

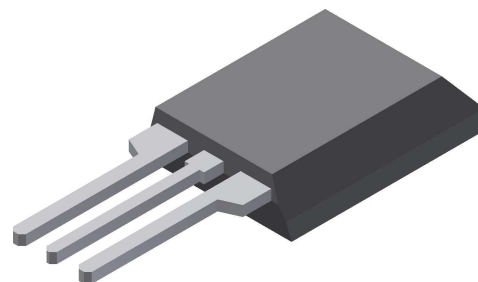
# HiPerFRED

|           |      |       |
|-----------|------|-------|
| $V_{RRM}$ | = 2x | 600 V |
| $I_{FAV}$ | =    | 15 A  |
| $t_{rr}$  | =    | 25 ns |

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

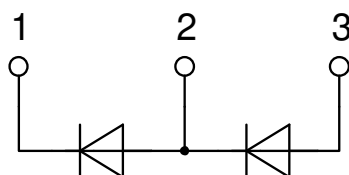
Part number

**DSEE15-12CC**



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

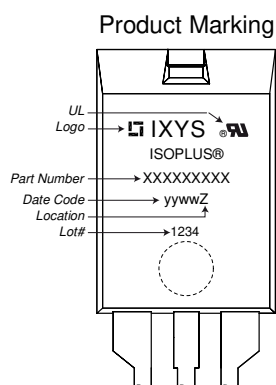
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

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| 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                                                             |                         |                          |      | 600  | V    |  |
| V <sub>RRM</sub>  | max. repetitive reverse blocking voltage     | T <sub>VJ</sub> = 25°C                                                             |                         |                          |      | 600  | V    |  |
| I <sub>R</sub>    | reverse current, drain current               | V <sub>R</sub> = 600 V                                                             | T <sub>VJ</sub> = 25°C  |                          |      | 100  | μA   |  |
|                   |                                              | V <sub>R</sub> = 600 V                                                             | T <sub>VJ</sub> = 150°C |                          |      | 0.5  | mA   |  |
| V <sub>F</sub>    | forward voltage drop                         | I <sub>F</sub> = 15 A                                                              | T <sub>VJ</sub> = 25°C  |                          |      | 2.04 | V    |  |
|                   |                                              | I <sub>F</sub> = 30 A                                                              |                         |                          |      | 2.25 | V    |  |
|                   |                                              | I <sub>F</sub> = 15 A                                                              | T <sub>VJ</sub> = 150°C |                          |      | 1.35 | V    |  |
|                   |                                              | I <sub>F</sub> = 30 A                                                              |                         |                          |      | 1.59 | V    |  |
| I <sub>FAV</sub>  | average forward current                      | T <sub>C</sub> = 140°C<br>rectangular      d = 0.5                                 | T <sub>VJ</sub> = 175°C |                          |      | 15   | A    |  |
| V <sub>F0</sub>   | threshold voltage                            | } for power loss calculation only                                                  |                         | T <sub>VJ</sub> = 175°C  |      | 0.99 | V    |  |
| r <sub>F</sub>    | slope resistance                             |                                                                                    |                         |                          |      | 15   | mΩ   |  |
| R <sub>thJC</sub> | thermal resistance junction to case          |                                                                                    |                         |                          |      | 1.6  | 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                                                              |                         |                          |      | 95   | 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   |      | 110  | A    |  |
| C <sub>J</sub>    | junction capacitance                         | V <sub>R</sub> = 400 V   f = 1 MHz                                                 |                         | T <sub>VJ</sub> = 25°C   | 12   |      | pF   |  |
| I <sub>RM</sub>   | max. reverse recovery current                | } I <sub>F</sub> = 15 A; V <sub>R</sub> = 300 V<br>-di <sub>F</sub> /dt = 600 A/μs |                         | T <sub>VJ</sub> = 25 °C  | 11   |      | A    |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 100 °C | 19   |      | A    |  |
| t <sub>rr</sub>   | reverse recovery time                        |                                                                                    |                         | T <sub>VJ</sub> = 25 °C  | 25   |      | ns   |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 100 °C | 83   |      | ns   |  |

| Package ISOPLUS220 |                                                              |                      | 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    |
| $F_c$              | 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 | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEE15-12CC     | DSEE15-12CC        | Tube          | 50       | 500725   |

### Equivalent Circuits for Simulation

\* on die level

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



**Fast Diode**

$V_{0\max}$  threshold voltage

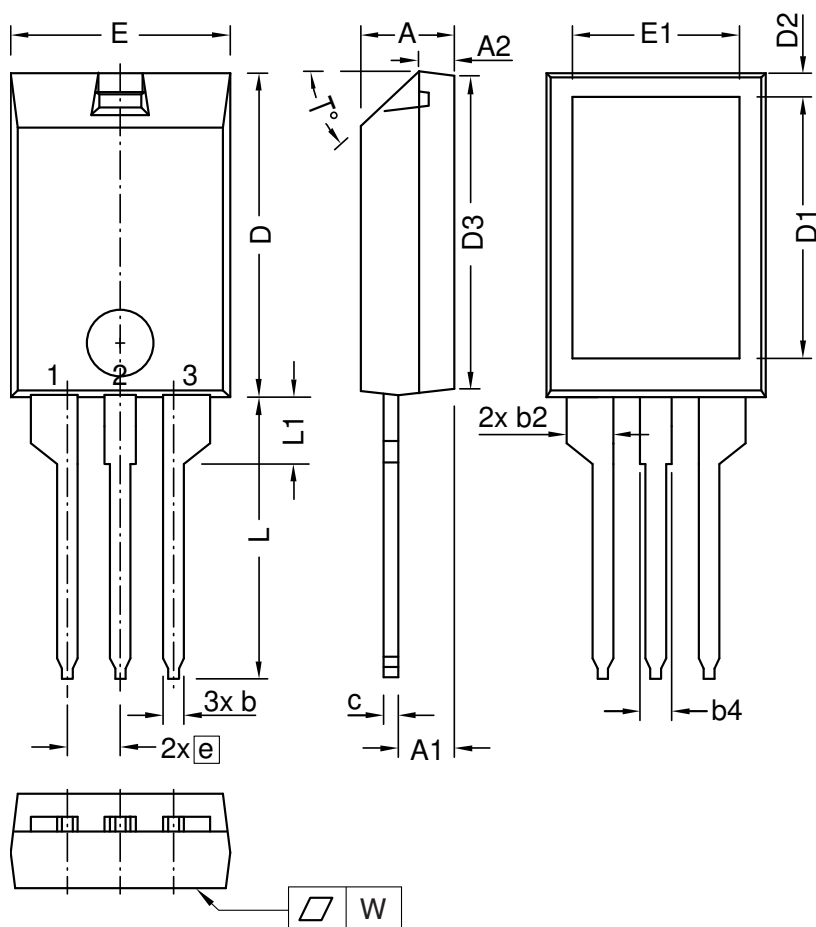
0.99

V

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

11.3

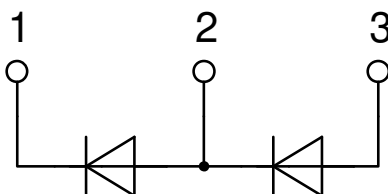
mΩ

**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.



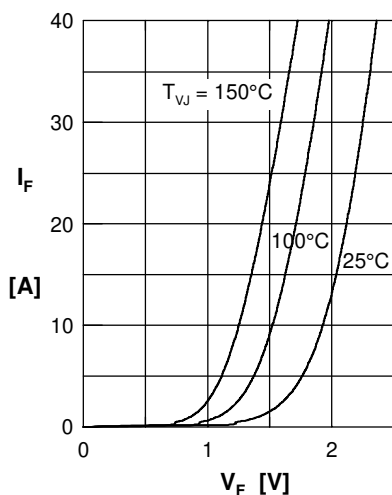
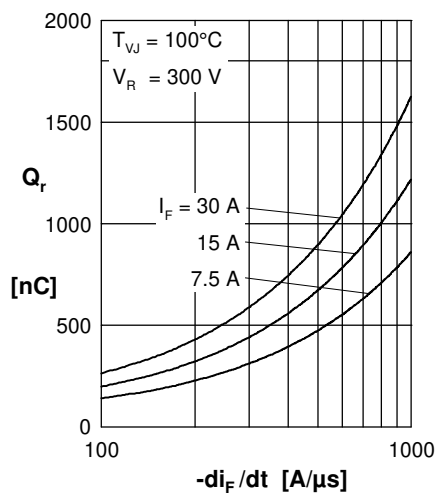
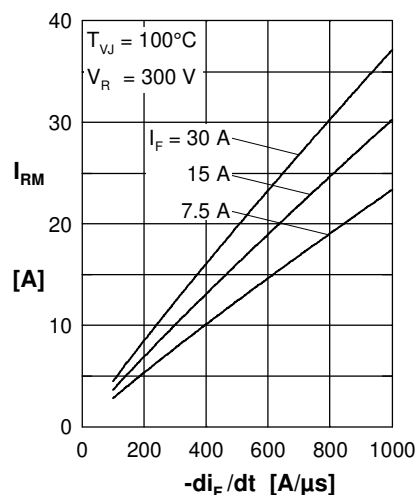
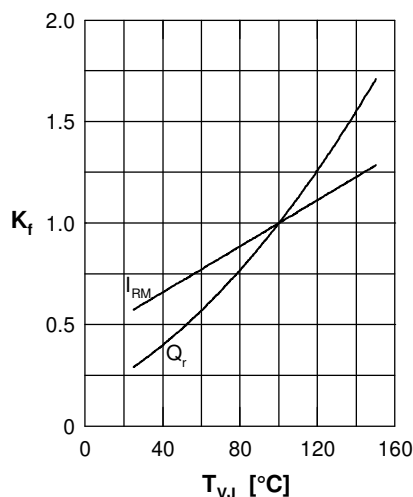
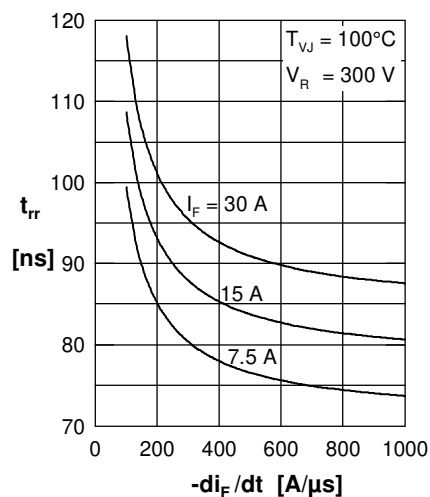
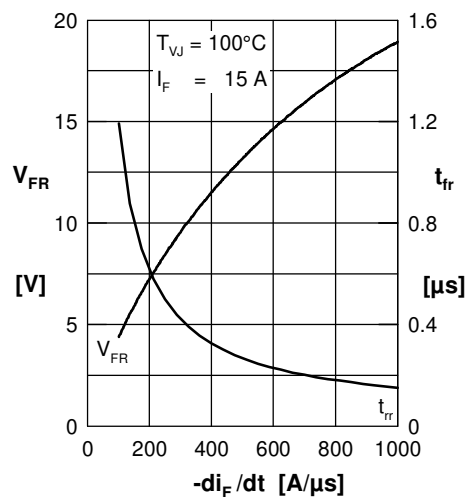
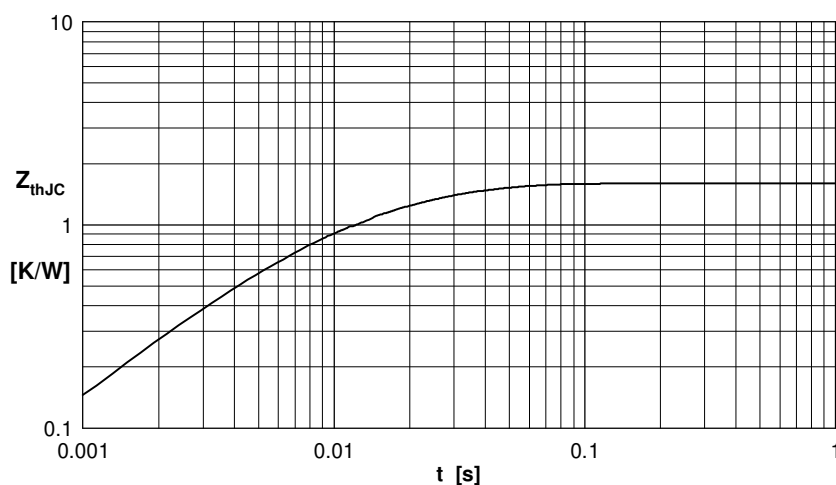
**Fast Diode**

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

 Fig. 2 Typ. reverse recovery charge  $Q_{rr}$  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 typ. forward recovery time  $t_{fr}$  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 | 0.908           | 0.0052    |
| 2 | 0.350           | 0.0003    |
| 3 | 0.342           | 0.0170    |