

# HiPerDynFRED

$$V_{RRM} = 1200\text{ V}$$

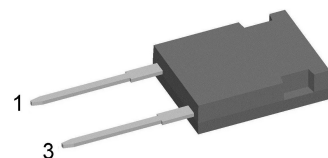
$$I_{FAV} = 30\text{ A}$$

$$t_{rr} = 15\text{ ns}$$

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

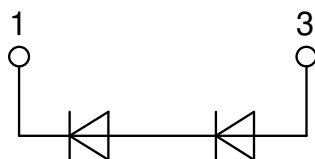
Part number

**DSEP30-12CR**



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
- 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

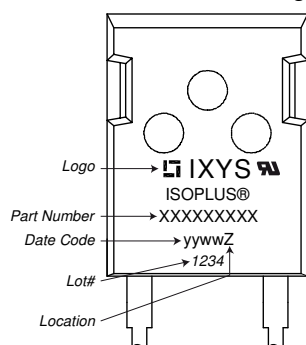
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| Fast Diode |                                              |                                                                                  |                                | Ratings                        |      |      |               |
|------------|----------------------------------------------|----------------------------------------------------------------------------------|--------------------------------|--------------------------------|------|------|---------------|
| Symbol     | Definition                                   | Conditions                                                                       |                                | min.                           | typ. | max. | Unit          |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |                                |      | 1200 | V             |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                                                    |                                |                                |      | 1200 | V             |
| $I_R$      | reverse current, drain current               | $V_R = 1200\text{ V}$                                                            | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 250  | $\mu\text{A}$ |
|            |                                              | $V_R = 1200\text{ V}$                                                            | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 2    | mA            |
| $V_F$      | forward voltage drop                         | $I_F = 30\text{ A}$                                                              | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 4.98 | V             |
|            |                                              | $I_F = 60\text{ A}$                                                              |                                |                                |      | 6.33 | V             |
|            |                                              | $I_F = 30\text{ A}$                                                              | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 3.18 | V             |
|            |                                              | $I_F = 60\text{ A}$                                                              |                                |                                |      | 4.40 | V             |
| $I_{FAV}$  | average forward current                      | $T_C = 105^{\circ}\text{C}$<br>rectangular $d = 0.5$                             | $T_{VJ} = 175^{\circ}\text{C}$ |                                |      | 30   | A             |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                                                |                                | $T_{VJ} = 175^{\circ}\text{C}$ |      | 1.69 | V             |
| $r_F$      | slope resistance                             |                                                                                  |                                |                                |      | 36.6 | m $\Omega$    |
| $R_{thJC}$ | thermal resistance junction to case          |                                                                                  |                                |                                |      | 0.6  | K/W           |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                                                  |                                |                                | 0.3  |      | K/W           |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                                                       |                                |                                |      | 250  | W             |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$               | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 250  | A             |
| $C_J$      | junction capacitance                         | $V_R = 800\text{ V}$ $f = 1\text{ MHz}$                                          | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 13   |      | pF            |
| $I_{RM}$   | max. reverse recovery current                | $I_F = 30\text{ A}; V_R = 600\text{ V}$<br>$-di_F/dt = 600\text{ A}/\mu\text{s}$ |                                | $T_{VJ} = 25^{\circ}\text{C}$  |      | 5.5  | A             |
|            |                                              |                                                                                  |                                | $T_{VJ} = 100^{\circ}\text{C}$ |      | 12.5 | A             |
| $t_{rr}$   | reverse recovery time                        |                                                                                  |                                | $T_{VJ} = 25^{\circ}\text{C}$  |      | 15   | ns            |
|            |                                              |                                                                                  |                                | $T_{VJ} = 100^{\circ}\text{C}$ |      | 70   | ns            |

| Package ISOPLUS247    |                                                              |                      |                                         | Ratings |      |      |      |
|-----------------------|--------------------------------------------------------------|----------------------|-----------------------------------------|---------|------|------|------|
| Symbol                | Definition                                                   | Conditions           |                                         | min.    | typ. | max. | Unit |
| I <sub>RMS</sub>      | RMS current                                                  | per terminal         |                                         |         |      | 70   | A    |
| T <sub>VJ</sub>       | virtual junction temperature                                 |                      |                                         | -55     |      | 175  | °C   |
| T <sub>op</sub>       | operation temperature                                        |                      |                                         | -55     |      | 150  | °C   |
| T <sub>stg</sub>      | storage temperature                                          |                      |                                         | -55     |      | 150  | °C   |
| Weight                |                                                              |                      |                                         |         | 6    |      | g    |
| F <sub>C</sub>        | mounting force with clip                                     |                      |                                         | 20      |      | 120  | N    |
| d <sub>Spp/App</sub>  | creepage distance on surface   striking distance through air | terminal to terminal |                                         | 5.4     |      |      | mm   |
| d <sub>Spb/Appb</sub> |                                                              | terminal to backside |                                         | 4.1     |      |      | mm   |
| V <sub>ISOL</sub>     | isolation voltage                                            | t = 1 second         | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA | 3600    |      |      | V    |
|                       |                                                              | t = 1 minute         |                                         | 3000    |      |      | V    |

### Product Marking



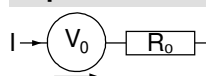
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEP30-12CR     | DSEP30-12CR        | Tube          | 30       | 481955   |

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

### Equivalent Circuits for Simulation

\* on die level

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



**Fast Diode**

$V_{0\max}$  threshold voltage

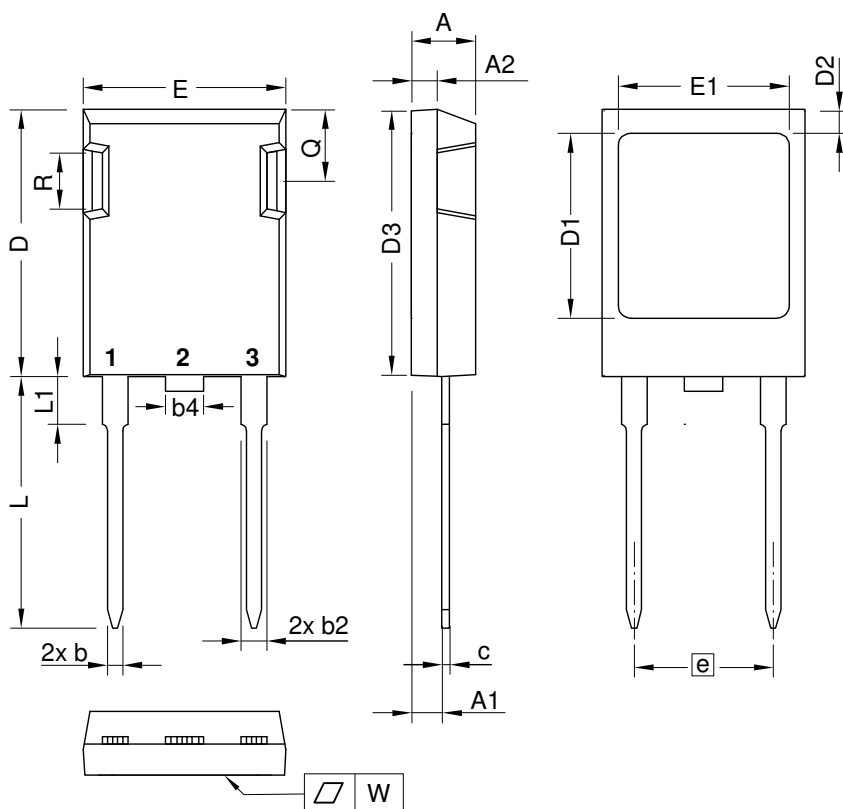
1.69

V

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

34

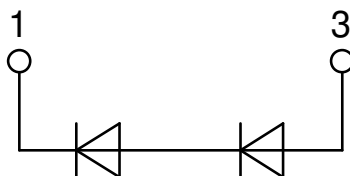
mΩ

**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  $L_{max}$ .



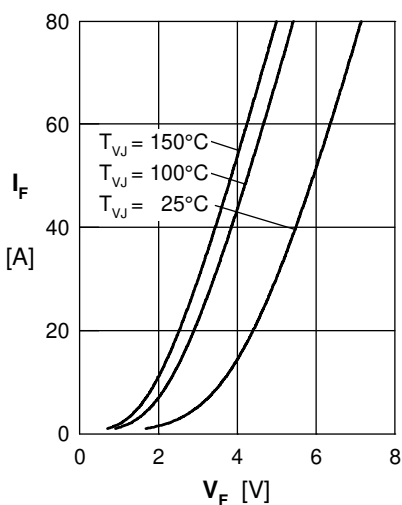
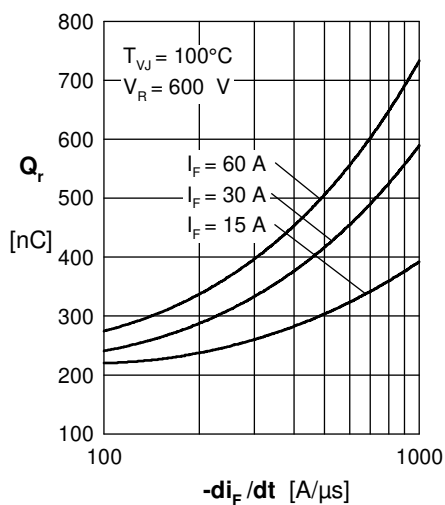
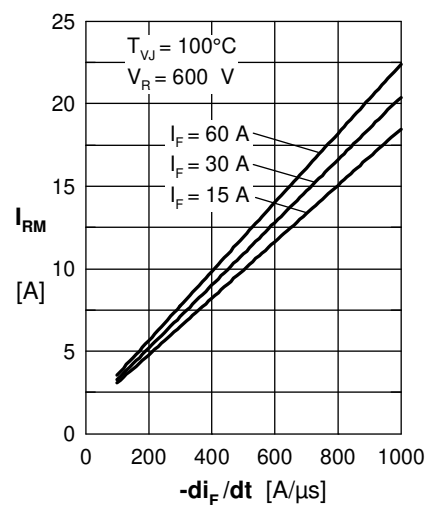
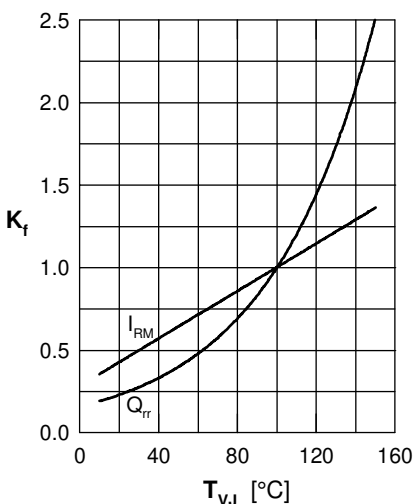
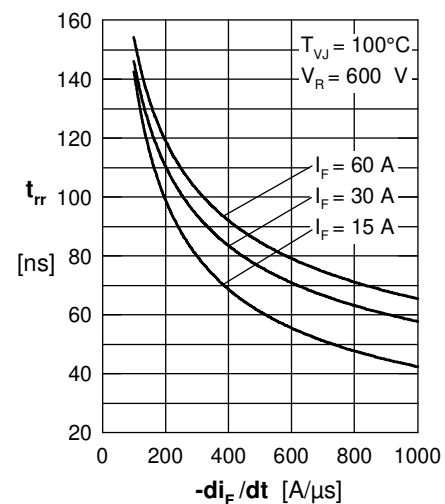
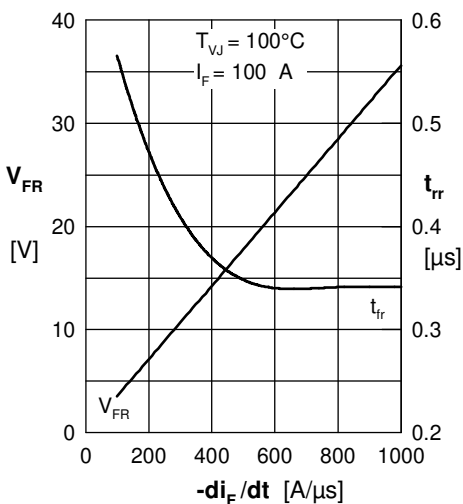
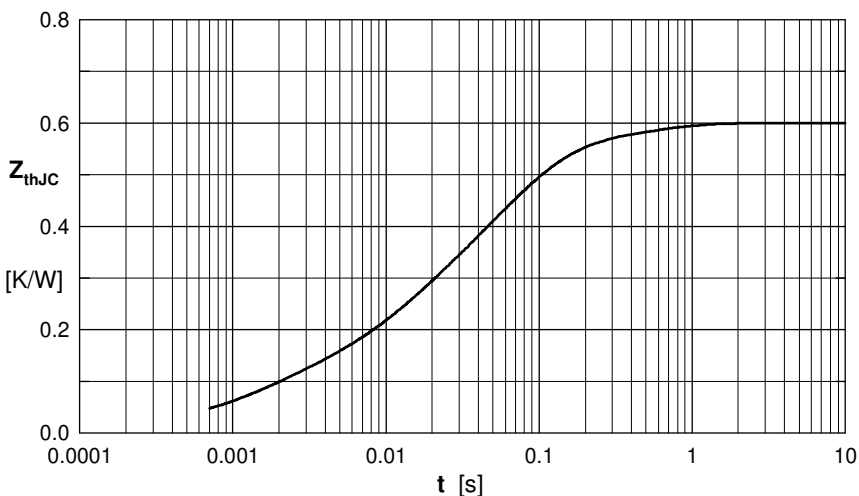
**Fast Diode**

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

 Fig. 2 Reverse recovery charge  $Q_r$  versus  $-di_F/dt$ 

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

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

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

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


Fig. 7 Transient thermal resistance junction to case

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.08            | 0.0013    |
| 2 | 0.122           | 0.0097    |
| 3 | 0.116           | 0.037     |
| 4 | 0.23            | 0.07      |
| 5 | 0.052           | 0.45      |