

Thyristor Modules

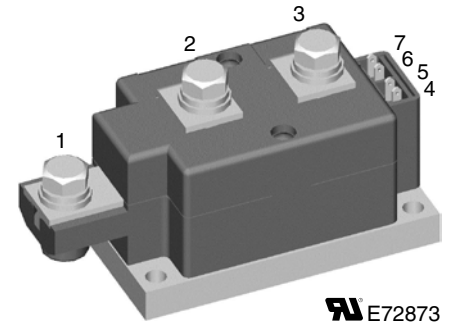
Thyristor/Diode Modules

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

$$I_{TAVM} = 2 \times 221 \text{ A}$$

$$V_{RRM} = 1200-1800 \text{ V}$$

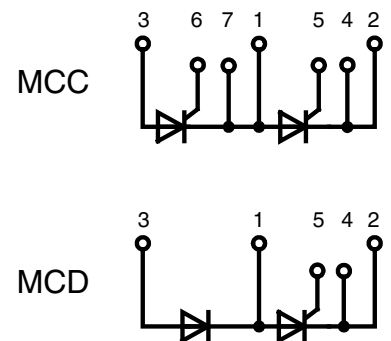
V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
1300	1200	MCC 225-12io1	MCD 225-12io1
1500	1400	MCC 225-14io1	MCD 225-14io1
1700	1600	MCC 225-16io1	MCD 225-16io1
1900	1800	MCC 225-18io1	MCD 225-18io1



 E72873

Symbol	Conditions	Maximum Ratings	
I_{TRMS} , I_{FRMS}	$T_{VJ} = T_{VJM}$	400	A
I_{TAVM} , I_{FAVM}	$T_C = 85^{\circ}\text{C}$; 180° sine	221	A
I_{TSM} , I_{FSM}	$T_{VJ} = 45^{\circ}\text{C}$; $t = 10\text{ ms}$ (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
I^2t	$T_{VJ} = 45^{\circ}\text{C}$; $t = 10\text{ ms}$ (50 Hz)	320 000	A²s
	$V_R = 0$ $t = 8.3\text{ ms}$ (60 Hz)	300 000	A²s
	$T_{VJ} = T_{VJM}$; $t = 10\text{ ms}$ (50 Hz)	245 000	A²s
	$V_R = 0$ $t = 8.3\text{ ms}$ (60 Hz)	246 000	A²s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$; repetitive, $I_T = 750\text{ A}$	100	A/μs
	$f = 50\text{ Hz}$; $t_p = 200\text{ μs}$; $V_D = \frac{2}{3} V_{DRM}$; $I_G = 1\text{ A}$; non repetitive, $I_T = I_{TAVM}$ $di_G/dt = 1\text{ A/μs}$	500	A/μs
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_D = \frac{2}{3} V_{DRM}$; $R_{GK} = \infty$; method 1 (linear voltage rise)	1000	V/μs
P_{GM}	$T_{VJ} = T_{VJM}$; $t_p = 30\text{ μs}$	120	W
P_{GAV}	$I_T = I_{T(AV)M}$; $t_p = 500\text{ μs}$	60	W
		20	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 $t = 1\text{ min}$	3000	V~
	$I_{ISOL} \leq 1\text{ mA}$ $t = 1\text{ s}$	3600	V~
M_d	Mounting torque (M6)	4.5 - 7	Nm
	Terminal connection torque (M8)	11 - 13	Nm
Weight	Typical including screws	750	g

Data according to IEC 60747 and refer to a single diode unless otherwise stated.



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

Symbol	Conditions	Characteristic Values	
		typ.	max.
I_{RRM}, I_{DRM}	$V_R / V_D = V_{RRM} / V_{DRM}$ $T_{VJ} = T_{VJM}$		40 mA
V_T, V_F	$I_T, I_F = 600$ A $T_{VJ} = 25^\circ\text{C}$		1.4 V
V_{T0}	For power-loss calculations only		0.8 V
r_t	$T_{VJ} = T_{VJM}$		0.76 mΩ
V_{GT}	$V_D = 6$ V $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = -40^\circ\text{C}$		2 V 3 V
I_{GT}	$V_D = 6$ V $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = -40^\circ\text{C}$		150 mA 220 mA
V_{GD}	$V_D = 2/3 V_{DRM}$ $T_{VJ} = T_{VJM}$		0.25 V
I_{GD}			10 mA
I_L	$t_p = 30$ μs; $V_D = 6$ V $I_G = 0.45$ A; $di_G/dt = 0.45$ A/μs $T_{VJ} = 25^\circ\text{C}$		200 mA
I_H	$V_D = 6$ V; $R_{GK} = \infty$; $T_{VJ} = 25^\circ\text{C}$		150 mA
t_{gd}	$V_D = 1/2 V_{DRM}$ $I_G = 1$ A; $di_G/dt = 1$ A/μs $T_{VJ} = 25^\circ\text{C}$		2 μs
t_q	$V_D = 2/3 V_{DRM}$ $dv/dt = 50$ V/μs; $-di/dt = 10$ A/μs $I_T = 300$ A; $V_R = 100$ V; $t_p = 200$ μs $T_{VJ} = T_{VJM}$	200	μs
Q_S	$I_T = 300$ A; $-di/dt = 50$ A/μs $T_{VJ} = T_{VJM}$		760 μC
I_{RM}			275 A
R_{thJC}	per thyristor; DC current per module		0.157 K/W 0.079 K/W
R_{thJK}	per thyristor; DC current per module		0.197 K/W 0.099 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

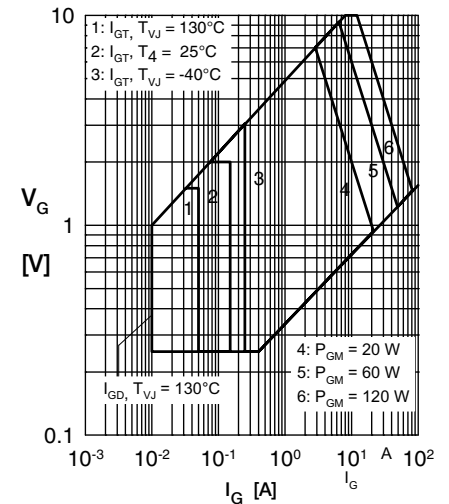


Fig. 1 Forward characteristics

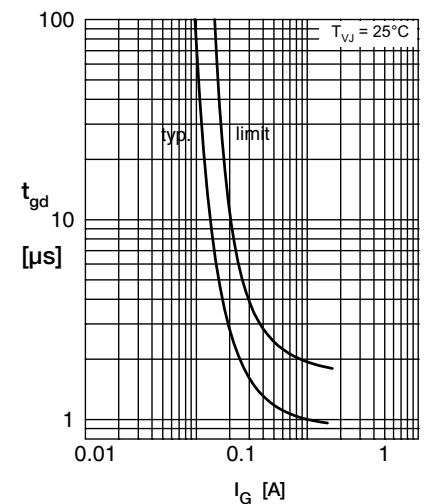


Fig. 2 Gate trigger characteristics

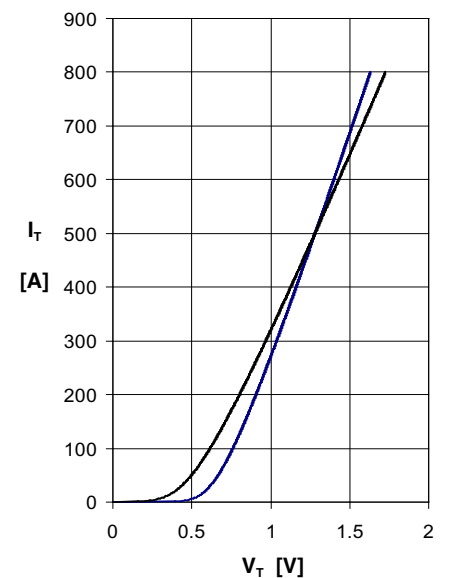


Fig. 2a Forward voltage drop

Technical drawing of a 3-axis piezoelectric force transducer, showing front and side views with dimensions and labels.

Front View (Top):

- Overall width: 115
- Overall height: 50
- Mounting holes: 4 holes, 6.2 diameter, spaced 20, 22.5, 35, and 28.5 from the left edge.
- Central section: 80 wide, 92 high.
- Right section: 28.5 wide, 45 high.
- Bottom section: 18 high.

Side View (Bottom):

- Overall width: 115
- Overall height: 50
- Mounting holes: 4 holes, 6.2 diameter, spaced 20, 22.5, 35, and 28.5 from the left edge.
- Central section: 80 wide, 92 high.
- Right section: 28.5 wide, 45 high.
- Bottom section: 18 high.

Labels:

- M8 x 20
- SW 13
- 2.8 x 0.8
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Type ZY 180L (L = Left for pin pair 4/5)
Type ZY 180R (R = Right for pin pair 6/7) } UL 758, style 3751

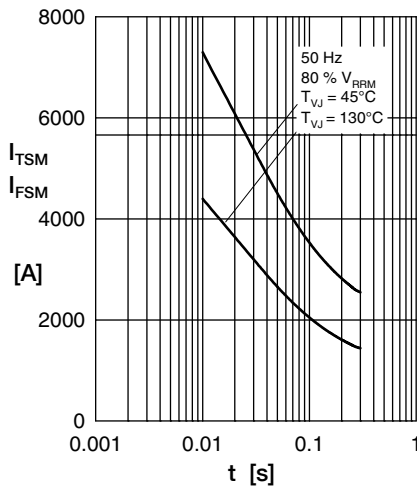


Fig. 3 Surge overload current
 $I_{TSM/FSM}$: Crest value, t : duration

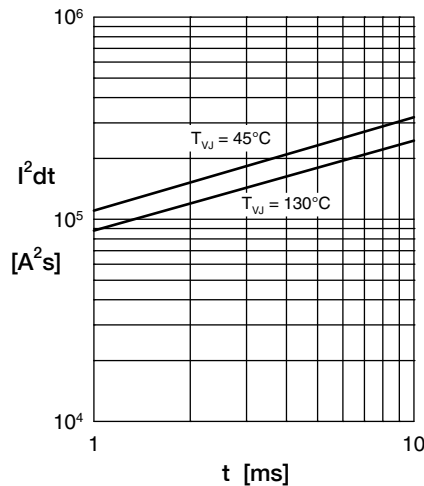


Fig. 4 I^2dt versus time

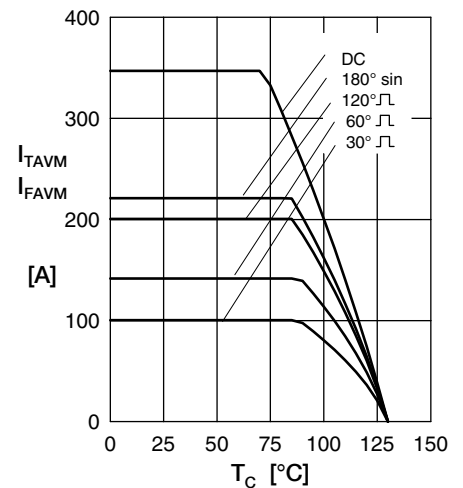


Fig. 4a Max. forward current
at case temperature

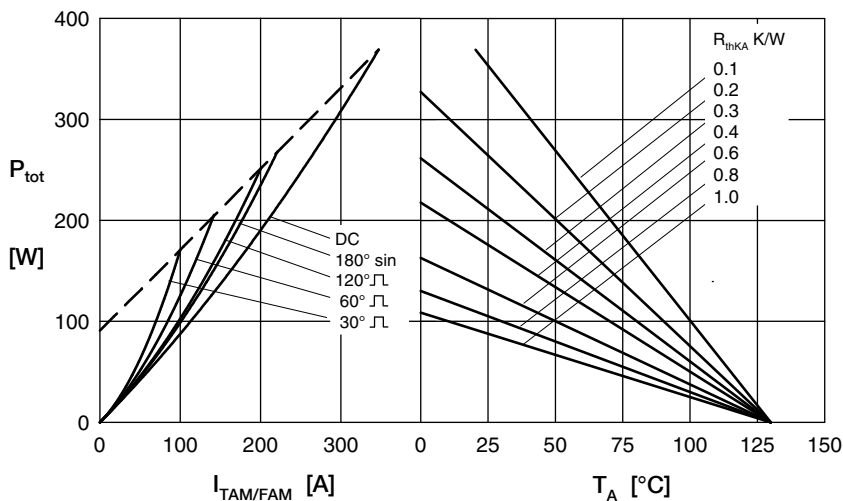


Fig. 5 Power dissipation versus on-state current and
ambient temperature (per thyristor or diode)

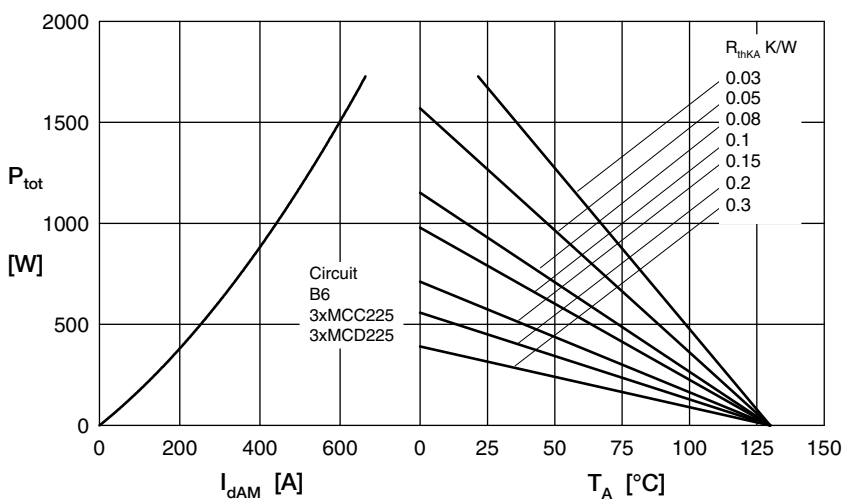


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct
output current and ambient temperature

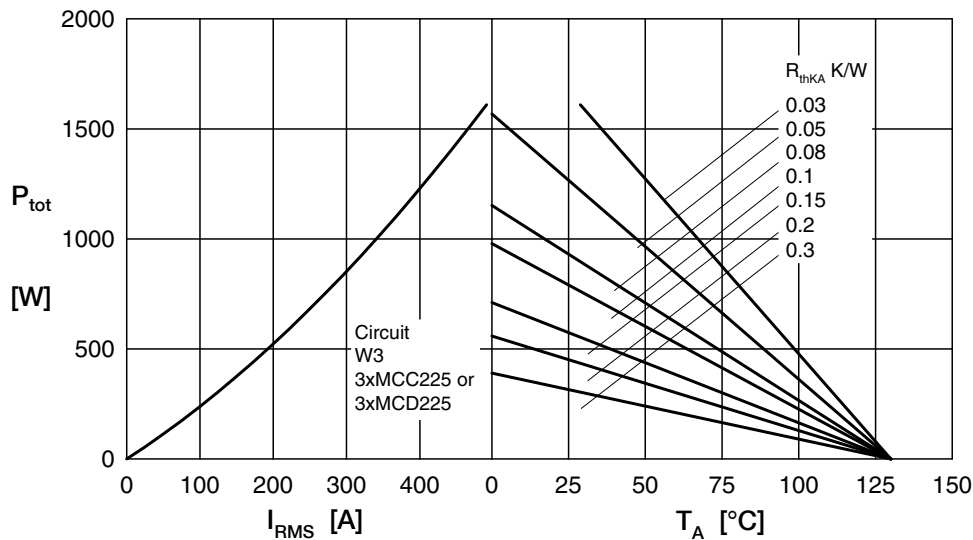


Fig. 7 Three phase AC-controller: Power dissipation versus R_{MS} output current and ambient temperature

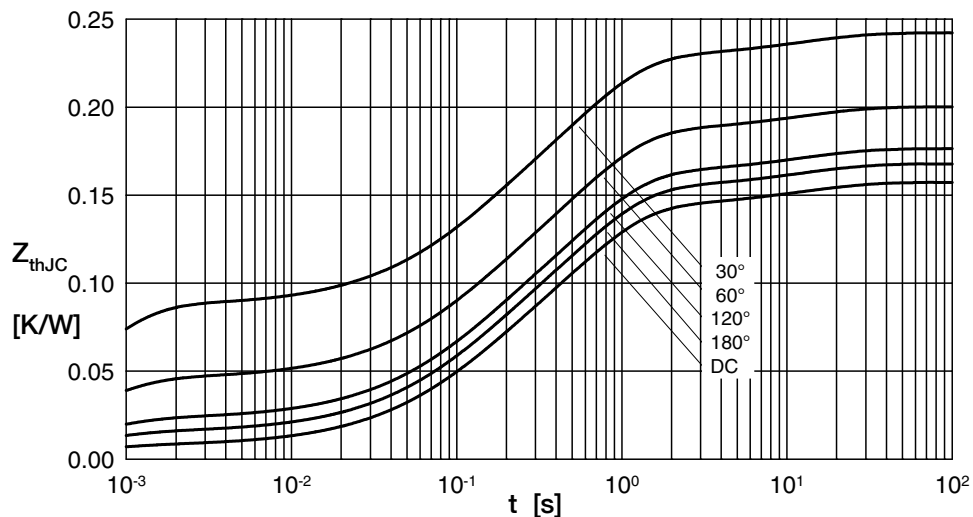


Fig. 8 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduct. angles d:

d	R_{thJC} (K/W)
DC	0.157
180°	0.168
120°	0.177
60°	0.200
30°	0.243

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0076	0.00054
2	0.0406	0.098
3	0.0944	0.54
4	0.0147	12

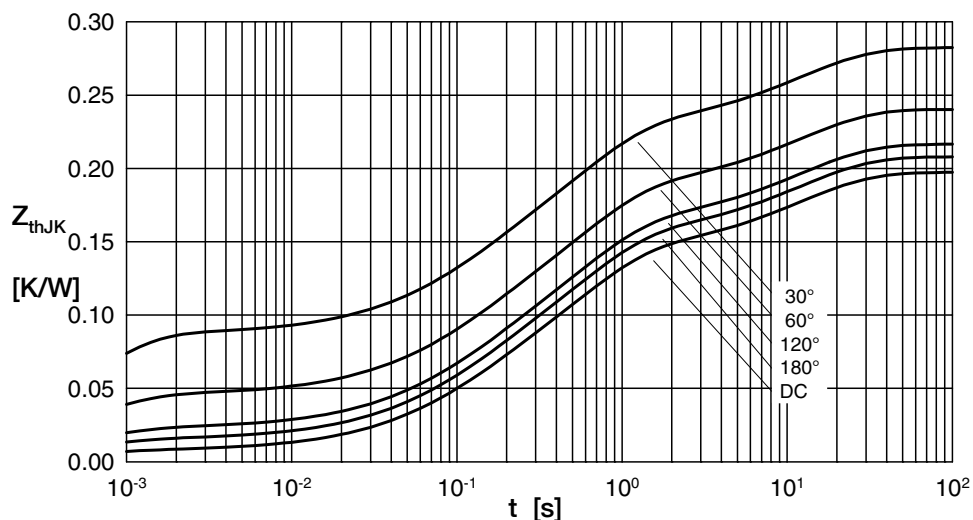


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor/diode)

R_{thJK} for various conduct. angles d:

d	R_{thJK} (K/W)
DC	0.197
180°	0.208
120°	0.217
60°	0.240
30°	0.283

Constants for Z_{thJK} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0076	0.00054
2	0.0406	0.098
3	0.0944	0.54
4	0.0147	12
5	0.04	12

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