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 ±1 ~ ±18V)
  KA3302 : 2 ~ 28V (or ±1 ~ ±14V)
- Low Supply Current Drain 800µA Typ.
- Open Collector Outputs for Wired and Connectors
- Low Input Bias Current 25nA Typ.
- Low Input Offset Current ±2.3nA Typ.
- Low Input Offset Voltage ±1.4mV Typ.
- Input Common Mode Voltage Range Includes Ground.
- Low Output Saturation Voltage
- Output Compatible With TTL, DTL and MOS Logic System

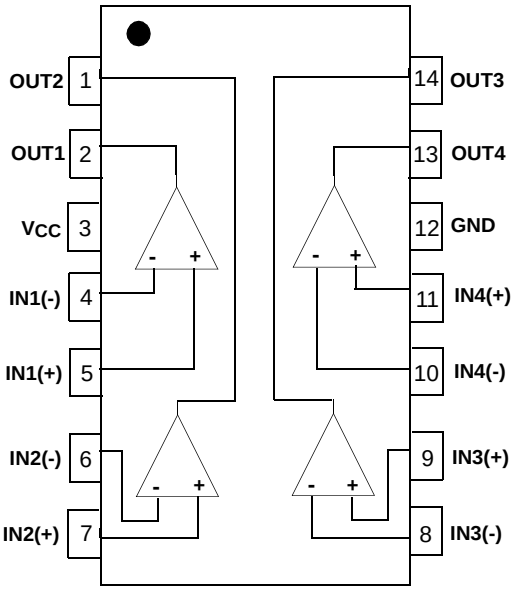
Description

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.

14-DIP

14-SOP

Internal Block Diagram



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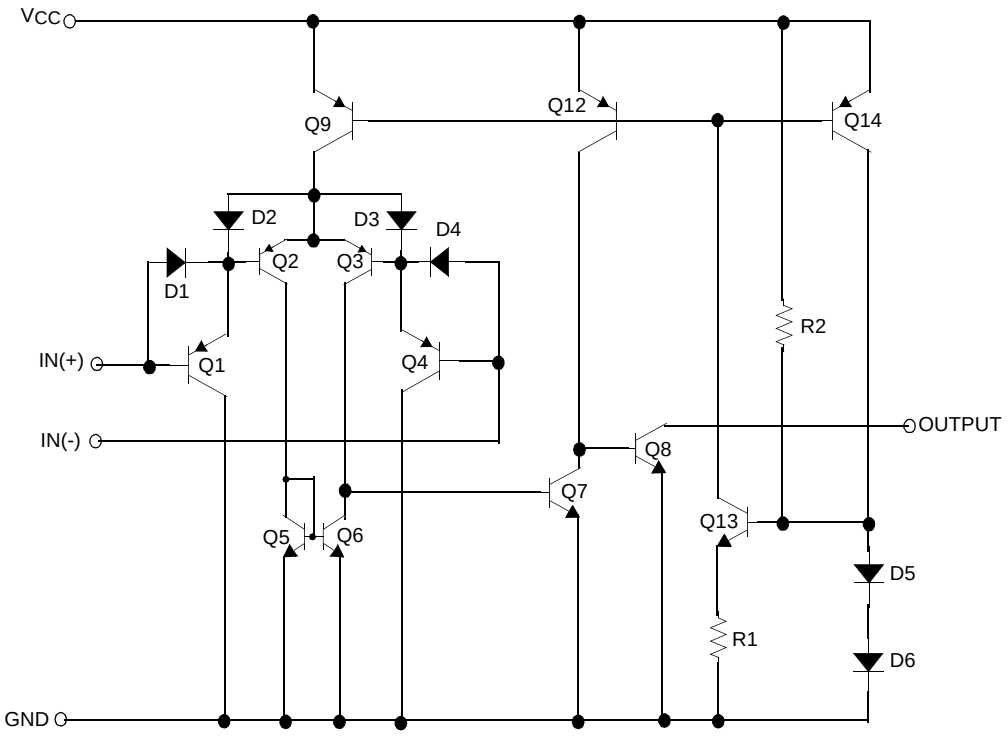
Schematic Diagram



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	P_D	570	mW
Operating Temperature KA339/KA339A KA239/KA239A KA2901/KA3302	T_{OPR}	 0 ~ +70 -25 ~ +85 -40 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Electrical Characteristics

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

Parameter	Symbol	Conditions	KA239A/KA339A			KA239/KA339			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)}$ = 1.4V, R_S = 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	$V_{I(R)}$	V_{CC} = 30V	0	-	V_{CC}-1.5	0	-	V_{CC}-1.5	V
		Note1	0	-	V_{CC}-2	0	-	V_{CC}-2	
Supply Current	I_{CC}	V_{CC} = 5V, 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_{LRES}	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 Note1	-	-	700	-	-	700	
Output Leakage Current	$I_{O(LKG)}$	$V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ = 5V	-	0.1	-	-	0.1	-	nA
		$V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ =30V	-	-	1.0	-	-	1.0	µA
Differential Voltage	$V_{I(DIFF)}$	Note1	-	-	36	-	-	36	V

Note:

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

Electrical Characteristics (Continued)

(V_{CC} = 5V, T_A = 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 KA3302, V_{CC} =28V		0	-	V_{CC} -1.5	0	-	V_{CC} -1.5	V
			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_{LRES}	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	Note1	-	-	700	-	-	700	
Output Leakage Current	$I_{O(LKG)}$	$V_{I(-)}$ = 0V $V_{I(+)}$ = 1V	$V_{O(P)}$ = 5V	-	0.1	-	-	0.1	-	nA
			$V_{O(P)}$ = 30V	-	-	1.0	-	-	1.0	µA
Differential Voltage	$V_{I(DIFF)}$	-	Note1	-	-	36	-	-	28	V

Note:

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

Typical Performance Characteristics

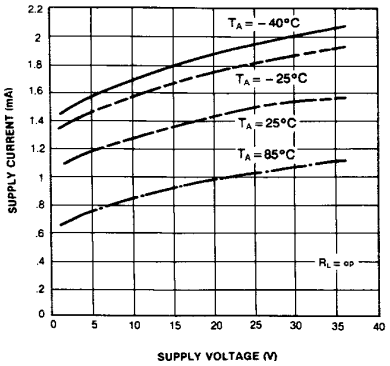


Figure 1. Supply Current vs Supply Voltage

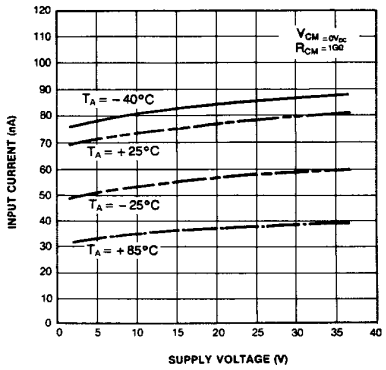


Figure 2. Input Current vs Supply Voltage

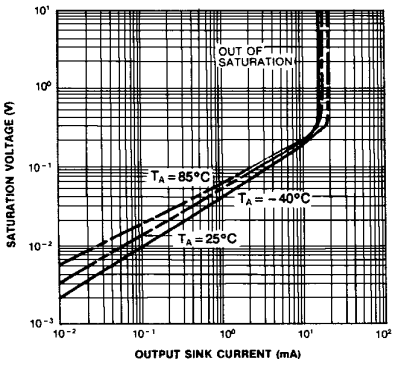


Figure 3. Output Saturation Voltage vs Sink Current

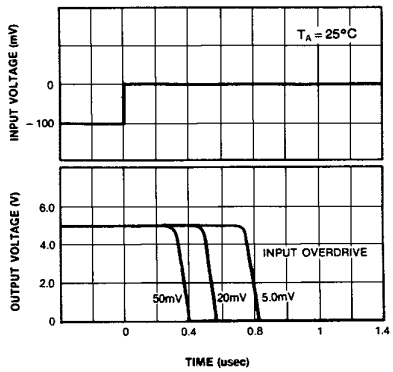


Figure 4. Response Time for Various Input Overdrive-Negative Transition

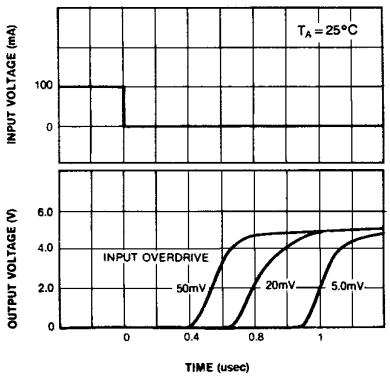


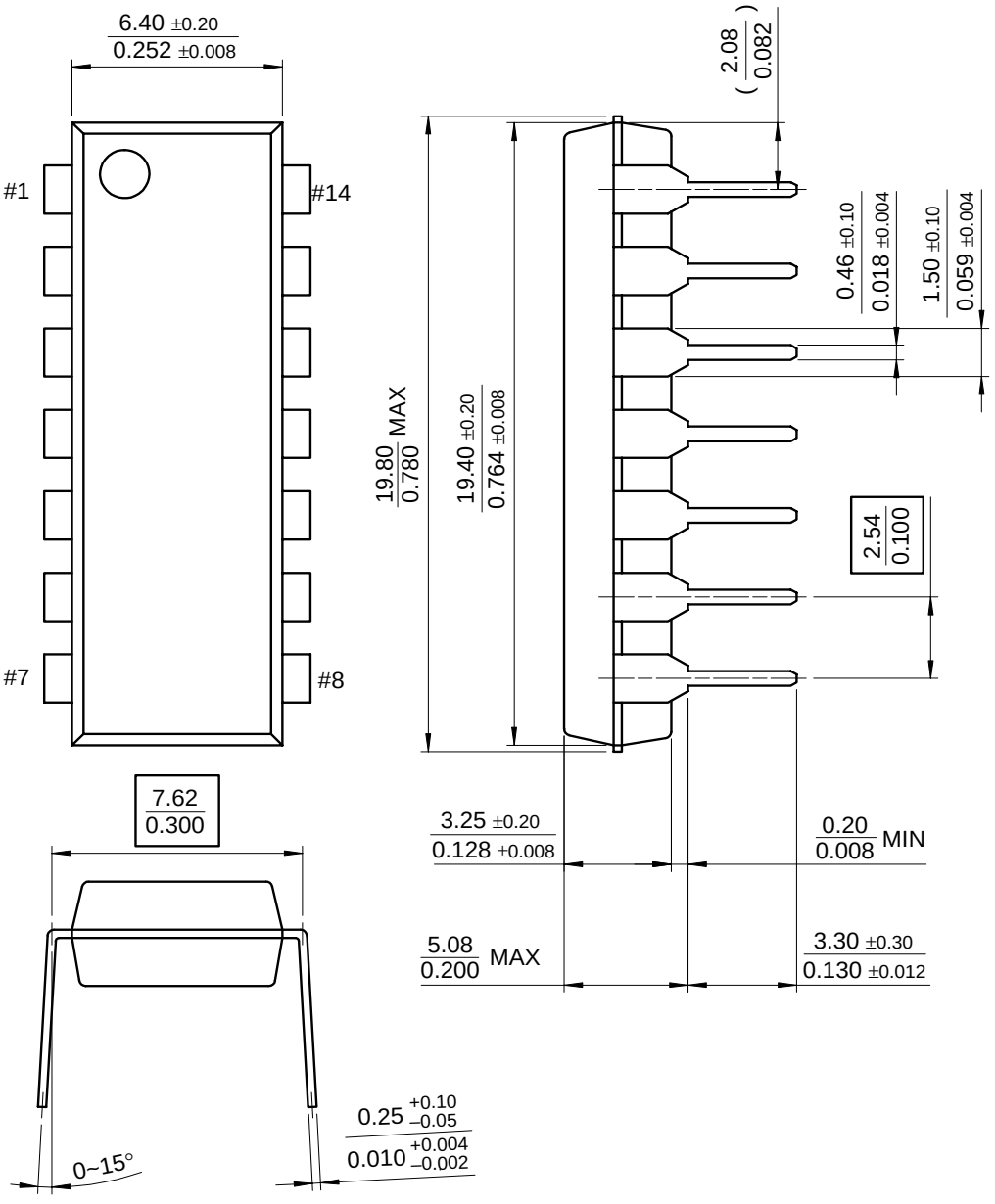
Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

Package

Dimensions in millimeters

14-DIP

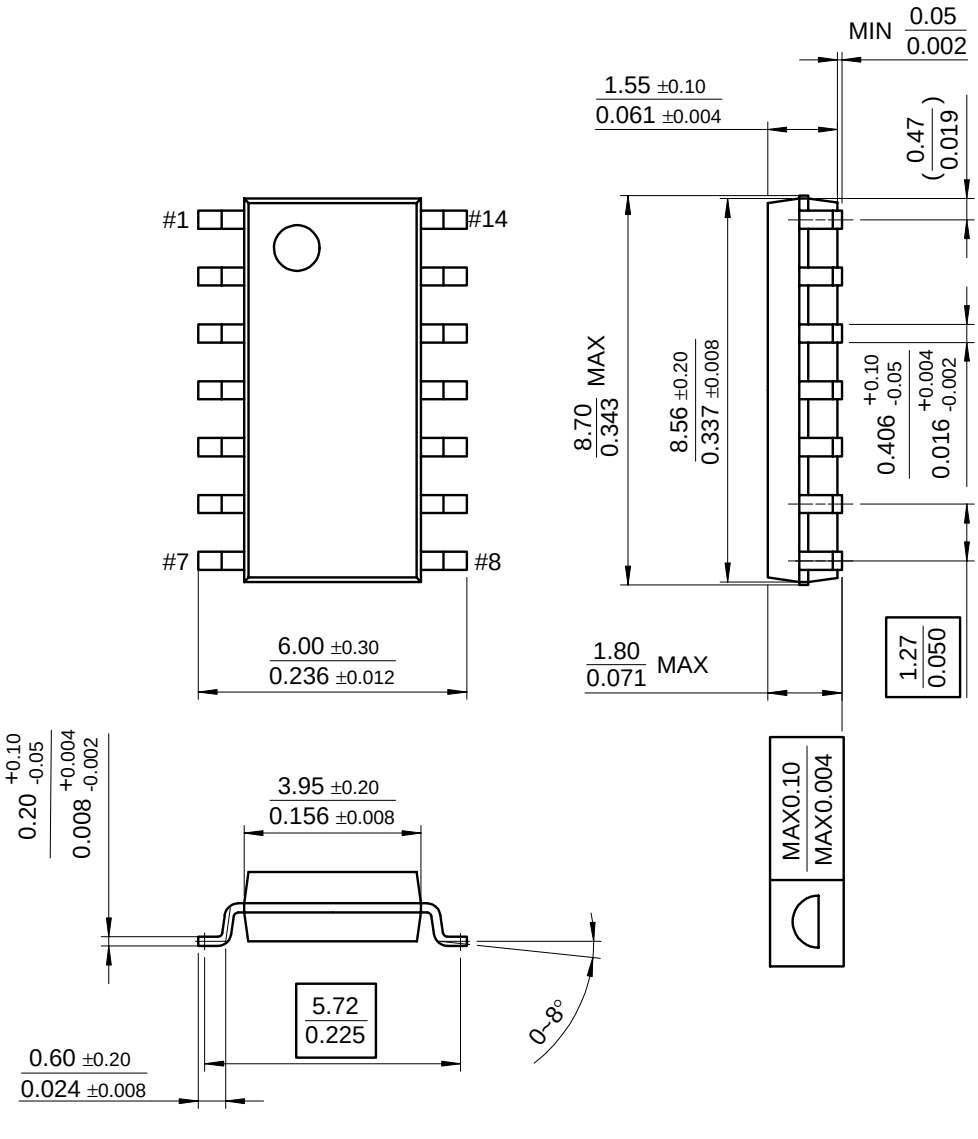


Mechanical Dimensions (Continued)

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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