

ISO amp full scale range is $\pm 300\text{mV}$
 gain is 8.2
 current config: $400\text{V} = 202\text{mV}$
 $R = 10\text{k Ohm}$

High Voltage measurement

Wim Boone

Sheet: /HV measurement/

File: hv_sense.kicad_sch

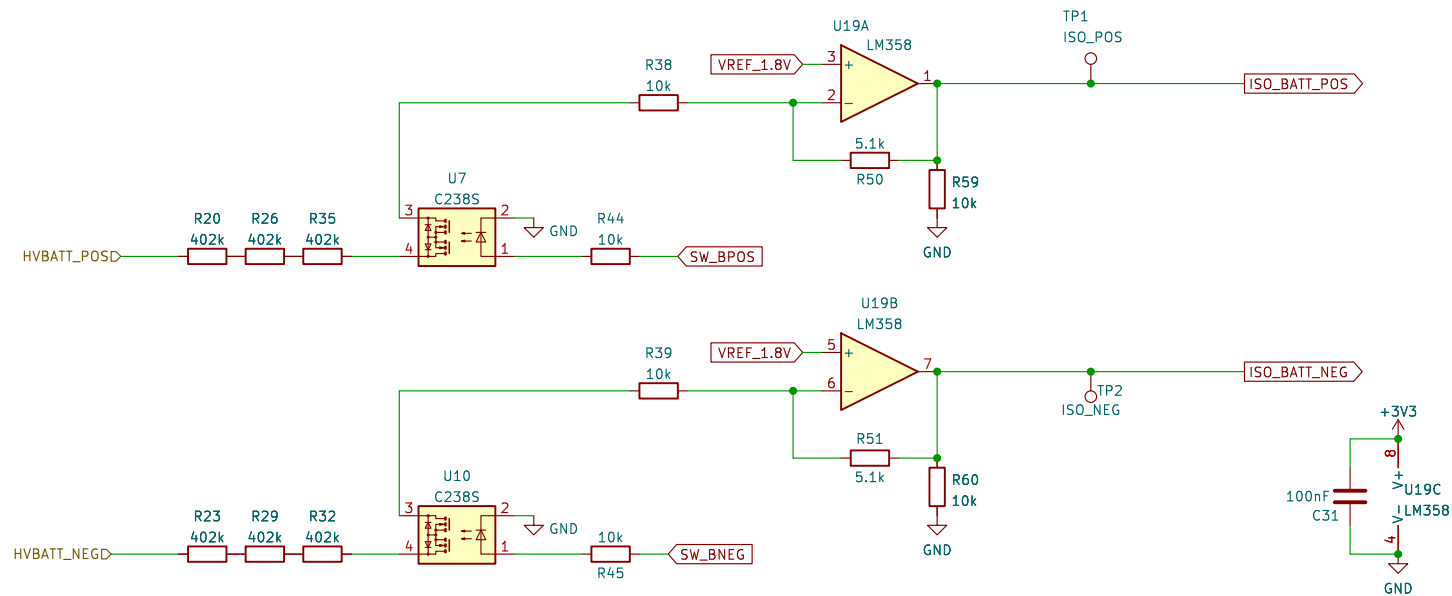
Title: Tesla Model 3 Battery Controller

Size: A4 Date: 2022-03-23

KiCad E.D.A. kicad 7.0.7

Rev: v0.3

Id: 3/13



Isolation Resistance measurement

Wim Boone

Sheet: /Iso fault detection/
File: isofault_det.kicad_sch

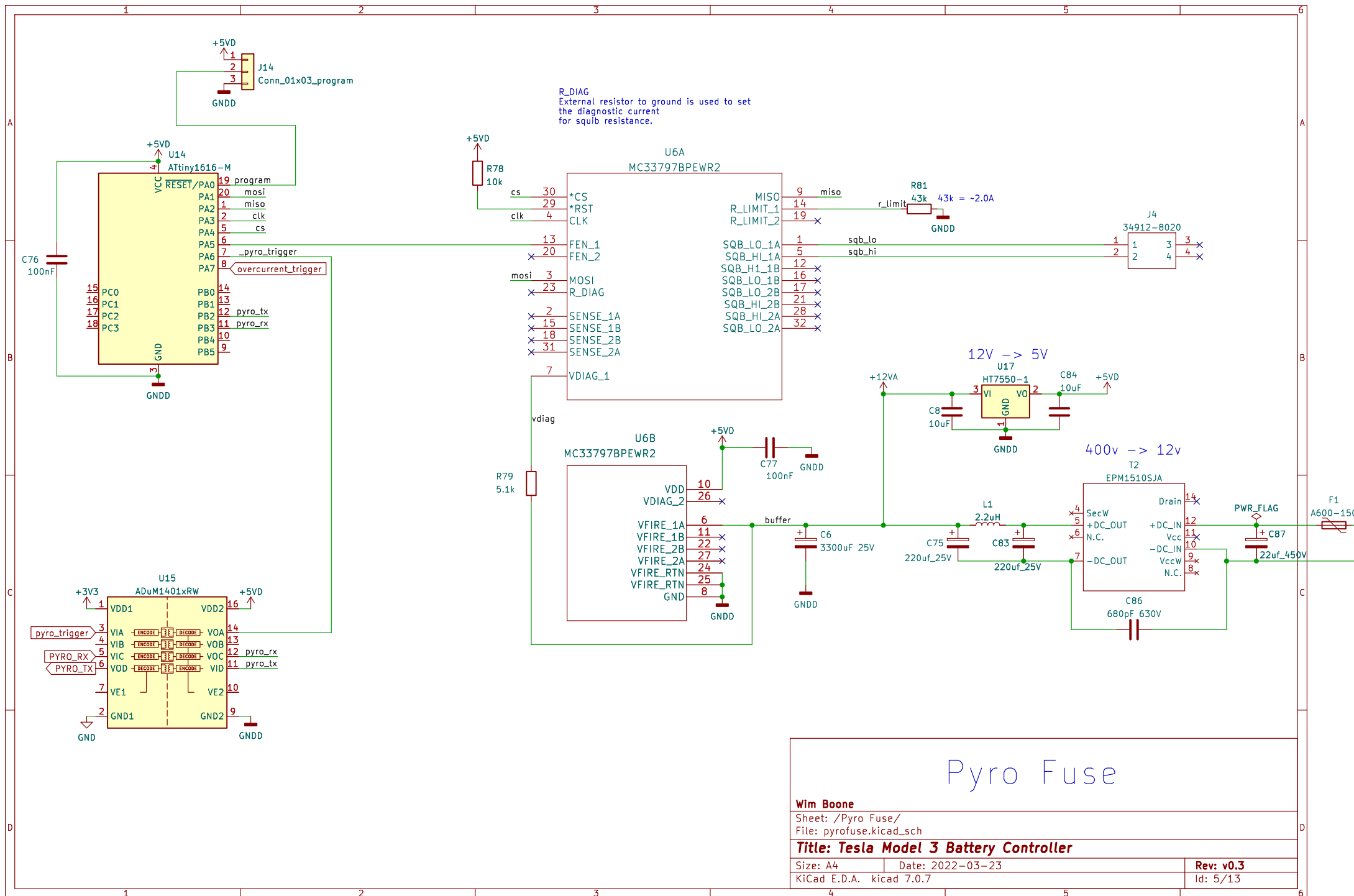
Title: Tesla Model 3 Battery Controller

Size: A4 Date: 2022-03-23

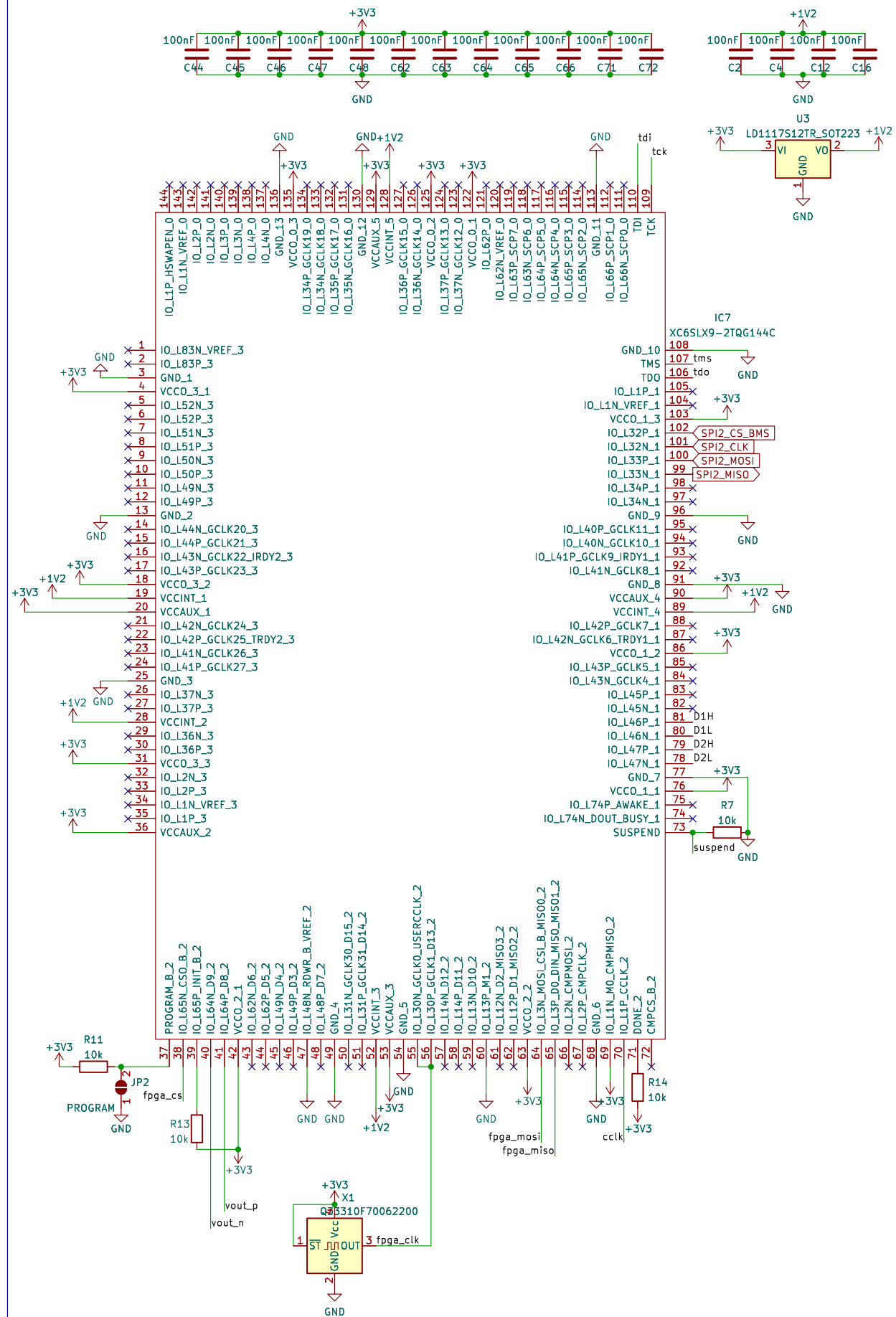
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Rev: v0.3

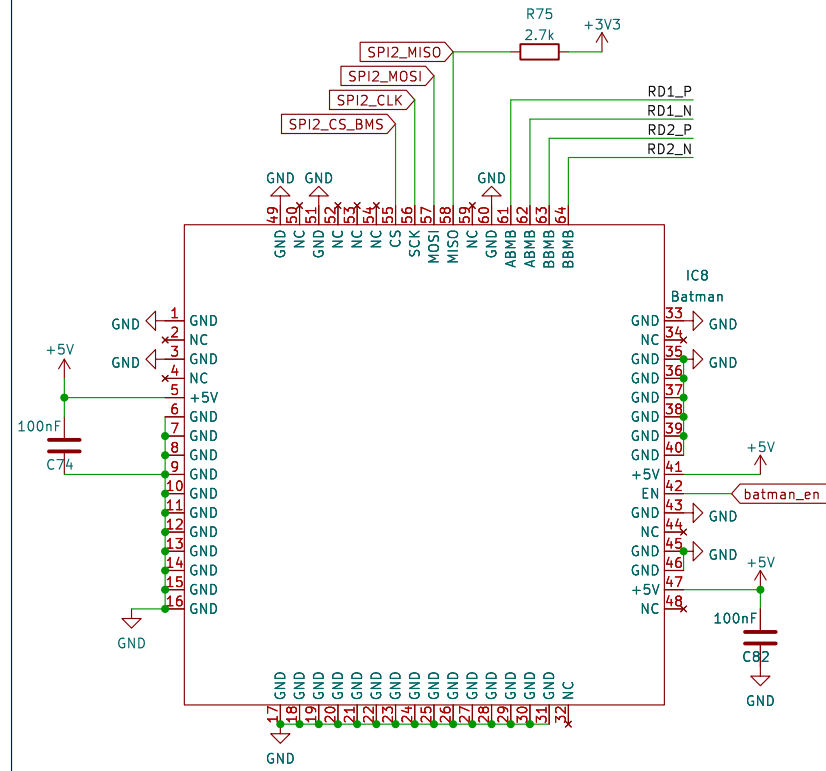
Id: 4/13



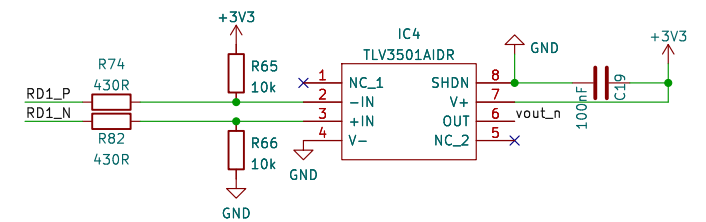
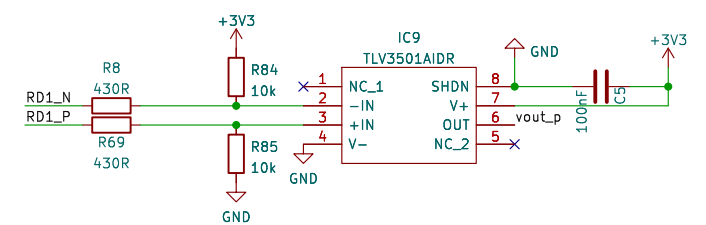
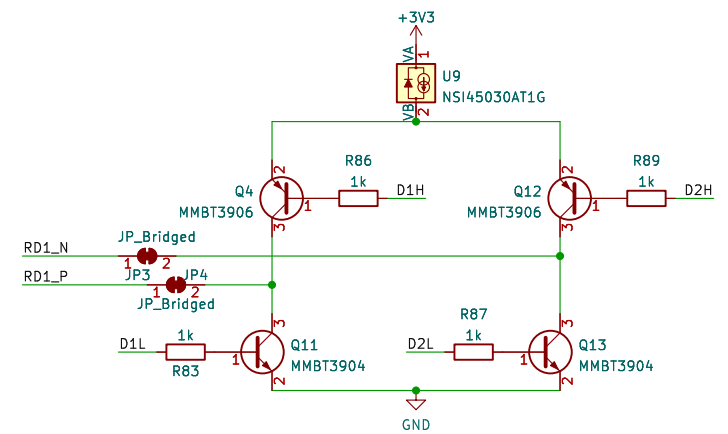
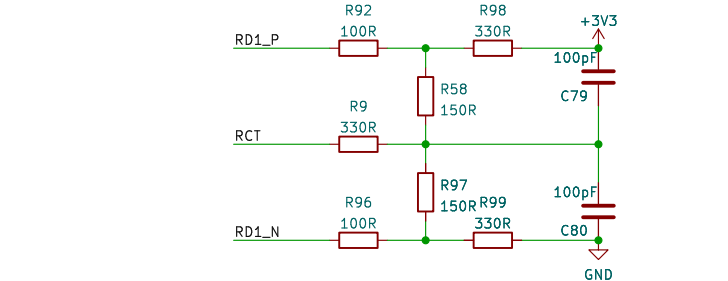
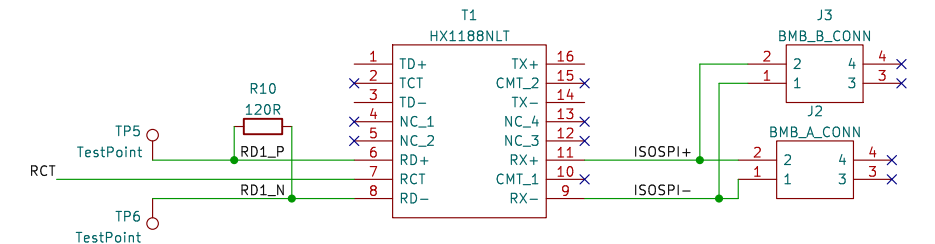
FPGA for Tesla M3 BMS slaves



Batman for Tesla M3 BMS slaves



BMS ISO-SPI

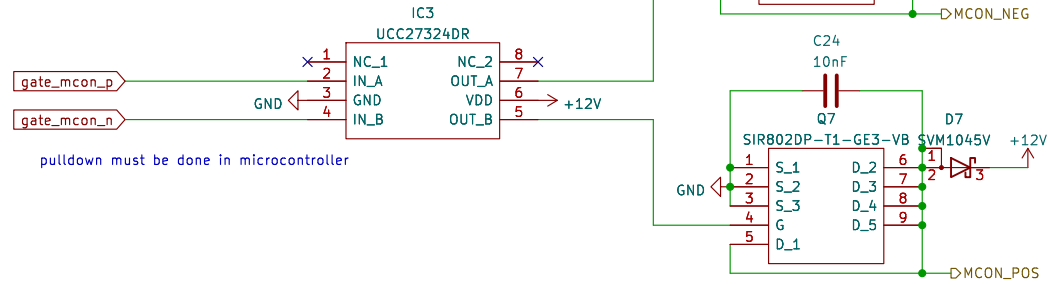


BMS communication

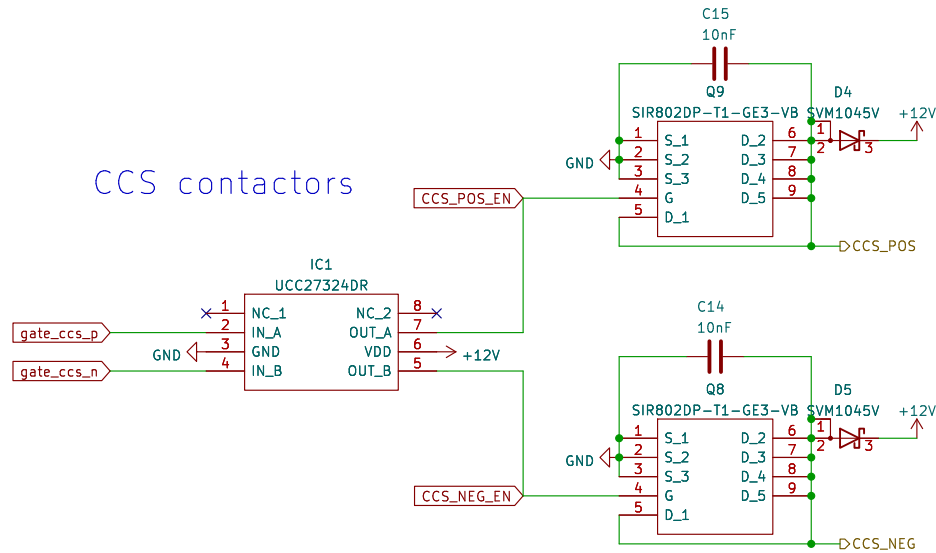
Wim Boone		
Sheet: /BMS communication/ File: bms.kicad_sch		
Title: Tesla Model 3 Battery Controller		
Size: A3	Date: 2022-03-23	Rev: v0.3
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ss54 400mV@1A 25C old
 30BQ015 280mV@1A 25C X
 SVM1045V 290mV@1A 25C 370mV@5A 25C
 ST54BF 270mV@1A 25C 370mV@5A 25C
 best: SVM1045V

Main battery contactors



CCS contactors



Contactors

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Sheet: /Contactors/

File: contactors.kicad_sch

Title: Tesla Model 3 Battery Controller

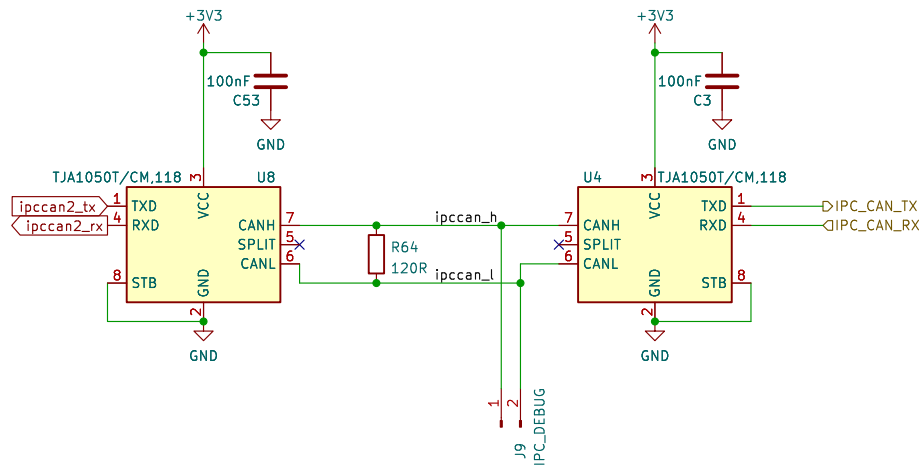
Size: A4 Date: 2022-03-23

KiCad E.D.A. kicad 7.0.7

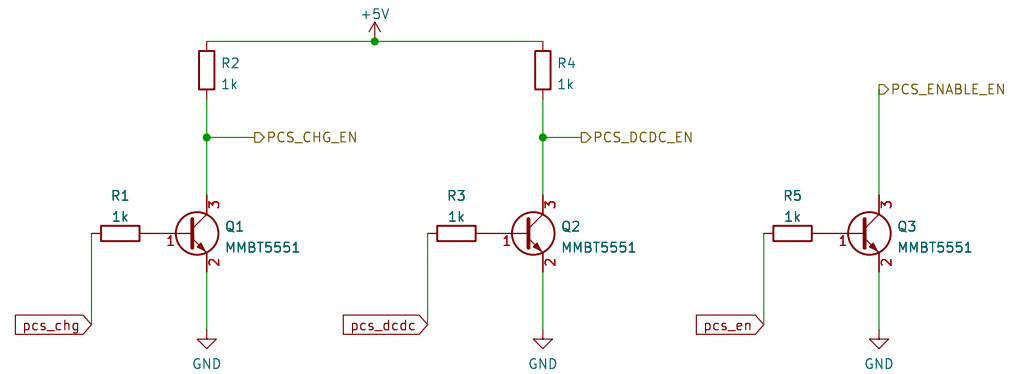
Rev: v0.3

Id: 8/13

IPC-CAN



PCS enable control



PCS Control

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Sheet: /PCS control/

File: pcs.kicad_sch

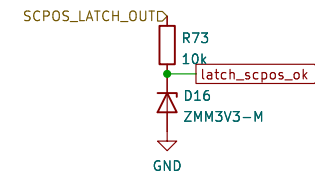
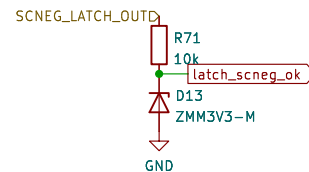
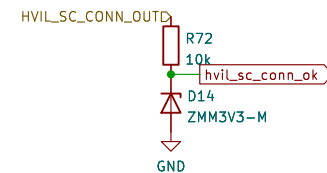
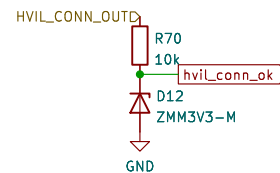
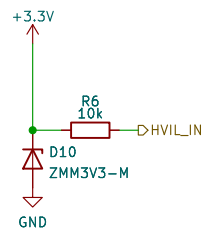
Title: Tesla Model 3 Battery Controller

Size: A4 Date: 2022-03-23

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Rev: v0.3

Id: 9/13



HVIL and continuity check

Wim Boone

Sheet: /HVIL safety/

File: hvil.kicad_sch

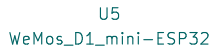
Title: Tesla Model 3 Battery Controller

Size: A4 Date: 2022-03-23

KiCad E.D.A. kicad 7.0.7

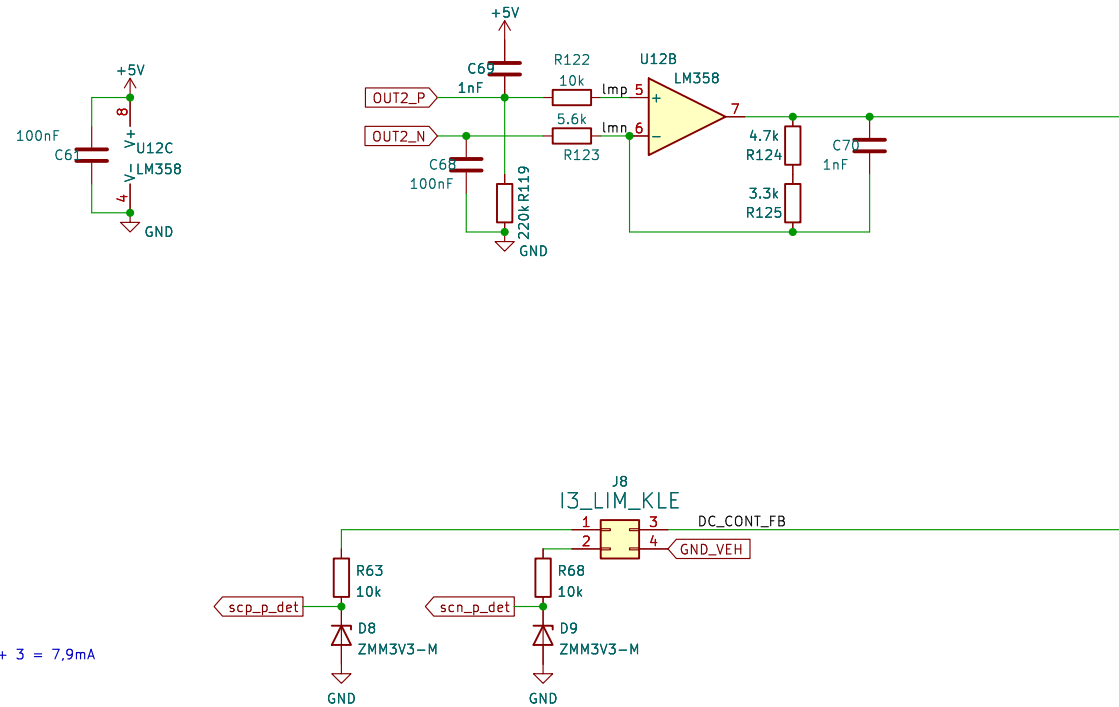
Rev: v0.3

Id: 10/13



Id: 11/13

I3 LIM KLE



DC FC contactors
 0V = 3 mA
 1V = 0.014mA
 $350V = (0.014 * 350) + 3 = 7.9mA$
 Output = 0-5v max

0V @ contactor side = 1.25V middle of iso amp

for 8,6mA @ 400V and 5v output
 with 581R and 3mA a voltage of 1,743V is required

0-400V means iso amp of scale 1,25 - 2,906V (diff = 1.656)
 output scale must be 1.743 - 5V (diff = 3,257)
 gain difference = 1,97
 after gain scale = 2,459 - 5,716V
 have to subtract 0,7V

gain = 1,963
 input res = 4.7k and fb res = 4.53k

Wim Boone

Sheet: /I3 LIM feedback/
 File: lim_controller.kicad_sch

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Size: A4 Date: 2022-03-23

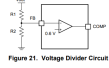
KiCad E.D.A. kicad 7.0.7

Rev: v0.3

Id: 13/13

Power supply for 3.3V & 5V

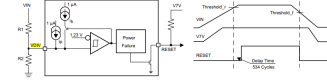
6.3.1 Adjusting the Output Voltage
The output voltage of each buck is set with a resistor divider from the output of back to the FB pin. It is recommended to use 1% tolerance of resistor.



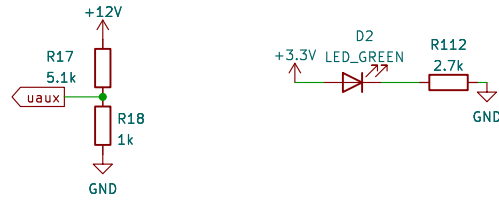
$$V_{out} = V_{in} \times \frac{R2}{R1 + R2}$$

7.3.2 Power Failure Detector

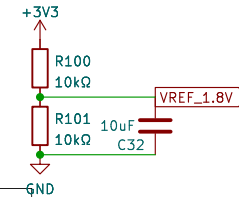
The power failure detector monitors the voltage on **VDD** and sets open-drain output RESET low when **VDD** is below 1.20V. There is a delay on the rising edge. 50K frequency cycles. Figure 7-2 shows the power failure detector timing diagram.



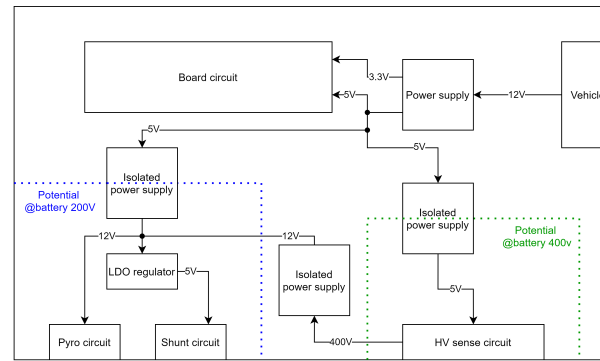
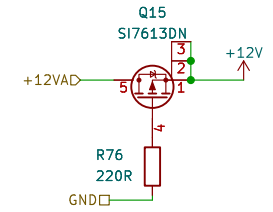
Indicator LEDs



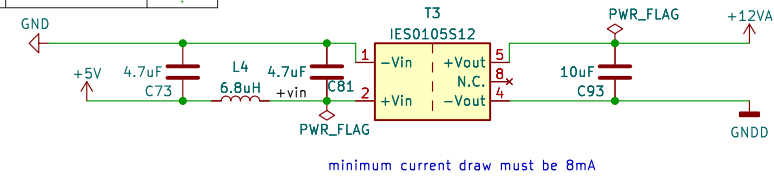
Reference Voltage for isolation monitoring



Reverse voltage protection

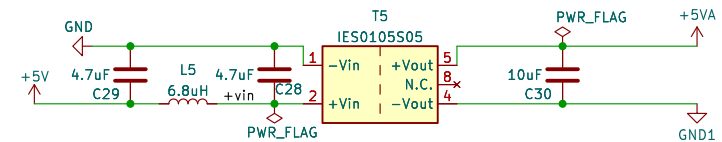


Isolated Power supply for shunt circuit



minimum current draw must be 8mA

Isolated Power supply for voltage measurement



Power supply

Wim Boone

Sheet: /Power supply/

File: power_supply.kicad_sch

Title: Tesla Model 3 Battery Controller

Size: A4

Date: 2022-03-23

KiCad E.D.A. kicad 7.0.7

Rev: v0.3

Id: 14/13