MTCH108 Demonstration Board User's Guide

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MTCH108 DEMONSTRATION BOARD USER'S GUIDE

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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 website (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 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 MTCH108 Demonstration Board User's Guide. Items discussed in this chapter include:

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

DOCUMENT LAYOUT

This document describes how to use the MTCH108 Demonstration Board. The document is organized as follows:

- **Chapter 1. "MTCH108 Demonstration Board Overview"**
- **Chapter 2. "Other Configurations"**
- **Appendix A. "MTCH108 Controller Board Schematic"**
- **Appendix B. "MTCH108 Controller Board Layout"**

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) { ... }`

RECOMMENDED READING

This user's guide describes how to use Microchip's MTCH108 Demonstration Board. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

http://www.microchip.com

"MTCH102/5/8 2, 5 and 8-Channel Proximity/Touch Controller" Data Sheet (DS40001793)

This data sheet provides detailed information regarding the MTCH108 Demonstration Board.

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- **Compilers** – The latest information on Microchip C compilers, assemblers, linkers and other language tools. These include all MPLAB C compilers; all MPLAB assemblers (including MPASM™ assembler); all MPLAB linkers (including MPLINK™ object linker); and all MPLAB librarians (including MPLIB™ object librarian).
- **Emulators** – The latest information on Microchip in-circuit emulators.This includes the MPLAB REAL ICE™ and MPLAB ICE 2000 in-circuit emulators.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit™ 3 debug express.
- **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 IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART® Plus and PICkit 2 and 3.

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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 website at:

http://www.microchip.com/support.

REVISION HISTORY

Revision A (12/2015)

Initial release of this document.

NOTES:

Chapter 1. MTCH108 Demonstration Board Overview

1.1 INTRODUCTION

The MTCH108 Demonstration Board is a very fast and convenient platform to evaluate the MTCH102/105/108 capacitive touch button/proximity solution, and also works as an example for sensor layout and integration with host. The board features up to eight touch buttons with adjustable scan rate and sensitivity, providing touch feedback using LEDs.

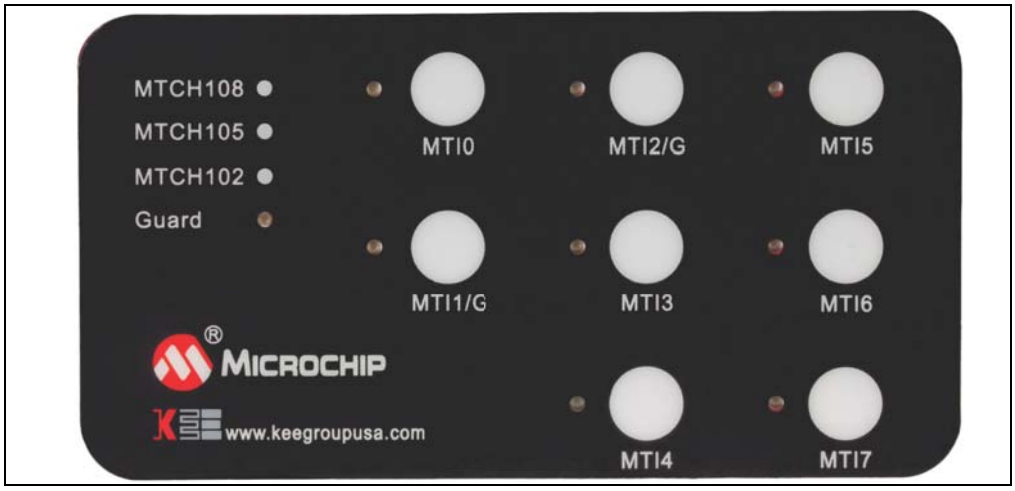
1.1.1 Kit items

- MTCH108 Controller Board with Touch Buttons
- Mini USB Cable

1.2 HARDWARE SETUP

The MTCH108 Demonstration Board uses an MTCH108 controller to detect touch/proximity event on buttons. There is also a preprogrammed PIC10 controller working as a host to control the scan rate of the MTCH108 controller.

FIGURE 1-1: MTCH108 DEMONSTRATION BOARD



1.2.1 On-Board Touch Buttons

There are eight touch buttons implemented on this board, which are 8 mm in diameter. All buttons are encircled by active guard by default.

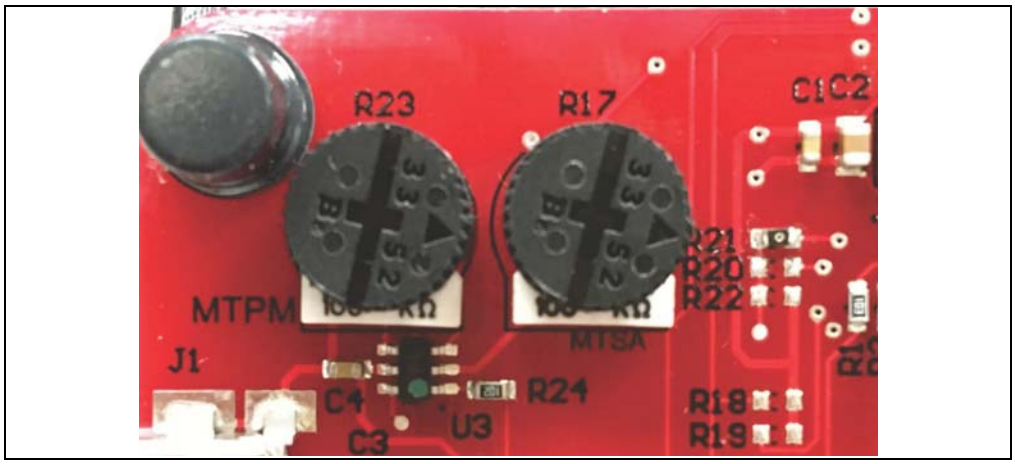
1.2.2 Power-up

The MTCH108 Demonstration Board is powered through the mini USB connector on the left edge of the board. The voltage (5V) from the USB port is then regulated down to 3.3V by the MPC1700 LDO. The USB connector is not used for any kind of communication.

1.2.3 Touch Sensitivity and Power Mode Adjustment

At the top left corner of the back side, there are two potentiometers that allow alternation of the Sensitivity and Power mode of the buttons, as shown in Figure 1-2.

FIGURE 1-2: SENSITIVITY AND POWER MODE BUTTONS



The R17 pin is connected to the MTSA pin of MTCH108 and it directly sets the voltage of the MTSA pin. Dialing the knob to the right will lower the button sensitivity; dialing it to the left will increase the sensitivity.

The R23 pin is used for Power mode adjustment and it is not directly connected to the MTPM pin. The potentiometer affects the voltage on an analog pin of the PIC10 controller. The PIC10 has one pin connect to the MTPM pin of MTCH108, so based on the voltage set by R23, PIC10 generates a waveform to control the MTPM pin.

- If dialing the knob to the most right position, the MTPM pin of MTCH108 receives a steady high waveform, so the MTCH108 controller works at the Normal mode, scanning as fast as it can.
- If dialing the knob to the most left position, the MTPM pin receives a steady low waveform, setting the MTCH108 controller at the Low-Power mode, which scans every 256 ms.
- If the position of the potentiometer is somewhere between the two ends, the MTPM pin receives a pulse waveform, putting the MTCH108 controller into the Smart-Scheduling mode. The pulse interval is preset by the PIC10 firmware, including 32 ms, 64 ms, 96 ms, 128 ms, 160 ms, 192 ms and 224 ms.

For further information on the MTSA and the MTPM pin function, refer to the *"MTCH102/5/8 2, 5 and 8-Channel Proximity/Touch Controller Data sheet"* (DS40001793).

1.2.4 LED Feedback

LEDs are used to provide visual feedback for touch configuration and information.

The LEDs to the right of the MTCH102, MTCH105 and MTCH108 labels indicates which part is populated on this board; by default, MTCH108 is selected.

The LED to the right of the Guard label indicates if the Guard feature is enabled on this board. If the Guard is enabled, this LED will be on when the PIC10 detects the Guard waveform. At the same time, it also provides a visual indication of the scan rate.

The LED next to each touch button indicates the state of the touch button. When the button is triggered, the LED will be lit up.

By default, the board has the Guard feature enabled, so the MTI2 pin outputs the Guard signal instead of behaving as a touch sensor. Therefore, the LED next to the MTI2/G button is not used.

NOTES:

Chapter 2. Other Configurations

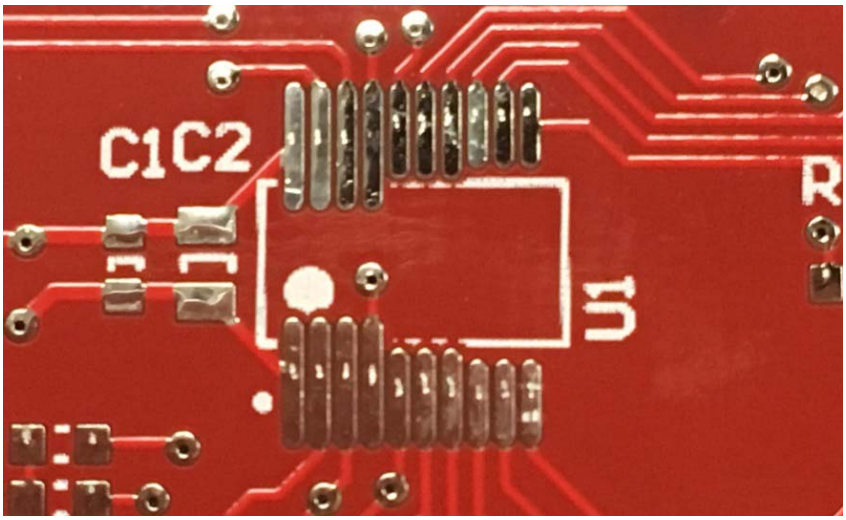
2.1 INTRODUCTION

In addition to the default behavior, the MTCH108 board can be reconfigured to evaluate different instances of usage.

2.1.1 Evaluate MTCH102/105/108

Because of the same pitch for the xSOP packages that MTCH102/105/108 uses, the board has the footprint to adapt the packages for all three MTCH10X devices, as shown in Figure 2-1.

FIGURE 2-1: MTCH102/105/108 FOOTPRINT



The MTCH108 (SSOP) package can be replaced with the MTCH102 (MSOP) or the MTCH105 (TSSOP) package and all the parts share the same pin 1 on the footprint. The MTCH102 and MTCH105 devices should work immediately after replacement. Also, it is recommended to populate the part indication LED to the corresponding places (D10 for MTCH102, D11 for MTCH105 and D12 for MTCH108).

2.1.2 Guard Enable/Disable

As described in the previous chapter, the Guard feature is enabled by default, so the sensor input for MTCH108 is limited to seven channels. The configuration can be changed by adding and removing certain jump resistors (0Ω). All the resistors mentioned below are 0Ω resistors, except for R10 (10 kΩ).

To evaluate the full eight buttons without Guard, remove R19, R21, and populate R22, R11 to disable the Guard feature and enable the LED for the MTI2 button. This also applies for the configuration of the MTCH105 device.

If MTCH102 is populated, the setting is different. For two buttons without Guard, remove R1, populate R22, and ensure R18 is not populated. For one button with Guard configuration, remove R10, R22 and populate R18 and R20.

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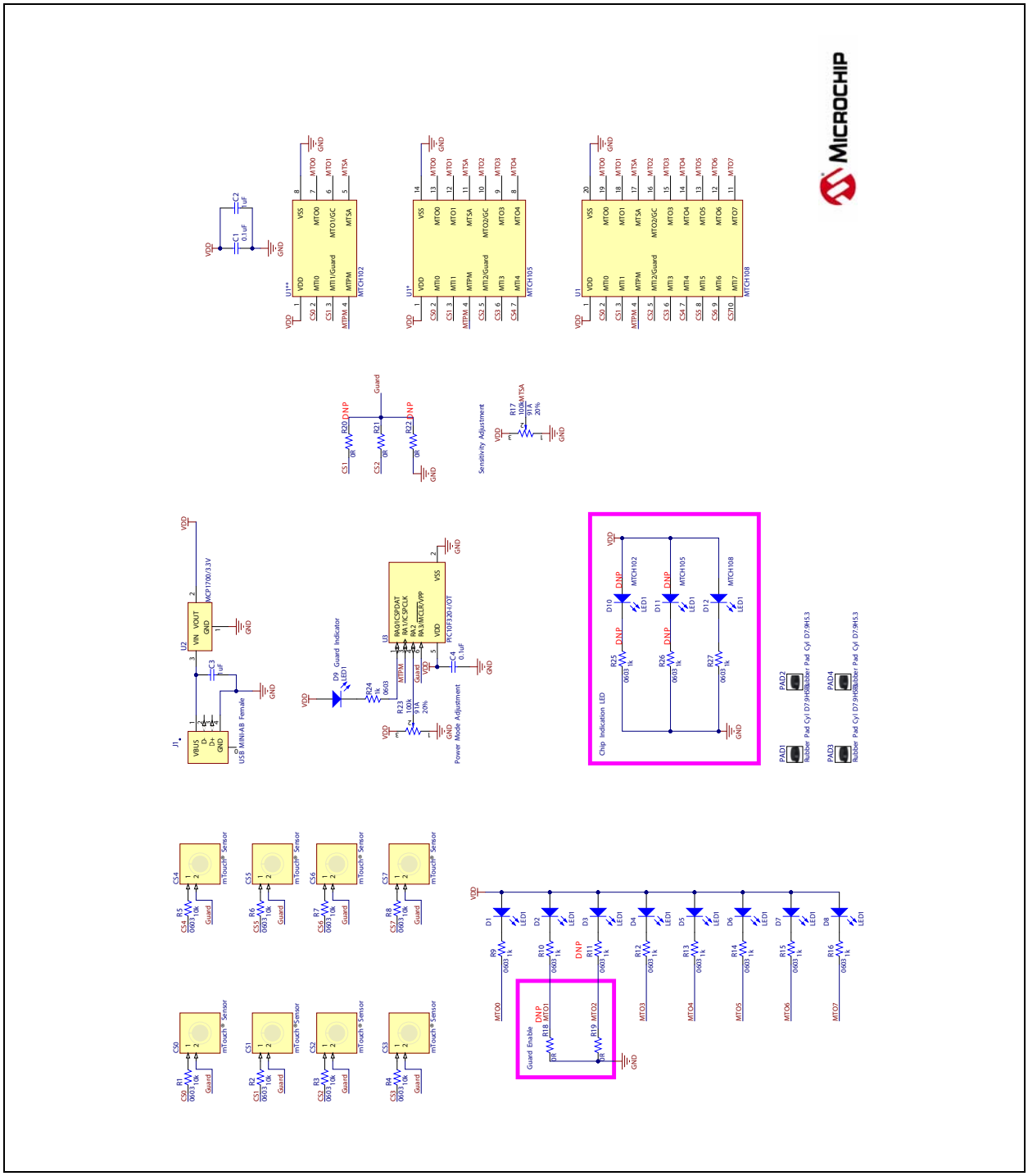
Appendix A. MTCH108 Controller Board Schematic

FIGURE A-1: MTCH108 DEMONSTRATION BOARD SCHEMATIC



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Appendix B. MTCH108 Controller Board Layout

FIGURE B-1: MTCH108 CONTROLLER BOARD FRONT LAYOUT

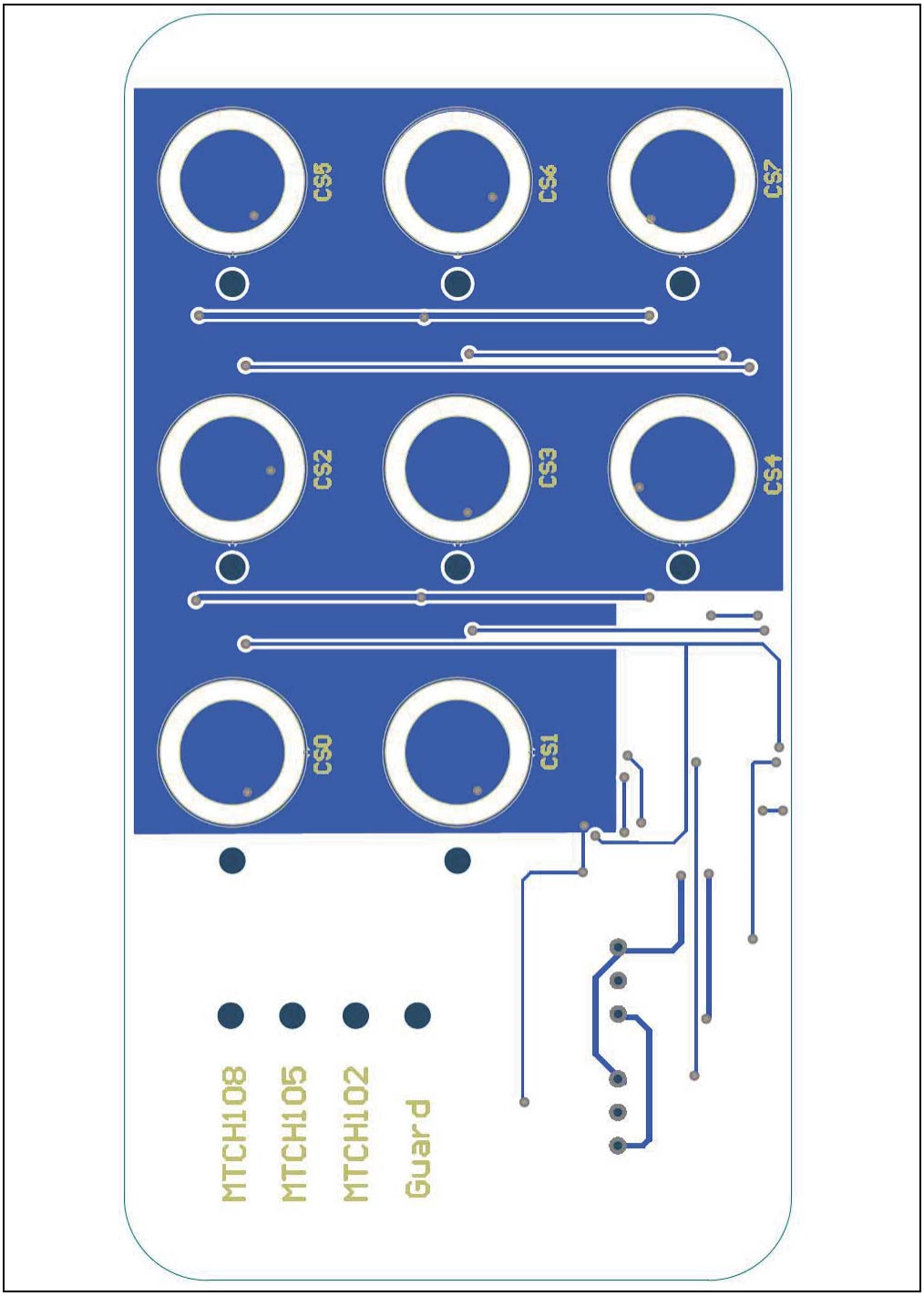
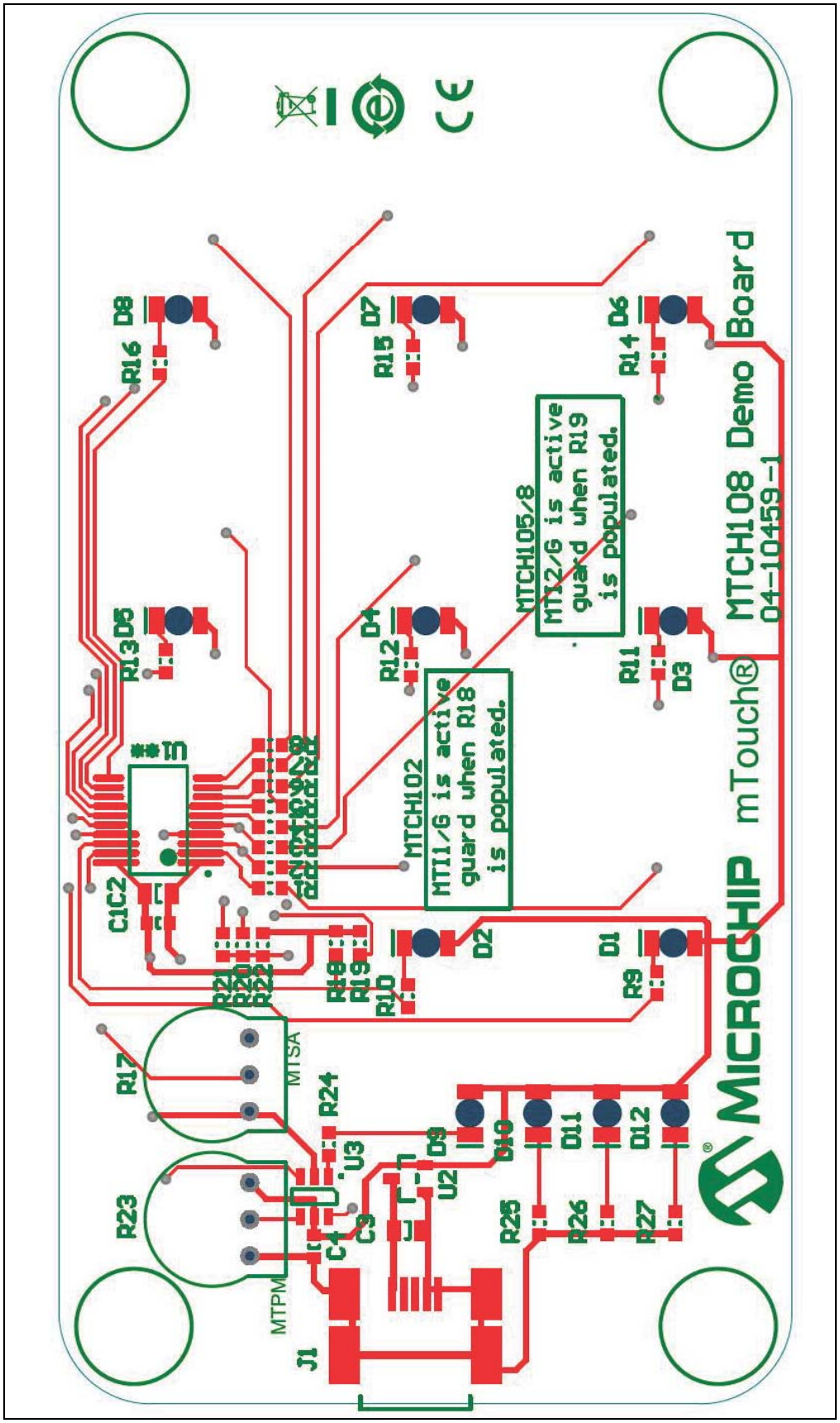


FIGURE B-2: MTCH108 CONTROLLER BOARD BACK SIDE LAYOUT



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