KA293/KA293A, KA393/KA393A, KA2903

Dual Differential Comparator

Features

- Single Supply Operation: 2V to 36V
- Dual Supply Operation: ± 1V to ±18V
- Allow Comparison of Voltages Near Ground Potential
- Low Current Drain 800µA Typ.
- Compatible with all Forms of Logic
- Low Input Bias Current 25nA Typ.
- Low Input Offset Current ±5nA Typ.
- Low Offset Voltage ±1mV Typ.

Descritpion

The KA293 series consists of two independent voltage comparators designed to operate from a single power supply over a wide voltage range.

8-DIP

1

8-SOP

1

9-SIP

1

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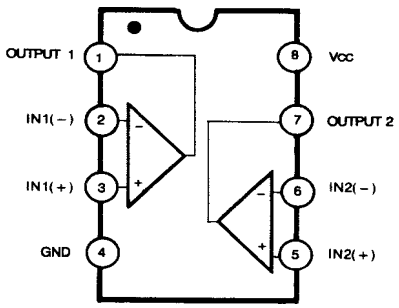
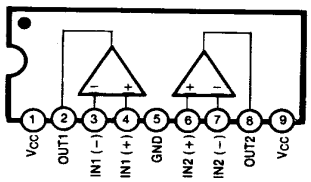
Internal Block Diagram





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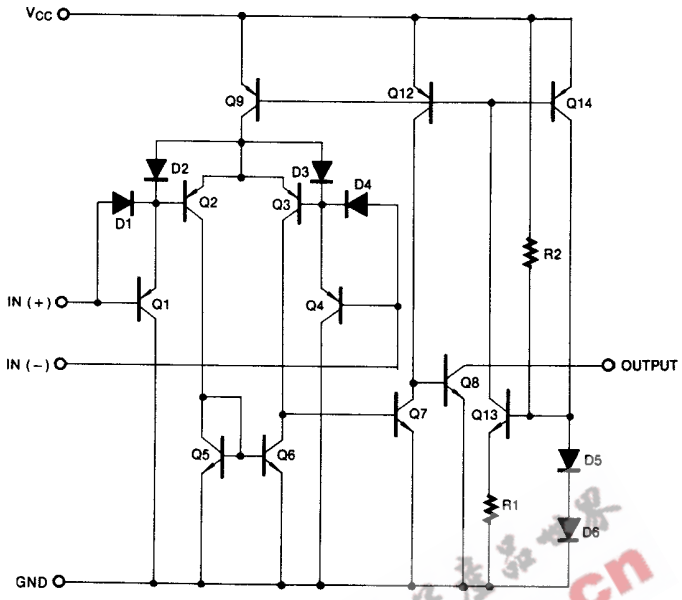
Schematic Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	±18 or 36	V
Differential Input Voltage	$V_{I(DIFF)}$	36	V
Input Voltage	V_I	- 0.3 to +36	V
Output Short Circuit to GND	-	Continuous	-
Power Dissipation, Ta = 25°C 8-DIP 8-SOP	P_D	 1040 480	mW
Operating Temperature KA393/KA393A KA293/KA293A KA2903	T_{OPR}	 0 ~ + 70 - 25 ~ + 85 - 40 ~ + 85	°C
Storage Temperature	T_{STG}	- 65 ~ + 150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient Max. 8-DIP 8-SOP	Rθja	 120 260	°C/W

Electrical Characteristics

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

Parameter	Symbol	Conditions		KA293A/KA393A			KA293/KA393			Unit
				Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)}$ =1.4V, R_S =0Ω		-	±1	±2	-	±1	±5	mV
		V_{CM}= 0 to1.5V	Note 1	-	-	±4.0	-	-	±9.0	
Input Offset Current	I_{IO}			-	±5	±50	-	±5	±50	nA
			Note 1	-	-	±150	-	-	±150	
Input Bias Current	I_{BIAS}			-	65	250	-	65	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 = ∞ , V_{CC} = 5V		-	0.6	1	-	0.6	1	mA
		R_L = ∞, V_{CC} = 30V		-	0.8	2.5	-	0.8	2.5	
Voltage Gain	G_V	V_{CC} =15V, R_L≥15KΩ (for large $V_{O(P-P)swing}$)		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		-	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		-	160	400	-	160	400	mV
		I_{SINK} = 4mA	Note 1	-	-	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

NOTE 1

KA393 / KA393A : 0 ≤ T_A ≤ +70°C

KA293 / KA293A : -25 ≤ T_A ≤ +85°C

KA2903 : -40 ≤ T_A ≤ +85°C

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Electrical Characteristics (Continued)

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

Parameter	Symbol	Conditions		KA2903			Unit
				Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)}$ =1.4V, R_S =0Ω		-	±1	±7	mV
		V_{CM}= 0 to 1.5V	Note 1	-	±9	±15	
Input Offset Current	I_{IO}			-	±5	±50	nA
			Note 1	-	±50	±200	
Input Bias Current	I_{BIAS}			-	65	250	nA
			Note 1	-	-	500	
Input Common Mode Voltage Range	$V_{I(R)}$			0	-	V_{CC}-1.5	V
			Note 1	0	-	V_{CC}-2	
Supply Current	I_{CC}	R_L = ∞ , V_{CC} = 5V		-	0.6	1	mA
		R_L = ∞, V_{CC} = 30V		-	1	2.5	
Voltage Gain	G_V	V_{CC} =15V, R_L≥15KΩ(for large $V_{O(P-P)}$swing)		25	100	-	V/mV
Large Signal Response Time	T_{LRES}	V_I =TTL Logic Swing V_{REF} =1.4V, V_{RL} =5V, R_L =5.1KΩ		-	350	-	nS
Response Time	T_{RES}	V_{RL} =5V, R_L =5.1KΩ		-	1.5	-	µS
Output Sink Current	I_{SINK}	$V_{I(-)}$≥1V, $V_{I(+)}$ =0V, $V_{O(P)}$ ≤1.5V		6	16	-	mA
Output Saturation Voltage	V_{SAT}	$V_{I(-)}$≥1V, $V_{I(+)}$ =0V		-	160	400	mV
		I_{SINK} = 4mA	NOTE 1	-	-	700	
Output Leakage Current	$I_{O(LKG)}$	$V_{I(-)}$ = 0V,	$V_{O(P)}$ = 5V	-	0.1	-	nA
		$V_{I(+)}$ = 1V	$V_{O(P)}$ = 30V	-	-	1.0	µA

NOTE 1
KA393 / KA393A : 0 ≤ T_A ≤ +70°C
KA293 / KA293A : -25 ≤ T_A ≤ +85°C
KA2903 : -40 ≤ T_A ≤ +85°C

Typical Performance Characteristics

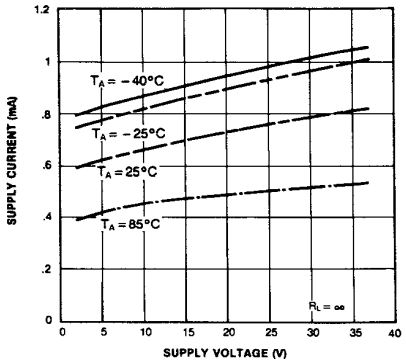


Figure 1. Supply Current vs Supply Voltage

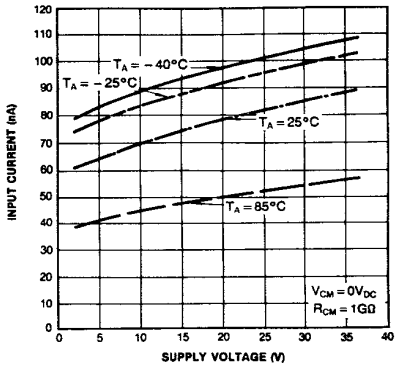


Figure 2. Input Current vs Supply Voltage

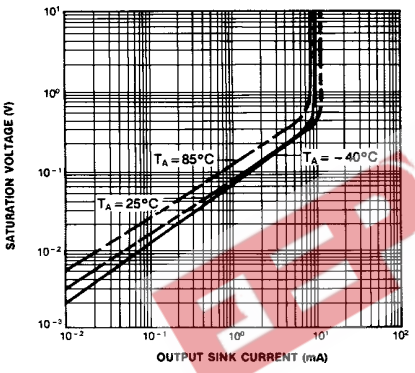


Figure 3. Output Saturation Voltage vs Sink Current

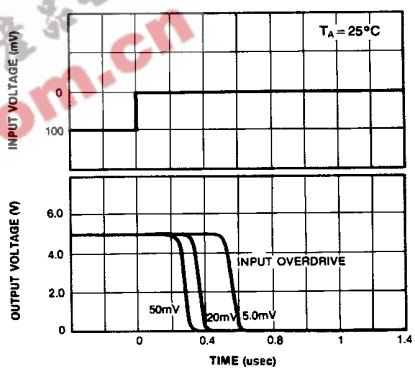


Figure 4. Response Time for Various Input Overdrive-Negative Transition

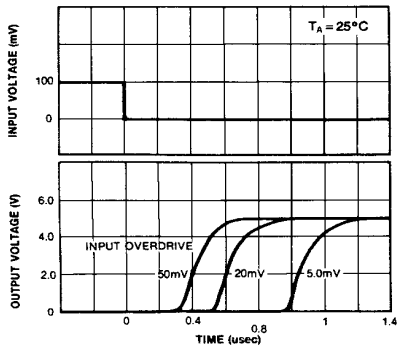


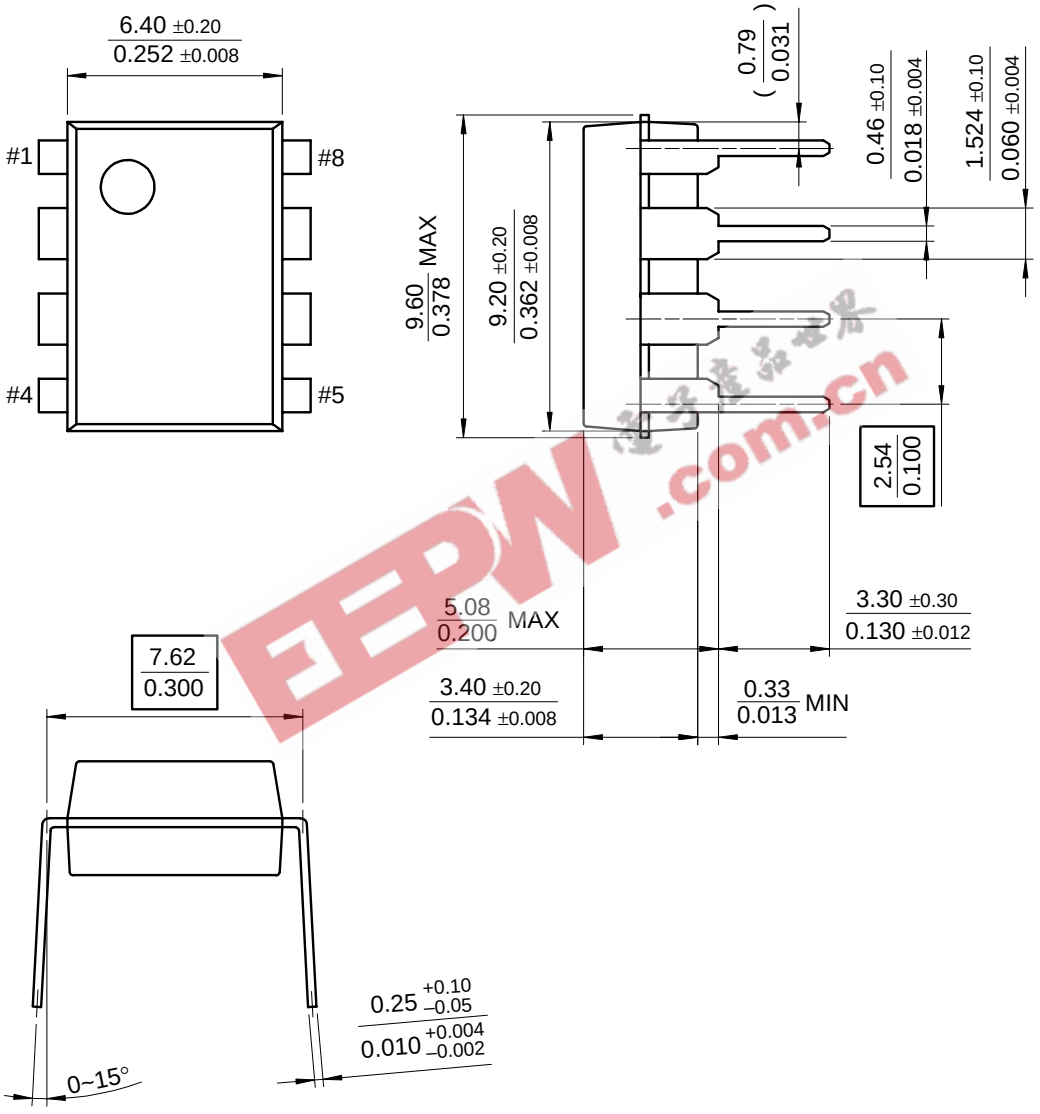
Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

Package

Dimensions in millimeters

8-DIP

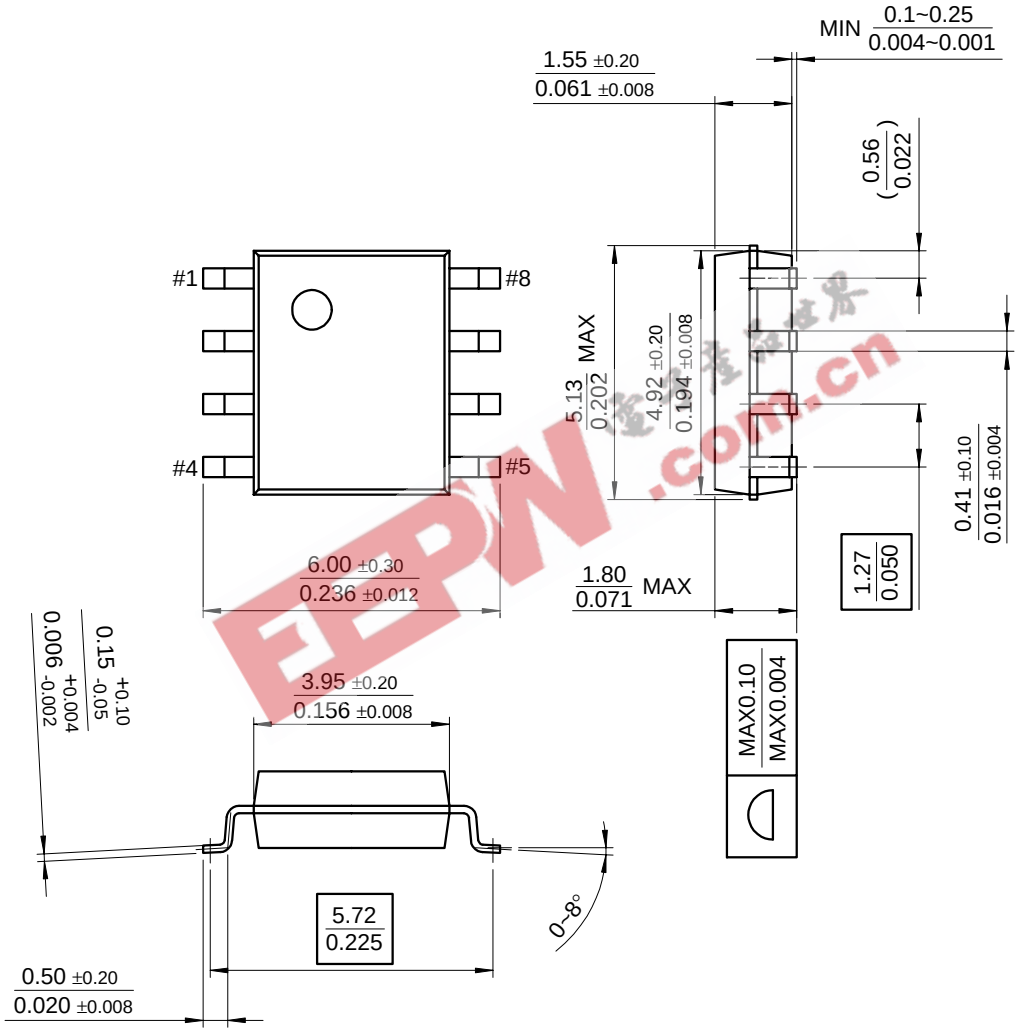


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

8-SOP

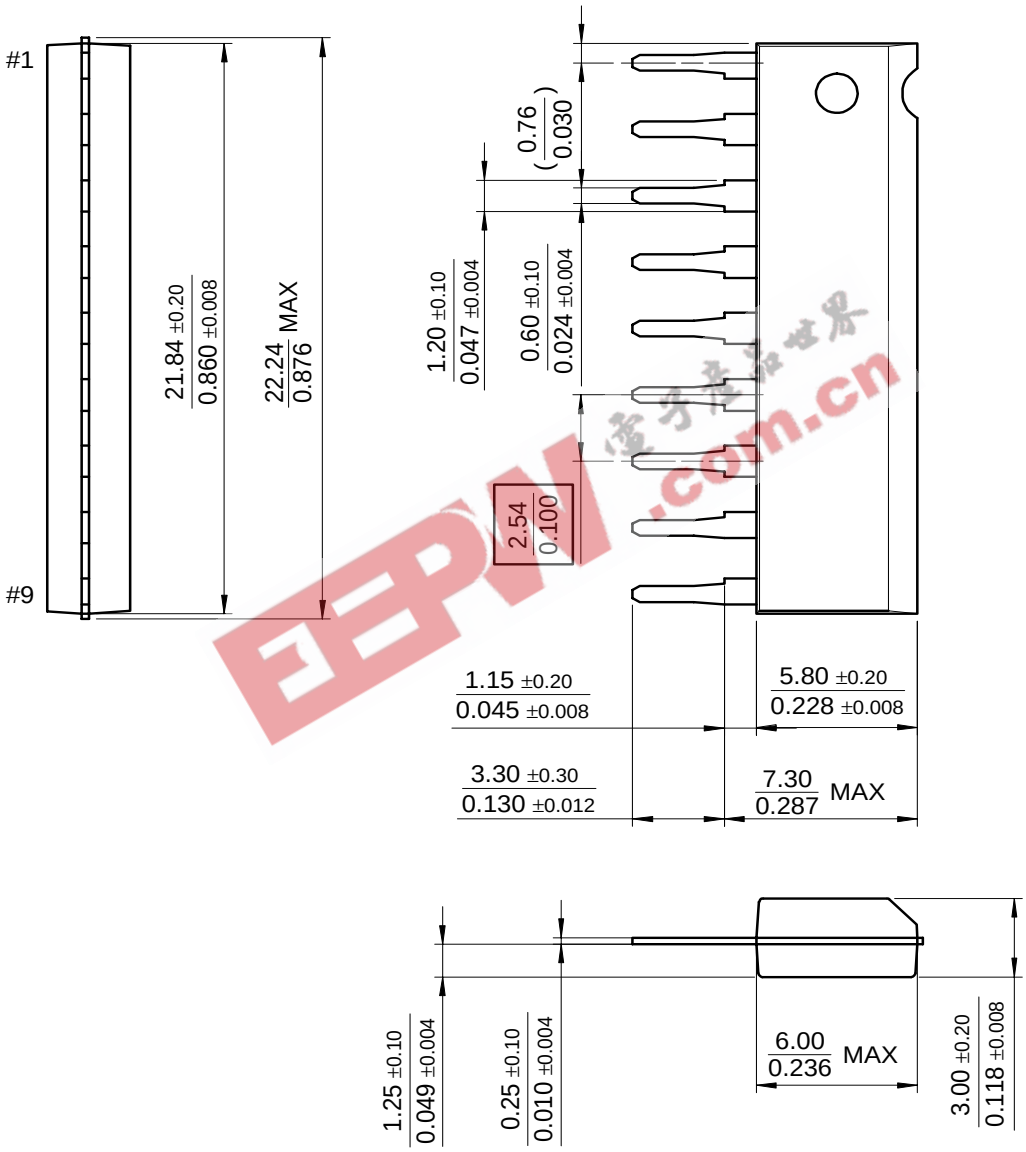


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

9-SIP



Ordering Information

Product Number	Package	Operating Temperature
KA393	8-DIP	0 ~ + 70°C
KA393A		
KA393D	8-SOP	
KA393AD		
KA393S	9-SIP	
KA293	8-DIP	-25 ~ + 85°C
KA293A		
KA293D	8-SOP	
KA293AD		
KA2903	8-DIP	-40 ~ + 85°C
KA2903D	8-SOP	

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