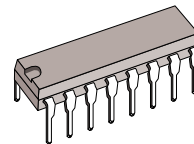


## DUAL HIGH CURRENT RELAY DRIVER

- HIGH OUTPUT CURRENT
- HYSTERESIS INPUT COMPARATOR WITH WIDE RANGE COMMON MODE OPERATION AND GROUND COMPATIBLE INPUTS
- INPUT COMPARATOR HYSTERESIS
- INTERNAL THERMAL PROTECTION WITH HYSTERESIS
- INTERNAL OUTPUT OVERVOLTAGE CLAMPING
- SINGLE SUPPLY VOLTAGE (3.5V up to 18V)



Powerdip (8 + 8)

ORDERING NUMBER : L9305A

### DESCRIPTION

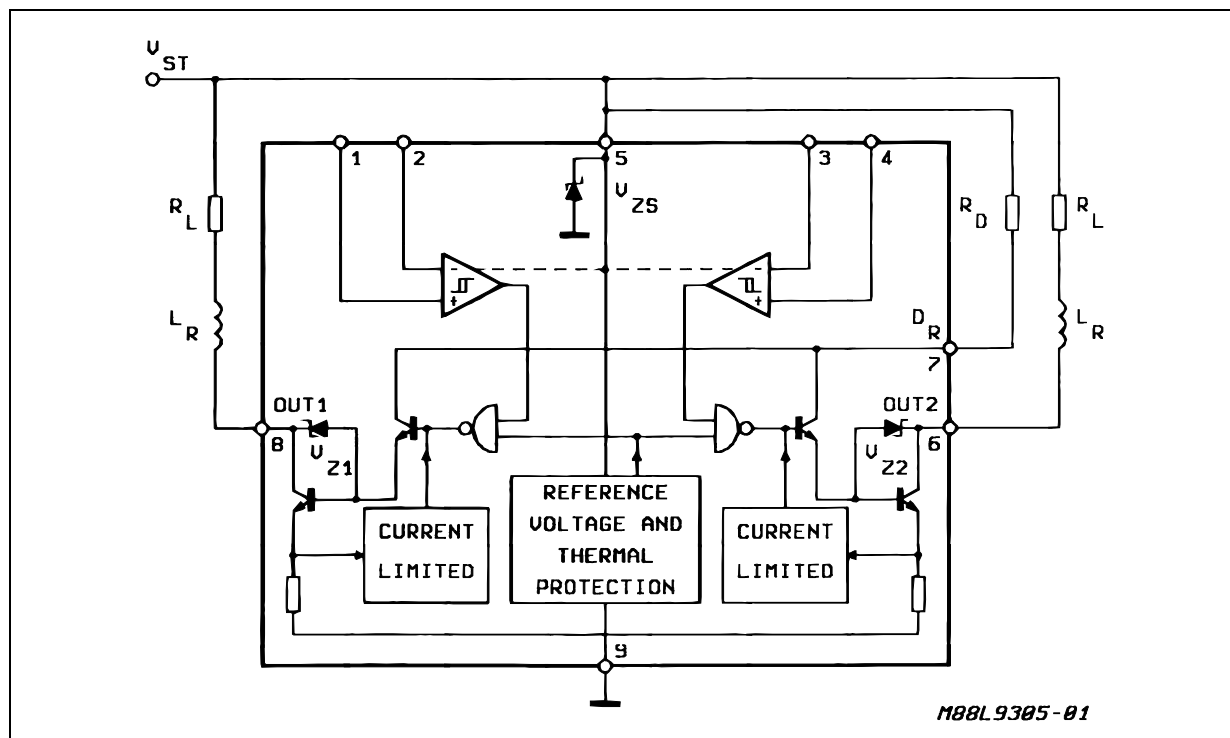
The L9305A is a monolithic interface circuit with differential input comparator and open collector output able to sink high current specifically to drive relays, lamps, d.c. motors.

Particular care has been taken to protect the device against destructive failures - short circuit of outputs to  $V_s$ , output overvoltages, supply overvoltage.

A built in thermal shut-down switches off the device when the IC's internal dissipation becomes too great and the chip temperature exceeds a set security threshold.

A hysteresis input comparator increases the interface's noise immunity, allowing the correct use also in critical environments as automotive or industrial applications.

### BLOCK DIAGRAM



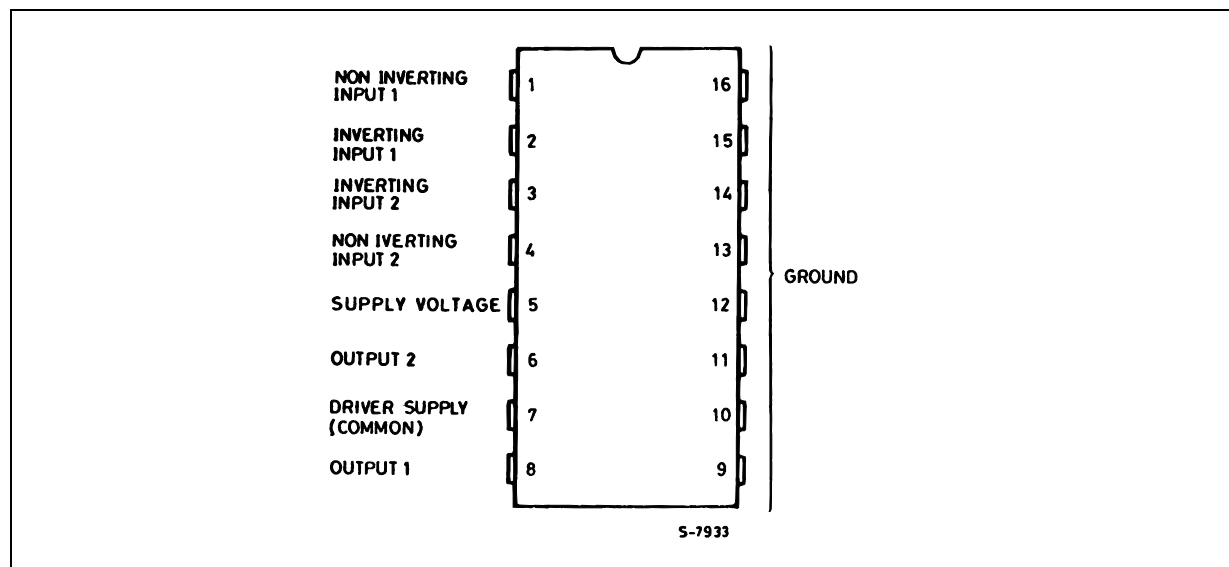
## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_5$	Supply Voltage	(*) 20	V
$V_7$	Driver Supply Voltage	26	V
$I_{zs}$	Supply Zener Clamp Current (DC) (PULSED) (**)	30 80	mA mA
$V_I$	Comparator Input Voltage Range	– 0.2 to 24	V
$V_I$	Differential Input Voltage	24	V
$T_j, T_{stg}$	Junction and Storage Temperature	– 55 to 150	°C
$P_{tot}$	Power Dissipation at $T_{amb} = 85^\circ\text{C}$	928	mW
$I_o$	Output Current	Int. limited	

(\*) The maximum allowed supply voltage without series resistors is limited by the built-in zener protection diodes

(\*\*)  $T_{on} \leq 2.5$  ms ; repetition time  $\geq 30$  ms.

## PIN CONNECTION (top view)



## THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j-pins}$	Thermal Resistance Junction to pins	Max. 15	°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction to Ambient	Max. 70	°C/W

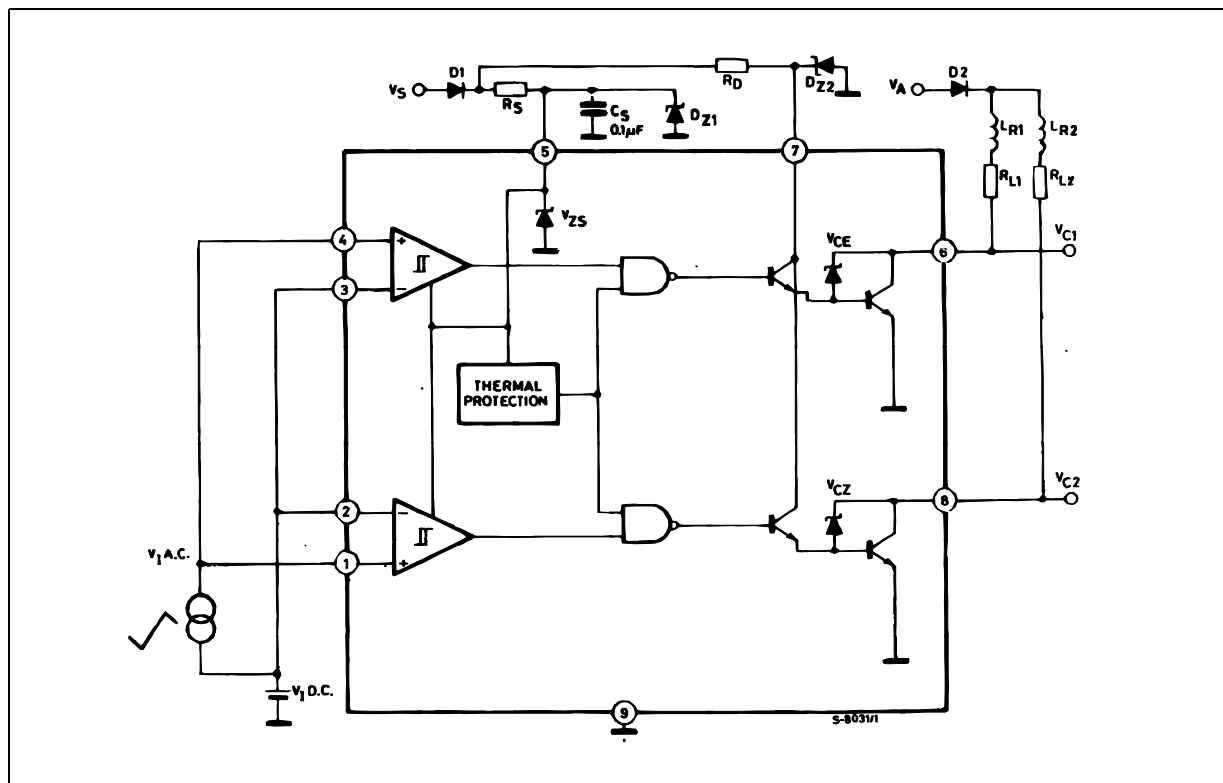
**ELECTRICAL CHARACTERISTICS** ( $V_5 = 14.4\text{V}$ ,  $T_{\text{amb}} = 25^\circ\text{C}$  ; refer to block diagram unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_5$	Supply Voltage		3.5		18*	V
$I_S$ "st.by"	Supply Current	$V_I^+ - V_I^- \geq 70\text{mV}$		5	8	mA
$I_{\text{SON}}$	Supply Current	$V_I^- - V_I^+ > 70\text{mV}$		18	30	mA
$V_{\text{CZ}}$	Output Clamping Voltage (for each channel)	$I_{\text{OUT}} = 1\text{A}$	20		27	V
$V_{\text{ZS}}$	Supply Voltage Clamp	$I_{\text{ZS}} = 10\text{mA}$	20		27	V
$V_{\text{IH}}$	Comparator Hysteresis	$V_I^+ - V_I^- = 200\text{mVpp}$ $f = 1\text{kHz}$	20		70	mV
$I_B$	Input Bias Current	$V^+ = V^- = 0\text{V}$		0.2	1	$\mu\text{A}$
$I_{\text{OS}}$	Input Offset Current	$V^+ = V^- = 0\text{V}$		$\pm 20$	$\pm 200$	nA
CMR	Input Common Mode Range	$V_5 = 3.5\text{V to } 18\text{V}$	0		$V_5 - 1.6$	V
$I_{\text{SC}}$	Output Short Circuit Current for Each Channel	$V_I^- - V_I^+ \geq 70\text{mV}$ $V_{\text{out}} = 16.5\text{V}$ $V_{\text{out}} = 6\text{V}$			0.85	A
					2.5	A
$I_{\text{CD}}$	Driver Transistor Current Capability	$V_I^- - V_I^+ \geq 70\text{mV}$ DC Pulsed (**)			300	mA
					600	mA
$V_{\text{CSAT}}$	On Status Saturation Voltage	$V_I^- - V_I^+ \geq 70\text{mV}$ $I_{\text{CD}} = 100\text{mA}$ $I_{\text{COUT}} = 1.2\text{A}$			1	V
$I_{\text{OL}}$	Output Leakage Current	$V_I^+ - V_I^- \geq 70\text{mV}$			250	$\mu\text{A}$

\*  $T_{\text{ON}} \leq 2.5\text{ ms}$  ; repetition time  $\geq 30\text{ ms}$ .

\*\* The maximum allowed supply voltage without limiting resistors is limited by the built-in protection zener diodes see  $V_{\text{CZ}}$ ,  $V_{\text{ZS}}$  Spec. values.

## TEST AND APPLICATION CIRCUIT



# APPLICATION INFORMATION (refer to application circuit)

D1 and D2 diodes are required only for reverse polarity protection.

If  $V_S$  may be higher than  $V_{ZS}$  a resistor  $R_S$  is necessary to limit the zener current  $I_{ZS}$ . In order to determine  $R_S$  value the following equations can be used :

$$1) \frac{V_{S \text{ MAX}} - V_{D1} - V_{ZS \text{ min}}}{R_S} < I_{ZS \text{ MAX}}$$

$$2) V_{S \text{ min}} - V_{D1} - R_S - I_{SON \text{ MAX}} > V_{ST \text{ min}}$$

where from  $T_{amb} = 25^\circ\text{C}$  :

- $V_{S \text{ MAX}}$  and  $V_{S \text{ min}}$  are the maximum and minimum values of power supply voltage
- $V_{D1}$  is the forward diode D1 voltage drop
- $V_{ZS \text{ min}} = 20 \text{ V}$
- $I_{ZS \text{ MAX}} = 30 \text{ mA}$  for d.c. mode and  $I_{ZS \text{ MAX}} = 80 \text{ mA}$  for pulsed mode (see Absolute maximum ratings)
- $I_{SOM \text{ MAX}} = 30 \text{ mA}$
- $V_{ST \text{ min}} = 3.5 \text{ V}$

If no  $R_S$  value can satisfy the system 1), 2) a more powerfull external zener  $D_Z = 18 \text{ V}$  is required.

Then 1) becomes :

$$\frac{V_{S \text{ MAX}} - V_{D1} - 18}{R_S} < I_{DZ \text{ MAX}}$$

where  $I_{DZ \text{ MAX}}$  is the maximum allowed  $D_Z$  current.

$V_A$  voltage cannot be higher than 20 V otherwise output overvoltage protection may be activated. Moreover  $V_A$  must be less than 16 V if short circuit protection is required.

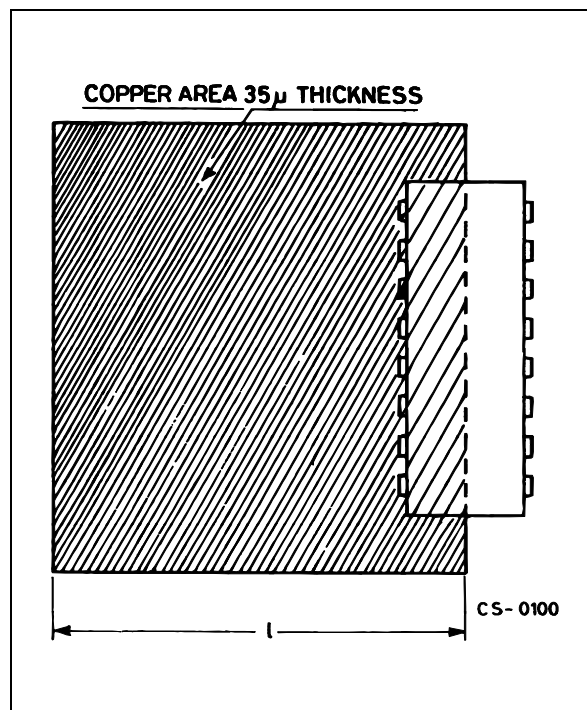
$D_{Z2} = 22$  to 24 V is a mandatory for output 7 protection if  $V_S$  may be higher than 26 V.

## MOUNTING INSTRUCTION

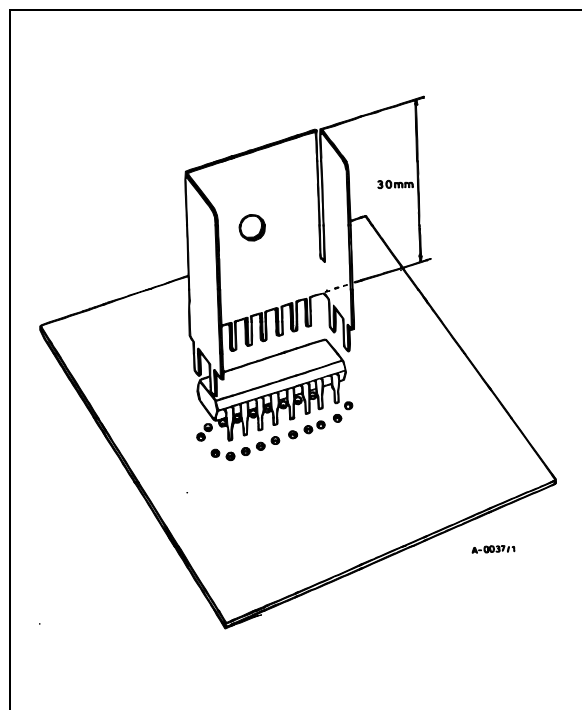
The L9305A is assembled in a new plastic package, the Powerdip, in which 8 pins (from 9 to 16) are attached to the frame and remover the heat produced by the chip.

Figure 2 and 3 show two ways of heatsinking. In the first case, a PC board copper area is used as a heatsink  $l = 65 \text{ mm}$ . While in the second case, the device is soldered to an external heatsink. In both examples, the thermal resistance junction-ambient is  $35^\circ\text{C/W}$ .

**Figure 2** : Example of Heatsink Using PC Board Copper ( $l = 65 \text{ mm}$ ).

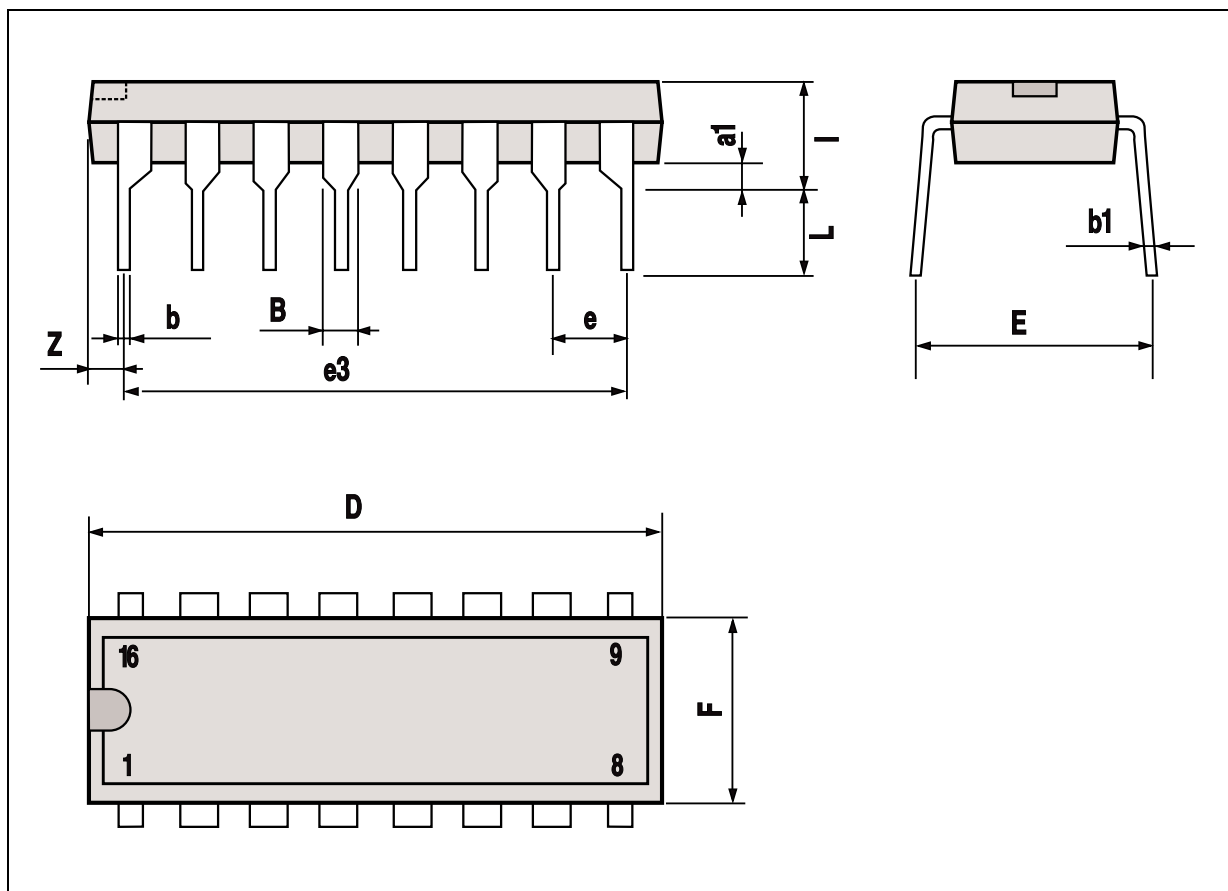


**Figure 3** : Example of an External Heatsink.



## POWERDIP16 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.85		1.40	0.033		0.055
b		0.50			0.020	
b1	0.38		0.50	0.015		0.020
D			20.0			0.787
E		8.80			0.346	
e		2.54			0.100	
e3		17.78			0.700	
F			7.10			0.280
I			5.10			0.201
L		3.30			0.130	
Z			1.27			0.050



Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.