Sheetname: Core_RP2350

Sheetfile: Core_RP2350.kicad_sch

Sheetname: DACs

Sheetfile: DACs.kicad_sch

Sheetname: SC_Detection

Sheetfile: SC_Detection.kicad_sch

Sheetname: Communication

Sheetfile: Communication.kicad_sch

Sheetname: Input

Sheetfile: Input.kicad_sch

Sheetname: Power_Supply

Sheetfile: Power_Supply.kicad_sch

Sheetname: Output

Sheetfile: Output.kicad_sch

Hexabitz

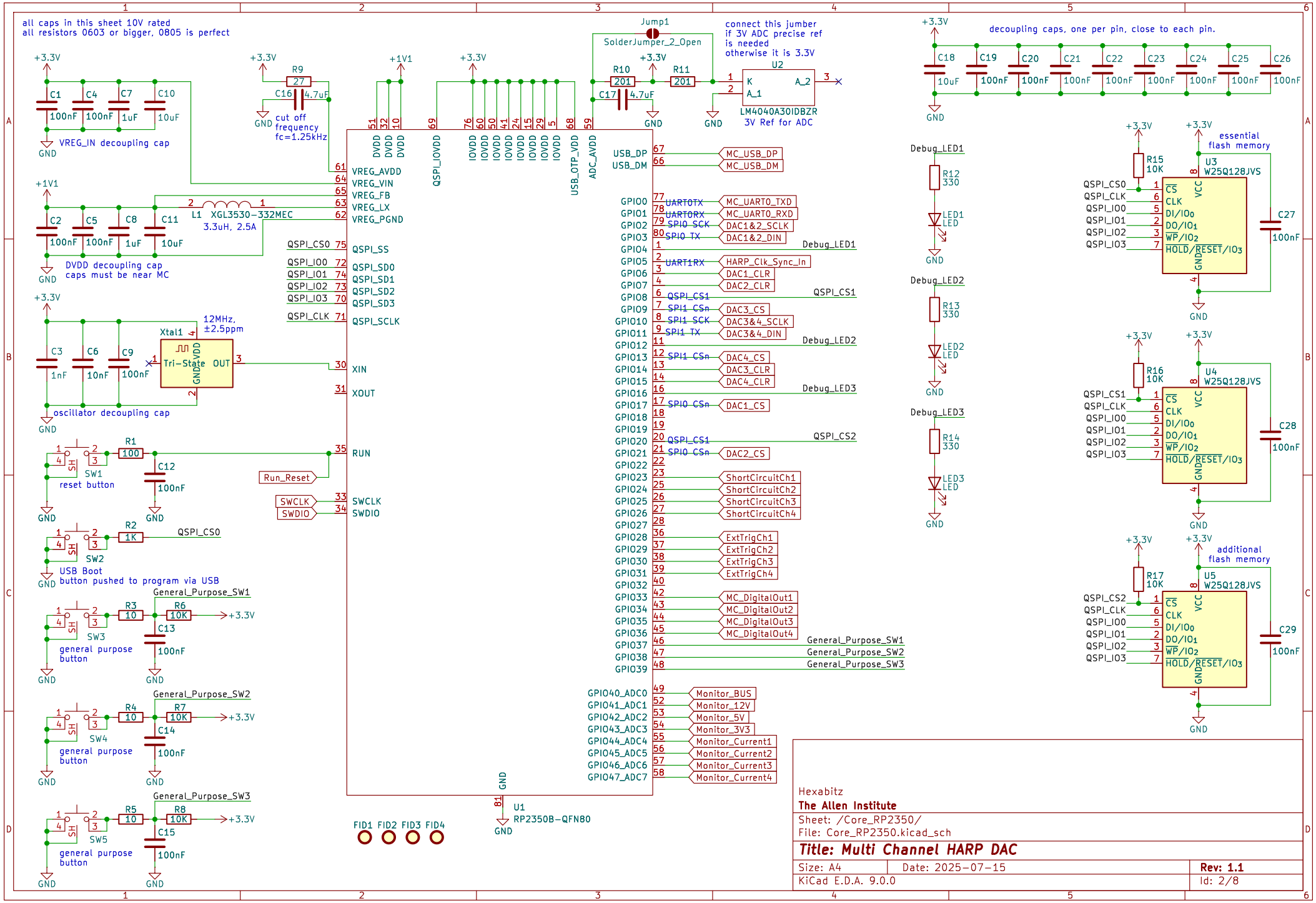
The Allen Institute

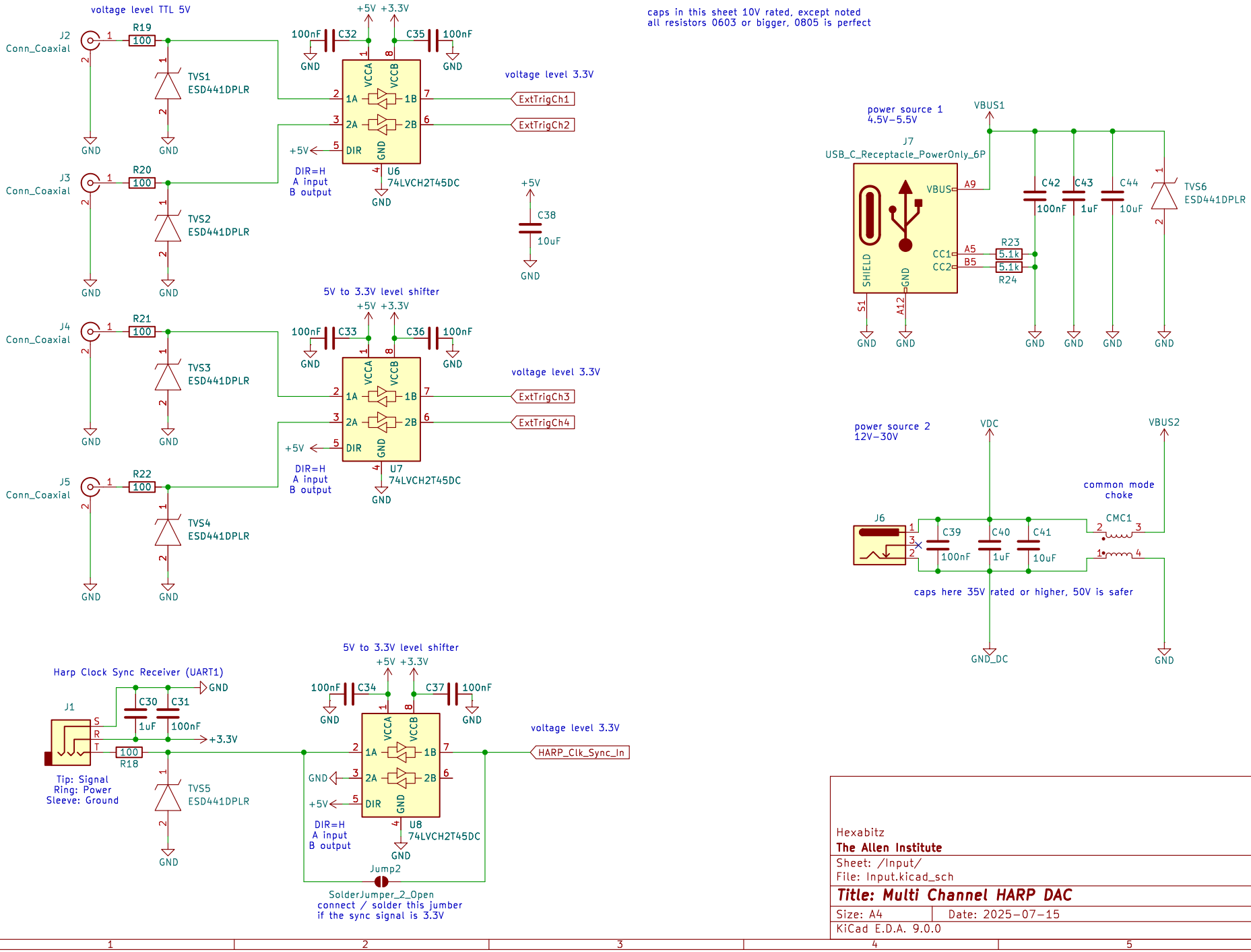
Sheet: /

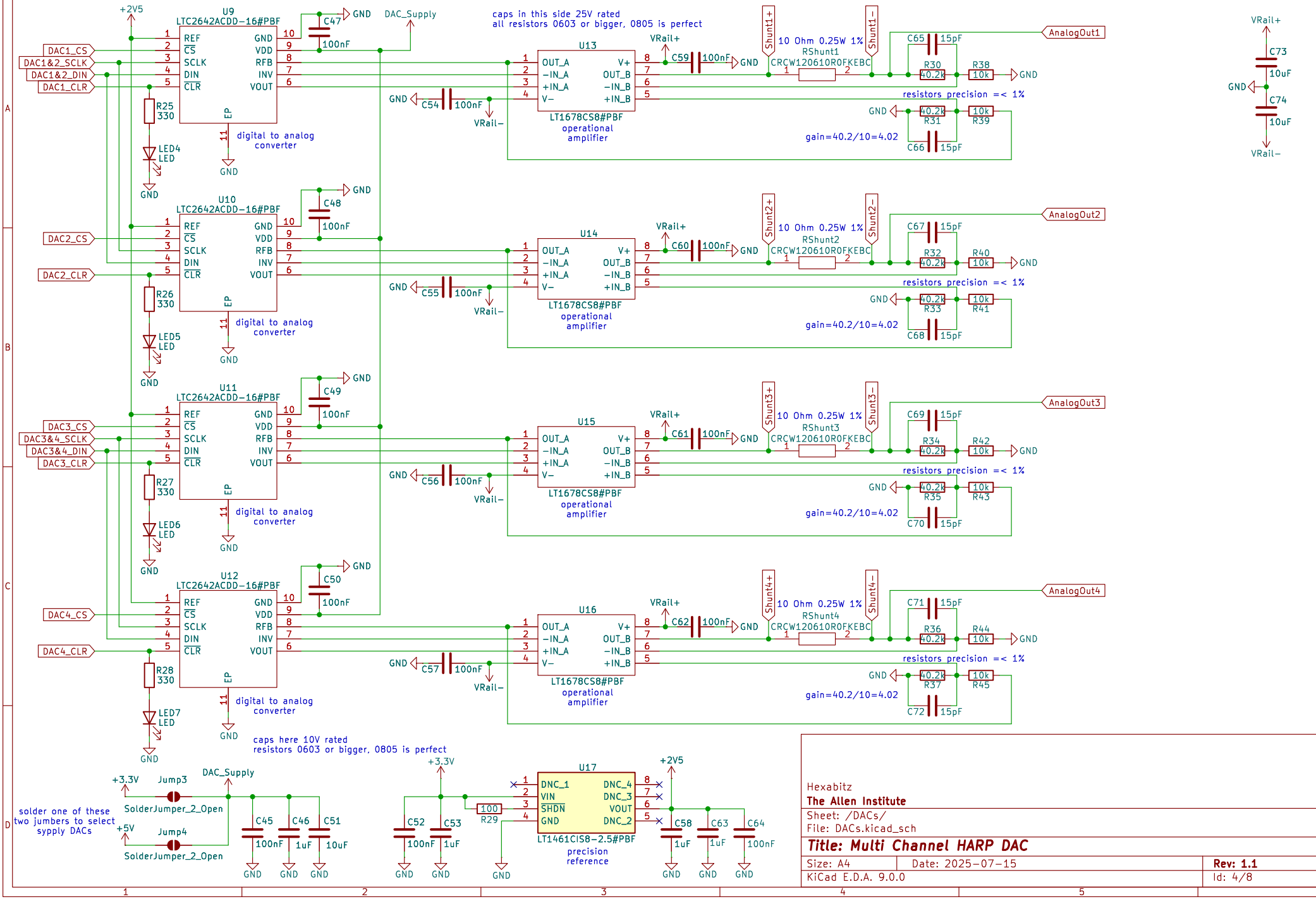
File: multi_ch_harp_dac.kicad_sch

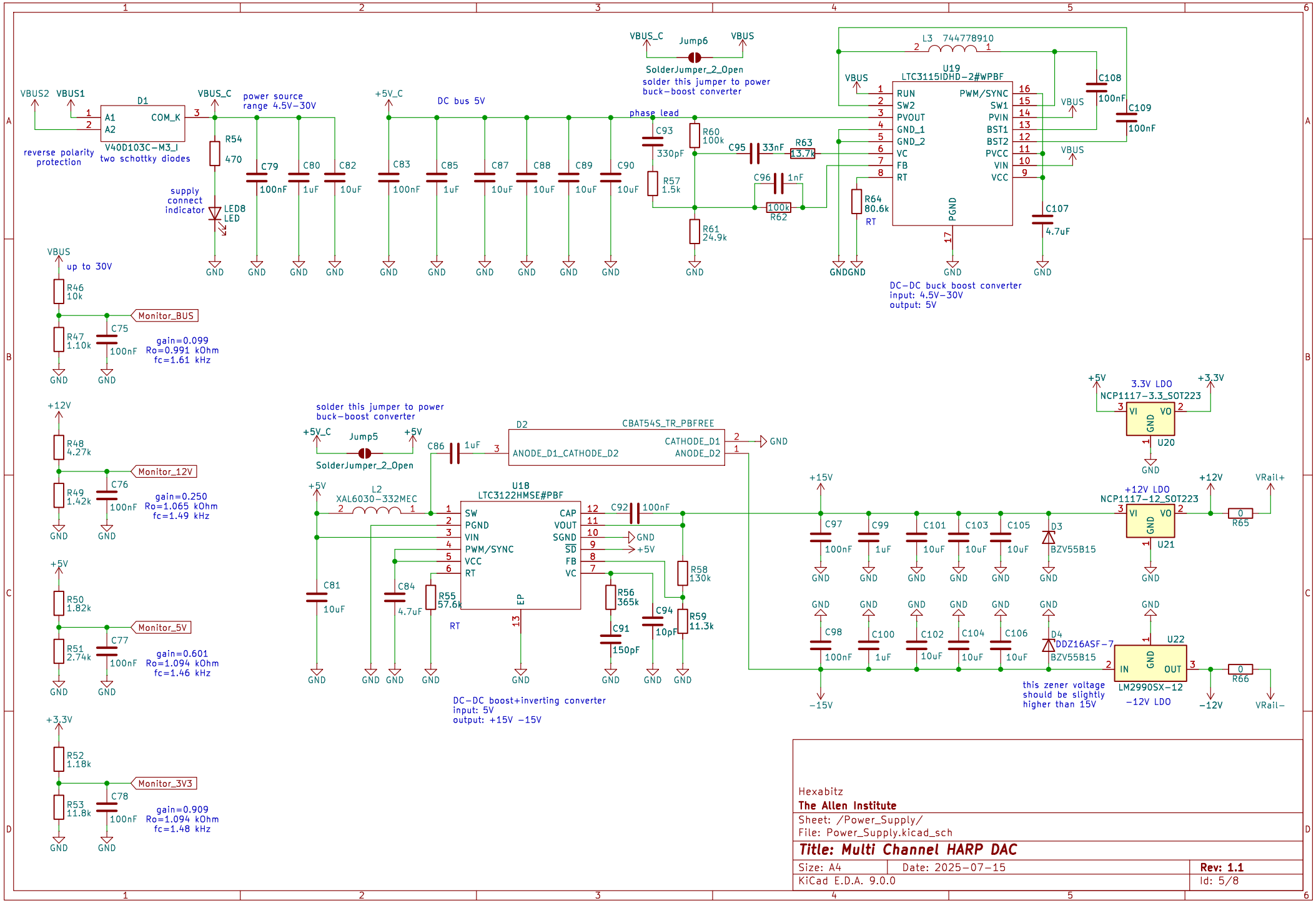
Title: Multi Channel HARP DAC

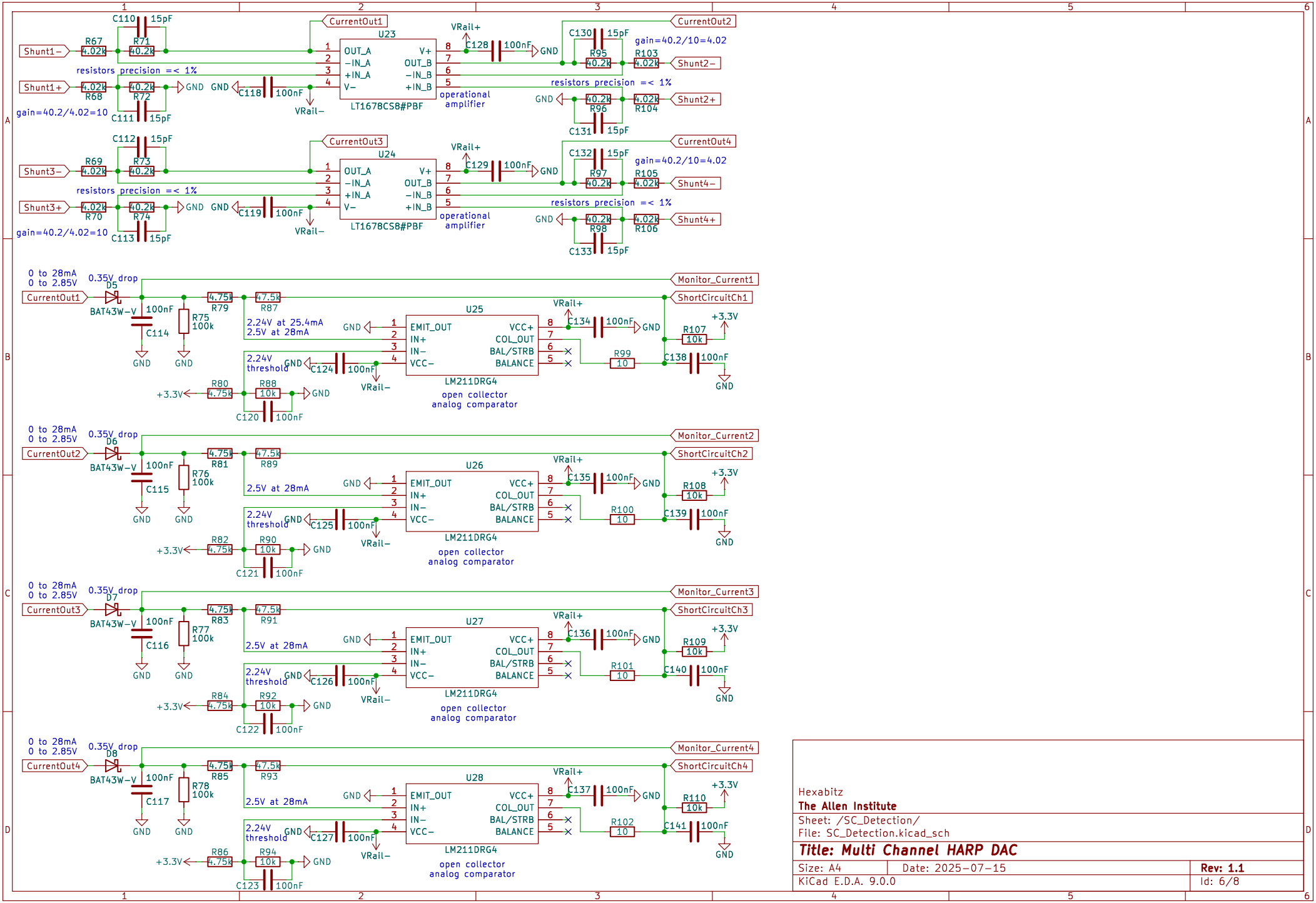
Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 1/8


all caps in this sheet 10V rated
all resistors 0603 or bigger, 0805 is perfect
VREG_IN decoupling cap
cut off frequency fc=1.25kHz
L1 XGL3530-332MEC
3.3uH, 2.5A
DVDD decoupling cap
caps must be near MC
12MHz, ±2.5ppm
oscillator decoupling cap
reset button
USB Boot button pushed to program via USB
general purpose button
Jump1
SolderJumper_2_Open
connect this jumber if 3V ADC precise ref is needed otherwise it is 3.3V
LM4040A30IDBZR 3V Ref for ADC
decoupling caps, one per pin, close to each pin.
essential flash memory
additional flash memory
W25Q128JVS
RP2350B-QFN80
Debug_LED1
Debug_LED2
Debug_LED3
Run_Reset
Hexabitz
The Allen Institute
Sheet: /Core_RP2350/
File: Core_RP2350.kicad_sch
Title: Multi Channel HARP DAC
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 2/8


voltage level TTL 5V
J2
Conn_Coaxial
R19
100
TVS1
ESD441DPLR
GND
+5V +3.3V
100nF C32
C35 100nF
VCCA
VCCB
1A
1B
2A
2B
DIR
GND
U6
74LVCH2T45DC
voltage level 3.3V
ExtTrigCh1
ExtTrigCh2
DIR=H
A input
B output
J3
R20
TVS2
ESD441DPLR
+5V
C38
10uF
caps in this sheet 10V rated, except noted
all resistors 0603 or bigger, 0805 is perfect
5V to 3.3V level shifter
J4
R21
TVS3
ESD441DPLR
C33
C36
U7
74LVCH2T45DC
ExtTrigCh3
ExtTrigCh4
J5
R22
TVS4
ESD441DPLR
power source 1
4.5V–5.5V
VBUS1
J7
USB_C_Receptacle_PowerOnly_6P
VBUS
A9
CC1
CC2
A5
B5
SHIELD
S1
A12
R23
5.1k
R24
C42
C43
C44
100nF
1uF
10uF
TVS6
ESD441DPLR
power source 2
12V–30V
VDC
VBUS2
J6
C39
C40
C41
common mode
choke
CMC1
caps here 35V rated or higher, 50V is safer
GND_DC
Harp Clock Sync Receiver (UART1)
J1
S
R
T
C30
C31
1uF
100nF
+3.3V
R18
Tip: Signal
Ring: Power
Sleeve: Ground
TVS5
ESD441DPLR
5V to 3.3V level shifter
C34
C37
U8
74LVCH2T45DC
voltage level 3.3V
HARP_Clk_Sync_In
DIR=H
A input
B output
Jump2
SolderJumper_2_Open
connect / solder this jumber
if the sync signal is 3.3V
Hexabitz
The Allen Institute
Sheet: /Input/
File: Input.kicad_sch
Title: Multi Channel HARP DAC
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 3/8


+2V5
U9
LTC2642ACDD-16#PBF
REF
CS
SCLK
DIN
CLR
GND
VDD
RFB
INV
VOUT
EP
DAC1_CS
DAC1&2_SCLK
DAC1&2_DIN
DAC1_CLR
C47
100nF
DAC_Supply
R25
330
LED4
LED
digital to analog converter
U10
DAC2_CS
DAC2_CLR
C48
R26
LED5
U11
DAC3_CS
DAC3&4_SCLK
DAC3&4_DIN
DAC3_CLR
C49
R27
LED6
U12
DAC4_CS
DAC4_CLR
C50
R28
LED7
caps here 10V rated
resistors 0603 or bigger, 0805 is perfect
caps in this side 25V rated
all resistors 0603 or bigger, 0805 is perfect
U13
LT1678CS8#PBF
operational amplifier
OUT_A
-IN_A
+IN_A
V-
V+
OUT_B
-IN_B
+IN_B
VRail+
VRail-
C59
C54
Shunt1+
Shunt1-
10 Ohm 0.25W 1%
RShunt1
CRCW120610R0FKEBC
AnalogOut1
C65
15pF
R30
40.2k
R38
10k
resistors precision =< 1%
R31
R39
C66
gain=40.2/10=4.02
U14
C60
C55
Shunt2+
Shunt2-
RShunt2
AnalogOut2
C67
R32
R40
R33
R41
C68
U15
C61
C56
Shunt3+
Shunt3-
RShunt3
AnalogOut3
C69
R34
R42
R35
R43
C70
U16
C62
C57
Shunt4+
Shunt4-
RShunt4
AnalogOut4
C71
R36
R44
R37
R45
C72
VRail+
C73
10uF
GND
C74
10uF
VRail-
solder one of these two jumbers to select sypply DACs
+3.3V
Jump3
SolderJumper_2_Open
+5V
Jump4
DAC_Supply
C45
100nF
C46
1uF
C51
10uF
U17
LT1461CIS8-2.5#PBF
precision reference
DNC_1
VIN
SHDN
DNC_4
DNC_3
VOUT
DNC_2
100
R29
C52
C53
C58
C63
C64
Hexabitz
The Allen Institute
Sheet: /DACs/
File: DACs.kicad_sch
Title: Multi Channel HARP DAC
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 4/8


VBUS2 VBUS1
D1
A1
A2
COM_K
V40D103C-M3_I
two schottky diodes
reverse polarity protection
VBUS_C
power source range 4.5V-30V
R54 470
supply connect indicator
LED8 LED
C79 100nF
C80 1uF
C82 10uF
GND
+5V_C
DC bus 5V
C83 100nF
C85 1uF
C87 10uF
C88 10uF
C89 10uF
C90 10uF
VBUS_C
Jump6
VBUS
SolderJumper_2_Open
solder this jumper to power buck-boost converter
phase lead
C93 330pF
R60 100k
C95 33nF
R63 13.7k
R57 1.5k
R61 24.9k
C96 1nF
R62 100k
R64 80.6k
RT
L3 744778910
U19
LTC3115IDHD-2#WPBF
RUN
SW2
PVOUT
GND_1
GND_2
VC
FB
RT
PWM/SYNC
SW1
PVIN
BST1
BST2
PVCC
VIN
VCC
PGND
C108 100nF
C109 100nF
C107 4.7uF
VBUS
DC-DC buck boost converter
input: 4.5V-30V
output: 5V
VBUS
up to 30V
R46 10k
R47 1.10k
C75 100nF
Monitor_BUS
gain=0.099
Ro=0.991 kOhm
fc=1.61 kHz
+12V
R48 4.27k
R49 1.42k
C76 100nF
Monitor_12V
gain=0.250
Ro=1.065 kOhm
fc=1.49 kHz
+5V
R50 1.82k
R51 2.74k
C77 100nF
Monitor_5V
gain=0.601
Ro=1.094 kOhm
fc=1.46 kHz
+3.3V
R52 1.18k
R53 11.8k
C78 100nF
Monitor_3V3
gain=0.909
Ro=1.094 kOhm
fc=1.48 kHz
solder this jumper to power buck-boost converter
+5V_C
Jump5
+5V
SolderJumper_2_Open
D2
CBAT54S_TR_PBFREE
ANODE_D1_CATHODE_D2
CATHODE_D1
ANODE_D2
C86 1uF
+5V
L2
XAL6030-332MEC
U18
LTC3122HMSE#PBF
SW
PGND
VIN
PWM/SYNC
VCC
RT
CAP
VOUT
SGND
SD
FB
VC
EP
C92 100nF
C81 10uF
C84 4.7uF
R55 57.6k
R56 365k
C91 150pF
C94 10pF
R58 130k
R59 11.3k
DC-DC boost+inverting converter
input: 5V
output: +15V -15V
+15V
C97 100nF
C99 1uF
C101 10uF
C103 10uF
C105 10uF
D3
BZV55B15
C98 100nF
C100 1uF
C102 10uF
C104 10uF
C106 10uF
D4
DDZ16ASF-7
BZV55B15
this zener voltage should be slightly higher than 15V
-15V
+5V
3.3V LDO
NCP1117-3.3_SOT223
U20
+3.3V
+12V LDO
NCP1117-12_SOT223
U21
+12V
VRail+
R65 0
U22
LM2990SX-12
-12V LDO
IN
OUT
R66 0
-12V
VRail-
Hexabitz
The Allen Institute
Sheet: /Power_Supply/
File: Power_Supply.kicad_sch
Title: Multi Channel HARP DAC
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 5/8



Hexabitz
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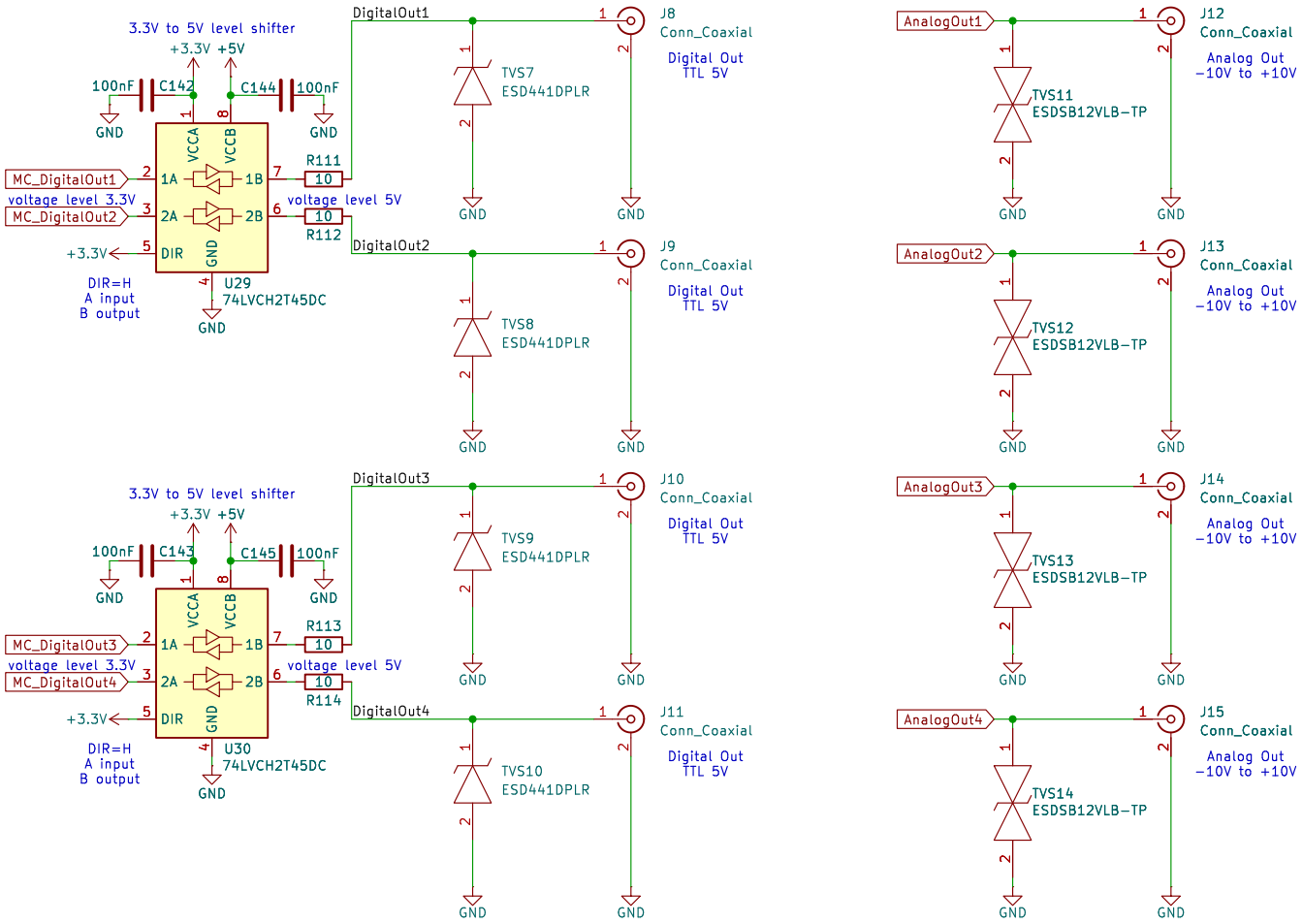
Sheet: /SC_Detection/
File: SC_Detection.kicad_sch

Title: Multi Channel HARP DAC

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 6/8

all caps in this sheet 10V rated
all resistors 0603 or bigger, 0805 is perfect



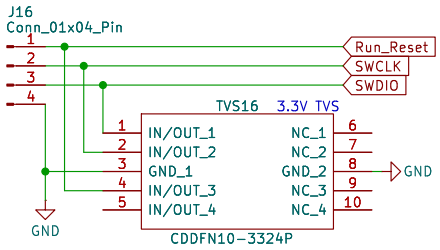
Hexabitz
The Allen Institute

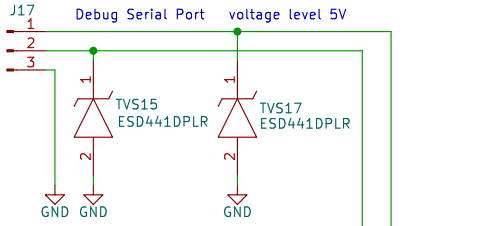
Sheet: /Output/
File: Output.kicad_sch

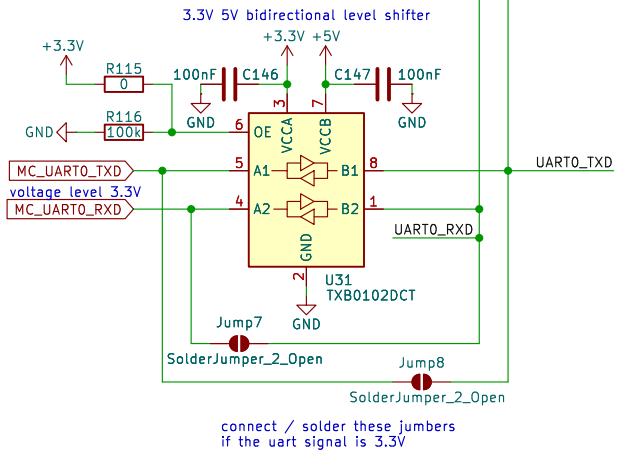
Title: Multi Channel HARP DAC

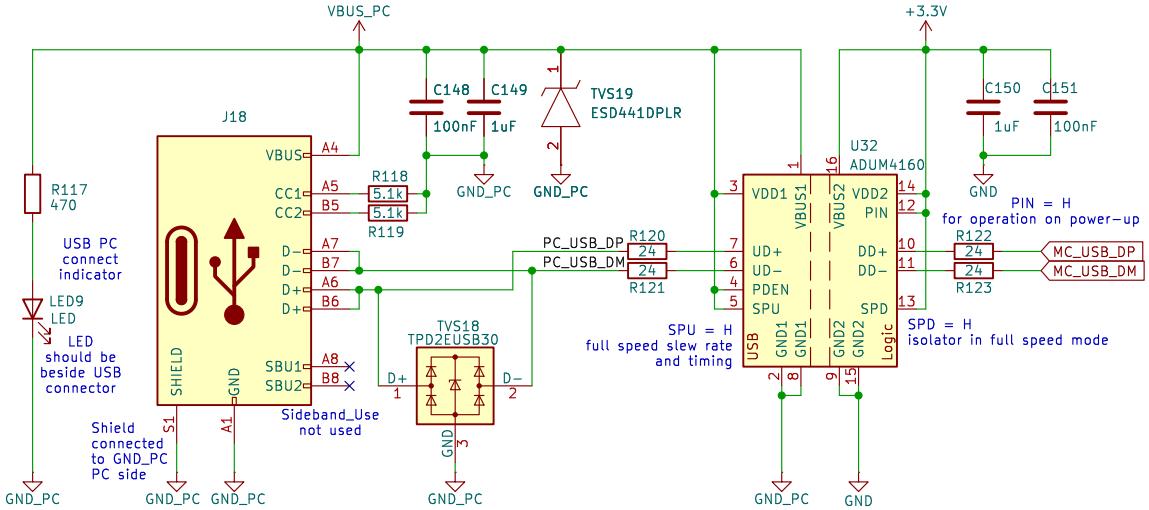
Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 7/8

all caps in this sheet 10V rated
all resistors 0603 or bigger, 0805 is perfect









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Sheet: /Communication/
File: Communication.kicad_sch

Title: Multi Channel HARP DAC

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 8/8