

Sheet: power

File: power.sch

Sheet: audio-codec

File: audio-codec.sch

Sheet: usb

File: usb.sch

Sheet: coreboard

File: coreboard.sch

Sheet: audio-inputs

File: audio-inputs.sch

Sheet: midi

File: midi.sch

Sheet: mechanics

File: mechanics.sch

Sheet: audio-outputs

File: audio-outputs.sch

Sheet: control-chain

File: control-chain.sch

Sheet: headphone

File: Headphone.sch

Notes

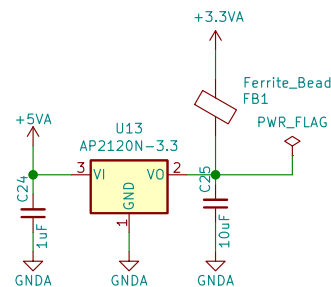
- All resistors named as RA* must have 1% tolerance
- All non-polarized capacitors named as CA* must use NP0 Temp. Coef.
- All other non-polarized capacitors should use X7R Temp. Coef.
- Decoupling caps must be placed as close as possible of the IC power pins

USB outp Power: 500mA
Inp Power: 12V 500mA
<https://github.com/moddevices/hw-mod-dwarf>
Dwarf Audio processing board
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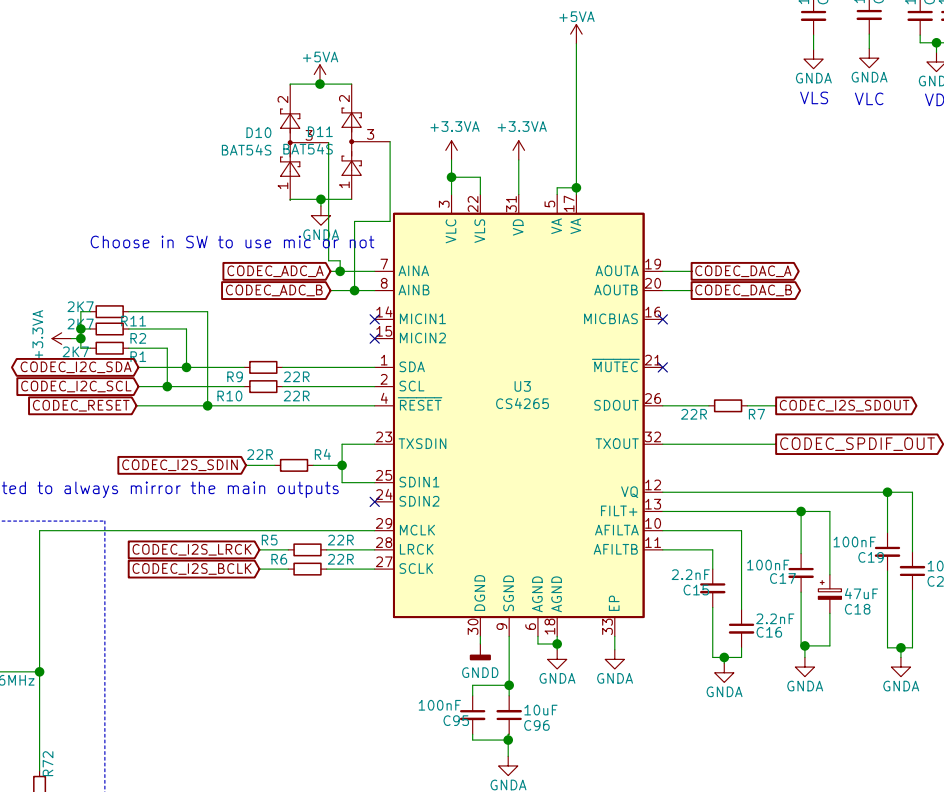
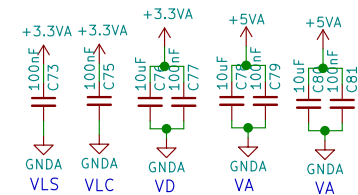
Sheet: /
File: bottom-board.sch

Title: MOD Dwarf – Main Board

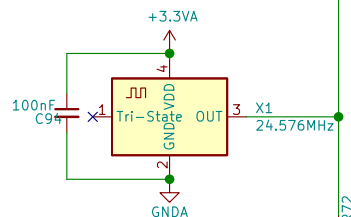
| | | |
|--------------|--|----------|
| Size: A4 | Date: 2021-09-06 | Rev: 1.3 |
| KiCad E.D.A. | kiCad 5.1.10-88a1d61d5890ubuntu20.04.1 | Id: 1/11 |



Use ferrite beads for EMI suppression and improved power supply decoupling



Codec MCLK



The 0ohm resistor at I2S_MCLK must only be placed when the xtal is not placed, and vice versa.

CODEC_I2S_MCLK R3 22R

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Sheet: /audio-codec/

File: audio-codec.sch

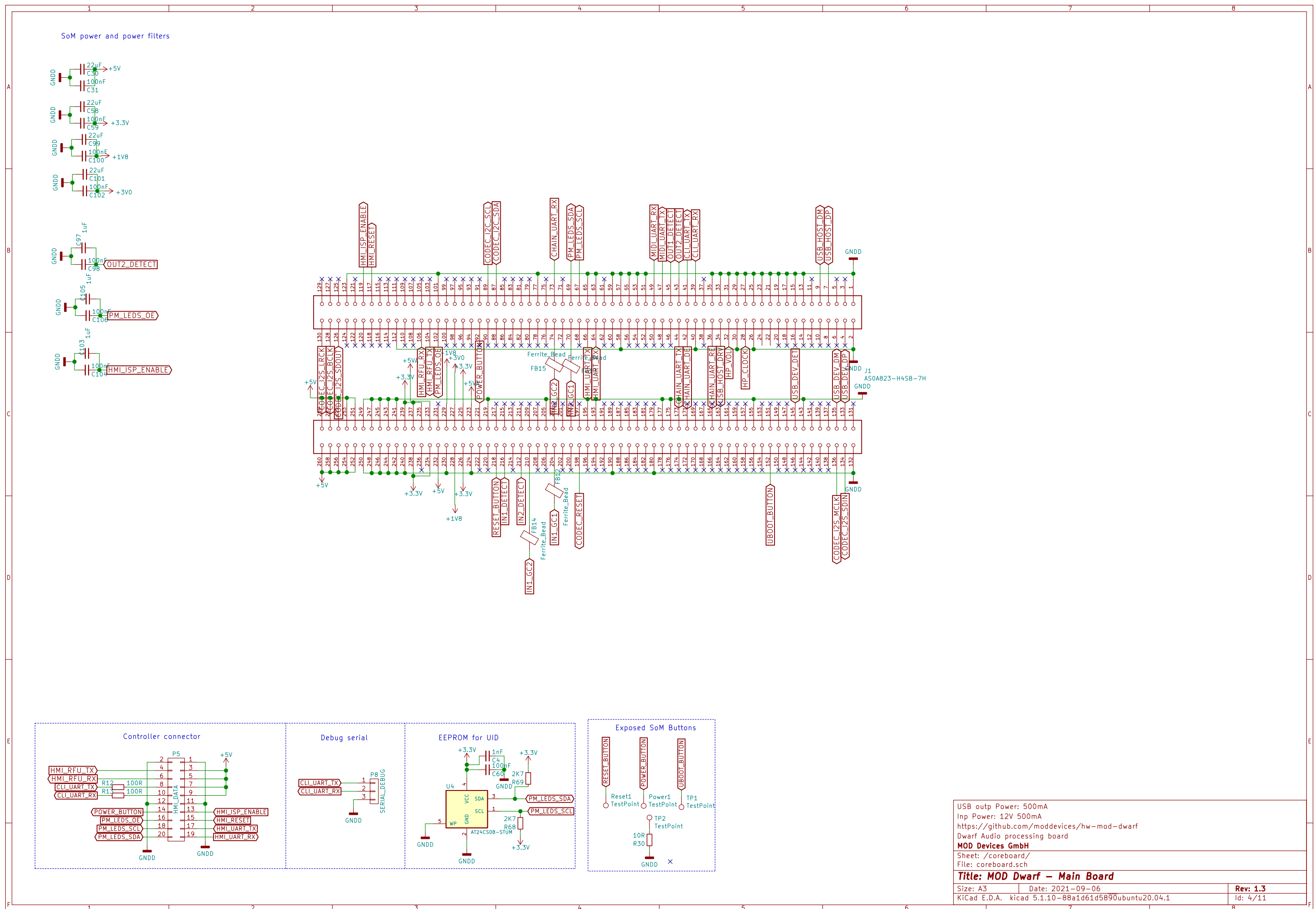
Title: MOD Dwarf – Main Board

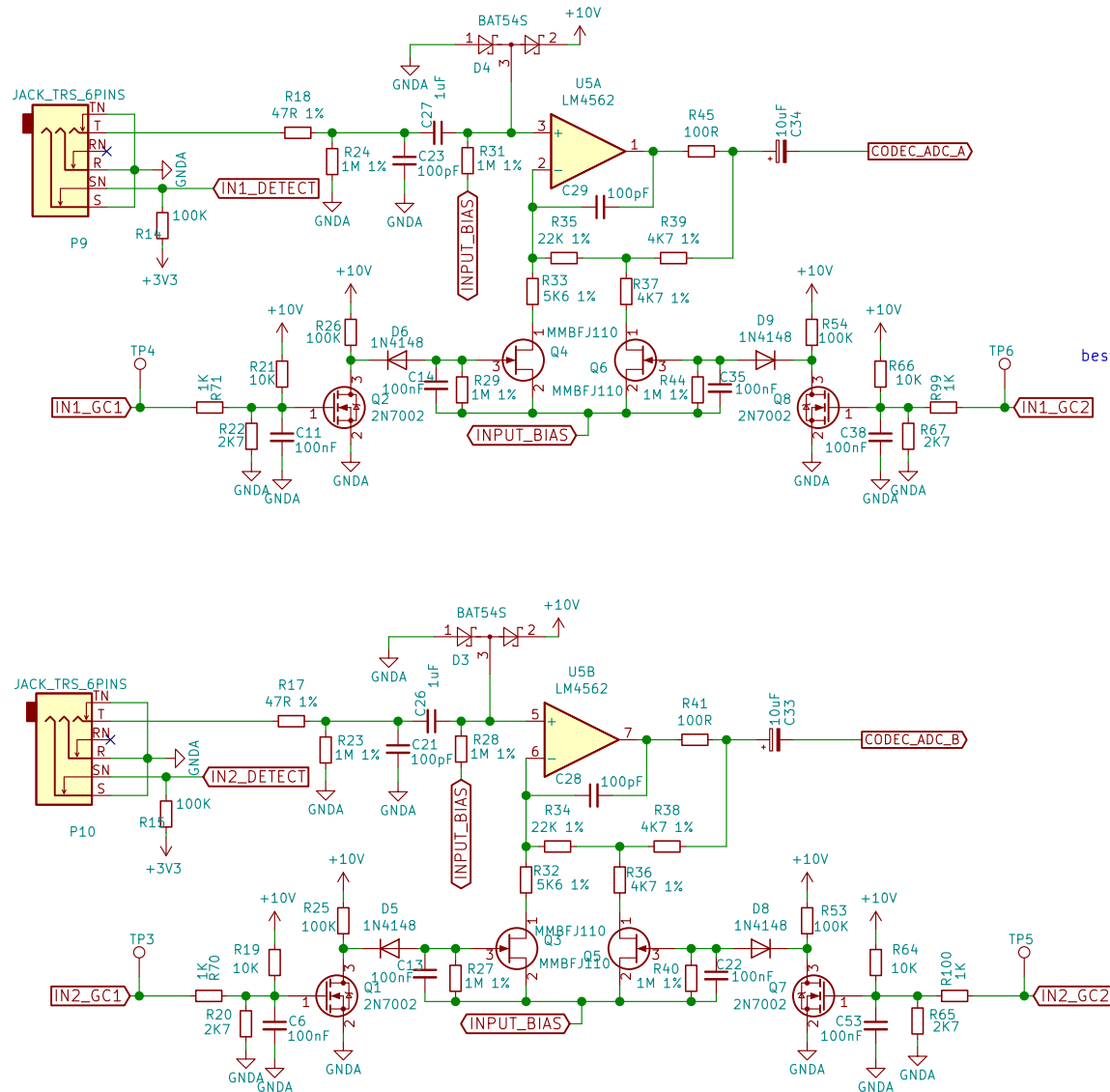
Size: A4 Date: 2021-09-06

KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1

Rev: 1.3

Id: 3/11





GC2, GC1: GAIN (dB)

| | |
|------|------|
| 1, 1 | 0.0 |
| 1, 0 | 6.0 |
| 0, 1 | 15.0 |
| 0, 0 | 20.4 |

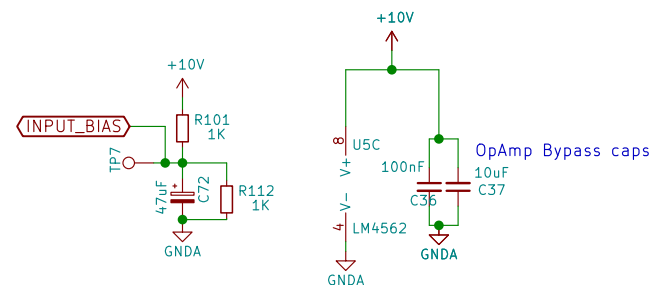
The gain calculation includes the R_{DSon} value

J110: $R_{DSon} = 18R$

The CODEC only presents optimal dynamic range and THD+N for PGA setting: $-12dB$ to $+6dB$.

best achievable noise will be $-94dB$ since this is the Johnson noise with an impedance of 1Meg

Use ferrite beads for EMI suppression and improved power supply decoupling



USB outp Power: 500mA
 Inp Power: 12V 500mA
<https://github.com/moddevices/hw-mod-dwarf>
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Sheet: /audio-inputs/

File: audio-inputs.sch

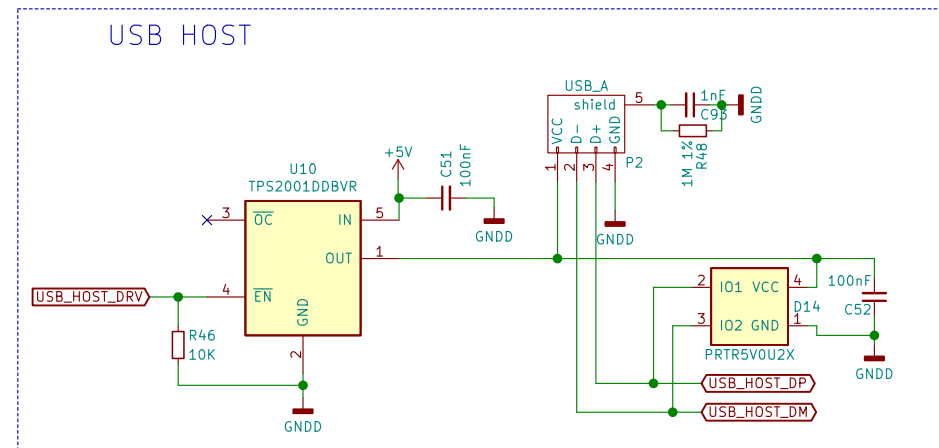
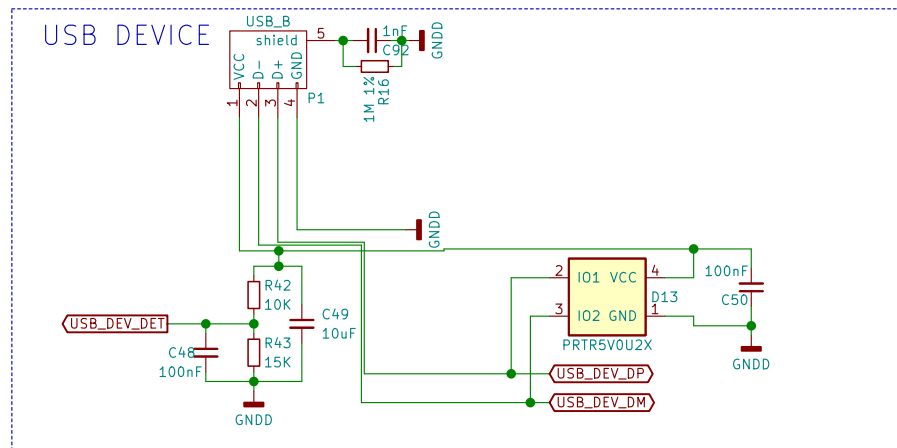
Title: MOD Dwarf – Main Board

Size: A4 Date: 2021-09-06

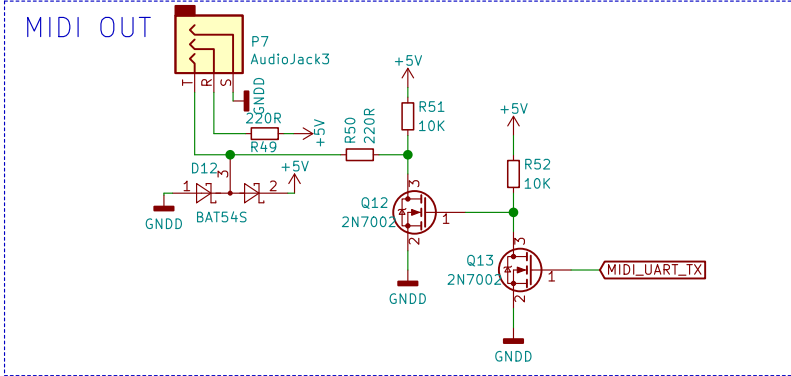
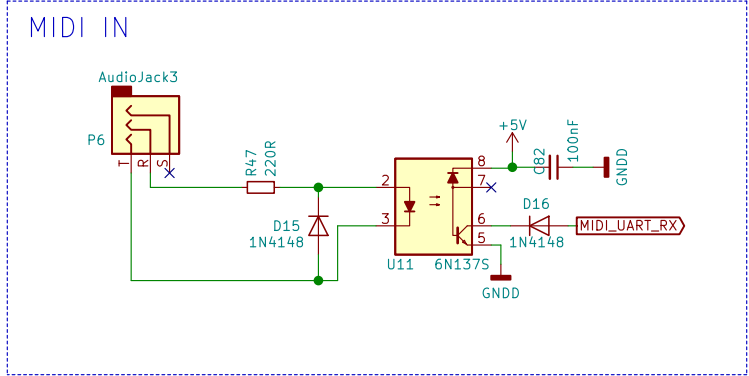
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1

Rev: 1.3

Id: 5/11



| | | |
|---|------------------|----------|
| USB outp Power: 500mA | | |
| Inp Power: 12V 500mA | | |
| https://github.com/moddevices/hw-mod-dwarf | | |
| Dwarf Audio processing board | | |
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| Sheet: /usb/ | | |
| File: usb.sch | | |
| Title: MOD Dwarf – Main Board | | |
| Size: A4 | Date: 2021-09-06 | Rev: 1.3 |
| KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1 | | Id: 7/11 |

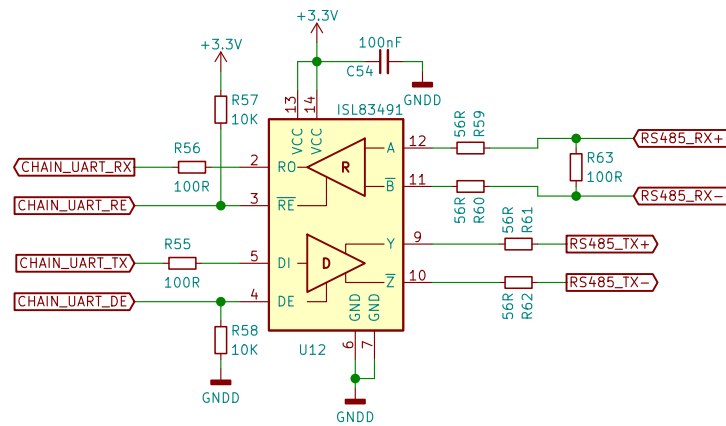


USB outp Power: 500mA
 Inp Power: 12V 500mA
<https://github.com/moddevices/hw-mod-dwarf>
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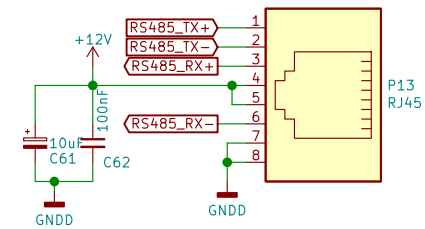
Sheet: /midi/
 File: midi.sch

Title: MOD Dwarf – Main Board

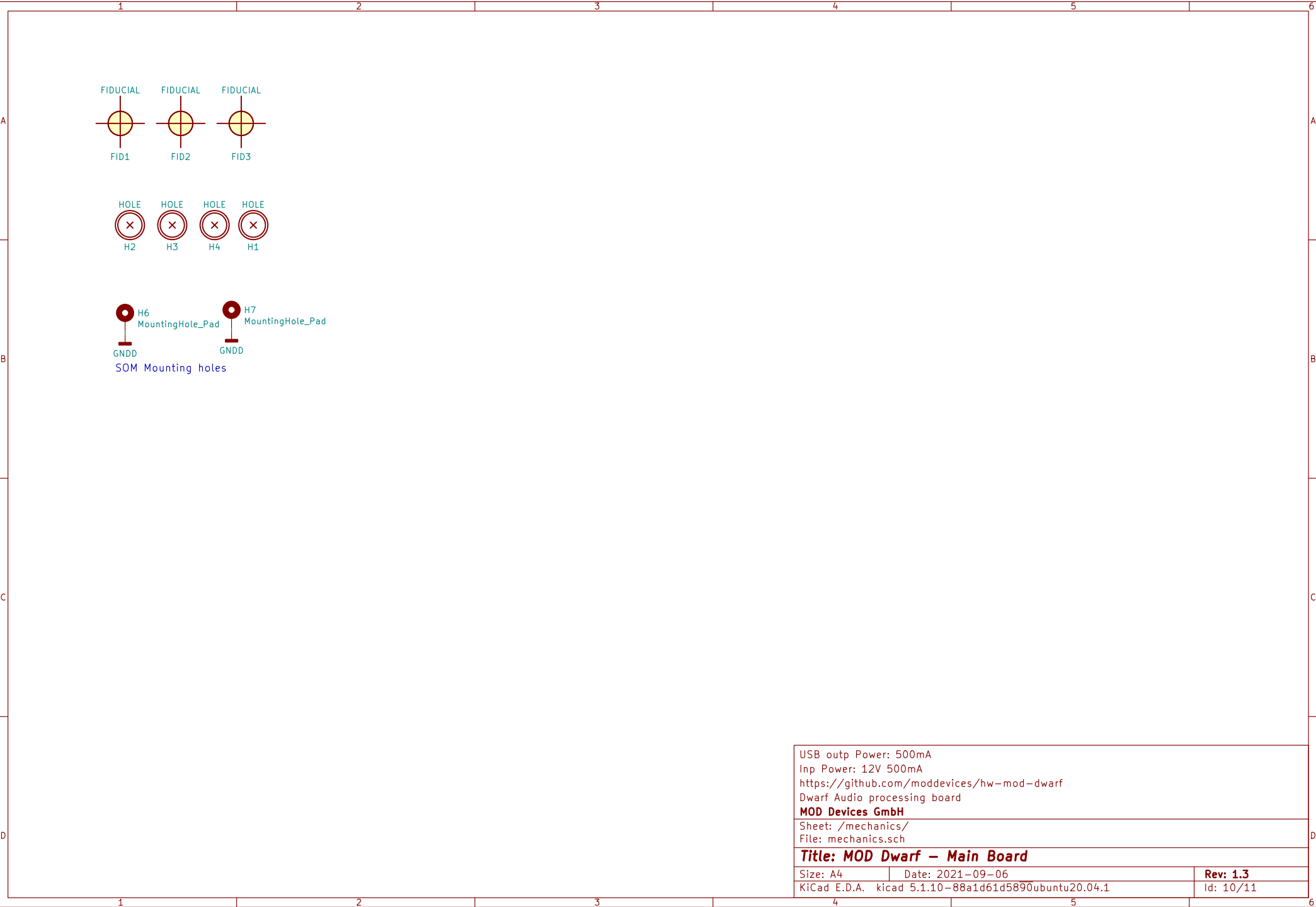
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|---|------------------|----------|
| Size: A4 | Date: 2021-09-06 | Rev: 1.3 |
| KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1 | | Id: 8/11 |



This port is NOT used for ethernet, but for a serial protocol that includes power over the RJ-45 connector



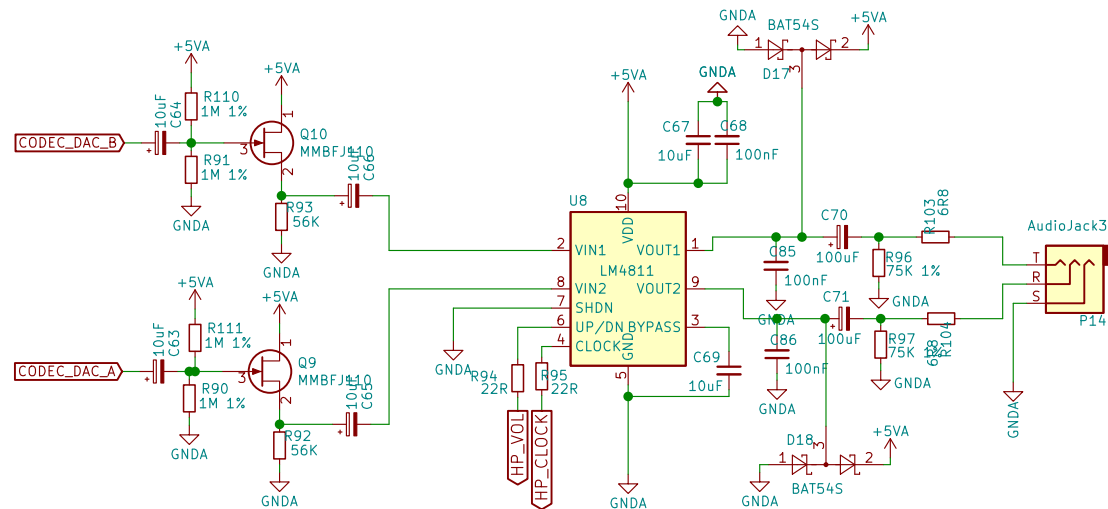
| | | |
|---|------------------|----------|
| USB outp Power: 500mA | | |
| Inp Power: 12V 500mA | | |
| https://github.com/moddevices/hw-mod-dwarf | | |
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| Sheet: /control-chain/ | | |
| File: control-chain.sch | | |
| Title: MOD Dwarf – Main Board | | |
| Size: A4 | Date: 2021-09-06 | Rev: 1.3 |
| KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1 | | Id: 9/11 |



LM4811 has adjustable gain of -33dB to $+12\text{dB}$, this is applied to the main out signal

Minimal load of 16 ohm with 0.1% THD+N

Max power 105mW



USB outp Power: 500mA
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Dwarf Audio processing board

MOD Devices GmbH

Sheet: /headphone/
File: Headphone.sch

Title: MOD Dwarf – Main Board

Size: A4
KiCad E.D.A. kicad 5.1.10-88a1d61d5890ubuntu20.04.1

Date: 2021-09-06

Rev: 1.3

Id: 11/11