ULTRA FAST RECOVERY RECTIFIER DIODES

Glass-passivated, high-efficiency epitaxial rectifier diodes in DO-5 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.

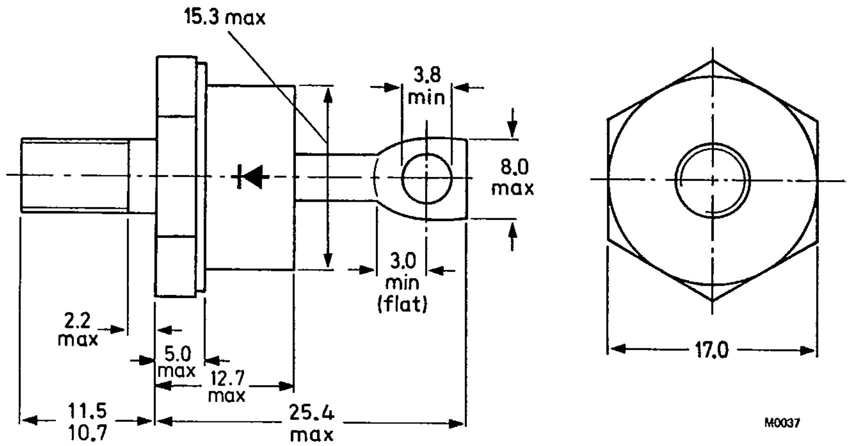
QUICK REFERENCE DATA

			BYW93–50	100	150	200	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	V
Average forward current	$I_{F(AV)}$	max.	60				A
Forward voltage	V_F	<	0.8				V
Reverse recovery time	t_{rr}	<	45				ns

MECHANICAL DATA

Dimensions in mm

Fig.1 DO-5; with metric M6 stud (ϕ 6 mm): e.g. BYW93–50
with ¼ in x 28 UNF stud (ϕ 6.35 mm); e.g. BYW93–50U



Net mass: 22 g

Diameter of clearance hole: max. 6.5 mm

Accessories supplied on request: see ACCESSORIES section.

Supplied with device: 1 nut, 1 lock washer

Torque on nut: min. 1.7 Nm (17 kg cm)
max. 3.5 Nm (35 kg cm)

Nut dimensions across the flats: M6: 10 mm, ¼ in x 28 UNF: 11.1 mm

Products approved to CECC 50 009-028, available on request.

RATINGS

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

Voltages			BYW93–50	100	150	200	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	V
Crest working reverse voltage	V_{RWM}	max.	50	100	150	200	V
Continuous reverse voltage*	V_R	max.	50	100	150	200	V

Currents

Average forward current; switching losses negligible up to 500 kHz				
square wave; δ = 0.5; up to T_{mb} = 110 °C	$I_{F(AV)}$	max.	60	A
up to T_{mb} = 125 °C	$I_{F(AV)}$	max.	40	A
sinusoidal; up to T_{mb} = 115 °C	$I_{F(AV)}$	max.	50	A
up to T_{mb} = 125 °C	$I_{F(AV)}$	max.	38	A
R.M.S. forward current	$I_{F(RMS)}$	max.	85	A
Repetitive peak forward current t_p = 20 μs; δ = 0.02	I_{FRM}	max.	1500	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.	800	A
t = 8.3 ms	I_{FSM}	max.	1000	A
I^2t for fusing (t = 10 ms)	I^2t	max.	3200	A^2s

Temperatures

Storage temperature	T_{stg}		–55 to +150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	0.7	K/W
From mounting base to heatsink				
a. with heatsink compound	$R_{th\ mb\text{-}h}$	=	0.2	K/W
b. without heatsink compound	$R_{th\ mb\text{-}h}$	=	0.3	K/W
Transient thermal impedance; t = 1 ms	$Z_{th\ j\text{-}mb}$	=	0.32	K/W

MOUNTING INSTRUCTIONS

The top connector should be neither bent nor twisted; it should be soldered into the circuit so that there is no strain on it.

During soldering the heat conduction to the junction should be kept to a minimum.

*To ensure thermal stability: $R_{th\ j\text{-}a} \leqslant 3.0$ K/W.

CHARACTERISTICS

Forward voltage				
I_F = 50 A; T_j = 150 °C	V_F	<	0.8	V*
I_F = 150 A; T_j = 25 °C	V_F	<	1.3	V*
Reverse current				
$V_R = V_{RWM\,max}$; T_j = 100 °C	I_R	<	5	mA
T_j = 25 °C	I_R	<	250	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}	<	45	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	<	35	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}	<	6	A
Forward recovery when switched to I_F = 10 A with dI_F/dt = 10 A/μs; T_j = 25 °C	V_{fr}	typ.	1.0	V

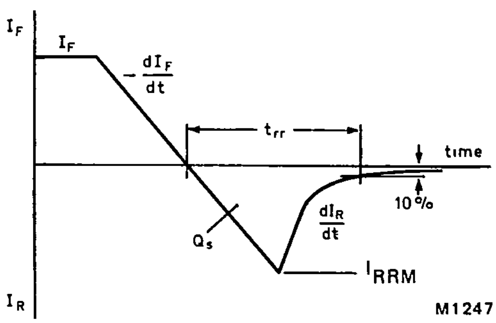


Fig.2 Definition of t_{rr}, Q_s and I_{RRM}.

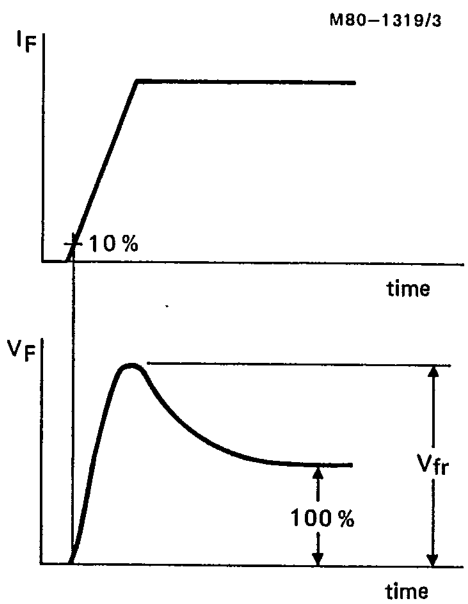


Fig.3 Definition of V_{fr}.

*Measured under pulse conditions to avoid excessive dissipation.

SQUARE-WAVE OPERATION

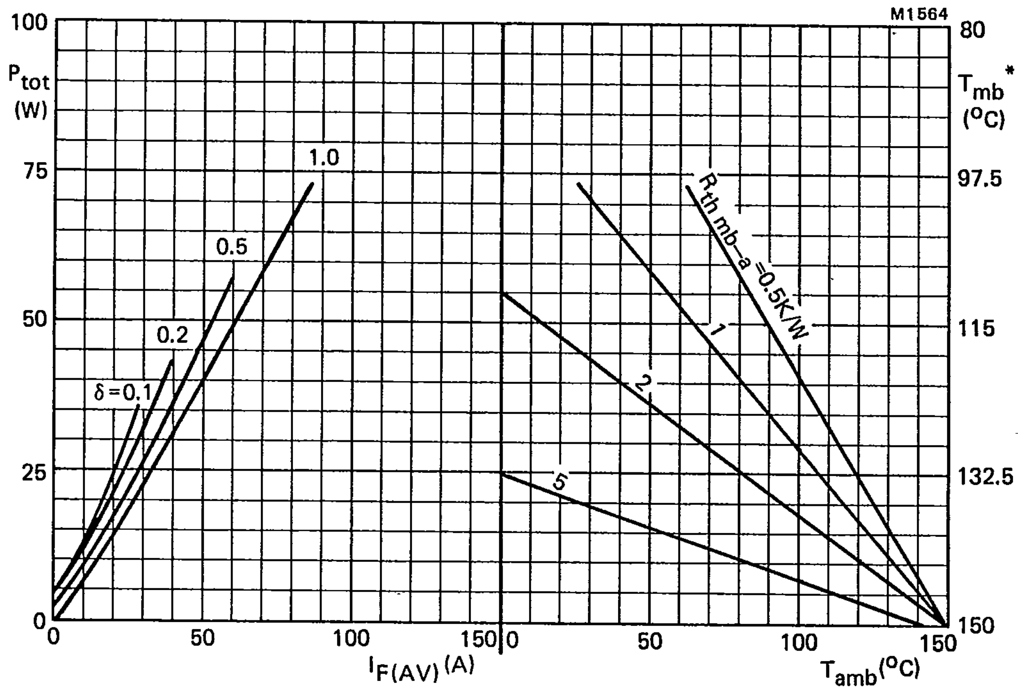
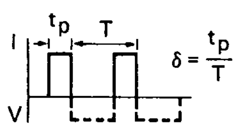


Fig.4 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
Power includes reverse current losses.



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

*T_{mb} scale is for comparison purposes and is correct only for $R_{th\ mb\text{-}a} < 2.1$ K/W

SINUSOIDAL OPERATION

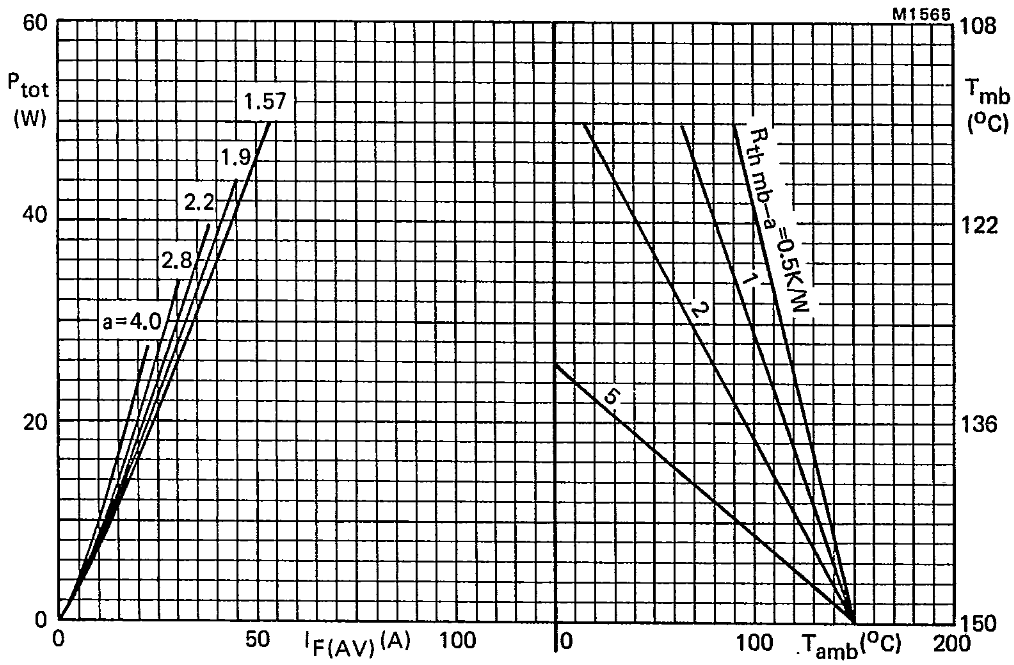


Fig.5 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
Power includes reverse current losses.
a = form factor = $I_{F(RMS)}/I_{F(AV)}$.

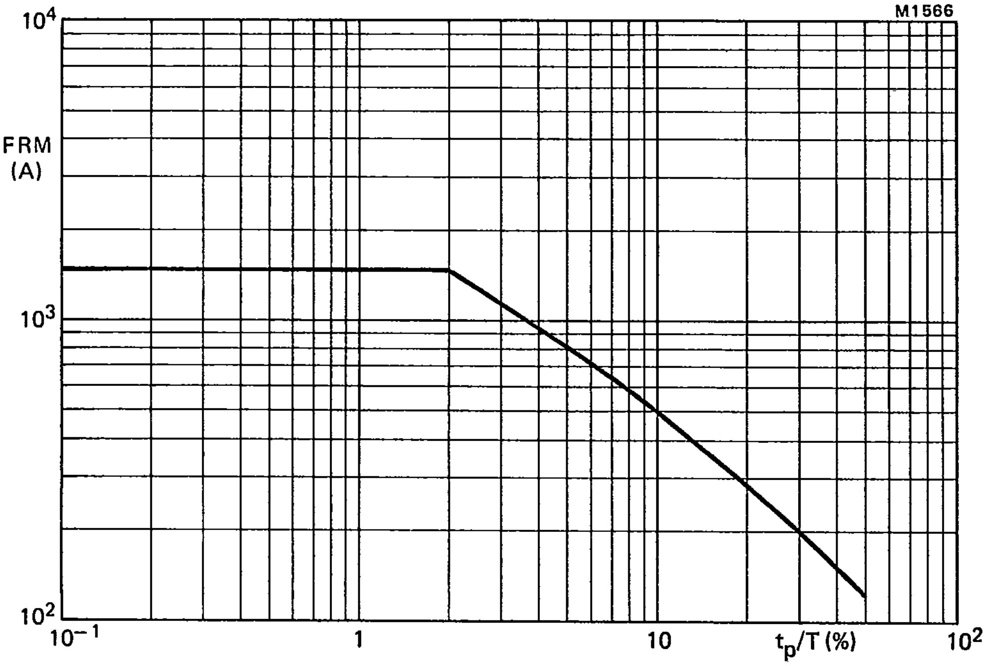
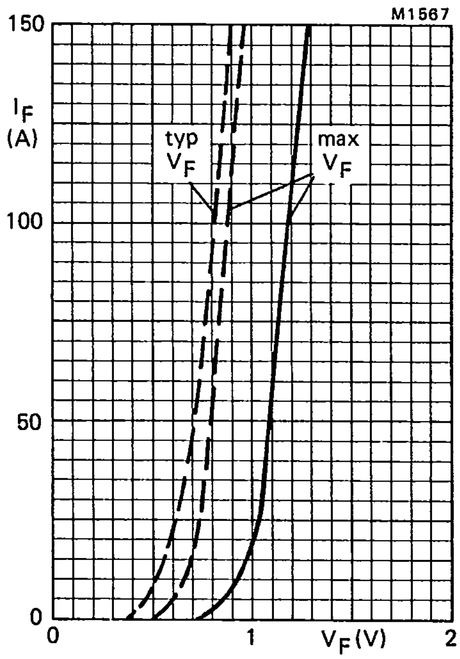
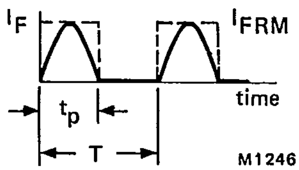


Fig.6 Maximum permissible repetitive peak forward current for square or sinusoidal currents; 1 $\mu s < t_p < 1$ ms.





Definition of I_{FRM} and t_p/T.

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

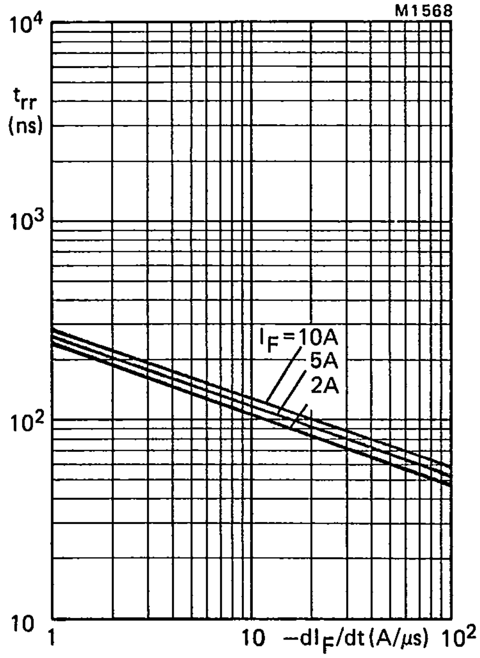


Fig.8 Maximum t_{rr} at T_j = 25 °C.

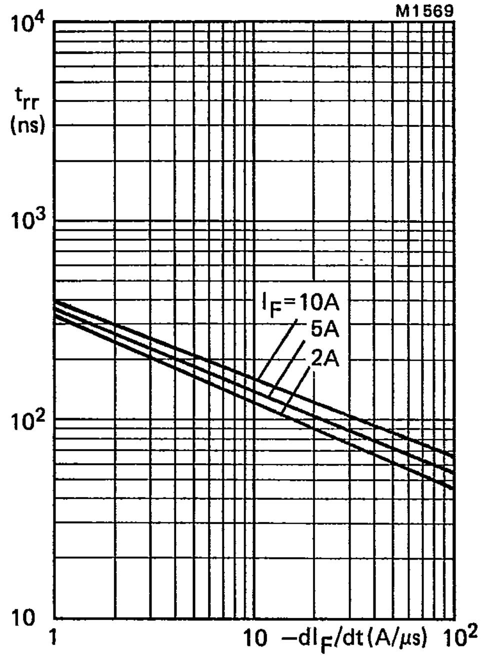


Fig.9 Maximum t_{rr} at T_j = 100 °C.

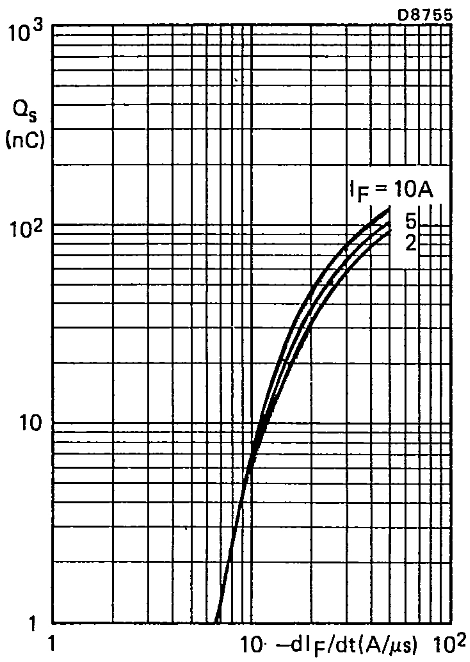


Fig.10 Maximum Q_s at T_j = 25 °C.

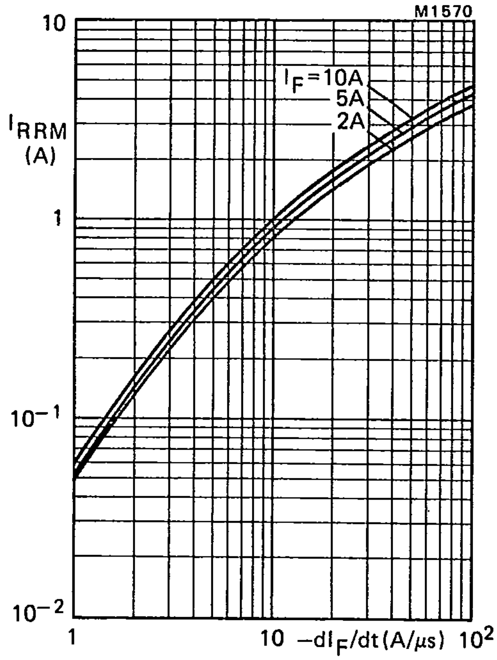


Fig.11 Maximum I_{RRM} at T_j = 25 °C.

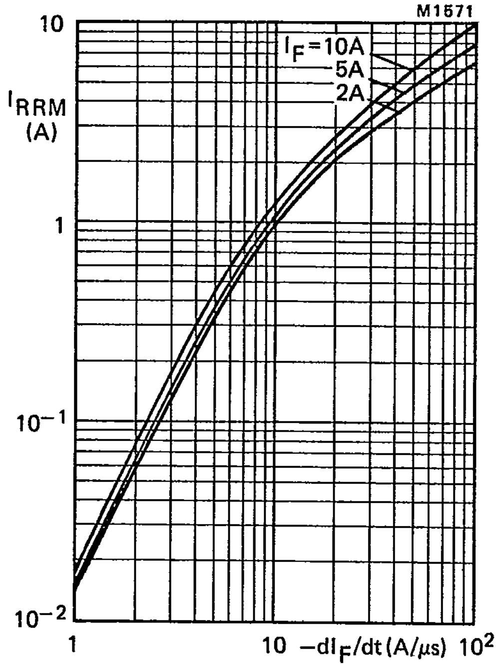


Fig.12 Maximum I_{RRM} at T_j = 100 °C.

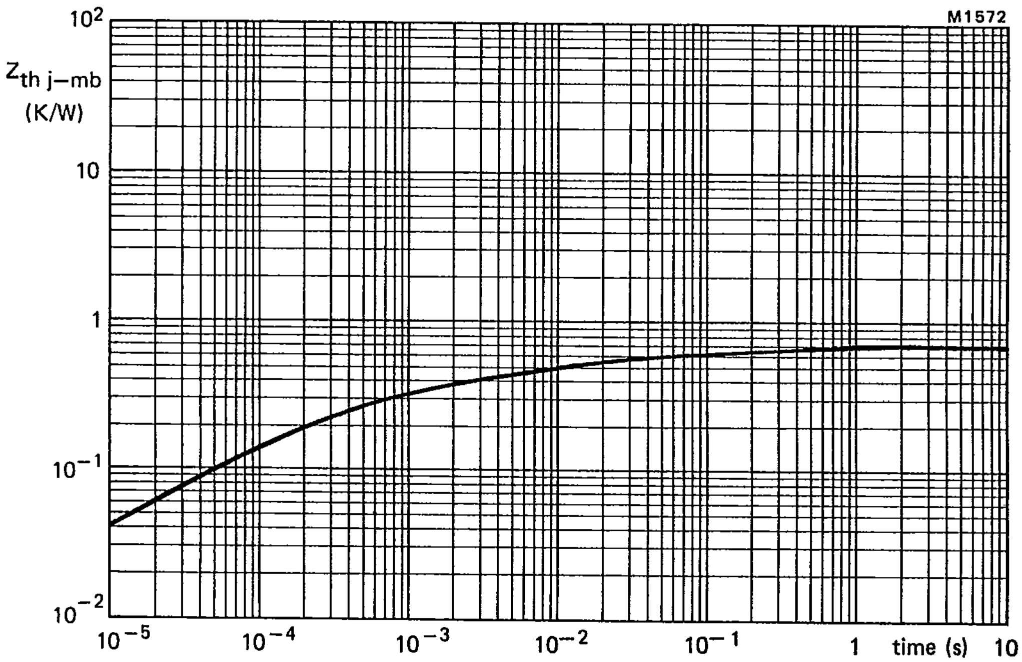


Fig.13 Transient thermal impedance.