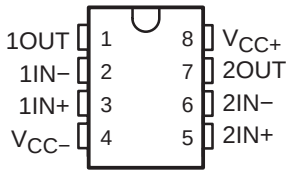
DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

- **Equivalent Input Noise Voltage 5 nV/$\sqrt{Hz}$ Typ at 1 kHz**
- **Unity-Gain Bandwidth . . . 10 MHz Typ**
- **Common-Mode Rejection Ratio . . . 100 dB Typ**
- **High dc Voltage Gain . . . 100 V/mV Typ**
- **Peak-to-Peak Output Voltage Swing 32 V Typ With $V_{CC\pm}$ = ±18 V and R_L = 600 Ω**
- **High Slew Rate . . . 9 V/μs Typ**
- **Wide Supply-Voltage Range . . . ±3 V to ±20 V**

NE5532, NE5532A . . . D, P, OR PS PACKAGE

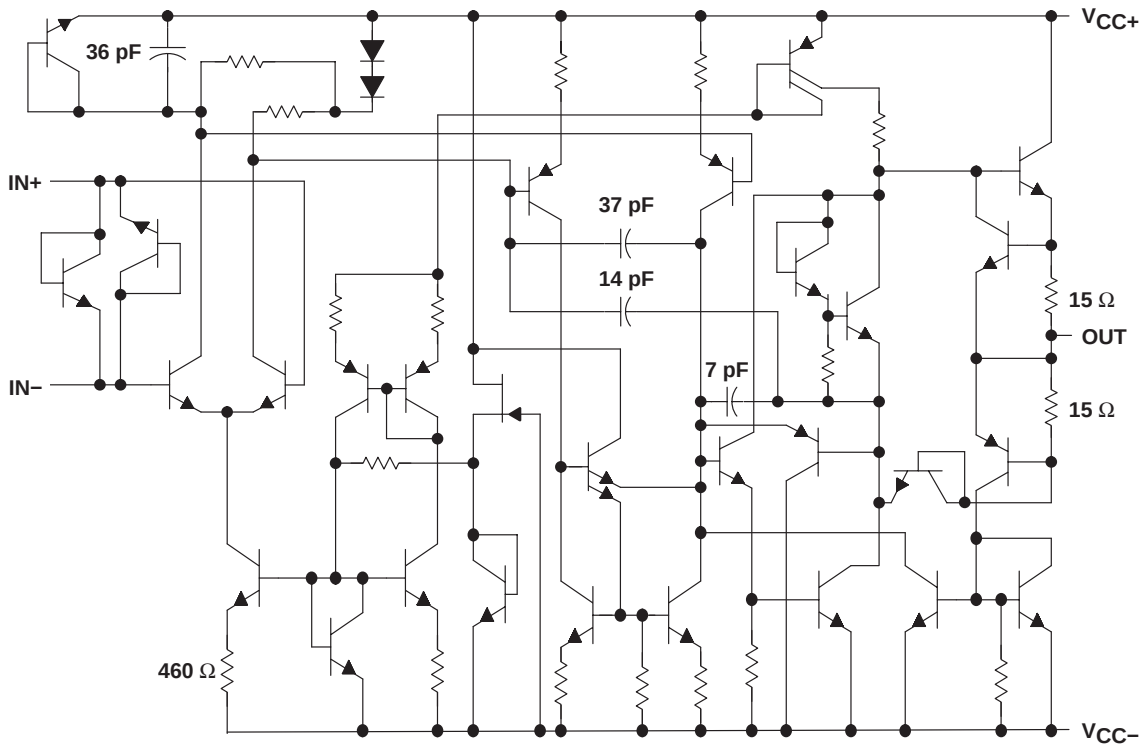
(TOP VIEW)



description

The NE5532, NE5532A are high-performance operational amplifiers combining excellent dc and ac characteristics. They feature very low noise, high output-drive capability, high unity-gain and maximum-output-swing bandwidths, low distortion, high slew rate, input-protection diodes, and output short-circuit protection. These operational amplifiers are compensated internally for unity-gain operation. These devices have specified maximum limits for equivalent input noise voltage.

schematic (each amplifier)



Component values shown are nominal.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage (see Note 1):	V_{CC+}	22 V
	V_{CC-}	−22 V
Input voltage, either input (see Notes 1 and 2)		$V_{CC\pm}$
Input current (see Note 3)		±10 mA
Duration of output short circuit (see Note 4)		Unlimited
Package thermal impedance, θ_{JA} (see Notes 5 and 6):	D package	97°C/W
	P package	85°C/W
	PS package	95°C/W
Operating virtual junction temperature, T_J		150°C
Storage temperature range, T_{stg}		−65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES:
1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-}.
2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage.
3. Excessive input current will flow if a differential input voltage in excess of approximately 0.6 V is applied between the inputs, unless some limiting resistance is used.
4. The output may be shorted to ground or either power supply. Temperature and/or supply voltages must be limited to ensure the maximum dissipation rating is not exceeded.
5. Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
6. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

		MIN	MAX	UNIT
V_{CC+}	Supply voltage	5	15	V
V_{CC-}	Supply voltage	−5	−15	V
T_A	Operating free-air temperature range	0	70	°C

electrical characteristics, $V_{CC\pm}$ = +15 V, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS†			NE5532, NE5532A			UNIT
					MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_O = 0	T_A = 25°C			0.5	4	mV
			T_A = Full range‡				5	
I_{IO}	Input offset current	T_A = 25°C				10	150	nA
		T_A = Full range‡					200	
I_{IB}	Input bias current	T_A = 25°C				200	800	nA
		T_A = Full range‡					1000	
V_{ICR}	Common-mode input-voltage range				±12	±13		V
V_{OPP}	Maximum peak-to-peak output-voltage swing	R_L ≥ 600 Ω	$V_{CC\pm}$ = ±15 V		24	26		V
			$V_{CC\pm}$ = ±18 V		30	32		
A_{VD}	Large-signal differential-voltage amplification	R_L ≥ 600 Ω, V_O = ±10 V	T_A = 25°C		15	50		V/mV
			T_A = Full range‡		10			
		R_L ≥ 2 kΩ, V_O = ±10 V	T_A = 25°C		25	100		
			T_A = Full range‡		15			
A_{vd}	Small-signal differential-voltage amplification	f = 10 kHz				2.2		V/mV
B_{OM}	Maximum-output-swing bandwidth	R_L = 600 Ω	V_O = ±10 V			140		kHz
			$V_{CC\pm}$ = ±18 V,	V_O = ±14 V		100		
B_1	Unity-gain bandwidth	R_L = 600 Ω,	C_L = 100 pF			10		MHz
r_i	Input resistance				30	300		kΩ
z_o	Output impedance	A_{VD} = 30 dB,	R_L = 600 Ω,	f = 10 kHz		0.3		Ω
CMRR	Common-mode rejection ratio	V_{IC} = V_{ICR} min			70	100		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$)	$V_{CC\pm}$ = ±9 V to ±15 V,		V_O = 0	80	100		dB
I_{OS}	Output short-circuit current				10	38	60	mA
I_{CC}	Total supply curent	V_O = 0,	No load			8	16	mA
	Crosstalk attenuation (V_{O1}/V_{O2})	V_{01} = 10 V peak,	f = 1 kHz			110		dB

† All characteristics are measured under open-loop conditions, with zero common-mode input voltage, unless otherwise specified.
‡ Full temperature ranges are: −40°C to 85°C for the SA5532 and SA5532A, and 0°C to 70°C for the NE5532 and NE5532A.

operating characteristics, $V_{CC\pm}$ = ±15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	NE5532			NE5532A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
SR	Slew rate at unity gain			9			9		V/μs
	Overshoot factor	V_I = 100 mV, A_{VD} = 1, R_L = 600 Ω, C_L = 100 pF		10			10		%
V_n	Equivalent input noise voltage	f = 30 Hz		8			8	10	nV/√Hz
		f = 1 kHz		5			5	6	
I_n	Equivalent input noise current	f = 30 Hz		2.7			2.7		pA/√Hz
		f = 1 kHz		0.7			0.7		

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