

Thyristor Modules

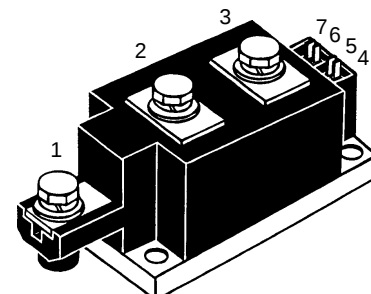
Thyristor/Diode Modules

$$I_{TRMS} = 2 \times 400 \text{ A}$$

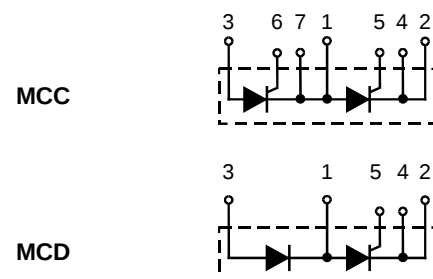
$$I_{TAVM} = 2 \times 240 \text{ A}$$

$$V_{RRM} = 2000\text{-}2200 \text{ V}$$

V_{RSM}	V_{RRM}	Type	
V_{DSM}	V_{DRM}		
V	V		
2100	2000	MCC 224-20io1	MCD 224-20io1
2300	2200	MCC 224-22io1	MCD 224-22io1



Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		400	A
I_{TAVM}	$T_C = 85^\circ\text{C}; 180^\circ \text{ sine}$		240	A
I_{TSM}	$T_{VJ} = 45^\circ\text{C};$	$t = 10 \text{ ms (50 Hz)}$	8000	A
	$V_R = 0$	$t = 8.3 \text{ ms (60 Hz)}$	8500	A
	$T_{VJ} = T_{VJM}$	$t = 10 \text{ ms (50 Hz)}$	7000	A
	$V_R = 0$	$t = 8.3 \text{ ms (60 Hz)}$	7500	A
$\int i^2 dt$	$T_{VJ} = 45^\circ\text{C}$	$t = 10 \text{ ms (50 Hz)}$	320000	A^2s
	$V_R = 0$	$t = 8.3 \text{ ms (60 Hz)}$	303000	A^2s
	$T_{VJ} = T_{VJM}$	$t = 10 \text{ ms (50 Hz)}$	245000	A^2s
	$V_R = 0$	$t = 8.3 \text{ ms (60 Hz)}$	240000	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ repetitive, $I_T = 750 \text{ A}$	$f = 50 \text{ Hz}, t_p = 200 \mu\text{s}$	100	$\text{A}/\mu\text{s}$
	$V_D = 2/3 V_{DRM}$ non repetitive, $I_T = I_{TAVM}$	$I_G = 1 \text{ A}$	500	$\text{A}/\mu\text{s}$
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}; V_{DR} = 2/3 V_{DRM}$		1000	$\text{V}/\mu\text{s}$
	$R_{GK} = \infty$; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	$t_p = 30 \mu\text{s}$	120	W
P_{GAV}	$I_T = I_{TAVM}$	$t_p = 500 \mu\text{s}$	60	W
V_{RGM}			20	W
T_{VJ}			10	V
T_{VJM}			-40 ...130	$^\circ\text{C}$
T_{stg}			130	$^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS	$t = 1 \text{ min}$	3000	V~
	$I_{ISOL} \leq 1 \text{ mA}$	$t = 1 \text{ s}$	3600	V~
M_d	Mounting torque (M6)		4.5-7/40-62	Nm/lb.in.
	Terminal connection torque (M8)		11-13/97-115	Nm/lb.in.
Weight	Typical including screws		750	g



Features

- International standard package
- **Direct Copper Bonded** Al_2O_3 -ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered E 72873
- Keyed gate/cathode twin pins

Applications

- Motor control, softstarter
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Solid state switches

Advantages

- 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

Symbol	Test Conditions	Characteristic Values	
I_{RRM}, I_{DRM}	$T_{VJ} = T_{VJM}; V_R = V_{RRM}$	40	mA
V_T	$I_T = 600 \text{ A}; T_{VJ} = 25^\circ\text{C}$	1.4	V
V_{T0}	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.8	V
r_T		0.76	mΩ
V_{GT}	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	2	V
	$T_{VJ} = -40^\circ\text{C}$	3	V
I_{GT}	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	150	mA
	$T_{VJ} = -40^\circ\text{C}$	220	mA
V_{GD}	$T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$	0.25	V
I_{GD}	$T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$	10	mA
I_L	$T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; t_p = 30 \mu\text{s}$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}; I_G = 0.45 \text{ A}$	200	mA
I_H	$T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$	150	mA
t_{gd}	$T_{VJ} = 25^\circ\text{C}; V_D = 1/2 V_{DRM}$ $di_G/dt = 1 \text{ A}/\mu\text{s}; I_G = 1 \text{ A}$	2	μs
t_q	$T_{VJ} = T_{VJM}; V_R = 100 \text{ V}; V_D = 2/3 V_{DRM}; t_p = 200 \mu\text{s}$ $dv/dt = 50 \text{ V}/\mu\text{s}; I_T = 300 \text{ A}; -di/dt = 10 \text{ A}/\mu\text{s}$	typ. 200	μs
Q_S	$T_{VJ} = T_{VJM}$ $-di/dt = 50 \text{ A}/\mu\text{s}; I_T = 400 \text{ A}$	760	μC
I_{RM}		275	A
R_{thJC}	per thyristor; DC current	0.139	K/W
	per module	0.069	K/W
R_{thJK}	per thyristor; DC current	0.179	K/W
	per module	0.089	K/W
d_s	Creeping distance on surface	12.7	mm
d_a	Creepage distance in air	9.6	mm
a	Maximum allowable acceleration	50	m/s ²

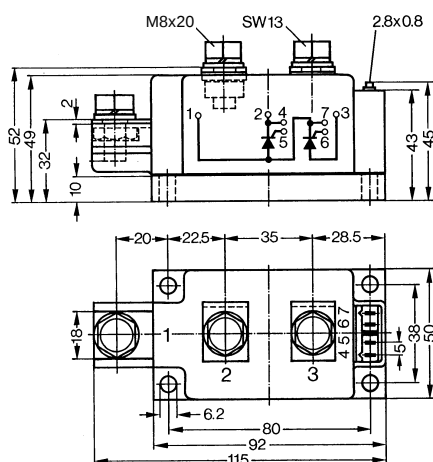
Optional accessories for modules

Keyed Gate/Cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red

Type ZY 180 L (L = Left for pin pair 4/5) } UL 758, style 1385,
Type ZY 180 R (R = Right for pin pair 6/7) } CSA class 5851, guide 460-1-1

Dimensions in mm (1 mm = 0.0394")

MCC



MCD

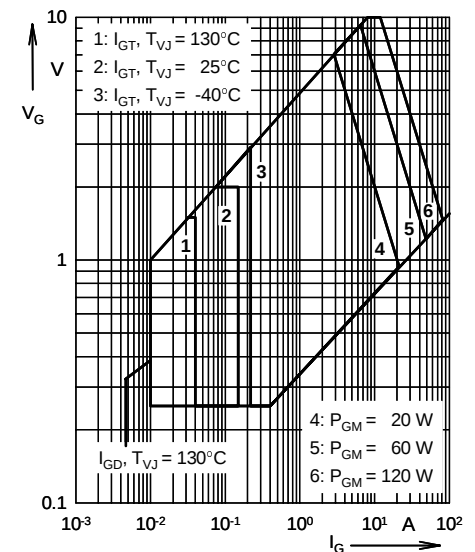
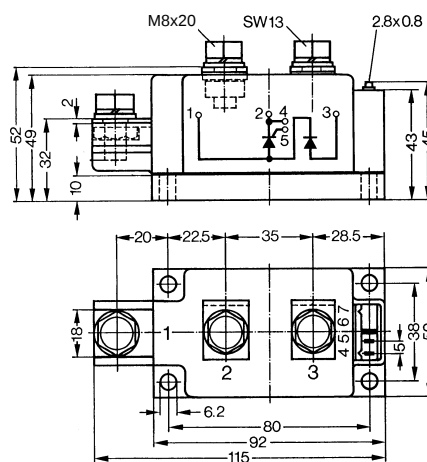


Fig. 1 Gate trigger characteristics

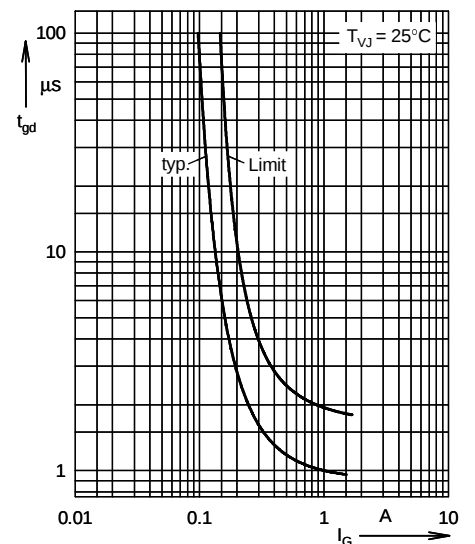


Fig. 2 Gate trigger delay time

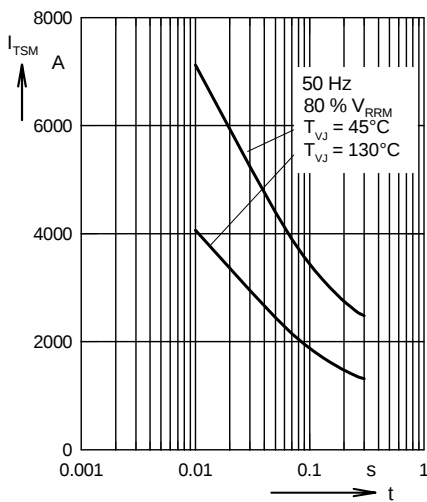


Fig. 3 Surge overload current
 I_{TSM} : Crest value, t : duration

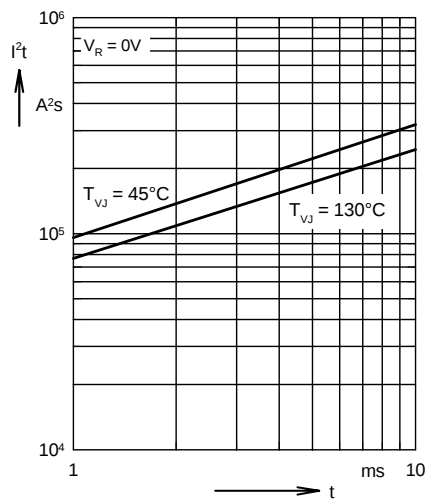


Fig. 4 I^2t versus time (1-10 ms)

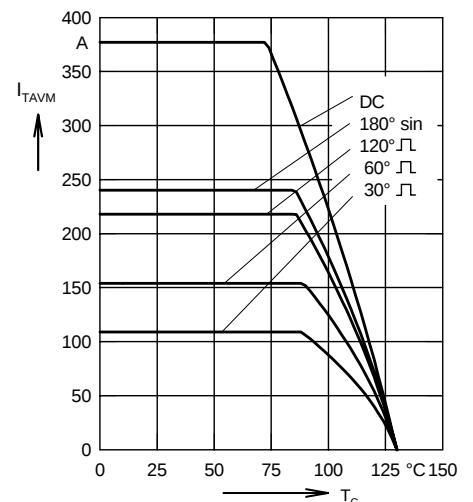


Fig. 4a Maximum forward current
at case temperature

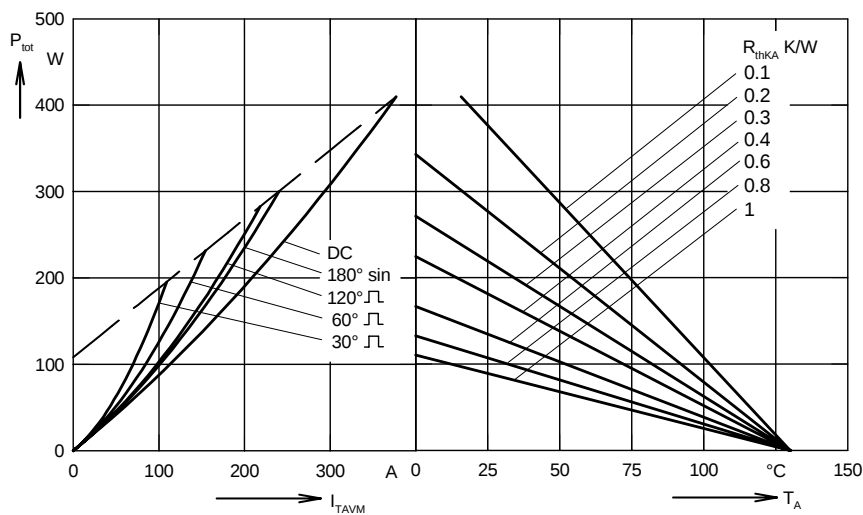


Fig. 5 Power dissipation versus on-state current and ambient temperature (per thyristor or diode)

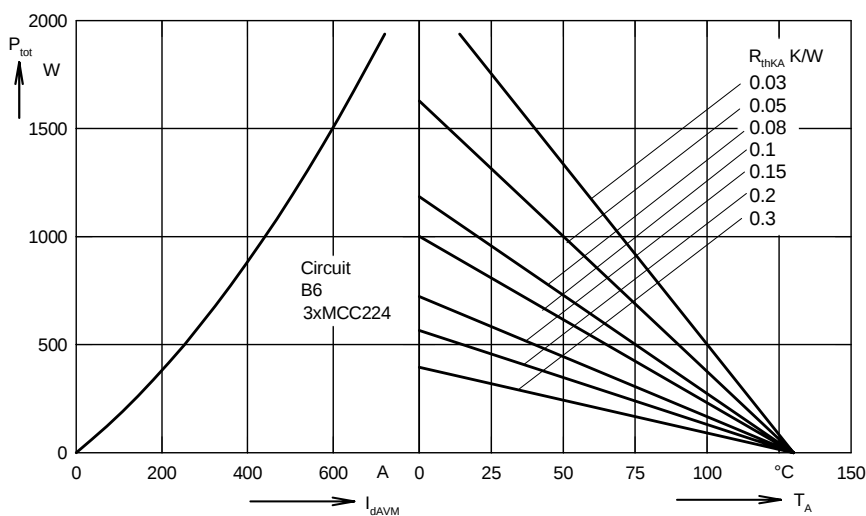


Fig. 6 Three phase rectifier bridge:
Power dissipation versus direct output current and ambient temperature

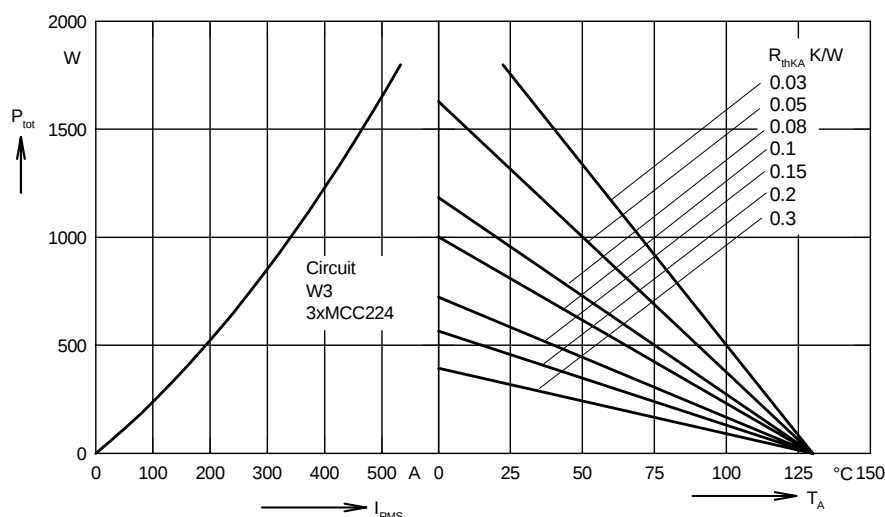


Fig. 7 Three phase AC-controller:
Power dissipation versus RMS
output current and ambient
temperature

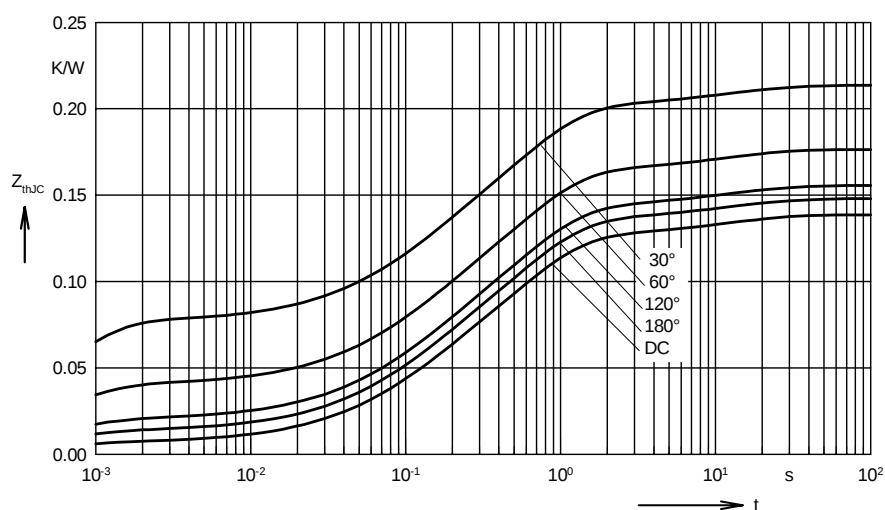


Fig. 8 Transient thermal impedance
junction to case (per thyristor or
diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.139
180°	0.148
120°	0.156
60°	0.176
30°	0.214

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0067	0.00054
2	0.0358	0.098
3	0.0832	0.54
4	0.0129	12

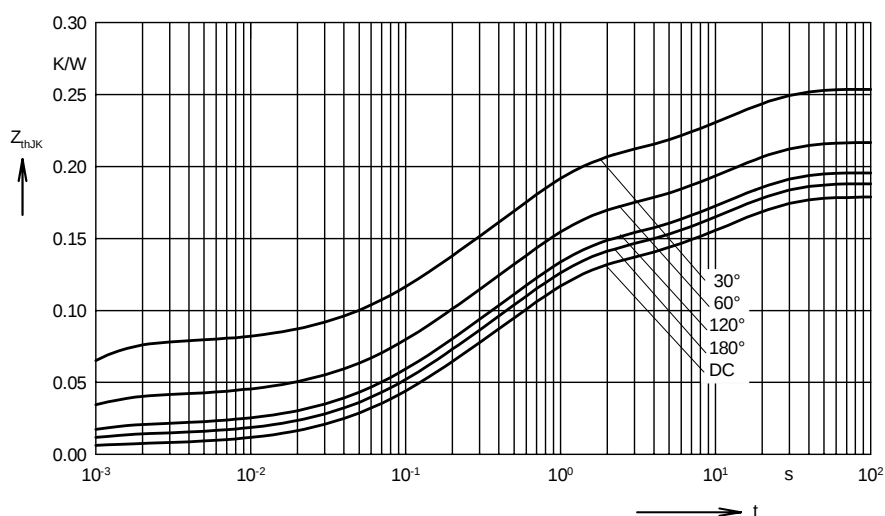


Fig. 9 Transient thermal impedance
junction to heatsink (per thyristor
or diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.179
180°	0.188
120°	0.196
60°	0.216
30°	0.256

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0067	0.00054
2	0.0358	0.098
3	0.0832	0.54
4	0.0129	12
5	0.04	12