DATA SHEET

BLS2731-110
Microwave power transistor

Product specification
Supersedes data of 1997 Nov 05

1998 Jan 30

Philips
Semiconductors

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Microwave power transistor BLS2731-110

FEATURES

- Suitable for short and medium pulse applications
- Internal input and output matching networks for an easy circuit design
- Emitter ballasting resistors improve ruggedness
- Gold metallization ensures excellent reliability
- Interdigitated emitter-base structure provides high emitter efficiency
- Multicell geometry improves power sharing and reduces thermal resistance.

APPLICATIONS

- Common base class-C pulsed power amplifiers for radar applications in the 2.7 to 3.1 GHz band.

DESCRIPTION

NPN silicon planar epitaxial microwave power transistor in a 2-lead rectangular flange package with a ceramic cap (SOT423A) with the common base connected to the flange.

PINNING - SOT423A

PIN	DESCRIPTION
1	collector
2	emitter
3	base; connected to flange

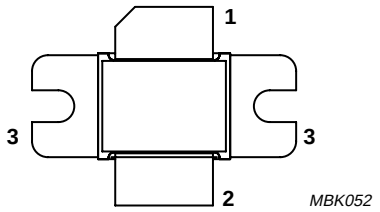


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common base class-C test circuit.

MODE OF OPERATION	f (GHz)	V_{CB} (V)	P_L (W)	G_p (dB)	η_C (%)
Pulsed class-C	2.7 to 3.1	40	>110	>7	>35

WARNING
Product and environmental safety - toxic materials
This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	75	V
V_{CES}	collector-emitter voltage	R_{BE} = 0	–	75	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_{CM}	peak collector current	$t_p \leq 100$ μs; $\delta \leq 10\%$	–	12	A
P_{tot}	total power dissipation	t_p = 100 μs; δ = 10%; T_{mb} = 25 °C	–	500	W
T_{stg}	storage temperature		–65	+200	°C
T_j	operating junction temperature		–	200	°C
T_{sld}	soldering temperature	up to 0.2 mm from ceramic cap; t ≤ 10 s	–	235	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j\text{-}h}$	thermal impedance from junction to heatsink	t_p = 100 μs; δ = 10%; note 1	0.24	K/W

Note

1. Equivalent thermal impedance under pulsed microwave operating conditions.

CHARACTERISTICS

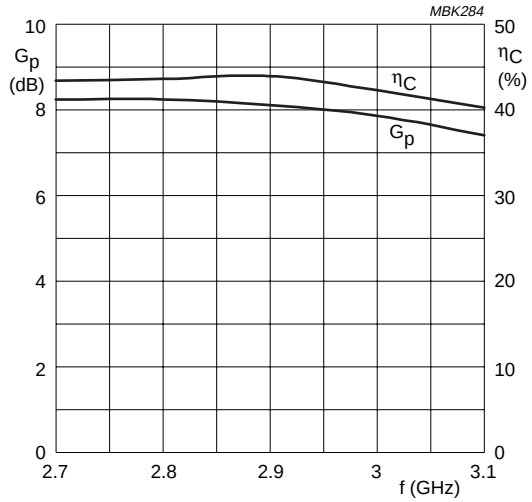
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 30 mA; open emitter	75	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 30 mA; V_{BE} = 0	75	–	V
I_{CBO}	collector leakage current	V_{CB} = 40 V; I_E = 0	–	3	mA
I_{CES}	collector leakage current	V_{CE} = 40 V; V_{BE} = 0	–	6	mA
I_{EBO}	emitter leakage current	V_{EB} = 1.5 V; I_C = 0	–	0.6	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 3 A	40	100	

APPLICATION INFORMATION

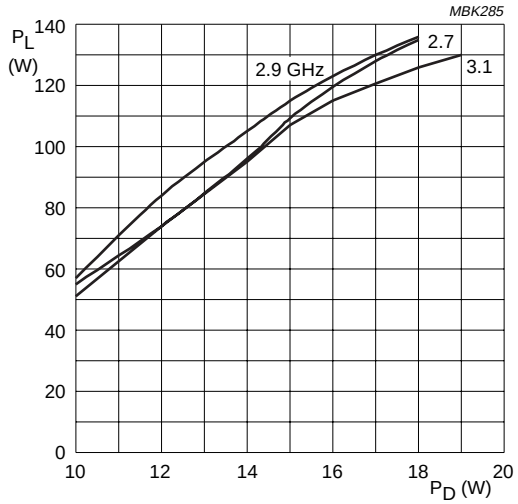
RF performance at T_h = 25 °C in a common base test circuit.

MODE OF OPERATION	f (GHz)	V_{CE} (V)	P_L (W)	G_P (dB)	η_C (%)
Class-C; t_p = 100 μs; δ = 10%	2.7 to 3.1	40	≥110	≥7	≥35
	2.7 to 2.9	40	typ. 130	typ. 8	typ. 42
	2.9 to 3.1	40	typ. 120	typ. 7.5	typ. 40



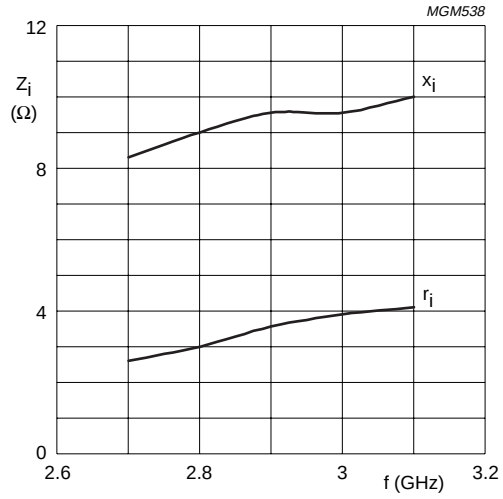
V_{CE} = 40 V; class-C; t_p = 100 µs; δ = 10%.

Fig.2 Power gain and efficiency as functions of frequency; typical values.



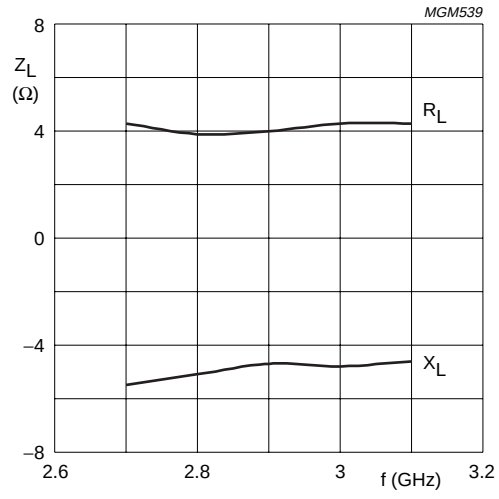
V_{CE} = 40 V; class-C; t_p = 100 µs; δ = 10%.

Fig.3 Load power as a function of drive power; typical values.



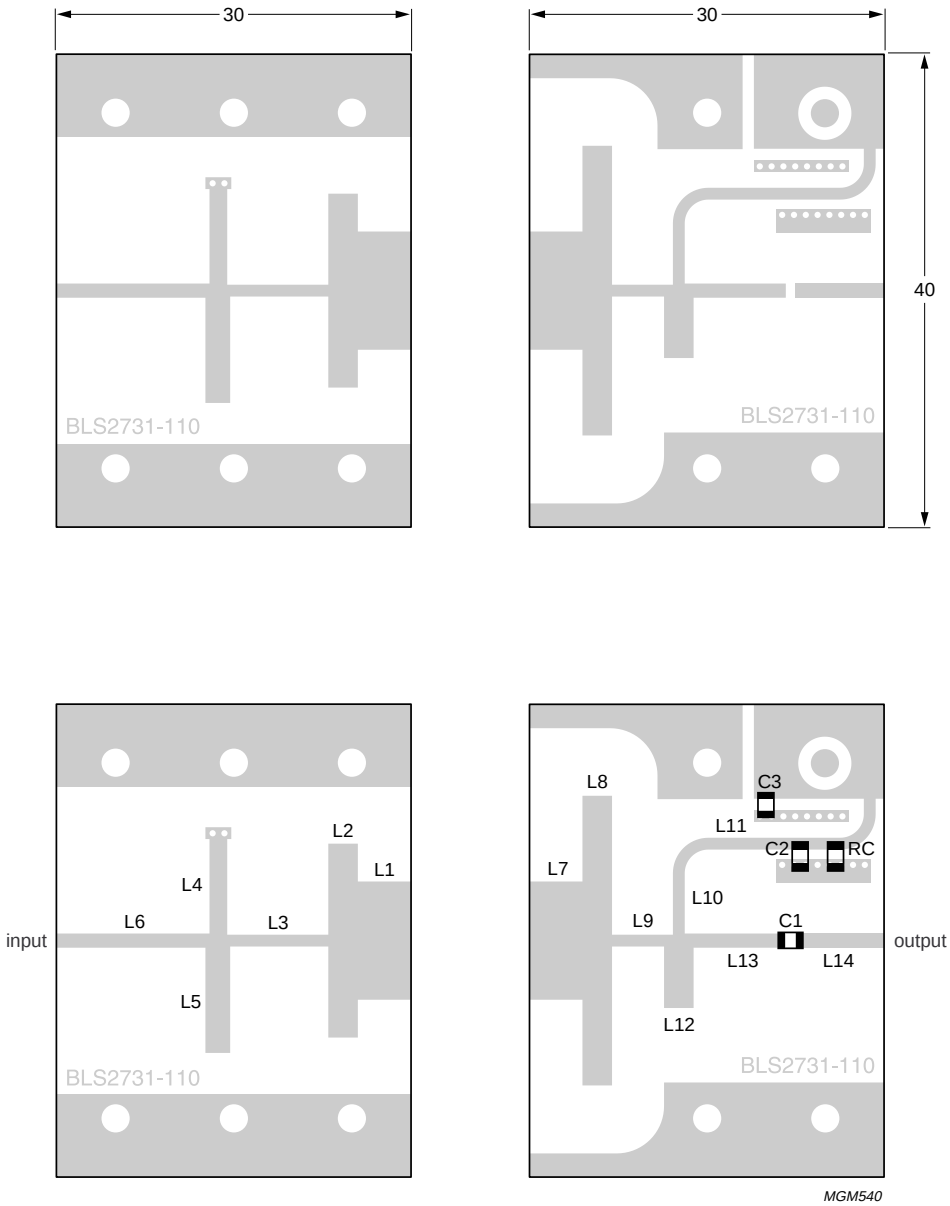
V_{CB} = 40 V; class-C; P_L = 110 W.

Fig.4 Input impedance as function of frequency (series components); typical values.



V_{CB} = 40 V; class-C; P_L = 110 W.

Fig.5 Load impedance as function of frequency (series components); typical values.



Dimensions in mm.

The components are located on one side of the copper-clad printed-circuit board, the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through metallization.

Fig.6 Component layout for 2.7 to 3.1 GHz class-C test circuit.

List of components

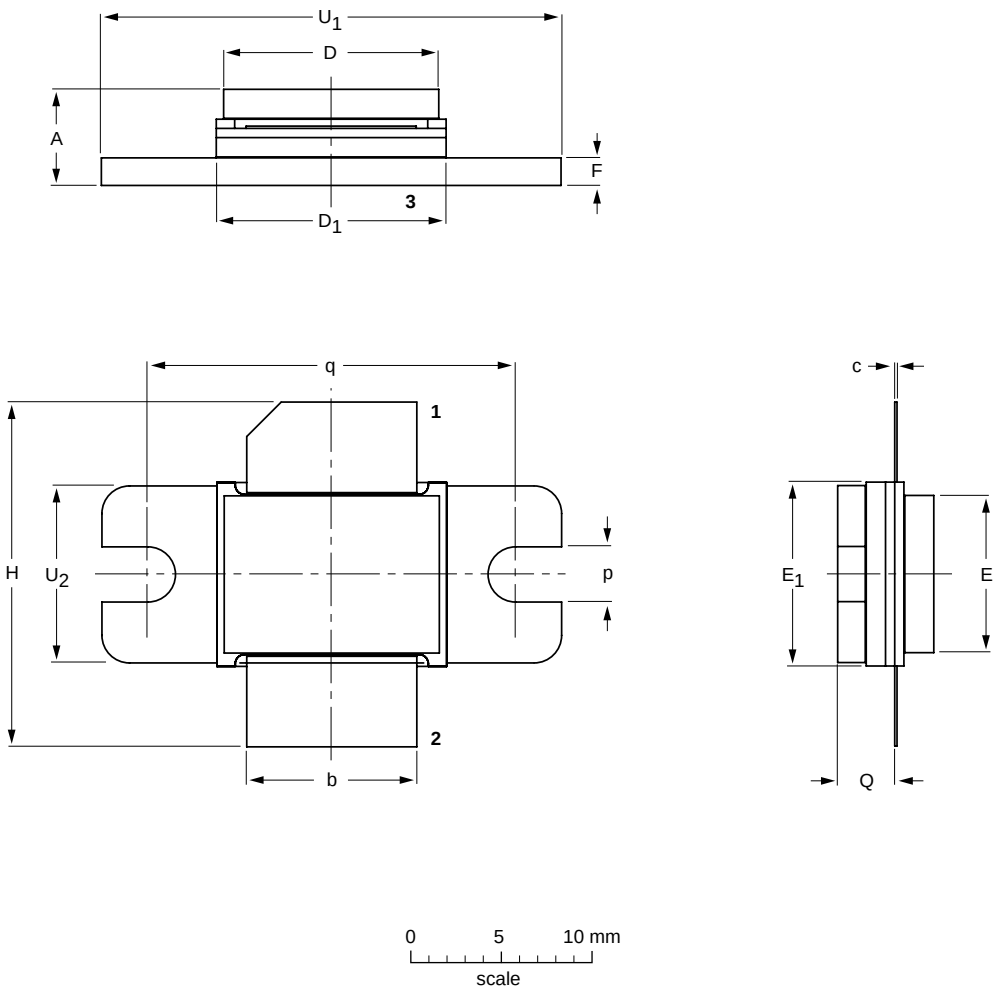
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE No.
C1, C2	multilayer ceramic chip capacitor; note 1	100 pF		
C3	multilayer ceramic chip capacitor	100 nF		
RC	multilayer ceramic chip capacitor in series with SMD resistor	100 nF + 5 Ω		
L1	stripline; note 2		length 4.5 mm width 10 mm	
L2	stripline; note 2		length 2.5 mm width 16.4 mm	
L3	stripline; note 2		length 8.3 mm width 1 mm	
L4	stripline; note 2		length 8 mm width 1.5 mm	
L5	stripline; note 2		length 2 mm width 8.9 mm	
L6	stripline; note 2		length 12.7 mm width 1.2 mm	
L7	stripline; note 2		length 4.5 mm width 10 mm	
L8	stripline; note 2		length 2.5 mm width 24.4 mm	
L9	stripline; note 2		length 4.4 mm width 1 mm	
L10	stripline; note 2		length 5.2 mm width 1 mm	
L11	stripline; note 2		length 9.3 mm width 1 mm	
L12	stripline; note 2		length 2.5 mm width 6 mm	
L13	stripline; note 2		length 7.8 mm width 1.2 mm	
L14	stripline; note 2		length 7.5 mm width 1.2 mm	

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. The striplines are on double-clad printed-circuit board with Duroid dielectric (ε_r = 2.2); thickness = 0.38 mm.

PACKAGE OUTLINE

Flanged hermetic ceramic package; 2 mounting holes; 2 leads **SOT423A**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2
mm	5.58 5.04	9.53 9.27	0.16 0.10	12.02 11.76	12.83 12.57	8.82 8.56	10.29 10.03	1.58 1.46	19.18 18.92	3.43 3.17	3.42 2.88	16.64 16.38	22.99 22.73	9.91 9.65

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT423A						97-04-01

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.	

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Philips Semiconductors – a worldwide company

Argentina: see South America

Australia: 34 Waterloo Road, NORTH RYDE, NSW 2113,
Tel. +61 2 9805 4455, Fax. +61 2 9805 4466

Austria: Computerstr. 6, A-1101 WIEN, P.O. Box 213, Tel. +43 160 1010,
Fax. +43 160 101 1210

Belarus: Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,
220050 MINSK, Tel. +375 172 200 733, Fax. +375 172 200 773

Belgium: see The Netherlands

Brazil: see South America

Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor,
51 James Bourchier Blvd., 1407 SOFIA,
Tel. +359 2 689 211, Fax. +359 2 689 102

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS,
Tel. +1 800 234 7381

China/Hong Kong: 501 Hong Kong Industrial Technology Centre,
72 Tat Chee Avenue, Kowloon Tong, HONG KONG,
Tel. +852 2319 7888, Fax. +852 2319 7700

Colombia: see South America

Czech Republic: see Austria

Denmark: Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,
Tel. +45 32 88 2636, Fax. +45 31 57 0044

Finland: Sinikalliontie 3, FIN-02630 ESPOO,
Tel. +358 9 615800, Fax. +358 9 61580920

France: 51 Rue Carnot, BP317, 92156 SURESNES Cedex,
Tel. +33 1 40 99 6161, Fax. +33 1 40 99 6427

Germany: Hammerbrookstraße 69, D-20097 HAMBURG,
Tel. +49 40 23 53 60, Fax. +49 40 23 536 300

Greece: No. 15, 25th March Street, GR 17778 TAVROS/ATHENS,
Tel. +30 1 4894 339/239, Fax. +30 1 4814 240

Hungary: see Austria

India: Philips INDIA Ltd, Band Box Building, 2nd floor,
254-D, Dr. Annie Besant Road, Worli, MUMBAI 400 025,
Tel. +91 22 493 8541, Fax. +91 22 493 0966

Indonesia: see Singapore

Ireland: Newstead, Clonskeagh, DUBLIN 14,
Tel. +353 1 7640 000, Fax. +353 1 7640 200

Israel: RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053,
TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

Italy: PHILIPS SEMICONDUCTORS, Piazza IV Novembre 3,
20124 MILANO, Tel. +39 2 6752 2531, Fax. +39 2 6752 2557

Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku, TOKYO 108,
Tel. +81 3 3740 5130, Fax. +81 3 3740 5077

Korea: Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL,
Tel. +82 2 709 1412, Fax. +82 2 709 1415

Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,
Tel. +60 3 750 5214, Fax. +60 3 757 4880

Mexico: 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,
Tel. +9-5 800 234 7381

Middle East: see Italy

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,
Tel. +31 40 27 82785, Fax. +31 40 27 88399

New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
Tel. +64 9 849 4160, Fax. +64 9 849 7811

Norway: Box 1, Manglerud 0612, OSLO,
Tel. +47 22 74 8000, Fax. +47 22 74 8341

Philippines: Philips Semiconductors Philippines Inc.,
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,
Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

Poland: Ul. Lukiska 10, PL 04-123 WARSZAWA,
Tel. +48 22 612 2831, Fax. +48 22 612 2327

Portugal: see Spain

Romania: see Italy

Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
Tel. +7 095 755 6918, Fax. +7 095 755 6919

Singapore: Lorong 1, Toa Payoh, SINGAPORE 1231,
Tel. +65 350 2538, Fax. +65 251 6500

Slovakia: see Austria

Slovenia: see Italy

South Africa: S.A. PHILIPS Pty Ltd., 195-215 Main Road Martindale,
2092 JOHANNESBURG, P.O. Box 7430 Johannesburg 2000,
Tel. +27 11 470 5911, Fax. +27 11 470 5494

South America: Al. Vicente Pinzon, 173, 6th floor,
04547-130 SÃO PAULO, SP, Brazil,
Tel. +55 11 821 2333, Fax. +55 11 821 2382

Spain: Balmes 22, 08007 BARCELONA,
Tel. +34 3 301 6312, Fax. +34 3 301 4107

Sweden: Kottbygatan 7, Akalla, S-16485 STOCKHOLM,
Tel. +46 8 632 2000, Fax. +46 8 632 2745

Switzerland: Allmendstrasse 140, CH-8027 ZÜRICH,
Tel. +41 1 488 2686, Fax. +41 1 488 3263

Taiwan: Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,
TAIPEI, Taiwan Tel. +886 2 2134 2865, Fax. +886 2 2134 2874

Thailand: PHILIPS ELECTRONICS (THAILAND) Ltd.,
209/2 Sanpavuth-Bangna Road Prakanong, BANGKOK 10260,
Tel. +66 2 745 4090, Fax. +66 2 398 0793

Turkey: Talatpasa Cad. No. 5, 80640 GÜLTEPE/ISTANBUL,
Tel. +90 212 279 2770, Fax. +90 212 282 6707

Ukraine: PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,
252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes,
MIDDLESEX UB3 5BX, Tel. +44 181 730 5000, Fax. +44 181 754 8421

United States: 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,
Tel. +1 800 234 7381

Uruguay: see South America

Vietnam: see Singapore

Yugoslavia: PHILIPS, Trg N. Pasica 5/v, 11000 BEOGRAD,
Tel. +381 11 625 344, Fax.+381 11 635 777

For all other countries apply to: Philips Semiconductors,
International Marketing & Sales Communications, Building BE-p, P.O. Box 218,
5600 MD EINDHOVEN, The Netherlands, Fax. +31 40 27 24825

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Printed in The Netherlands 125108/00/04/pp12 Date of release: 1998 Jan 30 Document order number: 9397 750 03234

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