



ULN2804

LINEAR INTEGRATED CIRCUIT

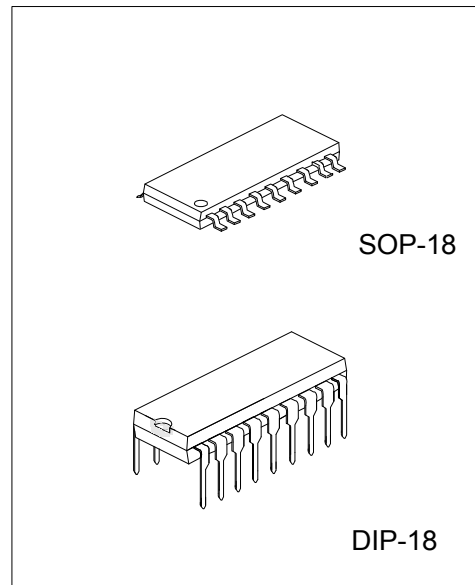
EIGHT HIGH VOLTAGE, HIGH CURRENT DARLINGTON ARRAYS

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 Darlington pairs 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

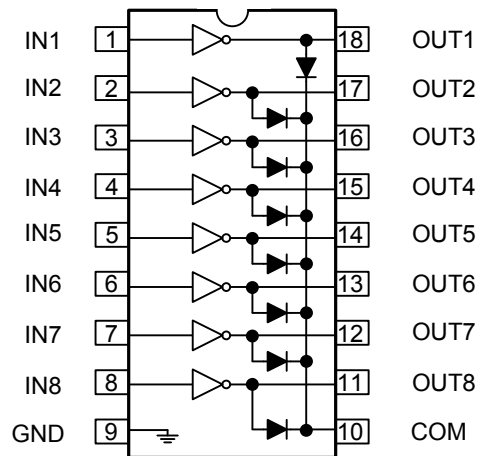
| Order Number | Package | Packing |
|----------------|---------|-----------|
| ULN2804G-D18-T | DIP-18 | Tube |
| ULN2804G-S18-R | SOP-18 | Tape Reel |
| ULN2804G-S18-T | SOP-18 | Tube |

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

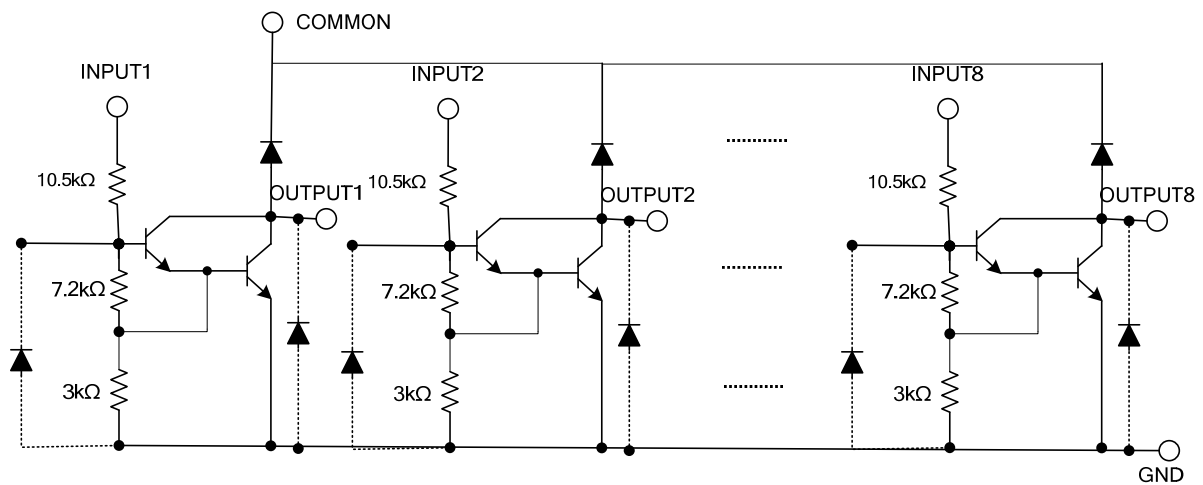
MARKING

| DIP-18 | SOP-18 |
|--------|--------|
| | |

■ 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 | $I_{OUT}=350mA, I_{IN}=500\mu A$ | | 1.3 | 1.6 | V | |
| | | | | $I_{OUT}=200mA, I_{IN}=350\mu A$ | | 1.1 | 1.3 | V | |
| | | | | $I_{OUT}=100mA, I_{IN}=250\mu A$ | | 0.9 | 1.1 | V | |
| Input Voltage | | $V_{IN(ON)}$ | 2 | $V_{CE}=2.0V$ | | | 5.0 | V | |
| | | | | | $I_{OUT}=125mA$ | | | 6.0 | V |
| | | | | | $I_{OUT}=200mA$ | | | 7.0 | V |
| | | | | | $I_{OUT}=275mA$ | | | 8.0 | V |
| Clamp Diode Forward Voltage | | V_F | 3 | $I_F=350mA$ | | 1.5 | 2.0 | V | |
| Output Leakage Current | | I_{CEX} | 4a | $V_{OUT}=50V, Ta=70^\circ C$ | | | 100 | μA | |
| | | | 4b | $V_{OUT}=50V, Ta=70^\circ C, V_{IN}=1.0V$ | | | 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 | $I_{OUT}=500\mu A, Ta=70^\circ C$ | 50 | 100 | | μA | |
| Clamp Diode Reverse Current | | I_R | 7 | $V_R=50V, Ta=25^\circ C$ | | | 50 | μA | |
| | | | | $V_R=50V, Ta=70^\circ C$ | | | 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.

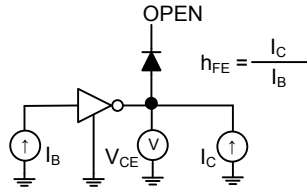


Figure 2.

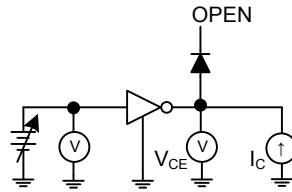


Figure 3.

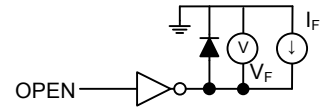


Figure 4a.

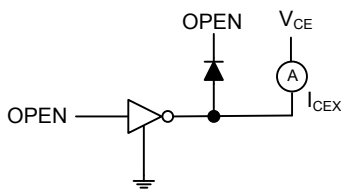


Figure 4b.

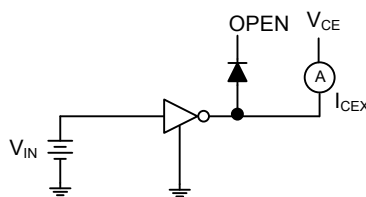


Figure 5.

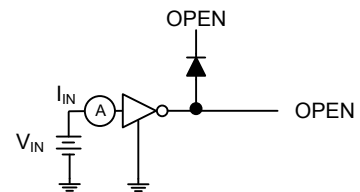


Figure 6.

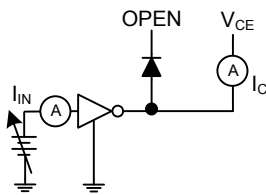


Figure 7.

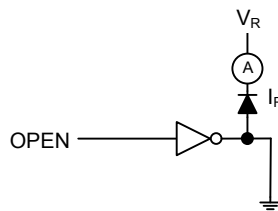
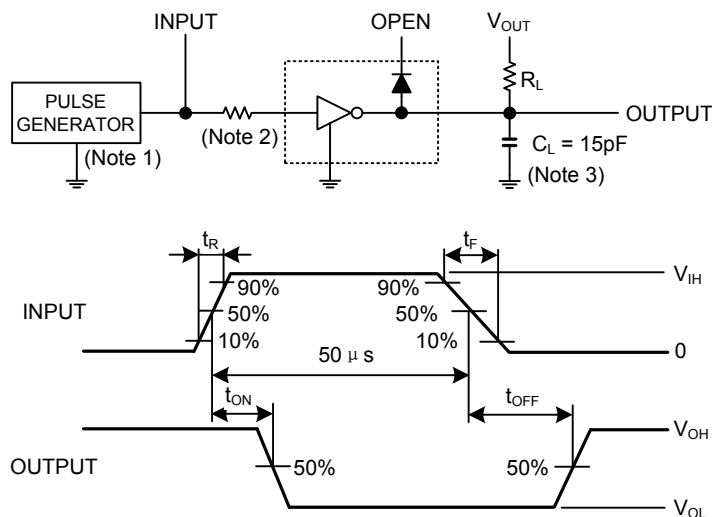


Figure 8.



Note1: Pulse width 50μs, duty cycle 10%

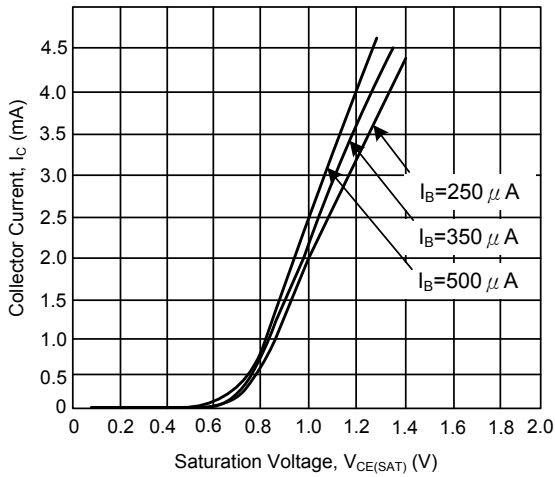
Output impedance 50Ω, $t_R \leq 5\text{ns}$, $t_F \leq 10\text{ns}$

Note2: $R_1 = 0$, $V_{IH} = 3\text{V}$

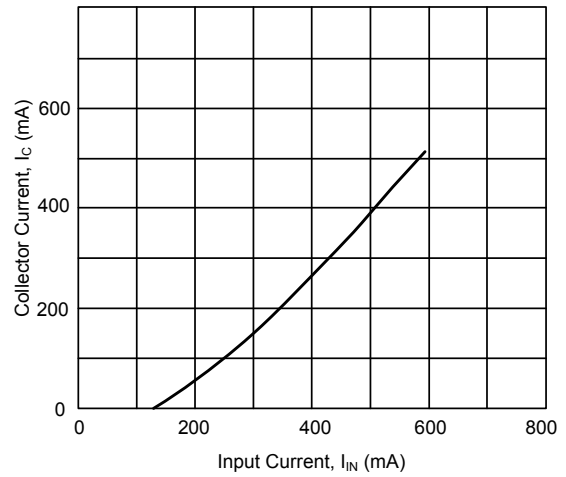
Note3: C_L includes probe and jig capacitance.

TYPICAL CHARACTERISTICS

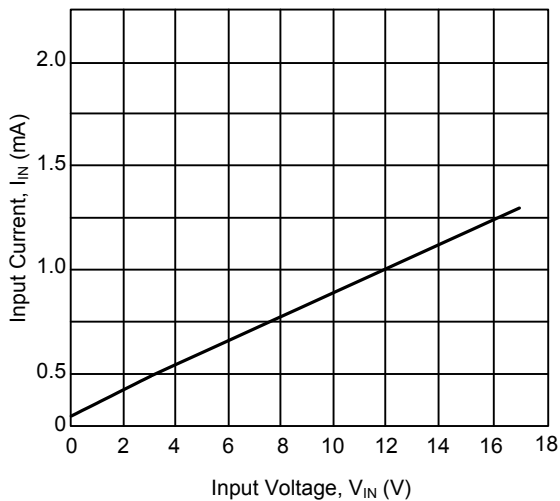
Output Current vs. Saturation Voltage



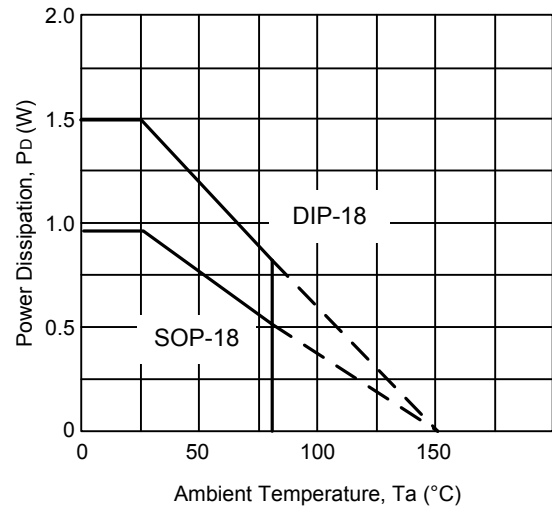
Output Current vs. Input Current



Input Current vs. Input Voltage



Power Dissipation vs. Ambient Temperature



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.