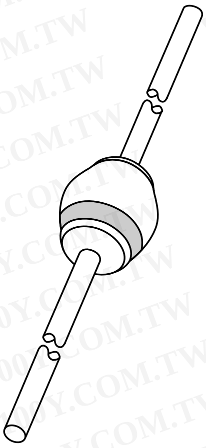
DISCRETE SEMICONDUCTORS

DATA SHEET



BYV28 series

Ultra fast low-loss controlled avalanche rectifiers

Product specification
Supersedes data of 1996 Oct 02

1997 Nov 24

Philips Semiconductors

PHILIPS

Ultra fast low-loss controlled avalanche rectifiers

BYV28 series

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Available in ammo-pack
- Also available with preformed leads for easy insertion.

DESCRIPTION

Rugged glass SOD64 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.

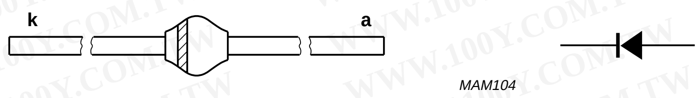


Fig.1 Simplified outline (SOD64) and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYV28-50		–	50	V
	BYV28-100		–	100	V
	BYV28-150		–	150	V
	BYV28-200		–	200	V
	BYV28-300		–	300	V
	BYV28-400		–	400	V
	BYV28-500		–	500	V
	BYV28-600		–	600	V
V_R	continuous reverse voltage				
	BYV28-50		–	50	V
	BYV28-100		–	100	V
	BYV28-150		–	150	V
	BYV28-200		–	200	V
	BYV28-300		–	300	V
	BYV28-400		–	400	V
	BYV28-500		–	500	V
	BYV28-600		–	600	V
$I_{F(AV)}$	average forward current	T_{tp} = 85 °C; lead length = 10 mm; see Figs 2 and 3; averaged over any 20 ms period; see also Figs 10 and 11			
	BYV28-50 to 400		–	3.5	A
	BYV28-500 and 600		–	3.1	A
$I_{F(AV)}$	average forward current	T_{amb} = 60 °C; printed-circuit board mounting (see Fig.20); see Figs 4 and 5; averaged over any 20 ms period; see also Figs 10 and 11			
	BYV28-50 to 400		–	1.9	A
	BYV28-500 and 600		–	1.5	A

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{FRM}	repetitive peak forward current	T_{tp} = 85 °C; see Figs 6 and 7			
	BYV28-50 to 400		–	32	A
	BYV28-500 and 600		–	31	A
I_{FRM}	repetitive peak forward current	T_{amb} = 60 °C; see Figs 8 and 9			
	BYV28-50 to 400		–	17	A
	BYV28-500 and 600		–	16	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine wave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	–	90	A
E_{RSM}	non-repetitive peak reverse avalanche energy	L = 120 mH; $T_j = T_{j\,max}$ prior to surge; inductive load switched off	–	20	mJ
T_{stg}	storage temperature		–65	+175	°C
T_j	junction temperature	see Fig.12	–65	+175	°C

ELECTRICAL CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 3.5 A; $T_j = T_{j\,max}$; see Figs 13, 14 and 15				
	BYV28-50 to 200		–	–	0.80	V
	BYV28-300 and 400		–	–	0.83	V
	BYV28-500 and 600		–	–	0.98	V
V_F	forward voltage	I_F = 3.5 A; see Figs 13, 14 and 15				
	BYV28-50 to 200		–	–	1.02	V
	BYV28-300 and 400		–	–	1.05	V
	BYV28-500 and 600		–	–	1.25	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA				
	BYV28-50		55	–	–	V
	BYV28-100		110	–	–	V
	BYV28-150		165	–	–	V
	BYV28-200		220	–	–	V
	BYV28-300		330	–	–	V
	BYV28-400		440	–	–	V
	BYV28-500		560	–	–	V
	BYV28-600		675	–	–	V
I_R	reverse current	$V_R = V_{RRMmax}$; see Fig.16	–	–	5	μA
		$V_R = V_{RRMmax}$; T_j = 165 °C; see Fig.16	–	–	150	μA
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.22				
	BYV28-50 to 200		–	–	25	ns
	BYV28-300 to 600		–	–	50	ns

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
C_d	diode capacitance	f = 1 MHz; V_R = 0; see Figs 17, 18 and 19				
	BYV28-50 to 200		–	190	–	pF
	BYV28-300 and 400		–	150	–	pF
	BYV28-500 and 600		–	125	–	pF
$\left\lvert \frac{dI_R}{dt} \right\rvert$	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/µs; see Fig.21	–	–	4	A/µs

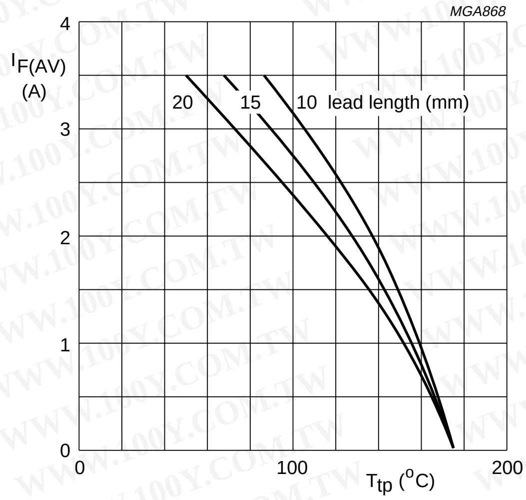
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}tp}$	thermal resistance from junction to tie-point	lead length = 10 mm	25	K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	75	K/W

Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥40 µm, see Fig.20 For more information please refer to the *"General Part of associated Handbook"*.

GRAPHICAL DATA

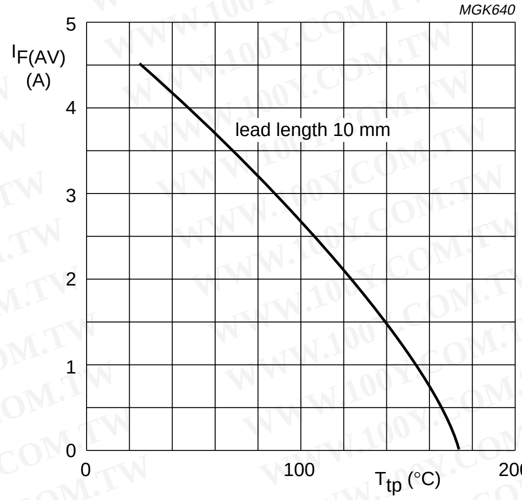


BYV28-50 to 400

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.

Switched mode application.

Fig.2 Maximum permissible average forward current as a function of tie-point temperature (including losses due to reverse leakage).

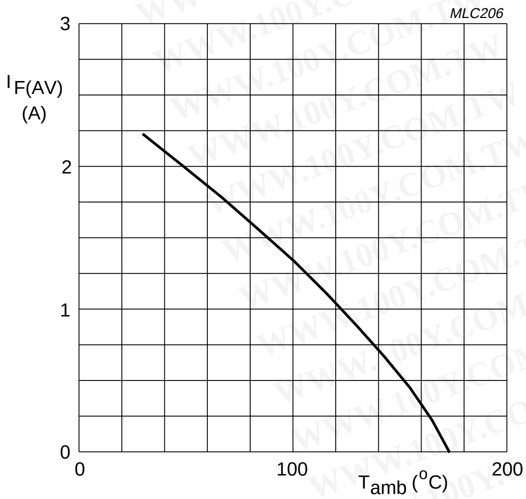


BYV28-500 and 600

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5.

Switched mode application.

Fig.3 Maximum permissible average forward current as a function of tie-point temperature (including losses due to reverse leakage).

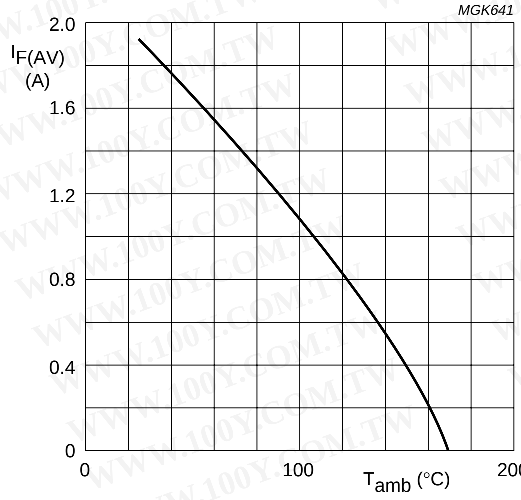


BYV28-50 to 400

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5; switched mode application.

Device mounted as shown in Fig.20.

Fig.4 Maximum permissible average forward current as a function of ambient temperature (including losses due to reverse leakage).

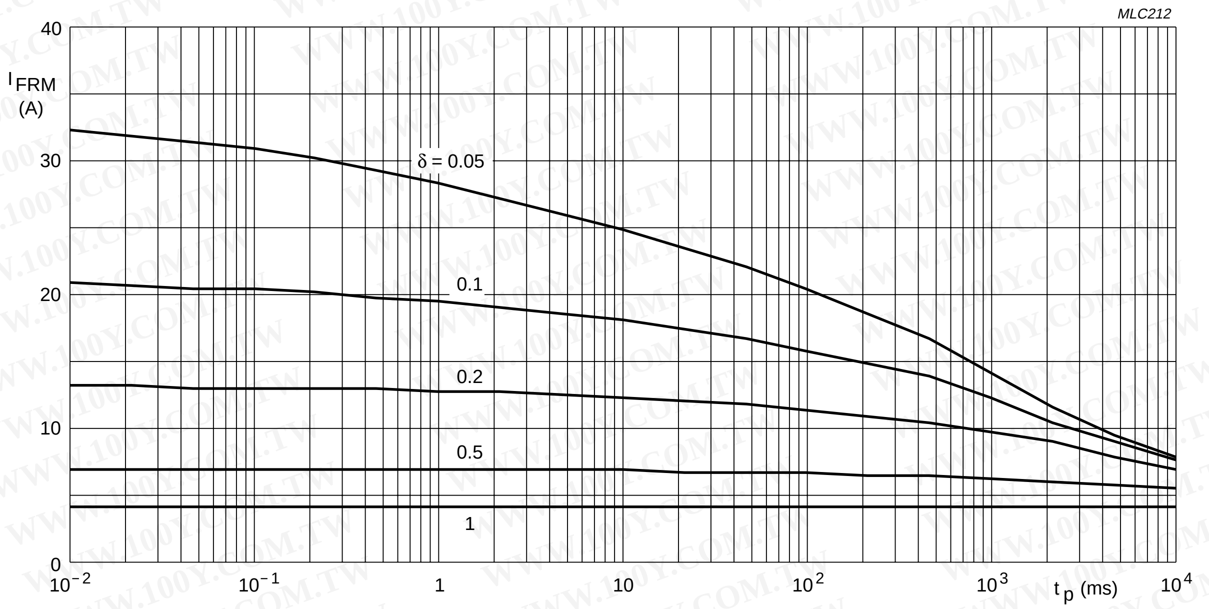


BYV28-500 and 600

a = 1.42; $V_R = V_{RRMmax}$; δ = 0.5; switched mode application.

Device mounted as shown in Fig.20.

Fig.5 Maximum permissible average forward current as a function of ambient temperature (including losses due to reverse leakage).

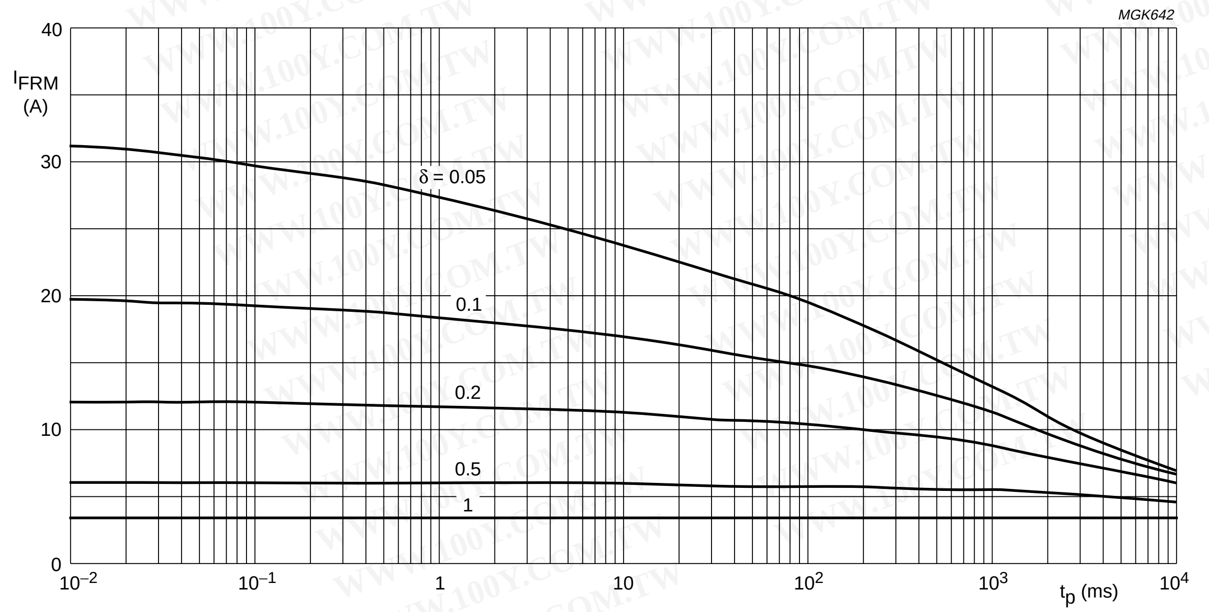


BYV28-50 to 400

T_{tp} = 85°C; $R_{th\ j\text{-}tp}$ = 25 K/W.

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

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

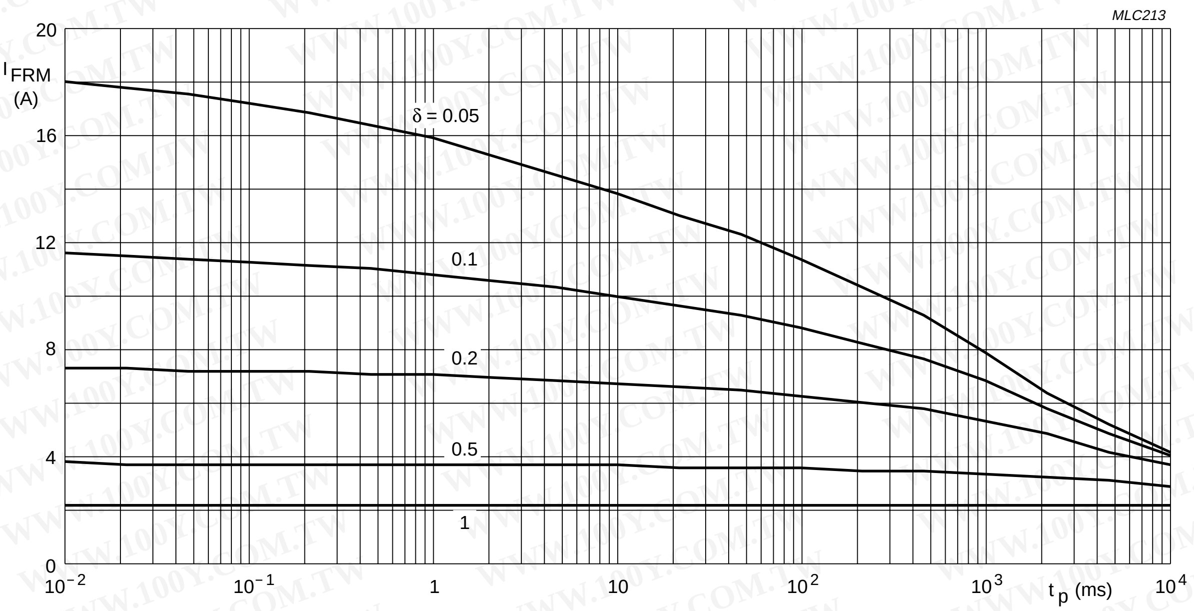


BYV28-500 and 600

T_{tp} = 85°C; $R_{th\ j\text{-}tp}$ = 25 K/W.

V_{RRMmax} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

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

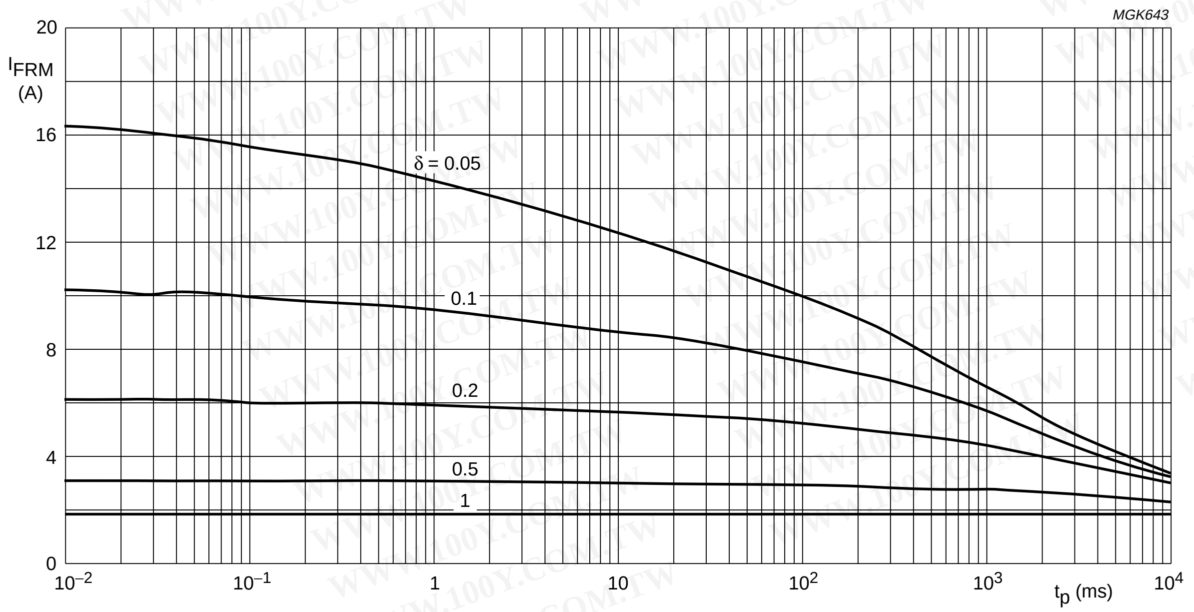


BYV28-50 to 400

T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 75 K/W.

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

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

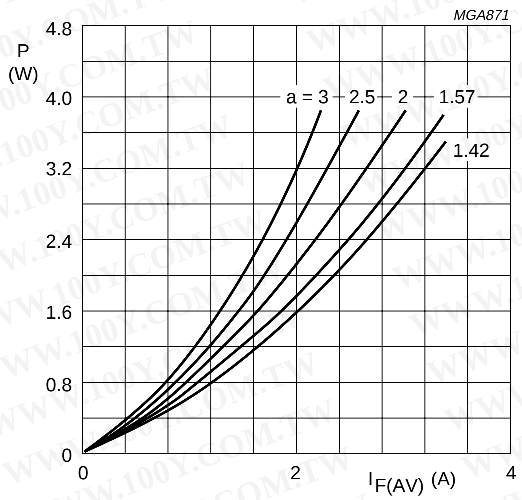


BYV28-500 and 600

T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 75 K/W.

V_{RRMmax} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

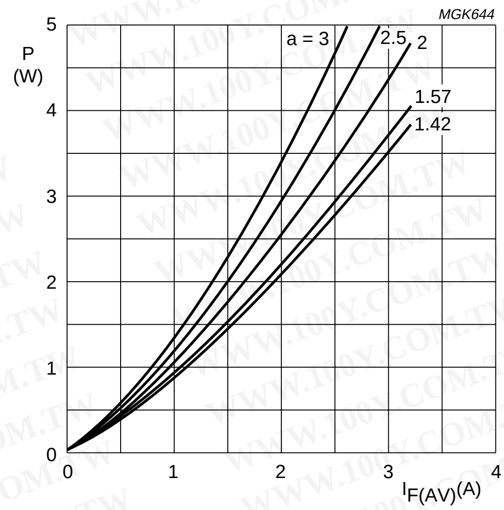
Fig.9 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.



BYV28-50 to 400

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

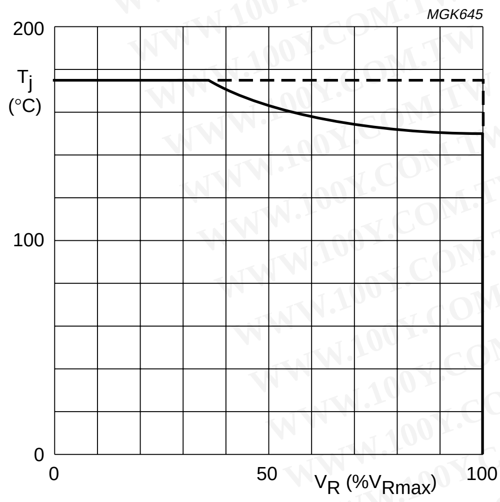
Fig.10 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.



BYV28-500 and 600

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

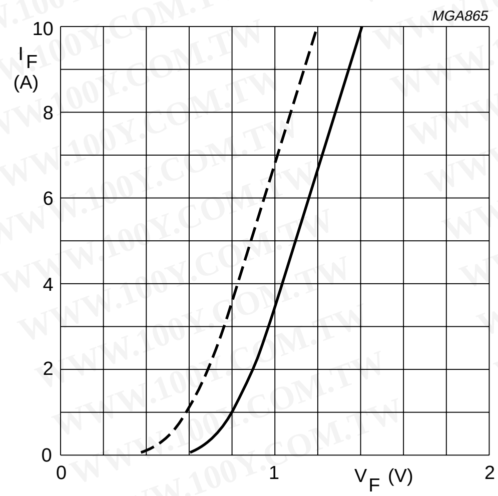
Fig.11 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.



Solid line = V_R.

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

Fig.12 Maximum permissible junction temperature as a function of maximum reverse voltage percentage.

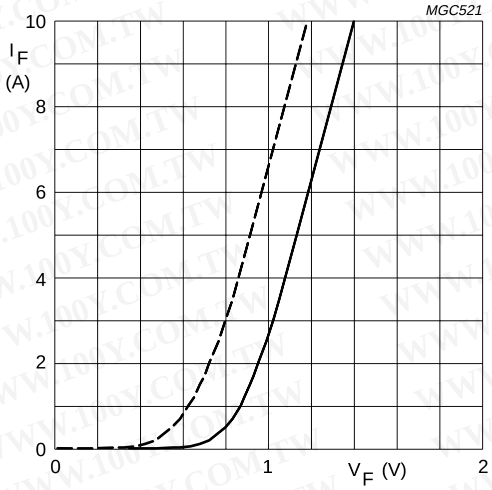


BYV28-50 to 200

Dotted line: $T_j = 175$ °C.

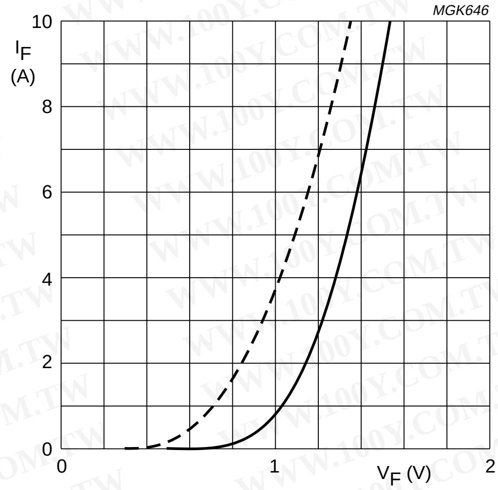
Solid line: $T_j = 25$ °C.

Fig.13 Forward current as a function of forward voltage; maximum values.



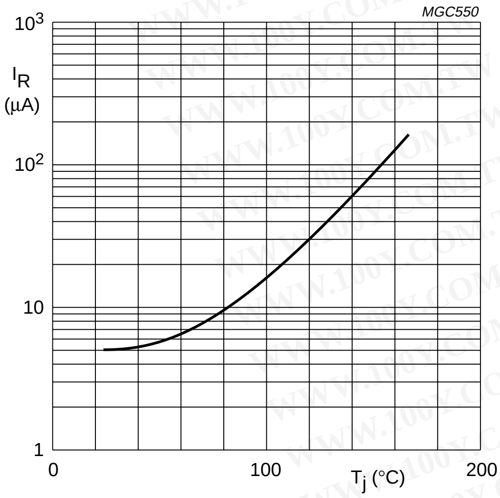
BYV28-300 and 400
Dotted line: T_j = 175 °C.
Solid line: T_j = 25 °C.

Fig.14 Forward current as a function of forward voltage; maximum values.



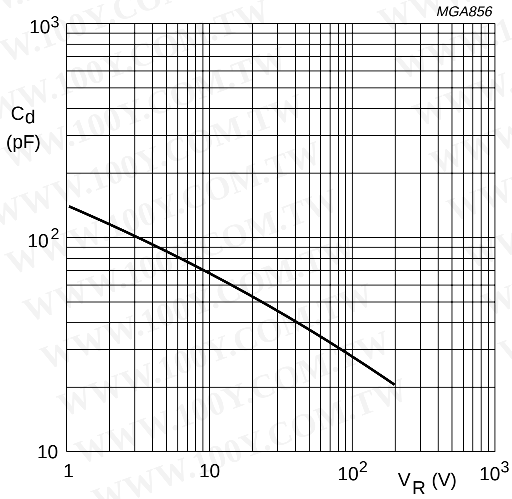
BYV28-500 and 600
Dotted line: T_j = 175 °C.
Solid line: T_j = 25 °C.

Fig.15 Forward current as a function of forward voltage; maximum values.



$V_R = V_{RRMmax}$.

Fig.16 Reverse current as a function of junction temperature; maximum values.

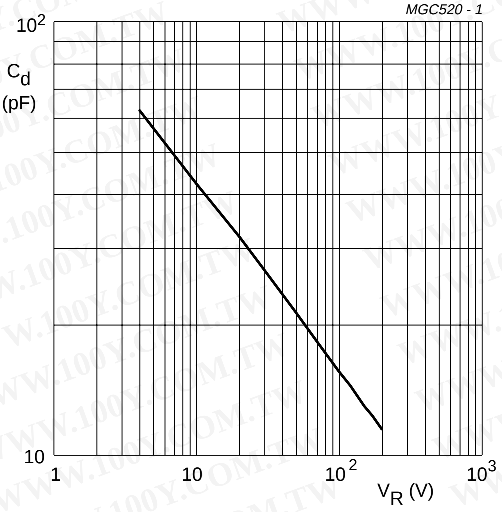


BYV28-50 to 200
f = 1 MHz; T_j = 25 °C.

Fig.17 Diode capacitance as a function of reverse voltage; typical values.

Ultra fast low-loss controlled avalanche rectifiers

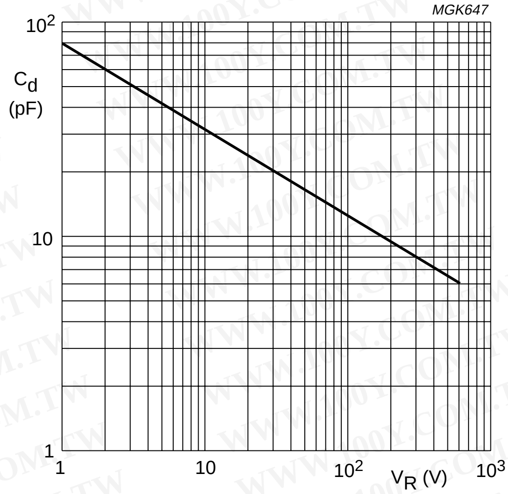
BYV28 series



BYV28-300 and 400

f = 1 MHz; T_j = 25 °C.

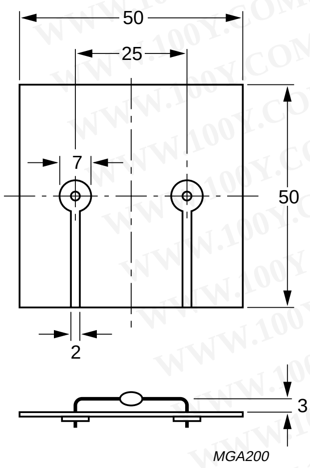
Fig.18 Diode capacitance as a function of reverse voltage; typical values.



BYV28-500 and 600

f = 1 MHz; T_j = 25 °C.

Fig.19 Diode capacitance as a function of reverse voltage; typical values.



Dimensions in mm.

Fig.20 Device mounted on a printed-circuit board.

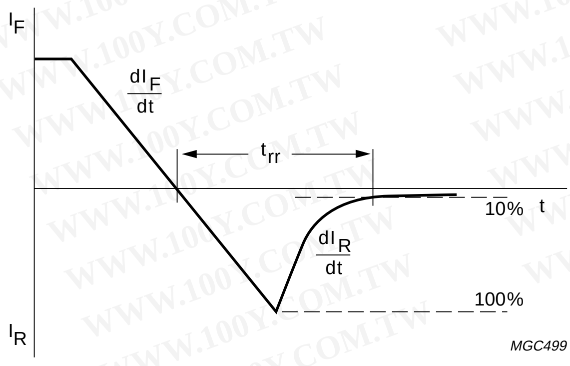
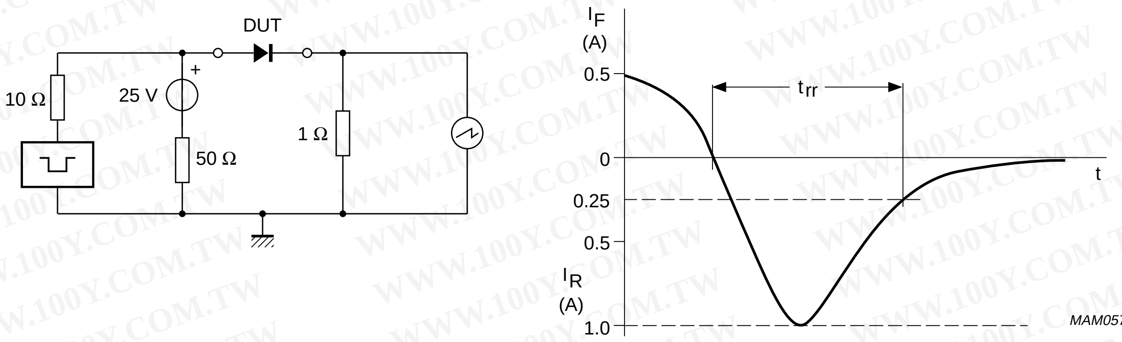


Fig.21 Reverse recovery definitions.



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

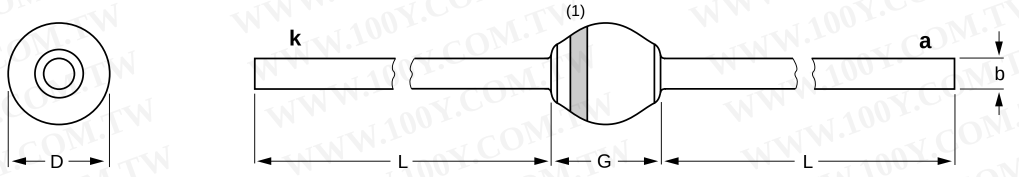
Fig.22 Test circuit and reverse recovery time waveform and definition.

Ultra fast low-loss controlled avalanche rectifiers

BYV28 series

PACKAGE OUTLINE

Hermetically sealed glass package; axial leaded; 2 leads **SOD64**



0 2.5 5 mm
scale

DIMENSIONS (mm are the original dimensions)

UNIT	b max.	D max.	G max.	L min.
mm	1.35	4.5	5.0	28

Note

1. The marking band indicates the cathode.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOD64						97-10-14

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.