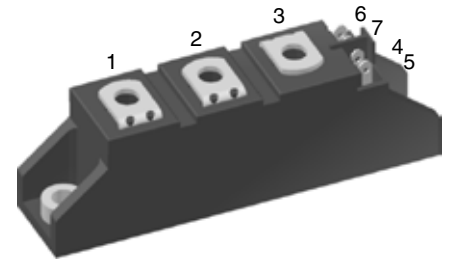


Thyristor Modules

Thyristor/Diode Modules

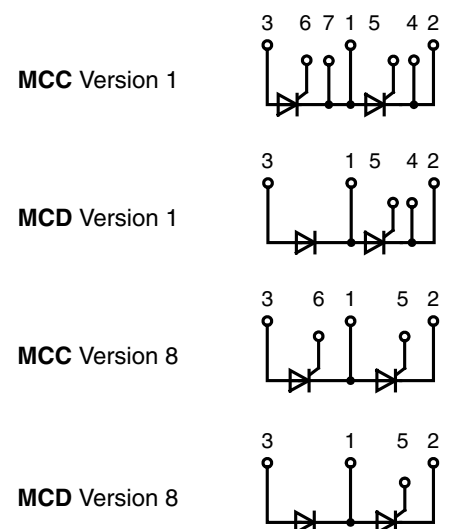
 $I_{TRMS} = 2x 180 A$
 $I_{TAVM} = 2x 116 A$
 $V_{RRM} = 800-1800 V$

| V_{RSM} | V_{RRM} | Type | | | | | |
|-----------|-----------|-----------|-------------|----|-----------|-------------|----|
| V_{DSM} | V_{DRM} | | 1B | 8B | Version | 1B | 8B |
| V | V | Version | | | | | |
| 900 | 800 | MCC 95-08 | io1B / io8B | | MCD 95-08 | io1B / io8B | |
| 1300 | 1200 | MCC 95-12 | io1B / io8B | | MCD 95-12 | io1B / io8B | |
| 1500 | 1400 | MCC 95-14 | io1B / io8B | | MCD 95-14 | io1B / io8B | |
| 1700 | 1600 | MCC 95-16 | io1B / io8B | | MCD 95-16 | io1B / io8B | |
| 1900 | 1800 | MCC 95-18 | io1B / io8B | | MCD 95-18 | io1B / io8B | |



| Symbol | Conditions | Maximum Ratings | |
|--|---|----------------------------------|--------------------|
| I_{TRMS}, I_{FRMS} I_{TAVM}, I_{FAVM} | $T_{VJ} = T_{VJM}$ $T_C = 85^\circ C; 180^\circ$ sine | 180 | A |
| | | 116 | A |
| I_{TSM}, I_{FSM} | $T_{VJ} = 45^\circ C$ $V_R = 0$ $t = 10$ ms (50 Hz) $t = 8.3$ ms (60 Hz) | 2250 | A |
| | | 2400 | A |
| | $T_{VJ} = T_{VJM}$ $V_R = 0$ $t = 10$ ms (50 Hz) $t = 8.3$ ms (60 Hz) | 2000 | A |
| | | 2150 | A |
| I^2t | $T_{VJ} = 45^\circ C$ $V_R = 0$ $t = 10$ ms (50 Hz) $t = 8.3$ ms (60 Hz) | 25 300 | A ² s |
| | | 23 900 | A ² s |
| | $T_{VJ} = T_{VJM}$ $V_R = 0$ $t = 10$ ms (50 Hz) $t = 8.3$ ms (60 Hz) | 20 000 | A ² s |
| | | 19 100 | A ² s |
| $(di/dt)_{cr}$ | $T_{VJ} = T_{VJM}$ $f = 50$ Hz; $t_p = 200$ μ s; $V_D = 2/3 V_{DRM}$ $I_G = 0.45$ A $di_G/dt = 0.45$ A/ μ s | repetitive, $I_T = 250$ A | 150 A/ μ s |
| | | non repetitive, $I_T = I_{TAVM}$ | 500 A/ μ s |
| $(dv/dt)_{cr}$ | $T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise) | | 1000 V/ μ s |
| P_{GM} | $T_{VJ} = T_{VJM}; t_p = 30$ μ s | 10 | W |
| | $I_T = I_{T(AV)M}; t_p = 500$ μ s | 5 | W |
| P_{GAV} | | 0.5 | W |
| V_{RGM} | | 10 | V |
| T_{VJ} | | -40...+125 | $^\circ C$ |
| T_{VJM} | | 125 | $^\circ C$ |
| T_{stg} | | -40...+125 | $^\circ C$ |
| V_{ISOL} | 50/60 Hz, RMS $I_{ISOL} \leq 1$ mA | $t = 1$ min $t = 1$ s | 3000 V~ 3600 V~ |
| M_d | Mounting torque (M5) Terminal connection torque (M5) | 2.5 - 4 2.5 - 4 | Nm Nm |
| Weight | Typical including screws | 85 | g |

Data according to IEC 60747 and refer to a single diode unless otherwise stated.



Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1

Applications

- DC Motor control
- Softstart AC motor controller
- Light, heat and temperature control

Advantages

- Space and weight savings
- Simple mounting with two screws
- Improved temperature & power cycling
- Reduced protection circuits

| Symbol | Conditions | Characteristic Values | |
|--------------------|--|---|---------------------|
| | | typ. | max. |
| I_{RRM}, I_{DRM} | $V_R / V_D = V_{RRM} / V_{DRM}$ | $T_{VJ} = T_{VJM}$ | 5 mA |
| V_T, V_F | $I_T / I_F = 300$ A | $T_{VJ} = 25^\circ\text{C}$ | 1.5 V |
| V_{T0} | For power-loss calculations only | | 0.8 V |
| r_t | | $T_{VJ} = T_{VJM}$ | 2.4 mΩ |
| V_{GT} | $V_D = 6$ V | $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = -40^\circ\text{C}$ | 2.5 V 2.6 V |
| I_{GT} | $V_D = 6$ V | $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = -40^\circ\text{C}$ | 150 mA 200 mA |
| V_{GD} | $V_D = \frac{2}{3} V_{DRM}$ | $T_{VJ} = T_{VJM}$ | 0.2 V |
| I_{GD} | | | 10 mA |
| I_L | $t_p = 10 \mu\text{s}; V_D = 6$ V $I_G = 0.45$ A; $di_G/dt = 0.45$ A/ μs | $T_{VJ} = 25^\circ\text{C}$ | 450 mA |
| I_H | $V_D = 6$ V; $R_{GK} = \infty$; | $T_{VJ} = 25^\circ\text{C}$ | 200 mA |
| t_{gd} | $V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.45$ A; $di_G/dt = 0.45$ A/ μs | $T_{VJ} = 25^\circ\text{C}$ | 2 μs |
| t_q | $V_D = \frac{2}{3} V_{DRM}$ $dv/dt = 20$ V/ μs ; $-di/dt = 10$ A/ μs $I_T = 150$ A; $V_R = 100$ V; $t_p = 200 \mu\text{s}$ | $T_{VJ} = T_{VJM}$ | 185 μs |
| Q_S | $I_T / I_F = 50$ A; $-di/dt = 6$ A/ μs | $T_{VJ} = T_{VJM}$ | 170 μC |
| I_{RM} | | | 45 A |
| R_{thJC} | per thyristor; DC current per module | } other values see Fig. 8/9 | 0.22 K/W |
| R_{thJK} | per thyristor; DC current per module | | 0.11 K/W |
| | | | 0.42 K/W |
| | | | 0.21 K/W |
| d_s | Creeping distance on surface | | 12.7 mm |
| d_A | Creepage distance in air | | 9.6 mm |
| a | Maximum allowable acceleration | | 50 m/s ² |

Optional accessories for modules

Coded gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red

Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
 Type **ZY 200R** (R = Right for pin pair 6/7) } CSA class 5851, guide 460-1-1

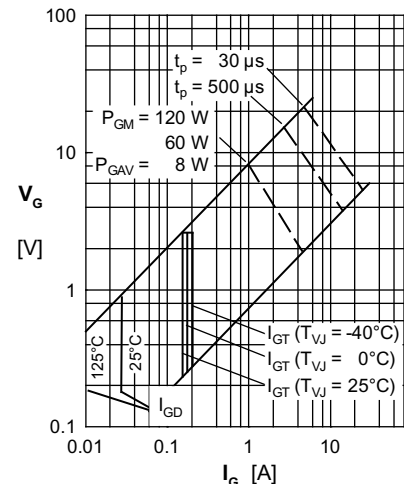


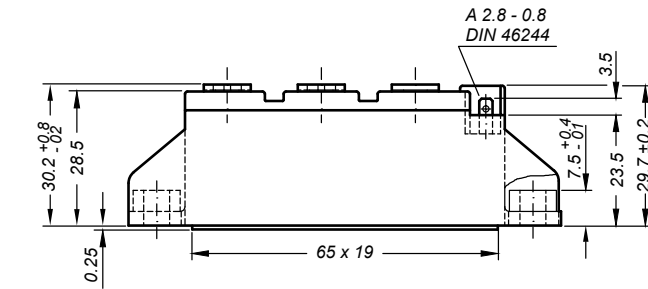
Fig. 1 Gate trigger characteristics



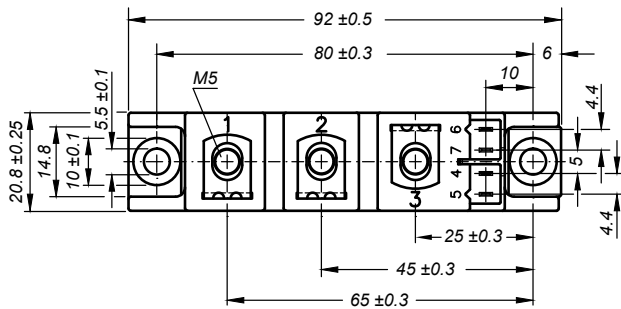
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC... Version 1B

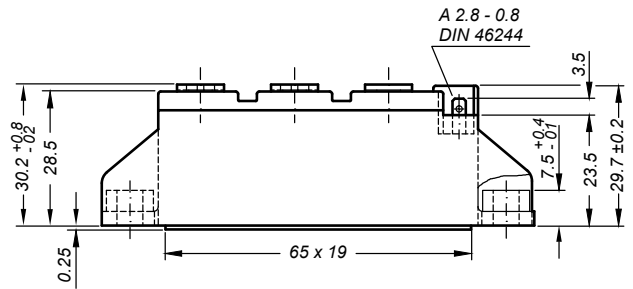


General tolerance: DIN ISO 2768 class „c“

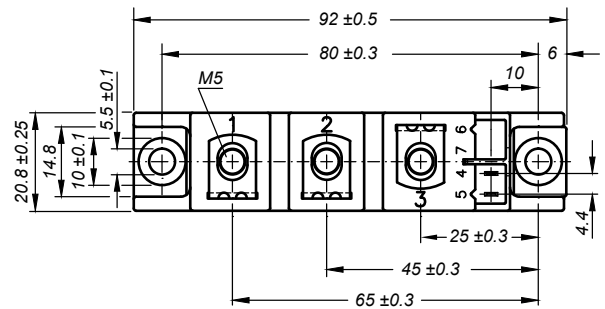


Optional accessories: Keyed gate/cathode twin plugs
Wire length: 350 mm, gate = yellow, cathode = red
UL 758, style 1385, CSA class 5851, guide 460-1-1
Type ZY 200L (L = Left for pin pair 4/5)
Type ZY 200R (R = Right for pin pair 6/7)

MCD... Version 1B

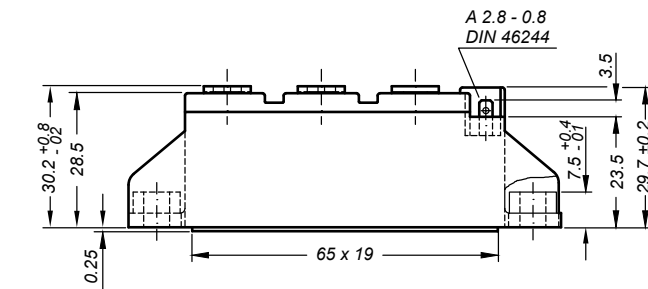


General tolerance: DIN ISO 2768 class „c“

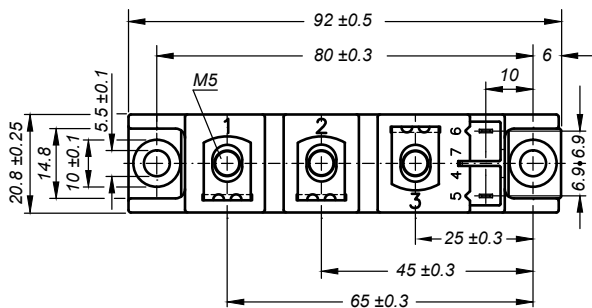


Optional accessories: Keyed gate/cathode twin plugs
Wire length: 350 mm, gate = yellow, cathode = red
UL 758, style 1385, CSA class 5851, guide 460-1-1
Type ZY 200L (L = Left for pin pair 4/5)

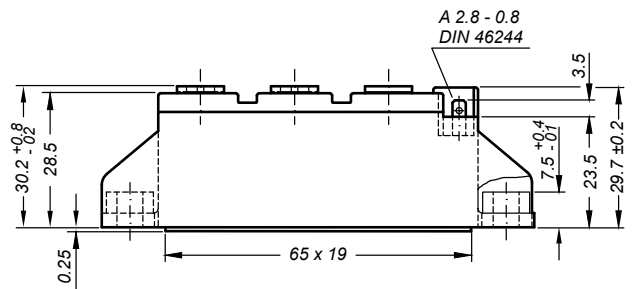
MCC... Version 8B



General tolerance: DIN ISO 2768 class „c“



MCD... Version 8B



General tolerance: DIN ISO 2768 class „c“

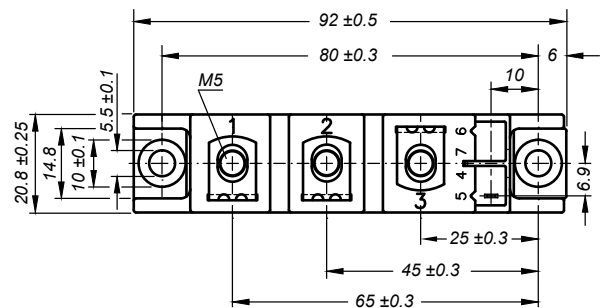




Fig. 3 Surge overload current I_{TSM} ,
 I_{FSM} : Crest value, t : duration



Fig. 4 I^2t versus time (1-10 ms)



Fig. 4a Maximum forward current
at case temperature



Fig. 5 Power dissipation versus
on-state current & ambient
temperature
(per thyristor or diode)

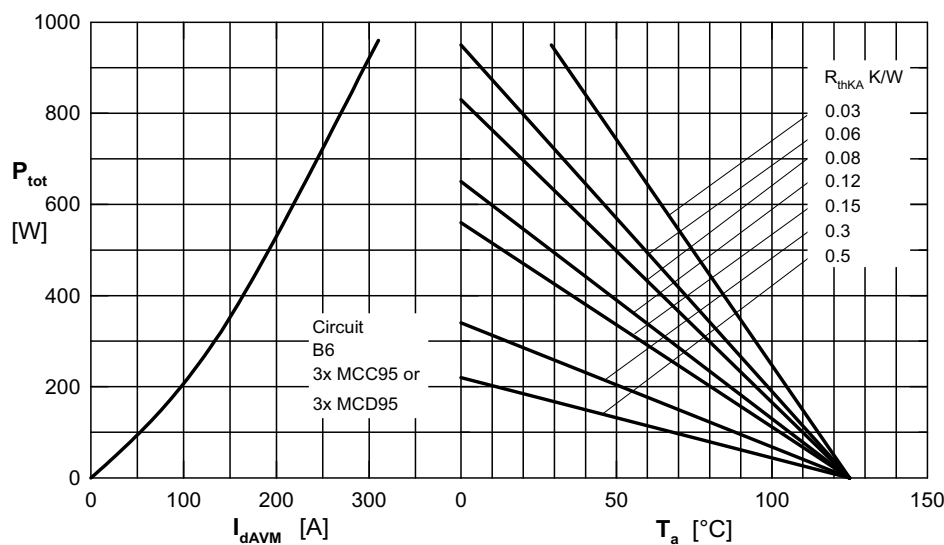


Fig. 6 Three phase rectifier bridge:
Power dissipation vs. direct
output current and ambient
temperature



Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

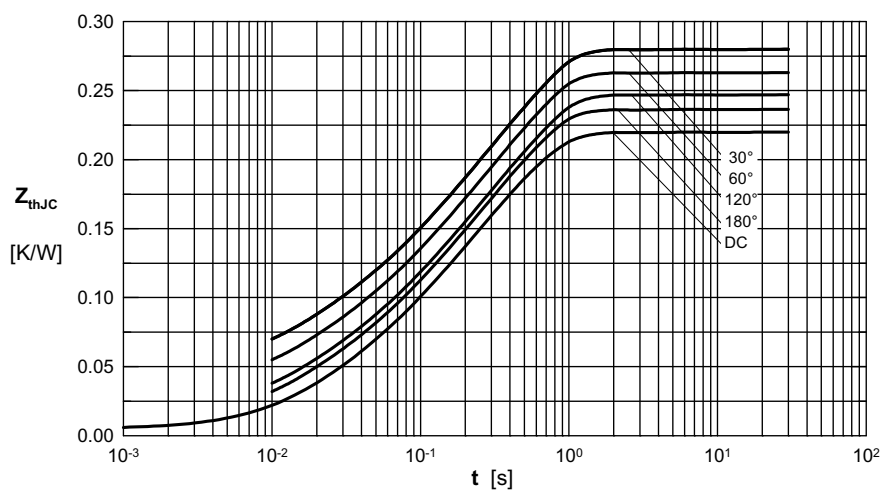


Fig. 8 Transient thermal impedance
junction to case
(per thyristor or diode)

R_{thJC} for various conduction angles d :

| d | R_{thJC} (K/W) |
|------|------------------|
| DC | 0.22 |
| 180° | 0.23 |
| 120° | 0.25 |
| 60° | 0.27 |
| 30° | 0.28 |

Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|-----|-----------------|-----------|
| 1 | 0.0066 | 0.0019 |
| 2 | 0.0678 | 0.0477 |
| 3 | 0.1456 | 0.344 |

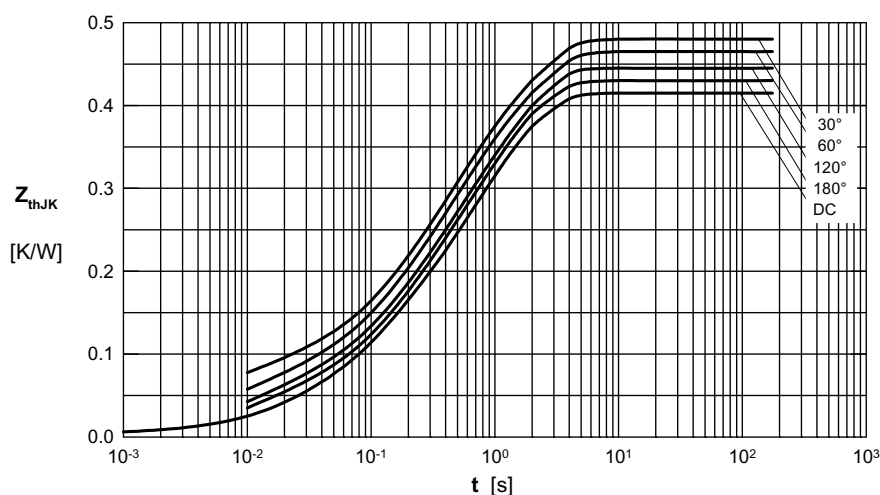


Fig. 9 Transient thermal impedance
junction to heatsink
(per thyristor or diode)

R_{thJK} for various conduction angles d :

| d | R_{thJK} (K/W) |
|------|------------------|
| DC | 0.42 |
| 180° | 0.43 |
| 120° | 0.45 |
| 60° | 0.47 |
| 30° | 0.48 |

Constants for Z_{thJK} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|-----|-----------------|-----------|
| 1 | 0.0066 | 0.0019 |
| 2 | 0.0678 | 0.0477 |
| 3 | 0.1456 | 0.344 |
| 4 | 0.2 | 1.32 |

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