



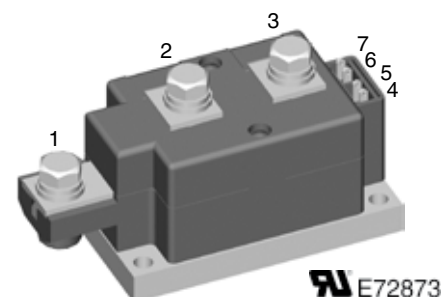
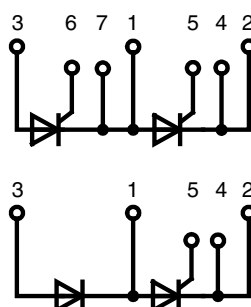
MCC 224
MCD 224

Thyristor Modules

Thyristor/Diode Modules

I_{TRMS} = 2x 400 A
I_{TAVM} = 2x 240 A
V_{RRM} = 2000/2200 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	Conditions	Maximum Ratings	
I _{TRMS}	T _{VJ} = T _{VJM}	400	A
I _{TAVM}	T _C = 85°C; 180° sine	240	A
I _{TSM}	T _{VJ} = 45°C; t = 10 ms (50 Hz)	8000	A
	V _R = 0; t = 8.3 ms (60 Hz)	8500	A
I ² t	T _{VJ} = 45°C; t = 10 ms (50 Hz)	320 000	A ² s
	V _R = 0; t = 8.3 ms (60 Hz)	303 000	A ² s
(di/dt) _{cr}	T _{VJ} = T _{VJM} ; repetitive, I _T = 750 A	100	A/μs
	f = 50 Hz; t _p = 200 μs; V _D = 2/3 V _{DRM} ; I _G = 1 A; di _G /dt = 1 A/μs	500	A/μs
(dv/dt) _{cr}	T _{VJ} = T _{VJM} ; V _D = 2/3 V _{DRM} ; R _{GK} = ∞; method 1 (linear voltage rise)	1000	V/μs
P _{GM}	T _{VJ} = T _{VJM} ; t _p = 30 μs	120	W
P _{GAV}	I _T = I _{T(AV)M} ; t _p = 500 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 min	3000	V~
	I _{ISOL} ≤ 1 mA t = 1 s	3600	V~
M _d	Mounting torque (M6)	4.5 - 7	Nm
	Terminal connection torque (M6)	11 - 13	Nm
Weight	Typical including screws	750	g

Features

- International standard package
- Direct Copper Bonded Al₂O₃-ceramic 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 diode unless otherwise stated.

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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	$I_T = 600$ 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	$t_p = 30 \mu\text{s}; V_D = 6$ 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; $t_p = 200 \mu\text{s}$	$T_{VJ} = T_{VJM}$	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		0.139 K/W 0.069 K/W
R_{thJK}	per thyristor; DC current per module		0.179 K/W 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 180L** (L = Left for pin pair 4/5) } UL 758, style 1385,
Type **ZY 180R** (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

Dimensions in mm (1 mm = 0.0394")

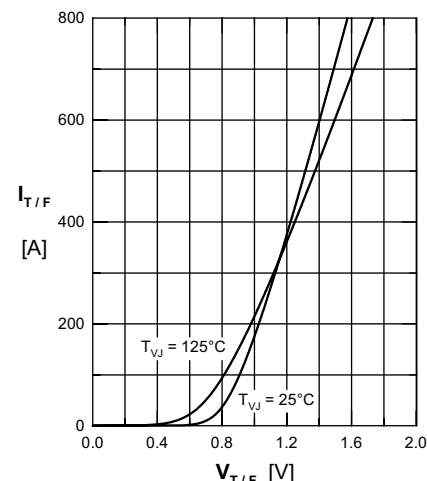
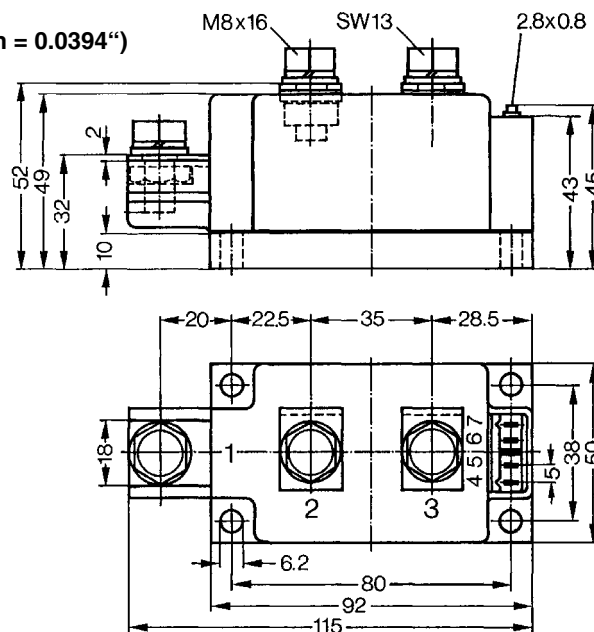


Fig. 1 Forward characteristics

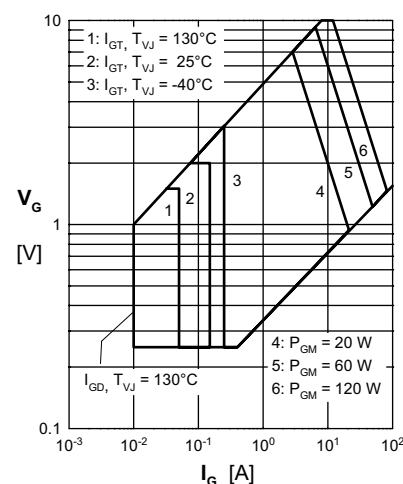


Fig. 2 Gate trigger characteristics

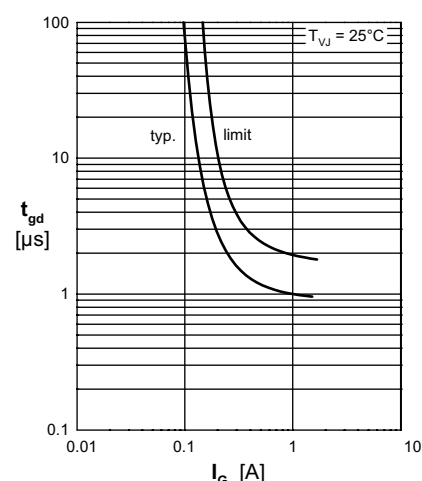


Fig. 3 Gate trigger delay time

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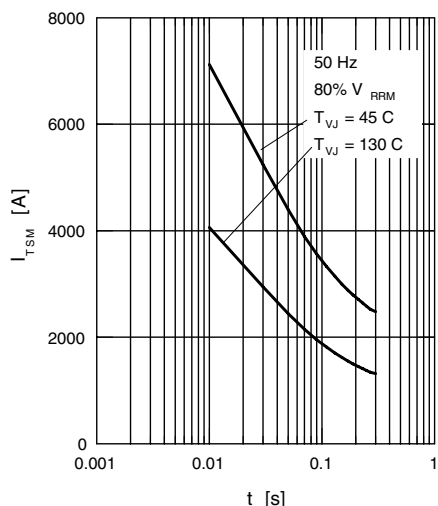


Fig. 4 Surge overload current
 I_{TSM} : Crest value, t: duration

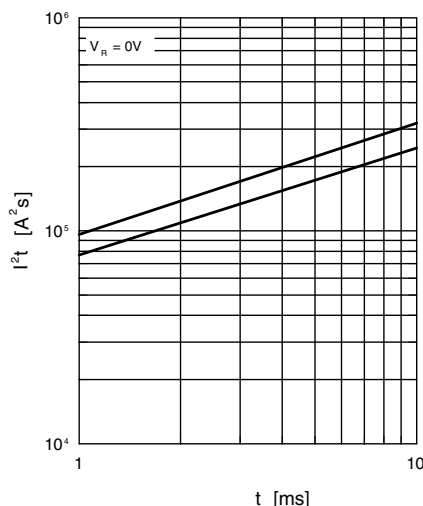


Fig. 5 i^2t versus time (1-10 ms)

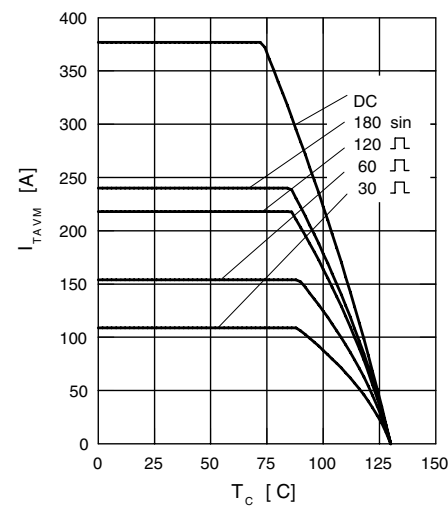


Fig. 5a Maximum forward current at case temperature

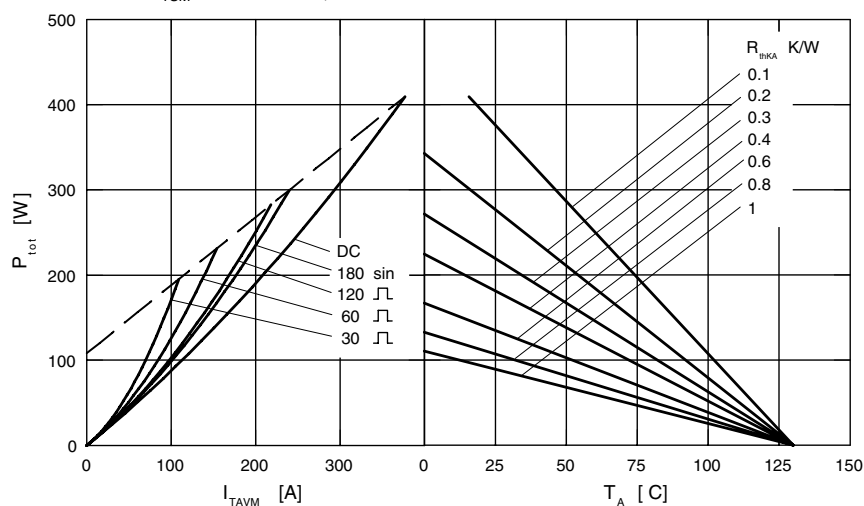


Fig. 6 Power dissipation vs. on-state current and ambient temperature

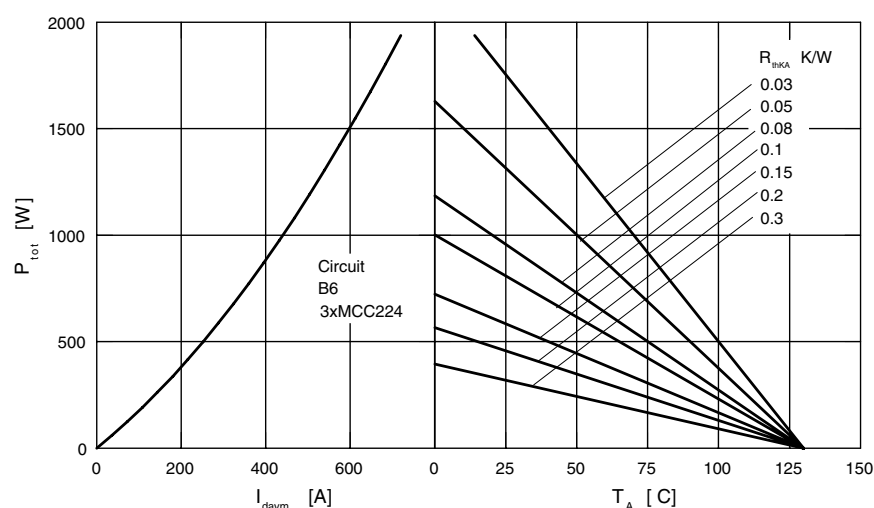


Fig. 7 Three phase rectifier bridge:
Power dissipation vs. direct output current and ambient temperature



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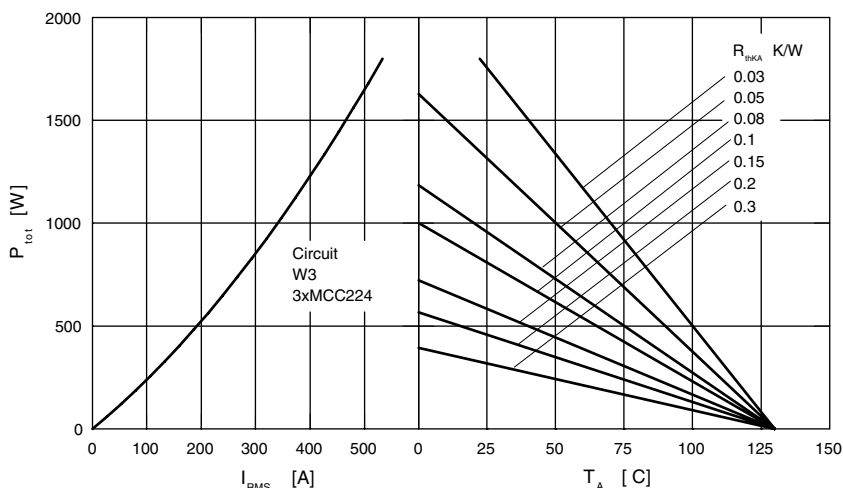


Fig. 8 3~ AC-controller: Power dissipation vs. RMS output current & ambient temperature

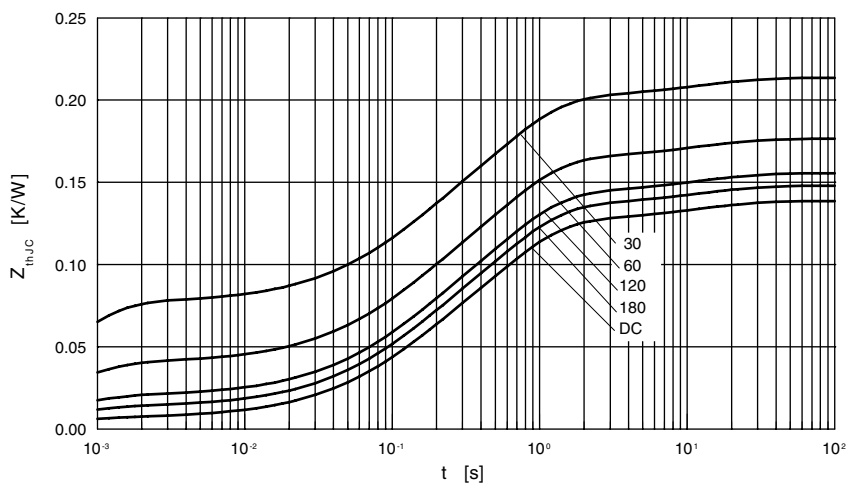


Fig. 9 Transient thermal impedance junction to case

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

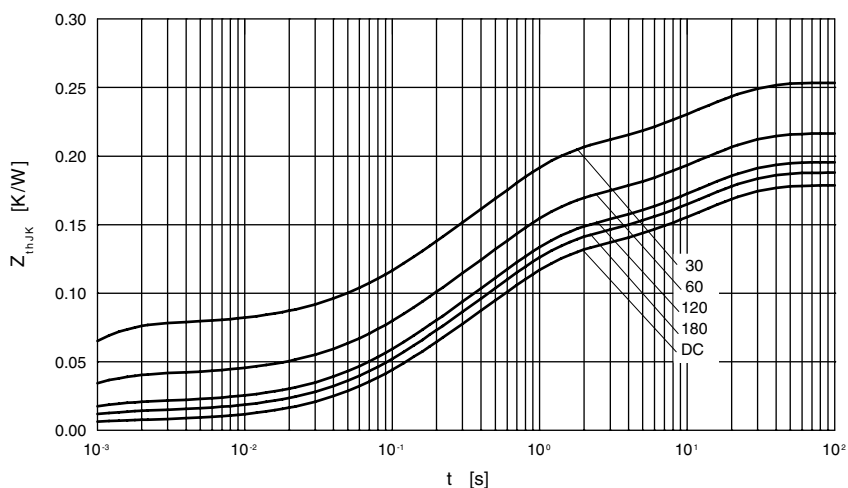


Fig. 10 Transient thermal impedance junction to heatsink

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	0.001
2	0.0358	0.08
3	0.0832	0.20
4	0.0129	1.0
5	0.04	