

DATA SHEET



BYD57 series Ultra-fast soft-recovery controlled avalanche rectifiers

Product specification
Supersedes data of 1998 Dec 04

1999 Nov 11

Ultra-fast soft-recovery controlled avalanche rectifiers

BYD57 series

FEATURES

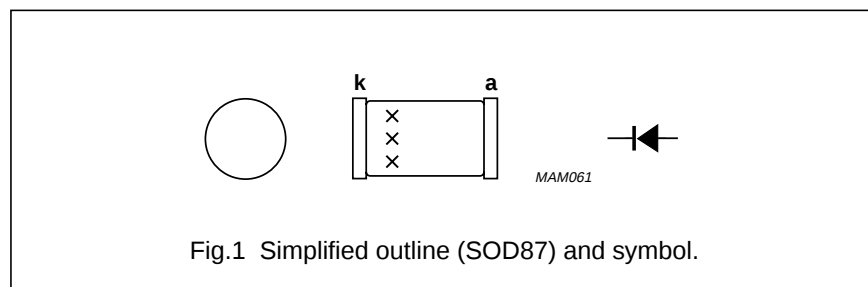
- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Shipped in 8 mm embossed tape
- Smallest surface mount rectifier outline.

DESCRIPTION

Cavity free cylindrical glass SOD87 package through Implotec™⁽¹⁾ technology. The SOD87 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				
	BYD57D		—	200	V
	BYD57G		—	400	V
	BYD57J		—	600	V
	BYD57K		—	800	V
	BYD57M		—	1000	V
	BYD57U		—	1200	V
	BYD57V		—	1400	V
V _R	continuous reverse voltage				
	BYD57D		—	200	V
	BYD57G		—	400	V
	BYD57J		—	600	V
	BYD57K		—	800	V
	BYD57M		—	1000	V
	BYD57U		—	1200	V
	BYD57V		—	1400	V
I _{F(AV)}	average forward current	T _{tp} = 85 °C; see Figs 2 and 3; averaged over any 20 ms period; see also Figs 10 and 11	—	1.0	A
	BYD57D to M		—	1.2	A
I _{F(AV)}	average forward current	T _{amb} = 60 °C; PCB mounting (see Fig.17); see Figs 4 and 5; averaged over any 20 ms period; see also Figs 10 and 11	—	0.4	A
	BYD57D to M		—	0.4	A
I _{FRM}	repetitive peak forward current	T _{tp} = 85 °C; see Figs 6 and 7	—	8.5	A
	BYD57D to M		—	11	A
	BYD57U and V				

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{FRM}	repetitive peak forward current	$T_{amb} = 60\text{ }^{\circ}\text{C}$; see Figs 8 and 9	–	3.0	A
	BYD57D to M BYD57U and V			3.7	A
I_{FSM}	non-repetitive peak forward current	$t = 10\text{ ms}$ half sinewave; $T_j = 25\text{ }^{\circ}\text{C}$ prior to surge; $V_R = V_{RRMmax}$	–	5.0	A
E_{RSM}	non-repetitive peak reverse avalanche energy	$L = 120\text{ mH}$; $T_j = T_{jmax}$ prior to surge; inductive load switched off	–	10	mJ
T_{stg}	storage temperature		–65	+175	$^{\circ}\text{C}$
T_j	junction temperature	see Fig.12	–65	+175	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	$I_F = 1\text{ A}$; $T_j = T_{jmax}$; see Figs 13 and 14	–	–	2.1	V
	BYD57D to M BYD57U and V				1.7	V
V_F	forward voltage	$I_F = 1\text{ A}$; see Figs 13 and 14	–	–	3.6	V
	BYD57D to M BYD57U and V				2.3	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	$I_R = 0.1\text{ mA}$		–	–	V
	BYD57D					
	BYD57G					
	BYD57J					
	BYD57K					
	BYD57M					
	BYD57U					
	BYD57V					
I_R	reverse current	$V_R = V_{RRMmax}$; see Fig.15	–	–	5	μA
		$V_R = V_{RRMmax}$; $T_j = 165\text{ }^{\circ}\text{C}$; see Fig.15	–	–	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	–	–	30	ns
	BYD57D to J BYD57K and M				75	ns
	BYD57U and V				150	ns
C_d	diode capacitance	$f = 1\text{ MHz}$; $V_R = 0$; see Fig.16	–	20	–	pF

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SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$\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/ μ s; see Fig.19	—	—	7	A/ μ s
	BYD57D to J		—	—	6	A/ μ s
	BYD57K and M		—	—	5	A/ μ s
	BYD57U and V		—	—	5	A/ μ s

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

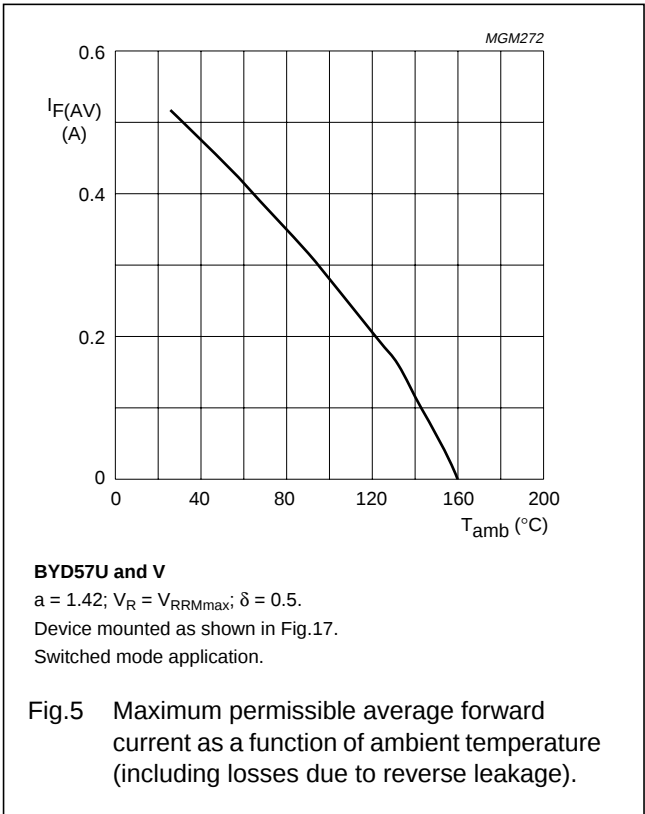
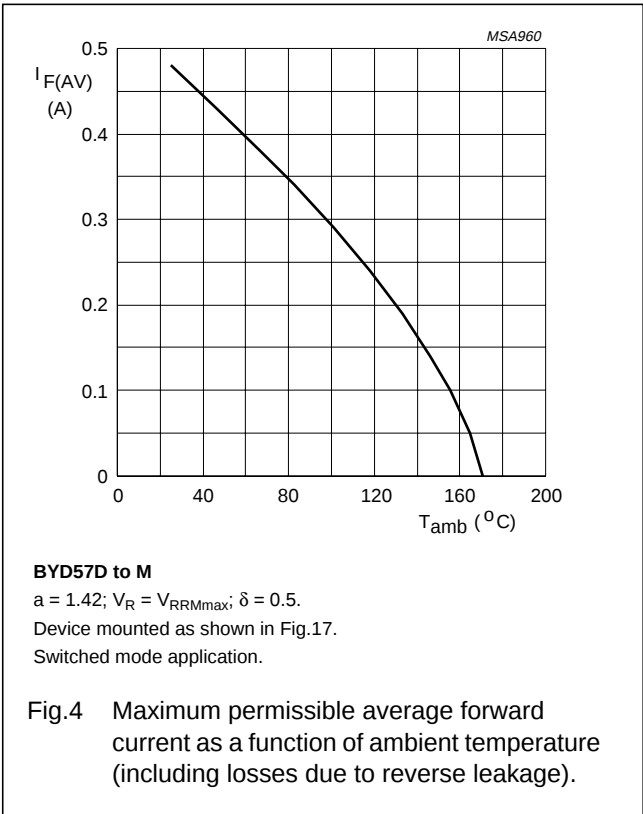
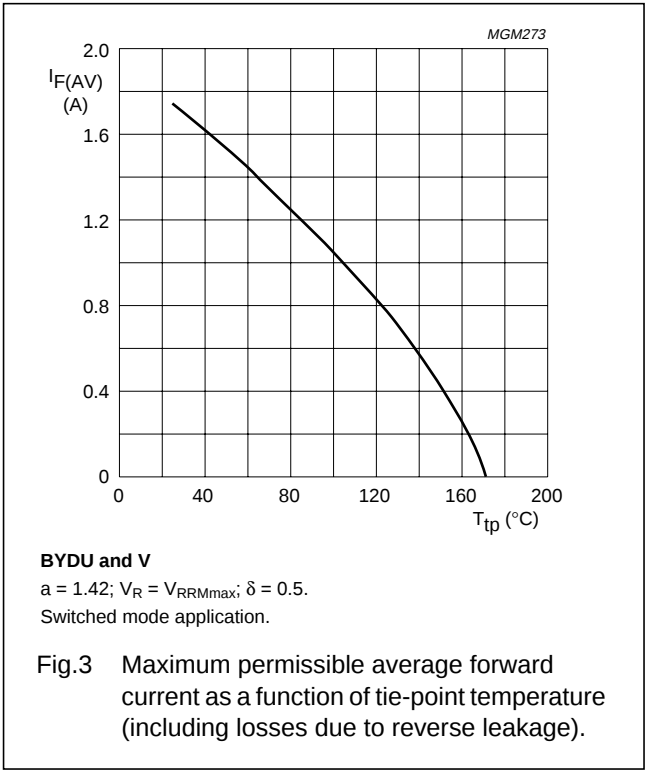
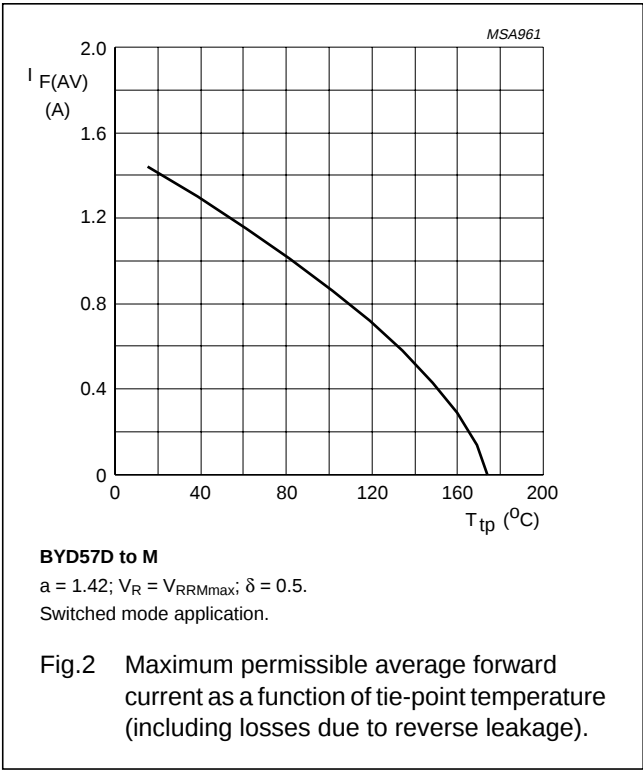
Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥ 40 μ m, see Fig.17. For more information please refer to the '*General Part of associated Handbook*'.

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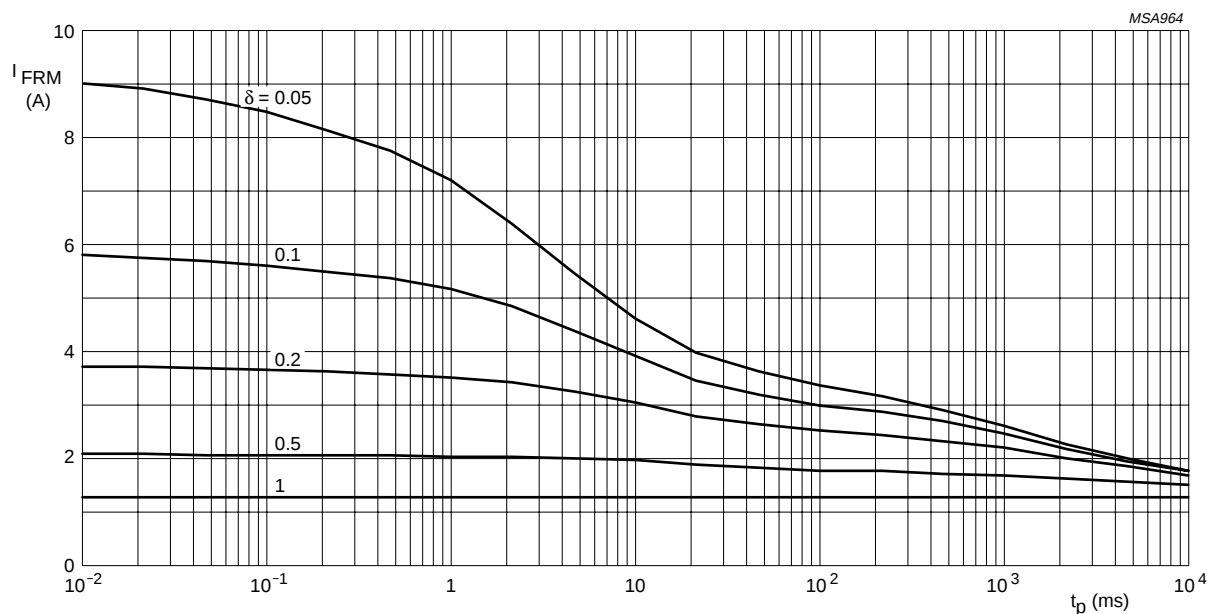
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GRAPHICAL DATA



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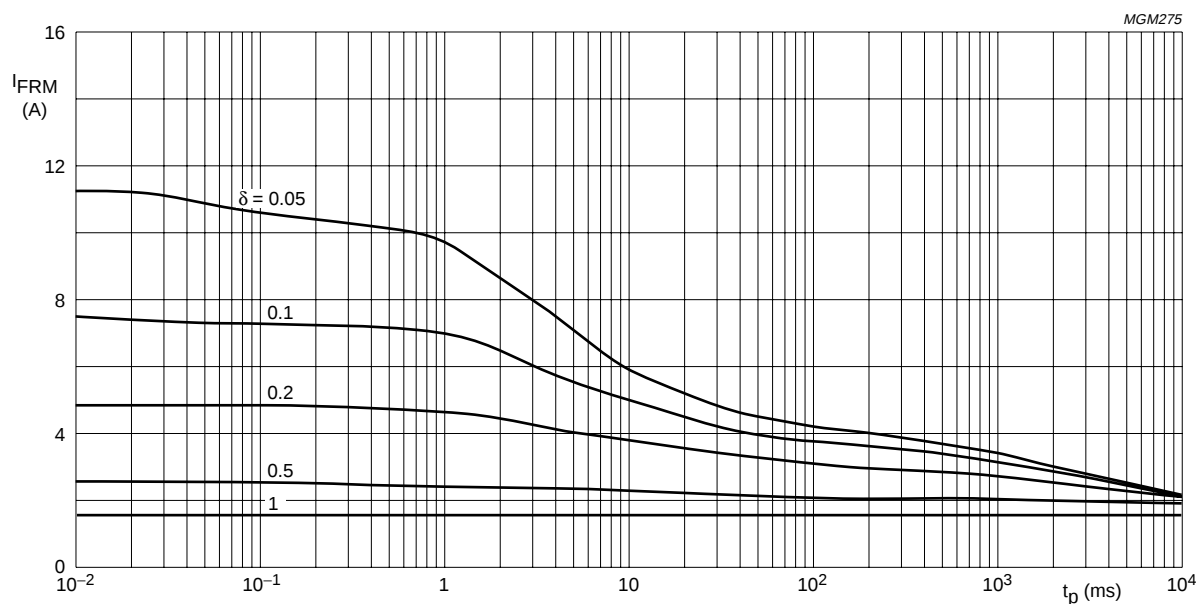


BYD57D to M

$T_{ip} = 85^\circ\text{C}$; $R_{th\ j-tp} = 30\text{ K/W}$.

V_{RRMmax} during $1 - \delta$; curves include derating for $T_{j\ max}$ at $V_{RRM} = 1000\text{ V}$.

Fig.6 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.



BYD57U and V

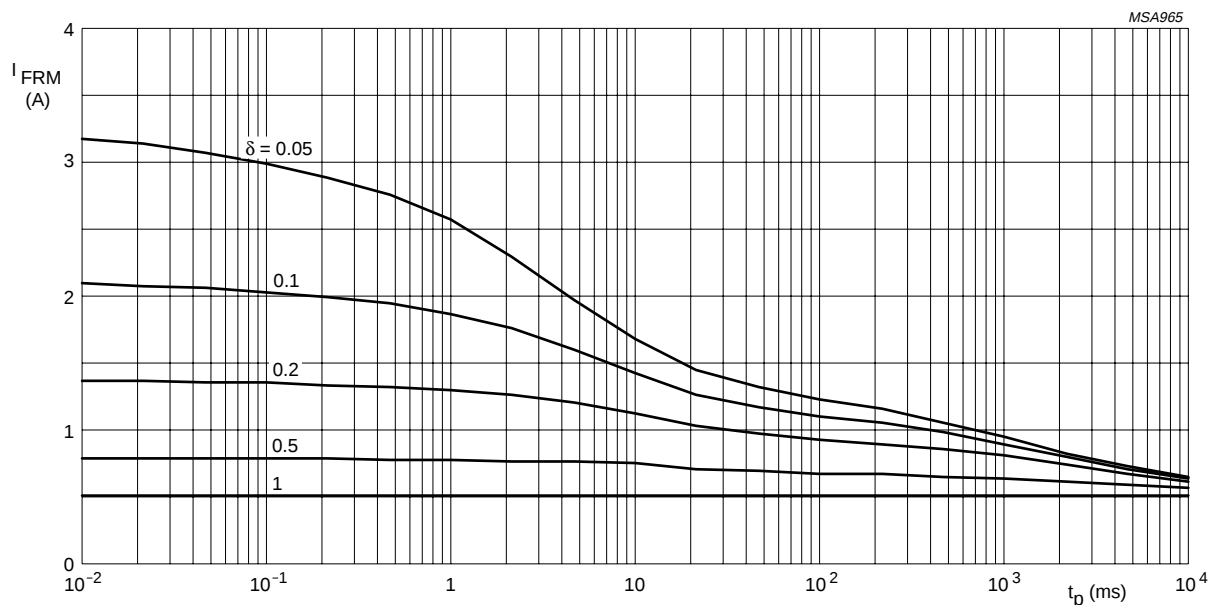
$T_{ip} = 85^\circ\text{C}$; $R_{th\ j-tp} = 30\text{ K/W}$.

V_{RRMmax} during $1 - \delta$; curves include derating for $T_{j\ max}$ at $V_{RRM} = 1000\text{ V}$.

Fig.7 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.

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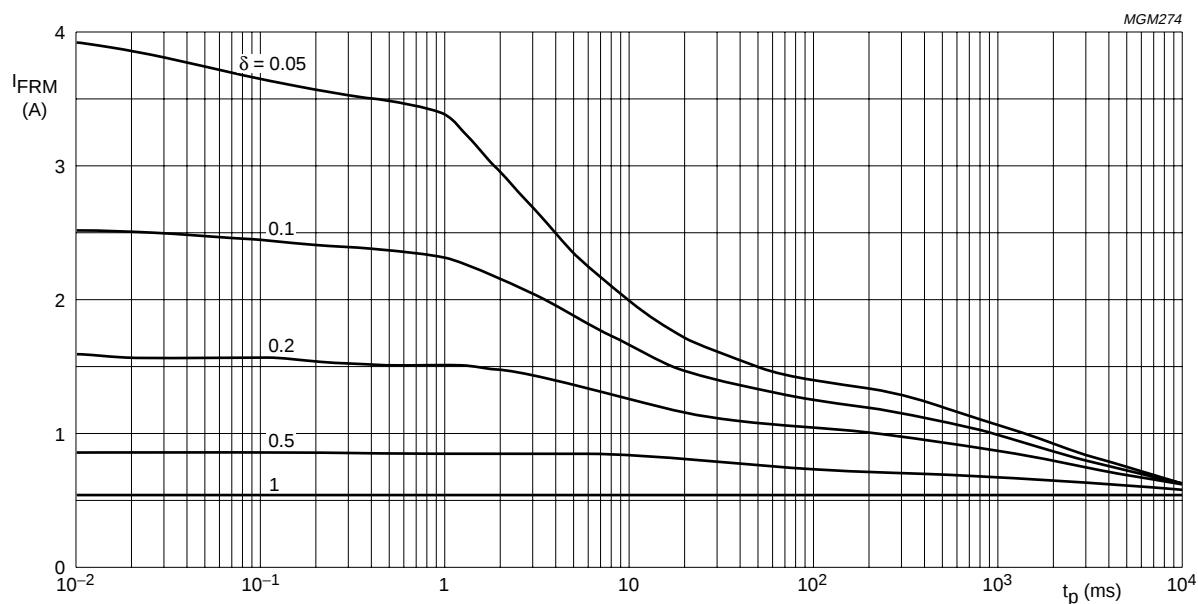


BYD57D to M

$T_{amb} = 60^\circ\text{C}$; $R_{th\ j-a} = 150\text{K/W}$.

V_{RRMmax} during $1 - \delta$; curves include derating for $T_{j\ max}$ at $V_{RRM} = 1000\text{ V}$.

Fig.8 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.



BYD57U and V

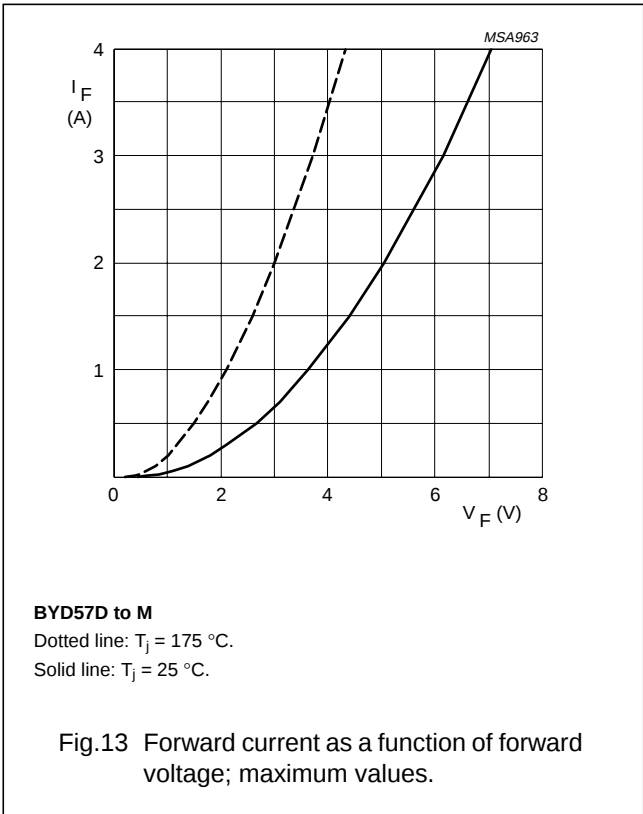
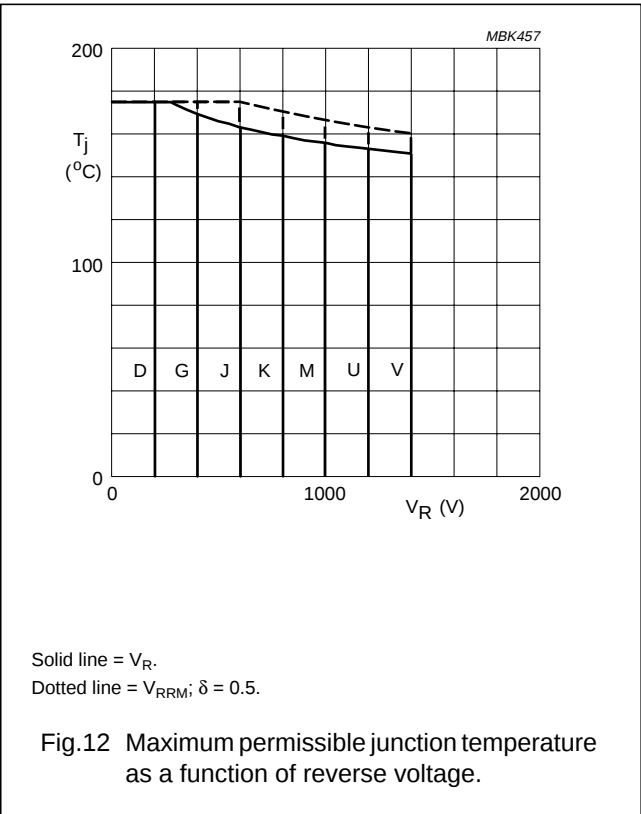
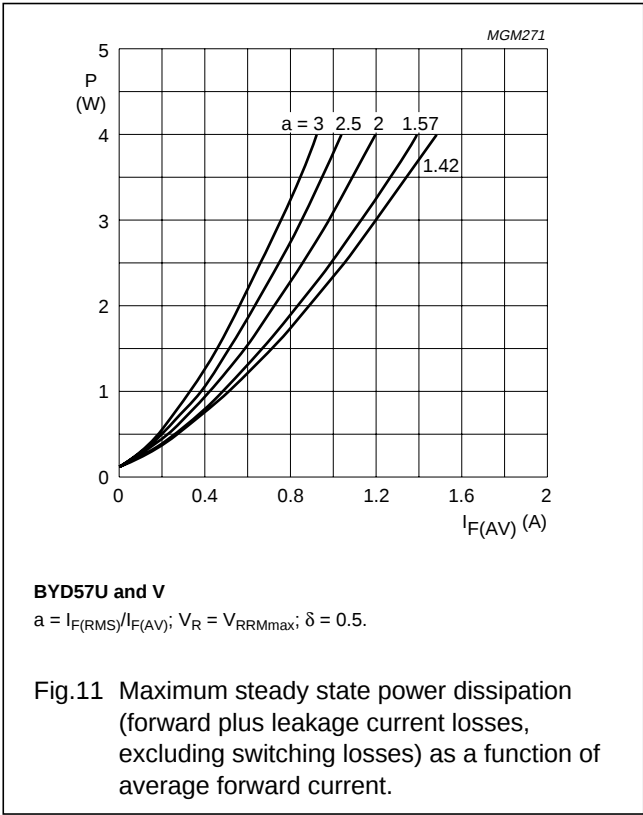
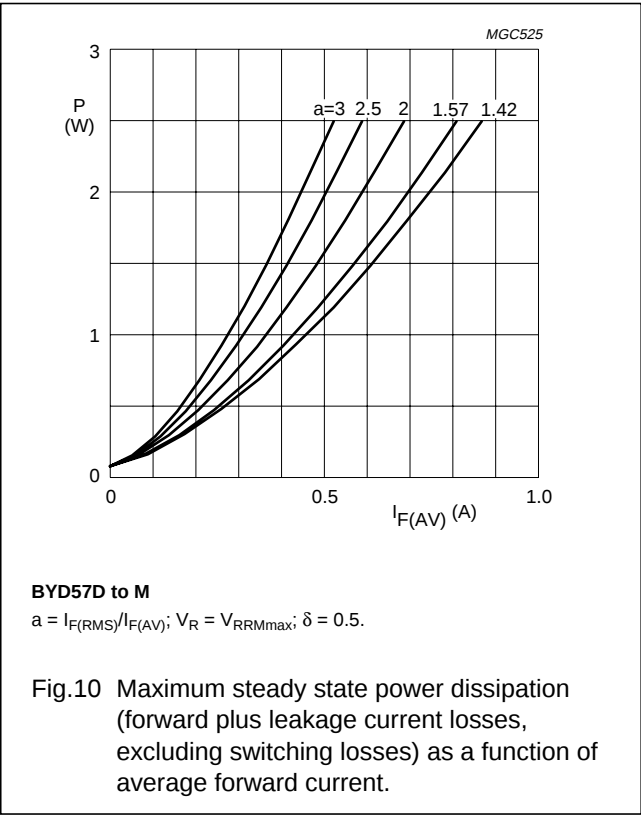
$T_{amb} = 60^\circ\text{C}$; $R_{th\ j-a} = 150\text{K/W}$.

V_{RRMmax} during $1 - \delta$; curves include derating for $T_{j\ max}$ at $V_{RRM} = 1000\text{ V}$.

Fig.9 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.

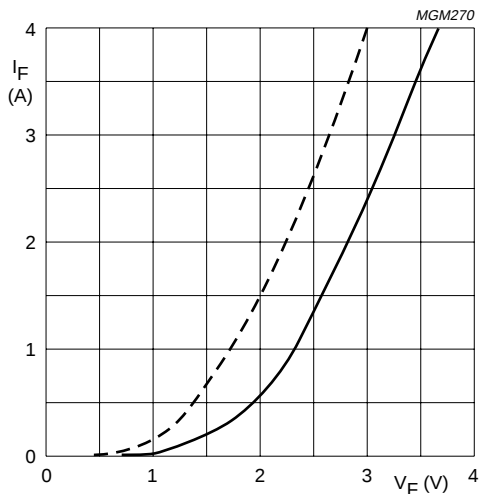
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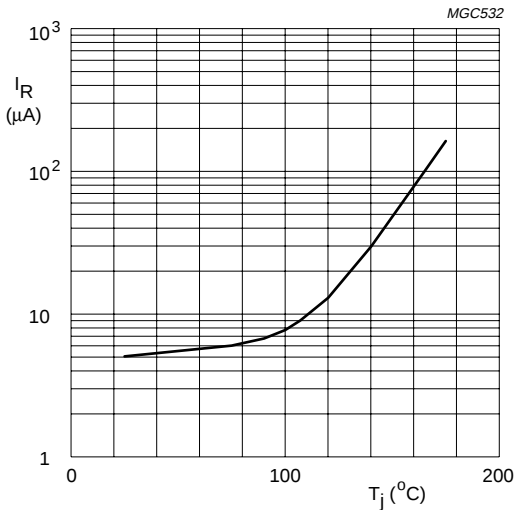
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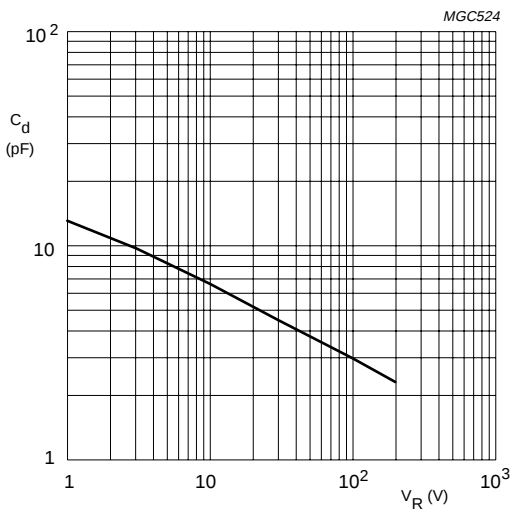
BYD57U and V
Dotted line: $T_j = 175\text{ }^{\circ}\text{C}$.
Solid line: $T_j = 25\text{ }^{\circ}\text{C}$.

Fig.14 Forward current as a function of forward voltage; maximum values.



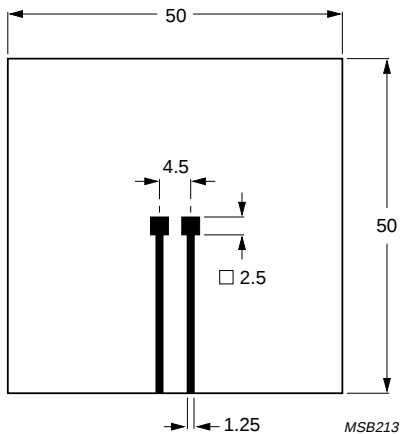
$V_R = V_{RRMmax}$.

Fig.15 Reverse current as a function of junction temperature; maximum values.



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

Fig.16 Diode capacitance as a function of reverse voltage; typical values.

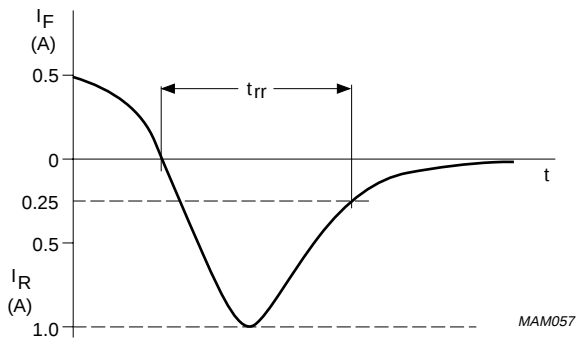
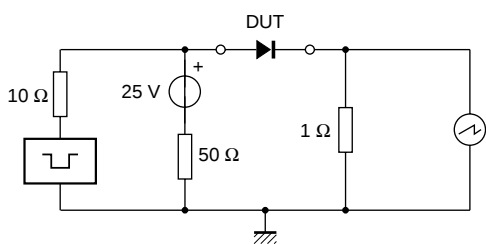


Dimensions in mm.

Fig.17 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.18 Test circuit and reverse recovery time waveform and definition.

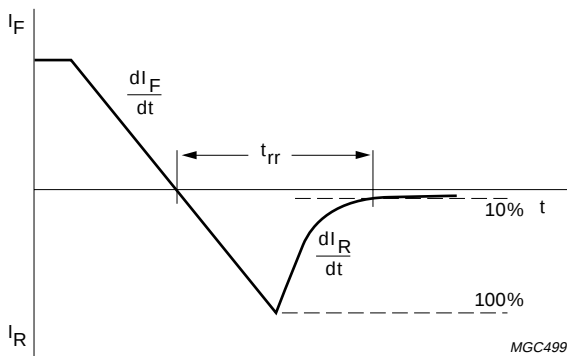


Fig.19 Reverse recovery definitions.

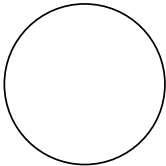
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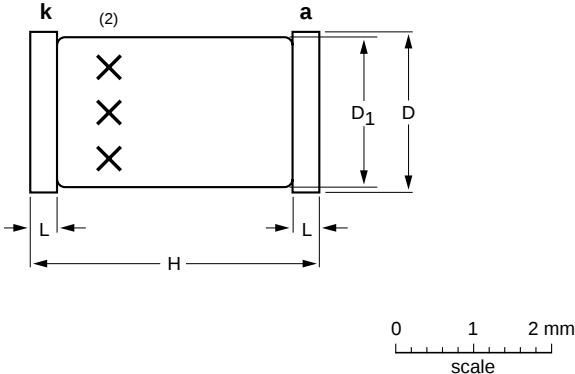
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PACKAGE OUTLINE

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

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.	

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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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