

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

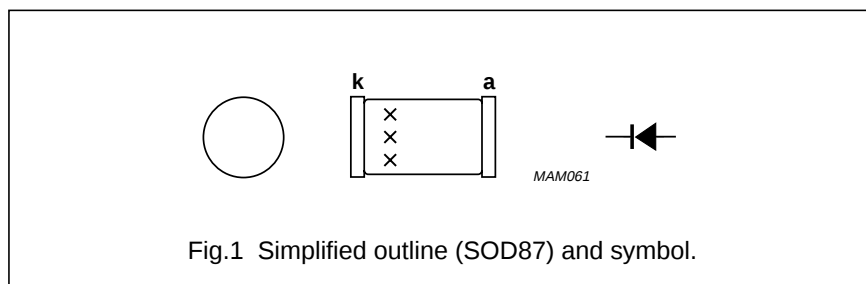
- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Shipped in 8 mm embossed tape
- Smallest surface mount rectifier outline.

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.



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	—	2.00	A
	BYD77A to D		—	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	—	0.85	A
	BYD77A to D		—	0.80	A
	BYD77E to G				

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{FRM}	repetitive peak forward current	$T_{tp} = 105\text{ }^{\circ}\text{C}$; see Figs 6 and 7	–	15	A
	BYD77A to D			13	A
I_{FRM}	repetitive peak forward current	$T_{amb} = 60\text{ }^{\circ}\text{C}$; 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; $V_R = V_{RRMmax}$	–	25	A
E_{RSM}	non-repetitive peak reverse avalanche energy	$L = 120\text{ mH}$; $T_j = 25\text{ }^{\circ}\text{C}$ prior to surge; inductive load switched off	–	10	mJ
T_{stg}	storage temperature		–65	+175	$^{\circ}\text{C}$
T_j	junction temperature		–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	$I_F = 1\text{ A}$; $T_j = T_{j\text{ max}}$; 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	$V_R = V_{RRMmax}$; see Fig.14	–	–	1	μA
		$V_R = V_{RRMmax}$; $T_j = 165\text{ }^{\circ}\text{C}$; 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	$f = 1 \text{ MHz}$; $V_R = 0 \text{ V}$; 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 $I_F = 1 \text{ A}$ to $V_R \geq 30 \text{ V}$ and $dI_F/dt = -1 \text{ A}/\mu\text{s}$; see Fig.17	–	–	4	A/ μs
	BYD77A to D BYD77E to G		–	–	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

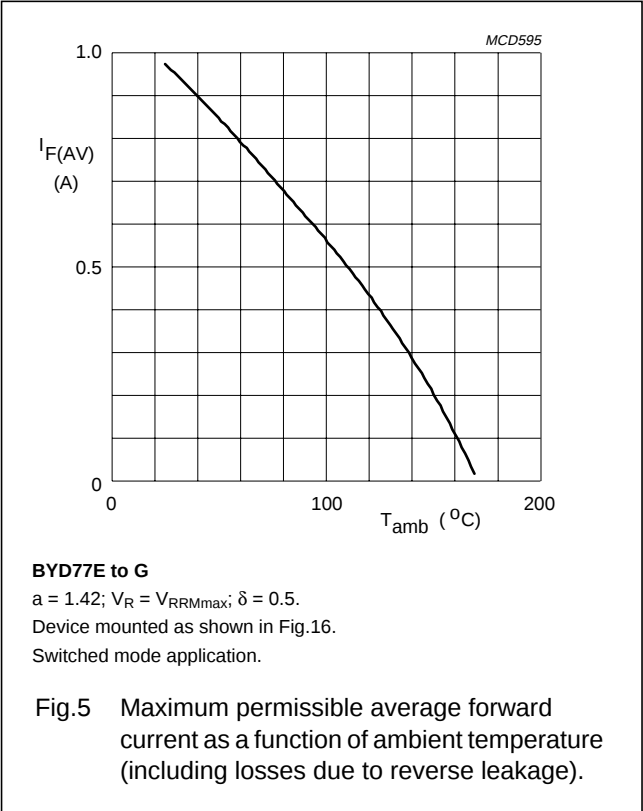
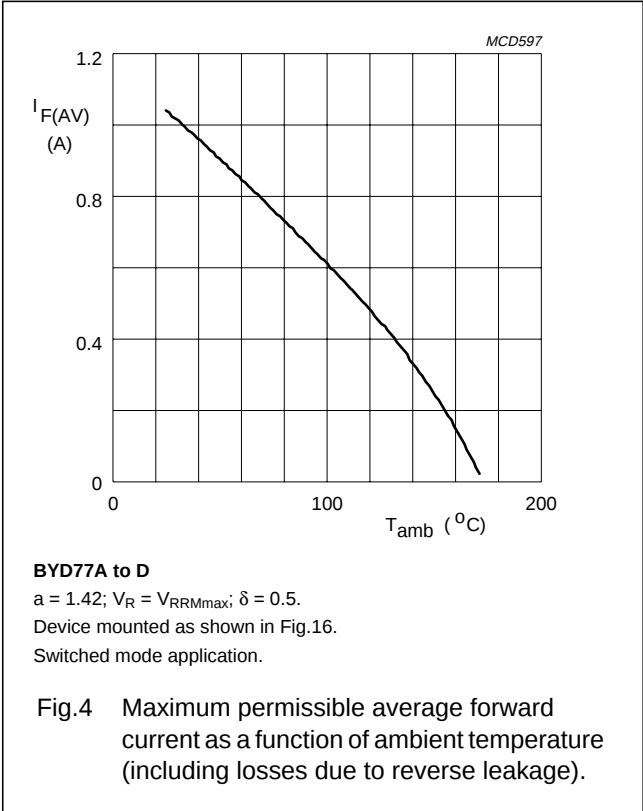
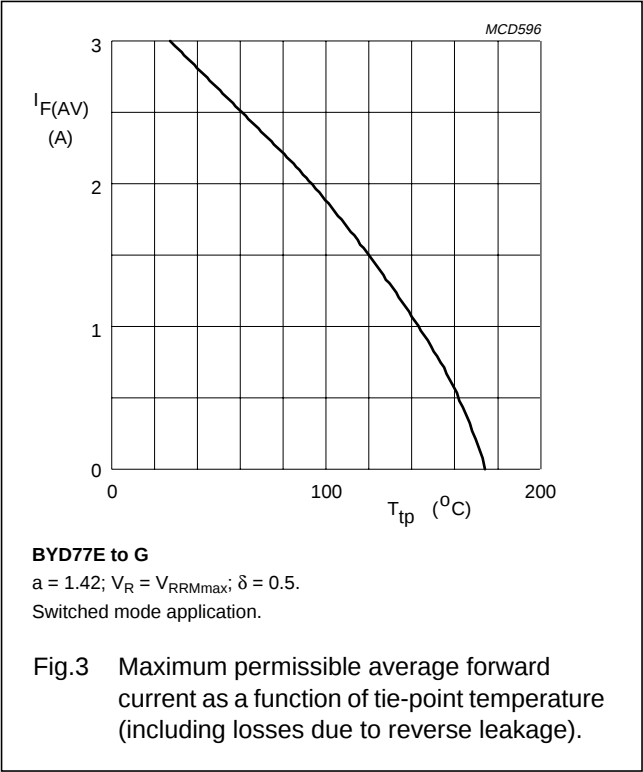
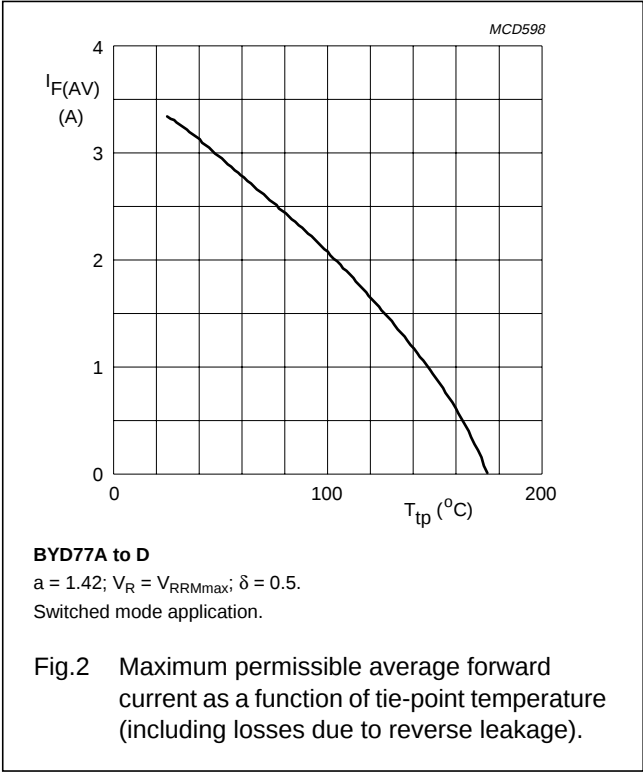
Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer $\geq 40 \mu\text{m}$, see Fig.16.
For more information please refer to the "General Part of associated Handbook".

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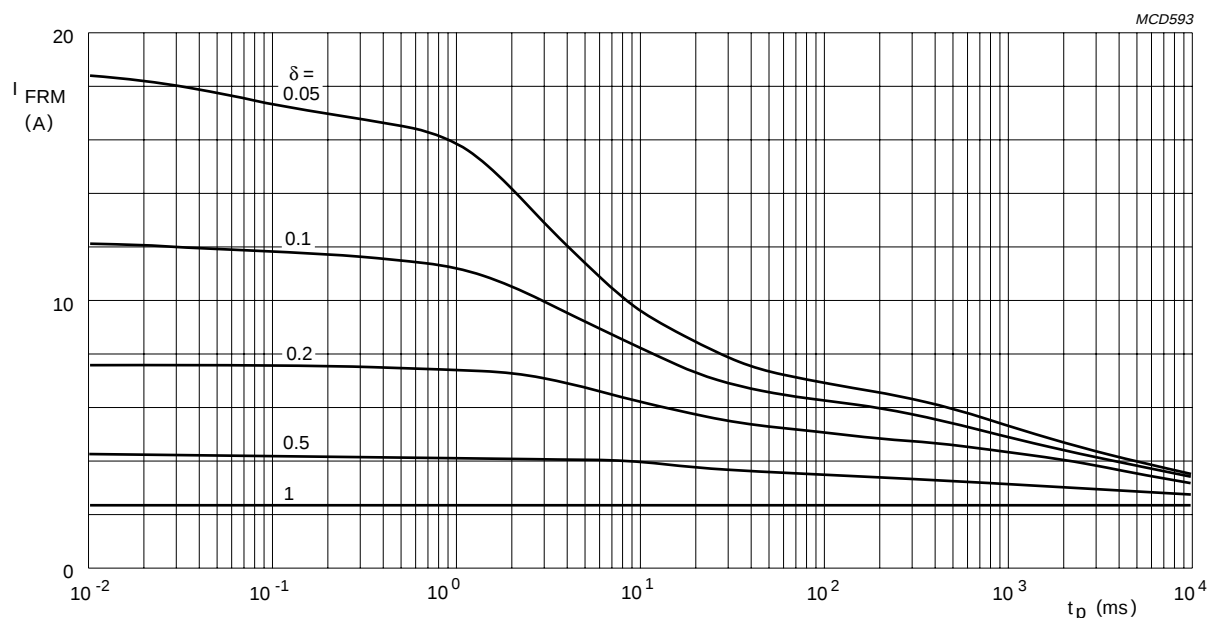
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GRAPHICAL DATA



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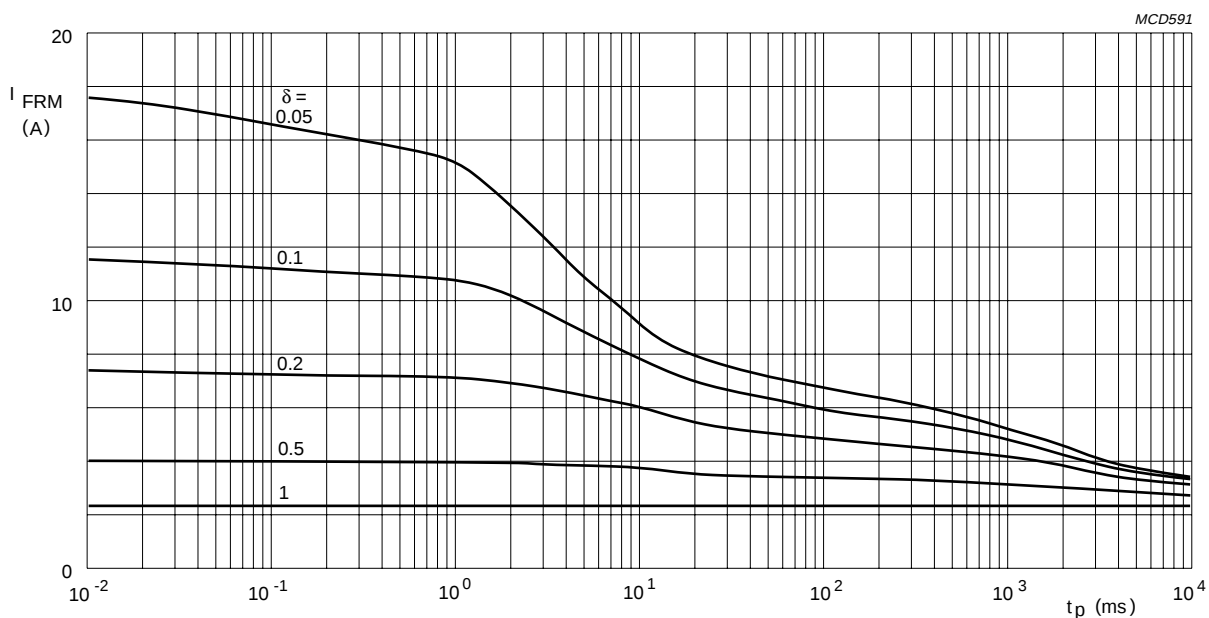


BYD77A to D

$T_{ip} = 105^\circ\text{C}$; $R_{thj-tp} = 30$ K/W.

V_{RRMmax} during $1 - \delta$; curves include derating for T_{jmax} at $V_{RRM} = 200$ V.

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



BYD77E to G

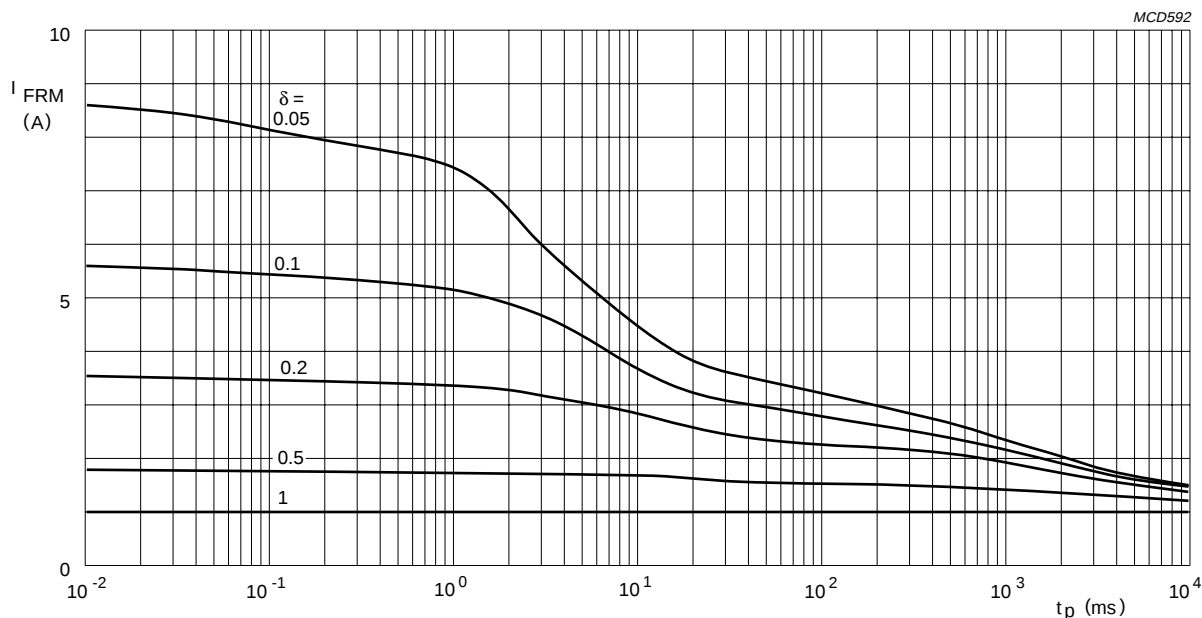
$T_{ip} = 105^\circ\text{C}$; $R_{thj-tp} = 30$ K/W.

V_{RRMmax} during $1 - \delta$; curves include derating for T_{jmax} at $V_{RRM} = 400$ V.

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

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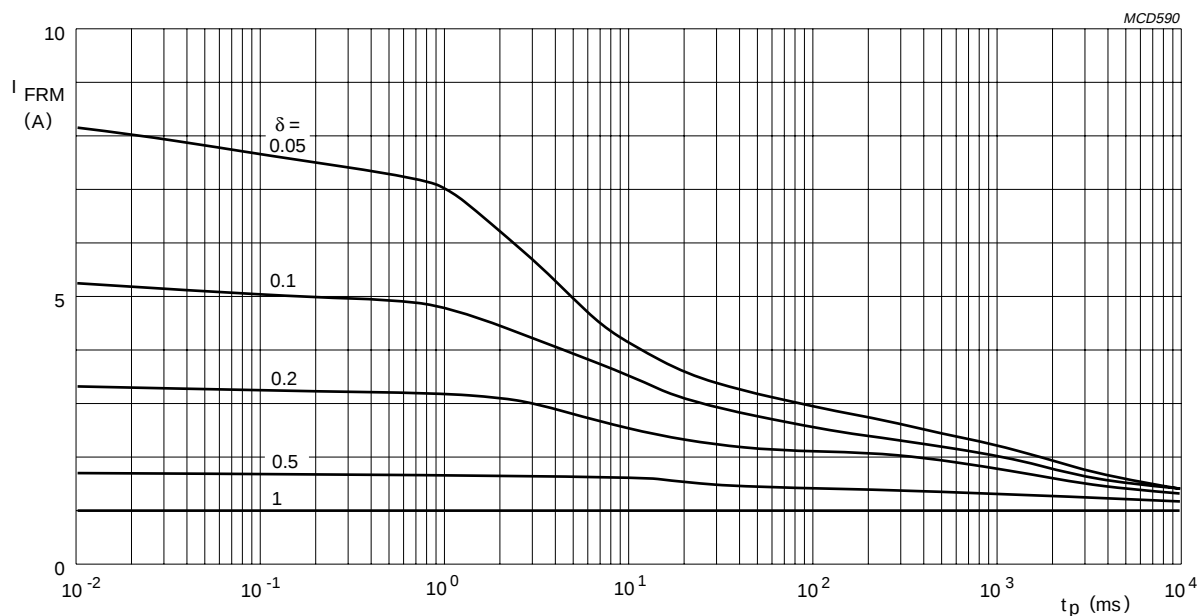


BYD77A to D

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

V_{RRMmax} during $1 - \delta$; curves include derating for $T_{j\ max}$ at $V_{RRM} = 200\text{ V}$.

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



BYD77E to G

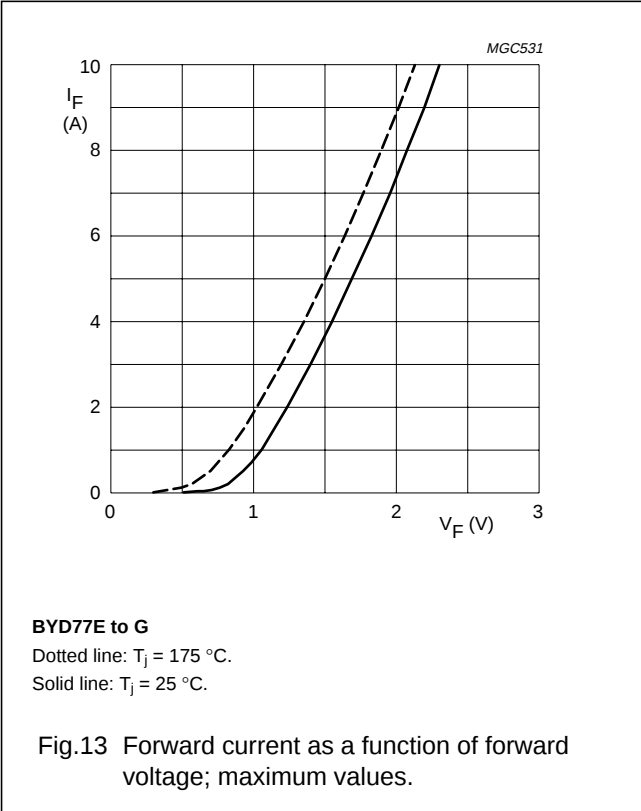
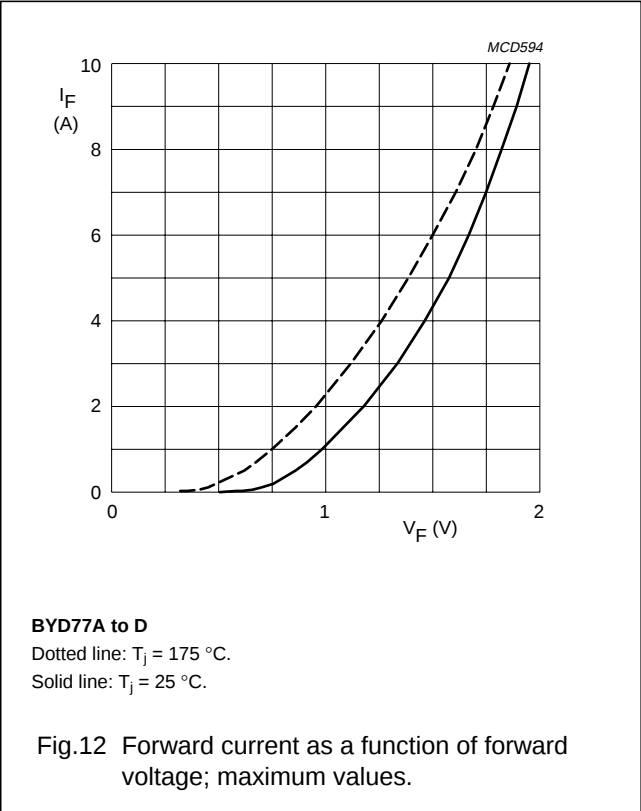
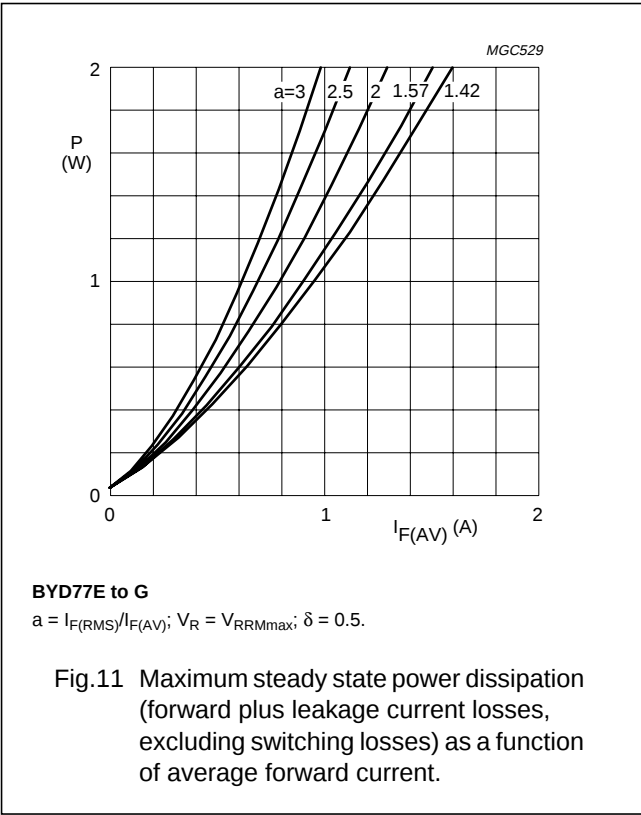
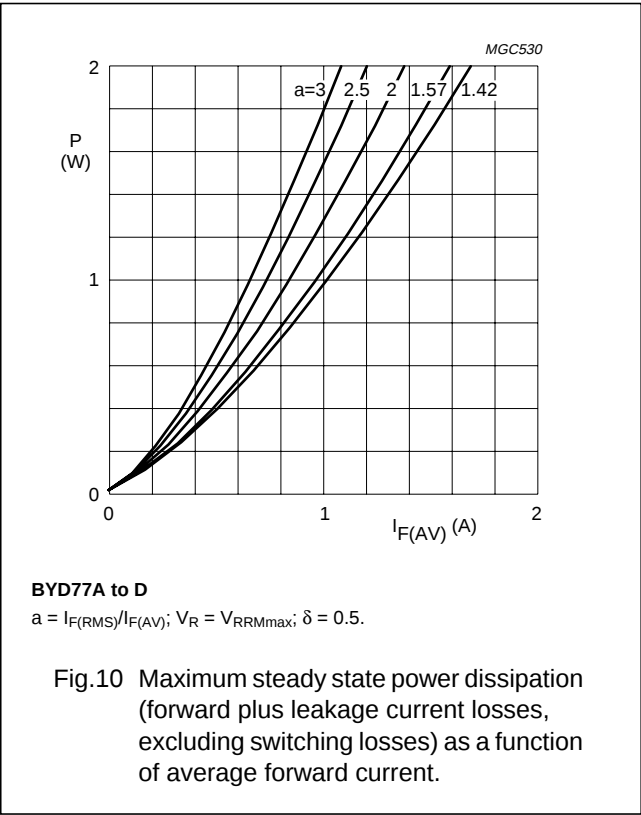
$T_{amb} = 60\text{ }^{\circ}\text{C}$; $R_{th\ j-a} = 150\text{ K/W}$.

V_{RRMmax} during $1 - \delta$; curves include derating for $T_{j\ max}$ at $V_{RRM} = 400\text{ V}$.

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

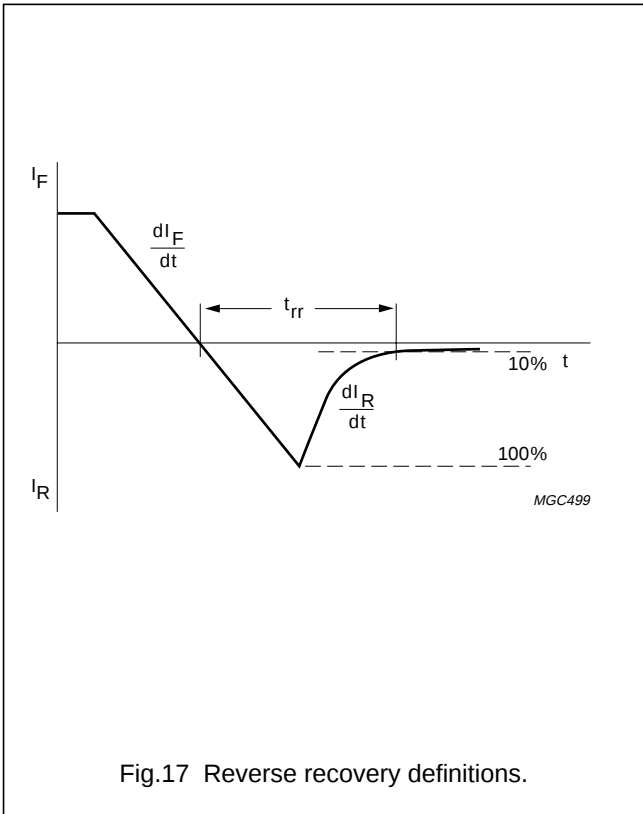
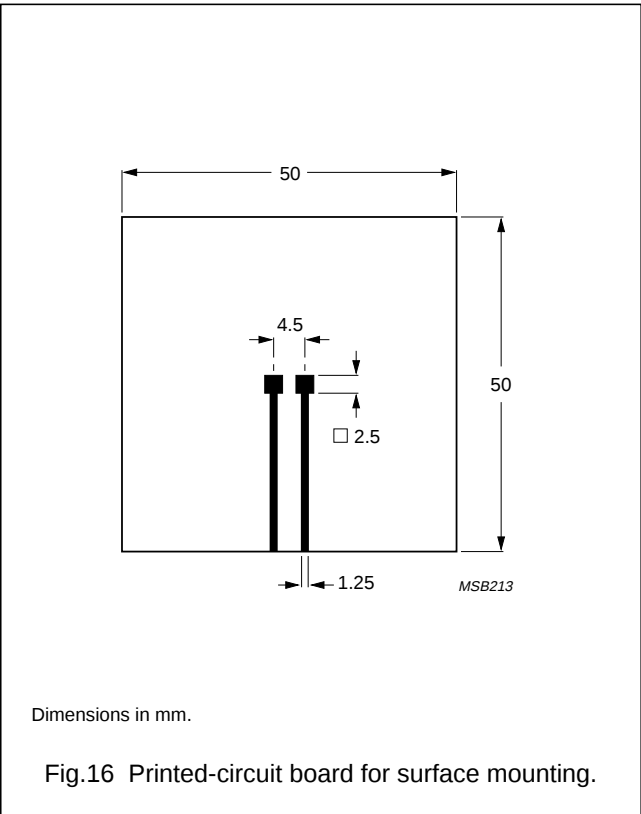
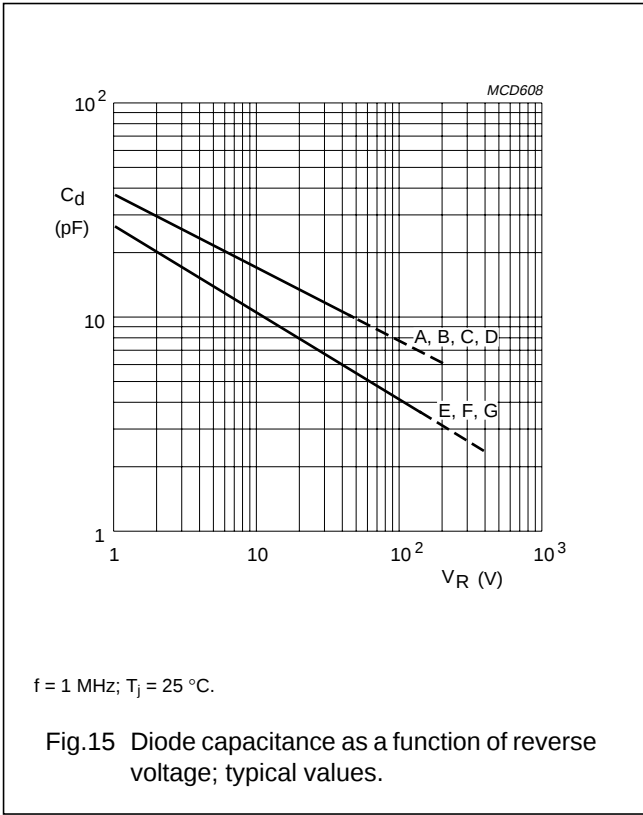
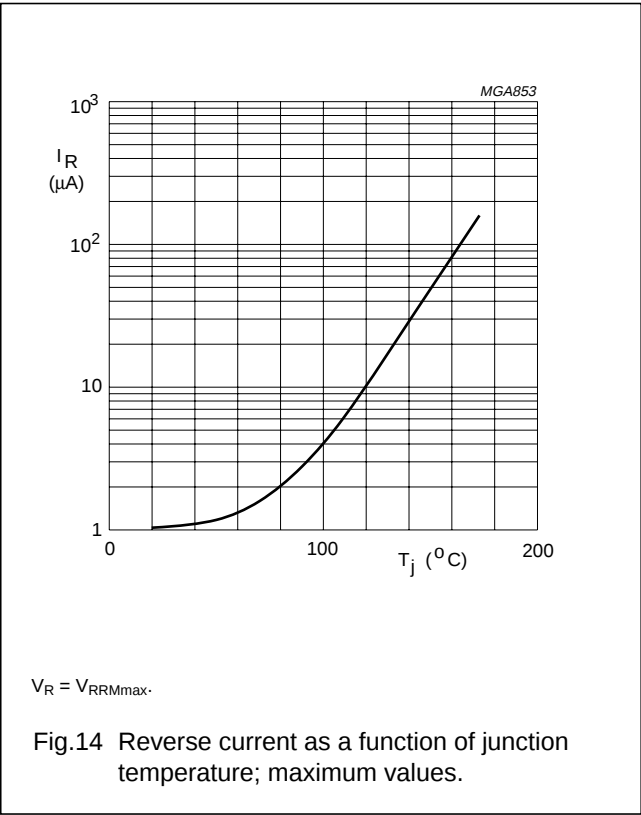
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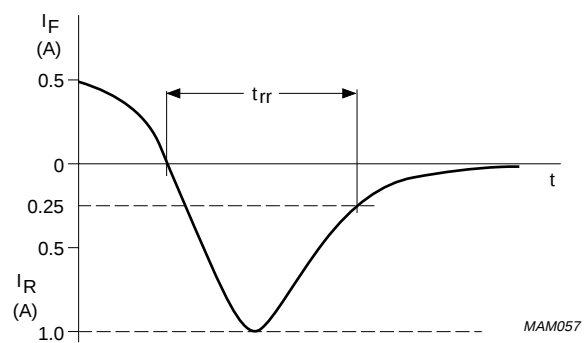
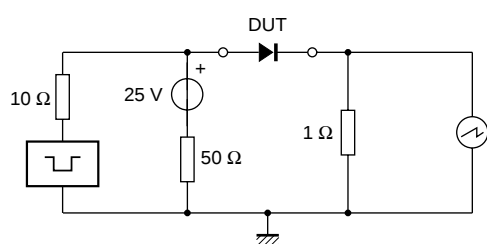
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Input impedance oscilloscope: 1 M Ω , 22 pF; $t_r \leq 7$ ns.
Source impedance: 50 Ω ; $t_r \leq 15$ ns.

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

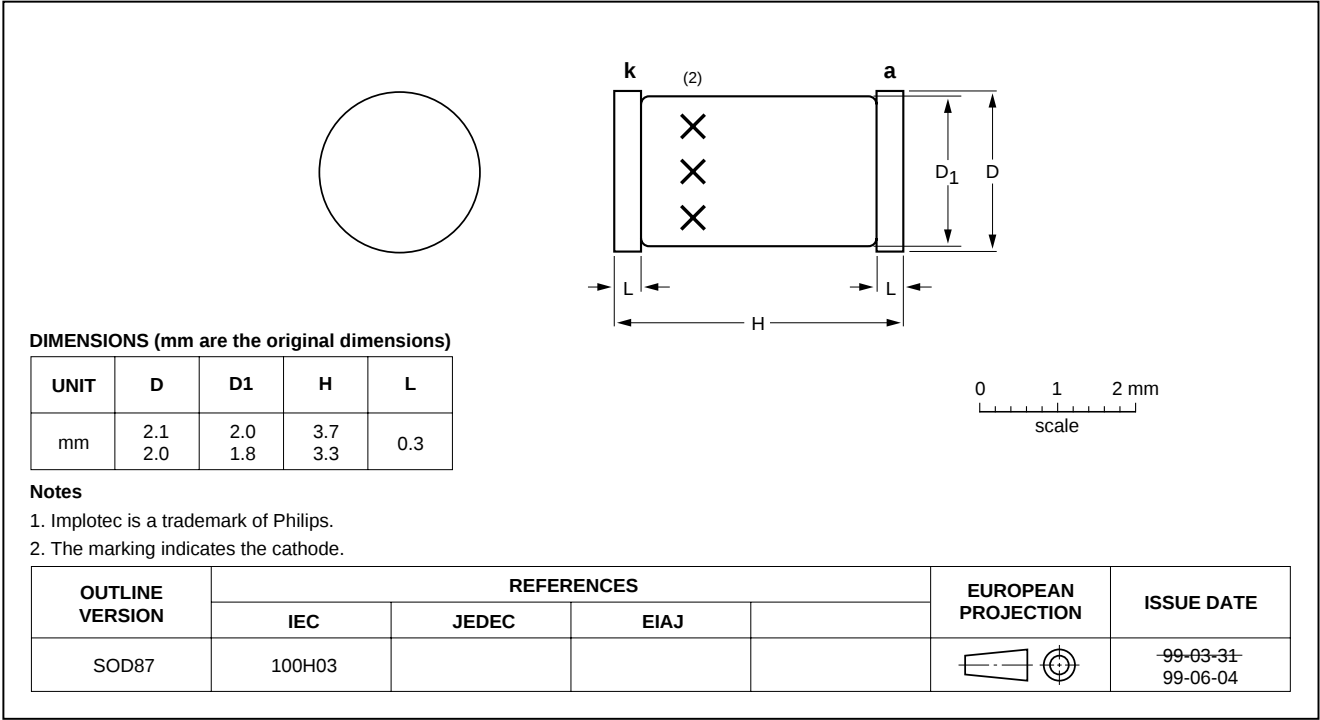
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PACKAGE OUTLINE

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

SOD87



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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Printed in The Netherlands

135002/03/pp12

Date of release: 1999 Nov 15

Document order number: 9397 750 06272

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