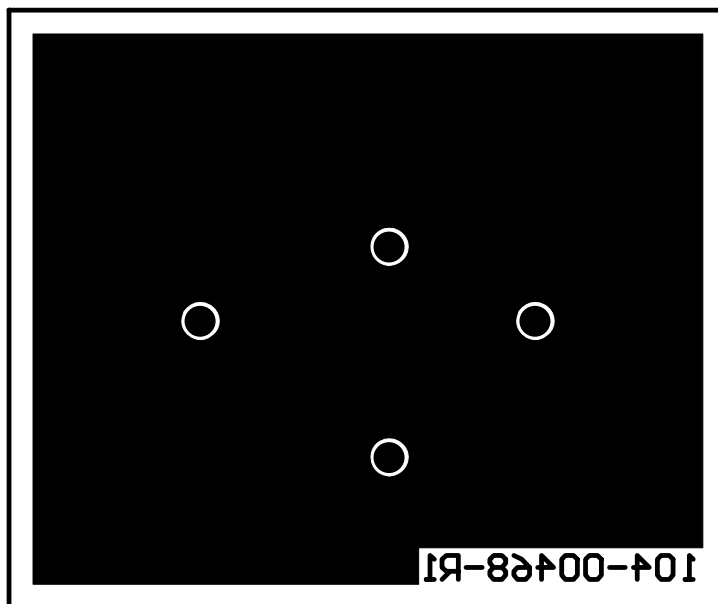
A.3 BOARD – TOP LAYER



A.4 BOARD – TOP COPPER



A.5 BOARD – BOTTOM COPPER



Appendix B. Bill of Materials

TABLE B-1: BILL OF MATERIALS (BOM)

Qty	Reference	Description	Manufacturer	Part Number
2	C1, C2	Cap. 2.2uF 16V ceramic X7R 0805 10%	TDK Corporation	C2012X7R1C225K
1	PCB	MCP1710 2.7 to 5.5V V_{IN} , 2.5V $_{OUT}$ printed circuit board	Microchip Technology Inc.	
1	R1	Res. 0.0 Ohm 1/10W 0603 SMD	Panasonic® - ECG	ERJ-3GEY0R00V
1	R2	Res. 1M Ohm 1/10W 5% 0603 SMD	Stackpole Electronics, Inc.	RMCF0603JT1M00
1	U1	MCP1710 ultra-low quiescent current LDO 2X2 DFN-8	Microchip Technology Inc.	
4	V_{IN} , V_{OUT} , GND, GND	PC test point compact SMT	Keystone Electronics Corp.	5016

Note 1: The components listed in this Bill of Materials are representative of the PCB assembly. The released BOM used in manufacturing uses all RoHS-compliant components.

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