

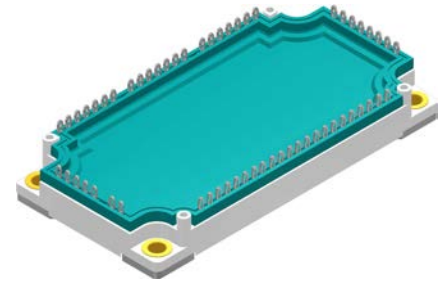
Standard Rectifier Module

| |
|---------------------------|
| 3~ Rectifier |
| $V_{RRM} = 1600\text{ V}$ |
| $I_{DAV} = 450\text{ A}$ |
| $I_{FSM} = 2400\text{ A}$ |

3~ Rectifier Bridge + NTC

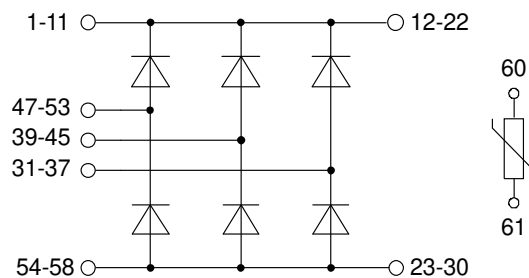
Part number

MDMA450U1600PTEH



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: 4300 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

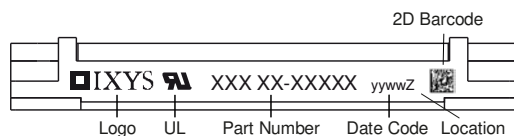
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| Rectifier | | | | Ratings | | | |
|------------|----------------------------------------------|-----------------------------|-------------------|------------------------------|------|-----------------------------------|-------------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 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 | μA |
| | | $V_R = 1600$ V | | $T_{VJ} = 150^\circ\text{C}$ | | 3 | mA |
| V_F | forward voltage drop | $I_F = 150$ A | | $T_{VJ} = 25^\circ\text{C}$ | | 1,24 | V |
| | | $I_F = 450$ A | | | | 1,76 | V |
| | | $I_F = 150$ A | | $T_{VJ} = 125^\circ\text{C}$ | | 1,20 | V |
| | | $I_F = 450$ A | | | | 1,91 | V |
| I_{DAV} | bridge output current | $T_C = 85^\circ\text{C}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 450 | A |
| | | rectangular | $d = \frac{1}{3}$ | | | | |
| V_{FO} | threshold voltage | | | $T_{VJ} = 150^\circ\text{C}$ | | 0,82 | V |
| r_F | slope resistance | | | | | 2,5 | m Ω |
| | | | | | | } for power loss calculation only | |
| R_{thJC} | thermal resistance junction to case | | | | | 0,2 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0,1 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 625 | W |
| I_{FSM} | max. forward surge current | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 2,40 | kA |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 2,59 | kA |
| | | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 2,04 | kA |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 2,21 | kA |
| I^2t | value for fusing | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 28,8 | kA ² s |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 27,9 | kA ² s |
| | | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 20,8 | kA ² s |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 20,2 | kA ² s |
| C_J | junction capacitance | $V_R = 400$ V; $f = 1$ MHz | | $T_{VJ} = 25^\circ\text{C}$ | | 91 | 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 |
| Weight | | | | 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 |
| $d_{Spb/Appb}$ | | terminal to backside | 12,0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second t = 1 minute | 4300 | | | V |
| | | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 3600 | | | V |



Part description

- M = Module
- D = Diode
- M = Standard Rectifier
- A = (up to 1800V)
- 450 = 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 | MDMA450U1600PTEH | MDMA450U1600PTEH | Blister | 24 | |
| Alternative | MDMA450U1600PTEH-PC | MDMA450U1600PTEH | Blister | 24 | 518562 |

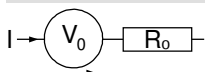
Temperature Sensor NTC

| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
|-------------|-------------------------|---------------------|------|------|------|------|
| R_{25} | resistance | $T_{VJ} = 25^\circ$ | 4,85 | 5 | 5,15 | kΩ |
| $B_{25/50}$ | temperature coefficient | | | 3375 | | K |

Equivalent Circuits for Simulation

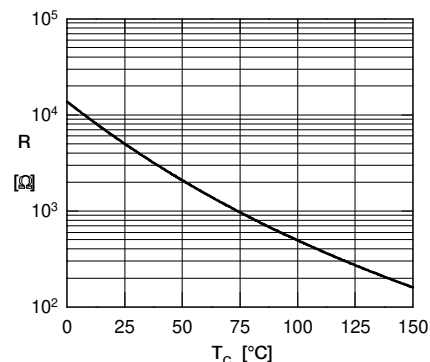
* on die level

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



Rectifier

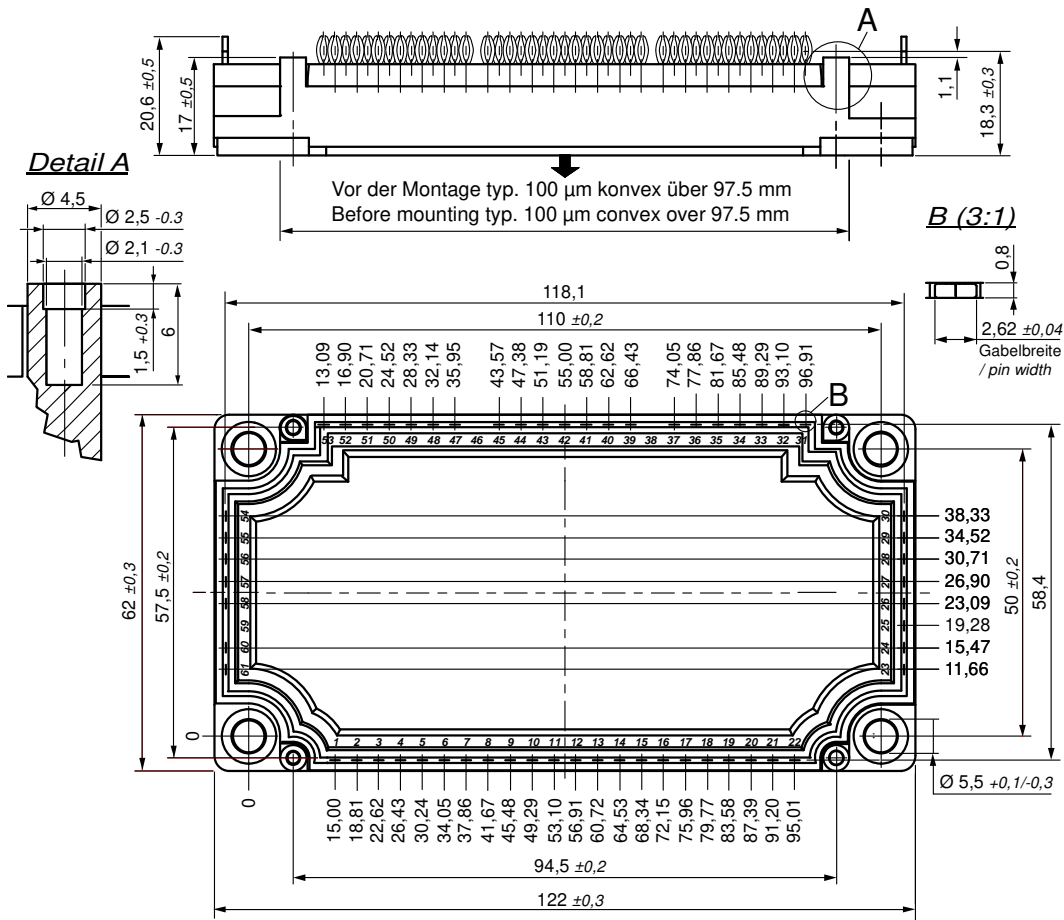
| | | | | | | |
|--------------|--------------------|------|--|--|--|----|
| $V_{0\ max}$ | threshold voltage | 0,82 | | | | V |
| $R_{0\ max}$ | slope resistance * | 1,2 | | | | mΩ |



Typ. NTC resistance vs. temperature



Outlines E3-Pack

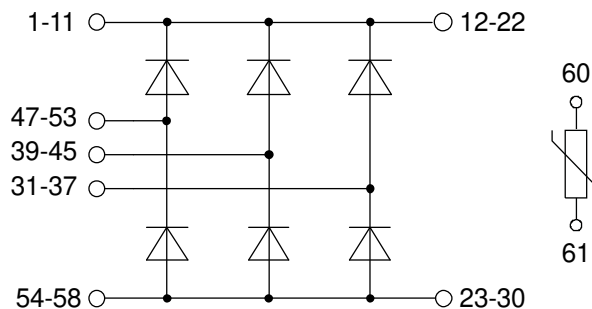


Bemerkung / Note:

- 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: **Ø 2.35 mm**
- Endlochdurchmesser / Diameter of plated holes: **Ø 2.14 - 2.29 mm** (Cu thickness in via typ. 50 µm)
- Beschichtung / Plating: **chem. Sn max. 15 µm**
- Einpresskraft / Insert Force: per terminal with a typ. insert speed of 7 mm/s: **typ. 90 N**
- Weitere Angaben / Further information: www.ixys.com **Application note IXAN0077**
- 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**)
- Max. Schraubenlänge / Max. screw length: **PCB-Dicke / thickness + 6 mm** (max. Lochtiefe / hole depth)
- Empfohlenes Drehmoment / Recommended mounting torque: **1.5 Nm**



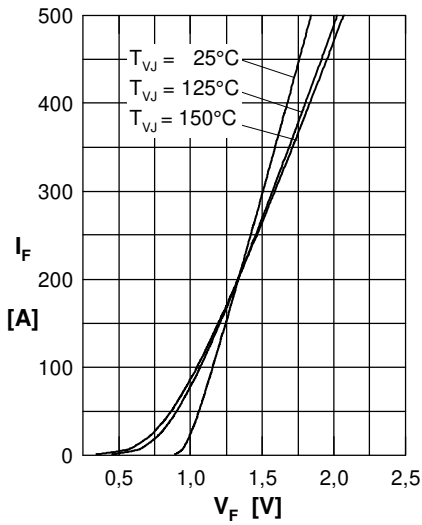
Rectifier


Fig. 1 Forward current versus voltage drop per diode

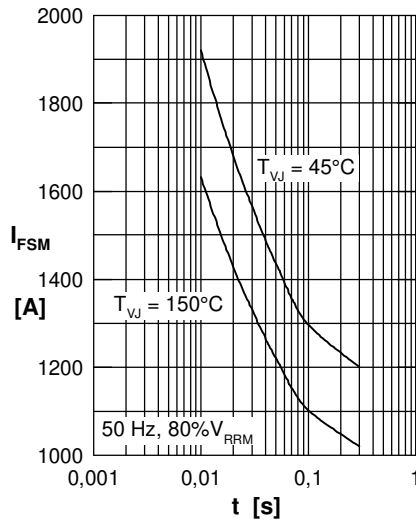


Fig. 2 Surge overload current vs. time per diode

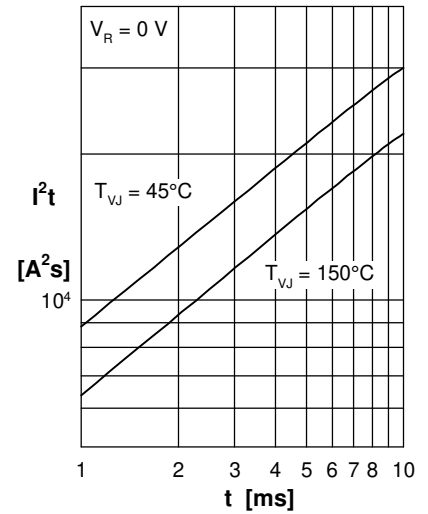
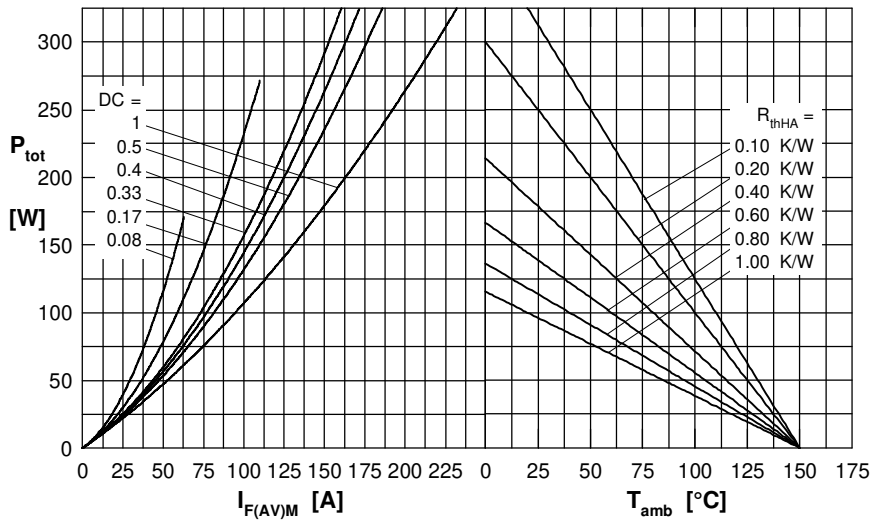

 Fig. 3 I^2t versus time per diode


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

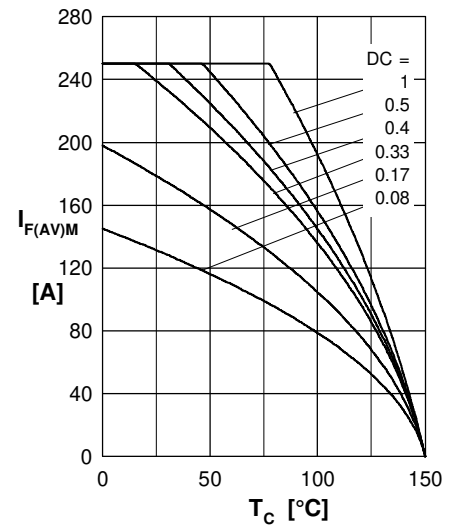


Fig. 5 Max. forward current vs. case temperature per diode

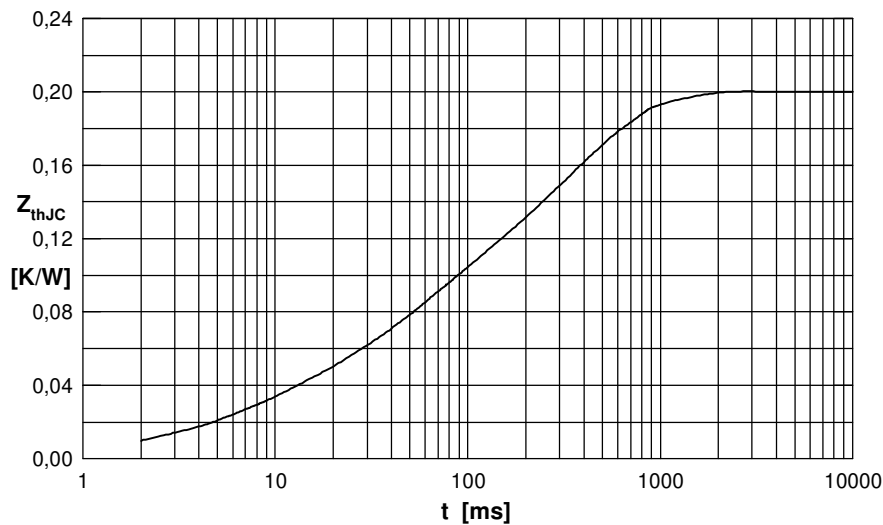


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for Z_{thjC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.020 | 0.006 |
| 2 | 0.003 | 0.007 |
| 3 | 0.057 | 0.042 |
| 4 | 0.120 | 0.350 |