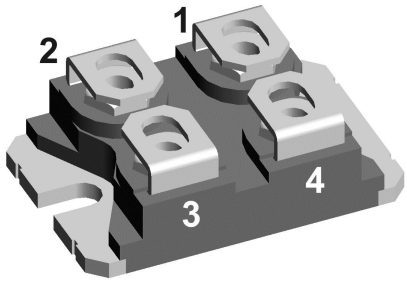
# HiPerFRED

$V_{RRM}$ = 400 V
$I_{FAV}$ = 2x 120 A
$t_{rr}$ = 30 ns

High Performance Fast Recovery Diode
Low Loss and Soft Recovery
Parallel legs

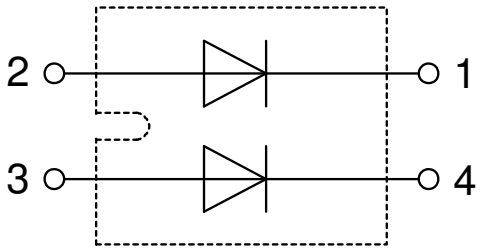
**Part number**

**DPF240X400NA**




Backside: isolated

E72873




**Features / Advantages:**

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low Irm-values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low Irm reduces:
  - Power dissipation within the diode
  - Turn-on loss in the commutating switch

**Applications:**

- Antiparallel diode for high frequency switching devices
- Antisaturation diode
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

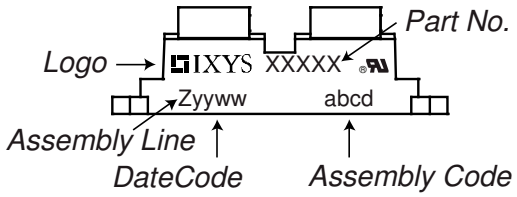
**Package:** SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

| Fast Diode | | | | Ratings | | | |
|---|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 400 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 400 | V |
| $I_R$ | *reverse current, drain current* | $V_R$ = 400 V | $T_{VJ}$ = 25°C | | | 10 | µA |
| | | $V_R$ = 400 V | $T_{VJ}$ = 150°C | | | 0.5 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 120 A | $T_{VJ}$ = 25°C | | | 1.25 | V |
| | | $I_F$ = 240 A | | | | 1.54 | V |
| | | $I_F$ = 120 A | $T_{VJ}$ = 150°C | | | 1.06 | V |
| | | $I_F$ = 240 A | | | | 1.42 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 70°C | $T_{VJ}$ = 150°C | | | 120 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 150°C | | | 0.71 | V |
| $r_F$ | *slope resistance* } | | | | | 2.9 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 0.5 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.10 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 250 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 1.20 | kA |
| $C_J$ | *junction capacitance* | $V_R$ = 200 V f = 1 MHz | $T_{VJ}$ = 25°C | | 187 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | | $T_{VJ}$ = 25 °C | | 7 | | A |
| | | $I_F$ = 120 A; V = 240 V | $T_{VJ}$ = 125 °C | | 18 | | A |
| $t_{rr}$ | *reverse recovery time* | $-d_F/dt$ = 200 A/µs | $T_{VJ}$ = 25 °C | | 30 | | ns |
| | | | $T_{VJ}$ = 125 °C | | 140 | | ns |

| Package SOT-227B (minibloc) | | | | | Ratings | | | |
|---|---|---|---|---|---|---|---|---|
| Symbol | Definition | Conditions | | | min. | typ. | max. | Unit |
| $I_{RMS}$ | *RMS current* | per terminal | | | | | 150 | A |
| $T_{VJ}$ | *virtual junction temperature* | | | | -40 | | 150 | °C |
| $T_{op}$ | *operation temperature* | | | | -40 | | 125 | °C |
| $T_{stg}$ | *storage temperature* | | | | -40 | | 150 | °C |
| **Weight** | | | | | | 30 | | g |
| $M_D$ | *mounting torque* | | | | 1.1 | | 1.5 | Nm |
| $M_T$ | *terminal torque* | | | | 1.1 | | 1.5 | Nm |
| $d_{Spp/App}$ | *creepage distance on surface \| striking distance through air* | | *terminal to terminal* | 10.5 | 3.2 | | | mm |
| $d_{Spb/Apb}$ | | | *terminal to backside* | 8.6 | 6.8 | | | mm |
| $V_{ISOL}$ | *isolation voltage* | t = 1 second | 50/60 Hz, RMS; $I_{ISOL}$ ≤ 1 mA | | 3000 | | | V |
| | | t = 1 minute | | | 2500 | | | V |

## Product Marking



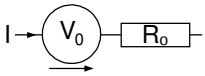

### Part description

D = Diode
P = HiPerFRED
F = ultra fast
240 = Current Rating [A]
X = Parallel legs
400 = Reverse Voltage [V]
NA = SOT-227B (minibloc)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DPF240X400NA | DPF240X400NA | Tube | 10 | 499554 |

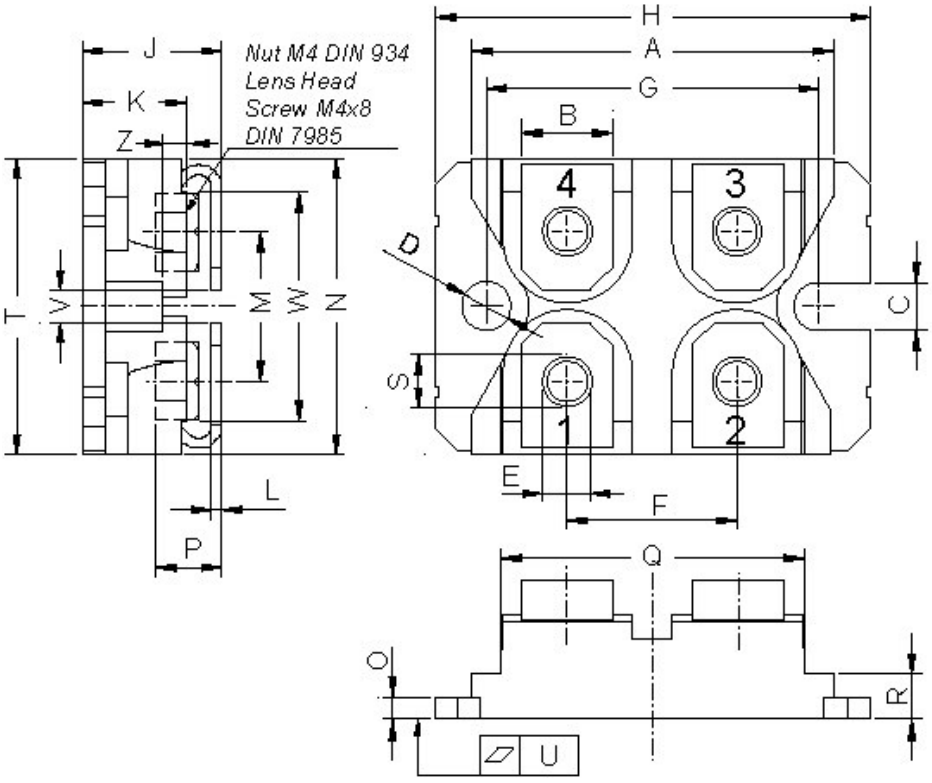
## Equivalent Circuits for Simulation

** on die level* $T_{VJ}$ = 150 °C

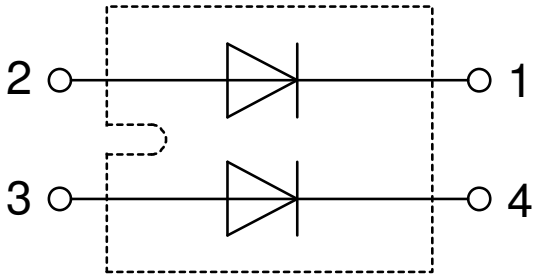



| | | Fast Diode | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0.71 | V |
| $R_{0\,max}$ | *slope resistance ** | 1.01 | mΩ |

## Outlines SOT-227B (minibloc)




| Dim. | Millimeter | | Inches | |
|---|---|---|---|---|
| | min | max | min | max |
| A | 31.50 | 31.88 | 1.240 | 1.255 |
| B | 7.80 | 8.20 | 0.307 | 0.323 |
| C | 4.09 | 4.29 | 0.161 | 0.169 |
| D | 4.09 | 4.29 | 0.161 | 0.169 |
| E | 4.09 | 4.29 | 0.161 | 0.169 |
| F | 14.91 | 15.11 | 0.587 | 0.595 |
| G | 30.12 | 30.30 | 1.186 | 1.193 |
| H | 37.80 | 38.23 | 1.488 | 1.505 |
| J | 11.68 | 12.22 | 0.460 | 0.481 |
| K | 8.92 | 9.60 | 0.351 | 0.378 |
| L | 0.74 | 0.84 | 0.029 | 0.033 |
| M | 12.50 | 13.10 | 0.492 | 0.516 |
| N | 25.15 | 25.42 | 0.990 | 1.001 |
| O | 1.95 | 2.13 | 0.077 | 0.084 |
| P | 4.95 | 6.20 | 0.195 | 0.244 |
| Q | 26.54 | 26.90 | 1.045 | 1.059 |
| R | 3.94 | 4.42 | 0.155 | 0.167 |
| S | 4.55 | 4.85 | 0.179 | 0.191 |
| T | 24.59 | 25.25 | 0.968 | 0.994 |
| U | -0.05 | 0.10 | -0.002 | 0.004 |
| V | 3.20 | 5.50 | 0.126 | 0.217 |
| W | 19.81 | 21.08 | 0.780 | 0.830 |
| Z | 2.50 | 2.70 | 0.098 | 0.106 |



## Fast Diode

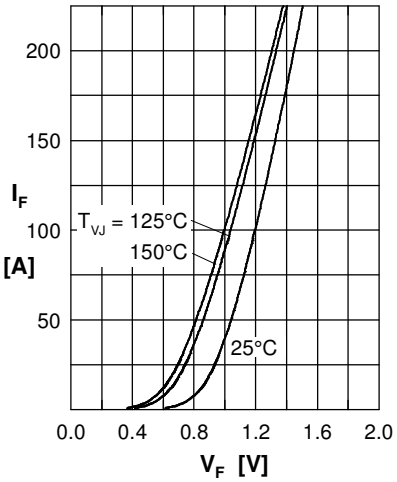



Fig. 1 Forward current $I_F$ vs. $V_F$

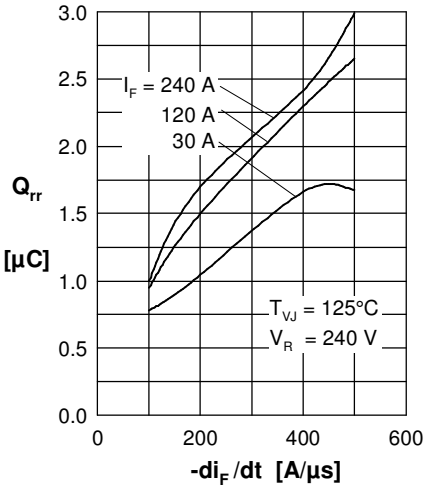



Fig. 2 Typ. reverse recovery charge $Q_{rr}$ vs. $-di_F/dt$

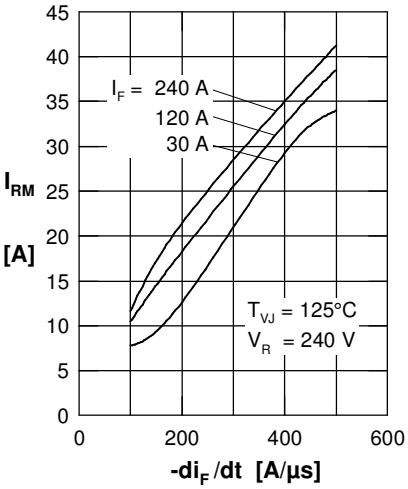



Fig. 3 Typ. reverse recovery current $I_{RM}$ vs. $-di_F/dt$

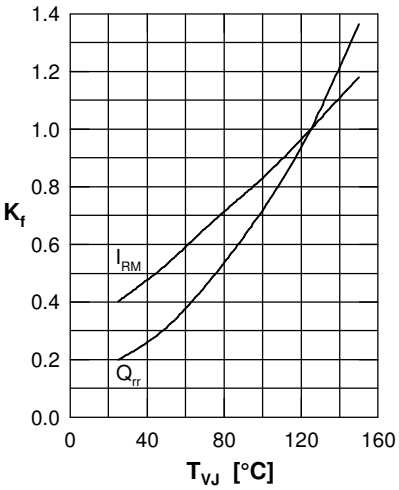



Fig. 4 Typ. dynamic parameters $Q_{rr}$, $I_{RM}$ vs. $T_{VJ}$

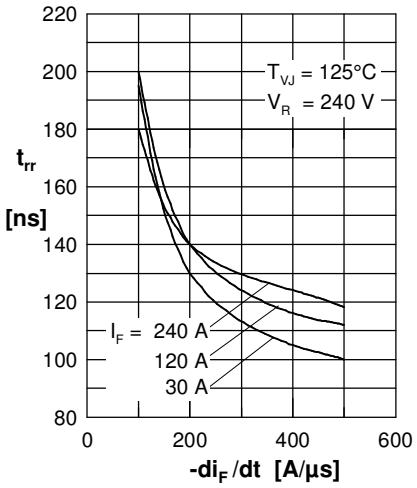



Fig. 5 Typ. reverse recovery time $t_{rr}$ vs. $-di_F/dt$

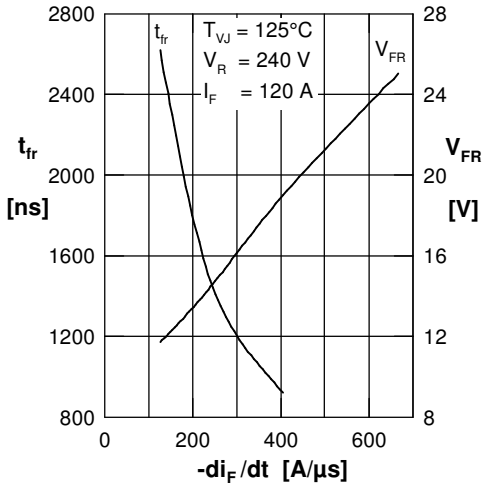



Fig. 6 Typ. forward recovery voltage $V_{FR}$ & $t_{fr}$ vs. $di_F/dt$

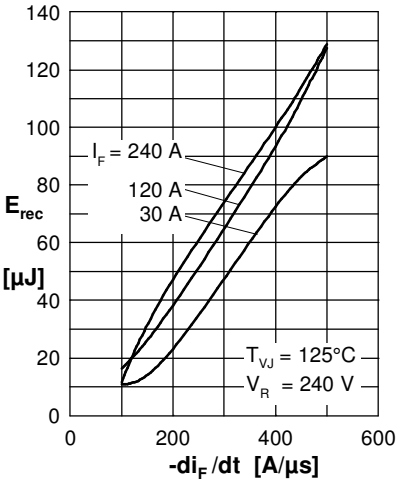



Fig. 7 Typ. recovery energy $E_{rec}$ vs. $-di_F/dt$

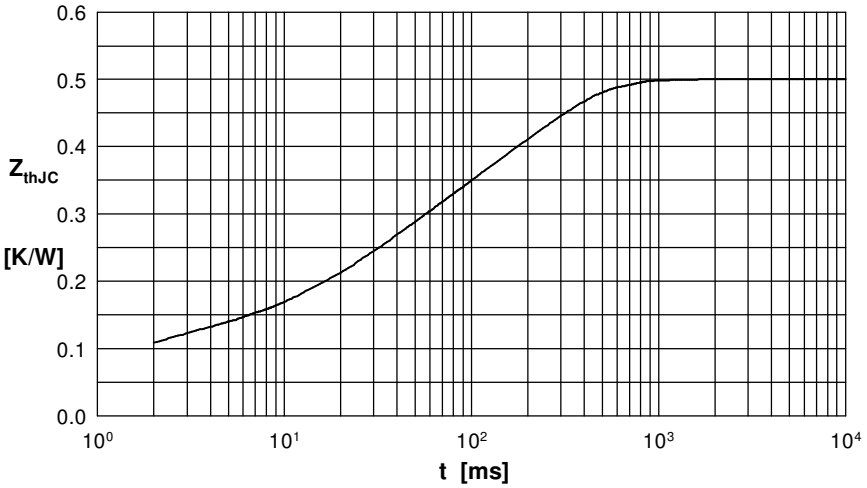



Fig. 8 Transient thermal impedance junction to case