

# Low-noise operational amplifiers

5534/5534A

[查询"5534A/BPA"供应商](#)

## FEATURES

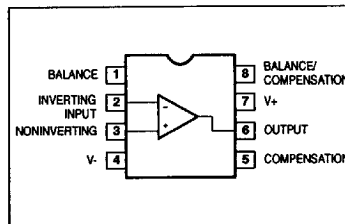
- Small-signal bandwidth: 10MHz
- Output drive capability: 600Ω, 10V<sub>RMS</sub> at V<sub>S</sub> = ±18V
- Input noise voltage: 4nV/√Hz
- DC voltage gain: 100000
- AC voltage gain: 6000 at 10kHz
- Power bandwidth: 200kHz
- Slew rate: 13V/μs
- Large supply voltage range: ±3 to ±20V

## DESCRIPTION

The 5534 is a high-performance low-noise operational amplifier. Compared to other operational amplifiers, such as TL083, it shows better noise performance, improved output drive capability and considerably higher small-signal and power bandwidths.

The op amps are internally compensated for again 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 5534A version be used which has guaranteed noise specifications.

## PIN CONFIGURATION



## ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
8-Pin Ceramic DIP	5534/BPA	GDIP-T8
8-Pin Ceramic DIP	5534A/BPA	GDIP-T8

\* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING <sup>2</sup>	UNIT
V <sub>S</sub>	Supply voltage	±22	V
V <sub>IN</sub>	Input voltage	±V supply	V
V <sub>DIFF</sub>	Differential input voltage <sup>1</sup>	±0.5	V
T <sub>stg</sub>	Storage temperature range	-65 to +150	°C
T <sub>J</sub>	Junction temperature	150	°C
t <sub>pp</sub>	Power dissipation at 25 °C	800	mW

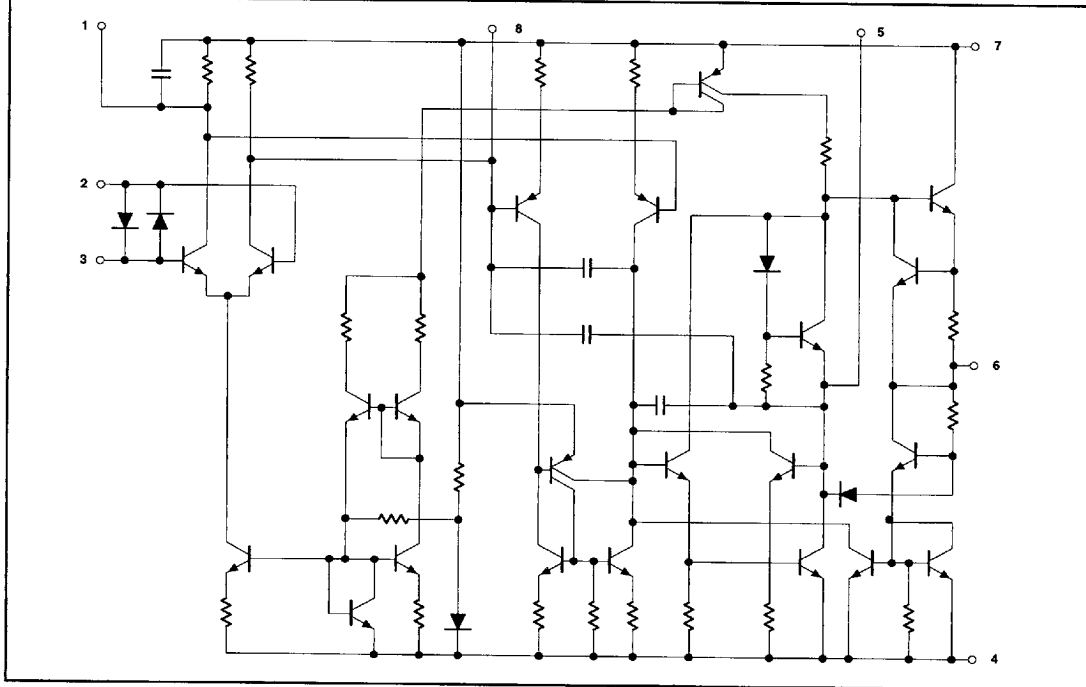
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## EQUIVALENT SCHEMATIC



## DC ELECTRICAL CHARACTERISTICS

$V_S = \pm 15V$ , unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	$T_{amb} = +25^{\circ}C$			$T_{amb} = -55^{\circ}C, +125^{\circ}C$			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{IO}$	Input offset voltage			0.5	2.0			3	mV
$I_{IO}$	Input offset current			10	200			500	nA
$I_{IB}$	Input bias current			400	800			1500	nA
$V_{ICR}$	Common mode voltage range		$\pm 12$	$\pm 13$		$\pm 12$			V
CMRR	Input mode rejection ratio	$R_S = 10k\Omega$	80	100		70			dB
PSRR	Power supply rejection ratio			10	50			100	$\mu V/V$
$A_V$	Large signal voltage gain	$R_L \geq 600\Omega, V_O = \pm 10V$	50	100		25			V/mV
$V_O$	Output voltage swing	$R_L \geq 600\Omega,$	$\pm 12$	$\pm 13$		$\pm 10$			V
		$R_L \geq 600\Omega, V_S = \pm 18V$	$\pm 15$	$\pm 16$					V
		$R_L \geq 2k\Omega, V_S = \pm 15V$	$\pm 13$	$\pm 13.5$		$\pm 12$			V
$R_I$	Input resistance <sup>3</sup>		50	100					k $\Omega$
$I_{SC}$	Output short-circuit current			38					mA
$I_{CC}$	Supply current			4	6.5			9	mA

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## AC ELECTRICAL CHARACTERISTICS

$V_S = \pm 15V$ , unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	$T_{amb} = +25^{\circ}C$			$T_{amb} = -55^{\circ}C, +125^{\circ}C$			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$R_{OUT}$	Output resistance	$A_V = 30dB$ closed loop $f = 10kHz, R_L = 600\Omega$ $C_C = 22pF$		0.3					$\Omega$
$t_r$	Transient response Rise time Overshoot	Voltage follower, $R_L = 600\Omega, C_C = 22pF,$ $C_L = 100pF, V_I = 50mV$		20					ns
OS			20				%		
$t_r$	Transient response Rise time Overshoot	$V_{IN} = 50mV, R_L = 600\Omega$ $C_C = 47pF, C_L = 500pF$		50					ns
OS			35				%		
AC	Gain	$f = 10kHz, C_C = 0$ $f = 10kHz, C_C = 22pF$		6 2.2					V/mV V/mV
GBW	Gain bandwidth product	$C_C = 22pF, C_L = 100pF$		10					mHz
SR	Slew rate <sup>3</sup>	$C_C = 0$ $C_C = 22pF$	4	13 6					$V/\mu S$ V/mus
PBW	Power bandwidth	$V_{OUT} = \pm 10V, C_C = 0$ $V_{OUT} = \pm 10V, C_C = 22pF$ $V_{OUT} = \pm 14V, R_L = 600\Omega$ $C_C = 22pF, V_{CC} = \pm 18V$		200 95 70					kHz kHz kHz

## ELECTRICAL CHARACTERISTICS

$T_{amb} = 25^{\circ}C, V_S \pm 15V$ , unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	5533/5534			5533A/5534A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$E_N$	Input noise voltage	$f_O = 30Hz$		7			5.5	7	$nV/\sqrt{Hz}$
		$f_O = 1kHz$		4			3.5	4.5	$nV/\sqrt{Hz}$
$I_N$	Input noise current	$f_O = 30Hz$		2.5			1.5		$pA/\sqrt{Hz}$
		$f_O = 1kHz$		0.6			0.4		$pA/\sqrt{Hz}$
$BB_N$	Broadband noise figure	$f = 10Hz - 20kHz,$ $R_S = 5k\Omega$					0.9		dB
CS	Channel separation	$f = 1kHz, R_S = 5k\Omega$		110			110		dB

### NOTES:

1. Diodes protect the inputs against over-voltage. Therefore, unless current-limiting resistors are used, large currents will flow if the different input voltage exceeds 0.6V. Maximum current should be limited to  $\pm 10mA$ .
2. Operations beyond the limits of this table may impair the useful life of the device.
3. This parameter is guaranteed, but not tested.

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April 6, 1992

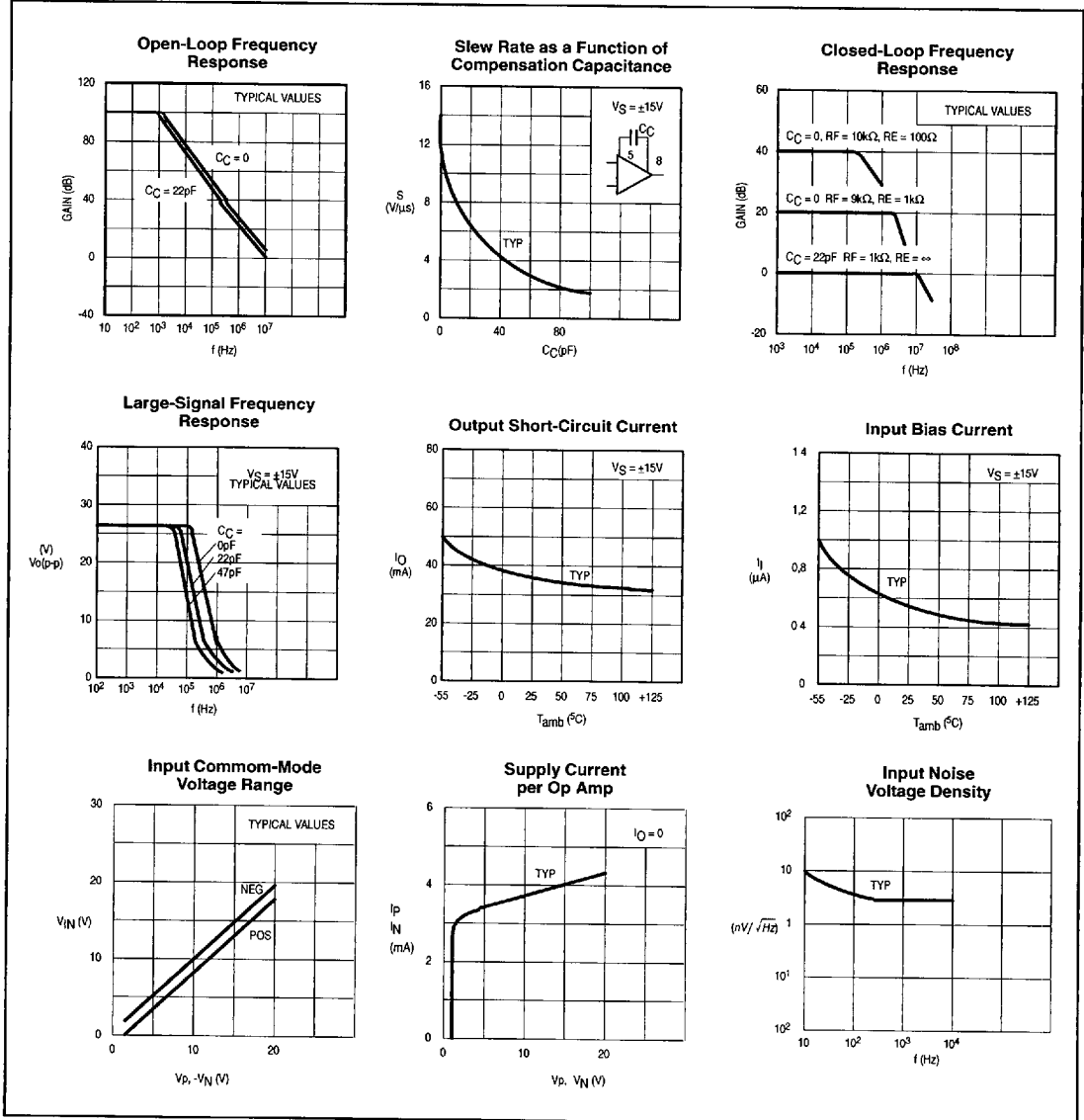
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TYPICAL PERFORMANCE CHARACTERISTICS



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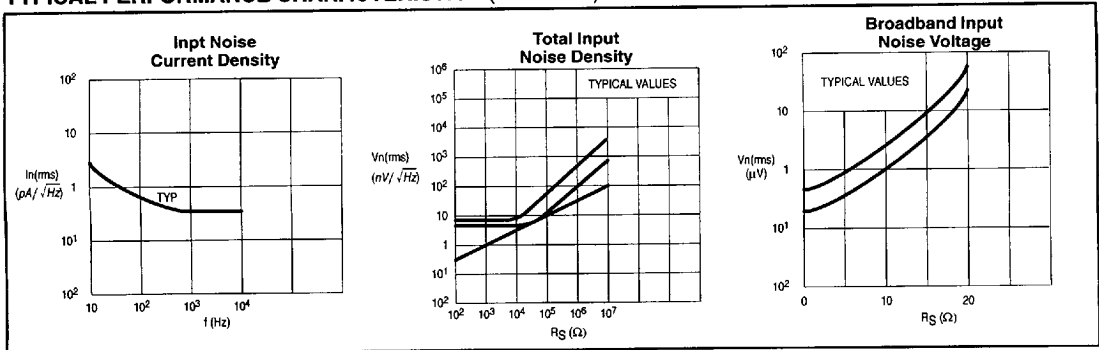
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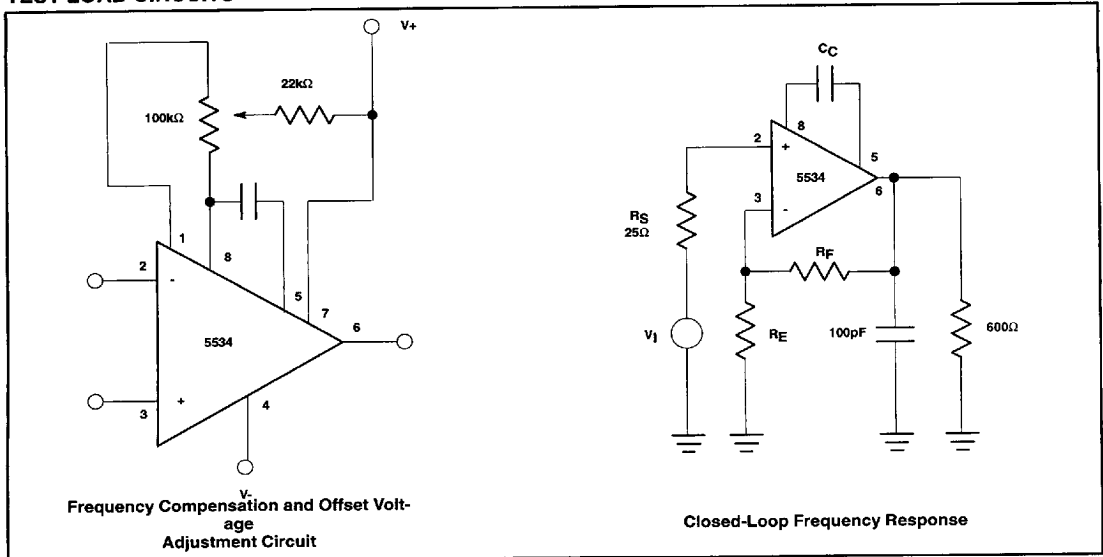
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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



TEST LOAD CIRCUITS



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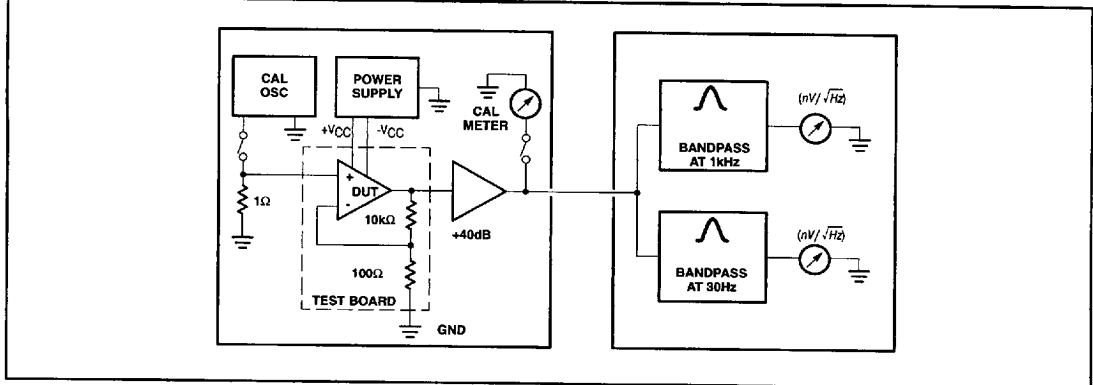
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## NOISE TEST BLOCK DIAGRAM



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