dsPIC33C Touch-CAN-LIN Curiosity Development Board User's Guide

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DSPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD USER'S GUIDE

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NOTES:

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "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® 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 dsPIC33C Touch-CAN-LIN Curiosity 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 dsPIC33C Touch-CAN-LIN Curiosity Development Board. The document is organized as follows:

- **Chapter 1. "Overview"** – This chapter introduces the dsPIC33C Touch-CAN-LIN Curiosity 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 main circuit elements of the board.
- **Appendix A. "Board Layout and Schematics"** – This appendix provides schematic diagrams for the dsPIC33C Touch-CAN-LIN Curiosity 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
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	`#define START`
	Filenames	`autoexec.bat`
	File paths	`c:\mcc18\h`
	Keywords	`_asm, _endasm, static`
	Command-line options	`-Opa+, -Opa-`
	Bit values	`0, 1`
	Constants	`0xFF, 'A'`
Italic Courier New	A variable argument	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`
	Represents code supplied by user	`void main (void) { ... }`

RECOMMENDED READING

This user's guide describes how to use the dsPIC33C Touch-CAN-LIN Curiosity 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® XC16 C Compiler User's Guide (DS50002071)

This comprehensive guide describes the usage, operation and features of Microchip's MPLAB XC16 C compiler (formerly MPLAB C30) 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.

dsPIC33CK1024MP710 Family Data Sheet (DS70005496)

Refer to this document for detailed information on the dsPIC33CK single core Digital Signal Controllers (DSCs). Reference information found in this data sheet includes:

- Device memory maps
- Device pinout and packaging details
- Device electrical specifications
- List of peripherals that are included on the devices and are available for download from the Microchip website (www.microchip.com).

THE MICROCHIP WEBSITE

Microchip provides online support via our website at www.microchip.com. This website is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the website contains the following information:

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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, and Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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- Distributor or Representative
- Local Sales Office
- Corporate Application Engineer (CAE)
- Embedded Solutions Engineer (ESE)

Customers should contact their distributor, representative or Embedded Solutions Engineer (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:

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

DOCUMENT REVISION HISTORY

Revision A (April 2023)

This is the initial release of this document.

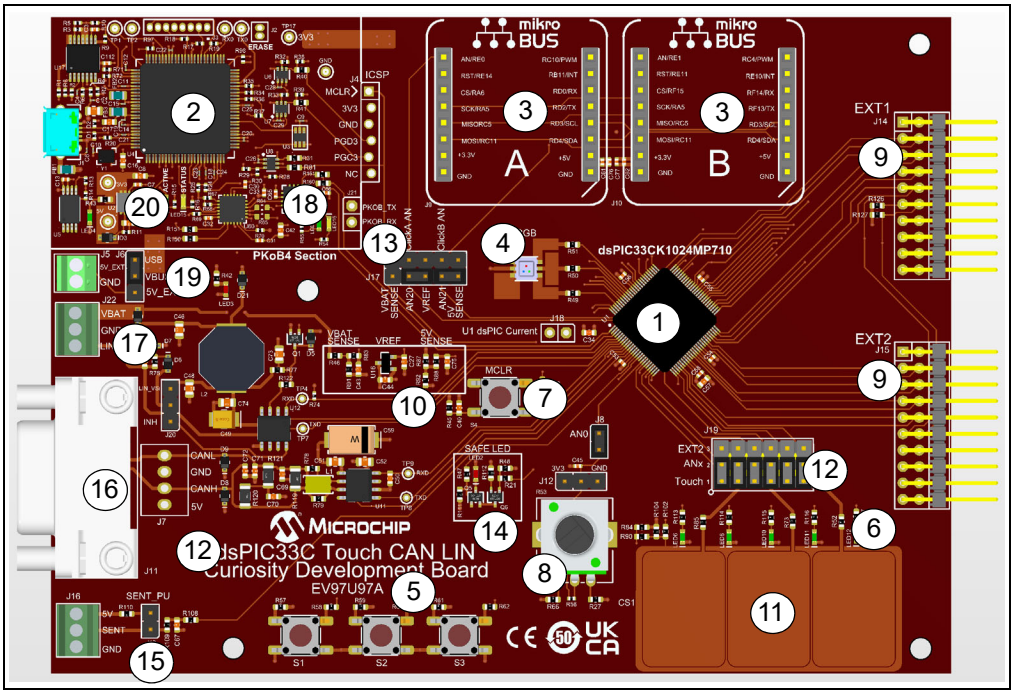
Chapter 1. Overview

1.1 INTRODUCTION

The dsPIC33C Touch-CAN-LIN Curiosity Development Board (EV97A97U) is intended as a feature-rich development and demonstration platform to enable customers to explore Touch, CAN/CAN-FD and LIN communication on dsPIC33C DSCs. In addition, the board supports mikroBUS™ and XPLAINED PRO interfaces, allowing companion development boards such as ATECC608/TA100 secure elements, QT Touch extension boards, BIST XPRO extension kits for pin failures, various sensors and interfaces via Click Boards™ to be used. Information for supported companion boards is available through the website at: www.microchip.com/en-us/development-tool/EV97U97A.

The main hardware features of the board are highlighted in Figure 1-1.

FIGURE 1-1: dsPIC33C CURIOSITY DEVELOPMENT BOARD



1. ISO 26262 compliant dsPIC33CK1024MP710 single core Digital Signal Controller (DSC) target device
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 (www.mikroe.com)
4. 1x Red/Green/Blue (RGB) LED
5. 3x general purpose push buttons
6. 5x general purpose green indicator LEDs
7. $\overline{\text{MCLR}}$ Reset push button
8. 10 kOhm potentiometer
9. 2 Xplained Pro Extension Headers

10. 3 voltage sensing circuits (V_{BAT} sense, 5V sense, and V_{REF})
11. 3 on-board capacitive touch pads
12. 3x6 100 mil male header to select between on-board capacitive touch pads or the Xplained Pro Extension header #2
13. 2x5 100 mil male jumper to provide multiple choices for conversion of analog channels 20 and 21
14. Functional Safety Safe LED circuit
15. SENT Driver circuit
16. CAN/CAN-FD Driver circuit
17. LIN Driver circuit
18. 2 Channel USB Hub supporting PKOB4 programming and UART/COM channel simultaneously
19. 1x3 pin 100 mil male header to select between 5V external or 5V USB power
20. 5V to 3.3V LDO

Chapter 2. Hardware

2.1 POWERING THE BOARD

Choose between USB or external power via the 3-pin header J6 by shunting 2 pins together.

2.1.1 USB Power

This board is intended to be primarily powered from the USB Micro-B connector, J1. The official *"USB 2.0 Specification"* restricts USB applications to consuming no more than 500 mA of USB VBUS power from the host. USB power must always be provided to the board and is the primary 5V source.

2.1.2 External Power

An external +5V VDC may optionally be connected through pin 2 of the J5 connector. Care should be taken to avoid exceeding a maximum of 6V on this input or damage to the 3V3 LDO may occur.

2.2 USING THE PROGRAMMED DEMO FIRMWARE

The development board comes programmed with basic demo firmware, which exercises several of the board hardware features. The potentiometer can be used to adjust the voltage, and the analog reading will be output via UART through the USB connector. The capacitive touch pads will light up when pressed. Sliding a finger from left to right on the touch pads will show the five lights turning on in the sequence in which the pads are touched. Additionally, the touch position information is output via UART.

The source code for the demo can be obtained from:

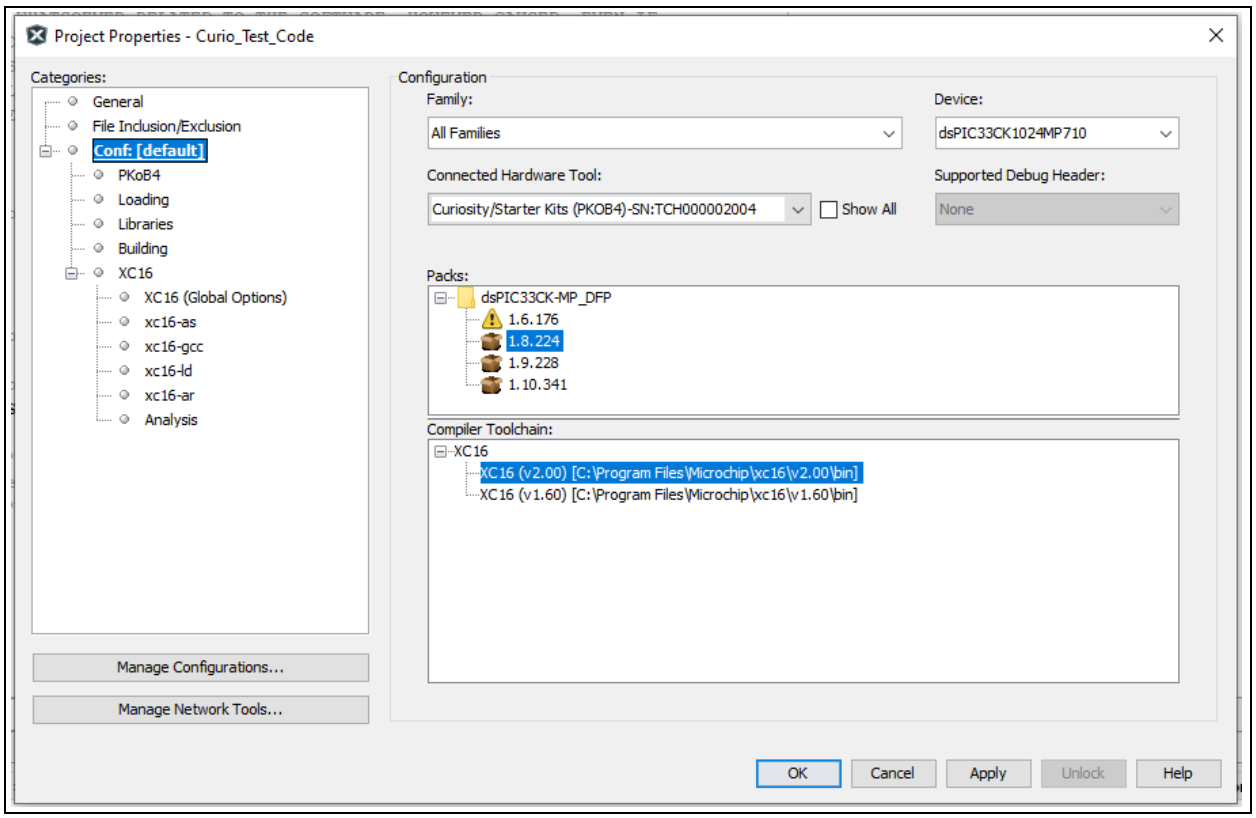
www.microchip.com/en-us/development-tool/EV97U97A

2.3 REPROGRAMMING AND DEBUGGING THE dsPIC33CK1024MP710 DEVICE

The board has a PICkit™ On-Board (PKOB4) programmer/debugger circuit, which can be used to program and debug the dsPIC33CK1024MP710 target device (U1). Alternatively, an external programmer/debugger tool can be connected to the board via the 6-pin in-line connector J4 using a male-male 100 mil pitch 6-pin header.

The PKOB4 circuit should automatically enumerate and be recognized by the MPLAB® X IDE, v5.05 or later, when the dsPIC33C Touch-CAN-LIN Curiosity Development Board is connected to the host via the USB Micro-B connector, J1. 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 2-1.

FIGURE 2-1: dsPIC33C CURIOSITY PKOB TOOL SELECTION



2.4 USING THE USB-UART INTERFACE

Two USB-UART channels are available for communication from the dsPIC 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.

2.4.1 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®, Mac® and Linux® 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:

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 successful USB driver installation, the device will appear as a “COMx” port object, which standard serial terminal programs can open/read/write to and from.

2.4.2 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 RP99_RA8_PKOB_TX and RP45_RB13_PKOB_RX. All nets are named assuming the perspective of the dsPIC device; the UART TX pin should be RP99 while the UART RX pin should be RP45.

2.5 CIRCUIT DETAILS

This section highlights some of the circuit elements and provides an explanation for their intent and function.

TABLE 2-1: JUMPERS/HEADERS/CONNECTORS

Jumper/ Header/ Connector	Description
J1	Micro B USB connector. Used as a 5V power source for the board, PKOB programming and COM ports.
J2	Unpopulated 2-pin 50 mil header used to erase the PKOB4.
J3	Unpopulated 8-pin header used to program the PKOB4.
J4	Unpopulated 6-pin staggered header interface that can be used optionally to connect an external programmer/debugger to the target microcontroller, U1. The J4 header connects to the debug port, PGx3. 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 into J4.
J5	2-pin header used to provide 5V external power. Do not exceed a maximum input voltage of 6V or damage to the 3V3 LDO may occur.
J7	Unpopulated 4-pin terminal header as an optional substitute to the standard CAN driver header (J11) that is on the board.
J8	2-pin header used to provide access to the dedicated analog channel 0. Shunt the header to connect analog channel 0 to the potentiometer.
J9, J10	Headers used for Mikrobus Click A and B respectively.
J11	DE-9P Male connector used as the output of the CAN Driver circuit.
J12	3-pin header used to allow fault injection into the potentiometer circuit. Shunting the 3v3 pin to the middle will drive the line high, while shunting to the GND side will drive the line low.
J13	2-pin 100 mil header that can be used for a 5V pull up on the SENT Driver line.
J14, J15	Xplained Pro Extension Interface headers used to connect to a variety of boards.
J16	1x3 terminal header used as the SENT Driver interface.
J17	2x5 pin header used to determine where analog channels 20 and 21 will connect. Each channel can be shunted to three different pins to measure separate circuits. See **Section 2.5.2 "AN20/AN21 Connection"** for more information.
J18	2-pin header that can be used to measure the current consumed only by the dsPIC. The net tie trace must be cut on the bottom before measurements can be taken.
J19	3x6 connector used to determine whether each analog channel is connected to the capacitive touch pads or the EXT2 header. In Figure 2-5, all six channels are connected to the capacitive touch pads, enabling redundant measurement on each pad. Alternatively, all six channels can be connected to the EXT2 header to enable support for Xplained Pro Extension boards.
J20	3-pin header which allows the LIN_BUS line to be pulled up either via the INH line or the LIN_VSi line depending on where a 2-pin shunt is placed.
J21	Unpopulated 2-pin header that can be used to tap into the UART traces connected to the PKOB4 chip.
J22	3-pin terminal header that acts as the output connection for the LIN Driver circuit

2.5.1 User Interface (UI)

The dsPIC33C Touch-CAN-LIN Curiosity Development Board contains a User Interface (UI) that is easily accessible on the right side (see Figure 1-1). The UI has the following elements:

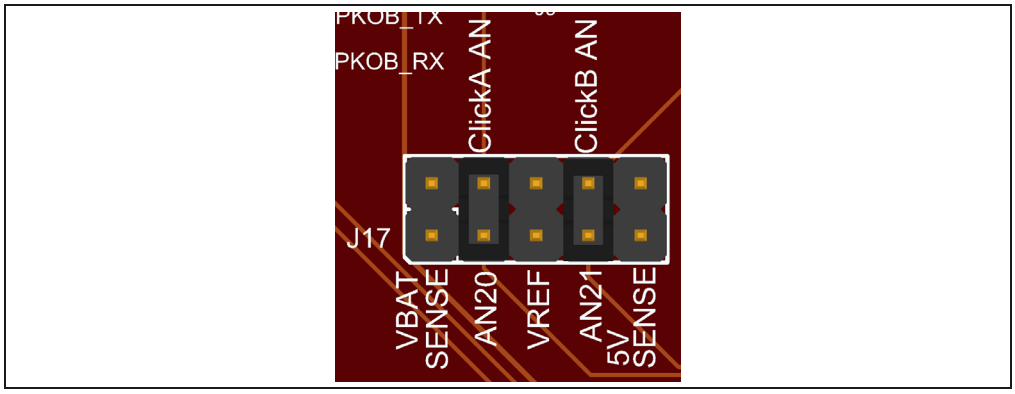
- One RGB LED
- A 10 kOhm potentiometer
- Three push buttons
- Five indication LEDs
- Three capacitive touch pads

Each element can be programed for any purpose to create the desired interaction between the user and the board behavior.

2.5.2 AN20/AN21 Connection

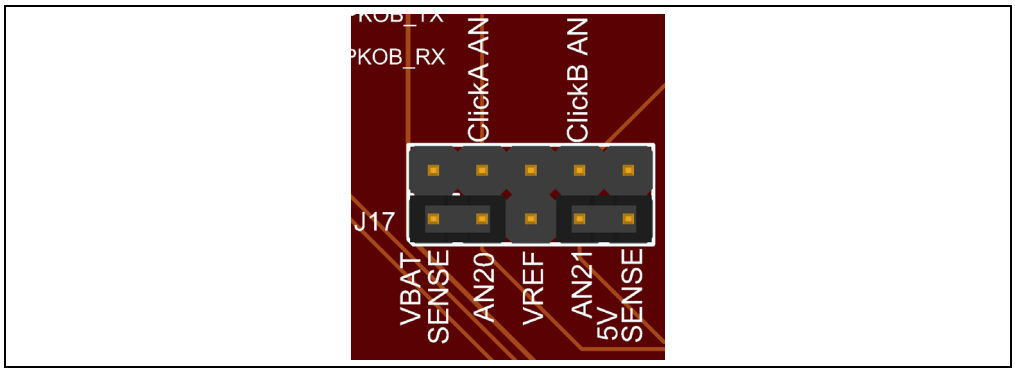
Both channel AN20 and AN21 have three possible shunt options. If both mikroBUS click boards are used, AN20 and AN21 can be shunted to click A Analog and click B Analog, respectively (Figure 2-2).

FIGURE 2-2: AN20/AN21 CONNECTION



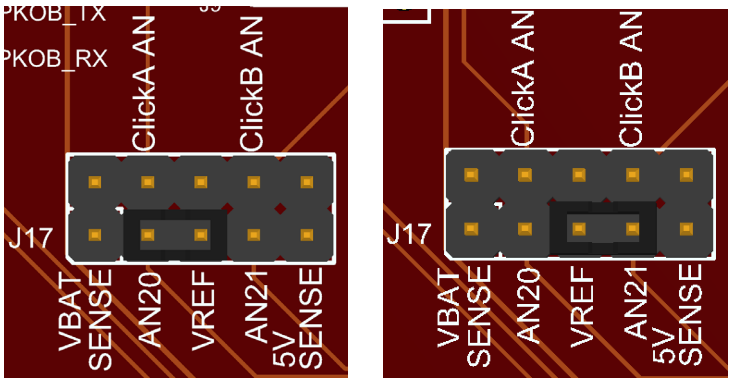
Alternatively, three voltage sense circuits can also be connected. The VBAT sense circuit that can be shunted to AN20 is used to measure the LIN input voltage through a voltage divider to maintain the 3v3 tolerance on AN20. The 5V sense can be connected to AN21 where 5V is divided down to 2.5V to maintain 3v3 tolerance on AN21 (Figure 2-3).

FIGURE 2-3: SENSE CIRCUIT



The VREF pin is a 2v5 output voltage reference option. Since the VREF pin is in between AN20 and AN21, either can be chosen (Figure 2-4).

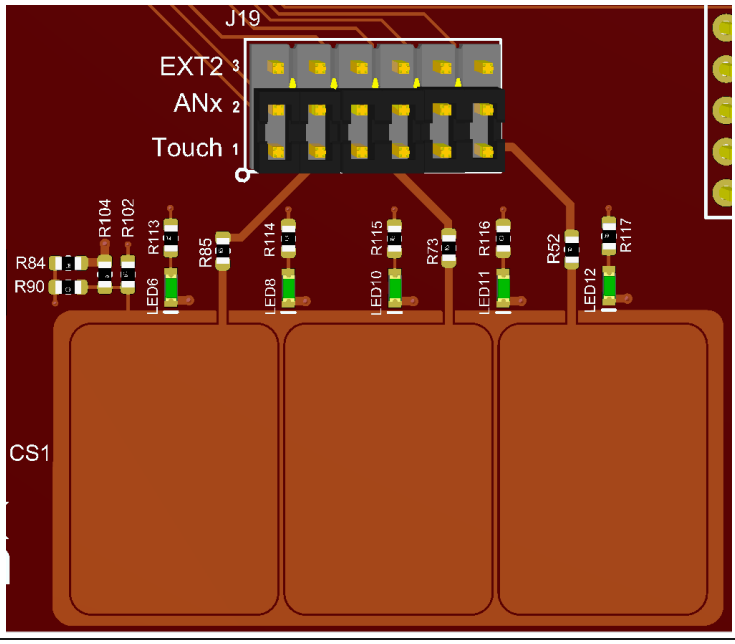
FIGURE 2-4: VREF OPTIONS



2.5.3 Capacitive Touch and Extension Header 2

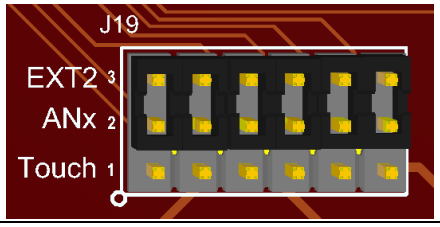
The out-of-box jumper configuration allows each capacitive touch pad to be read redundantly from two analog channels (Figure 2-5). For functionality purposes, only one out of each pair is necessary to measure the touch pad.

FIGURE 2-5: CAPACITIVE TOUCH PADS



To use an Xplained Pro device that requires two extension header connections, the jumpers should be moved from the ANx row and touch row on the J19 connector to the EXT2 row and ANx as shown in Figure 2-6.

FIGURE 2-6: EXTENSION HEADER CONNECTIONS



Appendix A. Board Layout and Schematics

This appendix contains the pinout, the schematics and the board layouts for the dsPIC33C Touch-CAN-LIN Curiosity Development Board. The topics covered in this appendix include:

- Pinout
- dsPIC33C Touch-CAN-LIN Curiosity Development Board Schematics
- dsPIC33C Touch-CAN-LIN Curiosity Development Board PCB Layout

A.1 PINOUT

Table A-1 shows the pinout and corresponding function for the dsPIC33C device.

TABLE A-1: PINOUT AND ELECTRICAL PARAMETERS, J1

Name	dsPIC® DSC Pin	Function/Description
RP46_RB14	1	UART TX to USB
AN20_RE0	2	J17 Analog Options
RP47_RB15	3	UART RX from USB
AN21_RE1	4	J17 Analog Options
RP80_RF0	5	LIN RXD
RP60_RC12	6	LIN EN
RP61_RC13	7	LIN TXD
RP62_RC14	8	CAN RXD
RP63_RC15	9	CAN TXD
MCLR	10	Master Clear
RP79_RD15	11	CAN STBY
RP81_RF1	12	SENT Driver
GND	13	Digital Ground
dsPIC3V3	14	Digital Power
RD14_SLED_ON_OFF	15	FuSa SAFE LED
RD13_SW1	16	Switch 1
AN12_RC0	17	J19 Analog Options
AN0_RA0	18	Potentiometer
AN22_RE2	19	J19 Analog Options
RF2_SLED_SAFE	20	FuSa SAFE LED
NC	21	Not Connected
AN23_RE3	22	J19 Analog Options
RF3_SW2	23	Switch 2
AN9_RA2	24	J19 Analog Options
RF4_SW3	25	Switch 3
RF5_SHIELD	26	mTouch Shield
AN3_RA3	27	J19 Analog Options
NC	28	No Connection

TABLE A-1: PINOUT AND ELECTRICAL PARAMETERS, J1 (CONTINUED)

Name	dsPIC® DSC Pin	Function/Description
AN24_RP86_RF6	29	J19 Analog Options
AN4_RA4	30	Xplained Pro 2
NC	31	No Connection
AN25_RF7	32	Xplained Pro 2
dsPIC3V3	33	Analog Power
GND	34	Analog Ground
NC	35	No Connection
AN13_RC1	36	Xplained Pro 2
AN14_RC2	37	Xplained Pro 2
AN17_RC6	38	Xplained Pro 2
dsPIC3V3	39	Digital Power
GND	40	Digital Ground
AN15_RC3	41	Xplained Pro 2
CLKI_AN5_RB0	42	MEMS Clock In
AN6_RB1	43	Xplained Pro 1
AN19_RD11	44	Xplained Pro 1
RE6_LED1	45	mTouch LED
AN26_RF8	46	Xplained Pro 1
AN18_RD10	47	Xplained Pro 1
RE7_LED2	48	mTouch LED
RP89_RF9	49	Xplained Pro 1
AN16_RC7	50	Xplained Pro 1
AN1_AN7_RB2	51	Xplained Pro 1
RE8_LED3	52	mTouch LED
RP90_RF10	53	Xplained Pro 1
AN8_RB3	54	Xplained Pro 1
RE9_LED4	55	mTouch LED
RP91_RF11_LED5	56	mTouch LED
RP36_RB4	57	Xplained Pro 2
ASDA1_RC8	58	Xplained Pro 1, 2 SDA
ASCL1_RC9	59	Xplained Pro 1, 2 SCL
RP92_RF12	60	Xplained Pro 2
RP73_RD9	61	Xplained Pro 1
RP72_RD8	62	Xplained Pro 1
GND	63	Digital Ground
dsPIC3V3	64	Digital Power
RP71_RD7	65	Touch ID chip
NC	66	No Connection
NC	67	No Connection
PGD3_RB5	68	PGD
PGC3_RB6	69	PGC
RE10	70	Click B INT
RP93_RF13	71	Click B TX
AN2_AN30_RB7	72	Xplained Pro 1

TABLE A-1: PINOUT AND ELECTRICAL PARAMETERS, J1 (CONTINUED)

Name	dsPIC® DSC Pin	Function/Description
RE11	73	Click B RST
RP94_RF14	74	Click B RX
AN10_RB10	75	Xplained Pro 1
RP95_RF15	76	Click B CS
AN11_RB9	77	Xplained Pro 1
NC	78	No Connection
RP96_RA5	79	Click A, B SCK
PWM5H_RC4	80	Click B PWM
NC	81	No Connection
RP53_RC5	82	Click A, B MISO
PWM7H_RC10	83	Click A PWM
RP59_RC11	84	Click A, B MOSI
ASDA3_RD4	85	Click A, B SDA
ASCL3_RD3	86	Click A, B SCL
GND	87	Digital Ground
dsPIC3V3	88	Digital Power
RP66_RD2	89	Click A TX
RP65_PWM4H_RD1	90	RGB LED (Blue)
RP64_RD0	91	Click A RX
RP42_PWM3H_RB10	92	RGB LED (Green)
RP43_RB11	93	Click A INT
RE14	94	Click A RST
RP97_RA6	95	Click A CS
NC	96	No Connection
RP44_PWM2H_RB12	97	RGB LED (Red)
RE15_LIN_WKIN	98	LIN Wake
RP99_RA8_PKOB_TX	99	UART TX to PKOB
RP45_RB13_PKOB_RX	100	UART RX from PKOB

A.2 dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS

Figure A-1 through Figure A-8 show the board schematics.

FIGURE A-1: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 3.0 (PAGE 1 OF 9)

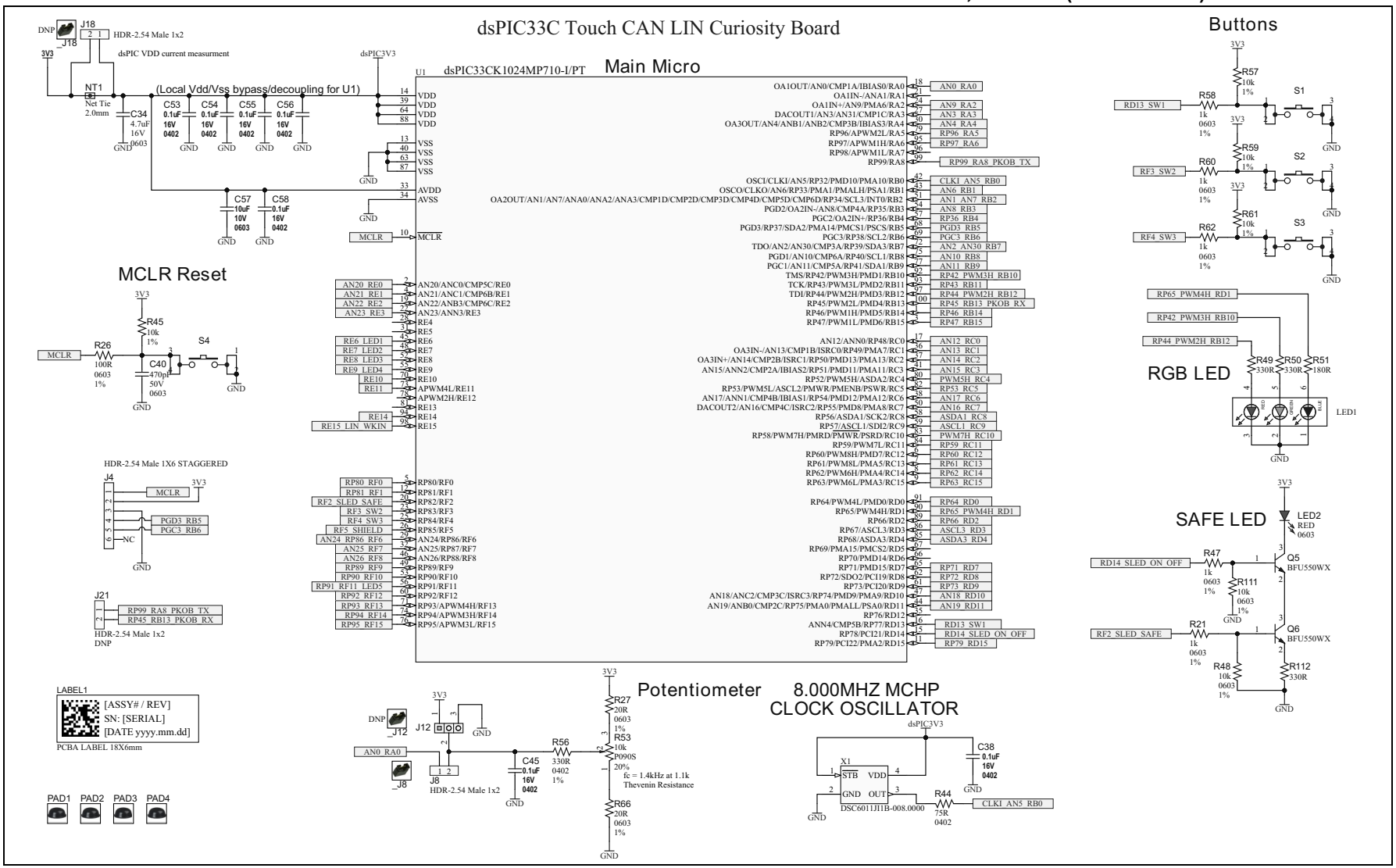


FIGURE A-2: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 2 OF 9)

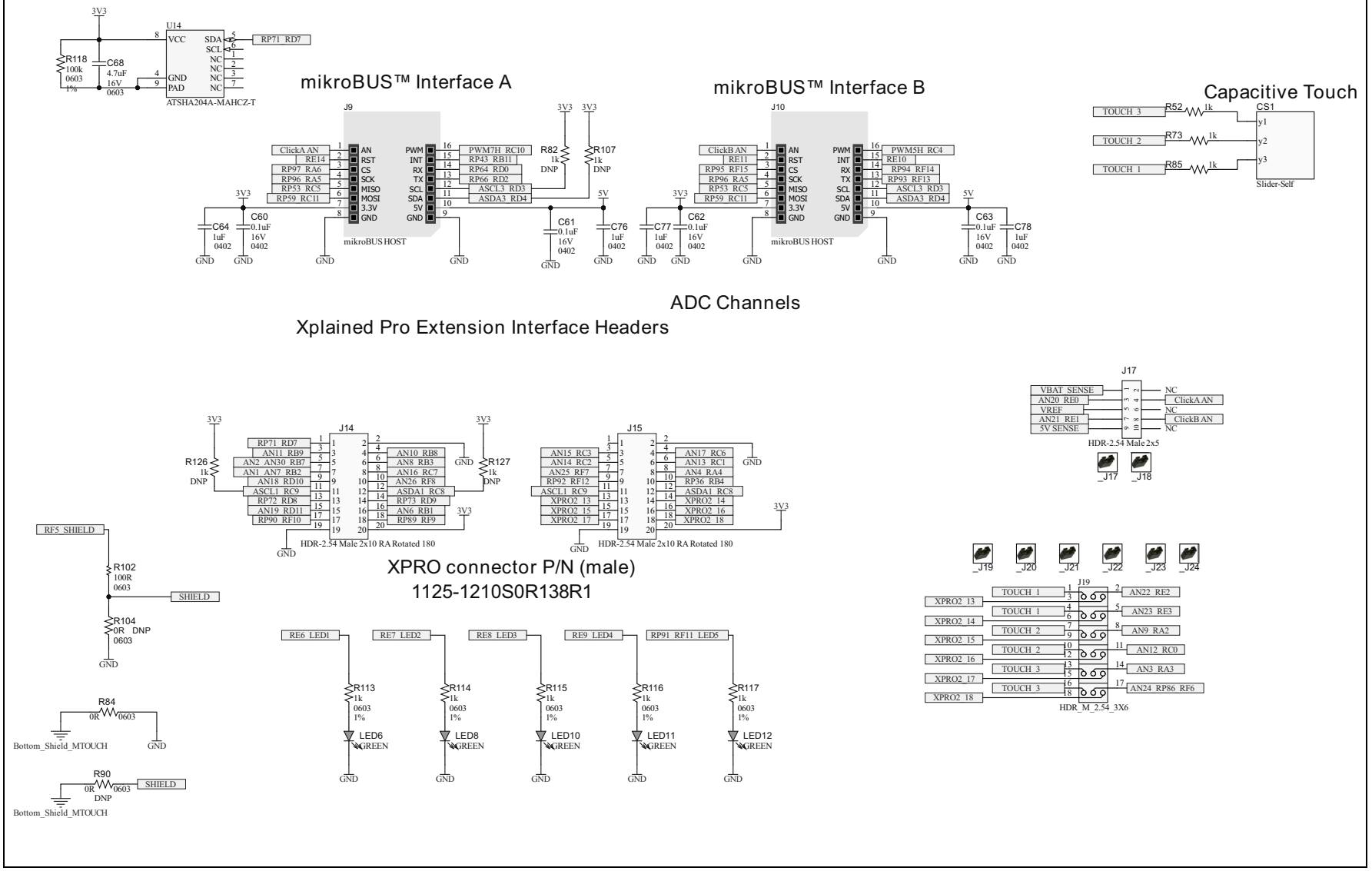


FIGURE A-3: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 3 OF 9)

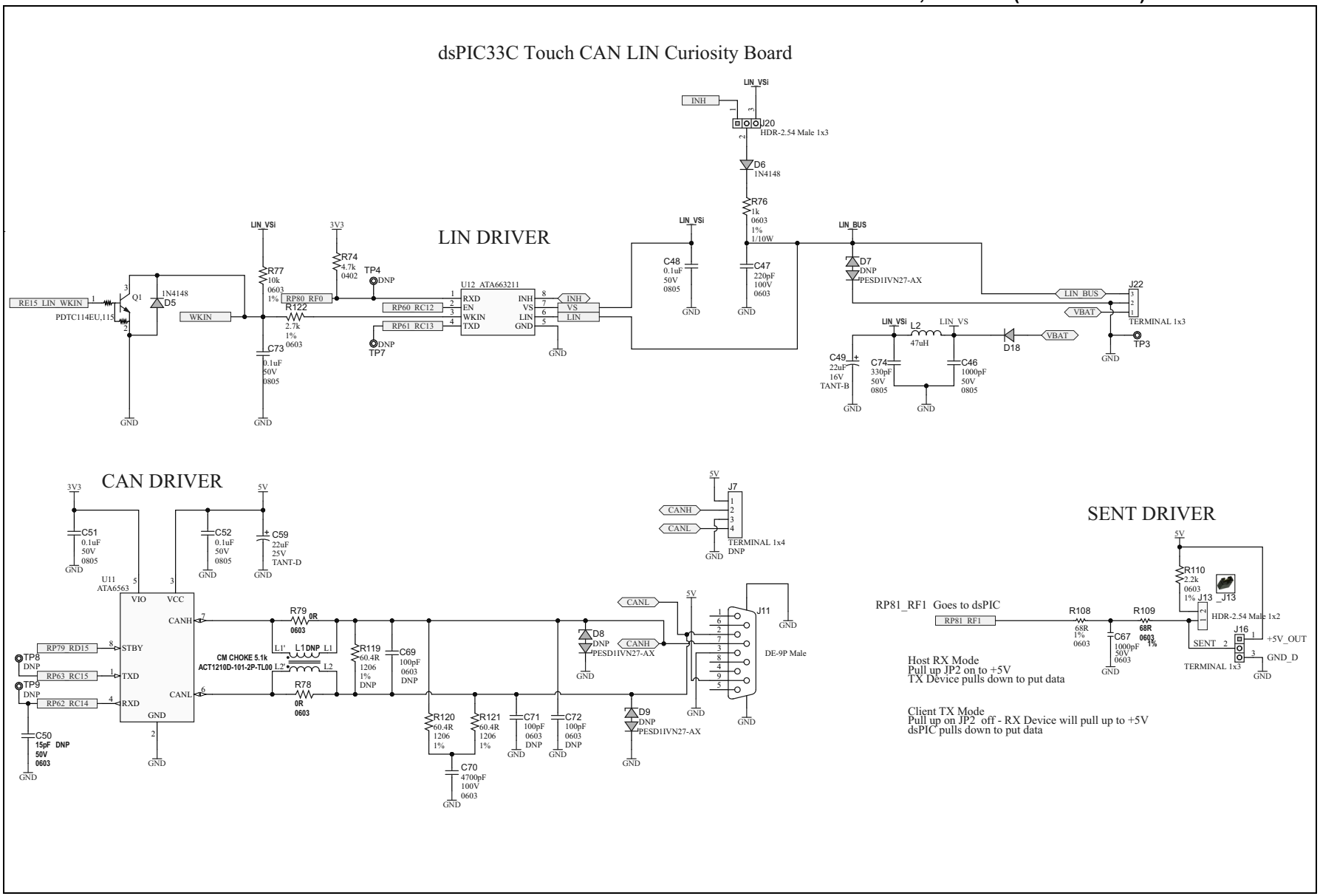


FIGURE A-4: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 4 OF 9)

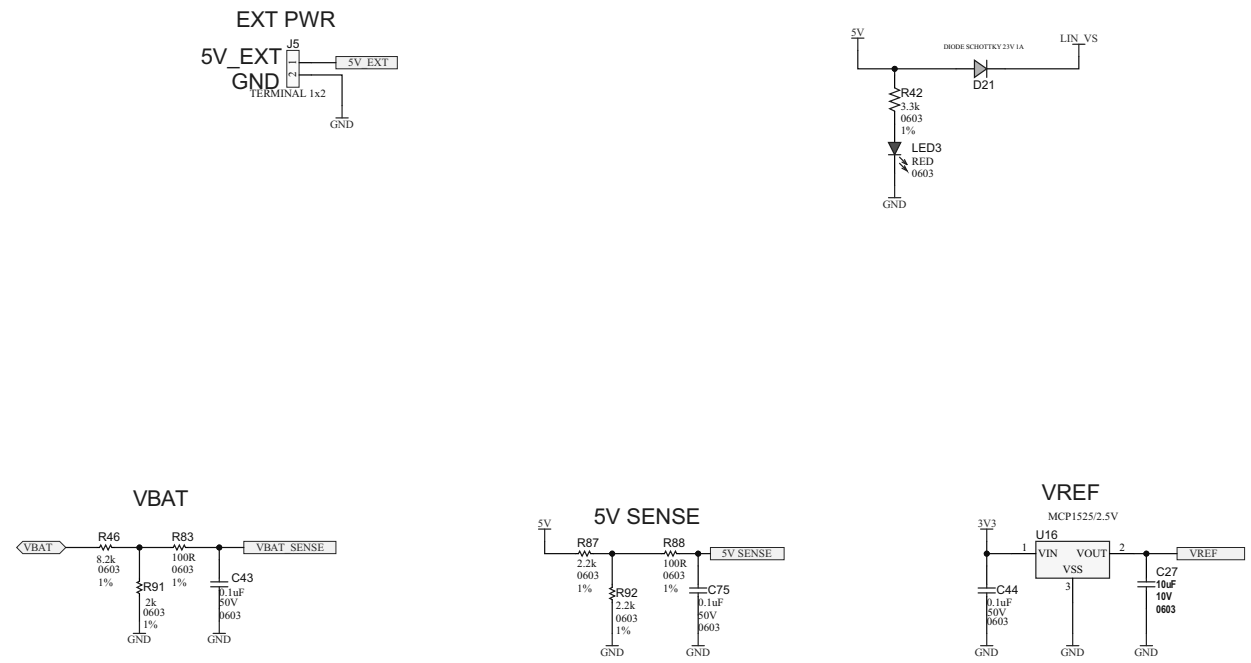


FIGURE A-5: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 5 OF 9)

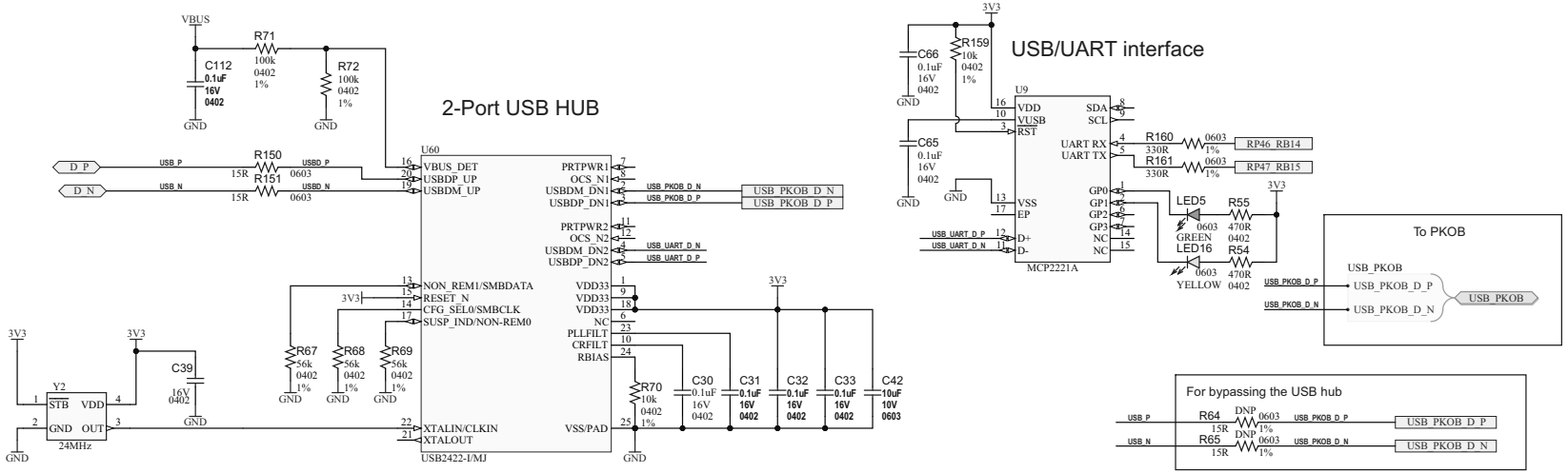


FIGURE A-6: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 6 OF 9)

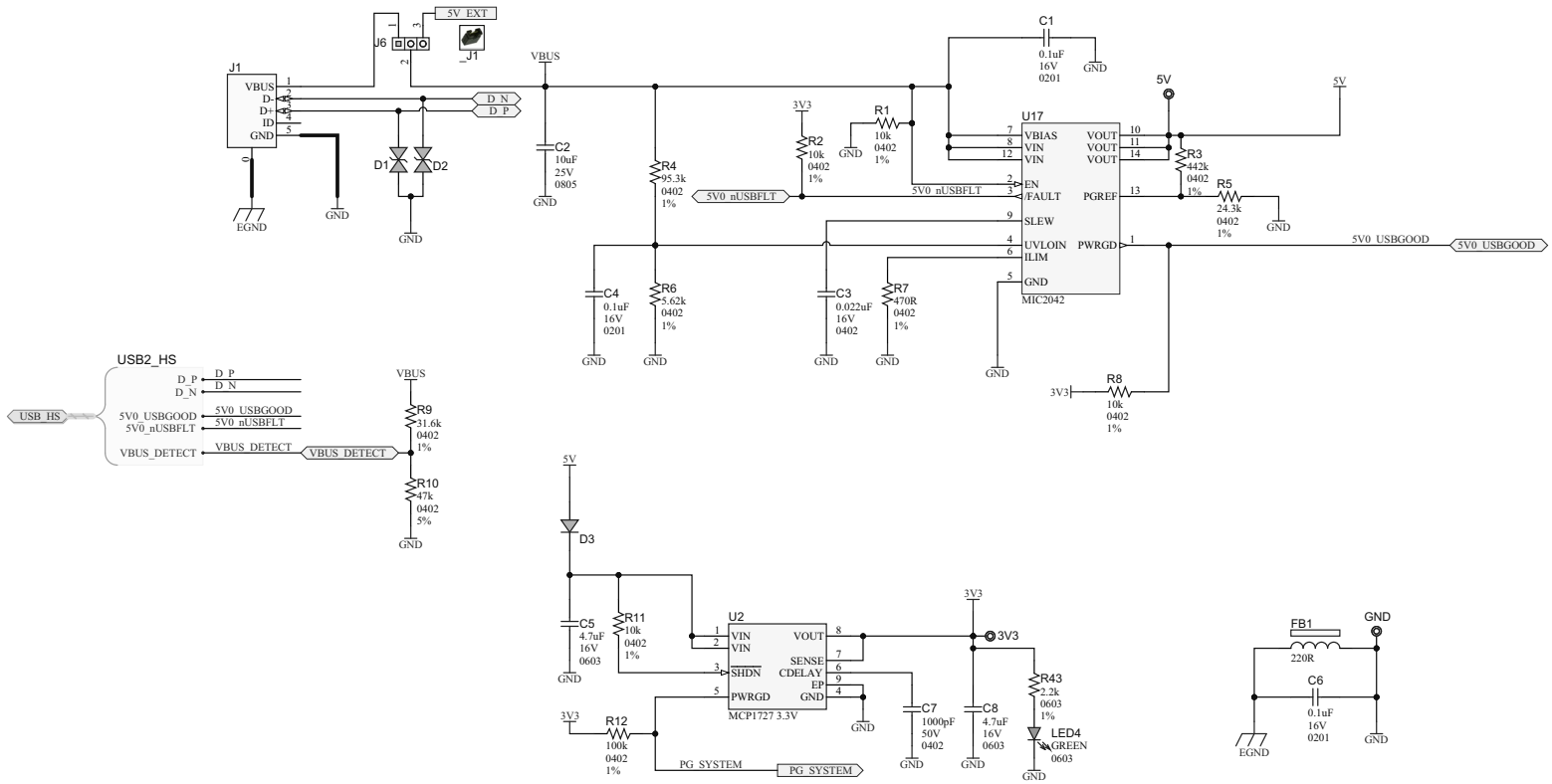


FIGURE A-7: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 7 OF 9)

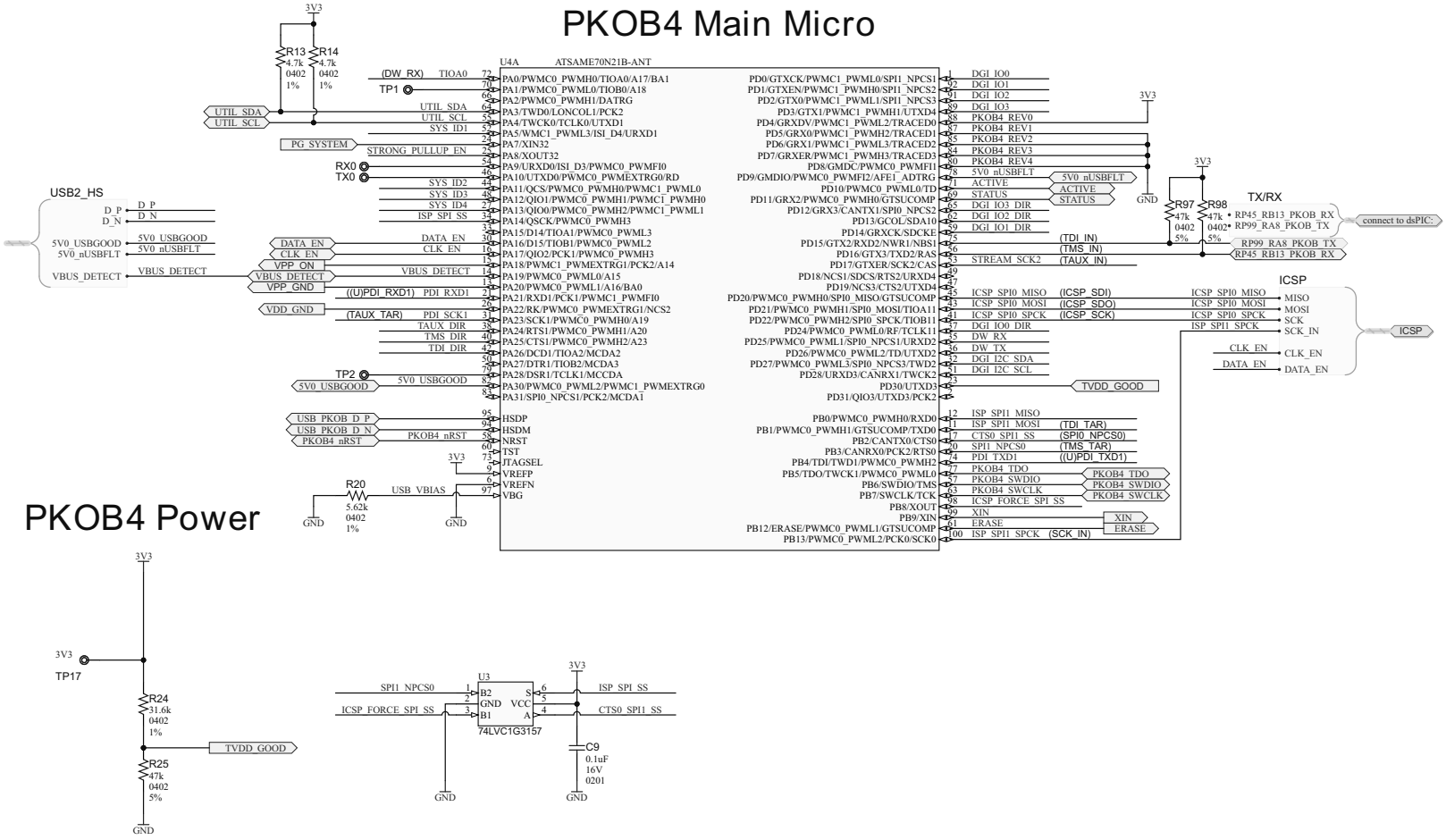


FIGURE A-8: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 8 OF 9)

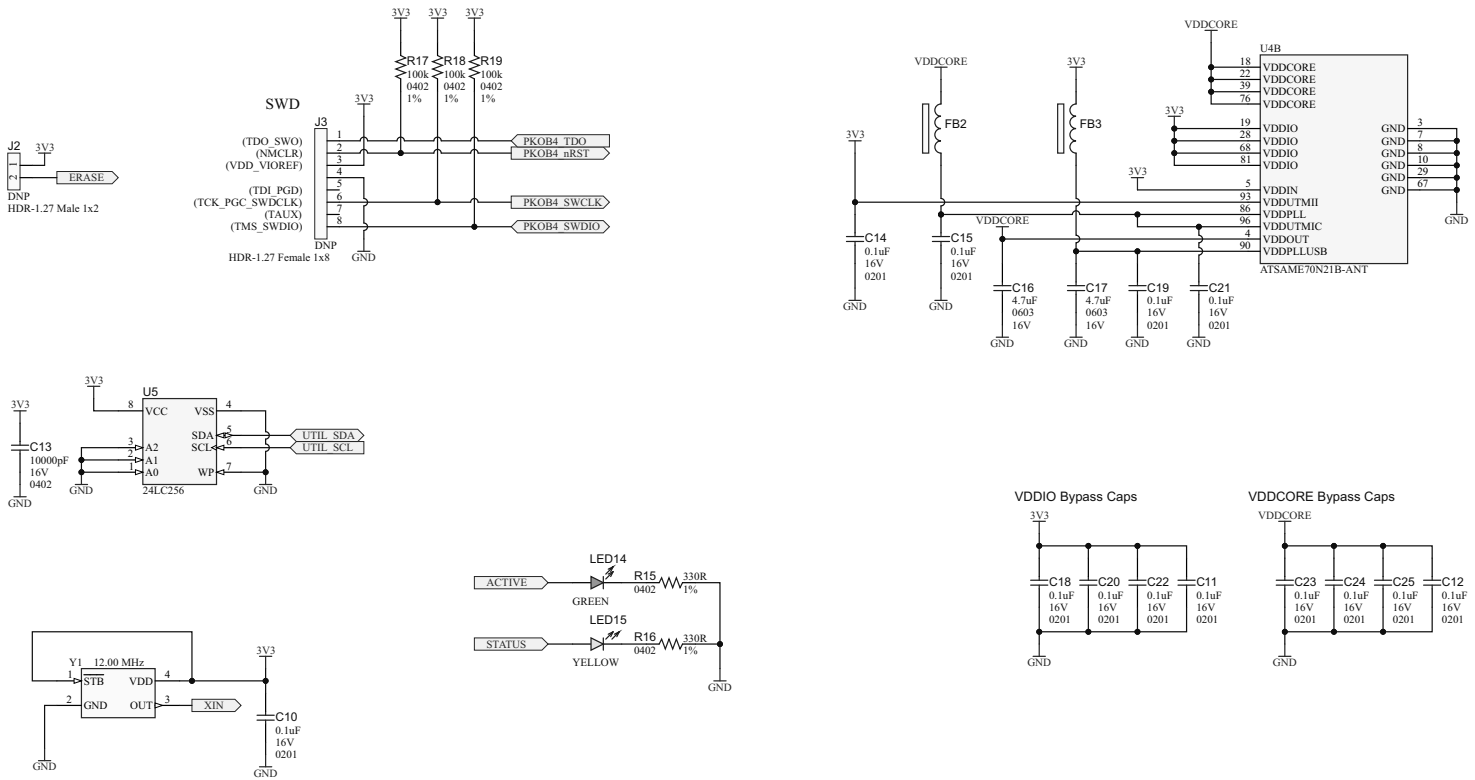
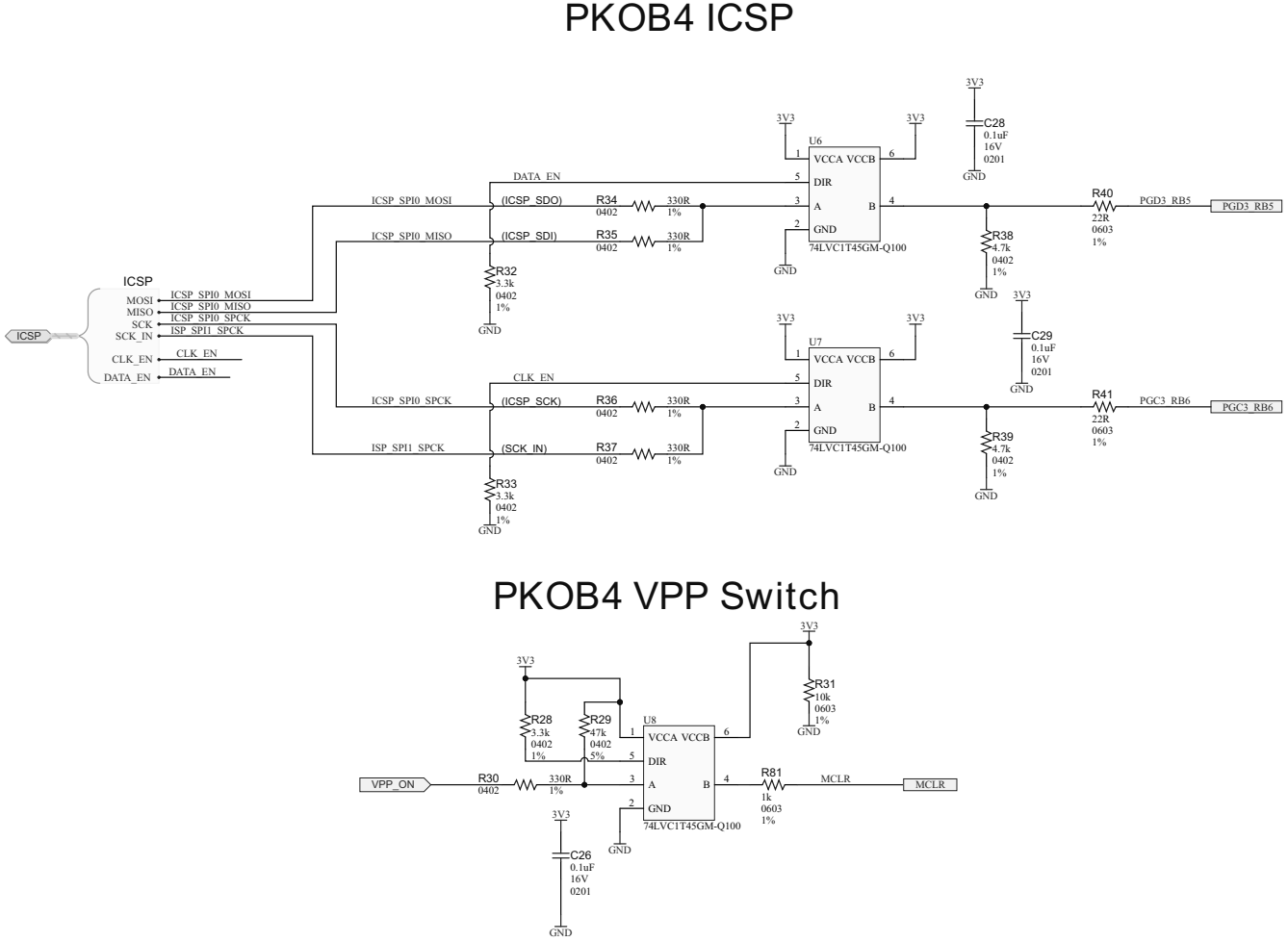


FIGURE A-9: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD SCHEMATICS, REV. 2.0 (PAGE 9 OF 9)

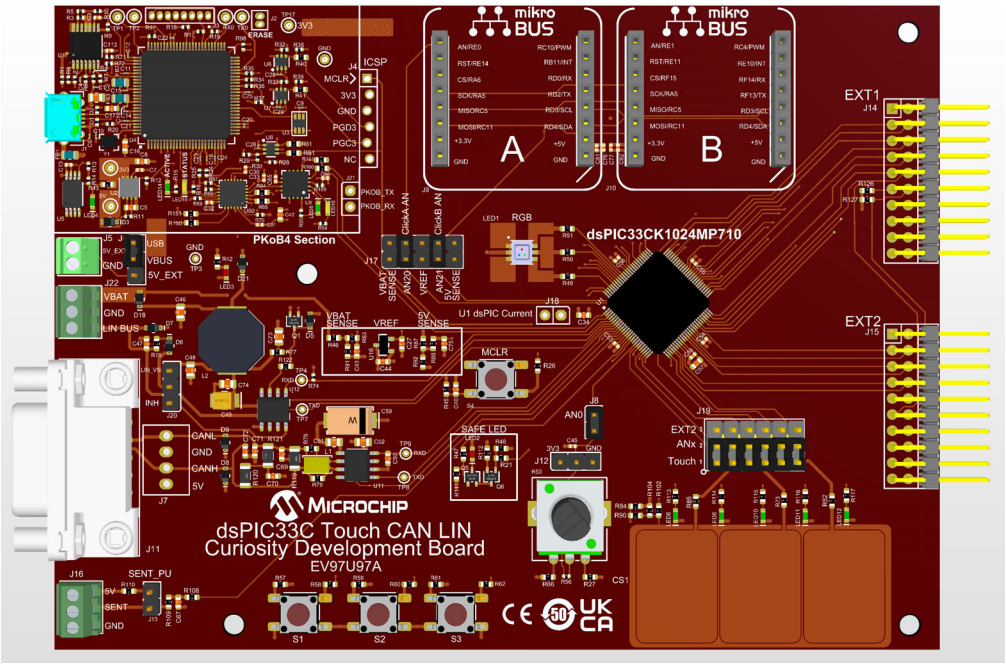


A.3 dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD PCB LAYOUT

The dsPIC33C Touch-CAN-LIN Curiosity Development Board is a four-layer FR4, 1.6 mm, Plated-Through-Hole (PTH) PCB construction. Figure A-10 and Figure A-11 illustrate the PCB layers.

FIGURE A-10: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD TOP SILKSCREEN AND TOP COPPER

Top Silkscreen



Top Copper

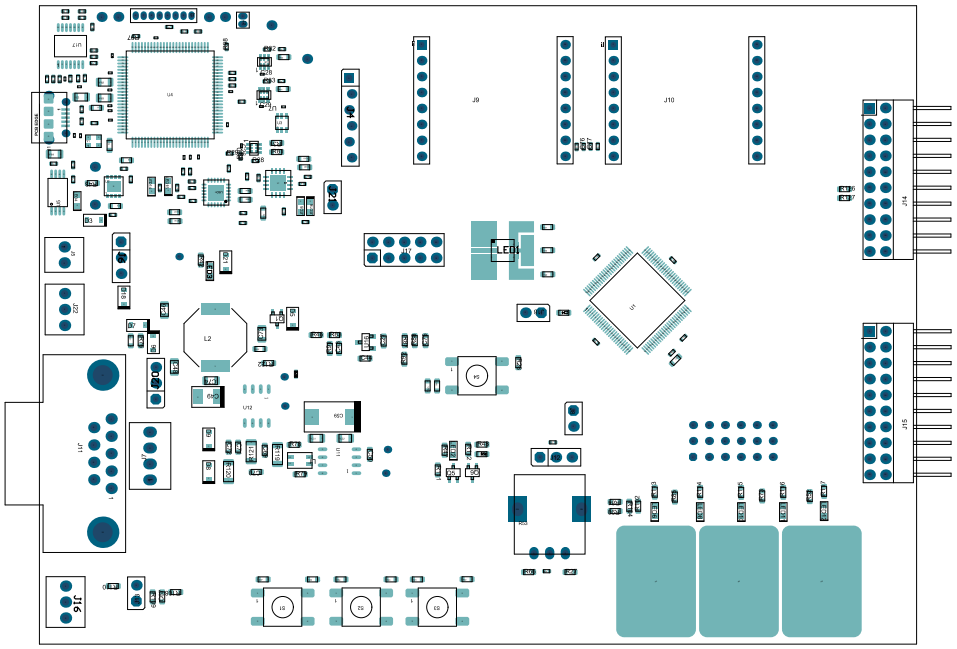
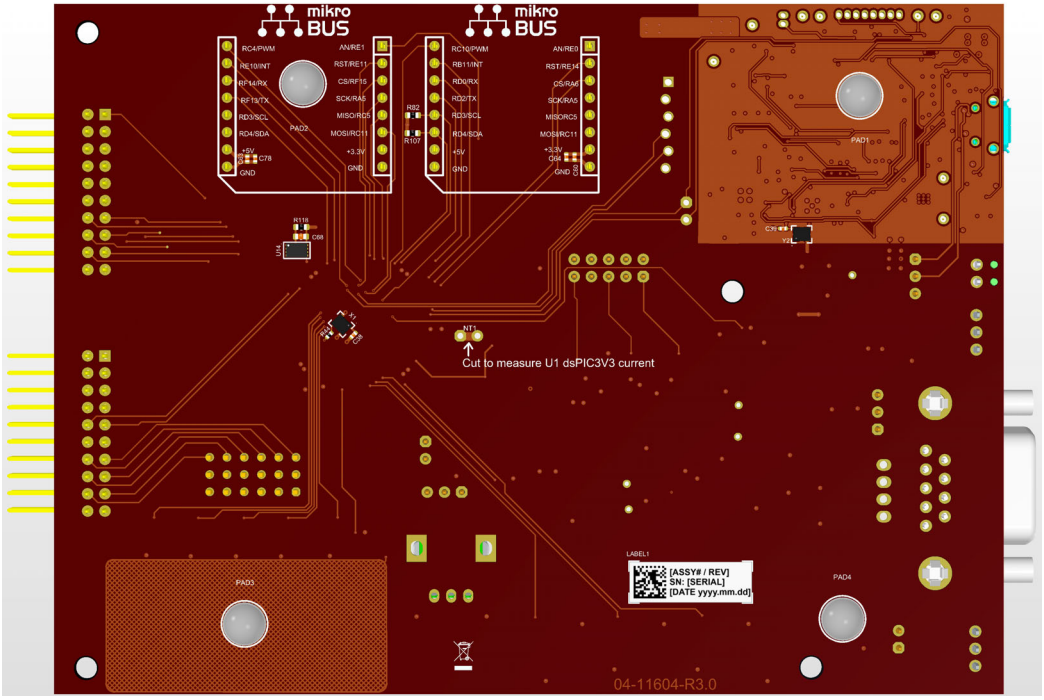
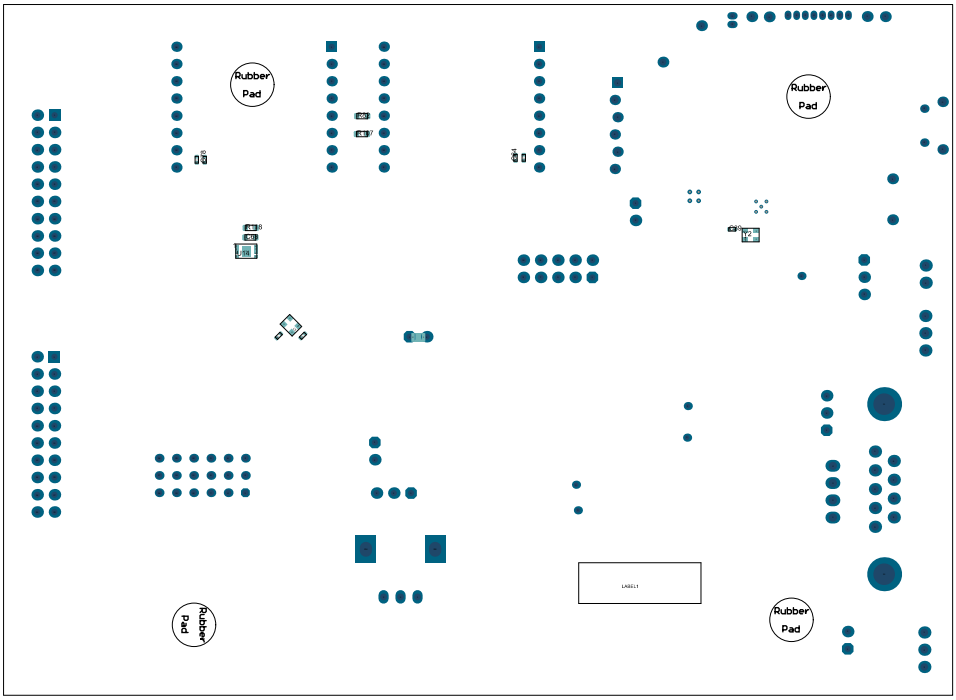


FIGURE A-11: dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD BOTTOM SILKSCREEN AND BOTTOM COPPER

Bottom Silkscreen



Bottom Copper



Appendix B. Bill of Materials (BOM)

This appendix contains the Bill of Materials (BOMs) for the dsPIC33C Touch-CAN-LIN Curiosity Development Board.

- Bill of Materials–dsPIC33C Touch-CAN-LIN Curiosity Development Board

B.1 BILL OF MATERIALS–dsPIC33C TOUCH-CAN-LIN CURIOSITY DEVELOPMENT BOARD

Table B-1 shows the Bill of Materials for the dsPIC33C Touch-CAN-LIN Curiosity Development Board.

TABLE B-1: dsPIC33C TOUCH-CAN-LIN DEVELOPMENT BOARD BOM

Qty	Designator	Description	Manufacturer	Manufacturer Part Number
11	_J1,_J8, _J13, _J17, _J18,_J19,_J20,_J21, _J22,_J23,_J24	MECH HW JUMPER 2.54mm 1x2	Tyco Electronics (TE Connectivity)	382811-6
20	C1, C4, C6, C9, C10, C11, C12, C14, C15, C18, C19, C20, C21, C22, C23, C24, C25, C26, C28, C29	CAP CER 0.1uF 16V 10% X5R SMD 0201	Murata	GRM033R61C104KE84D
1	C2	CAP CER 10uF 25V 10% X5R SMD 0805	Murata	GRM21BR61E106KA73L
1	C3	CAP CER 0.022uF 16V 10% X7R SMD 0402	Samsung Electro-Mechanics	CL05B223KO5NNNC
6	C5, C8, C16, C17, C34, C68	CAP CER 4.7uF 16V 10% X5R SMD 0603	TDK Corporation	C1608X5R1C475K080AC
1	C7	CAP CER 1000pF 50V 10% X7R SMD 0402	Murata	GCM155R71H102KA37D
1	C13	CAP CER 10000pF 16V 10% X7R SMD 0402	KEMET	C0402C103K4RACTU
3	C27, C42, C57	CAP CER 10uF 10V 20% X5R SMD 0603	Samsung	CL10A106MP8NNNC
19	C30,C31, C32, C33, C38,C39, C45, C53, C54, C55, C56, C58, C60, C61, C62, C63,C65,C66,C112	CAP CER 0.1uF 16V 10% X7R SMD 0402	Murata, KEMET	GRM155R71C104-KA88D, C0402C104K4RA-CAUTO
1	C40	CAP CER 470pF 50V 10% X7R SMD 0603	Samsung Electro-Mechanics	CL10B471KB8NNNC
3	C43, C44, C75	CAP CER 0.1uF 50V 10% X7R SMD 0603	Yageo	CC0603KRX7R9BB104
1	C46	CAP CER 1000pF 50V 10% X7R SMD 0805	D3_AVX Corporation	08055C102KAT2A

TABLE B-1: dsPIC33C TOUCH-CAN-LIN DEVELOPMENT BOARD BOM (CONTINUED)

1	C47	CAP CER 220pF 100V 5% C0G, NP0 SMD 0603	KEMET	C0603C221J1GACTU
4	C48, C51, C52, C73	CAP CER 0.1uF 50V 10% X7R SMD 0805	D3_AVX Corporation	08055C104KAT2A
1	C49	CAP TANT 22uF 16V 10% 2.3R SMD B	AVX	TAJB226K016RNJ
1	C59	CAP TANT 22uF 25V 10% 0.8Ohm SMD D	KEMET	T491D226K025AT
4	C64, C76, C77, C78	CAP CER 1uF 10V 10% X5R SMD 0402	Samsung Electro-Mechanics	CL05A105KP5NNNC
1	C67	CAP CER 1000pF 50V 10% X7R SMD 0603	TDK Corporation	C1608X7R1H102K
1	C70	CAP CER 4700pF 100V 10% X7R SMD 0603 AEC-Q200	TDK Corporation	CGA3E2X7R2A472K080AA
1	C74	CAP CER 330pF 50V 10% X7R SMD 0805	Yageo	CC0805KRX7R9BB331
1	CS1	M_TOUCH_SUR-FACE_1x3_12.7mmx25.4mm		
2	D1, D2	DIO TVS BIDIR PGB101 SMD 0402	Littlefuse	PGB1010402KR
3	D3, D18, D21	DIODE SCHOTTKY 23V 1A SOD323	ST Microelectronics	BAT20JFILM
2	D5, D6	DIO RECT 1N4148WS 1.25V 150mA 75V SOD-323	Diodes Incorporated	1N4148WS-7-F
1	FB1	FERRITE 2A 220R SMD 0805	Murata	BLM21PG221SN1D
2	FB2, FB3	FERRITE 2A 600R SMD 0805	TDK Corporation	MPZ2012S601AT000
1	J1	CON USB2.0 MICRO-B FEMALE TH/SMD R/A	FCI	10118194-0001LF
1	J5	CON TERMINAL 2.54mm 1x2 Female 20-30AWG 6A TH R/A	Degson Electronics Co., Ltd.	DG308-2.54-02P-14-00A(H)
3	J8, J13, J18	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	FCI	68000-202HLF
4	J9, J10	SOCKET mikroBUS HOST DIP 16 TH	Sullins Connector Solutions	PPTC081LFBN-RC
1	J11	CON DSUB DE-9P Male TH R/A	Norcomp Inc.	182-009-113R181
3	J6,J12, J20	CON HDR-2.54 Male 1x3 Gold 5.84MH TH VERT	FCI	68000-103HLF
2	J14, J15	CON HDR-2.54 Male 2x10 Rotated 180Degrees Gold TH RT ANGLE	Sullins Connector Solutions	PBC10DBAN
2	J16, J22	CON TERMINAL 2.54mm 1x3 Female 20-30AWG 6A TH R/A	On Shore Technology Inc	OSTVN03A150
1	J17	CON HDR-2.54 Male 2x5 Gold 5.84MH TH VERT	Amphenol ICC (FCI)	67997-210HLF
1	J19	CONN HEADER VERT 18POS 2.54MM	Samtec Inc.	TSW-106-07-G-T
1	L2	INDUCTOR 47uH 1.85A 30% SMD 10x10x3.8	Würth Elektronik	744066470

TABLE B-1: dsPIC33C TOUCH-CAN-LIN DEVELOPMENT BOARD BOM (CONTINUED)

1	LED1	DIO LED TRI RED, GREEN, BLUE 2.1V, 3.0V, 3.2V 50mA, 35mA, 35mA SMD 6-PLCC	Cree Inc	CLX6F-FKC-CNP1ST1E 1BB7D3D3CT-ND
2	LED2, LED3	DIO LED RED 2V 20mA 250mcd Clear SMD 0603	Würth Elektronik	150060RS75000
8	LED4, LED5, LED6, LED8, LED10, LED11, LED12, LED14	DIO LED GREEN 2V 30mA 35mcd Clear SMD 0603	Lite-On	LTST-C190KGKT
2	LED15, LED16	DIO LED YELLOW 2.1V 20mA 6mcd Clear SMD 0603	Lite-On	LTST-C190YKT
1	Q1	TRANS PREBIAS NPN 50V SOT323	Nexperia USA Inc.	PDTC114EU,115
2	Q5, Q6	RF TRANS NPN 12V 11GHZ SOT323-3	NXP USA Inc.	BFU550WX
6	R1, R2, R8, R11, R70, R159	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X
1	R3	RES TKF 442k 1% 1/16W SMD 0402	Samsung Electro-Mechanics	RC1005F4423CS
1	R4	RES TKF 95.3k 1% 1/16W SMD 0402 AEC-Q200	Yageo	AC0402FR-0795K3L
1	R5	RES TKF 24.3k 1% 1/16W SMD 0402	Samsung Electro-Mechanics	RC1005F2432CS
2	R6, R20	RES TKF 5.62k 1% 1/16W SMD 0402	Vishay	CRCW04025K62FKED
3	R7, R54, R55	RES TKF 470R 1% 1/16W MF 0402	Yageo	RC0402FR-07470RL
2	R9, R24	RES TKF 31.6k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF3162X
5	R10, R25, R29, R97, R98	RES TKF 47k 5% 1/10W SMD 0402	Panasonic	ERJ-2GEJ473X
6	R12, R17, R18, R19, R71, R72	RES TKF 100k 1% 1/10W SMD 0402 AEC-Q200	Panasonic	ERJ-2RKF1003X
5	R13, R14, R38, R39, R74	RES TKF 4.7k 1% 1/16W SMD 0402	Yageo	RC0402FR-074K7L
8	R15, R16, R30, R34, R35, R36, R37, R56	RES TKF 330R 1% 1/16W SMD 0402	Yageo	RC0402FR-07330RL
15	R21, R47, R52, R58, R60, R62, R73, R76, R81, R85, R113, R114, R115, R116, R117	RES TKF 1k 1% 1/10W SMD 0603	Vishay, Panasonic	CRCW06031K00FKEA, ERJ-3EKF1001V
4	R26, R83, R88, R102	RES TKF 100R 1% 1/10W SMD 0603 AEC-Q200	D1_Rohm Semiconductor	KTR03EZPF1000
2	R27, R66	RES TKF 20R 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF20R0V
3	R28, R32, R33	RES TKF 3.3k 1% 1/10W SMD 0402	Panasonic - ECG	ERJ-2RKF3301X
3	R31, R48, R111	RES TF 10k 1% 1/8W SMD 0603	Vishay Beyschlag, Vishay	MCT06030C1002FP500
2	R40, R41	RES TKF 22R 1% 1/10W SMD 0603	Yageo	RC0603FR-0722RL

TABLE B-1: dsPIC33C TOUCH-CAN-LIN DEVELOPMENT BOARD BOM (CONTINUED)

1	R42	RES TKF 3.3k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF3301V
4	R43, R87, R92, R110	RES TF 2.2k 1% 1/10W SMD 0603 AEC-Q200	TE Connectivity Passive Product	CRGCQ0603F2K2
1	R44	RES TKF 75R 1% 1/16W SMD 0402	Yageo	RC0402FR-0775RL
5	R45, R57, R59, R61, R77	RES TKF 10k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1002V
1	R46	RES TKF 8.2k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF8201V
5	R49, R50, R112, R160, R161	RES TKF 330R 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF3300V
1	R51	RES TKF 180R 1% 1/10W SMD 0603	Yageo	RC0603FR-07180RL
1	R53	RES VARIABLE 10k 20% TH P090S	BI Technologies / TT Electronics	P090S-14T20BR10K
3	R67, R68, R69	RES TKF 56k 1% 1/16W SMD 0402	ROHM	MCR01MZPF5602
3	R78, R79, R84	RES TKF 0R 1/10W SMD 0603	Panasonic	ERJ-3GEY0R00V
1	R91	RES TKF 2k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF2001V
2	R108, R109	RES TKF 68R 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF68R0V
1	R118	RES TF 100k 1% 1/8W SMD 0603	Yageo	RT0603FRD07100KL
2	R120, R121	RES TKF 60.4R 1% 1/4W SMD 1206	Yageo	RC1206FR-0760R4L
1	R122	RES TKF 2.7k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF2701V
2	R150, R151	RES TKF 15R 1% 1/16W SMD 0603	Stackpole Electronics Inc	RMCF0603FT15R0
4	S1, S2, S3, S4	SWITCH TACT SPST 12V 50mA PTS645SM43SMTR92 LFS SMD	C&K Components	PTS645SM43SMTR92 LFS
1	U3	IC SWITCH SPDT 74LVC1G3157 SC-70-6	Texas Instruments	SN74LVC1G3157DCKR
3	U6, U7, U8	IC TRANSCEIVER 74LVC1T45GM or 74LVC1T45GW Single Bit Voltage Translator SOT-886 SOT-363 Dual FP	Nexperia USA Inc.	74LVC1T45GM,132
Microchip Parts listed below				
1	U1	MCHP MCU16-BIT 1024KB Flash, 128KB, dsPIC33CK1024MP710-I/PT TQFP-100	Microchip Technology	dsPIC33CK1024MP710-I/PT
1	U2	MCHP ANALOG LDO 3.3V MCP1727-3302E/MF	Microchip Technology	MCP1727-3302E/MF

TABLE B-1: dsPIC33C TOUCH-CAN-LIN DEVELOPMENT BOARD BOM (CONTINUED)

1	U4	MCHP MCU 32-BIT 300MHz 2MB 384kB ATSAME70N21B-ANT LQFP-100	Microchip Technology	ATSAME70N21B-ANT
1	U5	MCHP MEMORY SERIAL EEPROM 256k I2C 24LC256T-E/ST TSSOP-8	Microchip Technology	24LC256T-E/ST
1	U9	MCHP INTERFACE USB I2C/UART MCP2221A-I/ML QFN-16	Microchip Technology	MCP2221A-I/ML
1	U11	MCHP INTERFACE CAN ATA6563-GAQW1 SOIC-8	Microchip Technology	ATA6563-GAQW1
1	U12	MCHP INTERFACE LIN ATA663211-GAQW SO-8	Microchip Technology	ATA663211-GAQW
1	U16	MCHP ANALOG VREF 2.5V MCP1525T-I/TT SOT-23-3	Microchip Technology	MCP1525T-I/TT
1	U17	MCHP ANALOG POWER SWITCH 5.5V 3A MIC2042-1YTS TSSOP-14	Microchip Technology	MIC2042-1YTS
1	U60	MCHP INTERFACE USB 2.0 HS 2 PORT HUB CTRLR QFN-24 USB2422-I/MJ	Microchip Technology	USB2422-I/MJ
1	X1	8.000MHZ MCHP CLOCK OSCILLATOR SINGLE DSC6011JI1B-008.0000 VLGA	Microchip Technology	DSC6011JI1B-008.0000
1	Y1	MCHP CLOCK OSCILLATOR SINGLE 12.000MHZ DSC6011JI1B-012.0000 VLGA	Microchip Technology	DSC6011JI1B-012.0000
1	Y2	MCHP OSC MEMS DSC6011-JI2B-024.0000_2.5LX2.0WX0.89H_LGA	Microchip Technology	DSC6011JI2B-024.0000
1	U14	IC Crypto Element SHA-256 1-Wire ATSHA204A-MAHCZ-T UDFN-8	Microchip Technology	ATSHA204A-MAHCZ
Mechanical Parts to be added in the package				
4	PAD1, PAD2, PAD3, PAD4	MECH HW RUBBER PAD Hemisphere D6.4 H1.9 CLEAR	3M	SJ5382
PCB				
1	PCB1	Printed Circuit Board		04-11604-R2
Do Not Populate Parts listed below				
3	_J12, _J18	MECH HW JUMPER 2.54mm 1x2	3M	969102-0000-DA
1	C50	CAP CER 15pF 50V 5% NP0 SMD 0603	Yageo	CC0603JRNP09BN150
3	C69, C71, C72	CAP CER 100pF 100V 5% C0G SMD 0603	KEMET	C0603C101J1GACTU
3	D7, D8, D9	DIO TVS PESD1IVN27-AX 45V 3A SOD-323	Nexperia USA Inc.	PESD1IVN27-AX
1	J2	CON HDR-1.27 Male 1x2 Gold TH VERT	Digikey	952-3598-ND

TABLE B-1: dsPIC33C TOUCH-CAN-LIN DEVELOPMENT BOARD BOM (CONTINUED)

1	J3	CON HDR-1.27 Female 1x8 TH VERT	Aceconn Technology (Shenzhen)	FSEA120-0802A002B1AB
1	J4	CON HDR-2.54 Male 1x6 Staggered DNP	Sullins Connector Solutions	PBC06SAAN
1	J7	CON TERMINAL 2.54mm 1x4 Female 20-30AWG 6A TH R/A	On Shore Technology Inc.	OSTVN04A150
1	J21	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	FCI	68000-202HLF
1	L1	CM CHOKE 5.1k@10MHz 1.5R SMD 1210 AEC-Q200	TDK Corporation	ACT1210D-101-2P-TL00
2	R64, R65	RES TKF 15R 1% 1/16W SMD 0603	Stackpole Electronics Inc	RMCF0603FT15R0
4	R82, R107, R126, R127	RES TKF 1k 1% 1/10W SMD 0603	Vishay	CRCW06031K00FKEA
2	R90, R104	RES TKF 0R 1/10W SMD 0603	Panasonic	RMCF0603ZT0R00
1	R119	RES TKF 60.4R 1% 1/4W SMD 1206	Yageo	RC1206FR-0760R4L

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China - Nanjing
Tel: 86-25-8473-2460

China - Qingdao
Tel: 86-532-8502-7355

China - Shanghai
Tel: 86-21-3326-8000

China - Shenyang
Tel: 86-24-2334-2829

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

China - Wuhan
Tel: 86-27-5980-5300

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Tel: 86-756-3210040

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Tel: 81-6-6152-7160

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Tel: 81-3-6880- 3770

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