JiviBoard Usage and Soldering Guide

AMP Lab at Virginia Tech

Jivtesh Kukreja

8 March 2024

Contents

1 Introduction

This document contains information about Jiviboard, the advance solder certifier for the AMP Lab at Virginia Tech. After successfully soldering this board, the student can finish their advance solder training at the lab. Similar to basic and intermediate solder training at the lab, the student keeps the board that they solder. The below sections detail what JiviBord is, how to use it after they successfully solder it, and a guide on how to solder the board.

2 What Is A JiviBoard? How Do You Use One?

JiviBoard is a microcontroller development board based on the Raspberry Pi Foundation's RP2040 MCU. The board is equipped with a type-c connector, 16Mb of flash memory, RGB LED, a 3-axis accelerometer, and two MOSFETs to drive 5V logic peripherals.

Once the board is successfully soldered, there is no software setup required. Connect the USB cable while pressing the boot button and the board should pop up as a storage drive. Drag the provided UF2 file (Appendix A) to test the board. The RGB should flash in a pattern and the board would output the data through USB which can be seen through a serial terminal. If the above test does not work, then it is recommended you check the voltages are correct on the test point as per the design files (Appendix B).

To utilize the JiviBoard, the pinout is provided (Figure 1). If you are unfamiliar with RP2040 MCU then it is recommended you go through the datasheet of RP2040 and pico development board (Appendix C). This MCU can be programmed with Micro Python or C/C++, examples are available online for both languages.

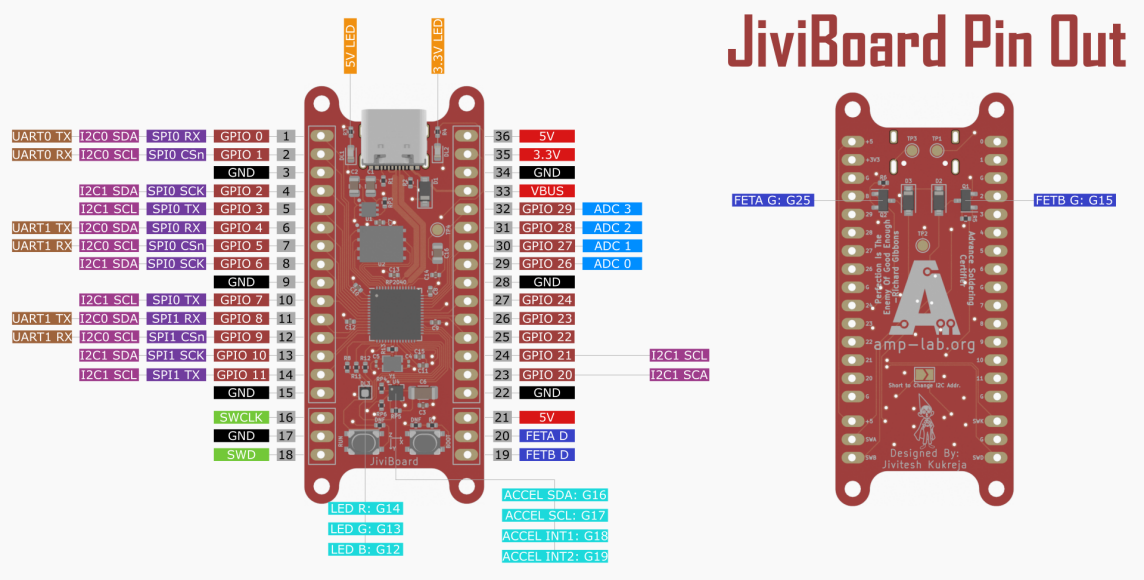

Figure 1: Pin Out Of A JiviBoard

3 Making a JiviBoard

JiviBoard can be challenging to solder as it contains QFN, 201, and other small packages. For the front side of the board, it is recommended you utilize the stencil printer with the reflow oven to solder the board. However, it can be hand soldered but this process would be very long, tedious, and unforgiving for components. The components on the back are recommended to be hand-soldered. However, the reflow oven can also be used here but the solder paste for the back needs to have a lower reflow temperature than the front otherwise your front components might come off.

The following table details the designator, value or manufacturer part number, quantity, and footprint of the components to be soldered on the board. The table also lists how to align the components as some components can only be placed in a specific way and any other way would result in undesirable behavior. There is no exact order to follow while placing the components but it is always helpful to place the smaller components first as you get more room to work with. If you have KiCad on your computer, it is recommended you utilize the Interactive HTML BOM plugin with the provided design files for easy component placement (Appendix B). If you are unsure of something you can check the datasheet of the components and the board file (Appendix B).

Designator	Value or Manufacturer Part Number	Footprint	Quantity	Alignment
C1, C2, C16	1u	805	3	None
C3,C7,C8,C9, C10,C11,C12, C13,C14,C15	100n	402	10	None
C4,C5	10p	603	2	None
C6	10u	1206	1	None
D1,D2,D3	Schottky	SOD-123	3	Bar side on the closed end
DL1	5V LED	603	1	Green notch on the closed end
DL2	3V LED	603	1	Green notch on the closed end
DL3	LED RGB	Custom	1	Notch with notch
J1	TYPE C	Custom	1	None
Q1,Q2	2N7002L	SOT-23	2	None
R1,R2	5.1k	402	2	None
R3	330	403	1	None
R4	120	404	1	None
R5,R6,RP4, RP5,RP6,RP3	10k	405	5	None
R7,R13	1k	406	2	None
R8	47	407	1	None
R11	39	408	1	None
R12	82	409	1	None
DNF	Do Not Fit	410	3	None
SW1,SW2	Switch	Custom	2	None
U1	TLV75733 PDRVR	SON65	1	Dot with dot
U2	W25Q16JVZ PIQ	SON127	1	Dot with dot
U3	RP2040	QFN-56	1	Dot with dot
U4	LIS2HH12TR	LGA-12	1	Dot with dot
Y1	12MHz	Custom	1	None

A Test Program

The test program can be found here. You can use the UF2 file for testing but the C code is also provided if you would like to experiment with it.

B JiviBoard Design Files

The following details the schematic and the PCB layout of the JiviBoard for reference (Figure 2-3). You can assess the KiCad board files and the bill of material here

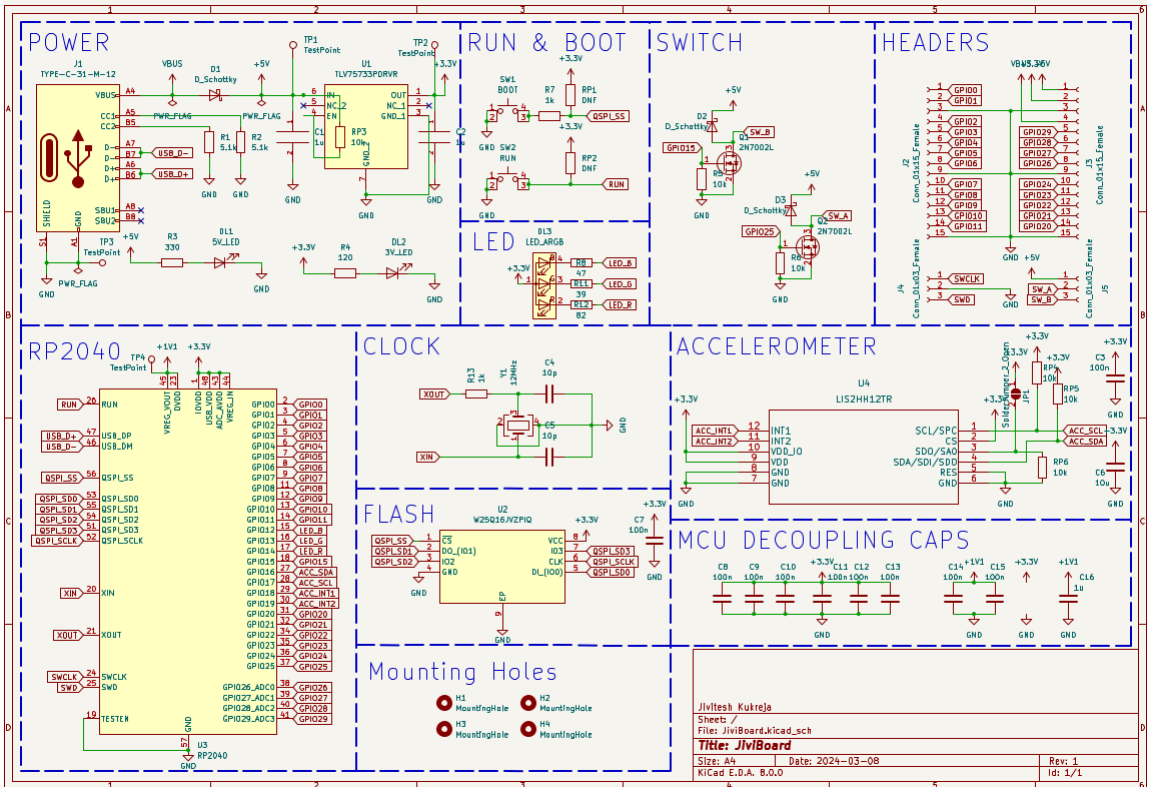

Figure 2: Schematic File Of JiviBoard

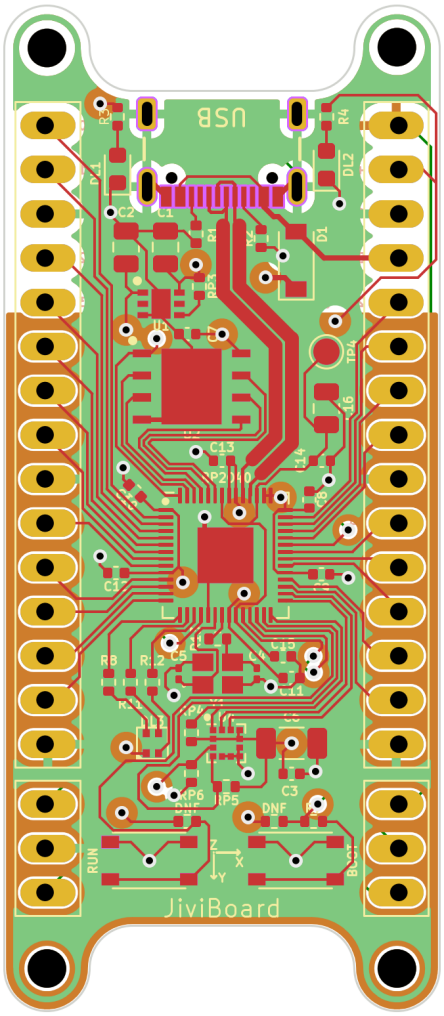

Figure 3: Board File Of JiviBoard

C RP2040 and Pico Datasheets

The RP2040 datasheet can be found here here, and pico datasheet can be found here. Moreover, you can find example C code here and micro python code here. These are for the pico and pico w, so be careful as peripherals are different. Also, if you plan and using C, you require the SDK which can be installed by following the guide here.