

### Features

- Low Power Consumption
- Wide Common-Mode and Differential Voltage Ranges
- Low Input Bias and Offset Currents
- Output Short-Circuit Protection
- Low Total Harmonic Distortion...0.003% Typ
- High Input Impedance...JFET-Input Stage
- Latch-Up-Free Operation
- High Slew Rate...13V/μs Typ
- Common-Mode Input Voltage Range Includes V<sub>CC+</sub>
- SOP-8L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

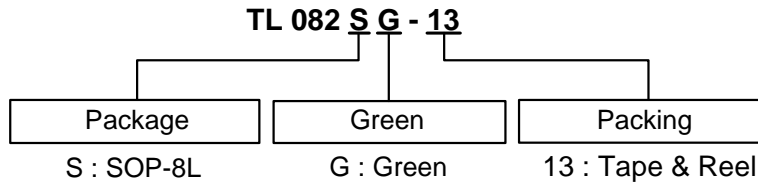
### General Description


The JFET-input operational amplifier family is designed to offer a wider selection than any previously developed operational amplifier family. Each of these JFET-input operational amplifiers incorporates well-matched, high-voltage JFET and bipolar transistors in a monolithic integrated circuit. The devices feature high slew rates, low input bias and offset currents, and low offset-voltage temperature coefficient.

### Applications

- Active filters
- Audio pre-amps
- Sample and holds
- Peak detectors

### Ordering Information

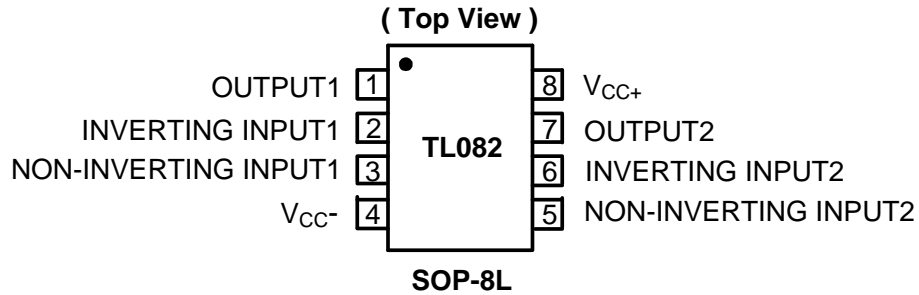


| Device   | Package Code | Packaging (Note 2) | 13" Tape and Reel |                    |
|--|--------------|--------------------|-------------------|--------------------|
|  |              |                    | Quantity          | Part Number Suffix |
|  TL082SG-13 | S            | SOP-8L             | 2500/Tape & Reel  | -13                |

- Notes:
1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html)
  2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

### Pin Assignments

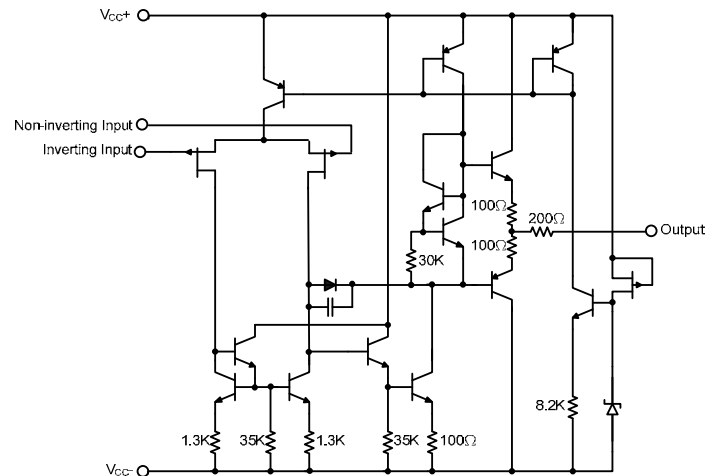
(1) Dual channel SOP-8L



### Pin Descriptions

| Pin Name             | Pin No. | Description                   |
|----------------------|---------|-------------------------------|
| OUTPUT1              | 1       | Channel 1 Output              |
| INVERTING INPUT1     | 2       | Channel 1 Inverting Input     |
| NON-INVERTING INPUT1 | 3       | Channel 1 Non-inverting Input |
| V <sub>CC-</sub>     | 4       | Supply Voltage                |
| NON-INVERTING INPUT2 | 5       | Channel 2 Non-inverting Input |
| INVERTING INPUT2     | 6       | Channel 2 Inverting Input     |
| OUTPUT2              | 7       | Channel 2 Output              |
| V <sub>CC+</sub>     | 8       | Supply Voltage                |

### Block Diagram



**Absolute Maximum Ratings (Note 8)**

| Symbol    | Parameter                                     | Rating      | Unit               |
|-----------|---|-------------|--------------------|
| $V_{CC+}$ | Supply Voltage + (Note 3)                     | +18         | V                  |
| $V_{CC-}$ | Supply Voltage - (Note 3)                     | -18         | V                  |
| $V_I$     | Input voltage (Notes 3 and 5)                 | $\pm 15$    | V                  |
| $V_{ID}$  | Differential input Voltage, $V_{ID}$ (Note 4) | $\pm 30$    | V                  |
|           | Duration of output short circuit (Note 6)     | Unlimited   |                    |
| $P_D$     | Power Dissipation (Note 7)                    | 860         | mW                 |
| $T_J$     | Operating Junction Temperature Range          | 150         | $^{\circ}\text{C}$ |
| $T_{ST}$  | Storage Temperature Range                     | -65 to +150 | $^{\circ}\text{C}$ |

- Notes:
3. ALL voltage values, except differential voltages, are with respect to the midpoint between  $V_{CC+}$  and  $V_{CC-}$ .
  4. Differential voltage are at the non-inverting input terminal with respect to the inverting input terminal.
  5. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15V, whichever is less.
  6. The output may be shorted to ground or either supply. Temperature and/or supply voltage must be limited to ensure that the dissipation rating is not exceeded.
  7. Maximum power dissipation is a function of  $T_J(\text{max})$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(\text{max}) - T_A) / \theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150 $^{\circ}\text{C}$  can affect reliability

**Recommended Operating Conditions (Note 8)**

| Symbol      | Description                         | Rating     | Unit               |
|-------------|-------------------------------------|------------|--------------------|
| $V_{CC\pm}$ | Supply Voltage                      | $\pm 15$   | V                  |
| $T_A$       | Operating Ambient Temperature Range | -40 to +85 | $^{\circ}\text{C}$ |

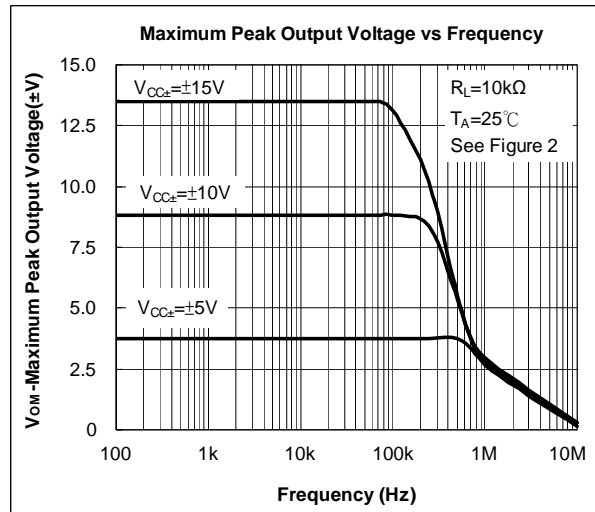
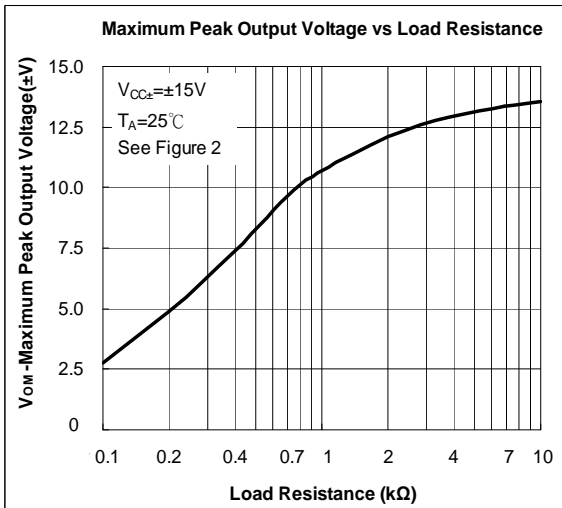
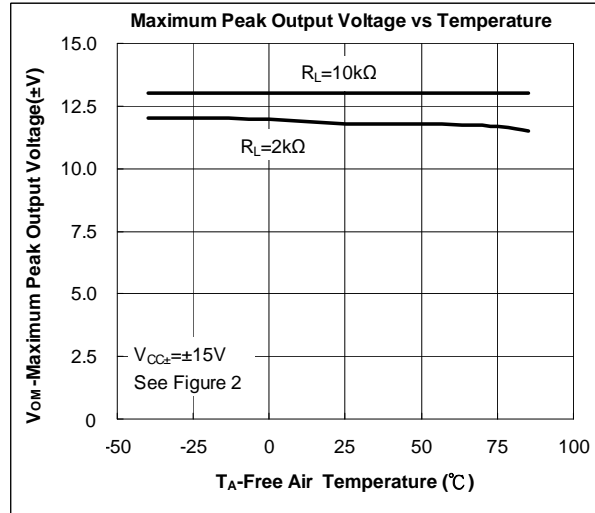
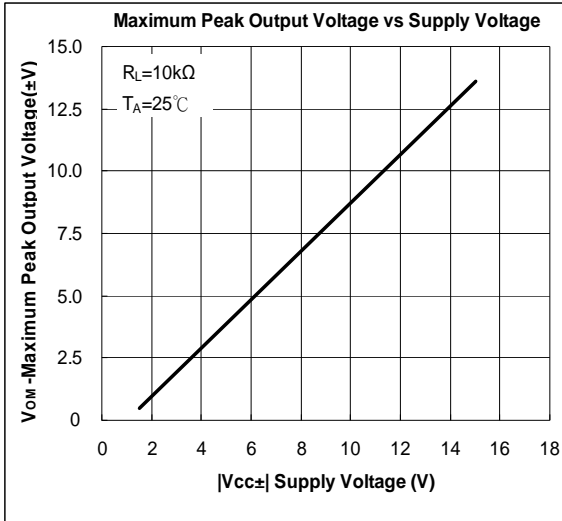
- Notes:
8. Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Recommended Operating Conditions indicate conditions for which the device is intended to be functional, but specific performance is not guaranteed. For guaranteed specifications and the test conditions, see the Electrical Characteristics.

**Electrical Characteristics** ( $V_{CC\pm} = \pm 15V$ ,  $T_A = 25^\circ C$ ; unless otherwise noted)

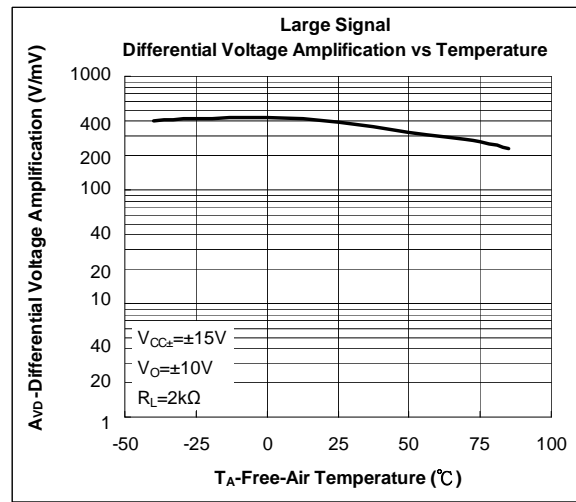
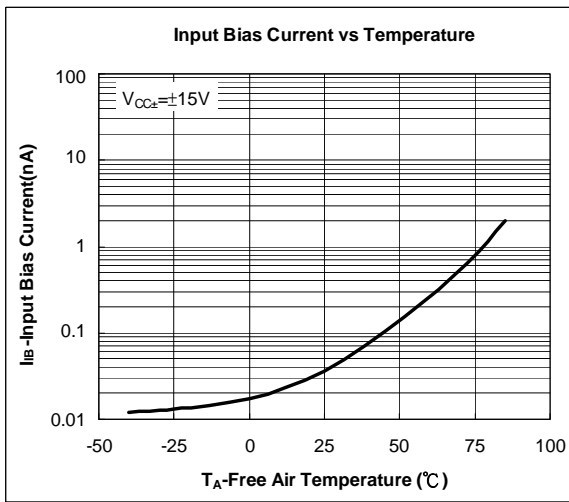
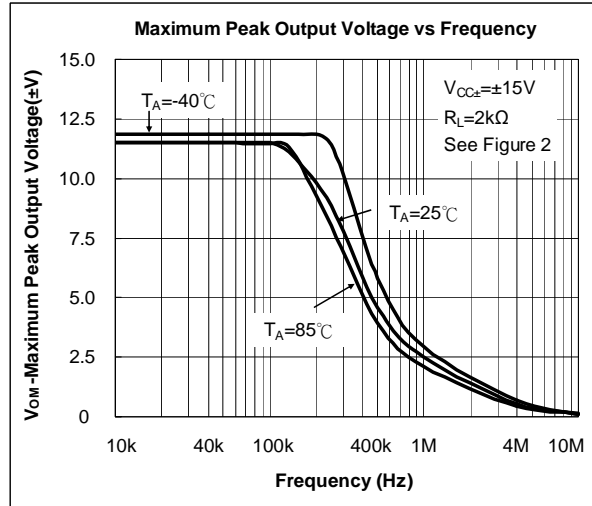
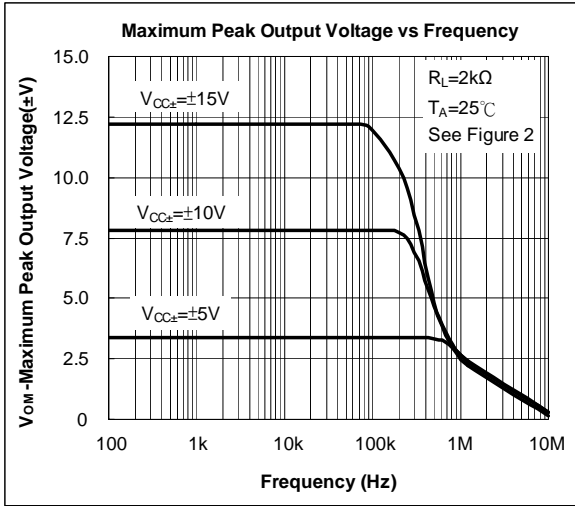
| Symbol            | Parameter   | Test Conditions  | Min                  | Typ.       | Max | Unit             |    |
|-------------------|---|--|----------------------|------------|-----|------------------|----|
| $V_{IO}$          | Input Offset Voltage  | $V_O=0$ ,<br>$R_S=50\Omega$  | $T_A=25^\circ C$     |            | 3   | 6                | mV |
|                   |   |  | $T_A=$ full range    |            |     | 9                |    |
| $\alpha_{V_{IO}}$ | Temperature Coefficient of Input Offset Voltage                     | $V_O=0$ , $R_S=50\Omega$ , $T_A=$ full range   |                      | 18         |     | $\mu V/^\circ C$ |    |
| $I_{IO}$          | Input Offset Current  | $V_O=0$  | $T_A=25^\circ C$     |            | 5   | 100              | pA |
|                   |   |  | $T_A=$ full range    |            |     | 10               | nA |
| $I_{IB}$          | Input Bias Current  | $V_O=0$  | $T_A=25^\circ C$     |            | 30  | 200              | pA |
|                   |   |  | $T_A=$ full range    |            |     | 20               | nA |
| $V_{ICR}$         | Common Mode Input Voltage Range                                     |  | $\pm 11$             | -12~+15    |     | V                |    |
| $V_{OM}$          | Maximum Peak Output Voltage Swing                                   | $R_L=10k\Omega$ , $T_A=25^\circ C$   | $\pm 12$             | $\pm 13.5$ |     | V                |    |
|                   |   | $R_L \geq 10k\Omega$ ,<br>$R_L \geq 2k\Omega$  | $\pm 12$             |            |     |                  |    |
|                   |   | $T_A=$ full range  | $\pm 10$             | $\pm 12$   |     |                  |    |
| $A_{VD}$          | Large Signal Differential Voltage Amplification                     | $V_O=\pm 10V$ ,<br>$R_L \geq 2k\Omega$   | $T_A=25^\circ C$     | 50         | 200 | V/mV             |    |
|                   |   |  | $T_A=$ full range    | 25         |     |                  |    |
| $B_1$             | Unity Gain Bandwidth  |  |                      | 3          |     | MHz              |    |
| $r_i$             | Input Resistance  | $T_A=25^\circ C$   |                      | $10^{12}$  |     | $\Omega$         |    |
| CMRR              | Common Mode Rejection Ratio   | $V_{IC}=V_{ICRmin}$ , $V_O=0$<br>$R_S=50\Omega$ , $T_A=25^\circ C$                       | 75                   | 86         |     | dB               |    |
| $k_{SVR}$         | Supply Voltage Rejection Ratio ( $\Delta V_{CC\pm}/\Delta V_{IO}$ ) | $V_{CC}=\pm 9$ to $\pm 15V$<br>$V_O=0$<br>$R_S=50\Omega$ , $T_A=25^\circ C$              | 80                   | 86         |     | dB               |    |
| $I_{CC}$          | Supply Current (each amplifier)                                     | $V_O=0$ , $T_A=25^\circ C$<br>No load  |                      | 1.4        | 2.8 | mA               |    |
| $V_{O1}/V_{O2}$   | Crosstalk Attenuation   | $A_{VD}=100$ , $T_A=25^\circ C$  |                      | 120        |     | dB               |    |
| SR                | Slew Rate at Unity Gain   | $V_I=10V$ , $C_L=100pF$ ,<br>$R_L=2k\Omega$<br>(See Figure 1)                            | $T_A=25^\circ C$     | 8          | 13  | V/ $\mu s$       |    |
|                   |   |  | $T_A=$ full range    | 5          |     |                  |    |
| tr                | Rise Time   | $V_I=20mV$ , $R_L=2k\Omega$ , $C_L=100pF$  |                      | 0.05       |     | $\mu s$          |    |
|                   | Overshoot Factor  | (See Figure 1)   |                      | 20         |     | %                |    |
| $V_n$             | Equivalent Input Noise Voltage                                      | $R_S=20\Omega$   | $f=1kHz$             |            | 18  | $nV/\sqrt{Hz}$   |    |
|                   |   |  | $f=10 Hz$ to $10kHz$ |            | 4   | $\mu V$          |    |
| $I_n$             | Equivalent Input Noise Current                                      | $R_S=20\Omega$ , $f=1kHz$  |                      | 0.01       |     | $pA/\sqrt{Hz}$   |    |
| THD               | Total Harmonic Distortion   | $V_{I rms}=6V$ , $A_{VD}=1$ ,<br>$R_L \geq 2k\Omega$ , $R_S \leq 1k\Omega$ ,<br>$f=1kHz$ |                      | 0.003      |     | %                |    |
| $\theta_{JA}$     | Thermal Resistance Junction-to-Ambient                              | SOP-8L (Note 9)  |                      | 145        |     | $^\circ C/W$     |    |
| $\theta_{JC}$     | Thermal Resistance Junction-to-Case                                 | SOP-8L (Note 9)  |                      | 35         |     | $^\circ C/W$     |    |

Notes: 9. Test condition for SOP-8L: Devices mounted on FR-4 substrate PC board, with minimum recommended pad layout.

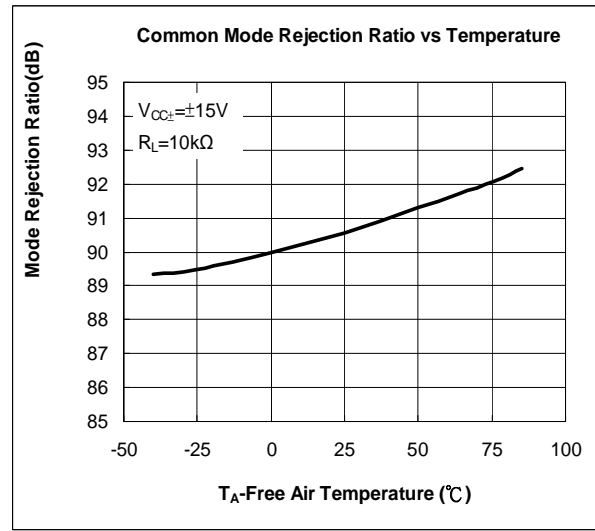
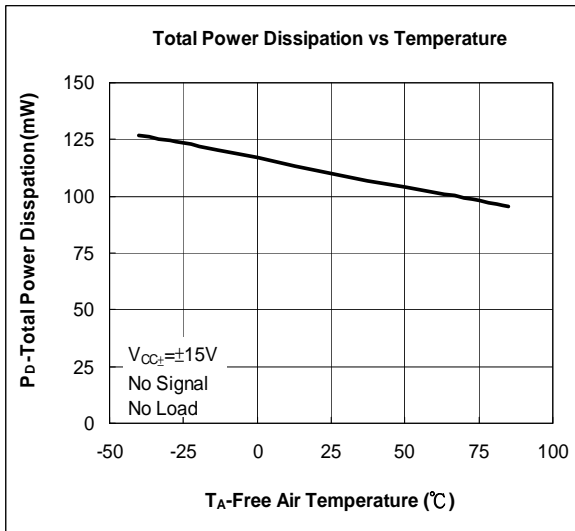
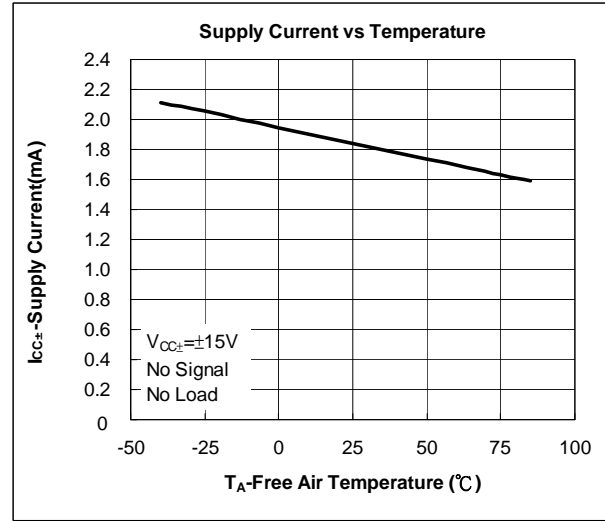
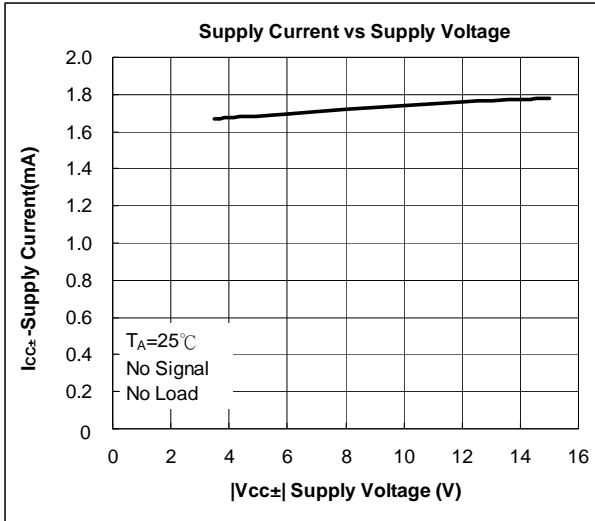
**Typical Performance Characteristics**



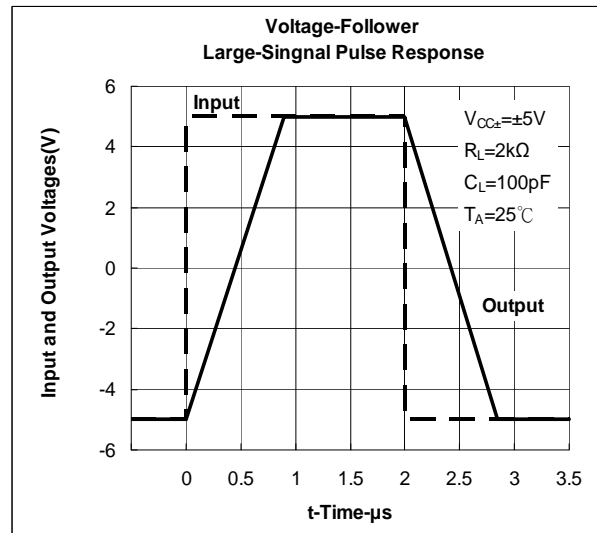
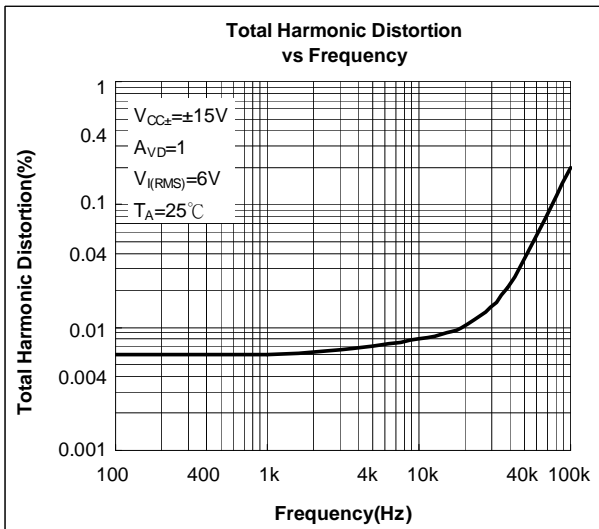
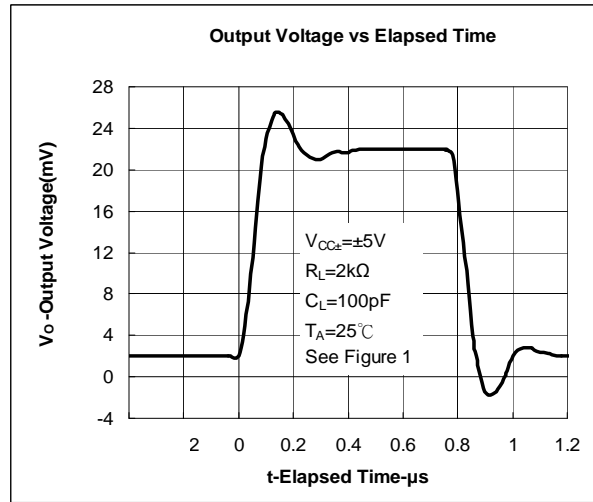
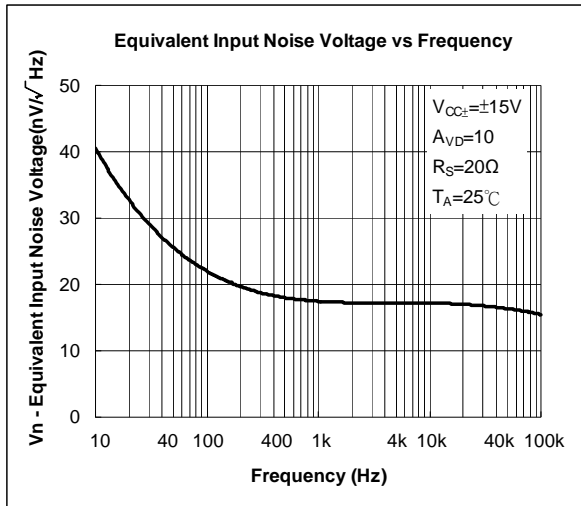
**Typical Performance Characteristics (Continued)**



**Typical Performance Characteristics (Continued)**



**Typical Performance Characteristics (Continued)**





**Test Circuit**

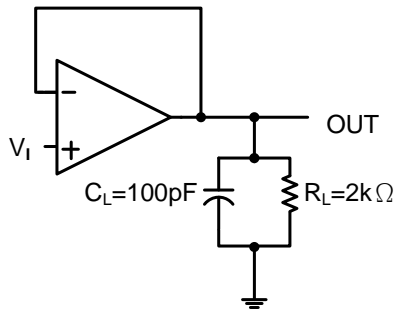


Figure 1. Unity-Gain Amplifier

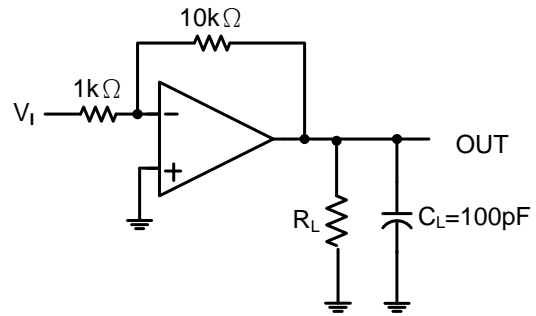
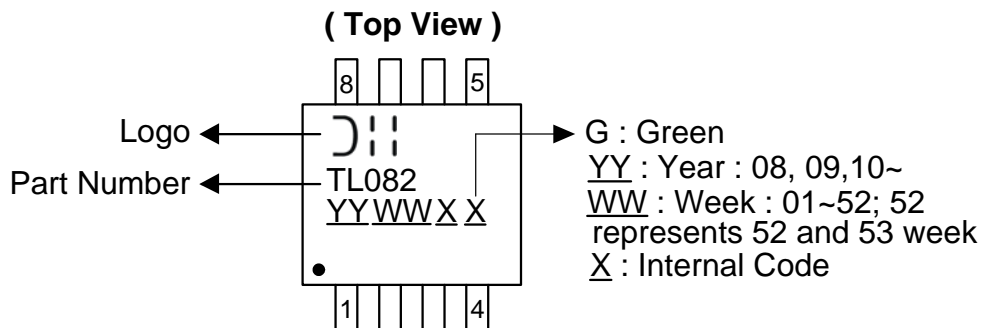


Figure 2. Gain-of-10 Inverting Amplifier

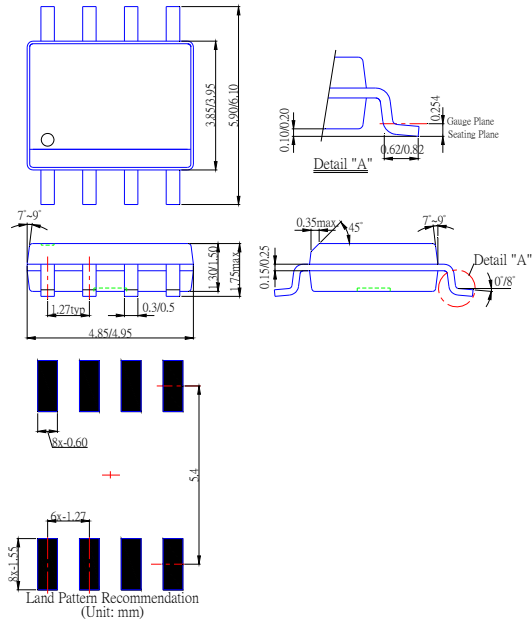
**Marking Information**

(1) SOP-8L



**Package Information ( All Dimensions in mm )**

**(1) Package type: SOP-8L**



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