High Power Single Thyristor Module

I_{TRMS} = 750 A
I_{TAV} = 464 A
V_{RRM} = 2000-2200 V

V_{RSM} V_{DSM}	V_{RRM} V_{DRM}	Type
V	V	
2100	2000	MCO 450-20io1
2300	2200	MCO 450-22io1

Symbol	Test Conditions		Maximum Ratings	
I_{TRMS}	$T_{VJ} = T_{VJM}$		750	A
I_{TAV}	$T_C = 85°C$; 180° sine		464	A
I_{TSM}	$T_{VJ} = 45°C$	t = 10 ms (50 Hz)	15000	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)	1125000	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/µs
	f = 50 Hz, t_P = 200 µs			
	$V_D = 2/3\ V_{DRM}$			
	I_G = 1 A, non repetitive, $I_T = I_{TAVM}$		500	A/µs
	di_G/dt = 1 A/µs			
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = 2/3\ V_{DRM}$		1000	V/µs
	$R_{GK} = \infty$; method 1 (linear voltage rise)			
P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	120	W
	I_T = I_{TAVM}	t_P = 500 µs	60	W
P_{GAV}			30	W
V_{RGM}			10	V
T_{VJ}			-40...130	°C
T_{VJM}			130	°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

- Direct copper bonded Al_2O_3-ceramic with copper base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL applied
- Keyed gate/cathode twin pins

Applications

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

Advantages

- 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	$I_T = 600\,A$; $T_{VJ} = 25°C$	1.15	V
V_{T0}	For power-loss calculations only ($T_{VJ} = T_{VJM}$)	0.77	V
r_T		0.42	mΩ
V_{GT}	$V_D = 6\,V$; $T_{VJ} = 25°C$	2	V
	$T_{VJ} = -40°C$	3	V
I_{GT}	$V_D = 6\,V$; $T_{VJ} = 25°C$	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	$T_{VJ} = 25°C$; $V_D = 6\,V$; $t_P = 30\,\mu s$ $di_G/dt = 1\,A/\mu s$; $I_G = 1\,A$	400	mA
I_H	$T_{VJ} = 25°C$; $V_D = 6\,V$; $R_{GK} = \infty$	300	mA
t_{gd}	$T_{VJ} = 25°C$; $V_D = 1/2\,V_{DRM}$ $di_G/dt = 1\,A/\mu s$; $I_G = 1\,A$	2	μs
t_q	$T_{VJ} = T_{VJM}$; $V_R = 100\,V$; $V_D = 2/3\,V_{DRM}$; $t_P = 200\,\mu s$ $dv/dt = 50\,V/\mu s$; $I_T = 500\,A$; $-di/dt = 10\,A/\mu s$	typ. 350	μs
R_{thJC}	DC current	0.072	K/W
R_{thJK}	DC current	0.096	K/W
d_S	Creep distance on surface	12.7	mm
d_A	Strike 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, File E 38136,
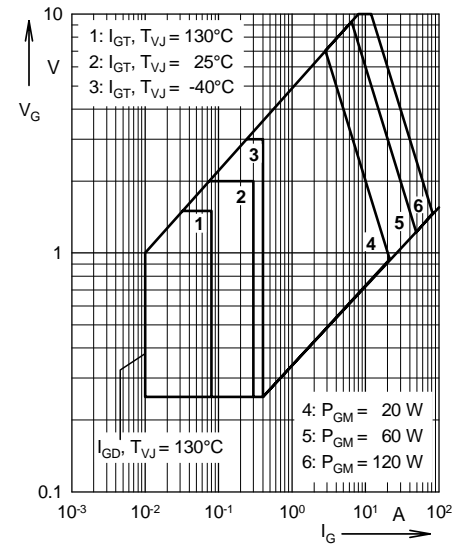CSA class 5851, guide 460-1-1, appl. 41234
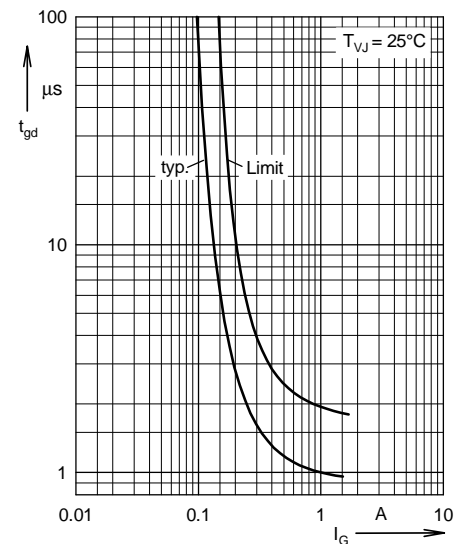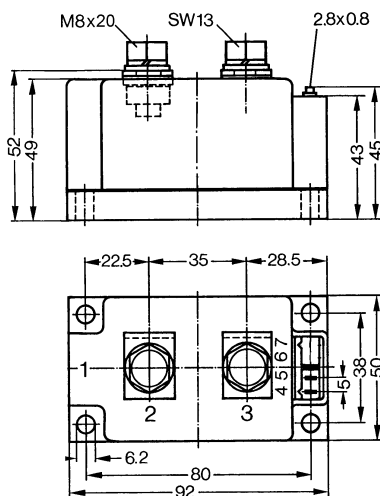

Fig. 1 Gate trigger characteristics

Fig. 2 Gate trigger delay time
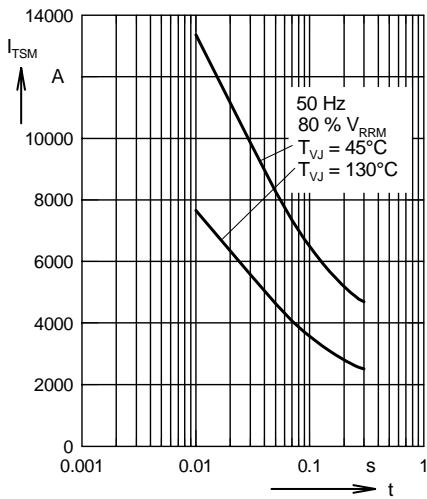
Dimensions in mm (1 mm = 0.0394")

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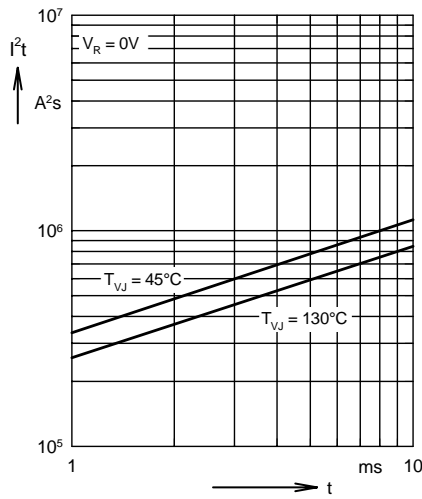I_{TSM}: Crest value, t: duration
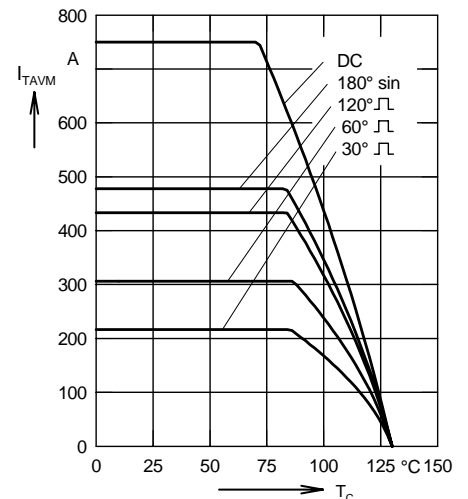

Fig. 4 I²t versus time (1-10 ms)

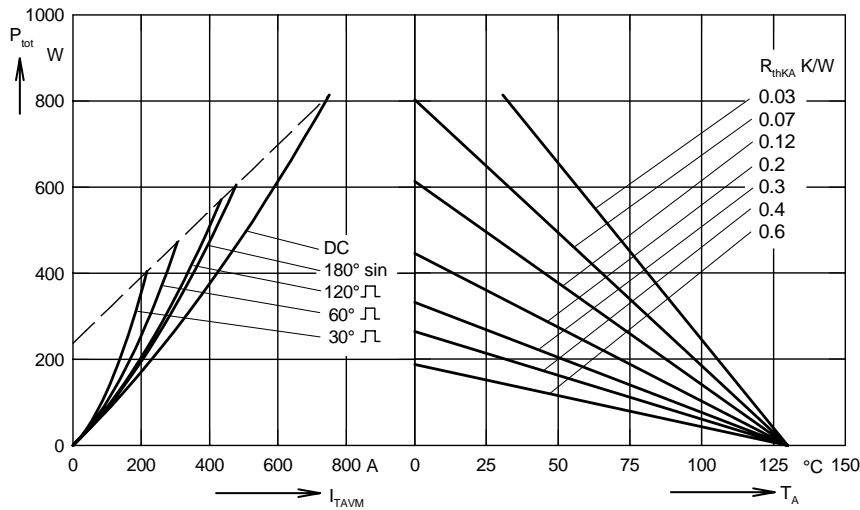Fig. 5 Maximum forward current
at case temperature

Fig. 6 Power dissipation versus on-
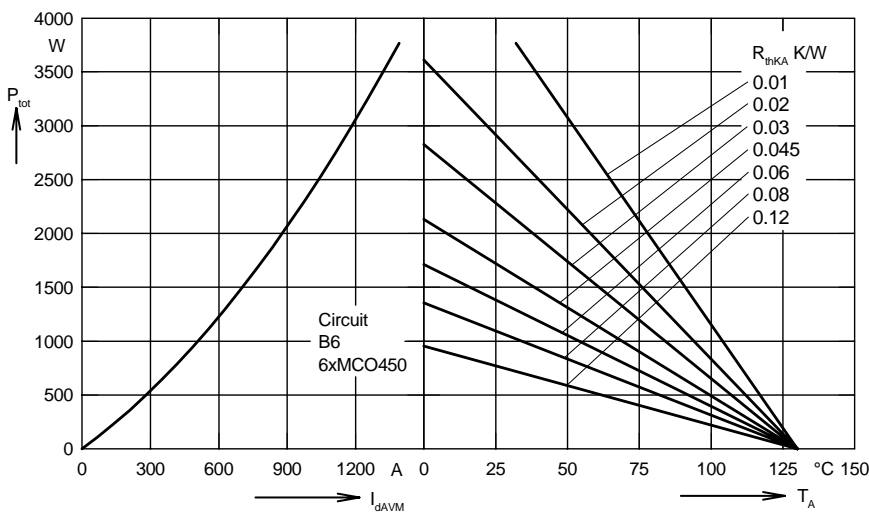state current and ambient
temperature

Fig. 7 Three phase rectifier bridge:
Power dissipation versus direct
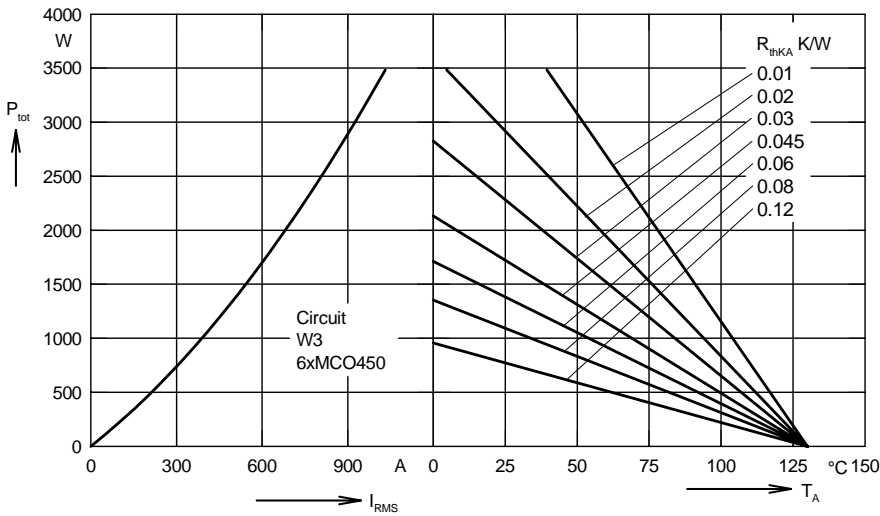output current and ambient
temperature

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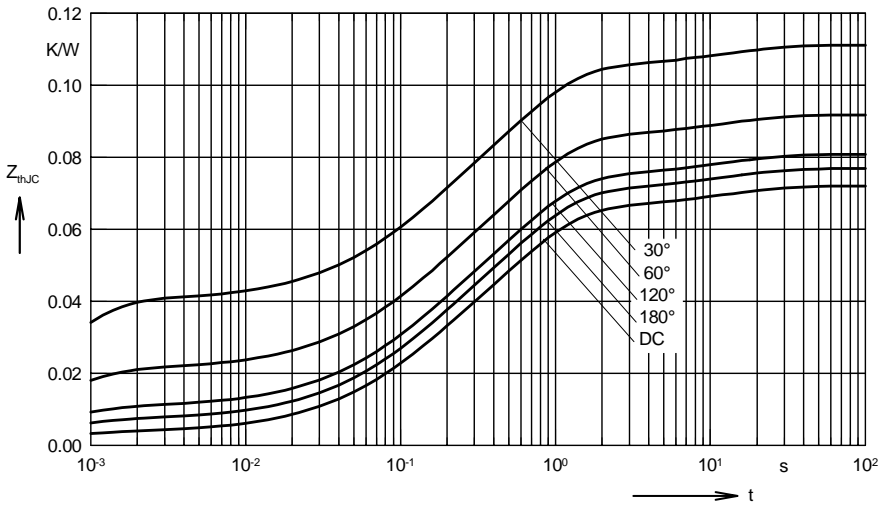

Fig. 9 Transient thermal impedance junction to case

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

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