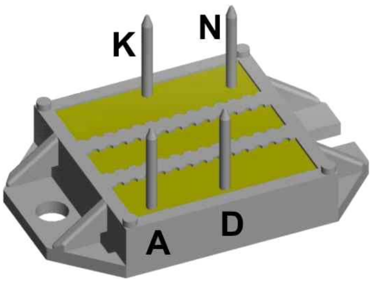
# HiPerFRED Module

$V_{RRM}$ = 1200 V
$I_{DAV}$ = 19 A
$t_{rr}$ = 40 ns

High Performance Fast Recovery Diode
Low Loss and Soft Recovery
1~ Rectifier Bridge

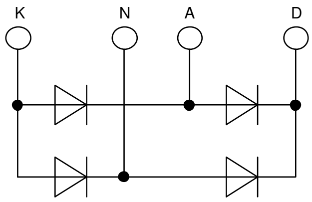
**Part number**

**VBE17-12NO7**




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:** ECO-PAC1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

**Disclaimer Notice**

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

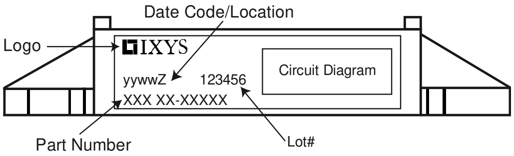
## Fast Diode

| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_R$ | *reverse current, drain current* | $V_R$ = 1200 V | $T_{VJ}$ = 25°C | | | 60 | µA |
| | | $V_R$ = 1200 V | $T_{VJ}$ = 125°C | | | 0.25 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 10 A | $T_{VJ}$ = 25°C | | | 2.92 | V |
| | | $I_F$ = 20 A | | | | 3.52 | V |
| | | $I_F$ = 10 A | $T_{VJ}$ = 150°C | | | 1.95 | V |
| | | $I_F$ = 20 A | | | | 2.52 | V |
| $I_{DAV}$ | *bridge output current* | $T_C$ = 85°C; rectangular d = 1.5 | $T_{VJ}$ = 150°C | | | 19 | A |
| $V_{F0}$ | *threshold voltage* | *for power loss calculation only* | $T_{VJ}$ = 150°C | | | 1.39 | V |
| $r_F$ | *slope resistance* | *for power loss calculation only* | | | | 55 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 2.5 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.30 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 50 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 40 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 600 V f = 1 MHz | $T_{VJ}$ = 25°C | | 3 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | $I_F$ = 10 A; $V_R$ = 600 V; $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 5 | | A |
| | | | $T_{VJ}$ = 100°C | | 8 | | A |
| $t_{rr}$ | *reverse recovery time* | $I_F$ = 10 A; $V_R$ = 600 V; $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 40 | | ns |
| | | | $T_{VJ}$ = 100°C | | 115 | | ns |

## Package ECO-PAC1

| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_{RMS}$ | *RMS current* | per terminal | | | | 100 | A |
| $T_{VJ}$ | *virtual junction temperature* | | | -40 | | 150 | °C |
| $T_{op}$ | *operation temperature* | | | -40 | | 125 | °C |
| $T_{stg}$ | *storage temperature* | | | -40 | | 125 | °C |
| **Weight** | | | | | 19 | | g |
| $M_D$ | *mounting torque* | | | 1.4 | | 2 | Nm |
| $d_{Spp/App}$ | *creepage distance on surface \| striking distance through air* | | *terminal to terminal* | 6.0 | | | mm |
| $d_{Spb/Apb}$ | | | *terminal to backside* | 10.0 | | | mm |
| $V_{ISOL}$ | *isolation voltage* | t = 1 second | 50/60 Hz, RMS; $I_{ISOL}$ ≤ 1 mA | 3600 | | | V |
| | | t = 1 minute | | 3000 | | | V |

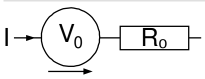
Ratings: min., typ., max.




| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | VBE17-12NO7 | VBE17-12NO7 | Box | 25 | 482773 |

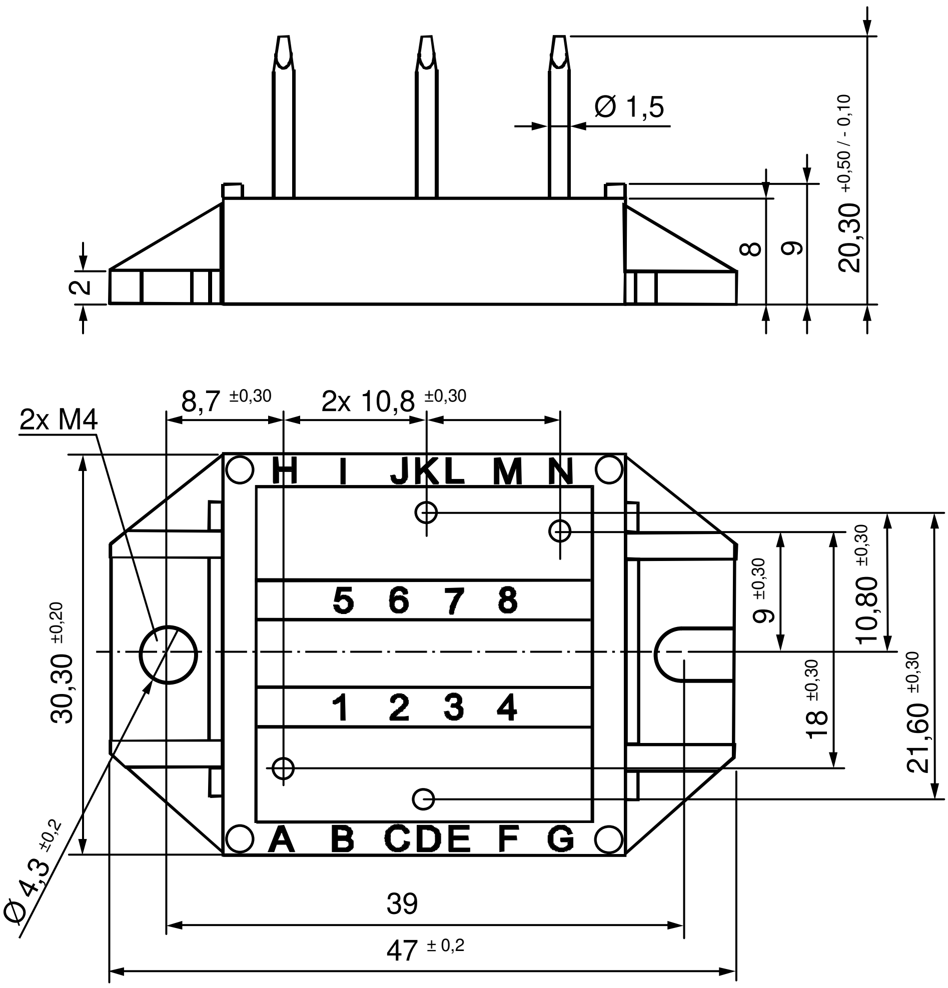
## Equivalent Circuits for Simulation

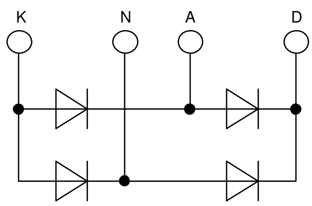
** on die level* $T_{VJ} = 150°C$




| | | Fast Diode | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 1.39 | V |
| $R_{0\,max}$ | *slope resistance ** | 53 | mΩ |

## Outlines ECO-PAC1



## Fast Diode

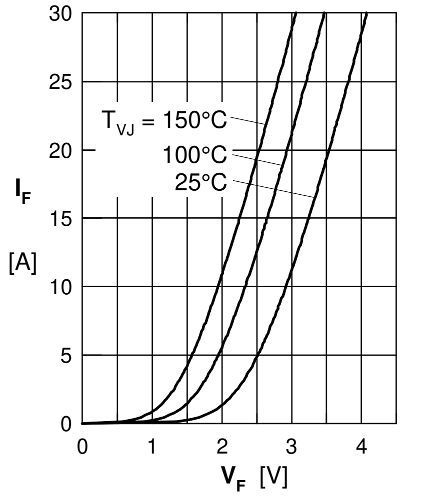



Fig. 1 Forward current $I_F$ vs. $V_F$

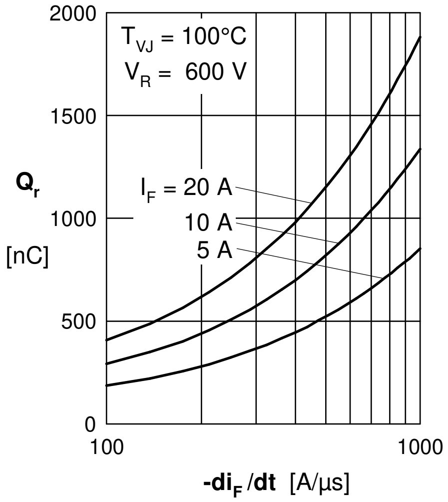



Fig. 2 Reverse recovery charge $Q_r$ versus $-di_F/dt$

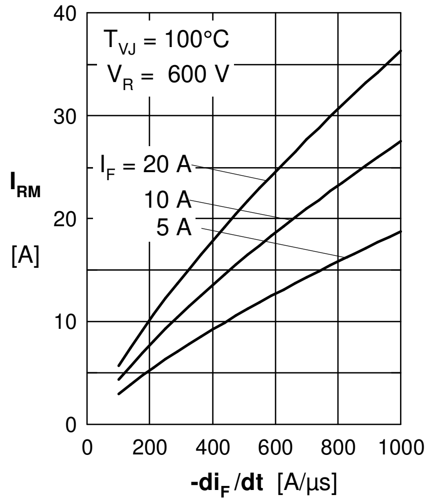



Fig. 3 Peak reverse current $I_{RM}$ versus $-di_F/dt$

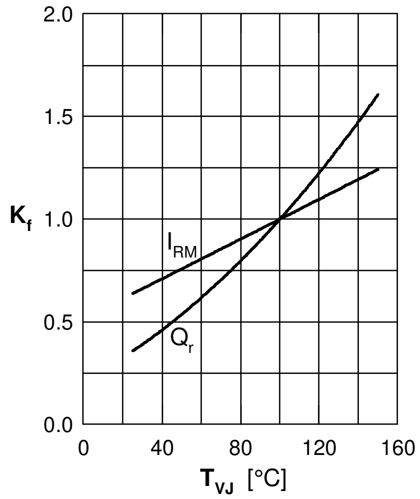



Fig. 4 Dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

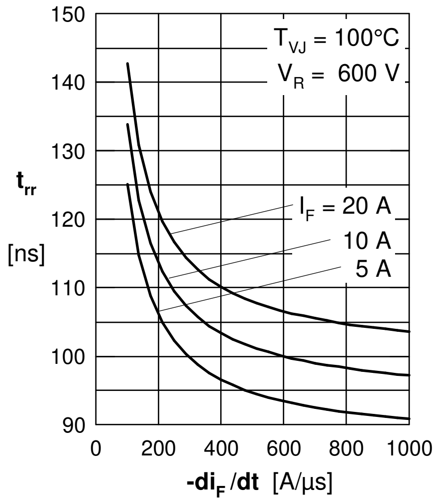



Fig. 5 Recovery time $t_{rr}$ vs. $-di_F/dt$

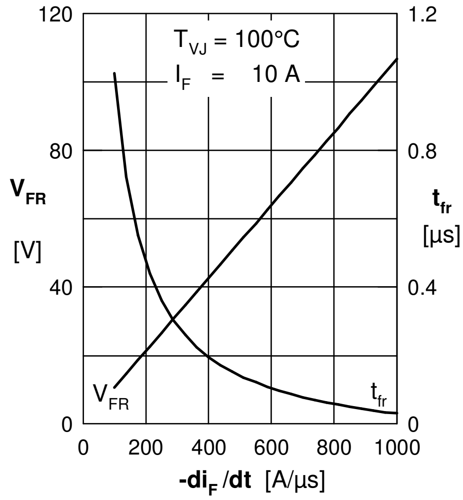



Fig. 6 Peak forward voltage $V_{FR}$ and $t_{fr}$ vs. $-di_F/dt$

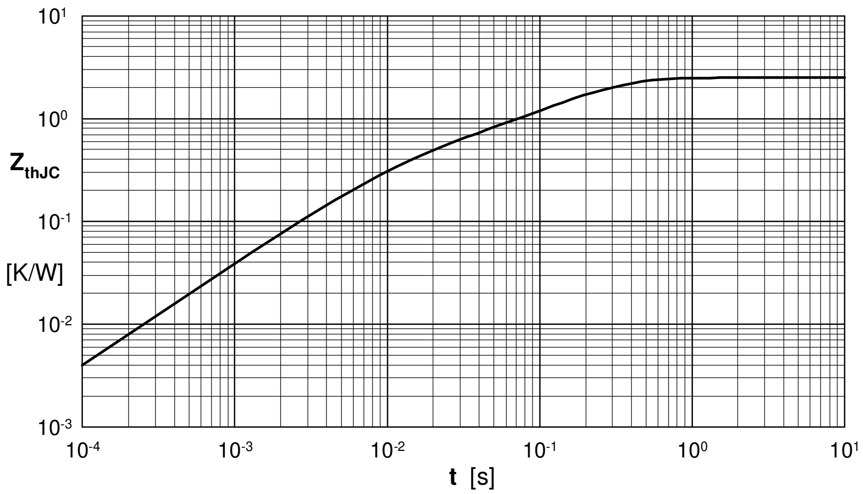



Fig. 7 Transient thermal resistance junction to case

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.8776 | 0.0052 |
| 2 | 0.3378 | 0.0003 |
| 3 | 0.0678 | 0.0004 |
| 4 | 1.2168 | 0.0092 |