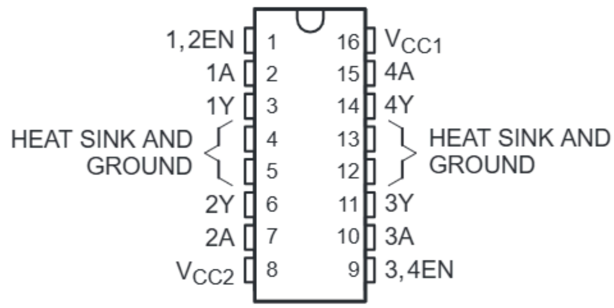
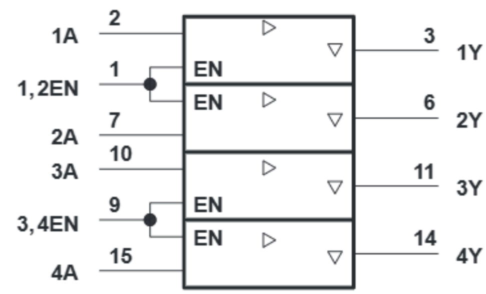
SLRS008A – SEPTEMBER 1986 – REVISED MAY 1990

- **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**

NE PACKAGE
(TOP VIEW)

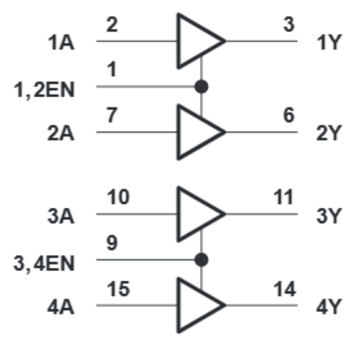


logic symbol†



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

logic diagram



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.

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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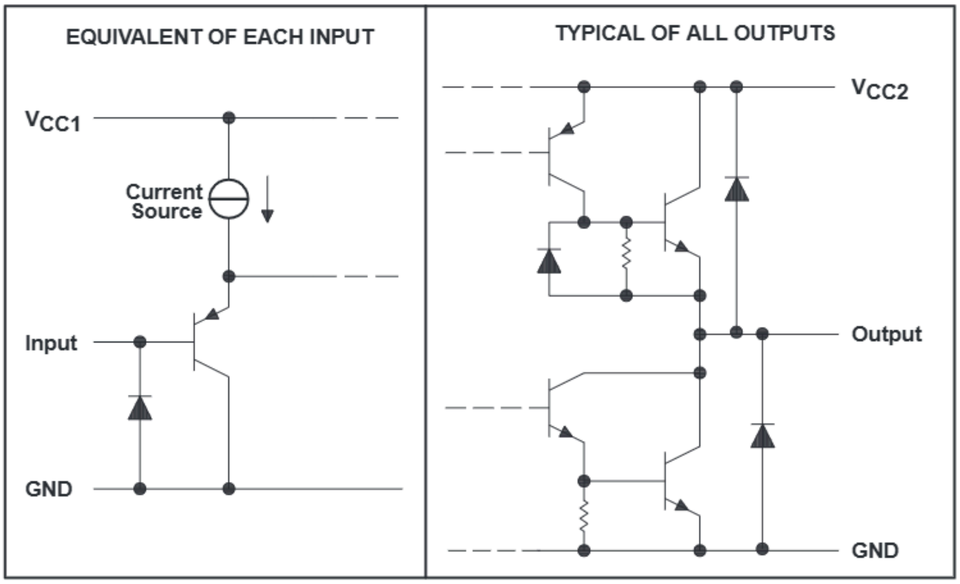
schematics of inputs and outputs



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, $t \leq 100\ \mu s$)	±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
	$V_{CC1} \geq 7$ 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.

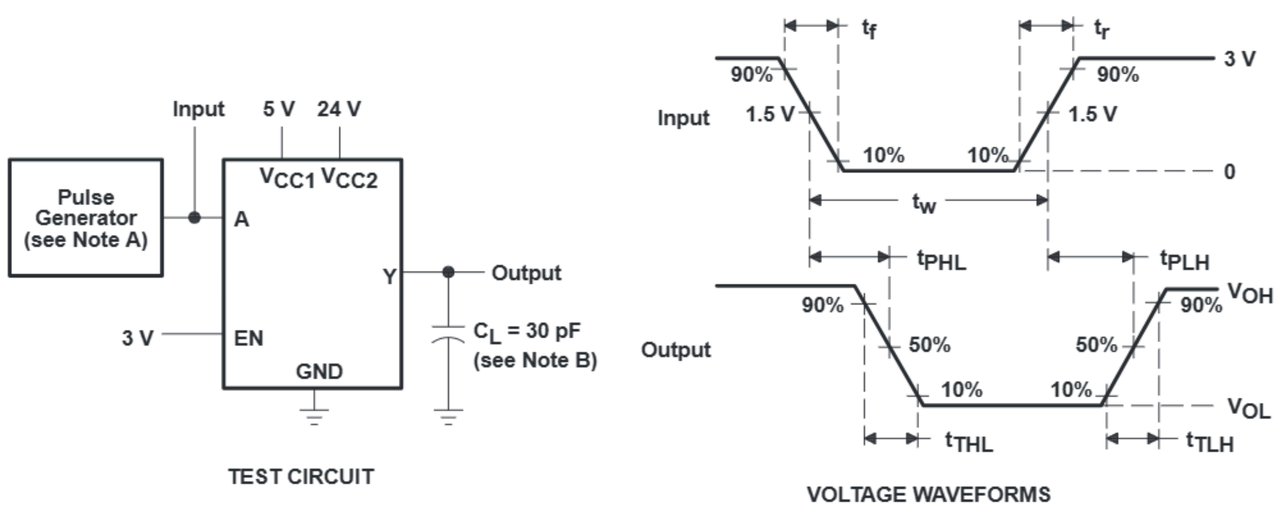
electrical characteristics, V_{CC1} = 5 V, V_{CC2} = 24 V, T_A = 25°C

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage		$I_{OH} = -0.6$ A		$V_{CC2}-1.8$	$V_{CC2}-1.4$		V
V_{OL}	Low-level output voltage		I_{OL} = 0.6 A			1.2	1.8	V
V_{OKH}	High-level output clamp voltage		$I_{OK} = -0.6$ A			$V_{CC2}+1.3$		V
V_{OKL}	Low-level output clamp voltage		$I_{OK} = -0.6$ A			1.3		V
I_{IH}	High-level input current	A	V_I = 7 V			0.2	100	∝A
		EN				0.2	±10	
I_{IL}	Low-level input current	A	V_I = 0			−3	−10	∝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 V, V_{CC2} = 24 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output from A input	C_L = 30 pF, See Figure 1		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: $t_r \le 10$ ns, $t_f \le 10$ ns, t_w = 10 ∝s, PRR = 5 kHz, Z_O = 50 Ω.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

APPLICATION INFORMATION

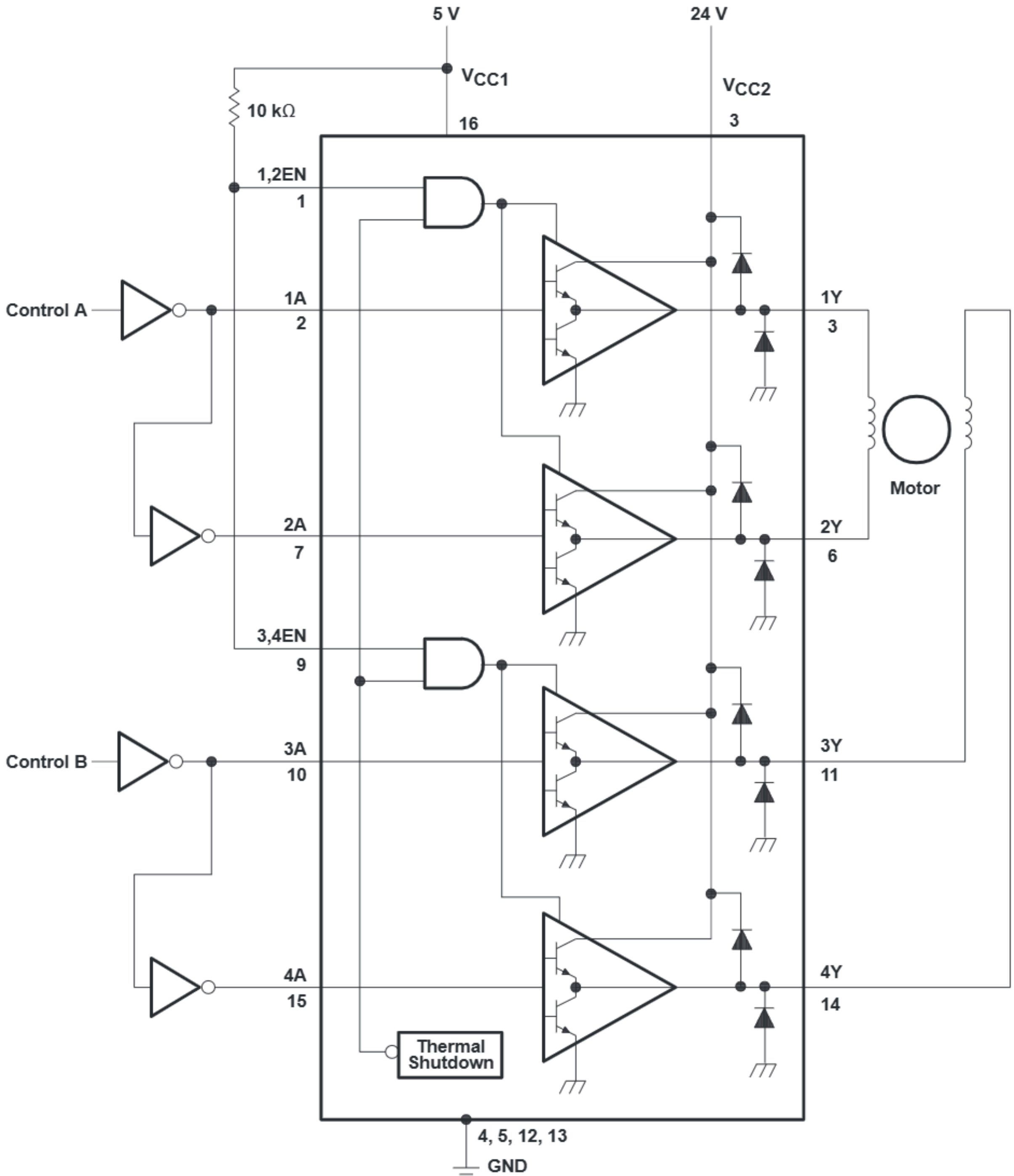


Figure 2. Two-Phase Motor Driver

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