

DATA SHEET

TDA1308 Class AB stereo headphone driver

Product specification
File under Integrated Circuits, IC01

August 1994

Philips Semiconductors



PHILIPS

Class AB stereo headphone driver

TDA1308

FEATURES

- Wide temperature range
- No switch ON/OFF clicks
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
 - high signal-to-noise ratio
 - high slew rate
 - low distortion
- Large output voltage swing.

GENERAL DESCRIPTION

The TDA1308 is an integrated class AB stereo headphone driver contained in an SO8 or a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications.

QUICK REFERENCE DATA

$V_{DD} = 5\text{ V}$; $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ °C}$; $f_i = 1\text{ kHz}$; $R_L = 32\text{ }\Omega$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{DD}	supply voltage					
	single		3.0	5.0	7.0	V
	dual		1.5	2.5	3.5	V
V_{SS}	negative supply voltage		-1.5	-2.5	-3.5	V
I_{DD}	supply current	no load	–	3	5	mA
P_{tot}	total power dissipation	no load	–	15	25	mW
P_o	maximum output power	THD < 0.1%; note 1	–	60	–	mW
(THD + N)/S	total harmonic distortion plus noise-to-signal ratio	note 1				
			–	0.03	0.06	%
			–	-70	-65	dB
		$R_L = 5\text{ k}\Omega$	–	-101	–	dB
S/N	signal-to-noise ratio		100	110	–	dB
α_{cs}	channel separation		–	70	–	dB
		$R_L = 5\text{ k}\Omega$	–	105	–	dB
PSRR	power supply ripple rejection	$f_i = 100\text{ Hz}$; $V_{ripple(p-p)} = 100\text{ mV}$	–	90	–	dB
T_{amb}	operating ambient temperature		-40	–	+85	°C

Note

1. $V_{DD} = 5\text{ V}$; $V_{O(p-p)} = 3.5\text{ V}$ (at 0 dB).

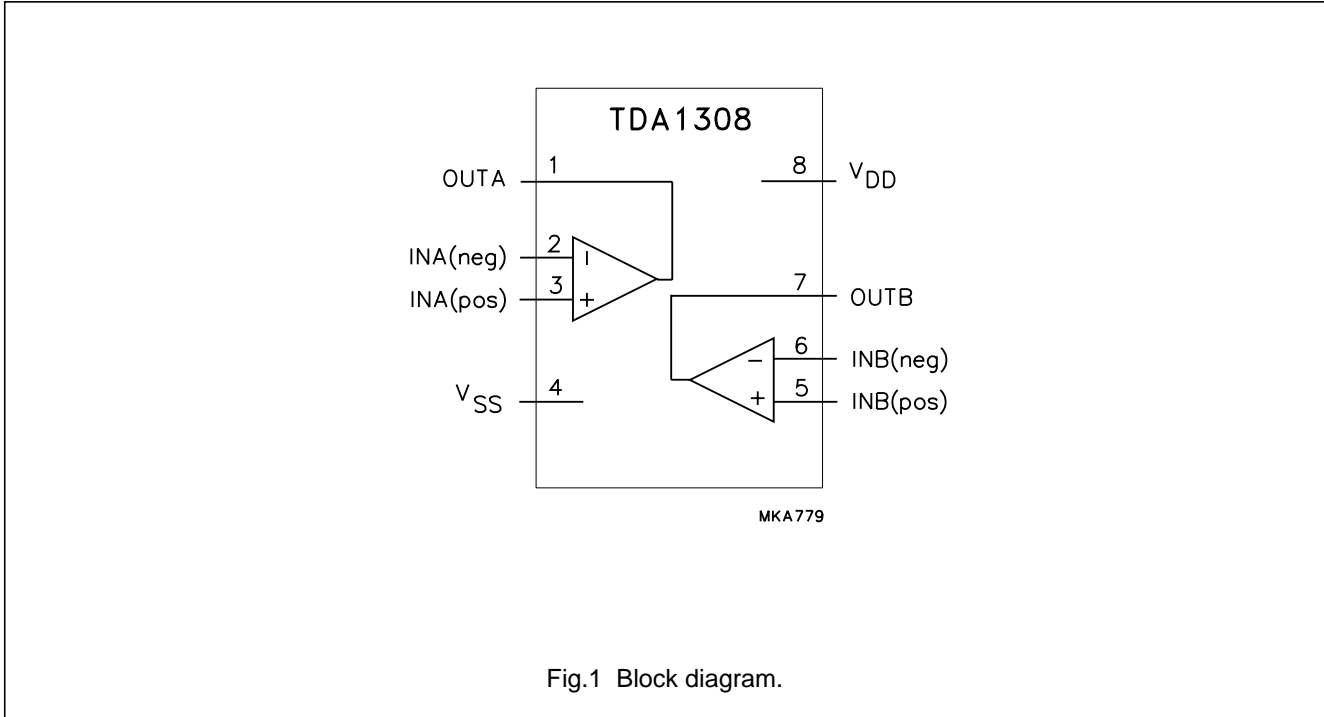
ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
TDA1308	DIP8	plastic dual in-line package; 8 leads (300 mil)	SOT97-1
TDA1308T	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

Class AB stereo headphone driver

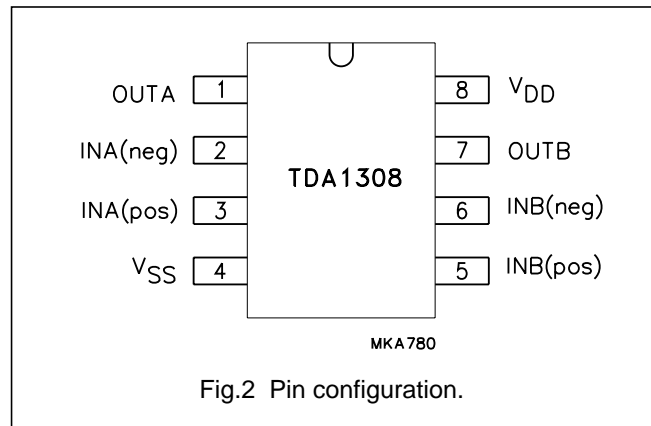
TDA1308

BLOCK DIAGRAM



PINNING

SYMBOL	PIN	DESCRIPTION
OUTA	1	output A
INA(neg)	2	inverting input A
INA(pos)	3	non-inverting input A
V _{SS}	4	negative supply
INB(pos)	5	non-inverting input B
INB(neg)	6	inverting input B
OUTB	7	output B
V _{DD}	8	positive supply



Class AB stereo headphone driver

TDA1308

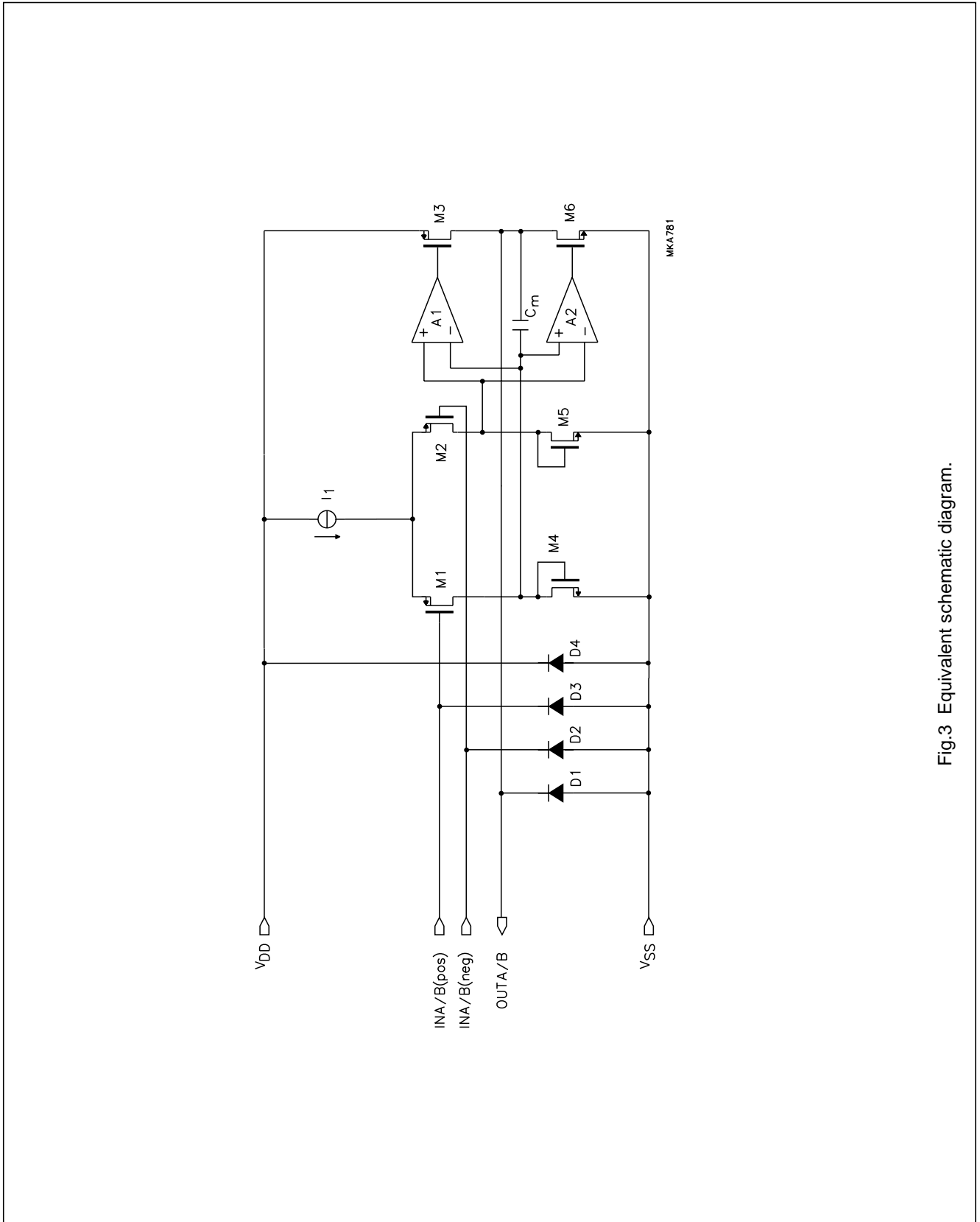


Fig.3 Equivalent schematic diagram.

Class AB stereo headphone driver

TDA1308

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DD}	supply voltage		0	8.0	V
$t_{SC(O)}$	output short-circuit duration	$T_{amb} = 25\text{ °C}; P_{tot} = 1\text{ W}$	20	–	s
T_{stg}	storage temperature		–65	+150	°C
T_{amb}	operating ambient temperature		–40	+85	°C
V_{esd}	electrostatic discharge	note 1	–2000	+2000	V
		note 2	–200	+200	V

Notes

- Human body model: C = 100 pF; R = 1500 Ω ; 3 pulses positive plus 3 pulses negative.
- Machine model: C = 200 pF; L = 0.5 mH; R = 0 Ω ; 3 pulses positive plus 3 pulses negative.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient in free air		
	DIP8	109	K/W
	SO8	210	K/W

QUALITY SPECIFICATION

In accordance with "UZW-BO/FQ-0601". The numbers of the quality specification can be found in the "Quality Reference Handbook". The handbook can be ordered using the code 9398 510 63011.

Class AB stereo headphone driver

TDA1308

CHARACTERISTICS $V_{DD} = 5\text{ V}$; $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ °C}$; $f_i = 1\text{ kHz}$; $R_L = 32\text{ }\Omega$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
V_{DD}	supply voltage					
	single		3.0	5.0	7.0	V
	dual		1.5	2.5	3.5	V
V_{SS}	negative supply voltage		-1.5	-2.5	-3.5	V
I_{DD}	supply current	no load	-	3	5	mA
P_{tot}	total power dissipation	no load	-	15	25	mW
DC characteristics						
$V_{I(os)}$	input offset voltage		-	10	-	mV
I_{bias}	input bias current		-	10	-	pA
V_{CM}	common mode voltage		0	-	3.5	V
G_v	open-loop voltage gain	$R_L = 5\text{ k}\Omega$	-	70	-	dB
I_O	maximum output current	$(THD + N)/S < 0.1\%$	-	60	-	mA
R_O	output resistance		-	0.25	-	Ω
V_O	output voltage swing	note 1	0.75	-	4.25	V
		$R_L = 16\text{ }\Omega$; note 1	1.5	-	3.5	V
		$R_L = 5\text{ k}\Omega$; note 1	0.1	-	4.9	V
PSRR	power supply rejection ratio	$f_i = 100\text{ Hz}$; $V_{ripple(p-p)} = 100\text{ mV}$	-	90	-	dB
α_{cs}	channel separation		-	70	-	dB
		$R_L = 5\text{ k}\Omega$	-	105	-	dB
C_L	load capacitance		-	-	200	pF
AC characteristics						
$(THD + N)/S$	total harmonic distortion plus noise-to-signal ratio	note 2	-	-70	-65	dB
			-	0.03	0.06	%
		note 2; $R_L = 5\text{ k}\Omega$	-	-101	-	dB
			-	0.0009	-	%
S/N	signal-to-noise ratio		100	110	-	dB
f_G	unity gain frequency	open-loop; $R_L = 5\text{ k}\Omega$	-	5.5	-	MHz
P_o	maximum output power	$(THD + N)/S < 0.1\%$	-	60	-	mW
C_i	input capacitance		-	3	-	pF
SR	slew rate	unity gain inverting	-	5	-	V/ μ s
B	power bandwidth	unity gain inverting	-	20	-	kHz

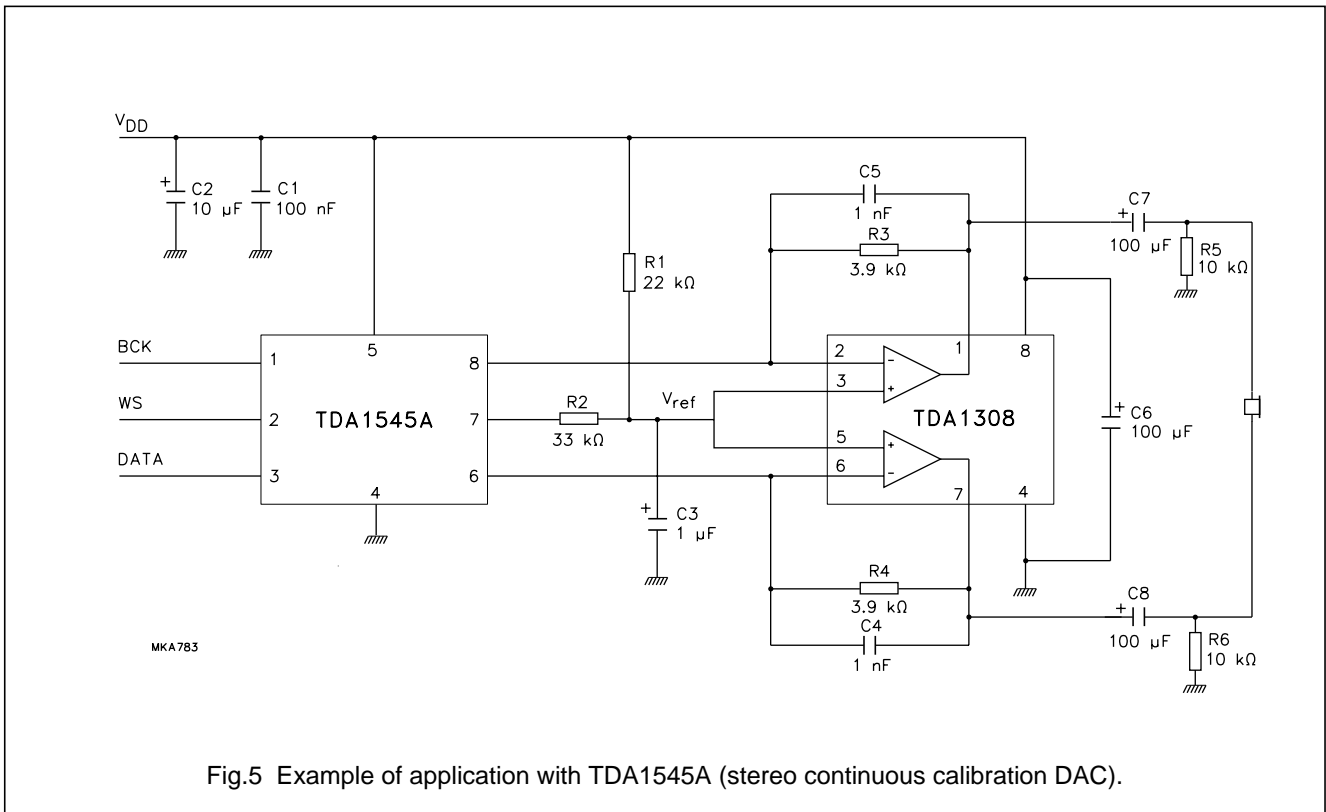
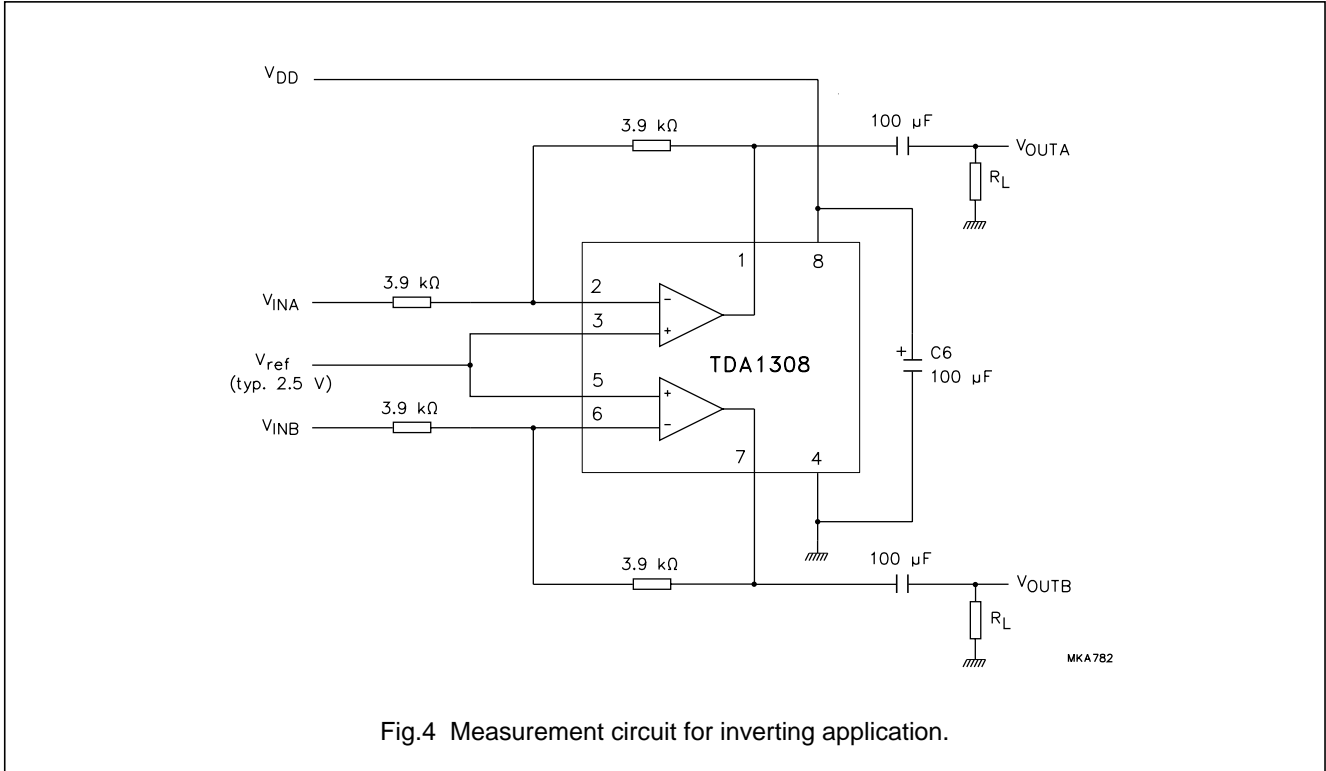
Notes

- Values are proportional to V_{DD} ; $(THD + N)/S < 0.1\%$.
- $V_{DD} = 5.0\text{ V}$; $V_{O(p-p)} = 3.5\text{ V}$ (at 0 dB).

Class AB stereo headphone driver

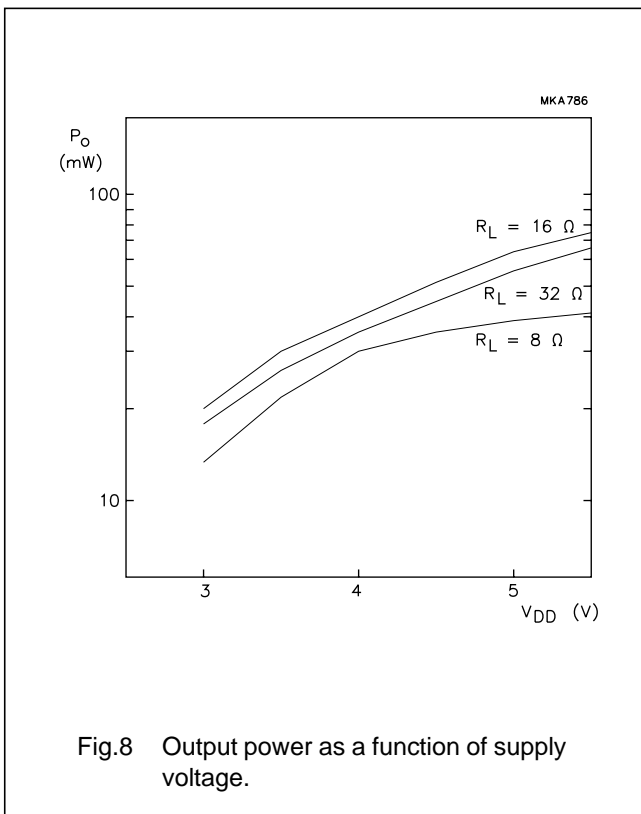
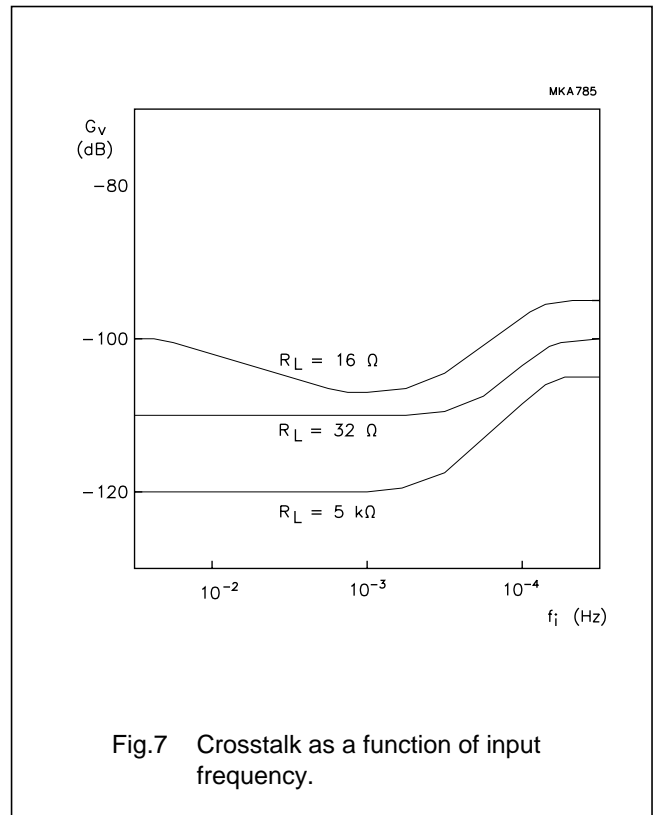
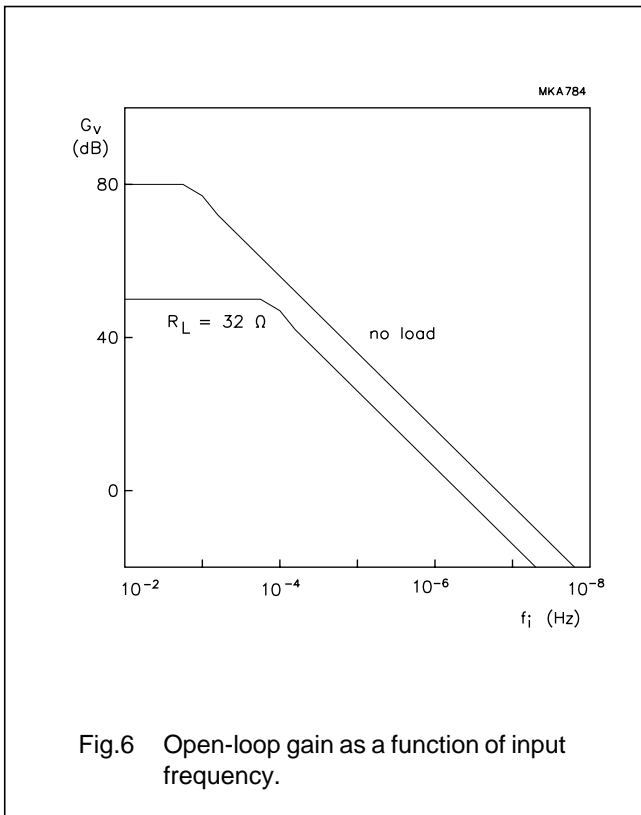
TDA1308

TEST AND APPLICATION INFORMATION



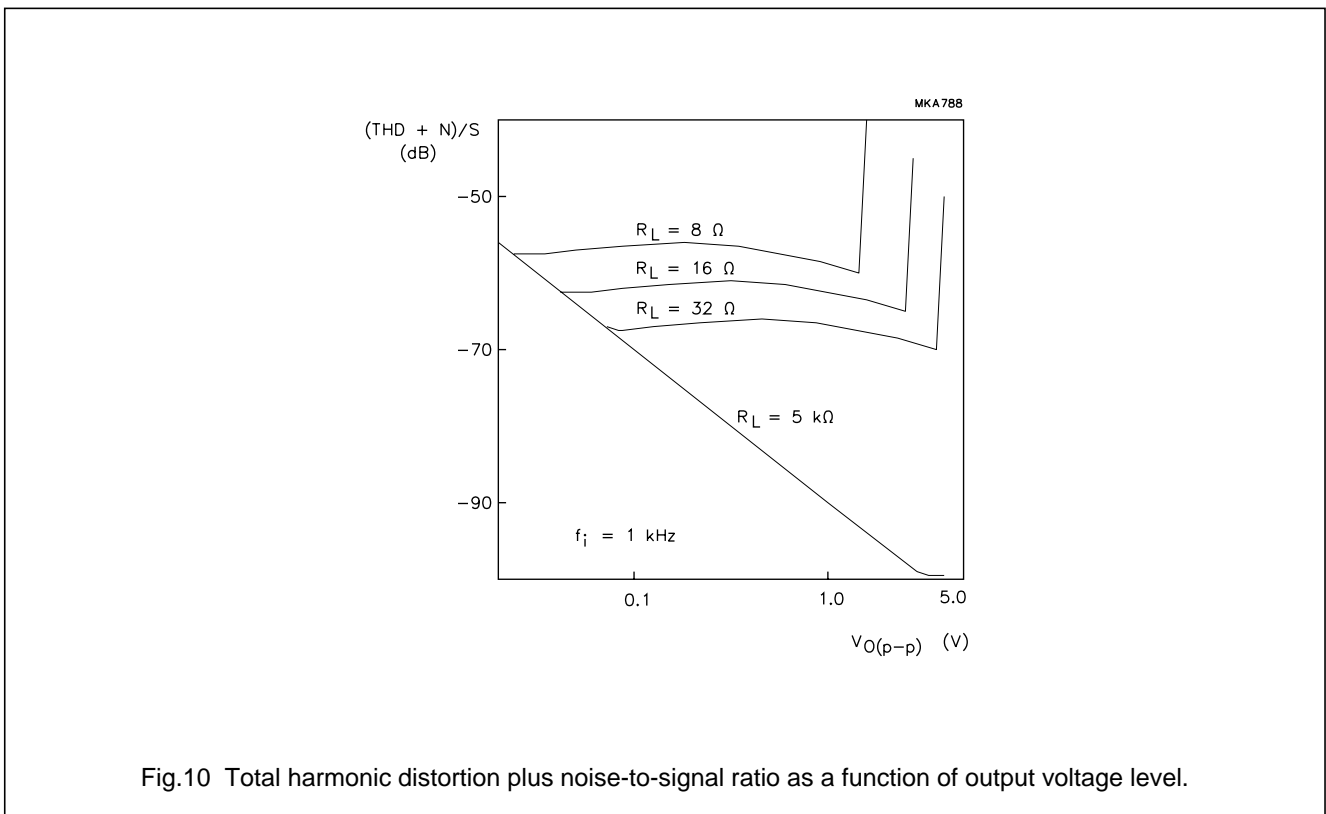
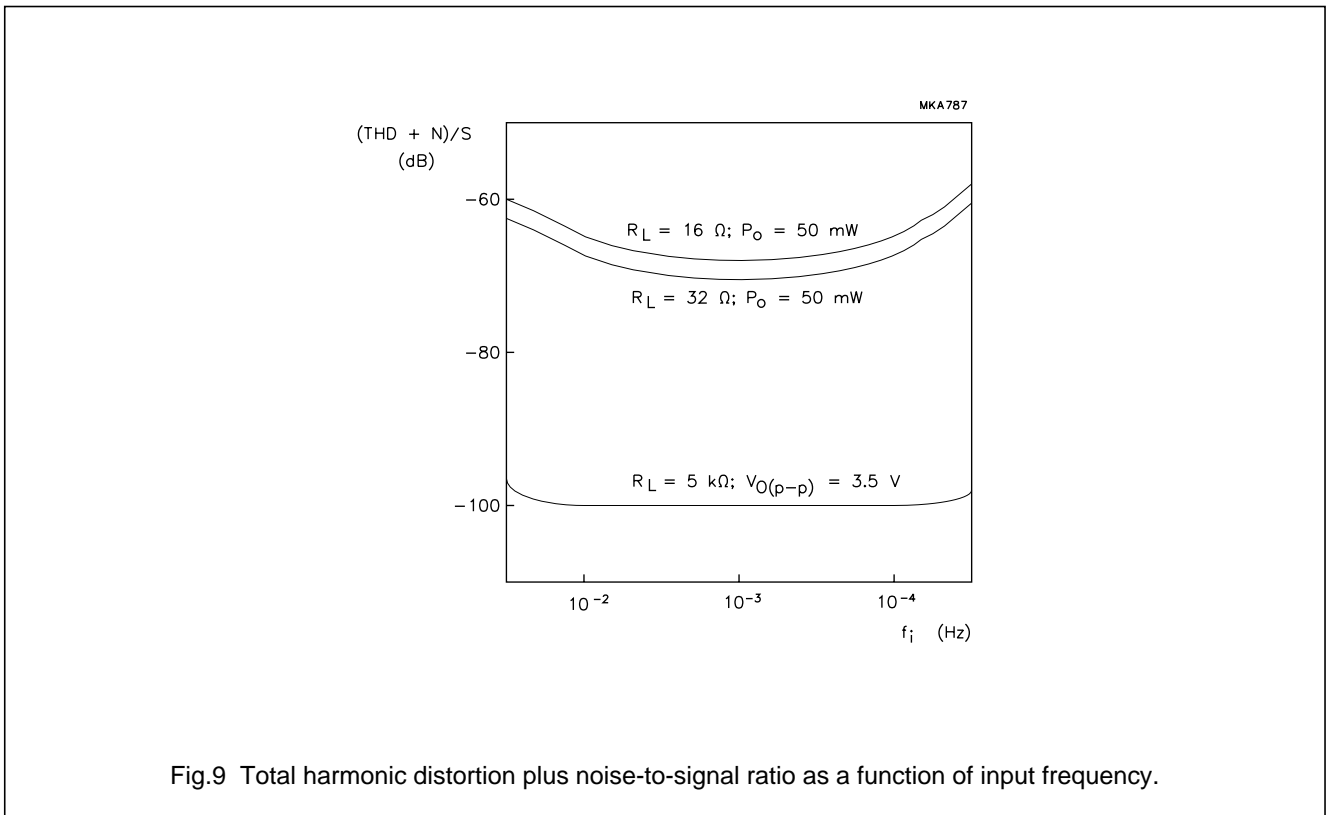
Class AB stereo headphone driver

TDA1308



Class AB stereo headphone driver

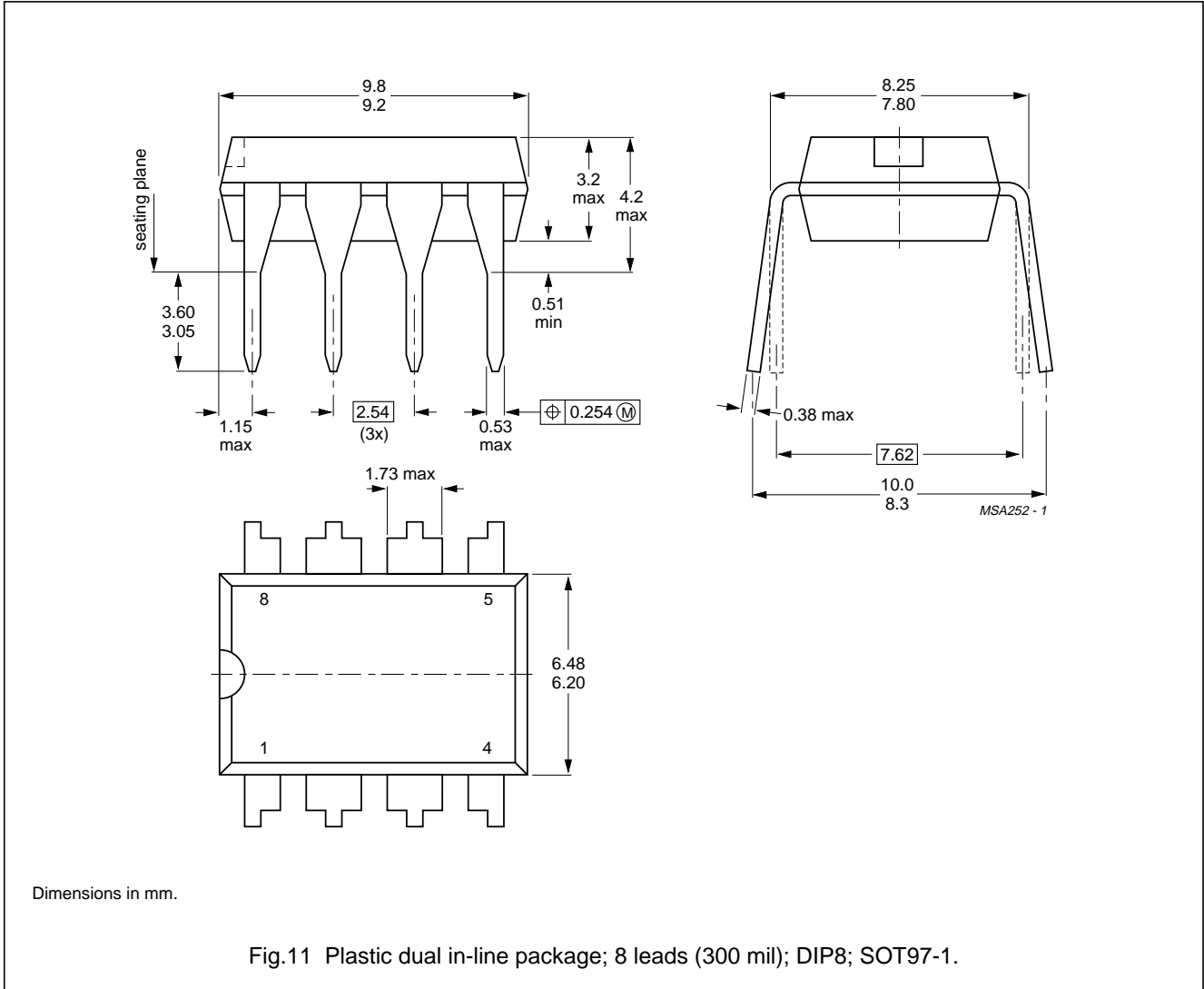
TDA1308



Class AB stereo headphone driver

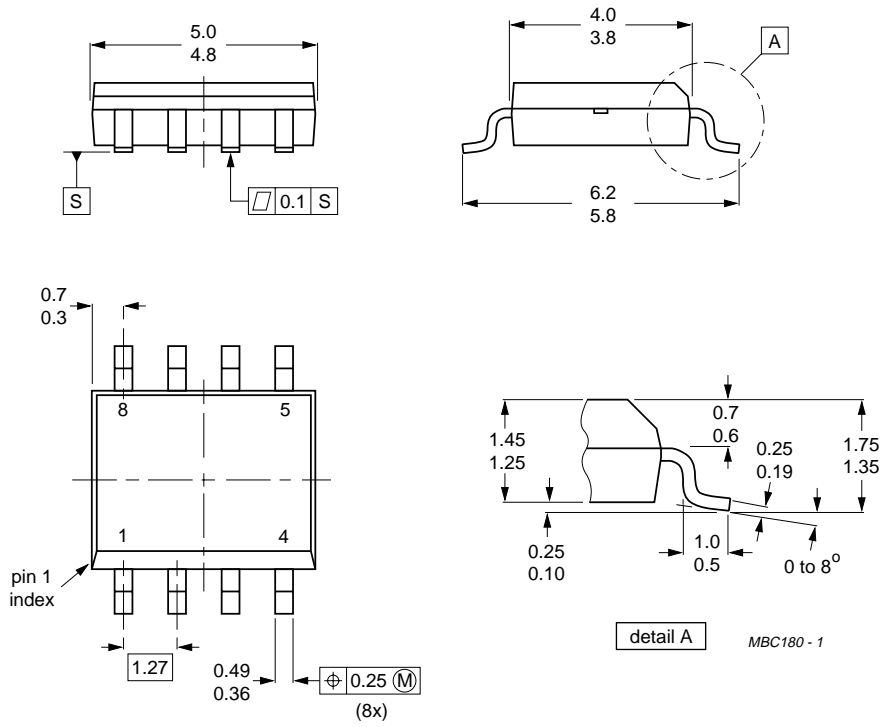
TDA1308

PACKAGE OUTLINES



Class AB stereo headphone driver

TDA1308



Dimensions in mm.

Fig.12 Plastic small outline package; 8 leads; body width 3.9 mm. (SO8; SOT96-1).

Class AB stereo headphone driver

TDA1308

SOLDERING

Plastic dual in-line packages

BY DIP OR WAVE

The maximum permissible temperature of the solder is 260 °C; this temperature must not be in contact with the joint for more than 5 s. The total contact time of successive solder waves must not exceed 5 s.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified storage maximum. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

REPAIRING SOLDERED JOINTS

Apply the soldering iron below the seating plane (or not more than 2 mm above it). If its temperature is below 300 °C, it must not be in contact for more than 10 s; if between 300 and 400 °C, for not more than 5 s.

Plastic small outline packages

BY WAVE

During placement and before soldering, the component must be fixed with a droplet of adhesive. After curing the adhesive, the component can be soldered. The adhesive can be applied by screen printing, pin transfer or syringe dispensing.

Maximum permissible solder temperature is 260 °C, and maximum duration of package immersion in solder bath is 10 s, if allowed to cool to less than 150 °C within 6 s. Typical dwell time is 4 s at 250 °C.

A modified wave soldering technique is recommended using two solder waves (dual-wave), in which a turbulent wave with high upward pressure is followed by a smooth laminar wave. Using a mildly-activated flux eliminates the need for removal of corrosive residues in most applications.

BY SOLDER PASTE REFLOW

Reflow soldering requires the solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the substrate by screen printing, stencilling or pressure-syringe dispensing before device placement.

Several techniques exist for reflowing; for example, thermal conduction by heated belt, infrared, and vapour-phase reflow. Dwell times vary between 50 and 300 s according to method. Typical reflow temperatures range from 215 to 250 °C.

Preheating is necessary to dry the paste and evaporate the binding agent. Preheating duration: 45 min at 45 °C.

REPAIRING SOLDERED JOINTS (BY HAND-HELD SOLDERING IRON OR PULSE-HEATED SOLDER TOOL)

Fix the component by first soldering two, diagonally opposite, end pins. Apply the heating tool to the flat part of the pin only. Contact time must be limited to 10 s at up to 300 °C. When using proper tools, all other pins can be soldered in one operation within 2 to 5 s at between 270 and 320 °C. (Pulse-heated soldering is not recommended for SO packages.)

For pulse-heated solder tool (resistance) soldering of VSO packages, solder is applied to the substrate by dipping or by an extra thick tin/lead plating before package placement.

Class AB stereo headphone driver

TDA1308

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

Class AB stereo headphone driver

TDA1308

NOTES

Class AB stereo headphone driver

TDA1308

NOTES

Philips Semiconductors – a worldwide company

Argentina: IEROD, Av. Juramento 1992 - 14.b, (1428)
BUENOS AIRES, Tel. (541)786 7633, Fax. (541)786 9367

Australia: 34 Waterloo Road, NORTH RYDE, NSW 2113,
Tel. (02)805 4455, Fax. (02)805 4466

Austria: Triester Str. 64, A-1101 WIEN, P.O. Box 213,
Tel. (01)60 101-1236, Fax. (01)60 101-1211

Belgium: Postbus 90050, 5600 PB EINDHOVEN, The Netherlands,
Tel. (31)40 783 749, Fax. (31)40 788 399

Brazil: Rua do Rocio 220 - 5th floor, Suite 51,
CEP: 04552-903-SÃO PAULO-SP, Brazil.
P.O. Box 7383 (01064-970).

Tel. (011)821-2333, Fax. (011)829-1849

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS:
Tel. (800) 234-7381, Fax. (708) 296-8556

Chile: Av. Santa Maria 0760, SANTIAGO,
Tel. (02)773 816, Fax. (02)777 6730

Colombia: IPRELENZO LTDA, Carrera 21 No. 56-17,
77621 BOGOTA, Tel. (571)249 7624/(571)217 4609,
Fax. (571)217 4549

Denmark: Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,
Tel. (032)88 2636, Fax. (031)57 1949

Finland: Sinikalliontie 3, FIN-02630 ESPOO,
Tel. (9)0-50261, Fax. (9)0-520971

France: 4 Rue du Port-aux-Vins, BP317,
92156 SURESNES Cedex,
Tel. (01)4099 6161, Fax. (01)4099 6427

Germany: P.O. Box 10 63 23, 20043 HAMBURG,
Tel. (040)3296-0, Fax. (040)3296 213.

Greece: No. 15, 25th March Street, GR 17778 TAVROS,
Tel. (01)4894 339/4894 911, Fax. (01)4814 240

Hong Kong: PHILIPS HONG KONG Ltd., 6/F Philips Ind. Bldg.,
24-28 Kung Yip St., KWAI CHUNG, N.T.,
Tel. (852)424 5121, Fax. (852)428 6729

India: Philips INDIA Ltd, Shivsagar Estate, A Block,
Dr. Annie Besant Rd. Worli, Bombay 400 018
Tel. (022)4938 541, Fax. (022)4938 722

Indonesia: Philips House, Jalan H.R. Rasuna Said Kav. 3-4,
P.O. Box 4252, JAKARTA 12950,
Tel. (021)5201 122, Fax. (021)5205 189

Ireland: Newstead, Clonskeagh, DUBLIN 14,
Tel. (01)640 000, Fax. (01)640 200

Italy: PHILIPS SEMICONDUCTORS S.r.l.,
Piazza IV Novembre 3, 20124 MILANO,
Tel. (0039)2 6752 2531, Fax. (0039)2 6752 2557

Japan: Philips Bldg 13-37, Kohnan2-chome, Minato-ku, TOKYO 108,
Tel. (03)3740 5028, Fax. (03)3740 0580

Korea: (Republic of) Philips House, 260-199 Itaewon-dong,
Yongsan-ku, SEOUL, Tel. (02)794-5011, Fax. (02)798-8022

Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA,
SELANGOR, Tel. (03)750 5214, Fax. (03)757 4880

Mexico: 5900 Gateway East, Suite 200, EL PASO, TX 79905,
Tel. 9-5(800)234-7381, Fax. (708)296-8556

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB
Tel. (040)783749, Fax. (040)788399

New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
Tel. (09)849-4160, Fax. (09)849-7811

Norway: Box 1, Manglerud 0612, OSLO,
Tel. (022)74 8000, Fax. (022)74 8341

Pakistan: Philips Electrical Industries of Pakistan Ltd.,
Exchange Bldg. ST-2/A, Block 9, KDA Scheme 5, Clifton,
KARACHI 75600, Tel. (021)587 4641-49,
Fax. (021)577035/5874546.

Philippines: PHILIPS SEMICONDUCTORS PHILIPPINES Inc,
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,
Metro MANILA, Tel. (02)810 0161, Fax. (02)817 3474

Portugal: PHILIPS PORTUGUESA, S.A.,
Rua dr. António Loureiro Borges 5, Arquiparque - Miraflores,
Apartado 300, 2795 LINDA-A-VELHA,
Tel. (01)14163160/4163333, Fax. (01)14163174/4163366.

Singapore: Lorong 1, Toa Payoh, SINGAPORE 1231,
Tel. (65)350 2000, Fax. (65)251 6500

South Africa: S.A. PHILIPS Pty Ltd.,
195-215 Main Road Martindale, 2092 JOHANNESBURG,
P.O. Box 7430 Johannesburg 2000,
Tel. (011)470-5911, Fax. (011)470-5494.

Spain: Balmes 22, 08007 BARCELONA,
Tel. (03)301 6312, Fax. (03)301 42 43

Sweden: Kottbygatan 7, Akalla. S-164 85 STOCKHOLM,
Tel. (0)8-632 2000, Fax. (0)8-632 2745

Switzerland: Allmendstrasse 140, CH-8027 ZÜRICH,
Tel. (01)488 2211, Fax. (01)481 77 30

Taiwan: PHILIPS TAIWAN Ltd., 23-30F, 66, Chung Hsiao West
Road, Sec. 1, Taipei, Taiwan ROC, P.O. Box 22978,
TAIPEI 100, Tel. (02)388 7666, Fax. (02)382 4382.

Thailand: PHILIPS ELECTRONICS (THAILAND) Ltd.,
209/2 Sanpavuth-Bangna Road Prakanong,
Bangkok 10260, THAILAND,
Tel. (662)398-0141, Fax. (662)398-3319.

Turkey: Talatpasa Cad. No. 5, 80640 GÜLTEPE/ISTANBUL,
Tel. (0212)279 2770, Fax. (0212)269 3094

United Kingdom: Philips Semiconductors LTD.,
276 Bath road, Hayes, MIDDLESEX UB3 5BX,
Tel. (081)73050000, Fax. (081)7548421

United States: 811 East Arques Avenue, SUNNYVALE,
CA 94088-3409, Tel. (800)234-7381, Fax. (708)296-8556

Uruguay: Coronel Mora 433, MONTEVIDEO,
Tel. (02)70-4044, Fax. (02)92 0601

For all other countries apply to: Philips Semiconductors,
International Marketing and Sales, Building BE-p,
P.O. Box 218, 5600 MD, EINDHOVEN, The Netherlands,
Telex 35000 phtcnl, Fax. +31-40-724825

SCD34

© Philips Electronics N.V. 1994

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Printed in The Netherlands

Philips Semiconductors



PHILIPS