

Thyristor Modules

Thyristor/Diode Modules

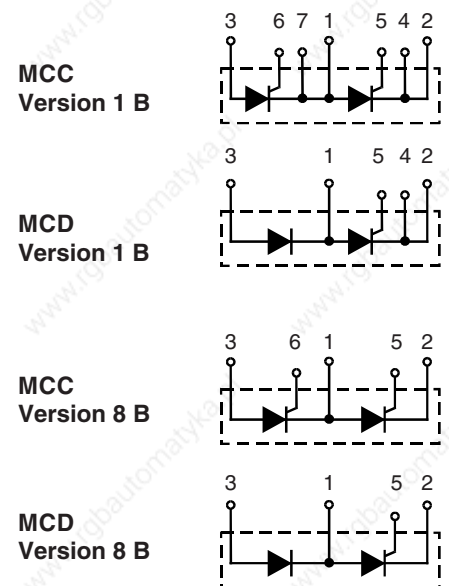
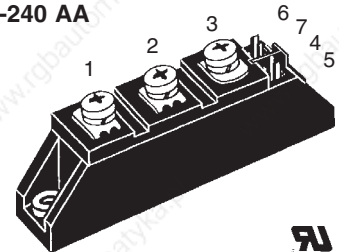
$$I_{TRMS} = 2x80 \text{ A}$$

$$I_{TAVM} = 2x51 \text{ A}$$

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

V_{RSM}	V_{RRM}	Type					
V_{DSM}	V_{DRM}	Version			Version		
V	V	1 B	8 B	1 B	8 B	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		

Symbol	Conditions	Maximum Ratings		
I_{TRMS}, I_{FRMS} I_{TAVM}, I_{FAVM}	$T_{VJ} = T_{VJM}$ $T_C = 83^\circ\text{C}; 180^\circ \text{ sine}$ $T_C = 85^\circ\text{C}; 180^\circ \text{ sine}$	80 51 49	A A A	
I_{TSM}, I_{FSM}	$T_{VJ} = 45^\circ\text{C};$ $V_R = 0;$ $t = 10 \text{ ms (50 Hz), sine}$ $t = 8.3 \text{ ms (60 Hz), sine}$	1150 1230	A A	
P_{dt}	$T_{VJ} = 45^\circ\text{C};$ $V_R = 0;$ $t = 10 \text{ ms (50 Hz), sine}$ $t = 8.3 \text{ ms (60 Hz), sine}$	6600 6280	A^2s A^2s	
	$T_{VJ} = T_{VJM};$ $V_R = 0;$ $t = 10 \text{ ms (50 Hz), sine}$ $t = 8.3 \text{ ms (60 Hz), sine}$	5000 4750	A^2s A^2s	
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM};$ $f = 50\text{Hz}; t_p = 200\mu\text{s};$ $V_D = \frac{2}{3} V_{DRM};$ $I_G = 0.45 \text{ A};$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}$	repetitive, $I_T = 150 \text{ A}$ non repetitive, $I_T = I_{TAVM}$	150 500	$\text{A}/\mu\text{s}$ $\text{A}/\mu\text{s}$
	$T_{VJ} = T_{VJM};$ $R_{GK} = \infty;$ method 1 (linear voltage rise)	$V_{DR} = \frac{2}{3} V_{DRM}$	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
			0.5	W
V_{RGM}			10	V
T_{VJ}			-40...+125	$^\circ\text{C}$
T_{VJM}			125	$^\circ\text{C}$
T_{stg}			-40...+125	$^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS; $I_{ISOL} \leq 1 \text{ mA};$	$t = 1 \text{ min}$ $t = 1 \text{ s}$	3000 3600	$\text{V}\sim$ $\text{V}\sim$
M_d	Mounting torque (M5)		2.5-4.0/22-35	$\text{Nm}/\text{lb.in.}$
	Terminal connection torque (M5)		2.5-4.0/22-35	$\text{Nm}/\text{lb.in.}$
Weight	typical including screws		90	g

TO-240 AA


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

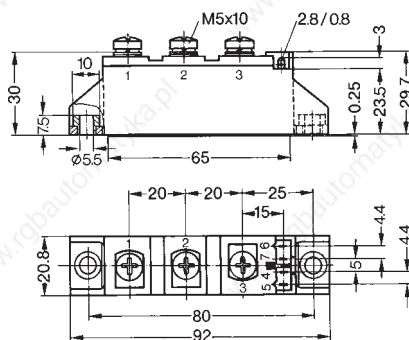
- Space and weight savings
- Simple mounting with two screws
- Improved temperature and power cycling
- Reduced protection circuits

Symbol	Conditions	Characteristic Values
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}; V_R = V_{RRM}; V_D = V_{DRM}$	5 mA
V_{T1}, 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 mΩ
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 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

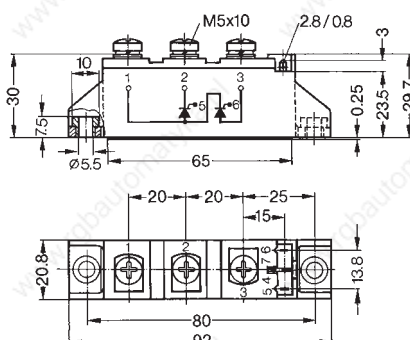
Optional accessories for module-type MCC 44 version 1 B
 Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
 Type **ZY 200L** (L = Left for pin pair 4/5) } UL 758, style 1385,
 Type **ZY 200R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

Dimensions in mm (1 mm = 0.0394")

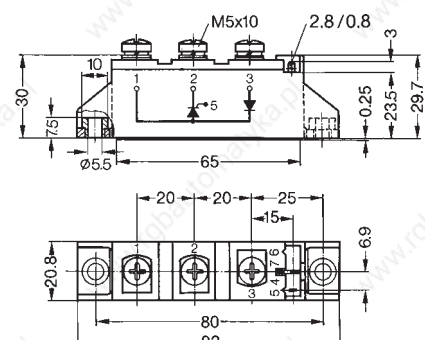
MCC/MCD Version 1 B



MCC Version 8 B



MCD Version 8 B



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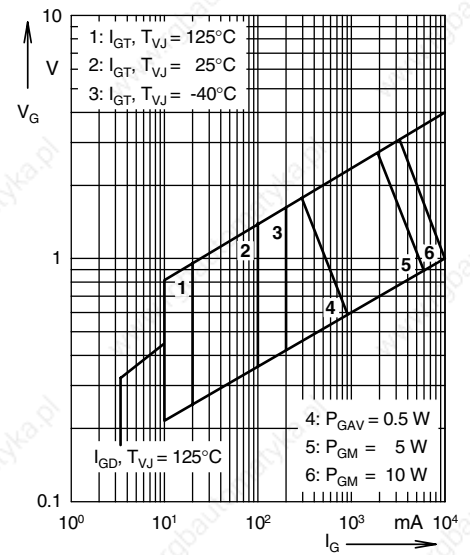


Fig. 1 Gate trigger characteristics

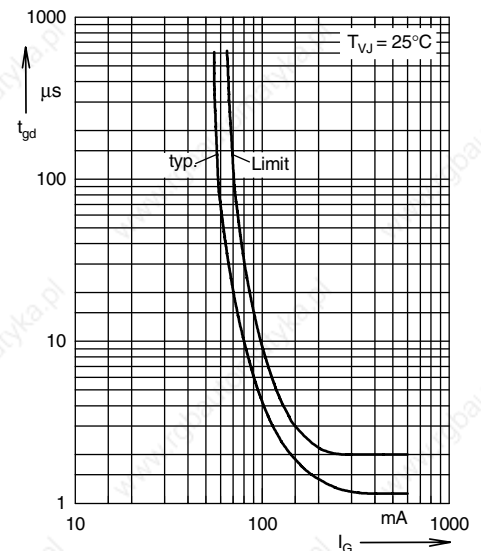


Fig. 2 Gate trigger delay time

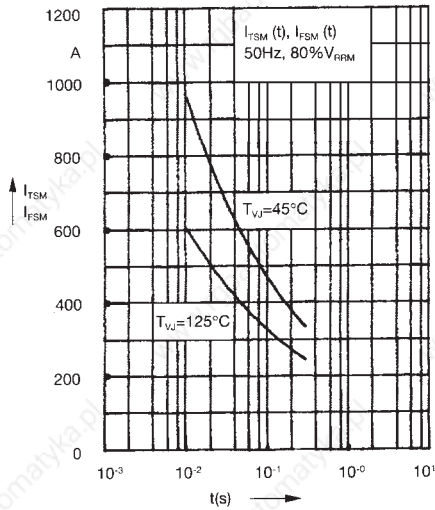


Fig. 3 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t: duration

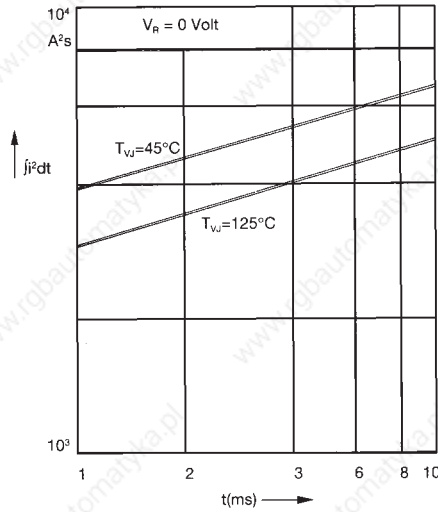


Fig. 4 j^2t versus time (1-10 ms)

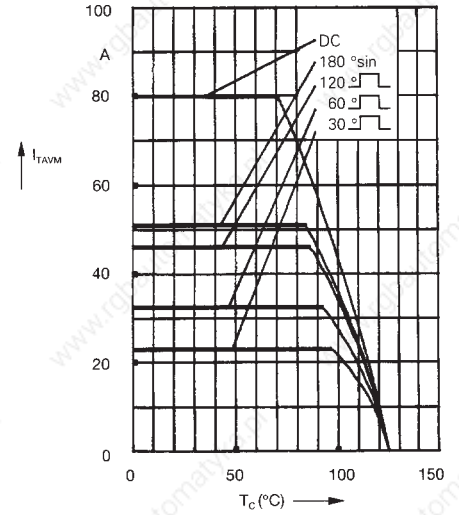


Fig. 4a Maximum forward current at case temperature

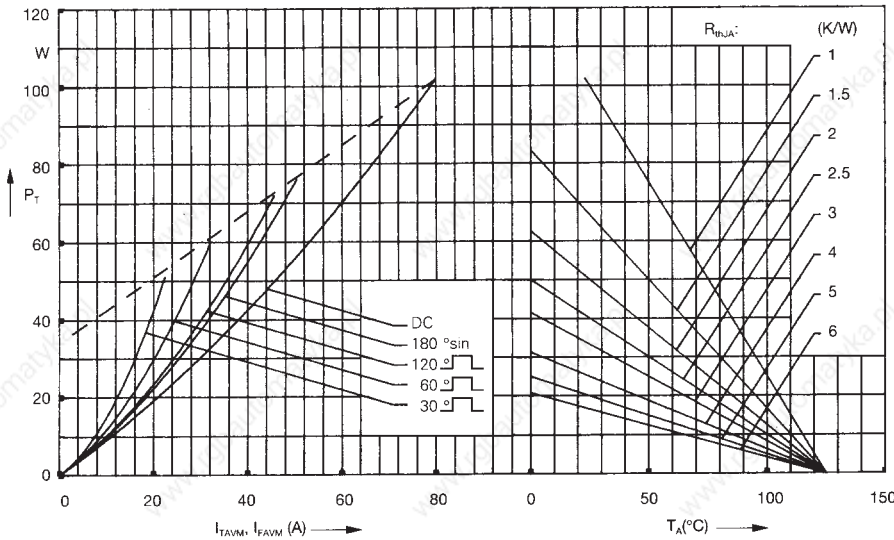


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

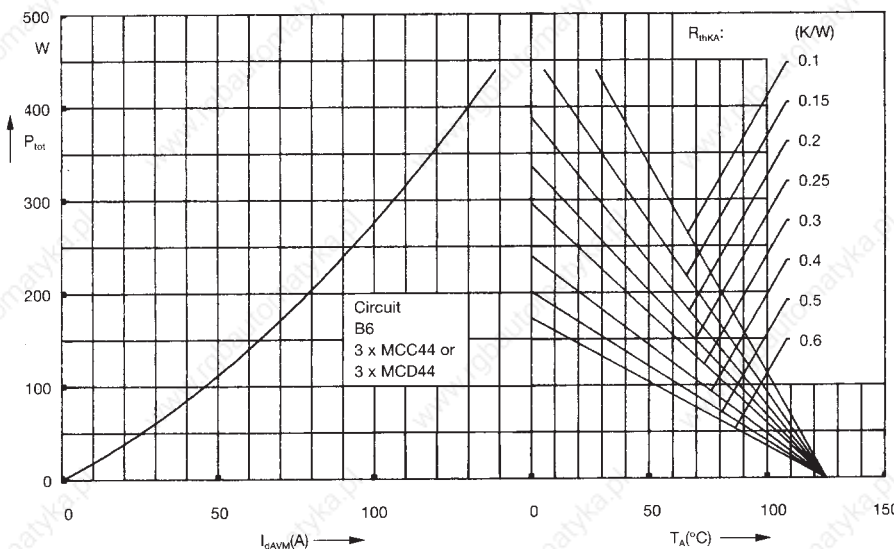


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

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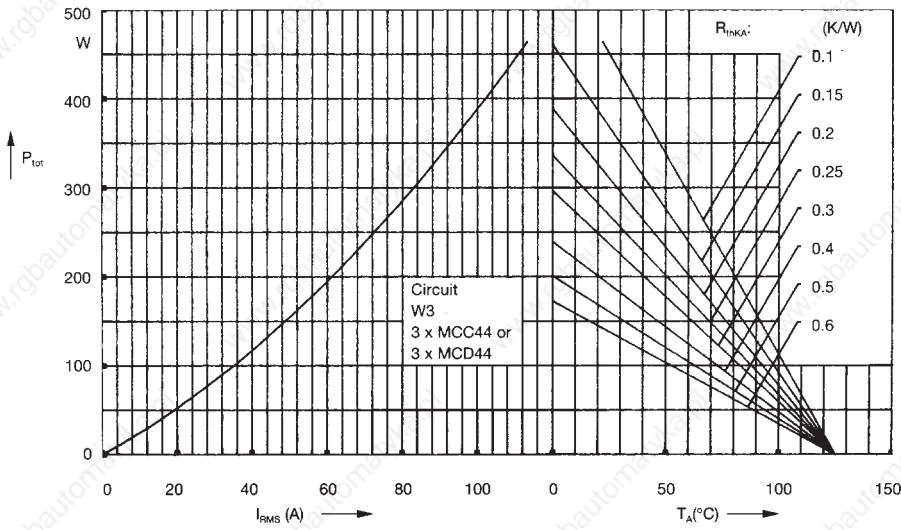


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

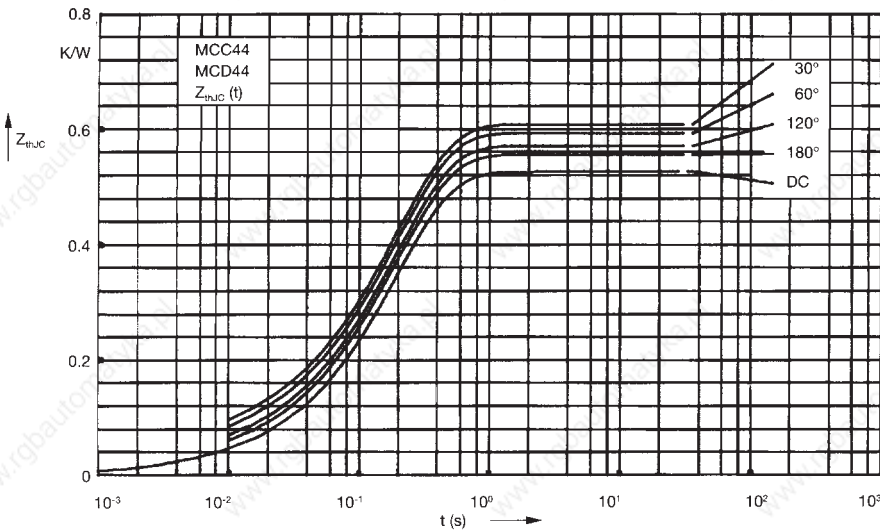


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

$R_{\theta JC}$ for various conduction angles d:

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

Constants for $Z_{\theta JC}$ calculation:

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

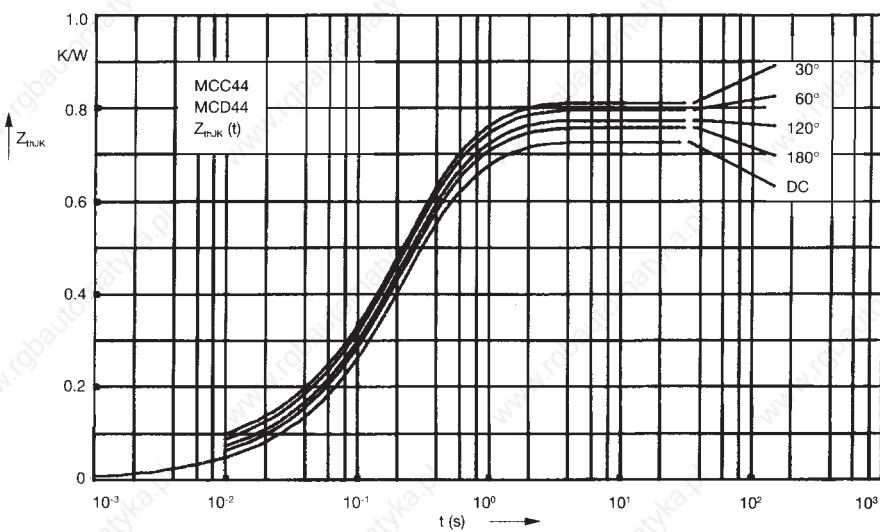


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

$R_{\theta JK}$ for various conduction angles d:

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

Constants for $Z_{\theta JK}$ calculation:

i	$R_{\theta i}$ (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