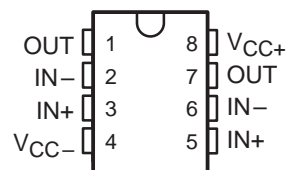


# NE5532, NE5532A, NE5532I, NE5532AI DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

SLOS075A – NOVEMBER 1979 – REVISED SEPTEMBER 1990

- Equivalent Input Noise Voltage  
5  $\text{nv}/\sqrt{\text{Hz}}$  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  $V_{CC\pm} = \pm 18 \text{ V}$  and  
 $R_L = 600 \Omega$
- High Slew Rate . . . 9 V/ $\mu\text{s}$  Typ
- Wide Supply Voltage Range . . .  $\pm 3 \text{ V}$   
to  $\pm 20 \text{ V}$
- Designed to Be Interchangeable With  
Signetics NE5532 and NE5532A

P PACKAGE  
(TOP VIEW)

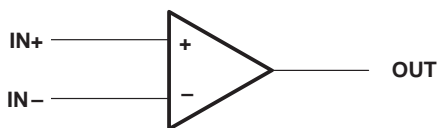


## description

The NE5532 and NE5532A are monolithic 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 internally compensated 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. The NE5532I and NE5532AI are characterized for operation from -40°C to 85°C.

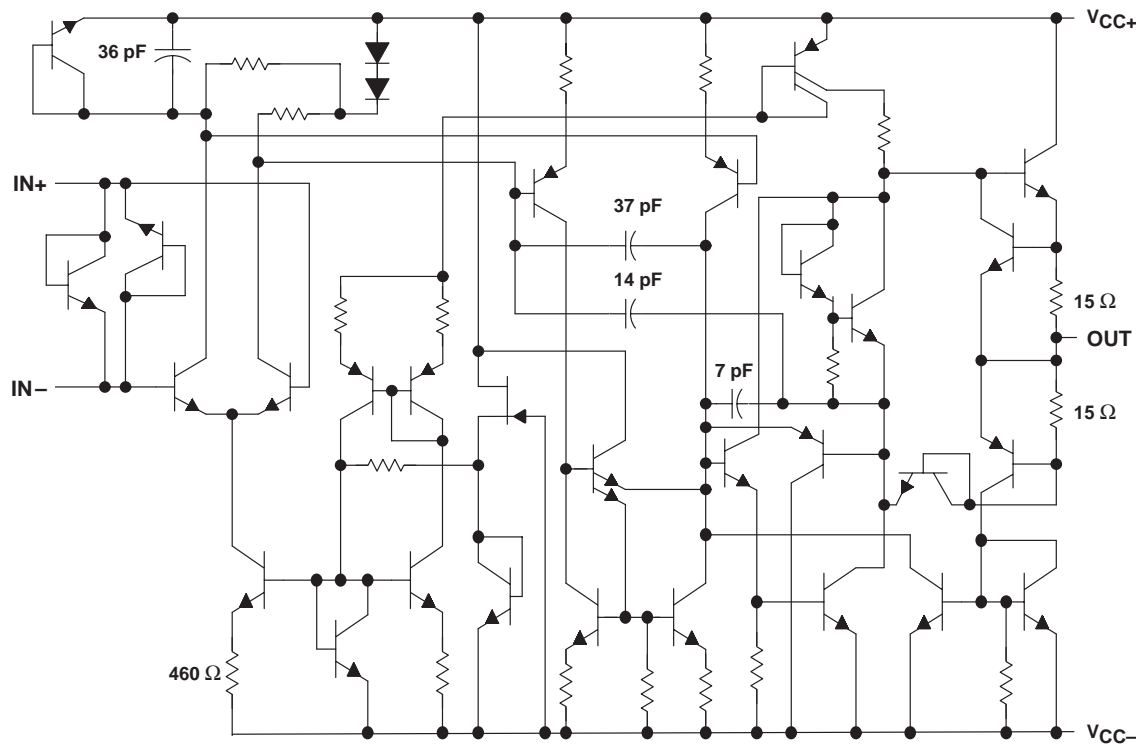
## symbol (each amplifier)



NE5532, NE5532A, NE5532I, NE5532AI  
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                    |
| Continuous total power dissipation                           | See Dissipation Rating Table |
| Operating free-air temperature range: NE5532, NE5532A        | 0°C to 70°C                  |
| NE5532I, NE5532AI  | -40°C to 85°C                |
| Storage temperature range                                    | -65°C to 150°C               |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds | 260°C                        |

- NOTES: 1. All voltage values, except differential voltages, are with respect to the midpoint between  $V_{CC+}$  and  $V_{CC-}$ .
2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage.
3. 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.
4. 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.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$<br>POWER RATING | OPERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$<br>POWER RATING | $T_A = 85^\circ\text{C}$<br>POWER RATING |
|---------|---|--|--|--|
| P       | 1000 mW                                     | 8 mW/°C  | 640 mW                                   | 520 mW                                   |

# NE5532, NE5532A, NE5532I, NE5532AI DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

SLOS075A – NOVEMBER 1979 – REVISED SEPTEMBER 1990

## recommended operating conditions

|                           | MIN | NOM | MAX | UNIT |
|---------------------------|-----|-----|-----|------|
| Supply voltage, $V_{CC+}$ | 5   |     | 15  | V    |
| Supply voltage, $V_{CC-}$ | -5  |     | -15 | V    |

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

| PARAMETER   | TEST CONDITIONS†  | MIN                  | TYP        | MAX         | UNIT       |
|---|---|----------------------|------------|-------------|------------|
| $V_{IO}$ Input offset voltage   | $V_O = 0$<br>$T_A = 25^\circ\text{C}$<br>$T_A = \text{Full range}$  |                      | 0.5        | 4<br>5      | mV         |
| $I_{IO}$ Input offset current   | $T_A = 25^\circ\text{C}$<br>$T_A = \text{Full range}$   |                      | 10         | 150<br>200  | nA         |
| $I_{IB}$ Input bias current   | $T_A = 25^\circ\text{C}$<br>$T_A = \text{Full range}$   |                      | 200        | 800<br>1000 | nA         |
| $V_{ICR}$ Common-mode input voltage range                                     |   | $\pm 12$             | $\pm 13$   |             | V          |
| $V_{OPP}$ Maximum peak-to-peak output voltage swing                           | $R_L \geq 600\ \Omega$<br>$V_{CC\pm} = \pm 15$ V<br>$V_{CC\pm} = \pm 18$ V  | 24<br>30             | 26<br>32   |             | V          |
| $A_{VD}$ Large-signal differential voltage amplification                      | $R_L \geq 600\ \Omega$ ,<br>$V_O = \pm 10$ V<br>$R_L \geq 2\ \text{k}\Omega$ ,<br>$V_O = \pm 10$ V<br>$T_A = 25^\circ\text{C}$<br>$T_A = \text{Full range}$ | 15<br>10<br>25<br>15 | 50<br>100  |             | V/mV       |
| $A_{vd}$ Small-signal differential voltage amplification                      | $f = 10\ \text{kHz}$  |                      | 2.2        |             | V/mV       |
| $B_{OM}$ Maximum-output-swing bandwidth                                       | $R_L = 600\ \Omega$<br>$V_O = \pm 10$ V<br>$V_{CC\pm} = \pm 18$ V, $V_O = \pm 14$ V   |                      | 140<br>100 |             | kHz        |
| $B_1$ 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 ( $\Delta V_{CC\pm}/\Delta V_{IO}$ ) | $V_{CC\pm} = \pm 9$ V to $\pm 15$ V, $V_O = 0$  | 80                   | 100        |             | dB         |
| $I_{OS}$ Output short-circuit current   |   |                      | 38         |             | mA         |
| $I_{CC}$ Total supply current   | $V_O = 0$ , No load   |                      | 8          | 16          | mA         |
| Crosstalk attenuation ( $V_{O1}/V_{O2}$ )                                     | $V_{O1} = 10$ 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. Full range for  $T_A$  is  $0^\circ\text{C}$  to  $70^\circ\text{C}$  for NE5532/NE5532A and  $-40^\circ\text{C}$  to  $85^\circ\text{C}$  for NE5532I/NE5532AI.

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

| PARAMETER                            | TEST CONDITIONS   | NE5532/NE5532I |            |     | NE5532A/NE5532AI |            |         | UNIT                   |
|--------------------------------------|---|----------------|------------|-----|------------------|------------|---------|------------------------|
|                                      |   | MIN            | TYP        | MAX | MIN              | TYP        | MAX     |                        |
| SR Slew rate at unity gain           |   |                | 9          |     |                  | 9          |         | V/ $\mu\text{s}$       |
| Overshoot factor                     | $V_I = 100\ \text{mV}$ , $A_{VD} = 1$ ,<br>$R_L = 600\ \Omega$ , $C_L = 100\ \text{pF}$ |                | 10%        |     |                  | 10%        |         |                        |
| $V_n$ Equivalent input noise voltage | $f = 30\ \text{Hz}$<br>$f = 1\ \text{kHz}$  |                | 8<br>5     |     |                  | 8<br>5     | 10<br>6 | nV/ $\sqrt{\text{Hz}}$ |
| $I_n$ Equivalent input noise current | $f = 30\ \text{Hz}$<br>$f = 1\ \text{kHz}$  |                | 2.7<br>0.7 |     |                  | 2.7<br>0.7 |         | pA/ $\sqrt{\text{Hz}}$ |

