



## ULN2803

## LINEAR INTEGRATED CIRCUIT

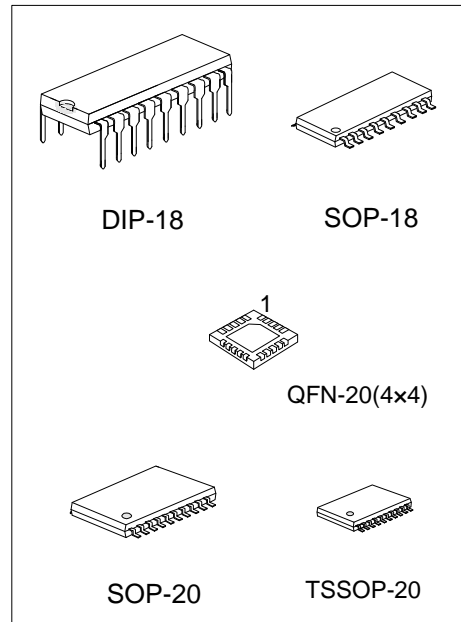
### EIGHT DARLINGTON ARRAYS

#### 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



#### ORDERING INFORMATION

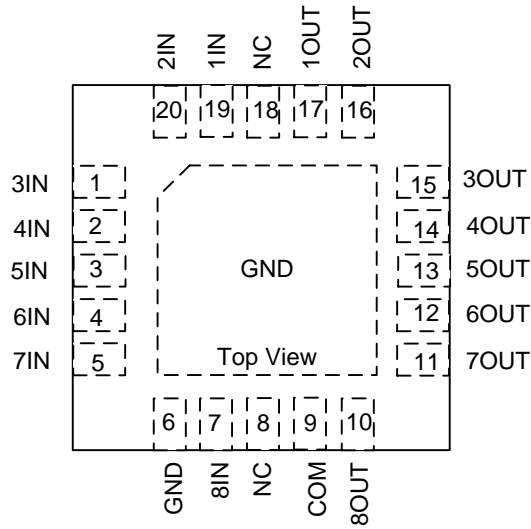
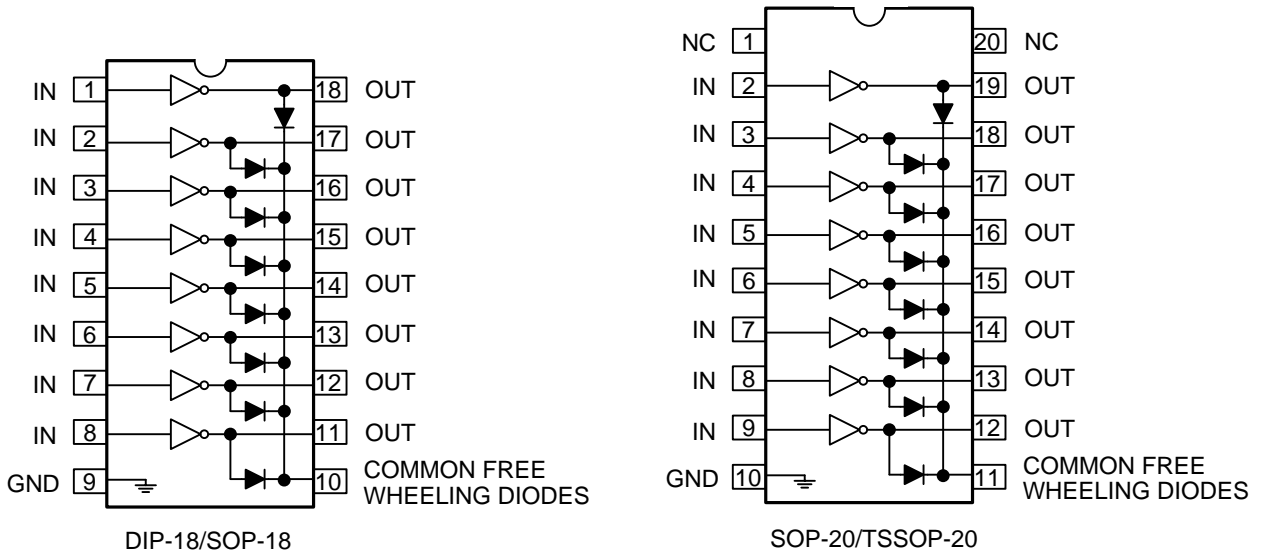
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULN2803L-D18-T	ULN2803G-D18-T	DIP-18	Tube
ULN2803L-S18-R	ULN2803G-S18-R	SOP-18	Tape Reel
ULN2803L-S20-R	ULN2803G-S20-R	SOP-20	Tape Reel
ULN2803L-P20-R	ULN2803G-P20-R	TSSOP-20	Tape Reel
ULN2803G-Q20-4040-R	ULN2803G-Q20-4040-R	QFN-20(4x4)	Tape Reel

<p>ULN2803G-D18-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) D18: DIP-18, S18: SOP-18, S20: SOP-20 P20: TSSOP-20, Q20-4040: QFN-20(4x4) (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

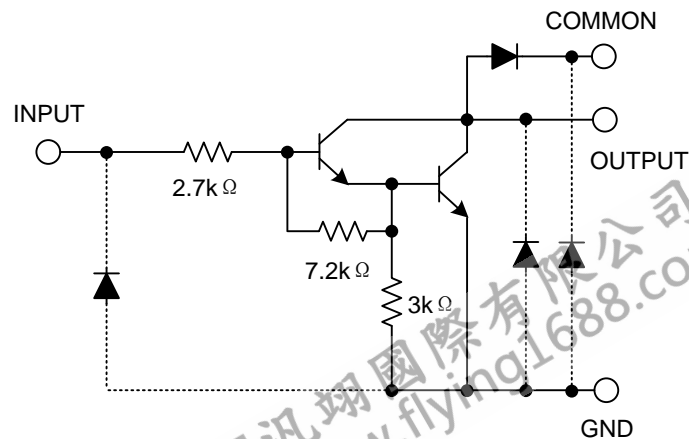
DIP-18	SOP-18
<p>UTC □□□□ → Date Code L: Lead Free G: Halogen Free □□ → Lot Code</p>	<p>UTC □□□□ → Date Code L: Lead Free G: Halogen Free □□ → Lot Code</p>
SOP-20 / TSSOP-20	QFN4040-20
<p>UTC □□□□ → Date Code L: Lead Free G: Halogen Free □□ → Lot Code</p>	<p>UTC ULN2803 ● □□□□□□ → Lot Code □□□□□□ → Date Code</p>

## ■ PIN CONFIGURATIONS



QFN4040-20

## ■ SCHEMATICS (EACH DRIVER)



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

### ■ 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		VR	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)	W
	SOP-20		0.56	W
	TSSOP-20		0.52	W
	QFN4040-20		0.6	W
Operating Temperature		$T_{OPR}$	-40 ~ +85	°C
Storage Temperature		$T_{STG}$	-40 ~ +150	°C

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

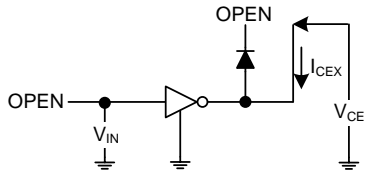
2. Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond Absolute maximum ratings.

### ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

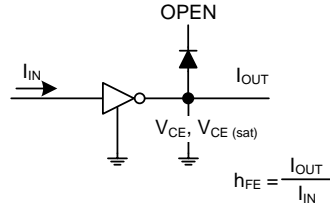
PARAMETER		SYMBOL	TEST CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Leakage Current		$I_{CEX}$	1	$V_{CE}=50\text{V}, T_A=25^\circ\text{C}$ $V_{CE}=50\text{V}, T_A=85^\circ\text{C}$			50 100	$\mu\text{A}$
Collector-Emitter Saturation Voltage		$V_{CE(SAT)}$	2	$I_{OUT}=350\text{mA}, I_{IN}=500\mu\text{A}$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

## TEST CIRCUIT

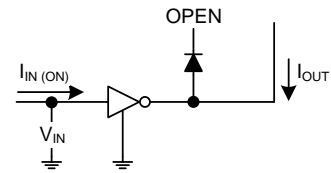
1.  $I_{CEX}$



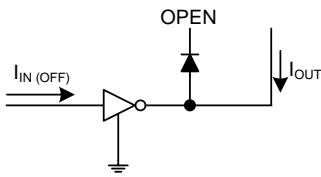
2.  $V_{CE(sat)}$ ,  $h_{FE}$



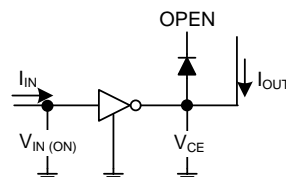
3.  $I_{IN(ON)}$



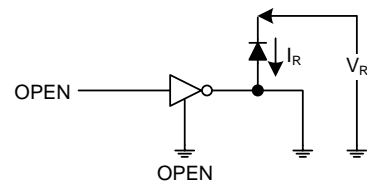
4.  $I_{IN(OFF)}$



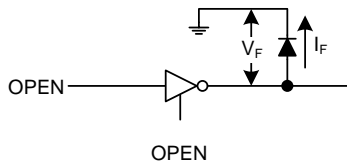
5.  $V_{IN(ON)}$



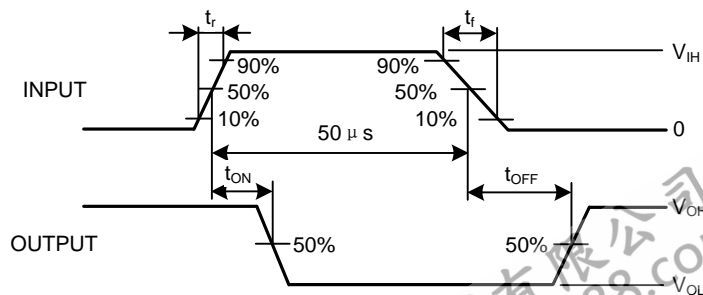
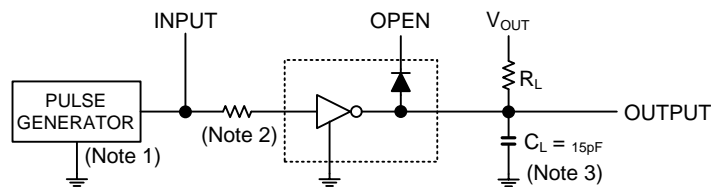
6.  $I_R$



7.  $V_F$

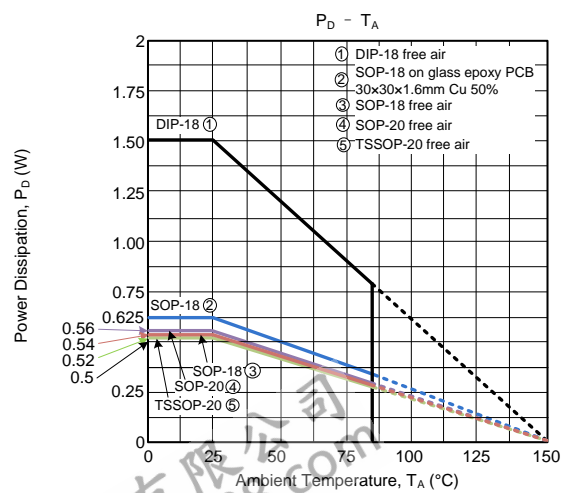
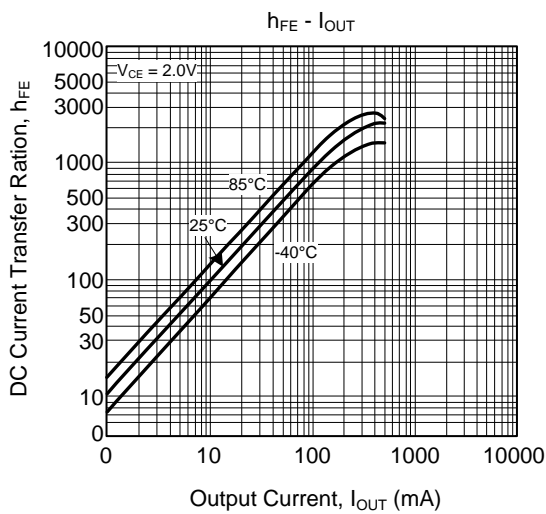
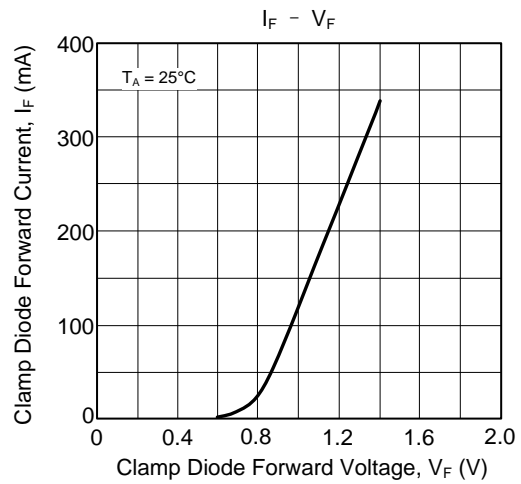
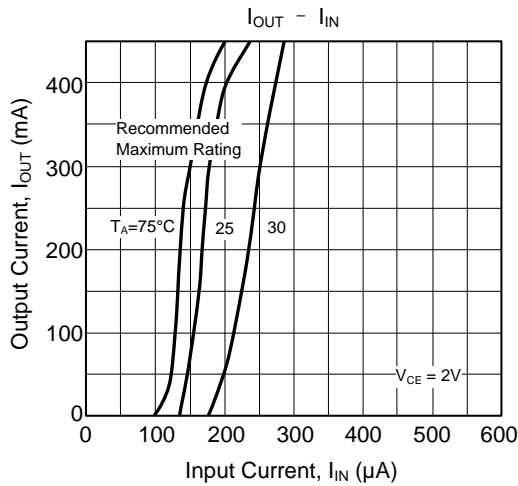
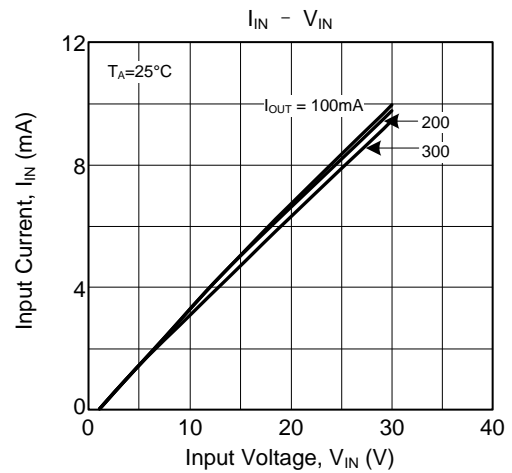
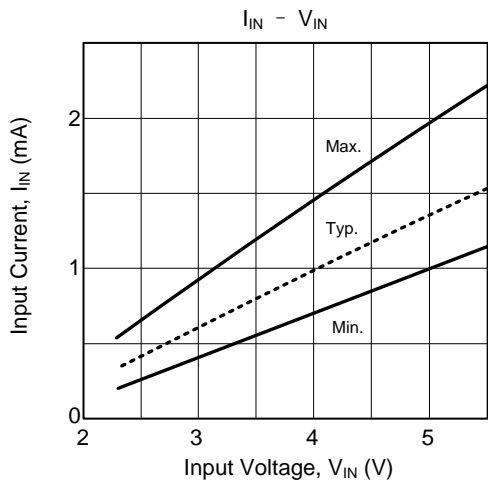


8.  $t_{ON}$ ,  $t_{OFF}$



- Notes: 1. Pulse width 50µs, duty cycle 10%  
 Output impedance 50Ω,  $t_r \leq 5ns$ ,  $t_f \leq 10ns$   
 2.  $R_1: 0$ ,  $V_{IH}: 3V$   
 3.  $C_L$  includes probe and jig capacitance.

## TYPICAL CHARACTERISTICS



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