Picoamp Input Current, Microvolt Offset, Low Noise Op Amp

FEATURES

- Internally Compensated
- *Guaranteed* Offset Voltage 120μV Max.
- *Guaranteed* Bias Current
  - 25°C 300pA Max.
  - 0°C to 70°C 380pA Max.
- *Guaranteed* Drift 1.8μV/°C Max.
- Low Noise, 0.1Hz to 10Hz 0.5μVp-p
- *Guaranteed* Low Supply Current 600μA Max.
- *Guaranteed* CMRR 110dB Min.
- *Guaranteed* PSRR 110dB Min.
- *Guaranteed* Voltage Gain with 5mA Load Current

APPLICATIONS

- Precision Instrumentation
- Charge Integrators
- Wide Dynamic Range Logarithmic Amplifiers
- Light Meters
- Low Frequency Active Filters
- Standard Cell Buffers
- Thermocouple Amplifiers

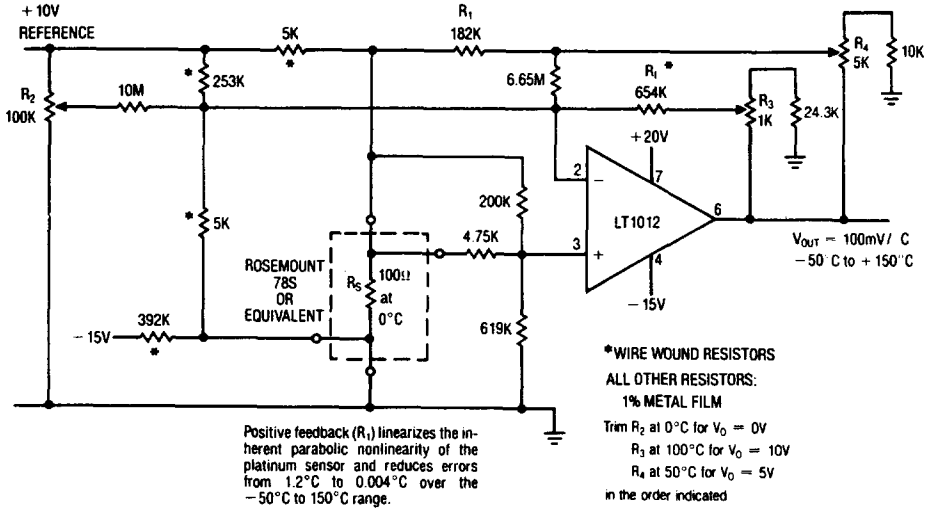
DESCRIPTION

The LT1012 is an internally compensated universal precision operational amplifier which can be used in practically all precision applications. The LT1012 combines picoampere bias currents (which are maintained over the full 0°C to 70°C temperature range), microvolt offset voltage (and low drift with time and temperature), low voltage and current noise, and low power dissipation. Extremely high common-mode and power supply rejection ratios, practically unmeasurable warm-up drift, and the ability to deliver 5mA load current with a voltage gain of a million round out the LT1012's superb precision specifications.

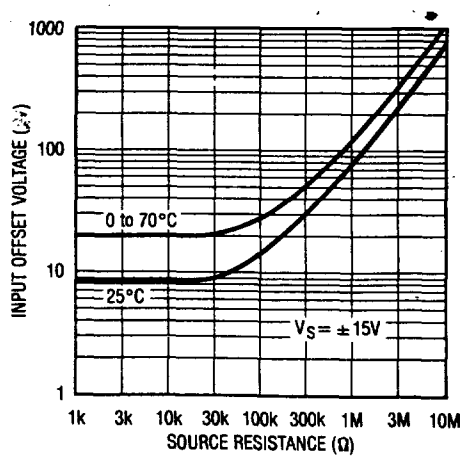
The all around excellence of the LT1012 eliminates the necessity of the time consuming error analysis procedure of precision system design in many applications; the LT1012 can be stocked as the universal internally compensated precision op amp.

2

Kelvin-Sensed Platinum Temperature Sensor Amplifier



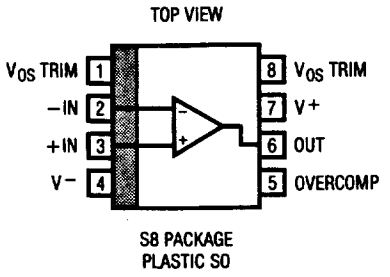
Offset Voltage vs Source Resistance (Balanced or Unbalanced)



ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... ±20V
Differential Input Current (Note 1)..... ±10mA
Input Voltage..... ±20V
Output Short Circuit Duration ..... Indefinite
Operating Temperature Range ..... 0°C to 70°C
Storage Temperature Range..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec.)..... 300°C

PACKAGE/ORDER INFORMATION



S8 PACKAGE
PLASTIC SO

ORDER PART NUMBER
LT1012S8
PART MARKING
1012

ELECTRICAL CHARACTERISTICS $V_S = \pm 15V$, $V_{CM} = 0V$, $T_A = 25°C$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	LT1012S8 MIN	LT1012S8 TYP	LT1012S8 MAX	UNITS
V_{OS}	Input Offset Voltage			10	120	µV
		Note 2		25	180	µV
	Long Term Input Offset Voltage Stability			0.3		µV/month
I_{OS}	Input Offset Current			50	280	pA
		Note 2		60	380	pA
I_B	Input Bias Current			±80	±300	pA
		Note 2		±120	±400	pA
e_n	Input Noise Voltage	0.1Hz to 10Hz		0.5		µVp-p
e_n	Input Noise Voltage Density	f_O = 10Hz (Note 3)		17	30	nV/√Hz
		f_O = 1000Hz (Note 3)		14	22	nV/√Hz
i_n	Input Noise Current Density	f_O = 10Hz		20		fA/√Hz
A_{VOL}	Large Signal Voltage Gain	$V_{OUT} = \pm 12V$, $R_L \geq 10k\Omega$	200	2000		V/mV
		$V_{OUT} = \pm 10V$, $R_L \geq 2k\Omega$	120	1000		V/mV
CMRR	Common-Mode Rejection Ratio	$V_{CM} = \pm 13.5V$	110	132		dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 2V$ to $\pm 20V$	110	132		dB
	Input Voltage Range		±13.5	±14.0		V
V_{OUT}	Output Voltage Swing	$R_L = 10k\Omega$	±13	±14		V
	Slew Rate		0.1	0.2		V/µs
I_S	Supply Current	Note 2		380	600	µA

ELECTRICAL CHARACTERISTICS $V_S = \pm 15V$, $V_{CM} = 0V$, $0°C \leq$, $T_A \leq 70°C$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		LT1012S8 MIN	TYP	MAX	UNITS
V_{OS}	Input Offset Voltage		●		20	200	μV
		Note 2	●		30	270	μV
	Average Temperature Coefficient of Input Offset Voltage		●		0.2	1.8	μV/°C
I_{OS}	Input Offset Current		●		60	380	pA
		Note 2	●		80	500	pA
	Average Temperature Coefficient of Input Offset Current		●		0.4	4	pA/°C
I_B	Input Bias Current		●		±100	±420	pA
		Note 2	●		±150	±550	pA
	Average Temperature Coefficient of Input Bias Current		●		0.5	5	pA/°C
A_{VOL}	Large Signal Voltage Gain	$V_{OUT} = \pm 12V$, $R_L \geq 10k\Omega$	●	150	1500		V/mV
		$V_{OUT} = \pm 10V$, $R_L \geq 2k\Omega$	●	100	800		V/mV
CMRR	Common-Mode Rejection Ratio	$V_{CM} = \pm 13.5V$	●	108	130		dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 2.5V$ to $\pm 20V$	●	108	128		dB
	Input Voltage Range		●	±13.5			V
V_{OUT}	Output Voltage Swing	$R_L = 10k\Omega$	●	±13	±14		V
I_S	Supply Current		●		400	800	μA

The ● denotes the specifications which apply over the full operating temperature range.

Note 1: Differential input voltages greater than 1V will cause excessive current to flow through the input protection diodes unless limiting resistance is used.

Note 2: These specifications apply for $\pm 2V \leq V_S \leq \pm 20V$ ($\pm 2.5V \leq V_S \leq \pm 20V$ over the temperature range) and $-13.5V \leq V_{CM} \leq 13.5V$ (for $V_S = \pm 15V$).

Note 3: This parameter is tested on a sample basis only.

2