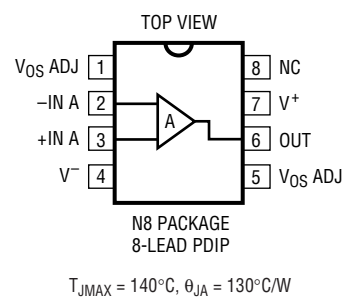
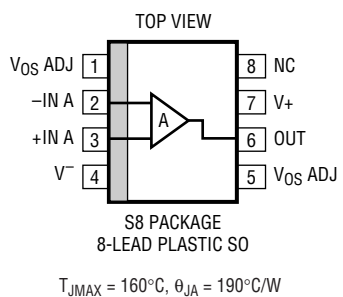


## ABSOLUTE MAXIMUM RATINGS (Note 1)

|                                               |                                               |                                            |                                                |
|-----------------------------------------------|-----------------------------------------------|--------------------------------------------|------------------------------------------------|
| Supply Voltage .....                          | $\pm 20\text{V}$                              | Specified Temperature Range                |                                                |
| Differential Input Voltage .....              | $\pm 40\text{V}$                              | Commercial (Note 8) .....                  | $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$  |
| Input Voltage (Equal to Supply Voltage) ..... | $\pm 20\text{V}$                              | Industrial .....                           | $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$  |
| Output Short-Circuit Duration .....           | Indefinite                                    | Storage Temperature Range .....            | $-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$ |
| Operating Temperature Range .....             | $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ | Lead Temperature (Soldering, 10 sec) ..... | $300^{\circ}\text{C}$                          |

## PACKAGE/ORDER INFORMATION

|  <p>N8 PACKAGE<br/>8-LEAD PDIP</p> <p><math>T_{JMAX} = 140^{\circ}\text{C}</math>, <math>\theta_{JA} = 130^{\circ}\text{C/W}</math></p> | ORDER PART NUMBER                                  |  <p>S8 PACKAGE<br/>8-LEAD PLASTIC SO</p> <p><math>T_{JMAX} = 160^{\circ}\text{C}</math>, <math>\theta_{JA} = 190^{\circ}\text{C/W}</math></p> | ORDER PART NUMBER                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|                                                                                                                                                                                                                          | LT1792ACN8<br>LT1792CN8<br>LT1792AIN8<br>LT1792IN8 |                                                                                                                                                                                                                                 | LT1792ACS8<br>LT1792CS8<br>LT1792AIS8<br>LT1792IS8 |
|                                                                                                                                                                                                                          |                                                    | S8 PART MARKING                                                                                                                                                                                                                 |                                                    |
|                                                                                                                                                                                                                          |                                                    |                                                                                                                                                                                                                                 | 1792A 1792AI<br>1792 1792I                         |

Consult factory for Military grade parts.

## ELECTRICAL CHARACTERISTICS $T_A = 25^{\circ}\text{C}$ , $V_S = \pm 15\text{V}$ , $V_{CM} = 0\text{V}$ , unless otherwise noted. (Note 9)

| SYMBOL   | PARAMETER                                            | CONDITIONS (Note 2)                                                           | LT1792AC/LT1792AI |                                     |     | LT1792C/LT1792I |                                     |     | UNITS                                                        |
|----------|------------------------------------------------------|-------------------------------------------------------------------------------|-------------------|-------------------------------------|-----|-----------------|-------------------------------------|-----|--------------------------------------------------------------|
|          |                                                      |                                                                               | MIN               | TYP                                 | MAX | MIN             | TYP                                 | MAX |                                                              |
| $V_{OS}$ | Input Offset Voltage                                 | $V_S = \pm 5\text{V}$                                                         |                   | 0.2                                 | 0.6 |                 | 0.2                                 | 0.8 | mV                                                           |
|          |                                                      |                                                                               |                   | 0.4                                 | 1.0 |                 | 0.4                                 | 1.3 | mV                                                           |
| $I_{OS}$ | Input Offset Current                                 | Warmed Up (Note 3)                                                            |                   | 100                                 | 400 |                 | 100                                 | 400 | pA                                                           |
| $I_B$    | Input Bias Current                                   | Warmed Up (Note 3)                                                            |                   | 300                                 | 800 |                 | 300                                 | 800 | pA                                                           |
| $e_n$    | Input Noise Voltage                                  | 0.1Hz to 10Hz                                                                 |                   | 2.4                                 |     |                 | 2.4                                 |     | $\mu\text{V}_{p-p}$                                          |
|          | Input Noise Voltage Density                          | $f_0 = 10\text{Hz}$<br>$f_0 = 1000\text{Hz}$                                  |                   | 8.3<br>4.2                          | 6.0 |                 | 8.3<br>4.2                          | 6.0 | $\text{nV}/\sqrt{\text{Hz}}$<br>$\text{nV}/\sqrt{\text{Hz}}$ |
| $i_n$    | Input Noise Current Density                          | $f_0 = 10\text{Hz}$ , $f_0 = 1000\text{Hz}$ (Note 4)                          |                   | 10                                  |     |                 | 10                                  |     | $\text{fA}/\sqrt{\text{Hz}}$                                 |
| $R_{IN}$ | Input Resistance<br>Differential Mode<br>Common Mode | $V_{CM} = -10\text{V}$ to $8\text{V}$<br>$V_{CM} = 8\text{V}$ to $11\text{V}$ |                   | $10^{11}$<br>$10^{11}$<br>$10^{10}$ |     |                 | $10^{11}$<br>$10^{11}$<br>$10^{10}$ |     | $\Omega$<br>$\Omega$<br>$\Omega$                             |
| $C_{IN}$ | Input Capacitance                                    | $V_S = \pm 5\text{V}$                                                         |                   | 14<br>27                            |     |                 | 14<br>27                            |     | pF<br>pF                                                     |
| $V_{CM}$ | Input Voltage Range (Note 5)                         |                                                                               | 13.0<br>-10.5     | 13.5<br>-11.0                       |     | 13.0<br>-10.5   | 13.5<br>-11.0                       |     | V<br>V                                                       |
| CMRR     | Common Mode Rejection Ratio                          | $V_{CM} = -10\text{V}$ to $13\text{V}$                                        | 85                | 105                                 |     | 82              | 100                                 |     | dB                                                           |
| PSRR     | Power Supply Rejection Ratio                         | $V_S = \pm 4.5\text{V}$ to $\pm 20\text{V}$                                   | 88                | 105                                 |     | 83              | 98                                  |     | dB                                                           |

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

| SYMBOL    | PARAMETER                       | CONDITIONS                                                                                | LT1792AC/LT1792AI        |                          |              | LT1792C/LT1792I          |                          |              | UNITS            |
|-----------|---------------------------------|-------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------|--------------------------|--------------------------|--------------|------------------|
|           |                                 |                                                                                           | MIN                      | TYP                      | MAX          | MIN                      | TYP                      | MAX          |                  |
| $A_{VOL}$ | Large-Signal Voltage Gain       | $V_O = \pm 12\text{V}$ , $R_L = 10\text{k}$<br>$V_O = \pm 10\text{V}$ , $R_L = 1\text{k}$ | 1200<br>600              | 4800<br>4000             |              | 1000<br>500              | 4500<br>3000             |              | V/mV<br>V/mV     |
| $V_{OUT}$ | Output Voltage Swing            | $R_L = 10\text{k}$<br>$R_L = 1\text{k}$                                                   | $\pm 13.0$<br>$\pm 12.0$ | $\pm 13.2$<br>$\pm 12.3$ |              | $\pm 13.0$<br>$\pm 12.0$ | $\pm 13.2$<br>$\pm 12.3$ |              | V<br>V           |
| SR        | Slew Rate                       | $R_L \geq 2\text{k}$ (Note 7)                                                             | 2.3                      | 3.4                      |              | 2.3                      | 3.4                      |              | V/ $\mu\text{s}$ |
| GBW       | Gain-Bandwidth Product          | $f_0 = 100\text{kHz}$                                                                     | 4.0                      | 5.6                      |              | 4.0                      | 5.6                      |              | MHz              |
| $I_S$     | Supply Current                  | $V_S = \pm 5\text{V}$                                                                     |                          | 4.2<br>4.2               | 5.20<br>5.15 |                          | 4.2<br>4.2               | 5.20<br>5.15 | mA<br>mA         |
|           | Offset Voltage Adjustment Range | $R_{POT}$ (to $V_{EE}$ ) = 10k                                                            |                          | 10                       |              |                          | 10                       |              | mV               |

The ● denotes specifications which apply over the temperature range  $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ .  $V_S = \pm 15\text{V}$ ,  $V_{CM} = 0\text{V}$ , unless otherwise noted. (Note 9)

| SYMBOL                                     | PARAMETER                          | CONDITIONS (Note 2)                                                                       |        | LT1792AC                 |                           |              | LT1792C                  |                           |              | UNITS                        |
|--------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------|--------|--------------------------|---------------------------|--------------|--------------------------|---------------------------|--------------|------------------------------|
|                                            |                                    |                                                                                           |        | MIN                      | TYP                       | MAX          | MIN                      | TYP                       | MAX          |                              |
| $V_{OS}$                                   | Input Offset Voltage               | $V_S = \pm 5\text{V}$                                                                     | ●<br>● |                          | 0.4<br>0.6                | 0.8<br>1.2   |                          | 0.8<br>1.2                | 2.7<br>3.2   | mV<br>mV                     |
| $\frac{\Delta V_{OS}}{\Delta \text{Temp}}$ | Average Input Offset Voltage Drift | (Note 6)                                                                                  | ●      |                          | 4                         | 10           |                          | 7                         | 40           | $\mu\text{V}/^\circ\text{C}$ |
| $I_{OS}$                                   | Input Offset Current               |                                                                                           | ●      |                          | 180                       | 500          |                          | 180                       | 500          | pA                           |
| $I_B$                                      | Input Bias Current                 |                                                                                           | ●      |                          | 500                       | 1800         |                          | 500                       | 1800         | pA                           |
| $V_{CM}$                                   | Input Voltage Range                |                                                                                           | ●<br>● | 12.9<br>-10.0            | 13.4<br>-10.8             |              | 12.9<br>-10.0            | 13.4<br>-10.8             |              | V<br>V                       |
| CMRR                                       | Common Mode Rejection Ratio        | $V_{CM} = -10\text{V}$ to 12.9V                                                           | ●      | 81                       | 104                       |              | 79                       | 99                        |              | dB                           |
| PSRR                                       | Power Supply Rejection Ratio       | $V_S = \pm 4.5\text{V}$ to $\pm 20\text{V}$                                               | ●      | 85                       | 99                        |              | 81                       | 97                        |              | dB                           |
| $A_{VOL}$                                  | Large-Signal Voltage Gain          | $V_O = \pm 12\text{V}$ , $R_L = 10\text{k}$<br>$V_O = \pm 10\text{V}$ , $R_L = 1\text{k}$ | ●<br>● | 900<br>500               | 3600<br>2600              |              | 800<br>400               | 3400<br>2400              |              | V/mV<br>V/mV                 |
| $V_{OUT}$                                  | Output Voltage Swing               | $R_L = 10\text{k}$<br>$R_L = 1\text{k}$                                                   | ●<br>● | $\pm 12.9$<br>$\pm 11.9$ | $\pm 13.2$<br>$\pm 12.15$ |              | $\pm 12.9$<br>$\pm 11.9$ | $\pm 13.2$<br>$\pm 12.15$ |              | V<br>V                       |
| SR                                         | Slew Rate                          | $R_L \geq 2\text{k}$ (Note 7)                                                             | ●      | 2.1                      | 3.1                       |              | 2.1                      | 3.1                       |              | V/ $\mu\text{s}$             |
| GBW                                        | Gain-Bandwidth Product             | $f_0 = 100\text{kHz}$                                                                     | ●      | 3.2                      | 4.5                       |              | 3.2                      | 4.5                       |              | MHz                          |
| $I_S$                                      | Supply Current                     | $V_S = \pm 5\text{V}$                                                                     | ●<br>● |                          | 4.2<br>4.2                | 5.30<br>5.25 |                          | 4.2<br>4.2                | 5.30<br>5.25 | mA<br>mA                     |

## ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the temperature range  $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$ .  $V_S = \pm 15\text{V}$ ,  $V_{CM} = 0\text{V}$ , unless otherwise noted. (Notes 8, 9)

| SYMBOL                                     | PARAMETER                          | CONDITIONS (Note 2)                                                                       |   | LT1792AC/LT1792AI |            |     | LT1792C/LT1792I |            |     | UNITS                          |
|--------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------|---|-------------------|------------|-----|-----------------|------------|-----|--------------------------------|
|                                            |                                    |                                                                                           |   | MIN               | TYP        | MAX | MIN             | TYP        | MAX |                                |
| $V_{OS}$                                   | Input Offset Voltage               | $V_S = \pm 5\text{V}$                                                                     | ● | 0.5               | 1.0        |     | 1.2             | 3.7        |     | mV                             |
|                                            |                                    |                                                                                           | ● | 0.8               | 1.4        |     | 1.5             | 4.2        |     | mV                             |
| $\frac{\Delta V_{OS}}{\Delta \text{Temp}}$ | Average Input Offset Voltage Drift | (Note 6)                                                                                  | ● | 4                 | 10         |     | 7               | 40         |     | $\mu\text{V}/^{\circ}\text{C}$ |
| $I_{OS}$                                   | Input Offset Current               |                                                                                           | ● | 300               | 800        |     | 300             | 800        |     | pA                             |
| $I_B$                                      | Input Bias Current                 |                                                                                           | ● | 1200              | 4000       |     | 1200            | 4000       |     | pA                             |
| $V_{CM}$                                   | Input Voltage Range                |                                                                                           | ● | 12.6              | 13.0       |     | 12.6            | 13.0       |     | V                              |
|                                            |                                    |                                                                                           | ● | -10.0             | -10.5      |     | -10.0           | -10.5      |     | V                              |
| CMRR                                       | Common Mode Rejection Ratio        | $V_{CM} = -10\text{V}$ to $12.6\text{V}$                                                  | ● | 80                | 103        |     | 78              | 98         |     | dB                             |
| PSRR                                       | Power Supply Rejection Ratio       | $V_S = \pm 4.5\text{V}$ to $\pm 20\text{V}$                                               | ● | 83                | 98         |     | 79              | 96         |     | dB                             |
| $A_{VOL}$                                  | Large-Signal Voltage Gain          | $V_O = \pm 12\text{V}$ , $R_L = 10\text{k}$<br>$V_O = \pm 10\text{V}$ , $R_L = 1\text{k}$ | ● | 850               | 3300       |     | 750             | 3000       |     | V/mV                           |
|                                            |                                    |                                                                                           | ● | 400               | 2200       |     | 300             | 2000       |     | V/mV                           |
| $V_{OUT}$                                  | Output Voltage Swing               | $R_L = 10\text{k}$<br>$R_L = 1\text{k}$                                                   | ● | $\pm 12.8$        | $\pm 13.1$ |     | $\pm 12.8$      | $\pm 13.1$ |     | V                              |
|                                            |                                    |                                                                                           | ● | $\pm 11.8$        | $\pm 12.1$ |     | $\pm 11.8$      | $\pm 12.1$ |     | V                              |
| SR                                         | Slew Rate                          | $R_L \geq 2\text{k}$                                                                      | ● | 2.0               | 3.0        |     | 2.0             | 3.0        |     | V/ $\mu\text{s}$               |
| GBW                                        | Gain-Bandwidth Product             | $f_0 = 100\text{kHz}$                                                                     | ● | 2.9               | 4.3        |     | 2.9             | 4.3        |     | MHz                            |
| $I_S$                                      | Supply Current                     | $V_S = \pm 5\text{V}$                                                                     | ● | 4.2               | 5.40       |     | 4.2             | 5.40       |     | mA                             |
|                                            |                                    |                                                                                           | ● | 4.2               | 5.35       |     | 4.2             | 5.35       |     | mA                             |

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

**Note 2:** Typical parameters are defined as the 60% yield of parameter distributions of individual amplifiers.

**Note 3:** Warmed-up  $I_B$  and  $I_{OS}$  readings are extrapolated to a chip temperature of  $32^{\circ}\text{C}$  from  $25^{\circ}\text{C}$  measurements and  $32^{\circ}\text{C}$  characterization data.

**Note 4:** Current noise is calculated from the formula:

$$i_n = (2qI_B)^{1/2}$$

where  $q = 1.6 \cdot 10^{-19}$  coulomb. The noise of source resistors up to 200M swamps the contribution of current noise.

**Note 5:** Input voltage range functionality is assured by testing offset voltage at the input voltage range limits to a maximum of 2.3mV (A grade), to 2.8mV (C grade).

**Note 6:** This parameter is not 100% tested.

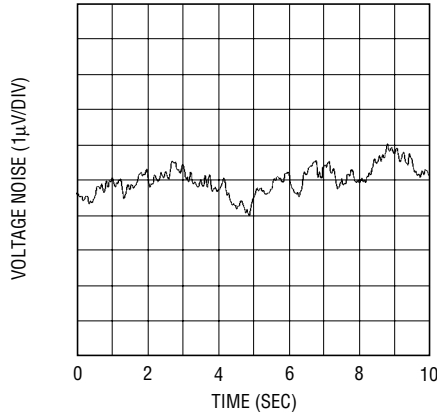
**Note 7:** Slew rate is measured in  $A_V = -1$ ; input signal is  $\pm 7.5\text{V}$ , output measured at  $\pm 2.5\text{V}$ .

**Note 8:** The LT1792AC and LT1792C are guaranteed to meet specified performance from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  and are designed, characterized and expected to meet these extended temperature limits, but are not tested at  $-40^{\circ}\text{C}$  and  $85^{\circ}\text{C}$ . The LT1792I is guaranteed to meet the extended temperature limits. The LT1792AC and LT1792AI grade are 100% temperature tested for the specified temperature range.

**Note 9:** The LT1792 is measured in an automated tester in less than one second after application of power. Depending on the package used, power dissipation, heat sinking, and air flow conditions, the fully warmed-up chip temperature can be  $10^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  higher than the ambient temperature.

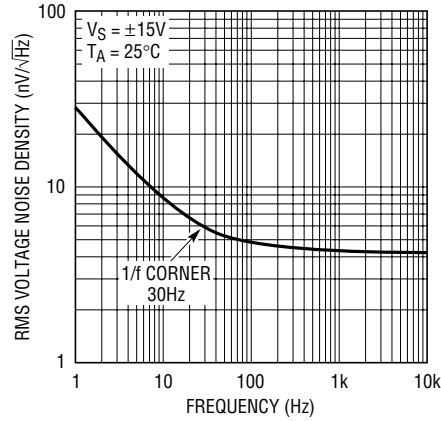
# TYPICAL PERFORMANCE CHARACTERISTICS

0.1Hz to 10Hz Voltage Noise



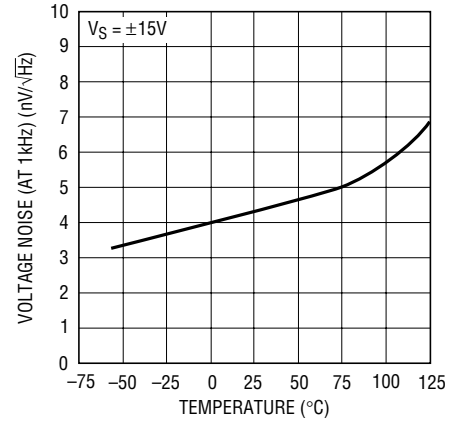
1792 G01

Voltage Noise vs Frequency



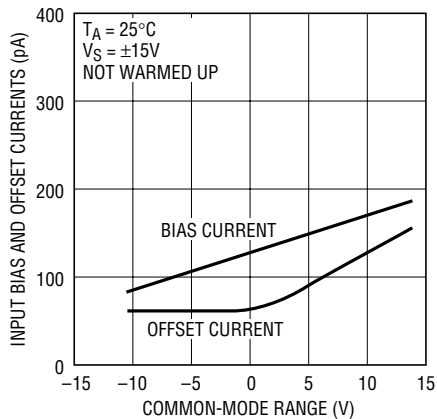
1792 G02

Voltage Noise vs Chip Temperature



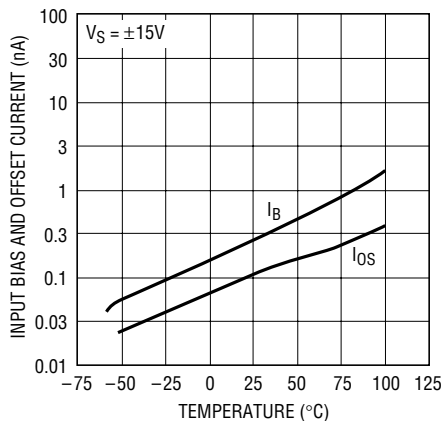
1792 G03

Input Bias and Offset Current Over the Common Mode Range



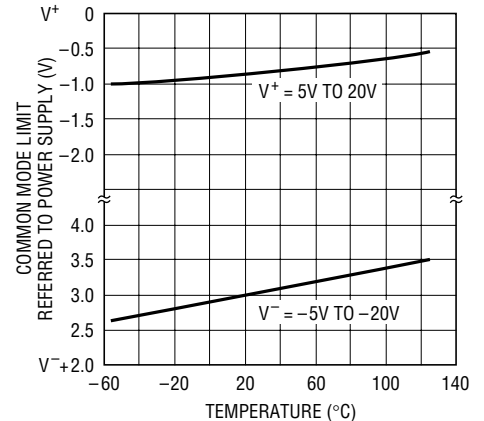
1792 G22

Input Bias and Offset Current vs Chip Temperature



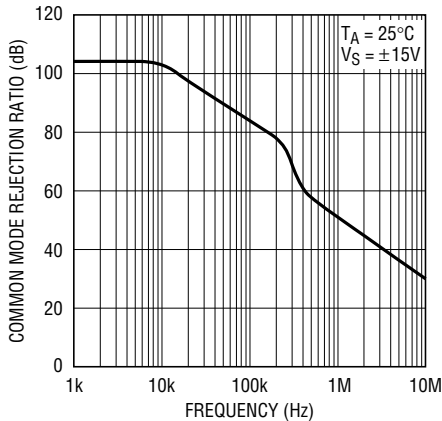
1792 G04

Common Mode Limit vs Temperature



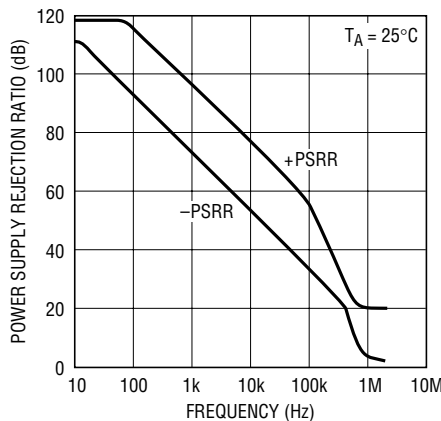
1792 G05

Common Mode Rejection Ratio vs Frequency



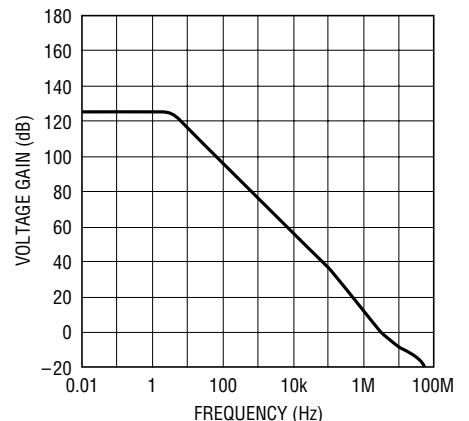
1792 G06

Power Supply Rejection Ratio vs Frequency



1792 G07

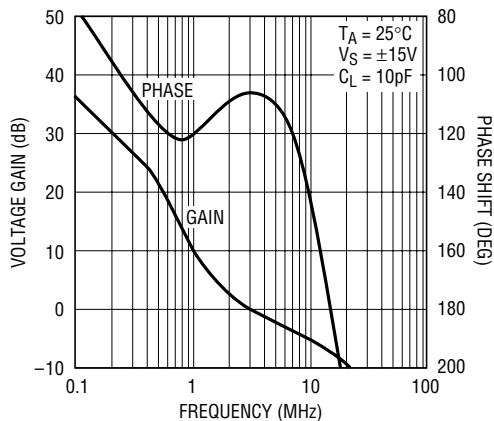
Voltage Gain vs Frequency



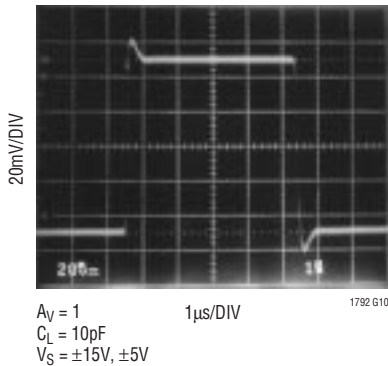
1792 G08

# TYPICAL PERFORMANCE CHARACTERISTICS

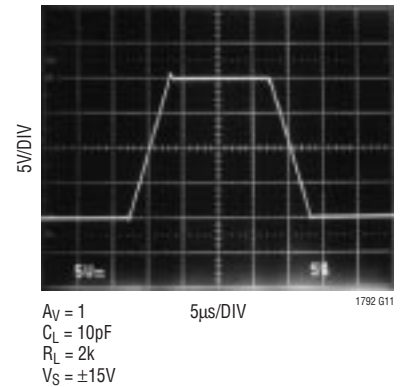
**Gain and Phase Shift vs Frequency**



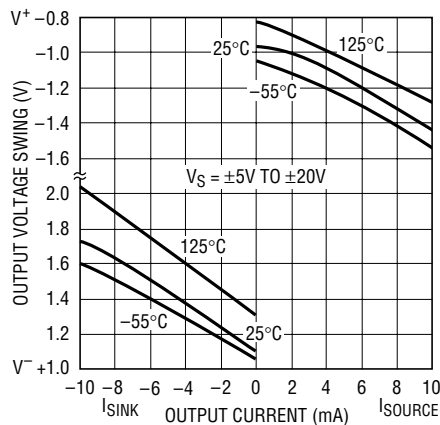
**Small-Signal Transient Response**



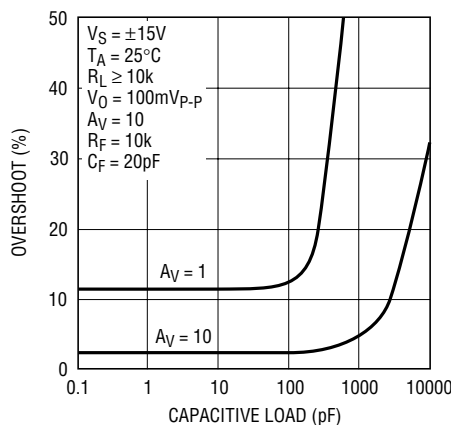
**Large-Signal Transient Response**



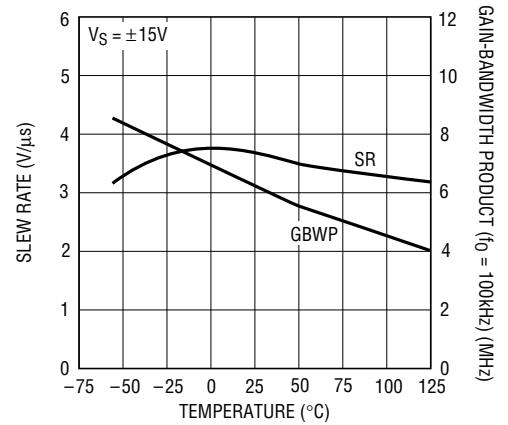
**Output Voltage Swing vs Load Current**



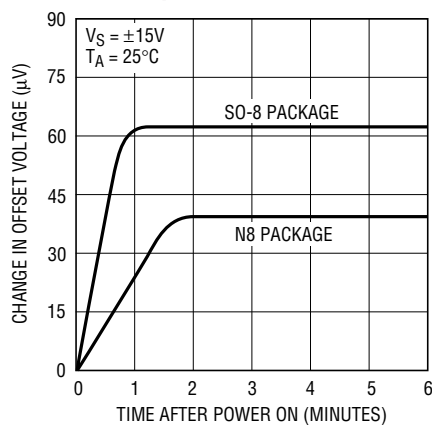
**Capacitive Load Handling**



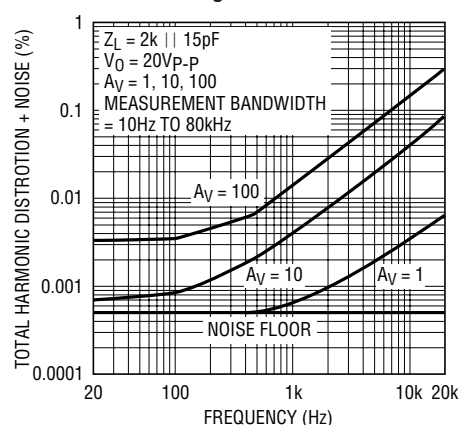
**Slew Rate and Gain-Bandwidth Product vs Temperature**



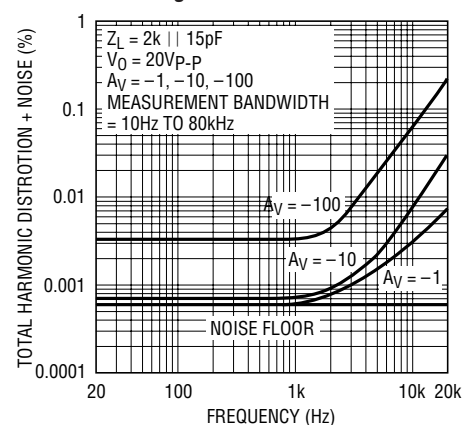
**Warm-Up Drift**



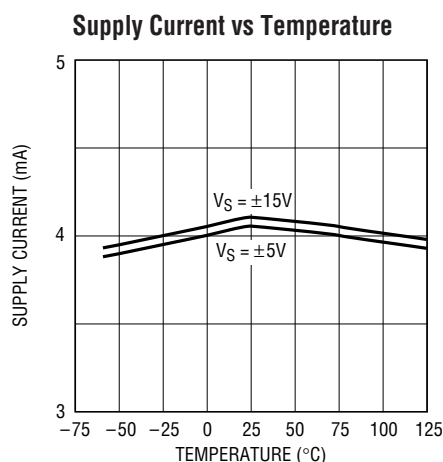
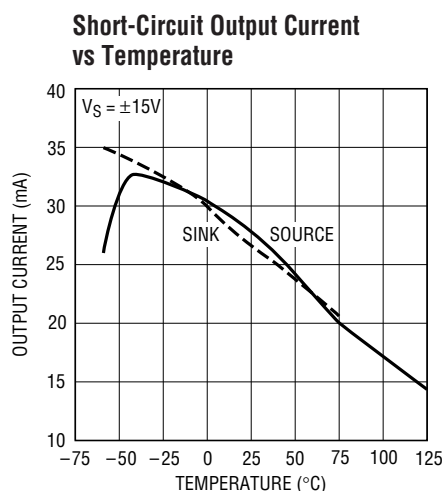
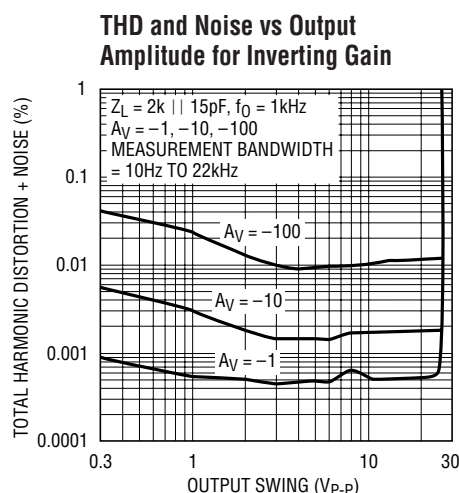
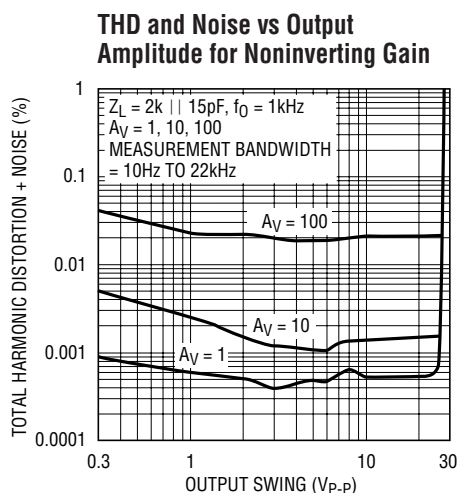
**THD and Noise vs Frequency for Noninverting Gain**



**THD and Noise vs Frequency for Inverting Gain**



## TYPICAL PERFORMANCE CHARACTERISTICS



## APPLICATIONS INFORMATION

The LT1792 may be inserted directly into OPA124, AD743, AD745, AD645, AD544 and AD820 sockets with improved noise performance. Offset nulling will be compatible with these devices with the wiper of the potentiometer tied to the negative supply (Figure 1a). No appreciable change in offset voltage drift with temperature will occur when the device is nulled with a potentiometer ranging from 10k to 200k. Finer adjustments can be made with resistors in series with the potentiometer (Figure 1b).

Being a low voltage noise JFET op amp, the LT1792 can replace many bipolar op amps that are used in amplifying low level signals from high impedance transducers. The

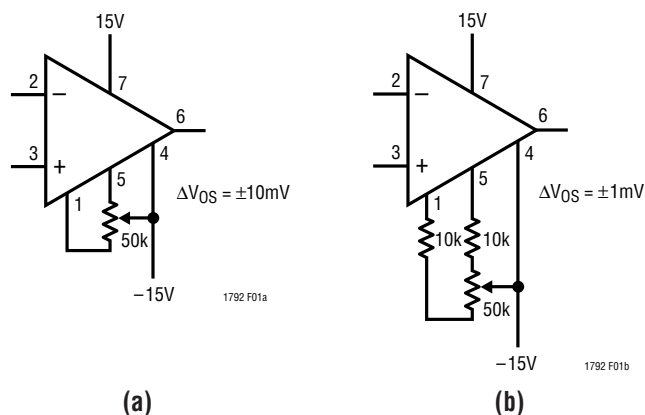
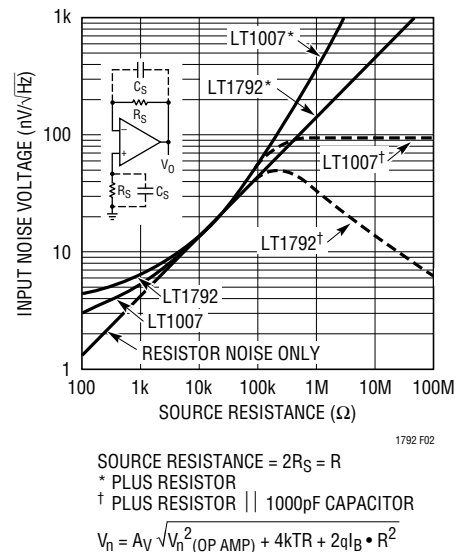


Figure 1

## APPLICATIONS INFORMATION

best bipolar op amps, with higher current noise, will eventually lose out to the LT1792 when transducer impedance increases. The low voltage noise of the LT1792 allows it to surpass most single JFET op amps available. For the best performance versus area available anywhere, the LT1792 is offered in the SO-8 surface mount package with no degradation in performance.

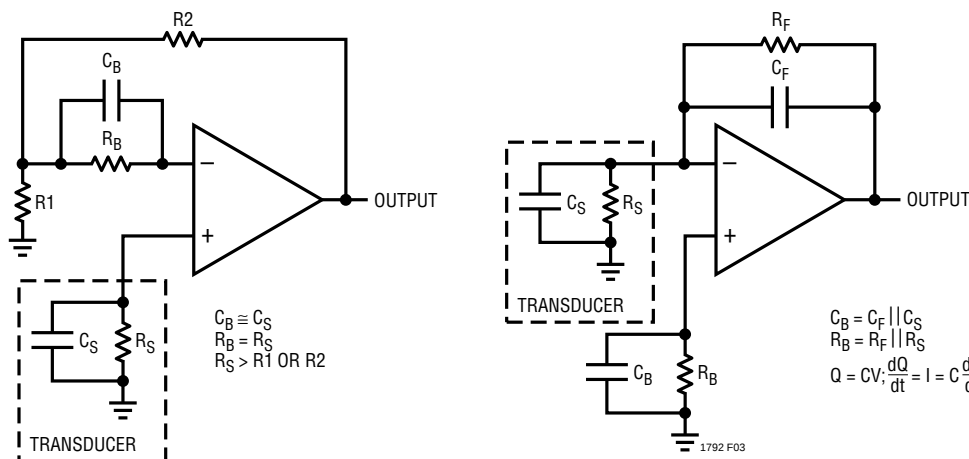
The low voltage and current noise offered by the LT1792 makes it useful in a wide range of applications, especially where high impedance, capacitive transducers are used such as hydrophones, precision accelerometers and photo diodes. The total output noise in such a system is the gain times the RMS sum of the op amp input referred voltage noise, the thermal noise of the transducer, and the op amp bias current noise times the transducer impedance. Figure 2 shows total input voltage noise versus source resistance. In a low source resistance (<5k) application the op amp voltage noise will dominate the total noise. This means the LT1792 will beat out any JFET op amp, only the lowest noise bipolar op amps have the edge at low source resistances. As the source resistance increases from 5k to 50k, the LT1792 will match the best bipolar op amps for noise performance, since the thermal noise of the transducer (4kTR) begins to dominate the total noise. A further increase in source resistance, above 50k, is where the op amp's current noise component ( $2qI_B R_{\text{TRANS}}$ ) will eventually dominate the total noise. At these high source resistances, the LT1792 will out perform the lowest noise bipolar op amp due to the inherently low



**Figure 2. Comparison of LT1792 and LT1007 Total Output 1kHz Voltage Noise Versus Source Resistance**

current noise of FET input op amps. Clearly, the LT1792 will extend the range of high impedance transducers that can be used for high signal-to-noise ratios. This makes the LT1792 the best choice for high impedance, capacitive transducers.

The high input impedance JFET front end makes the LT1792 suitable in applications where very high charge sensitivity is required. Figure 3 illustrates the LT1792 in its inverting and noninverting modes of operation. A charge amplifier is shown in the inverting mode example; here the gain depends on the principal of charge conservation at



**Figure 3. Noninverting and Inverting Gain Configurations**

## APPLICATIONS INFORMATION

the input of the LT1792. The charge across the transducer capacitance,  $C_S$ , is transferred to the feedback capacitor  $C_F$ , resulting in a change in voltage,  $dV$ , equal to  $dQ/C_F$ . The gain therefore is  $C_F/C_S$ . For unity gain, the  $C_F$  should equal the transducer capacitance plus the input capacitance of the LT1792 and  $R_F$  should equal  $R_S$ . In the noninverting mode example, the transducer current is converted to a change in voltage by the transducer capacitance; this voltage is then buffered by the LT1792 with a gain of  $1 + R_1/R_2$ . A DC path is provided by  $R_S$ , which is either the transducer impedance or an external resistor. Since  $R_S$  is usually several orders of magnitude greater than the parallel combination of  $R_1$  and  $R_2$ ,  $R_B$  is added to balance the DC offset caused by the noninverting input bias current and  $R_S$ . The input bias currents, although small at room temperature, can create significant errors at higher temperature, especially with transducer resistances of up to 100M or more. The optimum value for  $R_S$  is determined by equating the thermal noise ( $4kTR_S$ ) to the current noise times  $R_S$ ,  $[(2qI_B) \cdot R_S]$ , resulting in  $R_B = 2V_T/I_B$  ( $V_T = 26\text{mV}$  at  $25^\circ\text{C}$ ). A parallel capacitor,  $C_B$ , is used to cancel the phase shift caused by the op amp input capacitance and  $R_B$ .

### Reduced Power Supply Operation

The LT1792 can be operated from  $\pm 5\text{V}$  supplies for lower power dissipation resulting in lower  $I_B$  and noise at the

expense of reduced dynamic range. To illustrate this benefit, let's take the following example:

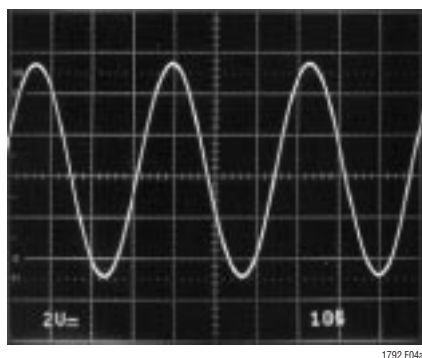
An LT1792CS8 operates at an ambient temperature of  $25^\circ\text{C}$  with  $\pm 15\text{V}$  supplies, dissipating 159mW of power (typical supply current = 5.3mA). The SO-8 package has a  $\theta_{JA}$  of  $190^\circ\text{C/W}$ , which results in a die temperature increase of  $30.2^\circ\text{C}$  or a room temperature die operating temperature of  $55.2^\circ\text{C}$ . At  $\pm 5\text{V}$  supplies, the die temperature increases by only one third of the previous amount or  $10.1^\circ\text{C}$  resulting in a typical die operating temperature of only  $35.1^\circ\text{C}$ . A 20 degree reduction of die temperature is achieved at the expense of a 20V reduction in dynamic range.

To take full advantage of a wide input common mode range, the LT1792 was designed to eliminate phase reversal. Referring to the photographs shown in Figure 4, the LT1792 is shown operating in the follower mode ( $A_V = 1$ ) at  $\pm 5\text{V}$  supplies with the input swinging  $\pm 5.2\text{V}$ . The output of the LT1792 clips cleanly and recovers with no phase reversal. This has the benefit of preventing lock-up in servo systems and minimizing distortion components.

### High Speed Operation

The low noise performance of the LT1792 was achieved by making the input JFET differential pair large to maximize the first stage gain. Increasing the JFET geometry

INPUT:  $\pm 5.2\text{V}$  Sine Wave



LT1792 Output

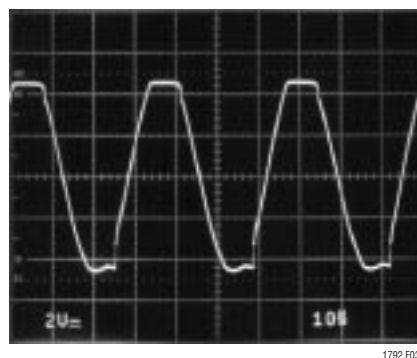


Figure 4. Voltage Follower with Input Exceeding the Common Mode Range ( $V_S = \pm 5\text{V}$ )

## APPLICATIONS INFORMATION

also increases the parasitic gate capacitance, which if left unchecked, can result in increased overshoot and ringing. When the feedback around the op amp is resistive ( $R_F$ ), a pole will be created with  $R_F$ , the source resistance and capacitance ( $R_S$ ,  $C_S$ ), and the amplifier input capacitance ( $C_{IN} = 27\text{pF}$ ). In low gain configurations and with  $R_S$  and  $R_F$  in the kilohm range (Figure 5), this pole can create excess phase shift and even oscillation. A small capacitor ( $C_F$ ) in parallel with  $R_F$  eliminates this problem. With  $R_S(C_S + C_{IN}) = R_F C_F$ , the effect of the feedback pole is completely removed.

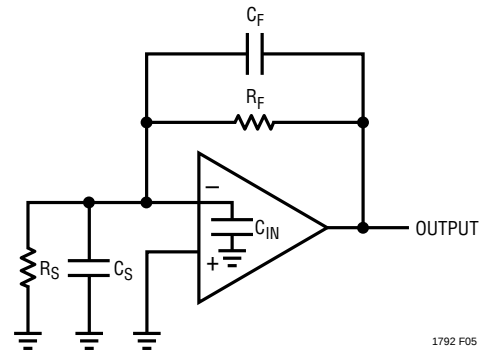
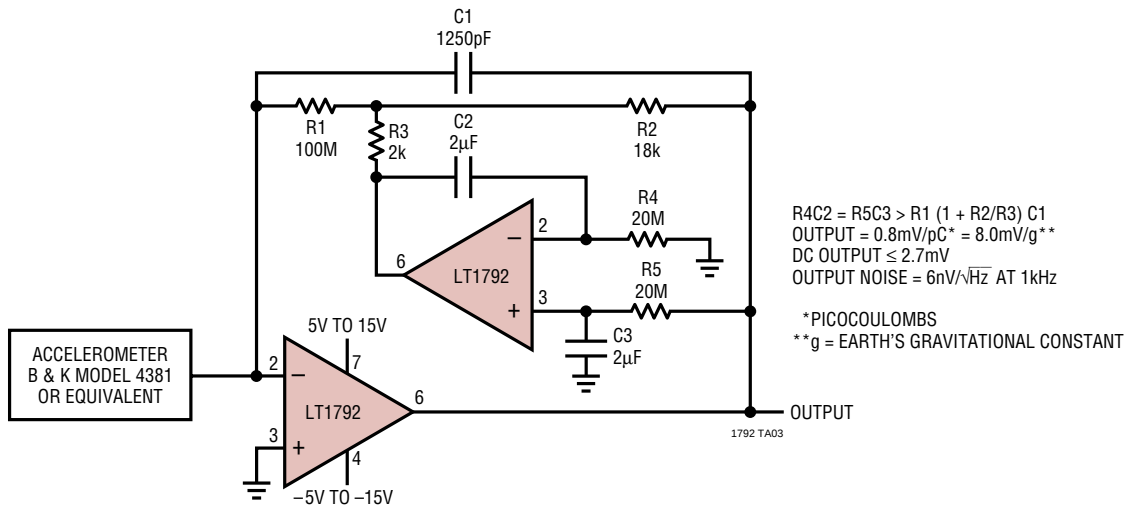


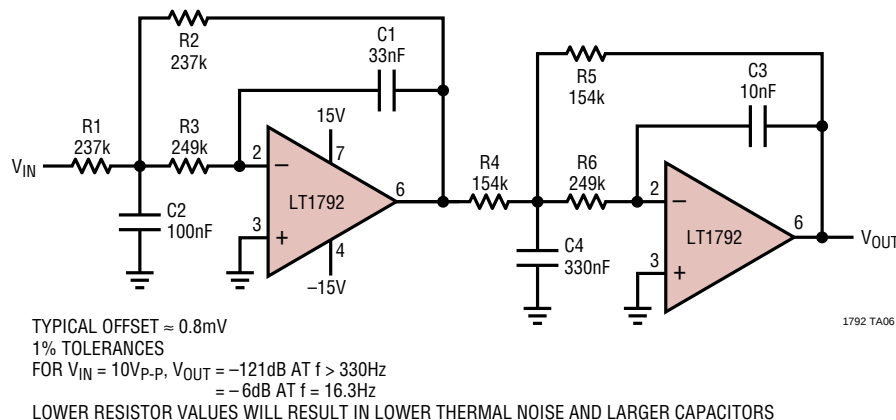
Figure 5

## TYPICAL APPLICATIONS

### Accelerometer Amplifier with DC Servo

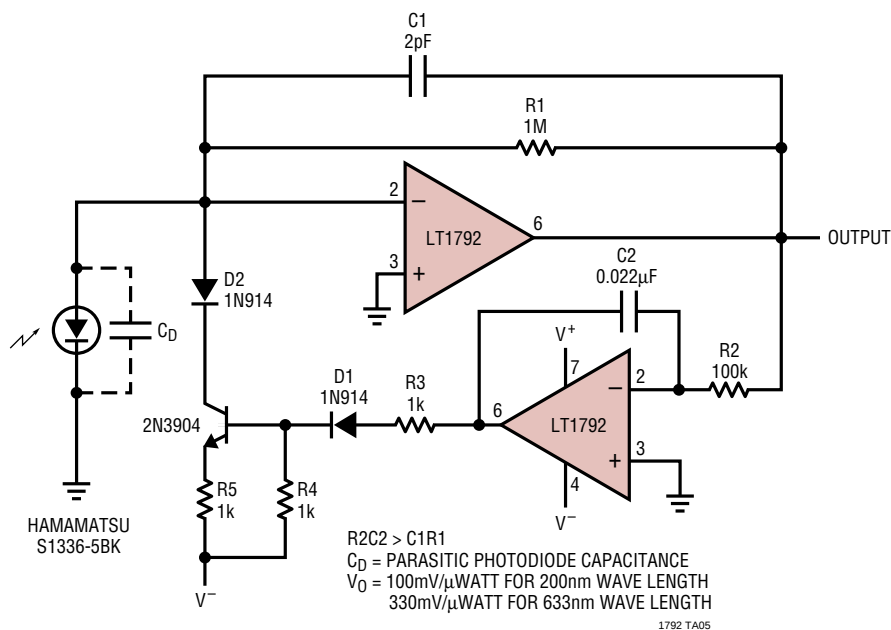


### 10Hz Fourth Order Chebyshev Lowpass Filter (0.01dB Ripple)

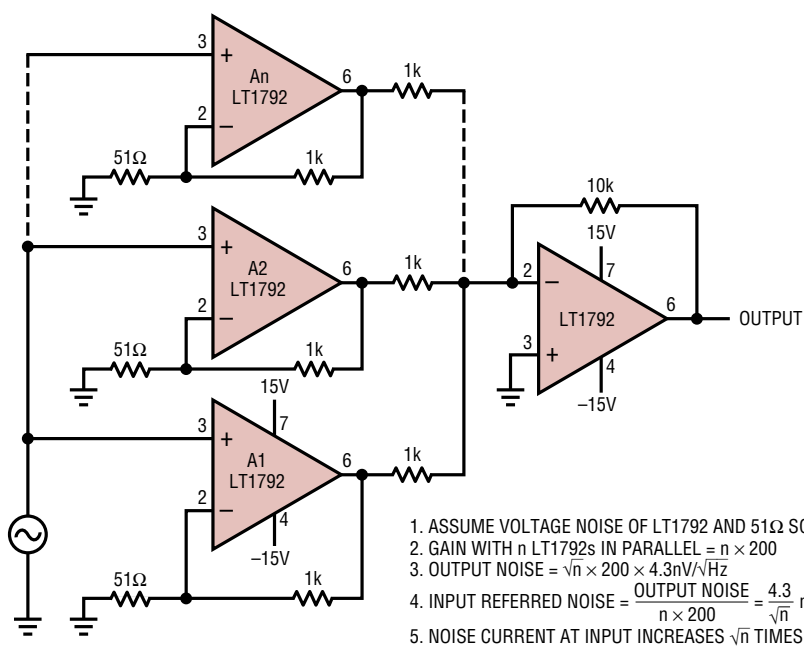


## TYPICAL APPLICATIONS

## Low Noise Light Sensor with DC Servo

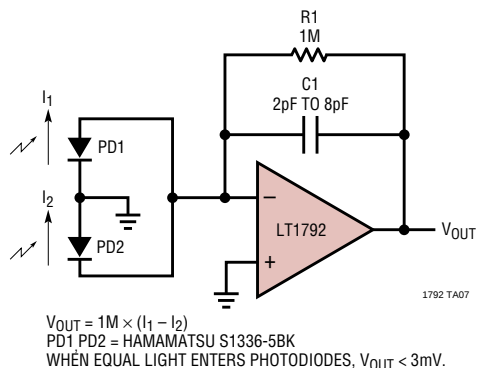


## Paralleling Amplifiers to Reduce Voltage Noise

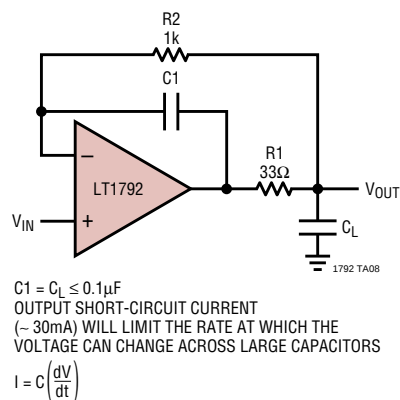


## TYPICAL APPLICATIONS

### Light Balance Detection Circuit



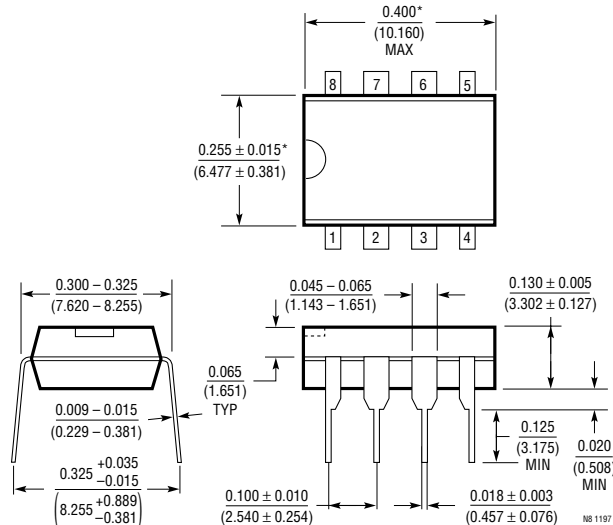
### Unity-Gain Buffer with Extended Load Capacitance Drive Capability



## PACKAGE DESCRIPTION

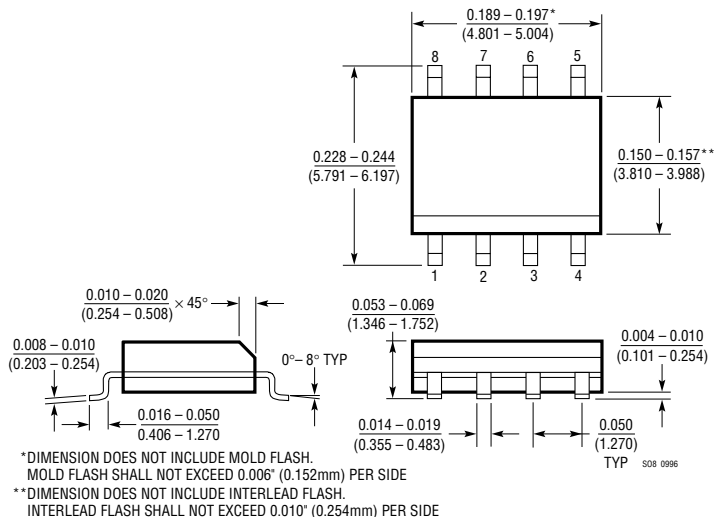
Dimensions in inches (millimeters) unless otherwise noted.

### N8 Package 8-Lead PDIP (Narrow 0.300) (LTC DWG # 05-08-1510)



\*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.  
 MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.010 INCH (0.254mm)

### S8 Package 8-Lead Plastic Small Outline (Narrow 0.150) (LTC DWG # 05-08-1610)



## RELATED PARTS

| PART NUMBER | DESCRIPTION                | COMMENTS                                                                  |
|-------------|----------------------------|---------------------------------------------------------------------------|
| LT1113      | Low Noise Dual JFET Op Amp | Dual Version of LT1792, $V_{NOISE} = 4.5nV/\sqrt{Hz}$                     |
| LT1169      | Low Noise Dual JFET Op Amp | Dual Version of LT1793, $I_B = 10pA$ , $V_{NOISE} = 6nV/\sqrt{Hz}$        |
| LT1793      | Low Noise Single Op Amp    | Lower $I_B$ Version of LT1792, $I_B = 10pA$ , $V_{NOISE} = 6nV/\sqrt{Hz}$ |