

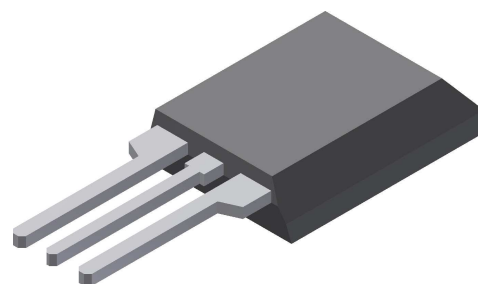
# HiPerFRED<sup>2</sup>

|           |      |       |
|-----------|------|-------|
| $V_{RRM}$ | = 2x | 400 V |
| $I_{FAV}$ | =    | 10 A  |
| $t_{rr}$  | =    | 45 ns |

High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Phase leg

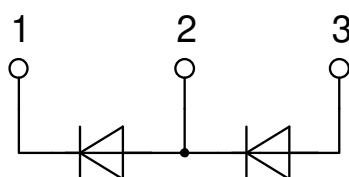
Part number

**DPG10P400PJ**



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: ISOPLUS220

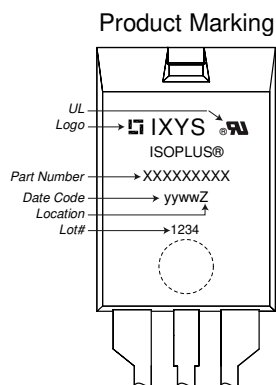
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

## 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](http://www.littelfuse.com/disclaimer-electronics).

| 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 |                          |      | 0.18 | mA   |  |
| V <sub>F</sub>    | forward voltage drop                         | I <sub>F</sub> = 10 A                                                              | T <sub>VJ</sub> = 25°C  |                          |      | 1.28 | V    |  |
|                   |                                              | I <sub>F</sub> = 20 A                                                              |                         |                          |      | 1.48 | V    |  |
|                   |                                              | I <sub>F</sub> = 10 A                                                              | T <sub>VJ</sub> = 150°C |                          |      | 1.02 | V    |  |
|                   |                                              | I <sub>F</sub> = 20 A                                                              |                         |                          |      | 1.24 | V    |  |
| I <sub>FAV</sub>  | average forward current                      | T <sub>C</sub> = 145°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  |      | 0.78 | V    |  |
| r <sub>F</sub>    | slope resistance                             |                                                                                    |                         |                          |      | 19.4 | mΩ   |  |
| R <sub>thJC</sub> | thermal resistance junction to case          |                                                                                    |                         |                          |      | 2.5  | K/W  |  |
| R <sub>thCH</sub> | thermal resistance case to heatsink          |                                                                                    |                         |                          | 0.5  |      | K/W  |  |
| P <sub>tot</sub>  | total power dissipation                      | T <sub>C</sub> = 25°C                                                              |                         |                          |      | 60   | 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   |      | 130  | A    |  |
| C <sub>J</sub>    | junction capacitance                         | V <sub>R</sub> = 200 V   f = 1 MHz                                                 |                         | T <sub>VJ</sub> = 25°C   | 16   |      | pF   |  |
| I <sub>RM</sub>   | max. reverse recovery current                | } I <sub>F</sub> = 15 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 | 5.5  |      | A    |  |
| t <sub>rr</sub>   | reverse recovery time                        |                                                                                    |                         | T <sub>VJ</sub> = 25 °C  | 45   |      | ns   |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 125 °C | 70   |      | ns   |  |

| Package ISOPLUS220   |                                                              |                      |                                         | Ratings |      |      |      |
|----------------------|--------------------------------------------------------------|----------------------|-----------------------------------------|---------|------|------|------|
| Symbol               | Definition                                                   | Conditions           |                                         | min.    | typ. | max. | Unit |
| I <sub>RMS</sub>     | RMS current                                                  | per terminal         |                                         |         |      | 35   | A    |
| T <sub>VJ</sub>      | virtual junction temperature                                 |                      |                                         | -55     |      | 175  | °C   |
| T <sub>op</sub>      | operation temperature                                        |                      |                                         | -55     |      | 150  | °C   |
| T <sub>stg</sub>     | storage temperature                                          |                      |                                         | -55     |      | 150  | °C   |
| Weight               |                                                              |                      |                                         |         | 2    |      | g    |
| F <sub>C</sub>       | mounting force with clip                                     |                      |                                         | 20      |      | 60   | N    |
| d <sub>Spp/App</sub> | creepage distance on surface / striking distance through air | terminal to terminal |                                         | 1.0     |      |      | mm   |
| d <sub>Spb/Apb</sub> |                                                              | terminal to backside |                                         | 3.0     |      |      | mm   |
| V <sub>ISOL</sub>    | isolation voltage                                            | t = 1 second         | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA | 3600    |      |      | V    |
|                      |                                                              | t = 1 minute         |                                         | 3000    |      |      | V    |



### Part description

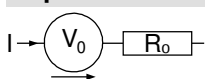
D = Diode  
 P = HiPerFRED  
 G = extreme fast  
 10 = Current Rating [A]  
 P = Phase leg  
 400 = Reverse Voltage [V]  
 PJ = ISOPLUS220AB (3)

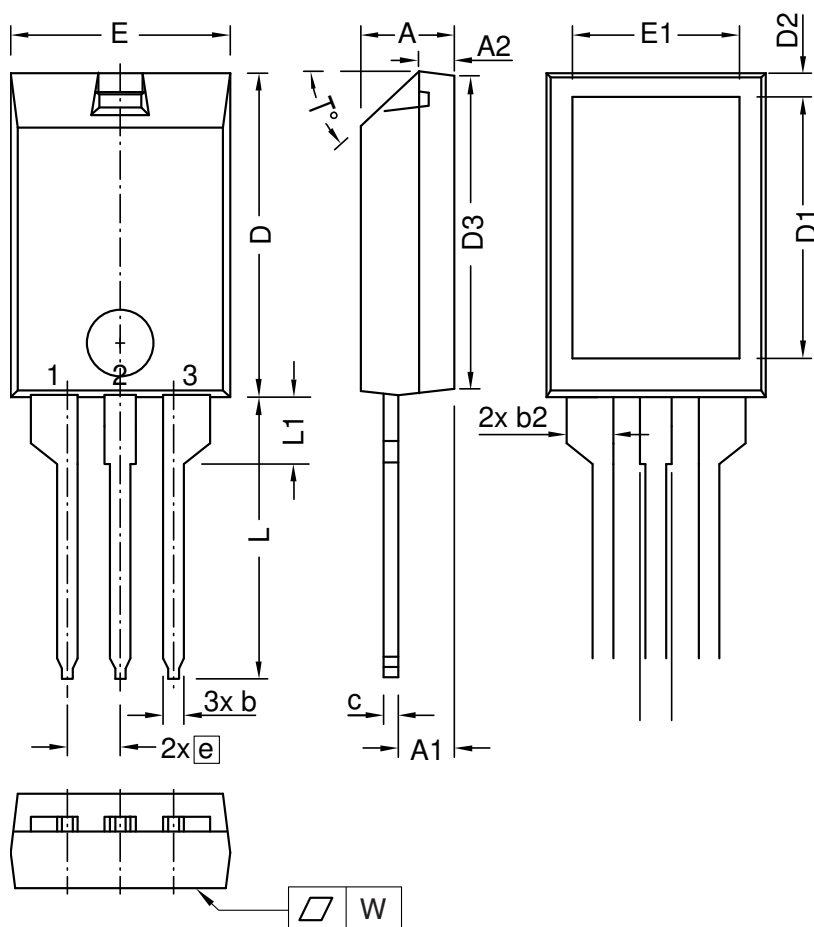
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DPG10P400PJ     | DPG10P400PJ        | Tube          | 50       | 507202   |

### Equivalent Circuits for Simulation

\* on die level

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

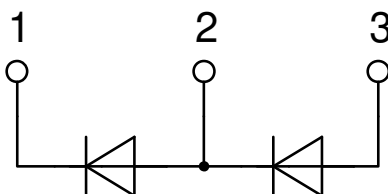
|                                                                                     |                    |                   |    |
|-------------------------------------------------------------------------------------|--------------------|-------------------|----|
|  |                    | <b>Fast Diode</b> |    |
| $V_{0\max}$                                                                         | threshold voltage  | 0.78              | V  |
| $R_{0\max}$                                                                         | slope resistance * | 16.2              | mΩ |

**Outlines ISOPLUS220**


| Dim. | Millimeters |       | Inches    |       |
|------|-------------|-------|-----------|-------|
|      | min         | max   | min       | max   |
| A    | 4.00        | 5.00  | 0.157     | 0.197 |
| A1   | 2.50        | 3.00  | 0.098     | 0.118 |
| A2   | 1.60        | 1.80  | 0.063     | 0.071 |
| b    | 0.90        | 1.30  | 0.035     | 0.051 |
| b2   | 2.20        | 2.55  | 0.087     | 0.100 |
| b4   | 1.25        | 1.65  | 0.049     | 0.065 |
| c    | 0.70        | 1.00  | 0.028     | 0.039 |
| D    | 15.00       | 16.00 | 0.591     | 0.630 |
| D1   | 12.00       | 13.00 | 0.472     | 0.512 |
| D2   | 1.10        | 1.50  | 0.043     | 0.059 |
| D3   | 14.90       | 15.50 | 0.587     | 0.610 |
| E    | 10.00       | 11.00 | 0.394     | 0.433 |
| E1   | 7.50        | 8.50  | 0.295     | 0.335 |
| e    | 2.54 BSC    |       | 0.100 BSC |       |
| L    | 13.00       | 14.50 | 0.512     | 0.571 |
| L1   | 3.00        | 3.50  | 0.118     | 0.138 |
| T°   | 42.5        | 47.5  |           |       |
| W    | -           | 0.1   | -         | 0.004 |

Die konvexe Form des Substrates ist typ. < 0.04 mm über der Kunststoffoberfläche der Bauteilunterseite  
 The convex bow of substrate is typ. < 0.04 mm over plastic surface level of device bottom side

Die Gehäuseabmessungen entsprechen dem Typ TO-273 gemäß JEDEC außer D und D1.  
 This drawing will meet all dimensions requirement of JEDEC outline TO-273 except D and D1.



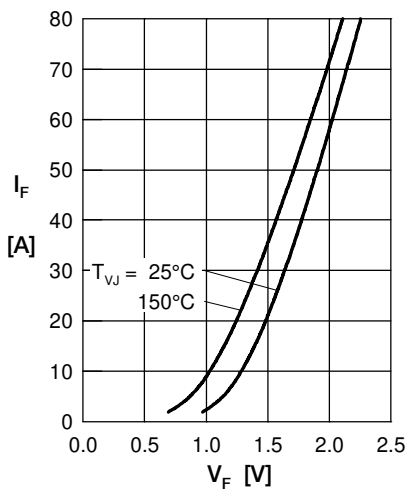
**Fast Diode**


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

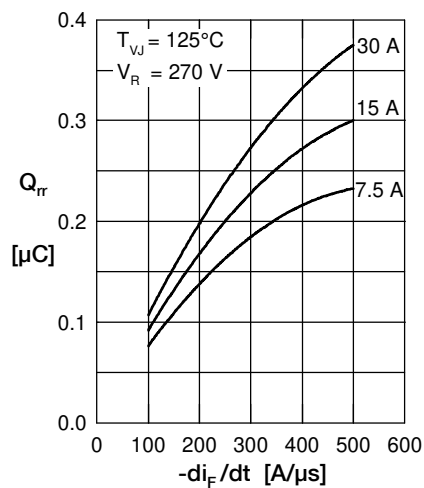


Fig. 2 Typ. reverse recov. charge  $Q_{rr}$  versus  $-di_F/dt$

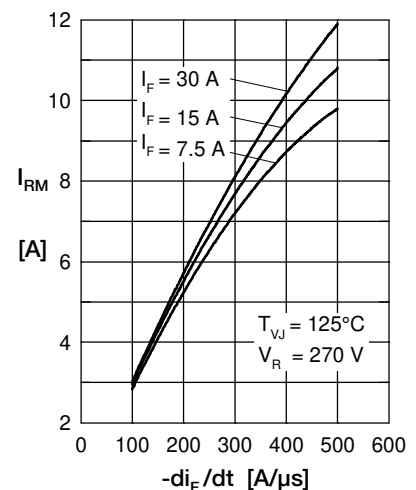


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

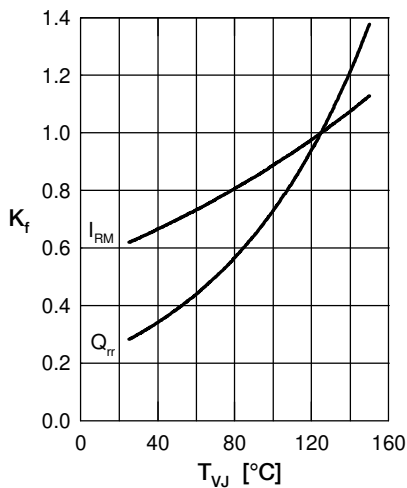


Fig. 4 Typ. dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$

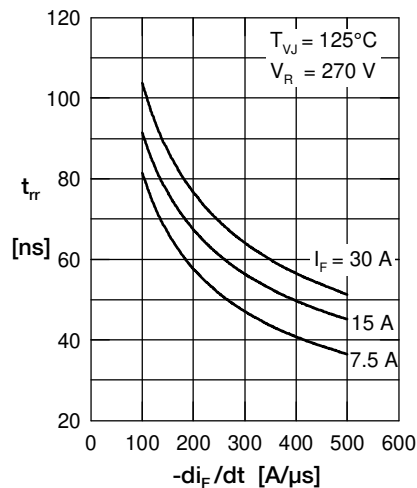


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$

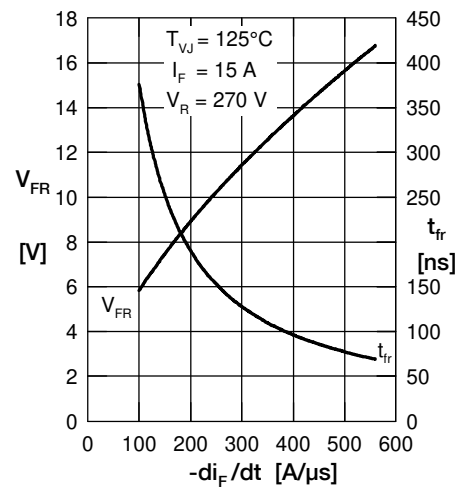


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

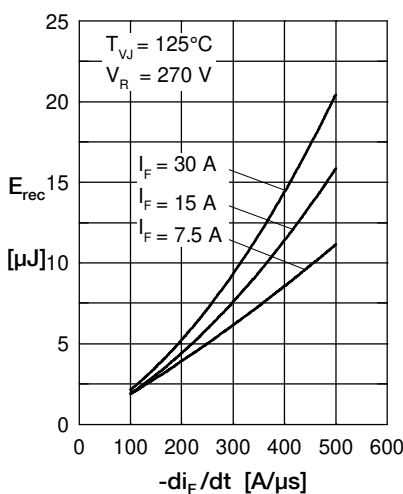


Fig. 7 Typ. recovery energy  $E_{rec}$  versus  $-di_F/dt$

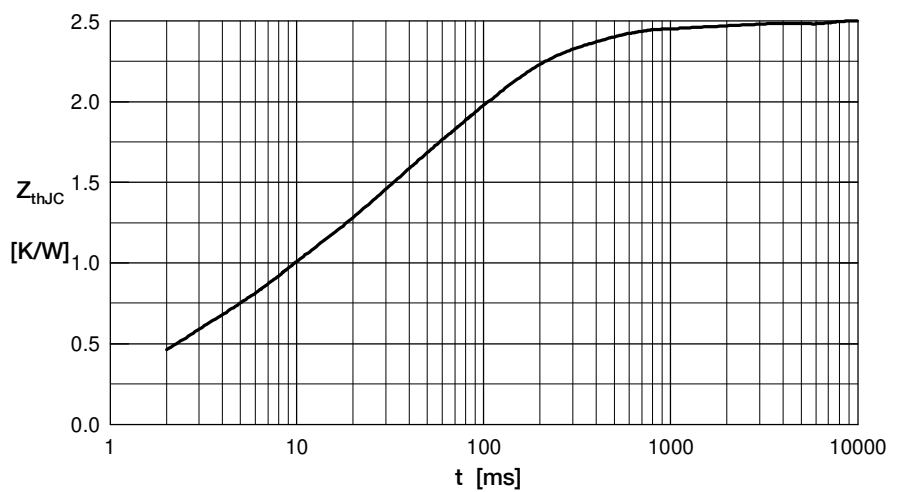


Fig. 8 Transient thermal resistance junction to case