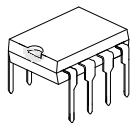
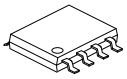
3CH DARLINGTON SINK DRIVER



DIP-8



SOP-8

■ DESCRIPTION

The UTC **ULN2001** is high-voltage, high-current darlington transistor arrays. Each consists of three NPN darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of a single darlington pair is 500mA. All units feature integral clamp diodes for switching inductive loads.

Applications include relay, hammer, lamp and display (LED) drivers.

The UTC **ULN2001** has a 2.7kΩ series base resistor for each darlington pair for operation directly with TTL or 5V CMOS devices.

■ FEATURES

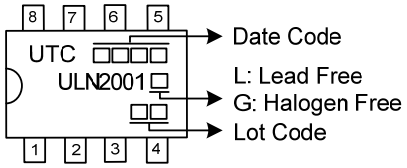
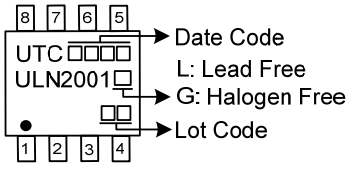
* Output Current (Single Output): 500mA max
* High Sustaining Voltage Output: 50V min
* Inputs Compatible with Various Types of Logic
* Output Clamp Diodes
* Relay-Driver Applications

■ ORDERING INFORMATION

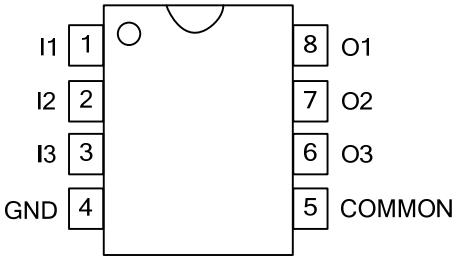
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULN2001L-D08-T	ULN2001G-D08-T	DIP-8	Tube
ULN2001L-S08-R	ULN2001G-S08-R	SOP-8	Tape Reel

ULN2001G-D08-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) D08: DIP-8, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

DIP-8	SOP-8
	

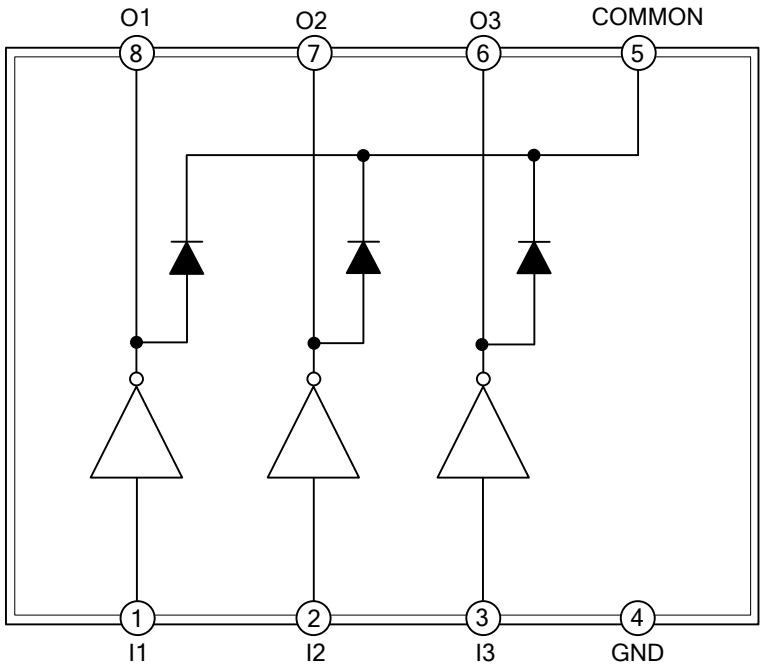
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	I1	1 Channel Input Pin
2	I2	2 Channel Input Pin
3	I3	3 Channel Input Pin
4	GND	Ground
5	COMMON	Clamp Diode
6	O3	3 Channel Output Pin
7	O2	2 Channel Output Pin
8	O1	1 Channel Output Pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		V_{CE}	50	V
Clamp Diode Reverse Voltage		V_{COM}	50	V
Input Voltage		V_I	30	V
Input Voltage		V_{COMMON}	50	V
Peak Collector Current		I_{CP}	500	mA/ch
Output Clamp Current		I_F	500	mA
Power Dissipation	DIP-8	P_D	0.750	W
	SOP-8		0.625	W
Junction Temperature		T_J	+125	°C
Operating Temperature		TOPR	-40 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +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.

■ RECOMMENDED OPERATING CONDITIONS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Sustaining Voltage	$V_{CE(SUS)}$		0		50	V
Output Current	I_{OUT}	T_A=+85°C			350	mA/ch
Input Voltage	V_{IN}		0		12	V
Input Voltage (Output On)	$V_{IN\ (ON)}$	I_{OUT}=350mA	2.8		12	V
Input Voltage (Output Off)	$V_{IN\ (OFF)}$		0		0.7	V
Clamp Diode Reverse Voltage	V_R				50	V
Clamp Diode Forward Current	I_F				350	mA

■ THERMAL DATA

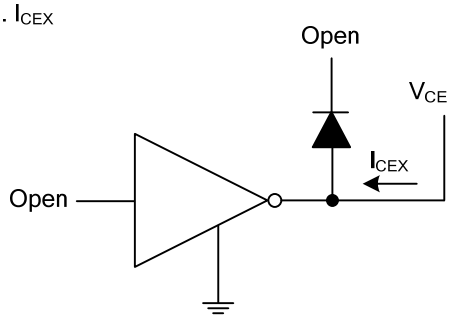
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-8	θ_{JA}	133	°C/W
	SOP-8		160	°C/W

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

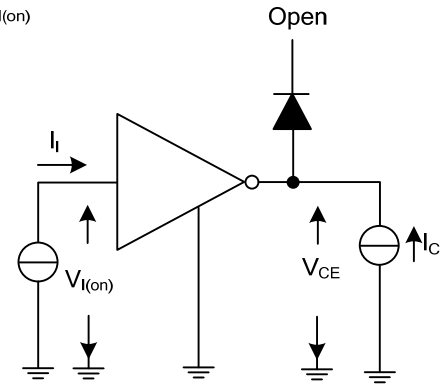
PARAMETER	SYMBOL	TEST CIRCUIT	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Voltage (Output On)	$I_{I(ON)}$	2	V_{CE}=1.5V	I_C=100mA		2.1	2.5	V
				I_C=200mA		2.2	2.6	V
				I_C=350mA		2.3	2.7	V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	3	V_I=2.4V (I_I>250μA)	I_C=100mA		1.1		V
				I_C=200mA		1.2		V
				I_C=350mA		1.3		V
Input Current	I_I	2	I_O=350mA	V_I=12V		6.5		mA
				V_I=6V		3.0		mA
				V_I=4.5V		2.1		mA
				V_I=2.4V		0.9		mA
Clamp Diode Forward Voltage	V_F	5	I_F=350mA				2.0	V
Output Leakage Current	I_{CEX}	1	V_{CE}=50V, I_I=0				50	μA
Clamp Diode Reverse Current	I_R	4	V_R=50V				50	μA
Propagation Delay Time, Low- to High	t_{PLH}	6	V_L=12V, R_L=120Ω			0.15	1	μs
Propagation Delay Time, High - to Low	t_{PHL}	6	V_L=12V, R_L=120Ω			0.15	1	μs

■ TEST CIRCUIT

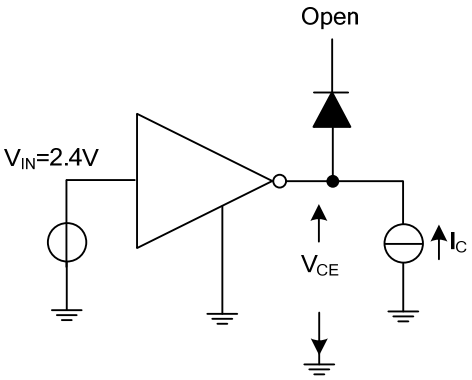
1. I_{CEX}



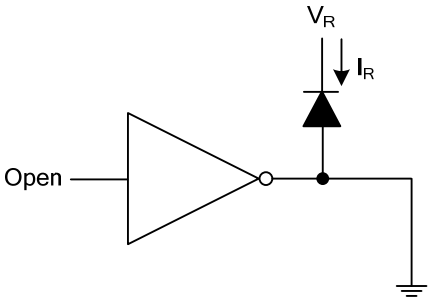
2. I_I & $V_{I(on)}$



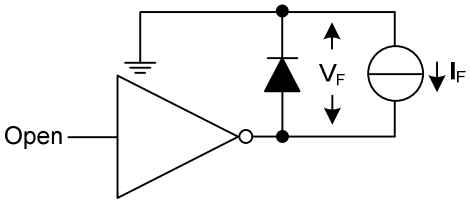
3. $V_{CE(sat)}$



4. I_R

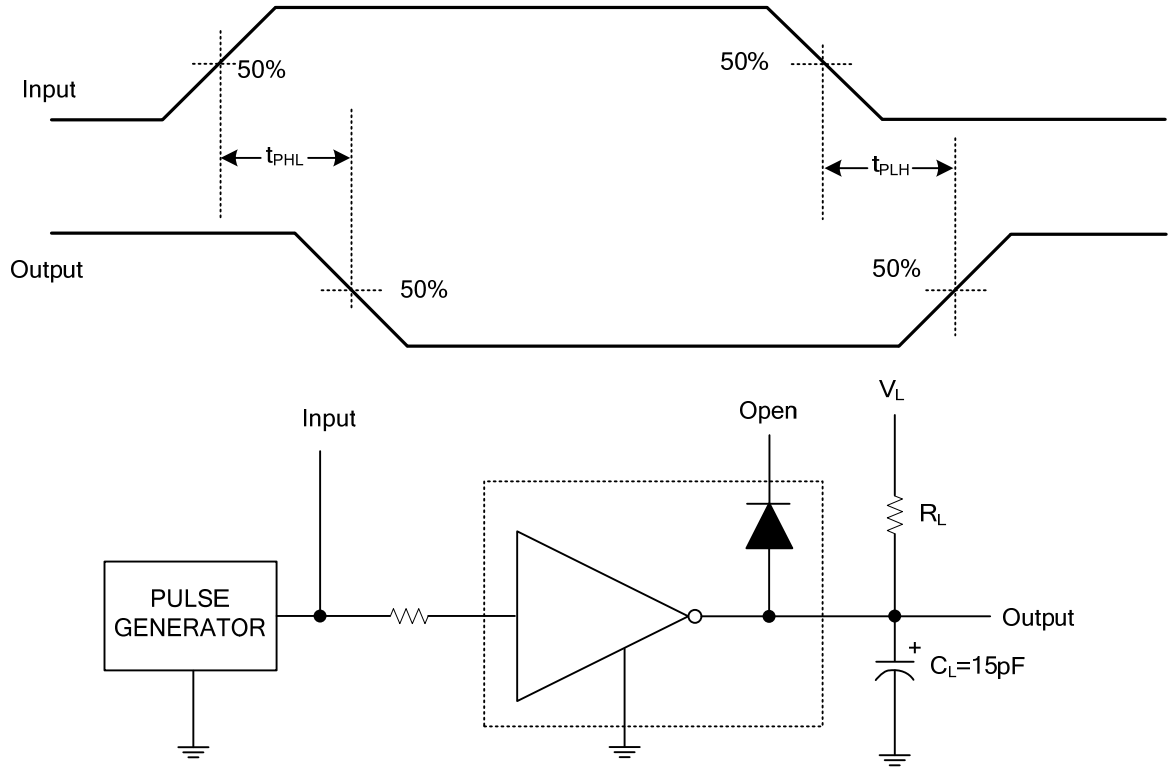


5. V_F

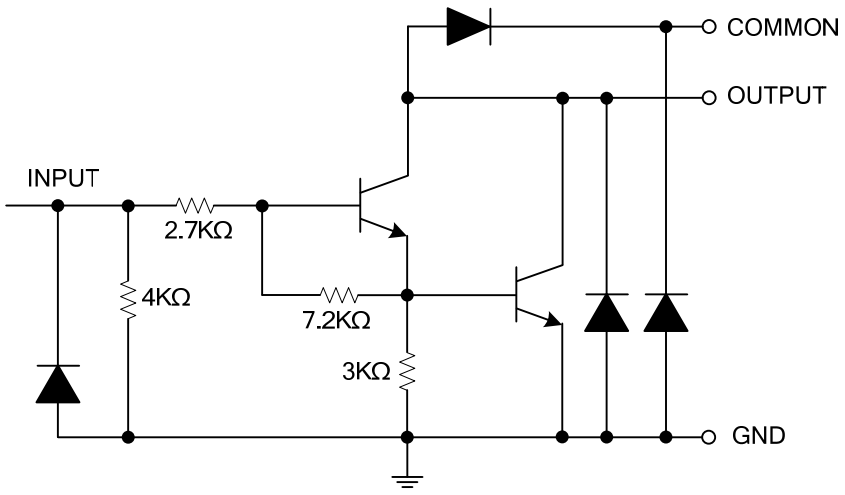


■ TEST CIRCUIT (Cont.)

6. Propagation Delay-Time Waveforms



■ TYPICAL APPLICATION CIRCUIT



UTC ULN2001 Drive Circuit