

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.

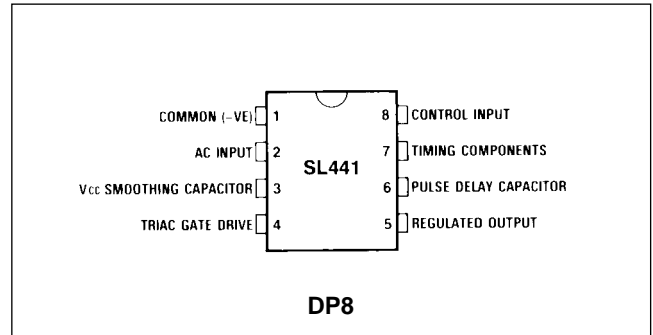


Fig.1 Pin Connections (top view)

- 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.

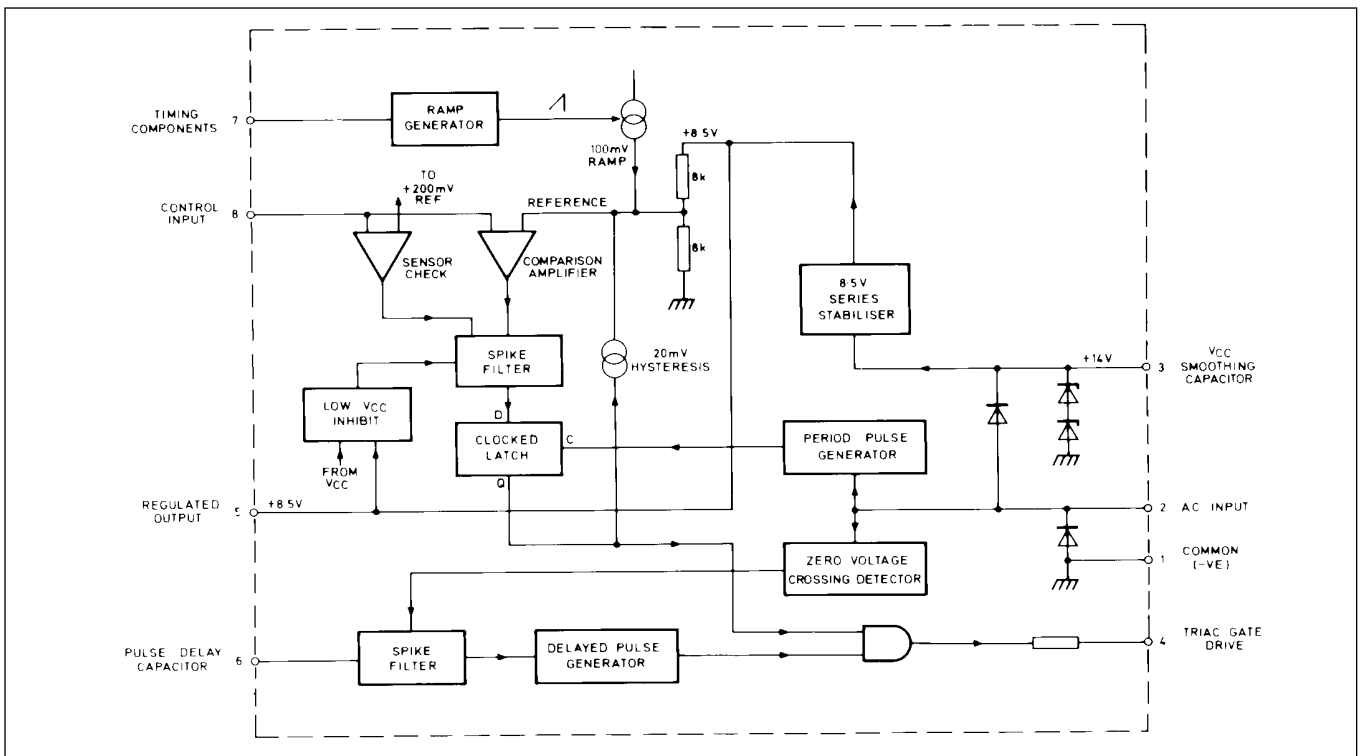


Fig. 2 Block Schematic of SL441C

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
Triac gate drive pin 4 (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		
Control input pin 8				
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_{P-P}

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

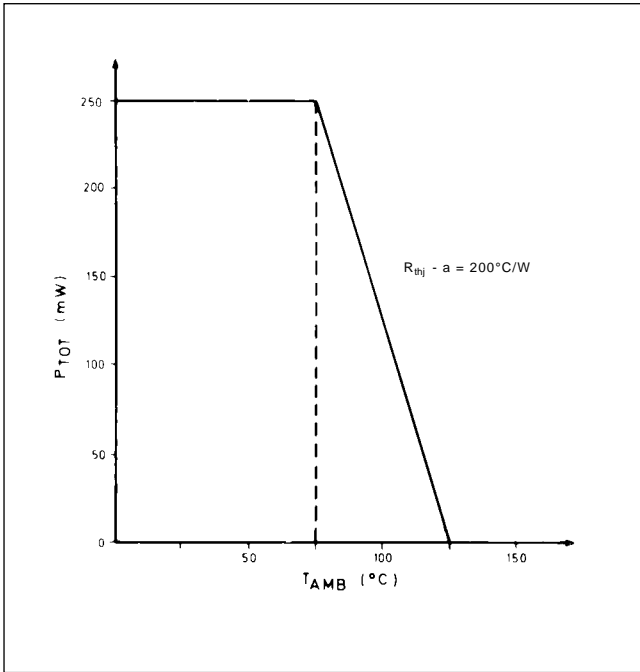


Fig. 3 Power Dissipation

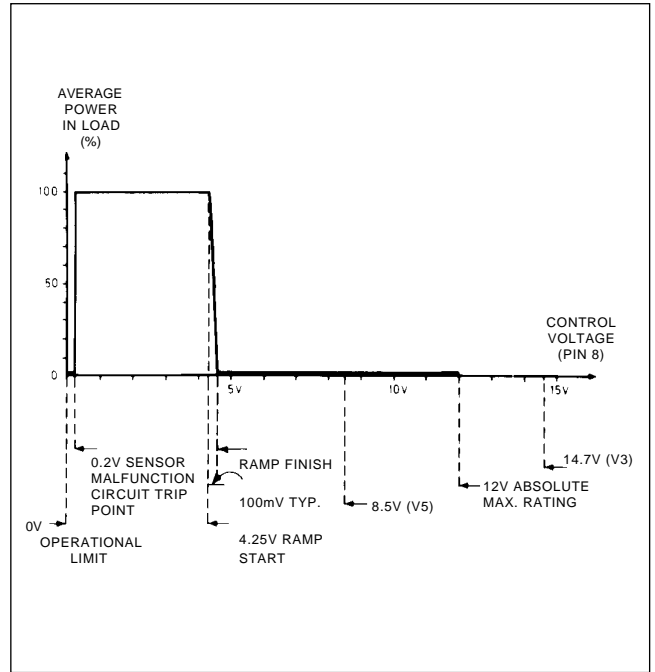


Fig. 4 Control Characteristic of Pin 8

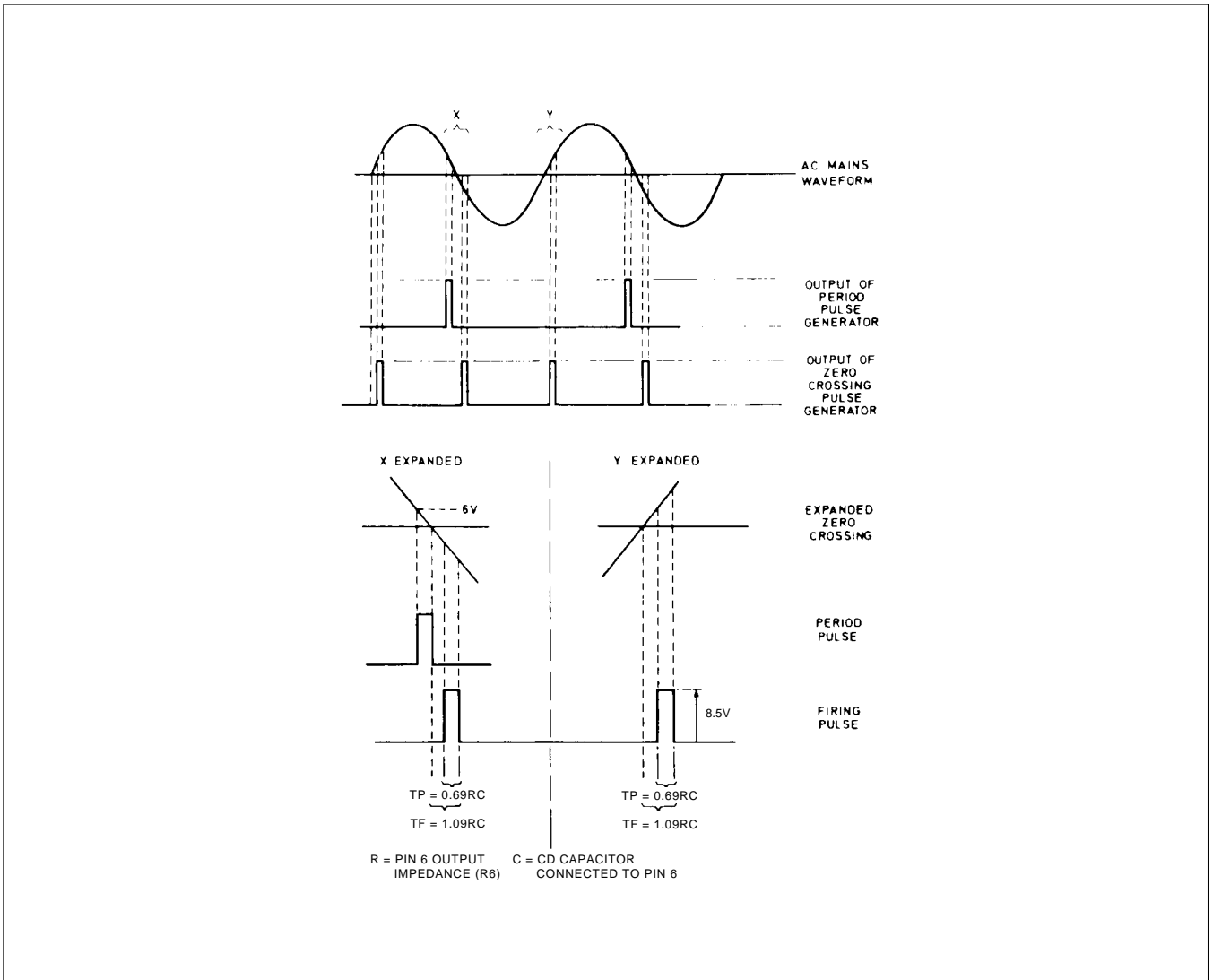


Fig. 5 Pulse Timing



HEADQUARTERS OPERATIONS
GEC PLESSEY SEMICONDUCTORS
Cheney Manor, Swindon,
Wiltshire SN2 2QW, United Kingdom.
Tel: (0793) 518000 Tx: 449637
Fax: (0793) 518411

GEC PLESSEY SEMICONDUCTORS
P.O. Box 66017, 1500 Green Hills Road, Scotts
Valley, California 95067-0017,
United States of America. Tel (408) 438 2900
ITT Telex: 4940840 Fax: (408) 438 5576

CUSTOMER SERVICE CENTRES

- **FRANCE & BENELUX** Les Ulis Cedex Tel: (1) 64 46 23 45 Tx: 602858F
Fax : (1) 64 46 06 07
- **GERMANY** Munich Tel: (089) 3609 06-0 Tx: 523980 Fax : (089) 3609 06-55
- **ITALY** Milan Tel: (02) 66040867 Fax: (02)66040993
- **JAPAN** Tokyo Tel: (03) 3296-0281 Fax: (03) 3296-0228
- **NORTH AMERICA Integrated Circuits and Microwave Products**, Scotts Valley, USA
Tel (408) 438 2900 ITT Tx: 4940840 Fax: (408) 438 7023.
Hybrid Products, Farmingdale, USA Tel (516) 293 8686 Fax: (516) 293 0061.
- **SOUTH EAST ASIA** Singapore Tel: (65) 3827708 Fax: (65) 3828872
- **SWEDEN** Stockolm Tel: 46 8 702 97 70 Fax: 46 8 640 47 36
- **UNITED KINGDOM & SCANDINAVIA**
Swindon Tel: (0793) 518510 Tx: 444410 Fax : (0793) 518582

These are supported by Agents and Distributors in major countries world-wide.

© GEC Plessey Semiconductors 1993 Publication No.DS3848 Issue No. 1.0 June 1993

This publication is issued to provide information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. The Company reserves the right to alter without prior knowledge the specification, design or price of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to the Company's conditions of sale, which are available on request.



<http://www.zarlink.com>

World Headquarters - Canada

Tel: +1 (613) 592 0200

Fax: +1 (613) 592 1010

North America - West Coast

Tel: (858) 675-3400

Fax: (858) 675-3450

North America - East Coast

Tel: (978) 322-4800

Fax: (978) 322-4888

Asia/Pacific

Tel: +65 333 6193

Fax: +65 333 6192

**Europe, Middle East,
and Africa (EMEA)**

Tel: +44 (0) 1793 518528

Fax: +44 (0) 1793 518581

Information relating to products and services furnished herein by Zarlink Semiconductor Inc. trading as Zarlink Semiconductor or its subsidiaries (collectively "Zarlink") is believed to be reliable. However, Zarlink assumes no liability for errors that may appear in this publication, or for liability otherwise arising from the application or use of any such information, product or service or for any infringement of patents or other intellectual property rights owned by third parties which may result from such application or use. Neither the supply of such information or purchase of product or service conveys any license, either express or implied, under patents or other intellectual property rights owned by Zarlink or licensed from third parties by Zarlink, whatsoever. Purchasers of products are also hereby notified that the use of product in certain ways or in combination with Zarlink, or non-Zarlink furnished goods or services may infringe patents or other intellectual property rights owned by Zarlink.

This publication is issued to provide information only and (unless agreed by Zarlink in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. The products, their specifications, services and other information appearing in this publication are subject to change by Zarlink without notice. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. Manufacturing does not necessarily include testing of all functions or parameters. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to Zarlink Semiconductor's conditions of sale which are available on request.

Purchase of Zarlink's I²C components conveys a licence under the Philips I²C Patent rights to use these components in an I²C System, provided that the system conforms to the I²C Standard Specification as defined by Philips

Zarlink and the Zarlink Semiconductor logo are trademarks of Zarlink Semiconductor Inc.
Copyright 2001, Zarlink Semiconductor Inc. All rights reserved.

TECHNICAL DOCUMENTATION - NOT FOR RESALE