

DATA SHEET



BYD77 series Ultra fast low-loss controlled avalanche rectifiers

Product specification
Supersedes data of 1996 May 24

1999 Nov 15

Ultra fast low-loss controlled avalanche rectifiers

BYD77 series

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Shipped in 8 mm embossed tape
- Smallest surface mount rectifier outline.

DESCRIPTION

Cavity free cylindrical glass SOD87 package through Implotec™(1) technology. This package is

hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

(1) Implotec is a trademark of Philips.

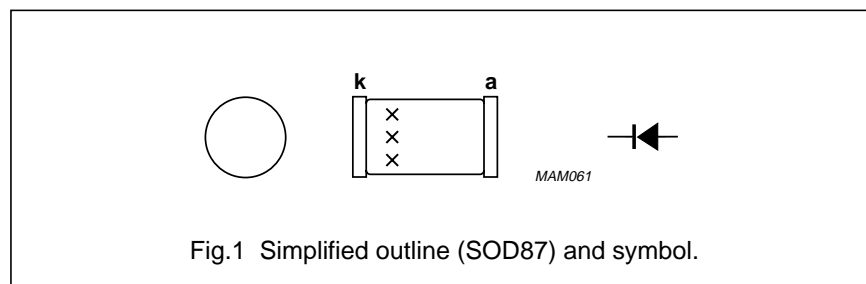


Fig.1 Simplified outline (SOD87) and symbol.

LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|--------------------|---------------------------------|---|------|------|------|
| V _{RRM} | repetitive peak reverse voltage | | | | |
| | BYD77A | | – | 50 | V |
| | BYD77B | | – | 100 | V |
| | BYD77C | | – | 150 | V |
| | BYD77D | | – | 200 | V |
| | BYD77E | | – | 250 | V |
| | BYD77F | | – | 300 | V |
| | BYD77G | | – | 400 | V |
| V _R | continuous reverse voltage | | | | |
| | BYD77A | | – | 50 | V |
| | BYD77B | | – | 100 | V |
| | BYD77C | | – | 150 | V |
| | BYD77D | | – | 200 | V |
| | BYD77E | | – | 250 | V |
| | BYD77F | | – | 300 | V |
| | BYD77G | | – | 400 | V |
| I _{F(AV)} | average forward current | T _{tp} = 105 °C; see Figs 2 and 3; averaged over any 20 ms period; see also Figs 10 and 11 | | | |
| | BYD77A to D | | – | 2.00 | A |
| | BYD77E to G | | – | 1.85 | A |
| I _{F(AV)} | average forward current | T _{amb} = 60 °C; PCB mounting (see Fig.16); see Figs 4 and 5; averaged over any 20 ms period; see also Figs 10 and 11 | | | |
| | BYD77A to D | | – | 0.85 | A |
| | BYD77E to G | | – | 0.80 | A |

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| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|--|--|------|------|------|
| I_{FRM} | repetitive peak forward current | $T_{tp} = 105\text{ °C}$; see Figs 6 and 7 | – | 15 | A |
| | BYD77A to D | | | 13 | A |
| I_{FRM} | repetitive peak forward current | $T_{amb} = 60\text{ °C}$; see Figs 8 and 9 | – | 8.5 | A |
| | BYD77E to G | | | 8.0 | A |
| I_{FSM} | non-repetitive peak forward current | $t = 10\text{ ms}$ half sine wave; $T_j = T_{j\text{ max}}$ prior to surge; $V_R = V_{RRM\text{ max}}$ | – | 25 | A |
| E_{RSM} | non-repetitive peak reverse avalanche energy | $L = 120\text{ mH}$; $T_j = 25\text{ °C}$ prior to surge; inductive load switched off | – | 10 | mJ |
| T_{stg} | storage temperature | | –65 | +175 | °C |
| T_j | junction temperature | | –65 | +175 | °C |

ELECTRICAL CHARACTERISTICS

$T_j = 25\text{ °C}$ unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT | | | |
|-------------|-------------------------------------|--|------|------|------|------|---|---|---|
| V_F | forward voltage | $I_F = 1\text{ A}$; $T_j = T_{j\text{ max}}$; see Figs 12 and 13 | – | – | 0.75 | V | | | |
| | BYD77A to D | | | | 0.83 | V | | | |
| V_F | forward voltage | $I_F = 1\text{ A}$; see Figs 12 and 13 | – | – | 0.98 | V | | | |
| | BYD77E to G | | | | 1.05 | V | | | |
| $V_{(BR)R}$ | reverse avalanche breakdown voltage | $I_R = 0.1\text{ mA}$ | | | | | | | |
| | BYD77A | | | | | 55 | – | – | V |
| | BYD77B | | | | | 110 | – | – | V |
| | BYD77C | | | | | 165 | – | – | V |
| | BYD77D | | | | | 220 | – | – | V |
| | BYD77E | | | | | 275 | – | – | V |
| | BYD77F | | | | | 330 | – | – | V |
| BYD77G | 440 | – | – | V | | | | | |
| I_R | reverse current | $V_R = V_{RRM\text{ max}}$; see Fig.14 | – | – | 1 | μA | | | |
| | | $V_R = V_{RRM\text{ max}}$; $T_j = 165\text{ °C}$; see Fig.14 | – | – | 100 | μA | | | |
| t_{rr} | reverse recovery time | when switched from $I_F = 0.5\text{ A}$ to $I_R = 1\text{ A}$; measured at $I_R = 0.25\text{ A}$; see Fig.18 | – | – | 25 | ns | | | |
| | BYD77A to D | | | | 50 | ns | | | |
| | BYD77E to G | | | | | | | | |

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| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|---|---|------|------|------|------|
| C _d | diode capacitance | f = 1 MHz; V _R = 0 V; see Fig.15 | – | 50 | – | pF |
| | BYD77A to D | | | | | |
| | BYD77E to G | | – | 40 | – | pF |
| $\left \frac{dI_R}{dt} \right $ | maximum slope of reverse recovery current | when switched from I _F = 1 A to V _R ≥ 30 V and dI _F /dt = –1 A/μs; see Fig.17 | – | – | 4 | A/μs |
| | BYD77A to D | | | | | |
| | BYD77E to G | | – | – | 5 | A/μs |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|----------------------|---|------------|-------|------|
| R _{th j-tp} | thermal resistance from junction to tie-point | | 30 | K/W |
| R _{th j-a} | thermal resistance from junction to ambient | note 1 | 150 | K/W |

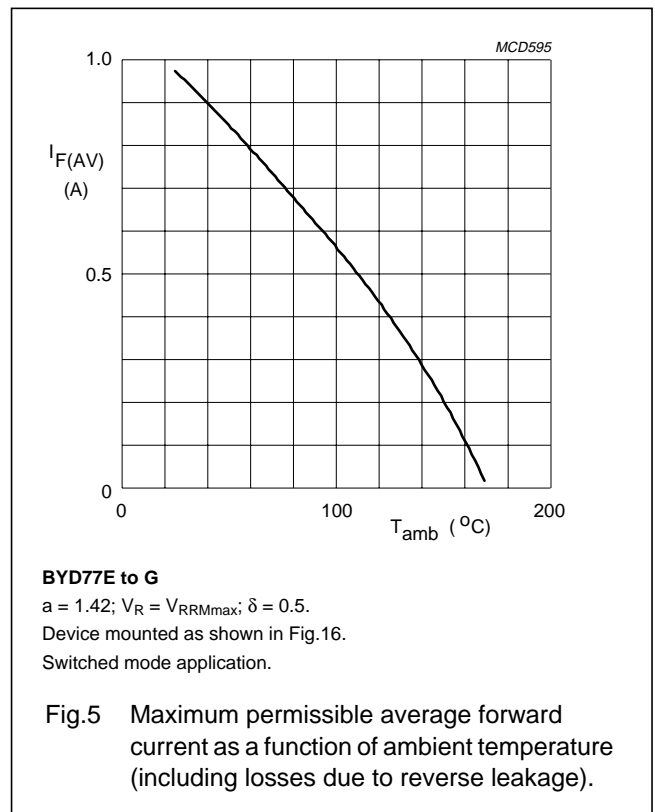
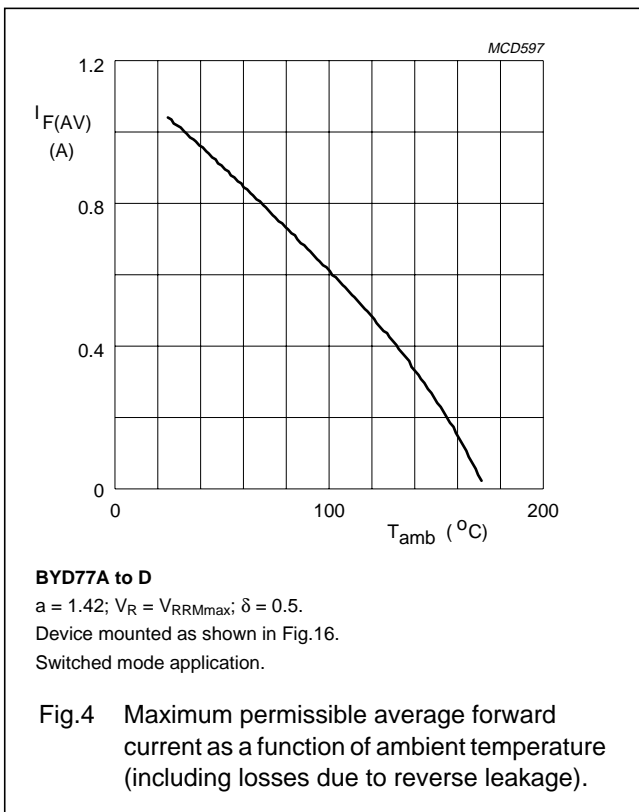
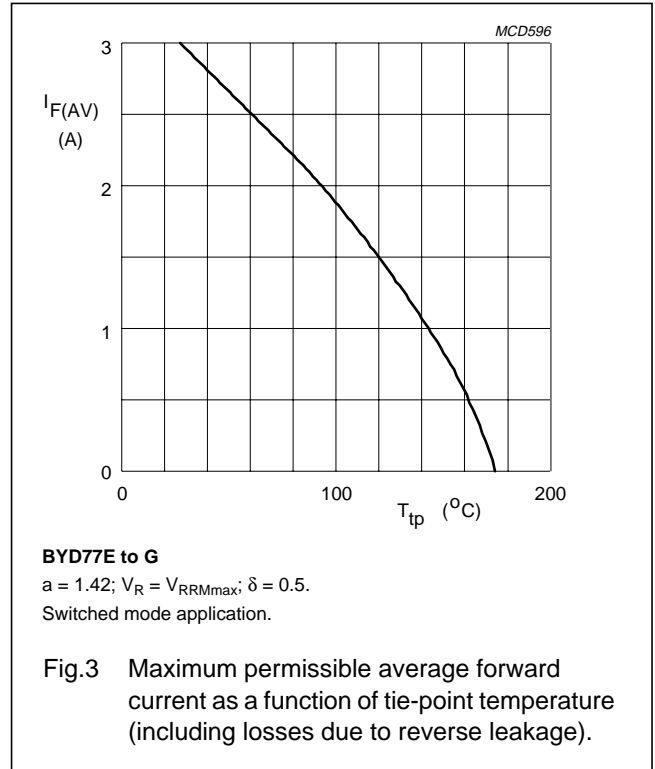
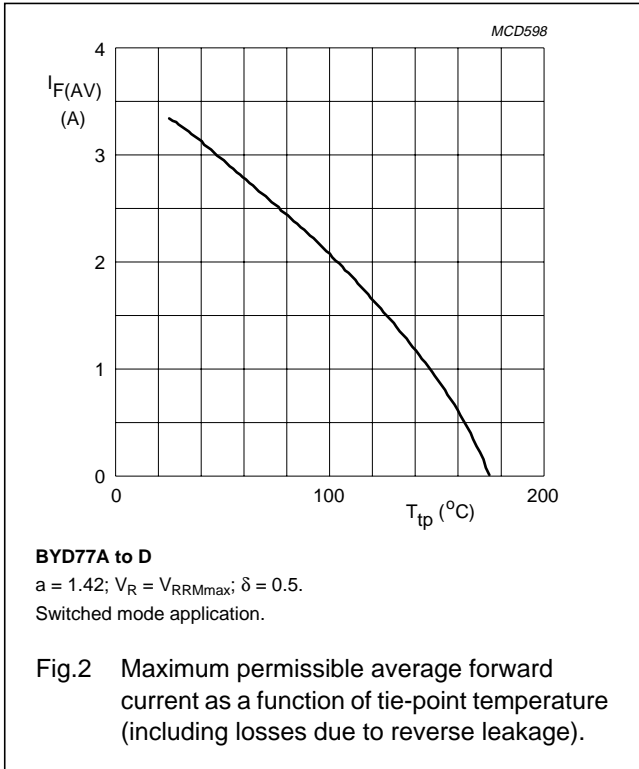
Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥40 μm, see Fig.16. For more information please refer to the "General Part of associated Handbook".

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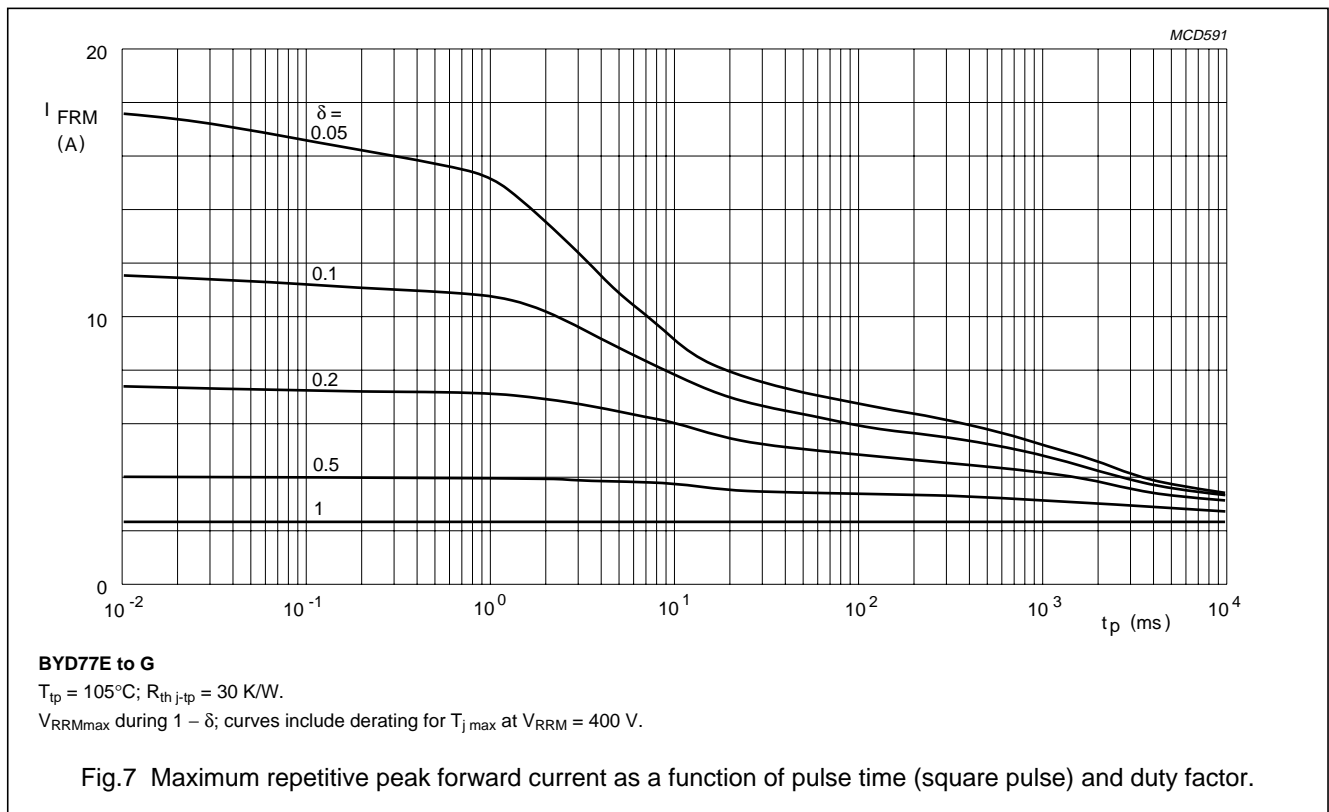
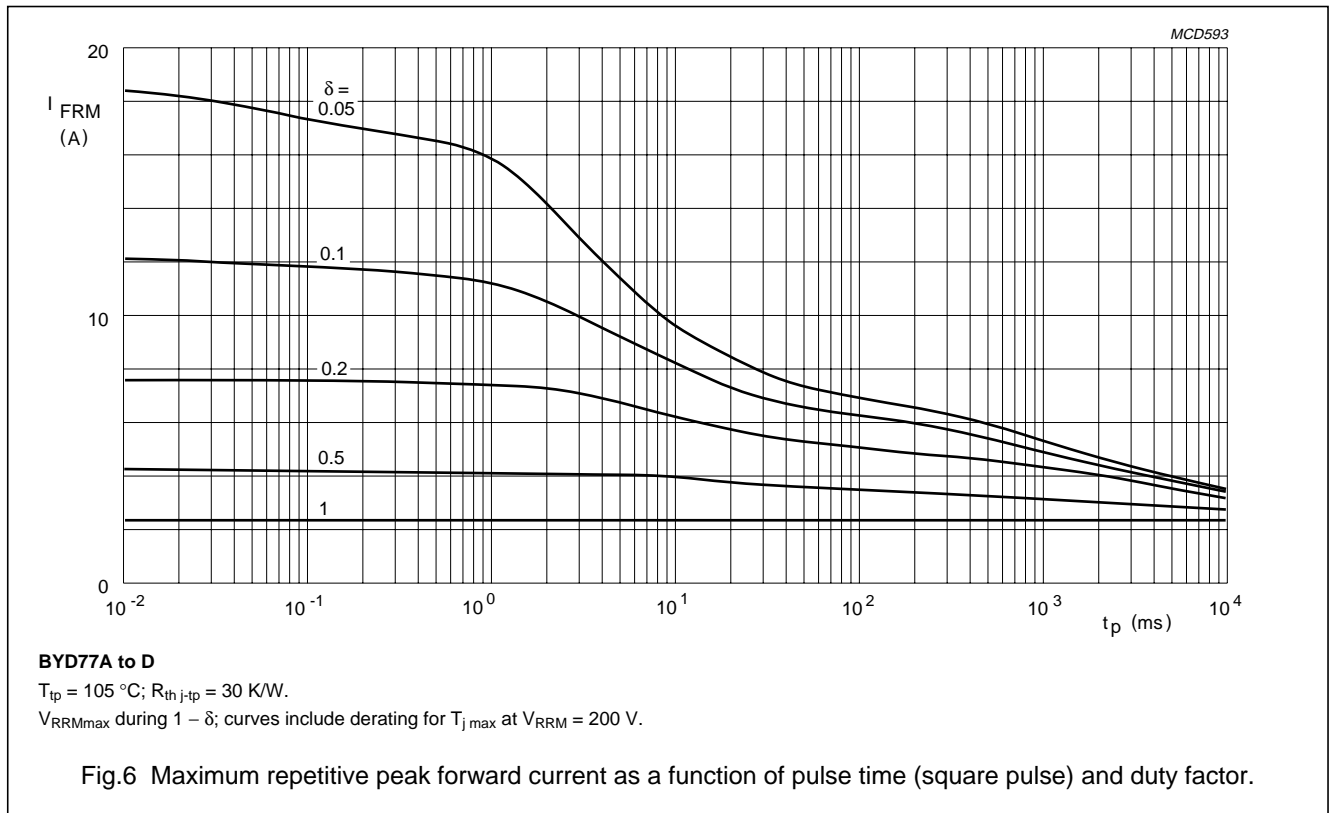
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GRAPHICAL DATA



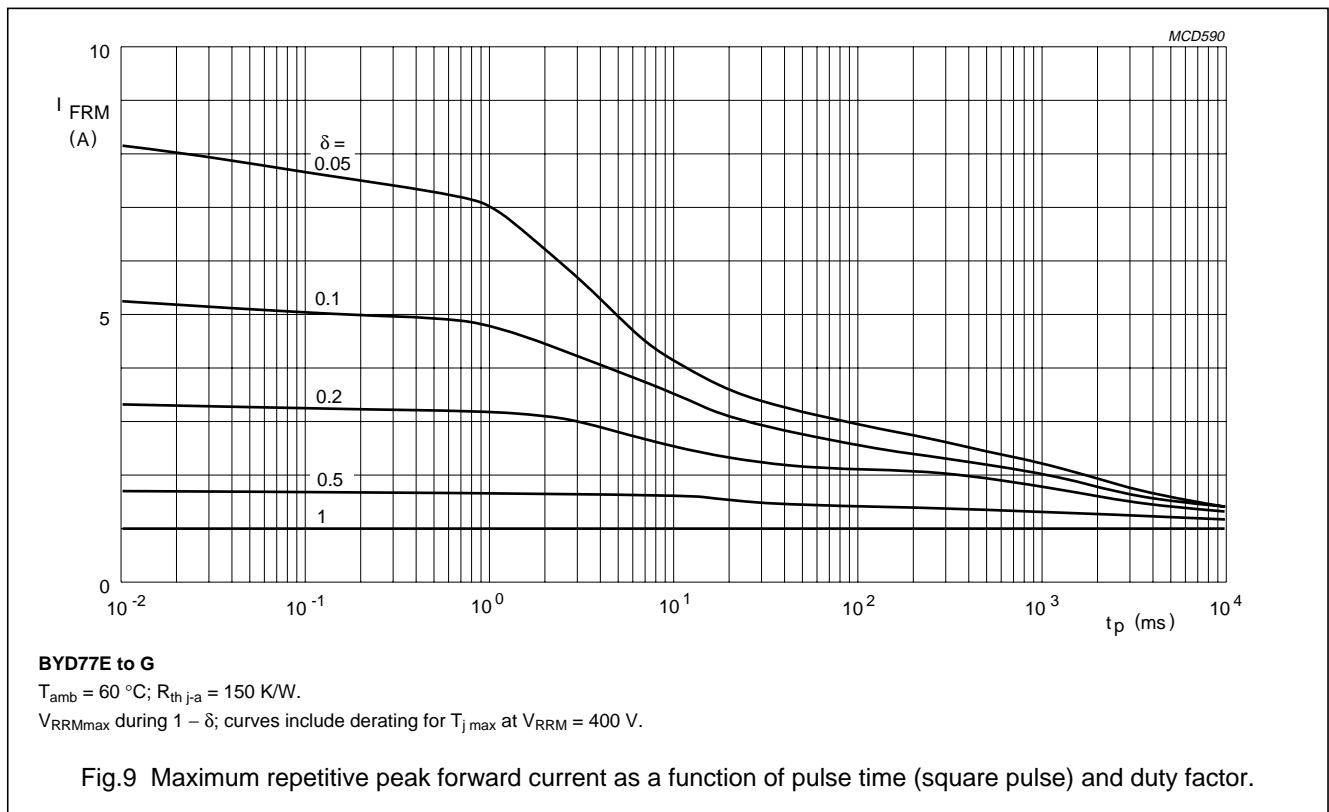
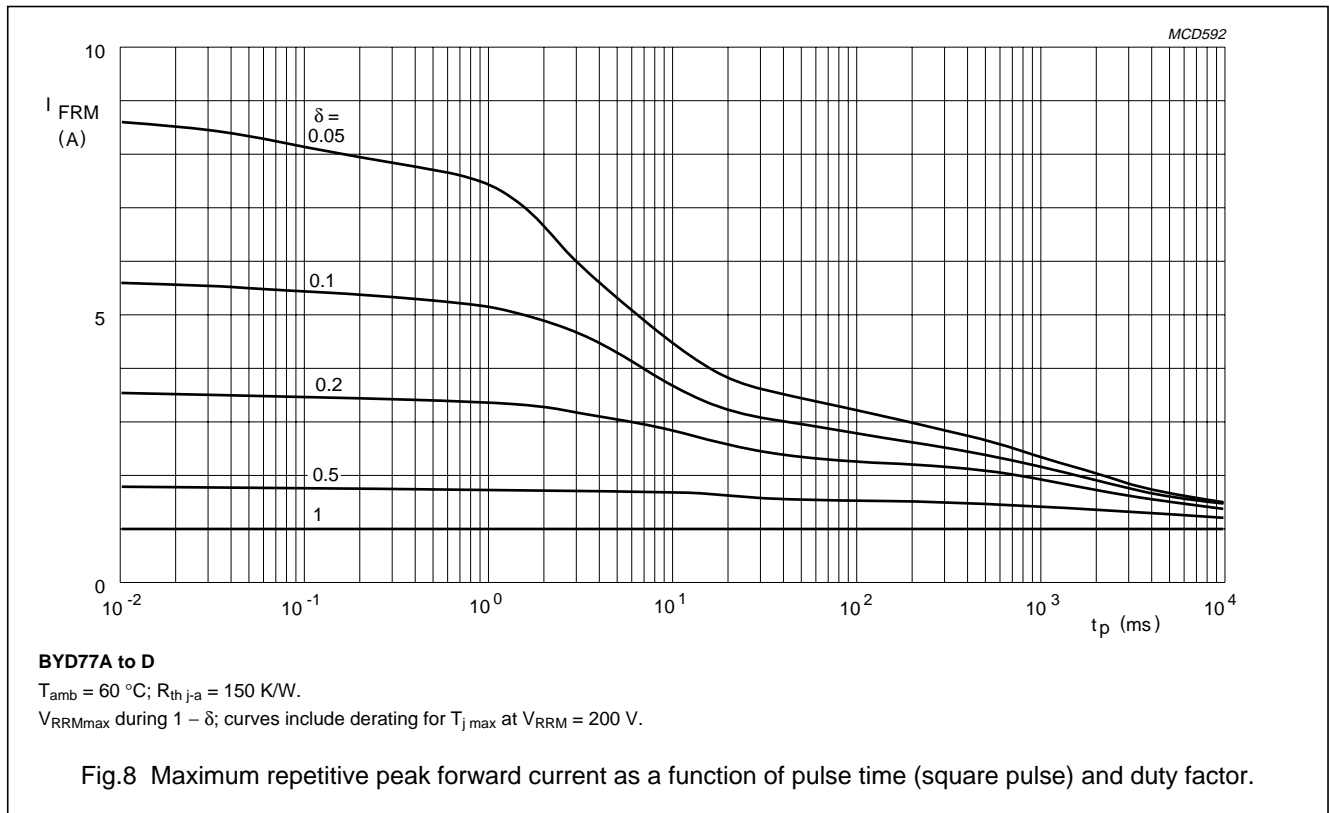
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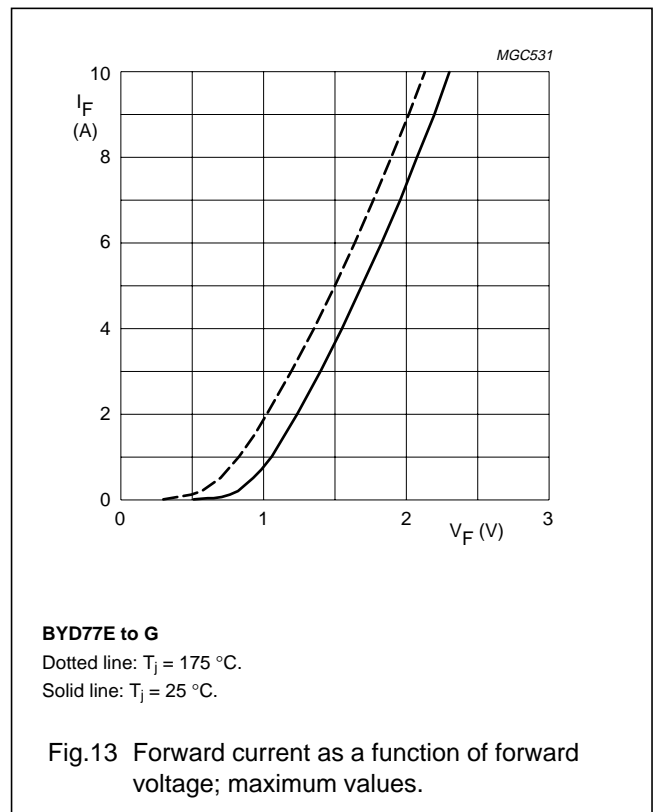
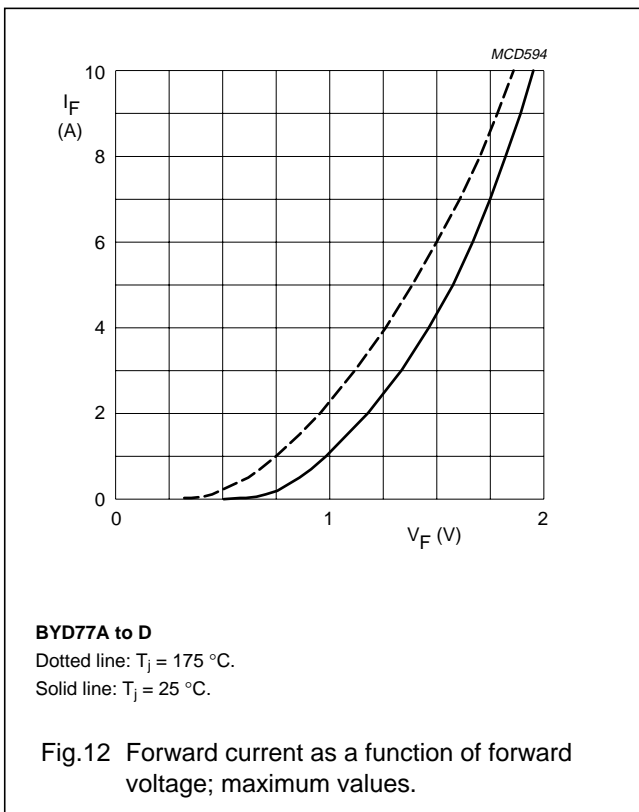
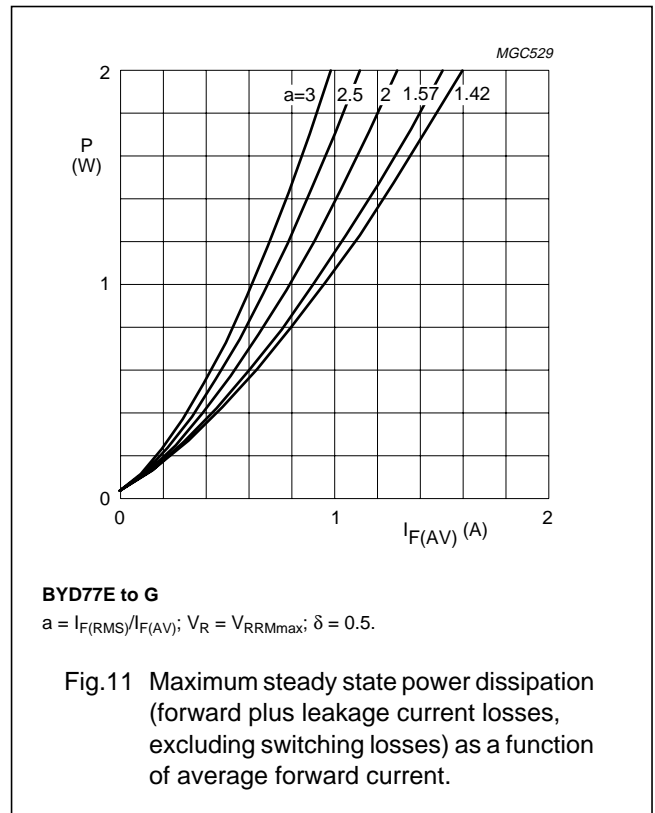
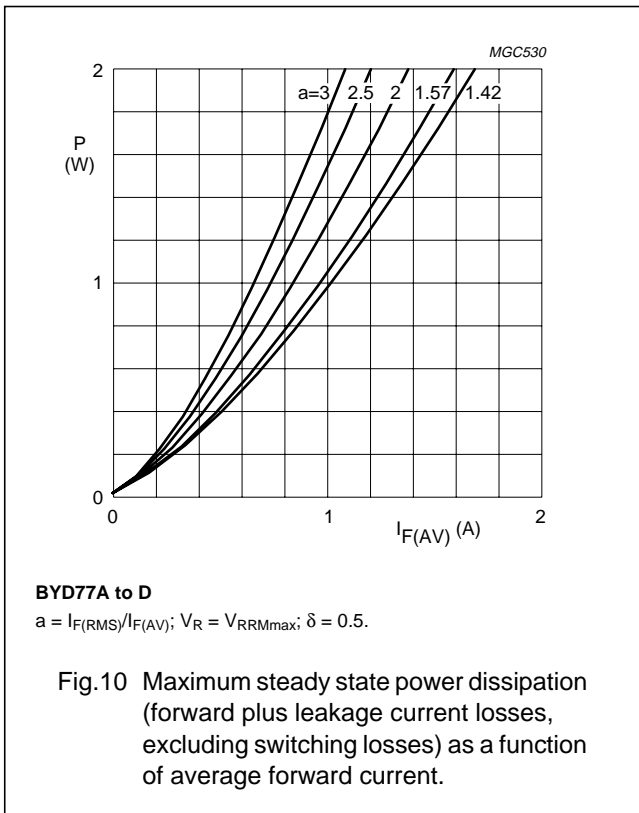
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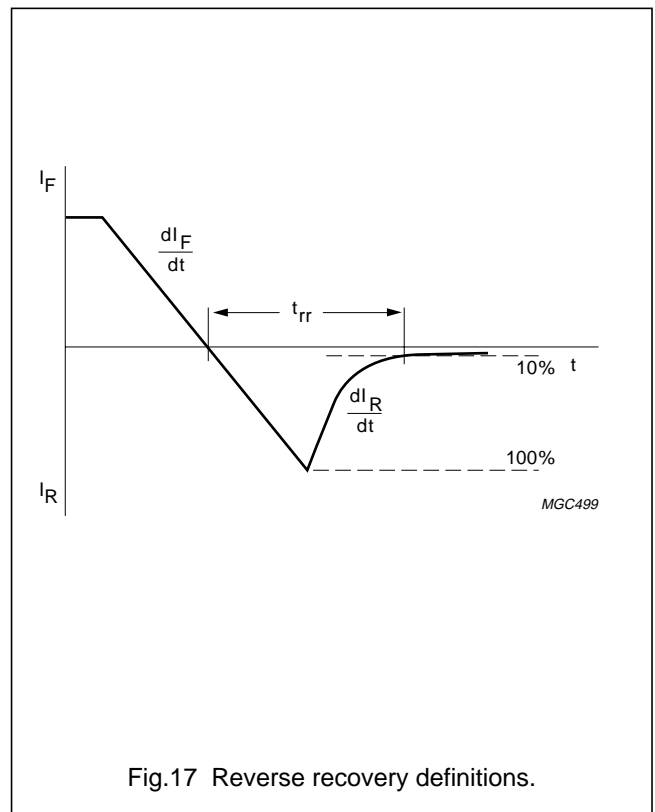
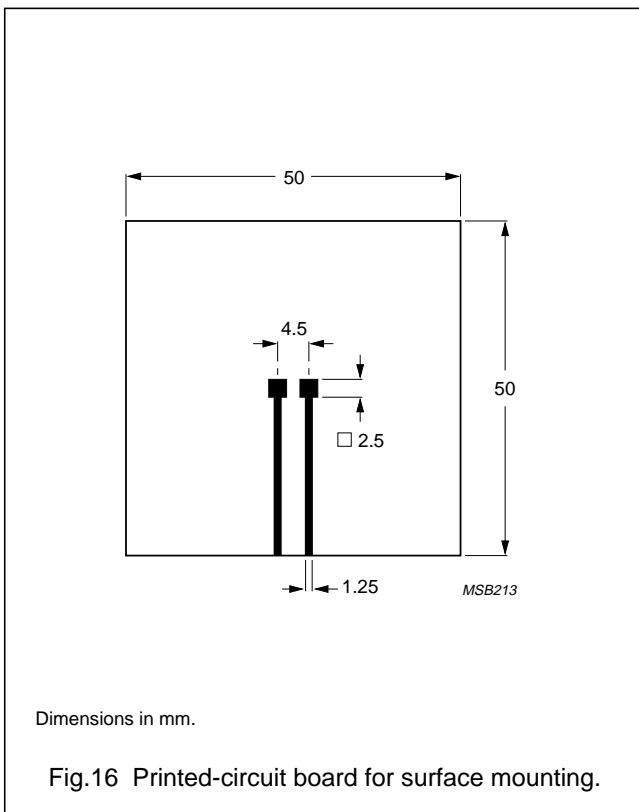
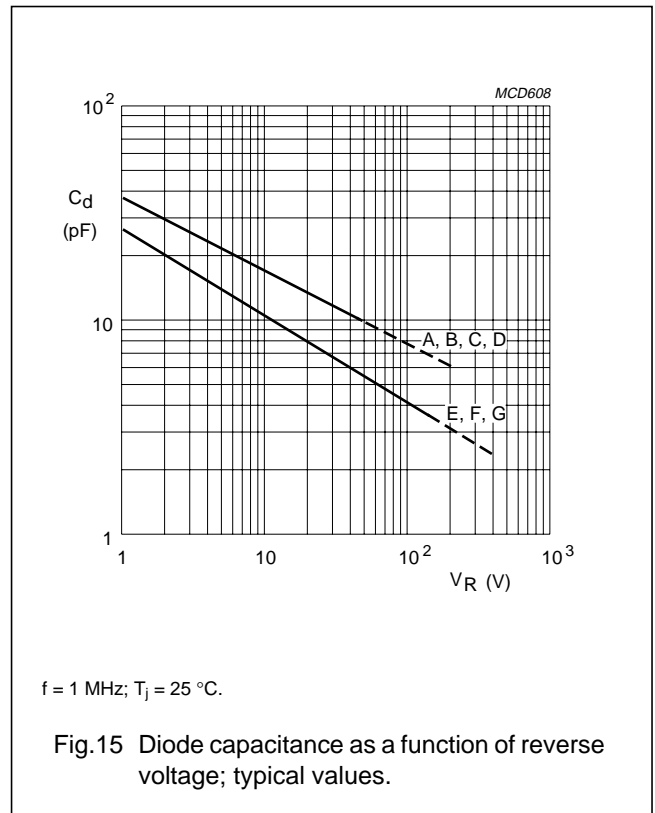
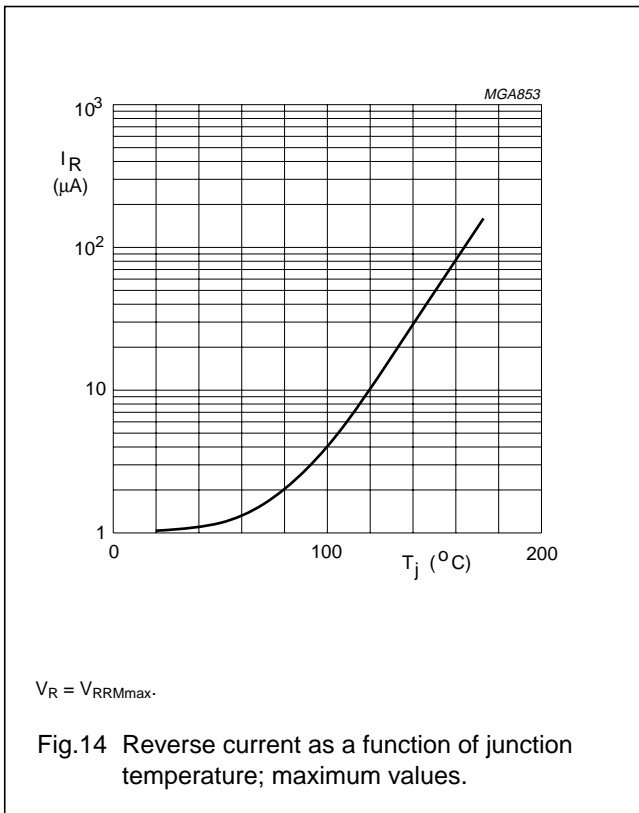
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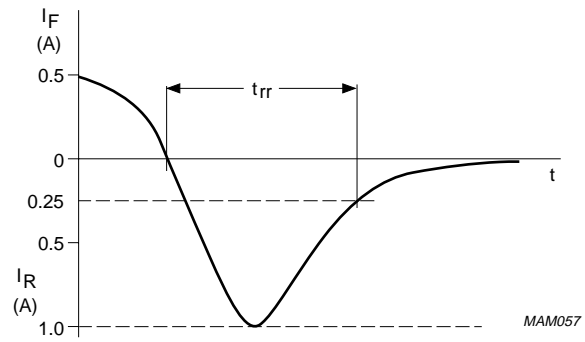
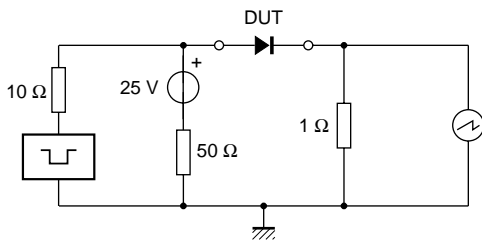
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Input impedance oscilloscope: 1 M Ω , 22 pF; $t_r \leq 7$ ns.
Source impedance: 50 Ω ; $t_r \leq 15$ ns.

Fig.18 Test circuit and reverse recovery time waveform and definition.

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PACKAGE OUTLINE

Hermetically sealed glass surface mounted package;
Implotec™(1) technology; 2 connectors

SOD87

DIMENSIONS (mm are the original dimensions)

| UNIT | D | D1 | H | L |
|------|------------|------------|------------|-----|
| mm | 2.1 2.0 | 2.0 1.8 | 3.7 3.3 | 0.3 |

Notes

- Implotec is a trademark of Philips.
- The marking indicates the cathode.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | |
| SOD87 | 100H03 | | | | 99-03-31 99-06-04 |

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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Argentina: see South America

Australia: 3 Figtree Drive, HOME BUSH, NSW 2140,
Tel. +61 2 9704 8141, Fax. +61 2 9704 8139

Austria: Computerstr. 6, A-1101 WIEN, P.O. Box 213,
Tel. +43 1 60 101 1248, Fax. +43 1 60 101 1210

Belarus: Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,
220050 MINSK, Tel. +375 172 20 0733, Fax. +375 172 20 0773

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Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor,
51 James Bourchier Blvd., 1407 SOFIA,
Tel. +359 2 68 9211, Fax. +359 2 68 9102

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS,
Tel. +1 800 234 7381, Fax. +1 800 943 0087

China/Hong Kong: 501 Hong Kong Industrial Technology Centre,
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Colombia: see South America

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Denmark: Sydhavnsgade 23, 1780 COPENHAGEN V,
Tel. +45 33 29 3333, Fax. +45 33 29 3905

Finland: Sinikalliontie 3, FIN-02630 ESPOO,
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France: 51 Rue Carnot, BP317, 92156 SURESNES Cedex,
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Germany: Hammerbrookstraße 69, D-20097 HAMBURG,
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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: PT Philips Development Corporation, Semiconductors Division,
Gedung Philips, Jl. Buncit Raya Kav.99-100, JAKARTA 12510,
Tel. +62 21 794 0040 ext. 2501, Fax. +62 21 794 0080

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, Via Casati, 23 - 20052 MONZA (MI),
Tel. +39 039 203 6838, Fax +39 039 203 6800

Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku,
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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,
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Mexico: 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,
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Middle East: see Italy

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New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
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Norway: Box 1, Manglerud 0612, OSLO,
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Pakistan: see Singapore

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: Al.Jerozolimskie 195 B, 02-222 WARSAW,
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Portugal: see Spain

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Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
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Singapore: Lorong 1, Toa Payoh, SINGAPORE 319762,
Tel. +65 350 2538, Fax. +65 251 6500

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South America: Al. Vicente Pinzon, 173, 6th floor,
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Spain: Balmes 22, 08007 BARCELONA,
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Taiwan: Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,
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Turkey: Yukari Dudullu, Org. San. Blg., 2.Cad. Nr. 28 81260 Umraniye,
ISTANBUL, Tel. +90 216 522 1500, Fax. +90 216 522 1813

Ukraine: PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,
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United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes,
MIDDLESEX UB3 5BX, Tel. +44 208 730 5000, Fax. +44 208 754 8421

United States: 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,
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