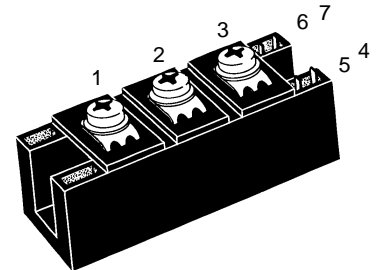


Thyristor Modules

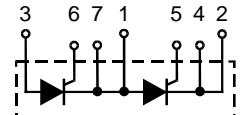
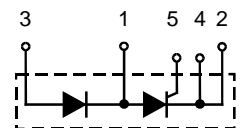
Thyristor/Diode Modules

$I_{TRMS} = 2x 300 A$
 $I_{TAVM} = 2x 190 A$
 $V_{RRM} = 800-1800 V$

| V_{RSM} | V_{RRM} | Type | |
|-----------|-----------|---------------|---------------|
| V_{DSM} | V_{DRM} | | |
| V | V | Version 1 | Version 1 |
| 900 | 800 | MCC 162-08io1 | MCD 162-08io1 |
| 1300 | 1200 | MCC 162-12io1 | MCD 162-12io1 |
| 1500 | 1400 | MCC 162-14io1 | MCD 162-14io1 |
| 1700 | 1600 | MCC 162-16io1 | MCD 162-16io1 |
| 1900 | 1800 | MCC 162-18io1 | MCD 162-18io1 |



| Symbol | Test Conditions | Maximum Ratings | | |
|----------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------|--------------------------------------|
| I_{TRMS}, I_{FRMS} I_{TAVM}, I_{FAVM} | $T_{VJ} = T_{VJM}$ | 300 | A | |
| | $T_C = 80^\circ C; 180^\circ$ sine | 190 | A | |
| | $T_C = 85^\circ C; 180^\circ$ sine | 181 | A | |
| I_{TSM}, I_{FSM} | $T_{VJ} = 45^\circ C;$ $V_R = 0$ | t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 6000 6400 | A A |
| | $T_{VJ} = T_{VJM}$ $V_R = 0$ | t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 5250 5600 | 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 | 180 000 170 000 | 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 | 137 000 128 000 | A ² s A ² s |
| $(di/dt)_{cr}$ | $T_{VJ} = T_{VJM}$ f = 50 Hz, $t_p = 200 \mu s$ $V_D = 2/3 V_{DRM}$ $I_G = 0.5 A$ | repetitive, $I_T = 500 A$ | 150 | A/ μs |
| | $di_G/dt = 0.5 A/\mu s$ | non repetitive, $I_T = 500 A$ | 500 | 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} | $T_{VJ} = T_{VJM}$ | $t_p = 30 \mu s$ | 120 | W |
| | $I_T = I_{TAVM}$ | $t_p = 500 \mu s$ | 60 | W |
| P_{GAV} | | | 8 | 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 | t = 1 min | 3000 | V~ |
| | $I_{ISOL} \leq 1 mA$ | t = 1 s | 3600 | V~ |
| M_d | Mounting torque (M6) | | 2.25-2.75/20-25 | Nm/lb.in. |
| | Terminal connection torque (M6) | | 4.5-5.5/40-48 | Nm/lb.in. |
| Weight | Typical including screws | | 125 | g |

MCC

MCD

Features

- International standard package
- Direct copper bonded Al₂O₃-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

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} | $T_{VJ} = T_{VJM}; V_R = V_{RRM}; V_D = V_{DRM}$ | 10 mA |
| V_T, V_F | $I_T, I_F = 300 \text{ A}; T_{VJ} = 25^\circ\text{C}$ | 1.25 V |
| V_{T0} | For power-loss calculations only ($T_{VJ} = 125^\circ\text{C}$) | 0.88 V |
| r_T | | 1.15 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 | $T_{VJ} = 25^\circ\text{C}; t_p = 30 \mu\text{s}; V_D = 6 \text{ V}$ $I_G = 0.5 \text{ A}; di/dt = 0.5 \text{ A}/\mu\text{s}$ | 300 mA |
| I_H | $T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$ | 200 mA |
| t_{gd} | $T_{VJ} = 25^\circ\text{C}; V_D = 1/2 V_{DRM}$ $I_G = 0.5 \text{ A}; di/dt = 0.5 \text{ A}/\mu\text{s}$ | 2 μs |
| t_q | $T_{VJ} = T_{VJM}; I_T = 300 \text{ A}, t_p = 200 \mu\text{s}; -di/dt = 10 \text{ A}/\mu\text{s}$ typ. $V_R = 100 \text{ V}; dv/dt = 20 \text{ V}/\mu\text{s}; V_D = 2/3 V_{DRM}$ | 150 μs |
| Q_S | $T_{VJ} = T_{VJM}; I_T, I_F = 300 \text{ A}, -di/dt = 50 \text{ A}/\mu\text{s}$ | 550 μC |
| I_{RM} | | 235 A |
| R_{thJC} | per thyristor/diode; DC current per module | 0.155 K/W |
| R_{thJK} | per thyristor/diode; DC current per module | 0.0775 K/W |
| | other values see Fig. 8/9 | 0.225 K/W |
| | | 0.1125 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 modules

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

Type ZY 180L (L = Left for pin pair 4/5) } UL 758, style 1385,
Type ZY 180R (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

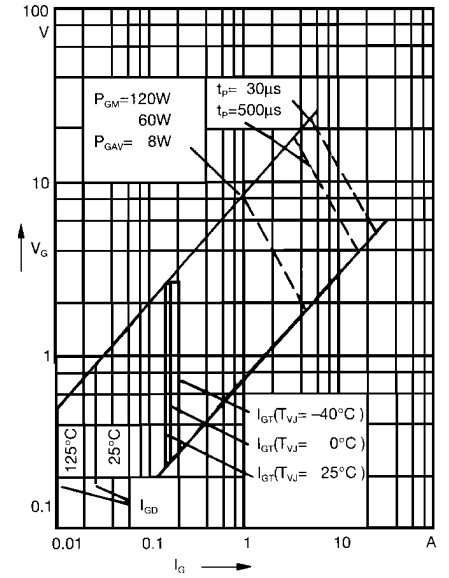


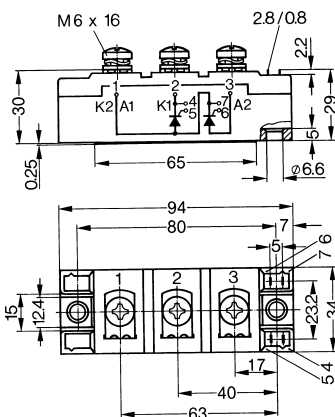
Fig. 1 Gate trigger characteristics



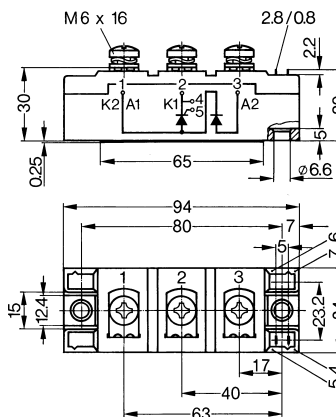
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

MCC Version 1



MCD Version 1



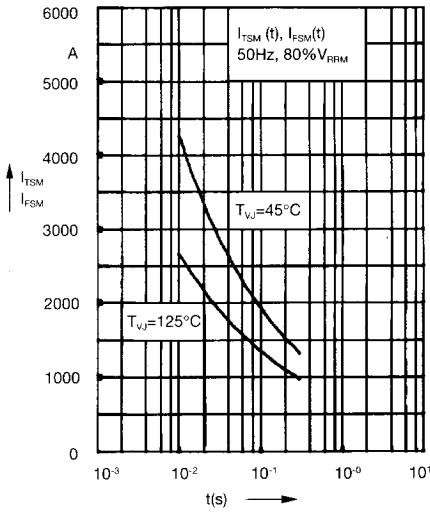


Fig. 3 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t: duration

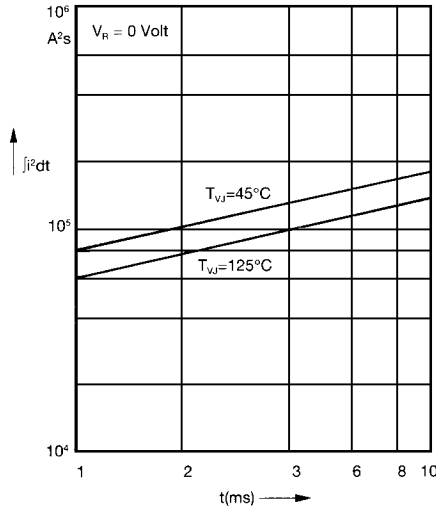


Fig. 4 $\int i^2 dt$ versus time (1-10 ms)

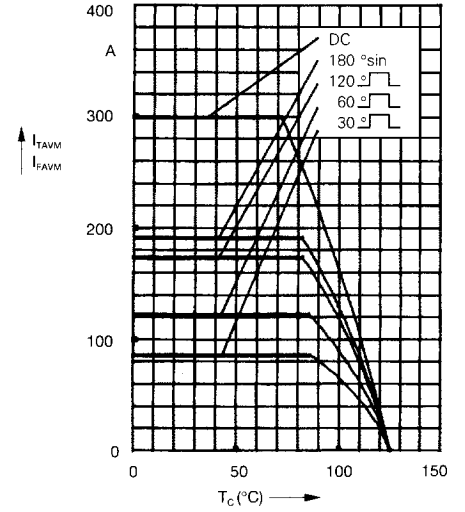


Fig. 4a Maximum forward current at case temperature

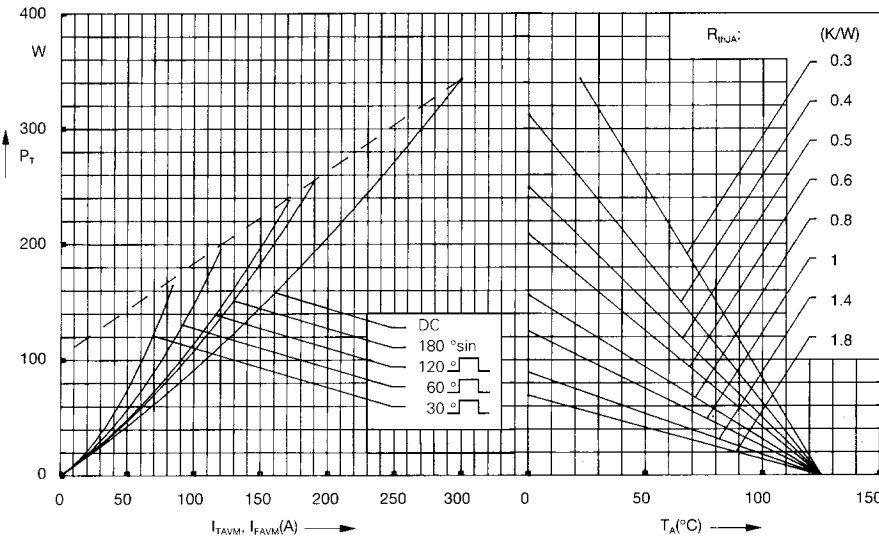


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

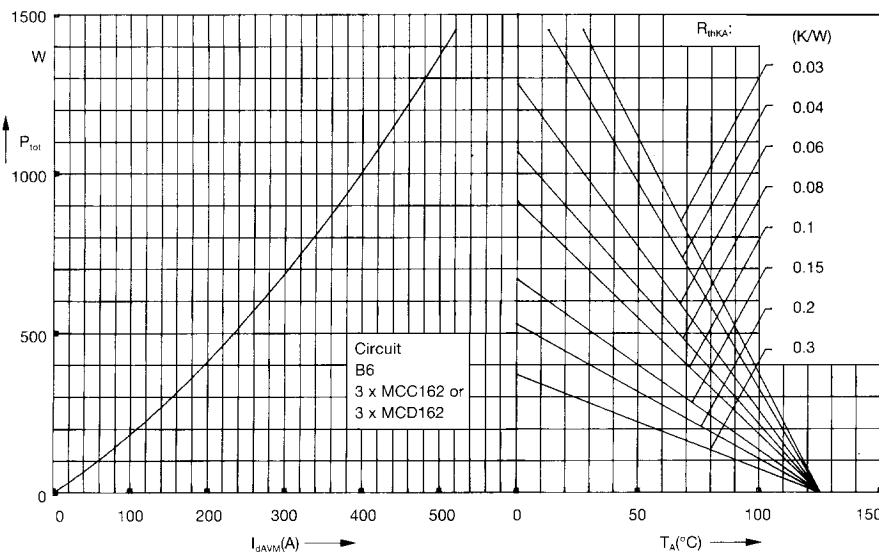


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

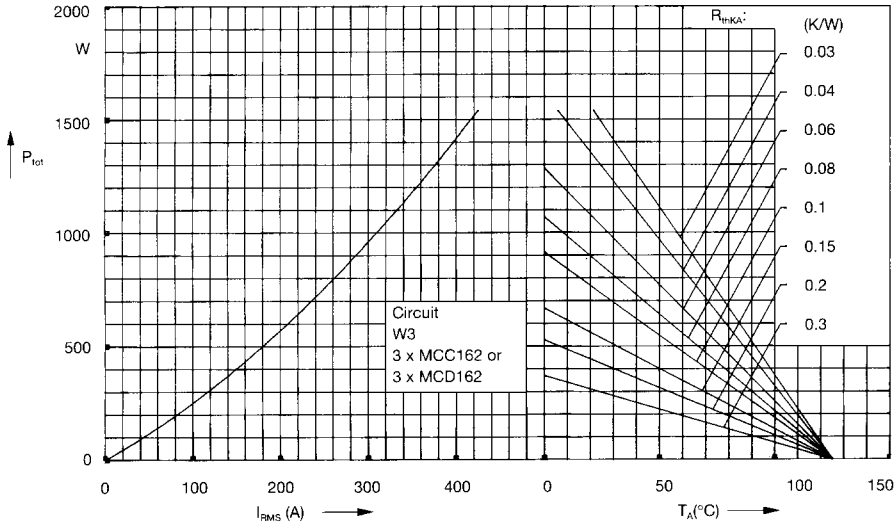


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

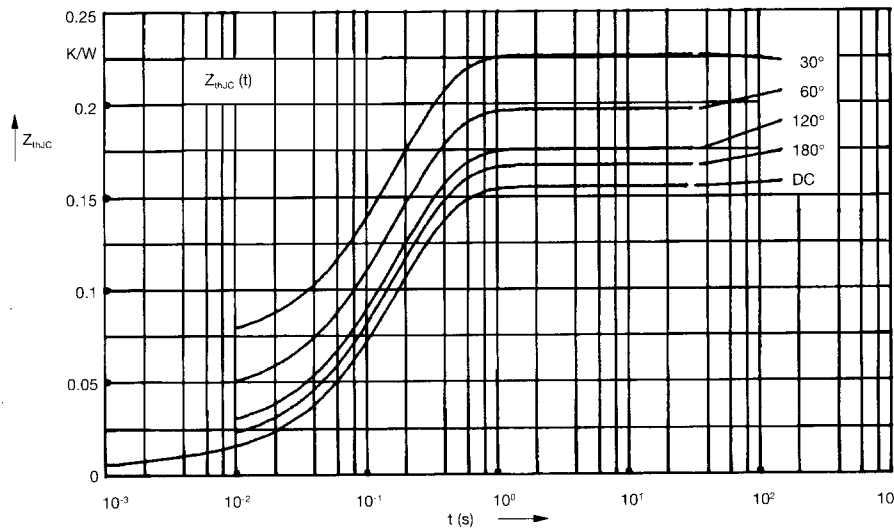


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

R_{thJC} for various conduction angles d :

| d | R_{thJC} (K/W) |
|------|------------------|
| DC | 0.155 |
| 180° | 0.167 |
| 120° | 0.176 |
| 60° | 0.197 |
| 30° | 0.227 |

Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|-----|-----------------|-----------|
| 1 | 0.0072 | 0.001 |
| 2 | 0.0188 | 0.08 |
| 3 | 0.129 | 0.2 |

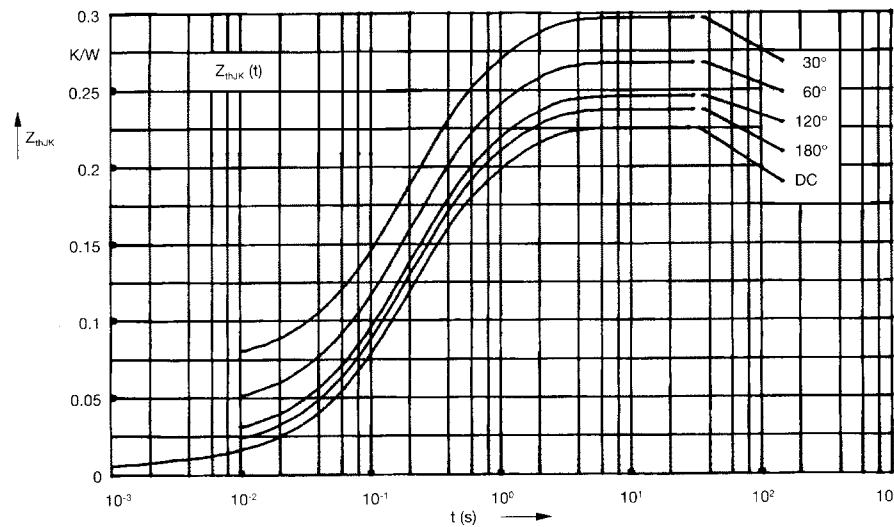


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

R_{thJK} for various conduction angles d :

| d | R_{thJK} (K/W) |
|------|------------------|
| DC | 0.225 |
| 180° | 0.237 |
| 120° | 0.246 |
| 60° | 0.267 |
| 30° | 0.297 |

Constants for Z_{thJK} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|-----|-----------------|-----------|
| 1 | 0.0072 | 0.001 |
| 2 | 0.0188 | 0.08 |
| 3 | 0.129 | 0.2 |
| 4 | 0.07 | 1.0 |