

# Standard Rectifier Module

|                         |        |
|-------------------------|--------|
| <b>3~<br/>Rectifier</b> |        |
| $V_{RRM} =$             | 2000 V |
| $I_{DAV} =$             | 60 A   |
| $I_{FSM} =$             | 350 A  |

## 3~ Rectifier Bridge

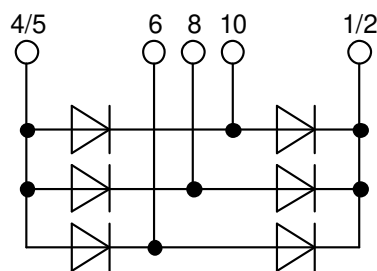
Part number

**VUO52-20NO1**



Backside: isolated

 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: V1-A-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

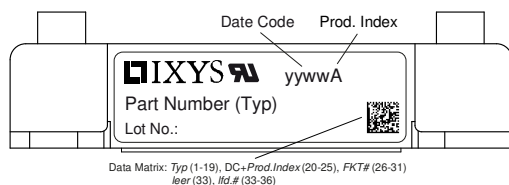
### Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).

| Rectifier  |  |  |   | Ratings                     |      |      |                  |            |
|------------|--|--|---|-----------------------------|------|------|------------------|------------|
| Symbol     | Definition                                   | Conditions                               |   | min.                        | typ. | max. | Unit             |            |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage |  |   |                             |      | 2100 | V                |            |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     |  |   |                             |      | 2000 | V                |            |
| $I_R$      | reverse current                              | $V_R = 2000$ V                           | $T_{VJ} = 25^\circ\text{C}$                       |                             |      | 40   | $\mu\text{A}$    |            |
|            |  | $V_R = 2000$ V                           | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 1.5  | mA               |            |
| $V_F$      | forward voltage drop                         | $I_F = 20$ A                             | $T_{VJ} = 25^\circ\text{C}$                       |                             |      | 1.13 | V                |            |
|            |  | $I_F = 60$ A                             |   |                             |      | 1.44 | V                |            |
|            |  | $I_F = 20$ A                             | $T_{VJ} = 125^\circ\text{C}$                      |                             |      | 1.07 | V                |            |
|            |  | $I_F = 60$ A                             |   |                             |      | 1.50 | V                |            |
| $I_{DAV}$  | bridge output current                        | $T_C = 110^\circ\text{C}$<br>rectangular | $T_{VJ} = 150^\circ\text{C}$<br>$d = \frac{1}{3}$ |                             |      | 60   | A                |            |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only        |   |                             |      | 0.83 | V                |            |
| $r_F$      | slope resistance                             |  |   |                             |      |      | 11.5             | m $\Omega$ |
| $R_{thJC}$ | thermal resistance junction to case          |  |   |                             |      | 1.3  | K/W              |            |
| $R_{thCH}$ | thermal resistance case to heatsink          |  |   | 0.3                         |      |      | K/W              |            |
| $P_{tot}$  | total power dissipation                      |  |   | $T_C = 25^\circ\text{C}$    |      |      | 95               | W          |
| $I_{FSM}$  | max. forward surge current                   | $t = 10$ ms; (50 Hz), sine               | $T_{VJ} = 45^\circ\text{C}$                       |                             |      | 350  | A                |            |
|            |  | $t = 8,3$ ms; (60 Hz), sine              | $V_R = 0$ V                                       |                             |      | 380  | A                |            |
|            |  | $t = 10$ ms; (50 Hz), sine               | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 300  | A                |            |
|            |  | $t = 8,3$ ms; (60 Hz), sine              | $V_R = 0$ V                                       |                             |      | 320  | A                |            |
| $I^2t$     | value for fusing                             | $t = 10$ ms; (50 Hz), sine               | $T_{VJ} = 45^\circ\text{C}$                       |                             |      | 615  | A <sup>2</sup> s |            |
|            |  | $t = 8,3$ ms; (60 Hz), sine              | $V_R = 0$ V                                       |                             |      | 600  | A <sup>2</sup> s |            |
|            |  | $t = 10$ ms; (50 Hz), sine               | $T_{VJ} = 150^\circ\text{C}$                      |                             |      | 450  | A <sup>2</sup> s |            |
|            |  | $t = 8,3$ ms; (60 Hz), sine              | $V_R = 0$ V                                       |                             |      | 425  | A <sup>2</sup> s |            |
| $C_J$      | junction capacitance                         | $V_R = 700$ V; $f = 1$ MHz               |   | $T_{VJ} = 25^\circ\text{C}$ |      | 7    | pF               |            |



| Package V1-A-Pack |  | Ratings   |      |      |      |      |
|-------------------|--|---|------|------|------|------|
| Symbol            | Definition   | Conditions  | min. | typ. | max. | Unit |
| $I_{RMS}$         | RMS current  | per terminal  |      |      | 100  | A    |
| $T_{VJ}$          | virtual junction temperature                                 |   | -40  |      | 150  | °C   |
| $T_{op}$          | operation temperature  |   | -40  |      | 125  | °C   |
| $T_{stg}$         | storage temperature  |   | -40  |      | 125  | °C   |
| <b>Weight</b>     |  |   |      | 37   |      | g    |
| $M_D$             | mounting torque  |   | 2    |      | 2.5  | Nm   |
| $d_{Spp/App}$     | creepage distance on surface / striking distance through air | terminal to terminal                                | 6.0  |      |      | mm   |
| $d_{Spb/Apb}$     |  | terminal to backside                                | 12.0 |      |      | mm   |
| $V_{ISOL}$        | isolation voltage  | t = 1 second<br>50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 3600 |      |      | V    |
|                   |  | t = 1 minute  | 3000 |      |      | V    |



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VUO52-20NO1     | VUO52-20NO1        | Blister       | 24       | 516840   |

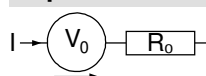
| Similar Part | Package   | Voltage class |
|--------------|-----------|---------------|
| VUO52-08NO1  | V1-A-Pack | 800           |
| VUO52-12NO1  | V1-A-Pack | 1200          |
| VUO52-14NO1  | V1-A-Pack | 1400          |
| VUO52-16NO1  | V1-A-Pack | 1600          |

|             |           |      |
|-------------|-----------|------|
| VUO52-18NO1 | V1-A-Pack | 1800 |
| VUO52-22NO1 | V1-A-Pack | 2200 |
| VUO34-16NO1 | V1-A-Pack | 1600 |
| VUO34-18NO1 | V1-A-Pack | 1800 |

**Equivalent Circuits for Simulation**

\* on die level

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



Rectifier

|              |                    |      |    |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage  | 0.83 | V  |
| $R_{0\ max}$ | slope resistance * | 10.2 | mΩ |



**Outlines V1-A-Pack**



**Remarks / Bemerkungen:**

1. Nominal distance mounting screws on heat sink: 52 mm / Nennabstand Befestigungsschrauben auf Kühlkörper: 52 mm
  2. General tolerance / Allgemeintoleranz: DIN ISO 2768 -T1-c
  3. Surface treatment of pins: tin plated (Sn) in hot dip / Oberflächenbehandlung der Pins: verzinkt (Sn) im Tauchbad
  4. Detail X: <sup>L</sup>  
EJOT PT® self-tapping screws (dimension K25) to be recommended for mounting on PCB <sup>L</sup>  
selbstschneidende Schraube (Größe K25) empfohlen für die PCB-Montage
- Take care on the maximum screw length according to board thickness and the maximum hole depth of 6 mm<sup>L</sup>  
Bei der Wahl der Schraubenlänge die PCB-Dicke und die maximale Lochtiefe von 6mm beachten
- Recommended mounting torque: 1.5 Nm / Empfohlenes Drehmoment: 1.5 Nm



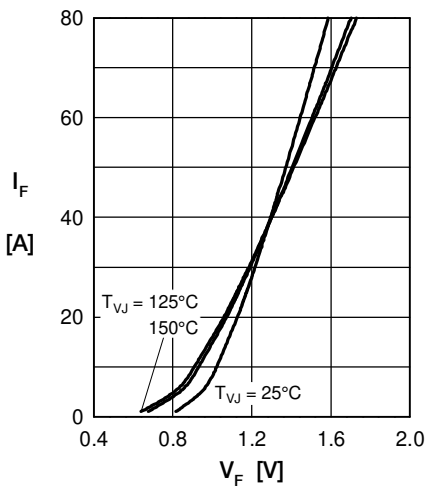
**Rectifier**


Fig. 1 Forward current vs. voltage drop per diode

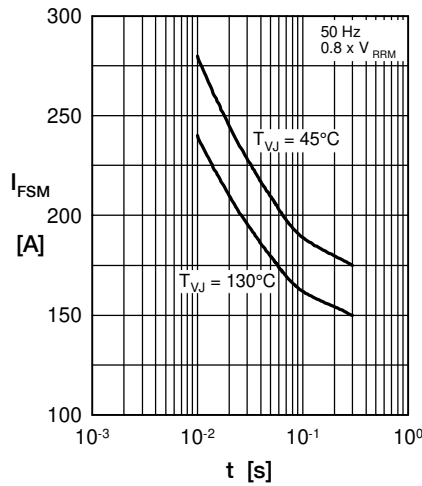


Fig. 2 Surge overload current vs. time per diode

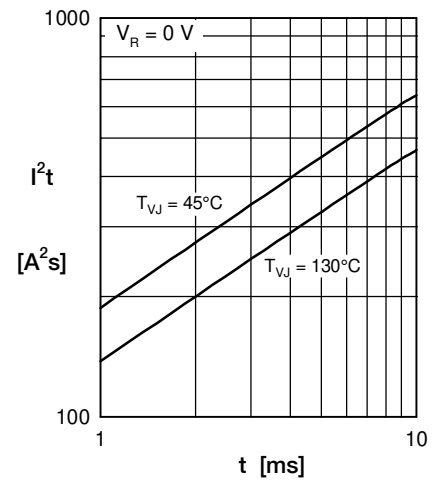
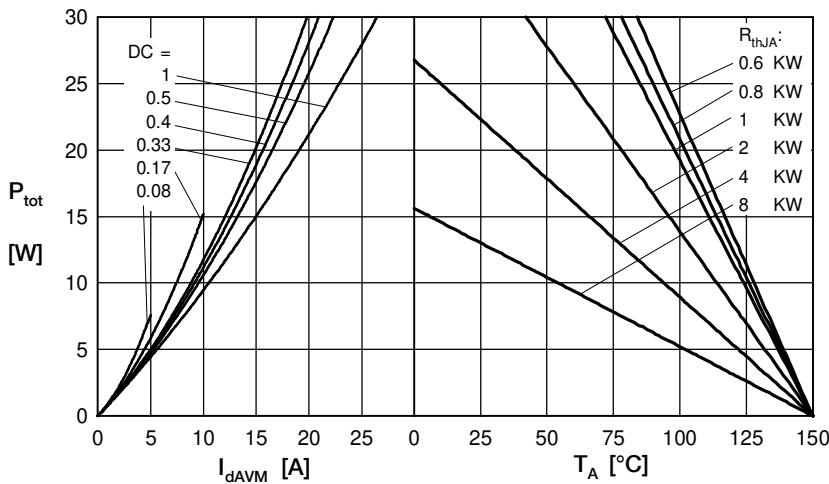

 Fig. 3  $I^2t$  vs. time per diode


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

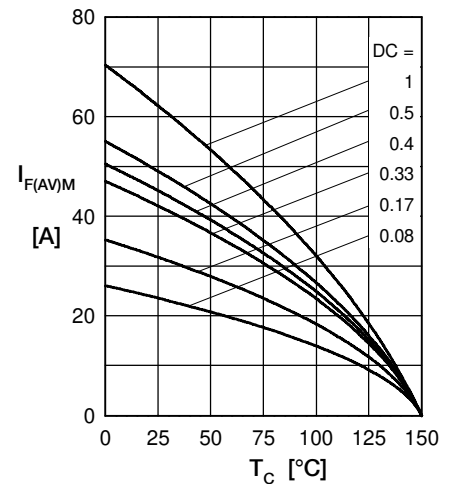


Fig. 5 Max. forward current vs. case temperature per diode

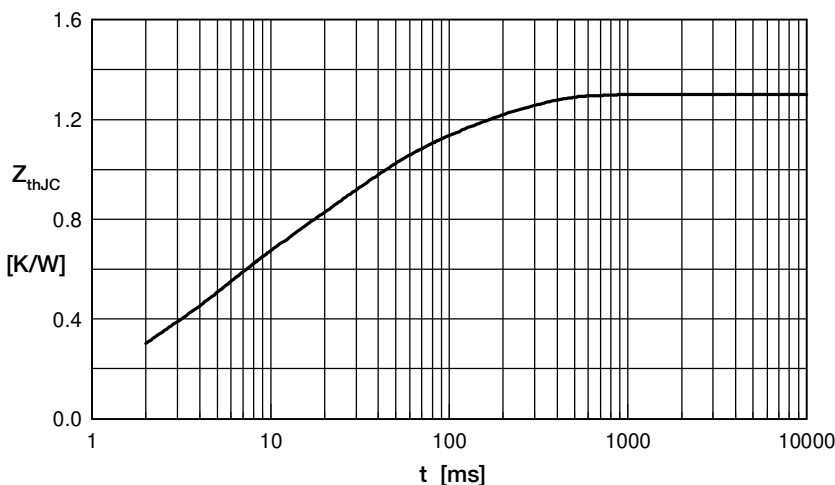


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{th}$ (K/W) | $t_i$ (s) |
|---|----------------|-----------|
| 1 | 0.06070        | 0.008     |
| 2 | 0.173          | 0.05      |
| 3 | 0.3005         | 0.06      |
| 4 | 0.463          | 0.3       |
| 5 | 0.3028         | 0.15      |