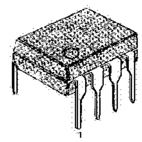
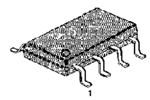
DUAL DIFFERENTIAL COMPARATOR

The LM293 series consists of two independent voltage comparators designed to operate from a single power supply over a wide voltage range.

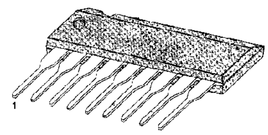
8 DIP

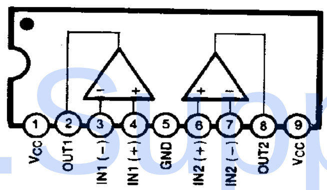


8 SOP



9 SIP

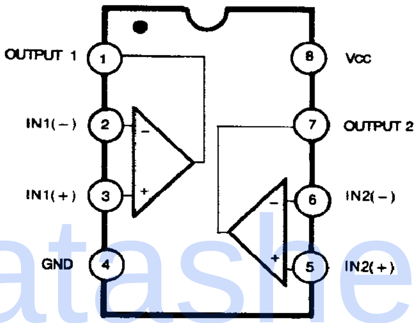




FEATURES

- 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 WP
- Low Offset Voltage ±1mV Typ

BLOCK DIAGRAM



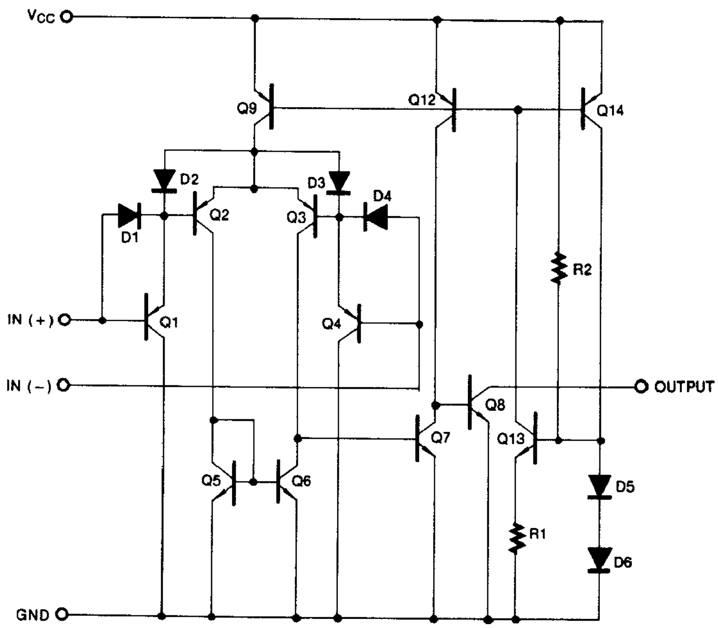
ORDERING INFORMATION

Device	Package	Operating Temperature
LM393N LM393AN	8 DIP	0 ~ + 75°C
LM393S LM393AS	9 SIP	
LM393M LM393AM	8 SOP	
LM293N LM293AN	8 DIP	-25 ~ + 85°C
LM293S LM293AS	9 DIP	
LM293M LM293AM	8 SOP	
LM2903N	8 DIP	-40 ~ + 85°C
LM2903M	8 SOP	
LM2903S	9 SIP	

FAIRCHILD SEMICONDUCTOR TM

Rev. B

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristic	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	P_D	570	mW
Operating Temperature LM393/LM393A LM293/LM293A LM2903	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)

Characteristic	Symbol	Test Conditions		LM293A/LM393A			LM293/LM393			Unit
				Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V_{IO}	V_{CM} =0V to V_{CC} =1.5V			±1	±2		±1	±5	mV
		$V_{O(P)}$ =1.4V, R_S =0Ω	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}	$R_L = \infty$			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≥15KΩ (for large $V_{O(P-P)swing}$)		50	200		50	200		V/mV
Large Signal Response Time	t_{RES}	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, VI(+) =0V			160	400		160	400	mV
		I_{SINK} = 4mA	NOTE 1			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

NOTE 1
LM393/A: 0≤T_A≤ +70°C
LM293/A: -25≤T_A≤ +85°C
LM2903: -40≤T_A≤ +85°C

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

Characteristic	Symbol	Test Conditions		LM2903 Min	LM2903 Typ	LM2903 Max	Unit
Input Offset Voltage	V_{IO}	V_{CM} =0V to V_{CC} =1.5V			±1	±7	mV
		$V_{O(P)}$ =1.4V, R_S =0Ω	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≥15KΩ(for large $V_{O(P-P)swing}$)		25	100		V/mV
Large Signal Response Time	t_{RES}	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, VI(+) =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
LM393/A: 0≤T_A≤ +70°C
LM293/A: -25≤T_A≤ +85°C
LM2903: -40≤T_A≤ +85°C

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 SUPPLY CURRENT

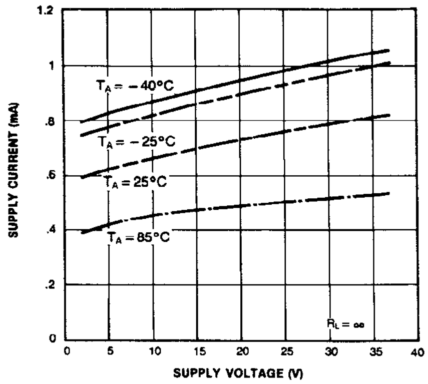


Fig. 2 INPUT CURRENT

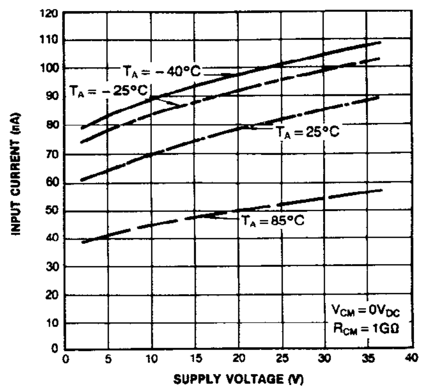


Fig. 3 OUTPUT SATURATION VOLTAGE

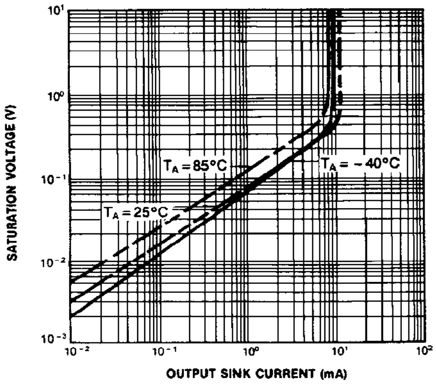


Fig. 4 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-NEGATIVE TRANSITION

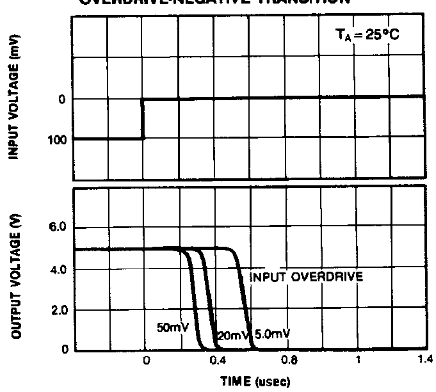
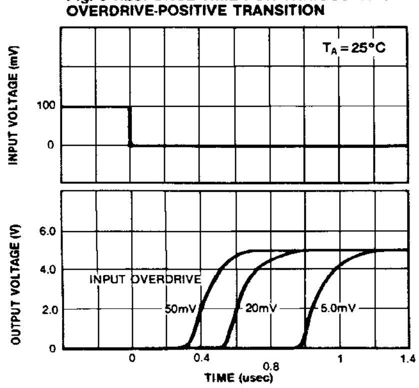


Fig. 5 RESPONSE TIME FOR VARIOUS INPUT OVERDRIVE-POSITIVE TRANSITION



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