



**MICROCHIP**

---

**PIC32MZ EF Curiosity  
Development Board  
User's Guide**

---

---

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

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- 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.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

---

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

*Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona, Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC<sup>®</sup> MCUs and dsPIC<sup>®</sup> DSCs, KEELoQ<sup>®</sup> code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.*

**QUALITY MANAGEMENT SYSTEM  
CERTIFIED BY DNV  
= ISO/TS 16949 =**

### Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BeaconThings, BitCloud, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Heldo, JukeBlox, KEELoQ, KEELoQ logo, Kleer, LANCheck, LINK MD, maXStylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, RightTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, EtherSynch, Hyper Speed Control, HyperLight Load, IntellIMOS, mTouch, Precision Edge, and Quiet-Wire are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, CryptoAuthentication, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, Mindi, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, PureSilicon, QMatrix, RightTouch logo, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2017, Microchip Technology Incorporated, All Rights Reserved.

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 (8<sup>th</sup> 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](http://www.microchip.com).

For information regarding the exclusive, limited warranties applicable to Microchip products, please see Microchip's standard terms and conditions of sale, which are printed on our sales documentation and available at [www.microchip.com](http://www.microchip.com).

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

---

---

## Table of Contents

---

---

|                                                                    |           |
|--------------------------------------------------------------------|-----------|
| <b>Preface</b> .....                                               | <b>7</b>  |
| <b>Chapter 1. Introduction</b>                                     |           |
| 1.1 Kit Contents .....                                             | 13        |
| 1.2 Development Board Functionality and Features .....             | 14        |
| <b>Chapter 2. Hardware</b>                                         |           |
| 2.1 Hardware Features .....                                        | 17        |
| <b>Appendix A. Schematics</b>                                      |           |
| A.1 Block Diagram .....                                            | 23        |
| A.2 Schematics .....                                               | 24        |
| <b>Appendix B. Bill of Materials</b>                               |           |
| B.1 PIC32MZ EF Curiosity Development Board Bill of Materials ..... | 27        |
| <b>Worldwide Sales and Service</b> .....                           | <b>30</b> |

# PIC32MZ EF Curiosity Development Board User's Guide

---

---

NOTES:



# PIC32MZ EF CURIOSITY DEVELOPMENT BOARD USER'S GUIDE

---

---

## 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](http://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 &gt; Save</i></u>                                                                                                                                                                      |
| Bold characters                                  | A dialog button                                                                                                                                                                                                                                                                                      | Click <b>OK</b>                                                                                                                                                                                   |
|                                                  | A tab                                                                                                                                                                                                                                                                                                | Click the <b>Power</b> 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)<br>{ ...<br>}                                                                                                                                                                    |
| 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. | <b>Note:</b> This is a standard note box.                                                                                                                                                         |
|                                                  |                                                                                                                                                                                                                                                                                                      | <div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>CAUTION</b></p> <p><b>This is a caution note.</b></p> </div> <p><b>Note 1:</b> This is a note used in a table.</p> |



## 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<sup>®</sup> 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<sup>®</sup> 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<sup>™</sup> Specification**

The purpose of mikroBUS<sup>™</sup> 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

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

# PIC32MZ EF Curiosity Development Board User's Guide

---

## DEVELOPMENT SYSTEMS CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at [www.microchip.com](http://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
- **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:



# PIC32MZ EF CURIOSITY DEVELOPMENT BOARD USER'S GUIDE

---

---

## 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.

# PIC32MZ EF Curiosity Development Board User's Guide

---

## 1.2 DEVELOPMENT BOARD FUNCTIONALITY AND FEATURES

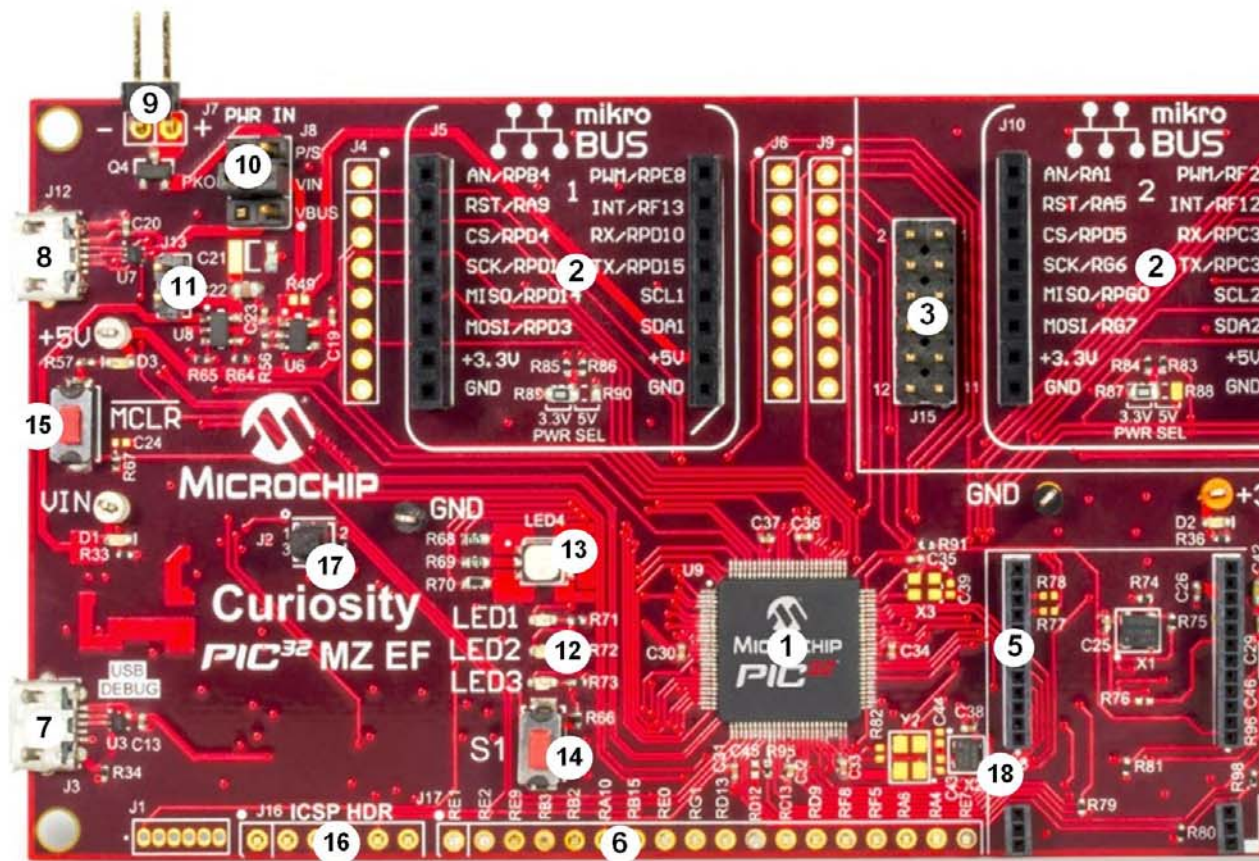
### 1.2.1 Development Board

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 VBUS in Host mode (J13).
12. Three user LEDs (LED1, LED2, and LED3).
13. RGB LED (LED4).
14. User button (S1).
15. Reset Button ( $\overline{MCLR}$ ).
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)



# PIC32MZ EF Curiosity Development Board User's Guide

---

---

NOTES:



## 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.

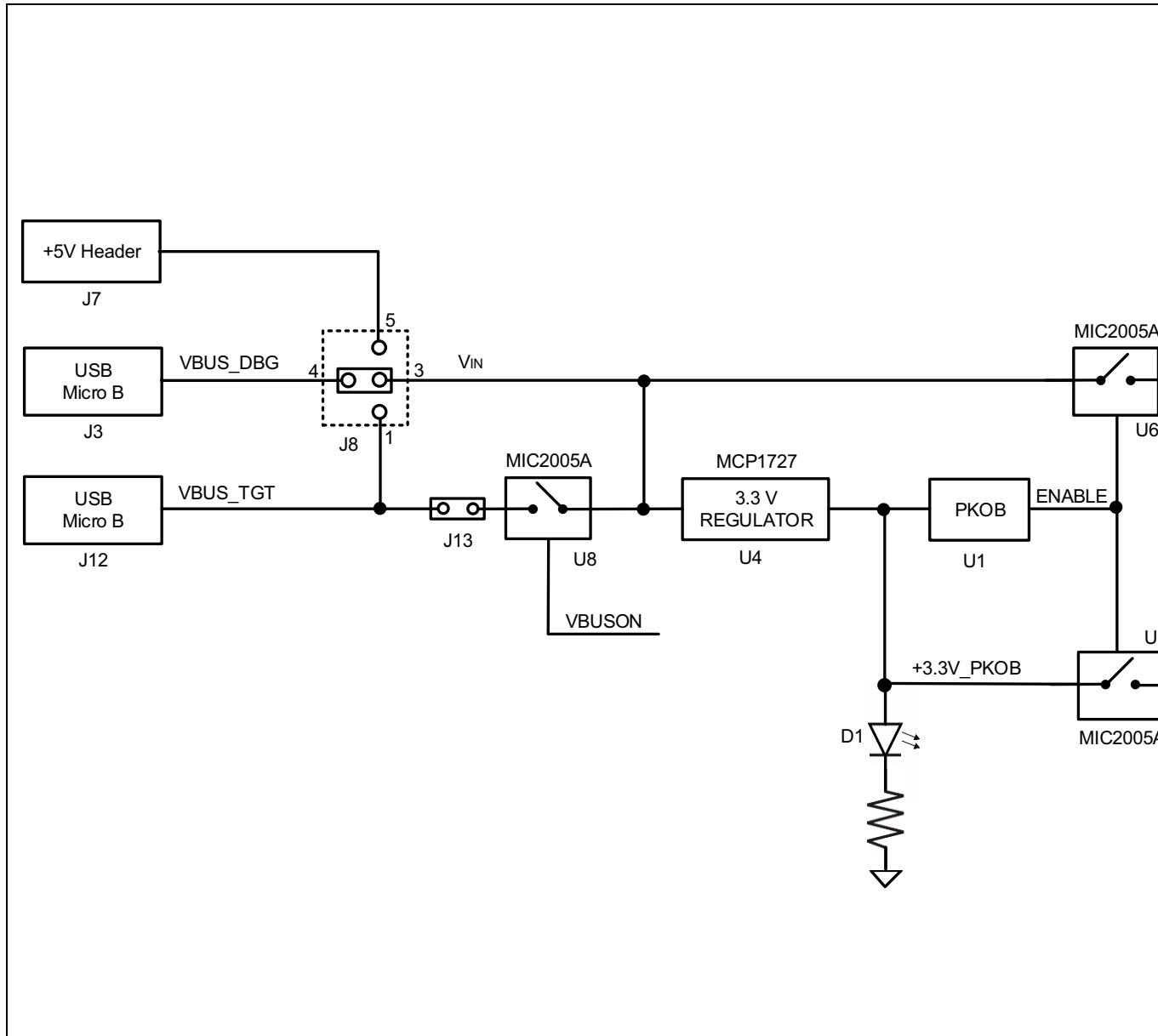
The +3.3V power supply for the microcontroller is generated by the MPC1727 voltage regulator.

**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                |

# PIC32MZ EF Curiosity Development Board User's Guide

---

## 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, I<sup>2</sup>C, 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](http://www.microchipdirect.com)).

**TABLE 2-5: AUDIO DAUGHTER BOARD**

| Daughter Board Name                         | Microchip Part Number    |
|---------------------------------------------|--------------------------|
| PIC32 Audio Codec Daughter Board - AK4642EN | <a href="#">AC320100</a> |

## 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](http://www.microchipdirect.com)).

**TABLE 2-6: ETHERNET PHY DAUGHTER BOARD**

| Daughter Board Name         | Microchip Part Number      |
|-----------------------------|----------------------------|
| LAN8720A PHY Daughter Board | <a href="#">AC320004-3</a> |

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.

# PIC32MZ EF Curiosity Development Board User's Guide

---

## 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.

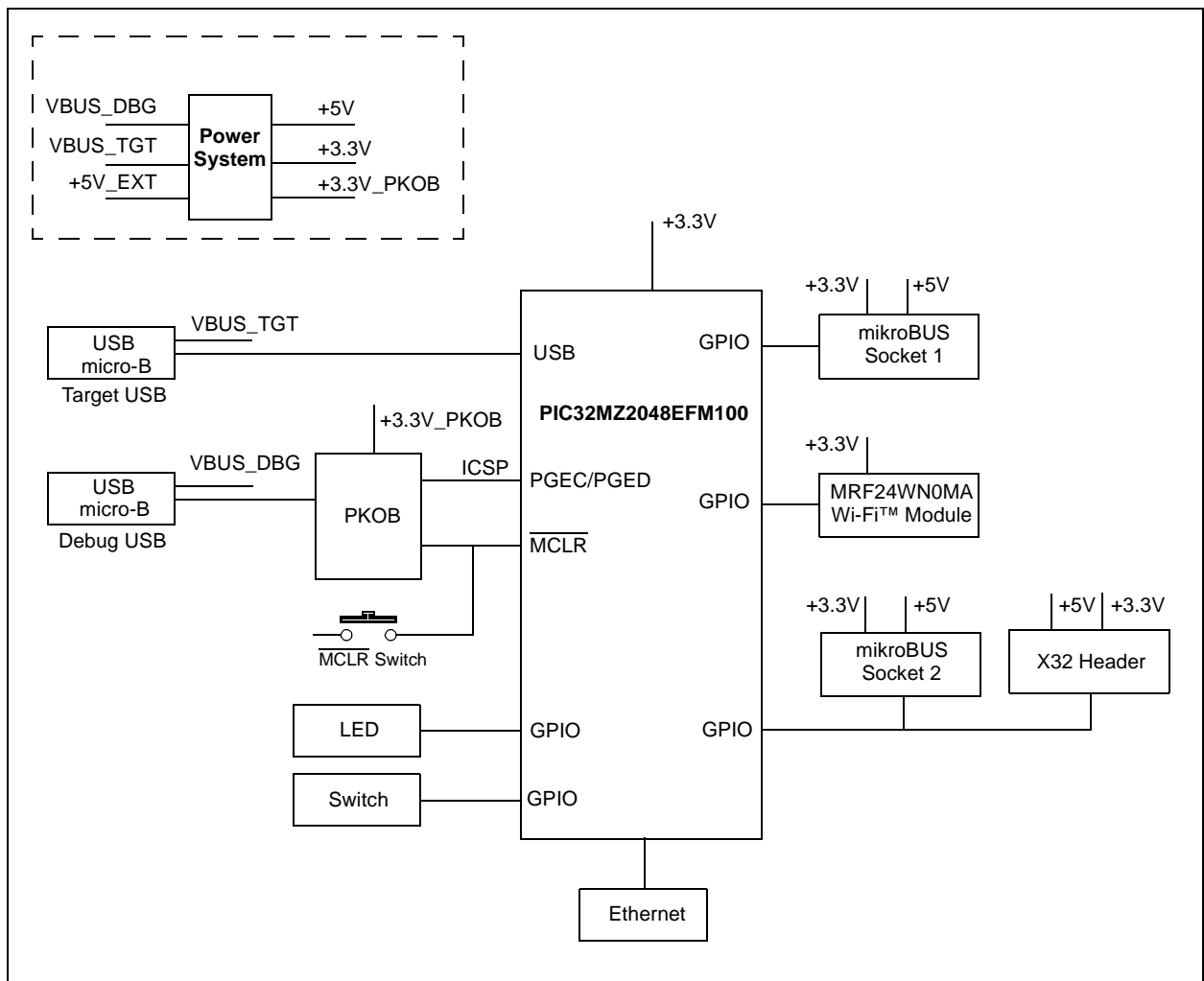
**TABLE 2-7: RESOURCE ASSIGNMENT**

| Resource Assignment | Peripheral       |      |       |                |           | Reference Clock |
|---------------------|------------------|------|-------|----------------|-----------|-----------------|
|                     | I <sup>2</sup> 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)

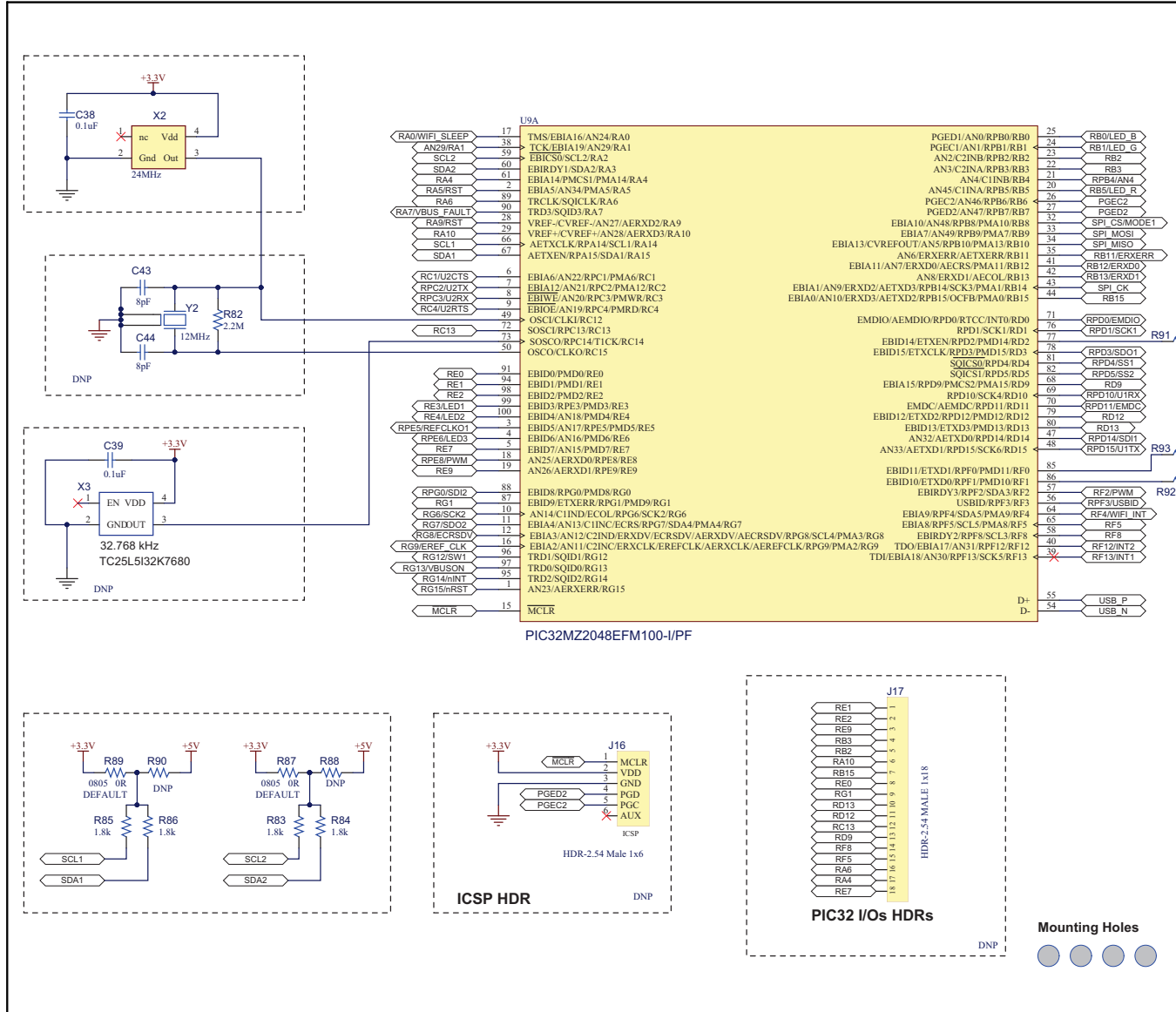




FIGURE A-3: PIC32MZ EF CURIOSITY DEVELOPMENT BOARD SCHEMATICS (SHEET 2 OF 3)

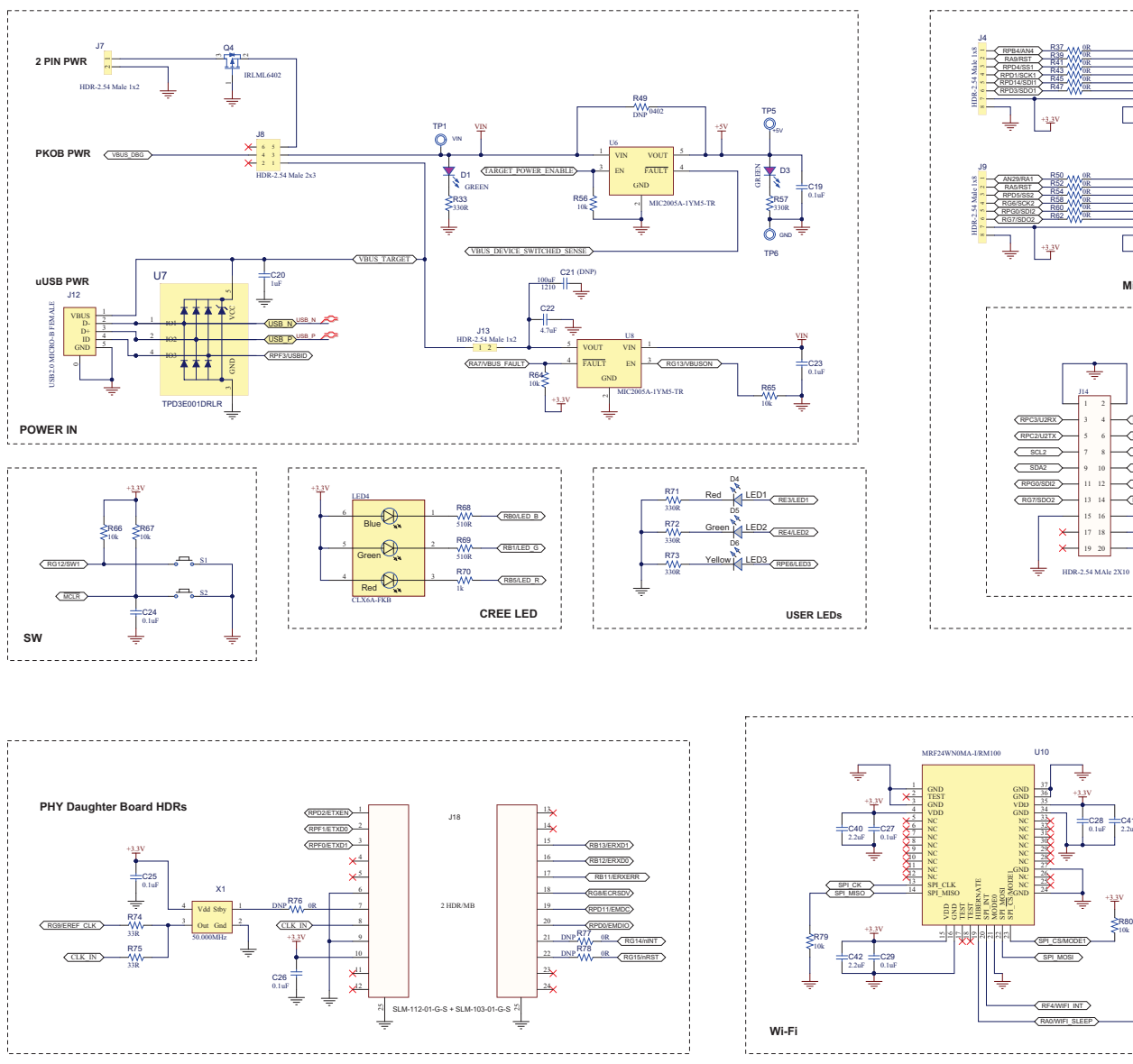
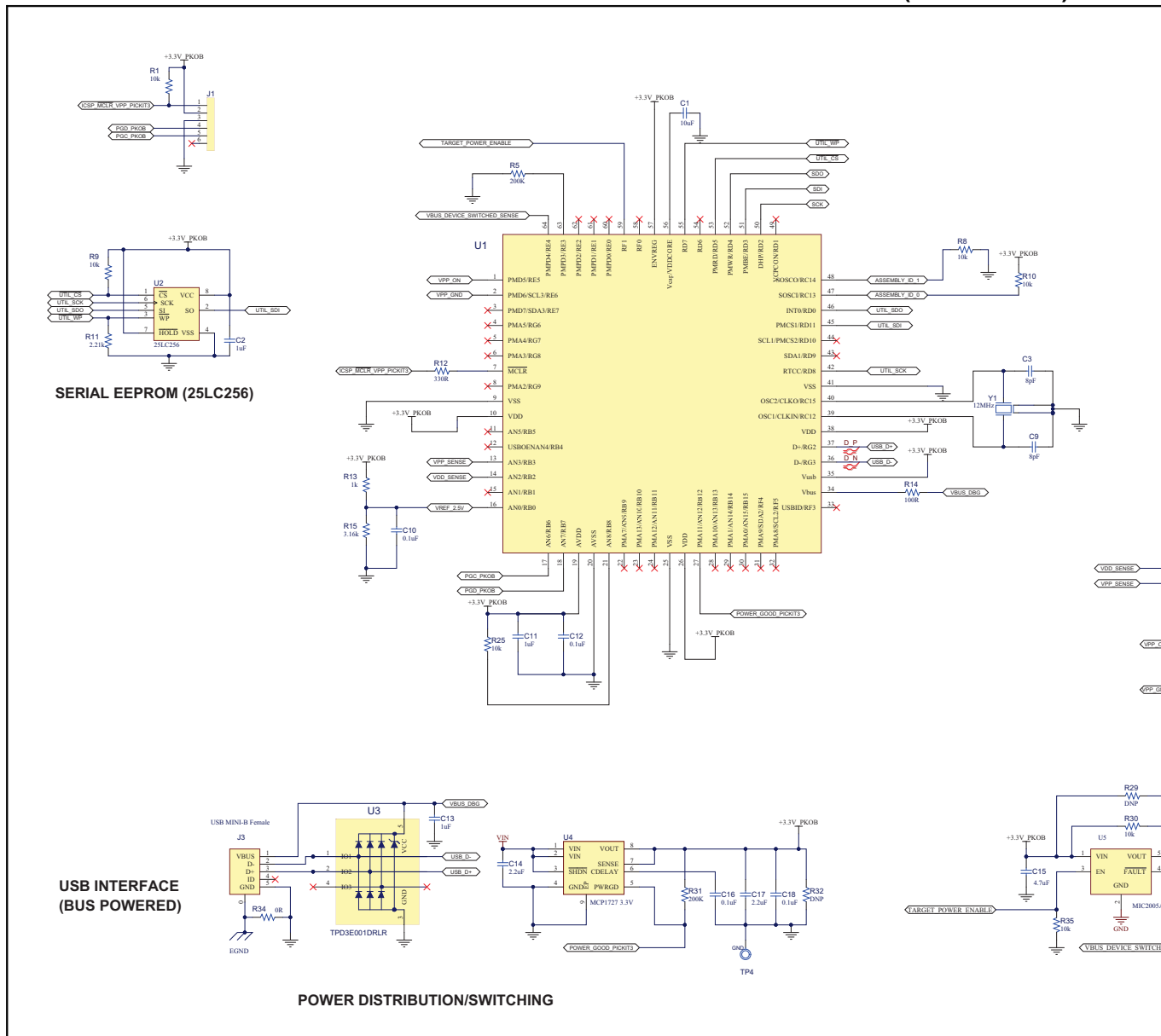


FIGURE A-4: PIC32MZ EF CURIOSITY DEVELOPMENT BOARD SCHEMATICS (SHEET 3 OF 3)





# PIC32MZ EF CURIOSITY DEVELOPMENT BOARD USER'S GUIDE

## 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 $\mu$ F 50V X7R 0402         | Samsung         | CL05B104KO5NNNC     |
| C1                                                                                                                                         | CAP CER 10 $\mu$ F 10V 10% X7R SMD 0805  | Murata          | GRM21BR71A106KE51L  |
| C2, C11                                                                                                                                    | CAP CER 1 $\mu$ 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 $\mu$ F 16V X5R 0603         | TDK Corporation | C1608X5R1C225K      |
| C15                                                                                                                                        | CAP CER 4.7 $\mu$ F 10V X5R 0603         | Taiyo           | LMK107BJ475KA-T     |
| C22                                                                                                                                        | CAP CER 4.7 $\mu$ 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       |

# PIC32MZ EF Curiosity Development Board User's Guide

**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,<br>R12, R33, R36,<br>R57, R71, R72,<br>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,<br>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<br>R3R3 |
| LED3                                                   | LED, SMD, YEL, 0603 package                                             | Kingbright                | APT1608YC                    |
| LED1                                                   | LED, SMD, RED, 0603 package                                             | Kingbright                | APT1608EC                    |
| D1, D2, D3,<br>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<br>SOT-23-3                    | International Rectifier   | IRLML6402TRPBF               |
| Q1                                                     | TRANS BJT PNP MMBT3906 -40V -200mA<br>300mW SOT-23-3                    | NXP Semiconductors        | PMBT3906,215                 |
| Q2, Q3                                                 | TRANS BJT NPN MMBT3904 40V 200mA 310mW<br>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<br>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<br>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<br>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<br>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. | DSC1001C1I-050.0000          |

---

---

**NOTES:**



## Worldwide Sales and Service

### AMERICAS

**Corporate Office**  
2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200  
Fax: 480-792-7277  
Technical Support:  
<http://www.microchip.com/support>  
Web Address:  
[www.microchip.com](http://www.microchip.com)

**Atlanta**  
Duluth, GA  
Tel: 678-957-9614  
Fax: 678-957-1455

**Austin, TX**  
Tel: 512-257-3370

**Boston**  
Westborough, MA  
Tel: 774-760-0087  
Fax: 774-760-0088

**Chicago**  
Itasca, IL  
Tel: 630-285-0071  
Fax: 630-285-0075

**Dallas**  
Addison, TX  
Tel: 972-818-7423  
Fax: 972-818-2924

**Detroit**  
Novi, MI  
Tel: 248-848-4000

**Houston, TX**  
Tel: 281-894-5983

**Indianapolis**  
Noblesville, IN  
Tel: 317-773-8323  
Fax: 317-773-5453  
Tel: 317-536-2380

**Los Angeles**  
Mission Viejo, CA  
Tel: 949-462-9523  
Fax: 949-462-9608  
Tel: 951-273-7800

**Raleigh, NC**  
Tel: 919-844-7510

**New York, NY**  
Tel: 631-435-6000

**San Jose, CA**  
Tel: 408-735-9110  
Tel: 408-436-4270

**Canada - Toronto**  
Tel: 905-695-1980  
Fax: 905-695-2078

### ASIA/PACIFIC

**Asia Pacific Office**  
Suites 3707-14, 37th Floor  
Tower 6, The Gateway  
Harbour City, Kowloon

**Hong Kong**  
Tel: 852-2943-5100  
Fax: 852-2401-3431

**Australia - Sydney**  
Tel: 61-2-9868-6733  
Fax: 61-2-9868-6755

**China - Beijing**  
Tel: 86-10-8569-7000  
Fax: 86-10-8528-2104

**China - Chengdu**  
Tel: 86-28-8665-5511  
Fax: 86-28-8665-7889

**China - Chongqing**  
Tel: 86-23-8980-9588  
Fax: 86-23-8980-9500

**China - Dongguan**  
Tel: 86-769-8702-9880

**China - Guangzhou**  
Tel: 86-20-8755-8029

**China - Hangzhou**  
Tel: 86-571-8792-8115  
Fax: 86-571-8792-8116

**China - Hong Kong SAR**  
Tel: 852-2943-5100  
Fax: 852-2401-3431

**China - Nanjing**  
Tel: 86-25-8473-2460  
Fax: 86-25-8473-2470

**China - Qingdao**  
Tel: 86-532-8502-7355  
Fax: 86-532-8502-7205

**China - Shanghai**  
Tel: 86-21-3326-8000  
Fax: 86-21-3326-8021

**China - Shenyang**  
Tel: 86-24-2334-2829  
Fax: 86-24-2334-2393

**China - Shenzhen**  
Tel: 86-755-8864-2200  
Fax: 86-755-8203-1760

**China - Wuhan**  
Tel: 86-27-5980-5300  
Fax: 86-27-5980-5118

**China - Xian**  
Tel: 86-29-8833-7252  
Fax: 86-29-8833-7256

### ASIA/PACIFIC

**China - Xiamen**  
Tel: 86-592-2388138  
Fax: 86-592-2388130

**China - Zhuhai**  
Tel: 86-756-3210040  
Fax: 86-756-3210049

**India - Bangalore**  
Tel: 91-80-3090-4444  
Fax: 91-80-3090-4123

**India - New Delhi**  
Tel: 91-11-4160-8631  
Fax: 91-11-4160-8632

**India - Pune**  
Tel: 91-20-3019-1500

**Japan - Osaka**  
Tel: 81-6-6152-7160  
Fax: 81-6-6152-9310

**Japan - Tokyo**  
Tel: 81-3-6880-3770  
Fax: 81-3-6880-3771

**Korea - Daegu**  
Tel: 82-53-744-4301  
Fax: 82-53-744-4302

**Korea - Seoul**  
Tel: 82-2-554-7200  
Fax: 82-2-558-5932 or  
82-2-558-5934

**Malaysia - Kuala Lumpur**  
Tel: 60-3-6201-9857  
Fax: 60-3-6201-9859

**Malaysia - Penang**  
Tel: 60-4-227-8870  
Fax: 60-4-227-4068

**Philippines - Manila**  
Tel: 63-2-634-9065  
Fax: 63-2-634-9069

**Singapore**  
Tel: 65-6334-8870  
Fax: 65-6334-8850

**Taiwan - Hsin Chu**  
Tel: 886-3-5778-366  
Fax: 886-3-5770-955

**Taiwan - Kaohsiung**  
Tel: 886-7-213-7830

**Taiwan - Taipei**  
Tel: 886-2-2508-8600  
Fax: 886-2-2508-0102

**Thailand - Bangkok**  
Tel: 66-2-694-1351  
Fax: 66-2-694-1350

### EUROPE

**Austria - Wels**  
Tel: 43-7242-2244-39  
Fax: 43-7242-2244-393

**Denmark - Copenhagen**  
Tel: 45-4450-2828  
Fax: 45-4485-2829

**Finland - Espoo**  
Tel: 358-9-4520-820

**France - Paris**  
Tel: 33-1-69-53-63-20  
Fax: 33-1-69-30-90-79

**France - Saint Cloud**  
Tel: 33-1-30-60-70-00

**Germany - Garching**  
Tel: 49-8931-9700  
**Germany - Haan**  
Tel: 49-2129-3766400

**Germany - Heilbronn**  
Tel: 49-7131-67-3636

**Germany - Karlsruhe**  
Tel: 49-721-625370

**Germany - Munich**  
Tel: 49-89-627-144-0  
Fax: 49-89-627-144-44

**Germany - Rosenheim**  
Tel: 49-8031-354-560

**Israel - Ra'anana**  
Tel: 972-9-744-7705

**Italy - Milan**  
Tel: 39-0331-742611  
Fax: 39-0331-466781

**Italy - Padova**  
Tel: 39-049-7625286

**Netherlands - Druenen**  
Tel: 31-416-690399  
Fax: 31-416-690340

**Norway - Trondheim**  
Tel: 47-7289-7561

**Poland - Warsaw**  
Tel: 48-22-3325737

**Romania - Bucharest**  
Tel: 40-21-407-87-50

**Spain - Madrid**  
Tel: 34-91-708-08-90  
Fax: 34-91-708-08-91

**Sweden - Gothenberg**  
Tel: 46-31-704-60-40

**Sweden - Stockholm**  
Tel: 46-8-5090-4654

**UK - Wokingham**  
Tel: 44-118-921-5800  
Fax: 44-118-921-5820

11/07/16

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Development Boards & Kits - PIC/DSPIC category](#):*

*Click to view products by [Microchip manufacturer](#):*

Other Similar products are found below :

[S-191](#) [TDGL025](#) [LSD4NBT-B208000001](#) [DV330021](#) [DM160230](#) [DM164141](#) [DM164142](#) [DM164143](#) [DM320010](#) [DM320105](#) [DM320106](#)  
[DM330028](#) [DV161001](#) [DM320008](#) [DM320008-C](#) [DM320010-C](#) [DM330026](#) [MIKROE-2653](#) [MIKROE-2644](#) [MIKROE-2657](#) [MIKROE-](#)  
[2647](#) [MIKROE-2654](#) [MIKROE-2648](#) [MIKROE-2788](#) [MIKROE-1907](#) [410-336](#) [SC70EV](#) [ECC577448EU](#) [ESP32-Audio-Kit](#) [AC103011](#)  
[AC243026](#) [AC323027](#) [ADM00333](#) [ARD00906](#) [DM160228](#) [DM163025-1](#) [DM163030](#) [DM164127-2](#) [DM164130-3](#) [DM164136](#) [DM164137](#)  
[DM164140](#) [DM180021](#) [DM182026](#) [DM183021](#) [DM240001](#) [DM240001-2](#) [DM240001-3](#) [DM240004](#) [DM240011](#)