

Thyristor Modules

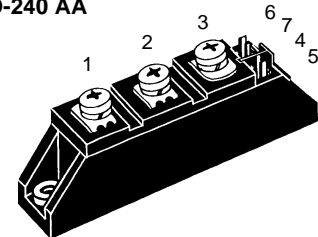
Thyristor/Diode Modules

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

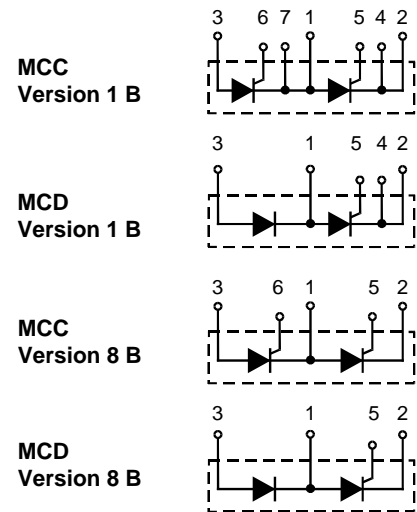
$$I_{TAVM} = 2 \times 115 \text{ A}$$

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

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type			
V	V	Version 1 B		Version 8 B	
900	800	MCC 72-08io1 B	--	MCC 72-08io8 B	MCD 72-08io8 B
1300	1200	MCC 72-12io1 B	MCD 72-12io1B	MCC 72-12io8 B	MCD 72-12io8 B
1500	1400	MCC 72-14io1 B	--	MCC 72-14io8 B	MCD 72-14io8 B
1700	1600	MCC 72-16io1 B	MCD 72-16io1B	MCC 72-16io8 B	MCD 72-16io8 B
1900	1800	MCC 72-18io1 B	--	MCC 72-18io8 B	MCD 72-18io8 B

TO-240 AA


Symbol	Test Conditions	Maximum Ratings	
I_{TRMS} , I_{FRMS} I_{TAVM} , I_{FAVM}	$T_{VJ} = T_{VJM}$ $T_C = 63^\circ\text{C}$; 180° sine $T_C = 85^\circ\text{C}$; 180° sine	180 115 85	A A 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	1700 1800 A A
	$T_{VJ} = T_{VJM}$ $V_R = 0$	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	1540 1640 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	14 450 13 500 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	11 850 11 300 A ² s A ² s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz; $t_p = 200 \mu\text{s}$ $V_D = 2/3 V_{DRM}$ $I_G = 0.45 \text{ A}$ $dj_G/dt = 0.45 \text{ A}/\mu\text{s}$	repetitive, $I_T = 250 \text{ A}$ non repetitive, $I_T = I_{TAVM}$	150 500 A/ μs 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}	$T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$	$t_p = 30 \mu\text{s}$ $t_p = 300 \mu\text{s}$	10 5 W W
P_{GAV}			0.5 W
V_{RGM}			10 V
T_{VJ}			-40...+125 °C
T_{VJM}			125 °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 3600 V~ V~
M_d	Mounting torque (M5) Terminal connection torque (M5)		2.5-4.0/22-35 Nm/lb.in.
Weight	Typical including screws		90 g


Features

- International standard package, JEDEC TO-240 AA
- Direct copper bonded Al_2O_3 -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

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

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}	$T_{VJ} = T_{VJM}; V_R = V_{RRM}; V_D = V_{DRM}$	5 mA
V_T, V_F	$I_T, I_F = 300 \text{ A}; T_{VJ} = 25^\circ\text{C}$	1.74 V
V_{TO}	For power-loss calculations only ($T_{VJ} = 125^\circ\text{C}$)	0.85 V
r_T		3.2 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	$T_{VJ} = 25^\circ\text{C}; t_p = 10 \mu\text{s}; V_D = 6 \text{ V}$ $I_G = 0.45 \text{ A}; di_g/dt = 0.45 \text{ A}/\mu\text{s}$	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 μs
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 μs
Q_S	$T_{VJ} = T_{VJM}; I_T, I_F = 50 \text{ A}; -di/dt = 6 \text{ A}/\mu\text{s}$	170 μC
I_{RM}		45 A
R_{thJC}	per thyristor/diode; DC current per module	0.3 K/W
R_{thJK}	per thyristor/diode; DC current per module	0.15 K/W
	other values see Fig. 8/9	0.5 K/W
		0.25 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 module-type MCC 72 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

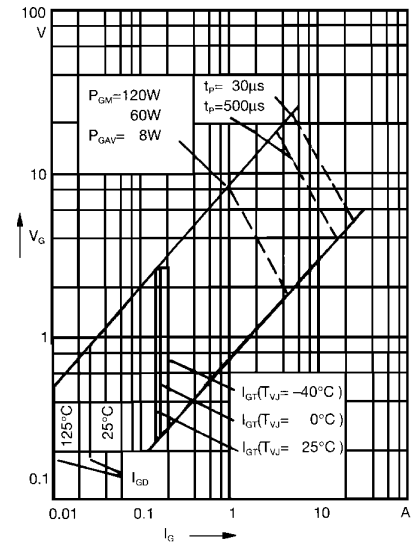


Fig. 1 Gate trigger characteristics

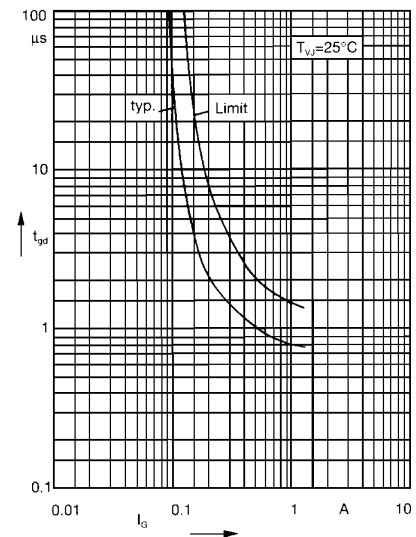
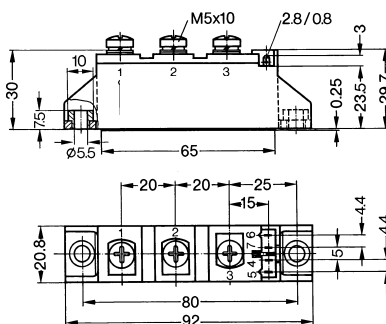


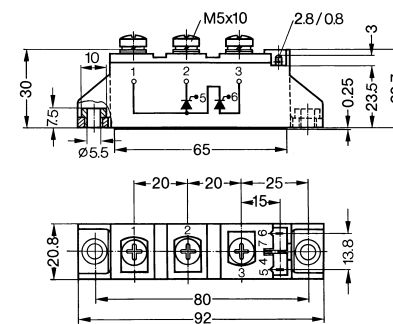
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

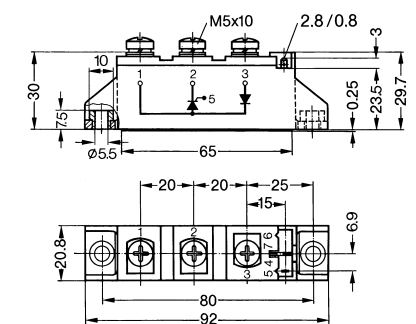
MCC / MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



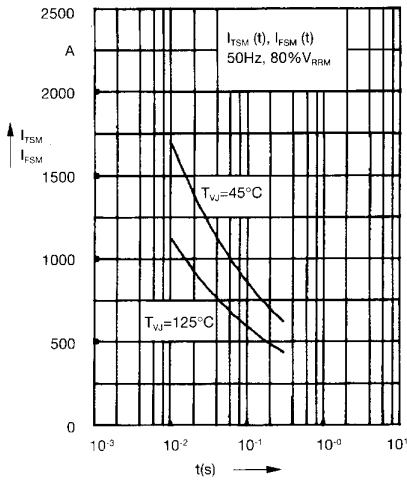


Fig. 3 Surge overload current
 I_{TSM}, I_{FSM} : Crest value, t : duration

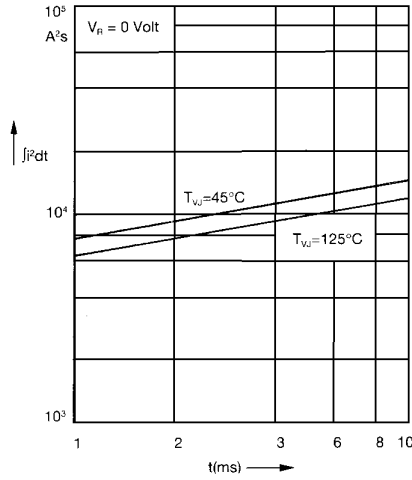


Fig. 4 $\int j^2 dt$ versus time (1-10 ms)

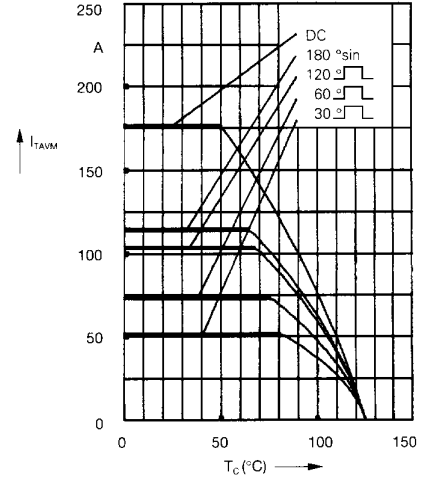


Fig. 4a Maximum forward current at case temperature

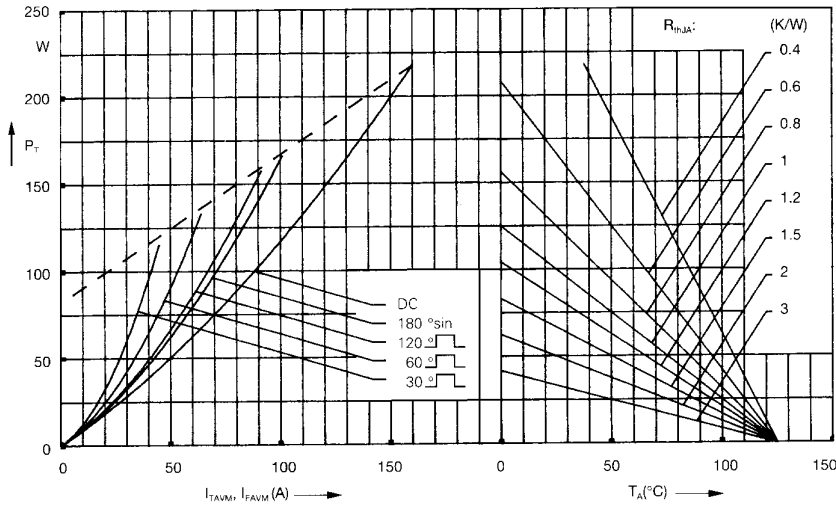


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

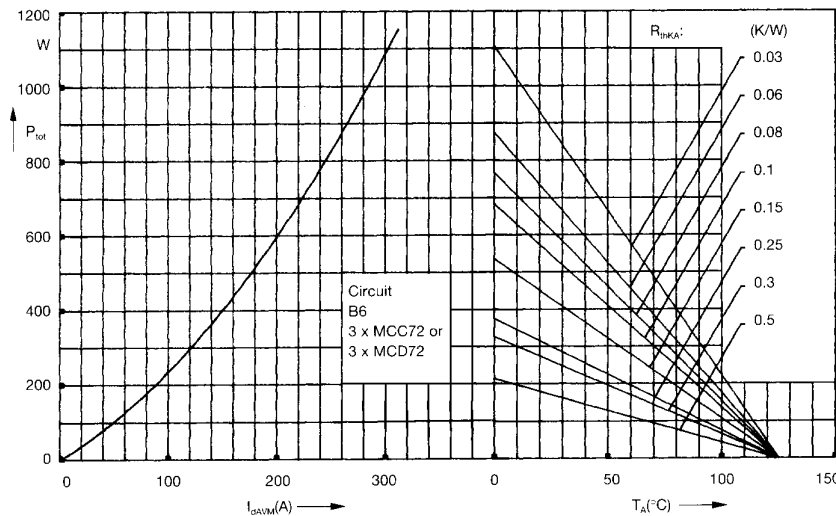


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

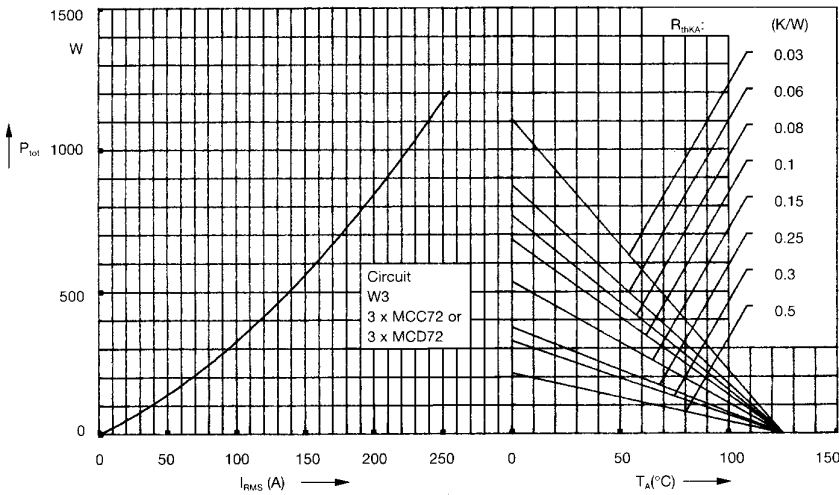


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

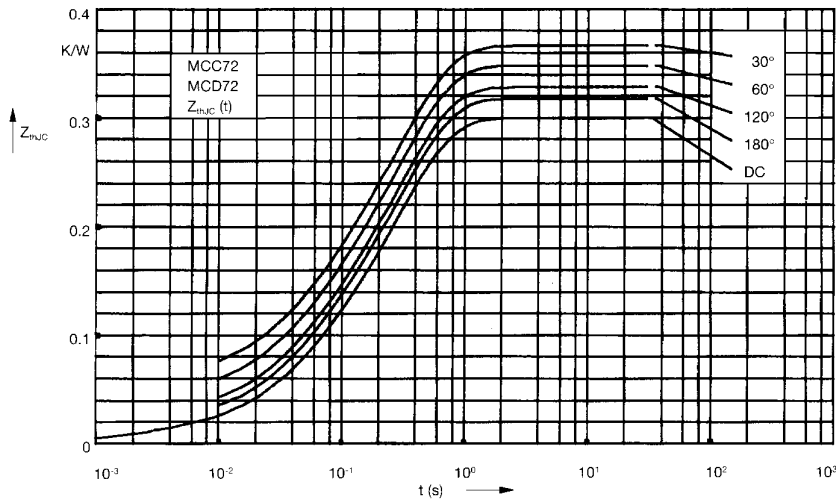


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.3
180°	0.31
120°	0.33
60°	0.35
30°	0.37

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.008	0.0019
2	0.054	0.047
3	0.238	0.3

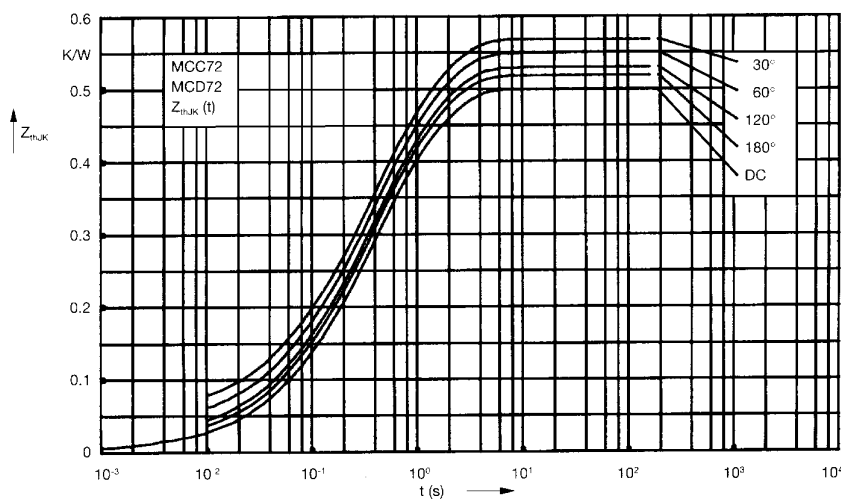


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.5
180°	0.51
120°	0.53
60°	0.55
30°	0.57

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.008	0.0019
2	0.054	0.047
3	0.238	0.3
4	0.2	1.25