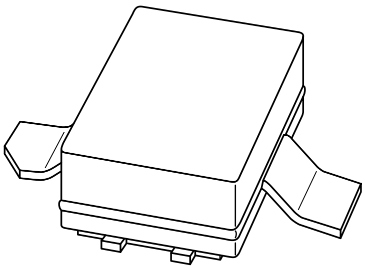
DATA SHEET



BLF2043
UHF power LDMOS transistor

Product specification
Supersedes data of 2002 Sep 10

2003 Feb 10

Philips
Semiconductors

PHILIPS

UHF power LDMOS transistor BLF2043

FEATURES

- Typical 2-tone performance at a supply voltage of 26 V and I_{DQ} of 85 mA:
  - Output power = 10 W (PEP)
  - Gain = 12 dB
  - Efficiency = 36.5%
  - dim = –32 dBc
- Easy power control
- Excellent ruggedness
- High power gain
- Excellent thermal stability
- Designed for broadband operation (HF to 2200 MHz)
- No internal matching for broadband operation.

APPLICATIONS

- RF power amplifiers for GSM, EDGE and CDMA base stations and multicarrier applications in the HF to 2200 MHz frequency range
- Broadcast drivers.

DESCRIPTION

10 W LDMOS power transistor for base station applications at frequencies from HF to 2200 MHz.

PINNING - SOT538A

PIN	DESCRIPTION
1	drain
2	gate
3	source, connected to mounting base

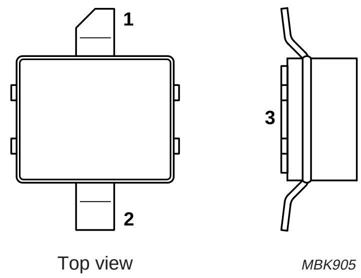


Fig.1 Simplified outline.

QUICK REFERENCE DATA

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

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)	d_{im} (dBc)
CW, class-AB (2-tone)	f_1 = 2000; f_2 = 2000.1	26	10 (PEP)	12.5	36.5	–32

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	75	V
V_{GS}	gate-source voltage		–	±15	V
I_D	drain current (DC)		–	2.2	A
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	200	°C

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}h}$	thermal resistance from junction to heatsink	T_{mb} = 25 °C; note 1	9	K/W

Note

1. Thermal resistance is determined under RF operating conditions.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 0.2 mA	65	–	–	V
V_{GSth}	gate-source threshold voltage	V_{DS} = 10 V; I_D = 20 mA	4	–	5	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 26 V	–	–	1.5	μA
I_{DSX}	on-state drain current	V_{GS} = V_{GSth} + 9 V; V_{DS} = 10 V	2.8	–	–	A
I_{GSS}	gate leakage current	V_{GS} = ±15 V; V_{DS} = 0	–	–	40	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 0.75 A	–	0.5	–	S
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 0.75 A	–	1.2	–	Ω
C_{is}	input capacitance	V_{GS} = 0; V_{DS} = 26 V; f = 1 MHz	–	11	–	pF
C_{os}	output capacitance	V_{GS} = 0; V_{DS} = 26 V; f = 1 MHz	–	9	–	pF
C_{rs}	feedback capacitance	V_{GS} = 0; V_{DS} = 26 V; f = 1 MHz	–	0.5	–	pF

APPLICATION INFORMATION

RF performance in a common source class-AB circuit. T_h = 25 °C; $R_{th\ mb\text{-}h}$ = 0.4 K/W, unless otherwise specified.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_p (dB)	η_D (%)	d_{im} (dBc)
CW, class-AB (2-tone)	f_1 = 2000; f_2 = 2000.1	26	85	10 (PEP)	>11.8	>33	≤–26

Ruggedness in class-AB operation

The BLF2043 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 26 V; f = 2000 MHz at rated load power.

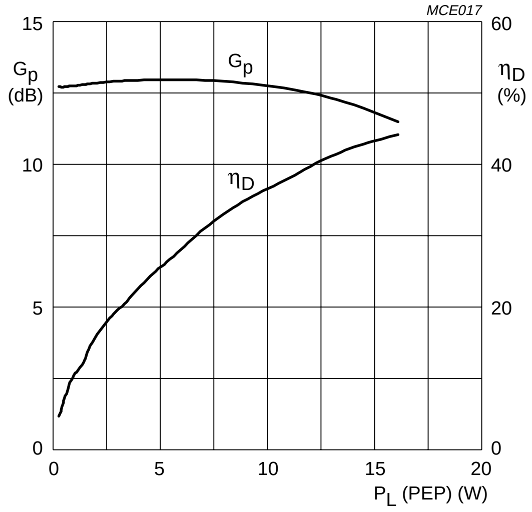


Fig.2 Power gain and efficiency as functions of peak envelope load power; typical values.

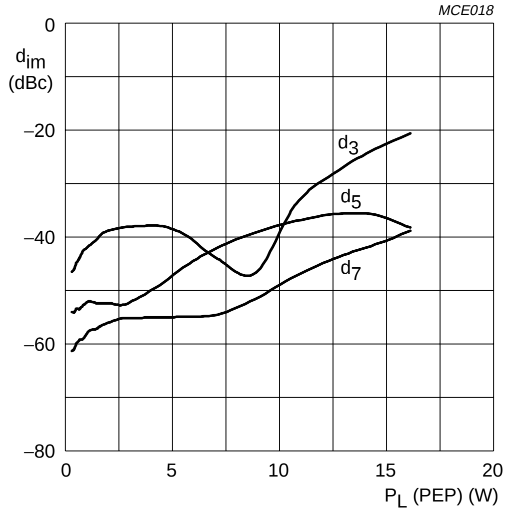
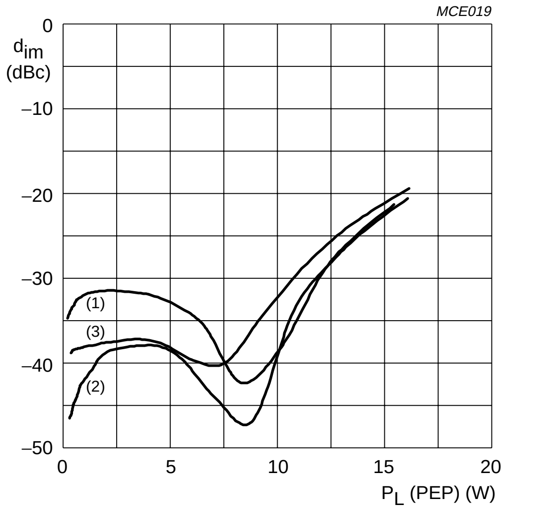
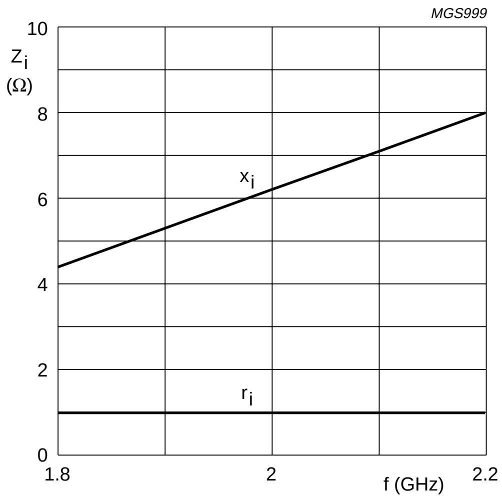


Fig.3 Intermodulation distortion as a function of peak envelope load power; typical values.



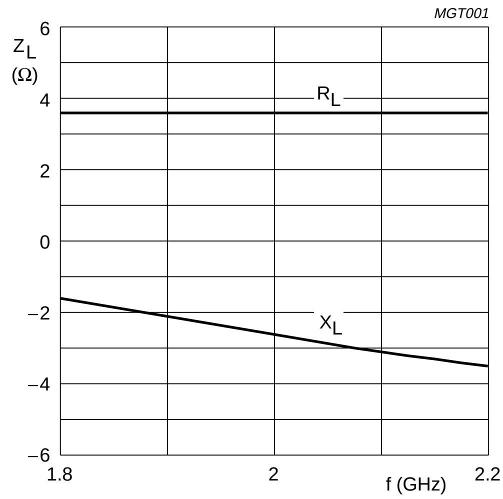
(1) I_{DQ} = 55 mA.
(2) I_{DQ} = 85 mA.
(3) I_{DQ} = 115 mA.

Fig.4 Third order intermodulation distortion as a function of peak envelope load power and I_{DQ} setting; typical values.



V_{DS} = 26 V; I_{DQ} = 25 mA; P_L = 10 W; $T_h \leq 25$ °C.
Impedance measured at reference planes (see Fig.7).

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



V_{DS} = 26 V; I_{DQ} = 25 mA; P_L = 10 W; $T_h \leq 25$ °C.
Impedance measured at reference planes (see Fig.7).

Fig.6 Load impedance as a function of frequency (series components); typical values.

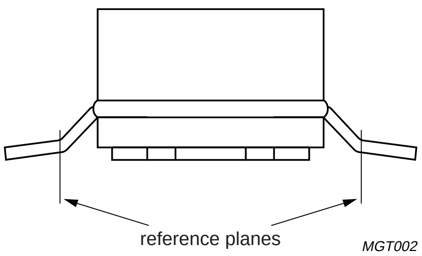


Fig.7 Measuring reference planes SOT538A.

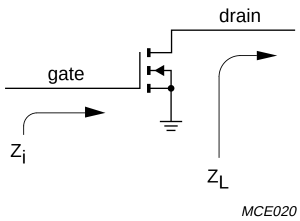


Fig.8 Definition of transistor impedance.

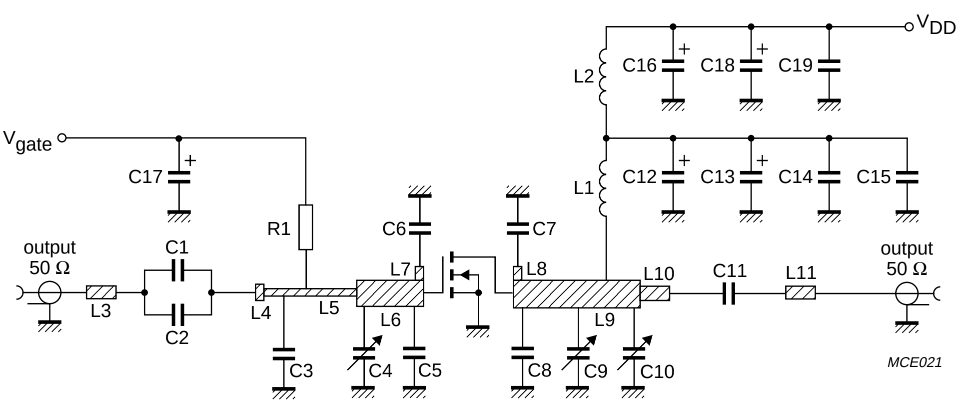


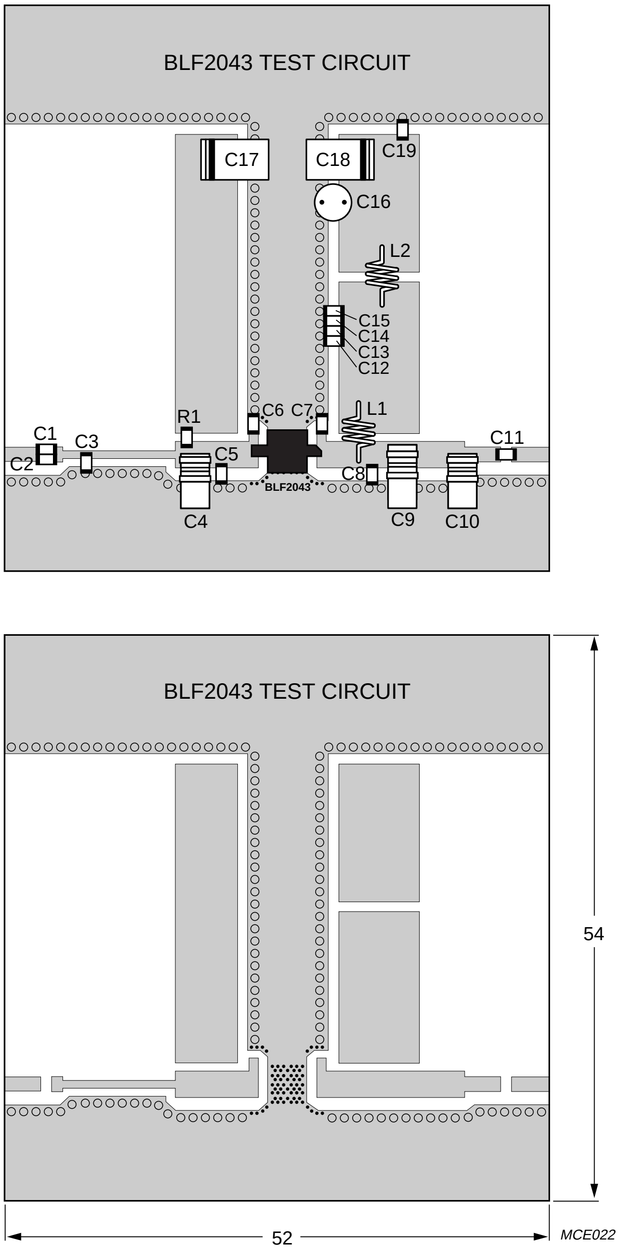
Fig.9 Class-AB test circuit for 2 GHz.

List of components (see Figs 8 and 9)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor; note 1	6.8 pF		
C3	multilayer ceramic chip capacitor; note 1	1.0 pF		
C4, C10, C11	tekelec variable capacitor; type 37271	0.6 to 4.5 pF		
C5, C7	multilayer ceramic chip capacitor; note 1	2.0 pF		
C6	multilayer ceramic chip capacitor; note 1	2.7 pF		
C8	multilayer ceramic chip capacitor; note 1	0.2 pF		
C9	multilayer ceramic chip capacitor; note 1	0.6 to 4.5 pF		
C12	multilayer ceramic chip capacitor; note 1	10 pF		
C13	multilayer ceramic chip capacitor; note 1	51 pF		
C14	multilayer ceramic chip capacitor; note 1	120 pF		
C15	multilayer ceramic chip capacitor	100 nF		2222 581 16641
C16	electrolytic capacitor	100 µF; 63 V		2222 037 58101
C17, C18	tantalum SMD capacitor	10 µF; 35 V		
C19	multilayer ceramic chip capacitor; note 2	1 nF		
L1, L2	3 turns enamelled 0.5 mm copper wire		3 loops; d = 3 mm length = 3 mm	
L3	stripline; note 3	50 Ω	3.5 × 1.5 mm	
L4	stripline; note 3	50 Ω	1.0 × 1.5 mm	
L5	stripline; note 3	73.2 Ω	5 × 2 mm	
L6	stripline; note 3	31 Ω	11.0 × 0.8 mm	
L7, L8	stripline; note 3	64.7 Ω	1.5 × 1.0 mm	
L9	stripline; note 3	31 Ω	14.4 × 3.0 mm	
L10, L11	stripline; note 3	50 Ω	3.5 × 1.5 mm	
R1	metal film resistor	2.2 kΩ; 0.6 W		

Notes

1. American Technical Ceramics type 100A or capacitor of same quality.
2. American Technical Ceramics type 100B or capacitor of same quality.
3. The striplines are on a double copper-clad printed-circuit board with Rogers 5880 dielectric (ε_r = 2.2); thickness 0.51 mm.



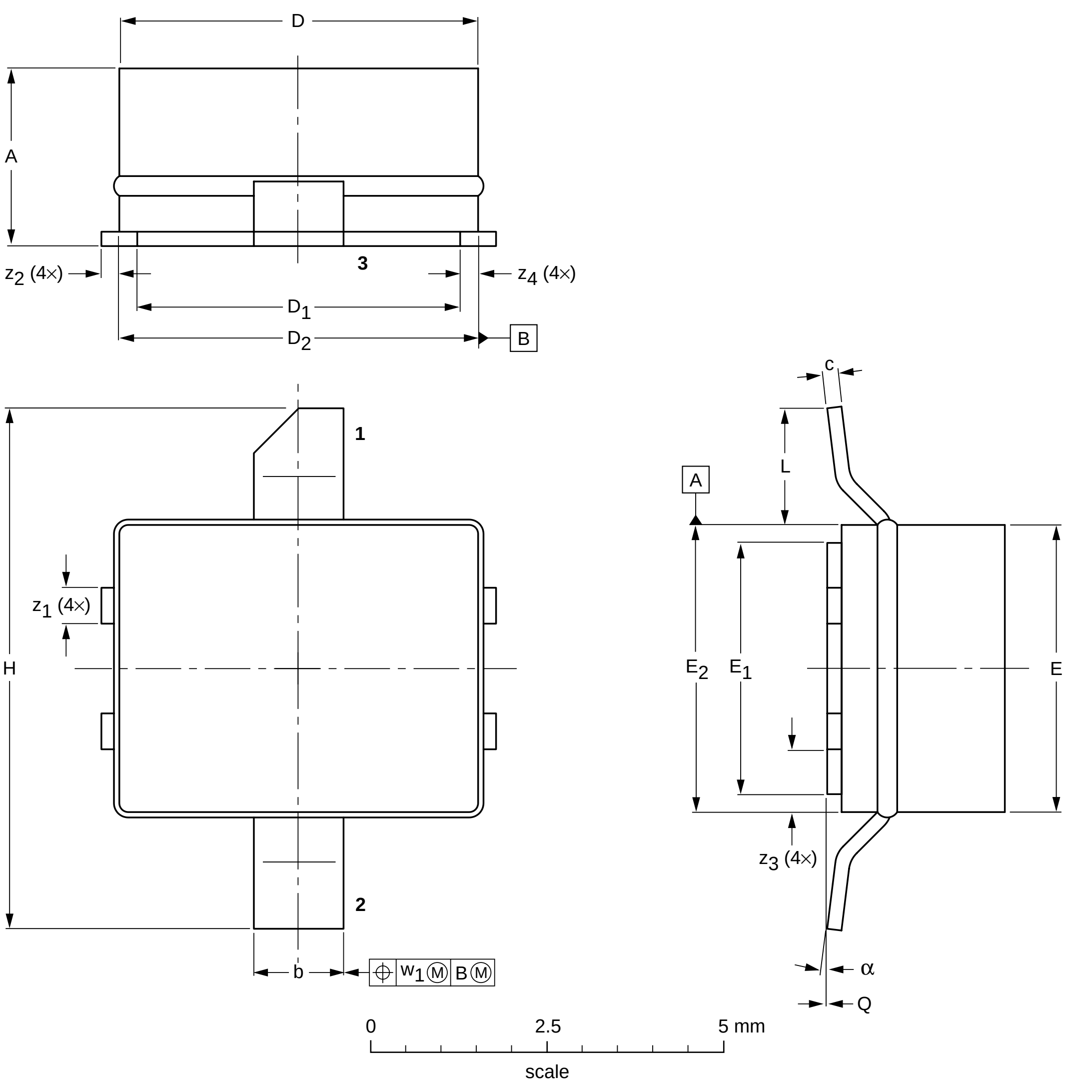
Dimensions in mm.

The components are situated on one side of the copper-clad printed-circuit board with Teflon dielectric (ε_r = 2.2), thickness 0.51 mm.

Fig.10 Component layout for 2 GHz class-AB test circuit.

PACKAGE OUTLINE

Ceramic surface mounted package; 2 leads **SOT538A**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	D_2	E	E_1	E_2	H	L	Q	w_1	z_1	z_2	z_3	z_4	α
mm	2.95 2.29	1.35 1.19	0.23 0.18	5.16 5.00	4.65 4.50	5.16 5.00	4.14 3.99	3.63 3.48	4.14 3.99	7.49 7.24	2.03 1.27	0.10 0.00	0.25	0.58 0.43	0.25 0.18	0.97 0.81	0.51 0.00	7° 0°
inches	0.116 0.090	0.053 0.047	0.009 0.007	0.203 0.197	0.183 0.177	0.203 0.197	0.163 0.157	0.143 0.137	0.163 0.157	0.295 0.285	0.080 0.050	0.004 0.000	0.010	0.023 0.017	0.010 0.007	0.038 0.032	0.020 0.000	7° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT538A						~~00-03-03~~ 02-08-20

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS[1]	PRODUCT STATUS[2][3]	DEFINITION
I	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.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

Notes

1. Please consult the most recently issued data sheet before initiating or completing a design.
2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

DEFINITIONS

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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 — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

DISCLAIMERS

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 Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status ‘Production’), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

NOTES

Philips Semiconductors – a worldwide company

Contact information

For additional information please visit **http://www.semiconductors.philips.com**. Fax: **+31 40 27 24825**
For sales offices addresses send e-mail to: **sales.addresses@www.semiconductors.philips.com**.

SCA75

Printed in The Netherlands 613524/06/pp12 Date of release: 2003 Feb 10 Document order number: 9397 750 10917

Let's make things better.

Philips
Semiconductors

PHILIPS