

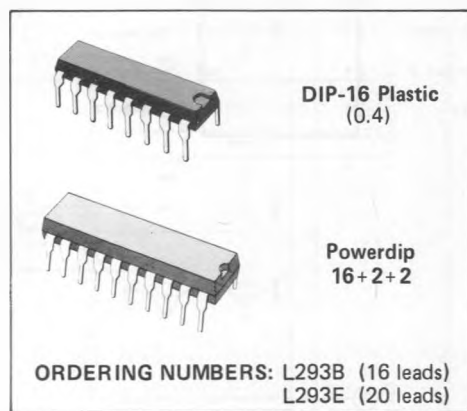
PUSH-PULL FOUR CHANNEL DRIVERS

- OUTPUT CURRENT 1A PER CHANNEL
- PEAK OUTPUT CURRENT 2A PER CHANNEL (NON REPETITIVE)
- INHIBIT FACILITY
- HIGH NOISE IMMUNITY
- SEPARATE LOGIC SUPPLY
- OVERTEMPERATURE PROTECTION

The L293B and L293E are quad push-pull drivers capable of delivering output currents to 1A per channel. Each channel is controlled by a TTL-compatible logic input and each pair of drivers (a full bridge) is equipped with an inhibit input which turns off all four transistors. A separate supply input is provided for the logic so that it may be run off a lower voltage to reduce dissipation.

Additionally, the L293E has external connection of sensing resistors, for switchmode control.

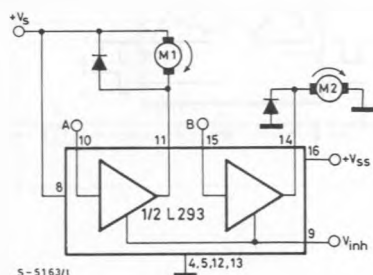
The L293B and L293E are packaged in 16 and 20-pin plastic DIPs respectively; both use the four center pins to conduct heat to the printed circuit board.



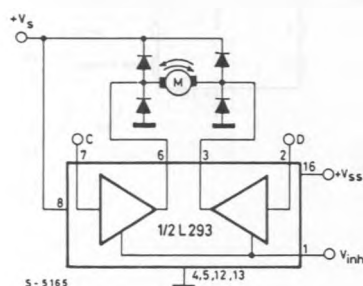
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	36	V
V_{ss}	Logic supply voltage	36	V
V_i	Input voltage	7	V
V_{inh}	Inhibit voltage	7	V
I_{out}	Peak output current (non-repetitive $t = 5ms$)	2	A
P_{tot}	Total power dissipation at $T_{ground-pins} = 80^\circ C$	5	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	$^\circ C$

DC motor control

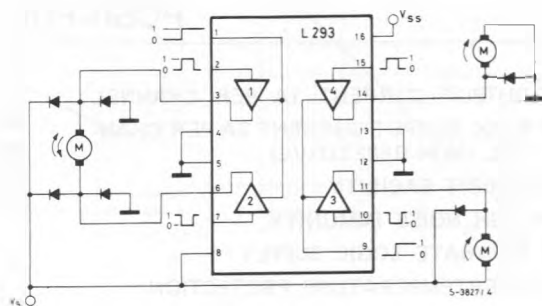
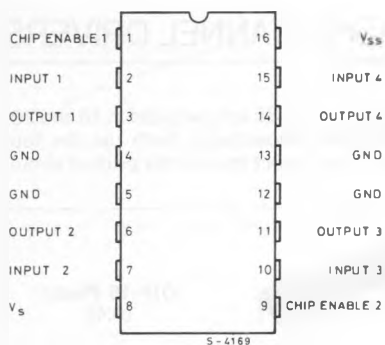


Bidirectional DC motor control



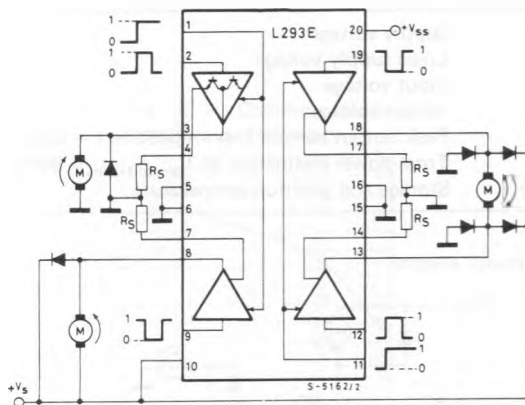
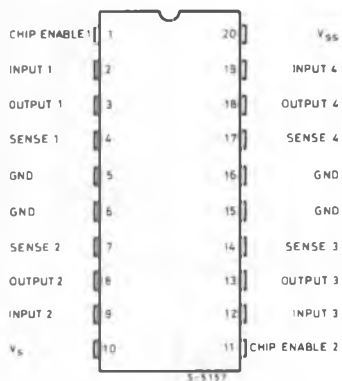
CONNECTION AND BLOCK DIAGRAM (L293)

(top view)

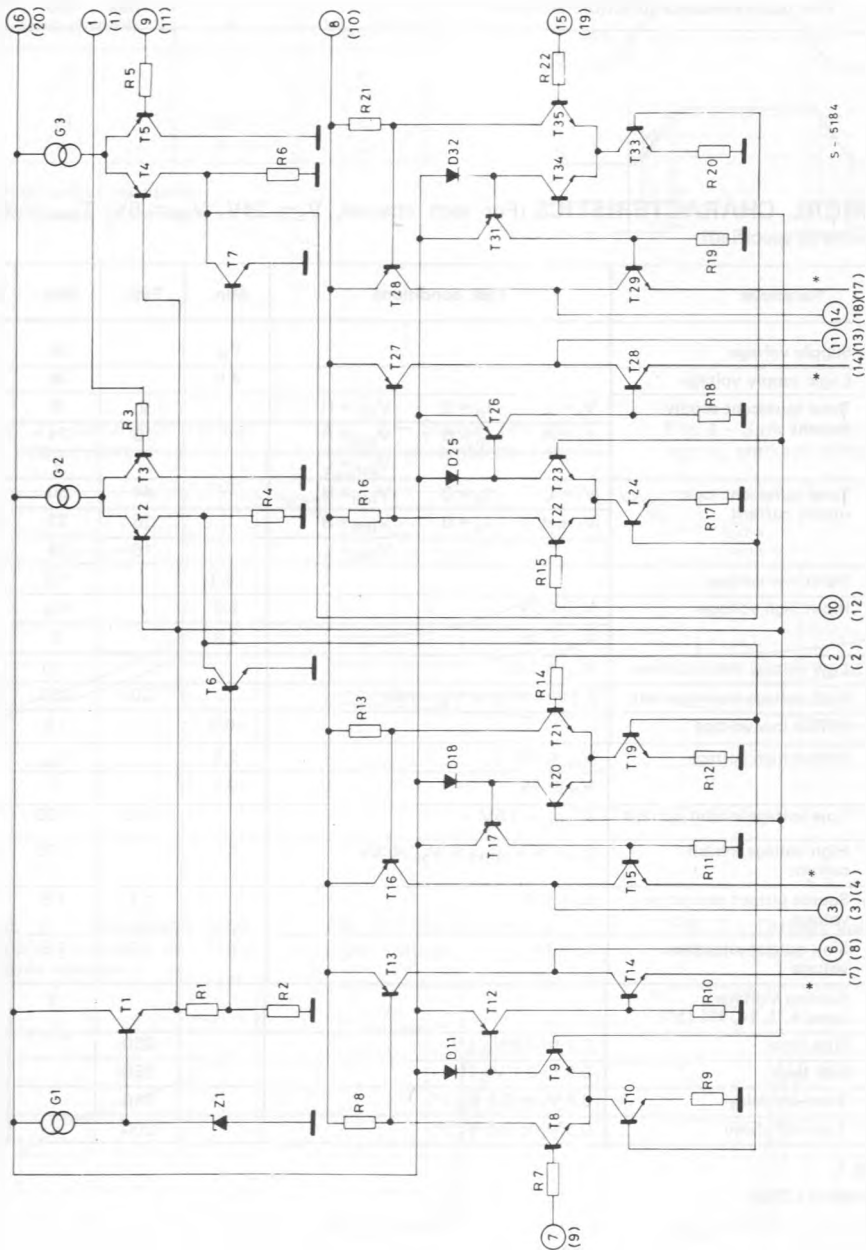


CONNECTION AND BLOCK DIAGRAM (L293E)

(top view)



SCHEMATIC DIAGRAM



(*) In the L293 these points are not externally available. They are internally connected to the ground (substrate).

○ Pins of L293E

THERMAL DATA

$R_{th\ j-case}$	Thermal resistance junction-case	max	14	°C/W
$R_{th\ j-amb}$	Thermal resistance junction-ambient	max	80	°C/W

ELECTRICAL CHARACTERISTICS (For each channel, $V_S = 24V$, $V_{SS} = 5V$, $T_{amb} = 25^\circ C$, unless otherwise specified)

Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_S Supply voltage		V_{SS}		36	V
V_{SS} Logic supply voltage		4.5		36	V
I_S Total quiescent supply current	$V_I = L \quad I_O = 0 \quad V_{InH} = H$		2	6	mA
	$V_I = H \quad I_O = 0 \quad V_{InH} = H$		16	24	
	$V_{InH} = L$			4	
I_{SS} Total quiescent logic supply current	$V_I = L \quad I_O = 0 \quad V_{InH} = H$		44	60	mA
	$V_I = H \quad I_O = 0 \quad V_{InH} = H$		16	22	
	$V_{InH} = L$		16	24	
V_{IL} Input low voltage		-0.3		1.5	V
V_{IH} Input high voltage	$V_{SS} \leq 7V$	2.3		V_{SS}	V
	$V_{SS} > 7V$	2.3		7	
I_{IL} Low voltage input current	$V_{IL} = 1.5V$			-10	μA
I_{IH} High voltage input current	$2.3V \leq V_{IH} \leq V_{SS} - 0.6V$		30	100	μA
V_{InHL} Inhibit low voltage		-0.3		1.5	V
V_{InHH} Inhibit high voltage	$V_{SS} \leq 7V$	2.3		V_{SS}	V
	$V_{SS} > 7V$	2.3		7	
I_{InHL} Low voltage inhibit current	$V_{InHL} = 1.5V$		-30	-100	μA
I_{InHH} High voltage inhibit current	$2.3V \leq V_{InHH} \leq V_{SS} - 0.6V$			± 10	μA
V_{CEsatH} Source output saturation voltage	$I_O = -1A$		1.4	1.8	V
V_{CEsatL} Sink output saturation voltage	$I_O = 1A$		1.2	1.8	V
V_{SENS} Sensing Voltage (pins 4, 7, 14, 17) (**)				2	V
t_r Rise time	0.1 to $0.9 V_O$ (*)		250		ns
t_f Fall time	0.9 to $0.1 V_O$ (*)		250		ns
t_{on} Turn-on delay	$0.5 V_I$ to $0.5 V_O$ (*)		750		ns
t_{off} Turn-off delay	$0.5 V_I$ to $0.5 V_O$ (*)		200		ns

(*) See fig. 1.

(**) Referred to L293E.

TRUTH TABLE

V_i (each channel)	V_o	$V_{inh.} (^{\circ})$
H	H	H
L	L	H
H	X ($^{\circ}$)	L
L	X ($^{\circ}$)	L

($^{\circ}$) High output impedance.

($^{\circ\circ}$) Relative to the considerate channel.

Fig. 1 - Switching times

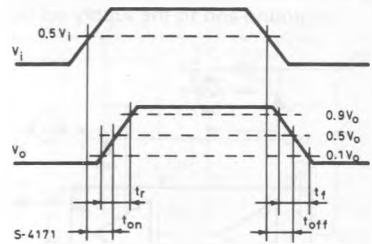


Fig. 2 - Saturation voltage vs. output current

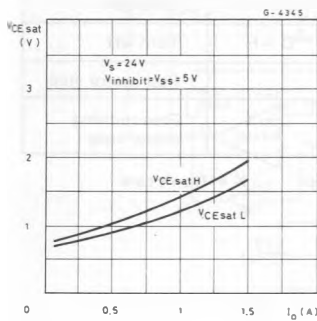


Fig. 3 - Source saturation voltage vs. ambient temperature

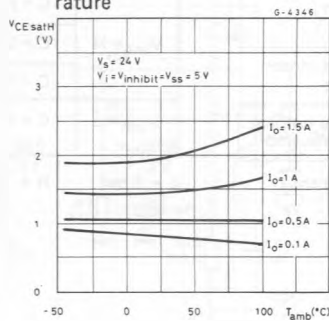


Fig. 4 - Sink saturation voltage vs. ambient temperature

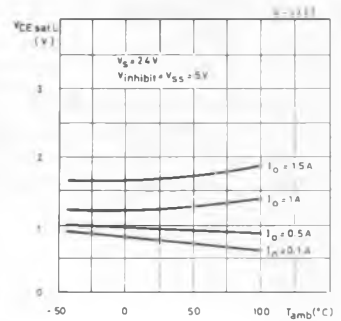


Fig. 5 - Quiescent logic supply current vs. logic supply voltage

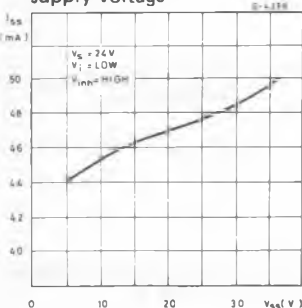


Fig. 6 - Output voltage vs. input voltage

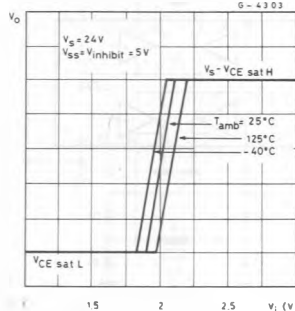
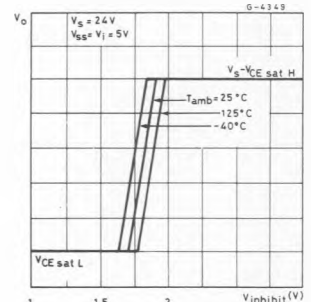


Fig. 7 - Output voltage vs. inhibit voltage



APPLICATION INFORMATION

Fig. 8 - DC motor controls (with connection to ground and to the supply voltage)

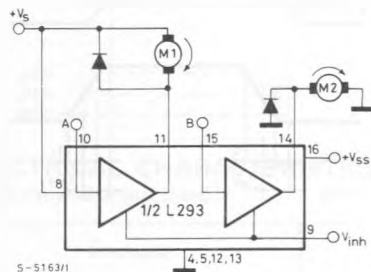
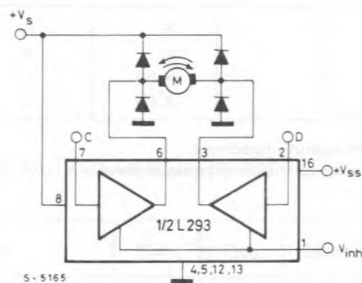


Fig. 9 - Bidirectional DC motor control



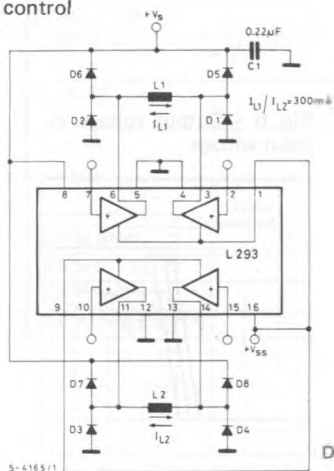
V_{InH}	A	M1	B	M2
H	H	Fast motor stop	H	Run
H	L	Run	L	Fast motor stop
L	X	Free running motor stop	X	Free running motor stop

L = Low H = High X = Don't care

INPUTS		FUNCTION
$V_{InH} = H$	C = H; D = L	Turn right
	C = L; D = H	Turn left
	C = D	Fast motor stop
$V_{InH} = L$	C = X; D = X	Free running motor stop

L = Low H = High X = Don't care

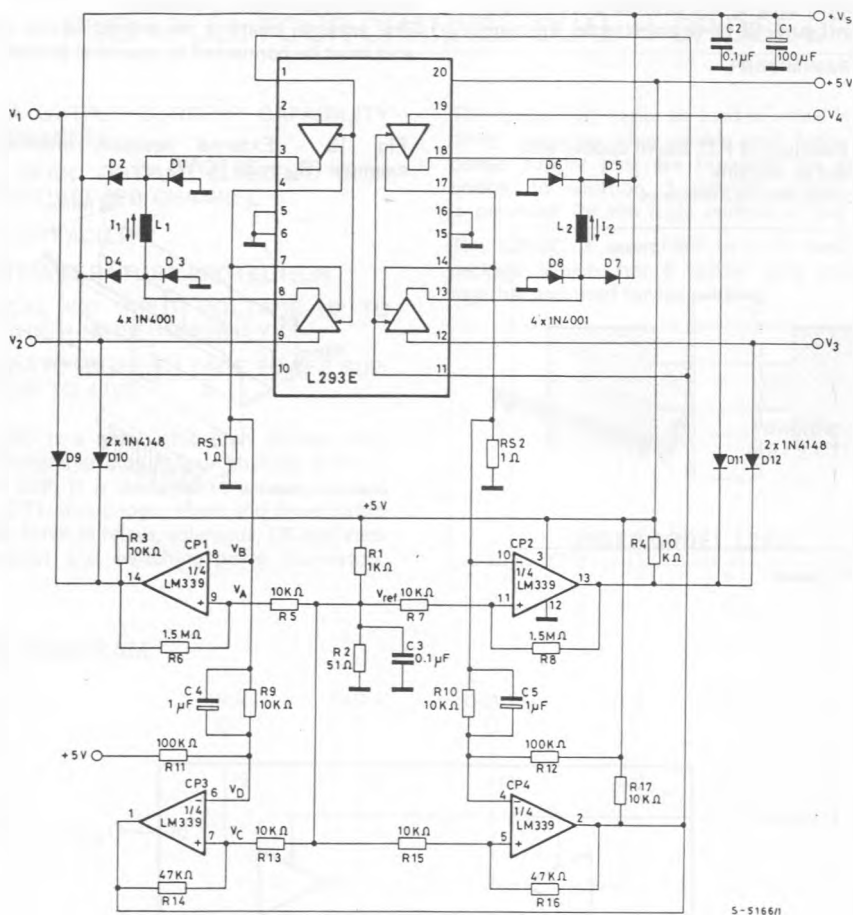
Fig. 10 - Bipolar stepping motor control



D1 - D8 = $\begin{cases} V_F < 1.2V @ I = 300mA \\ t_{rr} < 500ns \end{cases}$

APPLICATION INFORMATION (continued)

Fig. 11 - Stepping motor driver with phase current control and short circuit protection



D1 to D8 : $\begin{cases} V_F \leq 1.2V @ I = 300 \text{ mA} \\ t_{rr} \leq 200 \text{ ns} \end{cases}$

MOUNTING INSTRUCTIONS

The R_{thJAmb} of the L293 and the L293E can be reduced by soldering the GND pins to a suitable copper area of the printed circuit board as shown in figure 12 or to an external heatsink (figure 13).

During soldering the pins temperature must not exceed 260°C and the soldering time must not be longer than 12 seconds.

The external heatsink or printed circuit copper area must be connected to electrical ground.

Fig. 12 - Example of P.C. board copper area which is used as heatsink

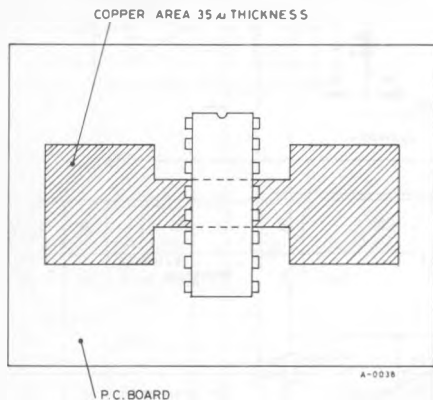


Fig. 13 - External heatsink mounting example ($R_{th} = 30^{\circ}\text{C/W}$)

