

DATA SHEET

TDA2615

2 × 6 W hi-fi audio power amplifier

Product specification
Supersedes data of July 1994
File under Integrated Circuits, IC01

1995 May 08

Philips Semiconductors



PHILIPS

2 × 6 W hi-fi audio power amplifier**TDA2615****FEATURES**

- Requires very few external components
- No switch-on/switch-off clicks
- Input mute during switch-on and switch-off
- Low offset voltage between output and ground
- Excellent gain balance of both amplifiers
- Hi-fi in accordance with "IEC 268" and "DIN 45500"
- Short-circuit proof and thermal protected
- Mute possibility.

GENERAL DESCRIPTION

The TDA2615 is a dual power amplifier in a 9-lead plastic single-in-line (SIL9MPF) medium power package. It has been especially designed for mains fed applications, such as stereo radio and stereo TV.

QUICK REFERENCE DATA

Stereo application.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$\pm V_P$	supply voltage range		7.5	–	21	V
P_O	output power	$V_S = \pm 12\text{ V}$; THD = 0.5%	–	6	–	W
G_v	internal voltage gain		–	30	–	dB
$ G_v $	channel unbalance		–	0.2	–	dB
α	channel separation		–	70	–	dB
SVRR	supply voltage ripple rejection		–	60	–	dB
V_{no}	noise output voltage		–	70	–	μV

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
TDA2615	SIL9MPF	plastic single in-line medium power package with fin; 9 leads	SOT110-1

2 × 6 W hi-fi audio power amplifier

TDA2615

BLOCK DIAGRAM

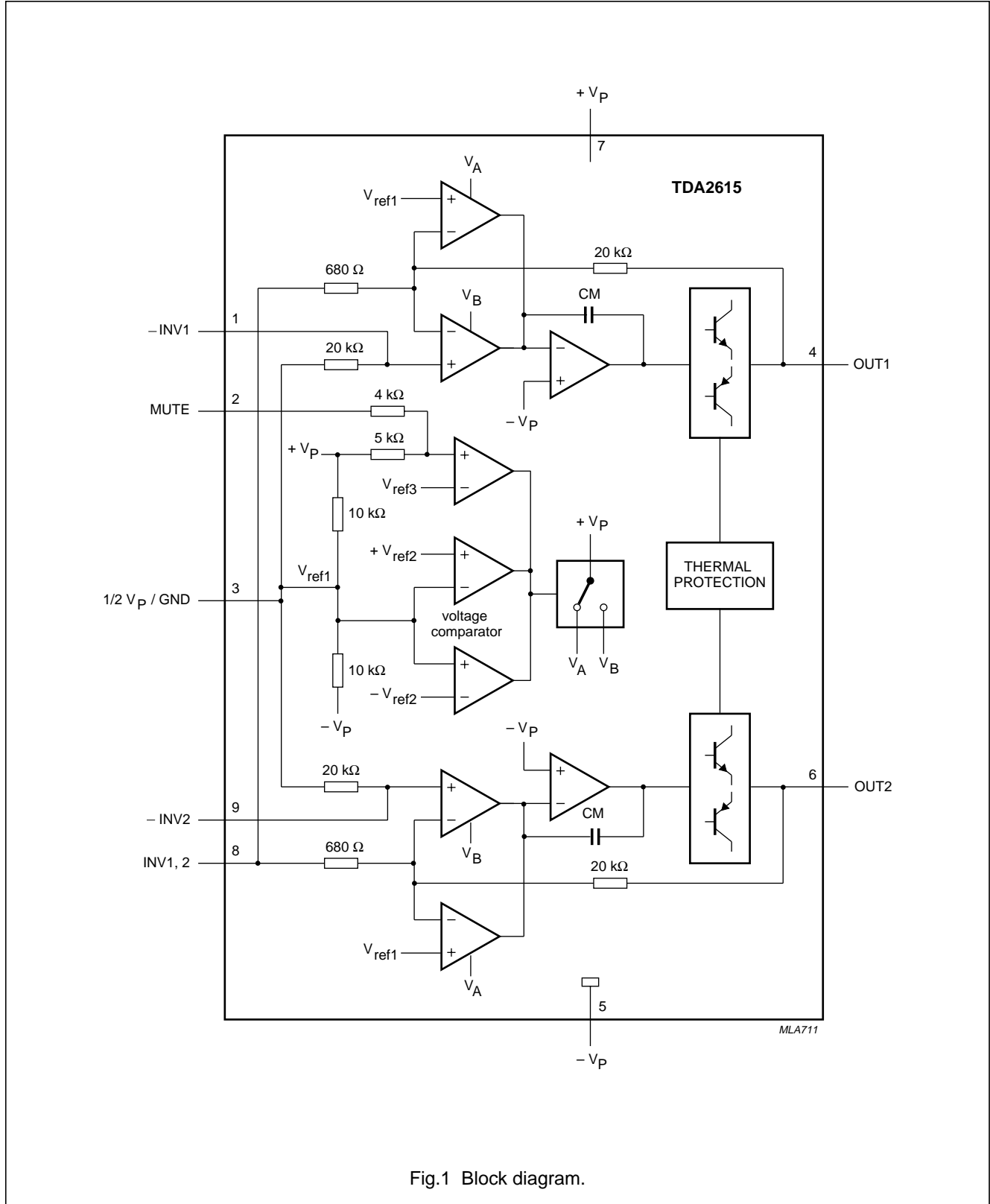
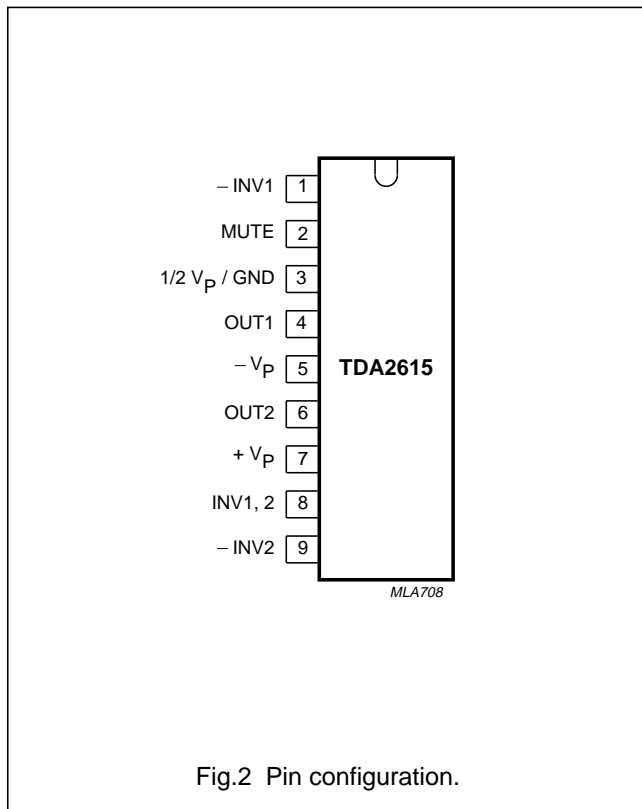


Fig.1 Block diagram.

2 × 6 W hi-fi audio power amplifier**TDA2615****PINNING**

SYMBOL	PIN	DESCRIPTION
-INV1	1	non-inverting input 1
MUTE	2	mute input
$\frac{1}{2}V_P$ /GND	3	$\frac{1}{2}$ supply voltage or ground
OUT1	4	output 1
-V _P	5	supply voltage (negative)
OUT2	6	output 2
+V _P	7	supply voltage (positive)
INV1, 2	8	inverting input 1 and 2
-INV2	9	non-inverting input 2

**FUNCTIONAL DESCRIPTION**

The TDA2615 is a hi-fi stereo amplifier designed for mains fed applications, such as stereo radio and stereo TV. The circuit is optimally designed for symmetrical power supplies, but is also well-suited to asymmetrical power supply systems.

An output power of 2 × 6 W (THD = 0.5%) can be delivered into an 8 Ω load with a symmetrical power supply of ±12 V. The gain is internally fixed at 30 dB, thus offering a low gain spread and a very good gain balance between the two amplifiers (0.2 dB).

A special feature is the input mute circuit. This circuit disconnects the non-inverting inputs when the supply voltage drops below ±6 V, while the amplifier still retains its DC operating adjustment. The circuit features suppression of unwanted signals at the inputs, during switch-on and switch-off.

The mute circuit can also be activated via pin 2. When a current of 300 μA is present at pin 2, the circuit is in the mute condition.

The device is provided with two thermal protection circuits. One circuit measures the average temperature of the crystal and the other measures the momentary temperature of the power transistors. These control circuits attack at temperatures in excess of +150 °C, so a crystal operating temperature of max. +150 °C can be used without extra distortion.

With the derating value of 6 K/W, the heatsink can be calculated as follows:

at $R_L = 8 \Omega$ and $V_S = \pm 12 V$, the measured maximum dissipation is 7.8 W.

With a maximum ambient temperature of +60 °C, the thermal resistance of the heatsink is:

$$R_{th} = \frac{150 - 60}{7.8} - 6 = 5.5 \text{ K/W}$$

The metal tab has the same potential as pin 5.

2 × 6 W hi-fi audio power amplifier

TDA2615

LIMITING VALUES

In accordance with the Absolute maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$\pm V_P$	supply voltage		–	21	V
I_{OSM}	non-repetitive peak output current		–	4	A
P_{tot}	total power dissipation	see Fig.3	–	15	W
T_{stg}	storage temperature range		–55	+150	°C
T_{xtal}	crystal temperature		–	+150	°C
T_{amb}	ambient operating temperature range		–25	+150	°C
t_{sc}	short-circuit time	short-circuit to ground; note 1	–	1	h

Note

- For asymmetrical power supplies (with the load short-circuited), the maximum unloaded supply voltage is limited to $V_P = 28\text{ V}$ and with an internal supply resistance of $R_S \geq 4\ \Omega$, the maximum unloaded supply voltage is limited to 32 V **(with the load short-circuited)**. For symmetrical power supplies the circuit is short-circuit-proof up to $V_P = 21\text{ V}$.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-c}$	thermal resistance from junction to case	6	K/W

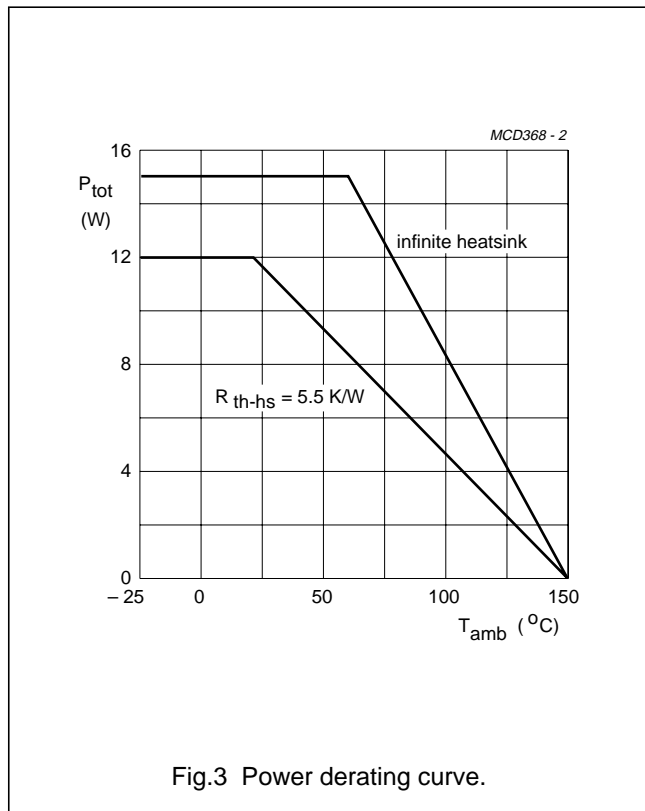


Fig.3 Power derating curve.

2 × 6 W hi-fi audio power amplifier

TDA2615

CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply						
$\pm V_P$	supply voltage range		–	12	21	V
I_{ORM}	repetitive peak output current		2.2	–	–	A
Operating position; note 1						
$\pm V_P$	supply voltage range		7.5	12	21	V
$I_{q(tot)}$	total quiescent current	$R_L = \infty$	18	40	70	mA
P_O	output power	THD = 0.5%	5	6	–	W
		THD = 10%	6.5	8	–	W
THD	total harmonic distortion	$P_O = 4\text{ W}$	–	0.15	0.2	%
B	power bandwidth	THD = 0.5%; note 2	–	20 to 20000	–	Hz
G_V	voltage gain		29	30	31	dB
$ G_V $	gain unbalance		–	0.2	1	dB
V_{no}	noise output voltage	note 3	–	70	140	μV
$ Z_i $	input impedance		14	20	26	$\text{k}\Omega$
SVRR	supply voltage ripple rejection	note 4	40	60	–	dB
α_{cs}	channel separation	$R_S = 0$	46	70	–	dB
I_{bias}	input bias current		–	0.3	–	μA
$ \Delta V_{GND} $	DC output offset voltage		–	30	200	mV
$ \Delta V_{4-6} $	DC output offset voltage	between two channels	–	4	150	mV
MUTE POSITION (AT $I_{MUTE} \geq 300\ \mu\text{A}$)						
V_O	output voltage	$V_I = 600\text{ mV}$	–	0.3	1.0	mV
Z_{2-7}	mute input impedance		–	9	–	$\text{k}\Omega$
$I_{q(tot)}$	total quiescent current	$R_L = \infty$	18	40	70	mA
V_{no}	noise output voltage	note 3	–	70	140	μV
SVRR	supply voltage ripple rejection	note 4	40	55	–	dB
$ \Delta V_{GND} $	DC output offset voltage		–	40	200	mV
$ \Delta V_{off} $	offset voltage with respect to operating position		–	4	150	mV
I_2	current if pin 2 is connected to pin 5		–	–	6	mA
Mute position; note 5						
$\pm V_P$	supply voltage range		2	–	5.8	V
I_P	total quiescent current	$R_L = \infty$	9	30	40	mA
V_O	output voltage	$V_I = 600\text{ mV}$	–	0.3	1.0	mV
V_{no}	noise output voltage	note 3	–	70	140	μV
SVRR	supply voltage ripple rejection	note 4	40	55	–	dB
$ \Delta V_{GND} $	DC output offset voltage		–	40	200	mV

2 × 6 W hi-fi audio power amplifier

TDA2615

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Operating position; note 6						
$I_{q(\text{tot})}$	total quiescent current		18	40	70	mA
P_O	output power	THD = 0.5%	5	6	–	W
		THD = 10%	6.5	8	–	W
THD	total harmonic distortion	$P_O = 4 \text{ W}$	–	0.13	0.2	%
B	power bandwidth	THD = 0.5%; note 1	–	40 to 20000	–	Hz
G_V	voltage gain		29	30	31	dB
$ G_V $	gain unbalance		–	0.2	1	dB
V_{no}	noise output voltage	note 3	–	70	140	μV
$ Z_i $	input impedance		14	20	26	$\text{k}\Omega$
SVRR	supply voltage ripple rejection		35	44	–	dB
α_{cs}	channel separation		–	45	–	dB
MUTE POSITION ($I_{\text{MUTE}} \geq 300 \mu\text{A}$)						
V_O	output voltage	$V_i = 600 \text{ mV}$	–	0.3	1.0	mV
Z_{2-7}	mute input impedance	note 7	6.7	9	11.3	$\text{k}\Omega$
$I_{q(\text{tot})}$	total quiescent current		18	40	70	mA
V_{no}	noise output voltage	note 3	–	70	140	μV
SVRR	supply voltage ripple rejection	note 4	35	44	–	dB
$ \Delta V_{\text{off}} $	offset voltage with respect to operating position		–	4	150	mV
I_2	current if pin 2 is connected to pin 5		–	–	6	mA

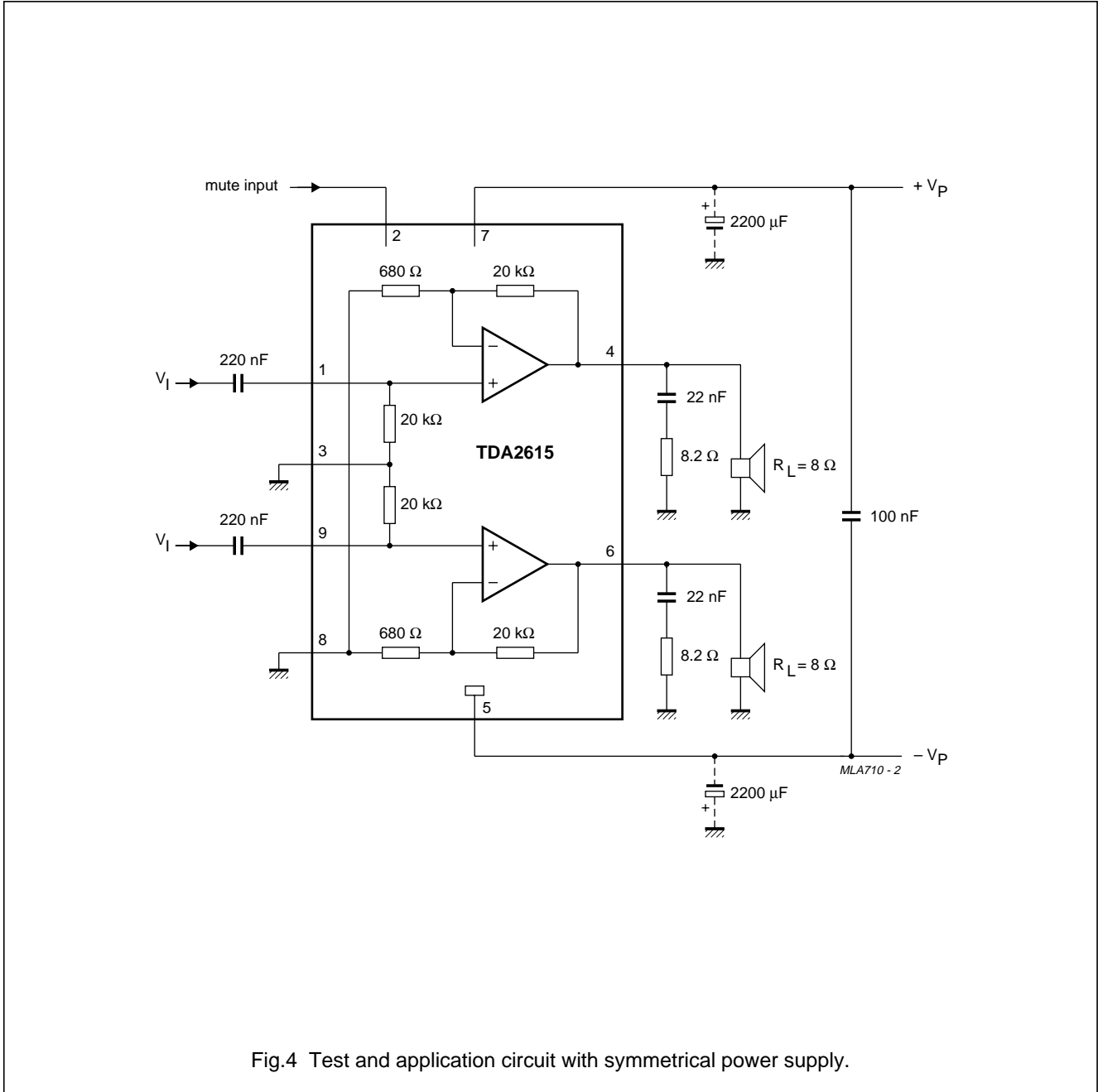
Notes

- $V_P = \pm 12 \text{ V}$; $R_L = 8 \Omega$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; $f_i = 1 \text{ kHz}$; symmetrical power supply $I_{\text{MUTE}} = < 30 \mu\text{A}$ (see Fig.4).
- The power bandwidth is measured at a maximum output power ($P_{O\text{max}}$) of -3 dB .
- The noise output voltage (RMS value) is measured at $R_S = 2 \text{ k}\Omega$, unweighted (20 Hz to 20 kHz).
- The ripple rejection is measured at $R_S = 0$ and $f_i = 100 \text{ Hz}$ to 20 kHz. The ripple voltage (200 mV) is applied in phase to the positive and the negative supply rails. With asymmetrical power supplies, the ripple rejection is measured at $f_i = 1 \text{ kHz}$.
- $\pm V_P = 4 \text{ V}$; $R_L = 8 \Omega$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; $f_i = 1 \text{ kHz}$; symmetrical power supply (see Fig.4).
- $V_P = 24 \text{ V}$; $R_L = 8 \Omega$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; $f_i = 1 \text{ kHz}$; asymmetrical power supply $I_{\text{MUTE}} < 30 \mu\text{A}$ (see Fig.5).
- The internal network at pin 2 is a resistor divider of typical 4 k Ω and 5 k Ω to the positive supply rail. At the connection of the 4 k Ω and 5 k Ω resistor a zener diode of typical 6.6 V is also connected to the positive supply rail. The spread of the zener voltage is 6.1 to 7.1 V.

2 × 6 W hi-fi audio power amplifier

TDA2615

TEST AND APPLICATION INFORMATION



2 × 6 W hi-fi audio power amplifier

TDA2615

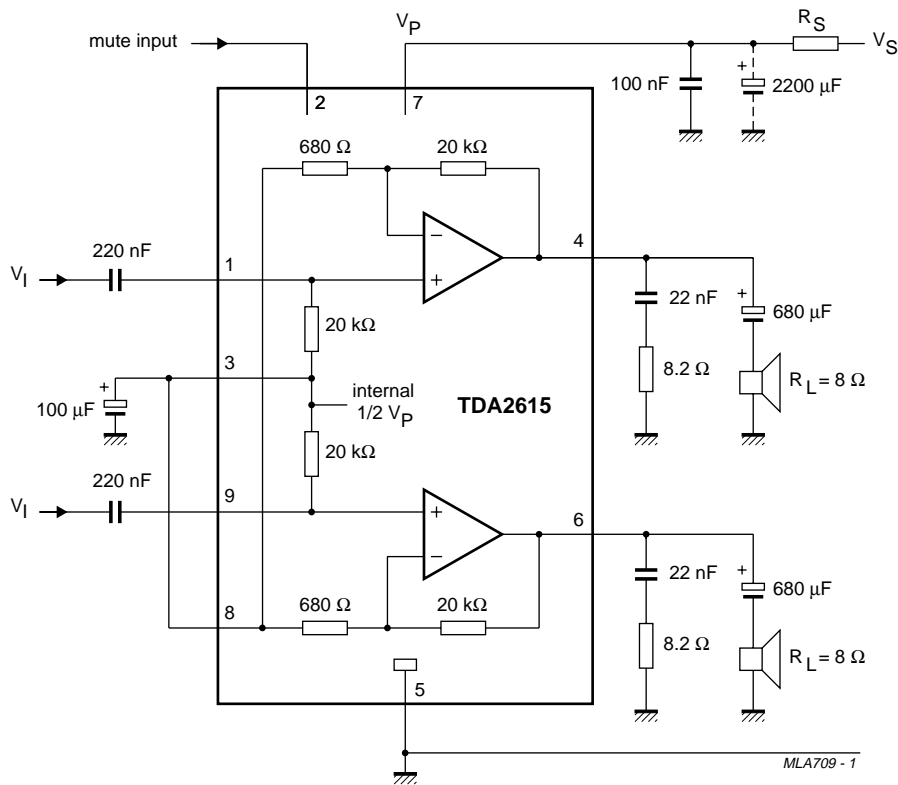


Fig.5 Test and application circuit with asymmetrical power supply.

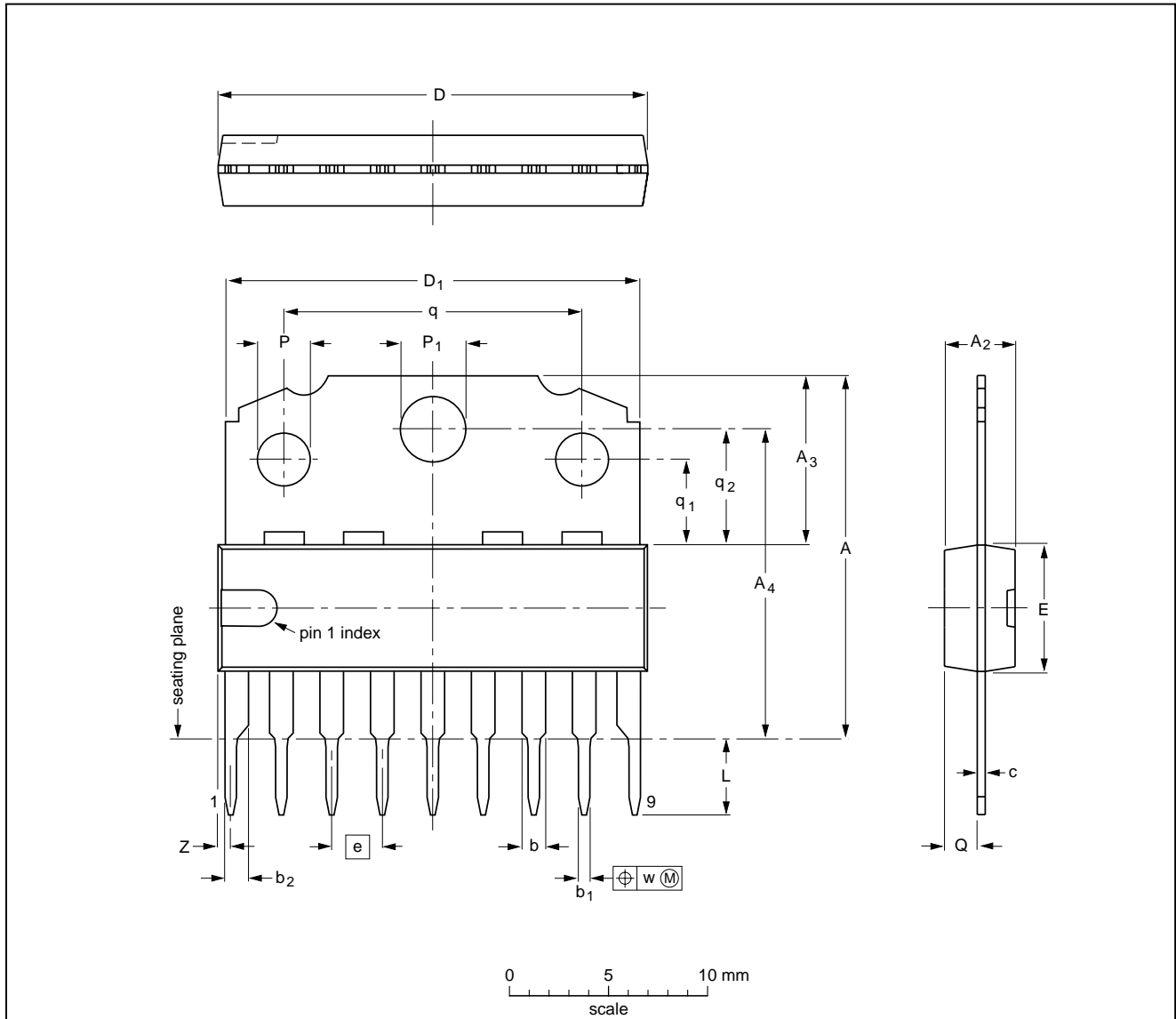
2 × 6 W hi-fi audio power amplifier

TDA2615

PACKAGE OUTLINE

SIL9MPF: plastic single in-line medium power package with fin; 9 leads

SOT110-1



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₂ max.	A ₃	A ₄	b	b ₁	b ₂	c	D ⁽¹⁾	D ₁	E ⁽¹⁾	e	L	P	P ₁	Q	q	q ₁	q ₂	w	Z ⁽¹⁾ max.
mm	18.5 17.8	3.7	8.7 8.0	15.8 15.4	1.40 1.14	0.67 0.50	1.40 1.14	0.48 0.38	21.8 21.4	21.4 20.7	6.48 6.20	2.54	3.9 3.4	2.75 2.50	3.4 3.2	1.75 1.55	15.1 14.9	4.4 4.2	5.9 5.7	0.25	1.0

Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT110-1						92-11-17 95-02-25

2 × 6 W hi-fi audio power amplifier**TDA2615****SOLDERING****Plastic single 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.

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.

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., 15/F Philips Ind. Bldg.,
24-28 Kung Yip St., KWAI CHUNG, N.T.,
Tel. (852)424 5121, Fax. (852)480 6960/480 6009

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)7640 000, Fax. (01)7640 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)4163160/4163333, Fax. (01)4163174/4163366

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 27 70, Fax. (0212)282 67 07

United Kingdom: Philips Semiconductors LTD.,
276 Bath Road, Hayes, MIDDLESEX UB3 5BX,
Tel. (0181)730-5000, Fax. (0181)754-8421

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

Internet: <http://www.semiconductors.philips.com/ps/>

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

SCD39 © Philips Electronics N.V. 1995

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

513061/1500/03/pp12
Document order number:

Date of release: 1995 May 08
9397 750 00122

Philips Semiconductors



PHILIPS