

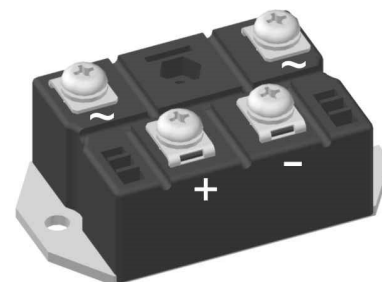
# Standard Rectifier Module

| 1~<br>Rectifier            |
|----------------------------|
| $V_{RRM} = 1800 \text{ V}$ |
| $I_{DAV} = 130 \text{ A}$  |
| $I_{FSM} = 1800 \text{ A}$ |

## 1~ Rectifier Bridge

Part number

**VBO130-18NO7**



 E72873



### Features / Advantages:

- Package with DCB ceramic
- Improved temperature and power cycling
- Planar passivated chips
- Very low forward voltage drop
- Very low leakage current

### 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: PWS-E

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Easy to mount with two screws
- Base plate: Copper internally DCB isolated
- Advanced power cycling

### Disclaimer Notice

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| Rectifier  |                                              |                                            |                                           | Ratings                        |      |      |                   |
|------------|----------------------------------------------|--------------------------------------------|-------------------------------------------|--------------------------------|------|------|-------------------|
| Symbol     | Definition                                   | Conditions                                 |                                           | min.                           | typ. | max. | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$              |                                           |                                |      | 1900 | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$              |                                           |                                |      | 1800 | V                 |
| $I_R$      | reverse current                              | $V_R = 1800\text{ V}$                      | $T_{VJ} = 25^{\circ}\text{C}$             |                                |      | 200  | $\mu\text{A}$     |
|            |                                              | $V_R = 1800\text{ V}$                      | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 2    | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 120\text{ A}$                       | $T_{VJ} = 25^{\circ}\text{C}$             |                                |      | 1.10 | V                 |
|            |                                              | $I_F = 240\text{ A}$                       |                                           |                                |      | 1.26 | V                 |
|            |                                              | $I_F = 120\text{ A}$                       | $T_{VJ} = 125^{\circ}\text{C}$            |                                |      | 1.00 | V                 |
|            |                                              | $I_F = 240\text{ A}$                       |                                           |                                |      | 1.21 | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 110^{\circ}\text{C}$<br>rectangular | $T_{VJ} = 150^{\circ}\text{C}$<br>d = 0.5 |                                |      | 130  | A                 |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only          |                                           | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.77 | V                 |
| $r_F$      | slope resistance                             |                                            |                                           |                                |      | 3.4  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                            |                                           |                                |      | 0.5  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                            |                                           |                                | 0.2  |      | K/W               |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                 |                                           |                                |      | 250  | W                 |
| $I_{FSM}$  | max. forward surge current                   | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 45^{\circ}\text{C}$             |                                |      | 1.80 | kA                |
|            |                                              | t = 8,3 ms; (60 Hz), sine                  | $V_R = 0\text{ V}$                        |                                |      | 1.95 | kA                |
|            |                                              | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 1.53 | kA                |
|            |                                              | t = 8,3 ms; (60 Hz), sine                  | $V_R = 0\text{ V}$                        |                                |      | 1.65 | kA                |
| $I^2t$     | value for fusing                             | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 45^{\circ}\text{C}$             |                                |      | 16.2 | kA <sup>2</sup> s |
|            |                                              | t = 8,3 ms; (60 Hz), sine                  | $V_R = 0\text{ V}$                        |                                |      | 15.7 | kA <sup>2</sup> s |
|            |                                              | t = 10 ms; (50 Hz), sine                   | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 11.7 | kA <sup>2</sup> s |
|            |                                              | t = 8,3 ms; (60 Hz), sine                  | $V_R = 0\text{ V}$                        |                                |      | 11.3 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$     |                                           |                                | 35   |      | pF                |

| Package PWS-E        |                                                              |                      | Ratings                                 |      |      |      |
|----------------------|--------------------------------------------------------------|----------------------|-----------------------------------------|------|------|------|
| Symbol               | Definition                                                   | Conditions           | min.                                    | typ. | max. | Unit |
| I <sub>RMS</sub>     | RMS current                                                  | per terminal         |                                         |      | 200  | A    |
| T <sub>VJ</sub>      | virtual junction temperature                                 |                      | -40                                     |      | 150  | °C   |
| T <sub>op</sub>      | operation temperature                                        |                      | -40                                     |      | 125  | °C   |
| T <sub>stg</sub>     | storage temperature                                          |                      | -40                                     |      | 125  | °C   |
| Weight               |                                                              |                      |                                         | 273  |      | g    |
| M <sub>D</sub>       | mounting torque                                              |                      | 4.25                                    |      | 5.75 | Nm   |
| M <sub>T</sub>       | terminal torque                                              |                      | 4.25                                    |      | 5.75 | Nm   |
| d <sub>Spp/App</sub> | creepage distance on surface   striking distance through air | terminal to terminal | 12.0                                    |      |      | mm   |
| d <sub>Spb/Apb</sub> |                                                              | terminal to backside | 26.0                                    |      |      | mm   |
| V <sub>ISOL</sub>    | isolation voltage                                            | t = 1 second         | 3000                                    |      |      | V    |
|                      |                                                              | t = 1 minute         | 2500                                    |      |      | V    |
|                      |                                                              |                      | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA |      |      |      |



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VBO130-18NO7    | VBO130-18NO7       | Box           | 5        | 491373   |

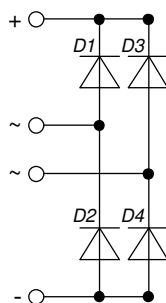
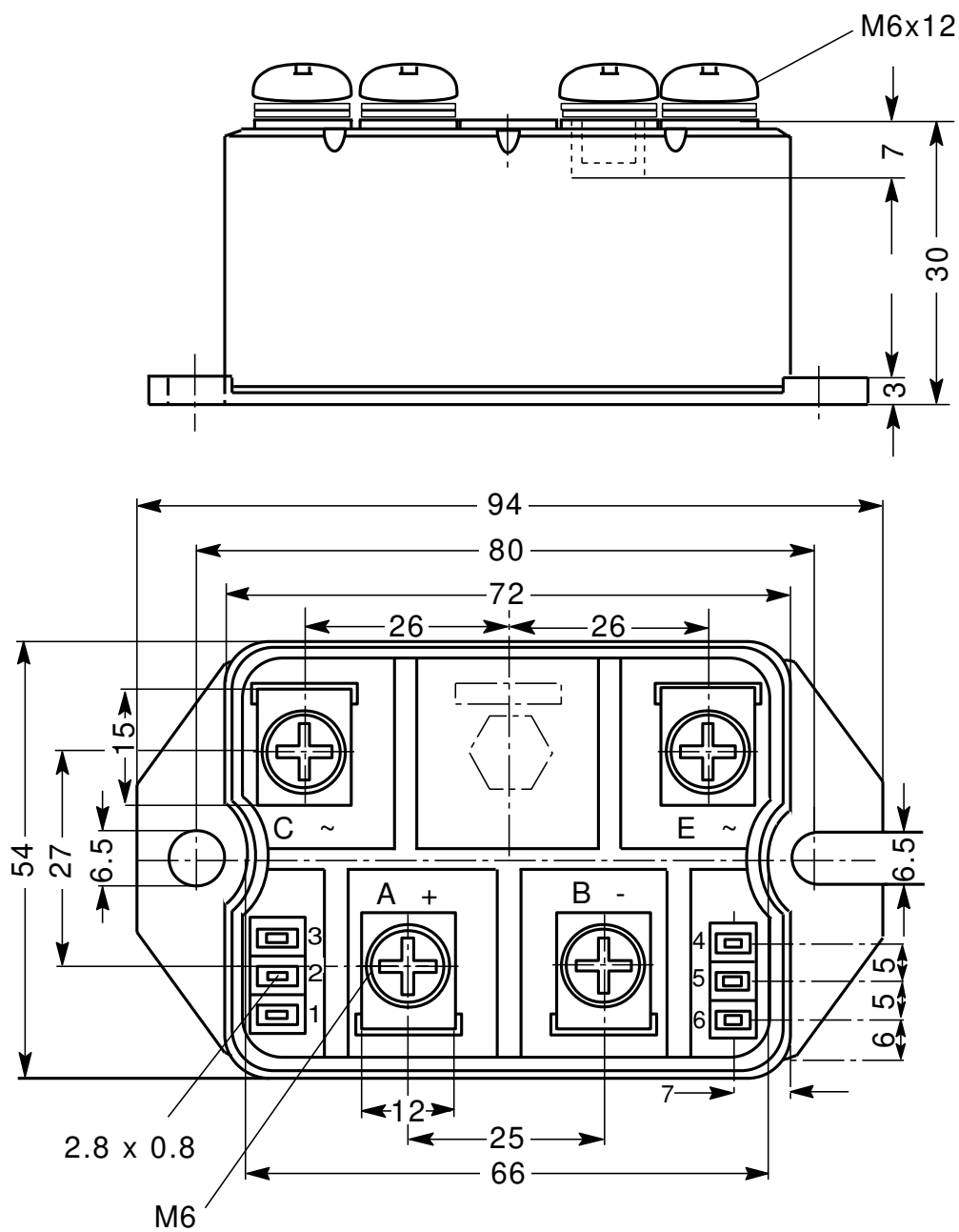
### Equivalent Circuits for Simulation

\* on die level

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

|                                                                                     |                    |                  |    |
|-------------------------------------------------------------------------------------|--------------------|------------------|----|
|  |                    | <b>Rectifier</b> |    |
| $V_{0 \max}$                                                                        | threshold voltage  | 0.77             | V  |
| $R_{0 \max}$                                                                        | slope resistance * | 2.2              | mΩ |

**Outlines PWS-E**



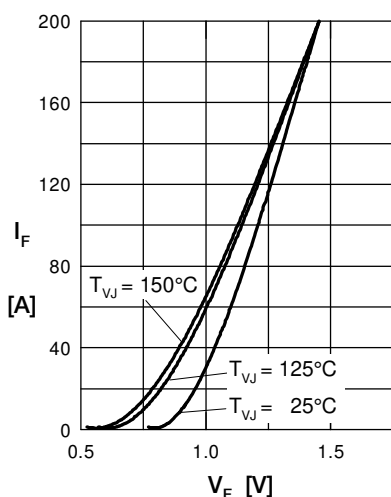
**Rectifier**


Fig. 1 Forward current vs. voltage drop per diode

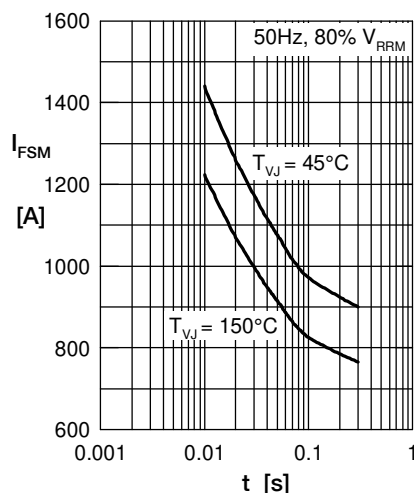


Fig. 2 Surge overload current vs. time per diode

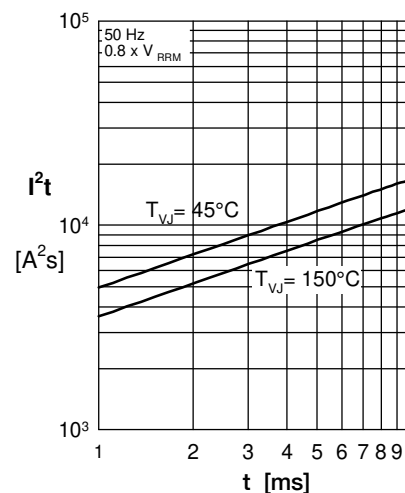
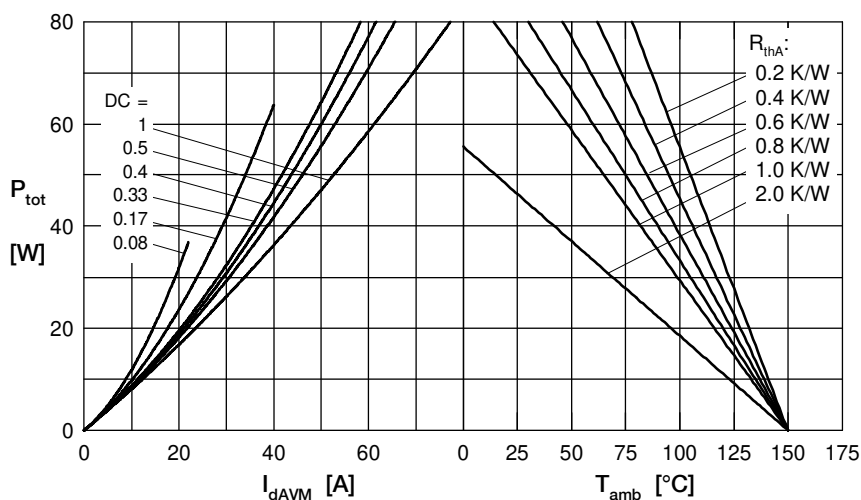

 Fig. 3  $I^2t$  vs. time per diode


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

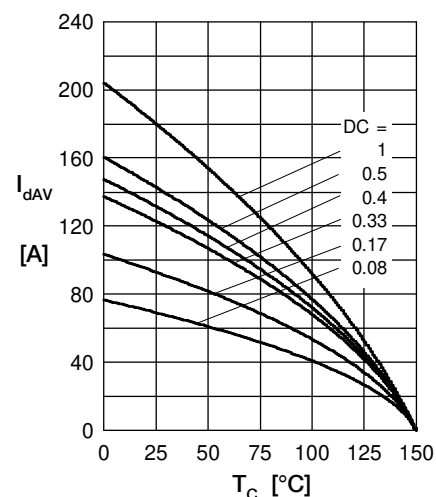


Fig. 5 Max. forward current vs. case temperature per diode

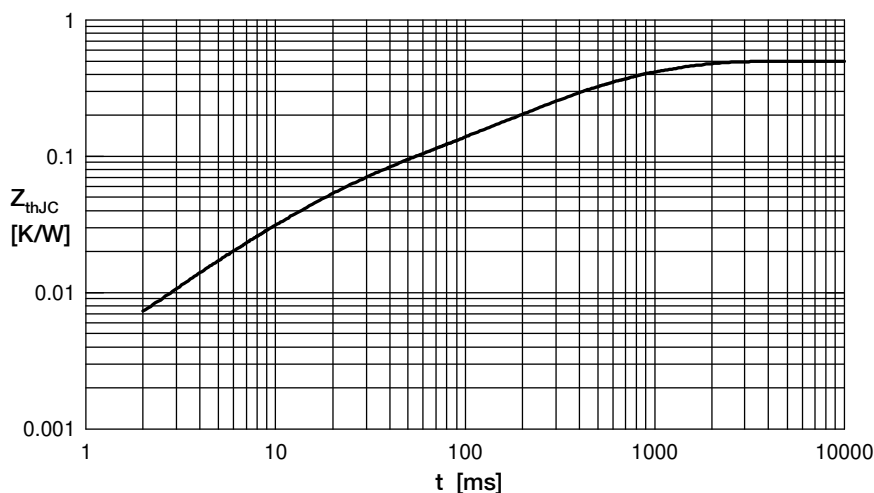


Fig. 6 Transient thermal impedance junction to case vs. time per diode

| $R_i$ | $t_i$ |
|-------|-------|
| 0.050 | 0.02  |
| 0.003 | 0.01  |
| 0.120 | 0.225 |
| 0.217 | 0.8   |
| 0.110 | 0.58  |

