⊓IXYS

Thyristor Modules
Thyristor/Diode Modules

I_{TRMS} = 2x 400 A
I_{TAVM} = 2x 250 A
V_{RRM} = 800-1600 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type	
V	**V**	**Version 1**	**Version 1**
900	800	**MCC 220-08io1**	**MCD 220-08io1**
1300	1200	**MCC 220-12io1**	**MCD 220-12io1**
1500	1400	**MCC 220-14io1**	**MCD 220-14io1**
1700	1600	**MCC 220-16io1**	**MCD 220-16io1**

MCC

MCD
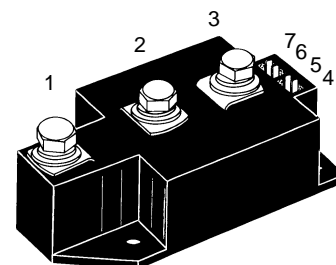
Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}, I_{FRMS} I_{TAVM}, I_{FAVM}	$T_{VJ} = T_{VJM}$ $T_C = 85°C$; 180° sine		400 250	A A
I_{TSM}, I_{FSM}	$T_{VJ} = 45°C$; $V_R = 0$	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	8500 9000	A A
	$T_{VJ} = T_{VJM}$ $V_R = 0$	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	7000 7600	A A
$\int i^2 dt$	$T_{VJ} = 45°C$ $V_R = 0$	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	360 000 336 000	A^2s A^2s
	$T_{VJ} = T_{VJM}$ $V_R = 0$	t = 10 ms (50 Hz), sine t = 8.3 ms (60 Hz), sine	245 000 240 000	A^2s A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz, $t_P = 200$ μs $V_D = 2/3\ V_{DRM}$ $I_G = 1$ A $di_G/dt = 1$ A/μs	repetitive, $I_T = 750$ A	100	A/μs
		non repetitive, $I_T = 250$ A	800	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}	$T_{VJ} = T_{VJM}$ $I_T = I_{TAVM}$	$t_P = 30$ μs $t_P = 500$ μs	120 60	W W
P_{GAV}			20	W
V_{RGM}			10	V
T_{VJ}			-40...+140	°C
T_{VJM}			140	°C
T_{stg}			-40...+125	°C
V_{ISOL}	50/60 Hz, RMS $I_{ISOL} \leq 1$ mA	t = 1 min t = 1 s	3000 3600	V~ V~
M_d	Mounting torque (M5) Terminal connection torque (M8)		2.5-5/22-44 12-15/106-132	Nm/lb.in. Nm/lb.in.
Weight	Typical including screws		320	g
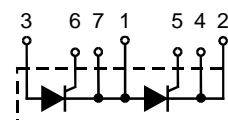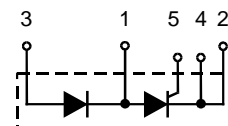
Features
• International standard package
• Direct copper bonded Al_2O_3-ceramic base plate
• Planar passivated chips
• Isolation voltage 3600 V~
• UL registered, E 72873
• Keyed gate/cathode twin pins

Applications
• Motor control
• Power converter
• Heat and temperature control for industrial furnaces and chemical processes
• Lighting control
• Contactless switches

Advantages
• Space and weight savings
• Simple mounting
• 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

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Symbol	Test Conditions		Characteristic Values	
I_{RRM}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$; $V_D = V_{DRM}$		70	mA
I_{DRM}			40	mA
V_T, V_F	I_T, $I_F = 600$ A; $T_{VJ} = 25°C$		1.53	V
V_{T0}	For power-loss calculations only ($T_{VJ} = 140°C$)		0.9	V
r_T			1.0	mΩ
V_{GT}	$V_D = 6$ V;	$T_{VJ} = 25°C$	2	V
		$T_{VJ} = -40°C$	3	V
I_{GT}	$V_D = 6$ V;	$T_{VJ} = 25°C$	150	mA
		$T_{VJ} = -40°C$	200	mA
V_{GD}	$T_{VJ} = T_{VJM}$;	$V_D = 2/3$ V_{DRM}	0.25	V
I_{GD}			10	mA
I_L	$T_{VJ} = 25°C$; $t_P = 30$ µs; $V_D = 6$ V $I_G = 0.45$ A; $di_G/dt = 0.45$ A/µs		200	mA
I_H	$T_{VJ} = 25°C$; $V_D = 6$ V; $R_{GK} = \infty$		150	mA
t_{gd}	$T_{VJ} = 25°C$; $V_D = 1/2$ V_{DRM} $I_G = 1$ A; $di_G/dt = 1$ A/µs		2	µs
t_q	$T_{VJ} = T_{VJM}$; $I_T = 300$ A, $t_P = 200$ µs; $-di/dt = 10$ A/µs typ. $V_R = 100$ V; $dv/dt = 50$ V/µs; $V_D = 2/3$ V_{DRM}		200	µs
Q_S	$T_{VJ} = 125°C$; I_T, $I_F = 400$ A, $-di/dt = 50$ A/µs		760	µC
I_{RM}			275	A
R_{thJC}	per thyristor/diode; DC current	other values	0.139	K/W
	per module	see Fig. 8/9	0.0695	K/W
R_{thJK}	per thyristor/diode; DC current		0.179	K/W
	per module		0.0895	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/s²

Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red
Type **ZY 180L**　(L = Left for pin pair 4/5)　}　UL 758, style 1385,
Type **ZY 180R**　(R = right for pin pair 6/7) }　CSA class 5851, guide 460-1-1

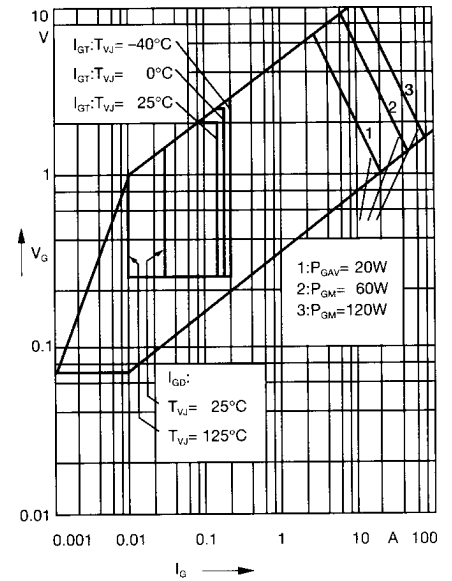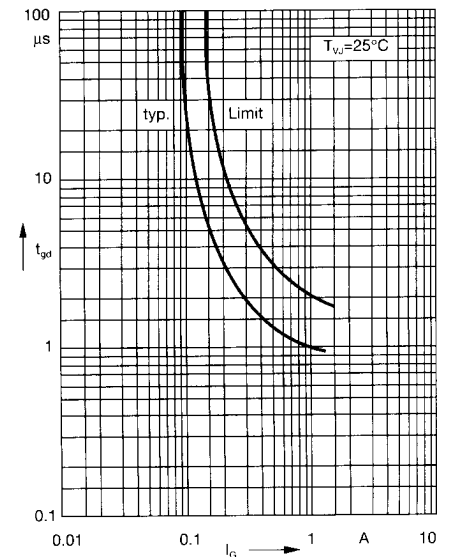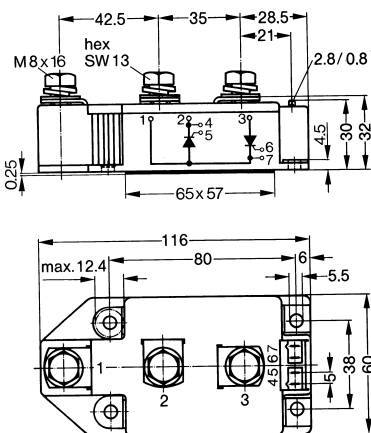**Dimensions in mm (1 mm = 0.0394")**

MCC

MCD

Fig. 1　Gate trigger characteristics
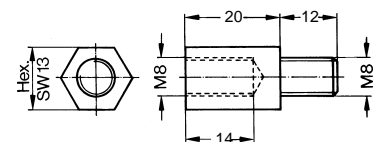

Fig. 2　Gate trigger delay time
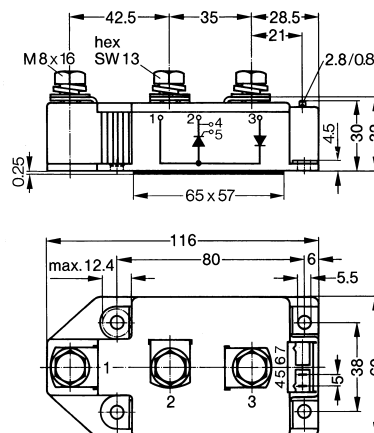
Threaded spacer for higher Anode/
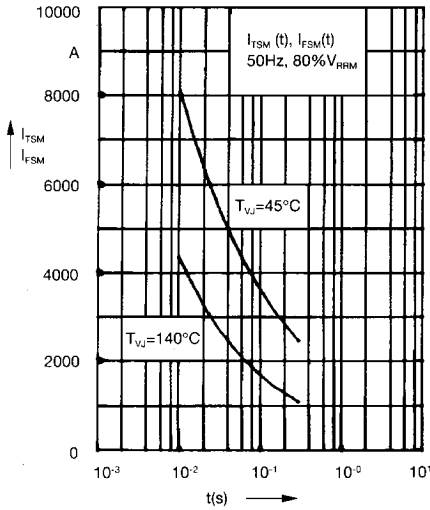Cathode construction:
Type **ZY 250**, material brass

Fig. 3 Surge overload current
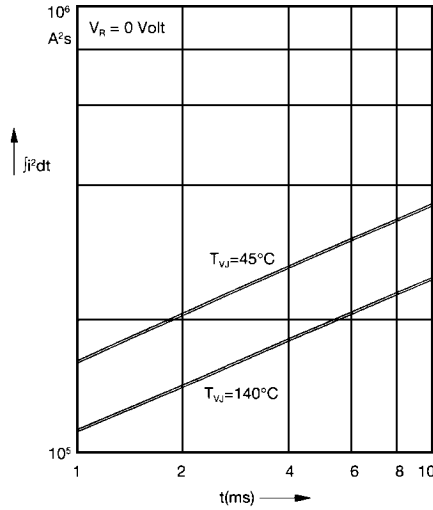I_{TSM}, I_{FSM}: Crest value, t: duration
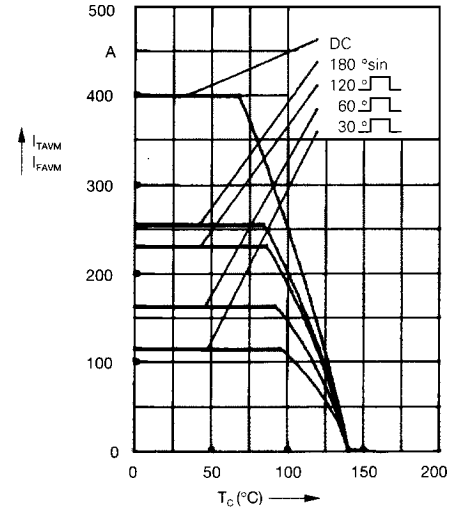
Fig. 4 $\int i^2 dt$ versus time (1-10 ms)

Fig. 4a Maximum forward current
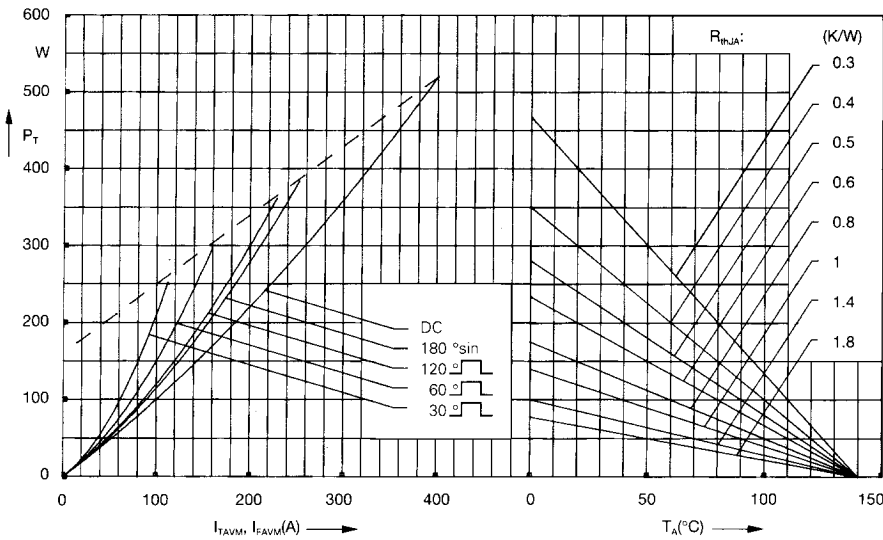at case temperature

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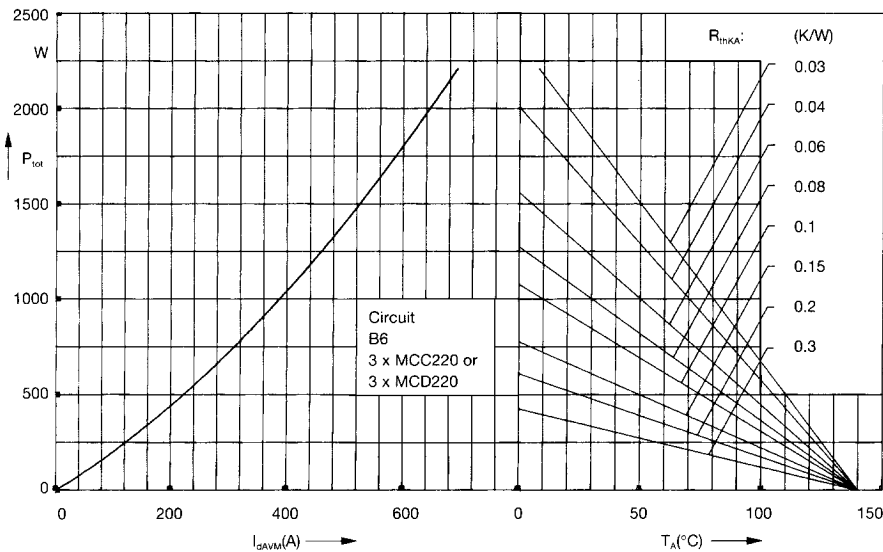temperature (per thyristor or
diode)

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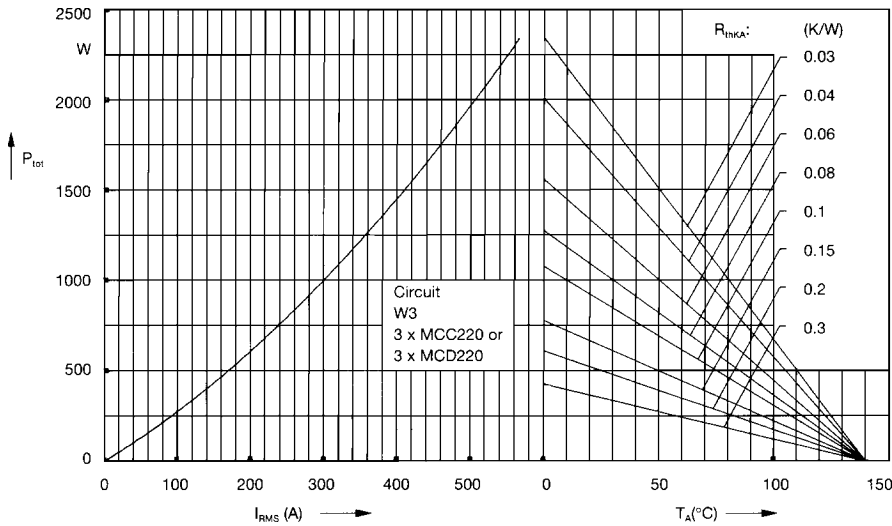output current and ambient
temperature

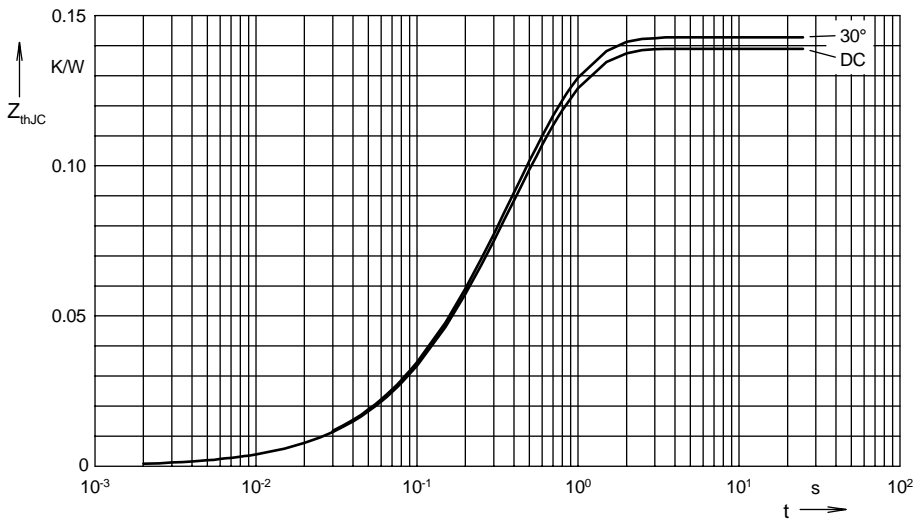**Fig. 7** Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

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	0.139
180°C	0.141
120°C	0.142
60°C	0.142
30°C	0.143

Constants for Z_{thJC} calculation:

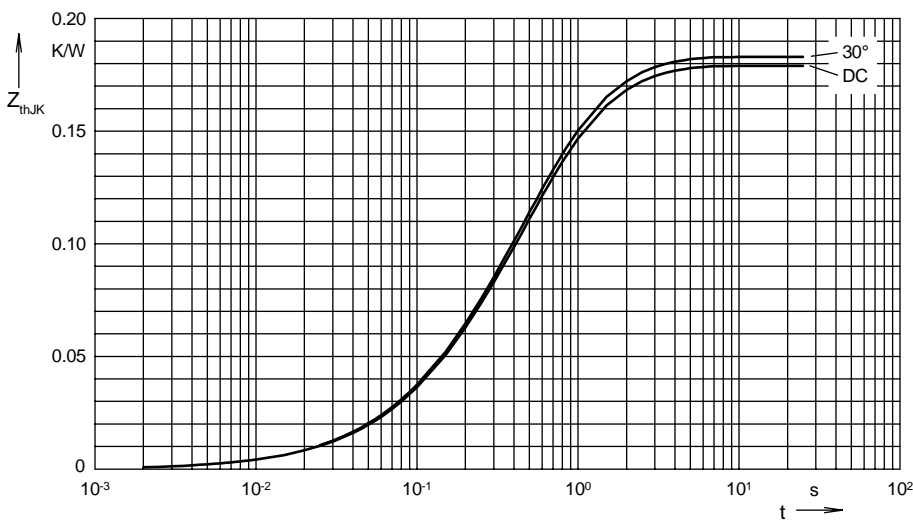| i	R_{thi} (K/W)	t_i (s)
1	0.0037	0.0099
2	0.0177	0.168
3	0.1175	0.456

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	0.179
180°C	0.181
120°C	0.182
60°C	0.183
30°C	0.183

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0037	0.0099
2	0.0177	0.168
3	0.1175	0.456
4	0.04	1.36

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