

Thyristor Modules

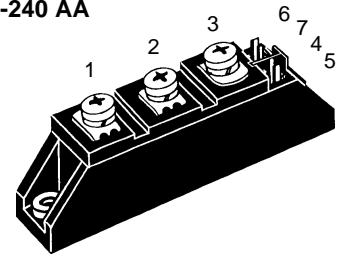
Thyristor/Diode Modules

$$I_{TRMS} = 2x 180 A$$

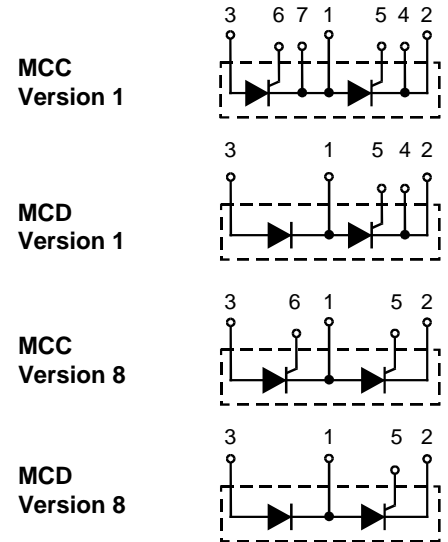
$$I_{TAVM} = 2x 116 A$$

$$V_{RRM} = 800-1800 V$$

| V_{RSM} V_{DSM} V | V_{RRM} V_{DRM} V | Type | | Version 1 | | Version 8 | |
|-----------------------------|-----------------------------|----------------|----------------|----------------|----------------|-----------|--|
| 900 | 800 | MCC 95-08io1 B | -- | MCC 95-08io8 B | MCD 95-08io8 B | | |
| 1300 | 1200 | MCC 95-12io1 B | MCD 95-12io1 B | MCC 95-12io8 B | MCD 95-12io8 B | | |
| 1500 | 1400 | MCC 95-14io1 B | -- | MCC 95-14io8 B | MCD 95-14io8 B | | |
| 1700 | 1600 | MCC 95-16io1 B | MCD 95-16io1 B | MCC 95-16io8 B | MCD 95-16io8 B | | |
| 1900 | 1800 | MCC 95-18io1 B | -- | MCC 95-18io8 B | MCD 95-18io8 B | | |
| 1500 | 1400 | MCC 95-16io1 | | | | | |
| 1700 | 1600 | MCC 95-18io1 | | | | | |

TO-240 AA


| Symbol | Test Conditions | Maximum Ratings | | |
|--|---|---|--------------------------------------|--------------------------|
| I_{TRMS}^1 , I_{FRMS} I_{TAVM}^2 , I_{FAVM} | $T_{VJ} = T_{VJM}$ $T_C = 85^\circ C$; 180° sine | 180 | A | |
| I_{TSM}^3 , I_{FSM} | $T_{VJ} = 45^\circ C$; $V_R = 0$ t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 2250 2400 | A A | |
| $\int i^2 dt$ | $T_{VJ} = 45^\circ C$ $V_R = 0$ t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 25 300 23 900 | A ² s A ² s | |
| | $T_{VJ} = T_{VJM}$ $V_R = 0$ t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 20 000 19 100 | A ² s A ² s | |
| $(di/dt)_{cr}$ | $T_{VJ} = T_{VJM}$ f = 50 Hz, $t_p = 200 \mu s$ $V_D = 2/3 V_{DRM}$ $I_G = 0.45 A$ $di_G/dt = 0.45 A/\mu s$ | repetitive, $I_T = 250 A$ non repetitive, $I_T = I_{TAVM}$ | 150 500 | A/ μs A/ μs |
| $(dv/dt)_{cr}$ | $T_{VJ} = T_{VJM}$; $R_{GK} = \infty$; method 1 (linear voltage rise) | $V_{DR} = 2/3 V_{DRM}$ | 1000 | V/ μs |
| P_{GM} | $T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$ | $t_p = 30 \mu s$ $t_p = 300 \mu s$ | 10 5 | W W |
| | | | 0.5 | W |
| V_{RGM} | | | 10 | V |
| T_{VJ} | | | -40...+125 | °C |
| T_{VJM} | | | 125 | °C |
| T_{stg} | | | -40...+125 | °C |
| V_{ISOL} | 50/60 Hz, RMS $I_{ISOL} \leq 1 mA$ | t = 1 min t = 1 s | 3000 3600 | V~ V~ |
| | | | | |
| M_d | Mounting torque (M5) | | 2.5-4.0/22-35 | Nm/lb.in. |
| | Terminal connection torque (M5) | | 2.5-4.0/22-35 | Nm/lb.in. |
| Weight | Typical including screws | | 90 | g |


Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al₂O₃ -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 and power cycling
- Reduced protection circuits

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated. IXYS reserves the right to change limits, test conditions and dimensions

| Symbol | Test Conditions | Characteristic Values |
|--------------------|--|-----------------------|
| I_{RRM}, I_{DRM} | $T_{VJ} = T_{VJM}; V_R = V_{RRM}; V_D = V_{DRM}$ | 5 mA |
| V_T, V_F | $I_T, I_F = 300 \text{ A}; T_{VJ} = 25^\circ\text{C}$ | 1.5 V |
| V_{T0} | For power-loss calculations only ($T_{VJ} = 125^\circ\text{C}$) | 0.8 V |
| r_T | | 2.4 mΩ |
| V_{GT} | $V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$ | 2.5 V |
| | $T_{VJ} = -40^\circ\text{C}$ | 2.6 V |
| I_{GT} | $V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$ | 150 mA |
| | $T_{VJ} = -40^\circ\text{C}$ | 200 mA |
| V_{GD} | $T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$ | 0.2 V |
| I_{GD} | | 10 mA |
| I_L | $T_{VJ} = 25^\circ\text{C}; t_p = 10 \mu\text{s}; V_D = 6 \text{ V}$ $I_G = 0.45 \text{ A}; di_G/dt = 0.45 \text{ A}/\mu\text{s}$ | 450 mA |
| I_H | $T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$ | 200 mA |
| t_{gd} | $T_{VJ} = 25^\circ\text{C}; V_D = 1/2 V_{DRM}$ $I_G = 0.45 \text{ A}; di_G/dt = 0.45 \text{ A}/\mu\text{s}$ | 2 μs |
| t_q | $T_{VJ} = T_{VJM}; I_T = 150 \text{ A}, t_p = 200 \mu\text{s}; -di/dt = 10 \text{ A}/\mu\text{s}$ typ. $V_R = 100 \text{ V}; dv/dt = 20 \text{ V}/\mu\text{s}; V_D = 2/3 V_{DRM}$ | 185 μs |
| Q_S | $T_{VJ} = T_{VJM}; I_T, I_F = 50 \text{ A}, -di/dt = 6 \text{ A}/\mu\text{s}$ | 170 μC |
| I_{RM} | | 45 A |
| R_{thJC} | per thyristor/diode; DC current per module | 0.22 K/W |
| R_{thJK} | per thyristor/diode; DC current per module | 0.11 K/W |
| | other values see Fig. 8/9 | 0.42 K/W |
| | | 0.21 K/W |
| d_s | Creepage distance on surface | 12.7 mm |
| d_A | Strike distance through air | 9.6 mm |
| a | Maximum allowable acceleration | 50 m/s ² |

Optional accessories for module-type MCC 95 version 1 B

Keyed 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

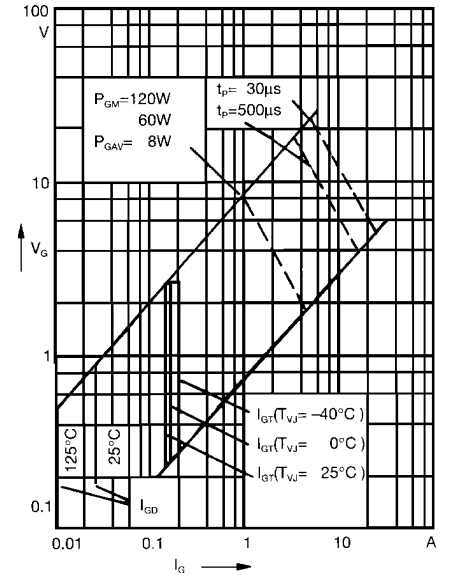


Fig. 1 Gate trigger characteristics

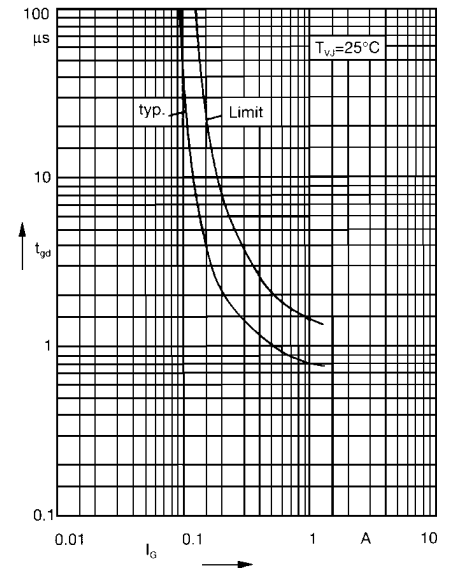
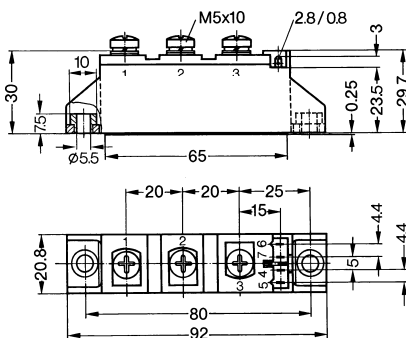


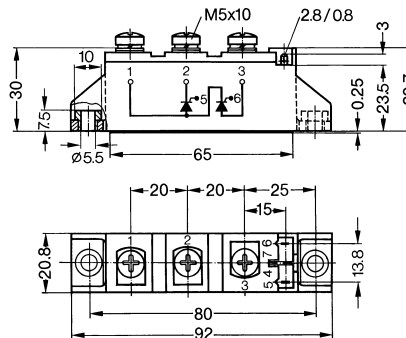
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

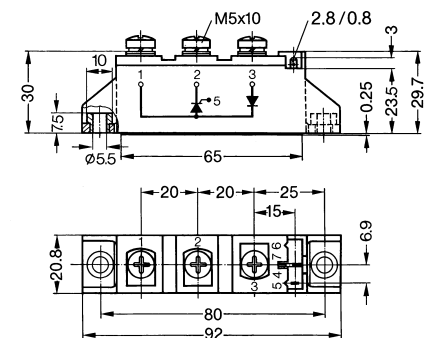
MCC / MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



Version 1 or 8 without B in typ designation = without insert in mounting holes

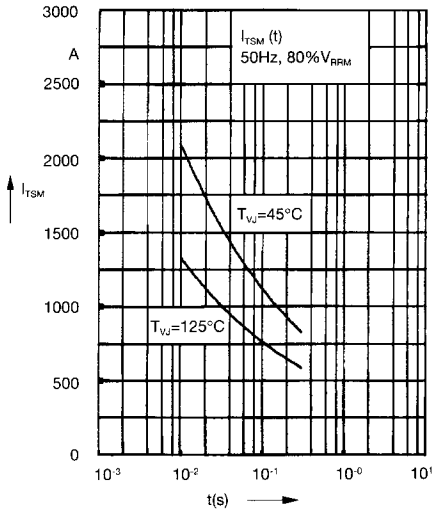


Fig. 3 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t: duration

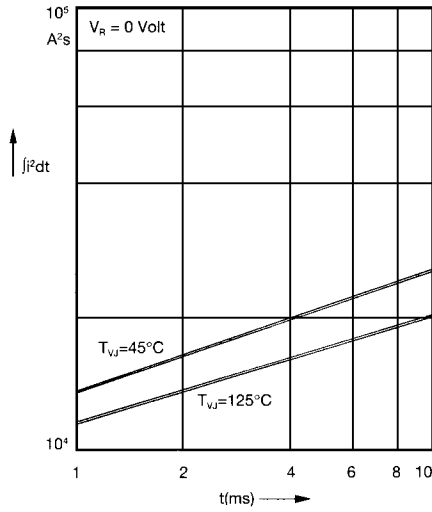


Fig. 4 $\int i^2 dt$ versus time (1-10 ms)

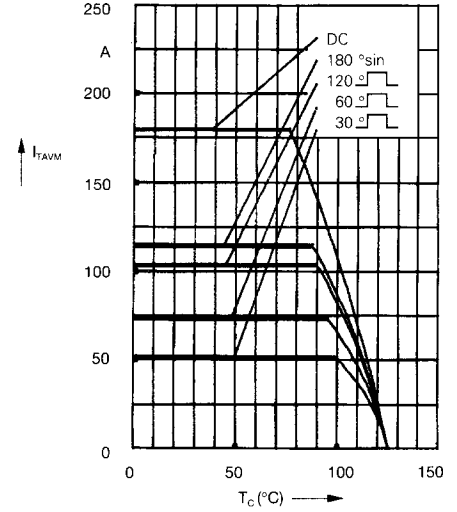


Fig. 4a Maximum forward current at case temperature

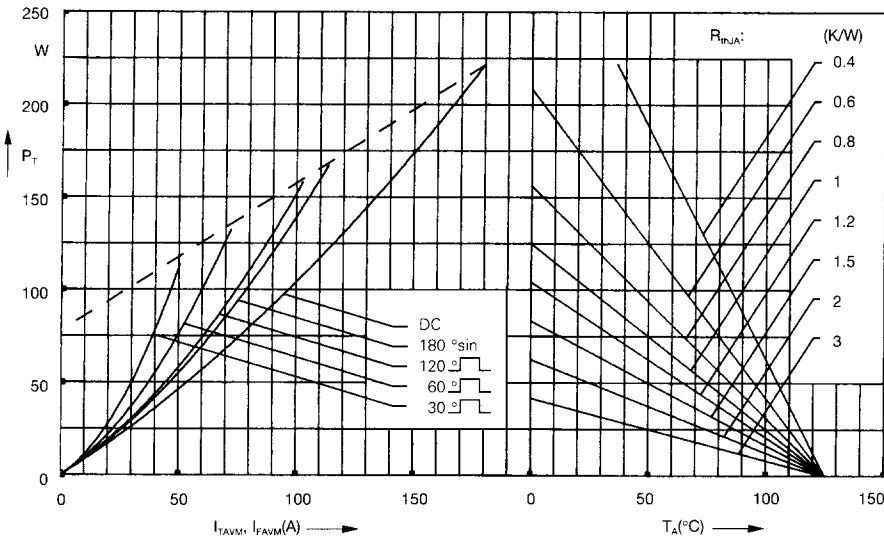


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

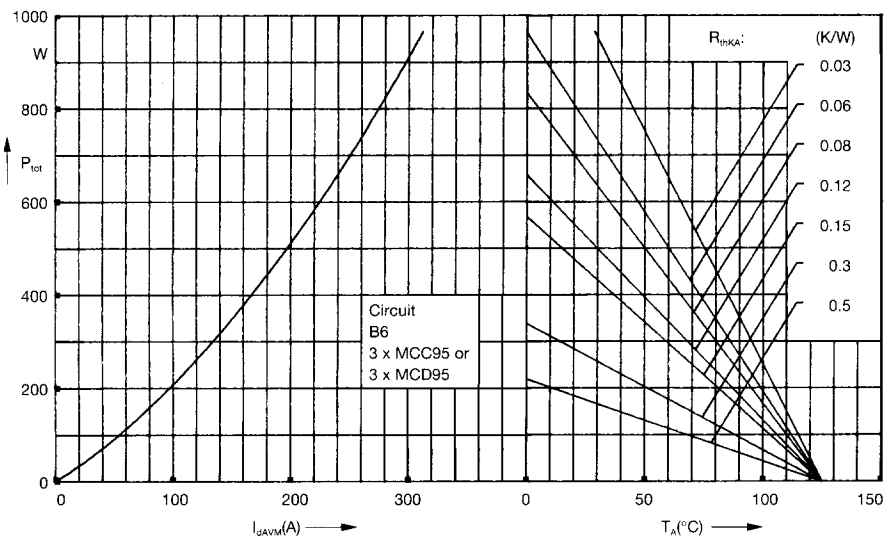


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

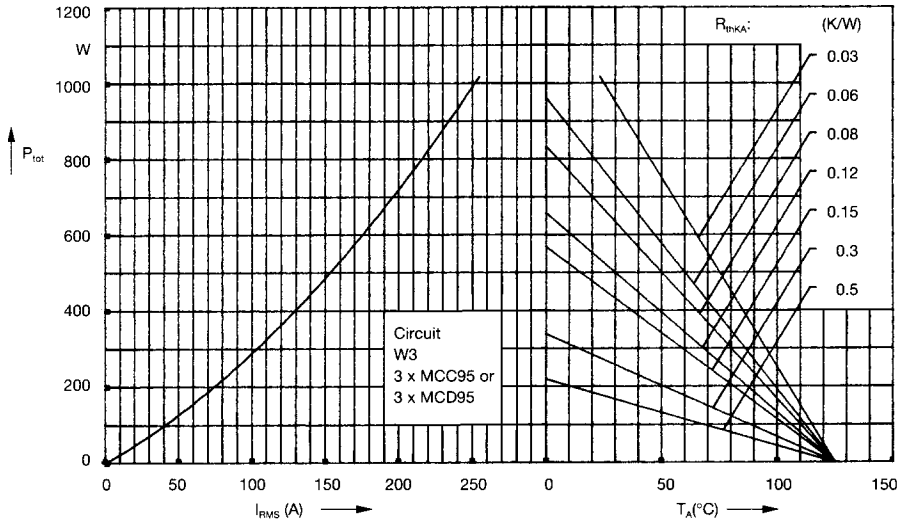


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

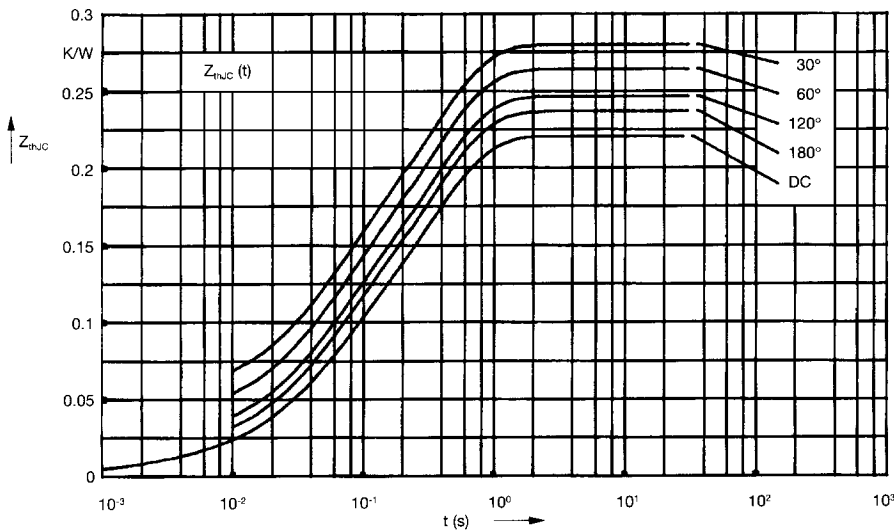


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

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 |

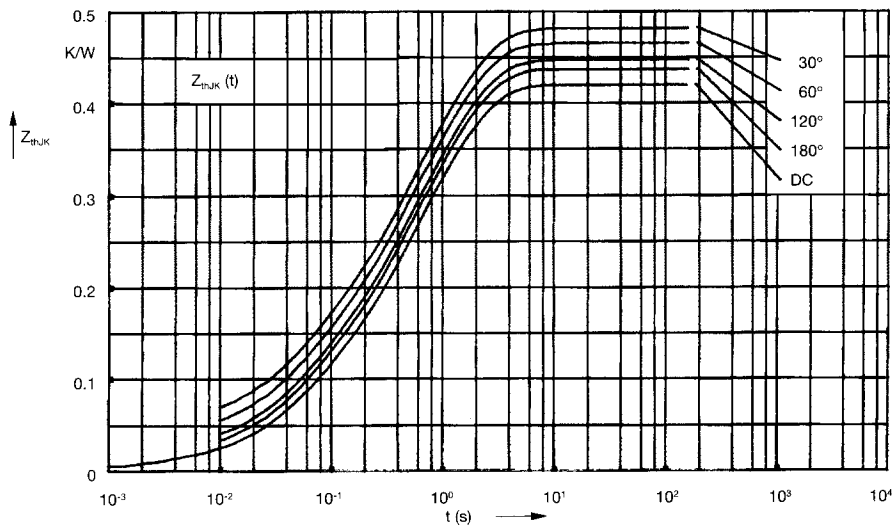


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

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 |