

Thyristor Modules

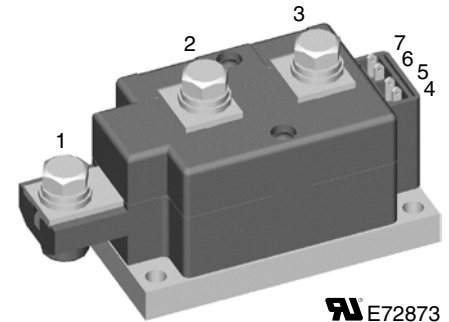
Thyristor/Diode Modules

$$I_{TRMS} = 2x\ 400\ A$$

$$I_{TAVM} = 2x\ 221\ A$$

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

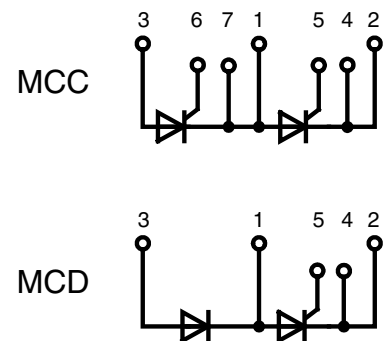
V_{RSM} V_{DSM} V	V_{RRM} V_{DRM} V	Type	
1300	1200	MCC 225-12io1	MCD 225-12io1
1500	1400	MCC 225-14io1	MCD 225-14io1
1700	1600	MCC 225-16io1	MCD 225-16io1
1900	1800	MCC 225-18io1	MCD 225-18io1



 E72873

Symbol	Conditions	Maximum Ratings	
I_{TRMS}, I_{FRMS} I_{TAVM}, I_{FAVM}	$T_{VJ} = T_{VJM}$ $T_C = 85^{\circ}C; 180^{\circ}$ sine	400 221	A A
I_{TSM}, I_{FSM}	$T_{VJ} = 45^{\circ}C; t = 10\ ms$ (50 Hz) $V_R = 0; t = 8.3\ ms$ (60 Hz)	8000 8500	A A
	$T_{VJ} = T_{VJM}; t = 10\ ms$ (50 Hz) $V_R = 0; t = 8.3\ ms$ (60 Hz)	7000 7500	A A
I^2t	$T_{VJ} = 45^{\circ}C; t = 10\ ms$ (50 Hz) $V_R = 0; t = 8.3\ ms$ (60 Hz)	320 000 300 000	A ² s A ² s
	$T_{VJ} = T_{VJM}; t = 10\ ms$ (50 Hz) $V_R = 0; t = 8.3\ ms$ (60 Hz)	245 000 246 000	A ² s A ² s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM};$ repetitive, $I_T = 750\ A$ $f = 50\ Hz; t_p = 200\ \mu s;$	100	A/ μs
	$V_D = \frac{2}{3} V_{DRM};$ $I_G = 1\ A;$ non repetitive, $I_T = I_{TAVM}$ $di_G/dt = 1\ A/\mu s$	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}	$T_{VJ} = T_{VJM}; t_p = 30\ \mu s$	120	W
P_{GAV}	$I_T = I_{T(AV)M}; t_p = 500\ \mu s$	60 20	W W
V_{RGM}		10	V
T_{VJ}		-40...+130	$^{\circ}C$
T_{VJM}		130	$^{\circ}C$
T_{stg}		-40...+125	$^{\circ}C$
V_{ISOL}	50/60 Hz, RMS $t = 1\ min$ $I_{ISOL} \leq 1\ mA; t = 1\ s$	3000 3600	V~ V~
M_d	Mounting torque (M6) Terminal connection torque (M8)	4.5 - 7 11 - 13	Nm 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 $T_{VJ} = 25^\circ\text{C}$		2 V
	$T_{VJ} = -40^\circ\text{C}$		3 V
I_{GT}	$V_D = 6$ V $T_{VJ} = 25^\circ\text{C}$		150 mA
	$T_{VJ} = -40^\circ\text{C}$		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

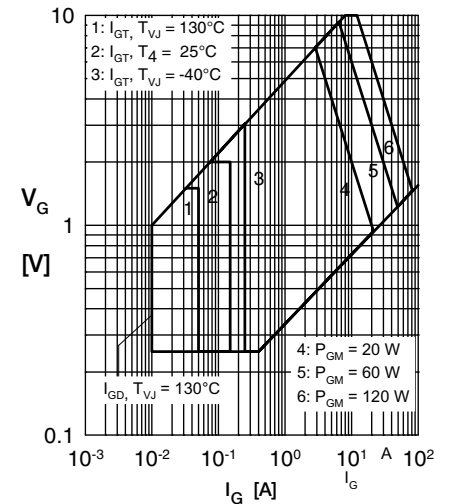


Fig. 1 Forward characteristics

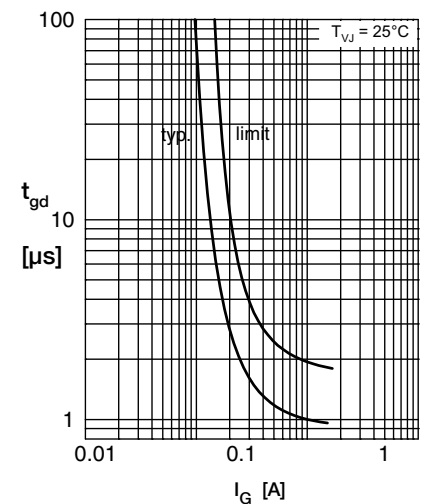


Fig. 2 Gate trigger characteristics

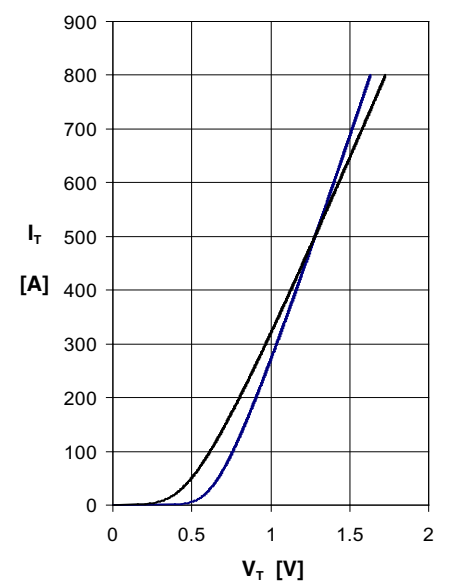


Fig. 2a Forward voltage drop

Technical drawing of a 3D printed part, showing front and top views with dimensions and labels.

Front View (Top):

- Overall height: $52^{+0}_{-1,4}$
- Height to top of first feature: 49
- Height to top of second feature: $32^{+0}_{-1,9}$
- Height to top of third feature: 2
- Height to top of fourth feature: 10
- Overall width: 43
- Overall width (including base): 45
- Labels: M8 x 20, SW 13, 2.8 x 0.8

Top View (Bottom):

- Overall width: 115
- Overall height: 50
- Width of first feature: 20
- Width of second feature: 22.5
- Width of third feature: 35
- Width of fourth feature: 28.5
- Height of first feature: 18
- Height of second feature: 6.2
- Height of third feature: 80
- Height of fourth feature: 92
- Labels: 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

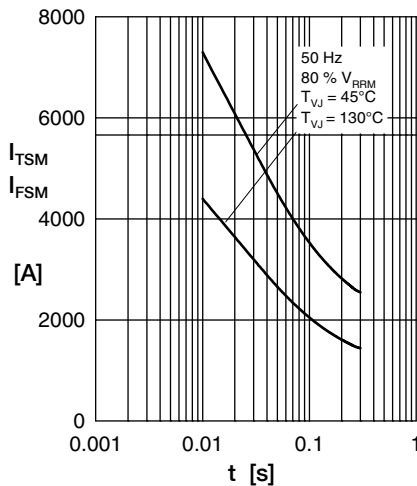


Fig. 3 Surge overload current
 $I_{TSM/FSM}$: Crest value, t : duration

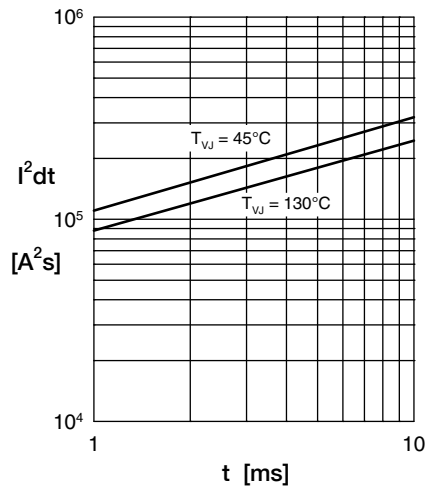


Fig. 4 I^2dt versus time

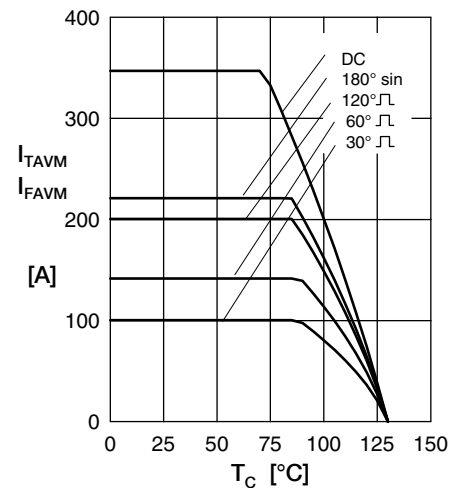


Fig. 4a Max. forward current
at case temperature

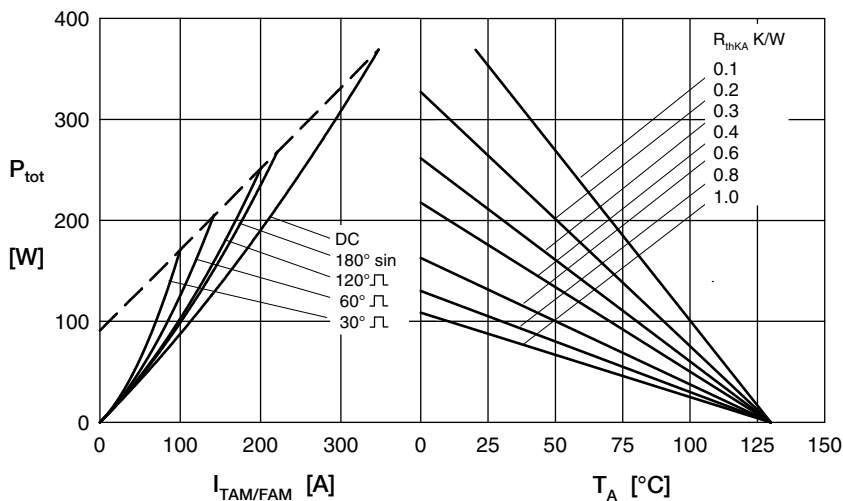


Fig. 5 Power dissipation versus on-state current and
ambient temperature (per thyristor or diode)

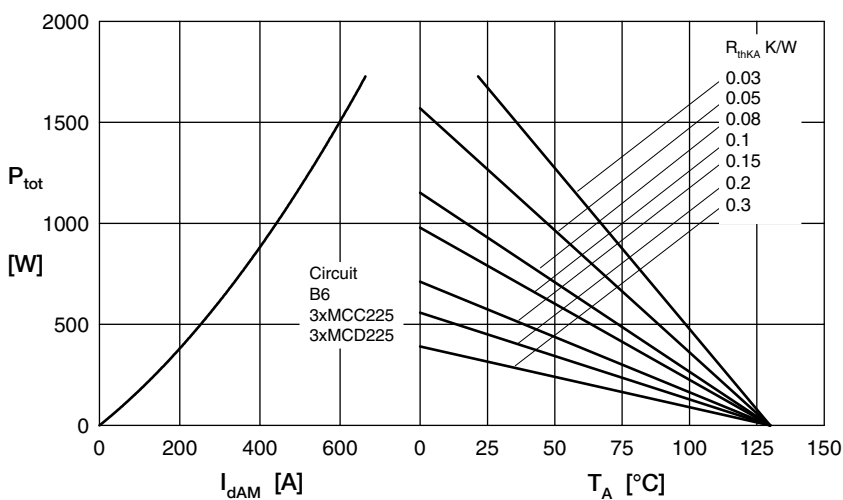


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct
output current and ambient temperature

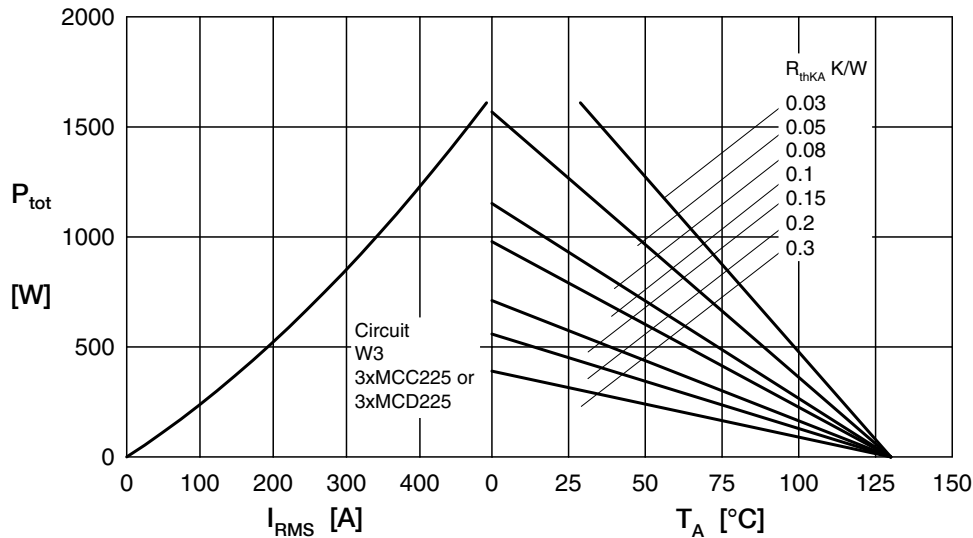


Fig. 7 Three phase AC-controller: Power dissipation versus R_{MS} output current and ambient temperature

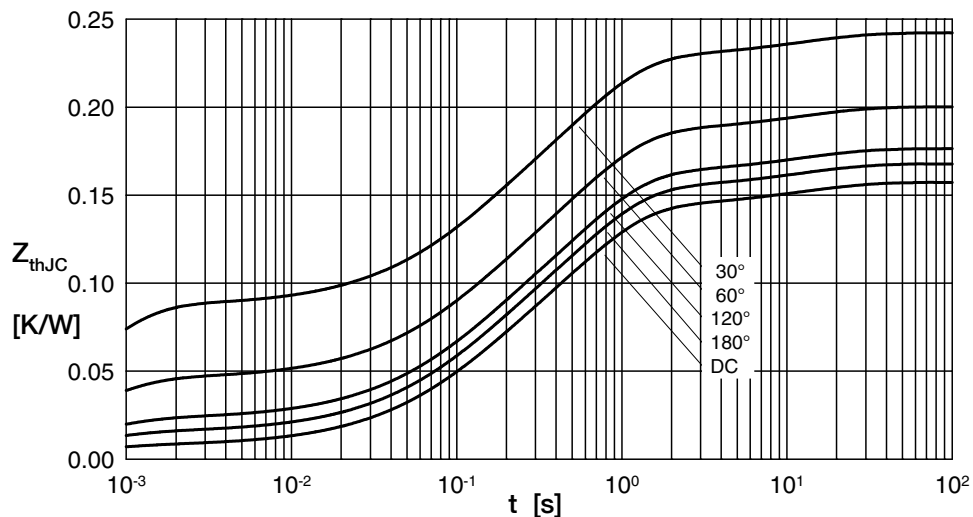


Fig. 8 Transient thermal impedance junction to case (per thyristor/diode)

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

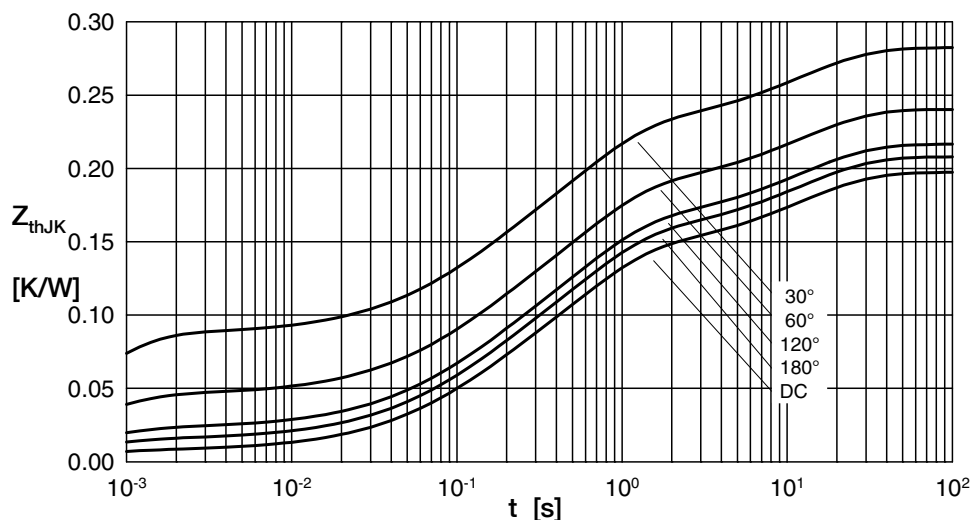


Fig. 9 Transient thermal impedance junction to heatsink (per thyristor/diode)

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