

# LM339x2 OCTAL DIFFERENTIAL COMPARATOR

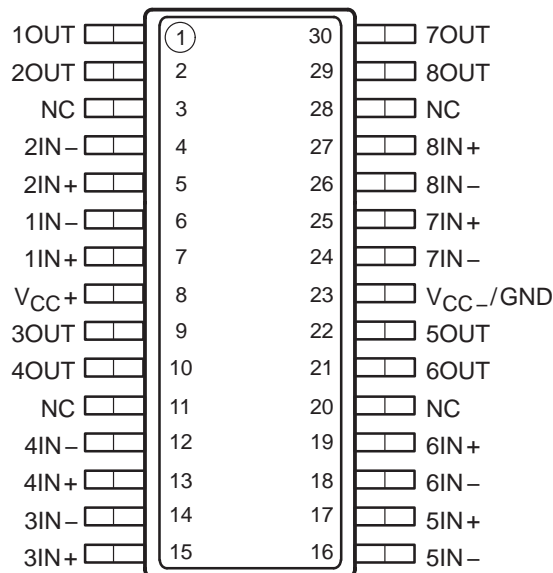
SLCS122A – APRIL 1996 – REVISED SEPTEMBER 1996

- **Single Supply or Dual Supplies**
- **Wide Range of Supply Voltage**  
2 V to 36 V
- **Low Supply-Current Drain Independent of Supply Voltage . . . 1.6 mA Typ**
- **Low Input Bias Current . . . 25 nA Typ**
- **Low Input Offset Current . . . 5 nA Typ**
- **Low Input Offset Voltage . . . 2 mV Typ**
- **Common-Mode Input Voltage Range Includes Ground**
- **Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage . . .  $\pm 36$  V**
- **Low Output Saturation Voltage**
- **Output Compatible With TTL, MOS, and CMOS**

## description

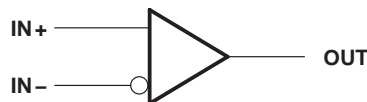
The LM339x2 consists of eight independent voltage comparators that are designed to operate from a single power supply over a wide range of voltages. Operation from dual supplies is also possible when the difference between the two supplies is 2 V to 36 V and  $V_{CC}$  is at least 1.5 V more positive than the input common-mode voltage. Current drain is independent of the supply voltage. The outputs can be connected to other open-collector outputs to achieve wire-AND relationships.

**DB PACKAGE  
(TOP VIEW)**



NC – No internal connection

## symbol (each comparator)



## AVAILABLE OPTION

$T_A$	$V_{IOmax}$ AT 25°C	PACKAGE
		SMALL OUTLINE (DB)†
0°C to 70°C	5 mV	LM339x2DBLE

† The DB package is only available left-end taped and reeled.



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**PRODUCTION DATA** information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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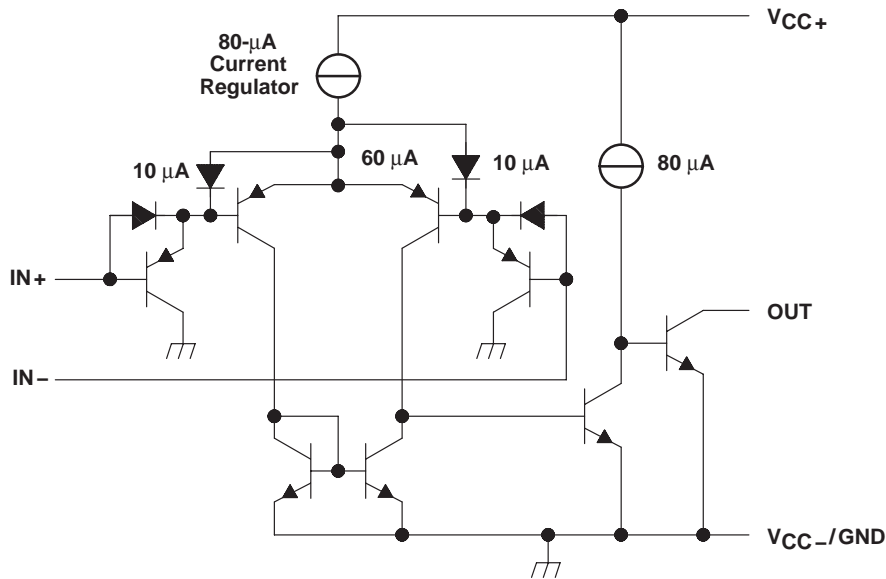
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## schematic (each comparator)

ACTUAL DEVICE COMPONENT COUNT	
Transistors	120
Diodes	7
Resistors	4
JFET	2



All component values shown are nominal.

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, $V_{CC}$ (see Note 1)	36 V
Differential input voltage, $V_{ID}$ (see Note 2)	$\pm 36$ V
Input voltage range, $V_I$ (any input)	-0.3 V to 36 V
Output voltage, $V_O$	36 V
Output current, $I_O$	20 mA
Duration of output short circuit to ground (see Note 3)	unlimited
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$	0°C to 70°C
Storage temperature range	-60°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these conditions beyond those indicated is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All voltage values, except differential voltages, are with respect to network GND.  
 2. Differential voltages are at IN+ with respect to IN-.  
 3. Short circuits from outputs to  $V_{CC}$  can cause excessive heating and eventual destruction.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
DB	1024 mW	8.2 mW/°C	655 mW

## electrical characteristics at specified free-air temperature, $V_{CC} = 5$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	$T_A$ †	MIN	TYP‡	MAX	UNIT
$V_{IO}$	Input offset voltage	$V_{CC} = 5$ V to 30 V, $V_{IC} = V_{ICRmin}$ , $V_O = 1.4$ V	25°C		2	5	mV
			Full range			9	
$I_{IO}$	Input offset current	$V_O = 1.4$ V	25°C		5	50	nA
			Full range			150	



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$I_{IB}$ Input bias current	$V_O = 1.4\text{ V}$	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	$V_{CC} = 15\text{ V}$ , $V_O = 1.4\text{ V to } 11.4\text{ V}$ , $R_L \geq 15\text{ k}\Omega\text{ to } V_{CC}$	25°C	50	200	V/mV	
$V_{OL}$ Low-level output voltage	$V_{ID} = -1\text{ V}$ , $I_{OL} = 4\text{ mA}$	25°C	150	400	mV	
		Full range	700			
$I_{OH}$ High-level output current	$V_{ID} = 1\text{ V}$	$V_{OH} = 5\text{ V}$	25°C	0.1	50	nA
		$V_{OH} = 30\text{ V}$	Full range	1		$\mu\text{A}$
$I_{OL}$ Low-level output current	$V_{ID} = -1\text{ V}$ , $V_{OL} = 1.5\text{ V}$	25°C	6	16	mA	
$I_{CC}$ Supply current (eight comparators)	$V_O = 2.5\text{ V}$ , No load	25°C	1.6	4	mA	
	$V_{CC} = 30\text{ V}$ , No load	25°C	2	5	mA	

† Full range for LM339 is 0°C to 70°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

‡ All typical values are measured at  $T_A = 25^\circ\text{C}$ .

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Response time	$R_L$ connected to 5 V through 5.1 k $\Omega$ , $C_L = 15\text{ pF}$ §, See Note 4	100-mV input step with 5-mV overdrive		1.3	ns
		TTL 1-level input step		0.3	

§  $C_L$  includes probe and jig capacitance.

NOTE 4: The response time specified is the interval between the input step function and the instant when the output crosses 1.4 V.



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