

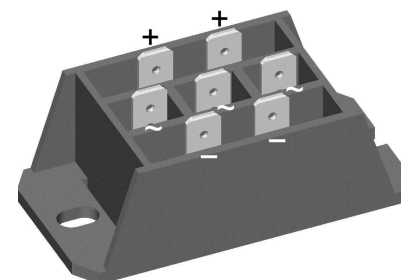
# Standard Rectifier Module

| 3~<br>Rectifier |          |
|-----------------|----------|
| $V_{RRM}$       | = 1200 V |
| $I_{DAV}$       | = 75 A   |
| $I_{FSM}$       | = 700 A  |

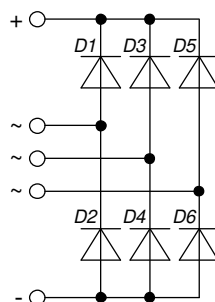
## 3~ Rectifier Bridge

Part number

**VUO60-12NO3**



 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 three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

### Package: FO-F

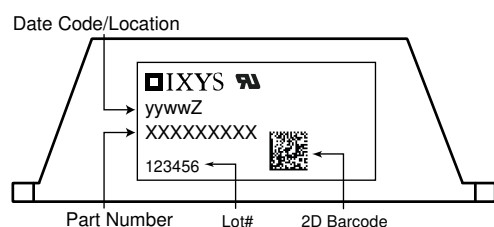
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- 1/4" fast-on terminals
- Easy to mount with two screws
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

### Disclaimer Notice

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| Rectifier  |                                              |                                                   |                                                     | Ratings                        |      |      |                   |
|------------|----------------------------------------------|---------------------------------------------------|-----------------------------------------------------|--------------------------------|------|------|-------------------|
| Symbol     | Definition                                   | Conditions                                        |                                                     | min.                           | typ. | max. | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}\text{C}$                     |                                                     |                                |      | 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                         | $I_F = 25\text{ A}$                               | $T_{VJ} = 25^{\circ}\text{C}$                       |                                |      | 1.06 | V                 |
|            |                                              | $I_F = 75\text{ A}$                               |                                                     |                                |      | 1.30 | V                 |
|            |                                              | $I_F = 25\text{ A}$                               | $T_{VJ} = 125^{\circ}\text{C}$                      |                                |      | 0.96 | V                 |
|            |                                              | $I_F = 75\text{ A}$                               |                                                     |                                |      | 1.27 | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 110^{\circ}\text{C}$<br>rectangular        | $T_{VJ} = 150^{\circ}\text{C}$<br>$d = \frac{1}{3}$ |                                |      | 75   | A                 |
| $V_{F0}$   | threshold voltage                            | } for power loss calculation only                 |                                                     | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.77 | V                 |
| $r_F$      | slope resistance                             |                                                   |                                                     |                                |      | 6.5  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                                   |                                                     |                                |      | 1.2  | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                                   |                                                     |                                | 0.4  |      | K/W               |
| $P_{tot}$  | total power dissipation                      | $T_C = 25^{\circ}\text{C}$                        |                                                     |                                |      | 100  | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$                       |                                |      | 700  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 755  | A                 |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$                      |                                |      | 595  | A                 |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 645  | A                 |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 45^{\circ}\text{C}$                       |                                |      | 2.45 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 2.37 | kA <sup>2</sup> s |
|            |                                              | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  | $T_{VJ} = 150^{\circ}\text{C}$                      |                                |      | 1.77 | kA <sup>2</sup> s |
|            |                                              | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$                                  |                                |      | 1.73 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$            |                                                     |                                | 25   |      | pF                |

| Package FO-F         |                                                              |                      |                                         | 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               |                                                              |                      |                                         |         | 45   |      | g    |   |
| M <sub>D</sub>       | mounting torque                                              |                      |                                         | 2       |      | 2.5  | Nm   |   |
| d <sub>Spp/App</sub> | creepage distance on surface   striking distance through air | terminal to terminal | 18.0                                    | 6.0     |      |      | mm   |   |
| d <sub>Spb/Apb</sub> |                                                              | terminal to backside | 26.0                                    | 20.0    |      |      | mm   |   |
| V <sub>ISOL</sub>    | isolation voltage                                            | t = 1 second         | 50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA |         | 3600 |      |      | V |
|                      |                                                              | t = 1 minute         |                                         |         | 3000 |      |      | V |

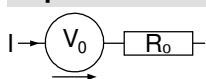


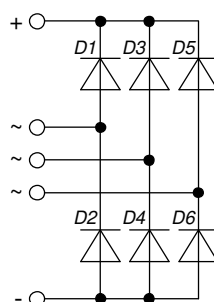
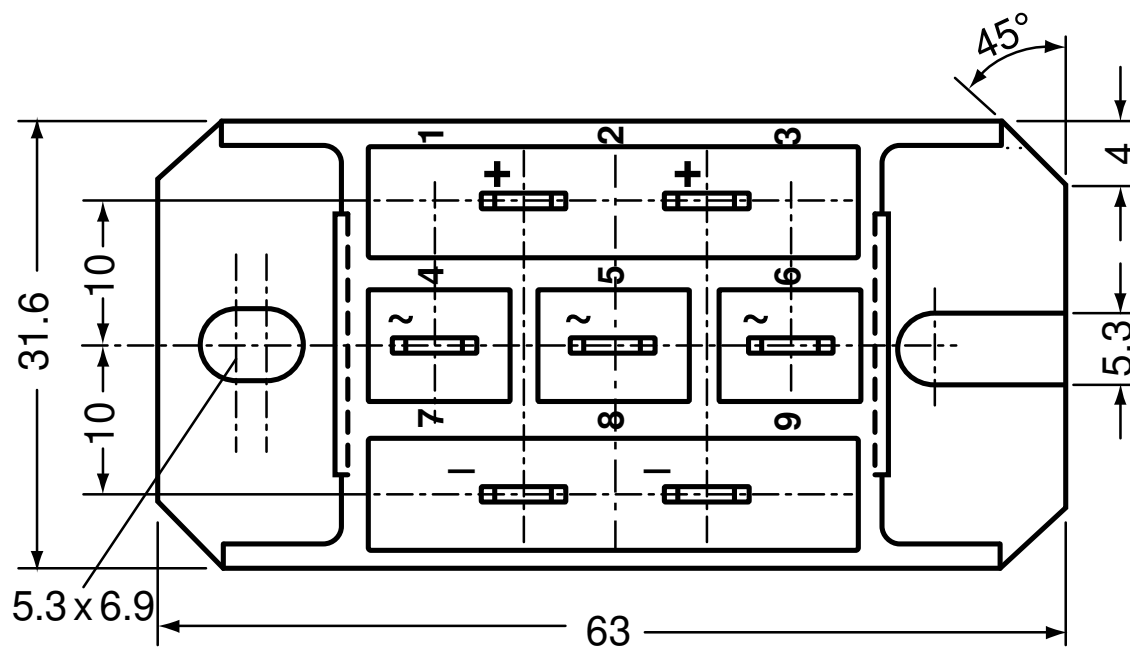
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VUO60-12NO3     | VUO60-12NO3        | Box           | 10       | 465313   |

### Equivalent Circuits for Simulation

\* on die level

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

|                                                                                     |                    |      |    |
|-------------------------------------------------------------------------------------|--------------------|------|----|
|  |                    |      |    |
| $V_{0\max}$                                                                         | threshold voltage  | 0.77 | V  |
| $R_{0\max}$                                                                         | slope resistance * | 5.3  | mΩ |



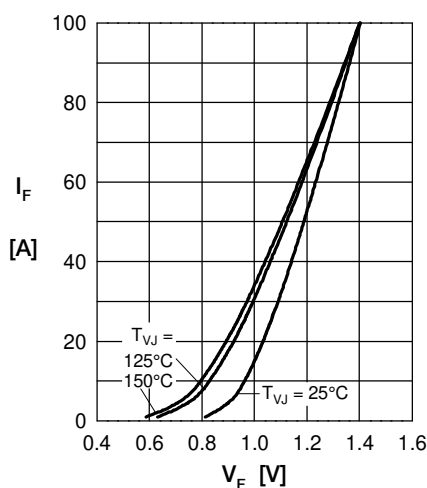
**Rectifier**


Fig. 1 Forward current vs. voltage drop per diode

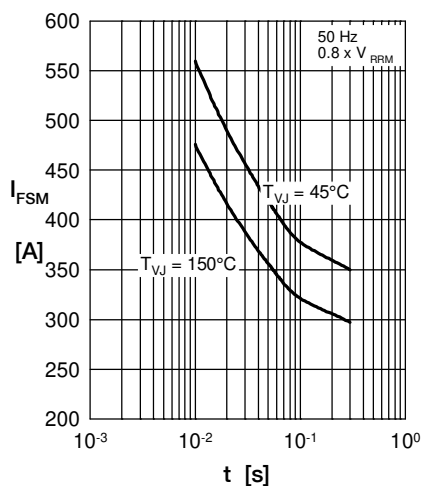


Fig. 2 Surge overload current vs. time per diode

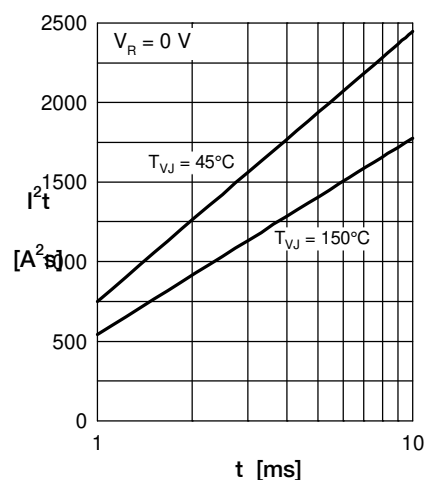


Fig. 3  $I^2t$  vs. time per diode

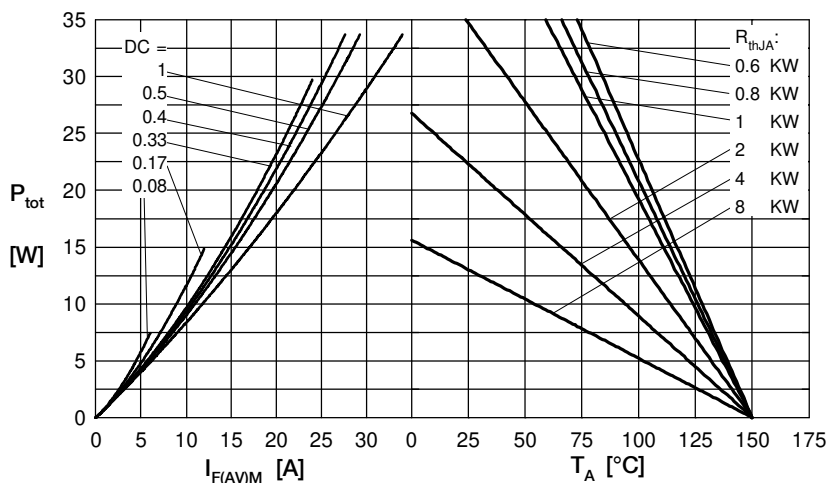


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

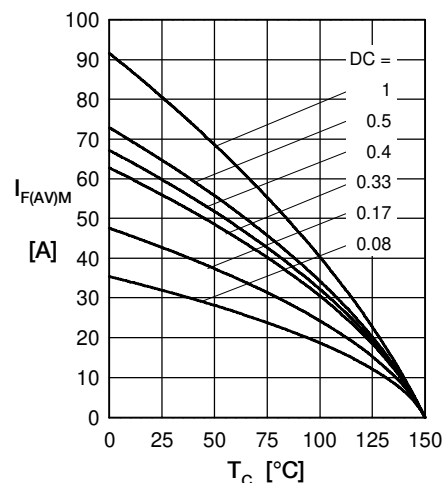


Fig. 5 Max. forward current vs. case temperature per diode

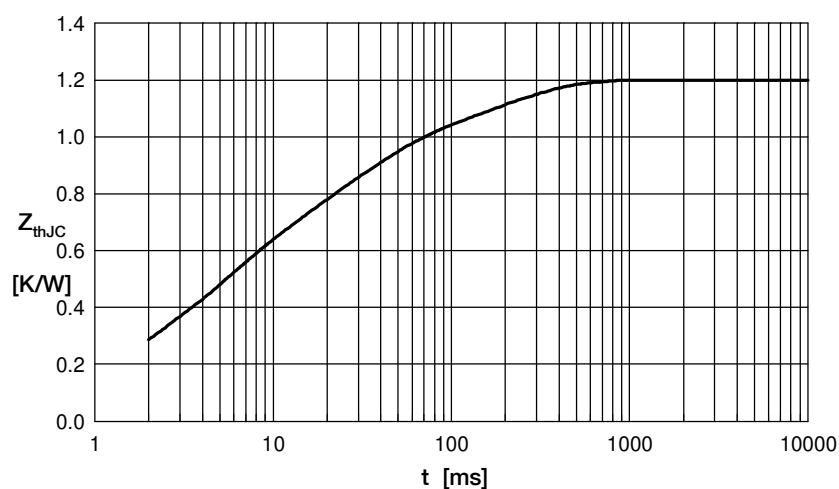


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.0607         | 0.00040   |
| 2 | 0.1330         | 0.00256   |
| 3 | 0.3305         | 0.00450   |
| 4 | 0.4130         | 0.02420   |
| 5 | 0.2628         | 0.18000   |

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