

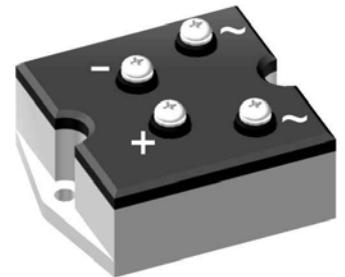
# Standard Rectifier Module

| 1~ Rectifier |          |
|--------------|----------|
| $V_{RRM}$    | = 1200 V |
| $I_{DAV}$    | = 45 A   |
| $I_{FSM}$    | = 750 A  |

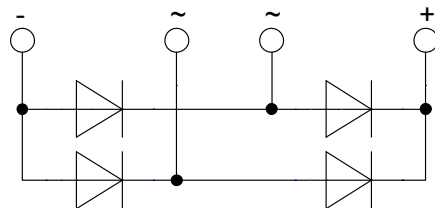
## 1~ Rectifier Bridge

Part number

**VBO50-12NO7**



 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:

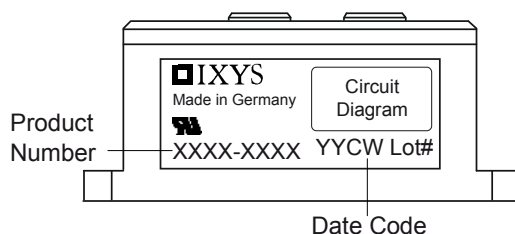
- Diode for main rectification
- For one phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

### Package: PWS-B

- Industry standard outline
- RoHS compliant
- Easy to mount with two screws
- Base plate: Aluminium internally DCB isolated
- Advanced power cycling

| Rectifier  |                                              |                                                     |                                | Ratings                        |      |      |                   |
|------------|----------------------------------------------|-----------------------------------------------------|--------------------------------|--------------------------------|------|------|-------------------|
| Symbol     | Definition                                   | Conditions                                          |                                | min.                           | typ. | max. | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |                                |      | 1300 | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |                                |      | 1200 | V                 |
| $I_R$      | reverse current                              | $V_R = 1200\text{ V}$                               | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 100  | $\mu\text{A}$     |
|            |                                              | $V_R = 1200\text{ V}$                               | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1.5  | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 20\text{ A}$                                 | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.03 | V                 |
|            |                                              | $I_F = 40\text{ A}$                                 |                                |                                |      | 1.14 | V                 |
|            |                                              | $I_F = 20\text{ A}$                                 | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 0.92 | V                 |
|            |                                              | $I_F = 40\text{ A}$                                 |                                |                                |      | 1.06 | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 85^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 45   | A                 |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                   |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.76 | V                 |
| $r_F$      | slope resistance                             |                                                     |                                |                                |      | 6.9  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                                     |                                |                                |      | 2.7  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                     |                                |                                | 0.4  |      | K/W               |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                          |                                |                                |      | 46   | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$    | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 750  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$   | $V_R = 0\text{ V}$             |                                |      | 810  | A                 |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$    | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 640  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$   | $V_R = 0\text{ V}$             |                                |      | 690  | A                 |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$    | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 2.82 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$   | $V_R = 0\text{ V}$             |                                |      | 2.73 | kA <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$    | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 2.05 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$   | $V_R = 0\text{ V}$             |                                |      | 1.98 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$              |                                |                                | 10   |      | pF                |

| Package PWS-B |                                                              |                      | Ratings |      |      |      |
|---------------|--------------------------------------------------------------|----------------------|---------|------|------|------|
| Symbol        | Definition                                                   | Conditions           | min.    | typ. | max. | Unit |
| $I_{RMS}$     | RMS current                                                  | per terminal         |         |      | 100  | A    |
| $T_{stg}$     | storage temperature                                          |                      | -40     |      | 125  | °C   |
| $T_{VJ}$      | virtual junction temperature                                 |                      | -40     |      | 150  | °C   |
| Weight        |                                                              |                      |         | 193  |      | g    |
| $M_D$         | mounting torque                                              |                      | 4.25    |      | 5.75 | Nm   |
| $M_T$         | terminal torque                                              |                      | 2.5     |      | 3.5  | Nm   |
| $d_{Spp/App}$ | creepage distance on surface   striking distance through air | terminal to terminal | 11.0    |      |      | mm   |
| $d_{Spb/Apb}$ |                                                              | terminal to backside | 7.5     |      |      | mm   |
| $V_{ISOL}$    | isolation voltage                                            | t = 1 second         | 3000    |      |      | V    |
|               |                                                              | t = 1 minute         | 2500    |      |      | V    |

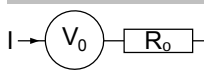


| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | VBO50-12NO7 | VBO50-12NO7        | Box           | 10       | 474002   |

### Equivalent Circuits for Simulation

\* on die level

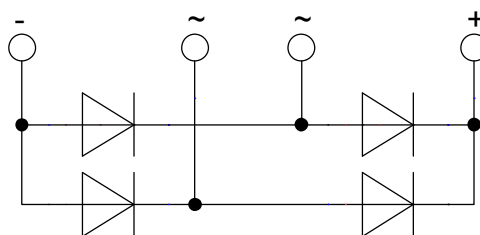
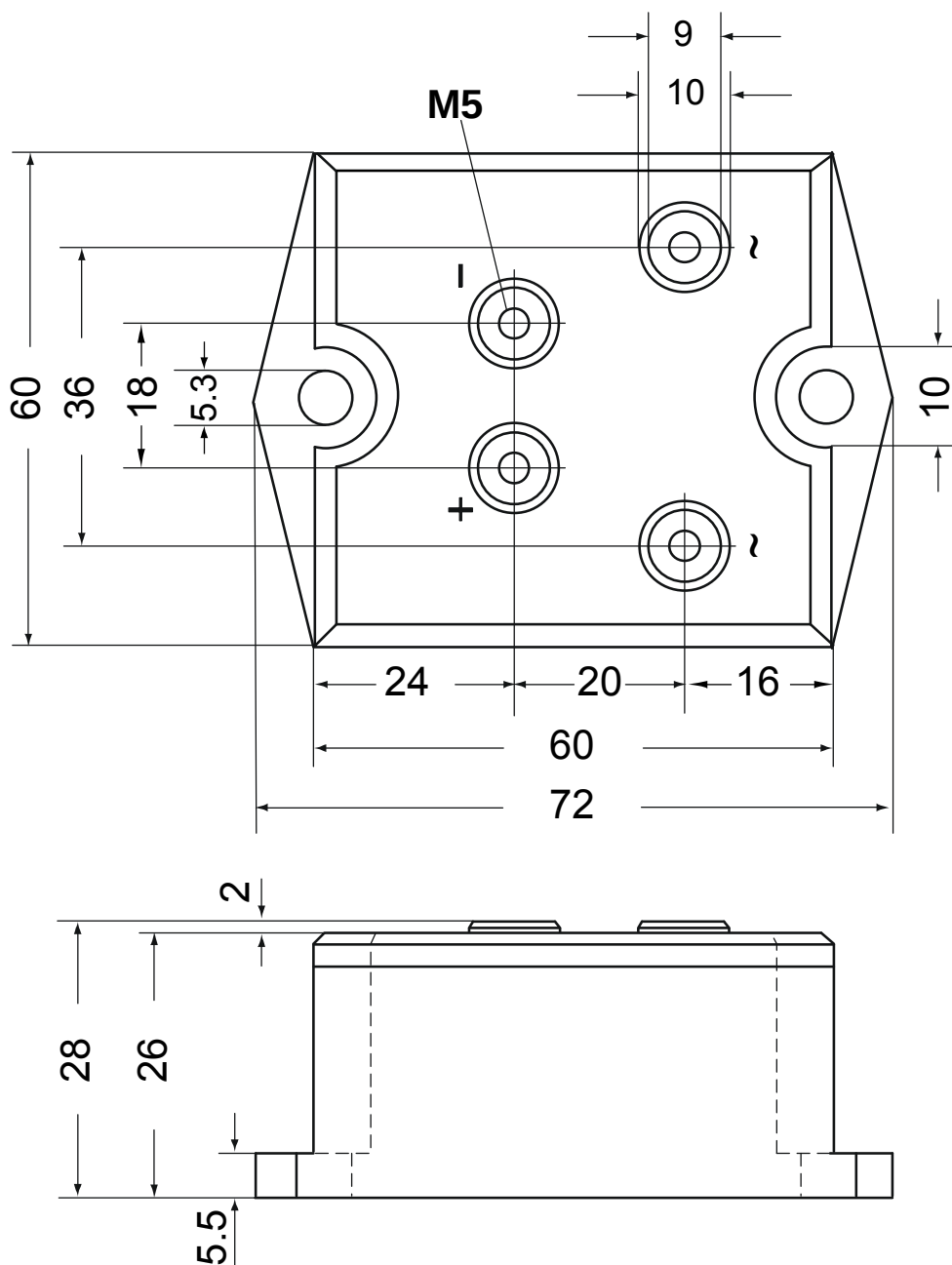
$T_{VJ} = 150^\circ\text{C}$



Rectifier

|             |                    |      |    |
|-------------|--------------------|------|----|
| $V_{0\max}$ | threshold voltage  | 0.76 | V  |
| $R_{0\max}$ | slope resistance * | 5.7  | mΩ |

Outlines PWS-B



## Rectifier

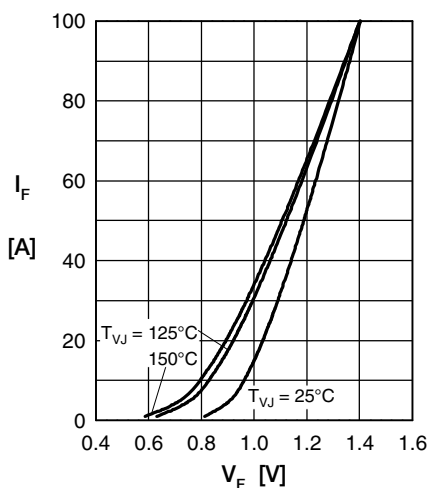


Fig. 1 Forward current vs. voltage drop per diode

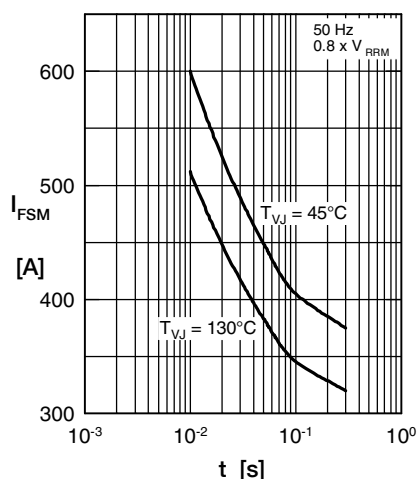


Fig. 2 Surge overload current vs. time per diode

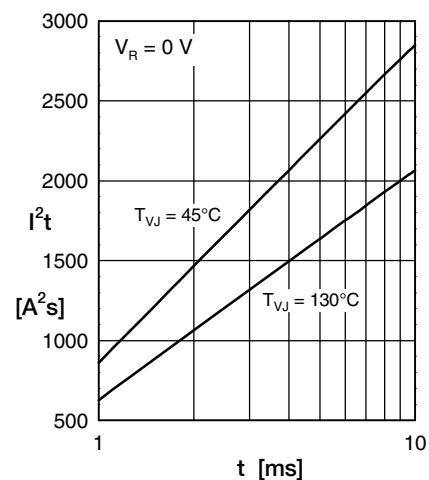


Fig. 3  $I^2t$  vs. time per diode

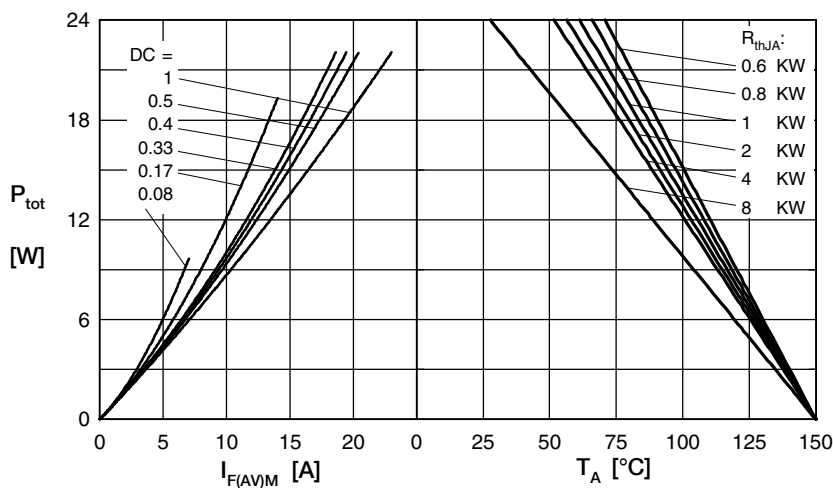


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

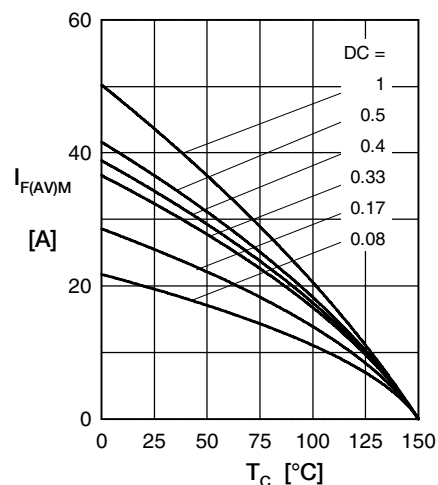


Fig. 5 Max. forward current vs. case temperature per diode

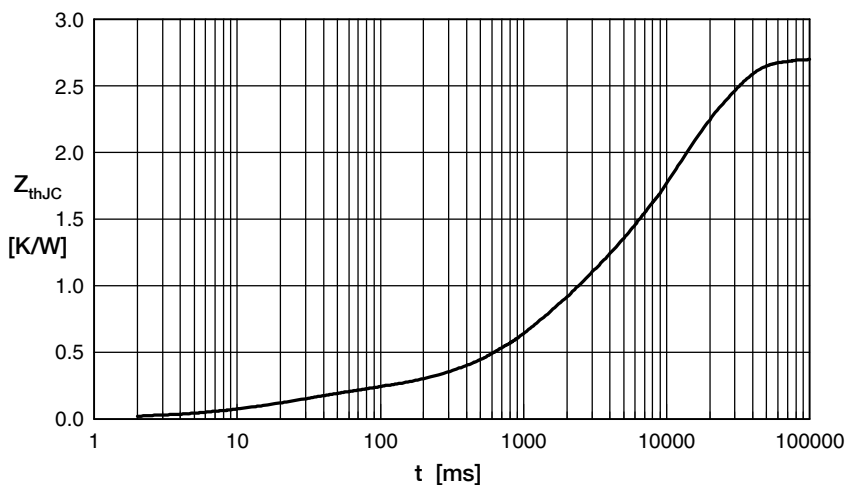


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.040          | 0.010     |
| 2 | 0.150          | 0.030     |
| 3 | 0.610          | 1.350     |
| 4 | 1.900          | 14.00     |