

## Low Power Low Offset Voltage Quad Comparators

# LM339

### Description

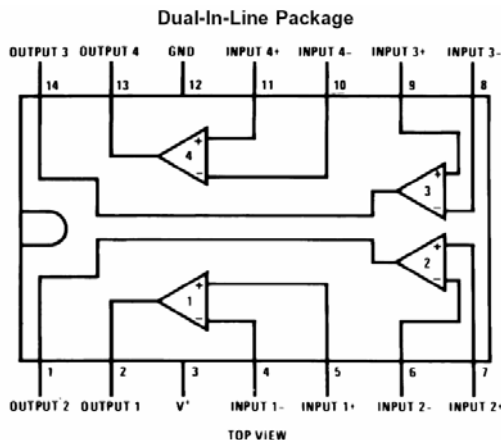
The LM339 consists of four independent precision voltage comparators with an offset voltage specification as low as 2 mV max for all four comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. 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.

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. The LM339 was designed to directly interface with TTL and CMOS. When operated from both plus and minus power supplies, they will directly interface with MOS logic — where the low power drain of the LM339 is a distinct advantage over standard comparators.

### Features

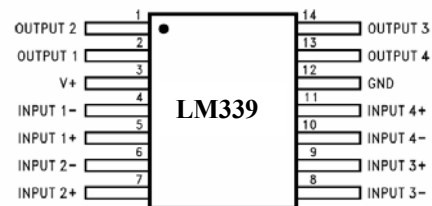
- **Wide supply voltage range**
- **LM339 is 2 to 36 VDC or – 1 to – 18**
- **Very low supply current drain ( 0.8 mA) — independent of supply voltage**
- **Low input biasing current: 25 nA**
- **Low input offset current: – 5 nA n Offset voltage: – 3 mV**
- **Input common- mode voltage range includes GND**
- **Differential input voltage range equal to the power supply voltage**
- **Low output saturation voltage: 250 mV at 4 mA**
- **Output voltage compatible with TTL, DTL, ECL, MOS and CMOS logic systems**

### Pin Connection



### Ordering Information

Devices	Package	Temp.
LM339M	SO-14	0 °C to 70 °C
LM339P	14-DIP	0 °C to 70 °C



## Absolute Maximum Rating

Parameter	LM339	Unit
Supply Voltage	36	V
Differential Input Voltage	36	V
Input Voltage	-0.3 to 36	V
Input Current	50	mA
Storage Temperature	0 to 70	°C
Lead Temperature (solder 10 Second)	260	°C
ESD	250	V

## Electrical Characteristics

( $V_{CC} = 5V$ ;  $T_J = 25^\circ C$ , unless otherwise specified)

PARAMETER	TEST CONDITIONS*	MIN	TYP	MAX	UNIT	
$V_{IO}$ Input offset voltage	$V_{CC} = 5V$ to $30V$	25 °C	2	5	mV	
	$V_{IC} = V_{ICRmin}$ , $V_O = 1.4V$	Full range		9		
$I_{IO}$ Input offset current	$V_O = 1.4V$	25 °C	5	50	nA	
		Full range		150		
$I_{IB}$ Input bias current	$V_O = 1.4V$	25 °C	-25	-250	nA	
		Full range		-400		
$V_{ICR}$ Common-mode input voltage range**		25 °C	0 to $V_{CC} - 1.5$		V	
		Full range	0 to $V_{CC} - 2$			
$A_{VD}$ Large-signal differential voltage amplification	$V_{CC} = 15V$ , $V_O = 1.4V$ to $11.4V$ , $R_L \geq 15k\Omega$ to $V_{CC}$	25 °C	50	200	V/mV	
$I_{OH}$ High-level output current	$V_{OH} = 5V$ , $V_{ID} = 1V$	25 °C		0.1	50	nA
	$V_{OH} = 30V$ , $V_{ID} = 1V$	Full range			1	$\mu A$
$V_{OL}$ Low-level output voltage	$I_{OL} = 4mA$ , $V_{ID} = -1V$	25 °C		150	400	mV
		Full range			700	
$I_{OL}$ Low-level output current	$V_{OL} = 1.5V$ , $V_{ID} = -1V$	25 °C	6		mA	
$I_{CC}$ Supply current	$R_L = \infty$	$V_{CC} = 5V$	25 °C	0.8	2	mA
		$V_{CC} = 30V$	Full range			

\* Full range (MIN to MAX), for the LM339 is 0 °C to 70 °C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

\*\* The voltage at either input or common-mode should not be allowed to go negative by more than 0.3 V. The upper end of the common-mode voltage range is  $V_{CC} - 1.5 V$ , but either or both inputs can go to 30 V without damage.

## switching characteristics, $V_{CC} = 5V$ , $T_A = 25^\circ C$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Response time	$R_L$ connected to 5V through 5.1k $\Omega$ , $C_L = 15pF$ * (See Note 1)	100-mV input step with 5-mV overdrive		1.3	$\mu s$
		TTL-level input step		0.3	

\*  $C_L$  includes probe and jig capacitance.

NOTE 1: The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

**Advance Information-** These data sheets contain descriptions of products that are in development. The specifications are based on the engineering calculations, computer simulations and/ or initial prototype evaluation.

**Preliminary Information-** These data sheets contain minimum and maximum specifications that are based on the initial device characterizations. These limits are subject to change upon the completion of the full characterization over the specified temperature and supply voltage ranges.

The application circuit examples are only to explain the representative applications of the devices and are not intended to guarantee any circuit design or permit any industrial property right to other rights to execute. Bay Linear takes no responsibility for any problems related to any industrial property right resulting from the use of the contents shown in the data book. Typical parameters can and do vary in different applications. Customer's technical experts must validate all operating parameters including "Typical" for each customer application.

---

#### **LIFE SUPPORT AND NUCLEAR POLICY**

---

Bay Linear products are not authorized for and should not be used within life support systems which are intended for surgical implants into the body to support or sustain life, in aircraft, space equipment, submarine, or nuclear facility applications without the specific written consent of Bay Linear President.

---