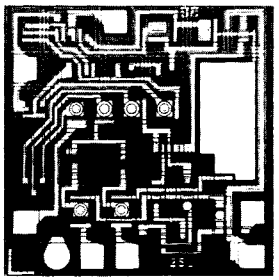
Silicon General

The SG1250 series of operational amplifiers have been designed to offer exceptional performance under conditions of extremely low internal power consumption. Since the quiescent current is determined by a single external resistor, operation over a wide range of currents and voltages is possible.

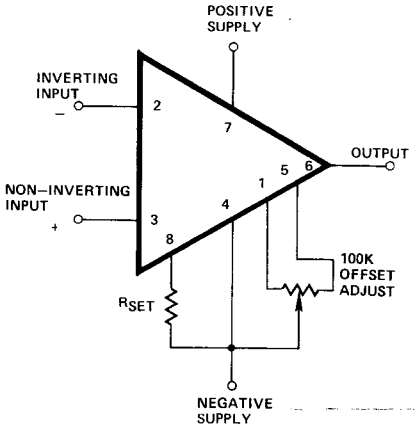
Input bias current requirements are both very low and essentially constant over temperature thru the use of specialized PNP input transistors. Additional advantages of this design include the use of internal frequency compensation, offset nulling, and pin configuration of the SG741 class of amplifiers.



FEATURES

- Adjustable power consumption to less than 20 microwatts
- Supply voltages from ±1 to ±18 volts
- Less than 15 nA bias currents
- Complete short-circuit protection
- Internally compensated

CONNECTION DIAGRAM



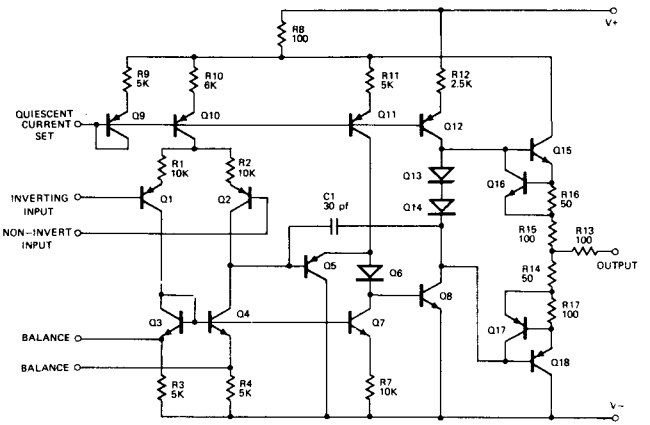
NOTE: R_{SET} is required to establish the internal operating currents. Its value may be determined from the table given on Page 2.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 Volts
Differential Input Voltage (Note 1)	±15 Volts
Common-mode Range (Note 1)	±15 Volts
Output Short Circuit Duration (Note 2)	Indefinate
Power Dissipation (Pkg. Limitation)	
T–Package	680 mW
Derate above 25°C	5.4 mW/°C
M–Package	400 mW
Derate above 25°C	4.0 mW/°C
Operating Temperature Range	
T–Package	–55°C to +125°C
M–Package	0°C to +70°C
Storage Temperature Range	
T–Package	–65°C to +150°C
M–Package	–55°C to +125°C

NOTE 1: Not to exceed either supply voltage.
NOTE 2: Short circuit may be to ground or either supply.

SCHEMATIC DIAGRAM



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ELECTRICAL CHARACTERISTICS

NOTE: R_{SET} is 1.1 MΩ for $V_S = \pm 3$ V and 7.5 MΩ for $V_S = \pm 15$ V. Unless otherwise specified, $T_A = +25^oC$. Operating Temperature Range is -55^oC to $+125^oC$ for the SG1250 and 0^oC to $+70^oC$ for the SG2250 and and SG3250.

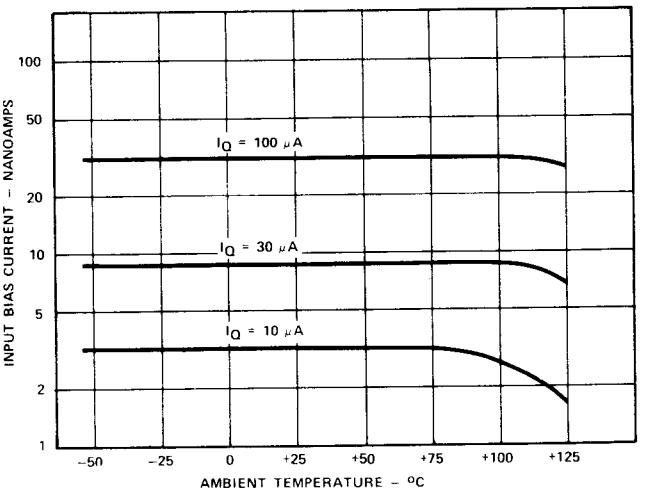
Parameter	Conditions	SG1250/2250 Min	Typ	Max	SG3250 Min	Typ	Max	Units
Input Offset Voltage	± 3 V < V_S < ± 15 V, $R_s \leq$ 10 KΩ	–	1	3	–	1	6	mV
	Same, over temperature range	–	1	4	–	1	7.5	mV
Input Bias Current	± 3 V < V_S < ± 15 V	–	8	15	–	10	30	nA
	Same, over temperature range	–	10	15	–	15	50	nA
Input Offset Current	± 3 V < V_S < ± 15 V	–	0	5	–	0	10	nA
	Same, over temperature range	–	0	8	–	0	15	nA
Input Resistance	± 3 V < V_S < ± 15 V	3	10	–	3	10	–	MΩ
Large Signal Voltage Gain	$V_S = \pm 3$ V, R_L = 10 KΩ	40	80	–	40	80	–	V/mV
	Same, over temperature range	25	–	–	25	–	–	V/mV
	$V_S = \pm 15$ V, R_L = 10 KΩ	100	200	–	75	200	–	V/mV
	Same, over temperature range	50	–	–	50	–	–	V/mV
Output Voltage Swing	$V_S = \pm 3$ V, R_L = 10 KΩ	±1.5	±2	–	±1.5	±2	–	Volts
	Same, over temperature range	±1.0	±2	–	±1.0	±2	–	Volts
	$V_S = \pm 15$ V, R_L = 10 KΩ	±11	±13	–	±11	±13	–	Volts
	Same, over temperature range	±10	±13	–	±10	±13	–	Volts
Output Short Circuit Current	± 3 V < V_S < ± 15 V	–	±10	–	–	±10	–	mA
Common-mode Rejection Ratio	± 3 V < $V_S \leq \pm 15$ V, $R_s \leq$ 10 KΩ	70	80	–	70	80	–	dB
Power Supply Rejection Ratio	$V_S = \pm 3$ V, $R_s \leq$ 10 KΩ	–	50	200	–	50	200	μV/V
	$V_S = \pm 15$ V, $R_s \leq$ 10 KΩ	–	30	150	–	30	150	μV/V
Power Consumption	$V_S = \pm 3$ V, R_L = 0	–	180	240	–	180	240	μW
	$V_S = \pm 15$ V, R_L = 0	–	0.9	1.2	–	0.9	1.2	mW
Offset Voltage Adjustment Range	± 3 V < V_S < ± 15 V	–	±12	–	–	±12	–	mV
Ave. T.C. of Offset Voltage	$V_S = \pm 15$ V, $R_s \leq$ 10 KΩ Over Temperature Range	–	4	–	–	6	–	μV/°C
Ave. T.C. of Offset Current	$V_S = \pm 15$ V, $R_s \leq$ 10 KΩ Over Temperature Range	–	2	–	–	1	–	PA/°C
Equiv. Input Noise Voltage	$V_S = \pm 15$ V, f = 10 Hz, R_s = 0	–	35	–	–	35	–	nV/√Hz
Equiv. Input Noise Current	$V_S = \pm 15$ V, f = 10 Hz, R_s = 0	–	0.5	–	–	0.5	–	pA/√Hz
Rise Time	$V_S = \pm 15$ V, R_L = 10 K, C_L = 100 pF	–	2	–	–	2	–	μ Sec
Over Shoot	$V_S = \pm 15$ V, R_L = 10 K, C_L = 100 pF	–	10	–	–	10	–	%
Slew Rate	$V_S = \pm 15$ V, R_L = 10 K, C_L = 100 pF	–	0.2	–	–	0.2	–	V/μSec

QUIESCENT CURRENT SETTING RESISTOR (Pin 8 to Pin 4)

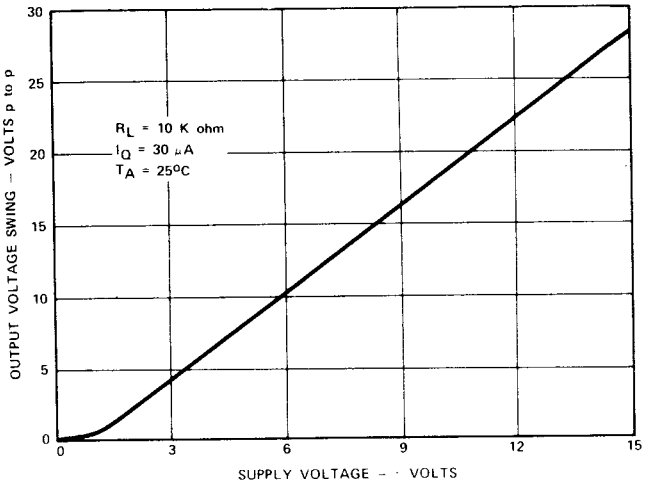
VS \ IQ	10 μA	30 μA	100 μA	300 μA
±1.5 V	1.5 MΩ	470 KΩ	150 KΩ	—
±3 V	3.3 MΩ	1.1 MΩ	330 KΩ	100 KΩ
±6 V	7.5 MΩ	2.7 MΩ	750 KΩ	220 KΩ

VS \ IQ	10 μA	30 μA	100 μA	300 μA
±9 V	13 MΩ	4.0 MΩ	1.3 MΩ	350 KΩ
±12 V	18 MΩ	5.6 MΩ	1.5 MΩ	510 KΩ
±15 V	22 MΩ	7.5 MΩ	2.2 MΩ	620 KΩ

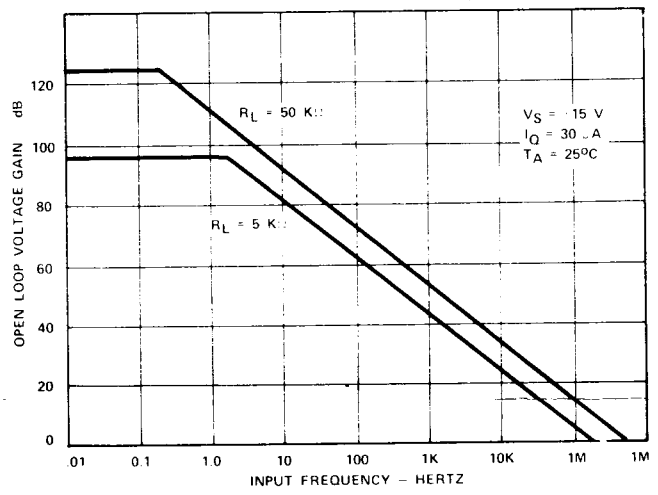
TYPICAL CHARACTERISTICS



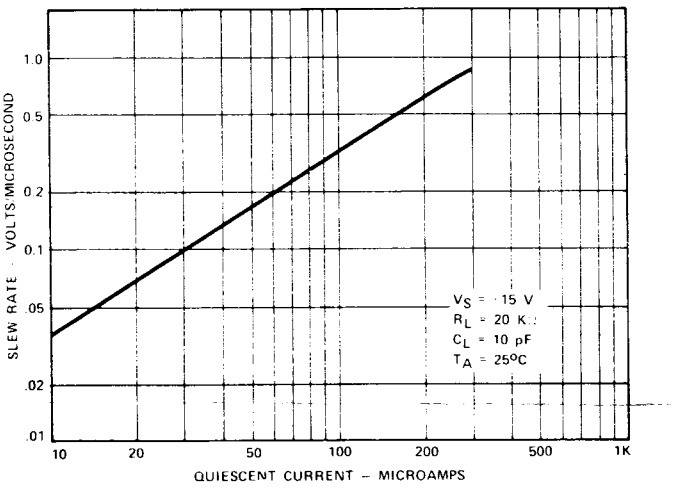
INPUT BIAS CURRENT VS TEMPERATURE



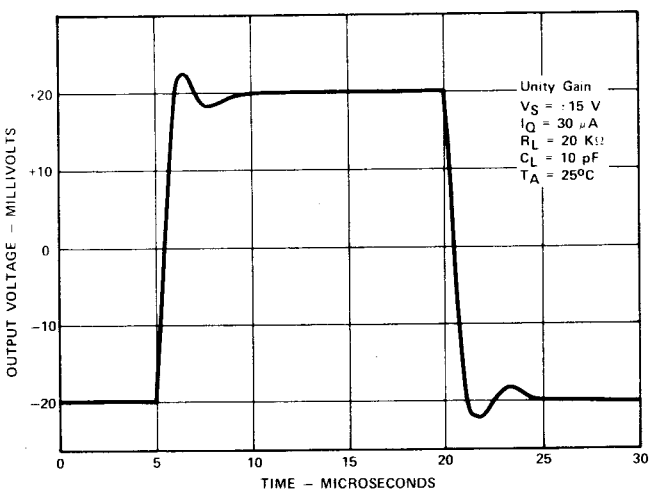
OUTPUT VOLTAGE SWING VS SUPPLY VOLTAGE



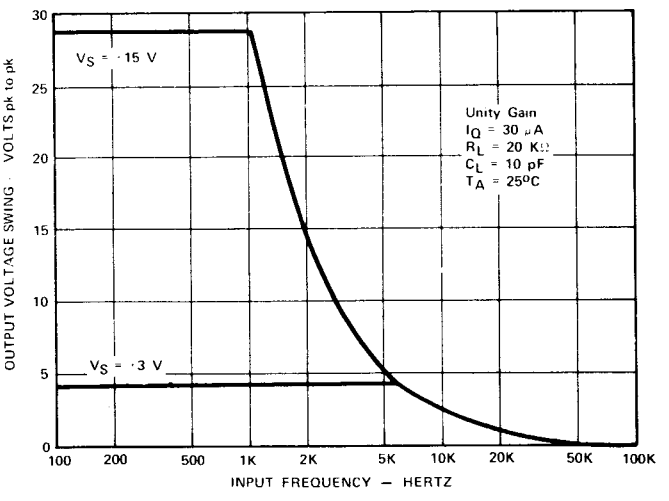
OPEN LOOP FREQUENCY RESPONSE



SLEW RATE VS QUIESCENT CURRENT

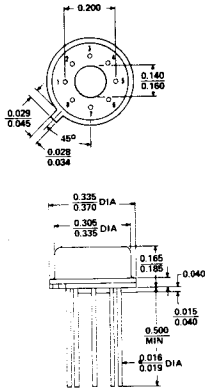


SMALL SIGNAL TRANSIENT RESPONSE

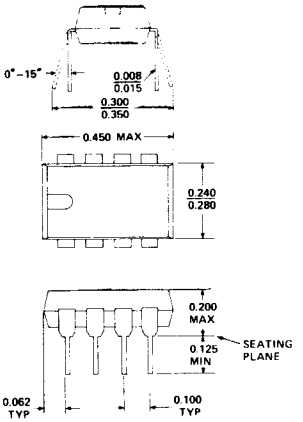


OUTPUT VOLTAGE SWING VS FREQUENCY

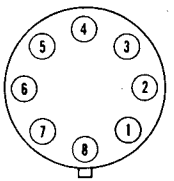
T-PACKAGE
TO-99



M-PACKAGE
8-PIN MINIDIP

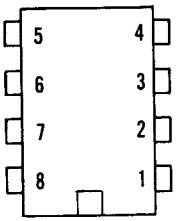


TOP VIEW



T–PACKAGE
TO–99

TOP VIEW



M–PACKAGE
8-PIN MINIDIP