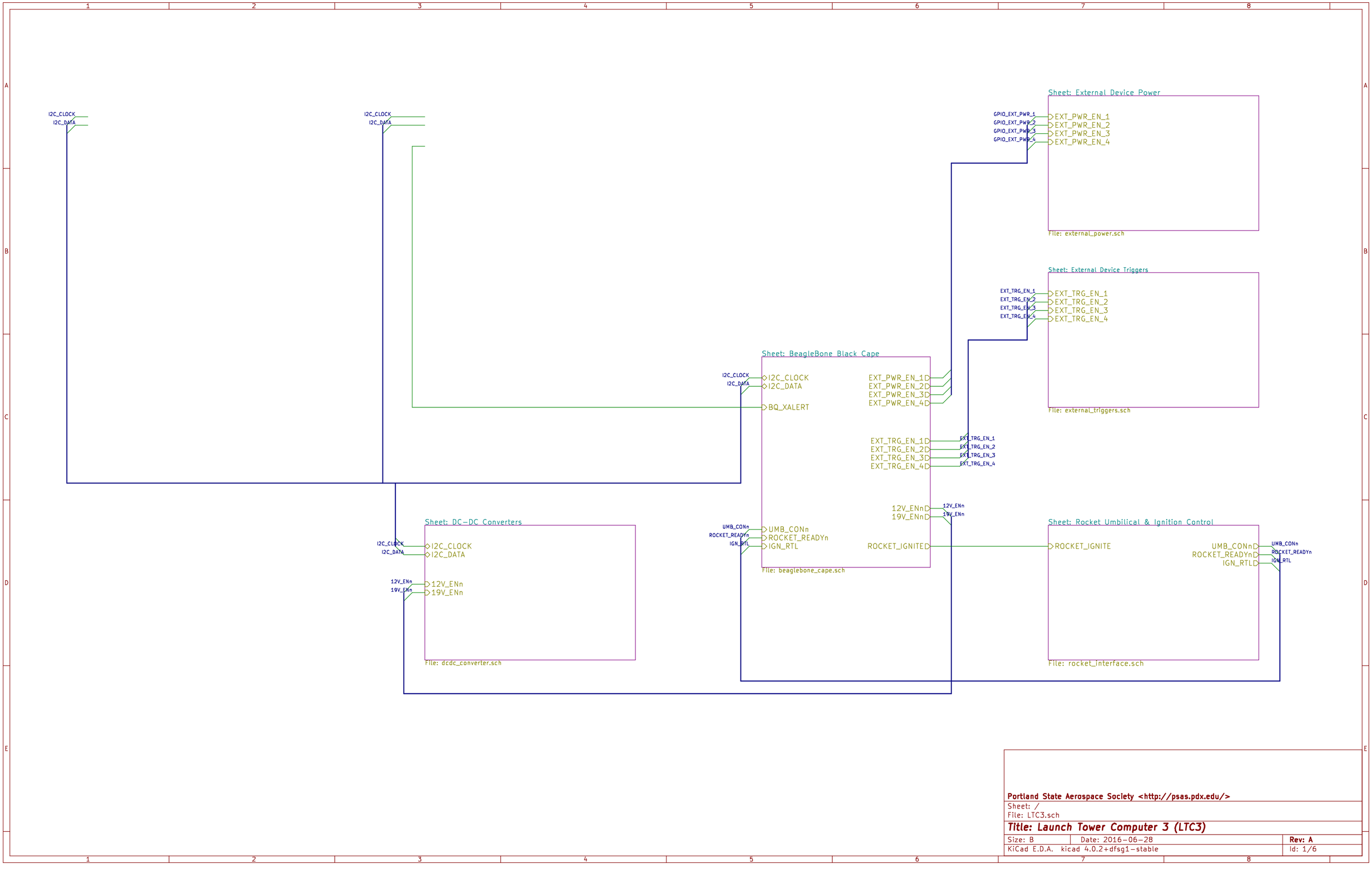
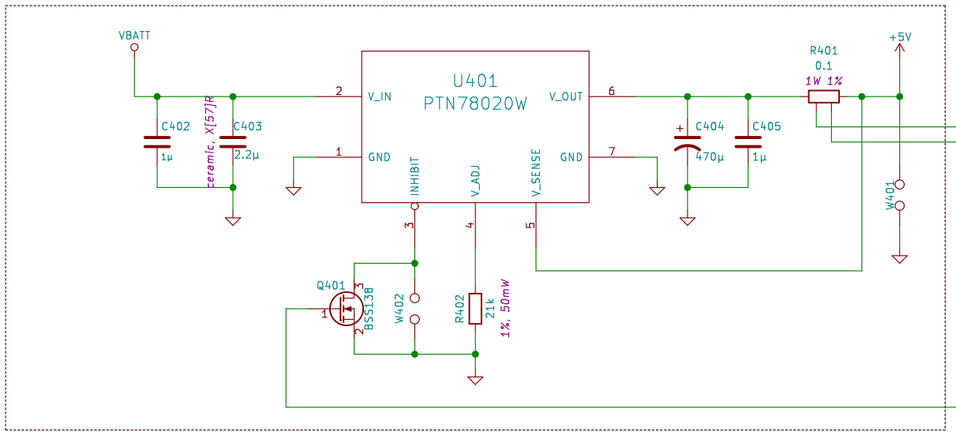
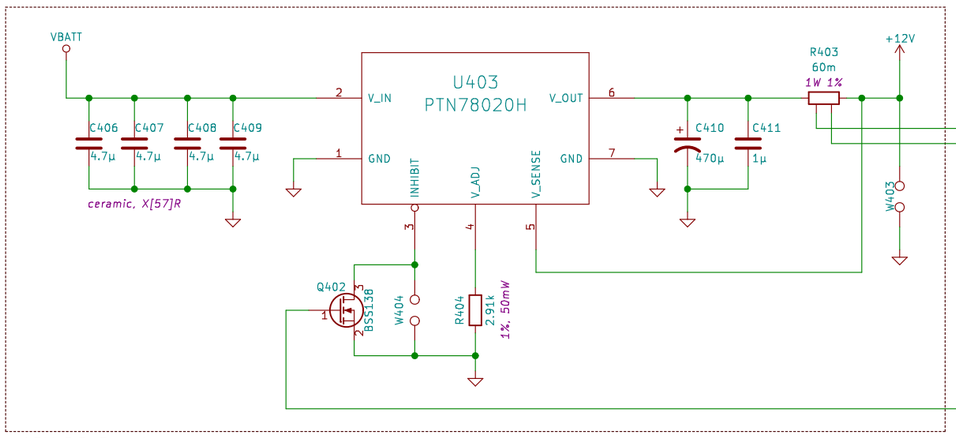
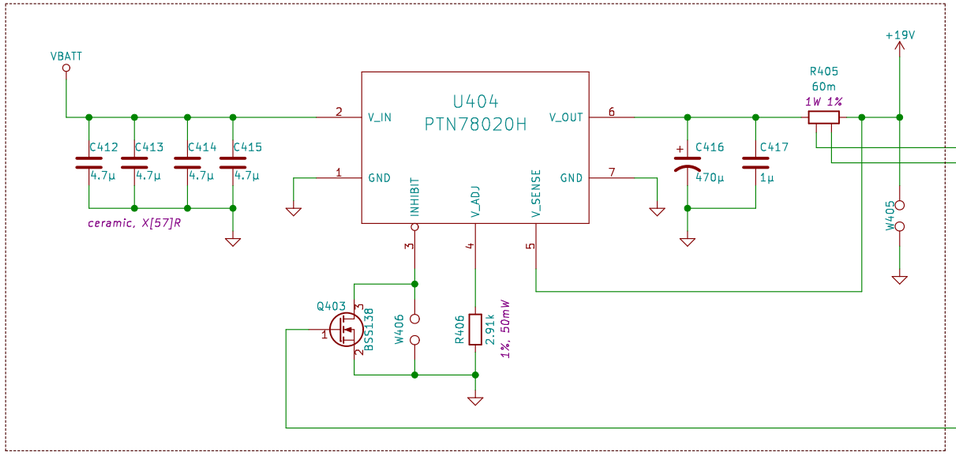

I2C_CLOCK
I2C_DATA
I2C_CLOCK
I2C_DATA
Sheet: External Device Power
GPIO_EXT_PWR_1
GPIO_EXT_PWR_2
GPIO_EXT_PWR_3
GPIO_EXT_PWR_4
EXT_PWR_EN_1
EXT_PWR_EN_2
EXT_PWR_EN_3
EXT_PWR_EN_4
File: external_power.sch
Sheet: External Device Triggers
EXT_TRG_EN_1
EXT_TRG_EN_2
EXT_TRG_EN_3
EXT_TRG_EN_4
EXT_TRG_EN_1
EXT_TRG_EN_2
EXT_TRG_EN_3
EXT_TRG_EN_4
File: external_triggers.sch
Sheet: BeagleBone Black Cape
I2C_CLOCK
I2C_DATA
BQ_XALERT
EXT_PWR_EN_1
EXT_PWR_EN_2
EXT_PWR_EN_3
EXT_PWR_EN_4
EXT_TRG_EN_1
EXT_TRG_EN_2
EXT_TRG_EN_3
EXT_TRG_EN_4
EXT_TRG_EN_1
EXT_TRG_EN_2
EXT_TRG_EN_3
EXT_TRG_EN_4
12V_ENn
19V_ENn
12V_ENn
19V_ENn
UMB_CONn
ROCKET_READYn
IGN_RTL
UMB_CONn
ROCKET_READYn
IGN_RTL
ROCKET_IGNITED
File: beaglebone_cape.sch
Sheet: DC-DC Converters
I2C_CLOCK
I2C_DATA
12V_ENn
19V_ENn
I2C_CLOCK
I2C_DATA
12V_ENn
19V_ENn
File: dcdc_converter.sch
Sheet: Rocket Umbilical & Ignition Control
ROCKET_IGNITE
UMB_CONn
ROCKET_READYn
IGN_RTL
UMB_CONn
ROCKET_READYn
IGN_RTL
File: rocket_interface.sch
Portland State Aerospace Society <http://psas.pdx.edu/>
Sheet: /
File: LTC3.sch
Title: Launch Tower Computer 3 (LTC3)
Size: B
Date: 2016-06-28
Rev: A
KiCad E.D.A. kicad 4.0.2+dfsg1-stable
Id: 1/6



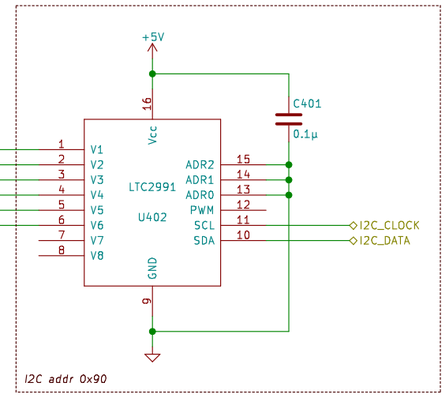
+5V DC Supply



+12V DC Supply

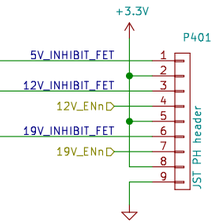


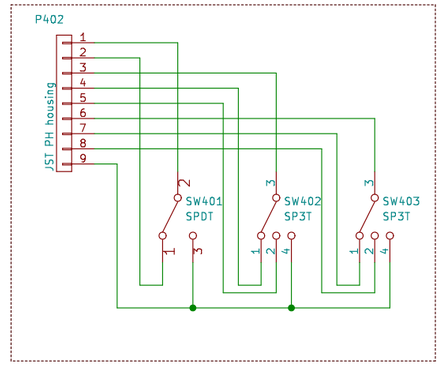
+19V DC Supply



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





Manual Override Switches, Front Panel

Toggle 5V converter's INHIBIT FET between +3.3V and ground. Toggle 12V and 19V converters' INHIBIT FET between the BeagleBone, +3.3V, or ground.

NB: The 5V converter supplies the BeagleBone. We don't want the BB to be able to commit suicide, thus it does not get a connection to the 5V converter's INHIBIT FET.

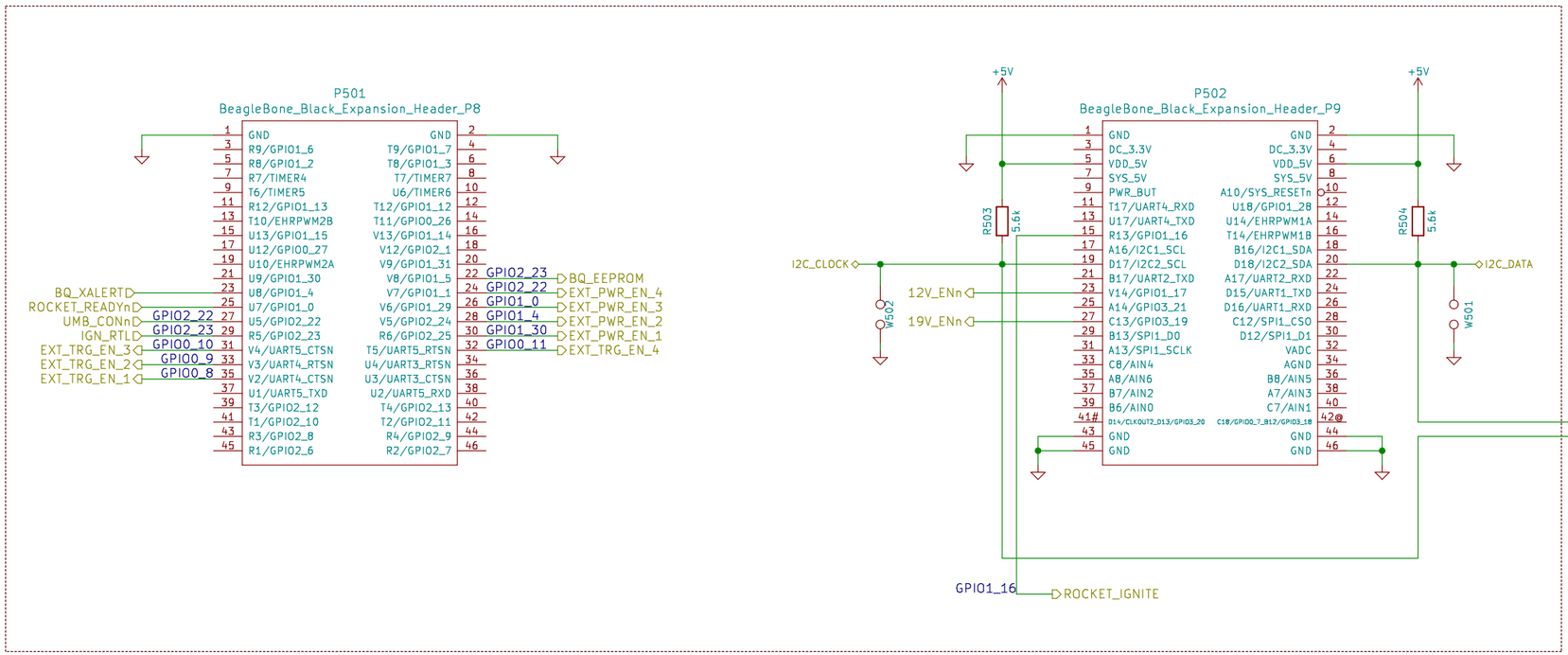
NOTES
1. V_sense should connect as close as possible to the largest load on the given power rail.
2. Place Rset resistors as close to package pins as possible.
3. Ceramic (Cin) capacitors should be located within 0.5 in of the input pins.
4. We may need heat sinks on the converters. The datasheet indicates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

Portland State Aerospace Society <http://psas.pdx.edu/>

Sheet: /DC-DC Converters/
File: dcdc_converter.sch

Title: LTC3 DC-DC Converters

Size: B	Date: 2016-05-09	**Rev: A**
KiCad E.D.A. kicad 4.0.2+dfsg1-stable		Id: 2/6



BeagleBone Expansion Headers

I2C Devices

ADDR	Part	Type	Location
0x10	U203	BQ77PL900	B/PM
0x54	U501	EEPROM	BBB
0x90	U402	LTC2991	DC-DC
0x98	U203	LTC2990	Power In
0x9A	U301	LTC2990	B/PM

NOTES:
* Do NOT change ROCKET_IGNITE, pin default reset state is High-Z w/ pulldown resistor. Other pins can be configured in EEPROM at boot time.
* All I2C devices on LTC3 are slaves. The BBB is the only master so the LTC will not need arbitration.

Portland State Aerospace Society <http://psas.pdx.edu/>

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

Title: LTC3 BeagleBone Black Cape Interface

Size: B	Date: 2016-05-09	**Rev: A**
KiCad E.D.A. kicad 4.0.2+dfsg1-stable		Id: 3/6

TODO: select conn.

Ignition battery pack disconnected until
flight computer has asserted ROCKET_READY
and 19 VDC rail (shore power) has been shut off.

ROCKET_READYn
+3.1V
+5V
R601 10k
U601B
CD74HC14
R603 62k
R604 100k
R602 120
IC601
TLP3542
U601A
CD74HC14
R605 10k
W602 0/5V
U602
SN65220DBV
SOT-23
U603
741G08
Shore Power Check
+19V
R612 5.6k
R613 1.5k
C603 0.1µ
W603 0/5V
U601F
CD74HC14
R615 10k
W604 0/5V
W605 0/5V

Input Logic

D602 CDSU4148
R606 100
R607 500k
R609 NP
C601 10µ
C602 NP
W606 0/5V

Delay (5s)

+5V
IGN_BATT_P
P601 BATT-IN
W601 14.8-16.8V
GND_IGN
K601
RELAY_1C
CDSU4148 D601
U601D
CD74HC14
U601C
CD74HC14
Q601 PMV45EN
R608 10k
U601E
CD74HC14
R611 62k
R610 250
IGN_RTL
+3.1V
R614 100k
D603 LED
Ready-To-Launch

Ignition Battery Relay

RJ45 J601
ROCKET_READY_5V
+19V
P603
UMBILICAL
ROCKET_ETH_1
ROCKET_ETH_2
ROCKET_ETH_3
ROCKET_ETH_4
UMB_CONN_FROM_RKT
UMB_CONN_TO_LTC
R621 5.1k
R616 5.1k
UMB_CONn
D609 3.3V
C604 1µ

TODO: conn. to umbilical conn. on front panel

Rocket Umbilical
Rocket-to-BeagleBone Ethernet

Q603 ZVN4525E6
Q604 ZVN4525E6
Q605 ZVN4525E6
R617 30k
R618 30k
R619 30k
S4B-PH-K
P606

P609
PHR-4
Batt. Relay Closed
D606
557-1702-203F
Ign. Relay Closed
D608
557-1702-203F
Ignition HOT
D610
557-1502-203F

BAKERCON Hazard Gauge
(super-bright LEDs, exterior panel)

TODO: find out if Dialight 557 LED indicators require current-limiting resistor

ROCKET_IGNITE
Q602 PMV45EN
R620 250
Rocket_Ignite
D605
W607 0/3.3V
R622 10k
D604 CDSU4148
K602
RELAY_1C
P605 43045-0200 MicroFit3 1x2 header
P607 43045-0200 MicroFit3 1x2 header
GND_IGN

Rocket Ignition Relay

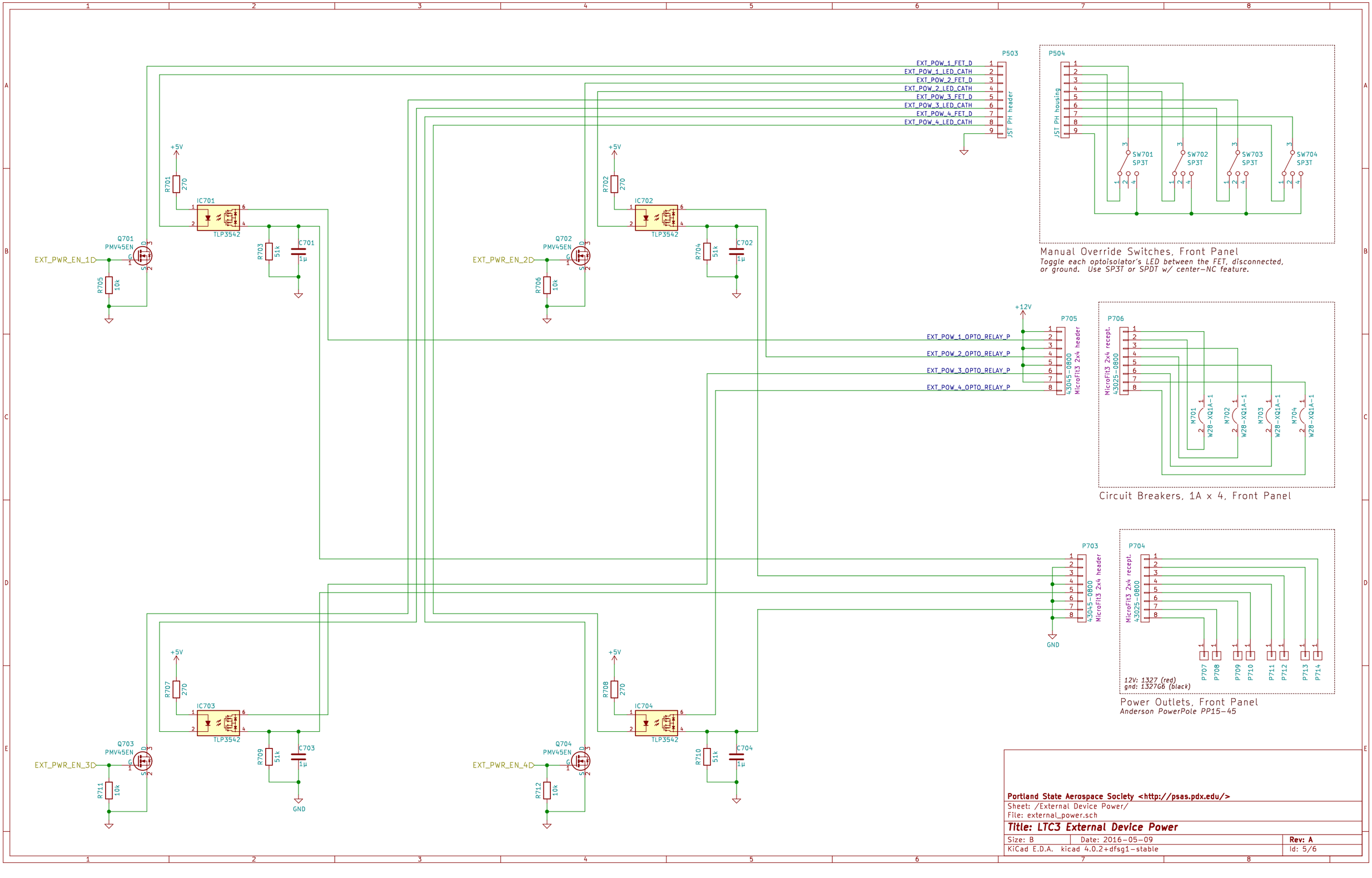
P604 43025-0200 MicroFit3 1x2 recept.
M601 W28-XQ1A-10
SW601 SPST
JP601 Banana Jack, 1x2
P608 43025-0200 MicroFit3 1x2 recept.
P602 CONN_01X02 To Away Box

Breaker, Arm Switch,
Shorting Bar, &
Ignition Connector
(front panel)

VCC for CD74HC14

Bypass Capacitors
(one per IC VCC)
C605 0.1µ
C606 0.1µ

Portland State Aerospace Society <http://psas.pdx.edu/>
Sheet: /Rocket Umbilical & Ignition Control/
File: rocket_interface.sch
Title: LTC3 Rocket Umbilical & Ignition Control
Size: B | Date: 2016-05-09 | **Rev: A**
KiCad E.D.A. kicad 4.0.2+dfsg1-stable | Id: 4/6

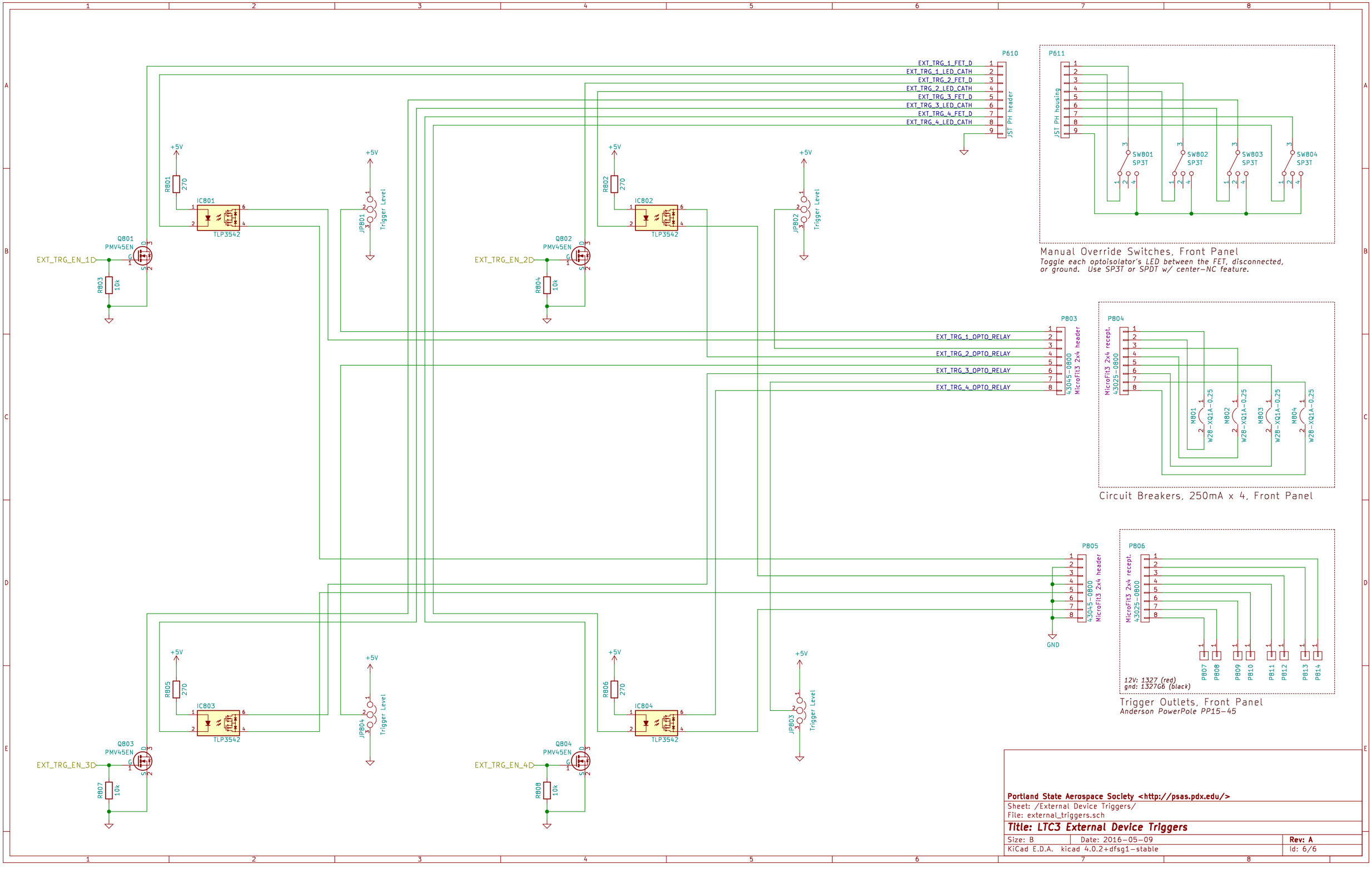


Portland State Aerospace Society <http://psas.pdx.edu/>

Sheet: /External Device Power/
File: external_power.sch

Title: LTC3 External Device Power

Size: B	Date: 2016-05-09	**Rev: A**
KiCad E.D.A. kicad 4.0.2+dfsg1-stable		Id: 5/6


P610
EXT_TRG_1_FET_D
EXT_TRG_1_LED_CATH
EXT_TRG_2_FET_D
EXT_TRG_2_LED_CATH
EXT_TRG_3_FET_D
EXT_TRG_3_LED_CATH
EXT_TRG_4_FET_D
EXT_TRG_4_LED_CATH
JST PH header
P611
JST PH housing
SW801 SP3T
SW802 SP3T
SW803 SP3T
SW804 SP3T
Manual Override Switches, Front Panel
Toggle each optoisolator's LED between the FET, disconnected, or ground. Use SP3T or SPDT w/ center-NC feature.
+5V
R801 270
IC801
TLP3542
JP801
Trigger Level
Q801
PMV45EN
EXT_TRG_EN_1
R803 10k
R802 270
IC802
JP802
Q802
EXT_TRG_EN_2
R804 10k
P803
EXT_TRG_1_OPTO_RELAY
EXT_TRG_2_OPTO_RELAY
EXT_TRG_3_OPTO_RELAY
EXT_TRG_4_OPTO_RELAY
MicroFit3 2x4 header
43045-0800
P804
MicroFit3 2x4 recept.
43025-0800
M801 W28-XQ1A-0.25
M802 W28-XQ1A-0.25
M803 W28-XQ1A-0.25
M804 W28-XQ1A-0.25
Circuit Breakers, 250mA x 4, Front Panel
R805 270
IC803
JP804
Q803
EXT_TRG_EN_3
R807 10k
R806 270
IC804
JP803
Q804
EXT_TRG_EN_4
R808 10k
P805
GND
P806
P807 P808 P809 P810 P811 P812 P813 P814
12V: 1327 (red)
gnd: 1327G6 (black)
Trigger Outlets, Front Panel
Anderson PowerPole PP15-45
Portland State Aerospace Society <http://psas.pdx.edu/>
Sheet: /External Device Triggers/
File: external_triggers.sch
Title: LTC3 External Device Triggers
Size: B
Date: 2016-05-09
Rev: A
KiCad E.D.A. kicad 4.0.2+dfsg1-stable
Id: 6/6