

High Voltage Standard Rectifier Module

$$V_{RRM} = 2 \times 3400 \text{ V}$$

$$I_{FAV} = 240 \text{ A}$$

$$V_F = 1,01 \text{ V}$$

Phase leg

Part number

MDD175-34N1



Backside: isolated

 E72873



Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

Applications:

- Diode for main rectification
- For single and three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

Package: Y1

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

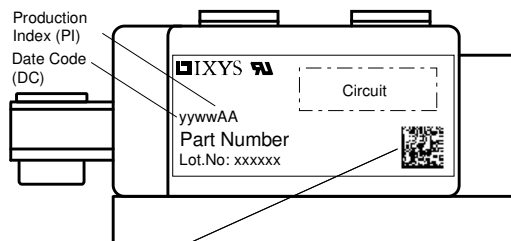
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| Rectifier | | | | Ratings | | | |
|------------|--|---|---------|------------------------------|------|-------|-------------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 3500 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 3400 | V |
| I_R | reverse current | $V_R = 3400\text{ V}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 1 | mA |
| | | $V_R = 3400\text{ V}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 5 | mA |
| V_F | forward voltage drop | $I_F = 200\text{ A}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 1,07 | V |
| | | $I_F = 400\text{ A}$ | | | | 1,26 | V |
| | | $I_F = 200\text{ A}$ | | $T_{VJ} = 125^\circ\text{C}$ | | 1,01 | V |
| | | $I_F = 400\text{ A}$ | | | | 1,26 | V |
| I_{FAV} | average forward current | $T_C = 100^\circ\text{C}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 240 | A |
| | | 180° sine | d = 0.5 | | | | |
| V_{F0} | threshold voltage | } for power loss calculation only | | $T_{VJ} = 150^\circ\text{C}$ | | 0,74 | V |
| r_F | slope resistance | | | | | 1,27 | mΩ |
| R_{thJC} | thermal resistance junction to case | | | | | 0,14 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | | 0,04 | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 900 | W |
| I_{FSM} | max. forward surge current | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 8,50 | kA |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0\text{ V}$ | | 9,18 | kA |
| | | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 7,23 | kA |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0\text{ V}$ | | 7,81 | kA |
| I^2t | value for fusing | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 361,3 | kA ² s |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0\text{ V}$ | | 350,6 | kA ² s |
| | | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 261,0 | kA ² s |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0\text{ V}$ | | 253,4 | kA ² s |
| C_J | junction capacitance | $V_R = 1100\text{ V}; f = 1\text{ MHz}$ | | $T_{VJ} = 25^\circ\text{C}$ | | 182 | pF |

| Package Y1 | | Ratings | | | | |
|---------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 600 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| Weight | | | | 680 | | g |
| M_D | mounting torque | | 4,5 | | 7 | Nm |
| M_T | terminal torque | | 11 | | 13 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 16,0 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 16,0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 4800 | | | V |
| | | t = 1 minute | 4000 | | | V |

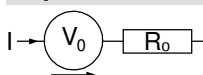


Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MDD175-34N1 | MDD175-34N1 | Box | 3 | 504075 |

Equivalent Circuits for Simulation

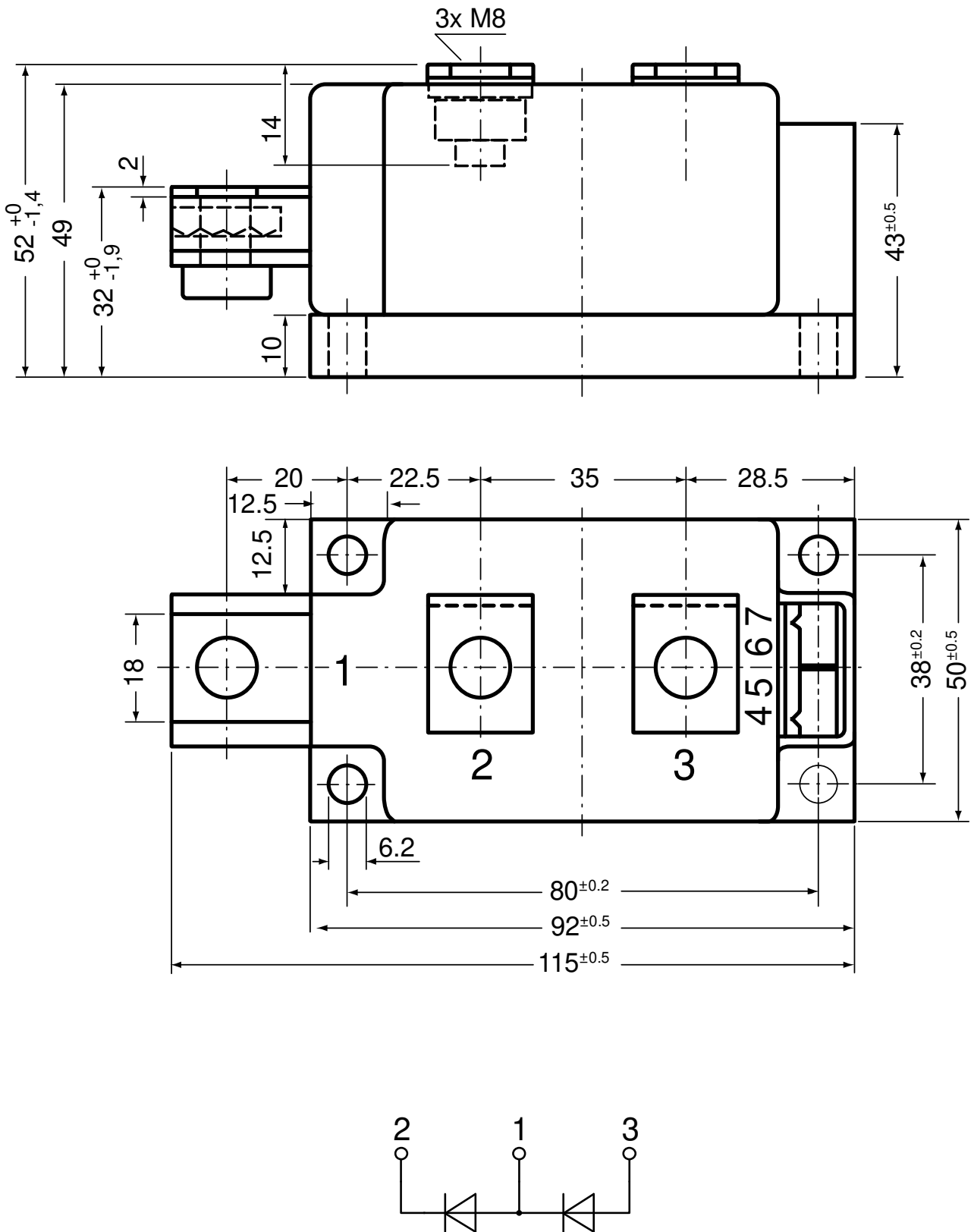
* on die level

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

Rectifier

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0,74 | V |
| $R_{0\ max}$ | slope resistance * | 0,75 | mΩ |



Outlines Y1



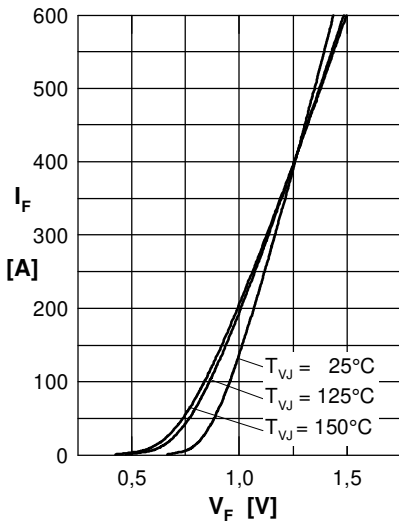
Rectifier


Fig. 1 Forward current versus voltage drop per diode

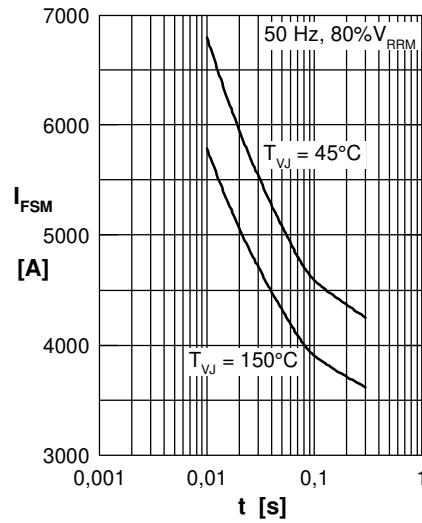


Fig. 2 Surge overload current

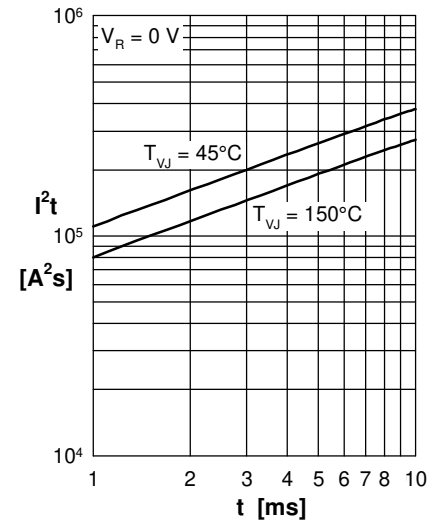
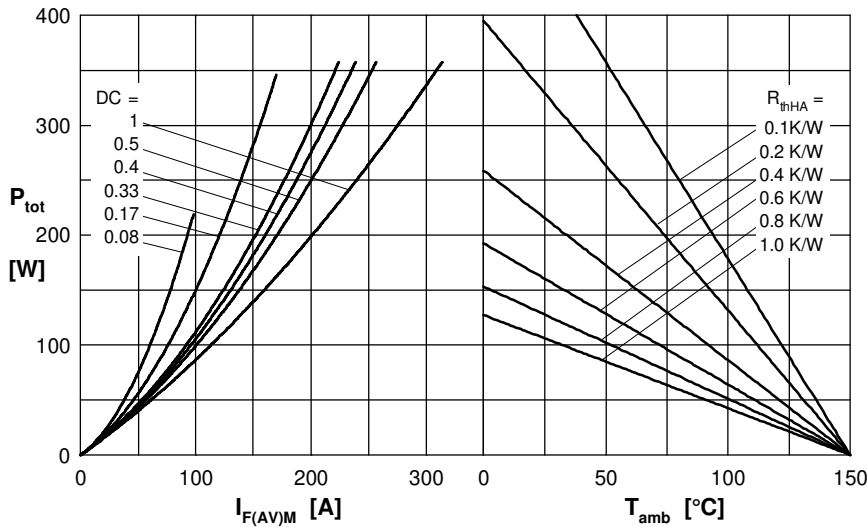

 Fig. 3 I^2t versus time per diode


Fig. 4 Power dissipation vs. direct output current and ambient temperature

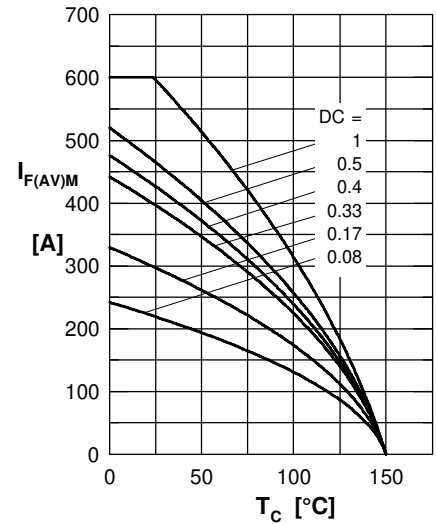


Fig. 5 Max. forward current vs. case temperature

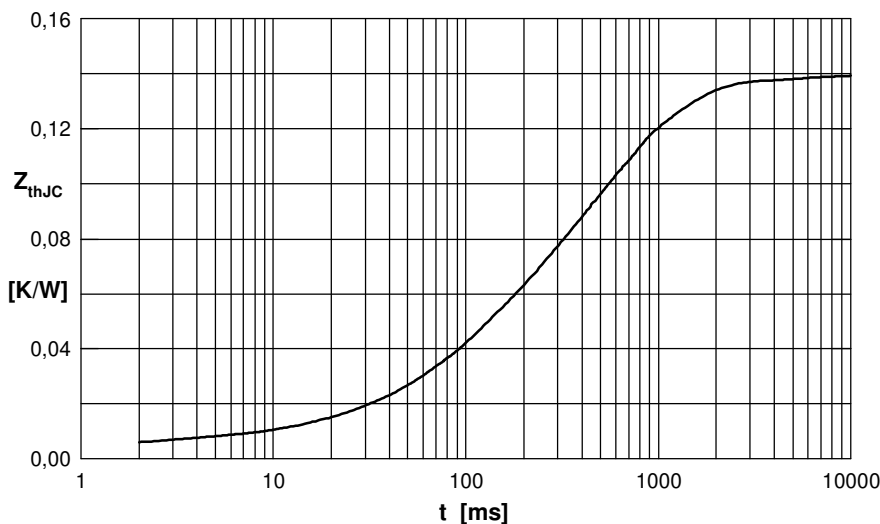


Fig. 6 Transient thermal impedance junction to case

 Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.0058 | 0.001 |
| 2 | 0.0310 | 0.120 |
| 3 | 0.0980 | 0.800 |
| 4 | 0.0052 | 0.700 |