OP-07CS8

Precision Operational Amplifier

FEATURES

- *Guaranteed* 150μV *max.* Offset Voltage
- *Guaranteed* 1.8μV/°C *max.* Offset Voltage Drift with Temperature
- *Excellent* 2.0μV/Month *max.* Long Term Stability
- *Guaranteed* 0.65μVp-p *max.* Noise
- *Guaranteed* 7nA *max.* Input Bias Current

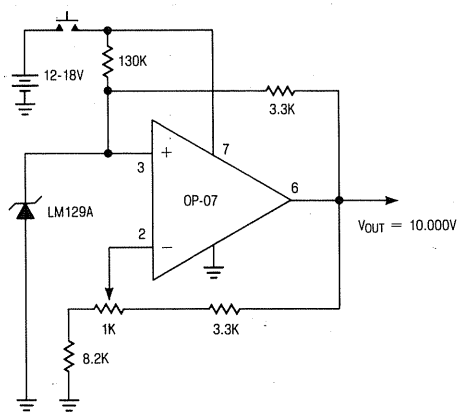
APPLICATIONS

- Thermocouple Amplifiers
- Strain Gauge Amplifiers
- Low Level Signal Processing
- Medical Instrumentation

DESCRIPTION

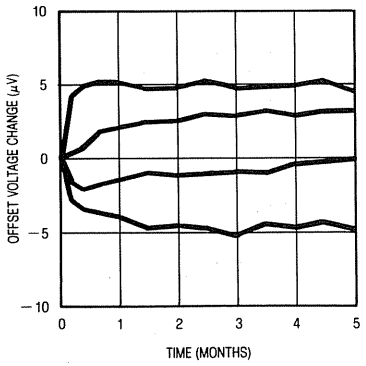
The OP-07 offers excellent performance in applications requiring low offset voltage, low drift with time and temperature and very low noise. Linear's OP-07 is interchangeable with many of the precision op amp device types. The OP-07 also offers a wide input voltage range, high common-mode rejection and low input bias current. These features result in optimum performance for small signal level and low frequency applications. Use of advanced design, processing and testing techniques make Linear's OP-07 a superior choice over similar products. A buffered reference application is shown below. For single op amp applications requiring higher performance in the SO package, see the LT1001CS8.

Precision Buffered Single Supply Reference



The OP-07 contributes less than 5% of the total drift with temperature, noise and long term drift of the reference application.

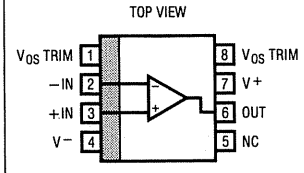
Long Term Stability of Four Representative Units



ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... ±22V
Differential Input Voltage ..... ±30V
Input Voltage Equal to Supply Voltage
Output Short Circuit Duration ..... Indefinite
Operating Temperature Range ..... 0°C to 70°C
Storage Temperature Range
All Devices ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec.) ..... 300°C

PACKAGE/ORDER INFORMATION



ORDER PART NUMBER
OP-07CS8
PART MARKING
OP07CS8

ELECTRICAL CHARACTERISTICS $V_S = \pm 15V$, $T_A = 25°C$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	OP-07CS8 MIN	OP-07CS8 TYP	OP-07CS8 MAX	UNITS
V_{OS}	Input Offset Voltage	(Note 1)		60	150	µV
$\frac{\Delta V_{OS}}{\Delta Time}$	Long Term Input Offset Voltage Stability	(Notes 2 and 3)		0.4	2.0	µV/Month
I_{OS}	Input Offset Current			0.8	6.0	nA
I_B	Input Bias Current			±1.8	±7.0	nA
e_n	Input Noise Voltage	0.1Hz to 10Hz (Note 2)		0.35	0.65	µVp-p
	Input Noise Voltage Density	$f_O = 10Hz$ $f_O = 100Hz$ (Note 2) $f_O = 1000Hz$		10.5 10.2 9.8	20.0 13.5 11.5	nV/√Hz nV/√Hz nV/√Hz
I_n	Input Noise Current	0.1Hz to 10Hz (Note 2)		15	35	pAp-p
	Input Noise Current Density	$f_O = 10Hz$ $f_O = 100Hz$ (Note 2) $f_O = 1000Hz$		0.32 0.15 0.13	0.90 0.27 0.18	pA/√Hz pA/√Hz pA/√Hz
R_{in}	Input Resistance Differential Mode	(Note 4)	8	33		MΩ
	Input Resistance Common-Mode			120		GΩ
	Input Voltage Range		±13.0	±14.0		V
CMRR	Common-Mode Rejection Ratio	$V_{CM} = \pm 13V$	100	120		dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 3V$ to $\pm 18V$	90	104		dB
A_{VOL}	Large Signal Voltage Gain	$R_L = 2k\Omega$, $V_O = \pm 10V$ $R_L = 500\Omega$, $V_O = \pm 0.5V$ $V_S = \pm 3V$ (Note 4)	120 100	400 400		V/mV V/mV
V_O	Maximum Output Voltage Swing	$R_L = 10k\Omega$ $R_L \geq 2k\Omega$ $R_L \geq 1k\Omega$	±12.5 ±11.5	±13.0 ±12.8 ±12.0		V V V
SR	Slewing Rate	$R_L \geq 2k\Omega$ (Note 2)	0.1	0.25		V/µs
GBW	Closed Loop Bandwidth	$A_{VOL} = +1$ (Note 2)	0.4	0.6		MHz
Z_o	Open Loop Output Impedance	$V_O = 0$, $I_o = 0$, $f = 10Hz$		60		Ω
P_d	Power Dissipation	$V_S = \pm 15V$ $V_S = \pm 3V$		80 4	150 8	mW mW
	Offset Adjustment Range	Null Pot = 20kΩ		±4		mV

ELECTRICAL CHARACTERISTICS $V_S = \pm 15V$, $0°C \le T_A \le 70°C$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		OP-07CS8 MIN	TYP	MAX	UNITS
V_{OS}	Input Offset Voltage		●		85	250	μV
$\frac{\Delta V_{OS}}{\Delta Temp}$	Average Input Offset Voltage Drift Without External Trim With External Trim	 Null Pot = 20kΩ (Note 2)	●		 0.5 0.4	 1.8 1.6	 μV/°C μV/°C
I_{OS}	Input Offset Current		●		1.6	8.0	nA
$\frac{\Delta I_{OS}}{\Delta Temp}$	Average Input Offset Current Drift	(Note 2)	●		12	50	pA/°C
I_B	Input Bias Current		●		±2.2	±9.0	nA
$\frac{\Delta I_B}{\Delta Temp}$	Average Input Bias Current Drift	(Note 2)	●		18	50	pA/°C
	Input Voltage Range		●	±13.0	±13.5		V
CMRR	Common-Mode Rejection Ratio	$V_{CM} = \pm 13V$	●	97	120		dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 3V$ to $\pm 18V$	●	86	100		dB
A_{VOL}	Large Signal Voltage Gain	$R_L \ge 2k\Omega$, $V_o = \pm 10V$	●	100	400		V/mV
V_{OUT}	Output Voltage Swing	$R_L \ge 2k\Omega$	●	±11.0	±12.6		V

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

Note 1: Offset voltage is measured with high speed test equipment, approximately 1 second after power is applied.

Note 2: This parameter is tested on a sample basis only.

Note 3: 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 operating days are typically 2.5μV.

Note 4: This parameter is guaranteed by design.