

Standard Rectifier

| 1~ Rectifier | |
|--------------|---------|
| V_{RRM} | = 800 V |
| I_{DAV} | = 40 A |
| I_{FSM} | = 320 A |

1~ Rectifier Bridge

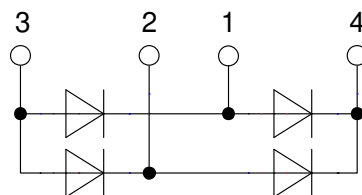
Part number

VBO40-08NO6



Backside: isolated

 E72873



Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

Applications:

- Diode for main rectification
- For one phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

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

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| Rectifier | | | | Ratings | | | | |
|------------|--|---|------------------------------|-----------------------------|------|------|------------------|------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit | |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 900 | V | |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 800 | V | |
| I_R | reverse current | $V_R = 800\text{ V}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 40 | μA | |
| | | $V_R = 800\text{ V}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 1.5 | mA | |
| V_F | forward voltage drop | $I_F = 20\text{ A}$ | $T_{VJ} = 25^\circ\text{C}$ | | | 1.15 | V | |
| | | | | | | 1.33 | V | |
| | | $I_F = 40\text{ A}$ | $T_{VJ} = 125^\circ\text{C}$ | | | 1.07 | V | |
| | | | | | | 1.31 | V | |
| I_{DAV} | bridge output current | $T_C = 115^\circ\text{C}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 40 | A | |
| | | rectangular | $d = 0.5$ | | | | | |
| V_{FO} | threshold voltage | } for power loss calculation only | | | | 0.81 | V | |
| r_F | slope resistance | | | | | | 12.1 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | | 1.3 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0.1 | | | K/W | |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | | 95 | W |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 320 | A | |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 345 | A | |
| | | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 270 | A | |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 295 | A | |
| I^2t | value for fusing | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 510 | A ² s | |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 495 | A ² s | |
| | | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 365 | A ² s | |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 360 | A ² s | |
| C_J | junction capacitance | $V_R = 400\text{ V}; f = 1\text{ MHz}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 11 | pF | |



| 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 | |

Product Marking



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VBO40-08NO6 | VBO40-08NO6 | Tube | 10 | 475866 |

| Similar Part | Package | Voltage class |
|--------------|---------------------|---------------|
| VBO40-12NO6 | SOT-227B (minibloc) | 1200 |
| VBO40-16NO6 | SOT-227B (minibloc) | 1600 |

Equivalent Circuits for Simulation

* on die level

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



Rectifier

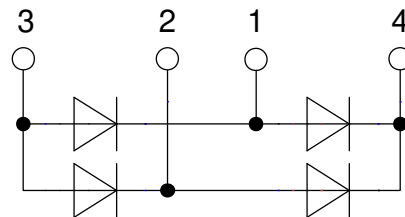
| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.81 | V |
| $R_{0\ max}$ | slope resistance * | 10.2 | mΩ |



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 |





Rectifier

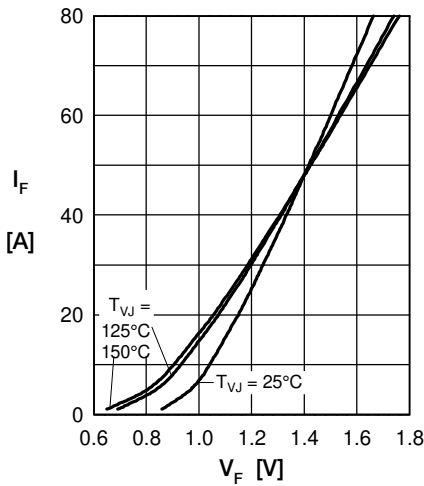


Fig. 1 Forward current vs. voltage drop per diode

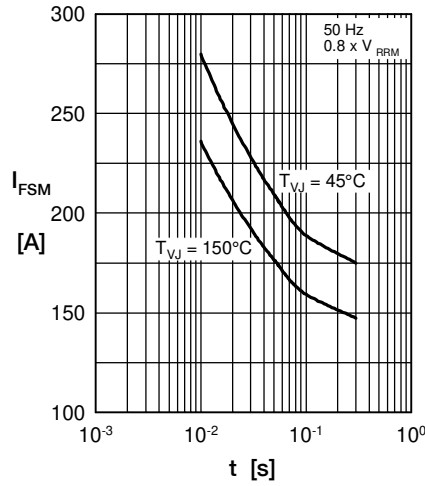


Fig. 2 Surge overload current vs. time per diode

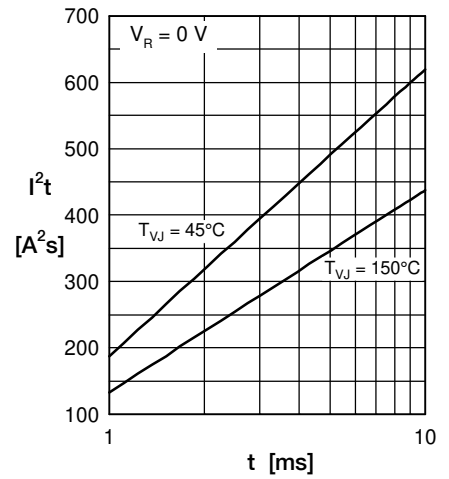


Fig. 3 I^2t vs. time per diode

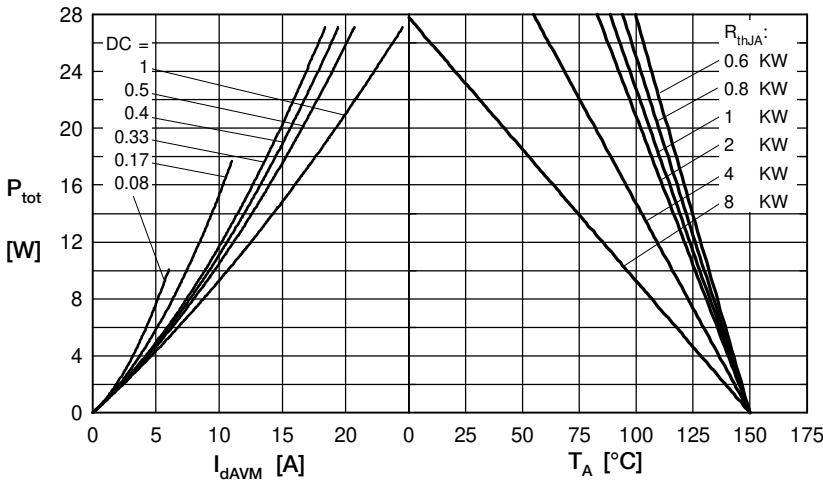


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

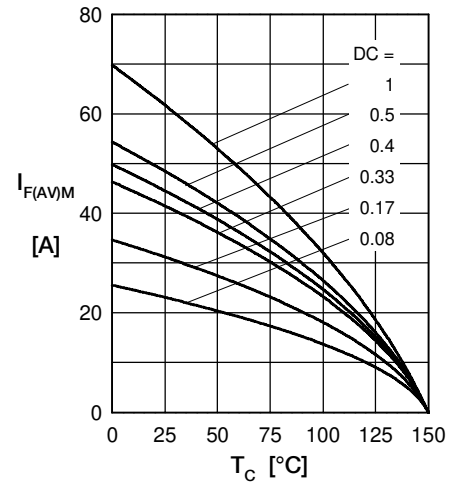


Fig. 5 Max. forward current vs. case temperature per diode

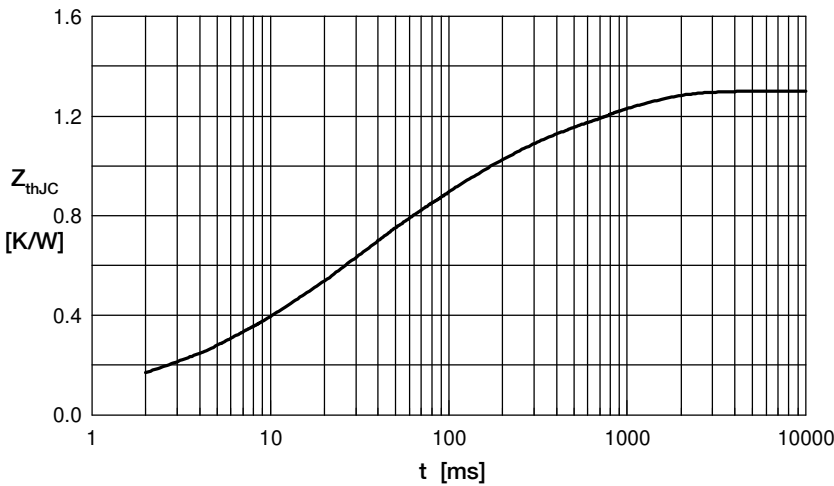


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for Z_{thJC} calculation:

| i | R_{th} (K/W) | t_i (s) |
|---|----------------|-----------|
| 1 | 0.061 | 0.0002 |
| 2 | 0.145 | 0.0036 |
| 3 | 0.398 | 0.0200 |
| 4 | 0.405 | 0.1000 |
| 5 | 0.291 | 0.7000 |