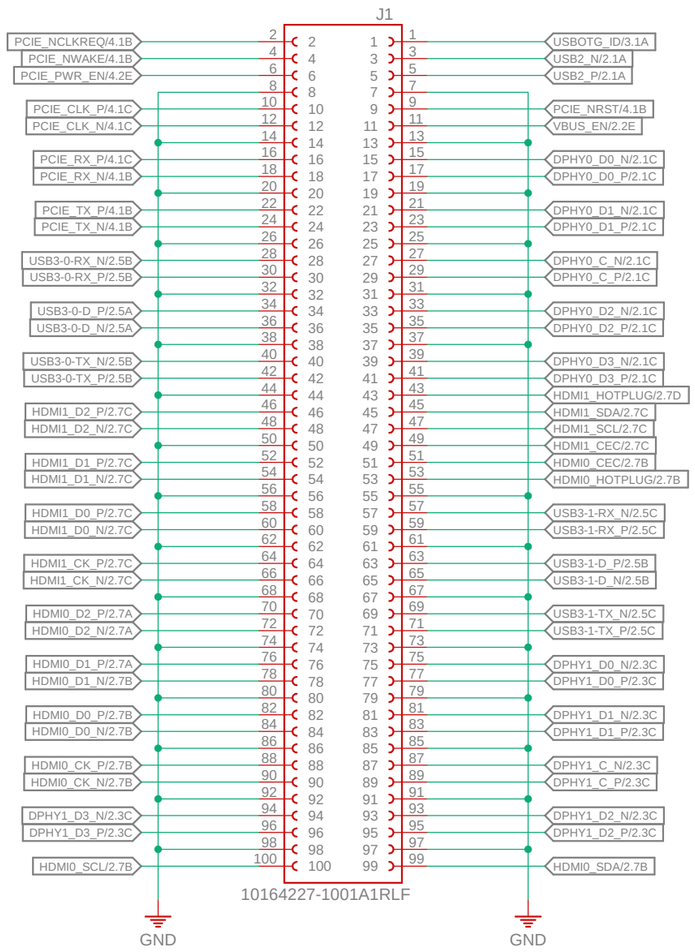

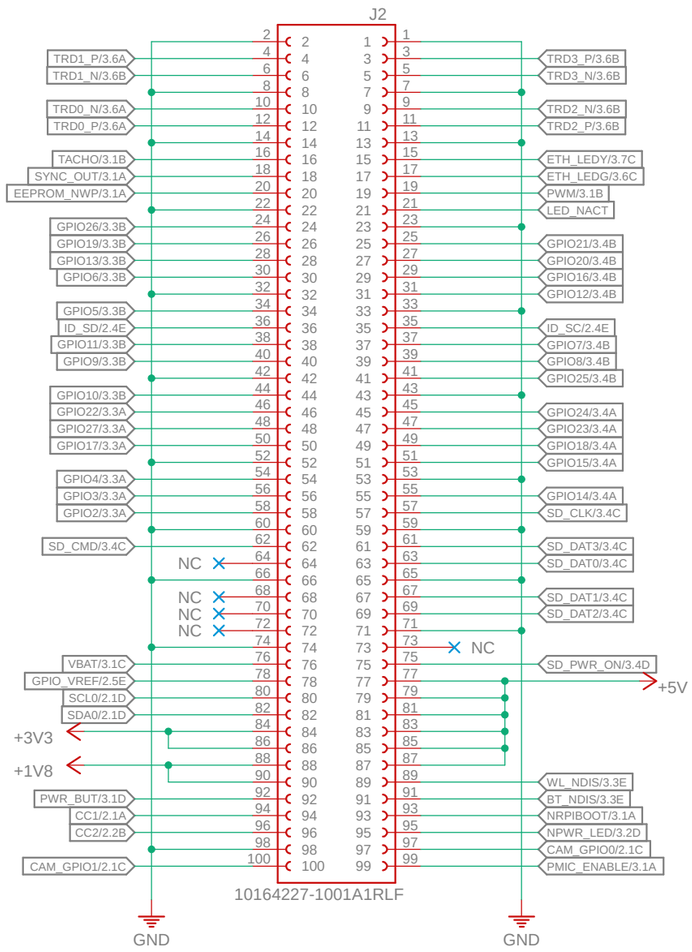

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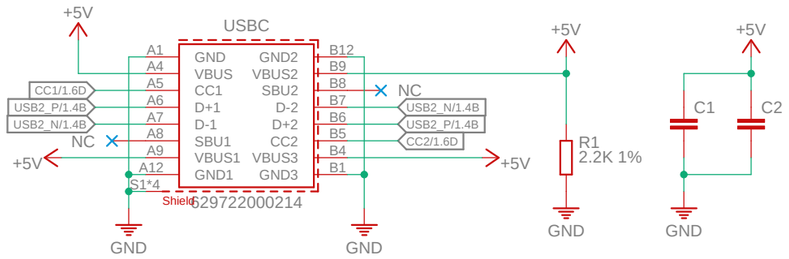
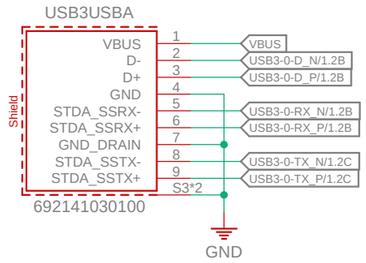
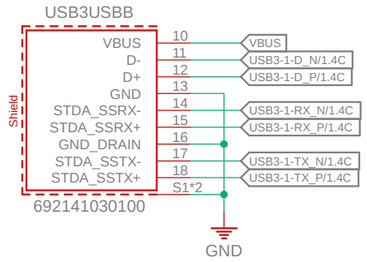
USB-C POWER CONNECTOR

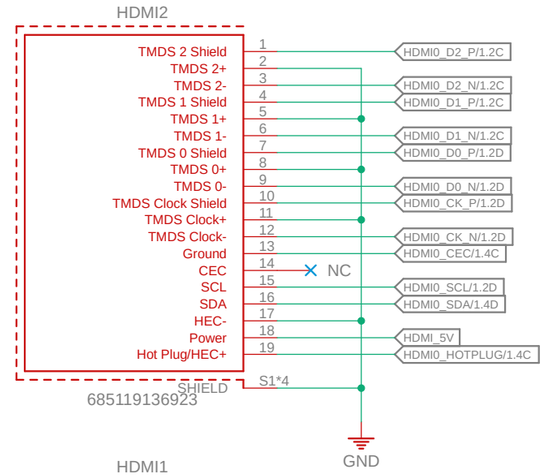


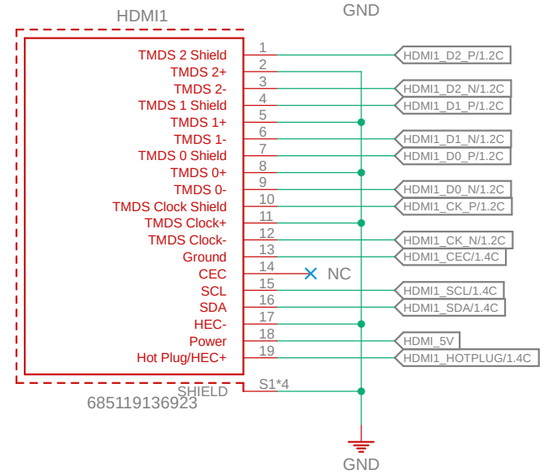
USB3 CONNECTORS



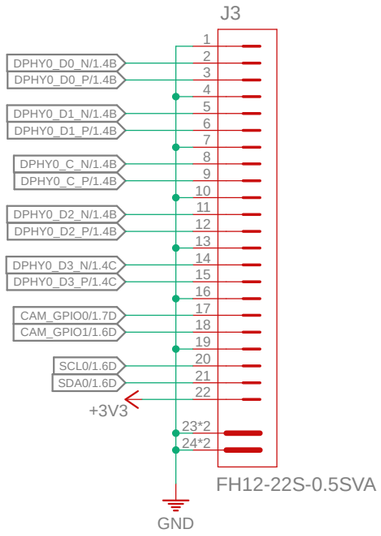


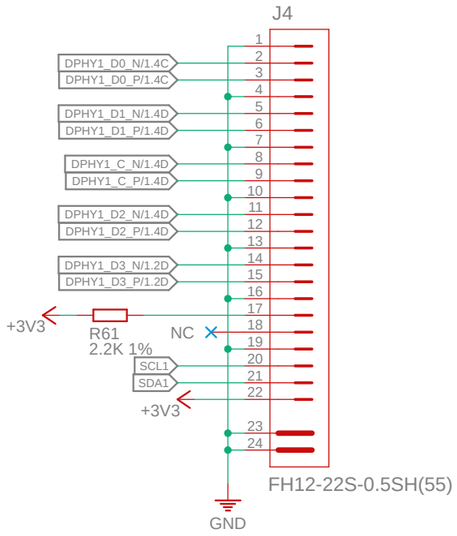
DUAL-HDMI CONNECTOR



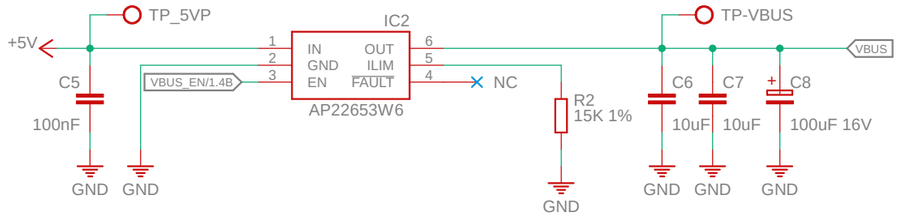


DSI/CSI CONNECTORS

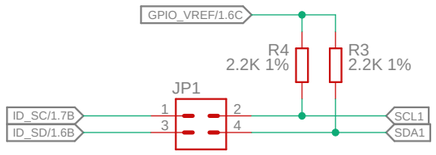


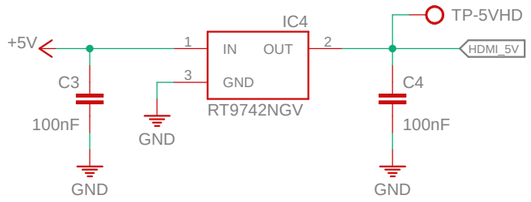


CURRENT LIMIT SWITCH



DPHY1 JUMPERS





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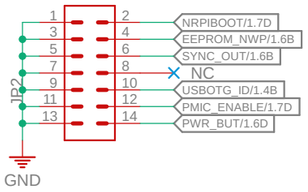
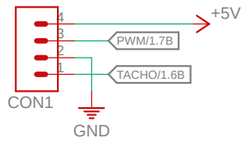
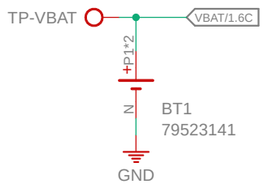
JUMPERS



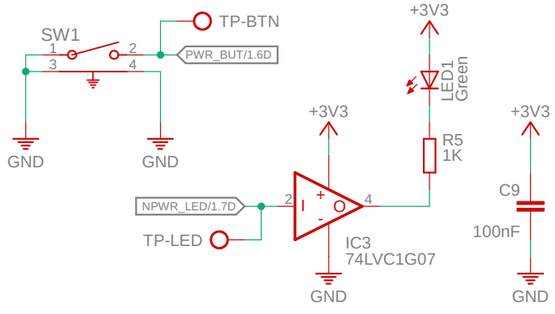
FAN CONNECTOR



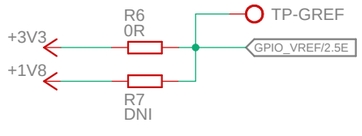
RTC BATTERY



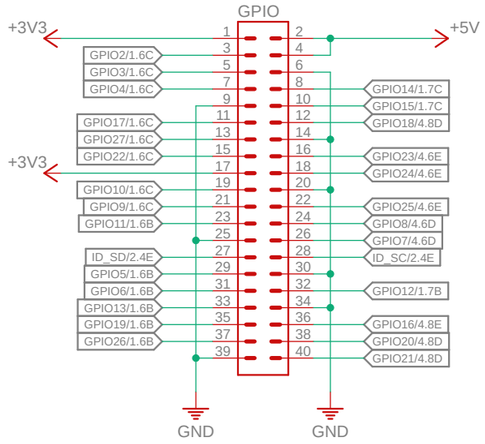
POWER BUTTON AND LED



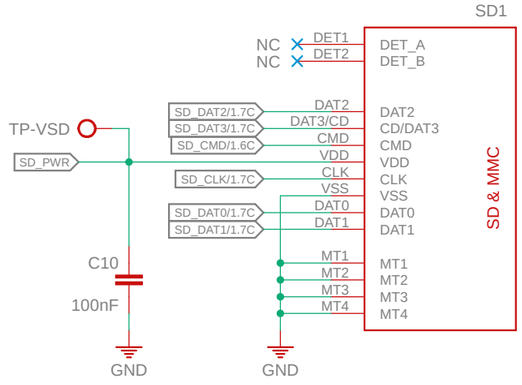
GPIO VOLTAGE SELECT

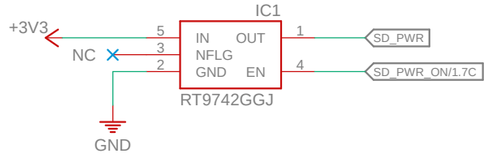


40-PIN GPIO HEADER

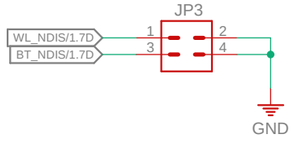


MICRO-SD SOCKET

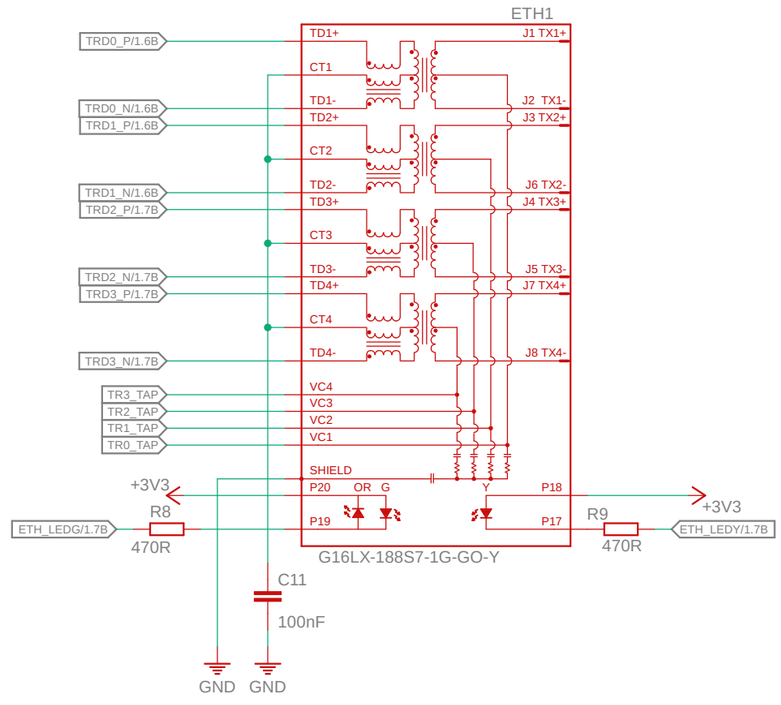


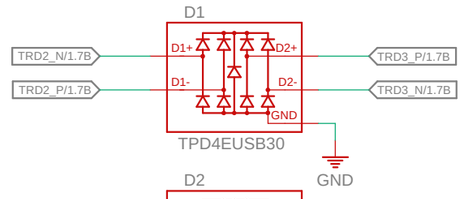


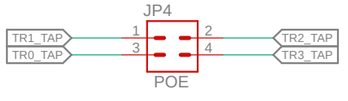
RF DISABLE



1000 BASE ETHERNET







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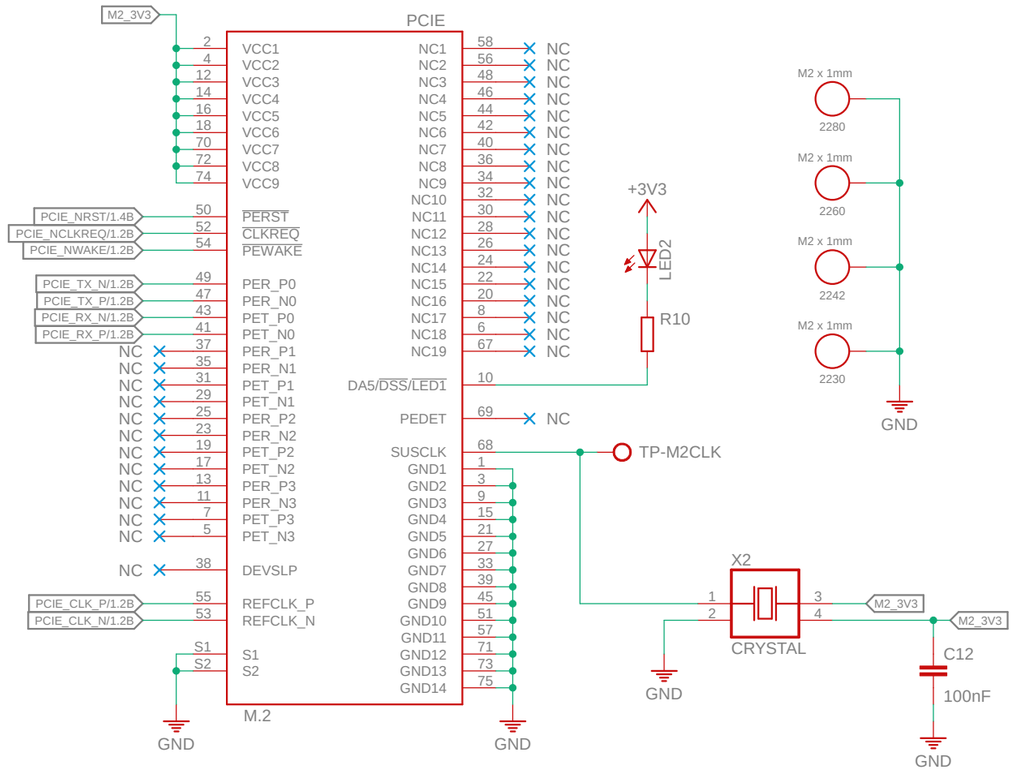
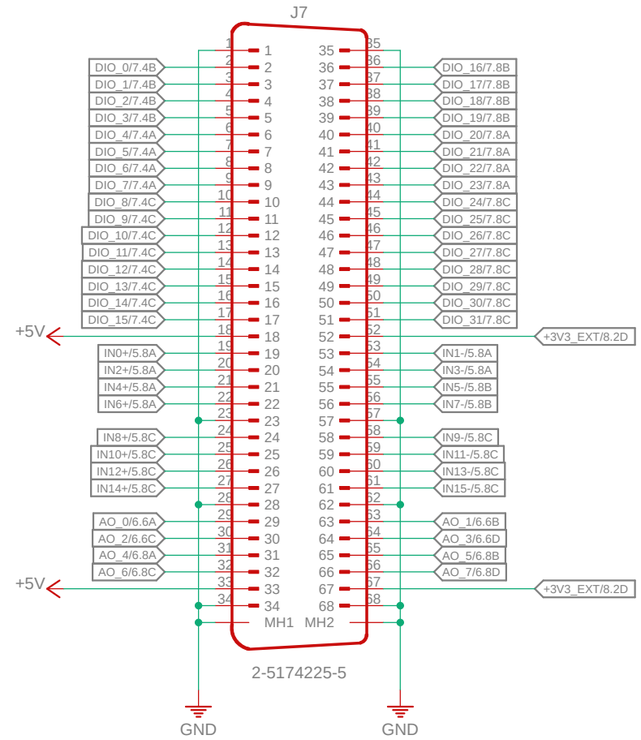
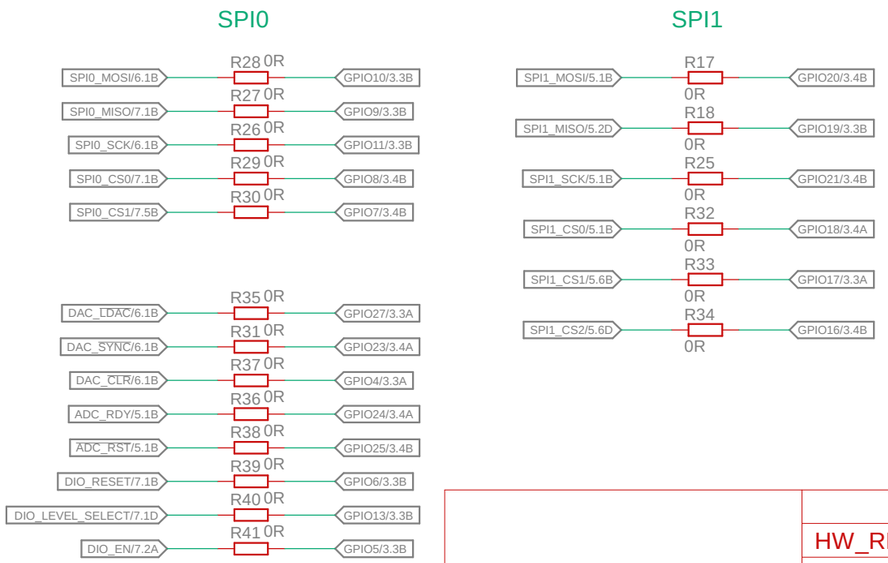
PCIE-M.2 M-KEY CONNECTOR



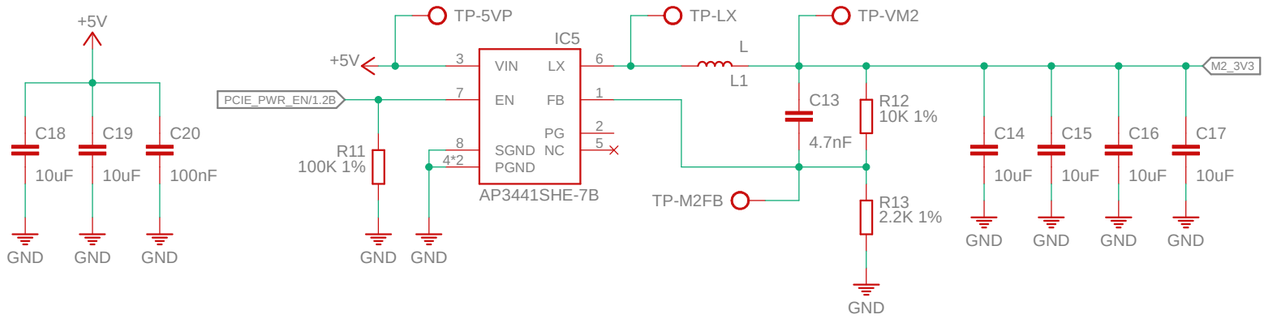
TEST CONNECTOR



IO-GPIO JUMPERS



PCIE POWER SUPPLY



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ADS9234R ADC

PGA

INPUT MULTIPLEXER

A1	A0	EN	ON
X	X	0	–
0	0	1	OUT0 IN0+ AND IN1–
0	1	1	OUT1 IN2+ AND IN3–
1	0	1	OUT2 IN4+ AND IN5–
1	1	1	OUT3 IN6+ AND IN7–

A1	A0	EN	ON
X	X	0	–
0	0	1	OUT0 IN8+ AND IN9–
0	1	1	OUT1 IN10+ AND IN11–
1	0	1	OUT2 IN12+ AND IN13–
1	1	1	OUT3 IN14+ AND IN15–

ANALOG-IN TESTPOINTS

VOCMA — VOCM_A
VCOMB — VOCM_B
SPI1_CS0 — SPI1_CS0/4.7D
REFOUT — REFOUT
REFBY2 — REFBY2
TP9 — VREF_ADC/8.3E
VREFR — VREF_ADC_RAW/8.2E
REF/2 — VREF_ADC/2

ADC ON SPI1

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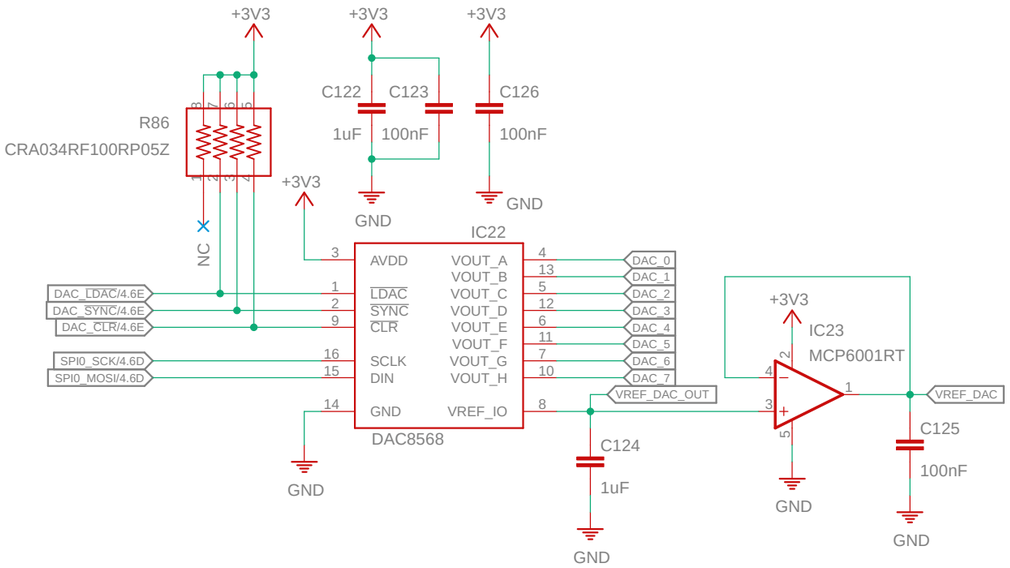
ANALOG-OUT DAC



DAC8568 Output Calculation:
V_OUT = (1 + R_FB/R_G2 + R_FB/R_G1) * V_DAC - (R_FB/R_G2) * V_REF

Given:
Supply voltage: +/-12V
Reference voltage (V_REF): 2.5V
DAC resolution: 16 bits
Desired output range: -12V to +12V

1. Determine the Gain (G):
G = (V_OUT_max - V_OUT_min) / (V_DAC_max - V_DAC_min)
G = (12 - (-12)) / (2.5 - 0) = 24 / 2.5 = 9.6

2. Solve for Resistor Ratios:
G = 1 + R_FB/R_G2 + R_FB/R_G1
Assume R_G1 = R_G2 = R_G:
G = 1 + 2 * (R_FB / R_G)
9.6 = 1 + 2 * (R_FB / R_G)
2 * (R_FB / R_G) = 8.6
R_FB / R_G = 4.3

3. Choose Resistor Values:
Let R_G = 10 kOhm
R_FB = 4.3 * R_G = 4.3 * 10 kOhm = 43 kOhm

Resistor Values:
R_FB = 43 kOhm
R_G1 = R_G2 = 10 kOhm

4. Calculate Output Resolution:
Resolution_DAC = V_REF / 2^16 = 2.5 / 65536 ≈ 0.038 mV
Resolution_OUT = Resolution_DAC * G = 0.038 mV * 9.6 ≈ 0.365 mV

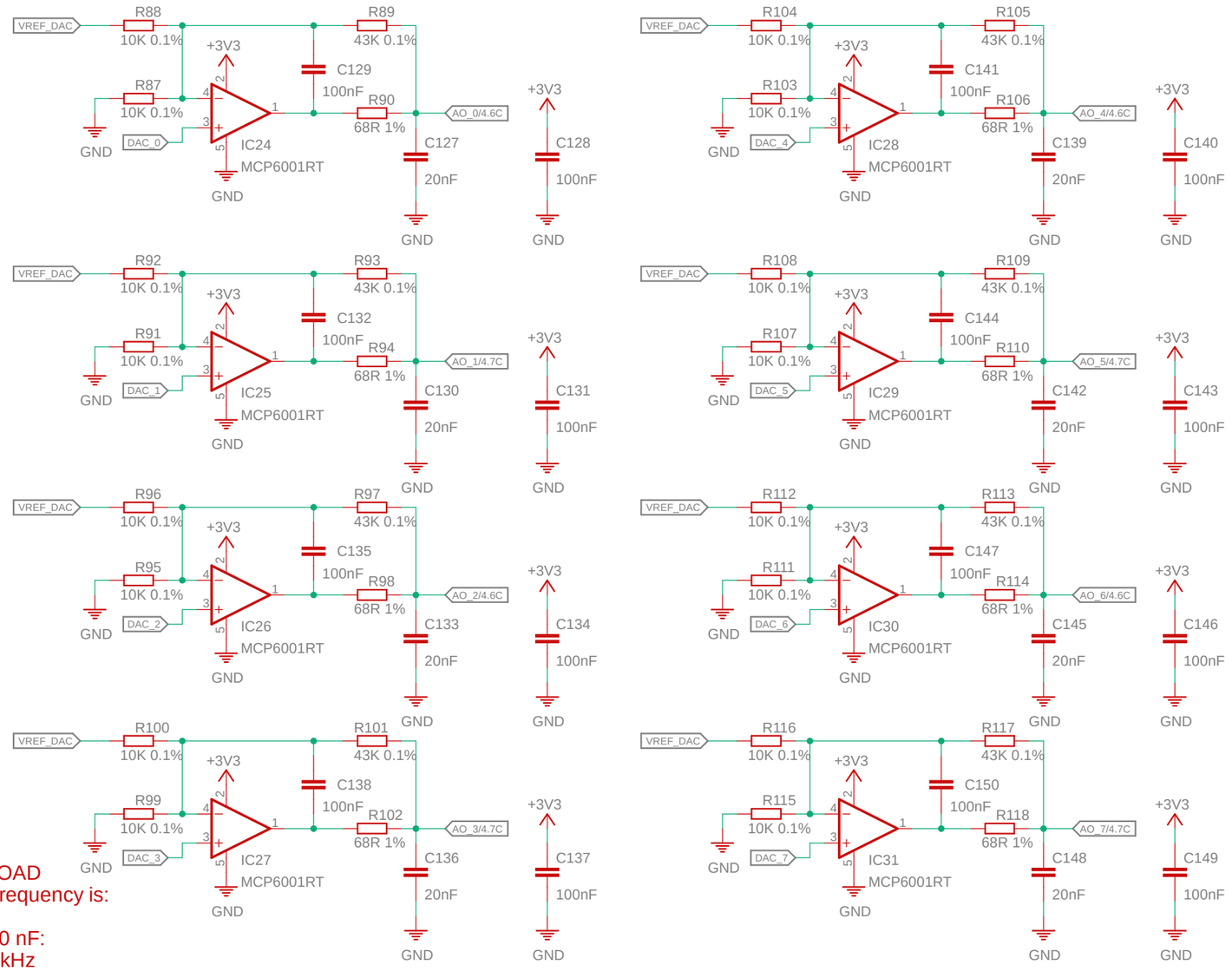
Final Results:
Resistor values:
R_FB = 43 kOhm
R_G1 = R_G2 = 10 kOhm
Output resolution: 0.365 mV per step

Choose R_ISOLATION = 68 Ω:

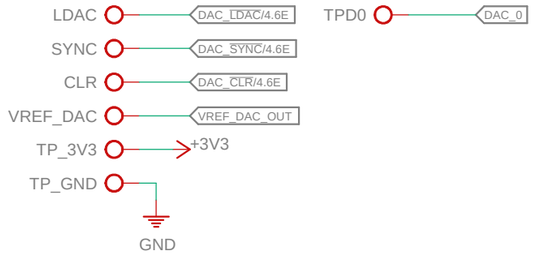
1. Stability with Capacitive Load:
The combination of R_ISO and C_LOAD creates a low-pass filter. The cutoff frequency is:
f_c = 1 / (2 * π * R_ISO * C_LOAD)
For R_ISO = 68 Ω and C_LOAD = 20 nF:
f_c = 1 / (2 * π * 68 * 20e-9) ≈ 117.2 kHz

2. Voltage Drop Across R_ISO:
The voltage drop is:
V_drop = I_load * R_ISO

ANALOG-OUT OUTPUT DRIVERS



ANALOG-OUT TESTPOINTS



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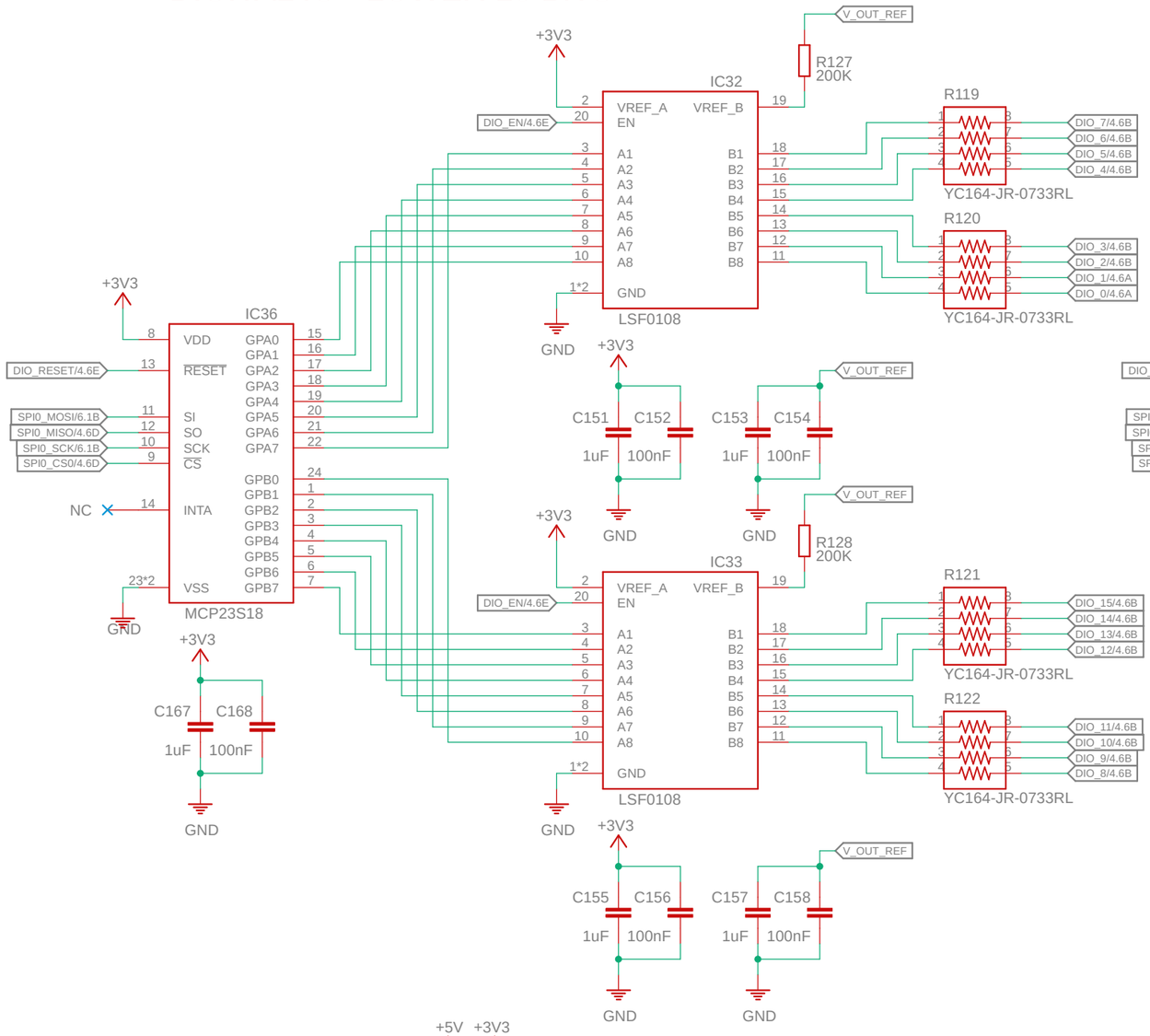
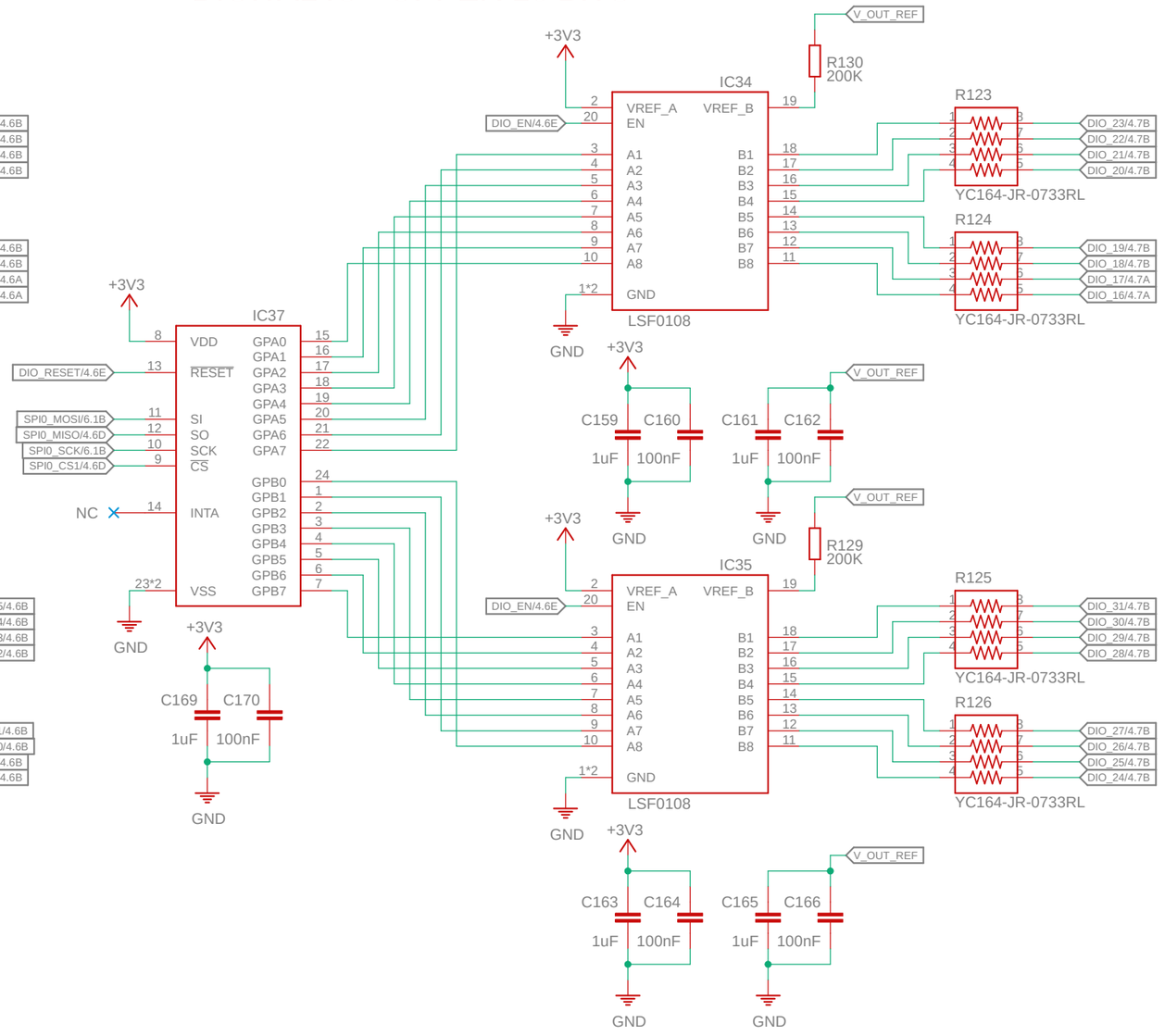
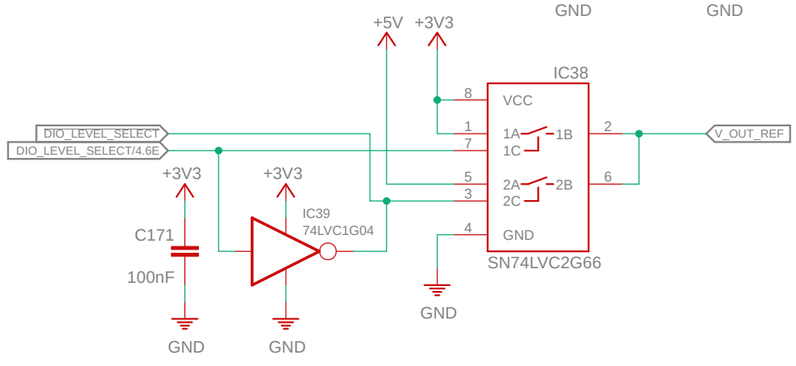
DIGITAL IO - LOWER 16 BITS

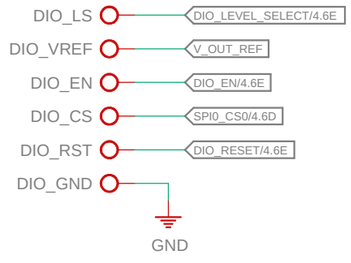


DIGITAL IO - UPPER 16 BITS





ANALOG-OUT TESTPOINTS



DIO ON SPI0

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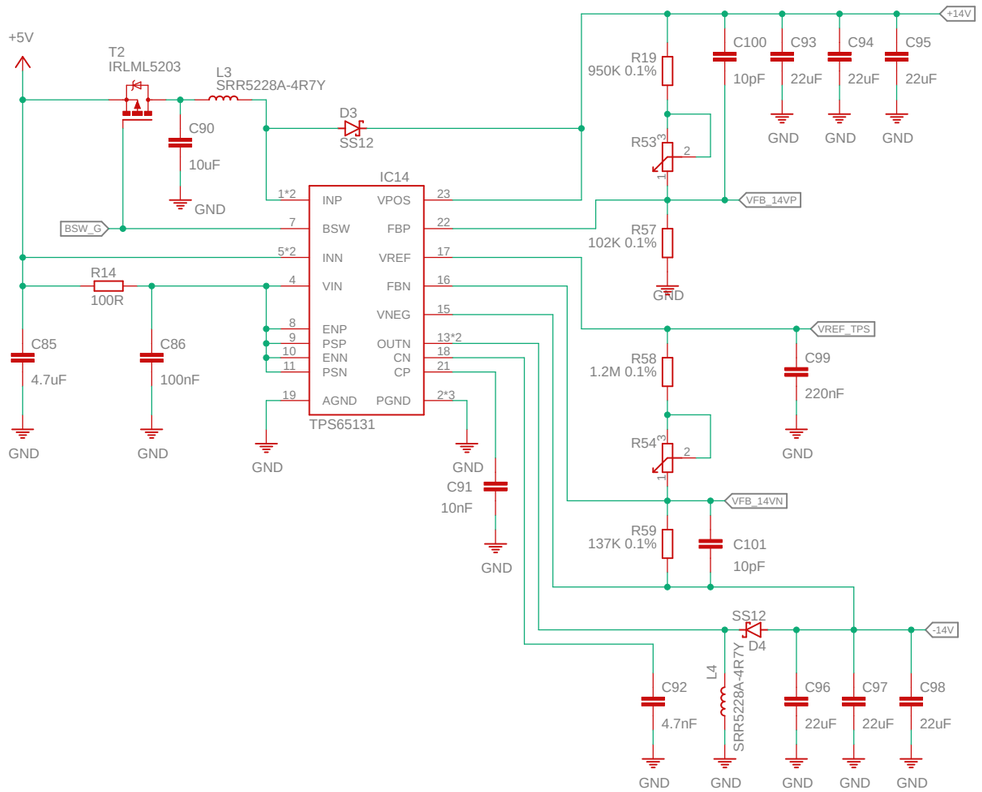
Positive Output (Vout_pos = 14V):
- Given:
  - R1 = 976 kΩ
  - Calculated R2 ≈ 102.3 kΩ
- Nearest E96 Standard Value:
  - R2 = 102 kΩ
- Resulting Output Voltage:
  - Vout = 1.213 × (1 + R1 / R2)
  - Vout = 1.213 × (1 + 976 / 102) ≈ 13.98 V
- Final Pair:
  - R1 = 976 kΩ
  - R2 = 102 kΩ

Positive Channel:
- Target VOUTP = 14 V,
adjustment range: 12.6 V to 15.4 V.
- Configuration:
  - R2P = 102 kΩ (fixed).
  - R1P = 950 kΩ (fixed) + 250 kΩ (trimmer).
- Adjustment Range:
  - R1P = 950 kΩ to 1200 kΩ.

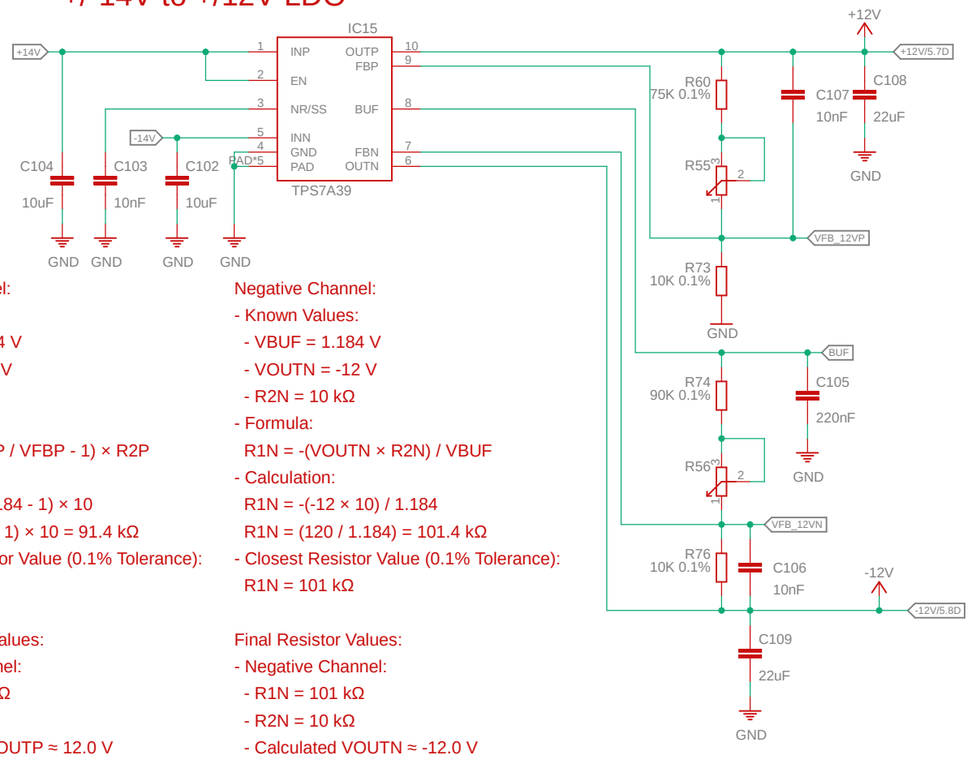
Negative Output (Vout_neg = -14V):
- Given:
  - R1 = 1.3 MΩ
  - Calculated R2 ≈ 136.3 kΩ
- Nearest E96 Standard Value:
  - R2 = 137 kΩ
- Resulting Output Voltage:
  - Vout = 1.213 × (1 + R1 / R2)
  - Vout = 1.213 × (1 + 1300 / 137) ≈ 14.01 V
- Final Pair:
  - R1 = 1.3 MΩ
  - R2 = 137 kΩ

Negative Channel:
- Target VOUTN = -14 V,
adjustment range: -12.6 V to -15.4 V.
- Configuration:
  - R2N = 137 kΩ (fixed).
  - R1N = 1.2 MΩ (fixed) + 250 kΩ (trimmer).
- Adjustment Range:
  - R1N = 1.2 MΩ to 1.45 MΩ.

5V to +/-14V BOOST CONVERTER



+/-14V to +/12V LDO



Positive Channel:
- Known Values:
  - VFBP = 1.184 V
  - VOUTP = 12 V
  - R2P = 10 kΩ
- Formula:
  R1P = (VOUTP / VFBP - 1) × R2P
- Calculation:
  R1P = (12 / 1.184 - 1) × 10
  R1P = (10.14 - 1) × 10 = 91.4 kΩ
- Closest Resistor Value (0.1% Tolerance):
  R1P = 91.5 kΩ

Final Resistor Values:
- Positive Channel:
  - R1P = 91.5 kΩ
  - R2P = 10 kΩ
  - Calculated VOUTP ≈ 12.0 V

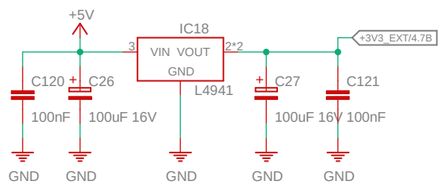
Positive Channel:
- Target VOUTP = 12 V,
adjustment range: 10.8 V to 13.2 V.
- Feedback Resistor Configuration:
  - R2P = 10 kΩ (fixed).
  - R1P = 75 kΩ (fixed) + 20 kΩ (trimmer).
- Adjustment Range:
  - R1P = 81.2 kΩ to 101.5 kΩ.

Negative Channel:
- Known Values:
  - VBUF = 1.184 V
  - VOUTN = -12 V
  - R2N = 10 kΩ
- Formula:
  R1N = -(VOUTN × R2N) / VBUF
- Calculation:
  R1N = -(-12 × 10) / 1.184
  R1N = (120 / 1.184) = 101.4 kΩ
- Closest Resistor Value (0.1% Tolerance):
  R1N = 101 kΩ

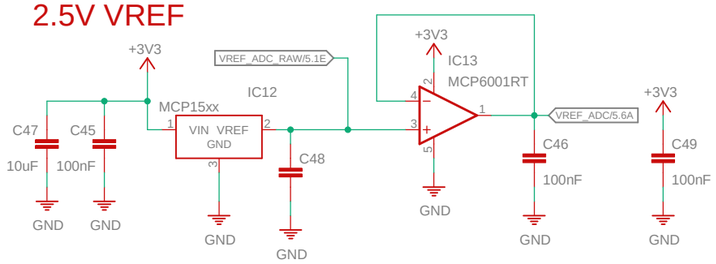
Final Resistor Values:
- Negative Channel:
  - R1N = 101 kΩ
  - R2N = 10 kΩ
  - Calculated VOUTN ≈ -12.0 V

Negative Channel:
- Target VOUTN = -12 V,
adjustment range: -10.8 V to -13.2 V.
- Feedback Resistor Configuration:
  - R2N = 10 kΩ (fixed).
  - R1N = 90 kΩ (fixed) + 20 kΩ (trimmer).
- Adjustment Range:
  - R1N = 91.2 kΩ to 111.5 kΩ.

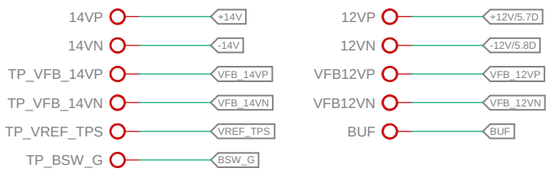
3.3V TARGET LDO



2.5V VREF



TESTPOINTS POWER



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