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June 2011

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 Typical
- Compatible with all Forms of Logic
- Low Input Bias Current: 25nA Typical
- Low Input Offset Current: ±5nA Typical
- Low Offset Voltage: ±1mV Typical

Description

The KA393 / KA393A / KA2903 series consists of two independent voltage comparators designed to operate from a single power supply over a wide voltage range.

Figure 1. DIP Package

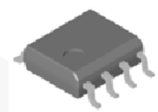

Figure 2. SOIC Package

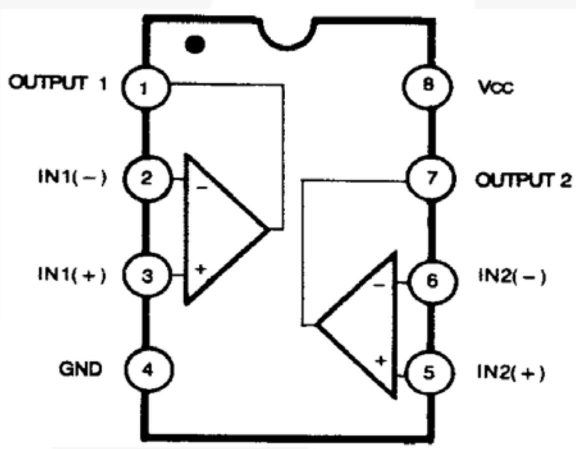

Figure 3. Block Diagram

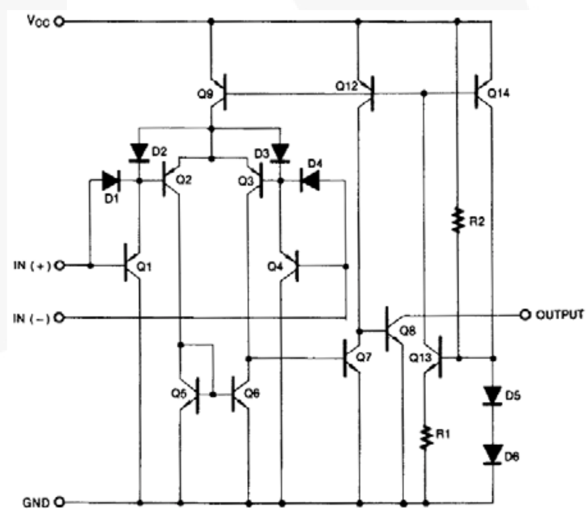

Figure 4. Schematic

Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
KA393	0 to 70°C	8-Lead DIP	Tube
KA393A	0 to 70°C		Tube
KA393DTF	0 to 70°C	8-Lead SOIC	Tape and Reel
KA393ADTF	0 to 70°C		Tape and Reel
KA2903DTF	-40 to 85°C		Tape and Reel

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V_{CC}	Power Supply Voltage		±18	36	V
$V_{I(DIFF)}$	Differential Input Voltage			36	V
V_I	Input Voltage		-0.3	+36.0	V
	Output Short Circuit to GND		Continuous		
P_D	Power Dissipation, $T_A = 25°C$	8-DIP		1040	mW
		8-SOIC		480	
T_{OPR}	Operating Temperature	KA393 / KA393A	0	+70	°C
		KA2903	-40	+85	
T_{STG}	Storage Temperature		-65	+150	°C
$R\Theta_{JA}$	Thermal Resistance, Junction-to-Ambient	8-DIP		120	°C/W
		8-SOIC		260	
ESD	Electrostatic Discharge Capability	Human Body Model, JESD22-A114		1000	V
		Charged Device Model, JESD22-C101		2000	

Electrical Characteristics

V_{CC} = 5V and T_A = 25°C, Unless otherwise specified.

Symbol	Parameter		Conditions	Min.	Typ.	Max.	Unit
V_{IO}	Input Offset Voltage	KA393	$V_{O(P)}$ =1.4V, R_S =0Ω		±1	±5	mV
			V_{CM}= 0 to1.5V, T_A= 0 to +70°C			±9	
		KA393A	$V_{O(P)}$ =1.4V, R_S =0Ω		±1	±2	
			V_{CM}= 0 to1.5V, T_A= 0 to +70°C			±4	
I_{IO}	Input Offset Current		T_A=25°C		±5	±50	nA
			T_A= 0 to +70°C			±150	
I_{BIAS}	Input Bias Current		T_A=25°C		65	250	nA
			T_A= 0 to +70°C			400	
$V_{I(R)}$	Input Common-Mode Voltage Range		T_A=25°C	0		V_{CC}-1.5	V
			T_A= 0 to +70°C	0		V_{CC}-2.0	
I_{CC}	Supply Current		R_L = ∞, V_{CC} = 5V		0.6	1.0	mA
			R_L = ∞, V_{CC} = 30V		0.8	2.5	
V_G	Voltage Gain		V_{CC} =15V, R_L≥15KΩ, (for Large $V_{O(P-P)}$ Swing)	50	200		V/mV
t_{LRES}	Large Signal Response Time		V_I =TTL Logic Swing V_{REF} =1.4V, V_{RL} =5V, R_L =5.1KΩ		350		ns
t_{RES}	Response Time		V_{RL} =5V, R_L =5.1KΩ		1.4		μs
I_{SINK}	Output Sink Current		$V_{I(-)}$≥ 1V, $V_{I(+)}$ = 0V, $V_{O(P)}$ ≤ 1.5V	6	18		mA
V_{SAT}	Output Saturation Voltage		$V_{I(-)}$ ≥ 1V, $V_{I(+)}$ =0V		160	400	mV
			I_{SINK}=4mA, T_A= 0 to +70°C			700	
$I_{O(LKG)}$	Output Leakage Current		$V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ = 5V		0.1		nA
			$V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ = 30V			1.0	μA

KA2903

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{IO}	Input Offset Voltage	$V_{O(P)}$ =1.4V, R_S =0Ω		±1	±7	mV
		V_{CM}= 0 to1.5V, T_A= -40 to +85°C		±9	±15	
I_{IO}	Input Offset Current	T_A=25°C		±5	±50	nA
		T_A= -40 to +85°C		±50	±200	
I_{BIAS}	Input Bias Current	T_A=25°C		65	250	nA
		T_A= -40 to +85°C			500	
$V_{I(R)}$	Input Common-Mode Voltage Range	T_A=25°C	0		V_{CC}-1.5	V
		T_A= -40 to +85°C	0		V_{CC}-2.0	
I_{CC}	Supply Current	R_L = ∞, V_{CC} = 5V		0.6	1.0	mA
		R_L = ∞, V_{CC} = 30V		1.0	2.5	
V_G	Voltage Gain	V_{CC} =15V, R_L≥15KΩ, (for Large $V_{O(P-P)}$ Swing)	25	100		V/mV
t_{LRES}	Large Signal Response Time	V_I =TTL Logic Swing V_{REF} =1.4V, V_{RL} =5V, R_L =5.1KΩ		350		ns
t_{RES}	Response Time	V_{RL} =5V, R_L =5.1KΩ		1.5		μs
I_{SINK}	Output Sink Current	$V_{I(-)}$≥ 1V, $V_{I(+)}$ = 0V, $V_{O(P)}$ ≤ 1.5V	6	16		mA
V_{SAT}	Output Saturation Voltage	$V_{I(-)}$ ≥ 1V, $V_{I(+)}$ =0V		160	400	mV
		I_{SINK}=4mA, T_A= -40 to +85°C			700	
$I_{O(LKG)}$	Output Leakage Current	$V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ = 5V		0.1		nA
		$V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ = 30V			1.0	μA

Typical Performance Characteristics

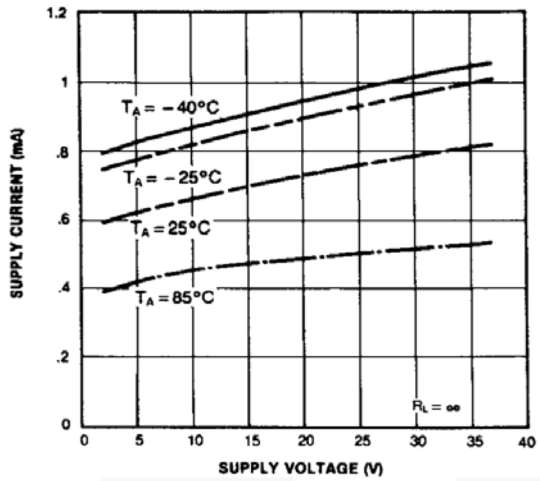

Figure 5. Supply Current vs. Supply Voltage

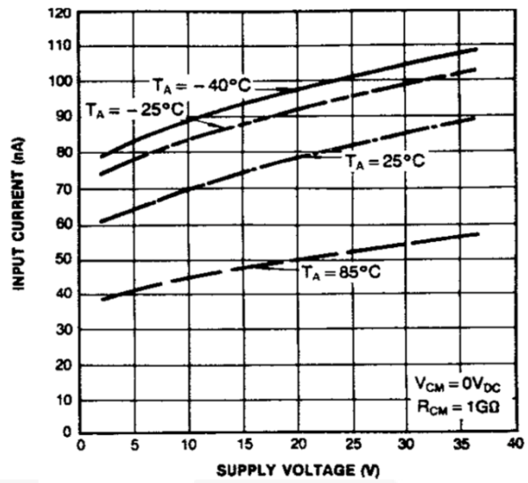

Figure 6. Input Current vs. Supply Voltage

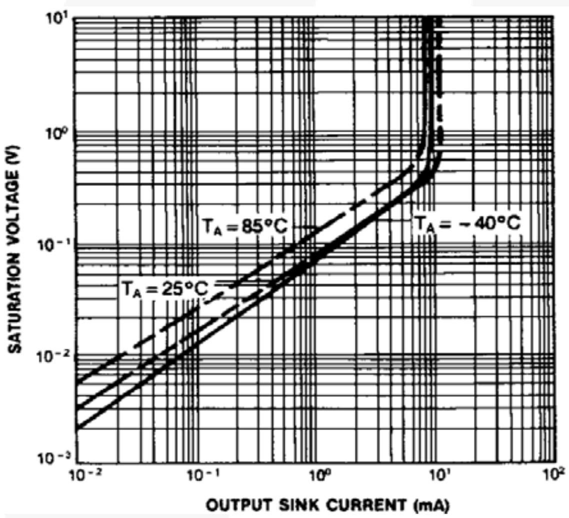

Figure 7. Output Saturation Voltage vs. Sink Current

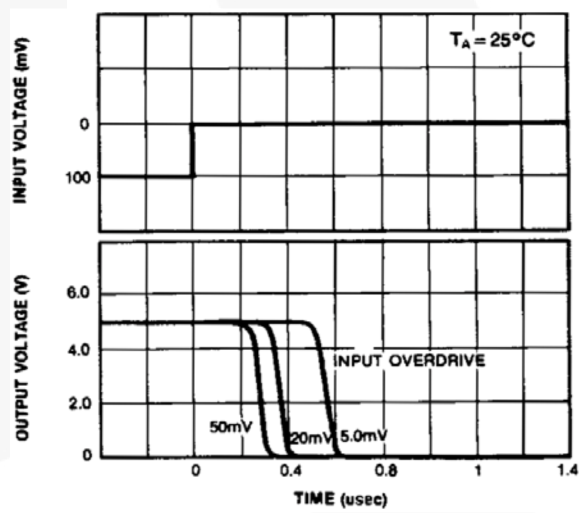

Figure 8. Response Time for Various Input Overdrive-Negative Transitions

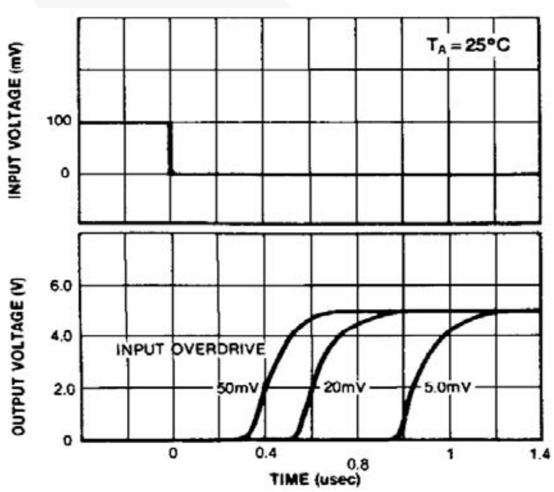

Figure 9. Response Time for Various Input Overdrive-Positive Transitions

Physical Dimensions

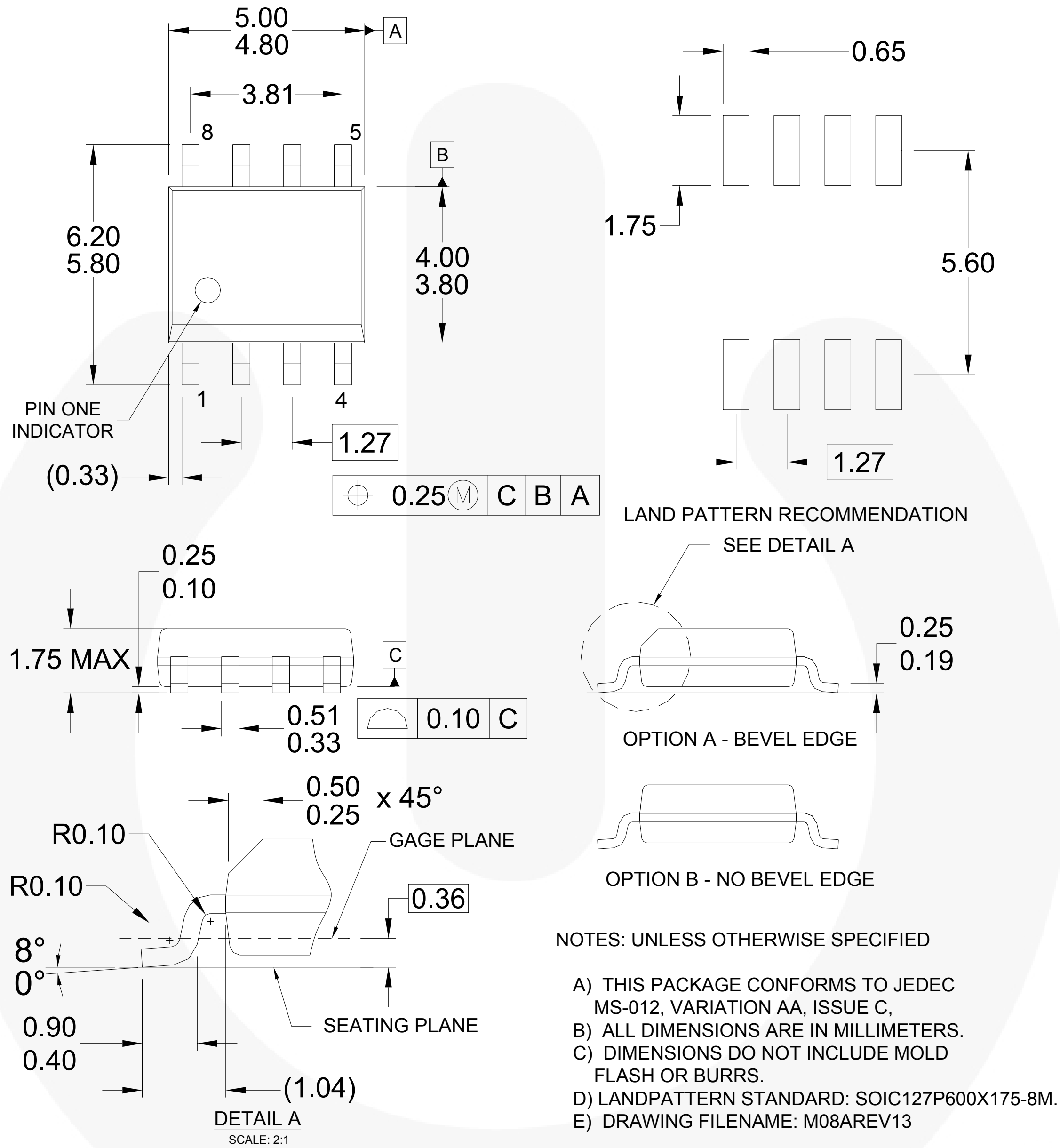

Figure 10.8-Lead, Small-Outline Integrated Circuit (SOIC), JEDEC MS-012, .150" Narrow Body

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Physical Dimensions

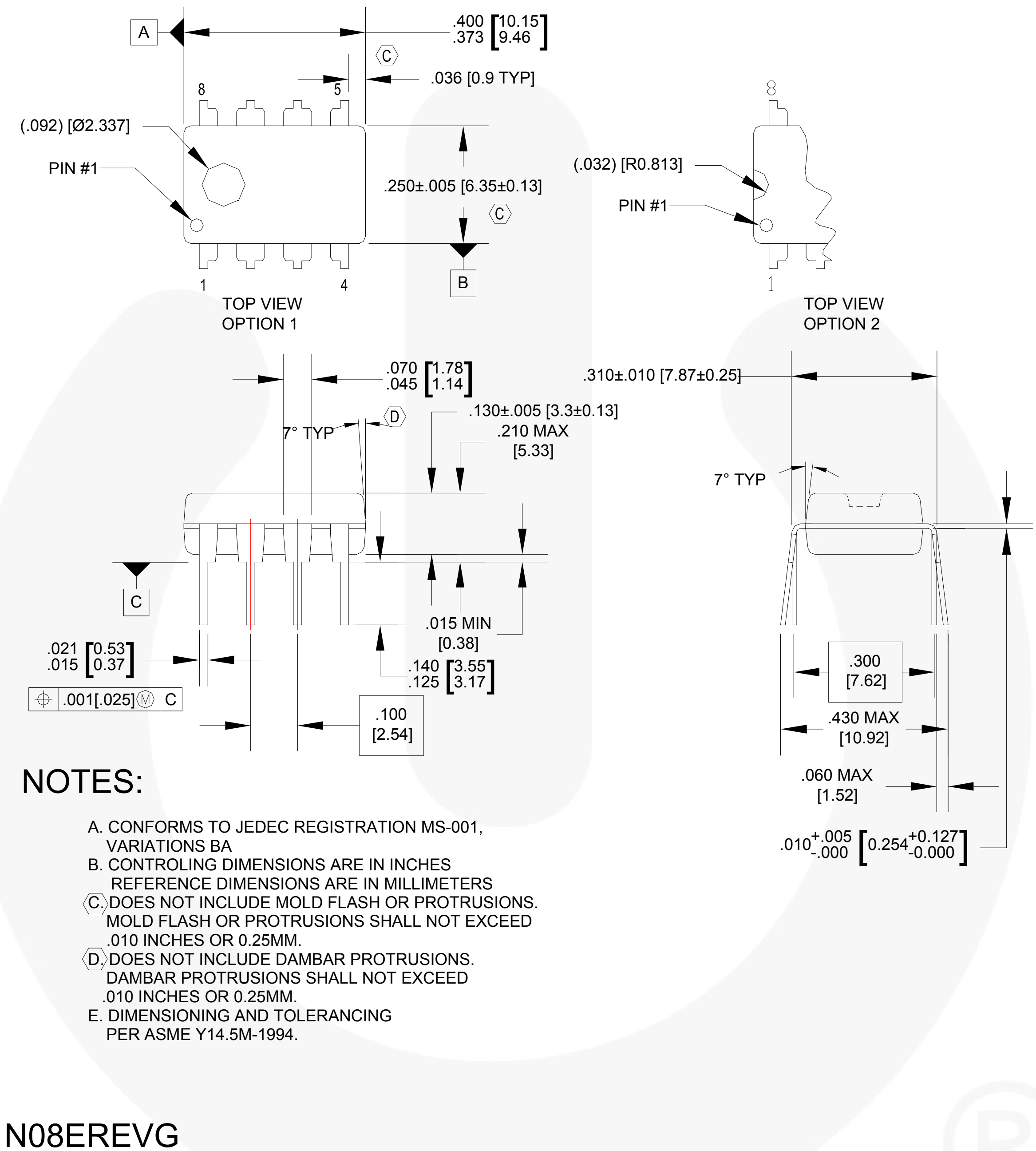

Figure 1. 8-Lead, DIP, JEDEC MS-001, .300" Wide

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