

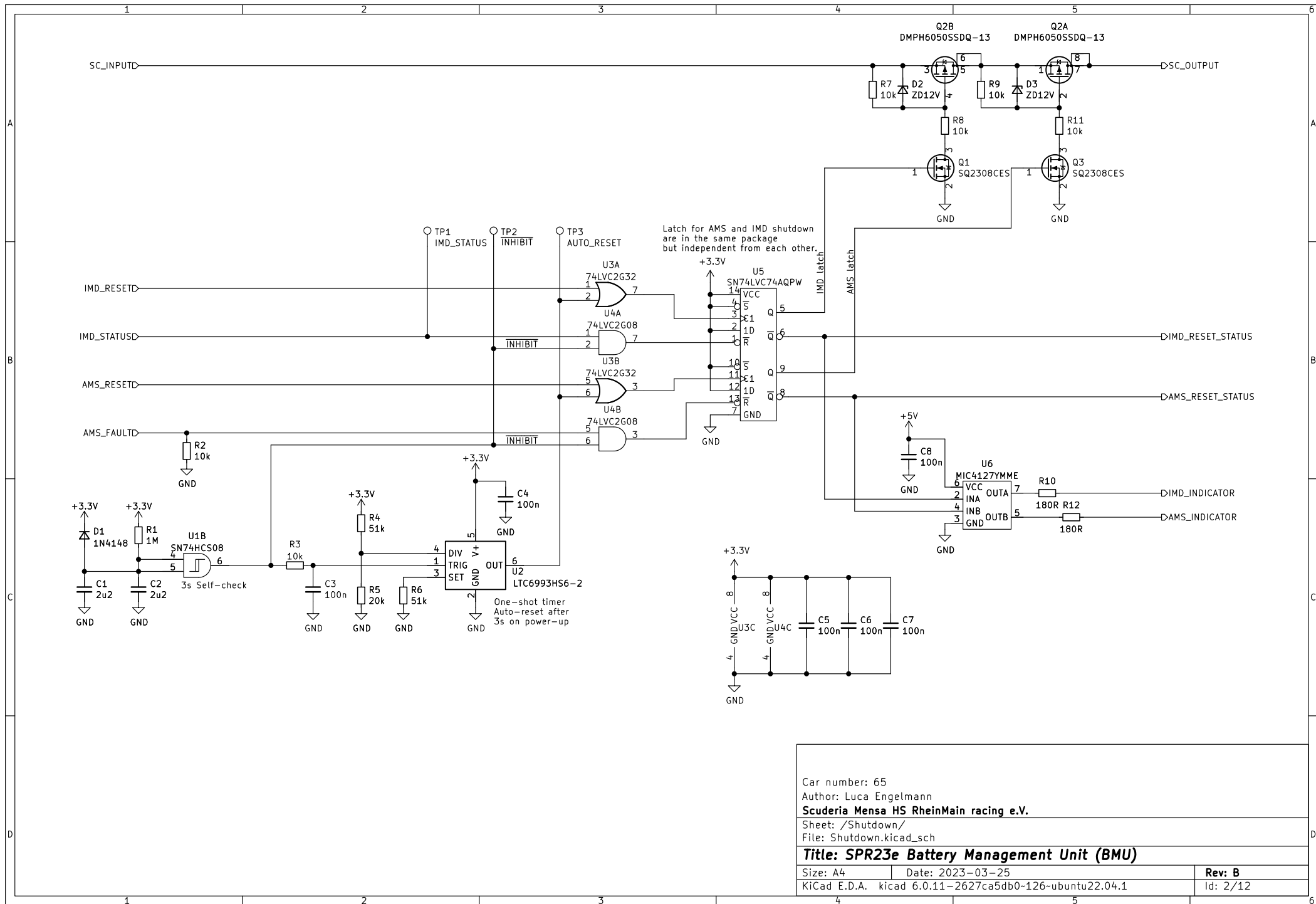
Car number: 65
Author: Luca Engelmann
Scuderia Mensa HS RheinMain racing e.V.

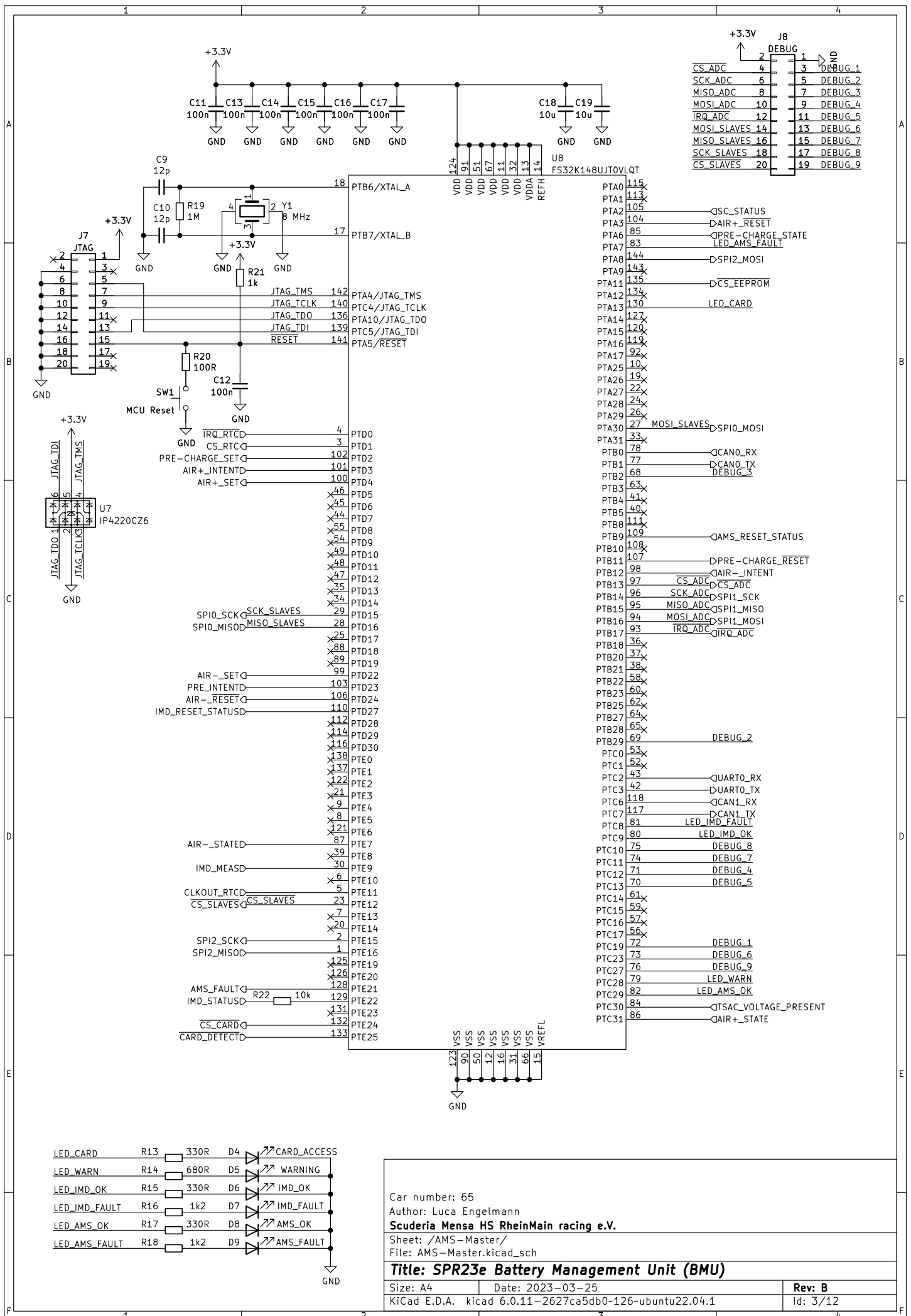
Sheet: /
File: spr23e-bmu.kicad_sch

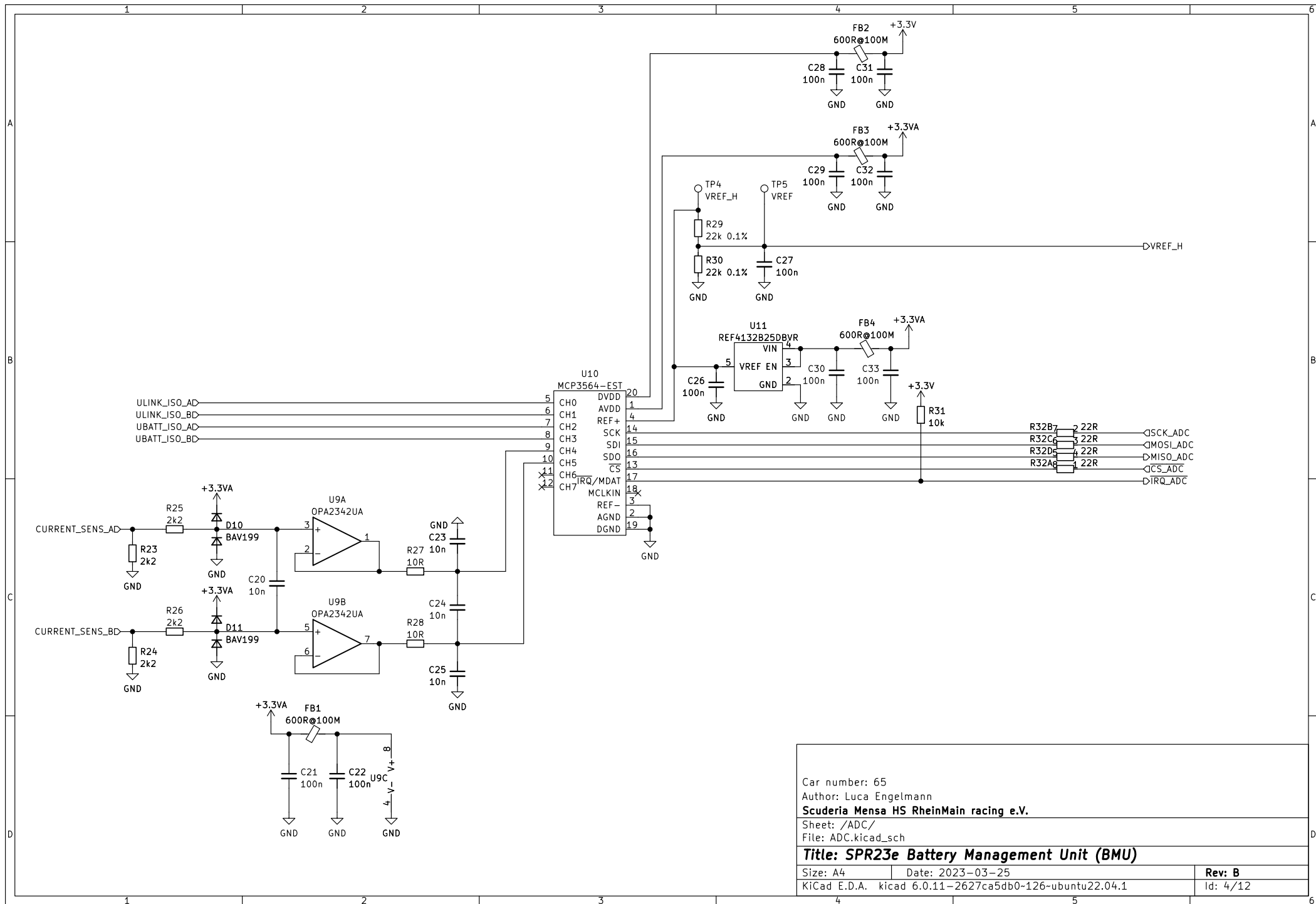
Title: SPR23e Battery Management Unit (BMU)

Size: A4 Date: 2023-03-25
KiCad E.D.A. kicad 6.0.11-2627ca5db0-126-ubuntu22.04.1

Rev: B
Id: 1/12







Car number: 65
Author: Luca Engelmann
Scuderia Mensa HS RheinMain racing e.V.

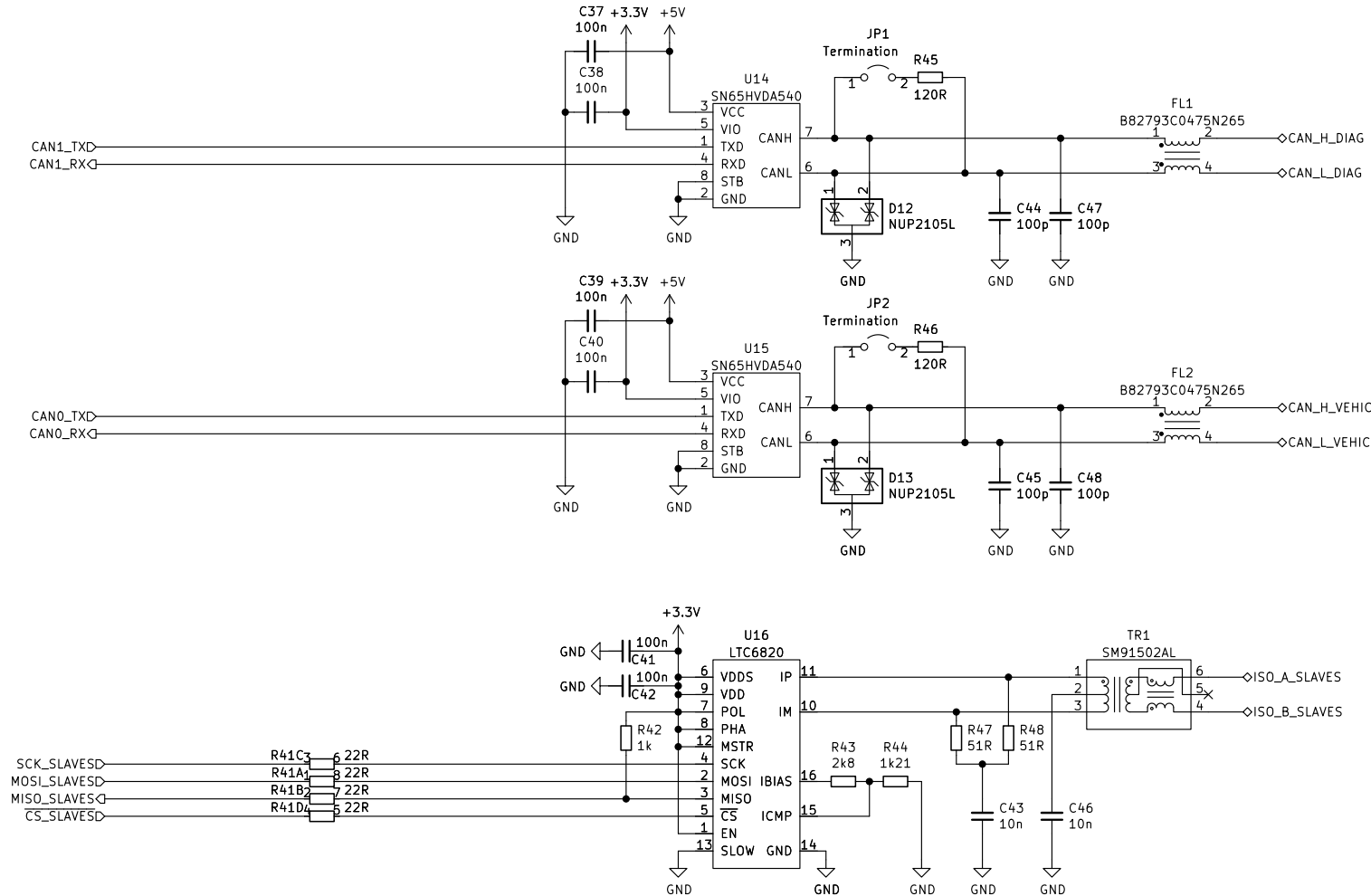
Sheet: /ADC/
File: ADC.kicad_sch

Title: SPR23e Battery Management Unit (BMU)

Size: A4 Date: 2023-03-25
KiCad E.D.A. kicad 6.0.11-2627ca5db0-126-ubuntu22.04.1

Rev: B
Id: 4/12

KiCad E.D.A.	kicad 6.0.11-2627ca5db0~126~ubuntu22.04.1
--------------	---



Car number: 65
 Author: Luca Engelmann
Scuderia Mensa HS RheinMain racing e.V.

Sheet: /Interface/
 File: Interface.kicad_sch

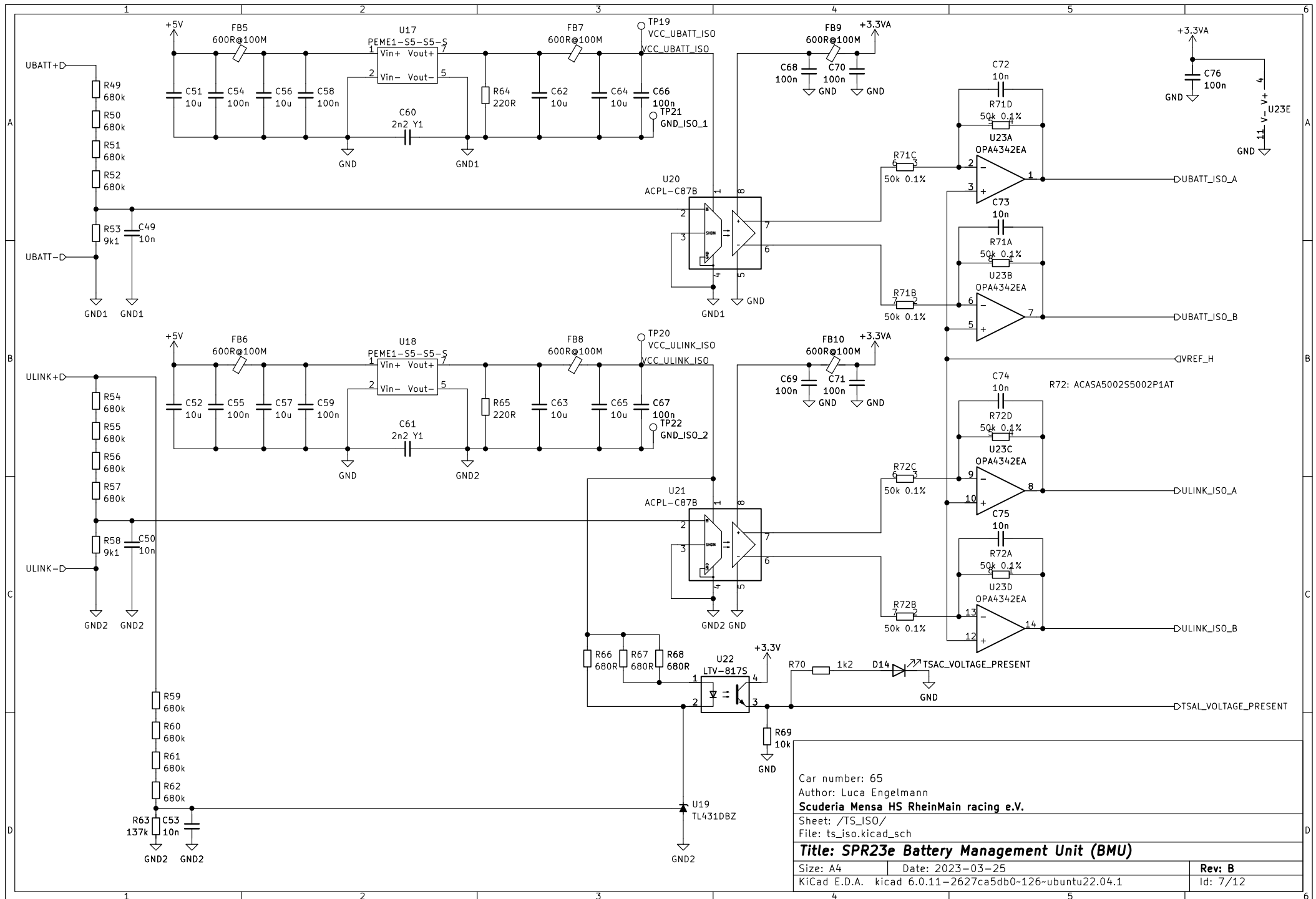
Title: SPR23e Battery Management Unit (BMU)

Size: A4
 KiCad E.D.A. kicad 6.0.11-2627ca5db0-126-ubuntu22.04.1

Date: 2023-03-25

Rev: B

Id: 6/12



Car number: 65
 Author: Luca Engelmann
Scuderia Mensa HS RheinMain racing e.V.

Sheet: /TS_ISO/
 File: ts_iso.kicad_sch

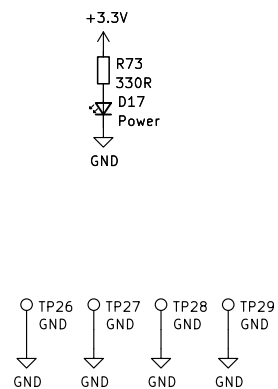
Title: SPR23e Battery Management Unit (BMU)

Size: A4 Date: 2023-03-25

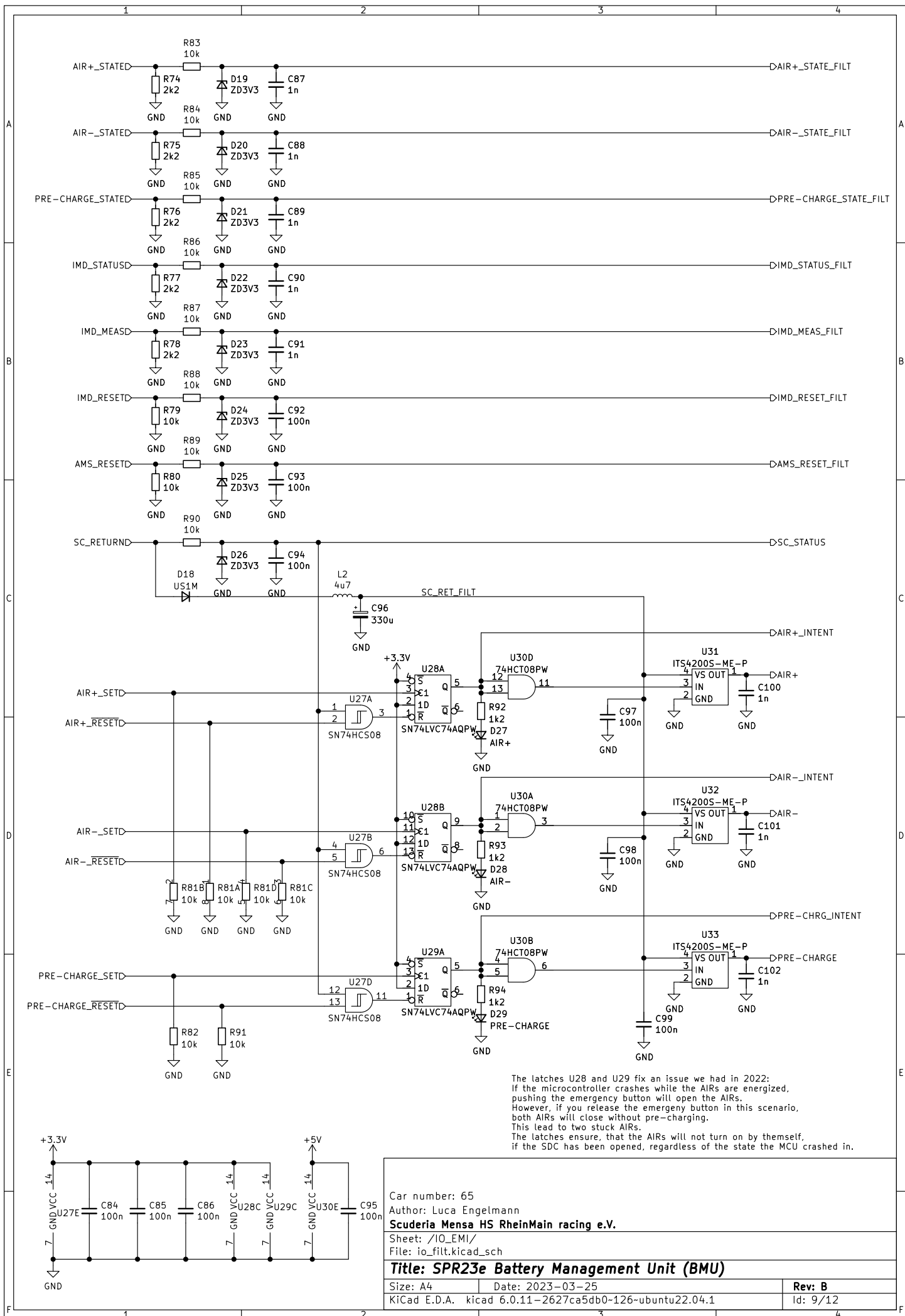
KiCad E.D.A. kicad 6.0.11-2627ca5db0-126-ubuntu22.04.1

Rev: B

Id: 7/12

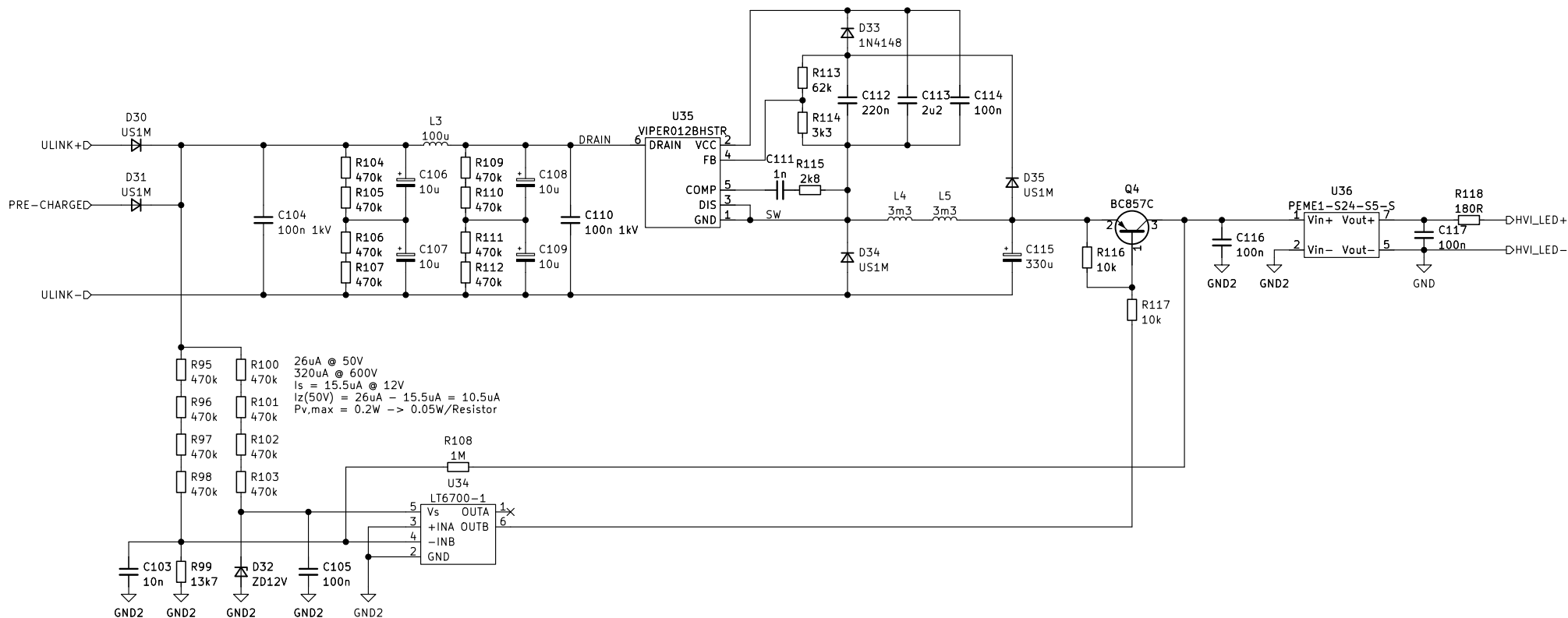


Id: 8/12



U35 is a regulated buck converter, which converts the TS voltage down to 24V.
 It operates in a range of 50V to 600V and is not galvanically isolated.
 Below 50V, the output is unstable and starts to pulse at a slow rate.
 U36 is a galvanically isolated DCDC converter, which isolates the LED supply from the TS.
 To ensure a hard on/off transistion of the LED at 50V.
 U34 compares the input voltage to an internal reference.
 It is powered from the TS, since it has to operate even if U35 is not regulating yet.
 The circuit is powered from the TSAC output as well as from the node between pre-charge
 relay and pre-charge resistor. Otherwise, the circuit would load the TS voltage down
 during pre-charge, effectively preventing the pre-charge.

R108 adds some hysteresis, resulting in a turn-on threshold of 56V and a turn-off threshold of 40V



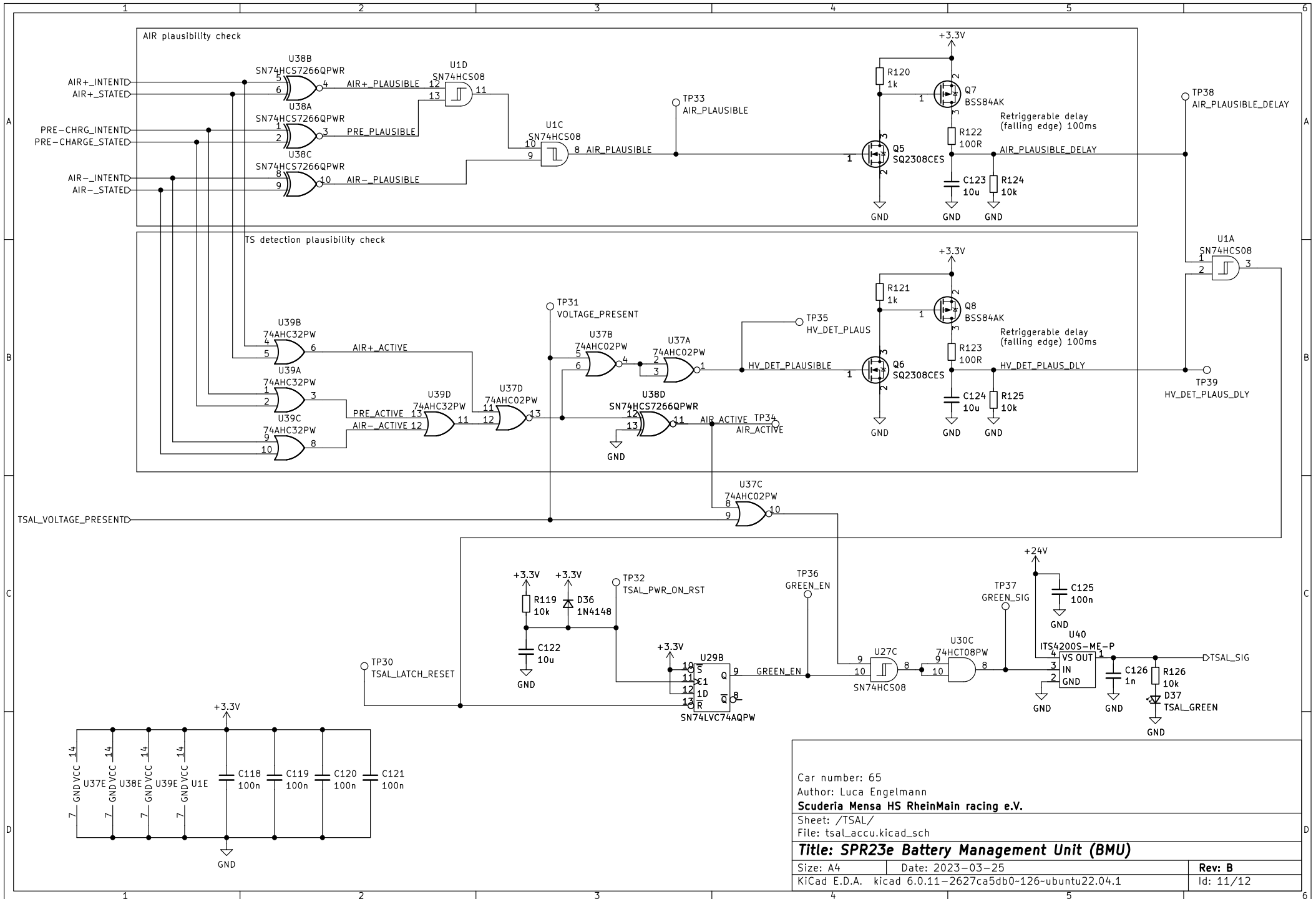
Car number: 65
 Author: Luca Engelmann
Scuderia Mensa HS RheinMain racing e.V.

Sheet: /HVI/
 File: voltage_indicator.kicad_sch

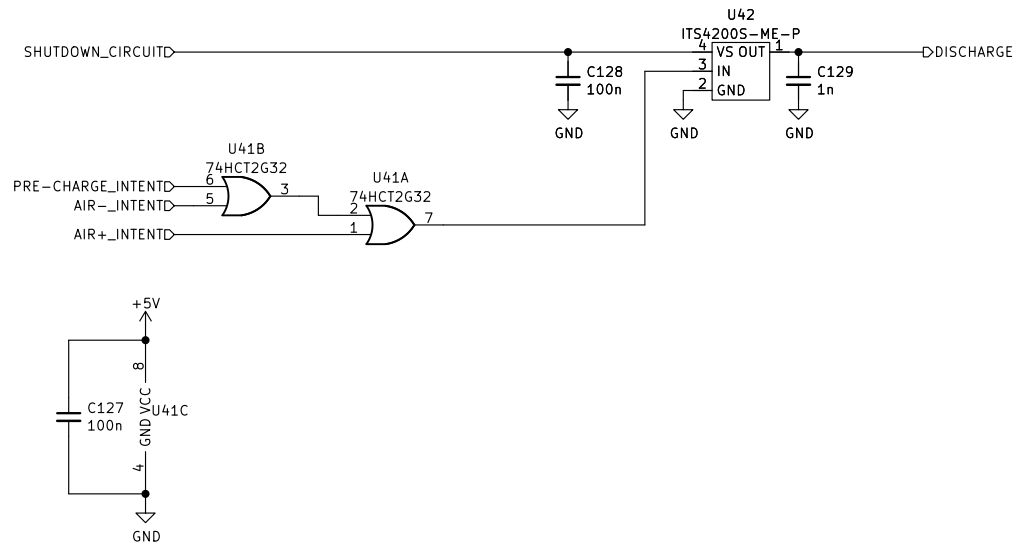
Title: SPR23e Battery Management Unit (BMU)

Size: A4 Date: 2023-03-25
 KiCad E.D.A. kicad 6.0.11-2627ca5db0-126-ubuntu22.04.1

Rev: B
 Id: 10/12



The discharge circuit in the inverter is controlled by the shutdown circuit. To ensure that the discharge circuit is still enabled while the shutdown circuit is closed but TS is still off, the intentional states of the AIRs are used. The discharge circuit is disabled as soon as any of the AIRs is active but still re-activated if an AIR is stuck.



Car number: 65
Author: Luca Engelmann
Scuderia Mensa HS RheinMain racing e.V.

Sheet: /Discharge_Ctrl/
File: discharge.kicad_sch

Title: SPR23e Battery Management Unit (BMU)

Size: A4 Date: 2023-03-25
KiCad E.D.A. kicad 6.0.11-2627ca5db0-126-ubuntu22.04.1

Rev: B
Id: 12/12