

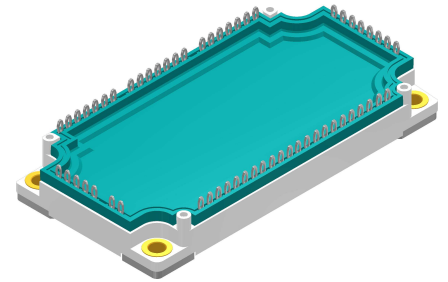
High Voltage Standard Rectifier Module

| |
|---------------------------|
| 3~ Rectifier |
| $V_{RRM} = 2200\text{ V}$ |
| $I_{DAV} = 660\text{ A}$ |
| $I_{FSM} = 5000\text{ A}$ |

3~ Rectifier Bridge + NTC

Part number

MDNA660U2200PTEH



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

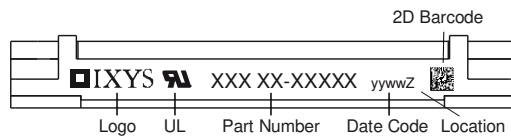
- Isolation Voltage: 4300 V~
- Industry standard outline
- RoHS compliant
- PressFit-Pins for PCB mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

Disclaimer Notice

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| Rectifier | | | | Ratings | | | |
|------------|--|-----------------------------------|-------------|------------------------------|-------|-------|-------------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 2300 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 2200 | V |
| I_R | reverse current | $V_R = 2200$ V | | $T_{VJ} = 25^\circ\text{C}$ | | 400 | μA |
| | | $V_R = 2200$ V | | $T_{VJ} = 150^\circ\text{C}$ | | 6 | mA |
| V_F | forward voltage drop | $I_F = 220$ A | | $T_{VJ} = 25^\circ\text{C}$ | | 1.28 | V |
| | | $I_F = 660$ A | | | | 1.95 | V |
| | | $I_F = 220$ A | | $T_{VJ} = 125^\circ\text{C}$ | | 1.19 | V |
| | | $I_F = 660$ A | | | | 1.95 | V |
| I_{DAV} | bridge output current | $T_C = 85^\circ\text{C}$ | rectangular | $T_{VJ} = 150^\circ\text{C}$ | | 660 | A |
| V_{FO} | threshold voltage | } for power loss calculation only | | $T_{VJ} = 150^\circ\text{C}$ | | 0.77 | V |
| r_F | slope resistance | | | | | 1.8 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | | 0.15 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.075 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 830 | W |
| I_{FSM} | max. forward surge current | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 5.00 | kA |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 5.40 | kA |
| | | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 4.25 | kA |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 4.59 | kA |
| I^2t | value for fusing | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 125.0 | kA ² s |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 121.3 | kA ² s |
| | | $t = 10$ ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 90.3 | kA ² s |
| | | $t = 8,3$ ms; (60 Hz), sine | | $V_R = 0$ V | | 87.6 | kA ² s |
| C_J | junction capacitance | $V_R = 700$ V; $f = 1$ MHz | | $T_{VJ} = 25^\circ\text{C}$ | | 158 | 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 | | 175 | °C |
| T_{op} | operation temperature | | -40 | | 150 | °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 |
| $d_{Spb/Apb}$ | | terminal to backside | 12.0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second t = 1 minute | 4300 3600 | | | V |
| | | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | | | | V |



Part description

M = Module
 D = Diode
 N = High Voltage Standard Rectifier
 A = (>= 2000V)
 660 = Current Rating [A]
 U = 3- Rectifier Bridge
 2200 = 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 | MDNA660U2200PTEH | MDNA660U2200PTEH | Blister | 24 | 516663 |
| Alternative | MDNA660U2200PTEH-PC | MDNA660U2200PTEH | Blister | 24 | 514482 |

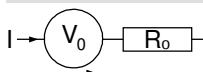
Temperature Sensor NTC

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

Equivalent Circuits for Simulation

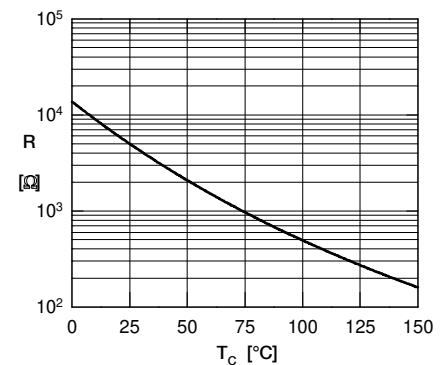
* on die level

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



Rectifier

| | | | | | | |
|--------------|--------------------|------|--|--|--|------------|
| $V_{0 \max}$ | threshold voltage | 0.77 | | | | V |
| $R_{0 \max}$ | slope resistance * | 0.57 | | | | m Ω |



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 PCB¹

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



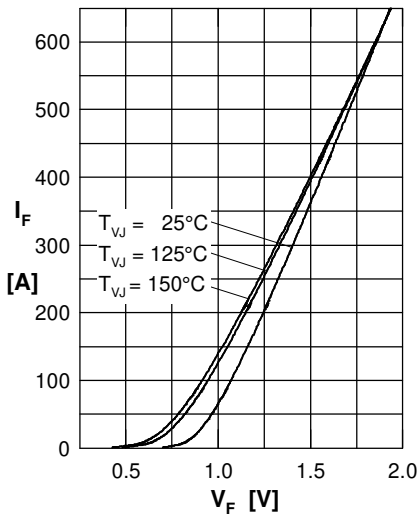
Rectifier


Fig. 1 Forward current versus voltage drop per diode

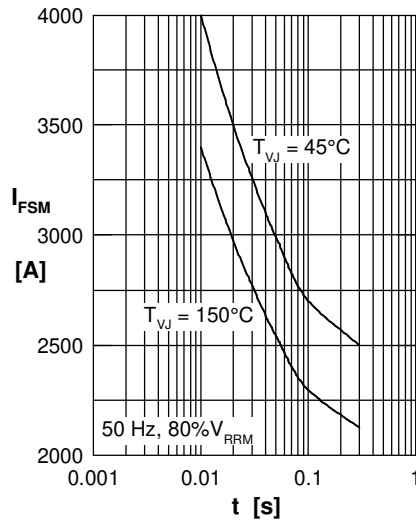


Fig. 2 Surge overload current vs. time per diode

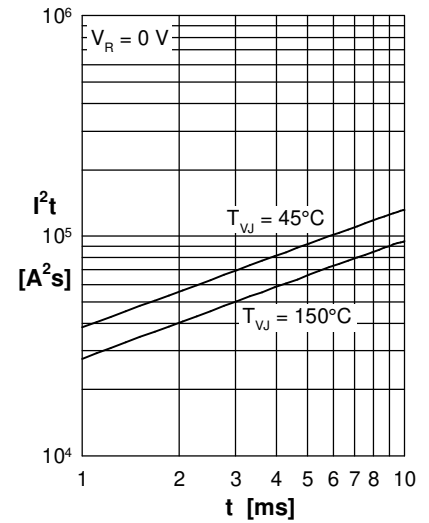
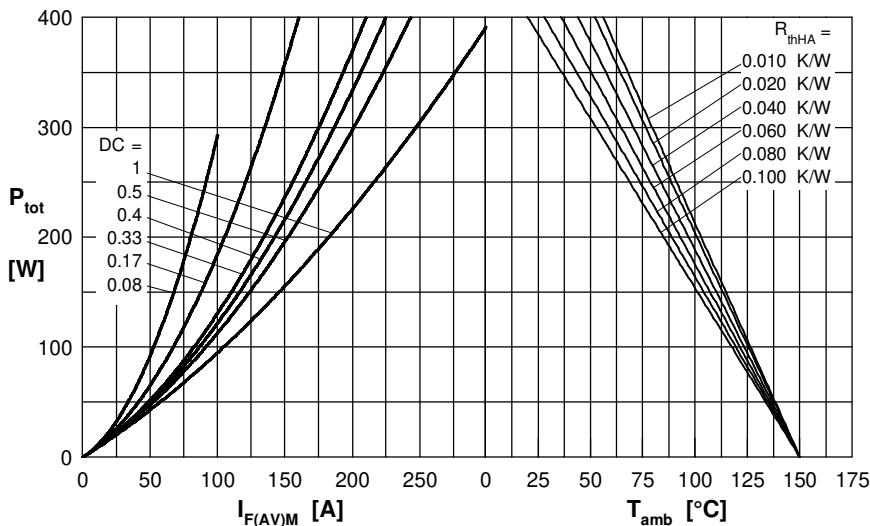

 Fig. 3 I^2t versus time per diode


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

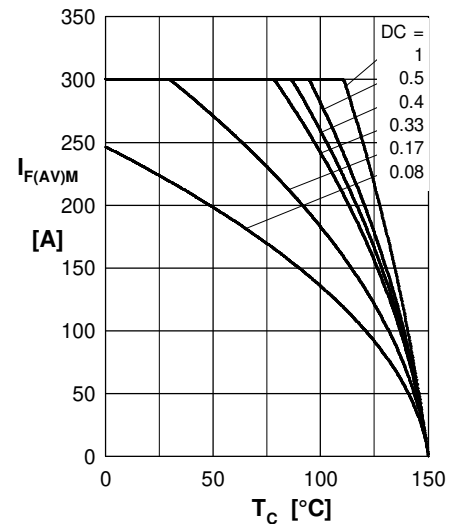


Fig. 5 Max. forward current vs. case temperature per diode

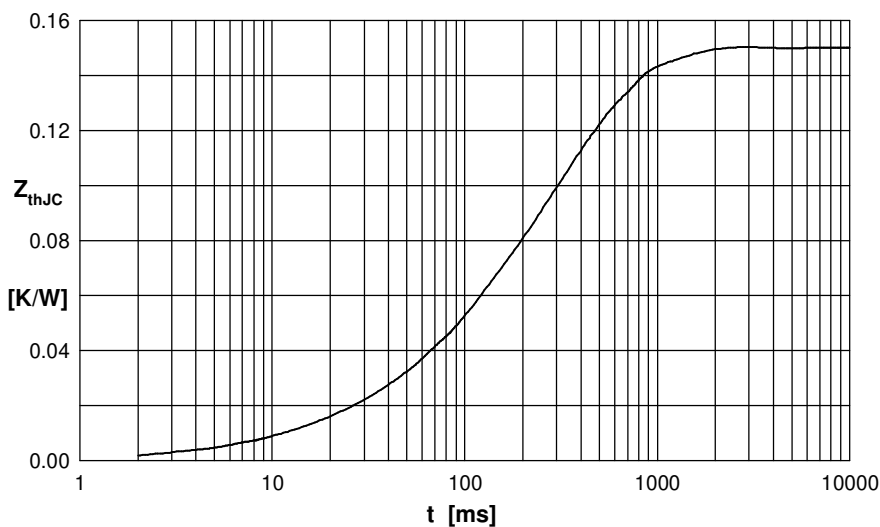


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for Z_{thjC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.006 | 0.015 |
| 2 | 0.017 | 0.080 |
| 3 | 0.039 | 0.220 |
| 4 | 0.088 | 0.380 |