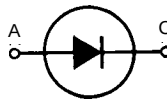


# Fast Recovery Epitaxial Diode (FRED)

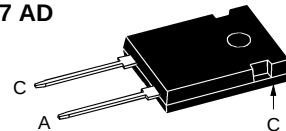
**DSEI 60**

**$I_{FAVM} = 60\text{ A}$**   
 **$V_{RRM} = 600\text{ V}$**   
 **$t_{rr} = 35\text{ ns}$**

| $V_{RSM}$ | $V_{RRM}$ | Type        |
|-----------|-----------|-------------|
| V         | V         |             |
| 600       | 600       | DSEI 60-06A |



**TO-247 AD**



A = Anode, C = Cathode

| Symbol       | Test Conditions                                                               | Maximum Ratings |                      |
|--------------|-------------------------------------------------------------------------------|-----------------|----------------------|
| $I_{FRMS}$   | $T_{VJ} = T_{VJM}$                                                            | 100             | A                    |
| $I_{FAVM}$ ① | $T_C = 70^\circ\text{C}$ ; rectangular, $d = 0.5$                             | 60              | A                    |
| $I_{FRM}$    | $t_p < 10\text{ }\mu\text{s}$ ; rep. rating, pulse width limited by $T_{VJM}$ | 800             | A                    |
| $I_{FSM}$    | $T_{VJ} = 45^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine                | 550             | A                    |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 600             | A                    |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine               | 480             | A                    |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 520             | A                    |
| $I^2t$       | $T_{VJ} = 45^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine                | 1510            | $\text{A}^2\text{s}$ |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 1490            | $\text{A}^2\text{s}$ |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10\text{ ms}$ (50 Hz), sine               | 1150            | $\text{A}^2\text{s}$ |
|              | $t = 8.3\text{ ms}$ (60 Hz), sine                                             | 1120            | $\text{A}^2\text{s}$ |
| $T_{VJ}$     |                                                                               | -40...+150      | $^\circ\text{C}$     |
| $T_{VJM}$    |                                                                               | 150             | $^\circ\text{C}$     |
| $T_{stg}$    |                                                                               | -40...+150      | $^\circ\text{C}$     |
| $P_{tot}$    | $T_C = 25^\circ\text{C}$                                                      | 166             | W                    |
| $M_d$        | Mounting torque                                                               | 0.8...1.2       | Nm                   |
| Weight       |                                                                               | 6               | g                    |

## Features

- International standard package JEDEC TO-247 AD
- 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.                 |
| $I_R$      | $T_{VJ} = 25^\circ\text{C}$                                                                                                                           | $V_R = V_{RRM}$           | 200 $\mu\text{A}$    |
|            | $T_{VJ} = 25^\circ\text{C}$                                                                                                                           | $V_R = 0.8 \cdot V_{RRM}$ | 100 $\mu\text{A}$    |
|            | $T_{VJ} = 125^\circ\text{C}$                                                                                                                          | $V_R = 0.8 \cdot V_{RRM}$ | 14 mA                |
| $V_F$      | $I_F = 70\text{ A}$ ; $T_{VJ} = 150^\circ\text{C}$                                                                                                    |                           | 1.5 V                |
|            | $T_{VJ} = 25^\circ\text{C}$                                                                                                                           |                           | 1.8 V                |
| $V_{T0}$   | For power-loss calculations only                                                                                                                      |                           | 1.13 V               |
| $r_T$      | $T_{VJ} = T_{VJM}$                                                                                                                                    |                           | 4.7 $\text{m}\Omega$ |
| $R_{thJC}$ | 0.25                                                                                                                                                  |                           | 0.75 K/W             |
| $R_{thCK}$ |                                                                                                                                                       |                           | K/W                  |
| $R_{thJA}$ |                                                                                                                                                       |                           | 35 K/W               |
| $t_{rr}$   | $I_F = 1\text{ A}$ ; $-di/dt = 200\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$ ; $T_{VJ} = 25^\circ\text{C}$                                          | 35                        | 50 ns                |
| $I_{RM}$   | $V_R = 350\text{ V}$ ; $I_F = 60\text{ A}$ ; $-di_F/dt = 480\text{ A}/\mu\text{s}$<br>$L \leq 0.05\text{ }\mu\text{H}$ ; $T_{VJ} = 100^\circ\text{C}$ | 19                        | 21 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

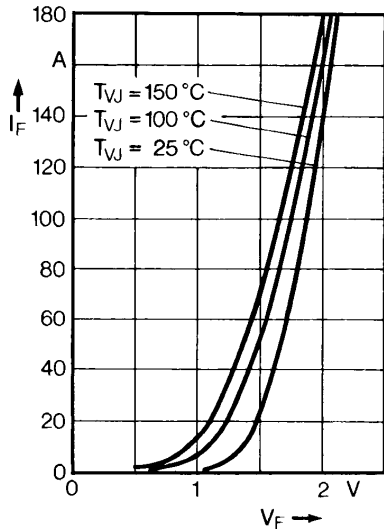


Fig. 1 Forward current versus voltage drop.

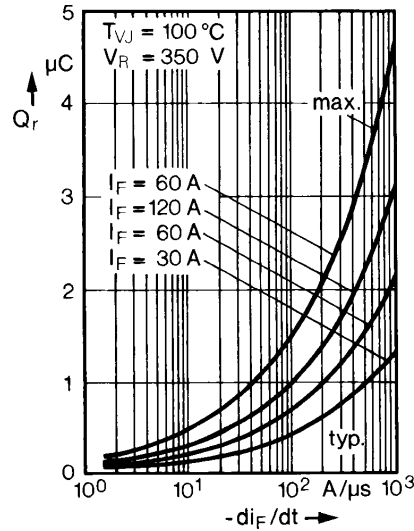


Fig. 2 Recovery charge versus  $-di_F/dt$ .

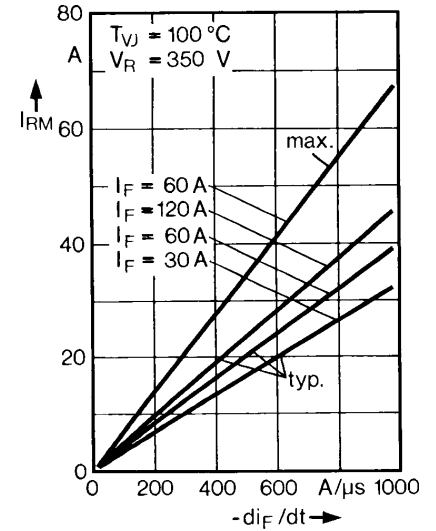


Fig. 3 Peak reverse current versus  $-di_F/dt$ .

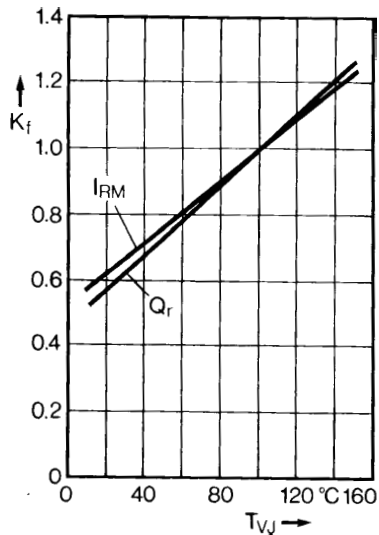


Fig. 4 Dynamic parameters versus junction temperature.

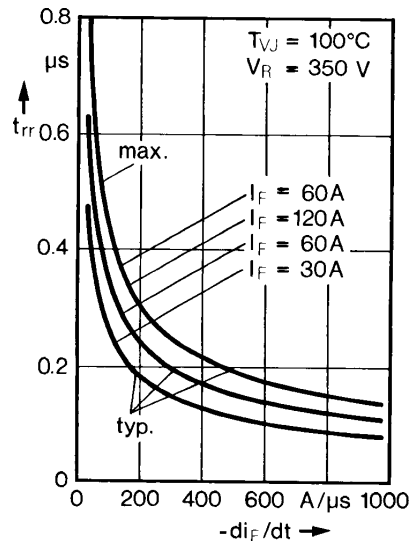


Fig. 5 Recovery time versus  $-di_F/dt$ .

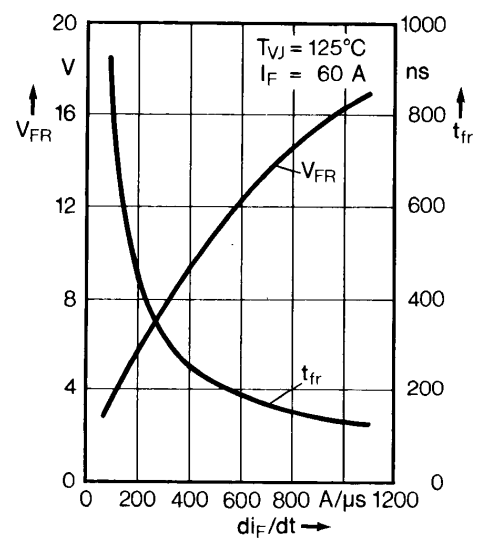


Fig. 6 Peak forward voltage versus  $di_F/dt$ .

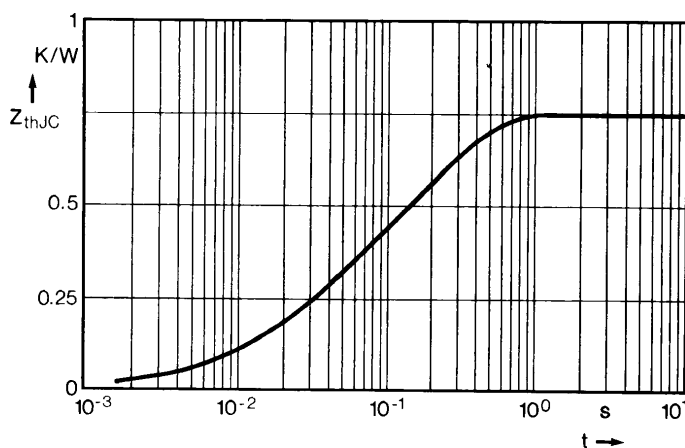
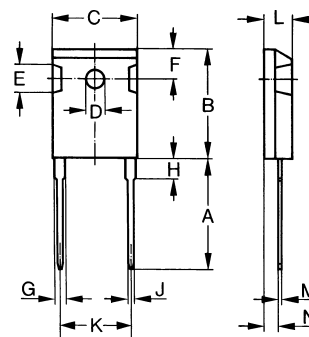


Fig. 7 Transient thermal impedance junction to case.

### Dimensions



| Dim. | Millimeter<br>Min. Max. | Inches<br>Min. Max. |
|------|-------------------------|---------------------|
| A    | 19.81 20.32             | 0.780 0.800         |
| B    | 20.80 21.46             | 0.819 0.845         |
| C    | 15.75 16.26             | 0.610 0.640         |
| D    | 3.55 3.65               | 0.140 0.144         |
| E    | 4.32 5.49               | 0.170 0.216         |
| F    | 5.4 6.2                 | 0.212 0.244         |
| G    | 1.65 2.13               | 0.065 0.084         |
| H    | - 4.5                   | - 0.177             |
| J    | 1.0 1.4                 | 0.040 0.055         |
| K    | 10.8 11.0               | 0.426 0.433         |
| L    | 4.7 5.3                 | 0.185 0.209         |
| M    | 0.4 0.8                 | 0.016 0.031         |
| N    | 2.2 2.54                | 0.087 0.102         |