

KA239/KA239A, KA339/KA339A KA3302, KA2901

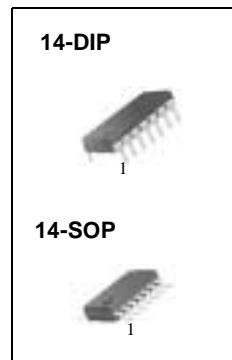
Quad Comparator

Features

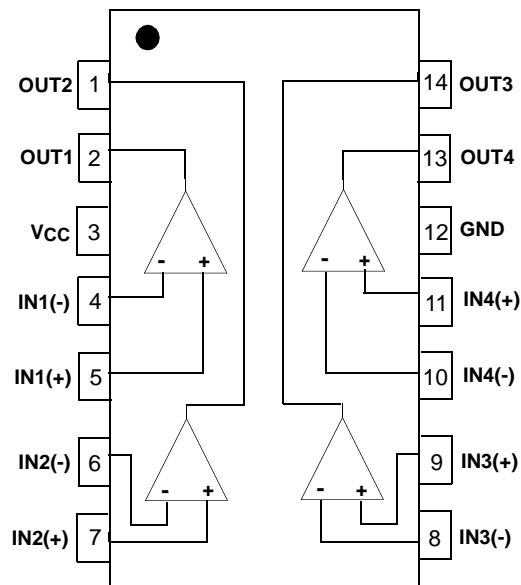
- Single or Dual Supply Operation
- Wide Range of Supply Voltage
KA239/KA239A, KA339/KA339A, KA2901 : 2 ~ 36V
(or $\pm 1 \sim \pm 18V$)
KA3302 : 2 ~ 28V (or $\pm 1 \sim \pm 14V$)
- Low Supply Current Drain 800 μ A Typ.
- Open Collector Outputs for Wired and Connectors
- Low Input Bias Current 25nA Typ.
- Low Input Offset Current $\pm 2.3nA$ Typ.
- Low Input Offset Voltage $\pm 1.4mV$ Typ.
- Input Common Mode Voltage Range Includes Ground.
- Low Output Saturation Voltage
- Output Compatible With TTL, DTL and MOS Logic System

Description

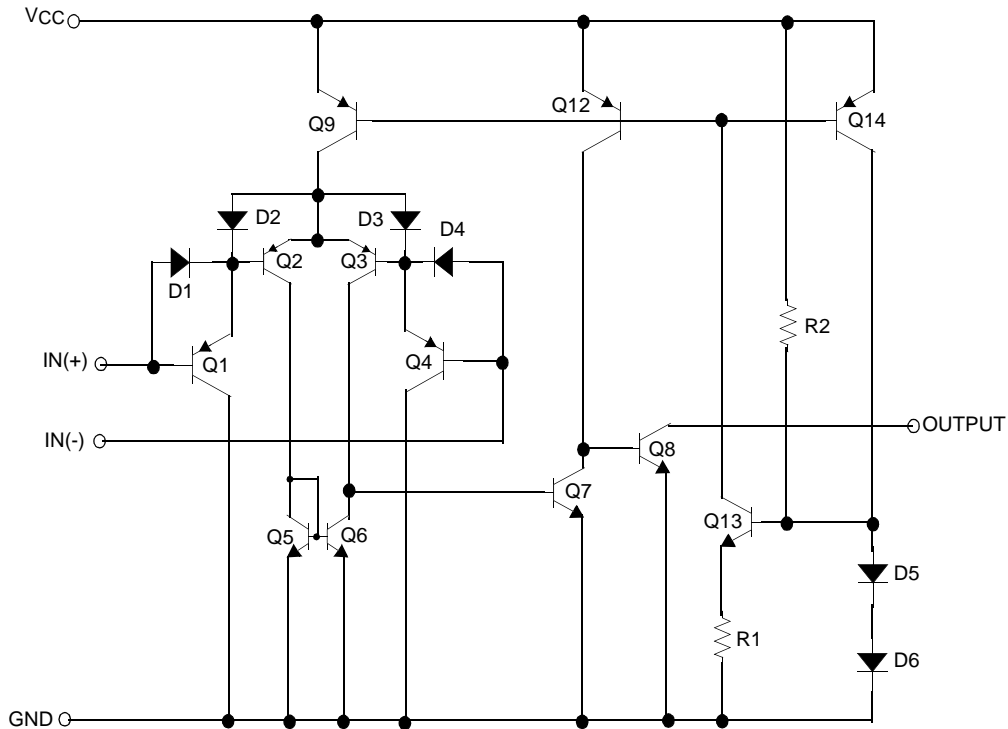
The KA239/KA239A, KA339/KA339A, KA3302, KA2901 consist of four independent voltage comparators designed to operate from single power supply over a wide voltage range.



Internal Block Diagram



Schematic Diagram



Absolute Maximum Ratings

Parameter	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	PD	570	mW
Operating Temperature KA339/KA339A KA239/KA239A KA2901/KA3302	T_{OPR}	0 ~ +70 -25 ~ +85 -40 ~ +85	$^{\circ}C$
Storage Temperature	T_{STG}	-65 ~ +150	$^{\circ}C$

Electrical Characteristics

(VCC = 5V, TA = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	KA239A/KA339A			KA239/KA339			Unit	
			Min.	Typ.	Max.	Min.	Typ.	Max.		
Input Offset Voltage	V _{IO}	VO(P) = 1.4V, RS = 0Ω	-	1	2	-	1.4	5	mV	
		Note1	-	-	4.0	-	-	9.0		
Input Offset Current	I _{IO}	I _{IN(+)} - I _{IN(-)} , V _{CM} = 0V	-	2.3	50	-	2.3	50	nA	
		Note1	-	-	150	-	-	150		
Input Bias Current	I _{BIAS}	V _{CM} = 0V	-	57	250	-	57	250	nA	
		Note1	-	-	400	-	-	400		
Input Common Mode Voltage Range	V _{I(R)}	VCC = 30V	0	-	VCC-1.5	0	-	VCC-1.5	V	
		Note1	0	-	VCC-2	0	-	VCC-2		
Supply Current	I _{CC}	VCC = 5V, RL = ∞	-	1.1	2.0	-	1.1	2.0	mA	
Voltage Gain	GV	VCC = 15V, RL ≥ 15kΩ (for large swing)	50	200	-	50	200	-	V/mV	
Large Signal Response Time	T _{LRES}	V _I = TTL Logic Swing V _{REF} = 1.4V, V _{RL} = 5V, RL = 5.1kΩ (Note2)	-	300	-	-	300	-	ns	
Response Time	T _{RES}	V _{RL} = 5V, RL = 5.1kΩ (Note2)	-	1.3	-	-	1.3	-	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	Note1	-	-	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)}		Note1	-	-	36	-	-	36	V

Note:

- KA339 / KA339A: 0 ≤ TA ≤ +70°C
KA239 / KA239A: -25 ≤ TA ≤ +85°C
KA2901 / KA3302: -40 ≤ TA ≤ +85°C
- These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (Continued)

(VCC = 5V, TA = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	KA2901			KA3302			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V _{IO}	V _{O(P)} = 1.4V, R _S = 0Ω	-	2	7	-	2	20	mV
		Note1	-	9	15	-	-	40	
Input Offset Current	I _{IO}		-	2.3	50	-	3	100	nA
		Note1	-	50	200	-	-	300	
Input Bias Current	I _{BIAS}		-	57	250	-	57	250	nA
		Note1	-	200	500	-	-	1000	
Input Common Mode Voltage Range	V _{I(R)}	KA2901, V _{CC} = 30V	0	-	V _{CC}	0	-	V _{CC}	V
		KA3302, V _{CC} = 28V	0	-	-1.5	0	-	-1.5	
		Note1	0	-	V _{CC} -2	0	-	V _{CC} -2	
Supply Current	I _{CC}	R _L = ∞, V _{CC} = 5V	-	1.1	2.0	-	1.1	2.0	mA
		R _L = ∞, V _{CC} = 30V (KA3302, V _{CC} = 28V)	-	1.6	2.5	-	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 _{LR}	V _I = TTL Logic Swing V _{REF} = 1.4V, V _{RL} = 5V, R _L = 5.1kΩ (Note2)	-	300	-	-	300	-	ns
Response Time	T _{RES}	V _{RL} = 5V, R _L = 5.1kΩ (Note2)	-	1.3	-	-	1.3	-	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	μA
Differential Voltage	V _{I(DIFF)}	-	-	-	36	-	-	28	V

Note:

- KA339 / KA339A: 0 ≤ T_A ≤ +70°C
KA239 / KA239A: -25 ≤ T_A ≤ +85°C
KA2901 / KA3302: -40 ≤ T_A ≤ +85°C
- These parameters, although guaranteed, are not 100% tested in production.

Typical Performance Characteristics

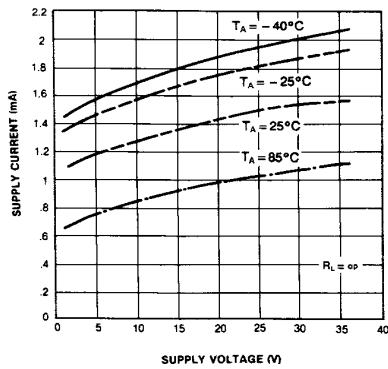


Figure 1. Supply Current vs Supply Voltage

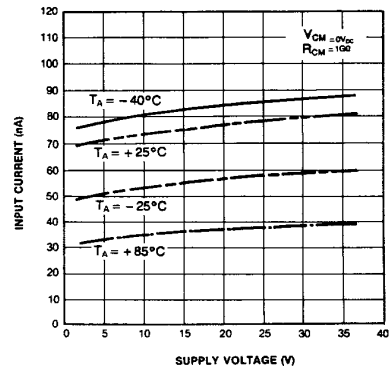


Figure 2. Input Current vs Supply Voltage

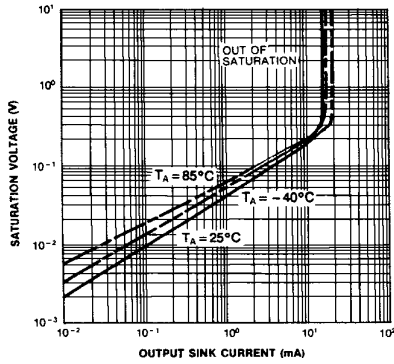


Figure 3. Output Saturation Voltage vs Sink Current

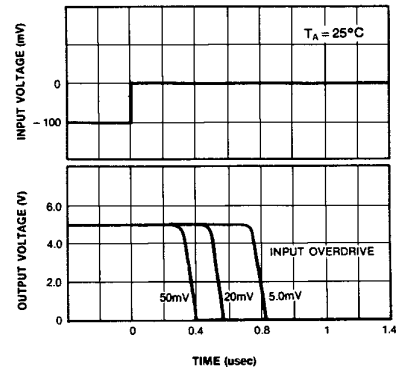


Figure 4. Response Time for Various Input Overdrive-Negative Transition

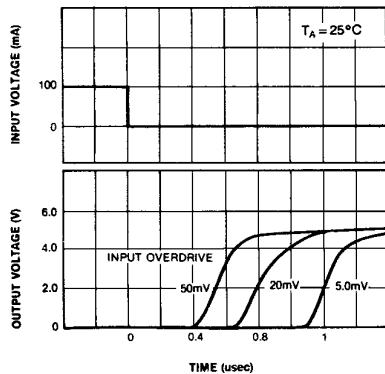


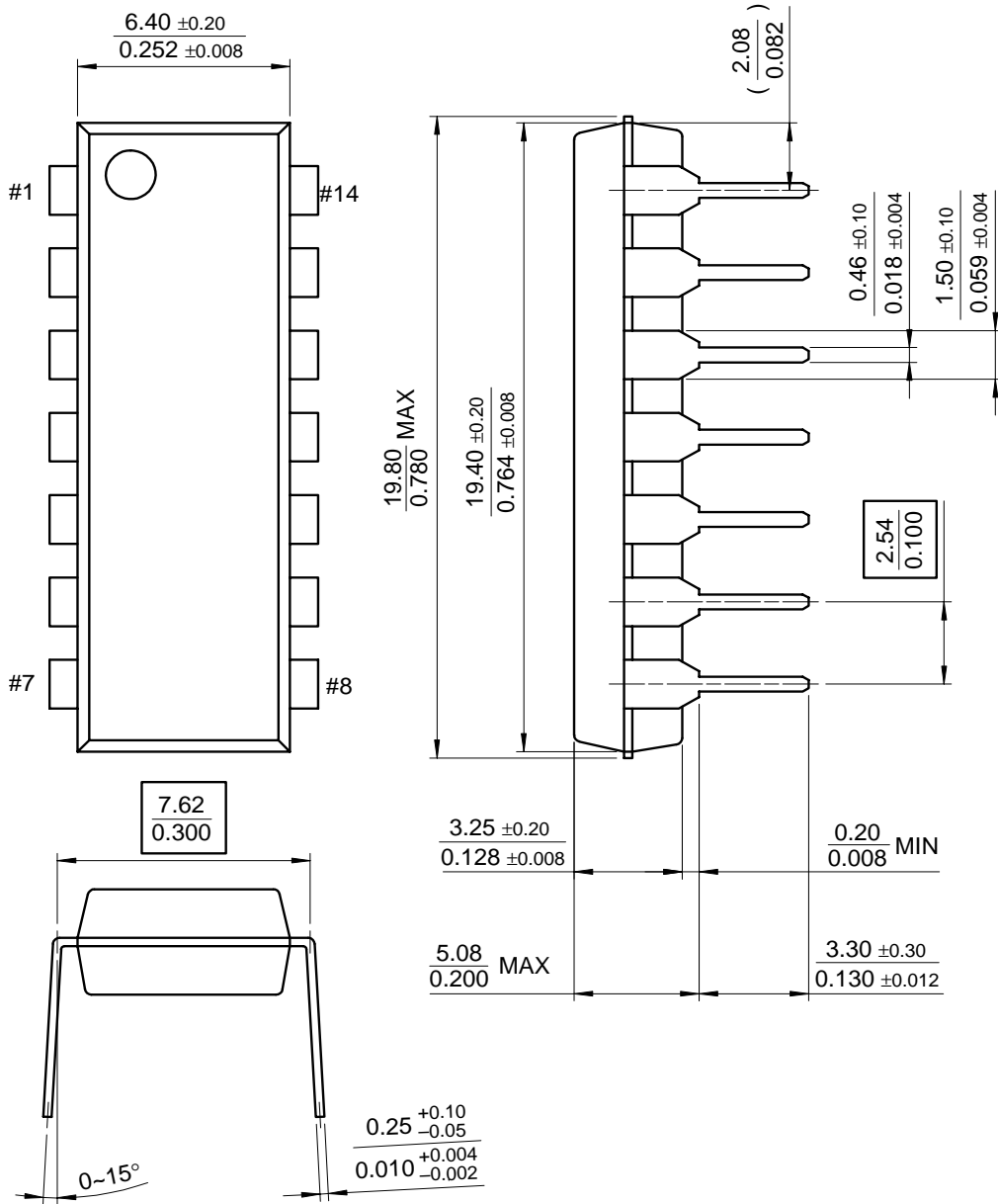
Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

Package

Dimensions in millimeters

14-DIP

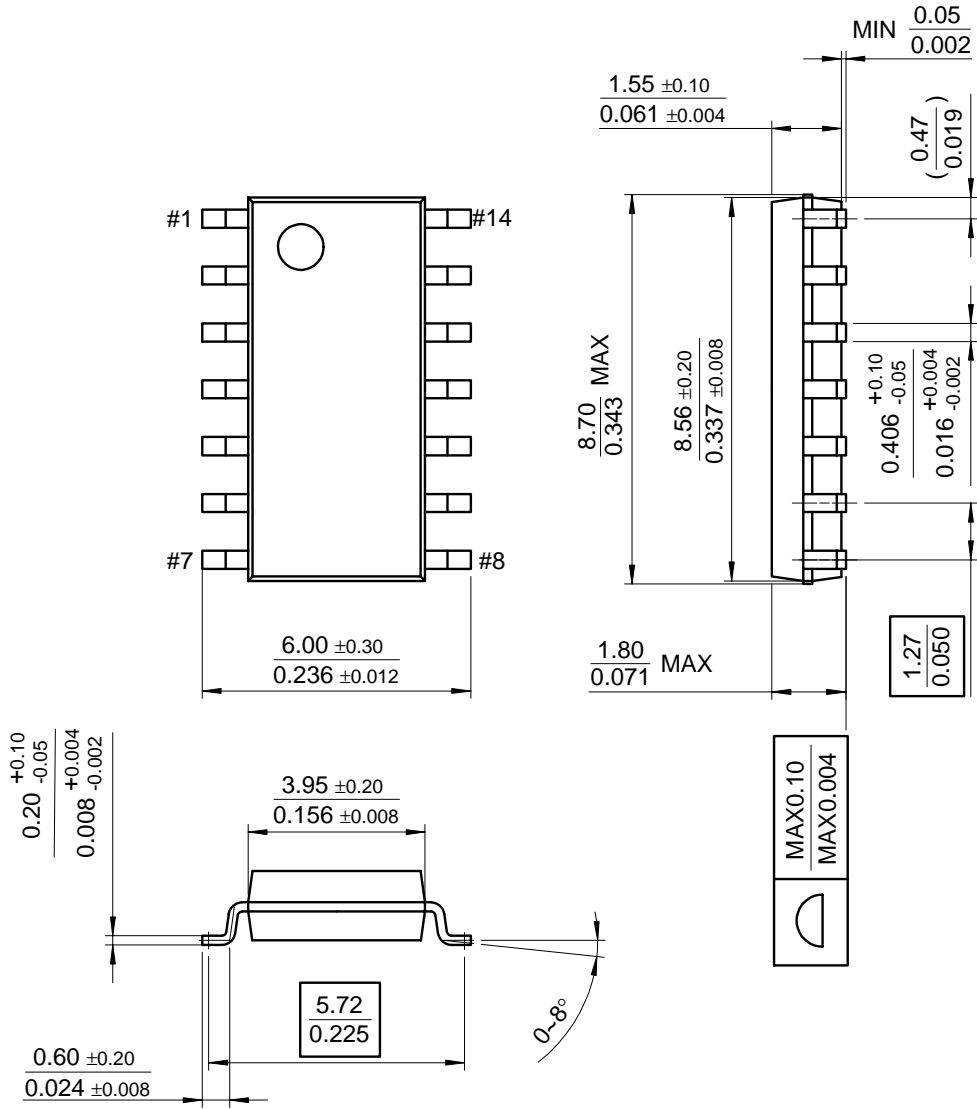


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

14-SOP



Ordering Information

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

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