

# L293D QUADRUPLE HALF-H DRIVER

SLRS008A – SEPTEMBER 1986 – REVISED MAY 1990

- 600-mA Output Current Capability Per Driver
- Pulsed Current 1.2-A Per Driver
- Output Clamp Diodes for Inductive Transient Suppression
- Wide Supply Voltage Range 4.5 V to 36 V
- Separate Input-Logic Supply
- Thermal Shutdown
- Internal ESD Protection
- High-Noise-Immunity Inputs
- Functional Replacement for SGS L293D

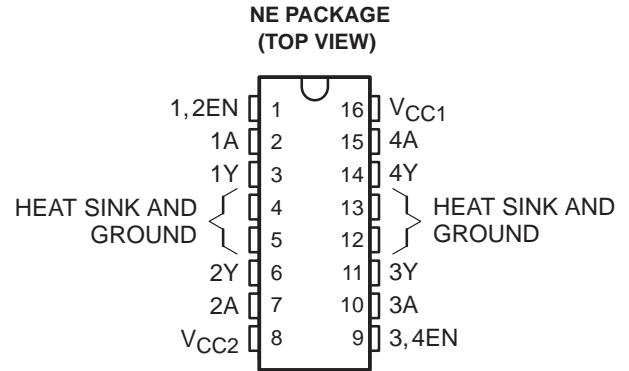
## description

The L293D is a quadruple high-current half-H driver designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. It is designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

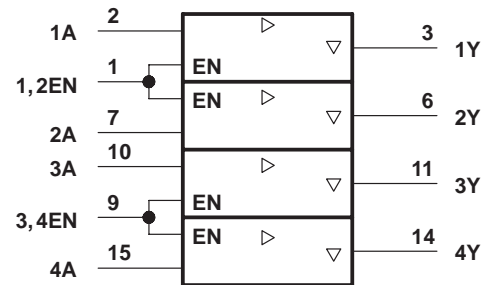
All inputs are TTL-compatible. Each output is a complete totem-pole drive circuit with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. External high-speed output clamp diodes should be used for inductive transient suppression. When the enable input is low, those drivers are disabled, and their outputs are off and in a high-impedance state. With the proper data inputs, each pair of drivers form a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

A  $V_{CC1}$  terminal, separate from  $V_{CC2}$ , is provided for the logic inputs to minimize device power dissipation.

The L293D is designed for operation from 0°C to 70°C.

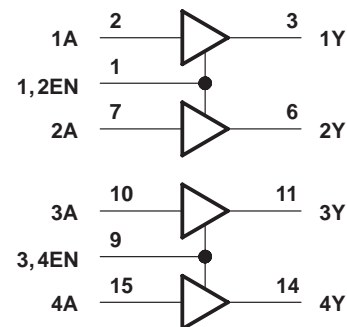


## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram



FUNCTION TABLE  
(each driver)

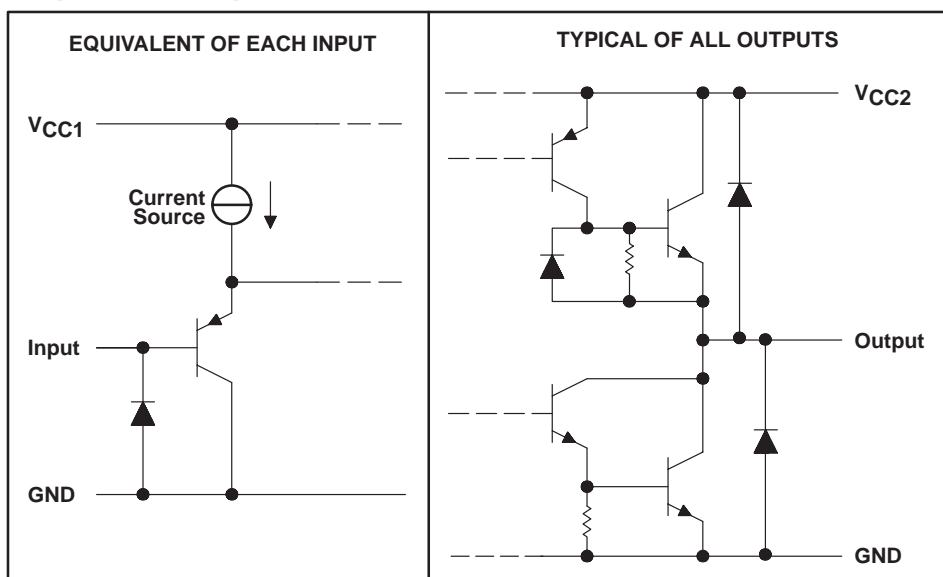
INPUTS‡		OUTPUT
A	EN	Y
H	H	H
L	H	L
X	L	Z

H = high-level, L = low level,  
X = irrelevant, Z = high-impedance (off)  
‡ In the thermal shutdown mode, the output is in the high-impedance state regardless of the input levels.

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## schematics of inputs and outputs



## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Logic supply voltage range, $V_{CC1}$ (see Note 1)	36 V
Output supply voltage range, $V_{CC2}$	36 V
Input voltage range, $V_I$	7 V
Output voltage range, $V_O$	-3 V to $V_{CC2} + 3$ V
Peak output current (nonrepetitive, $t \leq 100 \mu\text{s}$ )	$\pm 1.2$ A
Continuous output current, $I_O$	$\pm 600$ mA
Continuous total dissipation at (or below) 25°C free-air temperature (see Notes 2 and 3)	2075 mW
Continuous total dissipation at 80°C case temperature (see Note 3)	5000 mW
Operating case or virtual junction temperature range, $T_J$	-40°C to 150°C
Storage temperature range, $T_{\text{stg}}$	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES:
- All voltage values are with respect to the network ground terminal.
  - For operation above 25°C free-air temperature, derate linearly at the rate of 16.6 mW/°C.
  - For operation above 25°C case temperature, derate linearly at the rate of 71.4 mW/°C. Due to variations in individual device electrical characteristics and thermal resistance, the built-in thermal overload protection may be activated at power levels slightly above or below the rated dissipation.

## recommended operating conditions

	MIN	MAX	UNIT
Logic supply voltage, $V_{CC1}$	4.5	7	V
Output supply voltage, $V_{CC2}$	$V_{CC1}$	36	V
High-level input voltage, $V_{IH}$	$V_{CC1} \leq 7$ V	2.3	$V_{CC1}$
	$V_{CC1} \geq 7$ V	2.3	7
Low-level input voltage, $V_{IL}$	-0.3†	1.5	V
Operating free-air temperature, $T_A$	0	70	°C

† The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels.

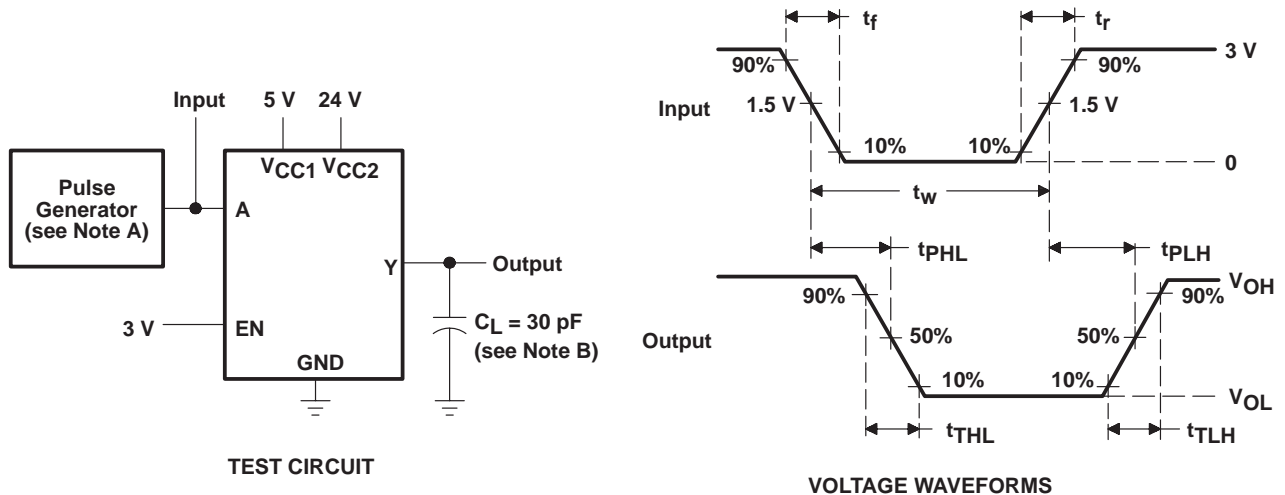
electrical characteristics,  $V_{CC1} = 5\text{ V}$ ,  $V_{CC2} = 24\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OH}$	High-level output voltage	$I_{OH} = -0.6\text{ A}$	$V_{CC2} - 1.8$	$V_{CC2} - 1.4$		V
$V_{OL}$	Low-level output voltage	$I_{OL} = 0.6\text{ A}$		1.2	1.8	V
$V_{OKH}$	High-level output clamp voltage	$I_{OK} = -0.6\text{ A}$		$V_{CC2} + 1.3$		V
$V_{OKL}$	Low-level output clamp voltage	$I_{OK} = -0.6\text{ A}$		1.3		V
$I_{IH}$	High-level input current	A	$V_I = 7\text{ V}$	0.2	100	$\mu\text{A}$
		EN		0.2	$\pm 10$	
$I_{IL}$	Low-level input current	A	$V_I = 0$	-3	-10	$\mu\text{A}$
		EN		-2	-100	
$I_{CC1}$	Logic supply current	$I_O = 0$	All outputs at high level	13	22	mA
			All outputs at low level	35	60	
			All outputs at high impedance	8	24	
$I_{CC2}$	Output supply current	$I_O = 0$	All outputs at high level	14	24	mA
			All outputs at low level	2	6	
			All outputs at high impedance	2	4	

switching characteristics,  $V_{CC1} = 5\text{ V}$ ,  $V_{CC2} = 24\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	Propagation delay time, low-to-high-level output from A input		800		ns
$t_{PHL}$	Propagation delay time, high-to-low-level output from A input		400		ns
$t_{TLH}$	Transition time, low-to-high-level output		300		ns
$t_{THL}$	Transition time, high-to-low-level output		300		ns

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics:  $t_r \leq 10\text{ ns}$ ,  $t_f \leq 10\text{ ns}$ ,  $t_w = 10\text{ }\mu\text{s}$ ,  $\text{PRR} = 5\text{ kHz}$ ,  $Z_O = 50\text{ }\Omega$ .  
B.  $C_L$  includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

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## APPLICATION INFORMATION

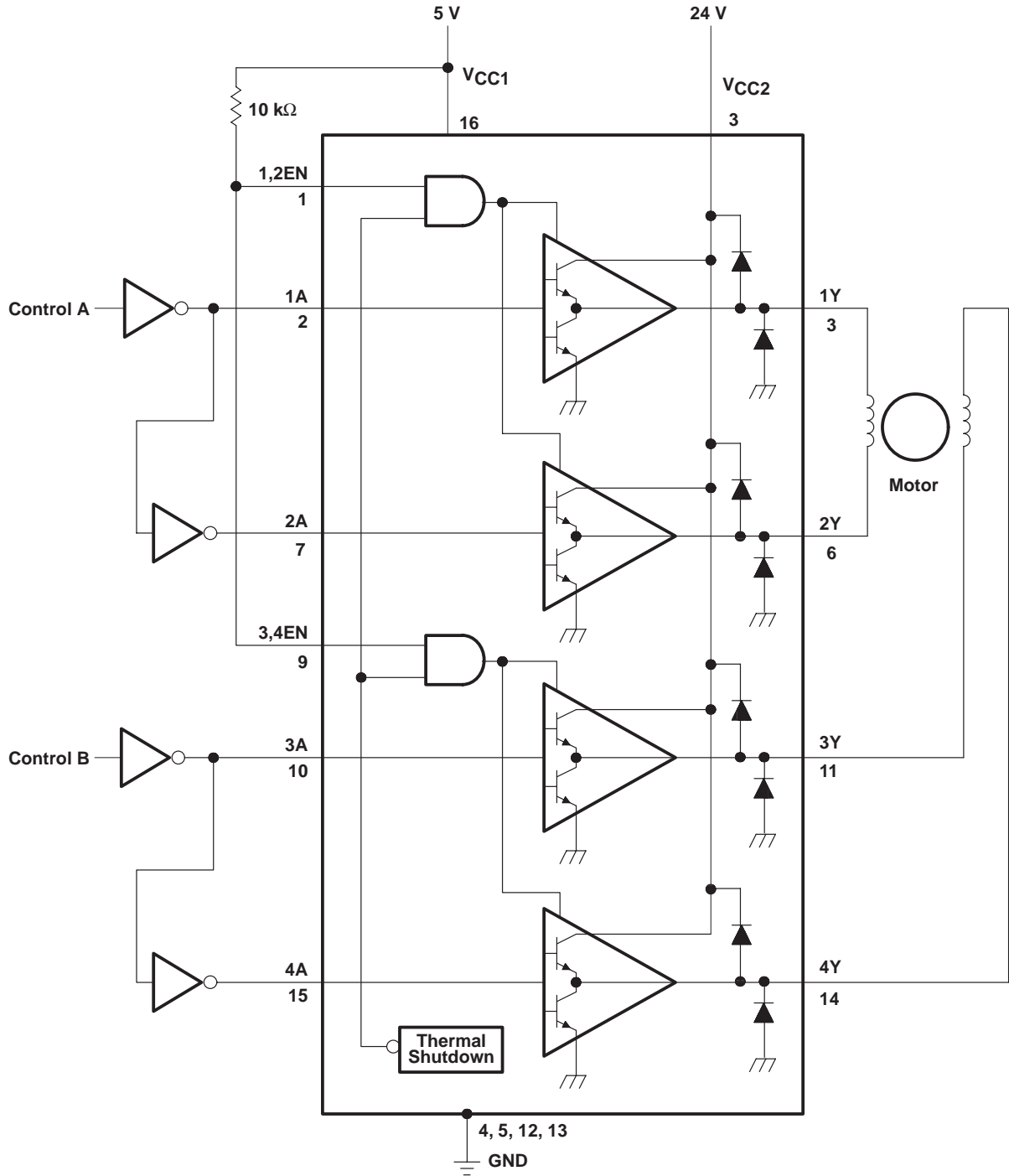


Figure 2. Two-Phase Motor Driver

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