

# QUAD VOLTAGE COMPARATOR

LM339

## FEATURES

- Wide single supply voltage range  $2.0V_{DC}$  TO  $36V_{DC}$  or dual supplies  $\pm 1.0V_{DC}$  to  $\pm 18V_{DC}$
- Very low supply current drain ( $0.8mA$ ) independent of supply voltage ( $1.0mW/comparator$  at  $5.0V_{DC}$ )
- Low input biasing current  $25nA$
- Low input offset current  $\pm 5nA$  and offset voltage
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Low output  $250mV$  at  $4mA$  saturation voltage
- Output voltage compatible with TTL, DTL, ECL, MOS and CMOS logic system
- Moisture Sensitivity Level 3

## APPLICATION

- A/D Converters
- Wide range VOC
- MOS clock generator
- High voltage logic gate
- Multivibrators

## DESCRIPTION

The LM339 consists of four independent precision voltage comparators, with an offset voltage specification as low as  $20mV$  max for each comparator, which were designed specifically to operate from a single power supply over a wide range of voltages.

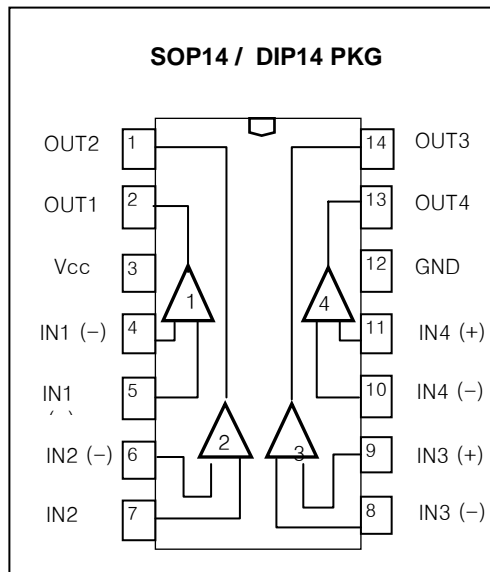
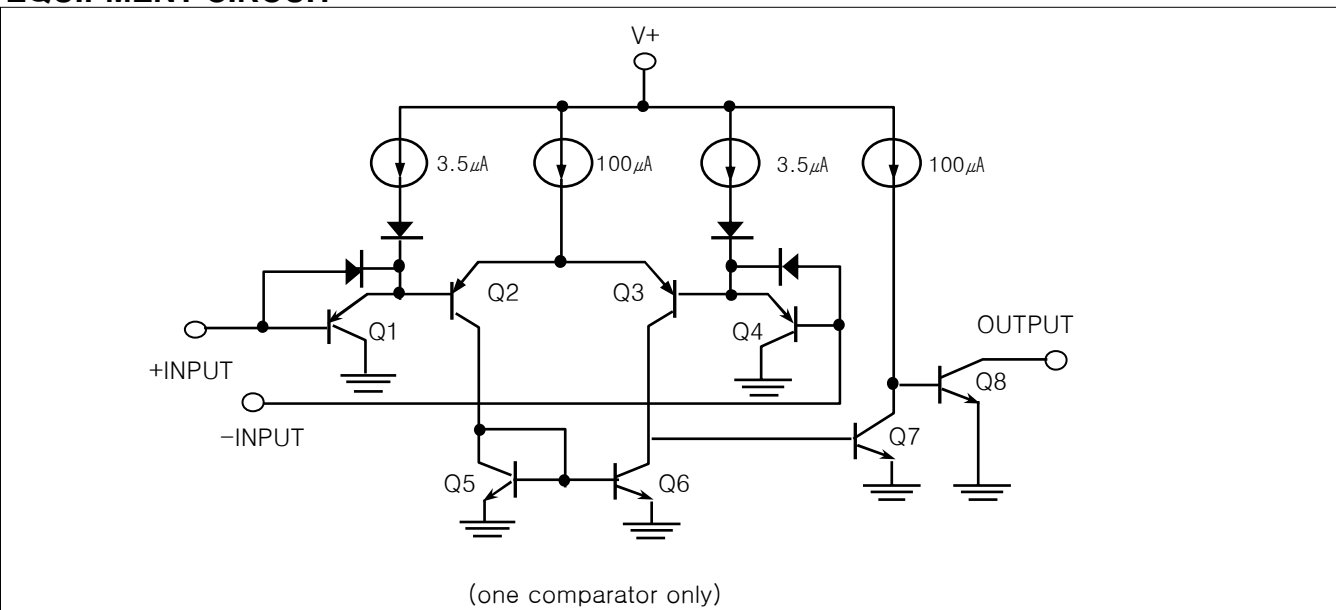
Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though they are operated from a single power supply voltage.

The LM339 series was designed to directly interface with TTL and CMOS.

When operated from both plus and minus power supplies, the LM339 series will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators.

## EQUIPMENT CIRCUIT



## ORDERING INFORMATION

Device	Package
LM339D	SOP 14
LM339N	DIP 14

## ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	$\pm 18$ 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	$T_{OPR}$	0~+70	°C
Storage Temperature	$T_{STG}$	-65 to +150	°C

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

PARAMETER	TEST CONDITION*		LM339			UNIT	
			MIN	TYP	MAX		
$V_{IO}$ Input Offset Voltage	$V_{CC}=5V$ to 30V $V_{IC}=V_{ICRMIN}$ , $V_O=1.4V$	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	0to $V_{CC}-1.5$			V	
		Full Range	0to $V_{CC}-2$				
$A_{VD}$ 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	2	mA
		$V_{CC}=30V$	Full Range			2.5	

\* Full range (MIN to MAX), for LM339 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.

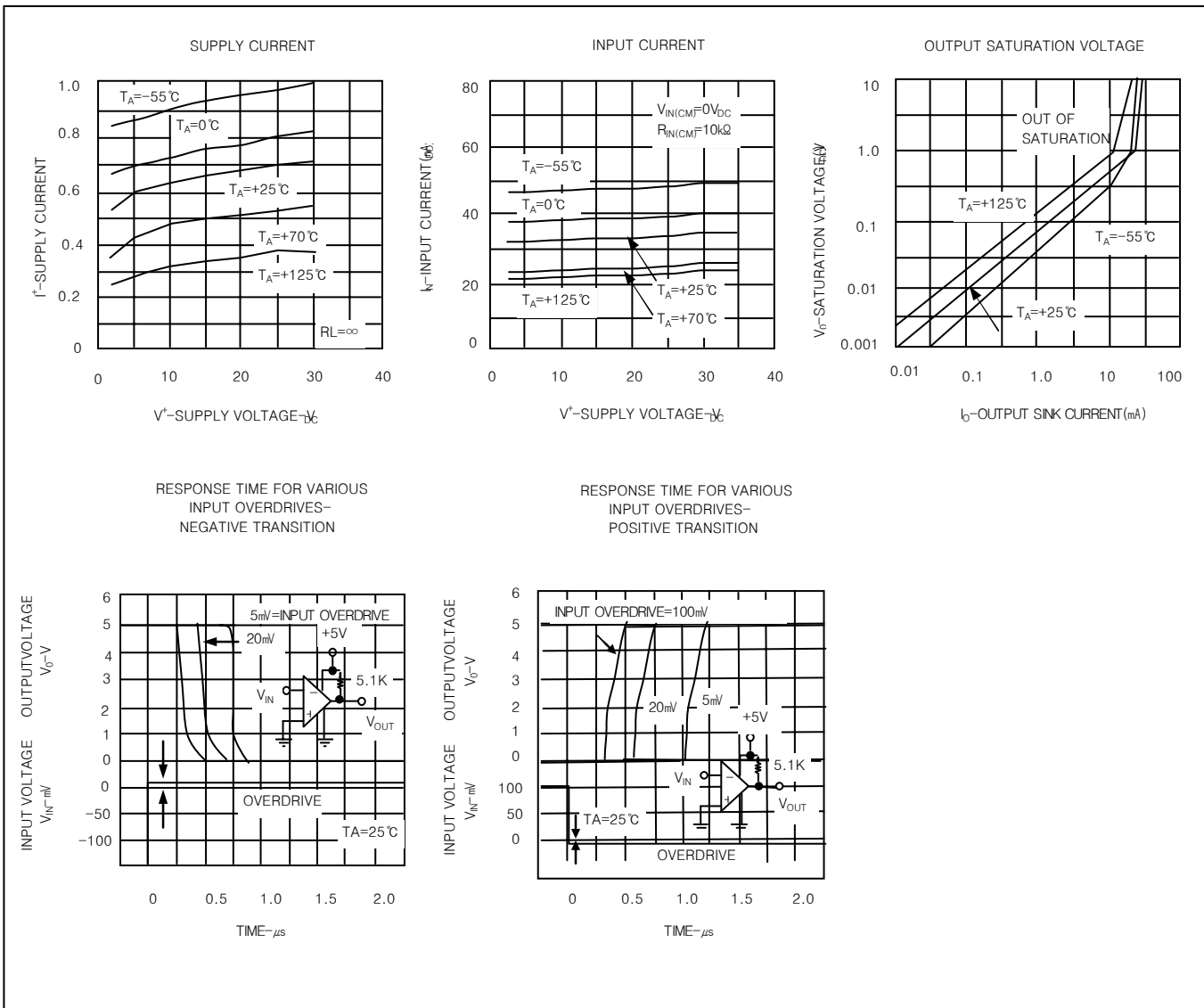
## Switching characteristics, $V_{CC}=5V$ , $T_A=25^\circ C$

PARAMETER	TEST CONDITIONS		LM339			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

