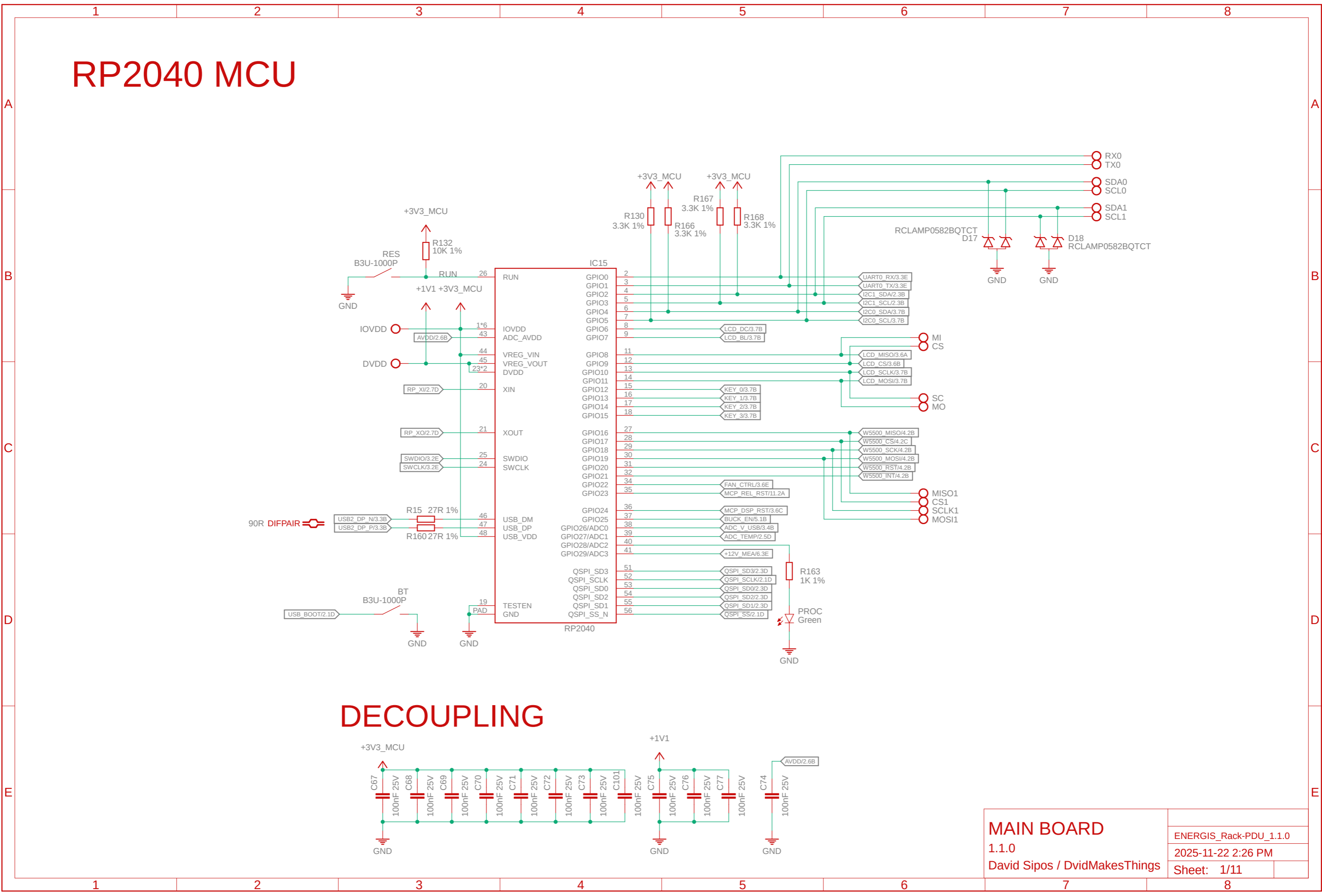
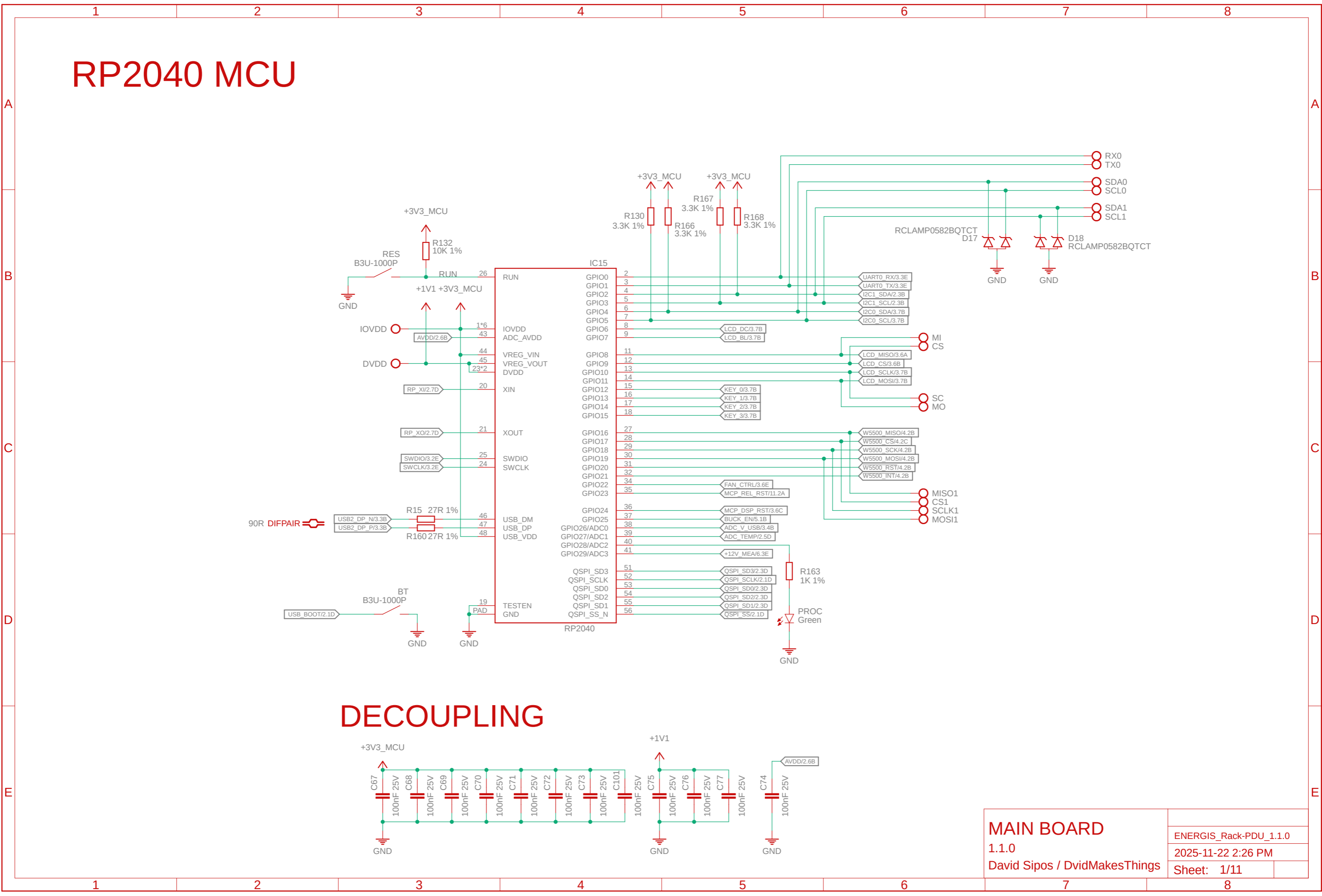
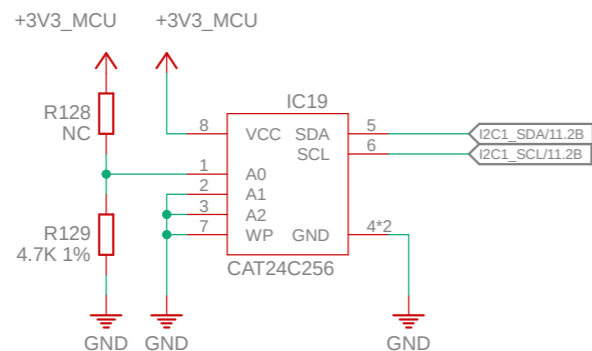


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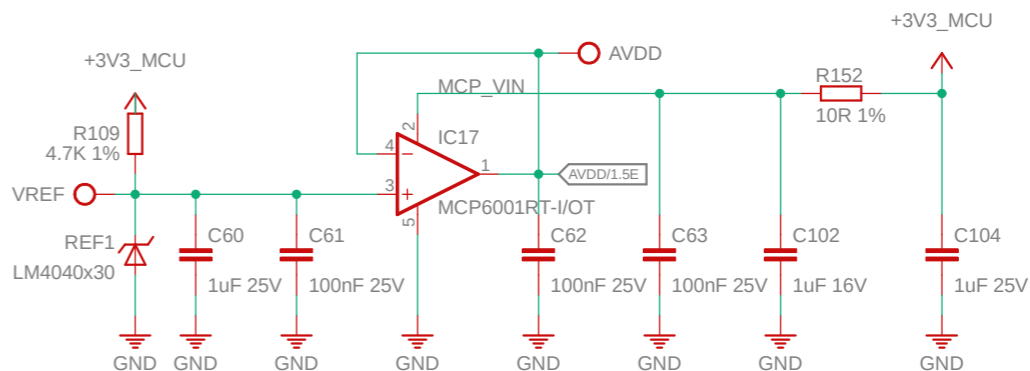
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Sheet: 1/11	

PERIPHERALS

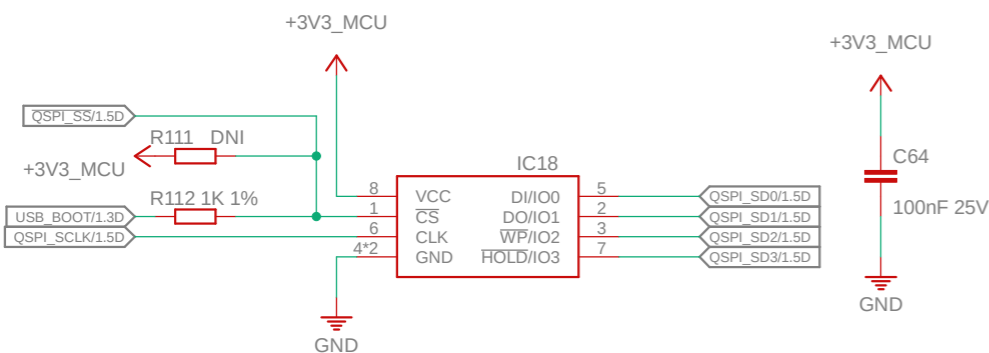
USER MEMORY



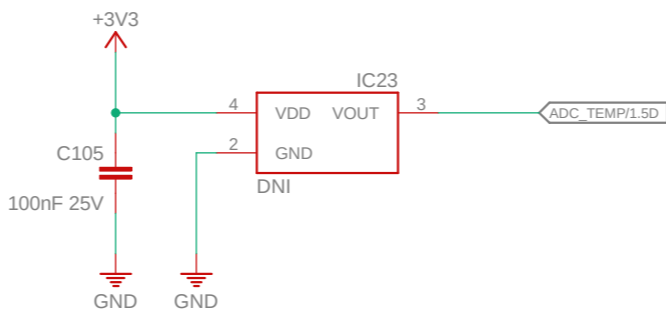
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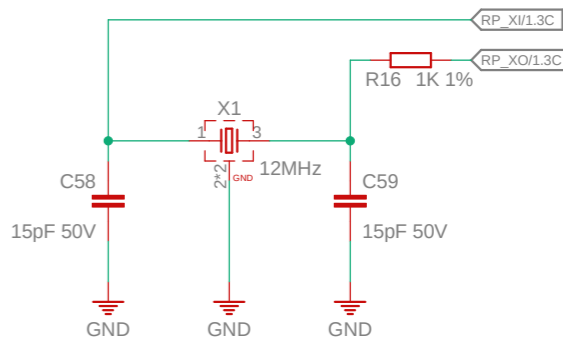
RP2040 FLASH



TEMPERATURE SENSOR



12MHZ CRYSTAL



MAIN BOARD

1.1.0

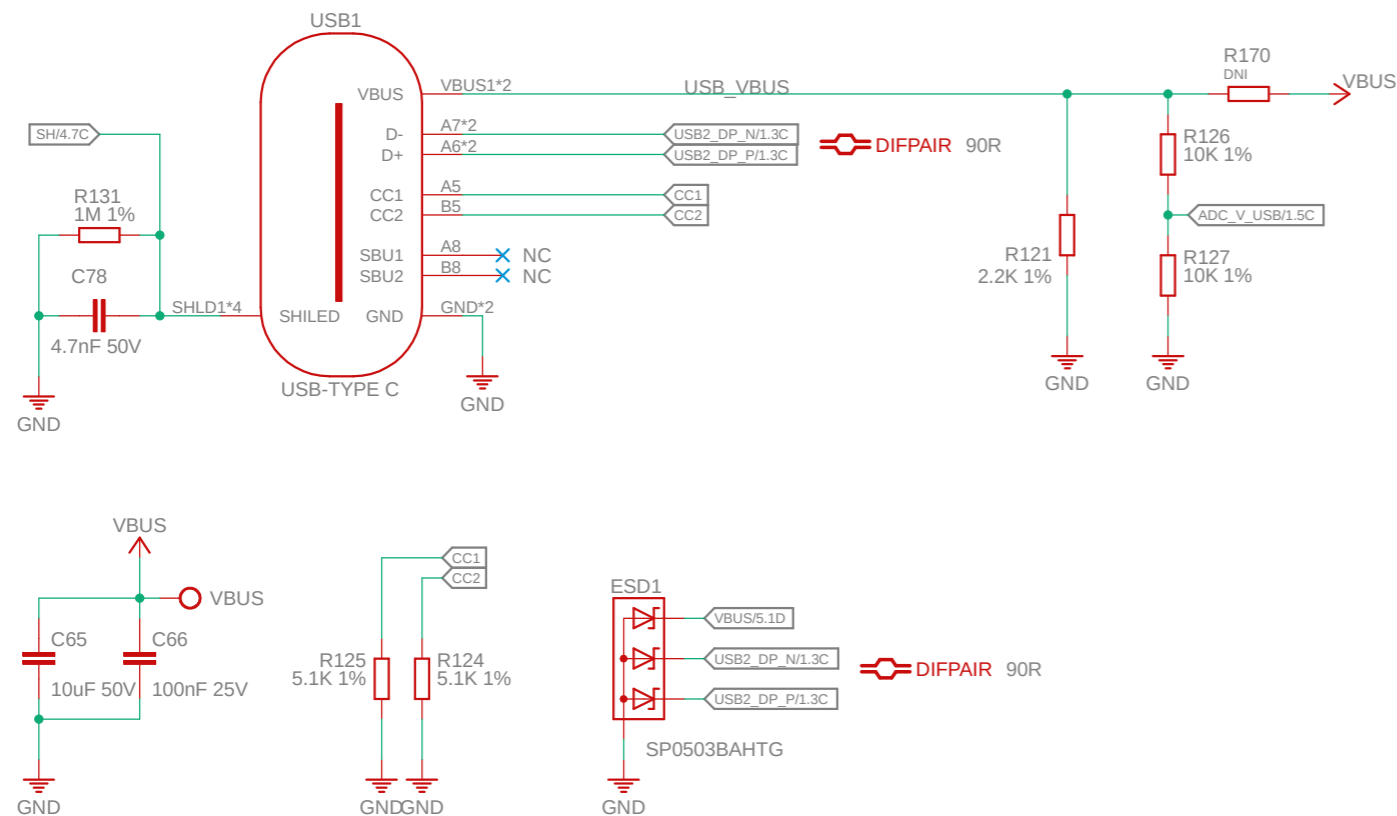
David Sipos / DvidMakesThings

ENERGIS_Rack-PDU_1.1.0

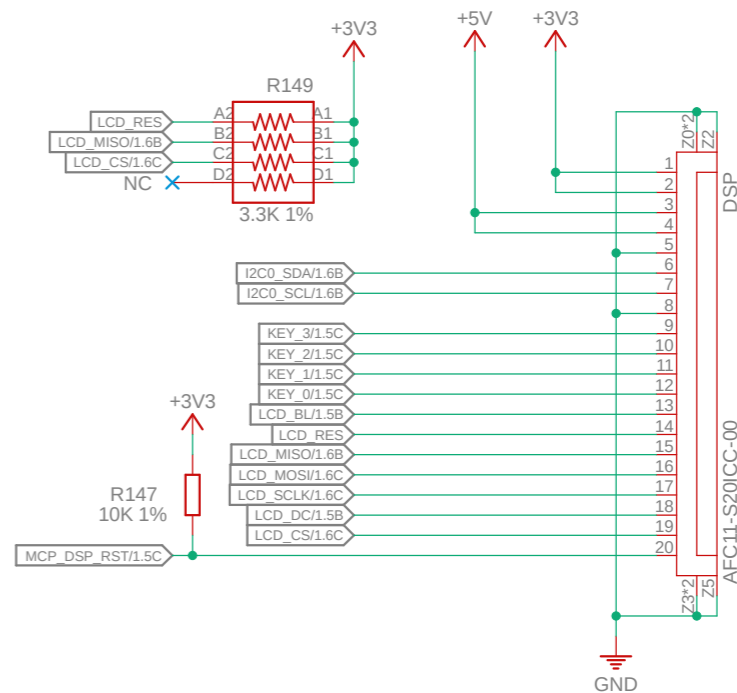
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Sheet: 2/11

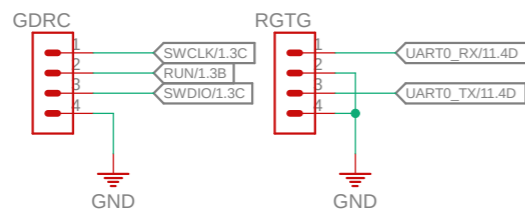
USB-C CONNECTOR



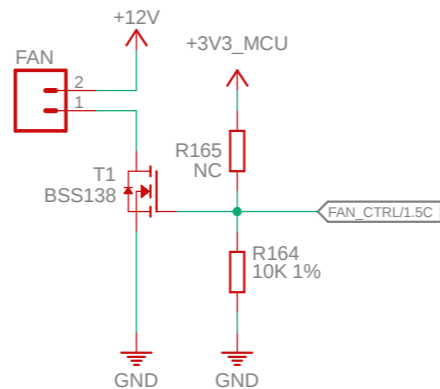
BOARD CONNECTOR



DEBUG CONNECTOR



FAN CONNECTOR

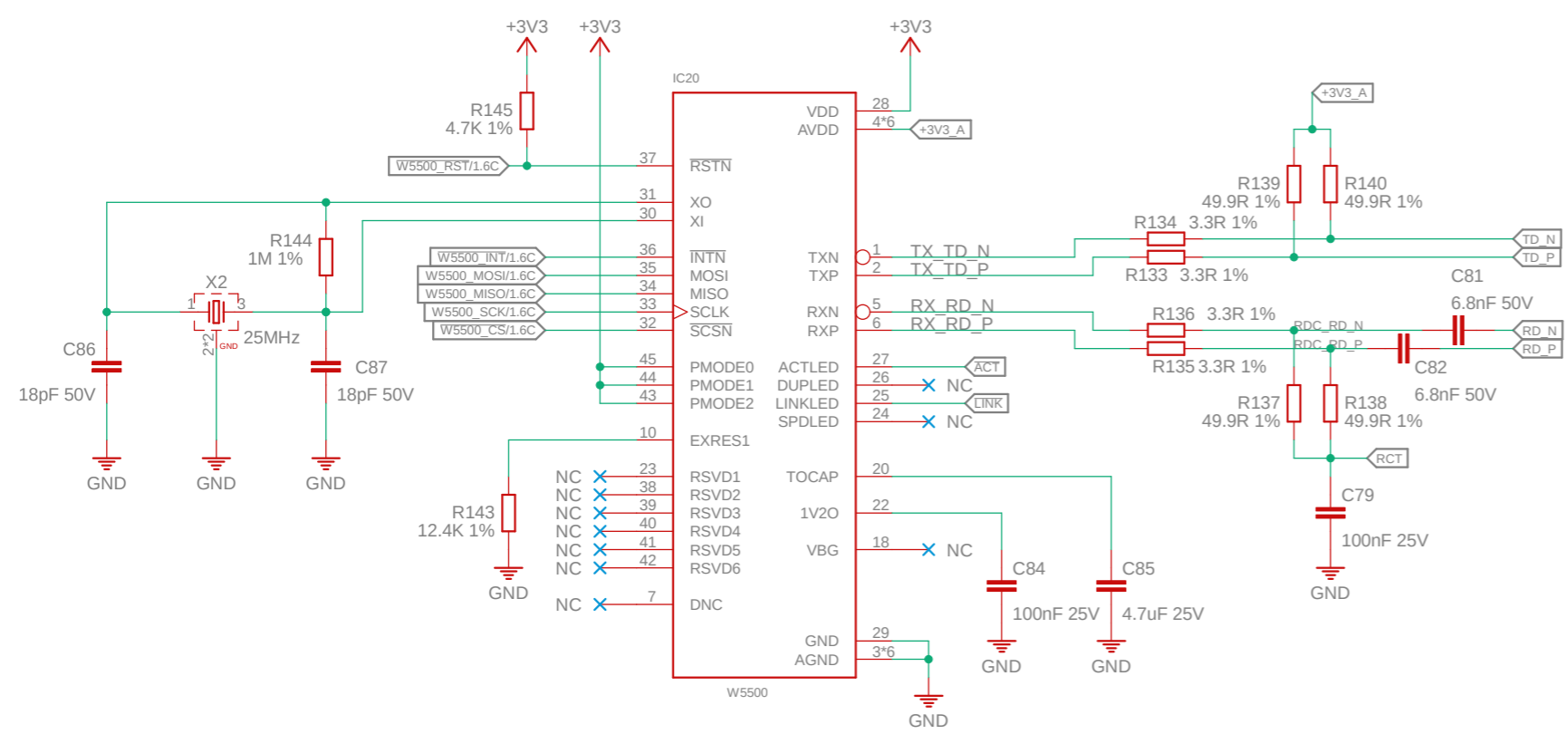


MAIN BOARD

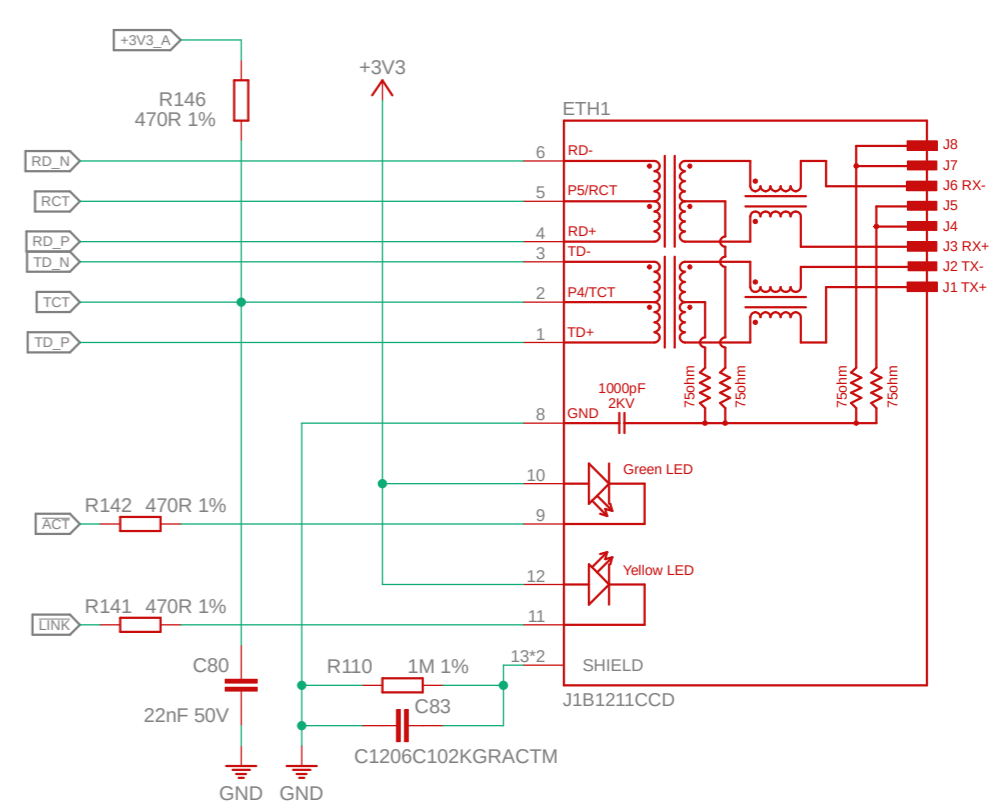
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ENERGIS_Rack-PDU_1.1.0
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Sheet: 3/11

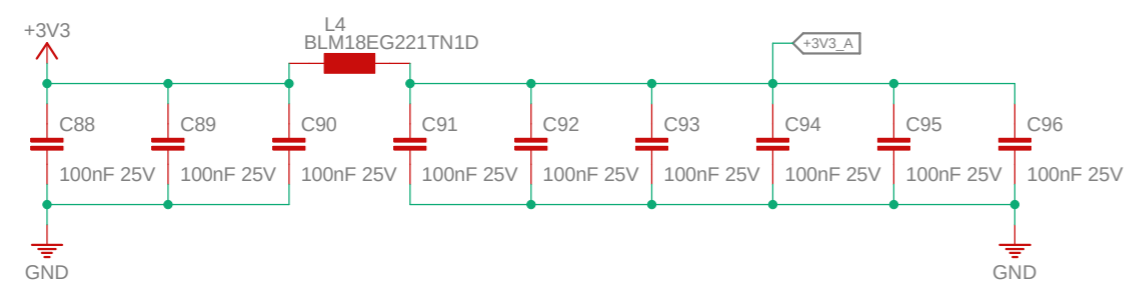
W5500 ETHERNET CONTROLLER



RJ45-CAT5



DECOUPLING



5V DC-DC CONVERTER

230VAC
12VDC

5VDC

MCU

3.3V VBUS-LDO

USB-C 5VDC

3V3

3V3_MCU

3.3V DC-DC CONVERTER

ENABLE/DISABLE

3V3

3VDC

PERIPHERALS

MCU

MAIN BOARD
1.1.0
David Sipos / DvidMakesThings

ENERGIS_Rack-PDU_1.1.0
2025-11-22 2:26 PM
Sheet: 5/11

5V DC-DC CONVERTER

This section converts 12VDC to 5VDC. It features an MP2315 IC (IC1) with pins IN, BST, EN, VCC, SW, AAM, GND, and FB. The circuit includes input capacitors C1, C3, and C6; feedback capacitors C11 and C14; an output capacitor C8; an inductor L1; and a MOSFET SW. A P5ON LED (R148) indicates power status. The output is 5VDC.

3.3 VBUS-LDO

This section converts USB-C 5VDC to 3V3. It uses an LDO IC (IC21) with pins VIN, VOUT, EN, and NC. The circuit includes input capacitors C97 and C98; an output capacitor C100; and a MOSFET SW. A PWR LED (R151) indicates power status. The output is 3V3.

3.3V DC-DC CONVERTER

This section converts 5VDC to 3V3. It features an MP2315 IC (IC2) with pins IN, BST, EN, VCC, SW, AAM, GND, and FB. The circuit includes input capacitors C2, C4, and C7; feedback capacitors C12 and C15; an output capacitor C9; an inductor L2; and a MOSFET SW3. A P3ON LED (R123) indicates power status. The output is 3V3.

MAIN BOARD
1.1.0
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ENERGIS_Rack-PDU_1.1.0	
2025-11-22 2:26 PM	
Sheet: 5/11	

5V DC-DC CONVERTER

This section converts 12VDC to 5VDC. It features an MP2315 IC (IC1) with pins IN, BST, EN, VCC, SW, AAM, GND, and FB. The circuit includes input capacitors C1, C3, and C6; feedback capacitors C11 and C14; an output capacitor C8; an inductor L1; and a MOSFET SW. A P5ON LED (R148) indicates power status. The output is 5VDC.

3.3 VBUS-LDO

This section converts USB-C 5VDC to 3V3. It uses an LDO IC (IC21) with pins VIN, VOUT, EN, and NC. The circuit includes input capacitors C97 and C98; an output capacitor C100; and a MOSFET SW. A PWR LED (R151) indicates power status. The output is 3V3.

3.3V DC-DC CONVERTER

This section converts 5VDC to 3V3. It features an MP2315 IC (IC2) with pins IN, BST, EN, VCC, SW, AAM, GND, and FB. The circuit includes input capacitors C2, C4, and C7; feedback capacitors C12 and C15; an output capacitor C9; an inductor L2; and a MOSFET SW3. A P3ON LED (R123) indicates power status. The output is 3V3.

MAIN BOARD

1.1.0
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ENERGIS_Rack-PDU_1.1.0	
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Diagram illustrating the power supply and regulation circuitry for a MAIN BOARD, showing three main sections: 5V DC-DC CONVERTER, 3.3V VBUS-LDO, and 3.3V DC-DC CONVERTER.

5V DC-DC CONVERTER: This section converts 230VAC to 12VDC, which is then regulated to 5VDC. The circuit includes an input filter (C1, C3), a pre-regulator (R1, R161, R162), and the MP2315 DC-DC converter IC. The output is 5VDC, which is connected to the MCU.

3.3V VBUS-LDO: This section converts USB-C 5VDC to 3.3V VBUS. The circuit includes an input filter (C97, C98), the LDO IC (IC21), and an output filter (C100, C99). The output is 3.3V VBUS, which is connected to the MCU.

3.3V DC-DC CONVERTER: This section converts 5VDC to 3.3VDC. The circuit includes an input filter (C2, C4), a pre-regulator (R171, R172), and the MP2315 DC-DC converter IC. The output is 3.3VDC, which is connected to the PERIPHERALS.

MAIN BOARD: The board is labeled MAIN BOARD 1.1.0, designed by David Sipos / DvidMakesThings. The version is ENERGIS_Rack-PDU_1.1.0, dated 2025-11-22 2:26 PM. The sheet number is 5/11.

5V DC-DC CONVERTER

230VAC
12VDC

5VDC

MCU

3.3 VBUS-LDO

USB-C 5VDC

3V3

3V3_MCU

3.3V DC-DC CONVERTER

ENABLE/DISABLE

3V3

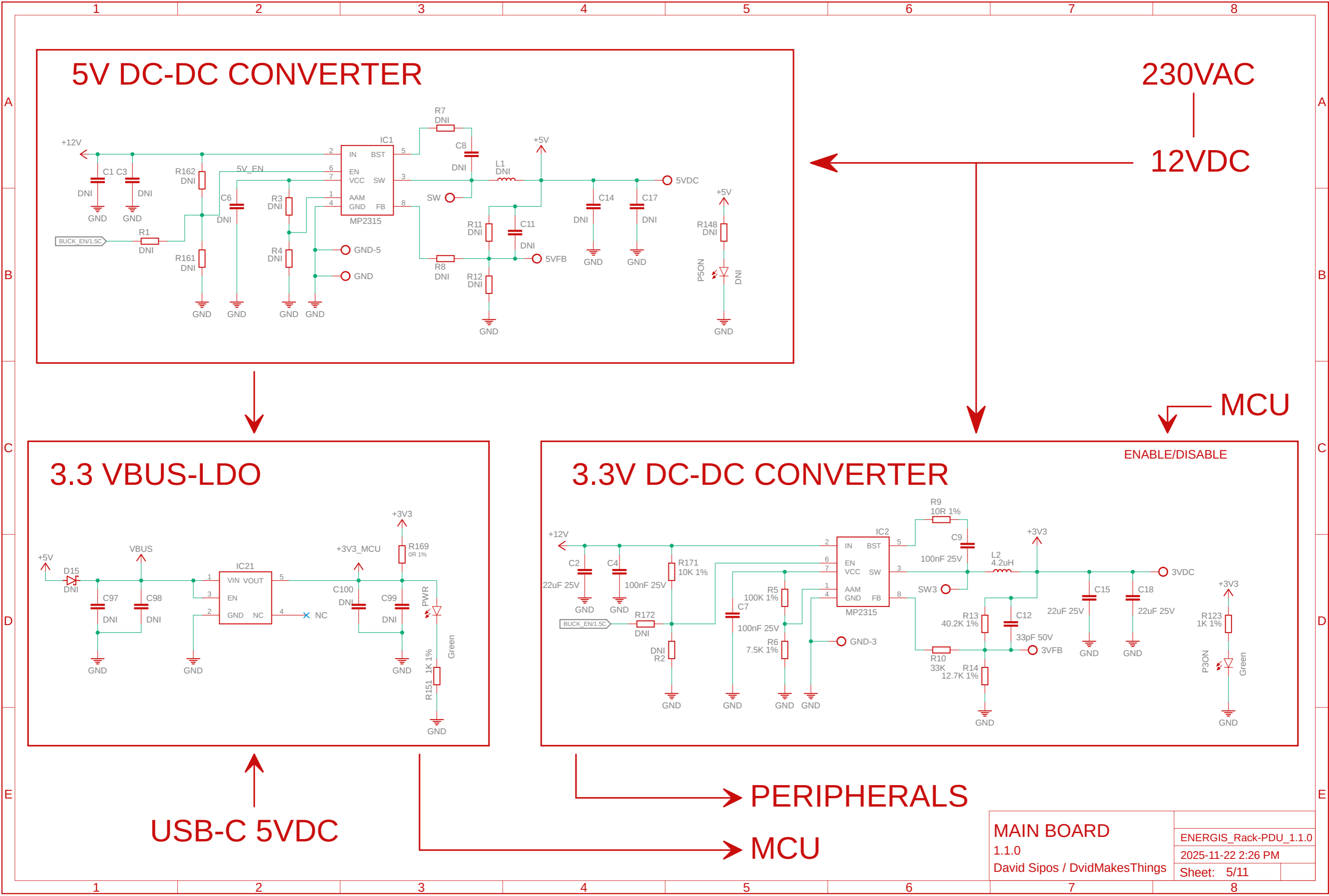
3VDC

PERIPHERALS

MCU

MAIN BOARD
1.1.0
David Sipos / DvidMakesThings

ENERGIS_Rack-PDU_1.1.0
2025-11-22 2:26 PM
Sheet: 5/11



5V DC-DC CONVERTER

This section converts 12VDC to 5VDC. It features an MP2315 IC (IC1) with a feedback network (R11, R12, C11) and a bootstrap network (R7, C8). The output is 5VDC, which is also labeled as 5VFB. A P5ON LED is connected to the output.

3.3 VBUS-LDO

This section converts 5VDC to 3.3V. It uses an LDO (IC21) with a feedback network (R151, R169) and a bootstrap network (R171, R172). The output is 3.3V, which is also labeled as 3.3V_MCU. A PWR LED is connected to the output.

3.3V DC-DC CONVERTER

This section converts 5VDC to 3.3V. It features an MP2315 IC (IC2) with a feedback network (R13, R14, C12) and a bootstrap network (R9, C9). The output is 3.3V, which is also labeled as 3.3VFB. A P3ON LED is connected to the output.

MAIN BOARD

1.1.0
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ENERGIS_Rack-PDU_1.1.0	
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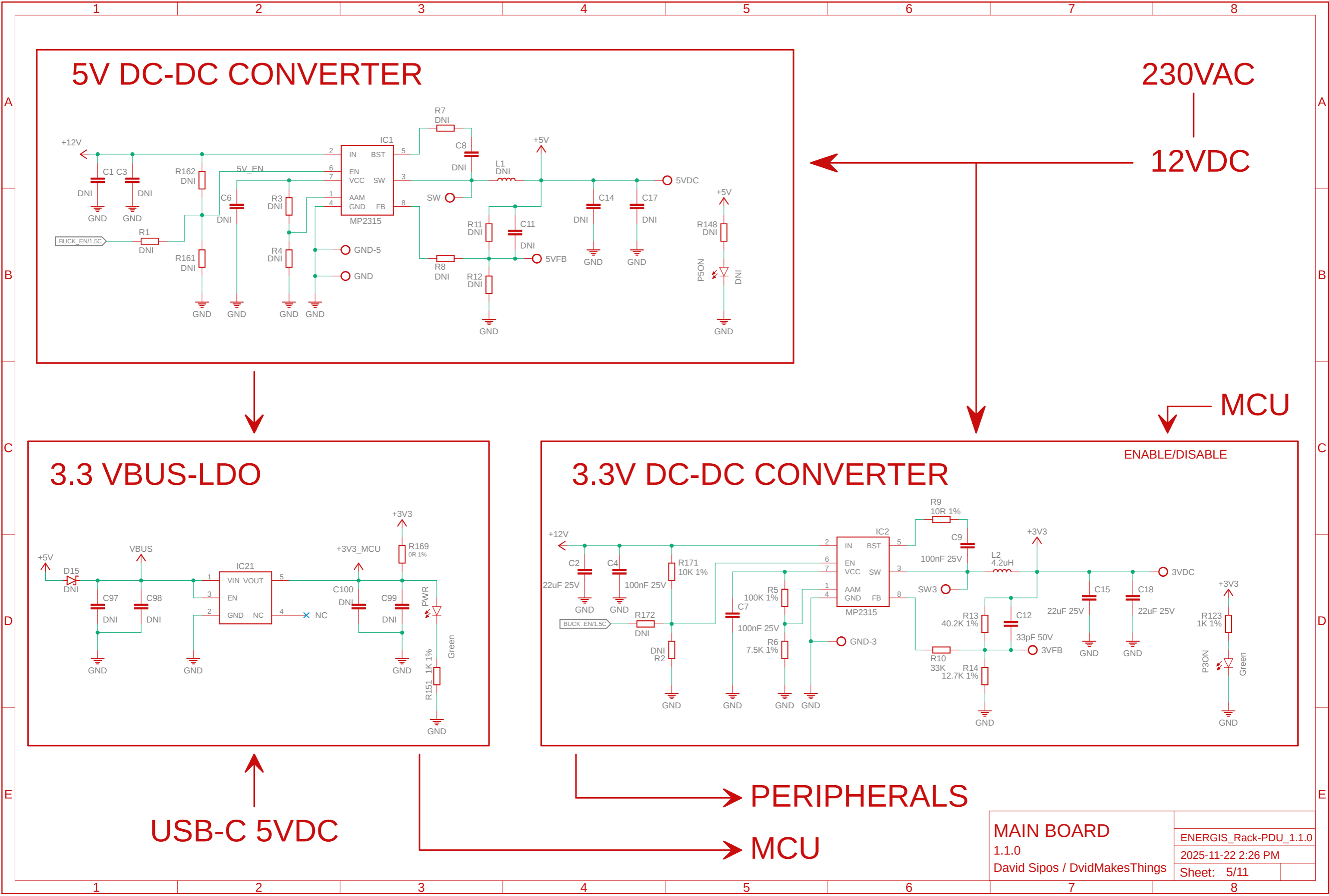


Diagram illustrating the power supply and regulation circuitry for a MAIN BOARD, showing three main sections: 5V DC-DC CONVERTER, 3.3V VBUS-LDO, and 3.3V DC-DC CONVERTER.

5V DC-DC CONVERTER: This section converts 230VAC to 12VDC, which is then regulated to 5VDC. The circuit includes an input filter (C1, C3), a pre-regulator (R1, R161, R162), and an MP2315 DC-DC converter (IC1). The output is 5VDC, which is connected to the MCU.

3.3V VBUS-LDO: This section converts USB-C 5VDC to 3.3V VBUS. The circuit includes an input filter (C97, C98), a diode (D15), and an LDO (IC21). The output is 3.3V VBUS, which is connected to the MCU.

3.3V DC-DC CONVERTER: This section converts 5VDC to 3.3VDC. The circuit includes an input filter (C2, C4), a pre-regulator (R171, R172), and an MP2315 DC-DC converter (IC2). The output is 3.3VDC, which is connected to the PERIPHERALS.

MAIN BOARD: The board is labeled MAIN BOARD 1.1.0, designed by David Sipos / DvidMakesThings. The version is ENERGIS_Rack-PDU_1.1.0, dated 2025-11-22 2:26 PM. The sheet number is 5/11.

5V DC-DC CONVERTER

This section converts 12VDC to 5VDC. It features an MP2315 IC (IC1) with a feedback network (R11, R12, C11) and a bootstrap network (R7, C8). The output is 5VDC, which is connected to the MCU.

3.3 VBUS-LDO

This section converts USB-C 5VDC to 3.3V. It uses an LDO (IC21) with a feedback network (R151, R169) and a bootstrap network (R171, R172). The output is 3.3V, which is connected to the MCU.

3.3V DC-DC CONVERTER

This section converts 5VDC to 3.3V. It features an MP2315 IC (IC2) with a feedback network (R13, R14, C12) and a bootstrap network (R9, C9). The output is 3.3V, which is connected to the PERIPHERALS.

MAIN BOARD

1.1.0
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ENERGIS_Rack-PDU_1.1.0
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Sheet: 5/11

5V DC-DC CONVERTER

230VAC
12VDC

5VDC

MCU

3.3 VBUS-LDO

USB-C 5VDC

3V3

3V3_MCU

3.3V DC-DC CONVERTER

ENABLE/DISABLE

3V3

3VDC

PERIPHERALS

MCU

MAIN BOARD
1.1.0
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ENERGIS_Rack-PDU_1.1.0
2025-11-22 2:26 PM
Sheet: 5/11

5V DC-DC CONVERTER

230VAC
12VDC

5VDC

MCU

3.3V VBUS-LDO

USB-C 5VDC

3V3

3V3_MCU

3.3V DC-DC CONVERTER

ENABLE/DISABLE

3V3

3VDC

PERIPHERALS

MCU

MAIN BOARD
1.1.0
David Sipos / DvidMakesThings

ENERGIS_Rack-PDU_1.1.0
2025-11-22 2:26 PM
Sheet: 5/11

5V DC-DC CONVERTER

230VAC
12VDC

5VDC

MCU

3.3V VBUS-LDO

USB-C 5VDC

3V3

3V3_MCU

3.3V DC-DC CONVERTER

ENABLE/DISABLE

3V3

3VDC

PERIPHERALS

MCU

MAIN BOARD
1.1.0
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ENERGIS_Rack-PDU_1.1.0
2025-11-22 2:26 PM
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5V DC-DC CONVERTER

This section converts 12VDC to 5VDC. It features an MP2315 IC (IC1) with a feedback network (R11, R12, C11) and a bootstrap network (R7, C8). The output is 5VDC, which is connected to the MCU.

3.3 VBUS-LDO

This section converts USB-C 5VDC to 3.3V. It uses an LDO (IC21) with a feedback network (R151, R169) and a bootstrap network (R151, R169). The output is 3.3V, which is connected to the MCU.

3.3V DC-DC CONVERTER

This section converts 5VDC to 3.3V. It features an MP2315 IC (IC2) with a feedback network (R13, R14, C12) and a bootstrap network (R9, C9). The output is 3.3V, which is connected to the PERIPHERALS.

MAIN BOARD

1.1.0
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ENERGIS_Rack-PDU_1.1.0
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5V DC-DC CONVERTER

230VAC
12VDC

5VDC

MCU

3.3 VBUS-LDO

USB-C 5VDC

3V3

3V3_MCU

3.3V DC-DC CONVERTER

ENABLE/DISABLE

3V3

3VDC

PERIPHERALS

MCU

MAIN BOARD
1.1.0
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ENERGIS_Rack-PDU_1.1.0
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5V DC-DC CONVERTER

This section converts 12VDC to 5VDC. It features an MP2315 IC (IC1) with a feedback network (R11, R12, C11) and a bootstrap network (R7, C8). The output is 5VDC, which is connected to the MCU.

3.3 VBUS-LDO

This section converts USB-C 5VDC to 3.3V. It uses an LDO (IC21) with a feedback network (R151, R169) and a bootstrap network (R151, R169). The output is 3.3V, which is connected to the MCU.

3.3V DC-DC CONVERTER

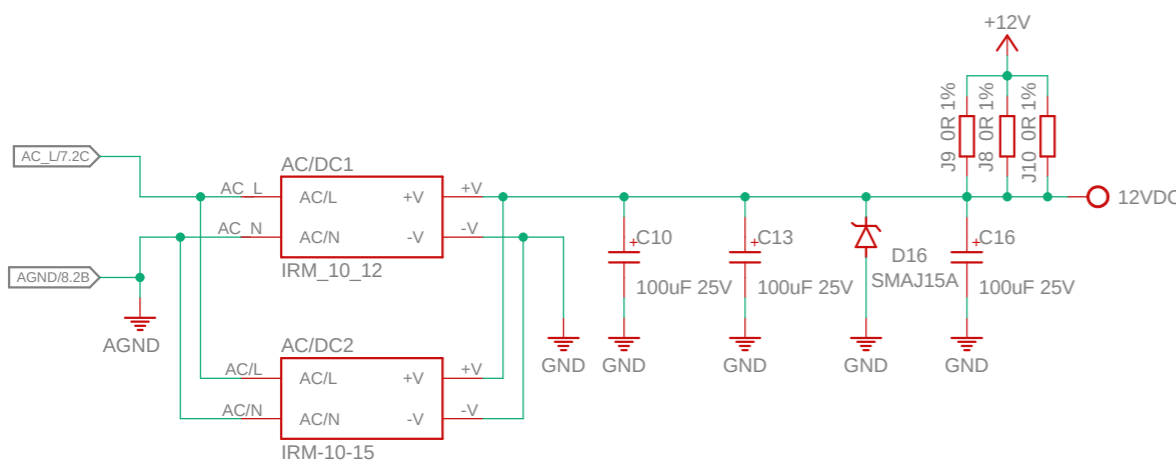
This section converts 5VDC to 3.3V. It features an MP2315 IC (IC2) with a feedback network (R13, R14, C12) and a bootstrap network (R9, C9). The output is 3.3V, which is connected to the PERIPHERALS.

MAIN BOARD

1.1.0
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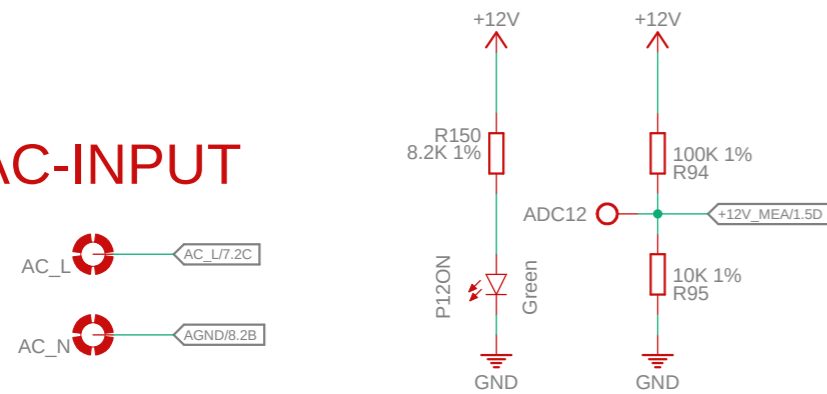
12V - 10W FLYBACK CONVERTER



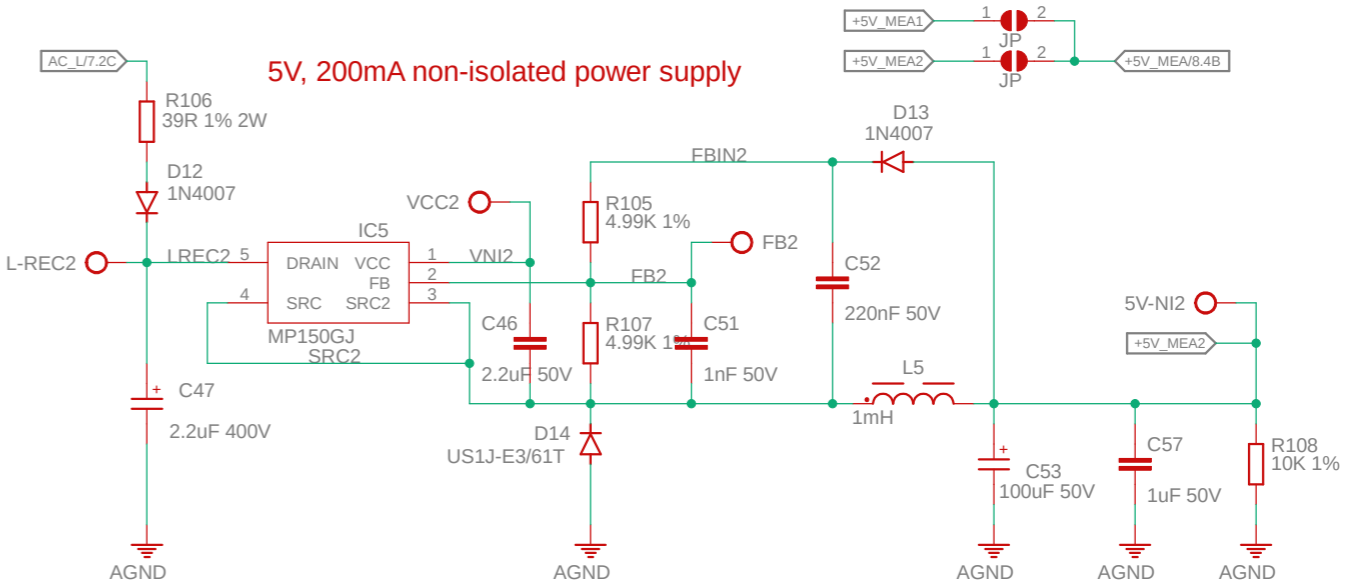
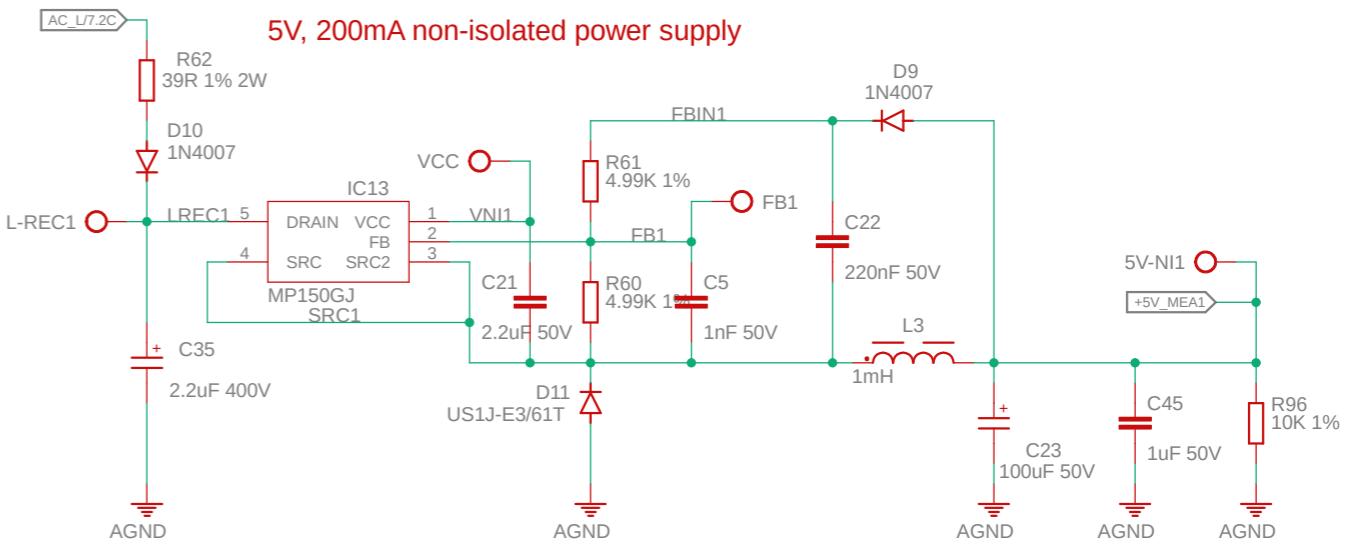
Design Note — 12 V supply (Mean Well IRM-10 series), universal 110 V/230 V AC

This schematic uses the Mean Well IRM-10 encapsulated AC-DC module (e.g., IRM-10-12) to produce 12 VDC. The IRM-10 series is specified for a wide input range of 85–305 VAC (47–440 Hz) and 120–430 VDC, meaning it operates from both ~115 VAC and ~230 VAC mains with no selector or changes to the circuit. Safety approvals (IEC/UL/EN 62368-1), Class II construction, and built-in EMI/EMC compliance are provided by the module.

AC-INPUT



5V NON-ISOLATED



Design Note — 5 V / 200 mA non-isolated supply (MP150), universal 110 V/230 V AC

This design uses MPS MP150 in high-side buck to generate 5 V/200 mA directly from rectified mains. MP150 integrates a 500 V MOSFET (Drain-to-Source rating 500 V), covering the ~325 VDC peak from 230 VAC and ~155 VDC from 115 VAC, so the circuit from 85–265 VAC ("universal input").

MAIN BOARD		ENERGIS_Rack-PDU_1.1.0	
1.1.0		2025-11-22 2:26 PM	
David Sipos / DvidMakesThings		Sheet: 6/11	

A



E

ENERGIS_Rack-PDU_1.1.0

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AC CHANNEL MEASUREMENT

The diagrams show the following components and connections:

- Channel 1 (IC6):** INP to AGND/6.1E, VDD to +5V_MEA/9.4D, RX to NC, PF to NC, TX to TX_CH1/10.3C, INN to INN, VP to GND. Resistors R25 (1K 1%), R33 (1K 1%), R34 (1K 1%), R35 (0.002R 1%), R36 (470K 1%), R37 (470K 1%), R38 (470K 1%), R39 (470K 1%), R40 (1K 1%). Capacitors C24 (33nF 50V), C25 (33nF 50V), C26 (33nF 50V).
- Channel 2 (IC10):** INP to AGND/6.1E, VDD to +5V_MEA/9.4D, RX to NC, PF to NC, TX to TX_CH3/10.3B, INN to INN, VP to GND. Resistors R65 (1K 1%), R66 (1K 1%), R67 (0.002R 1%), R68 (470K 1%), R69 (470K 1%), R70 (470K 1%), R71 (470K 1%), R72 (1K 1%). Capacitors C36 (33nF 50V), C37 (33nF 50V), C38 (33nF 50V).
- Channel 3 (IC8):** INP to AGND/6.1E, VDD to +5V_MEA/9.4D, RX to NC, PF to NC, TX to TX_CH2/10.3B, INN to INN, VP to GND. Resistors R49 (1K 1%), R50 (1K 1%), R51 (0.002R 1%), R52 (470K 1%), R53 (470K 1%), R54 (470K 1%), R55 (470K 1%), R56 (1K 1%). Capacitors C30 (33nF 50V), C31 (33nF 50V), C32 (33nF 50V).
- Channel 4 (IC12):** INP to AGND/6.1E, VDD to +5V_MEA/9.4D, RX to NC, PF to NC, TX to TX_CH4/10.3B, INN to INN, VP to GND. Resistors R81 (1K 1%), R82 (1K 1%), R83 (0.002R 1%), R84 (470K 1%), R85 (470K 1%), R86 (470K 1%), R87 (470K 1%), R88 (1K 1%). Capacitors C42 (33nF 50V), C43 (33nF 50V), C44 (33nF 50V).

Labels for signal sources: N_OUT1, L_OUT1, N_OUT2, L_OUT2, N_OUT3, L_OUT3, N_OUT4, L_OUT4.

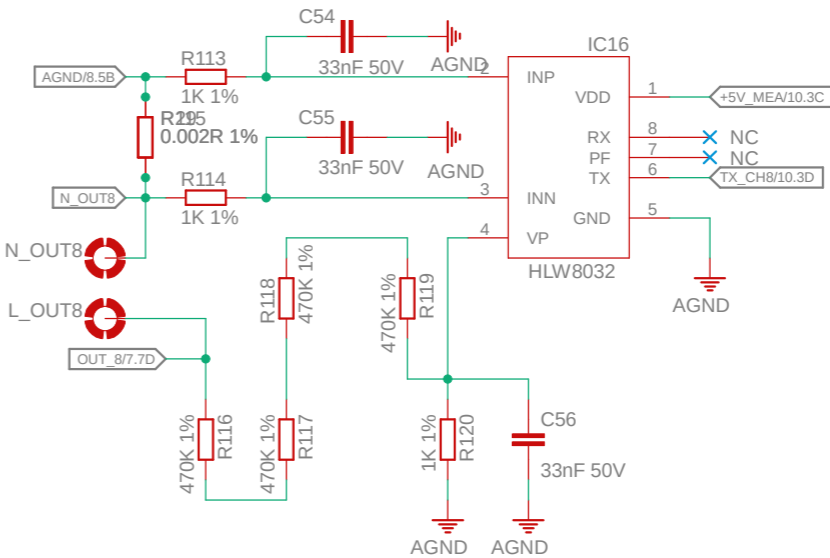
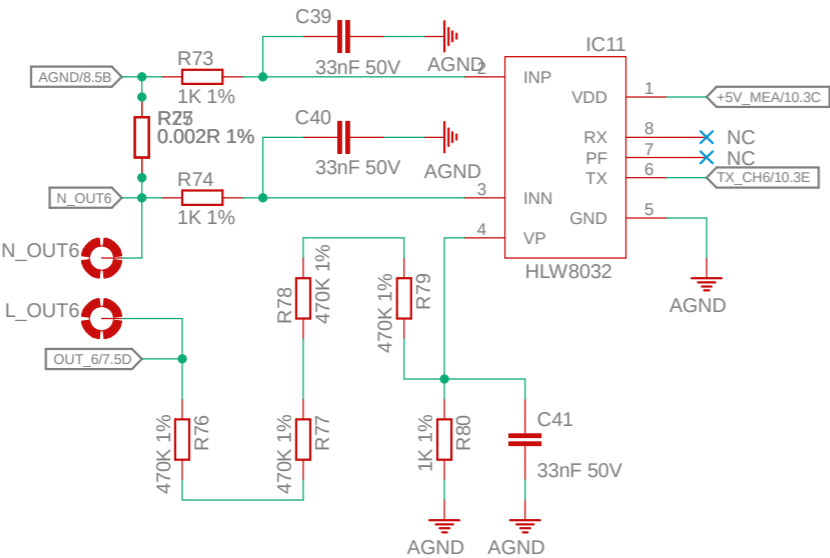
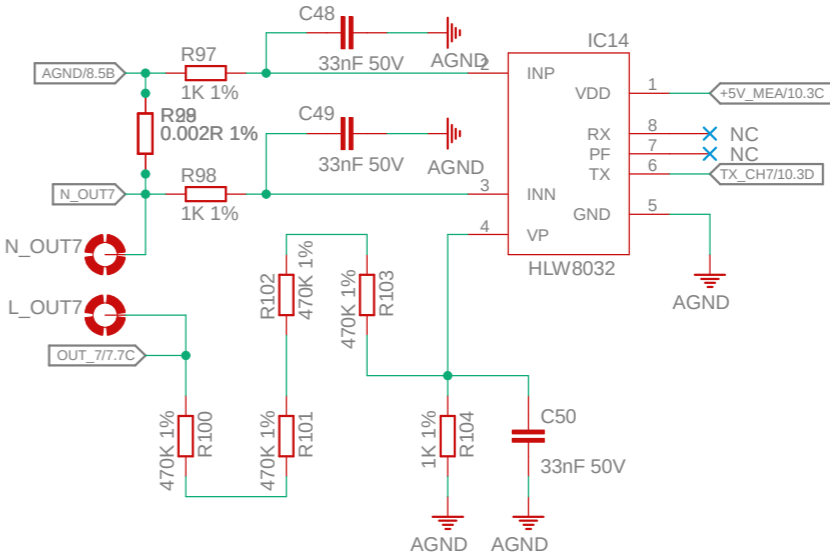
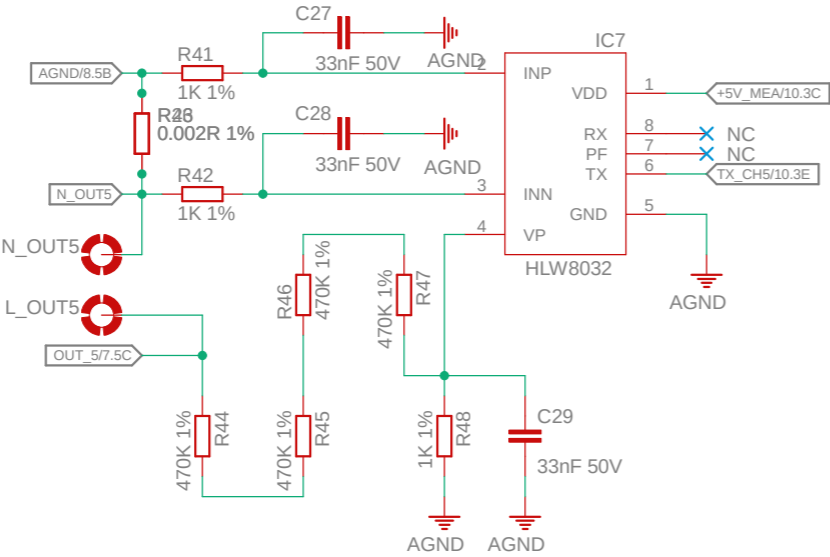
Labels for output signals: OUT_1/7.1C, OUT_2/7.1D, OUT_3/7.3C, OUT_4/7.3D.

MAIN BOARD
1.1.0
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ENERGIS_Rack-PDU_1.1.0
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Sheet: 8/11

AC CHANNEL MEASUREMENT



MAIN BOARD

1.1.0

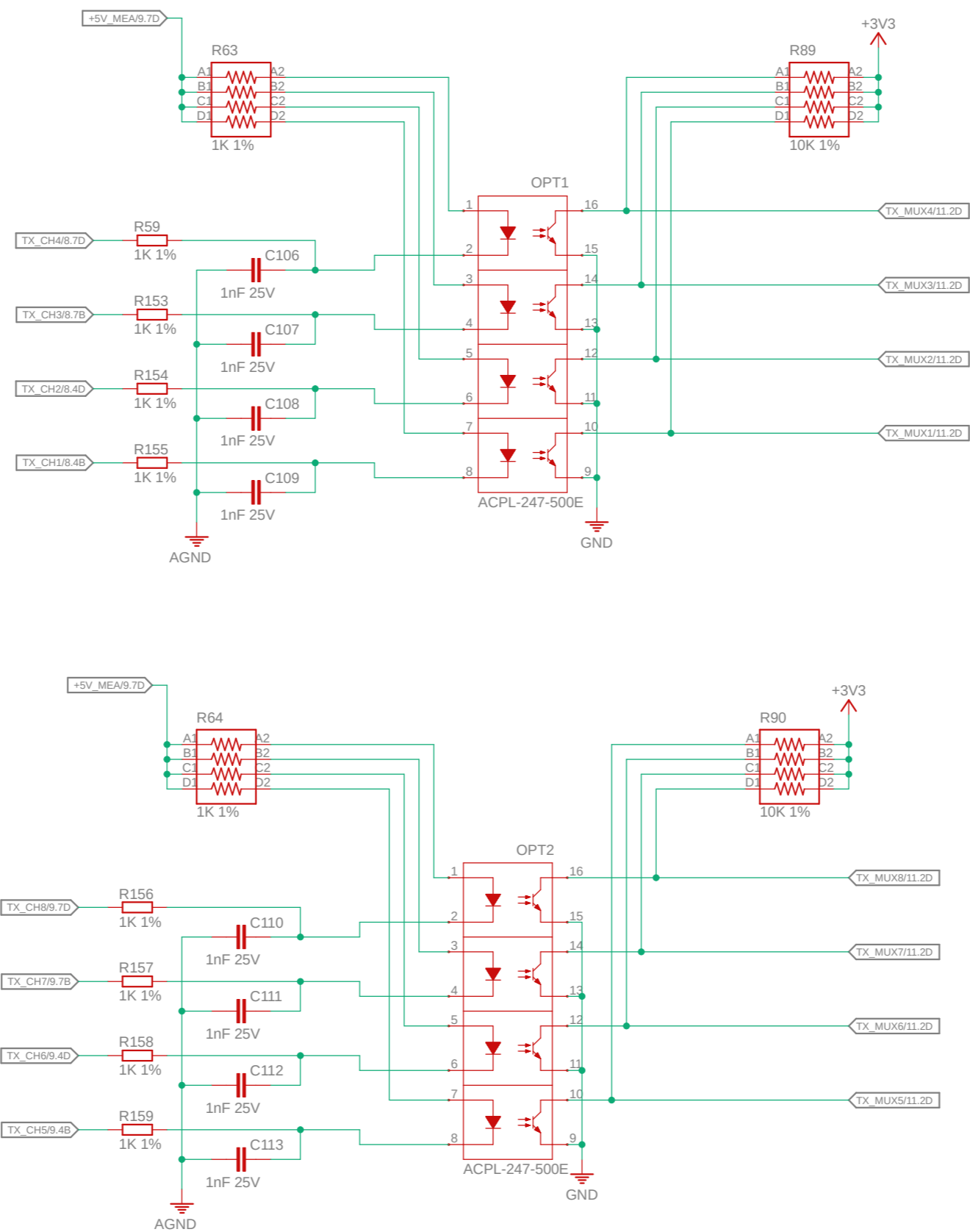
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ENERGIS_Rack-PDU_1.1.0

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SERIAL OPTOISOLATOR



MAIN BOARD

1.1.0

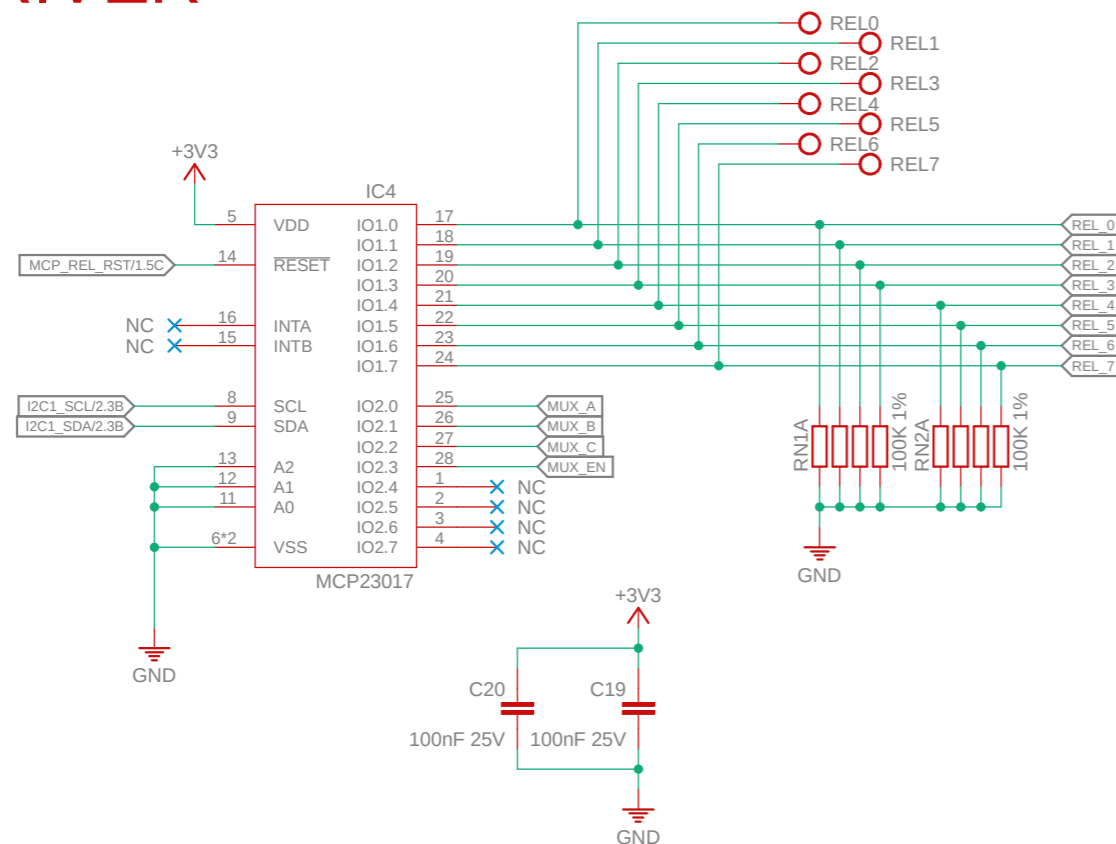
David Sipos / DvidMakesThings

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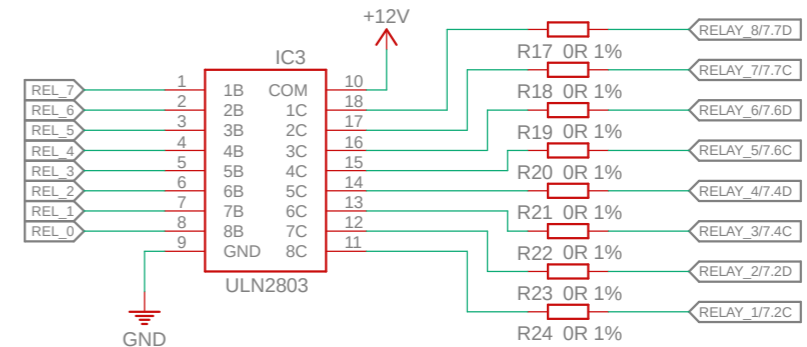
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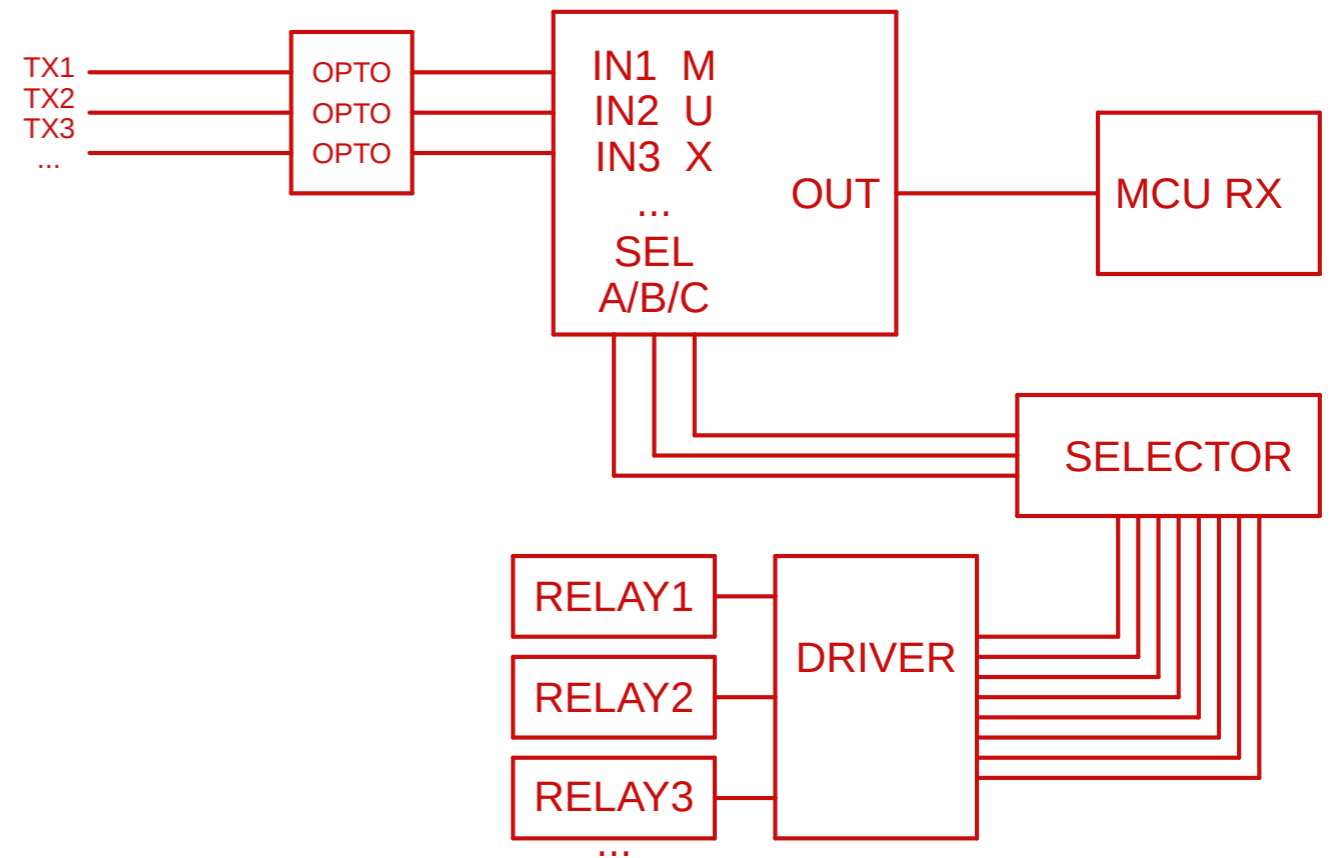
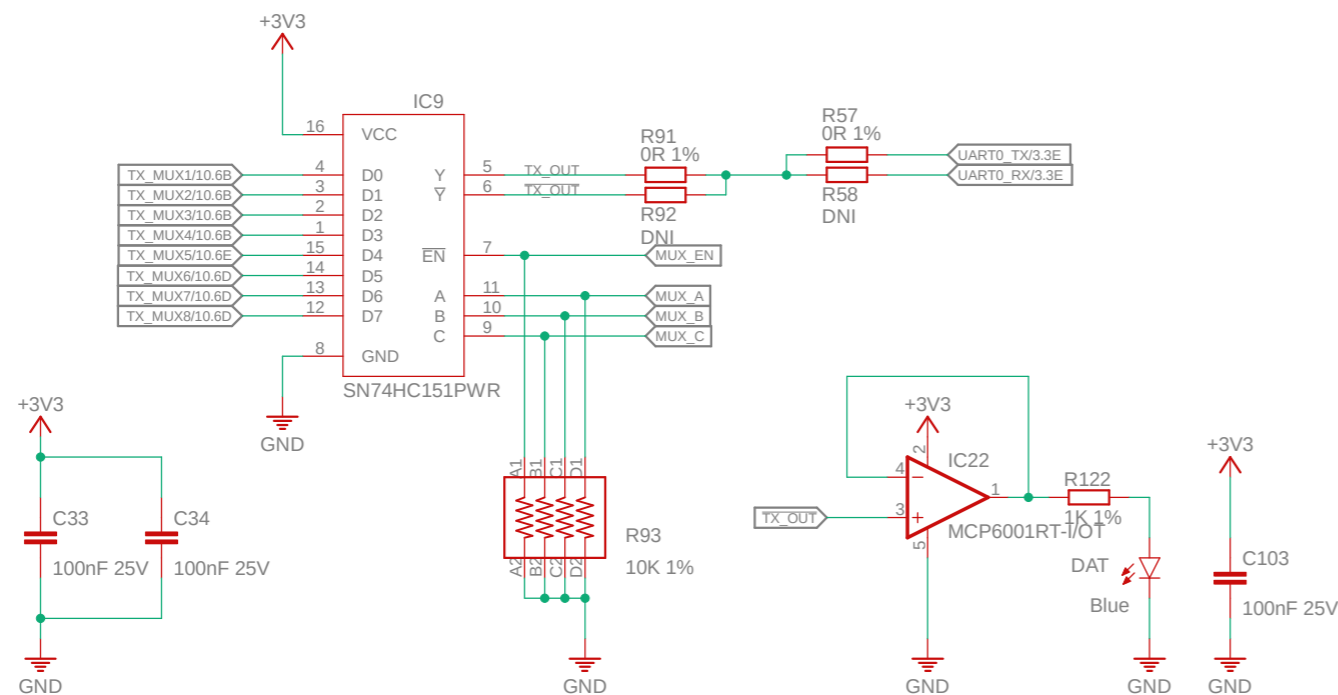
IO DRIVER



ULN2803 RELAY DRIVER



SERIAL MUX



MAIN BOARD

1.1.0

David Sipos / DvidMakesThings

ENERGIS_Rack-PDU_1.1.0

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