

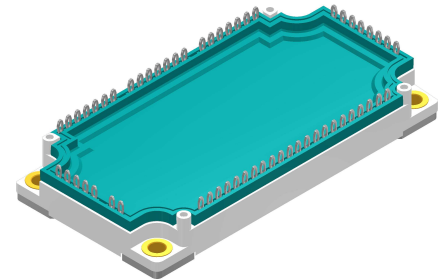
# Standard Rectifier Module

|                           |
|---------------------------|
| <b>3~<br/>Rectifier</b>   |
| $V_{RRM} = 1600\text{ V}$ |
| $I_{DAV} = 900\text{ A}$  |
| $I_{FSM} = 8000\text{ A}$ |

## 3~ Rectifier Bridge + NTC

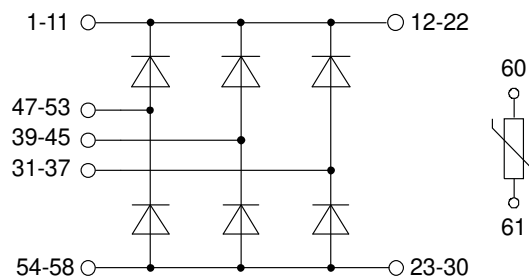
Part number

**MDMA900U1600PTEH**



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: E3-Pack

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

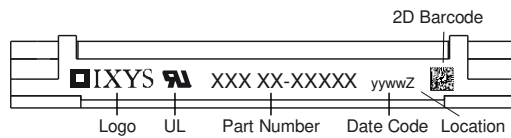
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| Rectifier  |  |   |                   | Ratings                 |      |                                   |                   |
|------------|--|---|-------------------|-------------------------|------|-----------------------------------|-------------------|
| Symbol     | Definition                                   | Conditions  |                   | min.                    | typ. | max.                              | Unit              |
| $V_{RSM}$  | max. non-repetitive reverse blocking voltage |   |                   | $T_{VJ} = 25^{\circ}C$  |      | 1700                              | V                 |
| $V_{RRM}$  | max. repetitive reverse blocking voltage     |   |                   | $T_{VJ} = 25^{\circ}C$  |      | 1600                              | V                 |
| $I_R$      | reverse current                              | $V_R = 1600\text{ V}$                             |                   | $T_{VJ} = 25^{\circ}C$  |      | 200                               | $\mu A$           |
|            |  | $V_R = 1600\text{ V}$                             |                   | $T_{VJ} = 150^{\circ}C$ |      | 5                                 | mA                |
| $V_F$      | forward voltage drop                         | $I_F = 300\text{ A}$                              |                   | $T_{VJ} = 25^{\circ}C$  |      | 1.27                              | V                 |
|            |  | $I_F = 900\text{ A}$                              |                   |                         |      | 1.92                              | V                 |
|            |  | $I_F = 300\text{ A}$                              |                   | $T_{VJ} = 125^{\circ}C$ |      | 1.19                              | V                 |
|            |  | $I_F = 900\text{ A}$                              |                   |                         |      | 1.94                              | V                 |
| $I_{DAV}$  | bridge output current                        | $T_C = 85^{\circ}C$                               |                   | $T_{VJ} = 150^{\circ}C$ |      | 900                               | A                 |
|            |  | rectangular                                       | $d = \frac{1}{3}$ |                         |      |                                   |                   |
| $V_{FO}$   | threshold voltage                            |   |                   | $T_{VJ} = 150^{\circ}C$ |      | 0.78                              | V                 |
| $r_F$      | slope resistance                             |   |                   |                         |      | 1.3                               | m $\Omega$        |
|            |  |   |                   |                         |      | } for power loss calculation only |                   |
| $R_{thJC}$ | thermal resistance junction to case          |   |                   |                         |      | 0.1                               | K/W               |
| $R_{thCH}$ | thermal resistance case to heatsink          |   |                   |                         | 0.05 |                                   | K/W               |
| $P_{tot}$  | total power dissipation                      |   |                   | $T_C = 25^{\circ}C$     |      | 1250                              | W                 |
| $I_{FSM}$  | max. forward surge current                   | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  |                   | $T_{VJ} = 45^{\circ}C$  |      | 8.00                              | kA                |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ |                   | $V_R = 0\text{ V}$      |      | 8.64                              | kA                |
|            |  | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  |                   | $T_{VJ} = 150^{\circ}C$ |      | 6.80                              | kA                |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ |                   | $V_R = 0\text{ V}$      |      | 7.35                              | kA                |
| $I^2t$     | value for fusing                             | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  |                   | $T_{VJ} = 45^{\circ}C$  |      | 320.0                             | kA <sup>2</sup> s |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ |                   | $V_R = 0\text{ V}$      |      | 310.5                             | kA <sup>2</sup> s |
|            |  | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$  |                   | $T_{VJ} = 150^{\circ}C$ |      | 231.2                             | kA <sup>2</sup> s |
|            |  | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ |                   | $V_R = 0\text{ V}$      |      | 224.4                             | kA <sup>2</sup> s |
| $C_J$      | junction capacitance                         | $V_R = 400\text{ V}; f = 1\text{ MHz}$            |                   | $T_{VJ} = 25^{\circ}C$  |      | 343                               | pF                |



| Package E3-Pack |  | Ratings                             |              |      |      |        |
|-----------------|--|-------------------------------------|--------------|------|------|--------|
| Symbol          | Definition   | Conditions                          | min.         | typ. | max. | Unit   |
| $I_{RMS}$       | RMS current  | per terminal                        |              |      | 30   | 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>   |  |                                     |              | 270  |      | 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 |              |      |      |        |



**Part description**

- M = Module
- D = Diode
- M = Standard Rectifier
- A = (up to 1800V)
- 900 = Current Rating [A]
- U = 3- Rectifier Bridge
- 1600 = Reverse Voltage [V]
- PT = PressFit-Pin, Thermistor
- EH = E3-Pack
- = Hyphen
- PC = Phase Change Material

| Ordering    | Ordering Number     | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|---------------------|--------------------|---------------|----------|----------|
| Standard    | MDMA900U1600PTEH    | MDMA900U1600PTEH   | Blister       | 24       | 515661   |
| Alternative | MDMA900U1600PTEH-PC | MDMA900U1600PTEH   | Blister       | 24       | 514468   |

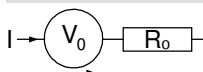
**Temperature Sensor NTC**

| Symbol      | Definition              | Conditions          | min. | typ. | max. | Unit       |
|-------------|-------------------------|---------------------|------|------|------|------------|
| $R_{25}$    | resistance              | $T_{VJ} = 25^\circ$ | 4.85 | 5    | 5.15 | k $\Omega$ |
| $B_{25/50}$ | temperature coefficient |                     |      | 3375 |      | K          |

**Equivalent Circuits for Simulation**

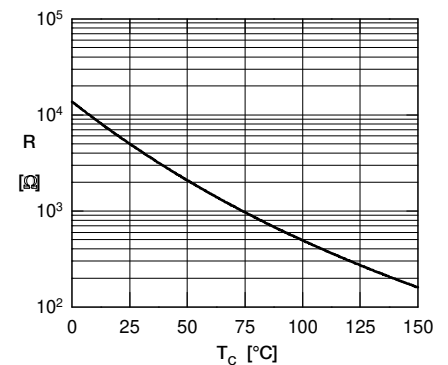
\* on die level

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



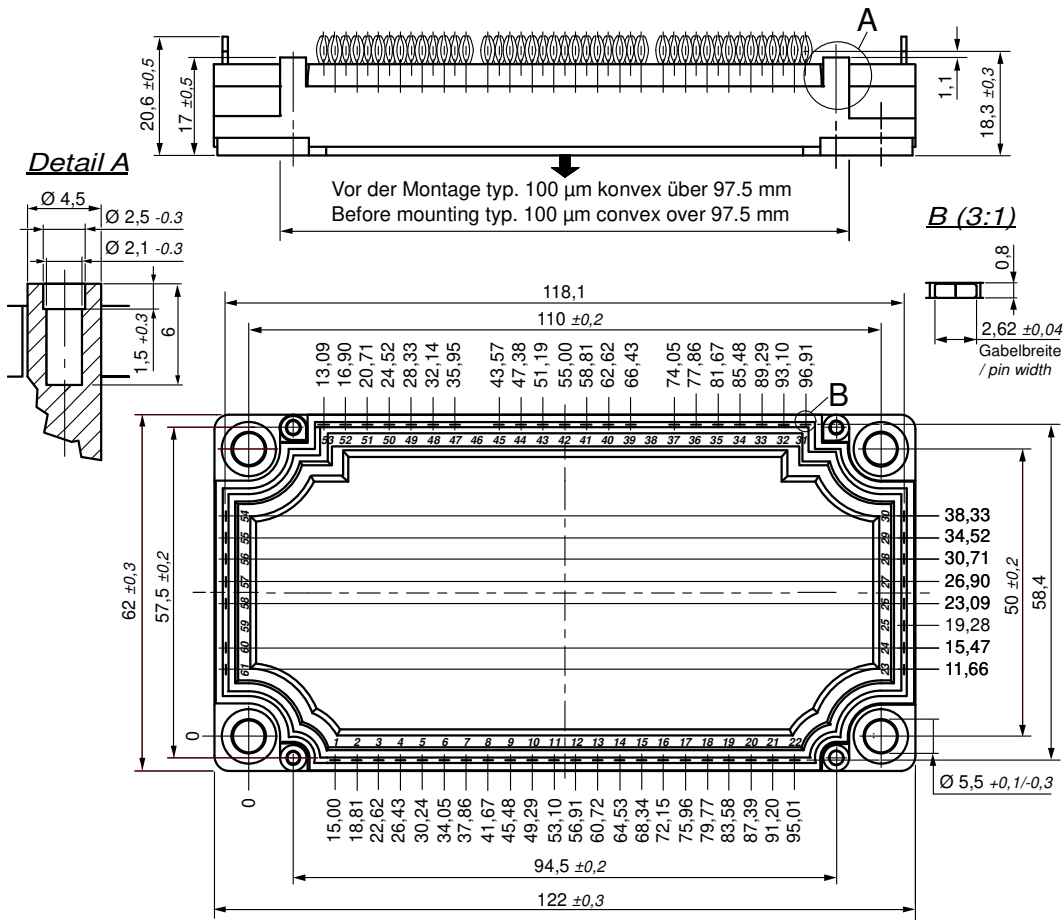
Rectifier

|              |                    |      |  |  |  |            |
|--------------|--------------------|------|--|--|--|------------|
| $V_{0 \max}$ | threshold voltage  | 0.78 |  |  |  | V          |
| $R_{0 \max}$ | slope resistance * | 0.36 |  |  |  | m $\Omega$ |





**Outlines E3-Pack**

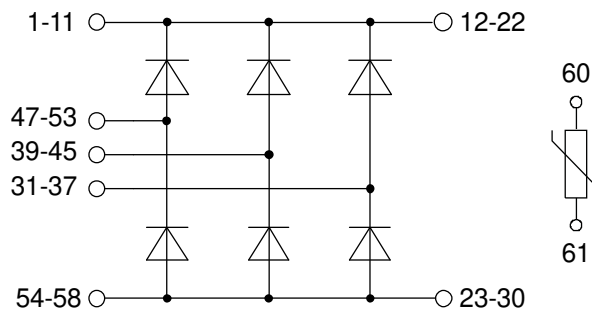


**Bemerkung / Note:**

- 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:  $\oplus 0.1$
- Bohrlochdurchmesser / Diameter of drill:  $\varnothing 2.35$  mm
- Endlochdurchmesser / Diameter of plated holes:  $\varnothing 2.14 - 2.29$  mm (Cu thickness in via typ. 50  $\mu$ m)
- Beschichtung / Plating: **chem. Sn max. 15  $\mu$ m**
- Einpresskraft / Insert Force: per terminal with a typ. insert speed of 7 mm/s: **typ. 90 N**
- Weitere Angaben / Further information: [www.ixys.com](http://www.ixys.com) **Application note IXAN0077**
- Montageanleitung / Mounting instruction: [www.ixys.com](http://www.ixys.com) **Application note IXAN0024**

**Detail A:** PCB-Montage / Mounting on PCB<sup>1</sup>

- Empfohlene, selbstschneidende Schraube / Recommended, self-tapping screw: **EJOT PT®** (Größe / size: **K25**)<sup>1</sup>
- Max. Schraubenlänge / Max. screw length: **PCB-Dicke / thickness + 6 mm** (max. Lochtiefe / hole depth)<sup>1</sup>
- Empfohlenes Drehmoment / Recommended mounting torque: **1.5 Nm**



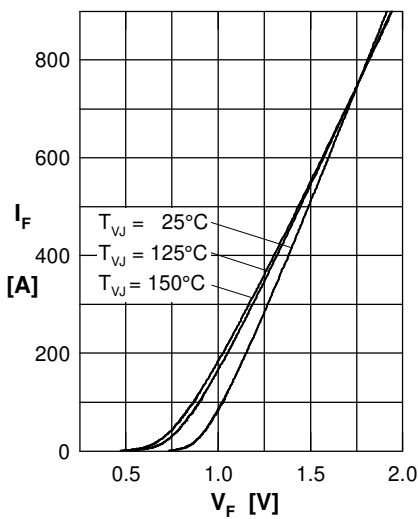
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

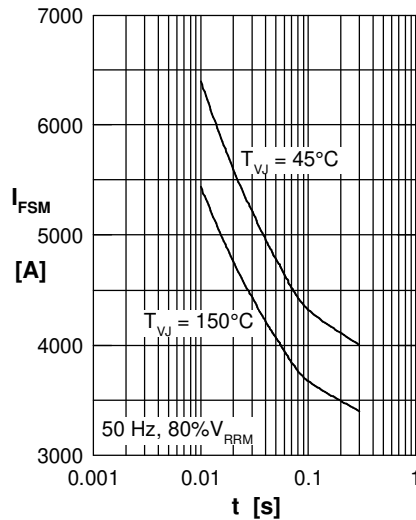


Fig. 2 Surge overload current vs. time per diode

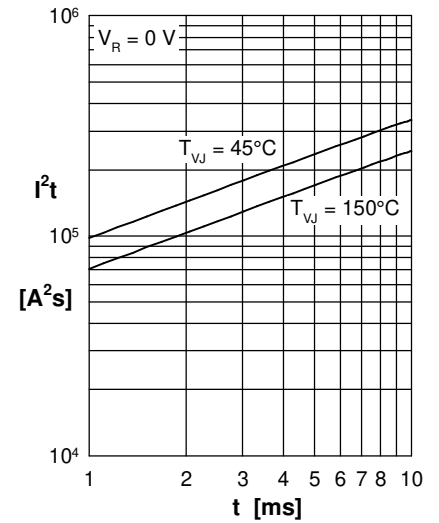
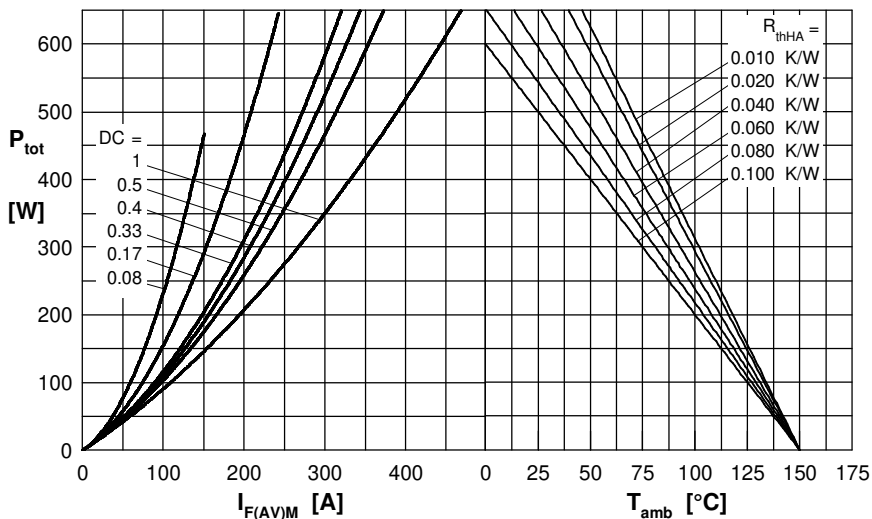

 Fig. 3  $I^2t$  versus time per diode


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

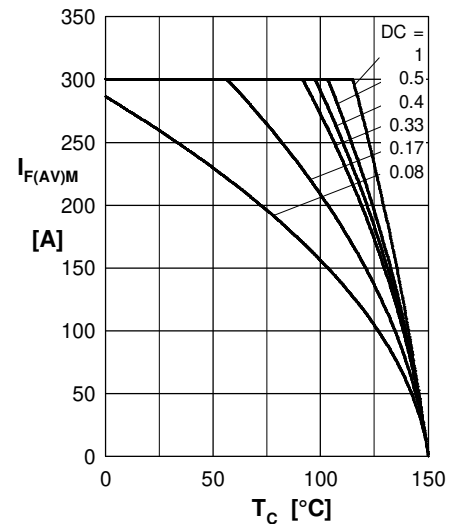


Fig. 5 Max. forward current vs. case temperature per diode

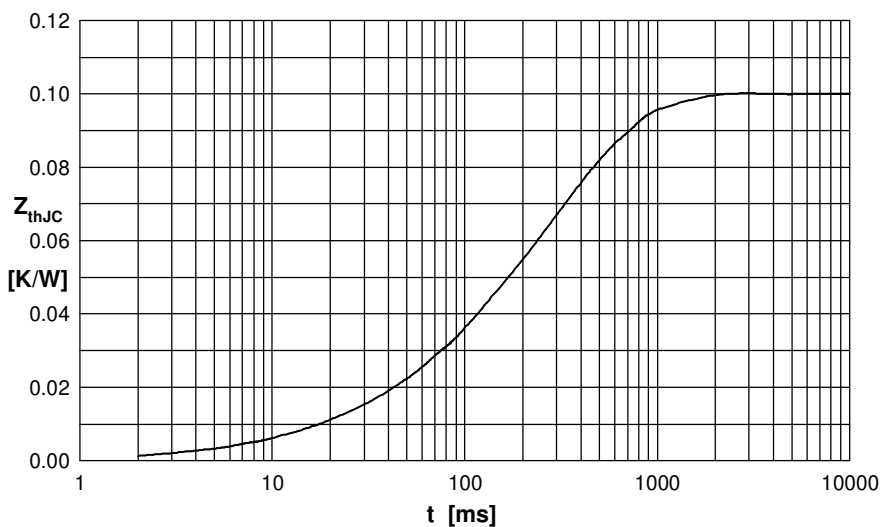


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.004           | 0.015     |
| 2 | 0.014           | 0.080     |
| 3 | 0.024           | 0.220     |
| 4 | 0.058           | 0.380     |