

1. Head Warning

This circuit generates high voltage! Do never operate it before it is mounted in a closed ventilated housing. Do never operate it if you have no skills in electronics. If you build a electronic device with it, you must take care of all the valid terms and laws. I disclaim any responsibility for injury as a result of using this circuit. All risks and damages, incidental or otherwise, arising from the use or misuse of this circuit are entirely the responsibility of the user.

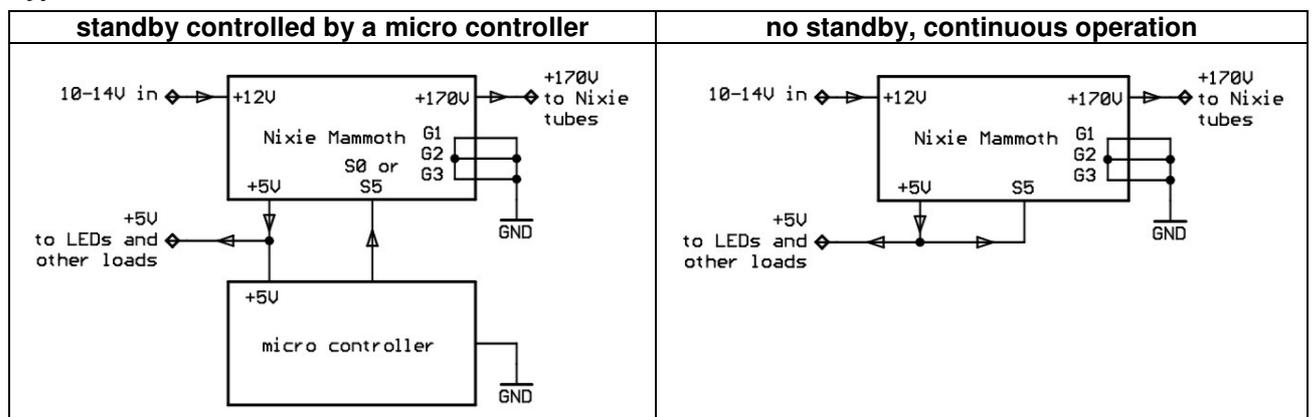
2. Application of the Nixie Mammoth

The Nixie Mammoth is a high efficient push-pull power supply designed for Nixie clocks with LED floor lighting. It delivers 2 fixed, regulated voltages: 170 V DC for the Nixie tubes and 5V DC for the LEDs, micro controller, GPS and other 5V loads. It is **ideal for driving 6 large Nixie tubes like IN-18** at rated current with LED floor lighting but can also be used for smaller tubes or clocks. It has 2 shutdown inputs (active high and active low) for the 170V output. The shutdown inputs do not influence the 5V output. No outer bypass capacitors or filters are required.

3. Specifications

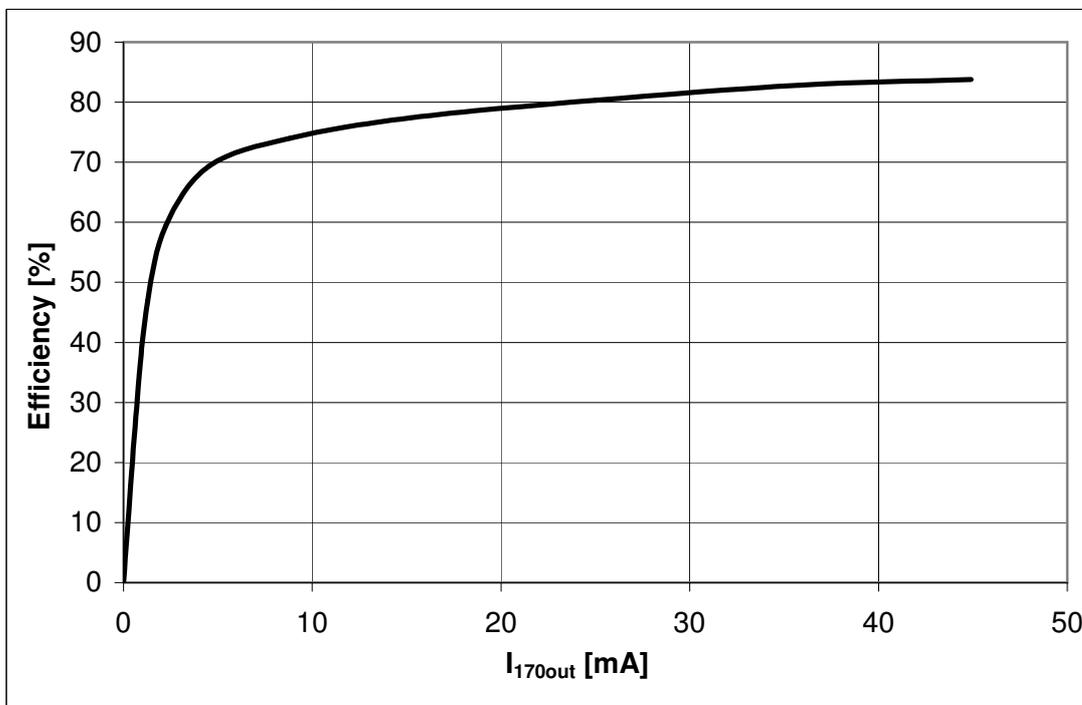
		Min	Typ	Max	Unit	Notes
Input voltage	V_{in}	-0.3		14	V	absolute maximum ratings
		10	12	14	V	$0 < I_{170out} < 36mA$
			12	14	V	$0 < I_{170out} < 45mA$
Quiescent current	$I_{quiescent}$	3.5	4	4.5	mA	at $V_{in} = 12V$, both shutdown inputs open, 5V output open
No 170V load current	$I_{no\ load}$	37	42	47	mA	at $V_{in} = 12V$, 170 V supply active, 5V output open, 170 V output open
Output current (170V output)	I_{170out}	0		45	mA	at $V_{in} = 12V$
Output voltage (170V output)	V_{170out}	167	170	172	V	
Output power (170V output)	P_{170out}	0		7.65	W	at $V_{in} = 12V$, $-20C < T_{amb} < 60^{\circ}C$
Output current (5V output)	I_{5out}	0		0.8	A	short time maximum current is 1A
Output voltage (5V output)	V_{5out}	4.95	5	5.02	V	
Output power (5V output)	P_{5out}	0		4	W	
S5 shutdown input ON voltage	$V_{S5\ ON}$	>0.8	5	20	V	If you connect S5 to +5V, the 170V output remains on all the time
S5 shutdown input OFF voltage	$V_{S5\ OFF}$	-20	0	<0.5	V	
S0 shutdown input ON voltage	$V_{S0\ ON}$		0	<4	V	If you connect S0 to GND, the 170V output remains on all the time
S0 shutdown input OFF voltage	$V_{S0\ OFF}$	>4.5	5	20	V	

4. Typical connections



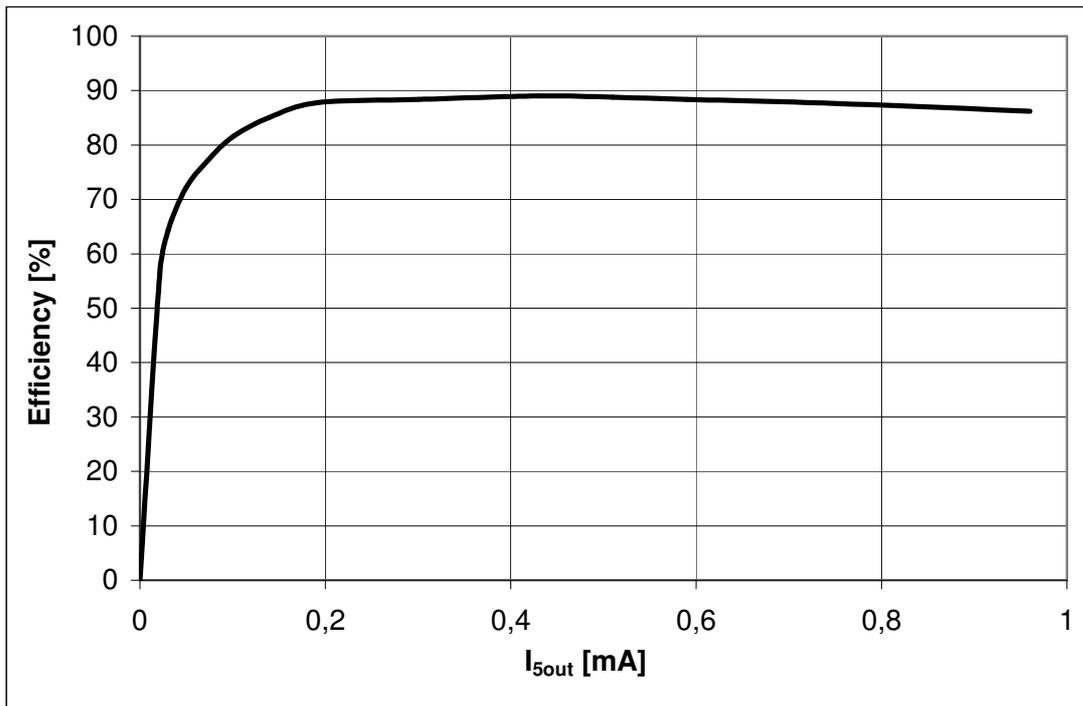
5. Pin description and circuit protections

Pin	Pin Description
G1, G2, G3	GND connection of the circuit. All 3 are internally connected.
+12V	Power input of the circuit. Connect the power source here. This input is protected against overvoltage (>14V), reverse voltage (< -0,5V) and over current (>1.25A) by an internal fuse. You don't need any external bypass capacitors , safety diodes or fuses.
+5V	+5V output of the circuit. Connect the LEDES for the floor lighting and all other 5V loads here. This output is fully short circuit protected.
+170V	+170V output of the circuit. Connect the Nixie tubes (and colon tubes) here. This output is short circuit protected for switching components, however the secondary of the power transformer is stacked on top of the input voltage such that a short circuit will allow current to flow and the fuse to blow.
S5	Shutdown input for 170V output. Do never use S5 and S0 together. Always only use whether S5 or S0 and leave the other one open. If >0.8V (typically 5V) is applied to this input, the 170V output switches on. If <0.5V (typically 0V) is applied to this input, the 170V output switches off.
S0	Shutdown input for 170V output. Do never use S5 and S0 together. Always only use whether S5 or S0 and leave the other one open. If <4V (typically 0V) is applied to this input, the 170V output switches on. If >4.5V (typically 5V) is applied to this input, the 170V output switches off.

6. Efficiency of the 170V supply @ $V_{in}=12V$ 

The 170V circuit is designed for a high efficiency over a wide output power range.

7. Efficiency of the 5V supply @ $V_{in}=12V$



The 5V circuit is also designed for a high efficiency over a wide output power range.

8. Pinout and outline

