



### 概述:

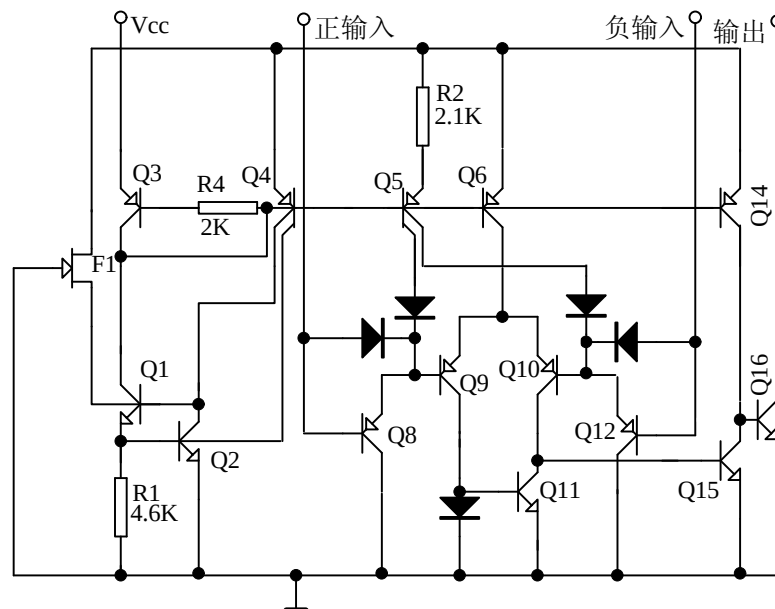
LM293DR是由两个独立、精确的电压比较器组成，其失调电压不超过 2.0mV。可在单电源下或双电源下工作。并且其电流大小不受电源电压幅度大小影响。这些比较器有一个独特的性能，就是即使在单电源下工作时，其输入共模电压范围也能达到零电平。主要用于消费类和工业类电子产品中。

采用 SOP-8(SOIC-8) 封装形式。

### 主要特点:

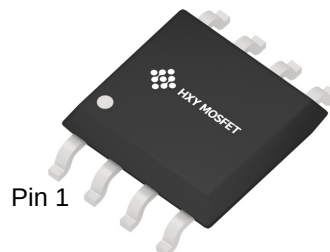
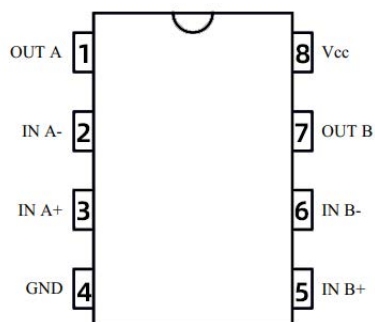
- 工作电源电压范围宽： 单电源：2.0V~36V  
双电源：±1.0V~±18V
- 电源电流小：0.8mA 与电源电压无关
- 输入偏置电流低：25nA
- 输入失调电流低：5.0nA
- 输入失调电压低：5.0mV
- 输入共模电压范围可达零电平
- 输入差分电压的范围与电源电压的范围一致。
- 可与 TTL、DTL、ECL、MOS 和 CMOS 兼容。

### 内部电路图





### 引出端功能符号



| 引出端序号 | 功 能        | 符 号   | 引出端序号 | 功 能        | 符 号   |
|-------|------------|-------|-------|------------|-------|
| 1     | 比较器 1 输出   | OUT A | 5     | 比较器 2 正相输入 | IN2+  |
| 2     | 比较器 1 反相输入 | IN1-  | 6     | 比较器 2 反相输入 | IN2-  |
| 3     | 比较器 1 正相输入 | IN1+  | 7     | 比较器 2 输出   | OUT B |
| 4     | 地          | GND   | 8     | 电源         | Vcc   |

### 极限值（绝对最大额定值，若无其它规定，Tamb=25℃）

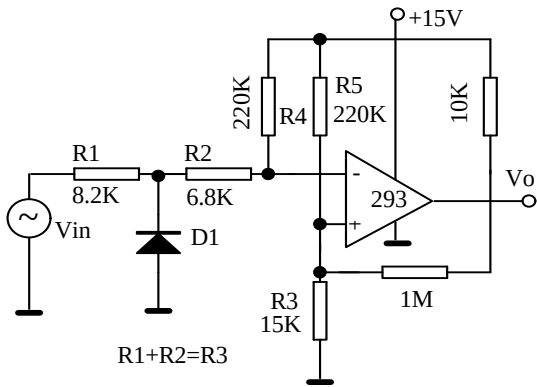
| 参 数 名 称  |       | 符 号                  | 数 值  |     | 单 位 |
|----------|-------|----------------------|------|-----|-----|
|          |       |                      | 最 小  | 最 大 |     |
| 电源电压     | 双电源电压 | Vcc                  | -    | ±18 | V   |
|          | 单电源电压 |                      |      | 36  |     |
| 输入差分电压   |       | V <sub>IDR</sub>     |      | 36  | V   |
| 输入共模电压   |       | V <sub>ICR</sub>     | -0.3 | 36  | V   |
| 输出对地短路电流 |       | I <sub>OG</sub>      |      | 20  | mA  |
| 最大工作结温   |       | T <sub>J</sub> (MAX) |      | 125 | ℃   |
| 功耗 (*)   |       | P <sub>D</sub>       |      | 570 | mW  |
| 工作环境温度   |       | T <sub>amb</sub>     | 0    | 70  | ℃   |
| 贮存温度     |       | T <sub>stg</sub>     | -65  | 150 | ℃   |



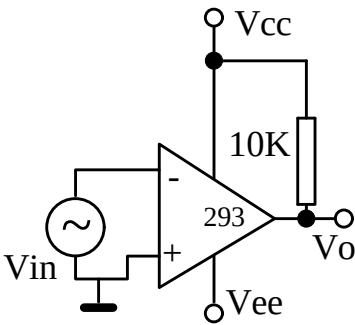
电特性（若无其它规定，Vcc=5V，Tamb=25℃）

| 特 性      | 测试条件                                                                                             | 符 号               | 规 范 值 |      |                      | 单 位  |
|----------|--------------------------------------------------------------------------------------------------|-------------------|-------|------|----------------------|------|
|          |                                                                                                  |                   | 最 小   | 典 型  | 最 大                  |      |
| 输入失调电压   | Ta=25℃                                                                                           | V <sub>IO</sub>   |       | ±1.0 | ±5.0                 | mV   |
|          | 0℃ ≤ Ta ≤ 70℃                                                                                    |                   |       |      | ±9.0                 |      |
| 输入失调电流   | Ta=25℃                                                                                           | I <sub>IO</sub>   |       | ±5.0 | ±50                  | nA   |
|          | 0℃ ≤ Ta ≤ 70℃                                                                                    |                   |       |      | ±150                 |      |
| 输入偏置电流   | Ta=25℃                                                                                           | I <sub>IB</sub>   |       | 25   | 250                  | nA   |
|          | 0℃ ≤ Ta ≤ 70℃                                                                                    |                   |       |      | 400                  |      |
| 输入共模电压范围 | Ta=25℃                                                                                           | V <sub>ICR</sub>  | 0     |      | V <sub>CC</sub> -1.5 | V    |
|          | 0℃ ≤ Ta ≤ 70℃                                                                                    |                   | 0     |      | V <sub>CC</sub> -2.0 |      |
| 电源电流     | R <sub>L</sub> =∞ 双比较器                                                                           | I <sub>CC</sub>   |       | 0.4  | 1.0                  | mA   |
|          | R <sub>L</sub> =∞ 双比较器，V <sub>CC</sub> =30V                                                      |                   |       |      | 2.5                  |      |
| 电压增益     | R <sub>L</sub> ≥ 15KΩ，V <sub>CC</sub> =15V                                                       | G <sub>V</sub>    | 50    | 200  |                      | V/mV |
| 大信号响应时间  | V <sub>IN</sub> =TTL 逻辑摆幅，V <sub>REF</sub> =1.4V，<br>V <sub>RL</sub> =5.0V，R <sub>L</sub> =5.1KΩ | t <sub>RES</sub>  |       | 300  |                      | ns   |
| 响应时间     | V <sub>RL</sub> =5.0V，R <sub>L</sub> =5.1KΩ                                                      | t <sub>RES</sub>  |       | 1.3  |                      | ns   |
| 输入差分电压   |                                                                                                  | V <sub>ID</sub>   |       |      | V <sub>CC</sub>      | V    |
| 输出陷电流    | V <sub>IN</sub> (-) ≥ 1.0V，V <sub>IN</sub> (+) =0V，V <sub>O</sub> ≤ 1.5V                         | I <sub>SINK</sub> | 6.0   | 16   |                      | mA   |
| 输出饱和电压   | V <sub>IN</sub> (-) ≥ 1.0V，V <sub>IN</sub> (+) =0V，I <sub>SINK</sub> ≤ 4.0mA                     | V <sub>SAT</sub>  |       | 150  | 400                  | mV   |
|          | V <sub>IN</sub> (-) ≥ 1.0V，V <sub>IN</sub> (+) =0V，I <sub>SINK</sub> ≤ 4.0mA<br>0℃ ≤ Ta ≤ 70℃    |                   |       |      | 700                  |      |
| 输出漏电流    | V <sub>IN</sub> (+) ≥ 1.0V，V <sub>IN</sub> (-) =0V，V <sub>O</sub> =5.0V                          | I <sub>OL</sub>   |       | 0.1  |                      | nA   |
|          | V <sub>IN</sub> (+) ≥ 1.0V，V <sub>IN</sub> (-) =0V，V <sub>O</sub> =30V<br>0℃ ≤ Ta ≤ 70℃          |                   |       |      | 1000                 |      |

应用图



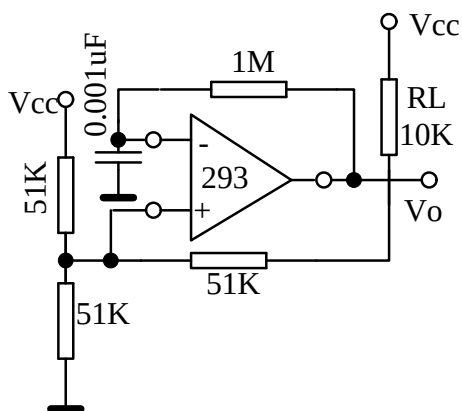
过零检波器(单电源应用)



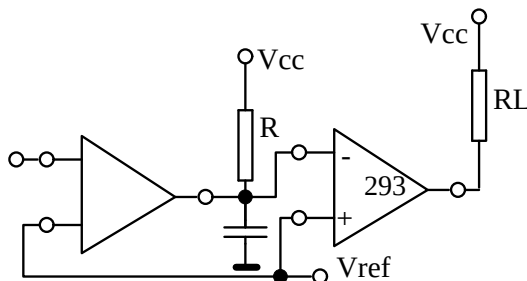
过零检波器(双电源应用)



## 应用图



方波振荡器



延时发生器

## 使用说明:

LM293DR是高增益、宽频带器件，象大多数比较器一样，如果输出端到输入端有寄生电容而产生耦合，则很容易产生振荡。这种现象仅仅出现在当比较器改变状态时，输出电压过渡的间隙。电源加旁路滤波并不能解决这个问题，标准PC板的设计对减小输入—输出寄生电容耦合是有助的。减小输入电阻至小于 $10K\Omega$ 将减小反馈信号，而且增加甚至很小的正反馈量（滞回 $1.0\sim 10mV$ ）能导致快速转换，使得不可能产生由于寄生电容引起的振荡。除非利用滞后，否则直接插入IC并在引脚上加上电阻将引起输入—输出在很短的转换周期内振荡，如果输入信号是脉冲波形，并且上升和下降时间相当快，则滞回将不需要。

比较器的所有没有用的引脚必须接地。

LM293DR偏置网络确立了其静态电流与电源电压范围 $2.0\sim 30V$ 无关。

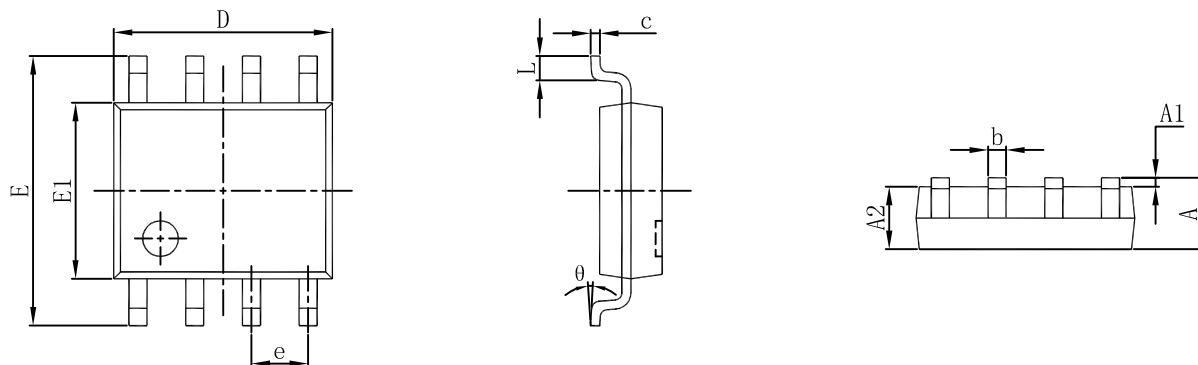
通常电源不需要加旁路电容。

差分输入电压可以大于 $V_{cc}$ 并不损坏器件。保护部分必须能阻止输入电压向负端超过 $-0.3V$ 。

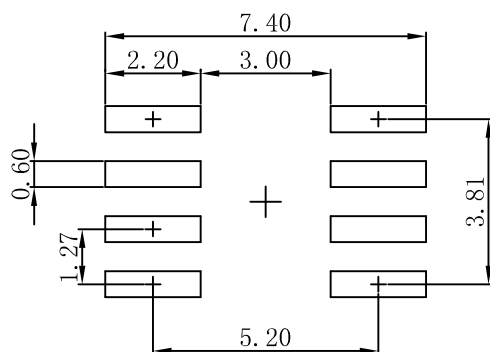
LM293DR的输出部分是集电极开路，发射极接地的NPN输出晶体管，可以用多集电极输出提供或功能。输出负载电阻能衔接在可允许电源电压范围内的任何电源电压上，不受 $V_{cc}$ 端电压值的限制。此输出能作为一个简单的对地SPS开路（当不用负载电阻没被运用），输出部分的陷电流被可能得到的驱动和器件的 $\beta$ 值所限制。当达到极限电流（ $16mA$ ）时，输出晶体管将退出而且输出电压将很快上升。输出饱和电压被输出晶体管大约 $60\Omega$ 的 $\gamma_{SAT}$ 限制。当负载电流很小时，输出晶体管的低失调电压（约 $1.0mV$ ）允许输出箝位在零电平。



封装信息：SOP-8(SOIC-8)



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.007                | 0.010 |
| D      | 4.800                     | 5.000 | 0.189                | 0.197 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| E      | 5.800                     | 6.200 | 0.228                | 0.244 |
| E1     | 3.800                     | 4.000 | 0.150                | 0.157 |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |



Note:  
1.Controlling dimension:in millimeters.  
2.General tolerance:± 0.05mm.  
3.The pad layout is for reference purposes only.



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