Avalanche fast soft-recovery rectifier diodes

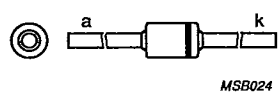
BYD34 series

DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed axial-leaded ID (implosion diode) glass envelopes. They are intended for television and industrial applications, such as Switched Mode Power Supplies (SMPS), scan rectifiers in TV receivers and also for use in inverter and converter applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in a picture tube).

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_R	continuous reverse voltage		
	BYD34D	200	V
	BYD34G	400	V
	BYD34J	600	V
	BYD34K	800	V
	BYD34M	1000	V
V_{RRM}	repetitive peak reverse voltage		
	BYD34D	200	V
	BYD34G	400	V
	BYD34J	600	V
	BYD34K	800	V
	BYD34M	1000	V
$I_{F(AV)}$	average forward current	1.8	A
I_{FSM}	non-repetitive peak forward current		
	BYD34D, G and J	45	A
	BYD34K and M	35	A
E_{RSM}	non-repetitive peak reverse energy	10	mJ
t_{rr}	reverse recovery time		
	BYD34D, G and J	250	ns
	BYD34K and M	300	ns



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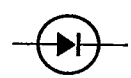

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Fig.1 Simplified outline (SOD84) and symbol.

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LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD34D		–	200	V
	BYD34G		–	400	V
	BYD34J		–	600	V
	BYD34K		–	800	V
	BYD34M		–	1000	V
V_R	continuous reverse voltage				
	BYD34D		–	200	V
	BYD34G		–	400	V
	BYD34J		–	600	V
	BYD34K		–	800	V
	BYD34M		–	1000	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{tp} = 55 °C; lead length = 10 mm	–	1.8	A
		averaged over any 20 ms period; T_{amb} = 60 °C; see Fig.2	–	1	A
I_{FRM}	repetitive peak forward current	T_{tp} = 55 °C; see Fig.12	–	17	A
		T_{amb} = 60 °C; see Fig.13	–	9	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine-wave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRM\,max}$			
	BYD34D, G and J		–	45	A
	BYD34K and M		–	35	A
E_{RSM}	non-repetitive peak reverse avalanche energy	I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	–	10	mJ
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

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THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	50 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	105 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≤ 40 µm, see Fig.2.

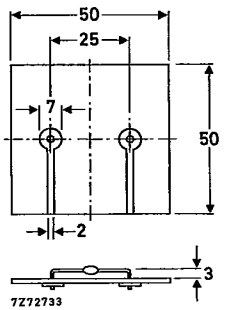

Fig.2 Device mounted on a printed circuit board.

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CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 3 A; $T_j = T_{j\ max}$; note 1	–	1.2	V
		I_F = 3 A; note 1	–	1.4	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD34D		300	–	V
	BYD34G		500	–	V
	BYD34J		700	–	V
	BYD34K		900	–	V
	BYD34M		1100	–	V
I_R	reverse current	$V_R = V_{RRM\ max}$; note 2	–	1	μA
		$V_R = V_{RRM\ max}$; T_j = 165 °C; note 2	–	150	μA
t_{rr}	reverse recovery time	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 20 A/μs			
	BYD34D, G and J		–	250	ns
	BYD34K and M		–	300	ns
Q_s	reverse recovery (recovered charge)	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 20 A/μs			
	BYD34D, G and J		–	250	nC
	BYD34K and M		–	400	nC
$\|dI_R/dt\|$	maximum slope of reverse recovery current	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 1 A/μs			
	BYD34D, G and J		–	6	A/μs
	BYD34K and M		–	5	A/μs

Notes

1. Measured under pulse conditions to avoid excessive dissipation.
2. Illuminance < 500 lux (daylight); relative humidity < 65%.

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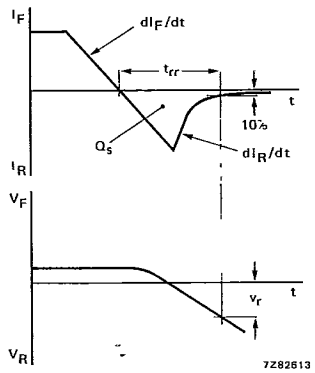


Fig.3 Definitions of t_{rr}, Q_s, dI_F/dt and dI_R/dt.

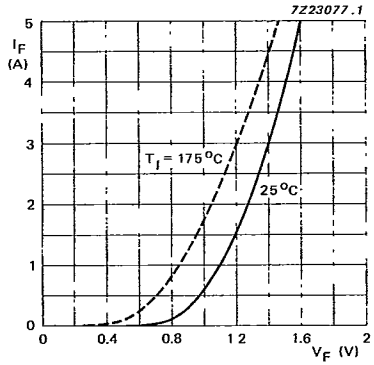
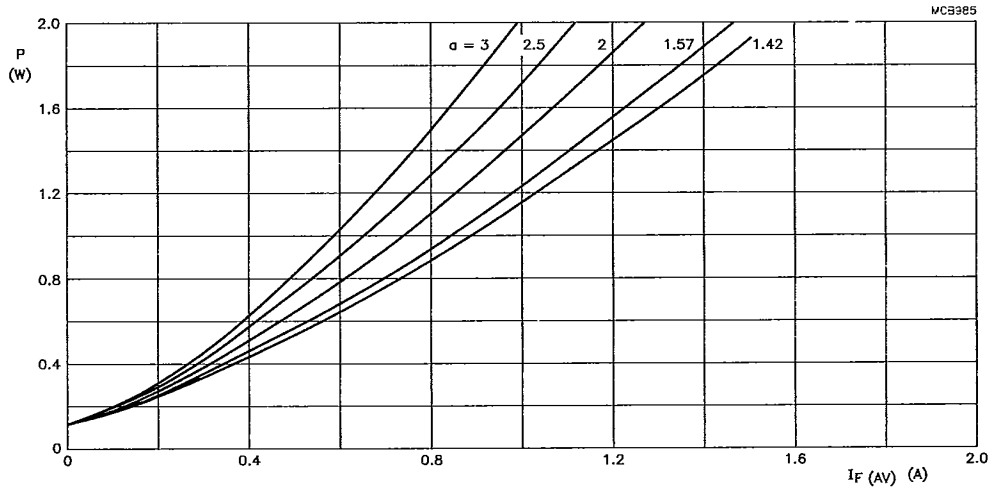


Fig.4 Forward voltage as a function of forward current.



$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$.

Fig.5 Maximum values of steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current; switched mode application.

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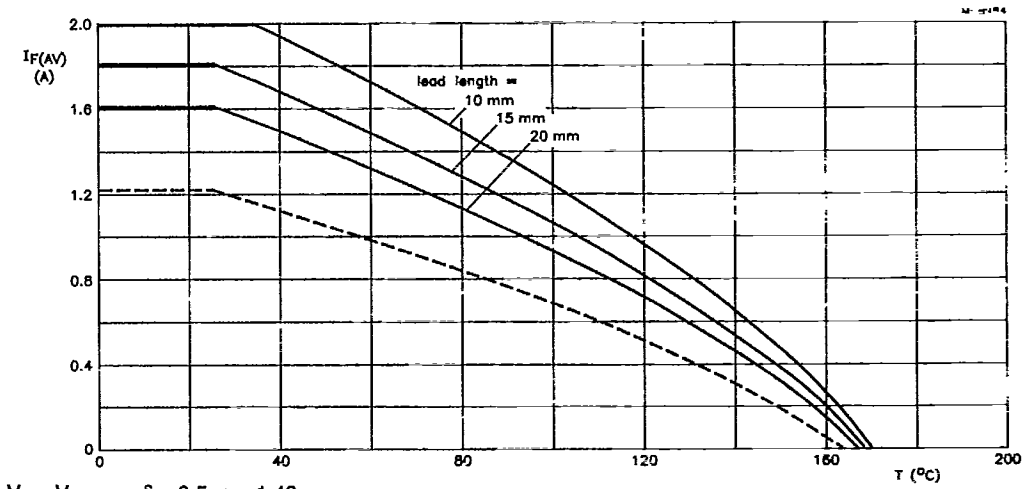
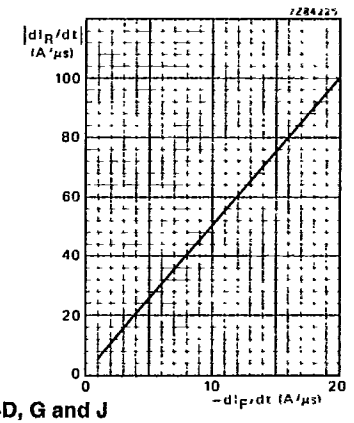


$V_R = V_{RRM\ max}$, $\delta = 0.5$; $a = 1.42$.

Dotted line = ambient temperature, and device mounted as shown in Fig.2.

Solid line = tie-point temperature.

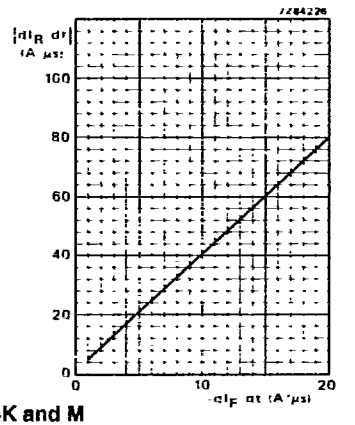
Fig.6 Maximum average forward current as a function of temperature (including losses due to reverse leakage); switched mode application.



BYD34D, G and J

$T_j = 25$ °C.

Fig.7 Maximum slope of reverse recovery current.



BYD34K and M

$T_j = 25$ °C.

Fig.8 Maximum slope of reverse recovery current.

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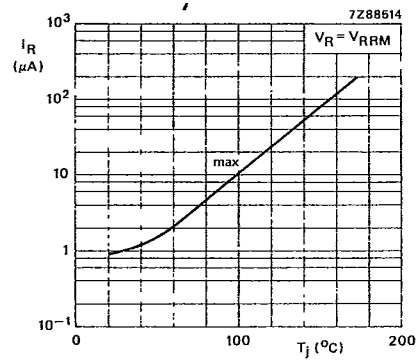
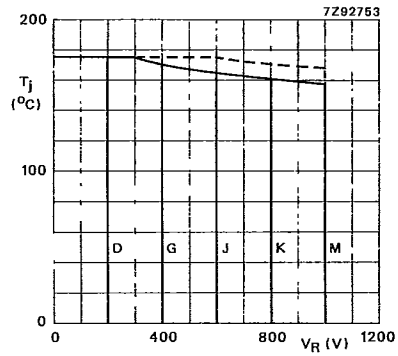


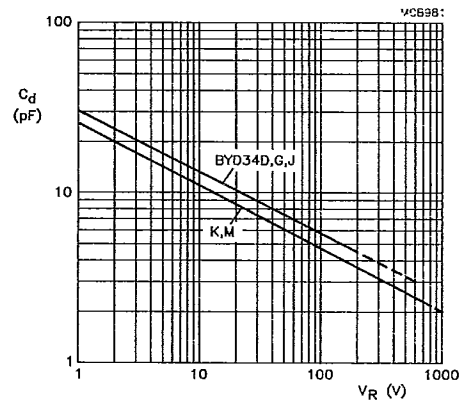
Fig.9 Reverse current as a function of junction temperature.



Dotted line = V_{RRM}; δ = 0.5; device mounted as shown in Fig.2.

Solid line = V_R; device mounted as shown in Fig.2.

Fig.10 Maximum permissible junction temperature as a function of reverse voltage.



f = 1 MHz; T_j = 25 °C.

Fig.11 Diode capacitance as a function of reverse voltage, typical values.

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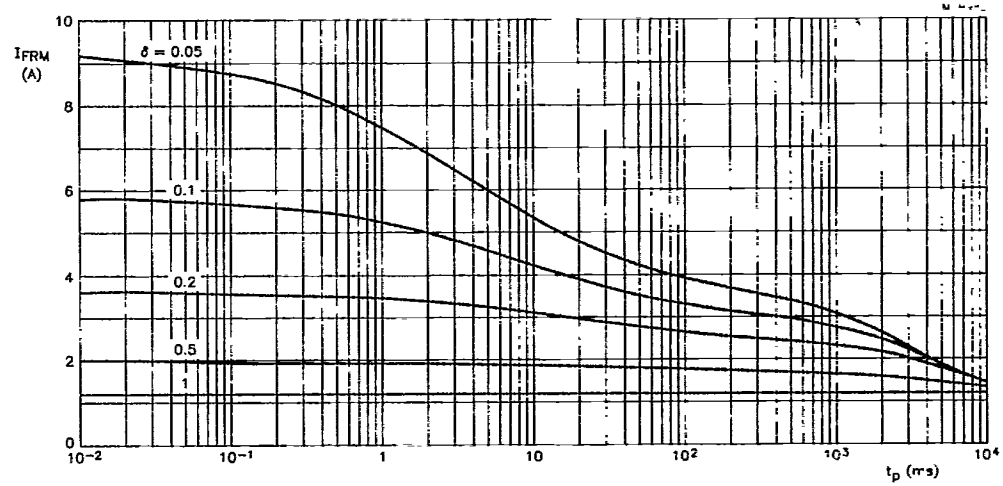
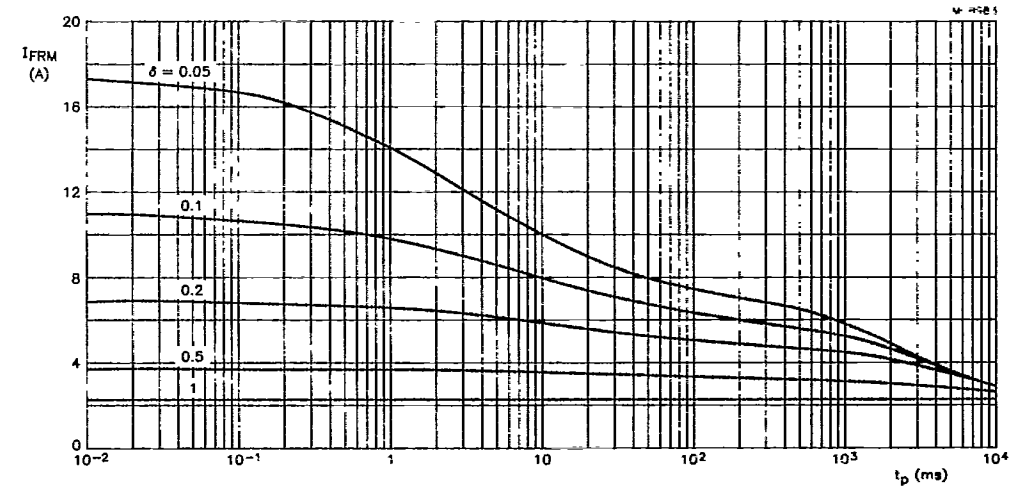


δ at T_{tp} = 55 °C; $R_{th\ j-tp}$ = 50 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

Fig.12 Maximum repetitive forward current as a function of pulse time and duty factor (δ).



δ at T_{amb} = 65 °C; $R_{th\ j-a}$ = 105 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

Fig.13 Maximum repetitive forward current as a function of pulse time and duty factor (δ).

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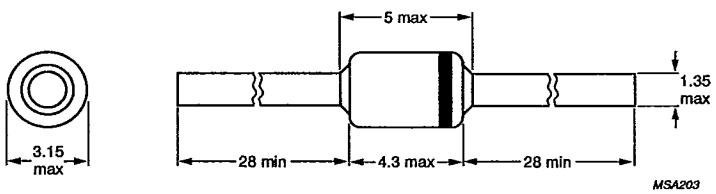
PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.14 SOD84.