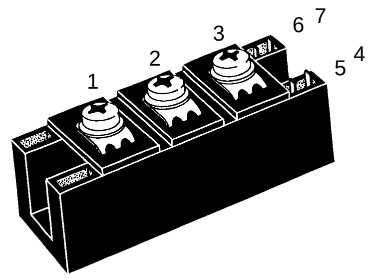
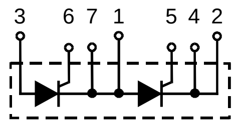
# Thyristor Modules
# Thyristor/Diode Modules

$I_{TRMS}$ = 2x 300 A
$I_{TAVM}$ = 2x 130 A
$V_{RRM}$ = 800-1800 V

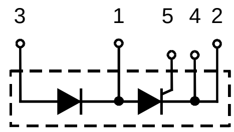
| $V_{RSM}$ $V_{DSM}$ | $V_{RRM}$ $V_{DRM}$ | Type | |
|---|---|---|---|
| V | V | Version 1 | Version 1 |
| 900 | 800 | MCC 132-08io1 | MCD 132-08io1 |
| 1300 | 1200 | MCC 132-12io1 | MCD 132-12io1 |
| 1500 | 1400 | MCC 132-14io1 | MCD 132-14io1 |
| 1700 | 1600 | MCC 132-16io1 | MCD 132-16io1 |
| 1900 | 1800 | MCC 132-18io1 | MCD 132-18io1 |




MCC




MCD




| Symbol | Test Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $I_{TRMS}$, $I_{FRMS}$ | $T_{VJ} = T_{VJM}$ | | 300 | A |
| $I_{TAVM}$, $I_{FAVM}$ | $T_C$ = 85°C; 180° sine | | 130 | A |
| $I_{TSM}$, $I_{FSM}$ | $T_{VJ}$ = 45°C; | t = 10 ms (50 Hz), sine | 4750 | A |
| | $V_R$ = 0 | t = 8.3 ms (60 Hz), sine | 5080 | A |
| | $T_{VJ} = T_{VJM}$ | t = 10 ms (50 Hz), sine | 4230 | A |
| | $V_R$ = 0 | t = 8.3 ms (60 Hz), sine | 4530 | A |
| ∫i²dt | $T_{VJ}$ = 45°C | t = 10 ms (50 Hz), sine | 113 000 | A²s |
| | $V_R$ = 0 | t = 8.3 ms (60 Hz), sine | 108 000 | A²s |
| | $T_{VJ} = T_{VJM}$ | t = 10 ms (50 Hz), sine | 89 500 | A²s |
| | $V_R$ = 0 | t = 8.3 ms (60 Hz), sine | 86 200 | A²s |
| $(di/dt)_{cr}$ | $T_{VJ} = T_{VJM}$<br>f =50 Hz, $t_P$ =200 µs<br>$V_D$ = 2/3 $V_{DRM}$ | repetitive, $I_T$ = 500 A | 150 | A/µs |
| | $I_G$ = 0.5 A<br>$di_G/dt$ = 0.5 A/µs | non repetitive, $I_T$ = 500 A | 500 | A/µs |
| $(dv/dt)_{cr}$ | $T_{VJ} = T_{VJM}$;<br>$R_{GK}$ = ∞; method 1 (linear voltage rise) | $V_{DR}$ = 2/3 $V_{DRM}$ | 1000 | V/µs |
| $P_{GM}$ | $T_{VJ} = T_{VJM}$ | $t_P$ = 30 µs | 120 | W |
| | $I_T = I_{TAVM}$ | $t_P$ = 500 µs | 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~ |
| | $I_{ISOL}$ ≤ 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 |

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 $Al_2O_3$ -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

032

| 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 A; $T_{VJ}$ = 25°C | | 1.36 | V |
| $V_{T0}$ | For power-loss calculations only ($T_{VJ}$ = 125°C) | | 0.8 | V |
| $r_T$ | | | 1.5 | mΩ |
| $V_{GT}$ | $V_D$ = 6 V; | $T_{VJ}$ = 25°C | 2.5 | V |
| | | $T_{VJ}$ = -40°C | 2.6 | V |
| $I_{GT}$ | $V_D$ = 6 V; | $T_{VJ}$ = 25°C | 150 | mA |
| | | $T_{VJ}$ = -40°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°C; $t_P$ = 30 µs; $V_D$ = 6 V<br>$I_G$ = 0.5 A; $di_G/dt$ = 0.5 A/µs | | 300 | mA |
| $I_H$ | $T_{VJ}$ = 25°C; $V_D$ = 6 V; $R_{GK} = \infty$ | | 200 | mA |
| $t_{gd}$ | $T_{VJ}$ = 25°C; $V_D$ = 1/2 $V_{DRM}$<br>$I_G$ = 0.5 A; $di_G/dt$ = 0.5 A/µs | | 2 | µs |
| $t_q$ | $T_{VJ} = T_{VJM}$; $I_T$ = 160 A, $t_P$ = 200 µs; -di/dt = 10 A/µs typ.<br>$V_R$ = 100 V; dv/dt = 20 V/µs; $V_D$ = 2/3 $V_{DRM}$ | | 150 | µs |
| $Q_S$ | $T_{VJ} = T_{VJM}$; $I_T$, $I_F$ = 300 A, -di/dt = 50 A/µs | | 550 | µC |
| $I_{RM}$ | | | 235 | A |
| $R_{thJC}$ | per thyristor/diode; DC current | other values see Fig. 8/9 | 0.23 | K/W |
| | per module | | 0.115 | K/W |
| $R_{thJK}$ | per thyristor/diode; DC current | | 0.33 | K/W |
| | per module | | 0.165 | 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

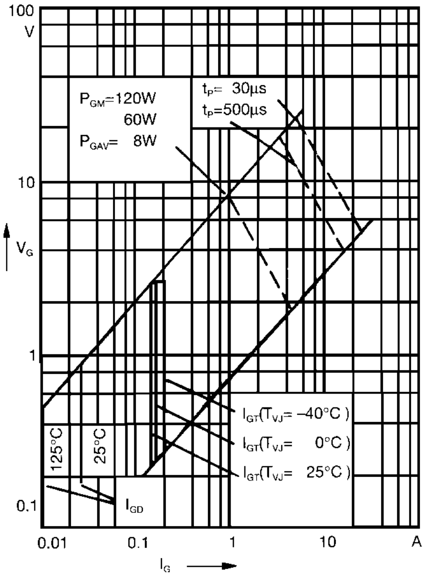



Fig. 1 Gate trigger characteristics

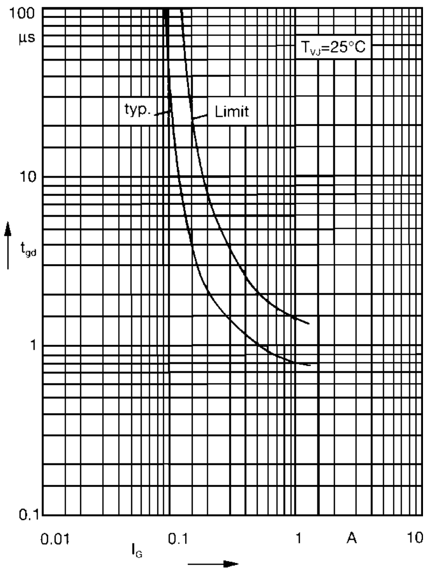
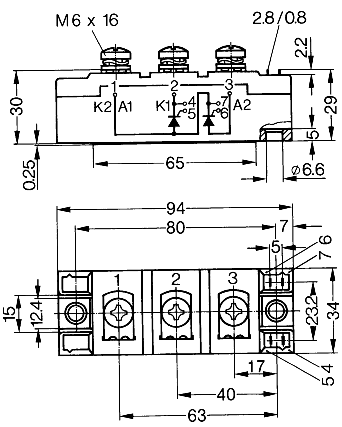


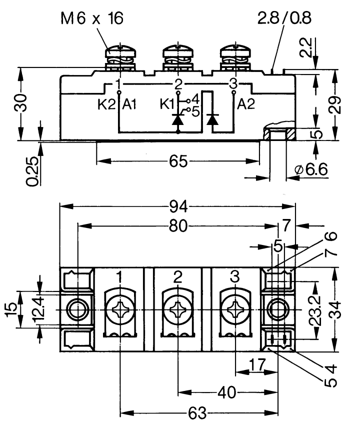

Fig. 2 Gate trigger delay time

**Dimensions in mm (1 mm = 0.0394")**

**MCC**




**MCD**



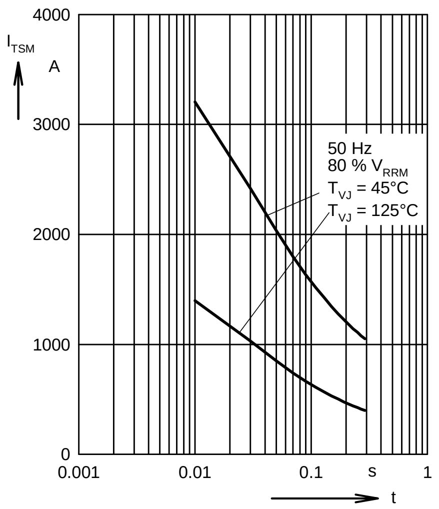



Fig. 3 Surge overload current
$I_{TSM}$, $I_{FSM}$: Crest value, t: duration

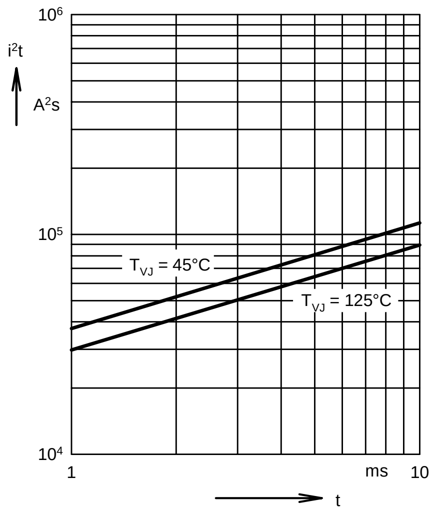



Fig. 4 $i^2t$ versus time (1-10 ms)

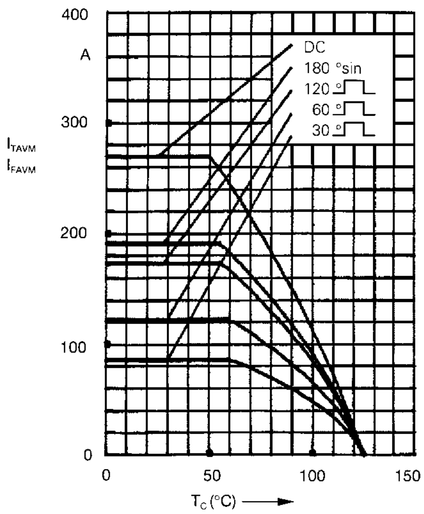



Fig. 4a Maximum forward current at case temperature

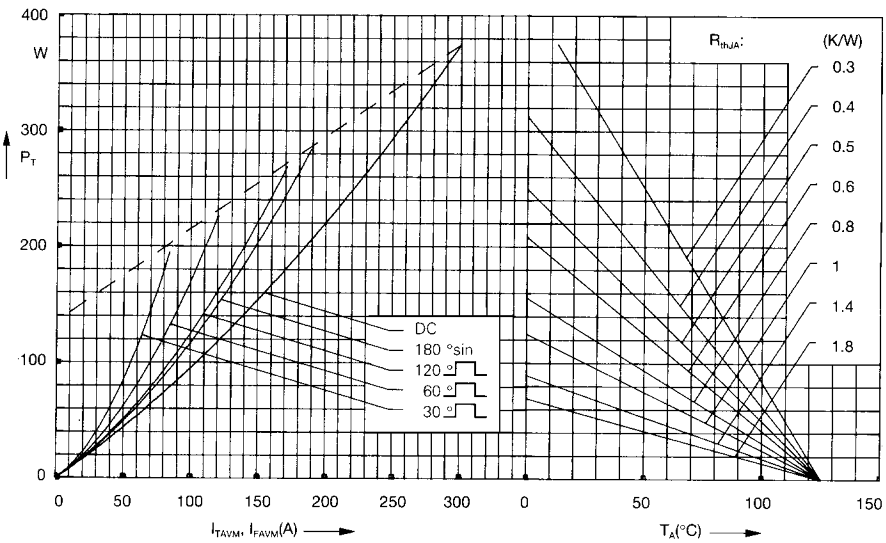



Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

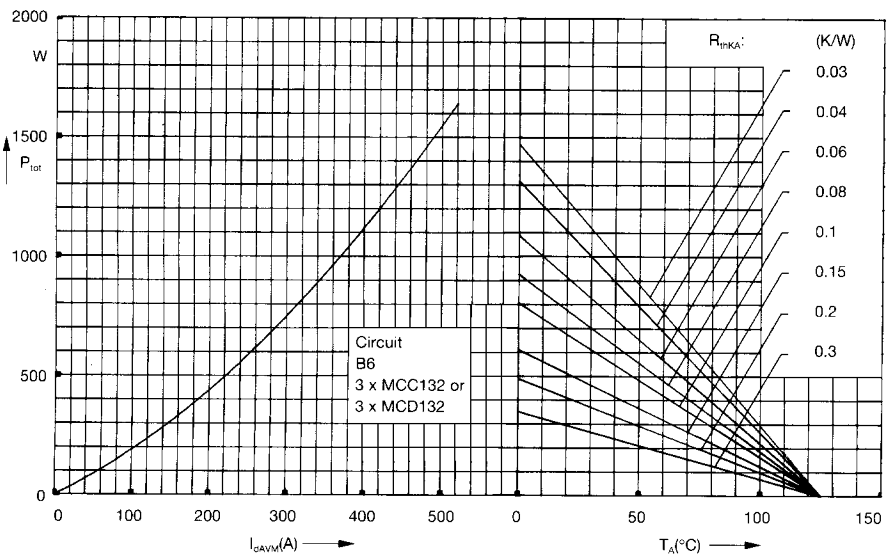



Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

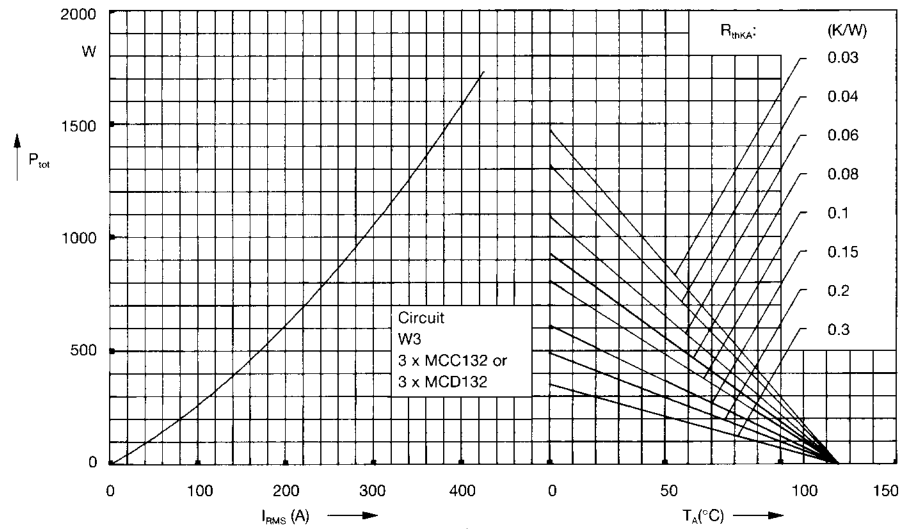



Fig. 7 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

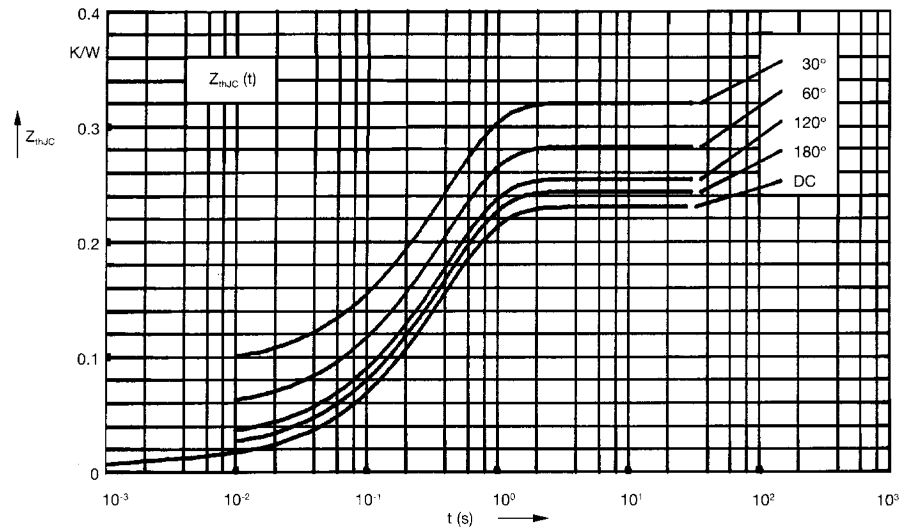



Fig. 8 Transient thermal impedance junction to case (per thyristor or diode)

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

| d | $R_{thJC}$ (K/W) |
|---|---|
| DC | 0.230 |
| 180° | 0.244 |
| 120° | 0.255 |
| 60° | 0.283 |
| 30° | 0.321 |

Constants for $Z_{thJC}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.0095 | 0.001 |
| 2 | 0.0175 | 0.065 |
| 3 | 0.203 | 0.4 |

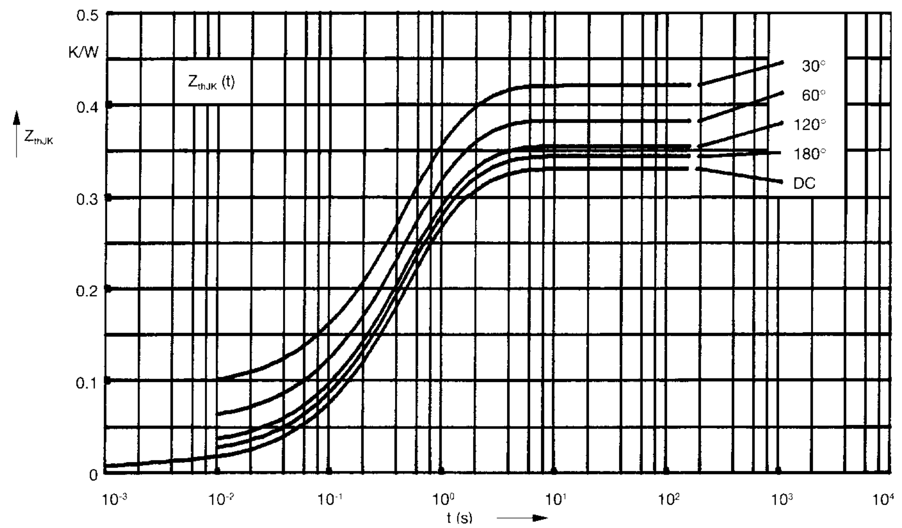



Fig. 9 Transient thermal impedance junction to heatsink (per thyristor or diode)

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

| d | $R_{thJK}$ (K/W) |
|---|---|
| DC | 0.330 |
| 180° | 0.344 |
| 120° | 0.355 |
| 60° | 0.383 |
| 30° | 0.421 |

Constants for $Z_{thJK}$ calculation:

| i | $R_{thi}$ (K/W) | $t_i$ (s) |
|---|---|---|
| 1 | 0.0095 | 0.001 |
| 2 | 0.0175 | 0.065 |
| 3 | 0.203 | 0.4 |
| 4 | 0.1 | 1.29 |