

# SL441C

## ZERO VOLTAGE SWITCH

The SL441C is a symmetrical burst control integrated circuit in an 8 pin DIL package. When used with a triac, AC power may be regulated by varying the number of mains cycles applied to the load in a fixed timing period. The device is especially suited to room temperature control applications including panel heaters, fan heaters etc. Zero Voltage Switching has the advantage of minimising radio frequency interference.

### FEATURES

- Balanced zero voltage point crossing detector, spike filter and pulse generator for reliable triggering of the triac.
- A period pulse generator and bistable which are arranged to provide symmetrical burst control and eliminate 1/2 wave firing. (EN50.006 BS5406,1976)
- A ramp generator whose output is used to modify an internal reference voltage which is then compared with the voltage appearing on the thermistor to form a proportional control system. The period of the ramp generator is defined externally and may be chosen to limit 'lamp flicker' in accordance with EN50.006/BS5406, 1976.

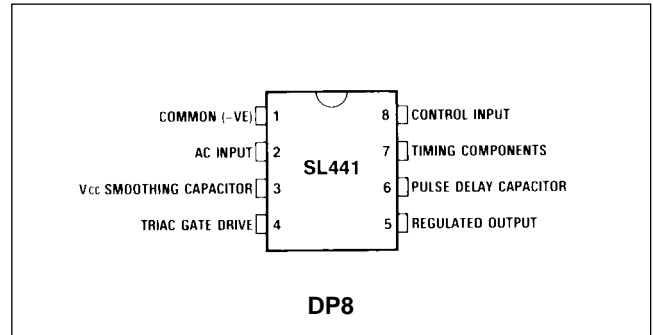


Fig.1 Pin Connections (top view)

- The comparison amplifier has inbuilt hysteresis to eliminate switching jitter and a spike filter/sampling circuit to provide high immunity to both spikes and coherent 50Hz/60Hz.
- Thermistor malfunction may be sensed and power automatically removed.
- A supply voltage sensing circuit which inhibits firing pulses when the supply is inadequate to guarantee proper circuit operation. This eliminates stressing of the triac at switch-on.

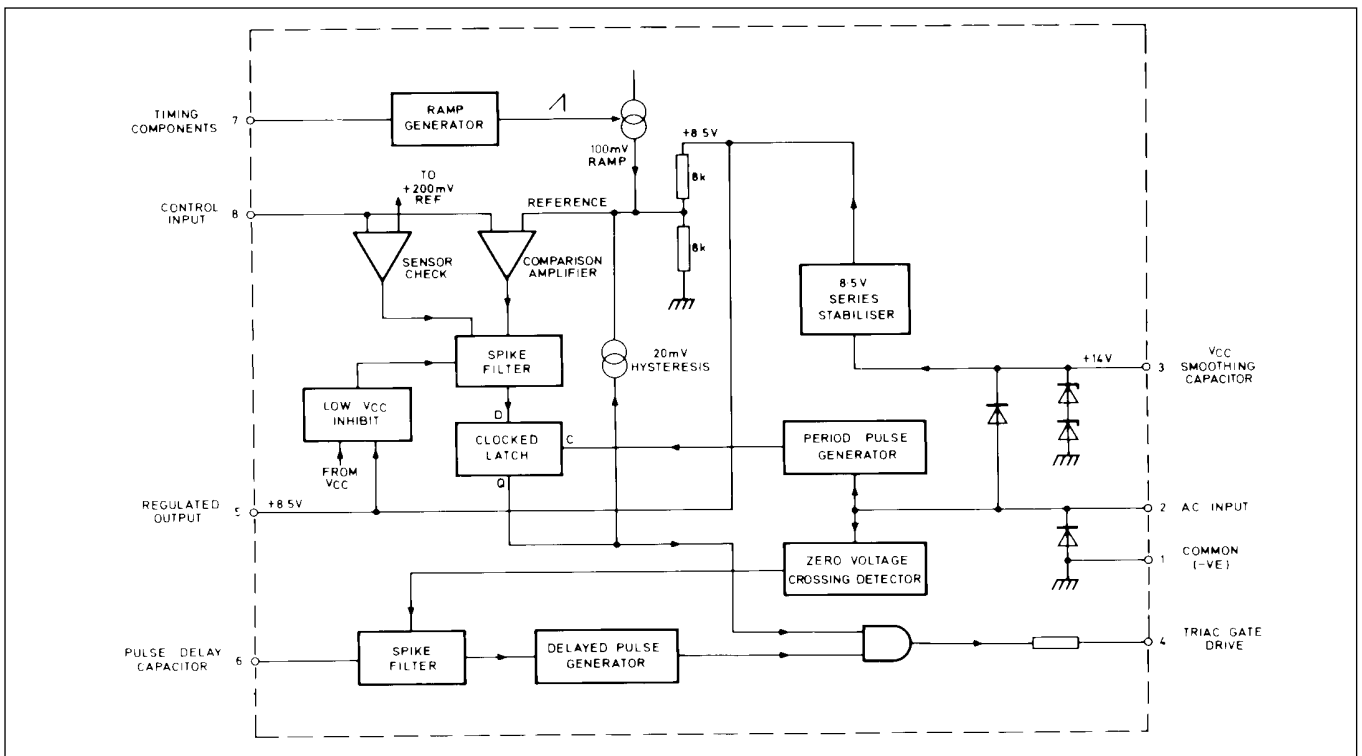


Fig. 2 Block Schematic of SL441C

## SL441C

### ELECTRICAL CHARACTERISTICS

These Characteristics are guaranteed at the following temperatures (unless otherwise stated).

$$T_{amb} = +25^{\circ}\text{C}$$

All voltages measured with respect to common (pin 1)

Characteristics	Min	Typ	Max	Units
Shunt regulating voltage pin 3 @ 16mA		14.7		V
Shunt regulating voltage pin 3 @ 16mA @ 75°C			16	V
Supply voltage trip level pin 3		12.2		V
Supply current (less $I_{4AV}$ , $I_5$ ) (see Note 1)			7.5	mA
Regulated voltage pin 5	8.0	8.5	9.0	V
Regulated voltage temperature coefficient pin 5	-1		+1	mV/°C
<b>Triac gate drive pin 4</b> (see Note 2)				
Open circuit ON voltage		8.5		V
Open circuit OFF voltage			0.1	V
Output current into 2V drain	100	130		mA
Output current into 4V drain	65	80		mA
Output current into short circuit			200	mA
Internal drain resistance		800		
<b>Control input pin 8</b>				
Bias current			1	μA
Hysteresis		20		mV
Sensor malfunction circuit operates at	150	200	250	mV
Input working voltage range	0		12	V
Internal reference voltage (Ramp start) (see Note 3)	4.0	4.25	4.5	V
Internal reference voltage (Ramp finish) (see Note 3)		4.35		V
Peak-to-peak amplitude of ramp	70	100	130	mV
Pin 6 output impedance (R6) (see Note 2)	21.5	27	32.5	k
Maximum ripple voltage pin 3			1	V <sub>P-P</sub>

#### NOTES

- The supply current is  $0.45 \times$  (RMS current fed into pin 2).  $I_5$  is the current drained from pin 5 externally.  $I_{4AV}$  is the average triac gate current supplied each mains cycle.
- Triac firing pulse.  $t_p$  Pulse width =  $0.69 R_6 C_D$  microseconds typical  
 $t_f$  Pulse finish =  $1.09 R_6 C_D$  microseconds minimum after zero voltage point R6 in kohms.  $C_D$  in nF.  
See Application circuit  
 $t_p$  Nominal ( $C_D = 2.7\text{nF}$ ) = 50 microseconds  
 $t_p$  Minimum ( $C_D = 2.7\text{nF}$ ) = 63 microseconds
- Ramp period =  $0.85 \pm 0.15 \times R_T C_T$  sec. See Application circuit. The actual value of  $R_T$  must lie between 500kohms and 3Mohms.

#### ABSOLUTE MAXIMUM RATINGS

##### VOLTAGES

Voltage on pin  $V_8$  - I Max. 12V

Voltage on pin  $V_4$  - I Max. 10V

##### TEMPERATURE

Operating ambient temperature  $T_{AMB}$  -10°C to +75°C

Storage temperature  $T_{STG}$  -55°C to +150°C

##### CURRENTS

Supply current (pin 2) Peak value  $\pm I_2M$  50mA.

Non-repetitive peak current ( $t_p \leq 250\mu\text{s}$ )  $\pm I_2SM$  200mA.

Output current (pin 5) Max. 5mA Short circuit protected.

Output current (pin 4) average value  $I_4$  (AV) Max 5mA Short circuit protected

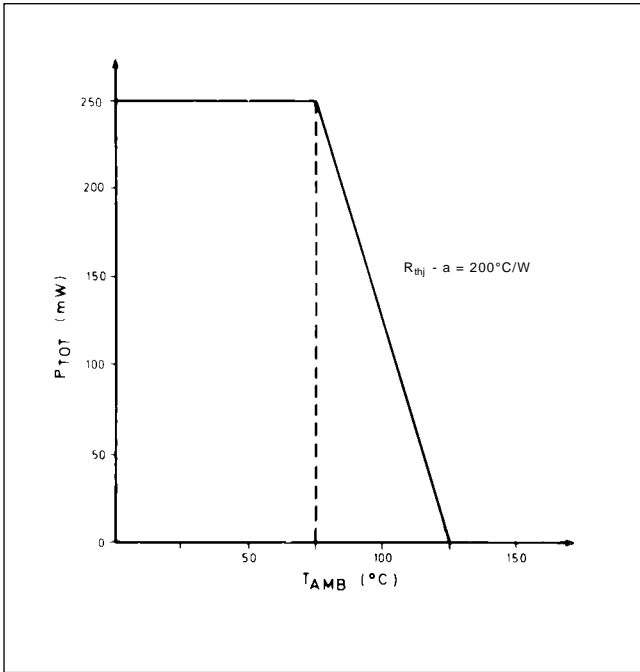


Fig. 3 Power Dissipation

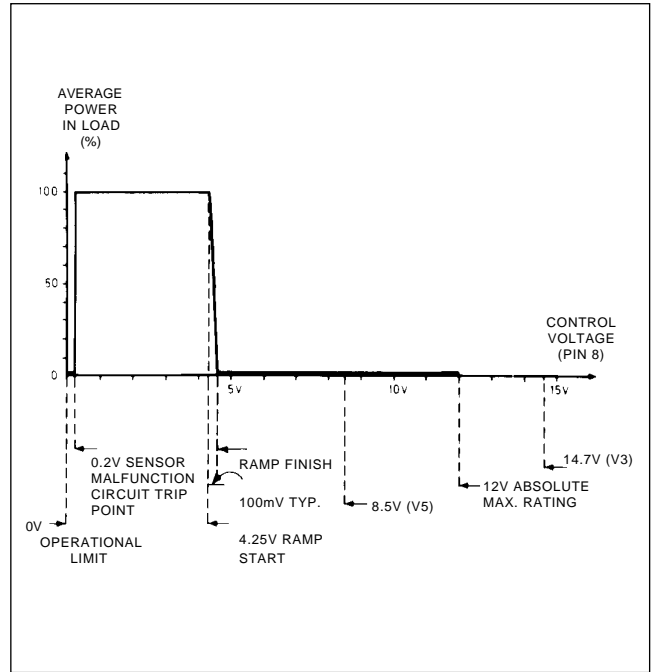


Fig. 4 Control Characteristic of Pin 8

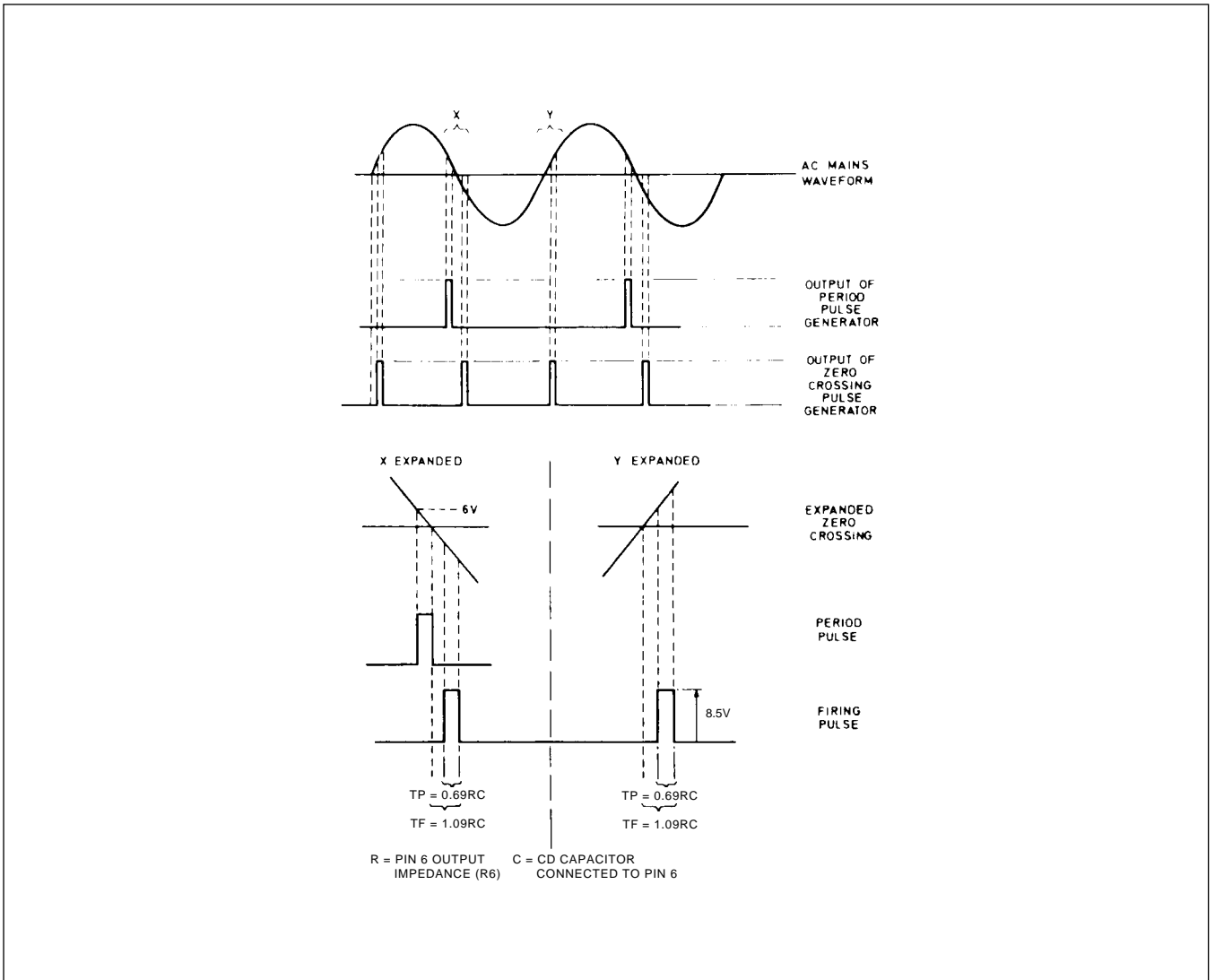


Fig. 5 Pulse Timing



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