



**MICROCHIP**

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**dsPIC33A Curiosity Platform  
Development Board  
User's Guide**

# dsPIC33A Curiosity Platform Development Board User's Guide

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## Preface

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### NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (<https://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 dsPIC33A Curiosity Platform Development Board. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Website](#)
- [Product Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

## DOCUMENT LAYOUT

This user's guide provides an overview of the dsPIC33A Curiosity Platform Development Board. The document is organized as follows:

- **Chapter 1. “Overview”** – This chapter introduces the dsPIC33A Curiosity Platform Development Board and provides a brief overview of its various features.
- **Chapter 2. “Hardware”** – This chapter describes how to program/debug the board using the on-board programmer and the board's main circuit elements.
- **Appendix A. “Board Layout and Schematics”** – This appendix provides schematic diagrams for the dsPIC33A Curiosity Platform Development Board.
- **Appendix B. “Bill of Materials (BOM)”** – This appendix provides the component list used in assembling the board.

## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

| Description                                      | Represents  | Examples  |
|--|---|---|
| <b>Arial font:</b>                               |   |   |
| 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&gt;Save</i></u>                                  |
| Bold characters                                  | A dialog button   | Click <b>OK</b>   |
|  | A tab   | Click the <b>Power</b> tab                                  |
| N'Rnnnn  | A number in verilog format, where N is the total number of digits, R is the radix and n is a digit. | 4'b0010, 2'hF1  |
| Text in angle brackets < >                       | A key on the keyboard   | Press <Enter>, <F1>   |
| <b>Courier New font:</b>                         |   |   |
| Plain Courier New                                | Sample source code  | #define START   |
|  | Filenames   | autoexec.bat  |
|  | File paths  | c:\mcc18\h  |
|  | Keywords  | _asm, _endasm, static                                       |
|  | Command-line options  | -Opa+, -Opa-  |
|  | Bit values  | 0, 1  |
|  | Constants   | 0xFF, 'A'   |
| Italic Courier New                               | A variable argument   | <i>file.o</i> , where <i>file</i> can be any valid filename |
| Square brackets [ ]                              | Optional arguments  | mcc18 [options] <i>file</i> [options]                       |
| Curly brackets and pipe character: {   }         | Choice of mutually exclusive arguments; an OR selection   | errorlevel {0 1}  |
| Ellipses...                                      | Replaces repeated text  | var_name [, var_name...]                                    |
|  | Represents code supplied by user  | void main (void)<br>{ ...<br>}                              |

## RECOMMENDED READING

This user's guide describes how to use the dsPIC33A Curiosity Platform Development Board. The device-specific data sheets contain current information on programming the specific microcontroller or Digital Signal Controller (DSC) devices. The following Microchip documents are recommended as supplemental reference resources:

### **MPLAB® XC-DSC C Compiler User's Guide (DS50003589)**

This comprehensive guide describes the usage, operation and features of Microchip's MPLAB XC-DSC C compiler for use with 16-bit devices.

### **MPLAB® X IDE User's Guide (DS50002027)**

This document describes the installation and implementation of the MPLAB X IDE software.

## THE MICROCHIP WEBSITE

Microchip provides online support via our website at <https://www.microchip.com>. This website is used to make files and information easily available to customers. Some of the available content includes:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, the latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups and a Microchip design partner program member listing
- **Business of Microchip** – Product selector and ordering guides, the latest Microchip press releases, a listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers.

A listing of sales offices and locations is included in the back of this document.

Technical support is available through the website at:

<https://www.microchip.com/support>.

## DOCUMENT REVISION HISTORY

### Revision A (June 2024)

This is the initial release of this document.



## Chapter 1. Overview

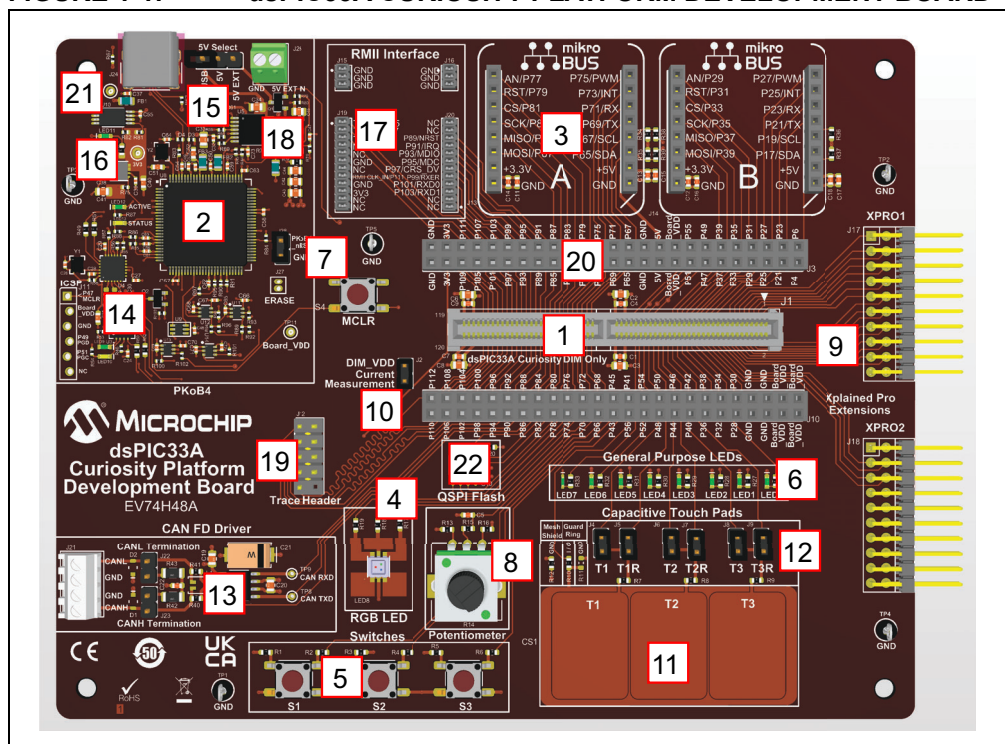
### 1.1 INTRODUCTION

The dsPIC33A Curiosity Platform Development Board (EV74H48A) is a full-featured development and demonstration platform enabling customers to explore the capabilities of the dsPIC33A DSC family. Board operation requires the insertion of a 120-pin General Purpose Dual In-Line Module (DIM) containing a dsPIC33A DSC device (purchased separately). The board supports custom feature expansion by providing mikroBUS™ and Xplained Pro interfaces, allowing companion development boards such as QTouch® extension boards, BIST-XPRO extension kits, various sensors and interfaces via Click boards™ to be added. Information for supported companion boards is available through the website at:

<https://www.microchip.com/en-us/development-tool/EV74H48A>.

The main hardware features of the board are highlighted in [Figure 1-1](#).

**FIGURE 1-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD**



1. dsPIC33A Curiosity DIM Connector
2. Integrated PICKIT™ On-Board 4 (PKOB4) programmer/debugger
3. 2x mikroBUS™ interfaces for hardware expansion, compatible with a wide range of existing Click boards™ from MikroElektronika (<https://www.mikroe.com>)
4. 1x Red/Green/Blue (RGB) LED
5. 3x general purpose push buttons
6. 8x general purpose green indicator LEDs

7.  $\overline{\text{MCLR}}$  Reset push button
8. 10k Ohm potentiometer
9. 2 Xplained Pro Extension Headers
10. 100 mil male header for current measurements of DIM\_VDD
11. 3 on-board capacitive touch pads
12. 6 100 mil headers for choosing redundant analog measurements of capacitive touch pads
13. CAN/CAN-FD Driver circuit
14. 2 Channel USB Hub supporting PKOB4 programming and UART/COM channel simultaneously
15. 1x3 pin 100 mil male header to select between 5V external or 5V USB power
16. 5V to 3.3V LDO
17. 50 mil RMII interface
18. 3.3V to adjustable 3.3V or 5V boost
19. 9-pin 100 mil trace header
20. 2x25 pin 100 mil female interface header for all DIM connections
21. USB-C<sup>®</sup> cable connector
22. 2Mbit SQI flash memory

## 1.2 POWERING THE BOARD

Choose between USB or external power via the 3-pin header J25 by shunting 2 pins together.

### 1.2.1 USB Power

This board is intended to be primarily powered from the USB Micro-C<sup>®</sup> connector, J24. The official “*USB 2.0 Specification*” restricts USB applications to consume no more than 500 mA of USB VBUS power from the host. For applications higher than 500 mA, 5V should be used.

### 1.2.2 External Power

An external +5V VDC may optionally be connected through terminal connector J26. Care should be taken to avoid exceeding a maximum of 6V on this input or damage to the 3V3 LDO may occur.

### 1.2.3 Boost Circuit

In addition to the on-board 3.3V and 5V nodes, there is a power plane labeled in the schematic as “Board\_VDD.” Board\_VDD utilizes the on-board boost converter to power the dsPIC33A General Purpose DIMs and, depending on the DIM inserted, will output either 3.3V or 5V. This is accomplished by connecting “P55\_Board\_VDD\_SELECT” to GND through a singular DIM pin. If a DIM is designed with a 5V dsPIC33A device, the P55\_Board\_VDD\_Select pin will be tied to GND and the boost circuit will output 5V. Otherwise, P55\_Board\_VDD\_Select is left floating and the boost circuit will operate in Bypass mode, outputting 3.3V.

## 1.3 USING THE PROGRAMMED DEMO FIRMWARE

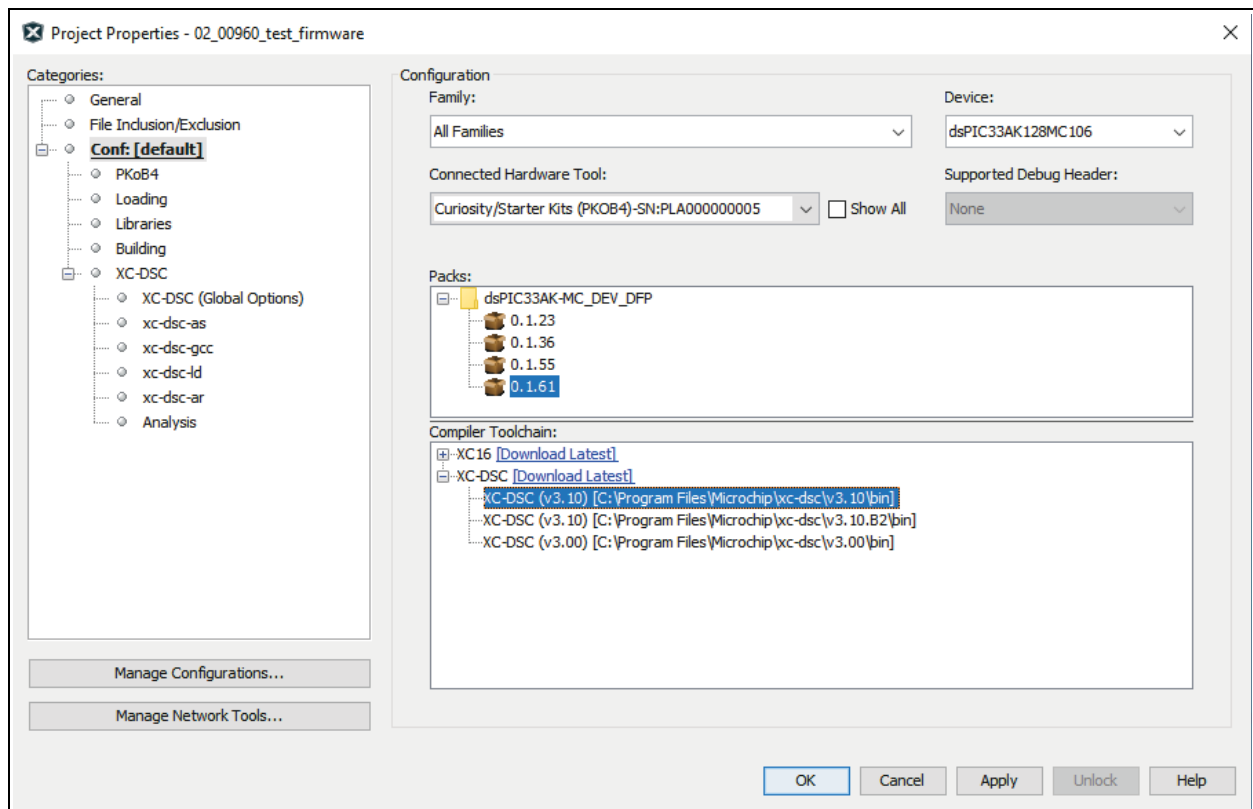
Each General Purpose DIM comes programmed with basic demo firmware which exercises several of the board hardware features, based on available pin count and modules for each device.

The source code for each demo can be obtained at:  
<https://www.microchip.com/en-us/development-tool>

## 1.4 REPROGRAMMING AND DEBUGGING THE dsPIC33A DEVICE

The board has a PICKit™ On-Board (PKOB4) programmer/debugger circuit which can be used to program and debug any dsPIC33A target device attached through the J1 DIM connector. Alternatively, an external programmer/debugger tool can be connected to the board via the 6-pin in-line connector J11 using a male-male 100 mil pitch 6-pin header or to the 6-pin in-line connector on the DIM itself. The PKOB4 circuit should automatically enumerate and be recognized by the MPLAB X IDE, v6.15 or later, when the dsPIC33A Curiosity Platform Development Board is connected to the host via the USB Micro-C connector, J24. No custom USB driver installation is necessary as the PKOB circuit relies on standard OS provided Human Interface Device (HID) drivers; therefore, the driver installation should be fully automatic. When plugged in, the PKOB programmer/debugger tool can be selected from the MPLAB X project properties page by selecting the device under: *Hardware Tools>Microchip Kits>Starter Kits (PKOB)>Curiosity/Starter Kits (PKOB4)*, as shown in [Figure 1-2](#).

**FIGURE 1-2: DSPIC33A CURIOSITY PKOB TOOL SELECTION**



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## Chapter 2. Hardware

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### 2.1 USING THE USB-UART INTERFACE

Two USB-UART channels are available for communication from the dsPIC<sup>®</sup> device to a PC via the USB connector. The MCP2221A provides the first channel, and the PKOB4 provides the second. Each channel will enumerate separately and can be used simultaneously.

#### 2.1.1 MCP2221A based USB-UART Channel

The board is equipped with a USB-UART interface based around the MCP2221A chip. The MCP2221A chip implements the standard Communication Device Class (CDC) – Abstract Control Model (ACM) protocol and, therefore, can use standard USB drivers that are provided with modern Windows<sup>®</sup>, Mac<sup>®</sup> and Linux<sup>®</sup> operating systems. Under most operating systems, the USB driver installation will be fully automatic. Under certain older operating systems, or if the device is attached to a machine running an operating system older than Windows 10 without an active Internet connection, manual installation of the drivers may be necessary. In this case, the driver package can be downloaded from:

<https://www.microchip.com/mcp2221a>

Details on how to access the serial port from Mac and Linux operating systems can also be found in the associated collateral for the MCP2221A. Under Windows, after a successful USB driver installation, the device will appear as a “COMx” port object in which standard serial terminal programs can open/read/write to and from.

#### 2.1.2 PKOB4 based USB-UART Channel

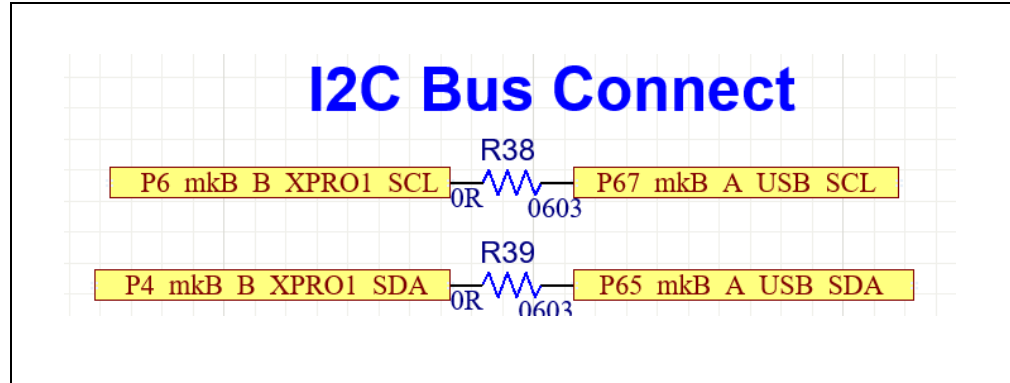
Since this board has a 2-port USB hub, it can support more than one COM channel at a time. The second COM channel is connected through the PKOB4 directly to the USB connector allowing two unique UART interfaces to be utilized from the dsPIC.

To utilize this interface, configure a UART connection to nets P102\_UART\_PKOB\_TX and P100\_UART\_PKOB\_RX. All nets are named assuming the perspective of the dsPIC device, and the respective device infosheet should be used to determine which pins are designated to the USB-UART channel.

### 2.2 USING THE I2C BUS

Several on-board functions, including mikroBus A, mikroBus B, XPRO1 and I2C to USB, support I2C capability. By default, these functions are tied together on the same I2C bus through 0 Ohm resistors R38 and R39, as shown in [Figure 2-1](#).

FIGURE 2-1: I2C BUS CONNECT



## 2.2.1 I2C Bus Connect - Populated

While connecting all features on a single bus may provide a more streamlined I2C experience, this also ties DIM pins P6 to P67 and P4 to P65 which limits the number of general purpose header pins that can be utilized at a time.

In this configuration, the pins for the unused I2C module should be configured as digital inputs.

## 2.2.2 I2C Bus Connect - Not Populated

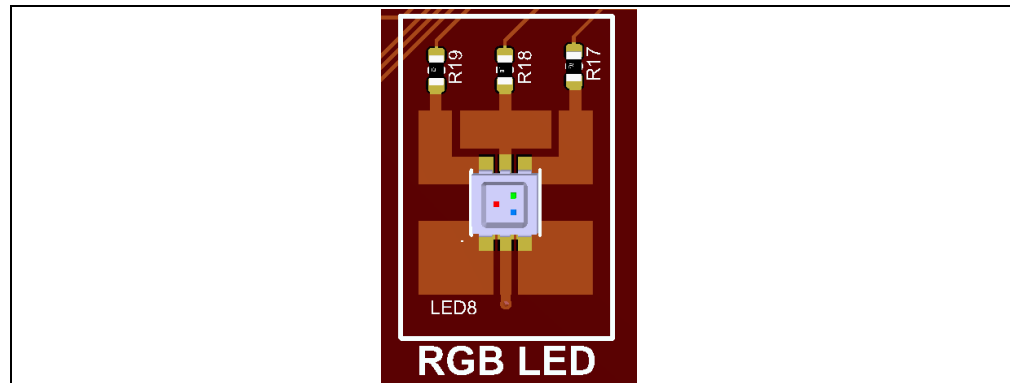
Removing R38 and R39 separates P6 and P67 as well as P4 and P65 into individually-controlled pins.

This groups the features supporting I2C into two separate I2C buses. mikroBus A and I2C to USB are supported on one bus, and mikroBus B and XPRO1 are supported on the other. If all I2C-supported features are required, two separate I2C modules will need to be configured in the dsPIC device.

## 2.3 RGB LED

Every General Purpose DIM is designed to support a PWM driving signal for each individual color. This design allows a wide range of color options on the RGB LED.

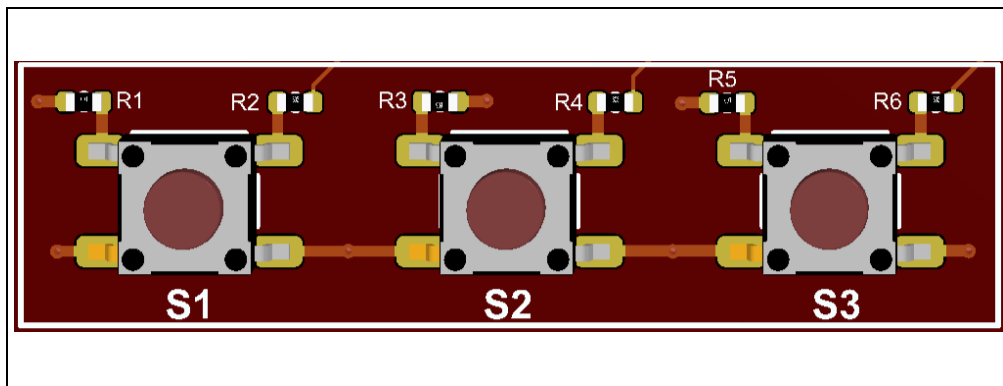
FIGURE 2-2: RGB LED



## 2.4 GENERAL PURPOSE PUSH BUTTONS

The general purpose push button switches each have a pull up to Board\_VDD. The dsPIC IO pins should be configured as digital inputs to utilize these switches. Keep in mind that the switch is an active-low circuit.

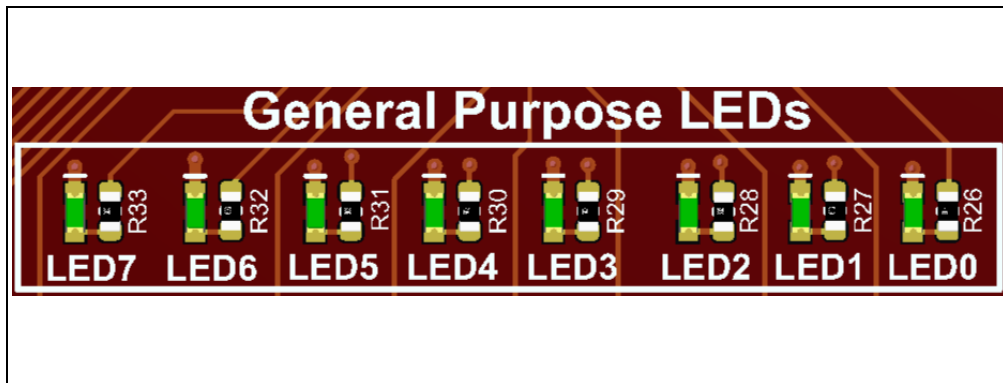
**FIGURE 2-3: GENERAL PURPOSE PUSH BUTTONS**



## 2.5 GENERAL PURPOSE GREEN INDICATOR LEDS

While the rest of the board has reference designators ordered from left to right, the general purpose LEDs are ordered from right to left to signify an MSB to LSB representation. This allows an easy display of up to 1 byte of data.

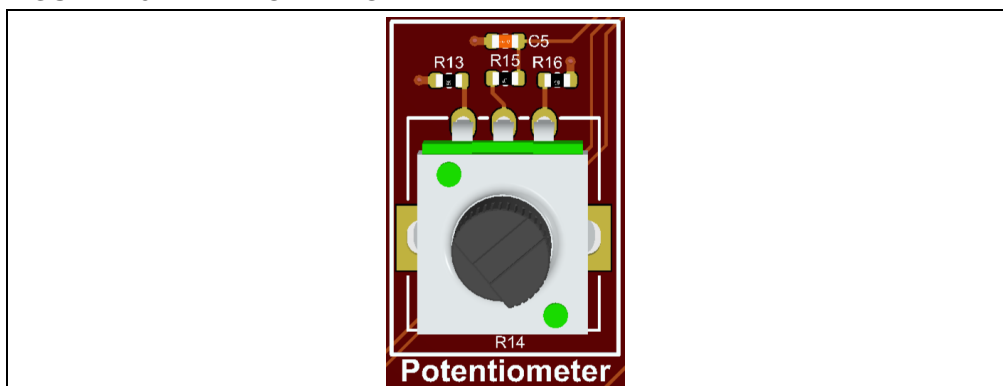
**FIGURE 2-4: GENERAL PURPOSE GREEN INDICATOR LEDS**



## 2.6 10K OHM POTENTIOMETER

The 10k Ohm potentiometer presents a simple method of providing an analog input to the 12-bit ADC on the dsPIC33A devices. A 20 Ohm resistor is placed between the potentiometer and Board\_VDD, and another is placed between the potentiometer and VSS. This limits the voltage range that can be input to the ADC from just over VSS to just under Board\_VDD, providing a method for detecting open and short circuit faults on the input voltage.

**FIGURE 2-5: POTENTIOMETER**



## 2.7 XPLAINED PRO EXTENSION HEADERS

The XPLAINED PRO Extension Headers allow the use of both BIST-XPRO extension kits and QTouch extension boards. Below is a table showing the functions supported on each pin.

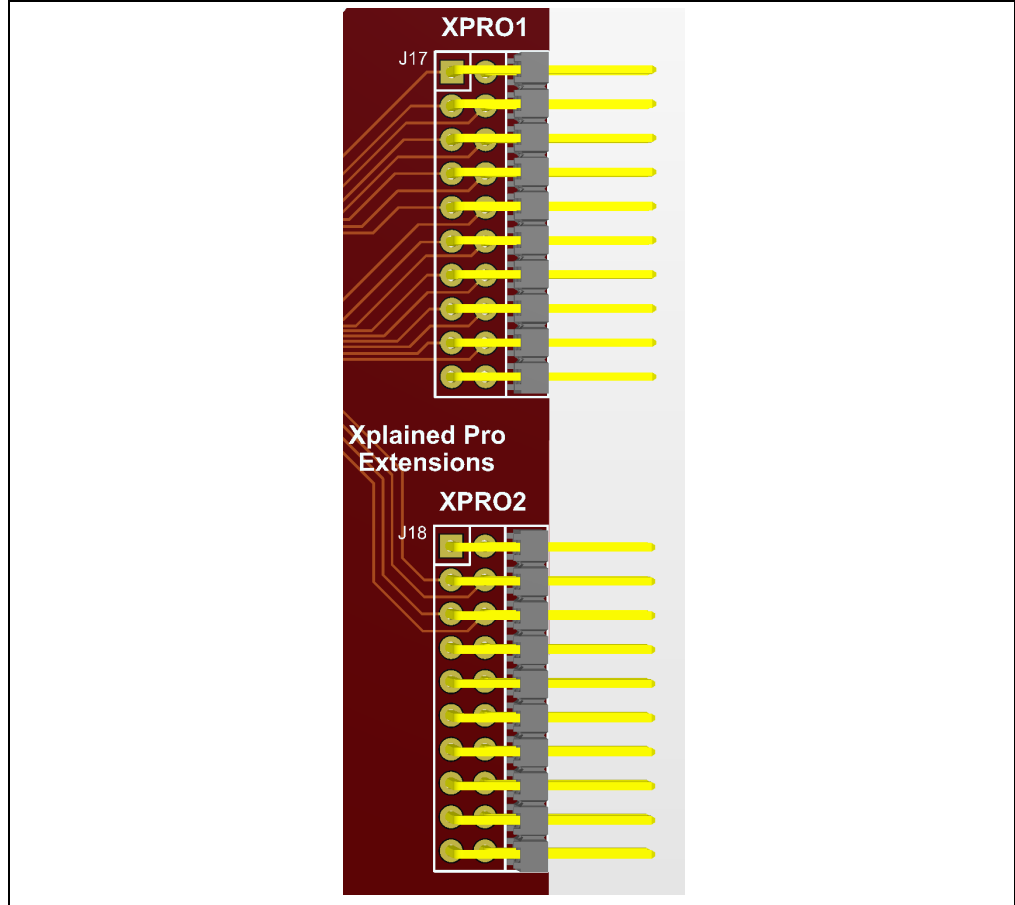
**Note:** Not all dsPIC33A General Purpose DIMs will support full functionality.

**TABLE 2-1: XPLAINED PRO EXTENSION HEADER SUPPORT**

| EXT1 | DIM Pin # | Pin Requirements    | EXT2 | DIM Pin # | Pin Requirements |
|------|-----------|---------------------|------|-----------|------------------|
| 1    | 15        | PPS / GPIO          | 1    | NC        | NC               |
| 2    | GND       | GND                 | 2    | GND       | GND              |
| 3    | 13        | Analog / PPS / GPIO | 3    | 20        | Analog           |
| 4    | 11        | Analog / PPS / GPIO | 4    | 22        | Analog           |
| 5    | 9         | Analog / PPS / GPIO | 5    | 24        | Analog           |
| 6    | 7         | Analog / PPS / GPIO | 6    | 26        | Analog           |
| 7    | 5         | Analog / PPS / GPIO | 7    | NC        | NC               |
| 8    | 3         | Analog / PPS / GPIO | 8    | NC        | NC               |
| 9    | 1         | Analog / PPS / GPIO | 9    | NC        | NC               |
| 10   | 2         | Analog / PPS / GPIO | 10   | NC        | NC               |
| 11   | 4         | I2C / PPS / GPIO    | 11   | NC        | NC               |
| 12   | 6         | I2C / PPS / GPIO    | 12   | NC        | NC               |
| 13   | 8         | NC                  | 13   | NC        | NC               |
| 14   | 10        | NC                  | 14   | NC        | NC               |
| 15   | 15        | Analog / PPS / GPIO | 15   | NC        | NC               |
| 16   | 14        | Analog / PPS / GPIO | 16   | NC        | NC               |
| 17   | 16        | Analog / PPS / GPIO | 17   | NC        | NC               |
| 18   | 18        | Analog / PPS / GPIO | 18   | NC        | NC               |
| 19   | GND       | GND                 | 19   | NC        | GND              |
| 20   | Board_VDD | Board_VDD           | 20   | Board_VDD | Board_VDD        |



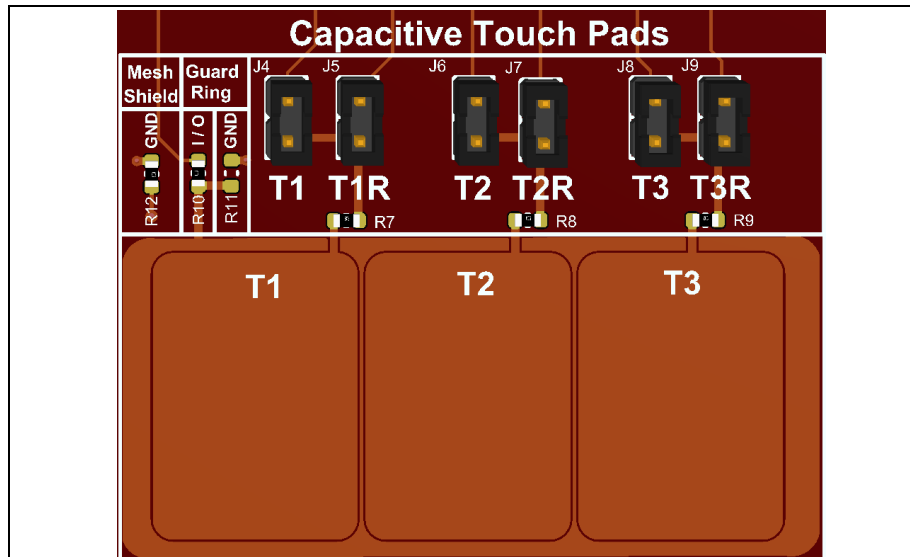
**FIGURE 2-6: XPLAINED PRO HEADERS**



## 2.8 CAPACITIVE TOUCH PADS

The out-of-box jumper configuration allows each capacitive touch pad to be read redundantly from two analog channels (Figure 2-7). For functionality purposes, only one jumper from each pair is necessary to measure the touch pad.

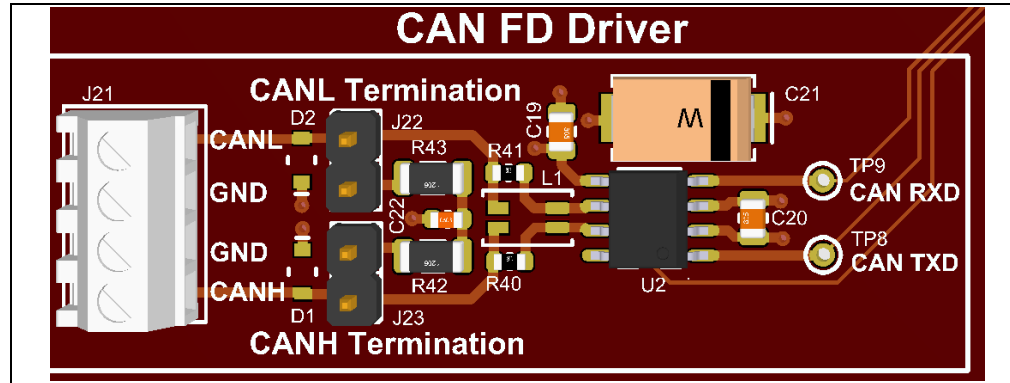
**FIGURE 2-7: CAPACITIVE TOUCH PADS**



## 2.9 CAN/CAN-FD DRIVER CIRCUIT

The CAN/CAN-FD driver circuit utilizes Microchip's ATA6563 CAN interface to communicate through a 4-pin terminal header (J21). Installing shunts on J22 and J23 connects a standard 120 Ohm termination between CANH and CANL.

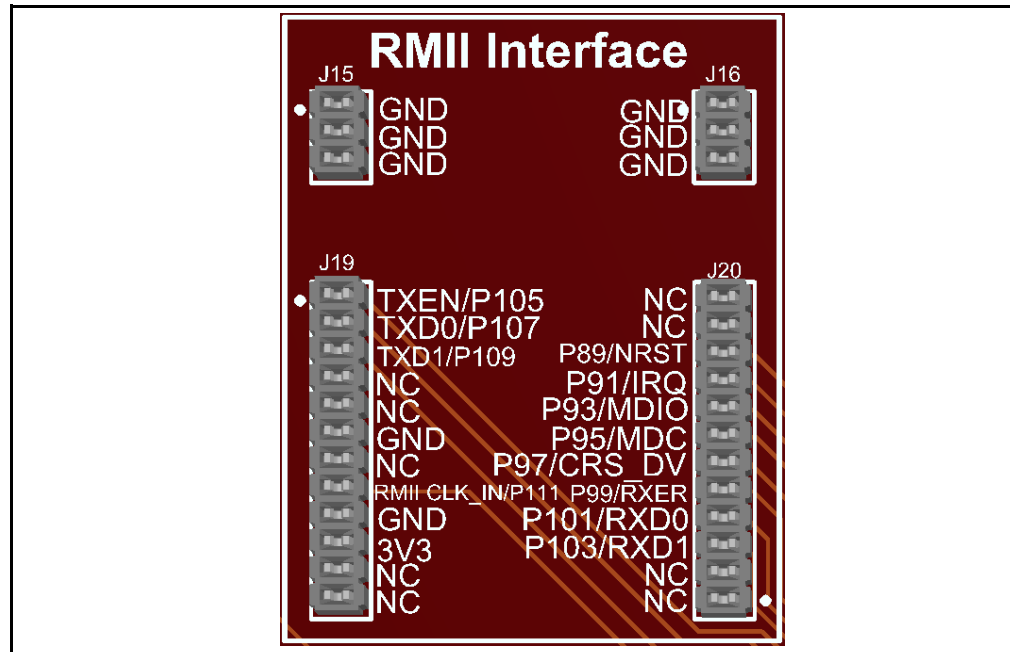
**FIGURE 2-8: CAN/CAN-FD DRIVER CIRCUIT**



## 2.10 RMII INTERFACE

The RMII Interface allows the addition of the LAN8670-RMII Evaluation Board for ethernet communication and other evaluation boards of a similar type if the feature is available on the inserted DIM.

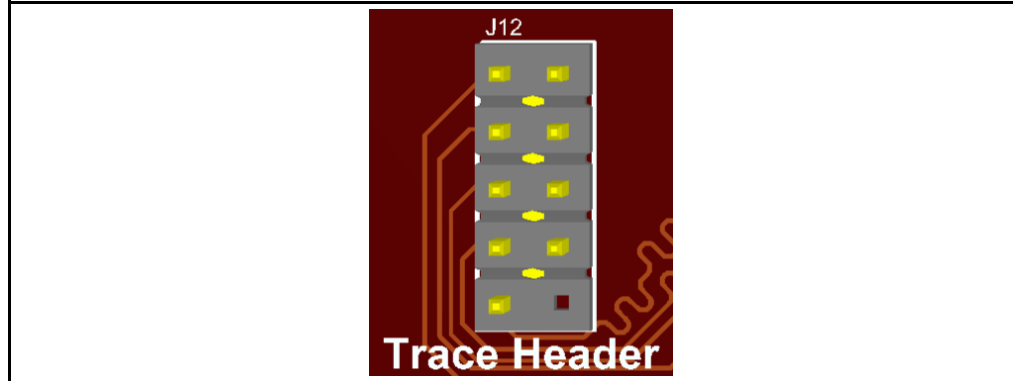
**FIGURE 2-9: RMII INTERFACE**



## 2.11 TRACE HEADER

The 9-pin trace header provides instruction trace capabilities if the feature is available on the inserted DIM.

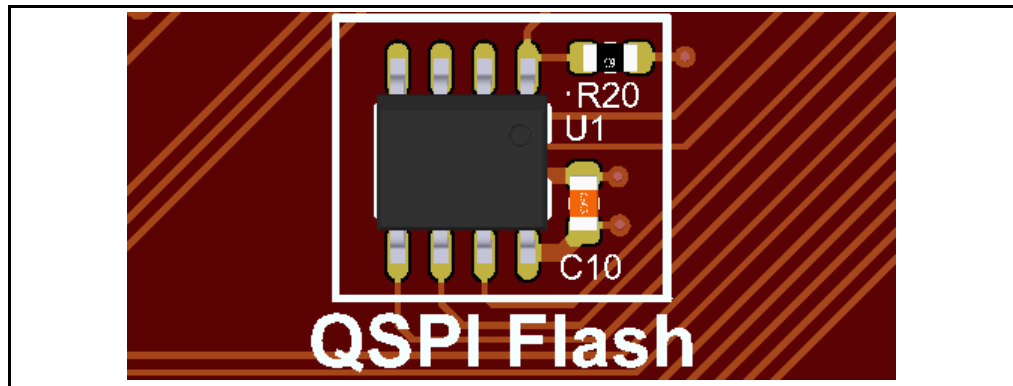
**FIGURE 2-10: TRACE HEADER**



## 2.12 2MBIT SQI FLASH MEMORY

The SST26VF020A is a Quad SPI Flash<sup>®</sup> memory device (QSPI or SQI) with standard SPI communication availability. When in use, the device operates in SPI mode until the command to enable QSPI mode is sent, allowing the QSPI mode to be available at all times.

**FIGURE 2-11: QSPI FLASH**



NOTES:

## Appendix A. Board Layout and Schematics

This appendix contains the jumpers, pinout, schematics and board layouts for the dsPIC33A Curiosity Platform Development Board.

### A.1 JUMPERS

Table A-1 shows the jumpers for the dsPIC33A Curiosity Platform Development Board Device.

**TABLE A-1: JUMPERS**

| Jumper                 | Description  |
|------------------------|--|
| J1                     | dsPIC33A Curiosity GP DIM Connector.   |
| J2                     | 2-pin 100 mil header used for dsPIC33A Current Measurement.  |
| J3, J10                | Two 2x25 pin 100 mil female header interfaces that can be used to connect to most DIM pins for general purpose use.  |
| J4, J5, J6, J7, J8, J9 | Six 100 mil headers used to determine which analog pins from the dsPIC33A connect to each capacitive touch pad. All six channels can be connected at once, enabling redundant analog measurement for each pad.   |
| J11                    | Unpopulated 6-pin staggered header interface that can be used optionally to connect an external programmer/debugger to the target DSC. The J11 header connects to the debug port. The holes are slightly staggered to provide some friction retention force without requiring physical soldering when a straight male-male or right angle male-male header is installed. |
| J12                    | 9-pin 100 mil header used for Trace communication.   |
| J13, J14               | Headers used for mikroBus interface connectors A and B, respectively.  |
| J15, J16, J19, J20     | 50 mil female headers used for interface with the LAN8670 RMII Evaluation Board.   |
| J17, J18               | Xplained Pro Extension Interface headers used to connect to a variety of boards.   |
| J21                    | 4-pin terminal connector used as the output of the CAN Driver circuit.   |
| J22, J23               | 2-pin 100 mil headers that can be used as termination shunts for CANH and CANL.  |
| J24                    | Micro-C USB connector. Used as a 5V power source for the board, PKOB4 programming and COM ports.   |
| J25                    | 3-pin header used to select input voltage between USB power (5V_USB) and external power (5V_EXT).  |
| J26                    | 2-pin terminal header for external 5V use.   |
| J28                    | 2-pin 100 mil header that can be shunted to hold PKOB4 in Reset, effectively deactivating the PKOB4 circuit.   |

# dsPIC33A Curiosity Platform Development Board User's Guide

## A.2 PINOUT

Table A-2 shows the pinout for the dsPIC33A Curiosity Platform Development Board device.

TABLE A-2: PINOUT

| Name                 | dsPIC33A Curiosity DIM Pin |    | Name               |
|----------------------|----------------------------|----|--------------------|
| P1_XPRO1_9           | 1                          | 2  | P2_XPRO1_10        |
| P3_XPRO1_8           | 3                          | 4  | P4_mkB_B_XPRO1_SDA |
| P5_XPRO1_7           | 5                          | 6  | P6_mkB_B_XPRO1_SCL |
| P7_XPRO1_6           | 7                          | 8  | P8_XPRO1_13        |
| P9_XPRO1_5           | 9                          | 10 | P10_XPRO1_14       |
| P11_XPRO1_4          | 11                         | 12 | P12_XPRO1_15       |
| P13_XPRO1_3          | 13                         | 14 | P14_XPRO1_16       |
| P15_XPRO1_1          | 15                         | 16 | P16_XPRO1_17       |
| NC                   | 17                         | 18 | P18_XPRO1_18       |
| NC                   | 19                         | 20 | P20_XPRO2_3        |
| P21_mkB_B_TX         | 21                         | 22 | P22_XPRO2_4        |
| P23_mkB_B_RX         | 23                         | 24 | P24_XPRO2_5        |
| P25_mkB_B_INT        | 25                         | 26 | P26_XPRO2_6        |
| P27_mkB_B_PWM        | 27                         | 28 | P28_LED_0          |
| P29_mkB_B_AN         | 29                         | 30 | P30_LED_1          |
| P31_mkB_B_RST        | 31                         | 32 | P32_LED_2          |
| P33_mkB_B_CS         | 33                         | 34 | P34_LED_3          |
| P35_mkB_B_SCK        | 35                         | 36 | P36_LED_4          |
| P37_mkB_B_MISO       | 37                         | 38 | P38_Cap_Touch_3R   |
| P39_mkB_B_MOSI       | 39                         | 40 | P40_Cap_Touch_3    |
| P41_S3               | 41                         | 42 | P42_Cap_Touch_2R   |
| P43_S2               | 43                         | 44 | P44_Cap_Touch_2    |
| P45_S1               | 45                         | 46 | P46_Cap_Touch_1R   |
| P47_MCLR             | 47                         | 48 | P48_Cap_Touch_1    |
| P49_PGD              | 49                         | 50 | P50_LED_5          |
| P51_PGC              | 51                         | 52 | P52_LED_6          |
| NC                   | 53                         | 54 | P54_LED_7          |
| P55_Board_VDD_Select | 55                         | 56 | P56_Cap_Touch_DS   |
| DIM_VDD              | 57                         | 58 | DIM_VDD            |
| DIM_VDD              | 59                         | 60 | DIM_VDD            |
| GND                  | 61                         | 62 | GND                |
| GND                  | 63                         | 64 | GND                |
| P65_mkB_A_USB_SDA    | 65                         | 66 | P66_POT            |
| P67_mkB_A_USB_SCL    | 67                         | 68 | P68_LED_R          |
| P69_mkB_A_TX         | 69                         | 70 | P70_LED_G          |
| P71_mkB_A_RX         | 71                         | 72 | P72_LED_B          |
| P73_mkB_A_INT        | 73                         | 74 | P74_QSPI_MOSI      |
| P75_mkB_A_PWM        | 75                         | 76 | P76_QSPI_SCK       |

**TABLE A-2: PINOUT (CONTINUED)**

|                  |     |     |                   |
|------------------|-----|-----|-------------------|
| P77_mkB_A_AN     | 77  | 78  | P78_QSPI_HOLD     |
| P79_mkB_A_RST    | 79  | 80  | P80_QSPI_WP       |
| P81_mkB_A_CS     | 81  | 82  | P82_QSPI_MISO     |
| P83_mkB_A_SCK    | 83  | 84  | P84_QPSI_CS       |
| P85_mkB_A_MISO   | 85  | 86  | P86_CAN_STBY      |
| P87_mkB_A_MOSI   | 87  | 88  | P88_CAN_TXD       |
| P89_RMII_NRST    | 89  | 90  | P90_CAN_RXD       |
| P91_RMII_IRQ     | 91  | 92  | P92_GPIO          |
| P93_RMII_MDIO    | 93  | 94  | P94_GPIO          |
| P95_RMII_MDC     | 95  | 96  | P96_UART_USB_RX   |
| P97_RMII_CRSDV   | 97  | 98  | P98_UART_USB_TX   |
| P99_RMII_RXER    | 99  | 100 | P100_UART_PKoB_RX |
| P101_RMII_RXD0   | 101 | 102 | P102_UART_PKoB_TX |
| P103_RMII_RXD1   | 103 | 104 | P104_TRCLK        |
| P105_RMII_TXEN   | 105 | 106 | P106_TRDAT0       |
| P107_RMII_TXD0   | 107 | 108 | P108_TRDAT1       |
| P109_RMII_TXD1   | 109 | 110 | P110_TRDAT2       |
| P111_RMII_CLK_IN | 111 | 112 | P112_TRDAT3       |
| DIM_VDD          | 113 | 114 | DIM_VDD           |
| DIM_VDD          | 115 | 116 | DIM_VDD           |
| GND              | 117 | 118 | GND               |
| GND              | 119 | 120 | GND               |

# A.3 dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS

Figure A-1 through Figure A-7 show the board schematics.

## FIGURE A-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 1 OF 7)

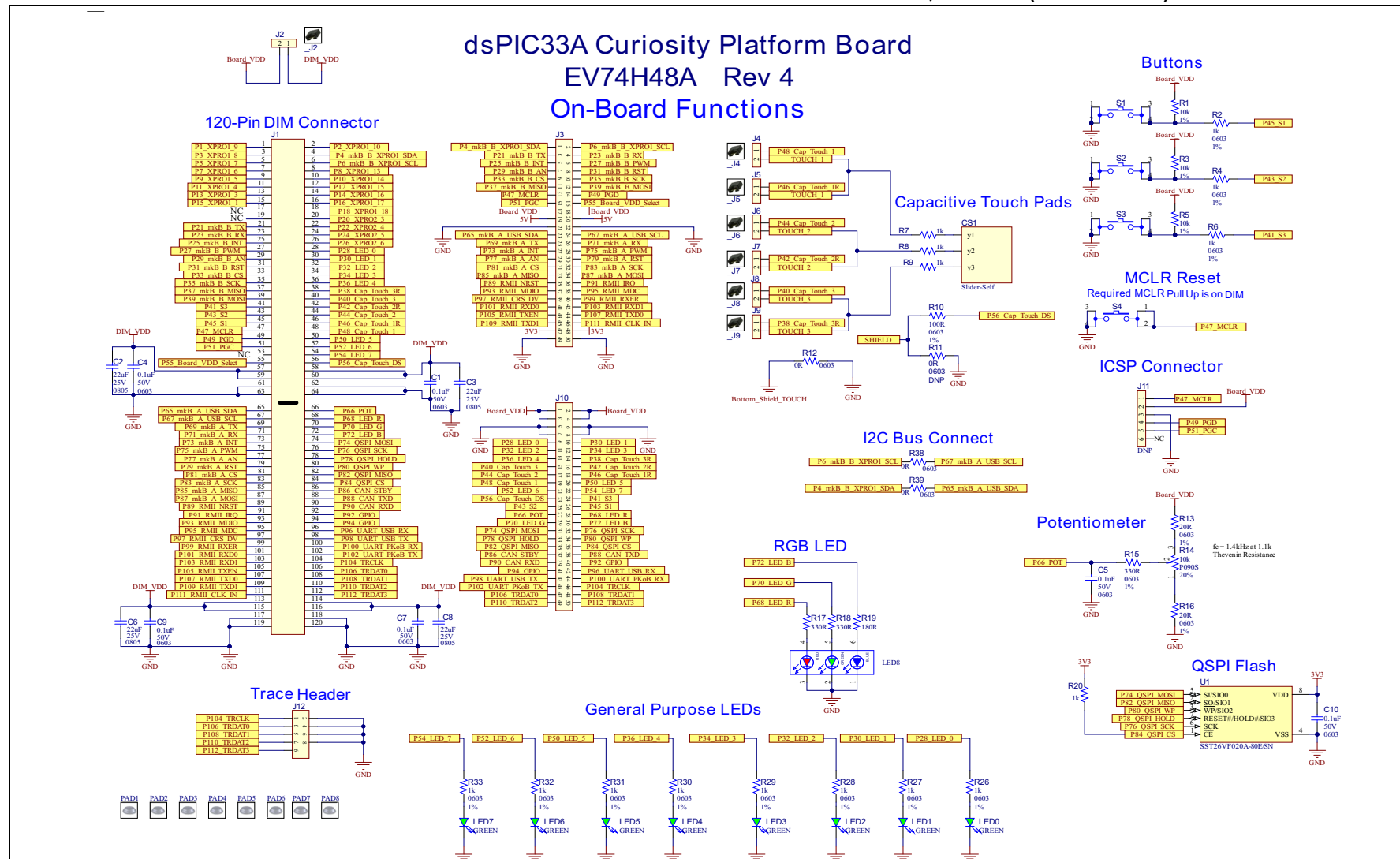




FIGURE A-2: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 2 OF 7)

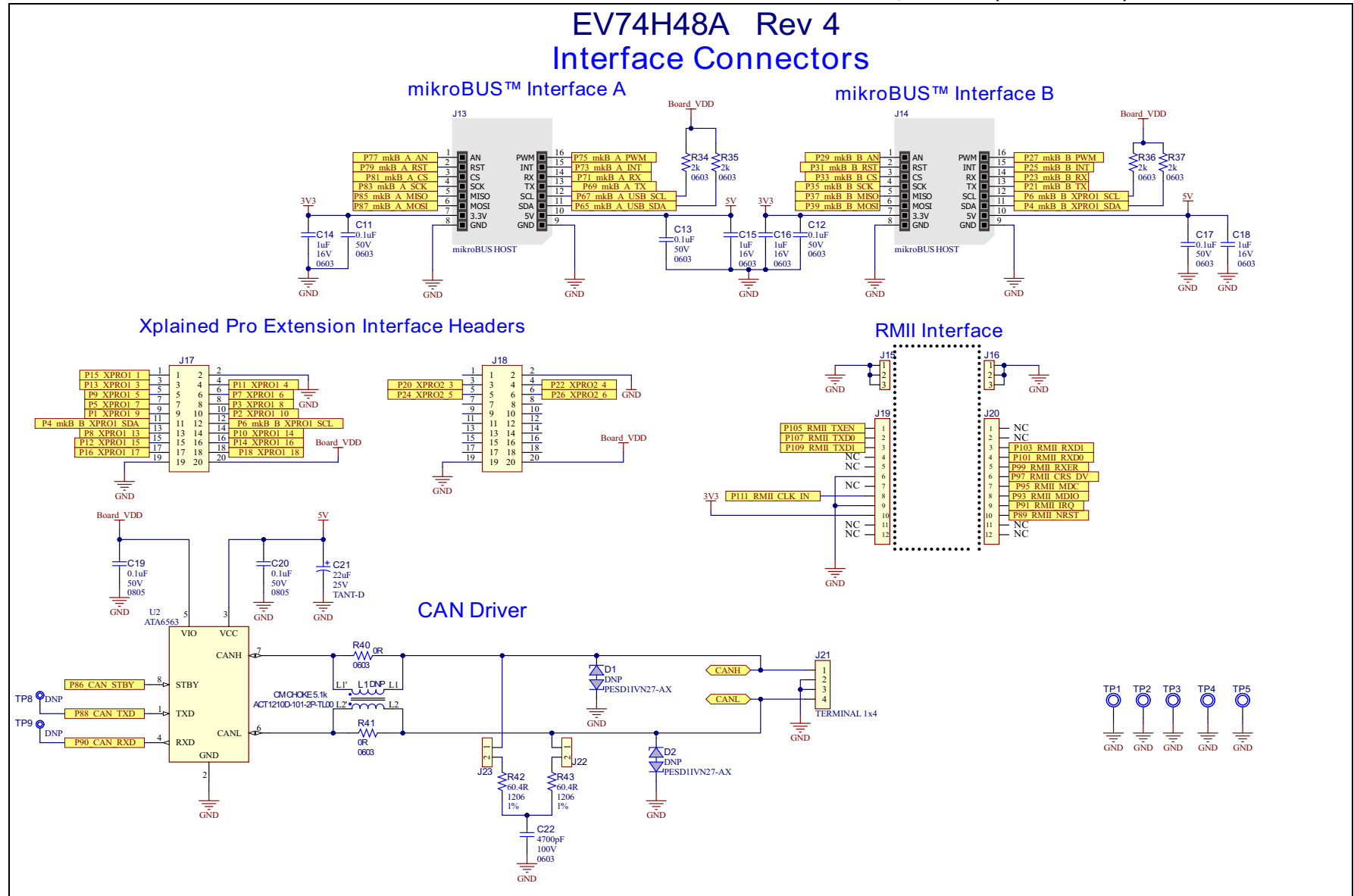


FIGURE A-3: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 3 OF 7)

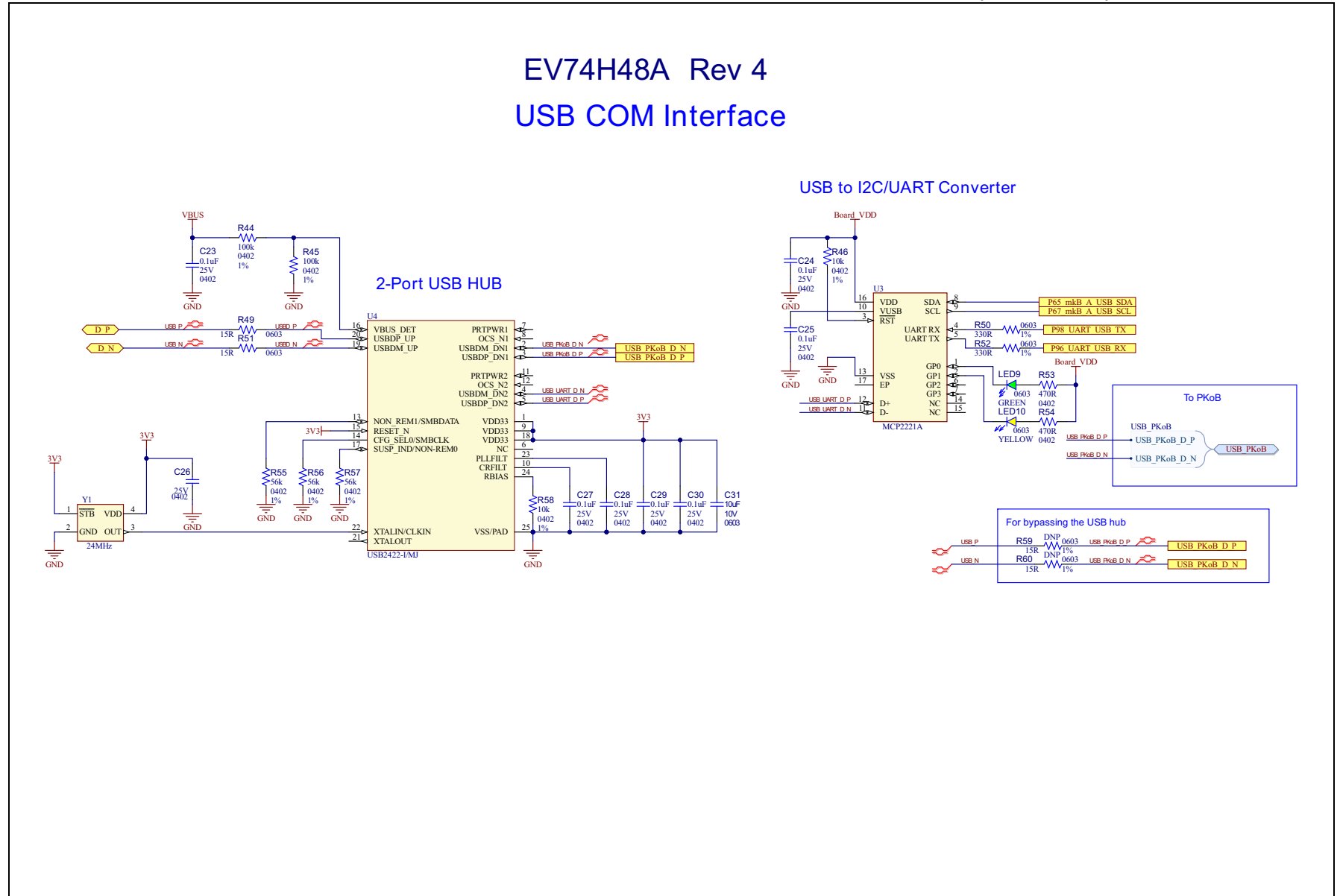


FIGURE A-4: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 4 OF 7)

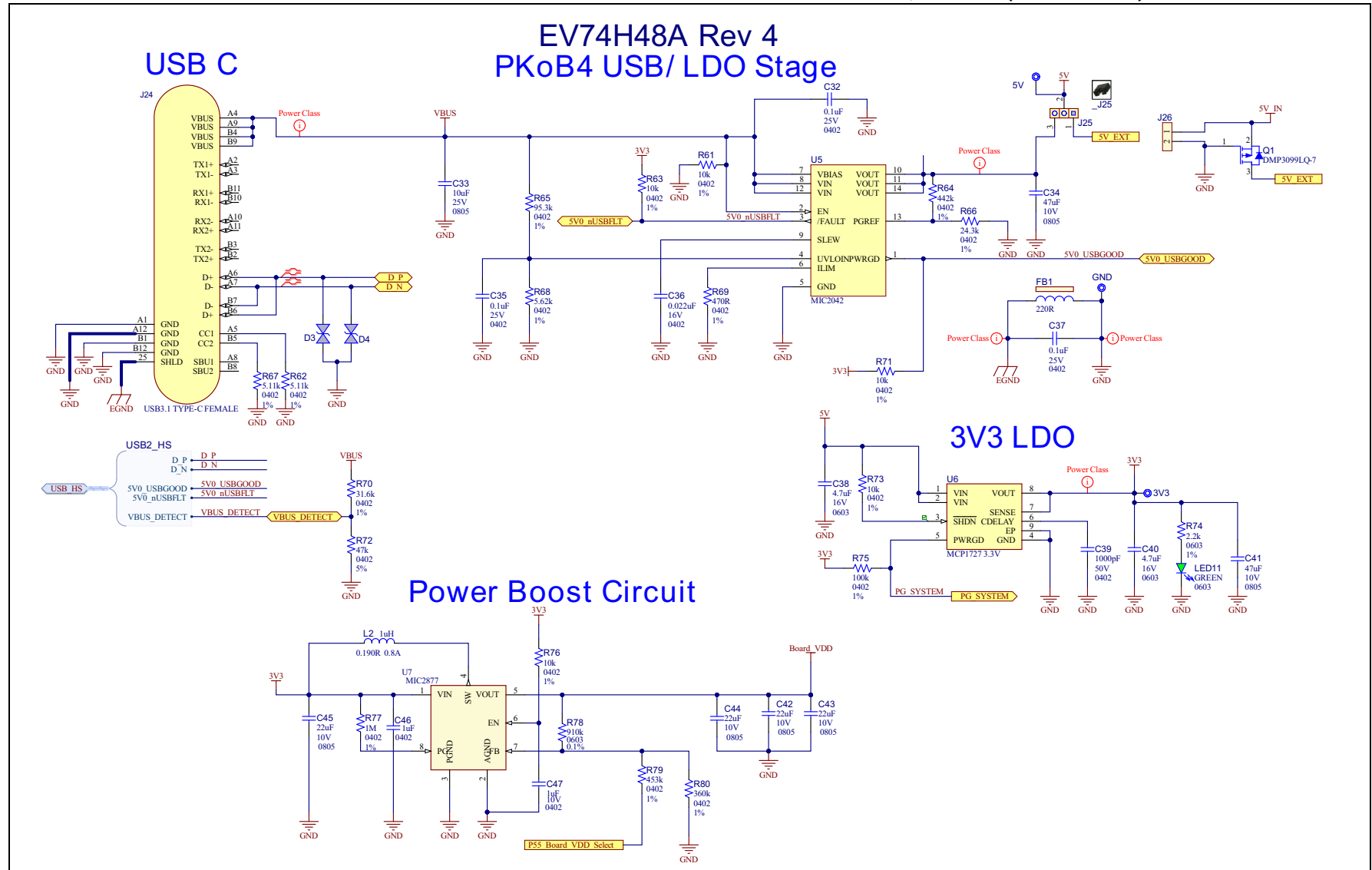


FIGURE A-5: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 5 OF 7)

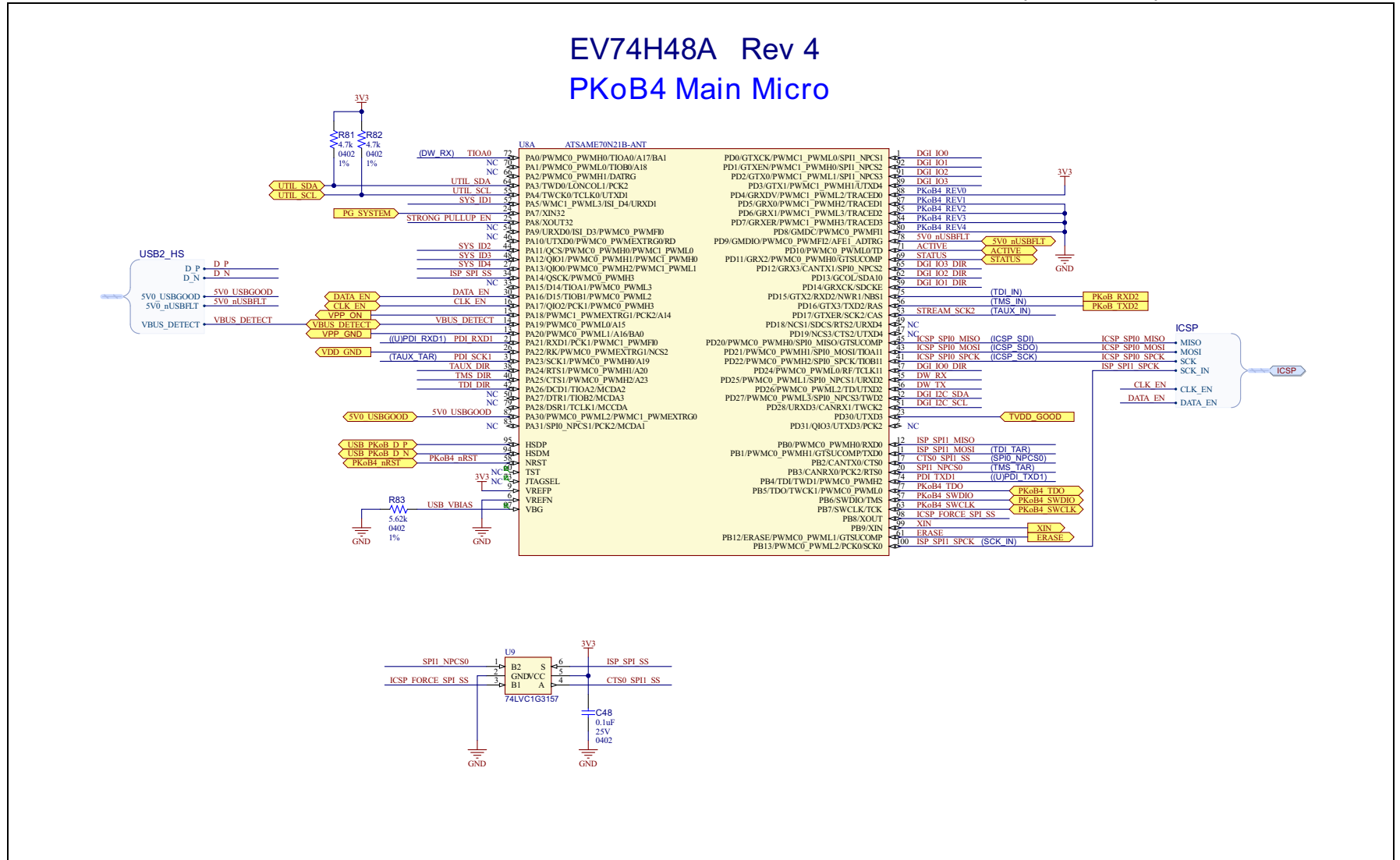


FIGURE A-6: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 6 OF 7)

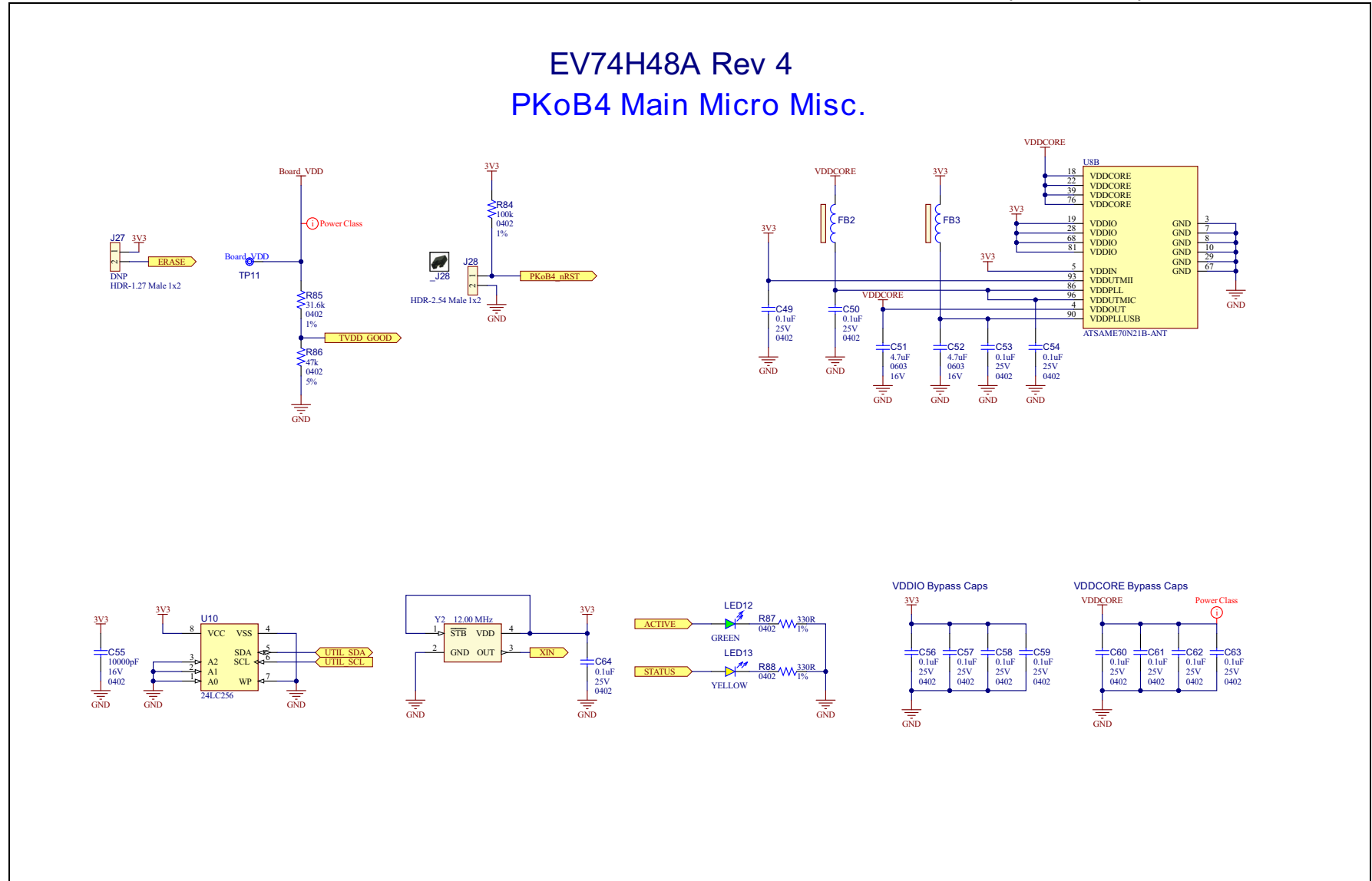
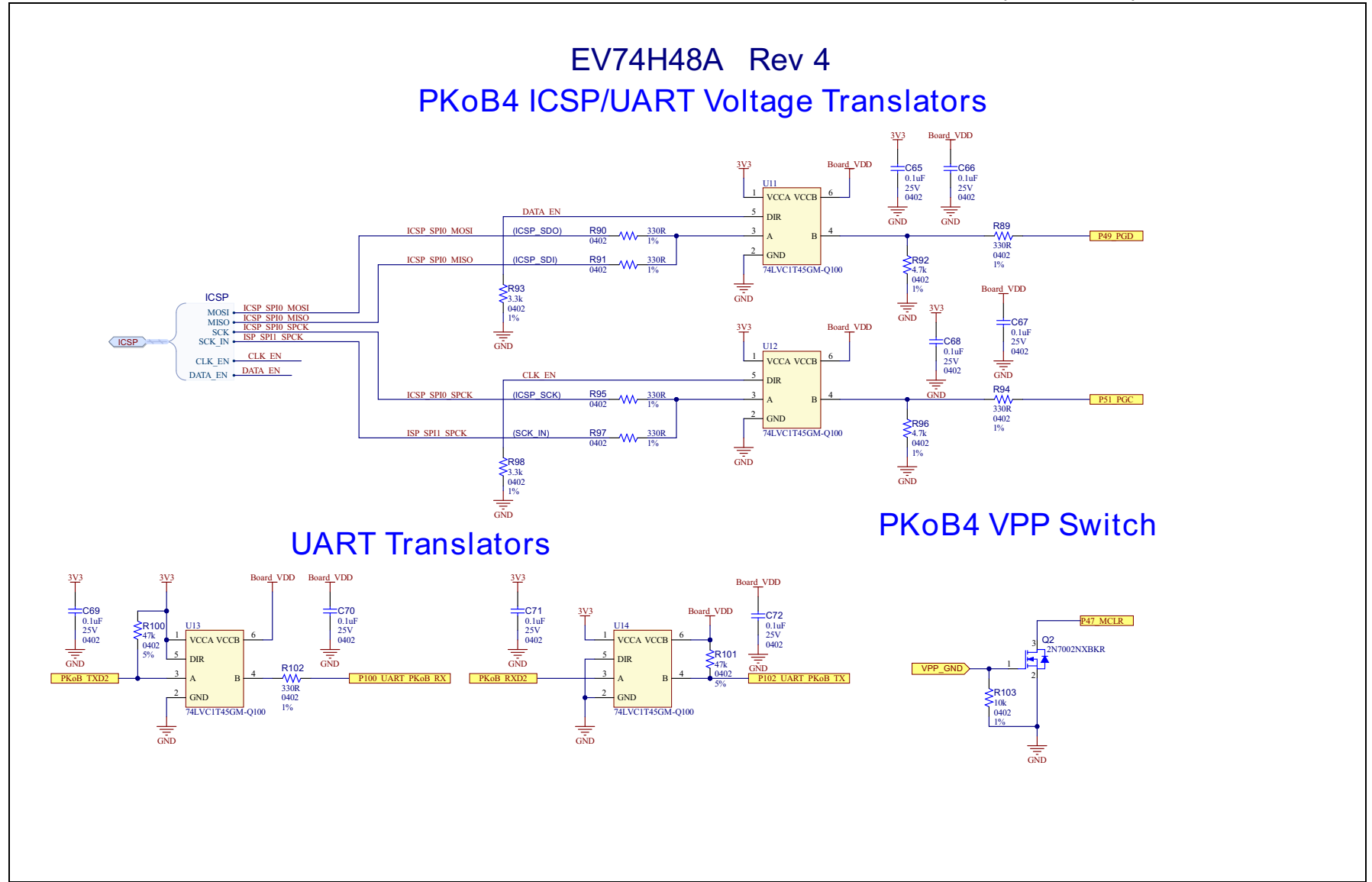
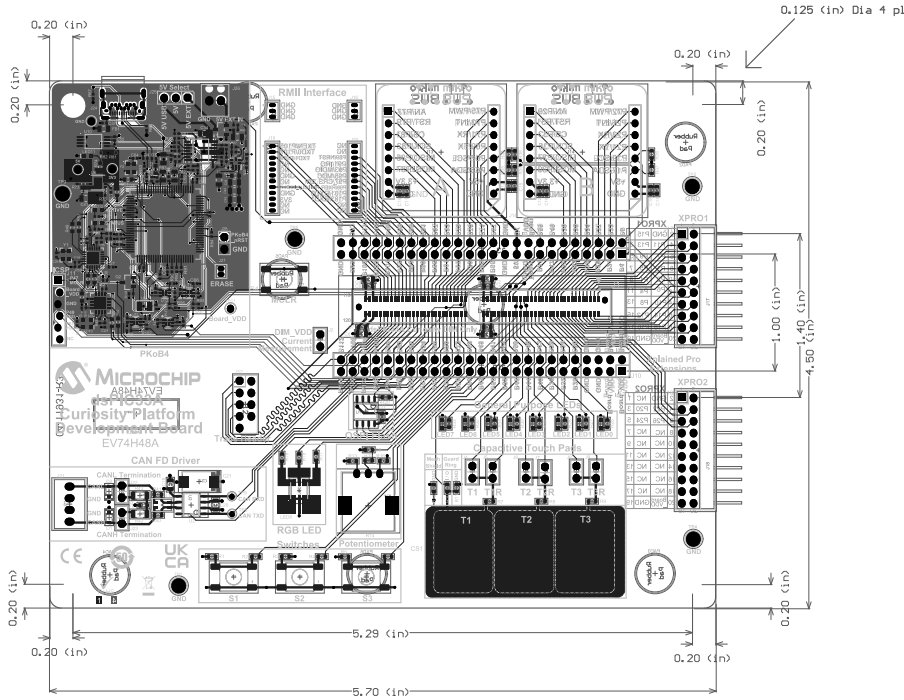


FIGURE A-7: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD SCHEMATICS, REV. 4.0 (PAGE 7 OF 7)



## A.4 DSPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD LAYOUT, REV. 4.0



### ASSEMBLY NOTES:

1. ALL COMPONENTS SHALL BE ROHS COMPLIANT.
2. ALL UNUSED THROUGH HOLE COMPONENT LOCATIONS SHALL BE FREE OF SOLDER.
3. ALL COMPONENTS SHALL BE MOUNTED FLUSH TO THE BOARD, EXCEPT AS NOTED.
4. FINISHED BOARD SHALL BE FREE OF ALL RESIDUES.
5. ALL LEADS SHALL BE TRIMMED TO A MAXIMUM HEIGHT OF 2mm
6. PLACE LABEL ON THE LOCATION INDICATED.

THIS PCB TO BE MANUFACTURED TO MEET ALL ACCEPTANCE LEVELS OF A CLASS 2 PCB PER ANSI/IPC-A-600G.

MATERIAL: FR-4 or Equivalent  
 MULTILAYER  CONTROLLED IMPEDANCE  
 4 LAYERS  
 Cu WEIGHT EXTERNAL LAYERS  35um FINISHED  
 Cu WEIGHT INTERNAL LAYERS  35um FINISHED  
 FINISHED OVERALL THICKNESS  1.6 mm ± 10 %  
 COPPER THEIVING ALLOWED  YES  NO  
 FINISH:  LEAD-FREE HOT AIR LEVELING  
 IMMERSION GOLD  
 IMMERSION TIN  
 SMOBC WITH SELECTIVE GOLD PLATING ON LANDS INDICATED. 1um GOLD OVER 5-10 um NICKEL  
 SOLDERMASK   
 SOLDERMASK COLOR   
 SILKSCREEN COLOR   
 DRILLING:  Blind / Buried Vias  
 Via Layer Pairs

ALL HOLES TO BE LOCATED BY THE COORDINATES FROM THE NC DRILL DATA PROVIDED.

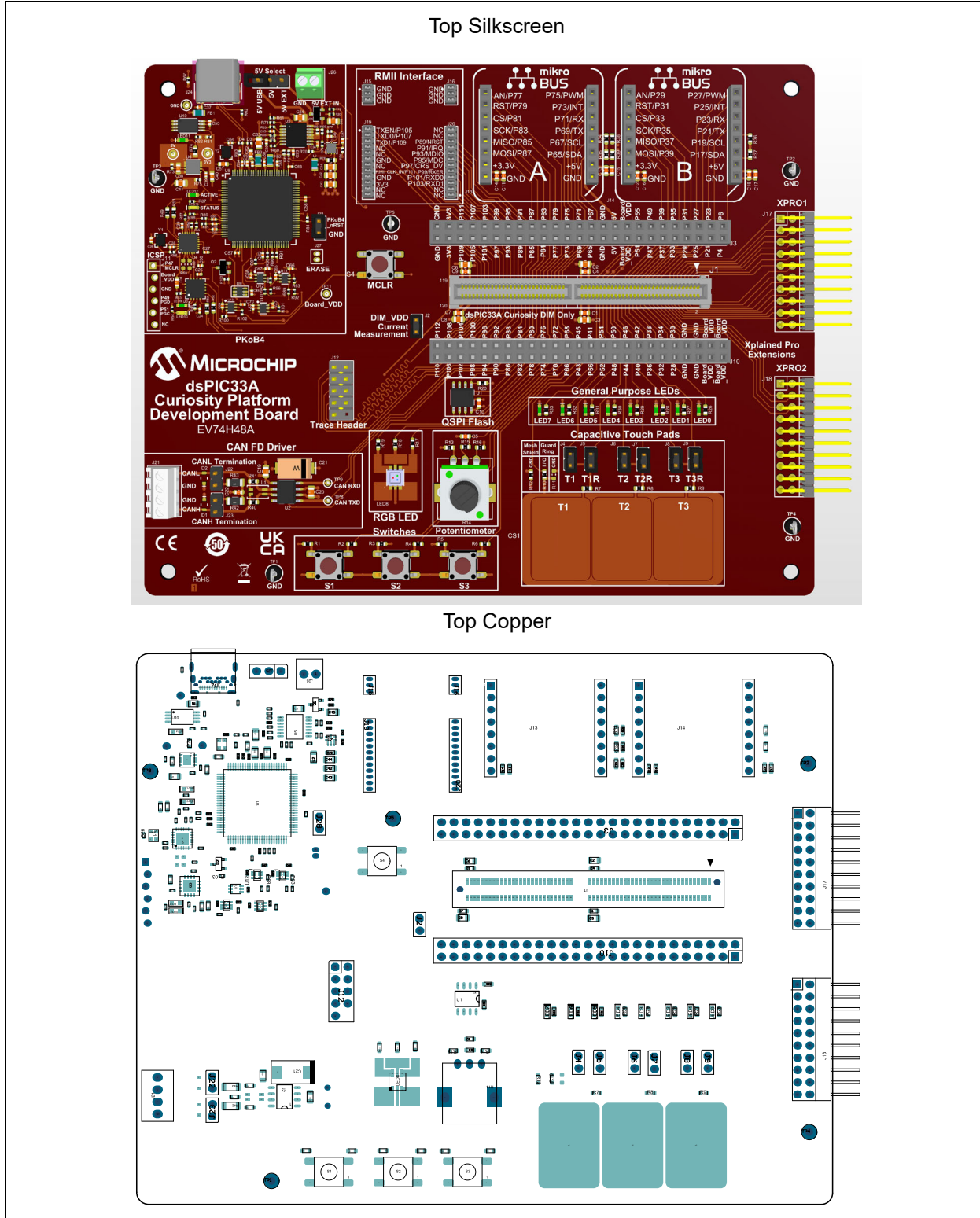
USE ARTWORK SET NO.  PCB REV   
 ANY ALTERNATIVES TO THE ABOVE SPECIFICATIONS MUST FIRST BE APPROVED.

| Layer                  | Name           | Material     | Thickness | Constant | Color |
|------------------------|----------------|--------------|-----------|----------|-------|
|                        | Top Overlay    |              |           |          | GTD   |
|                        | Top Solder     | Solder Paste | 0.075mm   | 3.5      | Q75   |
| 1                      | Top Layer      | FR4          | 0.203mm   |          | Q71   |
|                        | Dielectric1    | FR4          | 0.149mm   | 4.2      |       |
| 2                      | GND            | FR4          | 0.203mm   |          | Q91   |
|                        | Dielectric2    | FR4          | 1.200mm   | 4.2      |       |
| 3                      | VDD            | FR4          | 0.203mm   |          | Q92   |
|                        | Dielectric3    | FR4          | 0.149mm   | 4.2      |       |
| 4                      | Bottom Layer   | FR4          | 0.203mm   |          | Q93   |
|                        | Bottom Solder  | Solder Paste | 0.075mm   | 3.5      | Q95   |
|                        | Bottom Overlay |              |           |          | Q90   |
| Total board thickness: |                |              | 1.540mm   |          |       |

## A.5 dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD PCB LAYOUT

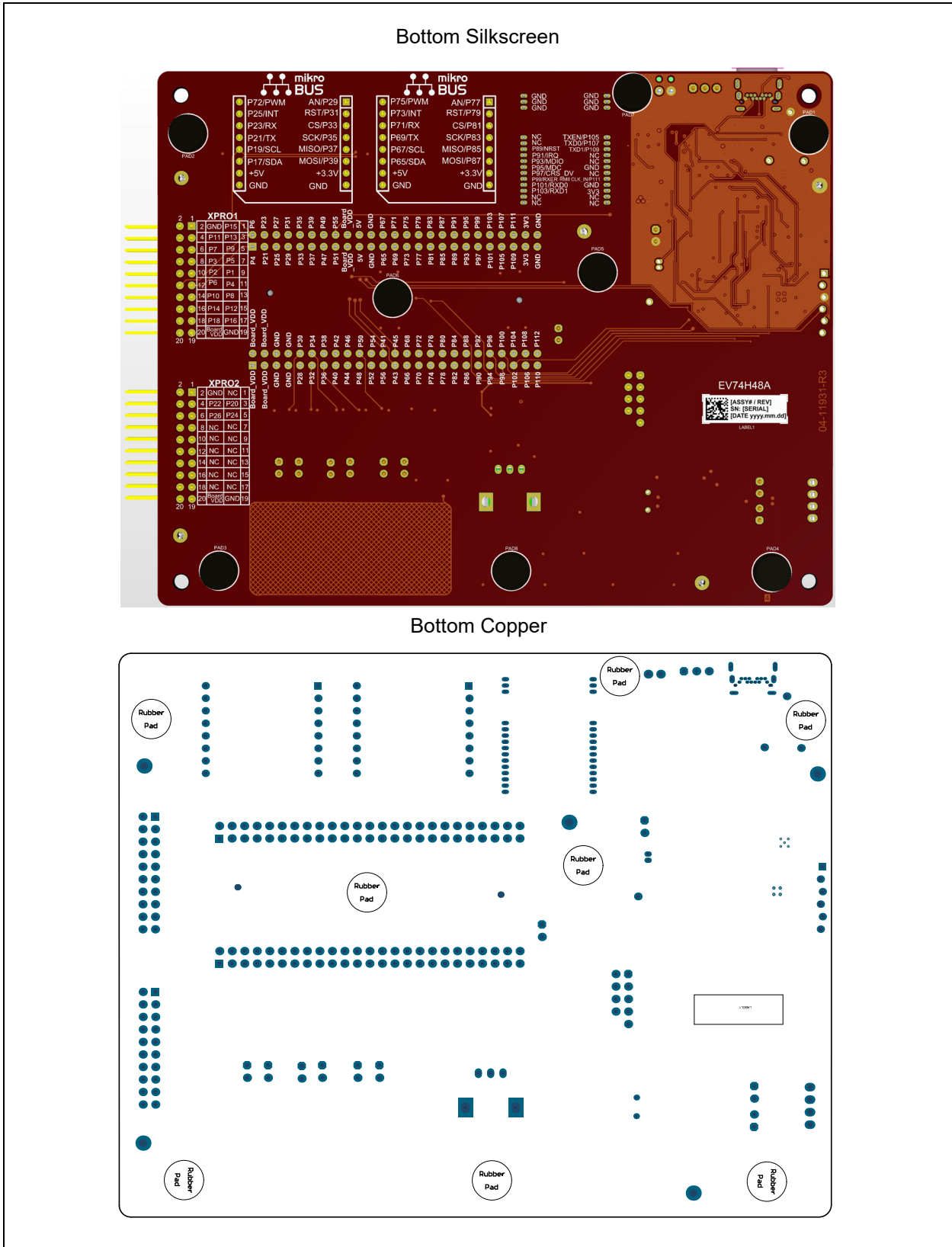
The dsPIC33A Curiosity Platform Development Board is a four-layer FR4, 1.6 mm, Plated-Through-Hole (PTH) PCB construction. Figure A-8 and Figure A-9 illustrate the PCB layers.

**FIGURE A-8: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD TOP SILKSCREEN AND TOP COPPER**





**FIGURE A-9: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD BOTTOM SILKSCREEN AND BOTTOM COPPER**



NOTES:

## Appendix B. Bill of Materials (BOM)

This appendix contains the Bill of Materials (BOMs) for the dsPIC33A Curiosity Platform Development Board.

### B.1 BILL OF MATERIALS – dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD

Table B-1 shows the Bill of Materials for the dsPIC33A Curiosity Platform Development Board.

**TABLE B-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD BOM**

| Qty | Designator  | Description                                   | Manufacturer                | Manufacturer Part #  |
|-----|---|---|-----------------------------|----------------------|
| 9   | _J2, _J4, _J5, _J6, _J7, _J8, _J9, _J25, _J28   | MECH HW JUMPER 2.54mm 1x2                     | Sullins Connector Solutions | SSC02SYAN            |
| 10  | C1, C4, C5, C7, C9, C10, C11, C12, C13, C17   | CAP CER 0.1uF 50V 10% X7R SMD 0603            | Yageo Corporation           | CC0603KRX7R9BB104    |
| 4   | C2, C3, C6, C8  | CAP CER 22uF 25V 20% X5R SMD 0805             | Samsung                     | CL21A226MAYNNNE      |
| 4   | C14, C15, C16, C18  | CAP CER 1uF 16V 10% X7R SMD 0603              | Taiyo Yuden                 | EMK107B7105KA        |
| 2   | C19, C20  | CAP CER 0.1uF 50V 10% X7R SMD 0805            | Samsung                     | CL21B104KBCNNNC      |
| 1   | C21   | CAP TANT 22uF 25V 10% 0.8Ohm SMD D            | KEMET                       | T491D226K025AT       |
| 1   | C22   | CAP CER 4700pF 100V 10% X7R SMD 0603 AEC-Q200 | TDK Corporation             | CGA3E2X7R2A472K080AA |
| 33  | C23, C24, C25, C26, C27, C28, C29, C30, C32, C35, C37, C48, C49, C50, C53, C54, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72 | CAP CER 0.1uF 25V 10% X7R SMD 0402            | TDK Corporation             | C1005X7R1E104K050BB  |
| 1   | C33   | CAP CER 10uF 25V 10% X5R SMD 0805             | Murata Electronics®         | GRM21BR61E106KA73L   |
| 2   | C34, C41  | CAP CER 47uF 10V 20% X5R 0805                 | Murata Electronics          | GRM21BR61A476ME15K   |
| 1   | C36   | CAP CER 0.022uF 16V 10% X7R SMD 0402          | Yageo Corporation           | CC0402KRX7R7BB223    |
| 4   | C38, C40, C51, C52  | CAP CER 4.7uF 16V 10% X5R SMD 0603            | TDK Corporation             | C1608X5R1C475K080AC  |

# dsPIC33A Curiosity Platform Development Board User's Guide

**TABLE B-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD BOM (CONTINUED)**

|    |  |   |                                   |                             |
|----|--|---|-----------------------------------|-----------------------------|
| 1  | C39  | CAP CER 1000pF 50V 10% X7R SMD 0402                                       | Murata Electronics                | GCM155R71H102KA37D          |
| 4  | C42, C43, C44, C45   | CAP CER 22uF 10V 20% X5R SMD 0805 >50%C_at_3V3                            | Taiyo Yuden                       | LMK212BBJ226MG-T            |
| 2  | C46, C47   | CAP CER 1uF 10V 10% X5R SMD 0402  | Samsung                           | CL05A105KP5NNNC             |
| 1  | C55  | CAP CER 10000pF 16V 10% X7R SMD 0402                                      | KEMET                             | C0402C103K4RACTU            |
| 2  | D3, D4   | DIO TVS BIDIR PGB101 SMD 0402   | Littelfuse <sup>®</sup>           | PGB1010402KR                |
| 1  | FB1  | FERRITE 2A 220R SMD 0805  | Murata Electronics <sup>®</sup>   | BLM21PG221SN1D              |
| 2  | FB2, FB3   | FERRITE 2A 600R SMD 0805  | TDK Corporation                   | MPZ2012S601AT000            |
| 1  | J1   | CON EDGE HTEC8 0.80mm 120P Female SMD VERT                                | Samtec                            | HTEC8-160-01-L-DV-A-K-TR    |
| 10 | J2, J4, J5, J6, J7, J8, J9, J22, J23, J28                          | CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT                                 | Multicomp SPC                     | SPC20481                    |
| 2  | J3, J10  | CON HDR-2.54 Female 2x25 Tin TH VERT                                      | Samtec                            | SSW-125-01-F-D              |
| 1  | J12  | CONN HEADER VERT 10POS 2.54MM   | Samtec                            | TSW-105-07-L-D-010          |
| 2  | J13, J14   | SOCKET mikroBUS HOST DIP 16 TH  | Sullins Connector Solutions       | PPTC081LFBN-RC              |
| 2  | J15, J16   | CON STRIP-1.27 Female 1x3 Gold TH VERT                                    | Samtec                            | SLM-103-01-L-S              |
| 2  | J17, J18   | CON HDR-2.54 Male 2x10 Rotated 180Degrees Gold TH RT ANGLE                | Sullins Connector Solutions       | PBC10DBAN                   |
| 2  | J19, J20   | CON STRIP-1.27 Female 1x12 Gold TH VERT                                   | Samtec                            | SLM-112-01-L-S              |
| 1  | J21  | CON TERMINAL 2.54mm 1x4 Female 20-30AWG 6A TH R/A                         | On-Shore Technology               | OSTVN04A150                 |
| 1  | J24  | CON USB3.0 TYPE-C FEMALE SMD R/A  | Advanced-Connectek Inc.           | NBR25-AK5322                |
| 1  | J25  | CON HDR-2.54 Male 1x3 Gold 5.84MH TH VERT                                 | Amphenol Communications Solutions | 68000103HLF                 |
| 1  | J26  | CON TERMINAL 2.54mm 1x2 Female 20-30AWG 6A TH R/A                         | Phoenix Contact                   | 1725656                     |
| 1  | L2   | INDUCTOR 1uH 0.8A 20% SMD 0805  | Murata Electronics                | LQM21PN1R0MC0D              |
| 11 | LED0, LED1, LED2, LED3, LED4, LED5, LED6, LED7, LED9, LED11, LED12 | DIO LED GREEN 2V 30mA 35mcd Clear SMD 0603                                | Vishay <sup>®</sup> Lite-On       | LTST-C190KGKT               |
| 1  | LED8   | DIO LED TRI RED, GREEN, BLUE 2.1V, 3.0V, 3.2V 50mA, 35mA, 35mA SMD 6-PLCC | Cree LED <sup>®</sup>             | CLX6F-FKC-CNP1ST1E 1BB7D3D3 |
| 2  | LED10, LED13   | DIO LED YELLOW 2.1V 20mA 6mcd Clear SMD 0603                              | Vishay Lite-On                    | LTST-C190YKT                |

# Bill of Materials (BOM)

**TABLE B-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD BOM (CONTINUED)**

|    |  |  |   |                  |
|----|--|--|---|------------------|
| 1  | Q1   | TRANS FET P-CH<br>DMP3099LQ-7 -30V -3.8A<br>1.08W SOT-23-3   | Diodes Incorporated <sup>®</sup>            | DMP3099LQ        |
| 1  | Q2   | TRANS FET N-CH<br>2N7002NXBKR 60V 270mA<br>2.8R 0.4W SOT23-3 | Nexperia                                    | 2N7002NXBKR      |
| 3  | R1, R3, R5   | RES TKF 10k 1% 1/10W SMD<br>0603                             | NIC Components Corp <sup>®</sup>            | NRC06F1002TRF    |
| 15 | R2, R4, R6, R7, R8,<br>R9, R20, R26, R27,<br>R28, R29, R30, R31,<br>R32, R33 | RES TKF 1k 1% 1/10W SMD<br>0603                              | Stackpole Electronics,<br>Inc.              | RMCF0603FT1K00   |
| 1  | R10  | RES TKF 100R 1% 1/10W<br>SMD 0603 AEC-Q200 (Use<br>RSMT0696) | Yageo Coporation                            | AC0603FR-07100RL |
| 5  | R12, R38, R39, R40,<br>R41   | RES TKF 0R 1/10W SMD<br>0603                                 | Stackpole Electronics,<br>Inc.              | RMCF0603ZT0R00   |
| 2  | R13, R16   | RES TKF 20R 1% 1/10W SMD<br>0603                             | Panasonic <sup>®</sup>                      | ERJ-3EKF20R0V    |
| 1  | R14  | RES VARIABLE 10k 20% TH<br>P090S                             | TT Electronics / BI Tech-<br>nologies       | P090S-14T20BR10K |
| 5  | R15, R17, R18, R50,<br>R52   | RES TKF 330R 1% 1/10W<br>SMD 0603                            | Stackpole Electronics,<br>Inc.              | RMCF0603FT330R   |
| 1  | R19  | RES TKF 180R 1% 1/10W<br>SMD 0603                            | Yageo Corporation                           | RC0603FR-07180RL |
| 4  | R34, R35, R36, R37   | RES TKF 2k 1% 1/10W SMD<br>0603                              | Stackpole Electronics,<br>Inc.              | RMCF0603FT2K00   |
| 2  | R42, R43   | RES TKF 60.4R 1% 1/4W<br>SMD 1206                            | Yageo Corporation                           | RC1206FR-0760R4L |
| 4  | R44, R45, R75, R84   | RES TKF 100k 1% 1/10W<br>SMD 0402 AEC-Q200                   | KOA Speer Electronics,<br>Inc. <sup>®</sup> | RK73H1ETTP1003F  |
| 8  | R46, R58, R61, R63,<br>R71, R73, R76, R103                                   | RES TKF 10k 1% 1/10W SMD<br>0402                             | Panasonic                                   | ERJ-2RKF1002X    |
| 2  | R49, R51   | RES TKF 15R 1% 1/16W SMD<br>0603                             | Stackpole Electronics,<br>Inc.              | RMCF0603FT15R0   |
| 3  | R53, R54, R69  | RES TKF 470R 1% 1/16W MF<br>0402                             | Yageo Corporation                           | RC0402FR-07470RL |
| 3  | R55, R56, R57  | RES TKF 56k 1% 1/16W SMD<br>0402                             | Rohm Semiconductor                          | MCR01MZPF5602    |
| 2  | R62, R67   | RES TKF 5.11k 1% 1/10W<br>SMD 0402 AEC-Q200                  | KOA Speer Electronics,<br>Inc.              | RK73H1ETTP5111F  |
| 1  | R64  | RES TKF 442k 1% 1/16W<br>SMD 0402                            | Samsung                                     | RC1005F4423CS    |
| 1  | R65  | RES TKF 95.3k 1% 1/16W<br>SMD 0402 AEC-Q200                  | Yageo Corporation                           | AC0402FR-0795K3L |
| 1  | R66  | RES TKF 24.3k 1% 1/16W<br>SMD 0402                           | Samsung                                     | RC1005F2432CS    |
| 2  | R68, R83   | RES TKF 5.62k 1% 1/16W<br>SMD 0402                           | Vishay / Dale                               | CRCW04025K62FKED |

# dsPIC33A Curiosity Platform Development Board User's Guide

**TABLE B-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD BOM (CONTINUED)**

|                                     |  |   |                                    |                     |
|-------------------------------------|--|---|------------------------------------|---------------------|
| 2                                   | R70, R85                                     | RES TKF 31.6k 1% 1/10W SMD 0402   | Panasonic                          | ERJ-2RKF3162X       |
| 4                                   | R72, R86, R100, R101                         | RES TKF 47k 5% 1/10W SMD 0402   | Panasonic                          | ERJ-2GEJ473X        |
| 1                                   | R74  | RES TF 2.2k 1% 1/10W SMD 0603 AEC-Q200  | Stackpole Electronics, Inc.        | RMCF0603FT2K20      |
| 1                                   | R77  | RES TKF 1M 1% 1/10W SMD 0402  | Panasonic                          | ERJ-2RKF1004X       |
| 1                                   | R78  | RES TF 910k 0.1% 1/16W SMD 0603   | TE Connectivity                    | CPF0603B910KE1      |
| 1                                   | R79  | RES TKF 487K 1% 1/10W SMD 0402  | Panasonic                          | ERJ-2RKF4873X       |
| 1                                   | R80  | RES TKF 340k 1% 1/10W SMD 0402  | Panasonic                          | ERJ-2RKF3403X       |
| 4                                   | R81, R82, R92, R96                           | RES TKF 4.7k 1% 1/16W SMD 0402  | Yageo Corporation                  | RC0402FR-074K7L     |
| 9                                   | R87, R88, R89, R90, R91, R94, R95, R97, R102 | RES TKF 330R 1% 1/16W SMD 0402  | Yageo Corporation                  | RC0402FR-07330RL    |
| 2                                   | R93, R98                                     | RES TKF 3.3k 1% 1/10W SMD 0402  | Panasonic                          | ERJ-2RKF3301X       |
| 4                                   | S1, S2, S3, S4                               | SWITCH TACT SPST 12V 50mA PTS645SM43SMTR92 LFS SMD  | C&K Switches <sup>®</sup>          | PTS645SM43SMTR92LFS |
| 5                                   | TP1, TP2, TP3, TP4, TP5                      | CON TP LOOP Black TH  | Keystone Electronics <sup>®</sup>  | 5011                |
| 1                                   | U9   | IC SWITCH SPDT 74LVC1G3157 SC-70-6  | Rochester Electronics <sup>®</sup> | SN74LVC1G3157DCKR   |
| 4                                   | U11, U12, U13, U14                           | IC TRANSCEIVER 74LVC1T45GM or 74LVC1T45GW Single Bit Voltage Translator SOT-886 SOT-363 Dual FP | Nexperia                           | 74LVC1T45GM,115     |
| <b>Microchip Parts listed below</b> |  |   |                                    |                     |
| 1                                   | U1   | MCHP MEMORY SERIAL FLASH 16M 104MHz SST26VF020A-80E/SN SOIC-8                                   | Microchip Technology               | SST26VF020A-80E/SN  |
| 1                                   | U2   | MCHP INTERFACE CAN ATA6563-GAQW1 SOIC-8   | Microchip Technology               | ATA6563-GAQW1       |
| 1                                   | U3   | MCHP INTERFACE USB I2C/UART MCP2221A-I/ML QFN-16  | Microchip Technology               | MCP2221A-I/ML       |
| 1                                   | U4   | MCHP INTERFACE USB 2.0 HS 2 PORT HUB CTRLR QFN-24 USB2422-I/MJ                                  | Microchip Technology               | USB2422-I/MJ        |
| 1                                   | U5   | MCHP ANALOG POWER SWITCH 5.5V 3A MIC2042-1YTS TSSOP-14  | Microchip Technology               | MIC2042-1YTS        |
| 1                                   | U6   | MCHP ANALOG LDO 3.3V MCP1727-3302E/MF   | Microchip Technology               | MCP1727-3302E/MF    |

# Bill of Materials (BOM)

**TABLE B-1: dsPIC33A CURIOSITY PLATFORM DEVELOPMENT BOARD BOM (CONTINUED)**

|  |  |  |                                  |                      |
|--|--|--|----------------------------------|----------------------|
| 1  | U7   | MCHP ANALOG SWITCHER<br>Boost 3V to 5.5V<br>MIC2877-AYFT-TR FTQFN-8    | Microchip Technology             | MIC2877-AYFT-TR      |
| 1  | U8   | MCHP MCU 32-BIT 300MHz<br>2MB 384kB<br>ATSAME70N21B-ANT<br>LQFP-100    | Microchip Technology             | ATSAME70N21B-ANT     |
| 1  | U10  | MCHP MEMORY SERIAL<br>EEPROM 256k I2C<br>24LC256T-E/ST TSSOP-8         | Microchip Technology             | 24LC256T-E/ST        |
| 1  | Y1   | MCHP OSC MEMS DSC6011-<br>J12B-024.0000_2.5LX2.0WX0.<br>89H_LGA        | Microchip Technology             | DSC6011J12B-024.0000 |
| 1  | Y2   | MCHP CLOCK OSCILLATOR<br>SINGLE 12.000MHZ<br>DSC6011J11B-012.0000 VLGA | Microchip Technology             | DSC6011J11B-012.0000 |
| <b>Mechanical Parts to be added in the package</b> |  |  |                                  |                      |
| 1  | LABEL1   | LABEL PCBA 18x6mm Data-<br>matrix Assy# / Rev / Serial /<br>Date       | ACT Logimark AS <sup>®</sup>     | 505462               |
| 8  | PAD1, PAD2, PAD3,<br>PAD4, PAD5, PAD6,<br>PAD7, PAD8 | MECH HW RUBBER PAD<br>Cylindrical flat top D8H2.8<br>Black             | 3M <sup>™</sup>                  | SJ5076BLACK          |
| <b>PCB</b>   |  |  |                                  |                      |
| 1  | PCB1   | Printed Circuit Board  |                                  | 04-11931-R3          |
| <b>Do Not Populate Parts listed below</b>          |  |  |                                  |                      |
| 2  | D1, D2   | DIO TVS PESD11VN27-AX<br>45V 3A SOD-323                                | Nexperia                         | PESD11VN27-AX        |
| 1  | J11  | CON HDR-2.54 Male 1x6<br>Staggered DNP                                 | Sullins Connector Solu-<br>tions | PBC36SAAN            |
| 1  | J27  | CON HDR-1.27 Male 1x2 Gold<br>TH VERT                                  | Harwin                           | M50-3530242          |
| 1  | L1   | CM CHOKE 5.1k@10MHz<br>1.5R SMD 1210 AEC-Q200                          | TDK Corporation                  | ACT1210D-101-2P-TL00 |
| 1  | R11  | RES TKF 0R 1/10W SMD<br>0603   | Stackpole Electronics,<br>Inc.   | RMCF0603ZT0R00       |
| 2  | R59, R60   | RES TKF 15R 1% 1/16W SMD<br>0603                                       | Stackpole Electronics,<br>Inc.   | RMCF0603FT15R0       |





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## Worldwide Sales and Service

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2355 West Chandler Blvd.

Chandler, AZ 85224-6199

Tel: 480-792-7200

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