



DUAL PRECISION CMOS VOLTAGE COMPARATOR WITH OPEN DRAIN DRIVER

GENERAL DESCRIPTION

The ALD2301A/ALD2301B/ALD2301C/ALD2301 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 55 μ A per comparator; and single (+5V) or dual ($\pm$ 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/ALD2301C/ALD2301 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.

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

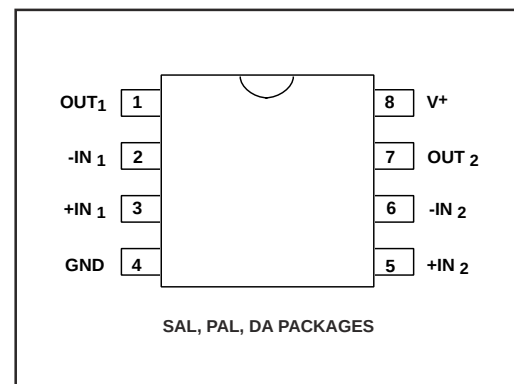
BENEFITS

- Low power and high precision combination
- Built-in high input impedance buffer
- Built-in output driver with up to 60mA sink current

FEATURES

- Fanout of 30LS TTL loads
- Low supply current of 110 μ A typical
- Functional equivalent to LM193 industry standard comparators
- Extremely low input bias currents -- typically 10pA
- Virtually eliminates source impedance effects
- Low operating supply voltage of 3V to 10V
- Single (+5V) and dual supply ($\pm$ 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 -- typically 60mA
- Low supply current spikes

PIN CONFIGURATION

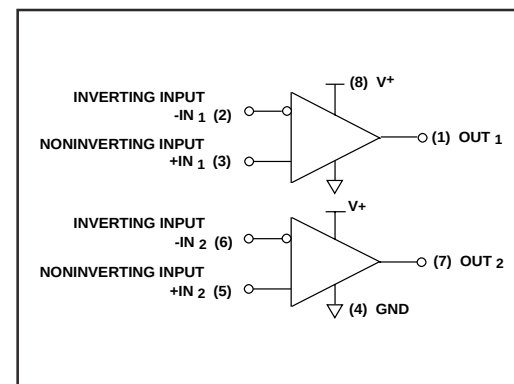


ORDERING INFORMATION ("L" suffix for lead free version)

Operating Temperature Range *		
0°C to +70°C	0°C to +70°C	-55°C to +125°C
8-Pin Small Outline Package (SOIC)	8-Pin Plastic Dip Package	8-Pin CERDIP Package
ALD2301ASAL	ALD2301APAL	ALD2301ADA
ALD2301BSAL	ALD2301BPAL	ALD2301BDA
ALD2301CSAL	ALD2301CPAL	ALD2301CDA
ALD2301SAL	ALD2301PAL	ALD2301DA

* Contact factory for leaded (non-RoHS) or high temperature versions.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Supply voltage, V^+ _____ 10.6V
Differential input voltage range _____ -0.3V to $V^+ + 0.3V$
Power dissipation _____ 600 mW
Operating temperature range SAL, PAL packages _____ 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

$T_A = 25^\circ\text{C}$ $V^+ = +5V$ unless otherwise specified

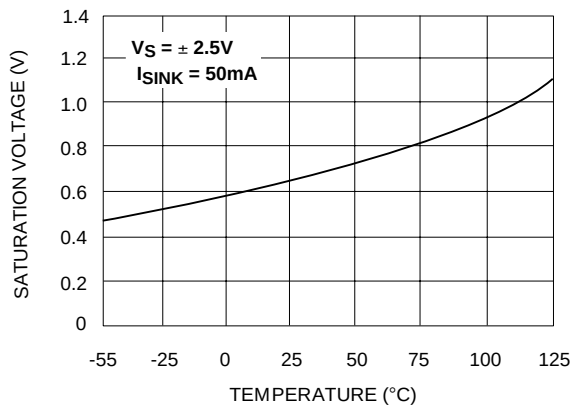
Parameter	Symbol	2301A			2301B			2301C			2301			Unit	Test Conditions
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
Supply Voltage	V_S V^+	± 1.5 3		± 5 10	± 1.5 3		± 5 10	± 1.5 3		± 5 10	± 1.5 3		± 5 10	V V	Dual Supply Single Supply
Supply Current	I_S		110	180		110	180		110	180		110	180	μA	$R_{LOAD} = \infty$
Voltage Gain	A_{VD}	50	150		50	150		50	150		50	150		V/mV	$R_{LOAD} \geq 15K\Omega$
Input Offset Voltage	V_{OS}			2			5			20			10	mV	$R_{LOAD} \geq 1.5K\Omega$
Input Offset Current ¹	I_{OS}		10	200		10	200		10	400		10	200	pA	
Input Bias Current ¹	I_B		10	200		10	200		10	400		10	200	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	$I_{SINK} = 12\text{mA}$ $V_{INPUT} = 1V$ 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	$R_L = 5.1K\Omega$ $C_L = 15\text{pF}$ 100mV Input Step/5mV Overdrive
			300			300			300			300		ns	$R_L = 5.1K\Omega$ $C_L = 15\text{pF}$ TTL - Level Input Step

Notes : ¹ Consists of junction leakage currents.

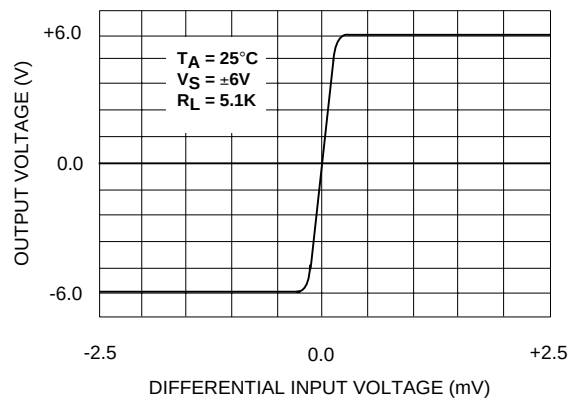
² Sample tested parameters.

TYPICAL PERFORMANCE CHARACTERISTICS

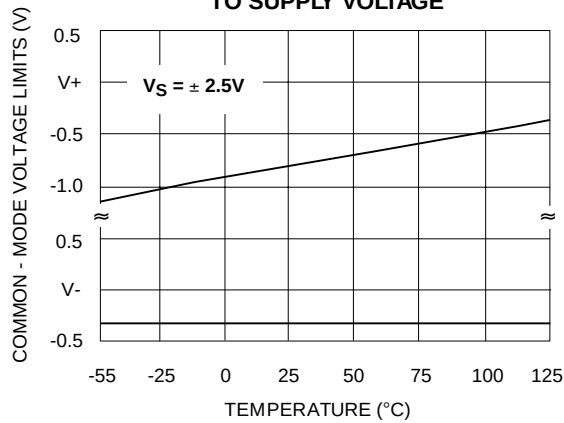
**SATURATION VOLTAGE
vs. TEMPERATURE**



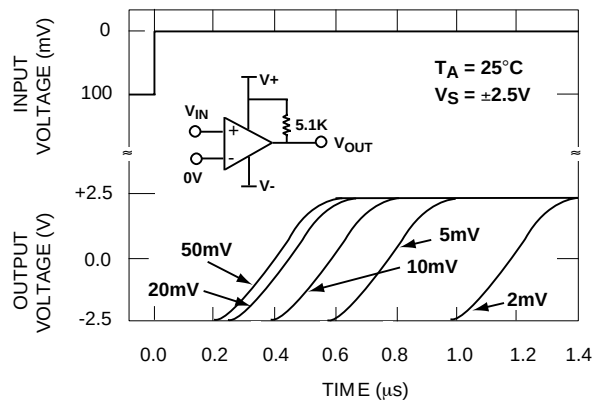
TRANSFER FUNCTION



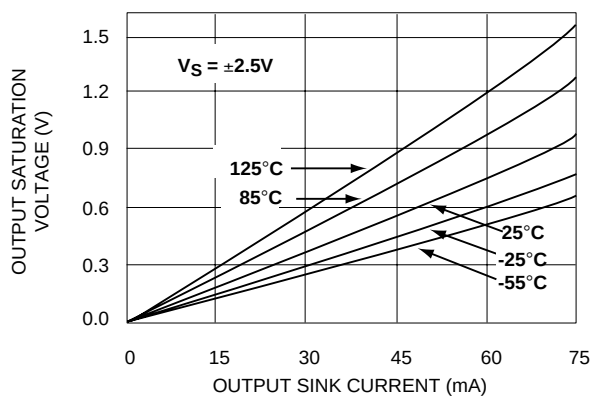
**COMMON - MODE VOLTAGE REFERRED
TO SUPPLY VOLTAGE**



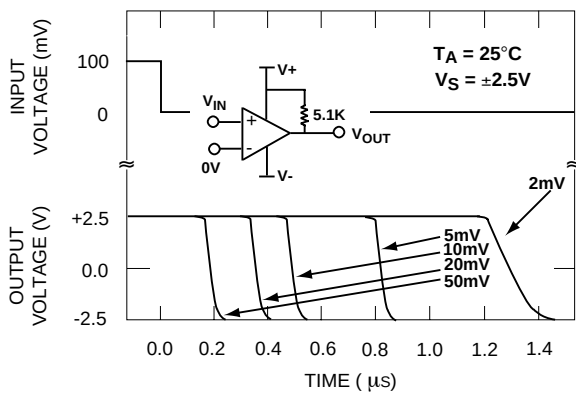
**RESPONSE TIME FOR VARIOUS
INPUT OVERDRIVES**



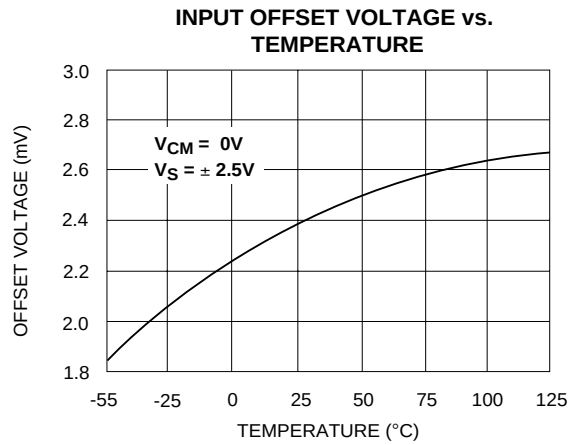
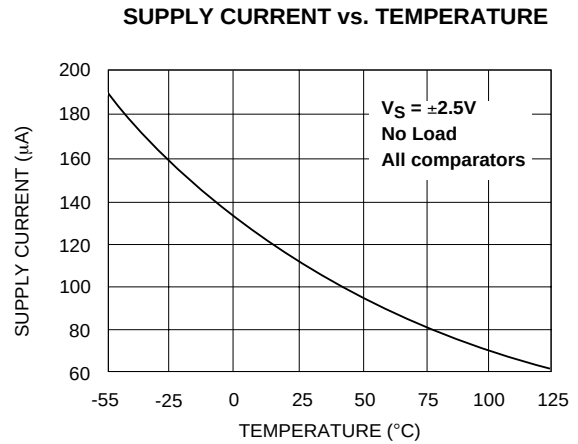
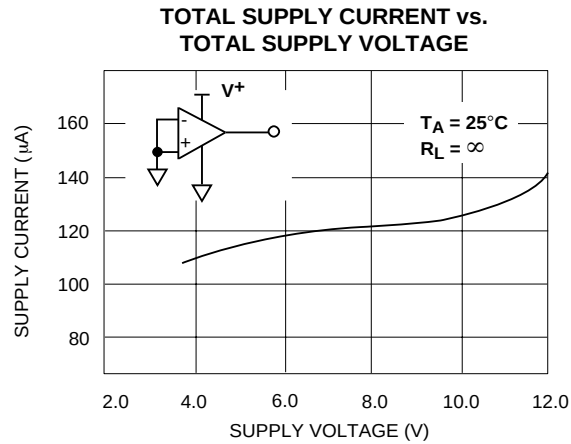
**SATURATION VOLTAGE vs.
SINK CURRENT**



**RESPONSE TIME FOR VARIOUS
INPUT OVERDRIVES**

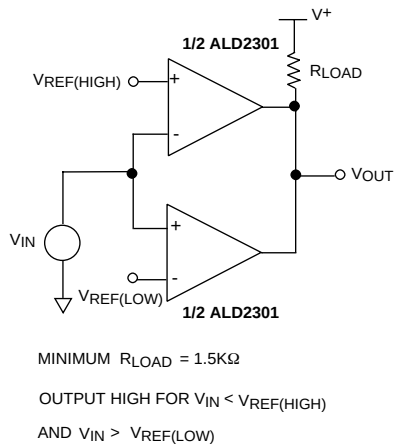


TYPICAL PERFORMANCE CHARACTERISTICS (cont'd)

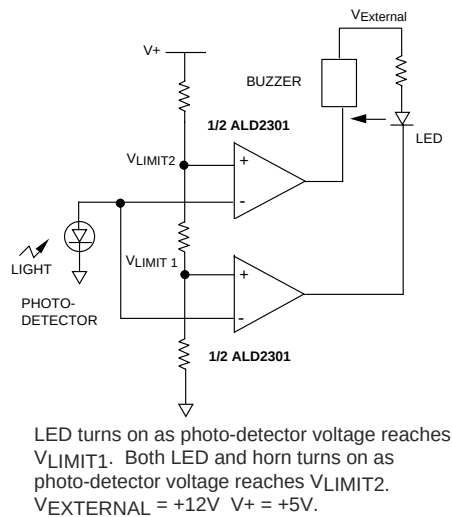


TYPICAL APPLICATIONS

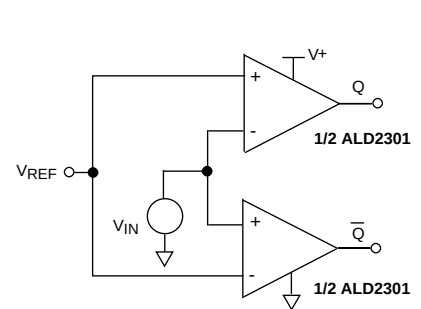
DUAL LIMIT WINDOW COMPARATOR



DUAL LIMIT PHOTO-DETECTOR MONITOR

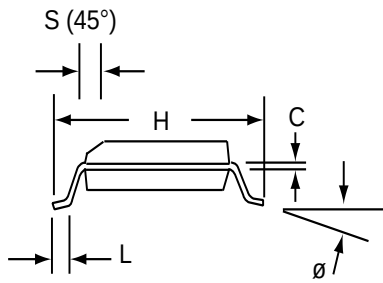
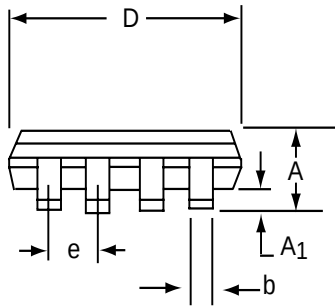
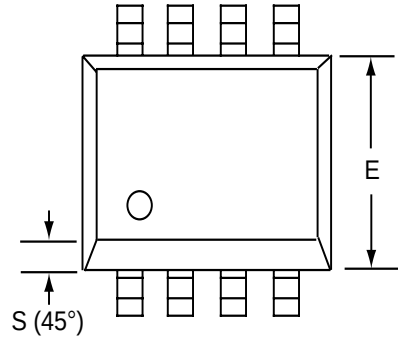


VOLTAGE COMPARATOR WITH COMPLEMENTARY OUTPUTS



SOIC-8 PACKAGE DRAWING

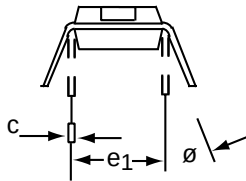
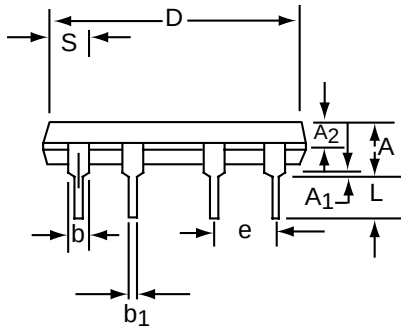
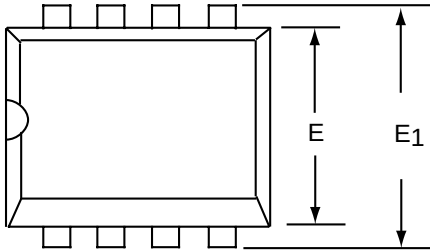
8 Pin Plastic SOIC Package



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A₁	0.10	0.25	0.004	0.010
b	0.35	0.45	0.014	0.018
C	0.18	0.25	0.007	0.010
D-8	4.69	5.00	0.185	0.196
E	3.50	4.05	0.140	0.160
e	1.27 BSC		0.050 BSC	
H	5.70	6.30	0.224	0.248
L	0.60	0.937	0.024	0.037
Ø	0°	8°	0°	8°
S	0.25	0.50	0.010	0.020

PDIP-8 PACKAGE DRAWING

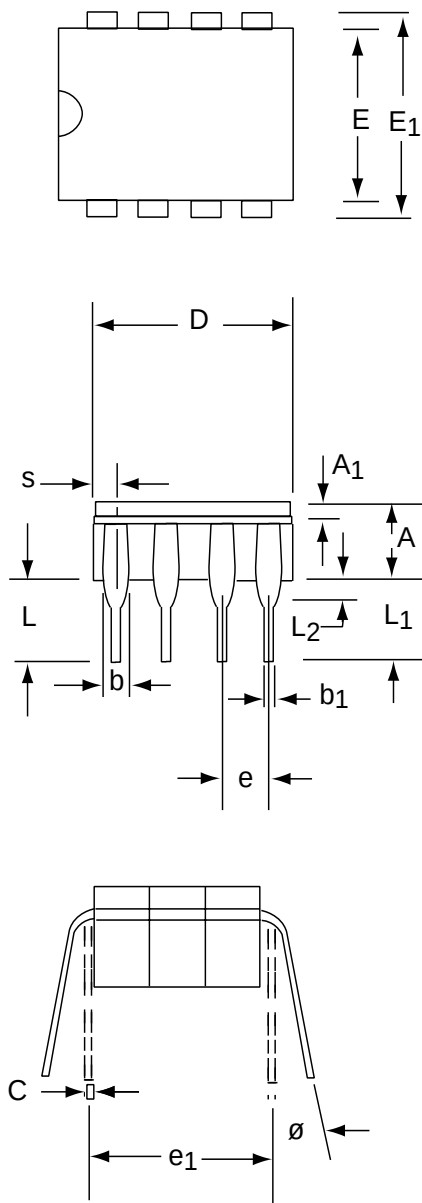
8 Pin Plastic DIP Package



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.81	5.08	0.105	0.200
A ₁	0.38	1.27	0.015	0.050
A ₂	1.27	2.03	0.050	0.080
b	0.89	1.65	0.035	0.065
b ₁	0.38	0.51	0.015	0.020
c	0.20	0.30	0.008	0.012
D-8	9.40	11.68	0.370	0.460
E	5.59	7.11	0.220	0.280
E ₁	7.62	8.26	0.300	0.325
e	2.29	2.79	0.090	0.110
e ₁	7.37	7.87	0.290	0.310
L	2.79	3.81	0.110	0.150
S-8	1.02	2.03	0.040	0.080
Ø	0°	15°	0°	15°

CERDIP-8 PACKAGE DRAWING

8 Pin CERDIP Package



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	3.55	5.08	0.140	0.200
A ₁	1.27	2.16	0.050	0.085
b	0.97	1.65	0.038	0.065
b ₁	0.36	0.58	0.014	0.023
C	0.20	0.38	0.008	0.015
D-8	--	10.29	--	0.405
E	5.59	7.87	0.220	0.310
E ₁	7.73	8.26	0.290	0.325
e	2.54 BSC		0.100 BSC	
e ₁	7.62 BSC		0.300 BSC	
L	3.81	5.08	0.150	0.200
L ₁	3.18	--	0.125	--
L ₂	0.38	1.78	0.015	0.070
S	--	2.49	--	0.098
Ø	0°	15°	0°	15°