

Standard Rectifier Module

$$V_{RRM} = 2 \times 1800 \text{ V}$$

$$I_{FAV} = 140 \text{ A}$$

$$V_F = 1.11 \text{ V}$$

Phase leg

Part number

MDMA140P1800TG



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

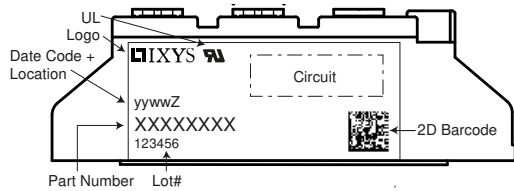
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| Rectifier | | | | Ratings | | | |
|------------|--|---------------------------|---------|------------------------------|------|------|-------------------|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | | | | | 1900 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | | | | | 1800 | V |
| I_R | reverse current | $V_R = 1800$ V | | $T_{VJ} = 25^\circ\text{C}$ | | 100 | μA |
| | | $V_R = 1800$ V | | $T_{VJ} = 150^\circ\text{C}$ | | 3.5 | mA |
| V_F | forward voltage drop | $I_F = 140$ A | | $T_{VJ} = 25^\circ\text{C}$ | | 1.18 | V |
| | | $I_F = 280$ A | | | | 1.43 | V |
| | | $I_F = 140$ A | | $T_{VJ} = 125^\circ\text{C}$ | | 1.11 | V |
| | | $I_F = 280$ A | | | | 1.41 | V |
| I_{FAV} | average forward current | $T_C = 100^\circ\text{C}$ | | $T_{VJ} = 150^\circ\text{C}$ | | 140 | A |
| | | rectangular | d = 0.5 | | | | |
| V_{FO} | threshold voltage | | | $T_{VJ} = 150^\circ\text{C}$ | | 0.78 | V |
| r_F | slope resistance | | | | | 2.2 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | | 0.23 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | | 0.2 | | K/W |
| P_{tot} | total power dissipation | | | $T_C = 25^\circ\text{C}$ | | 540 | W |
| I_{FSM} | max. forward surge current | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 2.80 | kA |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 3.03 | kA |
| | | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 2.38 | kA |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 2.57 | kA |
| I^2t | value for fusing | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 45^\circ\text{C}$ | | 39.2 | kA ² s |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 38.1 | kA ² s |
| | | t = 10 ms; (50 Hz), sine | | $T_{VJ} = 150^\circ\text{C}$ | | 28.3 | kA ² s |
| | | t = 8,3 ms; (60 Hz), sine | | $V_R = 0$ V | | 27.5 | kA ² s |
| C_J | junction capacitance | $V_R = 400$ V; f = 1 MHz | | $T_{VJ} = 25^\circ\text{C}$ | | 116 | pF |



| Package TO-240AA | | Ratings | | | | |
|------------------|--|----------------------|-------------------------------------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 200 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 125 | °C |
| Weight | | | | 76 | | g |
| M_D | mounting torque | | 2.5 | | 4 | Nm |
| M_T | terminal torque | | 2.5 | | 4 | Nm |
| $d_{Spp/App}$ | creepage distance on surface striking distance through air | terminal to terminal | 13.0 | 9.7 | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 16.0 | 16.0 | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | | 4800 | | V |
| | | t = 1 minute | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 4000 | | V |



Part description

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

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MDMA140P1800TG | MDMA140P1800TG | Box | 36 | 514028 |

Equivalent Circuits for Simulation

* on die level

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



Rectifier

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.78 | V |
| $R_{0\ max}$ | slope resistance * | 1 | mΩ |



Outlines TO-240AA



General tolerance: DIN ISO 2768 class „c“



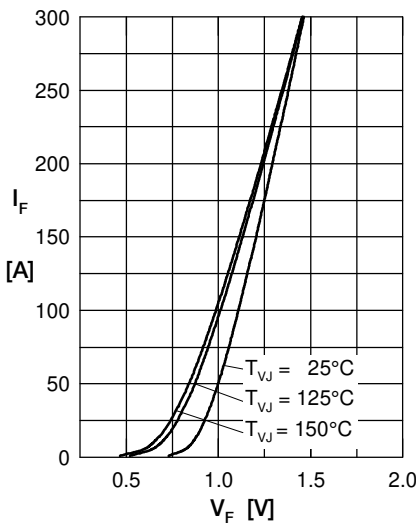
Rectifier


Fig. 1 Forward current versus voltage drop per diode



Fig. 2 Surge overload current vs. time per diode

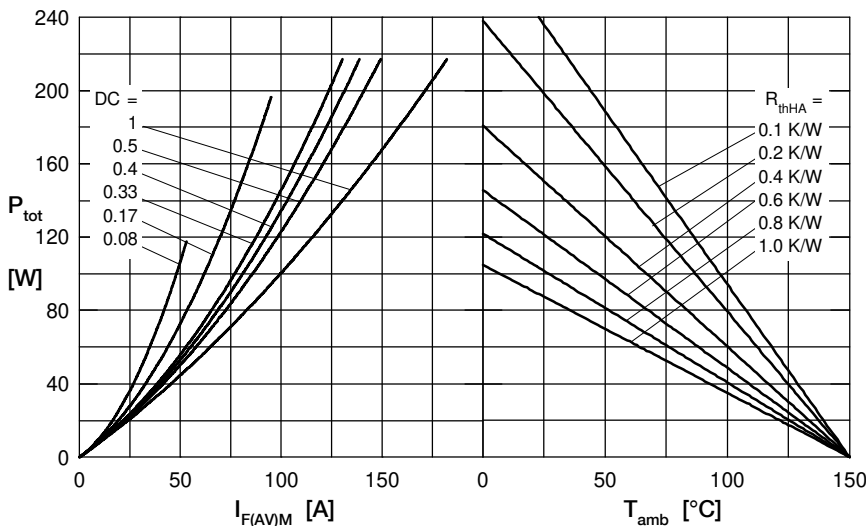

 Fig. 3 I^2t versus time per diode


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

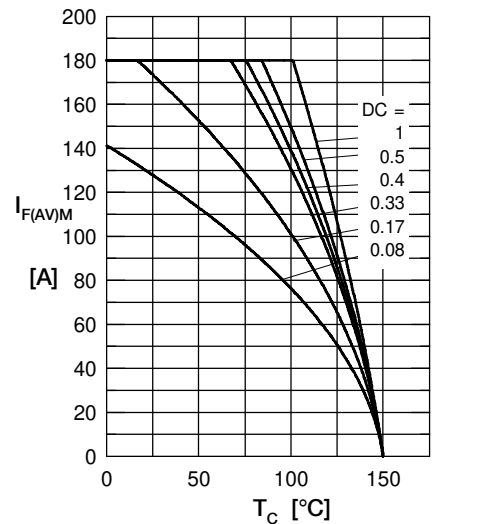


Fig. 5 Max. forward current vs. case temperature per diode

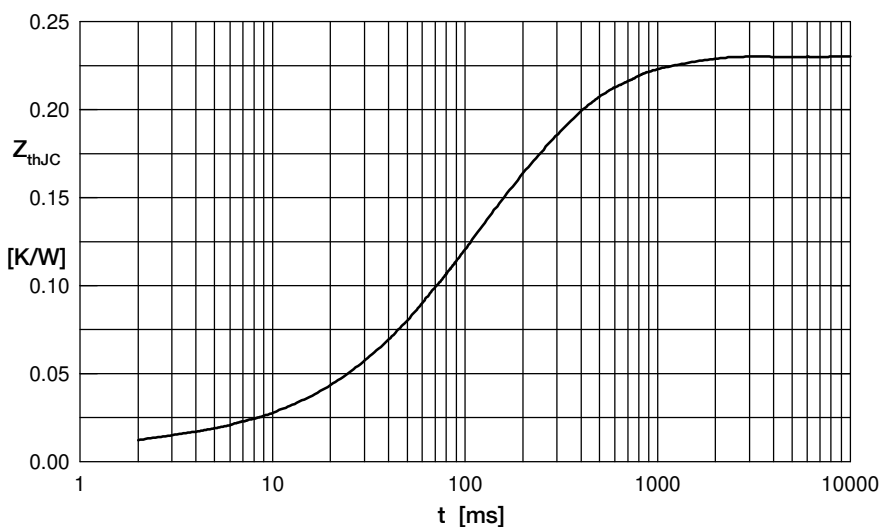


Fig. 6 Transient thermal impedance junction to case vs. time per diode

 Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|---|-----------------|-----------|
| 1 | 0.01 | 0.001 |
| 2 | 0.05 | 0.050 |
| 3 | 0.12 | 0.150 |
| 4 | 0.05 | 0.500 |