BYD47-20

Fast soft-recovery rectifier

Rev. 04 — 4 February 2005 Product data sheet

1. Product profile

1.1 General description

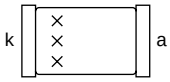
Cavity free cylindrical glass SOD87 package through Implotec™ technology. This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

1.2 Features

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Shipped in 8 mm embossed tape
- Smallest surface mount rectifier outline

2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline	Symbol
1	cathode (K) [1]		 sym006
2	anode (A)		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
BYD47-20	-	hermetically sealed glass surface mounted package; Implotec™ technology; 2 connectors	SOD87

PHILIPS

4. Limiting values

Table 3: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RSM}	non-repetitive peak reverse voltage		-	2100	V
V_{RRM}	repetitive peak reverse voltage		-	2000	V
$I_{F(AV)}$	average forward current	T_{tp} = 105 °C; see Figure 1; averaged over any 20 ms period; see also Figure 5	-	0.80	A
		T_{amb} = 25 °C; printed-circuit board mounting (see Figure 13); see Figure 2; averaged over any 20 ms period; see also Figure 5	-	0.34	A
I_{FRM}	repetitive peak forward current	T_{tp} = 85 °C; see Figure 3	-	8.0	A
		T_{amb} = 65 °C; see Figure 4	-	2.8	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine wave; $T_j = T_{j(max)}$ prior to surge; $V_R = V_{RRMmax}$	-	10	A
T_{stg}	storage temperature		–65	+175	°C
T_j	junction temperature	see Figure 6	–65	+175	°C

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions		Typ	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		[1]	150	K/W

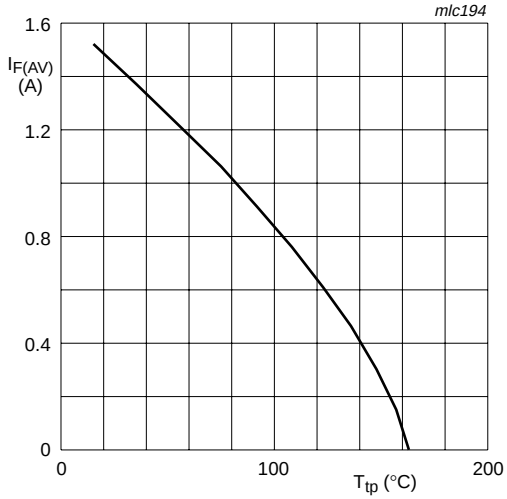
[1] Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥ 40 µm, see Figure 13.

6. Characteristics

Table 5: Characteristics

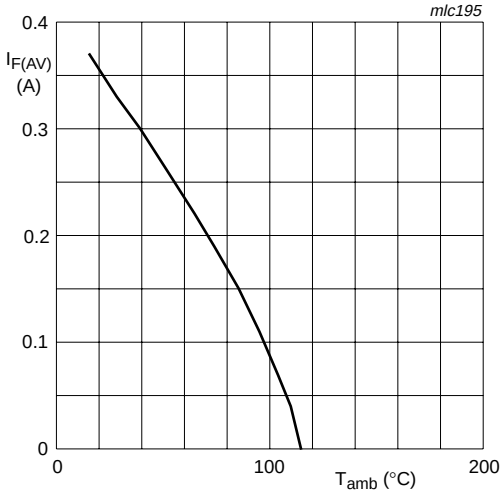
T_j = 25 °C; unless otherwise stated.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	I_F = 1 A; $T_j = T_{j(max)}$; see Figure 7	-	-	2.05	V
		I_F = 1 A; see Figure 7	-	-	2.40	V
I_R	reverse current	$V_R = V_{RRMmax}$; see Figure 8	-	-	5	µA
		$V_R = V_{RRMmax}$; T_j = 125 °C; see Figure 8	-	-	50	µA
t_{rr}	reverse recovery time	when switched from I_F = 0.5 A to I_R = 1 A; measured at I_R = 0.25 A; see Figure 10	-	-	300	ns
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; see Figure 9	-	15	-	pF
$\left\|\frac{dI_R}{dt}\right\|$	maximum slope of reverse recovery current	when switched from I_F = 1 A to $V_R \geq$ 30 V and dI_F/dt = –1 A/µs; see Figure 11	-	-	5	A/µs



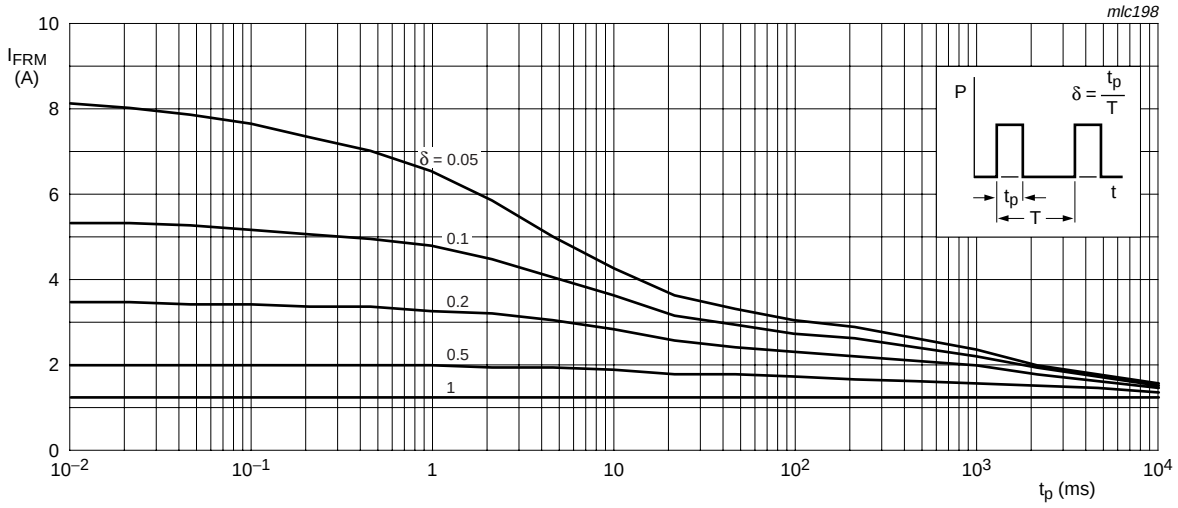
a = $I_{F(RMS)}/I_{F(AV)}$ = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.
Switched mode application.

Fig 1. Maximum permissible average forward current as a function of tie-point temperature (including losses due to reverse leakage)



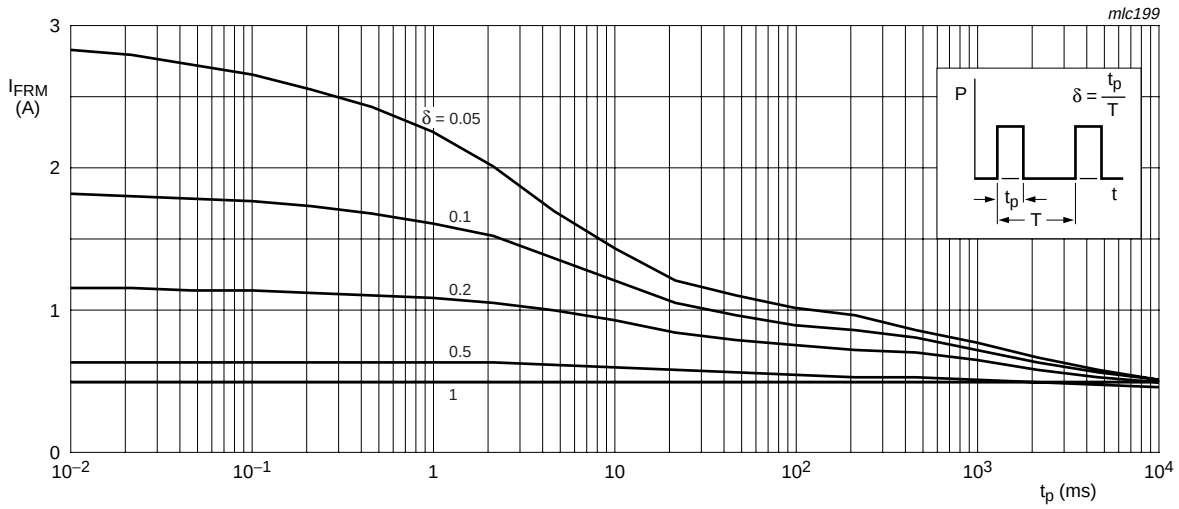
a = $I_{F(RMS)}/I_{F(AV)}$ = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.
Device mounted as shown in Figure 13.
Switched mode application.

Fig 2. Maximum permissible average forward current as a function of ambient temperature (including losses due to reverse leakage)



T_{tp} = 85 °C; $R_{th(j\text{-}tp)}$ = 30 K/W.
V_{RRMmax} during 1 − δ; curves include derating for $T_{j(max)}$ at V_{RRM} = 2000 V.

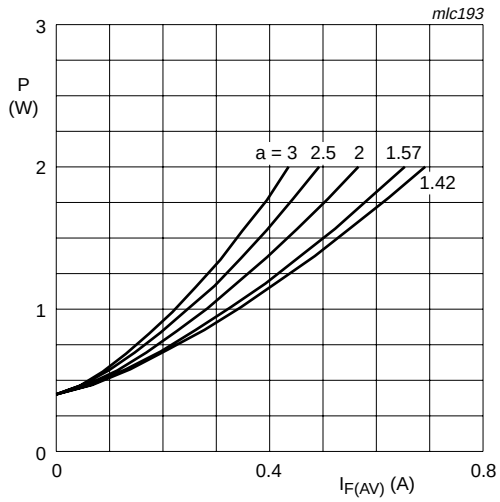
Fig 3. Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor



T_{amb} = 65 °C; $R_{th(j-a)}$ = 150 K/W.

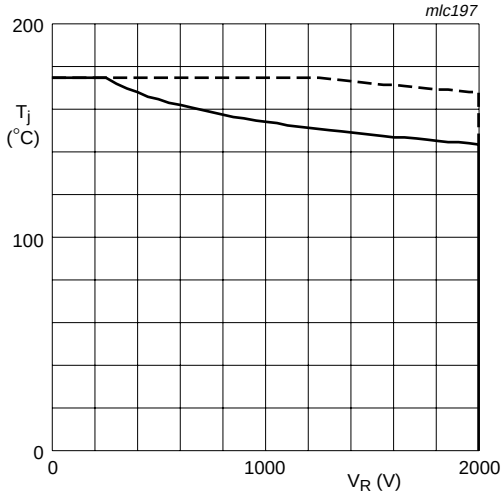
V_{RRMmax} during 1 – δ; curves include derating for $T_{j(max)}$ at V_{RRM} = 2000 V.

Fig 4. Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor



a = $I_{F(RMS)}/I_{F(AV)}$; V_R = V_{RRMmax}; δ = 0.5.

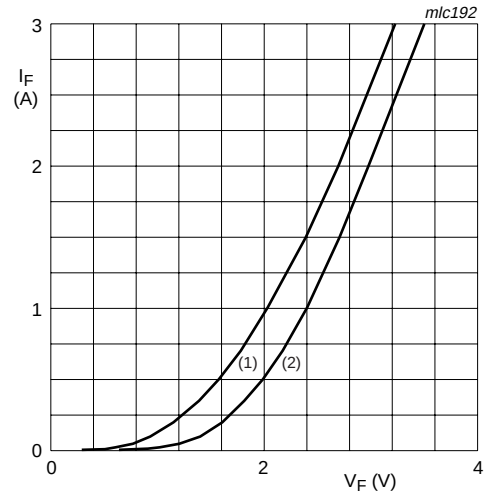
Fig 5. Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current



Solid line: V_{RRM}; δ = 0.5.

Dotted line: V_{RRM}; δ = 0.1.

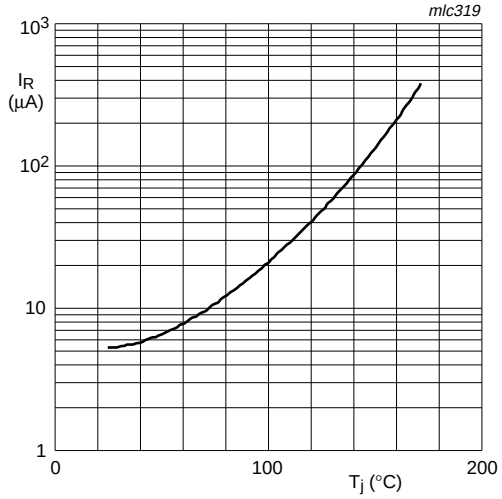
Fig 6. Maximum permissible junction temperature as a function of reverse voltage



(1) T_j = 175 °C.

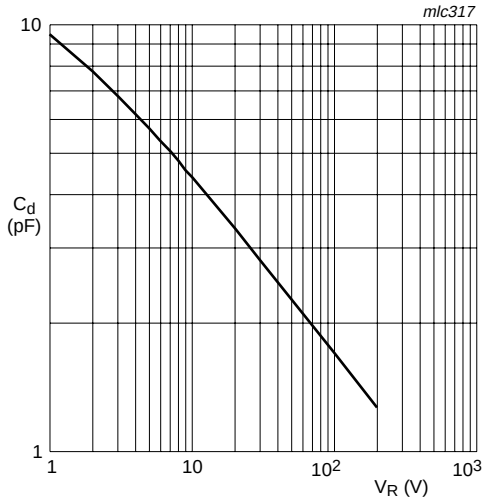
(2) T_j = 25 °C.

Fig 7. Forward current as a function of forward voltage; maximum values



$V_R = V_{RRMmax}$.

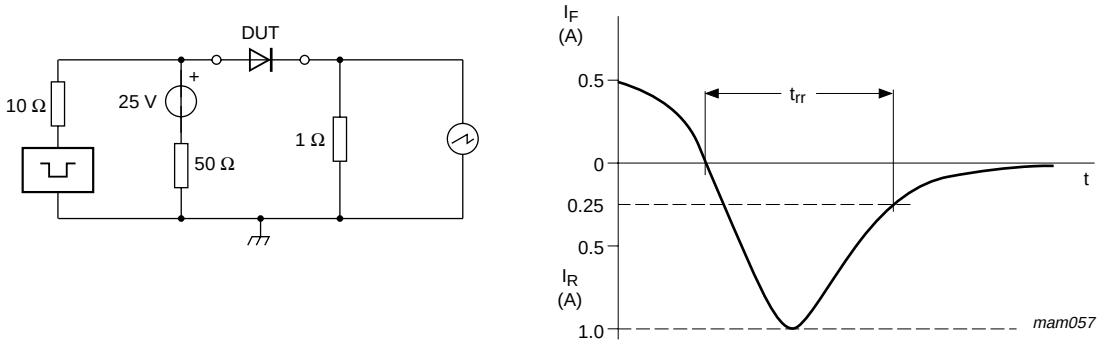
Fig 8. Reverse current as a function of junction temperature; maximum values



f = 1 MHz; T_j = 25 °C.

Fig 9. Diode capacitance as a function of reverse voltage; typical values

7. Test information



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

Source impedance: 50 Ω; $t_r \leq 15$ ns.

Fig 10. Test circuit and reverse recovery time waveform and definition

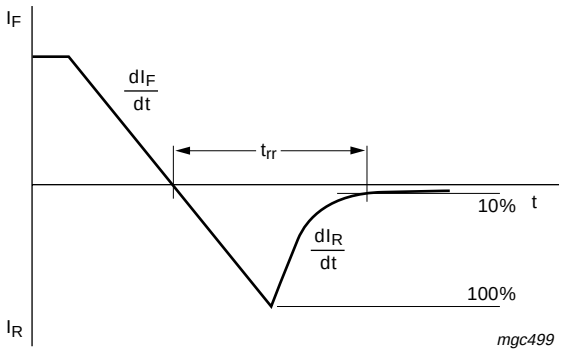
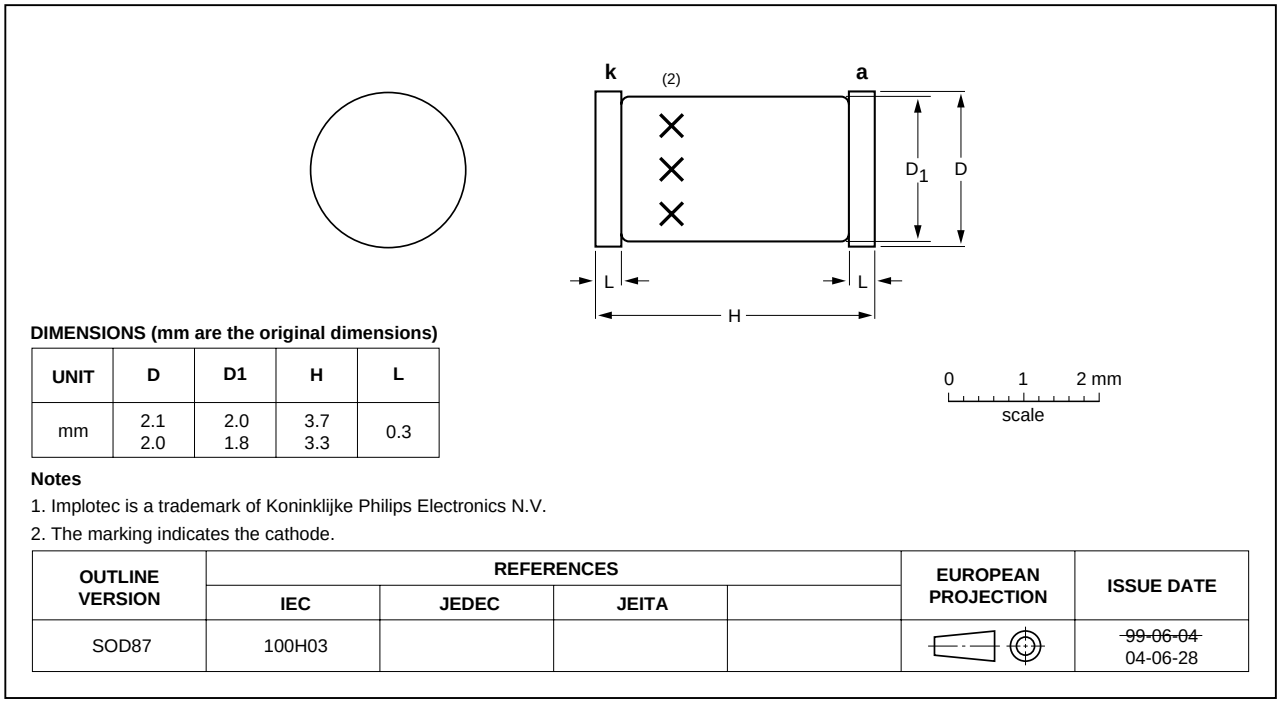


Fig 11. Reverse recovery definitions

8. 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

1. Implotec is a trademark of Koninklijke Philips Electronics N.V.
2. The marking indicates the cathode.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOD87	100H03					~~99-06-04~~ 04-06-28

Fig 12. Package outline SOD87

9. Mounting

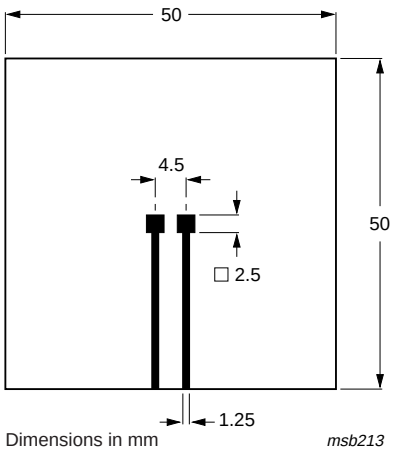


Fig 13. Printed-circuit board for surface mounting

10. Revision history

Table 6: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BYD47-20_4	20050204	Product data sheet	-	9397 750 14417	BYD47_SERIES_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • Type numbers BYD47-16 and BYD47-18 removed • Title changed to Fast soft-recovery rectifier				
BYD47_SERIES_3	19991111	Product specification	-	9397 750 06273	BYD47_2
BYD47_2	19960605	Product specification	-	n.a.	BYD47SERIES_1
BYD47SERIES_1	19941114	Product specification	-	n.a.	-

11. 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).

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[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.

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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.

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16. Contents

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