



Standard Rectifier Module

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

$$I_{FAV} = 59 \text{ A}$$

$$V_F = 1.26 \text{ V}$$

Phase leg

Part number

MDD44-18N1B



Backside: isolated



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: 3600 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

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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 | $V_R = 1800\text{ V}$ | | | 100 | μA | |
| | | $V_R = 1800\text{ V}$ | | | 10 | mA | |
| V_F | forward voltage drop | $I_F = 100\text{ A}$ | | | 1.30 | V | |
| | | $I_F = 200\text{ A}$ | | | 1.60 | V | |
| | | $I_F = 100\text{ A}$ | $T_{VJ} = 125^\circ\text{C}$ | | | 1.26 | V |
| | | $I_F = 200\text{ A}$ | | | | 1.67 | V |
| I_{FAV} | average forward current | $T_C = 100^\circ\text{C}$ | | | 59 | A | |
| $I_{F(RMS)}$ | RMS forward current | 180° sine | | | 100 | A | |
| V_{F0} | threshold voltage | } for power loss calculation only | | | 0.80 | V | |
| r_F | slope resistance | | | | 4.3 | m Ω | |
| R_{thJC} | thermal resistance junction to case | | | | 0.59 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0.2 | | K/W | |
| P_{tot} | total power dissipation | | | | 212 | W | |
| I_{FSM} | max. forward surge current | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 1.15 | kA |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 1.24 | kA |
| | | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 980 | A |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 1.06 | kA |
| I^2t | value for fusing | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^\circ\text{C}$ | | | 6.62 | kA ² s |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 6.40 | kA ² s |
| | | $t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^\circ\text{C}$ | | | 4.80 | kA ² s |
| | | $t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$ | $V_R = 0\text{ V}$ | | | 4.63 | kA ² s |
| C_J | junction capacitance | $V_R = 400\text{ V}; f = 1\text{ MHz}$ | $T_{VJ} = 25^\circ\text{C}$ | | 27 | pF | |



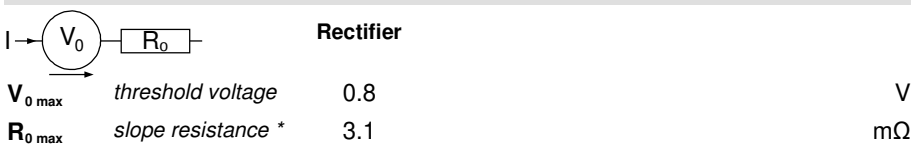
| Package TO-240AA | | | | Ratings | | | |
|------------------|--|----------------------|-------------------------------------|---------|------|------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| I_{RMS} | RMS current | per terminal | | | 200 | A | |
| T_{VJ} | virtual junction 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 | | | 3600 | V | |
| | | t = 1 minute | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | | 3000 | V | |



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MDD44-18N1B | MDD44-18N1B | Box | 36 | 454397 |

| Similar Part | Package | Voltage class |
|--------------|----------|---------------|
| MDD44-08N1B | TO-240AA | 800 |
| MDD44-12N1B | TO-240AA | 1200 |
| MDD44-14N1B | TO-240AA | 1400 |
| MDD44-16N1B | TO-240AA | 1600 |

Equivalent Circuits for Simulation * on die level $T_{VJ} = 150^{\circ}\text{C}$





Outlines TO-240AA



General tolerance: DIN ISO 2768 class „c“





Rectifier

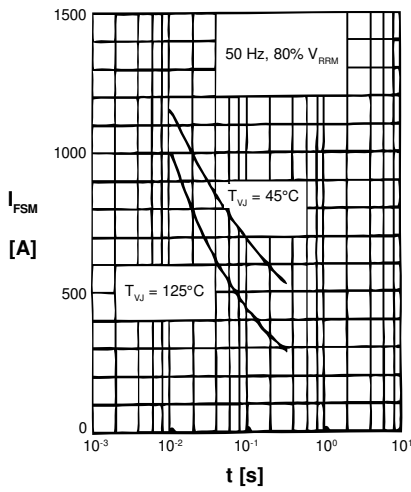


Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

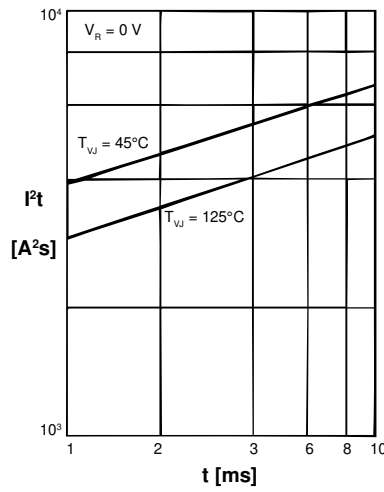


Fig. 2 I^2t versus time (1-10 ms)

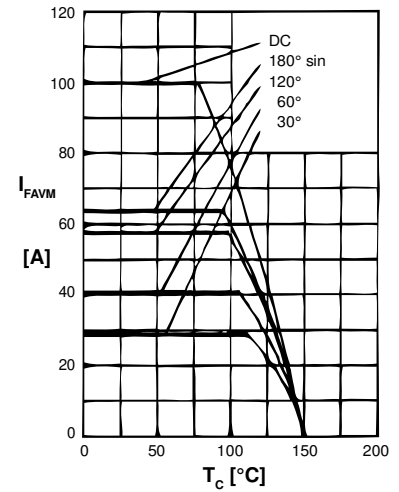


Fig. 3 Maximum forward current at case temperature

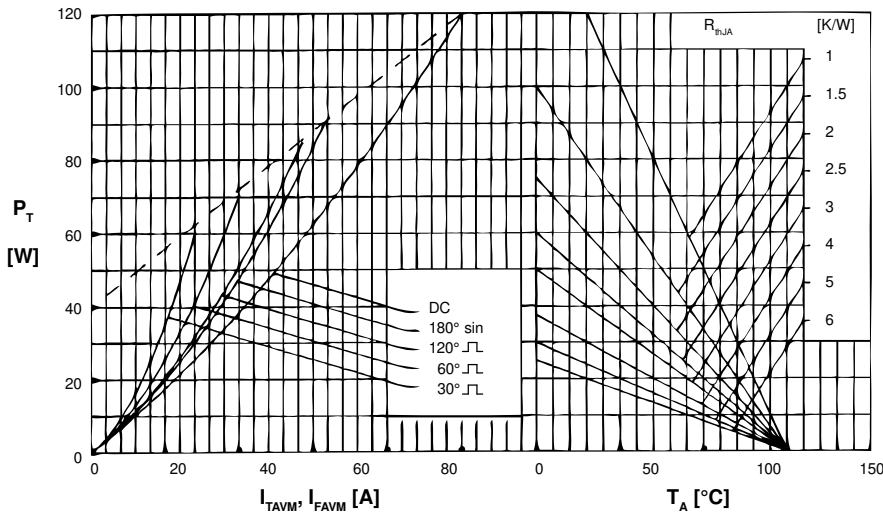


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

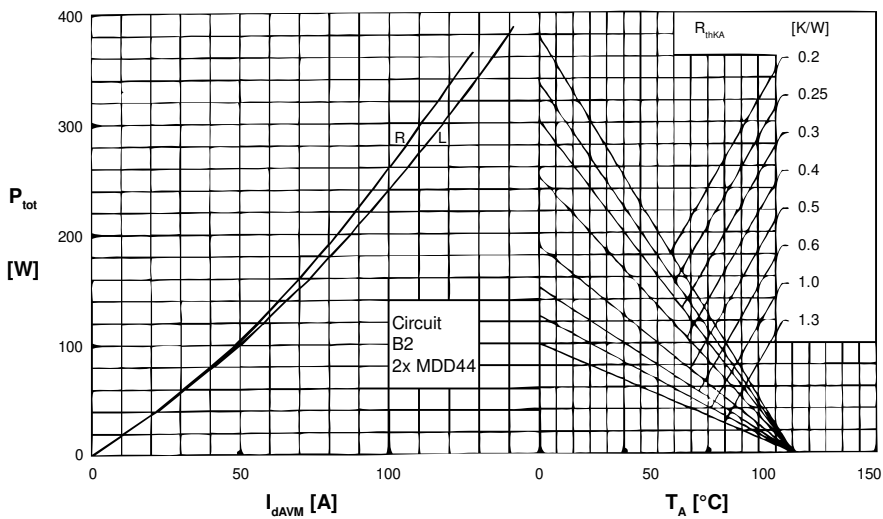


Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load



Rectifier

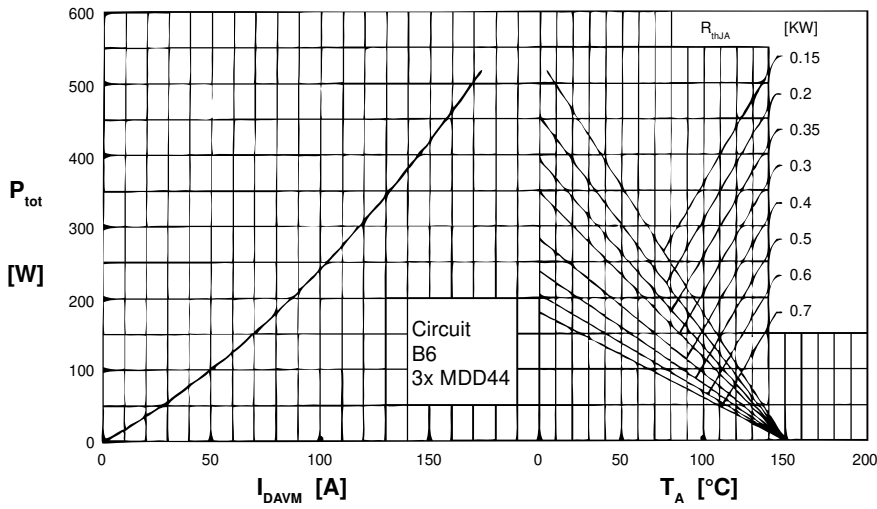


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

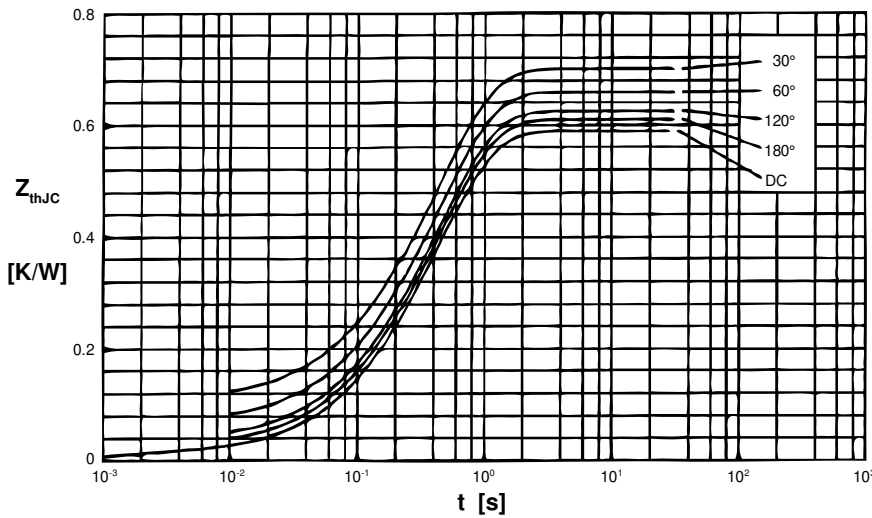


Fig. 7 Transient thermal impedance junction to case (per diode)

$R_{\theta JC}$ for various conduction angles d:

| d | $R_{\theta JC}$ [K/W] |
|------|-----------------------|
| DC | 0.59 |
| 180° | 0.61 |
| 120° | 0.63 |
| 60° | 0.66 |
| 30° | 0.70 |

Constants for $Z_{\theta JC}$ calculation:

| i | $R_{\theta i}$ [K/W] | t_i [s] |
|---|----------------------|-----------|
| 1 | 0.012 | 0.0012 |
| 2 | 0.045 | 0.0950 |
| 3 | 0.533 | 0.4550 |

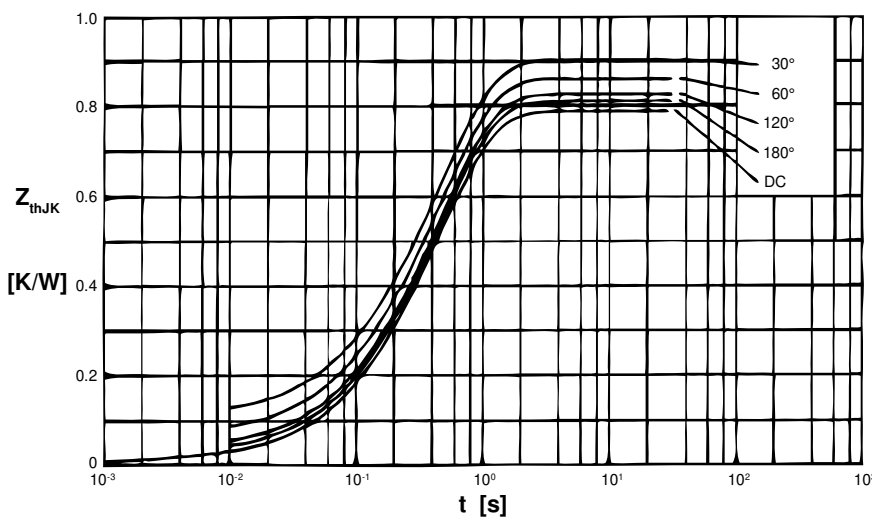


Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

$R_{\theta JK}$ for various conduction angles d:

| d | $R_{\theta JK}$ [K/W] |
|------|-----------------------|
| DC | 0.79 |
| 180° | 0.81 |
| 120° | 0.83 |
| 60° | 0.86 |
| 30° | 0.90 |

Constants for $Z_{\theta JK}$ calculation:

| i | $R_{\theta i}$ [K/W] | t_i [s] |
|---|----------------------|-----------|
| 1 | 0.012 | 0.0012 |
| 2 | 0.045 | 0.0950 |
| 3 | 0.533 | 0.4550 |
| 4 | 0.200 | 0.4950 |