IVY-III DAC Output Stage

User Manual

Revision 1.0

Twisted Pear Audio

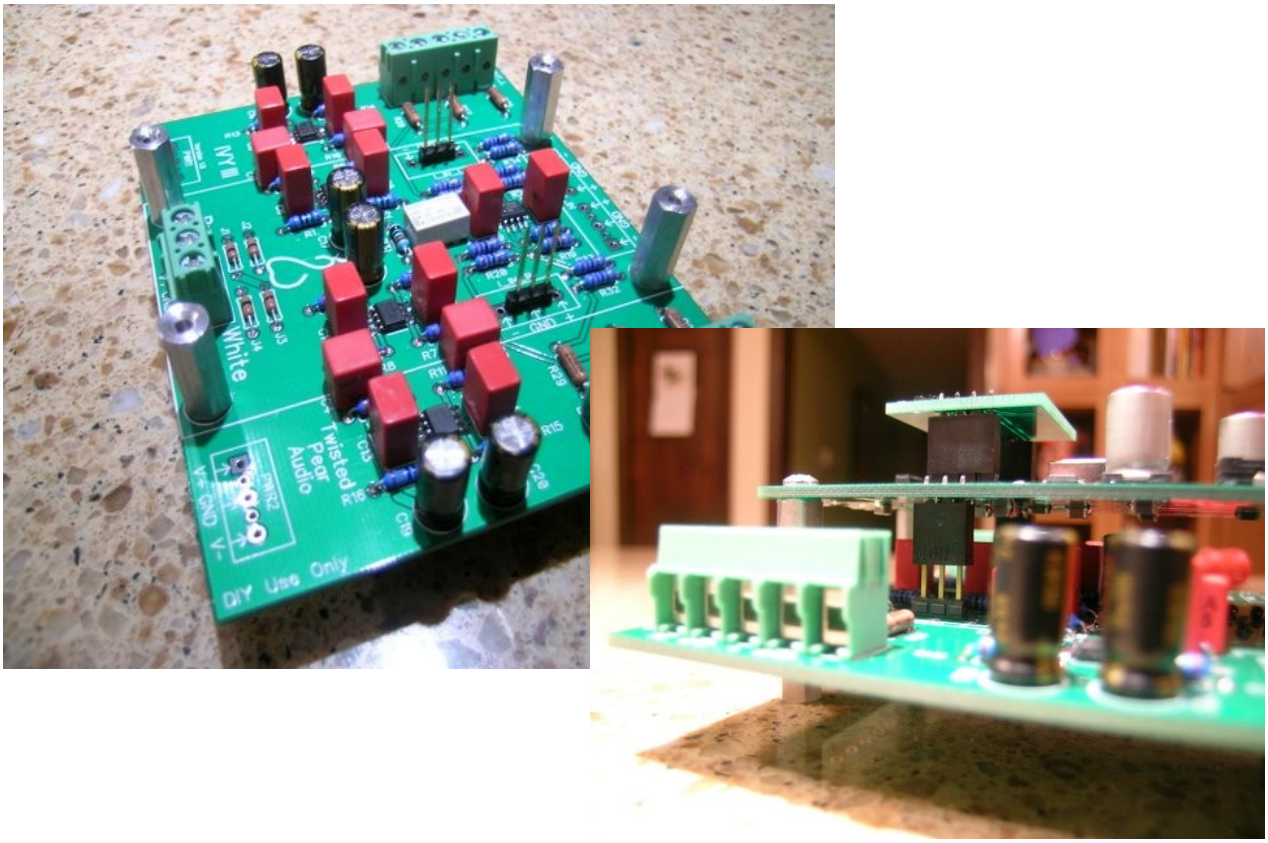
Overview

The IVY-III is a very flexible DAC output stage designed specifically for Twisted Pear modules, but flexible enough to be used with just about any balanced output audio DAC. It is design to support both voltage output DACs such as the Opus or current output DACs such as the Buffalo-I/II and COD. This manual covers configurations for Buffalo/ Buffalo-II, COD, and Opus DACs. It would be quite easy to use it with other DACs, but those are beyond the scope of this manual.

Power Supply Requirements

The power supplies should be ±12VDC to ±15VDC (±15V rails will provide the best dynamic range). Each section of the IVY can be powered independently, or a single supply can be used by installing jumpers J1-4, which is the recommended configuration. With ±15V rails, the idle current draw will be about 90mA per rail. A suitable power supply should have capacity for at least 150mA per rail.

Stacking the Buffalo II



Notice that one set of current input headers physically lines up with the Buffalo-II current output headers when the Buffalo-II is placed over the IVY-III. Stacking with the Buffalo II using male and female .1" (2.54mm) pin-headers will give you the shortest possible signal path from the DAC yielding the best results (included in the complete kit).

The images above illustrate stacking the Buffalo-II and the IVY-III. The headers and standoffs supplied with the kit are chosen to easily facilitate stacking. Notice that in this configuration the input terminal blocks should be omitted. Also notice that the image depicts a prototype board, supplied kit parts may look slightly different.

Configuration

Consult the table below for guidelines for setting up the IVY-III for the output level you desire.

Configuration	R1-R4	R13-16	R32-R35	Input Used
Buffalo I/II ~2VRMS*	750	180	n/a	I_In_R + L
Buffalo I/II ~4VRMS	750	356	n/a	I_In_R + L
COD ~2VMS	750	356	Jumper	I_In_R + L or Vin reverse phase.
COD ~4VMS	750	750	Jumper	I_In_R + L or Vin reverse phase.
Opus ~2VRMS	2.2K	750	2.2K	V_In normal phase.
Opus ~4VRMS	2.2K	1.5K	2.2K	V_In normal phase.

***Table 1** – Gain settings and inputs for TPA DACs. * - Denotes supplied kit parts. Figures are approximate,*

The kit includes resistors for 2VRMs(industry standard consumer level) output with Buffalo-I/II. Other configuration will require that you obtain resistors. We recommend you use ¼-Watt metal film resistors matched to at least 0.1% tolerance.

COD Notes:

- When stacking the COD with the IVY-III, it is easiest to use the IVY-III's voltage input terminals (V_In), rather than the current-input terminals (I_In_R, I_In_L) and use jumpers for R32-R35.
- The COD outputs denote current polarity and not voltage polarity, so when connecting them to the IVY-III's voltage input terminals, you should wire it opposite phase from what is marked on the COD.

Opus Notes:

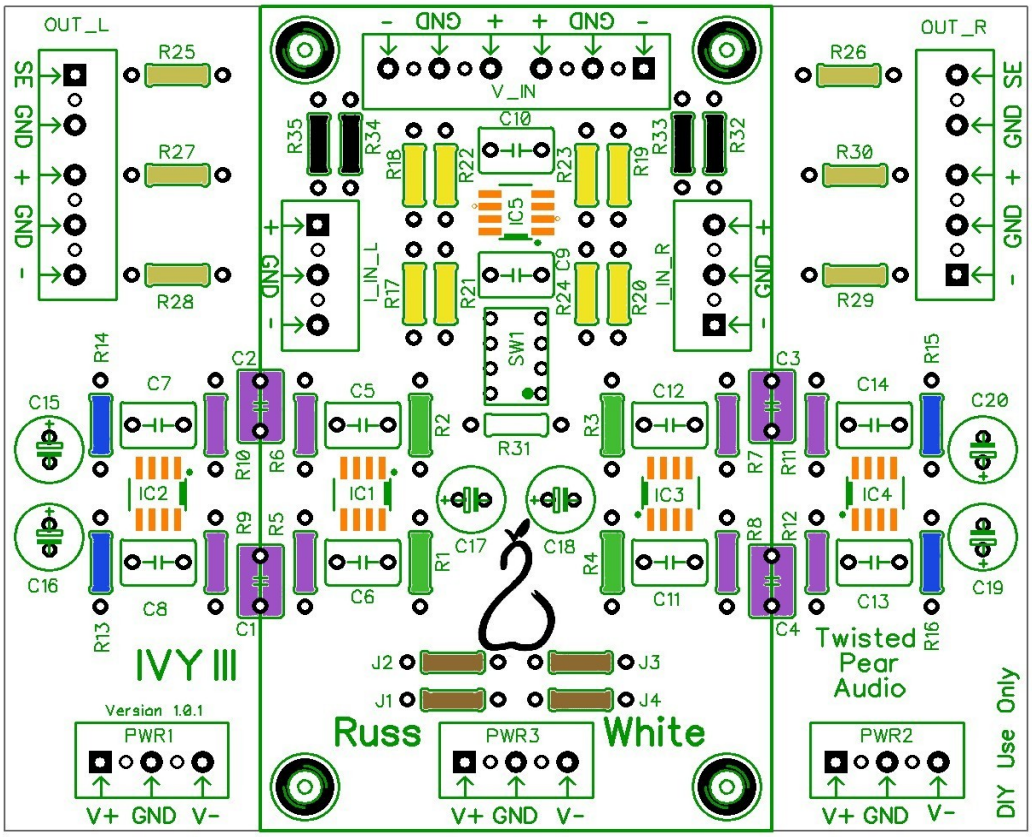
- The Opus can be connected to the voltage input terminals (V_In) only.
- The IVY-III and the Opus can stack as the Opus outputs line up with the IVY-III voltage inputs.
- The single ended output will be at the same level as the balanced output.

Driving Headphones

The IVY-III can easily drive most headphones (even down to 16Ω) when used as a balanced headphone driver along with the Volumite or similar digital volume control. The SE outputs are not capable of as much power, but can still be used for most headphones. It is recommended that if you wish to drive headphones you use jumpers for R25/R26 and/or R27-R30, which will allow for better damping factor. The OPA1632 can drive up to 150mA, giving you plenty of power for almost any headphone listening situation. It is recommended when driving power amps to always use the output resistors, especially with very capacitive cables.

Advanced Configurations

The IVY-III as provided is specifically designed to compliment the Buffalo II and our other DACs, but some users may want to adjust output levels or filter frequencies. These topics are not covered here, but the schematic is provided to facilitate adjustments. This should only be attempted by advanced users. As always feel free to ask questions. The image below shows the major functional blocks.



Legend:

Gold - Output resistors.

Green – I/V Gain resistors.

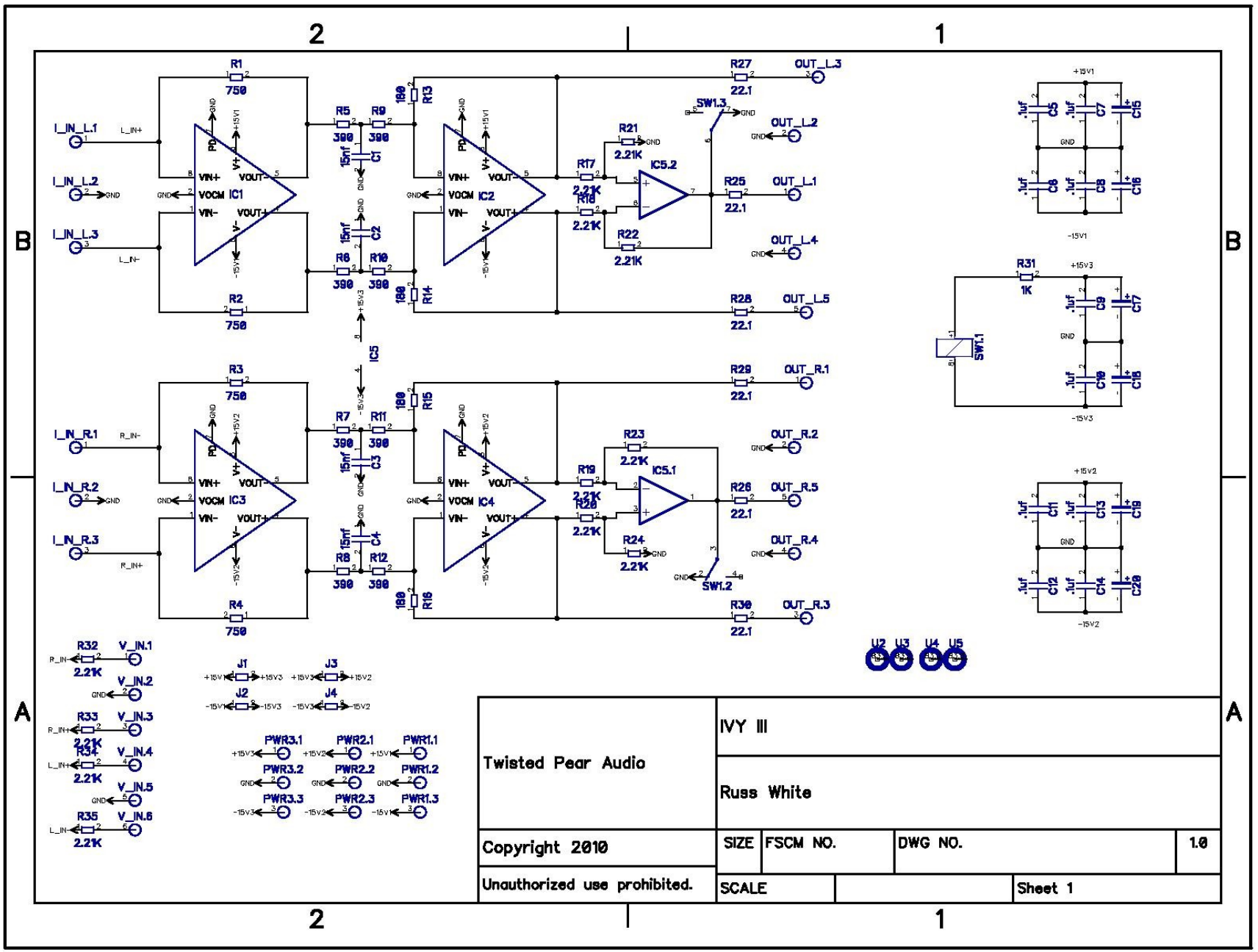
Purple – Filter components.

Blue – Second stage gain resistors

Brown – Power supply jumpers.

Yellow – Balanced to single ended conversion resistors.

Black – Voltage input resistors.


2
1
B
A
I_IN_L.1
I_IN_L.2
I_IN_L.3
I_IN_R.1
I_IN_R.2
I_IN_R.3
R1
R2
R3
R4
750
R5
R6
R7
R8
390
15nf
C1
C2
C3
C4
R9
R10
R11
R12
R13
R14
R15
R16
180
IC1
IC2
IC3
IC4
IC5
IC5.1
IC5.2
VIN+
VIN-
VOCM
VOUT+
VOUT-
R17
R18
R19
R20
R21
R22
R23
R24
2.21K
R25
R26
R27
R28
R29
R30
22.1
OUT_L.1
OUT_L.2
OUT_L.3
OUT_L.4
OUT_L.5
OUT_R.1
OUT_R.2
OUT_R.3
OUT_R.4
OUT_R.5
SW1.1
SW1.2
SW1.3
R31
1K
+15V1
-15V1
+15V2
-15V2
+15V3
-15V3
GND
.1uf
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
U2
U3
U4
U5
R32
R33
R34
R35
V_IN.1
V_IN.2
V_IN.3
V_IN.4
V_IN.5
V_IN.6
J1
J2
J3
J4
PWR3.1
PWR2.1
PWR1.1
PWR3.2
PWR2.2
PWR1.2
PWR3.3
PWR2.3
PWR1.3
Twisted Pear Audio
IVY III
Russ White
Copyright 2010
Unauthorized use prohibited.
SIZE
FSCM NO.
DWG NO.
1.0
SCALE
Sheet 1