

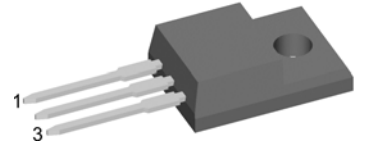
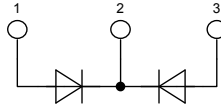
# HiPerFRED<sup>2</sup>

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

$V_{RRM} = 400\text{ V}$   
 $I_{FAV} = 2 \times 10\text{ A}$   
 $t_{rr} = 45\text{ ns}$

Part number

**DPG 20 C 400 PN**



Backside: isolated

E72873

**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:**

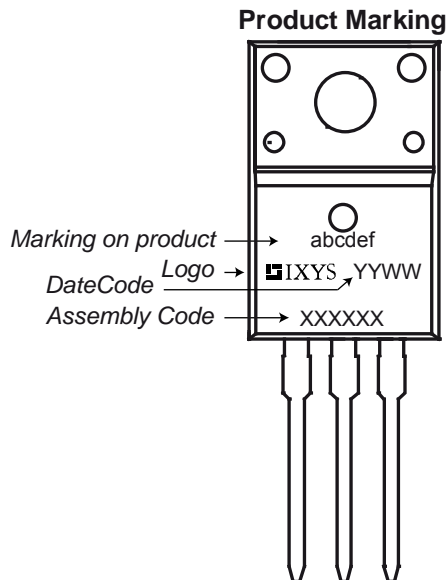
- Housing: TO-220FP
- Industry standard outline
- Plastic overmolded tab for electrical isolation
- Isolation Voltage 2500 V
- Epoxy meets UL 94V-0
- RoHS compliant

**Ratings**

| Symbol     | Definition                          | Conditions                              | Ratings |      |      | Unit               |
|------------|-------------------------------------|---|---------|------|------|--------------------|
|            |                                     |   | min.    | typ. | max. |                    |
| $V_{RRM}$  | max. repetitive reverse voltage     |   |         |      | 400  | V                  |
| $I_R$      | reverse current                     | $V_R = 400\text{ V}$                    |         |      | 1    | $\mu\text{A}$      |
|            |                                     | $V_R = 400\text{ V}$                    |         |      | 0.15 | mA                 |
| $V_F$      | forward voltage                     | $I_F = 10\text{ A}$                     |         |      | 1.32 | V                  |
|            |                                     | $I_F = 20\text{ A}$                     |         |      | 1.51 | V                  |
|            |                                     | $I_F = 10\text{ A}$                     |         |      | 1.03 | V                  |
|            |                                     | $I_F = 20\text{ A}$                     |         |      | 1.24 | V                  |
| $I_{FAV}$  | average forward current             | rectangular d = 0.5                     |         |      | 10   | A                  |
| $V_{F0}$   | threshold voltage                   | } for power loss calculation only       |         |      | 0.77 | V                  |
| $r_F$      | slope resistance                    |   |         |      | 19.8 | m $\Omega$         |
| $R_{thJC}$ | thermal resistance junction to case |   |         |      | 4.40 | K/W                |
| $T_{VJ}$   | virtual junction temperature        |   | -55     |      | 175  | $^{\circ}\text{C}$ |
| $P_{tot}$  | total power dissipation             |   |         |      | 35   | W                  |
| $I_{FSM}$  | max. forward surge current          | t = 10 ms (50 Hz), sine                 |         |      | 150  | A                  |
| $I_{RM}$   | max. reverse recovery current       |   |         |      | 4    | A                  |
|            |                                     | $I_F = 10\text{ A}; V_R = 270\text{ V}$ |         |      | 6    | A                  |
| $t_{rr}$   | reverse recovery time               | $-di_F/dt = 200\text{ A}/\mu\text{s}$   |         |      | 45   | ns                 |
|            |                                     |   |         |      | 65   | ns                 |
| $C_J$      | junction capacitance                | $V_R = 200\text{ V}; f = 1\text{ MHz}$  |         |      | 12   | pF                 |

| Symbol        | Definition                          | Conditions            | Ratings |      |      | Unit |
|---------------|-------------------------------------|-----------------------|---------|------|------|------|
|               |                                     |                       | min.    | typ. | max. |      |
| $I_{RMS}$     | RMS current                         | per pin <sup>1)</sup> |         |      | 35   | A    |
| $R_{thCH}$    | thermal resistance case to heatsink |                       |         | 0.50 |      | K/W  |
| $T_{stg}$     | storage temperature                 |                       | -55     |      | 150  | °C   |
| <b>Weight</b> |                                     |                       |         | 2    |      | g    |
| $M_D$         | mounting torque                     |                       | 0.4     |      | 0.6  | Nm   |
| $F_C$         | mounting force with clip            |                       | 20      |      | 60   | N    |
| $V_{ISOL}$    | isolation voltage                   | t = 1 second          | 2500    |      |      | V    |
|               |                                     | t = 1 minute          | 2000    |      |      | V    |
| $d_s$         | creepage distance on surface        |                       | 1.07    |      |      | mm   |
| $d_A$         | striking distance through air       |                       | 1.07    |      |      | mm   |

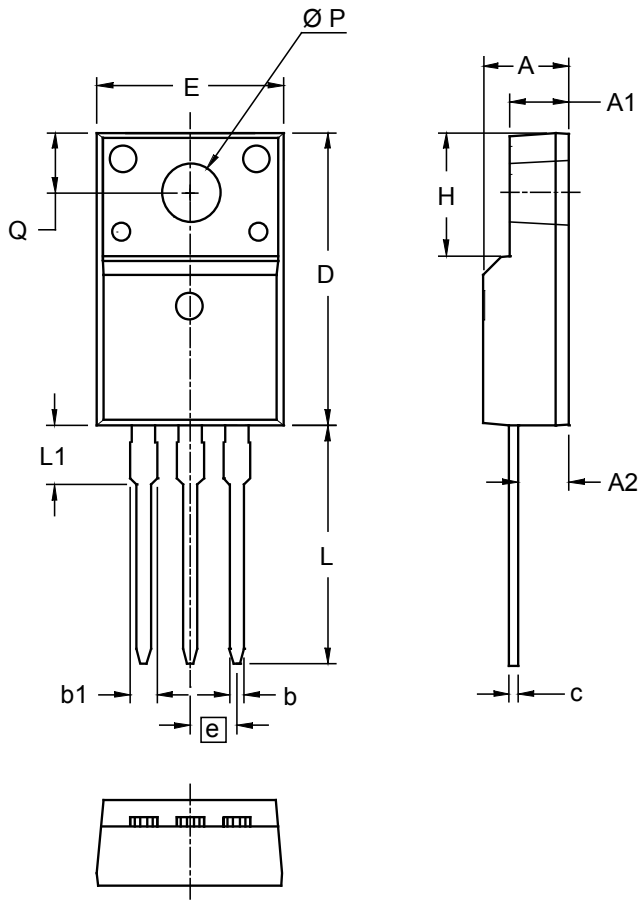
<sup>1)</sup>  $I_{RMS}$  is typically limited by: 1. pin-to-chip resistance; or by 2. current capability of the chip.  
 In case of 1, a common cathode/anode configuration and a non-isolated backside, the whole current capability can be used by connecting the backside.


**Part number**

D = Diode  
 P = HiPerFRED  
 G = extreme fast  
 20 = Current Rating [A]  
 C = Common Cathode  
 400 = Reverse Voltage [V]  
 PN = TO-220ABFP (3)

| Ordering | Part Name       | Marking on Product | Delivering Mode | Base Qty | Code Key |
|----------|-----------------|--------------------|-----------------|----------|----------|
| Standard | DPG 20 C 400 PN | DPG20C400PN        | Tube            | 50       | 504338   |

| Similar Part | Package          | Voltage Class |
|--------------|------------------|---------------|
| DPG20C400PB  | TO-220AB (3)     | 400           |
| DPG20C400PC  | TO-263AB (D2Pak) | 400           |

**Outlines TO-220FP**


| SYM             | INCHES   |      | MILLIMETERS |       |
|-----------------|----------|------|-------------|-------|
|                 | MIN      | MAX  | MIN         | MAX   |
| A               | .177     | .193 | 4.50        | 4.90  |
| A1              | .092     | .108 | 2.34        | 2.74  |
| A2              | .101     | .117 | 2.56        | 2.96  |
| b               | .028     | .035 | 0.70        | 0.90  |
| b1              | .050     | .058 | 1.27        | 1.47  |
| c               | .018     | .024 | 0.45        | 0.60  |
| D               | .617     | .633 | 15.67       | 16.07 |
| E               | .392     | .408 | 9.96        | 10.36 |
| e               | .100 BSC |      | 2.54 BSC    |       |
| H               | .255     | .271 | 6.48        | 6.88  |
| L               | .499     | .523 | 12.68       | 13.28 |
| L1              | .119     | .135 | 3.03        | 3.43  |
| $\varnothing P$ | .121     | .129 | 3.08        | 3.28  |
| Q               | .126     | .134 | 3.20        | 3.40  |

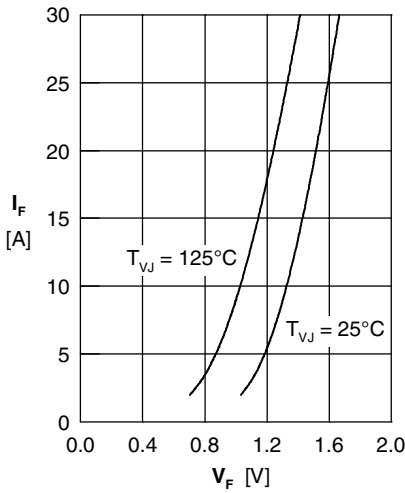


Fig. 1 Forward current  $I_F$  versus forward voltage drop  $V_F$

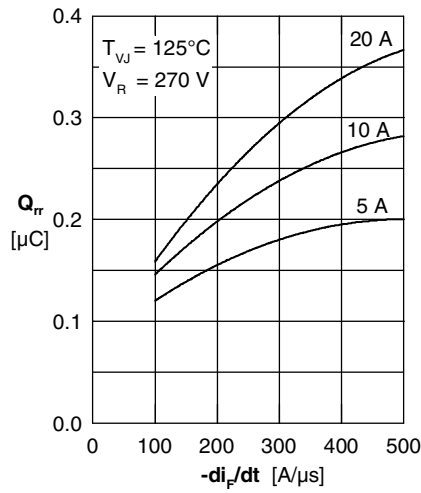


Fig. 2 Typ. reverse recovery charge  $Q_{rr}$  versus  $-di_F/dt$

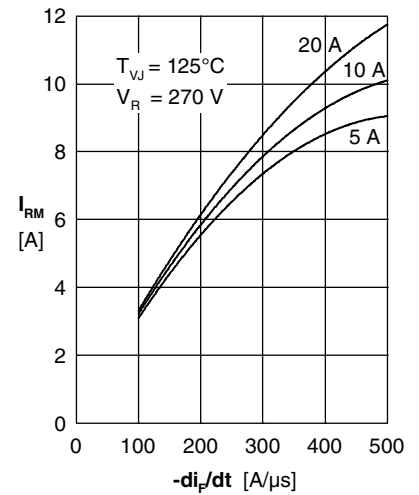


Fig. 3 Typ. reverse recovery current  $I_{RM}$  versus  $-di_F/dt$

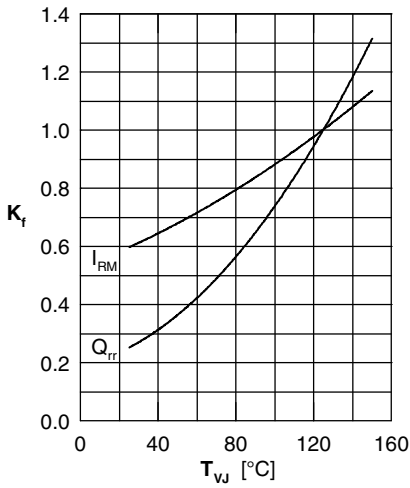


Fig. 4 Dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$

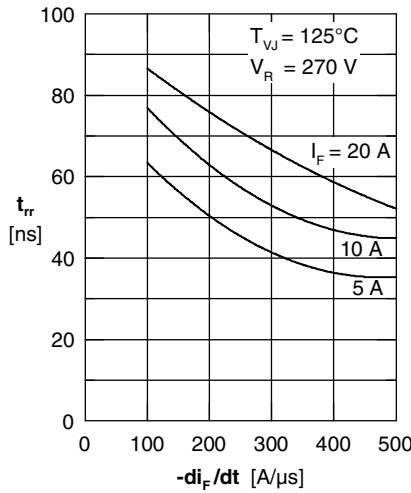


Fig. 5 Typ. reverse recovery time  $t_{rr}$  versus  $-di_F/dt$

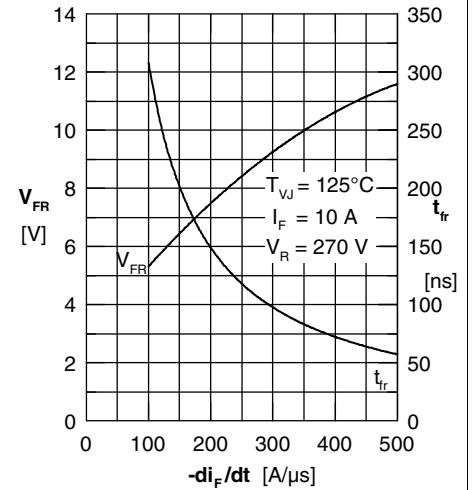


Fig. 6 Typ. forward recovery voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

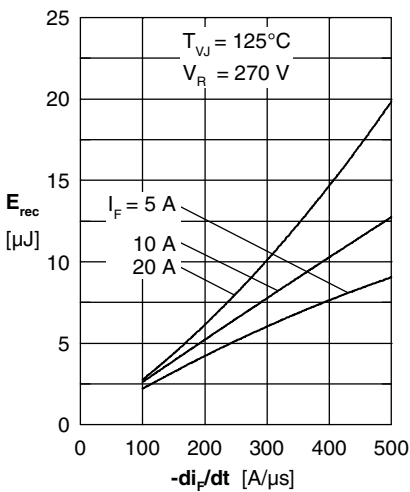


Fig. 7 Typ. recovery energy  $E_{rec}$  versus  $-di_F/dt$

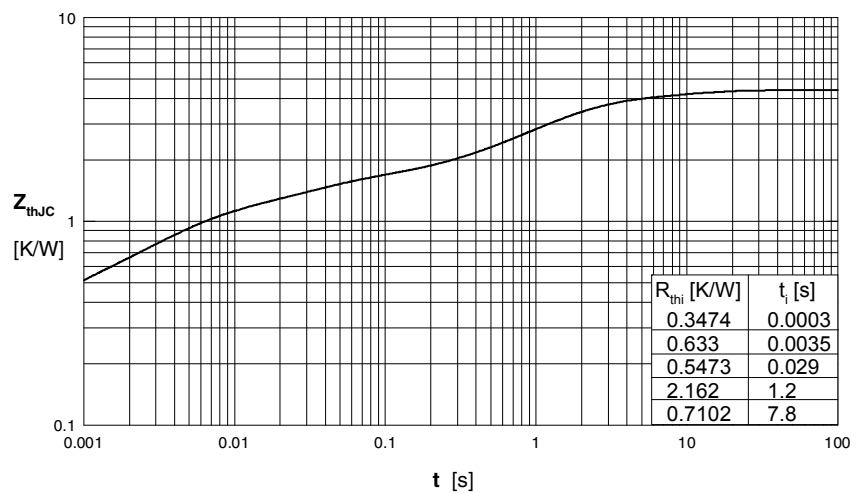


Fig. 8 Transient thermal resistance junction to case