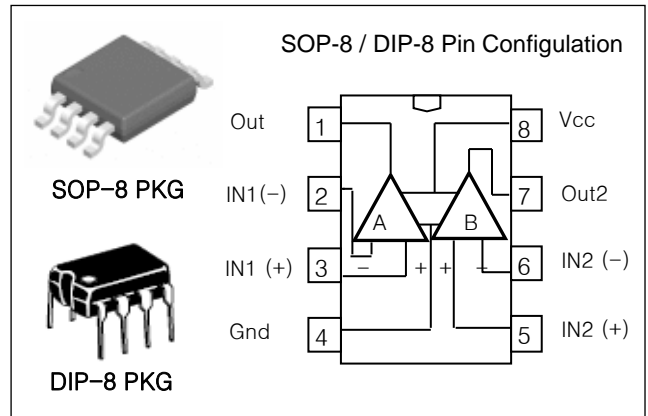


## FEATURES

- Single Supply Operation : 2V to 30V
- Dual Supply Operation :  $\pm 1V$  to  $\pm 15V$
- Allow Comparison of Voltages Near Ground Potential
- Compatible with all Forms of Logic
- Low Input Biasing Current
- Low Input Offset Current
- Low Offset Voltage
- Moisture Sensitivity Level 3
- Low supply current drain independent of supply voltage.



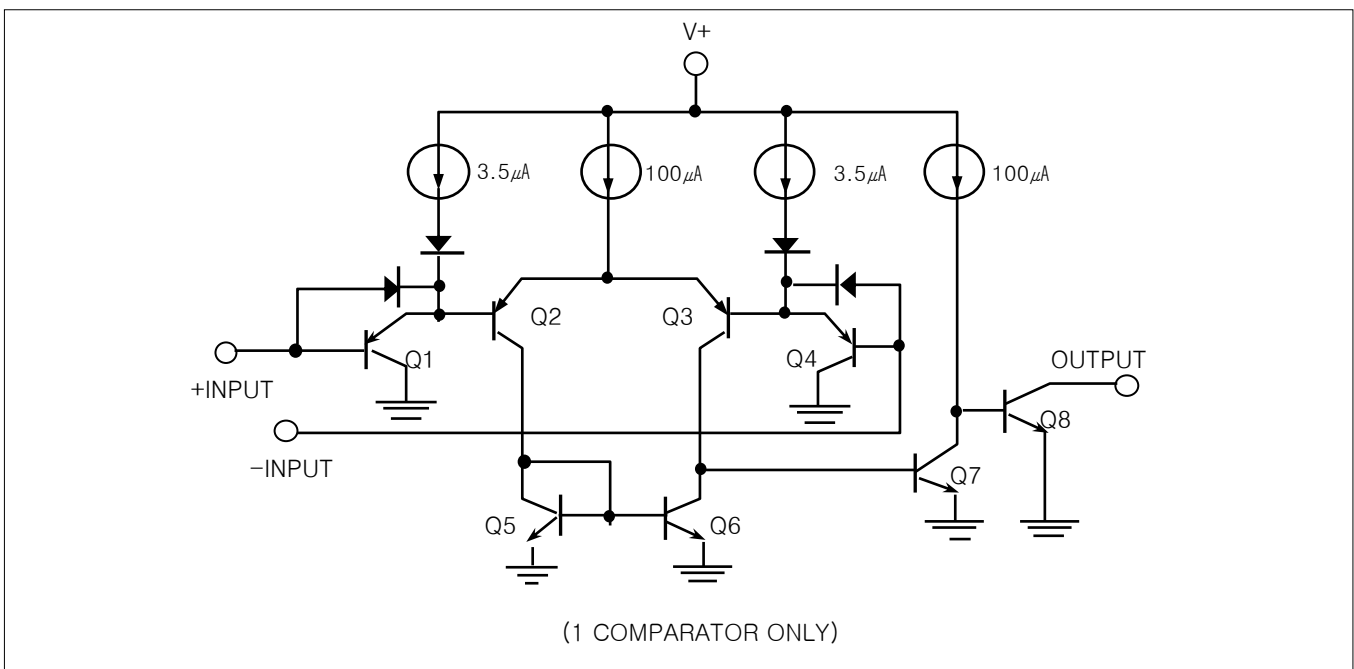
## ORDERING INFORMATION

Device	Package
LM393D	8 SOP
LM393N	8 DIP

## DESCRIPTION

The LM393 series consists of two independent precision voltage comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. The output can be connected to other open-collector outputs to achieve wired-A relationships.

## EQUIVALENT CIRCUIT



## ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	VALUE	UNIT
Power Supply Voltage	$V_{CC}$	$\pm 17$ or 34	V
Differential Input Voltage	$V_{I(DIFF)}$	34	V
Input Voltage	$V_I$	-0.3 to +34	V
Output Short Circuit to GND		Continuous	
Power Dissipation	$P_D$	570	mW
Operating Temperature Range	$T_{OPR}$	0~+70	°C
Storage Temperature Range	$T_{STG}$	-65 to +150	°C

## Electrical characteristics at specified free-air temperature, $V_{CC}=5V$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*	LM393			UNIT	
		MIN	TYP	MAX		
$V_{IO}$ Input Offset Voltage	$V_{CC}=5V$ to 30V $V_{IC}=V_{ICR}$ MIN, $V_O=1.4V$	25°C	2	5	mV	
		Full Range		9		
$I_{IO}$ Input Offset Current	$V_O=1.4V$	25°C	5	50	nA	
		Full Range		150		
$I_{IB}$ Input Bias Current	$V_O=1.4V$	25°C	-25	-250	nA	
		Full Range		-400		
$V_{ICR}$ Common-Mode Input Voltage Range**		25°C	0	$V_{CC}-1.5$	V	
		Full Range	0	$V_{CC}-2.0$		
$A_{VD}$ Large-Signal Differential Voltage Amplification	$V_{CC}=15V$ , $V_O=1.4V$ to 11.4V, $R_L \geq 15k\Omega$ to $V_{CC}$	25°C	50	200	V/mV	
$I_{OH}$ High-Level Output Current	$V_{OH}=5V$ , $V_{ID}=1V$ $V_{OH}=30V$ , $V_{ID}=1V$	25°C	0.1	50	nA	
		Full Range		1	$\mu A$	
$V_{OL}$ Low-Level Output Voltage	$I_{OL}=4mA$ , $V_{ID}=-1V$	25°C		150	400	mV
		Full Range			700	
$I_{OL}$ Low-Level Output Current	$V_{OL}=1.5V$ , $V_{ID}=-1V$	25°C	6		mA	
$I_{CC}$ Supply Current	$R_L=\infty$	$V_{CC}=5V$	25°C	0.8	1	mA
		$V_{CC}=30V$	Full Range		2.5	

\* Full range (MIN to MAX), for LM393 is 0°C to 70°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

\*\* The voltage at either input or common-mode should not be allowed to go negative by more than 0.3V.

The upper end of the common-mode voltage range is  $V_{CC} - 1.5V$ , but either or both inputs can go to 30V without damage.

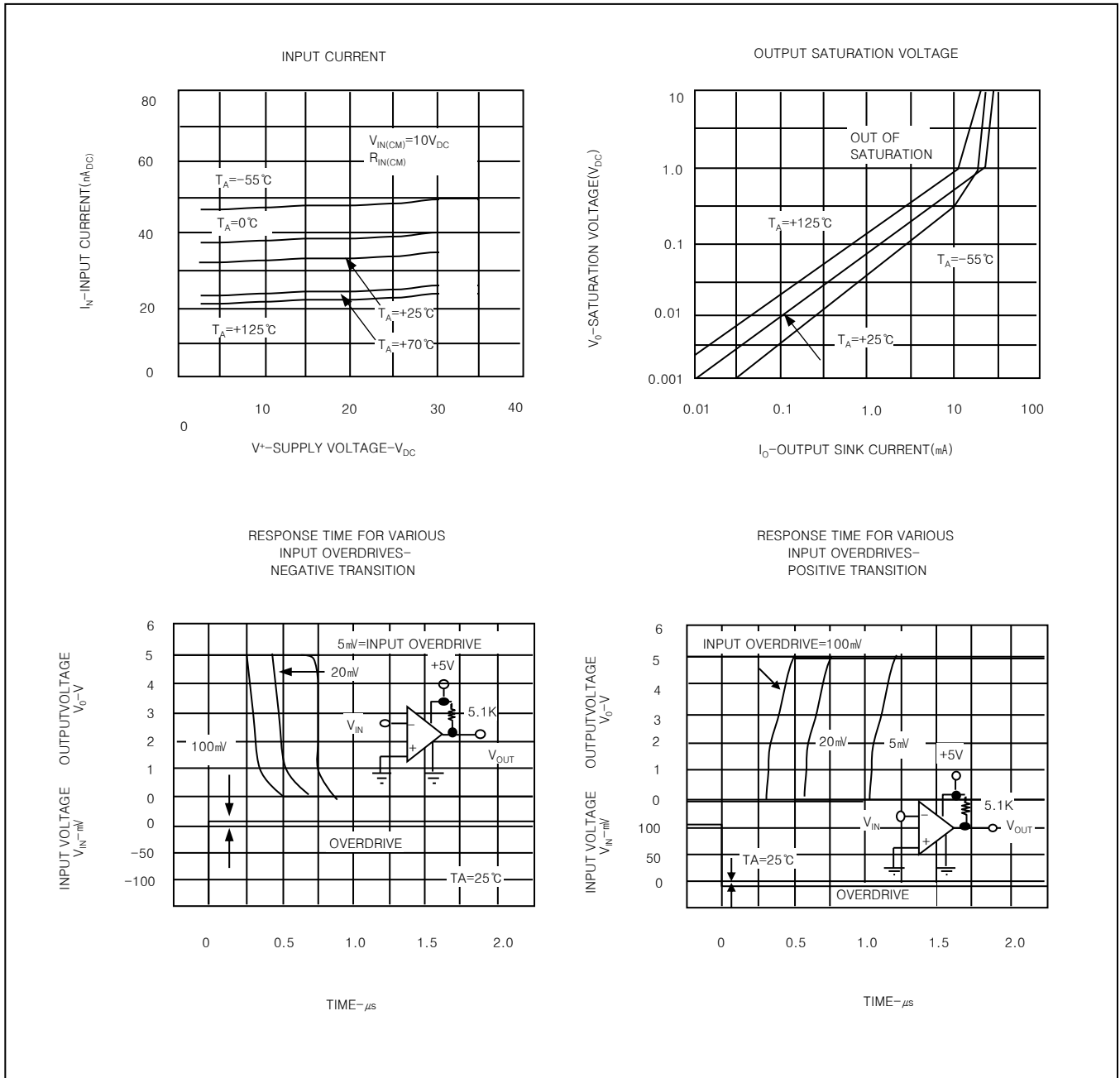
## Switching characteristics, $V_{CC}=5V$ , $T_A=25^\circ C$

PARAMETER	TEST CONDITION	LM393			UNIT
		MIN	TYP	MAX	
Response Time	$R_L$ Connected to 5V Through 5.1k $\Omega$ , $C_L=15pF$ *(See Note 1)	100-mV Input Step with 5-mV Overdrive		1.3	$\mu s$
		TTL-Level Input Step		0.3	

\*  $C_L$  includes probe and jig capacitance.

Note 1 : The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL APPLICATIONS

