

# Silicon Controlled Rectifiers

## Reverse Blocking Triode Thyristors

... designed for overvoltage protection in crowbar circuits.

- Glass-Passivated Junctions for Greater Parameter Stability and Reliability
- Center-Gate Geometry for Uniform Current Spreading Enabling High Discharge Current
- Small Rugged, Thermowatt or Metal Packages Constructed for Low Thermal Resistance for Maximum Power Dissipation and Durability
- High Capacitor Discharge Current  
300 Amps (MCR68)  
750 Amps (MCR69)

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted.)

Rating	Symbol	Value		Unit
		MCR68	MCR69	
Peak Repetitive Forward or Reverse Blocking Voltage, Note 1 ( $T_J = -40$ to $+125^\circ\text{C}$ , Gate Open ) -2 MCR68, 69 -3 -6	$V_{DRM}$ or $V_{RRM}$		50 100 400	Volts
Peak Discharge Current, Note 2	$I_{TM}$	300	750	Amps
On-State Current ( $T_C = 85^\circ\text{C}$ ) (1/2 Cycle, Sine Wave, 60 Hz)	$I_T(\text{RMS})$ $I_T(\text{AV})$	12 8	25 16	Amps
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, $T_J = 125^\circ\text{C}$ )	$I_{TSM}$	100	300	Amps
Circuit Fusing ( $t = 8.3$ ms)	$I^2t$	40	375	$\text{A}^2\text{s}$
Critical Rate-of-Rise of Current (Note 3)	$di/dt$	75	100	$\text{A}/\mu\text{s}$
Peak Gate Current ( $t \leq 2$ $\mu\text{s}$ )	$I_{GM}$	2		Amps
Peak Gate Power ( $t \leq 2$ $\mu\text{s}$ )	$P_{GM}$	20		Watts
Average Gate Power	$P_{G(\text{AV})}$	0.5		Watt
Operating Junction Temperature Range	$T_J$	-40 to +125		$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to +150		$^\circ\text{C}$
Mounting Torque	—	8		in. lb.

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction to Case	$R_{\theta JC}$	2	1.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60		$^\circ\text{C}/\text{W}$

- Notes: 1.  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.
2. Ratings apply for  $t_w = 1$  ms. See Figure 1 for  $I_{TM}$  capability for various duration of an exponentially decaying current waveform,  $t_w$  is defined as 5 time constants of an exponentially decaying current pulse.
3. Test Conditions:  $I_G = 150$  mA,  $V_D = \text{Rated } V_{DRM}$ ,  $I_{TM} = \text{Rated Value}$ ,  $T_J = 125^\circ\text{C}$ .

## MCR68 Series MCR69 Series

SCRs  
12 and 25 AMPERES RMS  
50 thru 400 VOLTS



CASE 221A-04  
(TO-220AB)  
STYLE 3

## MCR68 Series • MCR69 Series

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}, \text{ Gate Open}$ ) $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	$I_{DRM}, I_{RRM}$	— —	— —	10 2	$\mu\text{A}$ mA
Forward On-State Voltage ( $I_{TM} = 24 \text{ A}$ ), Note 1 ( $I_{TM} = 50 \text{ A}$ ), Note 1 ( $I_{TM} = 300 \text{ A}, t_w = 1 \text{ ms}$ ), Note 2 ( $I_{TM} = 750 \text{ A}, t_w = 1 \text{ ms}$ ), Note 2	$V_{TM}$	— — — —	— — 6 6	2.2 1.8 — —	Volts
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}, R_L = 100 \Omega$ )	$I_{GT}$	2	7	30	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}, R_L = 100 \Omega$ ) ( $V_D = \text{Rated } V_{DRM}, R_L = 1 \text{ k}\Omega, T_J = 125^\circ\text{C}$ )	$V_{GT}$	— 0.2	0.65 0.40	1.5 —	Volts
Holding Current ( $I_{TM} = 100 \text{ mA}, \text{ Gate Open}$ )	$I_H$	3	15	50	mA
Latching Current ( $V_D = 12 \text{ Vdc}, I_G = 150 \text{ mA}, t_r \leq 50 \mu\text{s}$ )	$I_L$	—	—	60	mA
Critical Rate-of-Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}, \text{ Gate Open}, \text{ Exponential Waveform}, T_J = 125^\circ\text{C}$ )	dv/dt	10	—	—	V/ $\mu\text{s}$
Gate Controlled Turn-On Time, Note 3 ( $V_D = \text{Rated } V_{DRM}, I_G = 150 \text{ mA}$ ) ( $I_{TM} = 24 \text{ A Peak}$ ) ( $I_{TM} = 50 \text{ A Peak}$ )	$t_{gt}$	— —	1 1	— —	$\mu\text{s}$

- Notes: 1. Pulse duration  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 2. Ratings apply for  $t_w = 1 \text{ ms}$ . See Figure 1 for  $I_{TM}$  capability for various durations of an exponentially decaying current waveform.  $t_w$  is defined as 5 time constants of an exponentially decaying current pulse.  
 3. The gate controlled turn-on time in a crowbar circuit will be influenced by the circuit inductance.

FIGURE 1 — PEAK CAPACITOR DISCHARGE CURRENT

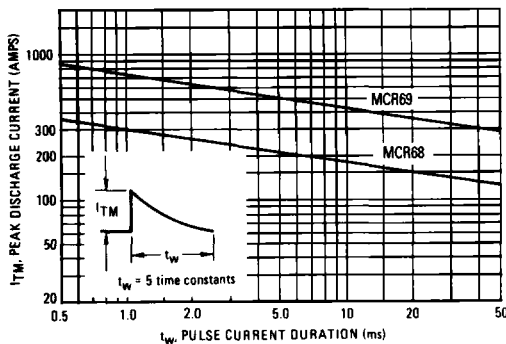
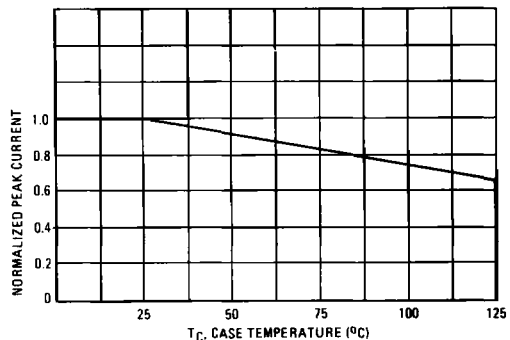


FIGURE 2 — PEAK CAPACITOR DISCHARGE CURRENT DERATING



MCR68 Series • MCR69 Series

FIGURE 3 — CURRENT DERATING  
MCR68

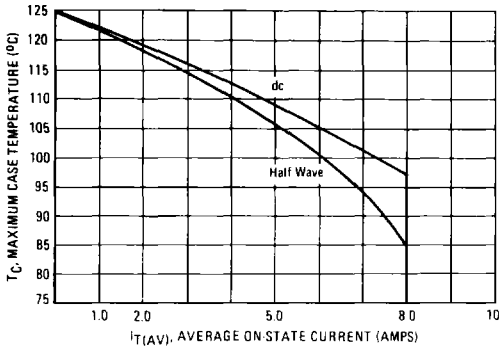


FIGURE 4 — CURRENT DERATING  
MCR69

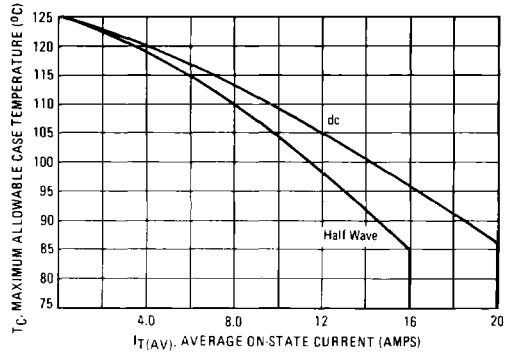


FIGURE 5 — MAXIMUM POWER DISSIPATION  
MCR68

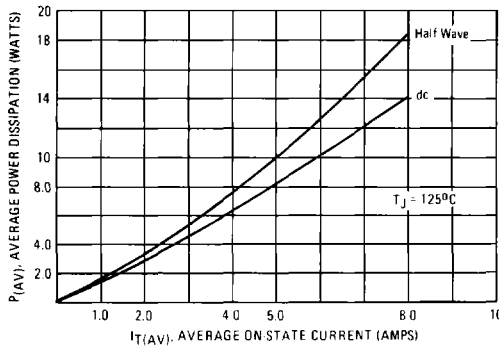


FIGURE 6 — MAXIMUM POWER DISSIPATION  
MCR69

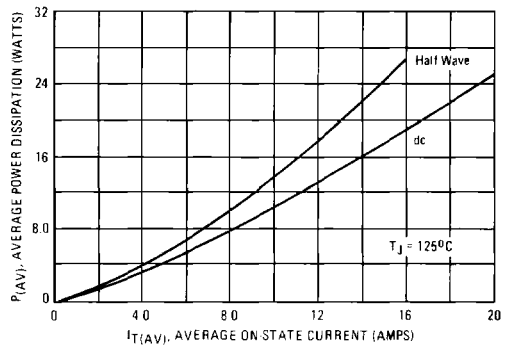
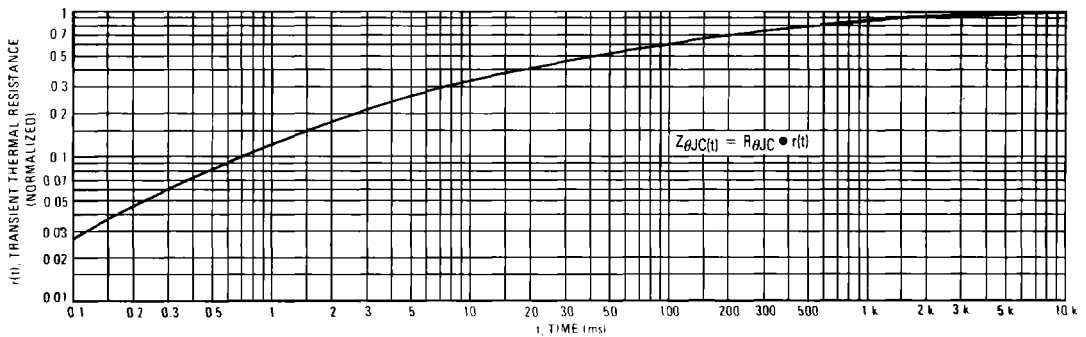


FIGURE 7 — THERMAL RESPONSE



3

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FIGURE 8 – GATE TRIGGER CURRENT

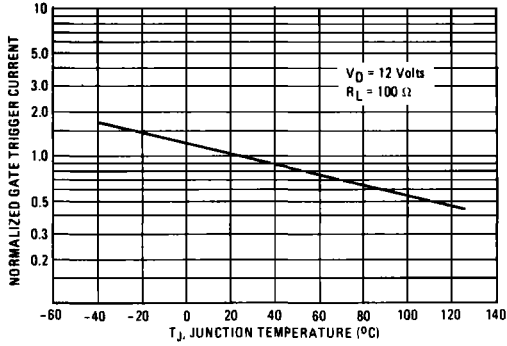


FIGURE 9 – GATE TRIGGER VOLTAGE

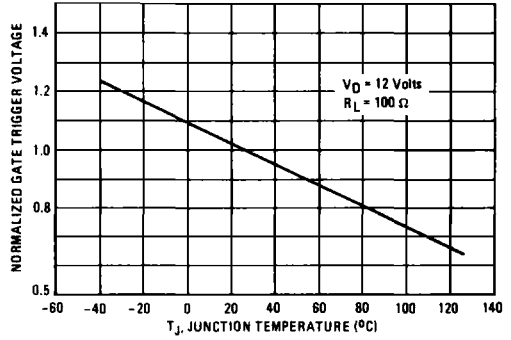


FIGURE 10 – HOLDING CURRENT

