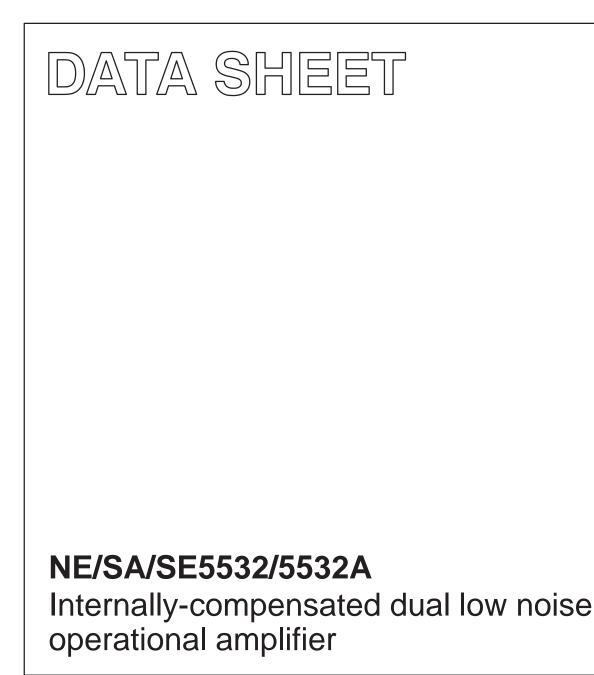
INTEGRATED CIRCUITS



Product data Supersedes data of 1997 Sep 29

2001 Aug 03



Philips Semiconductors

NE/SA/SE5532/5532A

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 be used because it has guaranteed noise voltage specifications.

FEATURES

- Small-signal bandwidth: 10 MHz
- Output drive capability: 600 Ω , 10 V_{RMS}
- Input noise voltage: 5 nV/\/Hz (typical)
- DC voltage gain: 50000
- AC voltage gain: 2200 at 10 kHz
- Power bandwidth: 140 kHz
- Slew rate: 9 V/µs
- Large supply voltage range: ±3 to ±20 V
- Compensated for unity gain

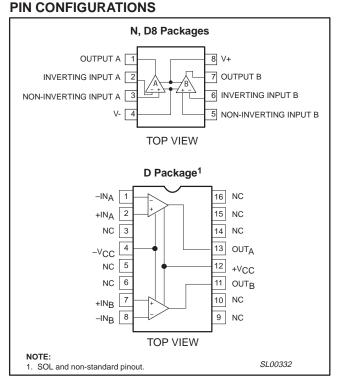


Figure 1. Pin Configurations

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
8-Pin Small Outline Package (SO)	0 °C to 70 °C	NE5532AD8	SOT96-1
8-Pin Plastic Dual In-Line Package (DIP)	0 °C to 70 °C	NE5532AN	SOT97-1
16-Pin Plastic Small Outline Large (SOL) Package	0 °C to 70 °C	NE5532D	SOT162-1
8-Pin Small Outline Package (SO)	0 °C to 70 °C	NE5532D8	SOT96-1
8-Pin Plastic Dual In-Line Package (DIP)	0 °C to 70 °C	NE5532N	SOT97-1
8-Pin Plastic Dual In-Line Package (DIP)	−40 °C to +85 °C	SA5532N	SOT97-1
8-Pin Small Outline Package (SO)	–55 °C to +125 °C	SE5532AD8	SOT96-1
16-Pin Plastic Dual In-Line Package (DIP)	–55 °C to +125 °C	SE5532N	SOT38-4

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EQUIVALENT SCHEMATIC (EACH AMPLIFIER)

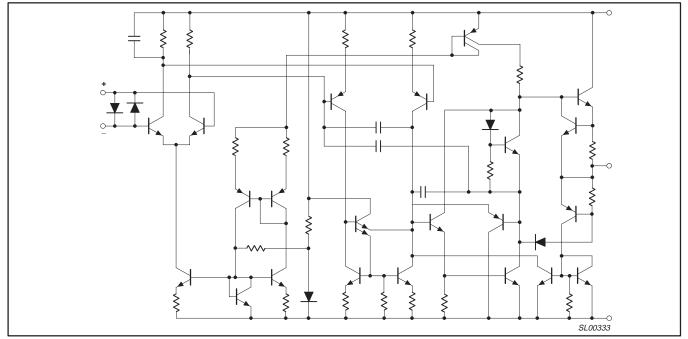


Figure 2. Equivalent Schematic (Each Amplifier)

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V _S	Supply voltage	±22	V
V _{IN}	Input voltage	±V _{SUPPLY}	V
V _{DIFF}	Differential input voltage ¹	±0.5	V
T _{amb}	Operating temperature range NE5532/A SA5532 SE5532/A	0 to 70 -40 to +85 -55 to +125	⊃° C ℃
T _{stg}	Storage temperature	-65 to +150	°C
Tj	Junction temperature	150	°C
P _D	Maximum power dissipation, T _{amb} = 25 °C (still-air) ² 8 D8 package 8 N package 16 D package	780 1200 1200	mW mW mW
T _{sld}	Lead soldering temperature (10 sec max)	230	°C

NOTES:

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 ±10 mA.

2. Thermal resistances of the above packages are as follows:

N package at 100 °C/W D package at 105 °C/W

D8 package at 160 °C/W

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DC ELECTRICAL CHARACTERISTICS

 T_{amb} = 25 °C; V_S = ± 15 V, unless otherwise specified. $^{1,\ 2,\ 3}$

SYMBOL	DADAMETED	TEST CONDITIONS		SE5532//	4	NE5532/A, SA5532			UNIT
STINBUL	PARAMETER	TEST CONDITIONS	Min	Тур	Max	Min	Тур	Max	UNIT
V _{OS}	Offset voltage			0.5	2		0.5	4	mV
		Over temperature			3			5	mV
$\Delta V_{OS} / \Delta T$				5			5		μV/°C
I _{OS}	Offset current				100		10	150	nA
		Over temperature			200			200	nA
$\Delta I_{OS} / \Delta T$				200			200		pA/°C
IB	Input current			200	400		200	800	nA
		Over temperature			700			1000	nA
$\Delta I_B / \Delta T$				5			5		nA/°C
				8	10.5		8	16	mA
I _{CC}	Supply current								
		Over temperature			13				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
		$R_L \ge 2 k\Omega; V_O = \pm 10 V$	50	100		25	100		V/mV
Avol	Large-signal voltage gain	Over temperature	25			15			V/mV
AVOL	Large signal voltage gain	$R_L \ge 600 \ \Omega; \ V_O = \pm 10 \ V$	40	50		15	50		V/mV
		Over temperature	20			10			V/mV
		$R_L \ge 600 \ \Omega$	±12	±13		±12	±13		
		Over temperature	±10	±12		±10	±12		
V _{OUT}	Output swing	$R_L \ge 600 \ \Omega; \ V_S = \pm 18 \ V$	±15	±16		±15	±16		V
		Over temperature	±12	±14		±12	±14		
		$R_L \ge 2 k\Omega$	±13	±13.5		±13	±13.5		
		Over temperature	±12	±12.5	<u> </u>	±10	±12.5		
R _{IN}	Input resistance		30	300		30	300		kΩ
I _{SC}	Output short circuit current		10	38	60	10	38	60	mA

NOTES:

1. Diodes protect the inputs against overvoltage. Therefore, unless current-limiting resistors are used, large currents will flow if the differential input voltage exceeds 0.6 V. Maximum current should be limited to ± 10 mA.

2. For operation at elevated temperature, derate packages based on the package thermal resistance. 3. Output may be shorted to ground at $V_S = \pm 15$ V, $T_{amb} = 25$ °C. Temperature and/or supply voltages must be limited to ensure dissipation rating is not exceeded.

AC ELECTRICAL CHARACTERISTICS

 T_{amb} = 25 °C; V_S = ± 15 V, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS		NE/SE5532/A, SA5532				
STWBUL	PARAMETER	TEST CONDITIONS	Min	Тур	Max	UNIT		
R _{OUT}	Output resistance	$A_V = 30 \text{ dB Closed-loop}$ f = 10 kHz, R _L = 600 Ω		0.3		Ω		
	Overshoot	Voltage-follower V_{IN} = 100 mV _{P-P} C_L = 100 pF; R_L = 600 Ω		10		%		
A _V	Gain	f = 10 kHz		2.2		V/mV		
GBW	Gain bandwidth product	$C_{L} = 100 \text{ pF}; R_{L} = 600 \Omega$		10		MHz		
SR	Slew rate			9		V/µs		
	Power bandwidth	$V_{OUT} = \pm 10 \text{ V}$ $V_{OUT} = \pm 14 \text{ V}; \text{ R}_{L} = 600 \Omega,$ $V_{CC} = \pm 18 \text{ V}$		140 100		kHz kHz		

NE/SA/SE5532/5532A

ELECTRICAL CHARACTERISTICS

 T_{amb} = 25 °C; V_S = ± 15 V, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	N	E/SE553	32	NE/SA/SE5532A			UNIT
STWBOL	PARAMETER	TEST CONDITIONS	Min	Тур	Max	Min	Тур	Max	
V _{NOISE}	Input noise voltage	f _O = 30 Hz f _O = 1 kHz		8 5			8 5	12 6	nV/√Hz nV/√Hz
INOISE	Input noise current	f _O = 30 Hz f _O = 1 kHz		2.7 0.7			2.7 0.7		pA/√Hz pA/√Hz
	Channel separation	f = 1 kHz; $R_S = 5 k\Omega$		110			110		dB

TYPICAL PERFORMANCE CHARACTERISTICS

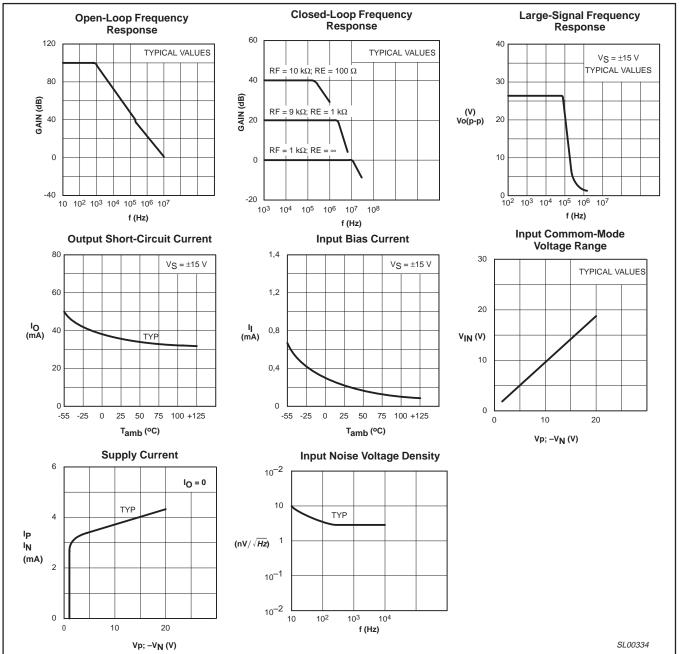


Figure 3. Typical Performance Characteristics

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TEST CIRCUITS

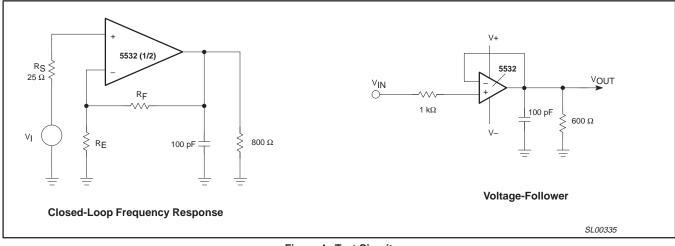
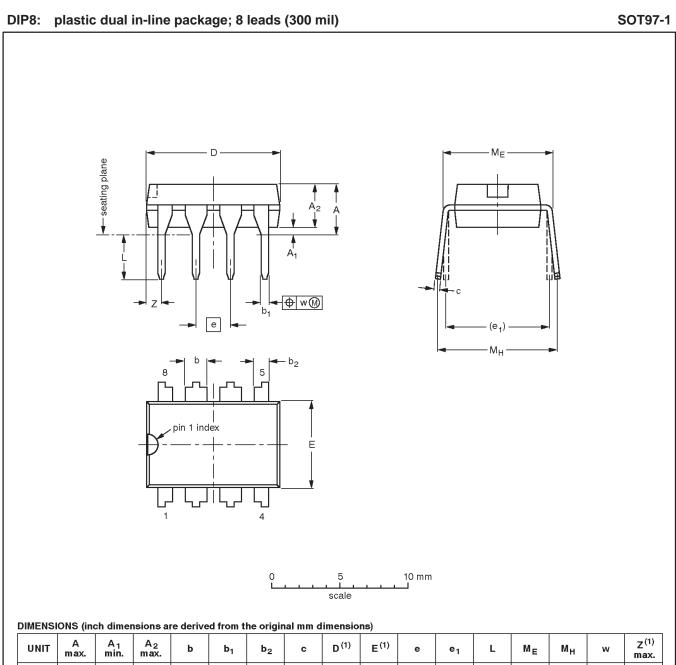


Figure 4. Test Circuits

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UNII	max.	min.	max.	b	Б 1	b ₂	c	D,	E	e	e ₁	L	ME	мн	w	max.
mm	4.2	0.51	3.2	1.73 1.14	0.53 0.38	1.07 0.89	0.36 0.23	9.8 9.2	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	1.15
inches	0.17	0.020	0.13	0.068 0.045	0.021 0.015	0.042 0.035	0.014 0.009	0.39 0.36	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.045

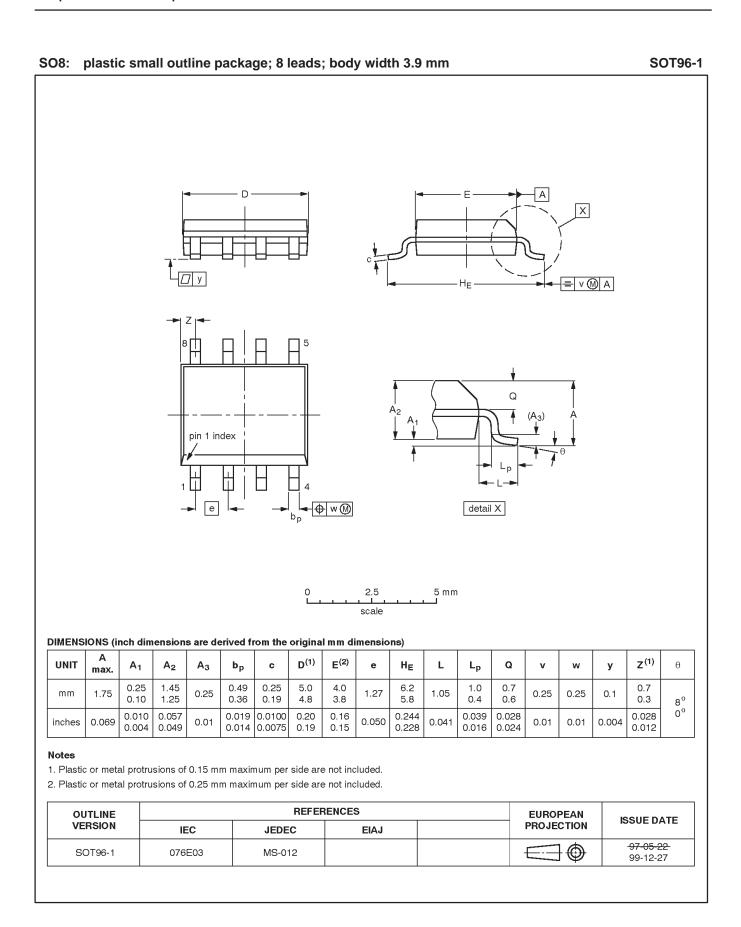
Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

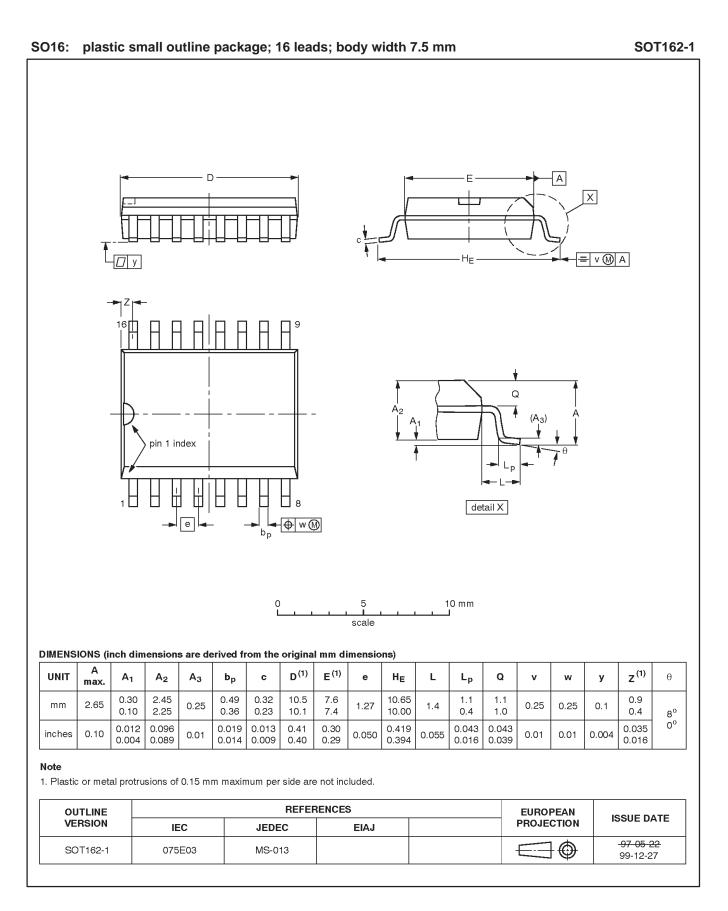
OUTLINE		REFER	RENCES	EUROPEAN ISSUE DAT			
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE	
SOT97-1	050G01	MO-001	SC-504-8			-95-02-04 99-12-27	

Product data

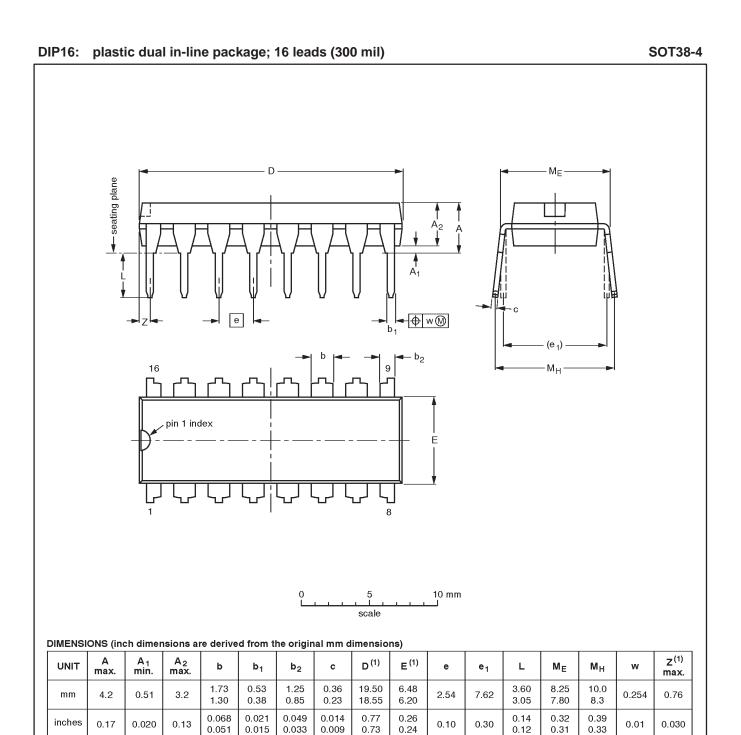
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Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFER				
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE
SOT38-4						-92-11-17 95-01-14

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NOTES

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Data sheet status ^[1]	Product status ^[2]	Definitions
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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Date of release: 03-02

Document order number:

9397 750 09563

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