

DATA SHEET

BSN10; BSN10A N-channel enhancement mode vertical D-MOS transistors

Product specification
File under Discrete Semiconductors, SC13b

April 1995

N-channel enhancement mode vertical D-MOS transistors

BSN10; BSN10A

FEATURES

- Direct interface to C-MOS, TTL, etc.
- High-speed switching
- No secondary breakdown.

DESCRIPTION

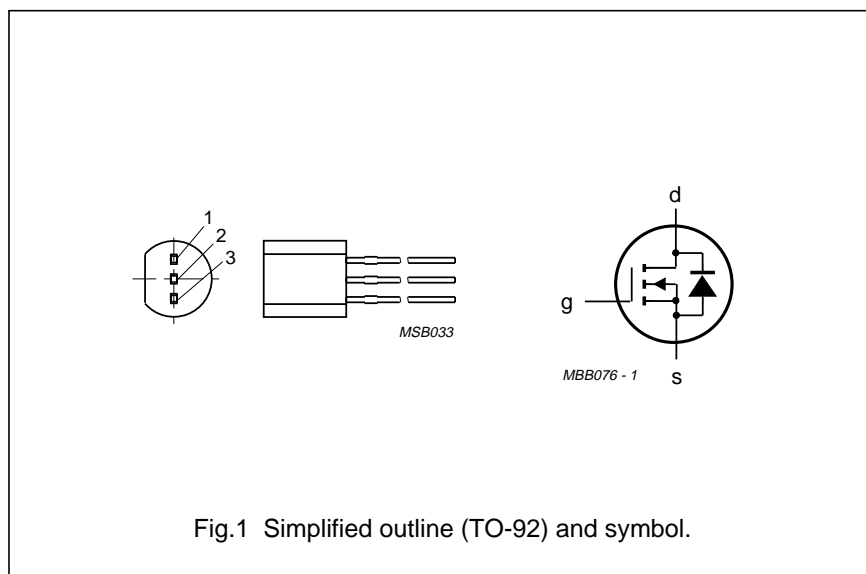
N-channel enhancement mode vertical D-MOS transistor in a TO-92 envelope, intended for use in general purpose fast switching applications.

PINNING - TO-92

| PIN | DESCRIPTION |
|--------|-------------|
| BSN10 | |
| 1 | gate |
| 2 | drain |
| 3 | source |
| BSN10A | |
| 1 | source |
| 2 | gate |
| 3 | drain |

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | MAX. | UNIT |
|--------------|-------------------------------|------|----------|
| V_{DS} | drain-source voltage | 50 | V |
| I_D | DC drain current | 175 | mA |
| $R_{DS(on)}$ | drain-source on-resistance | 15 | Ω |
| $V_{GS(th)}$ | gate-source threshold voltage | 1.8 | V |



LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---------------|---------------------------|---|------|------|--------------------|
| V_{DS} | drain-source voltage | | – | 50 | V |
| $\pm V_{GSO}$ | gate-source voltage | open drain | – | 20 | V |
| I_D | DC drain current | | – | 175 | mA |
| I_{DM} | peak drain current | | – | 300 | mA |
| P_{tot} | total power dissipation | up to $T_{amb} = 25\text{ }^{\circ}\text{C}$ (note 1) | – | 830 | mW |
| T_{stg} | storage temperature range | | –65 | 150 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | – | 150 | $^{\circ}\text{C}$ |

THERMAL RESISTANCE

| SYMBOL | PARAMETER | THERMAL RESISTANCE |
|---------------|-----------------------------------|--------------------|
| $R_{th\ j-a}$ | from junction to ambient (note 1) | 150 K/W |

Note

1. Device mounted on a printed circuit board, maximum lead length 4 mm.

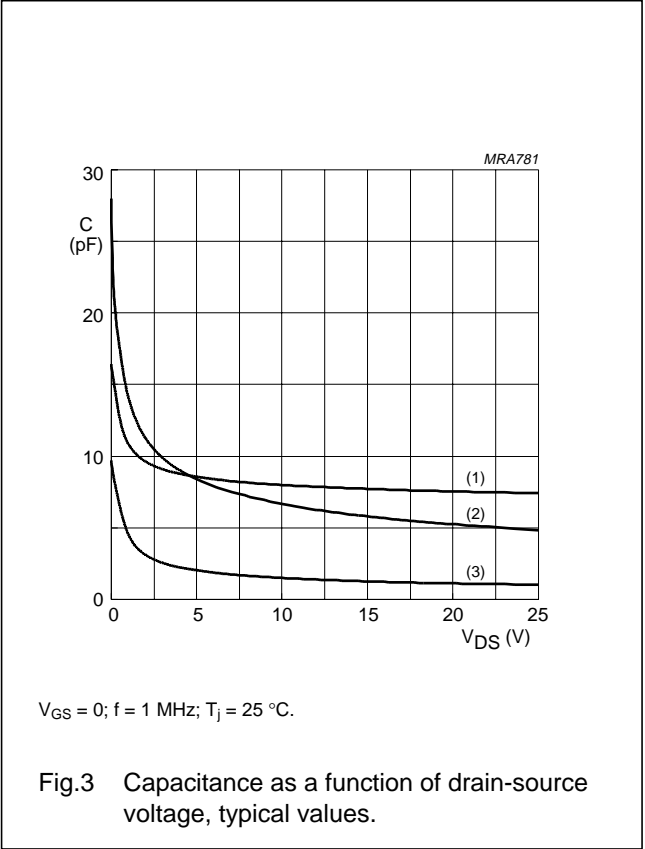
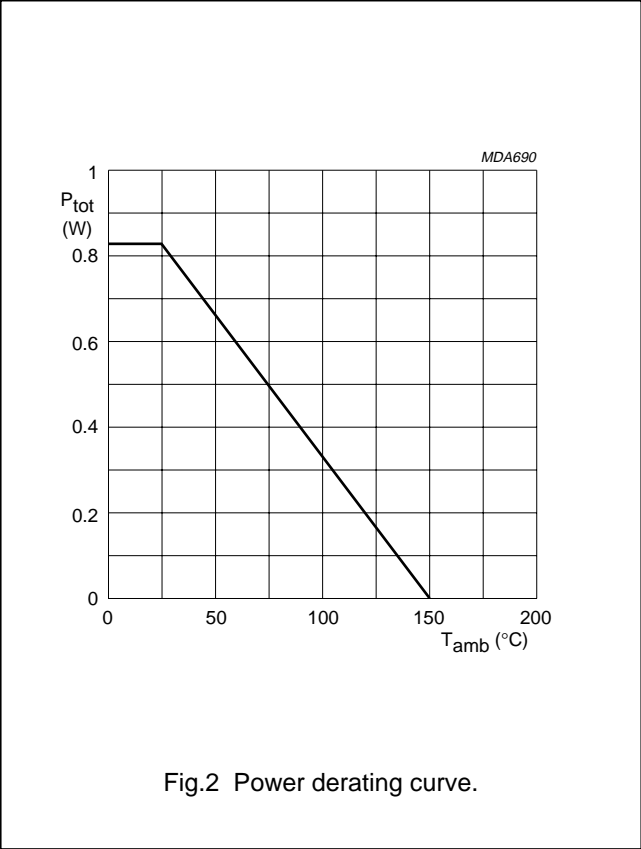
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CHARACTERISTICS

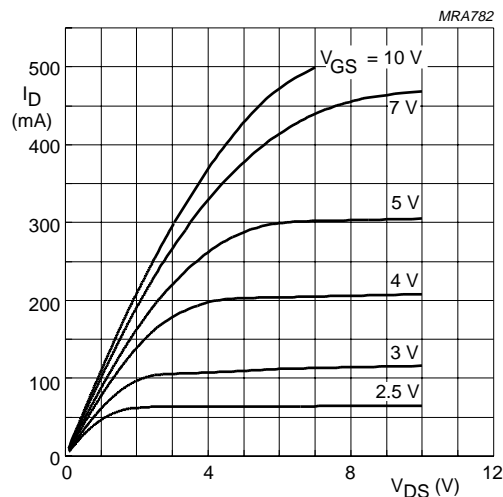
T_j = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------|--------------------------------|---|------|------|------|------|
| V _{(BR)DSS} | drain-source breakdown voltage | I _D = 10 µA; V _{GS} = 0 | 50 | – | – | V |
| I _{DSS} | drain-source leakage current | V _{DS} = 40 V; V _{GS} = 0 | – | – | 1 | µA |
| ±I _{GSS} | gate-source leakage current | ±V _{GS} = 20 V; V _{DS} = 0 | – | – | 100 | nA |
| V _{GS(th)} | gate-source threshold voltage | I _D = 1 mA; V _{GS} = V _{DS} | 0.4 | – | 1.8 | V |
| R _{DS(on)} | drain-source on-resistance | I _D = 100 mA; V _{GS} = 10 V | – | 8 | 15 | Ω |
| | | I _D = 100 mA; V _{GS} = 5 V | – | 12 | 20 | Ω |
| | | I _D = 10 mA; V _{GS} = 2.5 V | – | 18 | 30 | Ω |
| Y _{fs} | transfer admittance | I _D = 100 mA; V _{DS} = 10 V | 40 | 80 | – | mS |
| C _{iss} | input capacitance | V _{DS} = 10 V; V _{GS} = 0; f = 1 MHz | – | 8 | 15 | pF |
| C _{oss} | output capacitance | V _{DS} = 10 V; V _{GS} = 0; f = 1 MHz | – | 7 | 15 | pF |
| C _{rss} | feedback capacitance | V _{DS} = 10 V; V _{GS} = 0; f = 1 MHz | – | 2 | 5 | pF |
| Switching times | | | | | | |
| t _{on} | turn-on time | I _D = 100 mA; V _{DD} = 20 V; V _{GS} = 0 to 10 V | – | 2 | 5 | ns |
| t _{off} | turn-off time | I _D = 100 mA; V _{DD} = 50 V; V _{GS} = 0 to 10 V | – | 5 | 10 | ns |



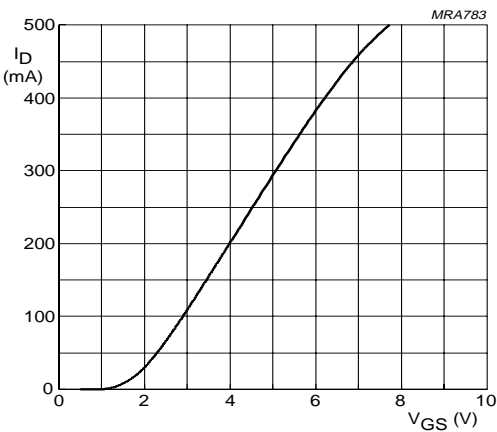
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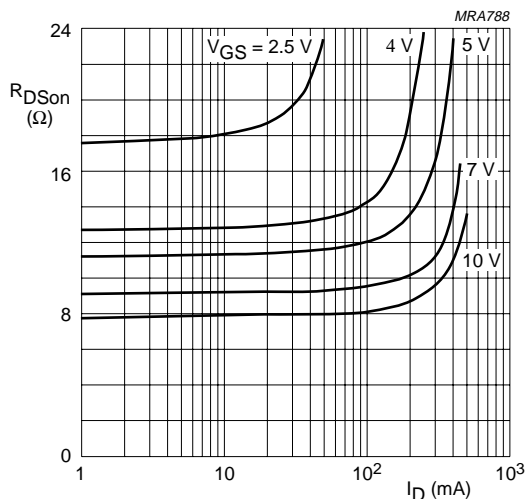
$T_j = 25\text{ }^{\circ}\text{C}.$

Fig.4 Typical output characteristics.



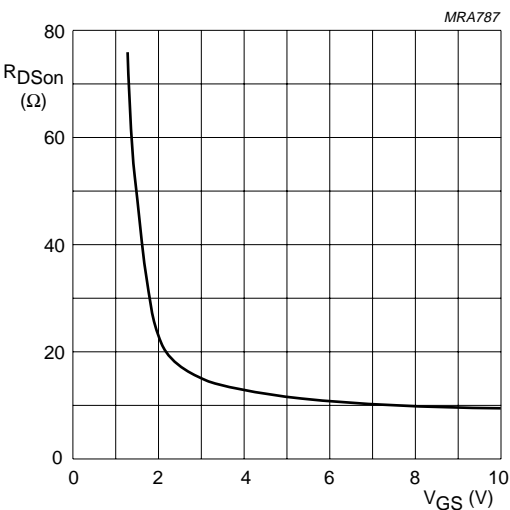
$V_{DS} = 10\text{ V}; T_j = 25\text{ }^{\circ}\text{C}.$

Fig.5 Typical transfer characteristics.



$T_j = 25\text{ }^{\circ}\text{C}.$

Fig.6 Drain-source on-resistance as a function of drain current, typical values.

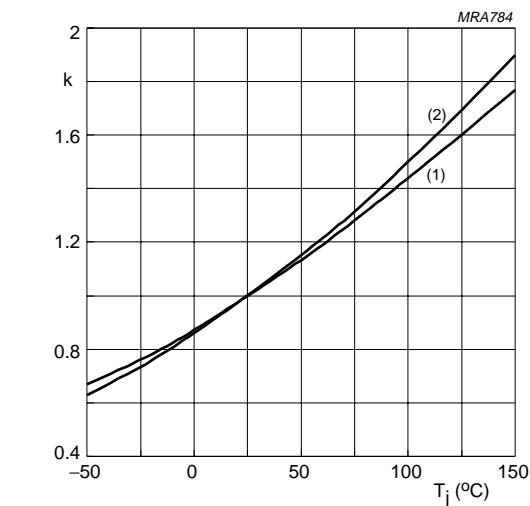


$V_{DS} = 0.1\text{ V}; T_j = 25\text{ }^{\circ}\text{C}.$

Fig.7 Drain-source on-resistance as a function of gate-source voltage, typical values.

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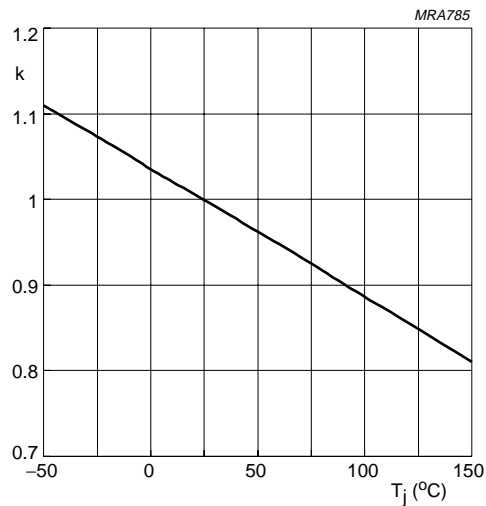
$$k = \frac{R_{DS(on)} \text{ at } T_j}{R_{DS(on)} \text{ at } 25^\circ\text{C}}$$

Typical $R_{DS(on)}$ at 100 mA/10 V.

(1) $I_D = 10 \text{ mA}$; $V_{GS} = 2.5 \text{ V}$.

(2) $I_D = 100 \text{ mA}$; $V_{GS} = 10 \text{ V}$.

Fig.8 Temperature coefficient of drain-source on-resistance.



$$k = \frac{V_{GS(th)} \text{ at } T_j}{V_{GS(th)} \text{ at } 25^\circ\text{C}}$$

Typical $V_{GS(th)}$ at 1 mA.

Fig.9 Temperature coefficient gate-source threshold voltage.

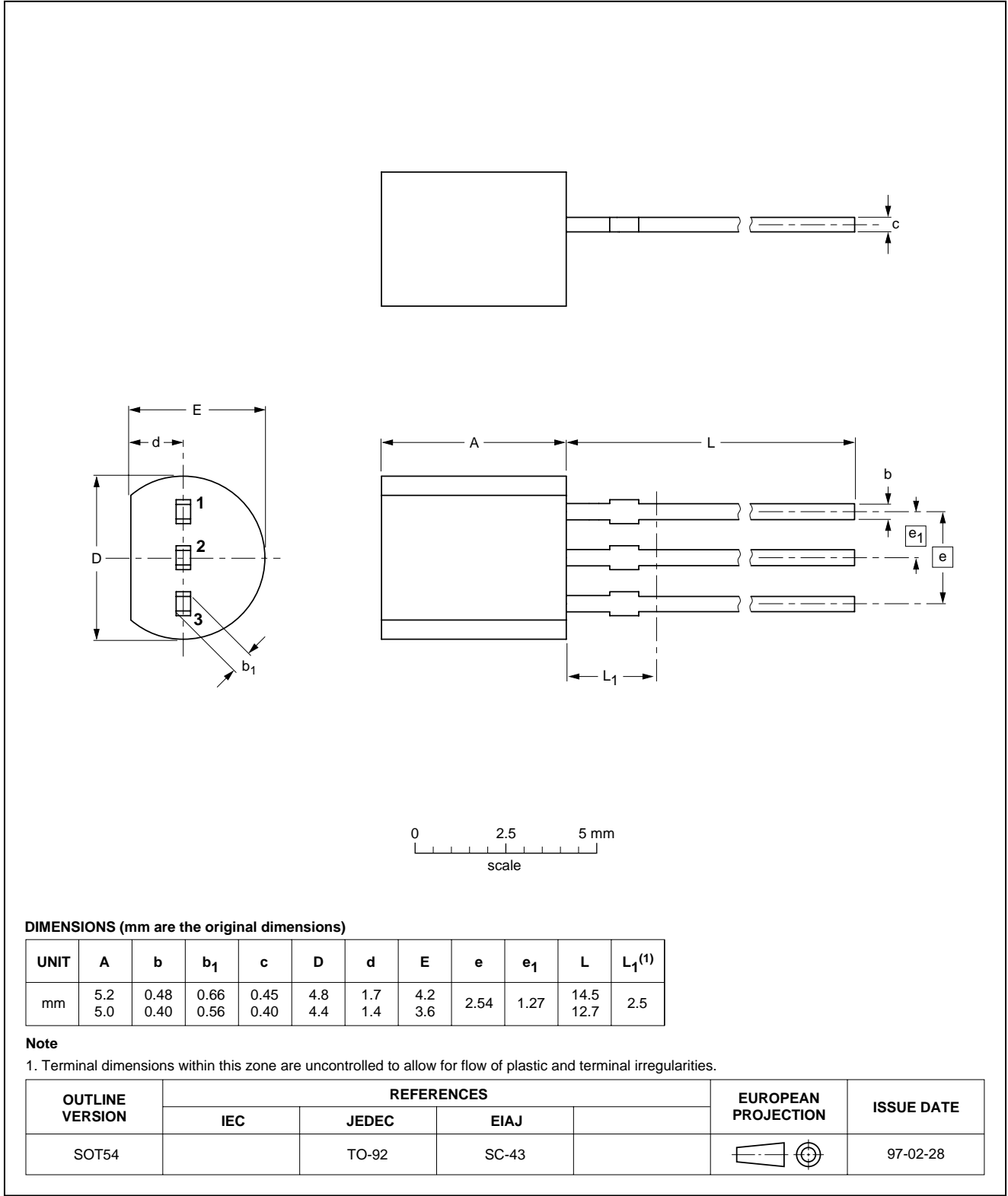
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PACKAGE OUTLINES

Plastic single-ended leaded (through hole) package; 3 leads

SOT54



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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. |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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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 1 60 101, Fax. +43 1 60 101 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: 4 Rue du Port-aux-Vins, 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, Shivsagar Estate, A Block, Dr. Annie Besant Rd.
Worli, MUMBAI 400 018, Tel. +91 22 4938 541, Fax. +91 22 4938 722

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: Rua do Rocio 220, 5th floor, Suite 51,
04552-903 São Paulo, SÃO PAULO - SP, Brazil,
Tel. +55 11 821 2333, Fax. +55 11 829 1849

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 1 481 7730

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

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