



PIC32MZ EF Curiosity Development Board User's Guide

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ISBN: 978-1-5224-1440-7

Object of Declaration:

PIC32MZ EF Curiosity Development Board (DM320104)

EU Declaration of Conformity

Manufacturer: Microchip Technology Inc.
2355 W. Chandler Blvd.
Chandler, Arizona, 85224-6199
USA

This declaration of conformity is issued by the manufacturer.

The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).

This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

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


Derek Carlson
VP Development Tools

12-Sep-14
Date

PIC32MZ EF Curiosity Development Board User's Guide

NOTES:



PIC32MZ EF CURIOSITY DEVELOPMENT 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 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 PIC32MZ EF Curiosity Development Board. 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 PIC32MZ EF Curiosity Development Board 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 development board, highlighting its features and uses.
- **Chapter 2. “Hardware”** provides the hardware descriptions of the development board.
- **Appendix A. “Schematics”** provides a block diagram, board layouts, and detailed schematics of the development board.
- **Appendix B. “Bill of Materials”** provides the bill of materials for the components used in the design and manufacture of the development board.

PIC32MZ EF Curiosity Development Board 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 X 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	#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'
<i>Italic Courier New</i>	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) { ... }
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.
Notes		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.

PIC32MZ Embedded Connectivity with Floating Point Unit (EF) Family Data Sheet (DS60001320)

Refer to this document for detailed information on PIC32MZ EF family 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.

Universal Serial Bus Specification and Associated Documents

The Universal Serial Bus is defined by the USB 2.0 specification and its associated supplements and class-specific documents. These documents are available from the USB Implementers Forum. See their web site at: <http://www.usb.org>.

mikroBUS™ Specification

The purpose of mikroBUS™ is to enable easy hardware expandability with a large number of standardized compact add-on boards. See their web site at: <http://www.mikroe.com/mikrobus/>.

THE MICROCHIP WEB SITE

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- **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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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
- **Programmers** – 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 (August 2016)

This is the initial released version of this user's guide.

Revision B (March 2017)

Updated section [2.1.2 “Power Supply”](#) and [Table B-1](#).

PIC32MZ EF Curiosity Development Board User's Guide

NOTES:

Chapter 1. Introduction

Thank you for purchasing a Microchip Technology PIC32MZ EF Curiosity Development Board.

The PIC32MZ EF Curiosity Development Board includes an integrated programmer/debugger and requires no additional hardware to get started. Users can expand functionality through MikroElektronika mikroBUS™ Click™ adapter boards, add Ethernet connectivity with the Microchip LAN8720A PHY Daughter Board, add Wi-Fi™ connectivity using the Microchip MRF24WN0MA on-board Wi-Fi module, and add audio input/output capability with Microchip audio daughter boards.

With or without expansion boards, the PIC32MZ EF Curiosity Development Board provides the freedom to develop for a variety of applications, including Internet of Things (IoT), robotics development, and proof-of-concept designs.

This chapter includes the following topics:

- [Kit Contents](#)
- [Development Board Functionality and Features](#)

1.1 KIT CONTENTS

The PIC32MZ EF Family Starter Kit contains the following items:

- One PIC32MZ EF Curiosity Development Board
- One on-board PIC32MZ2048EFM100 microcontroller

Note: If you are missing any part of a 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.

1.2 DEVELOPMENT BOARD FUNCTIONALITY AND FEATURES

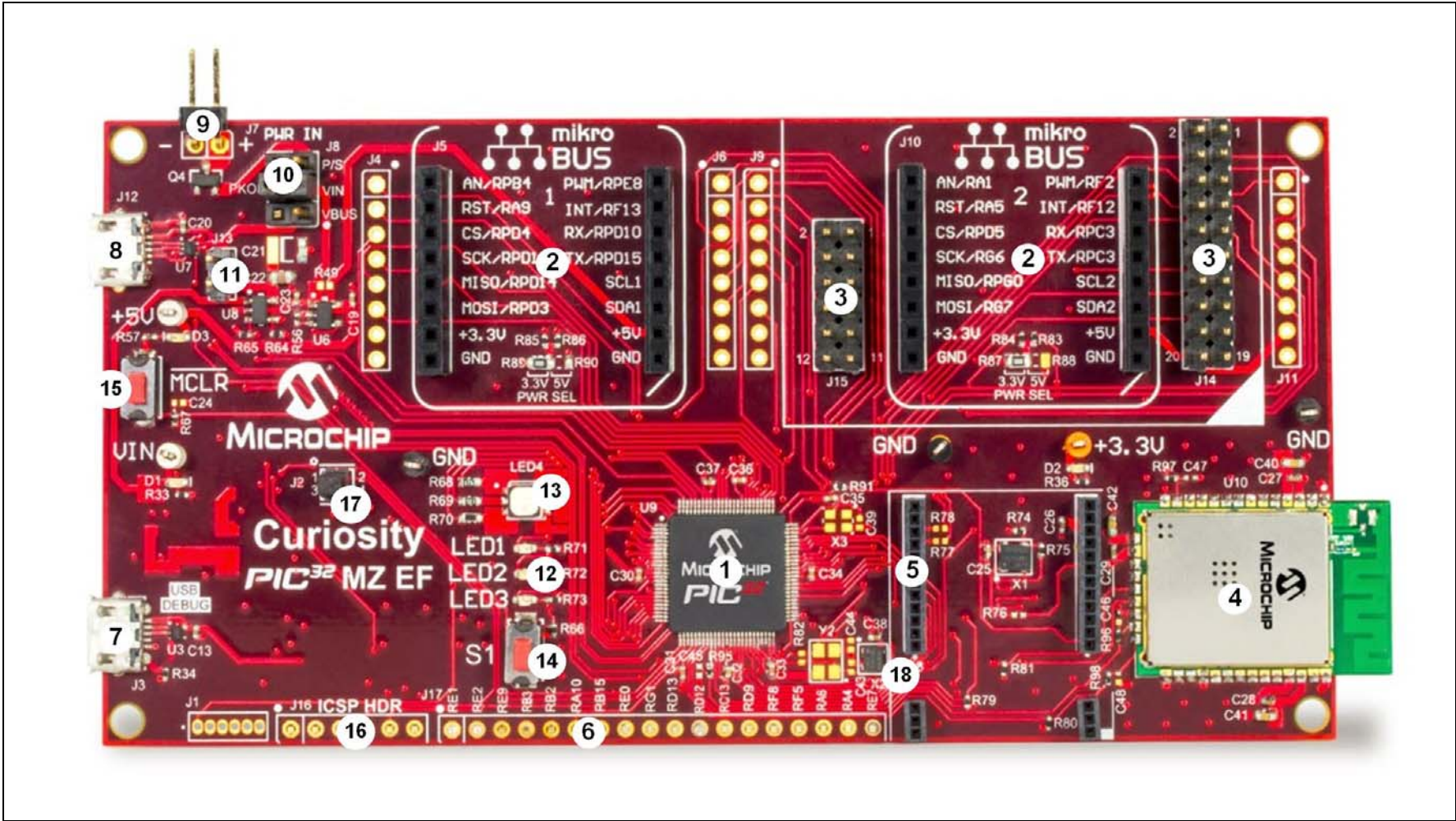
1.2.1 Development Board

The major features and top assembly of the PIC32MZ EF Curiosity Development Board are shown in [Figure 1-1](#):

1. PIC32MZ2048EFM100 32-bit microcontroller (U9).
2. Two mikroBUS sockets to expand functionality using MikroElektronika Click adapter boards (J5, J10).
3. X32 header for audio I/O using Microchip audio daughter boards (J14, J15).
4. MRF24WN0MA, 2.4 GHz IEEE 802.11n compliant wireless module (U10).
5. Header for flexible Ethernet PHY options using Microchip PHY daughter boards (J18).
6. GPIO expansion header (J17).
7. Debug USB connector for programming/debugging (J3).
8. Target USB connector for PIC32 USB connectivity (Device/Host mode) (J12).
9. Header for external 5V input (J7).
10. Jumper to select power source: Debug USB connector, target USB connector and external +5V input (J8).
11. Jumper to drive V_{bus} in Host mode (J13).
12. Three user LEDs (LED1, LED2, and LED3).
13. RGB LED (LED4).
14. User button (S1).
15. Reset Button ($\overline{\text{MCLR}}$).
16. ICSP header for external debugger, such as MPLAB® REAL ICE™ or MPLAB ICD 3 (J16).
17. Jumper to select on-board debugger or external debugger (J2).
18. 24 MHz crystal oscillator (X2).

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

FIGURE 1-1: PIC32MZ EF CURIOSITY DEVELOPMENT BOARD LAYOUT (TOP VIEW)



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Chapter 2. Hardware

This chapter describes the hardware features of the PIC32MZ EF Curiosity Development Board.

2.1 HARDWARE FEATURES

Only certain features of the development board are discussed in this section. Refer to [Figure 1-1](#) in [Section 1.2 “Development Board Functionality and Features”](#) for their locations.

2.1.1 Processor

The PIC32MZ EF Curiosity Development Board is designed with a permanently mounted (i.e., soldered) PIC32MZ2048EFM100 microcontroller (U9).

2.1.2 Power Supply

Power can be supplied to the development board from the host PC using a Type A male-to-micro-B USB cable or by using an external +5V supply. Jumper J8 is used to select the voltage source for the development board. [Table 2-1](#) provides the details of the power supply sources available for the development board.

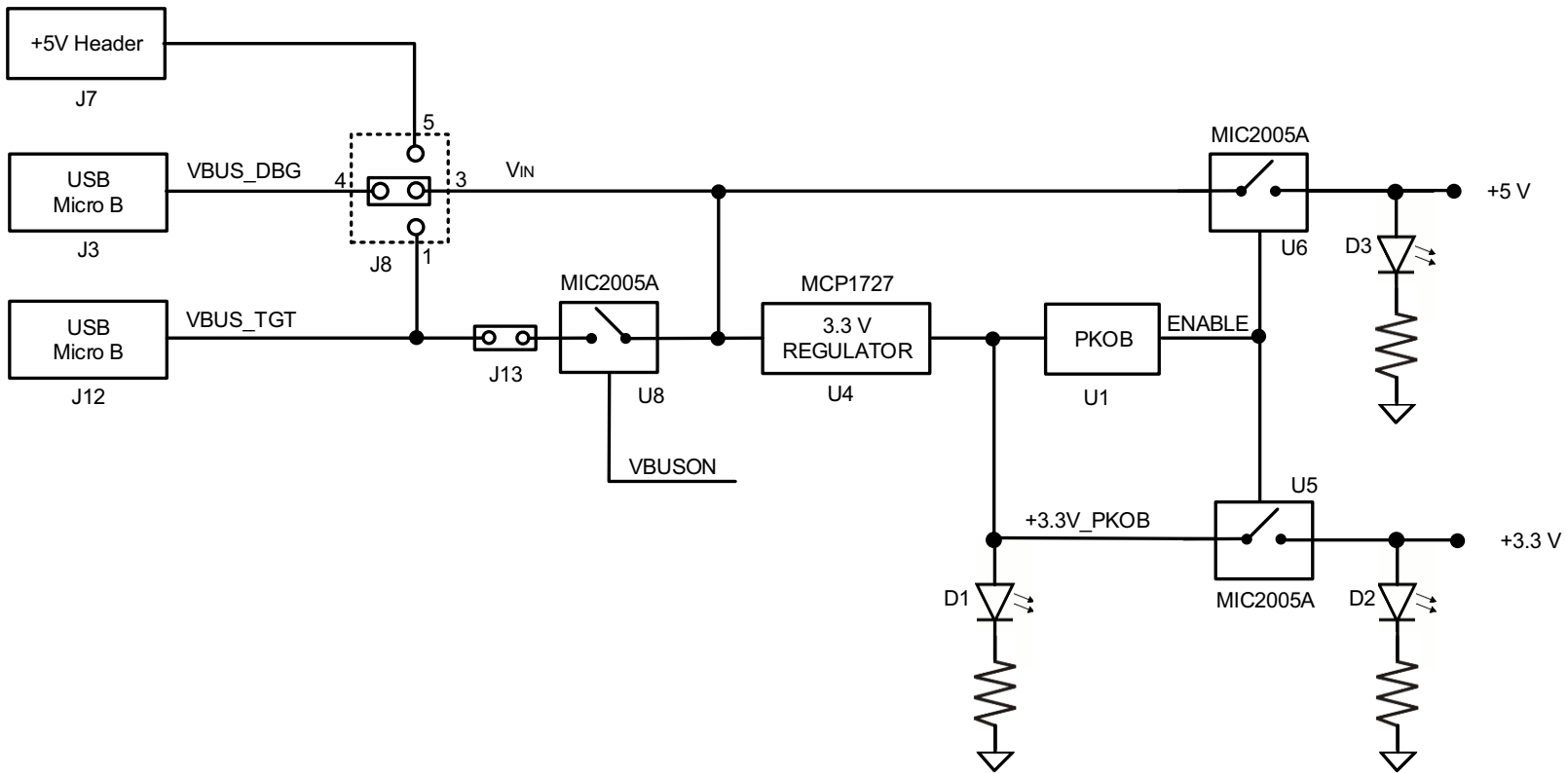
The +3.3V power supply for the microcontroller is generated by the MPC1727 voltage regulator.

TABLE 2-1: DEVELOPMENT BOARD POWER SUPPLY SOURCES

Power Input	Connection	Jumper Position (J8)
USB micro-B (J3)	Using a Type A male-to-micro-B USB cable (not provided with the kit)	VIN-PKOB (4-3)
USB micro-B (J12)	Using a Type A male-to-micro B USB cable (not provided with the kit)	VIN-VBUS(1-3)
External 5V (J7)	Connect the development board to an external 5V power supply.	VIN-P/S(5-3)

If the PICKIT™ On-board (PKOB) debugger is connected to a host PC, it enumerates with the host computer and once it has successfully been enumerated, it turns on the main board power supply (+3.3V and +5V) using the high side power switch (MIC2005A) by driving the ENABLE signal high. [Figure 2-1](#) shows the power topology for the development board.

FIGURE 2-1: POWER TOPOLOGY



2.1.3 Programming and Debug

The PIC32MZ EF Curiosity Development Board includes the PICKit On-board (PKOB) debugger based on the PIC24FJ256GB106 USB Microcontroller. In addition, it provides the option to use external debuggers, such as MPLAB REAL ICE or MPLAB ICD 3 by connecting to the In-Circuit Serial Programming™ (ICSP™) header, J16.

By default, the on-board debugger is connected to the programming pins (PGEC and PGED) of the PIC32 device. To use an external debugger, remove Jumper J2 to disconnect the on-board debugger from driving the programming pins.

TABLE 2-2: DEBUGGER SELECTION

J2 Jumper Positions	
On-board Debugger	External Debugger
Pins 1-2 shorted	Pins 1-2 Open
Pins 3-4 shorted	Pins 3-4 Open

2.1.4 USB Connectivity

The PIC32MZ2048EFM100 microcontroller has an integrated Hi-Speed USB module that enables the user to implement the USB functionality through the micro-AB USB connector (J12). Users can connect the development board for USB functionality using any one of these modes:

- **Device Mode:** Connect the host PC to the target USB connector (J12) using the USB Type A male to micro-B male cable. Use Jumper J8 to select the required power source for the board.
- **Host Mode:** Connect the USB device to the target USB connector (J12) using a USB Type A Female to micro-B male cable (this cable is not included in the kit). Install a jumper in the J13 header to drive the Vbus line in Host mode. Use jumper J8 to select the power source from either the Debug USB connector or the external 5V input.

2.1.5 Switches

The PIC32MZ EF Curiosity Development Board contains two push buttons: Reset button (MCLR) and user-configurable button (S1). The Reset button is connected to the PIC32 Master Clear reset line and the other is a generic user-configurable button. When a button is pressed, it will drive the I/O line to GND.

TABLE 2-3: PUSH BUTTONS

Push Button Name	Microcontroller Pin
MCLR	MCLR
S1	RG12

2.1.6 LEDs

Four user-programmable LEDs are available on the PIC32MZ EF Curiosity Development Board, and these LEDs can be turned ON/OFF using the connected GPIO pins. [Table 2-4](#) provides the details of the LEDs and related GPIO pins.

The RGB LEDs (LED4) are connected to the re-mappable pins with an output compare functionality to control the color and brightness with PWM output. In the RGB LED, blue is the component of the GPIO pin RB0, green is the component of the GPIO pin RB1, and red is the component of the GPIO pin RB5.

TABLE 2-4: LEDs

LED Name	Microcontroller Pin
LED1	RE3
LED2	RE4
LED3	RE6
LED4 (RGB LEDs - blue, green, red)	RB0, RB1, RB5

2.1.7 Oscillator Options

A 24 MHz crystal oscillator (X2) is connected to the on-board microcontroller for precision clocking. Depending on which is populated on the board, a 12 MHz crystal (Y2) may be used instead of external oscillator (X2).

The 480 Mbps USB High-Speed signal rate specification requires $\pm 0.05\%$ or 500 ppm clock accuracy. Therefore, an external crystal is required to meet the clock accuracy requirement for USB. Non-USB applications can use the internal RC oscillators.

The PIC32MZ EF Curiosity Development Board also has provision for an external secondary 32 kHz oscillator (X3); however, this component is not populated.

2.1.8 mikroBUS™ Sockets

Two mikroBUS sockets (J5 and J10) are available on the development board and these sockets can be used to expand the functionality using the MikroElektronika Click adapter boards. The mikroBUS connector consists of two 1x8 female headers with SPI, I²C, UART, RST, PWM, analog, and interrupt lines as well as 3.3V, 5V, and GND power lines.

The GPIO pins for the mikroBUS sockets are assigned to route, as follows:

- UART1, I2C1, SPI1, and OC1 peripheral instances to mikroBUS socket J5
- UART2, I2C2, SPI2, and OC2 peripheral instances to mikroBUS socket J10. Note that UART2, I2C2, and SPI2 peripherals are also routed to the X32 audio header.

2.1.9 X32 Audio Header

The PIC32MZ EF Curiosity Development Board includes two X32 headers (J14, J15) to enable a connection to the Microchip Audio Codec Daughter Board. [Table 2-5](#) provides the details of the available Audio Codec Daughter Board, and for additional information, contact your local Microchip sales office.

For a complete list of currently available Audio Codec Daughter Boards, visit the microchipDIRECT web site (www.microchipdirect.com).

TABLE 2-5: AUDIO DAUGHTER BOARD

Daughter Board Name	Microchip Part Number
PIC32 Audio Codec Daughter Board - AK4642EN	AC320100

2.1.10 Ethernet PHY

The PIC32MZ EF Curiosity Development Board includes headers to mount different Ethernet PHY daughter boards to implement a complete Ethernet node for networking. [Table 2-6](#) provides the details of the available daughter board. For a complete list of currently available audio daughter boards, visit the microchipDIRECT web site (www.microchipdirect.com).

TABLE 2-6: ETHERNET PHY DAUGHTER BOARD

Daughter Board Name	Microchip Part Number
LAN8720A PHY Daughter Board	AC320004-3

The Microchip LAN8720A PHY Daughter Board is populated with a small footprint RMII 10/100 Ethernet transceiver (LAN8720A). This daughter board enables Ethernet communication with variety of Microchip development boards.

2.1.11 MRF24WN0MA Wi-Fi Module

The PIC32MZ EF Curiosity Development Board provides wireless connectivity with an on-board MRF24WN0MA 2.4 GHz, IEEE 802.11n-compliant wireless module. The PIC32 microcontroller uses the Serial Peripheral Interface (SPI) to communicate with the MRF24WN0MA module.

2.1.12 PIC32 I/O Header

The PIC32MZ EF Curiosity Development Board provides a header (J17) to access unused microcontroller GPIO pins.

2.1.13 Peripheral Resource Assignment

The MCU peripheral instances, assigned for different hardware interfaces, are provided in [Table 2-7](#). The correct peripheral instance must be used in the application to use the respective hardware interface.

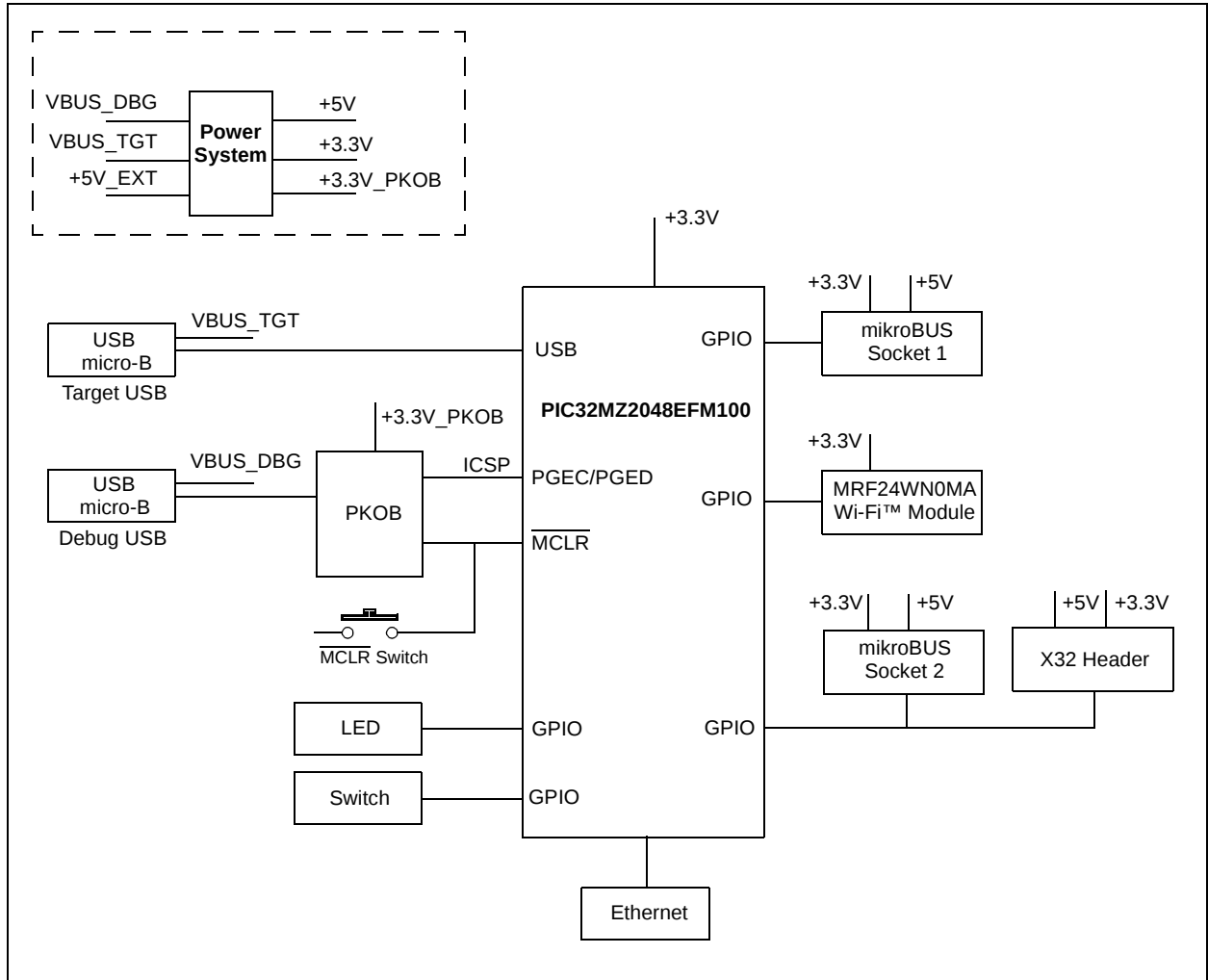
TABLE 2-7: RESOURCE ASSIGNMENT

Resource Assignment	Peripheral					Reference Clock
	I ² C	SPI	UART	Output Compare	Interrupt	
MikroBus1 (J5)	I2C1	SPI1	UART1	OC1	INT1	—
MikroBus2 (J10)	I2C2	SPI2	UART2	OC2	INT2	—
X32 (J14, J15)	I2C2	SPI2	UART2	—	—	REFCLK01
Wi-Fi (U10)	—	SPI3	—	—	INT3	—
RGB LED (LED4)	—	—	—	OC3, OC4, OC5	—	—

Appendix A. Schematics

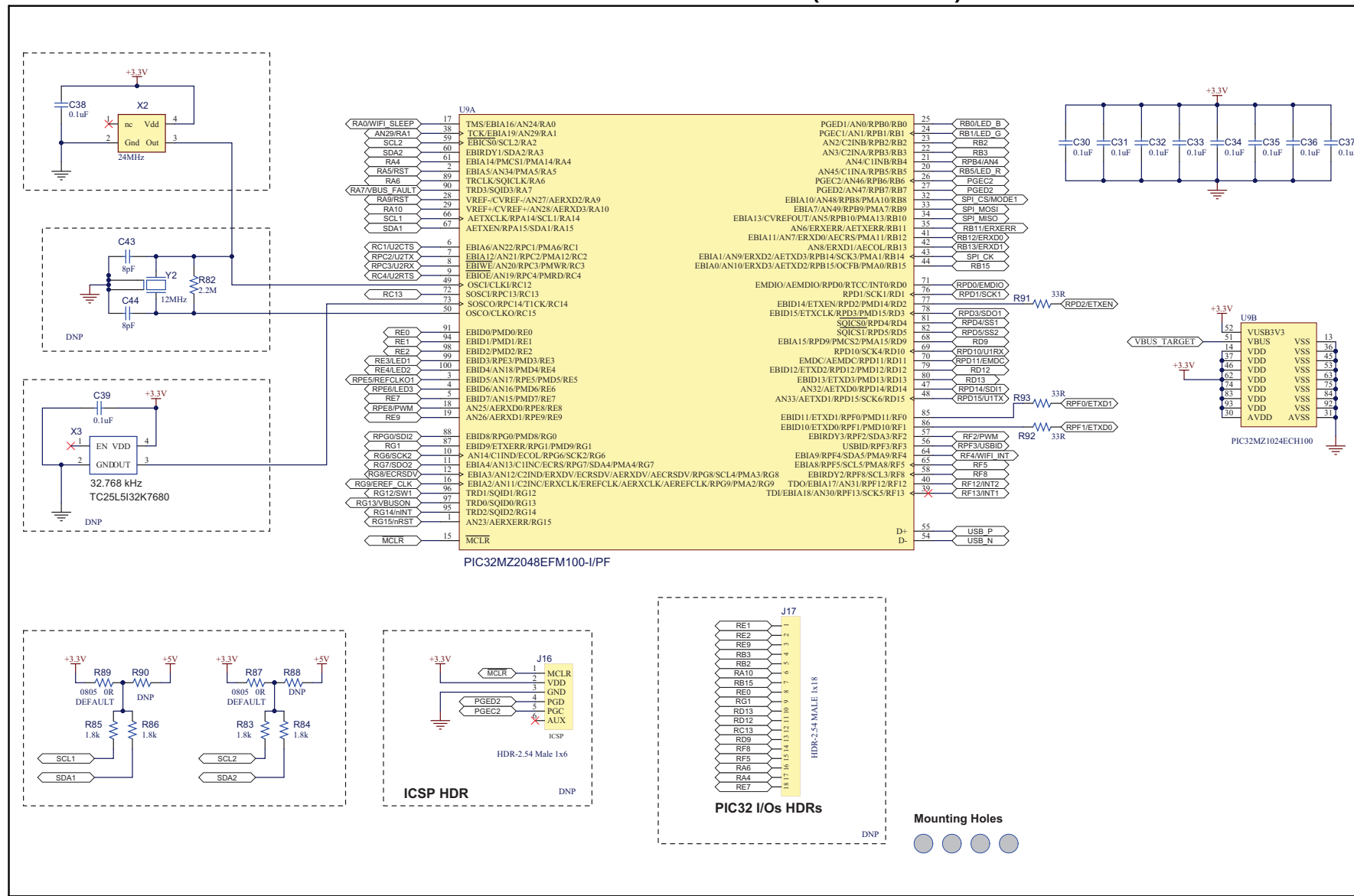
A.1 BLOCK DIAGRAM

FIGURE A-1: HIGH-LEVEL BLOCK DIAGRAM OF THE PIC32MZ EF CURIOSITY DEVELOPMENT BOARD



A.2 SCHEMATICS

FIGURE A-2: PIC32MZ EF CURIOSITY DEVELOPMENT BOARD SCHEMATICS (SHEET 1 OF 3)



Schematics

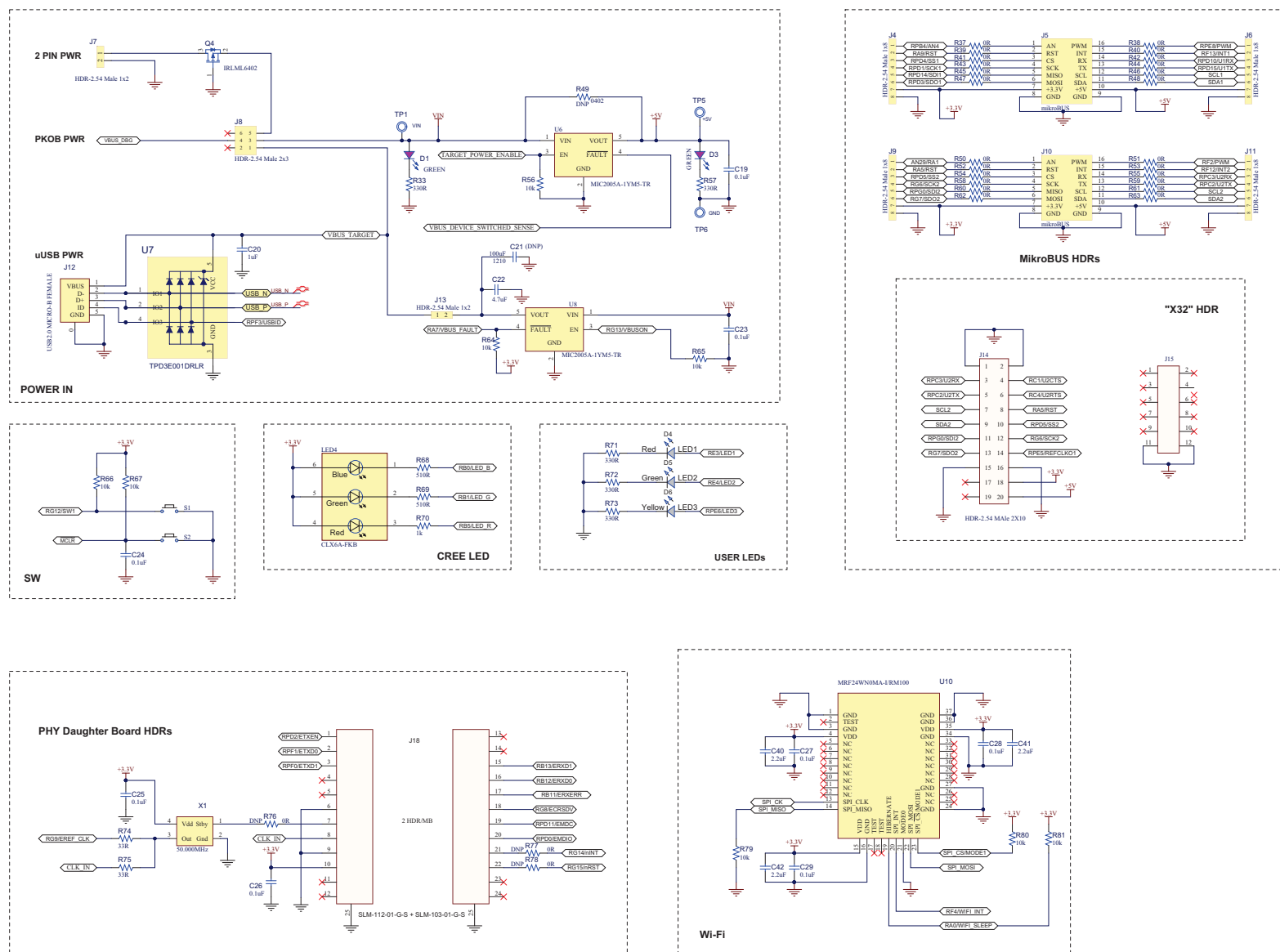
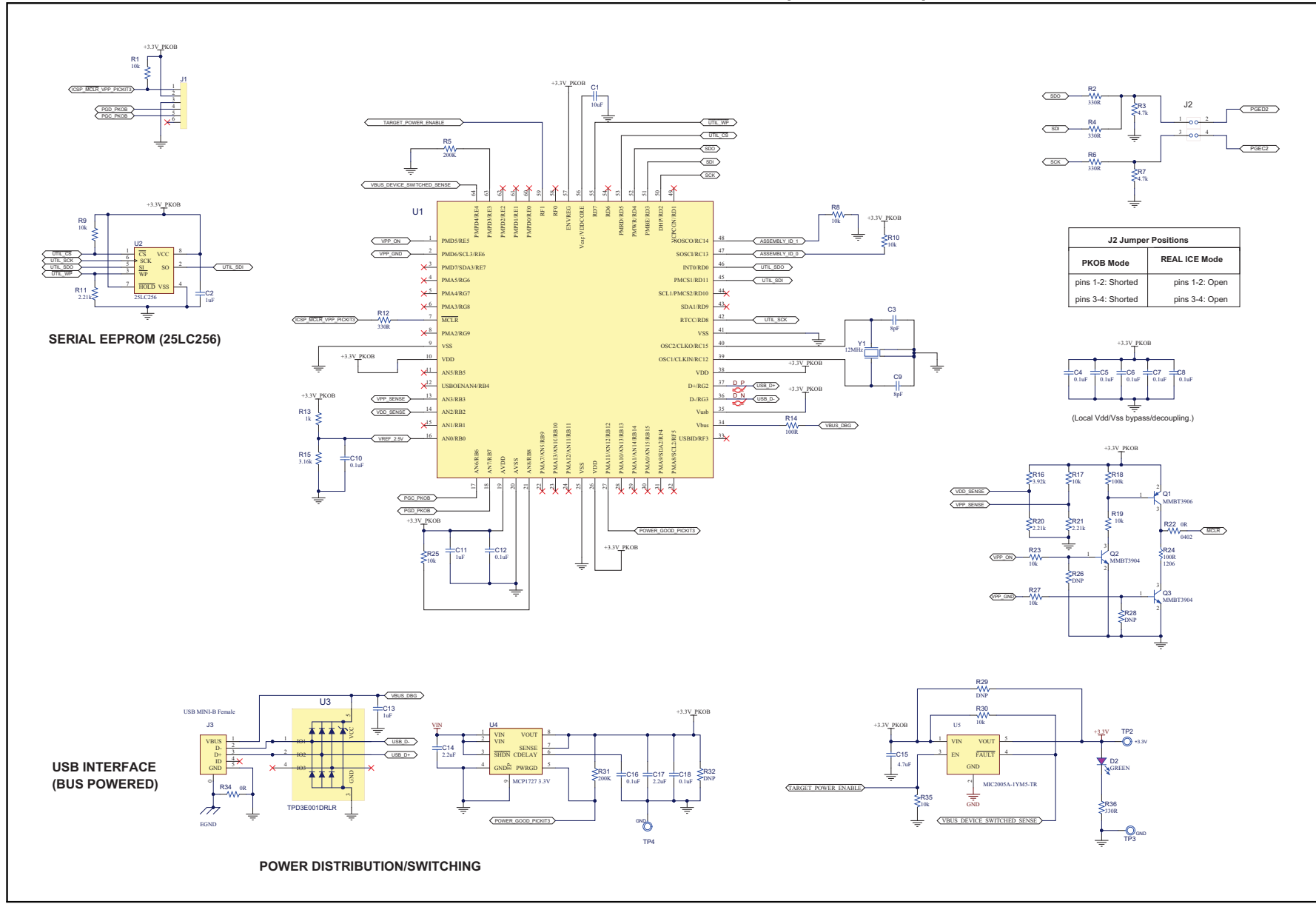


FIGURE A-4: PIC32MZ EF CURIOSITY DEVELOPMENT BOARD SCHEMATICS (SHEET 3 OF 3)



Appendix B. Bill of Materials

B.1 PIC32MZ EF CURIOSITY DEVELOPMENT BOARD BILL OF MATERIALS

TABLE B-1: BILL OF MATERIALS

Reference	Description	Manufacturer	Part No.
C4, C5, C6, C7, C8, C10, C12, C13, C16, C18, C19, C20, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39	CAP CER .10 μ F 50V X7R 0402	Samsung	CL05B104KO5NNNC
C1	CAP CER 10 μ F 10V 10% X7R SMD 0805	Murata	GRM21BR71A106KE51L
C2, C11	CAP CER 1 μ F 10V 10% X5R SMD 0402	Murata	GRM155R61A105KE15D
C3, C9	CAP CER 8 pF 50V C0G 0402	Murata	GRM1555C1H8R0DA01D
C14, C17, C40, C41, C42	CAP CER 2.2 μ F 16V X5R 0603	TDK Corporation	C1608X5R1C225K
C15	CAP CER 4.7 μ F 10V X5R 0603	Taiyo	LMK107BJ475KA-T
C22	CAP CER 4.7 μ F 10V 10% X7R SMD 0805	TDK Corporation	C2012X7R1A475K125AC
R70	RES TKF 1k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1001V
R13, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R50, R51, R52, R53, R54, R55, R58, R59, R60, R61, R62, R63	RES TKF 1k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1001X
R14	RES TKF 100R 5% 1/16W SMD 0402	Yageo	RC0402JR-07100RL
R16	RES TKF 3.92K 1% 1/16W SMD 0402	Yageo	RC0402FR-073K92L
R24	RES TKF 100R 1% 1/4W SMD 1206	Yageo	RC1206FR-07100RL
R1, R8, R9, R10, R17, R19, R23, R25, R27, R30, R35, R56, R64, R65, R66, R67, R79, R80, R81	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X
R74, R75	RES TKF 33R 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF33R0X
R68, R69	RES TKF 510R 1% 1/10W SMD 0603	Yageo	RC0603FR-07510RL
R3, R7	RES TKF 4.7k 5% 1/10W SMD 0402	Panasonic	ERJ-2GEJ472X
R5, R31	RES TKF 200k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF2003X
R11, R20, R21	RES TKF 2.21k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF2211X
R18	RES TKF 100k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1003X

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TABLE B-1: BILL OF MATERIALS (CONTINUED)

Reference	Description	Manufacturer	Part No.
R22, R34,	RES TKF 0R 1/16W SMD 0402	Yageo	RC0402JR-070RL
R2, R4, R6, R12, R33, R36, R57, R71, R72, R73	RES TKF 330R 5% 1/10W SMD 0402	Panasonic	ERJ-2GEJ331X
R15	RES SMD 3.16K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF3161X
R83, R84, R85, R86	RES SMD 1.8K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF1801X
R87, R89	RES TKF 0R 1/8W SMD 0805	Panasonic	ERJ-6GEY0R00V
LED4	LED RGB CLX6A-FKB	Cree	CLX6A-FKB-CK1P1G1BB7 R3R3
LED3	LED, SMD, YEL, 0603 package	Kingbright	APT1608YC
LED1	LED, SMD, RED, 0603 package	Kingbright	APT1608EC
D1, D2, D3, LED2	LED, SMD, GRN, 0603 package	Kingbright	APT1608SGC
S1, S2	SWITCH TACTILE SPST-NO 0.05A 12V	APEM INC	ADTSM32RVTR
Q4	TRANS FET P-CH IRLML6402 -20V -3.7A 1.3W SOT-23-3	International Rectifier	IRLML6402TRPBF
Q1	TRANS BJT PNP MMBT3906 -40V -200mA 300mW SOT-23-3	NXP Semiconductors	PMBT3906,215
Q2, Q3	TRANS BJT NPN MMBT3904 40V 200mA 310mW SOT-23-3	Diodes Incorporated	MMBT3904-7-F
J7	CON HDR-2.54 Male 1x2 RA	Samtec	TSW-102-08-F-S-RA
J13	CON HDR-2.54 Male 1x2	Samtec	TSW-102-07-F-S
J8	CON HDR-2.54 Male 2x3	Samtec	TSW-103-07-F-D
J12	USB - micro B USB 2.0 Receptacle Connector 5 Position SM RA	Amphenol	10118194-0001LF
J5, J10	mikroBUS HOST	Sullins	SSW-108-01-F-S
J14	CON HDR-0.1" Male 2x10	Samtec	TSW-110-07-F-D
J15	CON HDR-0.1" Male 2x6	Samtec	TSW-106-07-F-D
J18	TWO CONN HEADER .050" 12POS PCB GOLD	Samtec	SLM-112-01-F-S
@J18	TWO CONN HEADER .050" 3POS PCB GOLD	Samtec	SLM-103-01-F-S
J2	HDR_JMPR_2X2_TH_0.05"	Samtec	FTS-102-01-F-D
@J2	CONN JUMPER SHORTING 1.27MM GOLD	Sullins	NPB02DVFN-RC
J3	USB - micro B USB 2.0 Receptacle Connector 5 Position SM RA	Amphenol	10118194-0001LF
X2	OSC MEMS 24.000MHZ CMOS SMD	Abracon LLC	ASDMB-24.000MHZ-LC-T
Y1	CRYSTAL 12MHz 8 pF SMD NX3225SA	AVX	NX3225SA-12.000000MHZ
U3, U7	ESD Protection -TPD3E001DRLR	TI	TPD3E001DRLR
RUBBER FEET	BUMPER CYLIN 0.312" DIA BLK	3M	SJ61A1
U10	MOD ON BOARD WIFI RADIO PCB ANT	Microchip Technology Inc.	MRF24WN0MA-I/RM100
U9	MCHP MCU 32-BIT 200MHz 2048kB 512kB PIC32MZ1024EFM100-I/ pF TQFP-100	Microchip Technology Inc.	PIC32MZ2048EFM100-I/PT
U1	IC PIC MCU FLASH 256K 64-TQFP	Microchip Technology Inc.	PIC24FJ256GB106-I/PT
U2	MCHP MEMORY SERIAL EEPROM 256k SPI 25LC256-E/SN SOIC-8	Microchip Technology Inc.	25LC256T-E/SN
U4	MCHP ANALOG LDO 3.3V MCP1727-3302E/MF	Microchip Technology Inc.	MCP1727-3302E/MF
U5, U6, U8	IC SWITCH LOAD FULL FUNC SOT23-5	Microchip Technology Inc.	MIC2005A-1YM5-TR
X1	OSC MEMS 50.000 MHz_1.8V~3.3V SMD	Microchip Technology Inc.	DSC1001CI1-050.0000

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