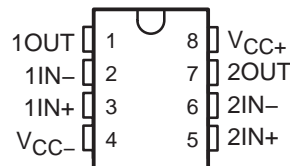


NE5532, NE5532A, SA5532, SA5532A DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

SLOS075H – NOVEMBER 1979 – REVISED MAY 2004

- Equivalent Input Noise Voltage
5 nV/ $\sqrt{\text{Hz}}$ 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 $V_{CC\pm} = \pm 18\text{ V}$ and $R_L = 600\ \Omega$
- High Slew Rate . . . 9 V/ μs Typ
- Wide Supply-Voltage Range . . . $\pm 3\text{ V}$ to
 $\pm 20\text{ V}$

NE5532, NE5532A . . . D, P, OR PS PACKAGE
SA5532, SA5532A . . . D OR P PACKAGE
(TOP VIEW)



description/ordering information

The NE5532, NE5532A, SA5532, and SA5532A 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.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING	
0°C to 70°C	PDIP – P	Tube of 50	NE5532P	NE5532P	
			NE5532AP	NE5532AP	
	SOIC – D	Tube of 75 Reel of 2500	NE5532D	N5532	
			NE5532DR		
			Tube of 75 Reel of 2500	NE5532AD	N5532A
				NE5532ADR	
SOP – PS	Reel of 2000	NE5532PSR	N5532		
		NE5532APSR	N5532A		
–40°C to 85°C	PDIP – P	Tube of 50	SA5532P	SA5532P	
			SA5532AP	SA5532AP	
	SOIC – D	Tube of 75 Reel of 2500	SA5532D	SA5532	
			SA5532DR		
			Tube of 75 Reel of 2500	SA5532AD	SA5532A
				SA5532ADR	

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

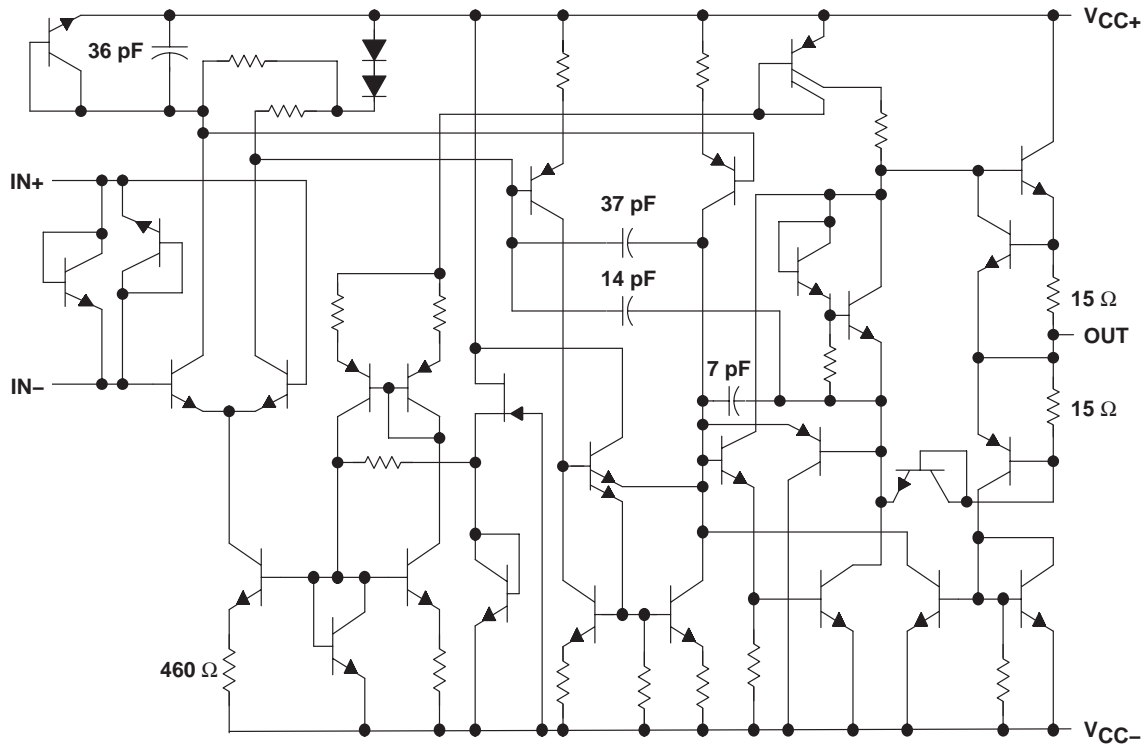
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NE5532, NE5532A, SA5532, SA5532A DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

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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.



NE5532, NE5532A, SA5532, SA5532A DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

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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	NE5532, NE5532A	0	70	°C
		SA5532, SA5532A	-40	85	

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

PARAMETER	TEST CONDITIONS†		NE5532, NE5532A SA5532, SA5532A			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±} = ±15 V		24	26	V
			V _{CC±} = ±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±} = ±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 (ΔV _{CC±} /ΔV _{IO})	V _{CC±} = ±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 current	V _O = 0, No load		8	16	mA	
	Crosstalk attenuation (V _{O1} /V _{O2})	V _{O1} = 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.



NE5532, NE5532A, SA5532, SA5532A DUAL LOW-NOISE OPERATIONAL AMPLIFIERS

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operating characteristics, $V_{CC\pm} = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	NE5532, SA5532			NE5532A, SA5532A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
SR	Slew rate at unity gain		9			9			V/ μ s
	Overshoot factor	$V_I = 100\text{ mV}$, $R_L = 600\ \Omega$, $A_{VD} = 1$, $C_L = 100\text{ pF}$	10			10			%
V_n	Equivalent input noise voltage	$f = 30\text{ Hz}$	8			8	10	nV/ $\sqrt{\text{Hz}}$	
		$f = 1\text{ kHz}$	5			5	6		
I_n	Equivalent input noise current	$f = 30\text{ Hz}$	2.7			2.7			pA/ $\sqrt{\text{Hz}}$
		$f = 1\text{ kHz}$	0.7			0.7			



P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



4040082/D 05/98

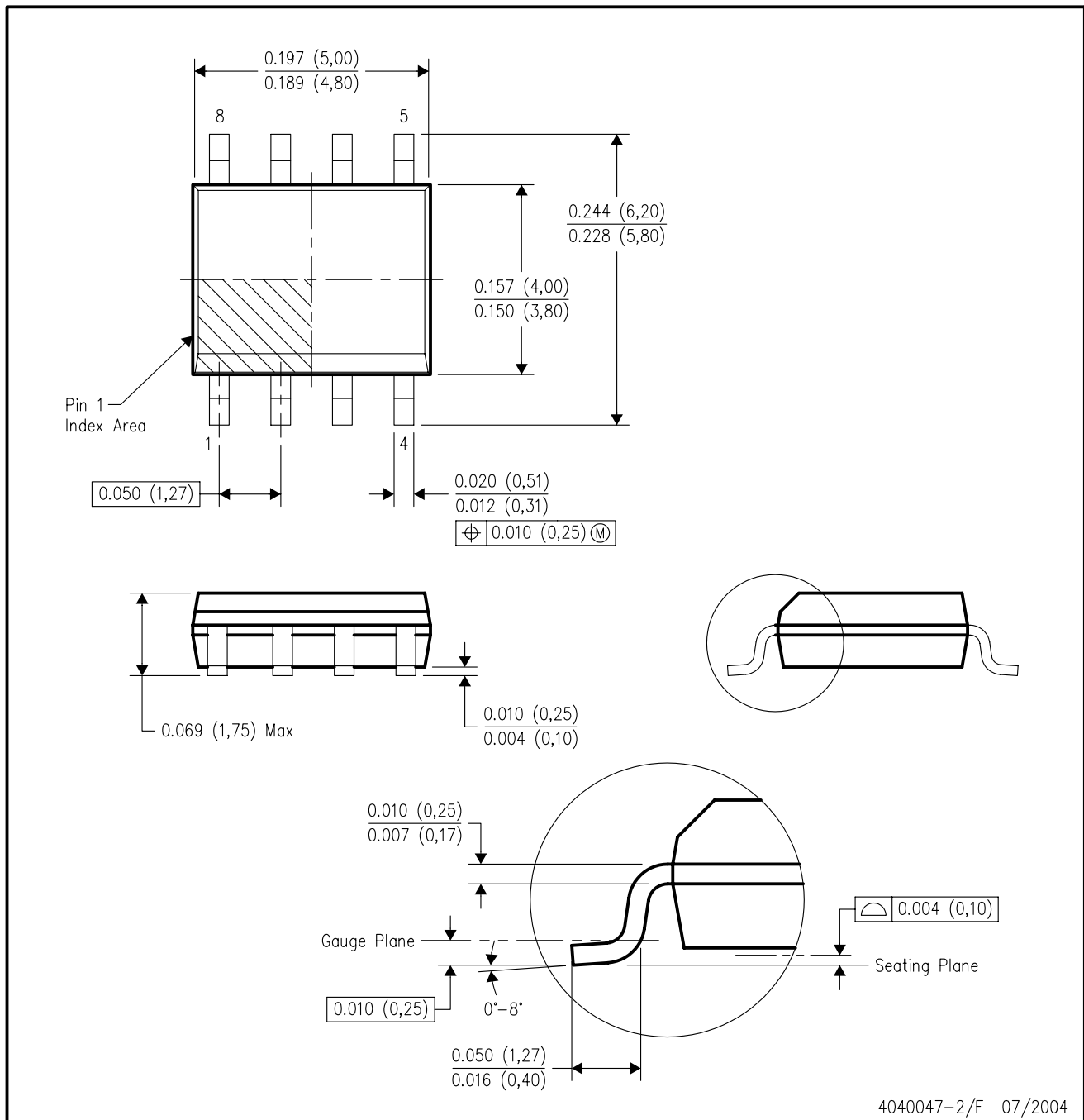
- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-001

For the latest package information, go to http://www.ti.com/sc/docs/package/pkg_info.htm



D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AA.

MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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