

ASH Power

Variant: [No Variations]

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Introduction

This board manages power control and distribution for my Octapod.

The power board has the following responsibilities:

- * Regulate servo voltage from 2 or 3S Li-ion battery packs.
- * Measure voltage and current to servos.
- * Supply the main board with power (not regulated).
- * Provide soft-start functionality for servos.
- * Control power on/off to servos.
- * Protect batteries with UVLO and OVLO.
- * Integrated charger using external USB-C supply.
- * Provide an interface for both main board MCU(I2C) and NVM(serial-SCPI).

Specifications

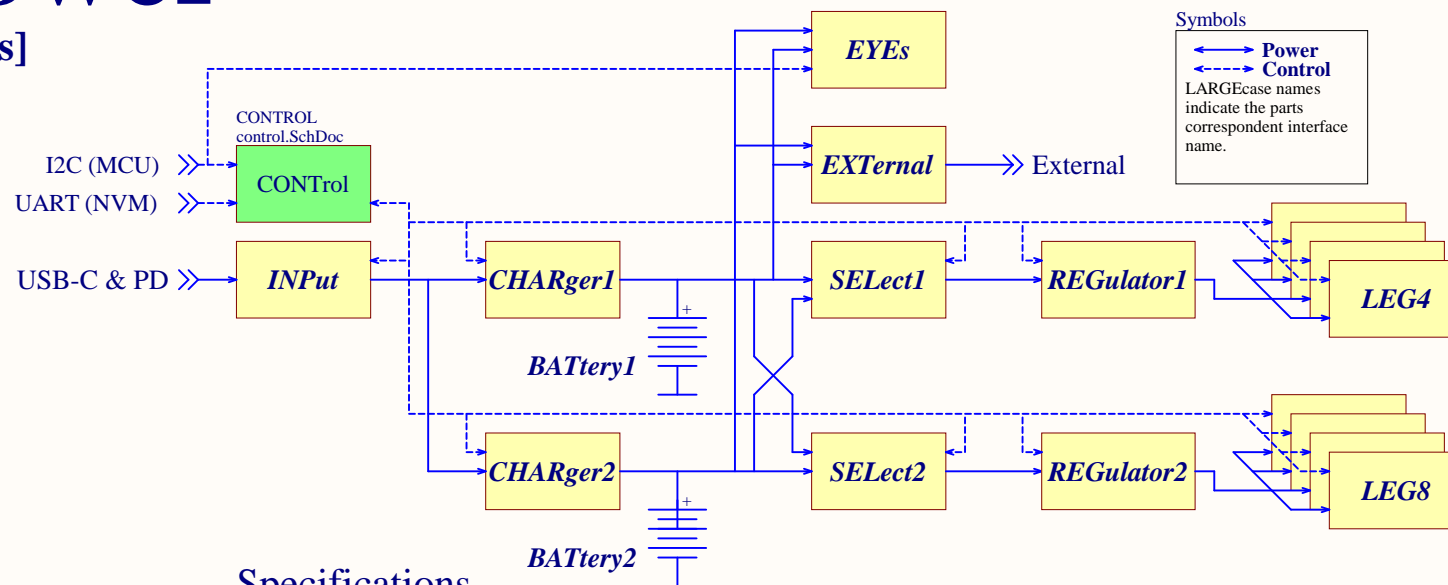
- * Serial interface
- * I2C control address:
 - CONTrol: 0x70
 - EYEs: 0x48
- * I2C slave addresses:
 - USB-PD: 0x28
 - Mux: 0x70 (1,2)
 - Charger: 0x6D
 - Leg-control: 0x60-0x63
 - Leg-isense: 0x70-0x73

Carrier connector

- 1 - NC
- 2 - GND
- 3 - \MASTER_FAULT
- 4 - NC
- 5 - \BATTERY_LOW
- 6 - NC
- 7 - SELF_TEST_OK
- 8 - NC
- 9 - RX (Carrier TX)
- 10 - TX (Carrier RX)

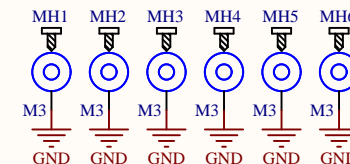
External connector

- 1 - SCL
- 2 - GND
- 3 - GND
- 4 - SDA
- 5 - VS
- 6 - VS



Symbols

- Power
- Control
- LARGEcase names indicate the parts' corresponding interface name.



Title **ASH Power - Cover**

GPA Robotics

Size: **A4**

Number: **1**

Revision: **1**

Date: **2020-04-01**

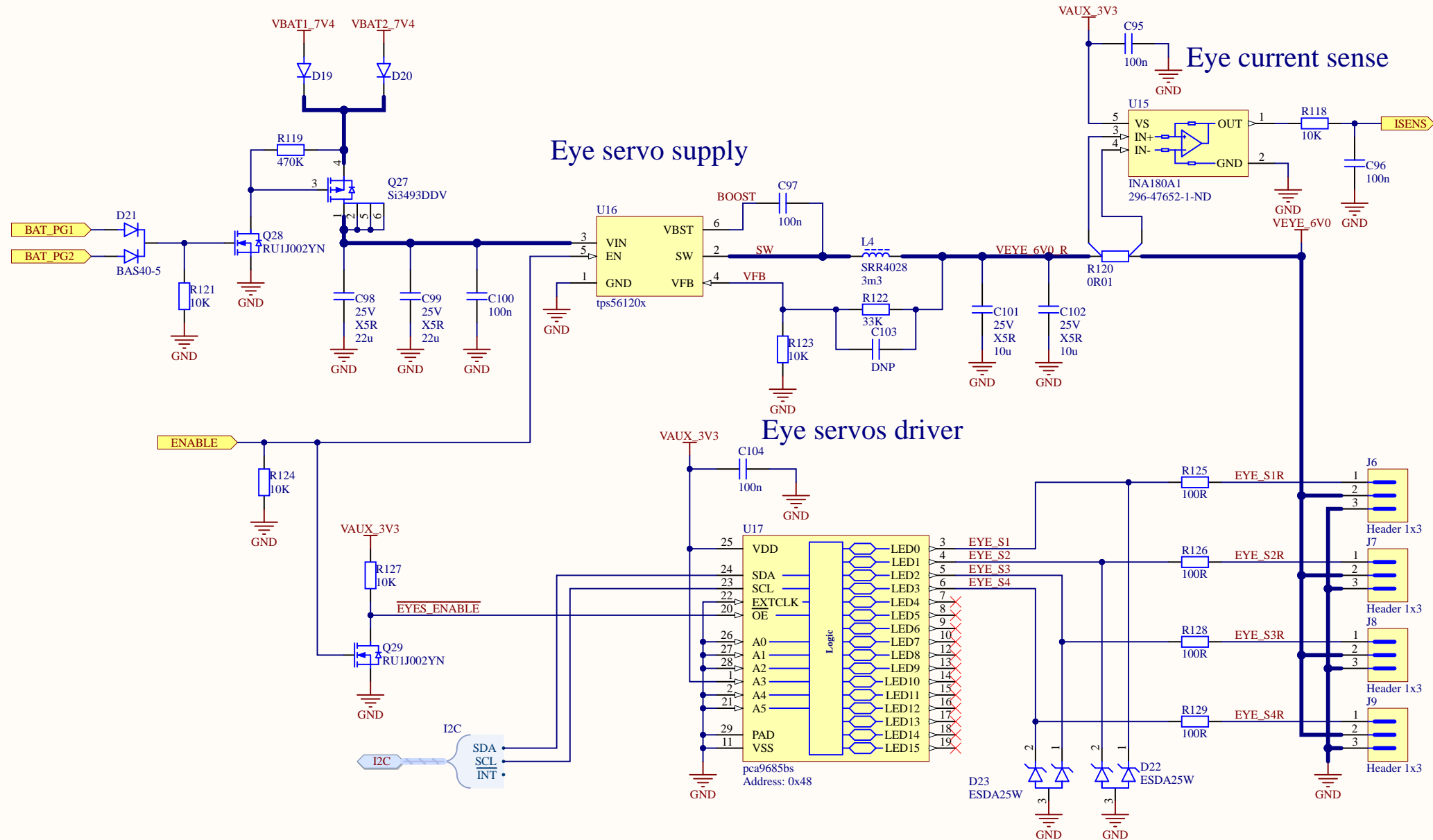
Time: **22:38:14**

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Repo: <https://github.com/Atmelfan/pcb-ash-power.git>







Title **ASH Power - Eye servos**

GPA Robotics

Size: **A4**

Number: **3**

Revision: **1**

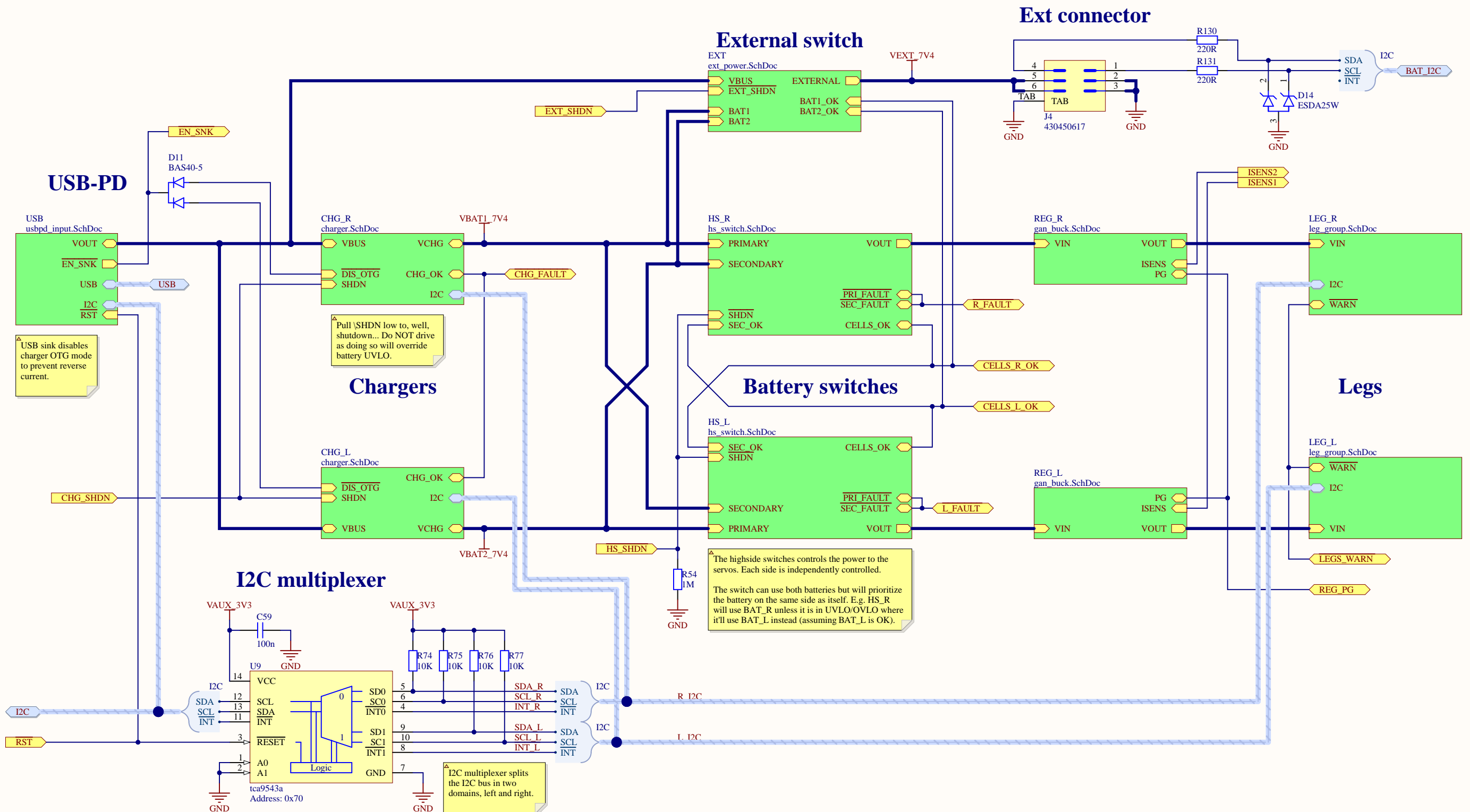
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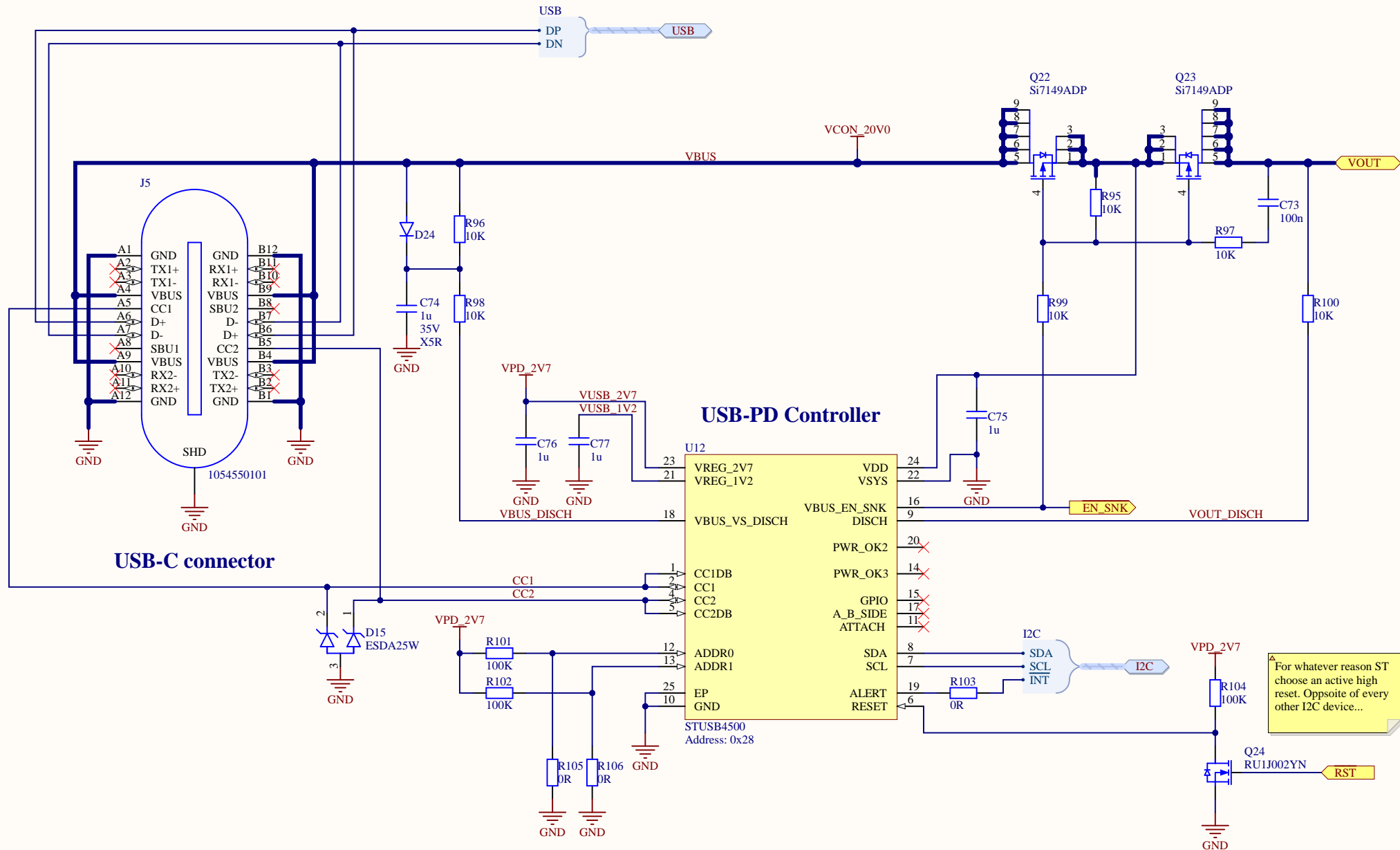
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Repo: <https://github.com/Atmelfan/pcb-ash-power.git>







Title **ASH Power - USB-PD**

GPA Robotics

Size: **A4**

Number: **5**

Revision: **1**

Date: **2020-04-01**

Time: **22:38:14**

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Repo: <https://github.com/Atmelfan/pcb-ash-power.git>



A

A

B

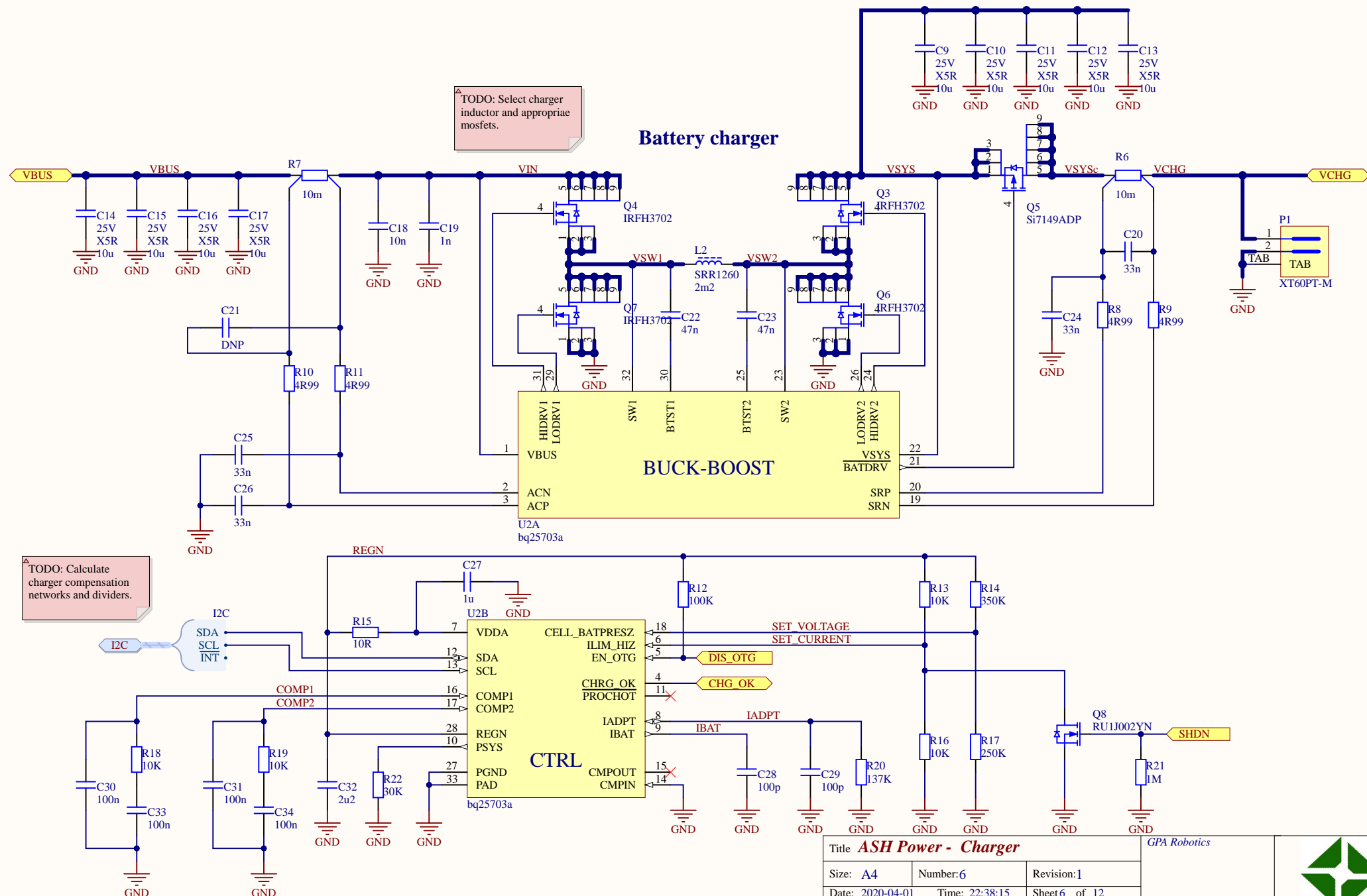
B

C

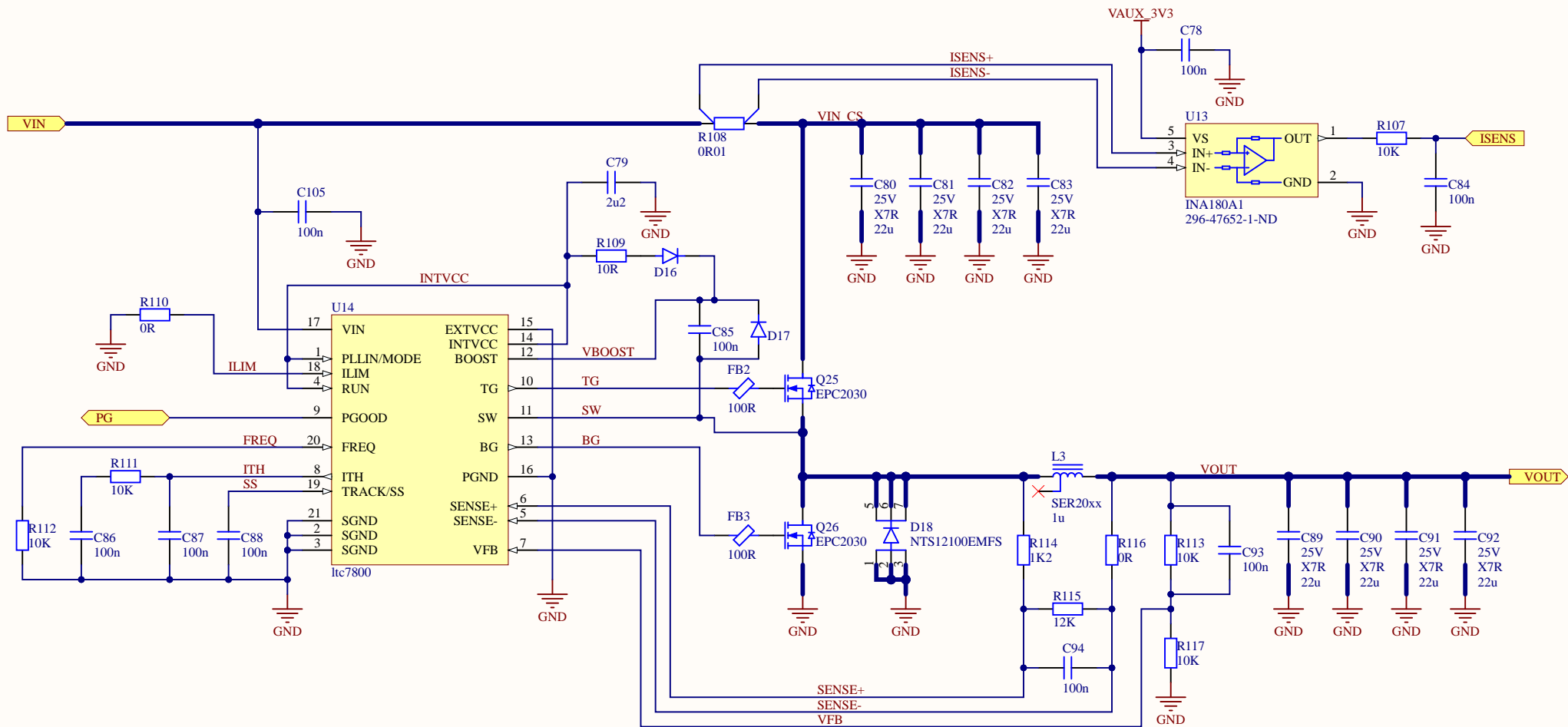
C

D

D







Title **ASH Power - GaN Step-down**

GPA Robotics

Size: **A4**

Number: **8**

Revision: **1**

Date: **2020-04-01**

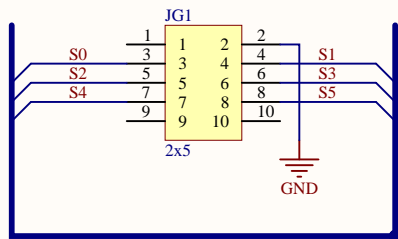
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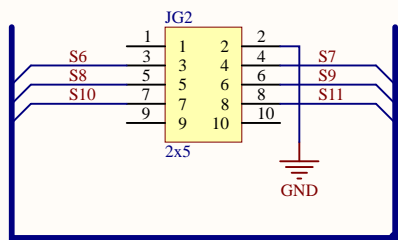
Repo: <https://github.com/Atmelfan/pcb-ash-power.git>



Front pair

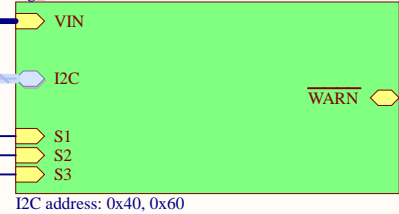


Back pair



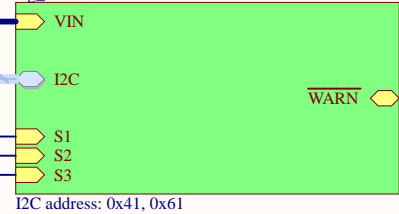
LEG1

leg_module.SchDoc



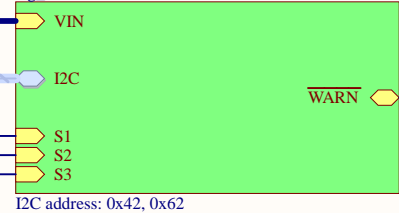
LEG2

leg_module.SchDoc



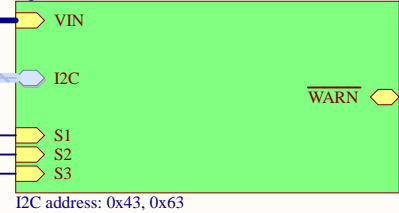
LEG3

leg_module.SchDoc



LEG4

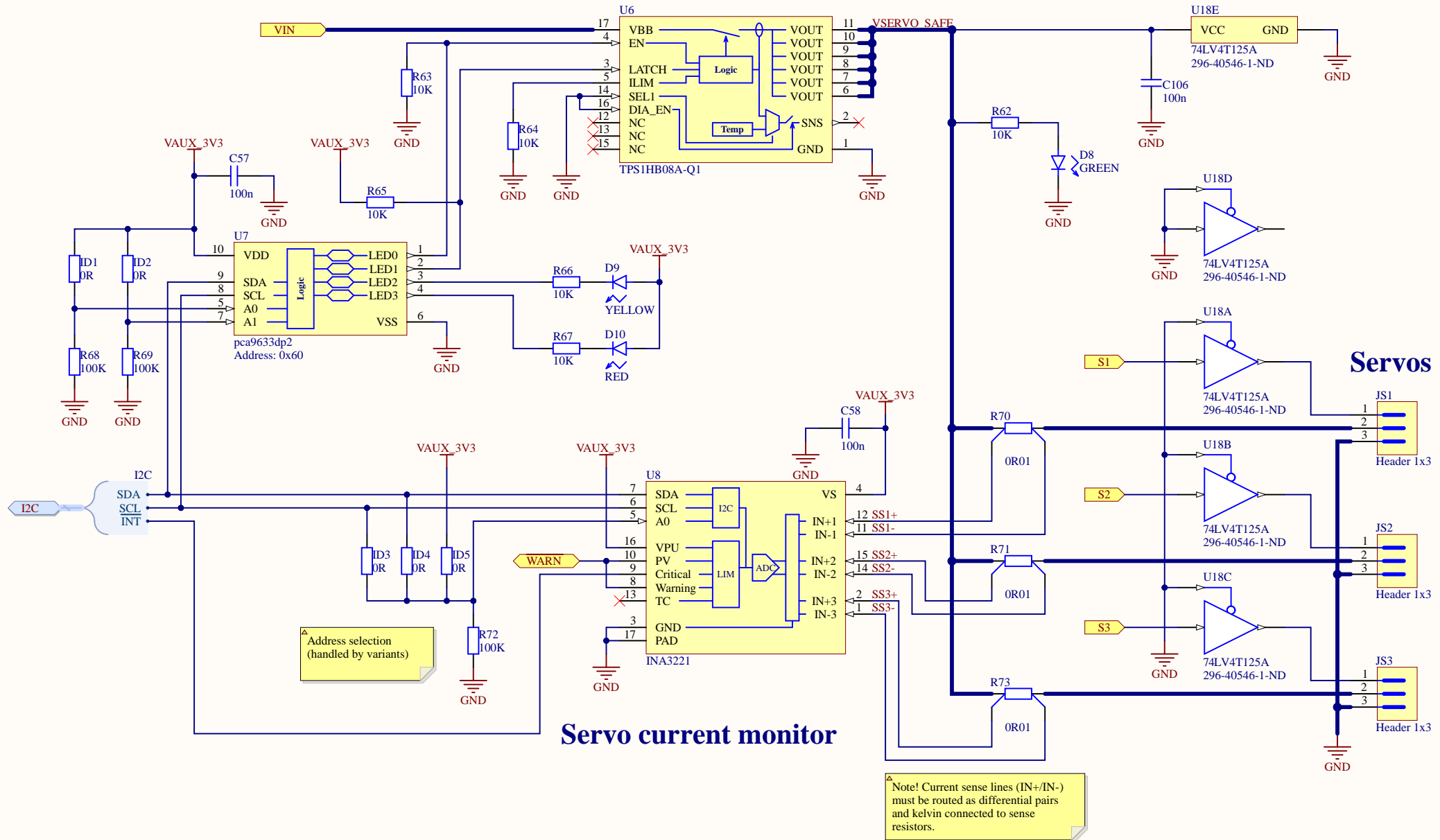
leg_module.SchDoc



The board has two leg groups, right and left. Each group consists of four legs which is further divided into two pairs, front and back. Each pair has a input PWM signal connector (JG1 and JG2).

Each leg has its own independent step-down converter and power monitor (for each of the legs three servos).



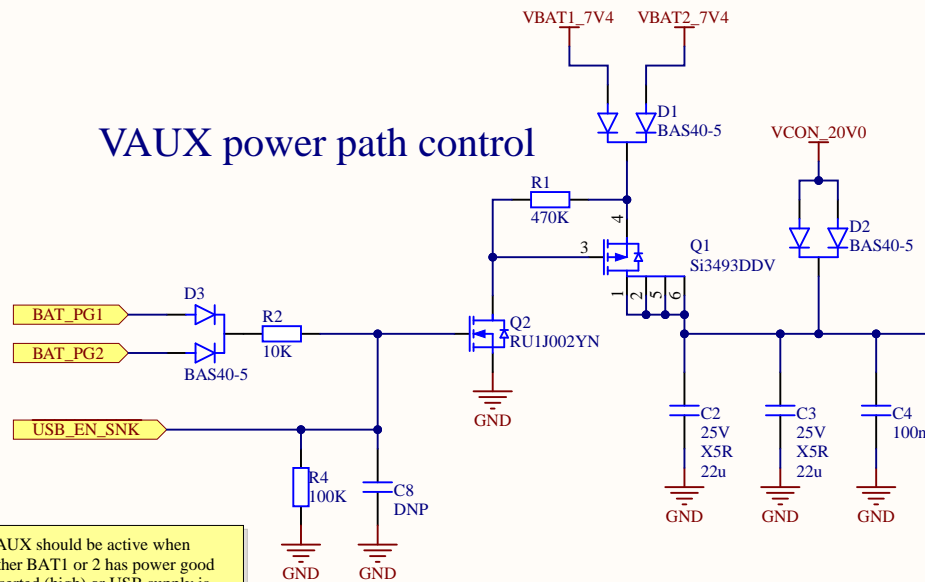


Servo current monitor

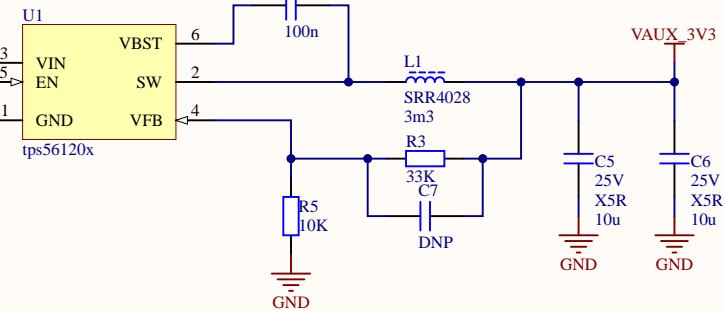
Servos

Note! Current sense lines (IN+/IN-) must be routed as differential pairs and kelvin connected to sense resistors.

VAUX power path control



VAUX supply



VAUX supplies the control circuitry of the power board.

VAUX should be active when either BAT1 or 2 has power good asserted (high) or USB supply is available.

If USB supply is available (5-20V) batteries should not be used for VAUX (even if VBATn > VBUS).

Title **ASH Power - AUX supply**

GPA Robotics

Size: **A4**

Number: **11**

Revision: **1**

Date: **2020-04-01**

Time: **22:38:15**

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Repo: <https://github.com/Atmelfan/pcb-ash-power.git>



A

B

C

D

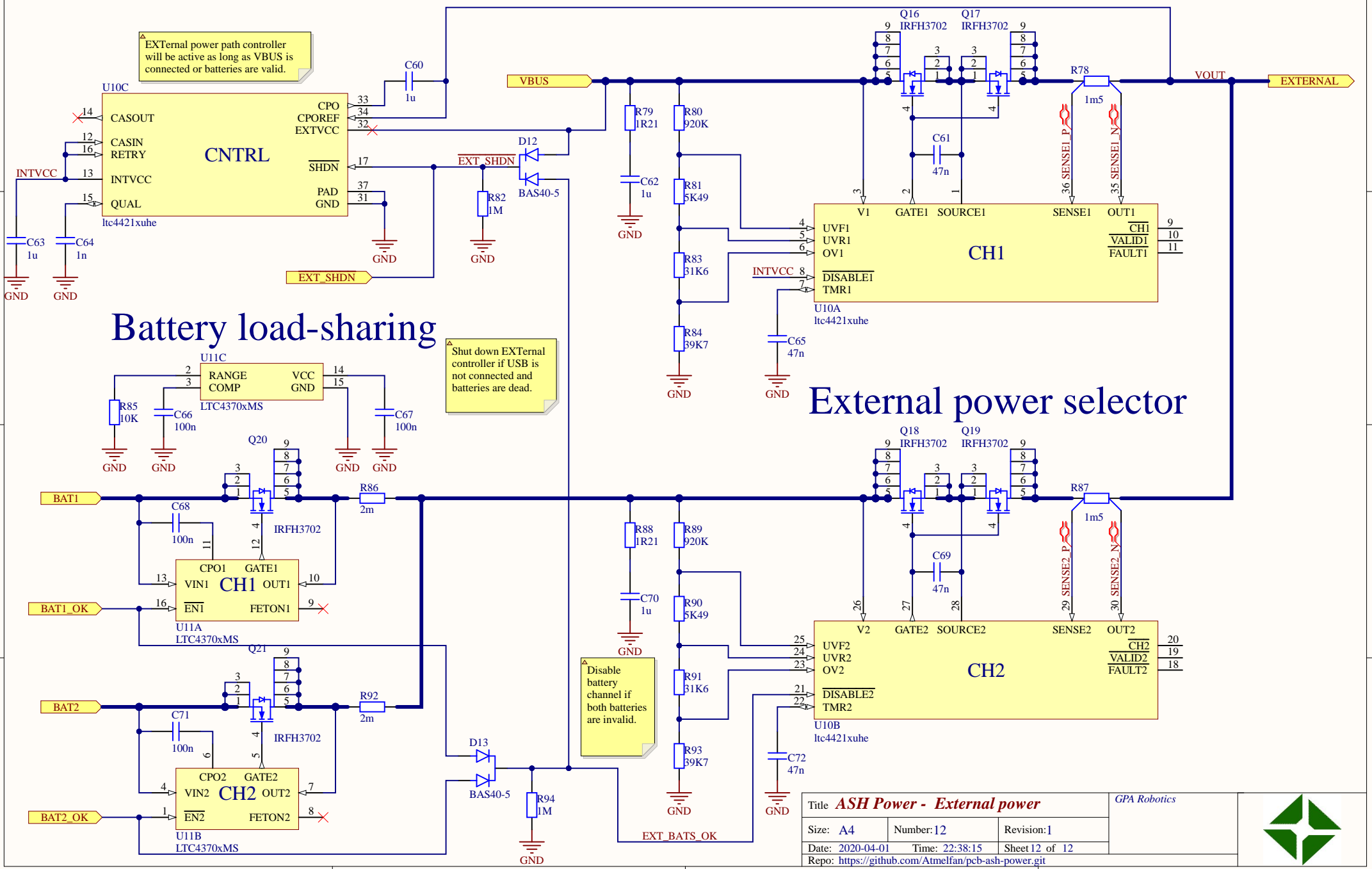
A

B

C

D

EXTERNAL power path controller will be active as long as VBUS is connected or batteries are valid.



Title **ASH Power - External power**

GPA Robotics

Size: A4

Number: 12

Revision: 1

Date: 2020-04-01

Time: 22:38:15

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Repo: <https://github.com/Atmelfan/pcb-ash-power.git>

