FAST SOFT-RECOVERY RECTIFIER DIODES

Glass-passivated double-diffused rectifier diodes in plastic envelopes, featuring fast reverse recovery times and non-snap-off characteristics. They are intended for use in chopper applications as well as in switched-mode power supplies, as efficiency diodes and scan rectifiers in television receivers. The series consists of normal polarity types (cathode to mounting base).

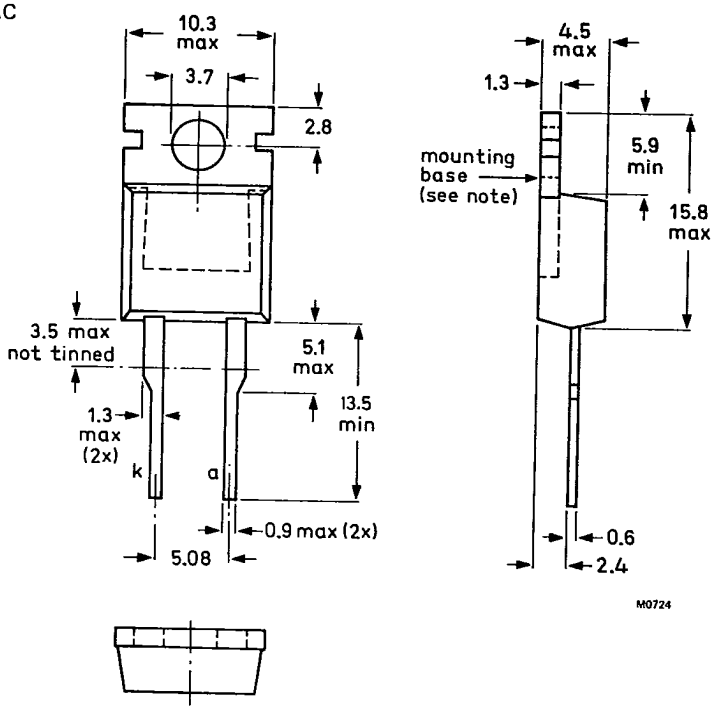
QUICK REFERENCE DATA

			BY329–800	1000	1200	
Repetitive peak reverse voltage	V_{RRM}	max.	800	1000	1200	V
Average forward current	$I_{F(AV)}$	max.		8		A
Non-repetitive peak forward current	I_{FSM}	max.		80		A
Reverse recovery time	t_{rr}	<		150		ns

MECHANICAL DATA

Dimensions in mm

Fig.1 TO-220AC



Note: The exposed metal mounting base is directly connected to the cathode. Accessories supplied on request: see data sheets Mounting instructions and accessories for TO–220 envelopes.

RATINGS

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

			BY329-800	1000	1200	
Voltages						
Non-repetitive peak reverse voltage	V_{RSM}	max.	800	1000	1200	V
Repetitive peak reverse voltage	V_{RRM}	max.	800	1000	1200	V
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	V
Currents						
Average forward current assuming zero switching losses						
square-wave; $\delta = 0.5$; up to $T_{mb} = 108\ ^oC$	$I_{F(AV)}$	max.		8		A
square-wave; $\delta = 0.5$; at $T_{mb} = 125\ ^oC$	$I_{F(AV)}$	max.		5.3		A
sinusoidal; up to $T_{mb} = 113\ ^oC$	$I_{F(AV)}$	max.		7		A
sinusoidal; at $T_{mb} = 125\ ^oC$	$I_{F(AV)}$	max.		5.2		A
R.M.S. forward current	$I_{F(RMS)}$	max.		11		A
Repetitive peak forward current	I_{FRM}	max.		80		A
Non-repetitive peak forward current: t = 10 ms half sine-wave; $T_j = 150\ ^oC$ prior to surge; with reapplied V_{RWM} max	I_{FSM}	max.		80		A
I^2t for fusing (t = 10 ms)	I^2t	max.		32		A^2s
Temperatues						
Storage temperature	T_{stg}			−40 to +150		^oC
Junction temperature	T_j	max.		150		^oC

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	3.0	K/W
Influence of mounting method				
1. Heatsink mounted with clip (see mounting instructions)				
Thermal resistance from mounting base to heatsink				
a. with heatsink compound	$R_{th\ mb\text{-}h}$	=	0.3	K/W
b. with heatsink compound and 0.06 mm maximum mica insulator	$R_{th\ mb\text{-}h}$	=	1.4	K/W
c. with heatsink compound and 0.1 mm maximum mica insulator (56369)	$R_{th\ mb\text{-}h}$	=	2.2	K/W
d. with heatsink compound and 0.25 mm maximum alumina insulator (56367)	$R_{th\ mb\text{-}h}$	=	0.8	K/W
e. without heatsink compound	$R_{th\ mb\text{-}h}$	=	1.4	K/W

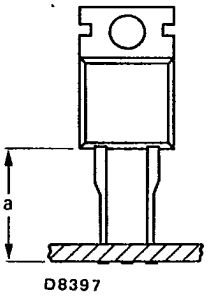
THERMAL RESISTANCE (continued)

2. Free-air operation

The quoted value of $R_{th\ j\text{-}a}$ should be used only when no leads of other dissipating components run to the same tie-point. Thermal resistance from junction to ambient in free air: mounted on a printed-circuit board at a = any lead length.

$R_{th\ j\text{-}a}$ = 60 °C/W

Fig.2



CHARACTERISTICS

Forward voltage I_F = 20 A; T_j = 25 °C	V_F	<	1.85	V*
Reverse current $V_R = V_{RWMmax}$; T_j = 125 °C	I_R	<	1.0	mA
Reverse recovery when switched from I_F = 2 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 20 A/μs; T_j = 25 °C Recovered charge	Q_s	<	0.7	μC
I_F = 1 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 50 A/μs; T_j = 25 °C Recovery time	t_{rr}	<	150	ns
Maximum slope of the reverse recovery current I_F = 2 A; $-dI_F/dt$ = 20 A/μs; T_j = 25 °C	$\lvert dI_R/dt \rvert$	<	60	A/μs

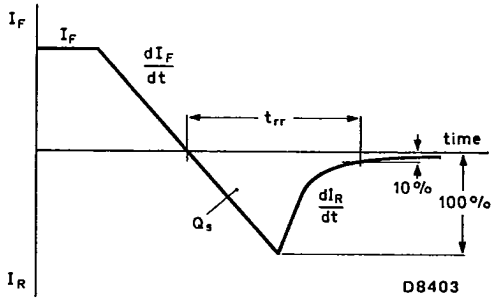


Fig.3 Definition of t_{rr} and Q_s

*Measured under pulse conditions to avoid excessive dissipation

MOUNTING INSTRUCTIONS

1. The device may be soldered directly into the circuit, but the maximum permissible temperature of the soldering iron or bath is 275 °C; it must not be in contact with the joint for more than 5 seconds. Soldered joints must be at least 4.7 mm from the seal.
2. The leads should not be bent less than 2.4 mm from the seal, and should be supported during bending. The bend radius must be no less than 1.0 mm.
3. It is recommended that the circuit connection be made to the cathode tag, rather than direct to the heatsink.
4. Mounting by means of a spring clip is the best mounting method because it offers:
   a. a good thermal contact under the crystal area and slightly lower $R_{th\ mb\text{-}h}$ values than screw mounting;
   b. safe isolation for mains operation.
   However, if a screw is used, it should be M3 cross-recess pan head. Care should be taken to avoid damage to the plastic body.
5. For good thermal contact heatsink compound should be used between base-plate and heatsink. Values of $R_{th\ mb\text{-}h}$ given for mounting with heatsink compound refer to the use of a metallic-oxide loaded compound. Ordinary silicone grease is not recommended.
6. Rivet mounting (only possible for non-insulated mounting).

   Devices may be rivetted to flat heatsinks; such a process must neither deform the mounting tab, nor enlarge the mounting hole.

SQUARE-WAVE OPERATION

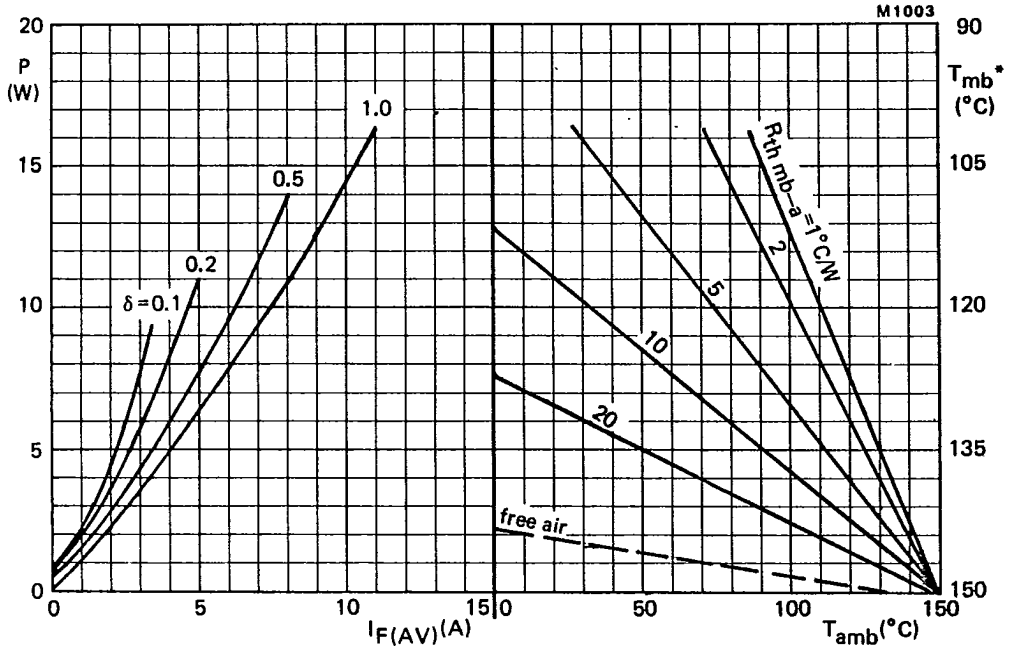
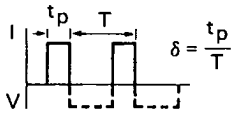


Fig.4 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
P = power including reverse current losses but excluding switching losses.



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

*T_{mb} scale is for comparison purposes and is correct only for $R_{th\ mb\text{-}a} < 10^{o}C/W$.

SINUSOIDAL OPERATION

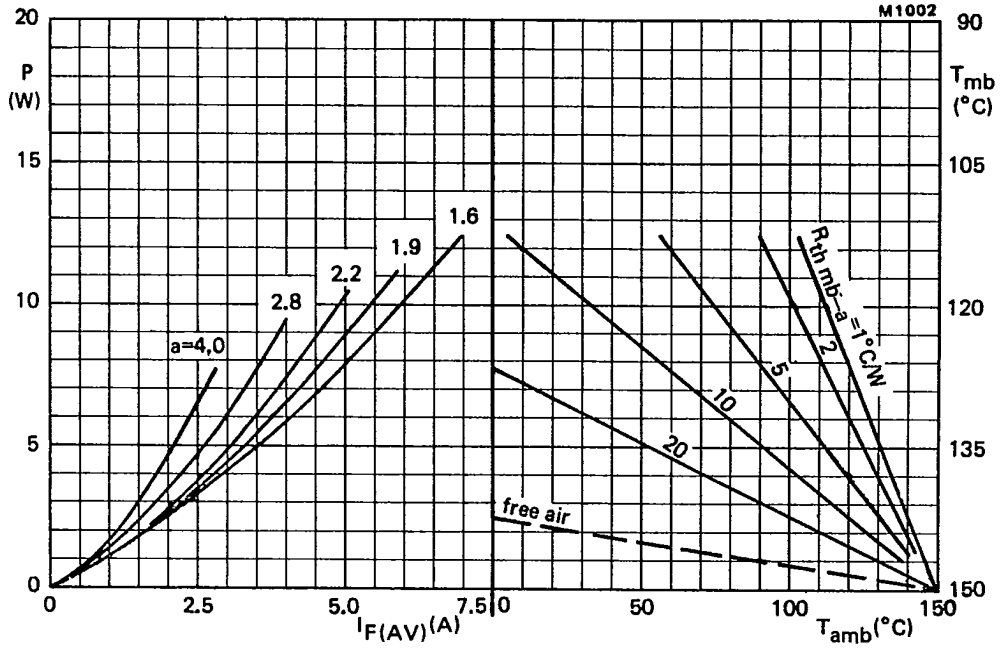


Fig.5 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
P = power including reverse current losses but excluding switching losses.
a = form factor = $I_{F(RMS)}/I_{F(AV)}$.

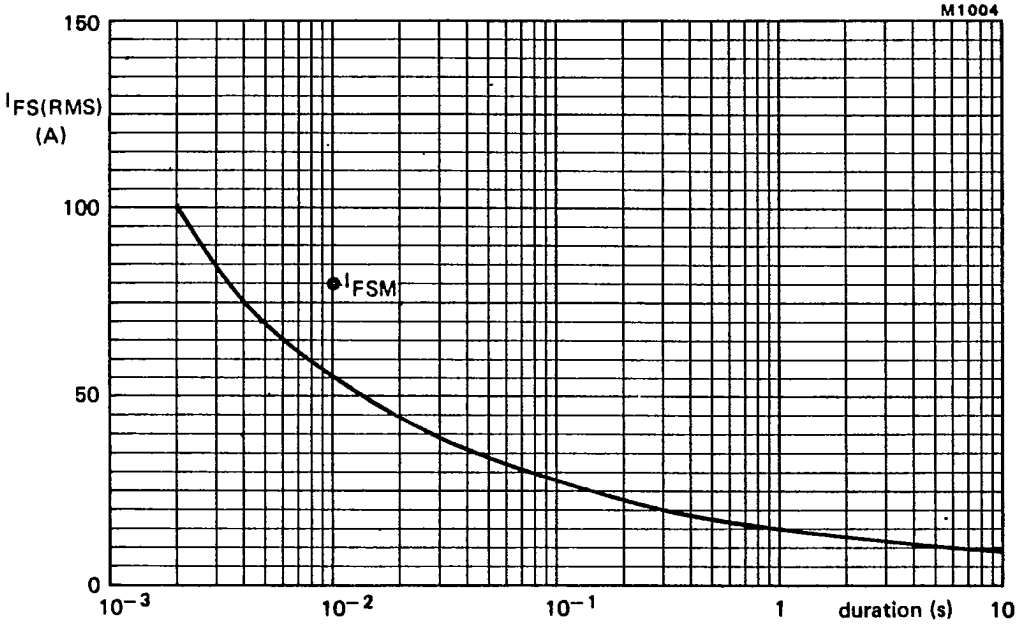
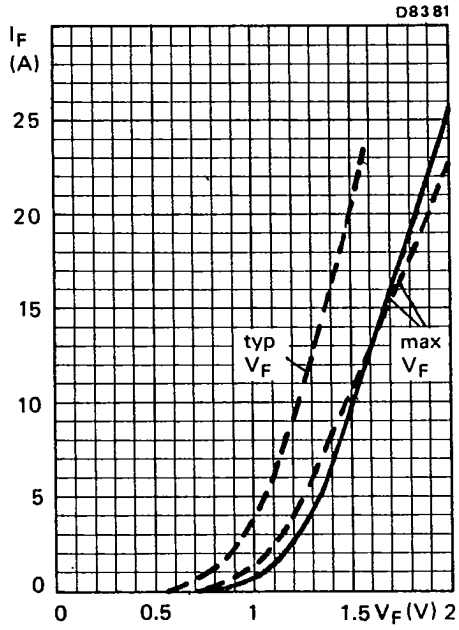


Fig.6 Maximum permissible non-repetitive r.m.s. forward current based on sinusoidal currents (f = 50 Hz); T_j = 150 °C prior to surge; with reapplied V_{RWMmax}.



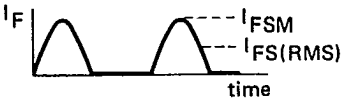


Fig.7 ——— T_j = 25 °C; – – – – T_j = 125 °C

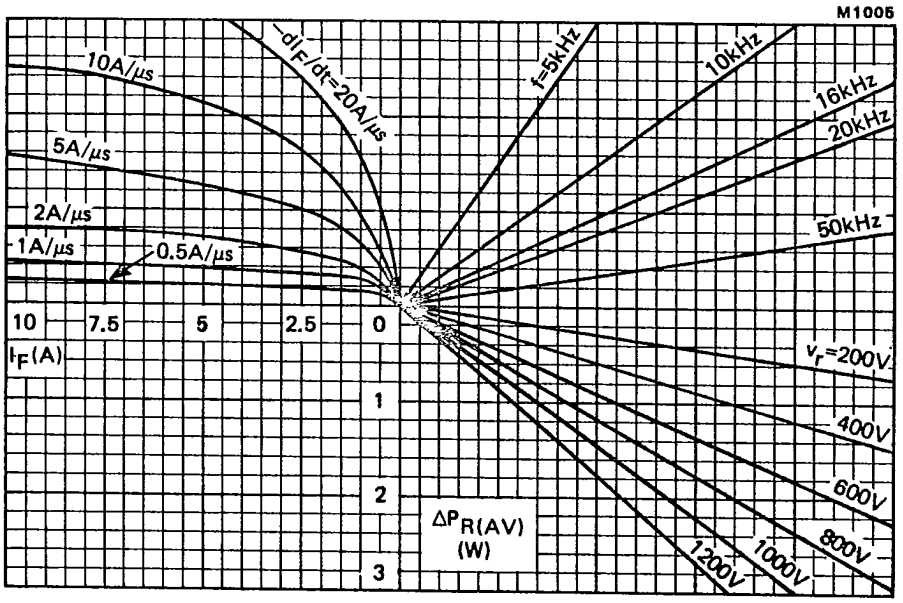
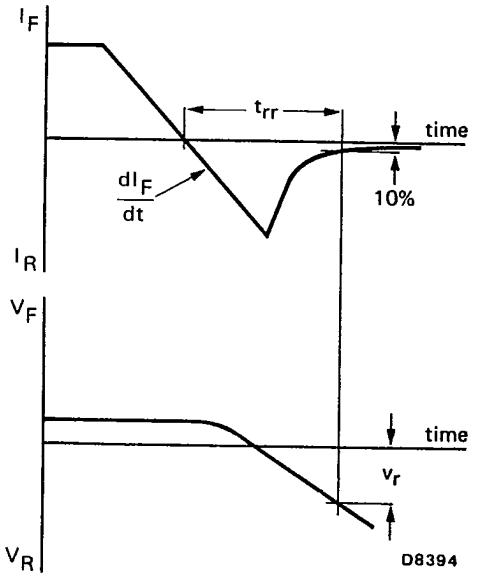


Fig.8 NOMOGRAM

Power loss $\Delta P_{R(AV)}$ due to switching only (to be added to steady state power losses).
I_F = forward current just before switching off; T_j = 150 °C



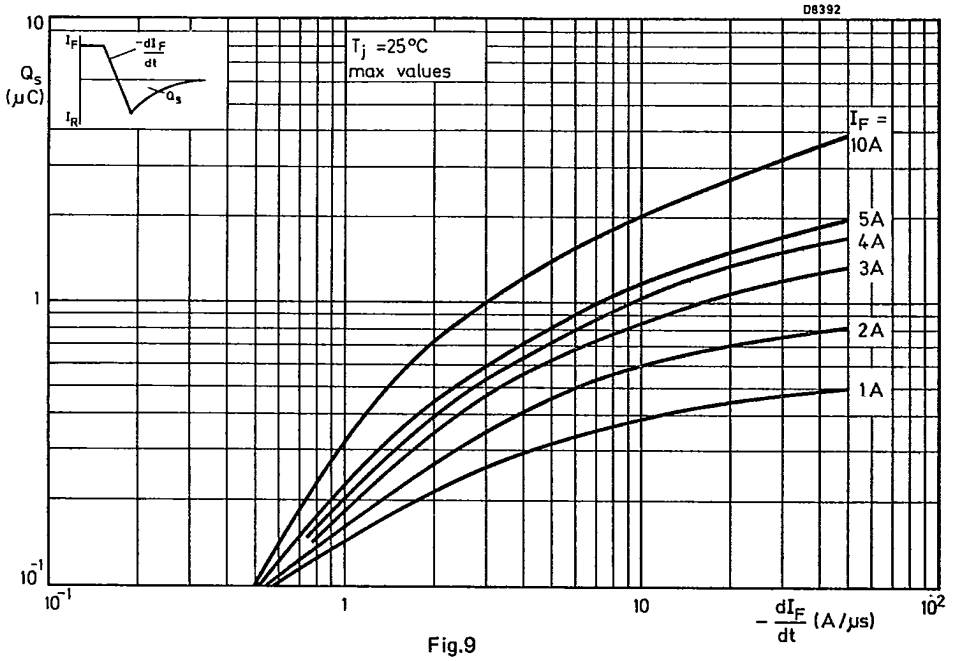


Fig.9

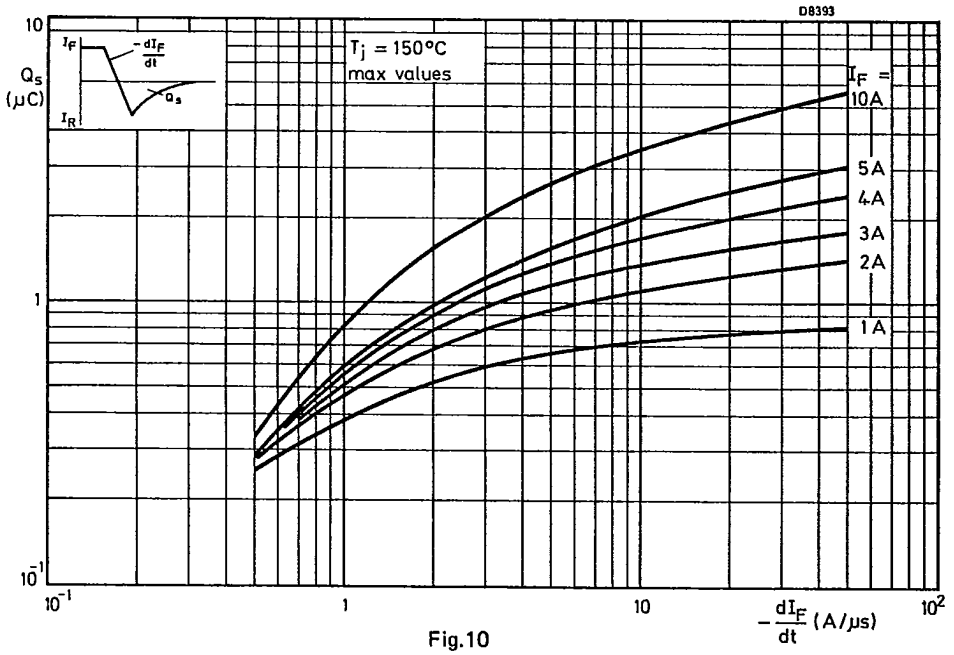


Fig.10

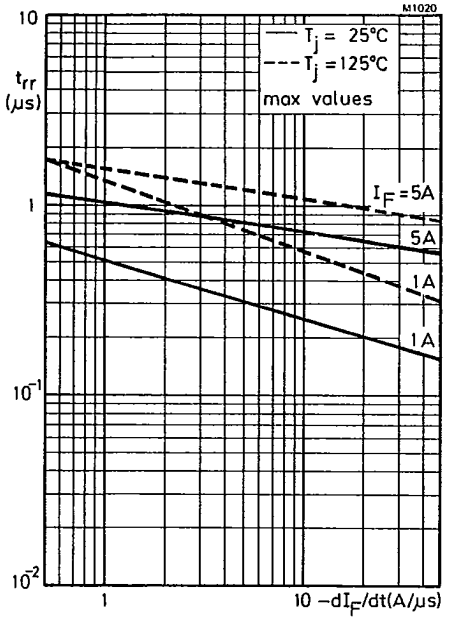


Fig.11

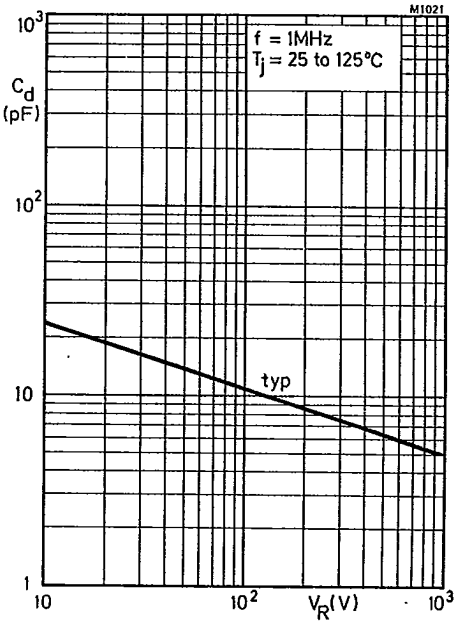


Fig.12

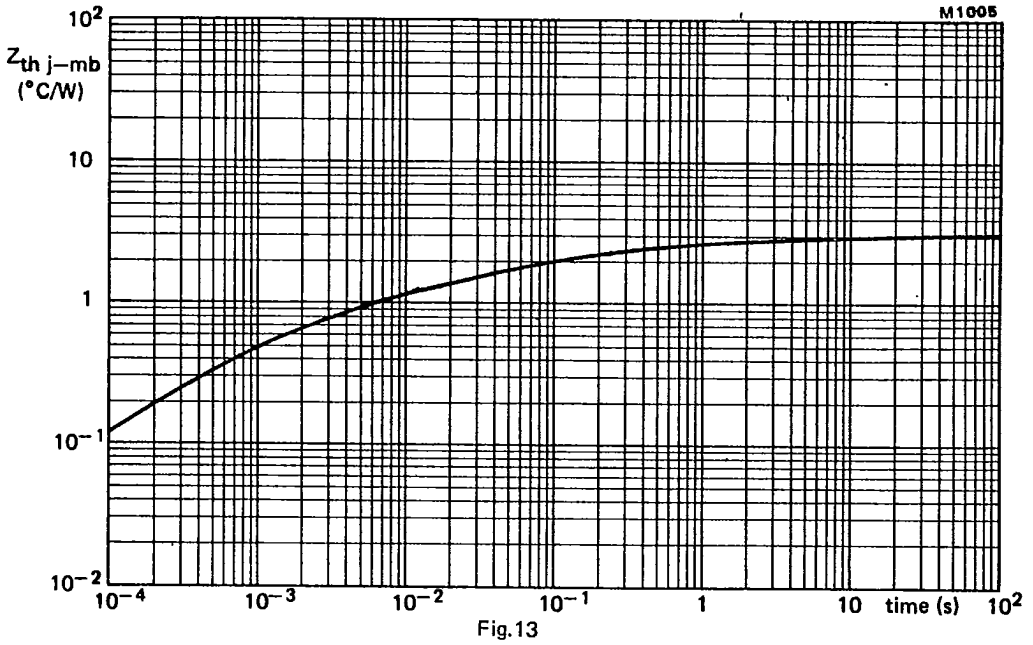


Fig.13

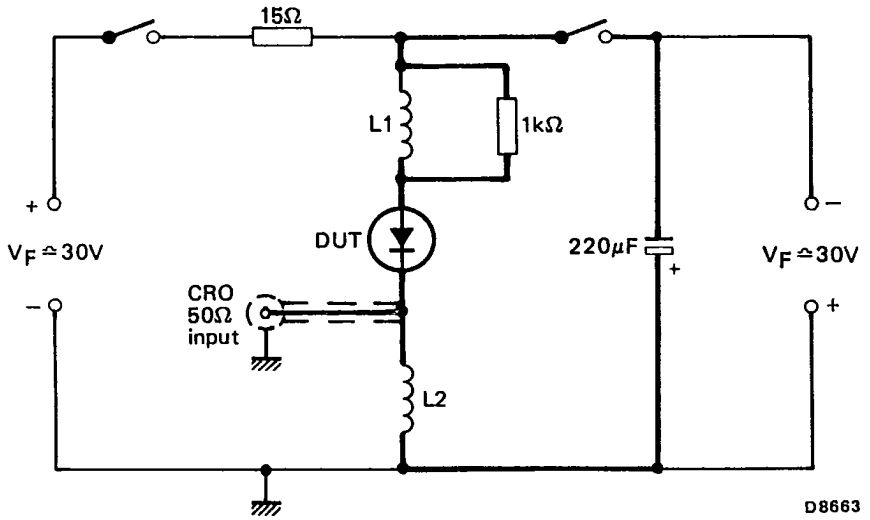


Fig.14 Simplified circuit diagram of practical apparatus to test softness of recovery.

NOTES

1. Duty factor of forward current should be low, $<2\%$.
2. dI_F/dt is set by L1, 1.5 μH gives 20 A/μs.
3. dI_R/dt is measured across L2, 200 nH gives 5A/μs/V.
4. Wiring shown in heavy should be kept as short as possible.