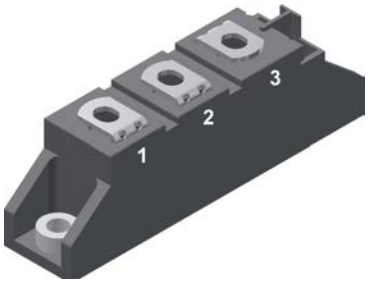
# Standard Rectifier Module

$V_{RRM}$ = 2x 1800 V
$I_{FAV}$ = 36 A
$V_F$ = 1,05 V

## Phase leg

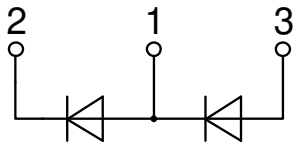
**Part number**

**MDD26-18N1B**




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

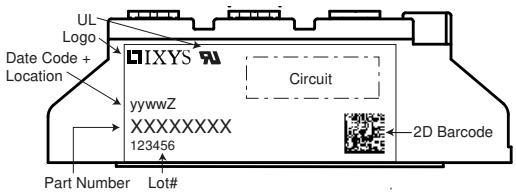
**Package:** TO-240AA

- 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 | | | 1900 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1800 | V |
| $I_R$ | *reverse current* | $V_R$ = 1800 V | $T_{VJ}$ = 25°C | | | 100 | µA |
| | | $V_R$ = 1800 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* } *for power loss calculation only* | | $T_{VJ}$ = 150°C | | | 0,80 | V |
| $r_F$ | *slope resistance* } | | | | | 6,1 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0,2 | | 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 |

| 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 |

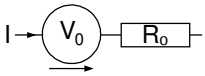



| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | MDD26-18N1B | MDD26-18N1B | Box | 36 | 454389 |

| Similar Part | Package | Voltage class |
|---|---|---|
| MDD26-08N1B | TO-240AA | 800 |
| MDD26-12N1B | TO-240AA | 1200 |
| MDD26-14N1B | TO-240AA | 1400 |
| MDD26-16N1B | TO-240AA | 1600 |

## Equivalent Circuits for Simulation

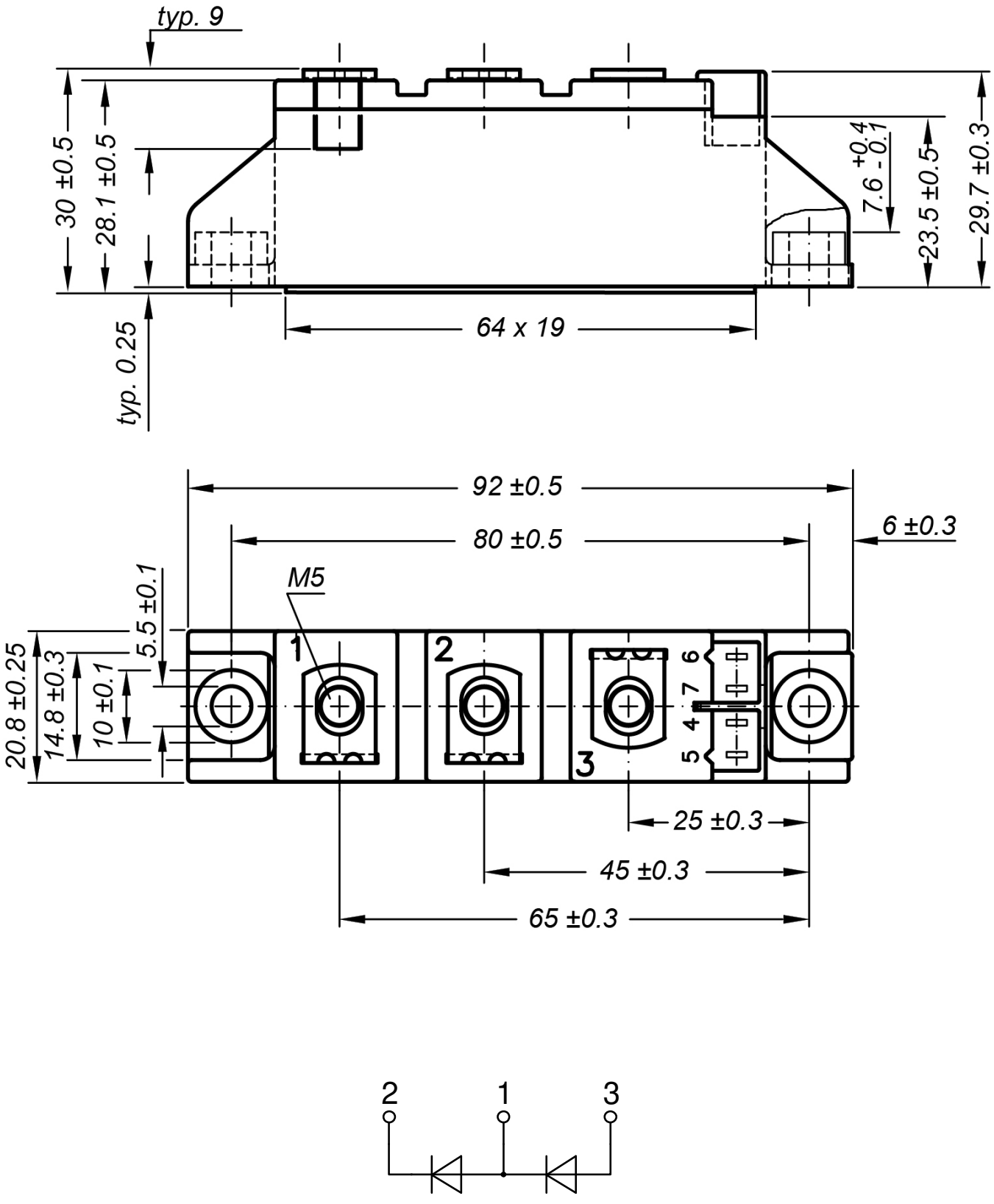
** on die level* $T_{VJ}$ = 150°C




**Rectifier**

| | | | |
|---|---|---|---|
| $V_{0\ max}$ | *threshold voltage* | 0,8 | V |
| $R_{0\ max}$ | *slope resistance ** | 4,9 | mΩ |

## Outlines TO-240AA



## Rectifier

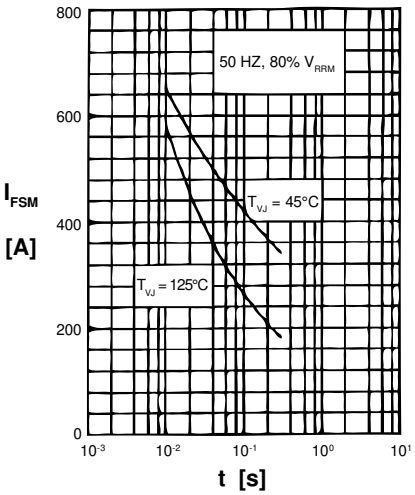



Fig. 1 Surge overload current
$I_{TSM}$: Crest value, t: duration

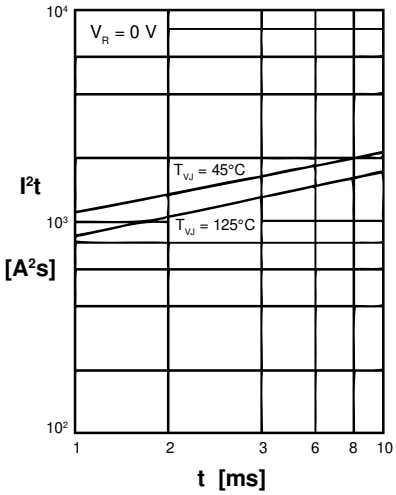



Fig. 2 $I^2t$ versus time (1-10 ms)

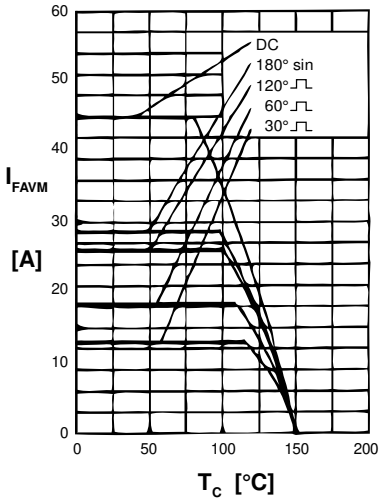



Fig. 3 Max. forward current at case temperature

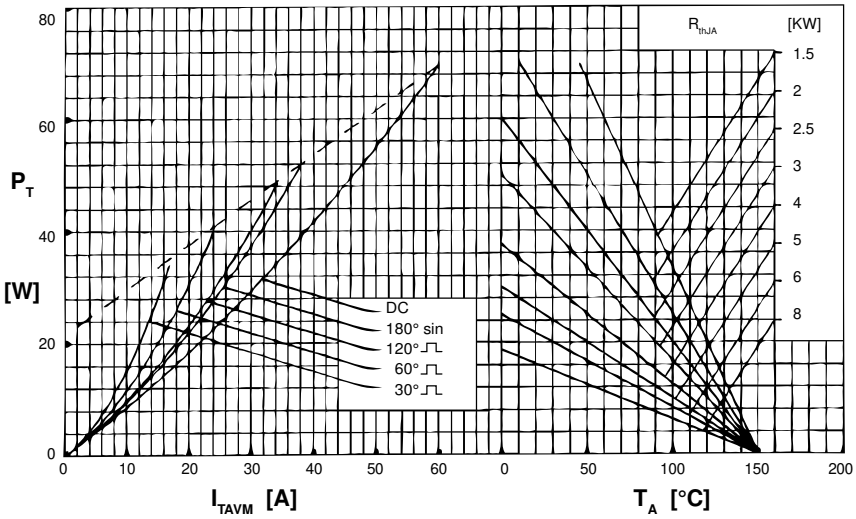



Fig. 4 Power dissipation versus onstate current & ambient temperature (per diode)

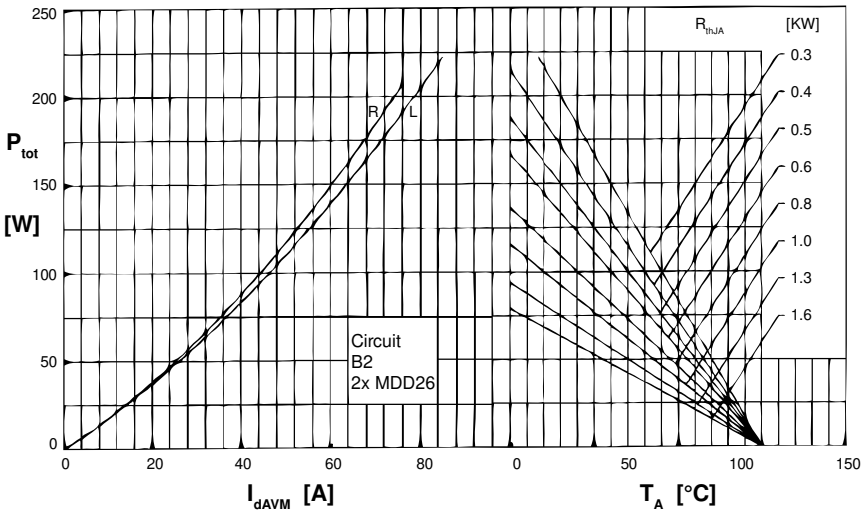



Fig. 6 Single phase rectifier bridge: Power dissipation vs. direct output current and ambient temperature; R = resistive load, L = inductive load

## Rectifier

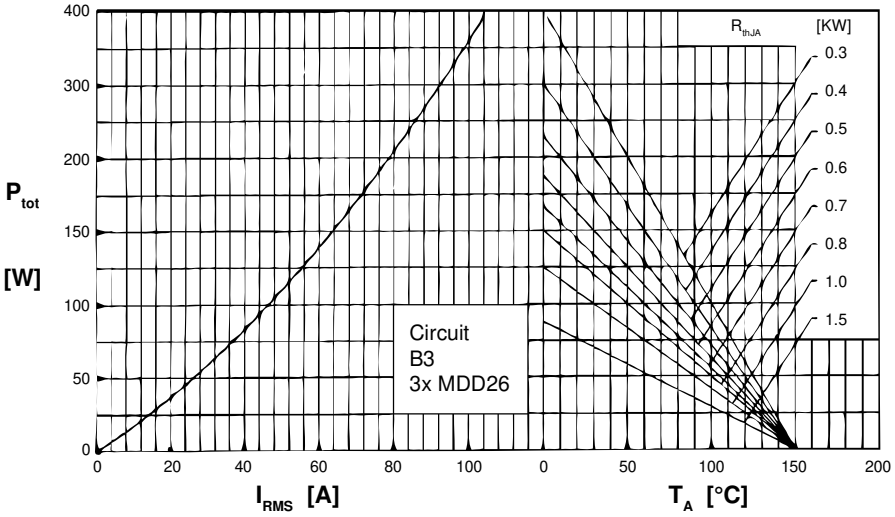



Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

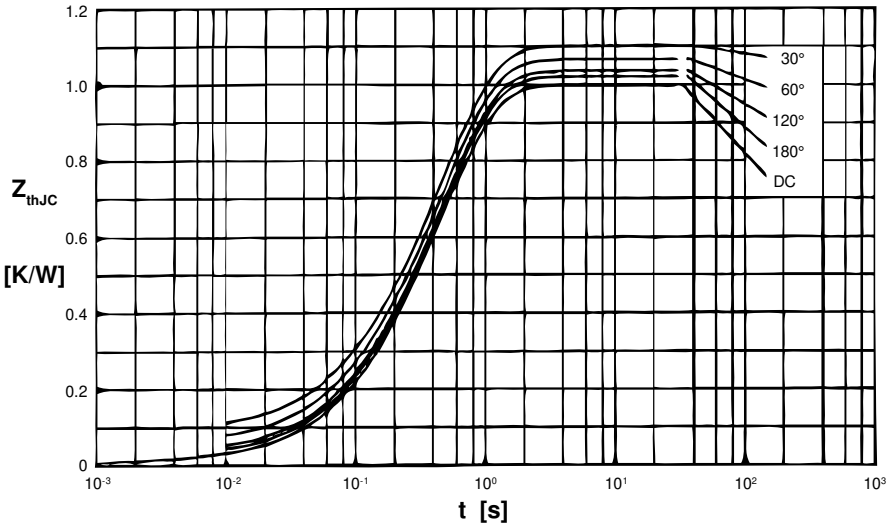



Fig. 7 Transient thermal impedance junction to case (per diode)

$R_{thJC}$ 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 |

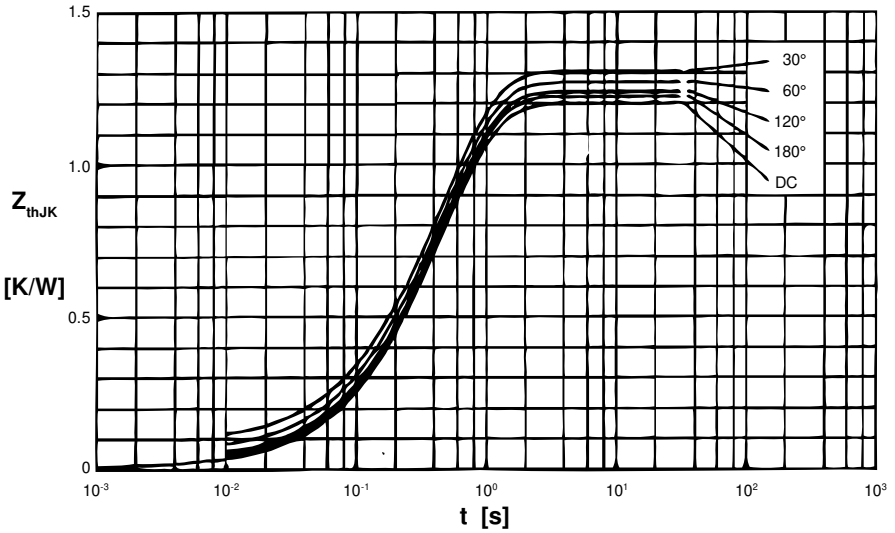



Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

$R_{thJK}$ 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 |