

## FEATURES

- *Guaranteed* Low Offset Voltage  $60\mu\text{V}$  Max.
- *Guaranteed* Low Drift  $1.0\mu\text{V}/^\circ\text{C}$  Max.
- *Guaranteed* Low Bias Current  $4\text{nA}$  Max.
- *Guaranteed* CMRR  $110\text{dB}$  Min.
- *Guaranteed* PSRR  $106\text{dB}$  Min.
- Low Power Dissipation  $80\text{mW}$  Max.
- Low Noise  $0.3\mu\text{Vp-p}$

## APPLICATIONS

- Thermocouple Amplifiers
- Strain Gauge Amplifiers
- Low Level Signal Processing
- High Accuracy Data Acquisition

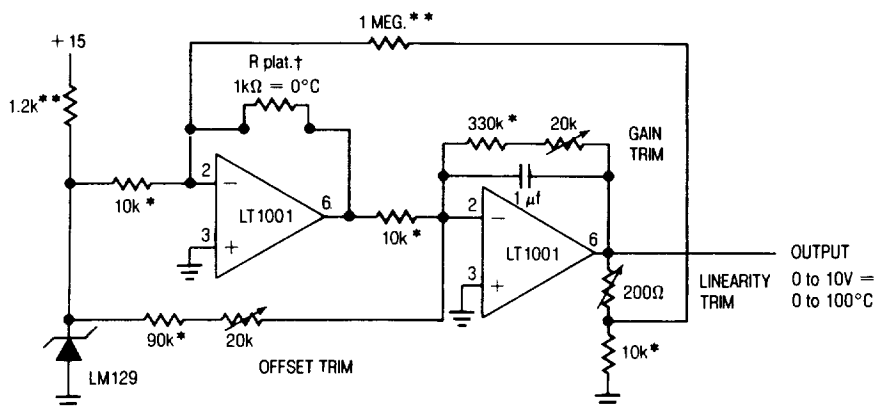
## DESCRIPTION

The LT1001 significantly advances the state-of-the-art of precision operational amplifiers. In the design, processing, and testing of the device, particular attention has been paid to the optimization of the entire distribution of several key parameters. Consequently, the specifications of the lowest cost, commercial temperature device, the LT1001C, have been dramatically improved when compared to equivalent grades of competing precision amplifiers.

Essentially, the input offset voltage of all units is less than  $50\mu\text{V}$  (see distribution plot below). Input bias and offset currents, common-mode and power supply rejection of the LT1001C offer guaranteed performance which were previously attainable only with expensive, selected grades of other devices. Power dissipation is nearly halved compared to the most popular precision op amps, without adversely affecting noise or speed performance. A beneficial by-product of lower dissipation is decreased warm-up drift. Output drive capability of the L1001 is also enhanced with voltage gain guaranteed at  $10\text{mA}$  of load current.

2

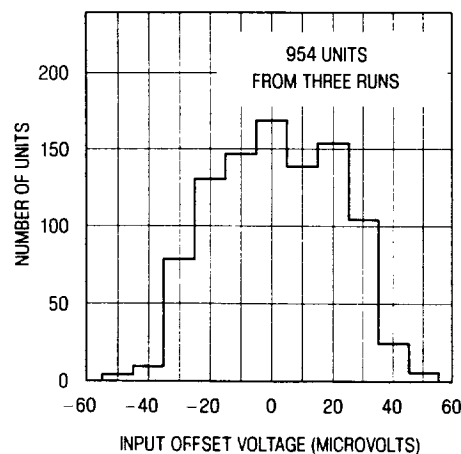
**Linearized Platinum Resistance Thermometer  
with  $\pm 0.025^\circ\text{C}$  Accuracy Over 0 to  $100^\circ\text{C}$**



\* ULTRONIX 105A WIREWOUND  
\*\* 1% FILM  
† PLATINUM RTD  
118MF (ROSEMOUNT, INC.)

‡ Trim sequence: trim offset ( $0^\circ\text{C} = 1000.0\Omega$ ),  
trim linearity ( $35^\circ\text{C} = 1138.7\Omega$ ), trim gain  
( $100^\circ\text{C} = 1392.6\Omega$ ). Repeat until all three  
points are fixed with  $\pm .025^\circ\text{C}$ .

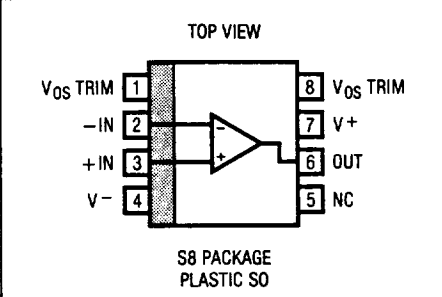
**Typical Distribution  
of Offset Voltage  
 $V_s = \pm 15\text{V}$ ,  $T_A = 25^\circ\text{C}$**



## ABSOLUTE MAXIMUM RATINGS

Supply Voltage .....	$\pm 22V$
Differential Input Voltage .....	$\pm 30V$
Input Voltage .....	$\pm 22V$
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

	ORDER PART NUMBER
	LT1001CS8
	PART MARKING
	1001

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

SYMBOL	PARAMETER	CONDITIONS	MIN	LT1001C TYP	MAX	UNITS
$V_{OS}$	Input Offset Voltage			18	60	$\mu V$
$\frac{\Delta V_{OS}}{\Delta Time}$	Long Term Input Offset Voltage Stability	Note 1 and Note 2		0.3	1.5	$\mu V/month$
$I_{OS}$	Input Offset Current			0.4	3.8	nA
$I_b$	Input Bias Current			$\pm 0.7$	$\pm 4.0$	nA
$e_n$	Input Noise Voltage	0.1Hz to 10Hz (Note 1)		0.3	0.6	$\mu Vp-p$
$e_n$	Input Noise Voltage Density	$f_o = 10Hz$ (Note 1) $f_o = 1000Hz$ (Note 1)		10.5 9.8	18.0 11.0	nV/ $\sqrt{Hz}$
$A_{VOL}$	Large Signal Voltage Gain	$R_L \geq 2k\Omega$ , $V_o = \pm 12V$ $R_L \geq 1k\Omega$ , $V_o = \pm 10V$	400 250	800 500		V/mV V/mV
CMRR	Common-Mode Rejection Ratio	$V_{CM} = \pm 13V$	110	126		dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 3V$ to $\pm 18V$	106	123		dB
$R_{in}$	Input Resistance Differential Mode		15	80		M $\Omega$
	Input Voltage Range		$\pm 13$	$\pm 14$		V
$V_{OUT}$	Maximum Output Voltage Swing	$R_L \geq 2k\Omega$ $R_L \geq 1k\Omega$	$\pm 13$ $\pm 12$	$\pm 14$ $\pm 13.5$		V V
$S_R$	Slew Rate	$R_L \geq 2k\Omega$ (Note 3)	0.1	0.25		V/ $\mu s$
GBW	Gain-Bandwidth Product	(Note 3)	0.4	0.8		MHz
$P_d$	Power Dissipation	No Load No Load, $V_S = \pm 3V$		48 4	80 8	mW mW

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

SYMBOL	PARAMETER	CONDITIONS	MIN	LT1001C TYP	MAX	UNITS
$V_{OS}$	Input Offset Voltage	●		30	110	$\mu V$
$\frac{\Delta V_{OS}}{\Delta Temp}$	Average Offset Voltage Drift	●		0.3	1.0	$\mu V/^{\circ}C$
$I_{OS}$	Input Offset Current	●		0.6	5.3	nA
$I_b$	Input Bias Current	●		$\pm 1.0$	$\pm 5.5$	nA
$A_{VOL}$	Large Signal Voltage Gain	$R_L \geq 2k\Omega$ , $V_o = \pm 10V$	●	250	750	V/mV
CMRR	Common-Mode Rejection Ratio	$V_{CM} = \pm 13V$	●	106	123	dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 3V$ to $\pm 18V$	●	103	120	dB
	Input Voltage Range	●	$\pm 13$	$\pm 14$		V
$V_{OUT}$	Output Voltage Swing	$R_L \geq 2k\Omega$	●	$\pm 12.5$	$\pm 13.8$	V
$P_d$	Power Dissipation	No Load	●	55	90	mW

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

**Note 1:** This parameter is tested on a sample basis only.

**Note 2:** Long Term Input Offset Voltage Stability refers to the averaged trend line of  $V_{OS}$  versus Time over extended periods after the first 30 days of

operation. Excluding the initial hour of operation, changes in  $V_{OS}$  during the first 30 days are typically  $2.5\mu V$ .

**Note 3:** Parameter is guaranteed by design.