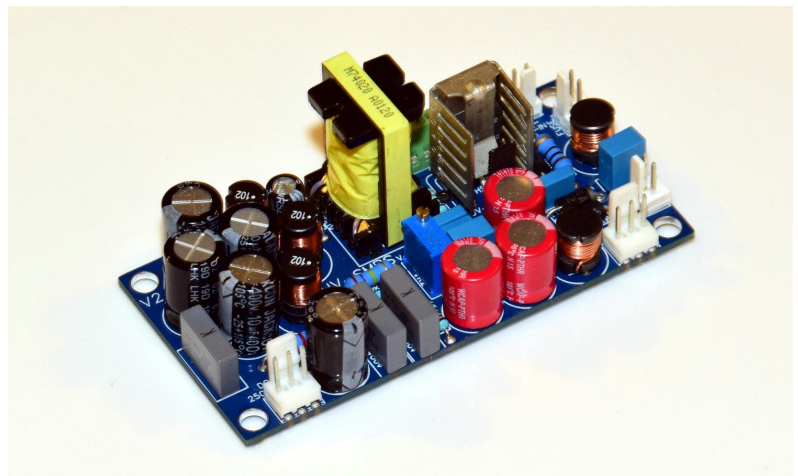


Application & Purpose:

Switch-mode Linear Regulated Power supply for providing High Voltage DC to Tube Phono and Pre-amps. Capable of 20mA at 290v. Dual voltage outputs, typically 290v and 250v - can be adjusted

Output current up to 20mA.
Sufficient to power one phono amp or one pre amp.



WARNING: Very high DC voltage device. Care must be taken to avoid painful electric shock.

Specification:

PCB Dimensions	87mm x 42mm x 1.6mm
Voltage Input	18v DC - wall-wart type supply min 2.5A
Transformer Required	10-20W Myrra 74010, 74020 or 74014
Max Output Current	20mA
Output Device	10-20W Flyback Transformer (Myrra)
Ripple	< 1mv
Hash	10-20mv - depending on load
Output Voltage	290v and 250v - adjustable
Switching Frequency	140kHz

Details:

Power supply for running ZinAmp Class-A Tube Phono or Pre-Amplifiers. Switch-mode ‘flyback’ type, with very low levels of ripple and hash. 50-60Hz ripple is barely measurable and some minimal hash is measurable above 120KHz and is less than 50mV. This can be considered a ‘quiet’ switch mode supply.

PCB has terminals for power switch, a barrel fuse and a 18v DC output for connecting a 12v regulated supply for powering tube filaments. This is a relatively straightforward module to build, but the very high DC output voltages mean extreme care must be taken during testing and connection. Whilst low current, it is unlikely to kill, but a 280vDC shock will be painful and debilitating!

Power Requirements - IMPORTANT

Generating high voltages using flyback creates heat and some noise!! This circuit has provisions to filter the noise and dissipate most of this heat, but the more power you try to draw, the more noise and heat you will generate. To minimise heat and noise issues, please choose a configuration:

Current	Flyback Transformer	Mosfet Heatsink	Peak Primary Voltage	Dual Primaries	Primary Inductance
10-12mA	Myrra 74010/20	No	40-45v	No	25-35uH
15-20mA	Myrra 74014	Yes	60-65v	Yes	90uH

Note: The Myrra 74014 flyback transformer operates with a higher primary voltage due to it's windings having a higher inductance. It also has dual primaries to increase efficiency. The peak primary voltage is higher which causes the mosfet switching device to heat up. The PCB has provision for a heatsink when using this configuration. You will also need to solder a wire link across the terminals marked Dual_Primaries.

Boosting voltage with Flyback Transformers:

In order to boost voltage, the flyback transformer is being used in reverse. This means the secondary winding(s) of the transformer are being used as the primary. When we mention the primary windings in the table above, we really mean the secondaries of the flyback transformer as referred to in the manufacturer's [datasheet](#).

Outputs and Voltages:

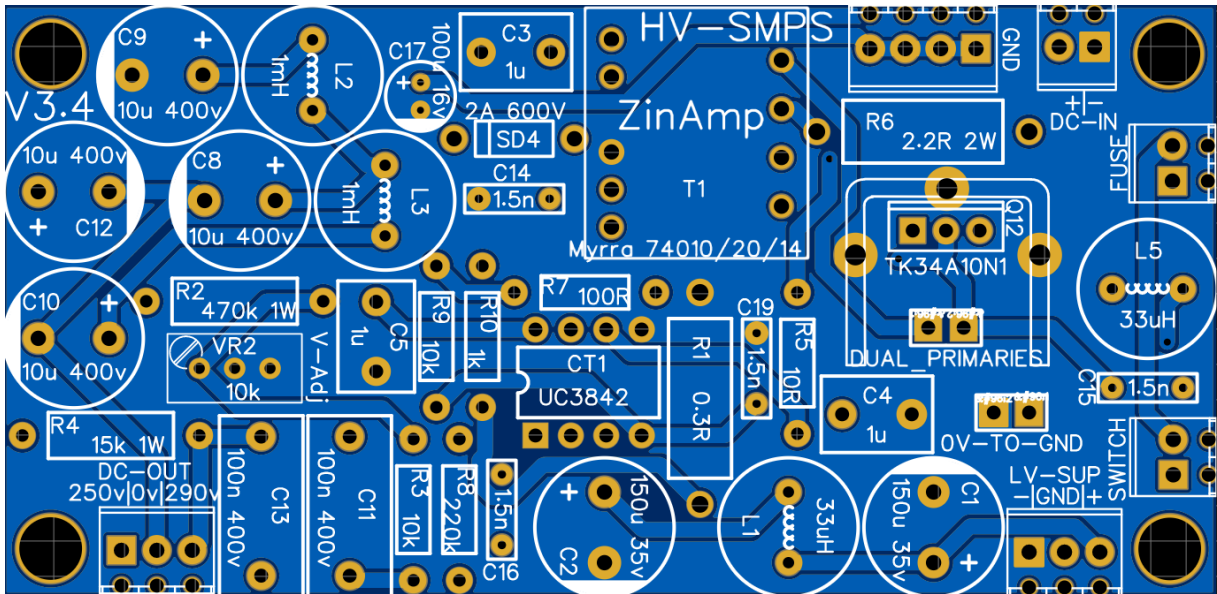
- Phono Amp - (250v and 290v DC)
- Pre-amp (270v and 290vDC) - requires modification
- note: only one of these modules can be powered at a time - not both

This supply can run in two modes - split rail and single rail - these are explained below

Safety:

WARNING: Very high DC voltage device. Care must be taken to avoid painful electric shock.

Bare PCB:



Operating Mode - Split Rail or Single Rail

The supply can be run in either split rail, mode or in single rail mode.

A pair of jumper terminals marked 0V-TO-GND can be jumpered to run the supply in Single-rail mode. Removing these jumpers will cause the rails to float in Split-rail mode. Only run in Split-rail mode if using a 12.6v Split-rail regulated supply running a ZinAmp Moving Coil Head Amp. No MC Head Amp, then run Single-rail.

Split Rail: for running a ZinAmp Valve Phono Stage with a Moving Coil Head Amp:

With a ZinAmp Valve Phono Stage coupled with a Moving Coil head amp, the head amp runs at $-/+6v$. This means the negative rail of the SMPS needs to sit at $-6v$. The positive rail will be at $+290v$ giving a rail-to-rail voltage of $296v$. To run in split rail mode, leave the terminals marked 0V-TO-GND disconnected.

Single Rail: for running a ZinAmp Valve Phono Stage without a Moving Coil Head Amp:

By jumpering (connecting) the terminals marked 0V-TO-GND, the negative rail of the supply is held to ground. This configuration is preferred if you are not using a moving coil head amp and don't require a negative rail voltage. Leaving the rails to float whilst not connected to the 12.6v supply is not-advised and may damage the output filter capacitors.

-----IF IN DOUBT - CONNECT THE TWO PINS MARKED 0V-TO-GND TOGETHER-----

Parts List:

Designator	Value/Spec	Qty	Manufacturer	Manufacturer Part	Supplier Part
0V-TO-GND	Jumper	1	RS Pro	251-8086	251-8086
C5	220n	1	Kemet	R82DC3220DQ60J	312-1475
C4,C6	1u	2	Epcos	B32529C0105J000	896-1304
C1,C2,C7	150u 35v	3	Worth	870055675010	839-2344
C11,C13,C14	100n 400v	3	Kemet	R46KF310040P1M	126-2250
C3,C15	1n	2	Wima	FKP2/1000/100/5	484-2038
C8,C9,C10,C12,C16	10u 400v	5	Kemet	R463F210040N0M	126-2227
C17	100u 16v	1	Rubycon	16PK100MEFC5X11	763-9396
DC-IN,FUSE,SWITCH	- +	1	RS-PRO	790-1098	790-1098
DC-OUT,LV-SUP	250v 0v 290v	1	RS-PRO	790-1092	790-1092
GND	0v	1	RS-PRO	790-1102	790-1102
HS1	AAVID_7141DG	1	Avid	7141DG	712-4239
L2,L3,L4	1mH	3	Bournes	RLB9012-102KL	736-1217
L1,L5	33uH	2	Würth	7447471330	749-8375
R1	3.3k	1	TE Connectivity	LR1F3K3	125-1162
R2	270k 1W	1	Vishay	R01000102703JA100	683-5470
R3	10k	1	TE Connectivity	LR1F10K	125-1164
R4	22k 1W	1	TEConnectivity	ROX1SJ22K	214-1311
R5	1k	1	Vishay	MRS25000C1001FCT00	683-3165
R6	22R 1W	1	TE Connectivity	ROX1SJ22R	14-0920
SD3	2A 600V	2	ST	STTH2R06	795-8486
T1	Myrra 74010/20	1	Myrra	74010	418-5515
TVS1,TVS2	P6KE24A	2	ST	P6KE24A	485-9294
U1	LT1170CT#PBF or LT1171CT#PBF	1	Analog Devices	LT1170CT#PBF or LT1171CT#PBF	545-5001 or 545-4991
VR2	1k	1	Bournes	PV36W102C01B00	181-4455

CONNECTORS: Both blank and ready-built PCB requires connectors be purchased and soldered on by the constructor. This is to give the constructor a choice of how they wire their own particular installation. Terminal block connectors are indicated in the list below in [blue](#) and can be swapped for equivalent 2.54mm pitch connectors e.g. Molex KK254 headers, which are provided to the constructor in self-wire kits.

Parts available from [RS Online](#). Also try [Farnell](#), [Mouser](#) and other online suppliers.

Parts from different manufacturers can be substituted where spec is sufficient