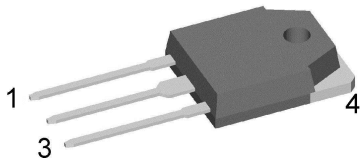
# HiPerFRED²

| | | |
|---|---|---|
| $V_{RRM}$ | = | 300 V |
| $I_{FAV}$ | = 2x | 60 A |
| $t_{rr}$ | = | 35 ns |

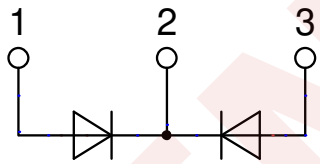
High Performance Fast Recovery Diode
Low Loss and Soft Recovery
Common Cathode

**Part number**

**DPG120C300QB**




Backside: cathode

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**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:** TO-3P

- Industry standard outline compatible with TO-247
- RoHS compliant
- Epoxy meets UL 94V-0

**Disclaimer Notice**

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## Fast Diode

| Symbol | Definition | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 300 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 300 | V |
| $I_R$ | *reverse current, drain current* | $V_R$ = 300 V | $T_{VJ}$ = 25°C | | | 1 | µA |
| | | $V_R$ = 300 V | $T_{VJ}$ = 150°C | | | 0.35 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 60 A | $T_{VJ}$ = 25°C | | | 1.40 | V |
| | | $I_F$ = 120 A | | | | 1.72 | V |
| | | $I_F$ = 60 A | $T_{VJ}$ = 125°C | | | 1.10 | V |
| | | $I_F$ = 120 A | | | | 1.45 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 130°C | $T_{VJ}$ = 175°C | | | 60 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 0.69 | V |
| $r_F$ | *slope resistance* } | | | | | 5.8 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 0.55 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.3 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 275 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 450 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 150 V f = 1 MHz | $T_{VJ}$ = 25°C | | 80 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | | $T_{VJ}$ = 25 °C | | 3.5 | | A |
| | | $I_F$ = 60 A; $V_R$ = 200 V | $T_{VJ}$ = 125 °C | | 9 | | A |
| $t_{rr}$ | *reverse recovery time* | $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25 °C | | 35 | | ns |
| | | | $T_{VJ}$ = 125 °C | | 65 | | ns |

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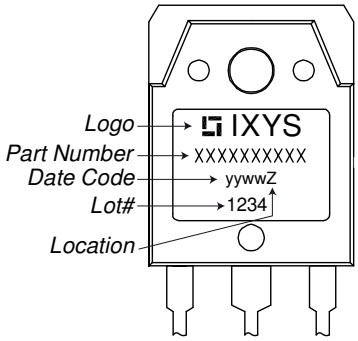
| Package TO-3P | | | Ratings | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal [1)] | | | 70 | A |
| $T_{VJ}$ | *virtual junction temperature* | | -55 | | 175 | °C |
| $T_{op}$ | *operation temperature* | | -55 | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | -55 | | 150 | °C |
| **Weight** | | | | 5 | | g |
| $M_D$ | *mounting torque* | | 0.8 | | 1.2 | Nm |
| $F_C$ | *mounting force with clip* | | 20 | | 120 | N |

Product Marking

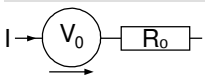



**Part description**

D = Diode
P = HiPerFRED
G = extreme fast
120 = Current Rating [A]
C = Common Cathode
300 = Reverse Voltage [V]
QB = TO-3P (3)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DPG120C300QB | DPG120C300QB | Tube | 30 | 503821 |

**Equivalent Circuits for Simulation** ** on die level* $T_{VJ}$ = 175°C




| | | Fast Diode | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0.69 | V |
| $R_{0\,max}$ | *slope resistance ** | 3.2 | mΩ |



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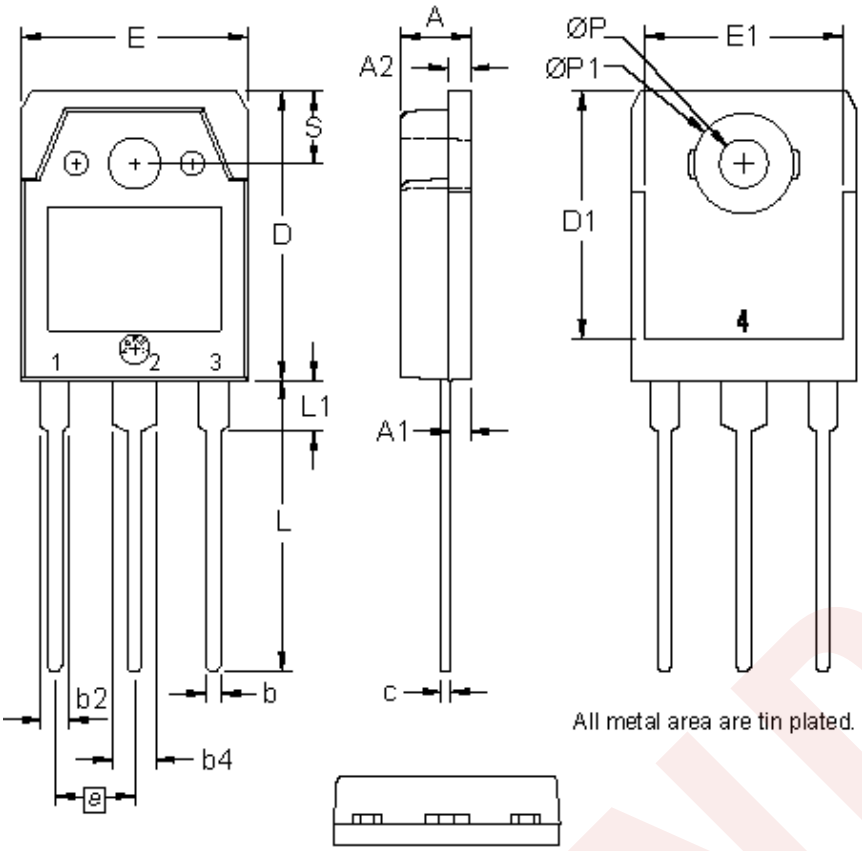
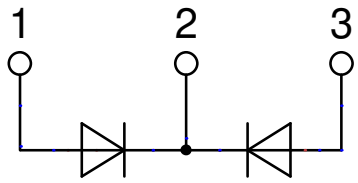
## Outlines TO-3P




| Dim. | Millimeter | | Inches | |
|---|---|---|---|---|
| | min | max | min | max |
| A | 4.70 | 4.90 | 0.185 | 0.193 |
| A1 | 1.30 | 1.50 | 0.051 | 0.059 |
| A2 | 1.45 | 1.65 | 0.057 | 0.065 |
| b | 0.90 | 1.15 | 0.035 | 0.045 |
| b2 | 1.90 | 2.20 | 0.075 | 0.087 |
| b4 | 2.90 | 3.20 | 0.114 | 0.126 |
| c | 0.55 | 0.80 | 0.022 | 0.031 |
| D | 19.80 | 20.10 | 0.780 | 0.791 |
| D1 | 16.90 | 17.20 | 0.665 | 0.677 |
| E | 15.50 | 15.80 | 0.610 | 0.622 |
| E1 | 13.50 | 13.70 | 0.531 | 0.539 |
| e | 5.45 BSC | | 0.215 BSC | |
| L | 19.80 | 20.20 | 0.780 | 0.795 |
| L1 | 3.40 | 3.60 | 0.134 | 0.142 |
| Ø P | 3.20 | 3.40 | 0.126 | 0.134 |
| ØP1 | 6.90 | 7.10 | 0.272 | 0.280 |
| S | 4.90 | 5.10 | 0.193 | 0.201 |

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## Fast Diode

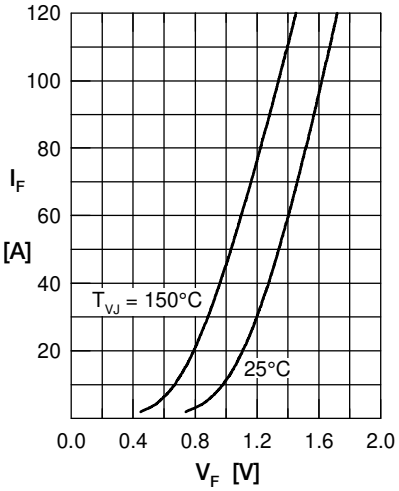


Fig. 1 Forward current $I_F$ versus $V_F$

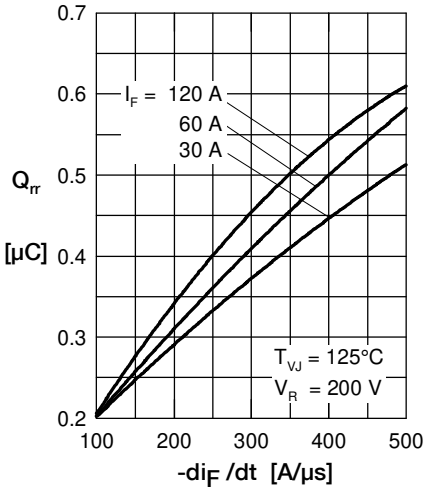


Fig. 2 Typ. reverse recov. charge $Q_{rr}$ versus -$di_F$/dt

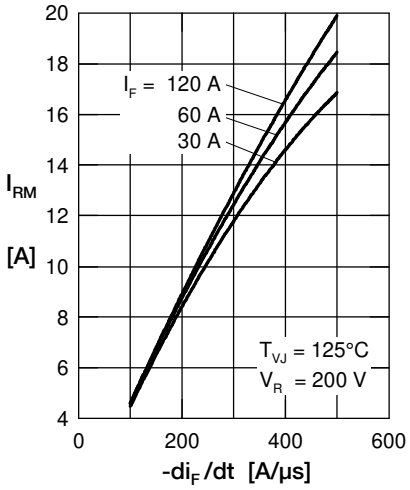


Fig. 3 Typ. reverse recov. current $I_{RM}$ versus -$di_F$/dt

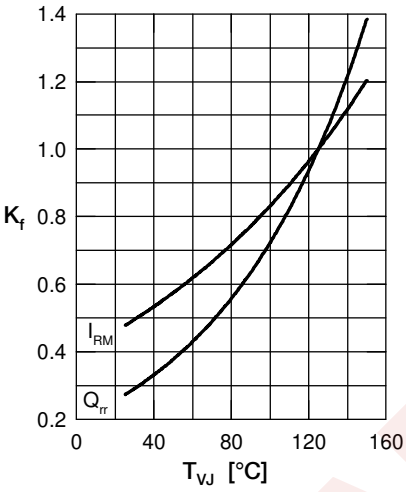


Fig. 4 Typ. dynamic parameters $Q_{rr}$, $I_{RM}$ versus $T_{VJ}$

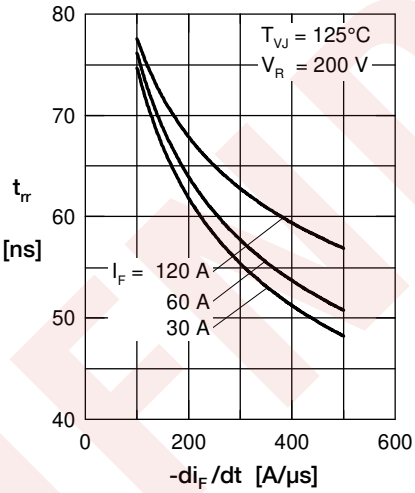


Fig. 5 Typ. reverse recov. time $t_{rr}$ versus -$di_F$/dt

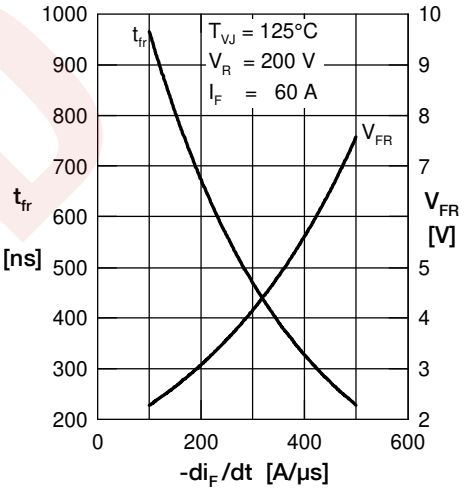


Fig. 6 Typ. forward recov. voltage $V_{FR}$ & time $t_{fr}$ versus $di_F$/dt

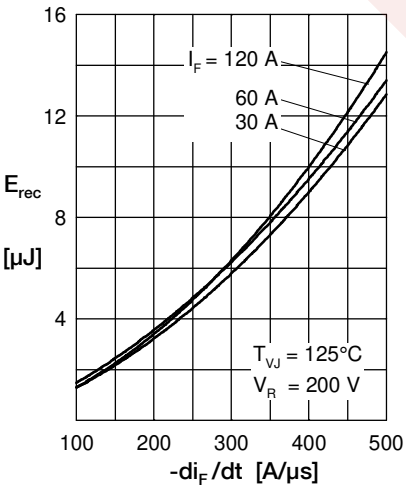


Fig. 7 Typ. recovery energy $E_{rec}$ versus -$di_F$/dt

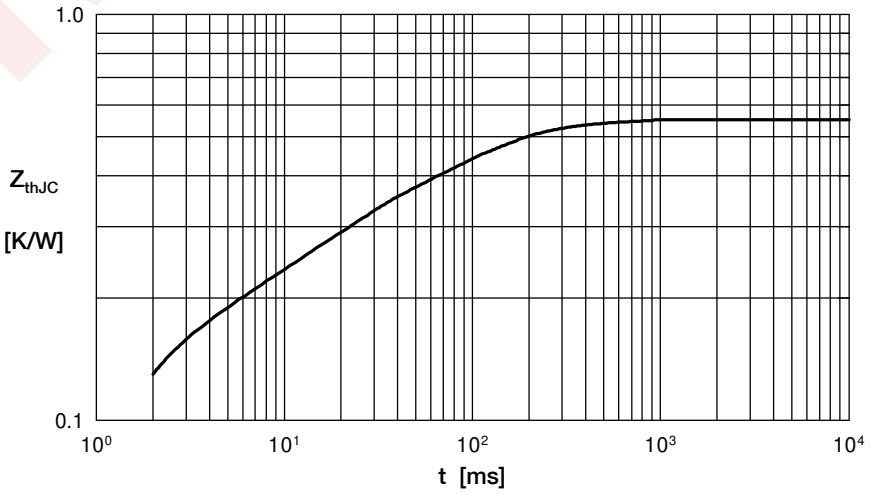


Fig. 8 Transient thermal impedance junction to case



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