

# DATA SHEET



## **BYD37 series** Fast soft-recovery controlled avalanche rectifiers

Product specification  
Supersedes data of 1996 Jun 05

1999 Nov 16

## Fast soft-recovery controlled avalanche rectifiers

## BYD37 series

### FEATURES

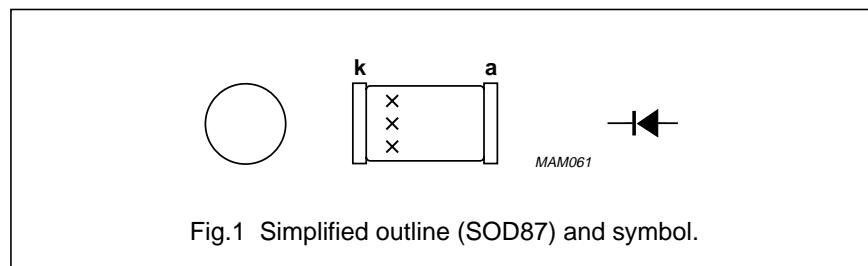
- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Smallest surface mount rectifier outline
- Shipped in 8 mm embossed tape.

### DESCRIPTION

Cavity free cylindrical glass package through Implotec™<sup>(1)</sup> 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.



### LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{RRM}$	repetitive peak reverse voltage				
	BYD37D		—	200	V
	BYD37G		—	400	V
	BYD37J		—	600	V
	BYD37K		—	800	V
	BYD37M		—	1000	V
$V_R$	continuous reverse voltage				
	BYD37D		—	200	V
	BYD37G		—	400	V
	BYD37J		—	600	V
	BYD37K		—	800	V
	BYD37M		—	1000	V
$I_{F(AV)}$	average forward current	$T_{tp} = 105\text{ °C}$ ; see Fig.2; averaged over any 20 ms period; see also Fig.6	—	1.5	A
$I_{F(AV)}$	average forward current	$T_{amb} = 60\text{ °C}$ ; PCB mounting (see Fig.11); see Fig.3; averaged over any 20 ms period; see also Fig.6	—	0.6	A
$I_{FRM}$	repetitive peak forward current	$T_{tp} = 105\text{ °C}$ ; see Fig.4	—	13	A
		$T_{amb} = 60\text{ °C}$ ; see Fig.5	—	5.5	A
$I_{FSM}$	non-repetitive peak forward current	$t = 10\text{ ms}$ half sine wave; $T_j = T_{j\text{ max}}$ prior to surge; $V_R = V_{RRM\text{ max}}$	—	20	A

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$E_{RSM}$	non-repetitive peak reverse avalanche energy	$L = 120 \text{ mH}$ ; $T_j = T_{j \max}$ prior to surge; inductive load switched off			
	BYD37D to J		–	10	mJ
	BYD37K and M		–	7	mJ
$T_{stg}$	storage temperature		–65	+175	°C
$T_j$	junction temperature	see Fig.7	–65	+175	°C

### ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_F$	forward voltage	$I_F = 1 \text{ A}$ ; $T_j = T_{j \max}$ ; see Fig.8	–	–	1.1	V
		$I_F = 1 \text{ A}$ ; see Fig.8	–	–	1.3	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	$I_R = 0.1 \text{ mA}$				
	BYD37D		300	–	–	V
	BYD37G		500	–	–	V
	BYD37J		700	–	–	V
	BYD37K		900	–	–	V
	BYD37M		1100	–	–	V
$I_R$	reverse current	$V_R = V_{RRMmax}$ ; see Fig.9	–	–	1	μA
		$V_R = V_{RRMmax}$ ; $T_j = 165 \text{ °C}$ ; see Fig.9	–	–	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.12	–	–	250	ns
	BYD37D to J BYD37K and M		–	–	300	ns
$C_d$	diode capacitance	$f = 1 \text{ MHz}$ ; $V_R = 0$ ; see Fig.10	–	20	–	pF
$\left  \frac{dI_R}{dt} \right $	maximum slope of reverse recovery current	when switched from $I_F = 1 \text{ A}$ to $V_R \geq 30 \text{ V}$ and $dI_F/dt = -1 \text{ A/}\mu\text{s}$ ; see Fig.13	–	–	6	A/μs
	BYD37D to J BYD37K and M		–	–	5	A/μs

### THERMAL CHARACTERISTICS

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

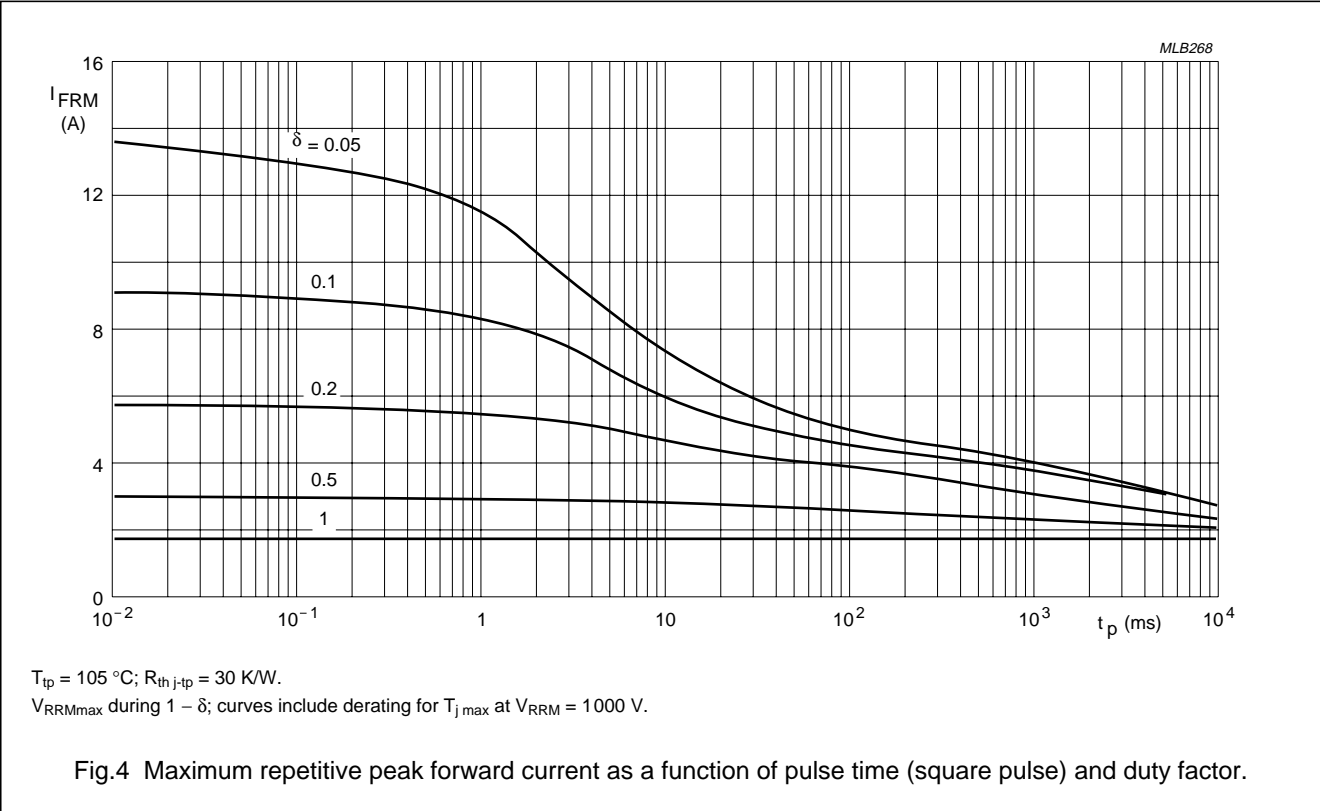
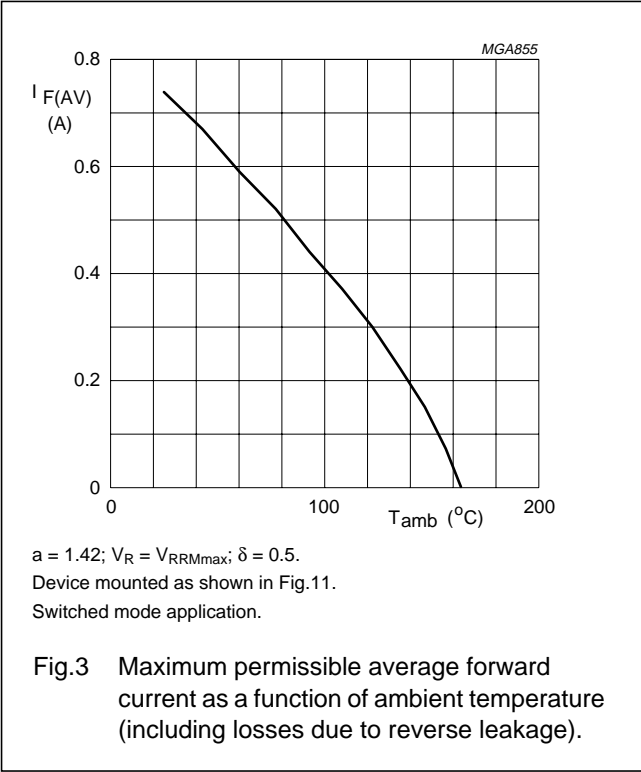
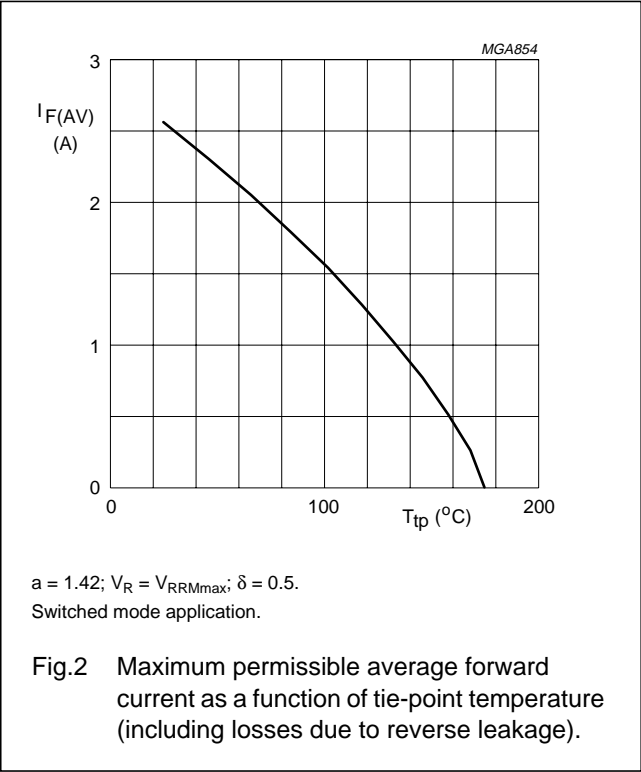
#### Note

- 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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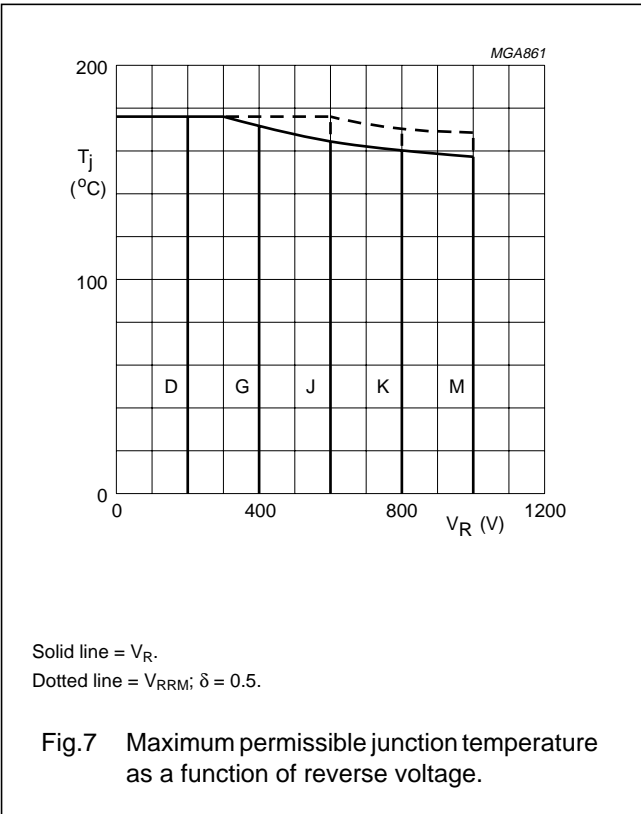
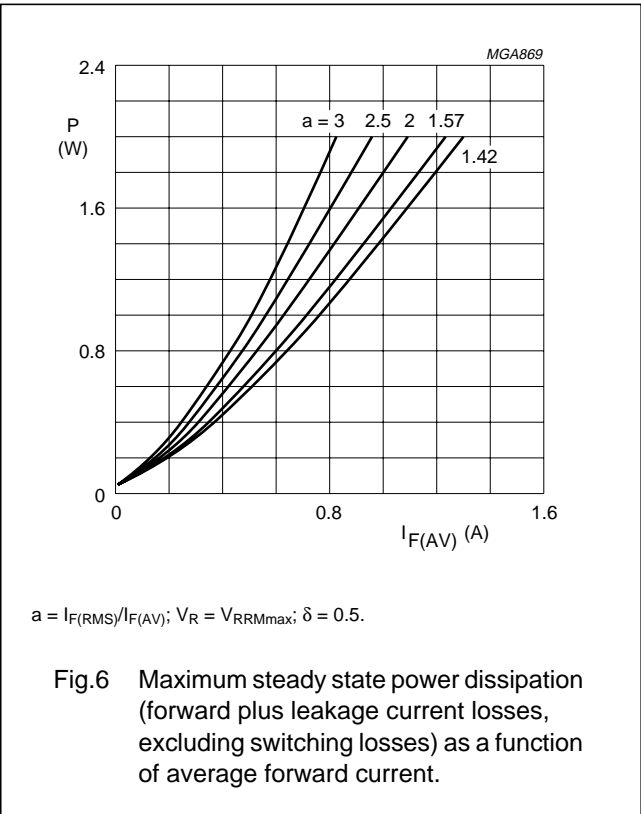
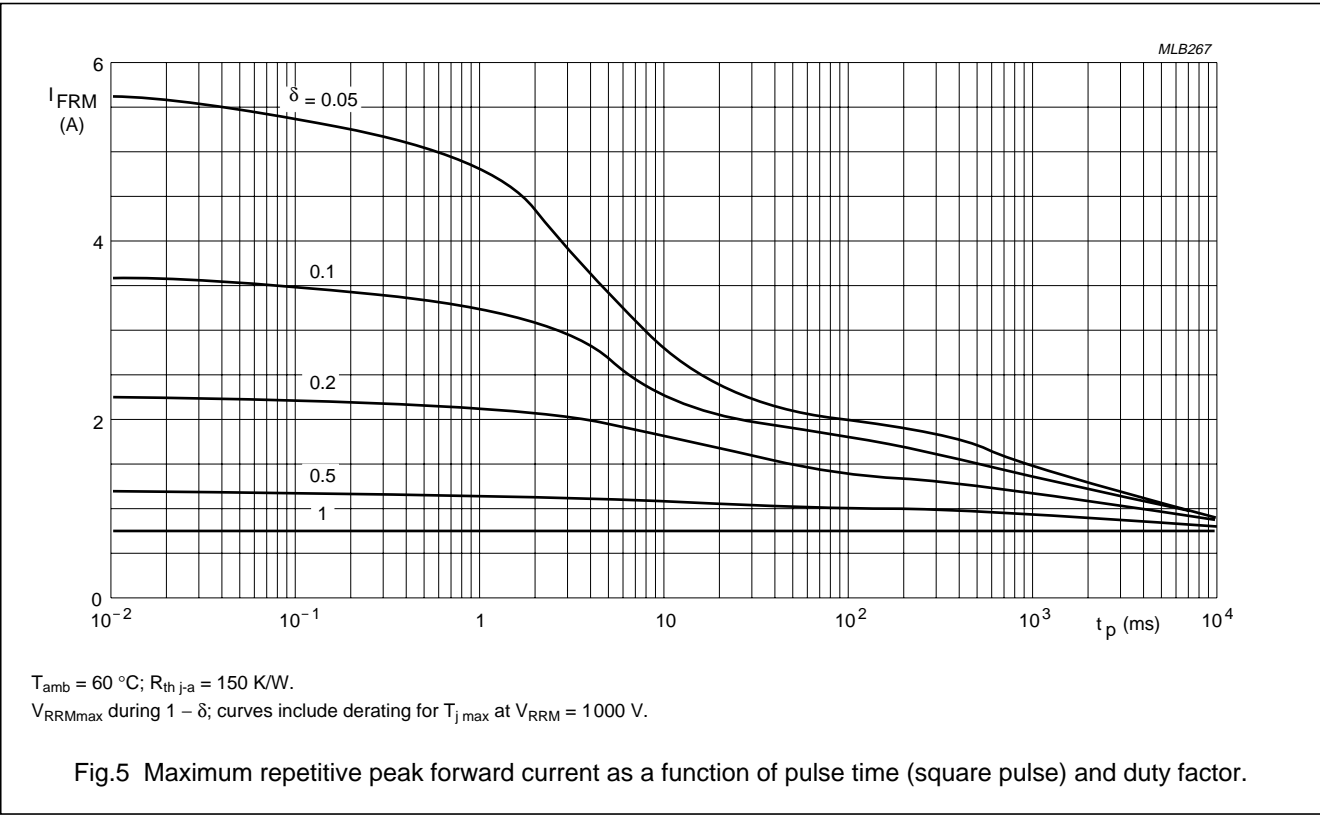
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GRAPHICAL DATA



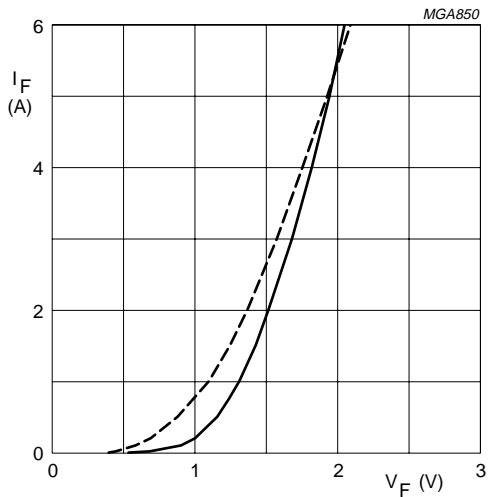
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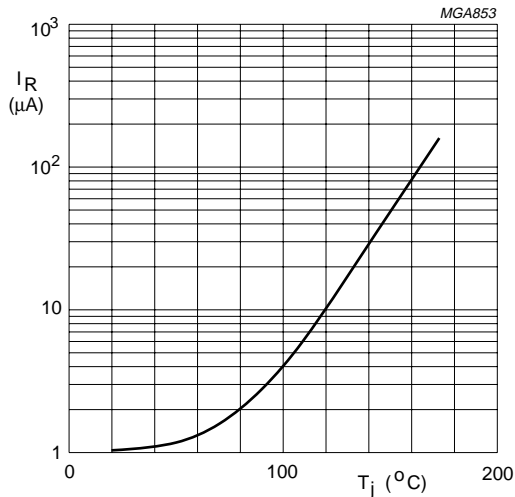
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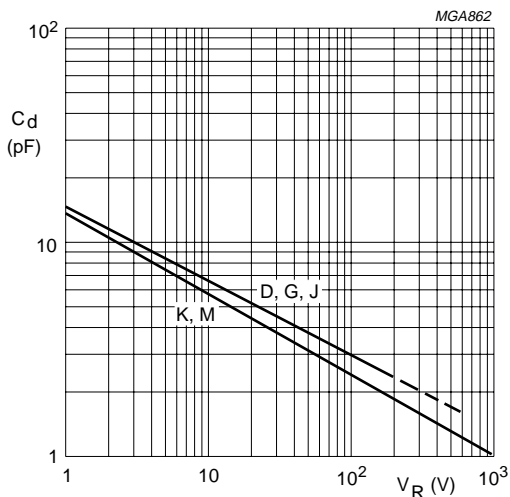
Dotted line:  $T_j = 175\text{ }^{\circ}\text{C}$ .  
Solid line:  $T_j = 25\text{ }^{\circ}\text{C}$ .

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



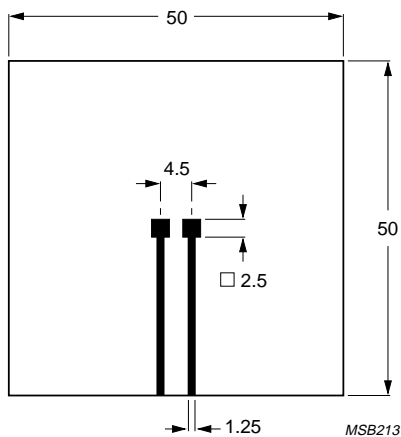
$V_R = V_{RRMmax}$ .

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.

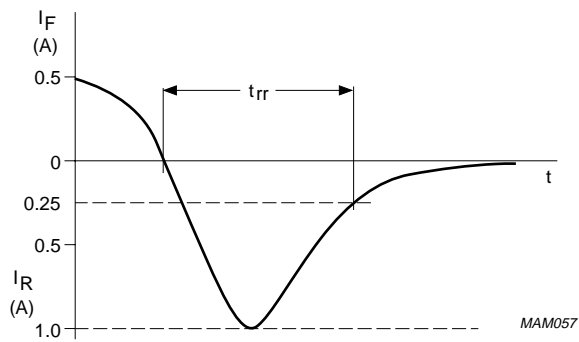
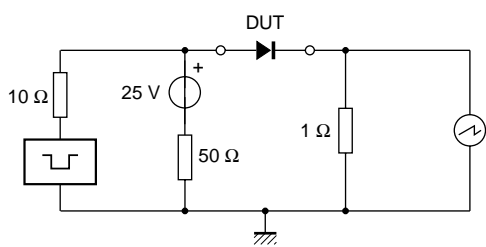


Dimensions in mm.

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.

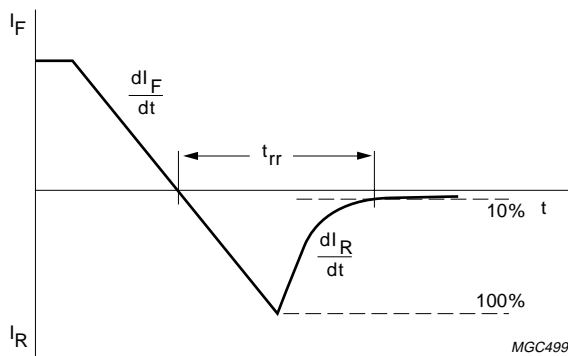


Fig.13 Reverse recovery definitions.

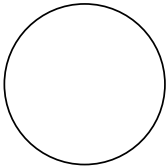
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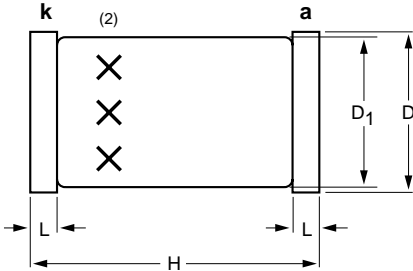
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PACKAGE OUTLINE

Hermetically sealed glass surface mounted package;  
Implotec<sup>TM</sup>(1) technology; 2 connectors

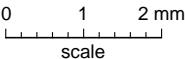
SOD87






**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**

1. Implotec is a trademark of Philips.  
2. 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.	

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

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**NOTES**

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