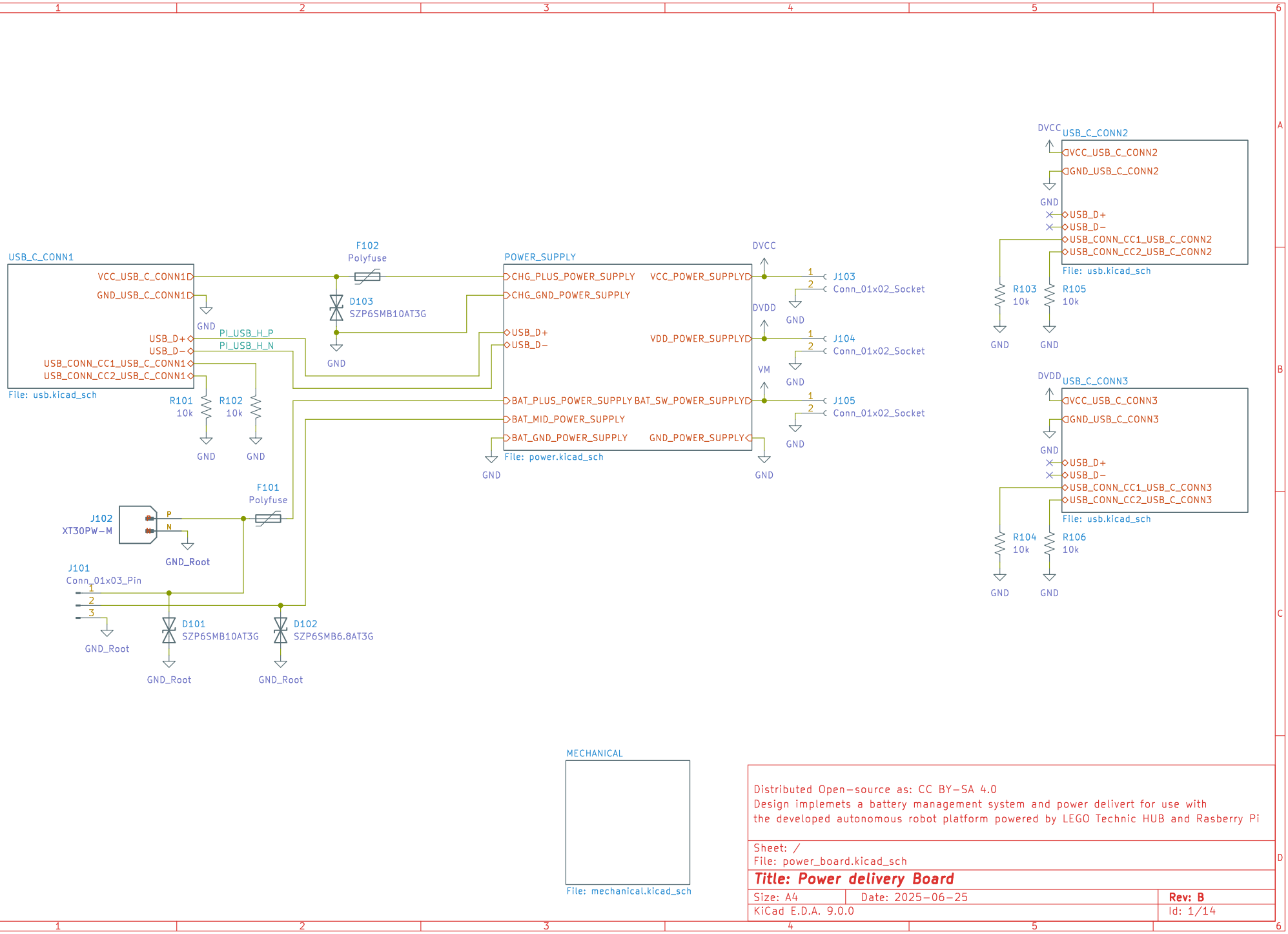

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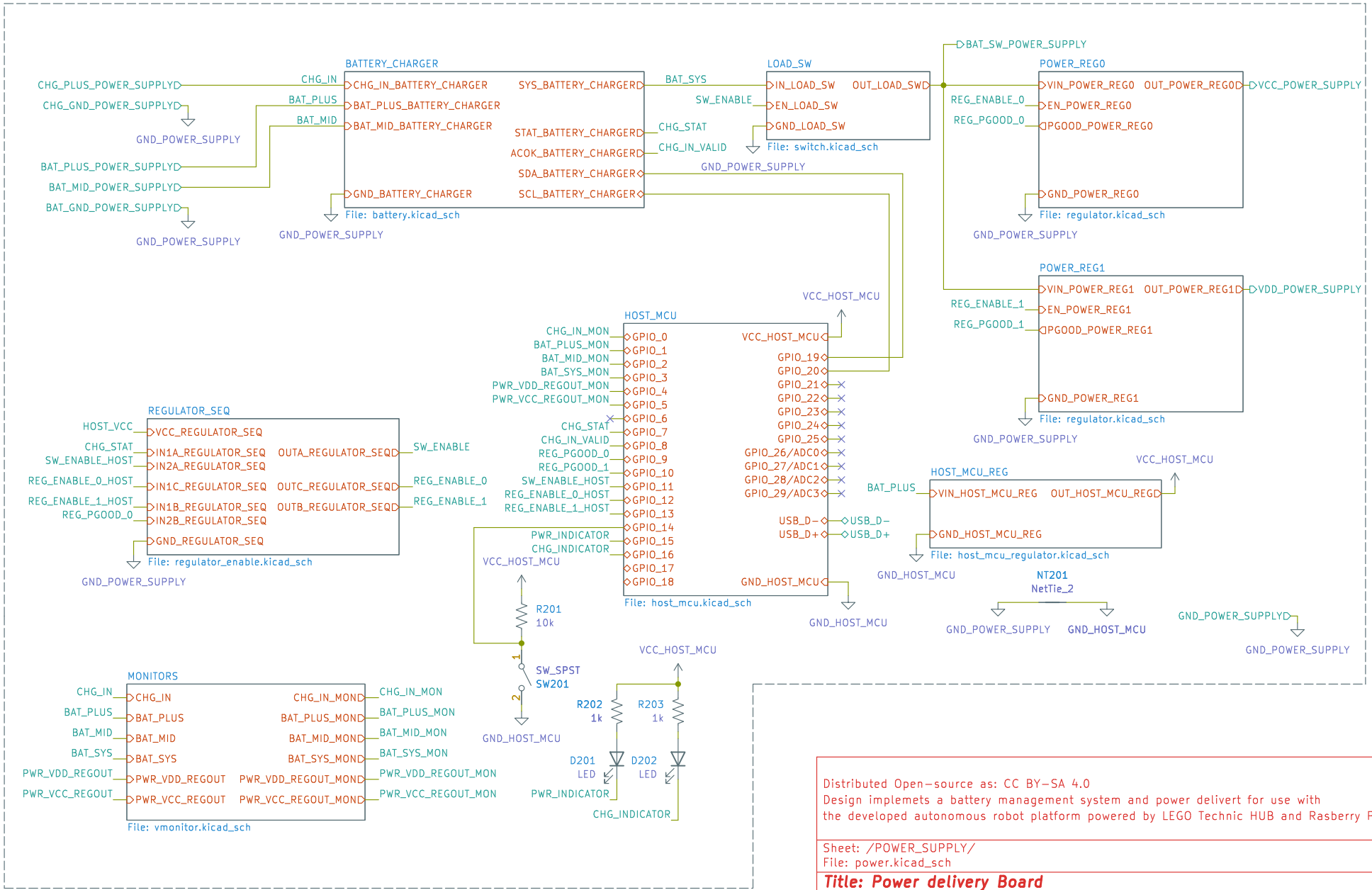
Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /
File: power_board.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025−06−25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 1/14

Battery Power Management



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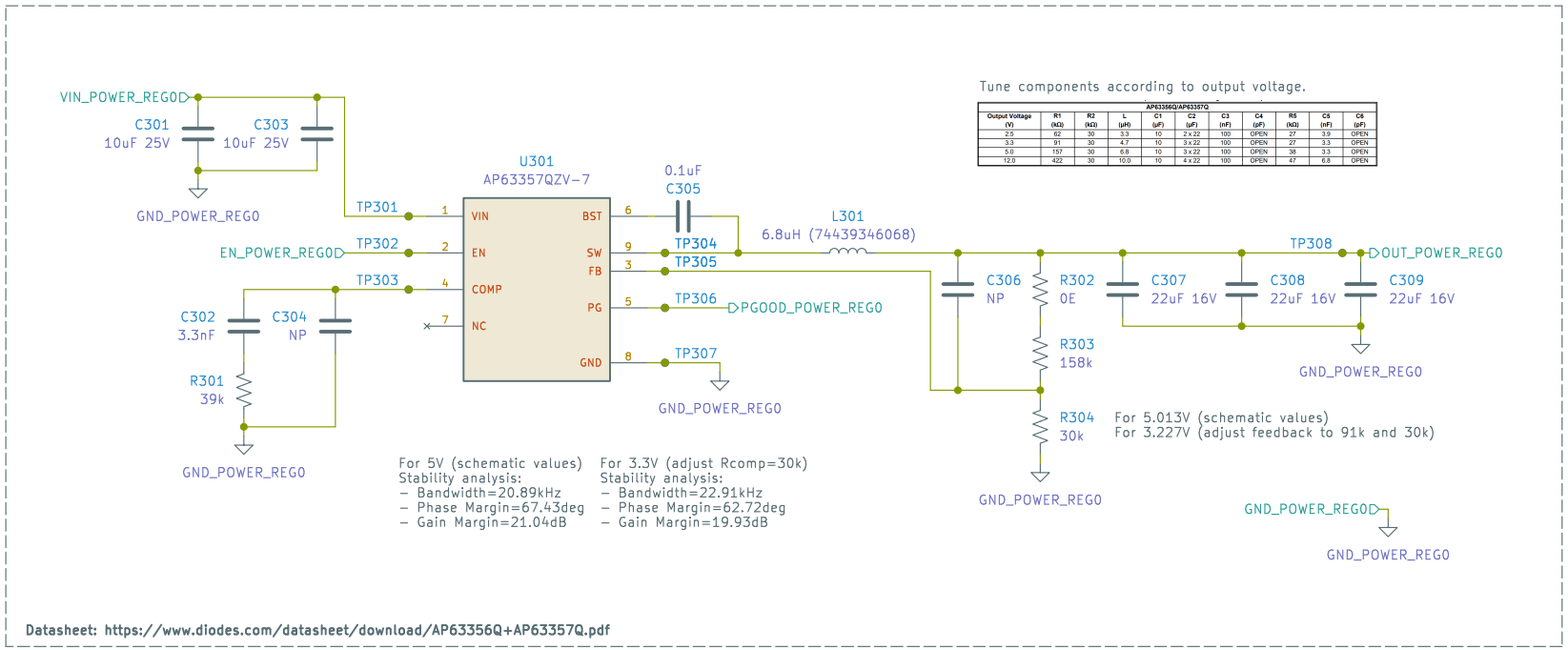
Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/
File: power.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025−06−25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 2/14

Power Regulator BUCK (PI and MCU PSU)



AP63356Q/AP63357Q										
Output Voltage (V)	R1 (kΩ)	R2 (kΩ)	L (µH)	C1 (µF)	C2 (µF)	C3 (nF)	C4 (pF)	R5 (kΩ)	C5 (nF)	C6 (pF)
2.5	62	30	3.3	10	2 x 22	100	OPEN	27	3.9	OPEN
3.3	91	30	4.7	10	3 x 22	100	OPEN	27	3.3	OPEN
5.0	157	30	6.8	10	3 x 22	100	OPEN	38	3.3	OPEN
12.0	422	30	10.0	10	4 x 22	100	OPEN	47	6.8	OPEN

Datasheet: https://www.diodes.com/datasheet/download/AP63356Q+AP63357Q.pdf

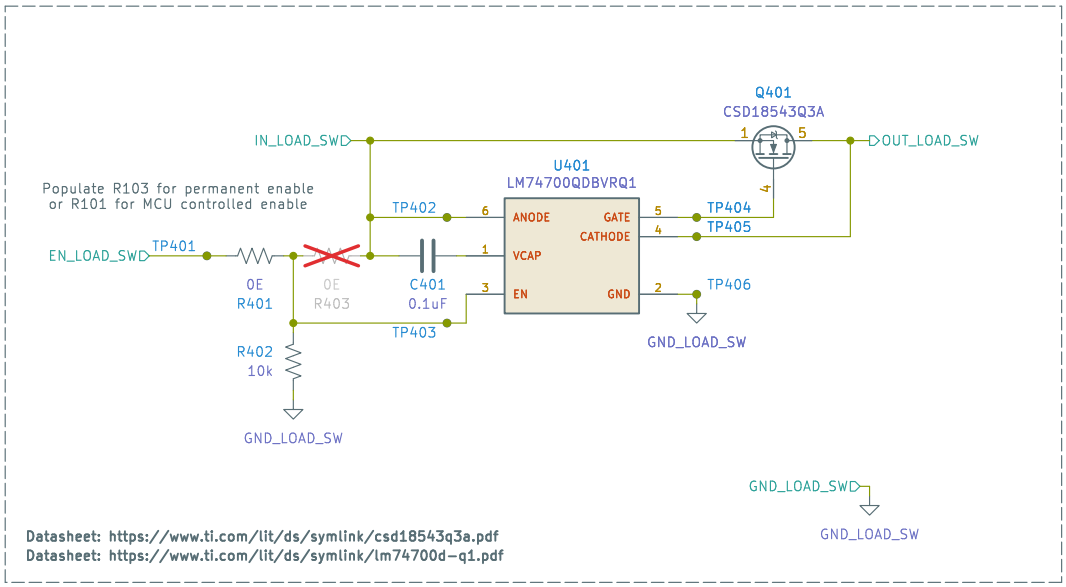
Design implemets a battery management system and power delivert for use with the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/POWER_REG0/
File: regulator.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025–06–25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 3/14

Load Switch with 2 Condition Enable



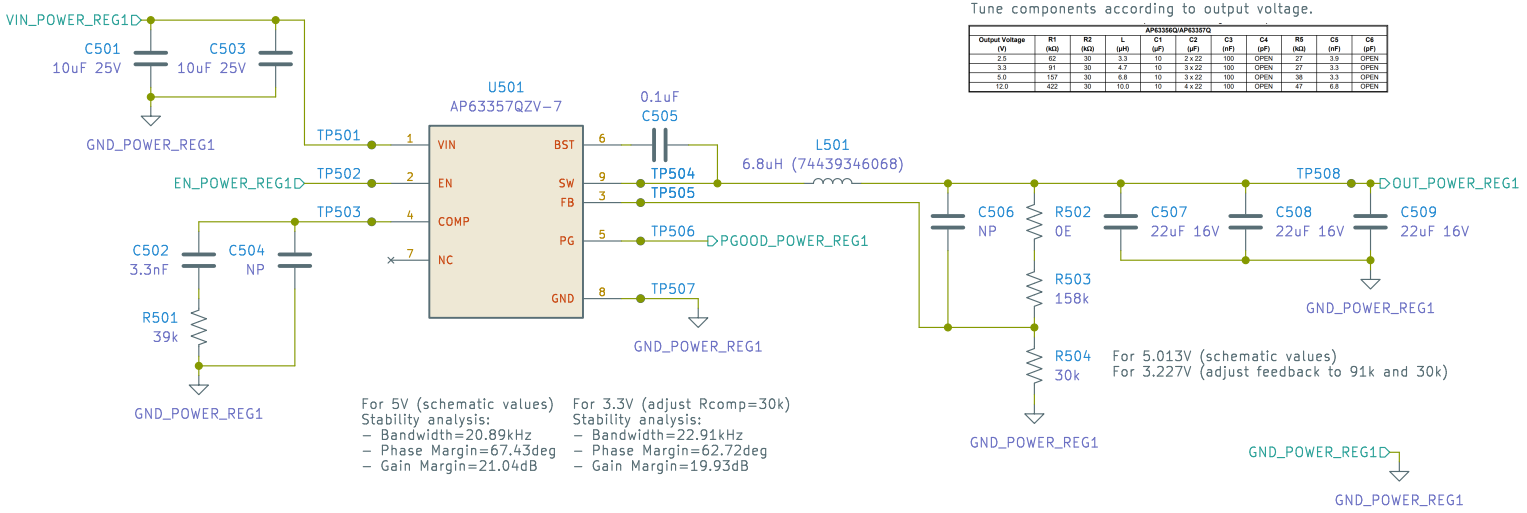
Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/LOAD_SW/
File: switch.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 4/14

Power Regulator BUCK (PI and MCU PSU)



Datasheet: https://www.diodes.com/datasheet/download/AP63356Q+AP63357Q.pdf

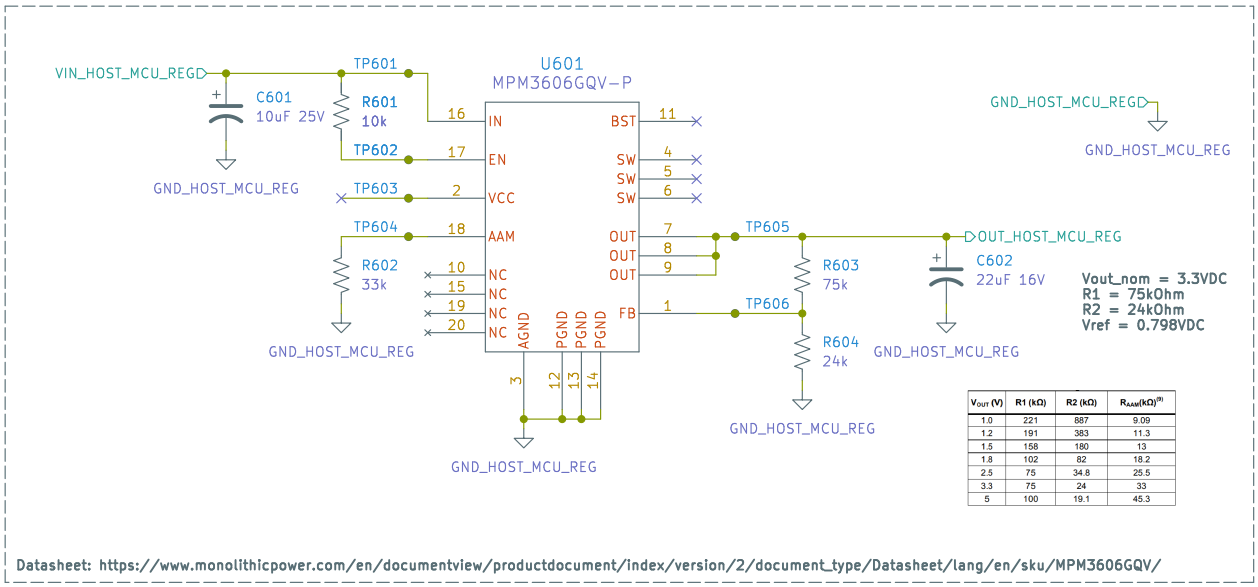
Design implemets a battery management system and power delivert for use with the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/POWER_REG1/
File: regulator.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025–06–25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 5/14

Power Regulator 3.3V 2V (MCU and sensors)



V_{OUT} (V)	R1 (kΩ)	R2 (kΩ)	R_{AAM}(kΩ)[3]
1.0	221	887	9.09
1.2	191	383	11.3
1.5	158	180	13
1.8	102	82	18.2
2.5	75	34.8	25.5
3.3	75	24	33
5	100	19.1	45.3

Datasheet: https://www.monolithicpower.com/en/documentview/productdocument/index/version/2/document_type/Datasheet/lang/en/sku/MPM3606GQV/

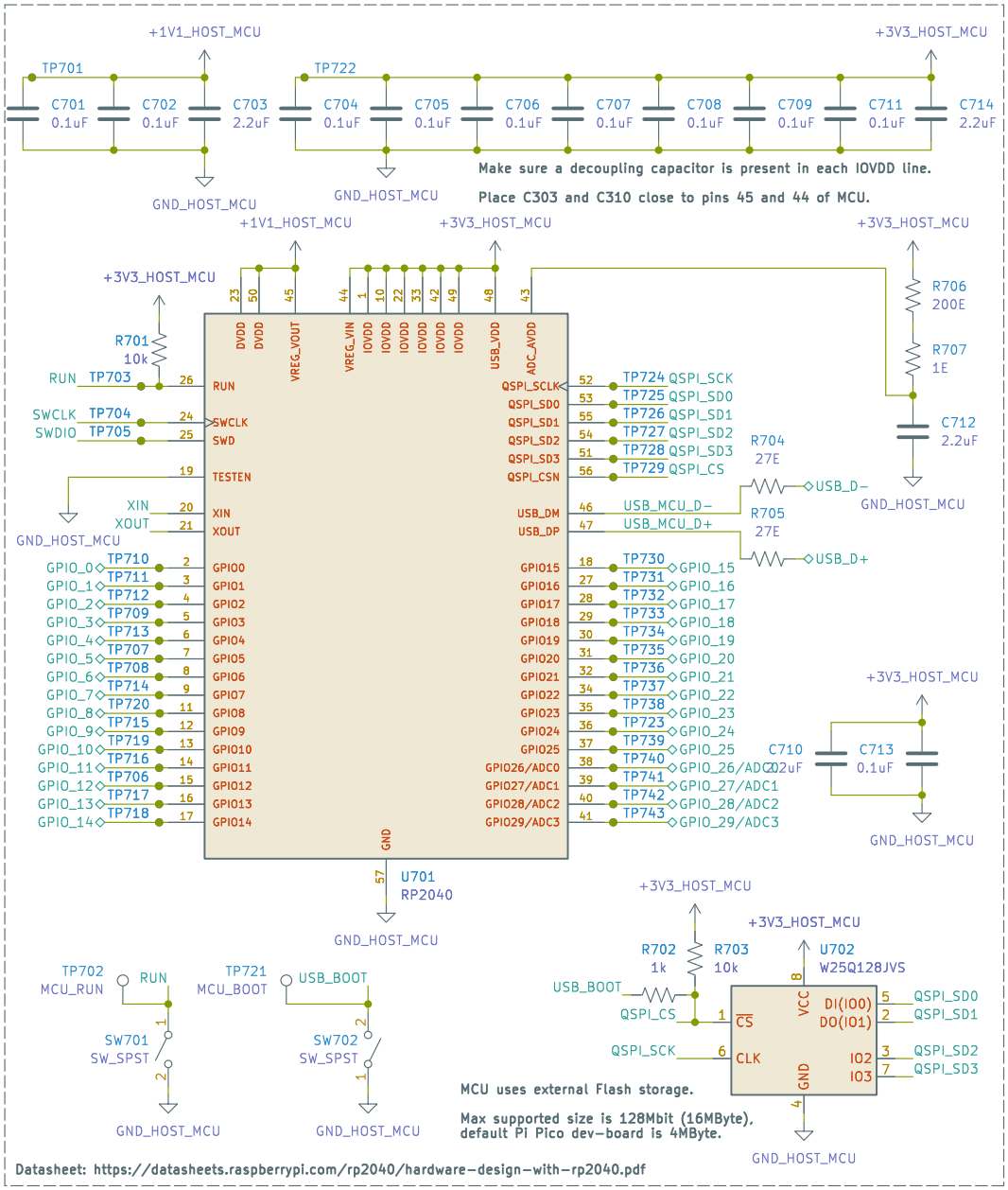
Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/HOST_MCU_REG/
File: host_mcu_regulator.kicad_sch

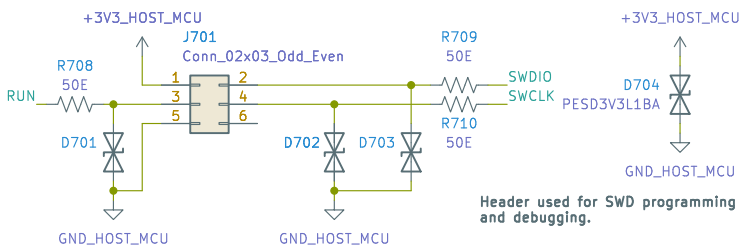
Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 6/14

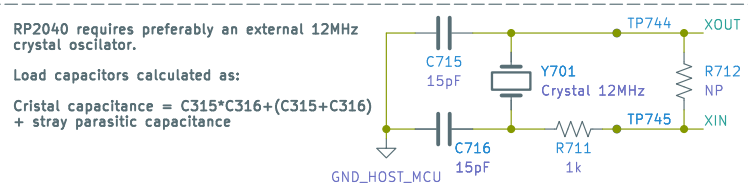
RP2040 Main MCU

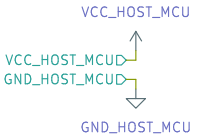


SWD programming header



Crystal oscilator





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Sheet: /POWER_SUPPLY/HOST_MCU/
File: host_mcu.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 7/14

Current Limit Switch with Reverse Current Blocking and Output Over-voltage Clamp

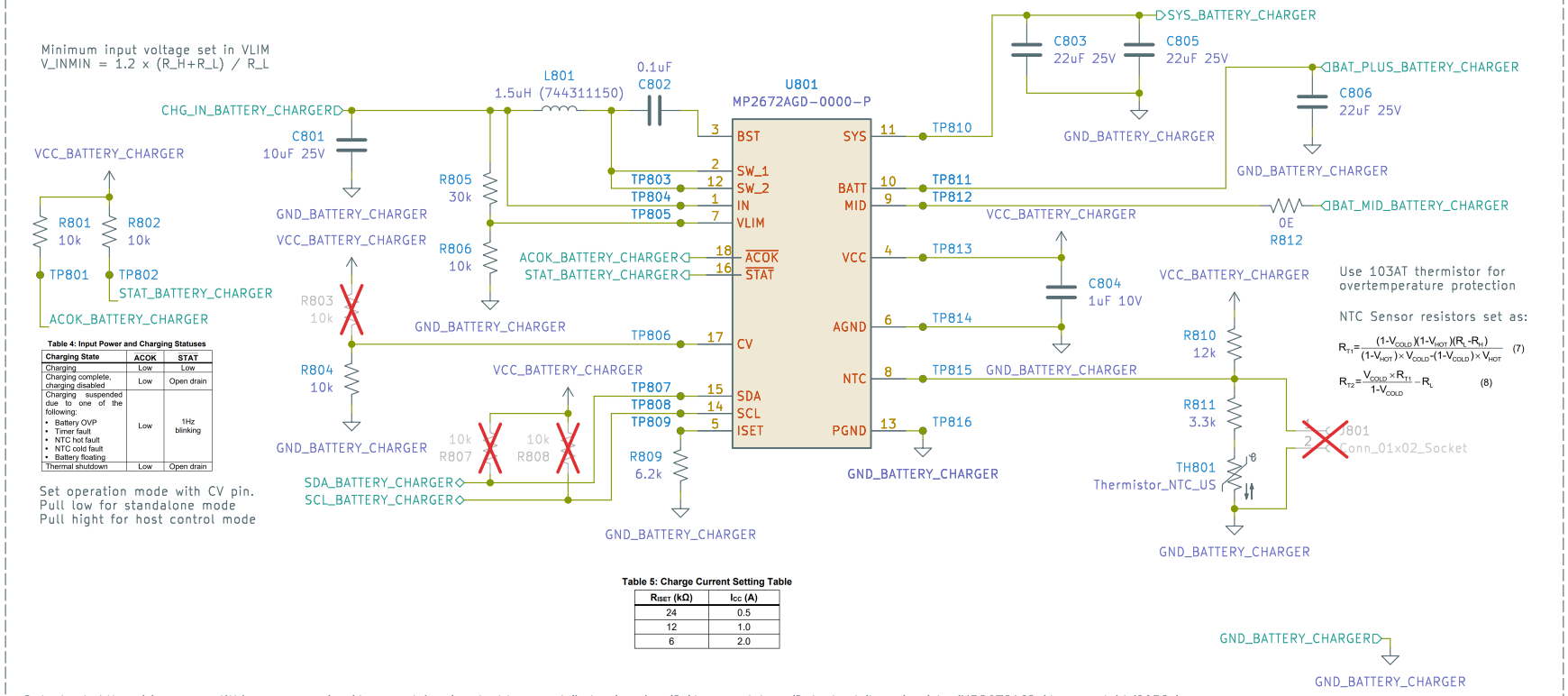

Table 4: Input Power and Charging Statuses

Charging State	ACOK	STAT
Charging	Low	Low
Charging complete, charging disabled	Low	Open drain
Charging suspended due to one of the following: • Battery OVP • Timer fault • NTC hot fault • NTC cold fault • Battery floating	Low	1Hz blinking
Thermal shutdown	Low	Open drain

Set operation mode with CV pin.
Pull low for standalone mode
Pull hight for host control mode

Table 5: Charge Current Setting Table

R_{ISET} (kΩ)	I_{CC} (A)
24	0.5
12	1.0
6	2.0

Datasheet: https://www.monolithicpower.com/en/documentview/productdocument/index/version/2/document_type/Datasheet/lang/en/sku/MP2672AGD/document_id/9059/

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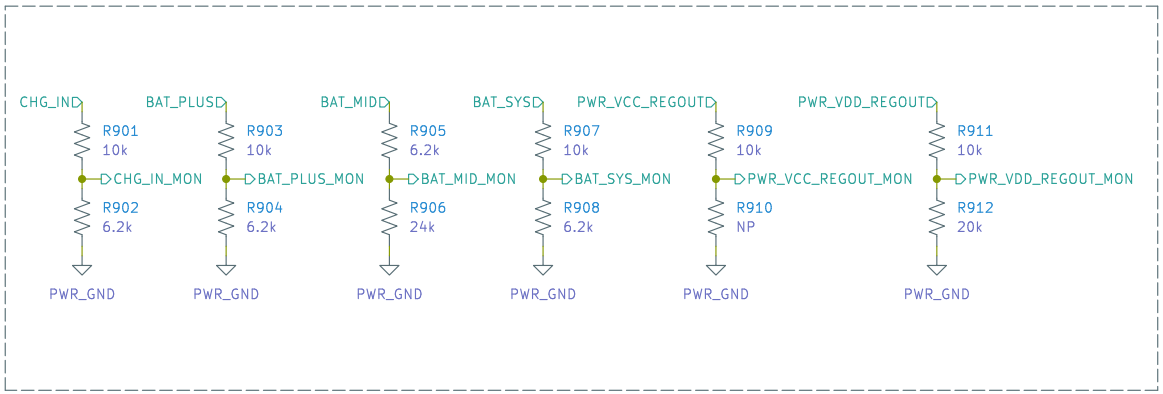
Sheet: /POWER_SUPPLY/BATTERY_CHARGER/
File: battery.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 8/14

Power Monitoring Voltage Dividers



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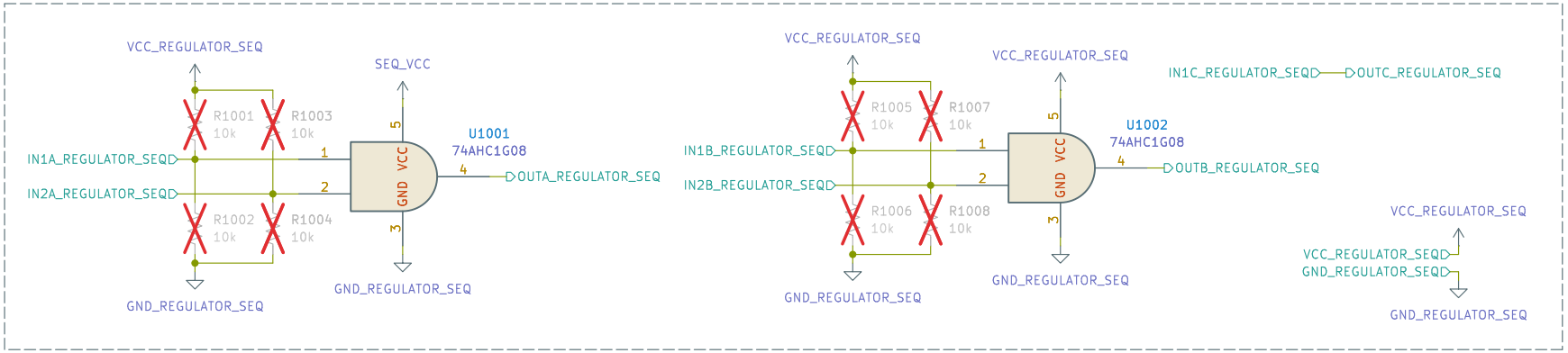
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/MONITORS/
File: vmonitor.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 9/14

Regulator Power sequence logic



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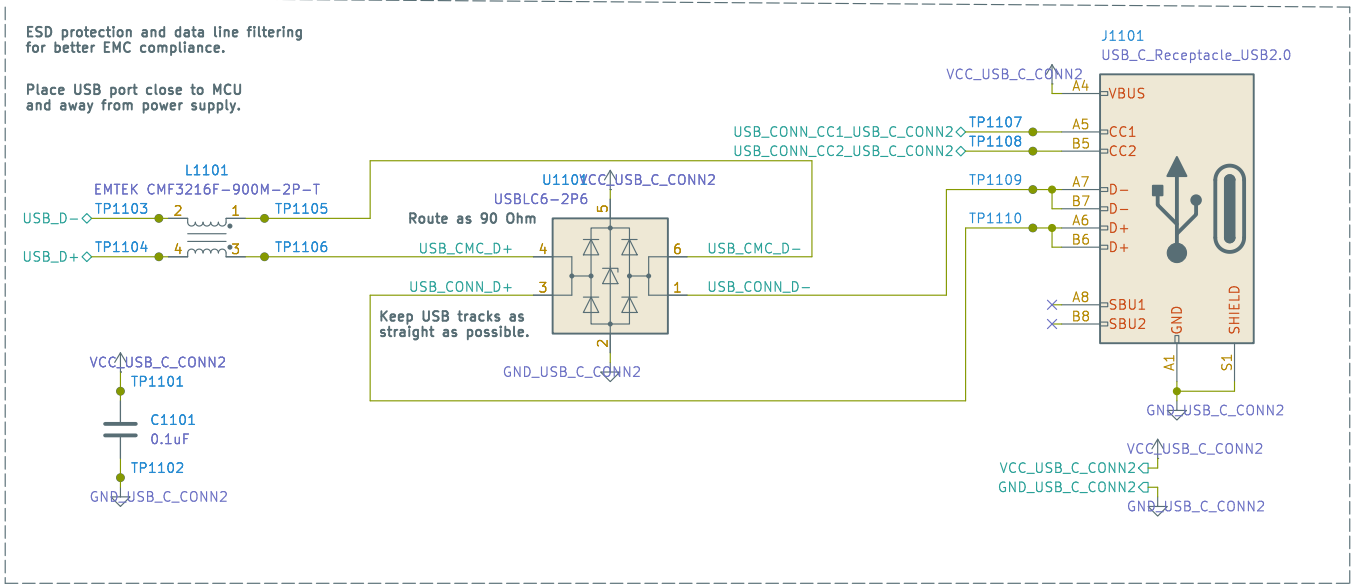
Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /POWER_SUPPLY/REGULATOR_SEQ/
File: regulator_enable.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 10/14

USB power and data through type C port

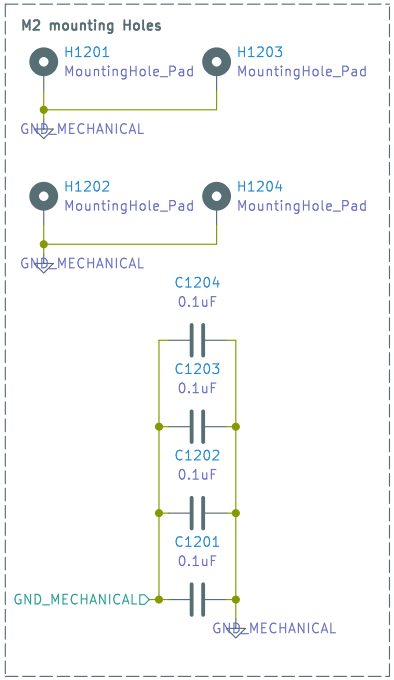


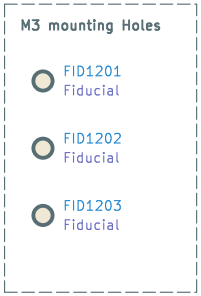
Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /USB_C_CONN2/
File: usb.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 11/14





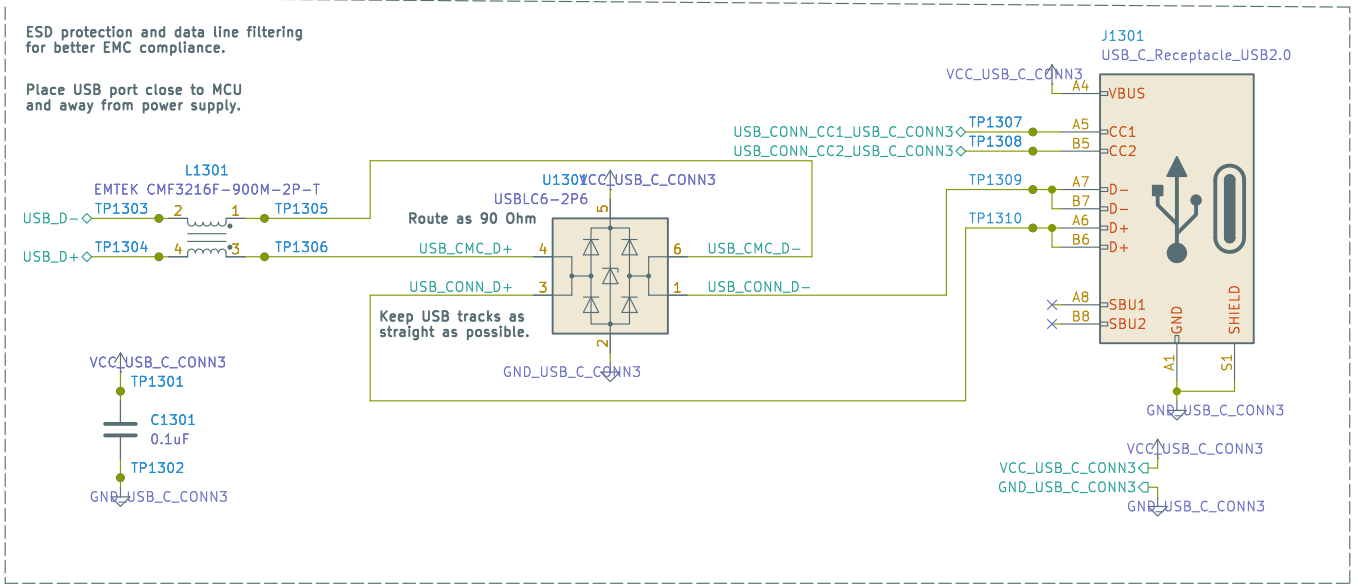
Design implemets a battery management system and power delivert for use with the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /MECHANICAL/
File: mechanical.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 12/14

USB power and data through type C port

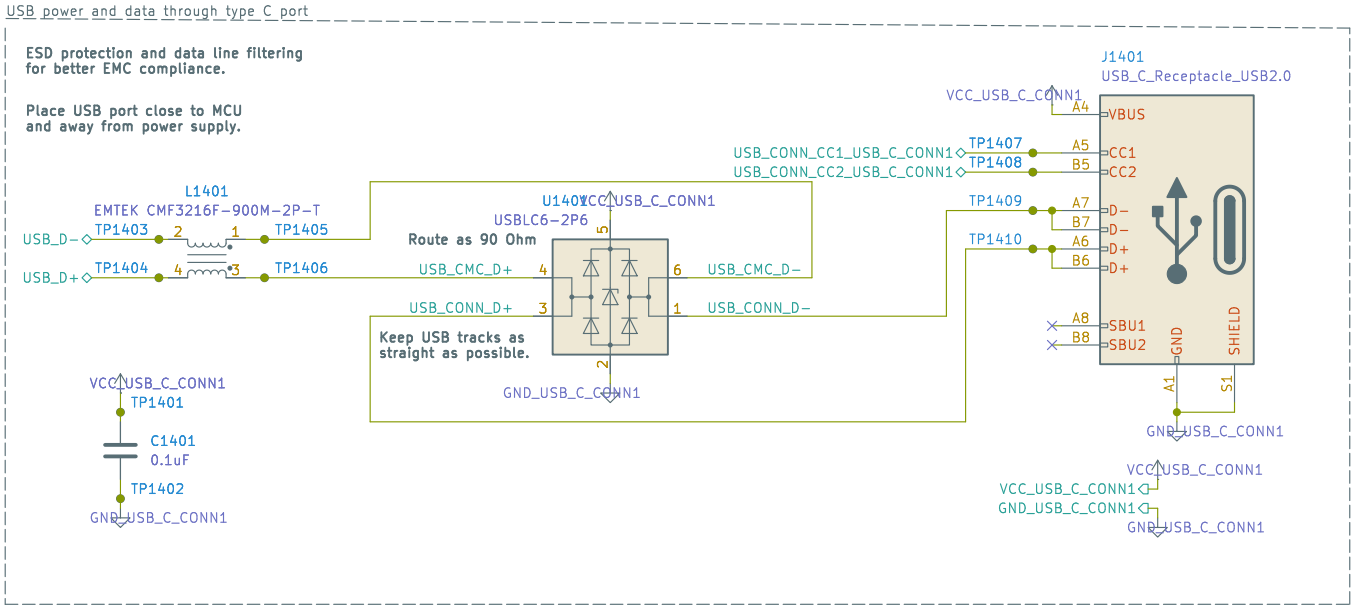


Design implemets a battery management system and power delivert for use with
the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /USB_C_CONN3/
File: usb.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 13/14



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the developed autonomous robot platform powered by LEGO Technic HUB and Rasberry Pi

Sheet: /USB_C_CONN1/
File: usb.kicad_sch

Title: Power delivery Board

Size: A4	Date: 2025-06-25	**Rev: B**
KiCad E.D.A. 9.0.0		Id: 14/14