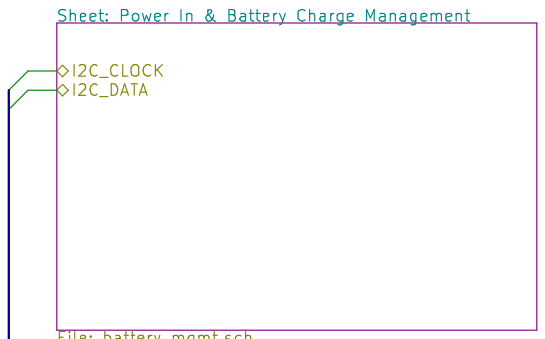

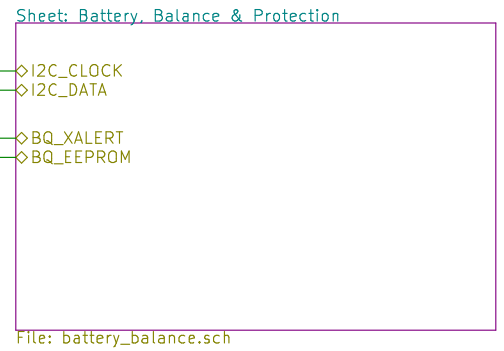

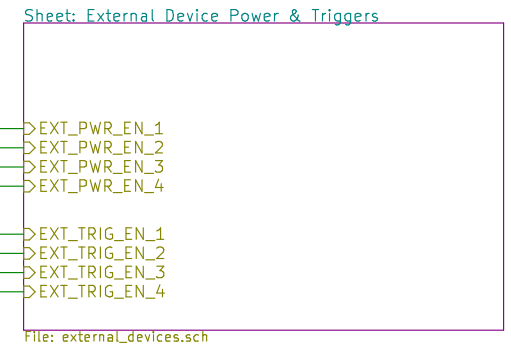

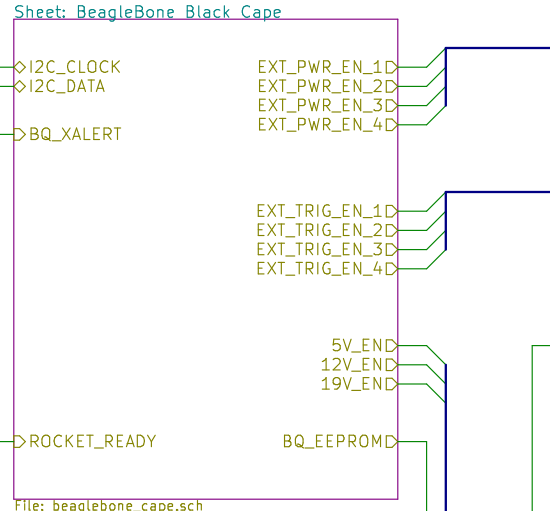

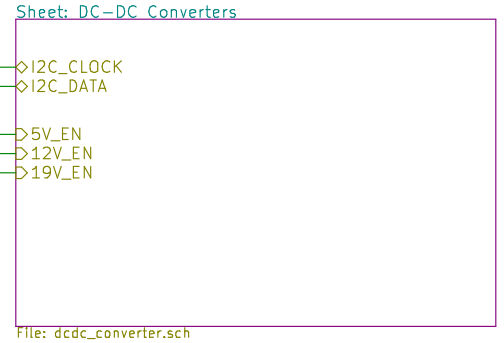

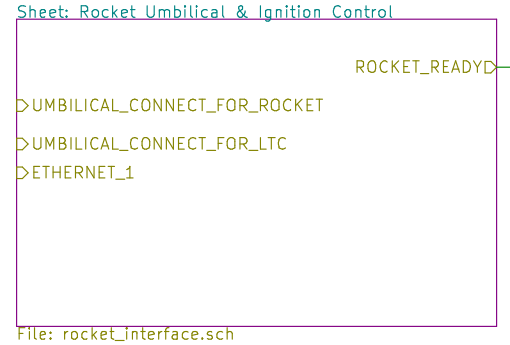

TODO:
* Finish wiring up sub-sheets.
  * Bus entries need labels on both sides!

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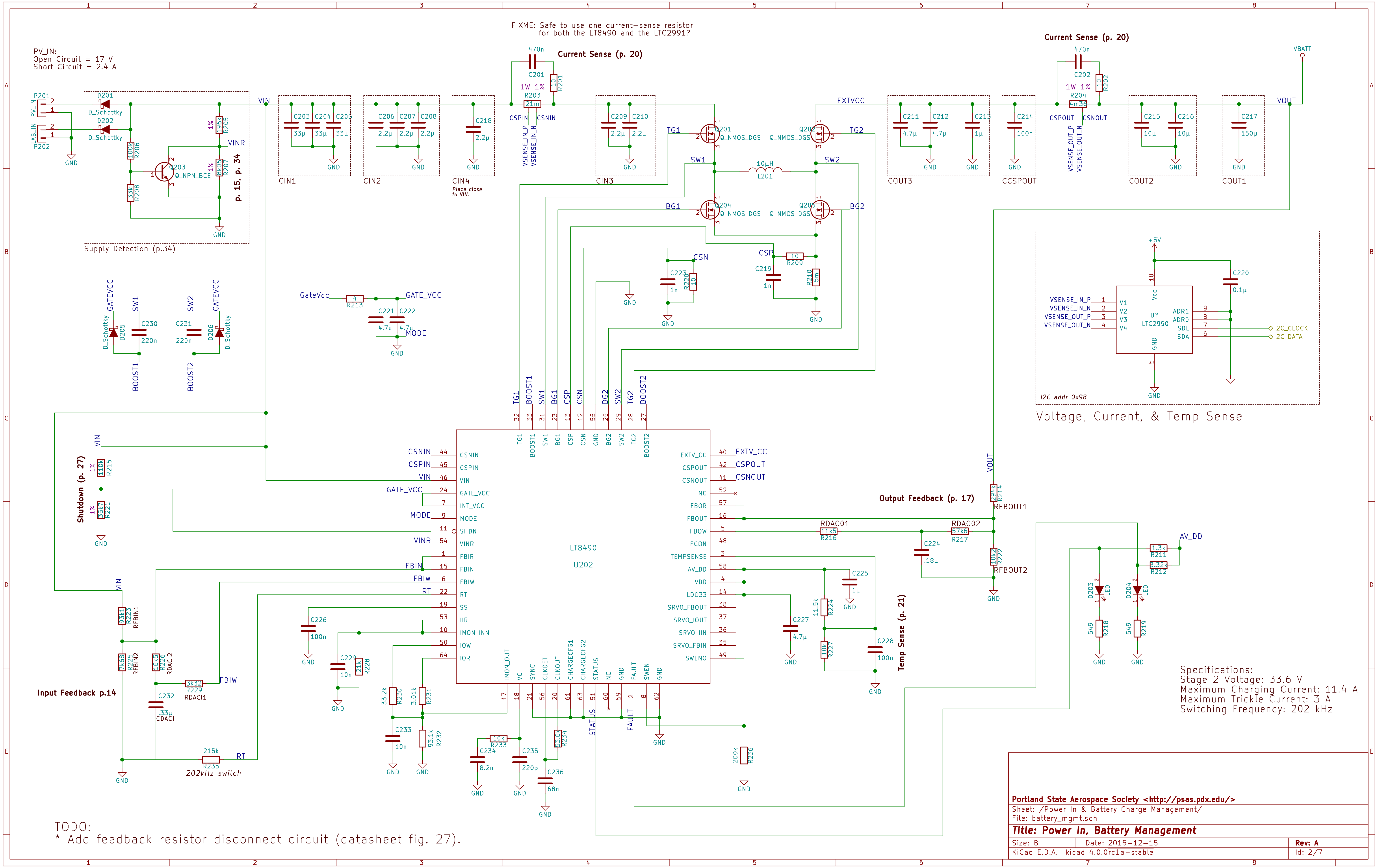
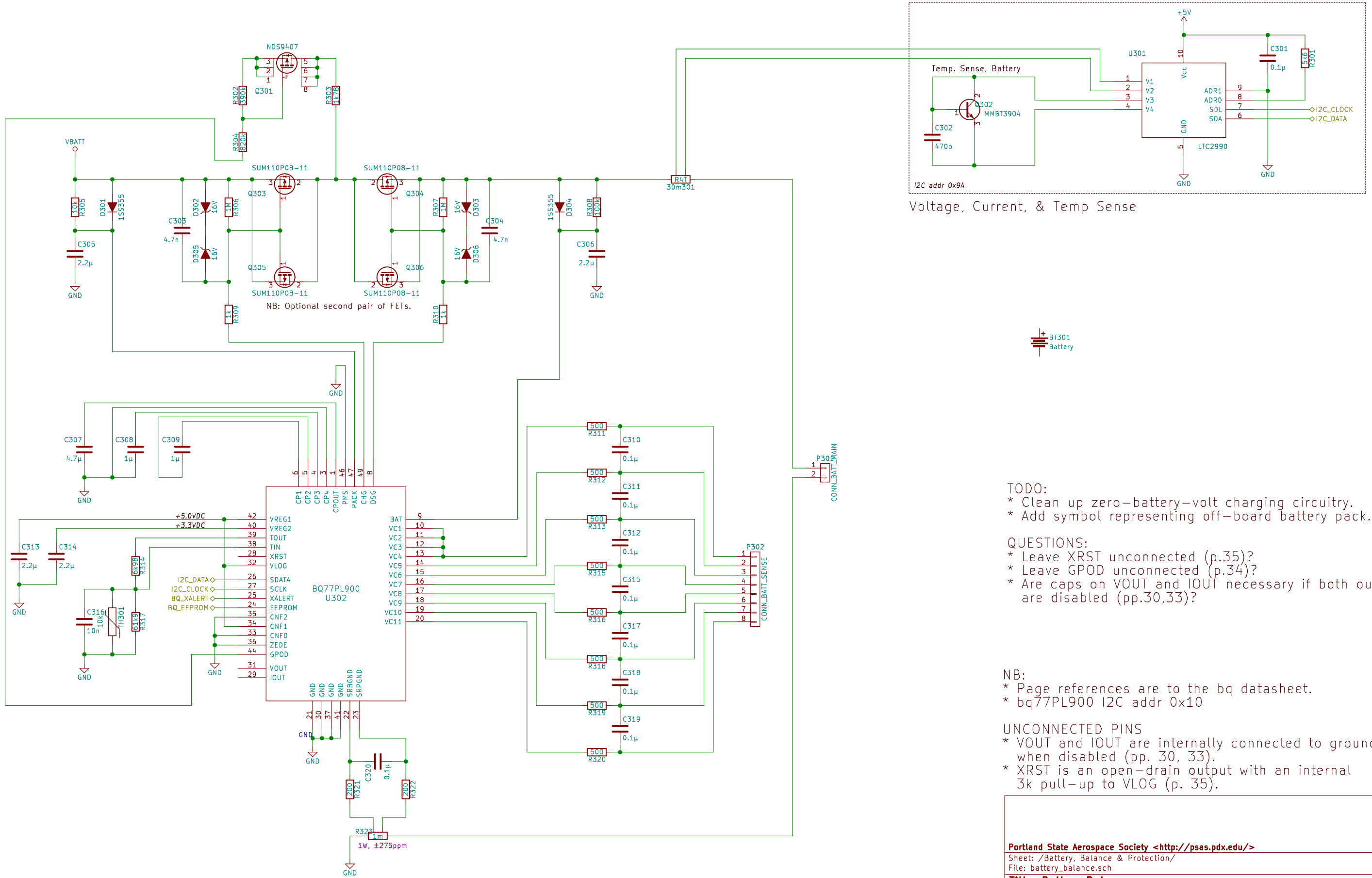
Sheet: /
File: Launch_Tower_Computer_III.sch

Title: Launch Tower Computer 3 (LTC3)

Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 1/7


PV_IN:
Open Circuit = 17 V
Short Circuit = 2.4 A
FIXME: Safe to use one current-sense resistor
for both the LT8490 and the LTC2991?
Current Sense (p. 20)
Current Sense (p. 20)
Supply Detection (p.34)
p. 15, p. 34
Place close to VIN.
Voltage, Current, & Temp Sense
I2C addr 0x98
LTC2990
LT8490
U202
Shutdown (p. 27)
Output Feedback (p. 17)
Temp Sense (p. 21)
Input Feedback p.14
202kHz switch
Specifications:
Stage 2 Voltage: 33.6 V
Maximum Charging Current: 11.4 A
Maximum Trickle Current: 3 A
Switching Frequency: 202 kHz
TODO:
* Add feedback resistor disconnect circuit (datasheet fig. 27).
Portland State Aerospace Society <http://psas.pdx.edu/>
Sheet: /Power In & Battery Charge Management/
File: battery_mgmt.sch
Title: Power In, Battery Management
Size: B
Date: 2015-12-15
Rev: A
KiCad E.D.A. kicad 4.0.0rc1a-stable
Id: 2/7



TODO:
* Clean up zero-battery-volt charging circuitry.
* Add symbol representing off-board battery pack.

QUESTIONS:
* Leave XRST unconnected (p.35)?
* Leave GPOD unconnected (p.34)?
* Are caps on VOUT and IOUT necessary if both outputs are disabled (pp.30,33)?

NB:
* Page references are to the bq datasheet.
* bq77PL900 I2C addr 0x10

UNCONNECTED PINS
* VOUT and IOUT are internally connected to ground when disabled (pp. 30, 33).
* XRST is an open-drain output with an internal 3k pull-up to VLOG (p. 35).

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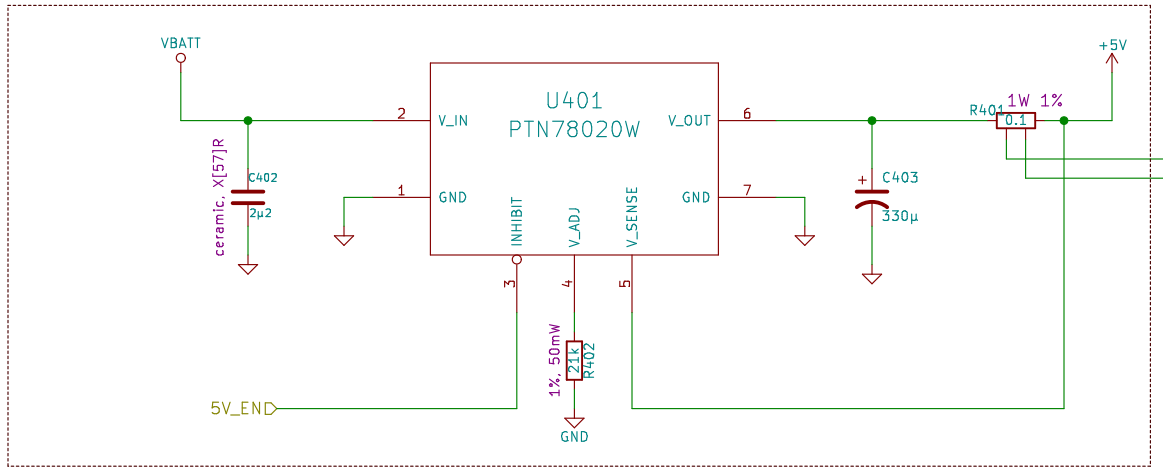
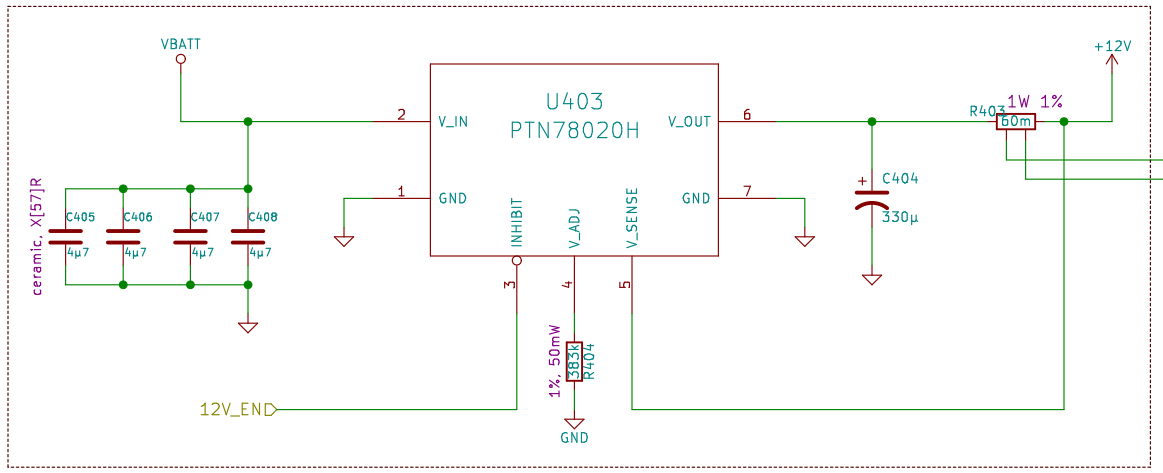
Sheet: /Battery, Balance & Protection/
File: battery_balance.sch

Title: Battery Balance

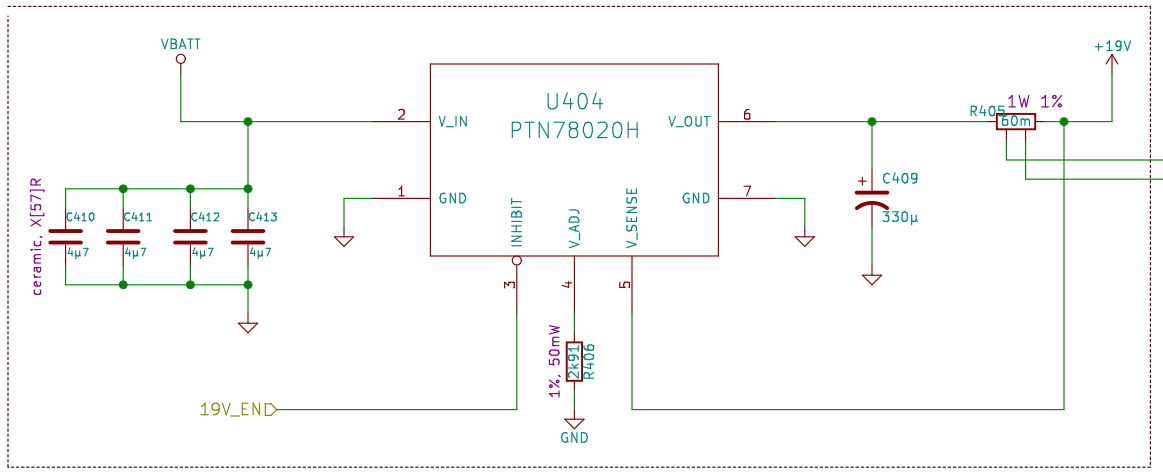
Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 3/7



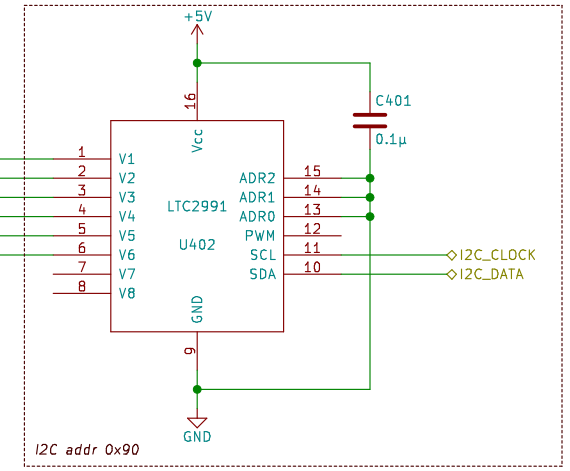
+5V DC Rail



+12V DC Rail



+19V DC Rail



Voltage, Current, & Temp Sense

Current Sense Resistors
full-scale voltage = 0.300 V
R_sense_max = 0.300/Imax
1 A = 300mΩ
3 A = 100mΩ
5 A = 60mΩ
10 A = 30mΩ

NB:
1. V_sense should connect as close as possible to the largest load on the given power rail.
2. Place Rset resistors as close to package pins as possible.
3. Ceramic (Cin) capacitors should be located within 0.5 in of the input pins.
4. We may need heat sinks on the converters. The datasheet indicates a range of 2W to 5W of power dissipation given our specs.
5. Pay attention to the datasheet's recommendations regarding capacitor selection.

TODO:
* Capacitor values are minimums. Consider increasing these. Consult datasheet for more info.

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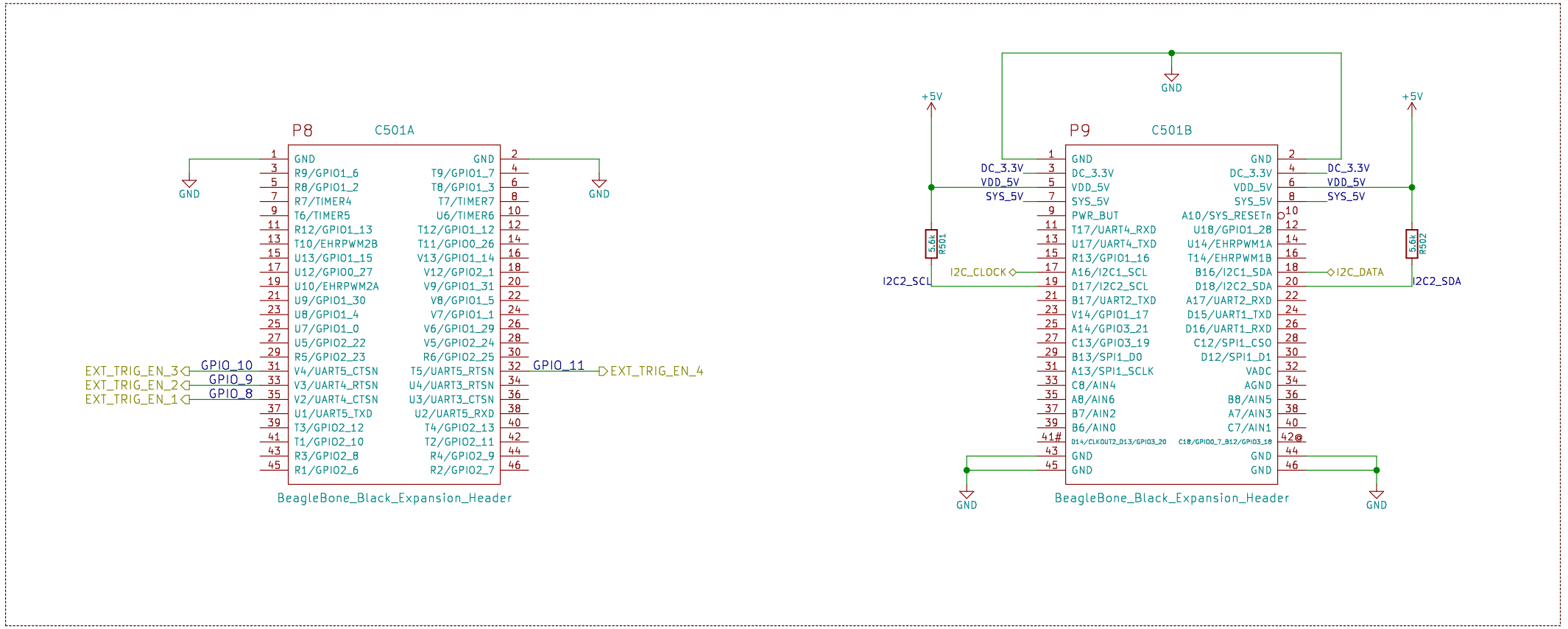
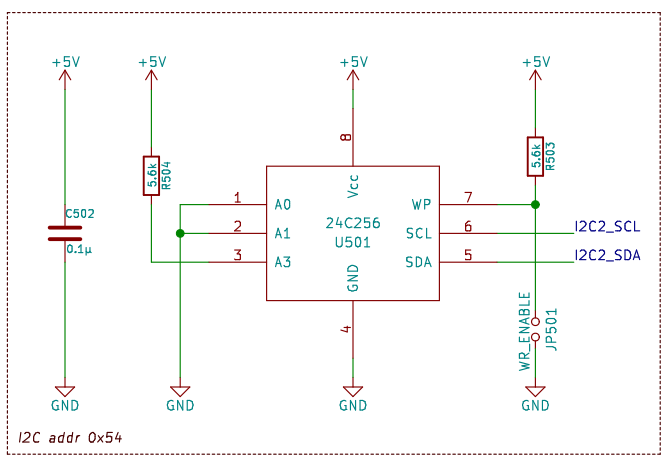
Sheet: /DC-DC Converters/		
File: dcdc_converter.sch		
Title: LTC3 DC-DC Converters		
Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 4/7



BeagleBone Expansion Headers



Cape EEPROM

TODO: connect these labels
to BBB GPIO pins.

ROCKET_READY

BQ_XALERT

EXT_PWR_EN_1
EXT_PWR_EN_2
EXT_PWR_EN_3
EXT_PWR_EN_4

5V_EN
12V_EN
19V_EN

BQ_EEPROM

TODO:
* Pick GPIO for rocket-ready signal.
* Buffer btw rocket-ready signal and BB, ign. board, etc?
* Umbilical connection state
* Ignition fuse state

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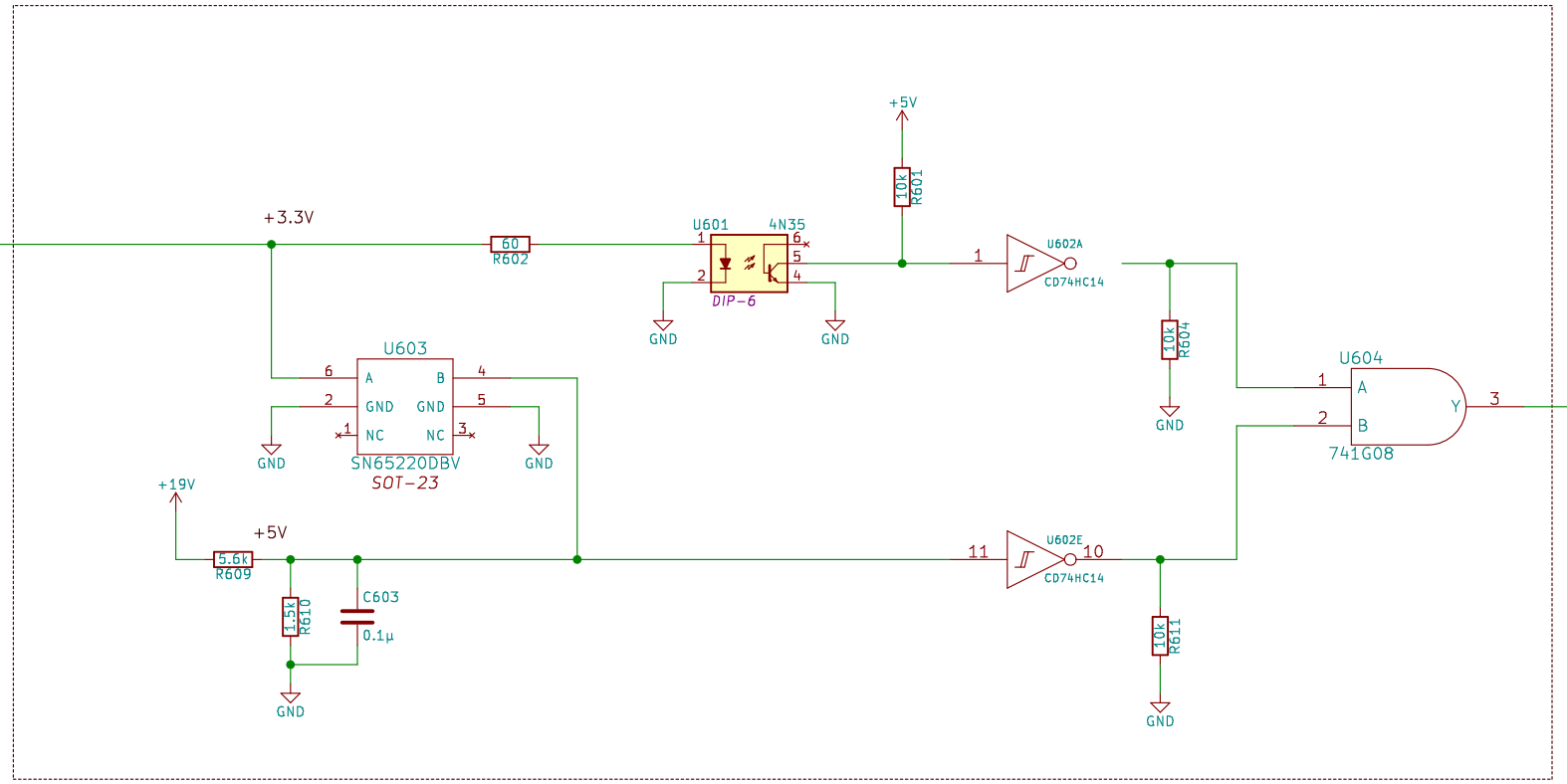
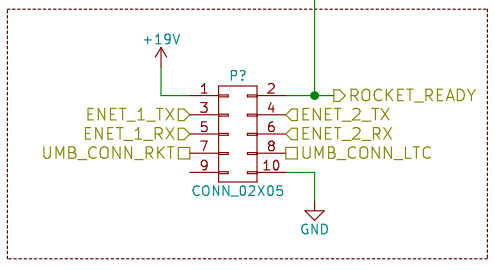
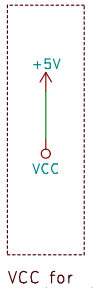
Sheet: /BeagleBone Black Cape/		
File: beaglebone_cape.sch		
Title: LTC3 BeagleBone Black Cape Interface		
Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 5/7

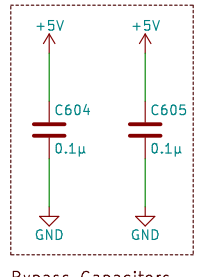




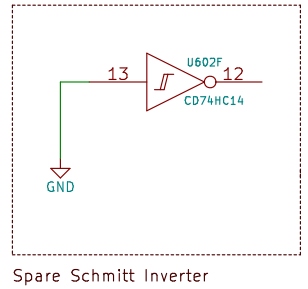
Rocket Umbilical



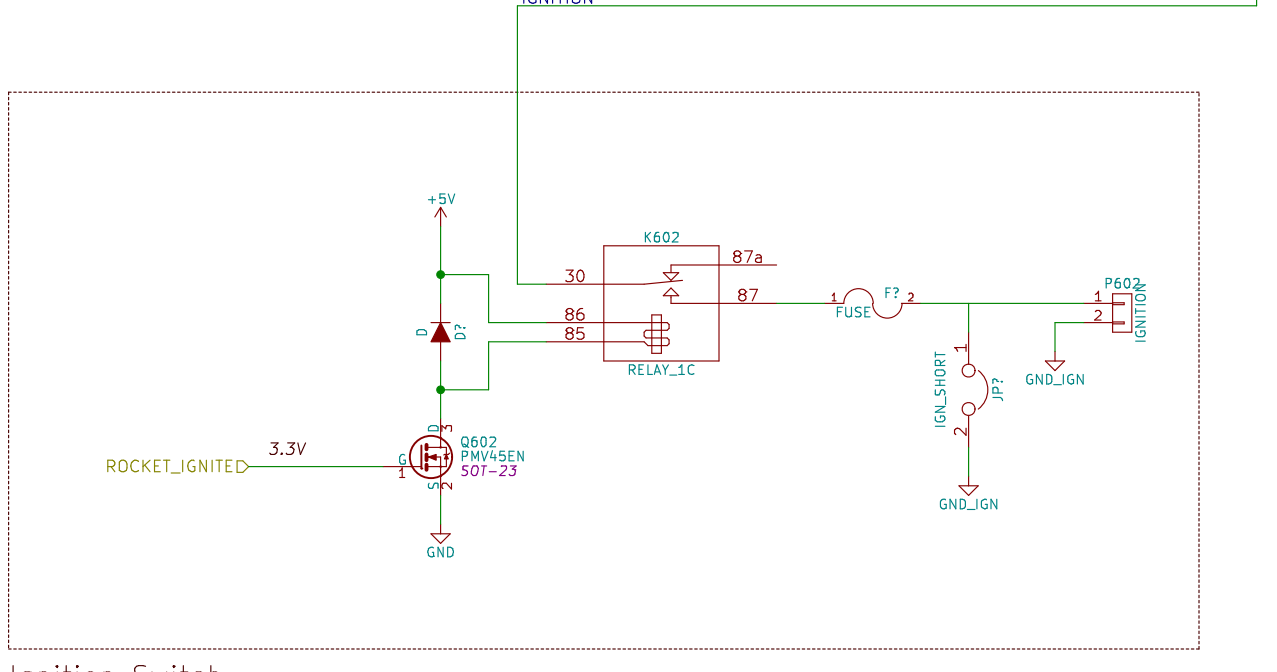
VCC for CD74HC14



Bypass Capacitors (one per IC VCC)



Spare Schmitt Inverter



Ignition Switch

TODO:
* Select appropriate component values.
* Add rocket umbilical connector.
  * Umbilical-to-Ethernet jack "adapter."
  * Umbilical connect sense.

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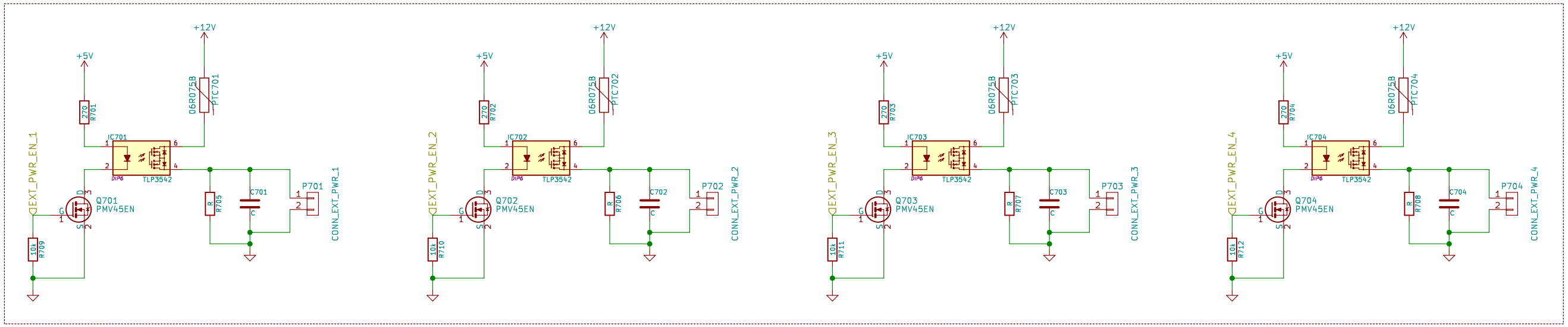
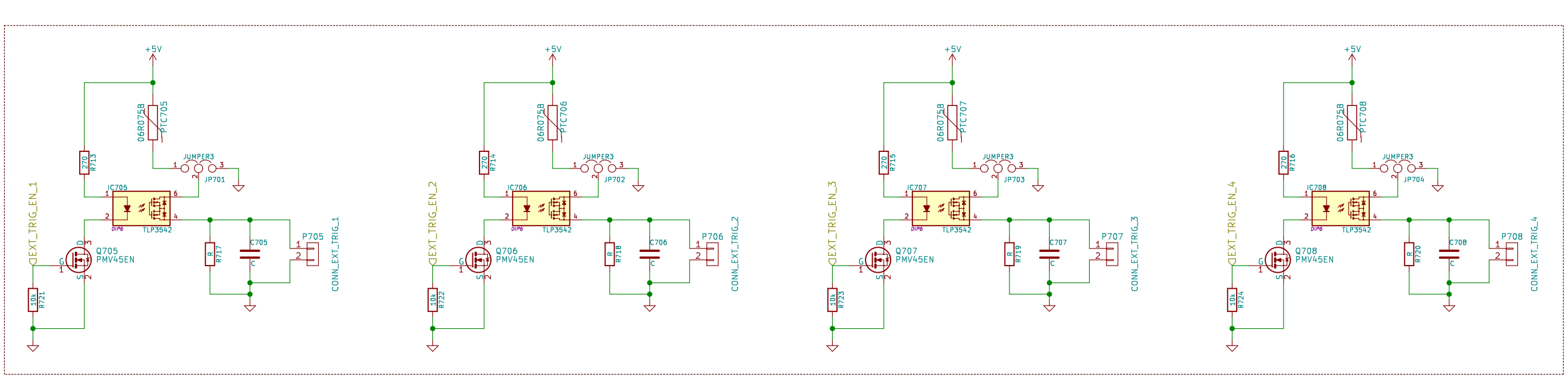
Sheet: /Rocket Umbilical & Ignition Control/
File: rocket_interface.sch

Title: LTC3 Rocket Umbilical & Ignition Control

Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 6/7



External Device Power



External Device Triggers

TODO:
* Determine values for bleeder resistor and filter capacitor on each output connector.
* Pick new PolyFuses, 0.5–1.0A max.

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Sheet: /External Device Power & Triggers/
File: external_devices.sch

Title: LTC3 External Power & Triggers

Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		id: 7/7