# Standard Rectifier Module
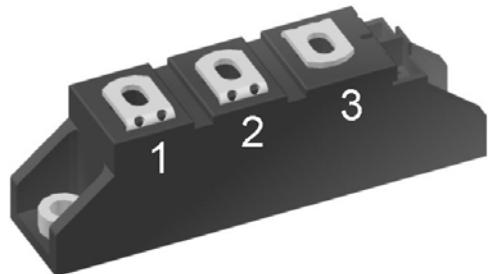
| | | |
|---|---|---|
| $V_{RRM}$ | = | 2 x 1600 V |
| $I_{FAV}$ | = | 36 A |
| $V_F$ | = | 1.05 V |

## Phase leg
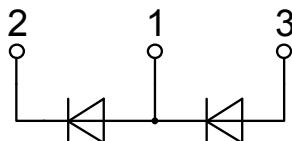
**Part number**

MDD26-16N1B

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
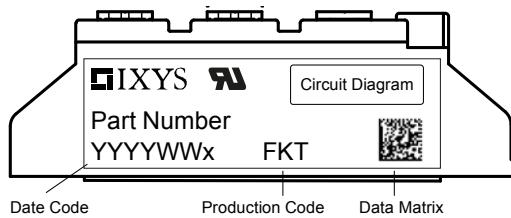
**Package:** TO-240AA

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

## Rectifier

| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | max. non-repetitive reverse blocking voltage | | $T_{VJ}$ = 25°C | | | 1700 | V |
| $V_{RRM}$ | max. repetitive reverse blocking voltage | | $T_{VJ}$ = 25°C | | | 1600 | V |
| $I_R$ | reverse current | $V_R$ = 1600 V | $T_{VJ}$ = 25°C | | | 100 | µA |
| | | $V_R$ = 1600 V | $T_{VJ}$ = 150°C | | | 1.5 | mA |
| $V_F$ | forward voltage drop | $I_F$ = 40 A | $T_{VJ}$ = 25°C | | | 1.13 | V |
| | | $I_F$ = 80 A | | | | 1.38 | V |
| | | $I_F$ = 40 A | $T_{VJ}$ = 125 °C | | | 1.05 | V |
| | | $I_F$ = 80 A | | | | 1.27 | V |
| $I_{FAV}$ | average forward current | $T_C$ = 100°C | $T_{VJ}$ = 150°C | | | 36 | A |
| $I_{F(RMS)}$ | RMS forward current | 180° sine | | | | 60 | A |
| $V_{F0}$ | threshold voltage | | $T_{VJ}$ = 150°C | | | 0.80 | V |
| $r_F$ | slope resistance | } for power loss calculation only | | | | 6.1 | mΩ |
| $R_{thJC}$ | thermal resistance junction to case | | | | | 1 | K/W |
| $R_{thCH}$ | thermal resistance case to heatsink | | | | 0.20 | | K/W |
| $P_{tot}$ | total power dissipation | | $T_C$ = 25°C | | | 125 | W |
| $I_{FSM}$ | max. forward surge current | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 650 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 700 | A |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 555 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 595 | A |
| $I^2t$ | value for fusing | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 2.12 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 2.04 | kA²s |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 1.54 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 1.48 | kA²s |
| $C_J$ | junction capacitance | $V_R$ = 400 V; f = 1 MHz | $T_{VJ}$ = 25°C | | 27 | | pF |

IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747and per semiconductor unless otherwise specified    20130702a

## Package    TO-240AA

| 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 | | | | | | 90 | | 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; $I_{ISOL} \leq 1$ mA | | 3600 | | | V |
| | | t = 1 minute | | | 3000 | | | V |

**Ratings**
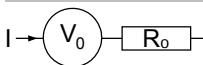
| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-------------|--------------------|---------------|----------|----------|
| Standard | MDD26-16N1B | MDD26-16N1B | Box | 6 | 453064 |

## 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 * | 4.9 | mΩ |

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**Outlines   TO-240AA**

M5x10

10

30

7.5

Ø5.5

0.25

29.7

65

20

20

25

20.8

1

2

6 7

3

5 4

80

92

2    1    3
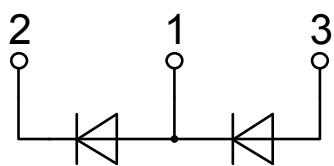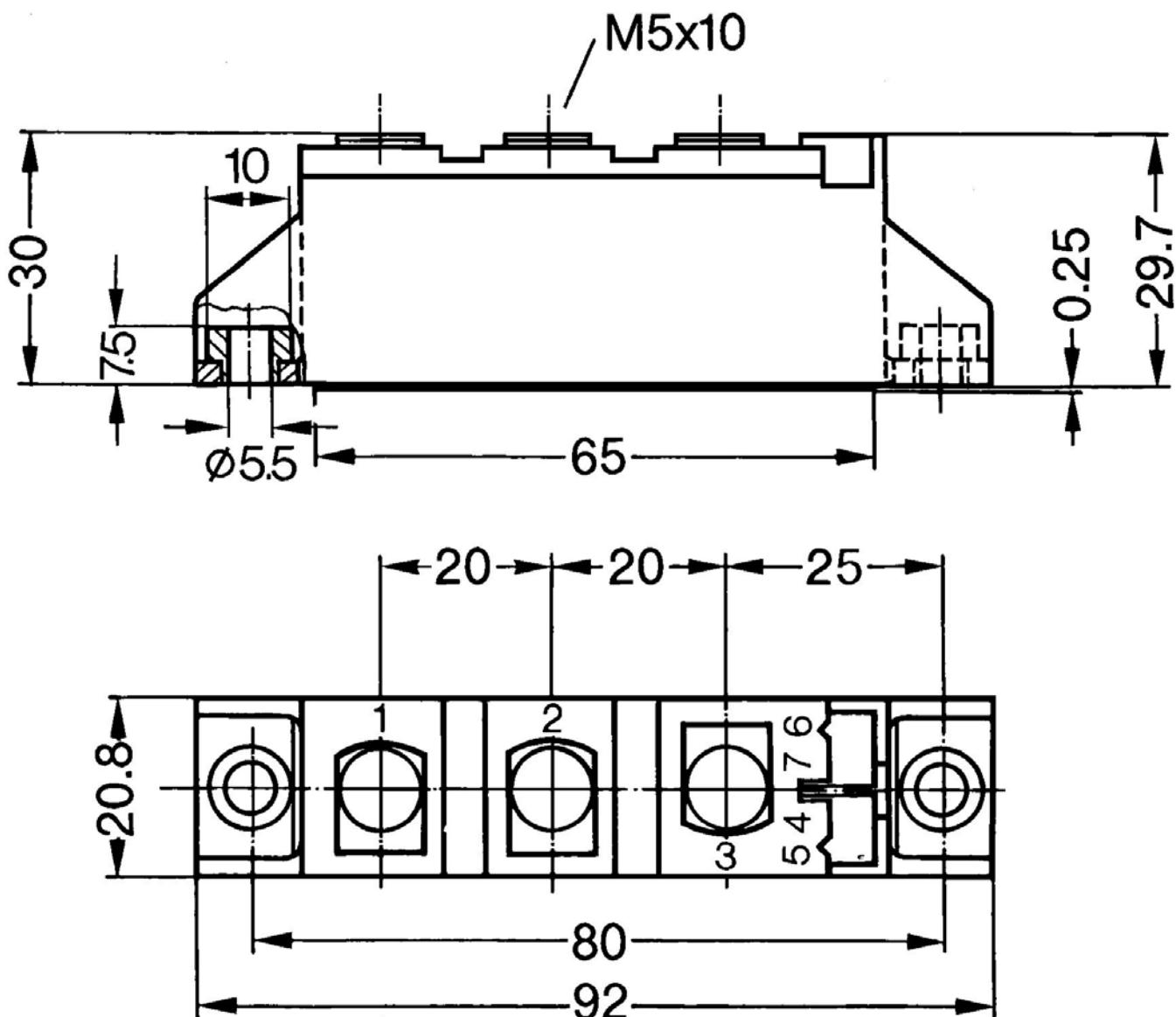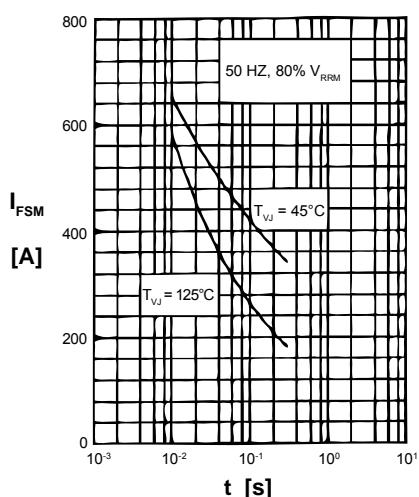
## Rectifier



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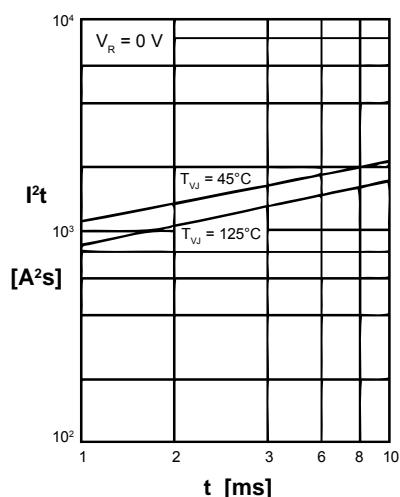


Fig. 2 I²t versus time (1-10 ms)
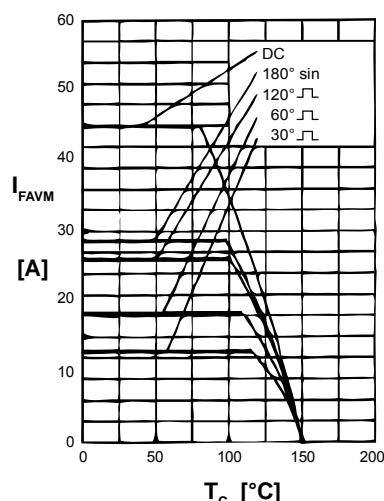


Fig. 3 Max. forward current
at case temperature
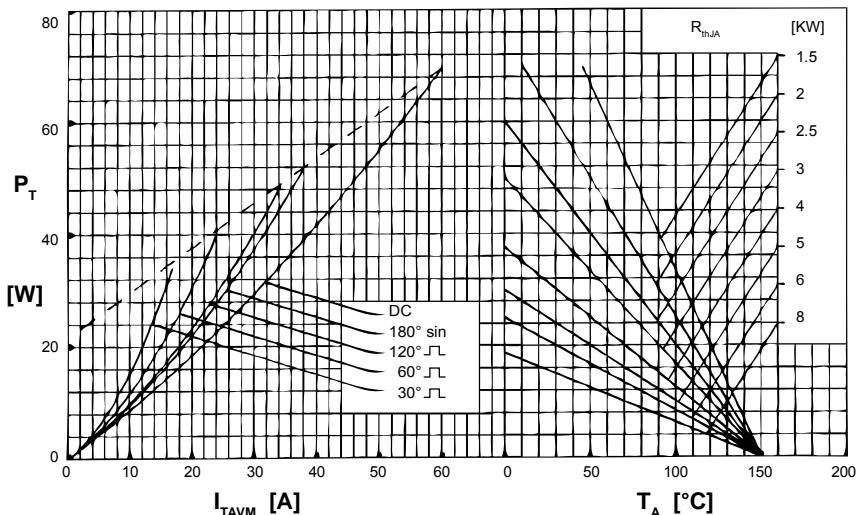


Fig. 4 Power dissipation versus onstate current & ambient temperature (per diode)
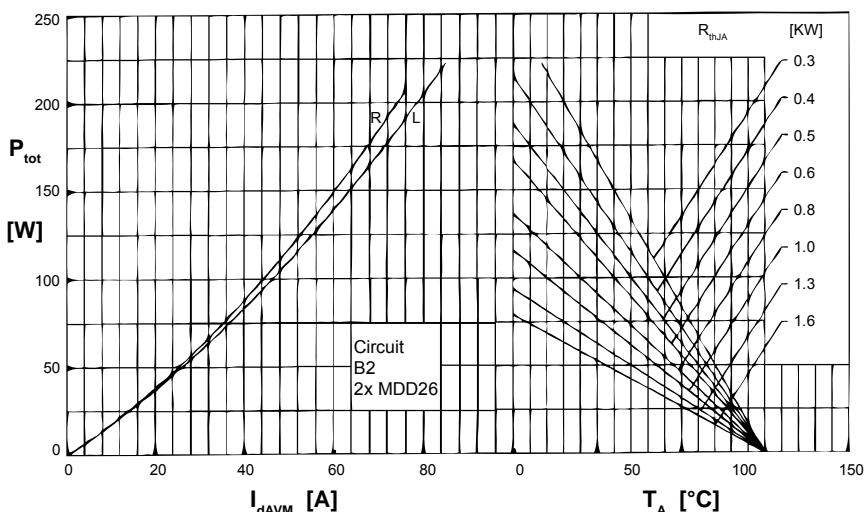


Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current
and ambient temperature; R = resistive load, L = inductive load

**Rectifier**
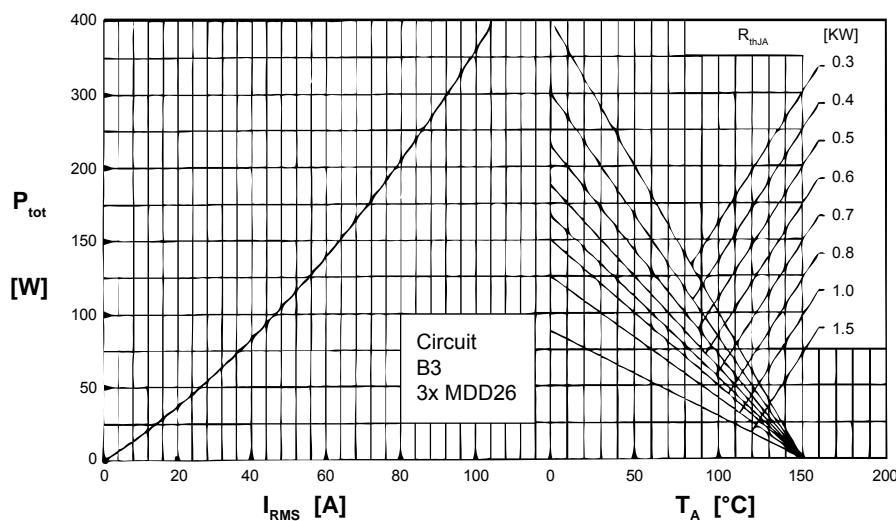


Fig. 6  Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature
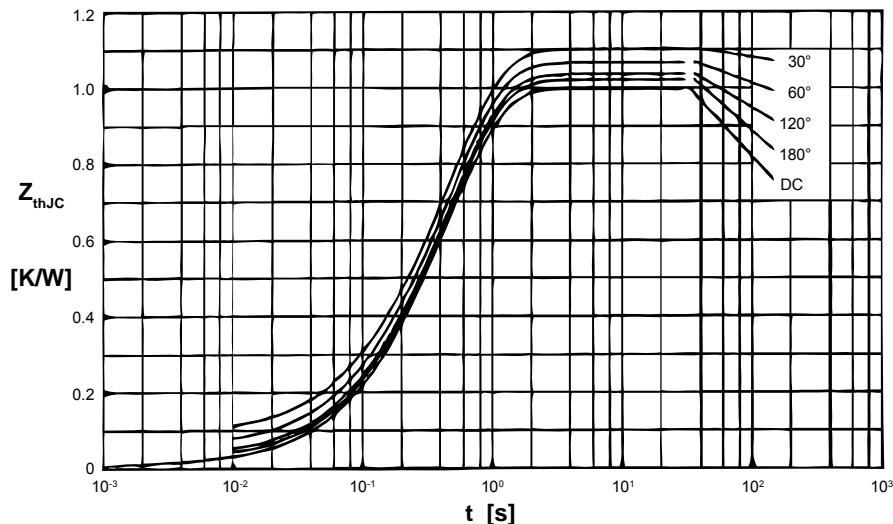


Fig. 7  Transient thermal impedance junction to case (per diode)

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

| d | $R_{thJC}$ [K/W] |
|------|------|
| DC | 1.00 |
| 180° | 1.02 |
| 120° | 1.04 |
| 60° | 1.07 |
| 30° | 1.10 |

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|------|--------|
| 1 | 0.01 | 0.0012 |
| 2 | 0.03 | 0.0950 |
| 3 | 0.96 | 0.4550 |
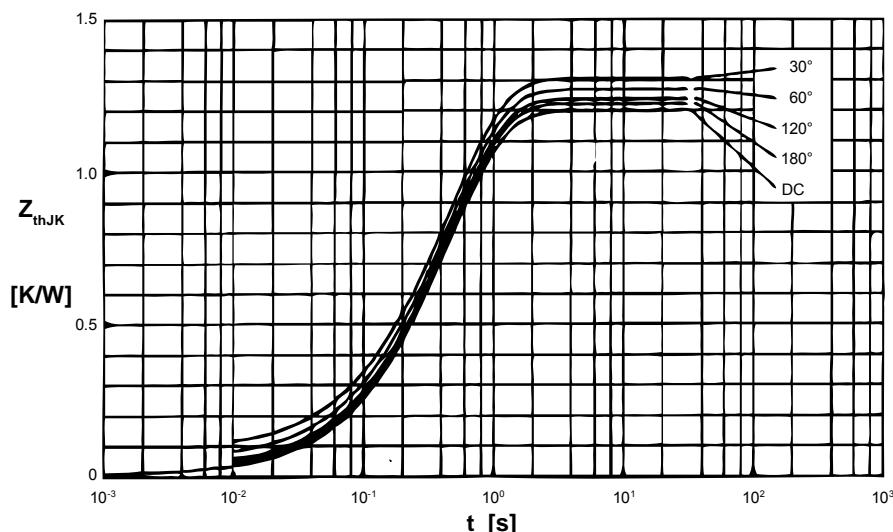


Fig. 8  Transient thermal impedance junction to heatsink (per thyristor)

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

| d | $R_{thJK}$ [K/W] |
|------|------|
| DC | 1.20 |
| 180° | 1.22 |
| 120° | 1.24 |
| 60° | 1.27 |
| 30° | 1.30 |

Constants for $Z_{thJK}$ calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|------|--------|
| 1 | 0.01 | 0.0012 |
| 2 | 0.03 | 0.0950 |
| 3 | 0.96 | 0.4550 |
| 4 | 0.20 | 0.4950 |