

# Internally compensated dual low noise operational amplifier

5532/5532A

### 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:  $\pm 3$  to  $\pm 20V$
- Compensated for unity gain

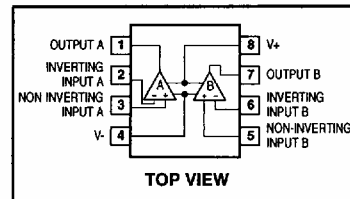
### DESCRIPTION

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, which has guaranteed noise voltage specifications, be used.

### PIN CONFIGURATION

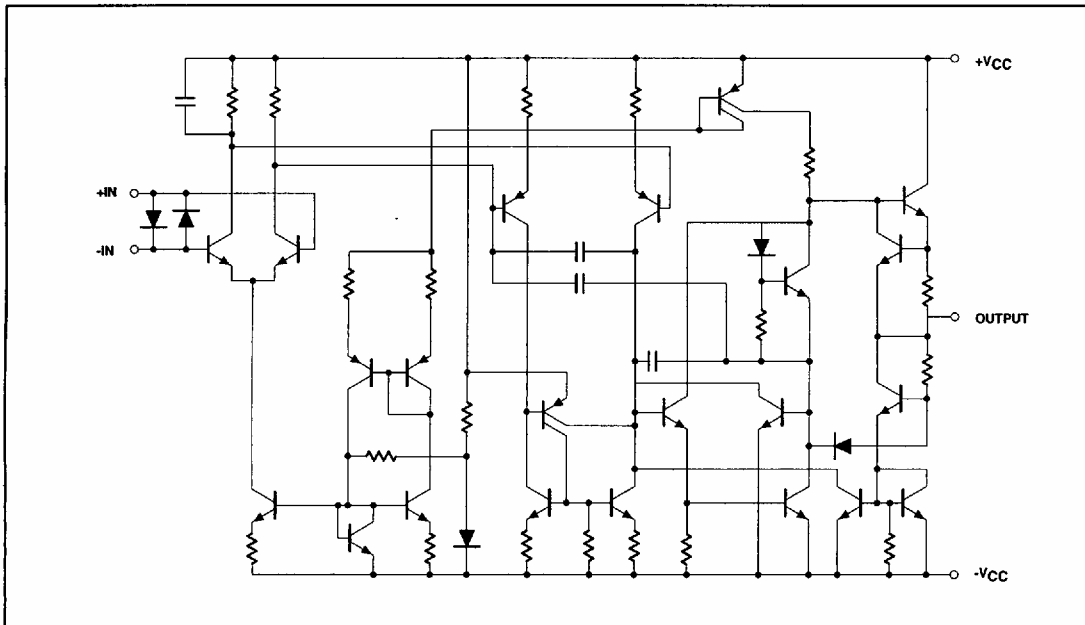


### ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
8-Pin Ceramic DIP	5532/BPA	GDIP1-T8
8-Pin Ceramic DIP	5532A/BPA	GDIP2-T8

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

### EQUIVALENT SCHEMATIC (Each Amplifier)



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## ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING <sup>2</sup>	UNIT
V <sub>S</sub>	Supply voltage	±22	V
V <sub>I</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
P <sub>D</sub>	Power dissipation	1000	mW

## DC ELECTRICAL CHARACTERISTICS

V<sub>S</sub> = ±15V, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	T <sub>amb</sub> = +25°C			T <sub>amb</sub> = -55°C, +125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V <sub>IO</sub>	Input offset voltage			0.5	2.0			3	mV
I <sub>IO</sub>	Input offset current				100			200	nA
I <sub>IB</sub>	Input bias current			200	400			700	nA
V <sub>ICR</sub>	Common mode voltage range		±12	±13		±12			V
CMRR	Common mode rejection ratio		80	100		70			dB
PSRR	Power supply rejection ratio			10	50			100	μV/V
A <sub>v</sub>	Large signal voltage gain	R <sub>L</sub> ≥ 2kΩ, V <sub>O</sub> = ±10V	50			25			V/mV
		R <sub>L</sub> ≥ 600Ω, V <sub>O</sub> = ±10V	40			20			V/mV
V <sub>O</sub>	Output voltage swing	R <sub>L</sub> ≥ 600Ω, V <sub>S</sub> = ±18V	±15	±16					V
		R <sub>L</sub> ≥ 2kΩ, V <sub>S</sub> = ±15V	±12	±13		±12			V
R <sub>I</sub>	Input resistance		30	300					kΩ
I <sub>SC</sub>	Output short-circuit current		10	38	60	5		80	mA
I <sub>CC</sub>	Supply current				13			13	mA

## AC ELECTRICAL CHARACTERISTICS

V<sub>S</sub> = ±15V, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	T <sub>amb</sub> = +25°C			T <sub>amb</sub> = -55°C, +125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
R <sub>OUT</sub>	Output resistance	A <sub>v</sub> = 30dB Closed loop f = 10kHz, R <sub>L</sub> = 600Ω		0.3					Ω
OS	Overshoot	Voltage follower V <sub>I</sub> = 100mV <sub>p-p</sub> C <sub>L</sub> = 100pF, R <sub>L</sub> = 600Ω		10					%
A <sub>v</sub>	Gain	f = 10kHz		2.2					V/mV
GBW	Gain bandwidth product	C <sub>L</sub> = 100pF, R <sub>L</sub> = 600Ω		10					MHz
SR	Slew rate			9					V/μs
PBW	Power bandwidth	V <sub>CC</sub> = ±18V V <sub>O</sub> = ±10V		140					kHz
		V <sub>O</sub> = ±14V, R <sub>L</sub> = 600Ω		100					kHz

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## ELECTRICAL CHARACTERISTICS

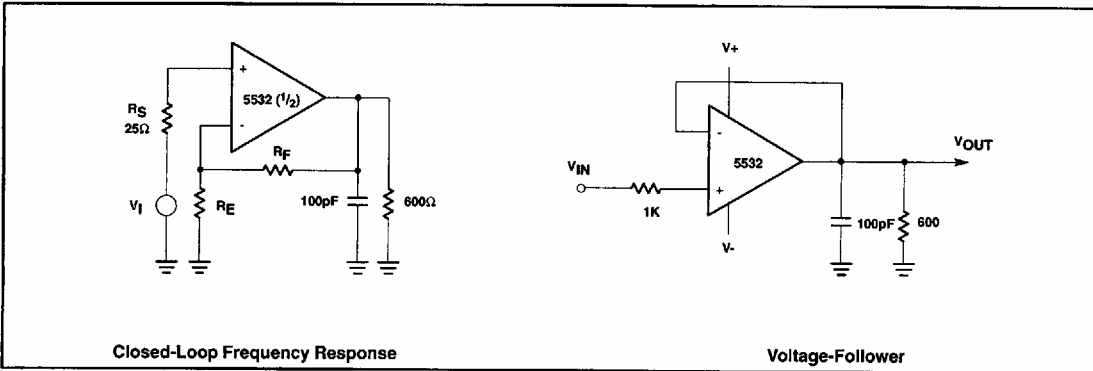
$V_S = \pm 15V$ , unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	$T_{amb} = +25^{\circ}C$			$T_{amb} = -55^{\circ}C, +125^{\circ}C$			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$E_N$	Input noise voltage <sup>3</sup>	$f_O = 30Hz$		8	12				$nV/\sqrt{Hz}$
		$f_O = 1kHz$		5	6				$nV/\sqrt{Hz}$
$I_N$	Input noise current	$f_O = 30Hz$		2.7					$pA/\sqrt{Hz}$
		$f_O = 1kHz$		0.7					$pA/\sqrt{Hz}$
CS	Channel separation	$f = 1kHz, R_S = 5k\Omega$		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. Input noise voltage is guaranteed for the 5532A only.

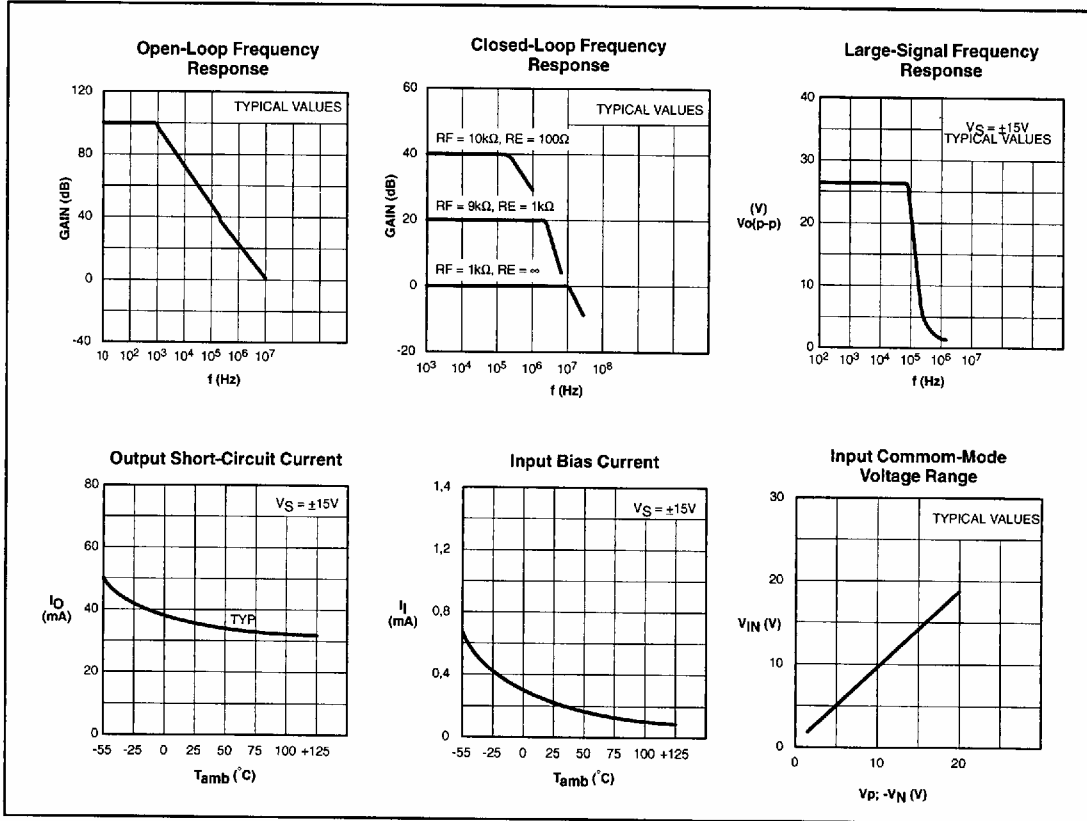
## TYPICAL TEST CIRCUITS



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## TYPICAL PERFORMANCE CHARACTERISTICS



## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

