



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.

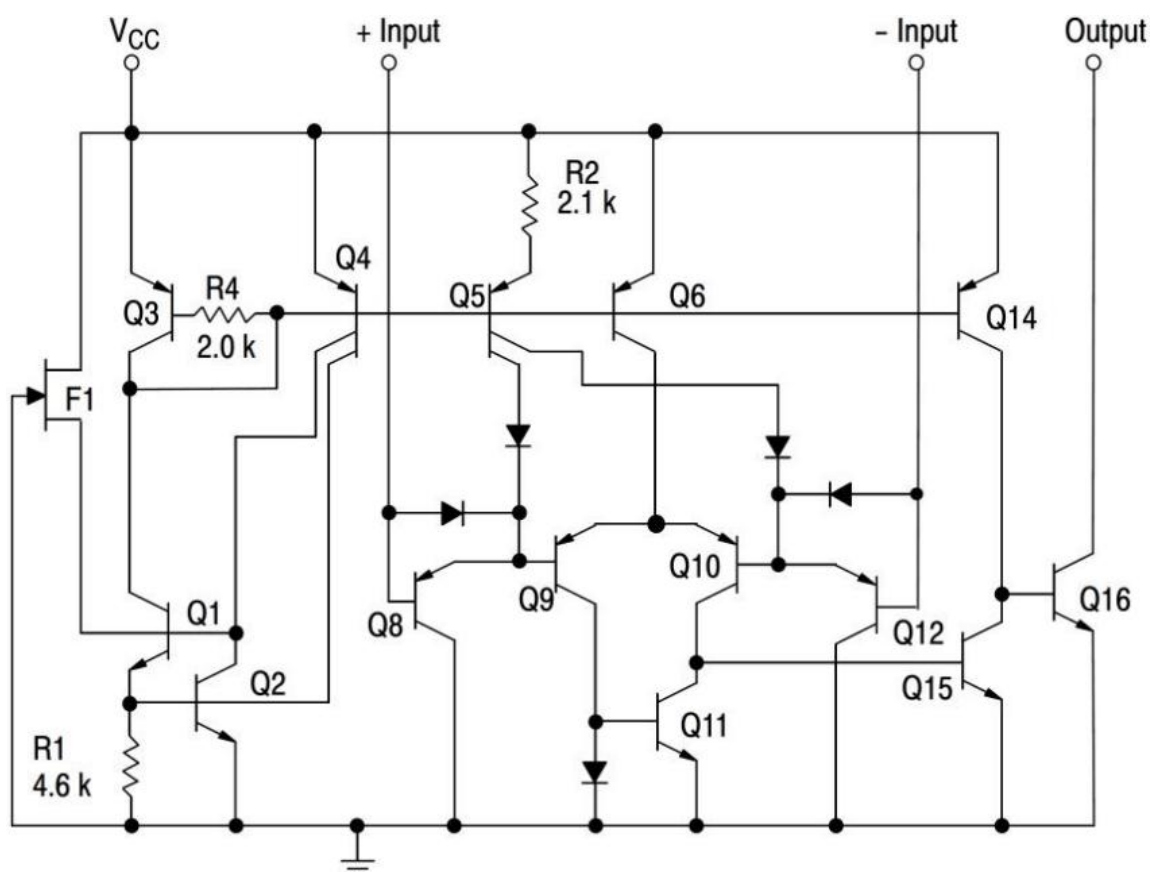
Features

- 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)





LM339

Ordering Information

Type	Marking	Package
LM339-D14	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.



LM339

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
		$T_{low} \leq T_A \leq T_{high}$	-	-	± 7	
Input Offset Current	I_{IO}	$T_A=25^{\circ}\text{C}$	-	± 5	± 50	nA
		$T_{low} \leq T_A \leq T_{high}$	-	-	± 150	
Input Bias Current	I_{IB}	$T_A=25^{\circ}\text{C}$	-	25	250	nA
		$T_{low} \leq T_A \leq T_{high}$	-	-	400	
Input Common-Mode Voltage Range	V_{ICR}	$T_A=25^{\circ}\text{C}$	0	-	$V_{CC}-1.5$	V
		$T_{low} \leq T_A \leq T_{high}$	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
		$I_N \geq 1.0\text{V}, I_{N+}=0\text{V}, I_{SINK} \leq 4.0\text{mA}, T_{low} \leq T_A \leq T_{high}$	-	-	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
		$I_{N+} \geq 1.0\text{V}, I_N=0\text{V}, V_O=30\text{V}, T_{low} \leq T_A \leq T_{high}$	-	-	1	



Typical Application

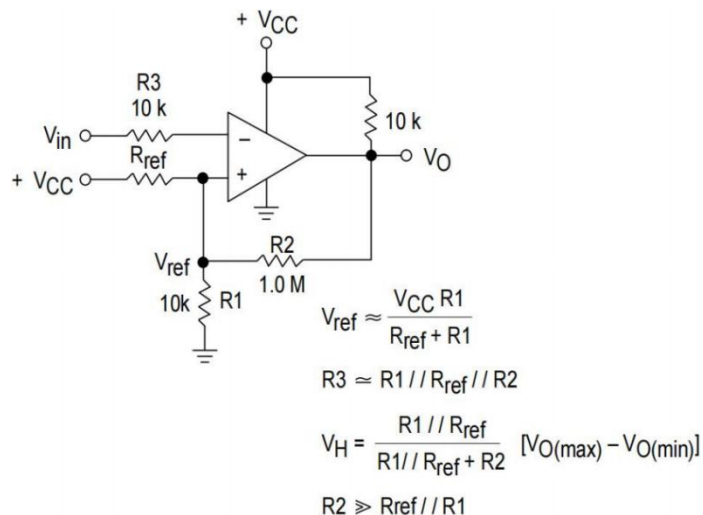


Figure 1. Inverting Comparator with Hysteresis

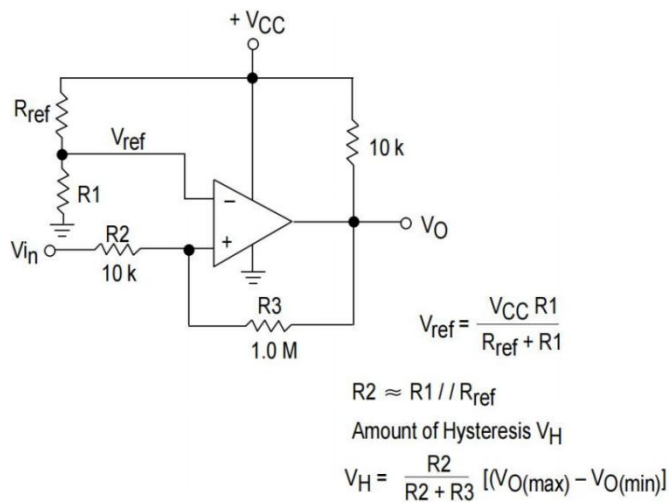
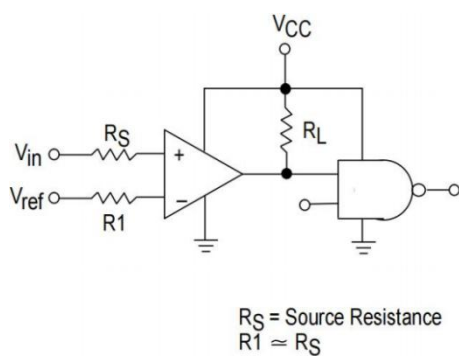


Figure 2. Non-Inverting Comparator with Hysteresis



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

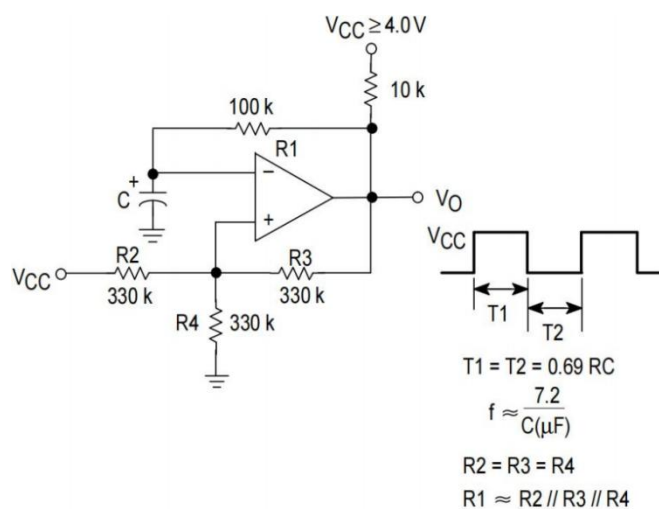


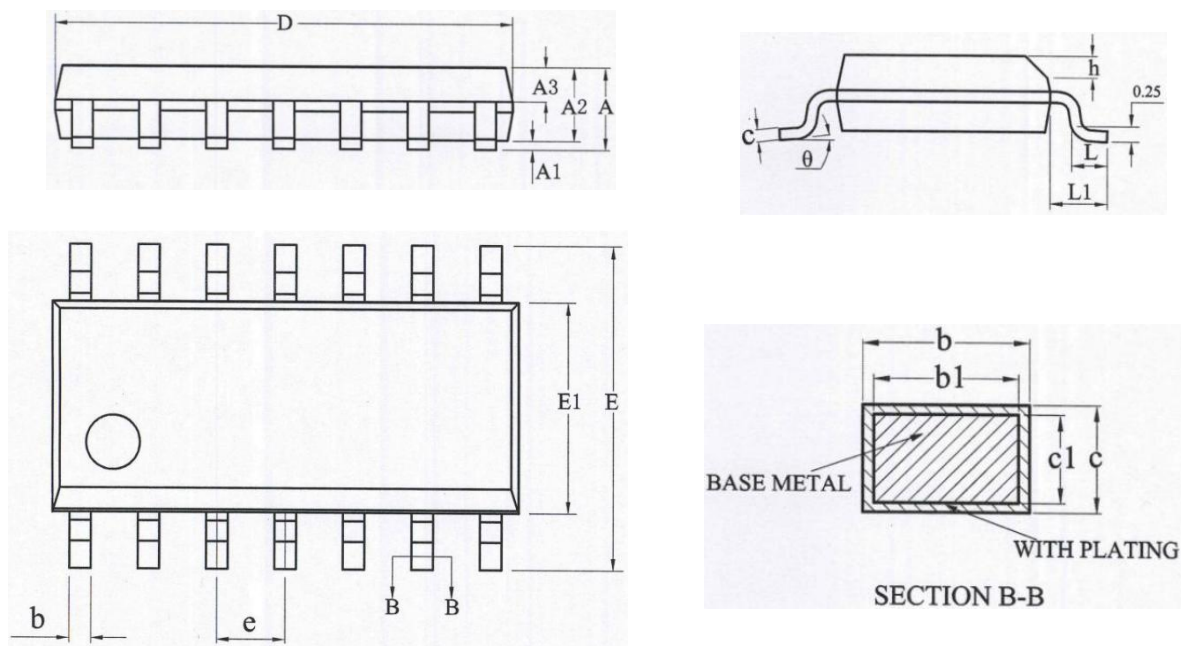
Figure 4. Square Wave Oscillator



Package Information

SOP-14

Dimensions in mm



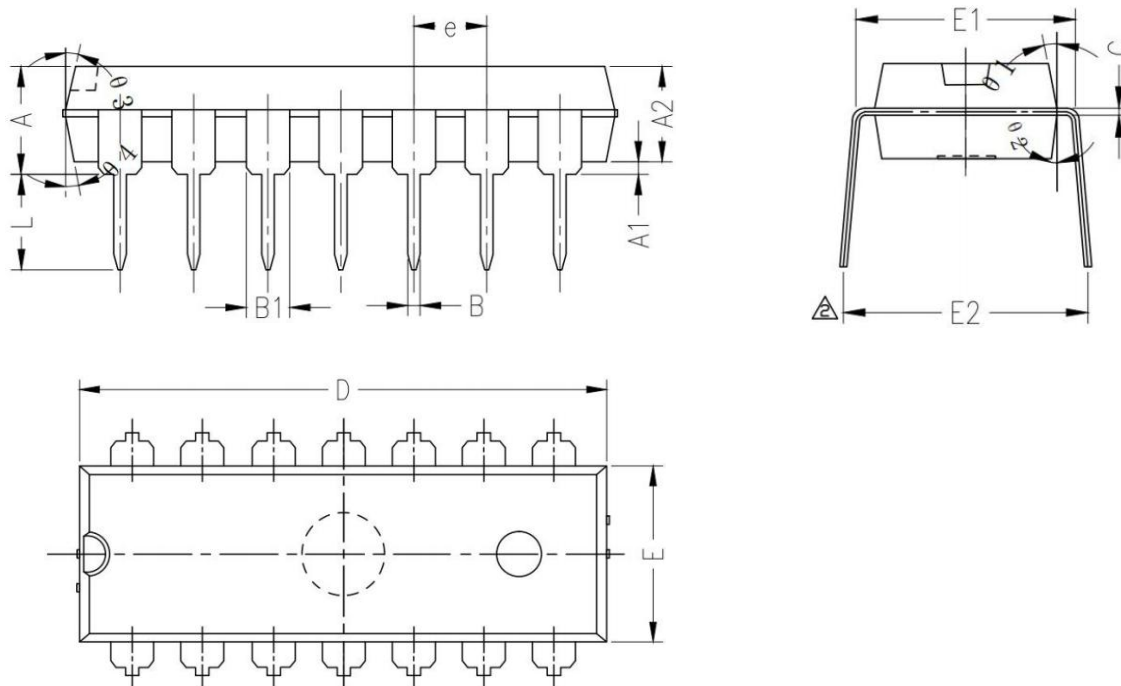
Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	-	-	1.75	D	8.55	8.65	8.75
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 (BSC)		
b	0.39	-	0.47	h	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1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



Shikues Disclaimer

1.Accuracy of Information and Right to Modify

The information provided in this document is for reference only. Shikues reserves the right to make changes to this document and to the specifications of the products described herein at any time, without prior notice, for the purpose of improving reliability, function, design, or for any other reason. It is the customer's responsibility to obtain and verify the latest product information and specifications before making any final design, procurement, or usage decisions.

2.No Warranty

Shikues makes no express or implied warranties, representations, or guarantees regarding the suitability of its products for any particular purpose.

Shikues assumes no liability for any assistance provided or for the design of customer products. All products are supplied "as is."

3.Intended Use and Limitation of Liability

The products described in this document are intended for use in general-purpose electronic devices. They are neither designed nor tested nor authorized for use in transportation equipment or applications requiring high reliability. Unless expressly authorized in writing by Shikues, these products must not be used as critical components in life-support systems or any applications where failure could directly pose a risk to human life (including, but not limited to, medical devices, transportation systems, aerospace equipment, nuclear facilities, and safety-critical systems).

Shikues assumes no responsibility or liability for any consequences arising from the use of its products in unauthorized or unintended applications.

Neither Shikues nor its representatives shall be held liable for any resulting damages.

4.Intellectual Property

This document does not grant any express or implied license—whether by estoppel, implication, or otherwise—to use any intellectual property rights of Shikues.