



**ALD2301A/ALD2301B
ALD2301/ALD2301C**

DUAL PRECISION CMOS VOLTAGE COMPARATOR WITH OPEN DRAIN DRIVER

GENERAL DESCRIPTION

The ALD2301A/ALD2301B/ALD2301/ALD2301C is a monolithic high performance dual voltage comparator built with advanced silicon gate CMOS technology. It features very high typical input impedance of $10^{12}\Omega$; low input bias current of 10pA; fast response time of 300ns; very low power dissipation of 55µA per comparator; and single +5V or dual ±5V power supply operation.

The input voltage range includes ground, making this comparator ideal for low level signal detection with high source impedance. The outputs are open-drain configuration, allowing maximum application flexibility, such as wired-OR connection. The outputs can be connected to a higher external voltage than V+.

The ALD2301A/ALD2301B/ALD2301/ALD2301C is ideal for a great variety of voltage comparator applications, especially low level signal detection circuits requiring low standby power, yet retaining high output current capability as needed.

FEATURES

- Fanout of 30 LS TTL loads
- Low supply current of 110µA typical
- Functional equivalent to LM193 industry standard comparators
- Extremely low input bias currents -- 10pA typical
- Virtually eliminates source impedance effects
- Low operating supply voltage of 3V to 12V
- Single +5V and dual supply ±5V operation
- High speed for both large signal and low level signals -- 300ns typical for TTL inputs
- CMOS, NMOS and TTL compatible
- Wired-OR open drain outputs
- High output sinking current -- 60mA typical
- Low supply current spikes

ORDERING INFORMATION

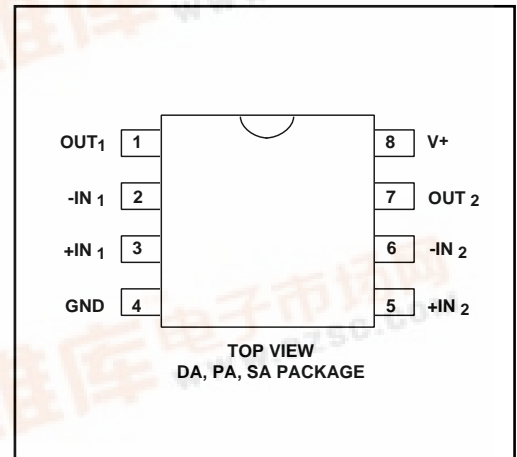
| Operating Temperature Range * | | |
|-------------------------------|--|---------------------------------|
| -55°C to +125°C | 0°C to +70°C | 0°C to +70°C |
| 8-Pin CERDIP Package | 8-Pin Small Outline Package (SOIC) | 8-Pin Plastic Dip Package |
| ALD 2301A DA | ALD2301A SA | ALD2301A PA |
| ALD 2301B DA | ALD 2301B SA | ALD2301B PA |
| ALD 2301 DA | ALD 2301 SA | ALD2301 PA |
| ALD 2301C DA | ALD 2301C SA | ALD2301C PA |

* Contact factory for industrial temperature range

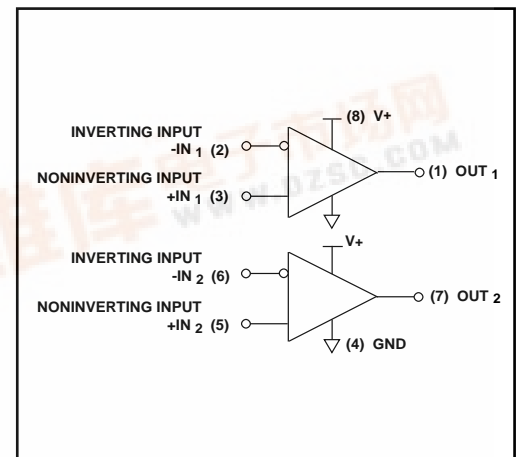
APPLICATIONS

- High source impedance voltage comparison circuits
- Dual limit window comparator
- Power supply voltage monitor
- Photo-detector sensor circuit
- Relay or LED driver
- Oscillators
- Battery operated instruments
- Remote signal detection

PIN CONFIGURATION



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| | |
|----------------------------------|---|
| Supply voltage, V+ | 13.2V |
| Differential input voltage range | -0.3V to V+ +0.3V |
| Power dissipation | 600 mW |
| Operating temperature range | PA, SA package 0°C to +70°C DA package -55°C to +125°C |
| Storage temperature range | -65°C to +150°C |
| Lead temperature, 10 seconds | +260°C |

OPERATING ELECTRICAL CHARACTERISTICS

T_A = 25°C V+ = +5V unless otherwise specified

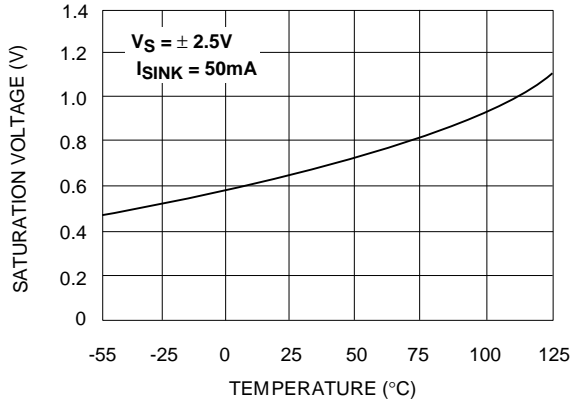
| Parameter | Symbol | 2301 | | | 2301A | | | 2301B | | | 2301C | | | Unit | Test Conditions |
|--|------------------|------|------|---------|-------|------|---------|-------|------|---------|-------|------|---------|------|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | | |
| Voltage Supply | V+ | 3 | | 12 | 3 | | 12 | 3 | | 12 | 3 | | 12 | V | |
| Supply Current | I _S | | 110 | 180 | | 110 | 180 | | 110 | 180 | | 110 | 180 | μA | R _{LOAD} = ∞ |
| Voltage Gain | A _{VD} | 50 | 150 | | 50 | 150 | | 50 | 150 | | 50 | 150 | | V/mV | R _{LOAD} ≥ 15KΩ |
| Input Offset Voltage | V _{OS} | | | 10 | | | 2 | | | 5 | | | 20 | mV | R _{LOAD} ≥ 1.5KΩ |
| Input Offset Current ¹ | I _{OS} | | 10 | 200 | | 10 | 200 | | 10 | 200 | | 10 | 400 | pA | |
| Input Bias Current ¹ | I _B | | 10 | 200 | | 10 | 200 | | 10 | 200 | | 10 | 400 | pA | |
| Common Mode Input Voltage Range ² | V _{ICR} | -0.3 | | V+ -1.5 | -0.3 | | V+ -1.5 | -0.3 | | V+ -1.5 | -0.3 | | V+ -1.5 | V | |
| Low Level Output Voltage | V _{OL} | | 0.15 | 0.4 | | 0.15 | 0.4 | | 0.15 | 0.4 | | 0.15 | 0.4 | V | I _{SINK} = 12mA V _{INPUT} = 1V Differential |
| Low Level Output Current | I _{OL} | 24 | 60 | | 24 | 60 | | 24 | 60 | | 24 | 60 | | mA | V _{OL} = 1.0 V |
| High Level Leakage Current | I _{OH} | | .01 | 20 | | .01 | 20 | | .01 | 20 | | .01 | 20 | nA | V _{OH} = 5.0 V |
| Response Time ² | t _{RP} | | 650 | | | 650 | | | 650 | | | 650 | | ns | R _L = 5.1KΩ C _L = 15pF 100mV Input Step/5mV Overdrive |
| | | | 300 | | | 300 | | | 300 | | | 300 | | ns | R _L = 5.1KΩ C _L = 15pF TTL - Level Input Step |

Notes : ¹ Consists of junction leakage currents.

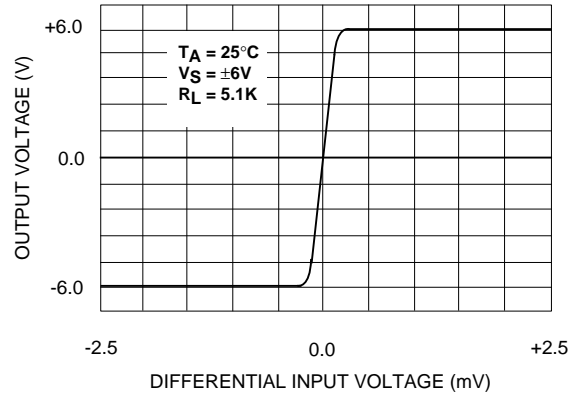
² Sample tested parameters.

TYPICAL PERFORMANCE CHARACTERISTICS

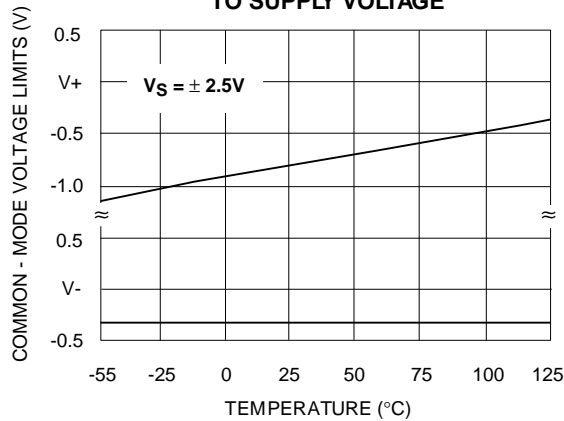
SATURATION VOLTAGE vs. TEMPERATURE



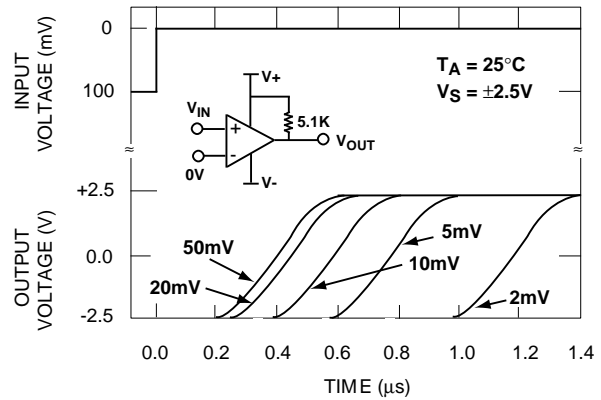
TRANSFER FUNCTION



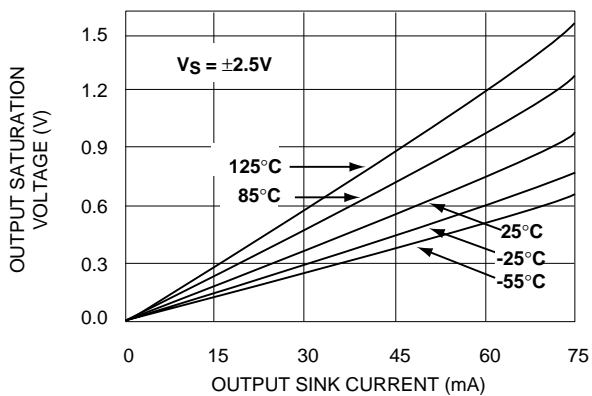
COMMON - MODE VOLTAGE REFERRED TO SUPPLY VOLTAGE



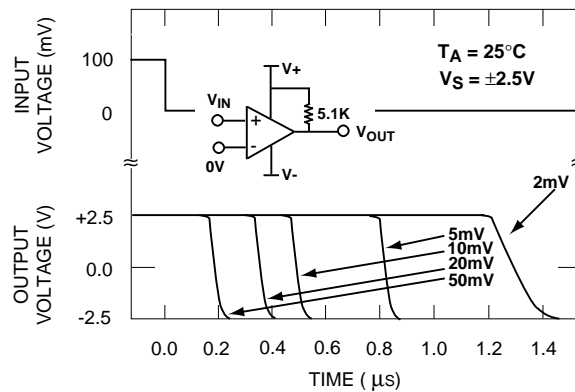
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



SATURATION VOLTAGE vs. SINK CURRENT

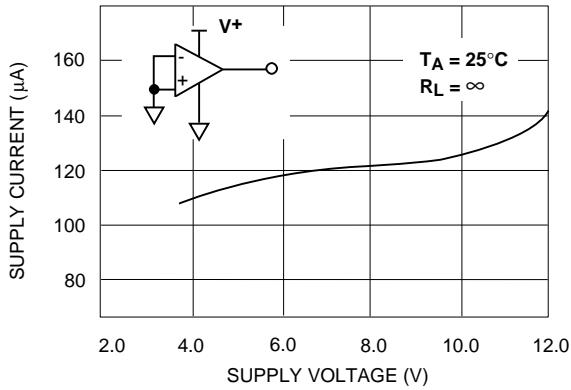


RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES

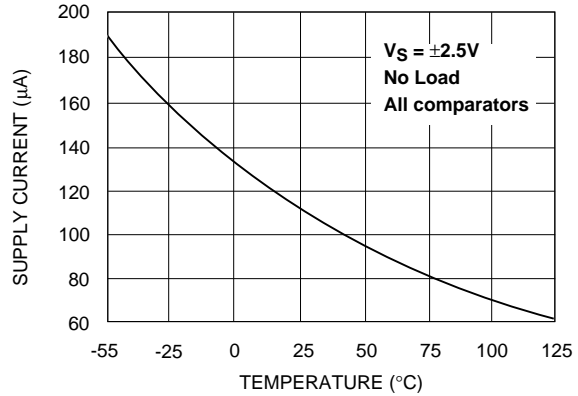


TYPICAL PERFORMANCE CHARACTERISTICS

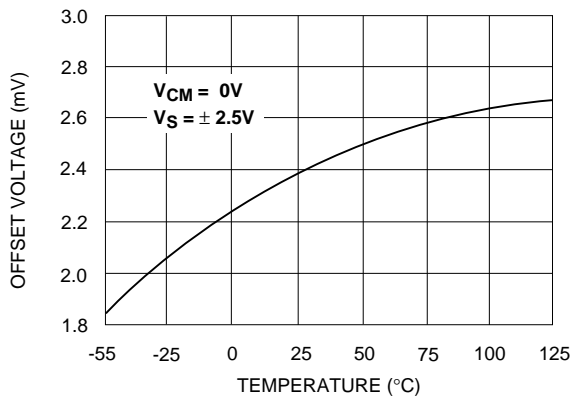
TOTAL SUPPLY CURRENT vs. TOTAL SUPPLY VOLTAGE



SUPPLY CURRENT vs. TEMPERATURE

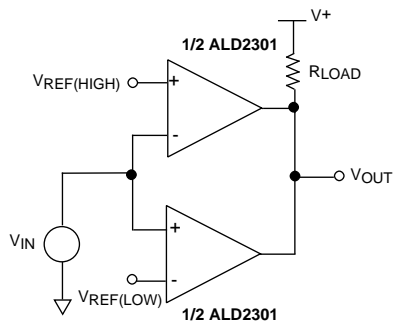


INPUT OFFSET VOLTAGE vs. TEMPERATURE



TYPICAL APPLICATIONS

DUAL LIMIT WINDOW COMPARATOR

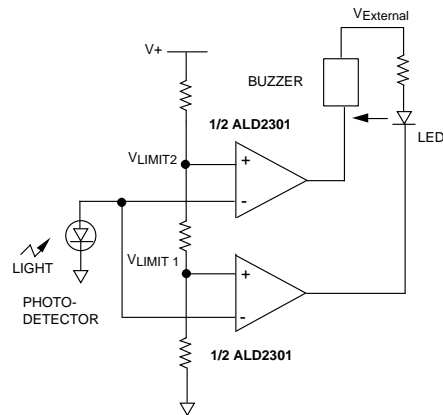


MINIMUM $R_{LOAD} = 1.5\text{k}\Omega$

OUTPUT HIGH FOR $V_{IN} < V_{REF(HIGH)}$

AND $V_{IN} > V_{REF(LOW)}$

DUAL LIMIT PHOTO-DETECTOR MONITOR



LED turns on as photo-detector voltage reaches V_{LIMIT1} . Both LED and horn turns on as photo-detector voltage reaches V_{LIMIT2} .
 $V_{EXTERNAL} = +12\text{V}$ $V_+ = +5\text{V}$.

VOLTAGE COMPARATOR WITH COMPLEMENTARY OUTPUTS

