

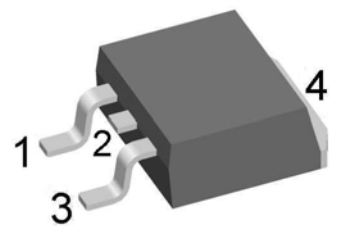
# HiPerFRED<sup>2</sup>

$$\begin{aligned} V_{RRM} &= 400V \\ I_{FAV} &= 2 \times 10A \\ t_{rr} &= 45ns \end{aligned}$$

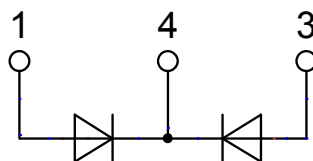
High Performance Fast Recovery Diode  
Low Loss and Soft Recovery  
Common Cathode

Part number

**DPG20C400PC**



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)

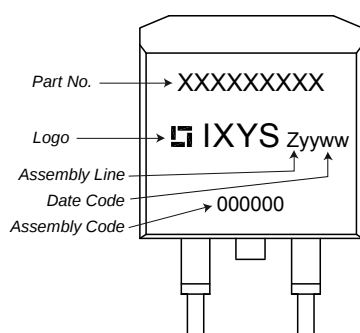
## Package: TO-263 (D2Pak)

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

| Fast Diode        |                                              |                                                                                    |                         | Ratings                 |      |      |      |  |
|-------------------|----------------------------------------------|------------------------------------------------------------------------------------|-------------------------|-------------------------|------|------|------|--|
| Symbol            | Definition                                   | Conditions                                                                         |                         | min.                    | typ. | max. | Unit |  |
| V <sub>RSM</sub>  | max. non-repetitive reverse blocking voltage | T <sub>VJ</sub> = 25°C                                                             |                         |                         |      | 400  | V    |  |
| V <sub>RRM</sub>  | max. repetitive reverse blocking voltage     | T <sub>VJ</sub> = 25°C                                                             |                         |                         |      | 400  | V    |  |
| I <sub>R</sub>    | reverse current, drain current               | V <sub>R</sub> = 400 V                                                             | T <sub>VJ</sub> = 25°C  |                         |      | 1    | μA   |  |
|                   |                                              | V <sub>R</sub> = 400 V                                                             | T <sub>VJ</sub> = 150°C |                         |      | 0.15 | mA   |  |
| V <sub>F</sub>    | forward voltage drop                         | I <sub>F</sub> = 10 A                                                              | T <sub>VJ</sub> = 25°C  |                         |      | 1.32 | V    |  |
|                   |                                              | I <sub>F</sub> = 20 A                                                              |                         |                         |      | 1.51 | V    |  |
|                   |                                              | I <sub>F</sub> = 10 A                                                              | T <sub>VJ</sub> = 150°C |                         |      | 1.03 | V    |  |
|                   |                                              | I <sub>F</sub> = 20 A                                                              |                         |                         |      | 1.24 | V    |  |
| I <sub>FAV</sub>  | average forward current                      | T <sub>C</sub> = 150°C<br>rectangular      d = 0.5                                 | T <sub>VJ</sub> = 175°C |                         |      | 10   | A    |  |
| V <sub>F0</sub>   | threshold voltage                            | } for power loss calculation only                                                  |                         | T <sub>VJ</sub> = 175°C |      | 0.77 | V    |  |
| r <sub>F</sub>    | slope resistance                             |                                                                                    |                         |                         |      | 19.8 | mΩ   |  |
| R <sub>thJC</sub> | thermal resistance junction to case          |                                                                                    |                         |                         |      | 2.3  | K/W  |  |
| R <sub>thCH</sub> | thermal resistance case to heatsink          |                                                                                    |                         |                         | 0.25 |      | K/W  |  |
| P <sub>tot</sub>  | total power dissipation                      | T <sub>C</sub> = 25°C                                                              |                         |                         |      | 65   | W    |  |
| I <sub>FSM</sub>  | max. forward surge current                   | t = 10 ms; (50 Hz), sine; V <sub>R</sub> = 0 V                                     |                         | T <sub>VJ</sub> = 45°C  |      | 150  | A    |  |
| C <sub>J</sub>    | junction capacitance                         | V <sub>R</sub> = 200 V    f = 1 MHz                                                |                         | T <sub>VJ</sub> = 25°C  | 12   |      | pF   |  |
| I <sub>RM</sub>   | max. reverse recovery current                | } I <sub>F</sub> = 10 A; V <sub>R</sub> = 270 V<br>-di <sub>F</sub> /dt = 200 A/μs |                         | T <sub>VJ</sub> = 25°C  | 4    |      | A    |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 125°C | 6    |      | A    |  |
| t <sub>rr</sub>   | reverse recovery time                        |                                                                                    |                         | T <sub>VJ</sub> = 25°C  | 45   |      | ns   |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 125°C | 65   |      | ns   |  |

| Package TO-263 (D2Pak) |                              |              | Ratings |      |      |      |
|------------------------|------------------------------|--------------|---------|------|------|------|
| Symbol                 | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$              | RMS current                  | per terminal |         |      | 35   | A    |
| $T_{VJ}$               | virtual junction temperature |              | -55     |      | 175  | °C   |
| $T_{op}$               | operation temperature        |              | -55     |      | 150  | °C   |
| $T_{stg}$              | storage temperature          |              | -55     |      | 150  | °C   |
| <b>Weight</b>          |                              |              |         | 2    |      | g    |
| $F_c$                  | mounting force with clip     |              | 20      |      | 60   | N    |

### Product Marking



### Part number

D = Diode  
 P = HiPerFRED  
 G = extreme fast  
 20 = Current Rating [A]  
 C = Common Cathode  
 400 = Reverse Voltage [V]  
 PC = TO-263AB (D2Pak) (2)

| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | DPG20C400PC | DPG20C400PC        | Tape & Reel   | 800      | 507327   |

| Similar Part | Package        | Voltage class |
|--------------|----------------|---------------|
| DPG20C400PB  | TO-220AB (3)   | 400           |
| DPG20C400PN  | TO-220ABFP (3) | 400           |

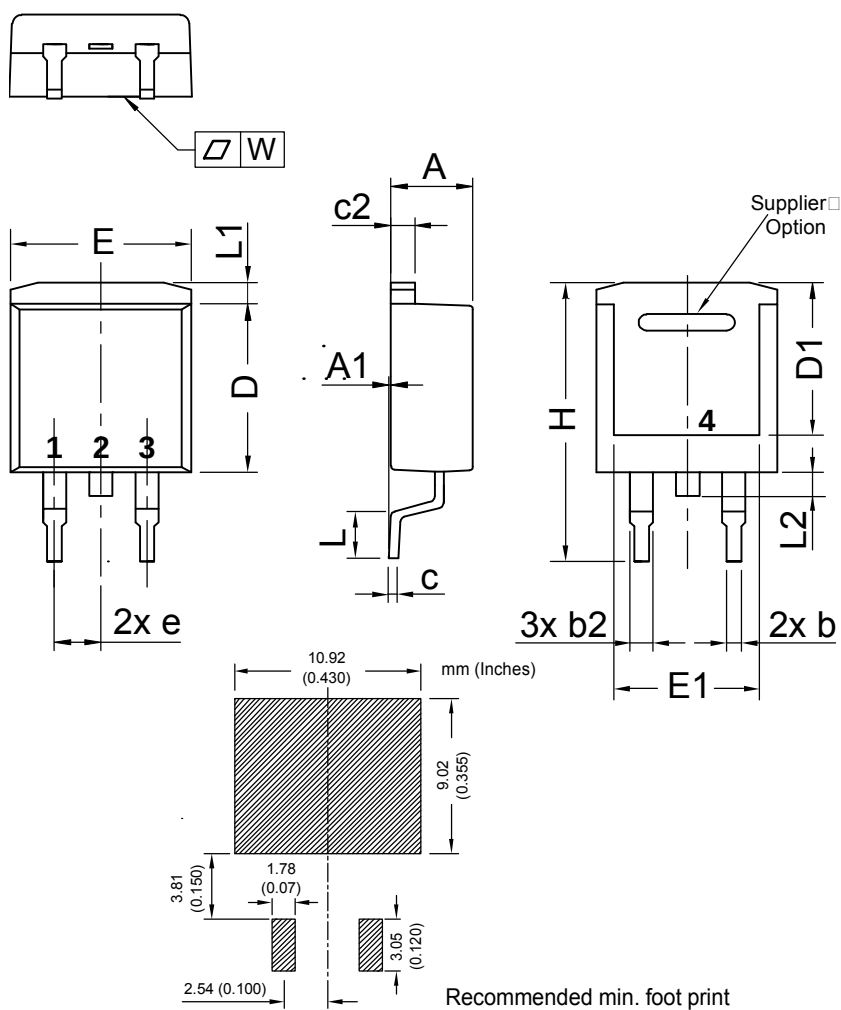
### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 175^{\circ}\text{C}$

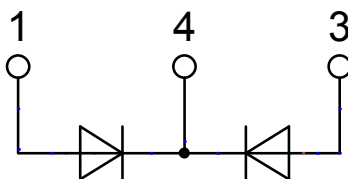
|                 |                    |       |                   |    |
|-----------------|--------------------|-------|-------------------|----|
| $I \rightarrow$ | $V_0$              | $R_0$ | <b>Fast Diode</b> |    |
| $V_{0\max}$     | threshold voltage  | 0.77  |                   | V  |
| $R_{0\max}$     | slope resistance * | 16.6  |                   | mΩ |

## Outlines TO-263 (D2Pak)



| Dim. | Millimeter |       | Inches      |       |
|------|------------|-------|-------------|-------|
|      | min        | max   | min         | max   |
| A    | 4.06       | 4.83  | 0.160       | 0.190 |
| A1   | typ. 0.10  |       | typ. 0.004  |       |
| A2   | 2.41       |       | 0.095       |       |
| b    | 0.51       | 0.99  | 0.020       | 0.039 |
| b2   | 1.14       | 1.40  | 0.045       | 0.055 |
| c    | 0.40       | 0.74  | 0.016       | 0.029 |
| c2   | 1.14       | 1.40  | 0.045       | 0.055 |
| D    | 8.38       | 9.40  | 0.330       | 0.370 |
| D1   | 8.00       | 8.89  | 0.315       | 0.350 |
| D2   | 2.5        |       | 0.098       |       |
| E    | 9.65       | 10.41 | 0.380       | 0.410 |
| E1   | 6.22       | 8.50  | 0.245       | 0.335 |
| e    | 2.54 BSC   |       | 0.100 BSC   |       |
| e1   | 4.28       |       | 0.169       |       |
| H    | 14.61      | 15.88 | 0.575       | 0.625 |
| L    | 1.78       | 2.79  | 0.070       | 0.110 |
| L1   | 1.02       | 1.68  | 0.040       | 0.066 |
| W    | typ. 0.02  | 0.040 | typ. 0.0008 | 0.002 |

All dimensions conform with and/or within JEDEC standard.



## Fast Diode

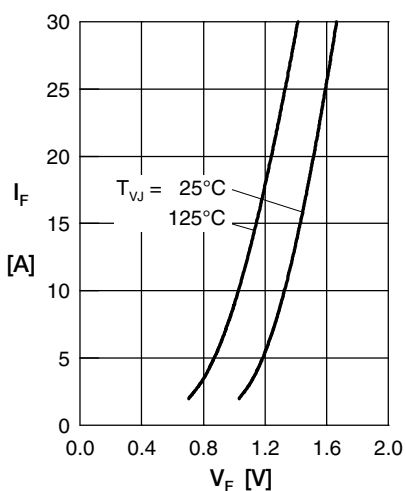


Fig. 1 Forward current  $I_F$  versus  $V_F$

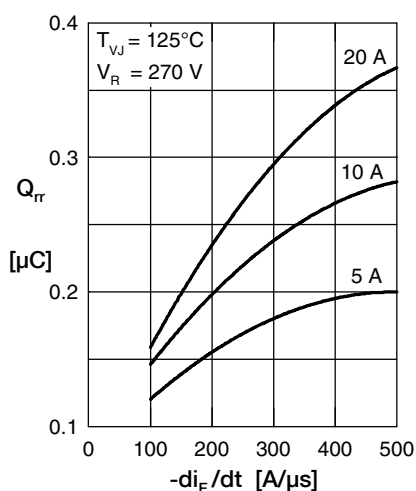


Fig. 2 Typ. reverse recov. charge  $Q_{rr}$  versus  $-di_F/dt$

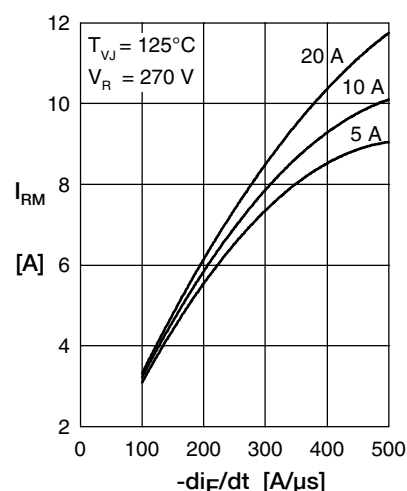


Fig. 3 Typ. reverse recov. current  $I_{RM}$  versus  $-di_F/dt$

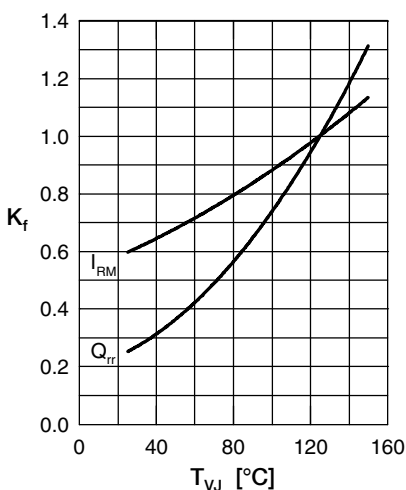


Fig. 4 Typ. dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$

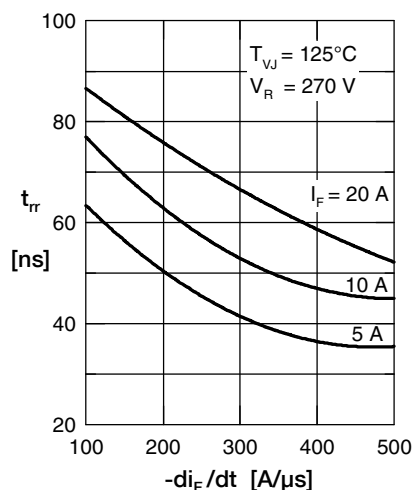


Fig. 5 Typ. reverse recov. time  $t_{rr}$  versus  $-di_F/dt$

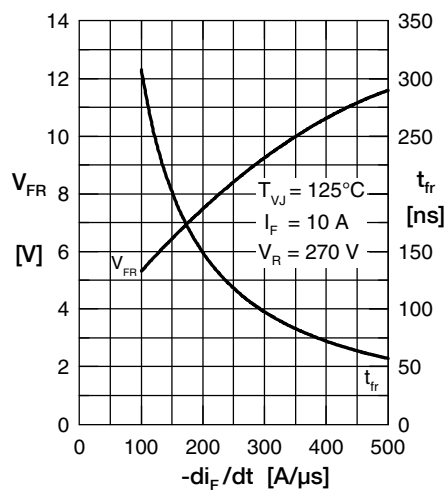


Fig. 6 Typ. forward recov. voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

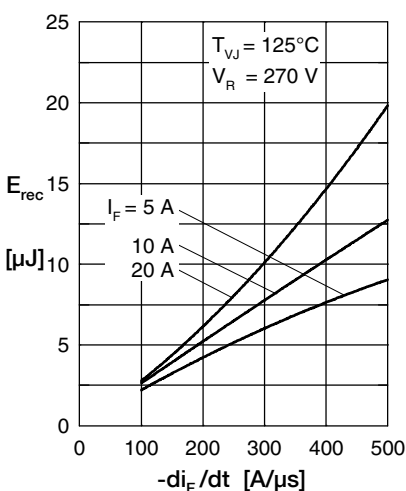


Fig. 7 Typ. recovery energy  $E_{rec}$  versus  $-di_F/dt$

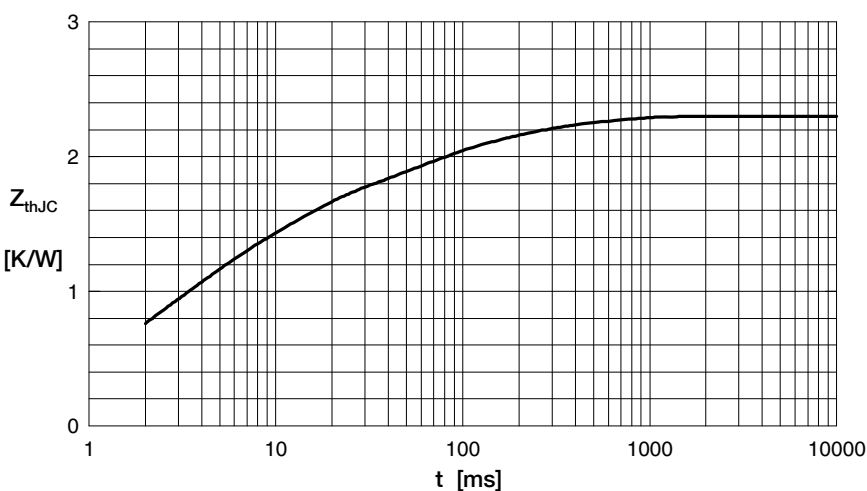


Fig. 8 Transient thermal resistance junction to case