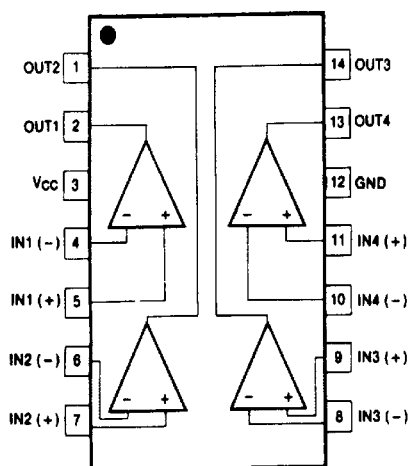


QUAD DIFFERENTIAL COMPARATOR

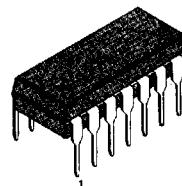
The LM239 series consists of four independent voltage comparators designed to operate from single power supply over a wide voltage range.

FEATURES

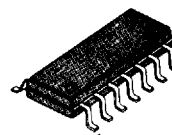
- Single or dual supply operation
- Wide range of supply voltage
LM239/A, LM339/A, LM2901: 2 ~ 36V (or $\pm 1 \sim \pm 18V$)
LM3302: 2 ~ 28V (or $\pm 1 \sim \pm 14V$)
- Low supply current drain 800 μA Typ
- Open collector outputs for wired and connectors
- Low input bias current 25nA Typ
- Low Input 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

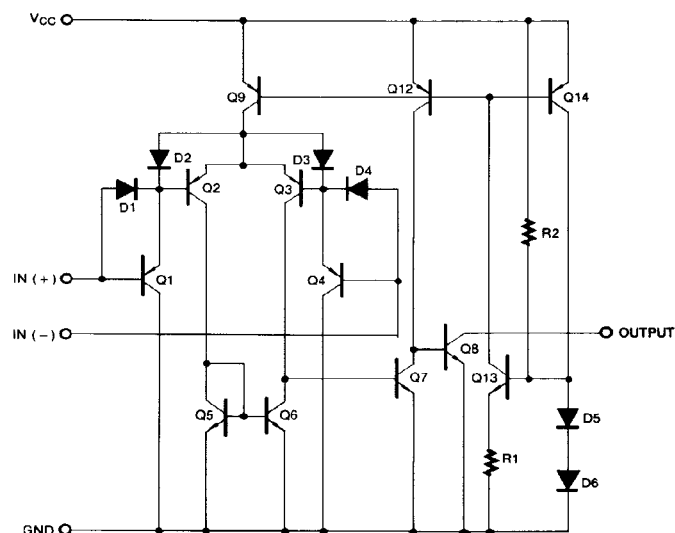


14 SOP

**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}	± 18 or 36	V
Supply Voltage Only LM3302	V_{CC}	± 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_{CC} = 5V, T_A = 25°C, unless otherwise specified)

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

Note 1.

LM339/A: 0 ≤ T_A ≤ +70°CLM239/A: -25 ≤ T_A ≤ +85°CLM2901/3302: -40 ≤ T_A ≤ +85°C

ELECTRICAL CHARACTERISTICS(V_{CC} = 5V, T_A = 25°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	LM2901			LM3302			Unit
			Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V _{IO}	V _{CM} = 0V to V _{CC} = 1.5V		2	7		2	20	mV
		V _{O(P)} = 1.4V, R _S = 0Ω		9	15			40	
Input Offset Current	I _{IO}			23	50		3	100	nA
				50	200			300	
Input Bias Current	I _{BIAS}			57	250		57	250	nA
				200	500			1000	
Input Common Mode Voltage Range	V _{IC(R)}		0		V _{CC} -1.5	0		V _{CC} -1.5	V
			0		V _{CC} -2	0		V _{CC} -2	
Supply Current	I _{CC}	R _L = ∞		1.1	2.0		1.1	2.0	mA
		R _L = ∞, V _{CC} = 30V		1.6	2.5				
Voltage Gain	G _V	V _{CC} = 15V, R _L ≥ 15KΩ (for large swing)	25	100		2	30		V/mV
Large Signal Response Time	t _{RES}	V _I = TTL Logic Swing V _{REF} = 1.4V, V _{RL} = 5V, R _L = 5.1KΩ		350			350		ns
Response Time	t _{RES}	V _{RL} = 5V, R _L = 5.1KΩ		1.4			1.4		μs
Output Sink Current	I _{SINK}	V _{I(-)} ≥ 1V, V _{I(+)} = 0V, V _{O(P)} ≤ 1.5V	6	18		6	18		mA
Output Saturation Voltage	V _{SAT}	V _{I(-)} ≥ 1V, V _{I(+)} = 0V		140	400		140	400	mV
		I _{SINK} = 4mA			700			700	
Output Leakage Current	I _{O(LKG)}	V _{I(-)} = 0V		0.1			0.1		nA
		V _{I(+)} = 1V			1.0			1.0	
Differential Voltage	V _{I(DIFF)}				36			36	V

Note 1.

LM339/A: 0 ≤ T_A ≤ +70°CLM239/A: -25 ≤ T_A ≤ +85°CLM2901/3302: -40 ≤ T_A ≤ +85°C

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 SUPPLY CURRENT

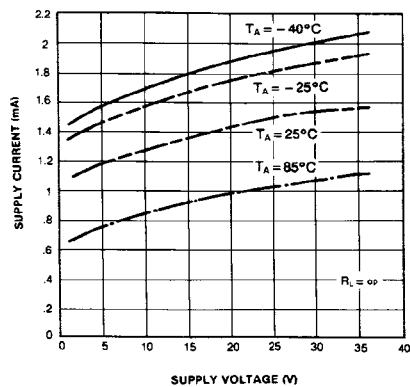


Fig. 2 INPUT CURRENT

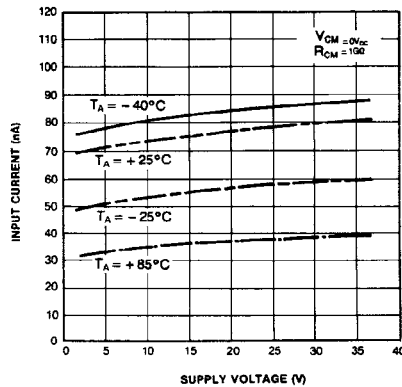


Fig. 3 OUTPUT SATURATION VOLTAGE

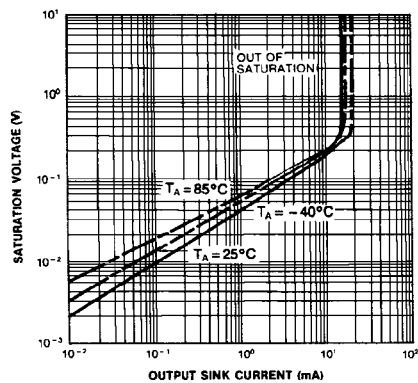


Fig. 4 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-NEGATIVE TRANSITION

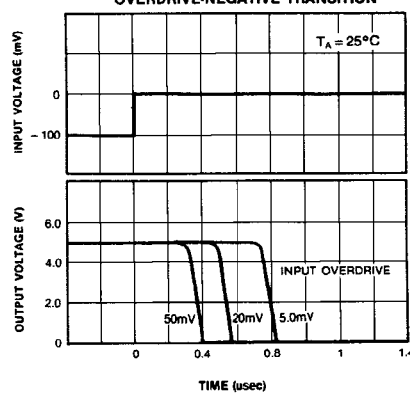
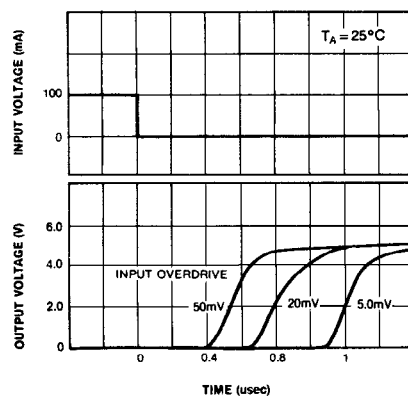


Fig. 5 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-POSITIVE TRANSITION



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