Four comparator

Description：

LM339 is a four comparator integrated circuit mainly used in consumer and industrial electronic products for level detection and low-level detection. Adopting DIP14 and SOP14 packaging forms.

Features:

-Single or dual power operation

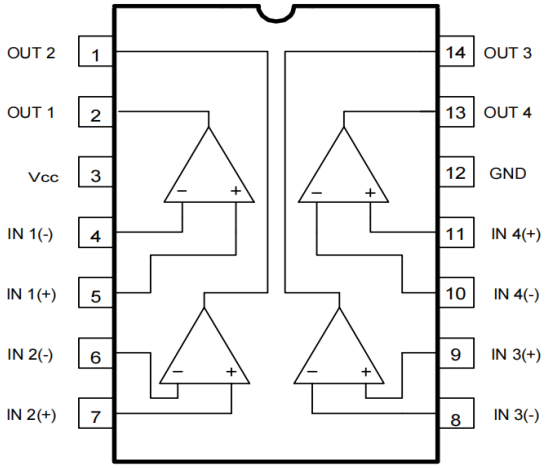
-Low input bias current: 25nA (typical)

-Low input offset current: ± 5.0nA (typical)

-Low output saturation voltage: 130mV

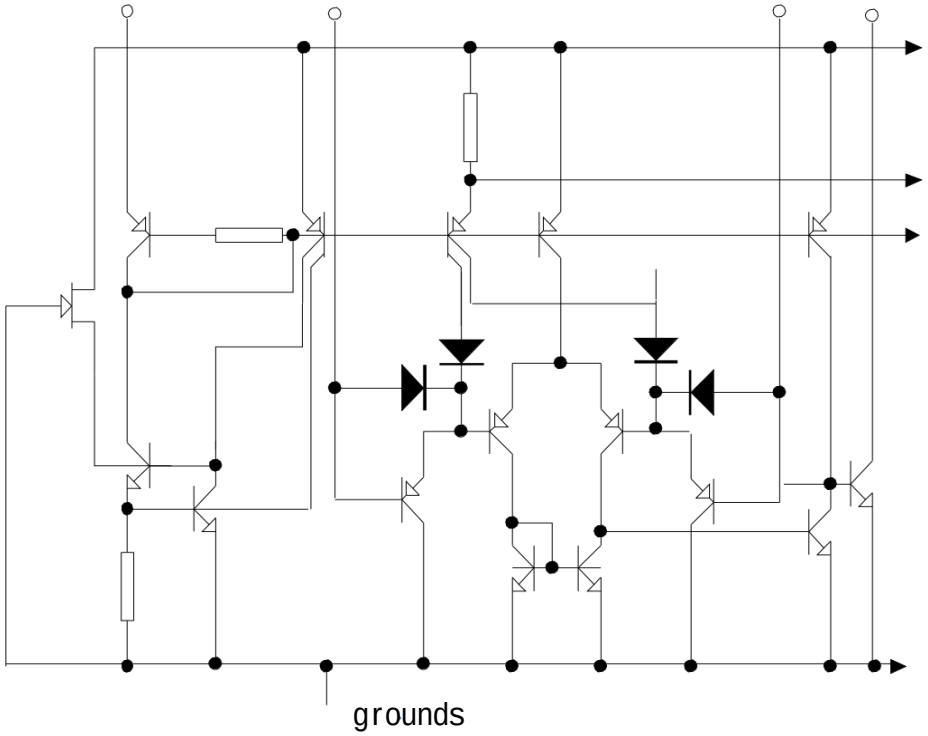
-Compatible with TTL and CMOS

Pin definition：



Pin NO.	Function	Symbols	Pin NO.	Function	Symbols
1	Output 2	OUT2	8	Inverted input 3	IN3(-)
2	Output 1	OUT1	9	Positive phase input 3	IN3(+)
3	power supply	Vcc	10	Inverted input 4	IN4(-)
4	Inverted input 1	IN1(-)	11	Positive phase input 4	IN4(+)
5	Positive phase input 1	IN1(+)	12	grounds	GND
6	Inverted input 2	IN2(-)	13	Output 4	OUT4
7	Positive phase input 2	IN2(+)	14	Output 3	OUT3

Internal circuit diagram:



Absolute Maximum Ratings：(Absolute maximum rated value, Tamb=25 unless otherwise specified)

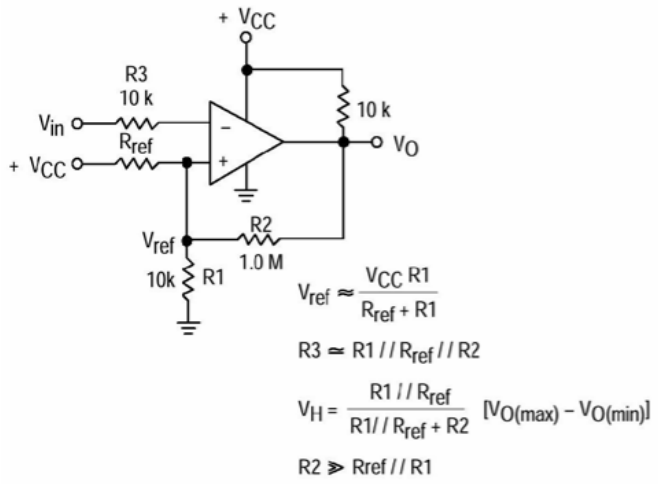
parameter	symbol	value	unit
supply voltage	Vcc	36 or ±18	V
Input differential voltage range	VIDR	36	V
Input common mode voltage range	VICMR	-0.3~Vcc	V
output current	ISC	50	mA
consumption (*)	PD	1.0	W
Ambient Temperature	Tamb	0~70	℃
Storage temperature	Tstg	-65~150	℃

Note (*): When used above 25 , for every 1 increase, the power consumption decreases by 8mW.

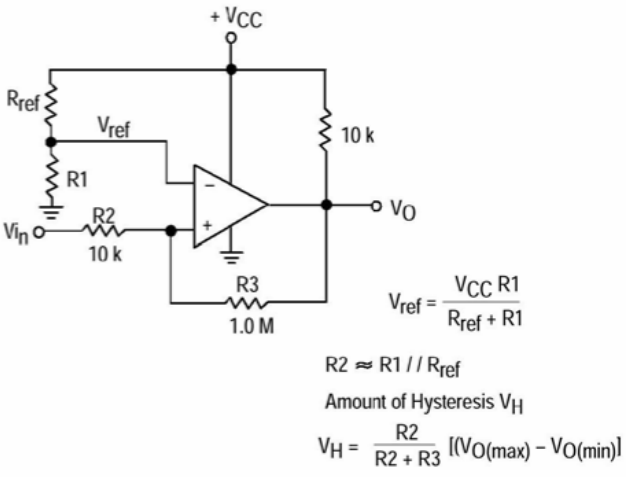
Electrical characteristics (if there are no other regulations, Vcc=5V, Tamb=25)

parameter	Test conditions	Symbols	Norm value			unit
			min	typ	max	
input offset voltage		VIo		±2.0	±5.0	mV
	0℃≤Ta ≤70℃				±9.0	
Input Offset Current		IIo		±5.0	±50	nA
	0℃≤Ta ≤70℃				±150	
Input Bias Current		IIB		25	250	nA
	0℃≤Ta ≤70℃				400	
Input common mode voltage range		VICR	0		Vcc-1.5	V
	0℃≤Ta≤70℃		0		Vcc-2.0	
Power supply current	RL=∞	Icc		0.8	2.0	mA
	Ru=∞, Vcc=30V			1.0	2.5	
Gain	RL≥ 15K, Vcc=15V	Gv	50	200		V/mV
Large signal response time	VIN=TTL logic swing, VREF=1.4V, VRL=5.0V, RL=5.1K	tRES		300		ns
response time	VRL=5.0V, RL=5.1K	tRES		1.3		ns
Input differential voltage		VID			Vcc	V
Output notch current	VIN(-)≥ 1.0V, VIN(+)=0V, Vo≤1.5V	ISINK	6.0	16		mA
output saturation voltage	VIN(-)≥1.0V, VIN(+)=0V, IsINK≤4.0mA	VSAT		130	400	mV
	VIN(-)≥1.0V, VIN(+)=0V, ISINK≤4.0mA 0℃≤Ta ≤70℃				700	
Output leakage current	VIN(+)≥1.0V, VIN(-)=0V, Vo=5.0V	IOL		0.1		nA
	VIN(+)≥1.0V, VIN(-)=0V, Vo=30V 0℃≤Ta ≤70℃				1000	

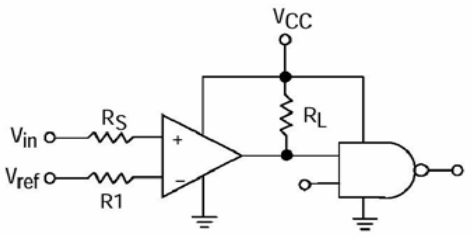
Application diagram



Inverse comparator with hysteresis



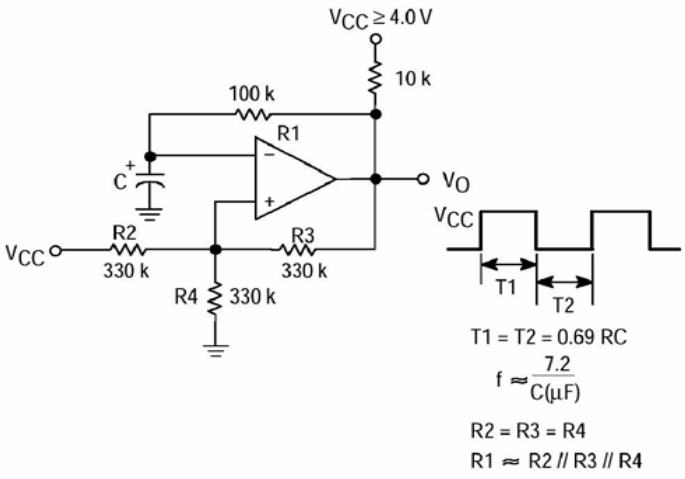
Positive phase comparator with hysteresis



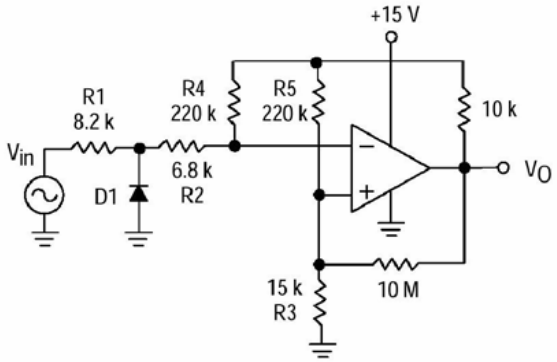
RS = Source Resistance
R1 ≃ RS

Logic	Device	VCC (V)	RL kΩ
CMOS	1/4 MC14001	+15	100
TTL	1/4 MC7400	+5.0	10

logical drive



square-wave oscillator

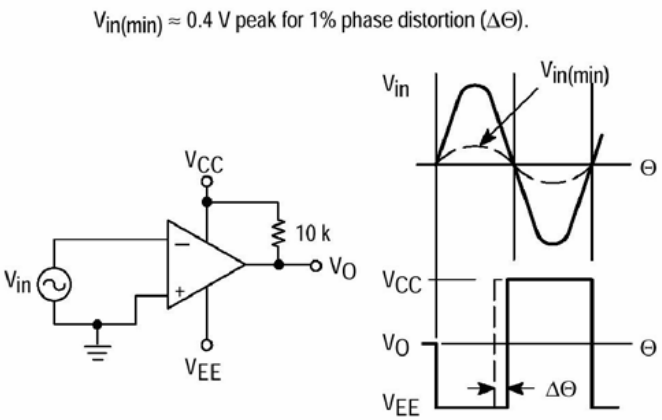


D1 prevents input from going negative by more than 0.6 V.

$$R1 + R2 = R3$$

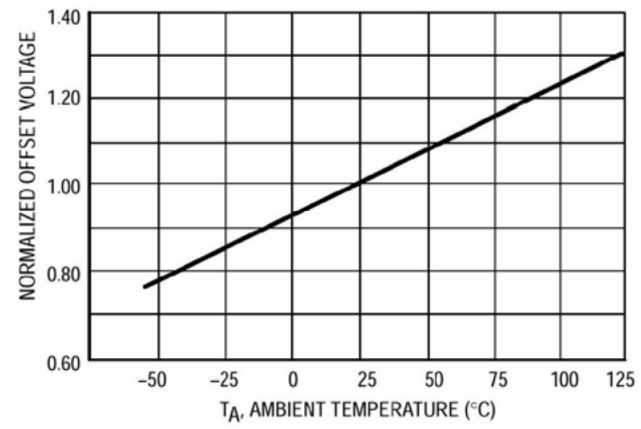
$$R3 \leq \frac{R5}{10}$$ for small error in zero crossing

Zero crossing detector (single power application)

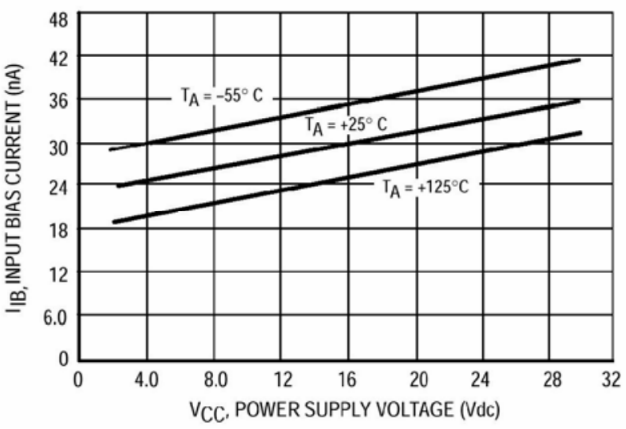


Zero crossing detector (dual power application)

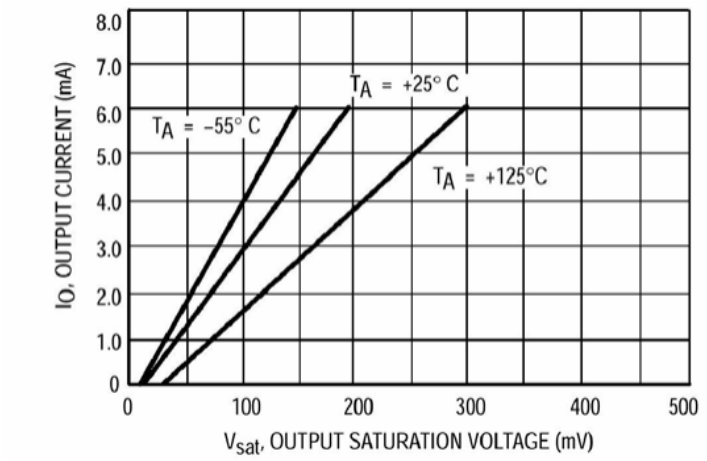
characteristic curve



Normal input offset voltage



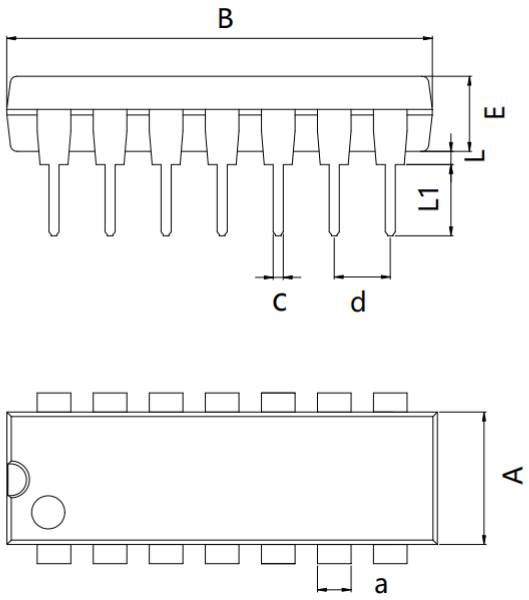
Input Bias Current



Output notch current and output saturation voltage

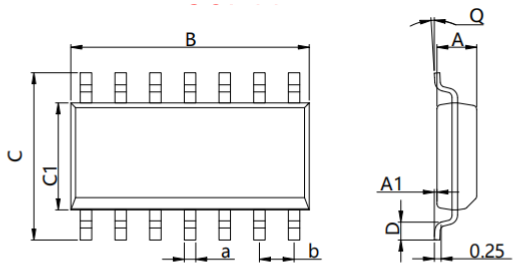
Packaging dimensions

DIP14



Dimensions In Millimeters(DIP14)										
Symbol:	A	B	D	D1	E	L	L1	a	c	d
Min:	6.10	18.94	8.40	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	19.56	9.00	7.82	3.55	0.70	3.60	1.55	0.50	

SOP14



Dimensions In Millimeters(SOP14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	8.55	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	8.75	6.20	4.00	0.80	8°	0.45	