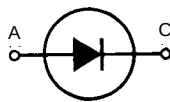


# Fast Recovery Epitaxial Diode (FRED)

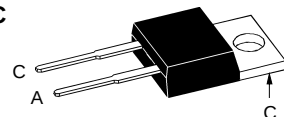
**DSEI 12**

**$I_{FAVM} = 11\text{ A}$**   
 **$V_{RRM} = 1200\text{ V}$**   
 **$t_{rr} = 50\text{ ns}$**

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



**TO-220 AC**



A = Anode, C = Cathode

| Symbol       | Test Conditions                                                               | Maximum Ratings |                      |
|--------------|-------------------------------------------------------------------------------|-----------------|----------------------|
| $I_{FRMS}$   | $T_{VJ} = T_{VJM}$                                                            | 25              | A                    |
| $I_{FAVM}$ ① | $T_C = 100^\circ\text{C}$ ; rectangular, $d = 0.5$                            | 11              | A                    |
| $I_{FRM}$    | $t_p < 10\text{ }\mu\text{s}$ ; rep. rating, pulse width limited by $T_{VJM}$ | 150             | A                    |
| $I_{FSM}$    | $T_{VJ} = 45^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine                | 75              | A                    |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 80              | A                    |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine               | 65              | A                    |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 70              | A                    |
| $I^2t$       | $T_{VJ} = 45^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine                | 28              | $\text{A}^2\text{s}$ |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 27              | $\text{A}^2\text{s}$ |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine               | 21              | $\text{A}^2\text{s}$ |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 20              | $\text{A}^2\text{s}$ |
| $T_{VJ}$     |                                                                               | -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                                                               | 0.4...0.6       | Nm                   |
| Weight       |                                                                               | 2               | g                    |

## Features

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

## Applications

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

## Advantages

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

| Symbol     | Test Conditions                                                                                                                                       | Characteristic Values |                       |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|
|            |                                                                                                                                                       | typ.                  | max.                  |
| $I_R$      | $T_{VJ} = 25^\circ\text{C}$                                                                                                                           |                       | 250 $\mu\text{A}$     |
|            | $T_{VJ} = 25^\circ\text{C}$                                                                                                                           |                       | 150 $\mu\text{A}$     |
|            | $T_{VJ} = 125^\circ\text{C}$                                                                                                                          |                       | 4 mA                  |
| $V_F$      | $I_F = 12\text{ A}$ ; $T_{VJ} = 150^\circ\text{C}$                                                                                                    |                       | 2.2 V                 |
|            | $T_{VJ} = 25^\circ\text{C}$                                                                                                                           |                       | 2.6 V                 |
| $V_{T0}$   | For power-loss calculations only                                                                                                                      |                       | 1.65 V                |
| $r_T$      | $T_{VJ} = T_{VJM}$                                                                                                                                    |                       | 46.2 $\text{m}\Omega$ |
| $R_{thJC}$ | 0.5                                                                                                                                                   |                       | 1.6 K/W               |
| $R_{thCK}$ |                                                                                                                                                       |                       | K/W                   |
| $R_{thJA}$ |                                                                                                                                                       |                       | 60 K/W                |
| $t_{rr}$   | $I_F = 1\text{ A}$ ; $-di/dt = 50\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$ ; $T_{VJ} = 25^\circ\text{C}$                                           | 50                    | 70 ns                 |
| $I_{RM}$   | $V_R = 540\text{ V}$ ; $I_F = 12\text{ A}$ ; $-di_F/dt = 100\text{ A}/\mu\text{s}$<br>$L \leq 0.05\text{ }\mu\text{H}$ ; $T_{VJ} = 100^\circ\text{C}$ | 6.5                   | 7.2 A                 |

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 IEC 60747

IXYS reserves the right to change limits, test conditions and dimensions

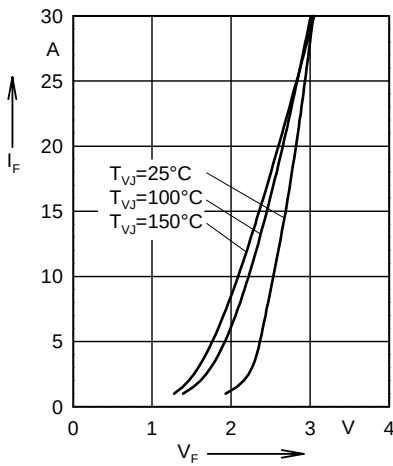


Fig. 1 Forward current versus voltage drop.

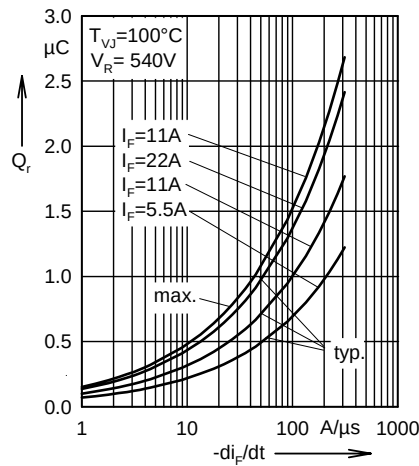


Fig. 2 Recovery charge versus  $-di_F/dt$ .

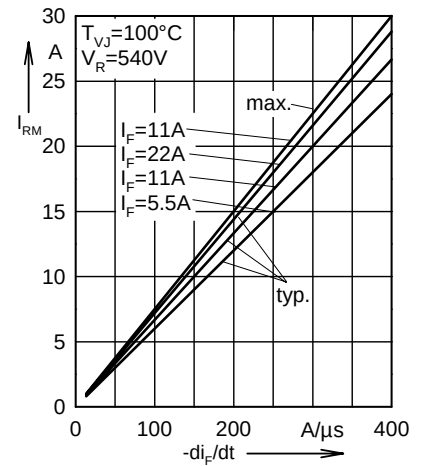


Fig. 3 Peak reverse current versus  $-di_F/dt$ .

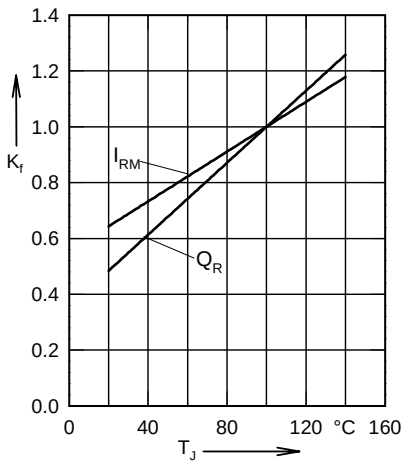


Fig. 4 Dynamic parameters versus junction temperature.

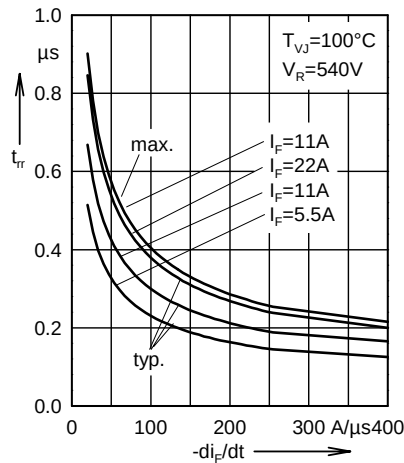


Fig. 5 Recovery time versus  $-di_F/dt$ .

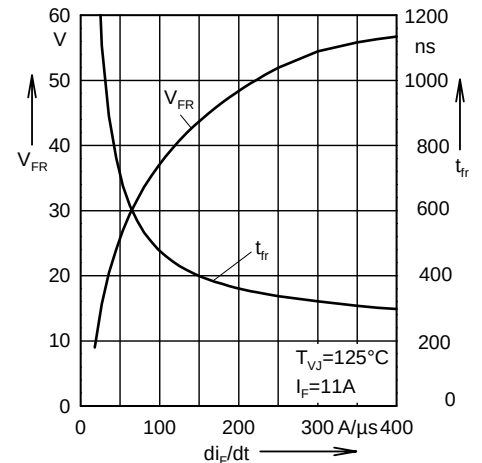


Fig. 6 Peak forward voltage versus  $di_F/dt$ .

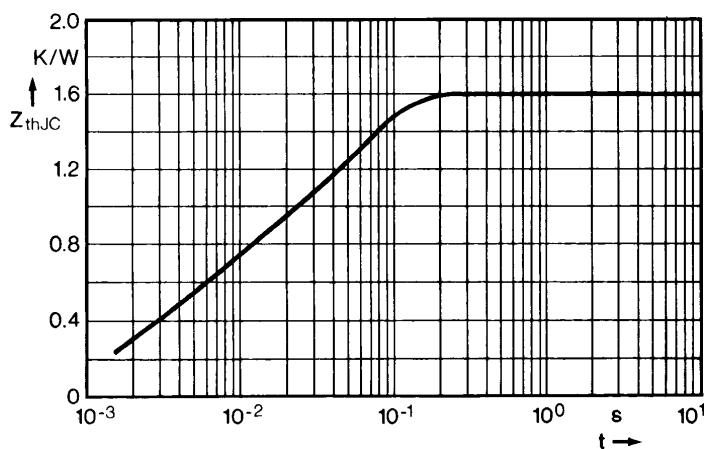
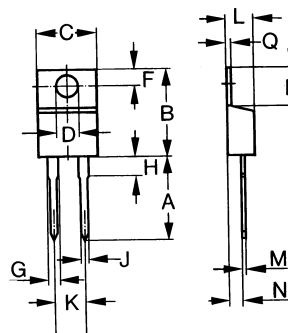


Fig. 7 Transient thermal impedance junction to case.

### Dimensions



| Dim. | Millimeter<br>Min. Max. | Inches<br>Min. Max. |
|------|-------------------------|---------------------|
| A    | 12.70 14.73             | 0.500 0.580         |
| B    | 14.23 16.51             | 0.560 0.650         |
| C    | 9.66 10.66              | 0.380 0.420         |
| D    | 3.54 4.08               | 0.139 0.161         |
| E    | 5.85 6.85               | 0.230 0.420         |
| F    | 2.54 3.42               | 0.100 0.135         |
| G    | 1.15 1.77               | 0.045 0.070         |
| H    | - 6.35                  | - 0.250             |
| J    | 0.64 0.89               | 0.025 0.035         |
| K    | 4.83 5.33               | 0.190 0.210         |
| L    | 3.56 4.82               | 0.140 0.190         |
| M    | 0.38 0.56               | 0.015 0.022         |
| N    | 2.04 2.49               | 0.080 0.115         |
| Q    | 0.64 1.39               | 0.025 0.055         |