

Restep Power System

Bug Report

This document captures all of the known hardware and software problems and areas for improvement, as well as proposed methods to correct those problems.

Hardware

- Problem:** The absolute maximum voltage on any microcontroller pin is $V_{cc} + 0.5V$. Pins 22, 26, 27, 40 & 41 could potentially have voltages applied to them before the microcontroller is powered.
Solution: Installed BAT54C diodes from microcontroller input pins to 5V. This keeps the pin voltages to $< V_{cc} + 0.5V$ at all times. When the 5V comes up, the diodes will be reverse biased, and only the 7uA leakage current will influence the voltage readings.
- Problem:** The 48V boost converter FET failed repeatedly during testing at full load and low line. Suspect the conditions caused the FET to operate outside it's safe operating area (SOA).
Solution: Replaced the SQJA92EP-T1_GE3 FET with SUM70060E. NOTE: this is not a drop-in replacement and the pad must be changed in the next PCB layout revision. Another aspect to consider is the reverse recovery of the diode. The SMT5H100P5-7 datasheet provides no reverse recovery information, and a diode with better reverse recovery may reduce power loss in the FET.
- Problem:** ICSP header pinout does not match the standard.
Solution: Change the ICSP header pinout to match the standard in the next PCB layout revision. This will simplify burning the bootloader in the microcontroller.
- Problem:** The INA230 is not recommended for new designs.
Solution: Replace the INA230 with the INA233, which supports the same PMBus messaging and packet error checking (PEC). NOTE: this is not a drop-in replacement and the pad must be changed in the next PCB layout revision.

Software

- Problem:** The function UpdateLastIndex (line 519) repeatedly overwrites locations 0 and 1 in the serial EEPROM and will wear level those memory locations relatively quickly.
Solution: Re-write the function to move the index locations around the EEPROM so that there is less chance of wear leveling.

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