

HiPerFRED

$$V_{RRM} = 600V$$

$$I_{FAV} = 2x \ 30A$$

$$t_{rr} = 35ns$$

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

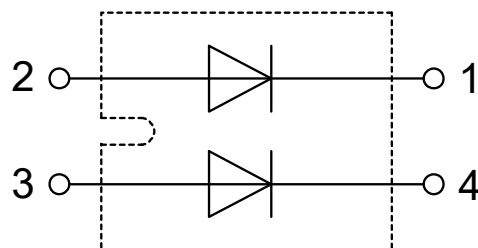
Part number

DSEP2x31-06A



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: SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Disclaimer Notice

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| Fast Diode | | | | Ratings | | | |
|------------|--|---|-------------------------|---------|------|------------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{RSM} | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 600 | V | |
| V_{RRM} | max. repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 600 | V | |
| I_R | reverse current, drain current | $V_R = 600 V$ | $T_{VJ} = 25^{\circ}C$ | | 250 | μA | |
| | | $V_R = 600 V$ | $T_{VJ} = 150^{\circ}C$ | | 1 | mA | |
| V_F | forward voltage drop | $I_F = 30 A$ | $T_{VJ} = 25^{\circ}C$ | | 1,58 | V | |
| | | $I_F = 60 A$ | | | 1,88 | V | |
| | | $I_F = 30 A$ | $T_{VJ} = 150^{\circ}C$ | | 1,23 | V | |
| | | $I_F = 60 A$ | | | 1,48 | V | |
| I_{FAV} | average forward current | $T_c = 100^{\circ}C$ rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}C$ | | 30 | A | |
| V_{FO} | threshold voltage | } for power loss calculation only | $T_{VJ} = 150^{\circ}C$ | | 0,98 | V | |
| r_F | slope resistance | | | | 8,2 | m Ω | |
| R_{thJC} | thermal resistance junction to case | | | | 1,15 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0,1 | | K/W | |
| P_{tot} | total power dissipation | | $T_c = 25^{\circ}C$ | | 100 | W | |
| I_{FSM} | max. forward surge current | $t = 10 ms; (50 Hz), sine; V_R = 0 V$ | $T_{VJ} = 45^{\circ}C$ | | 250 | A | |
| C_J | junction capacitance | $V_R = 400V$ $f = 1 MHz$ | $T_{VJ} = 25^{\circ}C$ | | 26 | pF | |
| I_{RM} | max. reverse recovery current | } $I_F = 30 A; V_R = 300 V$ $-di_F/dt = 400 A/\mu s$ | $T_{VJ} = 25^{\circ}C$ | | 12 | A | |
| | | | $T_{VJ} = 100^{\circ}C$ | | 20 | A | |
| t_{rr} | reverse recovery time | | $T_{VJ} = 25^{\circ}C$ | | 30 | ns | |
| | | | $T_{VJ} = 100^{\circ}C$ | | 90 | ns | |



| Package SOT-227B (minibloc) | | Ratings | | | | |
|-----------------------------|--|----------------------|-------------------------------------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 100 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 150 | °C |
| Weight | | | | 30 | | g |
| M_D | mounting torque | | 1,1 | | 1,5 | Nm |
| M_T | terminal torque | | 1,1 | | 1,5 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 10,5 | 3,2 | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 8,6 | 6,8 | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | | | 3000 | V |
| | | t = 1 minute | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | | 2500 | V |

Product Marking



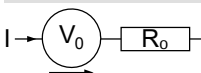
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEP2x31-06A | DSEP2x31-06A | Tube | 10 | 473928 |

| Similar Part | Package | Voltage class |
|--------------|---------------------|---------------|
| DSEP2x31-06B | SOT-227B (minibloc) | 600 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150^\circ\text{C}$



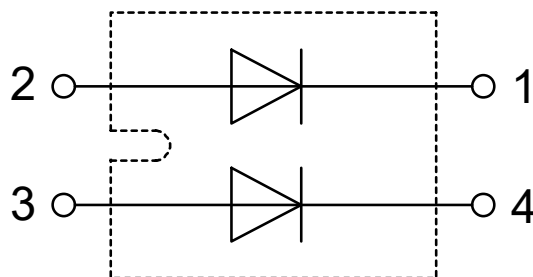
| Symbol | Definition | Fast Diode | Unit |
|--------------|--------------------|------------|------|
| $V_{0\ max}$ | threshold voltage | 0,98 | V |
| $R_{0\ max}$ | slope resistance * | 6,3 | mΩ |



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 |



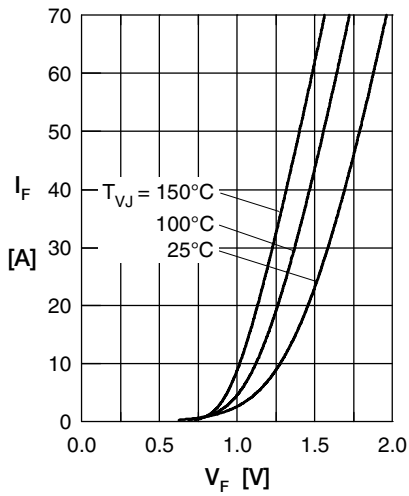
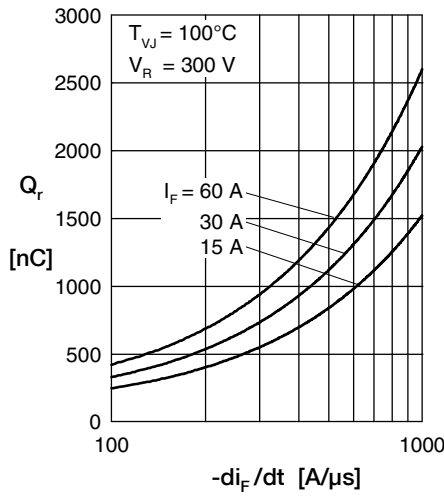
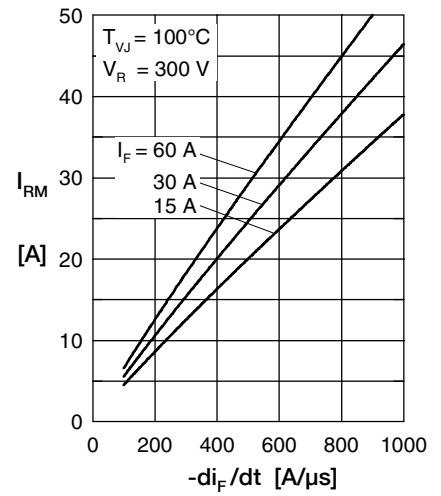
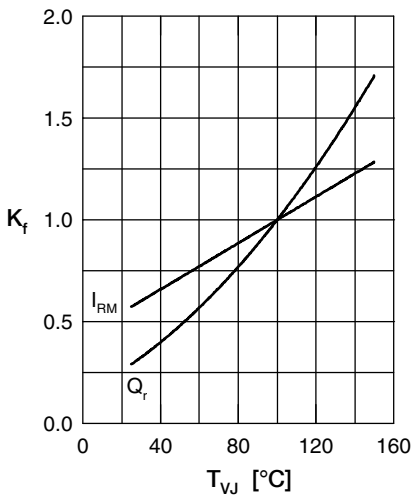
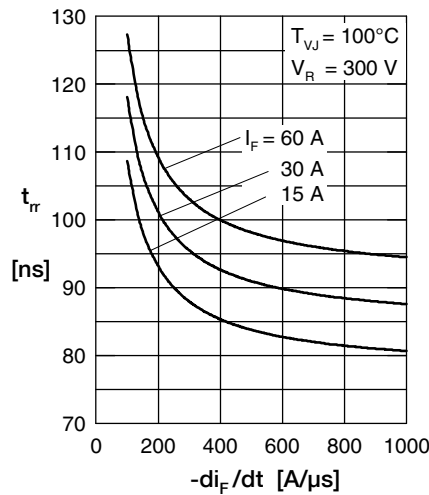
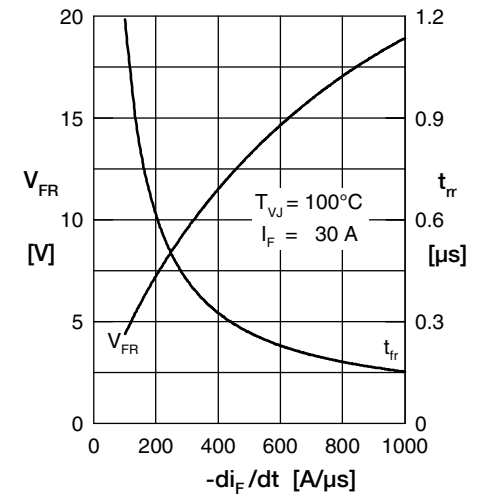
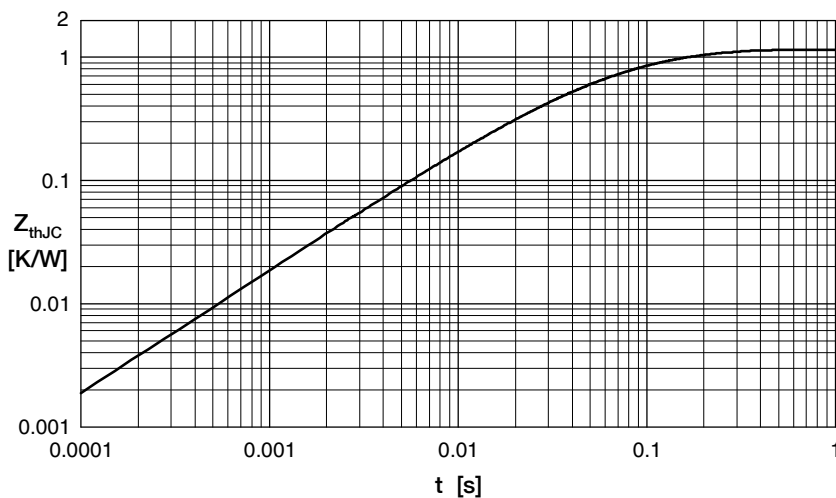
Fast Diode

 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_{tr} versus $-di_F/dt$

 Fig. 6 Peak forward voltage V_{FR} and t_{tr} 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 | 0.436 | 0.0055 |
| 2 | 0.482 | 0.0092 |
| 3 | 0.117 | 0.0007 |
| 4 | 0.115 | 0.0418 |