

# Thyristor Modules

## Thyristor/Diode Modules

$$I_{TRMS} = 2 \times 180 \text{ A}$$

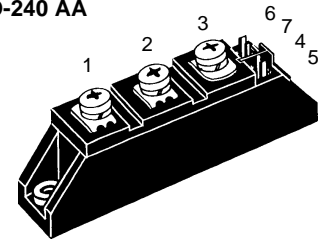
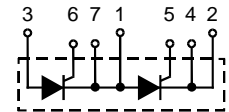
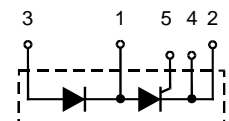
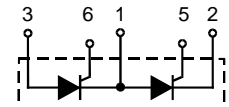
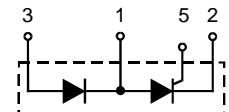
$$I_{TAVM} = 2 \times 116 \text{ A}$$

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

$V_{RSM}$ $V_{DSM}$ 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				

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

**TO-240 AA**

**MCC**  
**Version 1**

**MCD**  
**Version 1**

**MCC**  
**Version 8**

**MCD**  
**Version 8**

**Features**

- International standard package, JEDEC TO-240 AA
- Direct copper bonded  $\text{Al}_2\text{O}_3$  -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

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
$V_{TO}$	For power-loss calculations only ( $T_{VJ} = 125^\circ\text{C}$ )	0.8 V
$r_T$		2.4 m $\Omega$
$V_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	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 $\mu\text{s}$
$t_q$	$T_{VJ} = T_{VJM}; I_T = 150 \text{ A}; t_p = 200 \mu\text{s}; -di/dt = 10 \text{ A}/\mu\text{s}$ typ. $V_R = 100 \text{ V}; dv/dt = 20 \text{ V}/\mu\text{s}; V_D = 2/3 V_{DRM}$	185 $\mu\text{s}$
$Q_S$	$T_{VJ} = T_{VJM}; I_T, I_F = 50 \text{ A}; -di/dt = 6 \text{ A}/\mu\text{s}$	170 $\mu\text{C}$
$I_{RM}$		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 <sup>2</sup>

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

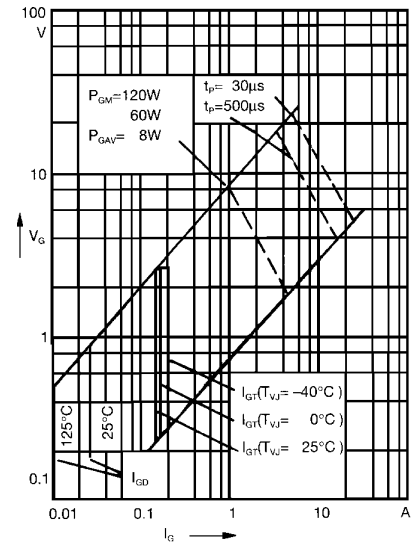


Fig. 1 Gate trigger characteristics

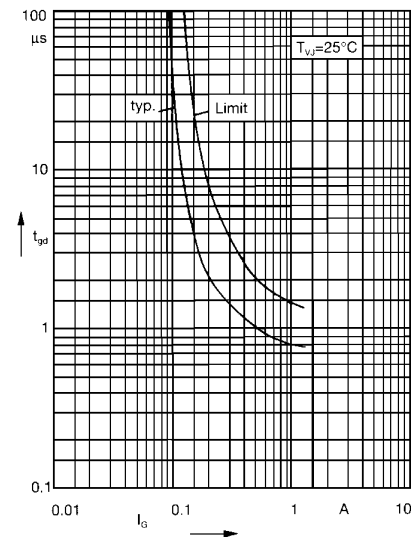
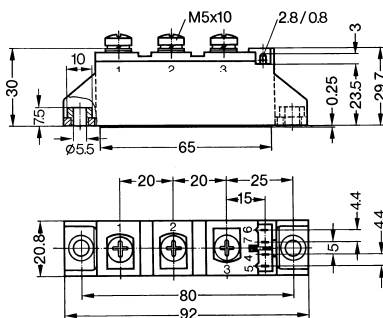


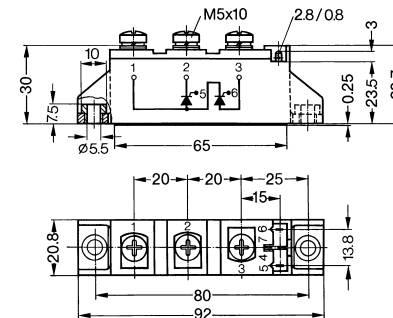
Fig. 2 Gate trigger delay time

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

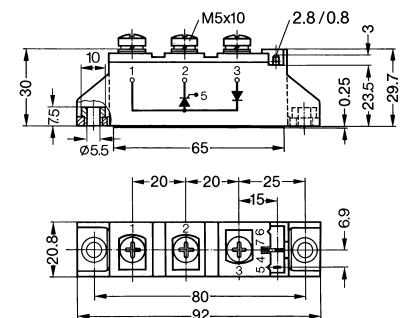
#### MCC / MCD Version 1 B



#### MCC Version 8 B



#### MCD Version 8 B



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

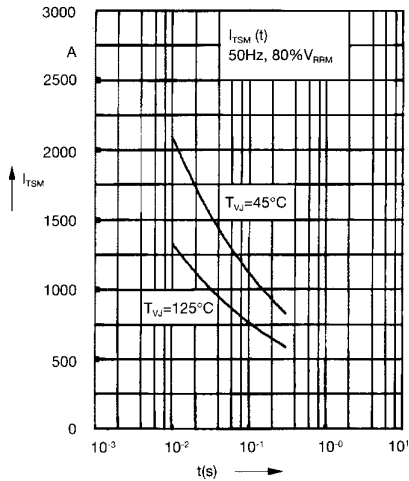


Fig. 3 Surge overload current  
 $I_{TSM}$ ,  $I_{FSM}$ : Crest value, t: duration

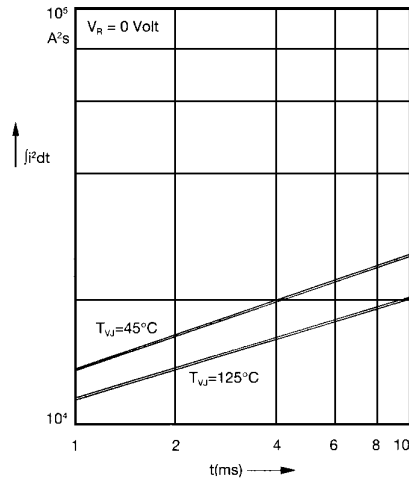


Fig. 4  $j^2dt$  versus time (1-10 ms)

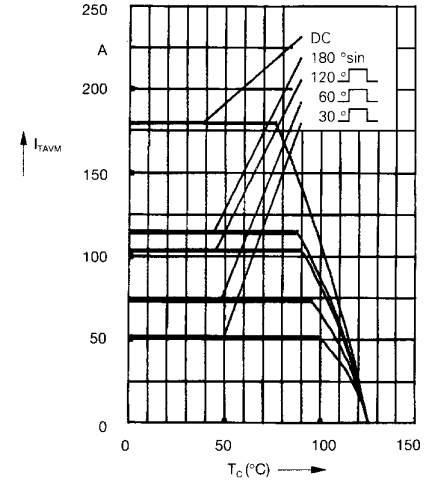


Fig. 4a Maximum forward current at case temperature

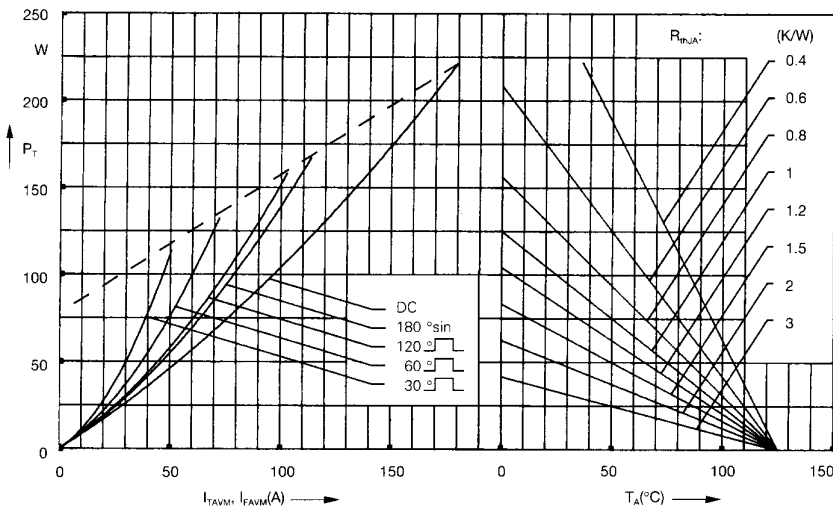


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

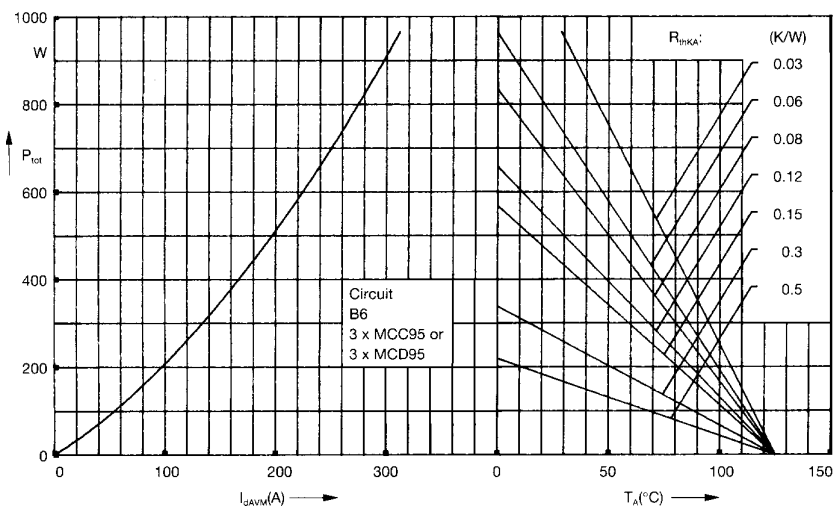


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

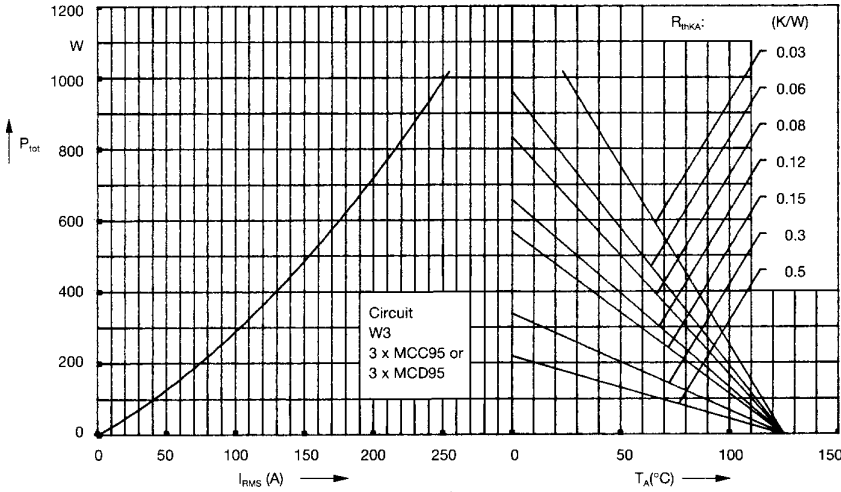


Fig. 7 Three phase AC-controller:  
Power dissipation versus RMS  
output current and ambient  
temperature

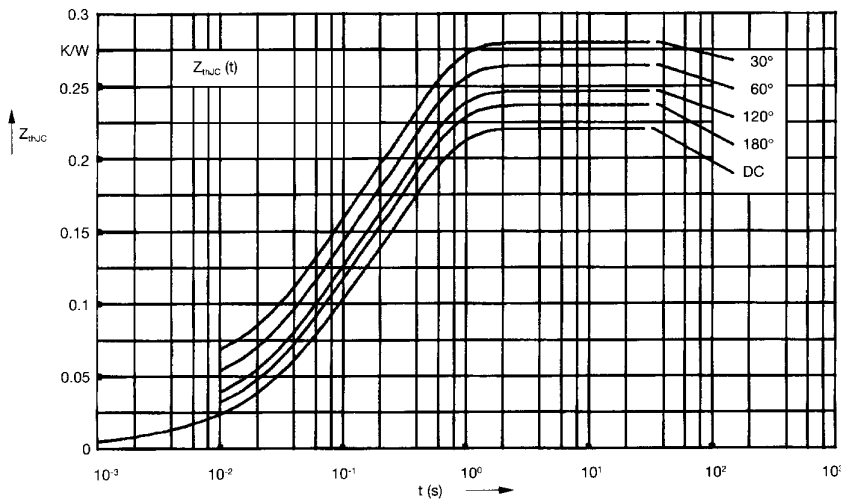


Fig. 8 Transient thermal impedance  
junction to case (per thyristor or  
diode)

$R_{thJC}$  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

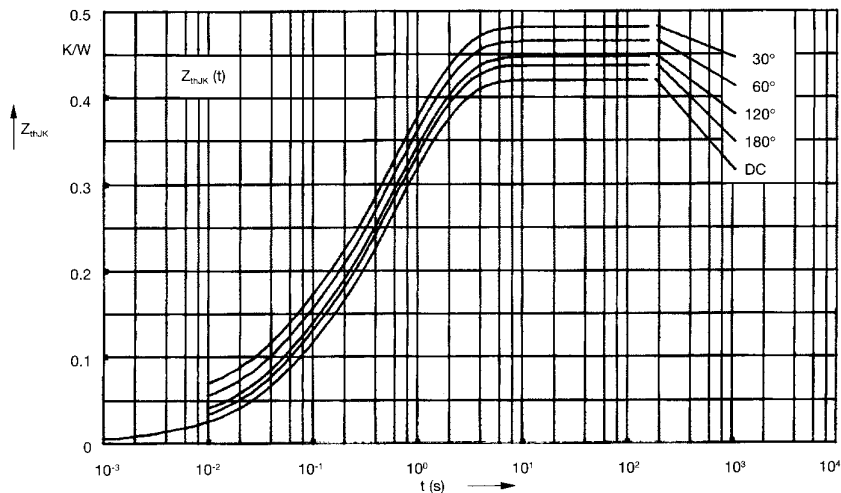


Fig. 9 Transient thermal impedance  
junction to heatsink (per thyristor  
or diode)

$R_{thJK}$  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