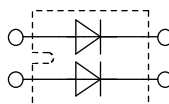


# HiPerFRED

High Performance Fast Recovery Diode  
Low Loss and Soft Recovery  
Parallel legs

Part number

DSEP2x91-03A



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:

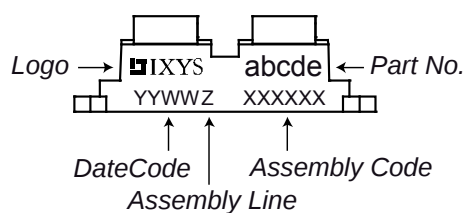
- Housing: SOT-227B (minibloc)
- Industry standard outline
- Cu base plate internal DCB isolated
- Isolation Voltage 3000 V
- Epoxy meets UL 94V-0
- RoHS compliant

## Ratings

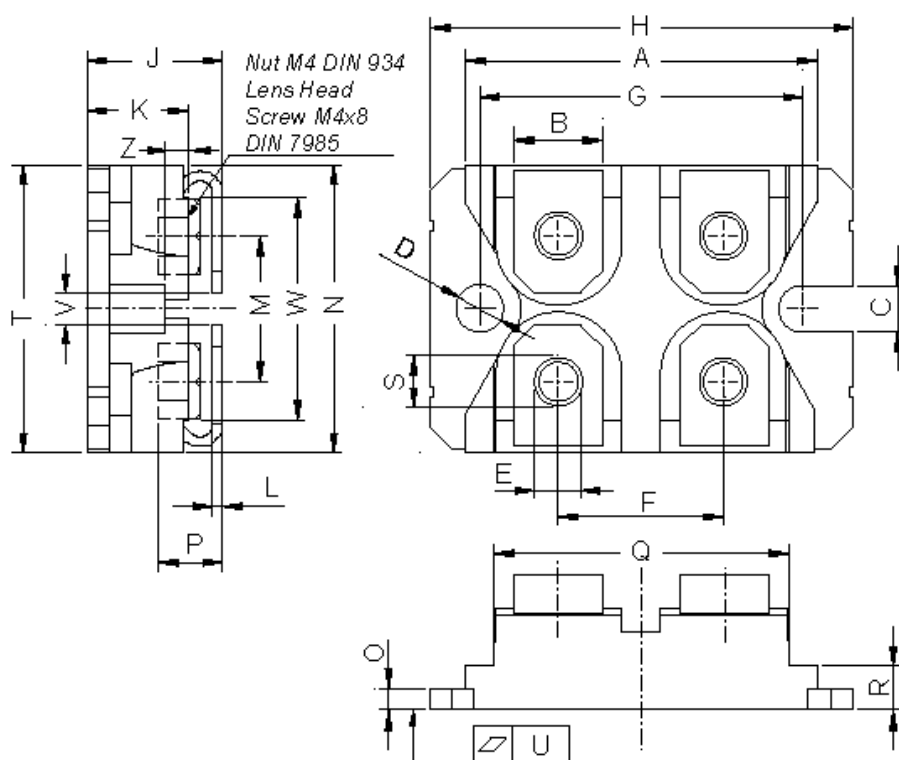
| Symbol     | Definition                          | Conditions                              |                                | min.                           | typ. | max. | Unit               |
|------------|-------------------------------------|-----------------------------------------|--------------------------------|--------------------------------|------|------|--------------------|
| $V_{RRM}$  | max. repetitive reverse voltage     |                                         | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 300  | V                  |
| $I_R$      | reverse current                     | $V_R = 300\text{ V}$                    | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1    | mA                 |
|            |                                     | $V_R = 300\text{ V}$                    | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 4    | mA                 |
| $V_F$      | forward voltage                     | $I_F = 90\text{ A}$                     | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.54 | V                  |
|            |                                     | $I_F = 180\text{ A}$                    |                                |                                |      | 1.86 | V                  |
|            |                                     | $I_F = 90\text{ A}$                     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.10 | V                  |
|            |                                     | $I_F = 180\text{ A}$                    |                                |                                |      | 1.44 | V                  |
| $I_{FAV}$  | average forward current             | rectangular $d = 0.5$                   | $T_C = 70^{\circ}\text{C}$     |                                |      | 90   | A                  |
| $V_{F0}$   | threshold voltage                   | } for power loss calculation only       |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.77 | V                  |
| $r_F$      | slope resistance                    |                                         |                                |                                |      | 3.7  | mΩ                 |
| $R_{thJC}$ | thermal resistance junction to case |                                         |                                |                                |      | 0.60 | K/W                |
| $T_{VJ}$   | virtual junction temperature        |                                         |                                | -40                            |      | 150  | $^{\circ}\text{C}$ |
| $P_{tot}$  | total power dissipation             |                                         | $T_C = 25^{\circ}\text{C}$     |                                |      | 200  | W                  |
| $I_{FSM}$  | max. forward surge current          | $t = 10\text{ ms (50 Hz), sine}$        | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 1000 | A                  |
| $I_{RM}$   | max. reverse recovery current       |                                         | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 12   |      | A                  |
|            |                                     | $I_F = 90\text{ A}; V_R = 150\text{ V}$ | $T_{VJ} = 100^{\circ}\text{C}$ |                                | 15   |      | A                  |
| $t_{rr}$   | reverse recovery time               | $-di_F/dt = 600\text{ A}/\mu\text{s}$   | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 40   |      | ns                 |
|            |                                     |                                         | $T_{VJ} = 100^{\circ}\text{C}$ |                                | 60   |      | ns                 |
| $C_J$      | junction capacitance                | $V_R = 150\text{ V}; f = 1\text{ MHz}$  | $T_{VJ} = 25^{\circ}\text{C}$  |                                | 273  |      | pF                 |

| Symbol        | Definition                                            | Conditions           | Ratings |      |      | Unit |
|---------------|-------------------------------------------------------|----------------------|---------|------|------|------|
|               |                                                       |                      | min.    | typ. | max. |      |
| $I_{RMS}$     | RMS current                                           | per terminal         |         |      | 100  | A    |
| $R_{thCH}$    | thermal resistance case to heatsink                   |                      |         | 0.10 |      | K/W  |
| $T_{stg}$     | storage temperature                                   |                      | -40     |      | 150  | °C   |
| <b>Weight</b> |                                                       |                      |         | 30   |      | g    |
| $M_D$         | mounting torque                                       |                      | 1.1     |      | 1.5  | Nm   |
| $M_T$         | terminal torque                                       |                      | 1.1     |      | 1.5  | Nm   |
| $V_{ISOL}$    | isolation voltage                                     | t = 1 second         | 3000    |      |      | V    |
|               |                                                       | t = 1 minute         | 2500    |      |      | V    |
| $d_{Spp/App}$ | creepage   striking distance on surface   through air | terminal to terminal | 10.5    | 3.2  |      | mm   |
| $d_{Spb/Apb}$ | creepage   striking distance on surface   through air | terminal to backside | 8.6     | 6.8  |      | mm   |

### Product Marking



| Ordering | Part Name    | Marking on Product | Delivering Mode | Base Qty | Code Key |
|----------|--------------|--------------------|-----------------|----------|----------|
| Standard | DSEP2x91-03A | DSEP2x91-03A       | Tube            | 10       | 476269   |

**Outlines SOT-227B (minibloc)**


| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | min        | max   | min    | max   |
| A    | 31.50      | 31.88 | 1.240  | 1.255 |
| B    | 7.80       | 8.20  | 0.307  | 0.323 |
| C    | 4.09       | 4.29  | 0.161  | 0.169 |
| D    | 4.09       | 4.29  | 0.161  | 0.169 |
| E    | 4.09       | 4.29  | 0.161  | 0.169 |
| F    | 14.91      | 15.11 | 0.587  | 0.595 |
| G    | 30.12      | 30.30 | 1.186  | 1.193 |
| H    | 37.80      | 38.23 | 1.488  | 1.505 |
| J    | 11.68      | 12.22 | 0.460  | 0.481 |
| K    | 8.92       | 9.60  | 0.351  | 0.378 |
| L    | 0.74       | 0.84  | 0.029  | 0.033 |
| M    | 12.50      | 13.10 | 0.492  | 0.516 |
| N    | 25.15      | 25.42 | 0.990  | 1.001 |
| O    | 1.95       | 2.13  | 0.077  | 0.084 |
| P    | 4.95       | 6.20  | 0.195  | 0.244 |
| Q    | 26.54      | 26.90 | 1.045  | 1.059 |
| R    | 3.94       | 4.42  | 0.155  | 0.167 |
| S    | 4.55       | 4.85  | 0.179  | 0.191 |
| T    | 24.59      | 25.25 | 0.968  | 0.994 |
| U    | -0.05      | 0.10  | -0.002 | 0.004 |
| V    | 3.20       | 5.50  | 0.126  | 0.217 |
| W    | 19.81      | 21.08 | 0.780  | 0.830 |
| Z    | 2.50       | 2.70  | 0.098  | 0.106 |

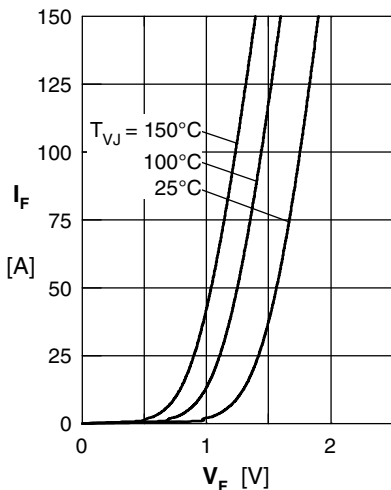


Fig. 1 Forward current  $I_F$  vs.  $V_F$

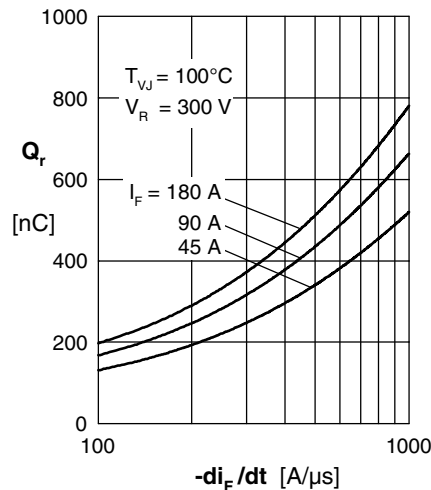


Fig. 2 Reverse recovery charge  $Q_r$  versus  $-di_F/dt$

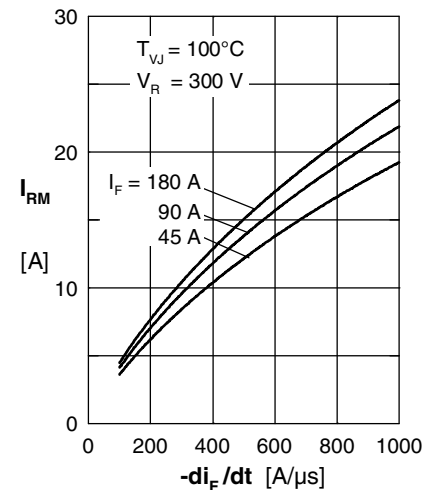


Fig. 3 Peak reverse current  $I_{RM}$  versus  $-di_F/dt$

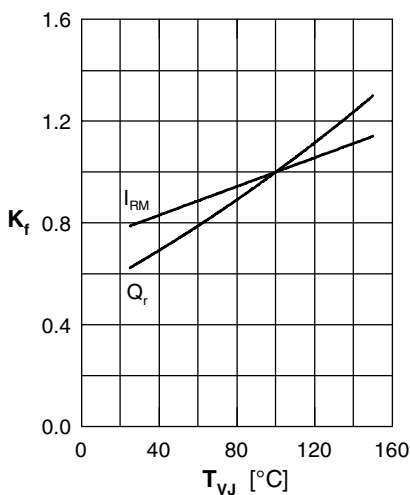


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

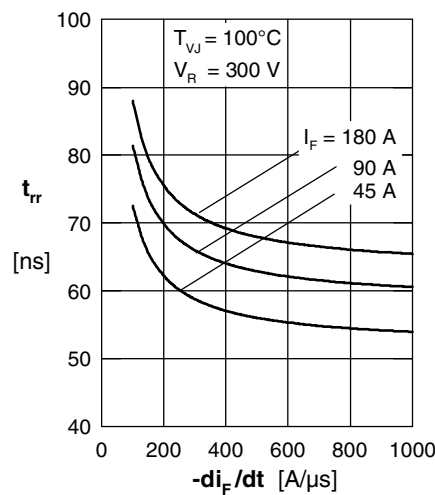


Fig. 5 Recovery time  $t_{rr}$  versus  $-di_F/dt$

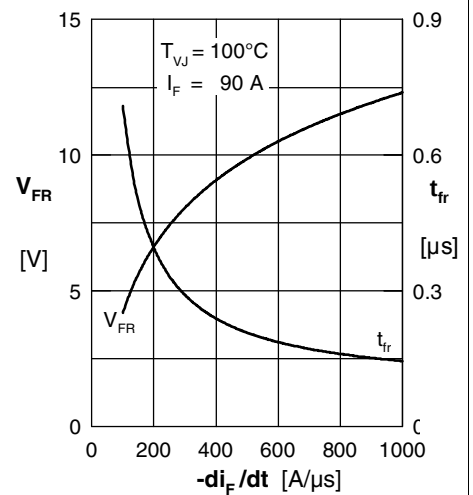


Fig. 6 Peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

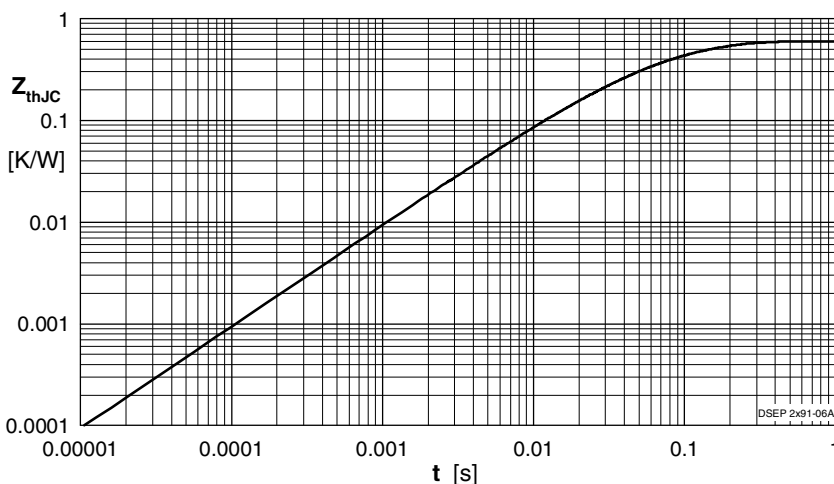


Fig. 7 Transient thermal resistance junction to case

Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.212           | 0.0055    |
| 2 | 0.248           | 0.0092    |
| 3 | 0.063           | 0.0007    |
| 4 | 0.077           | 0.0391    |