

KA293/KA293A, KA393/KA393A, KA2903

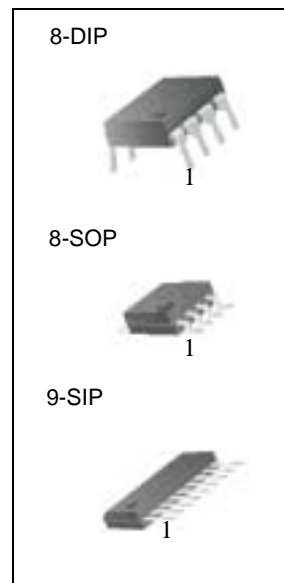
Dual Differential Comparator

Features

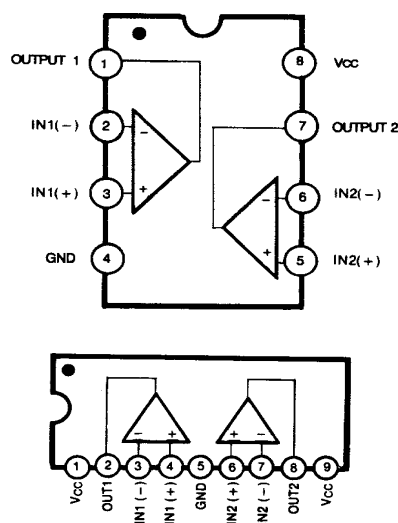
- Single Supply Operation: 2V to 36V
- Dual Supply Operation: $\pm 1V$ to $\pm 18V$
- Allow Comparison of Voltages Near Ground Potential
- Low Current Drain 800 μA Typ.
- Compatible with all Forms of Logic
- Low Input Bias Current 25nA Typ.
- Low Input Offset Current $\pm 5nA$ Typ.
- Low Offset Voltage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

Description

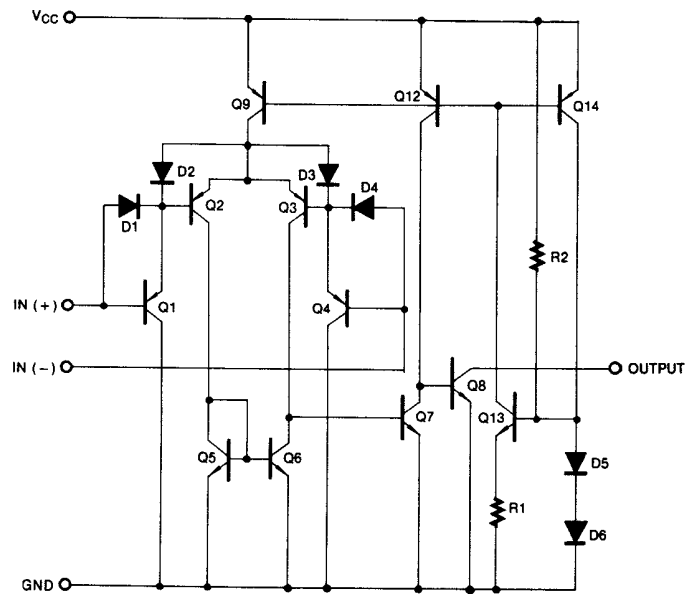
The KA293 series consists of two independent voltage comparators designed to operate from a single power supply over a wide voltage range.



Internal Block Diagram



Schematic Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power Supply Voltage	VCC	±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	P _D	570	mW
Operating Temperature KA393/KA393A KA293/KA293A KA2903	T _{OPR}	0 ~ + 70 - 25 ~ + 85 - 40 ~ + 85	°C
Storage Temperature	T _{STG}	- 65 ~ + 150	°C

Electrical Characteristics

($V_{CC} = 5V$, $T_A = 25^\circ C$, unless otherwise specified)

Parameter	Symbol	Conditions	KA293A/KA393A			KA293/KA393			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)} = 1.4V$, $R_S = 0\Omega$	-	± 1	± 2	-	± 1	± 5	mV
		$V_{CM} = 0$ to $1.5V$	NOTE 1	-	-	± 4.0	-	-	
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}	$R_L = \infty$	-	0.6	1	-	0.6	1	mA
		$R_L = \infty$, $V_{CC} = 30V$	-	0.8	2.5	-	0.8	2.5	
Voltage Gain	G_V	$V_{CC} = 15V$, $R_L \geq 15K\Omega$ (for large $V_{O(P-P)}$ swing)	50	200	-	50	200	-	V/mV
Large Signal Response Time	t_{RES}	$V_I = \text{TTL Logic Swing}$ $V_{REF} = 1.4V$, $V_{RL} = 5V$, $R_L = 5.1K\Omega$	-	350	-	-	350	-	nS
Response Time	t_{RES}	$V_{RL} = 5V$, $R_L = 5.1K\Omega$	-	1.4	-	-	1.4	-	μS
Output Sink Current	I_{SINK}	$V_{I(-)} \geq 1V$, $V_{I(+)} = 0V$, $V_{O(P)} \leq 1.5V$	6	18	-	6	18	-	mA
Output Saturation Voltage	V_{SAT}	$V_{I(-)} \geq 1V$, $V_{I(+)} = 0V$	-	160	400	-	160	400	mV
		$I_{SINK} = 4mA$	NOTE 1	-	-	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 : $0 \leq T_A \leq +70^\circ C$

KA293 / KA293A : $-25 \leq T_A \leq +85^\circ C$

KA2903 : $-40 \leq T_A \leq +85^\circ C$

Electrical Characteristics (Continued)

($V_{CC} = 5V$, $T_A = 25^\circ C$, unless otherwise specified)

Parameter	Symbol	Conditions	KA2903			Unit
			Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	$V_{O(P)} = 1.4V$, $R_S = 0\Omega$	-	± 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}	$R_L = \infty$	-	0.6	1	mA
		$R_L = \infty$, $V_{CC} = 30V$	-	1	2.5	
Voltage Gain	G_V	$V_{CC} = 15V$, $R_L \geq 15K\Omega$ (for large $V_{O(P-P)}$ swing)	25	100	-	V/mV
Large Signal Response Time	t_{RES}	$V_I = \text{TTL Logic Swing}$ $V_{REF} = 1.4V$, $V_{RL} = 5V$, $R_L = 5.1K\Omega$	-	350	-	nS
Response Time	t_{RES}	$V_{RL} = 5V$, $R_L = 5.1K\Omega$	-	1.5	-	μS
Output Sink Current	I_{SINK}	$V_{I(-)} \geq 1V$, $V_{I(+)} = 0V$, $V_{O(P)} \leq 1.5V$	6	16	-	mA
Output Saturation Voltage	V_{SAT}	$V_{I(-)} \geq 1V$, $V_{I(+)} = 0V$	-	160	400	mV
		$I_{SINK} = 4mA$ NOTE 1	-	-	700	
Output Leakage Current	$I_{O(LKG)}$	$V_{I(-)} = 0V$, $V_{I(+)} = 1V$	-	0.1	-	nA
		$V_{O(P)} = 5V$ $V_{O(P)} = 30V$	-	-	1.0	μA

NOTE 1

KA393 / KA393A : $0 \leq T_A \leq +70^\circ C$

KA293 / KA293A : $-25 \leq T_A \leq +85^\circ C$

KA2903 : $-40 \leq T_A \leq +85^\circ C$

Typical Performance Characteristics

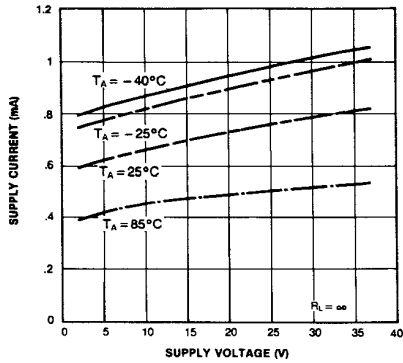


Figure 1. Supply Current vs Supply Voltage

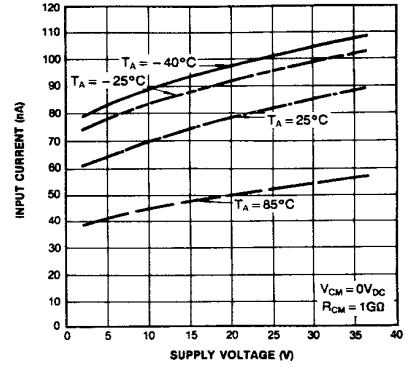


Figure 2. Input Current vs Supply Voltage

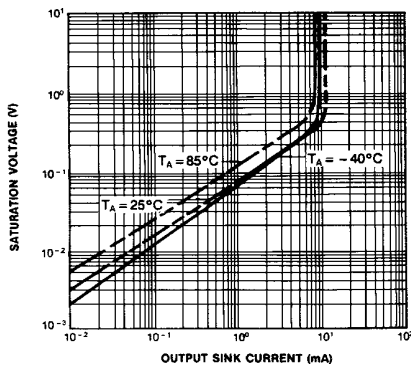


Figure 3. Output Saturation Voltage vs Sink Current

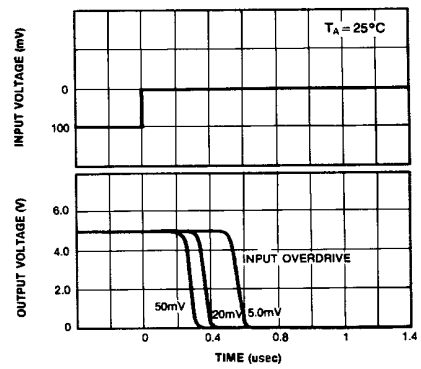


Figure 4. Response Time for Various Input Overdrive-Negative Transition

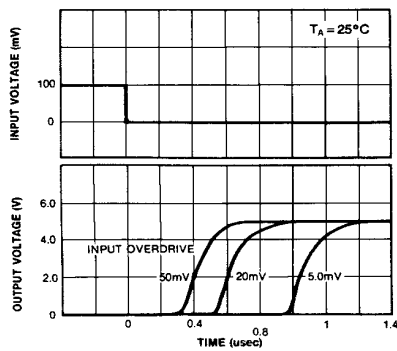
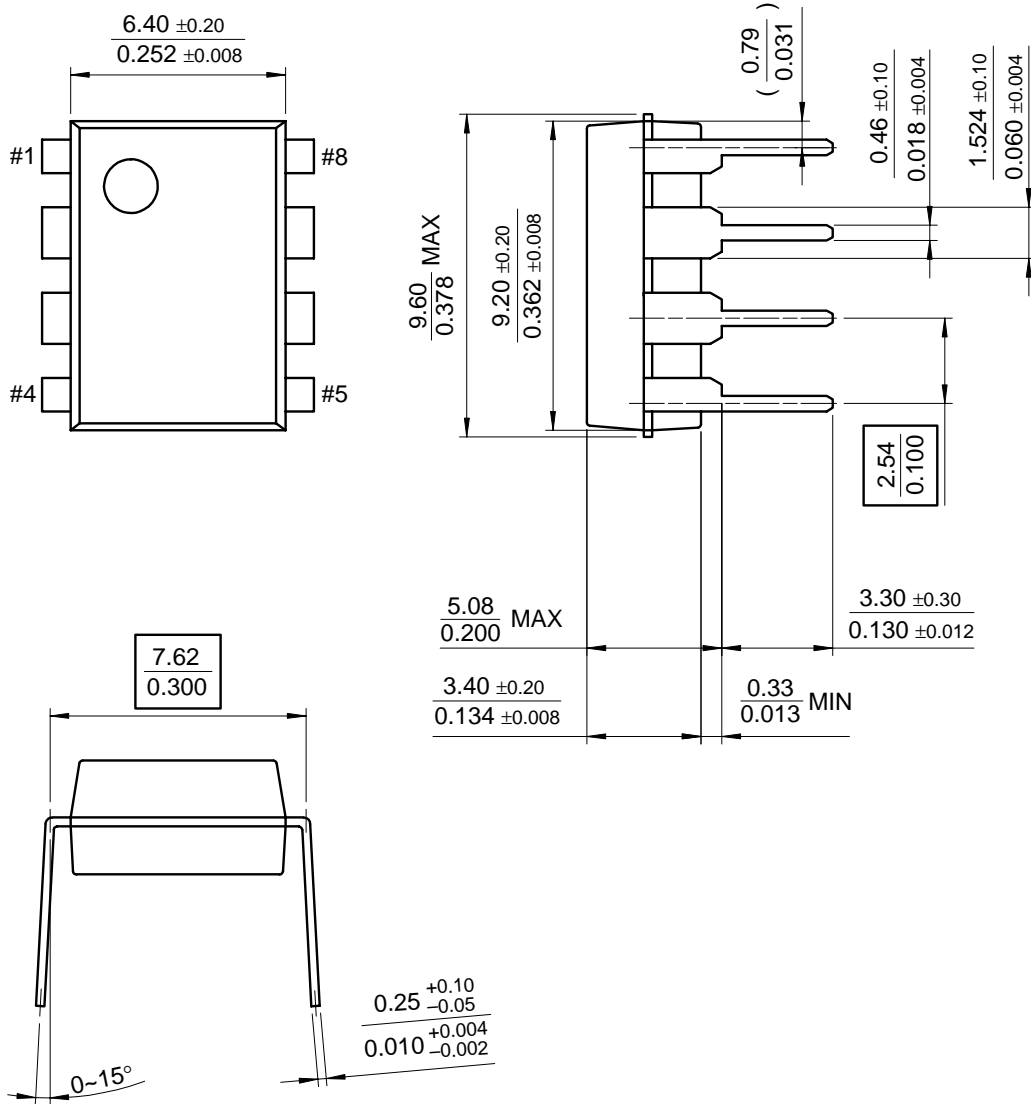


Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

Package

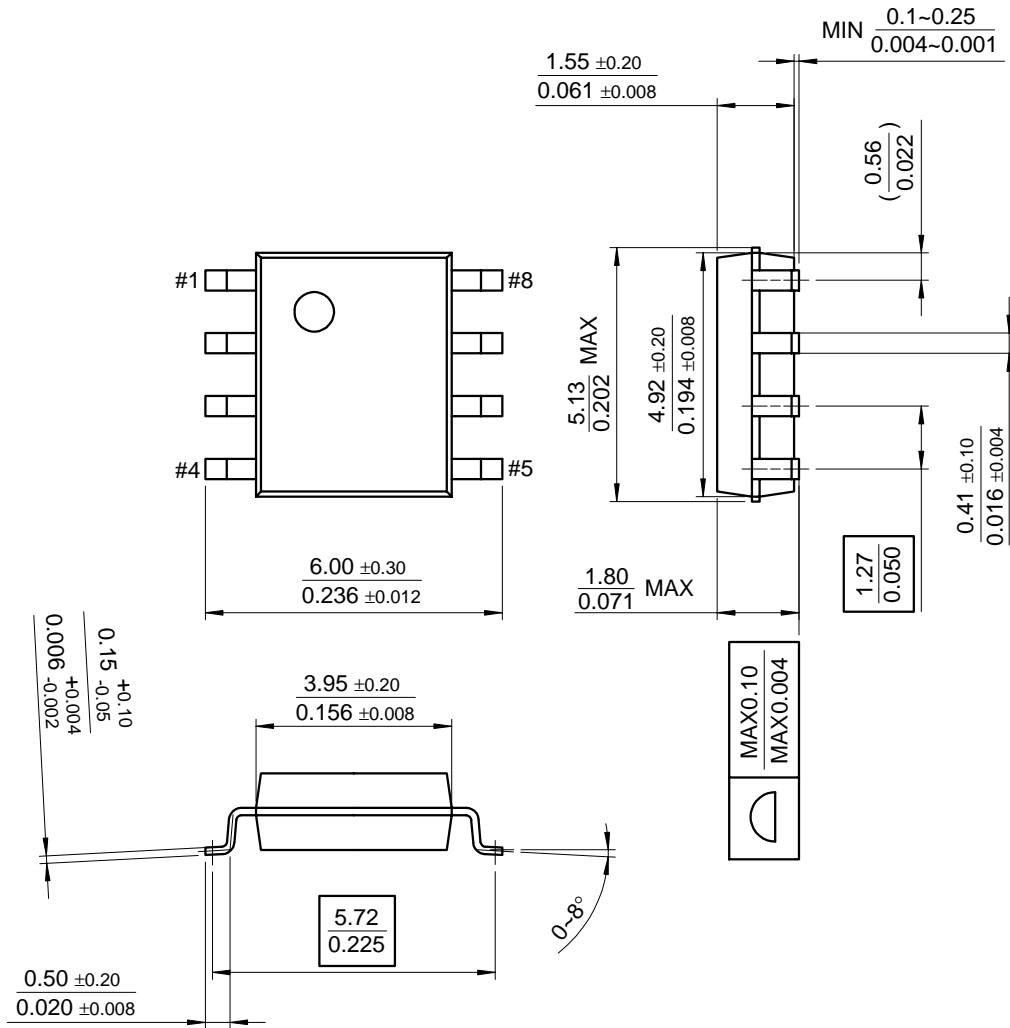
8-DIP



Mechanical Dimensions (Continued)

Package

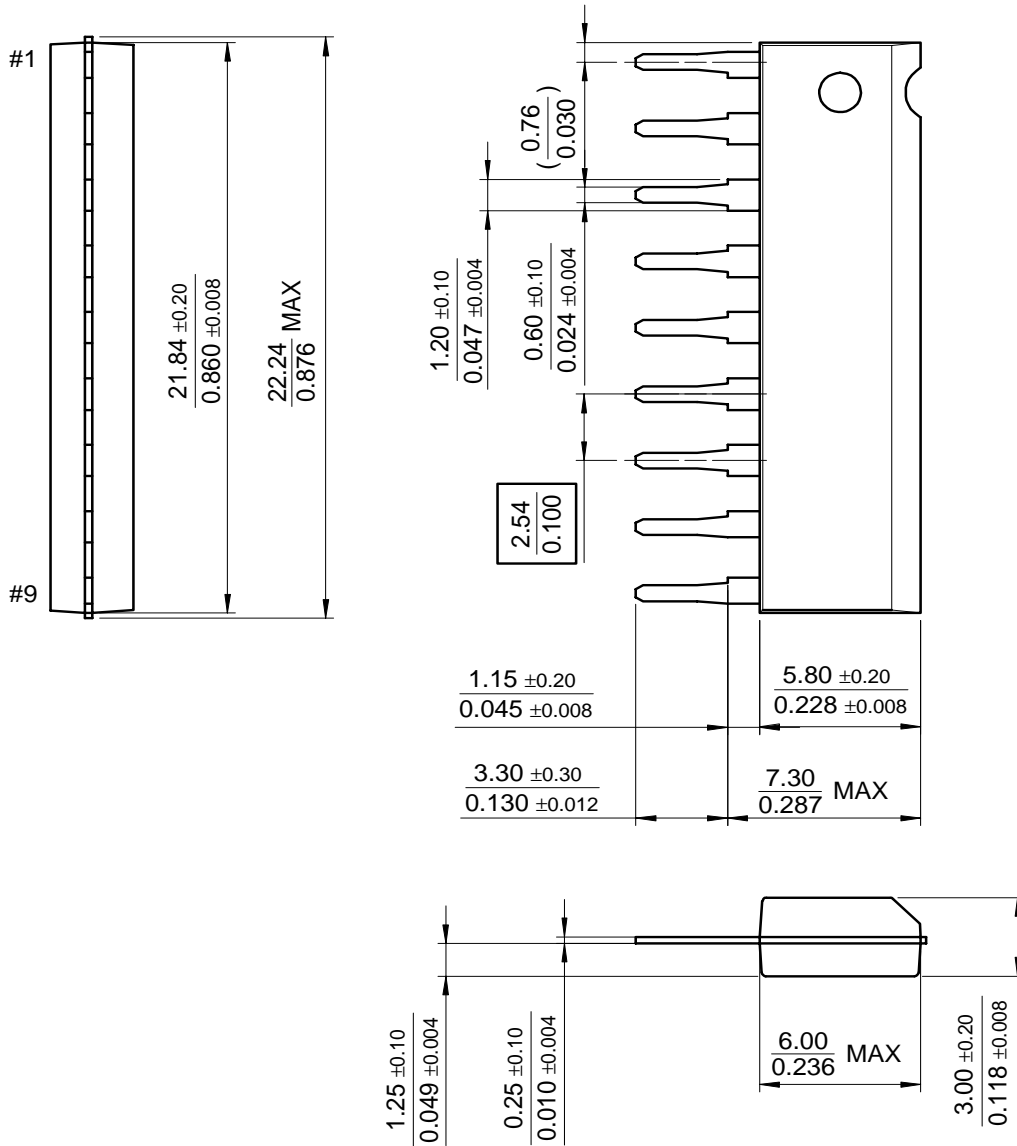
8-SOP



Mechanical Dimensions (Continued)

Package

9-SIP



Ordering Information

Product Number	Package	Operating Temperature
KA393	8-DIP	0 ~ + 75°C
KA393A		
KA393S	9-SIP	
KA393AS		
KA393D	8-SOP	
KA393AD		
KA293	8-DIP	-25 ~ + 85°C
KA293A		
KA293S	9-DIP	
KA293AS		
KA293D	8-SOP	
KA293AD		
KA2903	8-DIP	-40 ~ + 85°C
KA2903D	8-SOP	
KA2903S	9-SIP	

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.