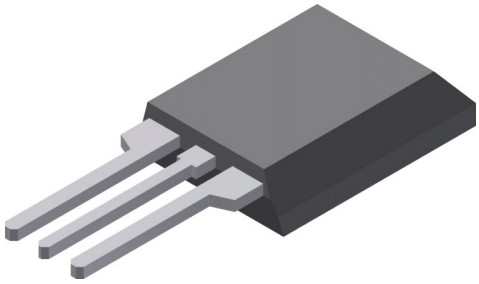
# HiPerFRED

| | | |
|---|---|---|
| $V_{RRM}$ | = | 600 V |
| $I_{FAV}$ | = 2x | 30 A |
| $t_{rr}$ | = | 25 ns |

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

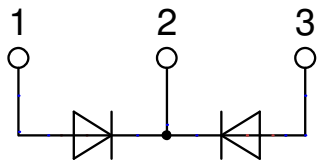
**Part number**

**DSEC59-06BC**



Backside: isolated

E72873




**Features / Advantages:**

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low Irm-values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low Irm 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

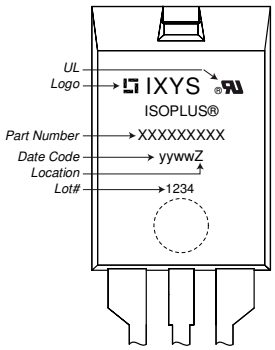
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

## Fast Diode

| Symbol | Definition | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 600 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 600 | V |
| $I_R$ | *reverse current, drain current* | $V_R$ = 600 V | $T_{VJ}$ = 25°C | | | 250 | µA |
| | | $V_R$ = 600 V | $T_{VJ}$ = 150°C | | | 2 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 30 A | $T_{VJ}$ = 25°C | | | 2,51 | V |
| | | $I_F$ = 60 A | | | | 3,19 | V |
| | | $I_F$ = 30 A | $T_{VJ}$ = 150°C | | | 1,61 | V |
| | | $I_F$ = 60 A | | | | 2,24 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 110°C | $T_{VJ}$ = 175°C | | | 30 | A |
| | | rectangular d = 0.5 | | | | | |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 175°C | | | 0,84 | V |
| $r_F$ | *slope resistance* } | | | | | 19,6 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1,1 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0,5 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 135 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 250 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 26 | | pF |
| $I_{RM}$ | *max. reverse recovery current* | | $T_{VJ}$ = 25°C | | 2,5 | | A |
| | | $I_F$ = 30 A; $V_R$ = 300 V | $T_{VJ}$ = 100°C | | 4,5 | | A |
| $t_{rr}$ | *reverse recovery time* | $-di_F/dt$ = 200 A/µs | $T_{VJ}$ = 25°C | | 25 | | ns |
| | | | $T_{VJ}$ = 100°C | | 70 | | ns |

| Package ISOPLUS220 | | | | Ratings | | | |
|---|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal [1] | | | | 35 | A |
| $T_{VJ}$ | *virtual junction temperature* | | | -55 | | 175 | °C |
| $T_{op}$ | *operation temperature* | | | -55 | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | | -55 | | 150 | °C |
| **Weight** | | | | | 2 | | g |
| $F_C$ | *mounting force with clip* | | | 20 | | 60 | N |
| $d_{Spp/App}$ | *creepage distance on surface \| striking distance through air* | | *terminal to terminal* | 1,0 | | | mm |
| $d_{Spb/Apb}$ | | | *terminal to backside* | 3,0 | | | mm |
| $V_{ISOL}$ | *isolation voltage* | t = 1 second | 50/60 Hz, RMS; $I_{ISOL}$ ≤ 1 mA | 3600 | | | V |
| | | t = 1 minute | | 3000 | | | V |

Product Marking

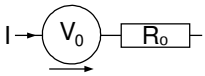



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | DSEC59-06BC | DSEC59-06BC | Tube | 50 | 505124 |

| Similar Part | Package | Voltage class |
|---|---|---|
| DSEC60-06B | TO-247AD (3) | 600 |
| DSEC60-06A | TO-247AD (3) | 600 |
| DHG60C600HB | TO-247AD (3) | 600 |

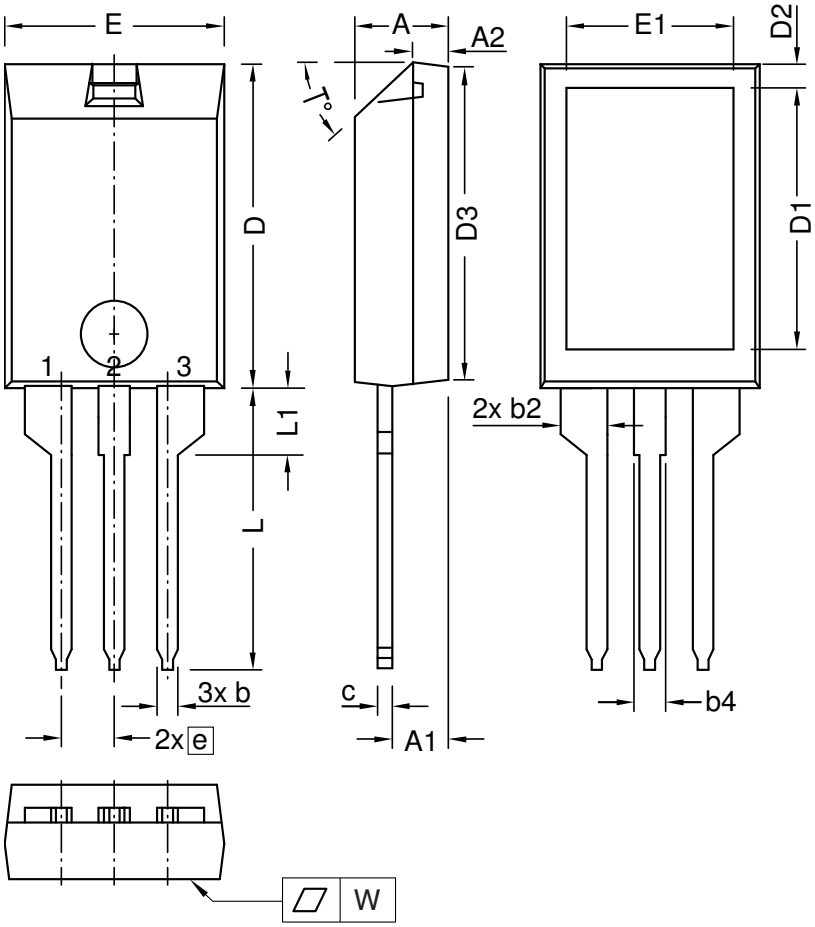
## Equivalent Circuits for Simulation

** on die level* $T_{VJ}$ = 175°C




| | | Fast Diode | |
|---|---|---|---|
| $V_{0\ max}$ | *threshold voltage* | 0,84 | V |
| $R_{0\ max}$ | *slope resistance ** | 16,4 | mΩ |

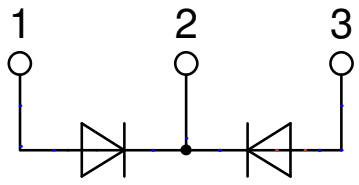
## Outlines ISOPLUS220




| 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 | 2.35 | 2.55 | 0.093 | 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 requiarement of JEDEC outline TO-273 except D and D1.*



## Fast Diode

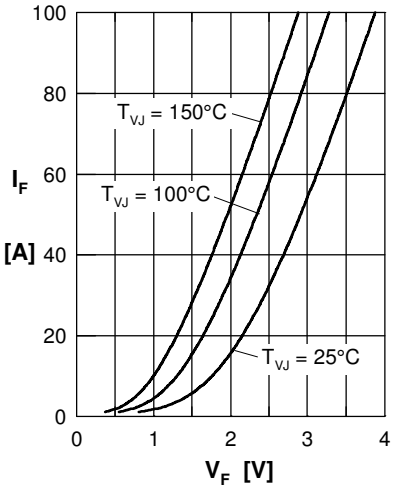



Fig. 1 Forward current $I_F$ versus $V_F$

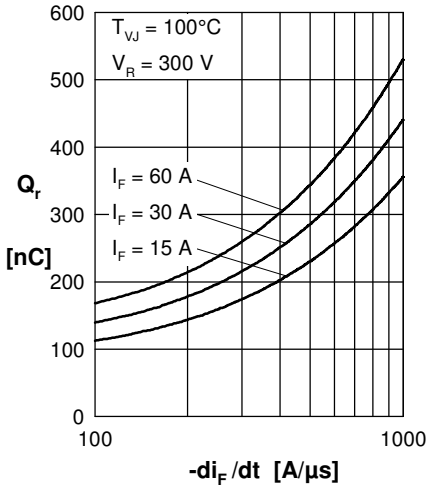



Fig. 2 Typ. reverse recov. charge $Q_r$ versus $-di_F/dt$

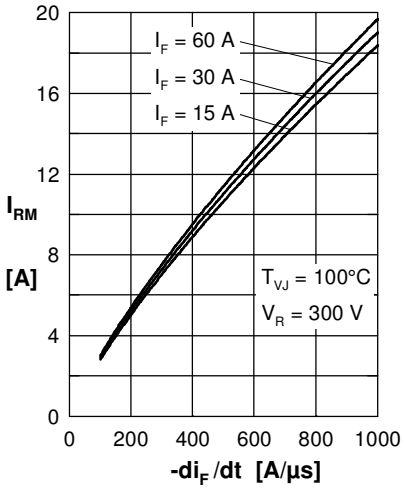



Fig. 3 Typ. peak reverse current $I_{RM}$ versus $-di_F/dt$

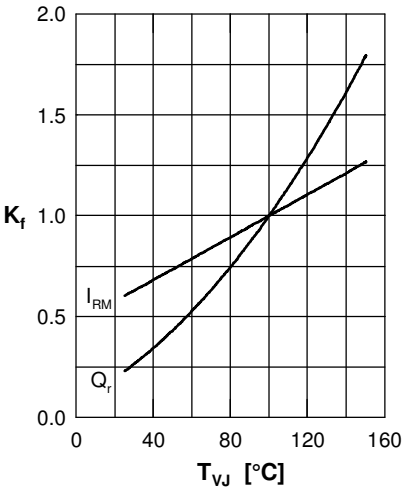



Fig. 4 Dynamic parameters $Q_r$, $I_{RM}$ versus $T_{VJ}$

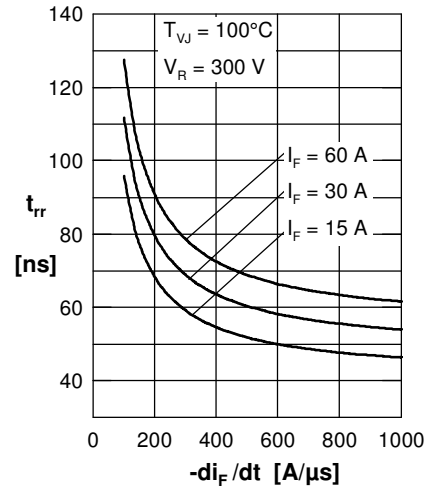



Fig. 5 Typ. recovery time $t_{rr}$ versus $-di_F/dt$

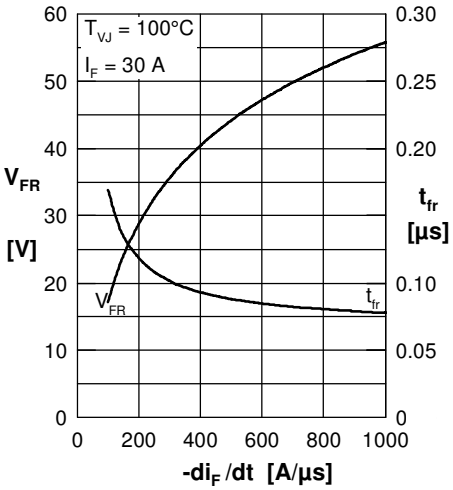



Fig. 6 Typ. peak forward voltage $V_{FR}$ and $t_{fr}$ versus $di_F/dt$

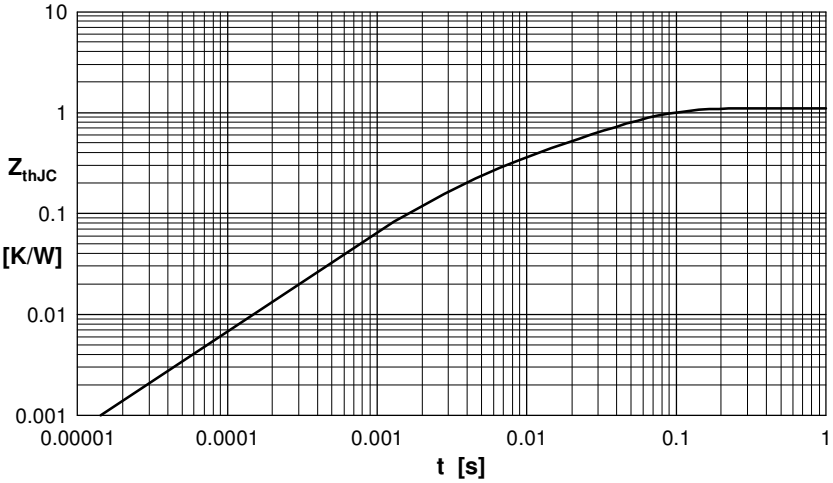



Fig. 7 Transient thermal impedance junction to case

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.030 | 0.0005 |
| 2 | 0.100 | 0.0050 |
| 3 | 0.360 | 0.0200 |
| 4 | 0.610 | 0.0500 |