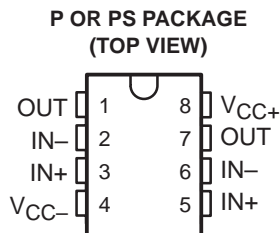


- **Equivalent Input Noise Voltage**  
5 nV/ $\sqrt{\text{Hz}}$  Typ at 1 kHz
- **Unity-Gain Bandwidth** . . . 10 MHz Typ
- **Common-Mode Rejection Ratio** . . . 100 dB Typ
- **High dc Voltage Gain** . . . 100 V/mV Typ
- **Peak-to-Peak Output Voltage Swing**  
32 V Typ With  $V_{CC\pm} = \pm 18$  V and  $R_L = 600 \Omega$
- **High Slew Rate** . . . 9 V/ $\mu\text{s}$  Typ
- **Wide Supply Voltage Range** . . .  $\pm 3$  V to  $\pm 20$  V
- **Designed to Be Interchangeable With**  
Signetics NE5532 and NE5532A
- **Package Options Include Plastic**  
Small-Outline (PS) Package and Standard Plastic (P) DIP



## description

The NE5532 and NE5532A are high-performance operational amplifiers combining excellent dc and ac characteristics. They feature very low noise, high output-drive capability, high unity-gain and maximum-output-swing bandwidths, low distortion, high slew rate, input-protection diodes, and output short-circuit protection. These operational amplifiers are compensated internally for unity-gain operation. The NE5532A has specified maximum limits for equivalent input noise voltage.

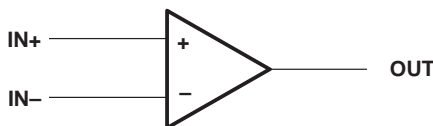
The NE5532 and NE5532A are characterized for operation from 0°C to 70°C.

### AVAILABLE OPTIONS

| T <sub>A</sub> | PACKAGED DEVICES               |                                  |
|----------------|--------------------------------|----------------------------------|
|                | PLASTIC<br>DUAL-IN-LINE<br>(P) | PLASTIC<br>SMALL-OUTLINE<br>(PS) |
| 0°C to 70°C    | NE5532P<br>NE5532AP            | NE5532PS<br>NE5532APS            |

The PS package is available taped and reeled. Add the suffix R to the device type (e.g., NE5532PSR).

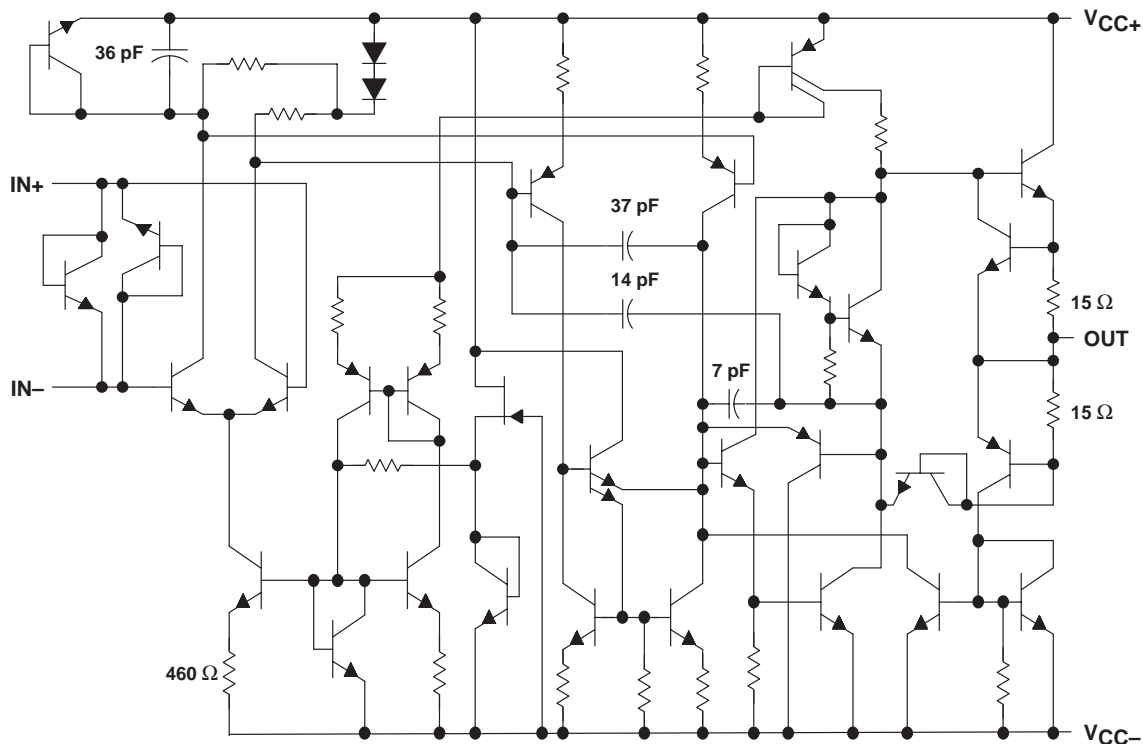
## symbol (each amplifier)



# NE5532, NE5532A DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

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## schematic (each amplifier)



Component values shown are nominal.

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

|  |                |
|--|----------------|
| Supply voltage, $V_{CC+}$ (see Note 1)                           | 22 V           |
| Supply voltage, $V_{CC-}$ (see Note 1)                           | -22 V          |
| Input voltage, either input (see Notes 1 and 2)                  | $V_{CC\pm}$    |
| Input current (see Note 3)                                       | $\pm 10$ mA    |
| Duration of output short circuit (see Note 4)                    | Unlimited      |
| Package thermal impedance, $\theta_{JA}$ (see Note 5): P package | 85°C/W         |
| PS package   | 95°C/W         |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds     | 260°C          |
| Storage temperature range, $T_{stg}$                             | -65°C to 150°C |

- NOTES:
- All voltage values, except differential voltages, are with respect to the midpoint between  $V_{CC+}$  and  $V_{CC-}$ .
  - The magnitude of the input voltage must never exceed the magnitude of the supply voltage.
  - Excessive input current will flow if a differential input voltage in excess of approximately 0.6 V is applied between the inputs unless some limiting resistance is used.
  - The output may be shorted to ground or either power supply. Temperature and/or supply voltages must be limited to ensure the maximum dissipation rating is not exceeded.
  - The package thermal impedance is calculated in accordance with JESD 51.

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## recommended operating conditions

|                                | MIN | NOM | MAX | UNIT |
|--------------------------------|-----|-----|-----|------|
| Supply voltage, $V_{CC+}$      | 5   |     | 15  | V    |
| Supply voltage, $V_{CC-}$      | -5  |     | -15 | V    |
| Operating free-air temperature | 0   |     | 70  | °C   |

## electrical characteristics, $V_{CC\pm} = +15\text{ V}$ , $T_A = 25^\circ\text{C}$ (unless otherwise noted)

| PARAMETER |   | TEST CONDITIONS†  |  | MIN      | TYP      | MAX  | UNIT       |
|-----------|---|---|--|----------|----------|------|------------|
| $V_{IO}$  | Input offset voltage  | $V_O = 0$   | $T_A = 25^\circ\text{C}$                     |          | 0.5      | 4    | mV         |
|           |   |   | $T_A = 0^\circ\text{C to } 70^\circ\text{C}$ |          |          | 5    |            |
| $I_{IO}$  | Input offset current  | $T_A = 25^\circ\text{C}$  |  |          | 10       | 150  | nA         |
|           |   | $T_A = 0^\circ\text{C to } 70^\circ\text{C}$                        |  |          |          | 200  |            |
| $I_{IB}$  | Input bias current  | $T_A = 25^\circ\text{C}$  |  |          | 200      | 800  | nA         |
|           |   | $T_A = 0^\circ\text{C to } 70^\circ\text{C}$                        |  |          |          | 1000 |            |
| $V_{ICR}$ | Common-mode input-voltage range                                     |   |  | $\pm 12$ | $\pm 13$ |      | V          |
| $V_{OPP}$ | Maximum peak-to-peak output-voltage swing                           | $R_L \geq 600\ \Omega$  | $V_{CC\pm} = \pm 15\text{ V}$                | 24       | 26       |      | V          |
|           |   |   | $V_{CC\pm} = \pm 18\text{ V}$                | 30       | 32       |      |            |
| $A_{VD}$  | Large-signal differential-voltage amplification                     | $R_L \geq 600\ \Omega$ ,<br>$V_O = \pm 10\text{ V}$                 | $T_A = 25^\circ\text{C}$                     | 15       | 50       |      | V/mV       |
|           |   |   | $T_A = 0^\circ\text{C to } 70^\circ\text{C}$ | 10       |          |      |            |
|           |   | $R_L \geq 2\text{ k}\Omega$ ,<br>$V_O = \pm 10\text{ V}$            | $T_A = 25^\circ\text{C}$                     | 25       | 100      |      |            |
|           |   |   | $T_A = 0^\circ\text{C to } 70^\circ\text{C}$ | 15       |          |      |            |
| $A_{vd}$  | Small-signal differential-voltage amplification                     | $f = 10\text{ kHz}$   |  |          | 2.2      |      | V/mV       |
| $B_{OM}$  | Maximum-output-swing bandwidth                                      | $R_L = 600\ \Omega$ , $V_O = \pm 10\text{ V}$                       |  |          | 140      |      | kHz        |
|           |   | $V_{CC\pm} = \pm 18\text{ V}$ , $V_O = \pm 14\text{ V}$             |  |          | 100      |      |            |
| $B_1$     | Unity-gain bandwidth  | $R_L = 600\ \Omega$ , $C_L = 100\text{ pF}$                         |  |          | 10       |      | MHz        |
| $r_i$     | Input resistance  |   |  | 30       | 300      |      | k $\Omega$ |
| $z_o$     | Output impedance  | $A_{VD} = 30\text{ dB}$ , $R_L = 600\ \Omega$ , $f = 10\text{ kHz}$ |  |          | 0.3      |      | $\Omega$   |
| CMRR      | Common-mode rejection ratio   | $V_{IC} = V_{ICR}\text{ min}$                                       |  | 70       | 100      |      | dB         |
| $k_{SVR}$ | Supply voltage rejection ratio ( $\Delta V_{CC\pm}/\Delta V_{IO}$ ) | $V_{CC\pm} = \pm 9\text{ V to } \pm 15\text{ V}$ , $V_O = 0$        |  | 80       | 100      |      | dB         |
| $I_{OS}$  | Output short-circuit current  |   |  | 10       | 38       | 60   | mA         |
| $I_{CC}$  | Total supply current  | $V_O = 0$ , No load   |  |          | 8        | 16   | mA         |
|           | Crosstalk attenuation ( $V_{O1}/V_{O2}$ )                           | $V_{O1} = 10\text{ V peak}$ , $f = 1\text{ kHz}$                    |  |          | 110      |      | dB         |

† All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified.

# NE5532, NE5532A DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

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operating characteristics,  $V_{CC\pm} = \pm 15\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS                | NE5532   |     |   | NE5532A |      |     | UNIT                   |
|-----------|--------------------------------|--|-----|---|---------|------|-----|------------------------|
|           |                                | MIN  | TYP | MAX                                     | MIN     | TYP  | MAX |                        |
| SR        | Slew rate at unity gain        |  | 9   |   |         | 9    |     | V/ $\mu$ s             |
|           | Overshoot factor               | $V_I = 100\text{ mV}$ ,<br>$R_L = 600\ \Omega$ , |     | $A_{VD} = 1$ ,<br>$C_L = 100\text{ pF}$ |         | 10%  |     |                        |
| $V_n$     | Equivalent input noise voltage | f = 30 Hz  |     | 8                                       |         | 8 10 |     | nV/ $\sqrt{\text{Hz}}$ |
|           |                                | f = 1 kHz  |     | 5                                       |         | 5 6  |     |                        |
| $I_n$     | Equivalent input noise current | f = 30 Hz  |     | 2.7                                     |         | 2.7  |     | pA/ $\sqrt{\text{Hz}}$ |
|           |                                | f = 1 kHz  |     | 0.7                                     |         | 0.7  |     |                        |



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