

# 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

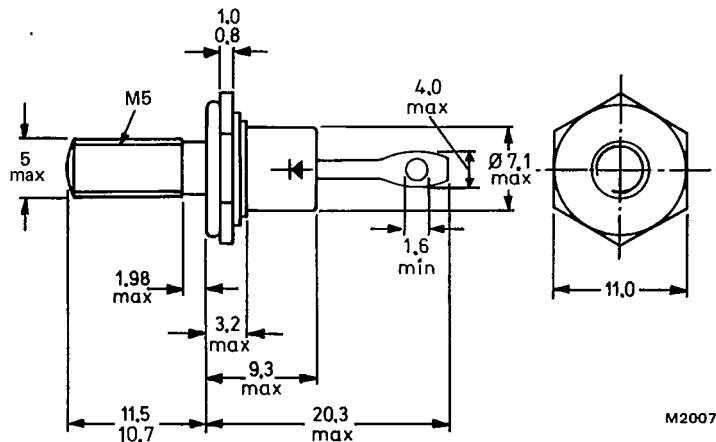
		BYV30-300			400	500	
Repetitive peak reverse voltage	$V_{RRM}$	max.	300	400	500		V
Average forward current	$I_{F(AV)}$	max.	14				A
Forward voltage	$V_F$	<	1.05				V
Reverse recovery time	$t_{rr}$	<	50				ns

## 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	V
→ 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
<b>Currents</b>					
Average forward current; switching losses negligible up to 100 kHz					
square wave; $\delta = 0.5$ ; up to $T_{mb} = 113\text{ }^{\circ}\text{C}$	$I_{F(AV)}$	max.	14		A
up to $T_{mb} = 125\text{ }^{\circ}\text{C}$	$I_{F(AV)}$	max.	10		A
sinusoidal; up to $T_{mb} = 118\text{ }^{\circ}\text{C}$	$I_{F(AV)}$	max.	12.5		A
up to $T_{mb} = 125\text{ }^{\circ}\text{C}$	$I_{F(AV)}$	max.	10		A
R.M.S. forward current	$I_{F(RMS)}$	max.	20		A
Repetitive peak forward current $t_p = 20\text{ }\mu\text{s}$ ; $\delta = 0.02$	$I_{FRM}$	max.	320		A
Non-repetitive peak forward current half sine-wave; $T_j = 150\text{ }^{\circ}\text{C}$ prior to surge; with reapplied $V_{RWMmax}$ ;					
$t = 10\text{ ms}$	$I_{FSM}$	max.	150		A
$t = 8.3\text{ ms}$	$I_{FSM}$	max.	180		A
$I^2t$ for fusing ( $t = 10\text{ ms}$ )	$I^2t$	max.	112		$\text{A}^2\text{s}$
<b>Temperatures</b>					
Storage temperature	$T_{stg}$		-65 to +175		$^{\circ}\text{C}$
Junction temperature	$T_j$	max.	150		$^{\circ}\text{C}$
<b>THERMAL RESISTANCE</b>					
From junction to mounting base	$R_{th\ j-mb}$	=	2.0		K/W
From mounting base to heatsink with heatsink compound	$R_{th\ mb-h}$	=	0.3		K/W
From junction to ambient in free air	$R_{th\ j-a}$	=	50		K/W

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

# CHARACTERISTICS

## Forward voltage

$$I_F = 15 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$$

$$I_F = 50 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$$

$V_F$	<	1.05	V*
$V_F$	<	1.40	V*

## Reverse current

$$V_R = V_{RWM} \text{ max}; T_j = 100 \text{ }^\circ\text{C}$$

$$T_j = 25 \text{ }^\circ\text{C}$$

$I_R$	<	0.8	mA
$I_R$	<	50	$\mu\text{A}$

## Reverse recovery when switched from

$$I_F = 1 \text{ A to } V_R \geq 30 \text{ V with } -dI_F/dt = 100 \text{ A}/\mu\text{s};$$

$$T_j = 25 \text{ }^\circ\text{C}; \text{ recovery time}$$

$t_{rr}$	<	50	ns
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$$I_F = 2 \text{ A to } V_R \geq 30 \text{ V with } -dI_F/dt = 20 \text{ A}/\mu\text{s};$$

$$T_j = 25 \text{ }^\circ\text{C}; \text{ recovered charge}$$

$Q_s$	<	50	nC
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$$I_F = 10 \text{ A to } V_R \geq 30 \text{ V with } -dI_F/dt = 50 \text{ A}/\mu\text{s};$$

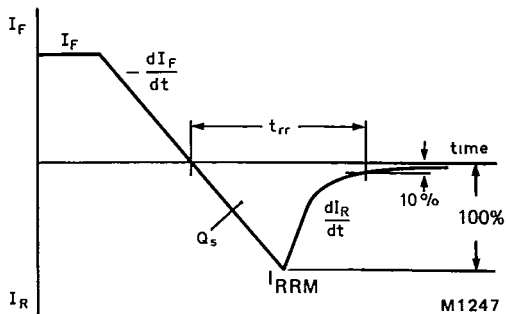
$$T_j = 100 \text{ }^\circ\text{C}; \text{ peak recovery current}$$

$I_{RRM}$	<	5.2	A
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## Forward recovery when switched to $I_F = 10 \text{ A}$

$$\text{with } dI_F/dt = 10 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$$

$V_{fr}$	typ.	2.5	V
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Fig.2 Definition of  $t_{rr}$ ,  $Q_s$  and  $I_{RRM}$ .

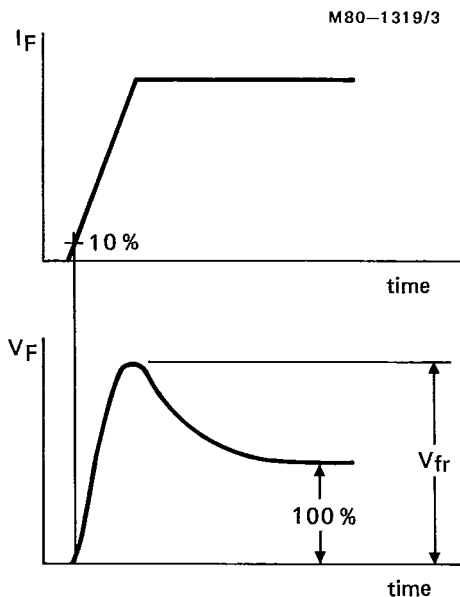


Fig.3 Definition of  $V_{fr}$ .

\*Measured under pulse conditions to avoid excessive dissipation.

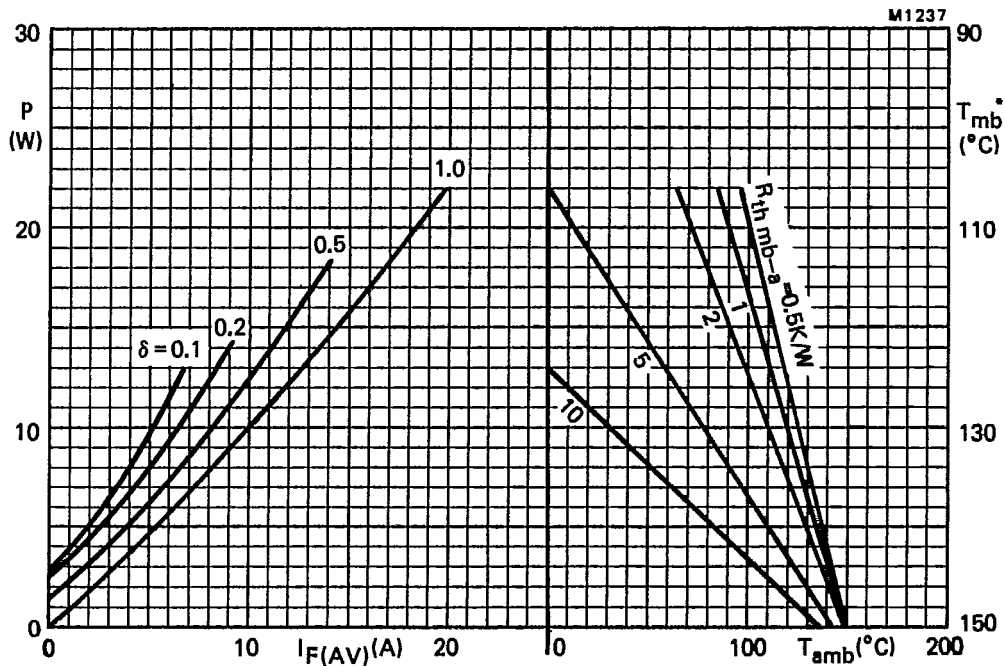
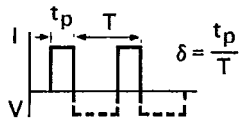


Fig.4 The right-hand part shows the relationship between the power (derived from the left-hand part) and the maximum permissible temperatures. Power includes reverse current losses and switching losses up to f = 100 kHz.



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

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\*T<sub>mb</sub> scale is for comparison purposes and is correct only for R<sub>th mb-a</sub> < 4.1 K/W.

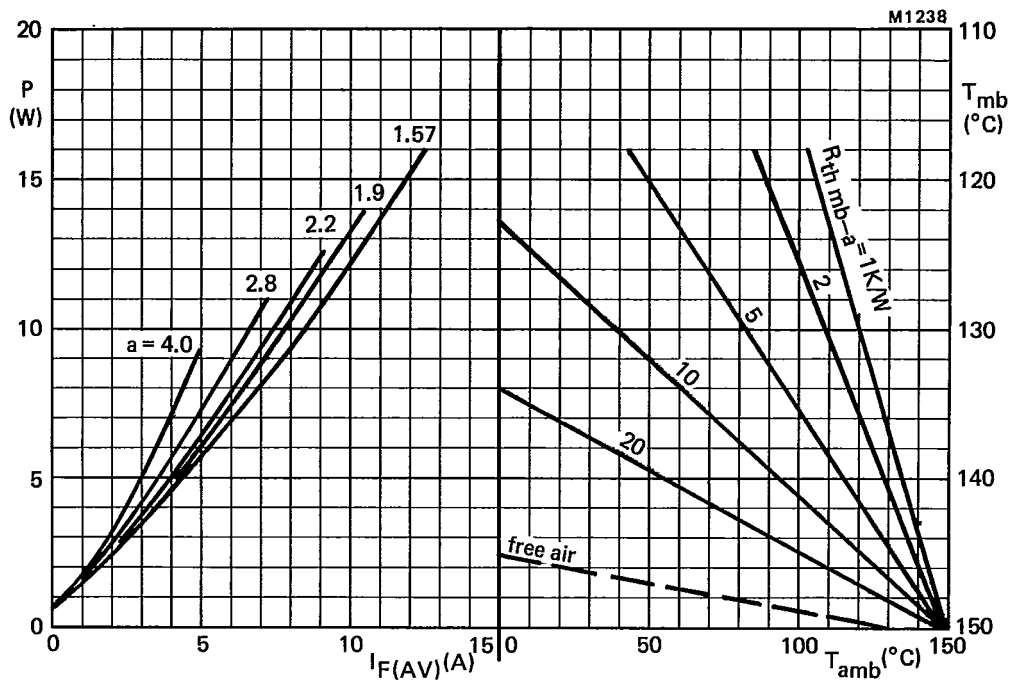


Fig.5 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.

$a$  = form factor =  $I_{F(RMS)}/I_{F(AV)}$ .

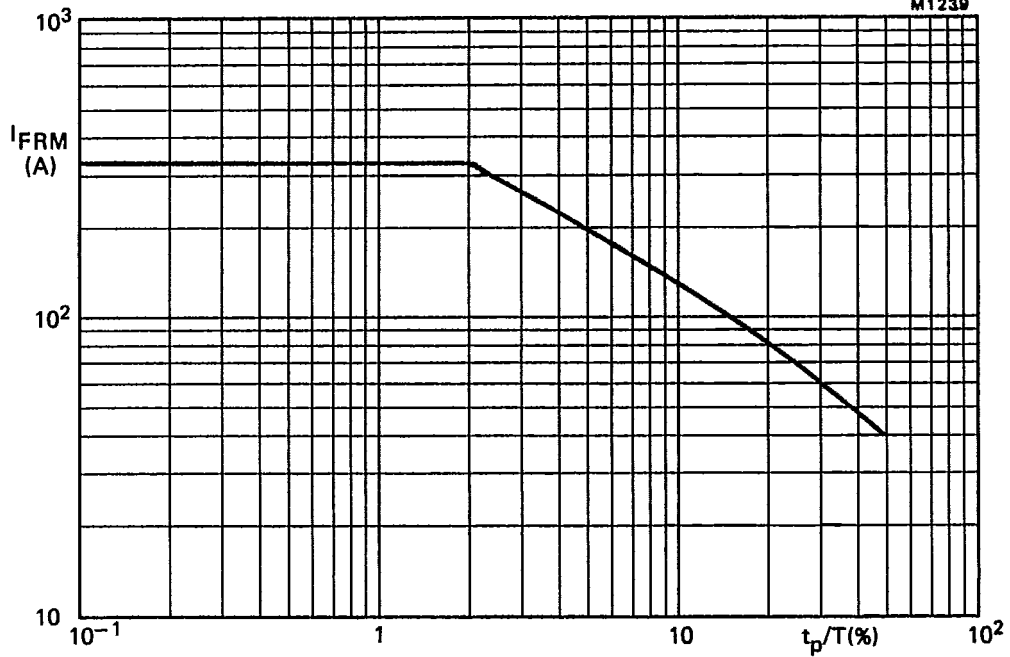
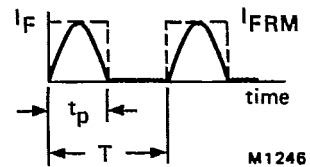
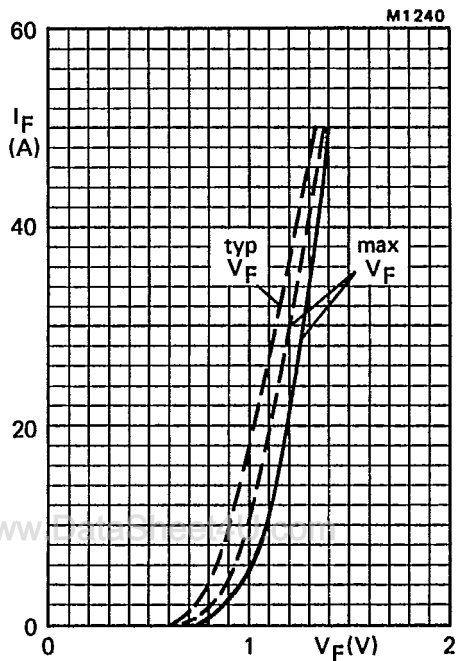


Fig.6 Maximum permissible repetitive peak forward current for square or sinusoidal currents;  $1 \mu\text{s} < t_p < 1 \text{ ms}$ .



Definition of  $I_{FRM}$  and  $t_p/T$ .

Fig.7 —  $T_j = 25^\circ\text{C}$ ; ---  $T_j = 150^\circ\text{C}$ .

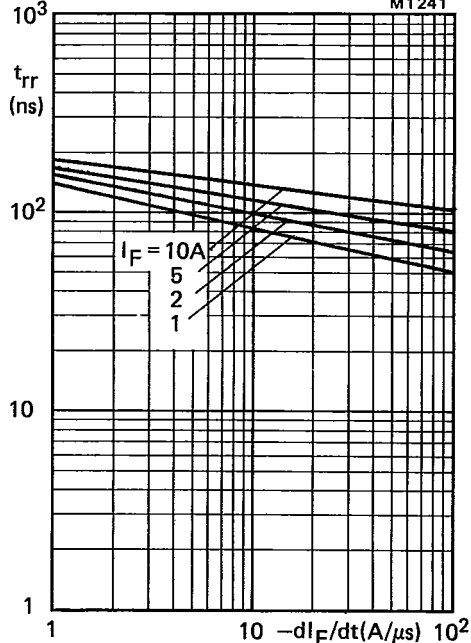


Fig.8 Maximum  $t_{rr}$  at  $T_j = 25\text{ }^\circ\text{C}$

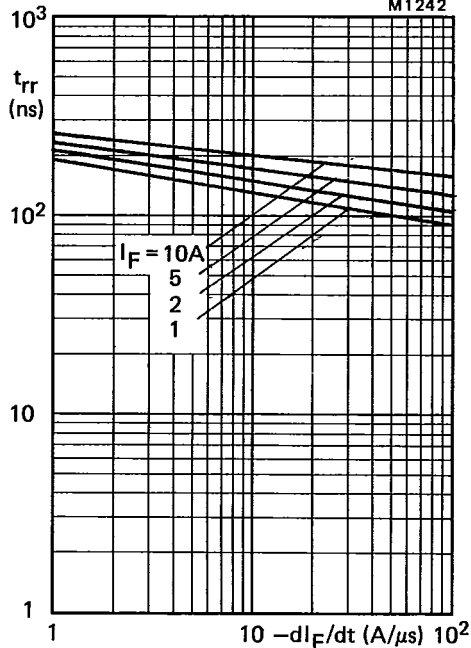


Fig.9 Maximum  $t_{rr}$  at  $T_j = 100\text{ }^\circ\text{C}$ .

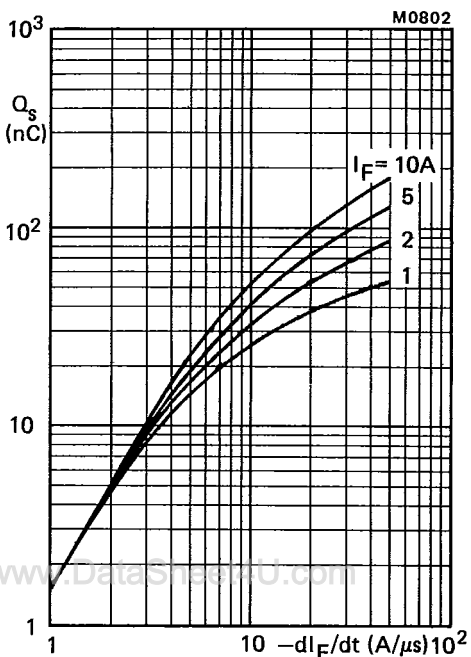


Fig.10 Maximum  $Q_s$  at  $T_j = 25\text{ }^\circ\text{C}$

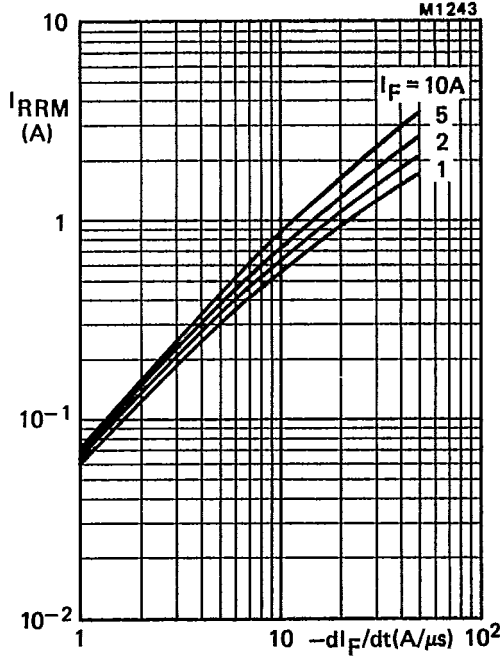


Fig.11 Maximum  $I_{RRM}$  at  $T_j = 25\text{ }^\circ\text{C}$

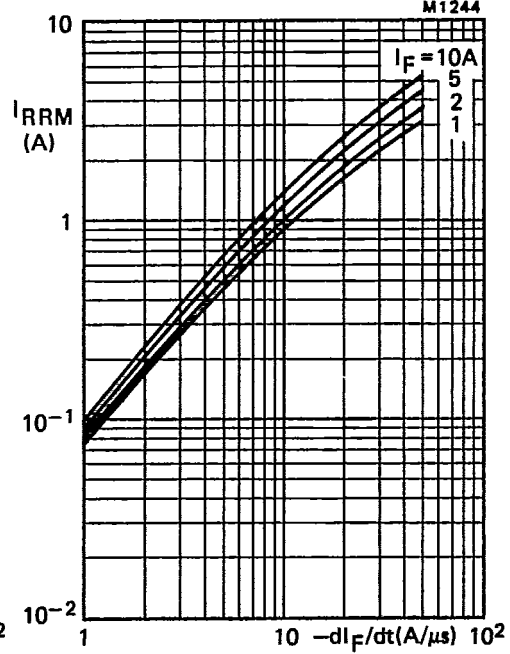


Fig.12 Maximum  $I_{RRM}$  at  $T_j = 100\text{ }^\circ\text{C}$ .

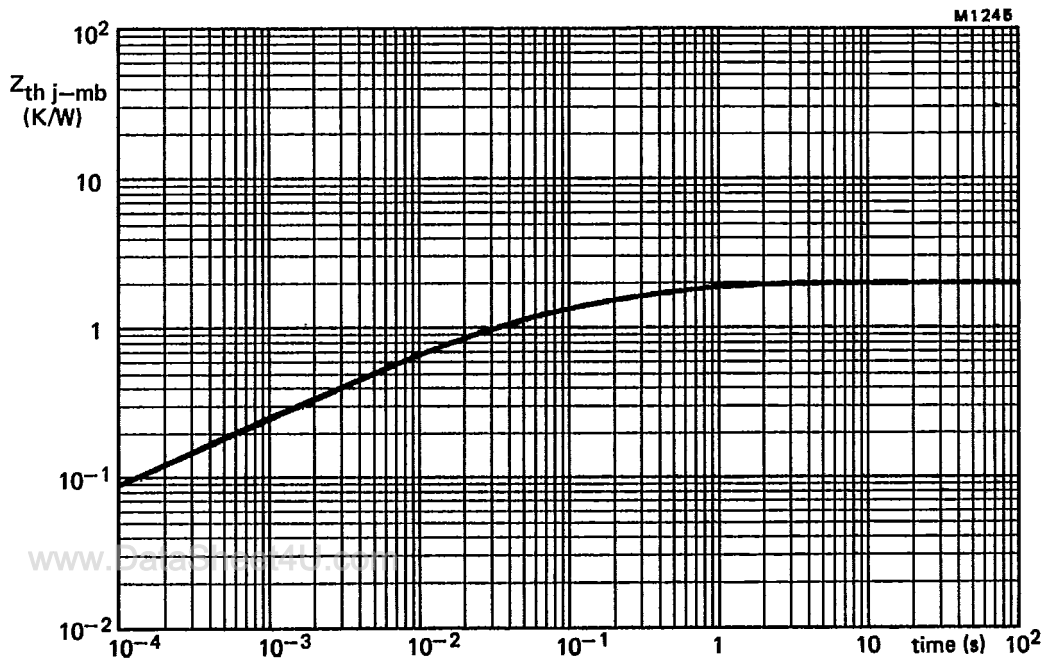


Fig.13 Transient thermal impedance.