

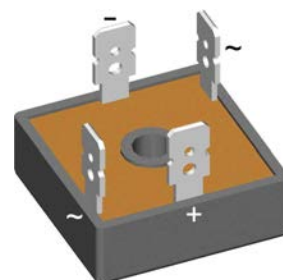
# Standard Rectifier Module

| 1~<br>Rectifier |          |
|-----------------|----------|
| $V_{RRM}$       | = 1800 V |
| $I_{DAV}$       | = 14 A   |
| $I_{FSM}$       | = 380 A  |

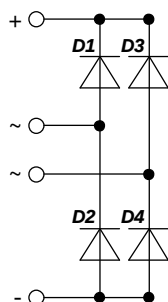
## 1~ Rectifier Bridge

Part number

**VBO22-18NO8**



 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: FO-B

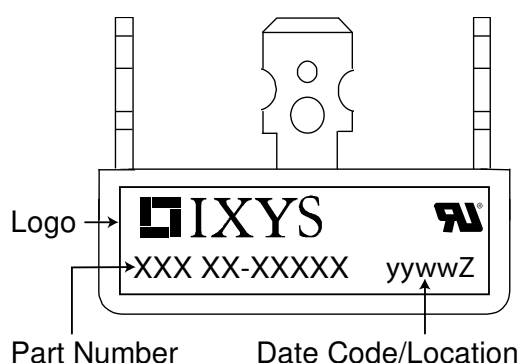
- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- 1/4" fast-on terminals
- Easy to mount with one screw

### Disclaimer Notice

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| Rectifier  |                                                     |                                                     |                                | Ratings                        |      |      |                  |
|------------|-----------------------------------------------------|-----------------------------------------------------|--------------------------------|--------------------------------|------|------|------------------|
| Symbol     | Definition                                          | Conditions                                          |                                | min.                           | typ. | max. | Unit             |
| $V_{RSM}$  | <b>max. non-repetitive reverse blocking voltage</b> | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |                                |      | 1900 | V                |
| $V_{RRM}$  | <b>max. repetitive reverse blocking voltage</b>     | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |                                |      | 1800 | V                |
| $I_R$      | <b>reverse current</b>                              | $V_R = 1800\text{ V}$                               | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 40   | $\mu\text{A}$    |
|            |                                                     | $V_R = 1800\text{ V}$                               | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 1,5  | mA               |
| $V_F$      | <b>forward voltage drop</b>                         | $I_F = 10\text{ A}$                                 | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1,05 | V                |
|            |                                                     | $I_F = 20\text{ A}$                                 |                                |                                |      | 1,15 | V                |
|            |                                                     | $I_F = 10\text{ A}$                                 | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 0,94 | V                |
|            |                                                     | $I_F = 20\text{ A}$                                 |                                |                                |      | 1,08 | V                |
| $I_{DAV}$  | <b>bridge output current</b>                        | $T_C = 85^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 14   | A                |
| $V_{F0}$   | <b>threshold voltage</b>                            | } <b>for power loss calculation only</b>            |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0,77 | V                |
| $r_F$      | <b>slope resistance</b>                             |                                                     |                                |                                |      | 14,2 | m $\Omega$       |
| $R_{thJC}$ | <b>thermal resistance junction to case</b>          |                                                     |                                |                                |      | 8    | K/W              |
| $R_{thCH}$ | <b>thermal resistance case to heatsink</b>          |                                                     |                                |                                | 1    |      | K/W              |
| $P_{tot}$  | <b>total power dissipation</b>                      | $T_C = 25^{\circ}\text{C}$                          |                                |                                |      | 15   | W                |
| $I_{FSM}$  | <b>max. forward surge current</b>                   | $t = 10\text{ ms; (50 Hz), sine}$                   | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 380  | A                |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                  | $V_R = 0\text{ V}$             |                                |      | 410  | A                |
|            |                                                     | $t = 10\text{ ms; (50 Hz), sine}$                   | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 325  | A                |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                  | $V_R = 0\text{ V}$             |                                |      | 350  | A                |
| $I^2t$     | <b>value for fusing</b>                             | $t = 10\text{ ms; (50 Hz), sine}$                   | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 720  | A <sup>2</sup> s |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                  | $V_R = 0\text{ V}$             |                                |      | 700  | A <sup>2</sup> s |
|            |                                                     | $t = 10\text{ ms; (50 Hz), sine}$                   | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 530  | A <sup>2</sup> s |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                  | $V_R = 0\text{ V}$             |                                |      | 510  | A <sup>2</sup> s |
| $C_J$      | <b>junction capacitance</b>                         | $V_R = 400\text{ V; } f = 1\text{ MHz}$             |                                |                                | 10   |      | pF               |

| Package FO-B         |                                                                     |                             |                                         | Ratings |      |      |      |   |
|----------------------|---------------------------------------------------------------------|-----------------------------|-----------------------------------------|---------|------|------|------|---|
| Symbol               | Definition                                                          | Conditions                  |                                         | min.    | typ. | max. | Unit |   |
| I <sub>RMS</sub>     | <i>RMS current</i>                                                  | per terminal                |                                         |         |      | 100  | A    |   |
| T <sub>VJ</sub>      | <i>virtual junction temperature</i>                                 |                             |                                         | -40     |      | 150  | °C   |   |
| T <sub>op</sub>      | <i>operation temperature</i>                                        |                             |                                         | -40     |      | 125  | °C   |   |
| T <sub>stg</sub>     | <i>storage temperature</i>                                          |                             |                                         | -40     |      | 125  | °C   |   |
| Weight               |                                                                     |                             |                                         |         | 19   |      | g    |   |
| M <sub>D</sub>       | <i>mounting torque</i>                                              |                             |                                         | 1,8     |      | 2,2  | Nm   |   |
| d <sub>Spp/App</sub> | <i>creepage distance on surface   striking distance through air</i> | <i>terminal to terminal</i> | 9,0                                     | 7,0     |      |      | mm   |   |
| d <sub>Spb/Apb</sub> |                                                                     | <i>terminal to backside</i> | 10,0                                    | 10,0    |      |      | mm   |   |
| V <sub>ISOL</sub>    | <i>isolation voltage</i>                                            | t = 1 second                | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA |         | 3000 |      |      | V |
|                      |                                                                     | t = 1 minute                |                                         |         | 2500 |      |      | V |

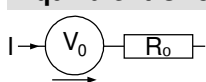


| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VBO22-18NO8     | VBO22-18NO8        | Box           | 50       | 477613   |

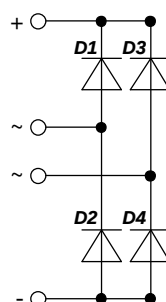
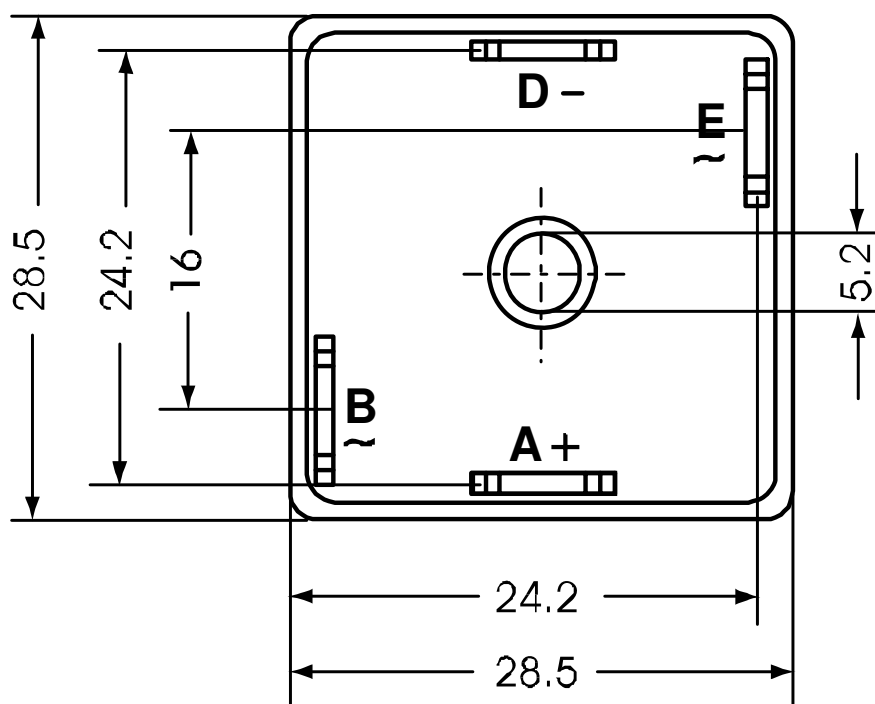
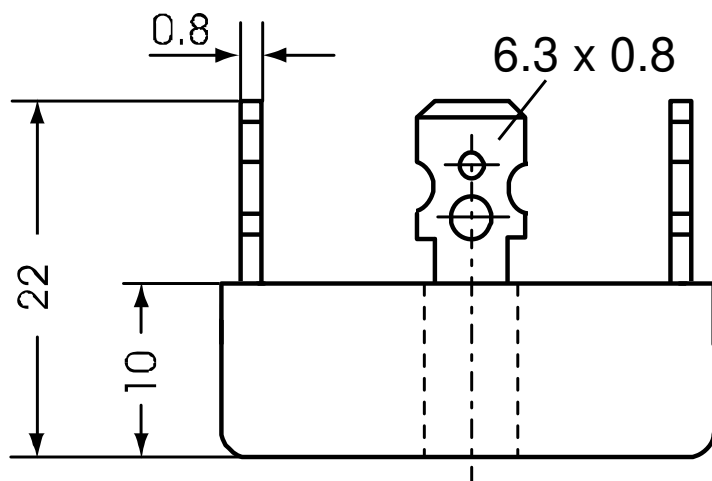
### Equivalent Circuits for Simulation

\* on die level

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

|                                                                                     |                           |                  |    |
|-------------------------------------------------------------------------------------|---------------------------|------------------|----|
|  |                           | <b>Rectifier</b> |    |
| $V_{0\ max}$                                                                        | <i>threshold voltage</i>  | 0,77             | V  |
| $R_{0\ max}$                                                                        | <i>slope resistance *</i> | 13               | mΩ |

**Outlines FO-B**



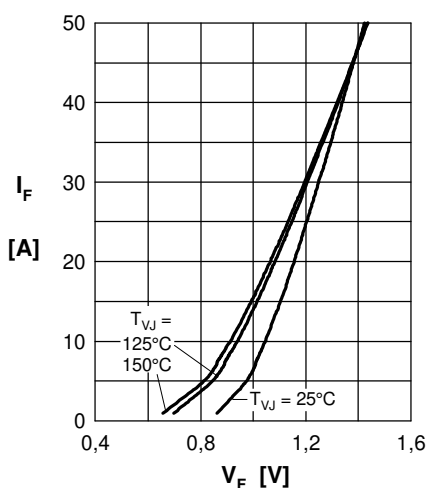
**Rectifier**


Fig. 1 Forward current vs. voltage drop per diode

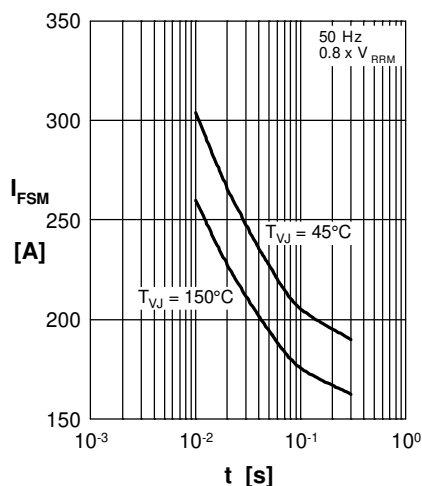


Fig. 2 Surge overload current vs. time per diode

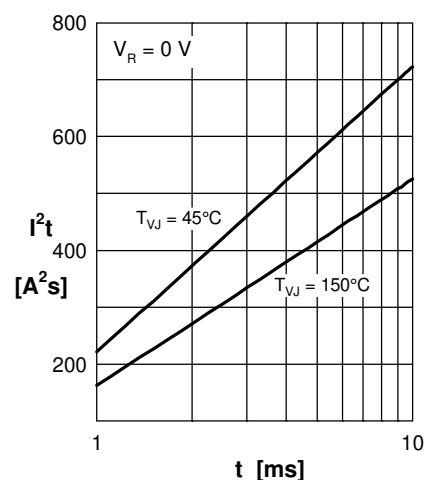


Fig. 3  $I^2t$  vs. time per diode

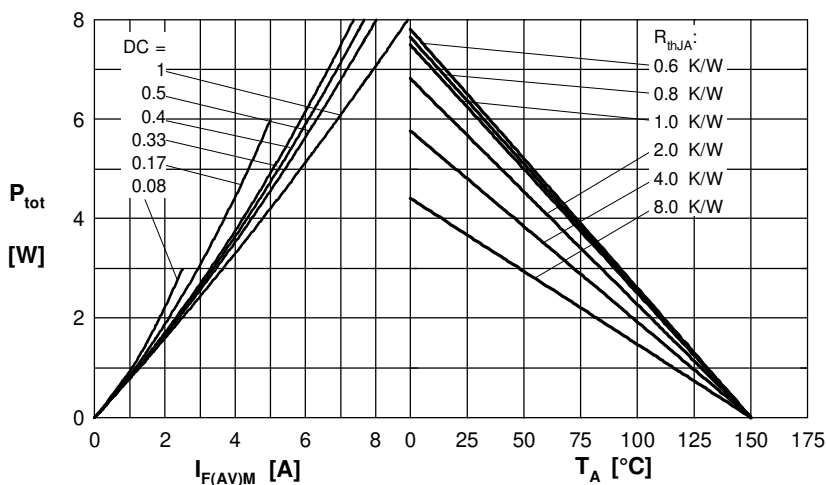


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

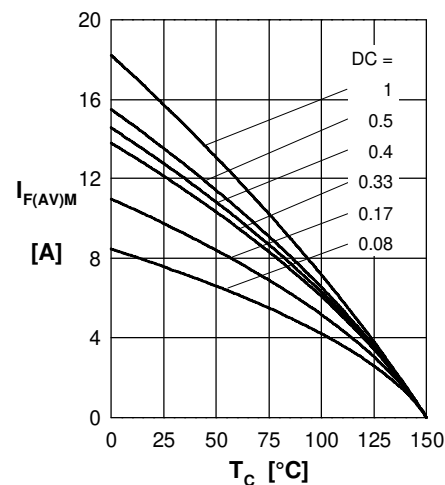


Fig. 5 Max. forward current vs. case temperature per diode

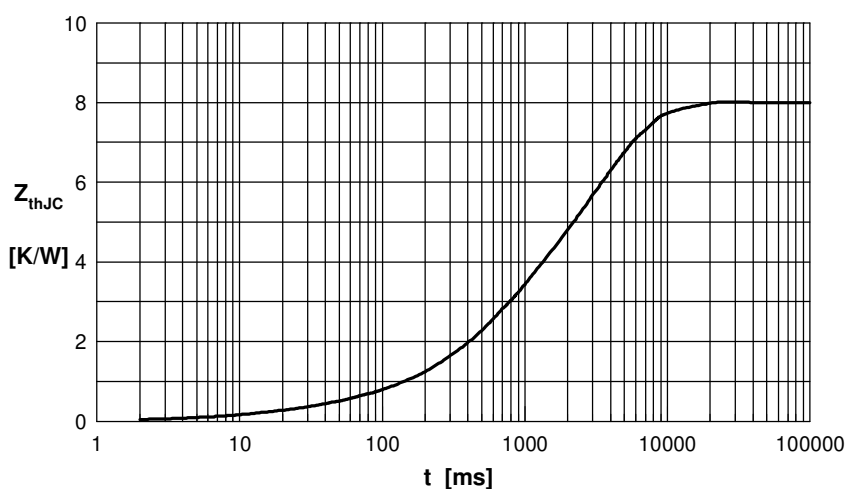


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.040          | 0.005     |
| 2 | 0.250          | 0.030     |
| 3 | 1.810          | 0.500     |
| 4 | 5.900          | 3.200     |