Signetics

NE/SE5532/5532A
Internally-Compensated Dual Low Noise Operational Amplifier

Linear Products

Product Specification

DESCRIPTION

The 5532 is a dual high-performance low noise operational amplifier. Compared to most of the standard operational amplifiers, such as the 1458, it shows better noise performance, improved output drive capability and considerably higher small-signal and power bandwidths.

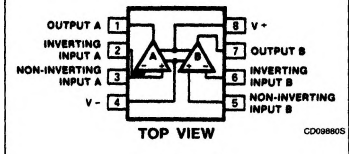
This makes the device especially suitable for application in high-quality and professional audio equipment, instrumentation and control circuits, and telephone channel amplifiers. The op amp is internally compensated for gains equal to one. If very low noise is of prime importance, it is recommended that the 5532A version be used because it has guaranteed noise voltage specifications.

FEATURES

- **Small-signal bandwidth: 10MHz**
- **Output drive capability: 600Ω, $10V_{RMS}$**
- **Input noise voltage: $5nV/\sqrt{Hz}$ (typical)**
- **DC voltage gain: 50000**
- **AC voltage gain: 2200 at 10kHz**
- **Power bandwidth: 140kHz**
- **Slew rate: $9V/\mu s$**
- **Large supply voltage range: ±3 to ±20V**
- **Compensated for unity gain**

PIN CONFIGURATIONS

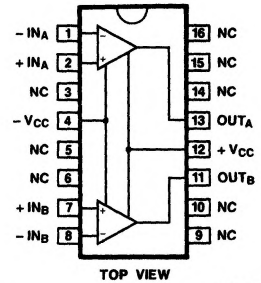
FE, N Packages



TOP VIEW

CD09880S

D Package[1]

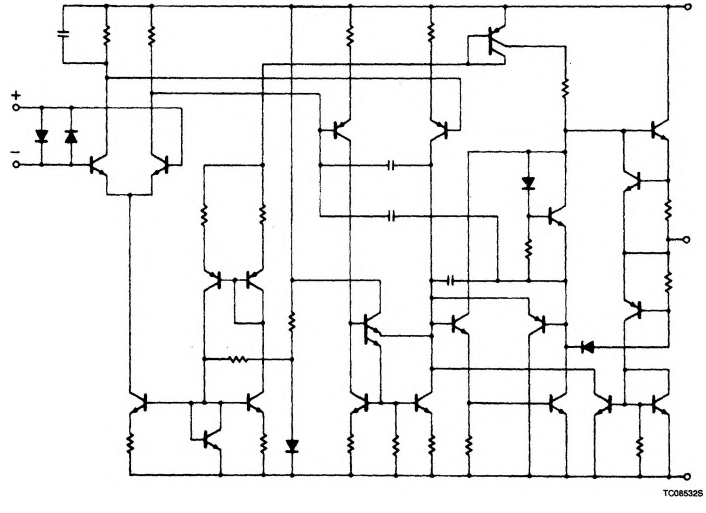


TOP VIEW

CD09891S

NOTE:
1. SOL and *non-standard* pinout.

EQUIVALENT SCHEMATIC (EACH AMPLIFIER)



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ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
8-Pin Plastic DIP	0 to 70°C	NE5532N
8-Pin Ceramic DIP	0 to 70°C	NE5532FE
8-Pin Plastic DIP	0 to 70°C	NE5532AN
8-Pin Ceramic DIP	0 to 70°C	NE5532AFE
8-Pin Ceramic DIP	−55°C to +125°C	SE5532FE
8-Pin Ceramic DIP	−55°C to +125°C	SE5532AFE
16-Pin Plastic SOL	0 to 70°C	NE5532D

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_S	Supply voltage	±22	V
V_{IN}	Input voltage	$\pm V_{SUPPLY}$	V
V_{DIFF}	Differential input voltage[1]	±0.5	V
T_A	Operating temperature range NE5532/A SE5532/A	 0 to 70 −55 to +125	 °C °C
T_{STG}	Storage temperature	−65 to +150	°C
T_J	Junction temperature	150	°C
P_D	Maximum power dissipation, T_A = 25°C, (still-air)[2] N package F package D package	 1200 1000 1200	 mW mW mW
T_{SOLD}	Lead soldering temperature (10sec max)	300	°C

NOTES:

1. Diodes protect the inputs against over-voltage. Therefore, unless current-limiting resistors are used, large currents will flow if the differential input voltage exceeds 0.6V. Maximum current should be limited to ±10mA.
2. Thermal resistances of the above packages are as follows:
   N package at 100°C/W.
   F package at 135°C/W.
   D package at 105°C/W.

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NE/SE5532/5532A

DC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.[1, 2, 3]

SYMBOL	PARAMETER	TEST CONDITIONS	SE5532/5532A			NE5532/5532A			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{OS}	Offset voltage			0.5	2		0.5	4	mV
		Over temperature			3			5	mV
$\Delta V_{OS}/\Delta T$				5			5		µV/°C
I_{OS}	Offset current				100		10	150	nA
		Over temperature			200			200	nA
$\Delta I_{OS}/\Delta T$				200			200		pA/°C
I_B	Input current			200	400		200	800	nA
		Over temperature			700			1000	nA
$\Delta I_B/\Delta T$				5			5		nA/°C
I_{CC}	Supply current			8	10.5		8	16	mA
		Over temperature			13				mA
V_{CM}	Common-mode input range		±12	±13		±12	±13		V
CMRR	Common-mode rejection ratio		80	100		70	100		dB
PSRR	Power supply rejection ratio			10	50		10	100	µV/V
A_{VOL}	Large-signal voltage gain	$R_L \geq 2k\Omega$, $V_O = \pm 10V$	50	100		25	100		V/mV
		Over temperature	25			15			V/mV
		$R_L \geq 600\Omega$, $V_O = \pm 10V$	40	50		15	50		V/mV
		Over temperature	20			10			V/mV
V_{OUT}	Output swing	$R_L \geq 600\Omega$	±12	±13		±12	±13		V
		Over temperature	±10	±12		±10	±12		V
		$R_L \geq 600\Omega$, $V_S = \pm 18V$	±15	±16		±15	±16		V
		Over temperature	±12	±14		±12	±14		V
		$R_L \geq 2k\Omega$	±13	±13.5		±13	±13.5		V
		Over temperature	±12	±12.5		±10	±12.5		V
R_{IN}	Input resistance		30	300		30	300		kΩ
I_{SC}	Output short circuit current		10	38	60	10	38	60	mA

NOTES:

1. Diodes protect the inputs against overvoltage. Therefore, unless current-limiting resistors are used, large currents will flow if the differential input voltage exceeds 0.6V. Maximum current should be limited to ±10mA.
2. For operation at elevated temperature, derate packages based on the package thermal resistance.
3. Output may be shorted to ground at $V_S = \pm 15V$, $T_A = 25°C$. Temperature and/or supply voltages must be limited to ensure dissipation rating is not exceeded.

AC ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	NE/SE5532/5532A			UNIT
			Min	Typ	Max	
R_{OUT}	Output resistance	A_V = 30dB Closed-loop f = 10kHz, $R_L = 600\Omega$		0.3		Ω
	Overshoot	Voltage-follower $V_{IN} = 100mV_{P-P}$ $C_L = 100pF$, $R_L = 600\Omega$		10		%
A_V	Gain	f = 10kHz		2.2		V/mV
GBW	Gain bandwidth product	$C_L = 100pF$, $R_L = 600\Omega$		10		MHz
SR	Slew rate			9		V/μs
	Power bandwidth	$V_{OUT} = \pm 10V$ $V_{OUT} = \pm 14V$, $R_L = 600\Omega$, $V_{CC} = \pm 18V$		140 100		kHz kHz

ELECTRICAL CHARACTERISTICS $T_A = 25°C$, $V_S = \pm 15V$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	NE/SE5532			NE/SE5532A			UNIT
			Min	Typ	Max	Min	Typ	Max	
V_{NOISE}	Input noise voltage	f_O = 30Hz f_O = 1kHz		8 5			8 5	12 6	nV/$\sqrt{Hz}$ nV/$\sqrt{Hz}$
I_{NOISE}	Input noise current	f_O = 30Hz f_O = 1kHz		2.7 0.7			2.7 0.7		pA/$\sqrt{Hz}$ pA/$\sqrt{Hz}$
	Channel separation	f = 1kHz, $R_S = 5k\Omega$		110			110		dB

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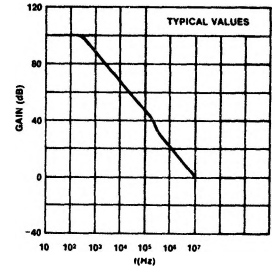
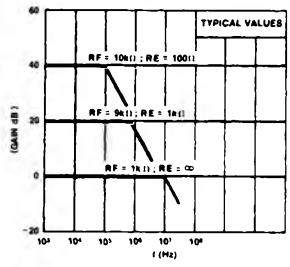
TYPICAL PERFORMANCE CHARACTERISTICS

Open-Loop Frequency Response



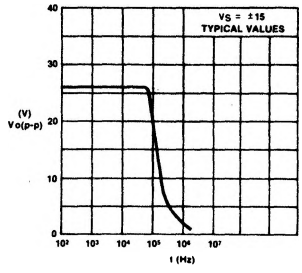
OP04870S

Closed-Loop Frequency Response



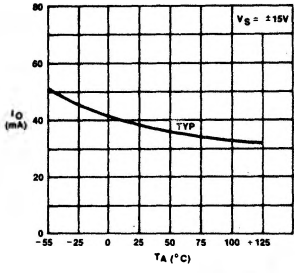
OPT4890S

Large-Signal Frequency Response



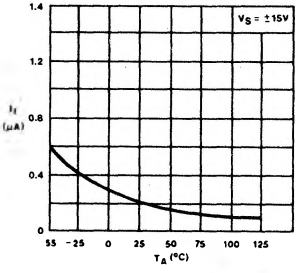
OPT4890S

Output Short-Circuit Current



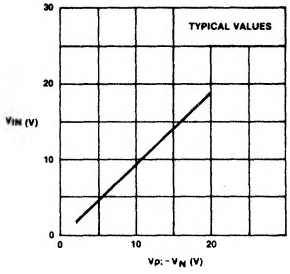
OP04900S

Input Bias Current



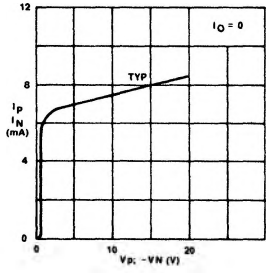
OP04910S

Input Common-Mode Voltage Range



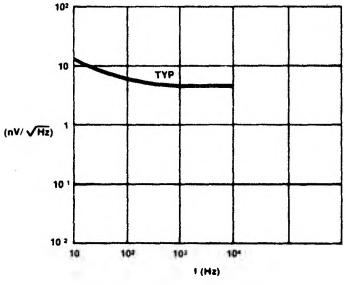
OP04920S

Supply Current



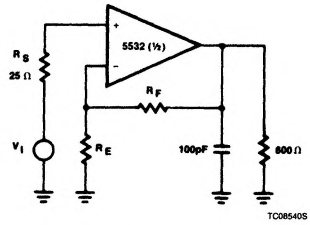
OP04930S

Input Noise Voltage Density

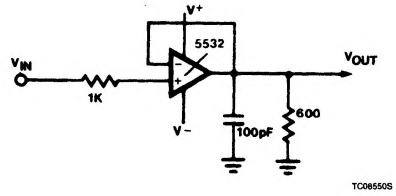


OP04940S

TEST CIRCUITS



Closed-Loop Frequency Response



Voltage-Follower