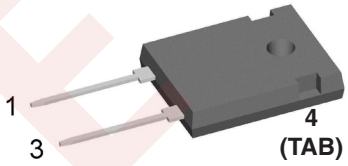
# Fast Recovery Epitaxial Diode (FRED)

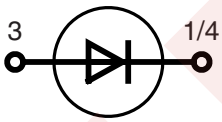
$I_{FAV}$ = 109 A
$V_{RRM}$ = 1200 V
$t_{rr}$ = 40 ns

**Part number**

DSEI 120-12A

**TO-247AD**




**Features / Advantages:**

- Planar passivated chips
- Low leakage current
- Very short recovery time
- Improved thermal behaviour
- Extremely low switching losses
- Low $I_{RM}$-values
- Soft recovery behaviour
- 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

**Applications:**

- Antiparallel diode for high frequency switching devices
- Antisaturation 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

**Package:** TO-247AD

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

**Disclaimer Notice**

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| Symbol | Conditions | Maximum Ratings | |
|---|---|---|---|
| $I_{FRMS}$ | $T_{VJ} = T_{VJM}$ | 100 | A |
| $I_{FAVM}$ ① | $T_C$ = 60°C; rectangular, d = 0.5 | 109 | A |
| $I_{FAV}$ ② | $T_C$ = 95°C; rectangular, d = 0.5 | 75 | A |
| $I_{FRM}$ | $t_P$ < 10 s; rep. rating, pulse width limited by $T_{VJM}$ | 1200 | A |
| $I_{FSM}$ | $T_{VJ}$ = 45°C; t = 10 ms (50 Hz), sine | 600 | A |
| | t = 8.3 ms (60 Hz), sine | 660 | A |
| | $T_{VJ}$ = 150°C; t = 10 ms (50 Hz), sine | 540 | A |
| | t = 8.3 ms (60 Hz), sine | 600 | A |
| $I^2t$ | $T_{VJ}$ = 45°C; t = 10 ms (50 Hz), sine | 1800 | $A^2s$ |
| | t = 8.3 ms (60 Hz), sine | 1800 | $A^2s$ |
| | $T_{VJ}$ = 150°C; t = 10 ms (50 Hz), sine | 1450 | $A^2s$ |
| | t = 8.3 ms (60 Hz), sine | 1500 | $A^2s$ |
| $P_{tot}$ | $T_C$ = 25°C | 357 | W |

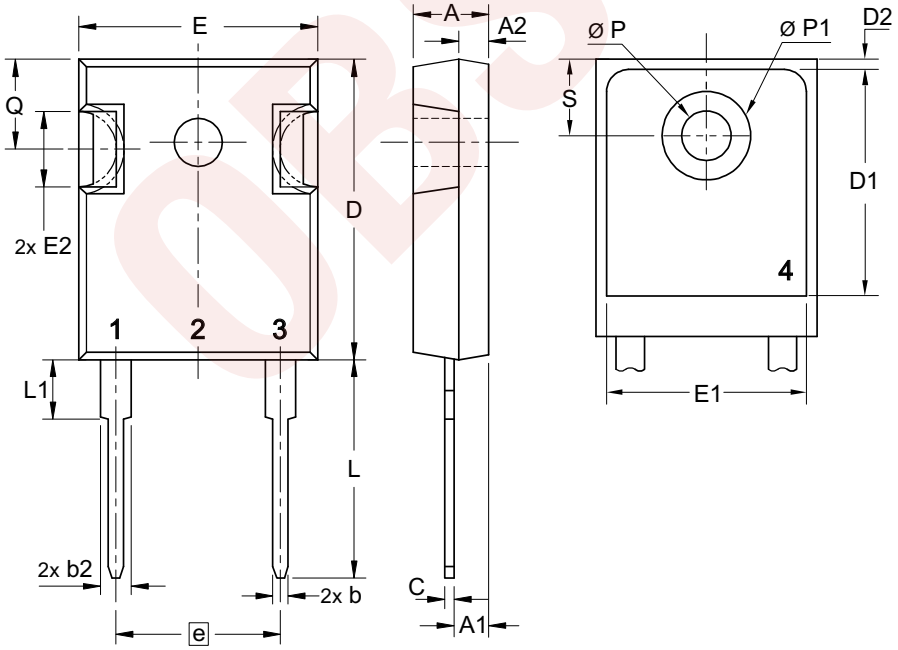
| Symbol | Conditions | Characteristic Values typ. | max. | |
|---|---|---|---|---|
| $I_R$ | $V_R = V_{RRM}$ $T_{VJ}$ = 25°C | | 3 | mA |
| | $V_R = 0.8 \cdot V_{RRM}$ $T_{VJ}$ = 25°C | | 1.5 | mA |
| | $V_R = 0.8 \cdot V_{RRM}$ $T_{VJ}$ = 125°C | | 20 | mA |
| $V_F$ | $I_F$ = 70 A $T_{VJ}$ = 150°C | | 1.55 | V |
| | $T_{VJ}$ = 25°C | | 1.80 | V |
| $V_{T0}$ | For power-loss calculations only | | 1.2 | V |
| $r_T$ | $T_{VJ} = T_{VJM}$ | | 4.6 | mΩ |
| $R_{thJC}$ | | | 0.35 | K/W |
| $R_{thCH}$ | | 0.25 | | K/W |
| $R_{thJA}$ | | | 35 | K/W |
| $t_{rr}$ | $I_F$ = 1 A; -di/dt = 200 A/µs; $V_R$ = 30 V; $T_{VJ}$ = 25°C | 40 | 60 | ns |
| $I_{RM}$ | $V_R$ = 350 V; $I_F$ = 75 A; $-di_F/dt$ = 200 A/µs; L ≤ 0.05 µH; $T_{VJ}$ = 100°C | 25 | 30 | A |

① Chip capability; ② limited to 70 A by leads

Data according to IEC 60747

**Outline Drawing TO-247AD**

Dimensions in mm (1 mm = 0.0394“)




| Sym. | Inches min. | Inches max. | Millimeter min. | Millimeter max. |
|---|---|---|---|---|
| A | 0.185 | 0.209 | 4.70 | 5.30 |
| A1 | 0.087 | 0.102 | 2.21 | 2.59 |
| A2 | 0.059 | 0.098 | 1.50 | 2.49 |
| D | 0.819 | 0.845 | 20.79 | 21.45 |
| E | 0.610 | 0.640 | 15.48 | 16.24 |
| E2 | 0.170 | 0.216 | 4.31 | 5.48 |
| e | 0.430 BSC | | 10.92 BSC | |
| L | 0.780 | 0.800 | 19.80 | 20.30 |
| L1 | - | 0.177 | - | 4.49 |
| Ø P | 0.140 | 0.144 | 3.55 | 3.65 |
| Q | 0.212 | 0.244 | 5.38 | 6.19 |
| S | 0.242 BSC | | 6.14 BSC | |
| b | 0.039 | 0.055 | 0.99 | 1.40 |
| b2 | 0.065 | 0.094 | 1.65 | 2.39 |
| b4 | 0.102 | 0.135 | 2.59 | 3.43 |
| c | 0.015 | 0.035 | 0.38 | 0.89 |
| D1 | 0.515 | - | 13.07 | - |
| D2 | 0.020 | 0.053 | 0.51 | 1.35 |
| E1 | 0.530 | - | 13.45 | - |
| Ø P1 | - | 0.29 | - | 7.39 |

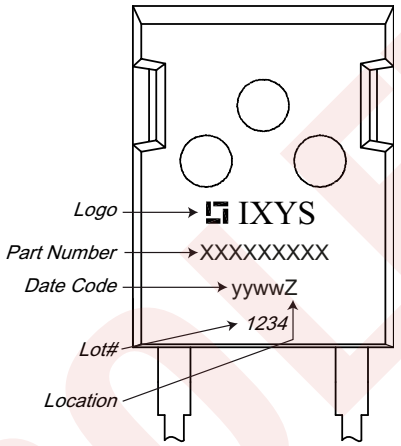
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| Package TO-247AD | | | Ratings | | | |
|---|---|---|---|---|---|---|
| Symbol | Definitions | Conditions | min. | typ. | max. | |
| $T_{VJ}$ | *virtual junction temperature* | | -40 | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | -40 | | 150 | °C |
| **Weight** | | | | 6 | | g |
| $M_D$ | *mounting torque* | | 0.8 | | 1.2 | Nm |

## Product Marking




| Ordering | Part Number | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|---|---|---|---|---|---|
| Standard | DSEI120-12A | DSEI120-12A | Tube | 30 | 467731 |

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## Curves

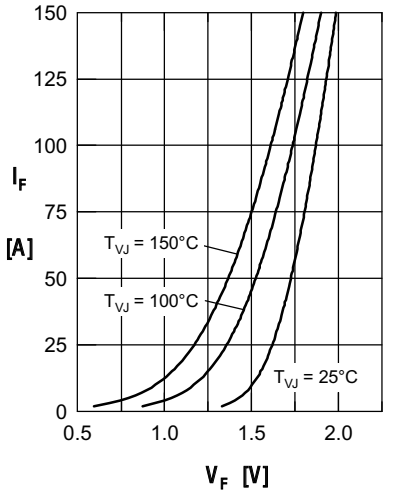



Fig. 1 Forward current $I_F$ vs. $V_F$

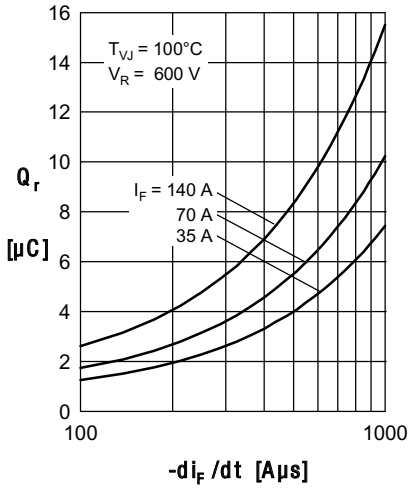



Fig. 2 Reverse recovery charge $Q_r$ versus $-di_F/dt$

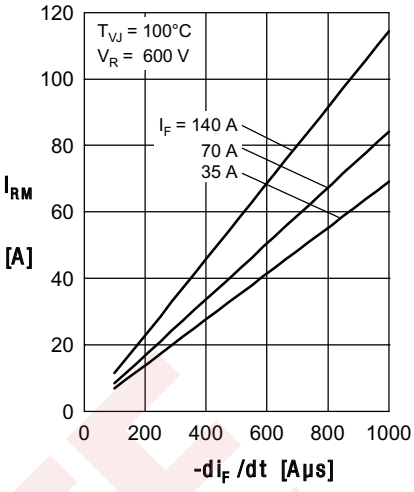



Fig. 3 Peak reverse current $I_{RM}$ versus $-di_F/dt$

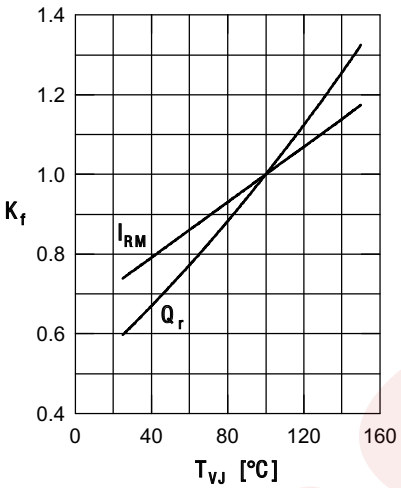



Fig. 4 Dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

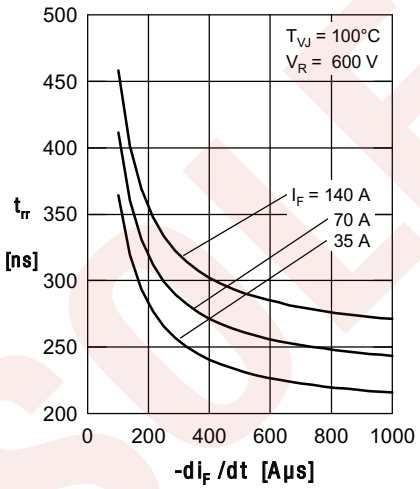



Fig. 5 Recovery time $t_{rr}$ versus $-di_F/dt$

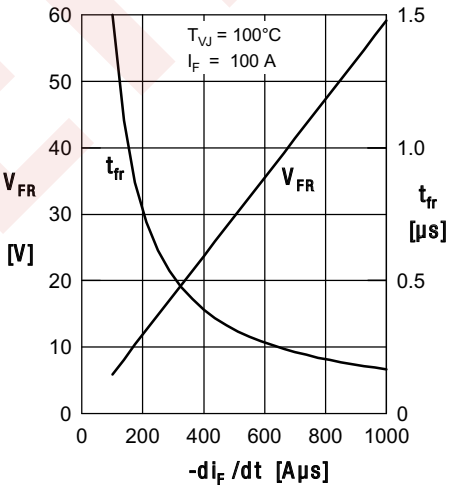



Fig. 6 Peak forward voltage $V_{FR}$ and $t_{fr}$ versus $-di_F/dt$

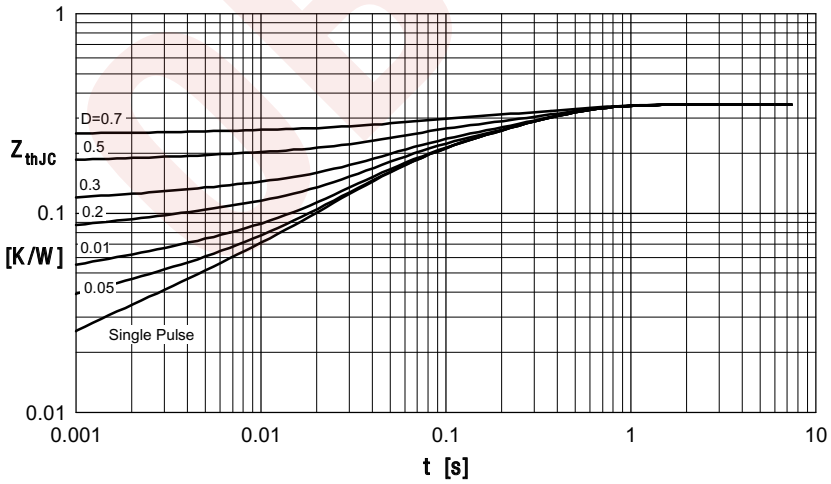



Fig. 7 Transient thermal resistance junction to case at various duty cycles

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.017 | 0.00038 |
| 2 | 0.0184 | 0.0026 |
| 3 | 0.1296 | 0.0387 |
| 4 | 0.185 | 0.274 |

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