

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

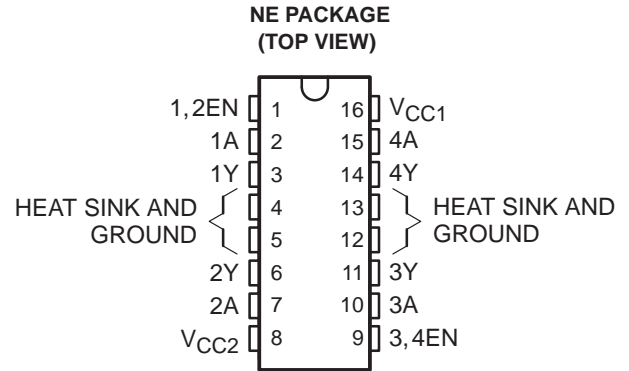
description

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.

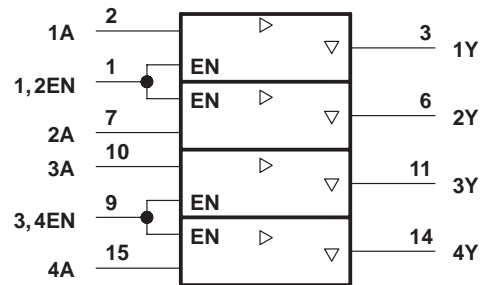
All inputs are TTL-compatible. Each output is a complete totem-pole drive circuit with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers 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.

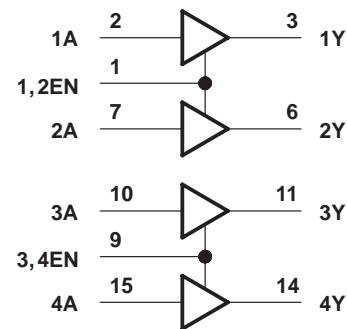


logic symbol†



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

logic diagram



**FUNCTION TABLE
(each driver)**

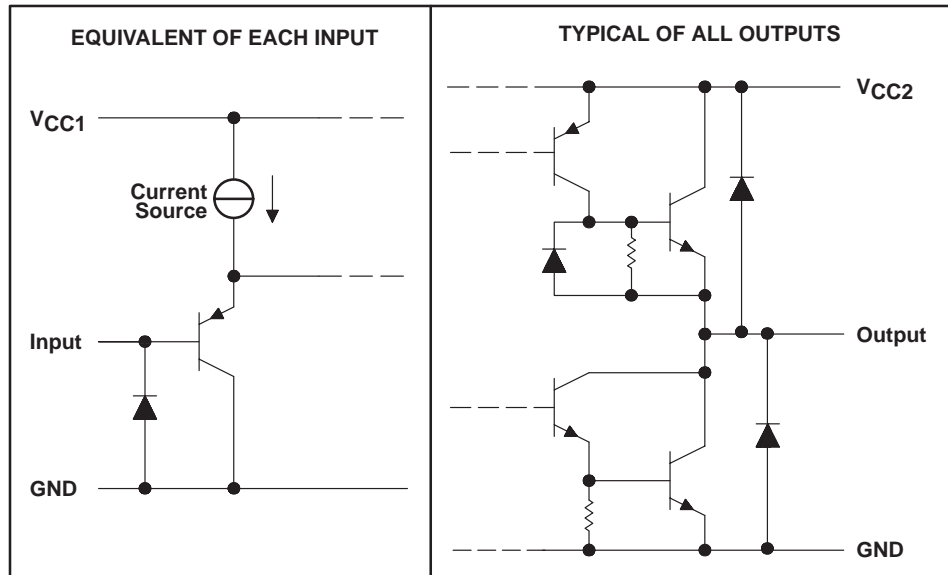
INPUTS‡		OUTPUT
A	EN	Y
H	H	H
L	H	L
X	L	Z

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, $t \leq 100 \mu\text{s}$)	± 1.2 A
Continuous output current, I_O	± 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_{stg}	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES: 1. All voltage values are with respect to the network ground terminal.
 2. For operation above 25°C free-air temperature, derate linearly at the rate of 16.6 mW/°C.
 3. 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.

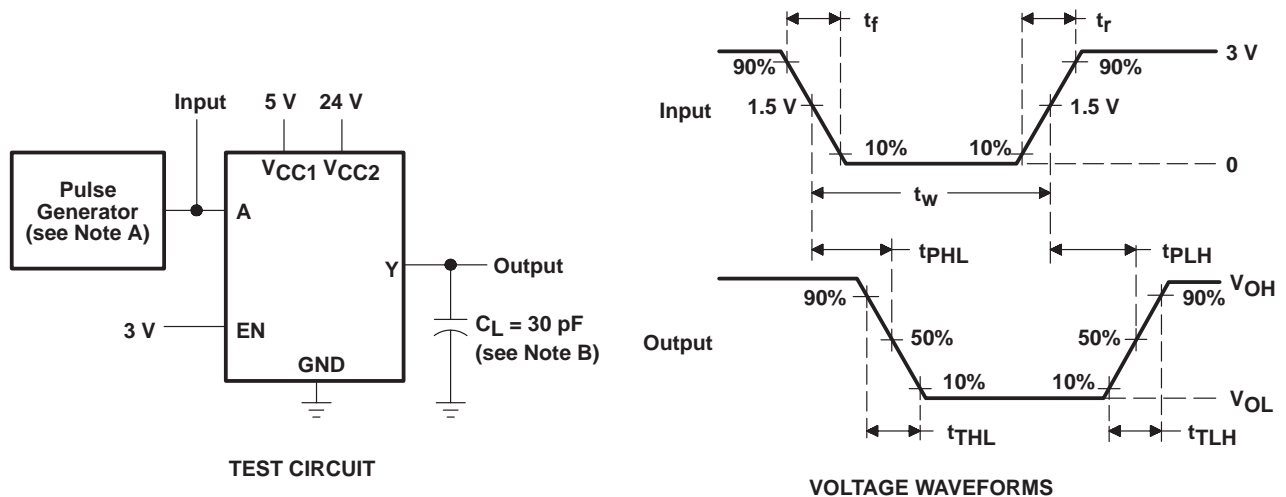
electrical characteristics, $V_{CC1} = 5\text{ V}$, $V_{CC2} = 24\text{ V}$, $T_A = 25^\circ\text{C}$

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	μA
		EN		0.2	± 10	
I_{IL}	Low-level input current	A	$V_I = 0$	-3	-10	μA
		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

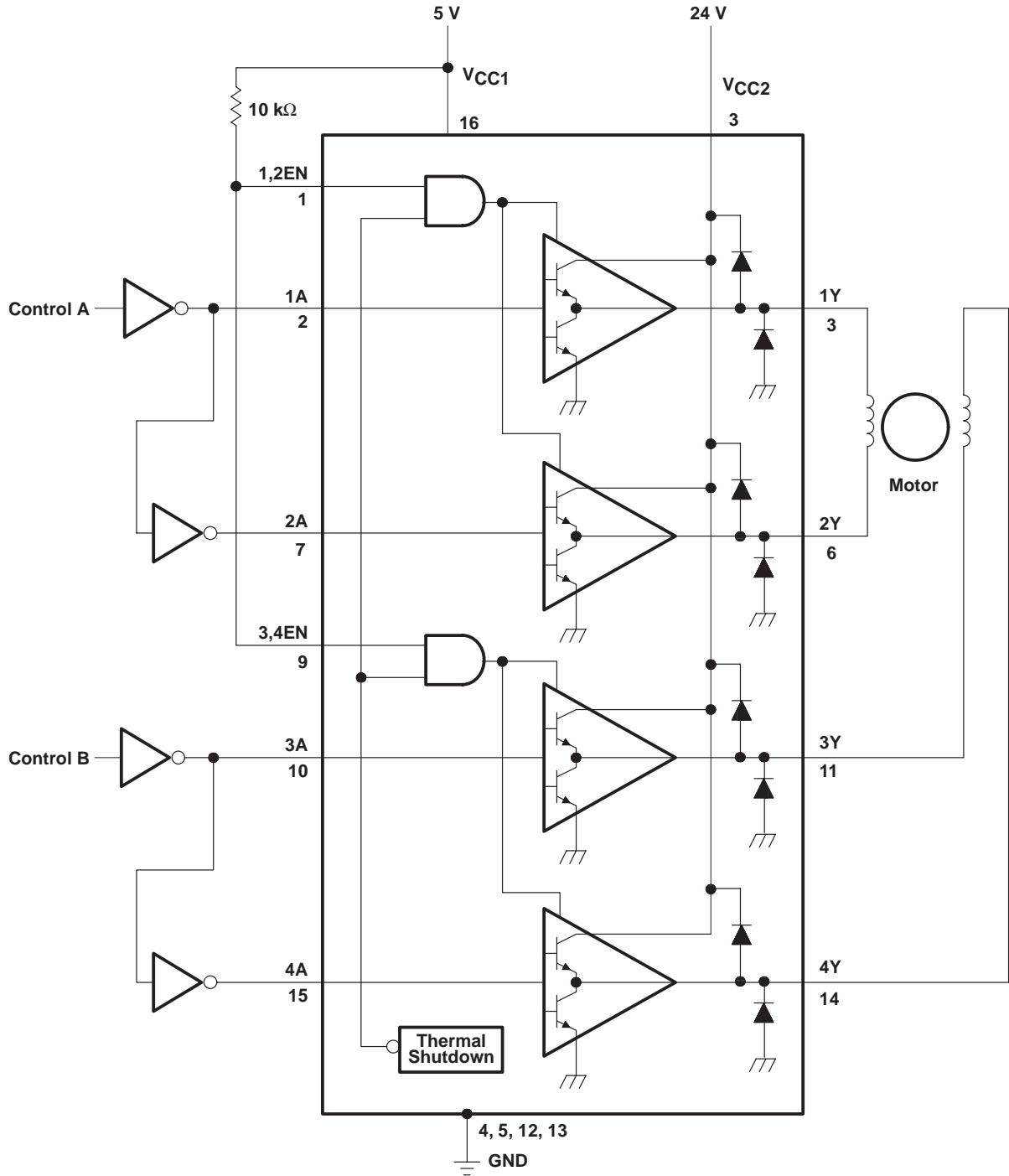


Figure 2. Two-Phase Motor Driver

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