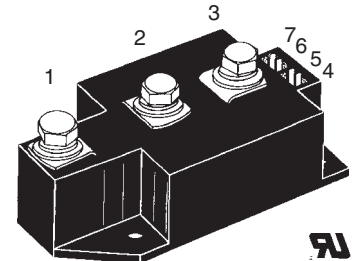


# Thyristor Modules

## Thyristor/Diode Modules

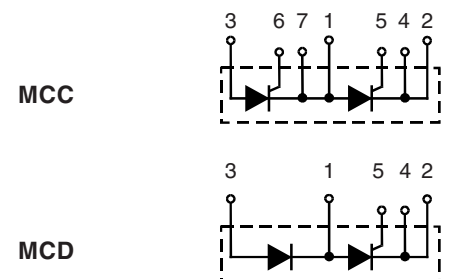
$I_{TRMS} = 2 \times 400 \text{ A}$   
 $I_{TAVM} = 2 \times 250 \text{ A}$   
 $V_{RRM} = 800-1800 \text{ V}$

| $V_{RSM}$<br>$V_{DSM}$<br>V | $V_{RRM}$<br>$V_{DRM}$<br>V | Type          | Version 1     | Version 1     |
|-----------------------------|-----------------------------|---------------|---------------|---------------|
| 900                         | 800                         | MCC 220-08io1 | MCC 220-08io1 | MCD 220-08io1 |
| 1300                        | 1200                        | MCC 220-12io1 | MCC 220-12io1 | MCD 220-12io1 |
| 1500                        | 1400                        | MCC 220-14io1 | MCC 220-14io1 | MCD 220-14io1 |
| 1700                        | 1600                        | MCC 220-16io1 | MCC 220-16io1 | MCD 220-16io1 |
| 1900                        | 1800                        | MCC 220-18io1 | MCC 220-18io1 | MCD 220-18io1 |



| Symbol                                       | Conditions                                                                               | Maximum Ratings                                     |                                                    |
|----------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|
| $I_{TRMS}, I_{FRMS}$<br>$I_{TAVM}, I_{FAVM}$ | $T_{VJ} = T_{VJM}$<br>$T_C = 85^\circ\text{C}; 180^\circ \text{ sine}$                   | 400                                                 | A                                                  |
|                                              |                                                                                          | 250                                                 | A                                                  |
| $I_{TSM}, I_{FSM}$                           | $T_{VJ} = 45^\circ\text{C}$<br>$V_R = 0$                                                 | t = 10 ms (50 Hz), sine<br>t = 8.3 ms (60 Hz), sine | 8500 A<br>9000 A                                   |
|                                              | $T_{VJ} = T_{VJM}$<br>$V_R = 0$                                                          | t = 10 ms (50 Hz), sine<br>t = 8.3 ms (60 Hz), sine | 7000 A<br>7600 A                                   |
| $\int i^2 dt$                                | $T_{VJ} = 45^\circ\text{C}$<br>$V_R = 0$                                                 | t = 10 ms (50 Hz), sine<br>t = 8.3 ms (60 Hz), sine | 360000 A <sup>2</sup> s<br>336000 A <sup>2</sup> s |
|                                              | $T_{VJ} = T_{VJM}$<br>$V_R = 0$                                                          | t = 10 ms (50 Hz), sine<br>t = 8.3 ms (60 Hz), sine | 245000 A <sup>2</sup> s<br>240000 A <sup>2</sup> s |
| $(di/dt)_{cr}$                               | $T_{VJ} = T_{VJM};$<br>f = 50 Hz; $t_p = 200 \mu\text{s}$<br>$V_D = \frac{2}{3} V_{DRM}$ | repetitive, $I_T = 750 \text{ A}$                   | 100 A/ $\mu\text{s}$                               |
|                                              | $I_G = 1 \text{ A}$<br>$di_G/dt = 1 \text{ A}/\mu\text{s}$                               | non repetitive, $I_T = 250 \text{ A}$               | 800 A/ $\mu\text{s}$                               |
| $(dv/dt)_{cr}$                               | $T_{VJ} = T_{VJM};$<br>$R_{GK} = \infty;$ method 1 (linear voltage rise)                 | $V_{DR} = \frac{2}{3} V_{DRM}$                      | 1000 V/ $\mu\text{s}$                              |
| $P_{GM}$                                     | $T_{VJ} = T_{VJM};$<br>$I_T = I_{TAVM};$                                                 | $t_p = 30 \mu\text{s}$<br>$t_p = 500 \mu\text{s}$   | 120 W<br>60 W                                      |
| $P_{GAV}$                                    |                                                                                          |                                                     | 20 W                                               |
| $V_{RGM}$                                    |                                                                                          |                                                     | 10 V                                               |
| $T_{VJ}$                                     |                                                                                          |                                                     | -40...+140 °C                                      |
| $T_{VJM}$                                    |                                                                                          |                                                     | 140 °C                                             |
| $T_{stg}$                                    |                                                                                          |                                                     | -40...+125 °C                                      |
| $V_{ISOL}$                                   | 50/60 Hz, RMS;<br>$I_{ISOL} \leq 1 \text{ mA};$                                          | t = 1 min<br>t = 1 s                                | 3000 V~<br>3600 V~                                 |
| $M_d$                                        | Mounting torque (M5)<br>Terminal connection torque (M8)                                  |                                                     | 2.5-5/22-44 Nm/lb.in.<br>12-15/106-132 Nm/lb.in.   |
| <b>Weight</b>                                | Typical including screws                                                                 |                                                     | 320 g                                              |

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



### Features

- International standard package
- Direct copper bonded  $\text{Al}_2\text{O}_3$ -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

### Applications

- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

### Advantages

- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits



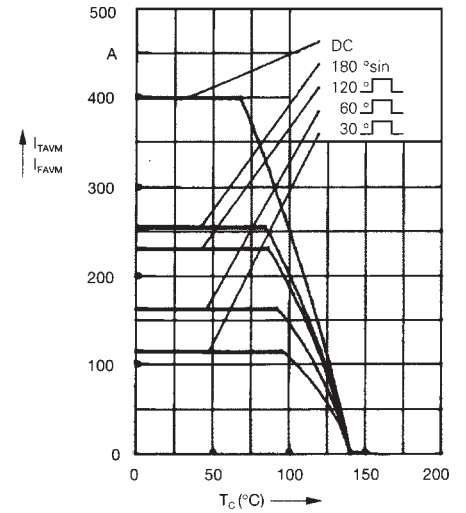
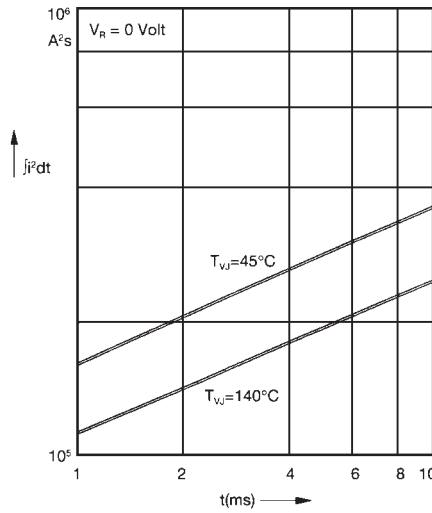
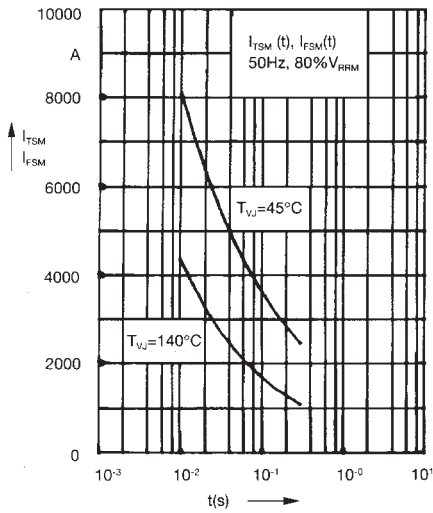


Fig. 3 Surge overload current  
 $I_{TSM}, I_{FSM}$ : Crest value,  $t$ : duration

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

Fig. 4a Maximum forward current at case temperature

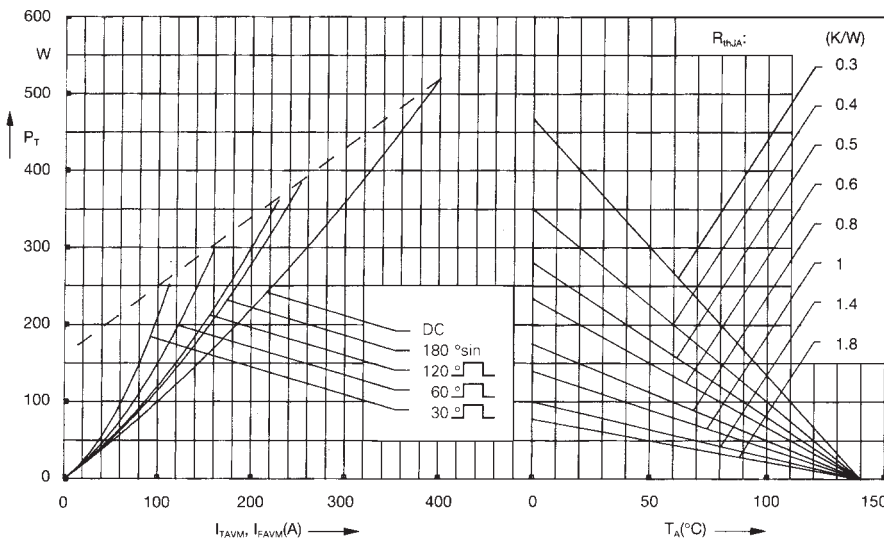


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

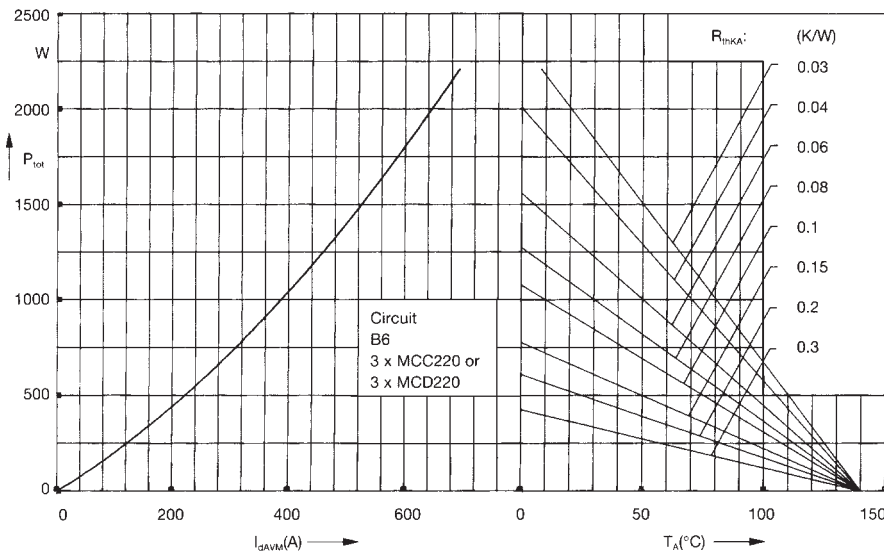


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

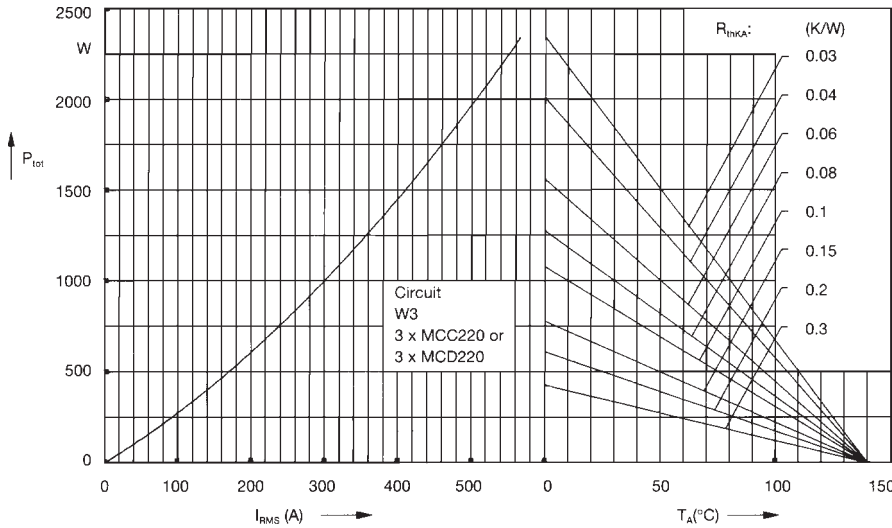


Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

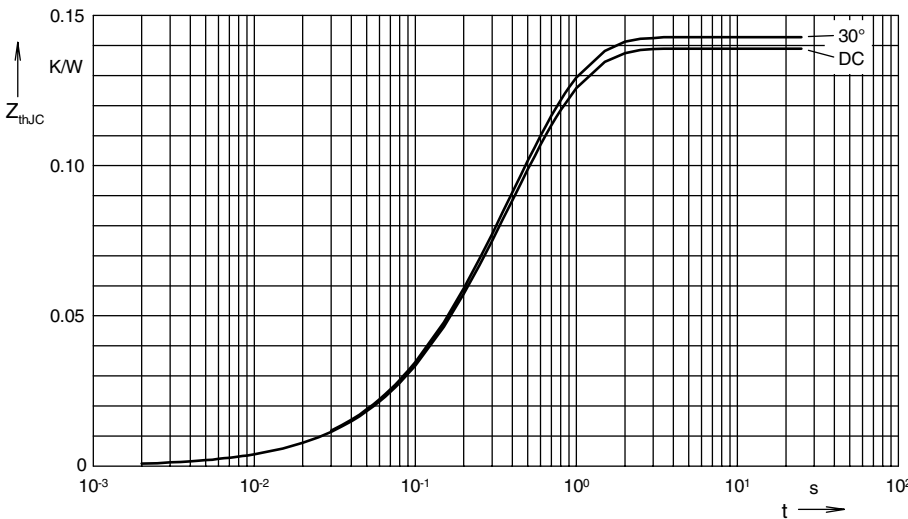


Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

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

| $d$   | $R_{thjC}$ (K/W) |
|-------|------------------|
| DC    | 0.139            |
| 180°C | 0.141            |
| 120°C | 0.142            |
| 60°C  | 0.142            |
| 30°C  | 0.143            |

Constants for  $Z_{thjC}$  calculation:

| $i$ | $R_{thi}$ (K/W) | $t_i$ (s) |
|-----|-----------------|-----------|
| 1   | 0.0037          | 0.0099    |
| 2   | 0.0177          | 0.168     |
| 3   | 0.1175          | 0.456     |

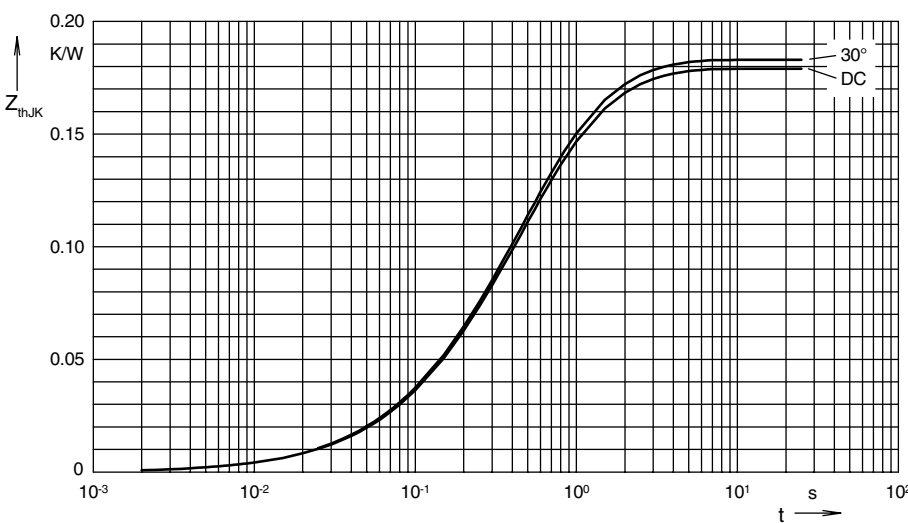


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

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

| $d$   | $R_{thjK}$ (K/W) |
|-------|------------------|
| DC    | 0.179            |
| 180°C | 0.181            |
| 120°C | 0.182            |
| 60°C  | 0.183            |
| 30°C  | 0.183            |

Constants for  $Z_{thjK}$  calculation:

| $i$ | $R_{thi}$ (K/W) | $t_i$ (s) |
|-----|-----------------|-----------|
| 1   | 0.0037          | 0.0099    |
| 2   | 0.0177          | 0.168     |
| 3   | 0.1175          | 0.456     |
| 4   | 0.04            | 1.36      |