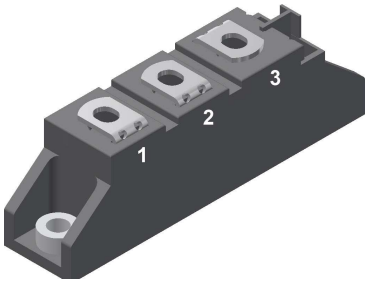
# Standard Rectifier Module

| | | |
|---|---|---|
| $V_{RRM}$ | = | 2x 1200 V |
| $I_{FAV}$ | = | 71 A |
| $V_F$ | = | 1.14 V |

## Phase leg

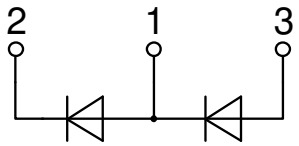
**Part number**

**MDD56-12N1B**




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

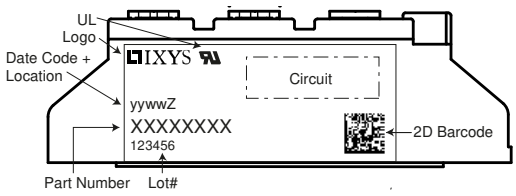
**Package:** TO-240AA

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

## Rectifier

| Symbol | Definition | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1300 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_R$ | *reverse current* | $V_R$ = 1200 V | $T_{VJ}$ = 25°C | | | 200 | µA |
| | | $V_R$ = 1200 V | $T_{VJ}$ = 150°C | | | 10 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 100 A | $T_{VJ}$ = 25°C | | | 1.21 | V |
| | | $I_F$ = 200 A | | | | 1.48 | V |
| | | $I_F$ = 100 A | $T_{VJ}$ = 125°C | | | 1.14 | V |
| | | $I_F$ = 200 A | | | | 1.45 | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 100°C | $T_{VJ}$ = 150°C | | | 71 | A |
| $I_{F(RMS)}$ | *RMS forward current* | 180° sine | | | | 150 | A |
| $V_{F0}$ | *threshold voltage* } *for power loss calculation only* | | $T_{VJ}$ = 150°C | | | 0.80 | V |
| $r_F$ | *slope resistance* } | | | | | 3 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 0.51 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.2 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 245 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 1.40 | kA |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 1.51 | kA |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 1.19 | kA |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 1.29 | kA |
| $I^2t$ | *value for fusing* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 9.80 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 9.49 | kA²s |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 7.08 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 6.87 | kA²s |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V; f = 1 MHz | $T_{VJ}$ = 25°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 | 50/60 Hz, RMS; $I_{ISOL}$ ≤ 1 mA | | 4800 | | | V |
| | | t = 1 minute | | | 4000 | | | V |

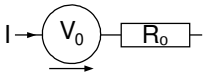



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | MDD56-12N1B | MDD56-12N1B | Box | 36 | 458066 |

| Similar Part | Package | Voltage class |
|---|---|---|
| MDD56-08N1B | TO-240AA | 800 |
| MDD56-14N1B | TO-240AA | 1400 |
| MDD56-16N1B | TO-240AA | 1600 |
| MDD56-18N1B | TO-240AA | 1800 |

## Equivalent Circuits for Simulation

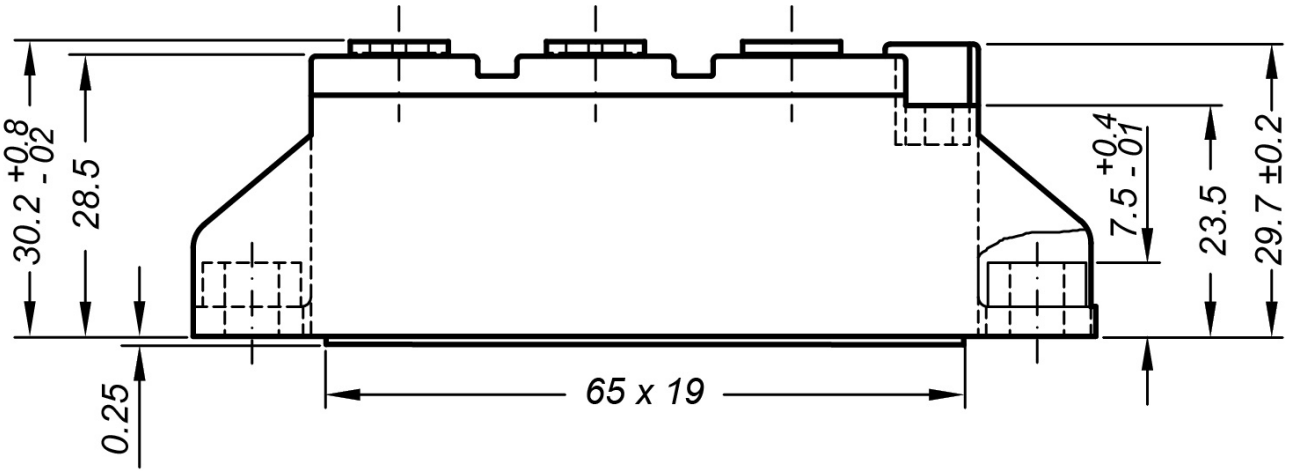
** on die level* $T_{VJ}$ = 150°C



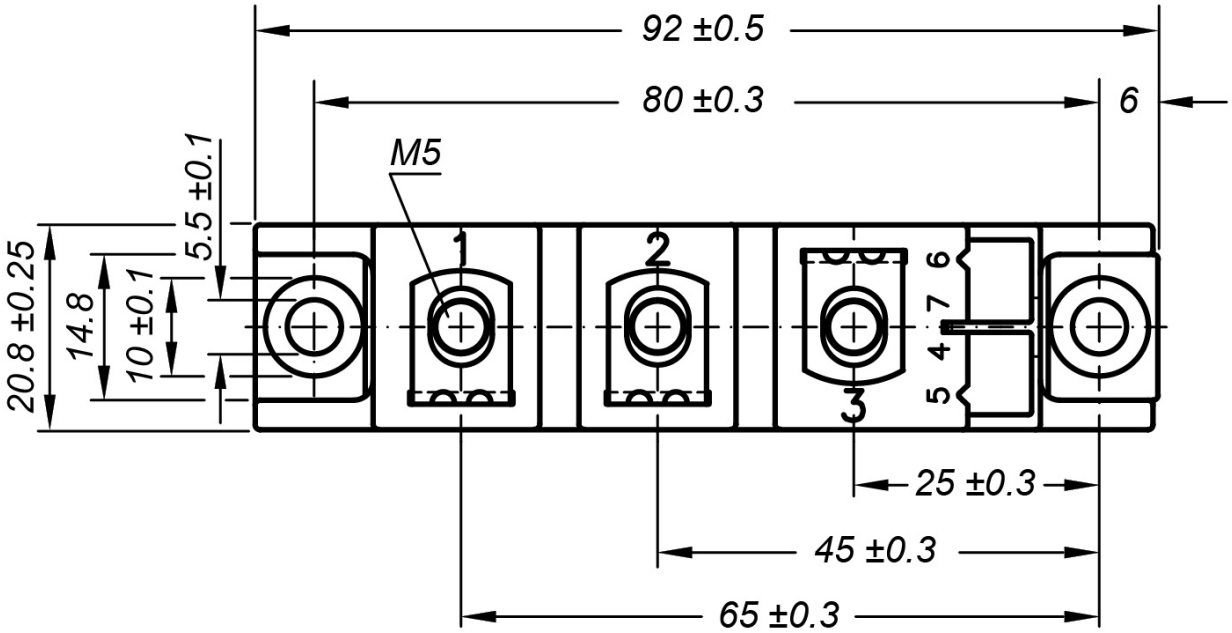

**Rectifier**

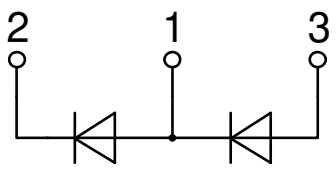
| | | | |
|---|---|---|---|
| $V_{0\ max}$ | *threshold voltage* | 0.8 | V |
| $R_{0\ max}$ | *slope resistance ** | 1.8 | mΩ |

## Outlines TO-240AA




*General tolerance: DIN ISO 2768 class „c“*



## Rectifier

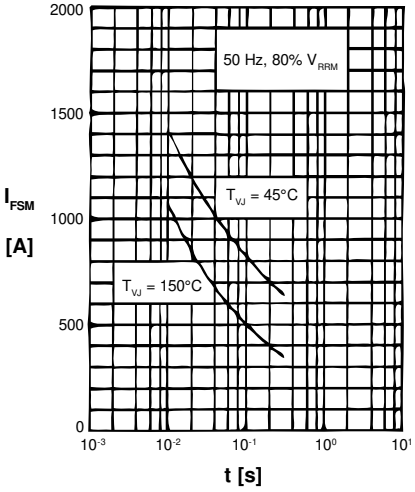



Fig. 1 Surge overload current
$I_{TSM}$, $I_{FSM}$: Crest value, t: duration

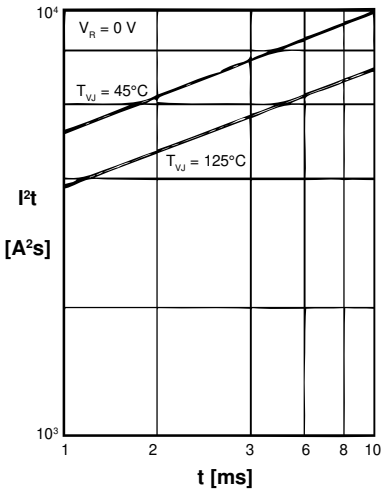



Fig. 2 $I^2t$ versus time (1-10 ms)

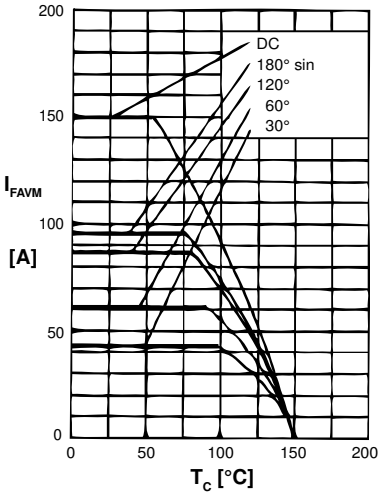



Fig. 3 Maximum forward current at case temperature

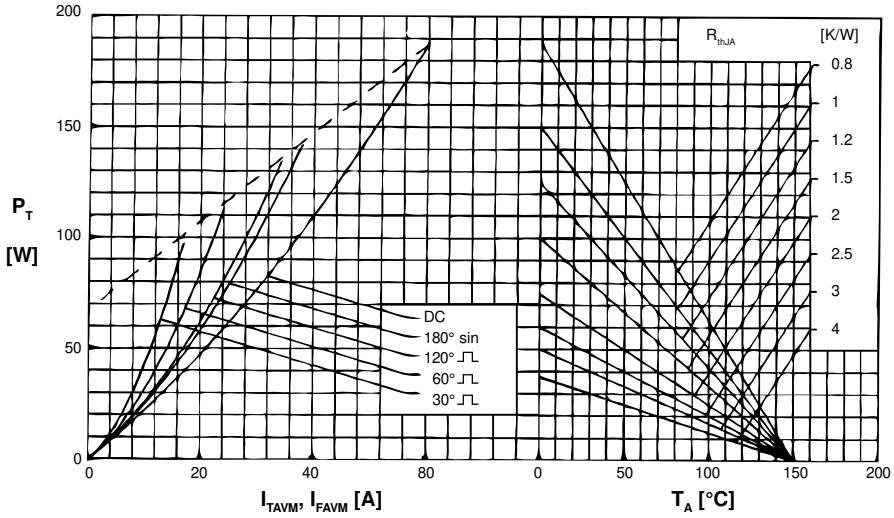



Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)

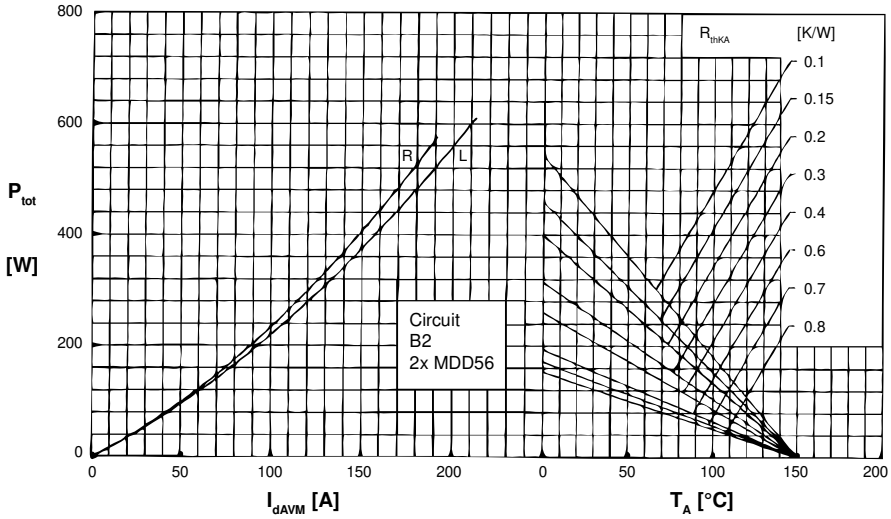



Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load,L = inductive load

## Rectifier

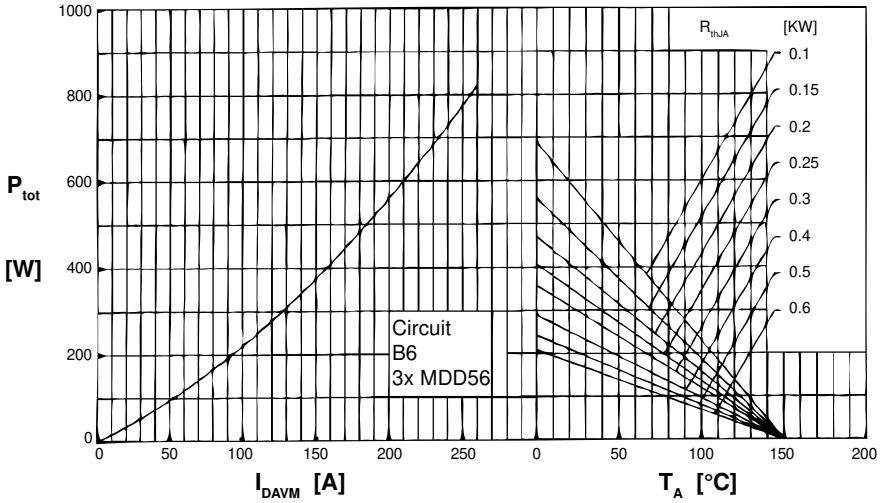
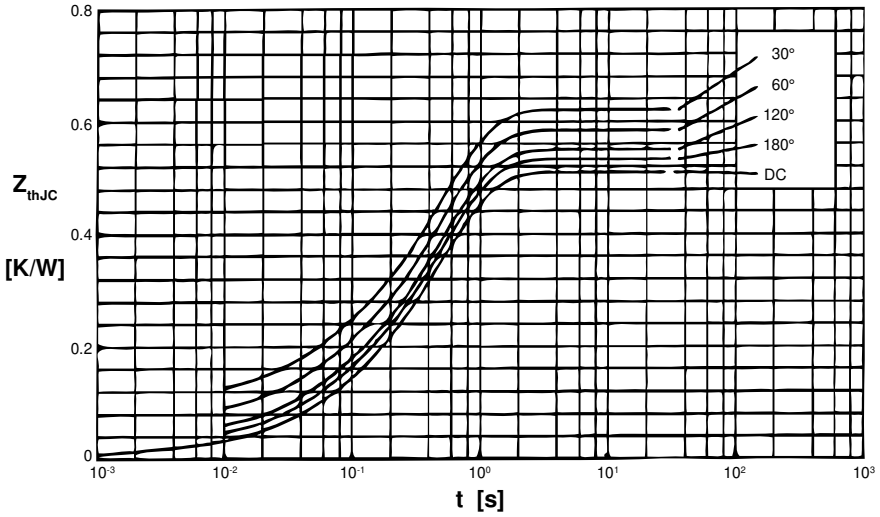



Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature



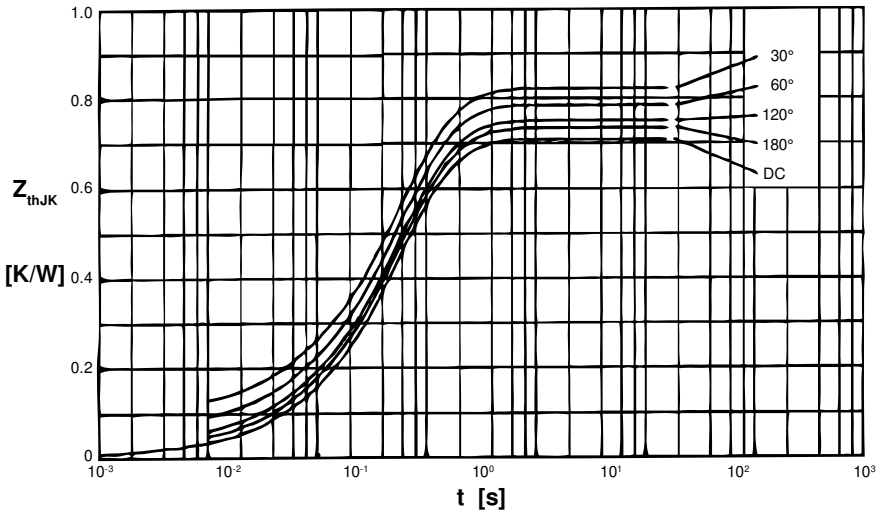

$R_{thJC}$ for various conduction angles d:

| d | $R_{thJC}$ [K/W] |
|---|---|
| DC | 0.51 |
| 180° | 0.53 |
| 120° | 0.55 |
| 60° | 0.58 |
| 30° | 0.62 |

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|---|---|
| 1 | 0.013 | 0.0015 |
| 2 | 0.055 | 0.0450 |
| 3 | 0.442 | 0.4850 |

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




$R_{thJK}$ for various conduction angles d:

| d | $R_{thJK}$ [K/W] |
|---|---|
| DC | 0.71 |
| 180° | 0.73 |
| 120° | 0.75 |
| 60° | 0.78 |
| 30° | 0.82 |

Constants for $Z_{thJK}$ calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|---|---|
| 1 | 0.013 | 0.0015 |
| 2 | 0.055 | 0.0450 |
| 3 | 0.442 | 0.4850 |
| 4 | 0.200 | 1.2500 |

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

Стандарт Электрон Связь

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