



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-ULN2001-4

七达林顿阵列

网址 www.sztdbdt.com 🔍

用芯智造 · 卓越品质

**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



特点

- 每封装包含七个达林顿管
- 每通道输出电流500mA
- 输出电 集成续流二极管，适用于感性负载
- 输出可并联以获得更大电流
- 兼容TTL/CMOS/PMOS/DTL输入
- 输入引脚位于输出引脚对面，便于布局设计

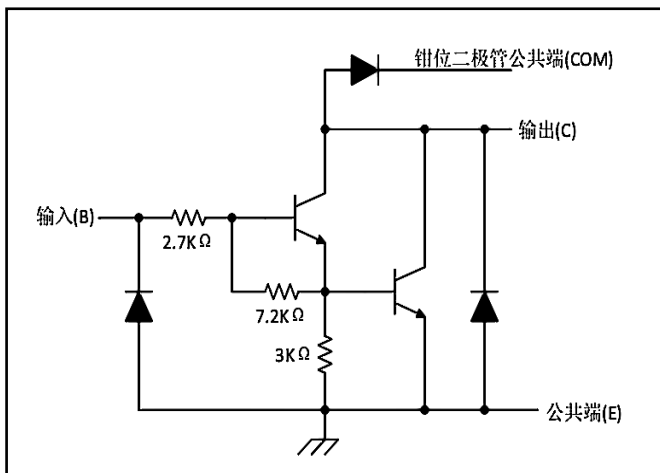
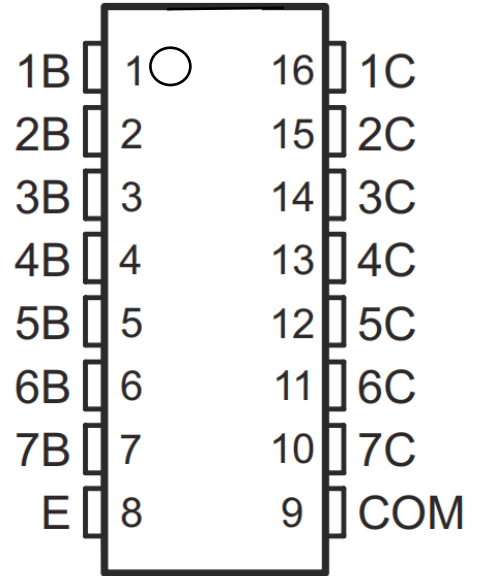
说明

ULN2001、ULN2002、ULN2003和ULN2004是高压、大电流达林顿阵列，每个阵列包含七个共集电极的达林顿对。每个通道的额定电流为500mA，可承受6mA的峰值电流。内置抑制二极管用于驱动感性负载，且输入引脚与输出引脚位置相反，以简化电路板布局。

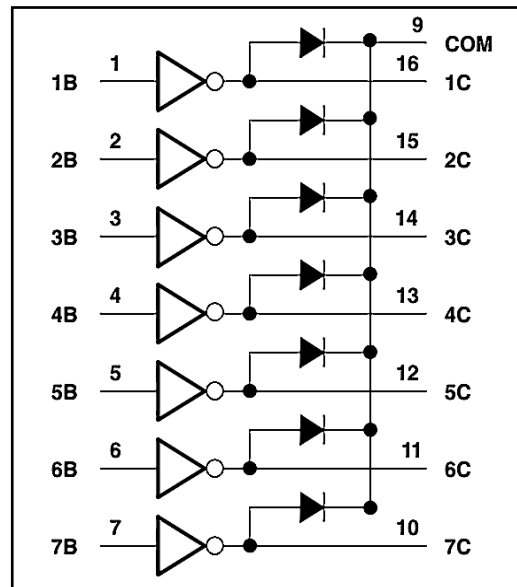
这些版本可与常见的逻辑系列接口：ULN2001（通用、DTL、TTL、PMOS、CMOS）；ULN2002（4-25V PMOS）；ULN2003（5V TTL、CMOS）；ULN2004（6-15V CMOMOS）。

这些多功能器件可用于驱动广泛的负载，包括电磁阀、继电器、直流电机、LED显示灯丝灯、热敏打印头和大功缓冲器。

ULN2001A/2002A/2003A和2004A提供16引脚DIP封装和16引脚SOP封装



单路驱动电路原理图



简化版方框图

应用

- 继电器驱动器 ● 灯驱动器 ● 显示屏驱动器 ● 线路驱动器 ● 逻辑缓冲器



引脚功能

| 引脚 | | I/O(1) | 说明 |
|-----|----|--------|----------------------|
| 名称 | 编号 | | |
| 1B | 1 | I | 达林顿基极输入 |
| 2B | 2 | I | 达林顿基极输入 |
| 3B | 3 | I | 达林顿基极输入 |
| 4B | 4 | I | 达林顿基极输入 |
| 5B | 5 | I | 达林顿基极输入 |
| 6B | 6 | I | 达林顿基极输入 |
| 7B | 7 | I | 达林顿基极输入 |
| E | 8 | — | 所有通道共享的共发射极(通常与地面相连) |
| COM | 9 | — | 反激二极管的共阴极节点(用于感性负载) |
| 7C | 10 | O | 达林顿集电极输出 |
| 6C | 11 | O | 达林顿集电极输出 |
| 5C | 12 | O | 达林顿集电极输出 |
| 4C | 13 | O | 达林顿集电极输出 |
| 3C | 14 | O | 达林顿集电极输出 |
| 2C | 15 | O | 达林顿集电极输出 |
| 1C | 16 | O | 达林顿集电极输出 |

极限参数

| 极限参数 | |
|-------------|------------|
| 存储温度: | 65°C~150°C |
| 工作温度范围: | 40°C~85°C |
| 结温度范围: | 40°C~150°C |
| 输入电压: | 0.3V~30V |
| 输出电压: | 55V |
| 射极到基极的最高耐压: | 6.0V |
| 集电极持续工作电流: | 500mA |
| 基极持续工作电流: | 25mA |



电参数

| 参数 | 测试图 | 测试条件 | | 2003 | | 单位 | |
|----------------------|-----|-------------------|--------------|----------|------------|----|------|
| | | | | 最小值 | 典型值 | | 最大值 |
| Vi(on) 导通状态输入电压 | 图6 | VCE=2V | | Ic=125mA | | 5 | V |
| | | | | Ic=200mA | 2.4 | 6 | |
| | | | | Ic=250mA | 2.7 | | |
| | | | | Ic=275mA | | 7 | |
| | | | | Ic=300mA | 3 | | |
| | | | | Ic=350mA | | 8 | |
| VOH 开关后高电平输出电压 | 图10 | Vs=50V, Io=300mA | | Vs -20 | Vs -20 | mV | |
| VCE(sat) 集电极-发射极饱和电压 | 图5 | I=250μA, Ic=100mA | | 0.9 | 1.1 | V | |
| | | I=350μA, Ic=200mA | | 1 | 1.3 | | |
| | | I=500μA, Ic=350mA | | 1.2 | 1.6 | | |
| CEX 集电极截止电流 | 图1 | VCE=50V, I=0 | | 50 | 50 | μA | |
| | 图2 | VCE=50V, TA=70°C | I=0 Vi=6V | 100 | 100 500 | | |
| VF 钳位正向电压 | 图8 | IF=350mA | | 1.7 | 2 | V | |
| I(off) 关断状态输入电流 | 图3 | VCE=50V, TA=70°C | Ic=500μA | 50 | 65 | μA | |
| I 输入电流 | 图4 | V=3.85V | | 0.93 | 1.35 | mA | |
| | | V=5V | | | 0.35 | | 0.5 |
| | | V=12V | | | 1 | | 1.45 |
| IR 钳位反向电流 | 图7 | VR=50V | | 50 | 50 | μA | |
| | | VR=50V | TA=70°C | 100 | 100 | | |
| Ci 输入电容 | | Vi=0, | f=1MHz | 15 | 25 | pF | |

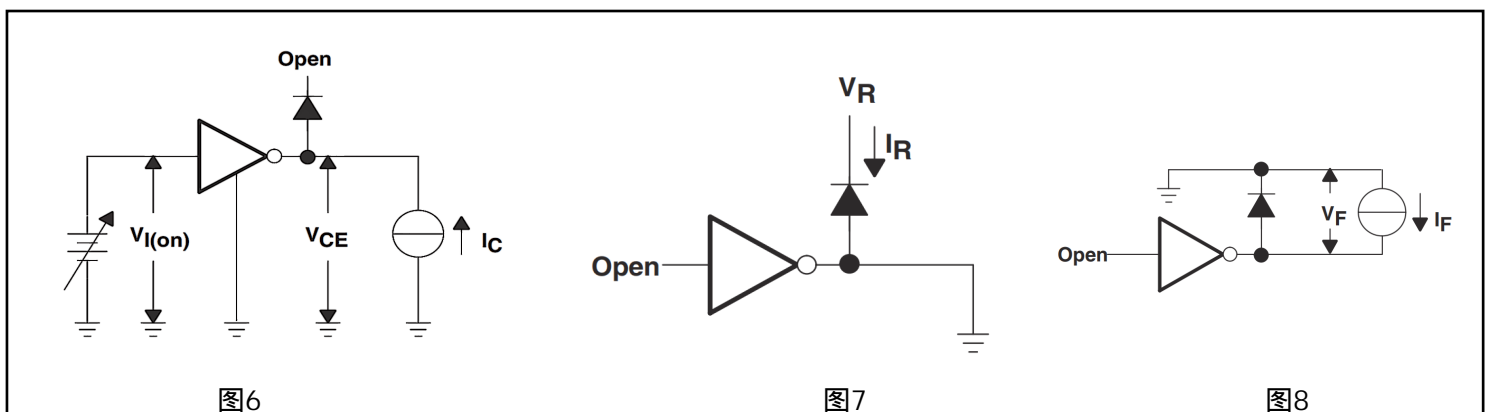
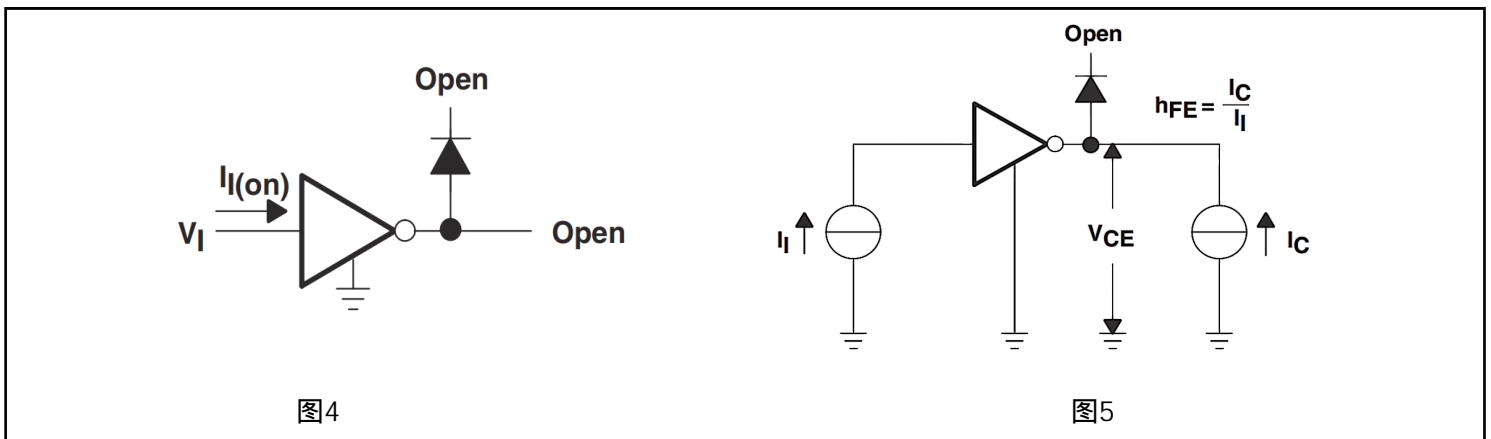
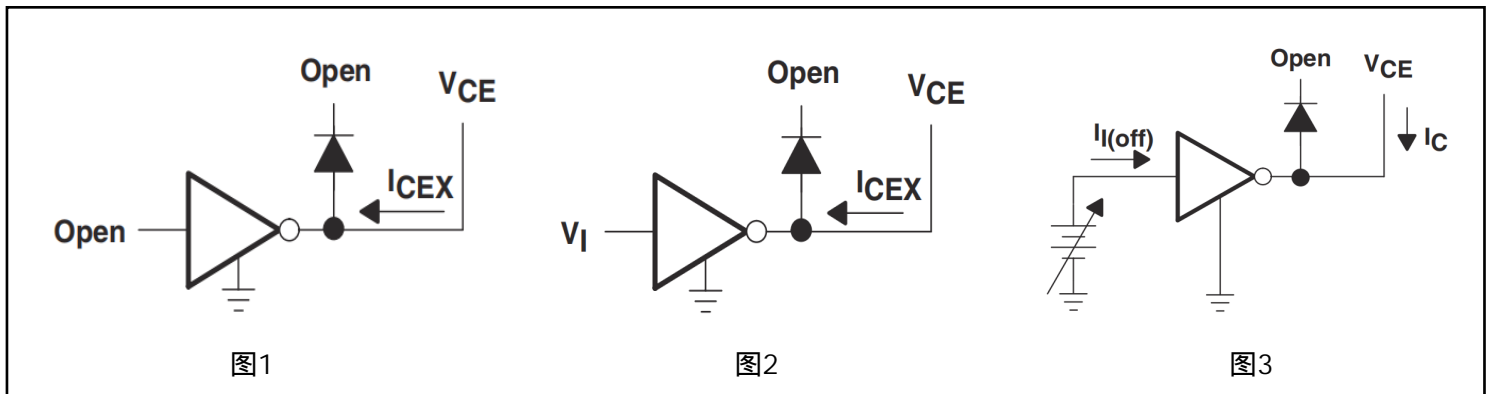
| 参数 | 测试图 | 测试条件 | | 2002 | | 单位 |
|----------------------|-----|-------------------|-------------|--------|------|----|
| | | | | 最小值 | 典型值 | |
| Vi(on) 导通状态输入电压 | 图6 | VCE=2V, Ic=300mA | | 13 | | V |
| VOH 开关后高电平输出电压 | 图10 | Vs=50V, Io=300mA | | Vs -20 | | mV |
| VCE(sat) 集电极-发射极饱和电压 | 图4 | I=250μA, Ic=100mA | | 0.9 | 1.1 | V |
| | | I=350μA, Ic=200mA | | 1 | 1.3 | |
| | | I=500μA, Ic=350mA | | 1.2 | 1.6 | |
| VF 钳位正向电压 | 图7 | IF=350mA | | 1.7 | 2 | V |
| CEX 集电极截止电流 | 图1 | VCE=50V, I=0 | | 50 | | μA |
| | 图2 | VCE=50V, TA=70°C | I=0 V=6V | 100 | 500 | |
| I(off) 关断状态输入电流 | 图2 | VCE=50V, | Ic=500μA | 50 | 65 | μA |
| I 输入电流 | 图3 | Vi=17V | | 0.82 | 1.25 | mA |
| IR 钳位反向电流 | 图6 | VR=50V | TA=70°C | 100 | | μA |
| | | VR=50V | | 50 | | |
| C 输入电容 | | Vi=0, | f=1MHz | 25 | | pF |

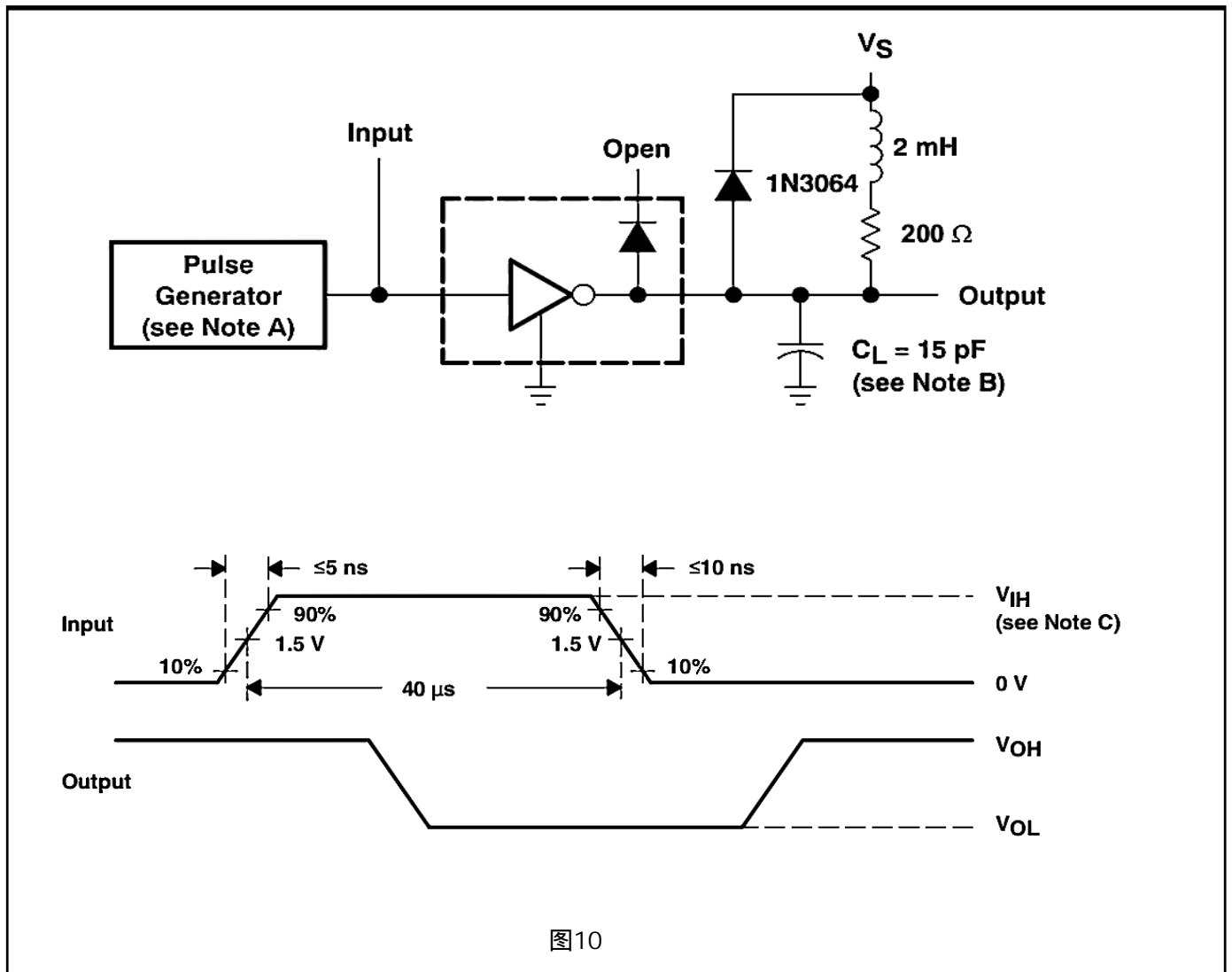
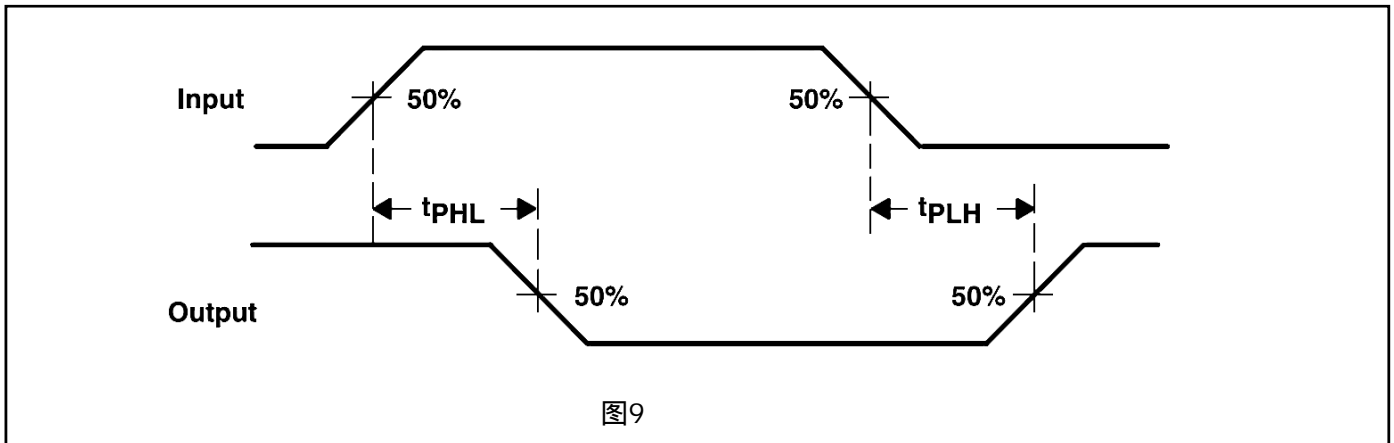
(除非特殊说明: V+ = 5V, Ta = 25)

开关特性

| 参数 | 测试条件 | 2001/2002/2003/2004 | | 单位 |
|------------------------------------|-------|---------------------|-----|----|
| | | 最小值 | 典型值 | |
| t _{pLH} 传播延迟时间, 低电平到高电平输出 | 请参阅图9 | 0.25 | 1 | μS |
| t _{pHL} 传播延迟时间, 高电平到低电平输出 | 请参阅图9 | 0.25 | 1 | μS |

电路测试

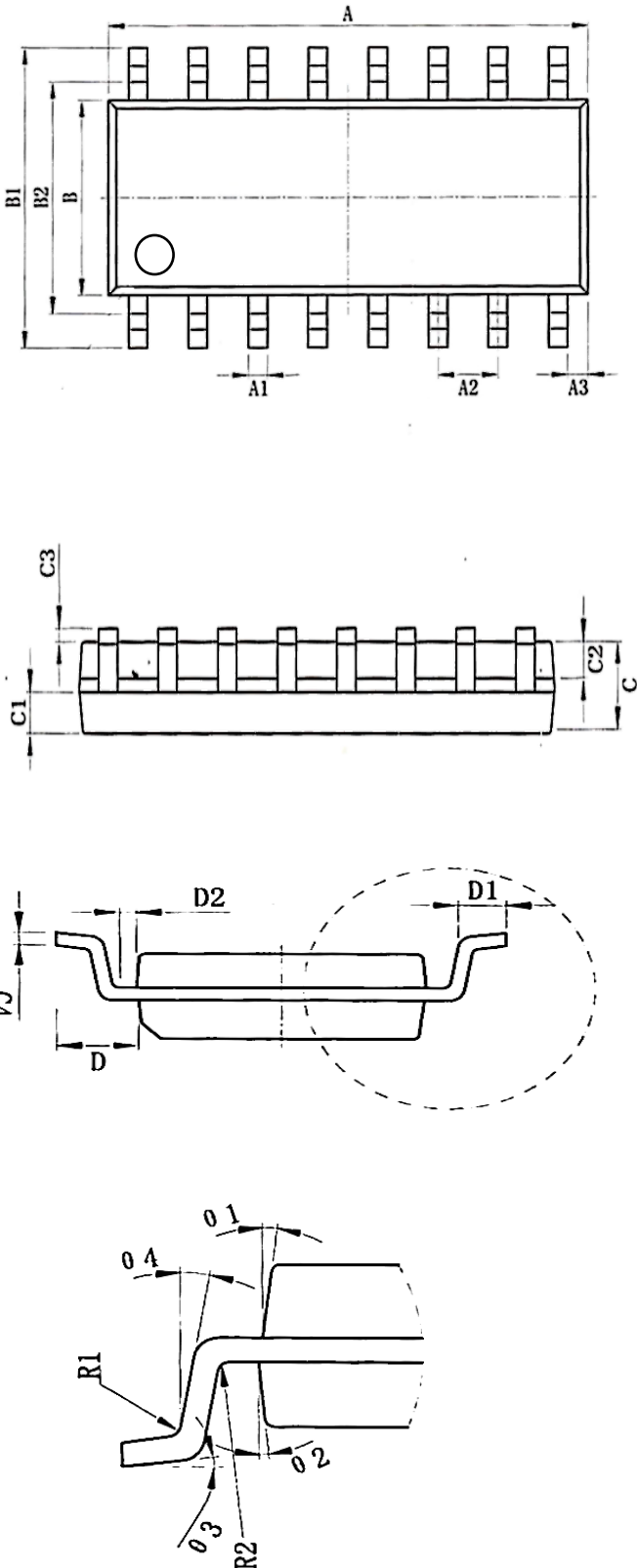




- 注：1、极限值是指超出该范围，器件有可能被损坏，并非器件的正常工作条件范围。电参数表提供了器件的工作条件范围；
2、除特别指明外，所有条件适用于达林顿阵列；
3、通常条件下，每路输出在 70°C、 $V^{CE(Sat)} = 1.6V$ 下脉冲宽度为 20ms 的持续工作



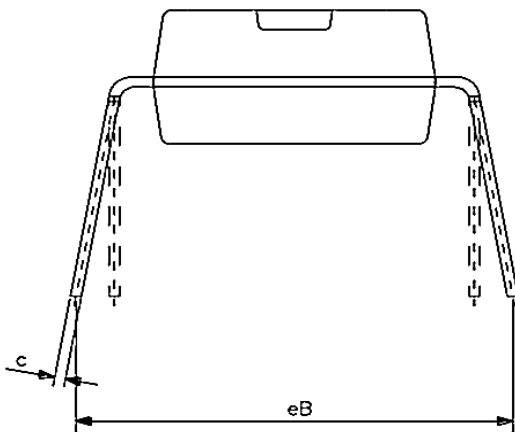
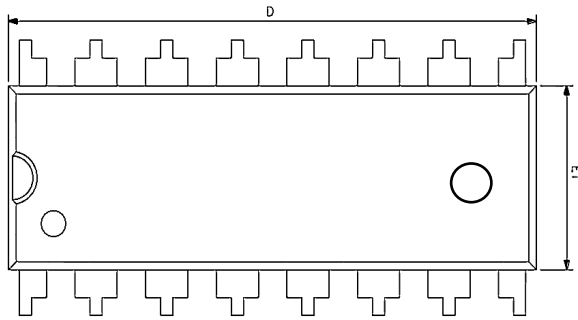
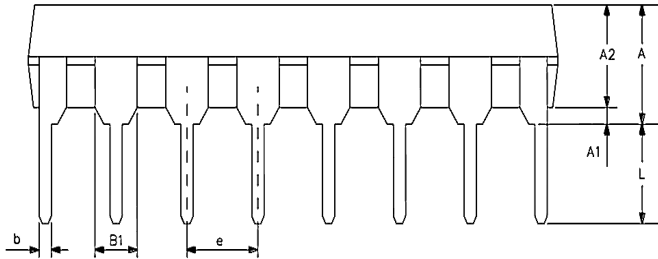
Package SOP16



| SIZE SYMBOL | MIN./mm | MAX./mm |
|----------------|------------|---------|
| A | 9.80 | 10.00 |
| A1 | 0.356 | 0.456 |
| A2 | 1.27TYP | |
| A3 | 0.302TYP | |
| B | 3.85 | 3.95 |
| B1 | 5.84 | 6.24 |
| B2 | 5.00 TYP | |
| C | 1.40 | 1.60 |
| C1 | 0.61 | 0.71 |
| C2 | 0.54 | 0.64 |
| C3 | 0.05 | 0.25 |
| C4 | 0.203 | 0.233 |
| D | 1.05 TYP | |
| D1 | 0.40 | 0.70 |
| D2 | 0.15 | 0.25 |
| R1 | 0.20TYP | |
| R2 | 0.20TYP | |
| O1 | 8°~12°TYP4 | |
| O2 | 8°~12°TYP4 | |
| O3 | 0°~8° | |
| O4 | 4°~12° | |



Package DIP16



| SIZE SYMBOL | MIN./mm | MAX./mm |
|----------------|---------|---------|
| A2 | 3.20 | 3.60 |
| A1 | 0.51 | — |
| A | 3.60 | 5.33 |
| L | 3.00 | 3.60 |
| b | 0.36 | 0.56 |
| B1 | 1.52 | |
| D | 18.80 | 19.94 |
| E1 | 6.20 | 6.60 |
| e | 2.54 | |
| C | 0.20 | 0.36 |
| eB | 7.62 | 9.30 |
| R | 0.20TYP | |
| R1 | 0.30TYP | |
| θ | 0° | 8° |
| θ_1 | 45°TYP | |
| O_2 | 12°TYP | |
| O_3 | 0° | 8° |
| O_4 | 0° | 10° |



订购信息

| Order Number | Package | Package Quantity | Marking On The park | Temperature |
|---------------------|---------|-----------------------|---------------------|---------------|
| ULN2001A-TUDI | DIP16 | Tube,25,A box of 1000 | ULN2001A | -40°C to 85°C |
| ULN2001D1013TR-TUDI | SOP16 | Tape,Reel,2500 | ULN2001 | |
| ULN2002A-TUDI | DIP16 | Tube,25,A box of 1000 | ULN2002A | |
| ULN2002D1013TR-TUDI | SOP16 | Tape,Reel,2500 | ULN2002 | |
| ULN2003A-TUDI | DIP16 | Tube,25,A box of 1000 | ULN2003A | |
| ULN2003D1013TR-TUDI | SOP16 | Tape,Reel,2500 | ULN2003 | |
| ULN2004A-TUDI | DIP16 | Tube,25,A box of 1000 | ULN2004A | |
| ULN2004D1013TR-TUDI | SOP16 | Tape,Reel,2500 | ULN2004 | |



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