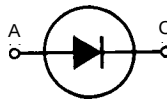


# Fast Recovery Epitaxial Diode (FRED)

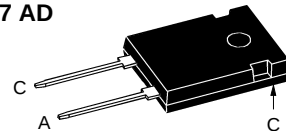
**DSEI 60**

**$I_{FAVM} = 52 \text{ A}$**   
 **$V_{RRM} = 1200 \text{ V}$**   
 **$t_{rr} = 40 \text{ ns}$**

| $V_{RSM}$ | $V_{RRM}$ | Type        |
|-----------|-----------|-------------|
| V         | V         |             |
| 1200      | 1200      | DSEI 60-12A |



**TO-247 AD**



A = Anode, C = Cathode

| Symbol       | Test Conditions                                                        | Maximum Ratings |                      |
|--------------|------------------------------------------------------------------------|-----------------|----------------------|
| $I_{FRMS}$   | $T_{VJ} = T_{VJM}$                                                     | 100             | A                    |
| $I_{FAVM}$ ① | $T_C = 60^\circ\text{C}$ ; rectangular, $d = 0.5$                      | 52              | A                    |
| $I_{FRM}$    | $t_p < 10 \mu\text{s}$ ; 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        | 500             | A                    |
|              | $t = 8.3 \text{ ms}$ (60 Hz), sine                                     | 540             | A                    |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10 \text{ ms}$ (50 Hz), sine       | 450             | A                    |
|              | $t = 8.3 \text{ ms}$ (60 Hz), sine                                     | 480             | A                    |
| $I^2t$       | $T_{VJ} = 45^\circ\text{C}$ ; $t = 10 \text{ ms}$ (50 Hz), sine        | 1250            | $\text{A}^2\text{s}$ |
|              | $t = 8.3 \text{ ms}$ (60 Hz), sine                                     | 1200            | $\text{A}^2\text{s}$ |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10 \text{ ms}$ (50 Hz), sine       | 1000            | $\text{A}^2\text{s}$ |
|              | $t = 8.3 \text{ ms}$ (60 Hz), sine                                     | 950             | $\text{A}^2\text{s}$ |
| $T_{VJ}$     |                                                                        | -40...+150      | $^\circ\text{C}$     |
| $T_{VJM}$    |                                                                        | 150             | $^\circ\text{C}$     |
| $T_{stg}$    |                                                                        | -40...+150      | $^\circ\text{C}$     |
| $P_{tot}$    | $T_C = 25^\circ\text{C}$                                               | 189             | 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.     |
| $I_R$      | $T_{VJ} = 25^\circ\text{C}$                                                                                                                       | $V_R = V_{RRM}$           | 2.2 mA   |
|            | $T_{VJ} = 25^\circ\text{C}$                                                                                                                       | $V_R = 0.8 \cdot V_{RRM}$ | 0.5 mA   |
|            | $T_{VJ} = 125^\circ\text{C}$                                                                                                                      | $V_R = 0.8 \cdot V_{RRM}$ | 14 mA    |
| $V_F$      | $I_F = 60 \text{ A}$ ; $T_{VJ} = 150^\circ\text{C}$                                                                                               |                           | 2.0 V    |
|            | $T_{VJ} = 25^\circ\text{C}$                                                                                                                       |                           | 2.55 V   |
| $V_{T0}$   | For power-loss calculations only                                                                                                                  |                           | 1.65 V   |
| $r_T$      | $T_{VJ} = T_{VJM}$                                                                                                                                |                           | 8.3 mΩ   |
| $R_{thJC}$ | 0.25                                                                                                                                              |                           | 0.66 K/W |
| $R_{thCK}$ |                                                                                                                                                   |                           | K/W      |
| $R_{thJA}$ |                                                                                                                                                   |                           | 35 K/W   |
| $t_{rr}$   | $I_F = 1 \text{ A}$ ; $-di/dt = 200 \text{ A}/\mu\text{s}$ ; $V_R = 30 \text{ V}$ ; $T_{VJ} = 25^\circ\text{C}$                                   | 40                        | 60 ns    |
| $I_{RM}$   | $V_R = 540 \text{ V}$ ; $I_F = 60 \text{ A}$ ; $-di_F/dt = 480 \text{ A}/\mu\text{s}$<br>$L \leq 0.05 \mu\text{H}$ ; $T_{VJ} = 100^\circ\text{C}$ | 32                        | 36 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

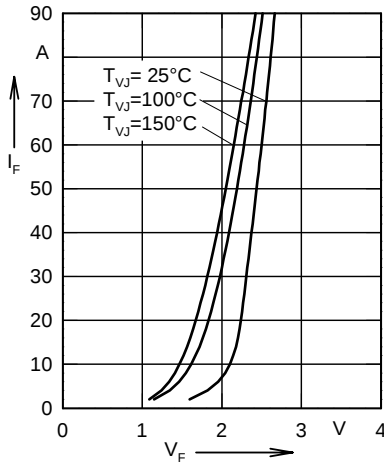


Fig. 1 Forward current versus voltage drop.

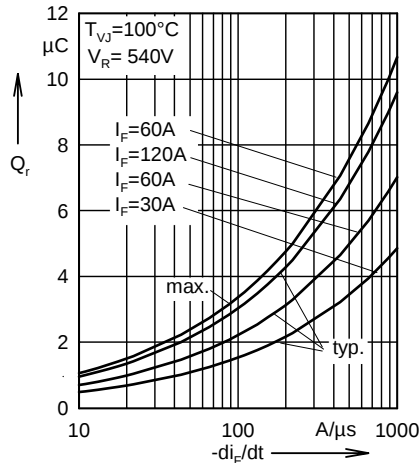


Fig. 2 Recovery charge versus  $-di_F/dt$ .

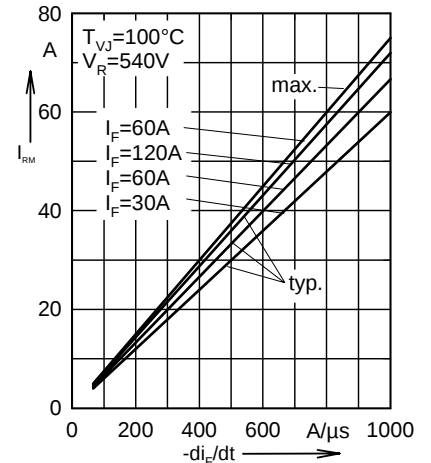


Fig. 3 Peak reverse current versus  $-di_F/dt$ .

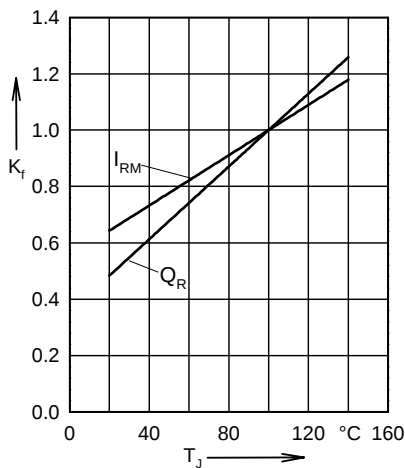


Fig. 4 Dynamic parameters versus junction temperature.

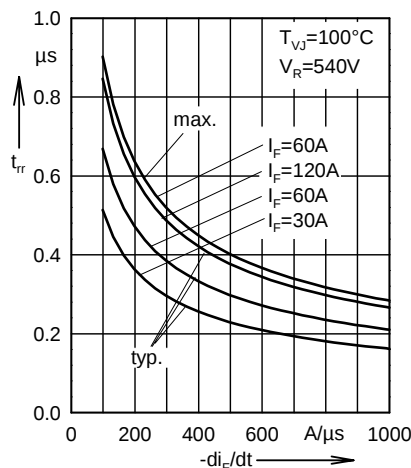


Fig. 5 Recovery time versus  $-di_F/dt$ .

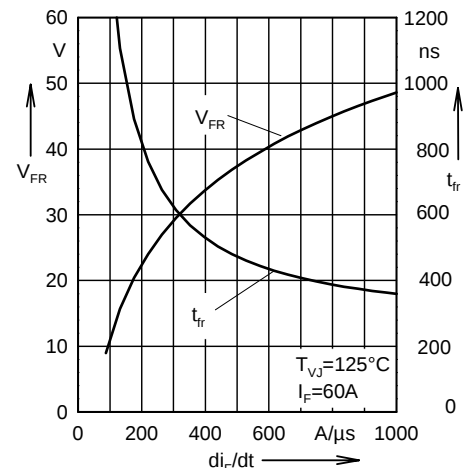


Fig. 6 Peak forward voltage versus  $di_F/dt$ .

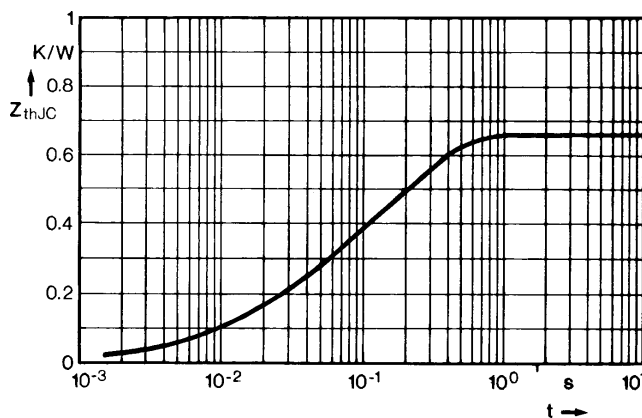
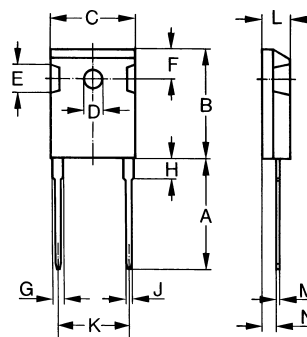


Fig. 7 Transient thermal impedance junction to case.

### Dimensions



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | 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 |

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