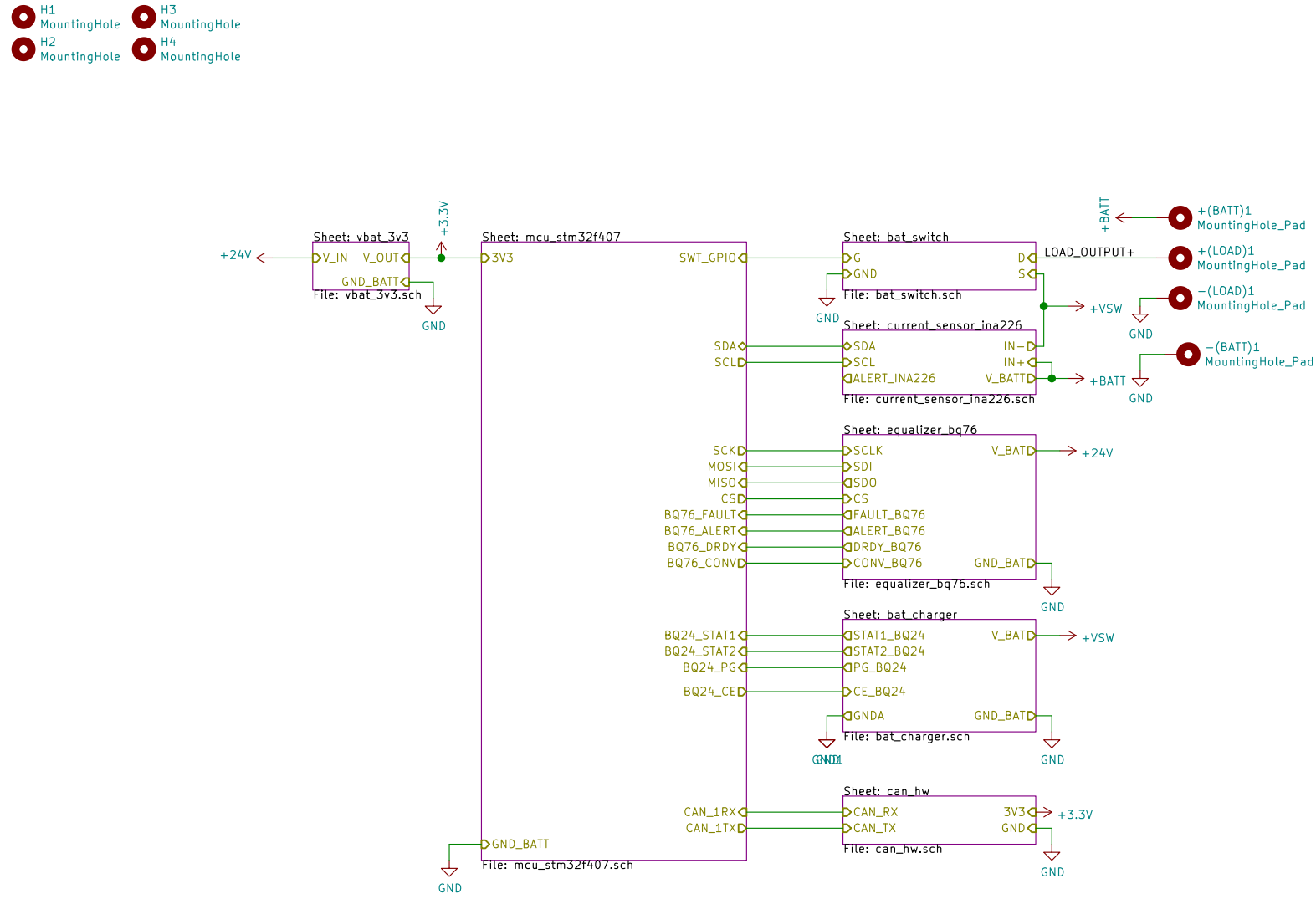

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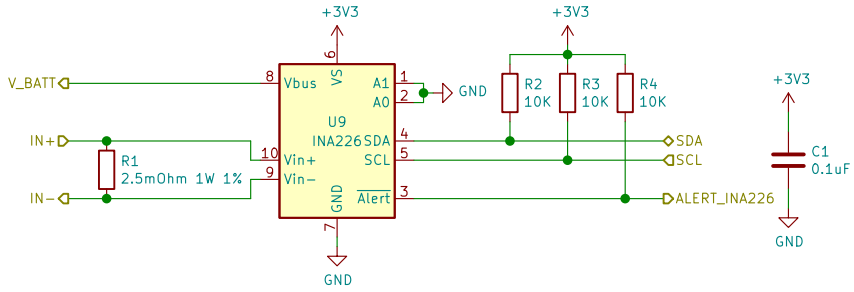
Sheet: /
File: bms_hardware.sch

Title: Battery Managment System (MBS)

Size: A4	Date: 2021-03-03	**Rev: A**
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1		Id: 1/9



NOTAS
– La corriente maxima esperada a consumir es de alrededor de 20A. Por lo tanto, la resistencia calculada es de 2.5mOhm 1W 1%
– La dirección I2C predefinida por los pines A0 y A1 es la 0x80, ya que ambos pines están conectados a masa.
– La entrada de corriente no se filtra ya que no se pretenden corrientes fluctuantes que superen a la tasa de muestre del ADC (500KHz)

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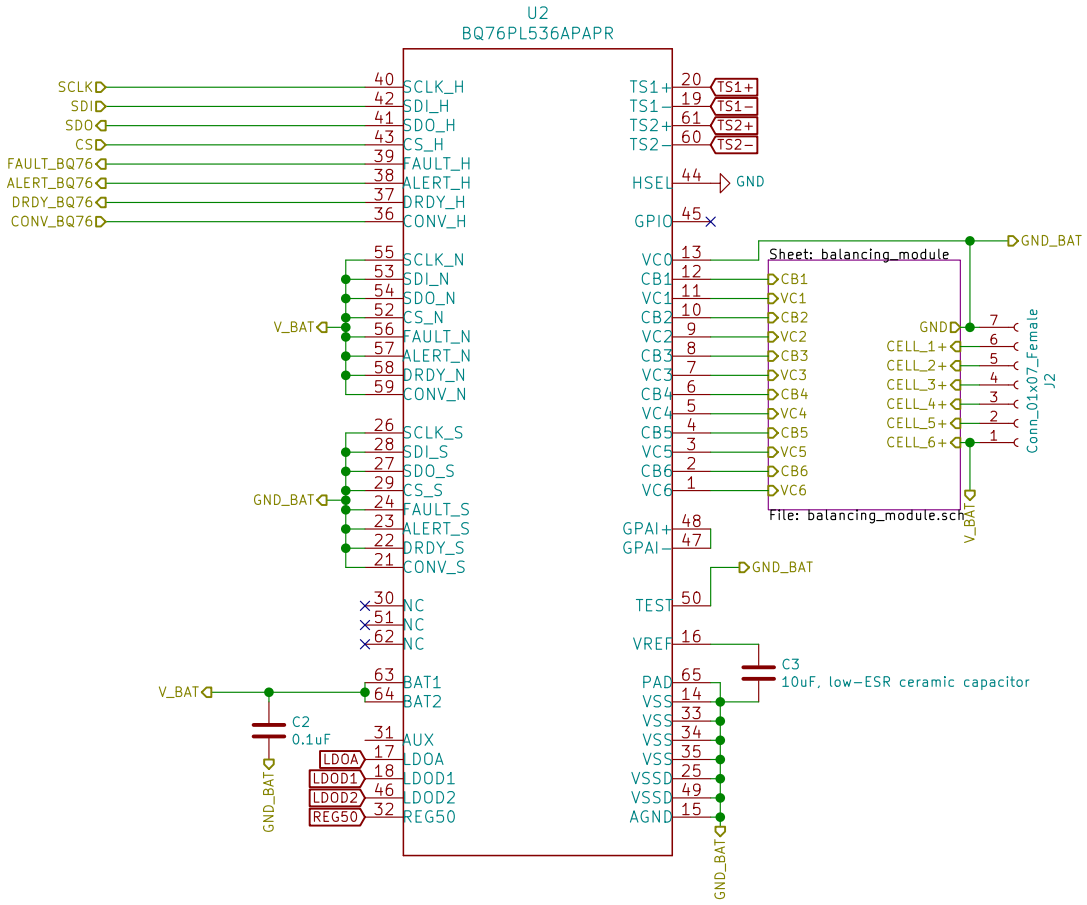
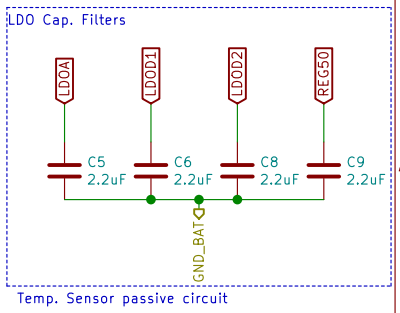
Sheet: /current_sensor_ina226/
File: current_sensor_ina226.sch

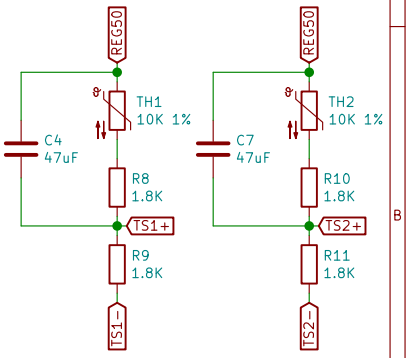
Title: Battery Managment System (MBS)

Size: A4	Date:	**Rev: A**
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1		Id: 2/9

NOTES
– General–purpose (differential) analog input not used. (GPAI+, GPAI– to GND)
– Host interface enable –> HSEL = GND
– GPIO not used –> connected to GND
– TEST pin is a factory test pin, for user purposes it needs to be connected to GND
– LDOA, LDOD1, LDOD2 y REG50 only need a 2.2uF cap for stability







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Sheet: /equalizer_bq76/
File: equalizer_bq76.sch

Title: Battery Managment System (MBS)

Size: A4	Date:	**Rev: A**
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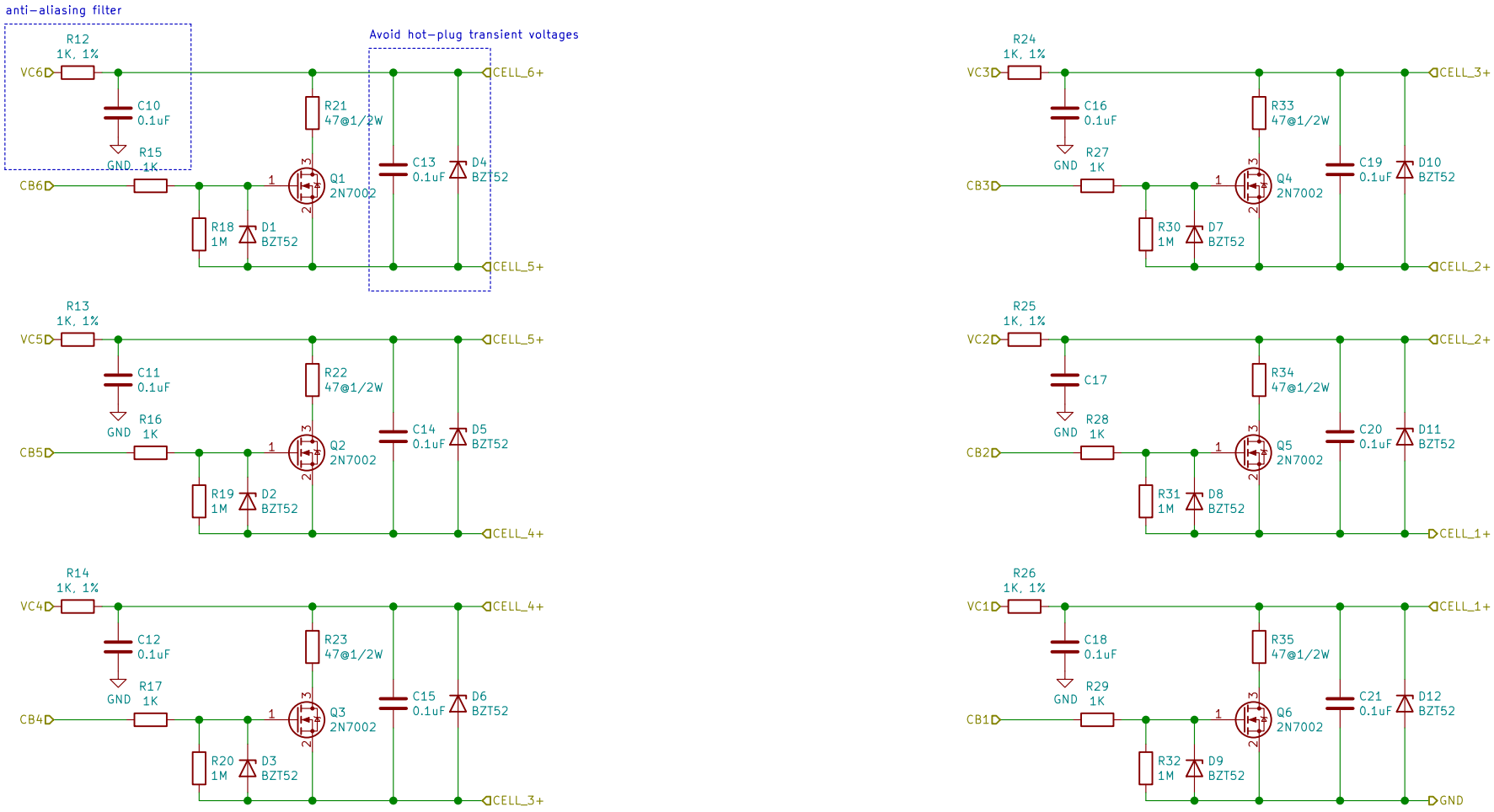

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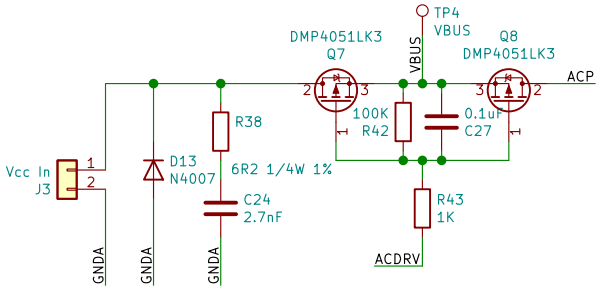
Sheet: /equalizer_bq76/balancing_module/
File: balancing_module.sch

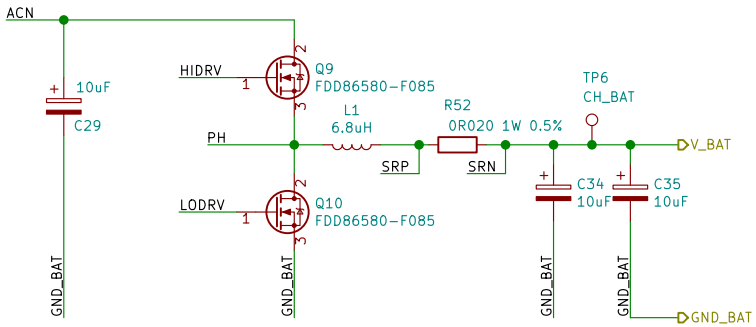
Title: Battery Managment System (MBS)

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.10−88a1d61d5890ubuntu20.04.1		Id: 4/9

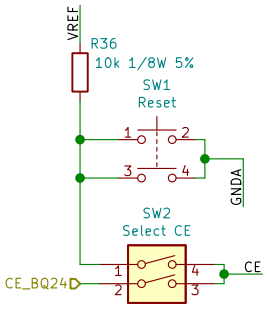
Input



Output

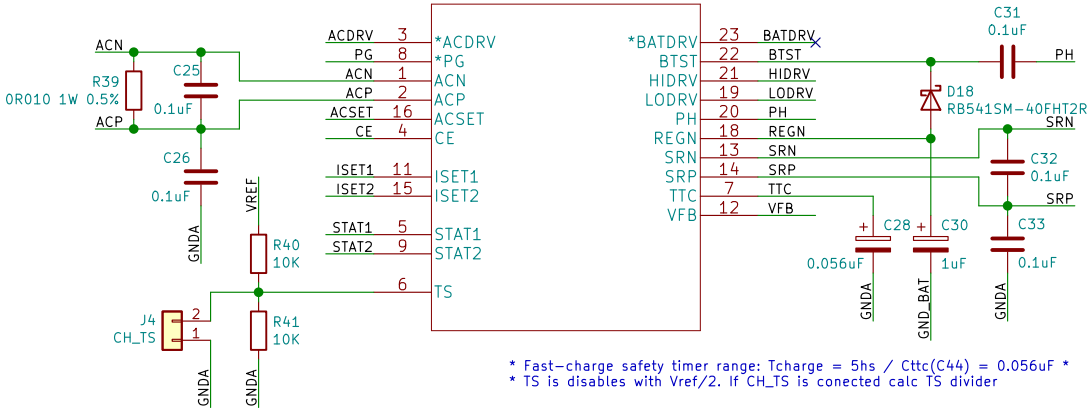


Reset & CE Source Selector



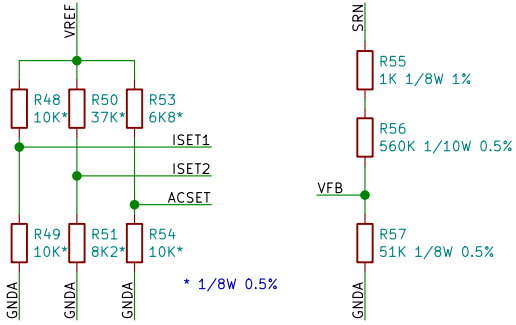
* 1 ON , 2 OFF: Stand Alone
* 1 OFF , 2 ON : u Controlled

U3A BQ24618RGET



* Fast-charge safety timer range: Tcharge = 5hs / Cttc(C44) = 0.056uF *
* TS is disables with Vref/2. If CH_TS is conected calc TS divider

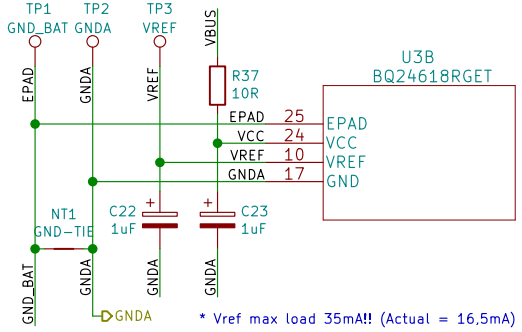
I & V Charging Set Points



* I (pre-charge) = V2set/(100*Rse)
* I (fast charge) = V1set/(20*Rse)
* Icset = max I imput = 5A

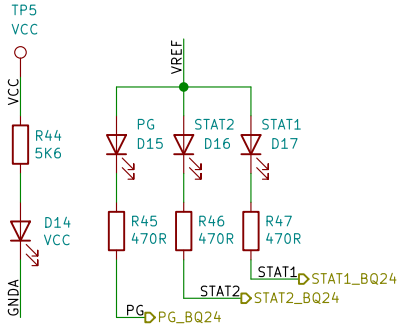
+VBATT = 2.1*[1+(R20+R21)/R22]

* Charge: CC-CV 0.5C (max) 4.20V, 100mA cut-off at 25°C



* Vref max load 35mA!! (Actual = 16,5mA)

Status LEDs & Signals



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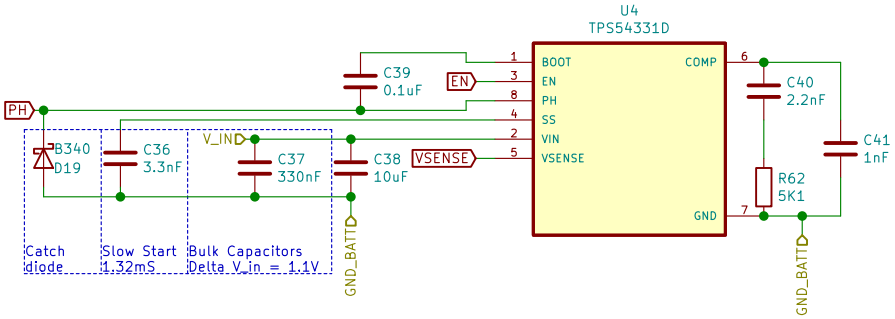
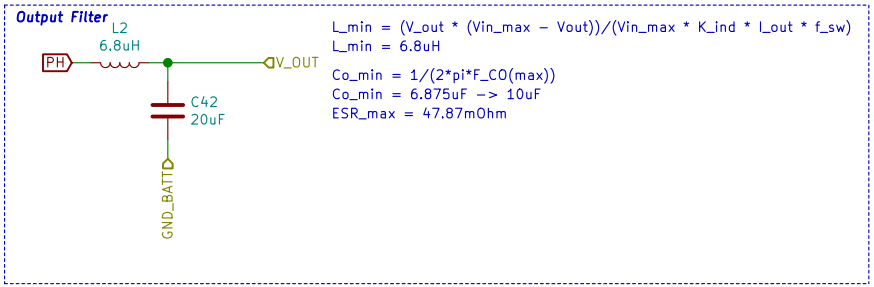
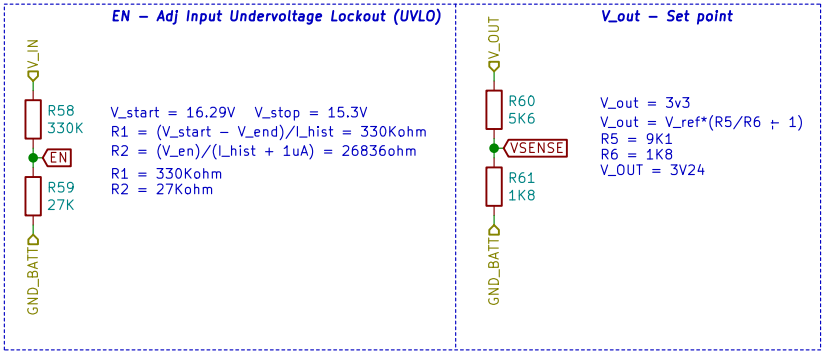
Sheet: /bat_charger/
File: bat_charger.sch

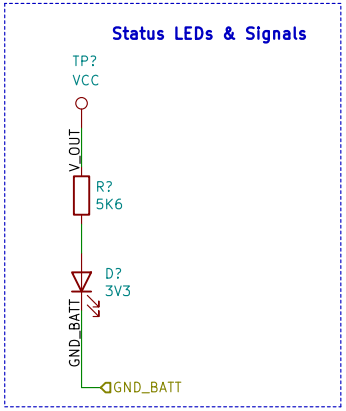
Title: Battery Managment System (MBS)

Size: A4	Date:	Rev: A
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1		Id: 5/9









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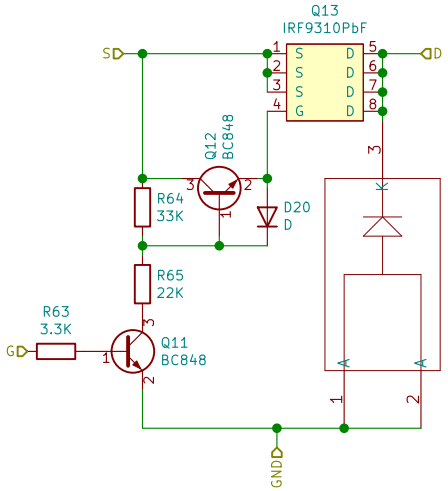
Sheet: /vbat_3v3/
File: vbat_3v3.sch

Title: Battery Managment System (MBS)

Size: A4	Date:	**Rev: A**
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1		Id: 6/9



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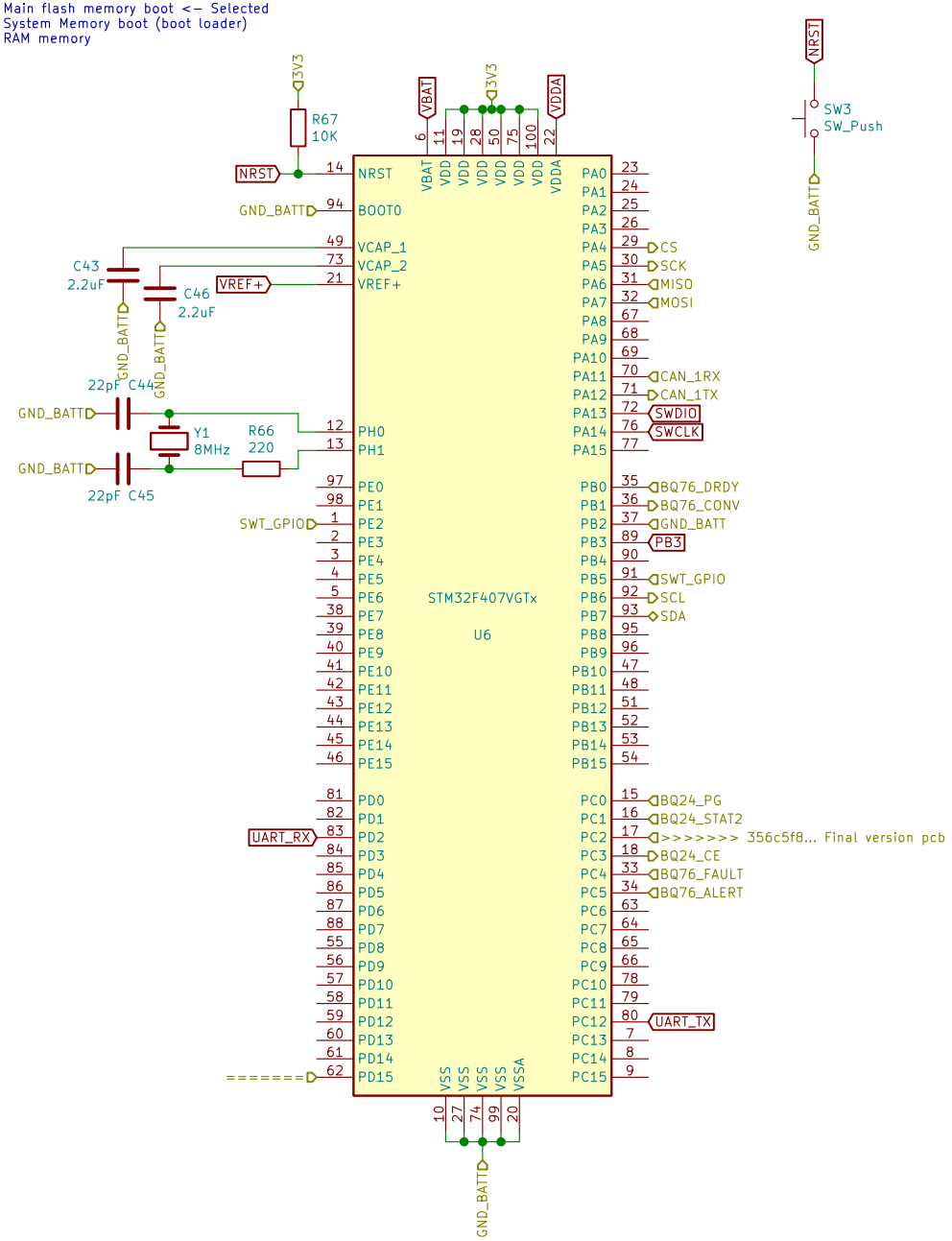
Sheet: /bat_switch/
File: bat_switch.sch

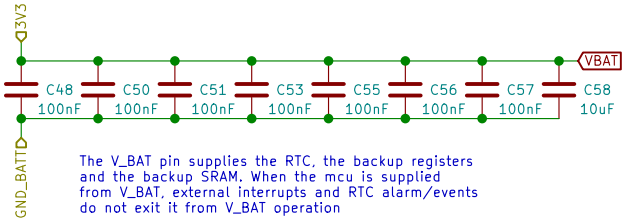
Title: Battery Managment System (MBS)

Size: A4	Date:	**Rev: A**
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1		Id: 7/9

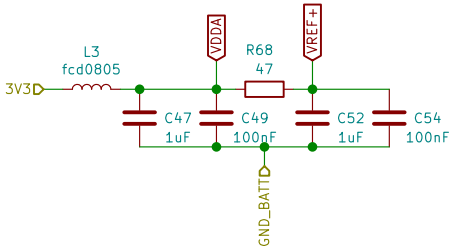
BOOT pins configuration

BOOT 0	BOOT 1	MODE
0	X	Main flash memory boot <- Selected
1	0	System Memory boot (boot loader)
1	1	RAM memory





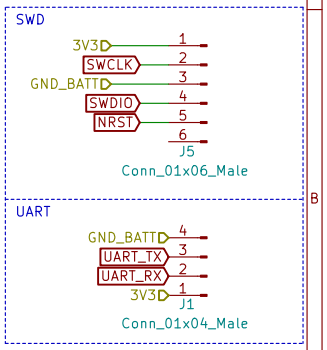
The V_BAT pin supplies the RTC, the backup registers and the backup SRAM. When the mcu is supplied from V_BAT, external interrupts and RTC alarm/events do not exit it from V_BAT operation



The VDD pins must be connected to VDD with external decoupling capacitors: one single Tantalum or Ceramic capacitor (min. 4.7 µF typ. 10 µF) for the package + one 100 nF Ceramic capacitor for each VDD pin.
The VBAT pin can be connected to the external battery (1.65 V < VBAT < 3.6 V). If no external battery is used, it is recommended to connect this pin to VDD with a 100 nF external ceramic decoupling capacitor.

The VDDA pin must be connected to two external decoupling capacitors (100 nF Ceramic + 1 µF Tantalum or Ceramic).

Additional precautions can be taken to filter analog noise:
-VDDA can be connected to VDD through a ferrite bead.
-The VREF+ pin can be connected to VDDA through a 47ohm resistor



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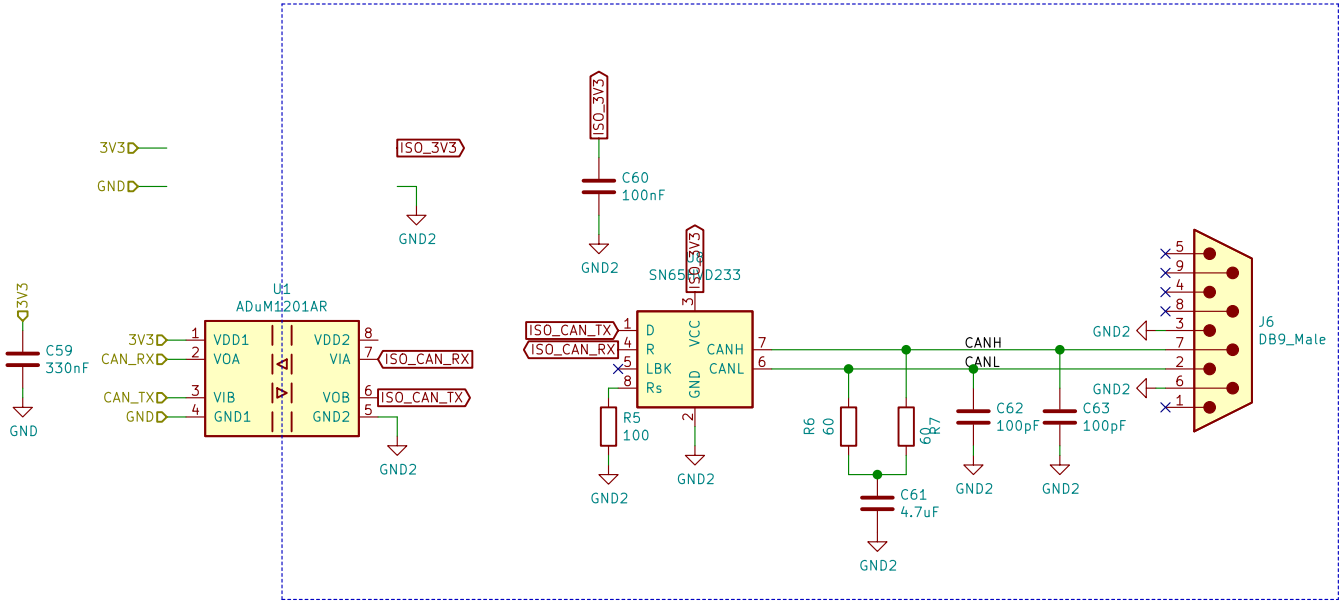
Sheet: /mcu_stm32f407/
File: mcu_stm32f407.sch

Title: Battery Managment System (MBS)

Size: A4	Date:	**Rev: A**
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1		Id: 8/9



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Universidad Nacional de Rosario (UNR)	
Ceccarelli Federico, Moya Martin, Santos Lucio	
Sheet: /can_hw/	
File: can_hw.sch	
Title: Battery Managment System (MBS)	
Size: A4	Date: **Rev: A**
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1	Id: 9/9