

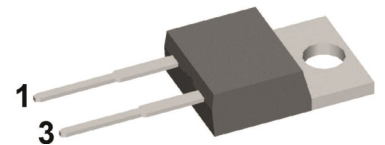
# HiPerFRED

|           |   |        |
|-----------|---|--------|
| $V_{RRM}$ | = | 1200 V |
| $I_{FAV}$ | = | 30 A   |
| $t_{rr}$  | = | 40 ns  |

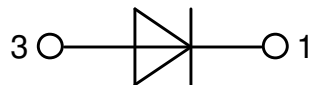
High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Single Diode

Part number

**DSEP29-12A**



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-220

- 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 | $T_{VJ} = 25^{\circ}C$                                  |                         |         | 1200 | V          |  |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}C$                                  |                         |         | 1200 | V          |  |
| $I_R$      | reverse current, drain current               | $V_R = 1200 V$  | $T_{VJ} = 25^{\circ}C$  |         | 250  | $\mu A$    |  |
|            |  | $V_R = 1200 V$  | $T_{VJ} = 150^{\circ}C$ |         | 1    | mA         |  |
| $V_F$      | forward voltage drop                         | $I_F = 30 A$  | $T_{VJ} = 25^{\circ}C$  |         | 2,75 | V          |  |
|            |  | $I_F = 60 A$  |                         |         | 3,30 | V          |  |
|            |  | $I_F = 30 A$  | $T_{VJ} = 150^{\circ}C$ |         | 1,81 | V          |  |
|            |  | $I_F = 60 A$  |                         |         | 2,34 | V          |  |
| $I_{FAV}$  | average forward current                      | $T_C = 120^{\circ}C$<br>rectangular $d = 0.5$           | $T_{VJ} = 175^{\circ}C$ |         | 30   | A          |  |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                       | $T_{VJ} = 175^{\circ}C$ |         | 1,12 | V          |  |
| $r_F$      | slope resistance                             |   |                         |         | 16,6 | m $\Omega$ |  |
| $R_{thJC}$ | thermal resistance junction to case          |   |                         |         | 0,9  | K/W        |  |
| $R_{thCH}$ | thermal resistance case to heatsink          |   |                         | 0,5     |      | K/W        |  |
| $P_{tot}$  | total power dissipation                      |   | $T_C = 25^{\circ}C$     |         | 165  | W          |  |
| $I_{FSM}$  | max. forward surge current                   | $t = 10 ms; (50 Hz), sine; V_R = 0 V$                   | $T_{VJ} = 45^{\circ}C$  |         | 200  | A          |  |
| $C_J$      | junction capacitance                         | $V_R = 600V f = 1 MHz$                                  | $T_{VJ} = 25^{\circ}C$  |         | 12   | pF         |  |
| $I_{RM}$   | max. reverse recovery current                | } $I_F = 30 A; V_R = 600 V$<br>$-di_F/dt = 200 A/\mu s$ | $T_{VJ} = 25^{\circ}C$  |         | 8,5  | A          |  |
|            |  |   | $T_{VJ} = 100^{\circ}C$ |         | 13   | A          |  |
| $t_{rr}$   | reverse recovery time                        |   | $T_{VJ} = 25^{\circ}C$  |         | 60   | ns         |  |
|            |  |   | $T_{VJ} = 100^{\circ}C$ |         | 170  | ns         |  |



| Package TO-220 |                              |              | 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    |
| $M_D$          | mounting torque              |              | 0,4     |      | 0,6  | Nm   |
| $F_C$          | mounting force with clip     |              | 20      |      | 60   | N    |

**Product Marking**



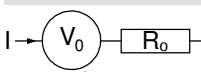
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEP29-12A      | DSEP29-12A         | Tube          | 50       | 477125   |

| Similar Part | Package        | Voltage class |
|--------------|----------------|---------------|
| DSEP29-12B   | TO-220AC (2)   | 1200          |
| DSEP30-12A   | TO-247AD (2)   | 1200          |
| DSEP30-12AR  | ISOPLUS247 (2) | 1200          |
| DSEP30-12B   | TO-247AD (2)   | 1200          |

**Equivalent Circuits for Simulation**

\* on die level

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

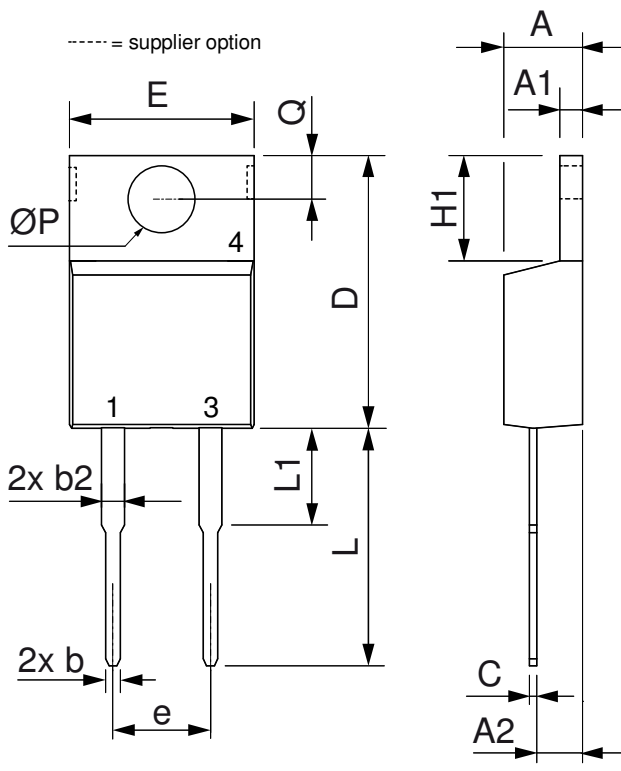


**Fast Diode**

|              |                    |      |    |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage  | 1,12 | V  |
| $R_{0\ max}$ | slope resistance * | 13,3 | mΩ |



**Outlines TO-220**



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 4.32       | 4.82  | 0.170  | 0.190 |
| A1   | 1.14       | 1.39  | 0.045  | 0.055 |
| A2   | 2.29       | 2.79  | 0.090  | 0.110 |
| b    | 0.64       | 1.01  | 0.025  | 0.040 |
| b2   | 1.15       | 1.65  | 0.045  | 0.065 |
| C    | 0.35       | 0.56  | 0.014  | 0.022 |
| D    | 14.73      | 16.00 | 0.580  | 0.630 |
| E    | 9.91       | 10.66 | 0.390  | 0.420 |
| e    | 5.08       | BSC   | 0.200  | BSC   |
| H1   | 5.85       | 6.85  | 0.230  | 0.270 |
| L    | 12.70      | 13.97 | 0.500  | 0.550 |
| L1   | 2.79       | 5.84  | 0.110  | 0.230 |
| ØP   | 3.54       | 4.08  | 0.139  | 0.161 |
| Q    | 2.54       | 3.18  | 0.100  | 0.125 |



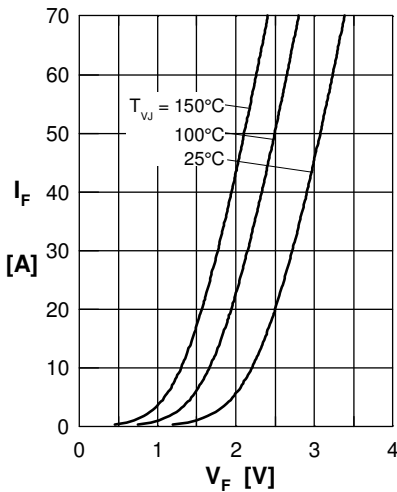
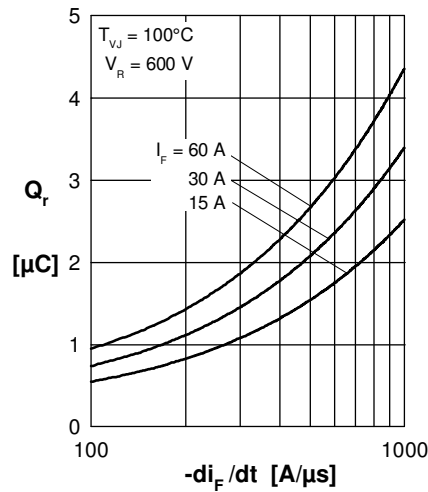
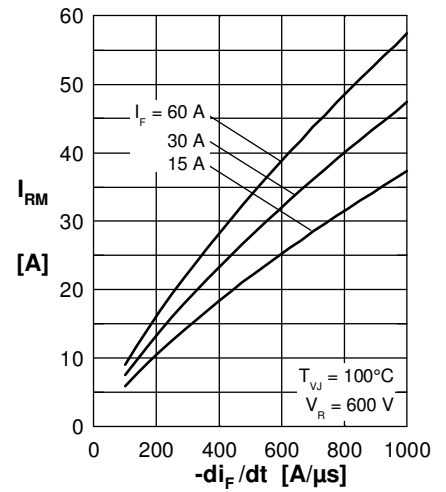
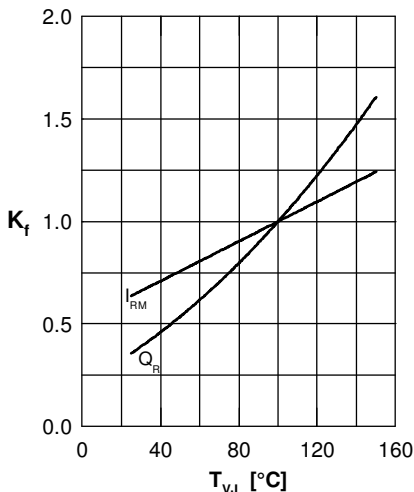
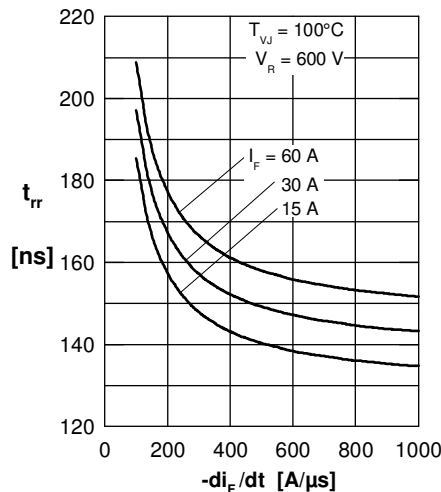
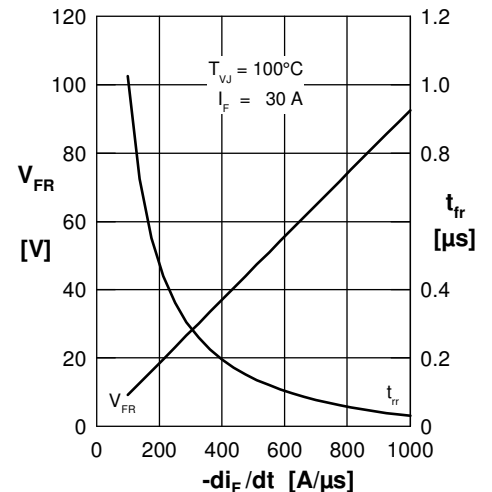
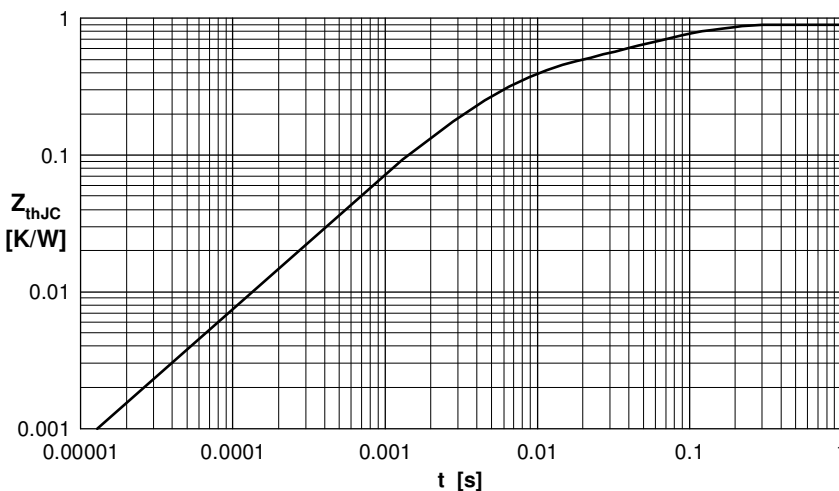
**Fast Diode**

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

 Fig. 2 Typ. reverse recov. charge  $Q_r$  versus  $-di_F/dt$ 

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

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

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

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


Fig. 7 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.030           | 0.001     |
| 2 | 0.080           | 0.030     |
| 3 | 0.300           | 0.006     |
| 4 | 0.490           | 0.060     |