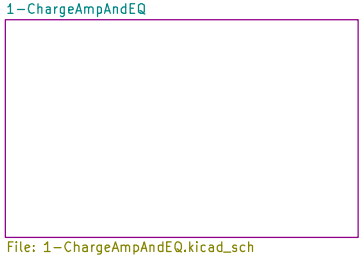
Piezo preamp with EQ

[1] Charge amplifier and Baxandall EQ

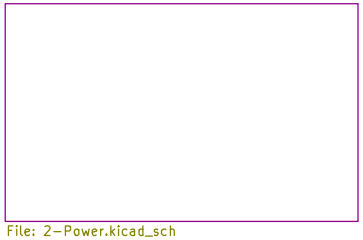
1-ChargeAmpAndEQ



File: 1-ChargeAmpAndEQ.kicad_sch

[2] Power supply and opamp biasing

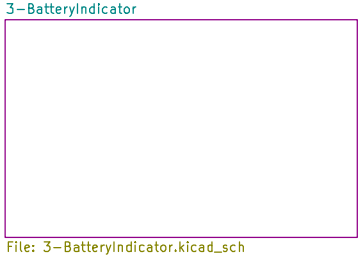
2-Power



File: 2-Power.kicad_sch

[3] Battery & power indicator

3-BatteryIndicator



File: 3-BatteryIndicator.kicad_sch

[4] Mounting, hardware and accessories

4-MountingAndAccessories

File: 4-MountingAndAccessories.kicad_sch

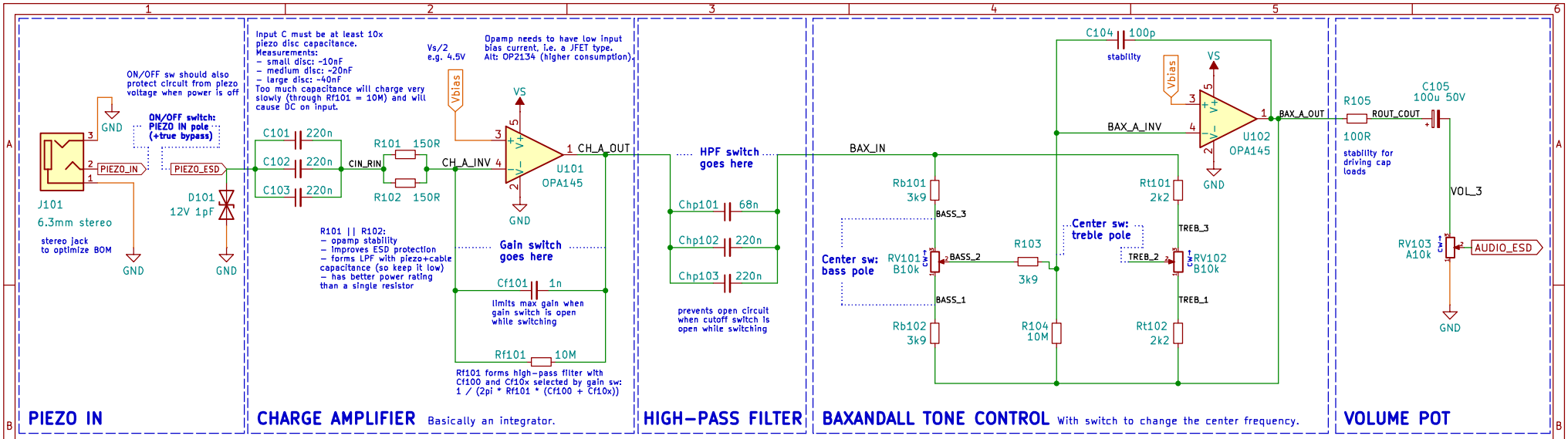
v3.1: minor PCB improvements
v3.0: +ON/OFF sw w/ true bypass, +BI mode sw, + DC jack, external pots, -LED trimpot, changing switches, reducing BOM

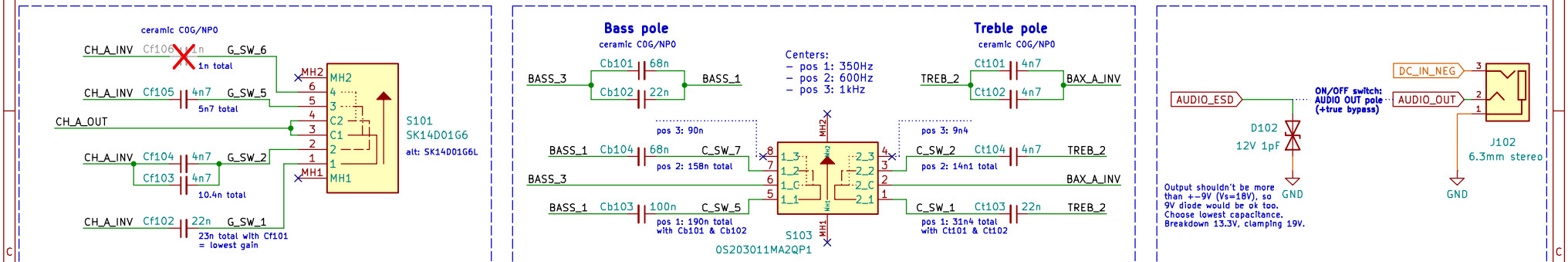
Arx

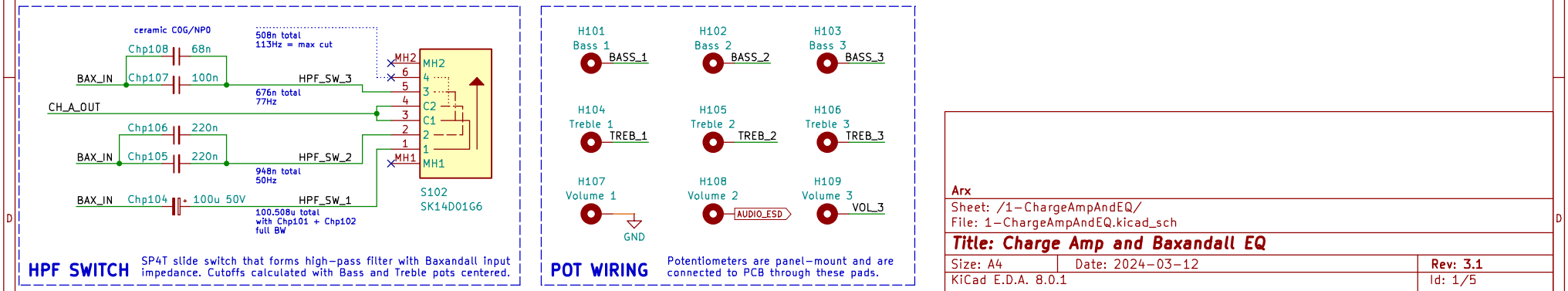
Sheet: /
File: 2024_PiezoPreamp3.kicad_sch

Title: Piezo Preamp + EQ

Size: A4	Date: 2024-03-12	**Rev: 3.1**
KiCad E.D.A. 8.0.1		Id: 1/5







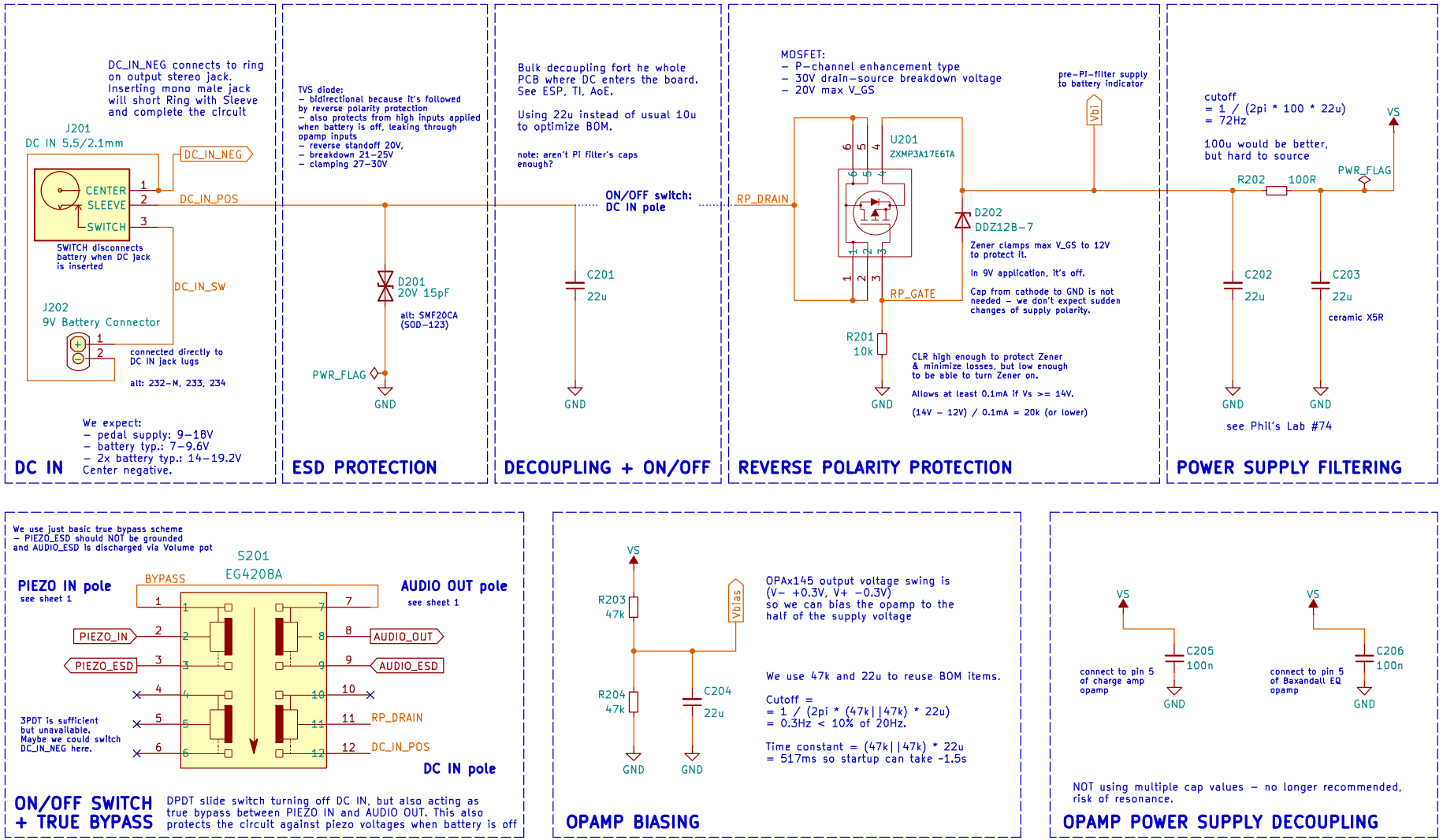
HPF SWITCH

POT WIRING

Arx
Sheet: /1–ChargeAmpAndEQ/
File: 1–ChargeAmpAndEQ.kicad_sch

Title: Charge Amp and Baxandall EQ

Size: A4	Date: 2024–03–12	Rev: 3.1
KiCad E.D.A. 8.0.1		Id: 1/5



Arx		
Sheet: /2-Power/		
File: 2-Power.kicad_sch		
Title: Power Supply and Opamp Biasing		
Size: A4	Date: 2024-03-12	**Rev: 3.1**
KiCad E.D.A. 8.0.1		Id: 2/5

"BI" mode: if input voltage > threshold, LED will flash briefly and then turn off to save power.
The lower the voltage, the longer the flash. Under the threshold, the LED stays on to signal replacement. 9V battery is dead <6.5V (but differs with type).

"LED always on" mode: power-on LED stays on regardless of input voltage.

Vbi

Power-on LED mode switch goes here

BI_SW

R301 47k BOM optimized

Voltage divider sets BI threshold.
If voltage over (R303 + RV301) is lower than Vbe (~0.6V), the LED stays ON.

Threshold range 4.7V – 16V (LTSpice).
Set to e.g. 6.9V for 9V battery.

BI_R

R302 47k

R303 3k9

TRIM_BI_3

max current through wiper:
20V/(2*47k+3k9) = 0.2mA
min power rating:
P = 10k * I^2 = 0.42mW

RV301 trim B10k

BI threshold adjustment

GND

C301 22u

C302 22u

Ceramic X5R.
Bigger cap = longer TC = longer flash

GND

BI_B1

R304 47k

U301 BC847BS,115

GND

E1 B1 C2 C1 B2 E2

BI_C2

BI_C1_B2

2xNPN BJT package.
hFE should be > 150.

If BJT1 is ON (B1–E1 > 0.6V), BJT2 is OFF and LED is OFF.

Low supply voltage prevents BJT1 from turning on -> LED is ON.

GND

BATTERY INDICATOR

with two modes: "battery indication" or "LED always on", and adjustable threshold.
Inspiration: https://freecircuits.wordpress.com/2011/04/22/low-battery-indicator/

D301
Red 100mcd/120°/2mA
Vf = 1.5–1.8–2.1V

LED_K

R305 10k

I = (20–1.5)V / 10000 = 1.85mA max

BI_C2

goes to collector of BJT2

POWER-ON LED with adjustable brightness

BI_SW

Vbi

S301
OS102011MA1QN1

Mounted on bottom side, so movement is reversed.

alt (same footprint):
OS102011MA1QN1C
OS102011MA1QS1
OS102011MA1QS1C

alt (different footprint):
1825232-1

POWER-ON LED MODE SWITCH

left = closed = NC = "Battery indicator mode"
right = open = NO = "LED always on"

Arx

Sheet: /3-BatteryIndicator/
File: 3-BatteryIndicator.kicad_sch

Title: Battery & Power Indicator

Size: A4	Date: 2024-03-12	Rev: 3.1
KiCad E.D.A. 8.0.1		Id: 3/5

can be used as a single point of grounding for enclosure if the grounding spring is not used

GND

H401
M2.5 MountingHole_Pad

H402
M2.5 MountingHole

H403
M2.5 MountingHole

H404
M2.5 MountingHole

MOUNTING HOLES

H405
hex M2.5/15mm

H406
hex M2.5/15mm

H407
hex M2.5/15mm

H408
hex M2.5/15mm

Stainless steel or nylon (PA), 15mm, female-female, M2.5, pitch 0.45, hex.

TOP STANDOFFS

H409
M2.5, L=6mm

H410
M2.5, L=6mm

H411
M2.5, L=6mm

H412
M2.5, L=6mm

Stainless steel, flat thin head <1mm, Phillips, M2.5, L=6mm, pitch 0.45.

TOP SCREWS

H413
hex M2.5/20mm

H414
hex M2.5/20mm

H415
hex M2.5/20mm

H416
hex M2.5/20mm

Stainless steel or nylon (PA), 20mm, female-male, M2.5, pitch 0.45, hex.

BOTTOM STANDOFFS

H417
M2.5, L=6mm

H418
M2.5, L=6mm

H419
M2.5, L=6mm

H420
M2.5, L=6mm

Stainless steel, flat thin head <1mm, Phillips, M2.5, L=6mm, pitch 0.45.

BOTTOM SCREWS

1

GND

J401
Spring Contact

Battery spring pushing against enclosure.
Can be used as a single point of grounding.

One point of contact with enclosure is ideal, but we can also use two (spring and mounting hole + pad + metal standoff).

GROUNDING SPRING

H421
LED light guide

alt:
FIX-LEMB2-4.8V0-F
FIX-LEMB2-7V0-F
FIX-LEMB2-8V0-F
FIX-LEMB2-10V0-F

guides power LED light to the top cover of enclosure

LED LIGHT GUIDE

H422
9V battery holder

alt: Keystone 71
(bit too short)

H423
M2, H=3, locking

H424
M2, H=3, locking

H425
Washer, H=0.35, D=5

H426
Washer, H=0.35, D=5

H427
M2, L>7mm

H428
M2, L>7mm

BATTERY HOLDER

fastened to the bottom side of PCB

what's missing:
- knobs for pots

Arx

Sheet: /4-MountingAndAccessories/
File: 4-MountingAndAccessories.kicad_sch

Title: Mounting, hardware and accessories

Size: A4	Date: 2024-03-12	Rev: 3.1
KiCad E.D.A. 8.0.1		Id: 1/5