

HIGH-VOLTAGE HIGH-CURRENT DARLINGTON TRANSISTOR ARRAYS

SLDS115 – FEBRUARY 1998

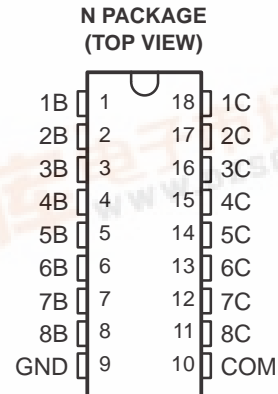
- 500-mA Rated Collector Current (Single Output)
- High-Voltage Outputs . . . 100 V
- Output Clamp Diodes
- Inputs Compatible With Various Types of Logic
- Relay Driver Applications
- Compatible With ULN2800A Series
- Packaged in Plastic (N) DIPs

description

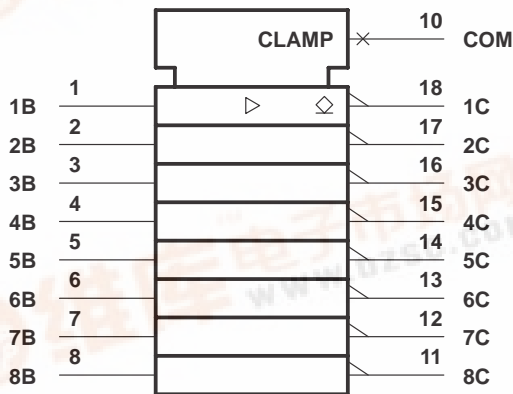
The SN75423 and SN75424 are monolithic high-voltage, high-current Darlington transistor arrays. Each consists of eight npn Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs can be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED and gas discharge), line drivers, and logic buffers.

The SN75423 has a 2700-Ω series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS. The SN75424 has a 10.5-kΩ series base resistor to allow operation directly with CMOS or PMOS that use supply voltages of 6 to 15 V.

The SN75423 and SN75424 are designed for operation from 0°C to 85°C.

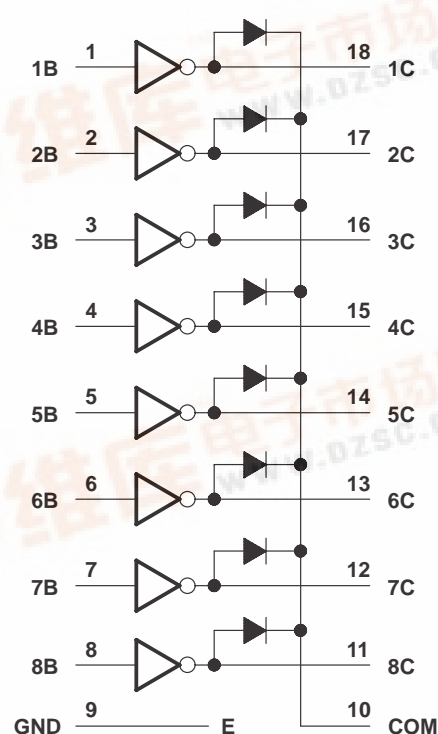


logic symbol†

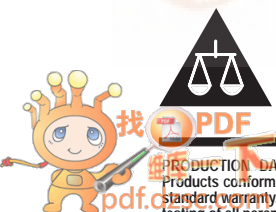


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)

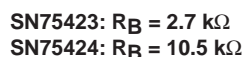


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schematic (each Darlington pair)



All resistor values shown are nominal.

absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)

Collector-emitter voltage, V_{CE}	100 V
Input voltage, V_I (see Note 1)	30 V
Continuous collector current	500 mA
Output clamp diode current, I_{OK}	500 mA
Total substrate-terminal current	-2.5 A
Continuous total power dissipation at or below 25°C free air temperature	1150 mW
Operating free-air temperature range, T_A	0°C to 85°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

NOTE 1: All voltage values are with respect to the emitter/substrate, terminal 9.

SN75423, SN75424
HIGH-VOLTAGE HIGH-CURRENT
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electrical characteristics, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST FIGURE	TEST CONDITIONS		SN75423			SN75424			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
$V_{I(on)}$ On-state input voltage	5	$V_{CE} = 2\text{ V}$	$I_C = 125\text{ mA}$						5	V
			$I_C = 200\text{ mA}$			2.4			6	
			$I_C = 250\text{ mA}$			2.7				
			$I_C = 275\text{ mA}$						7	
			$I_C = 300\text{ mA}$			3				
			$I_C = 350\text{ mA}$						8	
$V_{CE(sat)}$ Collector-emitter saturation voltage	6	$I_I = 250\text{ }\mu\text{A}$, $I_C = 100\text{ mA}$		0.9	1.1		0.9	1.1		V
		$I_I = 350\text{ }\mu\text{A}$, $I_C = 200\text{ mA}$		1	1.3		1	1.3		
		$I_I = 500\text{ }\mu\text{A}$, $I_C = 350\text{ mA}$		1.2	1.6		1.2	1.6		
V_F Clamp-diode forward voltage	8	$I_F = 350\text{ mA}$			1.7	2		1.7	2	V
I_{CEX} Collector cutoff current	1	$V_{CE} = 100\text{ V}$, $I_I = 0$				100			100	μA
	2	$V_{CE} = 100\text{ V}$, $V_I = 1\text{ V}$, $T_A = 70^\circ\text{C}$							500	
$I_{I(off)}$ Off-state input current	3	$V_{CE} = 100\text{ V}$, $I_C = 500\text{ }\mu\text{A}$, $T_A = 70^\circ\text{C}$		50	65		50	65		μA
$I_{I(on)}$ Input current	4	$V_I = 3.85\text{ V}$			0.93	1.35				mA
		$V_I = 5\text{ V}$						0.35	0.5	
		$V_I = 12\text{ V}$						1	1.45	
I_R Clamp-diode reverse current	7	$V_R = 100\text{ V}$				50			50	μA
C_i Input capacitance		$V_I = 0$, $f = 1\text{ MHz}$			15	30		15	30	pF

switching characteristics, $T_A = 25^\circ\text{C}$ free-air temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} Propagation delay time, low-to-high-level output	$V_S = 50\text{ V}$, $R_L = 163\text{ }\Omega$, $C_L = 15\text{ pF}$, See Figure 9		130		ns
t_{PHL} Propagation delay time, high-to-low-level output	$V_S = 50\text{ V}$, $R_L = 163\text{ }\Omega$, $C_L = 15\text{ pF}$, See Figure 9		20		ns
V_{OH} High-level output voltage after switching	$V_S = 60\text{ V}$, $I_O \approx 300\text{ mA}$, See Figure 10	$V_S - 20$			mV

PARAMETER MEASUREMENT INFORMATION

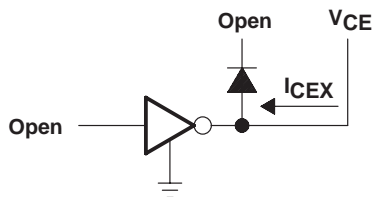


Figure 1. I_{CEX}

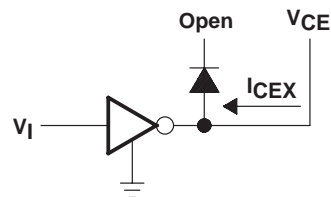


Figure 2. I_{CEX}

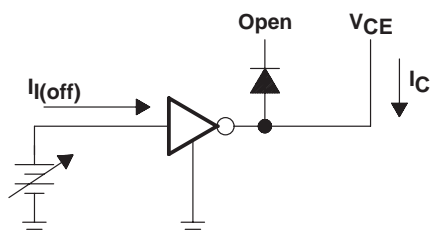


Figure 3. $I_{I(off)}$

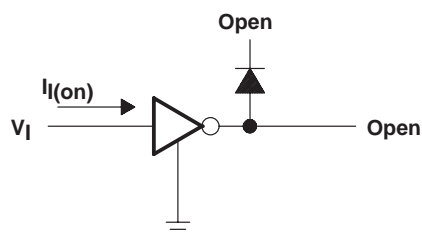


Figure 4. $I_{I(on)}$

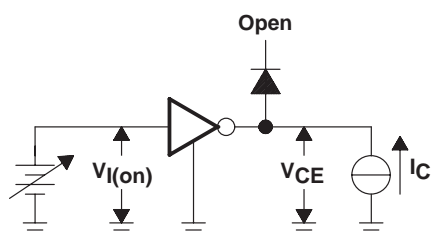


Figure 5. $V_{I(on)}$

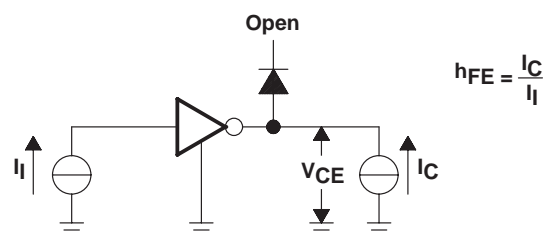


Figure 6. h_{FE} , $V_{CE(sat)}$

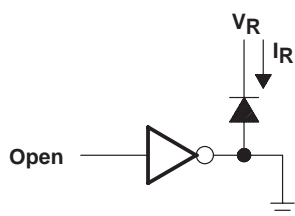


Figure 7. I_R

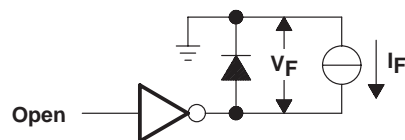
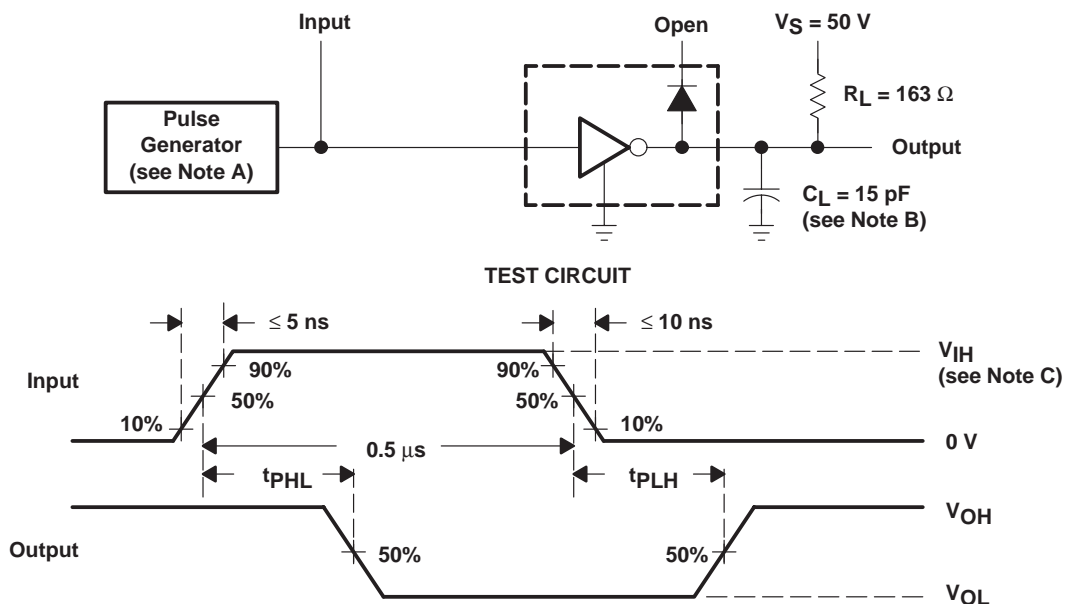


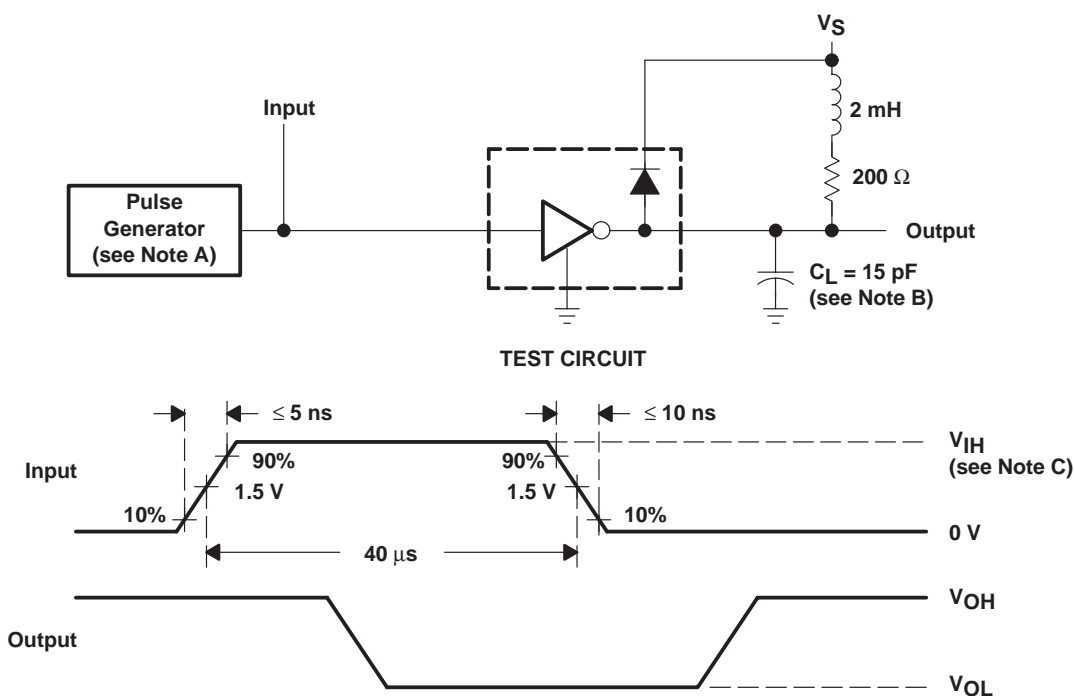
Figure 8. V_F

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. The pulse generator has the following characteristics: PRR = 12.5 kHz, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.
C. For testing the SN75423, $V_{IH} = 3$ V; for the SN75424, $V_{IH} = 8$ V.

Figure 9. Propagation Delay Test Circuit and Voltage Waveforms



- NOTES: A. The pulse generator has the following characteristics: PRR = 12.5 kHz, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.
C. For testing the SN75423, $V_{IH} = 3$ V; for the SN75424, $V_{IH} = 8$ V.

Figure 10. Latch-Up Test Circuit and Voltage Waveforms

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