Core

File: core.kicad_sch

Power

File: power.kicad_sch

Connectors

File: connectors.kicad_sch

Peripherals

File: peripherals.kicad_sch

Designed by: Dryw Wade

SparkFun Electronics

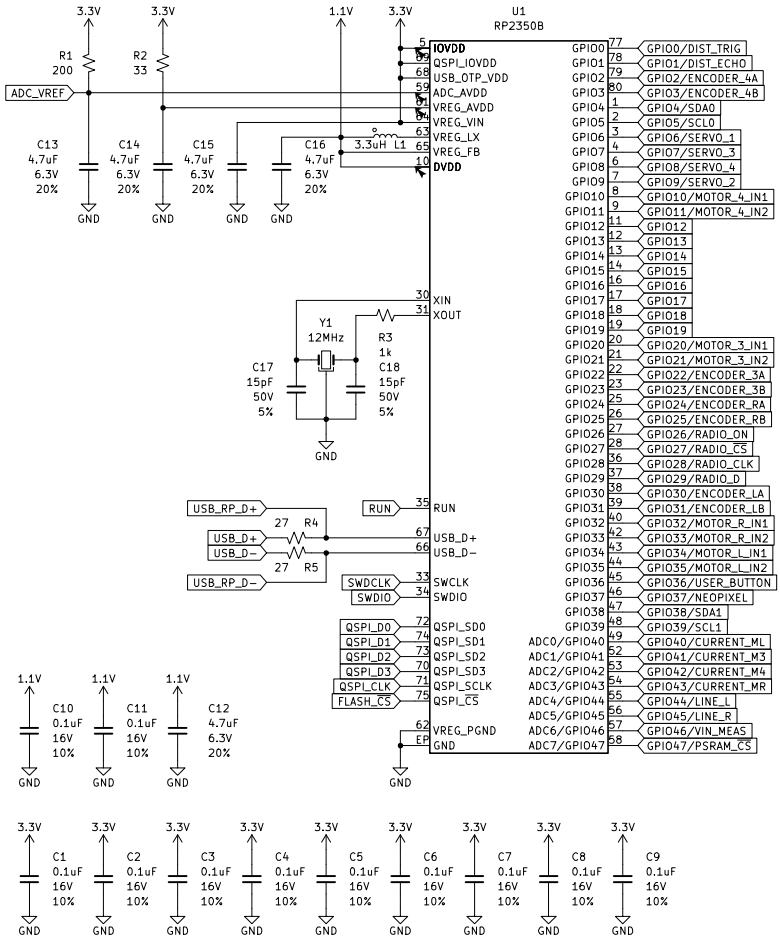
Sheet: /

File: SparkFun_XRP_Controller.kicad_sch

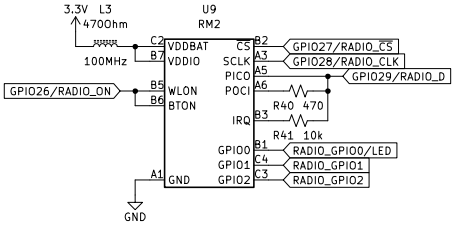
Title: SparkFun XRP Control Board

Size: USLetter	Date: 2024-12-12	**Rev: v20**
KiCad E.D.A. 8.0.8		Id: 1/5

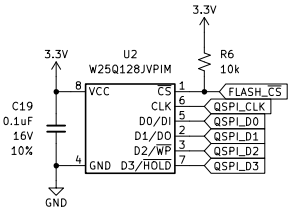
Processor – RP2350B



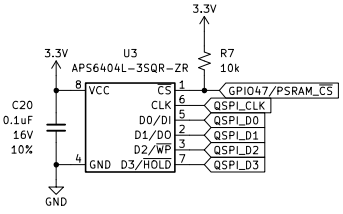
Radio – RM2



16MB Flash – W25Q128JVPIM



8MB PSRAM – APS6404L



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Sheet: /Core/
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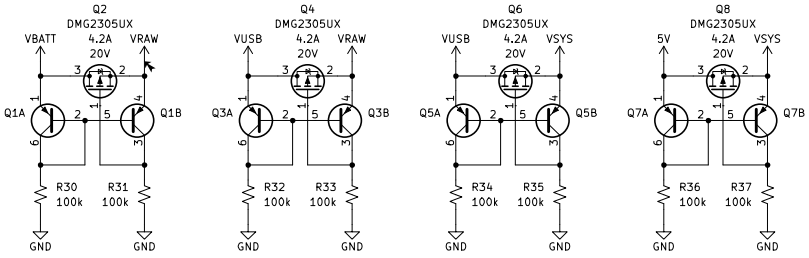
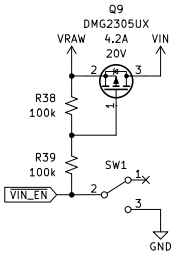
Title: SparkFun XRP Control Board

Size: USLetter	Date: 2024-12-12	**Rev: v20**
KiCad E.D.A. 8.0.8		Id: 2/5

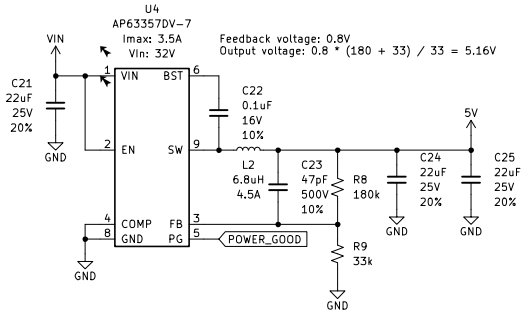
Ideal Diodes



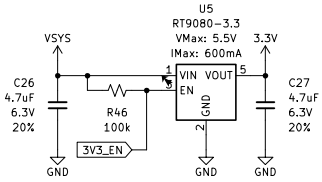
Power Switch



5V Buck Regulator – AP63357DV



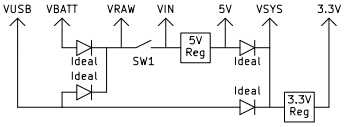
3.3V Linear Regulator – RT9080



Power Rails

Rail Name	Source	Usage	Voltage	Max Total Current	Matches RPi Pico
VUSB	USB-C connector	Raw USB voltage	5V	2A	Yes
VBATT	Barrel connector	Raw battery voltage	11V max 6V typical (4xAA)	2.5A	No
VRAW	Highest of VUSB and VBATT	Raw input voltage	5V to 11V	2A to 2.5A	No
VIN	VRAW after power switch	Motor power	5V to 11V	2A to 2.5A	No
5V	5V buck regulator	Servo power	5V	2A to 3.5A	No
VSYS	Highest of 5V and VUSB	5V supply voltage	5V	2A to 3.5A	Yes
3.3V	3.3V linear regulator	Processor, sensors, etc.	3.3V	600mA	Yes

This section is provided as a high-level reference for the power rails of this board



Designed by: Dryw Wade
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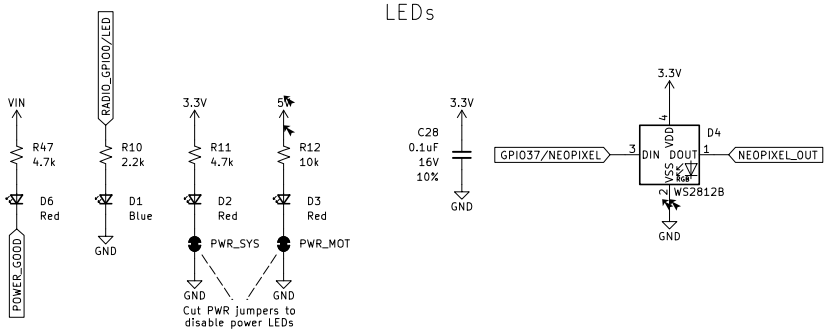
Sheet: /Power/
File: power.kicad_sch

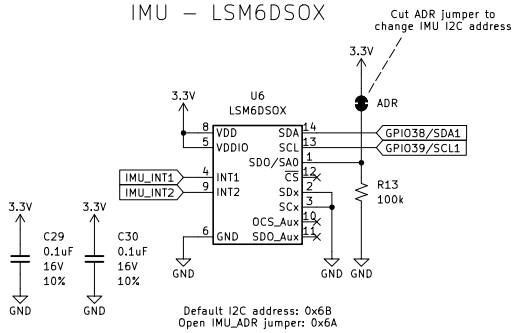
Title: SparkFun XRP Control Board

Size: USLetter	Date: 2024-12-12	**Rev: v20**
KiCad E.D.A. 8.0.8		Id: 3/5

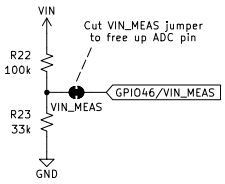
LEDs



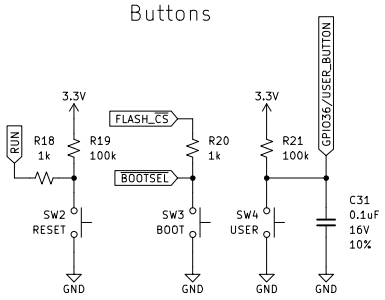
IMU – LSM6DSOX



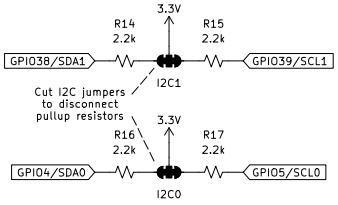
Input Voltage Measurement



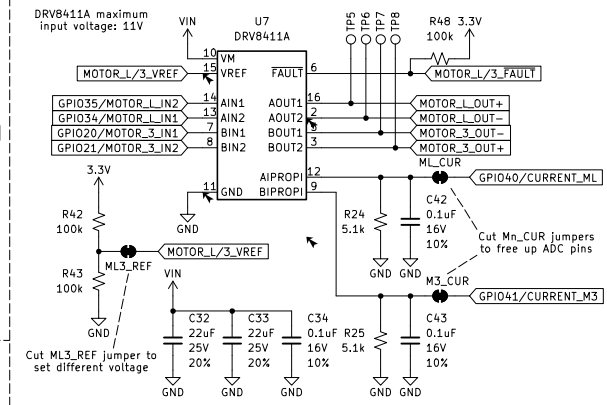
Buttons

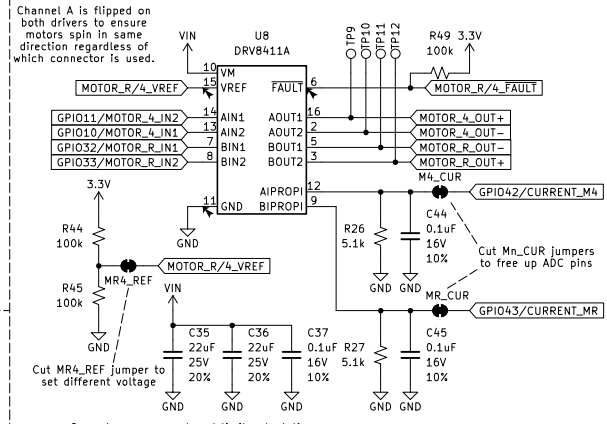


I2C Pullup Resistors



Motor Drivers – DRV8411A





Current measurement and limit calculations:

AIPROPI: 200uA/A
Max current: 4A
Max IPROPI: 800uA
RIPROPI: 5.1k

VREF: 3.3V / 2 = 1.65V
Max VIPROPI: (Max IPROPI) * (RIPROPI) = 4.08V
VIPROPI: (Max VIPROPI) / (Max current) = 1.02V per 1A
Current limit: (VREF) * (VIPROPI) = 1.683A

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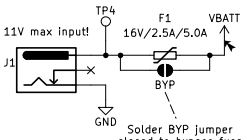
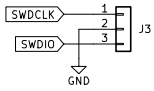
KiCad E.D.A. 8.0.8		Id: 4/5

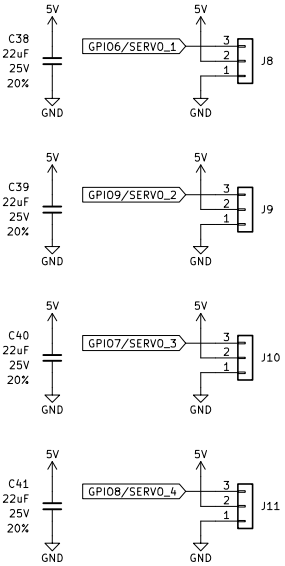
Barrel Jack



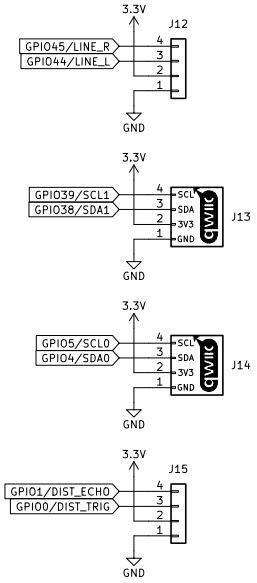
Debug Header



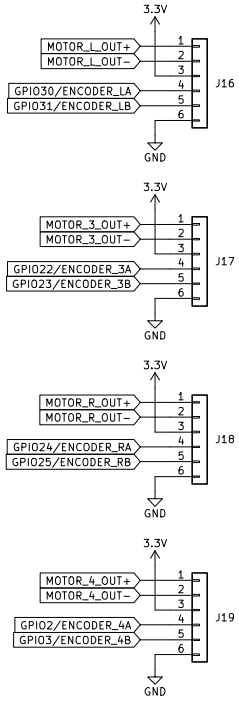
Servo Headers



Expansion Connectors

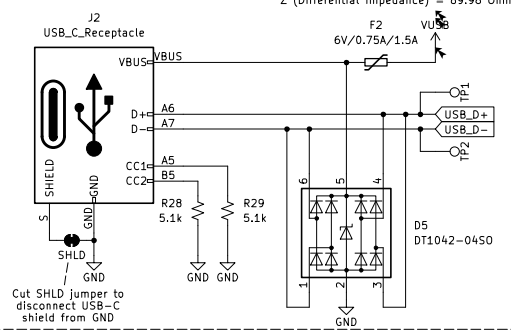


Motor Connectors



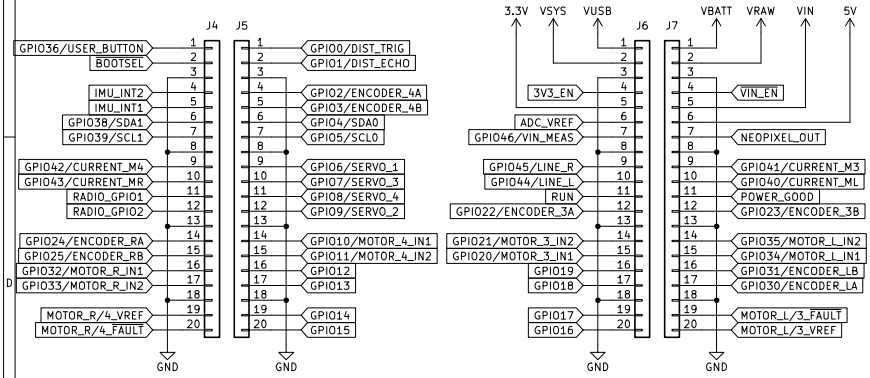
USB-C Connector

Differential Pair (Using Saturn PCB Toolkit)
JLC06161H-3313 Stackup
H (Prepreg Thickness) = 0.0994 mm
Er (3313 Material) = 4.1
W (conductor Width) = 5.4 mil
S (Conductor Spacing) = 5 mil
Z (Differential Impedance) = 89.98 Ohm



Expansion Headers

Inner rows match Pico pinout, except ADC pins



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KiCad E.D.A. 8.0.8		Id: 5/5