

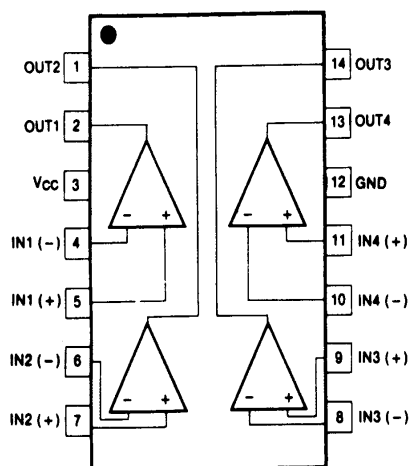
### QUAD DIFFERENTIAL COMPARATOR

The LM239 series consists of four independent voltage comparators designed to operate from single power supply over a wide voltage range.

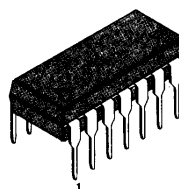
### FEATURES

- Single or dual supply operation
- Wide range of supply voltage  
LM239/A, LM339/A, LM2901: 2 ~ 36V (or  $\pm 1 \sim \pm 18V$ )  
LM3302: 2 ~ 28V (or  $\pm 1 \sim \pm 14V$ )
- Low supply current drain 800 $\mu A$  Typ
- Open collector outputs for wired and connectors
- Low input bias current 25nA Typ
- Low Input offset current  $\pm 2.3nA$  Typ.
- Low input offset voltage  $\pm 1.4mV$  Typ.
- Common mode input voltage range includes ground.
- Low output saturation voltage
- Output compatible with TTL, DTL and MOS logic system

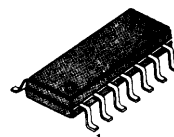
### BLOCK DIAGRAM



14 DIP



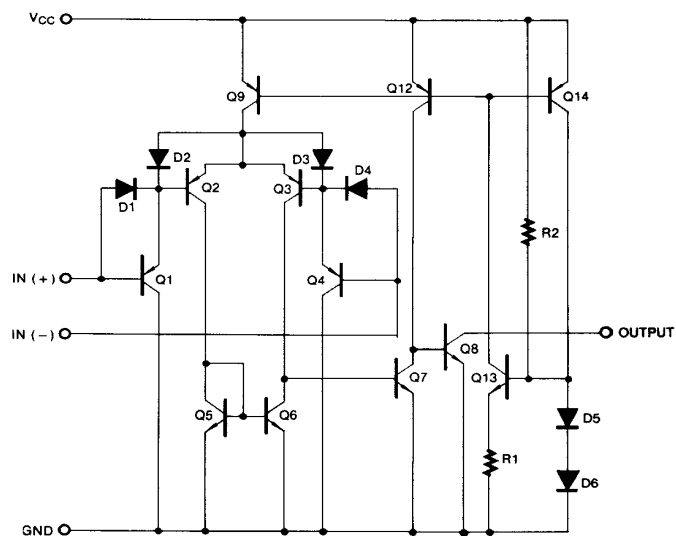
14 SOP



### ORDERING INFORMATION

Device	Package	Operating Temperature
LM339N LM339AN	14 DIP	0 ~ +70°C
LM339M LM339AM	14 SOP	
LM239N LM239AN	14 DIP	-25 ~ +85°C
LM239M LM239AM	14 SOP	
LM2901N LM2901M	14 DIP 14 SOP	-40 ~ +85°C
LM3302N LM3302M	14 DIP 14 SOP	

## SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	$\pm 18$ or 36	V
Supply Voltage Only LM3302	$V_{CC}$	$\pm 14$ or 28	V
Differential Input Voltage	$V_{I(DIFF)}$	36	V
Differential Input Voltage Only LM3302	$V_{I(DIFF)}$	28	V
Input Voltage	$V_I$	- 0.3 to +36	V
Input Voltage Only LM3302	$V_I$	- 0.3 to +28	V
Output Short Circuit to GND		Continuous	
Power Dissipation	$P_D$	570	mW
Operating Temperature LM339/LM339A	$T_{OPR}$	0 ~ + 70	°C
LM239/LM239A		- 25 ~ + 85	°C
LM2901/LM3302		- 40 ~ + 85	°C
Storage Temperature	$T_{STG}$	- 65 ~ + 150	°C

**ELECTRICAL CHARACTERISTICS**(V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	LM239A/LM339A			LM239/LM339			Unit
			Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V <sub>IO</sub>	V <sub>CM</sub> = 0V to V <sub>CC</sub> = 1.5V		±1	±2		±1.4	±5	mV
		V <sub>O(P)</sub> = 1.4V, R <sub>S</sub> = 0Ω			±4.0			±9.0	
Input Offset Current	I <sub>IO</sub>			±2.3	±50		±2.3	±50	nA
					±150			±150	
Input Bias Current	I <sub>BIAS</sub>			57	250		57	250	nA
					400			400	
Input Common Mode Voltage Range	V <sub>I(R)</sub>		0		V <sub>CC</sub> -1.5	0		V <sub>CC</sub> -1.5	V
			0		V <sub>CC</sub> -2	0		V <sub>CC</sub> -2	
Supply Current	I <sub>CC</sub>	R <sub>L</sub> = ∞		1.1	2.0		1.1	2.0	mA
Voltage Gain	G <sub>V</sub>	V <sub>CC</sub> = 15V, R <sub>L</sub> ≥ 15KΩ (for large swing)	50	200		50	200		V/mV
Large Signal Response Time	t <sub>RES</sub>	V <sub>I</sub> = TTL Logic Swing V <sub>REF</sub> = 1.4V, V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1KΩ		350			350		ns
Response Time	t <sub>RES</sub>	V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1KΩ		1.4			1.4		μs
Output Sink Current	I <sub>SINK</sub>	V <sub>I(-)</sub> ≥ 1V, V <sub>I(+)</sub> = 0V, V <sub>O(P)</sub> ≤ 1.5V	6	18		6	18		mA
Output Saturation Voltage	V <sub>SAT</sub>	V <sub>I(-)</sub> ≥ 1V, V <sub>I(+)</sub> = 0V		140	400		140	400	mV
		I <sub>SINK</sub> = 4mA			700			700	
Output Leakage Current	I <sub>O(LKG)</sub>	V <sub>I(-)</sub> = 0V		0.1			0.1		nA
		V <sub>I(+)</sub> = 1V			1.0			1.0	
Differential Voltage	V <sub>I(DIFF)</sub>				36			36	V

Note 1.

LM339/A: 0 ≤ T<sub>A</sub> ≤ +70°CLM239/A: -25 ≤ T<sub>A</sub> ≤ +85°CLM2901/3302: -40 ≤ T<sub>A</sub> ≤ +85°C

**ELECTRICAL CHARACTERISTICS**(V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	LM2901			LM3302			Unit
			Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V <sub>IO</sub>	V <sub>CM</sub> = 0V to V <sub>CC</sub> = 1.5V		2	7		2	20	mV
		V <sub>O(P)</sub> = 1.4V, R <sub>S</sub> = 0Ω		9	15			40	
Input Offset Current	I <sub>IO</sub>			2.3	50		3	100	nA
		NOTE 1		50	200			300	
Input Bias Current	I <sub>BIAS</sub>			57	250		57	250	nA
		NOTE 1		200	500			1000	
Input Common Mode Voltage Range	V <sub>I(R)</sub>		0		V <sub>CC</sub> -1.5	0		V <sub>CC</sub> -1.5	V
		NOTE 1	0		V <sub>CC</sub> -2	0		V <sub>CC</sub> -2	
Supply Current	I <sub>CC</sub>	R <sub>L</sub> = ∞		1.1	2.0		1.1	2.0	mA
		R <sub>L</sub> = ∞, V <sub>CC</sub> = 30V		1.6	2.5				
Voltage Gain	G <sub>V</sub>	V <sub>CC</sub> = 15V, R <sub>L</sub> ≥ 15KΩ (for large swing)	25	100		2	30		V/mV
Large Signal Response Time	t <sub>RES</sub>	V <sub>I</sub> = TTL Logic Swing V <sub>REF</sub> = 1.4V, V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1KΩ		350			350		ns
Response Time	t <sub>RES</sub>	V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1KΩ		1.4			1.4		μs
Output Sink Current	I <sub>SINK</sub>	V <sub>I(-)</sub> ≥ 1V, V <sub>I(+)</sub> = 0V, V <sub>O(P)</sub> ≤ 1.5V	6	18		6	18		mA
Output Saturation Voltage	V <sub>SAT</sub>	V <sub>I(-)</sub> ≥ 1V, V <sub>I(+)</sub> = 0V		140	400		140	400	mV
		I <sub>SINK</sub> = 4mA			700			700	
Output Leakage Current	I <sub>O(LKG)</sub>	V <sub>I(-)</sub> = 0V		0.1			0.1		nA
		V <sub>I(+)</sub> = 1V			1.0			1.0	
Differential Voltage	V <sub>I(DIFF)</sub>	NOTE 1			36			36	V

Note 1.

LM339/A: 0 ≤ T<sub>A</sub> ≤ +70°CLM239/A: -25 ≤ T<sub>A</sub> ≤ +85°CLM2901/3302: -40 ≤ T<sub>A</sub> ≤ +85°C

## TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 SUPPLY CURRENT

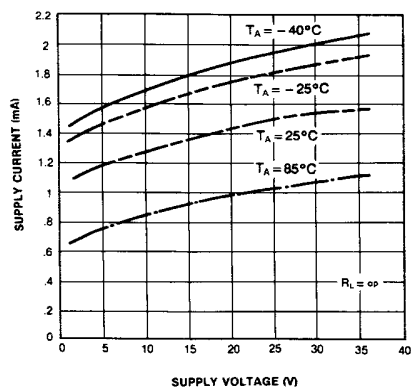


Fig. 2 INPUT CURRENT

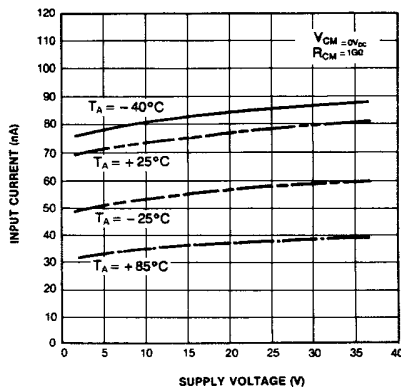


Fig. 3 OUTPUT SATURATION VOLTAGE

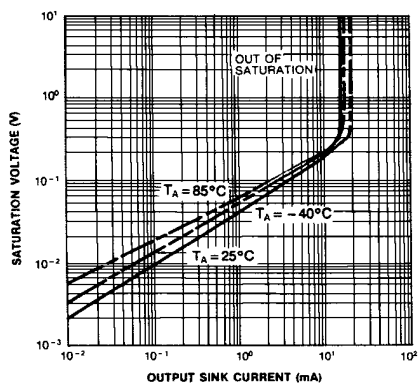


Fig. 4 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-NEGATIVE TRANSITION

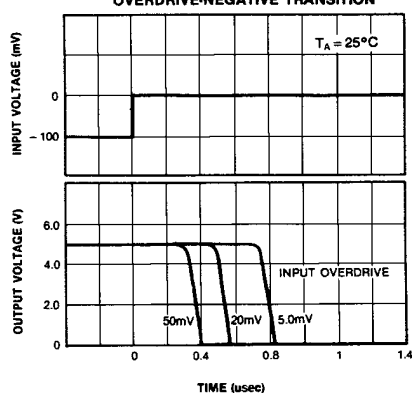
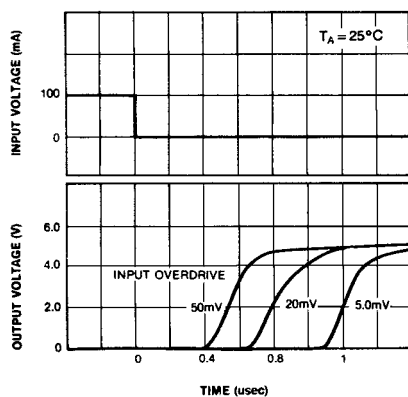


Fig. 5 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-POSITIVE TRANSITION



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