

# Standard Rectifier Module

$$V_{RRM} = 2 \times 1600 \text{ V}$$

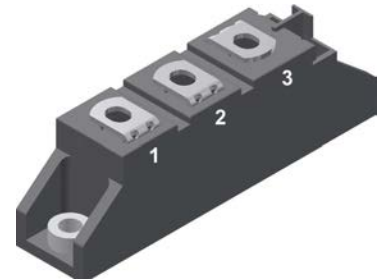
$$I_{FAV} = 65 \text{ A}$$

$$V_F = 1,11 \text{ V}$$

Phase leg

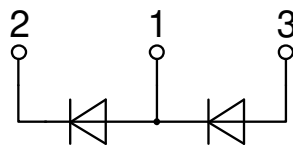
Part number

**MDMA65P1600TG**



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 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: TO-240AA

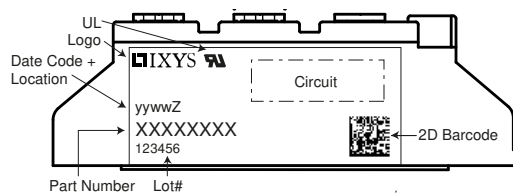
- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

## Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).

| Rectifier  |                                                     |                                                      |                                | Ratings                        |      |      |                   |
|------------|-----------------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|------|------|-------------------|
| Symbol     | Definition                                          | Conditions                                           |                                | min.                           | typ. | max. | Unit              |
| $V_{RSM}$  | <b>max. non-repetitive reverse blocking voltage</b> | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 1700 | V                 |
| $V_{RRM}$  | <b>max. repetitive reverse blocking voltage</b>     | $T_{VJ} = 25^{\circ}\text{C}$                        |                                |                                |      | 1600 | V                 |
| $I_R$      | <b>reverse current</b>                              | $V_R = 1600\text{ V}$                                | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 50   | $\mu\text{A}$     |
|            |                                                     | $V_R = 1600\text{ V}$                                | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 2    | mA                |
| $V_F$      | <b>forward voltage drop</b>                         | $I_F = 65\text{ A}$                                  | $T_{VJ} = 25^{\circ}\text{C}$  |                                |      | 1,18 | V                 |
|            |                                                     | $I_F = 130\text{ A}$                                 |                                |                                |      | 1,40 | V                 |
|            |                                                     | $I_F = 65\text{ A}$                                  | $T_{VJ} = 125^{\circ}\text{C}$ |                                |      | 1,11 | V                 |
|            |                                                     | $I_F = 130\text{ A}$                                 |                                |                                |      | 1,39 | V                 |
| $I_{FAV}$  | <b>average forward current</b>                      | $T_C = 100^{\circ}\text{C}$<br>rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 65   | A                 |
| $V_{F0}$   | <b>threshold voltage</b>                            | } <b>for power loss calculation only</b>             |                                | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0,81 | V                 |
| $r_F$      | <b>slope resistance</b>                             |                                                      |                                |                                |      | 4,3  | m $\Omega$        |
| $R_{thJC}$ | <b>thermal resistance junction to case</b>          |                                                      |                                |                                |      | 0,5  | K/W               |
| $R_{thCH}$ | <b>thermal resistance case to heatsink</b>          |                                                      |                                |                                | 0,2  |      | K/W               |
| $P_{tot}$  | <b>total power dissipation</b>                      | $T_C = 25^{\circ}\text{C}$                           |                                |                                |      | 250  | W                 |
| $I_{FSM}$  | <b>max. forward surge current</b>                   | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 1,10 | kA                |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |                                |      | 1,19 | kA                |
|            |                                                     | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 935  | A                 |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |                                |      | 1,01 | kA                |
| $I^2t$     | <b>value for fusing</b>                             | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 45^{\circ}\text{C}$  |                                |      | 6,05 | kA <sup>2</sup> s |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |                                |      | 5,89 | kA <sup>2</sup> s |
|            |                                                     | $t = 10\text{ ms; (50 Hz), sine}$                    | $T_{VJ} = 150^{\circ}\text{C}$ |                                |      | 4,37 | kA <sup>2</sup> s |
|            |                                                     | $t = 8,3\text{ ms; (60 Hz), sine}$                   | $V_R = 0\text{ V}$             |                                |      | 4,25 | kA <sup>2</sup> s |
| $C_J$      | <b>junction capacitance</b>                         | $V_R = 400\text{ V; } f = 1\text{ MHz}$              |                                |                                | 37   |      | pF                |

| Package TO-240AA |                                                                     |                             |                                     | Ratings |      |      |      |
|------------------|---------------------------------------------------------------------|-----------------------------|-------------------------------------|---------|------|------|------|
| Symbol           | Definition                                                          | Conditions                  |                                     | min.    | typ. | max. | Unit |
| $I_{RMS}$        | <b>RMS current</b>                                                  | per terminal                |                                     |         |      | 200  | A    |
| $T_{VJ}$         | <b>virtual junction temperature</b>                                 |                             |                                     | -40     |      | 150  | °C   |
| $T_{op}$         | <b>operation temperature</b>                                        |                             |                                     | -40     |      | 125  | °C   |
| $T_{stg}$        | <b>storage temperature</b>                                          |                             |                                     | -40     |      | 125  | °C   |
| <b>Weight</b>    |                                                                     |                             |                                     |         | 76   |      | g    |
| $M_D$            | <b>mounting torque</b>                                              |                             |                                     | 2,5     |      | 4    | Nm   |
| $M_T$            | <b>terminal torque</b>                                              |                             |                                     | 2,5     |      | 4    | Nm   |
| $d_{Spp/App}$    | <b>creepage distance on surface   striking distance through air</b> | <b>terminal to terminal</b> | 13,0                                | 9,7     |      |      | mm   |
| $d_{Spb/Apb}$    |                                                                     | <b>terminal to backside</b> | 16,0                                | 16,0    |      |      | mm   |
| $V_{ISOL}$       | <b>isolation voltage</b>                                            | t = 1 second                | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 4800    |      |      | V    |
|                  |                                                                     | t = 1 minute                |                                     | 4000    |      |      | V    |



### Part description

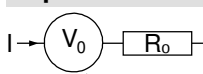
M = Module  
 D = Diode  
 M = Standard Rectifier  
 A = (up to 1800V)  
 65 = Current Rating [A]  
 P = Phase leg  
 1600 = Reverse Voltage [V]  
 TG = TO-240AA

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MDMA65P1600TG   | MDMA65P1600TG      | Box           | 36       | 515905   |

### Equivalent Circuits for Simulation

\* on die level

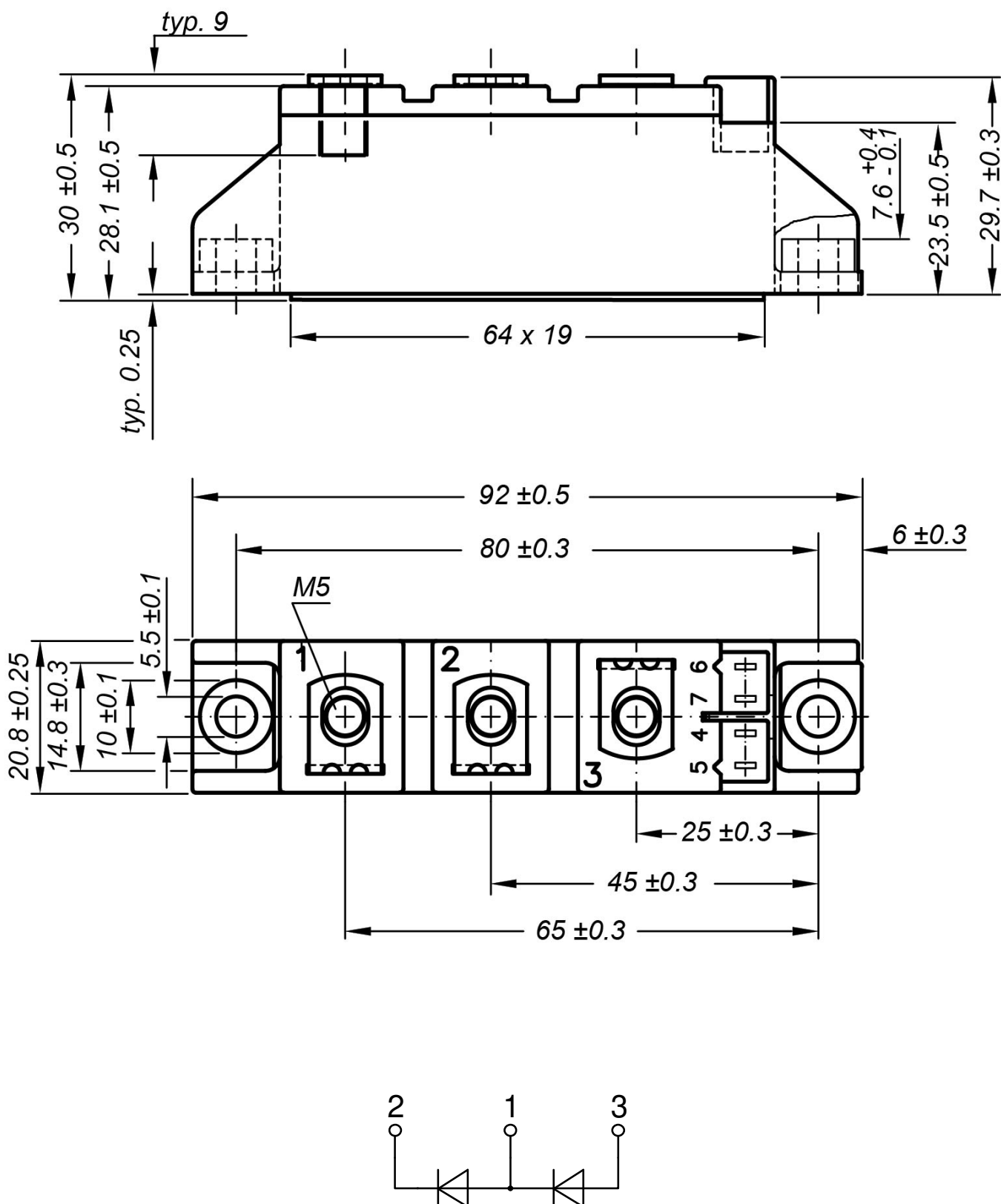
$T_{VJ} = 150^{\circ}\text{C}$



Rectifier

|             |                           |      |    |
|-------------|---------------------------|------|----|
| $V_{0\max}$ | <b>threshold voltage</b>  | 0,81 | V  |
| $R_{0\max}$ | <b>slope resistance *</b> | 3,1  | mΩ |

Outlines TO-240AA



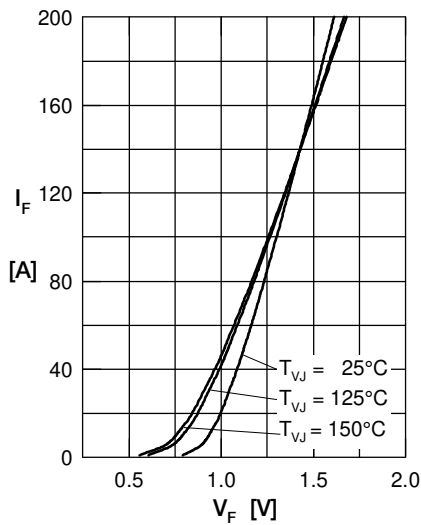
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

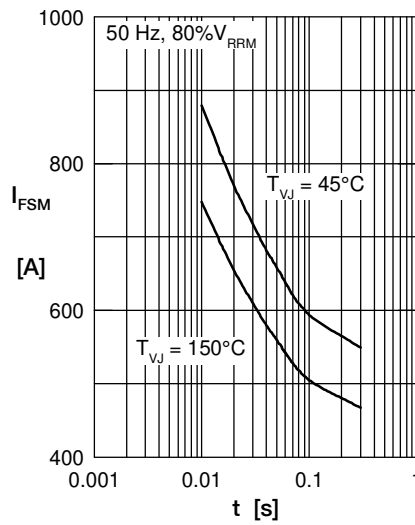


Fig. 2 Surge overload current vs. time per diode

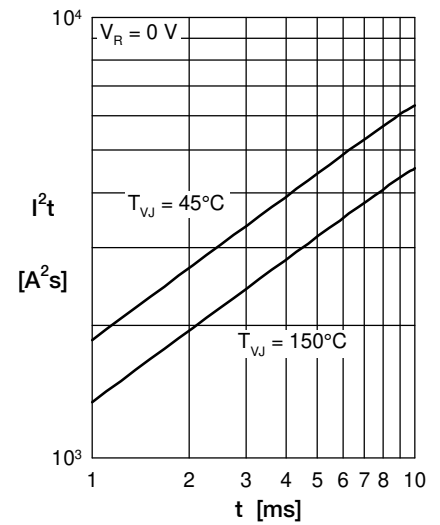
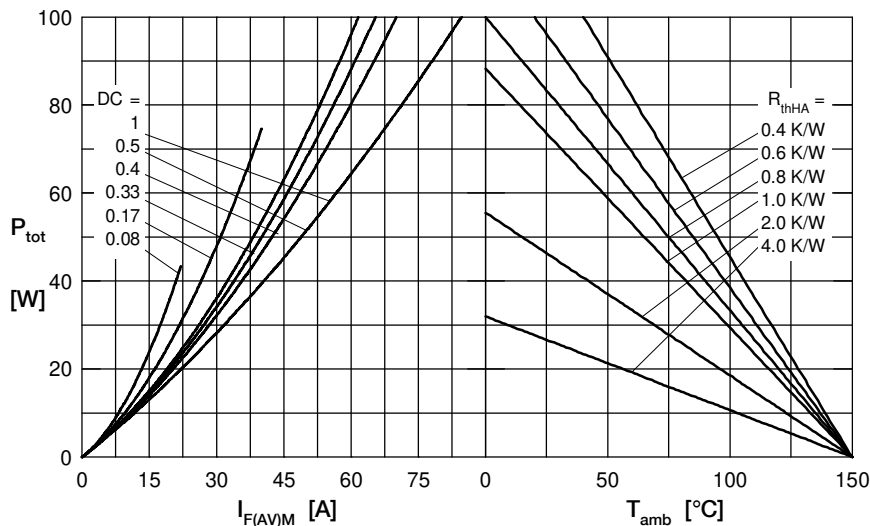

 Fig. 3  $I^2t$  versus time per diode


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

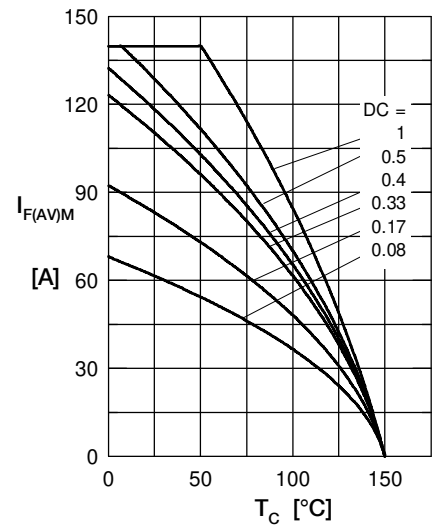


Fig. 5 Max. forward current vs. case temperature per diode

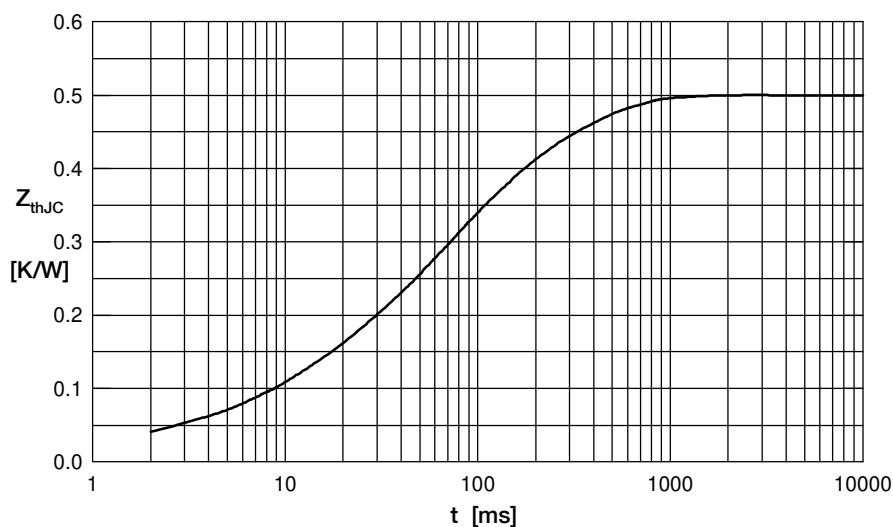


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for  $Z_{thJC}$  calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|-----------------|-----------|
| 1 | 0.022           | 0.001     |
| 2 | 0.068           | 0.010     |
| 3 | 0.245           | 0.060     |
| 4 | 0.165           | 0.270     |