



ULN2804

LINEAR INTEGRATED CIRCUIT

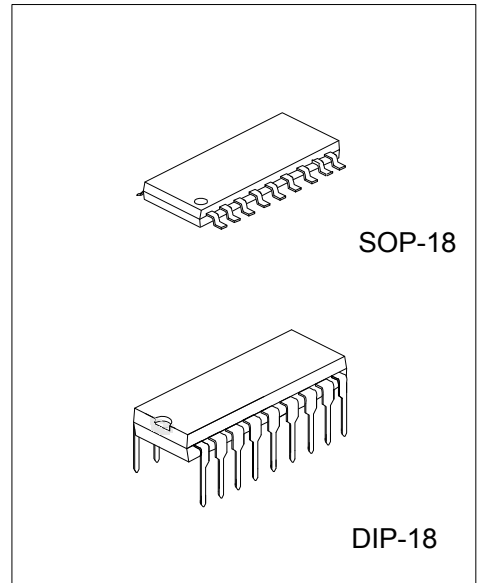
EIGHT HIGH VOLTAGE, HIGH CURRENT DARLINGTON ARRAYS

DESCRIPTION

The **ULN2804** is a high voltage, high current Darlington array comprised of eight NPN Darlington pairs. The device features open-collector outputs with suppression diodes for inductive loads and is ideally suited for interfacing between low-level logic circuitry and high power loads. Typical loads including relays DC motors, filament lamps, LED displays, printer hammers and high power buffers.

FEATURE

- * Eight Darlingtons with common emitters
- * TTL, PMOS or CMOS Compatible inputs
- * Peak output current to 500mA
- * Output voltage to 50V
- * Clamp diodes for transient suppression
- * DIP-28 and SOP-18 packages



ORDERING INFORMATION

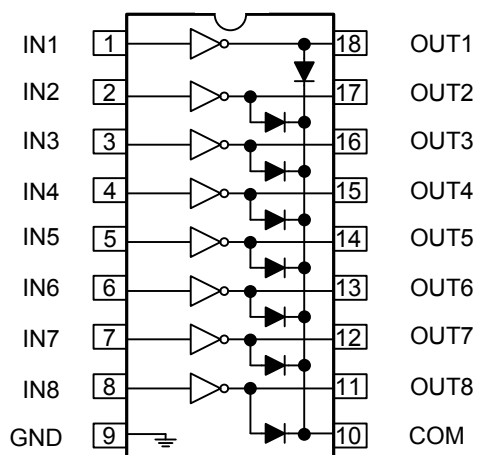
Order Number	Package	Packing
ULN2804G-D18-T	DIP-18	Tube
ULN2804G-S18-R	SOP-18	Tape Reel
ULN2804G-S18-T	SOP-18	Tube

ULN2804G-D18-T (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel, T: Tube (2) D18: DIP-18, S18: SOP-18 (3) G: Halogen Free and Lead Free
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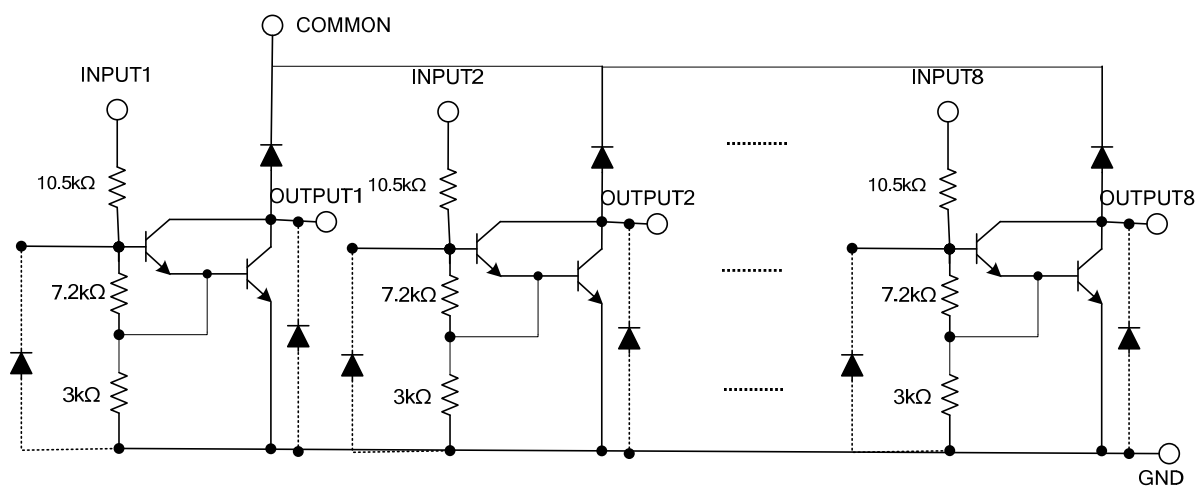
MARKING

DIP-18	SOP-18
18 17 16 15 14 13 12 11 10 UTC → Date Code ULN2804G → Lot Code 1 2 3 4 5 6 7 8 9	18 17 16 15 14 13 12 11 10 UTC → Date Code ULN2804G → Lot Code 1 2 3 4 5 6 7 8 9

PIN CONFIGURATIONS



SCHEMATICS



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V_{IN}	30	V
Output Voltage		V_{OUT}	50	V
Collector Current – Continuous		I_C	500	mA
Base Current – Continuous		I_B	25	mA
Power Dissipation	DIP-18	P_D	1.5	W
	SOP-18		0.95	W
Junction Temperature		T_J	+120	°C
Operating Ambient Temperature		T_{OPR}	0 ~ +70	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Note Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Thermal resistance from junction to Ambient	DIP-18	θ_{JA}	60	°C / W
	SOP-18		80	°C / W

■ ELECTRICAL CHARACTERISTICS (Ta = 25°C, unless otherwise specified.)

PARAMETER		SYMBOL	TEST FIGURE	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector-Emitter Saturation Voltage		V _{CE(SAT)}	1	I _{OUT} =350mA, I _{IN} =500μA		1.3	1.6	V
				I _{OUT} =200mA, I _{IN} =350μA		1.1	1.3	V
				I _{OUT} =100mA, I _{IN} =250μA		0.9	1.1	V
Input Voltage		V _{IN(ON)}	2	V _{CE} =2.0V	I _{OUT} =125mA		5.0	V
					I _{OUT} =200mA		6.0	V
					I _{OUT} =275mA		7.0	V
					I _{OUT} =350mA		8.0	V
Clamp Diode Forward Voltage		V _F	3	I _F =350mA		1.5	2.0	V
Output Leakage Current		I _{CEX}	4a	V _{OUT} =50V, Ta=70°C			100	μA
			4b	V _{OUT} =50V, Ta=70°C, V _{IN} =1.0V		500		
Input Current	ON	I _{IN(ON)}	5	V _{IN} =5V		0.35	0.5	mA
	V _{IN} =12V				1.0	1.45	mA	
	OFF	I _{IN(OFF)}	6	I _{OUT} =500μA, Ta=70°C	50	100		μA
Clamp Diode Reverse Current		I _R	7	V _R =50V, Ta=25°C			50	μA
				V _R =50V, Ta=70°C			100	μA
DC Current Gain		h _{FE}		V _{OUT} =2V, I _{OUT} =350mA	1000			
Input Capacitance		C _{IN}				15	25	pF
Turn-On Delay		t _{ON}	8			0.25	1	μS
Turn-Off Delay		t _{OFF}	8			0.25	1	μS

■ TEST FIGURES

Figure 1.

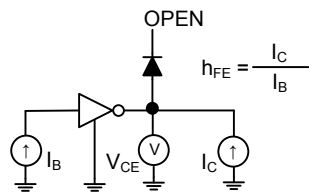


Figure 2.

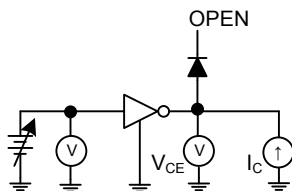


Figure 3.

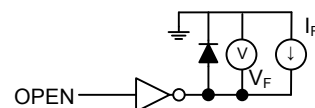


Figure 4a.

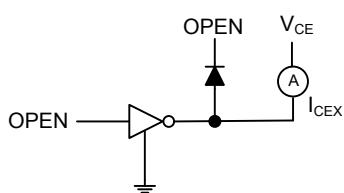


Figure 4b.

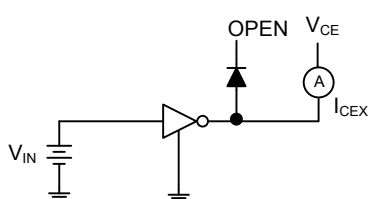


Figure 5.

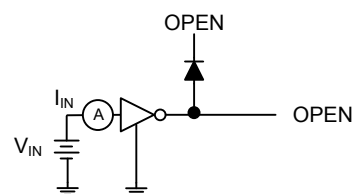


Figure 6.

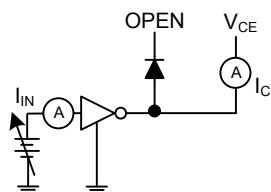


Figure 7.

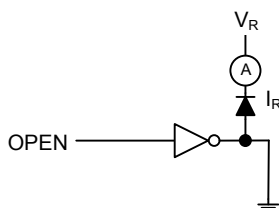
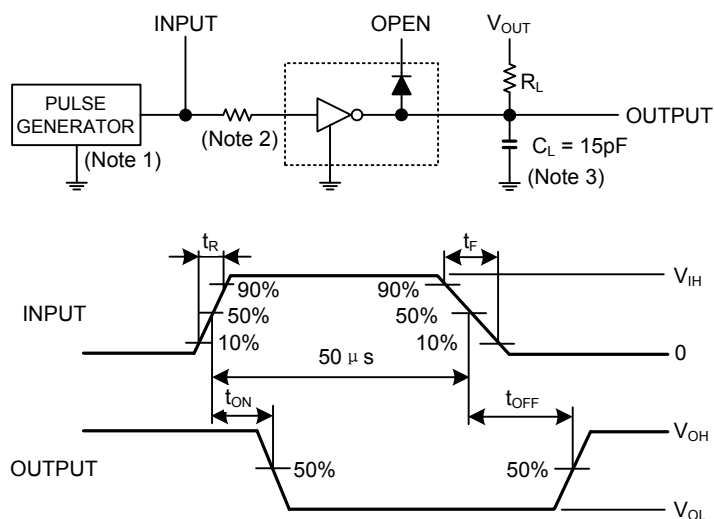


Figure 8.



Note1: Pulse width 50μs, duty cycle 10%

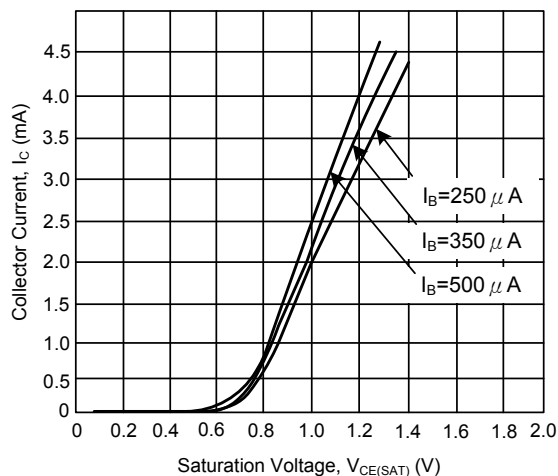
Output impedance 50Ω, $t_R \leq 5\text{ns}$, $t_F \leq 10\text{ns}$

Note2: R1: 0, V_{IH} : 3V

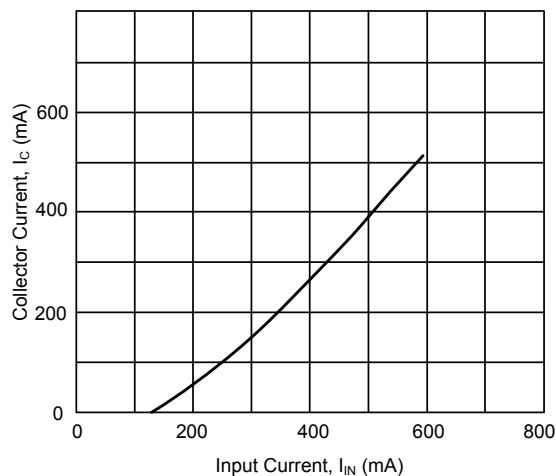
Note3: C_L includes probe and jig capacitance.

■ TYPICAL CHARACTERISTICS

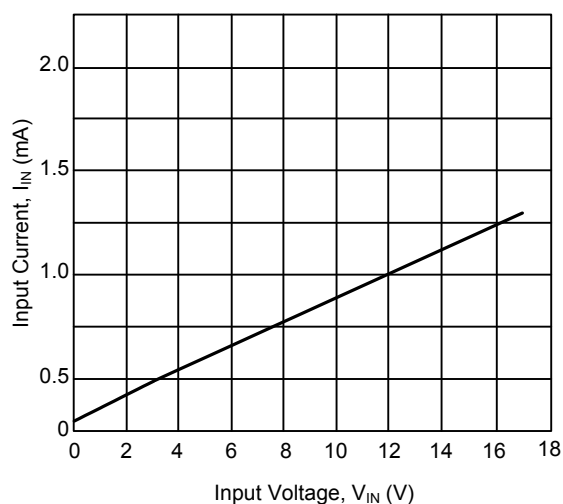
Output Current vs. Saturation Voltage



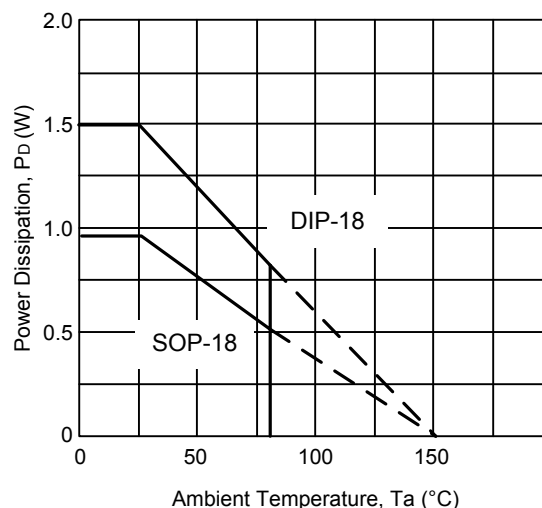
Output Current vs. Input Current



Input Current vs. Input Voltage



Power Dissipation vs. Ambient Temperature



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