

# LM393

# LINEAR INTEGRATED CIRCUIT

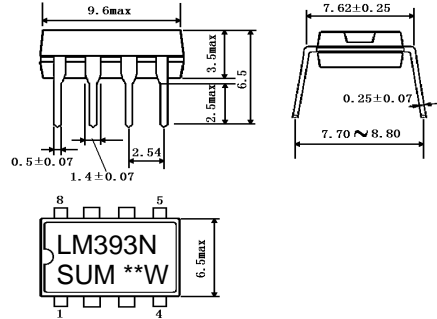
## QUAD DIFFERENTIAL COMPARATOR

### DESCRIPTION

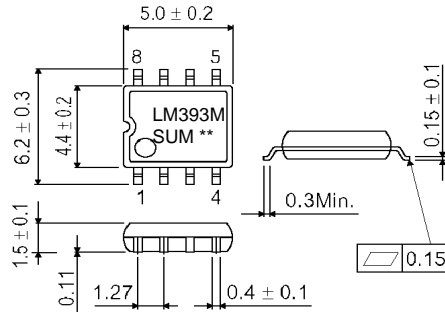
The LM393 consists of two independent voltage comparators designed specifically to operate from a single power supply over a wide voltage range.

### FEATURES

- \*Single or dual supply operation
- \*Wide operating supply range  
( $V_{CC}=2V\sim 32V$  or  $\pm 1$  to  $\pm 16V$ )
- \*Input common-mode voltage includes ground
- \*Low supply current drain:  $I_{CC}=0.8mA$  (Typical)
- \*Low input bias current  $I_{bias}=25nA$  (Typical)
- \*Output compatible with TTL, DTL, and CMOS logic system

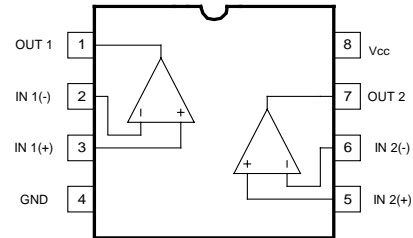
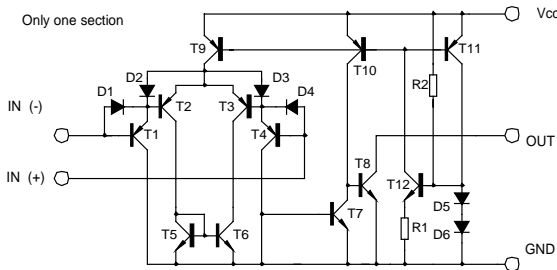


DIP-8



SOP-8

### BLOCK DIAGRAM



### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^{\circ}C$ )

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	$\pm 16$ OR 32	V
Differential input voltage	$V_i(\text{diff})$	32	V
Input Voltage	$V_I$	-0.3~32V	V
Power Dissipation	$P_d$	570	mW
Operating Temperature	$T_{opr}$	0 to +70	$^{\circ}C$
Storage Temperature	$T_{stg}$	-65 to 150	$^{\circ}C$

**ELECTRICAL CHARACTERISTICS**(V<sub>CC</sub>=5.0V, T<sub>a</sub>=25°C, All voltage referenced to GND unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	V <sub>IO</sub>	V <sub>CM</sub> =0 to V <sub>CC</sub> -1.5 V <sub>O(p)</sub> =1.4V, R <sub>S</sub> =0		±1.0	±5.0	mV
Input offset current	I <sub>IO</sub>			±5	±50	nA
Input Bias current	I <sub>B</sub>			65	250	nA
Input Common-mode voltage range	V <sub>I(R)</sub>		0		V <sub>CC</sub> -1.5	V
Supply Current	I <sub>CC</sub>	R <sub>L</sub> =∞		0.6	1.0	mA
		R <sub>L</sub> =∞, V <sub>CC</sub> =30V		0.8	2.5	mA
Large signal Voltage Gain	G <sub>V</sub>	V <sub>CC</sub> =15V, R <sub>L</sub> >15kΩ	50	200		V/mV
Large signal response time	t <sub>res</sub>	V <sub>i</sub> =TTL logic wing V <sub>ref</sub> =1.4V, V <sub>RL</sub> =5V, R <sub>L</sub> =5.1kΩ		350		ns
Response time	t <sub>res</sub>	V <sub>RL</sub> =5V, R <sub>L</sub> =5.1kΩ		1400		ns
Output sink current	I <sub>sink</sub>	V <sub>i(-)</sub> >1V, V <sub>i(+)</sub> =0V, V <sub>O(p)</sub> <1.5V	6	18		mA
Output saturation voltage	V <sub>sat</sub>	V <sub>i(-)</sub> >1V, V <sub>i(+)</sub> =0V, I <sub>sink</sub> =4mA	160	400		mV
output leakage current	I <sub>leakage</sub>	V <sub>i(+)</sub> =1V, V <sub>i(-)</sub> =0, V <sub>O(p)</sub> =5V	0.10			nA

TYPICAL CHARACTERISTICS PERFORMANCE

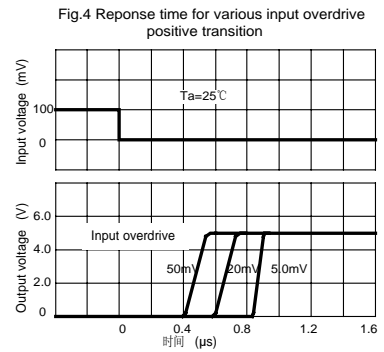
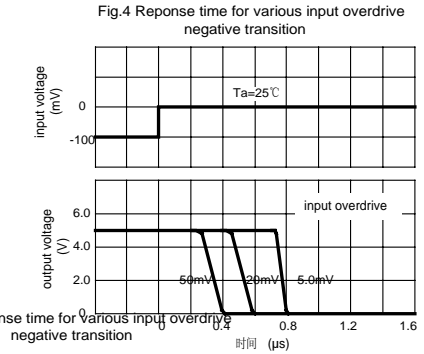
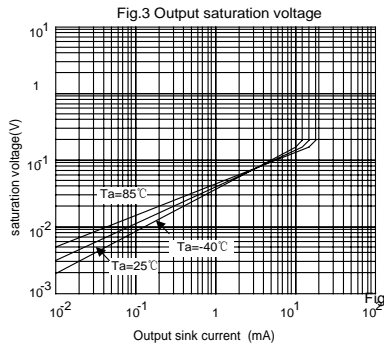
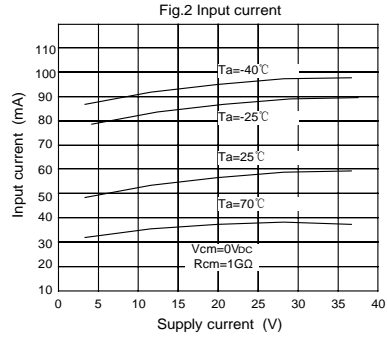
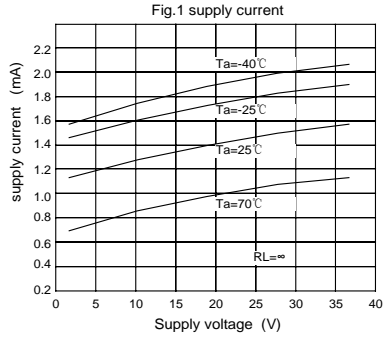


Fig.7

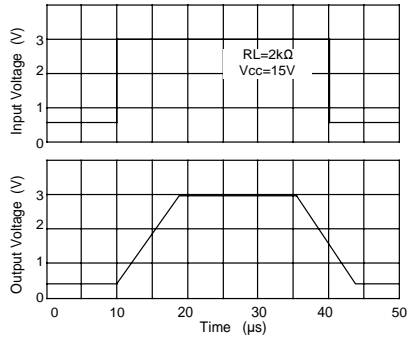


Fig.8 voltage Follower pulse response (small signal)

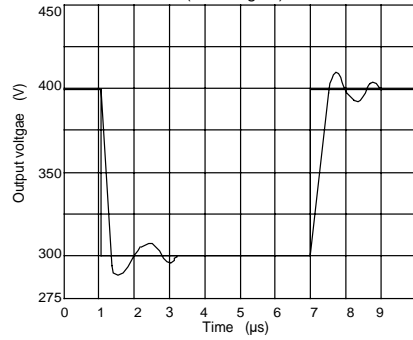


Fig.9 Large signal Frequency Response

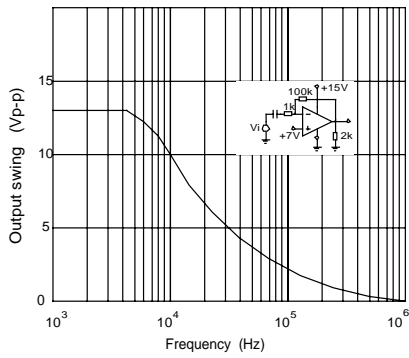


Fig.10 Output Characteristics current sourcing

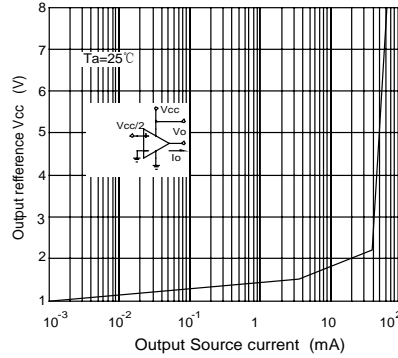


Fig.11 Output Characteristics Current sinking

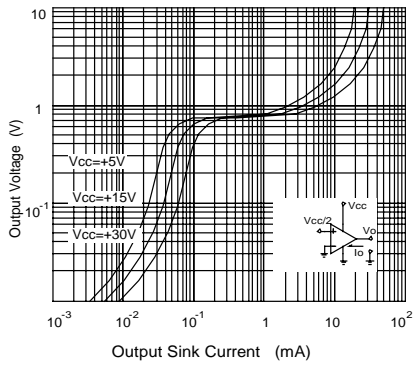


Fig.12 Current Limiting

