

# NE/SA/SE5512

## Dual High-Performance Operational Amplifier

### Product Specification

### Linear Products

#### 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.

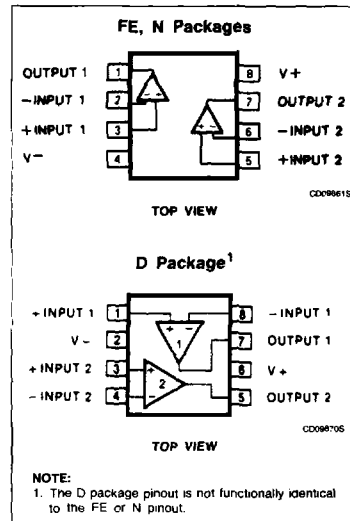
#### APPLICATIONS

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

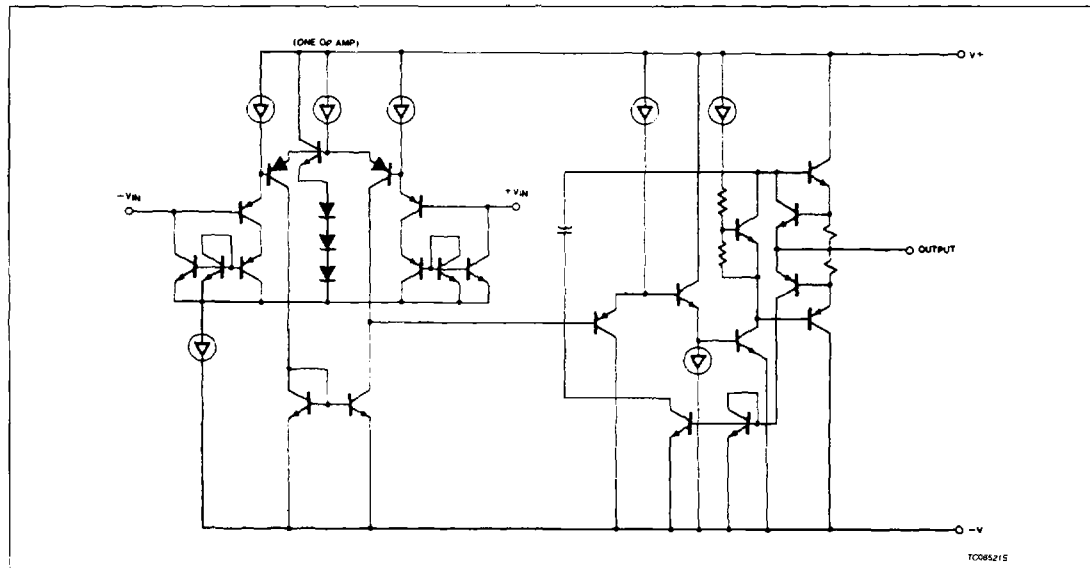
#### FEATURES

- Low input bias  $< \pm 20\text{nA}$
- Low input offset current  $< \pm 20\text{nA}$
- Low input offset voltage  $< 1\text{mV}$
- Low  $V_{OS}$  temperature drift  $5\mu\text{V}/^\circ\text{C}$
- Low input bias temperature drift  $40\text{pA}/^\circ\text{C}$
- Low input voltage noise  $30\text{nV}/\sqrt{\text{Hz}}$
- Low supply current  $1.5\text{mA}/\text{amp}$
- High slew rate  $1.0\text{V}/\mu\text{s}$
- High CMRR  $100\text{dB}$
- High input impedance  $100\text{M}\Omega$
- High PSRR  $110\text{dB}$
- High differential input voltage limit
- No crossover distortion
- Indefinite output short circuit protection
- Internally-compensated for unity gain
- $600\Omega$  drive capability
- MIL-STD processing available

#### PIN CONFIGURATIONS



#### EQUIVALENT SCHEMATIC



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## ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
8-Pin Plastic SO	0°C to +70°C	NE5512D
8-Pin Ceramic DIP	0°C to +70°C	NE5512FE
8-Pin Plastic DIP	0°C to +70°C	NE5512N
8-Pin Plastic SO	-40°C to +85°C	SA5512D
8-Pin Plastic DIP	-40°C to +85°C	SA5512N
8-Pin Ceramic DIP	-55°C to +125°C	SE5512FE
8-Pin Plastic DIP	-55°C to +125°C	SE5512N

## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V <sub>CC</sub>	Supply voltage	± 16	V
P <sub>D</sub> MAX	Maximum power dissipation, T <sub>A</sub> = 25°C (still air) <sup>1</sup> FE package N package D package	850 1212 800	mW 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

## NOTE:

1. The following derating factors should be applied above 25°C:

FE package at 6.8mW/°C

N package at 9.7mW/°C

D package at 6.4mW/°C

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**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	$R_S = 100k\Omega$ $T = +25^\circ C$ 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	$R_L = \text{Open}$ $T_A = 25^\circ C$ Over temp.		3.4 3.6	5 5.5		3.4 3.6	5 5.5	mA
PSRR	Power supply rejection ratio	$T_A = 25^\circ C$ Over temp.	80 80	110 100		80 80	110 100		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

**NOTE:**

1. Not to exceed maximum package power dissipation.