



# LM393

## LINEAR INTEGRATED CIRCUIT

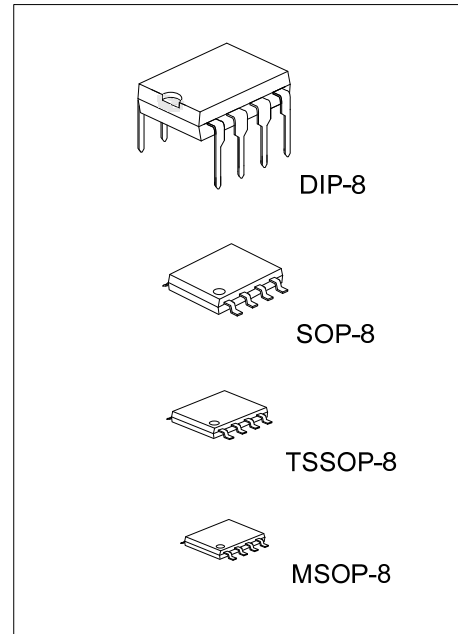
### DUAL DIFFERENTIAL COMPARATOR

#### DESCRIPTION

The UTC **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 ( $V_{CC}=2V \sim 36V$  or  $\pm 1 \sim \pm 18V$ )
- \* 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.

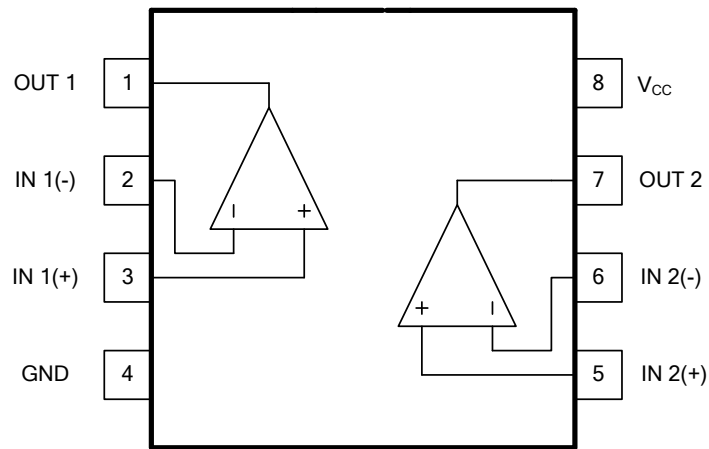


#### ORDERING INFORMATION

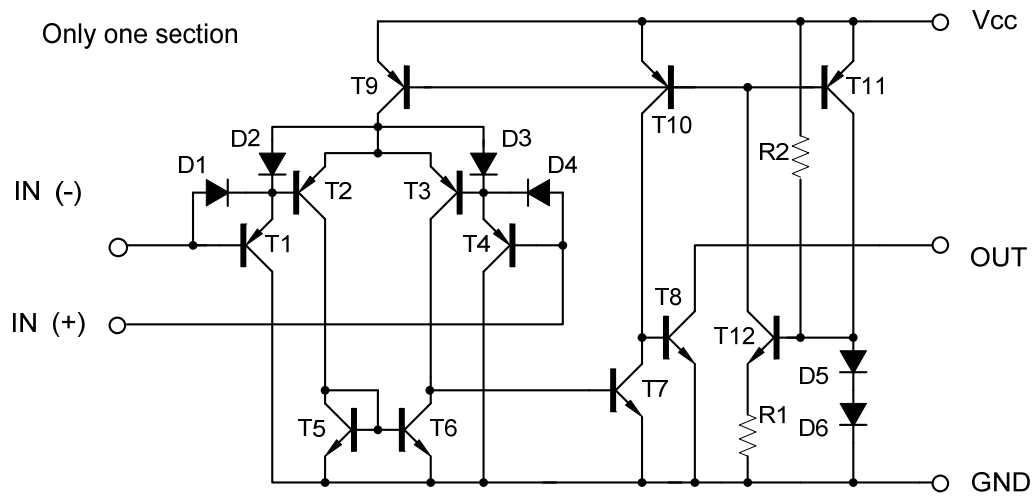
Ordering Number		Package	Packing
Lead Free Plating	Halogen-Free		
LM393L-D08-T	LM393G-D08-T	DIP-8	Tube
LM393L-S08-R	LM393G-S08-R	SOP-8	Tape Reel
LM393L-P08-R	LM393G-P08-R	TSSOP-8	Tape Reel
LM393L-SM1-R	LM393G-SM1-R	MSOP-8	Tape Reel

<p>LM393L-D08-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Plating</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) D08: DIP-8, S08: SOP-8, P08: TSSOP-8, SM1: MSOP-8</p> <p>(3) L: Lead Free, G: Halogen Free</p>
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## ■ PIN DESCRIPTION



## ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		$V_{CC}$	$\pm 18$ or 36	V
Differential Input Voltage		$V_{I(DIFF)}$	$\pm 36$	V
Input Voltage		$V_{IN}$	-0.3 ~ +36	V
Power Dissipation	DIP-8	$P_D$	600	mW
	SOP-8		420	mW
	TSSOP-8		350	mW
	MSOP-8		300	mW
Operating Temperature Range		$T_{OPR}$	-20 ~ +85	°C
Storage Temperature Range		$T_{STG}$	-65 ~ +150	°C

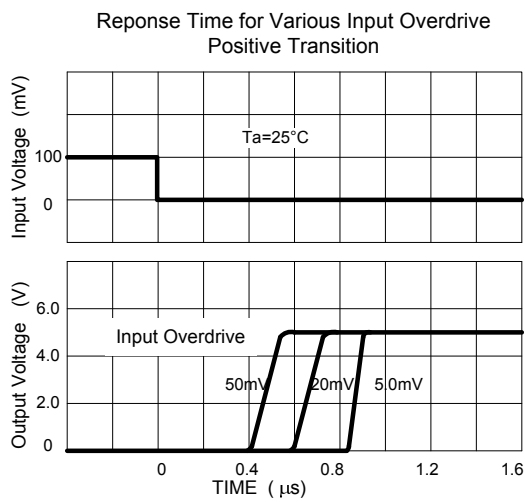
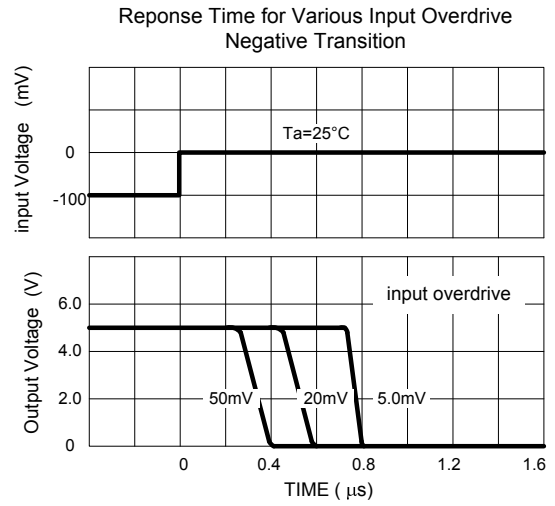
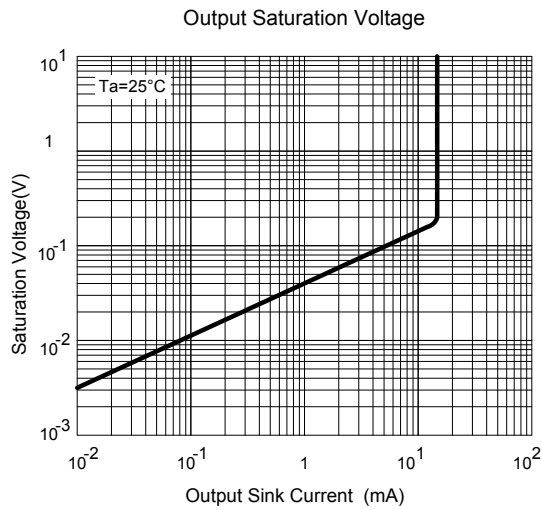
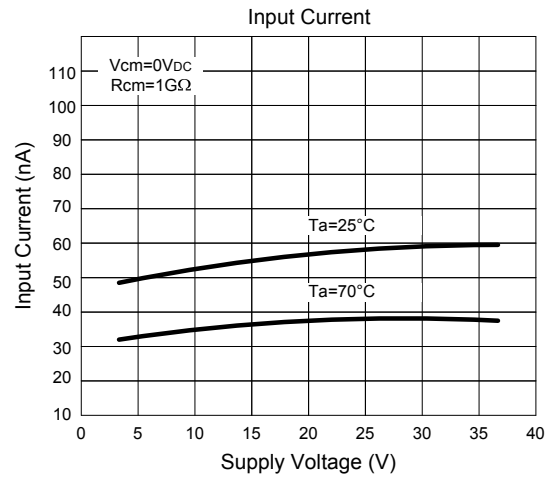
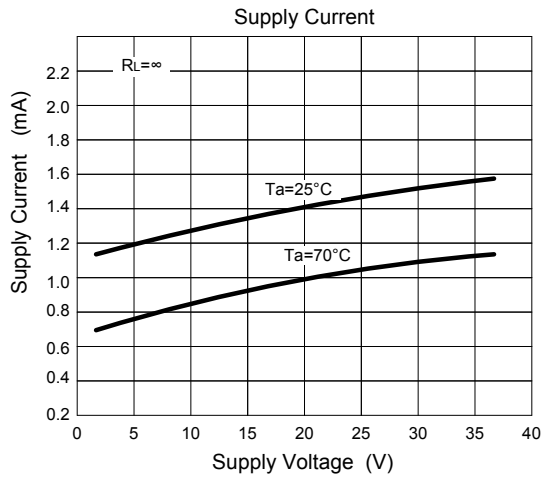
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ ELECTRICAL CHARACTERISTICS

( $V_{CC}=5.0V$ ,  $T_A=25^\circ C$ , All voltage referenced to GND unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{I(OFF)}$	$V_{CM}=0V$ to $V_{CC}-1.5V$ $V_{O(P)}=1.4V$ , $R_S=0\Omega$		1.0	5.0	mV
Output Saturation Voltage	$V_{SAT}$	$V_{I(-)}>1V$ , $V_{I(+)}=0V$ , $I_{SINK}=4mA$		160	400	mV
Input Common Mode Voltage	$V_{I(CM)}$	$V_{CC}=30V$	0		$V_{CC}-1.5$	V
Large Signal Voltage Gain	$G_V$	$V_{CC}=15V$ , $R_L \geq 15k\Omega$	50	200		V/mV
Power Supply Current	$I_{CC}$	$R_L=\infty$ , $V_{CC}=30V$		0.8	2.5	mA
		$R_L=\infty$		0.6	1.0	mA
Input Offset Current	$I_{I(OFF)}$			5	50	nA
Input Bias Current	$I_{I(BIAS)}$			65	250	nA
Output Sink Current	$I_{O(SINK)}$	$V_{I(-)}>1V$ , $V_{I(+)}=0V$ , $V_{O(P)}<1.5V$	6	18		mA
Output Leakage Current	$I_{O(LEAK)}$	$V_{I(+)}=1V$ , $V_{I(-)}=0$		0.1		nA
					1.0	$\mu A$
Large Signal Response Time	$t_R$	$V_{IN}$ =TTL logic wing $V_{REF}=1.4V$ , $V_{RL}=5V$ , $R_L=5.1k\Omega$		350		ns
Response Time	$t_R$	$V_{RL}=5V$ , $R_L=5.1k\Omega$		1400		ns

## TYPICAL CHARACTERISTICS



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