

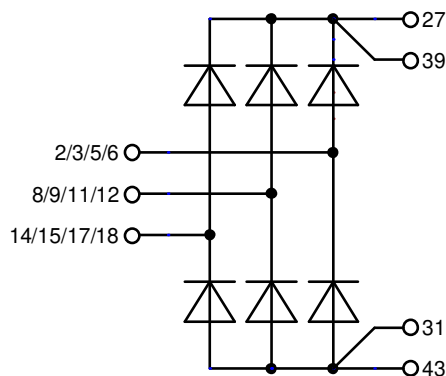
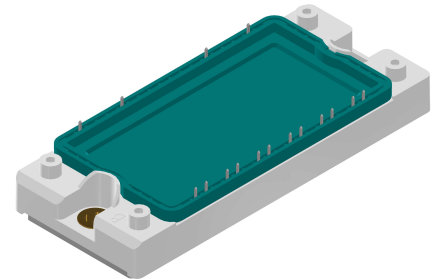
# Standard Rectifier Module

|                           |
|---------------------------|
| <b>3~<br/>Rectifier</b>   |
| $V_{RRM} = 1600\text{ V}$ |
| $I_{DAV} = 120\text{ A}$  |
| $I_{FSM} = 700\text{ A}$  |

## 3~ Rectifier Bridge

Part number

**VUO121-16NO1**



 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: E2-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

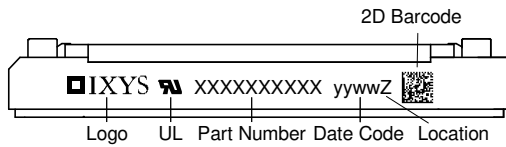
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| Rectifier  |  |                                   |             | Ratings                      |      |      |                   |
|------------|--|-----------------------------------|-------------|------------------------------|------|------|-------------------|
| Symbol     | Definition                                   | Conditions                        |             | min.                         | typ. | max. | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage |                                   |             |                              |      | 1700 | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     |                                   |             |                              |      | 1600 | V                 |
| $I_R$      | reverse current                              | $V_R = 1600$ V                    |             | $T_{VJ} = 25^\circ\text{C}$  |      | 100  | $\mu\text{A}$     |
|            |  | $V_R = 1600$ V                    |             | $T_{VJ} = 150^\circ\text{C}$ |      | 1.5  | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 40$ A                      |             | $T_{VJ} = 25^\circ\text{C}$  |      | 1.19 | V                 |
|            |  | $I_F = 120$ A                     |             |                              |      | 1.64 | V                 |
|            |  | $I_F = 40$ A                      |             | $T_{VJ} = 125^\circ\text{C}$ |      | 1.12 | V                 |
|            |  | $I_F = 120$ A                     |             |                              |      | 1.70 | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 105^\circ\text{C}$         | rectangular | $T_{VJ} = 150^\circ\text{C}$ |      | 120  | A                 |
| $V_{FO}$   | threshold voltage                            | } for power loss calculation only |             | $T_{VJ} = 150^\circ\text{C}$ |      | 0.80 | V                 |
| $r_F$      | slope resistance                             |                                   |             |                              |      | 7.6  | m $\Omega$        |
| $R_{thJC}$ | thermal resistance junction to case          |                                   |             |                              |      | 0.65 | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |                                   |             |                              | 0.1  |      | K/W               |
| $P_{tot}$  | total power dissipation                      |                                   |             | $T_C = 25^\circ\text{C}$     |      | 190  | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10$ ms; (50 Hz), sine        |             | $T_{VJ} = 45^\circ\text{C}$  |      | 700  | A                 |
|            |  | $t = 8,3$ ms; (60 Hz), sine       |             | $V_R = 0$ V                  |      | 755  | A                 |
|            |  | $t = 10$ ms; (50 Hz), sine        |             | $T_{VJ} = 150^\circ\text{C}$ |      | 595  | A                 |
|            |  | $t = 8,3$ ms; (60 Hz), sine       |             | $V_R = 0$ V                  |      | 645  | A                 |
| $I^2t$     | value for fusing                             | $t = 10$ ms; (50 Hz), sine        |             | $T_{VJ} = 45^\circ\text{C}$  |      | 2.45 | kA <sup>2</sup> s |
|            |  | $t = 8,3$ ms; (60 Hz), sine       |             | $V_R = 0$ V                  |      | 2.37 | kA <sup>2</sup> s |
|            |  | $t = 10$ ms; (50 Hz), sine        |             | $T_{VJ} = 150^\circ\text{C}$ |      | 1.77 | kA <sup>2</sup> s |
|            |  | $t = 8,3$ ms; (60 Hz), sine       |             | $V_R = 0$ V                  |      | 1.73 | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400$ V; $f = 1$ MHz        |             | $T_{VJ} = 25^\circ\text{C}$  |      | 27   | pF                |



| Package E2-Pack |  | Ratings                             |              |      |      |        |
|-----------------|--|-------------------------------------|--------------|------|------|--------|
| Symbol          | Definition   | Conditions                          | min.         | typ. | max. | Unit   |
| $I_{RMS}$       | RMS current  | per terminal                        |              |      | 50   | 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>   |  |                                     |              | 176  |      | g      |
| $M_D$           | mounting torque  |                                     | 3            |      | 6    | 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>t = 1 minute        | 3600<br>3000 |      |      | V<br>V |
|                 |  | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA |              |      |      |        |



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | VUO121-16NO1    | VUO121-16NO1       | Box           | 6        | 496278   |

**Equivalent Circuits for Simulation**

\* on die level

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

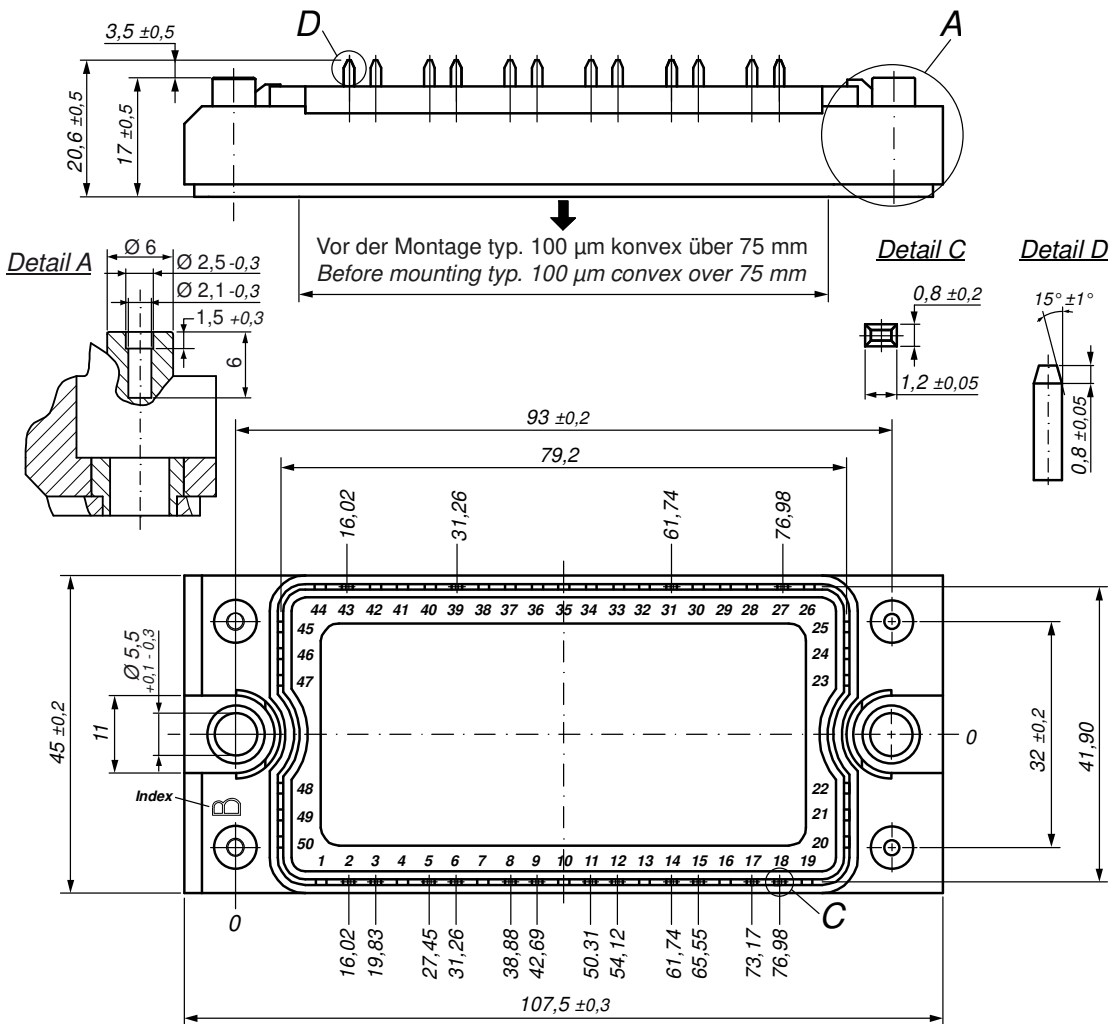


Rectifier

|              |                    |     |    |
|--------------|--------------------|-----|----|
| $V_{0\ max}$ | threshold voltage  | 0.8 | V  |
| $R_{0\ max}$ | slope resistance * | 4.5 | mΩ |



**Outlines E2-Pack**

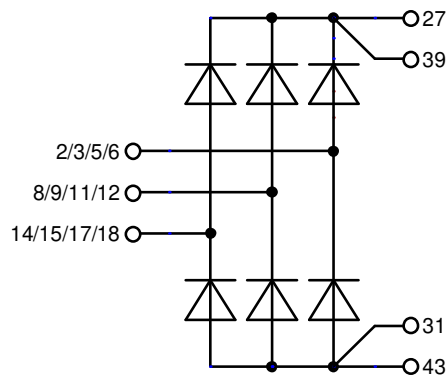


**Bemerkung / Note:**

- Nichttolerierete Maße nach / *Measure without tolerances according DIN ISO 2768-T1-m*
- PCB-Lochmuster / *PCB hole pattern: see pin position*
- Toleranz Pin-Position und PCB-Lochmuster / *Tolerance of pin position and PCB hole pattern:  $\oplus 0.1$*
- Montageanleitung / *Mounting instruction: www.ixys.com Application note IXAN0024*

**Detail A:** PCB-Montage / *Mounting on PCB*

- Empfohlene, selbstschneidende Schraube / *Recommended, self-tapping screw: EJOT PT® (Größe / size: K25)*<sup>L</sup>
- Max. Schraubenlänge / *Max. screw length: PCB-Dicke / thickness + 6 mm (max. Lochtiefe / hole depth)*<sup>L</sup>
- Empfohlenes Drehmoment / *Recommended mounting torque: 1.5 Nm*



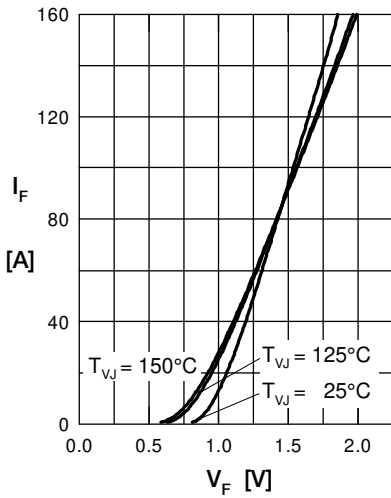
**Rectifier**


Fig. 1 Forward current vs. voltage drop per diode

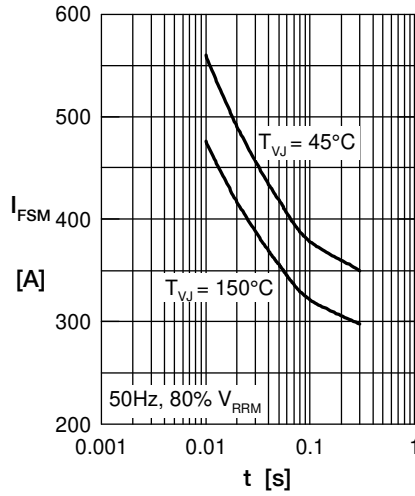


Fig. 2 Surge overload current vs. time per diode

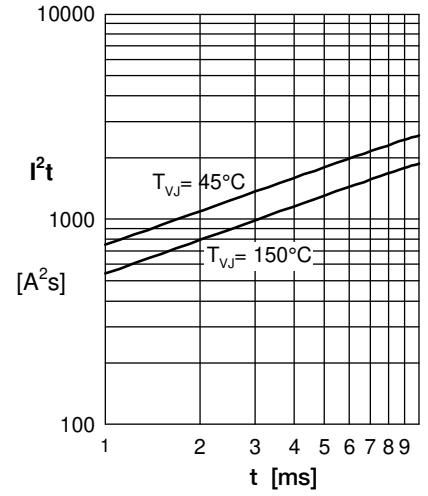
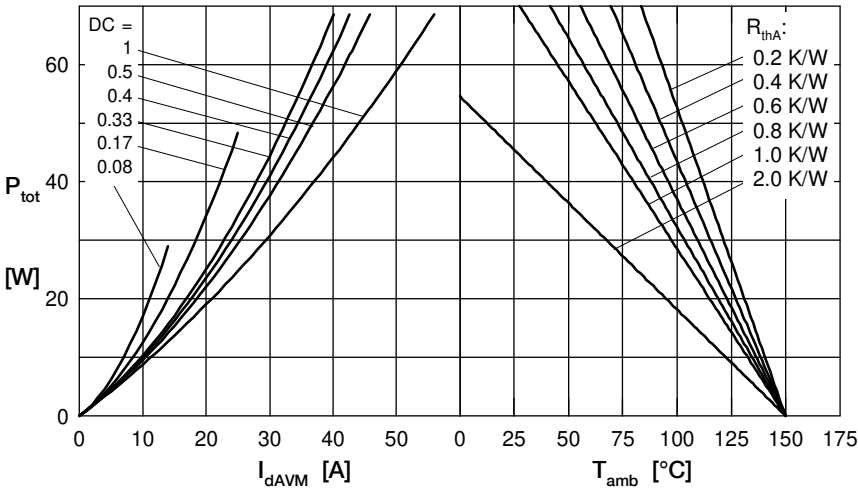

 Fig. 3  $I^2t$  vs. time per diode


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

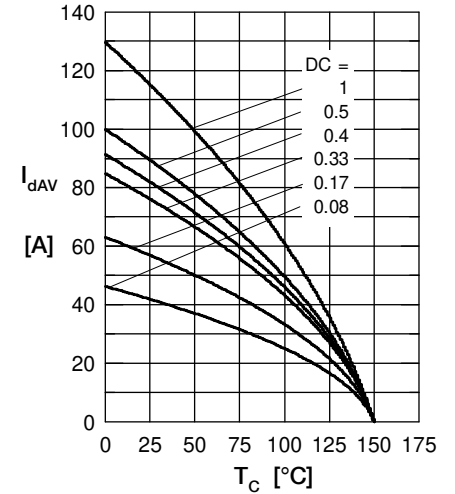


Fig. 5 Max. forward current vs. case temperature per diode

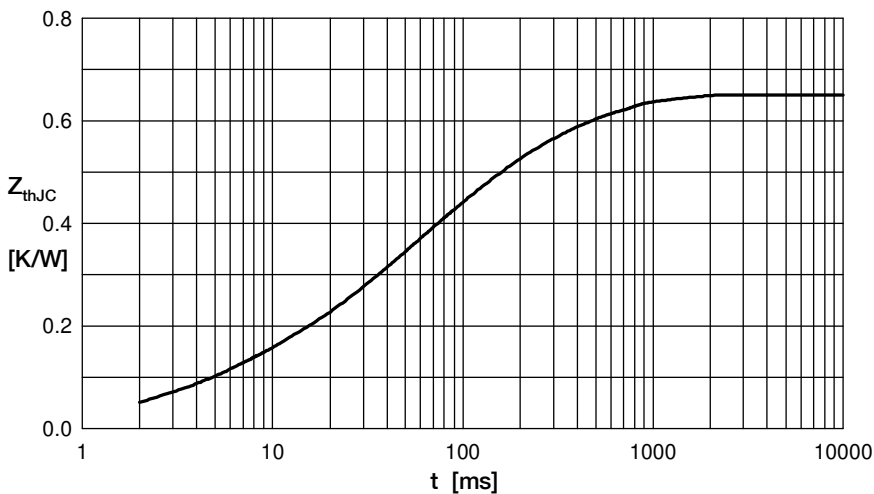


Fig. 6 Transient thermal impedance junction to case vs. time per diode

| $R_i$ | $q_i$ |
|-------|-------|
| 0.080 | 0.004 |
| 0.003 | 0.010 |
| 0.160 | 0.025 |
| 0.160 | 0.400 |
| 0.247 | 0.090 |