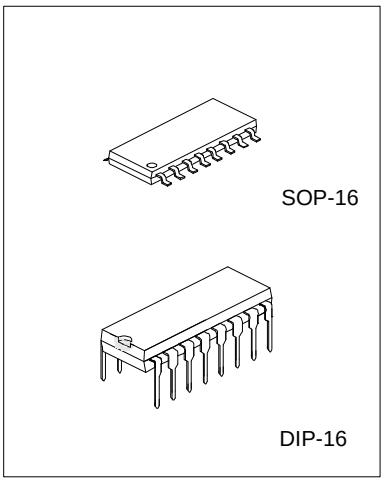
UTC ULN2003 LINEAR INTEGRATED CIRCUIT

THESE HIGH-VOLTAGE,HIGH-CURRENT



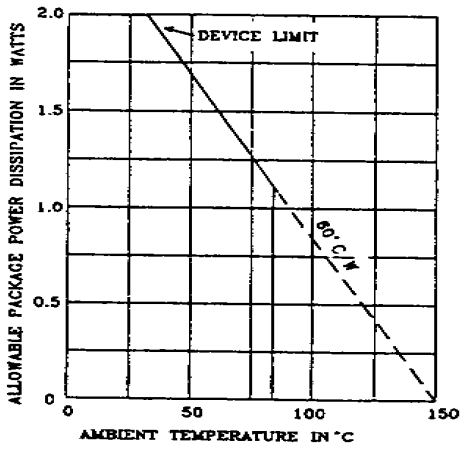
DESCRIPTION

Darlington arrays are comprised of seven silicon NPN darlington pairs on a common monolithic substrate. All units have open-collector outputs and integral diodes for inductive load transient suppression.

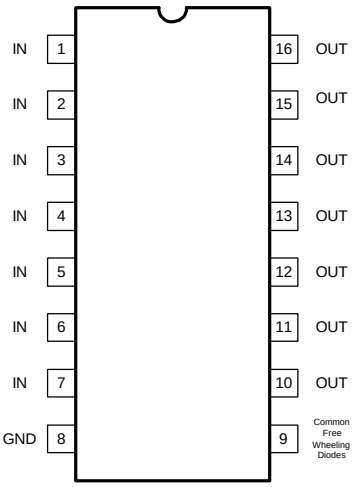
FEATURES

* ULN2003 has a 2.7kΩ series base resistor for each darlington pair, allowing operation directly with TTL or CMOS operating at a supply voltage of 5V. These devices will handle numberous interface needs particularly those beyond the capabilities of standard logic buffers.
* ULN2003 is the original high-voltage, high-current darlington array. The output transistors are capable of sinking 500mA and will sustain at least 50V in the off state. Output may be paralle-led for higher load-current capability.
* ULN2003 darlington arrays are furnished in a 16-pin dual in-line plastic package. These an also be supplyed in a hermetic dual in-line package for use in military an aerospace applications.

ALLOWABLE AVERAGE POWER DISSIPATION AS A FUNCTION OF AMBIENT TEMPERATURE



PIN CONFIGURATIONS



ABSOLUTE MAXIMUM RATINGS

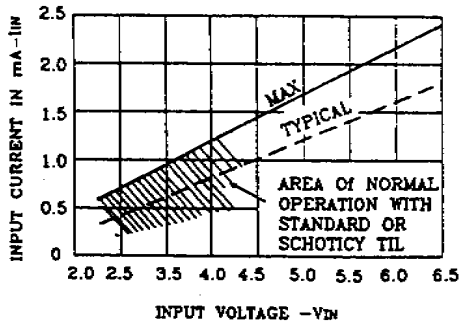
PARAMETER	SYMBOL	VALUE	UNIT
Input Voltage	V_{IN}	30	V
Continuous Input Current	I_{IN}	25	mA
Power Dissipation(one darlington pair)	P_D	1	W
Operating Ambient Temperature Range	T_A	-20 to +85	°C
Storage Temperature Range	T_S	-55 to +150	°C

*Debate at the rate of 16.67mW/°C above +25°C

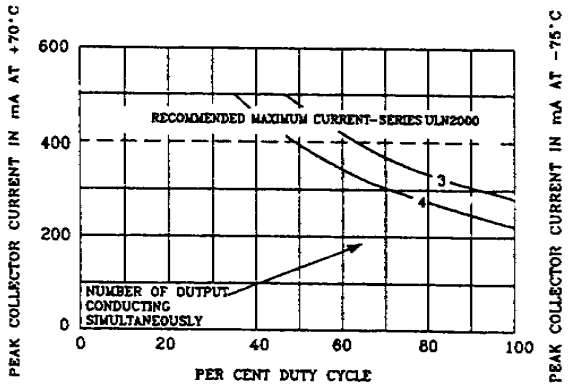
Under normal operating conditions, these devices will sustain 350mA per output with $V_{CE\ (STA)}$ =1.6V at +70°C With a pulse width of 20ms and a duty cycle of 34%.

PARTIAL SCHEMATICS

Series ULN2003
(each driver)



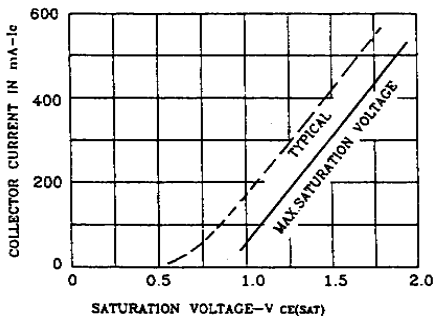
PEAK COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE



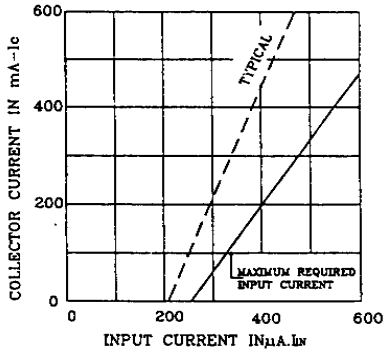
ELECTRICAL CHARACTERISTICS (Ta = 25 °C, Unless otherwise specified)

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=70°C			50 100	μA	1
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	Ic=100mA,Is=250μA Ic=200mA,Is=350μA Ic=350mA,Is=500μA		0.9 1.1 1.3	1.1 1.3 1.6	V	2
Input Current	$I_{IN(ON)}$	V_{IN} =3.85V		0.93	1.35	mA	3
Input Voltage	$I_{IN(OFF)}$	Ic=500μA,T_A=70°C	50	65		μA	4
	$V_{IN(ON)}$	V_{CE}=2.0V,Ic=200mA V_{CE}=2.0V,Ic=250mA V_{CE}=2.0V,Ic=300mA			2.4 2.7 3.0	V	5
Input Capacitance	C_{IN}			15	25	pF	
Turn-On Delay	t_{PLH}	0.5 Ein to 0.5 Eout		0.25	1.0	μS	
Turn-Off Delay	t_{PHL}	0.5 Ein to 0.5 Eout		0.25	1.0	μS	
Clamp Diode Leakage Current	I_R	V_R=50V,TA=25°C			50	μA	6
		V_R=50V,TA=70°C			100	μA	6
Clamp Diode Forward Voltage	V_F	I_F =350mA		1.7	2.0	V	7

COLLECTOR CURRENT AS A FUNCTION OF SATRATION VOLTAGE

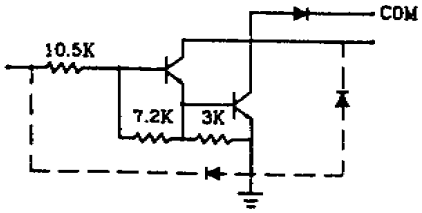


COLLECTOR CURRENT AS A FUNCTION OF INPUT CURRENT

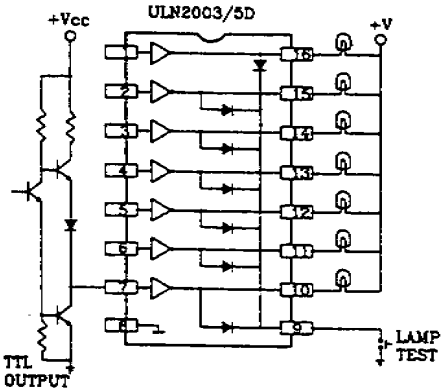


INPUT CURRENT AS A FUNCTION OF INPUT VOLTAGE

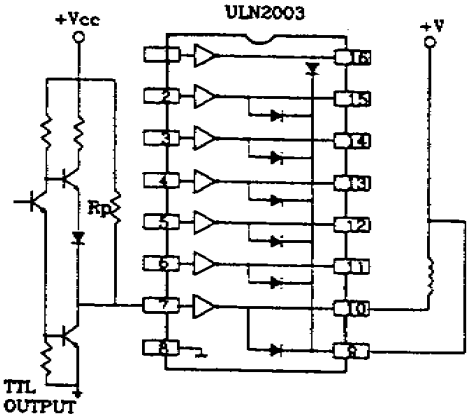
SERIES ULN2003



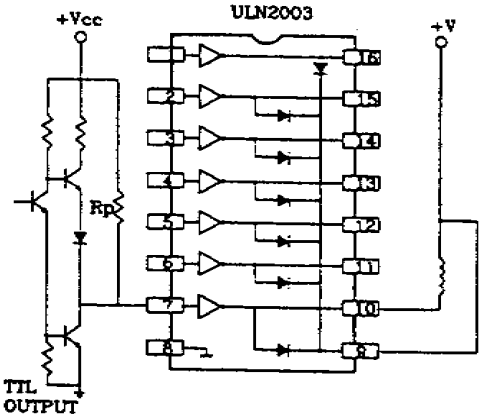
TTL TO LOAD



USE OF PULL-UP RESISTORS TO INCREASE DRIVE CURRENT



USE OF PULL-UP RESISTORS TO INCREASE DRIVE CURRENT



TEST CIRCUIT

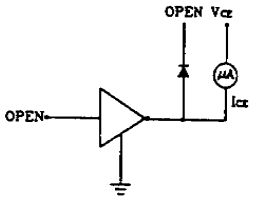


FIGURE 1

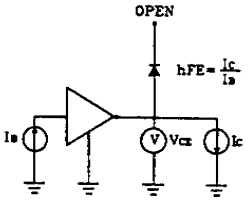


FIGURE 2

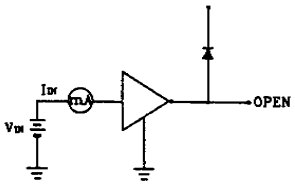


FIGURE 3

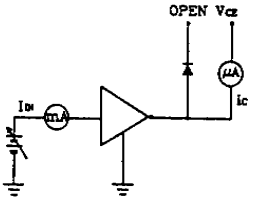


FIGURE 4

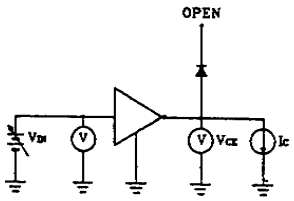


FIGURE 5

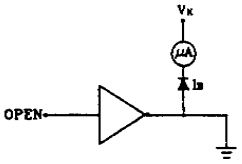


FIGURE 6

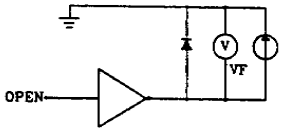


FIGURE 7