HIGH-VOLTAGE HIGH-CURRENT DARLINGTON TRANSISTOR ARRAYS
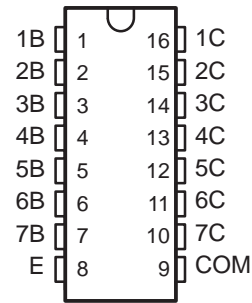
- **500-mA Rated Collector Current (Single Output)**
- **High-Voltage Outputs . . . 100 V**
- **Output Clamp Diodes**
- **Inputs Compatible With Various Types of Logic**
- **Relay Driver Applications**
- **Higher-Voltage Versions of ULN2003A and ULN2004A, for Commercial Temperature Range**

D OR N PACKAGE
(TOP VIEW)

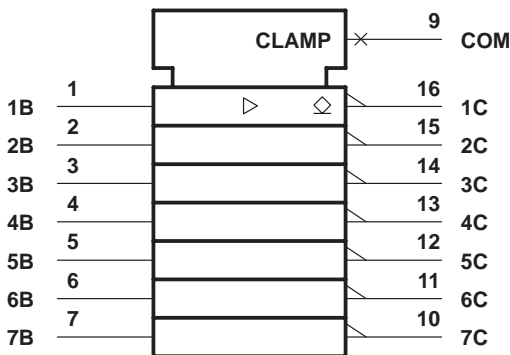|			
1B	1	16	1C
2B	2	15	2C
3B	3	14	3C
4B	4	13	4C
5B	5	12	5C
6B	6	11	6C
7B	7	10	7C
E	8	9	COM

description

The SN75468 and SN75469 are monolithic high-voltage, high-current Darlington transistor arrays. Each consists of seven 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.
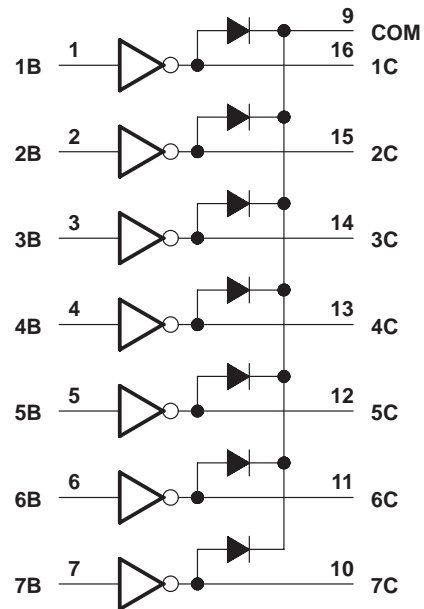
The SN75468 has a 2700-Ω series base resistor for each Darlington pair for operation directly with TTL or 5-V CMOS. The SN75469 has a 10.5-kΩ series base resistor to allow its operation directly with CMOS or PMOS that use supply voltages of 6 to 15 V. The required input current is below that of the SN75468.

logic symbol[†]

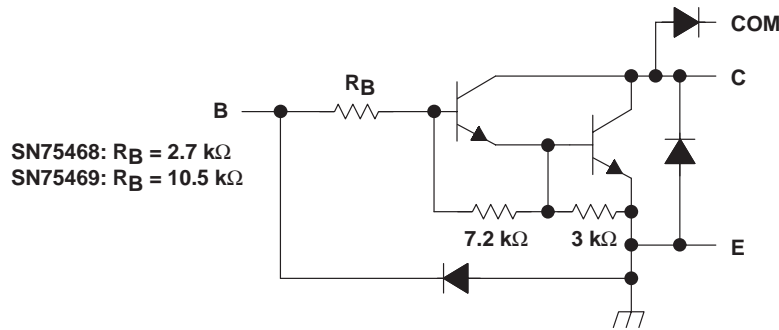[†] This symbol is in accordance with ANSI/IEEE Std91-1984 and IEC publication 617-12.

logic diagram

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SN75468, SN75469
DARLINGTON TRANSISTOR ARRAYS

schematic (each Darlington pair)

SN75468: R_B = 2.7 kΩ
SN75469: R_B = 10.5 kΩ

7.2 kΩ 3 kΩ

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
Peak collector current (see Figures 14 and 15) .... 500 mA
Output clamp current, I_{OK} .... 500 mA
Total emitter-terminal current .... −2.5 A
Continuous total power dissipation .... See Dissipation Rating Table
Operating free-air temperature range, T_A .... 0°C to 70°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 E, unless otherwise noted.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25$°C POWER RATING	DERATING FACTOR ABOVE $T_A = 25$°C	$T_A = 70$°C POWER RATING
D	950 mW	7.6 mW/°C	608 mW
N	1150 mW	9.2 mW/°C	736 mW

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electrical characteristics, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST FIGURE	TEST CONDITIONS		SN75468			SN75469			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
$V_{I(on)}$	On-state input voltage	5	V_{CE} = 2 V	I_C = 125 mA						5	V
				I_C = 200 mA			2.4			6	
				I_C = 250 mA			2.7				
				I_C = 275 mA						7	
				I_C = 300 mA			3				
				I_C = 350 mA						8	
$V_{CE(sat)}$	Collector-emitter saturation voltage	6	I_I = 250 µA,	I_C = 100 mA		0.9	1.1		0.9	1.1	V
			I_I = 350 µA,	I_C = 200 mA		1	1.3		1	1.3	
			I_I = 500 µA,	I_C = 350 mA		1.2	1.6		1.2	1.6	
V_F	Clamp-diode forward voltage	8	I_F = 350 mA			1.7	2		1.7	2	V
I_{CEX}	Collector cutoff current	1	V_{CE} = 100 V,	I_I = 0			50			50	µA
			V_{CE} = 100 V,	I_I = 0			100			100	
		2	T_A = 70°C	V_I = 1 V						500	
$I_{I(off)}$	Off-state input current	3	V_{CE} = 50 V, T_A = 70°C	I_C = 500 µA,	50	65		50	65		µA
I_I	Input current	4	V_I = 3.85 V			0.93	1.35				mA
			V_I = 5 V						0.35	0.5	
			V_I = 12 V						1	1.45	
I_R	Clamp-diode reverse current	7	V_R = 100 V				50			50	µA
			V_R = 100 V,	T_A = 70°C			100			100	
C_i	Input capacitance		V_I = 0,	f = 1 MHz		15	25		15	25	pF

switching characteristics, T_A = 25°C free-air temperature

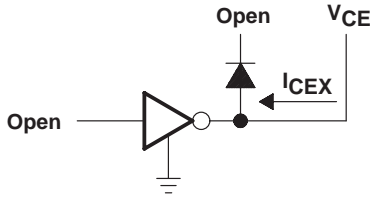| PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	V_S = 50 V,	R_L = 163 Ω,	C_L = 15 pF,		0.25	1	µs
t_{PHL}	Propagation delay time, high-to-low-level output	See Figure 9				0.25	1	µs
V_{OH}	High-level output voltage after switching	V_S = 50 V,	I_O ≈ 300 mA,	See Figure 10	$V_S - 20$			mV

PARAMETER MEASUREMENT INFORMATION

Figure 1. I_{CEX}
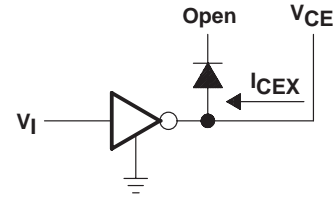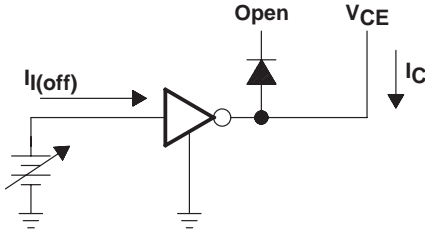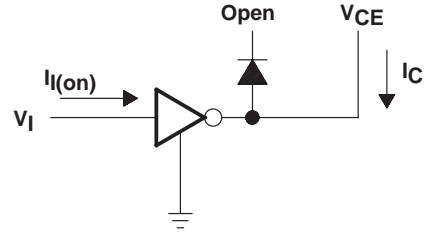
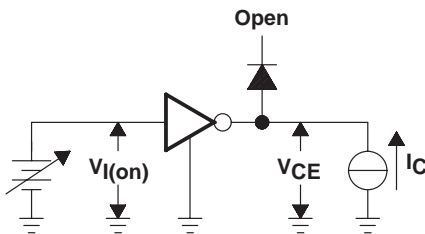Figure 2. I_{CEX}

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

Figure 4. I_I
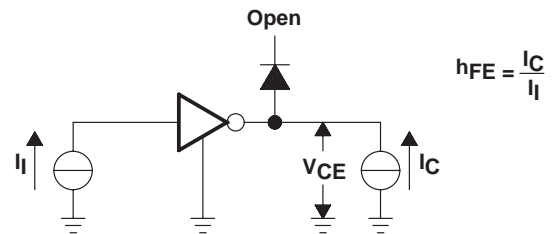
Figure 5. $V_{I(on)}$

$$h_{FE} = \frac{I_C}{I_I}$$

NOTE: I_I is fixed for measuring $V_{CE(sat)}$, variable for measuring h_{FE}.

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

Figure 7. I_R

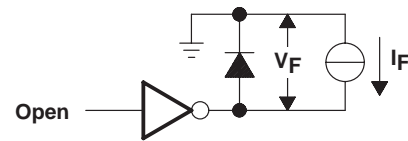Figure 8. V_F

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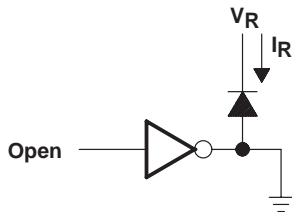
PARAMETER MEASUREMENT INFORMATION

TEST CIRCUIT

VOLTAGE WAVEFORMS
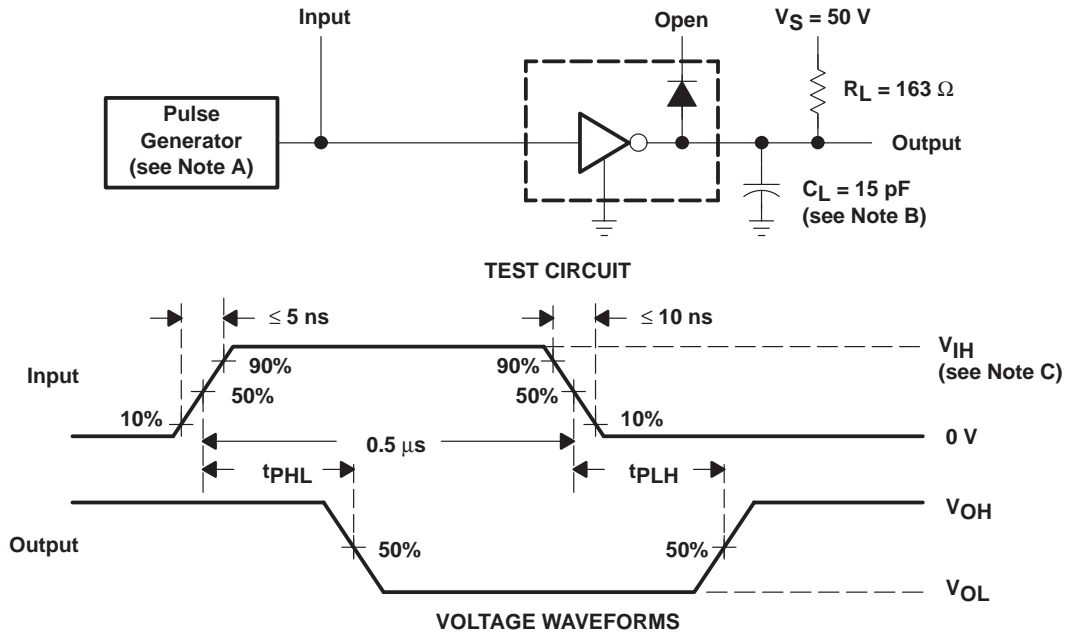
Figure 9. Test Circuit and Voltage Waveforms

TEST CIRCUIT
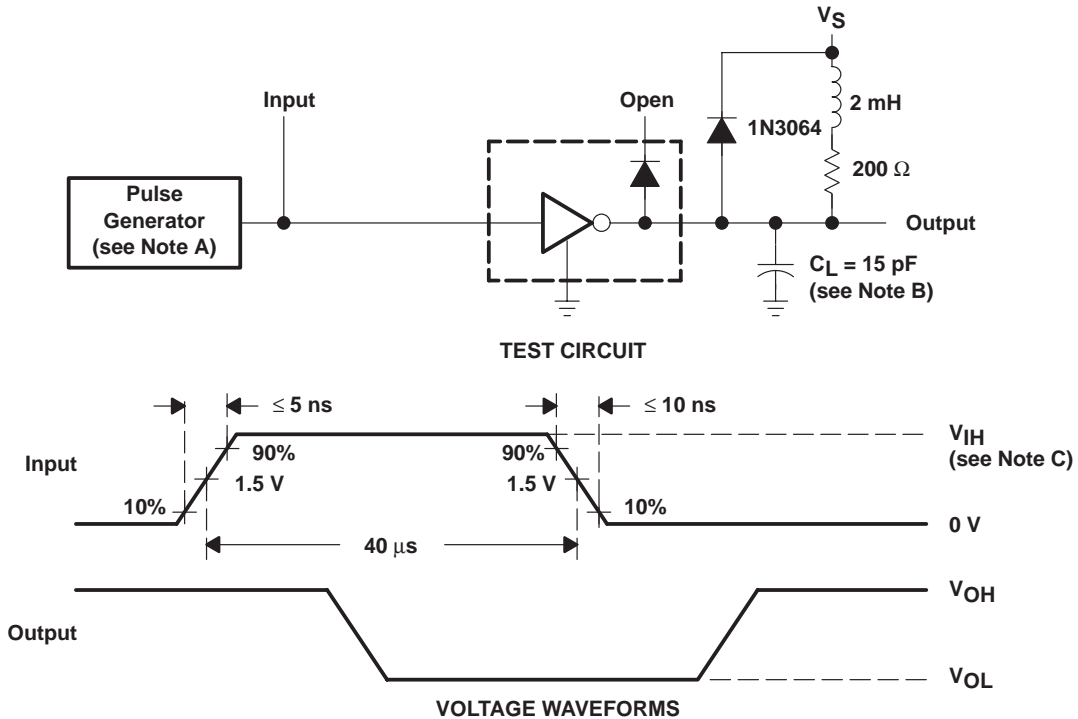
VOLTAGE WAVEFORMS

Figure 10. Latch-Up Test Circuit and Voltage Waveforms

NOTES: A. The pulse generator has the following characteristics: PRR = 12.5 kHz, Z_O = 50 Ω.
      B. C_L includes probe and jig capacitance.
      C. For testing the '468, V_{IH} = 3 V; for the '469, V_{IH} = 8 V.

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TYPICAL CHARACTERISTICS

COLLECTOR-EMITTER
SATURATION VOLTAGE
vs
COLLECTOR CURRENT
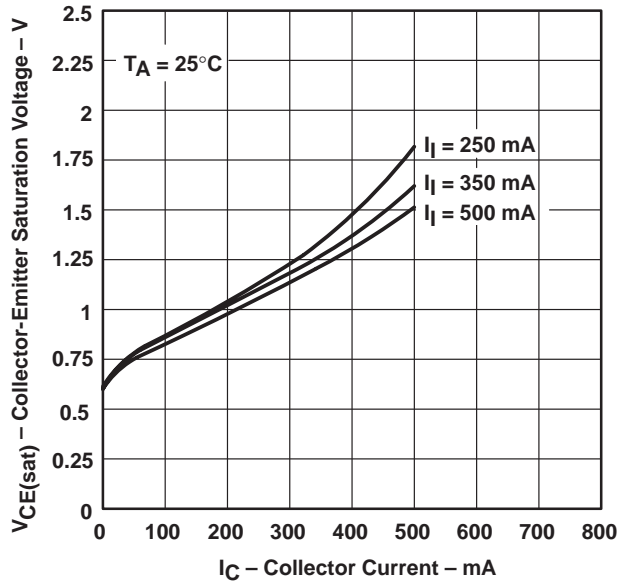(ONE DARLINGTON)

Figure 11

COLLECTOR-EMITTER
SATURATION VOLTAGE
vs
COLLECTOR CURRENT
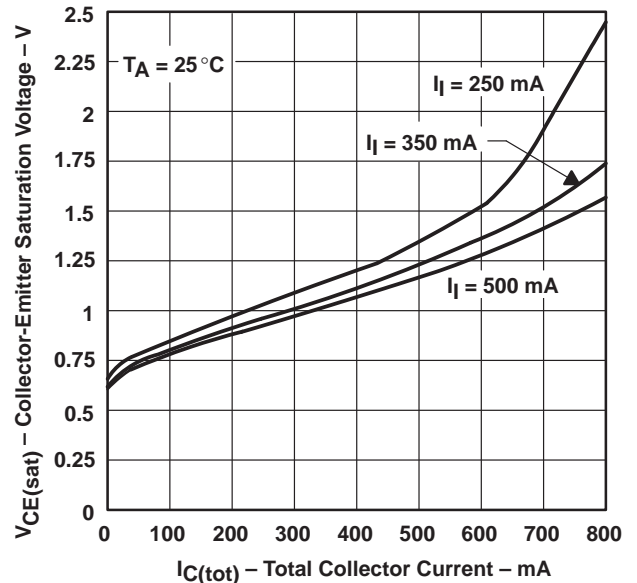(TWO DARLINGTONS PARALLELED)
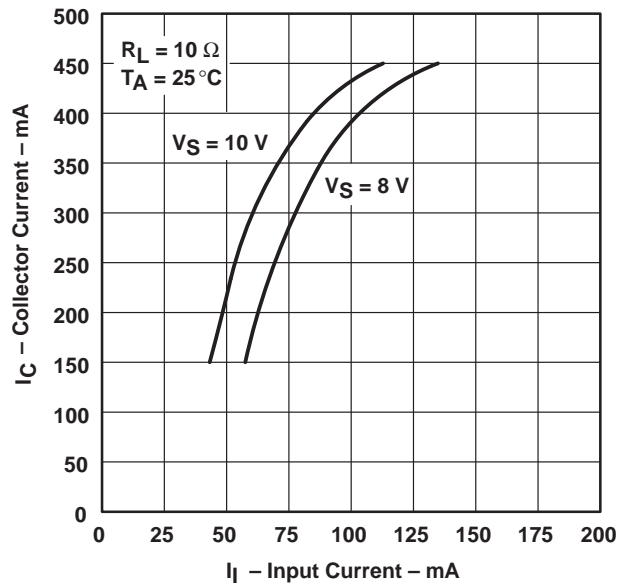

Figure 12

COLLECTOR CURRENT
vs
INPUT CURRENT

Figure 13

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THERMAL INFORMATION

D PACKAGE
MAXIMUM COLLECTOR CURRENT
vs
DUTY CYCLE
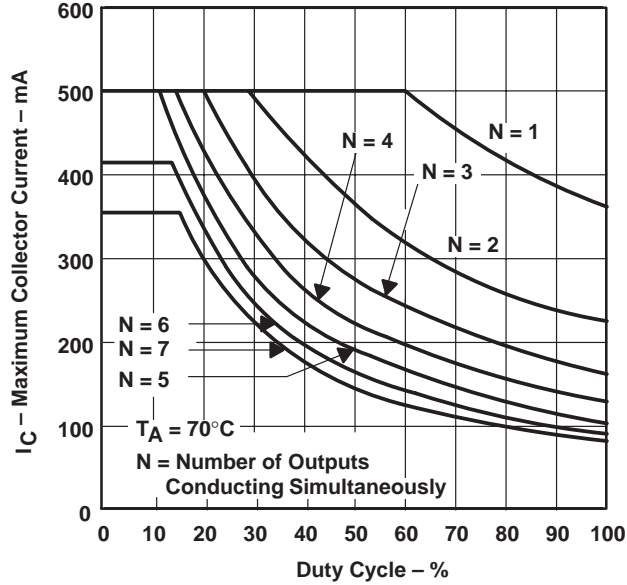
Figure 14

N PACKAGE
MAXIMUM COLLECTOR CURRENT
vs
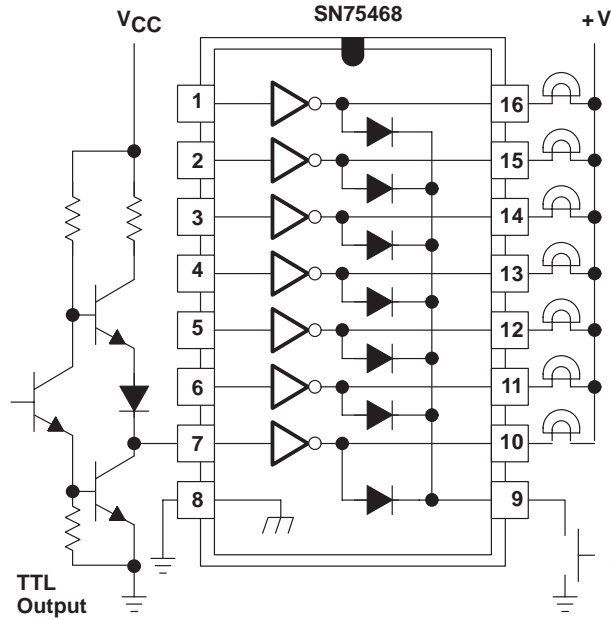**DUTY CYCLE**
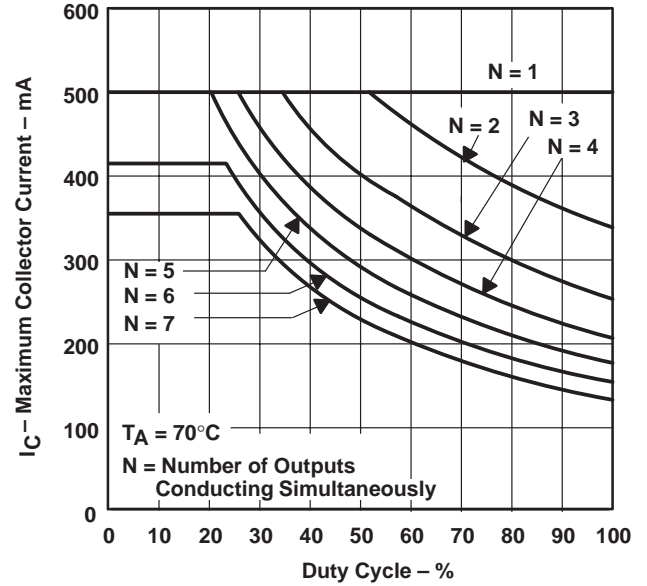
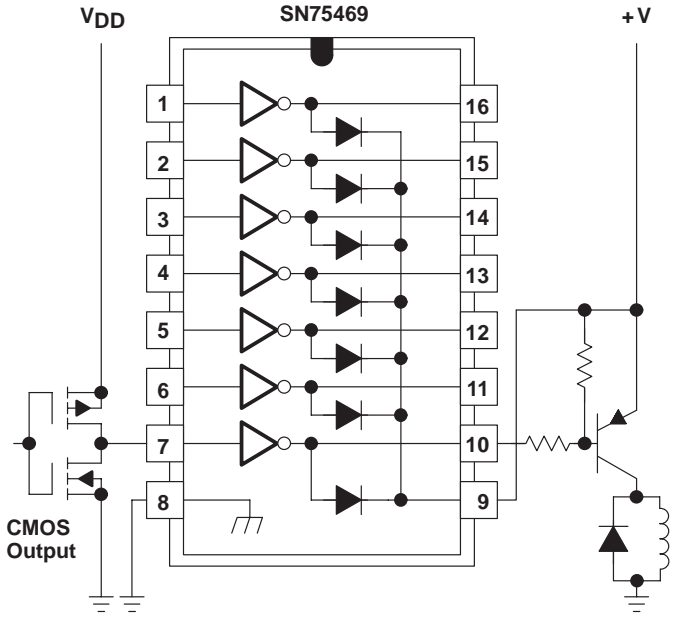**Figure 15**

APPLICATION INFORMATION

Figure 16. TTL to Load

Figure 17. Buffer for Higher Current Loads
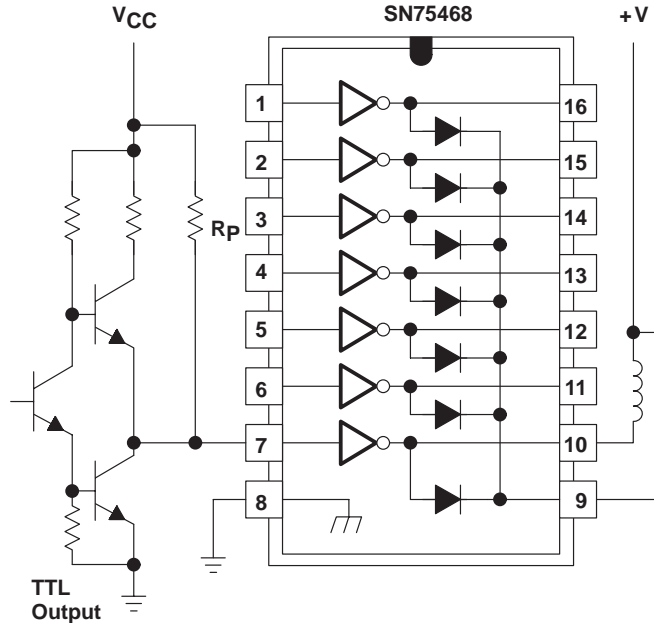
Figure 18. Use of Pullup Resistors to Increase Drive Current

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