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**PIC32MX1/2/5 Starter Kit
User's Guide**

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Object of Declaration: PIC32MX1/2/5 Starter Kit (DM320100)

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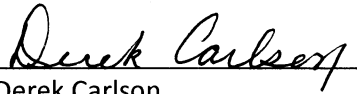
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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA



Derek Carlson
VP Development Tools

16-July-2013
Date

PIC32MX1/2/5 Starter Kit User's Guide

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PIC32MX1/2/5 STARTER KIT 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 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 “DSXXXXXXXXA”, where “XXXXXXXX” 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® X 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 PIC32MX1/2/5 Starter Kit. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [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 PIC32MX1/2/5 Starter Kit (also referred to as “starter kit”) as a development tool to emulate and debug firmware on a target board. This user’s guide is composed of the following chapters:

- **Chapter 1. “Introduction”** provides a brief overview of the starter kit, highlighting its features and uses.
- **Chapter 2. “Hardware”** provides the hardware descriptions of the starter kit.
- **Appendix A. “Wire List and Schematics”** provides a block diagram, board layouts, and detailed schematics of the starter kit.
- **Appendix B. “Bill of Materials”** provides the starter kit Bill of Materials.

PIC32MX1/2/5 Starter Kit User's Guide

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
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
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Plain Courier New	Sample source code	<code>#define START</code>
	Filenames	<code>autoexec.bat</code>
	File paths	<code>c:\mcc18\h</code>
	Keywords	<code>_asm, _endasm, static</code>
	Command-line options	<code>-Opa+, -Opa-</code>
	Bit values	<code>0, 1</code>
	Constants	<code>0xFF, 'A'</code>
<i>Italic Courier New</i>	A variable argument	<code>file.o</code> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	<code>mcc18 [options] file [options]</code>
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	<code>errorlevel {0 1}</code>
Ellipses...	Replaces repeated text	<code>var_name [, var_name...]</code>
	Represents code supplied by user	<code>void main (void) { ... }</code>
Notes	A Note presents information that we want to re-emphasize, either to help you avoid a common pitfall or to make you aware of operating differences between some device family members. A Note can be in a box, or when used in a table or figure, it is located at the bottom of the table or figure.	Note: This is a standard note box.
		CAUTION This is a caution note. Note 1: This is a note used in a table.

RECOMMENDED READING

This user's guide describes how to use the starter kit. The following Microchip documents are available and recommended as supplemental reference resources.

PIC32MX1XX/2XX/5XX 64/100-pin Family Data Sheet (DS60001290)

Refer to this document for detailed information on PIC32 devices. Reference information found in this data sheet includes:

- Device memory maps
- Device pinout and packaging details
- Device electrical specifications
- List of peripherals included on the devices

MPLAB[®] XC32 C/C++ Compiler User's Guide (DS50001686)

This document details the use of Microchip's MPLAB XC32 C/C++ Compiler to develop an application.

MPLAB[®] X IDE User's Guide (DS50002027)

Refer to this document for more information pertaining to the installation and implementation of the MPLAB X IDE software, as well as the MPLAB SIM Simulator software that is included with it.

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at: <http://www.microchip.com>. This web site makes files and information easily available to customers. Accessible by most Internet browsers, 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 listings
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listings of seminars and events; and listings of Microchip sales offices, distributors and factory representatives

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DEVELOPMENT SYSTEMS CUSTOMER CHANGE NOTIFICATION SERVICE

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To register, access the Microchip web site at www.microchip.com, click on Customer Change Notification and follow the registration instructions.

The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools
- **Emulators** – The latest information on the Microchip in-circuit emulator, MPLAB REAL ICE™
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debugger, MPLAB ICD 3
- **MPLAB X IDE** – The latest information on Microchip MPLAB X IDE, the Windows® Integrated Development Environment for development systems tools
- **Programmiers** – The latest information on Microchip programmers including the PICkit™ 3 development programmer

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 (September 2014)

This is the initial release of the PIC32MX1/2/5 Starter Kit User's Guide.

PIC32MX1/2/5 Starter Kit User's Guide

NOTES:

Chapter 1. Introduction

Thank you for purchasing a Microchip Technology PIC32MX1/2/5 Starter Kit. This board provides a low-cost, modular development system for Microchip's line of 32-bit microcontrollers (MCUs).

The starter kit comes preloaded with USB CDC demonstration software that enables communication over the USB bus to a computer. Additional features, including CAN demonstrations, are available in MPLAB® Harmony. The starter kit also supplies on-board circuitry for full debug and programming capabilities.

This chapter covers the following topics:

- [Kit Contents](#)
- [PIC32MX1/2/5 Starter Kit Functionality and Features](#)

The preprogrammed example code on the PIC32 MCU is available for download from the Microchip web site at: <http://www.microchip.com>. All project files have been included so that the code may be used directly to restore the PIC32 MCU on the starter kit to its original state (i.e., if the sample device has been reprogrammed with another program).

1.1 KIT CONTENTS

The PIC32MX1/2/5 Starter Kit contains the following items:

- PIC32MX1/2/5 Starter Kit development board, which includes:
 - MCP2562 CAN Transceiver
 - MCP16321 Buck converter (step down) to enable power use up to +24VDC
 - USB host and device connectors
 - PIC32MX570F512L
 - PIC24FJ256GB106 for debugging and programming
 - Buttons and LEDs for user I/O
- USB Type-A to USB B-mini cable for power and debugging of the development board

Note: If you are missing any part of the starter kit, contact a Microchip sales office for assistance. A list of Microchip offices for sales and service is provided on the last page of this document.

PIC32MX1/2/5 Starter Kit User's Guide

1.2 PIC32MX1/2/5 STARTER KIT FUNCTIONALITY AND FEATURES

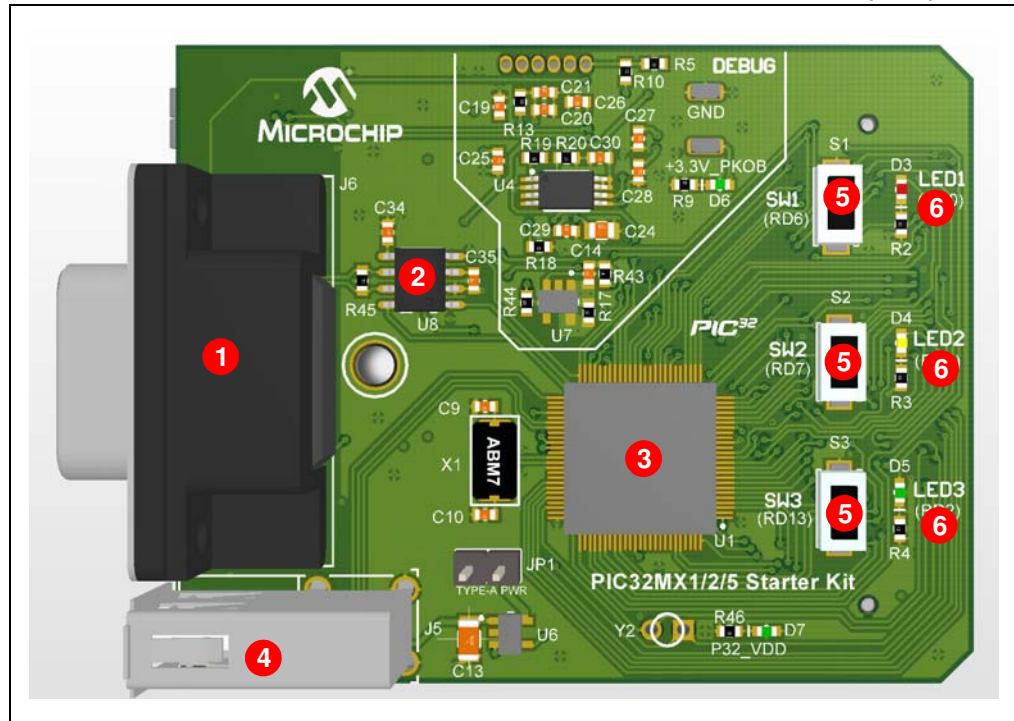
A representation of the layout of the PIC32MX1/2/5 Starter Kit is shown in [Figure 1-1](#) and [Figure 1-2](#).

The top side of the board includes these key features, as indicated in [Figure 1-1](#):

1. DB9 connector for CAN communication (J6).
2. MCP2562 CAN transceiver (U8).
3. PIC32MX570F512L (U1).
4. USB Type A Host connector (J5).
5. User-definable buttons (SW1-SW3).
6. User-definable LEDs (LED1-LED3).

For details on these features, refer to [Chapter 2. "Hardware"](#).

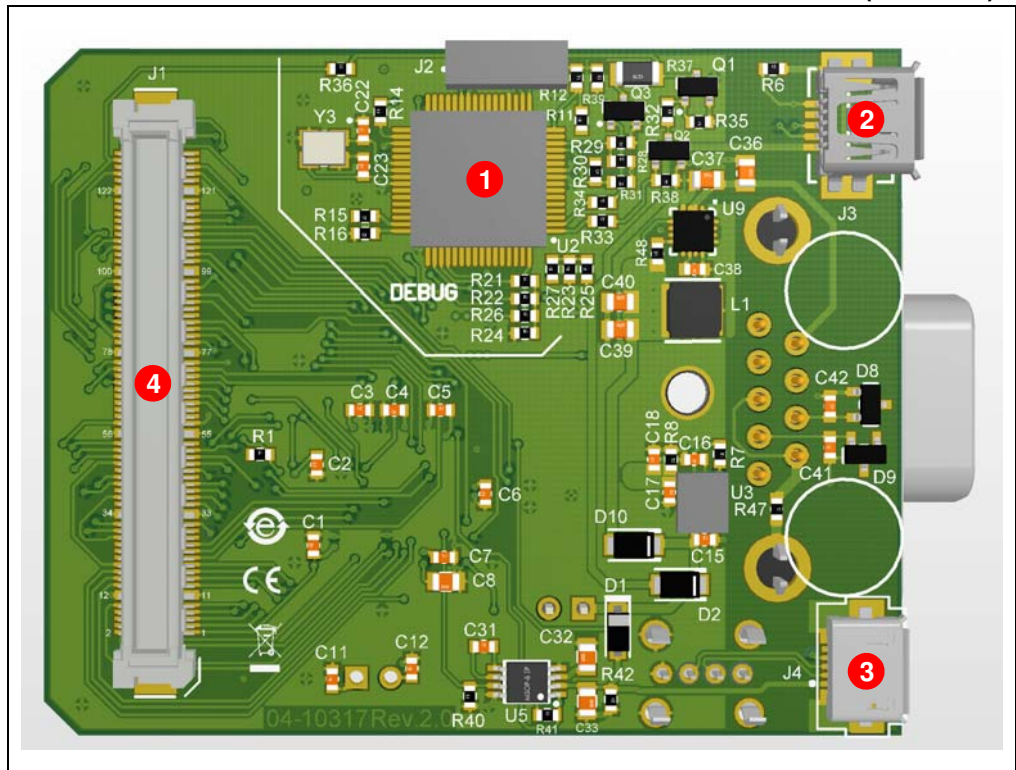
FIGURE 1-1: STARTER KIT DEVELOPMENT BOARD LAYOUT (TOP)



The bottom side of the board includes these key features, as indicated in [Figure 1-2](#):

1. PIC24FJ256GB106 USB microcontroller for on-board debugging (U2).
2. USB B-mini connector for on-board debugging support (J3).
3. USB micro-AB connector for USB OTG or Device connectivity for PIC32 USB applications (J4).
4. Expansion connector to be used with other Microchip products (J1).

FIGURE 1-2: STARTER KIT DEVELOPMENT BOARD LAYOUT (BOTTOM)



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Chapter 2. Hardware

This chapter describes the hardware features of the PIC32MX1/2/5 Starter Kit.

2.1 HARDWARE FEATURES

The key features of the starter kit are presented in the order provided in [Section 1.2 “PIC32MX1/2/5 Starter Kit Functionality and Features”](#). You can refer to [Figure 1-1](#) and [Figure 1-2](#) for their locations on the board.

2.1.1 MCP2562 CAN Transceiver

The MCP2562 is a Microchip manufactured device that is a CAN transceiver. This device takes a split differential signal part, and converts that signal into a single-ended set of signals (receive and transmit).

2.1.2 DB9 Connector

The DB9 connector is not a standard serial interface. The DB9 connector is an interface to the CAN transceiver and is compliant with CiA DS 102. This connector provides access to the following signals: CANH, CANL, GND, and a voltage Input.

2.1.3 Processor Support

The development board in the starter kit is designed with a permanently mounted (i.e., soldered) PIC32MX570F512L microcontroller. Support for this microcontroller is available using the Microchip MPLAB[®] X IDE, v2.20 and later, and with the MPLAB XC32 C/C++ Compiler, v1.33 or later.

2.1.4 Powering the Starter Kit

Use one of the following methods to provide power to the starter kit:

- Connect USB bus power to the USB debug connector (J3)
- Apply 6-24V DC power to pin 9 of the DB-9 connector (J6)

2.1.5 USB Connectivity

2.1.5.1 HOST MODE

Connect the device to the Type-A connector, J5, which is located on the top side of the starter kit development board.

2.1.5.2 DEVICE MODE

Connect the starter kit to a Host using a cable to port J4, which is located on the bottom side of the starter kit development board.

2.1.5.3 DEBUGGING MODE

The starter kit includes a PIC24FJ256GB106 USB microcontroller that provides debugger connectivity over USB. The PIC24FJ256GB106 is hard-wired to provide a ICSP[™] connection to the PIC32 device.

Connect the starter kit to port J3, which is located on the bottom side of the starter kit.

2.1.6 Switches

The three switches (SW1-SW3) are available on the starter kit development board for user-programmable options

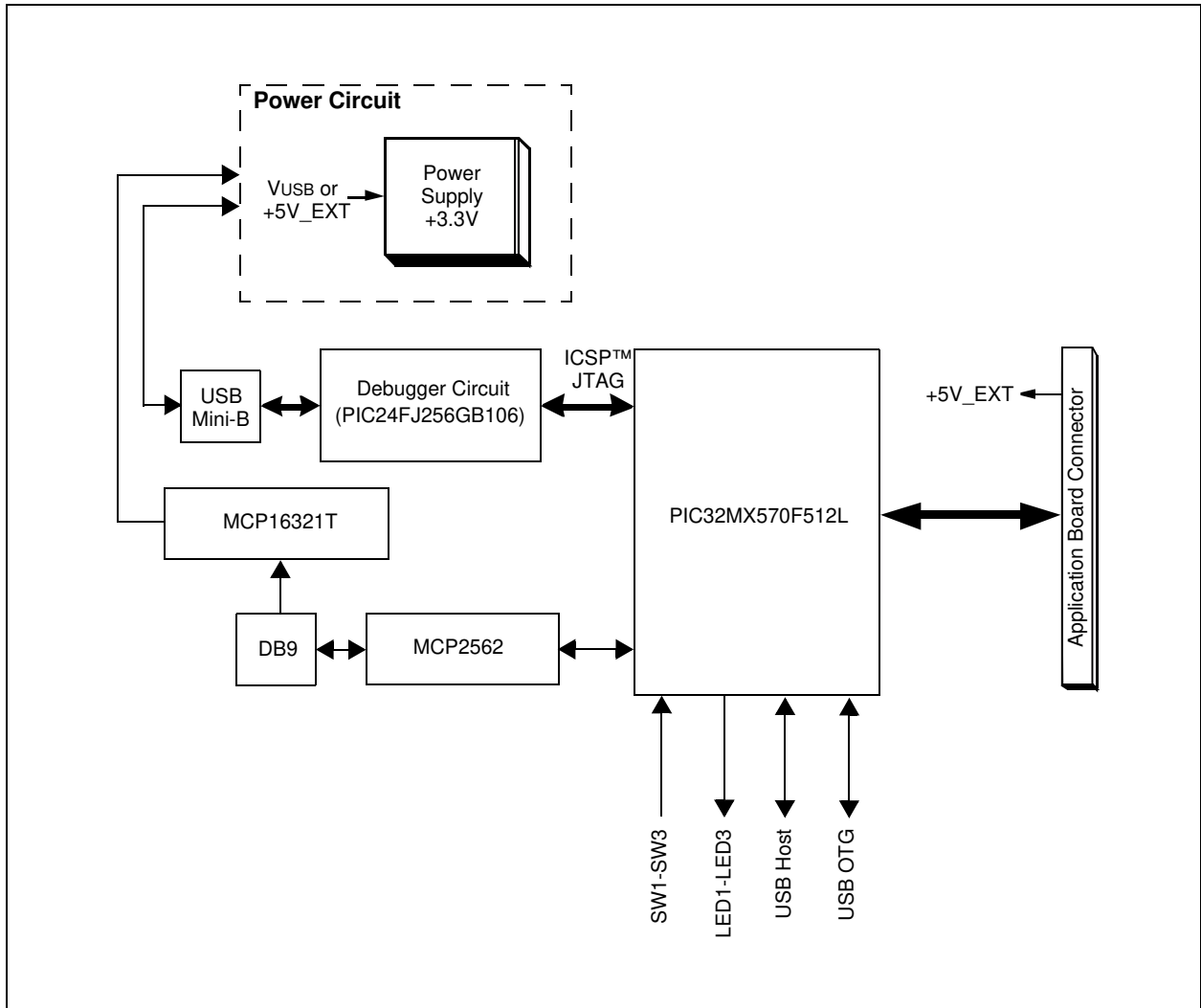
2.1.7 Other Features

The three LEDs (LED1-LED3) are available on the starter kit development board for user-programmable inputs.

Appendix A. Wire List and Schematics

A.1 PIC32MX1/2/5 STARTER KIT DEVELOPMENT BOARD BLOCK DIAGRAM

FIGURE A-1: HIGH-LEVEL BLOCK DIAGRAM OF THE STARTER KIT



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TABLE A-1: STARTER KIT WIRE LIST

PIC32MX570F512L Pin Number	PIC32MX570F512L Pin Name	Schematic Signal Name
1	AN28/RG15	RG15
2	VDD	VDD
3	AN22/RPE5/PMD5/RE5	PMD5/RE5
4	AN23/PMD6/RE6	PMD6/RE6
5	AN27/PMD7/RE7	PMD7/RE7
6	AN29/RPC1/RC1	RC1
7	AN30/RPC2/RC2	RC2
8	AN31/RPC3/RC3	RC3
9	RPC4/CTED7/RC4	RC4
10	AN16/C1IND/RPG6/SCK2/PMA5/RG6	SCK2/PMA5/RG6
11	AN17/C1INC/RPG7/PMA4/RG7	PMA4/RG7
12	AN18/C2IND/RPG8/PMA3/RG8	PMA3/RG8
13	MCLR	ICSP_MCLR_VPP_TARGET
14	AN19/C2INC/RPG9/PMA2/RG9	PMA2/RG9
15	VSS	VSS
16	VDD	VDD
17	TMS/CTED1/RA0	TMS/RA0
18	AN32/RPE8/RE8	RE8
19	AN33/RPE9/RE9	RE9
20	AN5/C1INA/RPB5/VBUSON/RB5	C1IN+/AN5/RB5
21	AN4/C1INB/USBOEN/RB4	C1IN-/AN4/RB4
22	PGED3/AN3/C2INA/RPB3/RB3	C2IN+/AN3/RB3
23	PGEC3/AN2/CTCMP/C2INB/RPB2/CTED13/RB2	C2IN-/AN2/CN4/RB2
24	PGEC1/AN1/RPB1/CTED12/RB1	PGC1/AN1/RB1
25	PGED1/AN0/RPB0/RB0	PGD1/AN0/RB0
26	PGEC2/AN6/RPB6/RB6	PGEC2
27	PGED2/AN7/RPB7/CTED3/RB7	PGED2
28	VREF-/PMA7/RA9	PMA7/VREF-/RA9
29	VREF+/PMA6/RA10	PMA6/VREF+/RA10
30	AVDD	AVDD
31	AVSS	AVSS
32	AN8/RPB8/CTED10/RB8	C1OUT/RB8
33	AN9/RPB9/CTED4/RB9	C2OUT/RB9
34	CVREFOUT/AN10/RPB10/CTED11/PMA13/RB10	PMA13/CVREF/AN10
35	AN11/PMA12/RB11	PMA12/RB11
36	VSS	VSS
37	VDD	VDD
38	TCK/CTED2/RA1	TCK/RA1
39	AN34/RPF13/SCK3/RF13	U2RTS/BCLK2/RF13
40	AN35/RPF12/RF12	U2CTS/RF12
41	AN12/PMA11/RB12	PMA11/AN12/RB12
42	AN13/PMA10/RB13	PMA10/AN13/RB13
43	AN14/RPB14/CTED5/PMA1/RB14	PMA1/AN14/RB14
44	AN15/RPB15/OCFB/CTED6/PMA0/RB15	PMA0/AN15/OCFB
45	VSS	VSS
46	VDD	VDD
47	AN36/RPD14/RD14	RD14
48	AN37/RPD15/SCK4/RD15	RD15/CAN_RDY
49	RPF4/PMA9/RF4	PMA9/RF4/CAN_TX
50	RPF5/PMA8/RF5	PMA8/RF5/CAN_RX
51	USBID/RPF3/RF3	RF3
52	AN38/RPF2/RF2	RF2

TABLE A-1: STARTER KIT WIRE LIST

PIC32MX570F512L Pin Number	PIC32MX570F512L Pin Name	Schematic Signal Name
53	AN39/RPF8/RF8	AN39/RPF8/RF8
54	VBUS	VBUS
55	Vusb3v3	VDD
56	D-	D-
57	D+	D+
58	SCL2/RA2	SCL2/RA2
59	SDA2/RA3	SDA2/RA3
60	TDI/CTED9/RA4	TDI/RA4
61	TDO/RA5	TDO/RA5
62	VDD	VDD
63	OSC1/CLKI/RC12	OSC1
64	OSC2/CLKO/RC15	OSC2
65	Vss	VSS
66	RPA14/SCL1/RA14	SCL1/RA14
67	RPA15/SDA1/RA15	SDA1/RA15
68	RPD8/RTCC/RD8	RTCC/RD8
69	RPD9/RD9	RD9
70	RPD10/SCK1/PMA15/RD10	OPMCS20SCKI0RD1
71	RPD11/PMA14/RD11	OPMCS10RD
72	RPD0/INT0/RD0	INT0/RD0
73	SOSCI/RPC13/RC13	SOSC1/RC13
74	SOSCO/RPC14/T1CK/RC14	SOSCO/T1CK/RC14
75	Vss	VSS
76	AN24/RPD1/RD1	RD1
77	AN25/RPD2/RD2	RD2
78	AN26/C3IND/RPD3/RD3	RD3
79	AN40/RPD12/PMD12/RD12	PMD12/RD12
80	AN41/PMD13/RD13	PMD13/RD13
81	RPD4/PMWR/RD4	PMWR/RD4
82	RPD5/PMRD/RD5	PMRD/RD5
83	AN42/C3INC/PMD14/RD6	PMD14/RD6
84	AN43/C3INB/PMD15/RD7	PMD15/RD7
85	VCAP	—
86	VDD	VDD
87	AN44/C3INA/RPF0/PMD11/RF0	PMD11/RF0
88	AN45/RPF1/PMD10/RF1	PMD10/RF1
89	RPG1/PMD9/RG1	PMD9/RG1
90	RPG0/PMD8/RG0	PMD8/RG0
91	TRCLK/RA6	TRCLK/RA6
92	TRD3/CTED8/RA7	TRD3/RA7
93	AN46/PMD0/RE0	PMD0/RE0
94	AN47/PMD1/RE1	PMD1/RE1
95	TRD2/RG14	TRD2/RG14
96	TRD1/RG12	TRD1/RG12
97	TRD0/RG13	TRD0/RG13
98	AN20/PMD2/RE2	PMD2/RE2
99	RPE3/CTPLS/PMD3/RE3	PMD3/RE3
100	AN21/PMD4/RE4	PMD4/RE4

A.2 STARTER KIT DEVELOPMENT BOARD SCHEMATICS

FIGURE A-2: PIC32MX570F512L (ON-BOARD DEVICE)

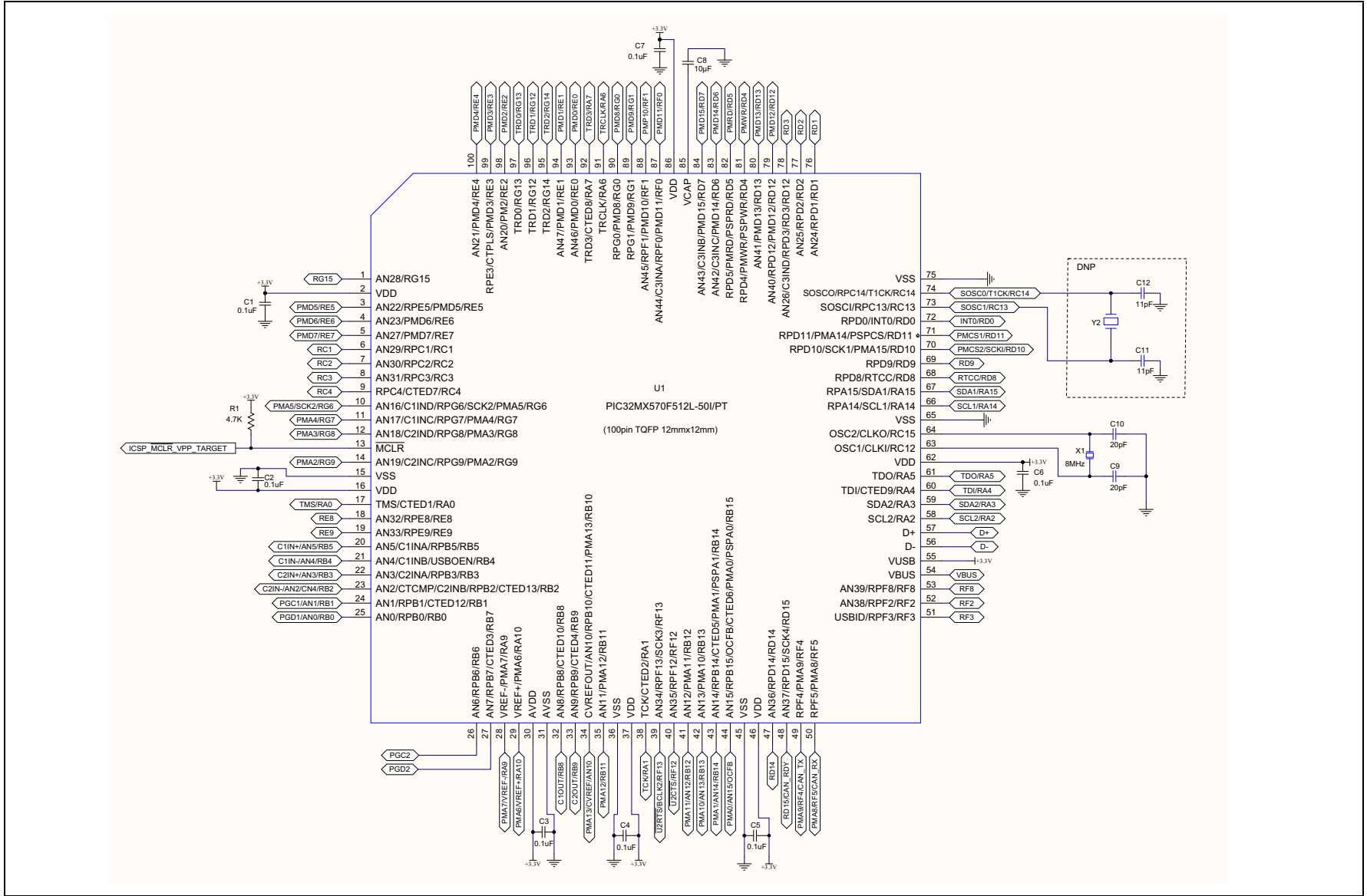
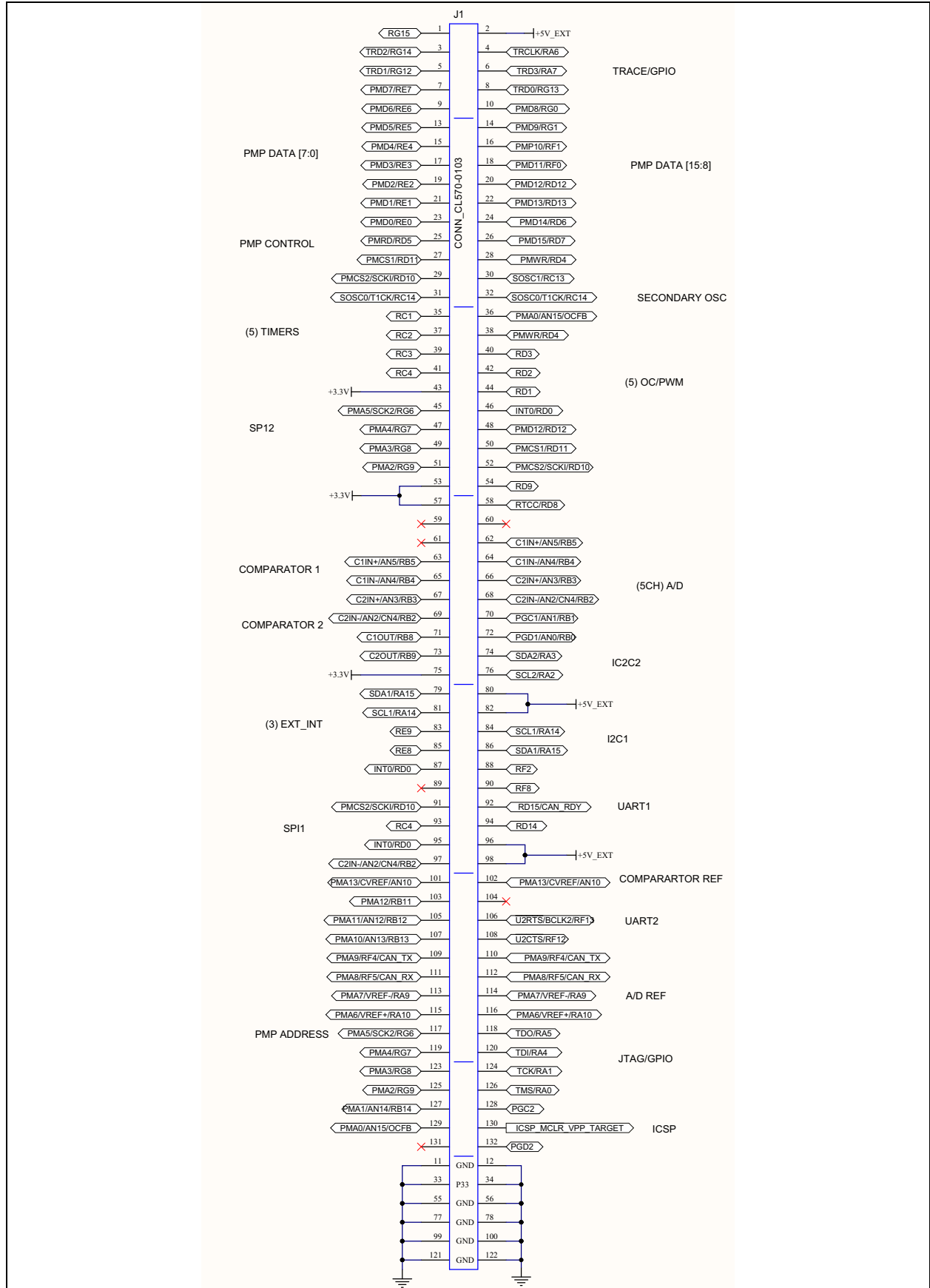


FIGURE A-3: 132-PIN CONNECTOR



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FIGURE A-4: USB OTG POWER SUPPLIES

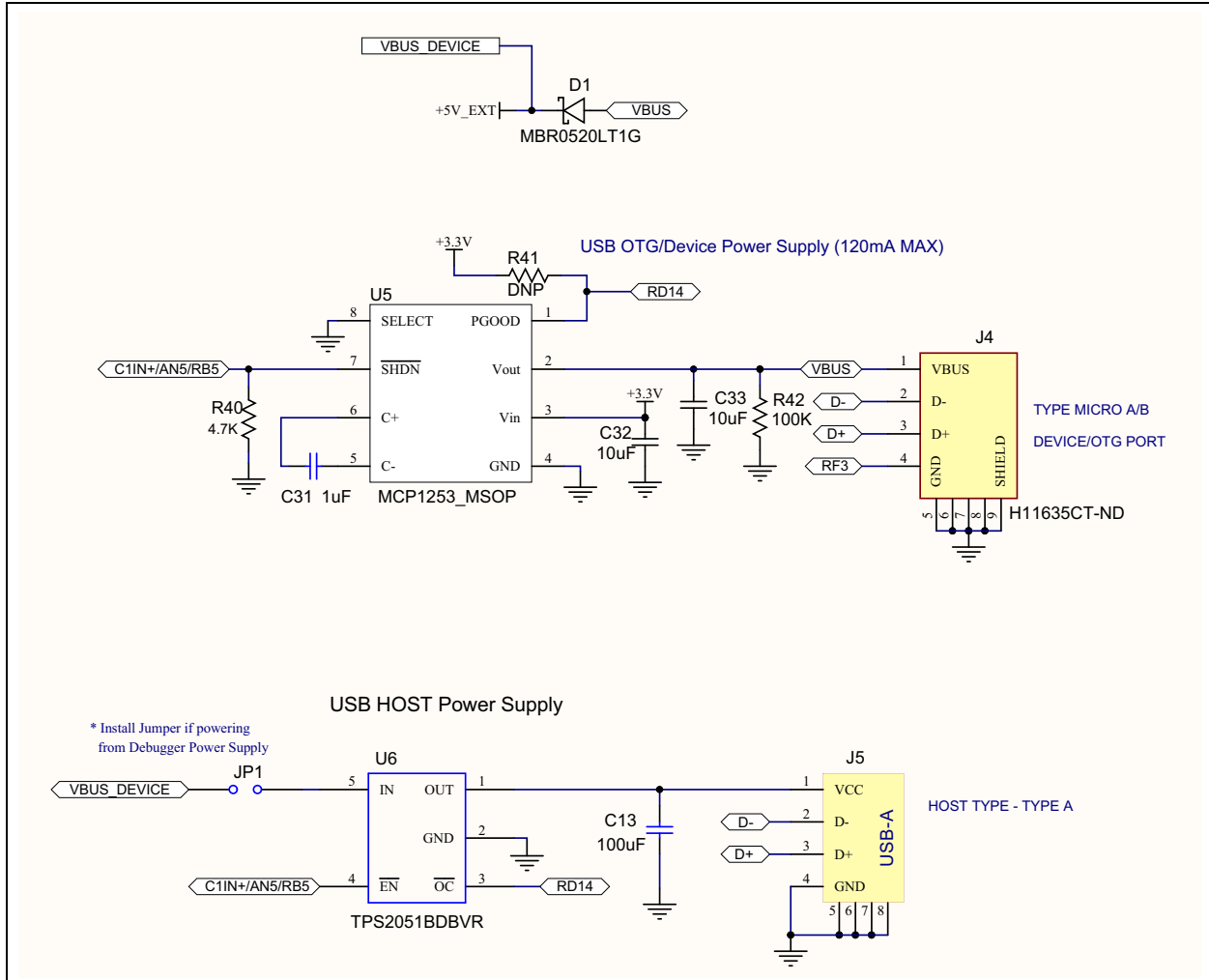


FIGURE A-5: USER LEDS

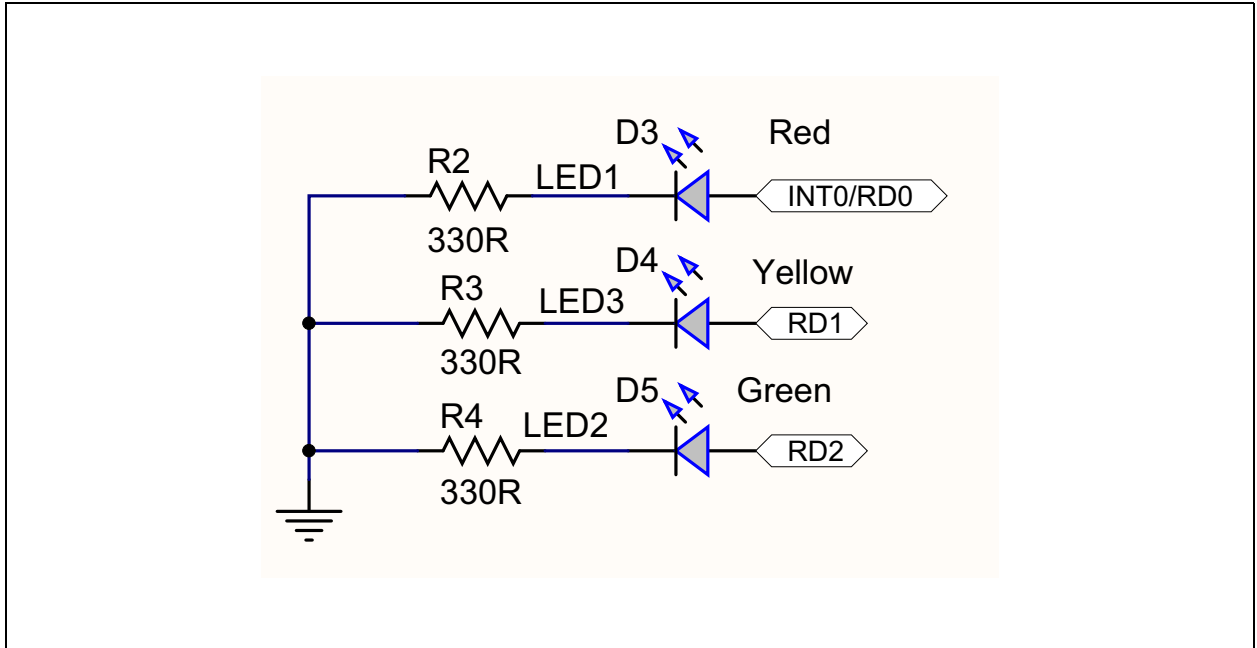


FIGURE A-6: USER SWITCHES

