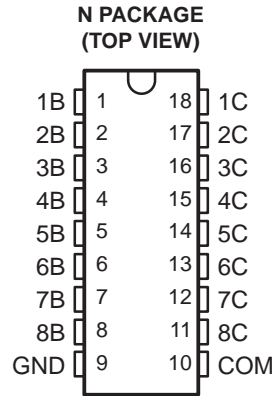


# SN75423, SN75424 HIGH-VOLTAGE HIGH-CURRENT DARLINGTON TRANSISTOR ARRAYS

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



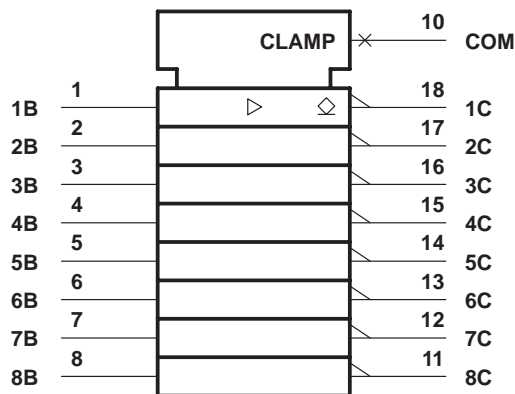
## description

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

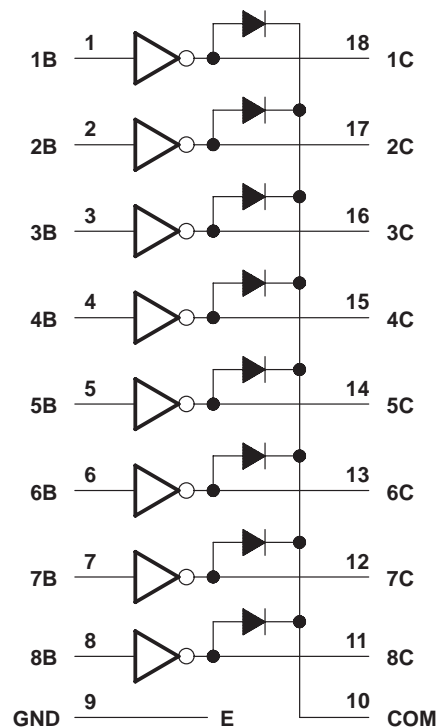
The SN75423 and SN75424 are designed for operation from 0°C to 85°C.

## 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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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

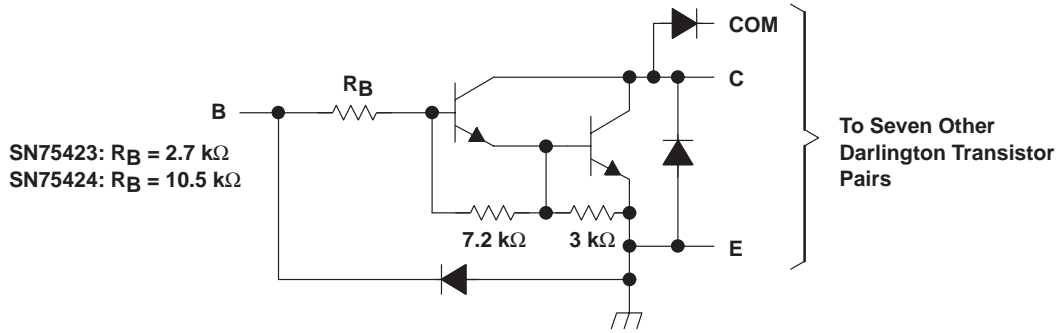
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**SN75423, SN75424**  
**HIGH-VOLTAGE HIGH-CURRENT**  
**DARLINGTON TRANSISTOR ARRAYS**

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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.

**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	$I_I = 250\ \mu\text{A}, I_C = 100\text{ mA}$		0.9	1.1		0.9	1.1	V		
		$I_I = 350\ \mu\text{A}, I_C = 200\text{ mA}$		1	1.3		1	1.3			
		$I_I = 500\ \mu\text{A}, I_C = 350\text{ mA}$		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	$\mu\text{A}$		
	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	$V_{CE} = 100\text{ V}, I_C = 500\ \mu\text{A}, T_A = 70^\circ\text{C}$	50	65		50	65		$\mu\text{A}$		
$I_{I(on)}$ 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	$\mu\text{A}$		
$C_i$ 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	$V_S = 50\text{ V}, R_L = 163\ \Omega, C_L = 15\text{ pF},$ See Figure 9		130		ns
$t_{PHL}$ Propagation delay time, high-to-low-level output	$V_S = 50\text{ V}, R_L = 163\ \Omega, C_L = 15\text{ pF},$ 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

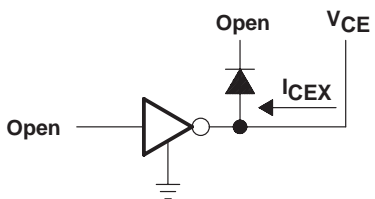


Figure 1.  $I_{CEX}$

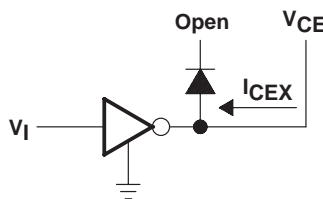


Figure 2.  $I_{CEX}$

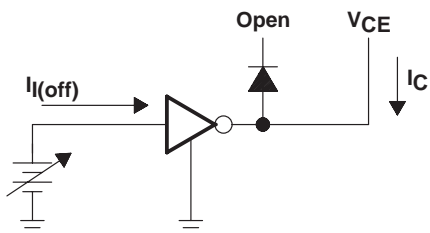


Figure 3.  $I_{I(off)}$

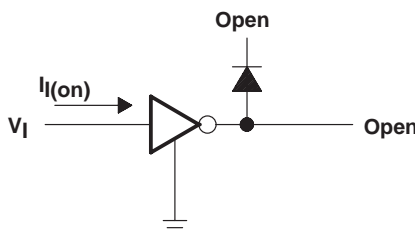


Figure 4.  $I_{I(on)}$

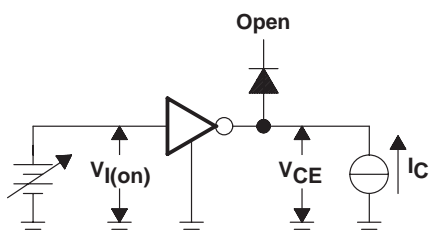


Figure 5.  $V_{I(on)}$

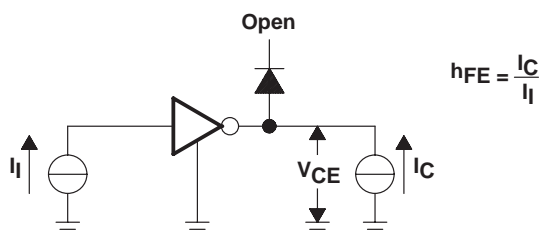


Figure 6.  $h_{FE}$ ,  $V_{CE(sat)}$

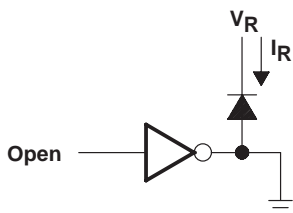


Figure 7.  $I_R$

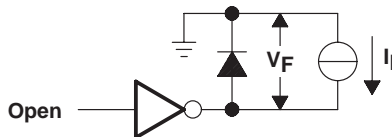
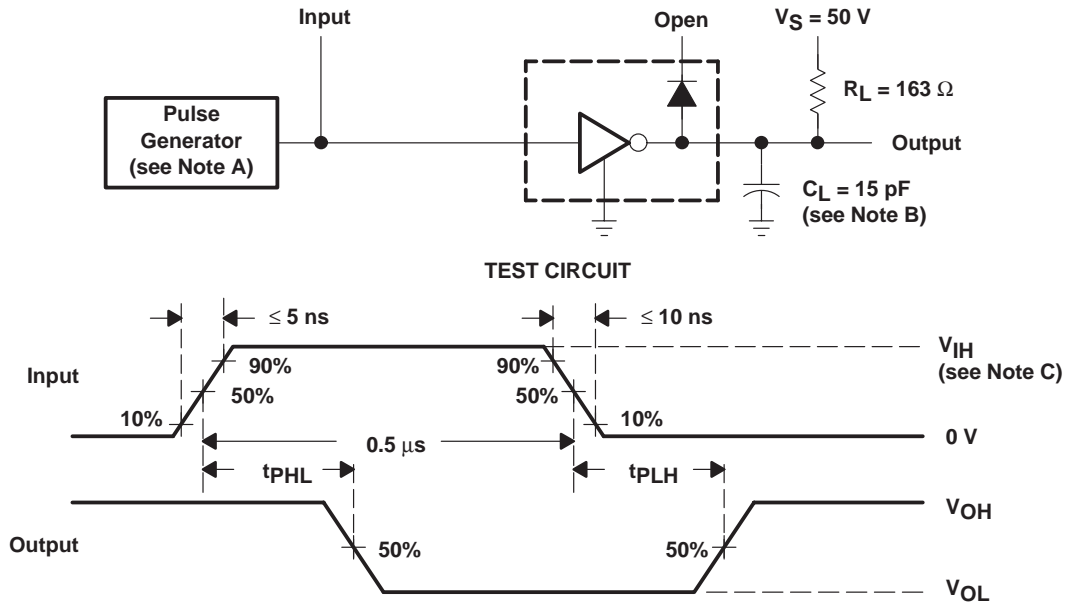


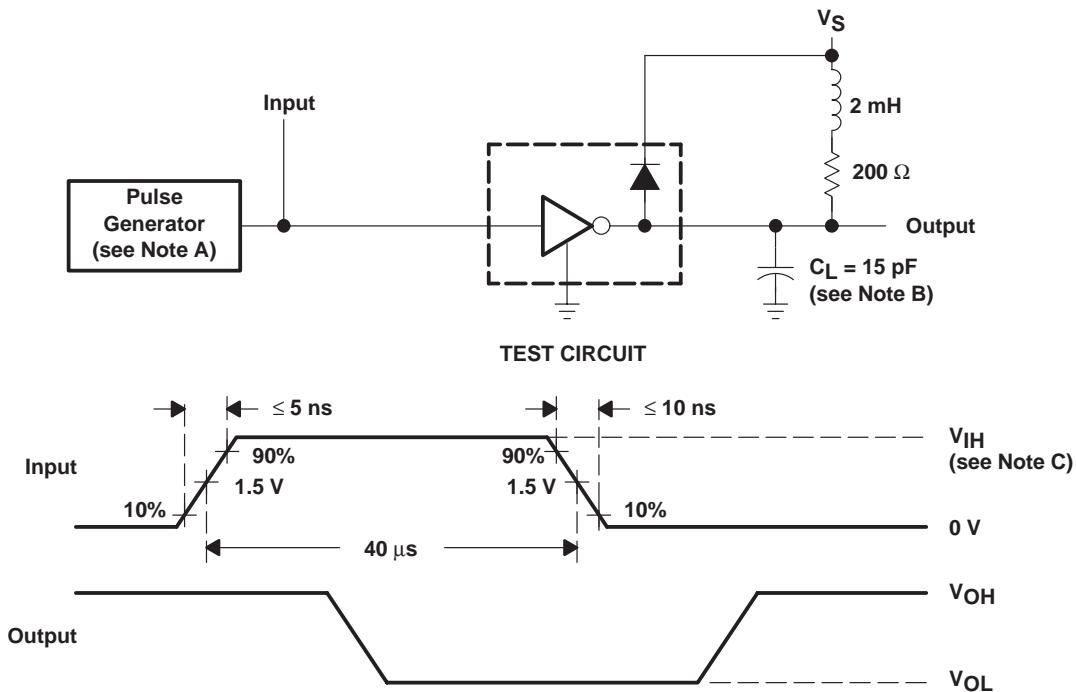
Figure 8.  $V_F$

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,  $V_{IH} = 3 \text{ V}$ ; for the SN75424,  $V_{IH} = 8 \text{ V}$ .

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,  $V_{IH} = 3 \text{ V}$ ; for the SN75424,  $V_{IH} = 8 \text{ V}$ .

Figure 10. Latch-Up Test Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN75423N	OBSOLETE	PDIP	N	18		TBD	Call TI	Call TI
SN75423N-90	OBSOLETE	PDIP	N	18		TBD	Call TI	Call TI

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

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<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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