

Quad Voltage Comparator

Description

The LM339 is a quad voltage comparator circuit consisting of four independent pre-stage voltage comparators. Its offset voltage specification can be as low as 3mV, mainly used in consumer electronic products.

The LM339 can operate on a single power supply or dual power supplies, and its operating current is not affected by the power supply voltage. It also has a unique feature that the input common-mode voltage range allows ground level with a single power supply.

The LM339 is available in SOP-14 and DIP-14 package types.

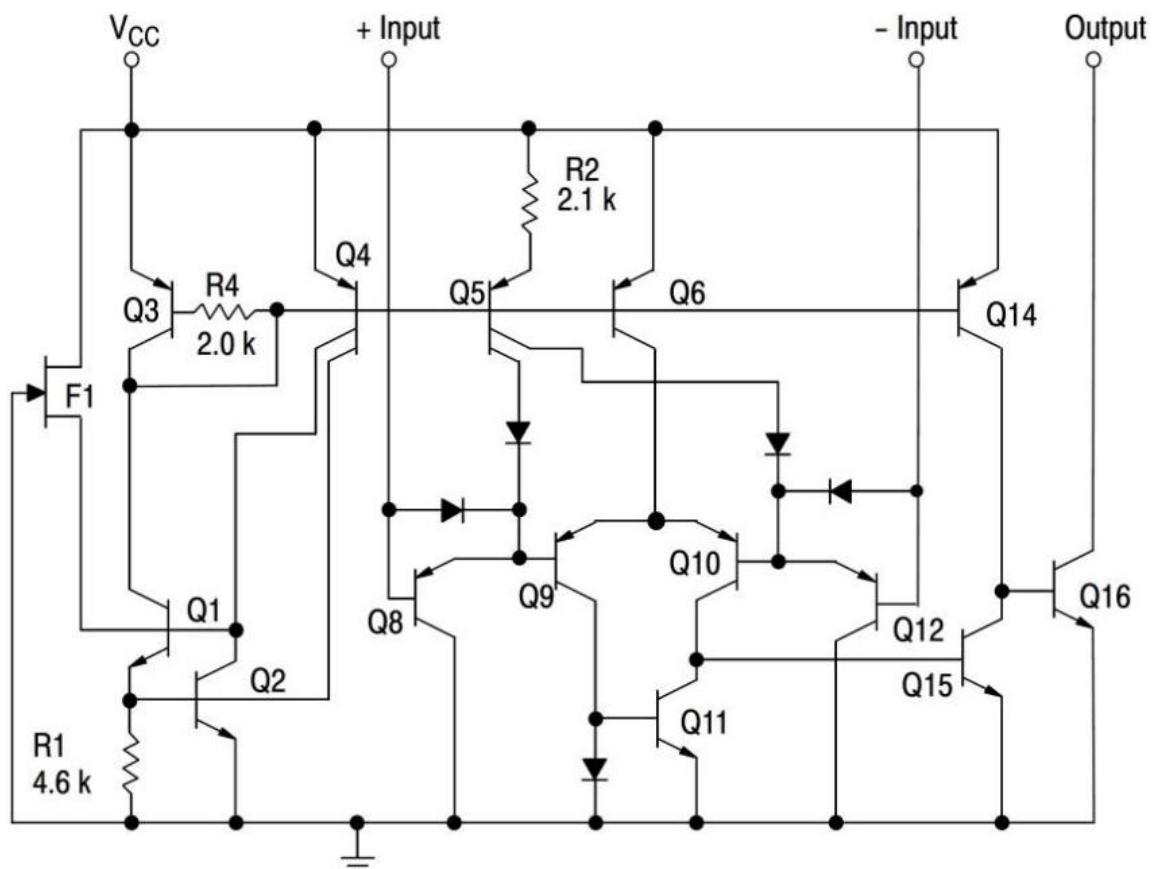
Features

- Wide Operating Power Supply Voltage Range:
Single Power Supply: 3V~36V
Dual Power Supplies: $\pm 1.5\text{V} \sim \pm 18\text{V}$
- Low Input Bias Current: 25nA(Typ.)
- Low Input Offset Current: $\pm 5\text{nA}$ (Typ.)
- Output Compatible with TTL, MOS, and CMOS

Applications

- Power Supply Monitoring
- Peak Detectors
- Logic Voltage Conversion

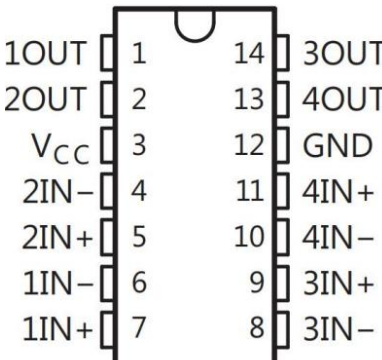
Function Block Diagram(One Channel Only)



Ordering Information

Type	Marking	Package
LM339-H14	LM339	DIP-14
LM339-P14	LM339	SOP-14

Pin Description

Pin Number	Pin Name	I/O	Description	Pin Configuration Diagram
1	1OUT	O	Output of the 1st comparator	
2	2OUT	O	Output of the 2nd comparator	
3	V _{CC}	P	Power supply	
4	2IN-	I	Inverting input of the 2nd comparator	
5	2IN+	I	Non-inverting input of the 2nd comparator	
6	1IN-	I	Inverting input of the 1st comparator	
7	1IN+	I	Non-inverting input of the 1st comparator	
8	3IN-	I	Inverting input of the 3rd comparator	
9	3IN+	I	Non-inverting input of the 3rd comparator	
10	4IN-	I	Inverting input of the 4th comparator	
11	4IN+	I	Non-inverting input of the 4th comparator	
12	GND	P	Ground	
13	4OUT	O	Output of the 4th comparator	
14	3OUT	O	Output of the 3rd comparator	

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Supply Voltage	V _{CC}	36 or ±18	V
Input Differential Voltage	V _{ID}	36	V
Input Common-Mode Voltage	V _{ICR}	-0.3~(V _{CC} -1.5)	V
Output Short-Circuit Current to Ground	I _{SC}	20	mA
Maximum Operating Junction Temperature	T _J	150	°C
Storage Temperature	T _S	-65~+150	°C
Lead Temperature(Soldering, 10s)	T _W	260	°C

Note: Exceeding these absolute maximum ratings may result in permanent damage to the device.

Recommended Operating Conditions($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	3	32 or ± 16	V
Operating Temperature	T_A	-20	+85	$^{\circ}\text{C}$

Electrical Characteristics($T_A=25^{\circ}\text{C}$, $V_{CC}=5\text{V}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}	$T_A=25^{\circ}\text{C}$	-	± 1	± 5	mV
		$T_{\text{low}} \leq T_A \leq T_{\text{high}}$	-	-	± 7	
Input Offset Current	I_{IO}	$T_A=25^{\circ}\text{C}$	-	± 5	± 50	nA
		$T_{\text{low}} \leq T_A \leq T_{\text{high}}$	-	-	± 150	
Input Bias Current	I_{IB}	$T_A=25^{\circ}\text{C}$	-	25	250	nA
		$T_{\text{low}} \leq T_A \leq T_{\text{high}}$	-	-	400	
Input Common-Mode Voltage Range	V_{ICR}	$T_A=25^{\circ}\text{C}$	0	-	$V_{CC}-1.5$	V
		$T_{\text{low}} \leq T_A \leq T_{\text{high}}$	0	-	$V_{CC}-2.0$	
Power Supply Current	I_{CC}	$R_L=\infty, V_{CC}=5\text{V}$	-	0.4	1.0	mA
		$R_L=\infty, V_{CC}=30\text{V}$	-	0.45	2.5	
Voltage Gain	G_V	$R_L \geq 15\text{k}\Omega, V_{CC}=15\text{V}$	50	200	-	V/mV
Large-Signal Response Time	t_{RES}	$V_{IN}=\text{TTL Logic Swing}, V_{REF}=1.4\text{V}, V_{RL}=5\text{V}, R_L=5.1\text{k}\Omega$	-	300	-	ns
Response Time	t_{TLH}	$V_{RL}=5\text{V}, R_L=5.1\text{k}\Omega$	-	1.3	-	μs
Input Differential Voltage	V_{ID}		-0.3	-	V_{CC}	V
Output Sink Current	I_{SINK}	$I_N \geq 1.0\text{V}, I_{N+}=0\text{V}, V_O \leq 1.5\text{V}$	6	16	-	mA
Output Saturation Voltage	V_{SAT}	$I_N \geq 1.0\text{V}, I_{N+}=0\text{V}, I_{SINK} \leq 4.0\text{mA}$	-	150	400	mV
		$I_N \geq 1.0\text{V}, I_{N+}=0\text{V}, I_{SINK} \leq 4.0\text{mA}, T_{\text{low}} \leq T_A \leq T_{\text{high}}$	-	-	700	
Output Leakage Current	I_{OL}	$I_{N+} \geq 1.0\text{V}, I_N=0\text{V}, V_O=5\text{V}$	-	0.1	-	μA
		$I_{N+} \geq 1.0\text{V}, I_N=0\text{V}, V_O=30\text{V}, T_{\text{low}} \leq T_A \leq T_{\text{high}}$	-	-	1	

Typical Application

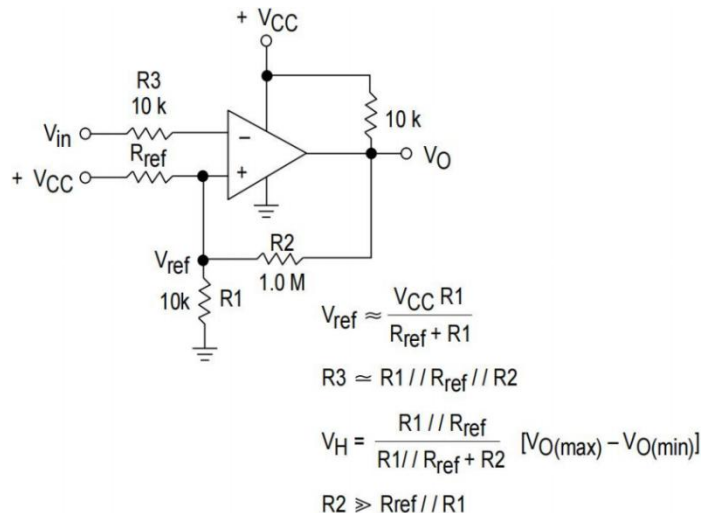


Figure 1. Inverting Comparator with Hysteresis

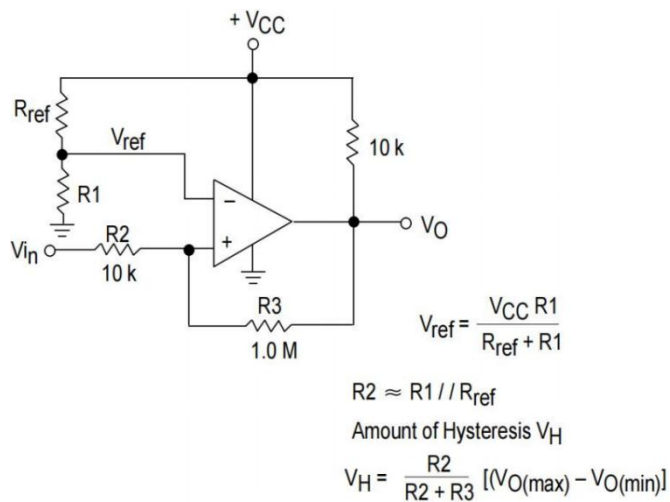
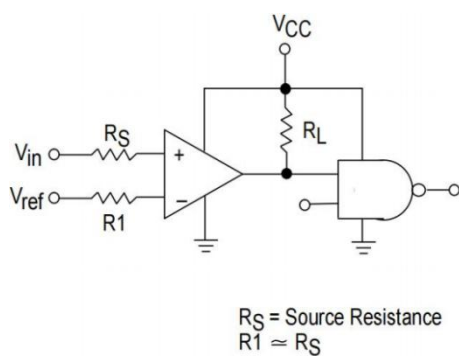


Figure 2. Non-Inverting Comparator with Hysteresis



Logic	Device	V _{CC} (V)	R _L kΩ
CMOS	1/4 MC14001	+15	100
TTL	1/4 MC7400	+5.0	10

Figure 3. Logic Driver

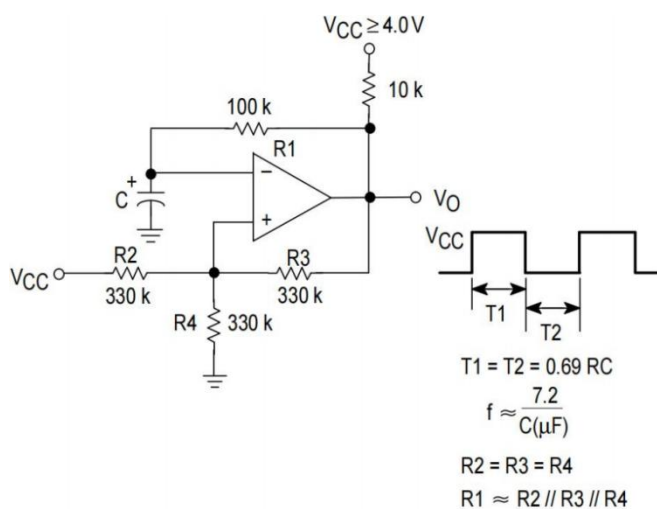
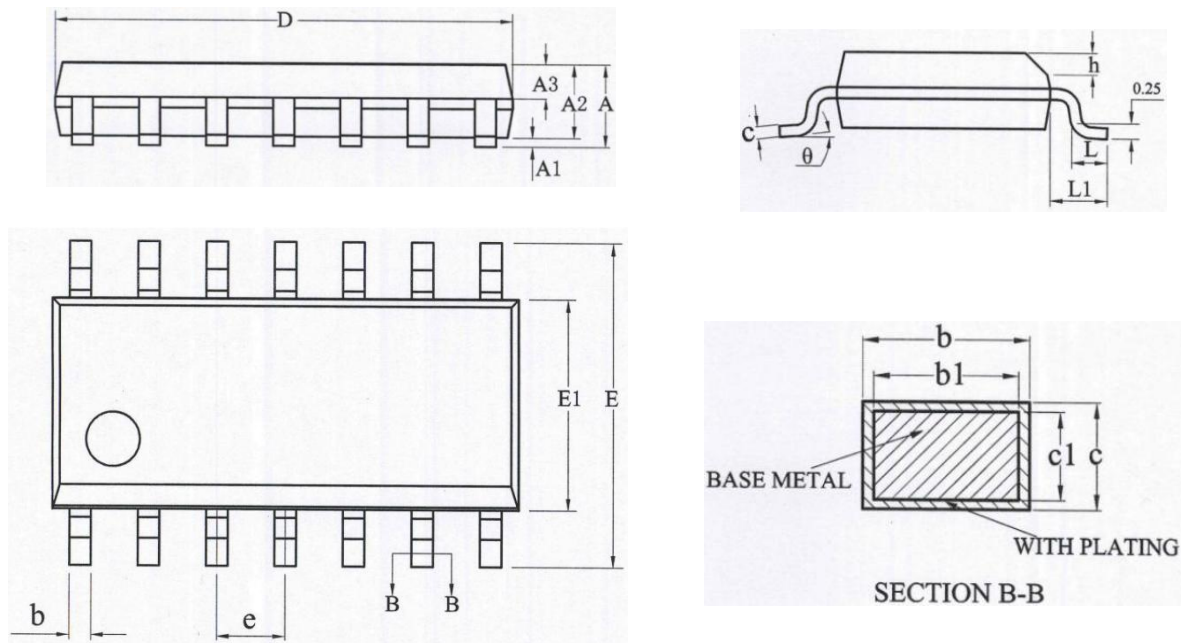


Figure 4. Square Wave Oscillator

Package Information

SOP-14

Dimensions in mm

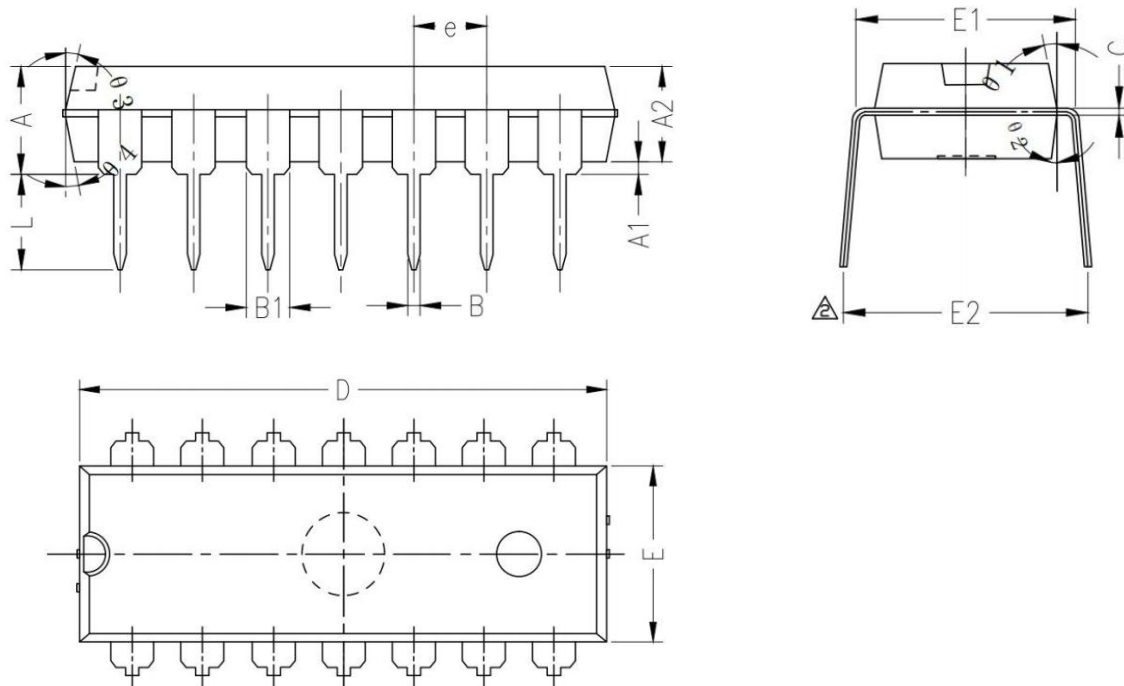


Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	-	-	1.75	D	8.55	8.65	8.75
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 (BSC)		
b	0.39	-	0.47	h	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1	1.05 (REF)		
c1	0.19	0.20	0.21	θ	0°	-	8°

Package Information

DIP-14

Dimensions in mm



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	3.75	3.81	3.95	E1	7.35	7.62	7.85
A1	0.51	-	-	e	2.54 (BSC)		
A2	3.20	3.30	3.45	L	3.00	3.30	3.60
B	0.38	0.48	0.56	E2	8.00	8.40	8.80
B1	1.52 (BSC)			θ1	9°	-	15°
C	0.20	0.25	0.34	θ2	7°	-	13°
D	18.80	19.05	19.30	θ3	8°	-	14°
E	6.20	6.35	6.50	θ4	5°	-	12°

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