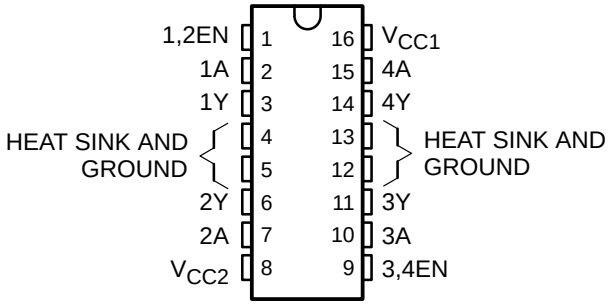
SLRS005A – SEPTEMBER 1986 – REVISED APRIL 2001

- **1-A Output Current Capability Per Driver**
- **Pulsed-Current 2-A Driver**
- **Wide Supply Voltage Range: 4.5 V to 36 V**
- **Separate Input-Logic Supply**
- **NE Package Designed for Heat Sinking**
- **Thermal Shutdown**
- **Internal ESD Protection**
- **High-Noise-Immunity Inputs**
- **Functional Replacement for SGS L293**

NE PACKAGE
(TOP VIEW)



description

The L293 is a quadruple high-current half-H driver designed to provide bidirectional drive currents of up to 1 A 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. When the enable input is low, those drivers are disabled and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

External high-speed output clamp diodes should be used for inductive transient suppression. A V_{CC1} terminal, separate from V_{CC2}, is provided for the logic inputs to minimize device power dissipation.

The L293 is characterized for operation from 0°C to 70°C.

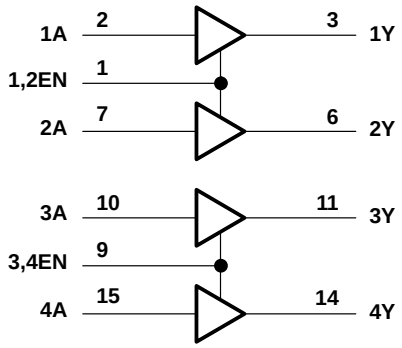
FUNCTION TABLE
(each driver)

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

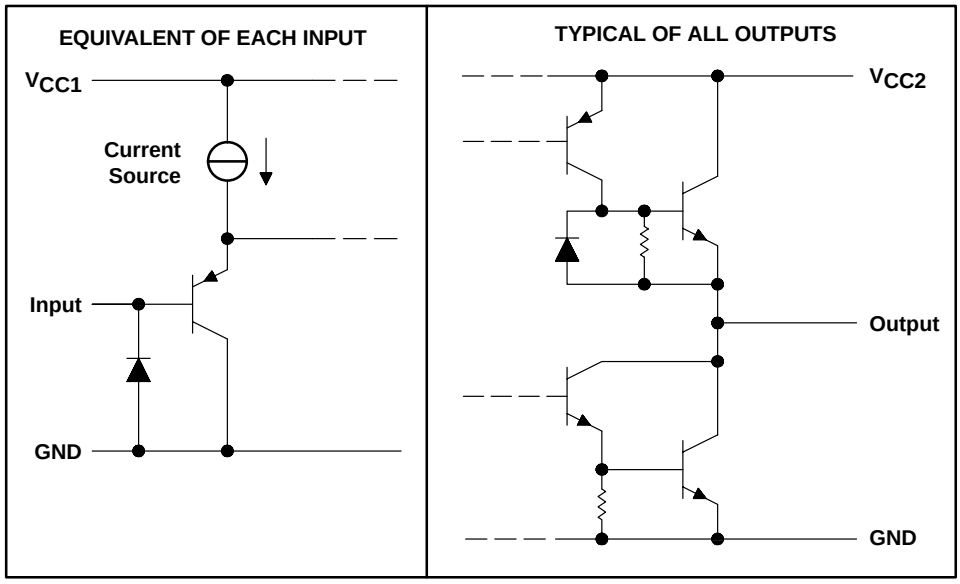
H = high level, L = low level, X = irrelevant, Z = high impedance (off)

† In the thermal shutdown mode, the output is in the high-impedance state, regardless of the input levels.

logic diagram



schematics of inputs and outputs



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

Supply voltage, V_{CC1} (see Note 1) . . . . . 36 V
Output supply voltage, V_{CC2} . . . . . 36 V
Input voltage, V_I . . . . . 7 V
Output voltage range, V_O . . . . . –3 V to V_{CC2} + 3 V
Peak output current, I_O (nonrepetitive, t ≤ 5 ms) . . . . . ±2 A
Continuous output current, I_O . . . . . ±1 A
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
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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
	Supply voltage	V_{CC1}	4.5	7	V
		V_{CC2}		36	
V_{IH}	High-level input voltage	V_{CC1} ≤ 7 V	2.3		V
		V_{CC1} ≥ 7 V	2.3	7	
V_{IL}	Low-level output voltage		–0.3†	1.5	V
T_A	Operating free-air temperature		0	70	°C

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

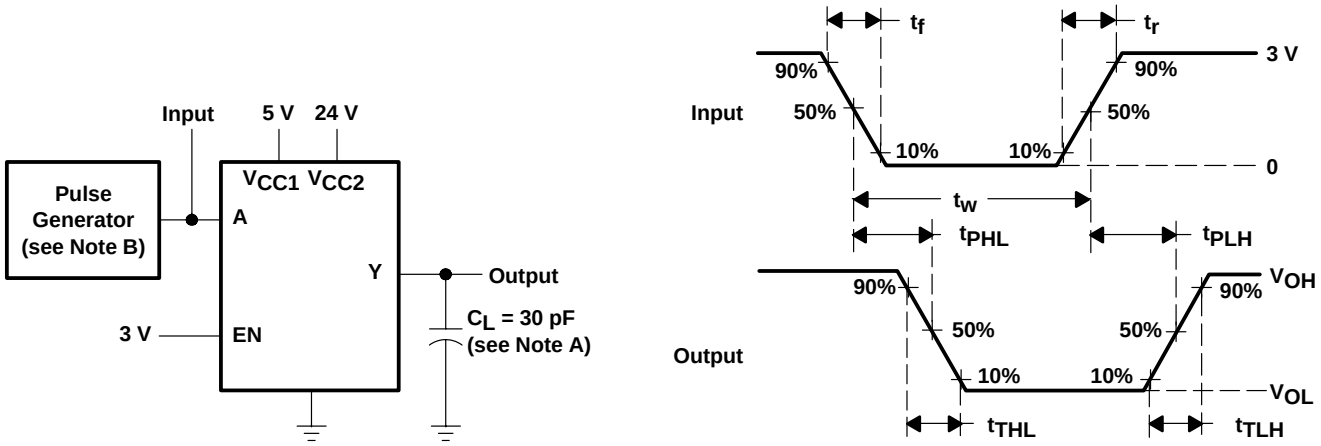
electrical characteristics, V_{CC1} = 5 V, V_{CC2} = 24 V, T_A = 25°C

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage		I_{OH} = –1 A		V_{CC2}–1.8	V_{CC2}–1.4		V
V_{OL}	Low-level output voltage		I_{OL} = 1 A			1.2	1.8	V
I_{IH}	High-level input current	A	V_I = 7 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 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	C_L = 30 pF,	See Figure 1		400		ns
t_{TLH}	Transition time, low-to-high-level output	C_L = 30 pF,	See Figure 1		300		ns
t_{THL}	Transition time, high-to-low-level output	C_L = 30 pF,	See Figure 1		300		ns

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT VOLTAGE WAVEFORMS

NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: $t_r \le 10$ ns, $t_f \le 10$ ns, t_W = 10 µs, PRR = 5 kHz, Z_O = 50 Ω.

Figure 1. Test Circuit and Voltage Waveforms

APPLICATION INFORMATION

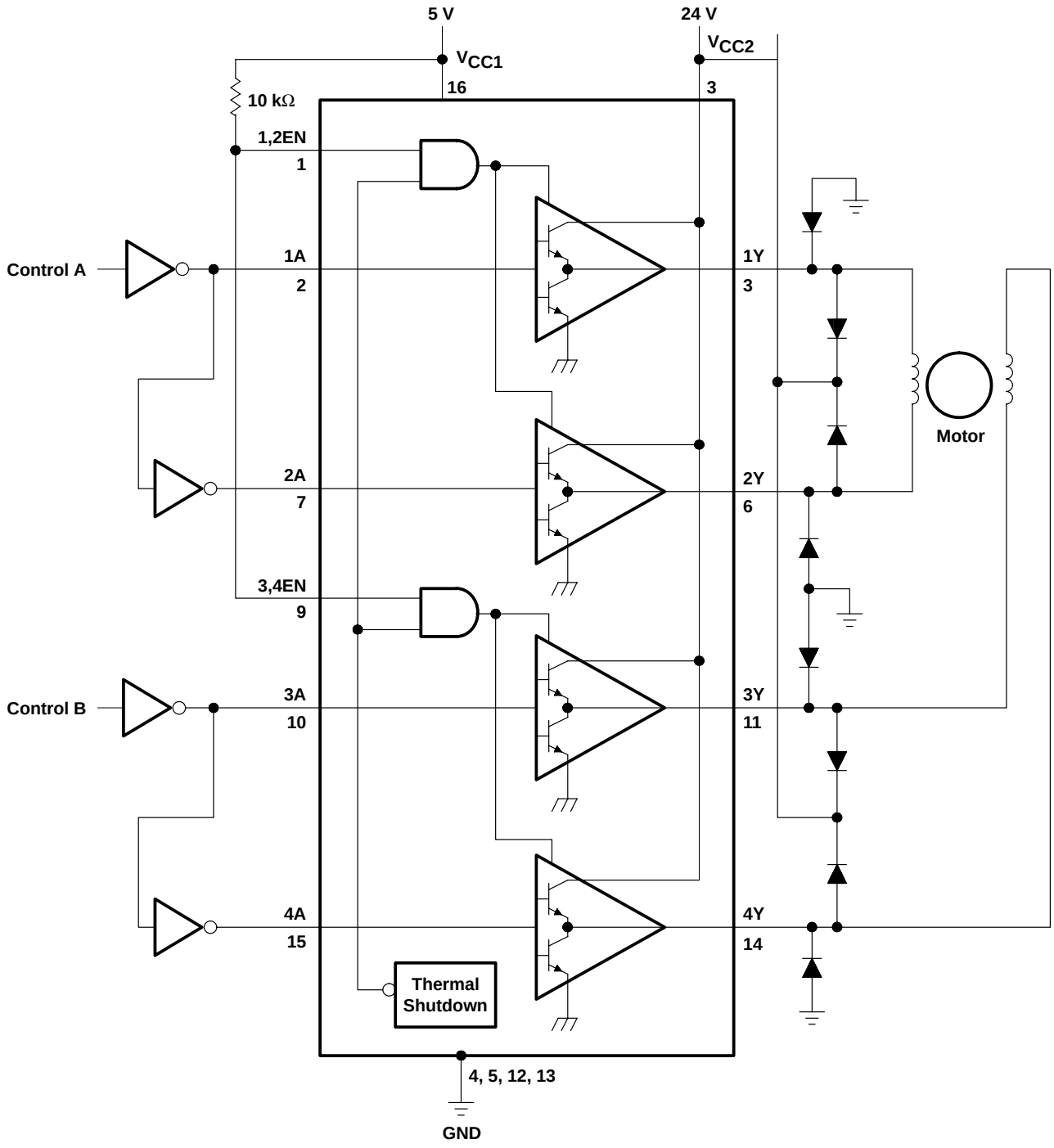


Figure 2. Two-Phase Motor Driver

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Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265