

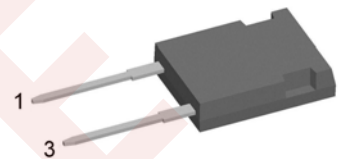
# HiPerFRED

$$\begin{aligned} V_{RRM} &= 1200\text{ V} \\ I_{FAV} &= 30\text{ A} \\ t_{rr} &= 40\text{ ns} \end{aligned}$$

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

Part number

**DSEP30-12AR**



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: ISOPLUS247

- 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

## Disclaimer Notice

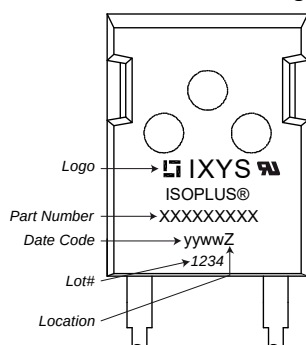
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| Fast Diode        |                                              |                                                                                    |                                    | Ratings                 |      |      |      |  |  |
|-------------------|----------------------------------------------|------------------------------------------------------------------------------------|------------------------------------|-------------------------|------|------|------|--|--|
| Symbol            | Definition                                   | Conditions                                                                         |                                    | min.                    | typ. | max. | Unit |  |  |
| V <sub>RSM</sub>  | max. non-repetitive reverse blocking voltage | T <sub>VJ</sub> = 25°C                                                             |                                    |                         |      | 1200 | V    |  |  |
| V <sub>RRM</sub>  | max. repetitive reverse blocking voltage     | T <sub>VJ</sub> = 25°C                                                             |                                    |                         |      | 1200 | V    |  |  |
| I <sub>R</sub>    | reverse current, drain current               | V <sub>R</sub> = 1200 V                                                            | T <sub>VJ</sub> = 25°C             |                         |      | 250  | μA   |  |  |
|                   |                                              | V <sub>R</sub> = 1200 V                                                            | T <sub>VJ</sub> = 150°C            |                         |      | 1    | mA   |  |  |
| V <sub>F</sub>    | forward voltage drop                         | I <sub>F</sub> = 30 A                                                              | T <sub>VJ</sub> = 25°C             |                         |      | 2,74 | V    |  |  |
|                   |                                              | I <sub>F</sub> = 60 A                                                              |                                    |                         |      | 3,27 | V    |  |  |
|                   |                                              | I <sub>F</sub> = 30 A                                                              | T <sub>VJ</sub> = 150°C            |                         |      | 1,79 | V    |  |  |
|                   |                                              | I <sub>F</sub> = 60 A                                                              |                                    |                         |      | 2,30 | V    |  |  |
| I <sub>FAV</sub>  | average forward current                      | T <sub>C</sub> = 105°C<br>rectangular                                              | T <sub>VJ</sub> = 175°C<br>d = 0.5 |                         |      | 30   | A    |  |  |
| V <sub>F0</sub>   | threshold voltage                            | } for power loss calculation only                                                  |                                    | T <sub>VJ</sub> = 175°C |      | 1,12 | V    |  |  |
| r <sub>F</sub>    | slope resistance                             |                                                                                    |                                    |                         |      | 16   | mΩ   |  |  |
| R <sub>thJC</sub> | thermal resistance junction to case          |                                                                                    |                                    |                         |      | 1,1  | K/W  |  |  |
| R <sub>thCH</sub> | thermal resistance case to heatsink          |                                                                                    |                                    |                         | 0,25 |      | K/W  |  |  |
| P <sub>tot</sub>  | total power dissipation                      | T <sub>C</sub> = 25°C                                                              |                                    |                         |      | 135  | 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  |      | 200  | A    |  |  |
| C <sub>J</sub>    | junction capacitance                         | V <sub>R</sub> = 600V f = 1 MHz                                                    |                                    | T <sub>VJ</sub> = 25°C  | 12   |      | pF   |  |  |
| I <sub>RM</sub>   | max. reverse recovery current                | } I <sub>F</sub> = 30 A; V <sub>R</sub> = 600 V<br>-di <sub>F</sub> /dt = 200 A/μs |                                    | T <sub>VJ</sub> = 25°C  | 8,5  |      | A    |  |  |
|                   |                                              |                                                                                    |                                    | T <sub>VJ</sub> = 100°C | 13   |      | A    |  |  |
| t <sub>rr</sub>   | reverse recovery time                        |                                                                                    |                                    | T <sub>VJ</sub> = 25°C  | 60   |      | ns   |  |  |
|                   |                                              |                                                                                    |                                    | T <sub>VJ</sub> = 100°C | 170  |      | ns   |  |  |



| Package ISOPLUS247 |                                                              |                      | Ratings |      |      |      |
|--------------------|--------------------------------------------------------------|----------------------|---------|------|------|------|
| Symbol             | Definition                                                   | Conditions           | min.    | typ. | max. | Unit |
| $I_{RMS}$          | RMS current                                                  | per terminal         |         |      | 70   | 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>      |                                                              |                      |         | 6    |      | g    |
| $F_c$              | mounting force with clip                                     |                      | 20      |      | 120  | N    |
| $d_{Spp/App}$      | creepage distance on surface   striking distance through air | terminal to terminal | 5,4     |      |      | mm   |
| $d_{Spb/Apb}$      |                                                              | terminal to backside | 4,1     |      |      | mm   |
| $V_{ISOL}$         | isolation voltage                                            | t = 1 second         | 3600    |      |      | V    |
|                    |                                                              | t = 1 minute         | 3000    |      |      | V    |

**Product Marking**



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEP30-12AR     | DSEP30-12AR        | Tube          | 30       | 481920   |

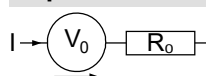
| Similar Part | Package        | Voltage class |
|--------------|----------------|---------------|
| DSEP30-12A   | TO-247AD (2)   | 1200          |
| DSEP29-12A   | TO-220AC (2)   | 1200          |
| DHG30I1200HA | TO-247AD (2)   | 1200          |
| DSEP30-12CR  | ISOPLUS247 (2) | 1200          |

|            |              |      |
|------------|--------------|------|
| DSEP30-12B | TO-247AD (2) | 1200 |
|------------|--------------|------|

**Equivalent Circuits for Simulation**

\* on die level

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



**Fast Diode**

$V_{0 \max}$  threshold voltage

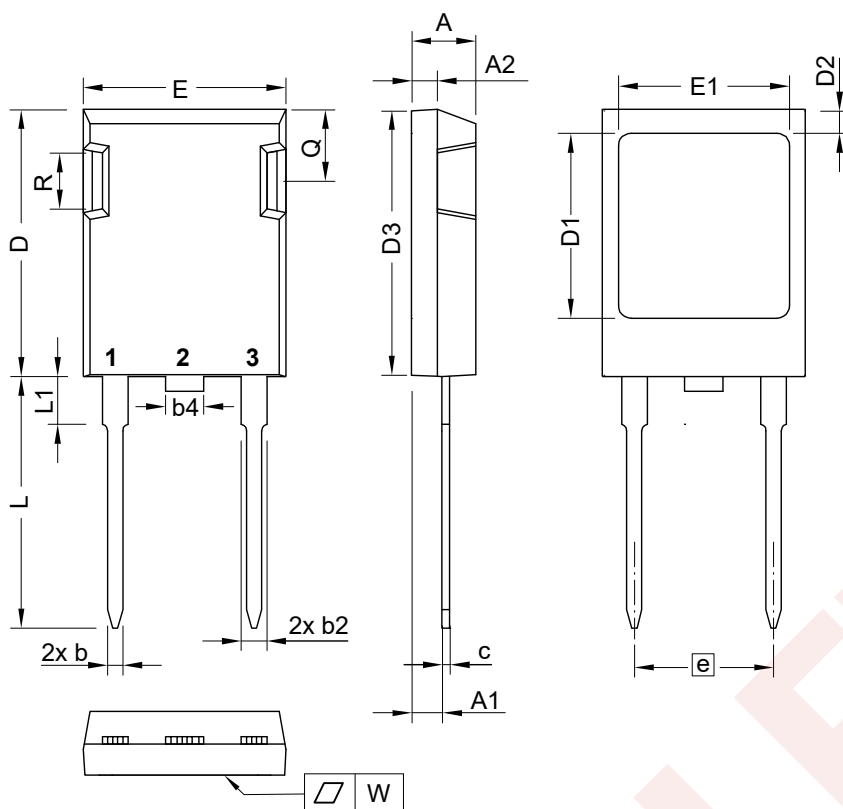
1,12

V

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

13,4

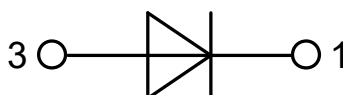
mΩ

**Outlines ISOPLUS247**


| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | min        | max   | min    | max   |
| A    | 4.83       | 5.21  | 0.190  | 0.205 |
| A1   | 2.29       | 2.54  | 0.090  | 0.100 |
| A2   | 1.91       | 2.16  | 0.075  | 0.085 |
| b    | 1.14       | 1.40  | 0.045  | 0.055 |
| b2   | 1.91       | 2.20  | 0.075  | 0.087 |
| b4   | 2.92       | 3.24  | 0.115  | 0.128 |
| c    | 0.61       | 0.83  | 0.024  | 0.033 |
| D    | 20.80      | 21.34 | 0.819  | 0.840 |
| D1   | 15.75      | 16.26 | 0.620  | 0.640 |
| D2   | 1.65       | 2.15  | 0.065  | 0.085 |
| D3   | 20.30      | 20.70 | 0.799  | 0.815 |
| E    | 15.75      | 16.13 | 0.620  | 0.635 |
| E1   | 13.21      | 13.72 | 0.520  | 0.540 |
| e    | 10.90      | BSC   | 0.429  | BSC   |
| L    | 19.81      | 20.60 | 0.780  | 0.811 |
| L1   | 3.81       | 4.38  | 0.150  | 0.172 |
| Q    | 5.59       | 6.20  | 0.220  | 0.244 |
| R    | 4.25       | 5.50  | 0.167  | 0.217 |
| W    | -          | 0.10  | -      | 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-247 AD gemäß JEDEC außer Schraubloch und  $L_{max}$ .  
 This drawing will meet all dimensions requirement of JEDEC outline TO-247 AD except screw hole and except  $L_{max}$ .



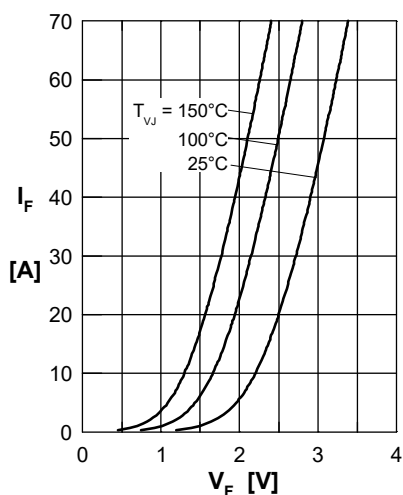
**Fast Diode**


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

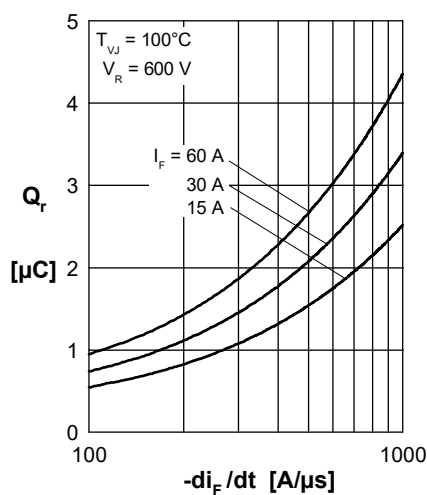


Fig. 2 Typ. reverse recov. charge  
 $Q_r$  versus  $-di_F/dt$

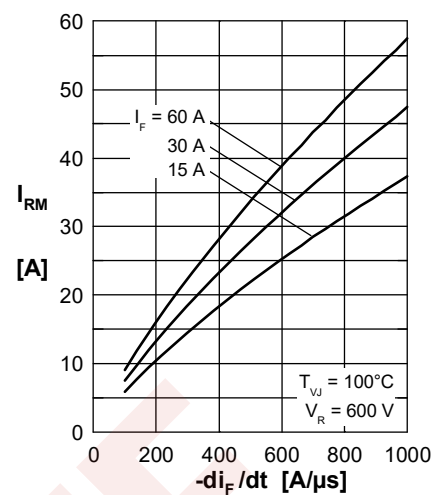


Fig. 3 Typ. peak reverse current  
 $I_{RM}$  versus  $-di_F/dt$

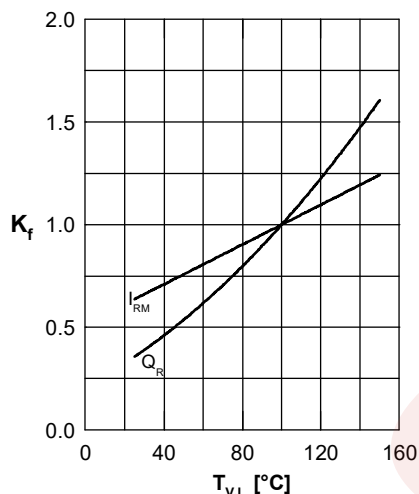


Fig. 4 Typ. dynamic parameters  
 $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

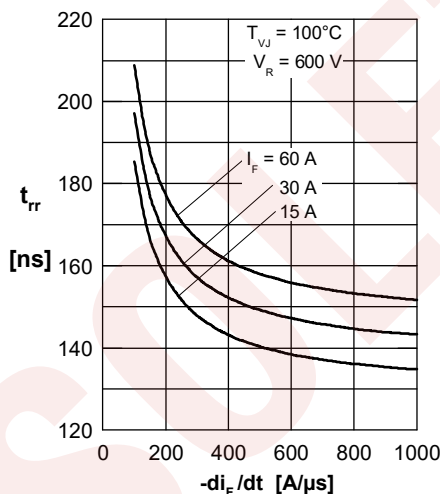


Fig. 5 Typ. recovery time  
 $t_{rr}$  versus  $-di_F/dt$

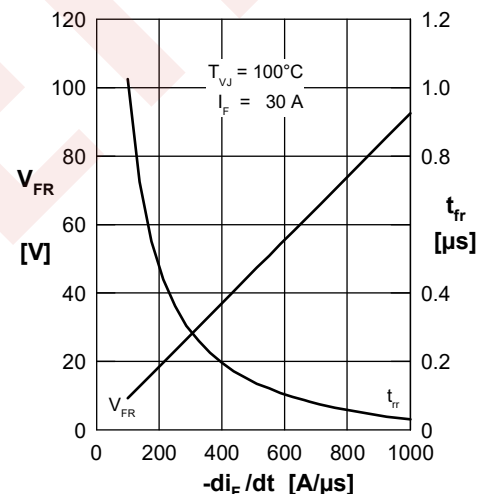


Fig. 6 Typ. peak forward voltage  
 $V_{FR}$  and  $t_{rr}$  versus  $di_F/dt$

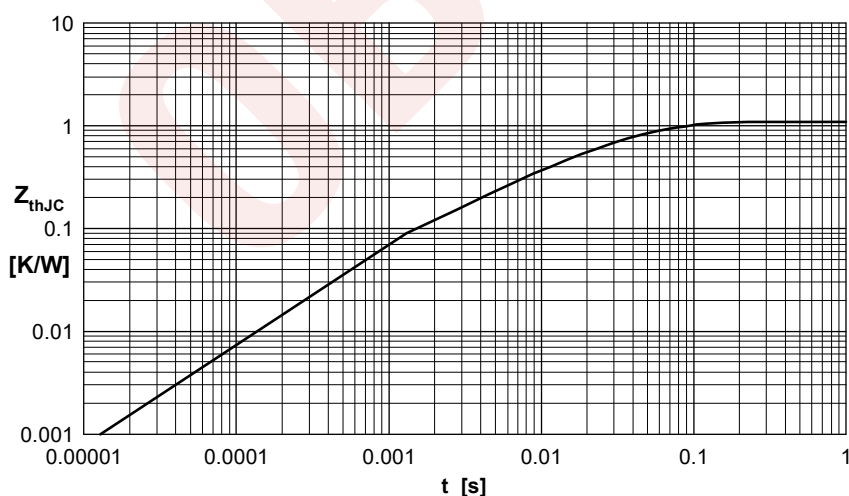


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

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