

Thyristor Modules

Thyristor/Diode Modules

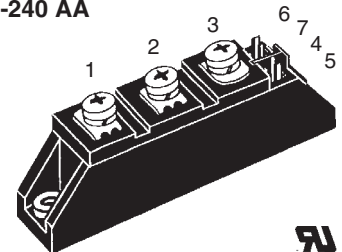
$$I_{TRMS} = 2 \times 180 \text{ A}$$

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

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

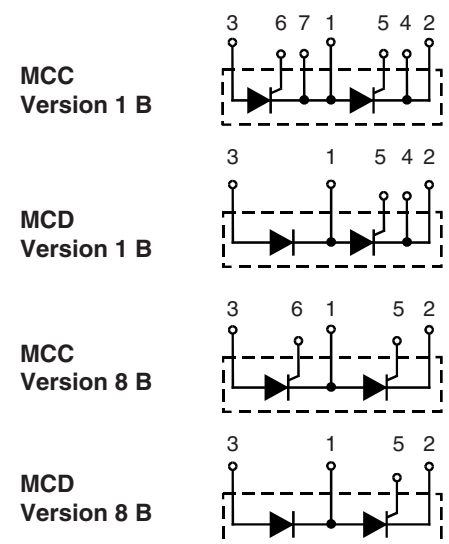
V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type						
		Version	1 B	8 B	Version	1 B	8 B	
900	800	MCC 72-08	io1 B / io8 B		MCD 72-08	io1 B / io8 B		
1300	1200	MCC 72-12	io1 B / io8 B		MCD 72-12	io1 B / io8 B		
1500	1400	MCC 72-14	io1 B / io8 B		MCD 72-14	io1 B / io8 B		
1700	1600	MCC 72-16	io1 B / io8 B		MCD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

TO-240 AA



Symbol	Conditions		Maximum Ratings	
I_{TRMS} , I_{FRMS} I_{TAVM} , I_{FAVM}	$T_{VJ} = T_{VJM}$		180	A
	$T_C = 63^{\circ}\text{C}$; 180° sine		115	A
	$T_C = 85^{\circ}\text{C}$; 180° sine		85	A
I_{TSM} , I_{FSM}	$T_{VJ} = 45^{\circ}\text{C}$	t = 10 ms (50 Hz), sine	1700	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	1800	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	1540	A
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	1640	A
$\int i^2 dt$	$T_{VJ} = 45^{\circ}\text{C}$	t = 10 ms (50 Hz), sine	14 450	A ² s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	13 500	A ² s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz), sine	11 850	A ² s
	$V_R = 0$	t = 8.3 ms (60 Hz), sine	11 300	A ² s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz; t _p =200 μs	repetitive, I _T = 250 A	150	A/μs
	$V_D = \frac{2}{3} V_{DRM}$ I _G = 0.45 A di _G /dt = 0.45 A/μs	non repetitive, I _T = I _{TAVM}	500	A/μs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; R _{GK} = ∞; method 1 (linear voltage rise)	$V_{DR} = \frac{2}{3} V_{DRM}$	1000	V/μs
P_{GM}	$T_{VJ} = T_{VJM}$;	t _p = 30 μs	10	W
	I _T = I _{TAVM} ;	t _p = 300 μs	5	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;	t = 1 min	3000	V~
	I _{ISOL} ≤ 1 mA;	t = 1 s	3600	V~
M_d	Mounting torque (M5)		2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)		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.



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

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	$I_T / I_F = 300 \text{ A}; T_{VJ} = 25^\circ\text{C}$	1.74	V
V_{T0}	For power-loss calculations only ($T_{VJ} = 125^\circ\text{C}$)	0.85	V
r_T		3.2	m Ω
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}	$T_{VJ} = T_{VJM}; V_D = \frac{2}{3} V_{DRM}$	0.2	V
I_{GD}		10	mA
I_L	$T_{VJ} = 25^\circ\text{C}; t_p = 10 \mu\text{s}; V_D = 6 \text{ V}$ $I_G = 0.45 \text{ A}; di/dt = 0.45 \text{ A}/\mu\text{s}$	450	mA
I_H	$T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$	200	mA
t_{gd}	$T_{VJ} = 25^\circ\text{C}; V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.45 \text{ A}; di/dt = 0.45 \text{ A}/\mu\text{s}$	2	μs
t_q	$T_{VJ} = T_{VJM}; I_T = 150 \text{ A}; t_p = 200 \mu\text{s}; -di/dt = 10 \text{ A}/\mu\text{s}$ $V_R = 100 \text{ V}; dv/dt = 20 \text{ V}/\mu\text{s}; V_D = \frac{2}{3} V_{DRM}$	typ. 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	0.3	K/W
R_{thJK}	per module	0.15	K/W
	per thyristor/diode; DC current	0.5	K/W
	per module	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

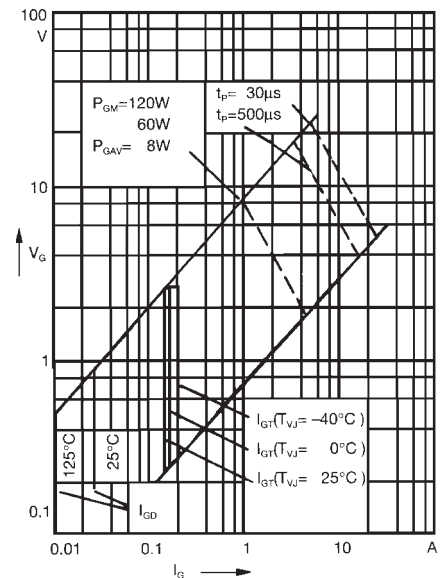


Fig. 1 Gate trigger characteristics

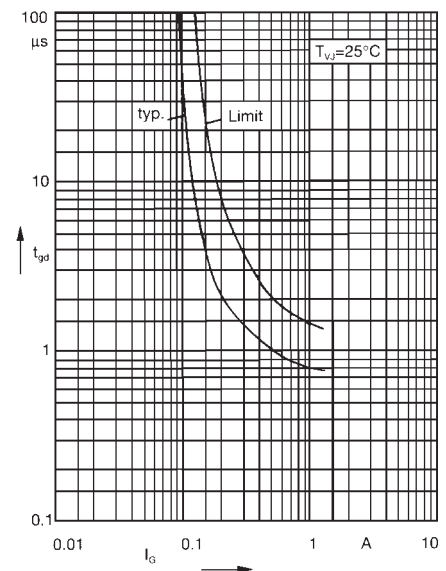
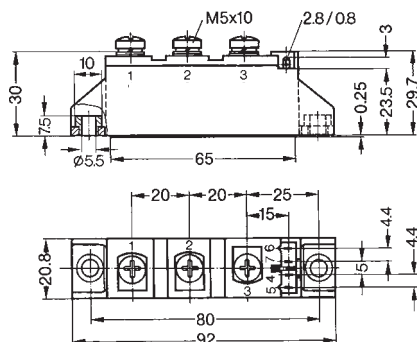


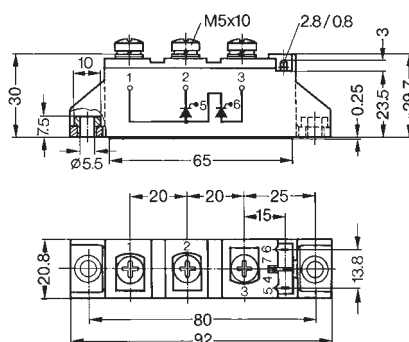
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

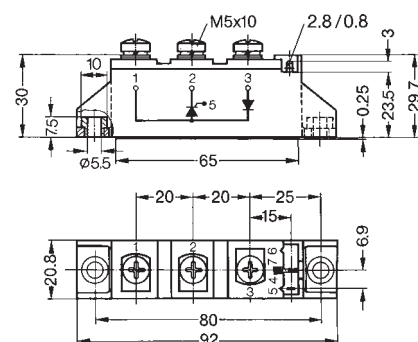
MCC / MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



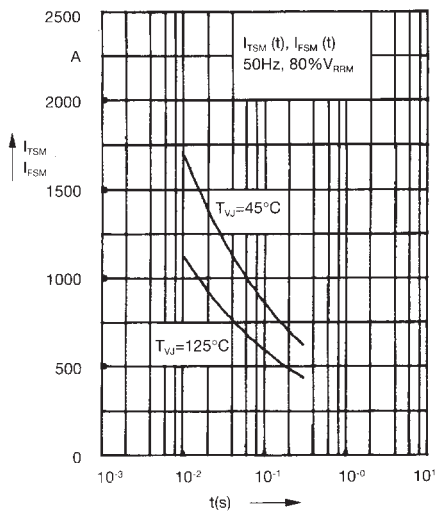


Fig. 3 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

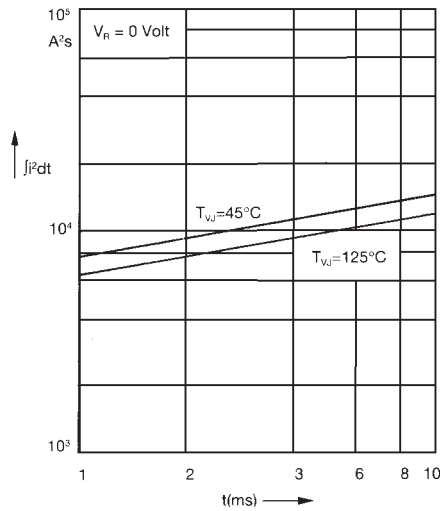


Fig. 4 $\int i^2 dt$ versus time (1-10 ms)

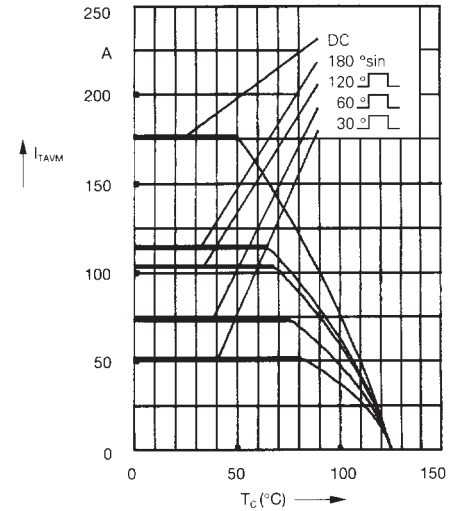


Fig. 4a Maximum forward current at case temperature

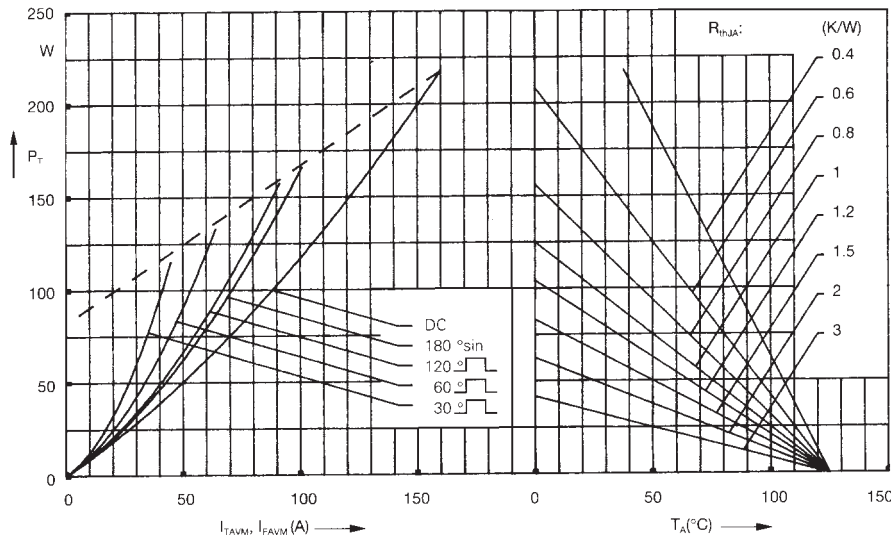


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

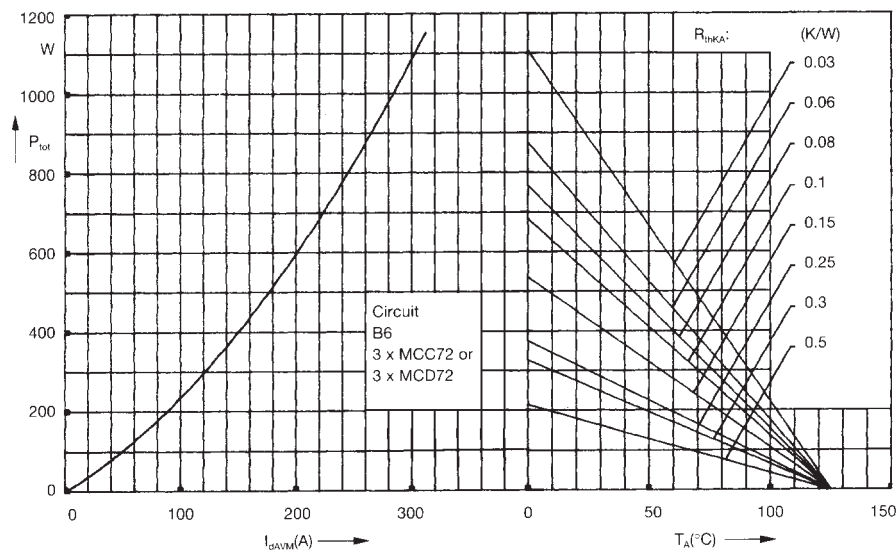


Fig. 6 Three phase rectifier bridge:
Power dissipation versus direct output current and ambient temperature

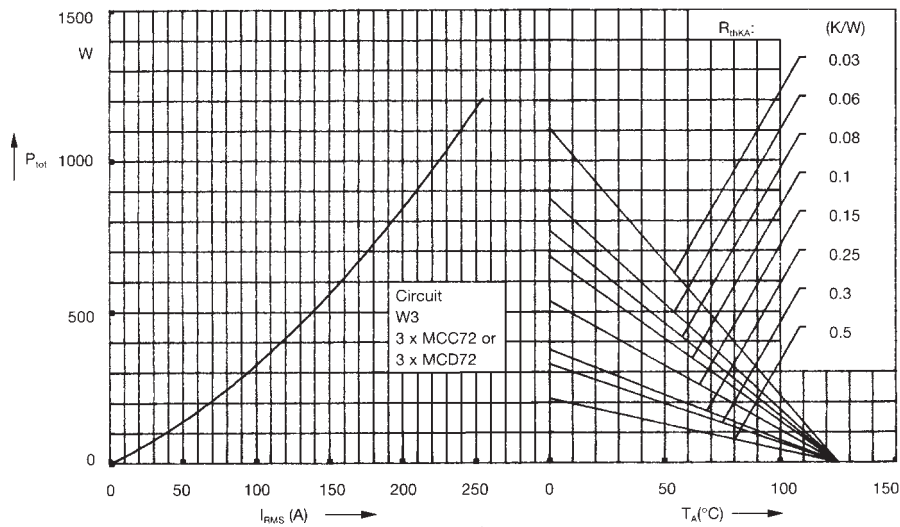


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

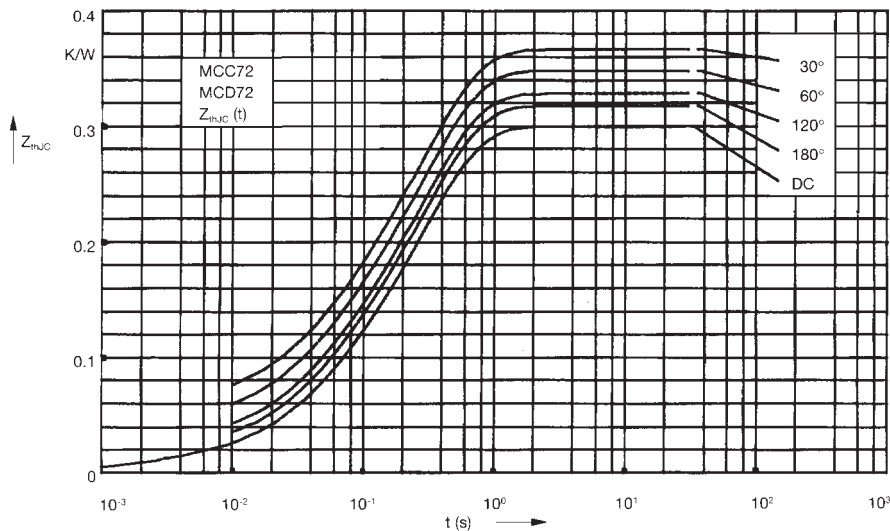


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

R_{thJC} for various conduction angles d :

d	R_{thJC} (K/W)
DC	0.3
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

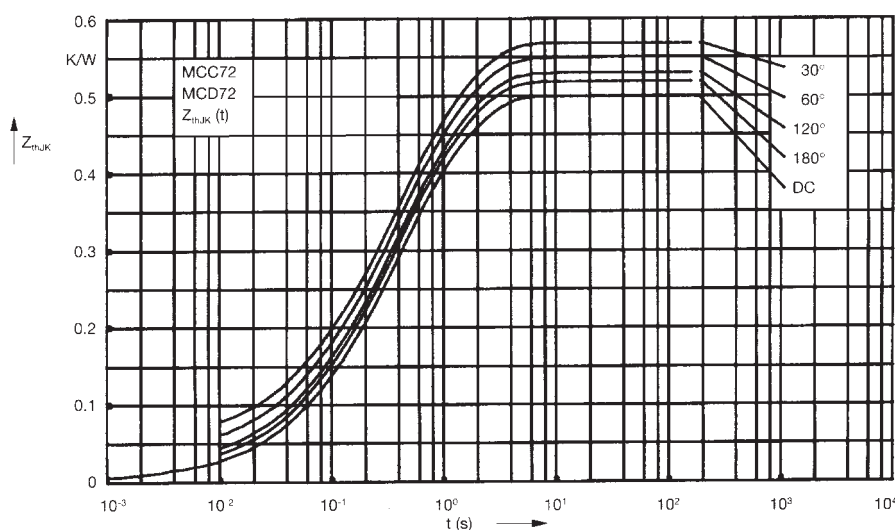


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

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