

# DBL 339

## QUAD VOLTAGE COMPARATOR

Specially designed to offer a versatility as high as possible

### FEATURES

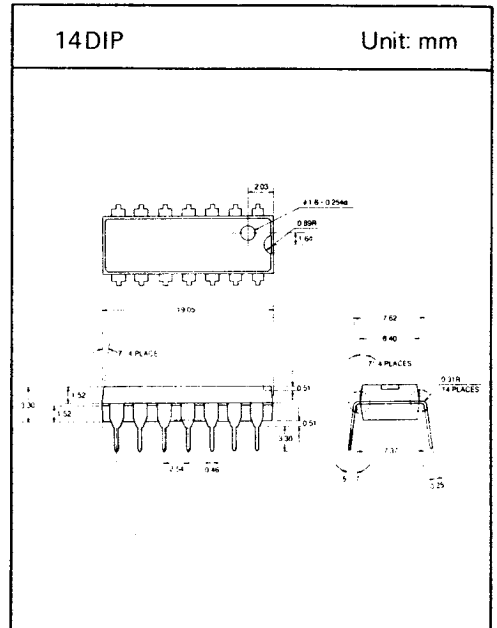
- Low current drain : 0.8mA
- Allows sensing near ground
- Logic output compatible with TTL, DTL, ECL, MOS and CMOS
- Low input biasing current
- Low input offset current
- Low output saturation voltage
- Wide supply voltage range :  
     Single : 2V~36V  
     Dual : ±1V~18V

### APPLICATIONS

- High precision comparators
- Driving logic systems
- Various multivibrators
- Generators and Oscillators

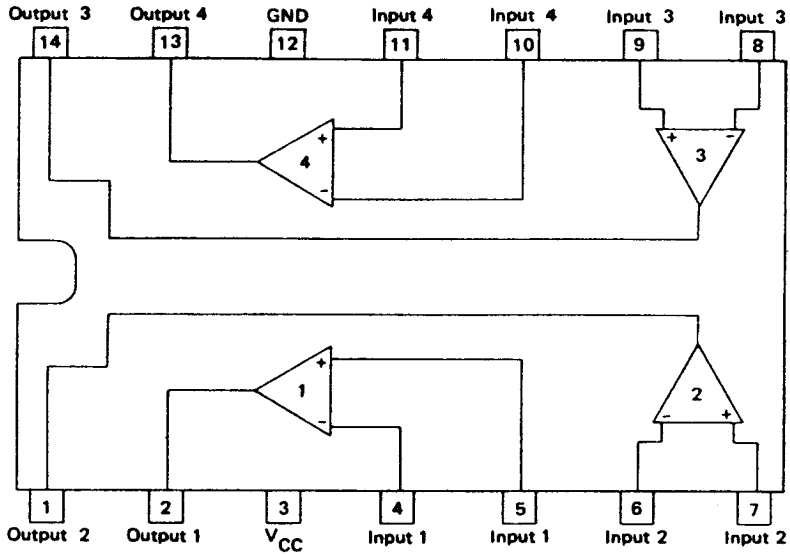
### MAXIMUM RATINGS

Characteristic	Symbol	Rating	Unit
Supply Voltage	$V_{CC}$	36 or $\pm 18$	V
Differential Input Voltage	$V_{IND}$	36	V
Input Voltage	$V_{IN}$	-0.3~36	V
Power Dissipation	$P_D$	570	mW
Operating Temperature	$T_{opr}$	0~+70	°C
Storage Temperature	$T_{stg}$	-55~+150	°C

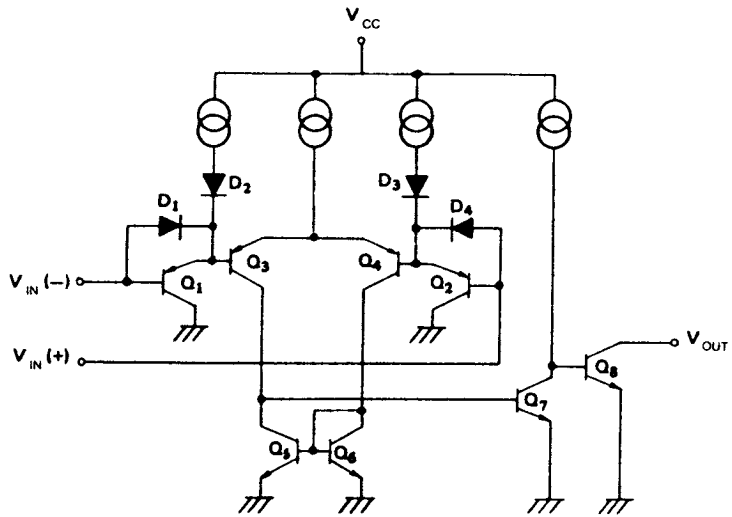


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## □ BLOCK DIAGRAM



## □ EQUIVALENT CIRCUIT (One section)



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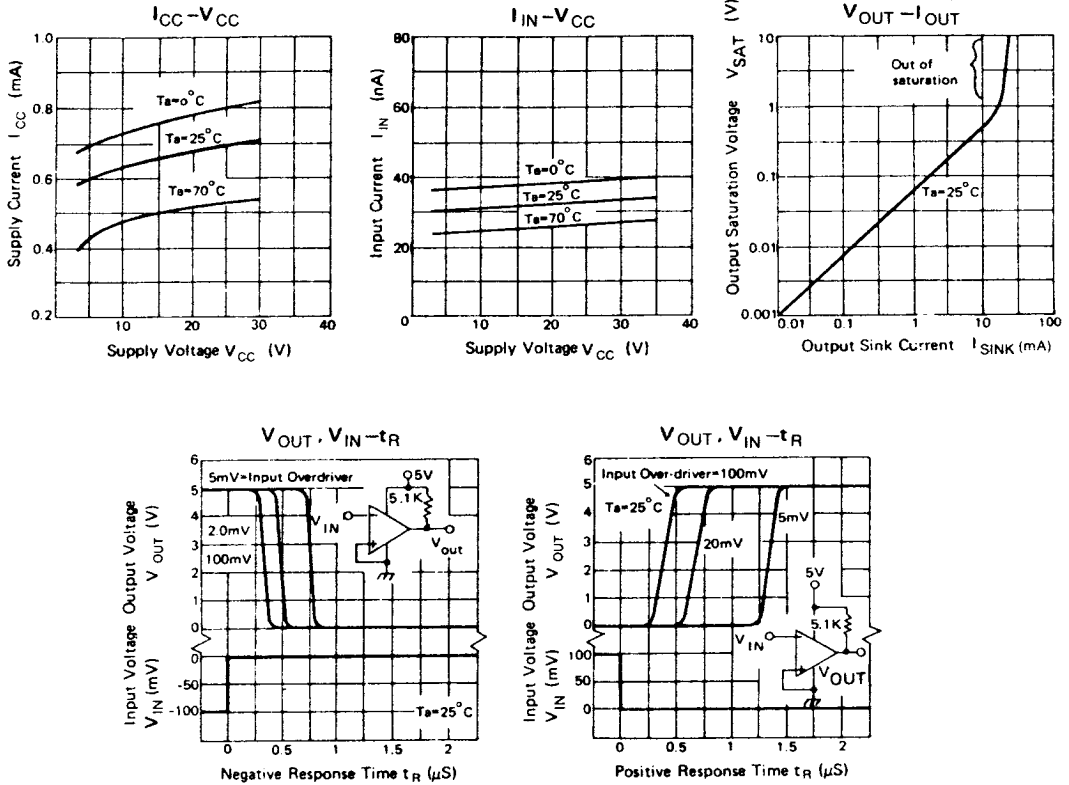
## □ ELECTRICAL CHARACTERISTICS

(Unless otherwise specified,  $V_{CC} = 5V$  and  $0^{\circ}C \leq T_a \leq 70^{\circ}C$ )

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Input Offset Voltage		$V_{IOS}$	$V_{OUT} = 1.4V, 5V \leq V_{CC} \leq 30V$	$T_a = 25^{\circ}C$	—	$\pm 2$	$\pm 5$ mV	
			$R_g = 0\Omega, 0V \leq V_{IC} \leq V_{CC} - 1.5V$		—	—	$\pm 9$	mV
Input Offset Current		$I_{IOS}$	—	$T_a = 25^{\circ}C$	—	$\pm 5$	$\pm 50$ nA	
					—	—	$\pm 150$	nA
Input Bias Current		$I_{IB}$	—	$T_a = 25^{\circ}C$	—	25	250 nA	
					—	—	400	nA
Input Common Mode Voltage Range		$V_{ICR}$	—	$T_a = 25^{\circ}C$	0	—	$V_{CC} - 1.5$ V	
					0	—	$V_{CC} - 2$	V
Supply Current		$I_{CC}$	$R_L = \infty, T_a = 25^{\circ}C$	—	0.8	2	mA	
Voltage Gain		$G_V$	$R_L \geq 15K\Omega, V_{CC} = 15V, T_a = 25^{\circ}C$	—	200	—	V/mV	
Response Time	Large Signal	$t_R$	$V_{RL} = 5V$	$V_{IN} = \text{TTL Logic swing}$	—	300	—	nS
	Small Signal		$R_L = 5.1K\Omega$	$V_{REF} = 1.4V$				
			$T_a = 25^{\circ}C$	$V_{IN} = 100mV \text{ step}$	—	1.3	—	$\mu S$
				with 5mV overdriver				
Output sink Current		$I_{SINK}$	$V_{IN-} \geq 1V, V_{IN+} = 0V$		6	16	—	mA
			$V_{OUT} \leq 1.5V, T_a = 25^{\circ}C$					
Output Leakage Current		$I_{LEAK}$	$V_{IN+} > 1V$	$V_{OUT} = 5V$	—	0.1	—	nA
				$T_a = 25^{\circ}C$				
			$V_{IN-} = 0V$	$V_{OUT} = 30V$	—	—	1	$\mu A$
Saturation Voltage		$V_{SAT}$	$V_{IN-} \geq 1V, V_{IN+} = 0V$	$T_a = 25^{\circ}C$	—	250	400	mV
			$I_{SINK} \leq 4mA$		—	—	700	mV
Differential Input Voltage		$V_{IND}$	Keep all $V_{IN'S} \geq 0V$		—	—	36	V

\*  $V_{IC}$  : Input Common Mode Voltage

## □ TYPICAL PERFORMANCE CHARACTERISTICS



## □ APPLICATION INFORMATION

During the output voltage transition intervals as the comparator change states, the DBL339 can easily oscillate if the output lead is inadvertently allowed to capacitively couple to the inputs via stray capacitance. PC board layout is helpful as it reduces stray input-output coupling. Reducing the input resistors to less than  $10\text{K}\ \Omega$  reduces the feedback signal levels and finally. Adding even a small amount (1 to 10mV) of positive feedback(hysteresis)causes such a rapid transition that oscillations due to stray feedback are not possible. It is good design practice to ground all pins of and unused comparator

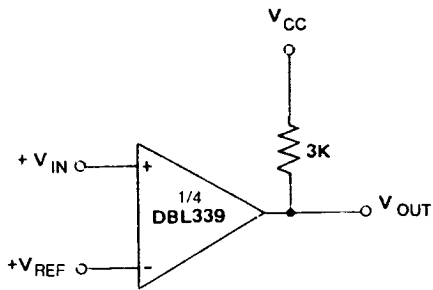
The differential input voltage may be larger than  $V_{CC}$  without damaging the device. Because input voltage more negative than  $-0.3\text{V}$ (at  $25^\circ\text{C}$ )should not be used, an input clamp diode can be used as protection. The output of the DBL339 is the uncommitted collector of a grounded-emitter NPN output transistor. Many collectors can be tied together to provide wired-OR output function.

When the output sink current limit(approximately 16mA)is exceeded, the output transistor will come out of saturation and output voltage will rise very rapidly. Under this limit, the output saturation voltage is limited by the approximately  $60\ \Omega$  saturation resistance of the output transistor.

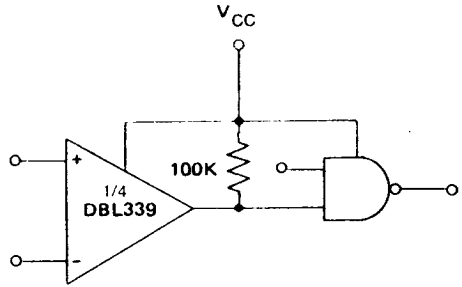
# DBL 339

## □ APPLICATION CIRCUITS ( $V_{CC} = 5V$ )

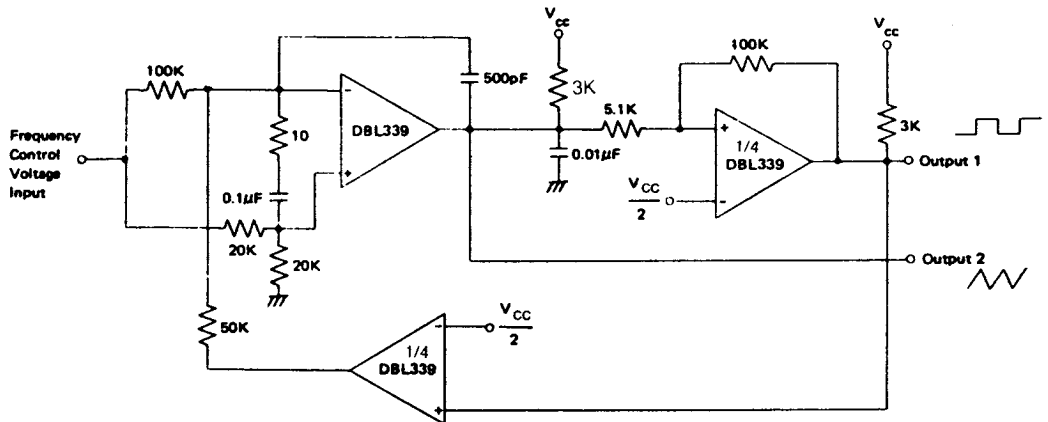
### 1. Basic Comparator



### 2. Driving CMOS



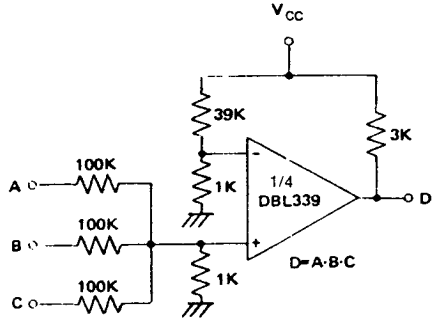
### 3. Two decade High frequency VCO



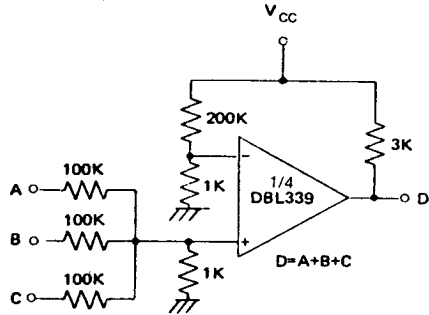
# DBL 339

## APPLICATION CIRCUITS ( $V_{CC} = 15V$ )

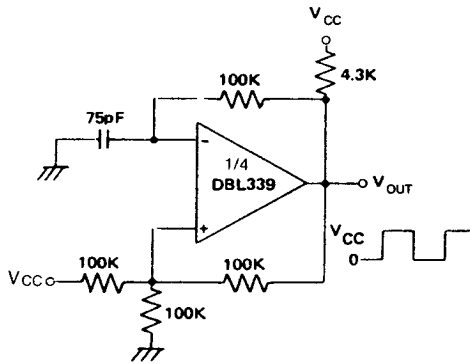
4. AND Gate



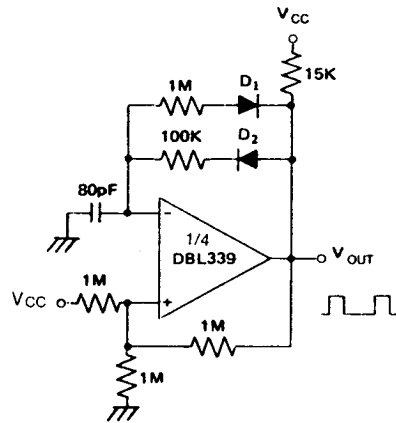
5. OR Gate



6. Squarewave Oscillator



7. Pulse Generator



8. One-Shot Multivibrator with Input Lock Out

