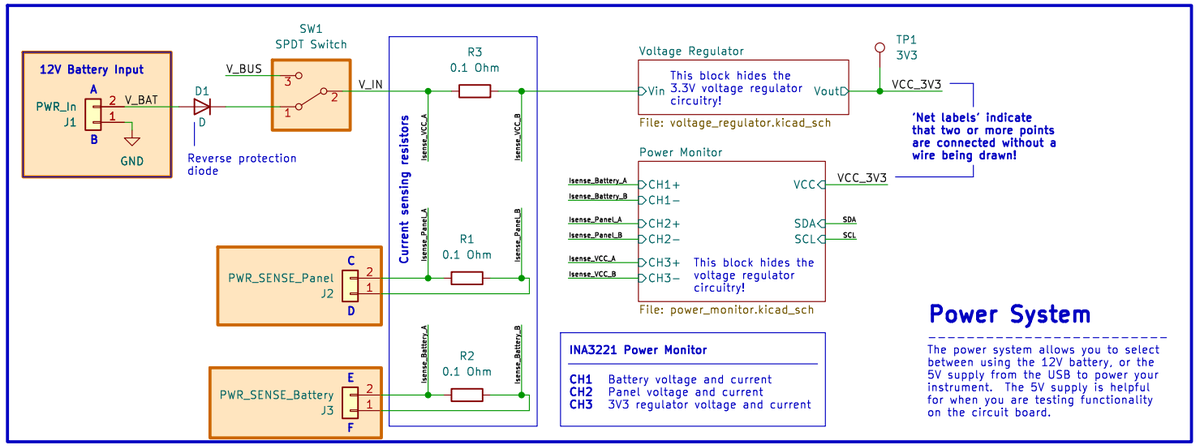


Power System

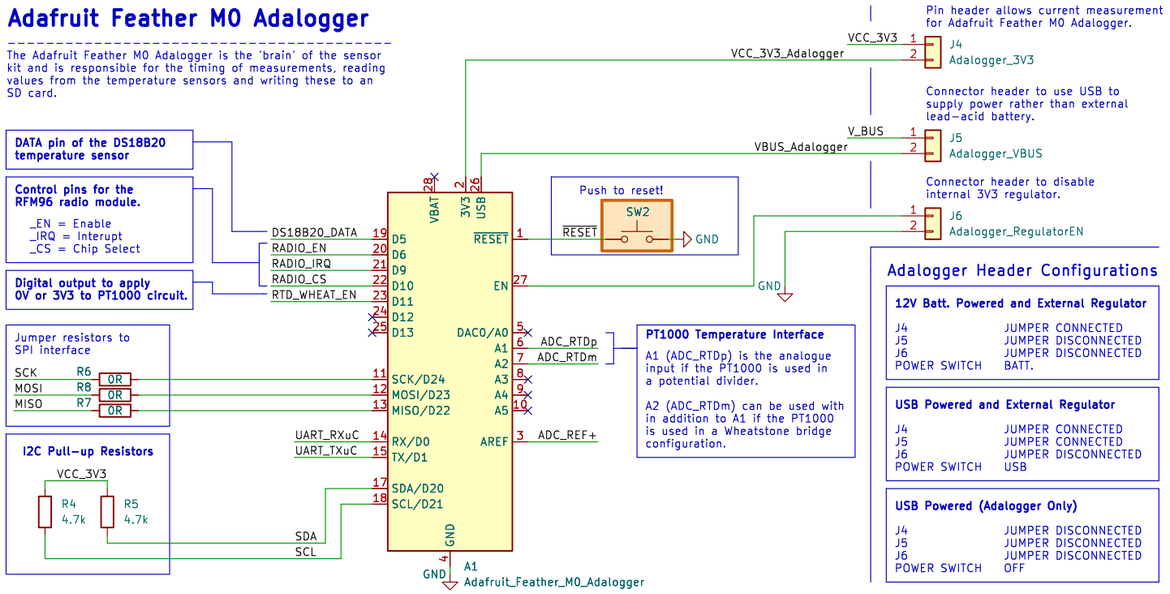
The power system allows you to select between using the 12V battery, or the 5V supply from the USB to power your instrument. The 5V supply is helpful for when you are testing functionality on the circuit board.

INA3221 Power Monitor

CH1	Battery voltage and current
CH2	Panel voltage and current
CH3	3V3 regulator voltage and current

Adafruit Feather M0 Adalogger

The Adafruit Feather M0 Adalogger is the 'brain' of the sensor kit and is responsible for the timing of measurements, reading values from the temperature sensors and writing these to an SD card.



Adalogger Header Configurations

12V Batt. Powered and External Regulator

J4	JUMPER CONNECTED
J5	JUMPER DISCONNECTED
J6	JUMPER DISCONNECTED
POWER SWITCH	BATT.

USB Powered and External Regulator

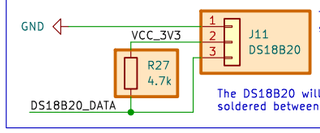
J4	JUMPER CONNECTED
J5	JUMPER CONNECTED
J6	JUMPER DISCONNECTED
POWER SWITCH	USB

USB Powered (Adalogger Only)

J4	JUMPER DISCONNECTED
J5	JUMPER DISCONNECTED
J6	JUMPER DISCONNECTED
POWER SWITCH	OFF

Sensors and Peripherals

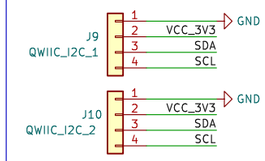
DS18B20 (Digital Temp. Sensor)



The DATA line of the DS18B20 temperature sensors is connected to Pin D5 on the Adalogger.

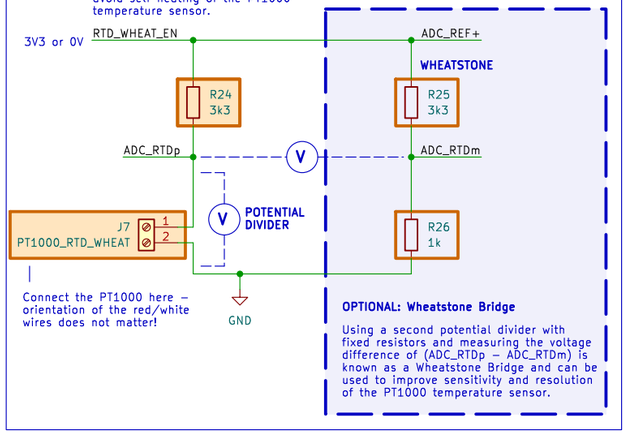
The DS18B20 will not work without R27 (4.7k) soldered between the DATA and 3V3 pins!

I2C QWIIC Connectors



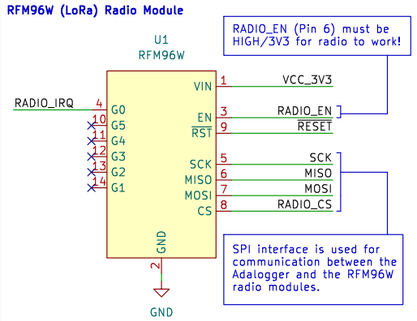
RTD (PT1000) Potential Divider / Wheatstone Bridge

RTD_WHEAT_EN is digital output (Pin 11) which applies a value of 3V3 or 0V from the Adalogger. The value(s) of R24 (and optionally R25, R26) should limit the maximum current to approximately 1mA to avoid self heating of the PT1000 temperature sensor.



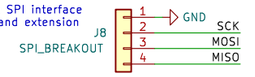
Radio and Serial Communications

RFM96W (LoRa) Radio Module



SPI Breakout

Exposes the SPI interface for testing and extension purposes.

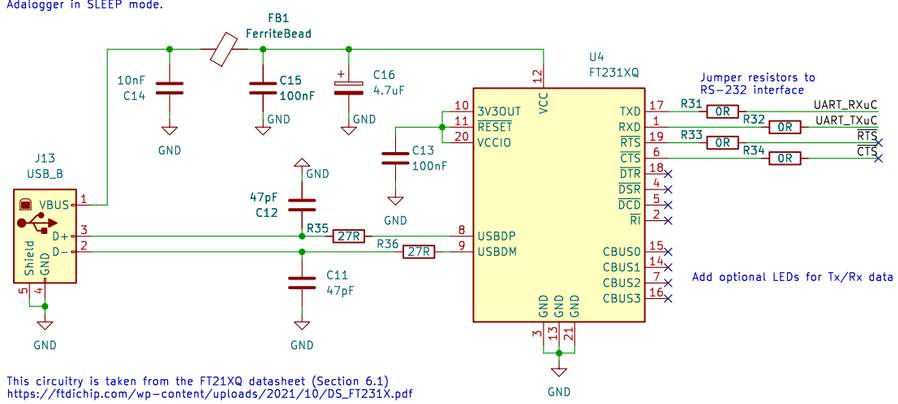


UART Breakout

Exposes the UART (USB DEBUG) interface for testing and extension purposes.

USB Debug Port

The USB DEBUG port provides an additional USB serial port for the sensor kit which can still be used when the Adalogger is not powered by its USB connection, or when you are using the Adalogger in SLEEP mode.



This circuitry is taken from the FT21XQ datasheet (Section 6.1)
https://ftdichip.com/wp−content/uploads/2021/10/DS_FT231X.pdf

PCB Soldering Help

Any components that are highlighted with an orange box and background do not comefitted to the PCB and you will need to solder these yourself. Check them off the schematic as you go to make sure you've done all of them!

Mechanical Symbols

KiCAD requires that you include mechanical features of the circuit, such as mounting holes and fiducial marks (for alignment of the PCB during manufacture) on the schematic. This is used to tell the PCB editor what sized hole or marking should be used.

FID1 Fiducial	H1 MountingHole	H3 MountingHole
FID2 Fiducial	H2 MountingHole	H4 MountingHole

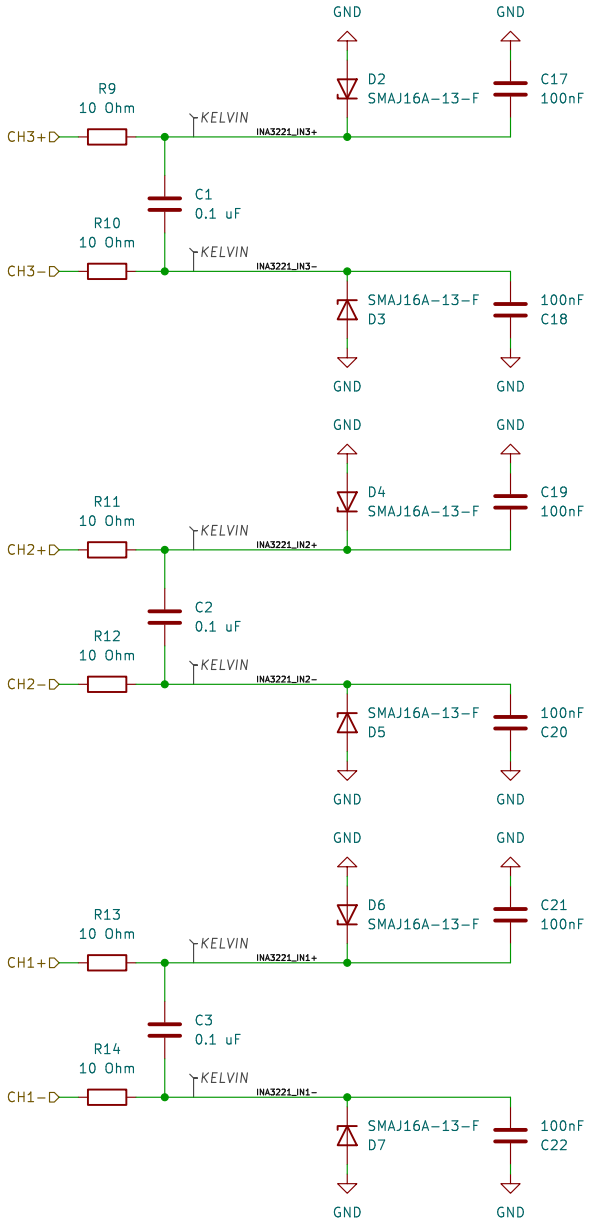
Contact: hawkinsj22@cardiff.ac.uk
Auth: J. D. Hawkins, L. Craw, M. Prior−Jones, E. Fisher
Cardiff University & CryoSkills Organising Committee

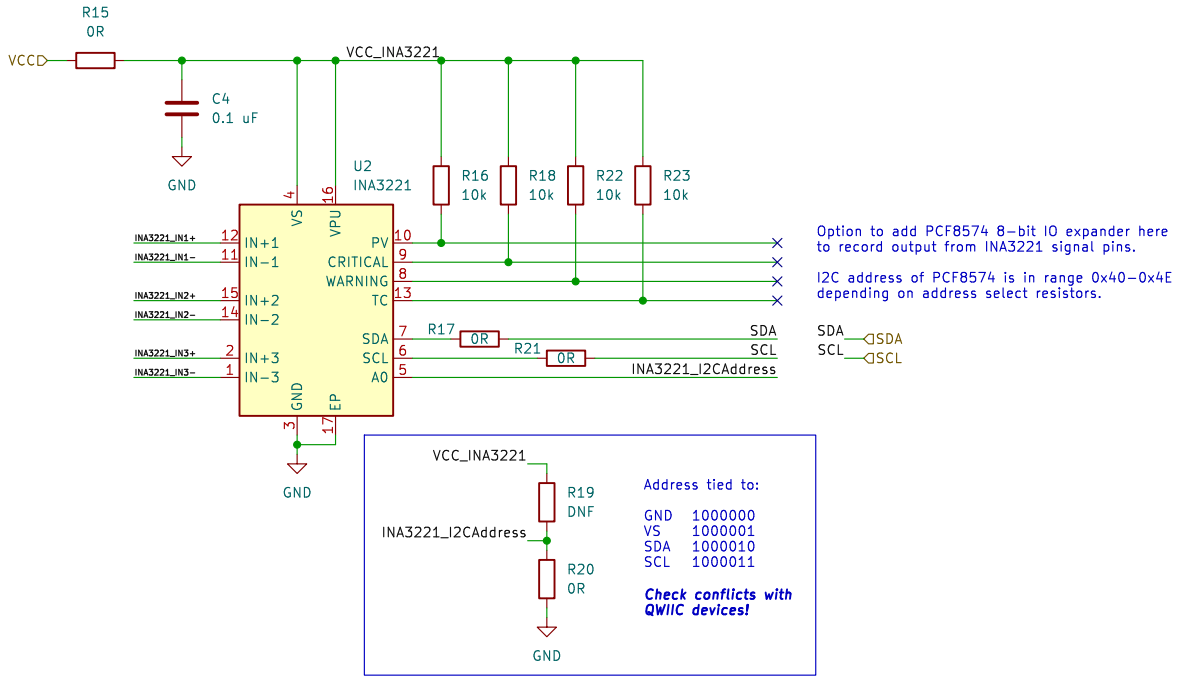
Sheet: /
File: cryoskills_sensor_kit.kicad_sch

Title: CryoSkills Sensor Kit

Size: A3	Date: 2024−03−19	**Rev: 1.1**
KiCad E.D.A. kicad 7.0.8		Id: 1/3

Zener clamp (SMBJ16D) to each INp/INm and 100n cap





Contact: hawkinsj22@cardiff.ac.uk
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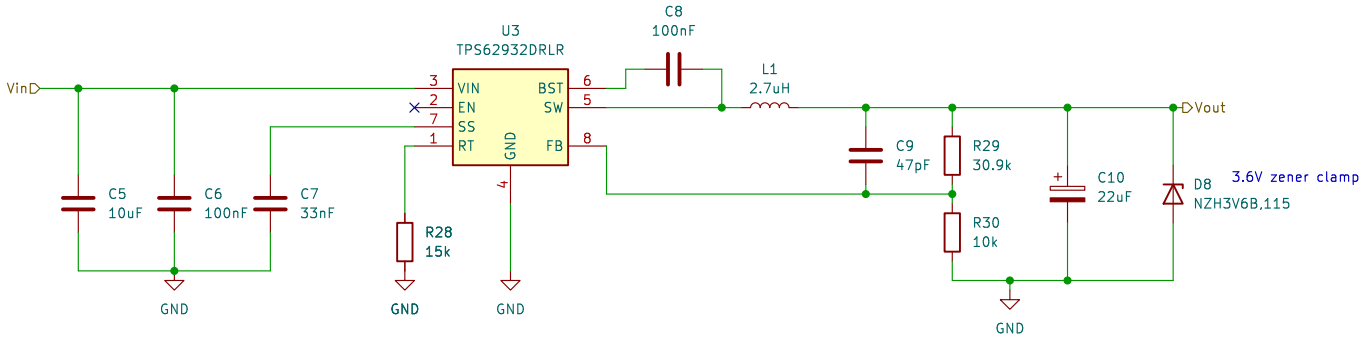
Cardiff University & CryoSkills Organising Committee

Sheet: /Power Monitor/
File: power_monitor.kicad_sch

Title: CryoSkills Sensor Kit

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.8		Id: 2/3



Contact: hawkinsj22@cardiff.ac.uk
Auth: J. D. Hawkins, L. Craw, M. Prior–Jones, E. Fisher
Cardiff University & CryoSkills Organising Committee

Sheet: /Voltage Regulator/
File: voltage_regulator.kicad_sch

Title: CryoSkills Sensor Kit

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 7.0.8		Id: 4/3