



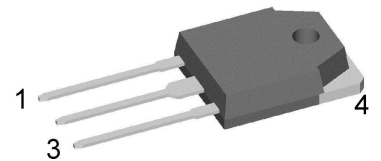
HiPerFRED²

$V_{RRM} = 300\text{ V}$
 $I_{FAV} = 2 \times 60\text{ A}$
 $t_{rr} = 35\text{ ns}$

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

Part number

DPG120C300QB



Backside: cathode



Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low I_{rm} -values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low I_{rm} 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

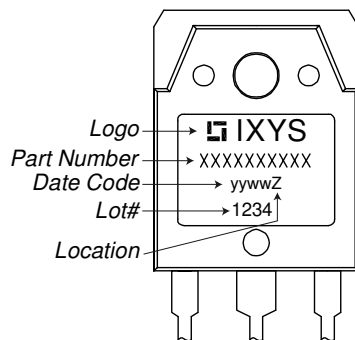
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| Fast Diode | | | | Ratings | | | |
|------------|--|--|-------------|------------------------------|------|------|---------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 300 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 300 | V |
| I_R | reverse current, drain current | $V_R = 300\text{ V}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 1 | μA |
| | | $V_R = 300\text{ V}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 0.35 | mA |
| V_F | forward voltage drop | $I_F = 60\text{ A}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 1.40 | V |
| | | $I_F = 120\text{ A}$ | | | | 1.72 | V |
| | | $I_F = 60\text{ A}$ | | $T_{VJ} = 125^\circ\text{C}$ | | 1.10 | V |
| | | $I_F = 120\text{ A}$ | | | | 1.45 | V |
| I_{FAV} | average forward current | $T_C = 130^\circ\text{C}$ | rectangular | $T_{VJ} = 175^\circ\text{C}$ | | 60 | A |
| V_{FO} | threshold voltage | } for power loss calculation only | | $T_{VJ} = 175^\circ\text{C}$ | | 0.69 | V |
| r_F | slope resistance | | | | | 5.8 | m Ω |
| 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 | | | $T_C = 25^\circ\text{C}$ | | 275 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$ | | $T_{VJ} = 45^\circ\text{C}$ | | 450 | A |
| C_J | junction capacitance | $V_R = 150\text{ V}$ $f = 1\text{ MHz}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 80 | pF |
| I_{RM} | max. reverse recovery current | } $I_F = 60\text{ A}; V_R = 200\text{ V}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 3.5 | A |
| | | | | $T_{VJ} = 125^\circ\text{C}$ | | 9 | A |
| t_{rr} | reverse recovery time | } $-di_F/dt = 200\text{ A}/\mu\text{s}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 35 | ns |
| | | | | $T_{VJ} = 125^\circ\text{C}$ | | 65 | ns |

| 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 |

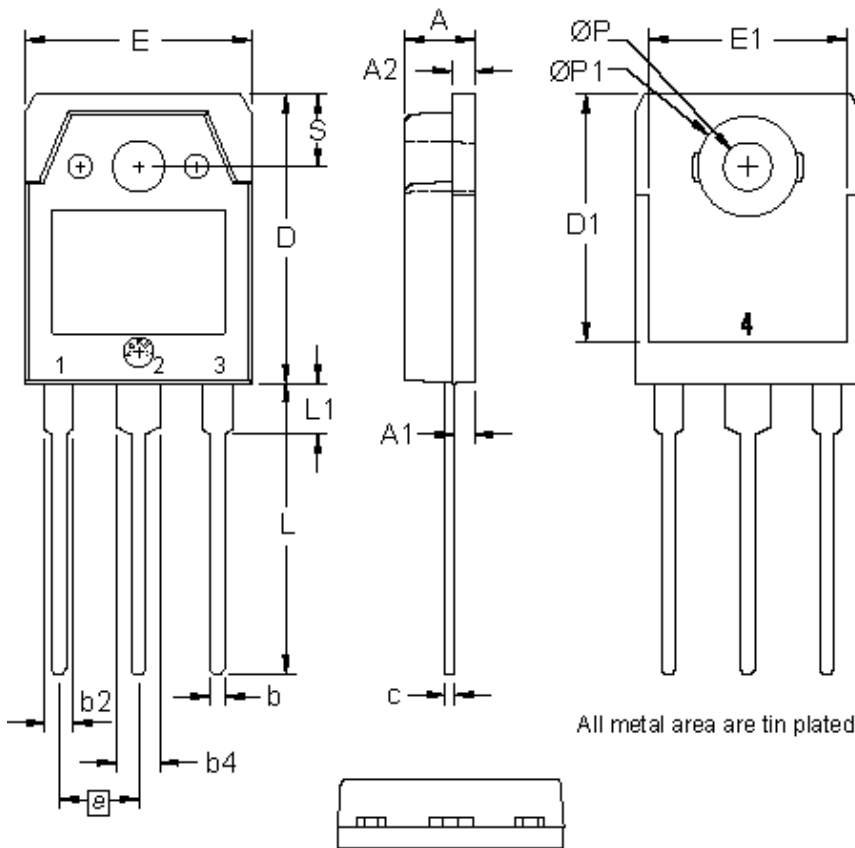
Equivalent Circuits for Simulation
** on die level*
 $T_{VJ} = 175^{\circ}\text{C}$

Fast Diode

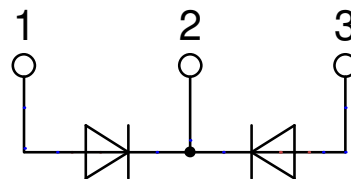
| | | | |
|-------------|--------------------|------|----|
| $V_{0\max}$ | threshold voltage | 0.69 | V |
| $R_{0\max}$ | slope resistance * | 3.2 | mΩ |



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 |



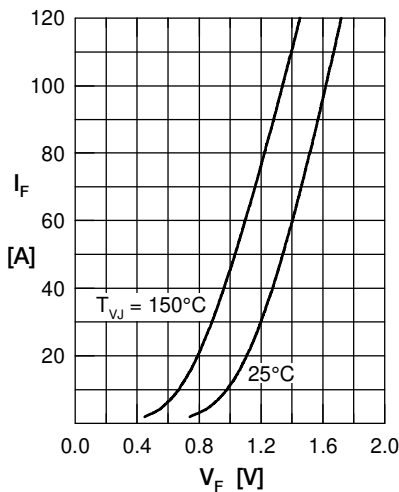
Fast Diode


Fig. 1 Forward current I_F versus V_F

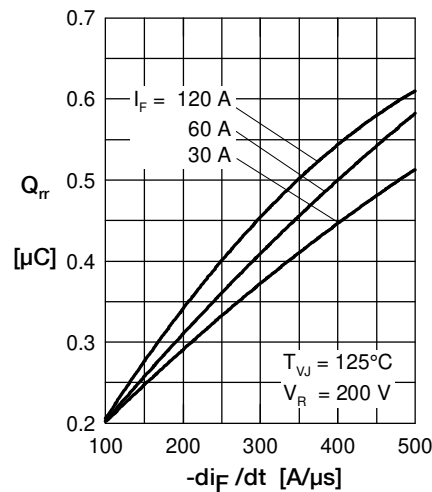


Fig. 2 Typ. reverse recov. charge Q_{rr} versus $-di_F/dt$

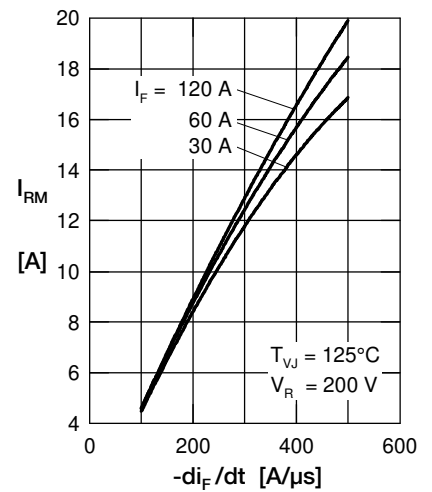


Fig. 3 Typ. reverse recov. current I_{RM} versus $-di_F/dt$

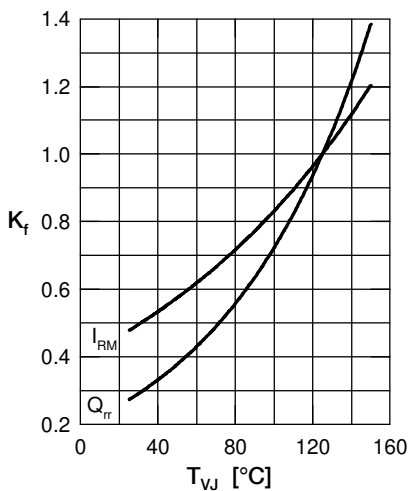


Fig. 4 Typ. dynamic parameters Q_{rr} , I_{RM} versus T_{VJ}

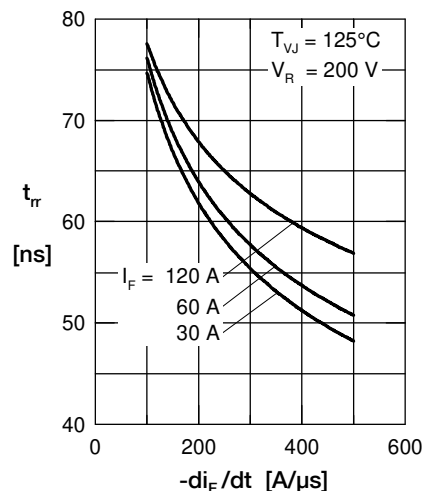


Fig. 5 Typ. reverse recov. time t_{rr} versus $-di_F/dt$

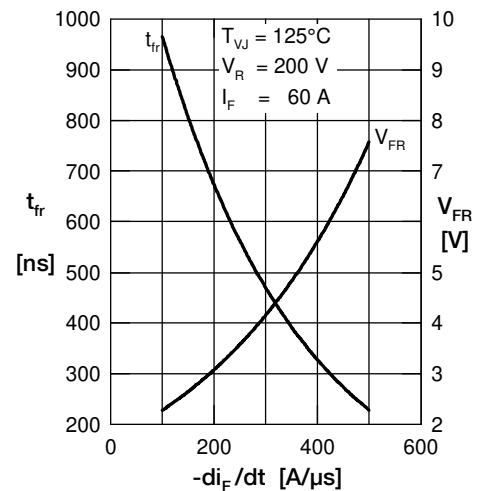


Fig. 6 Typ. forward recov. voltage V_{FR} & time t_{fr} versus di_F/dt

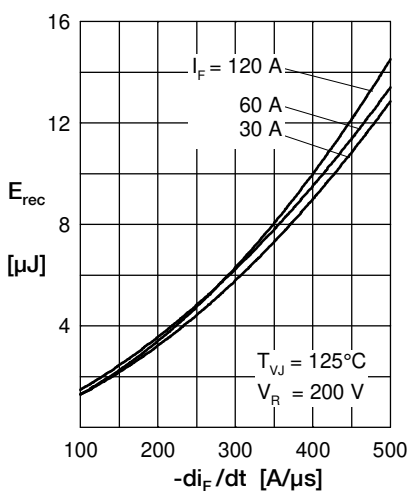


Fig. 7 Typ. recovery energy E_{rec} versus $-di_F/dt$

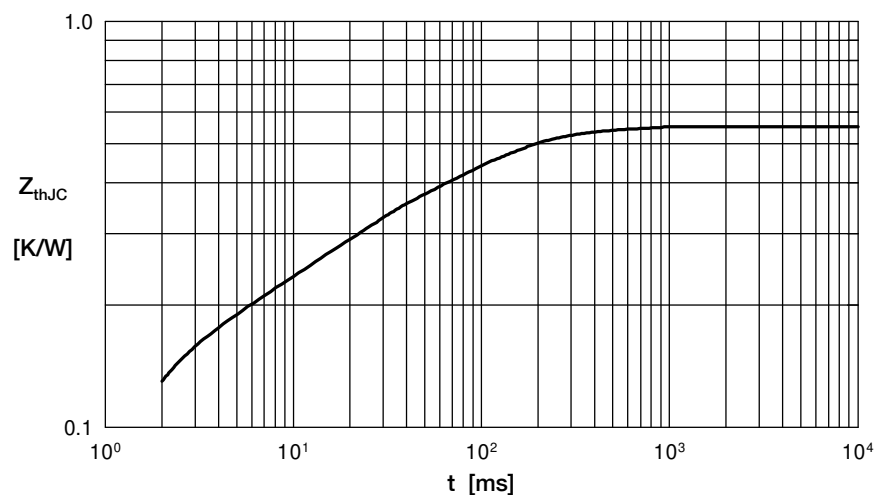


Fig. 8 Transient thermal impedance junction to case