

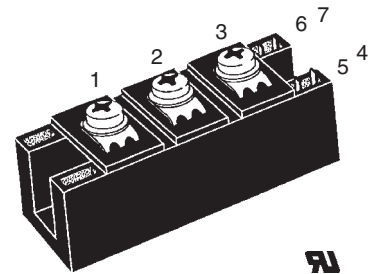
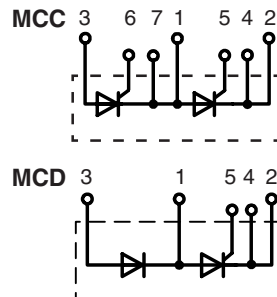
# High Voltage Thyristor Module

$$I_{TRMS} = 2 \times 300 \text{ A}$$

$$I_{TAVM} = 2 \times 165 \text{ A}$$

$$V_{RRM} = 2000\text{-}2200 \text{ V}$$

$V_{RSM}$	$V_{RRM}$	Type	
$V_{DSM}$	$V_{DRM}$		
V	V		
2100	2000	MCC 161-20io1	MCD 161-20io1
2300	2200	MCC 161-22io1	MCD 161-22io1



Symbol	Conditions	Maximum Ratings	
$I_{TRMS}$	$T_{VJ} = T_{VJM}$	300	A
$I_{TAVM}$	$T_C = 85^\circ\text{C}$ ; 180° sine	165	A
$I_{TSM}$	$T_{VJ} = 45^\circ\text{C}$ ; $V_R = 0$	$t = 10 \text{ ms}$ (50 Hz)	6000 A
		$t = 8.3 \text{ ms}$ (60 Hz)	6400 A
$I^2dt$	$T_{VJ} = 45^\circ\text{C}$ ; $V_R = 0$	$t = 10 \text{ ms}$ (50 Hz)	180000 $A^2s$
		$t = 8.3 \text{ ms}$ (60 Hz)	170000 $A^2s$
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ ; repetitive, $I_T = 500 \text{ A}$ $f = 50 \text{ Hz}$ ; $t_p = 200 \mu\text{s}$ ; $V_D = \frac{2}{3} V_{DRM}$ ; $I_G = 0.5 \text{ A}$ ;	non repetitive, $I_T = I_{TAVM}$	150 $A/\mu\text{s}$
		$di_G/dt = 0.5 \text{ A}/\mu\text{s}$	500 $A/\mu\text{s}$
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$ ; $V_{DR} = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)	1000	$V/\mu\text{s}$
$P_{GM}$	$T_{VJ} = T_{VJM}$ ; $t_p = 30 \mu\text{s}$ $I_T = I_{TAVM}$ ; $t_p = 500 \mu\text{s}$	120	W
		60	W
$P_{GAV}$		8	W
$V_{RGM}$		10	V
$T_{VJ}$		-40...125	$^\circ\text{C}$
$T_{VJM}$		125	$^\circ\text{C}$
$T_{stg}$		-40...125	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz, RMS; $t = 1 \text{ min}$ $I_{ISOL} \leq 1 \text{ mA}$ ; $t = 1 \text{ s}$	3000	V~
		3600	V~
$M_d$	Mounting torque (M6)	2.25-2.75	Nm
	Terminal connection torque (M6)	4.5-5.5	Nm
<b>Weight</b>	Typical including screws	125	g

## Features

- International standard package
- Direct Copper Bonded  $\text{Al}_2\text{O}_3$ -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Keyed gate/cathode twin pins

## Applications

- Motor control
- Power converter
- Heat and temperature control for industrial furnaces and chemical processes
- Lighting control
- Contactless switches

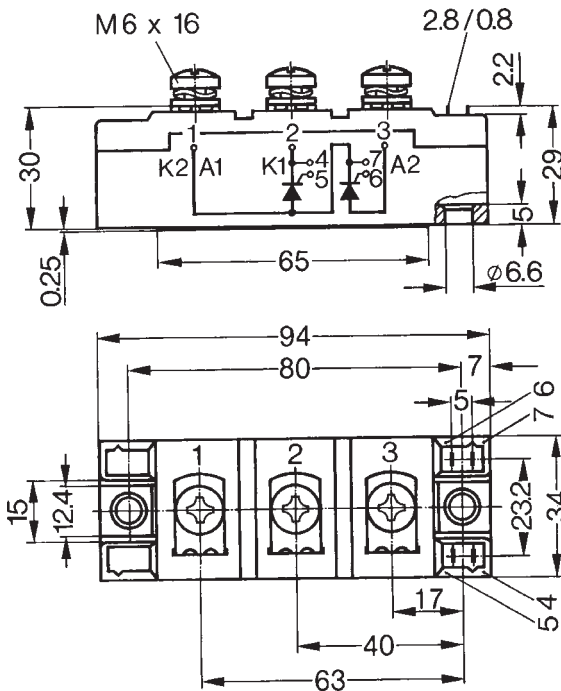
## Advantages

- Space and weight savings
- Simple mounting
- Improved temperature and power cycling
- Reduced protection circuits

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

Symbol	Conditions	Characteristic Values
$I_{RRM}, I_{DRM}$	$V_R = V_{RRM}; T_{VJ} = T_{VJM}$	40 mA
$V_T$	$I_T = 300A; T_{VJ} = 25^\circ C$	1.36 V
$V_{T0}$	For power-loss calculations only ( $T_{VJ} = T_{VJM}$ )	0.8 V
$r_T$		1.6 mΩ
$V_{GT}$	$V_D = 6 V; T_{VJ} = 25^\circ C$	2 V
	$T_{VJ} = -40^\circ C$	2.6 V
$I_{GT}$	$V_D = 6 V; T_{VJ} = 25^\circ C$	150 mA
	$T_{VJ} = -40^\circ C$	200 mA
$V_{GD}$	$V_D = 2/3 V_{DRM}; T_{VJ} = T_{VJM}$	0.25 V
$I_{GD}$	$V_D = 2/3 V_{DRM}; T_{VJ} = T_{VJM}$	10 mA
$I_L$	$T_{VJ} = 25^\circ C; V_D = 6 V; t_p = 30 \mu s$ $di_G/dt = 0.45 A/\mu s; I_G = 0.45 A$	200 mA
$I_H$	$T_{VJ} = 25^\circ C; V_D = 6 V; R_{GK} = \infty$	150 mA
$t_{gd}$	$T_{VJ} = 25^\circ C; V_D = 1/2 V_{DRM}$ $di_G/dt = 0.5 A/\mu s; I_G = 0.5 A$	2 μs
$t_q$	$T_{VJ} = T_{VJM}; V_R = 100 V; V_D = 2/3 V_{DRM}; t_p = 200 \mu s$ $dv/dt = 20 V/\mu s; I_T = 160 A; -di/dt = 10A/\mu s$	typ. 150 μs
$Q_S$	} $T_{VJ} = T_{VJM}$ } $-di/dt = 50 A/\mu s; I_T = 300 A$	550 μC
$I_{RM}$		235 A
$R_{thJC}$	per thyristor; DC current	0.155 K/W
	per module	0.078 K/W
$R_{thJK}$	per thyristor; DC current	0.225 K/W
	per module	0.113 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 <sup>2</sup>

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



**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

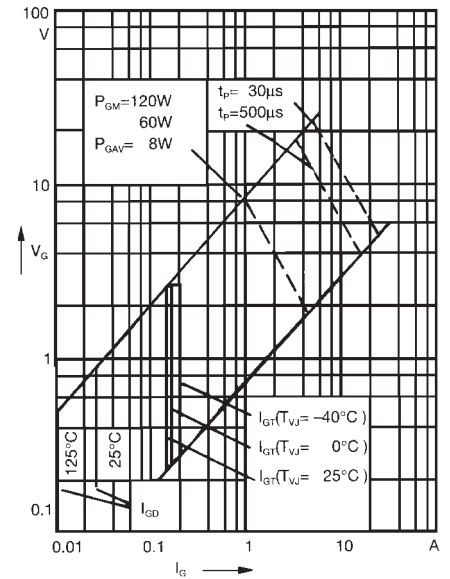


Fig. 1 Gate trigger characteristics

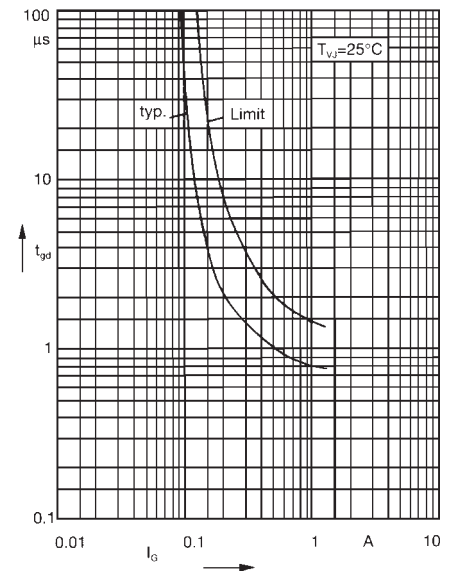


Fig. 2 Gate trigger delay time

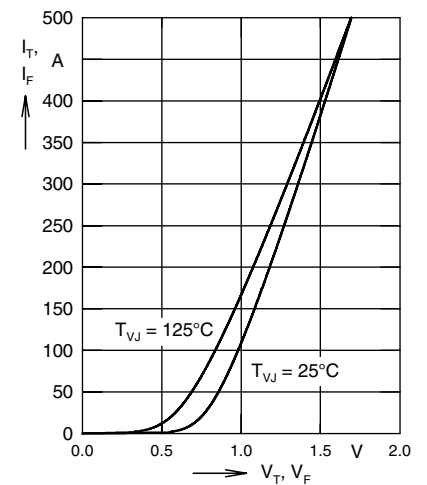


Fig 3: Forward current vs. voltage drop per thyristor/diode

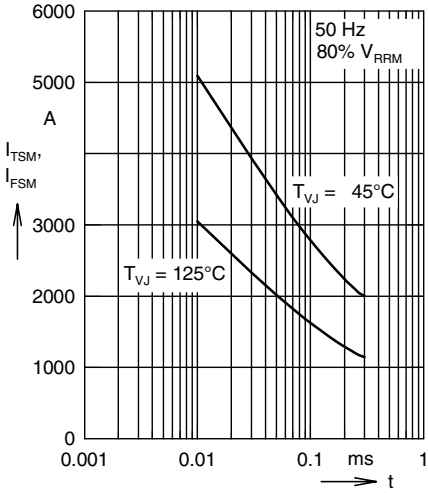


Fig. 4: Surge overload current  
 $I_{TSM}, I_{FSM} = f(t)$

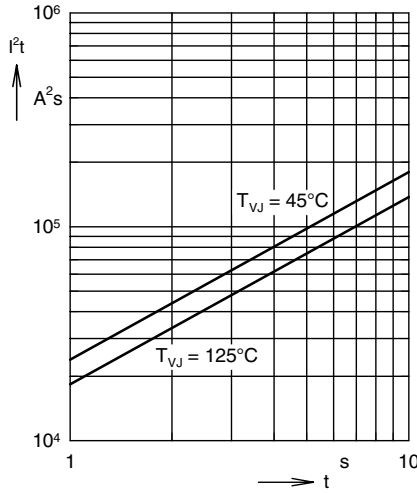


Fig. 5:  $I^2t$  versus time per diode

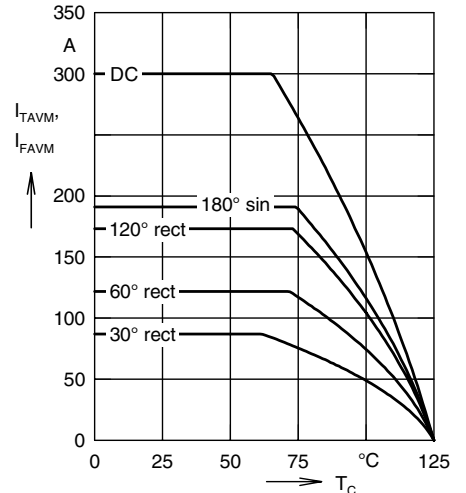


Fig. 6: Max. forward current at case temperature  
 $I_{TAVM/FAVM} = f(T_C, d)$

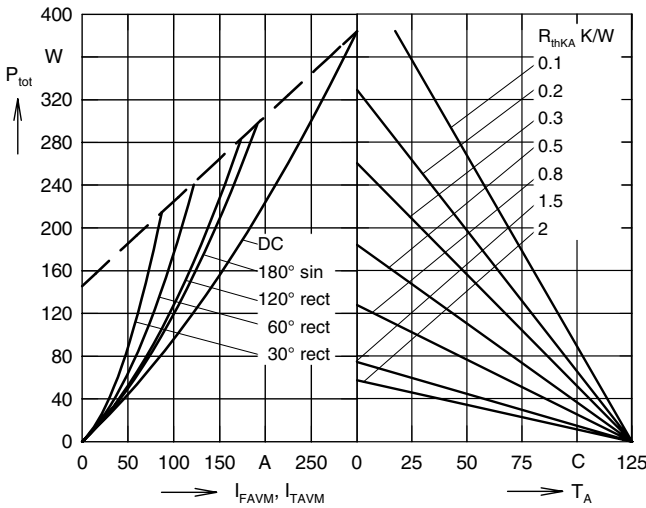


Fig. 7: Power dissipation vs. on-state current and ambient temperature (per thyristor/diode)

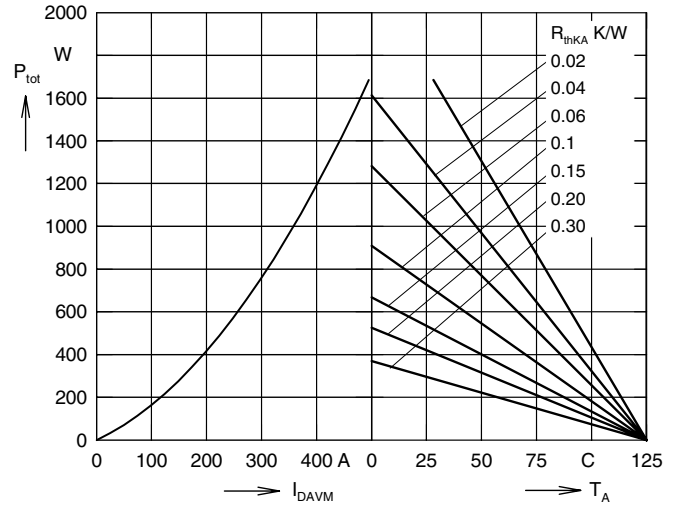


Fig. 8: Power dissipation vs. direct output current and ambient temperature (three phase rectifier bridge)

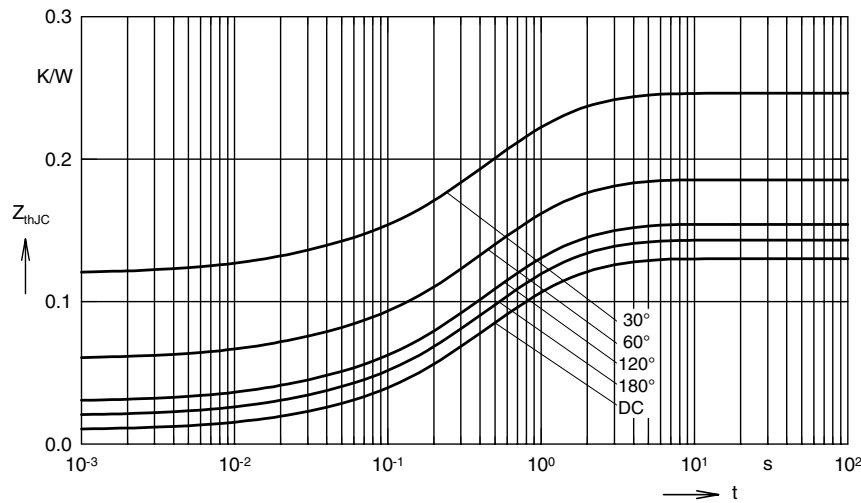


Fig. 9: Transient thermal impedance junction to case  $Z_{thJC}$  at various conduction angles

$R_{thJC}$  for various condition angles:

d	$R_{thJC}$ (K/W)
DC	0.155
180°	0.171
120°	0.184
60°	0.222
30°	0.294

Constants for  $Z_{thJC}$  calculation (DC):

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.012	0.00014
2	0.008	0.019
3	0.03	0.18
4	0.073	0.52
5	0.032	1.6