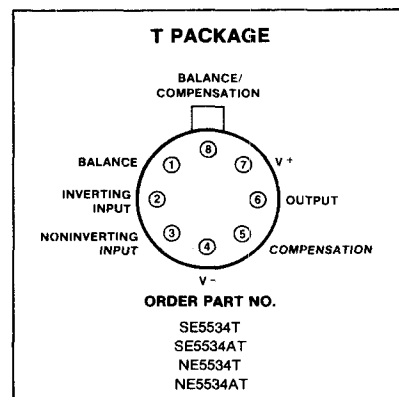
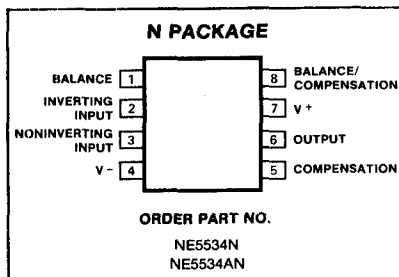


DESCRIPTION

The SE/NE5534 is a high-performance low noise operational amplifier. Compared to most of the standard operational amplifiers, such as 741 and 301A, 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, in instrumentation and control circuits and telephone channel amplifiers. The op amp is internally compensated for gain equal to, or higher than, three. The frequency response can be optimized with an external compensation capacitor for various applications (unity gain amplifier, capacitive load, slew-rate, low overshoot, etc.) If very low noise is of prime importance, it is recommended that the SE/NE5534A version be used which has guaranteed noise specifications.

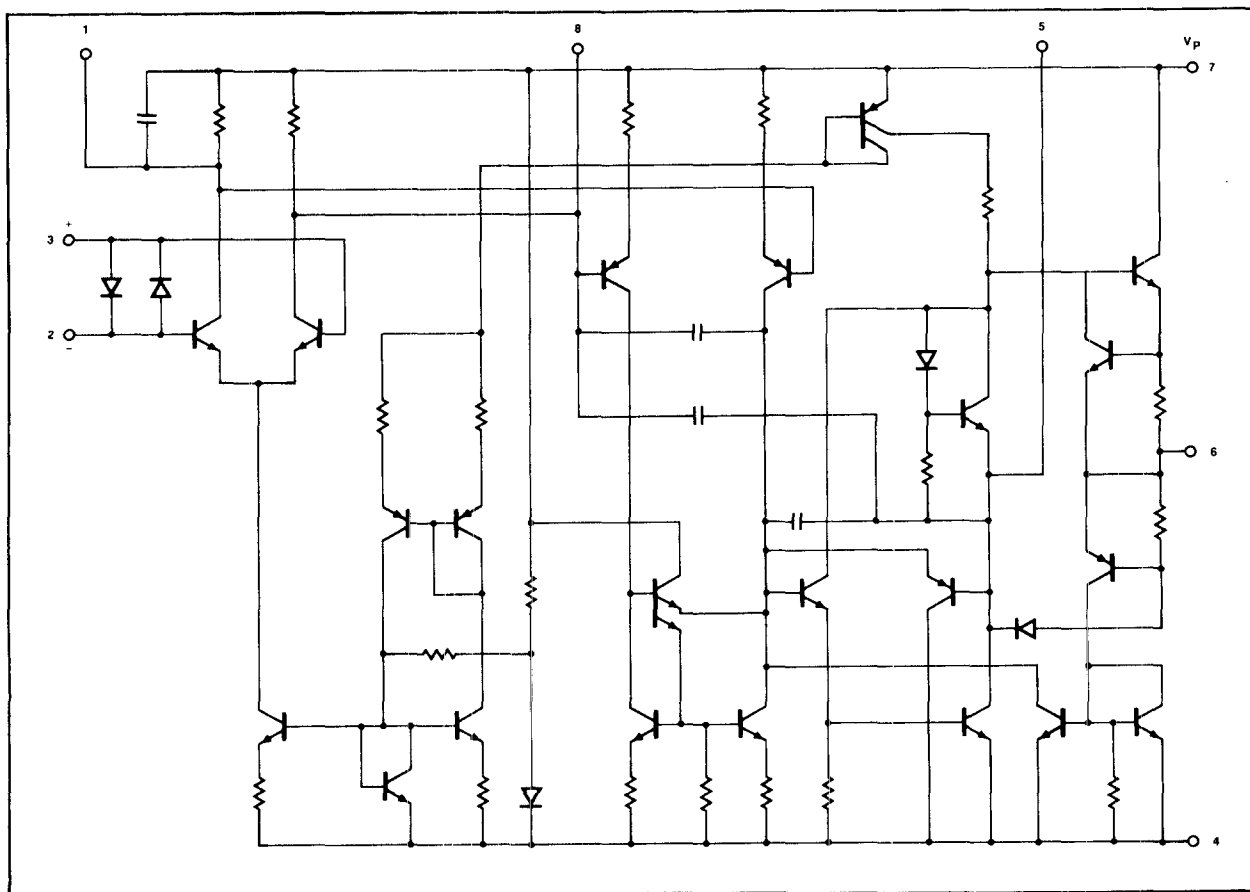
PIN CONFIGURATIONS



FEATURES

- Small-signal bandwidth: 10MHz
- Output drive capability: 600Ω, 10V (rms) at $V_s \approx \pm 18V$
- Input noise voltage: 4nV/√Hz
- DC voltage gain: 100000
- AC voltage gain: 6000 at 10kHz
- Power bandwidth: 200kHz
- Slew-rate: 13V/μs
- Large supply voltage range: ±3 to ±20V

EQUIVALENT SCHEMATIC



ABSOLUTE MAXIMUM RATINGS

PARAMETER		RATING	UNIT
V _S	Supply voltage	±22	V
V _{IN}	Input voltage	±V supply	V
V _{DIFF}	Differential input voltage	±5	V
T _A	Operating temperature range ¹		
	SE	-55 to +125	°C
	NE	0 to 70	°C
T _{STG}	Storage temperature	-65 to +150	°C
T _J	Junction temperature	150	°C
P _D	Power dissipation		
	5534T	680	mW
	5534N	500	mW
	Output short circuit duration ²	indefinite	
	Lead temperature (soldering 10 sec) ³	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. For operation at elevated temperature T package must be derated based on a thermal resistance of 150°C/W junction to ambient, 45°C/W junction to case. Thermal resistance of the N package is 240°C/W.
3. Output may be shorted to ground at V_S = ±15V, T_A = 25°C. Temperature and/or supply voltages must be limited to ensure dissipation rating is not exceeded.

DC ELECTRICAL CHARACTERISTICS T_A = 25°C, V_S = ±15V unless otherwise specified.1,2

PARAMETER	TEST CONDITIONS	SE5534/5534A			NE5534/5534A			UNIT
		Min	Typ	Max	Min	Typ	Max	
V _{OS}	Offset voltage		.5	2		.5	4	mV
	Over temperature			3			5	mV
I _{OS}	Offset current		10	200		20	300	nA
	Over temperature			500			400	nA
I _B	Input current		400	800		500	1500	nA
	Over temperature			1500			2000	nA
I _{CC}	Supply current		4	6.5		4	8	mA
	Over temperature			9				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 ≥ 600Ω, V _O = ±10V	50	100		25	100	V/mV
	Over temperature		25			15		V/mV
V _{OUT}	Output swing	R _L ≥ 600Ω	±12	±13		±12	±13	V
		R _L ≥ 600Ω V _S = ±18V	±15	±16		±15	±16	V
R _{IN}	Input resistance		50	100		30	100	KΩ
I _{SC}	Output short circuit current			38			38	mA

NOTES

1. For NE5534, NE5534A, T_{MIN} = 0°C, T_{MAX} = 70°C
2. For SE5534, SE5534A, T_{MIN} = -55°C, T_{MAX} = +125°C

AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ unless otherwise specified.

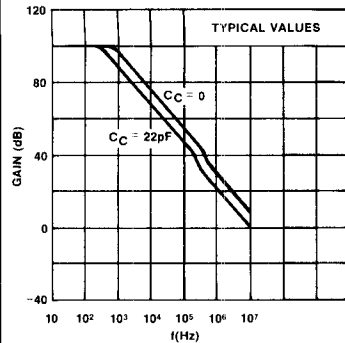
PARAMETER	TEST CONDITIONS	SE5534/5534A			NE5534/5534A			UNIT
		Min	Typ	Max	Min	Typ	Max	
R_{OUT} Output resistance	$A_V = 30\text{dB}$ closed loop $f = 10\text{kHz}$, $R_L = 600\Omega$, $C_C = 22\text{pF}$		0.3			0.3		Ω
Transient response	Voltage follower, $V_{IN} = 50\text{mV}$ $R_L = 600\Omega$, $C_C = 22\text{pF}$, $C_L = 100\text{pF}$							
T_R Rise time			20			20		ns
Overshoot			20			20		%
Transient response	$V_{IN} = 50\text{mV}$, $R_L = 600\Omega$ $C_C = 47\text{pF}$, $C_L = 500\text{pF}$							
T_R Rise time			50			50		ns
Overshoot			35			35		%
AC Gain	$f = 10\text{kHz}$, $C_C = 0$ $f = 10\text{kHz}$, $C_C = 22\text{pF}$		6			6		V/mV
			2.2			2.2		V/mV
Gain bandwidth product	$C_C = 22\text{pF}$, $C_L = 100\text{pF}$		10			10		mHz
Slew rate	$C_C = 0$ $C_C = 22\text{pF}$		13			13		V/ μS
			6			6		V/ μS
Power bandwidth	$V_{OUT} = \pm 10\text{V}$, $C_C = 0$ $V_{OUT} = \pm 10\text{V}$, $C_C = 22\text{pF}$ $V_{OUT} = \pm 14\text{V}$, $R_L = 600\Omega$ $C_C = 22\text{pF}$, $V_{CC} = \pm 18\text{V}$		200			200		kHz
			95			95		kHz
			70			70		kHz

ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ unless otherwise specified.

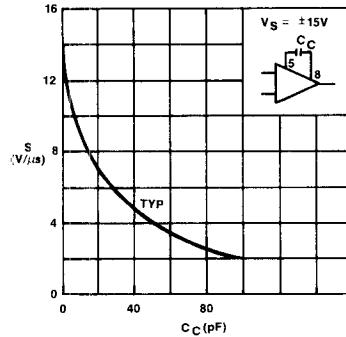
PARAMETER	TEST CONDITIONS	SE5534/NE5534			SE5534A/NE5534A			UNIT
		Min	Typ	Max	Min	Typ	Max	
Input noise voltage	$f_o = 30\text{Hz}$ $f_o = 1\text{kHz}$		7			5.5	7	$\text{nV}/\sqrt{\text{Hz}}$
			4			3.5	4.5	$\text{nV}/\sqrt{\text{Hz}}$
Input noise current	$f_o = 30\text{Hz}$ $f_o = 1\text{kHz}$		2.5			1.5		$\text{pA}/\sqrt{\text{Hz}}$
			0.6			0.4		$\text{pA}/\sqrt{\text{Hz}}$
Broadband noise figure	$f = 10\text{Hz} - 20\text{kHz}$, $R_S = 5\text{k}\Omega$		-			0.9		dB

TYPICAL PERFORMANCE CHARACTERISTICS

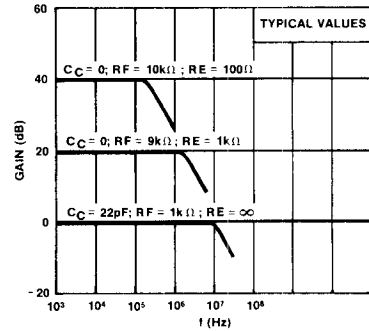
OPEN LOOP FREQUENCY RESPONSE



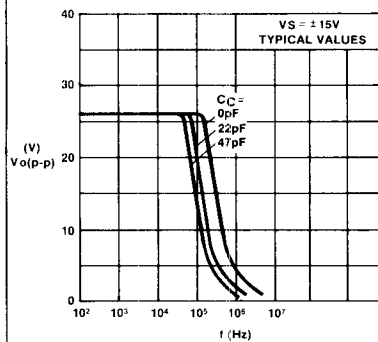
SLEW-RATE AS A FUNCTION OF COMPENSATION CAPACITANCE



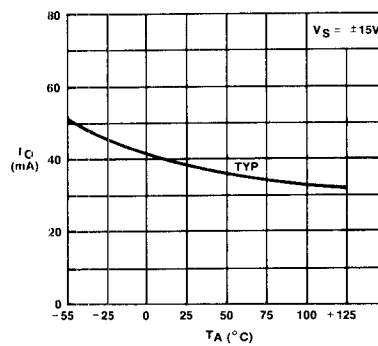
CLOSED LOOP FREQUENCY RESPONSE



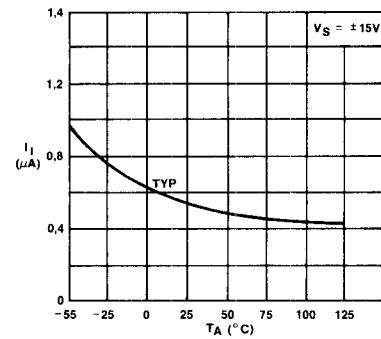
LARGE-SIGNAL FREQUENCY RESPONSE



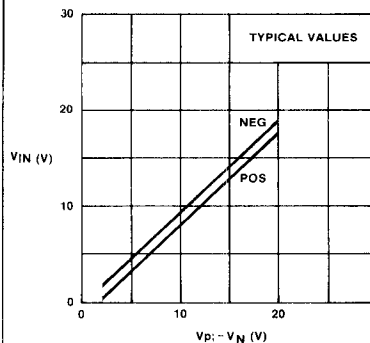
OUTPUT SHORT-CIRCUIT CURRENT



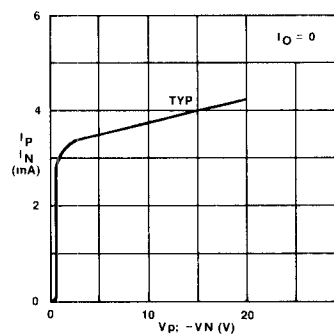
INPUT BIAS CURRENT



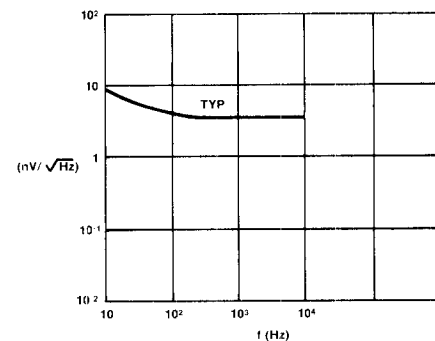
INPUT COMMON MODE VOLTAGE RANGE



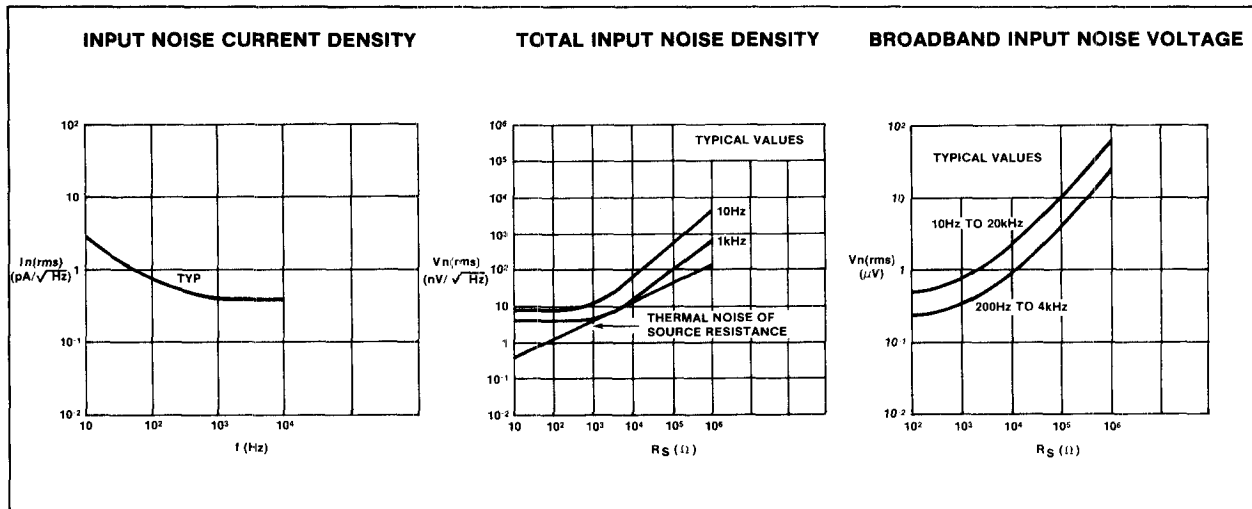
SUPPLY CURRENT



INPUT NOISE VOLTAGE DENSITY



TYPICAL PERFORMANCE CHARACTERISTICS (Cont'd)



TEST LOAD CIRCUITS

