



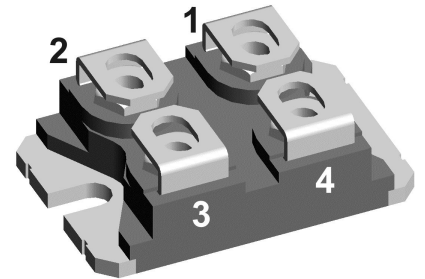
FRED

$V_{RRM} = 400\text{ V}$
 $I_{FAV} = 2 \times 60\text{ A}$
 $t_{rr} = 35\text{ ns}$

Fast Recovery Epitaxial Diode
 Low Loss and Soft Recovery
 Anti-parallel legs

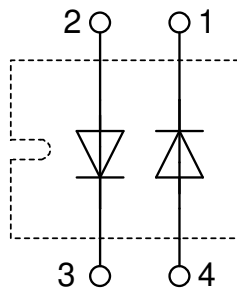
Part number

DSEI2x60-04C



Backside: isolated

E72873



Features / Advantages:

- Planar passivated chips
- 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

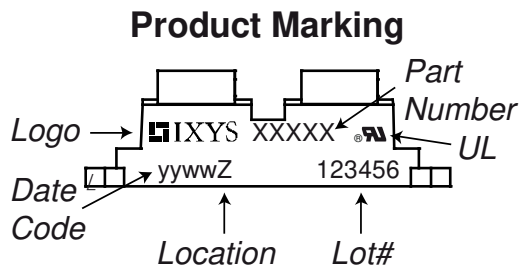
Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.



| Fast Diode | | | | Ratings | | | |
|------------|--|--|------------------------------|------------------------------|------|------|---------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 400 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 400 | V |
| I_R | reverse current, drain current | $V_R = 400\text{ V}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 200 | μA |
| | | $V_R = 320\text{ V}$ | $T_{VJ} = 125^\circ\text{C}$ | | | 14 | mA |
| V_F | forward voltage drop | $I_F = 60\text{ A}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 1.72 | V |
| | | $I_F = 120\text{ A}$ | | | | 1.96 | V |
| | | $I_F = 60\text{ A}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 1.47 | V |
| | | $I_F = 120\text{ A}$ | | | | 1.80 | V |
| I_{FAV} | average forward current | $T_C = 75^\circ\text{C}$ rectangular $d = 0.5$ | $T_{VJ} = 150^\circ\text{C}$ | | | 60 | A |
| V_{FO} | threshold voltage | } for power loss calculation only | | | | 1.16 | V |
| r_F | slope resistance | | | | | 5.1 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | | 0.7 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.10 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 180 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 550 | A |
| C_J | junction capacitance | $V_R = 400\text{ V}$ $f = 1\text{ MHz}$ | $T_{VJ} = 25^\circ\text{C}$ | | 60 | | pF |
| I_{RM} | max. reverse recovery current | } $I_F = 60\text{ A}; V_R = 350\text{ V}$ $-di_F/dt = 400\text{ A}/\mu\text{s}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 10 | A |
| | | | | $T_{VJ} = 100^\circ\text{C}$ | | 16 | A |
| t_{rr} | reverse recovery time | | | $T_{VJ} = 25^\circ\text{C}$ | | 100 | ns |
| | | | | $T_{VJ} = 100^\circ\text{C}$ | | 180 | ns |



| Package SOT-227B (minibloc) | | | | Ratings | | | |
|-----------------------------|--|----------------------|-------------------------------------|---------|------|------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| I_{RMS} | RMS current | per terminal | | | 150 | 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 | |



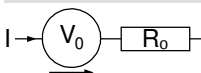
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DSEI2x60-04C | DSEI2x60-04C | Tube | 10 | 512461 |

| Similar Part | Package | Voltage class |
|--------------|---------------------|---------------|
| DSEI2x61-04C | SOT-227B (minibloc) | 400 |

Equivalent Circuits for Simulation

* on die level

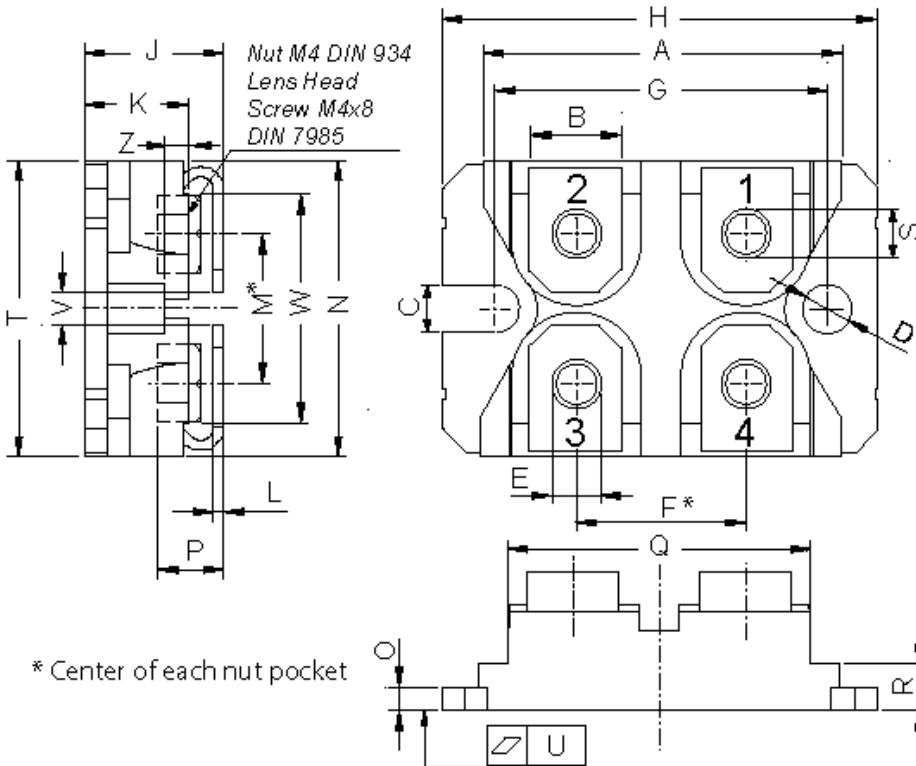
$T_{VJ} = 150^{\circ}C$



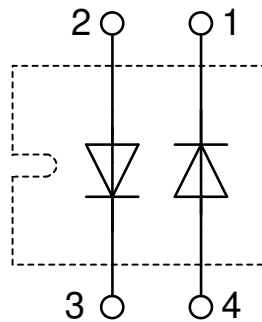
| Symbol | Definition | Value | Unit |
|--------------|--------------------|-------|------|
| $V_{0\ max}$ | threshold voltage | 1.16 | V |
| $R_{0\ max}$ | slope resistance * | 3.3 | mΩ |



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 |



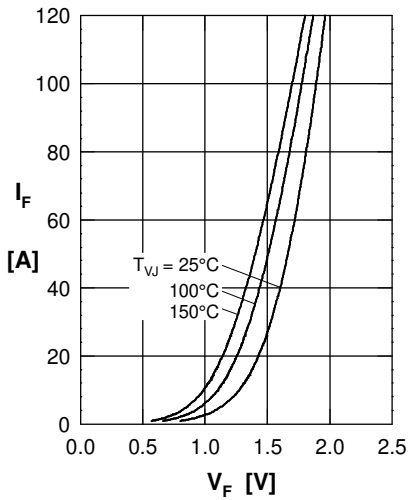
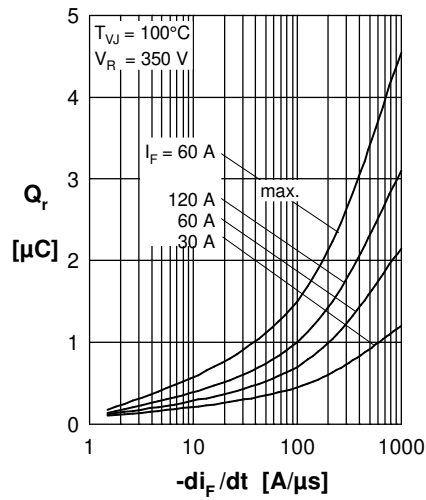
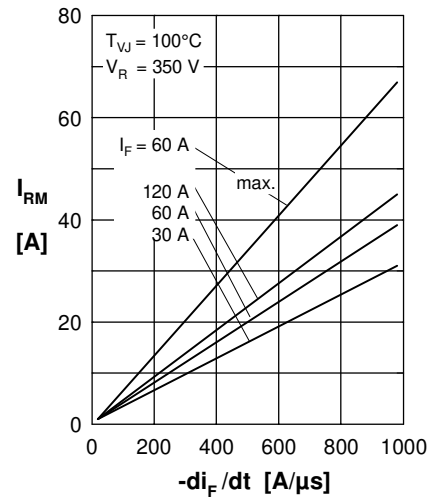
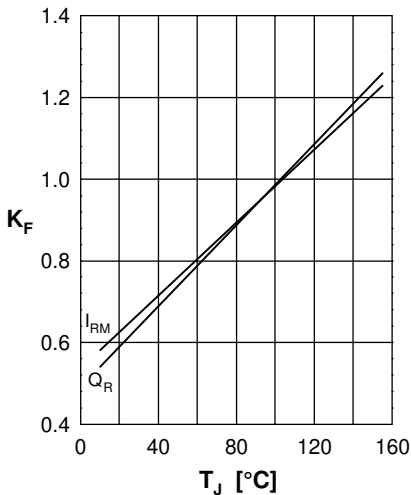
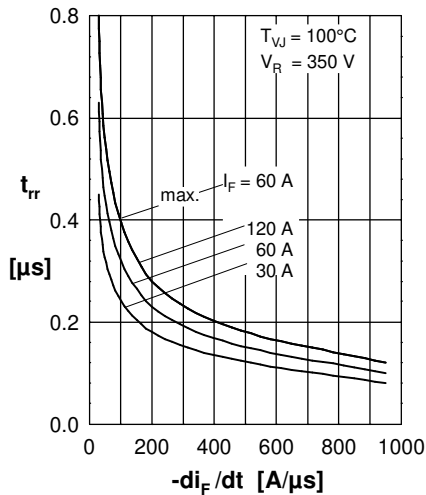
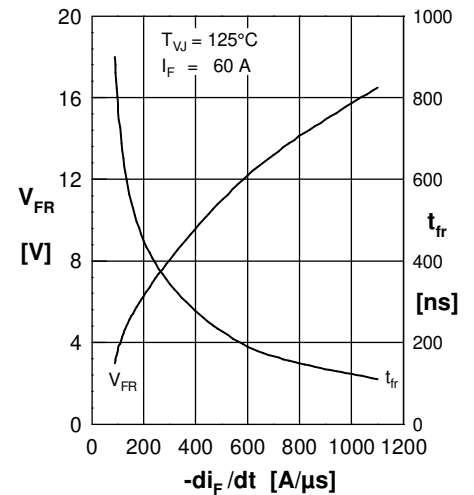
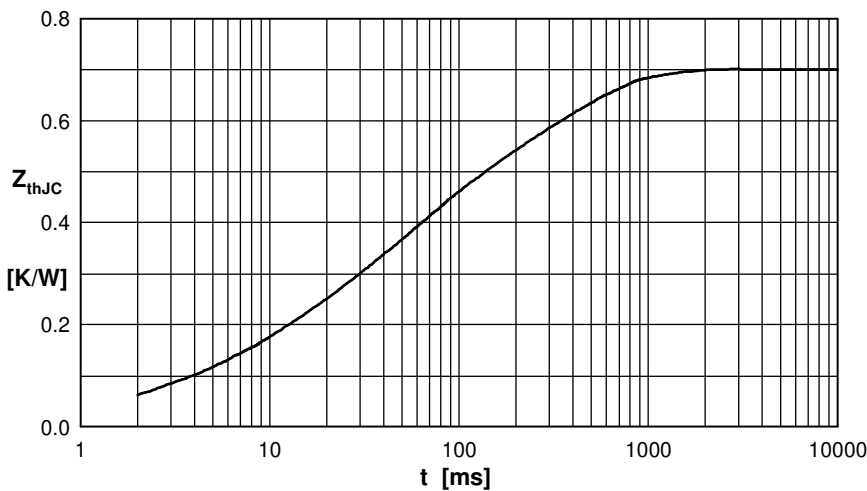
Fast Diode

 Fig. 1 Forward current I_F versus max. forward voltage drop 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 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

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

 Fig. 6 Typ. peak forward voltage V_{FR} and t_{tr} 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 | 0.120 | 0.010 |
| 2 | 0.045 | 0.002 |
| 3 | 0.105 | 0.050 |
| 4 | 0.160 | 0.050 |
| 5 | 0.270 | 0.350 |