

# DATA SHEET



## **BYV36 series** Fast soft-recovery controlled avalanche rectifiers

Product specification  
Supersedes data of 1996 May 30

1996 Jul 01

# Fast soft-recovery controlled avalanche rectifiers

## BYV36 series

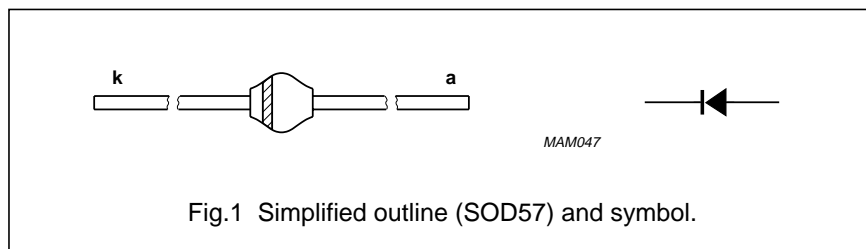
### FEATURES

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

### DESCRIPTION

Rugged glass SOD57 package, using a high temperature alloyed

construction. This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.



### LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>RRM</sub>	repetitive peak reverse voltage				
	BYV36A		–	200	V
	BYV36B		–	400	V
	BYV36C		–	600	V
	BYV36D		–	800	V
	BYV36E		–	1000	V
	BYV36F BYV36G		–	1200 1400	V V
V <sub>R</sub>	continuous reverse voltage				
	BYV36A		–	200	V
	BYV36B		–	400	V
	BYV36C		–	600	V
	BYV36D		–	800	V
	BYV36E		–	1000	V
	BYV36F BYV36G		–	1200 1400	V V
I <sub>F(AV)</sub>	average forward current	T <sub>tp</sub> = 60 °C; lead length = 10 mm; see Figs 2; 3 and 4	–	1.6	A
	BYV36A to C	averaged over any 20 ms period; see also Figs 14; 15 and 16	–	1.5	A
	BYV36D and E BYV36F and G		–	1.5	A
I <sub>F(AV)</sub>	average forward current	T <sub>amb</sub> = 60 °C; PCB mounting (see Fig.25); see Figs 5; 6 and 7	–	0.87	A
	BYV36A to C	averaged over any 20 ms period; see also Figs 14; 15 and 16	–	0.81	A
	BYV36D and E BYV36F and G		–	0.81	A

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{FRM}$	repetitive peak forward current	$T_{tp} = 60\text{ °C}$ ; see Figs 8; 9 and 10	–	18	A
	BYV36A to C			17	A
	BYV36D and E BYV36F and G			15	A
$I_{FRM}$	repetitive peak forward current	$T_{amb} = 60\text{ °C}$ ; see Figs 11; 12 and 13	–	9	A
	BYV36A to C			8	A
	BYV36D and E BYV36F and G			8	A
$I_{FSM}$	non-repetitive peak forward current	$t = 10\text{ ms}$ half sine wave; $T_j = T_{j\max}$ prior to surge; $V_R = V_{RRM\max}$	–	30	A
$E_{RSM}$	non-repetitive peak reverse avalanche energy	$L = 120\text{ mH}$ ; $T_j = T_{j\max}$ prior to surge; inductive load switched off	–	10	mJ
$T_{stg}$	storage temperature		–65	+175	°C
$T_j$	junction temperature	see Figs 17 and 18	–65	+175	°C

### ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT			
$V_F$	forward voltage	$I_F = 1\text{ A}$ ; $T_j = T_{j\max}$ ; see Figs 19; 20 and 21	–	–	1.00	V			
	BYV36A to C				1.05	V			
	BYV36D and E BYV36F and G				1.05	V			
$V_F$	forward voltage	$I_F = 1\text{ A}$ ; see Figs 19; 20 and 21	–	–	1.35	V			
	BYV36A to C				1.45	V			
	BYV36D and E BYV36F and G				1.45	V			
$V_{(BR)R}$	reverse avalanche breakdown voltage	$I_R = 0.1\text{ mA}$							
	BYV36A					300	–	–	V
	BYV36B					500	–	–	V
	BYV36C					700	–	–	V
	BYV36D					900	–	–	V
	BYV36E					1100	–	–	V
	BYV36F BYV36G					1300 1500	–	–	V
$I_R$	reverse current	$V_R = V_{RRM\max}$ ; see Fig.22	–	–	5	$\mu\text{A}$			
		$V_R = V_{RRM\max}$ ; $T_j = 165\text{ °C}$ ; see Fig.22	–	–	150	$\mu\text{A}$			

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SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$t_{rr}$	reverse recovery time	when switched from $I_F = 0.5$ A to $I_R = 1$ A; measured at $I_R = 0.25$ A; see Fig. 26	–	–	100	ns
	BYV36A to C					
	BYV36D and E BYV36F and G					
$C_d$	diode capacitance	$f = 1$ MHz; $V_R = 0$ V; see Figs 23 and 24	–	45	–	pF
	BYV36A to C					
	BYV36D and E BYV36F and G					
$\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/ $\mu$ s; see Fig.27	–	–	7	A/ $\mu$ s
	BYV36A to C					
	BYV36D and E BYV36F and G					

### THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-tp}$	thermal resistance from junction to tie-point	lead length = 10 mm	46	K/W
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	100	K/W

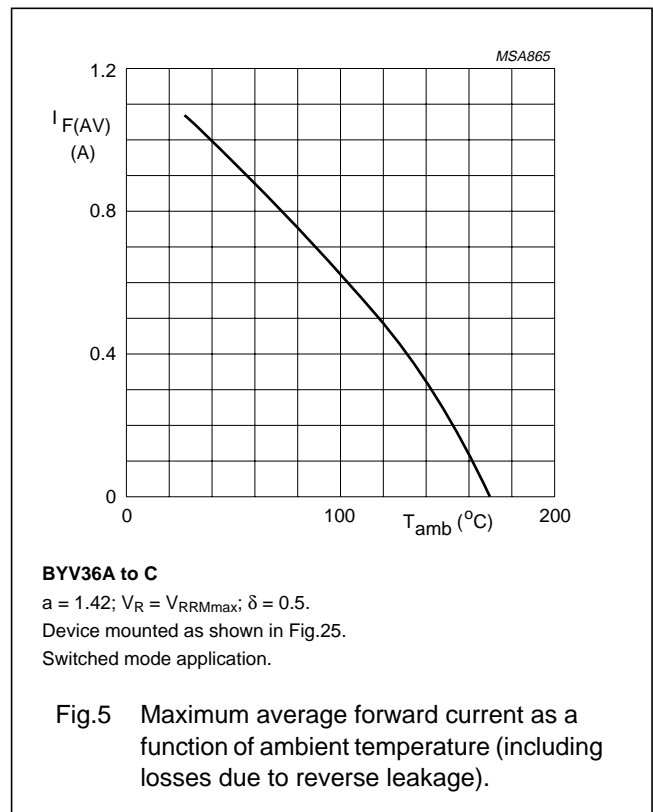
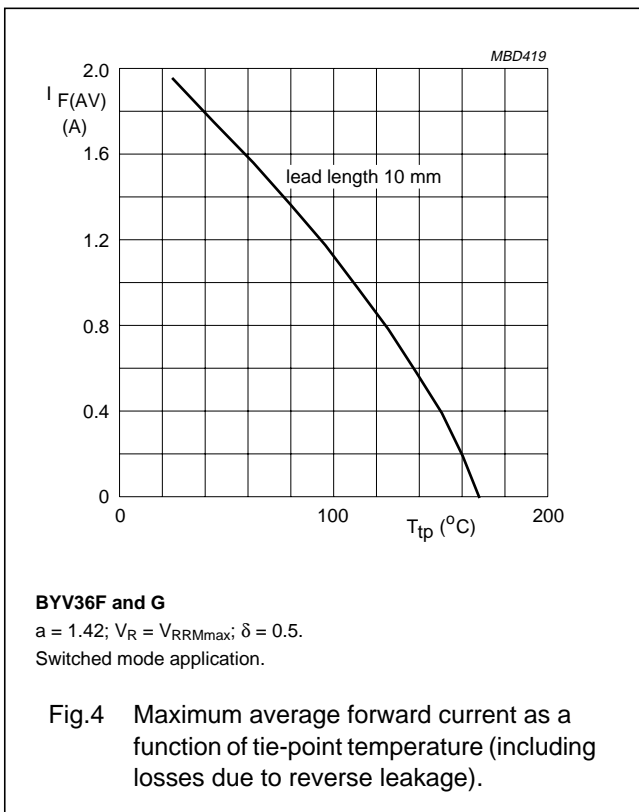
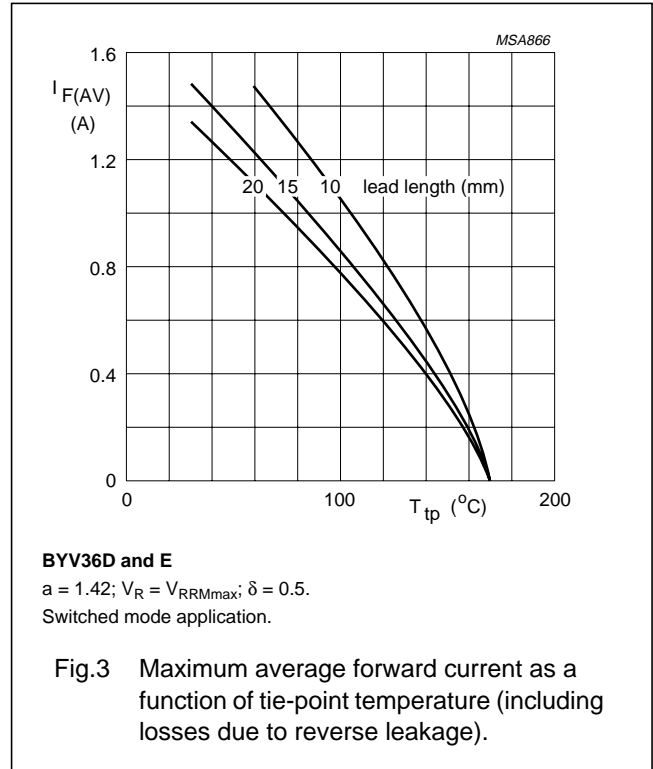
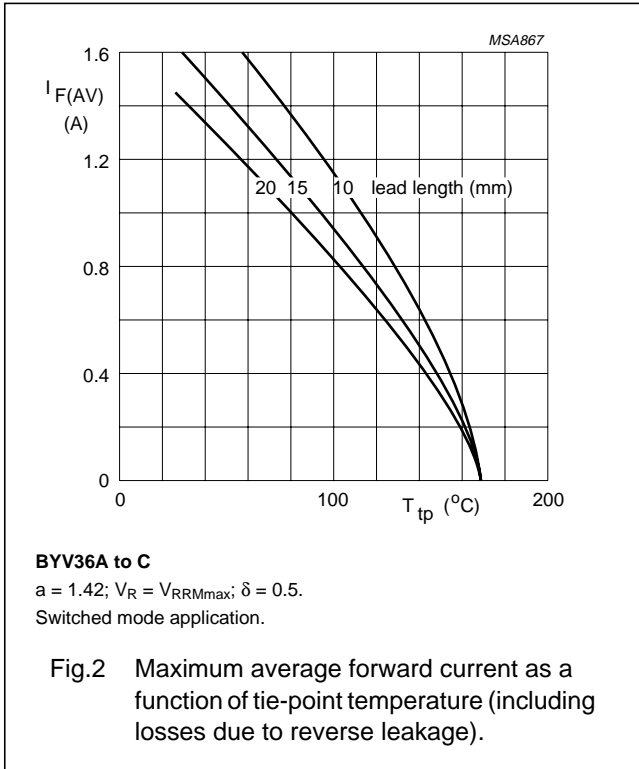
### Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer  $\geq 40$   $\mu$ m, see Fig.25. For more information please refer to the "General Part of associated Handbook".

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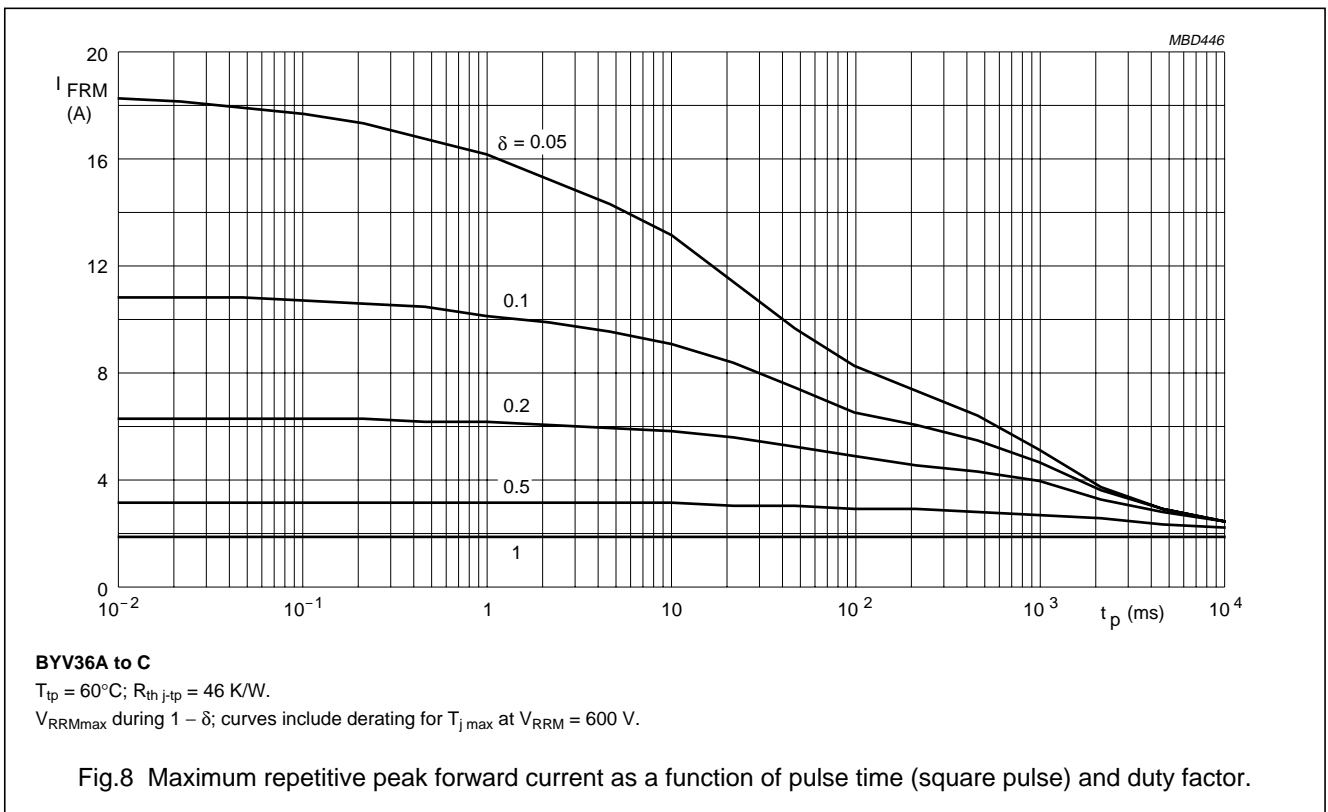
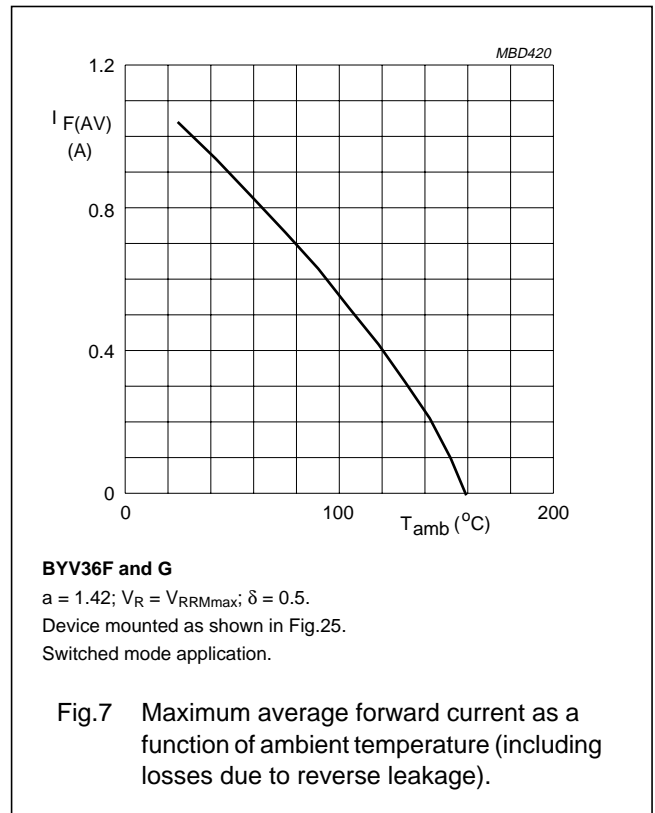
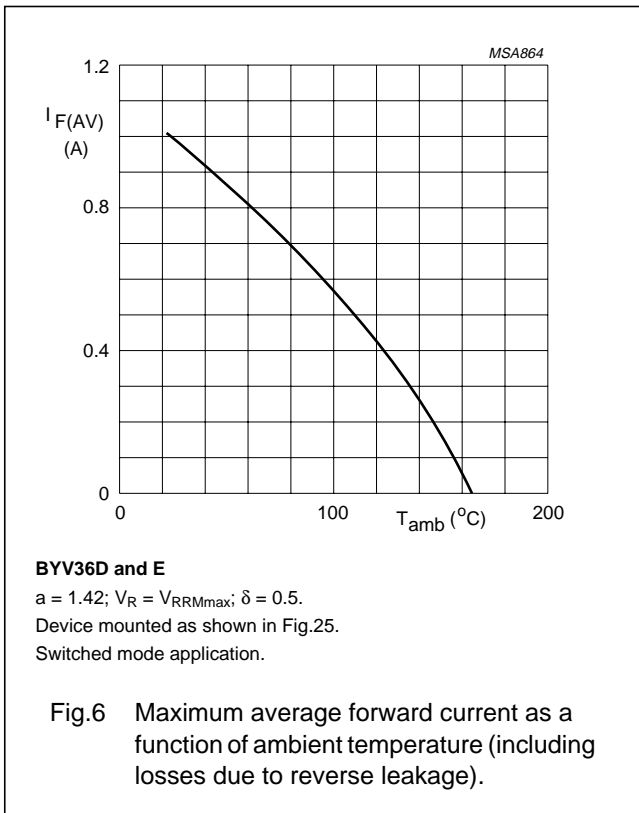
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GRAPHICAL DATA



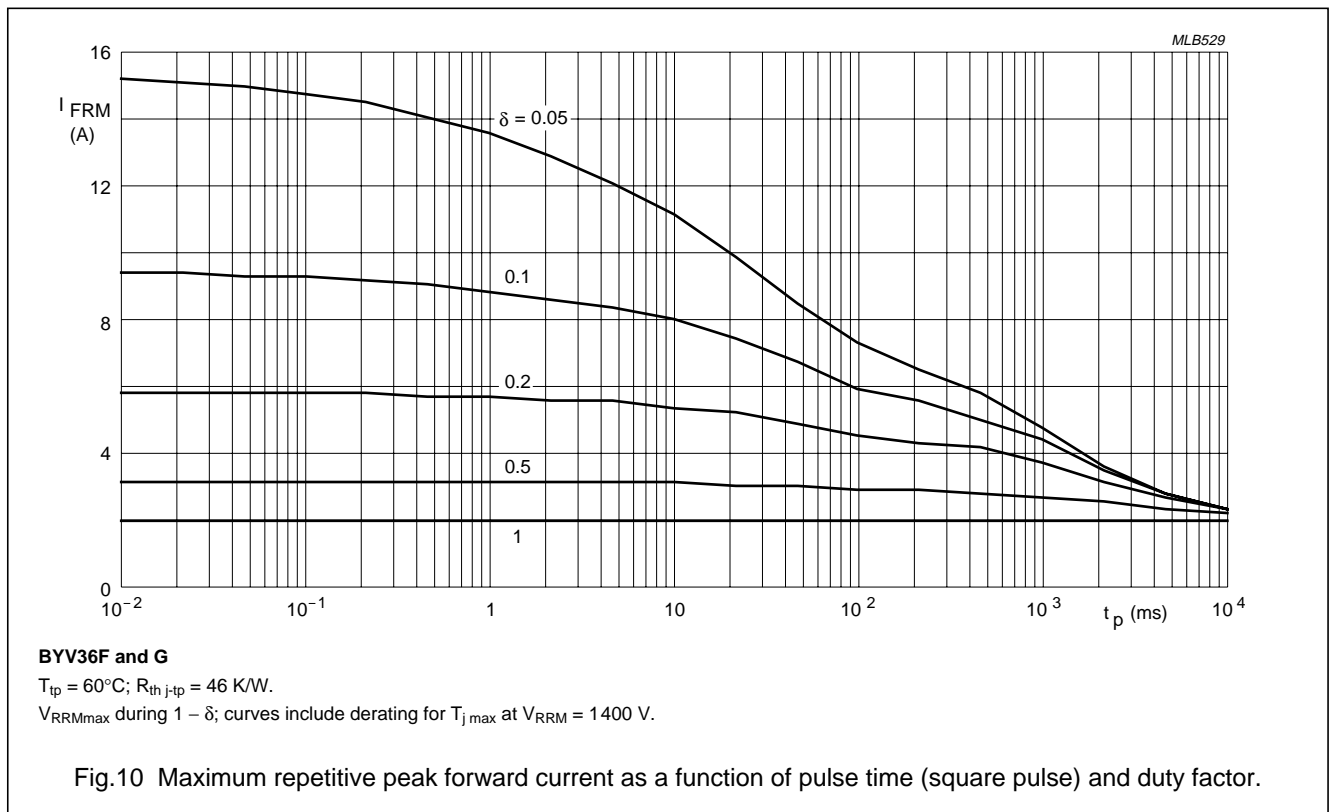
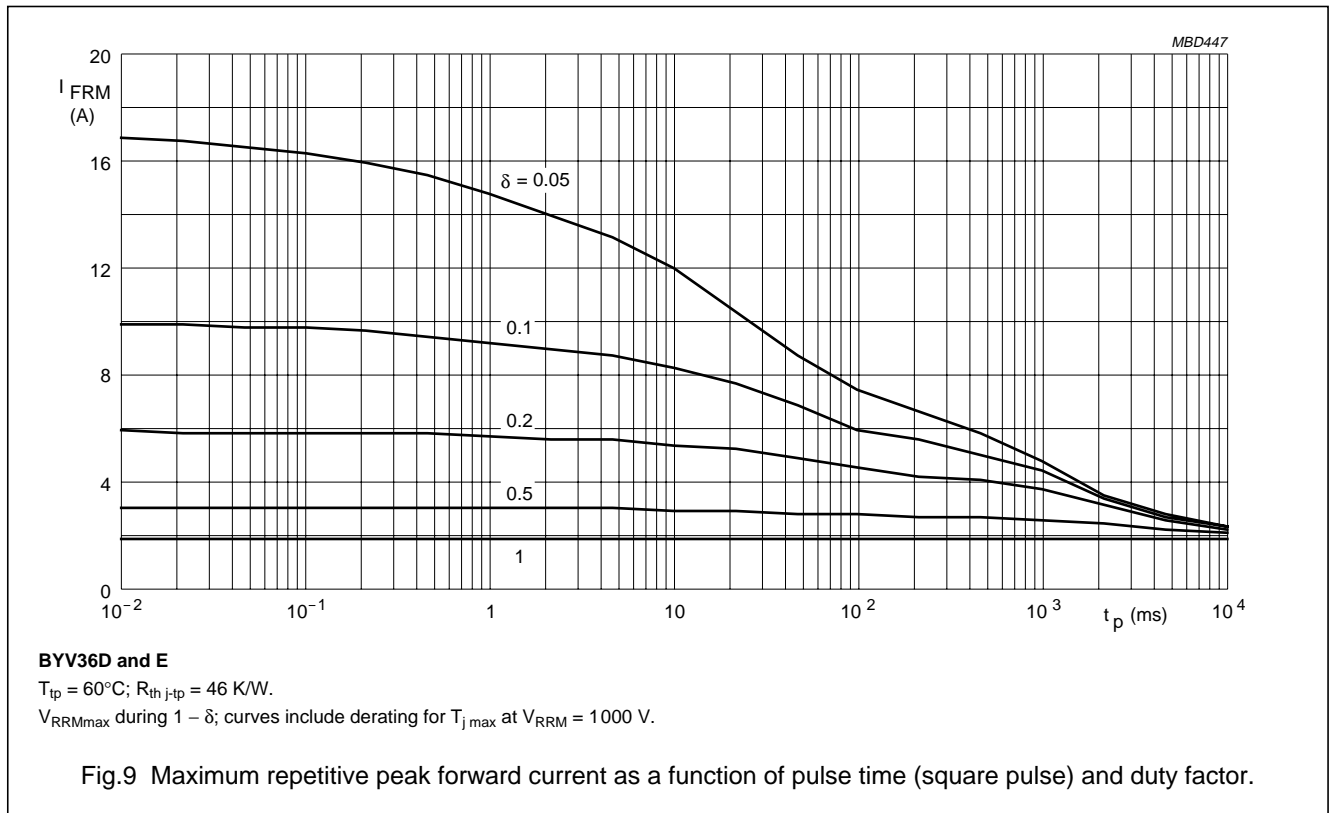
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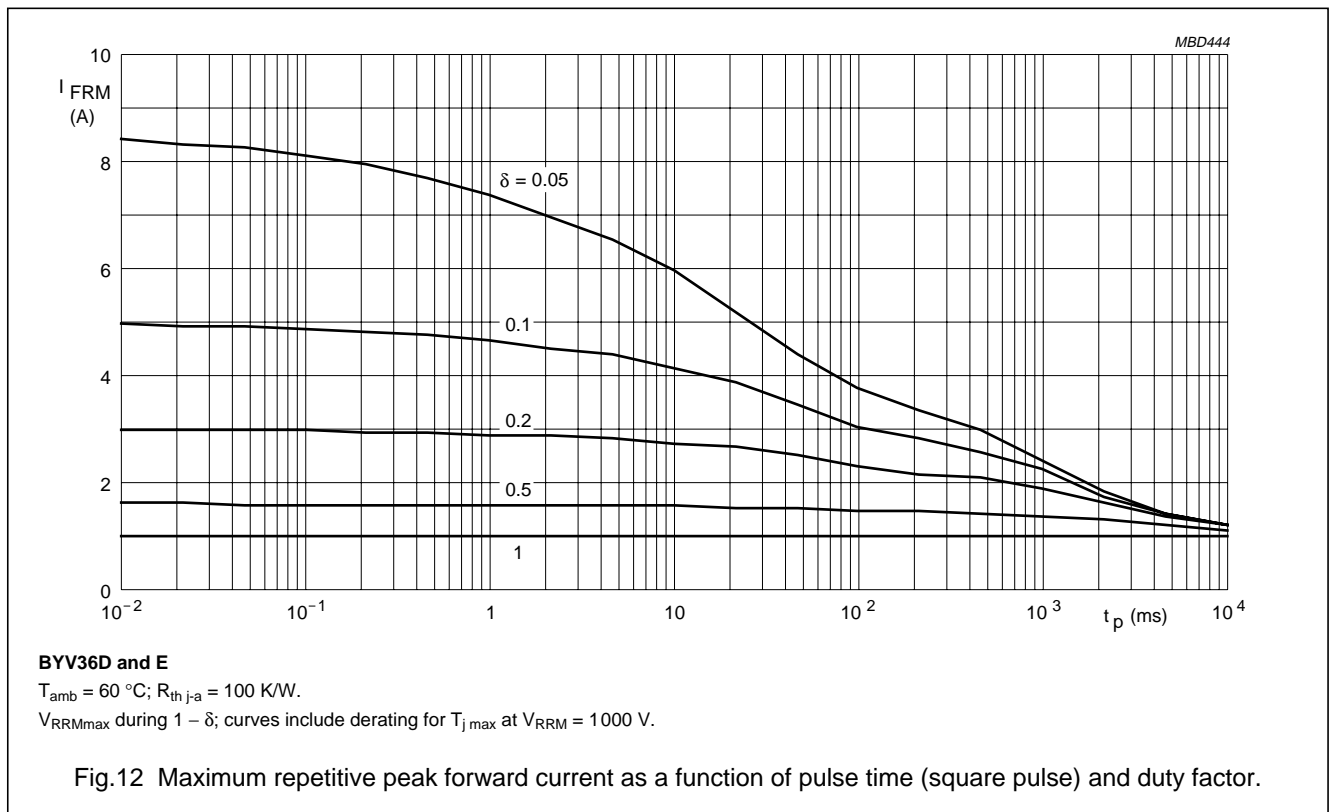
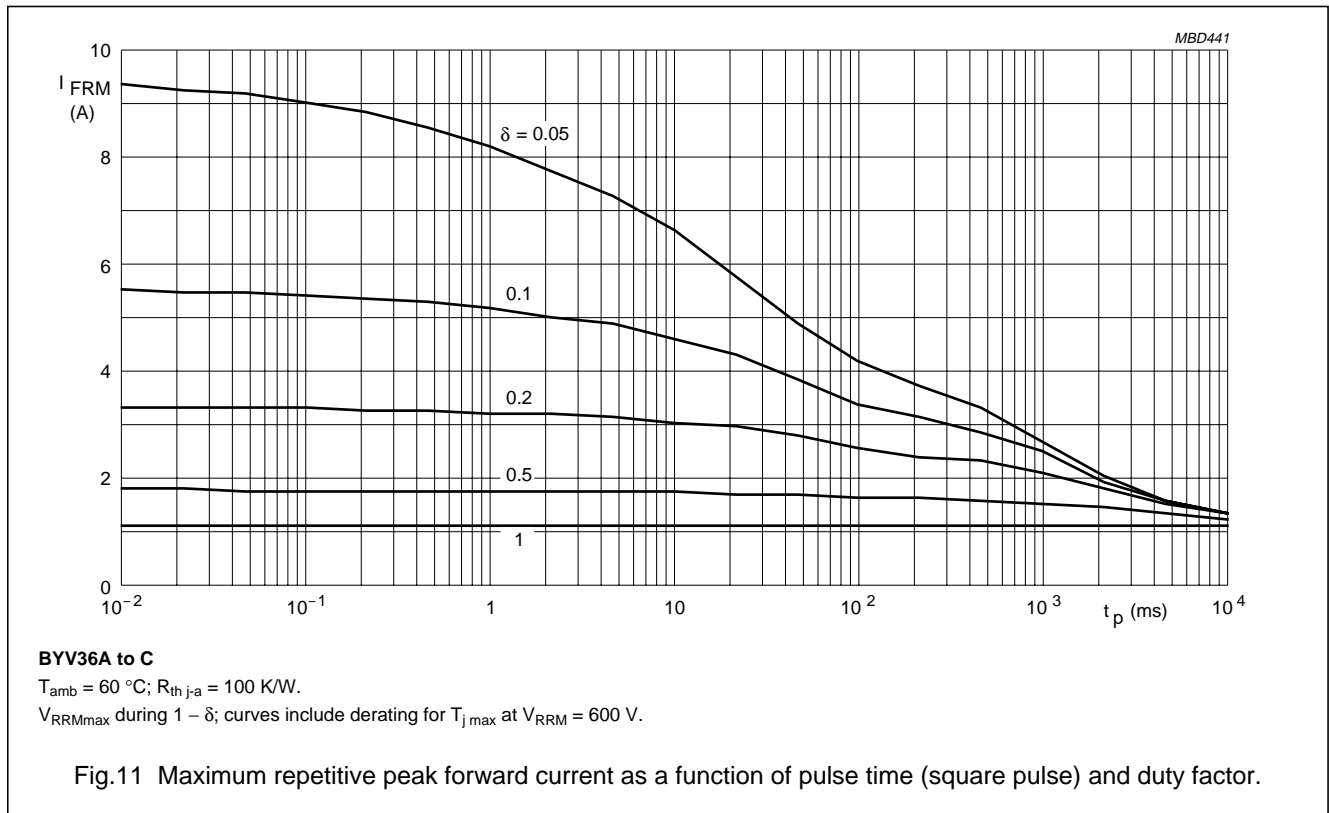
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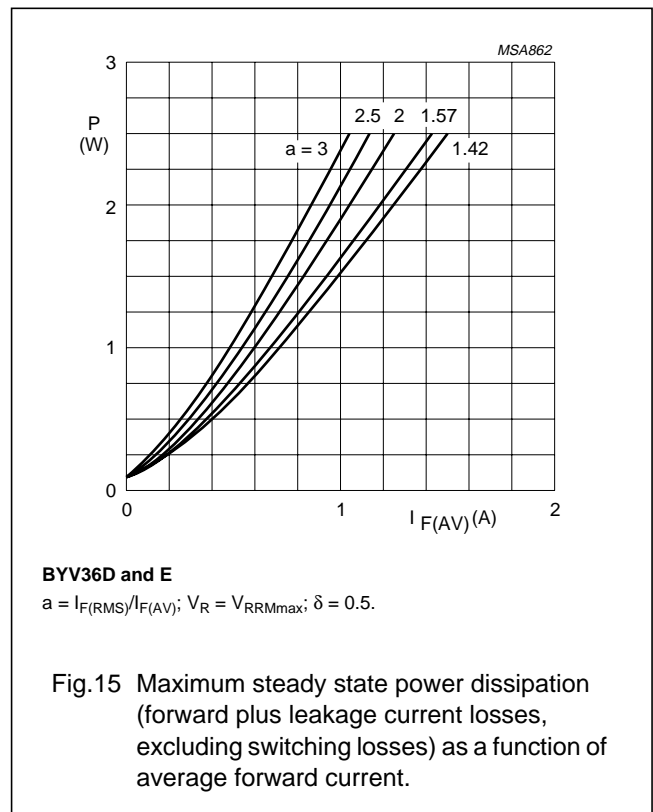
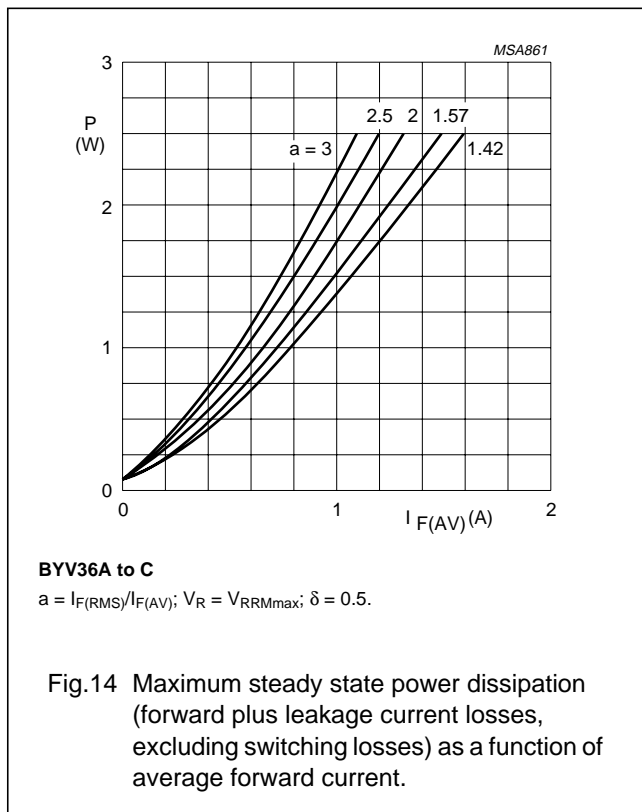
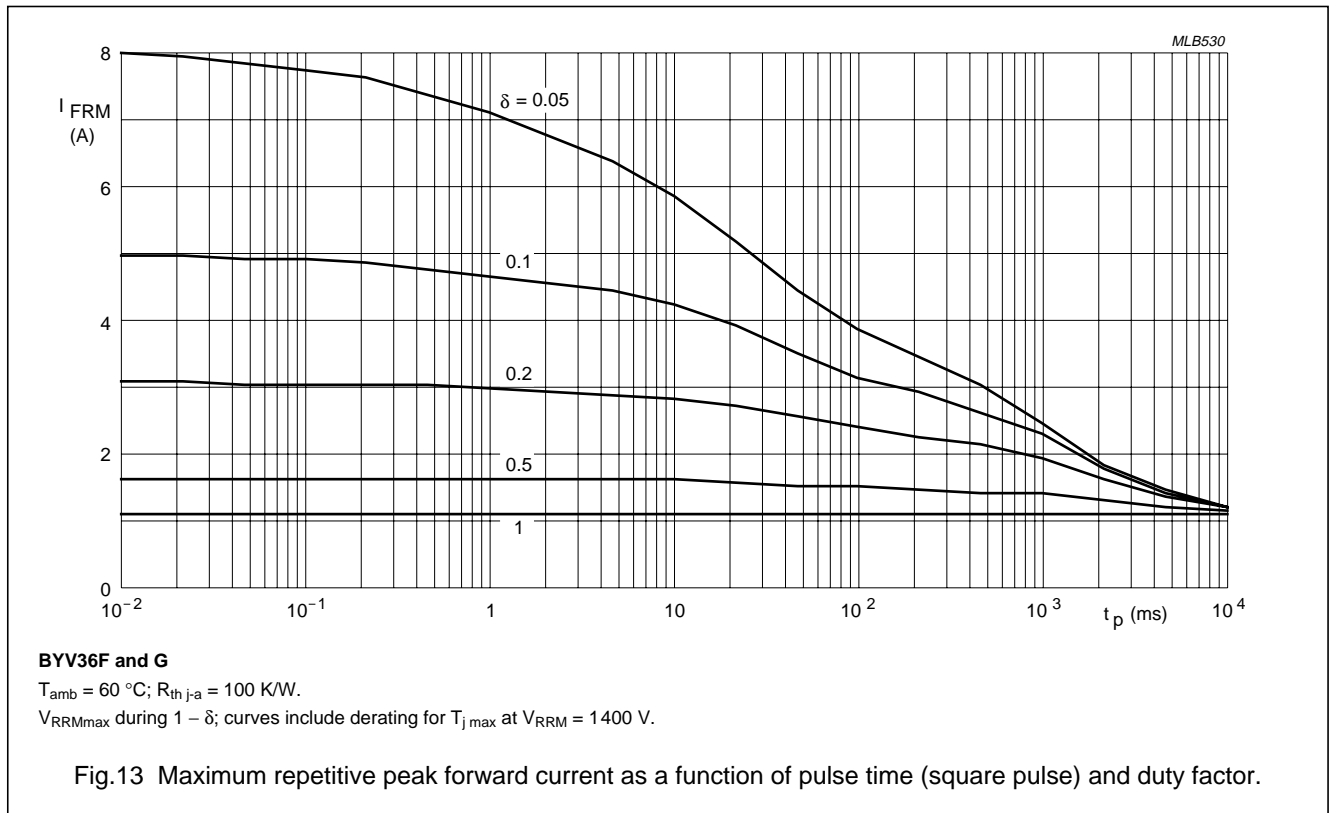
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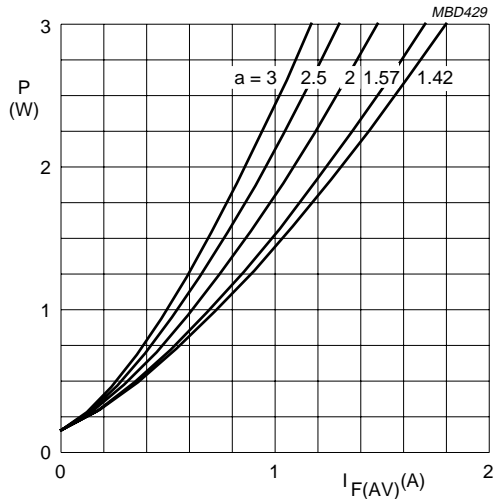
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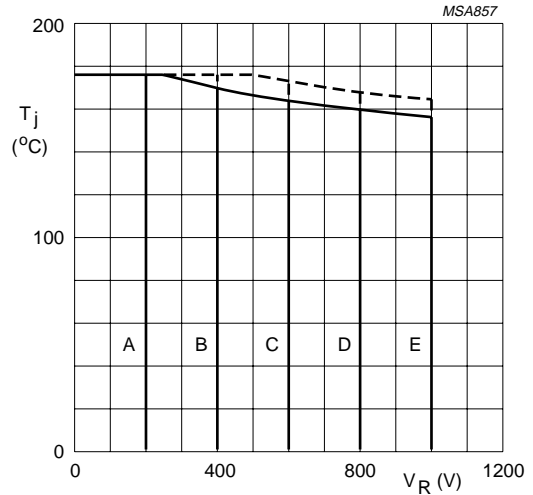
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**BYV36F and G**

$a = I_{F(RMS)}/I_{F(AV)}$ ;  $V_R = V_{RRMmax}$ ;  $\delta = 0.5$ .

Fig. 16 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.

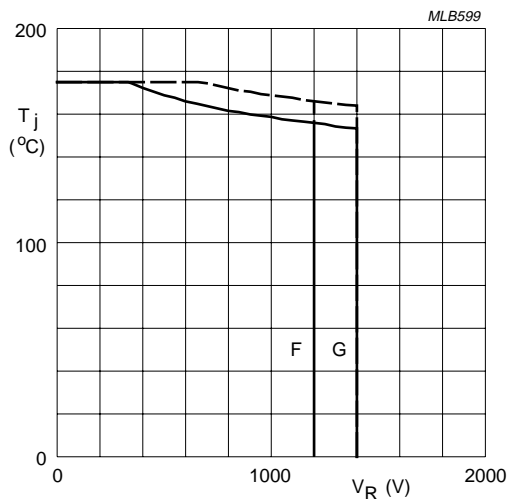


**BYV36A to E**

Solid line =  $V_R$ .

Dotted line =  $V_{RRM}$ ;  $\delta = 0.5$ .

Fig. 17 Maximum permissible junction temperature as a function of reverse voltage.

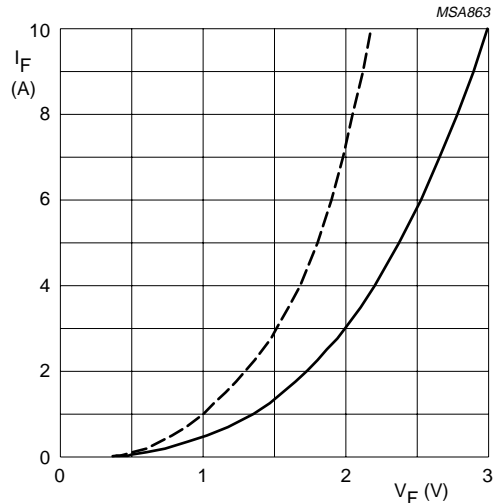


**BYV36F and G**

Solid line =  $V_R$ .

Dotted line =  $V_{RRM}$ ;  $\delta = 0.5$ .

Fig. 18 Maximum permissible junction temperature as a function of reverse voltage.



**BYV36A to C**

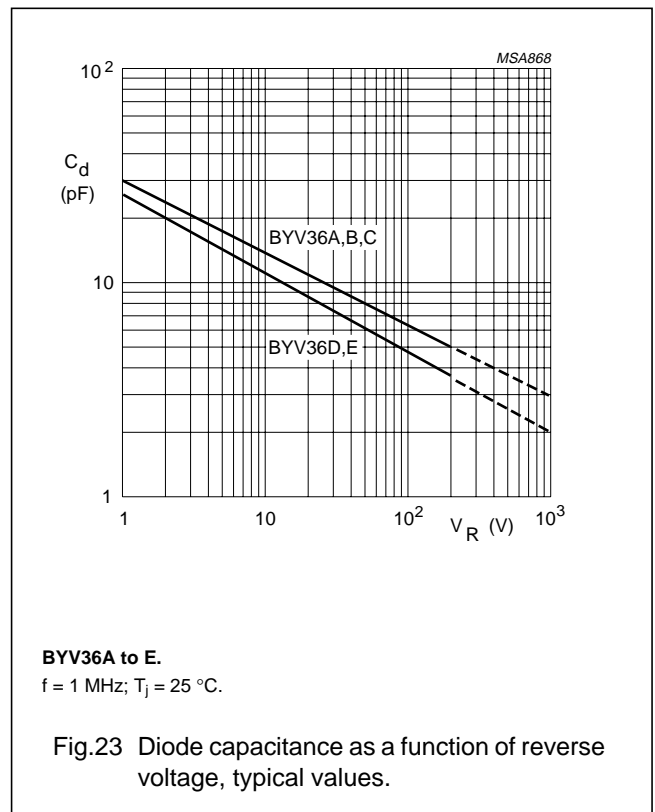
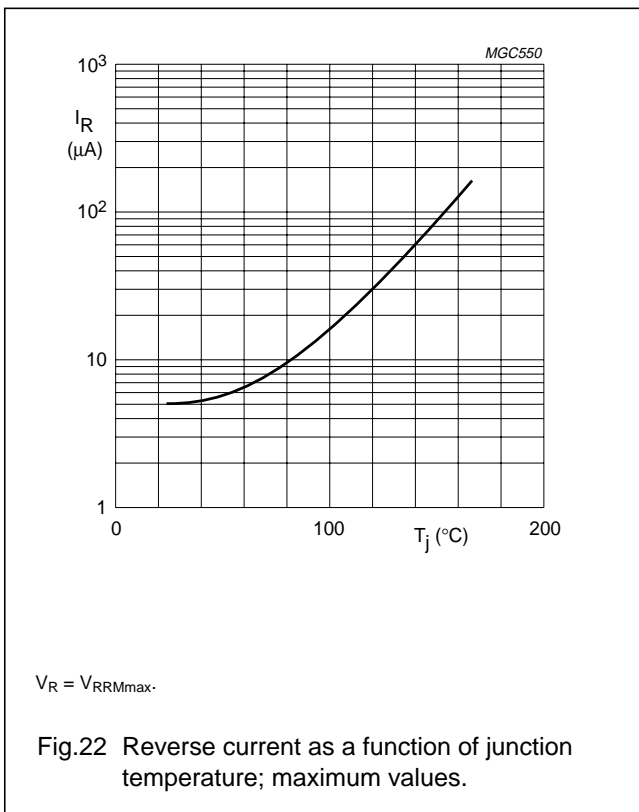
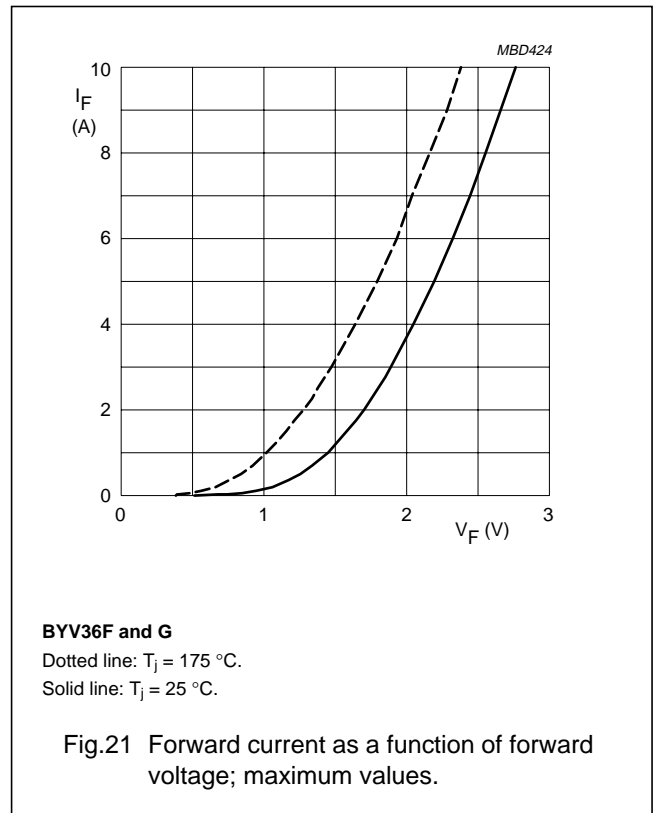
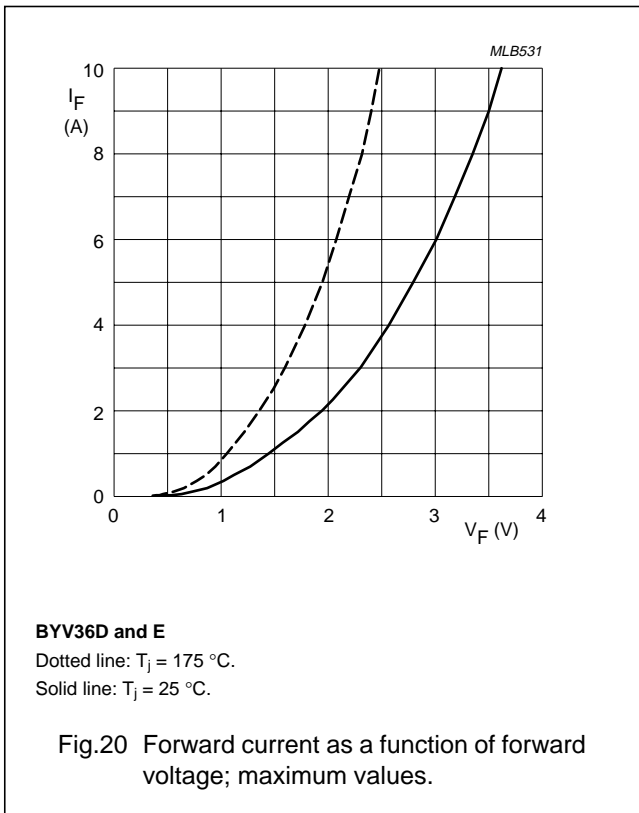
Dotted line:  $T_j = 175$  °C.

Solid line:  $T_j = 25$  °C.

Fig. 19 Forward current as a function of forward voltage; maximum values.

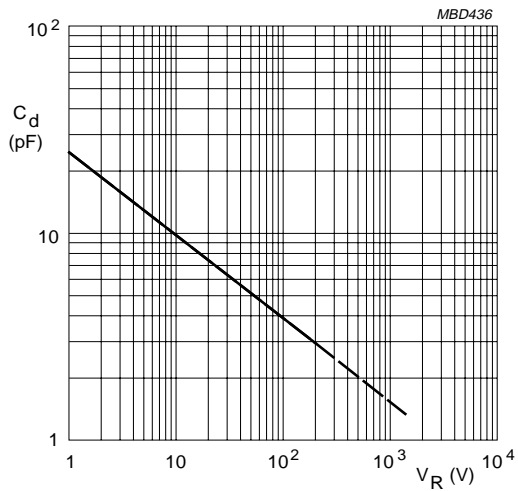
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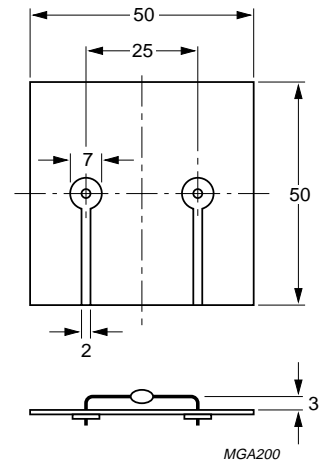
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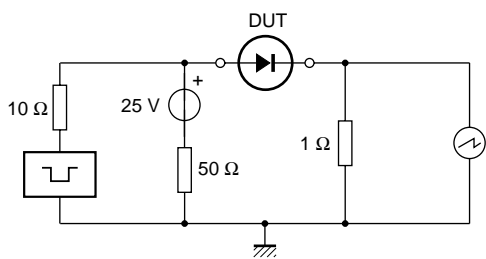
**BYV36F and G.**  
f = 1 MHz; T<sub>j</sub> = 25 °C.

Fig.24 Diode capacitance as a function of reverse voltage, typical values.



Dimensions in mm.

Fig.25 Device mounted on a printed-circuit board.



Input impedance oscilloscope: 1 MΩ, 22 pF; t<sub>r</sub> ≤ 7 ns.  
Source impedance: 50 Ω; t<sub>r</sub> ≤ 15 ns.

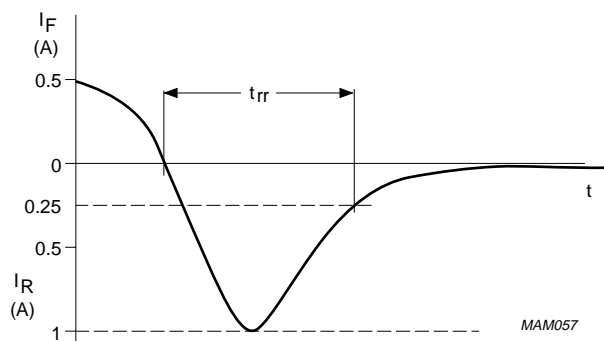


Fig.26 Test circuit and reverse recovery time waveform and definition.

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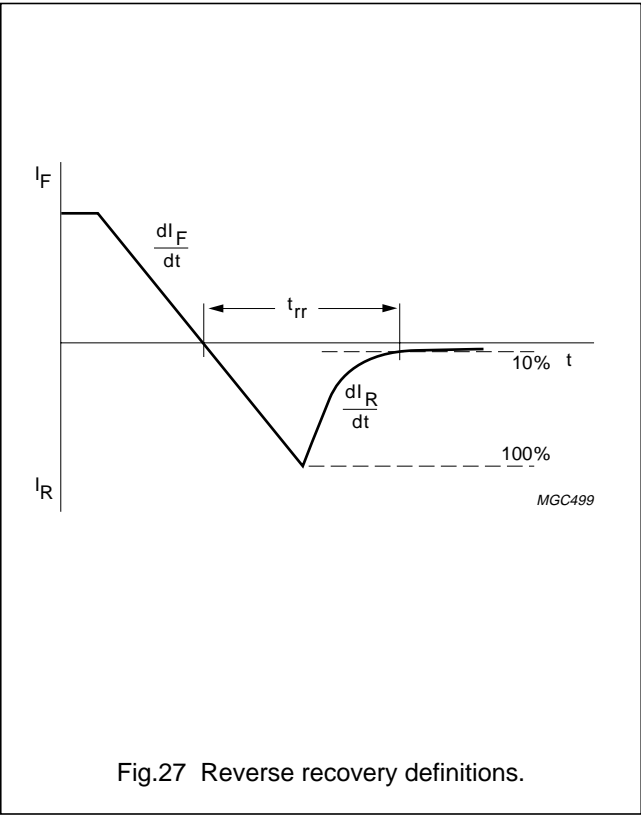
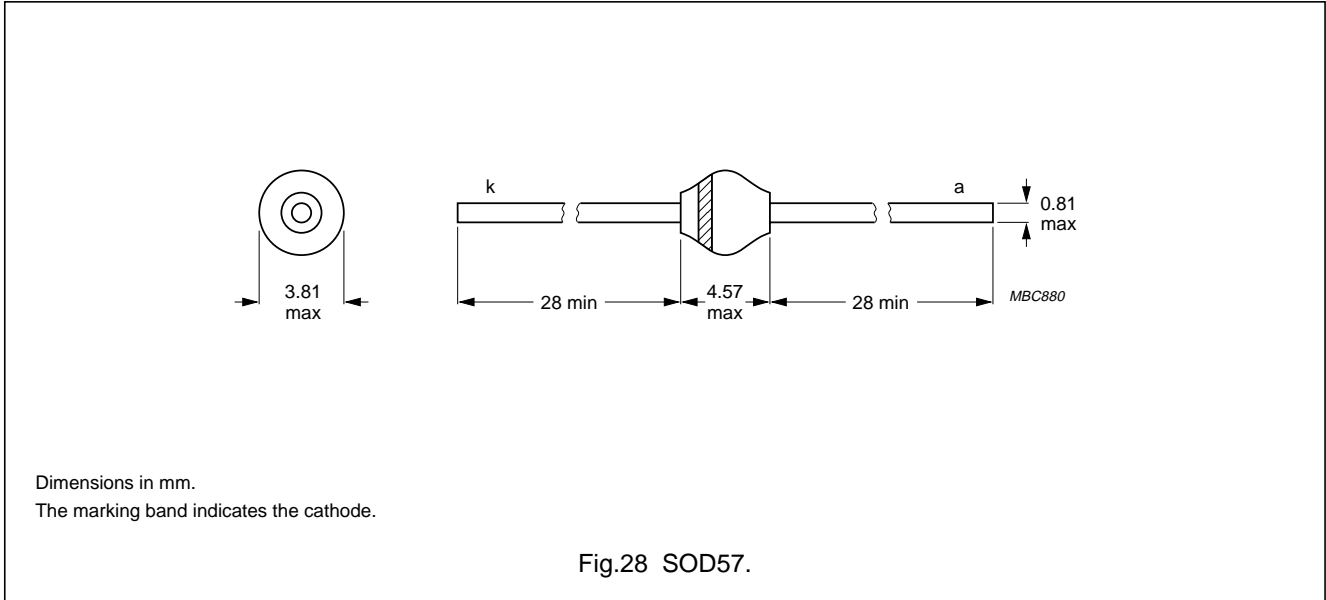


Fig.27 Reverse recovery definitions.

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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.