

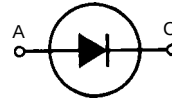
# Fast Recovery Epitaxial Diode (FRED)

$$I_{FAVM} = 17 \text{ A}$$

$$V_{RRM} = 1200 \text{ V}$$

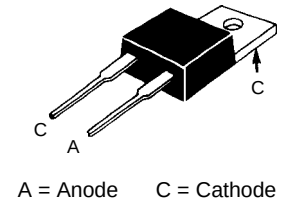
$$t_{rr} = 40 \text{ ns}$$

| $V_{RSM}$ | $V_{RRM}$ | Type        |
|-----------|-----------|-------------|
| 1200V     | 1200V     | DSEI 20-12A |



| Symbol        | Test Conditions                                                        | Maximum Ratings                    |                         |
|---------------|------------------------------------------------------------------------|------------------------------------|-------------------------|
| $I_{FRMS}$    | $T_{VJ} = T_{VJM}$                                                     | 70                                 | A                       |
| $I_{FAVM}$ ①  | $T_C = 85^\circ\text{C}$ ; rectangular, $d = 0.5$                      | 17                                 | A                       |
| $I_{FRM}$     | $t_p < 10 \mu\text{s}$ ; rep. rating, pulse width limited by $T_{VJM}$ | 220                                | A                       |
| $I_{FSM}$     | $T_{VJ} = 45^\circ\text{C}$                                            | $t = 10 \text{ ms}$ (50 Hz), sine  | 130 A                   |
|               |                                                                        | $t = 8.3 \text{ ms}$ (60 Hz), sine | 140 A                   |
|               | $T_{VJ} = 150^\circ\text{C}$                                           | $t = 10 \text{ ms}$ (50 Hz), sine  | 110 A                   |
|               |                                                                        | $t = 8.3 \text{ ms}$ (60 Hz), sine | 120 A                   |
| $\int i^2 dt$ | $T_{VJ} = 45^\circ\text{C}$                                            | $t = 10 \text{ ms}$ (50 Hz), sine  | 85 $\text{A}^2\text{s}$ |
|               |                                                                        | $t = 8.3 \text{ ms}$ (60 Hz), sine | 80 $\text{A}^2\text{s}$ |
|               | $T_{VJ} = 150^\circ\text{C}$                                           | $t = 10 \text{ ms}$ (50 Hz), sine  | 60 $\text{A}^2\text{s}$ |
|               |                                                                        | $t = 8.3 \text{ ms}$ (60 Hz), sine | 60 $\text{A}^2\text{s}$ |
| $T_{VJ}$      |                                                                        | -40...+150                         | $^\circ\text{C}$        |
| $T_{VJM}$     |                                                                        | 150                                | $^\circ\text{C}$        |
| $T_{stg}$     |                                                                        | -40...+150                         | $^\circ\text{C}$        |
| $P_{tot}$     | $T_C = 25^\circ\text{C}$                                               | 78                                 | W                       |
| $M_d$         | Mounting torque with screw M3                                          | 0.45/4                             | Nm/lb.in.               |
|               | Mounting torque with screw M3.5                                        | 0.55/5                             | Nm/lb.in.               |
| Weight        |                                                                        | 2                                  | g                       |

TO-220 AC



## Features

- Low  $I_{RM}$ -values
- Planar passivated chips
- Very short recovery time
- Soft recovery behaviour
- Epoxy meet UL 94V-0.
- Extremely low switching losses
- International standard package JEDEC TO-220 AC

## Applications

- Snubber diode
- Anti saturation diode
- Inductive heating and melting
- Free wheeling diode in converters and motor control circuits
- Rectifiers in switch mode power supplies (SMPS)
- Antiparallel diode for high frequency switching devices
- Uninterruptible power supplies (UPS)
- Ultrasonic cleaners and welders

## Advantages

- Low losses
- Low noise switching
- High reliability circuit operation
- Low voltage peaks for reduced protection circuits
- Operating at lower temperature or space saving by reduced cooling

| Symbol     | Test Conditions                                                                                                 | Characteristic Values        |                       |
|------------|-----------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------|
|            |                                                                                                                 | Typ.                         | Max.                  |
| $I_R$      | $V_R = V_{RRM}$                                                                                                 | $T_{VJ} = 25^\circ\text{C}$  | 750 $\mu\text{A}$     |
|            | $V_R = 0.8 V_{RRM}$                                                                                             | $T_{VJ} = 25^\circ\text{C}$  | 250 $\mu\text{A}$     |
|            | $V_R = 0.8 V_{RRM}$                                                                                             | $T_{VJ} = 125^\circ\text{C}$ | 7 mA                  |
| $V_F$      | $I_F = 12 \text{ A}$                                                                                            | $T_{VJ} = 150^\circ\text{C}$ | 1.87 V                |
|            |                                                                                                                 | $T_{VJ} = 25^\circ\text{C}$  | 2.15 V                |
| $V_{T0}$   | For power-loss calculations only                                                                                |                              | 1.65 V                |
| $r_T$      | $T_{VJ} = T_{VJM}$                                                                                              |                              | 18.2 $\text{m}\Omega$ |
| $R_{thJC}$ |                                                                                                                 | 0.5                          | 1.6 K/W               |
| $R_{thCK}$ |                                                                                                                 |                              | K/W                   |
| $R_{thJA}$ |                                                                                                                 |                              | 60 K/W                |
| $t_{rr}$   | $I_F = 1 \text{ A}$ ; $-di/dt = 100 \text{ A}/\mu\text{s}$ ; $V_R = 30 \text{ V}$ ; $T_{VJ} = 25^\circ\text{C}$ | 40                           | 60 ns                 |
| $I_{RM}$   | $V_R = 540 \text{ V}$ ; $I_F = 20 \text{ A}$ ; $-di_F/dt = 100 \text{ A}/\mu\text{s}$                           | 7                            | A                     |
|            | $L \leq 0.05 \mu\text{H}$ $T_{VJ} = 100^\circ\text{C}$                                                          |                              |                       |

①  $I_{FAVM}$  rating includes reverse blocking losses at  $T_{VJM}$ ,  $V_R = 0.8 V_{RRM}$ , duty cycle  $d = 0.5$   
Data according to DIN/IEC 747

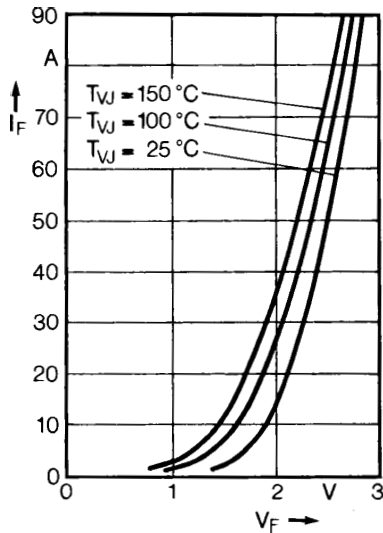


Fig. 1 Forward current versus voltage drop.

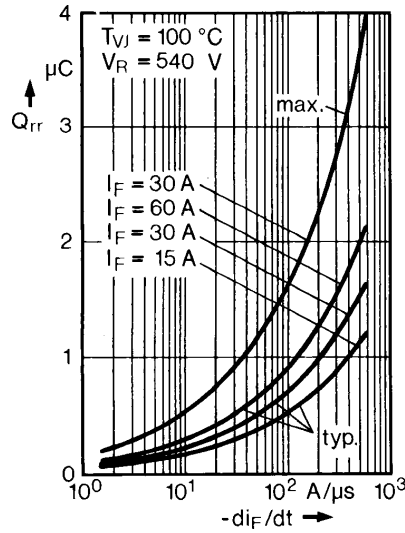


Fig. 2 Recovery charge versus  $-di_F/dt$ .

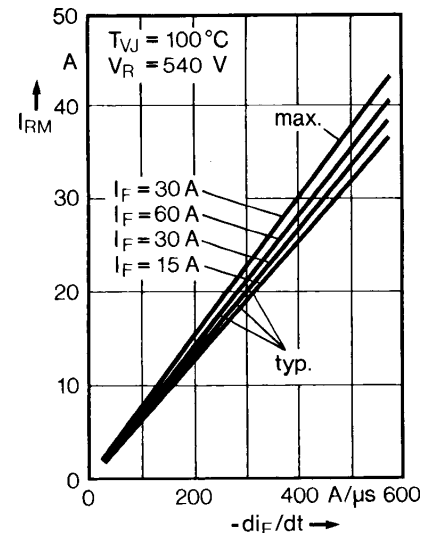


Fig. 3 Peak reverse current versus  $-di_F/dt$ .

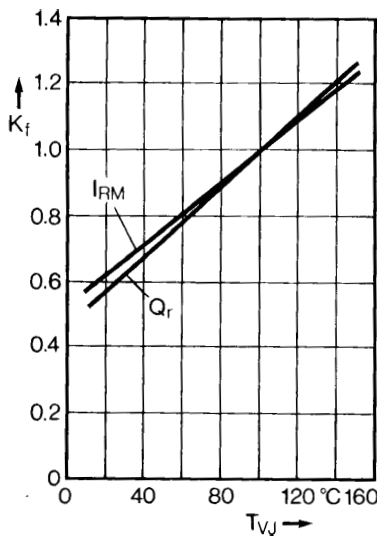


Fig. 4 Dynamic parameters versus junction temperature.

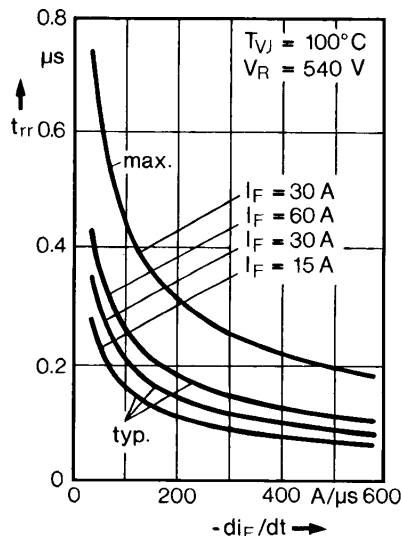


Fig. 5 Recovery time versus  $-di_F/dt$ .

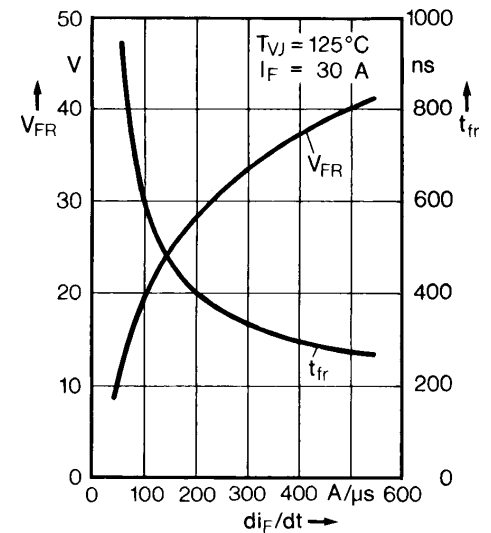


Fig. 6 Peak forward voltage versus  $-di_F/dt$ .

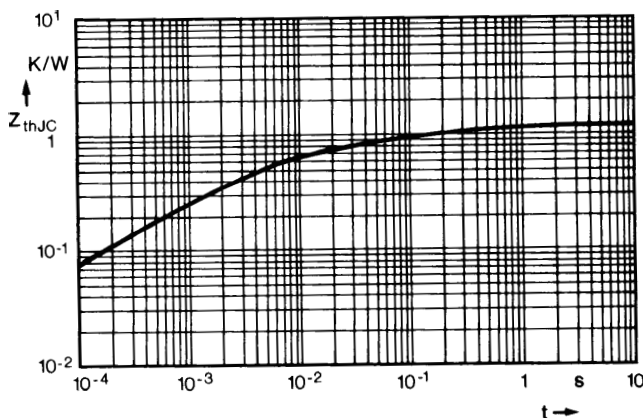
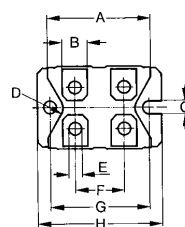
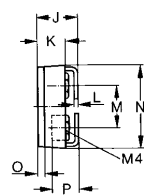


Fig. 7 Transient thermal impedance junction to case.



Dimensions  
miniBLOC SOT-227 B  
M4 screws (4x) supplied



| Dim. | Millimeter | Min. | Max.  | Inches | Min. | Max. |
|------|------------|------|-------|--------|------|------|
| A    | 31.5       | 31.7 | 1.241 | 1.249  |      |      |
| B    | 7.8        | 8.2  | 0.307 | 0.323  |      |      |
| C    | 4.0        | -    | 0.158 | -      |      |      |
| D    | 4.1        | 4.3  | 0.162 | 0.169  |      |      |
| E    | 4.1        | 4.3  | 0.162 | 0.169  |      |      |
| F    | 14.9       | 15.1 | 0.587 | 0.595  |      |      |
| G    | 30.1       | 30.3 | 1.186 | 1.193  |      |      |
| H    | 38.0       | 38.2 | 1.497 | 1.505  |      |      |
| J    | 11.8       | 12.2 | 0.465 | 0.481  |      |      |
| K    | 8.9        | 9.1  | 0.351 | 0.359  |      |      |
| L    | 0.75       | 0.85 | 0.030 | 0.033  |      |      |
| M    | 12.6       | 12.8 | 0.496 | 0.504  |      |      |
| N    | 25.2       | 25.4 | 0.993 | 1.001  |      |      |
| O    | 1.95       | 2.05 | 0.077 | 0.081  |      |      |
| P    | -          | 5.0  | -     | 0.197  |      |      |