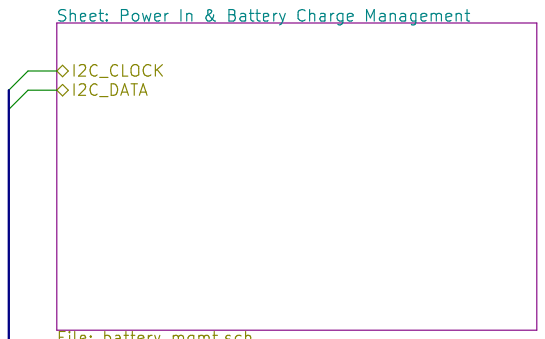

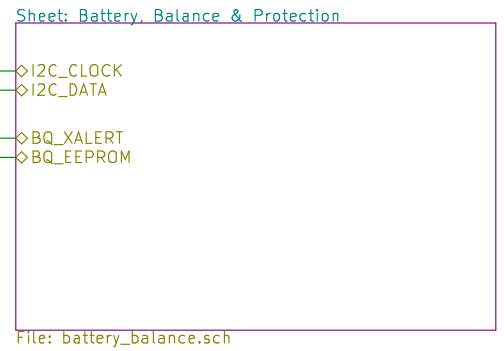

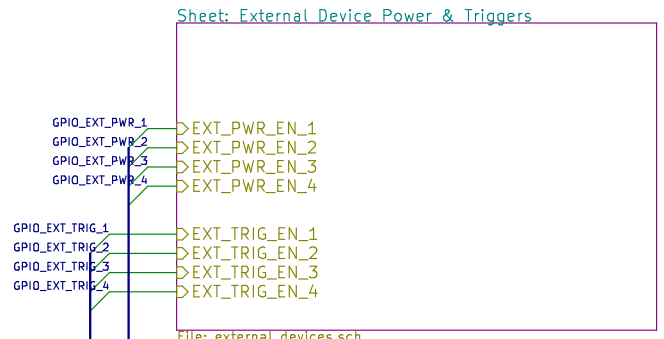

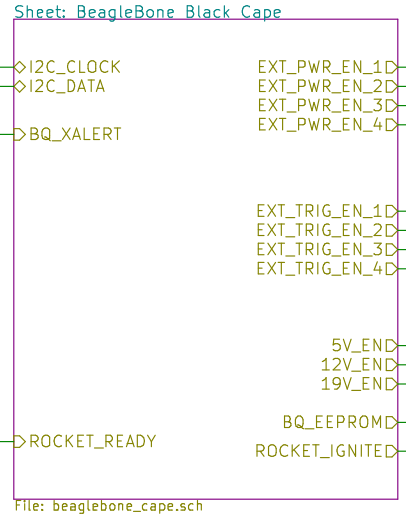

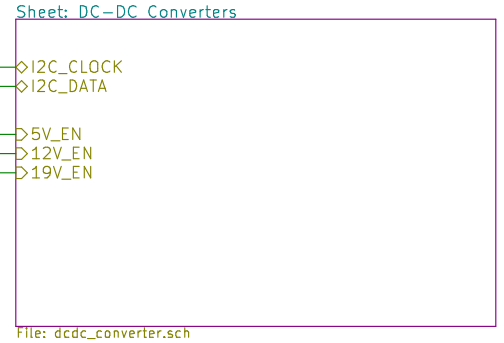

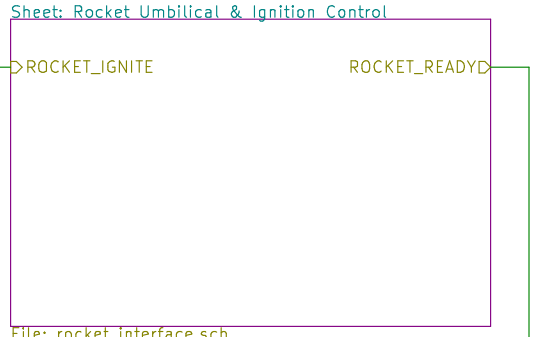

TODO:
* Finish wiring up sub-sheets.
  * Bus entries need labels on both sides!

Notes:
 * LTC3 is a single board represented on multiple sheets.

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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

TODO: replace with Vin power symbol

Supply Detection (p.34)

TODO: detail description

Supply Current Sense (p. 20)

TODO: redraw for clarity

TODO: verify CSP and CSP connections

Charge Current Sense (p. 20)

TODO: move CCSPOUT to here

Voltage, Current, & Temp Sense

I2C addr 0x98

TODO: LT8490 description

LT8490

U202

Output Feedback (p. 17)

Feedback Resistor Disconnect

Input Feedback p.14

Shutdown (p. 27)

202kHz switch

Temp Sense (p. 21)

TODO: temp sense R no place w/ parallel thermistor conn.

TODO: label pull-up resistors No-Place

TODO: limit ch

TODO: feed STATUS and FAULT signals into 4-chan. buffer for LEDs and BB

CHARGING PARAMETERS:
Stage 2 Voltage: 33.6 V
Maximum Charging Current: 11.4 A
Maximum Trickle Current: 3 A
Switching Frequency: 202 kHz

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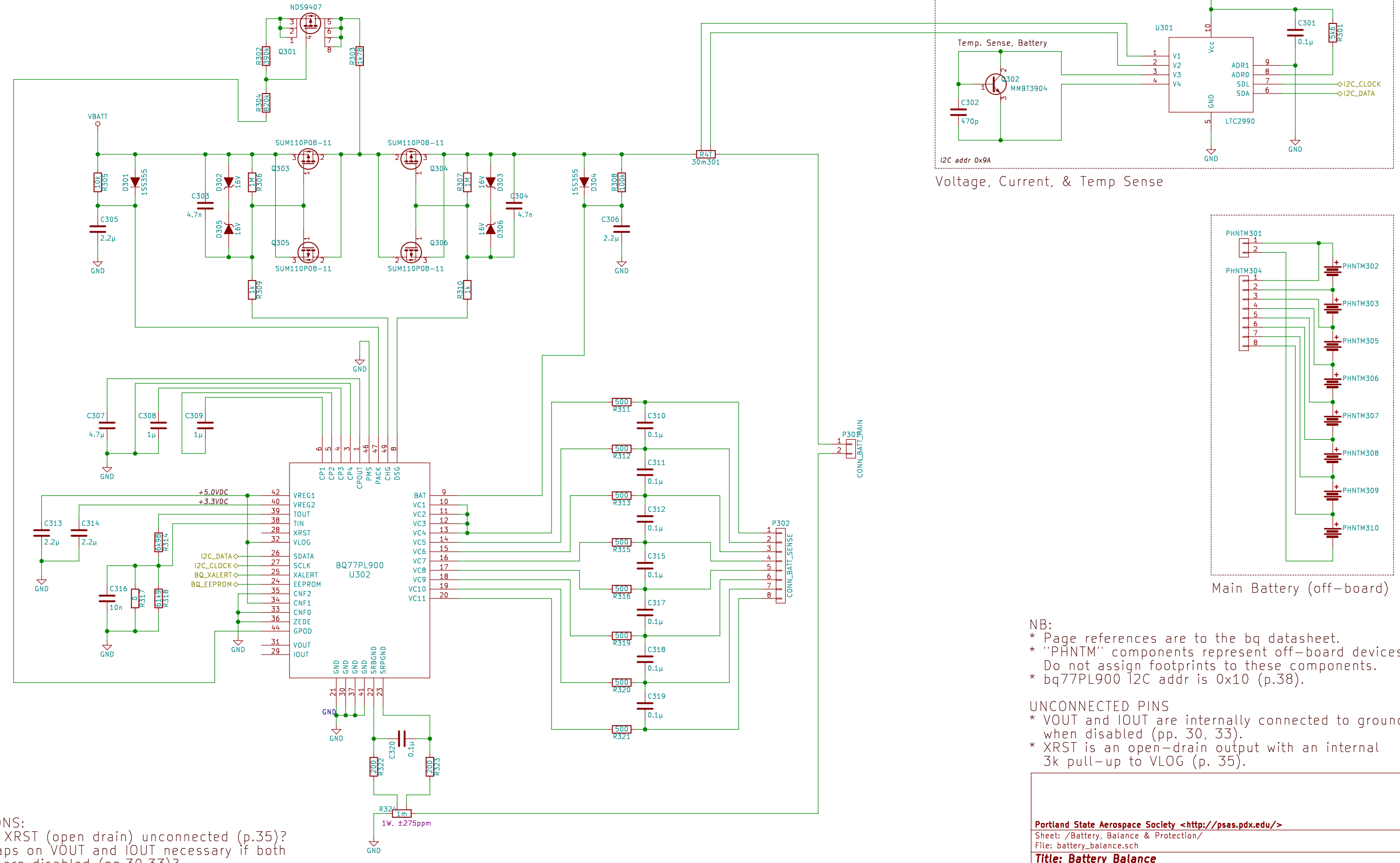
Sheet: /Power In & Battery Charge Management/
File: battery_mgmt.sch

Title: Power In, Battery Charging

Size: B	Date: 2015-12-16	Rev: A
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 2/7



NB:
* Page references are to the bq datasheet.
* "PHNTM" components represent off-board devices. Do not assign footprints to these components.
* bq77PL900 I2C addr is 0x10 (p.38).

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).

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

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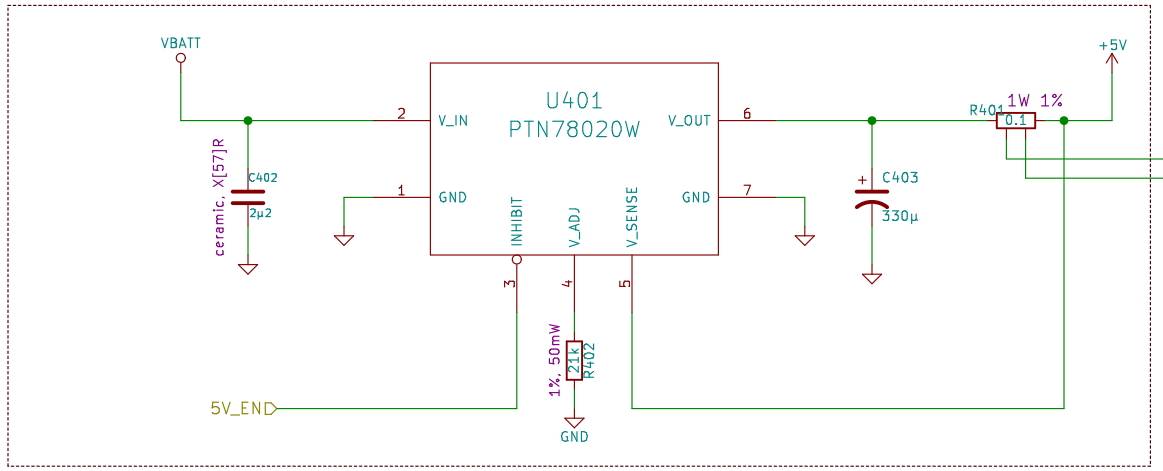
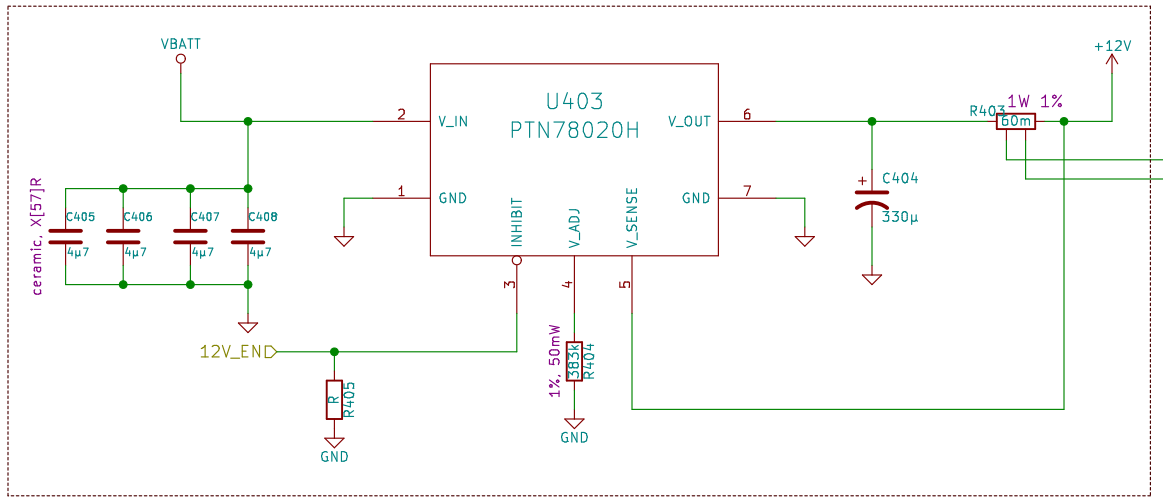
Sheet: /Battery, Balance & Protection/
File: battery_balance.sch

Title: Battery Balance

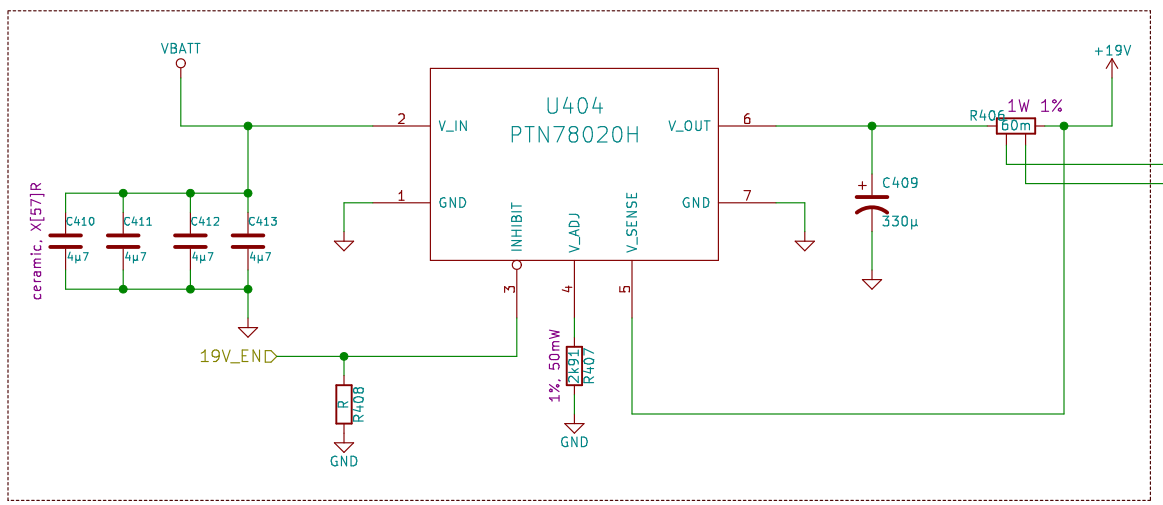
Size: B	Date: 2015-12-16	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 3/7



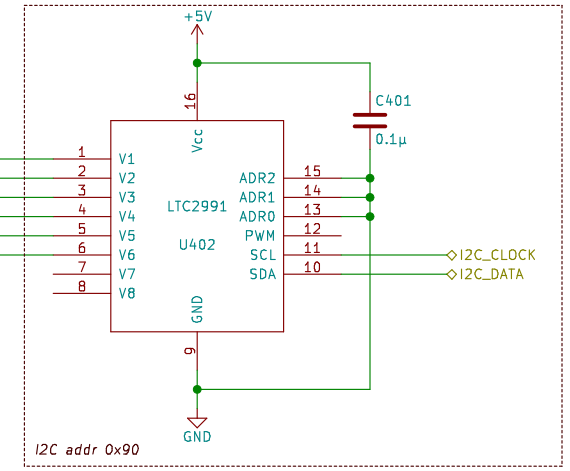
+5V DC Rail



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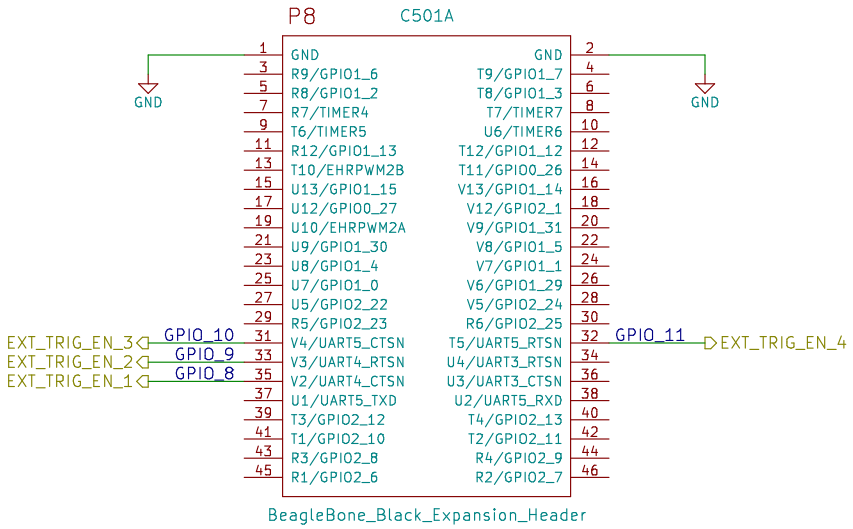
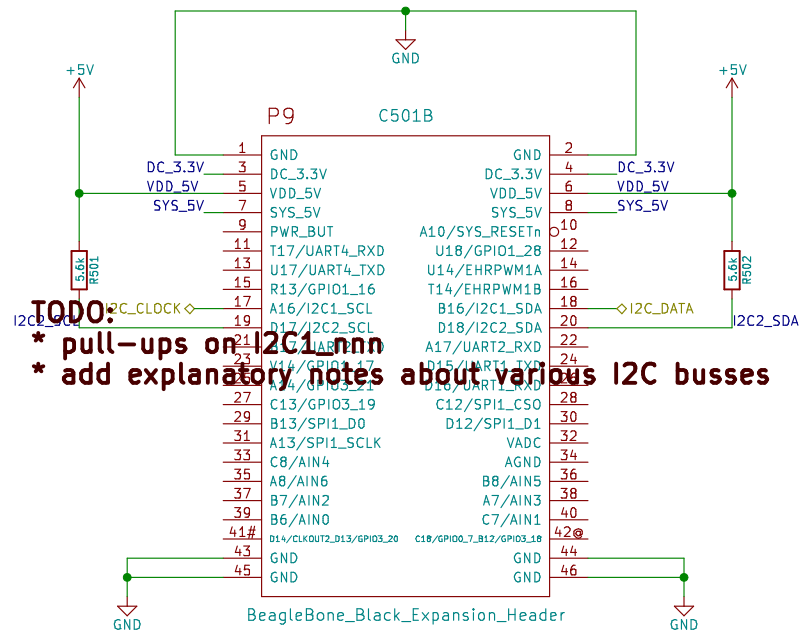
Sheet: /DC-DC Converters/		
File: dcdc_converter.sch		
Title: LTC3 DC-DC Converters		
Size: B	Date: 2015-12-15	**Rev: A**
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 4/7





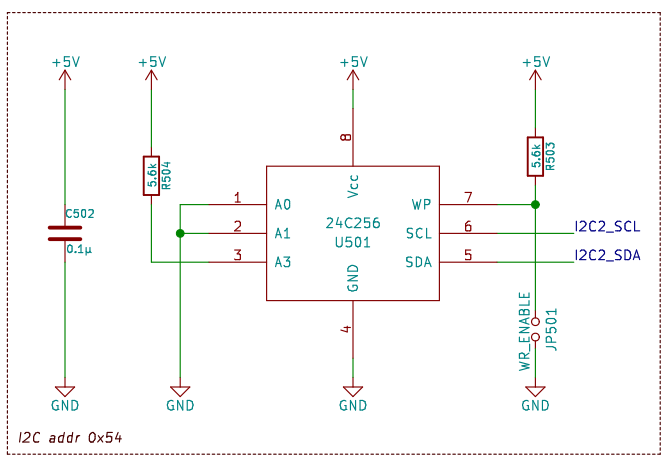
TODO:
* pull-ups on I2C1,nnn
* add explanatory notes about various I2C busses

BeagleBone Expansion Headers

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
12V_EN
19V_EN
BQ_EEPROM
ROCKET_IGNITE



Cape 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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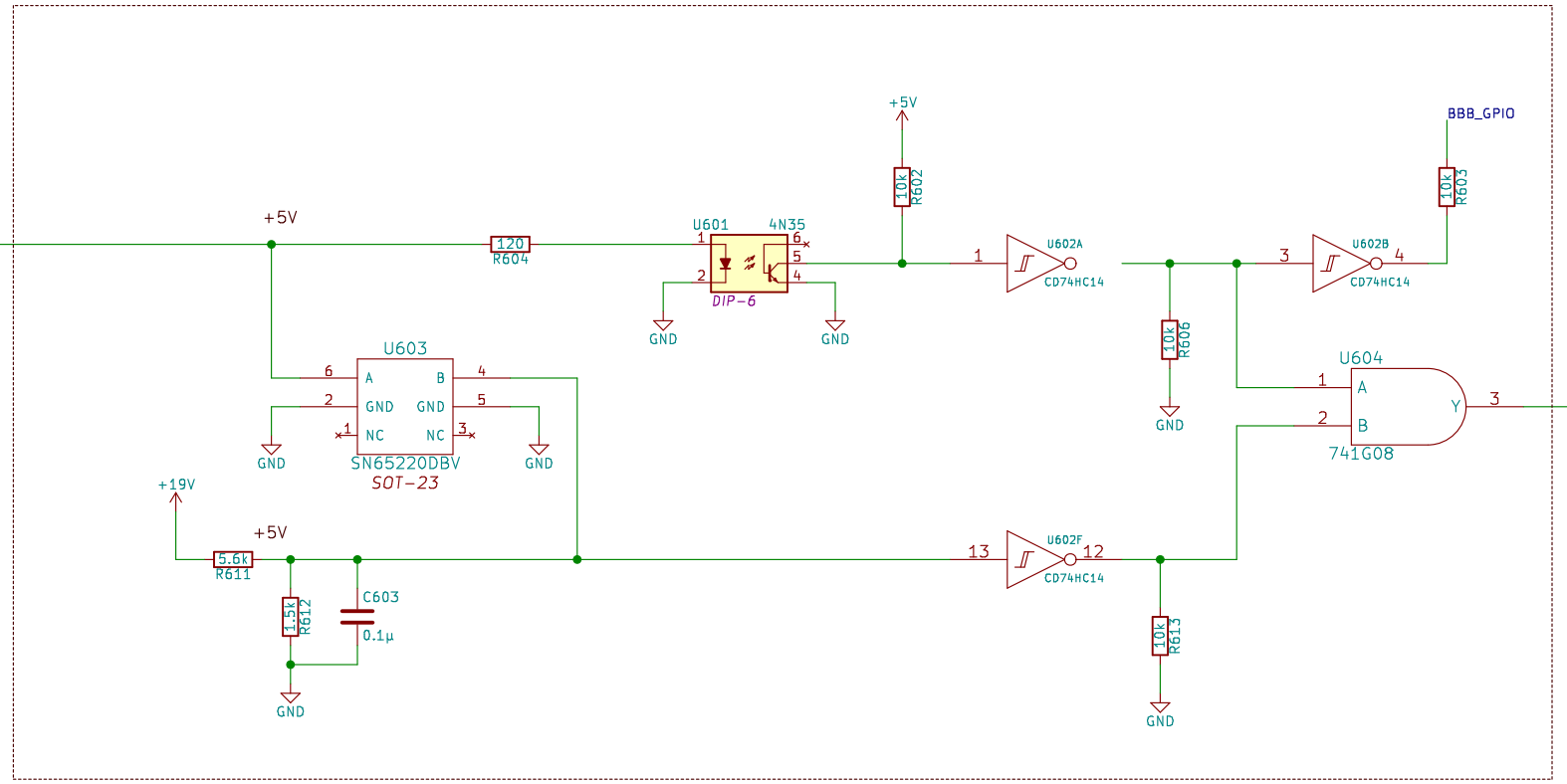
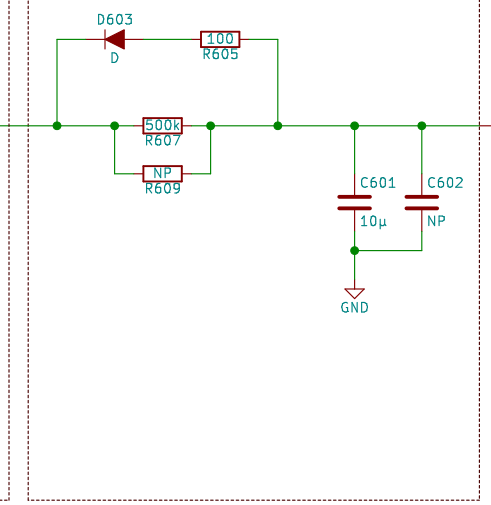
Sheet: /BeagleBone Black Cape/
File: beaglebone_cape.sch

Title: LTC3 BeagleBone Black Cape Interface

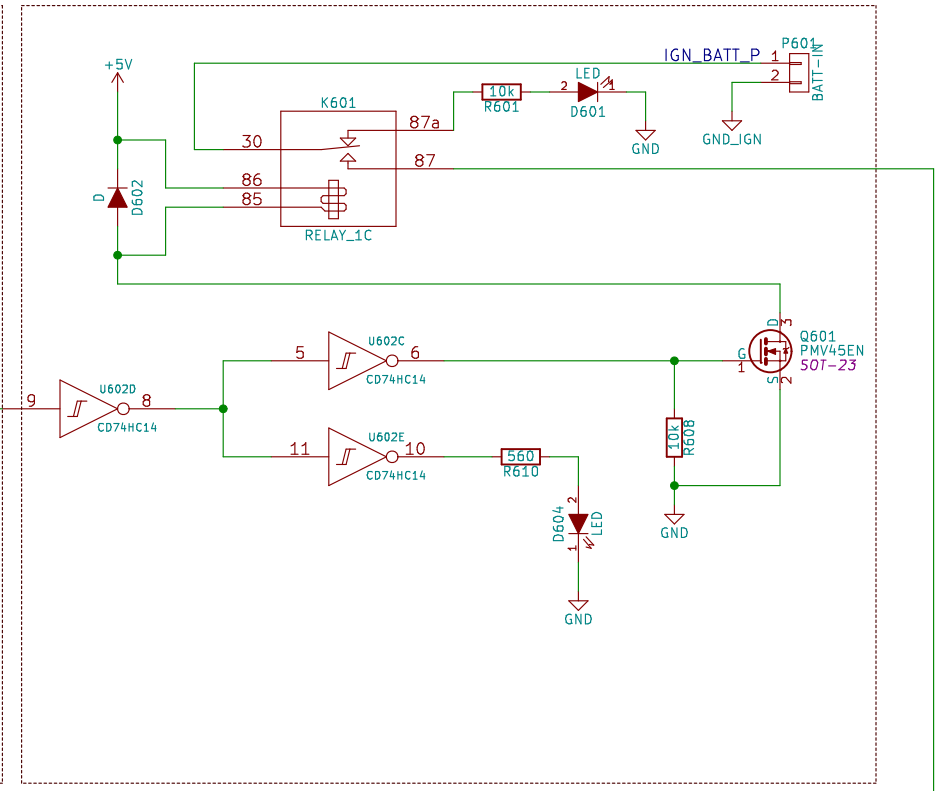
Size: B	Date: 2015-12-15	Rev: A
KiCad E.D.A. kicad 4.0.0rc1a-stable		Id: 5/7



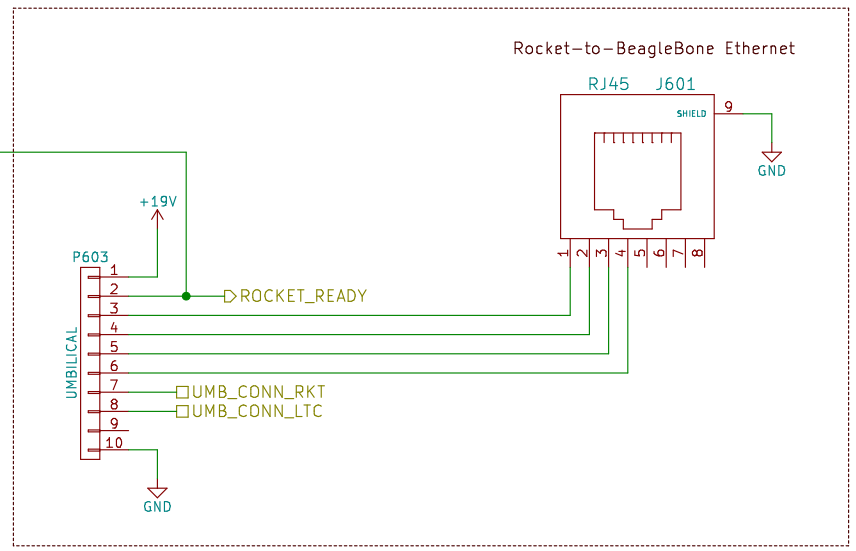
Input Logic



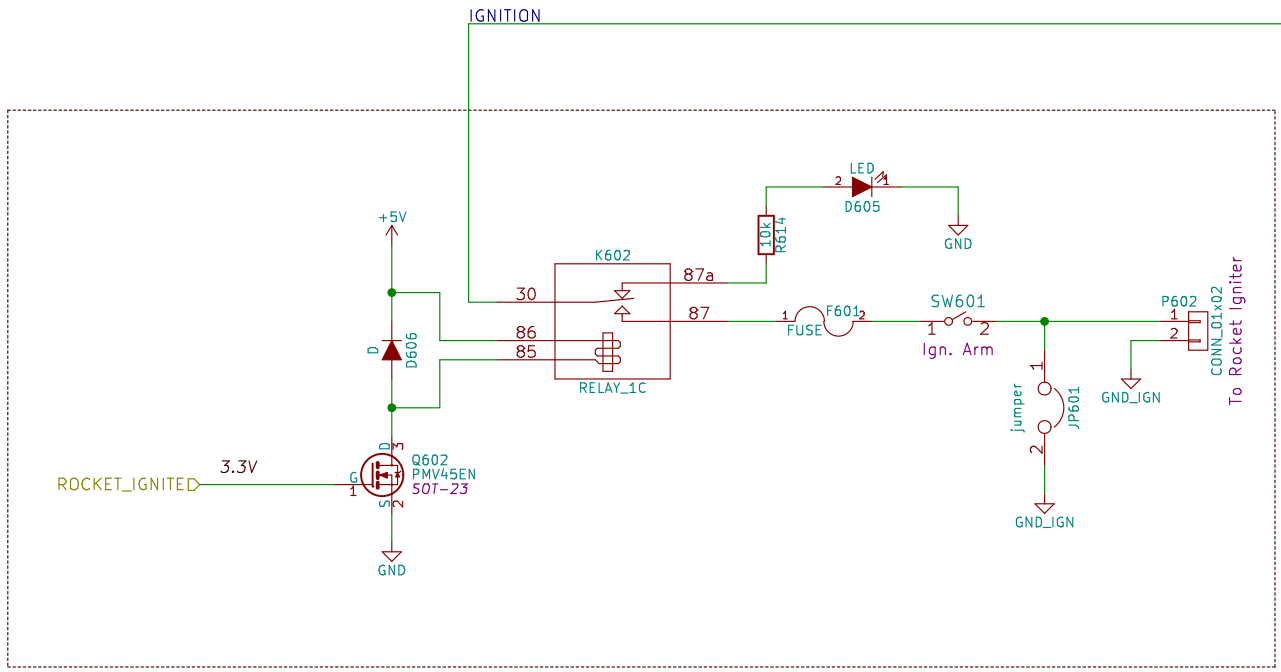
Delay (5s)



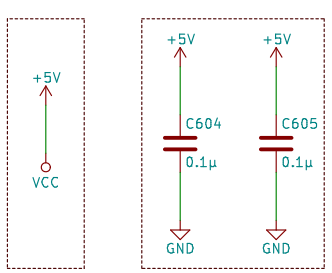
Ignition Battery Switch



Rocket Umbilical



Ignition Switch



VCC for
CD74HC14

Bypass Capacitors
(one per IC VCC)

TODO:
* Select appropriate component values.
* Finish rocket umbilical connector.
  * Verify Enet jack "adapter" wiring.
  * Add umbilical connect sense lines circuitry.
* Label various LEDs.

QUESTIONS:
  *Will 5v from schmidt fry BBB GPIO?

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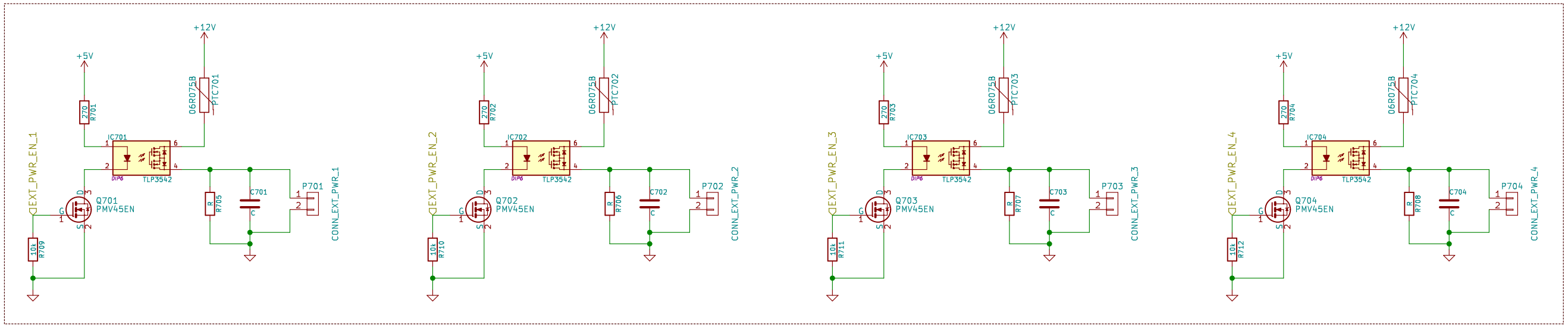
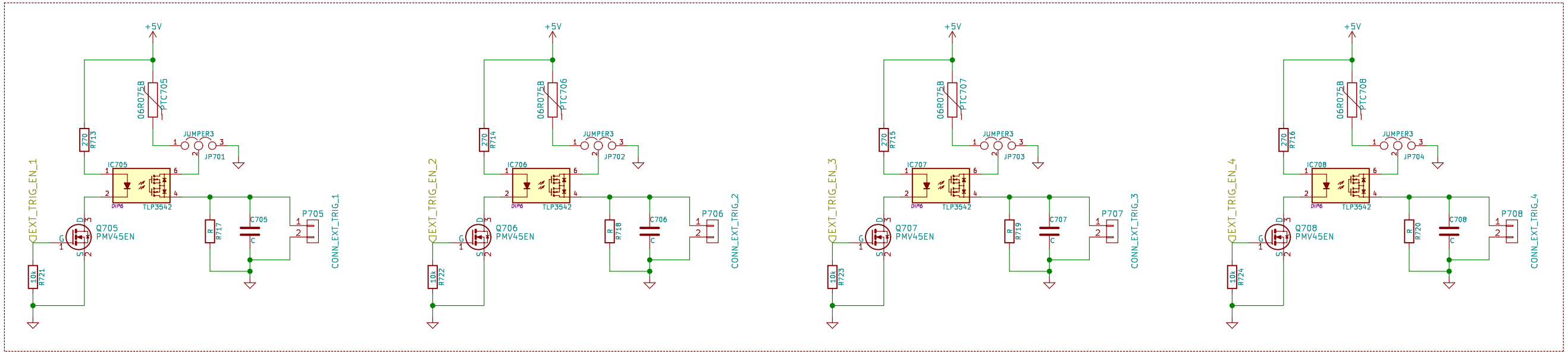
Sheet: /Rocket Umbilical & Ignition Control/
File: rocket_interface.sch

Title: LTC3 Rocket Umbilical & Ignition Control

Size: B	Date: 2015-12-16	**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