ULN2803/ULN2804 High-Voltage, High-Current Darlington Arrays

DESCRIPTION

The ULN2803/2804 series are high-voltage, high-current darington arrays comprised of eight NPN darington pairs. All units feature integral clamp diodes for switching inductive loads.

FEATURES

- Output current.....500mA
- High Sustaining Voltage.....50V Min.
- Output Clamp Diode
- Inputs Compatible With Various Types of Logic

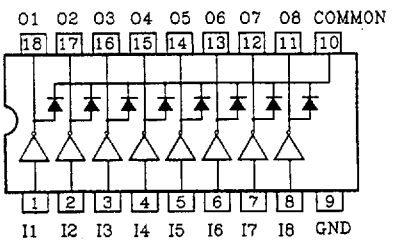
Type	Input Resistor	Designation
ULN2803	2.7KΩ	TTL , 5V C - MOS
ULN2804	10.5KΩ	6 ~ 15V P -MOS, C -MOS

18 DIP

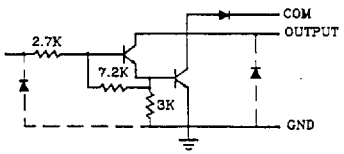
MAXIMUM RATING(Ta=25℃ unless otherwise

Characteristic		Symbol	Rating	Unit
Output Sustaining Voltage		$V_{CE(SUS)}$	50	V
Output Current		I_{OUT}	500	mA
Input Voltage		V_{IN}	-0.5~+30	V
Input Current		I_{IN}	25	mA
Clamp Diode	Reverse Voltage	V_R	50	V
	Forward Current	I_F	500	mA
GND Terminal Current		I_{GND}	3.2	A
Power Dissipation		P_D	1.47	W
Operating Temperature		Topr	-40~85	℃
Storage Temperature		Tstg	-55~150	℃

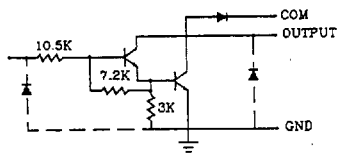
PIN CONNECTION (TOP VIEW)



ULN2803



ULN2804



RECOMMENDED OPERATING CONDITIONS(Ta=-40~85℃)

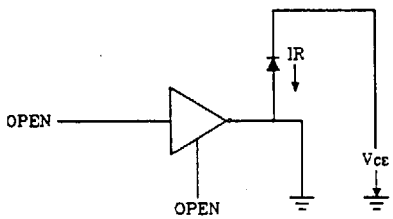
CHARACTERISTIC	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Output Sustaining Voltage	$V_{CE(SUS)}$		0	-	50	V
Output Current	I_{OUT}	T_{PW}=25mS,DF=8%, 8 Circuits T_{PW}=25mS,DF=25% 8 Circuits	0 0	- -	400 200	mA
Input Voltage	V_{IN}		0	-	30	V
Clamp Diode Reverse Voltage	V_R		-	-	50	V
Clamp Diode Forword Current	I_F		-	-	400	mA
Power Dissipation	P_D		-	-	0.52	W

ELECTRICAL CHARACTERISTICS(Ta=25℃ unless otherwise noted)

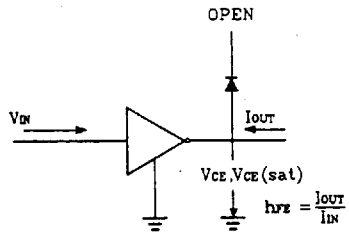
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	CONDITION	MIN.	TYP.	MAX.	UNIT
Output leak Current		I_{CEX}	1	V_{CE}=50V, Ta=25℃	-	-	50	μA
	ULN2804			V_{CE}=50V, Ta=85℃	-	-	100	
				V_{CE}=50V, V_{IN}=1V	-	-	500	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	2	I_{OUT}=350mA, I_{IN}=500μA	-	1.3	1.6	V
				I_{OUT}=200mA, I_{IN}=350μA	-	1.1	1.3	
				I_{OUT}=100mA, I_{IN}=250μA	-	0.9	1.1	
Input Current	ULN2803	$I_{IN(on)}$		V_{IN}=3.85V	-	0.93	1.35	mA
	ULN2804			V_{IN}=5V	-	0.35	0.5	
				V_{IN}=12V	-	1.0	1.45	
		$I_{ON(OFF)}$	4	I_{OUT}=500μA,Ta=85℃	50	65	-	μA
Input Voltage	ULN2803	$V_{IN(ON)}$	5	V_{CE}=2V, I_{OUT}=200mA	-	-	2.4	V
				V_{CE}=2V, I_{OUT}=250mA	-	-	2.7	
				V_{CE}=2V, I_{OUT}=300mA	-	-	3.0	
	ULN2804			V_{CE}=2V, I_{OUT}=125mA	-	-	5.0	
				V_{CE}=2V, I_{OUT}=200mA	-	-	6.0	
				V_{CE}=2V, I_{OUT}=275mA	-	-	7.0	
				V_{CE}=2V, I_{OUT}=350mA	-	-	8.0	
DC Current Transistor Ratio		h_{FE}	2	V_{CE}=2V, I_{OUT}=350mA	1000	-	-	
Clamp Diode Reverse Current		I_E	6	V_R=50V, Ta=25℃	-	-	50	μA
				V_R=50V, Ta=85℃	-	-	100	
Clamp Diode Forward Voltage		V_F	7	I_F=350mA			2.0	V
Input Capacitance		C_{IN}			-	15	-	pF
Turn-On Delay		t_{ON}	8	V_{OUT}=50V,R_L=163Ω	-	0.1	-	μS
Turn-Off Delay		t_{OFF}		C_L=15 pF	-	0.2	-	

TEST CIRCUIT

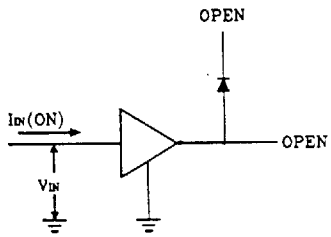
1. I_{CEX}



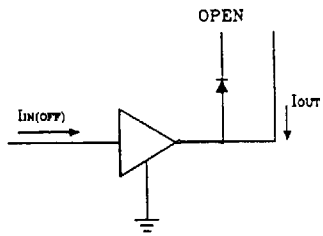
2. $V_{CE(sat)}$, h_{FE}



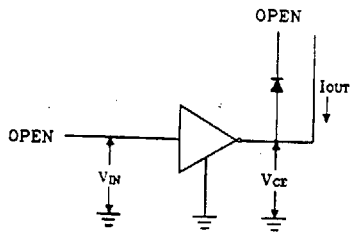
3. $I_{IN(ON)}$



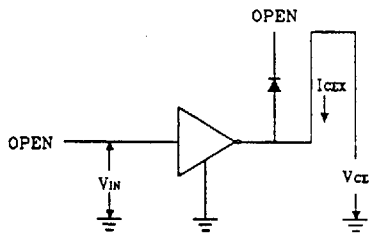
4. $I_{IN(OFF)}$



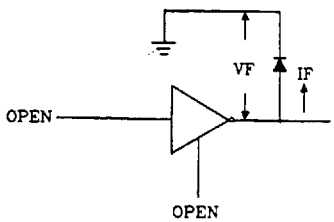
5. $V_{IN(ON)}$



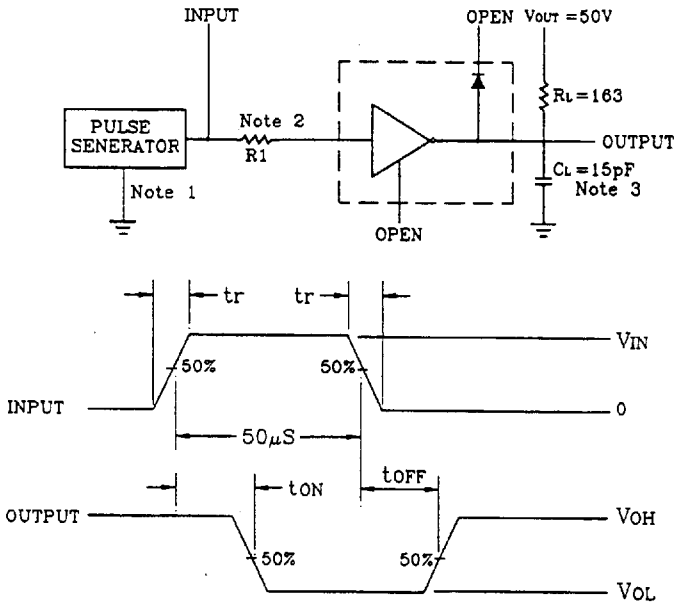
6. I_R



7. V_F



8. t_{ON}, t_{OFF}



Notes: 1. Pulse Width 50μ s, Duty Cycle 10%

Output Impedance 50Ω

$t_r \leq 5ns$, $t_f \leq 10ns$

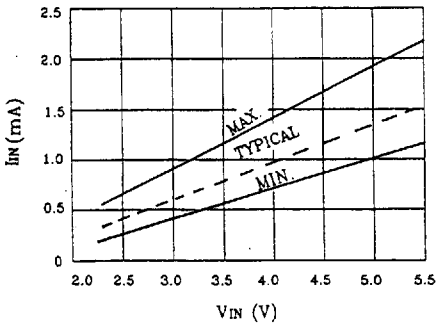
2. See below

Input Conditions

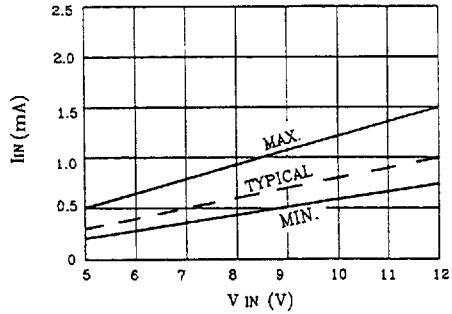
TYPE NUMBER	R_I	V_{IH}
ULN2803	0	3V
ULN2804	0	8V

3. C_L includes prob and jig capacitance.

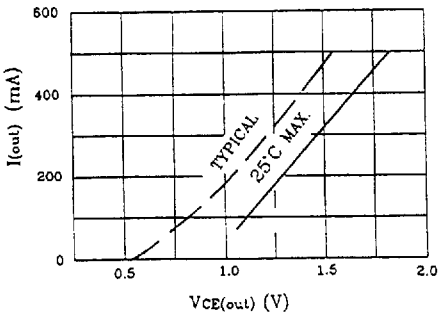
ULN2803 I_{IN} - V_{IN}



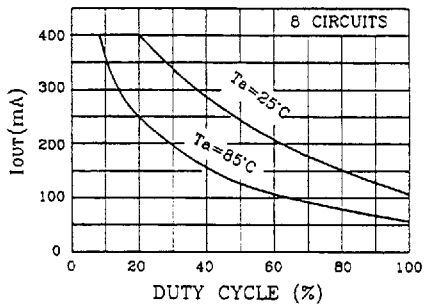
ULN2804 I_{IN} - V_{IN}



F_D -Ta



I_{OUT} -$V_{CE(sul)}$



I_{OUT} - DUTY CYCLE