

# DATA SHEET



## **BYD47 series** Fast soft-recovery controlled avalanche rectifiers

Product specification  
Supersedes data of 1996 Jun 05

1999 Nov 11

## Fast soft-recovery controlled avalanche rectifiers

## BYD47 series

### FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- 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.

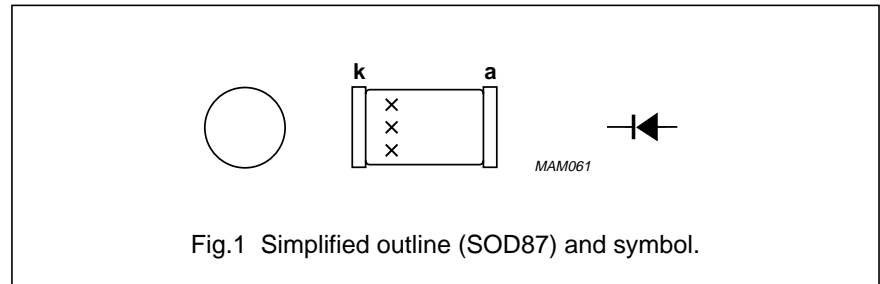


Fig.1 Simplified outline (SOD87) and symbol.

### LIMITING VALUES

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

| SYMBOL      | PARAMETER                           | CONDITIONS  | MIN. | MAX. | UNIT |
|-------------|-------------------------------------|---|------|------|------|
| $V_{RSM}$   | non-repetitive peak reverse voltage |   |      |      |      |
|             | BYD47-16                            |   | –    | 1700 | V    |
|             | BYD47-18                            |   | –    | 1900 | V    |
|             | BYD47-20                            |   | –    | 2100 | V    |
| $V_{RRM}$   | repetitive peak reverse voltage     |   |      |      |      |
|             | BYD47-16                            |   | –    | 1600 | V    |
|             | BYD47-18                            |   | –    | 1800 | V    |
|             | BYD47-20                            |   | –    | 2000 | V    |
| $I_{F(AV)}$ | average forward current             | $T_{tp} = 105\text{ °C}$ ; see Fig.2;<br>averaged over any 20 ms period;<br>see also Fig.6                            | –    | 0.80 | A    |
| $I_{F(AV)}$ | average forward current             | $T_{amb} = 25\text{ °C}$ ; PCB mounting (see Fig.11); see Fig.3;<br>averaged over any 20 ms period;<br>see also Fig.6 | –    | 0.34 | A    |
| $I_{FRM}$   | repetitive peak forward current     | $T_{tp} = 85\text{ °C}$ ; see Fig.4   | –    | 8.0  | A    |
|             |                                     | $T_{amb} = 65\text{ °C}$ ; see Fig.5  | –    | 2.8  | A    |
| $I_{FSM}$   | non-repetitive peak forward current | $t = 10\text{ ms}$ half sine wave; $T_j = T_{j\text{ max}}$<br>prior to surge; $V_R = V_{RRM\text{ max}}$             | –    | 10   | A    |
| $T_{stg}$   | storage temperature                 |   | –65  | +175 | °C   |
| $T_j$       | junction temperature                | see Fig.7   | –65  | +175 | °C   |

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### ELECTRICAL CHARACTERISTICS

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

| SYMBOL                           | PARAMETER                                 | CONDITIONS   | TYP. | MAX. | UNIT                   |
|----------------------------------|---|--|------|------|------------------------|
| $V_F$                            | forward voltage                           | $I_F = 1\text{ A}$ ; $T_j = T_{j\text{ max}}$ ; see Fig.8  | –    | 2.05 | V                      |
|                                  |   | $I_F = 1\text{ A}$ ; see Fig.8   | –    | 2.40 | V                      |
| $I_R$                            | reverse current                           | $V_R = V_{RRM\text{ max}}$ ;<br>see Fig.9  | –    | 5    | $\mu\text{A}$          |
|                                  |   | $V_R = V_{RRM\text{ max}}$ ; $T_j = 125\text{ °C}$ ;<br>see Fig.9  | –    | 50   | $\mu\text{A}$          |
| $t_{rr}$                         | reverse recovery time                     | when switched from $I_F = 0.5\text{ A}$ to<br>$I_R = 1\text{ A}$ ; measured at $I_R = 0.25\text{ A}$ ;<br>see Fig.12       | –    | 300  | ns                     |
| $C_d$                            | diode capacitance                         | $f = 1\text{ MHz}$ ; $V_R = 0\text{ V}$ ; see Fig.10   | 15   | –    | pF                     |
| $\left  \frac{dI_R}{dt} \right $ | maximum slope of reverse recovery current | when switched from $I_F = 1\text{ A}$ to<br>$V_R \geq 30\text{ V}$ and $dI_F/dt = -1\text{ A}/\mu\text{s}$ ;<br>see Fig.13 | –    | 5    | $\text{A}/\mu\text{s}$ |

### THERMAL CHARACTERISTICS

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

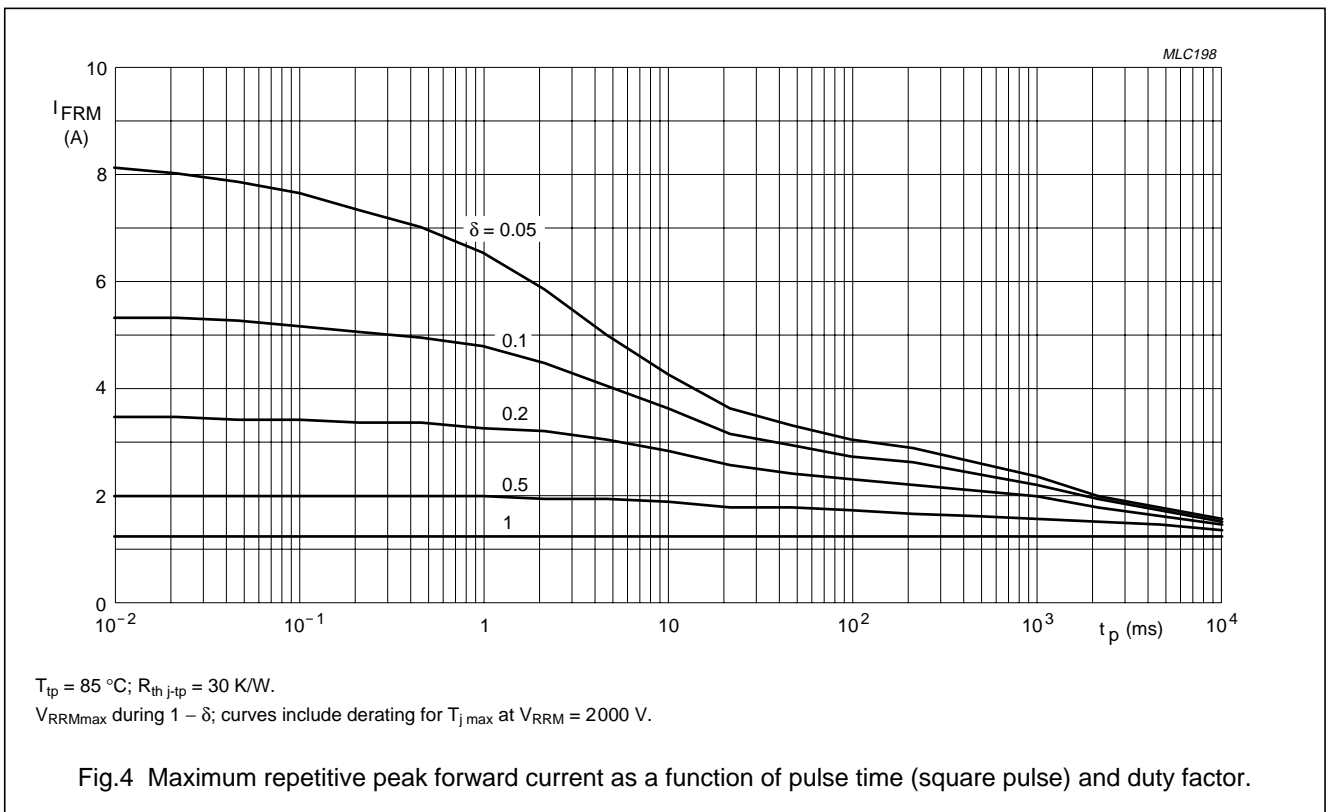
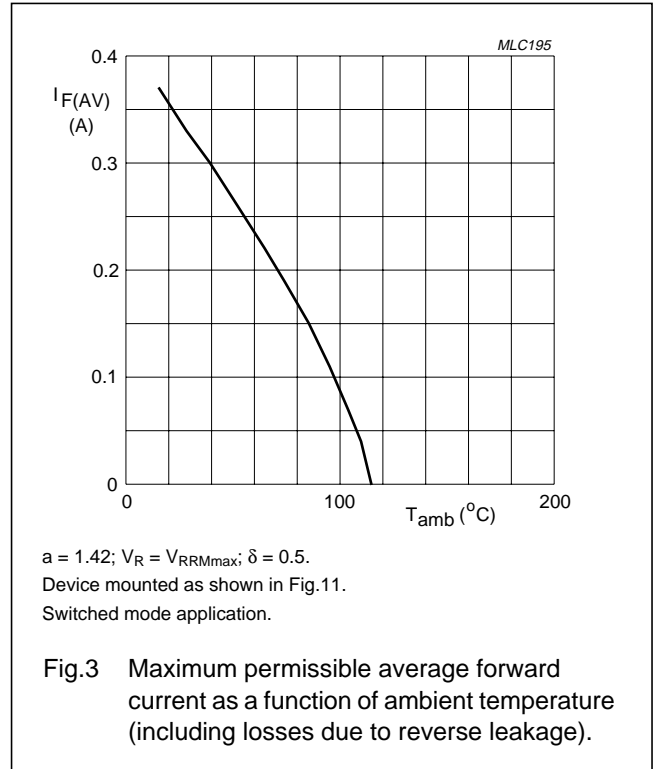
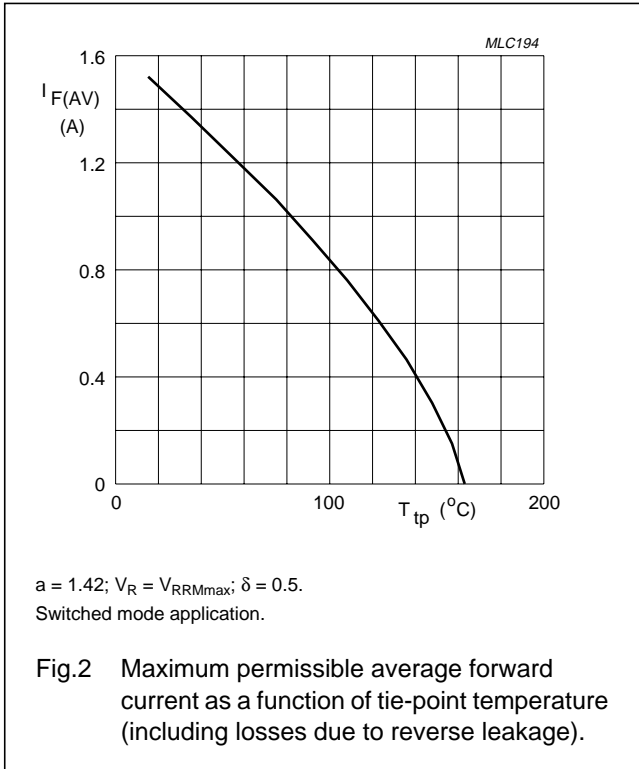
#### Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer  $\geq 40\text{ }\mu\text{m}$ , see Fig.11. For more information please refer to the "General Part of associated Handbook".

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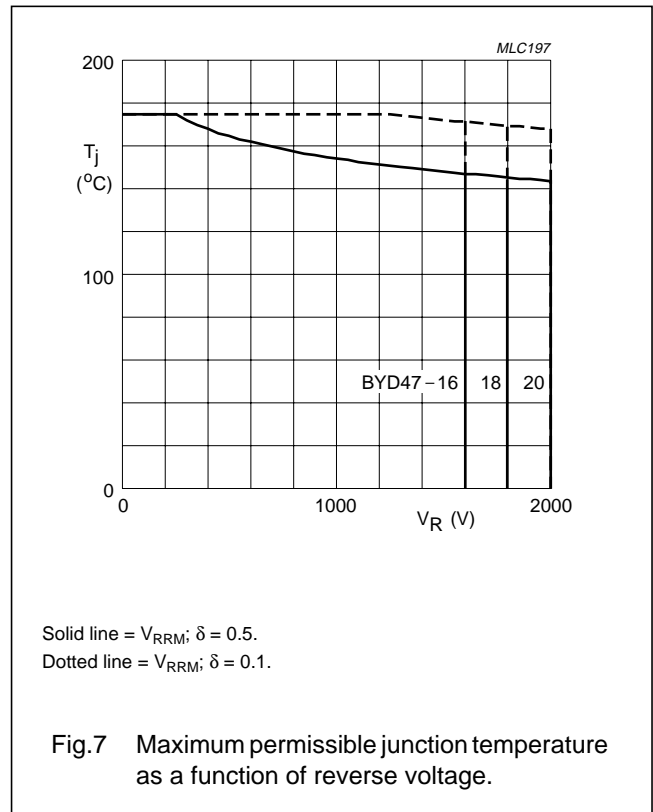
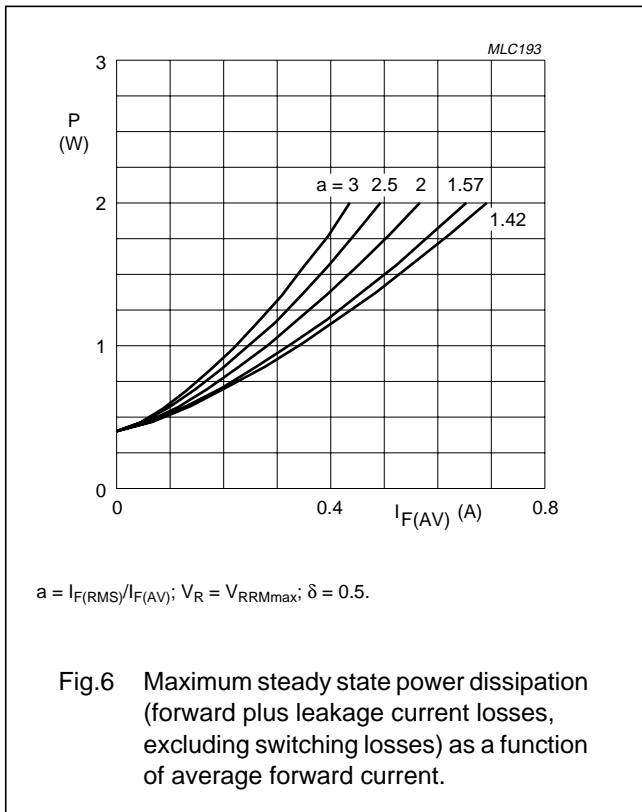
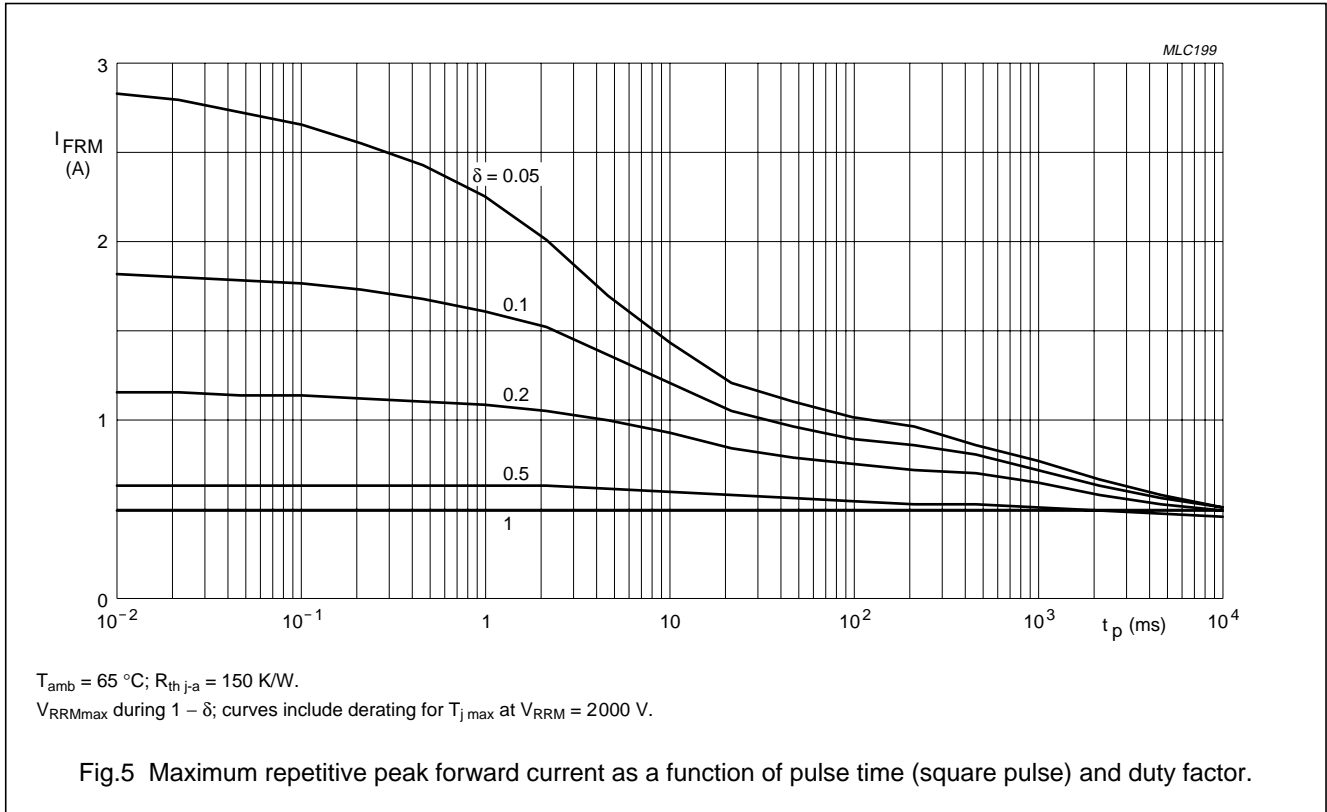
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GRAPHICAL DATA



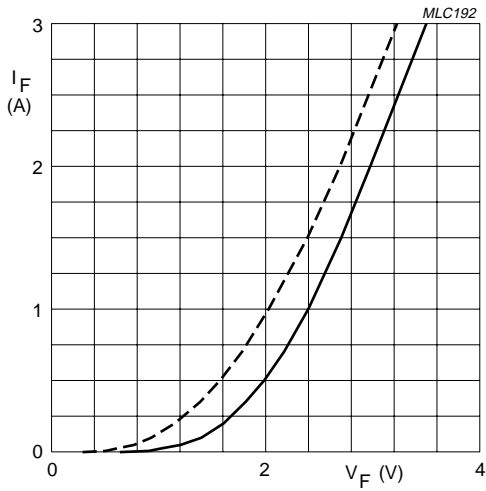
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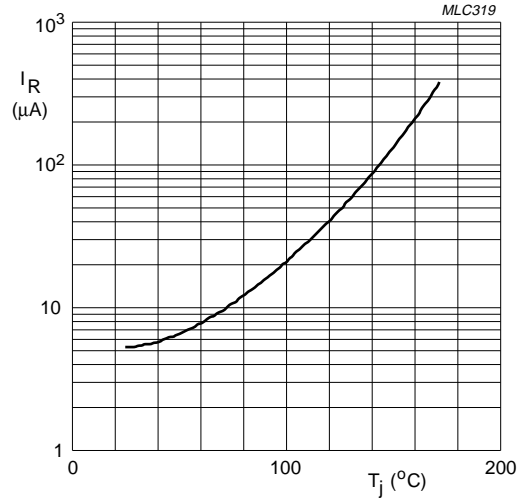
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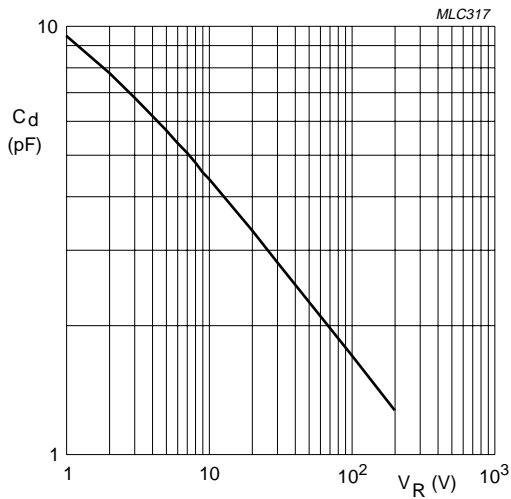
Dotted line:  $T_j = 175\text{ }^\circ\text{C}$ .  
Solid line:  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.8 Forward current as a function of forward voltage; maximum values.



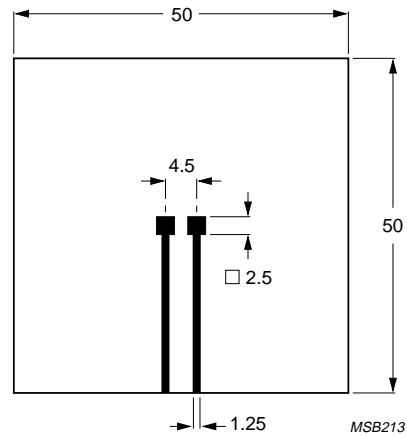
$V_R = V_{RRMmax}$ .

Fig.9 Reverse current as a function of junction temperature; maximum values.



$f = 1\text{ MHz}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.10 Diode capacitance as a function of reverse voltage; typical values.

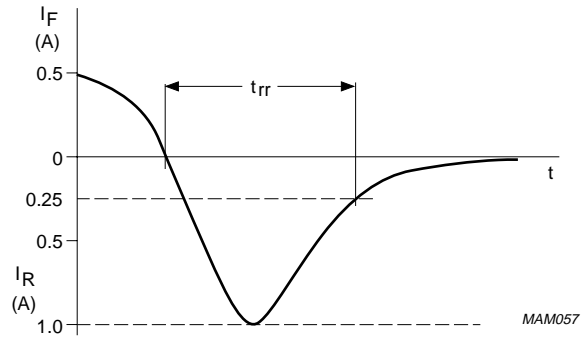
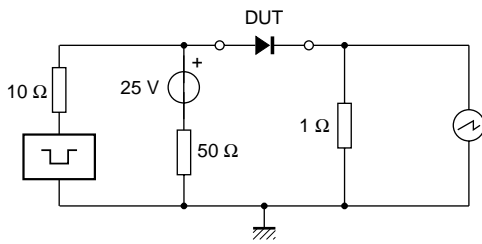


Dimensions in mm.

Fig.11 Printed-circuit board for surface mounting.

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

Fig.12 Test circuit and reverse recovery time waveform and definition.

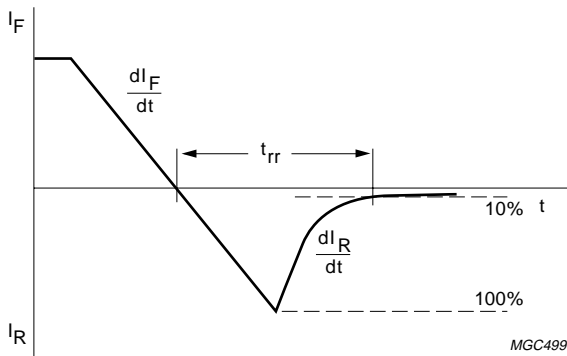


Fig.13 Reverse recovery definitions.

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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<br>2.0 | 2.0<br>1.8 | 3.7<br>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<br>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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