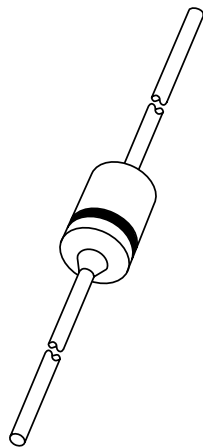


DATA SHEET



BYD13 series Controlled avalanche rectifiers

Product specification
Supersedes data of April 1992

1996 May 24

Controlled avalanche rectifiers

BYD13 series

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Available in ammo-pack.

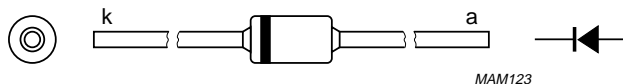


Fig.1 Simplified outline (SOD81) and symbol.

DESCRIPTION

Cavity free cylindrical glass 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.

MARKING

TYPE NUMBER	MARKING CODE
BYD13D	13D PH
BYD13G	13G PH
BYD13J	13J PH
BYD13K	13K PH
BYD13M	13M PH

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD13D		—	200	V
	BYD13G		—	400	V
	BYD13J		—	600	V
	BYD13K		—	800	V
	BYD13M		—	1000	V
V_{RWM}	crest working reverse voltage				
	BYD13D		—	200	V
	BYD13G		—	400	V
	BYD13J		—	600	V
	BYD13K		—	800	V
	BYD13M		—	1000	V
V_R	continuous reverse voltage				
	BYD13D		—	200	V
	BYD13G		—	400	V
	BYD13J		—	600	V
	BYD13K		—	800	V
	BYD13M		—	1000	V

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{F(AV)}$	average forward current	$T_{tp} = 55\text{ }^{\circ}\text{C}$; lead length = 10 mm; averaged over any 20 ms period; see Figs 2 and 4	—	1.40	A
		$T_{amb} = 65\text{ }^{\circ}\text{C}$; PCB mounting (see Fig.9); averaged over any 20 ms period; see Figs 3 and 4	—	0.75	A
I_{FSM}	non-repetitive peak forward current	$t = 10\text{ ms}$ half sinewave; $T_j = T_{j\text{ max}}$ prior to surge; $V_R = V_{RRM\text{ max}}$	—	20	A
E_{RSM}	non-repetitive peak reverse avalanche energy	$L = 120\text{ mH}$; $T_j = T_{j\text{ max}}$ prior to surge; inductive load switched off	—	7	mJ
T_{stg}	storage temperature		−65	+175	$^{\circ}\text{C}$
T_j	junction temperature	see Fig.5	−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 Fig.6	—	—	0.93	V
		$I_F = 1\text{ A}$; see Fig.6	—	—	1.05	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	$I_R = 0.1\text{ mA}$				
	BYD13D		225	—	—	V
	BYD13G		450	—	—	V
	BYD13J		650	—	—	V
	BYD13K		900	—	—	V
	BYD13M		1100	—	—	V
I_R	reverse current	$V_R = V_{RRM\text{ max}}$; see Fig.7	—	—	1	μA
		$V_R = V_{RRM\text{ max}}$; $T_j = 165\text{ }^{\circ}\text{C}$; see Fig.7	—	—	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.10	—	3	—	μs
C_d	diode capacitance	$V_R = 0\text{ V}$; $f = 1\text{ MHz}$; see Fig.8	—	21	—	pF

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\text{ j-tp}}$	thermal resistance from junction to tie-point	lead length = 10 mm	60	K/W
$R_{th\text{ j-a}}$	thermal resistance from junction to ambient	note 1	120	K/W

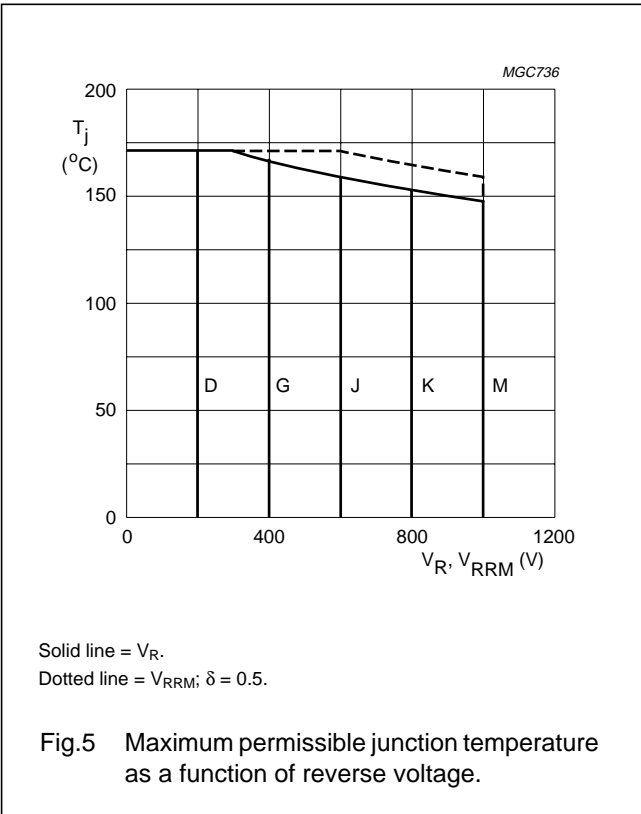
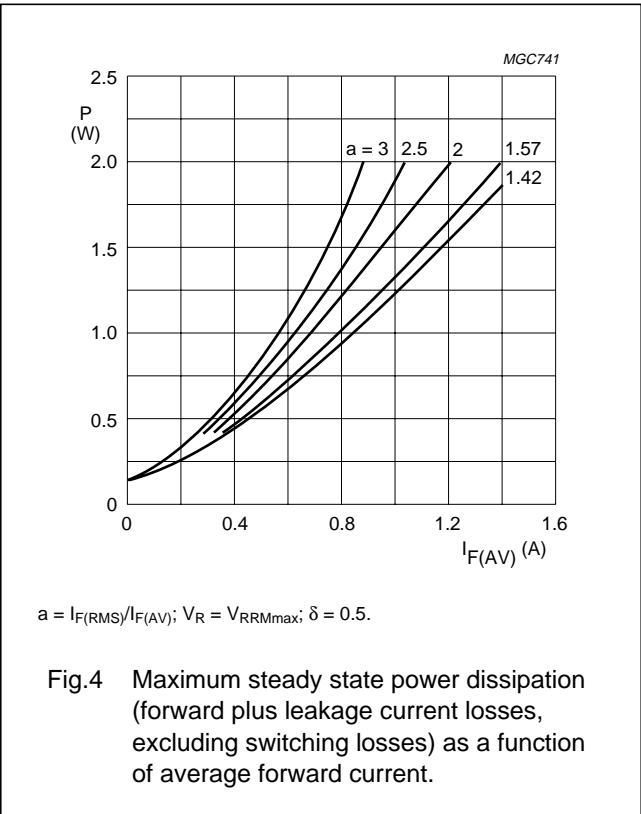
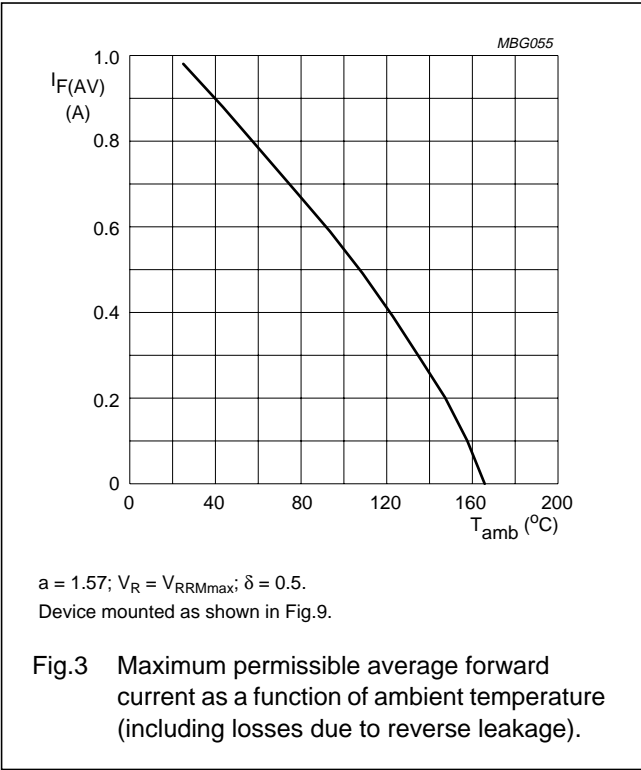
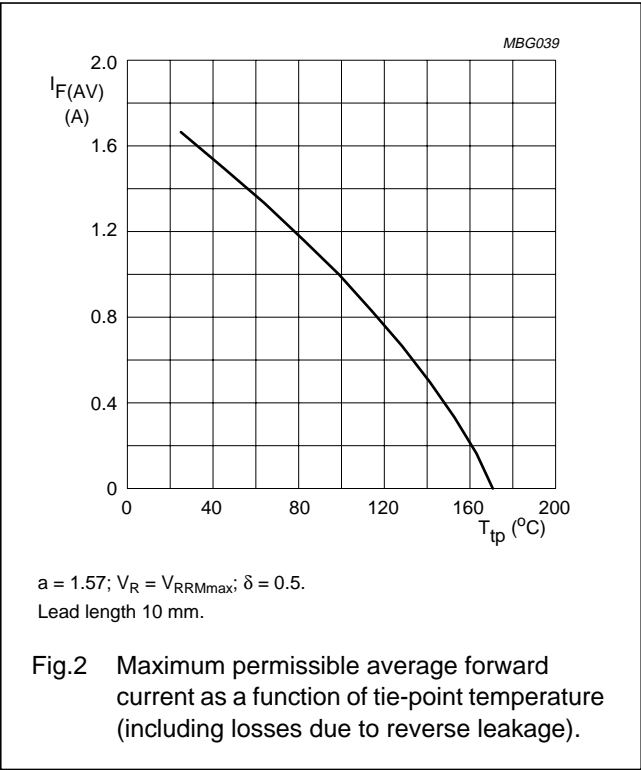
Note

1. Device mounted on epoxy-glass printed-circuit board, 1.5 mm thick; thickness of copper $\geq 40\text{ }\mu\text{m}$, see Fig.9. For more information please refer to the "General Part of associated Handbook".

Controlled avalanche rectifiers

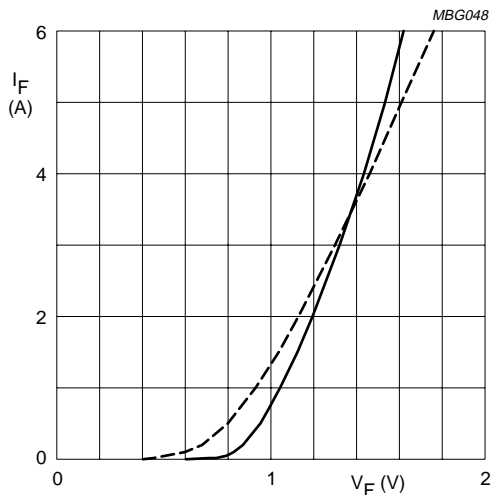
BYD13 series

GRAPHICAL DATA



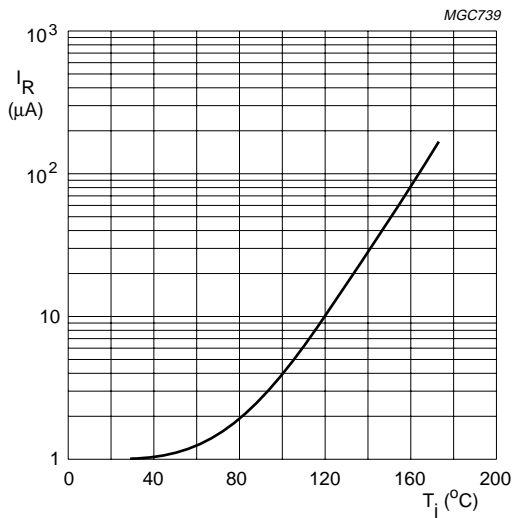
Controlled avalanche rectifiers

BYD13 series



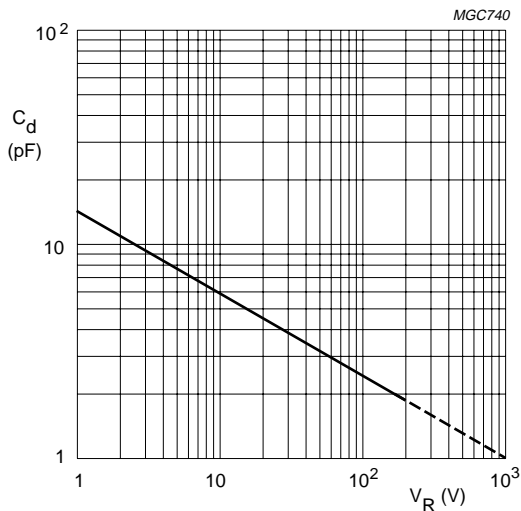
Solid line: $T_j = 25^\circ\text{C}$.
Dotted line: $T_j = 175^\circ\text{C}$.

Fig.6 Forward current as a function of forward voltage; maximum values.



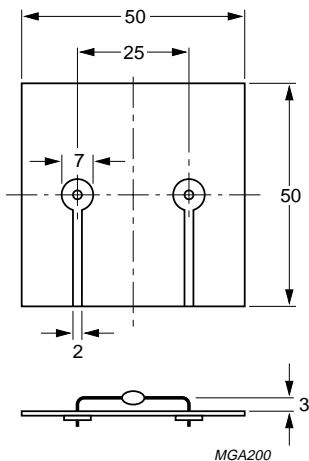
$V_R = V_{RRMmax}$.

Fig.7 Reverse current as a function of junction temperature; maximum values.



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

Fig.8 Diode capacitance as a function of reverse voltage; typical values.

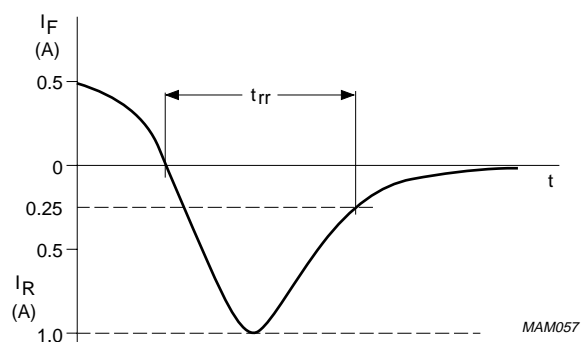
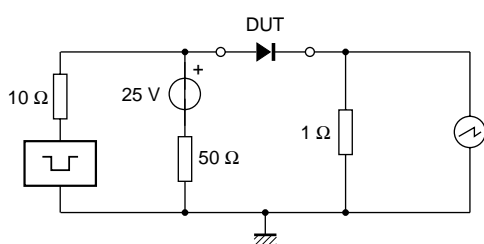


Dimensions in mm.

Fig.9 Device mounted on a printed-circuit board.

Controlled avalanche rectifiers

BYD13 series



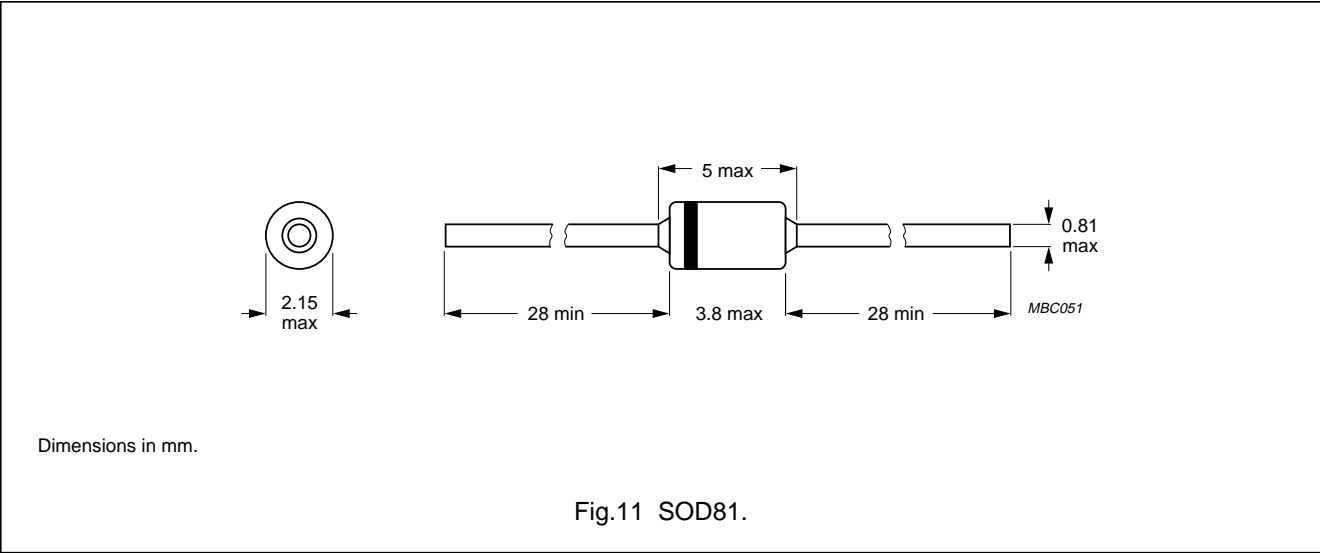
Input impedance oscilloscope: 1 M Ω , 22 pF; $t_r \leq 7$ ns.
Source impedance: 50 Ω ; $t_r \leq 15$ ns.

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

Controlled avalanche rectifiers

BYD13 series

PACKAGE OUTLINE



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.