

芯伯乐®
X I N B O L E

Product Specification

XBLW LM2901

Quadruple Comparator

WEB | www.xinboleic.com

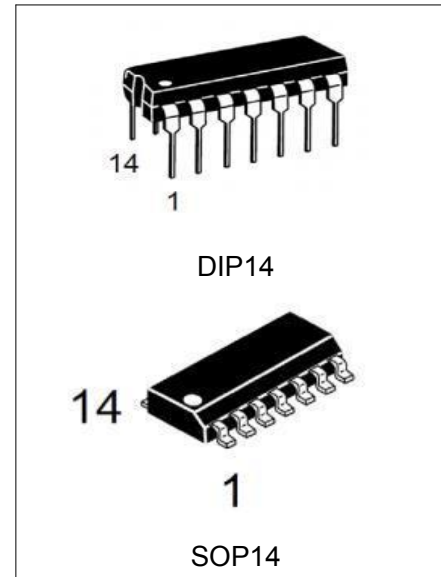


Description

The LM2901 is a four-comparator integrated circuit designed for level detection and low level detection in consumer and industrial electronics. Adopt DIP14, SOP14 package form.

Features

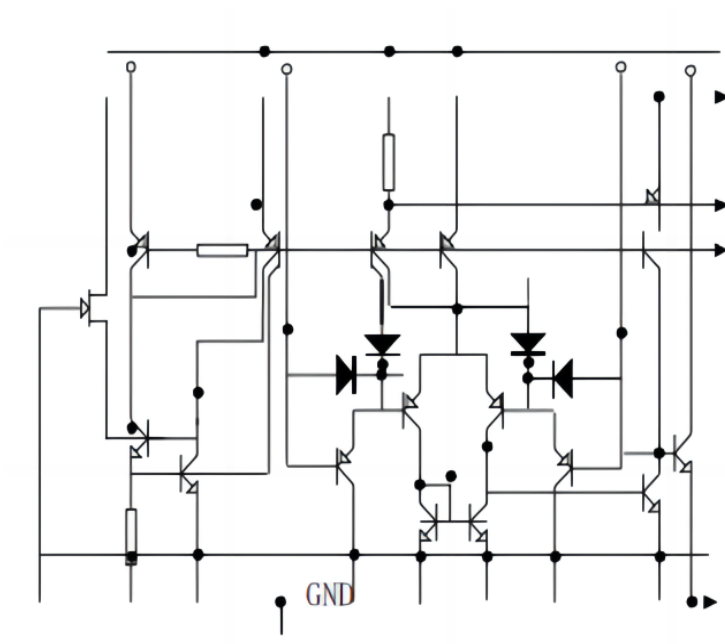
- Single or dual power supply operation
- Low input bias current: 25nA (typical)
- Low input offset current: $\pm 5.0\text{nA}$ (typical)
- Output saturation voltage: 130mV
- Compatible with TTL and CMOS



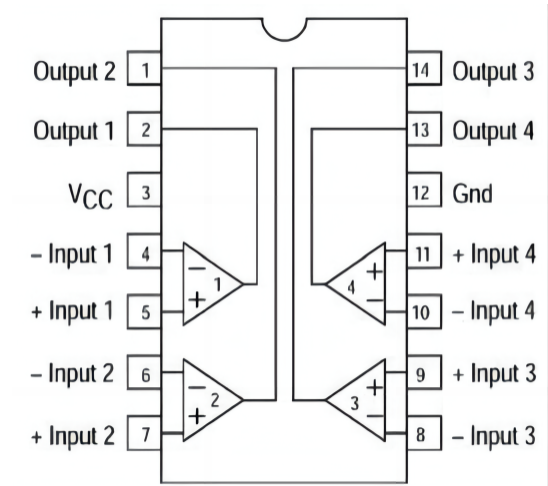
Ordering Information

| Product Model | Package Type | Marking | Packing | Packing Qty |
|----------------|--------------|---------|---------|--------------|
| XBLW LM2901N | DIP-14 | LM2901N | Tube | 1000Pcs/Box |
| XBLW LM2901DTR | SOP-14 | LM2901 | Tape | 2500Pcs/Reel |
| | | | | |
| | | | | |

Internal circuit diagram



Pin arrangement diagram



Pin end function symbol

| Export end serial number | Function | Symbol | Export end serial number | Function | Symbol |
|--------------------------|-------------------|---------|--------------------------|------------------|---------|
| 1 | Output 2 | OUT2 | 8 | Inverting input3 | IN3 (-) |
| 2 | Output 1 | OUT1 | 9 | Positive input3 | IN3 (+) |
| 3 | Power source | Vcc | 10 | Inverting input4 | IN4 (-) |
| 4 | Inverting input 1 | IN1 (-) | 11 | Positive input4 | IN4 (+) |
| 5 | Positive input 1 | IN1 (+) | 12 | Earthing | GND |
| 6 | Inverting input2 | IN2 (-) | 13 | Output 4 | OUT4 |
| 7 | Positive input2 | IN2 (+) | 14 | Output 3 | OUT3 |

Limit parameter (absolute maximum rating, Tamb=25°C if no other provisions are made)

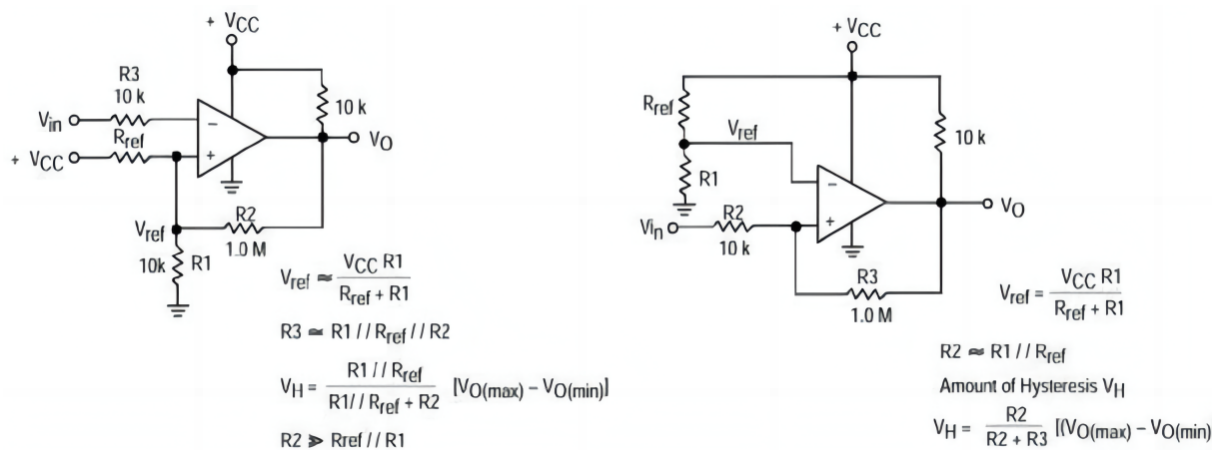
| Parameter | Symbol | Number value | Single bit |
|----------------------------------|--------|--------------|------------|
| Supply voltage | Vcc | 36 或 ±18 | V |
| Input differential voltage range | VIDR | 36 | V |
| Input common-mode voltage range | VICMR | -0.3~Vcc | V |
| Output current | ISC | 50 | mA |
| Power consumption (*) | PD | 1.0 | W |
| Operating ambient temperature | Tamb | -20~+85 | °C |
| Storage temperature | Tstg | -65~150 | °C |

Note (*): When used above 25 °C, power consumption is reduced by 8mW for every 1 °C increase.

**Electrical characteristics (if not otherwise specified, $V_{CC}=5V$,
 $T_{amb}=25^{\circ}C$)**

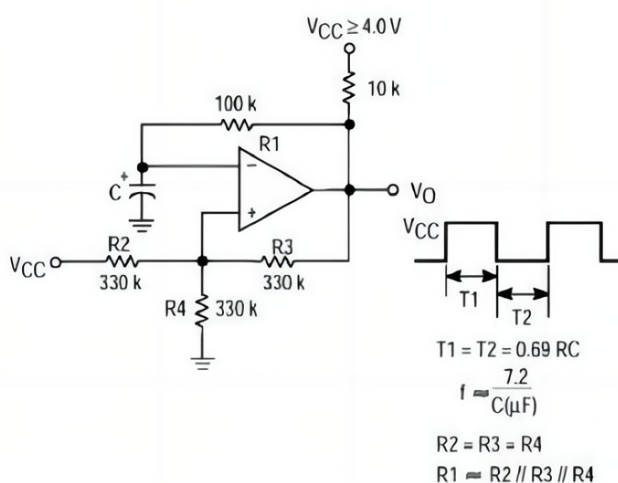
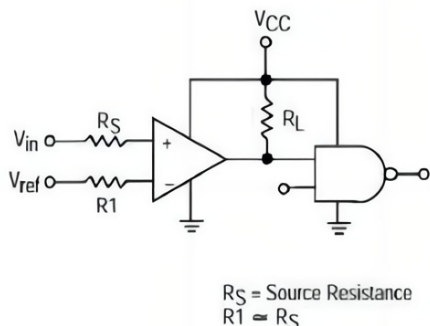
| Peculiarity | Test condition | Symbol | Norm value | | | Single bit |
|---------------------------------|--|------------|------------|-----------|--------------|------------|
| | | | MIN | TYP | MAX | |
| Input offset voltage | | V_{IO} | | ± 2.0 | ± 5.0 | mV |
| | $0^{\circ}C \leq T_a \leq 70^{\circ}C$ | | | | ± 9.0 | |
| Input offset current | | I_{IO} | | ± 5.0 | ± 50 | nA |
| | $0^{\circ}C \leq T_a \leq 70^{\circ}C$ | | | | ± 150 | |
| Input bias current | | I_{IB} | | 25 | 250 | nA |
| | $0^{\circ}C \leq T_a \leq 70^{\circ}C$ | | | | 400 | |
| Input common-mode voltage range | | V_{ICR} | 0 | | $V_{CC}-1.5$ | V |
| | $0^{\circ}C \leq T_a \leq 70^{\circ}C$ | | 0 | | $V_{CC}-2.0$ | |
| Supply current | $R_L = \infty$ | I_{CC} | | 0.8 | 2.0 | mA |
| | $R_L = \infty, V_{CC} = 30V$ | | | | 1.0 | |
| Voltage gain | $R_L > 15K, V_{CC} = 15V$ | G_V | 50 | 200 | | V/mV |
| Large signal response time | $V_{IN} = \text{TTL Logical swing}, V_{REF} = 1.4V, V_{RL} = 5.0V, R_L = 5.1K$ | t_{RES} | | 300 | | ns |
| Response time | $V_{RL} = 5.0V, R_L = 5.1K$ | t_{RES} | | 1.3 | | ns |
| Input differential voltage | | V_{ID} | | | V_{CC} | V |
| Output dip current | $V_{IN} (-) > 1.0V, V_{IN} (+) = 0V, V_O < 1.5V$ | I_{SINK} | 6.0 | 16 | | mA |
| Output saturation voltage | $V_{IN} (-) > 1.0V, V_{IN} (+) = 0V, I_{SINK} < 4.0mA$ | V_{SAT} | | 130 | 400 | mV |
| | $V_{IN} (-) > 1.0V, V_{IN} (+) = 0V, I_{SINK} < 4.0mA, 0^{\circ}C \leq T_a \leq 70^{\circ}C$ | | | | 700 | |
| Output leakage current | $V_{IN} (+) > 1.0V, V_{IN} (-) = 0V, V_O = 5.0V$ | I_{OL} | | 0.1 | | nA |
| | $V_{IN} (+) > 1.0V, V_{IN} (-) = 0V, V_O = 30V, 0^{\circ}C \leq T_a \leq 70^{\circ}C$ | | | | 1000 | |

Application drawing



Inverse comparator with hysteresis

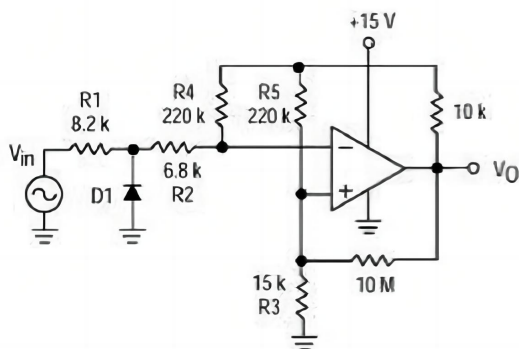
Positive phase comparator with lag



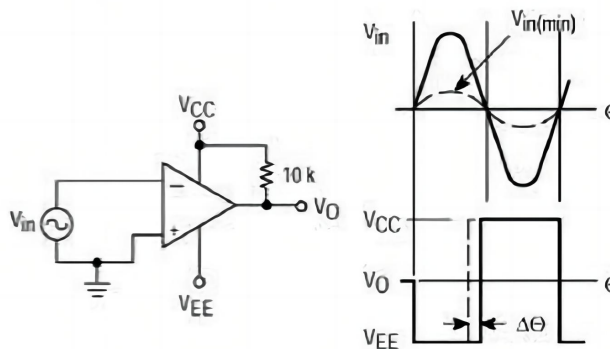
| Logic | Device | V _{CC} (V) | R _L kΩ |
|-------|-------------|---------------------|-------------------|
| CMOS | 1/4 MC14001 | +15 | 100 |
| TTL | 1/4 MC7400 | +5.0 | 10 |

Logical driver

Square wave oscillator



$V_{in(min)} \approx 0.4$ V peak for 1% phase distortion ($\Delta\theta$).

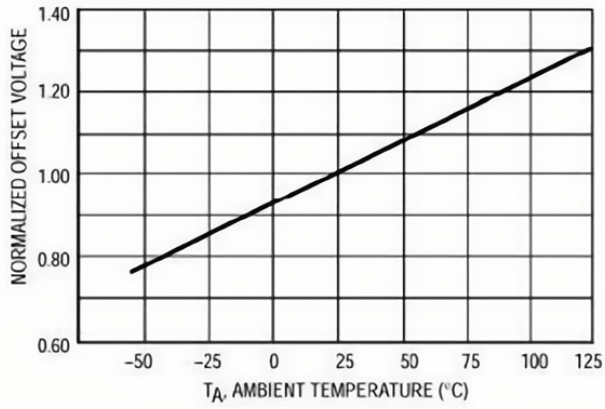


Zero-crossing detector (single-supply application)

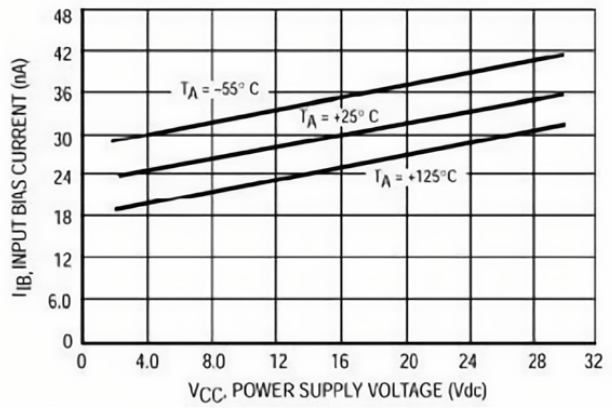
Zero-crossing detector (dual power supply application)

Characteristic Curve

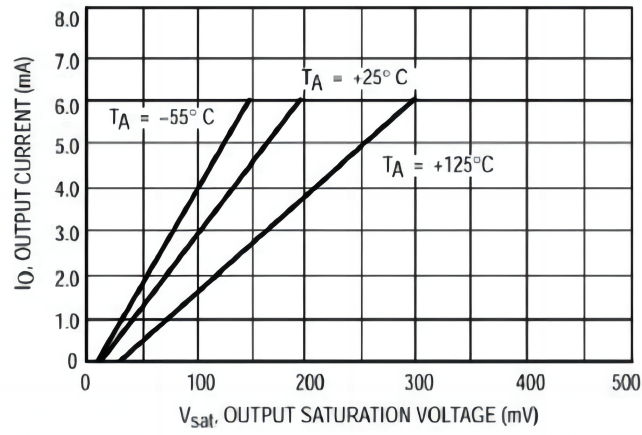
Normal input offset voltage



Input bias current

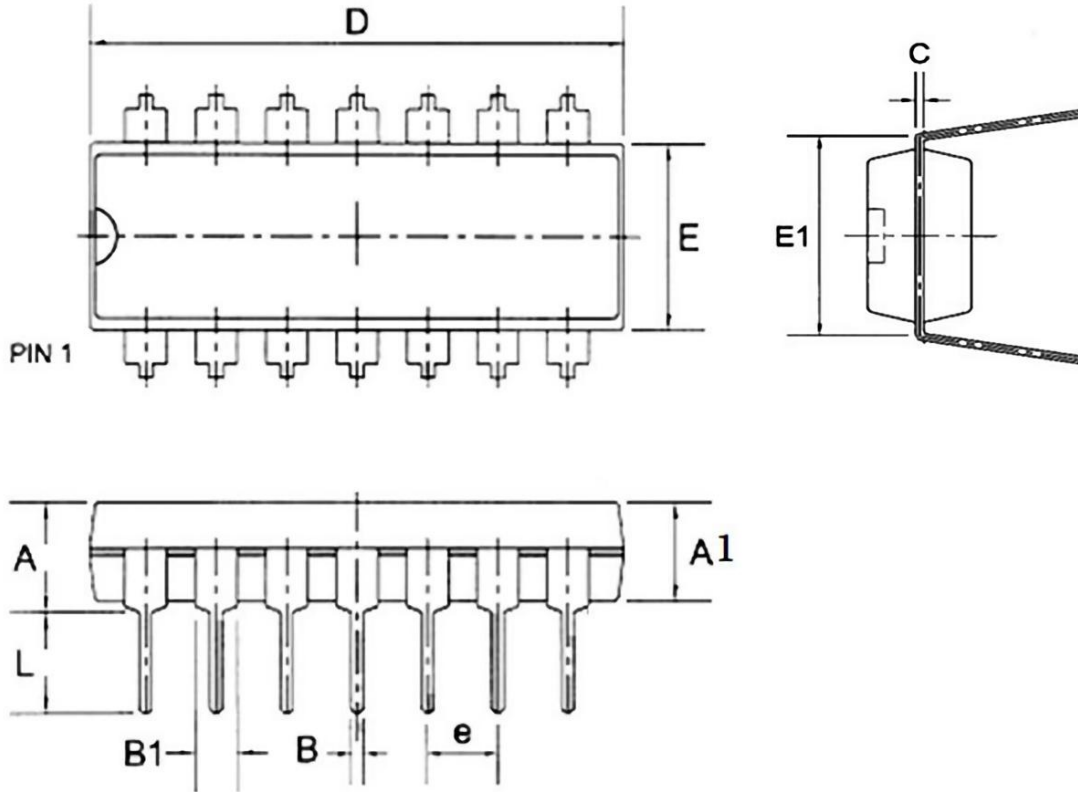


Output trap current and output saturation voltage



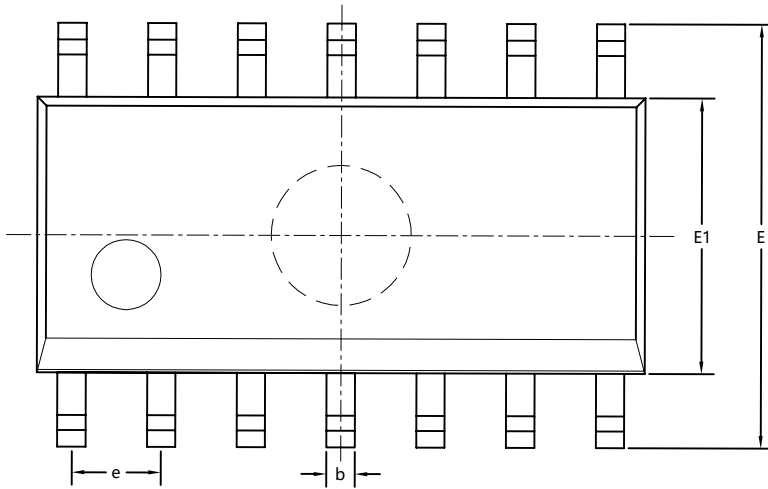
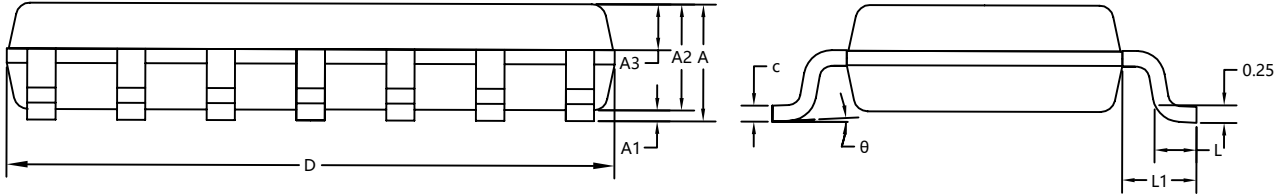
Packaging information:

DIP14



| Symbol | Dimensions in Millimeters | | |
|--------|---------------------------|-------|-------|
| | Min | Nom | Max |
| A | -- | -- | 4.31 |
| A1 | 3.15 | 3.30 | 3.65 |
| B | -- | 0.46 | -- |
| B1 | -- | 1.60 | -- |
| C | -- | 0.25 | -- |
| D | 19.00 | 19.30 | 19.60 |
| E | 6.20 | 6.40 | 6.60 |
| E1 | -- | 7.60 | -- |
| e | -- | 2.54 | -- |
| L | 3.00 | 3.35 | 3.60 |

SOP14



| SYMBOL | MILLIMETER | | |
|----------|------------|------|------|
| | MIN | NOM | MAX |
| A | 1.50 | 1.60 | 1.70 |
| A1 | 0.10 | 0.15 | 0.25 |
| A2 | 1.40 | 1.45 | 1.50 |
| A3 | 0.60 | 0.65 | 0.70 |
| b | 0.35 | 0.40 | 0.45 |
| c | 0.15 | 0.20 | 0.25 |
| D | 8.50 | 8.60 | 8.70 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.85 | 3.90 | 3.95 |
| e | 1.27BSC | | |
| L | 0.50 | 0.60 | 0.70 |
| L1 | 1.05REF | | |
| θ | 0° | 4° | 8° |

Statement:

- XBLW reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using XBLW products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!
- XBLW products are not licensed for life support, military, aerospace and other applications, and XBLW will not be responsible for the consequences of the use of products in these fields.
- If any or all XBLW products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all XBLW products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- XBLW documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. XBLW assumes no responsibility or liability for altered documents.
- XBLW is committed to becoming the preferred semiconductor brand for customers, and XBLW will strive to provide customers with better performance and better quality products.