
IVY Linestage

User Manual

Revision 2.3



Twisted Pear Audio

Overview

The IVY is a multi-purpose output stage for both voltage and current output DACs. It performs current to voltage (I/V) conversion as well as both filtering and buffering and has both balanced (fully differential) and single ended outputs. The circuit's foundation is the THS41xx which is a fully differential operational amplifier that has excellent common mode rejection as well as distortion canceling effects.

Power Requirements

Recommended Supply Voltage	±15VDC
Current Draw	

Configuration

The IVY can be configured in the following basic modes with many variations of each mode possible. In each configuration resistors R1-4 set the gain. When changing R1-4 the corner frequency (-3db point) of the low-pass filter will also change so you may need to change capacitors to reach your desired corner frequency. The base configurations covered are as follows:

- 1) True low impedance current to voltage (I/V) conversion with an input impedance approaching zero. This is the preferred mode for “COD” and “Buffalo”.
- 2) Low impedance voltage input(hybrid) with an input impedance less than 200 ohms and filtering prior to the amplifier stages. The only DAC tested in this configuration has been the “Buffalo” (ESS Sabre 8). This is an alternate configuration which allows more aggressive analog filtering. As usual, change R1-R4 to adjust gain.
- 3) High impedance voltage input. This is the only mode to use for the “Opus” DAC module as it is a voltage output only DAC. In this mode the IVY acts as an enhanced output stage with optional analog filtering.
- 4) Balanced to single ended conversion only. In this mode the balanced I/V front end is omitted and only the section of the circuit required for balanced to single ended conversion is retained. The terminals normally used as balanced output become balanced input. This can be useful in dual mono setups.

The IVY can be configured for dual mono operation for DACs which support it. When you using the IVY in this manner it is recommended that you decrease the gain of the balanced to single ended converter by 6db because the voltage from the prior stage will be 4VRMS(+6db) at 0db in this mode. This is easily accomplished by making R13-16 half the value of R9-12. A good choice is 2K for R9-12 and 1K for R13-16.

Suggested Values

Part	Buffalo24	COD	Opus
C1-4	Omit	Omit	1nf
R17-20	Omit	Omit	Jumper
R1-4	187Ω	357Ω	2K
R5-8	Jumper	Jumper	2K
C13-16	1nf	1nf	Omit

Table 1a - Example Configurations for approximately 2VRMS output. **These values are included in the IVY Kit.**

Part	Buffalo24	COD	Opus
C1-4	<i>Omit</i>	<i>Omit</i>	470pf
R17-20	<i>Omit</i>	<i>Omit</i>	Jumper
R1-4	357Ω	720Ω	4.02K
R5-8	Jumper	Jumper	2K
C13-16	1nf	1nf	<i>Omit</i>

Table 1a - Example Configurations for approximately 4VRMS output.

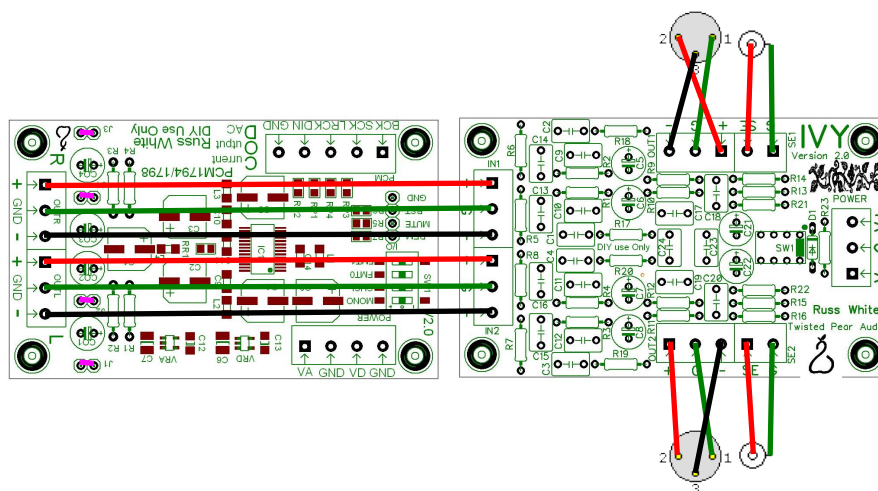
Additional Notes

Some users may wish to try different filter schemes. The filter can actually be omitted on the Opus. The WM8740 has a built in 195khz filter and the WM8741 a 474Khz filter. Some may prefer the Opus without any filtering, so you should decide if you would like to try it that way prior to soldering in the filter related caps and resistors.

The rest of the parts in the circuit generally stay the same values as those indicated on the schematic in all configurations unless you feel like need to adjust the gain of the single ended outputs.

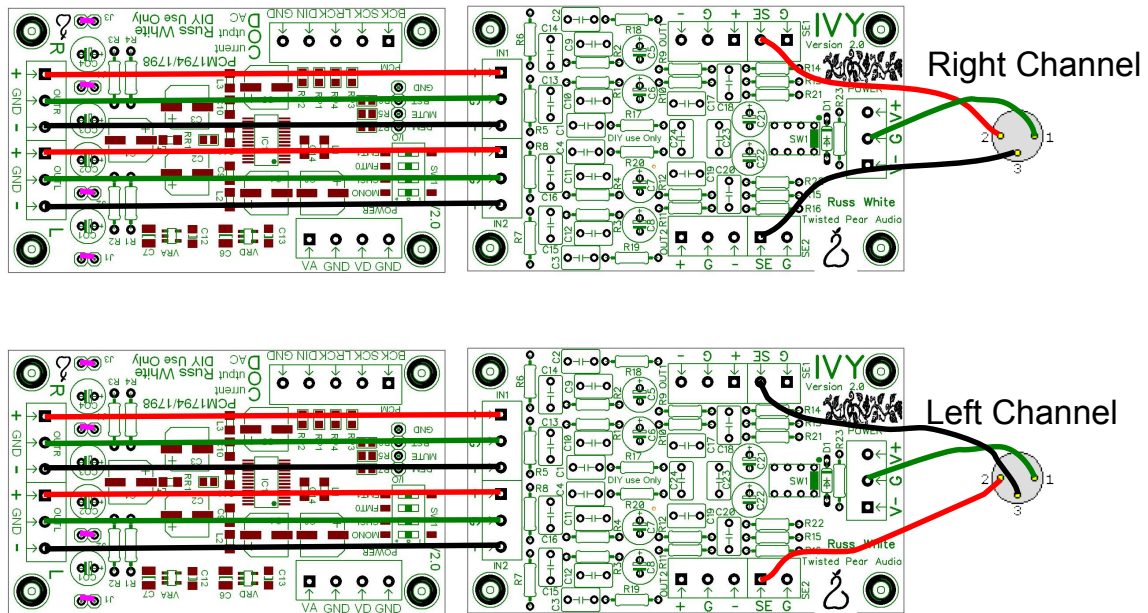
Versions of the IVY circuit prior to version 2 have slightly different reference descriptors(part names) and values. This document applies only to the version 2 boards.

COD – Stereo mode with Balanced and SE Outputs



Usually Stacked – Shown side by side for clarity.

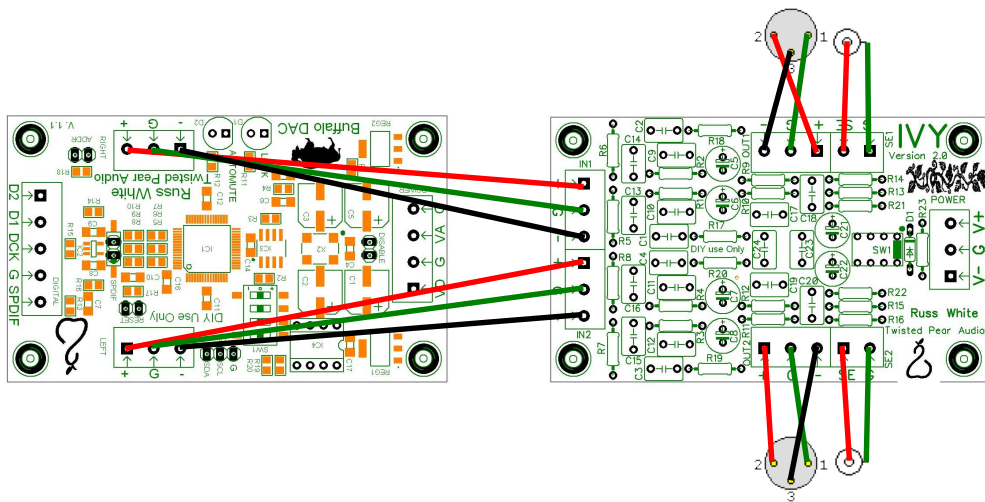
Note: J1-4 Must be in place, or CO1-4 replaced with jumpers.



Usually Stacked – Shown side by side for clarity.

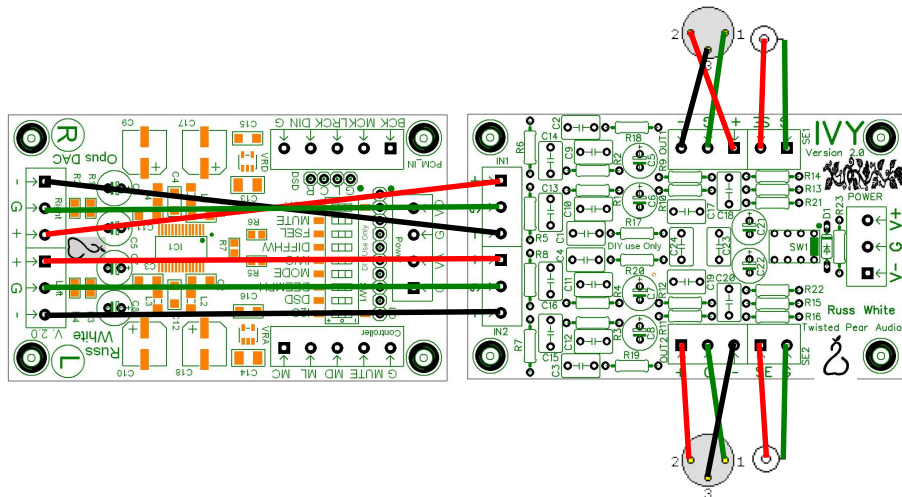
Note: J1-4 Must be in place, or CO1-4 replaced with jumpers.

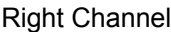
Buffalo Wiring – With Balanced and SE Outputs



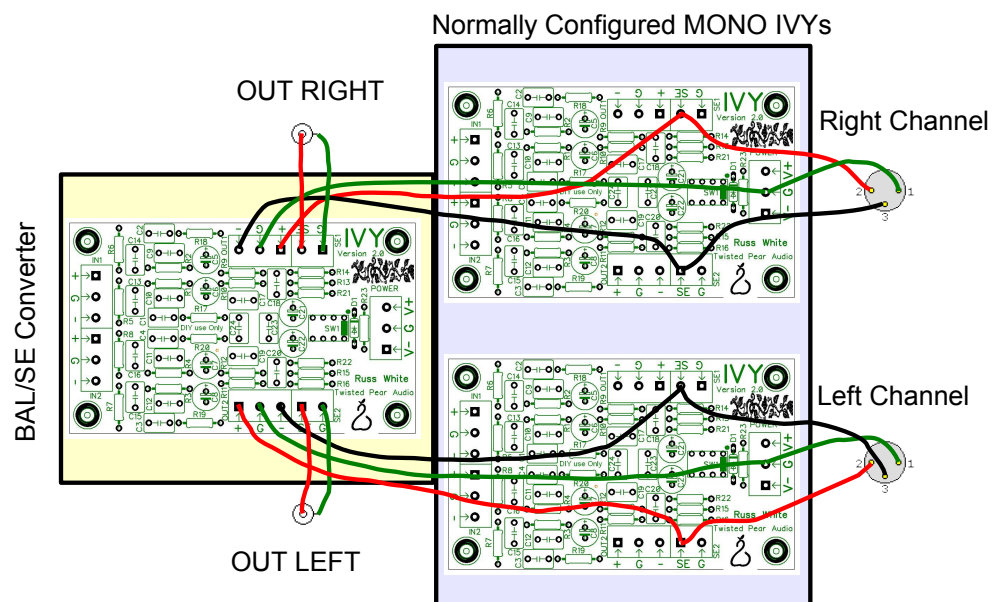
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Opus – Stereo mode with Balanced and SE Outputs





C5-8 on the Opus should be replaced with jumpers



ON BAL/SE IVY Omit the following:
R1-8, R17-20, C1-16, IC1, IC2