

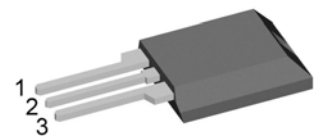
# HiPerFRED

$$\begin{aligned} V_{RRM} &= 600V \\ I_{FAV} &= 2 \times 15A \\ t_{rr} &= 35ns \end{aligned}$$

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

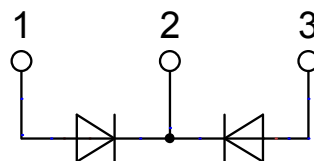
Part number

**DSEC29-06AC**



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:

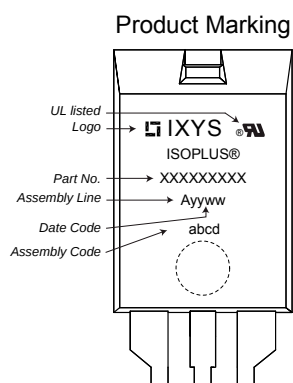
- Antiparallel diode for high frequency switching devices
- Antisaturation diode
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

## 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

| Fast Diode |                                              |                                                                                  |                                | Ratings |      |      |               |
|------------|----------------------------------------------|----------------------------------------------------------------------------------|--------------------------------|---------|------|------|---------------|
| Symbol     | Definition                                   | Conditions                                                                       |                                | min.    | typ. | max. | Unit          |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |         |      | 600  | V             |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |         |      | 600  | V             |
| $I_R$      | reverse current, drain current               | $V_R = 600\text{ V}$                                                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 100  | $\mu\text{A}$ |
|            |                                              | $V_R = 600\text{ V}$                                                             | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 0.5  | mA            |
| $V_F$      | forward voltage drop                         | $I_F = 15\text{ A}$                                                              | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 2.04 | V             |
|            |                                              | $I_F = 30\text{ A}$                                                              |                                |         |      | 2.25 | V             |
|            |                                              | $I_F = 15\text{ A}$                                                              | $T_{VJ} = 150^{\circ}\text{C}$ |         |      | 1.34 | V             |
|            |                                              | $I_F = 30\text{ A}$                                                              |                                |         |      | 1.59 | V             |
| $I_{FAV}$  | average forward current                      | $T_C = 140^{\circ}\text{C}$<br>rectangular $d = 0.5$                             | $T_{VJ} = 175^{\circ}\text{C}$ |         |      | 15   | A             |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                                                |                                |         |      | 0.99 | V             |
| $r_F$      | slope resistance                             |                                                                                  |                                |         |      | 15   | m $\Omega$    |
| $R_{thJC}$ | thermal resistance junction to case          |                                                                                  |                                |         |      | 1.6  | K/W           |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                                                  |                                |         | 0.50 |      | K/W           |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                                                       |                                |         |      | 95   | W             |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$               | $T_{VJ} = 45^{\circ}\text{C}$  |         |      | 110  | A             |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}$ $f = 1\text{ MHz}$                                          | $T_{VJ} = 25^{\circ}\text{C}$  |         | 12   |      | pF            |
| $I_{RM}$   | max. reverse recovery current                | $I_F = 15\text{ A}; V_R = 300\text{ V}$<br>$-di_F/dt = 200\text{ A}/\mu\text{s}$ | $T_{VJ} = 25^{\circ}\text{C}$  |         | 5    |      | A             |
|            |                                              |                                                                                  | $T_{VJ} = 100^{\circ}\text{C}$ |         | 7    |      | A             |
|            |                                              |                                                                                  | $T_{VJ} = 25^{\circ}\text{C}$  |         | 35   |      | ns            |
|            |                                              |                                                                                  | $T_{VJ} = 100^{\circ}\text{C}$ |         | 95   |      | ns            |
| $E_{AS}$   | non-repetitive avalanche energy              | $I_{AS} = 1\text{ A}$ $L = 180\text{ }\mu\text{H}$                               | $T_{VJ} = 25^{\circ}\text{C}$  |         |      | 0.1  | mJ            |
| $I_{AR}$   | repetitive avalanche current                 | $V_A = 1.5 \cdot V_R$ typ.: $f = 10\text{ kHz}$                                  |                                |         |      | 0.1  | A             |

| Package ISOPLUS220 |                                                              |                            | Ratings |      |      |      |
|--------------------|--------------------------------------------------------------|----------------------------|---------|------|------|------|
| Symbol             | Definition                                                   | Conditions                 | min.    | typ. | max. | Unit |
| $I_{RMS}$          | RMS current                                                  | per terminal <sup>1)</sup> |         |      | 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               | 3600    |      |      | V    |
|                    |                                                              | t = 1 minute               | 3000    |      |      | V    |



| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | DSEC29-06AC | DSEC29-06AC        | Tube          | 50       | 500810   |

| Similar Part | Package      | Voltage class |
|--------------|--------------|---------------|
| DSEC30-06A   | TO-247AD (3) | 600           |
| DSEC30-06B   | TO-247AD (3) | 600           |

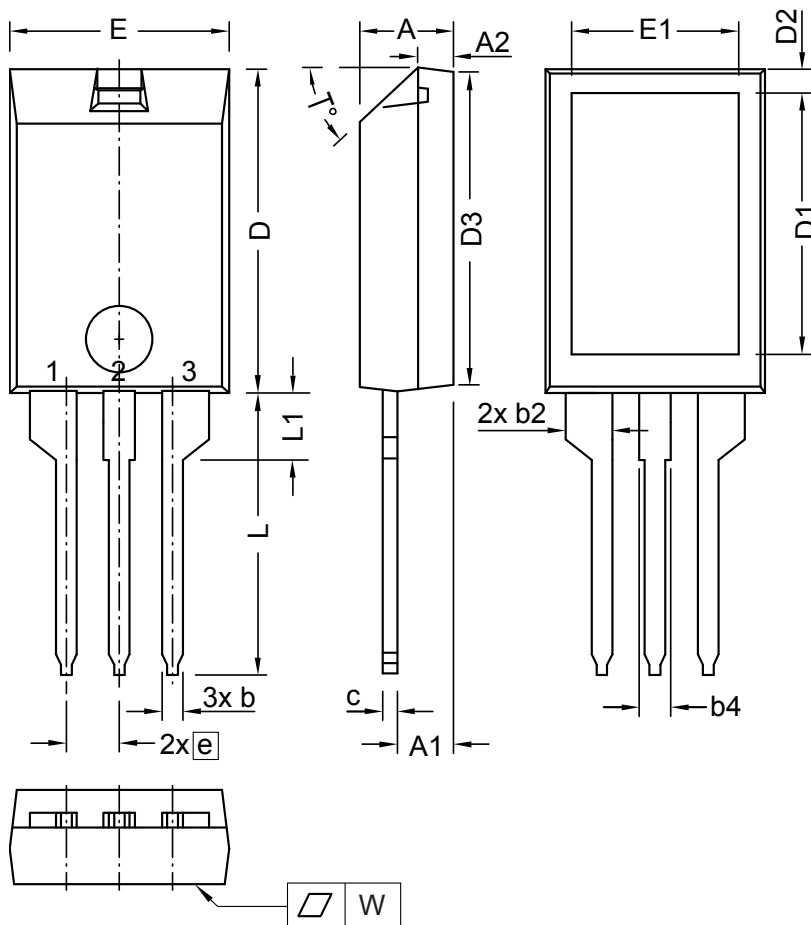
### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 175\text{ °C}$

|                                     |                    |        |
|-------------------------------------|--------------------|--------|
| $I \rightarrow V_0 \rightarrow R_0$ | Fast Diode         |        |
| $V_{0\max}$                         | threshold voltage  | 0.99 V |
| $R_{0\max}$                         | slope resistance * | 12 mΩ  |

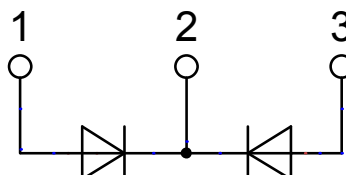
## Outlines ISOPLUS220



| 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 requirement of JEDEC outline TO-273 except D and D1.



## Fast Diode

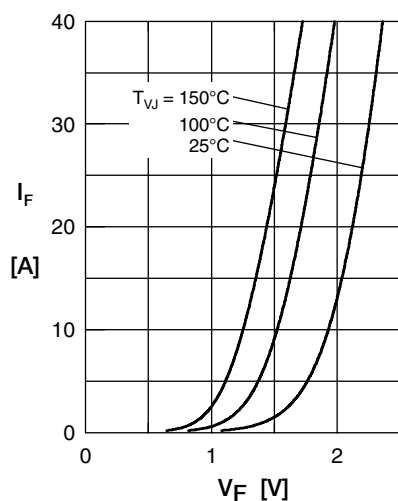


Fig. 1 Forward current  $I_F$  versus  $V_F$

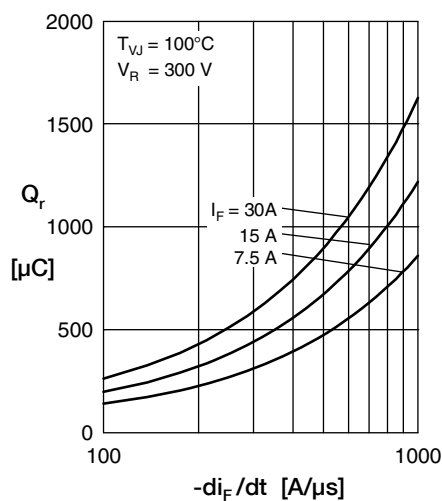


Fig. 2 Typ. reverse recov. charge  $Q_r$  versus  $-di_F/dt$

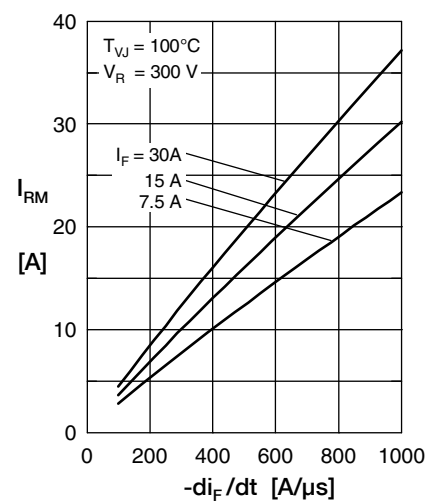


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

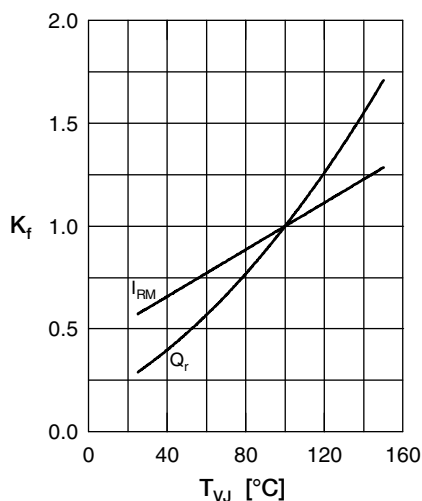


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

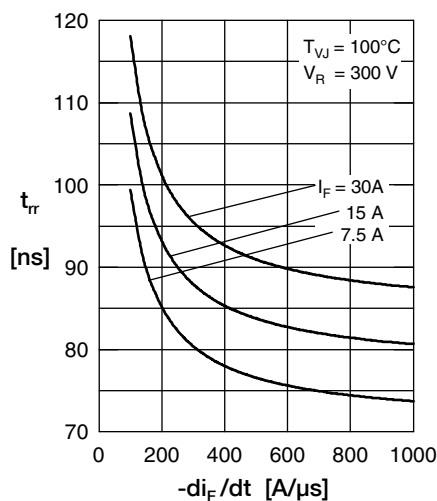


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$

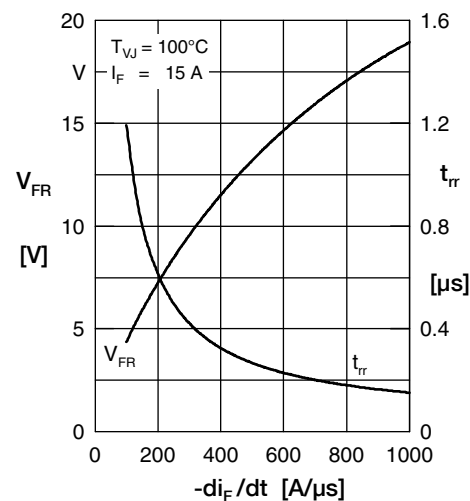


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{rr}$  versus  $di_F/dt$

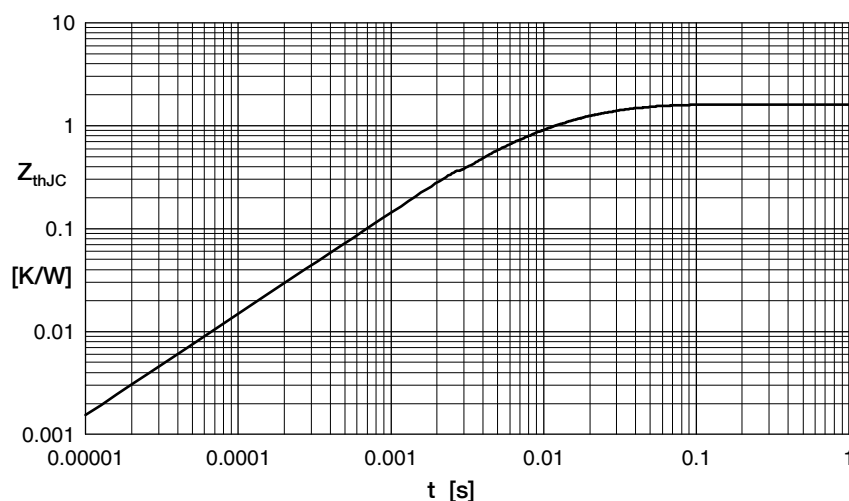


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.908           | 0.0052    |
| 2 | 0.350           | 0.0003    |
| 3 | 0.342           | 0.017     |