I’ve been reviewing the schematic. These are my comments about the circuit:

1. The battery charger IC is powered by +5V, +5V is regulated from Ve, and Ve is supplied by VBat. How are you planning the charge of the battery? Take into account that once that an external voltage is connected to Ve (J4) BATT\_GND is disconnected from GND, which prevent the charge of the battery. Maybe, I’m missing something.

Dennis, redid this circuit. He put in over voltage and temp safety chips as well as a charging chip. He also opted to put in dual cell batteries to boost voltage without a step-up switching regulator in order to reduce noise. Now this circuit does not change when the DC power is plugged in or not. The battery itself powers everything whether it is plugged in or not. Thew current consumption of the system is low so this will not throw off the charging IC.

There is no way the LDO regulator can supply the 500 mA current to the battery charger IC. The charger IC should be connected to a regulator that can provide more current or to Ve (if Ve is limited to the voltage of U1).

Good point. We adjusted the DC power supply voltages down to what the charging IC can handle and now it directly powers the charging IC for the battery.

1. Make sure that the LDO regulator (U10) does not have to dissipate too much power.

Now the battery directly feeds the Arduino IOT 33. This leaves the LDO to make the voltage more exact and cleaner for the rest of the device reference voltages and just a few mA per IC which will make it fall well under its 200mA max.

1. Add 0R resistance between subcircuits so you can easily isolate subcircuits for testing.

Done

1. Is U9 necessary? I haven’t check it, but the Arduino I2C pins might work with pullup resistors to 5V.

Normally you are correct. This is the Arduino IOT 33 which swapped to 3.3V logic and has no built-in protection for 5V. This limits the ADC range so we opted to increase voltages to utilize that range better.

1. Start with lower value capacitors in C7, C8, C11, C12, C18, C19 (e.g., 1 nF). You can increase them if needed.

Understood and implemented.

1. Increase R13 and R14 to something around 1000 Ohm as a current limit protection.

Implemented

1. VSS of U18-21 should be connected to -5V for allowing current in both directions. In addition, Ron of those IC is around 150; you can easily find other IC with lower Ron.

We chose this one due to its low cost, feeling that it would be sufficient and was in stock for JLPCB pick and place. It meets the 100uA current limit and voltage requirements.. As for the high resistance, I made a diagram showing why I thought it was good. I know lower is very possible, but they are much more expensive too.

