



**SMPS Charge pump power supply for 12ax7 and similar preamp tubes and Nixie tubes.**

Documentation Version 1.1 , 2/23/2019, if you have questions, contact mark@frogpedals.com

NE555 chip running at 32khz

Recommended input 9-12 VDC

Output: Regulated 6 VDC ( with LM7806 ) for vacuum tube heaters, rated at 1.5amps (1.2 max recommended)

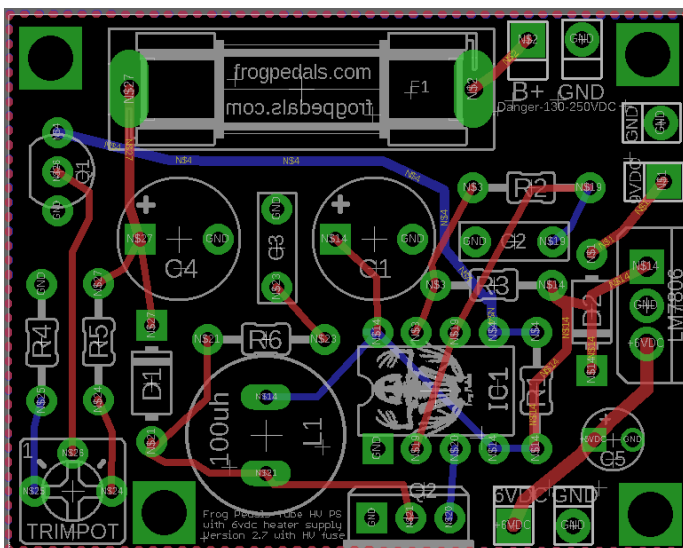
Output: 200-275 VDC (210-250 recommended) Rated at up to 20ma (the more load as you approach 15-20ma, the lower the maximum voltage may be)

**Reminder: This voltage is no joke, and improper handling of the circuit can at the least knock you on your butt, and at worst COULD KILL YOU. Always test the B+ test point and a ground pad (standoff plated holes) with a volt/ohm meter for low/no voltage before handling! NEVER use both hands to touch a working High Voltage SMPS. Connect a ground lead with one hand and a clip and then with only one hand, test the high voltage at the B+ test point.**

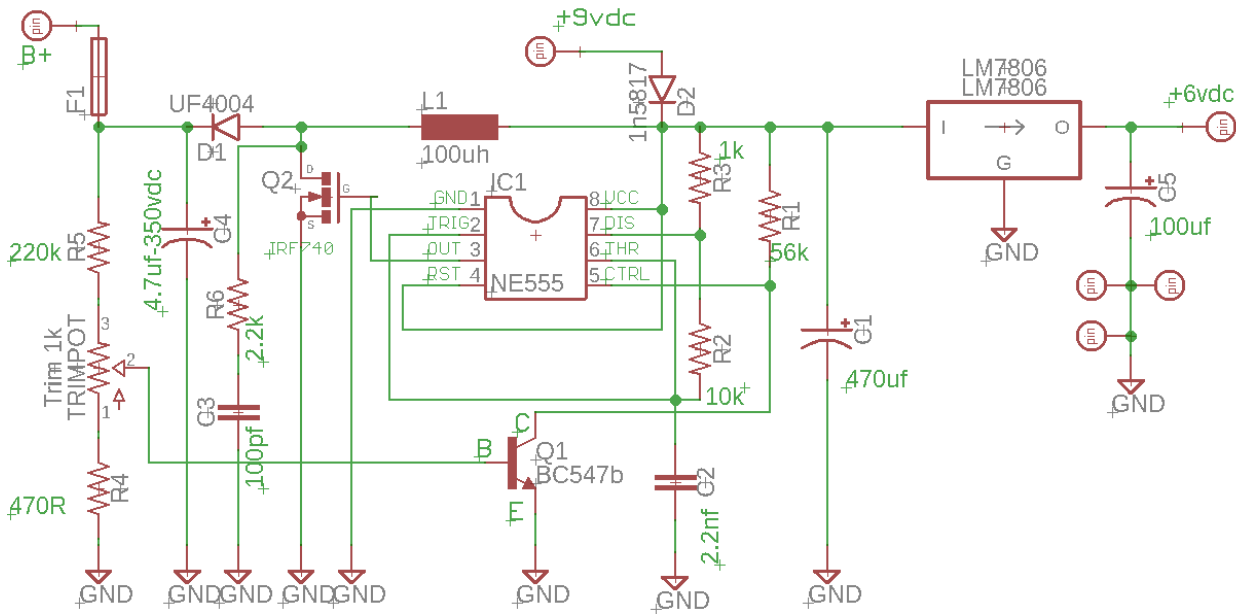
Assembly instructions:

I install all of the resistors and diodes first, 8 pin socket, then small capacitors, electrolytic caps and the inductor, trimpot, then LM7806 and IRF740, BC547, last the fuse. Remember, the fuse is optional. Install an insulated wire across the two fuse solder pads if you don't want to use a fuse. The four big pads near the corners with holes are to install board standoffs and are grounded. The 6VDC and ground connector are for your heater circuit and the B+ is the ~200VDC high voltage for your preamp tube. You only need to install one ground lead for both the 6VDC and 200VDC to your target board.

PCB Layout:



Schematic:



Recommended parts (or you can use any equivalent part available):

Mouser #	Mfr. #	Manufacturer	Component Number	Quan	Description
512-BC547BTA	BC547BTA	ON Semiconductor	Q1	1	Bipolar Transistors - BJT NPN 45V 100mA HFE/450
844-IRF740PBF	IRF740PBF	Vishay	Q2	1	MOSFET N-Chan 400V 10 Amp
595-NE555P	NE555P	Texas Instruments	IC1	1	Timers & Support Products Precision
8 position IC Socket	575-11041308410010	Mill-Max	Socket for IC1	1	8-pin IC Socket
512-UF4004	UF4004	ON Semiconductor	D1	1	Rectifiers

					1A 400V
667-ECA-1EHG471	ECA-1EHG471	Panasonic	C1	1	Aluminum Electrolytic Capacitors - Radial Leaded 470uF 25V
598-107CKSO35M	107CKSO35M	Cornell Dubilier	C5	1	Aluminum Electrolytic Capacitors - Radial Leaded 100uF 35V 20%
580-13R104C	13R104C	Murata	L1	1	Fixed Inductors Ind 100uH 1A Radial Leads
511-L7806CV-DG	L7806CV-DG	STMicroelectronics	LM7806	1	Linear Voltage Regulators Pos V Reg Dual Guage 1.5A 35V to 40V DC
603-MFR-25FRF5210K	MFR-25FRF52-10K	Yageo	R2	1	Metal Film Resistors - Through Hole 10K ohm 1/4W 1%
80-MMK5222J250J1TA18	MMK5222J250J01L1 6.5TA18	KEMET	C2	1	Film Capacitors 250volts 2200pF 5% LS 5mm
512-1N5817	1N5817	ON Semiconductor	D2	1	Schottky Diodes & Rectifiers Vr/20V Io/1A T/R
652-3362P-1-102LF	3362P-1-102LF	Bourns	Trimmer	1	Trimmer Resistors - Through Hole 1/4"SQ 1KOHMS 10% 0.5WATTS
647-UPW2V4R7MPD	UPW2V4R7MPD	Nichicon	C4	1	Aluminum Electrolytic Capacitors -

					Radial Leaded 350volts 4.7uF 10x20 20% 5LS
603-MFR-25FRF521K	MFR-25FRF52-1K	Yageo	R3	1	Metal Film Resistors - Through Hole 1K ohm 1/4W 1%
603-MFR-25FRF52-470R	MFR-25FRF52-470R	Yageo	R4	1	Metal Film Resistors - Through Hole 470 OHM 1/4W 1%
603-MFR-25FTE52-2K2	MFR-25FTE52-2K2	Yageo	R6	1	Metal Film Resistors - Through Hole 2.2K OHM 1/4W 1%
603-MFR-25FRF52-56K	MFR-25FRF52-56K	Yageo	R1	1	Metal Film Resistors - Through Hole 56K OHM 1/4W 1%
603-MFR-25FBF52-220K	MFR-25FBF52-220K	Yageo	R5	1	Metal Film Resistors - Through Hole 220K OHM 1/4W 1%
810-FG28C0G2E101JNT6	FG28C0G2E101JNT06	TDK	C3	1	Film Capacitors 100 pF 630 VDC 10%
576-64600001003	64600001003	Littlefuse	Fuse Holder	1	Fuse Holder
576-64800001009	64800001009	Littlefuse	Fuse Holder Cover	1	Fuse Holder Cover
576-215.200XP	215.200XP	Littlefuse	Fuse	1	.2 amp fuse recommen ded. Fuse and holder is optional. If not desired,

					then solder an insulated wire between two fuse holder contact points
small heatsink for LM7806 and IRF740PBF	567-274-3AB	Wakefield-Vette	Heat Sink	2	Note: 1rf740PBF needs to be insulated from ground. LM7806 can be mounted to enclosure for heatsink and is ok to connect to ground. Look up heat sink insulator kit TO-3