

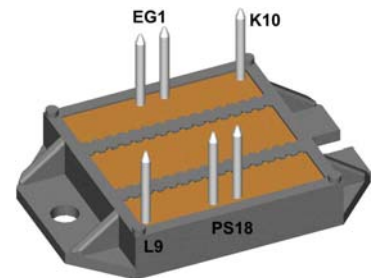
# Standard Rectifier Module

| 1~ Rectifier |          |
|--------------|----------|
| $V_{RRM}$    | = 1600 V |
| $I_{DAV}$    | = 90 A   |
| $I_{FSM}$    | = 1000 A |

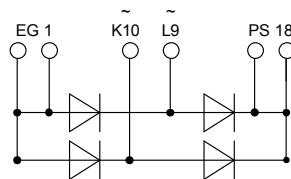
## 1~ Rectifier Bridge

Part number

**VBO88-16NO7**



 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:

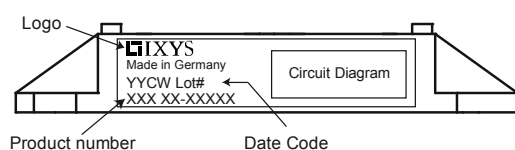
- Diode for main rectification
- For one phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

### Package: ECO-PAC2

- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 9 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

| Rectifier  |                                              |                                                      |                                | Ratings                        |      |      |                   |
|------------|----------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|------|------|-------------------|
| Symbol     | Definition                                   | Conditions                                           |                                | min.                           | typ. | max. | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 1700 | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 1600 | V                 |
| $I_R$      | reverse current                              | $V_R = 1600\text{ V}$                                | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 100  | $\mu\text{A}$     |
|            |                                              | $V_R = 1600\text{ V}$                                | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 2    | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 50\text{ A}$                                  | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1.13 | V                 |
|            |                                              | $I_F = 100\text{ A}$                                 |                                |                                |      | 1.31 | V                 |
|            |                                              | $I_F = 50\text{ A}$                                  | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 1.05 | V                 |
|            |                                              | $I_F = 100\text{ A}$                                 |                                |                                |      | 1.28 | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 115^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 90   | A                 |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only                    |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.80 | V                 |
| $r_F$      | slope resistance                             |                                                      |                                |                                |      | 4.6  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                                      |                                |                                |      | 0.6  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                      |                                |                                | 0.3  |      | K/W               |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 205  | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 1.00 | kA                |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 1.08 | kA                |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 850  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 920  | A                 |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 5.00 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 4.85 | kA <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$     | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 3.62 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$    | $V_R = 0\text{ V}$             |                                |      | 3.52 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$               |                                |                                | 35   |      | pF                |

| Package ECO-PAC2     |                                                              |              |                                         | Ratings |      |      |  |
|----------------------|--------------------------------------------------------------|--------------|-----------------------------------------|---------|------|------|--|
| Symbol               | Definition                                                   | Conditions   | min.                                    | typ.    | max. | Unit |  |
| I <sub>RMS</sub>     | RMS current                                                  | per terminal |                                         |         | 100  | A    |  |
| T <sub>stg</sub>     | storage temperature                                          |              | -40                                     |         | 125  | °C   |  |
| T <sub>VJ</sub>      | virtual junction temperature                                 |              | -40                                     |         | 150  | °C   |  |
| Weight               |                                                              |              |                                         | 24      |      | g    |  |
| M <sub>D</sub>       | mounting torque                                              |              | 1.5                                     |         | 2    | Nm   |  |
| d <sub>Spp/App</sub> | creepage distance on surface   striking distance through air |              | 6.0                                     |         |      | mm   |  |
| d <sub>Spb/Apb</sub> | terminal to backside                                         |              | 10.0                                    |         |      | 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 |         |      |      |  |

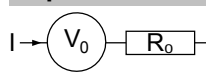


| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | VBO88-16NO7 | VBO88-16NO7        | Box           | 25       | 494402   |

### Equivalent Circuits for Simulation

\* on die level

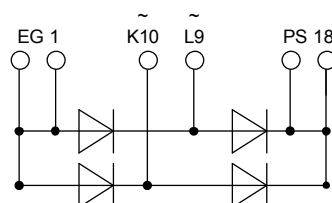
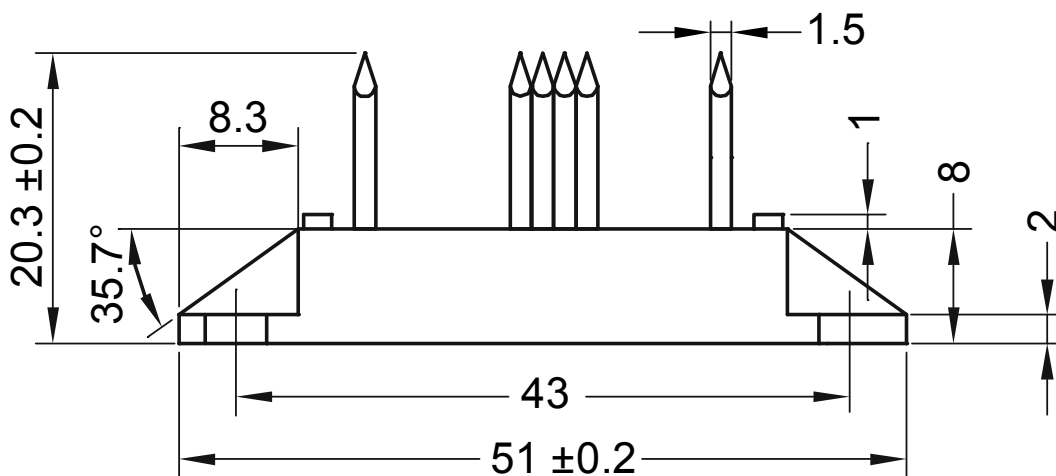
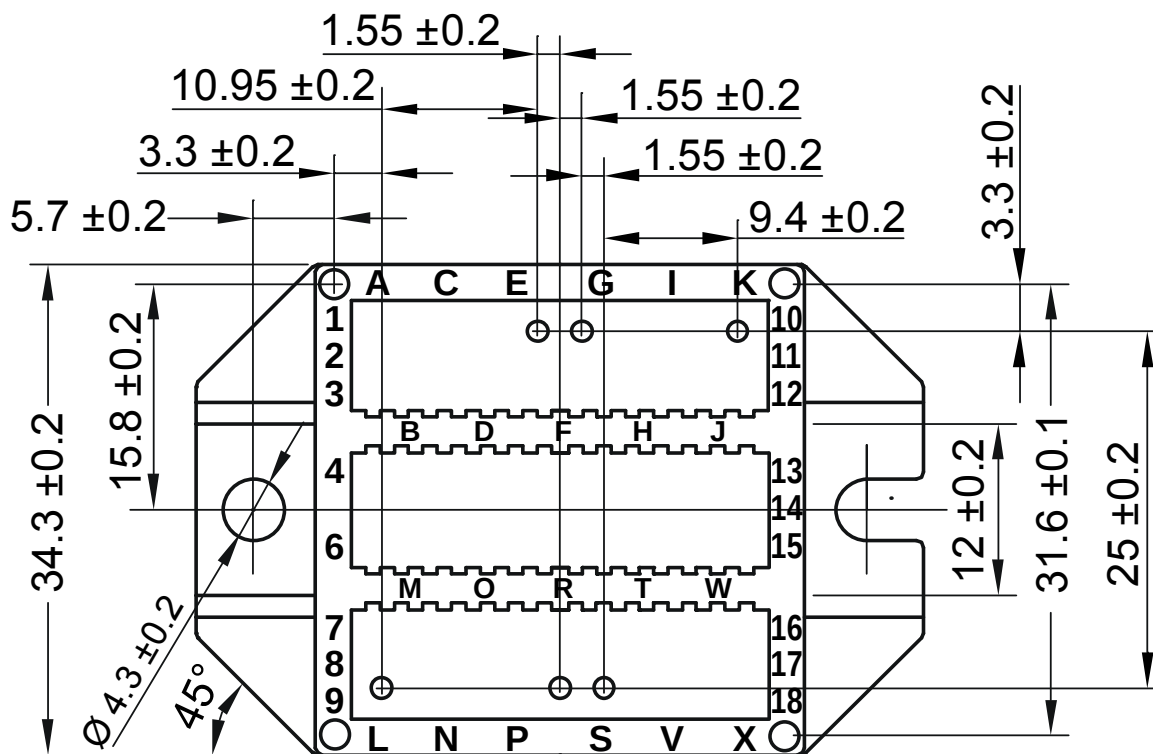
$T_{VJ} = 150^\circ\text{C}$



**Rectifier**

|             |                    |     |    |
|-------------|--------------------|-----|----|
| $V_{0\max}$ | threshold voltage  | 0.8 | V  |
| $R_{0\max}$ | slope resistance * | 3.4 | mΩ |

## Outlines ECO-PAC2



## Rectifier

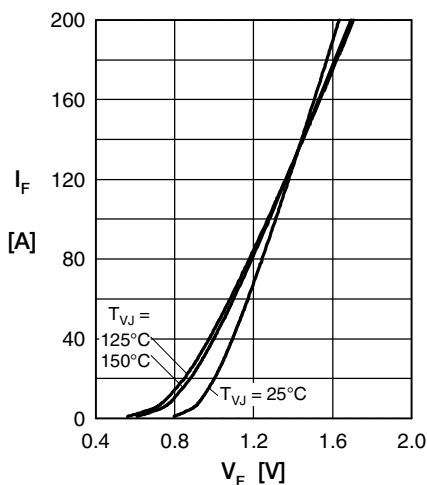


Fig. 1 Forward current vs. voltage drop per diode

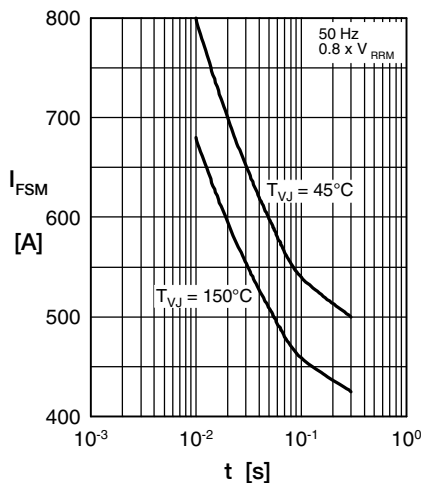


Fig. 2 Surge overload current vs. time per diode

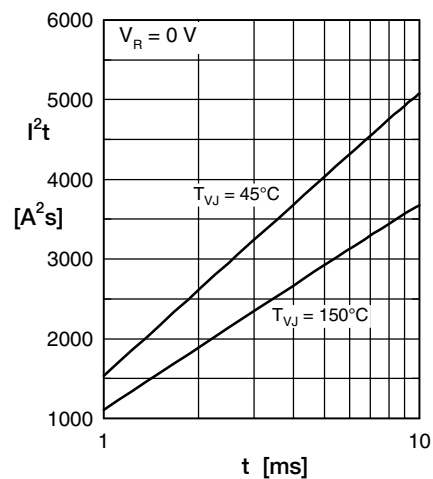


Fig. 3  $I^2t$  vs. time per diode

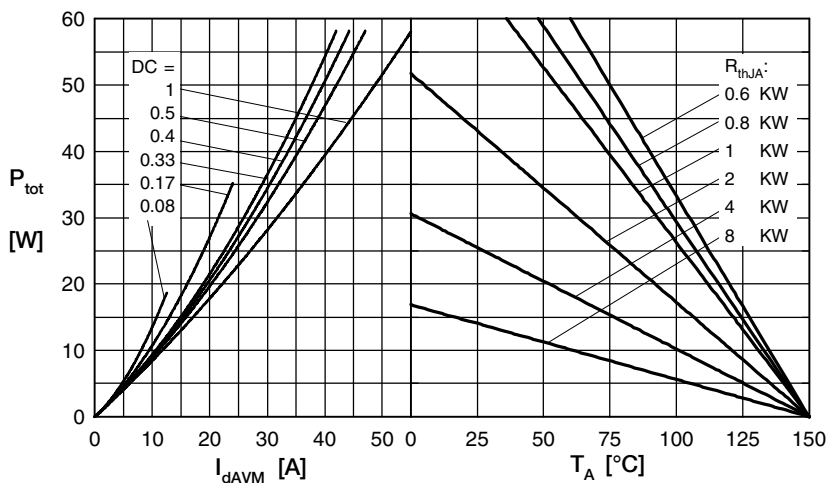


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

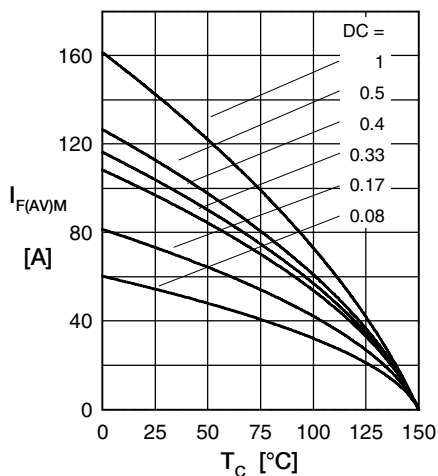


Fig. 5 Max. forward current vs. case temperature per diode

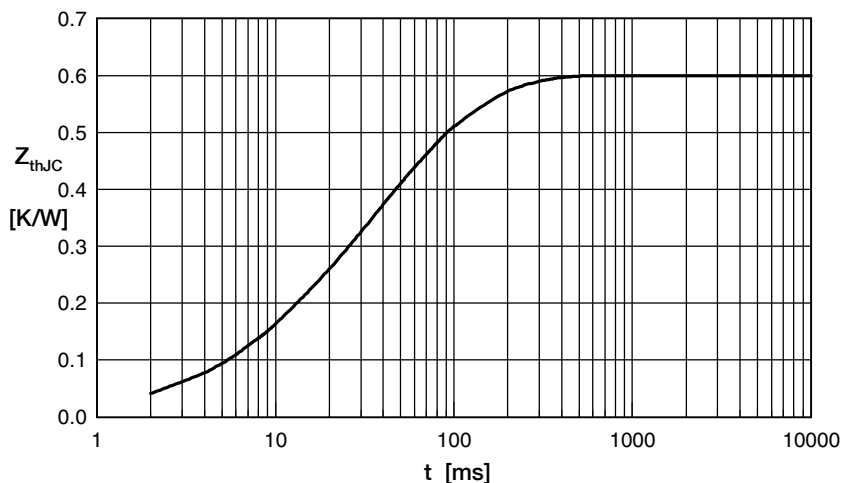


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.08           | 0.012     |
| 2 | 0.04           | 0.007     |
| 3 | 0.29           | 0.036     |
| 4 | 0.19           | 0.102     |

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