

# Standard Rectifier Module

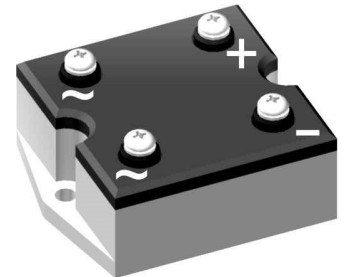
# PHASE OUT

1~ Rectifier Bridge

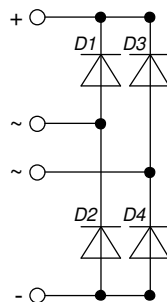
| 1~<br>Rectifier |          |
|-----------------|----------|
| $V_{RRM}$       | = 1600 V |
| $I_{DAV}$       | = 25 A   |
| $I_{FSM}$       | = 400 A  |

Part number

**VBO30-16NO7**



 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: PWS-A

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

**Recommended replacement: VBO40-16NO6, VBO52-16NO7**

## Disclaimer Notice

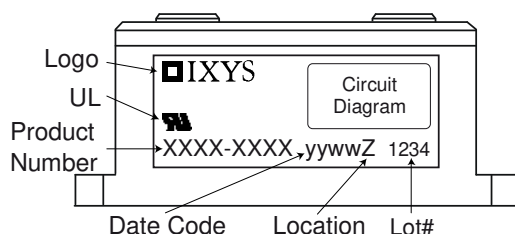
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| Rectifier  |                                              |                                           |                                           | Ratings                        |      |      |                  |
|------------|----------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|------|------|------------------|
| Symbol     | Definition                                   | Conditions                                |                                           | min.                           | typ. | max. | Unit             |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$             |                                           |                                |      | 1700 | V                |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     | $T_{VJ} = 25^{\circ}\text{C}$             |                                           |                                |      | 1600 | V                |
| $I_R$      | reverse current                              | $V_R = 1600\text{ V}$                     | $T_{VJ} = 25^{\circ}\text{C}$             |                                |      | 40   | $\mu\text{A}$    |
|            |                                              | $V_R = 1600\text{ V}$                     | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 1.5  | mA               |
| $V_F$      | forward voltage drop                         | $I_F = 15\text{ A}$                       | $T_{VJ} = 25^{\circ}\text{C}$             |                                |      | 1.10 | V                |
|            |                                              | $I_F = 30\text{ A}$                       |                                           |                                |      | 1.25 | V                |
|            |                                              | $I_F = 15\text{ A}$                       | $T_{VJ} = 125^{\circ}\text{C}$            |                                |      | 1.01 | V                |
|            |                                              | $I_F = 30\text{ A}$                       |                                           |                                |      | 1.21 | V                |
| $I_{DAV}$  | bridge output current                        | $T_C = 85^{\circ}\text{C}$<br>rectangular | $T_{VJ} = 150^{\circ}\text{C}$<br>d = 0.5 |                                |      | 25   | A                |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only         |                                           | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.80 | V                |
| $r_F$      | slope resistance                             |                                           |                                           |                                |      | 12.9 | m $\Omega$       |
| $R_{thJC}$ | thermal resistance junction to case          |                                           |                                           |                                |      | 4.2  | K/W              |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                           |                                           |                                | 0.6  |      | K/W              |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                |                                           |                                |      | 29   | W                |
| $I_{FSM}$  | max. forward surge current                   | t = 10 ms; (50 Hz), sine                  | $T_{VJ} = 45^{\circ}\text{C}$             |                                |      | 400  | A                |
|            |                                              | t = 8,3 ms; (60 Hz), sine                 | $V_R = 0\text{ V}$                        |                                |      | 430  | A                |
|            |                                              | t = 10 ms; (50 Hz), sine                  | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 340  | A                |
|            |                                              | t = 8,3 ms; (60 Hz), sine                 | $V_R = 0\text{ V}$                        |                                |      | 365  | A                |
| $I^2t$     | value for fusing                             | t = 10 ms; (50 Hz), sine                  | $T_{VJ} = 45^{\circ}\text{C}$             |                                |      | 800  | A <sup>2</sup> s |
|            |                                              | t = 8,3 ms; (60 Hz), sine                 | $V_R = 0\text{ V}$                        |                                |      | 770  | A <sup>2</sup> s |
|            |                                              | t = 10 ms; (50 Hz), sine                  | $T_{VJ} = 150^{\circ}\text{C}$            |                                |      | 580  | A <sup>2</sup> s |
|            |                                              | t = 8,3 ms; (60 Hz), sine                 | $V_R = 0\text{ V}$                        |                                |      | 555  | A <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$    |                                           |                                | 10   |      | pF               |

# PHASE OUT

Phase out

| Package PWS-A        |                                                              |                      |                                         | Ratings |      |      |      |
|----------------------|--------------------------------------------------------------|----------------------|-----------------------------------------|---------|------|------|------|
| Symbol               | Definition                                                   | Conditions           |                                         | min.    | typ. | max. | Unit |
| I <sub>RMS</sub>     | RMS current                                                  | per terminal         |                                         |         |      | 100  | 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               |                                                              |                      |                                         |         | 104  |      | g    |
| M <sub>D</sub>       | mounting torque                                              |                      |                                         | 1.25    |      | 1.75 | Nm   |
| M <sub>T</sub>       | terminal torque                                              |                      |                                         | 1.25    |      | 1.75 | Nm   |
| d <sub>Spp/App</sub> | creepage distance on surface   striking distance through air | terminal to terminal |                                         | 6.5     |      |      | mm   |
| d <sub>Spb/Apb</sub> |                                                              | terminal to backside |                                         | 8.5     |      |      | mm   |
| V <sub>ISOL</sub>    | isolation voltage                                            | t = 1 second         | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA | 3000    |      |      | V    |
|                      |                                                              | t = 1 minute         |                                         | 2500    |      |      | V    |

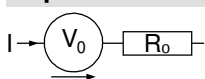


| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VBO30-16NO7     | VBO30-16NO7        | Box           | 20       | 470627   |

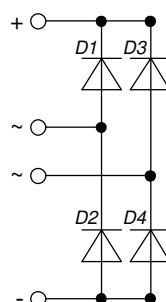
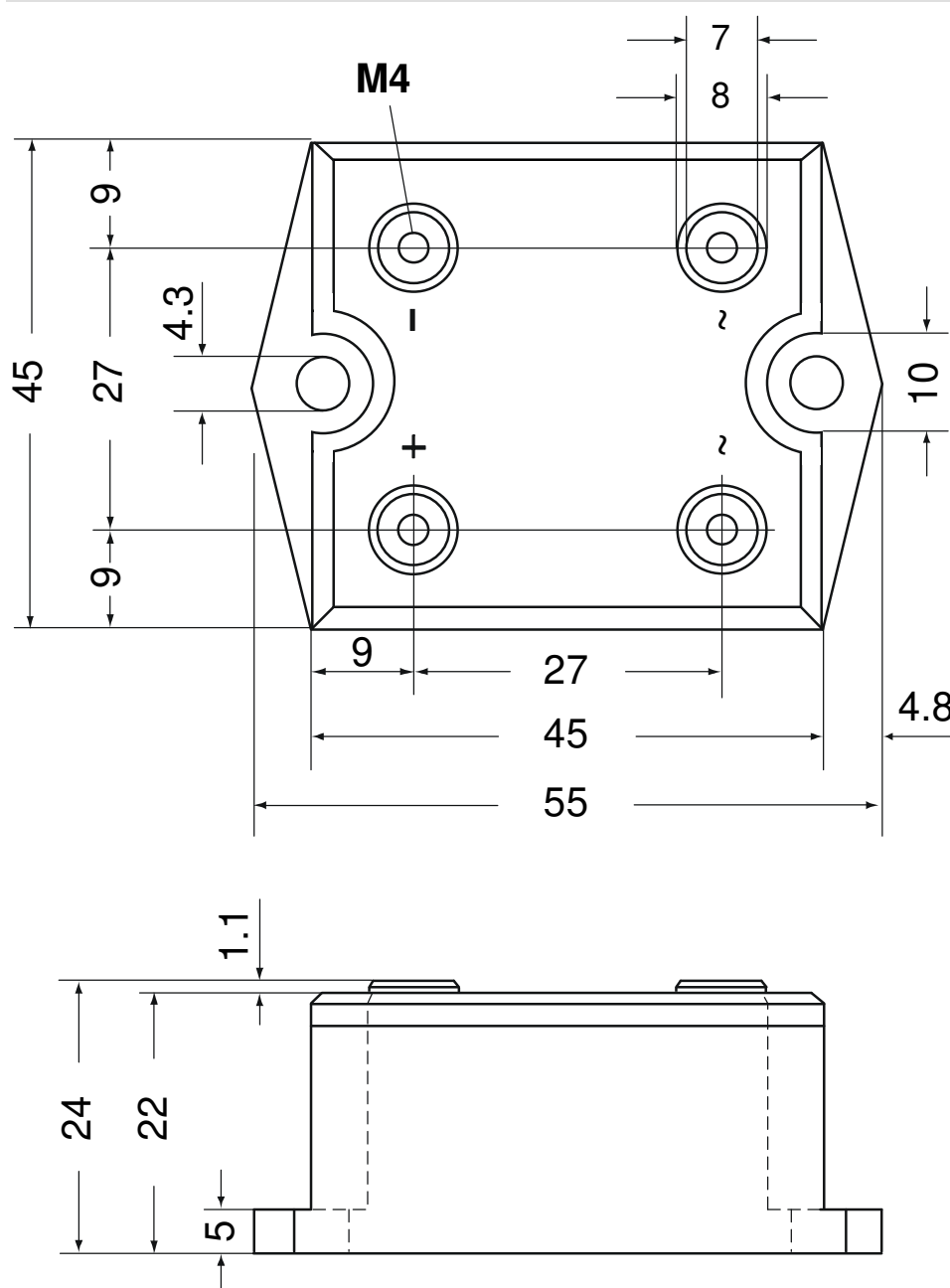
**Equivalent Circuits for Simulation**

\* on die level

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

|                                                                                     |                    |      |    |
|-------------------------------------------------------------------------------------|--------------------|------|----|
|  |                    |      |    |
| $V_{0\max}$                                                                         | threshold voltage  | 0.8  | V  |
| $R_{0\max}$                                                                         | slope resistance * | 11.7 | mΩ |

Outlines PWS-A



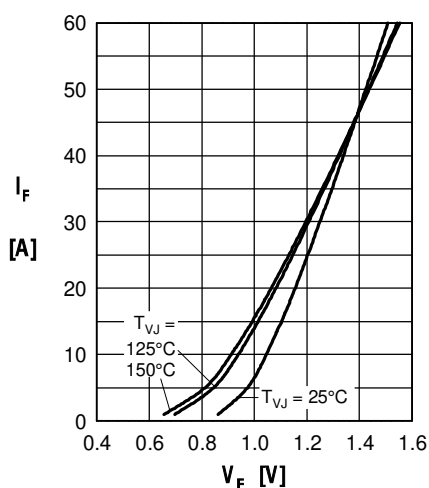
**Rectifier**


Fig. 1 Forward current vs. voltage drop per diode

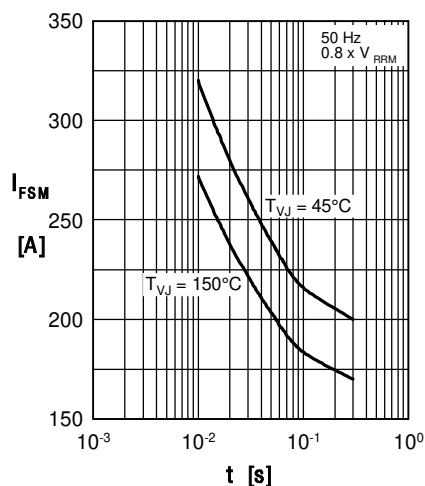


Fig. 2 Surge overload current vs. time per diode

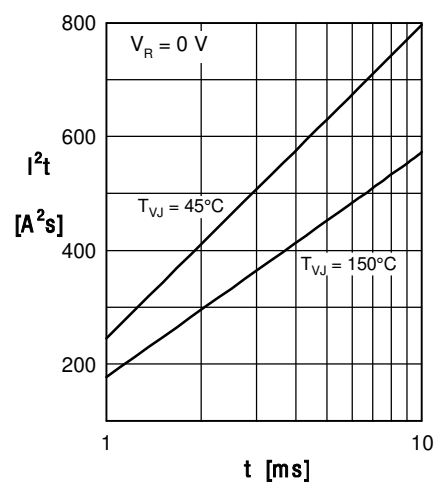
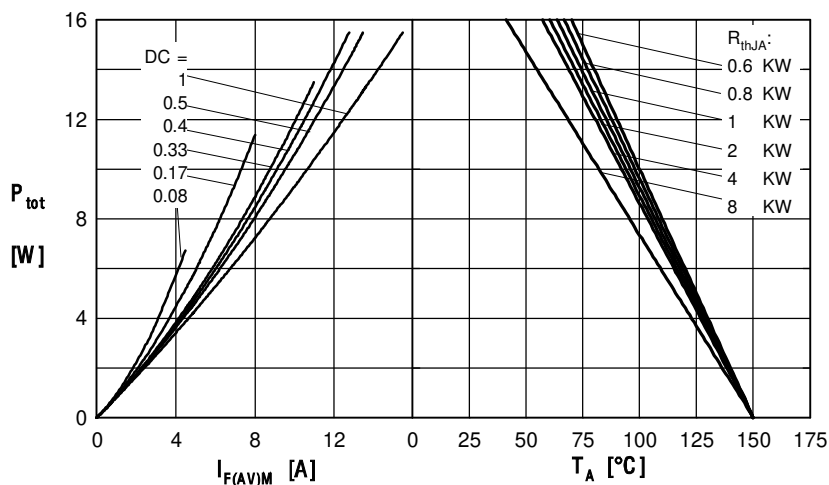

 Fig. 3  $I^2t$  vs. time per diode


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

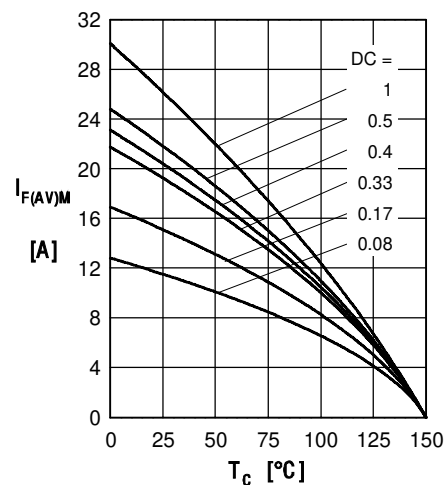


Fig. 5 Max. forward current vs. case temperature per diode

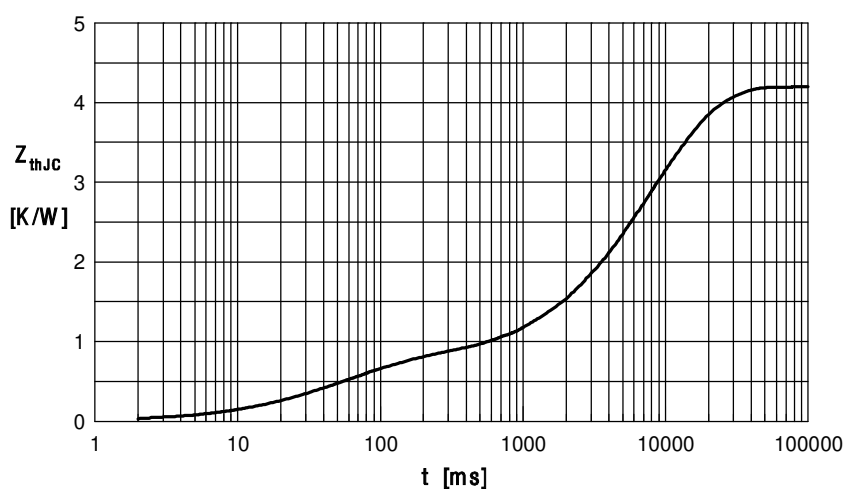


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.194          | 0.024     |
| 2 | 0.556          | 0.070     |
| 3 | 0.450          | 3.250     |
| 4 | 3.000          | 9.300     |