IXYS

High Power Thyristor Modules

I_{TRMS} = 880 A
$I_{T(AV)M}$ = 560 A
V_{RRM} = 1200-1800 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type
V	V	
1300	1200	MCO 500-12io1
1500	1400	MCO 500-14io1
1700	1600	MCO 500-16io1
1900	1800	MCO 500-18io1
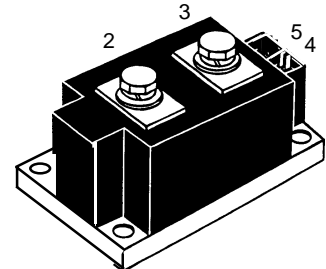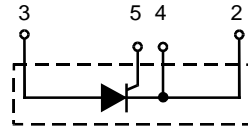
Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		880	A
$I_{T(AV)M}$	$T_C = 85°C$; 180° sine		560	A
I_{TSM}	$T_{VJ} = 45°C$	t = 10 ms (50 Hz)	17000	A
	$V_R = 0$	t = 8.3 ms (60 Hz)	16000	A
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	13000	A
	$V_R = 0$	t = 8.3 ms (60 Hz)	14400	A
I^2t	$T_{VJ} = 45°C$	t = 10 ms (50 Hz)	1445000	A^2s
	$V_R = 0$	t = 8.3 ms (60 Hz)	1062000	A^2s
	$T_{VJ} = T_{VJM}$	t = 10 ms (50 Hz)	845000	A^2s
	$V_R = 0$	t = 8.3 ms (60 Hz)	813000	A^2s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$	repetitive, I_T = 960 A	100	$A/\mu s$
	f = 50 Hz, $t_P = 200$ µs			
	$V_D = 2/3 V_{DRM}$			
	I_G = 1 A,	non repetitive, $I_T = I_{T(AV)M}$	500	$A/\mu s$
	di_G/dt = 1 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = 2/3 V_{DRM}$		1000	$V/\mu s$
	$R_{GK} = \infty$; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	$I_T = I_{T(AV)M}$	t_P = 500 µs	60	W
P_{GAV}			30	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 t = 1 min		3000	V~
	$I_{ISOL} \leq 1$ mA t = 1 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		650	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 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}	$T_{VJ} = T_{VJM}$; $V_R = V_{RRM}$	40	mA
V_T	$I_T = 1200$ A; $T_{VJ} = 25°C$	1.3	V
V_{T0}	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.8	V
r_T		0.38	$m\Omega$
V_{GT}	$V_D = 6$ V; $T_{VJ} = 25°C$	2	V
	$T_{VJ} = -40°C$	3	V
I_{GT}	$V_D = 6$ V; $T_{VJ} = 25°C$	300	mA
	$T_{VJ} = -40°C$	400	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	$T_{VJ} = 25°C$; $V_D = 6$ V; $t_P = 30\ \mu s$ $di_G/dt = 1$ A/μs; $I_G = 1$ A	400	mA
I_H	$T_{VJ} = 25°C$; $V_D = 6$ V; $R_{GK} = \infty$	300	mA
t_{gd}	$T_{VJ} = 25°C$; $V_D = 1/2\ V_{DRM}$ $di_G/dt = 1$ A/μs; $I_G = 1$ A	2	μs
t_q	$T_{VJ} = T_{VJM}$; $V_R = 100$ V; $V_D = 2/3\ V_{DRM}$; $t_P = 200\ \mu s$ $dv/dt = 50$ V/μs; $I_T = 500$ A; $-di/dt = 10$ A/μs	typ. 350	μs
R_{thJC}	DC current	0.072	K/W
R_{thJK}	DC current	0.096	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/s²

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,
CSA class 5851, guide 460-1-1

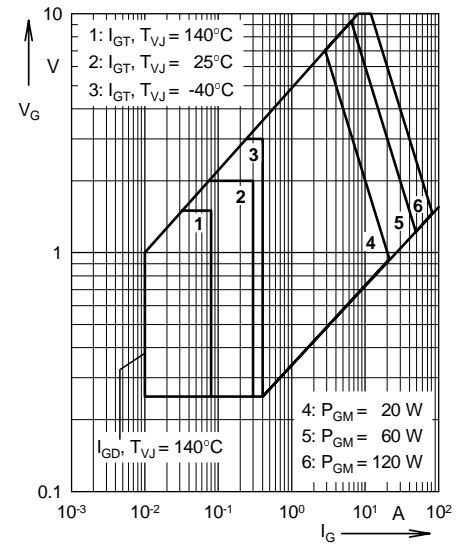Fig. 1 Gate trigger characteristics
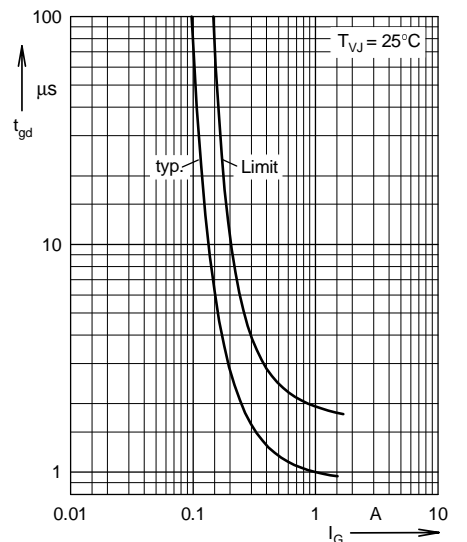
Fig. 2 Gate trigger delay time

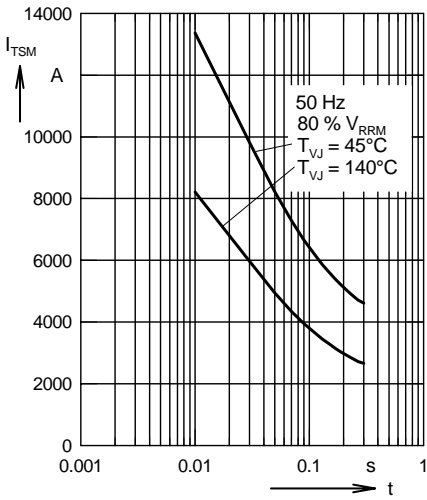**Dimensions in mm (1 mm = 0.0394")**

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

50 Hz
80 % V_{RRM}
$T_{VJ} = 45°C$
$T_{VJ} = 140°C$
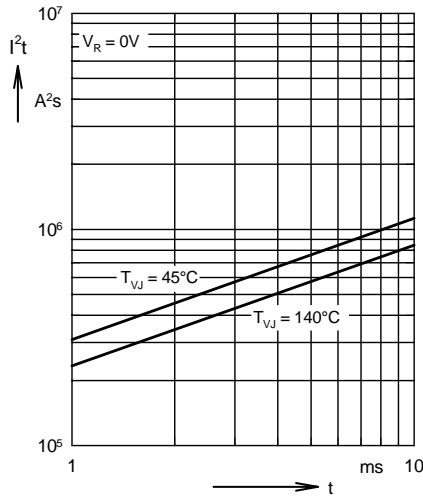
Fig. 4 ∫i²dt versus time (1-10 ms)

$V_R = 0V$

$T_{VJ} = 45°C$
$T_{VJ} = 140°C$
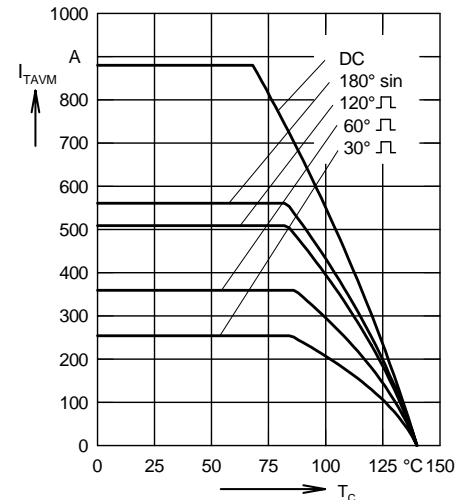
Fig. 5 Maximum forward current at case temperature

DC
180° sin
120° ⊓
60° ⊓
30° ⊓
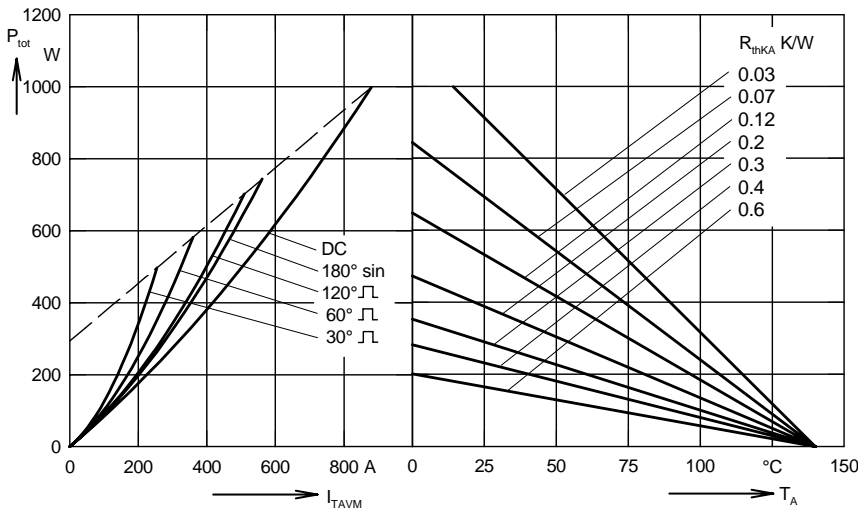
Fig. 6 Power dissipation versus on-state current and ambient temperature

R_{thKA} K/W
0.03
0.07
0.12
0.2
0.3
0.4
0.6

DC
180° sin
120° ⊓
60° ⊓
30° ⊓
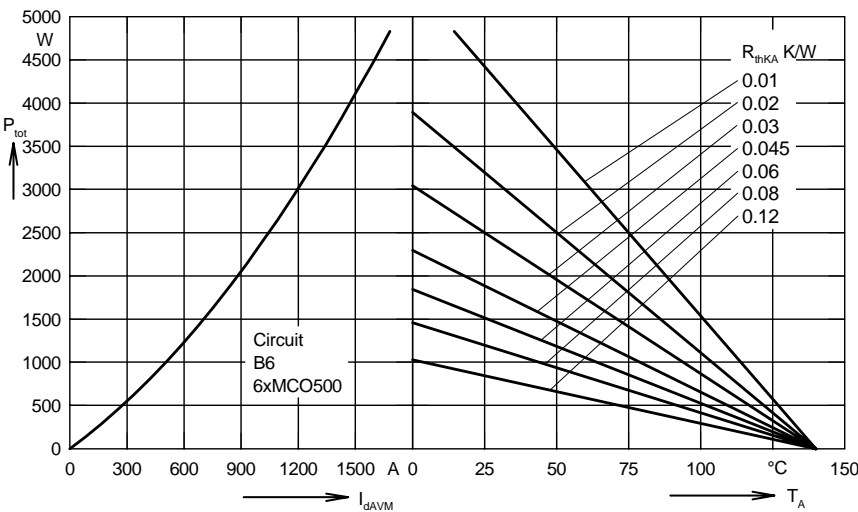
Fig. 7 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

R_{thKA} K/W
0.01
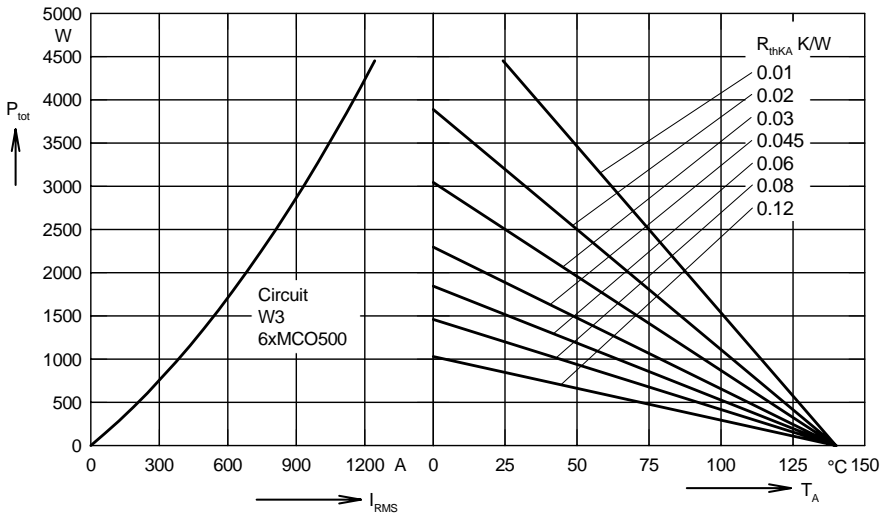0.02
0.03
0.045
0.06
0.08
0.12

Circuit
B6
6xMCO500

Fig. 8 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature
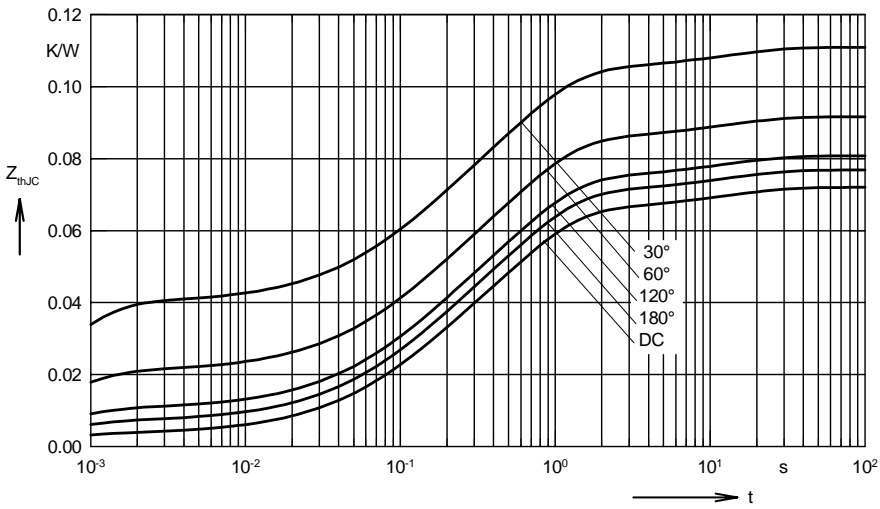

Fig. 9 Transient thermal impedance junction to case (per thyristor)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.072
180°	0.0768
120°	0.081
60°	0.092
30°	0.111

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12

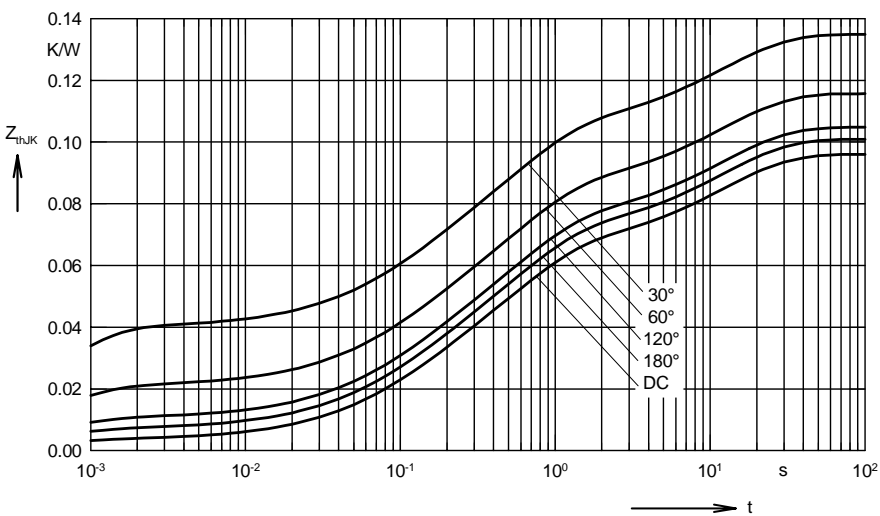Fig.10 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} (K/W)
DC	0.096
180°	0.1
120°	0.105
60°	0.116
30°	0.135

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0035	0.0054
2	0.0186	0.098
3	0.0432	0.54
4	0.0067	12
5	0.024	12