



AOS  
SEMICONDUCTOR

## 产品规格说明书

Product Data Sheet

### LM2903

WEB | [www.aossemi.cn](http://www.aossemi.cn) 🔍



电源管理IC



通信接口芯片



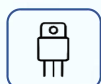
二三极管



LDO稳压器



逻辑器件



MOSFETs



运算放大器



显示驱动



MCU单片机



光电器件

# LM2903

## Data Sheet

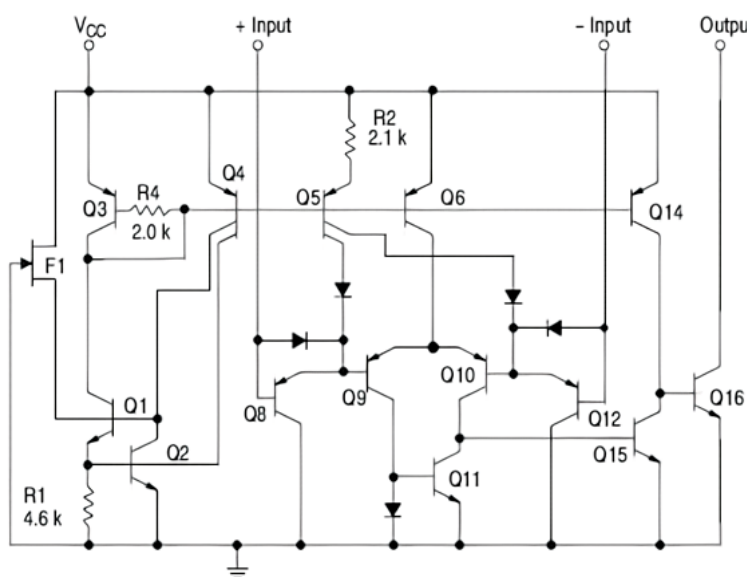
### Operational Amplifier/Comparator >Operational Amplifier

#### Quadruple Operational Amplifiers

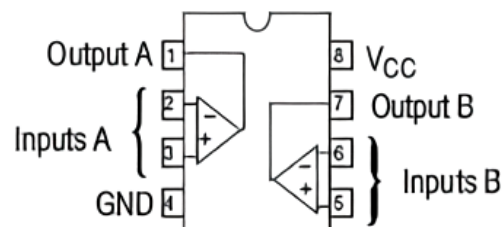
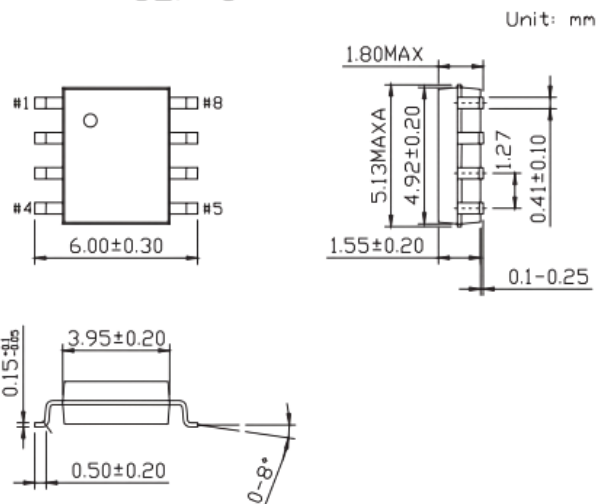
##### ■ Features

- Wide Single-Supply Range:2.0V~30V
- Split-Supply Range:  $\pm 1.0V \sim \pm 15V$
- Very Low Current Drain Independent of Supply Voltage:0.4mA
- Low Input Bias Current:25nA
- Low Input Offset Current:5.0nA
- Low Input Offset Voltage:5.0mV(max)
- Input Common Mode Range to Ground Level
- Differential Input Voltage Range Equal to Power Supply Voltage

##### ■ Representative Schematic Diagram



##### SOP-8



# LM2903

## Data Sheet

### ■ Absolute Maximum Ratings Ta=25℃

| Parameter                                                        | Symbol                               | Rating      | Unit |
|------------------------------------------------------------------|--------------------------------------|-------------|------|
| Power Supply Voltage                                             | V <sub>CC</sub>                      | +30 or ±15  | V    |
| Input Differential Voltage Range                                 | V <sub>IDR</sub>                     | 30          |      |
| Input Common Mode Voltage Range                                  | V <sub>ICR</sub>                     | -0.3~+30    |      |
| Output Short Circuit-to-Ground                                   | I <sub>SC</sub>                      | Continuous  | mA   |
| Output Sink Current*                                             | I <sub>SINK</sub>                    | 20          |      |
| Power Dissipation@Ta=25℃<br>Derate above 25℃                     | P <sub>D</sub><br>1/R <sub>θJA</sub> | 5705.7      | mW/℃ |
| Operating Ambient Temperature Range                              | T <sub>A</sub>                       | -40~+105    | ℃    |
| Maximum Operating Junction Range                                 | T <sub>J(max)</sub>                  | 150         |      |
| Storage Temperature Range                                        | T <sub>stg</sub>                     | -65~+150    |      |
| ESD Protection at any Pin<br>-Human Body Model<br>-Machine Model | V <sub>ESD</sub>                     | 2000<br>200 | V    |

\*The maximum output current may be as high as 20mA, independent of the magnitude of V<sub>CC</sub>, output short circuit to V<sub>CC</sub> can cause excessive heating and eventual destruction.



# LM2903

## Data Sheet

### ■ Electrical Characteristics ( $V_{CC}=5.0V$ , $0^{\circ}C \leq T_A \leq 70^{\circ}C$ , unless otherwise noted)

| Parameter                         | Symbol     | Test conditions                                                                                                                                                      | Min | Typ       | Max                          | Unit    |
|-----------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------|------------------------------|---------|
| Input Offset Voltage *1           | $V_{IO}$   | $T_A=25^{\circ}C$<br>$0^{\circ}C \leq T_A \leq 70^{\circ}C$                                                                                                          |     | $\pm 1.0$ | $\pm 5.0$<br>$9.0$           | mV      |
| Input Offset Current              | $I_{IO}$   | $T_A=25^{\circ}C$<br>$0^{\circ}C \leq T_A \leq 70^{\circ}C$                                                                                                          |     | $\pm 5.0$ | $\pm 50$<br>$\pm 150$        | nA      |
| Input Bias Current *2             | $I_{IB}$   | $T_A=25^{\circ}C$<br>$0^{\circ}C \leq T_A \leq 70^{\circ}C$                                                                                                          |     | 25        | 250400                       |         |
| Input Common Mode Voltage Range*2 | $V_{ICR}$  | $T_A=25^{\circ}C$<br>$0^{\circ}C \leq T_A \leq 70^{\circ}C$                                                                                                          |     |           | $V_{CC}-1.5$<br>$V_{CC}-2.0$ | V       |
| Voltage Gain                      | $A_{VOL}$  | $R_L \geq 15k\Omega$ , $V_{CC}=15V$ , $T_A=25^{\circ}C$                                                                                                              | 00  | 200       |                              | V/mV    |
| Large Signal Response Time        |            | $V_{in}=TTL$ Logic Swing,<br>$V_{ref}=1.4V$ , $V_{RL}=5.0V$ ,<br>$R_L=5.1k\Omega$ , $T_A=25^{\circ}C$                                                                | 50  | 300       |                              | ns      |
| Response Time*4                   | $t_{TLH}$  | $V_{RL}=5.0V$ , $R_L=5.1k\Omega$ , $T_A=25^{\circ}C$                                                                                                                 |     | 1.3       |                              | $\mu s$ |
| Input Differential Voltage *5     | $V_{ID}$   | All $V_{in} \geq GND$ or V-Supply<br>(if used)                                                                                                                       |     |           | $V_{CC}$                     | V       |
| Output Sink Current               | $I_{SINK}$ | $V_{in} \geq 1.0V$ , $V_{in+}=0V$ , $V_o \leq$<br>$T_A=25^{\circ}C$                                                                                                  | 6.0 | 16        |                              | mA      |
| Output Saturation Voltage         | $V_{OL}$   | $V_{in} \geq 1.0V$ , $V_{in+}=0V$ ,<br>$I_{SINK} \leq$ , $T_A=25^{\circ}C$<br>$0^{\circ}C \leq T_A \leq 70^{\circ}C$                                                 |     | 150       | 400                          | mV      |
|                                   |            |                                                                                                                                                                      |     |           | 700                          |         |
| Output Leakage Current            | $I_{OL}$   | $V_{in-}=0V$ , $V_{in+} \geq 1.0V$ , $V_o=5.0V$ ,<br>$T_A=25^{\circ}C$ , $V_{in-}=0V$ , $V_{in+} \geq 1.0V$ ,<br>$V_o=5.0V$ , $0^{\circ}C \leq T_A \leq 70^{\circ}C$ |     | 0.1       |                              | nA      |
|                                   |            |                                                                                                                                                                      |     |           | 1000                         |         |
| Supply Current                    | $I_{CC}$   | $R_L=\infty$<br>$A$<br>$^{\circ}C$                                                                                                                                   |     | 0.4       | 1.0                          | mA      |
|                                   |            | $R_L=\infty$<br>$CC=$                                                                                                                                                |     |           | 2.5                          |         |

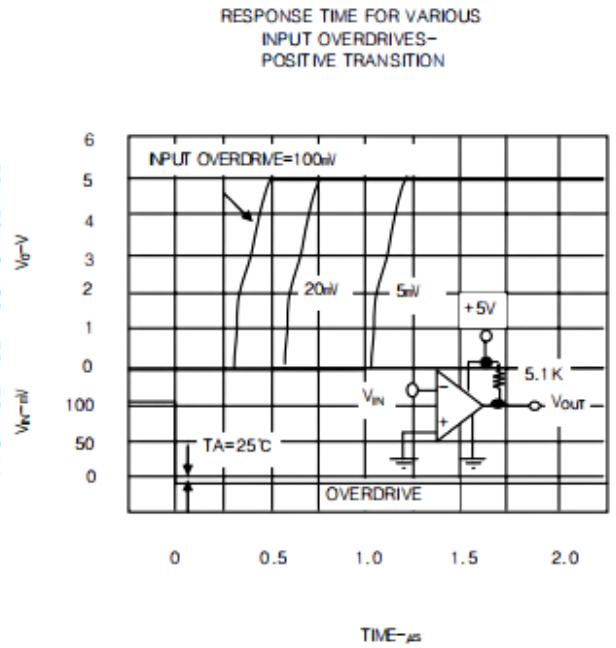
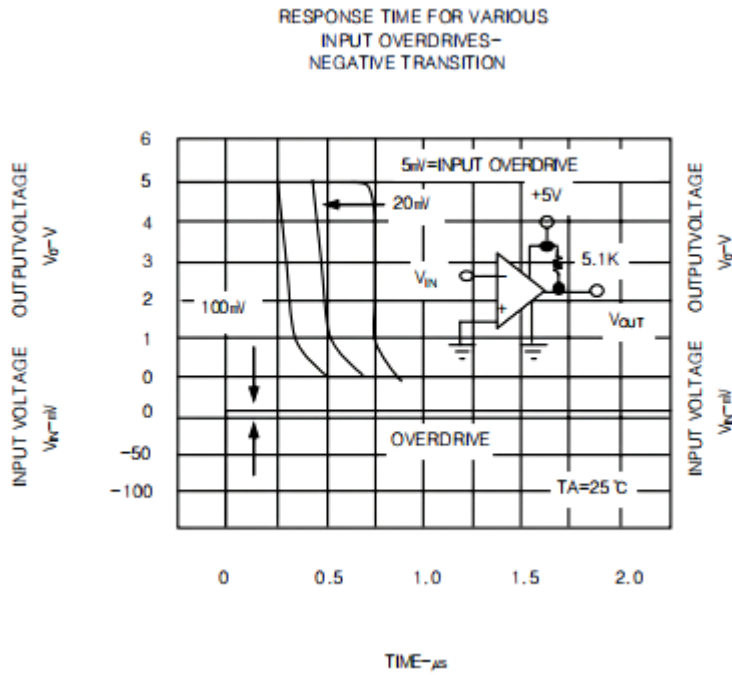
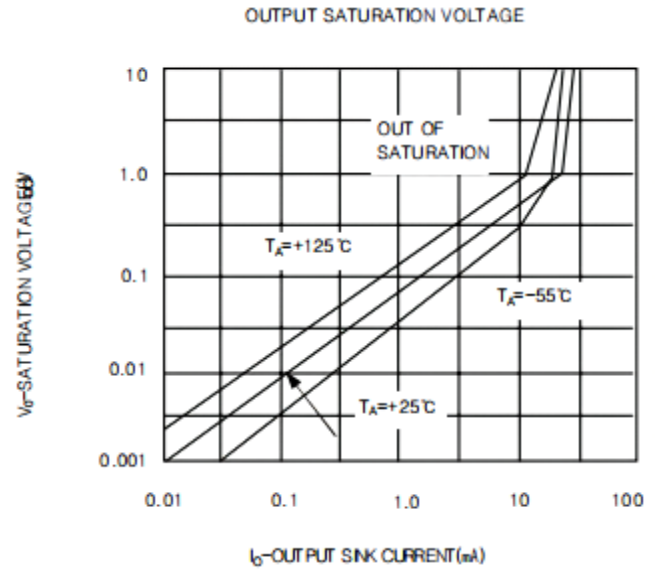
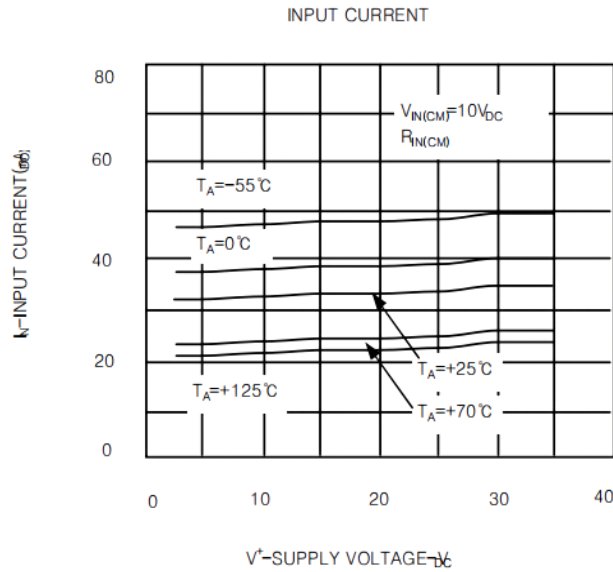
- \*1. At output switch point,  $V_o=1.4V$ ,  $R_s=0\Omega$  with  $V_{CC}$  from 5.0V~30V, and over the full input common mode range ( $0V \sim V_{CC}-1.5V$ ).
- \*2. Due to the PNP transistor inputs, bias current will flow out of the inputs. This current is essentially constant, independent of the output state, therefore, no loading changes will exist on the input lines.
- \*3. Input common mode of the either input should not be permitted to go more than 0.3V negative of ground or minus supply. The upper limit of common mode range is  $V_{CC}-1.5V$ .
- \*4. Response time is specified with a 100mV step and 5.0mV of overdrive. With large magnitudes of overdrive faster response times are obtainable.
- \*5. The comparator will exhibit proper output state if one of the inputs becomes greater than  $V_{CC}$ , the other input must remain within the common mode range. The low input state must not be less than -0.3V ground or minus supply.



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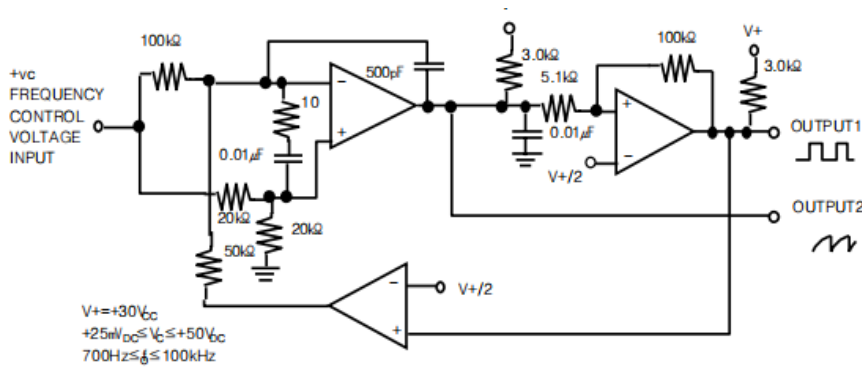
## ■ TYPICAL PERFORMANCE CHARACTERISTICS



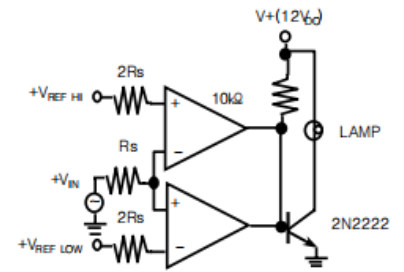
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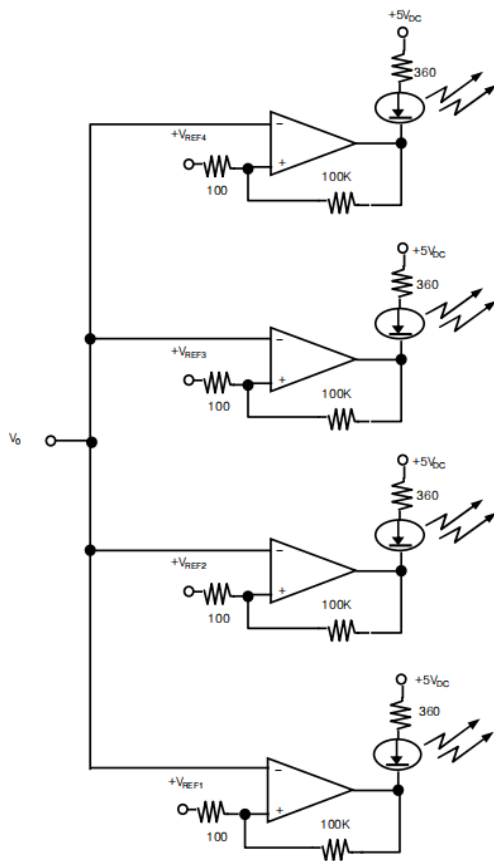
## ■ TYPICAL APPLICATIONS



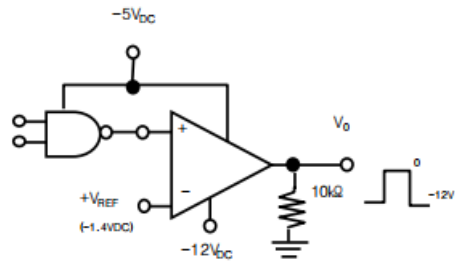
TWO-DECADE HIGH-FREQUENCY VCO



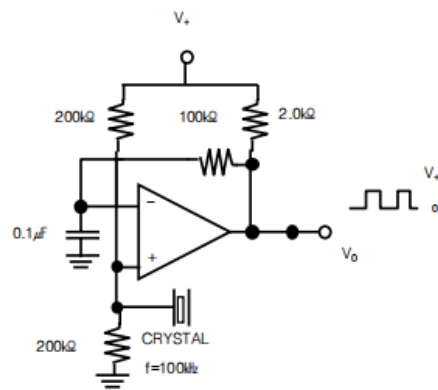
LIMIT COMPARATOR



VISIBLE VOLTAGE INDICATOR



TTL-TO-MOS LOGIC CONVERTER



CRYSTAL-CONTROLLED OSCILLATOR

