

# HiPerFRED

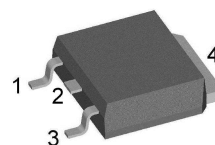
|           |   |       |
|-----------|---|-------|
| $V_{RRM}$ | = | 300 V |
| $I_{FAV}$ | = | 10 A  |
| $t_{rr}$  | = | 35 ns |

High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Single Diode

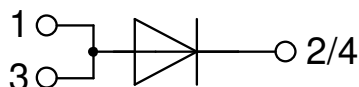
Part number

**DPG10IM300UC**

Marking on Product: PAOGUI



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-252 (DPak)

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

## Disclaimer Notice

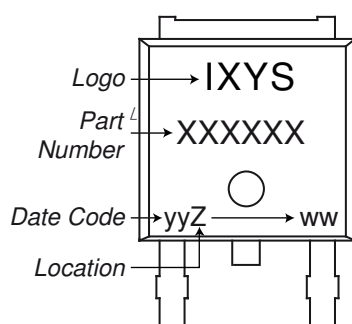
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| Fast Diode |                                              |                                                                                  |                                | Ratings                        |      |      |               |
|------------|----------------------------------------------|----------------------------------------------------------------------------------|--------------------------------|--------------------------------|------|------|---------------|
| Symbol     | Definition                                   | Conditions                                                                       |                                | min.                           | typ. | max. | Unit          |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |                                |      | 300  | V             |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |                                |      | 300  | V             |
| $I_R$      | reverse current, drain current               | $V_R = 300\text{ V}$                                                             | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1    | $\mu\text{A}$ |
|            |                                              | $V_R = 300\text{ V}$                                                             | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 0.06 | mA            |
| $V_F$      | forward voltage drop                         | $I_F = 10\text{ A}$                                                              | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.27 | V             |
|            |                                              | $I_F = 20\text{ A}$                                                              |                                |                                |      | 1.45 | V             |
|            |                                              | $I_F = 10\text{ A}$                                                              | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 0.98 | V             |
|            |                                              | $I_F = 20\text{ A}$                                                              |                                |                                |      | 1.17 | V             |
| $I_{FAV}$  | average forward current                      | $T_C = 150^{\circ}\text{C}$<br>rectangular $d = 0.5$                             | $T_{VJ} = 175^{\circ}\text{C}$ |                                |      | 10   | A             |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                                                |                                | $T_{VJ} = 175^{\circ}\text{C}$ |      | 0.74 | V             |
| $r_F$      | slope resistance                             |                                                                                  |                                |                                |      | 17.7 | m $\Omega$    |
| $R_{thJC}$ | thermal resistance junction to case          |                                                                                  |                                |                                |      | 2.3  | K/W           |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                                                  |                                |                                | 0.5  |      | K/W           |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                                                       |                                |                                |      | 65   | W             |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$               | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 140  | A             |
| $C_J$      | junction capacitance                         | $V_R = 150\text{ V}$ $f = 1\text{ MHz}$                                          | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 15   |      | pF            |
| $I_{RM}$   | max. reverse recovery current                | $I_F = 10\text{ A}; V_R = 200\text{ V}$<br>$-di_F/dt = 200\text{ A}/\mu\text{s}$ |                                | $T_{VJ} = 25^{\circ}\text{C}$  |      | 3    | A             |
|            |                                              |                                                                                  |                                | $T_{VJ} = 125^{\circ}\text{C}$ |      | 5.5  | A             |
| $t_{rr}$   | reverse recovery time                        |                                                                                  |                                | $T_{VJ} = 25^{\circ}\text{C}$  |      | 35   | ns            |
|            |                                              |                                                                                  |                                | $T_{VJ} = 125^{\circ}\text{C}$ |      | 45   | ns            |

| Package TO-252 (DPak) |                              |                            | Ratings |      |      |      |
|-----------------------|------------------------------|----------------------------|---------|------|------|------|
| Symbol                | Definition                   | Conditions                 | min.    | typ. | max. | Unit |
| $I_{RMS}$             | RMS current                  | per terminal <sup>1)</sup> |         |      | 20   | 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>         |                              |                            |         | 0.3  |      | g    |
| $F_c$                 | mounting force with clip     |                            | 20      |      | 60   | N    |

<sup>1)</sup>  $I_{RMS}$  is typically limited by the pin-to-chip resistance (1); or by the current capability of the chip (2). In case of (1) and a product with multiple pins for one chip-potential, the current capability can be increased by connecting the pins as one contact.

### Product Marking



### Part description

D = Diode  
 P = HiPerFRED  
 G = extreme fast  
 10 = Current Rating [A]  
 IM = Single Diode  
 300 = Reverse Voltage [V]  
 UC = TO-252AA (DPak)

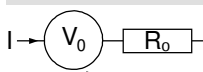
| Ordering    | Ordering Number  | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|------------------|--------------------|---------------|----------|----------|
| Standard    | DPG10IM300UC-TRL | PAOGUI             | Tape & Reel   | 2500     | 505682   |
| Alternative | DPG10IM300UC-TUB | PAOGUI             | Tube          | 70       | 524908   |

| Similar Part | Package      | Voltage class |
|--------------|--------------|---------------|
| DPG10I300PA  | TO-220AC (2) | 300           |

### Equivalent Circuits for Simulation

\* on die level

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



**Fast Diode**

$V_{0\max}$  threshold voltage

0.74

V

$R_{0\max}$  slope resistance \*

14.5

mΩ

**Outlines TO-252 (DPak)**


| Dim | Millimeters |       | Inches    |       |
|-----|-------------|-------|-----------|-------|
|     | min         | max   | min       | max   |
| A   | 2.20        | 2.40  | 0.087     | 0.094 |
| A1  | 2.10        | 2.50  | 0.083     | 0.098 |
| b   | 0.66        | 0.86  | 0.026     | 0.034 |
| b2  | -           | 0.96  | -         | 0.038 |
| b3  | 5.04        | 5.64  | 0.198     | 0.222 |
| b4  | 4.34 BSC    |       | 0.171 BSC |       |
| b5  | 0.50 BSC    |       | 0.020 BSC |       |
| c   | 0.40        | 0.86  | 0.016     | 0.034 |
| D   | 5.90        | 6.30  | 0.232     | 0.248 |
| E   | 6.40        | 6.80  | 0.252     | 0.268 |
| e   | 2.10        | 2.50  | 0.083     | 0.098 |
| H   | 9.20        | 10.10 | 0.362     | 0.398 |
| L   | 0.55        | 1.28  | 0.022     | 0.050 |
| L1  | 2.50        | 2.90  | 0.098     | 0.114 |
| L2  | 0.40        | 0.60  | 0.016     | 0.024 |
| L3  | 0.50        | 0.90  | 0.020     | 0.035 |
| L4  | 0.60        | 1.00  | 0.024     | 0.039 |
| L5  | 0.82        | 1.22  | 0.032     | 0.048 |
| L6  | 0.79        | 0.99  | 0.031     | 0.039 |
| L7  | 0.81        | 1.01  | 0.032     | 0.040 |
| L8  | 0.40        | 0.80  | 0.016     | 0.031 |
| L9  | 1.50 BSC    |       | 0.059 BSC |       |
| Ø P | 1.00 BSC    |       | 0.039 BSC |       |

Recommended  
min. foot print



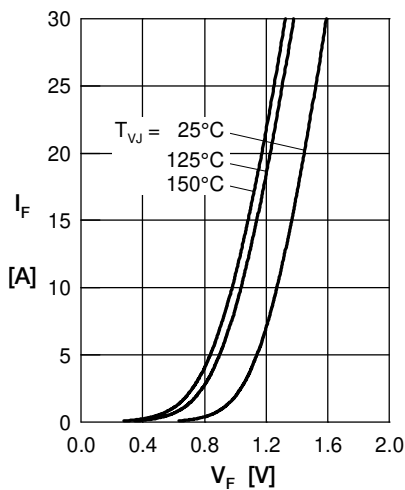
**Fast Diode**


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

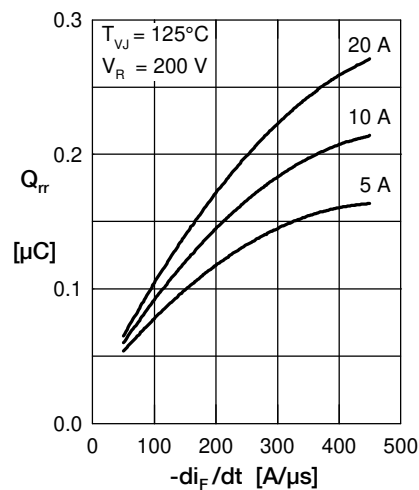


Fig. 2 Typ. reverse recov. charge  
 $Q_{rr}$  versus  $-di_F/dt$

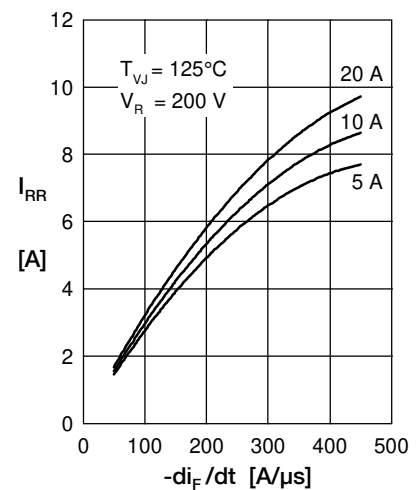


Fig. 3 Typ. reverse recov. current  
 $I_{RR}$  versus  $-di_F/dt$

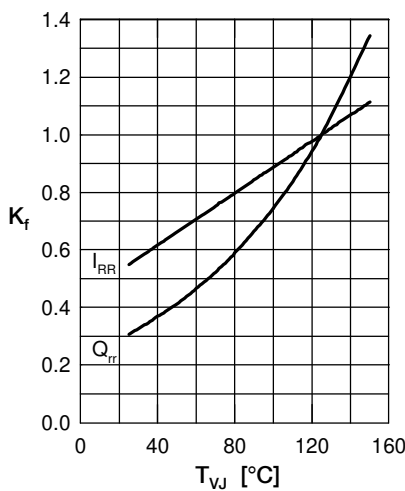


Fig. 4 Typ. dynamic parameters  
 $Q_{rr}$ ,  $I_{RR}$  versus  $T_{VJ}$

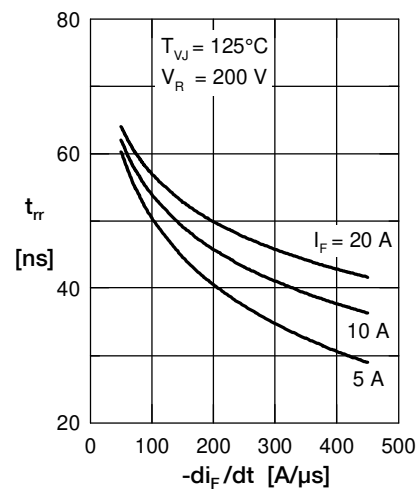


Fig. 5 Typ. reverse recov. time  
 $t_{rr}$  versus  $-di_F/dt$

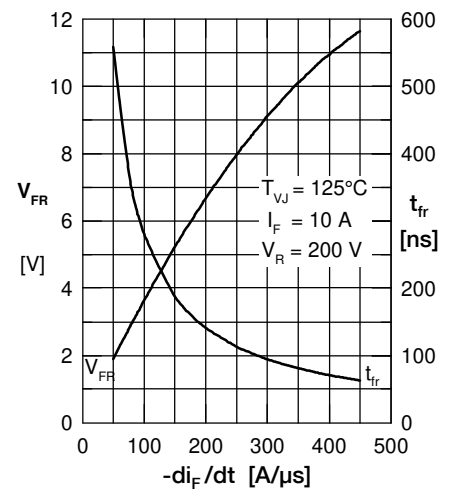


Fig. 6 Typ. forward recov. voltage  
 $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

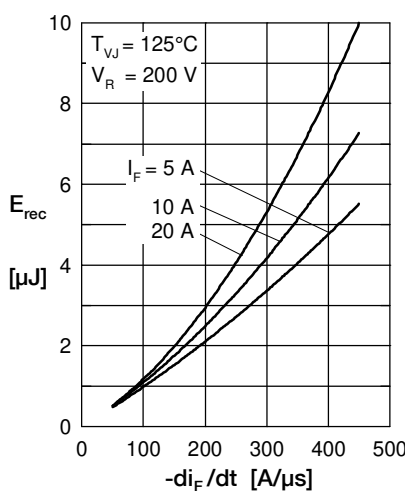


Fig. 7 Typ. recovery energy  
 $E_{rec}$  versus  $-di_F/dt$

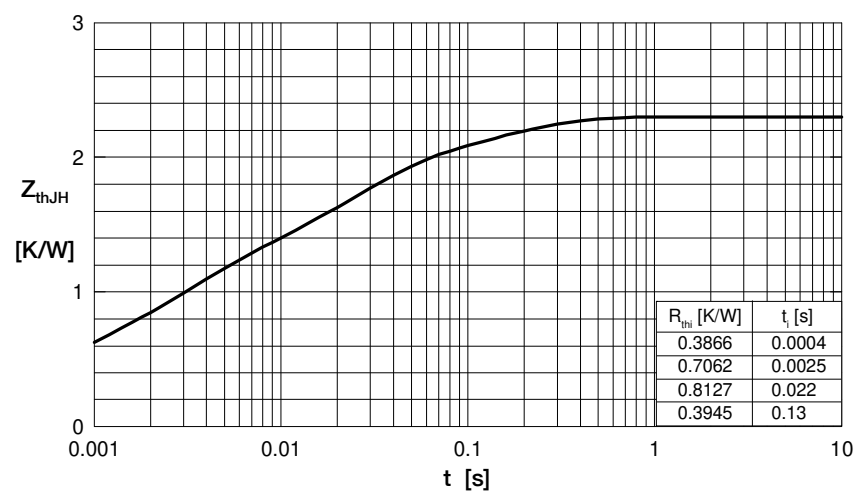


Fig. 8 Transient thermal resistance junction to case