

There is a PPY's ReClocker for BeagleBone Black (BBB)

<https://puredata.ru/>

This little cape is an isolator and reclocker. It isolates noise from a BBB and reclock data transmitted from BBB with two clean, external oscillators. Mr. nautibuoy, using it, has been able to connect a BBB to the valve DAC, a creation of Mr. MarcelvdG. Valve DAC is unique, as it is not just another chip DAC, with a tube output stage. It actually does something that I have never seen before. It uses vacuum tubes to convert digital to analogue signals.

BBB can output DSD512. PPY's cape connects a BBB DSD512 signal to a DAC. PPY probably wanted to design a universal BBB interface, allowing Amanero compatibility. Here, I just don't care about universal compatibility. The goal is to "simplify, then add lightness" and connect BBB to just one and only one Valve DAC. There is no need to allow switching to PCM, as PCM is not used and ignored.

A very, very good clock is the double secret ingredient of a good DAC. I know that I am not capable of building or designing a decent one, let alone a great one. So, I simply outsource it. The idea here is to accept two external clocks 22.5792 Mbit/s and 24.576 Mbit/s (adequate for DSD512), convert sine waves to square waves, select one, and distribute this master clock to the valve DAC, and BBB MCK_In.

The isolation part of the circuit has been coached by Arnold Schwarzenegger and is bulking out. Each clock or data channel uses a separate, single-channel, fast chip, and does not share rent and food with roommates.

The power supplies of these digital isolator chips have received meals delivered by Michelin chefs. Each digital isolator receives a CCS-shut regulator for the dirty side and the clean side. This is an idea from Zoran on another thread. I am not certain if he means just the clean side or both. I just do both. Why not. Additional cost is minimal.

I see a four layers board with components placed on both the top and bottom sides. ADI and Potato chips on top. Power supplies and bypass capacitors at the bottom. The TO-220 BJT located at the edge can be mounted directly to a heatsink, or the aluminum case of this DAC.

Bypass Capacitors are placed directly underneath SMT components on the bottom side of the board, ensuring shortest trace length possible. Add one bypass capacitor on each supply pin on devices with multiple power supply pins.

My idea is to make easy assembly. JLCPCB can build the bottom side and only a handful of chips need soldering on top.

Datasheet links

ADuM110N

ADuM130D

PO74G14A

PO74HSTL85352A

LM317L

TL1431

<https://www.analog.com/media/en/technical-documentation/data-sheets/ADuM110N.pdf>

https://www.analog.com/media/en/technical-documentation/data-sheets/ADuM130D_130E_131D_131E.pdf

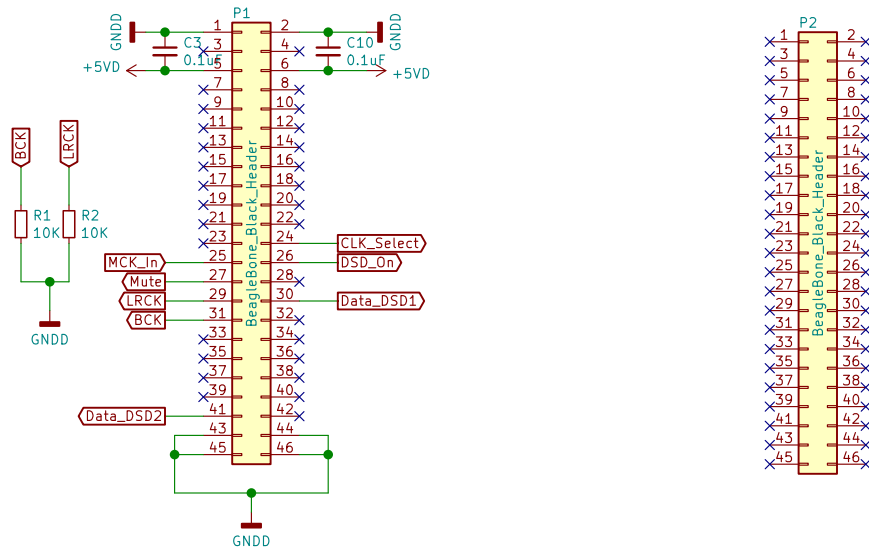
<http://www.potatosemi.com/potatosemiweb/datasheet/PO74G14A.pdf>

<http://www.potatosemi.com/potatosemiweb/datasheet/PO74HSTL85352A.pdf>

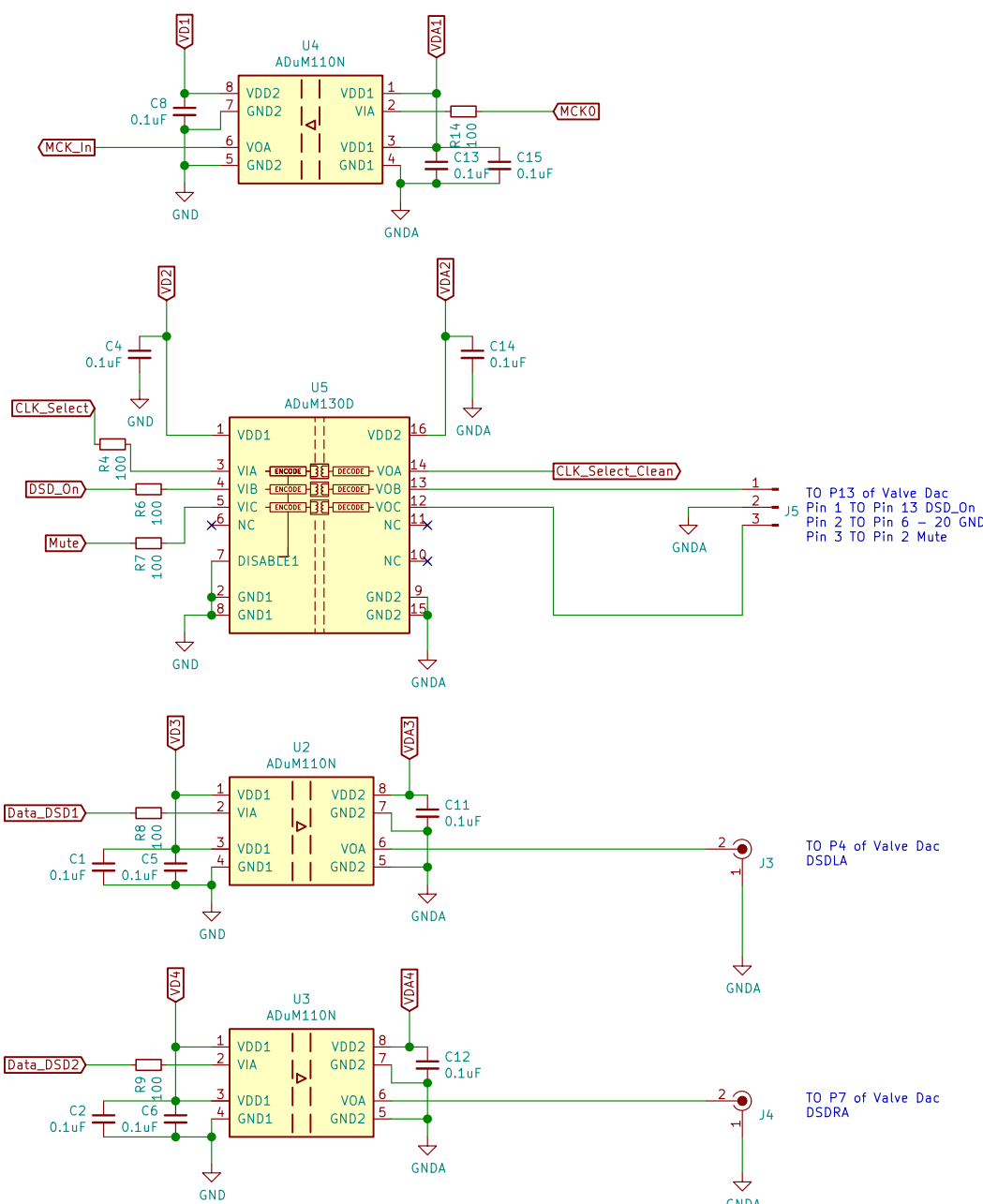
<https://www.ti.com/lit/ds/symlink/tm317l.pdf>

<https://www.ti.com/lit/ds/symlink/tl1431.pdf>

GPIO Pins Connection



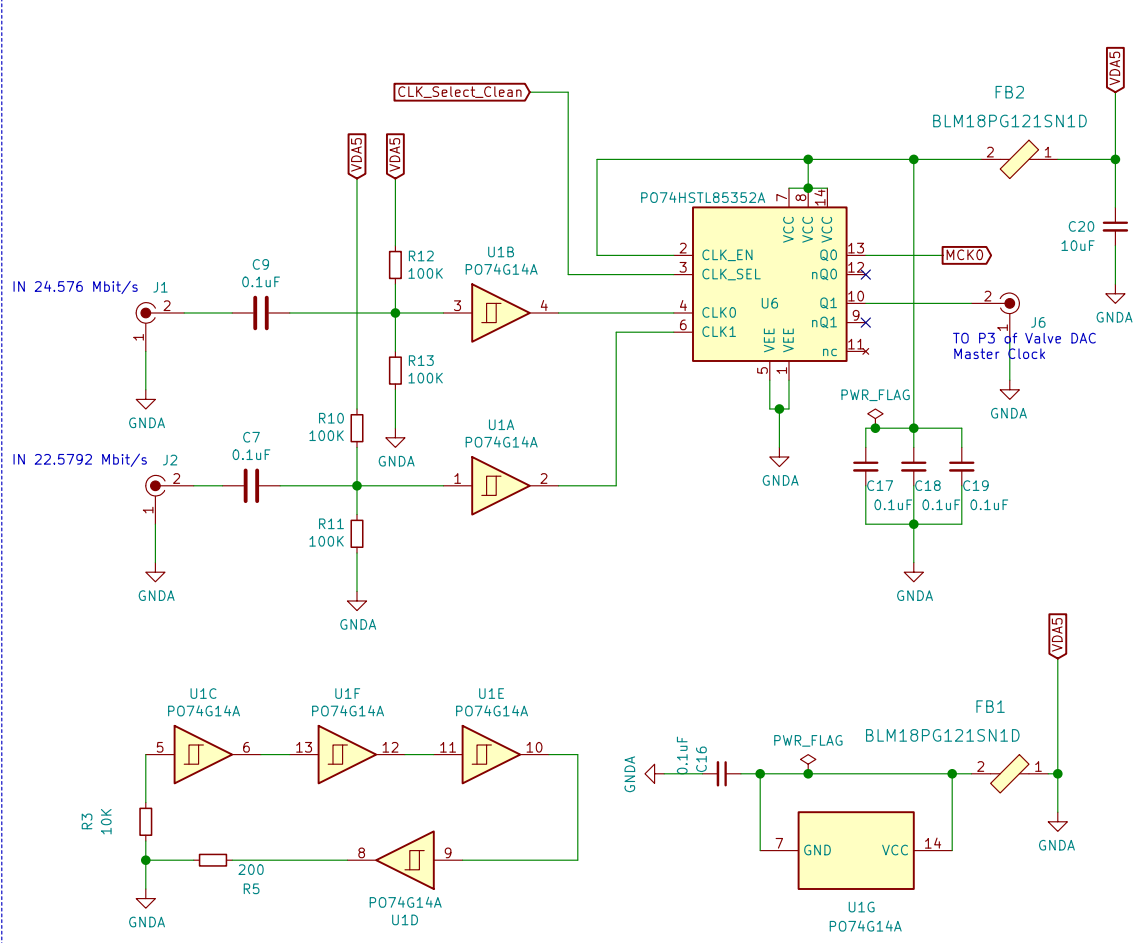
Digital Isolators – operating at 3.3v, 150 Mbps max data rate with an average 6.8 ns propagation delay



U6A and U6B of Valve DAC reclock Data_DSD1 and Data_DSD2 to the master clock. No need to duplicate effort here.

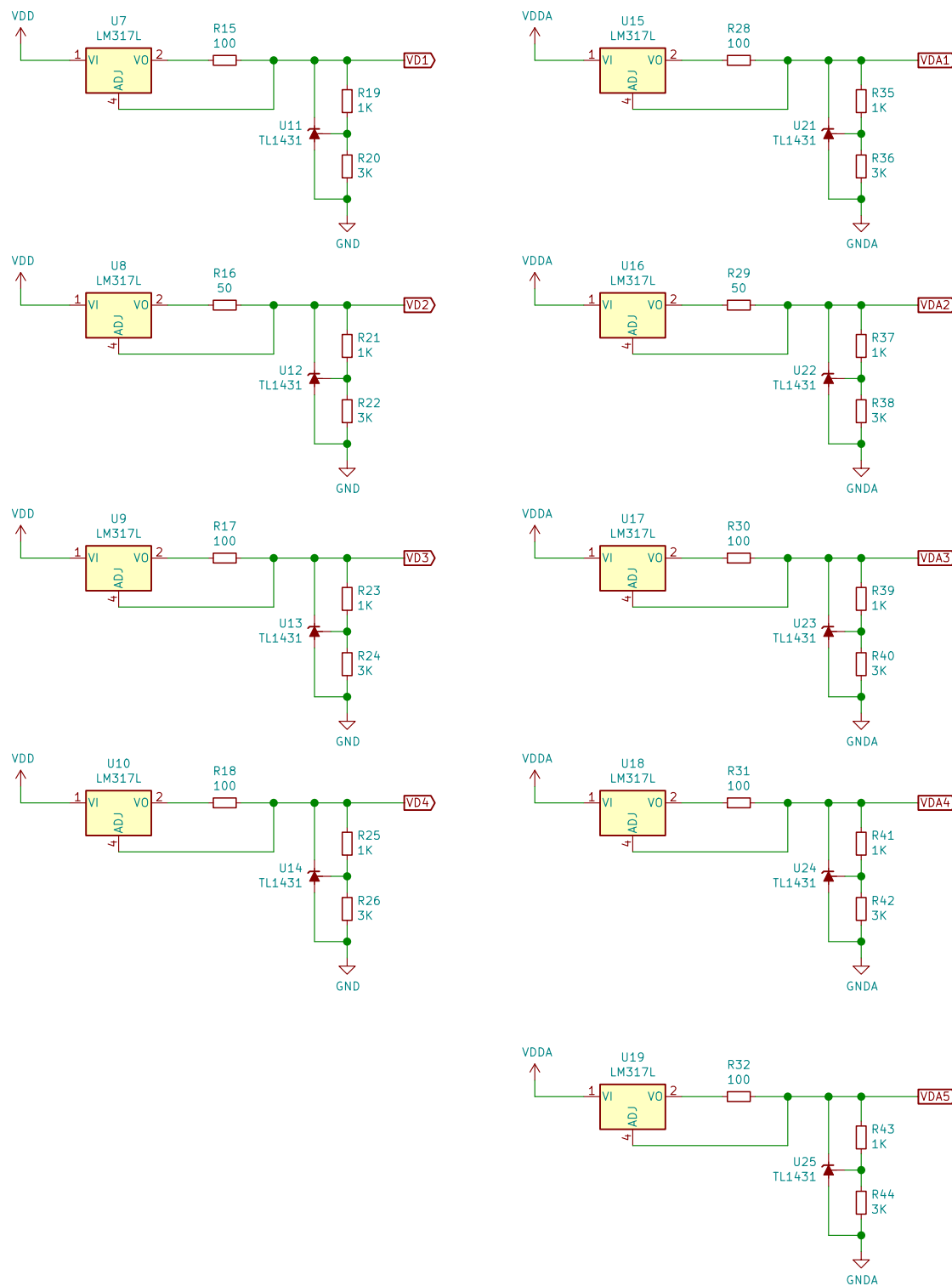
Schmitt-trigger clock inputs and clock distribution.

The idea here is to accept two external clocks: 22.5792 Mbit/s and 24.576 Mbit/s (adequate for DSD512), convert sine waves to square waves, select one, and distribute this master clock to the Valve DAC, and BBB MCK_In. LTSpice shows that it works for square waves as well.



LM317L/TL1431 CCS – Shunt Regulators

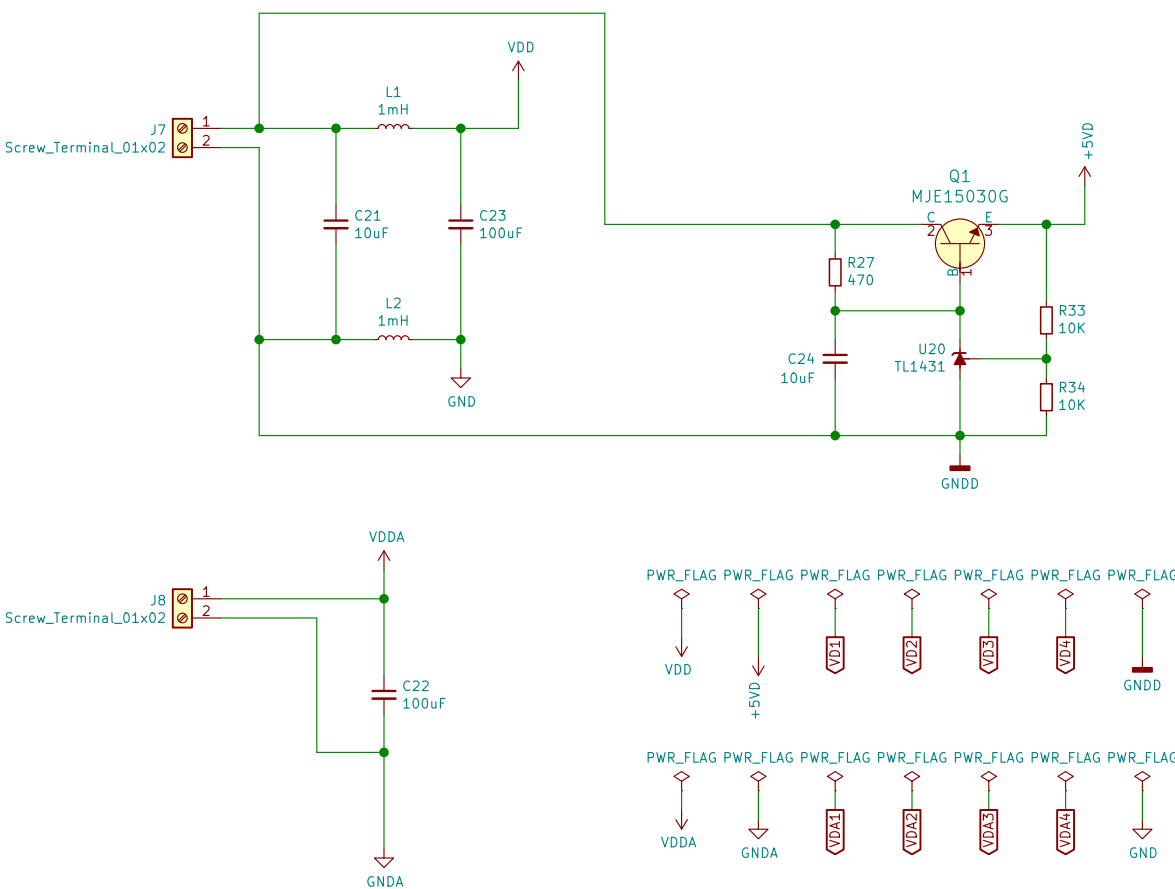
Nothing special here, just providing 3.3V outputs. Power flags VD1 – VD4 supply the dirty side of digital isolation. VDA1 – VDA5 supply the clean isolation.



Power Supply

Probably need around 7.5VDC to each of the two screw terminals. The top one supplies BBB and the dirty side of digital isolation. The lower one supplies the clean isolation. 5VDC powers BBB. There is no need to connect another power adapter to it.

CLC filter provides ground separation between BBB and dirty side of digital isolation. Those PWR_FLAGS surely are weird. But KiCad requires them and send me angry messages if I don't comply.



Connect Beagle Bone Black to Marcel van de Gevel's Valve DAC. Cut and paste great ideas from others by agent.5

See

<https://www.diyaudio.com/forums/digital-line-level/308860-valve-dac-linear-audio-volume-13-a.html>

Sheet: /

File: BeagleBone-Black-Cape.sch

Title: A B2V cape with no name yet

Size: C Date: August 26, 2020

KiCad E.D.A. kicad 5.1.4

Rev: 0.1

Id: 1/1