

**VOLTAGE COMPARATOR**

**DESCRIPTION**

The SG111/SG211/SG311 Voltage Comparators are medium-speed, high-input impedance devices which are especially well suited for use in level detection and low-level voltage sensing applications. Operation may be obtained from supply voltages ranging from  $\pm 15V$  down to a single + 5V source.

The output, an open collector NPN capable of switching 50V and 50mA, can drive RTL, DTL, TTL, MOS logic, relays or lamps. Both input and output can be isolated from ground and the output can drive loads referred to a positive supply, ground or a negative supply. These devices also offer offset balance, strobe capability and pin configuration of the SG710 Comparator.

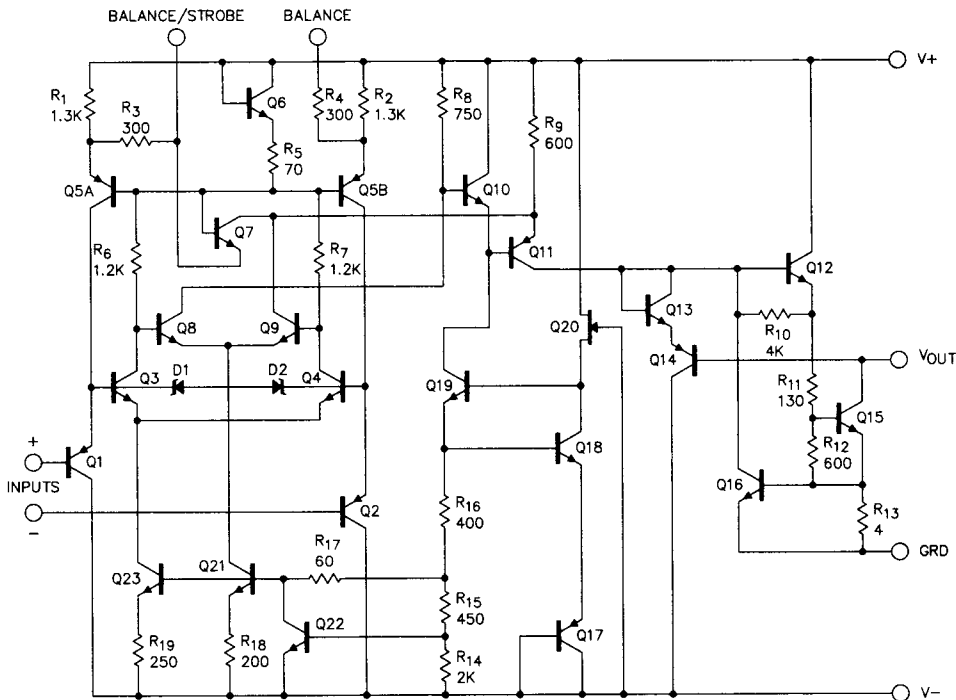
**FEATURES**

- Differential input voltage range of  $\pm 30V$
- 150nA maximum bias current
- 50V, 50mA output capability
- Single 5V supply operation
- Consumes 135mW at  $\pm 15V$

**HIGH RELIABILITY FEATURES - SG111**

- ◆ Available to MIL-STD - 883 and DESC SMD
- ◆ MIL - M38510 / 10304BGA - JAN111T
- ◆ SG level "S" processing available
- ◆ Dual version SG2111 also available for military applications

**SCHEMATIC DIAGRAM**



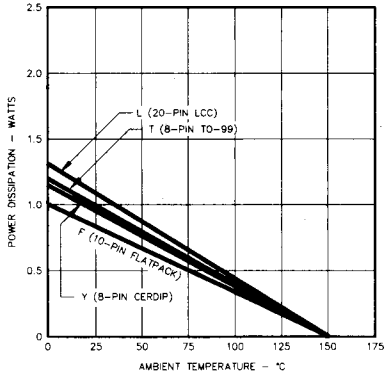
## ABSOLUTE MAXIMUM RATINGS (Note 1)

Total Supply Voltage ( $V_{B+}$ ) .....	36V	Input Voltage (Note 2) .....	±15V
Output to Negative Supply Voltage ( $V_{7-4}$ ) .....		Operating Junction Temperature .....	
SG111/SG211 .....	50V	Hermetic (Y, T, F, L Packages) .....	150°C
SG311 .....	40V	Storage Temperature Range .....	-65°C to 150°C
Ground to Negative Supply Voltage ( $V_{1-4}$ ) .....	30V	Output Short Circuit Duration .....	10 sec.
Differential Input Voltage .....	±30V	Lead Temperature (Soldering, 10 Seconds) .....	300°C

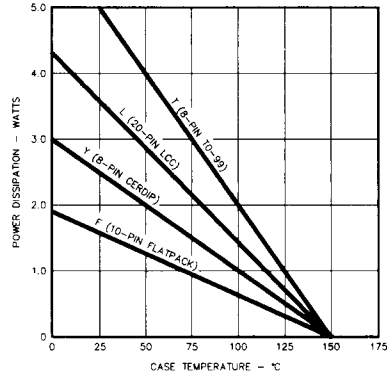
Note 1. Exceeding these ratings could cause damage to the device.

Note 2. Rating for ±15V supplies. The positive input voltage limit is 30V above the negative supply. The negative input voltage limit is equal to the negative supply voltage or 30V below the positive supply, whichever is less.

## THERMAL DERATING CURVES



MAXIMUM POWER DISSIPATION vs AMBIENT TEMPERATURE



MAXIMUM POWER DISSIPATION vs CASE TEMPERATURE

## RECOMMENDED OPERATING CONDITIONS (Note 3)

Total Supply Voltage .....	5V to 30V
$V_{OUT}$ to Ground Voltage .....	0V to 35V
Input Voltage Range with ±15V Supplies .....	±14V

### Operating Ambient Temperature Range

SG111 .....	-55°C to 125°C
SG211 .....	-25°C to 85°C
SG311 .....	0°C to 70°C

Note 3. Range over which the device is functional.

## ELECTRICAL SPECIFICATIONS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for SG111 with  $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$ , SG211 with  $-25^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ , SG 311 with  $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ , and  $V_S = \pm 15\text{V}$ . Offset voltage, offset current and bias currents given apply for supply voltages from a single 5V supply to ±15V supplies. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Test Conditions	SG111/SG211			SG311			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage (Note 4)	$T_A = 25^\circ\text{C}$ , $R_S \leq 50\text{K}$	0.7	3.0	3.0	2.0	7.5	mV	
Input Offset Current (Note 4)	$R_S \leq 50\text{K}$		4.0	10		10	mV	
	$T_A = 25^\circ\text{C}$		4.0	10		50	nA	
Input Bias Current	$T_A = 25^\circ\text{C}$		60	100		100	250	nA
				150			300	nA
Voltage Gain	$T_A = 25^\circ\text{C}$		200			200	V/mV	
Input Voltage Range	$T_A = 25^\circ\text{C}$		±14			±14	V	
Response Time (Note 5)			200			200	nS	
Saturation Voltage	$I_{OUT} = 50\text{mA}$ , $V_{IN} \leq -5\text{mV}$		0.75	1.5			V	
	$I_{OUT} = 50\text{mA}$ , $V_{IN} \leq -10\text{mV}$					0.75	1.5	V
	$V_+ \geq 4.5\text{V}$ , $V_- = 0$						V	
	$V_{IN} \leq -6\text{mV}$ , $I_{SNK} \leq 8\text{mA}$		0.23	0.4			V	
	$V_{IN} \leq -10\text{mV}$ , $I_{SINK} \leq 8\text{mA}$					0.23	0.4	V

ELECTRICAL SPECIFICATIONS (continued)

Parameter	Test Conditions	SG111/SG211			SG311			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
<b>Strobe on Current (Note 6)</b>	$T_A = 25^\circ\text{C}$		<b>3.0</b>			<b>3.0</b>		<b>mA</b>
<b>Output Leakage Current (Note 7)</b>	$V_{OUT} = 35\text{V}, V_{IN} \geq 5\text{mV}$		0.1	0.5				$\mu\text{A}$
	$T_A = 25^\circ\text{C}, V_{IN} \geq 5\text{mV}$		<b>0.2</b>	<b>10</b>				<b>nA</b>
	$T_A = 25^\circ\text{C}, V_{IN} \geq 10\text{mV}$					0.2	50	nA
<b>Short Circuit Current</b>	<b>10mS maximum test duration</b>							
	$T_A = -55^\circ\text{C}$	0		250				mA
	$T_A = 125^\circ\text{C}$	0		<b>150</b>				<b>mA</b>
	$T_A = 25^\circ\text{C}$	0		200	0		200	mA
<b>Positive Supply Current</b>	$T_A = 25^\circ\text{C}$		<b>5.1</b>	<b>6.0</b>		<b>5.1</b>	<b>7.5</b>	<b>mA</b>
<b>Negative Supply Current</b>	$T_A = 25^\circ\text{C}$		4.1	5.0		4.1	5.0	mA
<b>Response Time Low-to-High Level</b>	<b>Overdrive = -5mV</b>							
Collector Output (Note 7)	$C_L = 50\text{pF}$ minimum							
	$V_N = 100\text{mV}$		<b>400</b>			<b>400</b>		<b>ns</b>
<b>Response Time High-to-Low level (Note 7)</b>	<b>Overdrive = 5mV</b>							
	$C_L = 50\text{pF}$ minimum		400			400		ns
	$V_N = 100\text{mV}$							

Note 4. Maximum values drive output within 1 Volt of either supply with 1mA load.

Note 5. Response time specified is for 100mV input step with 5mV overdrive.

Note 6. Do not short the strobe pin to ground; it should be current driven at 3mA to 5mA.

Note 7. These parameters, although guaranteed over the recommended operating conditions, are not tested in production.

## CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No.	Ambient Temperature Range	Connection Diagram
8-PIN CERAMIC DIP Y - PACKAGE	SG111Y/883B SG111Y SG211Y SG311Y	-55°C to 125°C -55°C to 125°C -25°C to 85°C 0°C to 70°C	
8-PIN METAL CAN T - PACKAGE	SG111T/883B SG111T SG211T SG311T	-55°C to 125°C -55°C to 125°C -25°C to 85°C 0°C to 70°C	
10-PIN CERAMIC FLAT PACK F - PACKAGE	SG111F/883B SG111F	-55°C to 125°C -55°C to 125°C	
20-PIN CERAMIC LEADLESS CHIP CARRIER L - PACKAGE	SG111L/883B SG111L	-55°C to 125°C -55°C to 125°C	

Note 1. Contact factory for JAN and DESC product availability.  
 2. All packages are viewed from the top.