

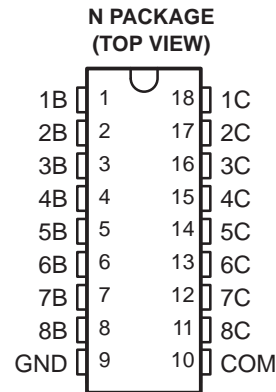
- 500 mA Rated Collector Current (Single Output)
- High-Voltage Outputs . . . 50 V
- Output Clamp Diodes
- Inputs Compatible With Various Types of Logic
- Relay Driver Applications
- Compatible with ULN2800A Series

description

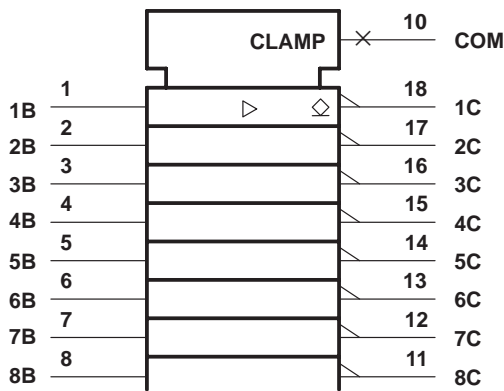
The ULN2803A is a monolithic high-voltage, high-current Darlington transistor array. The device consists of eight npn Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may 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 ULN2803A has a 2.7-k Ω series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS devices.

The ULN2803A is offered in a standard 18-pin dual in-line (N) package. The device is characterized for operation over the temperature range of -20°C to 85°C .

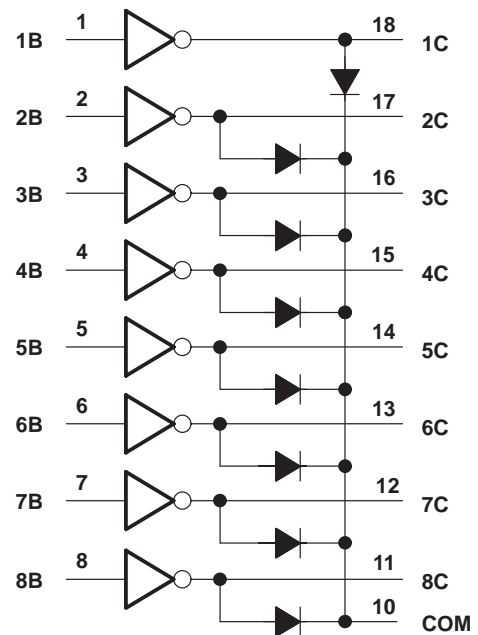


logic symbol†



† 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**

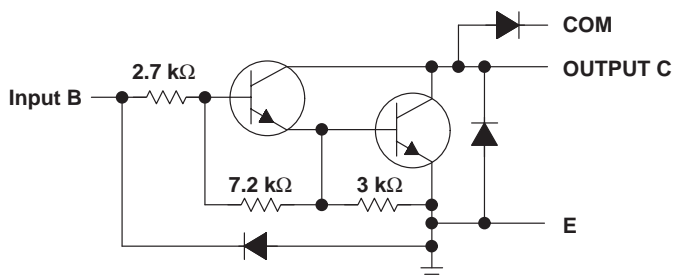
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ULN2803A DARLINGTON TRANSISTOR ARRAY

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schematic (each Darlington pair)



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

Collector-emitter voltage	50 V
Input voltage (see Note 1)	30 V
Continuous collector current	500 mA
Output clamp diode current	500 mA
Total substrate-terminal current	–2.5 A
Continuous dissipation at (or below) 25°C free-air temperature	1150 mW
Operating free-air temperature range, T_A	–20°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

† 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 voltages values, unless otherwise noted, are with respect to the emitter/substrate terminal GND.

electrical characteristics at 25°C free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT				
I_{CEX}	Collector cutoff current	$V_{CE} = 50\text{ V}$, See Figure 1 $I_I = 0$,			50	μA				
$I_{I(off)}$	Off-state input current	$V_{CE} = 50\text{ V}$, $T_A = 70^\circ\text{C}$, $I_C = 500\ \mu\text{A}$, See Figure 2	50	65		μA				
$I_{I(on)}$	Input current	$V_I = 3.85\text{ V}$, See Figure 3		0.93	1.35	mA				
$V_{I(on)}$	On-state input voltage	$V_{CE} = 2\text{ V}$, See Figure 4			$I_C = 200\text{ mA}$	2.4	V			
					$I_C = 250\text{ mA}$	2.7				
					$I_C = 300\text{ mA}$	3				
$V_{CE(sat)}$	Collector emitter saturation voltage	$I_I = 250\ \mu\text{A}$, See Figure 5	$I_C = 100\text{ mA}$,			0.9	1.1	V		
						$I_I = 350\ \mu\text{A}$, See Figure 5	$I_C = 200\text{ mA}$,		1	1.3
						$I_I = 500\ \mu\text{A}$, See Figure 5	$I_C = 350\text{ mA}$,		1.3	1.6
I_R	Clamp diode reverse current	$V_R = 50\text{ V}$, See Figure 6			50	μA				
V_F	Clamp diode forward voltage	$I_F = 350\text{ mA}$, See Figure 7		1.7	2	V				
C_i	Input capacitance	$V_I = 0\text{ V}$, $f = 1\text{ MHz}$		15	25	pF				

switching characteristics at 25°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 8		130		ns
t_{PHL}	Propagation delay time, high-to-low level output			20		
V_{OH}	High-level output voltage after switching	$V_S = 50\text{ V}$, See Figure 9 $I_O \approx 300\text{ mA}$,	$V_S - 20$			mV

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PARAMETER MEASUREMENT INFORMATION

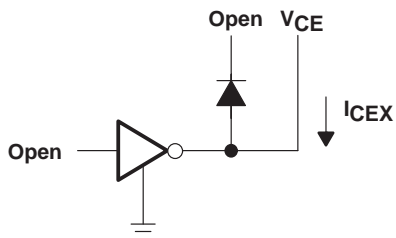


Figure 1. I_{CEX} Test Circuit

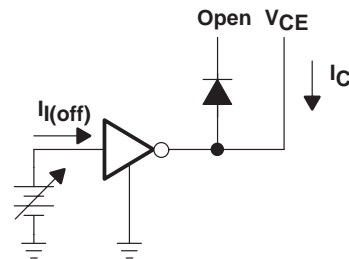


Figure 2. $I_{I(off)}$ Test Circuit

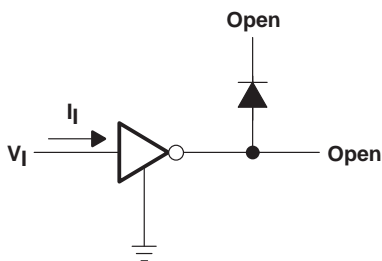


Figure 3. $I_{I(on)}$ Test Circuit

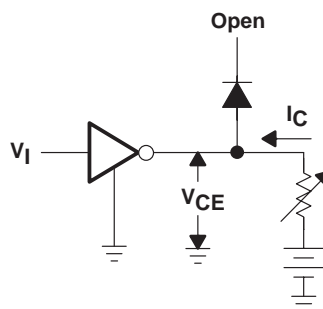


Figure 4. $V_{I(on)}$ Test Circuit

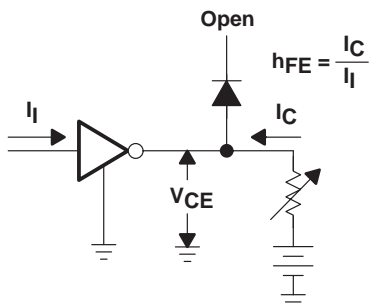


Figure 5. h_{FE} , $V_{CE(sat)}$ Test Circuit

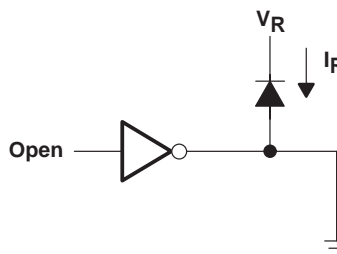


Figure 6. I_R Test Circuit

PARAMETER MEASUREMENT INFORMATION

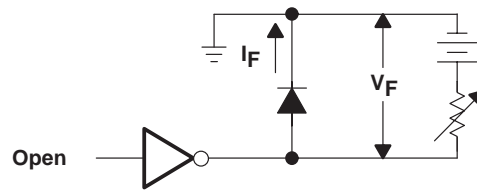
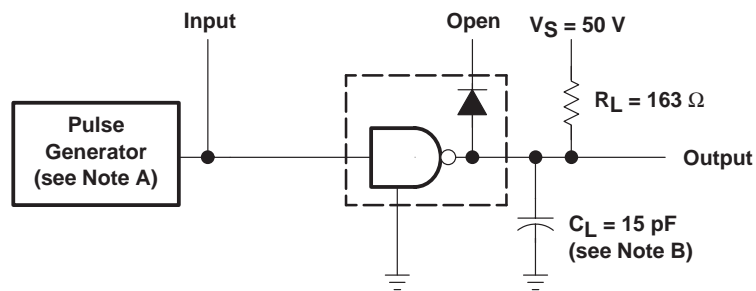
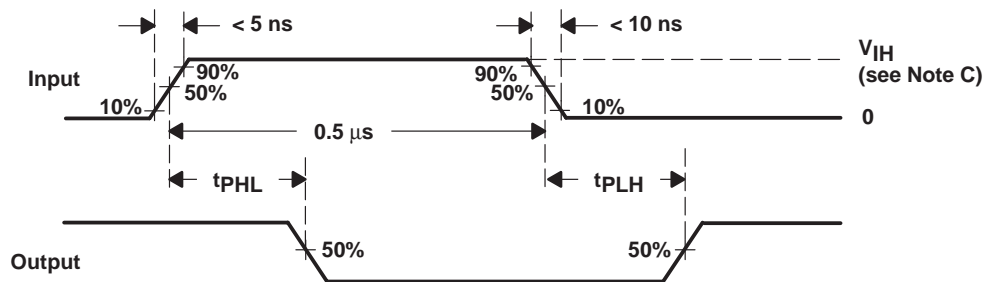


Figure 7. V_F Test Circuit



Test Circuit



Voltage Waveforms

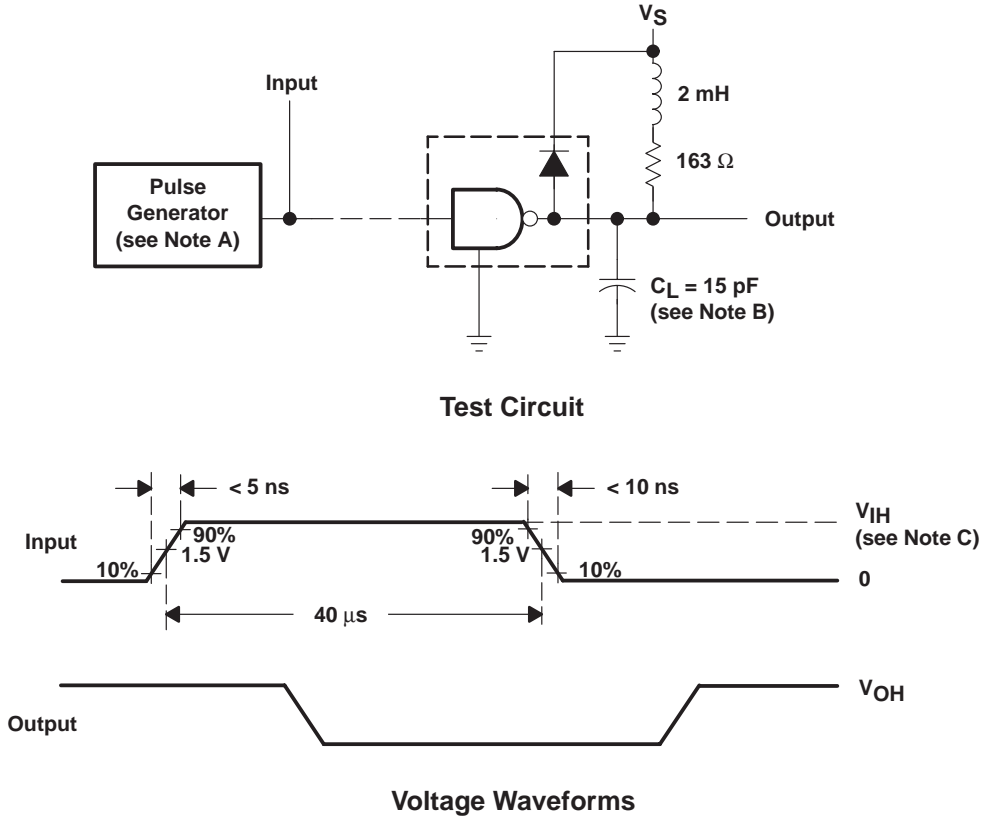
- NOTES: A. The pulse generator has the following characteristics: PRR = 1 MHz, $Z_O = 50 \Omega$.
 B. C_L includes probe and jig capacitance.
 C. $V_{IH} = 3 \text{ V}$

Figure 8. Propagation Delay Times

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- 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. $V_{IH} = 3 \text{ V}$

Figure 9. Latch-Up Test

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