

## 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.

### SPECIAL FEATURES

1. Balanced zero voltage point crossing detector, spike filter and pulse generator for reliable triggering of the triac.
2. A period pulse generator and bistable which are arranged to provide symmetrical burst control and eliminate  $\frac{1}{2}$  wave firing. (EN50.006, BS5406, 1976)
3. 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.

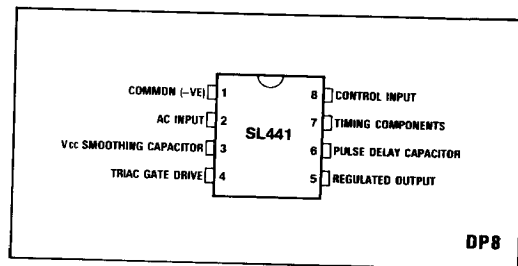


Fig.1 Pin connections (top view)

4. 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.
5. Thermistor malfunction may be sensed and power automatically removed.
6. 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.

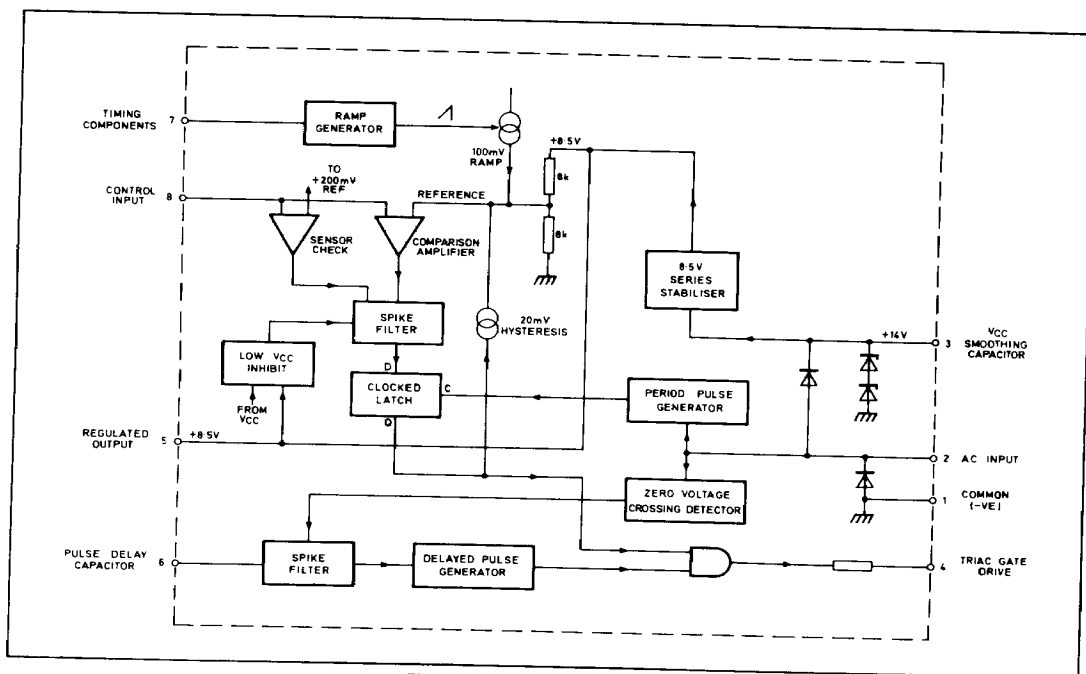


Fig.2 Block schematic of SL441C

## ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated):

 $T_{AMB} = 25^{\circ}\text{C}$ 

All voltages measured with respect to common (pin 1)

Characteristics	Value			Units
	Min.	Typ.	Max.	
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		$\Omega$
<b>Control input pin 8</b>				
Bias current			1	$\mu\text{A}$
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) }		4.35		V
Peak-to-peak amplitude of ramp	70	100	130	mV
Pin 6 output impedance ( $R_6$ ) (See Note 2)	21.5	27	32.5	k $\Omega$
Maximum ripple voltage pin 3			1	V <sub>P-P</sub>

## NOTES

- The supply current is  $0.45 \times (\text{RMS current fed into pin 2})$ .  $I_5$  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  $R_6$  in kohms,  $C_D$  in nF. See Application circuit  
 $t_r$  Nominal ( $C_D = 2.7\text{nF}$ ) = 50 microseconds  
 $t_f$  Minimum ( $C_D = 2.7\text{nF}$ ) = 63 microseconds
- Ramp period =  $0.85 \pm 0.15 \times R_1 C_T$  sec. See Application circuit. The actual value of  $R_1$  must lie between 500kohms and 3Mohms.

## ABSOLUTE MAXIMUM RATINGS

## Voltages

Voltage on pin 8  $V_{8-I}$  Max. 12VVoltage on pin 4  $V_{4-I}$  Max. 10V

## 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.

## Temperature

Operating ambient temperature  $T_{AMB}$   $-10^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$ Storage temperature  $T_{STG}$   $-30^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

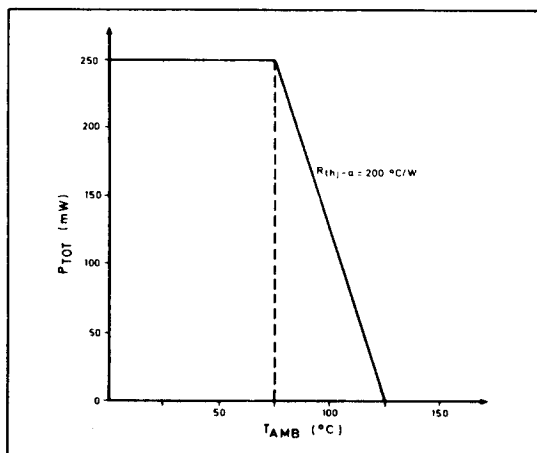


Fig. 3 Power dissipation

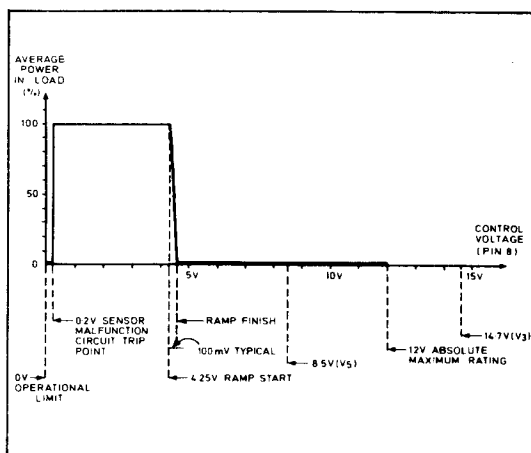


Fig. 4 Control characteristic of pin 8

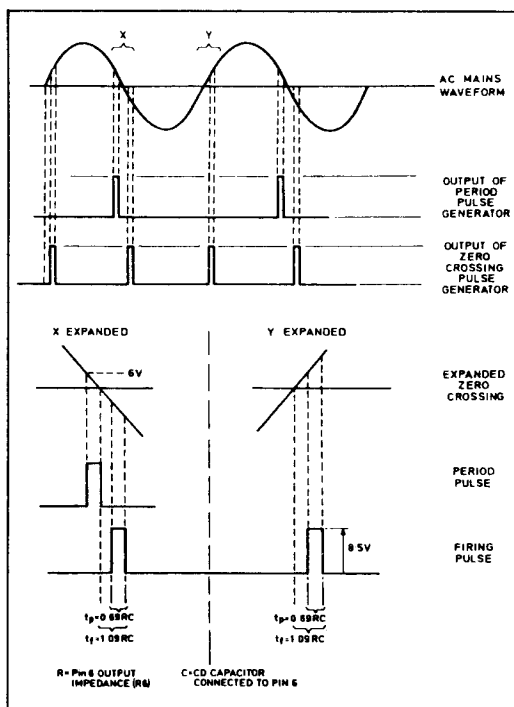


Fig. 5 Pulse timing