

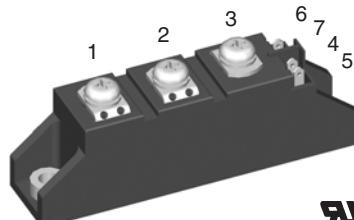
# Thyristor Modules

## Thyristor/Diode Modules

**I<sub>TRMS</sub> = 2x180 A**  
**I<sub>TAVM</sub> = 2x116 A**  
**V<sub>RRM</sub> = 800-1800 V**

V <sub>RSM</sub> V <sub>DSM</sub>	V <sub>RRM</sub> V <sub>DRM</sub>	Type	Version	1 B	8 B	Version	1 B	8 B
900	800	MCC 95-08	io1 B / io8 B			MCD 95-08	io1 B / io8 B	
1300	1200	MCC 95-12	io1 B / io8 B			MCD 95-12	io1 B / io8 B	
1500	1400	MCC 95-14	io1 B / io8 B			MCD 95-14	io1 B / io8 B	
1700	1600	MCC 95-16	io1 B / io8 B			MCD 95-16	io1 B / io8 B	
1900	1800	MCC 95-18	io1 B / io8 B			MCD 95-18	io1 B / io8 B	

TO-240 AA

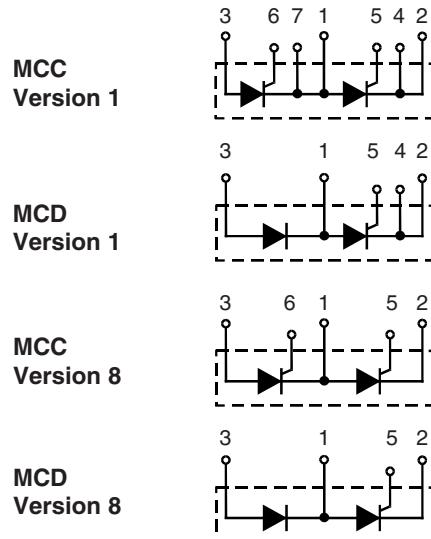


Symbol	Conditions	Maximum Ratings		
I <sub>TRMS</sub> , I <sub>FRMS</sub>	T <sub>VJ</sub> = T <sub>VJM</sub>	180	A	
I <sub>TAVM</sub> , I <sub>FAVM</sub>	T <sub>C</sub> = 85°C; 180° sine	116	A	
I <sub>TSM</sub> , I <sub>FSM</sub>	T <sub>VJ</sub> = 45°C	t = 10 ms (50 Hz), sine	2250	A
	V <sub>R</sub> = 0	t = 8.3 ms (60 Hz), sine	2400	A
	T <sub>VJ</sub> = T <sub>VJM</sub>	t = 10 ms (50 Hz), sine	2000	A
	V <sub>R</sub> = 0	t = 8.3 ms (60 Hz), sine	2150	A
Ji <sup>2</sup> dt	T <sub>VJ</sub> = 45°C	t = 10 ms (50 Hz), sine	25 300	A <sup>2</sup> s
	V <sub>R</sub> = 0	t = 8.3 ms (60 Hz), sine	23 900	A <sup>2</sup> s
	T <sub>VJ</sub> = T <sub>VJM</sub>	t = 10 ms (50 Hz), sine	20 000	A <sup>2</sup> s
	V <sub>R</sub> = 0	t = 8.3 ms (60 Hz), sine	19 100	A <sup>2</sup> s
(di/dt) <sub>cr</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; f = 50 Hz; t <sub>p</sub> = 200 µs V <sub>D</sub> = 2/3 V <sub>DRM</sub> ;	repetitive, I <sub>T</sub> = 250 A	150	A/µs
	I <sub>G</sub> = 0.45 A; di <sub>G</sub> /dt = 0.45 A/µs	non repetitive, I <sub>T</sub> = I <sub>TAVM</sub>	500	A/µs
(dv/dt) <sub>cr</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; R <sub>GR</sub> = ∞; method 1 (linear voltage rise)	V <sub>DR</sub> = 2/3 V <sub>DRM</sub>	1000	V/µs
P <sub>GM</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; I <sub>T</sub> = I <sub>TAVM</sub> ;	t <sub>p</sub> = 30 µs t <sub>p</sub> = 300 µs	10 5	W W
P <sub>GAV</sub>			0.5	W
V <sub>RGM</sub>			10	V
T <sub>VJ</sub>			-40...+125	°C
T <sub>VJM</sub>			125	°C
T <sub>stg</sub>			-40...+125	°C
V <sub>ISOL</sub>	50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA;	t = 1 min t = 1 s	3000 3600	V~ V~
M <sub>d</sub>	Mounting torque (M5) Terminal connection torque (M5)		2.5-4.0/22-35 Nm/lb.in. 2.5-4.0/22-35 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.

© 2007 IXYS All rights reserved



### Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al<sub>2</sub>O<sub>3</sub> -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E72873
- 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	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	$\text{m}\Omega$	
$V_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = -40^\circ\text{C}$	2.5	V	
$I_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = -40^\circ\text{C}$	150	$\text{mA}$	
		200	$\text{mA}$	
$V_{GD}$	$T_{VJ} = T_{VJM}; V_D = \frac{2}{3} V_{DRM}$	0.2	V	
$I_{GD}$		10	$\text{mA}$	
$I_L$	$T_{VJ} = 25^\circ\text{C}; t_p = 10 \mu\text{s}; V_D = 6 \text{ V}$ $I_G = 0.45 \text{ A}; di_g/dt = 0.45 \text{ A}/\mu\text{s}$	450	$\text{mA}$	
$I_H$	$T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$	200	$\text{mA}$	
$t_{gd}$	$T_{VJ} = 25^\circ\text{C}; V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.45 \text{ A}; di_g/dt = 0.45 \text{ A}/\mu\text{s}$	2	$\mu\text{s}$	
$t_q$	$T_{VJ} = T_{VJM}; I_T = 150 \text{ A}, t_p = 200 \mu\text{s}; -di/dt = 10 \text{ A}/\mu\text{s}$ $V_R = 100 \text{ V}; dv/dt = 20 \text{ V}/\mu\text{s}; V_D = \frac{2}{3} V_{DRM}$	typ.	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	other values	0.22	K/W
$R_{thJK}$	per thyristor/diode; DC current per module		0.11	K/W
		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	$\text{m}/\text{s}^2$	

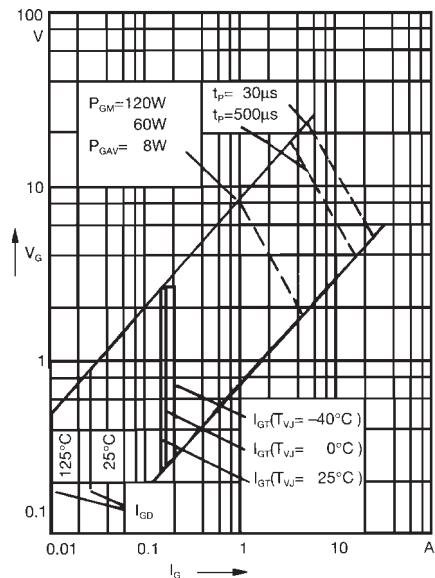


Fig. 1 Gate trigger characteristics

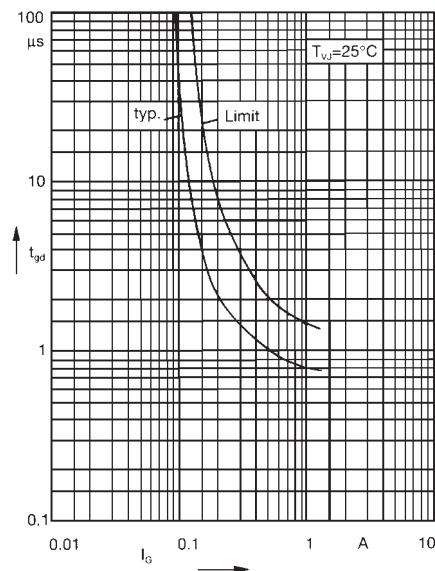
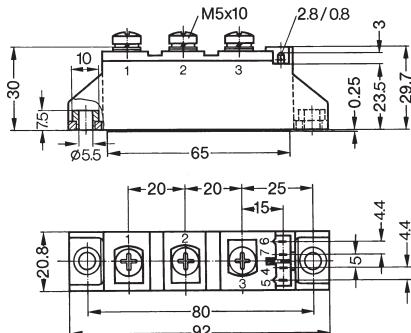


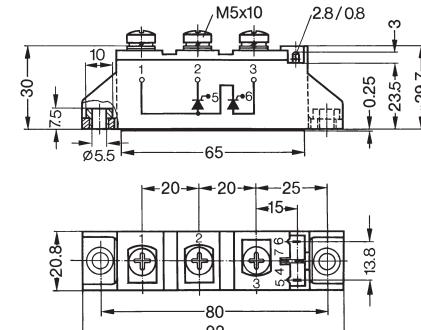
Fig. 2 Gate trigger delay time

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

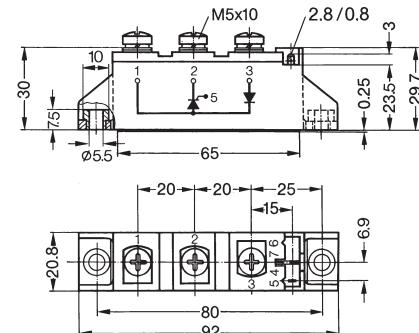
MCC / MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



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

IXYS reserves the right to change limits, test conditions and dimensions.

© 2007 IXYS All rights reserved

20070824

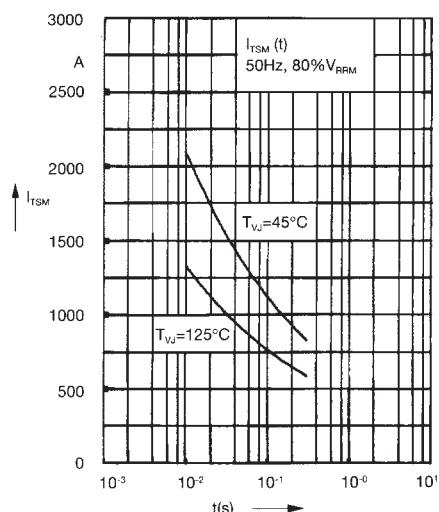


Fig. 3 Surge overload current  
 $I_{TSM}, I_{FSM}$ : Crest value, t: duration

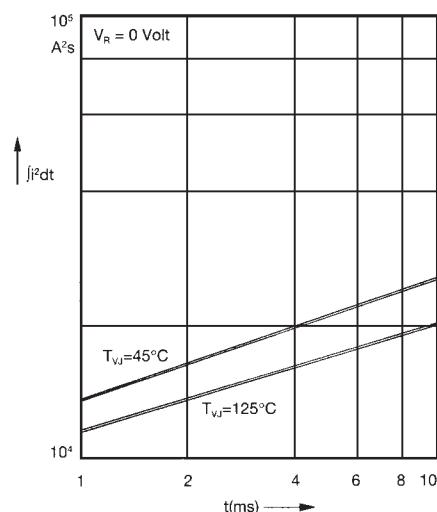


Fig. 4  $\int j^2 dt$  versus time (1-10 ms)

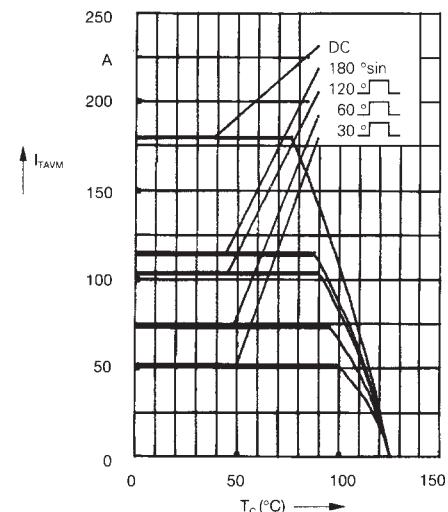


Fig. 4a Maximum forward current at case temperature

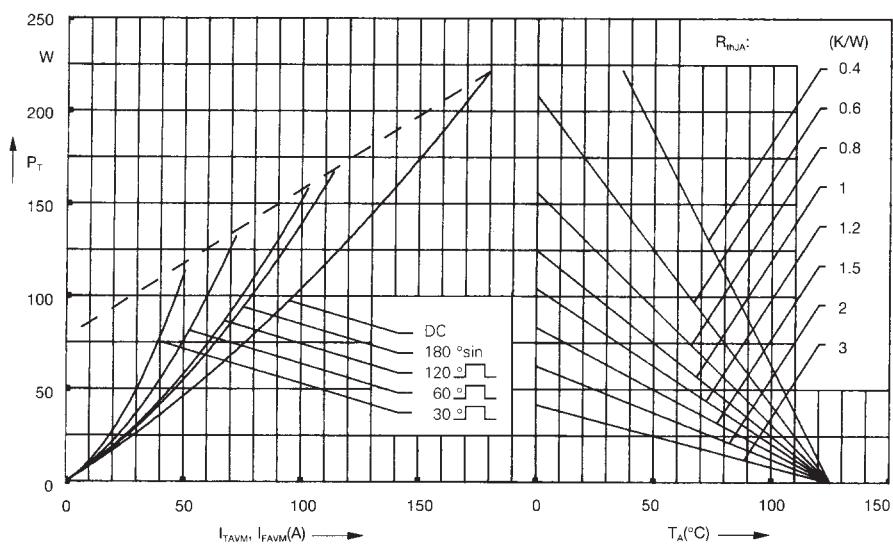


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

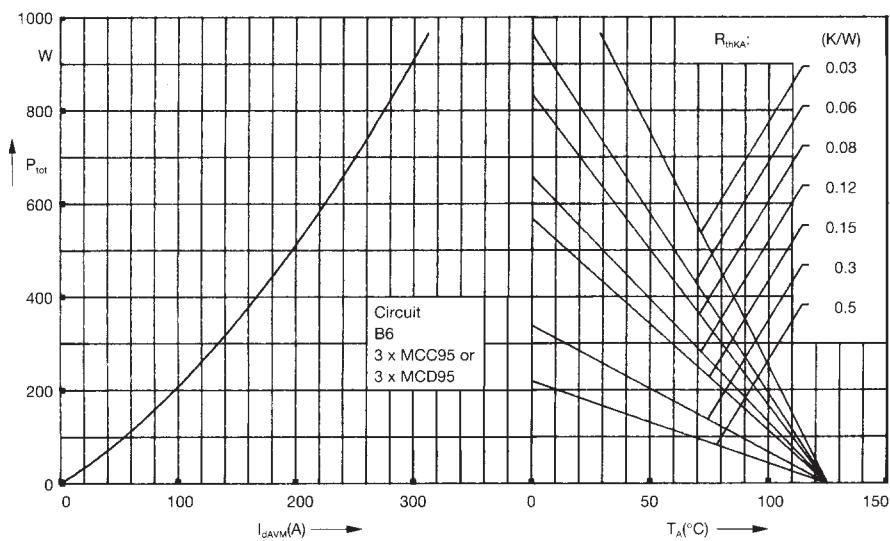


Fig. 6 Three phase rectifier bridge:  
Power dissipation versus direct output current and ambient temperature

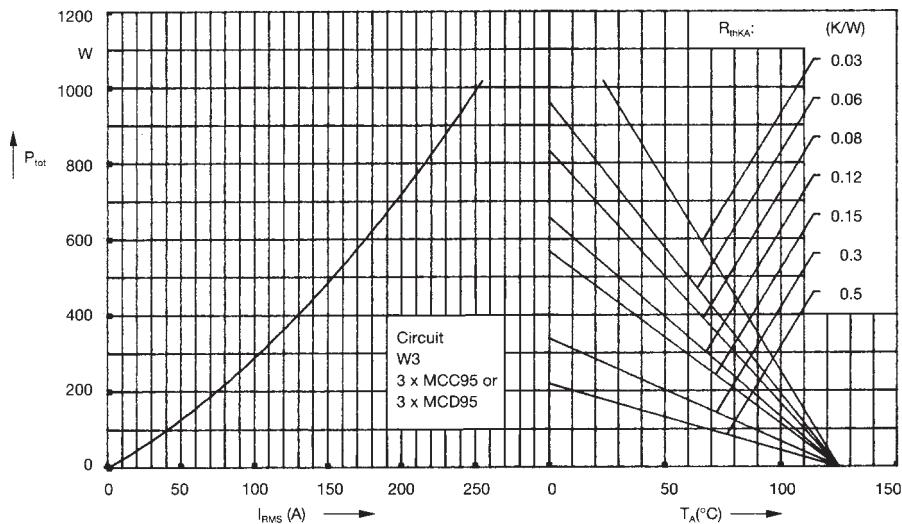


Fig. 7 Three phase AC-controller:  
Power dissipation versus RMS  
output current and ambient  
temperature

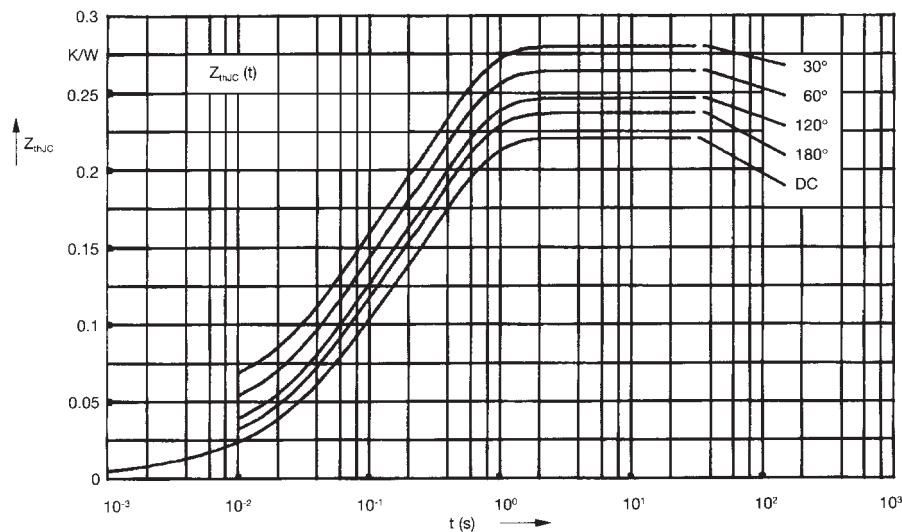


Fig. 8 Transient thermal impedance  
junction to case (per thyristor or  
diode)

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

d	$R_{thJC}$ (K/W)
DC	0.22
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

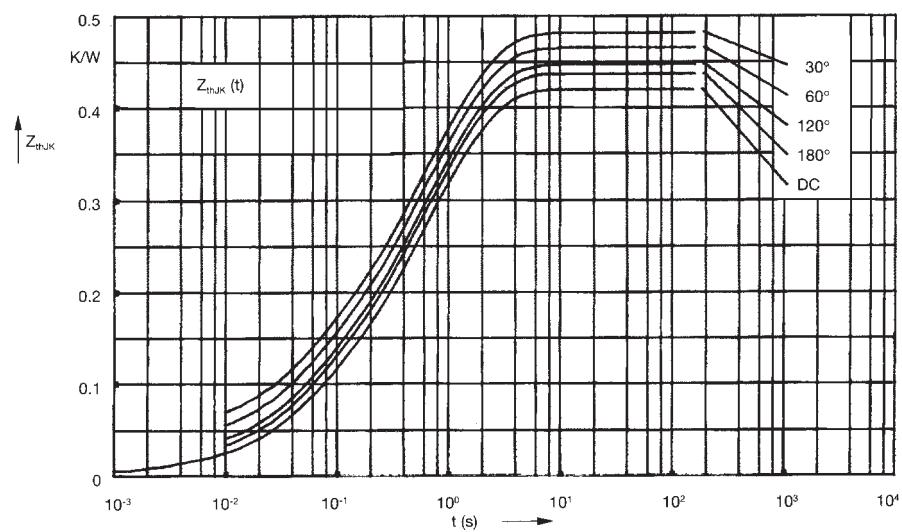


Fig. 9 Transient thermal impedance  
junction to heatsink (per thyristor or  
diode)

$R_{thJK}$  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