UTC ULN2003   LINEAR INTEGRATED CIRCUIT

SEVEN DARLINGTON ARRAYS
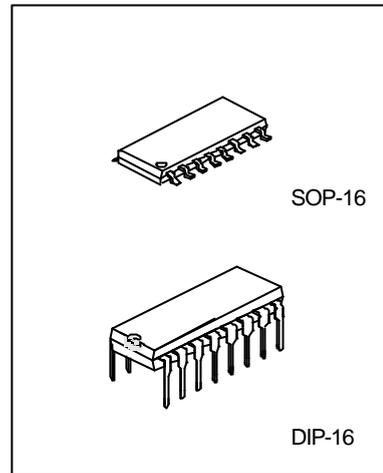
DESCRIPTION

The UTC ULN2003 is high-voltage,high-current darlighton drivers comprised of seven NPN darlington pairs.

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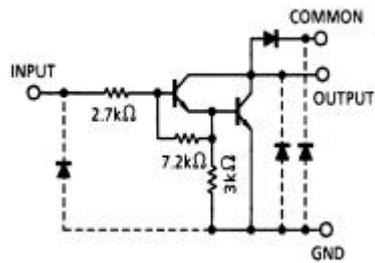
*Output current (single output) 500mA MAX.
*High sustaining voltage output 50V MIN.
*Output clamp diodes
*Inputs compatible with various types of logic

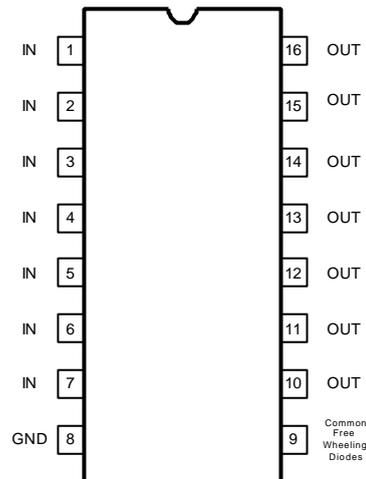### APPLICATIONS

*Relay, hammer, lamp and display (LED) drivers.

SOP-16

DIP-16

SCHEMATICS (EACH DRIVER)

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

PIN CONFIGURATIONS

IN	1		16	OUT
IN	2		15	OUT
IN	3		14	OUT
IN	4		13	OUT
IN	5		12	OUT
IN	6		11	OUT
IN	7		10	OUT
GND	8		9	Common Free Wheeling Diodes

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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	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	IF	500	mA
Power Dissipation	P_D	DIP: 1.47 SOP:0.54/0.625(Note)	W
Operating Ambient Temperature Range	T_{opr}	-40 to +85	°C
Storage Temperature Range	T_{Stg}	-55 to +150	°C

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

ELECTRICAL CHARACTERISTICS (Ta = 25 °C, Unless otherwise specified)

| PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	FIG
Output Leakage Current	I_{CEX}	V_{CE}=50V,T_A=25°C V_{CE}=50V,T_A=85°C			50 100	µA	1
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_{OUT}=350mA,I_{IN}=500µA I_{OUT}=200mA,I_{IN}=350µA I_{OUT}=100mA,I_{IN}=250µA		1.3 1.1 0.9	1.6 1.3 1.1	V	2
Input Current (output on)	$I_{IN(ON)}$	V_{IN}=2.4V,I_{OUT}=350mA		0.4	0.7	mA	3
Input Current (output off)	$I_{IN(OFF)}$	I_{OUT}=500µA,T_A=85°C	50	65		µA	4
Input Voltage (output on)	$V_{IN(ON)}$	V_{CE}=2.0V,hFE=800, I_{OUT}=350mA I_{OUT}=200mA			2.6 2.0	V	5
Clamp Diode Reverse Current	IR	V_R=50V, T_A=25°C V_R=50V, T_A=85°C			50 100	µA	6
Clamp Diode Forward Voltage	VF	IF=350mA			2.0	V	7
Input Capacitance	C_{IN}			15		pF	-
Turn-On Delay	t_{ON}	V_{OUT}=50V,RL=125Ω,CL=15pF		0.1		µS	8
Turn-Off Delay	t_{OFF}	V_{OUT}=50V,RL=125Ω,CL=15pF		0.2		µS	8

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TEST CIRCUIT

1. I_{CEX}

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

$$h_{FE} = \frac{I_{OUT}}{I_{IN}}$$
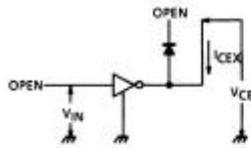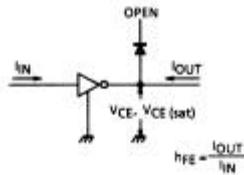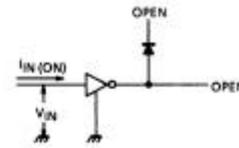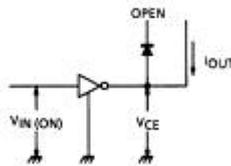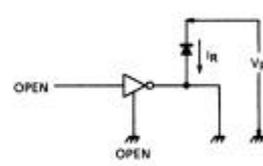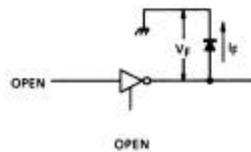
3. $I_{IN(ON)}$

4. $I_{IN(OFF)}$
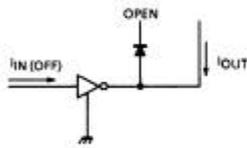
5. $V_{IN(ON)}$

6. I_R

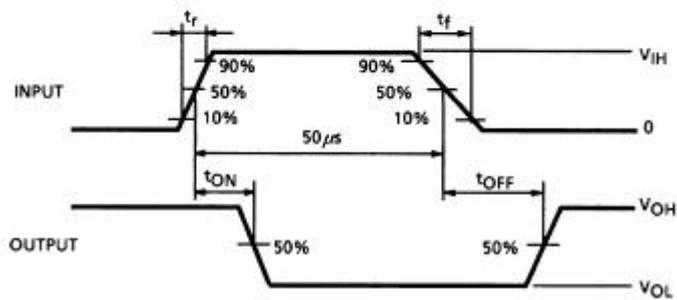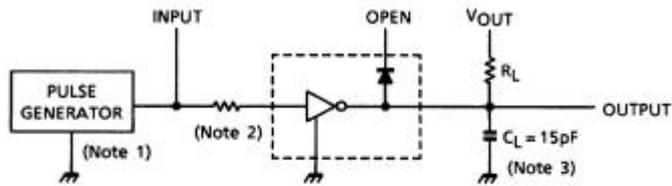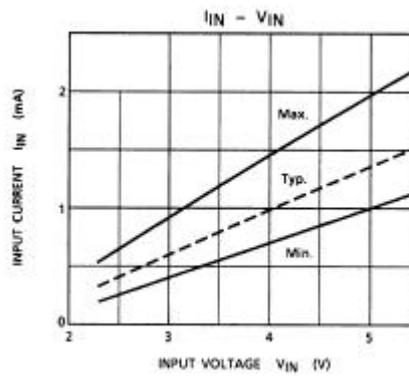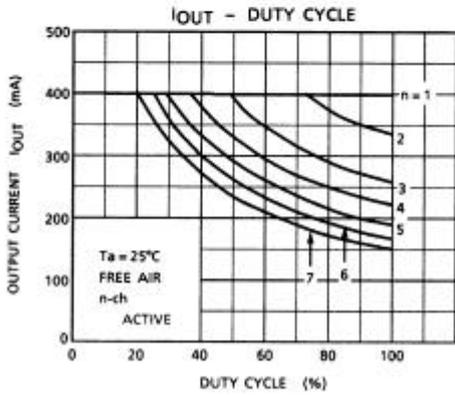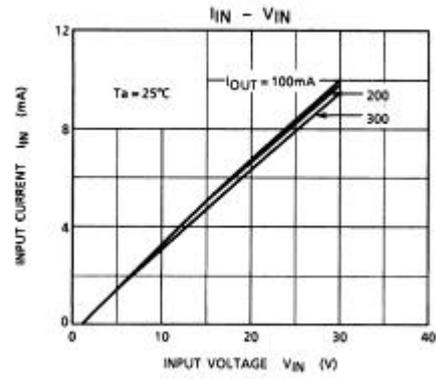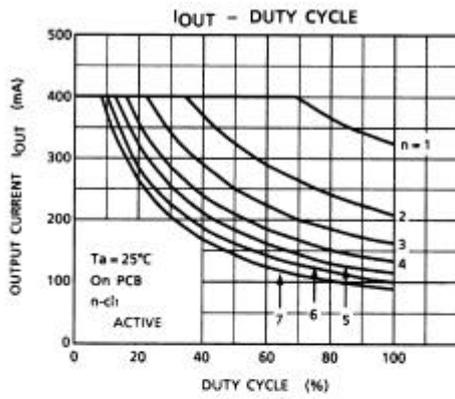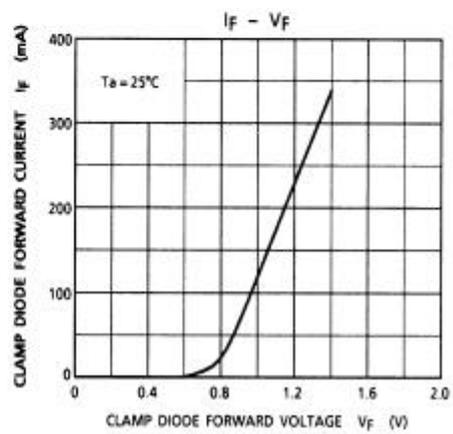7. V_F

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8. tON, tOFF

Note1: Pulse width 50µs, duty cycle 10%
　　　Output impedance 50Ω, tr<=5ns, tf<=10ns
Note2: R1: 0, VIH : 3V
Note3: CL includes probe and jig capacitance.

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hFE - IOUT

PD - Ta

① Type-AP free air
② Type-AFW on glass epoxy PCB
   30×30×1.6mm Cu 50%
③ Type-AFW free air