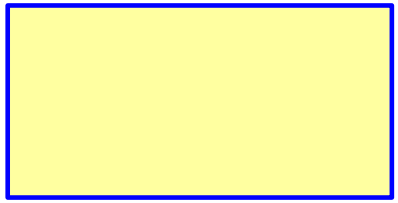
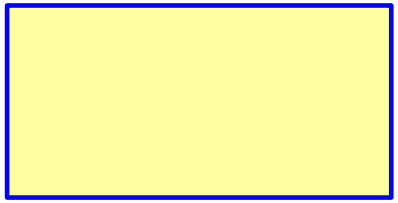
Sheetname: Core_RP2350



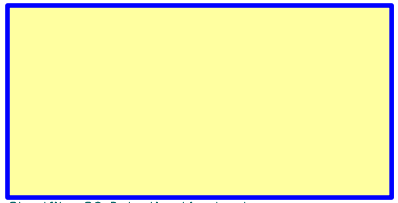
Sheetfile: Core_RP2350.kicad_sch

Sheetname: DACs



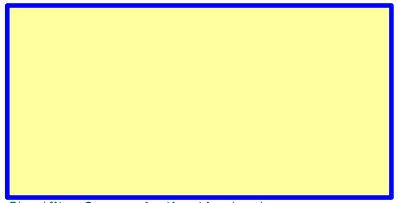
Sheetfile: DACs.kicad_sch

Sheetname: SC_Detection



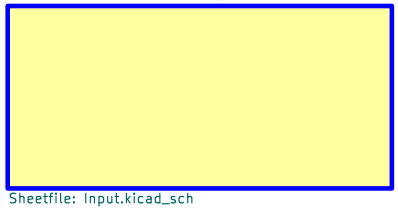
Sheetfile: SC_Detection.kicad_sch

Sheetname: Communication



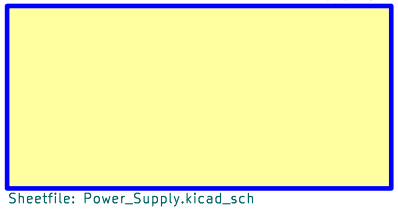
Sheetfile: Communication.kicad_sch

Sheetname: Input



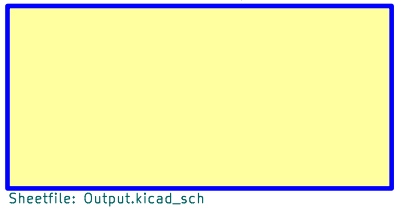
Sheetfile: Input.kicad_sch

Sheetname: Power_Supply



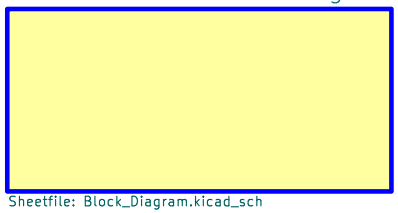
Sheetfile: Power_Supply.kicad_sch

Sheetname: Output



Sheetfile: Output.kicad_sch

Sheetname: Block_Diagram



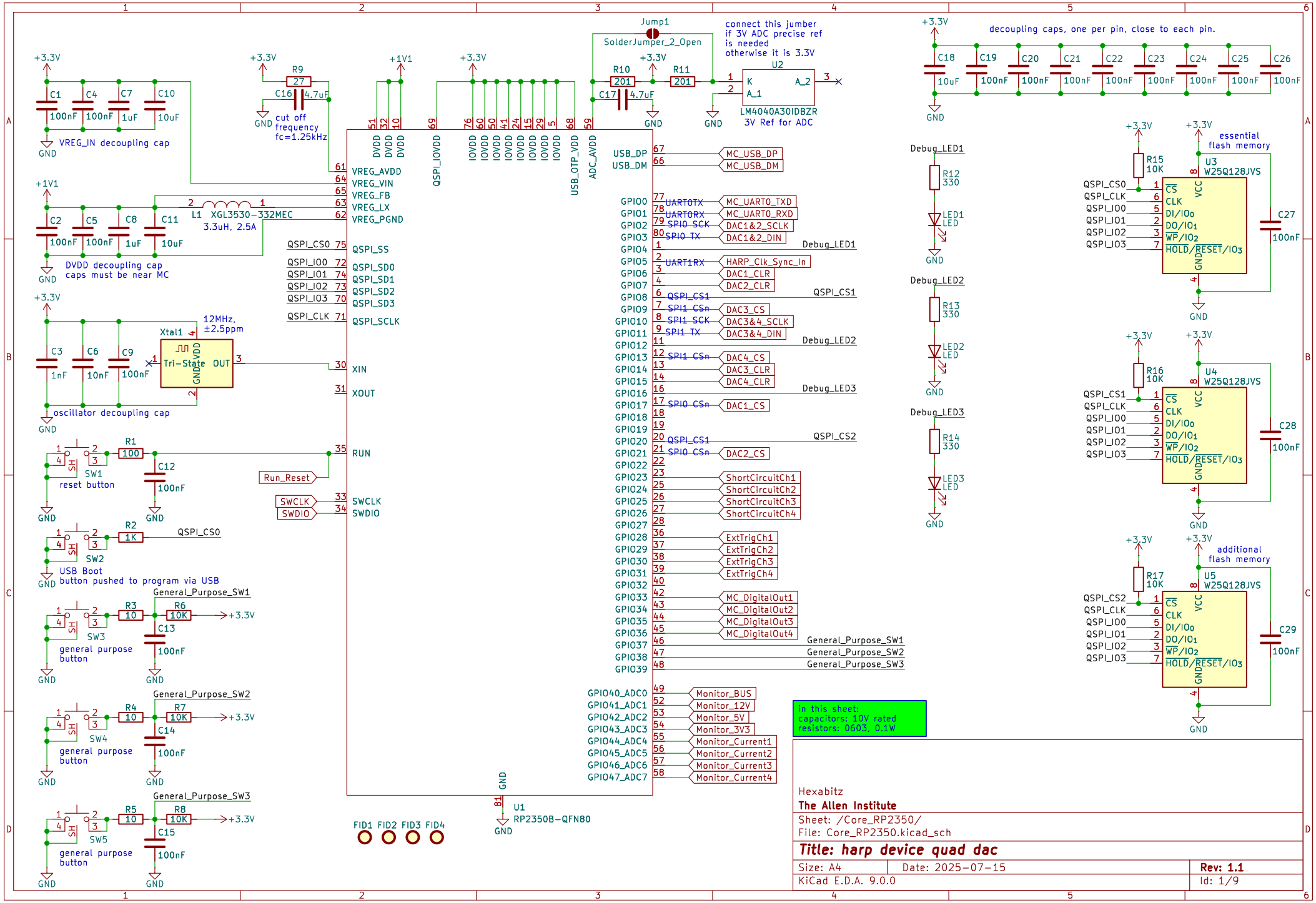
Sheetfile: Block_Diagram.kicad_sch

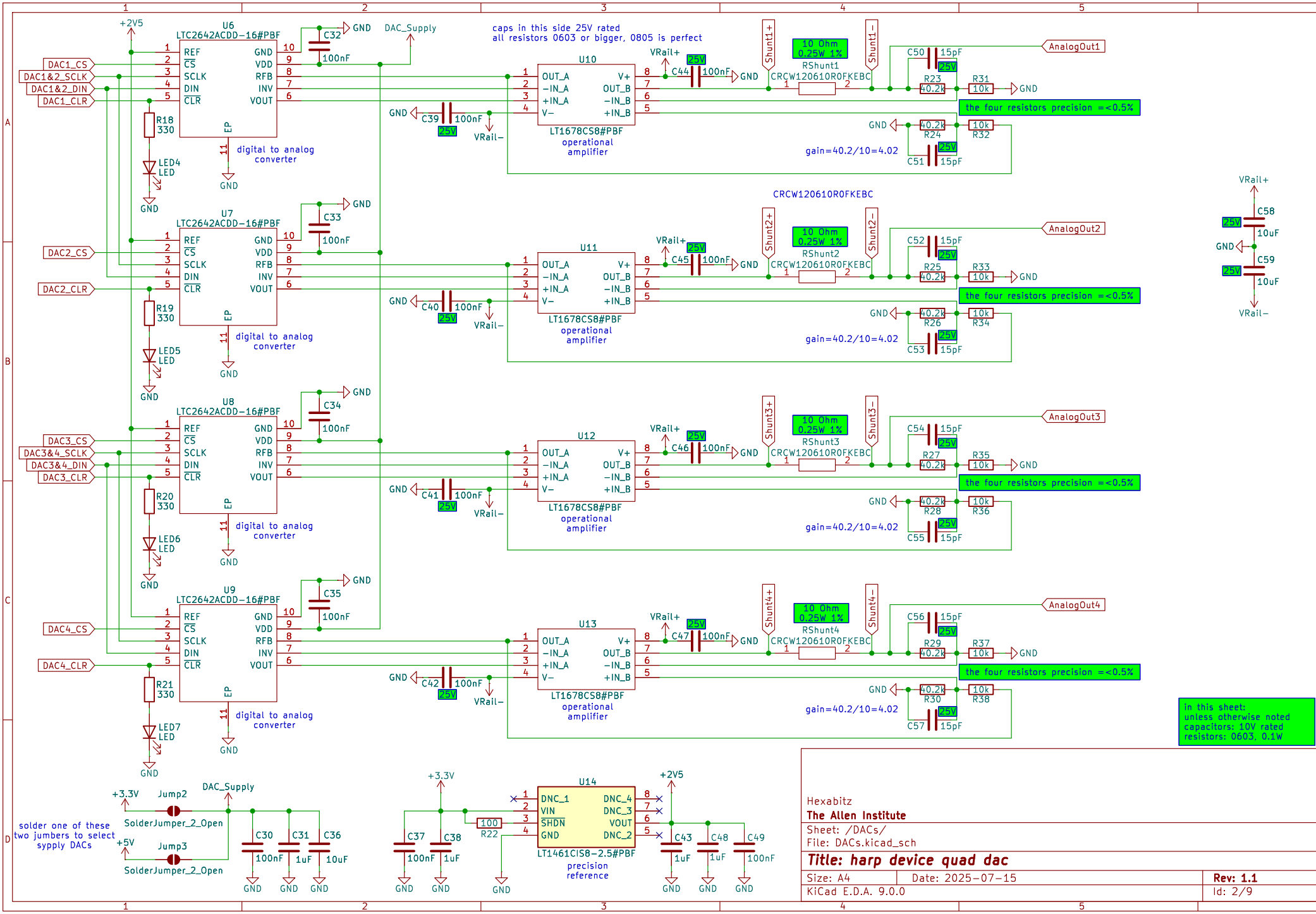
Hexabitz
The Allen Institute

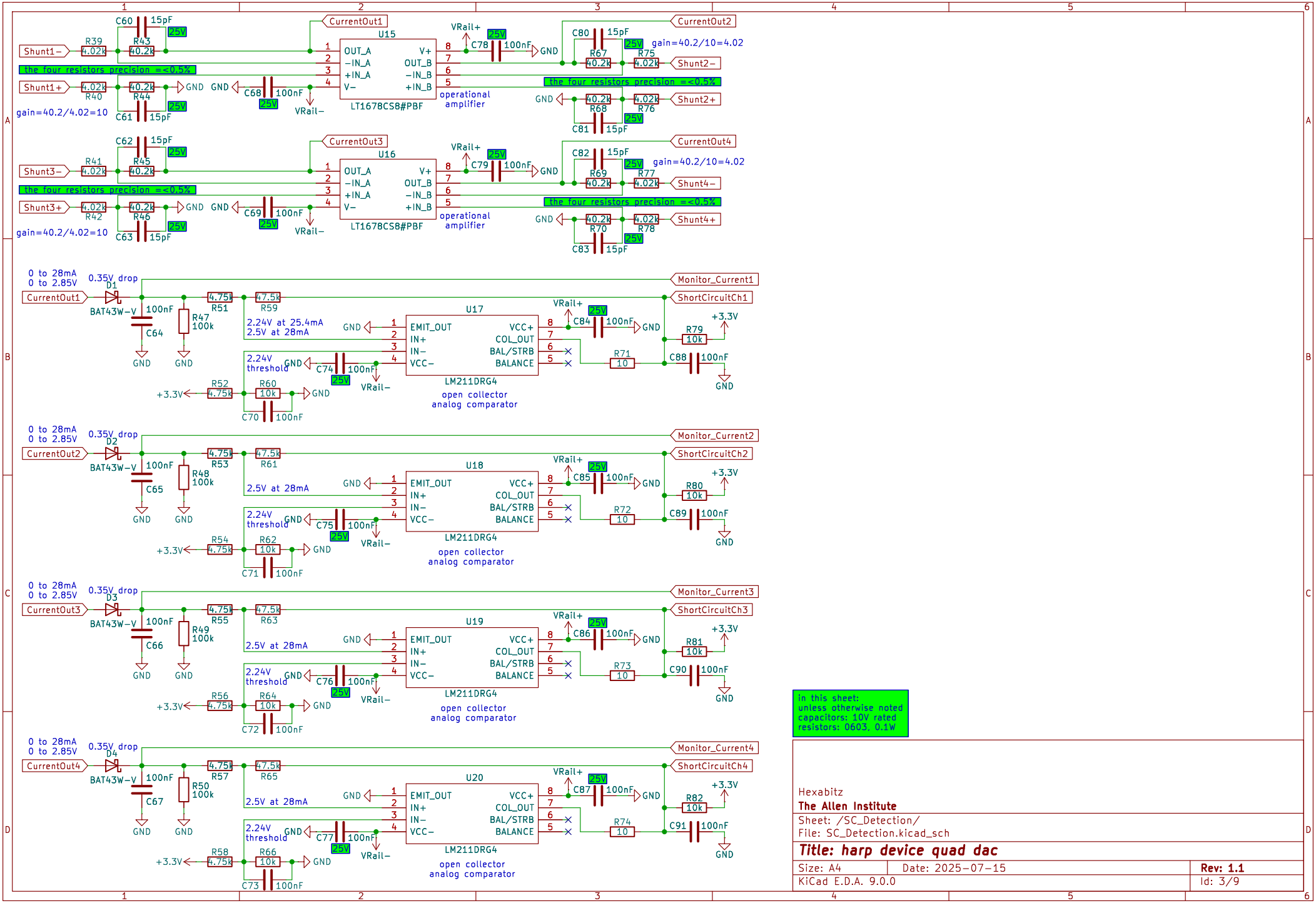
Sheet: /
File: harp.device.quad.dac.kicad_sch

Title: harp device quad dac

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 1/9


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
in this sheet:
capacitors: 10V rated
resistors: 0603, 0.1W
Hexabitz
The Allen Institute
Sheet: /Core_RP2350/
File: Core_RP2350.kicad_sch
Title: harp device quad dac
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 1/9


caps in this side 25V rated
all resistors 0603 or bigger, 0805 is perfect
U6
LTC2642ACDD-16#PBF
digital to analog converter
U7
LTC2642ACDD-16#PBF
digital to analog converter
U8
LTC2642ACDD-16#PBF
digital to analog converter
U9
LTC2642ACDD-16#PBF
digital to analog converter
U10
LT1678CS8#PBF
operational amplifier
U11
LT1678CS8#PBF
operational amplifier
U12
LT1678CS8#PBF
operational amplifier
U13
LT1678CS8#PBF
operational amplifier
CRCW120610R0FKEBC
10 Ohm 0.25W 1%
RShunt1
RShunt2
RShunt3
RShunt4
the four resistors precision =<0.5%
gain=40.2/10=4.02
AnalogOut1
AnalogOut2
AnalogOut3
AnalogOut4
U14
LT1461CIS8-2.5#PBF
precision reference
solder one of these two jumbers to select sypply DACs
SolderJumper_2_Open
SolderJumper_2_Open
in this sheet:
unless otherwise noted
capacitors: 10V rated
resistors: 0603, 0.1W
Hexabitz
The Allen Institute
Sheet: /DACs/
File: DACs.kicad_sch
Title: harp device quad dac
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 2/9



Hexabitz

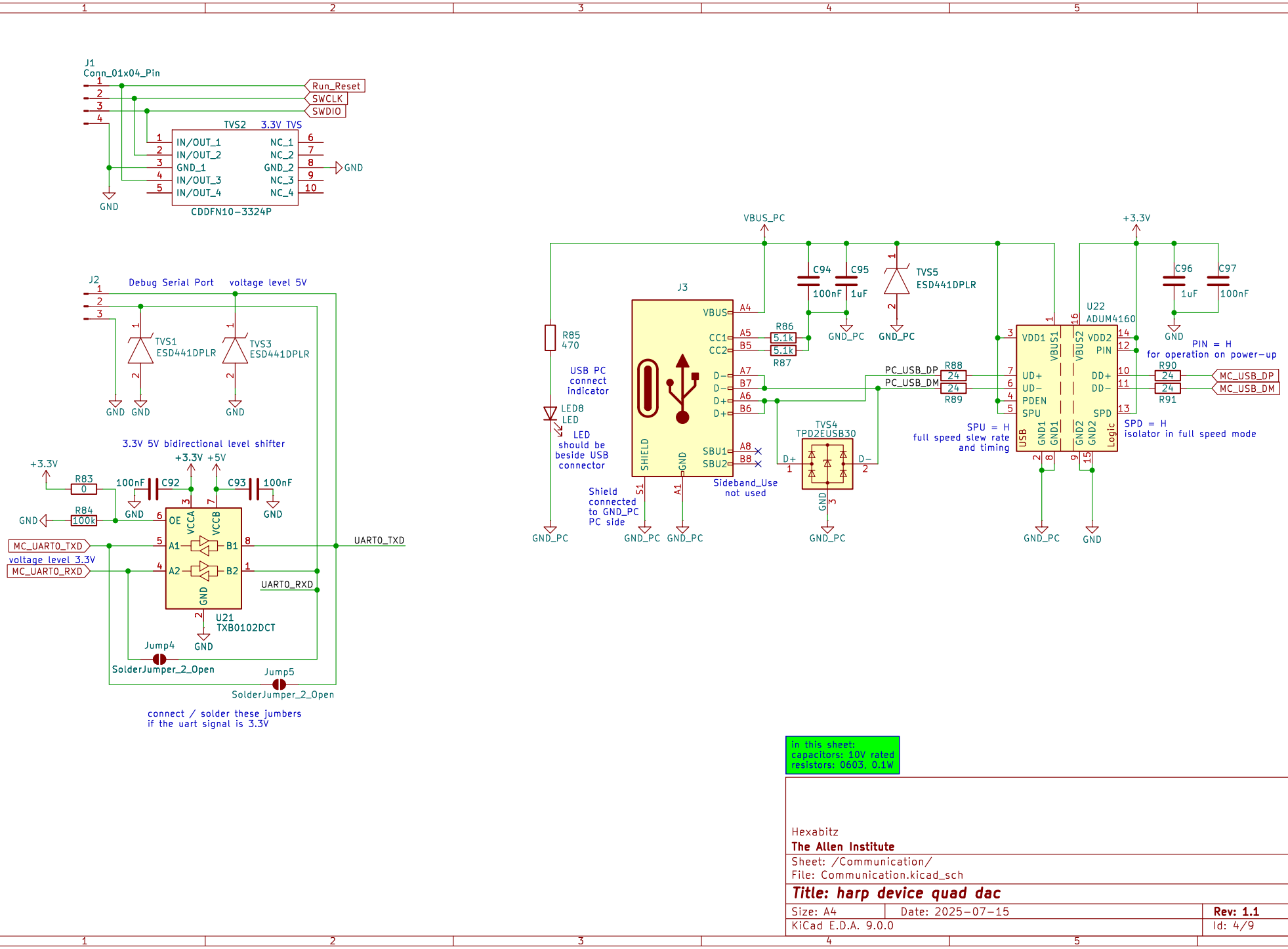
The Allen Institute

Sheet: /SC_Detection/

File: SC_Detection.kicad_sch

Title: harp device quad dac

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 3/9



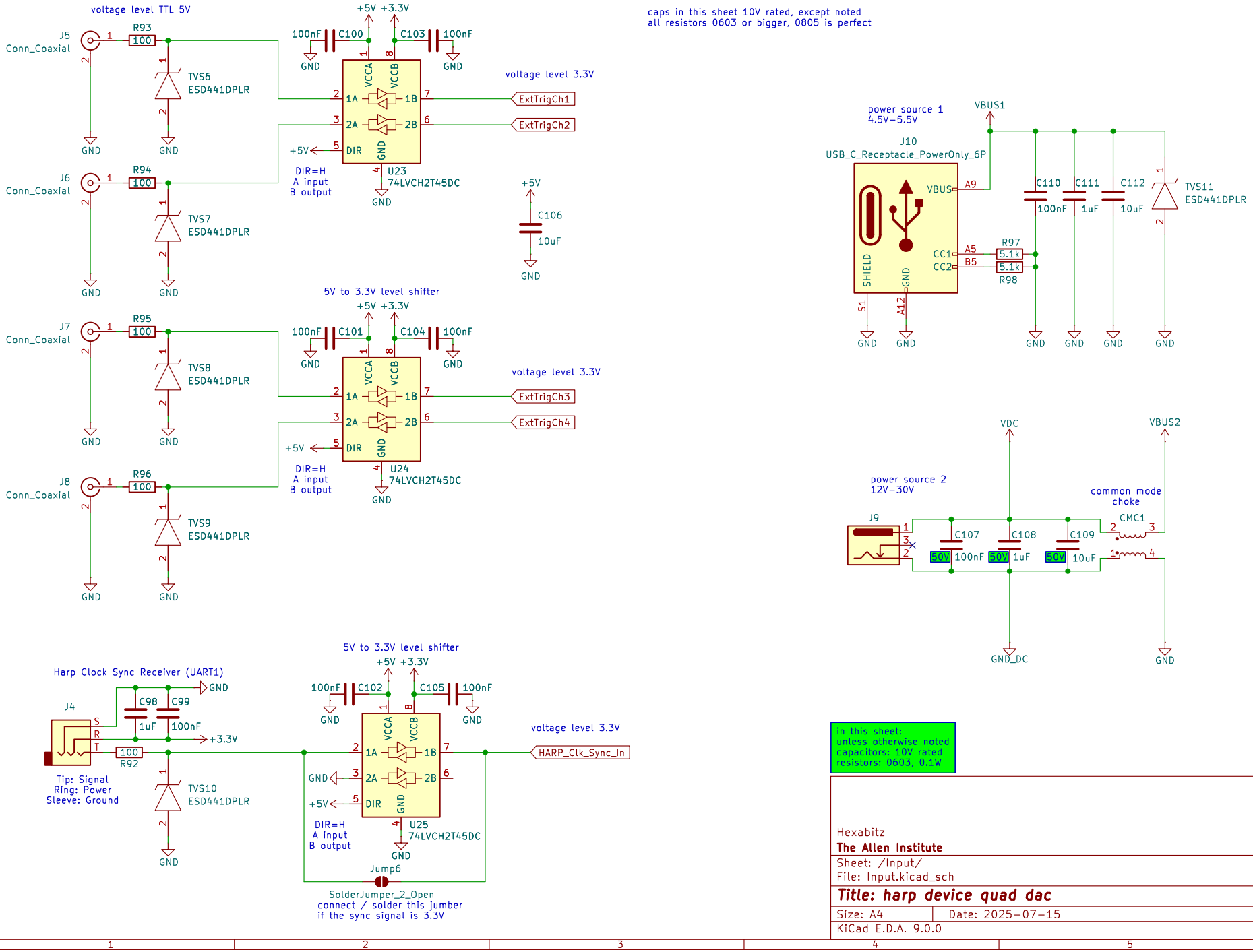
in this sheet:
capacitors: 10V rated
resistors: 0603, 0.1W

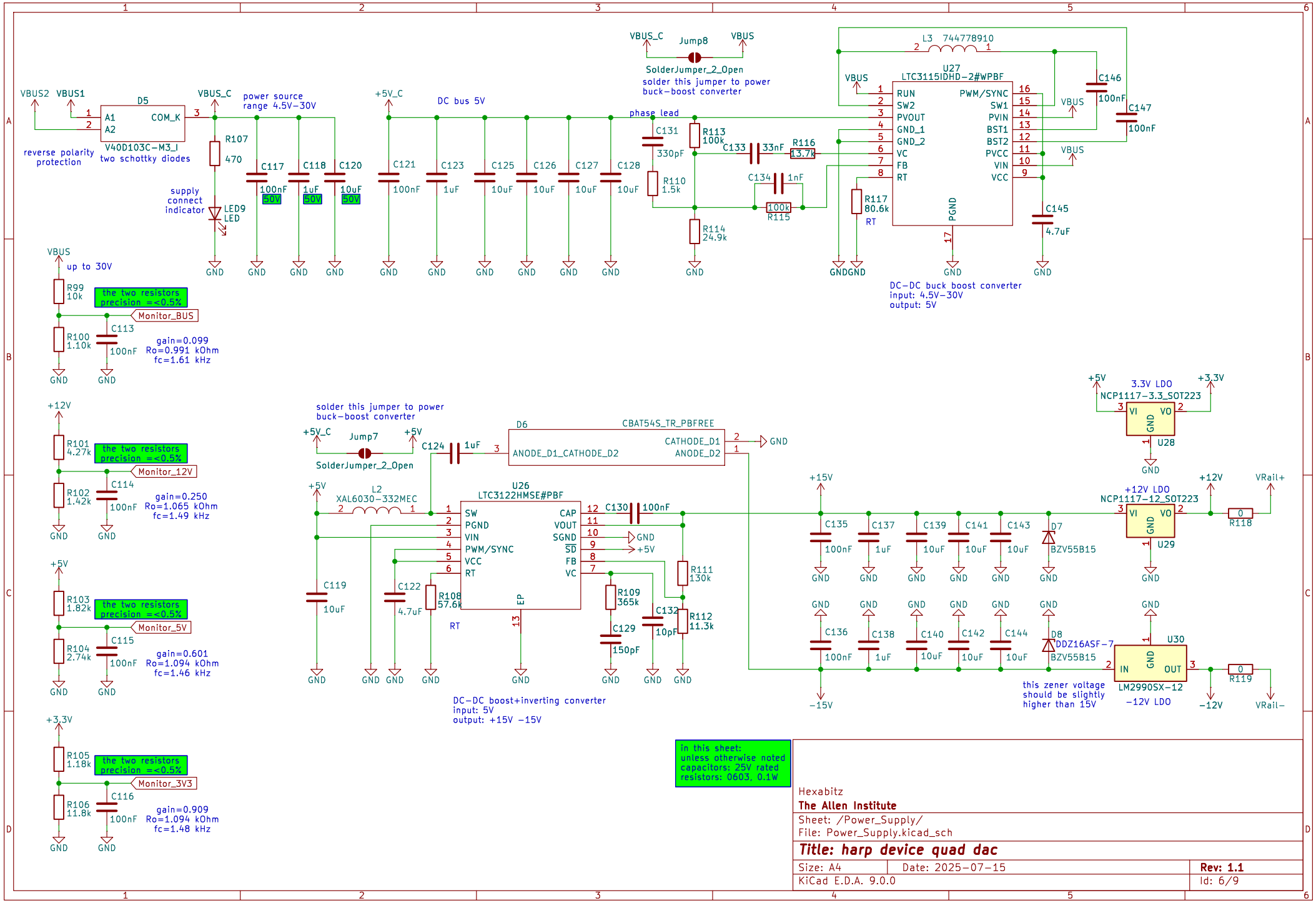
Hexabitz
The Allen Institute

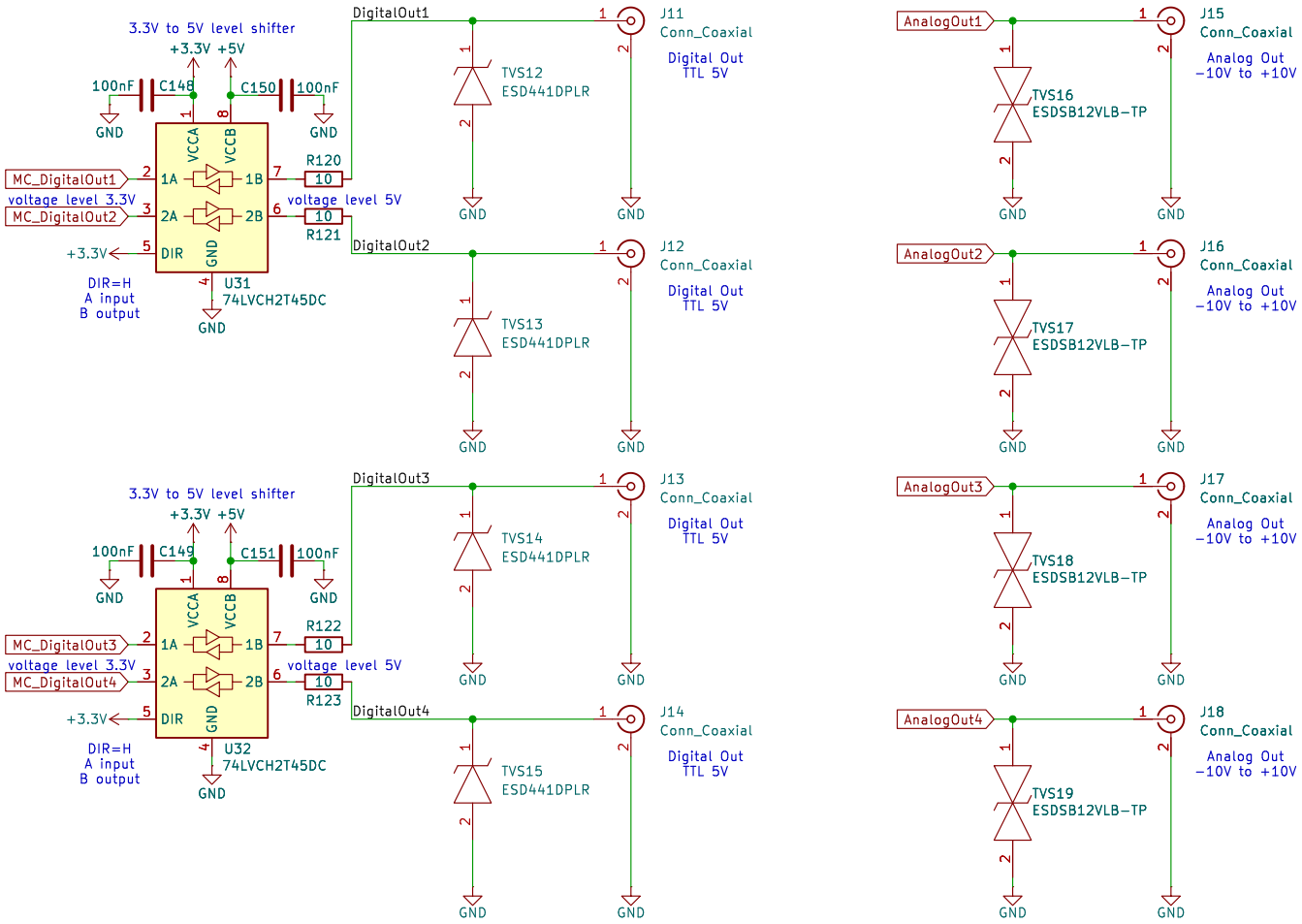
Sheet: /Communication/
File: Communication.kicad_sch

Title: harp device quad dac

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 4/9


voltage level TTL 5V
J5
Conn_Coaxial
R93
100
TVS6
ESD441DPLR
J6
Conn_Coaxial
R94
100
TVS7
ESD441DPLR
+5V +3.3V
100nF C100
C103 100nF
GND
VCCA
VCCB
1A
1B
2A
2B
DIR
GND
U23
74LVCH2T45DC
voltage level 3.3V
ExtTrigCh1
ExtTrigCh2
DIR=H
A input
B output
+5V
C106
10uF
caps in this sheet 10V rated, except noted
all resistors 0603 or bigger, 0805 is perfect
5V to 3.3V level shifter
J7
Conn_Coaxial
R95
100
TVS8
ESD441DPLR
J8
Conn_Coaxial
R96
100
TVS9
ESD441DPLR
C101
C104
U24
74LVCH2T45DC
ExtTrigCh3
ExtTrigCh4
power source 1
4.5V–5.5V
J10
USB_C_Receptacle_PowerOnly_6P
VBUS
SHIELD
CC1
CC2
A9
A5
B5
A12
S1
R97
5.1k
R98
5.1k
C110 100nF
C111 1uF
C112 10uF
VBUS1
TVS11
ESD441DPLR
power source 2
12V–30V
J9
VDC
VBUS2
common mode
choke
CMC1
C107 100nF 50V
C108 1uF 50V
C109 10uF 50V
GND_DC
Harp Clock Sync Receiver (UART1)
J4
S
R
T
C98 1uF
C99 100nF
100
R92
Tip: Signal
Ring: Power
Sleeve: Ground
TVS10
ESD441DPLR
5V to 3.3V level shifter
C102
C105
U25
74LVCH2T45DC
voltage level 3.3V
HARP_Clk_Sync_In
DIR=H
A input
B output
Jump6
SolderJumper_2_Open
connect / solder this jumber
if the sync signal is 3.3V
in this sheet:
unless otherwise noted
capacitors: 10V rated
resistors: 0603, 0.1W
Hexabitz
The Allen Institute
Sheet: /Input/
File: Input.kicad_sch
Title: harp device quad dac
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 5/9


VBUS2 VBUS1
D5
A1
A2
COM_K
V40D103C-M3_I
two schottky diodes
reverse polarity protection
VBUS_C
power source range 4.5V-30V
R107
470
supply connect indicator
LED9
LED
C117
100nF
50V
C118
1uF
50V
C120
10uF
50V
GND
+5V_C
DC bus 5V
C121
100nF
C123
1uF
C125
10uF
C126
10uF
C127
10uF
C128
10uF
VBUS_C
Jump8
VBUS
SolderJumper_2_Open
solder this jumper to power buck-boost converter
phase lead
C131
330pF
R113
100k
R110
1.5k
R114
24.9k
C133
33nF
R116
13.7k
C134
1nF
100k
R115
L3 744778910
U27
LTC3115IDHD-2#WPBF
RUN
SW2
PVOUT
GND_1
GND_2
VC
FB
RT
PWM/SYNC
SW1
PVIN
BST1
BST2
PVCC
VIN
VCC
PGND
R117
80.6k
RT
C146
100nF
C147
100nF
C145
4.7uF
VBUS
GNDGND
DC-DC buck boost converter
input: 4.5V-30V
output: 5V
VBUS
up to 30V
R99
10k
the two resistors precision =<0.5%
Monitor_BUS
R100
1.10k
C113
100nF
gain=0.099
Ro=0.991 kOhm
fc=1.61 kHz
+12V
R101
4.27k
the two resistors precision =<0.5%
Monitor_12V
R102
1.42k
C114
100nF
gain=0.250
Ro=1.065 kOhm
fc=1.49 kHz
+5V
R103
1.82k
the two resistors precision =<0.5%
Monitor_5V
R104
2.74k
C115
100nF
gain=0.601
Ro=1.094 kOhm
fc=1.46 kHz
+3.3V
R105
1.18k
the two resistors precision =<0.5%
Monitor_3V3
R106
11.8k
C116
100nF
gain=0.909
Ro=1.094 kOhm
fc=1.48 kHz
solder this jumper to power buck-boost converter
+5V_C
Jumper7
+5V
SolderJumper_2_Open
C124
1uF
D6
CBAT54S_TR_PBFREE
ANODE_D1_CATHODE_D2
CATHODE_D1
ANODE_D2
L2
XAL6030-332MEC
U26
LTC3122HMSE#PBF
SW
PGND
VIN
PWM/SYNC
VCC
RT
CAP
VOUT
SGND
SD
FB
VC
EP
C130
100nF
C119
10uF
C122
4.7uF
R108
57.6k
R109
365k
C129
150pF
C132
10pF
R111
130k
R112
11.3k
DC-DC boost+inverting converter
input: 5V
output: +15V -15V
+15V
-15V
C135
100nF
C137
1uF
C139
10uF
C141
10uF
C143
10uF
D7
BZV55B15
C136
100nF
C138
1uF
C140
10uF
C142
10uF
C144
10uF
D8
DDZ16ASF-7
BZV55B15
this zener voltage should be slightly higher than 15V
3.3V LDO
NCP1117-3.3_SOT223
U28
+12V LDO
NCP1117-12_SOT223
U29
R118
0
VRail+
U30
LM2990SX-12
-12V LDO
R119
0
-12V
VRail-
in this sheet:
unless otherwise noted
capacitors: 25V rated
resistors: 0603, 0.1W
Hexabitz
The Allen Institute
Sheet: /Power_Supply/
File: Power_Supply.kicad_sch
Title: harp device quad dac
Size: A4
Date: 2025-07-15
Rev: 1.1
KiCad E.D.A. 9.0.0
Id: 6/9



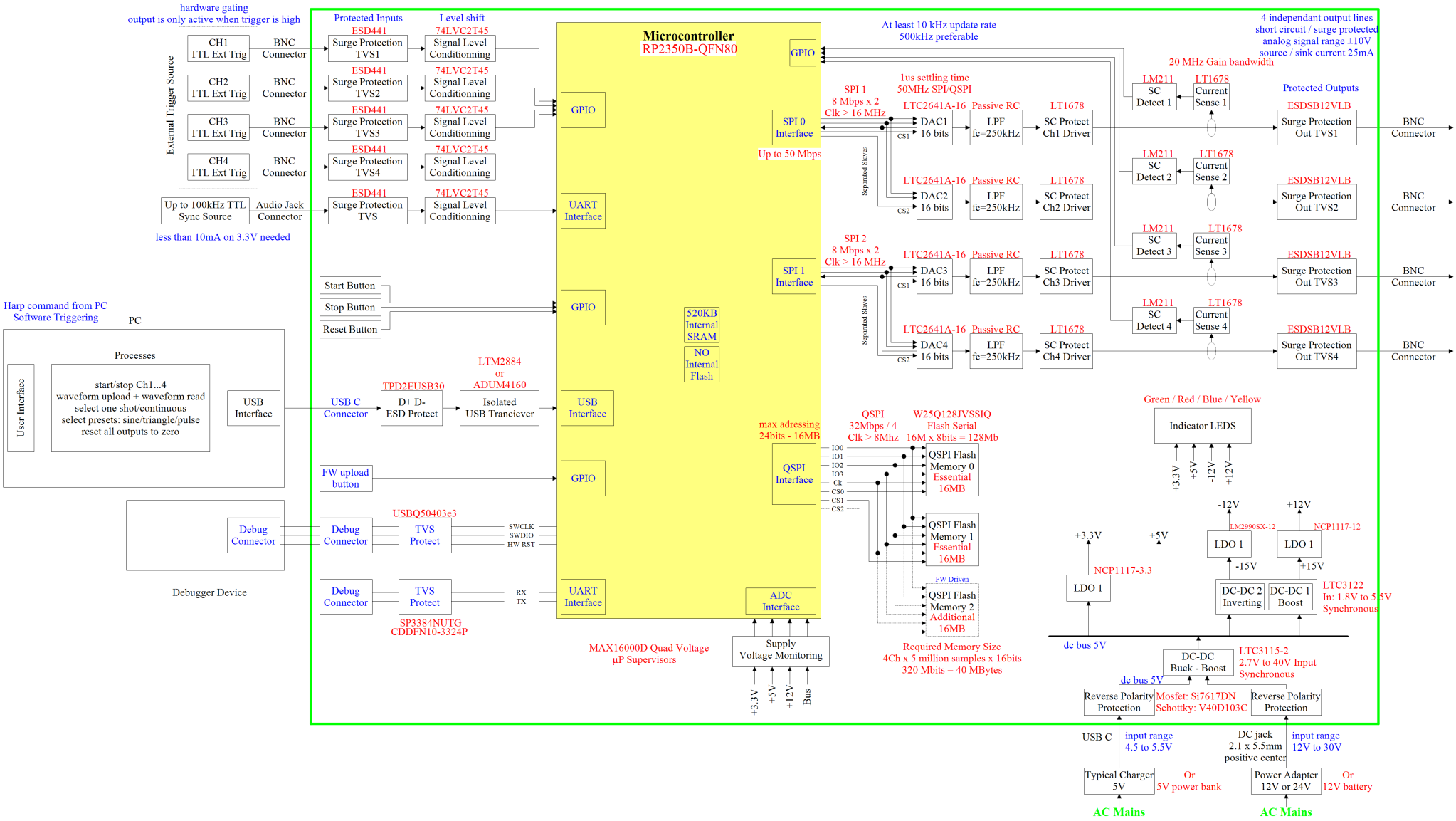
in this sheet:
capacitors: 10V rated
resistors: 0603, 0.1W

Hexabitz
The Allen Institute

Sheet: /Output/
File: Output.kicad_sch

Title: harp device quad dac

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 7/9



Hexabitz
The Allen Institute

Sheet: /Block_Diagram/
File: Block_Diagram.kicad_sch

Title: harp device quad dac

Size: A4	Date: 2025-07-15	**Rev: 1.1**
KiCad E.D.A. 9.0.0		Id: 8/9