

# High Voltage Thyristor Module

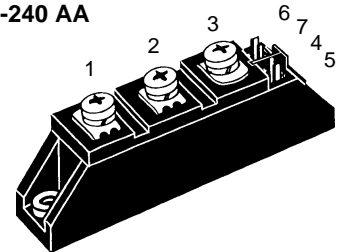
## High Voltage Thyristor/Diode Modules

$$I_{TRMS} = 2 \times 180 \text{ A}$$

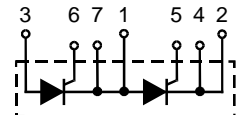
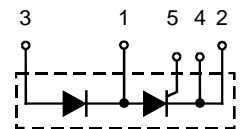
$$I_{TAVM} = 2 \times 104 \text{ A}$$

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

$V_{RSM}$ $V_{DSM}$ V	$V_{RRM}$ $V_{DRM}$ V	Type	
2100	2000	MCC 94-20io1 B	MCD 94-20io1 B
2300	2200	MCC 94-22io1 B	MCD 94-22io1 B

**TO-240 AA**


Symbol	Test Conditions	Maximum Ratings	
$I_{TRMS}$	$T_{VJ} = T_{VJM}$	180	A
$I_{TAVM}$	$T_C = 85^\circ\text{C}; 180^\circ \text{ sine}$	104	A
$I_{TSM}$	$T_{VJ} = 45^\circ\text{C};$ $V_R = 0$	$t = 10 \text{ ms (50 Hz)}$	1700 A
		$t = 8.3 \text{ ms (60 Hz)}$	1800 A
	$T_{VJ} = T_{VJM}$ $V_R = 0$	$t = 10 \text{ ms (50 Hz)}$	1540 A
		$t = 8.3 \text{ ms (60 Hz)}$	1640 A
$\int i^2 dt$	$T_{VJ} = 45^\circ\text{C}$ $V_R = 0$	$t = 10 \text{ ms (50 Hz)}$	14450 A <sup>2</sup> s
		$t = 8.3 \text{ ms (60 Hz)}$	13500 A <sup>2</sup> s
	$T_{VJ} = T_{VJM}$ $V_R = 0$	$t = 10 \text{ ms (50 Hz)}$	11850 A <sup>2</sup> s
		$t = 8.3 \text{ ms (60 Hz)}$	11300 A <sup>2</sup> s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ repetitive, $I_T = 250 \text{ A}$ $f = 50 \text{ Hz}, t_p = 200 \mu\text{s}$ $V_D = 2/3 V_{DRM}$ $I_G = 0.45 \text{ A},$ non repetitive, $I_T = I_{TAVM}$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}$	150	A/ $\mu\text{s}$
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}; V_{DR} = 2/3 V_{DRM}$ $R_{GK} = \infty;$ method 1 (linear voltage rise)	1000	V/ $\mu\text{s}$
$P_{GM}$	$T_{VJ} = T_{VJM}$ $t_p = 30 \mu\text{s}$	10	W
	$I_T = I_{TAVM}$ $t_p = 300 \mu\text{s}$	5	W
$P_{GAV}$		0.5	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 $t = 1 \text{ min}$	3000	V~
	$I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$	3600	V~
$M_d$	Mounting torque (M5)	2.5-4.0/22-35	Nm/lb.in.
	Terminal connection torque (M5)	2.5-4.0/22-35	Nm/lb.in.
<b>Weight</b>	Typical including screws	90	g

**MCC**

**MCD**

**Features**

- International standard package, JEDEC TO-240 AA
- **Direct Copper Bonded**  $\text{Al}_2\text{O}_3$  -ceramic base plate
- Planar passivated chips
- Isolation voltage 3600 V~
- UL registered, E 72873
- Gate-cathode twin pins for version 1B

**Applications**

- DC motor control
- Softstart AC motor controller
- Light, heat and temperature control

**Advantages**

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

Data according to IEC 60747 and refer to a single thyristor/diode unless otherwise stated. IXYS reserves the right to change limits, test conditions and dimensions

Symbol	Test Conditions	Characteristic Values
$I_{RRM}, I_{DRM}$	$T_{VJ} = T_{VJM}; V_R = V_{RRM}$	15 mA
$V_T$	$I_T = 300 \text{ A}; T_{VJ} = 25^\circ\text{C}$	1.74 V
$V_{T0}$	For power-loss calculations only ( $T_{VJ} = T_{VJM}$ )	0.85 V
$r_T$		3.2 mΩ
$V_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	1.5 V
	$T_{VJ} = -40^\circ\text{C}$	1.6 V
$I_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$	100 mA
	$T_{VJ} = -40^\circ\text{C}$	200 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
$I_L$	$T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; t_p = 30 \mu\text{s}$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}; I_G = 0.45 \text{ A}$	200 mA
$I_H$	$T_{VJ} = 25^\circ\text{C}; V_D = 6 \text{ V}; R_{GK} = \infty$	150 mA
$t_{gd}$	$T_{VJ} = 25^\circ\text{C}; V_D = 1/2 V_{DRM}$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}; I_G = 0.45 \text{ A}$	2 μs
$t_q$	$T_{VJ} = T_{VJM}; V_R = 100 \text{ V}; V_D = 2/3 V_{DRM}; t_p = 200 \mu\text{s}$ $dv/dt = 20 \text{ V}/\mu\text{s}; I_T = 150 \text{ A}; -di/dt = 10 \text{ A}/\mu\text{s}$	typ. 185 μs
$Q_S$	$T_{VJ} = T_{VJM}$ $-di/dt = 6 \text{ A}/\mu\text{s}; I_T = 50 \text{ A}$	170 μC
$I_{RM}$		45 A
$R_{thJC}$	per thyristor; DC current	0.22 K/W
	per module	0.11 K/W
$R_{thJK}$	per thyristor; DC current	0.42 K/W
	per module	0.21 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>

Optional accessories for module-type MCC 94 version 1 B

Keyed gate/cathode twin plugs with wire length = 350 mm, gate = yellow, cathode = red

Type ZY 200L (L = Left for pin pair 4/5) } UL 758, style 1385,  
Type ZY 200R (R = right for pin pair 6/7) } CSA class 5851, guide 460-1-1

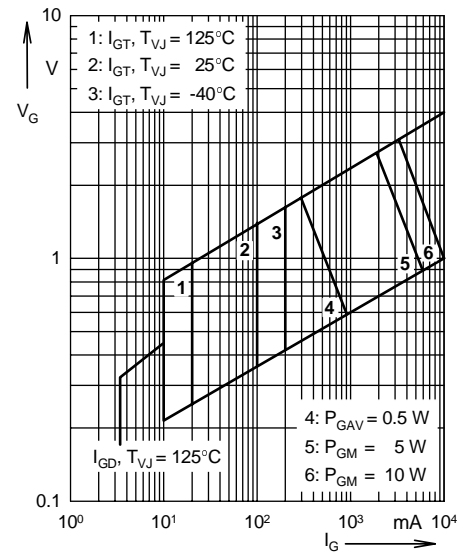


Fig. 1 Gate trigger characteristics

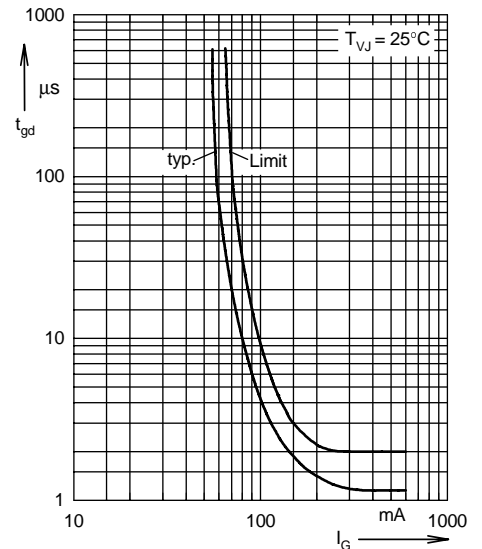
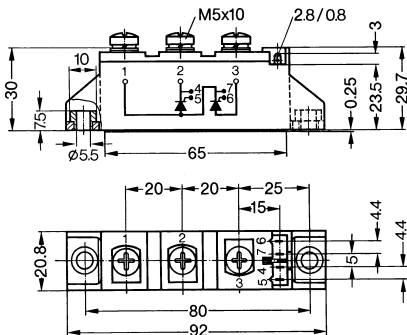


Fig. 2 Gate trigger delay time

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



### $R_{thJC}$ for various conduction angles d:

d	$R_{thJC}$ (K/W)
DC	0.22
180°	0.23
120°	0.25
60°	0.27
30°	0.28

### Constants for $Z_{thJC}$ calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0066	0.0019
2	0.0678	0.0477
3	0.1456	0.344

### $R_{thJK}$ for various conduction angles d:

d	$R_{thJK}$ (K/W)
DC	0.42
180°	0.43
120°	0.45
60°	0.47
30°	0.48

### Constants for $Z_{thJK}$ calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0066	0.0019
2	0.0678	0.0477
3	0.1456	0.344
4	0.2	1.32