

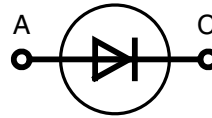
# Fast Recovery Epitaxial Diode (FRED)

$$I_{FAV} = 11 \text{ A}$$

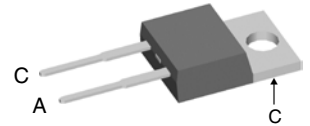
$$V_{RRM} = 1200 \text{ V}$$

$$t_{rr} = 50 \text{ ns}$$

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



TO-220 AC



A = Anode, C = Cathode

| Symbol       | 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                |
| $I_{FRM}$    | $t_p < 10 \mu\text{s}$ ; 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<br>$t = 8.3 \text{ ms}$ (60 Hz), sine  | 75              | A                |
|              |                                                                                                        | 80              | A                |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine | 65              | A                |
|              |                                                                                                        | 70              | A                |
| $I^2t$       | $T_{VJ} = 45^\circ\text{C}$ ; $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine  | 28              | A <sup>2</sup> s |
|              |                                                                                                        | 27              | A <sup>2</sup> s |
|              | $T_{VJ} = 150^\circ\text{C}$ ; $t = 10 \text{ ms}$ (50 Hz), sine<br>$t = 8.3 \text{ ms}$ (60 Hz), sine | 21              | A <sup>2</sup> s |
|              |                                                                                                        | 20              | A <sup>2</sup> s |
| $T_{VJ}$     |                                                                                                        | -40...+150      | °C               |
| $T_{VJM}$    |                                                                                                        | 150             | °C               |
| $T_{stg}$    |                                                                                                        | -40...+150      | °C               |
| $P_{tot}$    | $T_C = 25^\circ\text{C}$                                                                               | 78              | W                |
| $M_d$        | mounting torque                                                                                        | 0.4...0.6       | Nm               |
| Weight       | typical                                                                                                | 2               | g                |

| Symbol     | Conditions                                                                                                                                        | Characteristic Values |      |               |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|            |                                                                                                                                                   | typ.                  | max. |               |
| $I_R$      | $V_R = V_{RRM}$                                                                                                                                   |                       | 250  | $\mu\text{A}$ |
|            | $V_R = 0.8 \cdot V_{RRM}$                                                                                                                         |                       | 150  | $\mu\text{A}$ |
|            | $V_R = 0.8 \cdot V_{RRM}$                                                                                                                         |                       | 4    | mA            |
| $V_F$      | $I_F = 12 \text{ A}$                                                                                                                              |                       | 2.2  | V             |
|            |                                                                                                                                                   |                       | 2.6  | V             |
| $V_{T0}$   | For power-loss calculations only                                                                                                                  |                       | 1.65 | V             |
| $r_T$      | $T_{VJ} = T_{VJM}$                                                                                                                                |                       | 46.2 | m $\Omega$    |
| $R_{thJC}$ |                                                                                                                                                   | 0.5                   | 1.6  | K/W           |
| $R_{thCH}$ |                                                                                                                                                   |                       |      | 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>$L \leq 0.05 \mu\text{H}$ ; $T_{VJ} = 100^\circ\text{C}$ | 6.5                   | 7.2  | A             |

①  $I_{FAVM}$  rating includes reverse blocking losses at  $T_{VJM}$ .  $V_R = 0.8 \cdot V_{RRM}$ , duty cycle  $d = 0.5$   
Data according to IEC 60747

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

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## 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

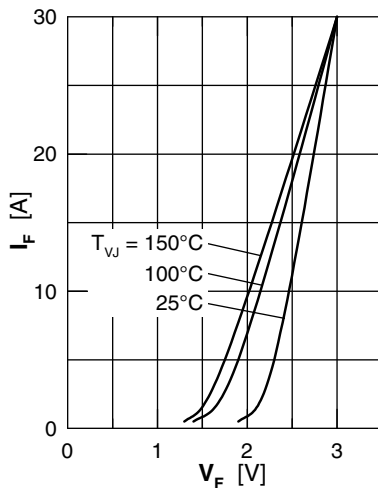


Fig. 1 Forward current versus voltage drop

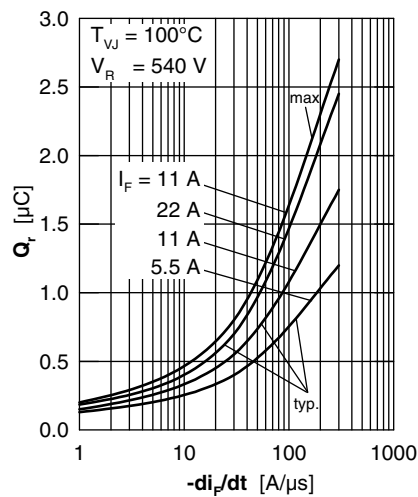


Fig. 2 Recovery charge versus  $-di_F/dt$

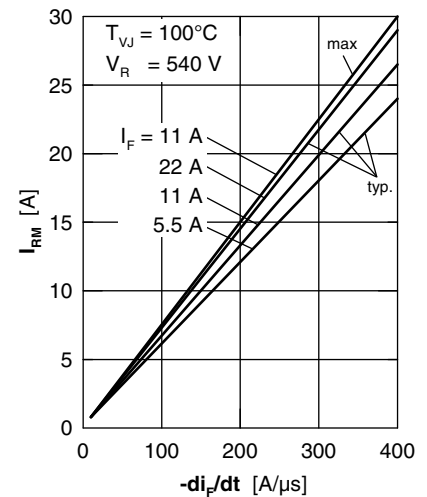


Fig. 3 Peak reverse current versus  $-di_F/dt$

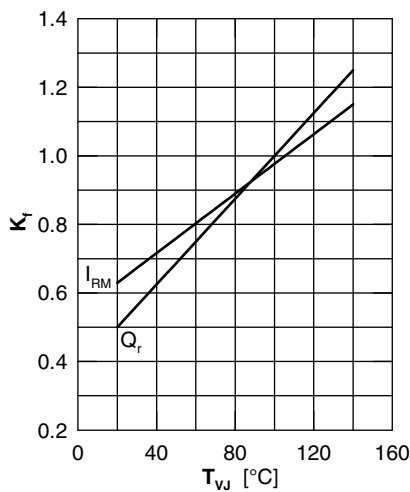


Fig. 4 Dynamic parameters versus junction temperature

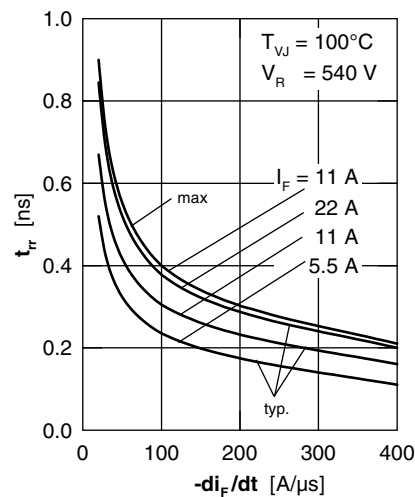


Fig. 5 Recovery time versus  $-di_F/dt$

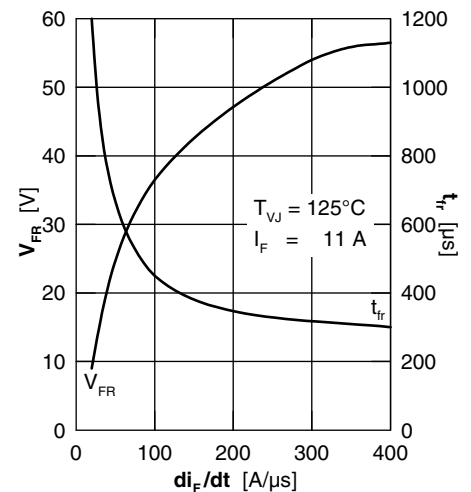


Fig. 6 Peak forward voltage versus  $di_F/dt$

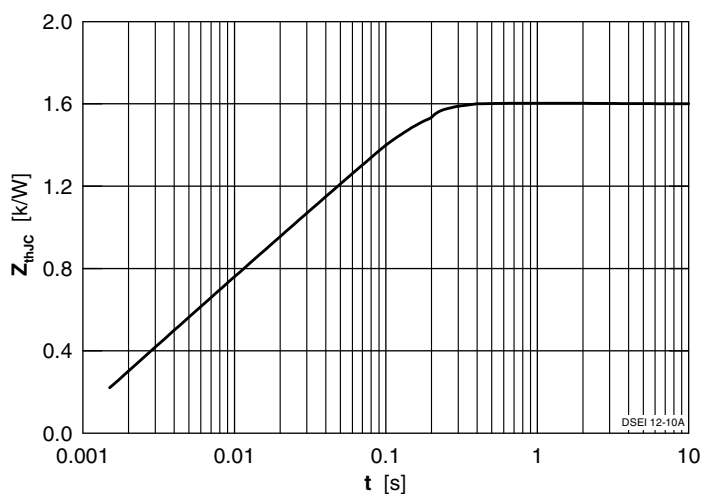


Fig. 7 Transient thermal resistance junction to case

Technical drawing of a mechanical part, showing front and side views with dimensions labeled A through Q.

**Front View Dimensions:**

- A:** Total height of the part.
- B:** Height of the main rectangular body.
- C:** Width of the top rectangular section.
- D:** Thickness of the top flange.
- E:** Height of the top flange.
- F:** Distance from the top edge of the flange to the center of the hole.
- G:** Diameter of the hole.
- H:** Height of the lower section.
- J:** Diameter of the lower section.
- K:** Thickness of the base flange.

**Side View Dimensions:**

- L:** Total width of the part.
- M:** Width of the base flange.
- N:** Distance from the front face to the start of the lower section.
- O:** Distance from the front face to the center of the hole.
- P:** Distance from the front face to the start of the top flange.
- Q:** Thickness of the top flange.

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 12.7       | 14.73 | 0.5    | 0.58  |
| B    | 14.23      | 16.51 | 0.56   | 0.65  |
| C    | 9.66       | 10.66 | 0.38   | 0.42  |
| D    | 3.54       | 4.08  | 0.139  | 0.161 |
| E    | 5.85       | 6.85  | 2.3    | 0.42  |
| F    | 2.54       | 3.42  | 0.1    | 0.135 |
| G    | 1.15       | 1.77  | 0.045  | 0.07  |
| H    | -          | 6.35  | -      | 0.25  |
| J    | 0.64       | 0.89  | 0.025  | 0.035 |
| K    | 4.83       | 5.33  | 0.19   | 0.21  |
| L    | 3.56       | 4.82  | 0.14   | 0.19  |
| M    | 0.51       | 0.76  | 0.02   | 0.03  |
| N    | 2.04       | 2.49  | 0.08   | 0.115 |
| Q    | 0.64       | 1.39  | 0.025  | 0.055 |