

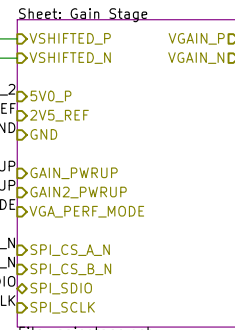
File: input.sch

VIN_FILTERED
± 2.5V range
Cumulative gain = 0.5 V/V (-6 dB)



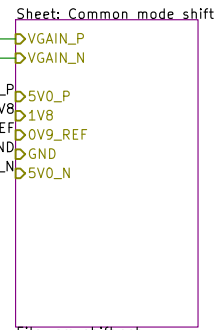
File: offset.sch

VSHIFTED
0-5V range, 2.5V CM
Cumulative gain = 0.5V/V (-6 dB)
VIN_OFFSET is ± 2.5V range



File: gainstage.sch

VGAIN
2.5V CM
Cumulative gain = 0.177 - 10 V/V
-15 to +20 dB



File: cm_shift.sch

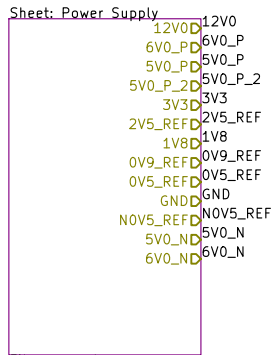
VOUT
900 mV CM
Cumulative gain = 0.223 - 12.59 V/V
-13 to +22 dB

SYSTEM GAIN CALCULATIONS

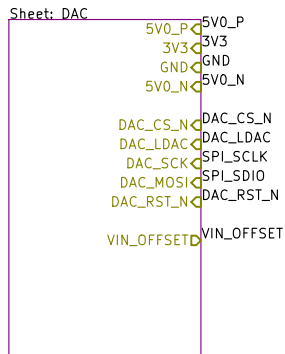
HMCAD1520 wants 2V full scale
In 12-bit mode: 488 μV/LSB @ 0 dB gain
In 8-bit mode: 7.8 mV/LSB @ 0 dB gain

MIN GAIN:
10V input range, -13 dB system gain (0.2V/V)
-9 dB gain on VGA
12 bit mode: 2.4 mV/LSB
8 bit mode: 39 mV/LSB

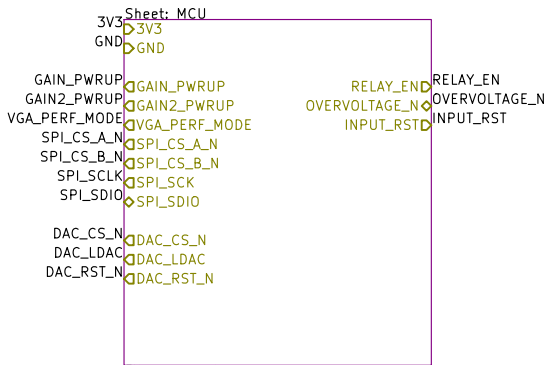
MAX GAIN:
159 mV input range, +22 dB system gain (12.59V/V)
+26 dB gain on VGA
12 bit mode: 38.7 μV/LSB
8 bit mode: 619.5 μV/LSB



File: psu.sch



File: dac.sch



File: mcu.sch

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Sheet: /
File: entry-afe-characterization.sch

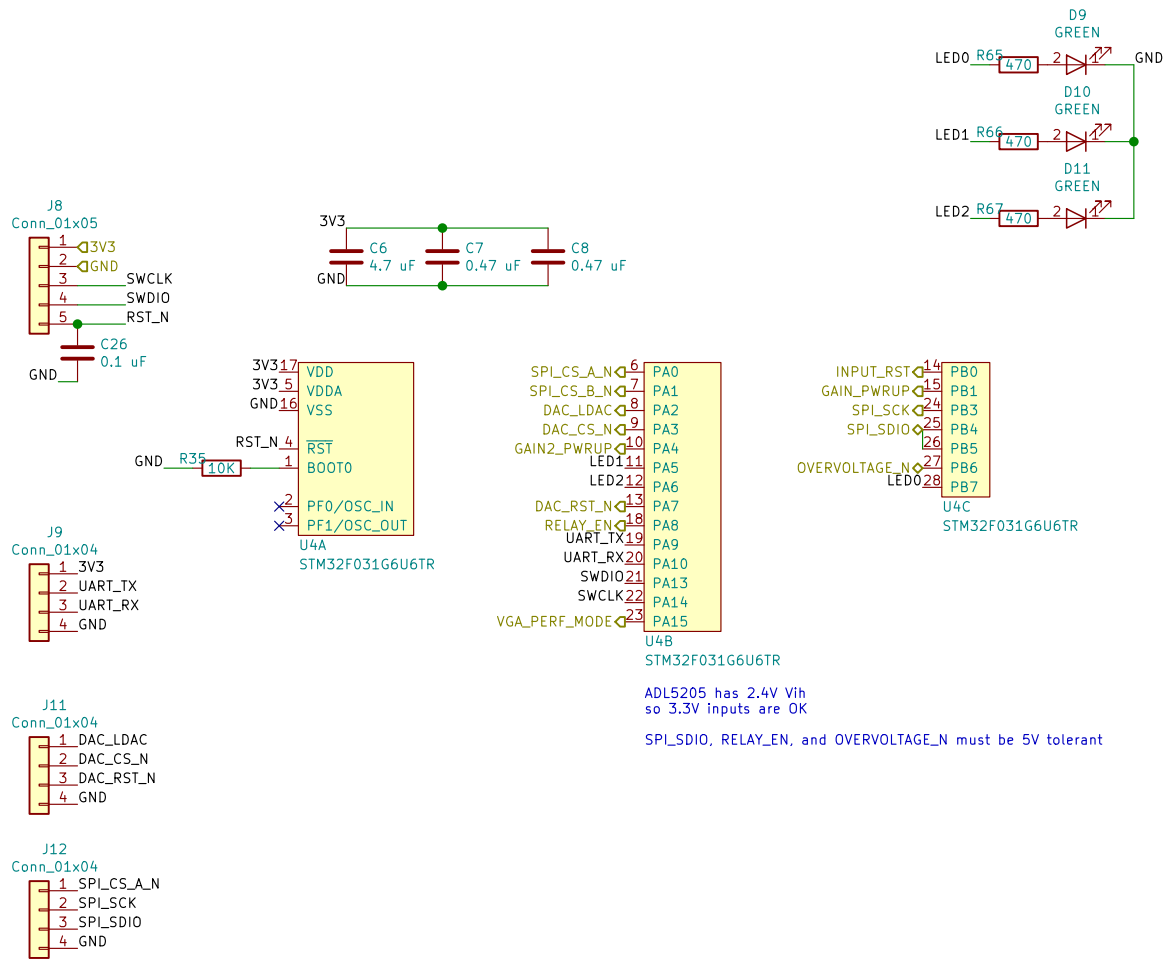
Title: Entry-Level Oscilloscope AFE Characterization Platform

Size: A4 Date: 2020-03-29

KiCad E.D.A. kicad (5.1.4)

Rev: 0.1

Id: 1/8

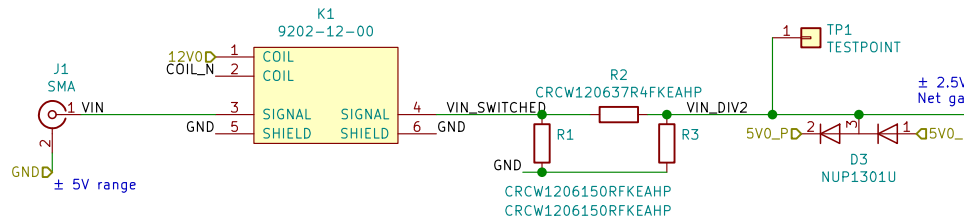


ADL5205 has 2.4V Vih
 so 3.3V inputs are OK

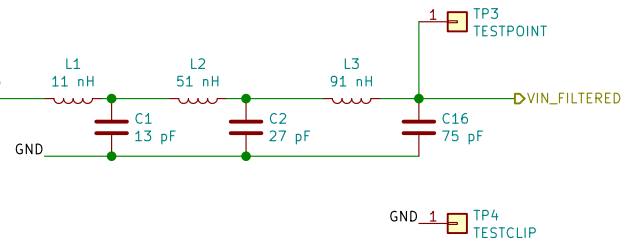
SPL_SDIO, RELAY_EN, and OVERVOLTAGE_N must be 5V tolerant

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Sheet: /MCU/ File: mcu.sch		
Title: Entry-Level Oscilloscope AFE Characterization Platform		
Size: A4	Date: 2020-03-29	Rev: 0.1
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Input protection and attenuator

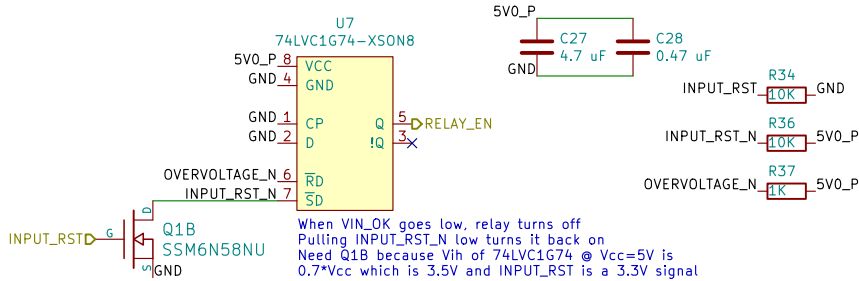
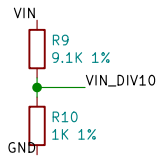


6th order 100 MHz Bessel-Thomson antialiasing filter



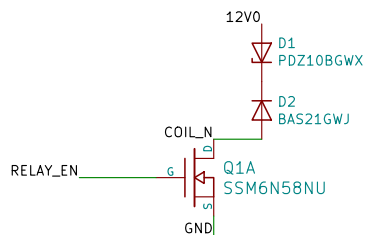
± 2.5V range
Net gain = 0.5 (-6 dB)

50V input overload gives -1A
ESD diode can handle 1A for 1 ms
R2 can handle 30W for 1ms, 100W for 100µs
Relay turn-off time is 100 µs
Goal: <50 µs response from overload to relay starting to shut off

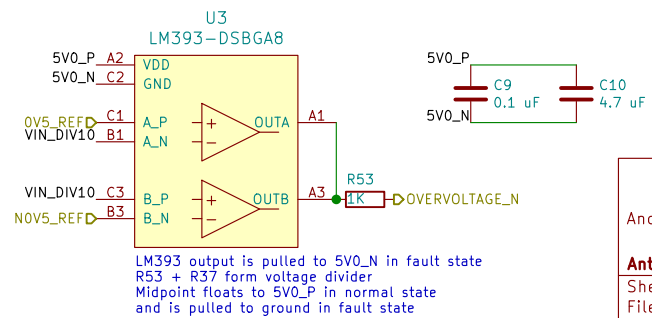


When VIN_OK goes low, relay turns off
Pulling INPUT_RST_N low turns it back on
Need Q1B because Vih of 74LVC1G74 @ Vcc=5V is 0.7*Vcc which is 3.5V and INPUT_RST is a 3.3V signal

Relay driver



Overvoltage shutdown



LM393 output is pulled to 5V0_N in fault state
R53 + R37 form voltage divider
Midpoint floats to 5V0_P in normal state and is pulled to ground in fault state

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Sheet: /Input/
File: input.sch

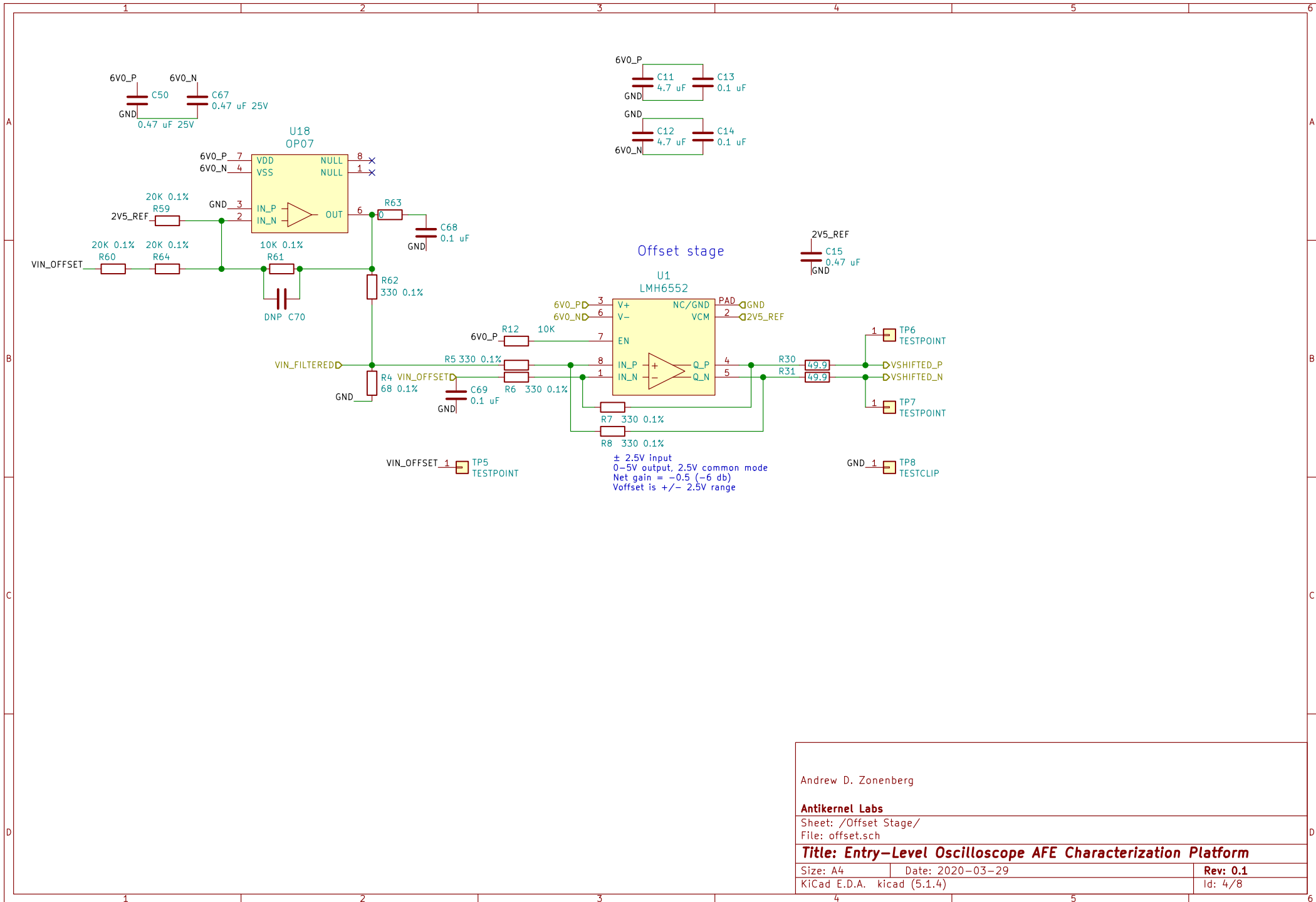
Title: Entry-Level Oscilloscope AFE Characterization Platform

Size: A4 Date: 2020-03-29

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Rev: 0.1

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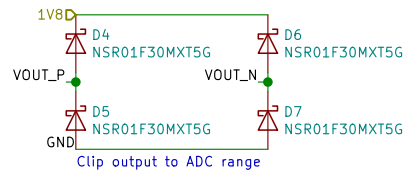
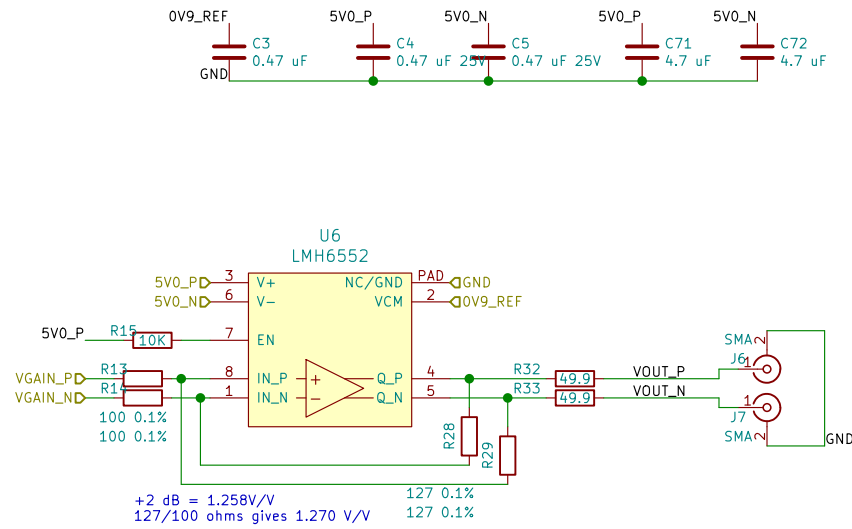
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Sheet: /Offset Stage/
 File: offset.sch

Title: Entry-Level Oscilloscope AFE Characterization Platform

Size: A4	Date: 2020-03-29	Rev: 0.1
KiCad E.D.A. kicad (5.1.4)		Id: 4/8



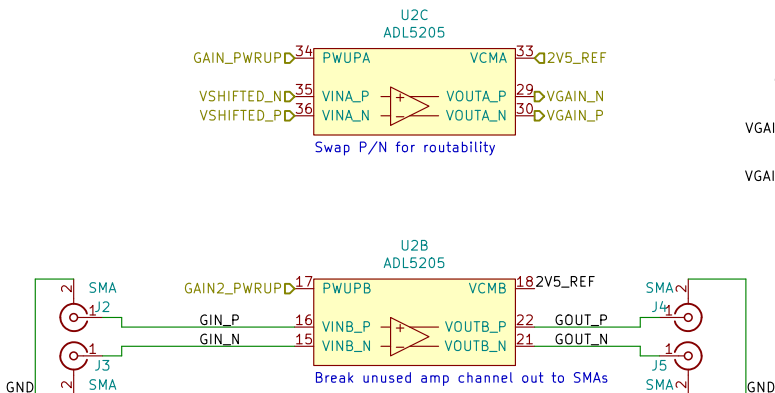
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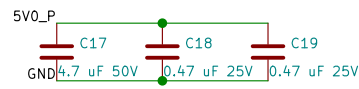
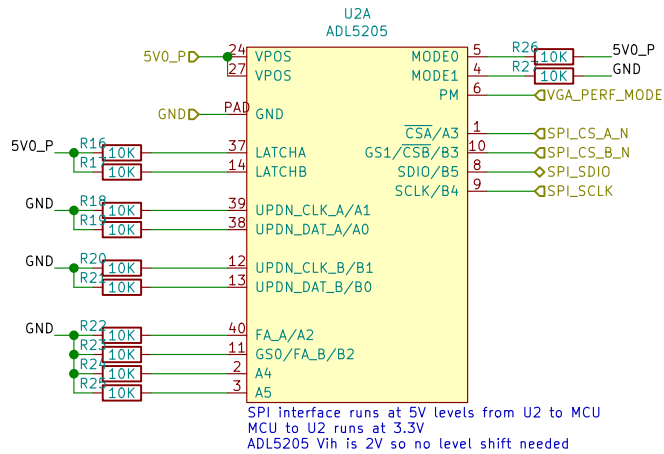
Sheet: /Common mode shift/
 File: cm_shift.sch

Title: Entry-Level Oscilloscope AFE Characterization Platform

Size: A4	Date: 2020-03-29	Rev: 0.1
KiCad E.D.A. kicad (5.1.4)		Id: 5/8



- GND_1 TP9 TESTCLIP
- VGAIN_P_1 TP10 TESTPOINT
- VGAIN_N_1 TP11 TESTPOINT



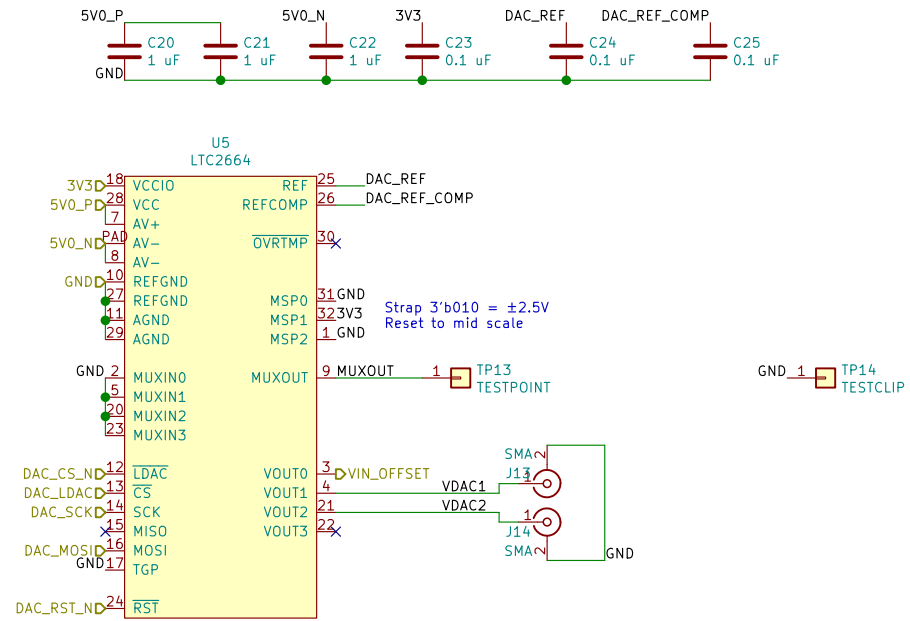
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Sheet: /Gain Stage/
File: gainstage.sch

Title: Entry-Level Oscilloscope AFE Characterization Platform

Size: A4	Date: 2020-03-29	Rev: 0.1
KiCad E.D.A. kicad (5.1.4)		Id: 6/8



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Sheet: /DAC/
File: dac.sch

Title: Entry-Level Oscilloscope AFE Characterization Platform

Size: A4	Date: 2020-03-29	Rev: 0.1
KiCad E.D.A. kicad (5.1.4)		Id: 7/8

