Low Power Low Offset Voltage Quad Comparators   LM2901
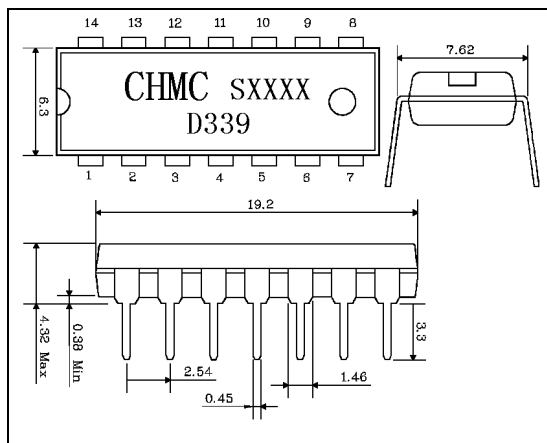
DESCRIPTION：

The LM2901 consists of four independent precision voltage comparators.These were designed specifically to operate from a signal power supply over a wide range of voltage.Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.The LM2901 also have a unique characteristic in that the input common-mode voltage range includes ground,even though operated from a single power supply voltage.
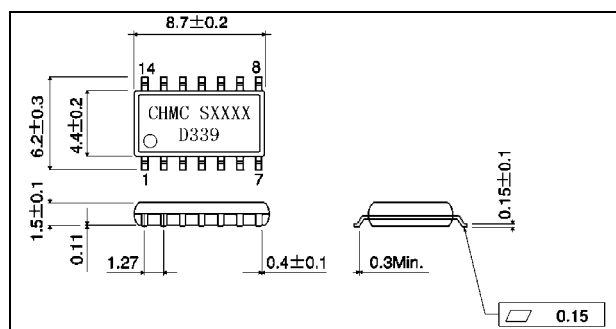
FEATURE：

- Low input biasing current：25nA（TYP.）.
- Low input offset current：±5.0nA（TYP.）.
- Low output saturation voltage：130mV.
- Output voltage compatible with TTL,CMOS.

Outline Drawing

DIP14

SOP14
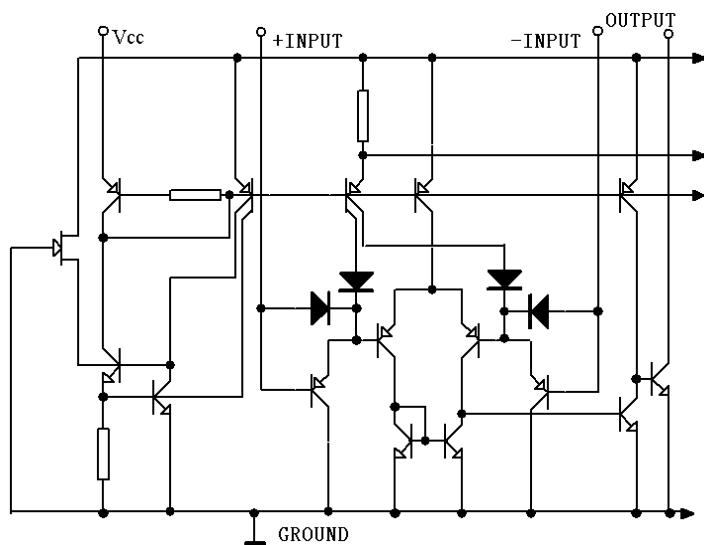
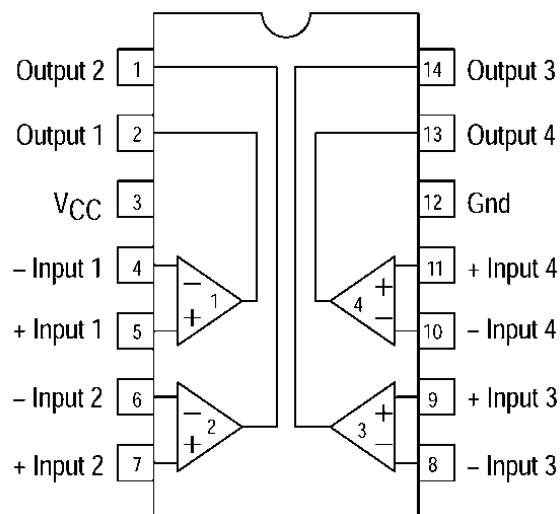### PIN CONFIGURATION

BLOCK DIAGRAM

PIN DESCRIPTIONS

No	Description	Symbol	No	Description	Symbol
1	Output 2	OUT2	8	-Input3	IN3（-）
2	Output 1	OUT1	9	+Input3	IN3（+）
3	Supply Voltage	Vcc	10	-Input4	IN4（-）
4	-Input1	IN1（-）	11	+Input4	IN4（+）
5	+Input1	IN1（+）	12	Ground	GND
6	-Input2	IN2（-）	13	Output 4	OUT4
7	+Input2	IN2（+）	14	Output 3	OUT3

ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Value	Unit
Supply Voltage	Vcc	36 or ±18	V
Differential Input Voltage	V_{IDR}	36	V
Input Voltage	V_{ICMR}	-0.3~Vcc	V
Input Current	I_{SC}	50	
Power Dissipation（*）	P_D	1.0	W
Operating Temperature Range	Tamb	-20~+85	℃
Storage Temperature Range	Tstg	-65~150	℃

Note（*）：Power dissipation reduces 8 mW/°C for using above Ta=25℃。

ELECTRICAL CHARACTERISTICS （Unless otherwise specified :Vcc=5V，Tamb=25℃）

| Characteristics	Test conditions	Symbol	Mi	Typ.	Max	Unit
Input Offset Voltage		V_{IO}		±2.0	±5.0	mV
	0℃ ≤ Ta ≤ 70℃				±9.0	
Input Offset Current		I_{IO}		±5.0	±50	nA
	0℃ ≤ Ta ≤ 70℃				±150	
Input Bias Current		I_{IB}		25	250	nA
	0℃ ≤ Ta ≤ 70℃				400	
Input Common-mode Voltage Range		V_{ICR}	0		Vcc-1.5	V
	0℃ ≤ Ta ≤ 70℃		0		Vcc-2.0	
Supply Current	$R_L=\infty$	I_{cc}		0.8	2.0	mA
	$R_L=\infty$，Vcc=30V			1.0	2.5	
Voltage Gain	$R_L \geq 15K\Omega$，Vcc=15V	G_V	50	200		V/mV
Large Signal Response Time	V_{IN}=TTL Logic Swing，V_{REF}=1.4V，V_{RL}=5.0V，R_L=5.1KΩ	t_{RES}		300		ns
Response Time	V_{RL}=5.0V，R_L=5.1KΩ	t_{RES}		1.3		ns
Input Differential Voltage		V_{ID}			Vcc	V
Output Sink Current	$V_{IN(-)} \geq 1.0V$，$V_{IN(+)}$=0V，Vo ≤ 1.5V	I_{SINK}	6.0	16		mA
output saturation voltage	$V_{IN(-)} \geq 1.0V$，$V_{IN(+)}$=0V，$I_{SINK} \leq 4.0mA$	V_{SAT}		130	400	mV
	$V_{IN(-)} \geq 1.0V$，$V_{IN(+)}$=0V，$I_{SINK} \leq$				700	
Output Leakage Current	$V_{IN(+)} \geq 1.0V$，$V_{IN(-)}$=0V，Vo=5.0V	I_{OL}		0.1		nA
	$V_{IN(+)} \geq 1.0V$，$V_{IN(-)}$=0V，Vo=30V 0℃ ≤ Ta ≤ 70℃				1000	

APPLICATION CIRCUIT
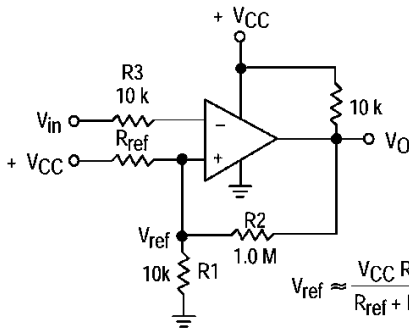
$$V_{ref} \approx \frac{V_{CC}\, R1}{R_{ref} + R1}$$

$$R3 \approx R1 \,//\, R_{ref} \,//\, R2$$

$$V_H = \frac{R1 \,//\, R_{ref}}{R1 \,//\, R_{ref} + R2}\,[V_{O(max)} - V_{O(min)}]$$

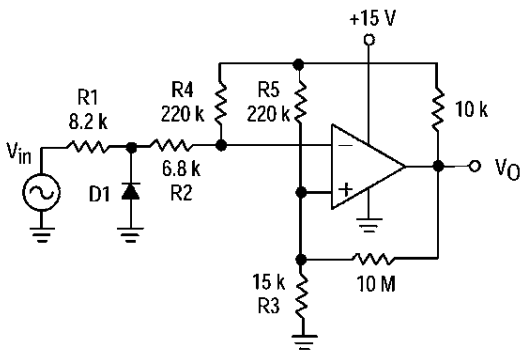$$R2 \geqslant R_{ref} \,//\, R1$$
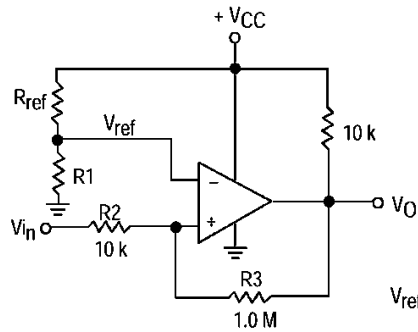
$$V_{ref} = \frac{V_{CC}\, R1}{R_{ref} + R1}$$

$$R2 \approx R1 \,//\, R_{ref}$$

Amount of Hysteresis V_H

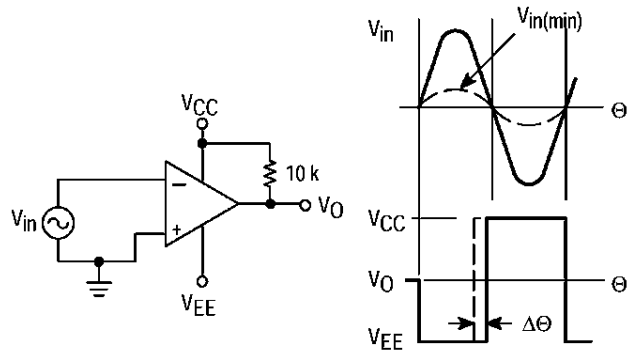$$V_H = \frac{R2}{R2 + R3}\,[(V_{O(max)} - V_{O(min)}]$$
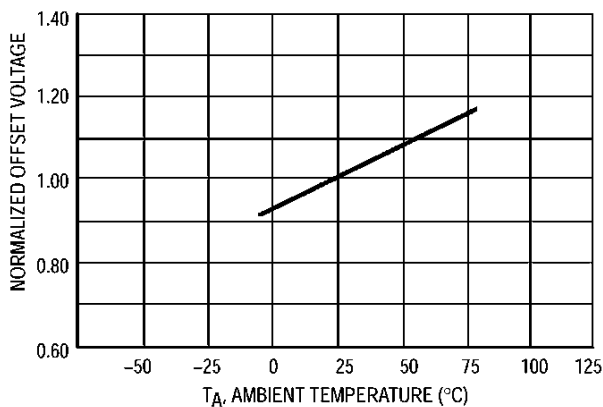
D1 prevents input from going negative by more than 0.6 V.

$$R1 + R2 = R3$$

$$R3 \leq \frac{R5}{10} \quad \text{for small error in zero crossing}$$
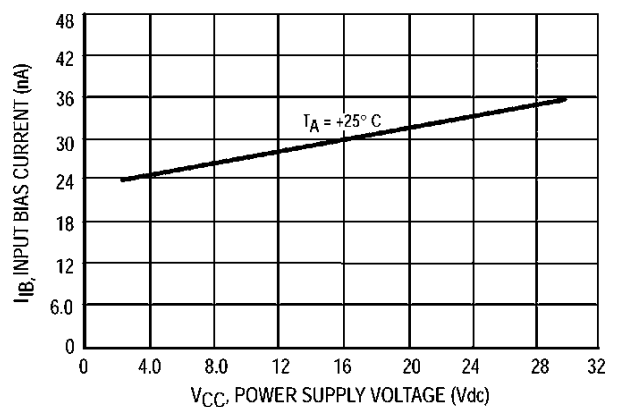
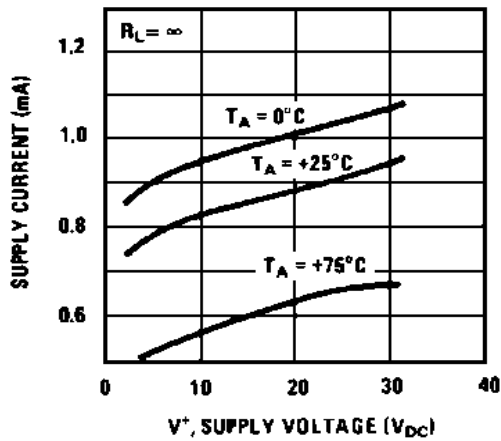$V_{in(min)} \approx 0.4$ V peak for 1% phase distortion ($\Delta\Theta$).

TYPICAL CHARACTERISTICS CURVES:

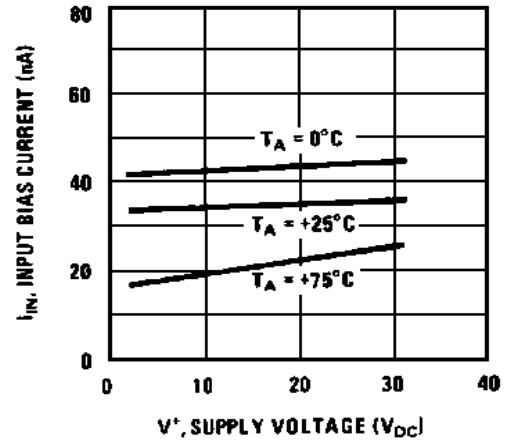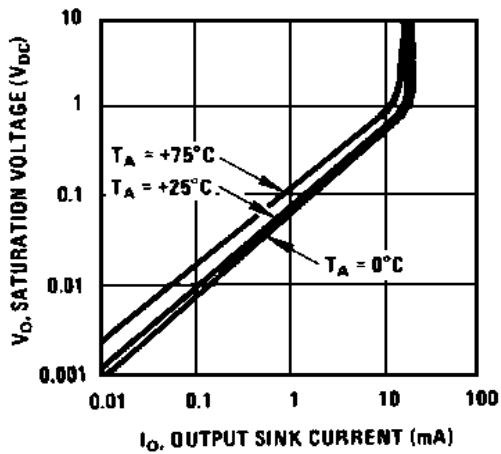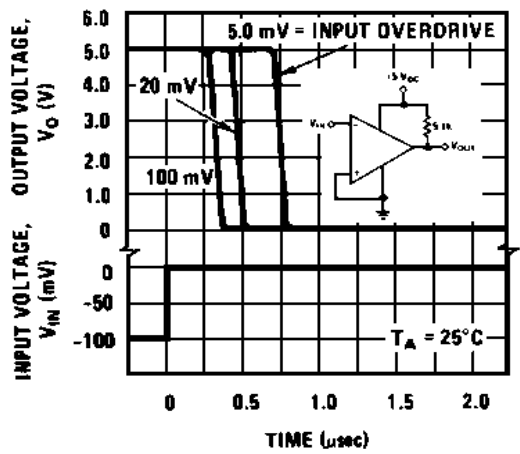Input Offset Voltage

Input Bias Current

Supply Current

Input Current

Output Saturation Voltage

Response Time for Various Input Overdrives —Negative Transition

Response Time for Various Input Overdrives —Positive Transition