



## ULN2803

## LINEAR INTEGRATED CIRCUIT

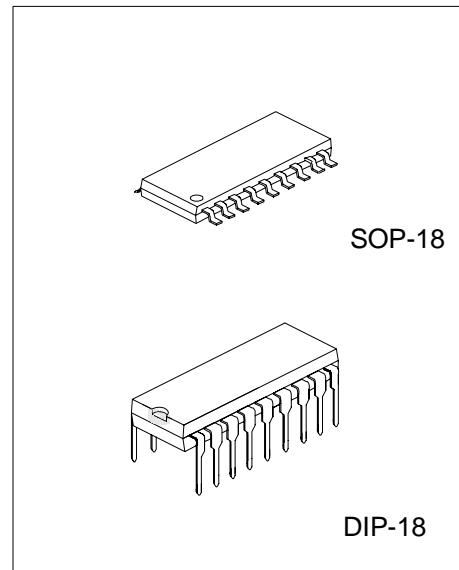
### EIGHT DARLINGTON ARRAYS

#### DESCRIPTION

The UTC **ULN2803** is high-voltage, high-current Darlington drivers comprised of eight NPN Darlington pairs.

#### FEATURES

- \*Output current (single output) 500mA MAX.
- \*High sustaining voltage output 50V MIN.
- \*Output clamp diodes
- \*Inputs compatible with various types of logic



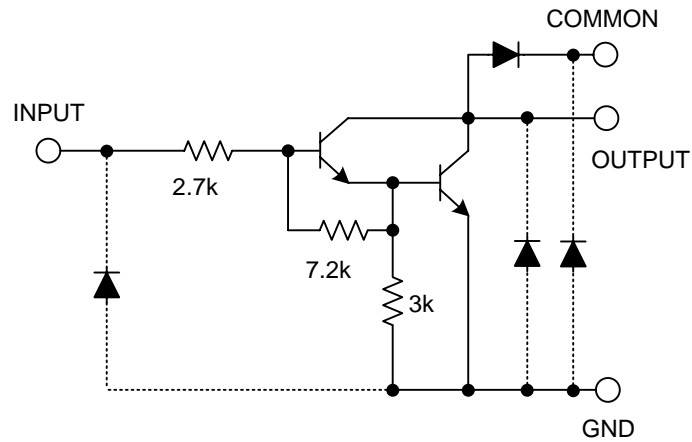
\*Pb-free plating product number: ULN2803L

#### ORDERING INFORMATION

| Ordering Number |                   | Package | Packing   |
|-----------------|-------------------|---------|-----------|
| Normal          | Lead Free Plating |         |           |
| ULN2803-D18-T   | ULN2803L-D18-T    | DIP-18  | Tube      |
| ULN2803-S18-R   | ULN2803L-S18-R    | SOP-18  | Tape Reel |
| ULN2803-S18-T   | ULN2803L-S18-T    | SOP-18  | Tube      |

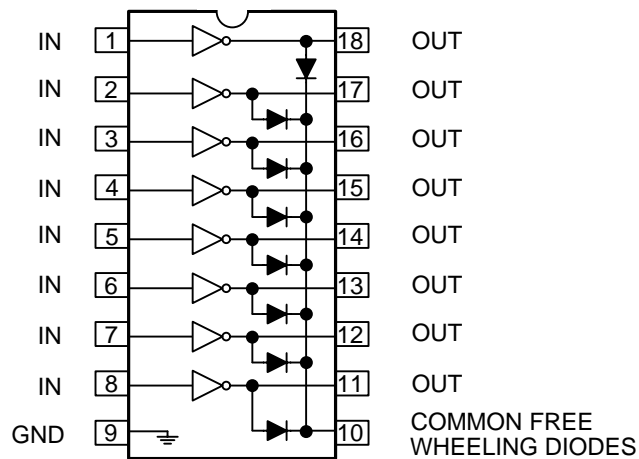
|   |  |
|---|--|
| <p>ULN2803L-D18-T</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Lead Plating</p> | <p>(1) T: Tube, R: Tape Reel<br/>(2) D18: DIP-18, S18: SOP-18<br/>(3) L: Lead Free Plating, Blank: Pb/Sn</p> |
|---|--|

## ■ SCHEMATICS (EACH DRIVER)



Note: The input and output parasitic diodes cannot be used as clamp diodes.

## ■ PIN CONFIGURATIONS



### ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER                   |        | SYMBOL        | RATINGS          | UNIT  |
|-----------------------------|--------|---------------|------------------|-------|
| Input Voltage               |        | $V_{IN}$      | -0.5~30          | V     |
| Output Sustaining Voltage   |        | $V_{CE(SUS)}$ | -0.5~50          | V     |
| Output Current              |        | $I_{OUT}$     | 500              | mA/ch |
| Clamp Diode Reverse Voltage |        | $V_R$         | 50               | V     |
| Clamp Diode Forward Current |        | $I_F$         | 500              | mA    |
| Power Dissipation           | DIP-18 | $P_D$         | 1.47             | W     |
|                             | SOP-18 |               | 0.54/0.625(Note) |       |
| Operating Temperature       |        | $T_{OPR}$     | -40 ~ +85        | °C    |
| Storage Temperature         |        | $T_{STG}$     | -40 ~ +150       | °C    |

Note 1. On glass epoxy PCB (30x30x1.6mm Cu 50%)

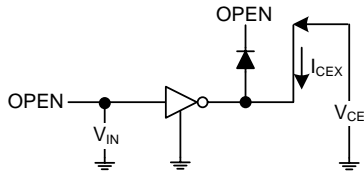
2. Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond Absolute maximum ratings.

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

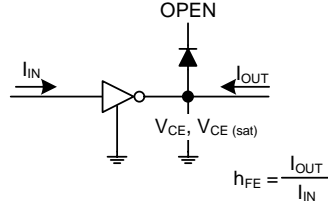
| PARAMETER                            |     | SYMBOL        | TEST CIRCUIT | TEST CONDITIONS  | MIN | TYP               | MAX               | UNIT    |
|--------------------------------------|-----|---------------|--------------|--|-----|-------------------|-------------------|---------|
| Output Leakage Current               |     | $I_{CEX}$     | 1            | $V_{CE}=50V, T_a=25^\circ C$<br>$V_{CE}=50V, T_a=85^\circ C$   |     |                   | 50<br>100         | $\mu A$ |
| Collector-Emitter Saturation Voltage |     | $V_{CE(SAT)}$ | 2            | $I_{OUT}=350mA, I_{IN}=500\mu A$<br>$I_{OUT}=200mA, I_{IN}=350\mu A$<br>$I_{OUT}=100mA, I_{IN}=250\mu A$ |     | 1.3<br>1.1<br>0.9 | 1.6<br>1.3<br>1.1 | V       |
| Input Current                        | ON  | $I_{IN(ON)}$  | 3            | $V_{IN}=3.85V, I_{OUT}=350mA$  |     | 0.93              | 1.35              | mA      |
|                                      | OFF | $I_{IN(OFF)}$ | 4            | $I_{OUT}=500\mu A, T_a=85^\circ C$   | 50  | 65                |                   | $\mu A$ |
| Input Voltage (output on)            |     | $V_{IN(ON)}$  | 5            | $V_{CE}=2.0V$<br>$I_{OUT}=200mA$<br>$I_{OUT}=250mA$<br>$I_{OUT}=300mA$                                   |     |                   | 2.4<br>2.7<br>3.0 | V       |
| Clamp Diode Reverse Current          |     | $I_R$         | 6            | $V_R=50V, T_a=25^\circ C$<br>$V_R=50V, T_a=85^\circ C$   |     |                   | 50<br>100         | $\mu A$ |
| Clamp Diode Forward Voltage          |     | $V_F$         | 7            | $I_F=350mA$  |     |                   | 2.0               | V       |
| Input Capacitance                    |     | $C_{IN}$      |              |  |     | 15                | 25                | pF      |
| Turn-On Delay                        |     | $t_{ON}$      | 8            | $V_{OUT}=50V, R_L=125\Omega, C_L=15pF$   |     | 0.1               | 1                 | $\mu S$ |
| Turn-Off Delay                       |     | $t_{OFF}$     | 8            | $V_{OUT}=50V, R_L=125\Omega, C_L=15pF$   |     | 0.2               | 1                 | $\mu S$ |

### ■ TEST CIRCUIT

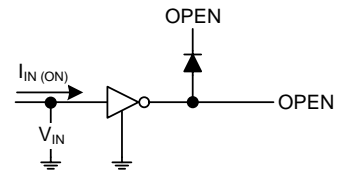
1.  $I_{CEX}$



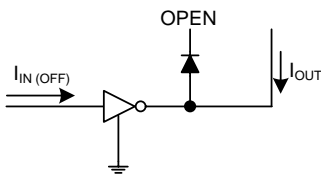
2.  $V_{CE(sat)}$ ,  $h_{FE}$



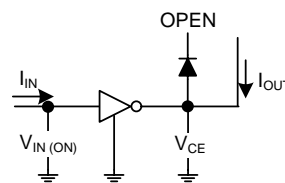
3.  $I_{IN(ON)}$



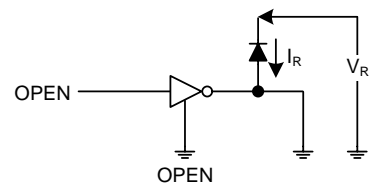
4.  $I_{IN(OFF)}$



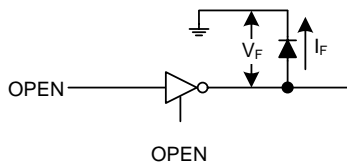
5.  $V_{IN(ON)}$



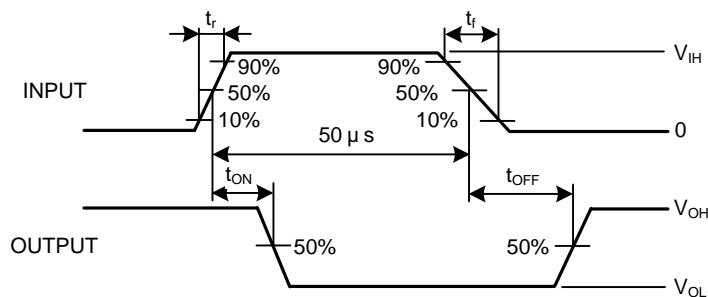
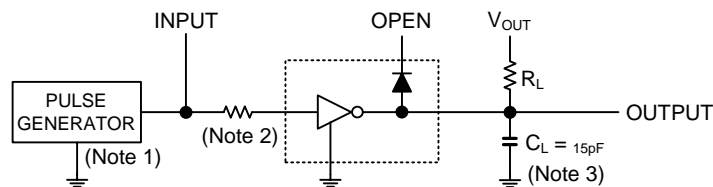
6.  $I_R$



7.  $V_F$



8.  $t_{ON}$ ,  $t_{OFF}$



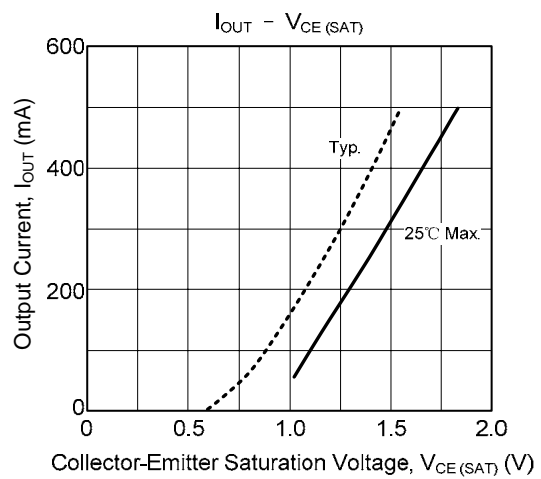
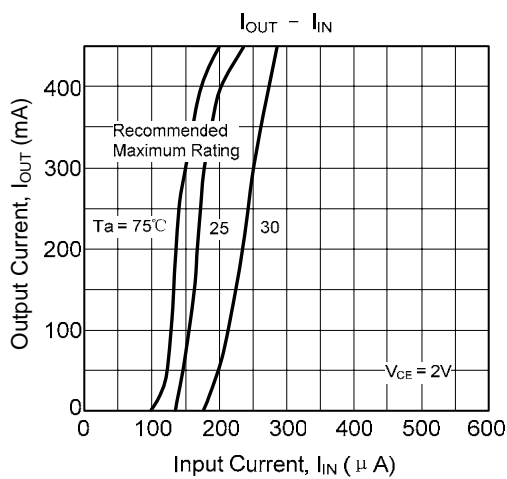
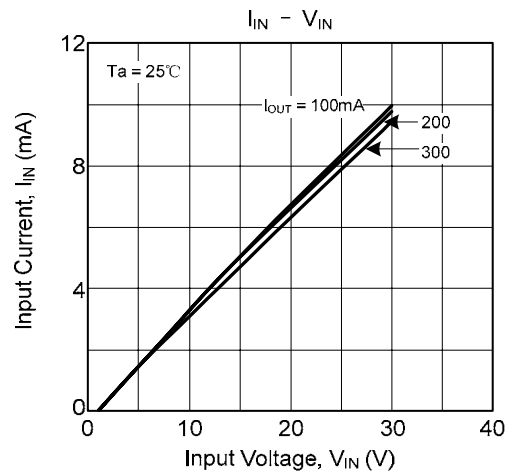
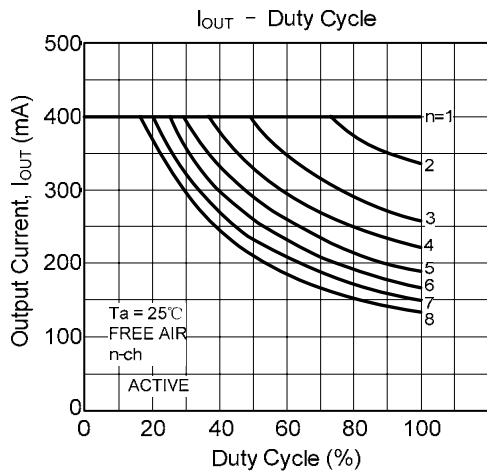
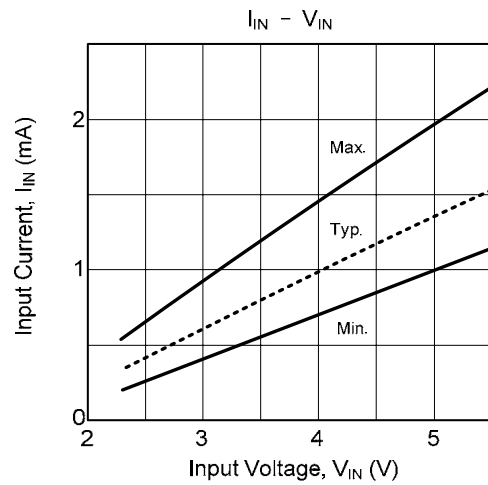
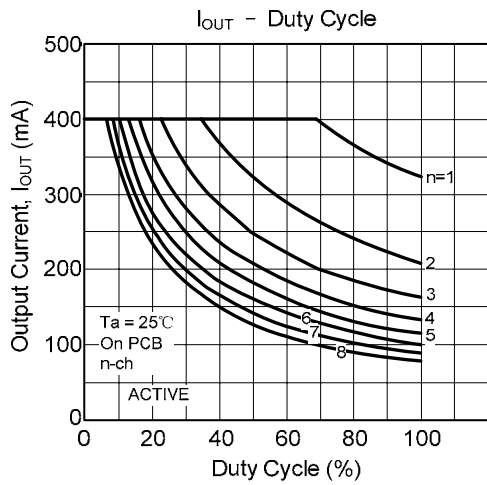
Note1: Pulse width 50 $\mu$ s, duty cycle 10%

Output impedance 50 $\Omega$ ,  $t_r \leq 5$ ns,  $t_f \leq 10$ ns

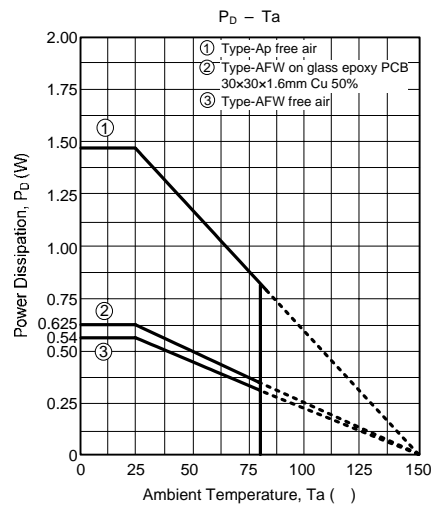
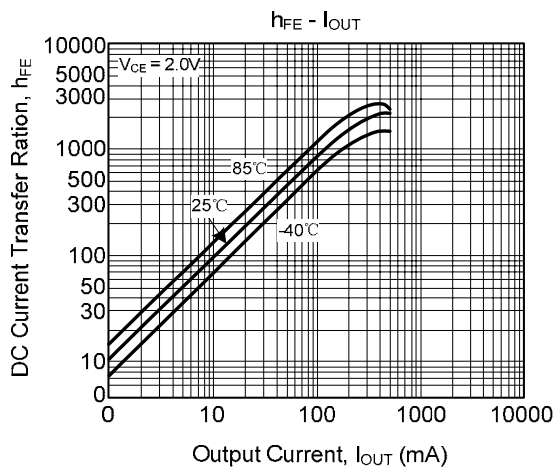
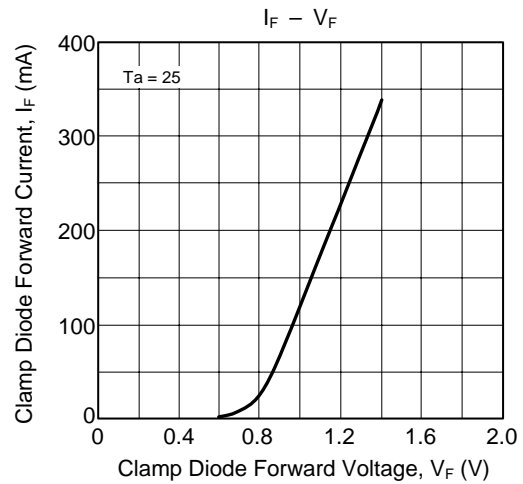
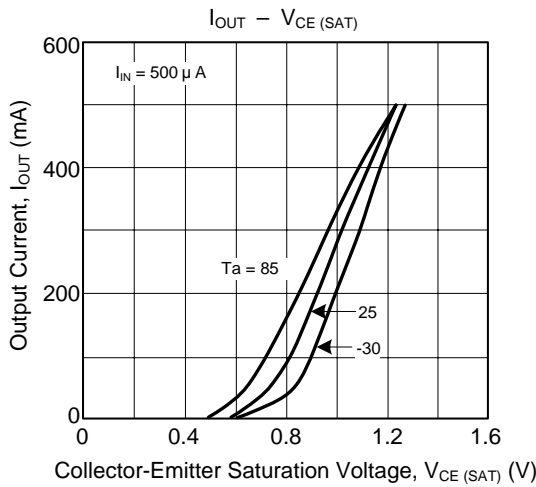
Note2:  $R_1 = 0$ ,  $V_{IH} = 3$ V

Note3:  $C_L$  includes probe and jig capacitance.

## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS(Cont.)



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