Quad Single Supply Comparator

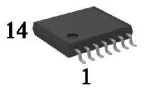
Features

The LM2901 consists of four independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max for four comparators which were designed specifically to operate from a single power supply over a wide range of voltages.

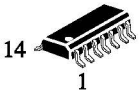
Application areas include limit comparators, simple analog to digital converters; pulse, squarewave and time delay generators; wide range VCO; MOS clock timers; multivibrators and high voltage digital logic gates.

These comparators also have a unique characteristic in that the input common mode voltage range includes ground even though operated from a single power supply voltage.

- Single or Split Supply Operation
- Low Input Bias Current
- Low Input Offset Current
- Input Common Mode Voltage Range to Gnd
- Low Output Saturation Voltage
- TTL and CMOS Compatible



TSSOP14



SOIC14

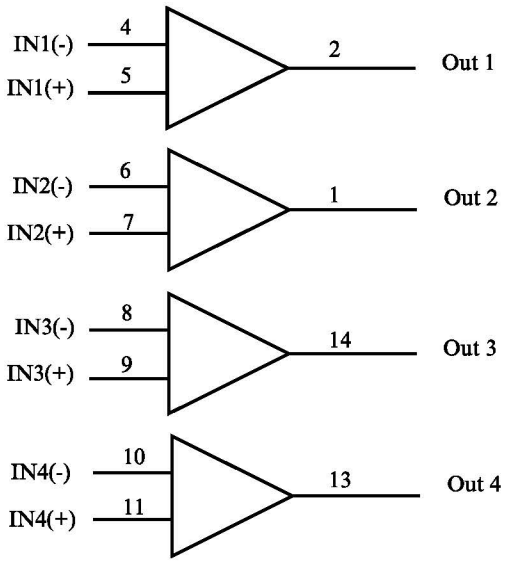
ORDERING INFORMATION

LM2901P TSSOP
LM2901D SOIC

Applications

- Consumer Electronics
- Industrial
  - Infotainment and Clusters
  - Body Control Modules
- Power Supervision
- Oscillators
- Peak Detectors
- Logic Voltage Translation

LOGIC DIAGRAM

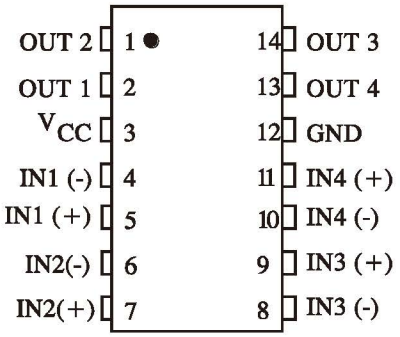


PIN 3 = V_{CC}
PIN 12 = GND

Ordering Information

Part Number	Package	Packing	Temperature（TA）	Package Qty	Note
LM2901DR	SOIC-14	Reel	-40°C ~ 125°C	2500	
LM2901PWR	TSSOP-14	Reel	-40°C ~ 125°C	2500	
LM2901AVQDR	SOIC-14	Reel	-40°C ~ 125°C	2500	
LM2901AVQPWR	TSSOP-14	Reel	-40°C ~ 125°C	2500	

PIN ASSIGNMENT



Pin Functions

PIN			I/O	DESCRIPTION
NAME	SOIC-14	TSSOP-14		
1IN+	7	10	I	Positive input pin of the comparator 1
1IN–	6	9	I	Negative input pin of the comparator 1
1OUT	1	2	O	Output pin of the comparator 1
2IN+	5	8	I	Positive input pin of the comparator 2
2IN–	4	6	I	Negative input pin of the comparator 2
2OUT	2	3	O	Output pin of the comparator 2
3IN+	9	13	I	Positive input pin of the comparator 3
3IN–	8	12	I	Negative input pin of the comparator 3
3OUT	14	20	O	Output pin of the comparator 3
4IN+	11	16	I	Positive input pin of the comparator 4
4IN–	10	14	I	Negative input pin of the comparator 4
4OUT	13	19	O	Output pin of the comparator 4
GND	12	18	—	Ground
V_{CC}	3	4	—	Supply pin

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	Power Supply Voltages Single Supply Split Supplies	 36 ±18	 V
V_{IDR}	Input Differential Voltage Range	36	V
V_{ICR}	Input Common Mode Voltage Range (1)	-0.3 to V_{CC}	V
I_{SC}	Output Short Circuit to Ground	Continuous	
I_{IN}	Input Current, per pin (2)	50	mA
T_J	Junction Temperature Plastic Packages	 150	 °C
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1mm from Case for 10 Seconds	260	°C
P_D	Power Dissipation @T_A=25°C Plastic Package Derate above 25°C	 1.0 8.0	 W mW/°C

* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied.
Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
Functional operation should be restricted to the Recommended Operating Conditions.
Notes:
1. Split Power Supplies.
2. V_{IN}<-0.3V. This input current will only exist when voltage at any of the input leads is driven negative.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	±2.5 or 5.0	±15 or 30	V
T_A	Operating Temperature, All Package	-40	+125	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS (T_A=-40 to +85°C)

Symbol	Parameter	Test Conditions	Guaranteed Limit			Unit
			Min	Typ	Max	
V_{IO}	Input Offset Voltage	V_0=1.4V V_{CC}=5.0-30V;R_S≤100Ω V_{ICR}=0V - (V_{CC}-1.5)V	-	2.0 1.0(1)	7.0* 2.0(1)*	mV
I_{IB}	Input Bias Current	V_0=1.4V V_{CC}=5.0-30V V_{ICR}=0V - (V_{CC}-1.5)V	-		-500	nA
I_{IO}	Input Offset Current	V_0=1.4V V_{CC}=5.0-30V V_{ICR}=0V - (V_{CC}-1.5)V	-		200	nA
V_{ICR}	Input Common Mode Voltage Range	V_{CC}=5.0-30V	0		V_{CC}-2.0V	V
I_{CC}	Supply Current	R_L=∞,V_{CC}=5.0 R_L=∞,V_{CC}=30V	- -		2.0* 2.5*	mA
A_{VOL}	Voltage Gain	V_{CC}=15V, R_L=15KΩ	-	100*	-	V/mV
t_1	Large Signal Response Time	V_{IN}=TTL Logic Swing, V_{ref}=1.4V, V_{CC}=5.0V, R_L=5.1KΩ, V_{RL}=5.0V	-	300*	-	ns
t_2	Response Time	V_{CC}=5.0V, R_L=5.1KΩ, V_{RL}=5.0V	-	1.3*	-	μs
I_{sink}	Output Sink Current	V_I(-)=1.0V, V_I(+)=0V, V_0≤1.5V, V_{CC}=5.0V	6.0*	-	-	mA
V_{sat}	Saturation Voltage	V_I(-)=1.0V, V_I(+)=0V, I_{sink}≤4.0mA, V_{CC}=5.0V	-	-	400	mV
I_{OL}	Output Leakage Current	V_I(+)=1.0V, V_I(-)=0V, V_0=5.0V V_0=30V		0.1*	1000	nA
V_{IDR}	Differential Input Voltage Range	All V_{IN}≥GND or V-Supply (if used)			V_{CC}*	V

* =@25 C

(1) A-Suffix devices LM2901A

TYPICAL PERFORMANCE CHARACTERISTICS

(V_{CC}=1.5V, T_A=+25°C, (each comporator))

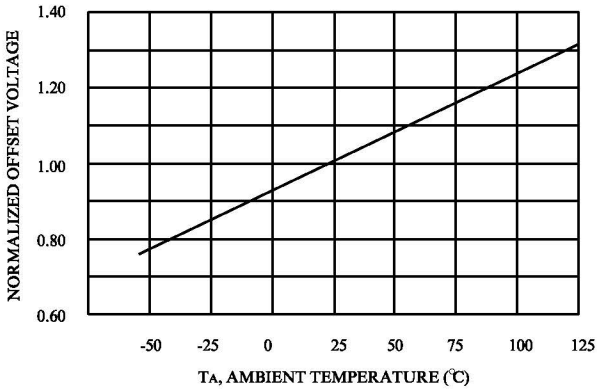


Figure 1. Normalized Input Offset Voltage

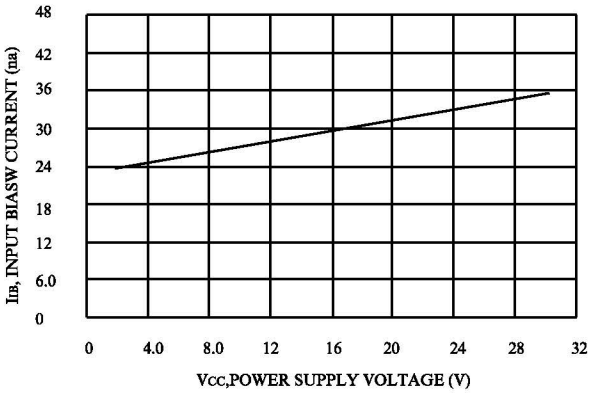


Figure 2. Input Bias Current

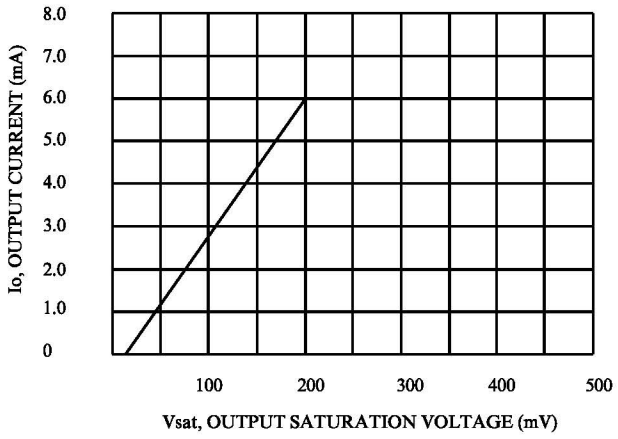


Figure 3. Output Sink Current versus Output Saturation Voltage

ypical applications

Figure 8. Basic comparator

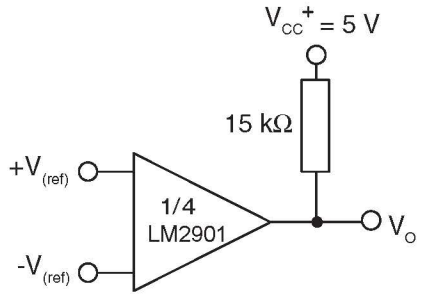


Figure 9. Driving CMOS

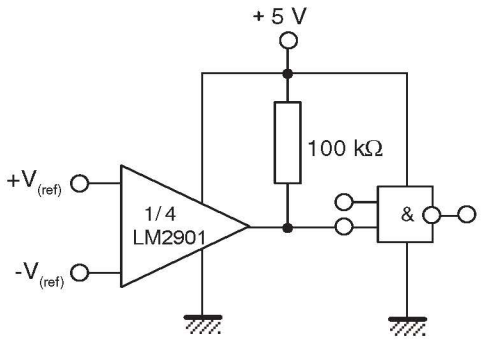


Figure 10. Driving TTL

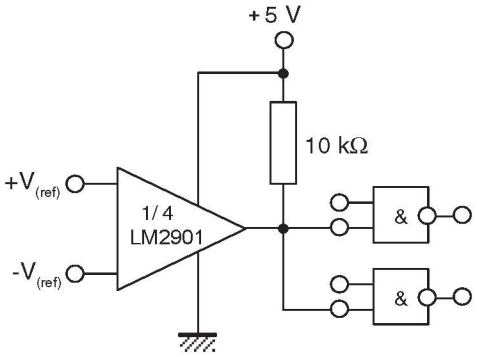


Figure 11. Low frequency op amp

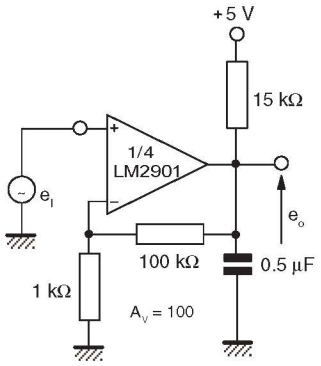


Figure 12. Low frequency op amp

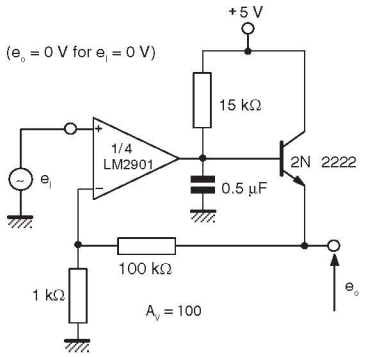
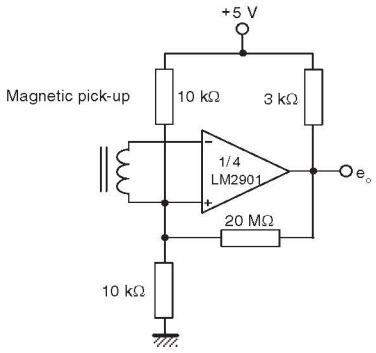
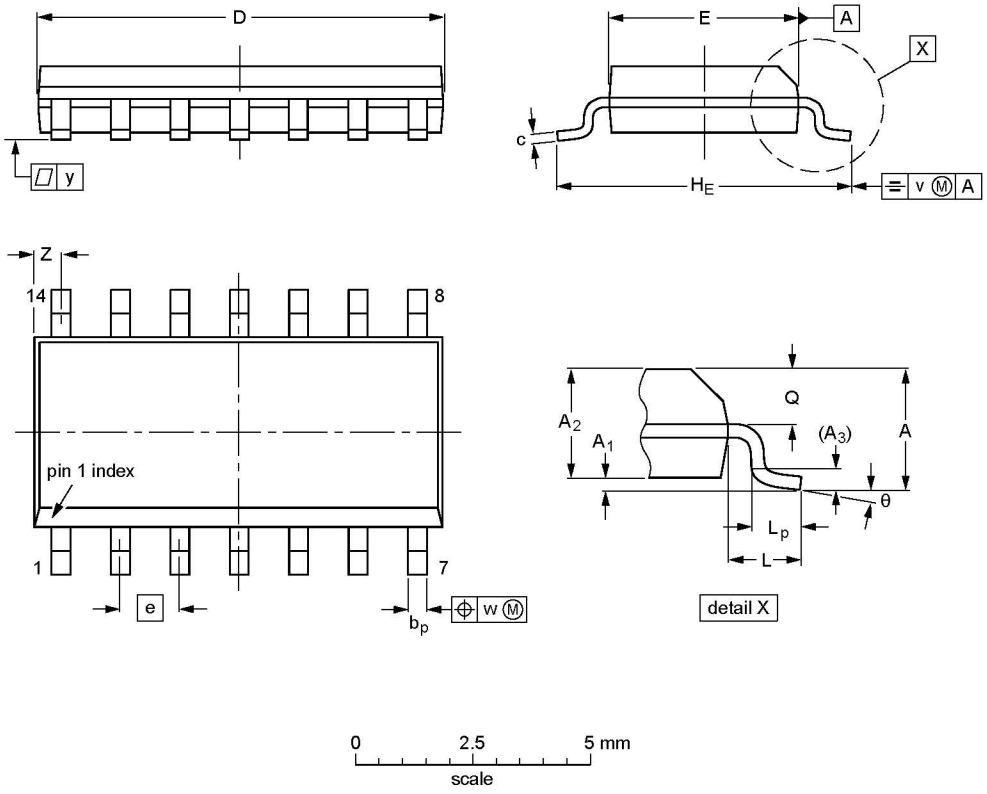


Figure 13. Transducer amplifier



Package diagram

SOIC14: plastic small outline package; 14 leads; body width 3.9 mm



DIMENSIONS (mm are the original dimensions)

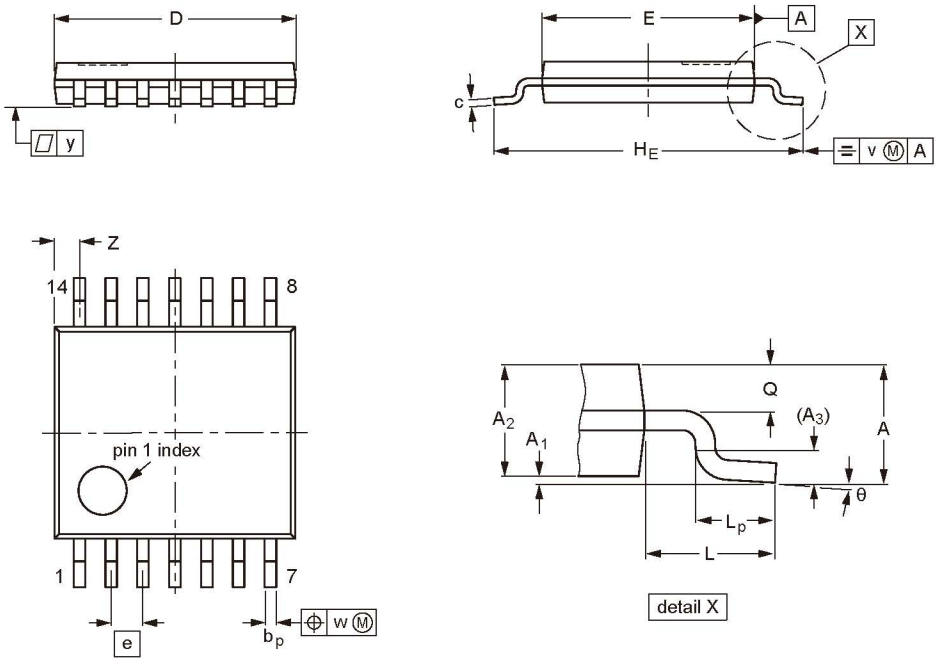
UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
TKSOIC14						05-06-19

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.72 0.38	8° 0°

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
TKTSSOP14						05-06-19