ULTRA FAST RECOVERY RECTIFIER DIODES

Glass-passivated, high-efficiency epitaxial rectifier diodes in DO—4 metal envelopes, featuring low forward voltage drop, ultra fast reverse recovery times, very low stored charge and soft recovery characteristic. They are intended for use in switched-mode power supplies and high-frequency circuits in general, where low conduction and switching losses are essential. The series consists of normal polarity (cathode to stud) types.

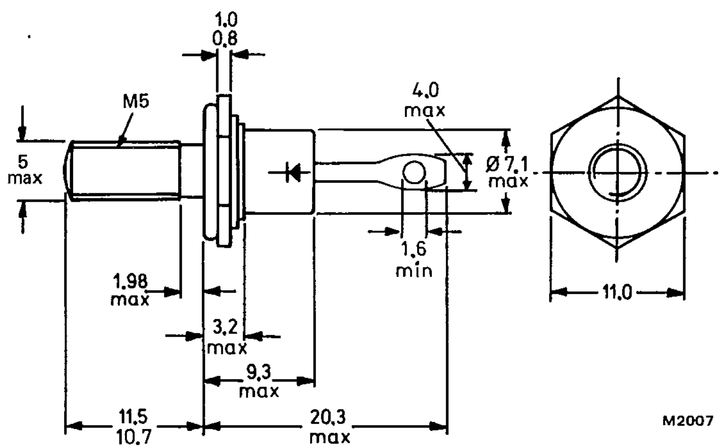
QUICK REFERENCE DATA

			BYV30—300	400	500	
Repetitive peak reverse voltage	V_{RRM}	max.	300	400	500	V
Average forward current	$I_{F(AV)}$	max.		14		A
Forward voltage	V_F	$<$		1.05		V
Reverse recovery time	t_{rr}	$<$		50		ns

MECHANICAL DATA

Dimensions in mm

Fig.1 DO-4 with metric (M5) stud as standard.
10-32 UNF is available upon request with suffix U (e.g. BYV30-400U).



Net mass: 6 g

Diameter of clearance hole: max. 5.2 mm

Accessories supplied on request: see data sheets Mounting instructions and Accessories for DO-4 envelopes.

Supplied with device: 1 nut, 1 lock washer.

Nut dimensions across the flats: 9.5 mm

Torque on nut:
min. 0.9 Nm (9 kg cm)
max. 1.7 Nm (17 kg cm)

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Voltages		BYV30–300	400	500	
→ Non-repetitive peak reverse voltage	V_{RSM}	max. 350	450	550	V
Repetitive peak reverse voltage	V_{RRM}	max. 300	400	500	V
Crest working reverse voltage	V_{RWM}	max. 200	300	400	V
Continuous reverse voltage*	V_R	max. 200	300	400	V

Currents

Average forward current; switching losses negligible up to 100 kHz				
square wave; δ = 0.5; up to T_{mb} = 113 °C	$I_{F(AV)}$	max.	14	A
up to T_{mb} = 125 °C	$I_{F(AV)}$	max.	10	A
sinusoidal; up to T_{mb} = 118 °C	$I_{F(AV)}$	max.	12.5	A
up to T_{mb} = 125 °C	$I_{F(AV)}$	max.	10	A
R.M.S. forward current	$I_{F(RMS)}$	max.	20	A
Repetitive peak forward current t_p = 20 μs; δ = 0.02	I_{FRM}	max.	320	A
Non-repetitive peak forward current half sine-wave; T_j = 150 °C prior to surge; with reapplied V_{RWMmax};				
t = 10 ms	I_{FSM}	max.	150	A
t = 8.3 ms	I_{FSM}	max.	180	A
I^2t for fusing (t = 10 ms)	I^2t	max.	112	A^2s

Temperatures

Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	2.0	K/W
From mounting base to heatsink with heatsink compound	$R_{th\ mb\text{-}h}$	=	0.3	K/W
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	50	K/W

*To ensure thermal stability: $R_{th\ j\text{-}a} \leqslant 4.6$ K/W.

CHARACTERISTICS

Forward voltage				
I_F = 15 A; T_j = 150 °C	V_F	<	1.05	V*
I_F = 50 A; T_j = 25 °C	V_F	<	1.40	V*
Reverse current				
$V_R = V_{RWM\,max}$; T_j = 100 °C	I_R	<	0.8	mA
T_j = 25 °C	I_R	<	50	μA
Reverse recovery when switched from				
I_F = 1 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 100 A/μs; T_j = 25 °C; recovery time	t_{rr}	<	50	ns
I_F = 2 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 20 A/μs; T_j = 25 °C; recovered charge	Q_s	<	50	nC
I_F = 10 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 50 A/μs; T_j = 100 °C; peak recovery current	I_{RRM}	<	5.2	A
Forward recovery when switched to I_F = 10 A with dI_F/dt = 10 A/μs; T_j = 25 °C	V_{fr}	typ.	2.5	V

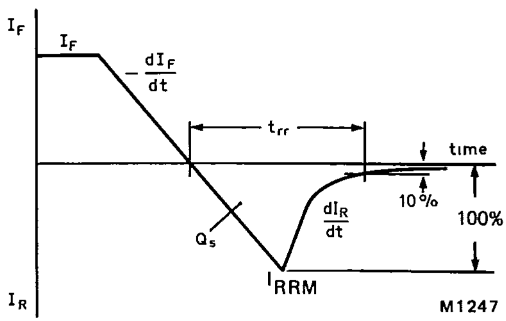


Fig.2 Definition of t_{rr}, Q_s and I_{RRM}.

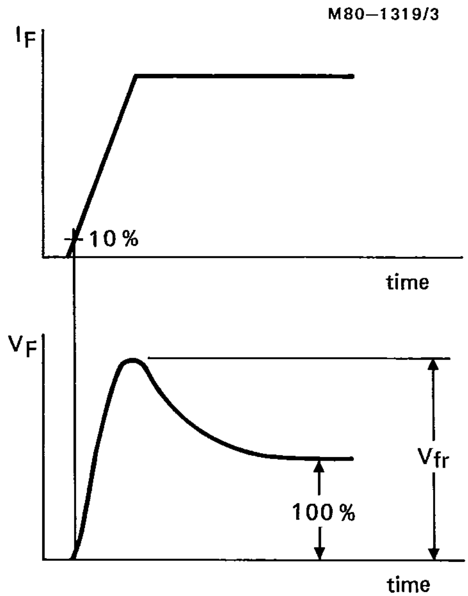


Fig.3 Definition of V_{fr}.

*Measured under pulse conditions to avoid excessive dissipation.

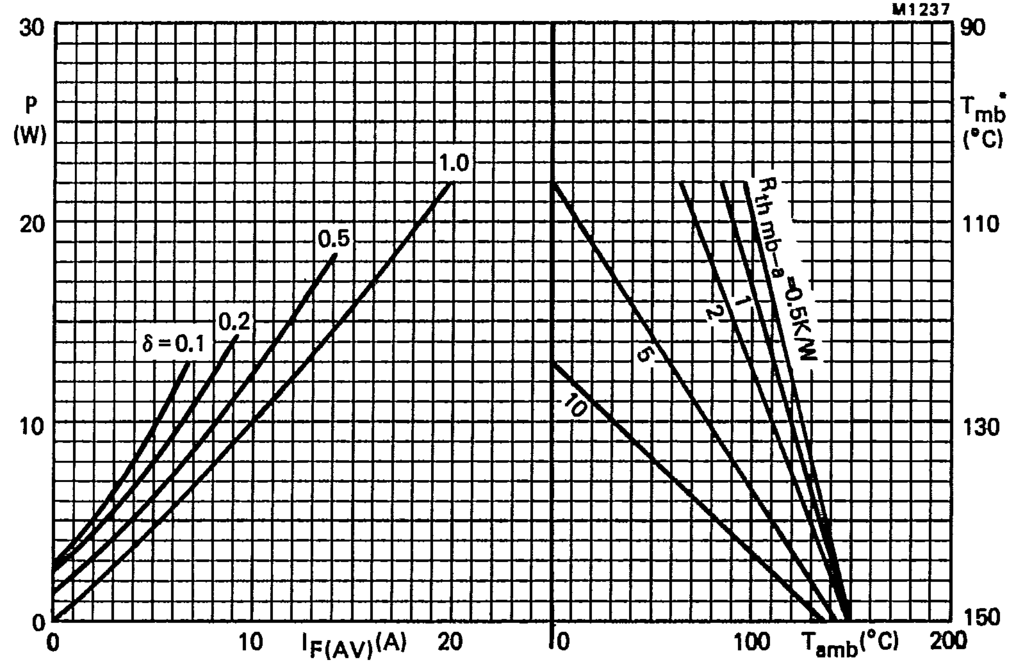
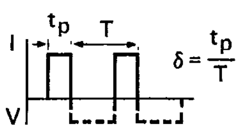


Fig.4 The right-hand part shows the relationship between the power (derived from the left-hand part) and the maximum permissible temperatures. Power includes reverse current losses and switching losses up to f = 100 kHz.



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$

*T_{mb} scale is for comparison purposes and is correct only for $R_{th\ mb\text{-}a} < 4.1$ K/W.

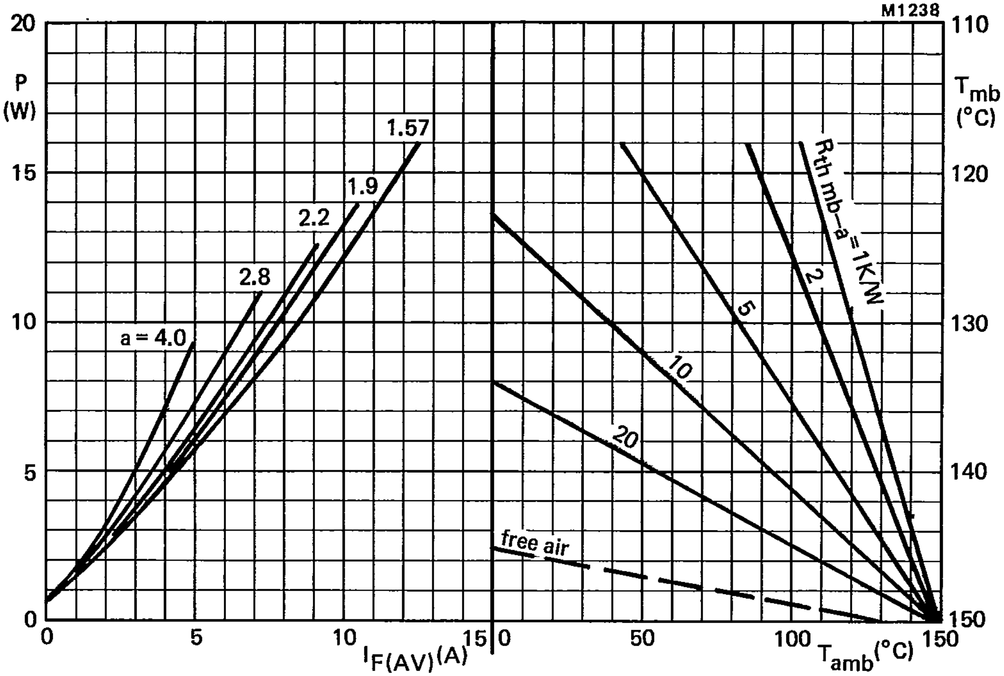


Fig.5 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
a = form factor = $I_{F(RMS)}/I_{F(AV)}$.

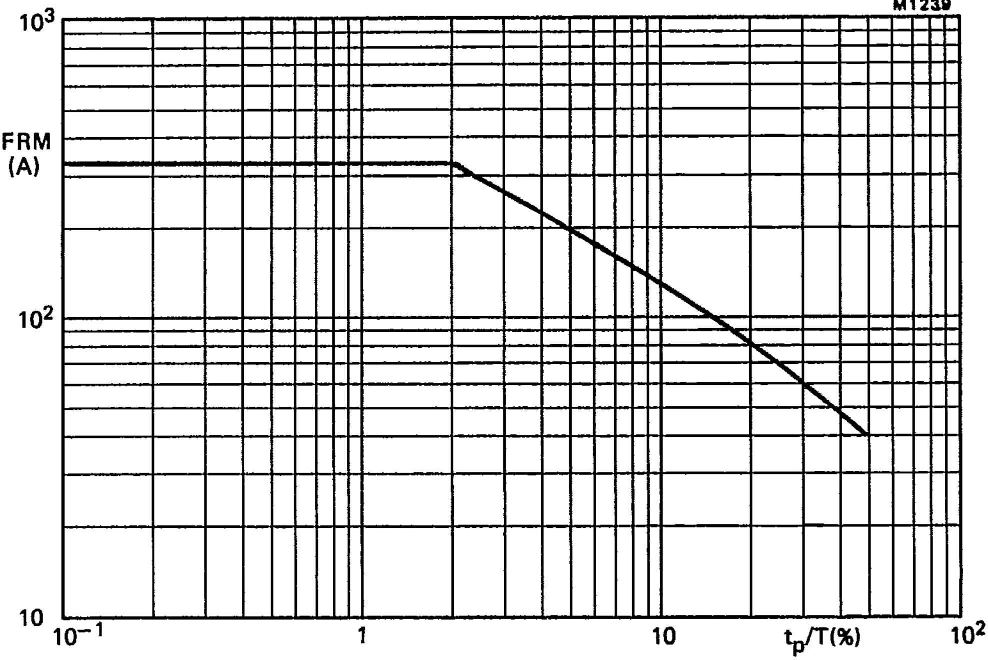
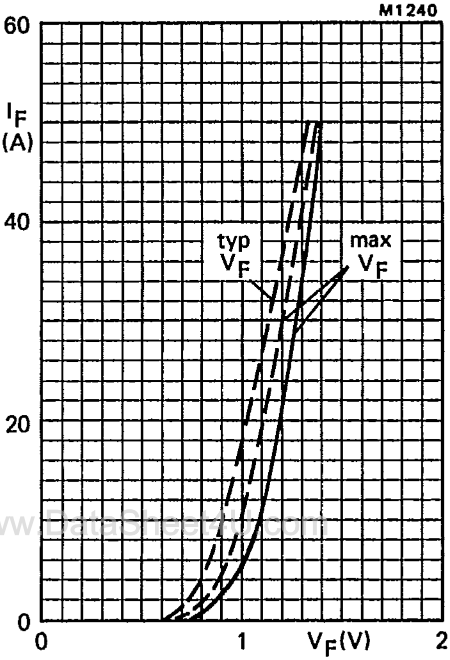
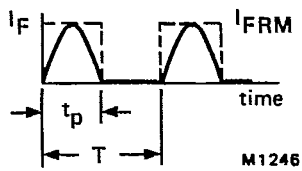


Fig.6 Maximum permissible repetitive peak forward current for square or sinusoidal currents;
1 $\mu s < t_p < 1$ ms.





Definition of I_{FRM} and t_p/T.

Fig.7 —— T_j = 25 °C; – – – T_j = 150 °C.

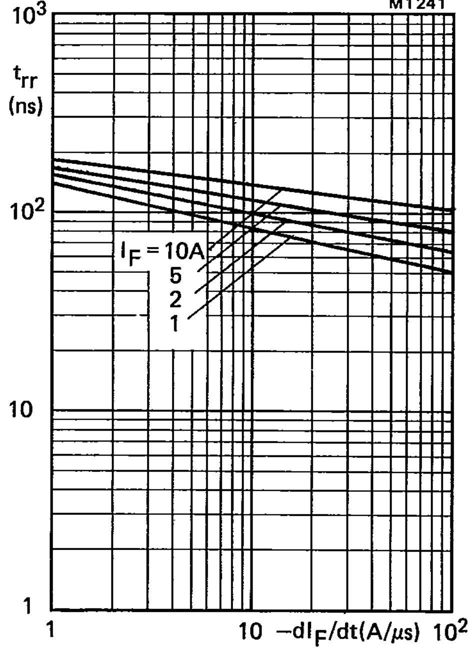


Fig.8 Maximum t_{rr} at T_j = 25 °C

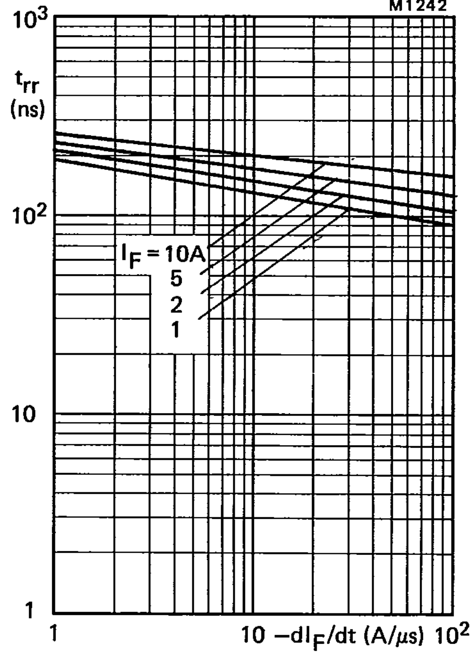


Fig.9 Maximum t_{rr} at T_j = 100 °C.

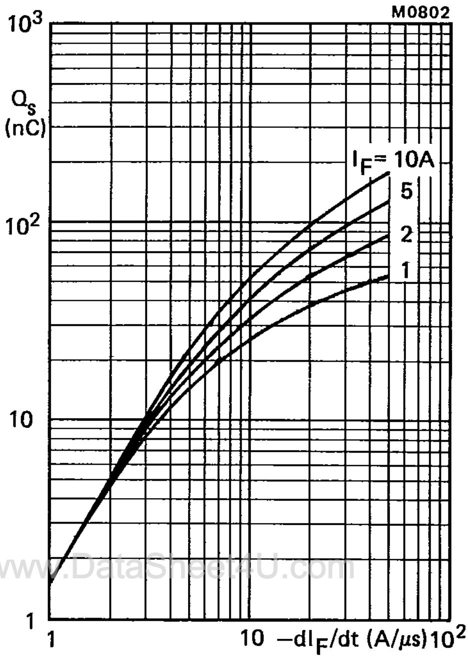


Fig.10 Maximum Q_s at T_j = 25 °C

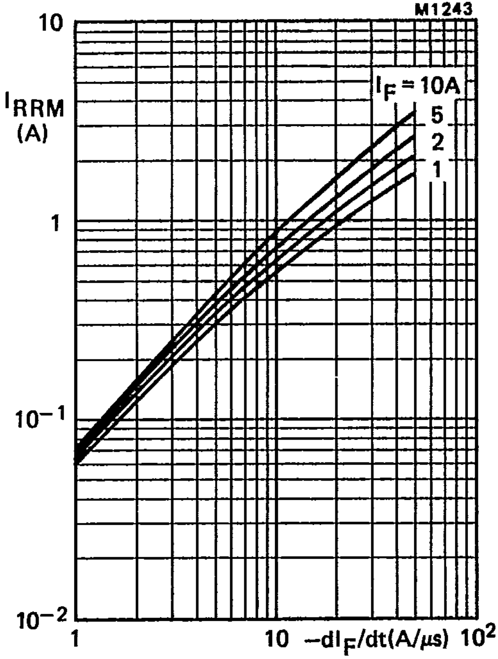


Fig.11 Maximum I_{RRM} at T_j = 25 °C

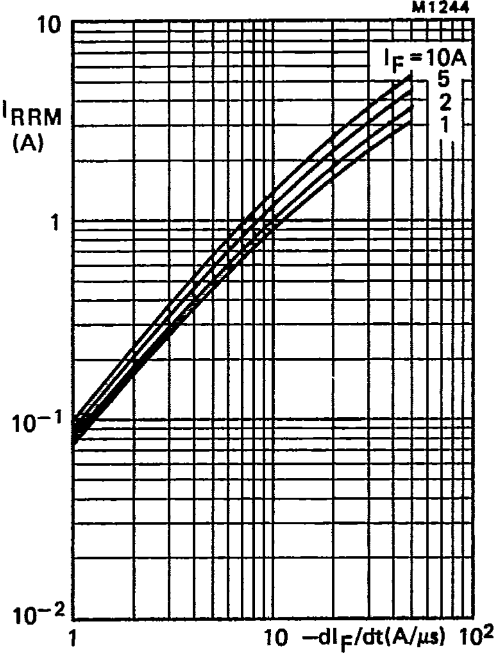


Fig.12 Maximum I_{RRM} at T_j = 100 °C.

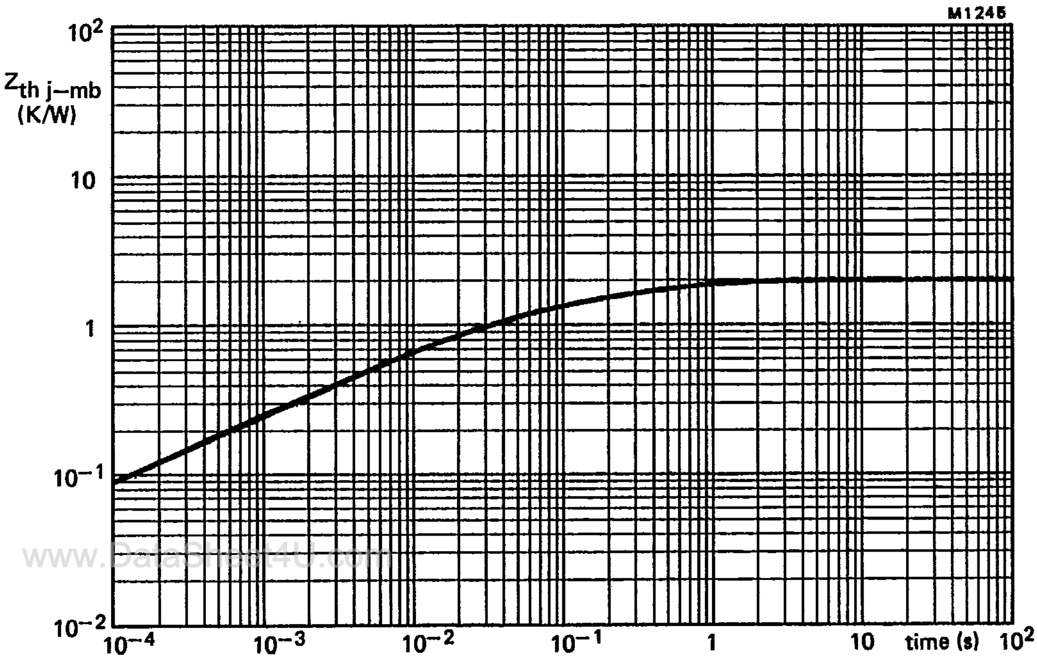


Fig.13 Transient thermal impedance.