# ELECTRICALLY ISOLATED RECTIFIER DIODES

Glass-passivated, double-diffused rectifier diodes in full-pack plastic envelopes, intended for power rectifier applications. Their electrical isolation makes them ideal for mounting on a common heatsink alongside other components without the need for additional insulators.

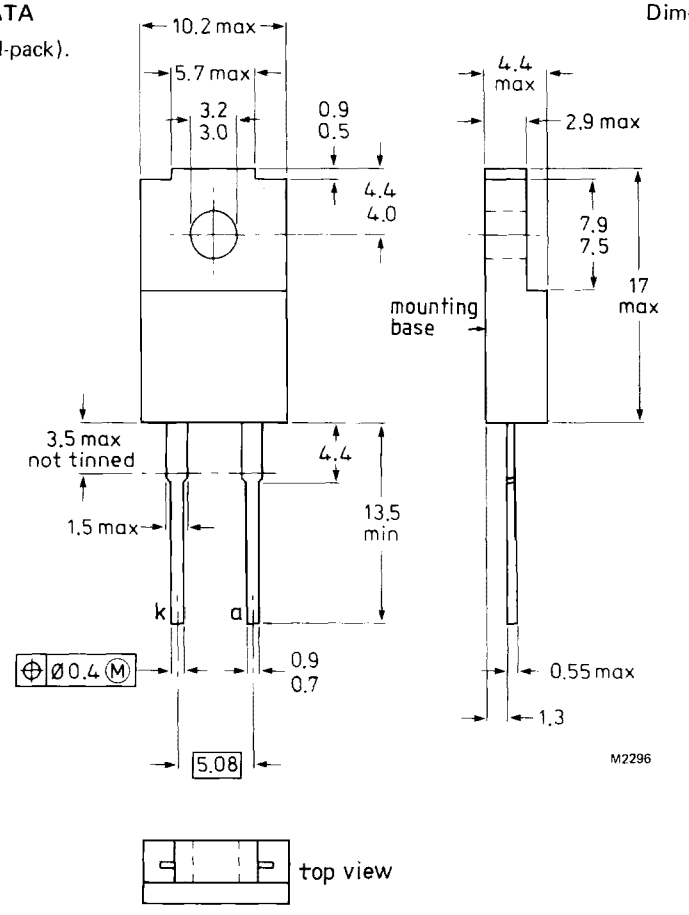
## QUICK REFERENCE DATA

| | | | BY249F–300 | 600 | |
|---|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | max. | 300 | 600 | V |
| Average forward current | $I_{F(AV)}$ | max. | 6.5 | | A |
| Non-repetitive peak forward current | $I_{FSM}$ | max. | 60 | | A |

## MECHANICAL DATA

Dimensions in mm

Fig.1 SOT-186 (full-pack).




Net mass: 2 g.

The mounting base is electrically isolated from all terminals.

Accessories supplied on request (see data sheets Mounting instructions for F-pack devices and Accessories for SOT-186 envelopes).

## RATINGS

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

| | | | BY249F–300 | 600 | |
|---|---|---|---|---|---|
| **Voltages** (note 1) | | | | | |
| Non-repetitive peak reverse voltage | $V_{RSM}$ | max. | 300 | 600 | V |
| Repetitive peak reverse voltage | $V_{RRM}$ | max. | 300 | 600 | V |
| Crest working reverse voltage | $V_{RWM}$ | max. | 200 | 400 | V |
| Continuous reverse voltage | $V_R$ | max. | 200 | 400 | V |
| **Currents** | | | | | |
| Average forward current; (note 2) | | | | | |
| sinusoidal; up to $T_h$ = 95 °C | $I_{F(AV)}$ | max. | | 6.5 | A |
| sinusoidal; at $T_h$ = 125 °C | $I_{F(AV)}$ | max. | | 3.2 | A |
| RMS forward current | $I_{F(RMS)}$ | max. | | 9.5 | A |
| Repetitive peak forward current; t = 10 ms; half sinewave | $I_{FRM}$ | max. | | 60 | A |
| Non-repetitive peak forward current; t = 10 ms; half sinewave; $T_j$ = 150 °C prior to surge; with re-applied $V_{RWMmax}$ | $I_{FSM}$ | max. | | 60 | A |
| $I^2t$ for fusing; t = 10 ms | $I^2t$ | max. | | 18 | $A^2s$ |
| **Temperatures** | | | | | |
| Storage temperature | $T_{stg}$ | | | −40 to +150 | °C |
| Junction temperature | $T_j$ | max. | | 150 | °C |

## ISOLATION

| | | | | | |
|---|---|---|---|---|---|
| Peak isolation voltage from all terminals to external heatsink | $V_{(isol)M}$ | max. | | 1000 | V |
| Isolation capacitance between all terminals and external heatsink (note 3) | $C_{(isol)}$ | typ. | | 12 | pF |

Notes

1. To ensure thermal stability: $R_{th\ j\text{-}a} < 15$ K/W for continuous reverse voltage.
2. The quoted temperatures assume heatsink compound is used.
3. Mounted without heatsink compound and 20 newtons pressure on the centre of the envelope.

## THERMAL RESISTANCE

From junction to external heatsink with minimum of 2 kgf (20 newtons) pressure on the centre of the envelope,

| | | | | |
|---|---|---|---|---|
| without heatsink compound | $R_{th\ j\text{-}h}$ | = | 7.2 | K/W |
| with heatsink compound | $R_{th\ j\text{-}h}$ | = | 5.5 | K/W |

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 point.

| | | | | |
|---|---|---|---|---|
| Thermal resistance from junction to ambient in free air, mounted on a printed circuit board | $R_{th\ j\text{-}a}$ | = | 55 | K/W |

## CHARACTERISTICS

| | | | | |
|---|---|---|---|---|
| Forward voltage | | | | |
| $I_F$ = 20 A; $T_j$ = 25 °C | $V_F$ | < | 1.6 | V* |
| $I_F$ = 5 A; $T_j$ = 100 °C | $V_F$ | < | 1.05 | V* |
| Reverse current | | | | |
| $V_R = V_{RWMmax}$; $T_j$ = 125 °C | $I_R$ | < | 0.4 | mA |

## 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; the heat source 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 mm.
3. Mounting by means of a spring clip is the best mounting method because it offers a good thermal contact under the crystal area and slightly lower $R_{th\ j\text{-}h}$ values than screw mounting. The force exerted on the top of the device by the clip should be at least 2 kgf (20 newtons) to ensure good thermal contact and must not exceed 3.5 kgf (35 newtons) to avoid damage to the device.
4. If screw mounting is used, it should be M3 cross-recess pan head.
   Minimum torque to ensure good thermal contact: 5.5 kgf (0.55 Nm)
   Maximum torque to avoid damage to the device: 8.0 kgf (0.80 Nm)
5. For good thermal contact, heatsink compound should be used between mounting base and heatsink. Values of $R_{th\ j\text{-}h}$ 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.
   It is not recommended to use rivets, since extensive damage could result to the plastic, which could destroy the insulating properties of the device.
7. The heatsink must have a flatness in the mounting area of 0.02 mm maximum per 10 mm. Mounting holes must be deburred.

## OPERATING NOTES

The various components of junction temperature rise above ambient are illustrated in Fig.2.

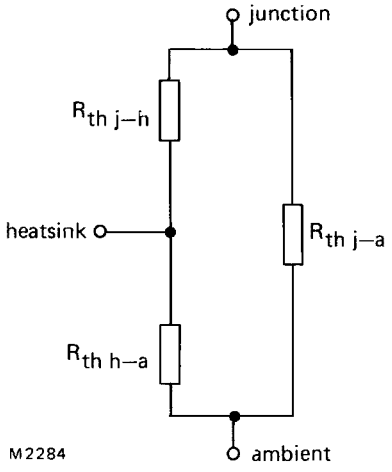



Fig.2.

Any measurement of heatsink temperature should be immediately adjacent to the device.

SINUSOIDAL OPERATION

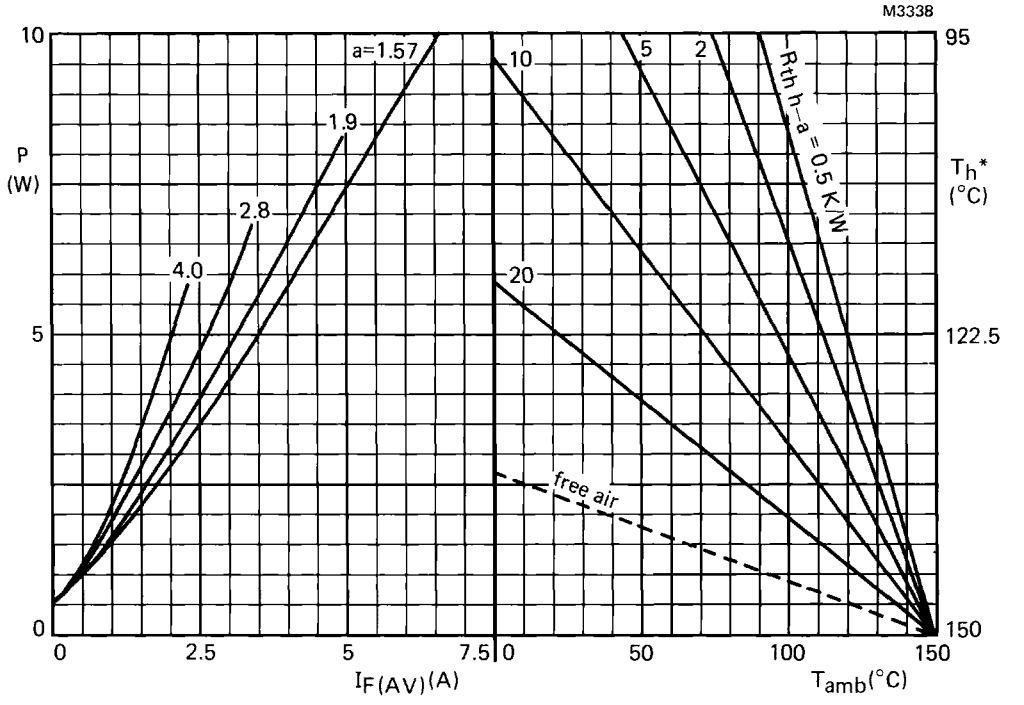



Fig.3 The right-hand part shows the interrelationship between the power (derived from the left-hand part) and the maximum permissible temperatures.
a = form factor = $I_{F(RMS)}/I_{F(AV)}$.

*$T_h$ scale is for comparison purposes and is correct only for $R_{th\ h\text{-}a} < 19.3$ K/W.

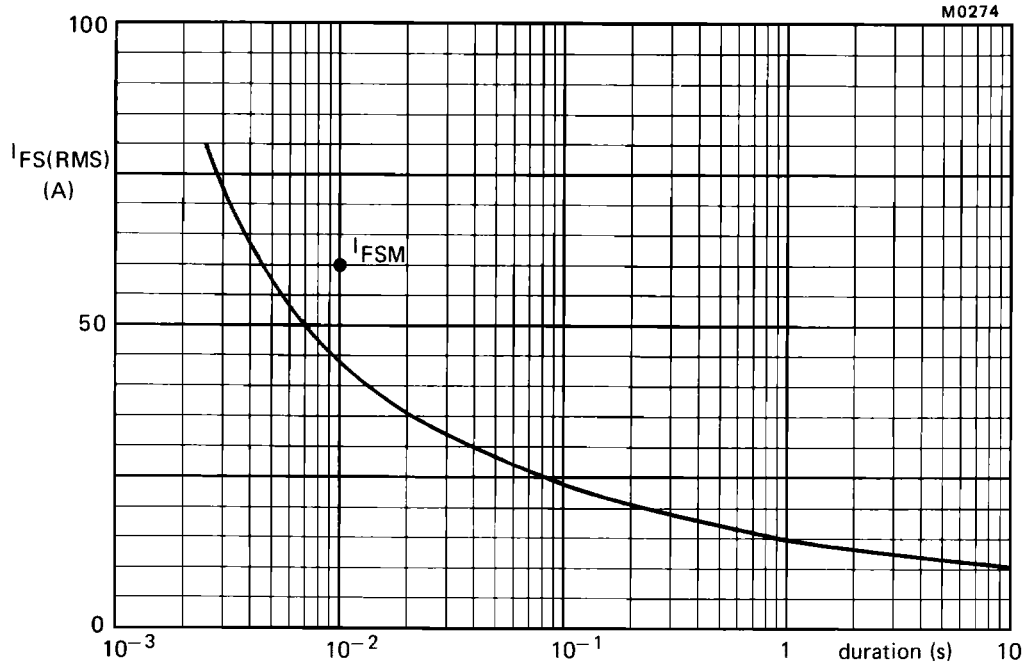
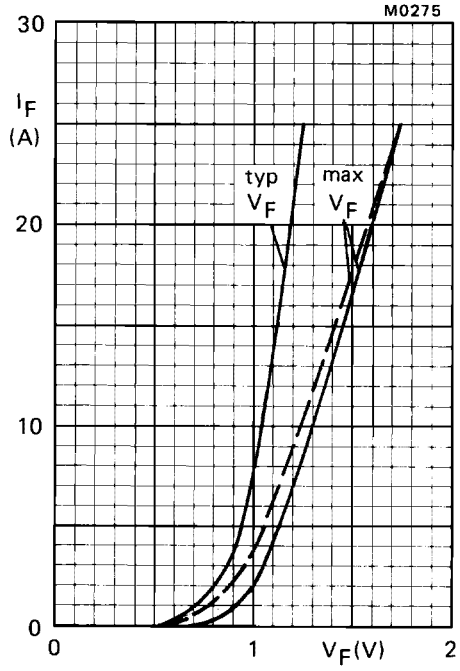



Fig.4 Maximum permissible non-repetitive RMS forward current based on sinusoidal currents (f = 50 Hz); $T_j$ = 150 °C prior to surge.



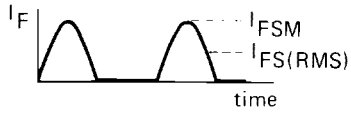




Fig.5 —— $T_j$ = 25 °C; – – – $T_j$ = 100 °C.

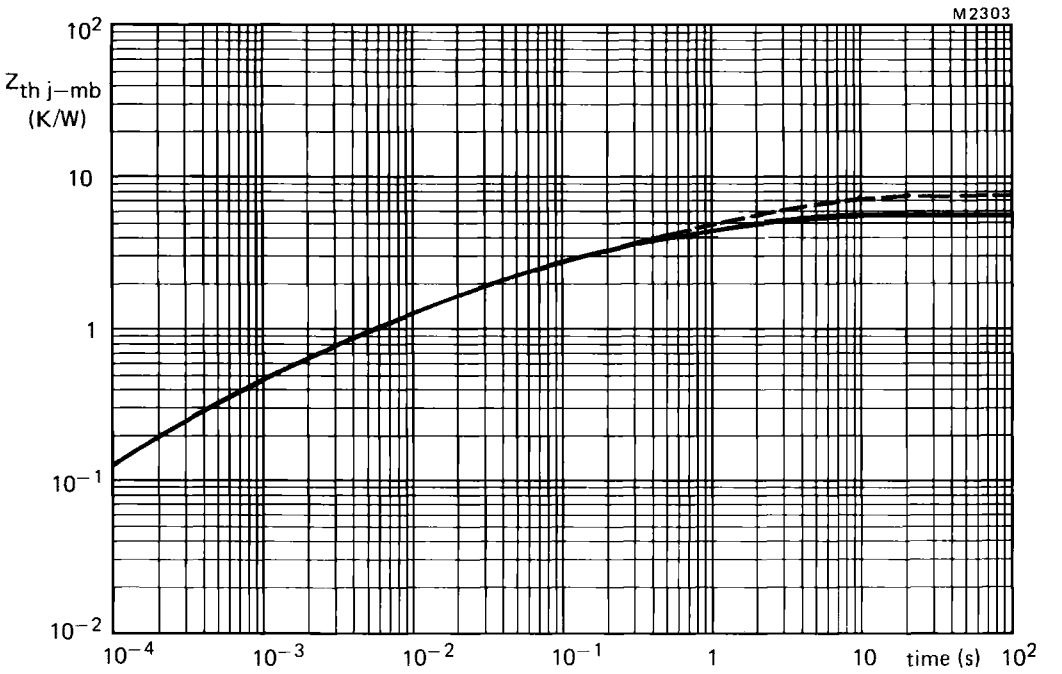



Fig.6 —— with heatsink compound; – – – – without heatsink compound.