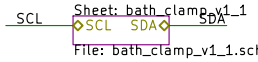
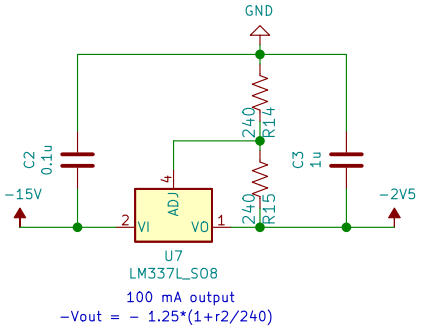
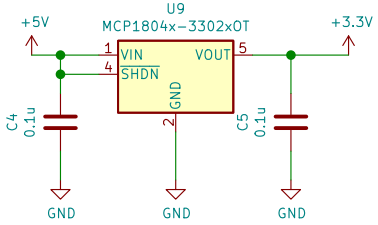
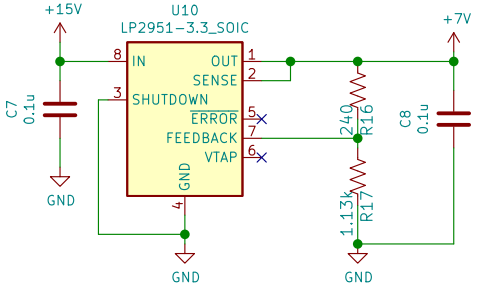
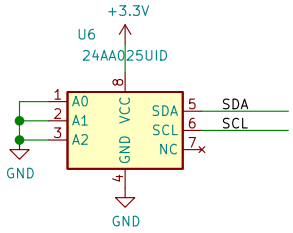


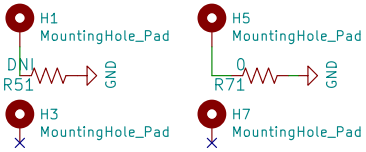
SDA, SCL to top-level to read the UID EEPROM









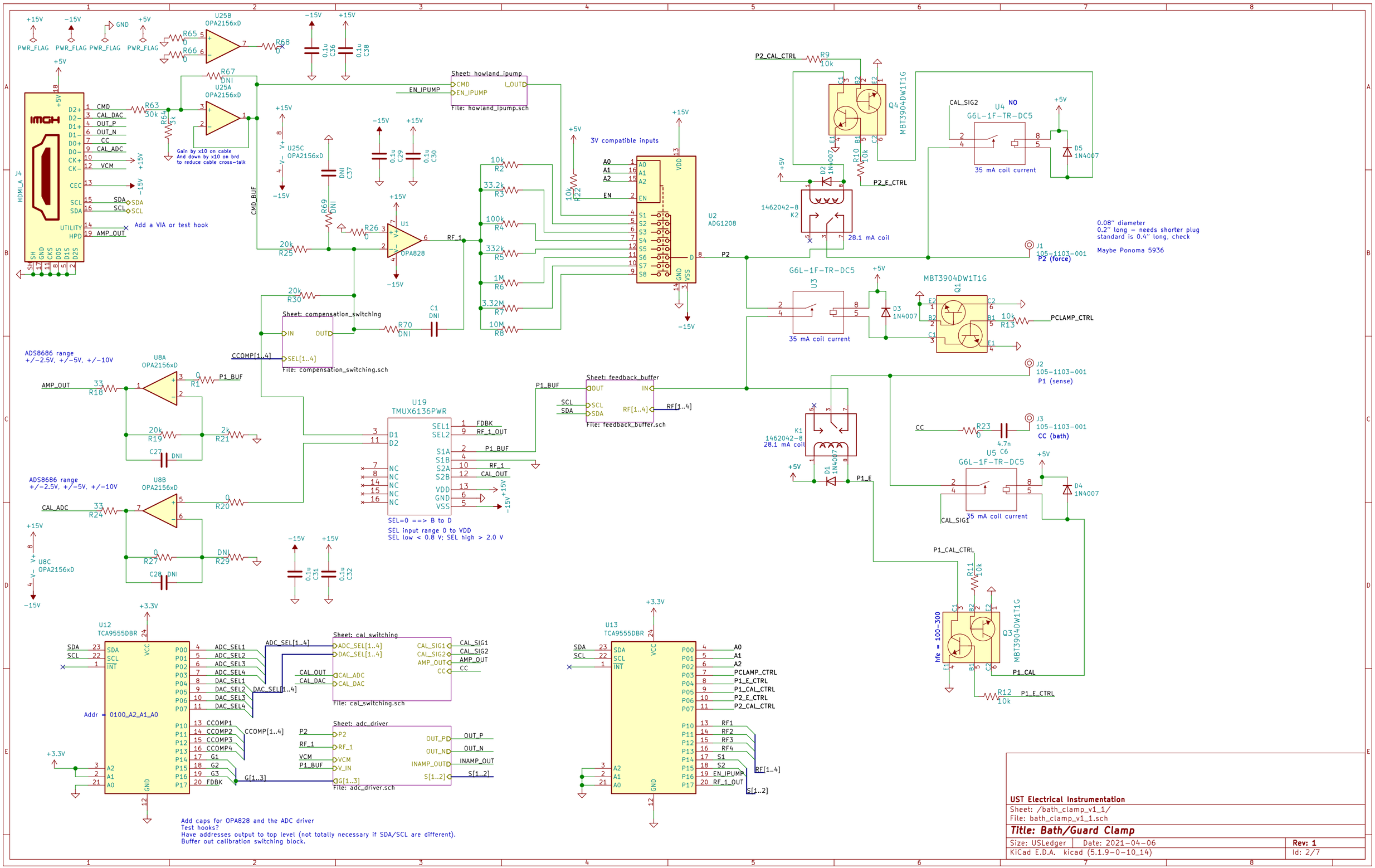


UST Electrical Instrumentation

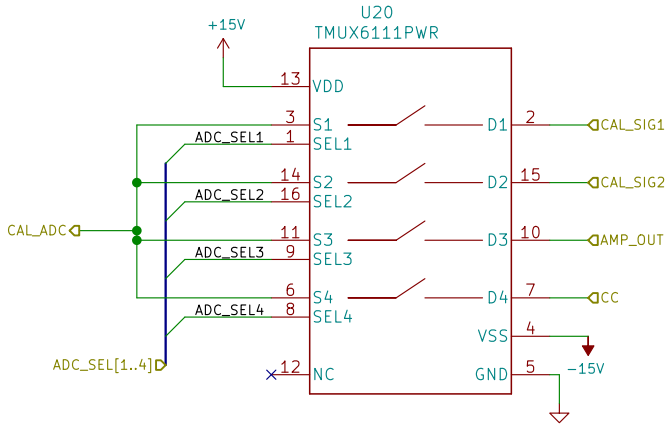
Sheet: /
File: bath_clamp_v1.sch

Title: Bath/Guard Clamp

Size: A4	Date: 2021-04-06	**Rev: 1**
KiCad E.D.A. kicad (5.1.9-0-10_14)		Id: 1/7

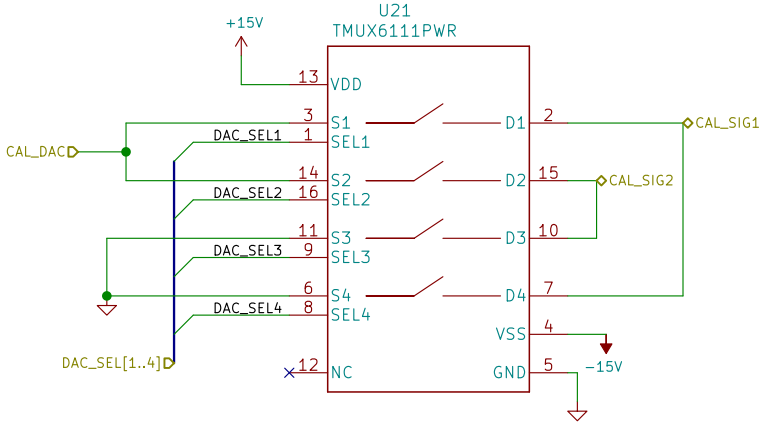

+15V
−15V
+5V
GND
PWR_FLAG
U25B
OPA2156xD
R65
R66
R68
0.1u
C36
C38
R67
DNI
U25A
R63
30k
R64
5k
Gain by x10 on cable
And down by x10 on brd
to reduce cable cross-talk
J4
HDMI_A
D2+
D2−
D1+
D1−
D0+
D0−
CK+
CK−
CEC
SCL
SDA
UTILITY
HPD
CMD
CAL_DAC
OUT_P
OUT_N
CC
CAL_ADC
VCM
AMP_OUT
Add a VIA or test hook
CMD_BUF
Sheet: howland_ipump
CMD
EN_IPUMP
I_OUT
File: howland_ipump.sch
U25C
OPA2156xD
DNI
C37
0.1u
C29
C30
R69
R26
0
20k
R25
U1
OPA828
RF_1
3V compatible inputs
10k
R22
U2
ADG1208
A0
A1
A2
EN
S1
S2
S3
S4
S5
S6
S7
S8
D
VDD
GND
VSS
10k
R2
33.2k
R3
100k
R4
332k
R5
1M
R6
3.32M
R7
10M
R8
P2
20k
R30
Sheet: compensation_switching
IN
OUT
SEL[1..4]
File: compensation_switching.sch
CCOMP[1..4]
R70
DNI
C1
DNI
P2_CAL_CTRL
R9
10k
Q4
MBT3904DW1T1G
D2
1N4007
R10
10k
P2_E_CTRL
1462042-8
K2
28.1 mA coil
CAL_SIG2
U4
NO
G6L-1F-TR-DC5
35 mA coil current
D5
1N4007
0.08" diameter
0.2" long – needs shorter plug
standard is 0.4" long, check
Maybe Ponoma 5936
J1
105-1103-001
P2 (force)
U3
G6L-1F-TR-DC5
35 mA coil current
D3
1N4007
Q1
MBT3904DW1T1G
R13
10k
PCLAMP_CTRL
J2
105-1103-001
P1 (sense)
ADS8686 range
+/−2.5V, +/−5V, +/−10V
U8A
OPA2156xD
AMP_OUT
R18
33
R1
0
P1_BUF
20k
R19
2k
R21
C27
DNI
U19
TMUX6136PWR
SEL1
SEL2
S1A
S1B
S2A
S2B
VDD
GND
VSS
NC
FDBK
RF_1_OUT
P1_BUF
RF_1
CAL_OUT
SEL=0 ==> B to D
SEL input range 0 to VDD
SEL low < 0.8 V; SEL high > 2.0 V
Sheet: feedback_buffer
OUT
IN
SCL
SDA
RF[1..4]
File: feedback_buffer.sch
K1
1462042-8
28.1 mA coil
D1
1N4007
P1_E
CC
R23
0
4.7n
J3
105-1103-001
CC (bath)
U5
C6
G6L-1F-TR-DC5
35 mA coil current
D4
1N4007
CAL_SIG1
ADS8686 range
+/−2.5V, +/−5V, +/−10V
U8B
OPA2156xD
CAL_ADC
R24
33
R20
0
R27
0
R29
DNI
C28
DNI
U8C
OPA2156xD
C31
0.1u
C32
0.1u
P1_CAL_CTRL
R11
10k
Q3
MBT3904DW1T1G
hfe = 100–300
P1_CAL
R12
10k
P1_E_CTRL
U12
TCA9555DBR
Addr = 0100_A2_A1_A0
ADC_SEL1
ADC_SEL2
ADC_SEL3
ADC_SEL4
DAC_SEL1
DAC_SEL2
DAC_SEL3
DAC_SEL4
ADC_SEL[1..4]
DAC_SEL[1..4]
Sheet: cal_switching
CAL_ADC
CAL_DAC
CAL_SIG1
CAL_SIG2
AMP_OUT
CC
File: cal_switching.sch
CCOMP1
CCOMP2
CCOMP3
CCOMP4
G1
G2
G3
FDBK
G[1..3]
Sheet: adc_driver
P2
RF_1
VCM
V_IN
OUT_P
OUT_N
INAMP_OUT
S[1..2]
File: adc_driver.sch
U13
TCA9555DBR
A0
A1
A2
PCLAMP_CTRL
P1_E_CTRL
P1_CAL_CTRL
P2_E_CTRL
P2_CAL_CTRL
RF1
RF2
RF3
RF4
S1
S2
EN_IPUMP
RF_1_OUT
Add caps for OPA828 and the ADC driver
Test hooks?
Have addresses output to top level (not totally necessary if SDA/SCL are different).
Buffer out calibration switching block.
UST Electrical Instrumentation
Sheet: /bath_clamp_v1_1/
File: bath_clamp_v1_1.sch
Title: Bath/Guard Clamp
Size: USLedger
Date: 2021-04-06
Rev: 1
KiCad E.D.A. kicad (5.1.9-0-10_14)
Id: 2/7

3.3 V compatible logic inputs
Cal signals to ADC output

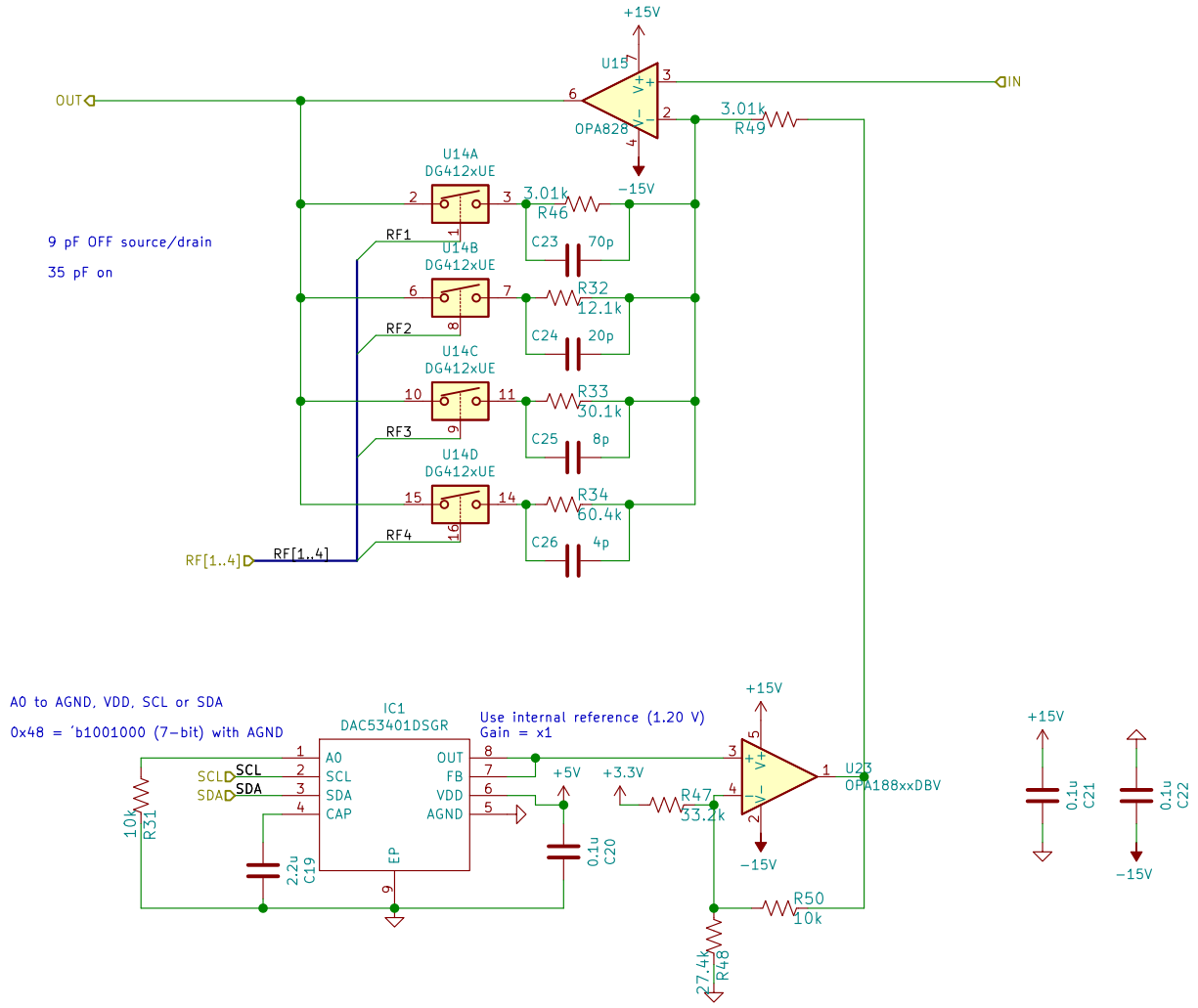


TODO: x10 buffer for some of these outptus?

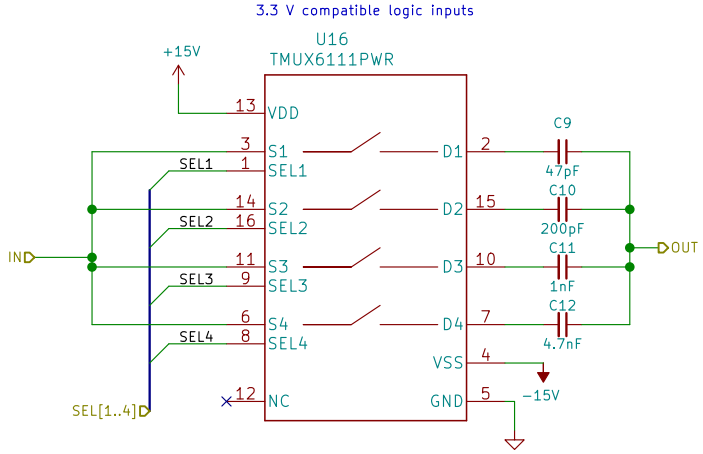
3.3 V compatible logic inputs
DAC inputs to CAL signals



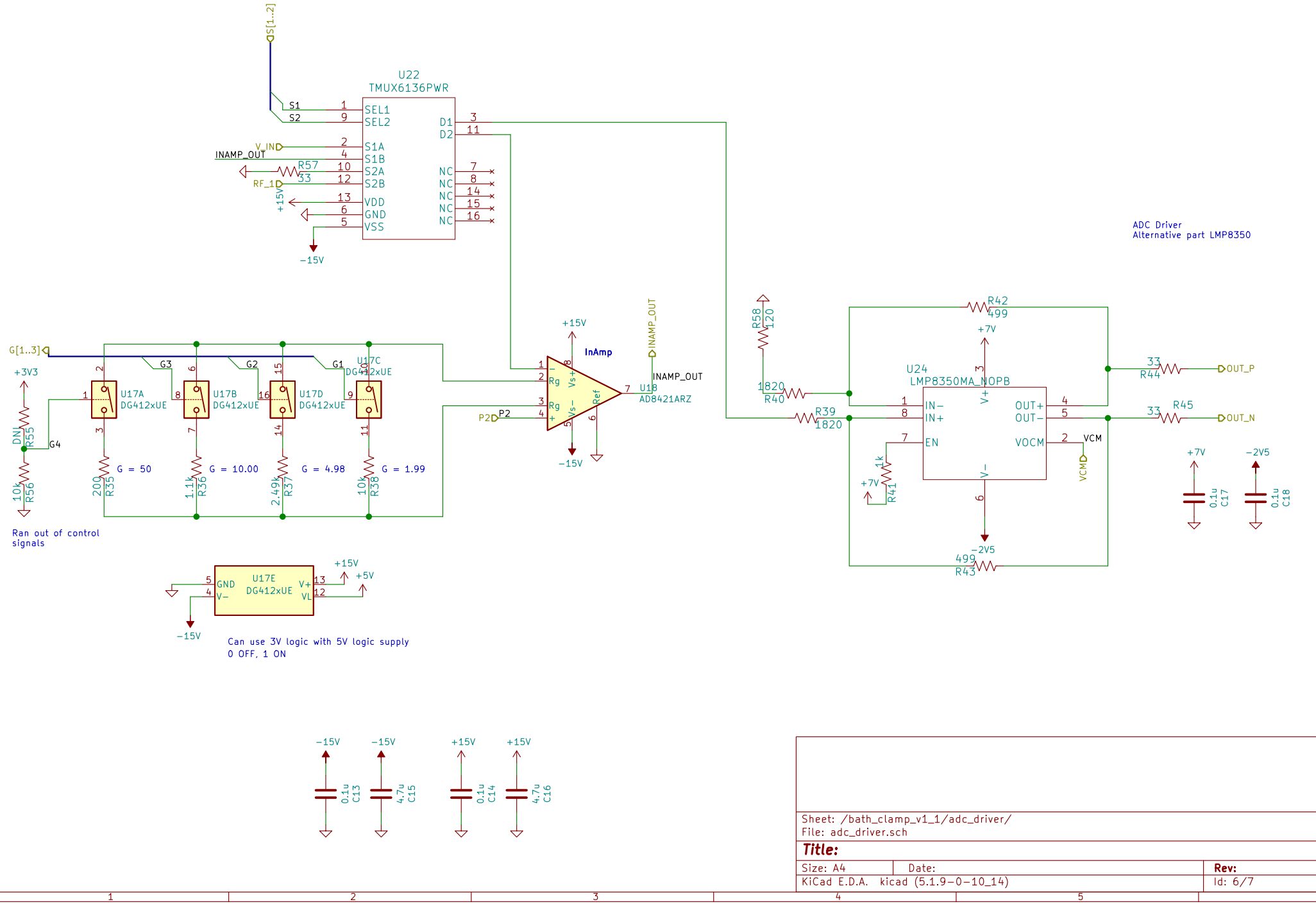
Sheet: /bath_clamp_v1_1/cal_switching/		
File: cal_switching.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.9-0-10_14)		Id: 3/7

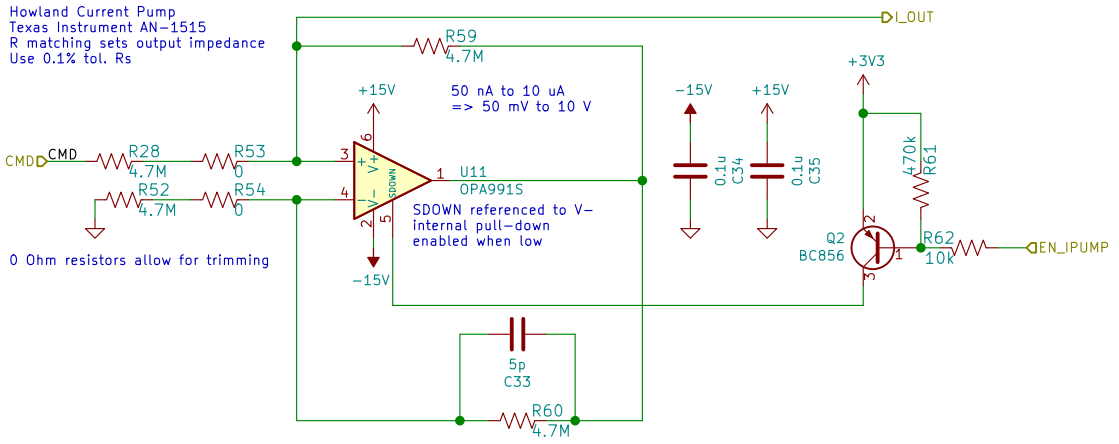


Sheet: /bath_clamp_v1_1/feedback_buffer/		
File: feedback_buffer.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.9-0-10_14)		Id: 4/7



Sheet: /bath_clamp_v1_1/compensation_switching/		
File: compensation_switching.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.9-0-10_14)		Id: 5/7


S[1..2]
U22
TMUX6136PWR
S1
S2
SEL1
SEL2
D1
D2
V_IN
INAMP_OUT
S1A
S1B
S2A
S2B
R57
33
RF_1
+15V
VDD
GND
VSS
NC
−15V
G[1..3]
+3V3
G3
G2
G1
U17A
DG412xUE
U17B
DG412xUE
U17D
DG412xUE
U17C
DG412xUE
DNI
R55
G4
10k
R56
200
R35
G = 50
1.1k
R36
G = 10.00
2.49k
R37
G = 4.98
10k
R38
G = 1.99
Ran out of control signals
InAmp
Rg
Vs+
Vs−
Ref
U18
AD8421ARZ
P2
R58
120
1820
R40
R39
1820
R42
499
+7V
U24
LMP8350MA_NOPB
IN−
IN+
EN
V+
V−
OUT+
OUT−
VOCM
VCM
R44
33
OUT_P
R45
33
OUT_N
1k
R41
499
R43
−2V5
0.1u
C17
0.1u
C18
ADC Driver
Alternative part LMP8350
U17E
DG412xUE
GND
V−
V+
VL
+5V
Can use 3V logic with 5V logic supply
0 OFF, 1 ON
0.1u
C13
4.7u
C15
0.1u
C14
4.7u
C16
Sheet: /bath_clamp_v1_1/adc_driver/
File: adc_driver.sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. kicad (5.1.9−0−10_14)
Id: 6/7



Sheet: /bath_clamp_v1_1/howland_ipump/		
File: howland_ipump.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.9-0-10_14)		Id: 7/7