

Thyristor Modules

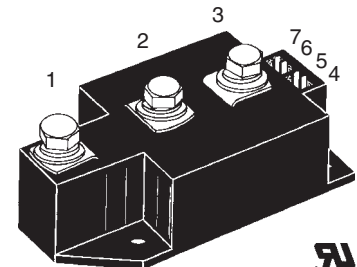
Thyristor/Diode Modules

$$I_{TRMS} = 2 \times 450 \text{ A}$$

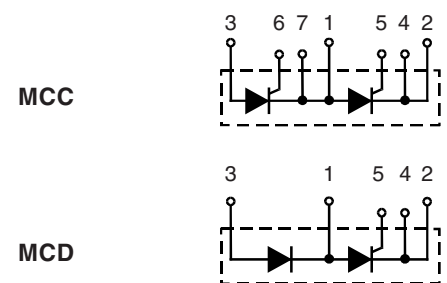
$$I_{TAVM} = 2 \times 287 \text{ A}$$

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

| V_{RSM} V_{DSM} V | V_{RRM} V_{DRM} V | Type | Version 1 | Version 1 |
|-----------------------------|-----------------------------|---------------|---------------|---------------|
| 900 | 800 | MCC 250-08io1 | MCC 250-08io1 | MCD 250-08io1 |
| 1300 | 1200 | MCC 250-12io1 | MCC 250-12io1 | MCD 250-12io1 |
| 1500 | 1400 | MCC 250-14io1 | MCC 250-14io1 | MCD 250-14io1 |
| 1700 | 1600 | MCC 250-16io1 | MCC 250-16io1 | MCD 250-16io1 |
| 1900 | 1800 | MCC 250-18io1 | MCC 250-18io1 | MCD 250-18io1 |



| Symbol | Conditions | Maximum Ratings | |
|--|--|---|--|
| I_{TRMS}, I_{FRMS} I_{TAVM}, I_{FAVM} | $T_{VJ} = T_{VJM}$ $T_C = 85^\circ\text{C}; 180^\circ \text{ sine}$ | 450 | A |
| | | 287 | A |
| I_{TSM}, I_{FSM} | $T_{VJ} = 45^\circ\text{C}$ $V_R = 0$ | t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 9000 A 9600 A |
| | $T_{VJ} = T_{VJM}$ $V_R = 0$ | t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 7800 A 8500 A |
| $\int i^2 dt$ | $T_{VJ} = 45^\circ\text{C}$ $V_R = 0$ | t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 405 000 A ² s 380 000 A ² s |
| | $T_{VJ} = T_{VJM}$ $V_R = 0$ | t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine | 304 000 A ² s 300 000 A ² s |
| $(di/dt)_{cr}$ | $T_{VJ} = T_{VJM};$ f = 50 Hz; $t_p = 200 \mu\text{s}$ $V_D = \frac{2}{3} V_{DRM}$ | repetitive, $I_T = 860 \text{ A}$ | 100 A/ μs |
| | $I_G = 1 \text{ A};$ $di_G/dt = 1 \text{ A}/\mu\text{s}$ | non repetitive, $I_T = 290 \text{ A}$ | 800 A/ μs |
| $(dv/dt)_{cr}$ | $T_{VJ} = T_{VJM};$ $R_{GK} = \infty;$ method 1 (linear voltage rise) | $V_{DR} = \frac{2}{3} V_{DRM}$ | 1000 V/ μs |
| P_{GM} | $T_{VJ} = T_{VJM};$ $I_T = I_{TAVM};$ | $t_p = 30 \mu\text{s}$ $t_p = 500 \mu\text{s}$ | 120 W 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; $I_{ISOL} \leq 1 \text{ mA};$ | t = 1 min t = 1 s | 3000 V~ 3600 V~ |
| M_d | Mounting torque (M5) Terminal connection torque (M8) | | 2.5-5/22-44 Nm/lb.in. 12-15/106-132 Nm/lb.in. |
| Weight | Typical including screws | | 320 g |



Features

- International standard package
- Direct copper bonded Al_2O_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

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

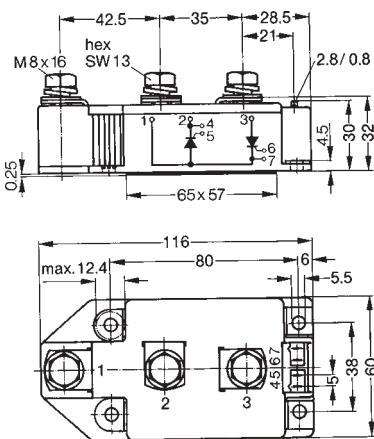
| Symbol | Conditions | Characteristic Values |
|------------|---|-----------------------|
| I_{RRM} | $T_{VJ} = T_{VJM}; V_R = V_{RRM}; V_D = V_{DRM}$ | 70 mA |
| I_{DRM} | | 40 mA |
| V_T, V_F | $I_T/I_F = 600 A; T_{VJ} = 25^\circ C$ | 1.36 V |
| V_{T0} | For power-loss calculations only ($T_{VJ} = 140^\circ C$) | 0.85 V |
| r_T | | 0.82 mΩ |
| V_{GT} | $V_D = 6 V; T_{VJ} = 25^\circ C$ | 2 V |
| | $T_{VJ} = -40^\circ C$ | 3 V |
| I_{GT} | $V_D = 6 V; T_{VJ} = 25^\circ C$ | 150 mA |
| | $T_{VJ} = -40^\circ C$ | 200 mA |
| V_{GD} | $T_{VJ} = T_{VJM}; V_D = \frac{2}{3} V_{DRM}$ | 0.25 V |
| I_{GD} | | 10 mA |
| I_L | $T_{VJ} = 25^\circ C; t_p = 30 \mu s; V_D = 6 V$ $I_G = 0.45 A; di_G/dt = 0.45 A/\mu s$ | 200 mA |
| I_H | $T_{VJ} = 25^\circ C; V_D = 6 V; R_{GK} = \infty$ | 150 mA |
| t_{gd} | $T_{VJ} = 25^\circ C; V_D = \frac{1}{2} V_{DRM}$ $I_G = 1 A; di_G/dt = 1 A/\mu s$ | 2 μs |
| t_q | $T_{VJ} = T_{VJM}; I_T = 300 A, t_p = 200 \mu s; -di/dt = 10 A/\mu s$ $V_R = 100 V; dv/dt = 50 V/\mu s; V_D = \frac{2}{3} V_{DRM}$ | typ. 200 μs |
| Q_S | $T_{VJ} = 125^\circ C; I_T/I_F = 400 A, -di/dt = 50 A/\mu s$ | 760 μC |
| I_{RM} | | 275 A |
| R_{thJC} | per thyristor/diode; DC current per module | 0.129 KW |
| R_{thJK} | per thyristor/diode; DC current per module | 0.0645 KW |
| | other values see Fig. 8/9 | 0.169 KW |
| | | 0.0845 KW |
| 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

Dimensions in mm (1 mm = 0.0394")

MCC



MCD

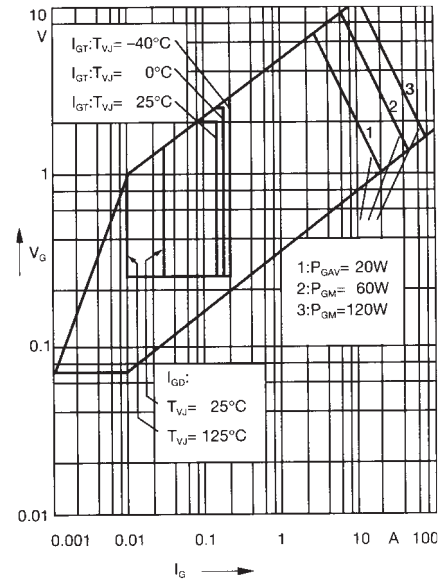
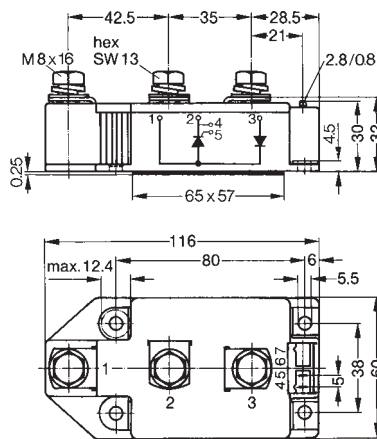


Fig. 1 Gate trigger characteristics

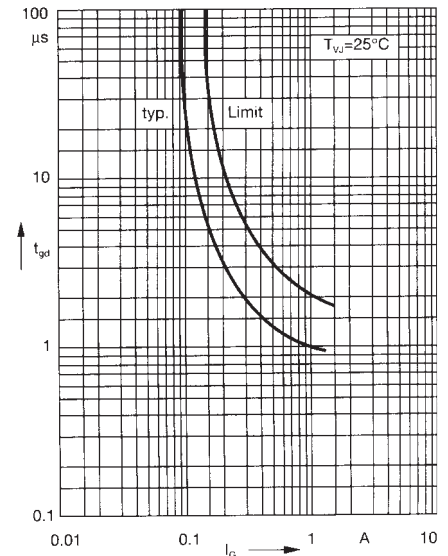
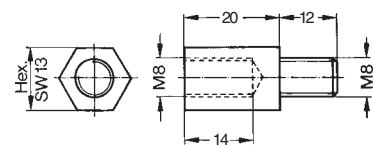


Fig. 2 Gate trigger delay time

Threaded spacer for higher Anode/Cathode construction:
 Type **ZY 250**, material brass



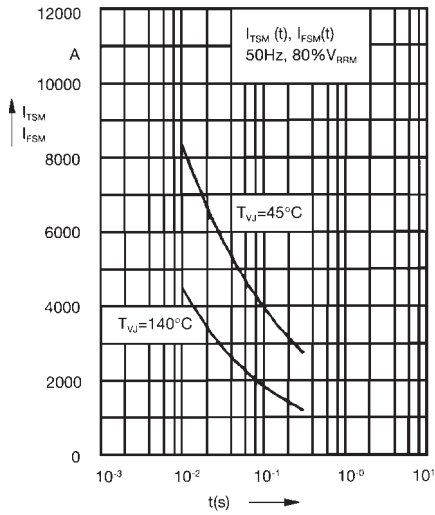


Fig. 3 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t: duration

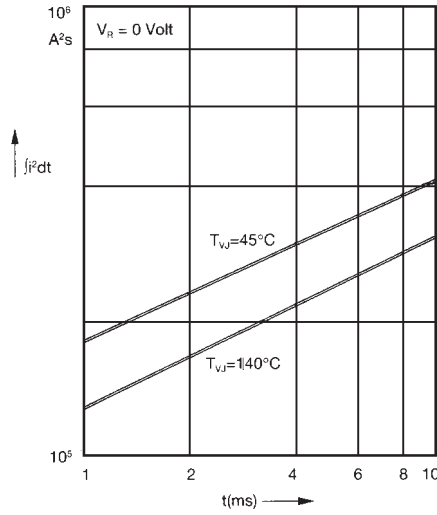


Fig. 4 $\int i^2 dt$ versus time (1-10 ms)

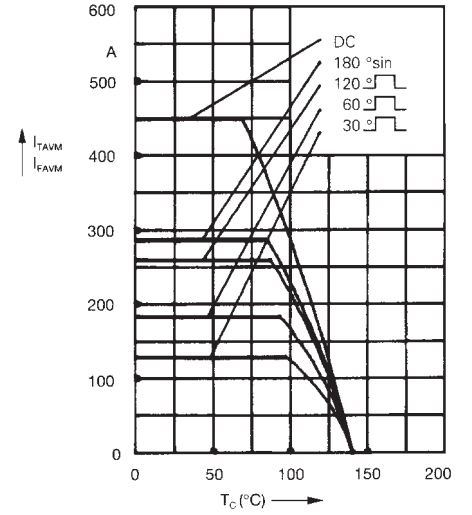


Fig. 4a Maximum forward current at case temperature

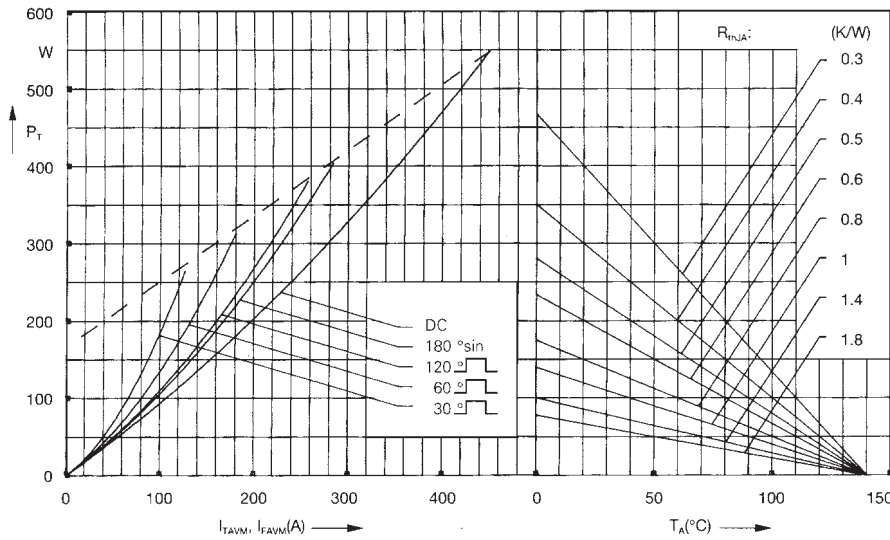


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

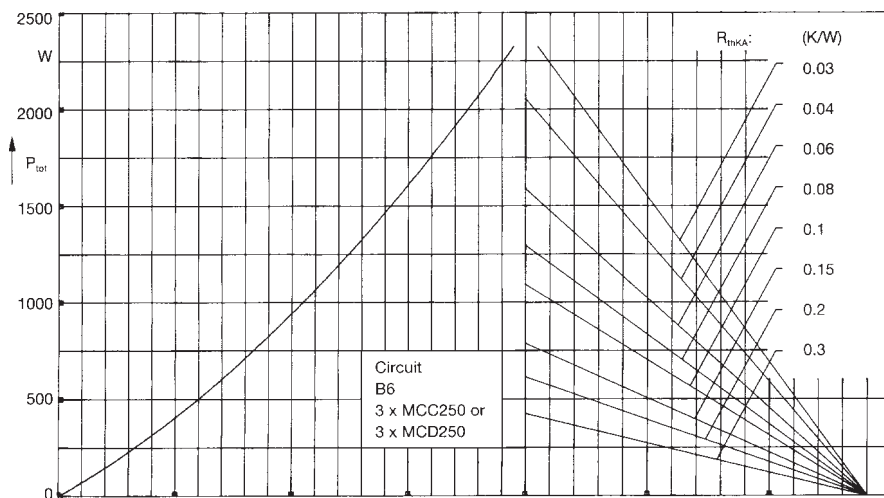


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

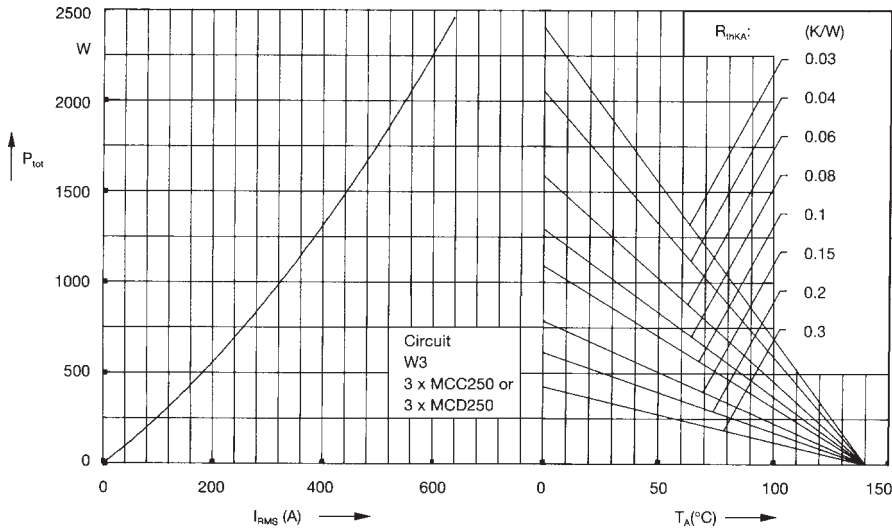


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

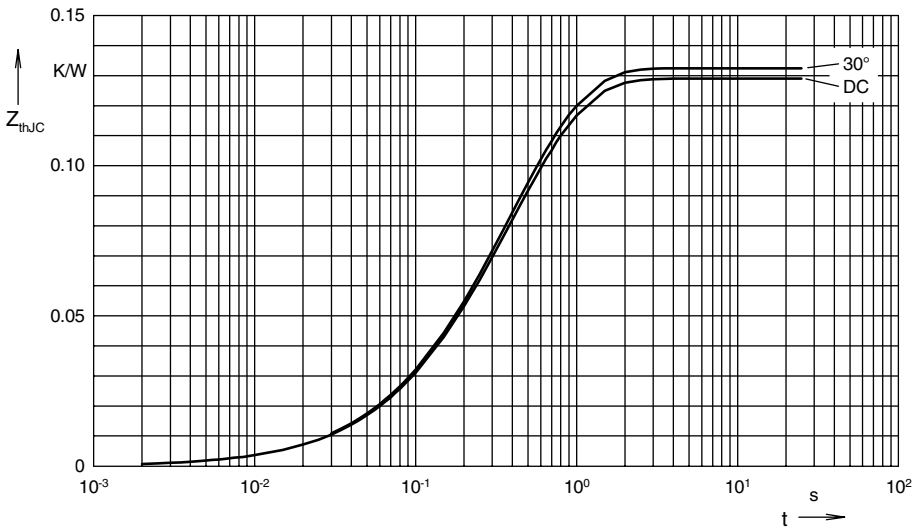


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

R_{thJC} for various conduction angles d :

| d | R_{thJC} (K/W) |
|-------|------------------|
| DC | 0.129 |
| 180°C | 0.131 |
| 120°C | 0.131 |
| 60°C | 0.132 |
| 30°C | 0.132 |

Constants for Z_{thJC} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|-----|-----------------|-----------|
| 1 | 0.0035 | 0.099 |
| 2 | 0.0165 | 0.168 |
| 3 | 0.1091 | 0.456 |

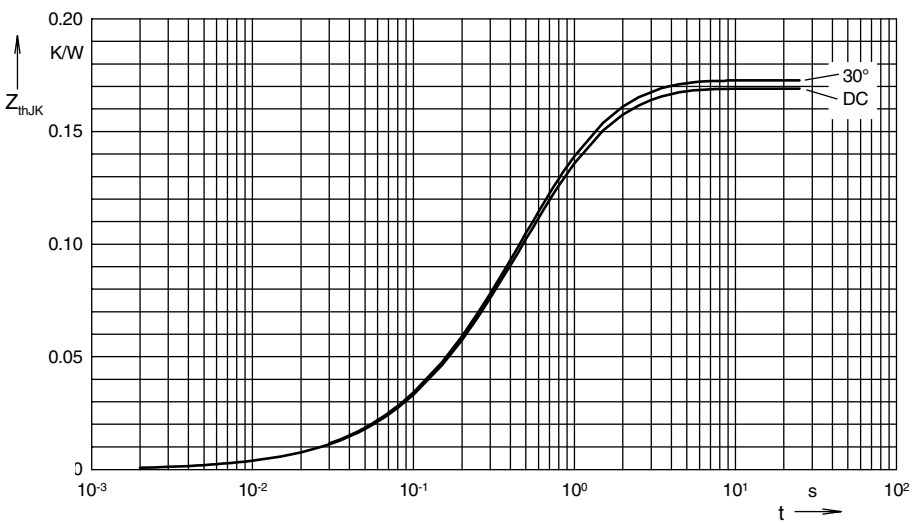


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

R_{thJK} for various conduction angles d :

| d | R_{thJK} (K/W) |
|-------|------------------|
| DC | 0.169 |
| 180°C | 0.171 |
| 120°C | 0.172 |
| 60°C | 0.172 |
| 30°C | 0.173 |

Constants for Z_{thJK} calculation:

| i | R_{thi} (K/W) | t_i (s) |
|-----|-----------------|-----------|
| 1 | 0.0033 | 0.099 |
| 2 | 0.0159 | 0.168 |
| 3 | 0.1053 | 0.456 |
| 4 | 0.04 | 1.36 |