

Darlington transistor array circuit

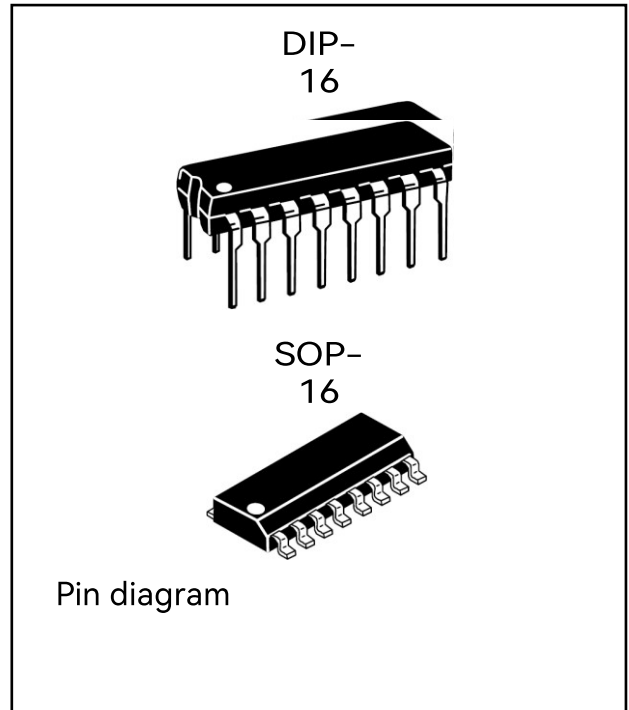
Overview

ULN2003A is a high voltage, high current Darlington transistor array monolithic integrated circuit. It is suitable for driving all kinds of lamps, relays and printer firing pins in industry and civil.

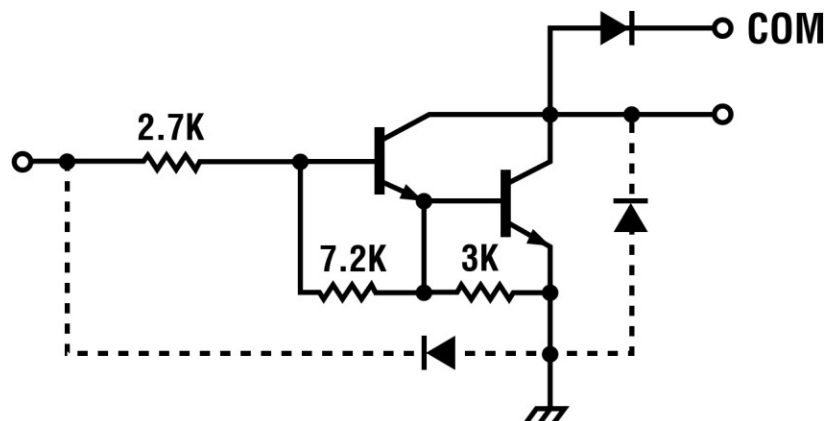
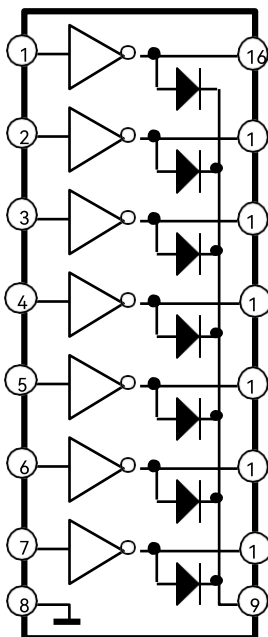
In DIP16 and SOP16 package form.

Main characters

- High voltage, output working voltage up to 50V
- Internal overvoltage protection circuit to prevent overvoltage damage by inductive negative load
- The peak influx current is 600mA, which can drive an incandescent lamp
- The input impedance is 2.7kΩ and can be used with TTL or CMOS logic circuits using 5V voltage



Functional block diagram



Limit value (absolute maximum rating, Tamb=25 ° C if no other requirements exist)

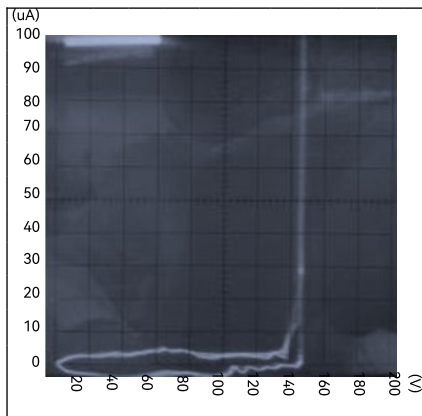
Parameter name	Symbol	Value			Unit
		Min	Typical	Max	
Output Voltage	Vo			50	V
Input Voltage	VI			30	V
Collector current (continuous current)	Ic			500	mA
Base current (continuous current)	IB			25	mA
Tj(junction temperature)	Tj			150	°C
Operating ambient temperature	Tamb	-40		85	°C
Storage temperature	Tstg	-55		150	°C
COM to GND breakdown voltage 1(Curve 1)	VCOMbd		130		V
OUT to GND breakdown voltage ²	Vobd		110		V

Note 1, Note 2: This voltage value is the typical value of the breakdown voltage of the pin, not the maximum operating voltage.

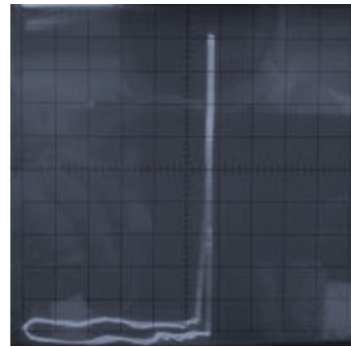
Electrical characteristics (if not otherwise specified, Tamb=25 ° C)

Characteristics	Symbol	Test conditions	Code Value			Unit
			Min	Typical	Max	
Output leakage current	ICEX	Vo=50V, Tamb= +85°C			100	µA
		Vo=50V, Tamb= +25°C			50	
Collector-emitter output saturation voltage drop	VCES	Ic=350mA, IB=500µA		1.1	1.6	V
		Ic=200mA, IB=350µA		0.95	1.3	
		Ic=100mA, IB=250µA		0.85	1.1	
Input current (on condition)	II (ON)	VI=3.85V		0.93	1.35	mA
Input voltage (on condition)	VI (ON)	VCE=2.0V, Ic=200mA			2.4	V
		VCE=2.0V, Ic=250mA			2.7	
		VCE=2.0V, Ic=300mA			3.0	
Input current (off condition)	II (OFF)	VCE=2.0V, Ic=350mA	50	100		µA
Input capacitance	CI			15	30	pF
Conduction delay time	tON	50%EI to 50%Eo		0.25	1.0	µs
Cutoff delay time	tOFF	50%EI to 50%Eo		0.25	1.0	µs
Clamp diode leakage current	IR	VR=50V	Tamb= +25°C		50	µA
			Tamb= +85°C		100	
Clamp diode forward voltage	VF	IF=350mA		1.5	2.0	V

Pressure curve (Tamb=25 ° C if no other requirements exist)

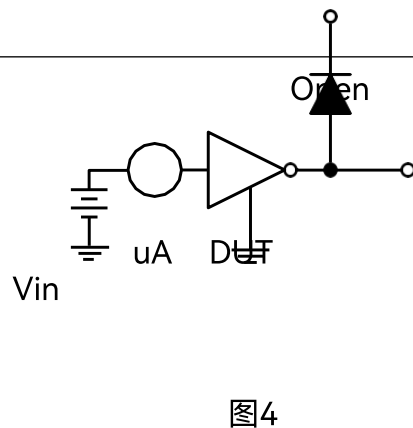
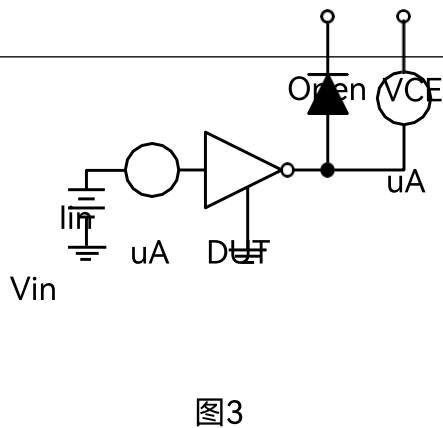
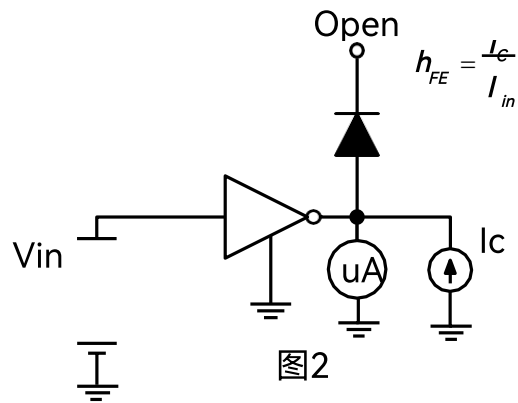
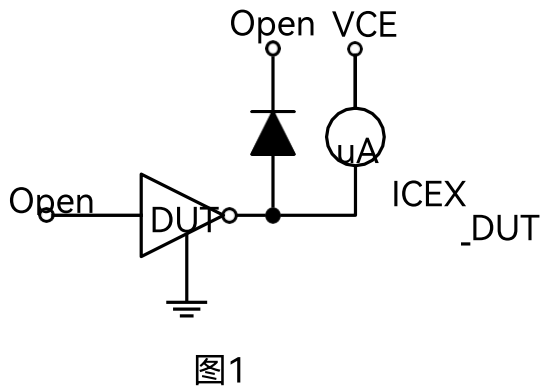


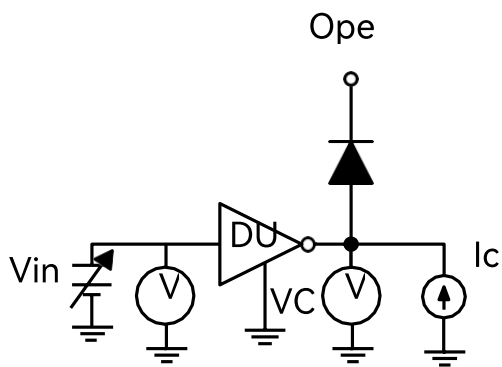
Curve 1.COM - GND withstand voltage diagram



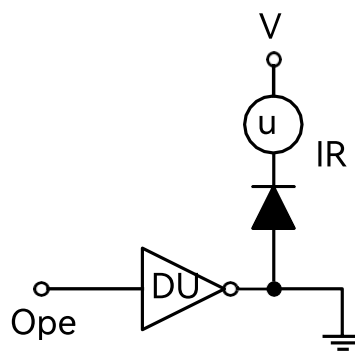
Curve 2.COM - GND withstand voltage diagram

Test diagram

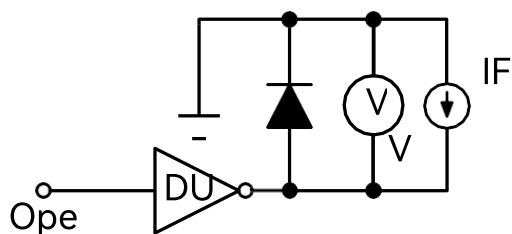




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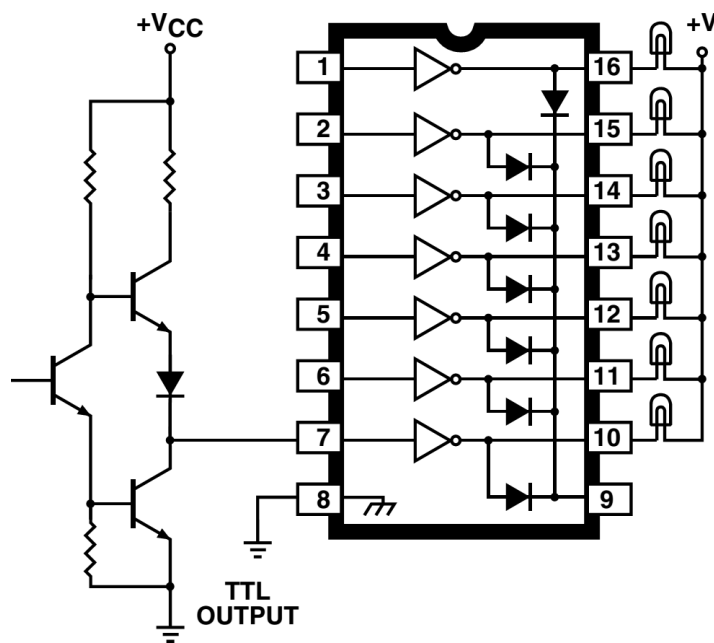


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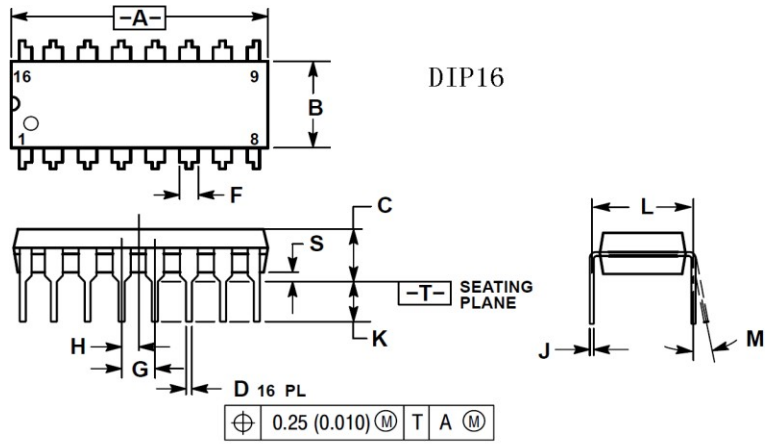
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Application circuit diagram



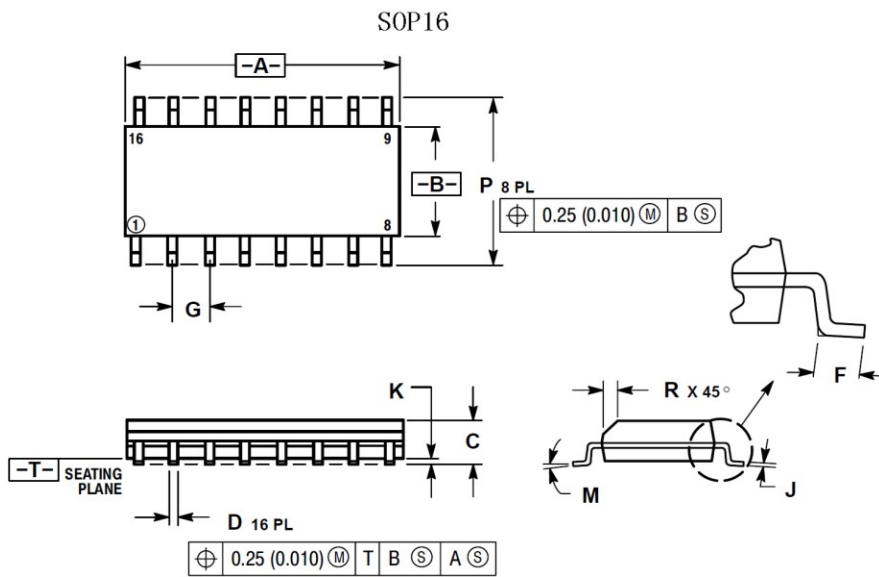
Packing size

(DIP16)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°		10°	
S	0.020	0.040	0.51	1.01

(SOP16)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°		7°	
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019