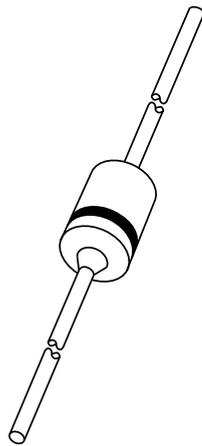


DATA SHEET



BYD53 series Fast soft-recovery controlled avalanche rectifiers

Product specification
Supersedes data of 1996 Jun 05
File under Discrete Semiconductors, SC01

1996 Sep 18

Fast soft-recovery controlled avalanche rectifiers

BYD53 series

FEATURES

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

DESCRIPTION

Cavity free cylindrical glass SOD81 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.

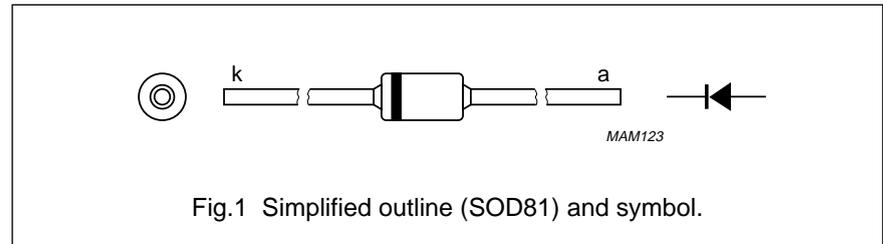


Fig.1 Simplified outline (SOD81) and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{RRM}	repetitive peak reverse voltage				
	BYD53U		–	1200	V
	BYD53V		–	1400	V
V _R	continuous reverse voltage				
	BYD53U		–	1200	V
	BYD53V		–	1400	V
I _{F(AV)}	average forward current	T _{tp} = 55 °C; lead length = 10 mm see Fig.2; averaged over any 20 ms period; see also Fig.6	–	0.85	A
		T _{amb} = 65 °C; PCB mounting (see Fig.11); see Fig.3; averaged over any 20 ms period; see also Fig.6	–	0.45	A
I _{FRM}	repetitive peak forward current	T _{tp} = 55 °C; see Fig.4	–	8.25	A
		T _{amb} = 65 °C; see Fig.5	–	4.45	A
I _{FSM}	non-repetitive peak forward current	t = 10 ms half sine wave; T _j = T _{jmax} prior to surge; V _R = V _{RRMmax}	–	5	A
E _{RSM}	non-repetitive peak reverse avalanche energy	L = 120 mH; T _j = T _{jmax} prior to surge; inductive load switched off	–	10	mJ
T _{stg}	storage temperature		–65	+175	°C
T _j	junction temperature	see Fig.7	–65	+175	°C

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ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	$I_F = 1\text{ A}$; $T_j = T_{j\text{ max}}$; see Fig.8	–	–	1.7	V
		$I_F = 1\text{ A}$; see Fig.8	–	–	2.3	V
$V_{(BR)R}$	reverse avalanche breakdown voltage BYD53U BYD53V	$I_R = 0.1\text{ mA}$	1300	–	–	V
			1500	–	–	V
I_R	reverse current	$V_R = V_{RRM\text{ max}}$; see Fig.9	–	–	1	μA
		$V_R = V_{RRM\text{ max}}$; $T_j = 165\text{ °C}$; 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	–	–	150	ns
C_d	diode capacitance	$f = 1\text{ MHz}$; $V_R = 0\text{ V}$; 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	–	–	5	$\text{A}/\mu\text{s}$

THERMAL CHARACTERISTICS

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

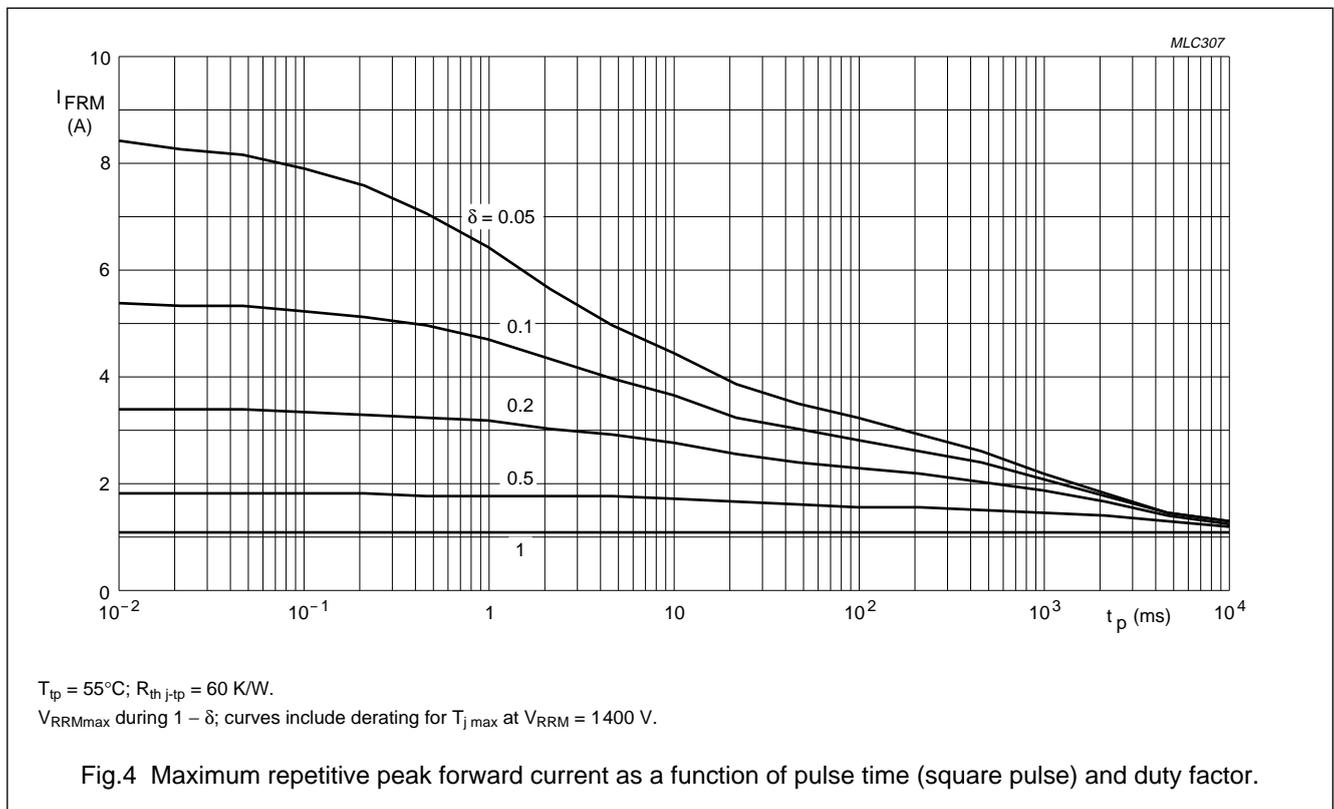
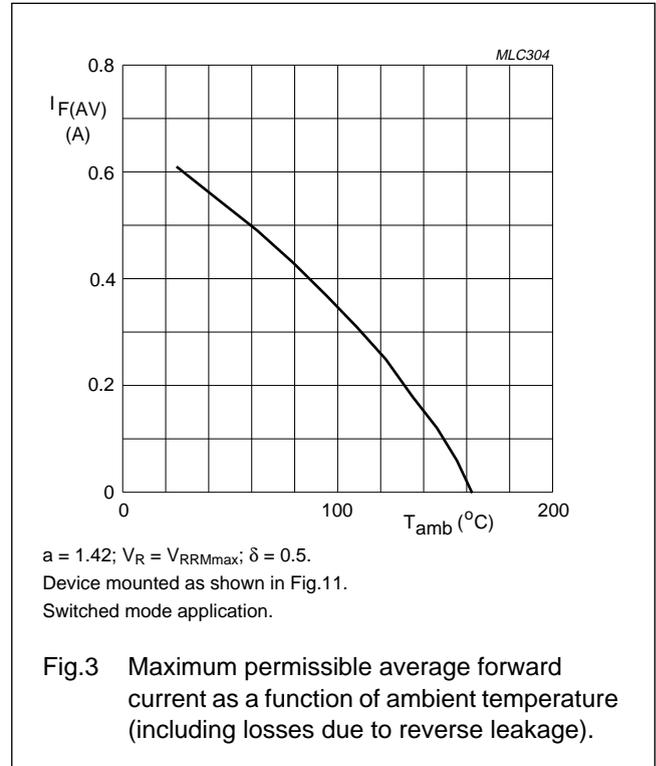
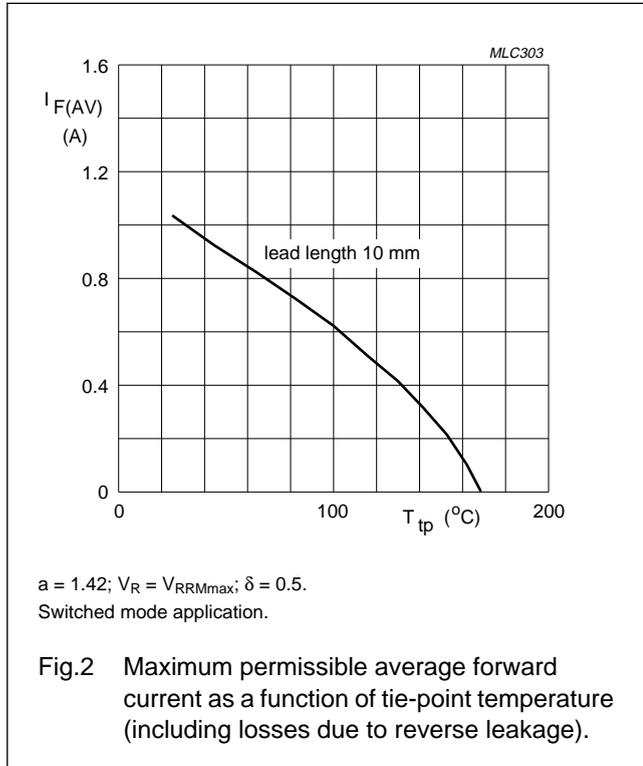
Note

1. 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 Handbook SC01'.

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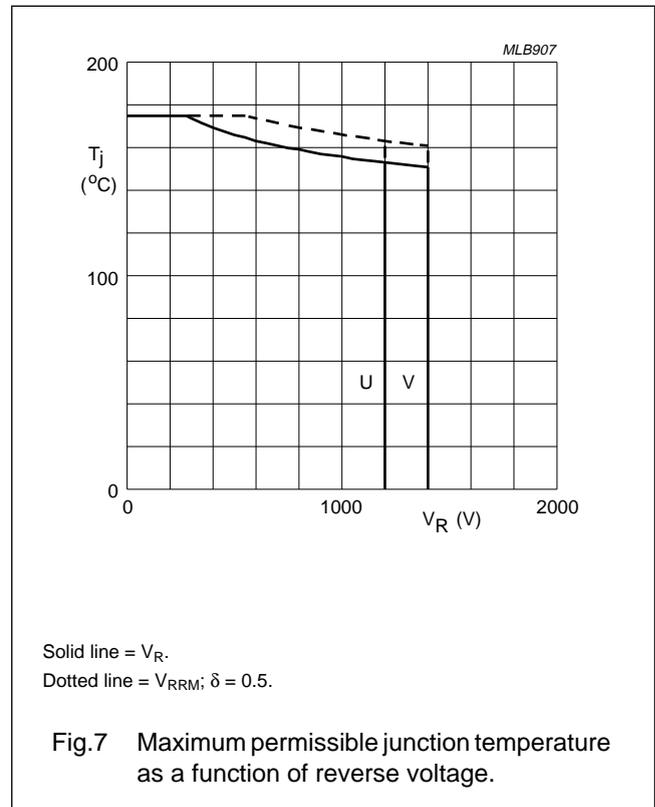
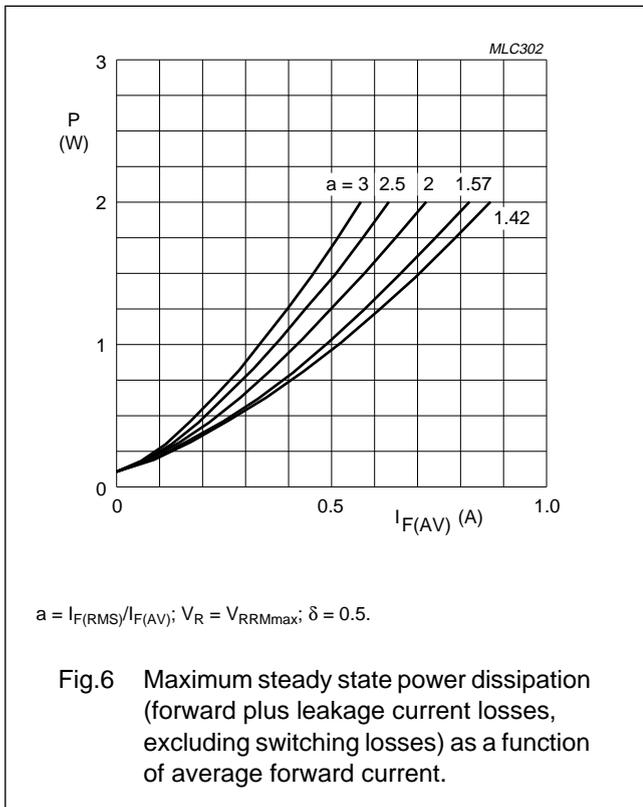
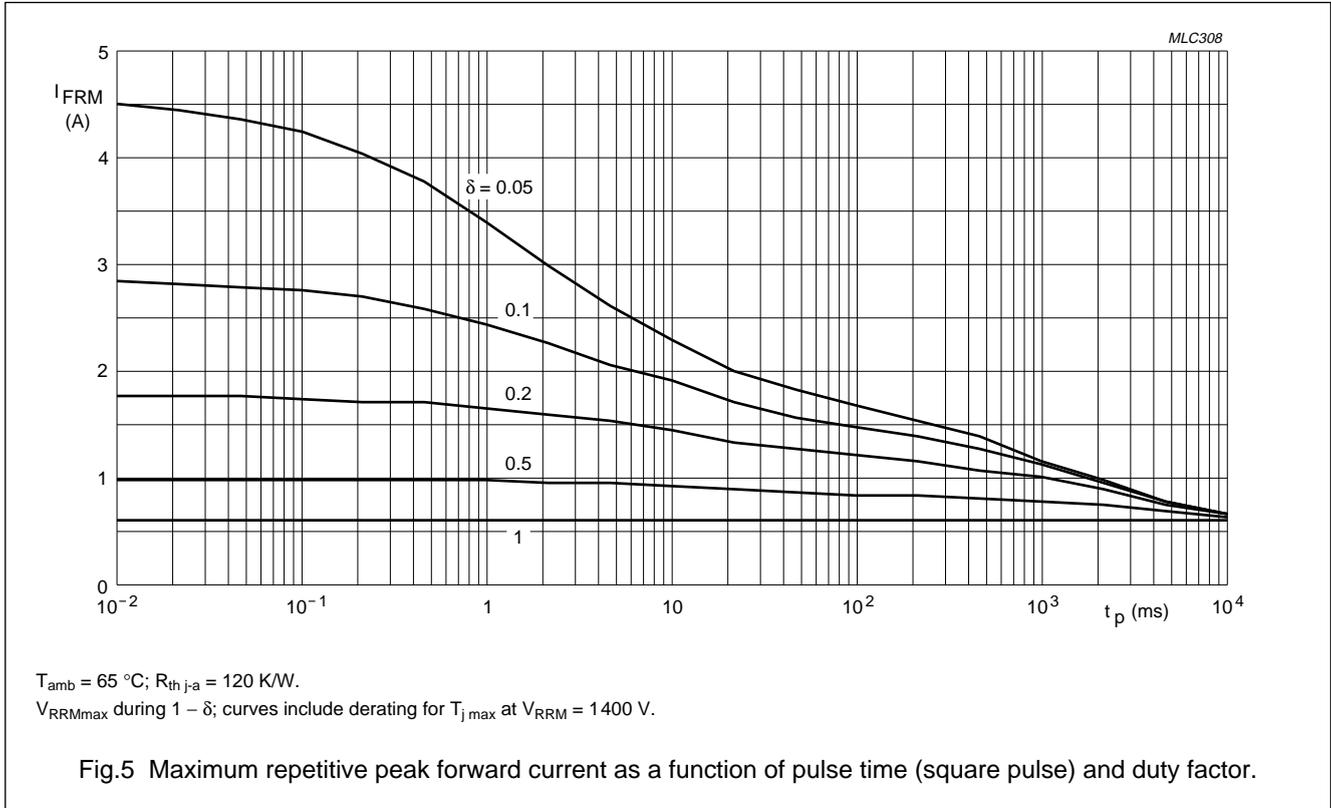
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GRAPHICAL DATA



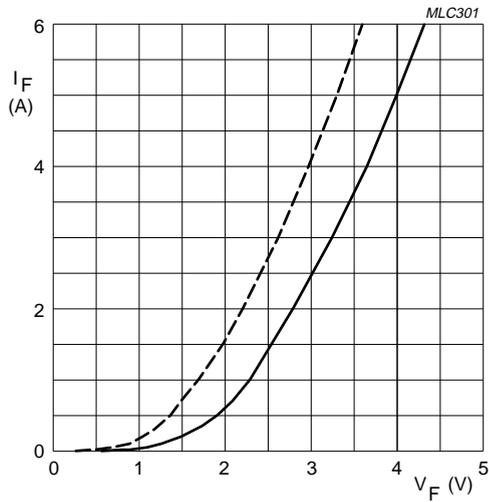
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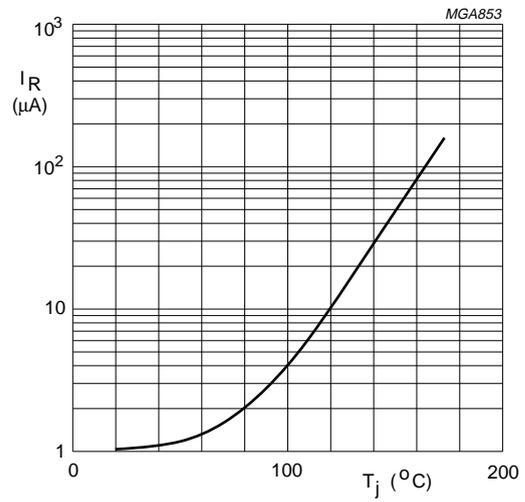
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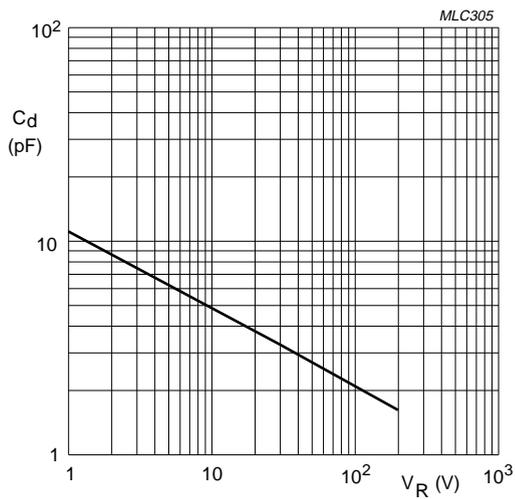
Dotted line: $T_j = 175\text{ }^\circ\text{C}$.
Solid line: $T_j = 25\text{ }^\circ\text{C}$.

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



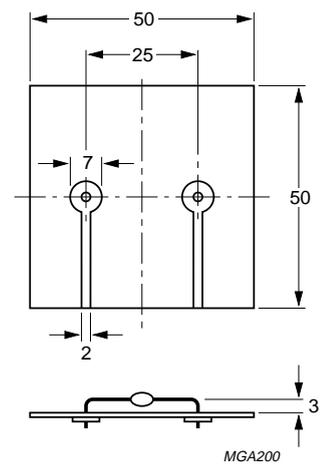
$V_R = V_{RRMmax}$.

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.

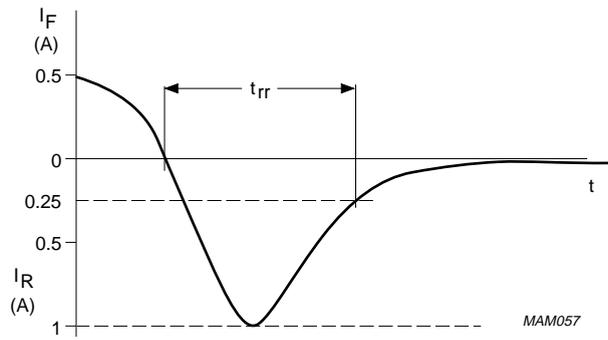
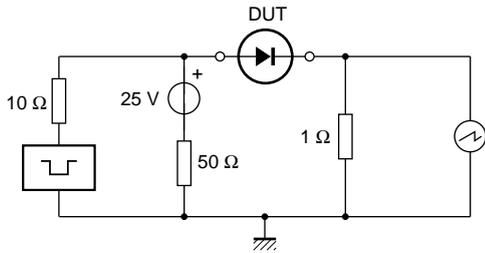


Dimensions in mm.

Fig.11 Device mounted on a printed-circuit board.

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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.

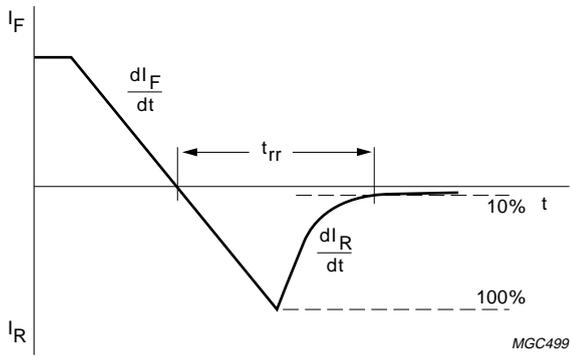
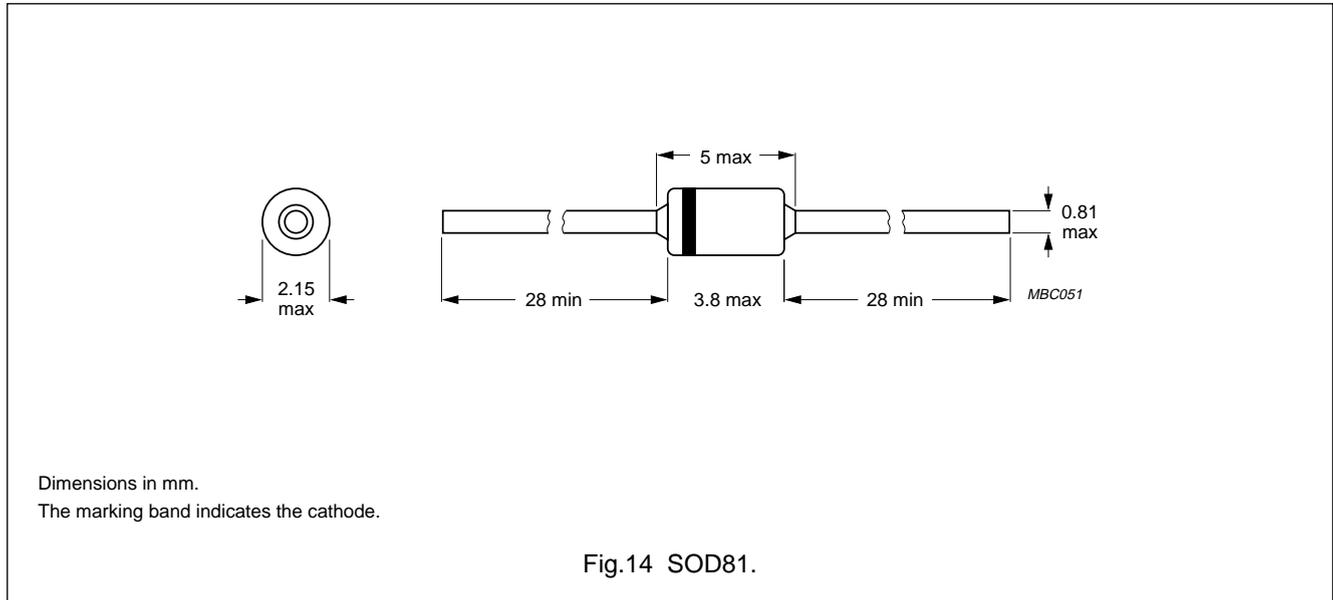


Fig.13 Reverse recovery definitions.

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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.