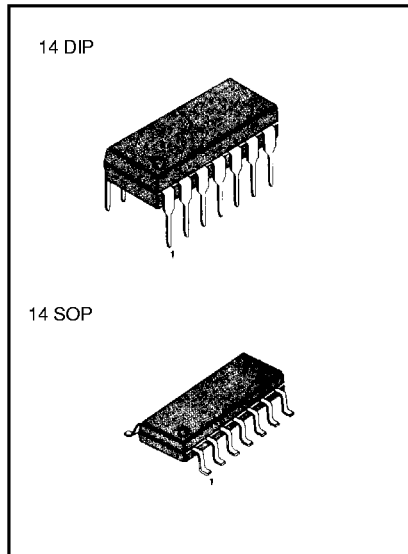


QUAD DIFFERENTIAL COMPARATOR

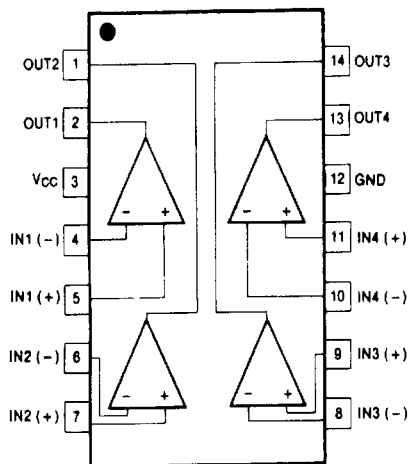
The KA239 series consists of four independent voltage comparators designed to operate from single power supply over a wide voltage range.

FEATURES

- Single or dual supply operation
- Wide range of supply voltage KA239/A, KA339/A: 2 ~ 36V
 KA2901 (or $\pm 1 \sim \pm 18V$)
 KA3302: 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



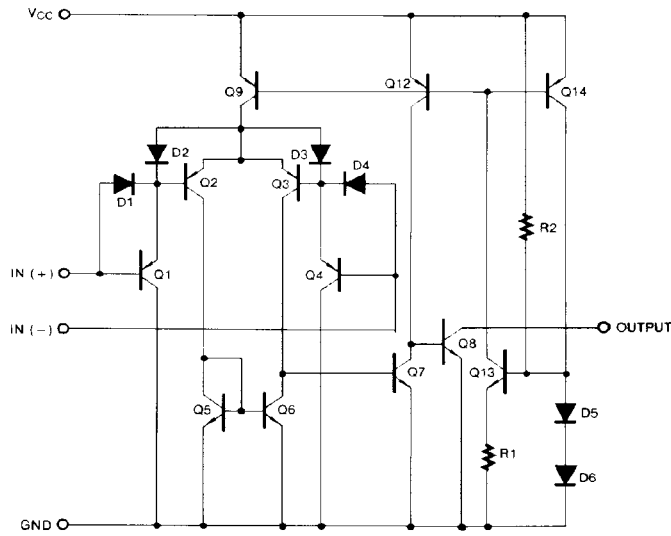
BLOCK DIAGRAM



ORDERING INFORMATION

Device	Package	Operating Temperature
KA339 KA339A	14 DIP	0 ~ +70 °C
KA339D KA339AD	14 SOP	
KA239 KA239A	14 DIP	-25 ~ + 85 °C
KA239D KA239AD	14 SOP	
KA2901 KA2901D KA3302 KA3302D	14 DIP 14 SOP 14 DIP 14 SOP	-40 ~ + 85 °C

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	V _{CC}	± 18 or 36	V
Supply Voltage Only KA3302	V _{CC}	± 14 or 28	V
Differential Input Voltage	V _{I(DIFF)}	36	V
Differential Input Voltage Only KA3302	V _{I(DIFF)}	28	V
Input Voltage	V _I	- 0.3 to +36	V
Input Voltage Only KA3302	V _I	- 0.3 to +28	V
Output Short Circuit to GND		Continuous	
Power Dissipation	P _D	570	mW
Operating Temperature KA339/KA339A		0 ~ + 70	°C
KA239/KA239A	T _{OPR}	- 25 ~ + 85	°C
KA2901/KA3302		- 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	KA239A/KA339A			KA239/KA339			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 _{I(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		350			350		ns
		V _{REF} = 1.4V, V _{RL} = 5V, R _L = 5.1KΩ							
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	V _{O(P)} = 5V	0.1			0.1		nA
		V _{I(+)} = 1V	V _{O(P)} = 30V		1.0			1.0	μA
Differential Voltage	V _{I(DIFF)}		NOTE 1		36			36	V

Note 1.

KA339/A: 0 ≤ T_A ≤ +70 °CKA239/A: -25 ≤ T_A ≤ +85 °CKA2901/3302: -40 ≤ T_A ≤ +85 °C

ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Test Conditions	KA2901			KA3302			Unit
			Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V _{IO}	V _{CM} = 0V to V _{CC} = 1.5V V _{O(P)} = 1.4V, R _S = 0Ω		2	7		2	20	mV
			NOTE 1	9	15		40		
Input Offset Current	I _{IO}			2.3	50		3	100	nA
			NOTE 1	50	200		300		
Input Bias Current	I _{BIAS}			57	250		57	250	nA
			NOTE 1	200	500		1000		
Input Common Mode Voltage Range	V _{I(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 = ∞ R _L = ∞, V _{CC} = 30V		1.1	2.0		1.1	2.0	mA
				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 I _{SINK} = 4mA		140	400		140	400	mV
			NOTE 1		700		700		
Output Leakage Current	I _{O(LKG)}	V _{I(-)} = 0V V _{I(+)} = 1V		0.1			0.1	nA	
			V _{O(P)} = 5V V _{O(P)} = 30V			1.0		1.0	μA
Differential Voltage	V _{I(DIFF)}				36		36	V	

Note 1.

KA339/A: 0 ≤ T_A ≤ +70 °CKA239/A: -25 ≤ T_A ≤ +85 °CKA2901/3302: -40 ≤ T_A ≤ +85 °C

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 SUPPLY CURRENT

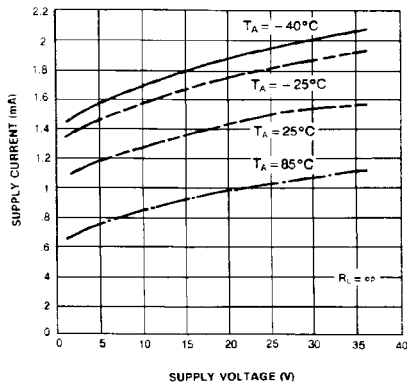


Fig. 2 INPUT CURRENT

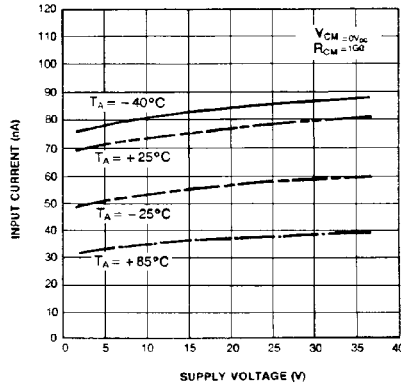


Fig. 3 OUTPUT SATURATION VOLTAGE

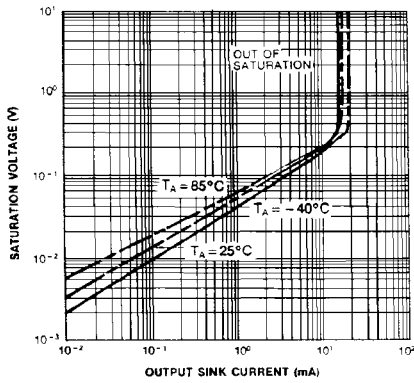


Fig. 4 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-NEGATIVE TRANSITION

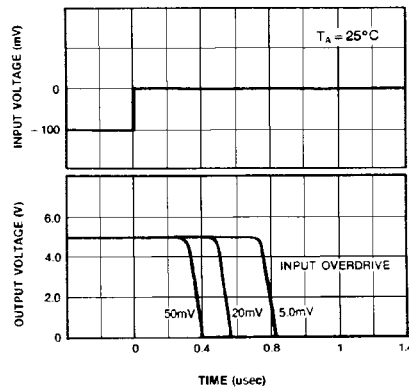
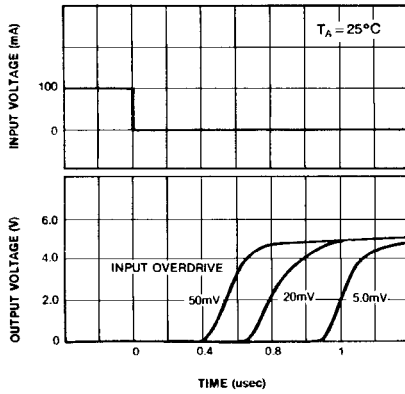


Fig. 5 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-POSITIVE TRANSITION



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