

# Dual high-performance operational amplifier

# NE/SA/SE5512

## DESCRIPTION

The 5512 series of high-performance operational amplifiers provides very good input characteristics. These amplifiers feature low input bias and voltage characteristics such as a 108 op amp with improved CMRR and a high differential input voltage limit achieved through the use of a bias cancellation and PNP input circuits with collector-to-emitter clamping. The output characteristics are like those of a 741 op amp with improved slew rate and drive capability, yet have low supply quiescent current.

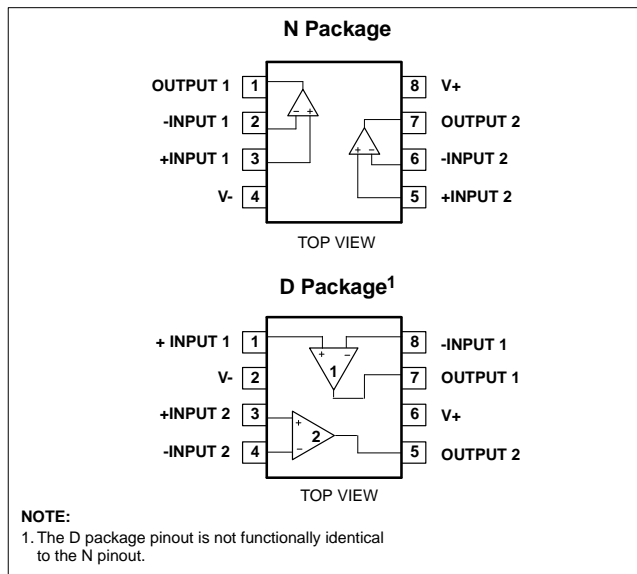
## APPLICATIONS

- AC amplifiers
- RC active filters
- Transducer amplifiers
- DC gain block
- Battery operation
- Instrumentation amplifiers

## FEATURES

- Low input bias <math>\pm 20\text{nA}</math>
- Low input offset current <math>\pm 20\text{nA}</math>
- Low input offset voltage <math>< 1\text{mV}</math>
- Low VOS temperature drift <math>5\mu\text{V}/^\circ\text{C}</math>
- Low input bias temperature drift <math>40\text{pA}/^\circ\text{C}</math>
- Low input voltage noise <math>30\text{nV}/\sqrt{\text{Hz}}</math>
- Low supply current <math>1.5\text{mA}/\text{amp}</math>
- High slew rate <math>1.0\text{V}/\mu\text{s}</math>
- High CMRR <math>100\text{dB}</math>

## PIN CONFIGURATIONS



- High input impedance <math>100\text{M}\Omega</math>
- High PSRR <math>110\text{dB}</math>
- High differential input voltage limit
- No crossover distortion
- Indefinite output short circuit protection
- Internally-compensated for unity gain
- <math>600\Omega</math> drive capability
- MIL-STD processing available

## ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
8-Pin Plastic Small Outline (SO) Package	0 to 70°C	NE5512D	0174C
8-Pin Plastic Dual In-Line Package (DIP)	0 to 70°C	NE5512N	0404B
8-Pin Plastic Small Outline (SO) Package	-40 to +85°C	SA5512D	0174C
8-Pin Plastic Dual In-Line Package (DIP)	-40 to +85°C	SA5512N	0404B
8-Pin Plastic Dual In-Line Package (DIP)	-55 to +125°C	SE5512N	0404B

## Dual high-performance operational amplifier

NE/SA/SE5512

**ABSOLUTE MAXIMUM RATINGS**

SYMBOL	PARAMETER	RATING	UNIT
V <sub>CC</sub>	Supply voltage	±16	V
P <sub>D MAX</sub>	Maximum power dissipation, T <sub>A</sub> =25°C (still air) <sup>1</sup> N package D package	1212 800	mW mW
T <sub>A</sub>	Operating ambient temperature range NE5512 SA5512 SE5512	0 to +70 -40 to +85 -55 to +125	°C °C °C
T <sub>STG</sub>	Storage temperature range	-65 to +150	°C
T <sub>SOLD</sub>	Lead soldering temperature (10sec max)	300	°C

**NOTES:**

- The following derating factors should be applied above 25°C  
N package at 9.7mW/°C  
D package at 6.4mW/°C

## Dual high-performance operational amplifier

NE/SA/SE5512

**ELECTRICAL PERFORMANCE CHARACTERISTICS** $V_{CC} = \pm 15V$ ,  $T_A = 25^\circ C$  over temperature range, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	SE5512			NE/SA5512			UNIT
			Min	Typ	Max	Min	Typ	Max	
$V_{OS}$	Input offset voltage	$R_S=100\Omega$ $T_A=+25^\circ C$ Over temp.		0.7 1	2 3		1 1.5	5 6	mV
$\Delta V_{OS}/\Delta T$				4			5		$\mu V/^\circ C$
$I_{OS}$	Input offset current	$R_S=100k\Omega$ $T_A=+25^\circ C$ Over temp.		3 4	10 20		6 8	20 30	nA
$\Delta I_{OS}/\Delta T$				30			40		$pA/^\circ C$
$I_{BIAS}$	Input bias current	$R_S=100k\Omega$ $T_A=+25^\circ C$ Over temp.		3 4	10 20		6 8	20 30	nA
$\Delta I_{BIAS}/\Delta T$				30			40		$pA/^\circ C$
$R_{IN}$	Input resistance differential	$T_A=+25^\circ C$		100			100		M $\Omega$
$V_{CM}$	Input common mode range	$T_A=+25^\circ C$ Over temp.	$\pm 13.5$ $\pm 13$	$\pm 13.7$ $\pm 13.2$		$\pm 13.5$ $\pm 13$	$\pm 13.7$ $\pm 13.2$		V
CMRR	Input common-mode rejection ratio	$V_{CC}=\pm 15V$ $V_{IN}=\pm 13.5V$ $T_A=+25^\circ C$ $V_{IN}=\pm 13V$ Over temp.	70	100		70	100		dB
$A_V$	Large-signal voltage gain	$R_L=2k\Omega$ $T_A=25^\circ C$ $V_O=\pm 10V$ over temp.	50 25	200		50 25	200		V/mV
SR	Slew rate	$T_A=25^\circ C$	0.6	1			1		V/ $\mu s$
GBW	Small-signal unity gain bandwidth	$T_A=25^\circ C$		3			3		MHz
$\theta_M$	Phase margin	$T_A=25^\circ C$		45			45		degree
$V_{OUT}$	Output voltage swing	$R_L=2k\Omega$ $T_A=25^\circ C$ Over temp.	$\pm 13$ $\pm 12.5$	$\pm 13.5$ $\pm 13$		$\pm 13$ $\pm 12.5$	$\pm 13.5$ $\pm 13$		V
$V_{OUT}$	Output voltage swing	$R_L=600\Omega^1$ $T_A=25^\circ C$ Over temp.	$\pm 10$ $\pm 7.5$	$\pm 11.5$ $\pm 9$		$\pm 10$ $\pm 8$	$\pm 11.5$ $\pm 9$		V
$I_{CC}$	Power supply current	$R_L=Open$ $T_A=25^\circ C$ Over temp.		3.4 3.6	5 5.5		3.4 3.6	5 5.5	mA
PSRR	Power supply rejection ratio	Over temp.	80	100		80	100		dB
AA	Amplifier-to-amplifier coupling	$f=1kHz$ to $20kHz$ , $T_A=25^\circ C$		-120			-120		dB
THD	Total harmonic distortion	$f=10kHz$ $T_A=25^\circ C$ $V_O=7V_{RMS}$		0.01			0.01		%
$V_{NOISE}$	Input noise voltage	$f=1kHz$ $T_A=25^\circ C$		30			30		nV/ $\sqrt{Hz}$
$I_{NOISE}$	Input noise current	$f=1kHz$ $T_A=25^\circ C$		0.2			0.2		pA/ $\sqrt{Hz}$
$I_{SC}$	Short-circuit current	$\pm 15V$ , $T_A=25^\circ C$		40			40		mA

**NOTES:**

1. Not to exceed maximum package power dissipation.

# Dual high-performance operational amplifier

# NE/SA/SE5512

## EQUIVALENT SCHEMATIC

