

Thyristor Modules

Thyristor/Diode Modules

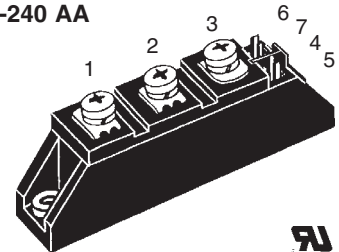
$$I_{TRMS} = 2 \times 80 \text{ A}$$

$$I_{TAVM} = 2 \times 51 \text{ A}$$

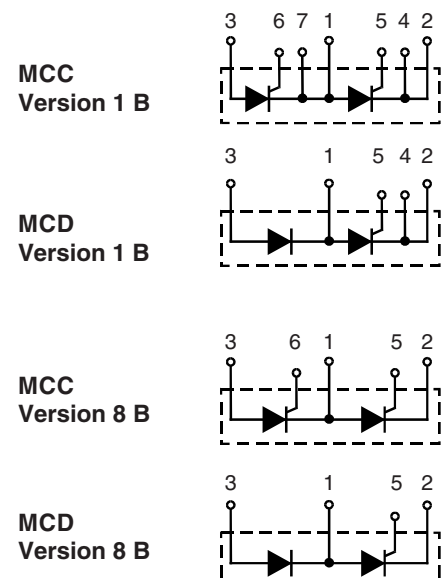
$$V_{RRM} = 800-1800 \text{ V}$$

V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type						
		Version	1 B	8 B	Version	1 B	8 B	
900	800	MCC 44-08	io1 B / io8 B		MCD 44-08	io1 B / io8 B		
1300	1200	MCC 44-12	io1 B / io8 B		MCD 44-12	io1 B / io8 B		
1500	1400	MCC 44-14	io1 B / io8 B		MCD 44-14	io1 B / io8 B		
1700	1600	MCC 44-16	io1 B / io8 B		MCD 44-16	io1 B / io8 B		
1900	1800	MCC 44-18	io1 B / io8 B		MCD 44-18	io1 B / io8 B		

TO-240 AA



Symbol	Conditions	Maximum Ratings			
I_{TRMS} , I_{FRMS} I_{TAVM} , I_{FAVM}	$T_{VJ} = T_{VJM}$	80	A		
	$T_C = 83^{\circ}\text{C}$; 180° sine	51	A		
	$T_C = 85^{\circ}\text{C}$; 180° sine	49	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	1150 1230	A A	
	$T_{VJ} = T_{VJM}$; t = 10 ms; $V_R = 0$;	(50 Hz), sine t = 8.3 ms (60 Hz), sine	1000 1070	A A	
	I^2dt	$T_{VJ} = 45^{\circ}\text{C}$; $V_R = 0$,	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	6600 6280	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	5000 4750	A ² s A ² s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$; f = 50Hz; t _p = 200μs; $V_D = \frac{2}{3} V_{DRM}$; I _G = 0.45 A; di _G /dt = 0.45 A/μs	repetitive, I _T = 150 A	150	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}	$T_{VJ} = T_{VJM}$; I _T = I _{TAVM} ;	t _p = 30 μs t _p = 300 μs	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} ≤ 1 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	



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	$I_T, I_F = 200 \text{ A}; T_{VJ} = 25^\circ\text{C}$	1.75	V
V_{T0}	For power-loss calculations only ($T_{VJ} = 125^\circ\text{C}$)	0.85	V
r_T		5.3	m Ω
V_{GT}	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	1.5	V
	$T_{VJ} = -40^\circ\text{C}$	1.6	V
I_{GT}	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	100	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	$T_{VJ} = T_{VJM}; I_T = 120 \text{ A}; t_p = 200 \mu\text{s}; -di/dt = 10 \text{ A}/\mu\text{s}$ $V_R = 100 \text{ V}; dv/dt = 20 \text{ V}/\mu\text{s}; V_D = 2/3 V_{DRM}$	typ. 150	μs
Q_S	$T_{VJ} = T_{VJM}; I_T/I_F = 50 \text{ A}; -di/dt = 0.64 \text{ A}/\mu\text{s}$	90	μC
I_{RM}		11	A
R_{thJC}	per thyristor/diode; DC current per module	0.53	K/W
R_{thJK}	per thyristor/diode; DC current per module	0.265	K/W
	other values see Fig. 8/9	0.73	K/W
		0.365	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 44 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

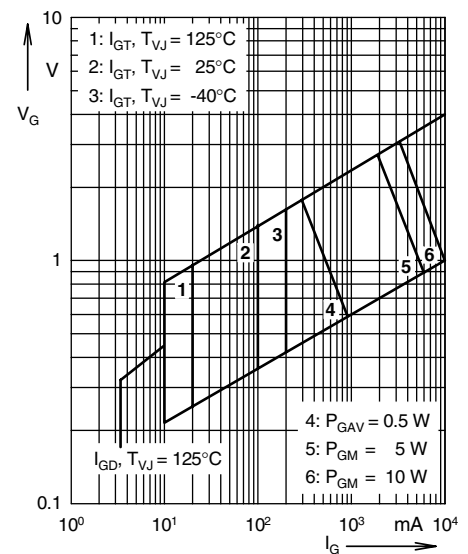


Fig. 1 Gate trigger characteristics

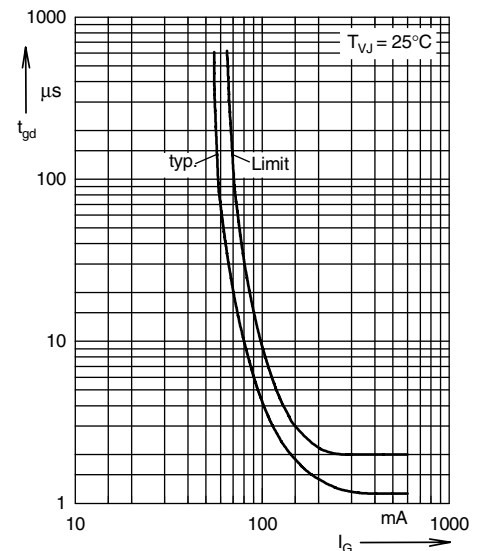
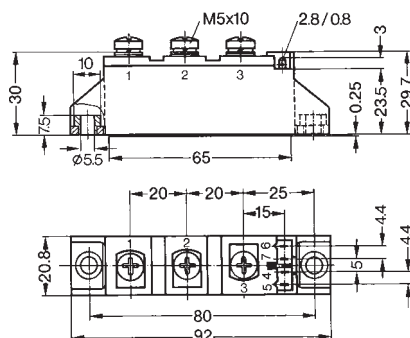


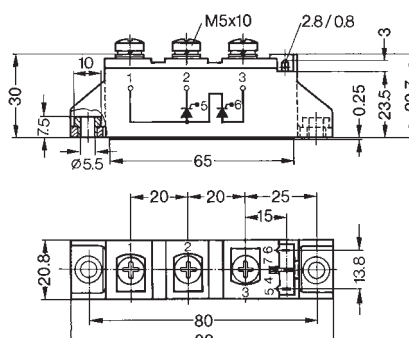
Fig. 2 Gate trigger delay time

Dimensions in mm (1 mm = 0.0394")

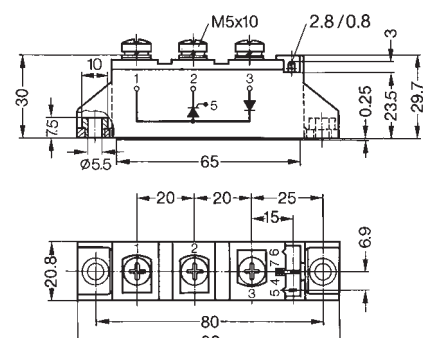
MCC/MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



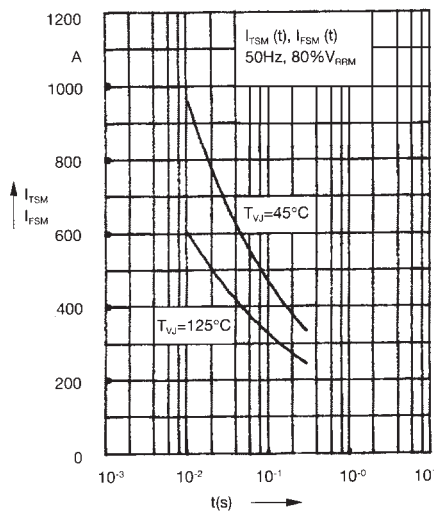


Fig. 3 Surge overload current
 I_{TSM}, I_{FSM} : Crest value, t : duration

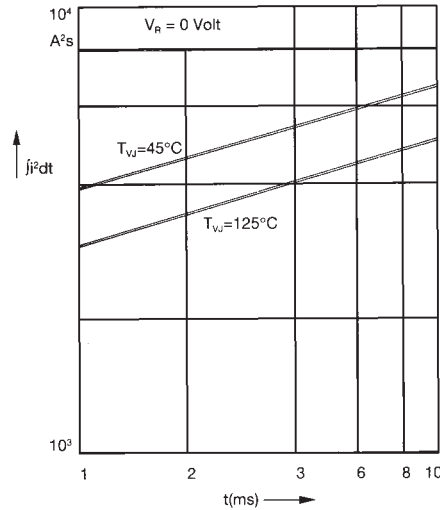


Fig. 4 j^2dt versus time (1-10 ms)

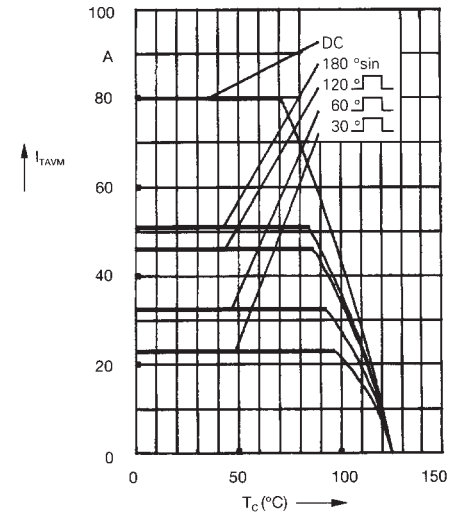


Fig. 4a Maximum forward current at case temperature

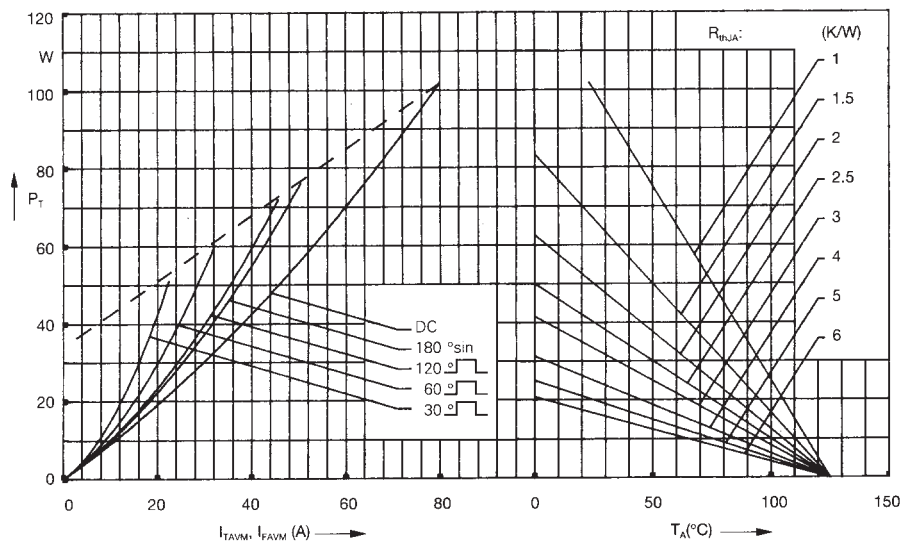


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

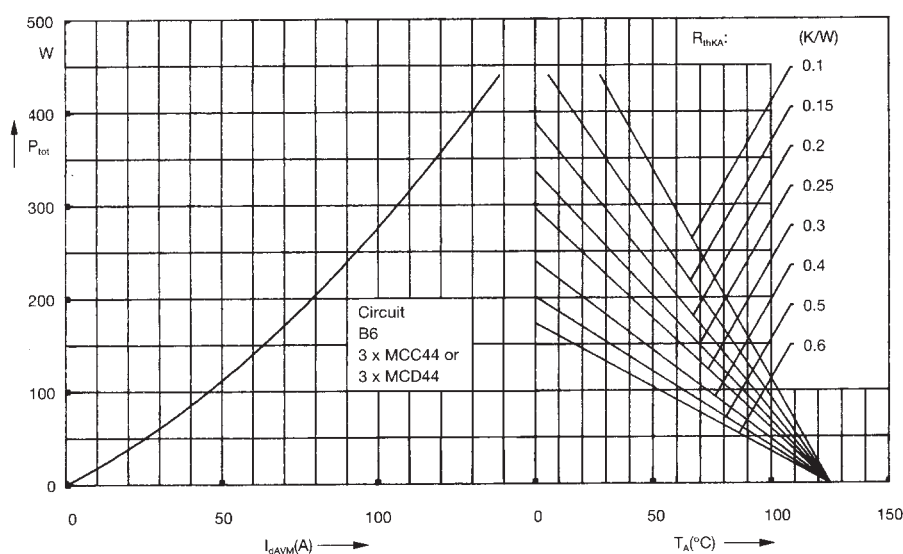


Fig. 6 Three phase rectifier bridge:
Power dissipation versus direct output current and ambient temperature

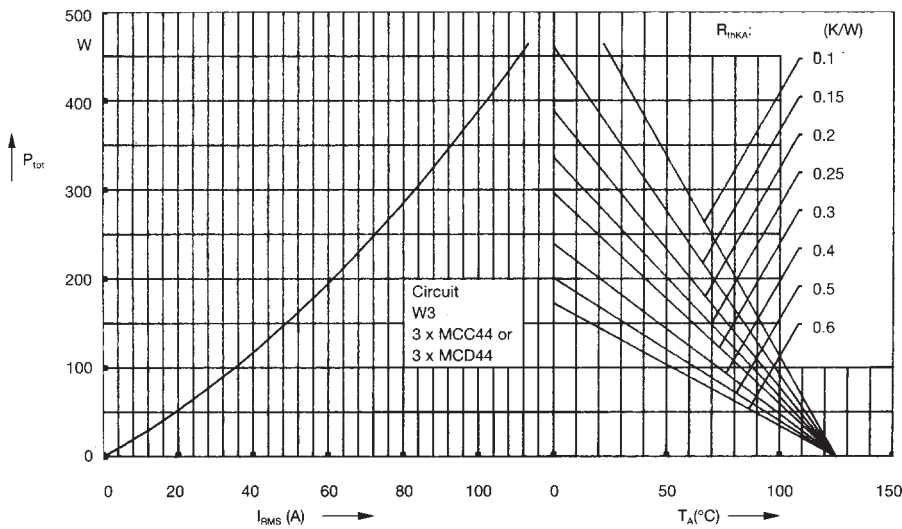


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

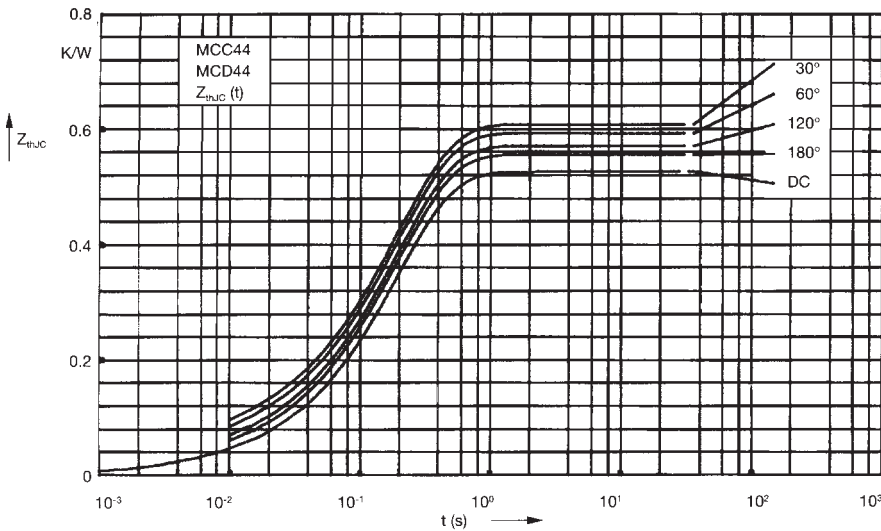


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.53
180°	0.55
120°	0.58
60°	0.6
30°	0.62

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.015	0.0035
2	0.026	0.02
3	0.489	0.195

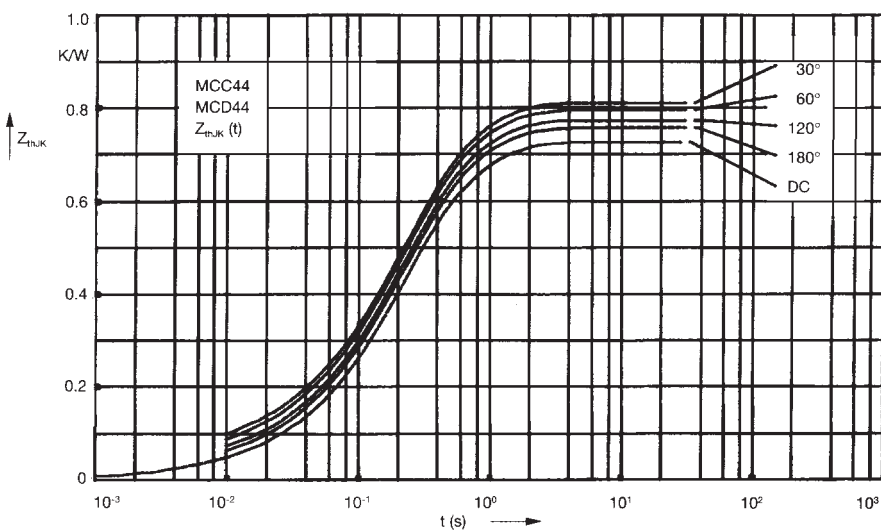


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.73
180°	0.75
120°	0.78
60°	0.8
30°	0.82

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.015	0.0035
2	0.026	0.02
3	0.489	0.195
4	0.2	0.68