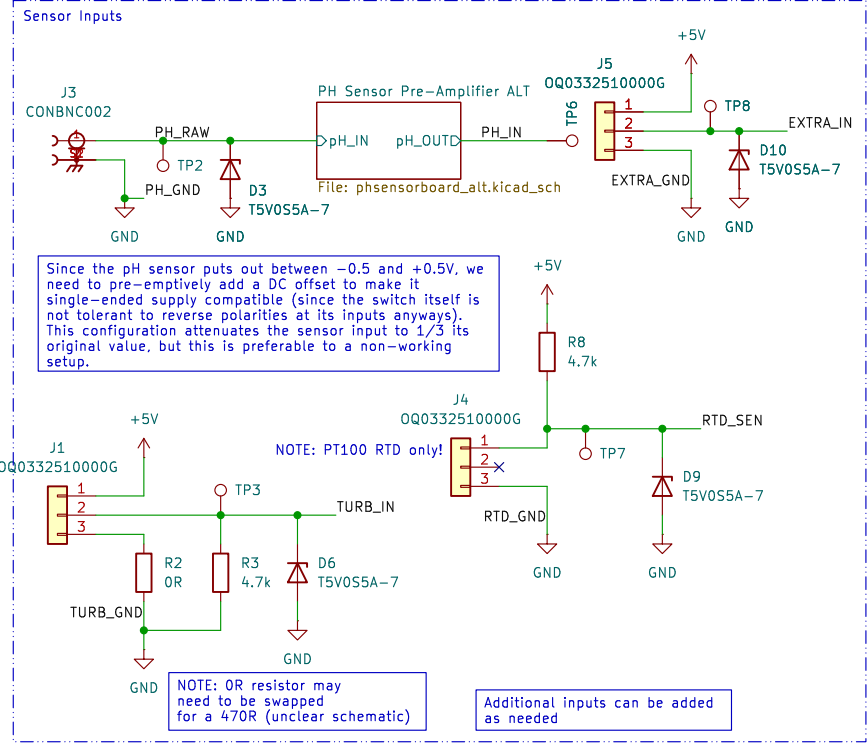
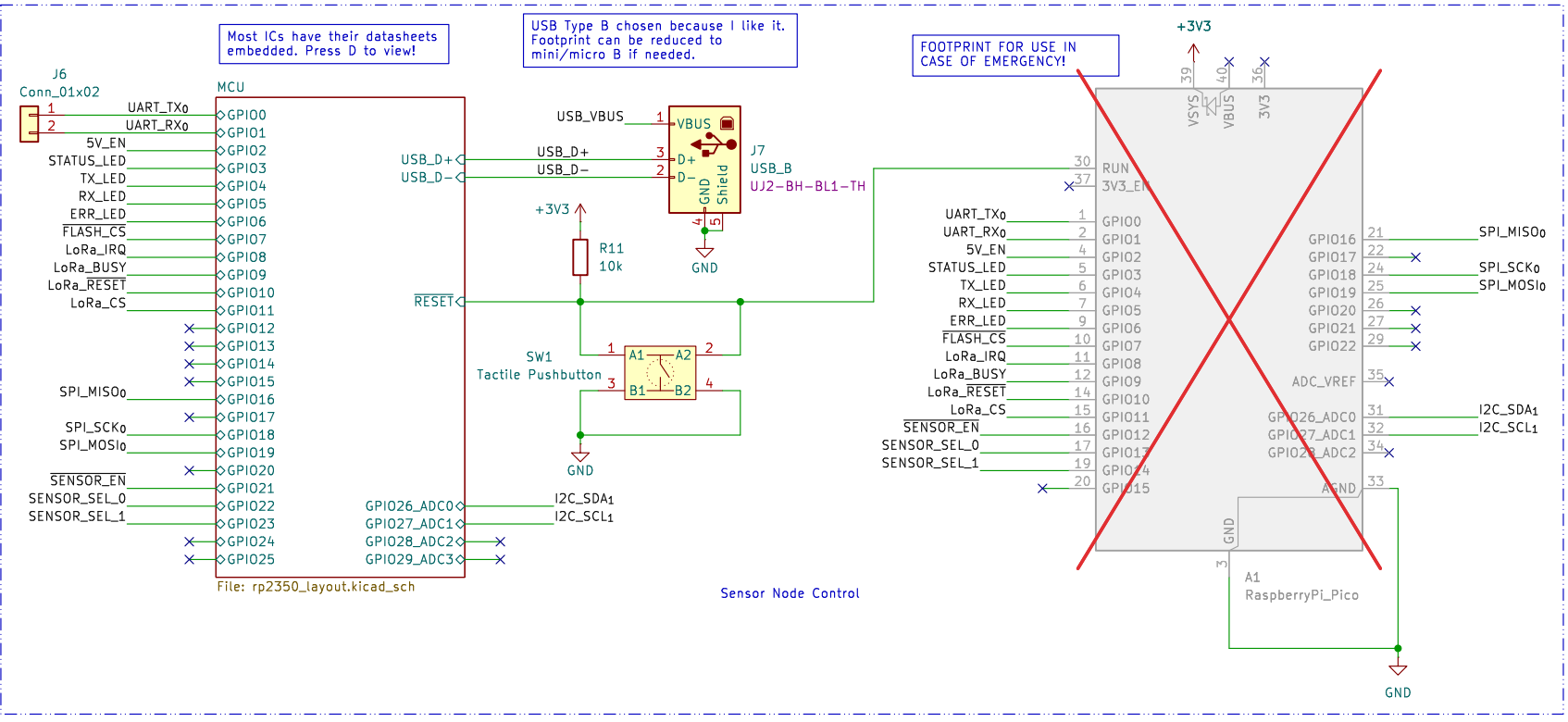
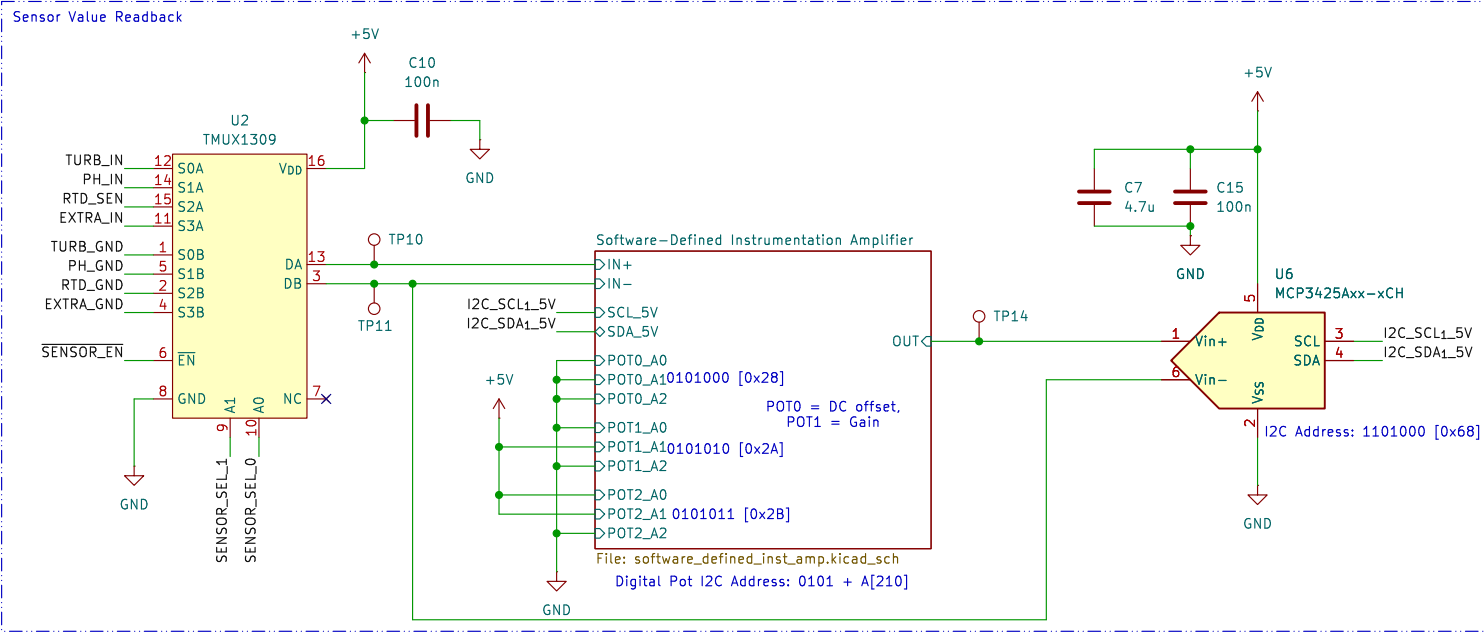
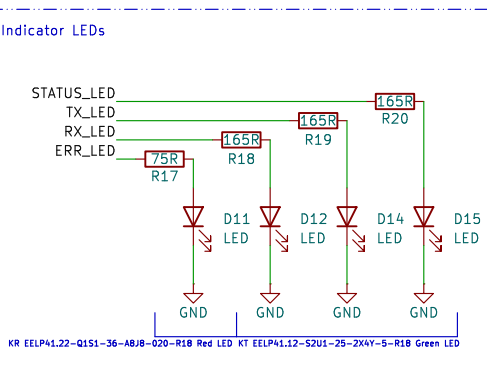
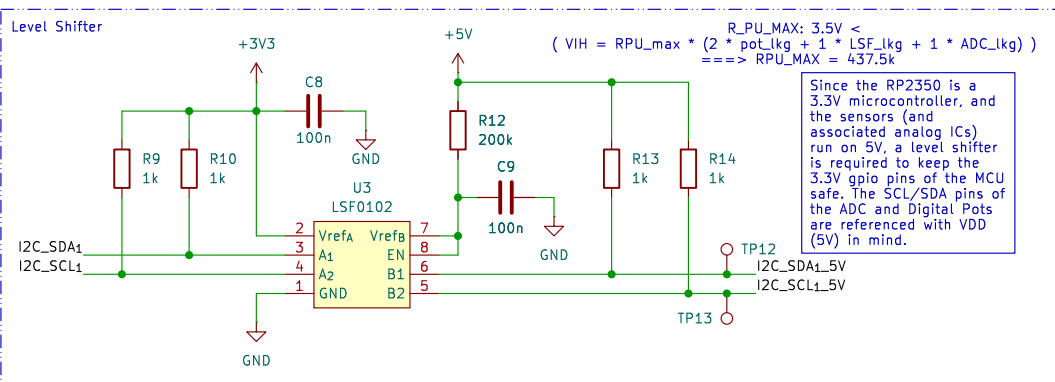


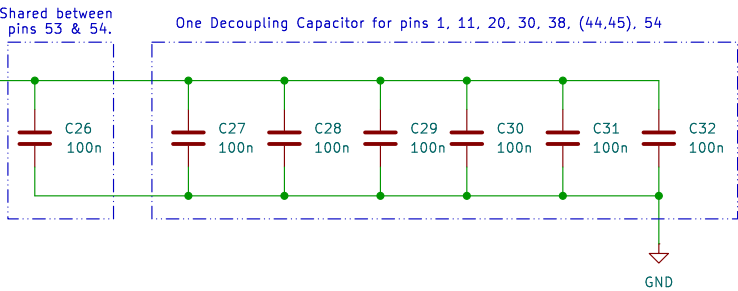
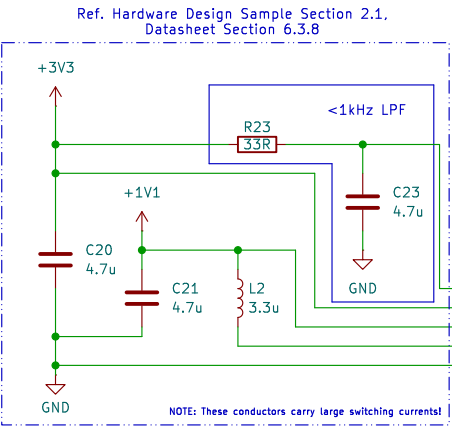
A buck-boost regulator was chosen for this design, as it allows for the D-Cell battery supply to operate anywhere along its output voltage curve (awful looking) and still provide a reliable 3.3V output.



SENSOR INPUTS/OUTPUTS ARE ALL ENABLED BY THE 5V_EN PIN OF THE REGULATOR!! - NO NEED FOR REDUNDANT IC TO SAVE POWER FOR A COUPLE OF SECONDS WHILE THE SENSORS ARE TURNED ON.



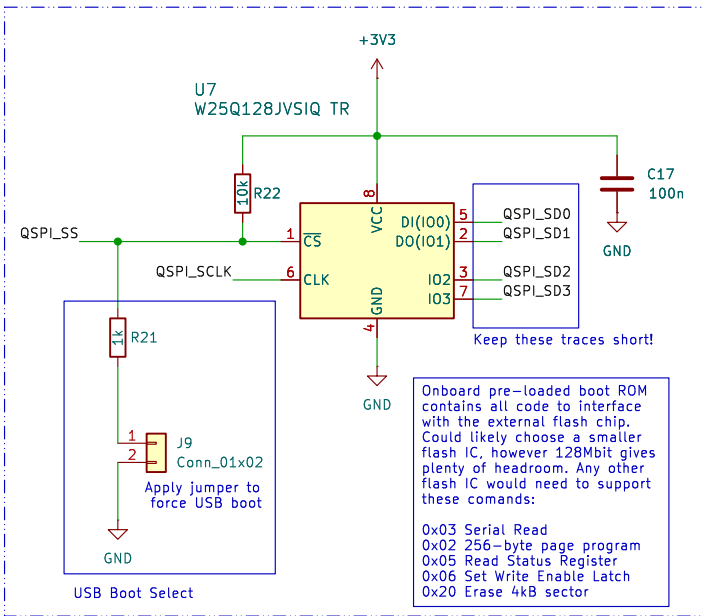
Power Supply Pin Descriptions:
VREG_VIN: 3.3V input for the onboard switching regulator
VREG_LX: External Inductor Connection for 1.1V output
VREG_FB: Switching Regulator Feedback. Monitors 1.1V output
VREG_PGND: Dedicated Power Ground Connection – must be designed to handle large switching currents.
VREG_AVDD: Analog circuitry VDD for switching regulator. Noise sensitive.
The inductor MUST be AOTA-B201610S3R3-101-T. This is because of issues with inductor winding direction.



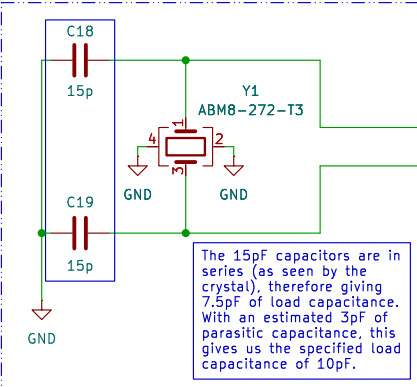
USB – Ref. 5.1 Design Reference Guide

Keep characteristic impedance of this differential pair to 90 Ohms. Requires ground plane directly beneath these lines.

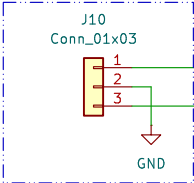
Program Flash – Ref. Section 3.1 of reference design guide



12 MHz XTAL
Ref. Section 4 of design guide



JST Debug Connector



Raspberry Pi
RP2350A QFN-60

GPIO – Ref. 5.2 Design Reference Guide

RP2350 Layout

Sheet: /MCU/
File: rp2350_layout.kicad_sch

Title: LoRa Water Quality Management System Sensor Node

Size: A3

Date:

Rev:

KiCad E.D.A. 9.0.4

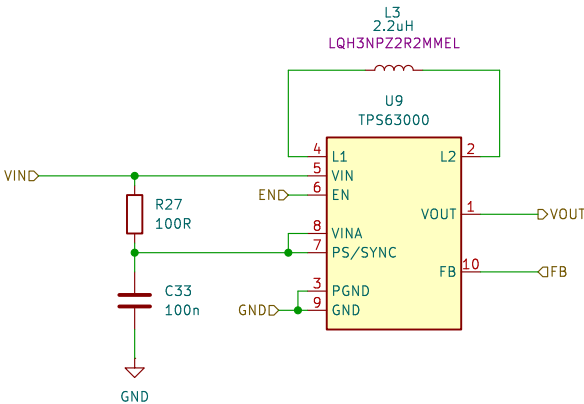
Id: 2/6

Maximum Current Throughput:

RP2350: ~100mA max
sx1262: 118mA max in +22dBm TX Mode
+200mA headroom

Let's call it 500mA expected worst case input current. Most of the time we will be in sleep mode and never come close to this.

Energizer considers the useable life of their D-Cell batteries to be up to 0.8V, meaning a minimum expected input voltage of 2.4V is reasonable. To add some factor of safety, I'll do the calculations with 2V input:



Power Supply

Sheet: /Buck-Boost Regulator Layout/
File: lwqms_power_supply.kicad_sch

Title: LoRa Water Quality Management System Sensor Node

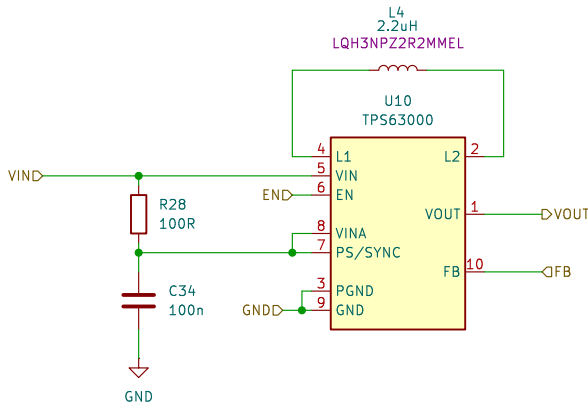
Size: A4	Date:	Rev:
KiCad E.D.A. 9.0.4		Id: 3/6

Maximum Current Throughput:

RP2350: ~100mA max
sx1262: 118mA max in +22dBm TX Mode
+200mA headroom

Let's call it 500mA expected worst case input current. Most of the time we will be in sleep mode and never come close to this.

Energizer considers the useable life of their D-Cell batteries to be up to 0.8V, meaning a minimum expected input voltage of 2.4V is reasonable. To add some factor of safety, I'll do the calculations with 2V input:

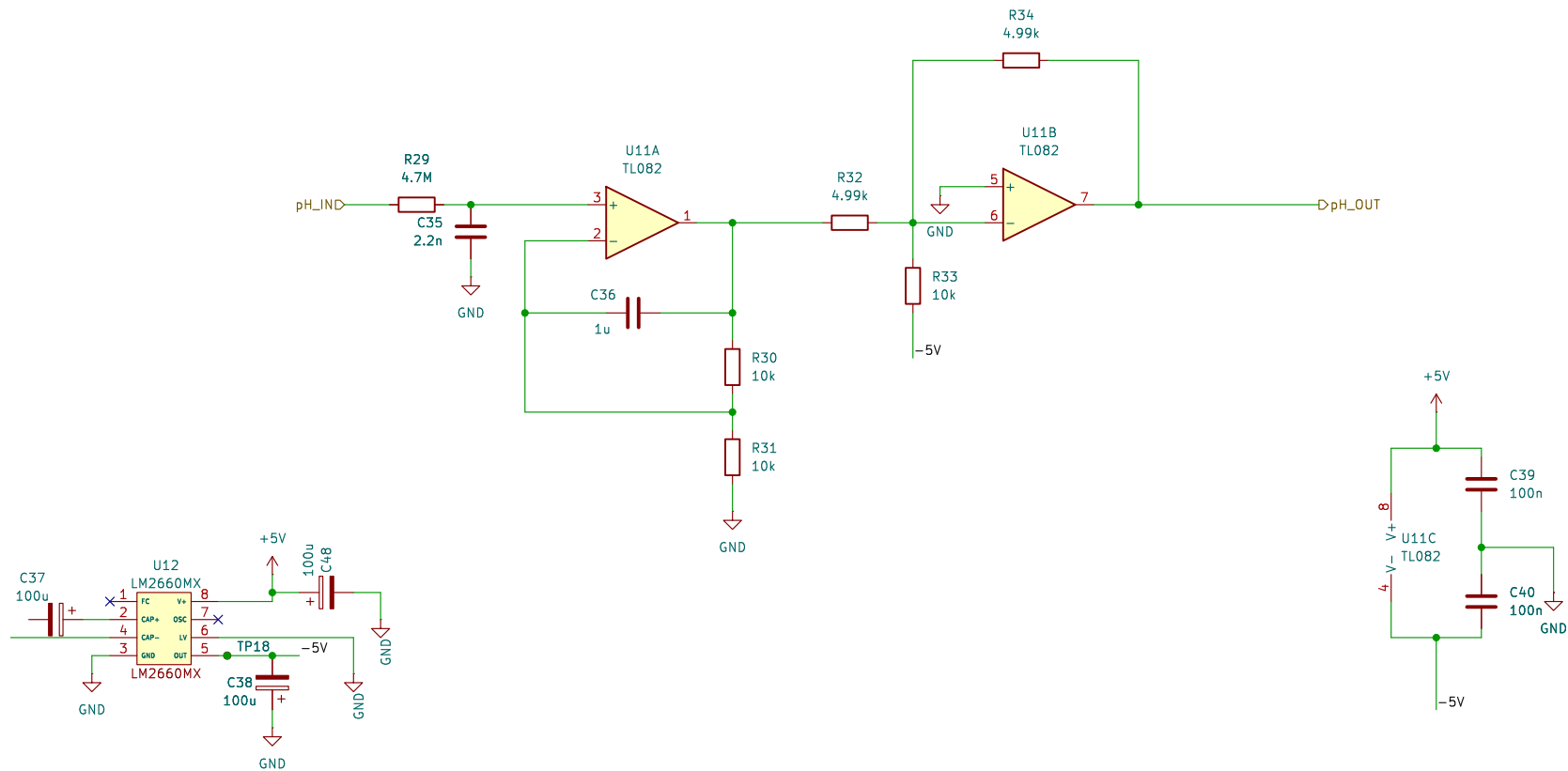


Power Supply

Sheet: /Buck-Boost Regulator Layout1/
File: lwqms_power_supply.kicad_sch

Title: LoRa Water Quality Management System Sensor Node

Size: A4	Date:	Rev:
KiCad E.D.A. 9.0.4		Id: 4/6



pH Sensor Pre-Amplifier

Sheet: /PH Sensor Pre-Amplifier ALT/
File: phsensorboard_alt.kicad_sch

Title: LoRa Water Quality Management System Sensor Node

Size: A4

Date:

Rev:

KiCad E.D.A. 9.0.4

Id: 5/6

