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Product data sheet

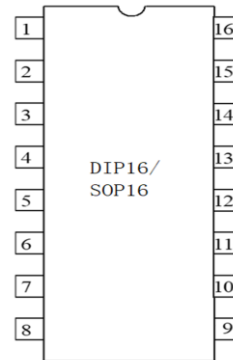
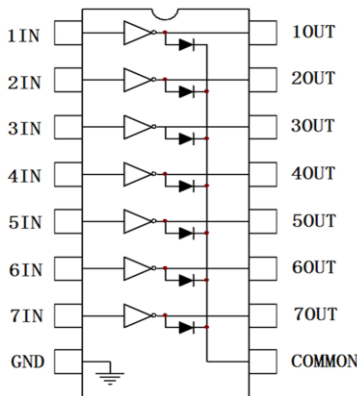
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GENERAL DESCRIPTION

ULN2003 是单片集成高耐压、大电流达林顿管阵列，电路内部包含 7 个独立的达林顿管驱动单路。电路内部设计有钳位二极管，可用于驱动继电器、步进电机等感性负载，将达林顿管并联可实现更高的输出电流能力。该电路可广泛应用于继电器驱动、照明驱动、显示屏驱动(LED)、步进电机驱动和逻辑缓冲器。ULN2003 的每一路达林顿管串联一个 2.7K 的基极电阻，在 5V 的工作电压下可直接与 TTL/CMOS 电路连接，可直接处理标准逻辑缓冲器所处理的数据。

FEATURES

- 宽输入耐压：0~30V, Ta=25°C
- 输出关闭状态耐压：50V Ta=25°C
- 输出最大电流：500MA, Ta=25°C
- 输入兼容 TTL/CMOS 逻辑信号



PIN CONFIGURATION

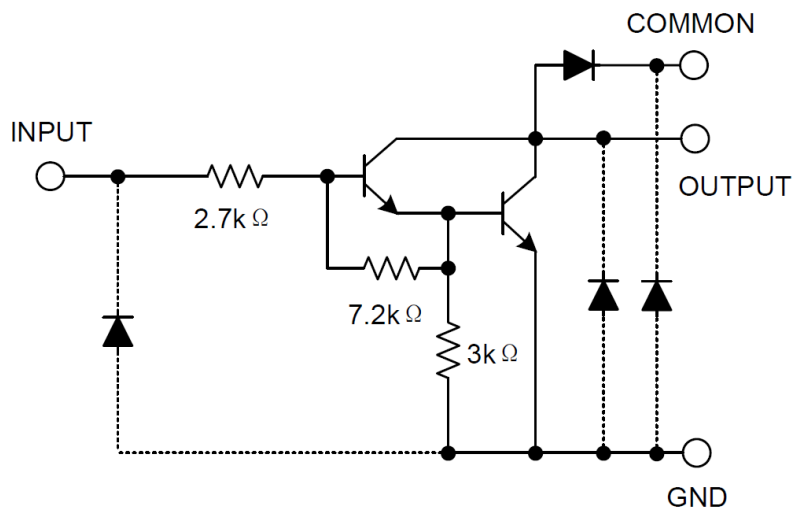
SOP16 DIP16	管脚 定义	管脚功 能描述	SOP16 DIP16	管脚 定义	管脚功 能描述
1	1IN	1 通道输入	16	10UT	1 通道输出
2	2IN	2 通道输入	15	20UT	2 通道输出
3	3IN	3 通道输入	14	30UT	3 通道输出
4	4IN	4 通道输入	13	40UT	4 通道输出
5	5IN	5 通道输入	12	50UT	5 通道输出
6	6IN	6 通道输入	11	60UT	6 通道输出
7	7IN	7 通道输入	10	70UT	7 通道输出
8	GND	接电源地	9	COMMON	钳位二极管公共端

极限参数

极限参数	符号	极限值	单位
输入电压	V_{IN}	30	V
输出电压	V_{CE}	50	V
集电极电流	I_C	500	mA
基极电流	I_B	25	mA
工作温度	T_A	-40~85	°C
存储温度	T_S	-65~150	°C
焊接温度	T_W	260, 10s	°C

注：极限参数是指无论在任何条件下都不能超过的极限值。如果超过此极限值，将有可能造成产品劣化等物理性损伤；同时在接近极限参数下，不能保证芯片可以正常工作。

原理逻辑图

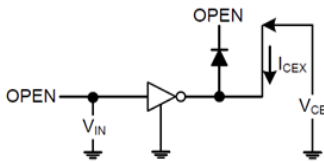


电学特性 (直流电学特性: $T_A=25^\circ\text{C}$)

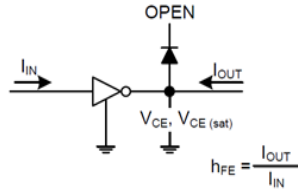
符号	项目	测试条件	测试电路	最小值	典型值	最大值	单位	
I_{CEX}	输出高漏电流	$V_{CE}=50\text{V}$	1	$T_A=25^\circ\text{C}$	-	0	50	μA
				$T_A=85^\circ\text{C}$	-	0	100	μA
$V_{CE(SAT)}$	输出低电平电压	$I_{OUT}=350\text{mA}, I_{IN}=500\mu\text{A}$	2	$T_A=25^\circ\text{C}$	-	1.0	1.6	V
				$T_A=85^\circ\text{C}$	-	0.9	1.3	V
				$T_A=25^\circ\text{C}$	-	0.8	1.1	V
$I_{IN(ON)}$	输入电流	$V_{IN}=3.85\text{V}, I_{OUT}=350\text{mA}$	3	-	0.7	1.35	mA	
$I_{IN(OFF)}$				$I_{OUT}=500\mu\text{A}, T_A=85^\circ\text{C}$	4	50	63	-
$V_{IN(ON)}$	输入电压	$V_{CE}=2\text{V}$	5	$I_{OUT}=200\text{mA}$	-	1.8	2.4	V
				$I_{OUT}=250\text{mA}$	-	1.85	2.7	V
				$I_{OUT}=300\text{mA}$	-	1.9	3.0	V
I_R	钳位二极管反向漏电流	$V_R=50\text{V}$	6	$T_A=25^\circ\text{C}$	-	0	50	μA
				$T_A=85^\circ\text{C}$	-	0	100	μA
V_F	钳位二极管压降	$I_F=350\text{mA}$	7	-	1.7	2.0	V	
t_{ON}	开启延迟时间	$V_{OUT}=50\text{V}, R_L=125\Omega, C_L=15\text{pF}$	8	-	0.1	1	μs	
t_{OFF}	关断延迟时间			-	0.2	1	μs	

测试方法

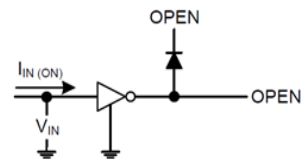
1. I_{CEX}



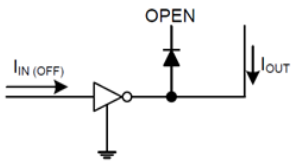
2. $V_{CE(sat)}, h_{FE}$



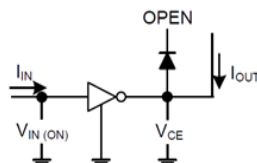
3. $I_{IN(ON)}$



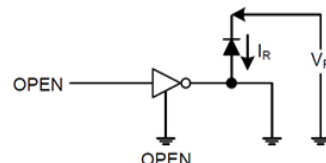
4. $I_{IN(OFF)}$



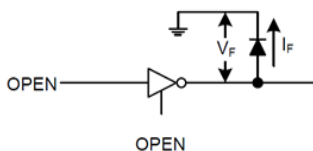
5. $V_{IN(ON)}$



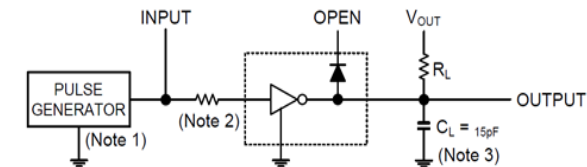
6. I_R



7. V_F



8. t_{ON}, t_{OFF}

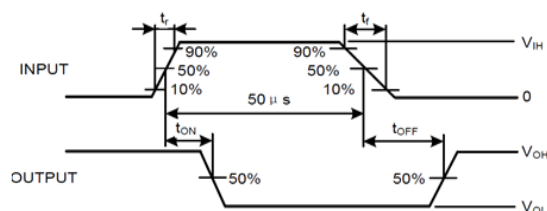


8. t_{ON}, t_{OFF} 注:

(1) 脉冲宽度为 50US, 占空比为 10%, 输出负载 125Ω, $t_r \leq 20\text{ns}$, $t_f \leq 20\text{ns}$;

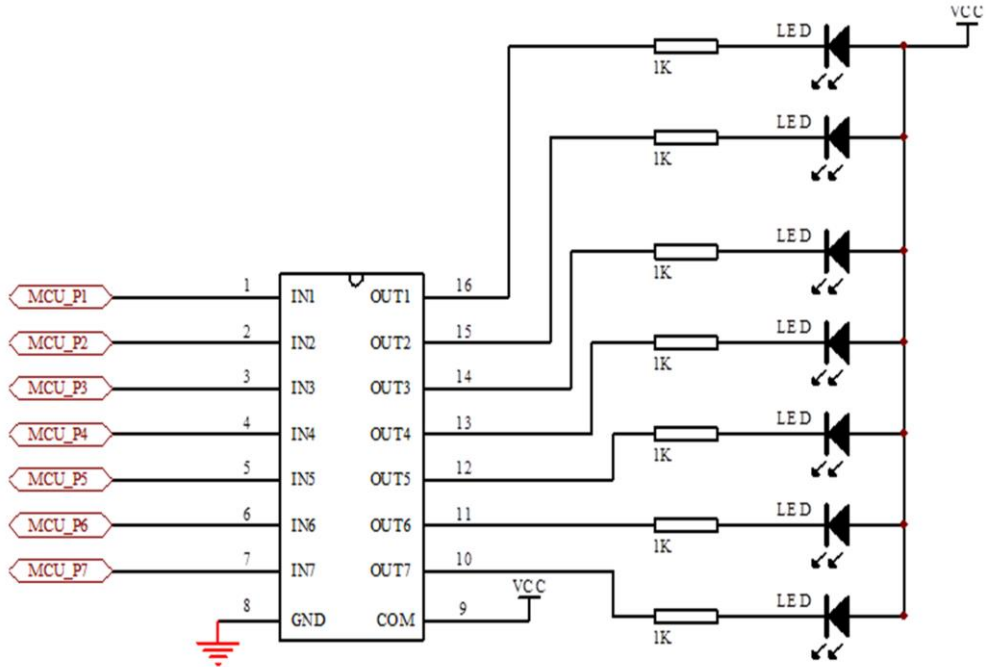
(2) $R=0, V_{IH}=3\text{V}$;

(3) C_L 包括探针和测试夹具的电容。



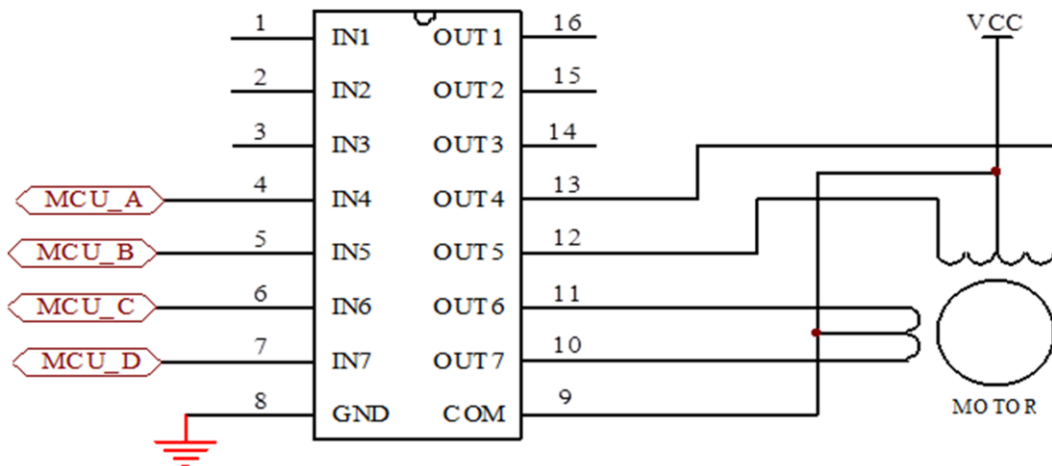
典型应用线路

1、 LED 驱动电路



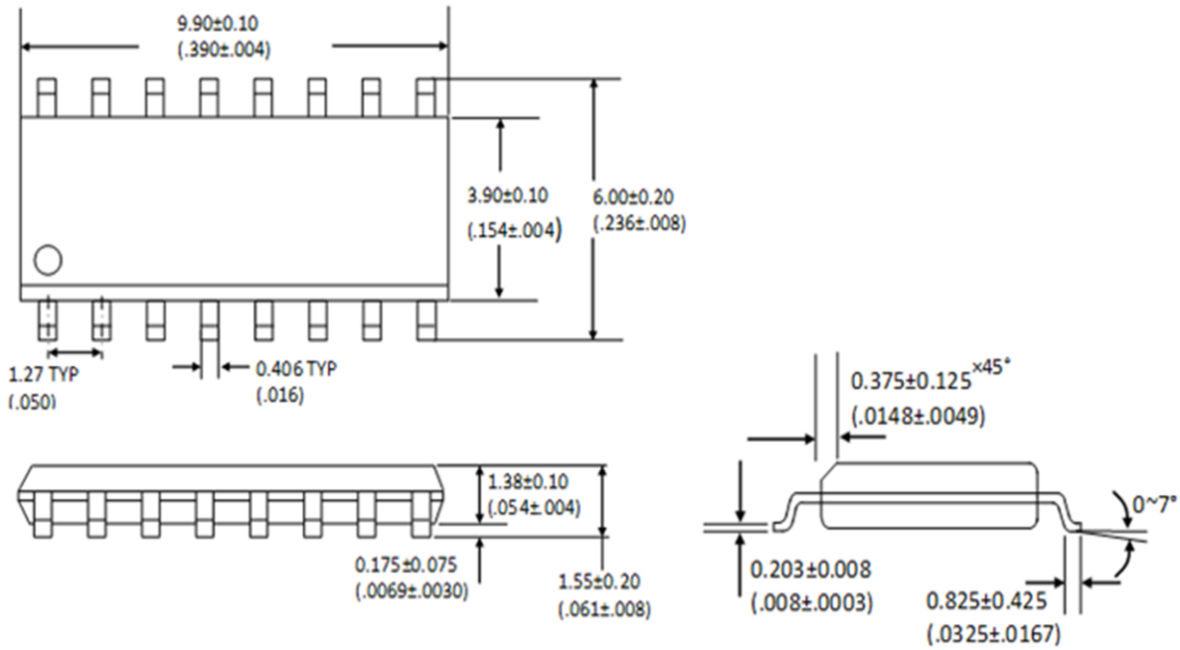
注：1K 的电阻可根据 VCC 的电压和所需 LED 的电流进行调整。

2、 步进电机驱动电路



PACKAGE MECHANICAL DATA

SOP-16

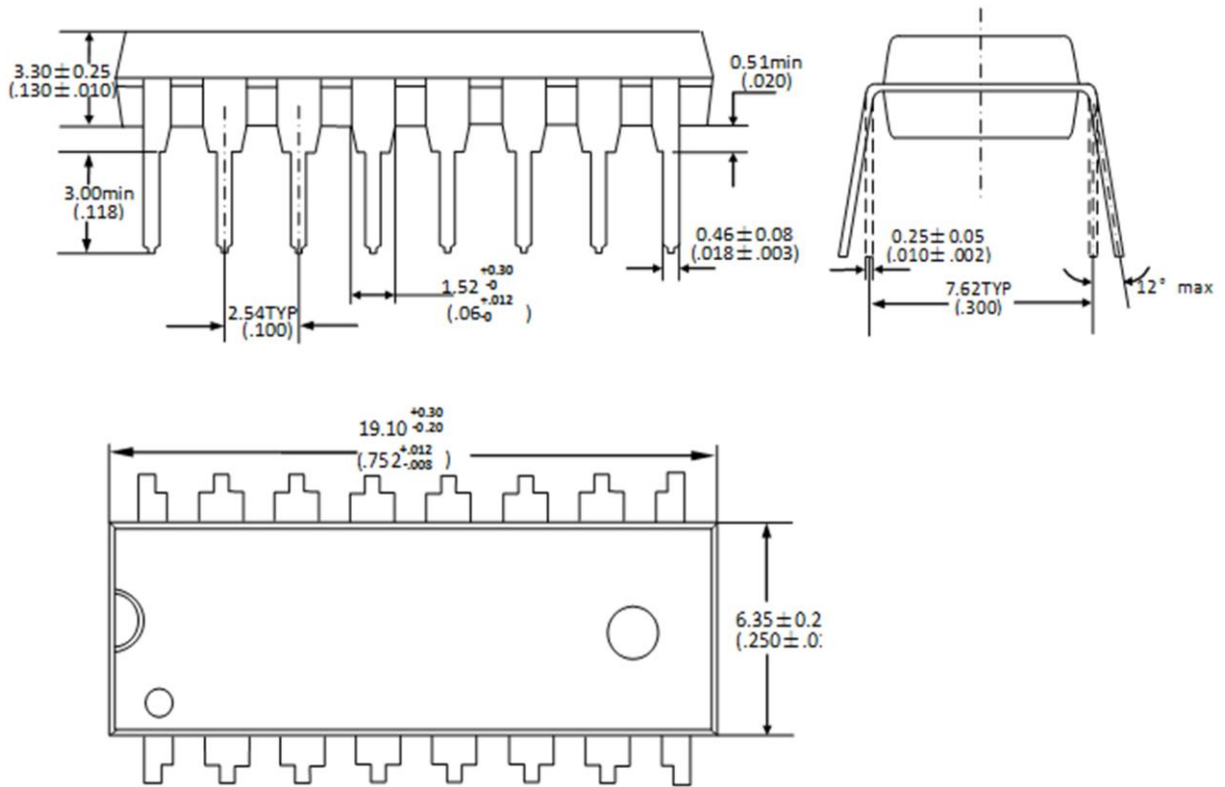


REEL SPECIFICATION

P/N	PKG	QTY
ULN2003	SOP-16	4000

PACKAGE MECHANICAL DATA

DIP-16



REEL SPECIFICATION

P/N	PKG	QTY
ULN2003	DIP-16	1000

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