

Picoamp Input Current, Microvolt Offset, Low Noise Op Amp

FEATURES

- Internally Compensated
- *Guaranteed* Offset Voltage 120 μ V Max.
- *Guaranteed* Bias Current 300pA Max.
- 25°C 380pA Max.
 - 0°C to 70°C 1.8 μ V/°C Max.
- *Guaranteed* Drift 0.5 μ Vp-p
- Low Noise, 0.1Hz to 10Hz 600 μ A Max.
- *Guaranteed* Low Supply Current 110dB Min.
- *Guaranteed* CMRR 110dB Min.
- *Guaranteed* PSRR
- *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

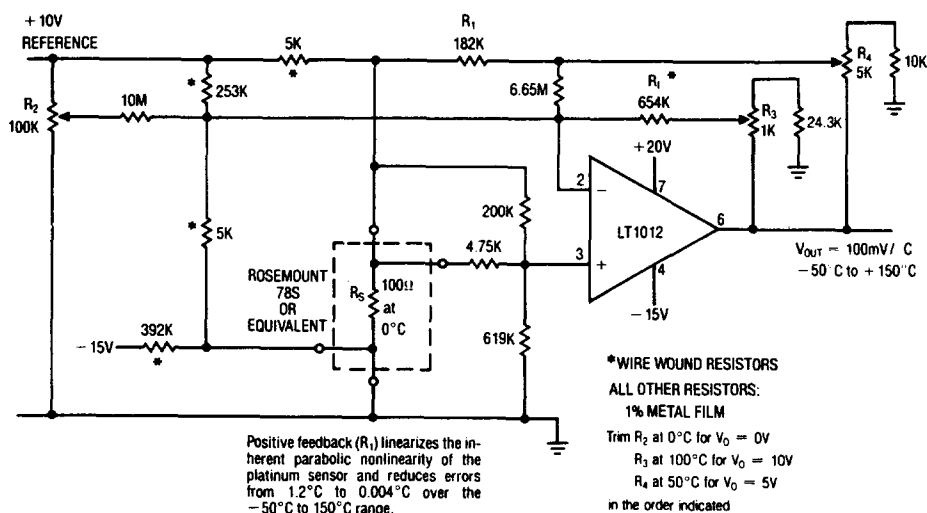
DESCRIPTION

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.

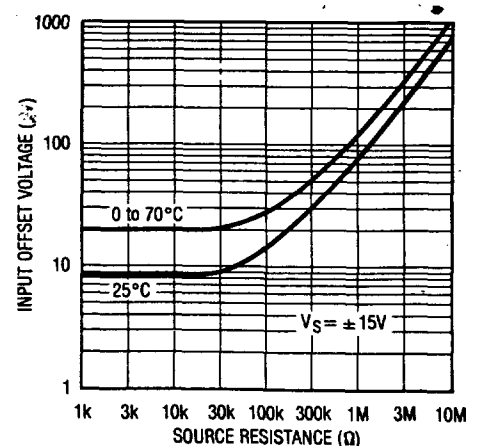
The all around excellence of the LT1012 eliminates the necessity of the time consuming error analysis procedure of precision system design in many applications; the LT1012 can be stocked as the universal internally compensated precision op amp.

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Kelvin-Sensed Platinum Temperature Sensor Amplifier



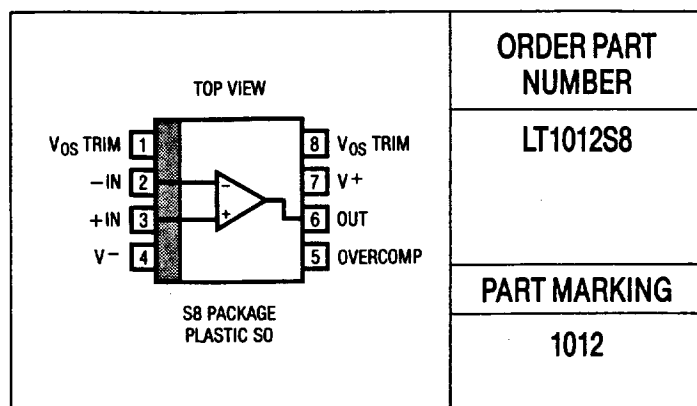
Offset Voltage vs Source Resistance (Balanced or Unbalanced)



ABSOLUTE MAXIMUM RATINGS

Supply Voltage	$\pm 20V$
Differential Input Current (Note 1).....	$\pm 10mA$
Input Voltage.....	$\pm 20V$
Output Short Circuit Duration	Indefinite
Operating Temperature Range	$0^{\circ}C$ to $70^{\circ}C$
Storage Temperature Range.....	$-65^{\circ}C$ to $150^{\circ}C$
Lead Temperature (Soldering, 10 sec.).....	$300^{\circ}C$

PACKAGE/ORDER INFORMATION



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

SYMBOL	PARAMETER	CONDITIONS	LT1012S8			UNITS
			MIN	TYP	MAX	
V_{OS}	Input Offset Voltage	Note 2		10	120	μV
				25	180	μV
	Long Term Input Offset Voltage Stability			0.3		$\mu V/month$
I_{OS}	Input Offset Current	Note 2		50	280	pA
				60	380	pA
I_B	Input Bias Current	Note 2		± 80	± 300	pA
				± 120	± 400	pA
e_n	Input Noise Voltage	0.1Hz to 10Hz		0.5		$\mu Vp-p$
e_n	Input Noise Voltage Density	$f_0 = 10Hz$ (Note 3)		17	30	nV/\sqrt{Hz}
		$f_0 = 1000Hz$ (Note 3)		14	22	nV/\sqrt{Hz}
i_n	Input Noise Current Density	$f_0 = 10Hz$		20		fA/\sqrt{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
				± 13.5	± 14.0	V
V_{OUT}	Output Voltage Swing	$R_L = 10k\Omega$	± 13	± 14		V
				0.1	0.2	$V/\mu s$
I_S	Supply Current	Note 2		380	600	μA

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

SYMBOL	PARAMETER	CONDITIONS	LT1012S8			UNITS
			MIN	TYP	MAX	
V_{OS}	Input Offset Voltage	Note 2	●	20	200	μV
			●	30	270	μV
	Average Temperature Coefficient of Input Offset Voltage	●	0.2	1.8	$\mu V/^\circ C$	
I_{OS}	Input Offset Current	Note 2	●	60	380	pA
			●	80	500	pA
	Average Temperature Coefficient of Input Offset Current	●	0.4	4	$pA/^\circ C$	
I_B	Input Bias Current	Note 2	●	± 100	± 420	pA
			●	± 150	± 550	pA
	Average Temperature Coefficient of Input Bias Current	●	0.5	5	$pA/^\circ C$	
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
			●	± 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.

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