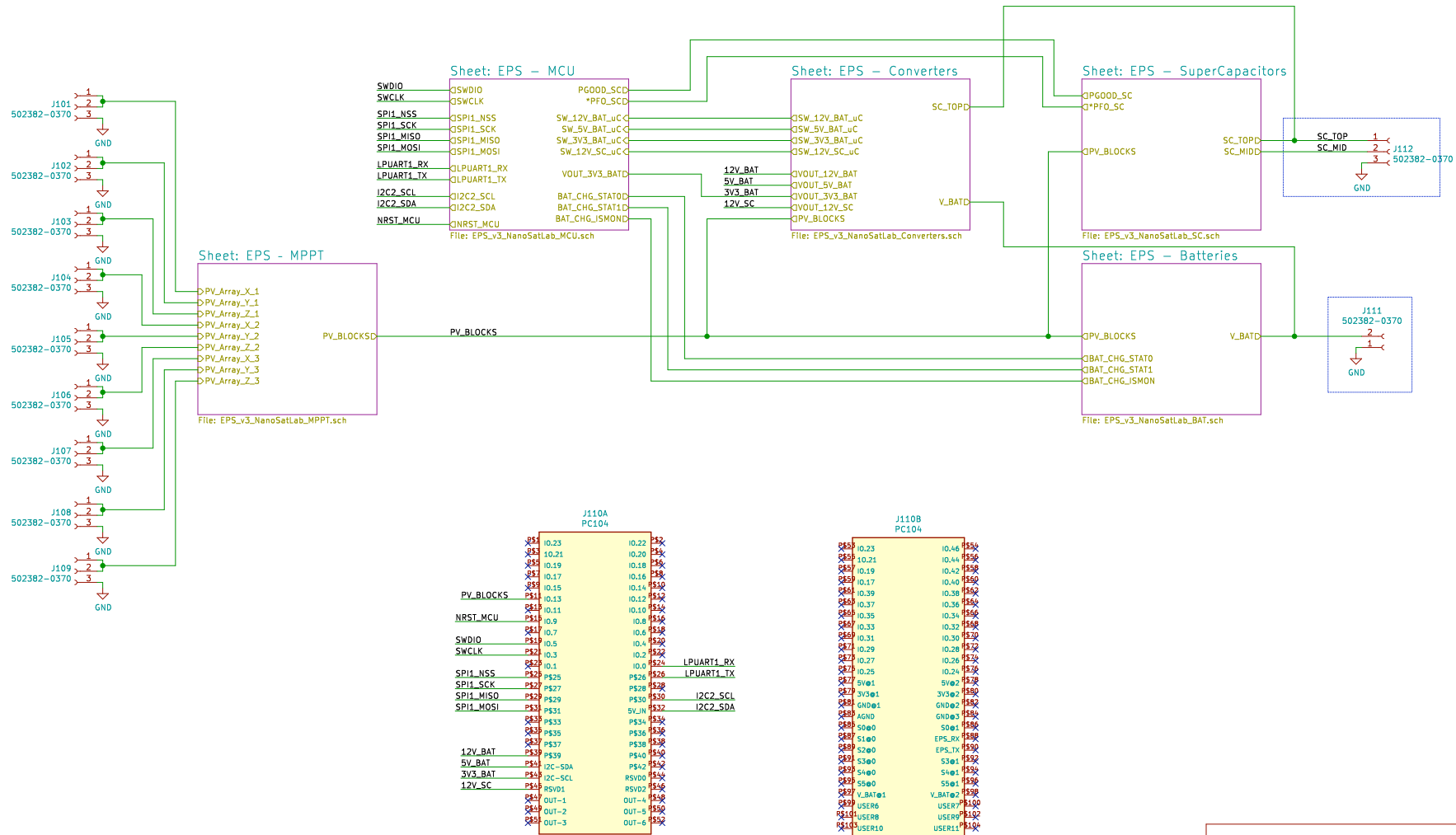


Electrical Power System (EPS) SuperCapacitors v3.0



The diagram illustrates the electrical connections for two STM32L412C8T6 microcontrollers (U201A and U201B) in a NanoSat Lab EPS system.

Microcontroller (µC) Details:

- U201A (STM32L412C8T6):**
 - Power:** VDD (Pin 48) connected to V3V3_BAT; VSS (Pin 47) connected to GND; VBAT (Pin 1) connected to GND.
 - Configuration:** PC13, PC14-OSC32_IN, PC15-OSC32_OUT, PH0-OSC_IN, PH1-OSC_OUT, PH3-BOOT0, and NRST (Pin 7) are configured.
 - SWD Interface:** SWDIO (Pin 34) and SWCLK (Pin 37) are connected to the J201 Serial Wire Debugger.
 - Other Connections:** PA0-PA15, PB0-PB15, and various status LEDs (SW_12V_BAT, SW_5V_BAT, SW_3V3_BAT, SW_12V_SC, PG00D_SCD, *PFD_SCD, BAT_CHG_ISMOND, BAT_CHG_STATOD, BAT_CHG_STATID, WDI) are connected to pins 10-38.
- U201B (STM32L412C8T6):**
 - Power:** VDD (Pin 48) connected to V3V3_BAT; VSS (Pin 47) connected to GND; VBAT (Pin 1) connected to GND.
 - Configuration:** VSSA/VREF-, VSSA/VREF+, VDDA/VREF+, VDDA/VREF+, and VDDUSB (Pin 36) are configured.
 - Other Connections:** VSS (Pin 35), VSS (Pin 47), GND (Pin 8), GND (Pin 23), and VBAT (Pin 1) are connected to pins 35-47.

Serial Wire Debugger (SWD): A J201 connector with pins 1 (VDD), 2 (SWDIO), 3 (SWCLK), and 4 (GND).

Voltage Supervisor (Watchdog): U202 (MCP1320T-29LE-OT) with pins 1 (*RST), 4 (WDI), 3 (*MR), 5 (VDD), and 2 (VSS) connected to the microcontroller's NRST and WDI pins.

Legend:

- Blue: VDD
- Green: GND
- Red: V3V3_BAT
- Yellow: VBAT
- Orange: VSSA/VREF-
- Light Blue: VSSA/VREF+
- Light Green: VDDA/VREF+
- Light Yellow: VDDA/VREF-
- Light Purple: VDDUSB

Metadata:

- Introduction to Research (IR)
- Mohamed Benomar
- NanoSat Lab
- Sheet: /EPS - MCU/
- File: EPS_v3_NanoSatLab_MCU.sch
- Title: Microcontroller - NanoSat Lab EPS**
- Size: A4 | Date: | Rev: v3.0
- KiCad E.D.A. kicad (5.1.10-1-10_14) | Id: 2/6

Diagram showing the pin connections for the J201 SWD interface. The connections are as follows:

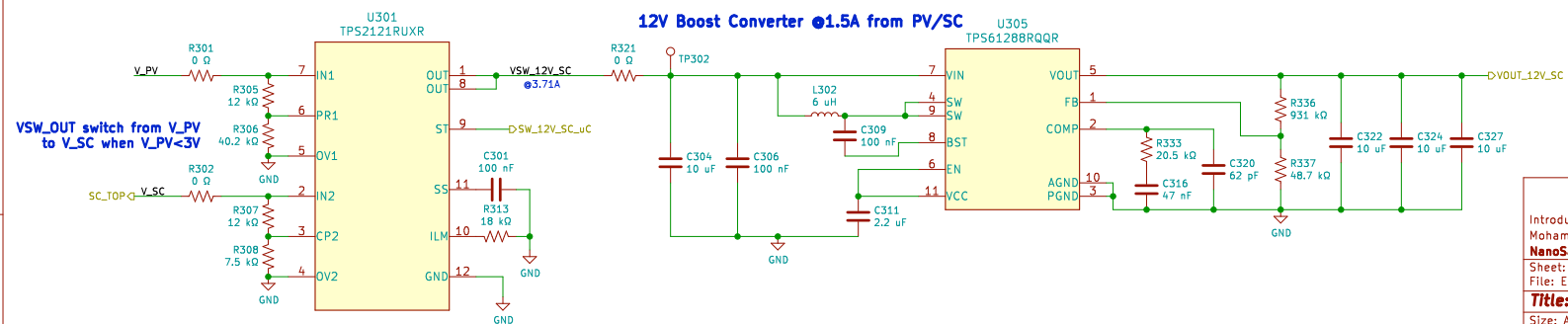
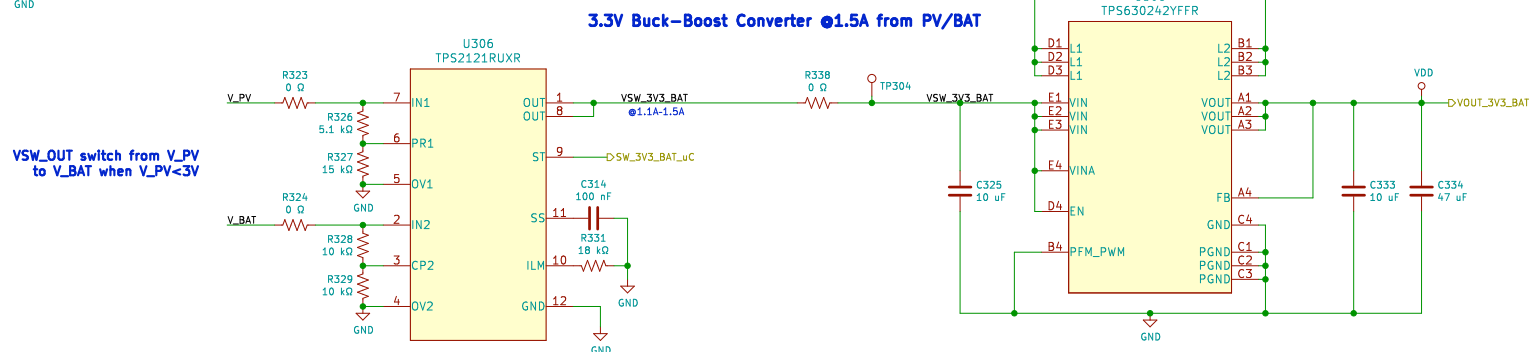
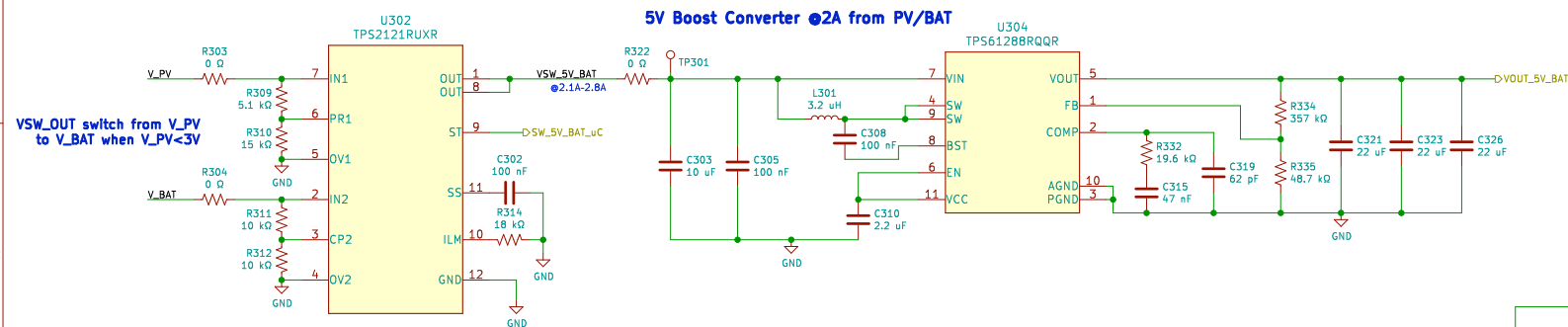
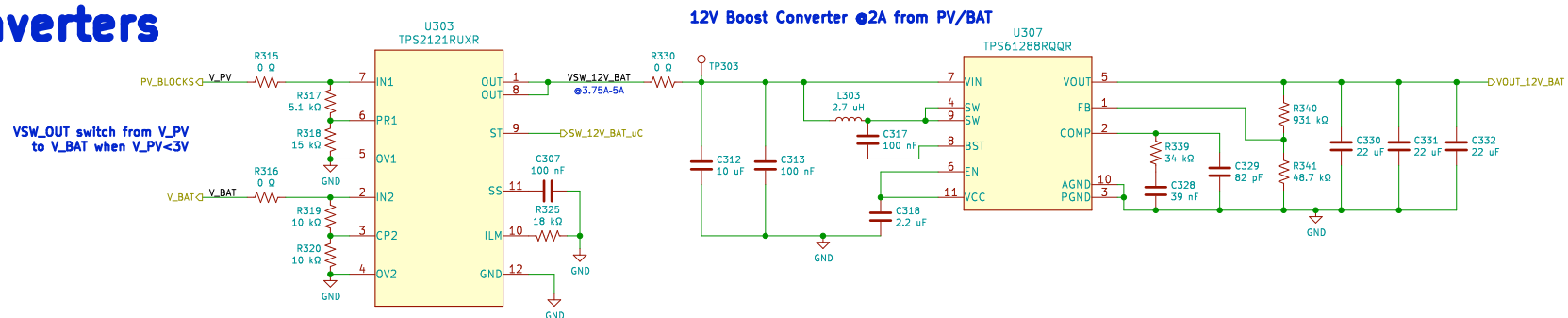
- VDD is connected to Pin 1.
- GND is connected to Pin 2.
- SWDIO is connected to Pin 3.
- SWCLK is connected to Pin 4.

The diagram shows the MCP1320T-29LE-OT (U202) with the following connections:

- VDD** (Pin 5) connected to the positive supply rail.
- VSS** (Pin 2) connected to **GND**.
- *RST** (Pin 1) connected to **VDD** through a resistor **R226** (0 Ω).
- WDI** (Pin 4) connected to **VDD** through a resistor **R227** (10 k Ω).
- *MR** (Pin 3) connected to **VDD** through a resistor **R227** (10 k Ω).
- A capacitor **C201** (100 nF) is connected between **VDD** and **GND**.

Id: 2/6

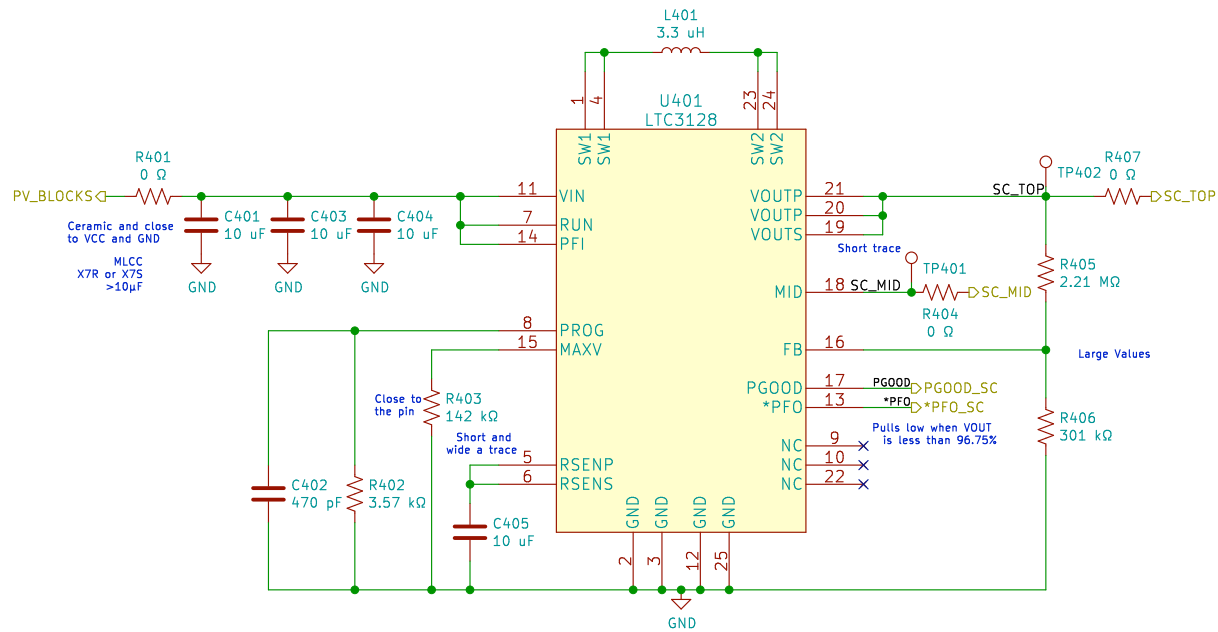
Power Converters



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Mohamed Benomar
NanoSat Lab
Sheet: /EPS – Converters/
File: EPS_v3_NanoSatLab_Converters.sch
Title: Power Converters
Size: A3 Date:
KiCad E.D.A. kicad (5.1.10–1–10.14)

Rev: v3.0
Id: 3/6

SuperCapacitor Charger



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Sheet: /EPS - SuperCapacitors/
File: EPS_v3_NanoSatLab_SC.sch

Title: SuperCapacitors Charger

Size: A4

Date:

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Rev: v3.0

Id: 4/6

Battery Charger

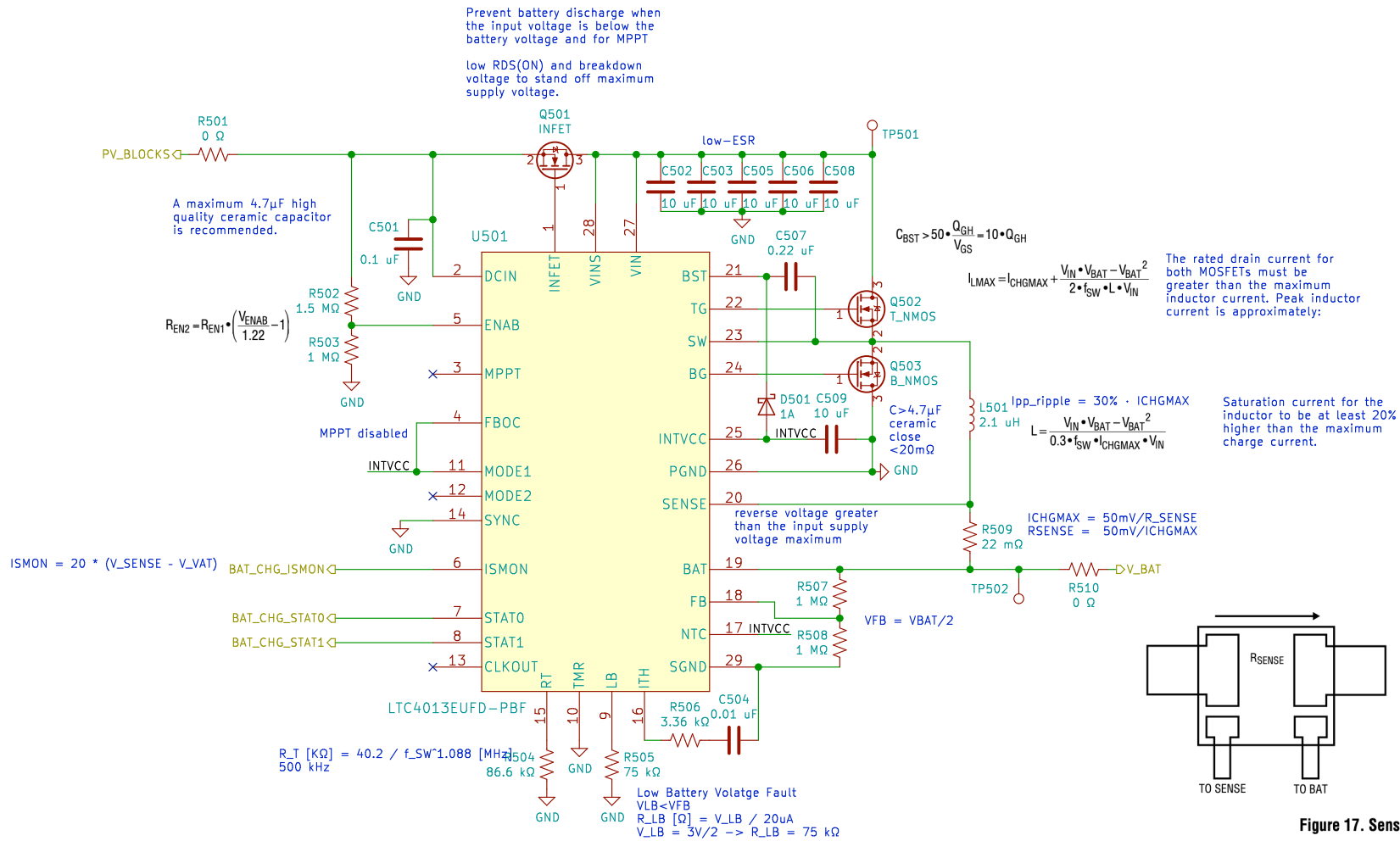


Figure 17. Sense Resistor PCB Layout

Introduction to Research (IR)

Mohamed Benomar

NanoSat Lab

Sheet: /EPS - Batteries/

File: EPS_v3_NanoSatLab_BAT.sch

Title: Battery Charger

Size: A4

Date:

KiCad E.D.A. kicad (5.1.10-1-10_14)

Rev: v3.0

Id: 5/6

MPPT Converters and PV Cells

