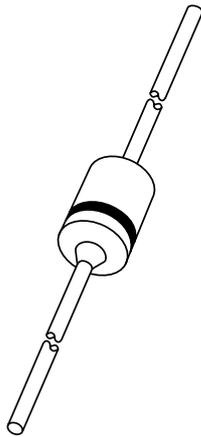


# DATA SHEET



## **BYD31 series** Fast soft-recovery controlled avalanche rectifiers

Product specification  
Supersedes data of 1996 Jun 05

1996 Sep 18

## Fast soft-recovery controlled avalanche rectifiers

## BYD31 series

### FEATURES

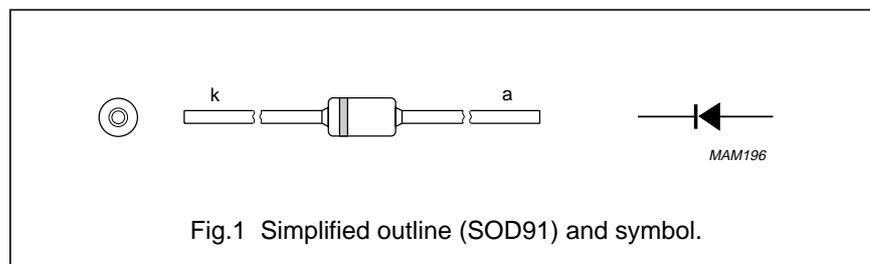
- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Available in ammo-pack.

### DESCRIPTION

Cavity free cylindrical glass package through Implotec™<sup>(1)</sup> 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				
	BYD31D		–	200	V
	BYD31G		–	400	V
	BYD31J		–	600	V
	BYD31K		–	800	V
	BYD31M		–	1000	V
$V_R$	continuous reverse voltage				
	BYD31D		–	200	V
	BYD31G		–	400	V
	BYD31J		–	600	V
	BYD31K		–	800	V
	BYD31M		–	1000	V
$I_{F(AV)}$	average forward current	$T_{tp} = 55\text{ °C}$ ; lead length = 10 mm; see Fig.2; averaged over any 20 ms period; see also Fig.6	–	440	mA
		$T_{amb} = 60\text{ °C}$ ; PCB mounting (see Fig.11); see Fig.3; averaged over any 20 ms period; see also Fig.6	–	320	mA
$I_{FRM}$	repetitive peak forward current	$T_{tp} = 55\text{ °C}$ ; see Fig.4	–	4	A
		$T_{amb} = 60\text{ °C}$ ; see Fig.5	–	3	A
$I_{FSM}$	non-repetitive peak forward current	$t = 10\text{ ms}$ half sine wave; $T_j = T_{jmax}$ prior to surge; $V_R = V_{RRMmax}$	–	5	A

## Fast soft-recovery controlled avalanche rectifiers

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$P_{RSM}$	non-repetitive peak reverse power dissipation	$t = 20 \mu s$ half sine wave; $T_j = T_{j \max}$ prior to surge			
	BYD31D to J		–	100	W
	BYD31K and M		–	50	W
$T_{stg}$	storage temperature		–65	+175	°C
$T_j$	junction temperature	see Fig.7	–65	+175	°C

### ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
$V_F$	forward voltage	$I_F = 0.5 \text{ A}$ ; $T_j = T_{j \max}$ ; see Fig.8	–	–	1.15	V	
		$I_F = 0.5 \text{ A}$ ; see Fig.8	–	–	1.35	V	
$V_{(BR)R}$	reverse avalanche breakdown voltage	$I_R = 0.1 \text{ mA}$					
			BYD31D	300	–	–	V
			BYD31G	500	–	–	V
			BYD31J	700	–	–	V
			BYD31K	900	–	–	V
	BYD31M	1100	–	–	V		
$I_R$	reverse current	$V_R = V_{RRMmax}$ ; see Fig.9	–	–	1	$\mu A$	
		$V_R = V_{RRMmax}$ ; $T_j = 165 \text{ °C}$ ; see Fig.9	–	–	75	$\mu A$	
$t_{rr}$	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					
			BYD31D to J	–	–	250	ns
	BYD31K and M		–	–	300	ns	
$C_d$	diode capacitance	$f = 1 \text{ MHz}$ ; $V_R = 0 \text{ V}$ ; see Fig.10	–	9	–	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 $dI_F/dt = -1 \text{ A}/\mu s$ ; see Fig.13					
			BYD31D to J	–	–	6	A/ $\mu s$
	BYD31K and M		–	–	5	A/ $\mu s$	

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**Fast soft-recovery  
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**BYD31 series****THERMAL CHARACTERISTICS**

<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>VALUE</b>	<b>UNIT</b>
$R_{th\ j-tp}$	thermal resistance from junction to tie-point	lead length = 10 mm	180	K/W
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	250	K/W

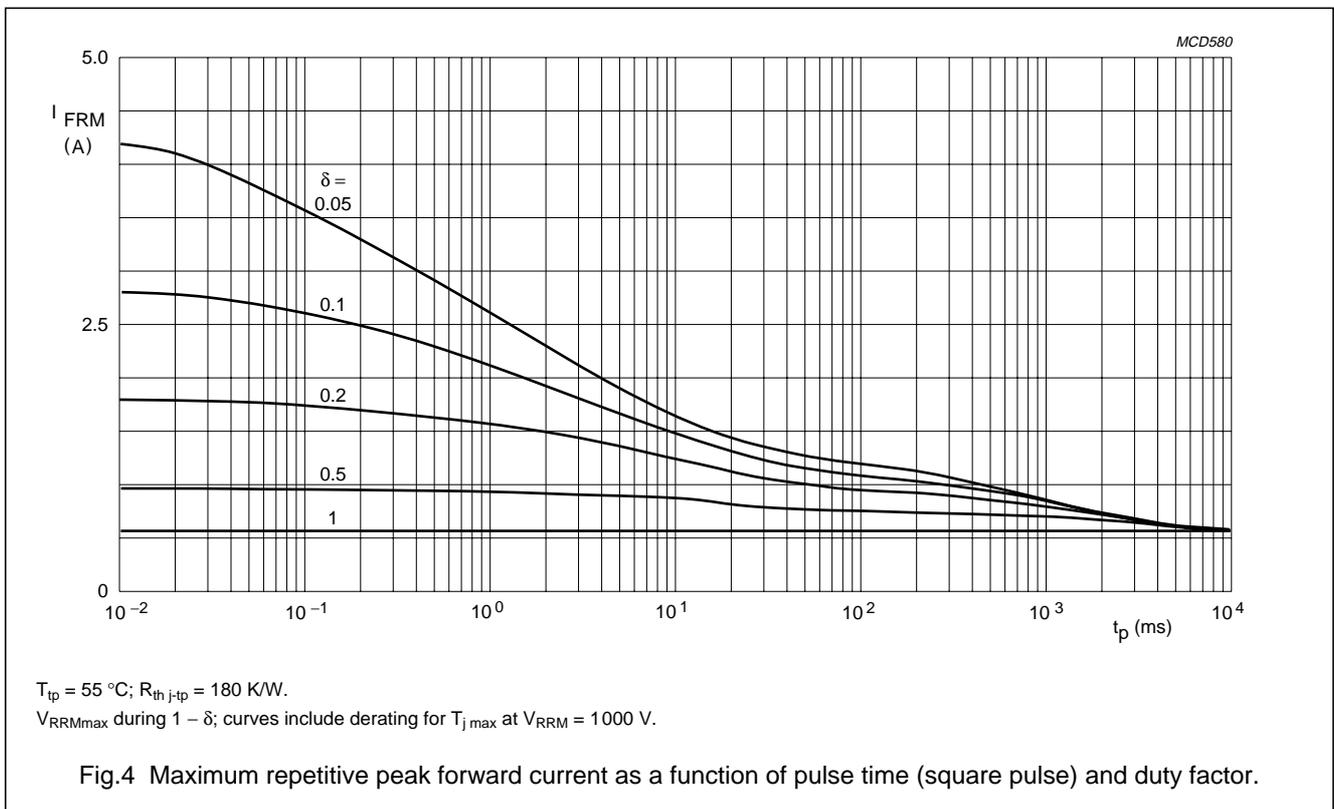
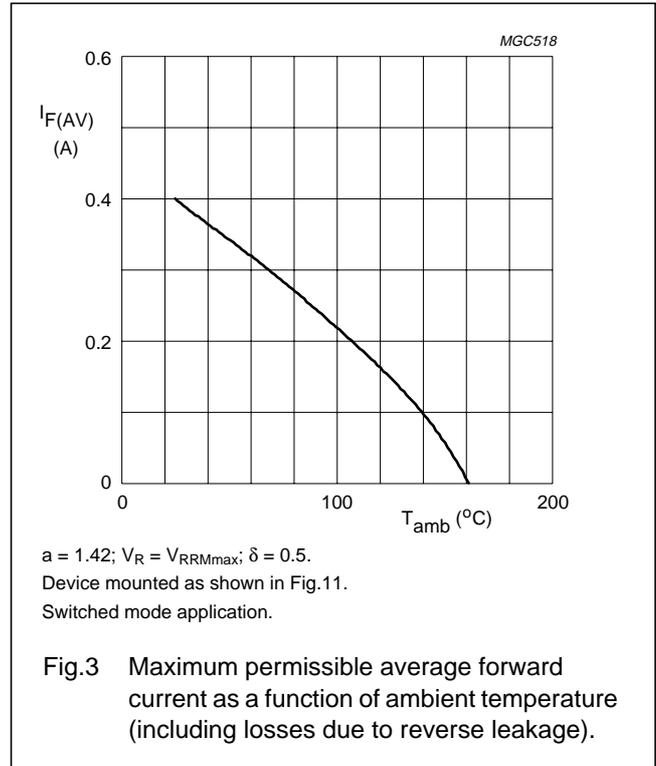
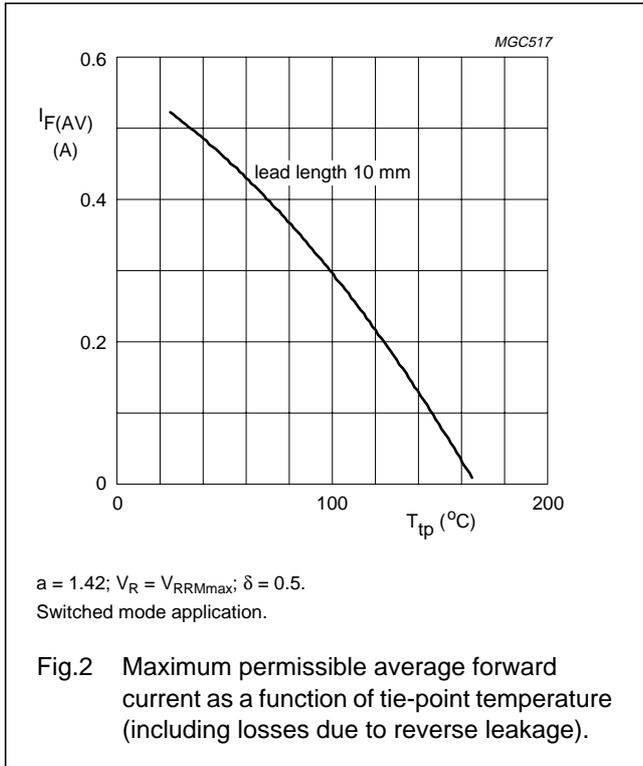
**Note**

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.11.  
For more information please refer to the "*General Part of associated Handbook*".

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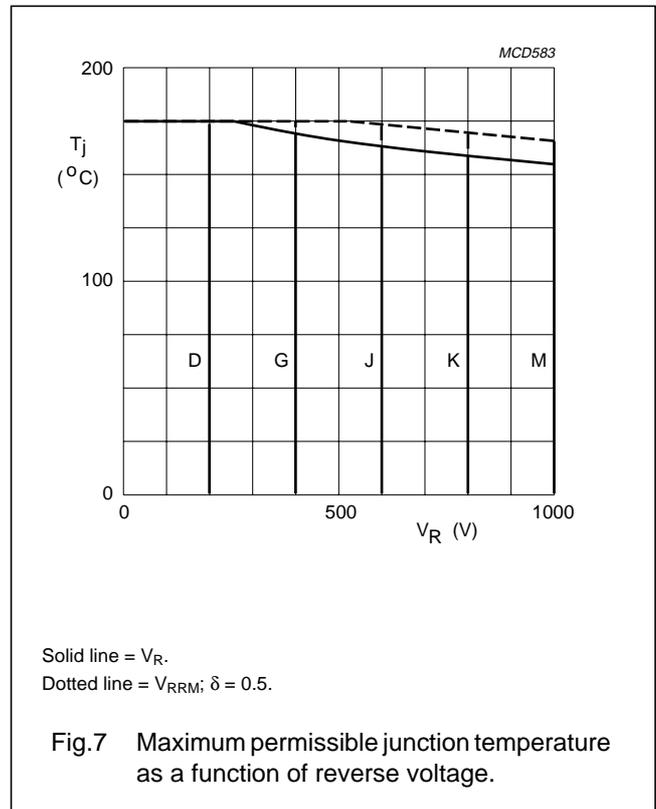
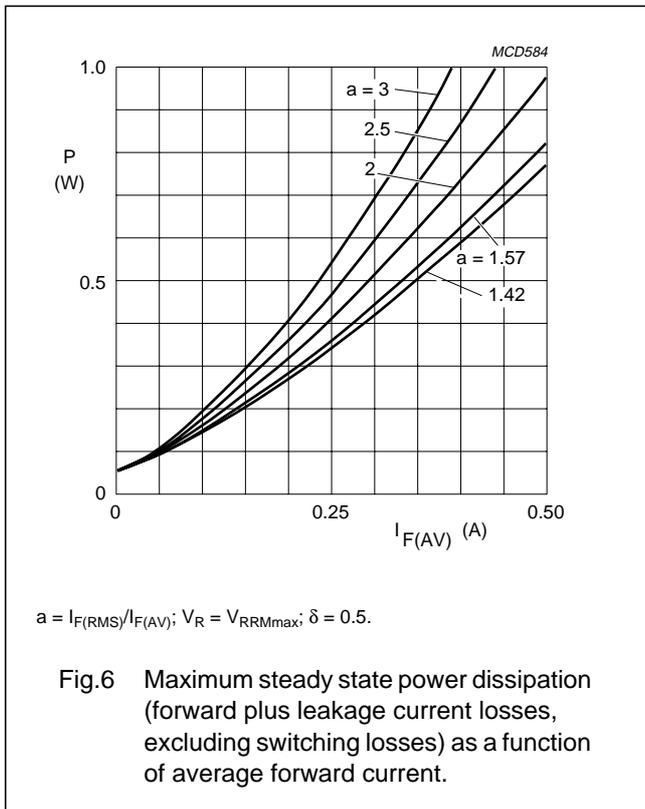
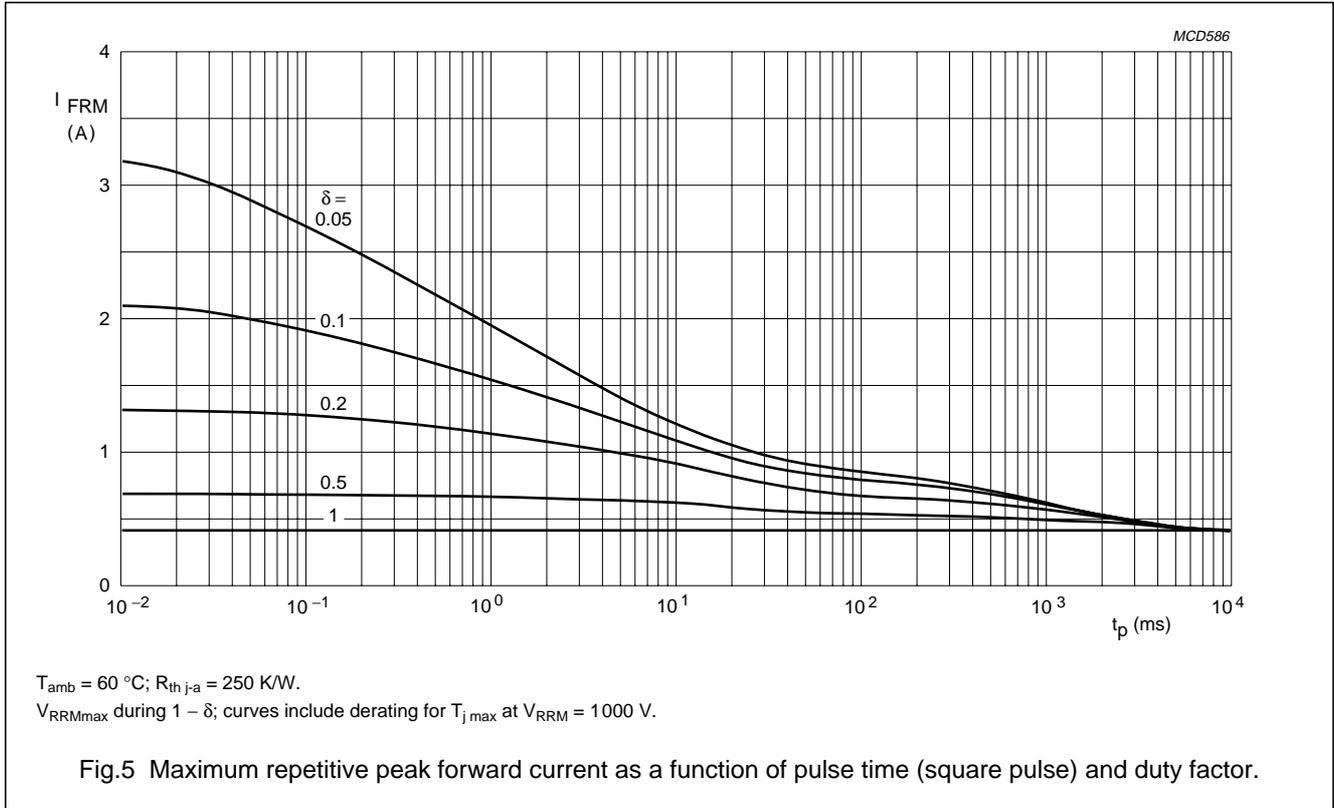
BYD31 series

GRAPHICAL DATA



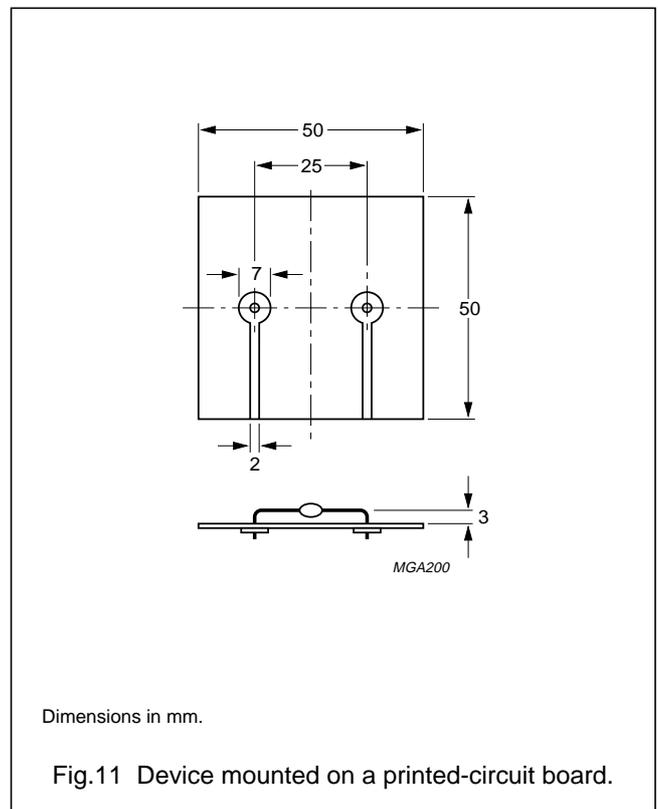
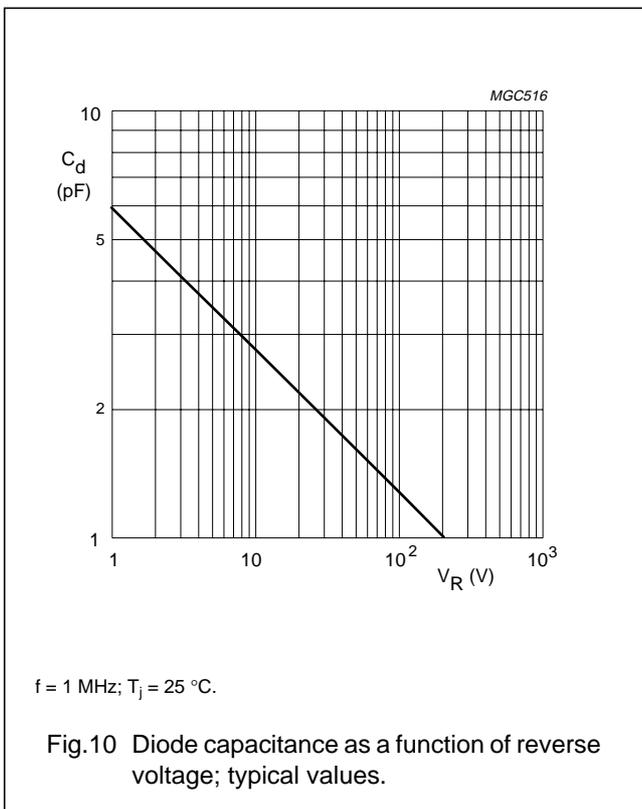
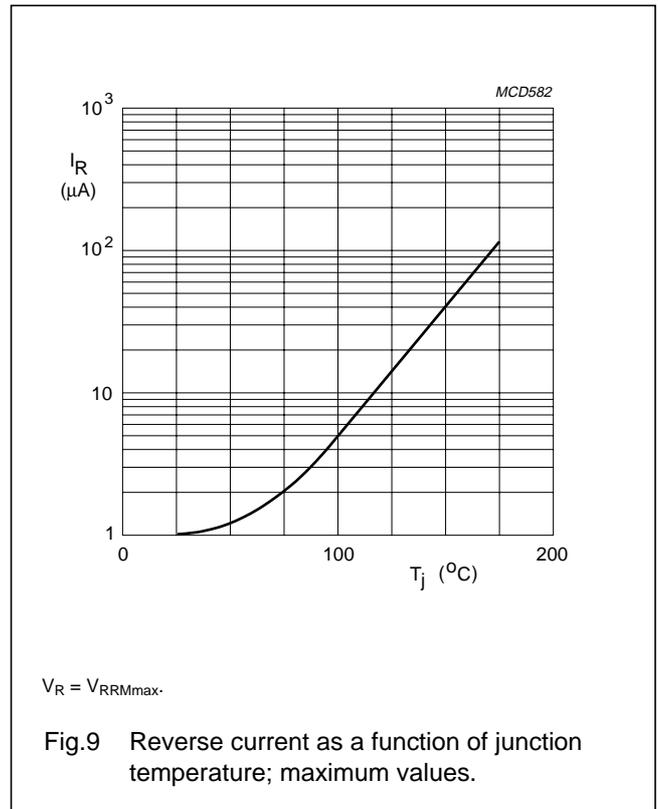
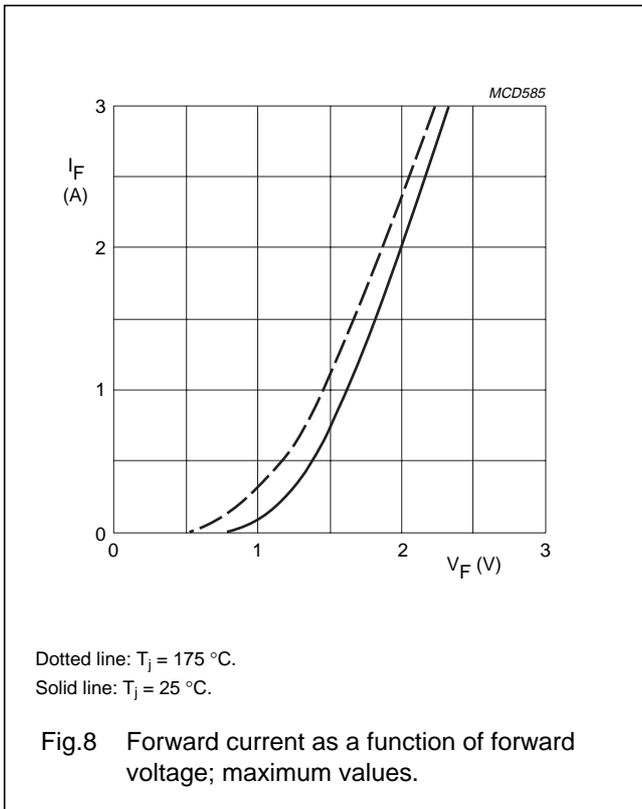
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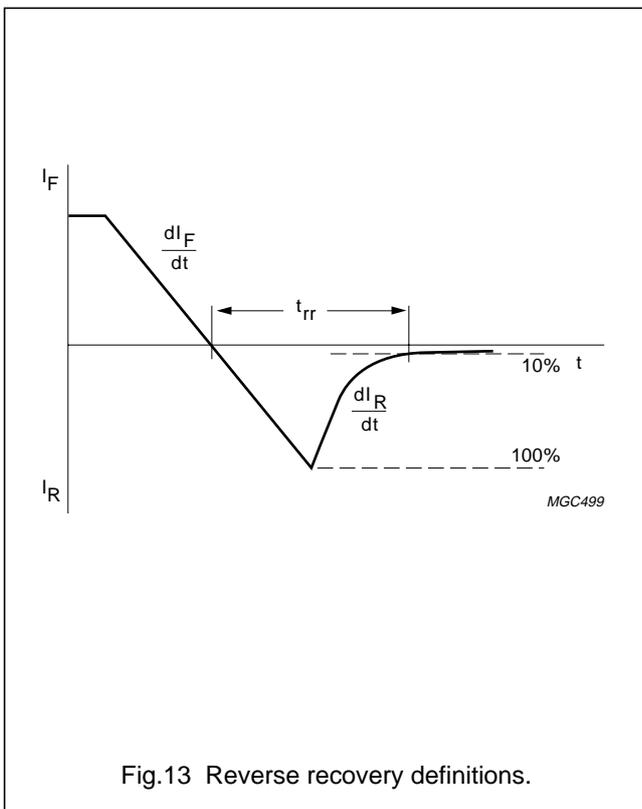
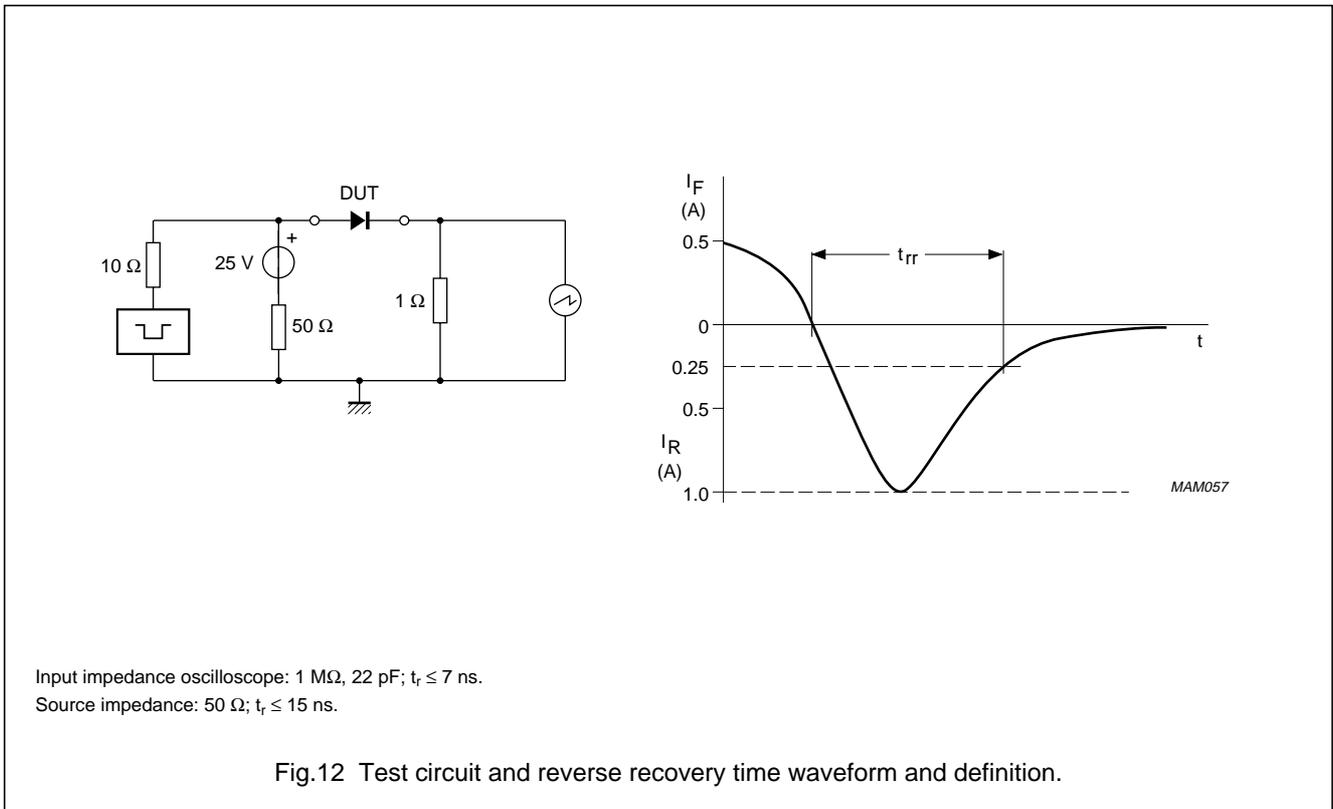
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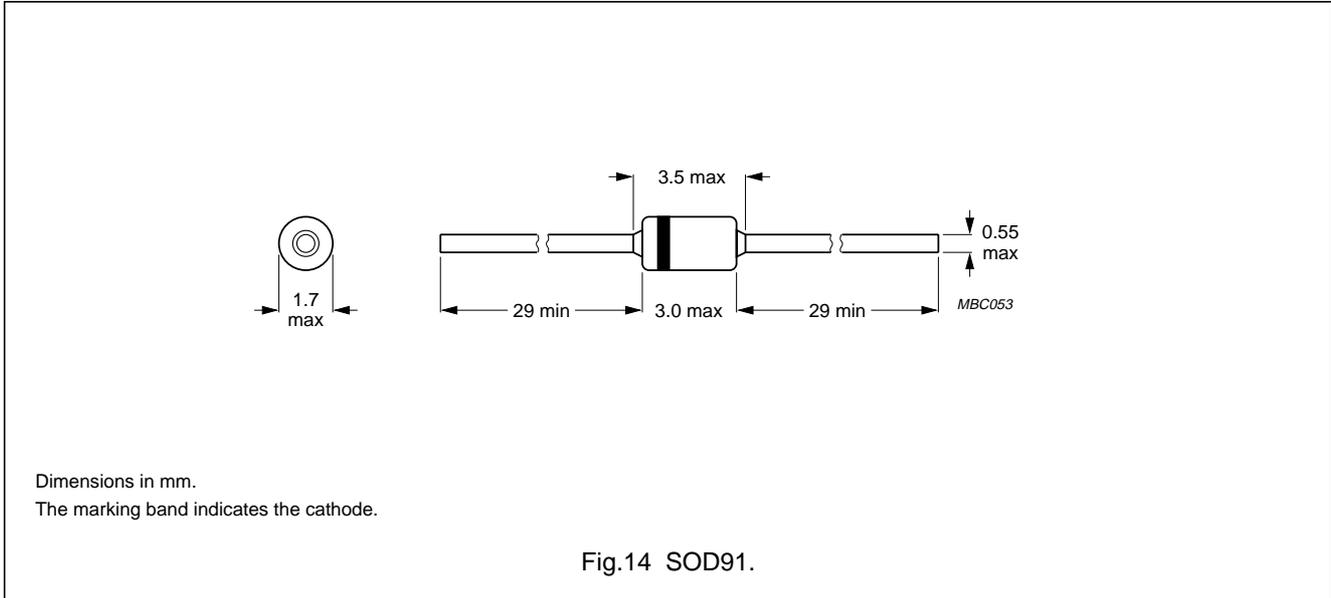
BYD31 series



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PACKAGE OUTLINE



DEFINITIONS

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
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.