

# MCR68-2

## Silicon Controlled Rectifiers

### Reverse Blocking 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 Package Constructed for Low Thermal Resistance and Maximum Power Dissipation and Durability
- High Capacitor Discharge Current, 300 Amps
- Device Marking: Logo, Device Type, e.g., MCR68-2, Date Code

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>(1)</sup> ( $T_J = -40$ to $+125^\circ\text{C}$ , Gate Open) MCR68-2	$V_{\text{DRM}}$ , $V_{\text{RRM}}$	50	Volts
Peak Discharge Current <sup>(2)</sup>	$I_{\text{TM}}$	300	Amps
On-State RMS Current ( $180^\circ$ Conduction Angles; $T_C = 85^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	12	Amps
Average On-State Current ( $180^\circ$ Conduction Angles; $T_C = 85^\circ\text{C}$ )	$I_{\text{T(AV)}}$	8.0	Amps
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, $T_J = 125^\circ\text{C}$ )	$I_{\text{TSM}}$	100	Amps
Circuit Fusing Considerations ( $t = 8.3$ ms)	$I^2t$	40	$\text{A}^2\text{s}$
Forward Peak Gate Current ( $t \leq 1.0$ $\mu\text{s}$ , $T_C = 85^\circ\text{C}$ )	$I_{\text{GM}}$	2.0	Amps
Forward Peak Gate Power ( $t \leq 1.0$ $\mu\text{s}$ , $T_C = 85^\circ\text{C}$ )	$P_{\text{GM}}$	20	Watts
Forward Average Gate Power ( $t = 8.3$ ms, $T_C = 85^\circ\text{C}$ )	$P_{\text{G(AV)}}$	0.5	Watt
Operating Junction Temperature Range	$T_J$	$-40$ to $+125$	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	$-40$ to $+150$	$^\circ\text{C}$
Mounting Torque	—	8.0	in. lb.

(1)  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  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.

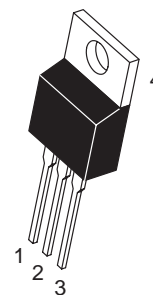
(2) Ratings apply for  $t_w = 1$  ms. See Figure 1 for  $I_{\text{TM}}$  capability for various duration of an exponentially decaying current waveform,  $t_w$  is defined as 5 time constants of an exponentially decaying current pulse.



ON Semiconductor

<http://onsemi.com>

SCRs  
12 AMPERES RMS  
50 VOLTS



TO-220AB  
CASE 221A  
STYLE 3

#### PIN ASSIGNMENT

	PIN ASSIGNMENT
1	Cathode
2	Anode
3	Gate
4	Anode

#### ORDERING INFORMATION

Device	Package	Shipping
MCR68-2	TO220AB	500/Box

## MCR68-2

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^{\circ}\text{C/W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	$^{\circ}\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ , Gate Open)	$I_{DRM}, I_{RRM}$	—	—	10	$\mu\text{A}$
$T_J = 125^{\circ}\text{C}$		—	—	2.0	$\text{mA}$

### ON CHARACTERISTICS

Peak Forward On-State Voltage ( $I_{TM} = 24 \text{ A}$ ) <sup>(1)</sup> ( $I_{TM} = 300 \text{ A}$ , $t_W = 1 \text{ ms}$ ) <sup>(2)</sup>	$V_{TM}$	—	—	2.2	Volts
		—	6.0	—	
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$I_{GT}$	2.0	7.0	30	$\text{mA}$
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ )	$V_{GT}$	—	0.65	1.5	Volts
Gate Non-Trigger Voltage ( $V_D = 12 \text{ Vdc}$ , $R_L = 100 \Omega$ , $T_J = 125^{\circ}\text{C}$ )	$V_{GD}$	0.2	0.40	—	Volts
Holding Current ( $V_D = 12 \text{ V}$ , Initiating Current = 200 $\text{mA}$ , Gate Open)	$I_H$	3.0	15	50	$\text{mA}$
Latching Current ( $V_D = 12 \text{ Vdc}$ , $I_G = 150 \text{ mA}$ )	$I_L$	—	—	60	$\text{mA}$
Gate Controlled Turn-On Time <sup>(3)</sup> ( $V_D = \text{Rated } V_{DRM}$ , $I_G = 150 \text{ mA}$ ) ( $I_{TM} = 24 \text{ A Peak}$ )	$t_{gt}$	—	1.0	—	$\mu\text{s}$

### DYNAMIC CHARACTERISTICS

Critical Rate-of-Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Gate Open, Exponential Waveform, $T_J = 125^{\circ}\text{C}$ )	$dv/dt$	10	—	—	$\text{V}/\mu\text{s}$
Critical Rate-of-Rise of On-State Current $I_G = 150 \text{ mA}$	$di/dt$	—	—	75	$\text{A}/\mu\text{s}$
$T_J = 125^{\circ}\text{C}$					

(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.

# Voltage Current Characteristic of SCR

Symbol	Parameter
$V_{DRM}$	Peak Repetitive Off State Forward Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Off State Reverse Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Peak On State Voltage
$I_H$	Holding Current

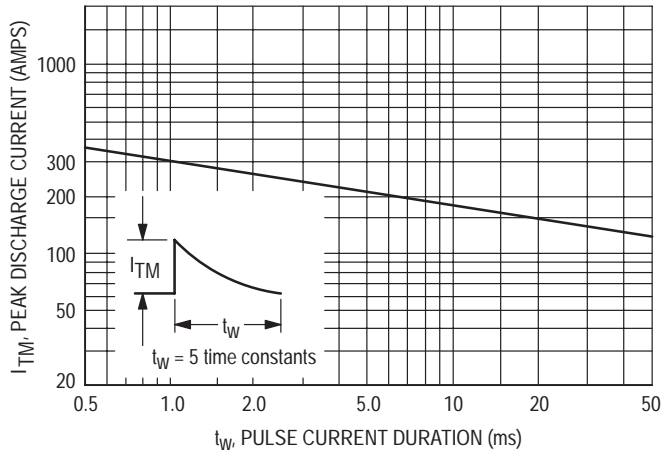
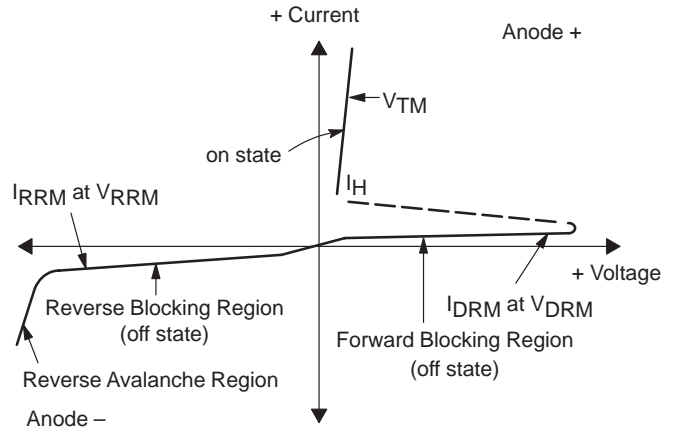


Figure 1. Peak Capacitor Discharge Current

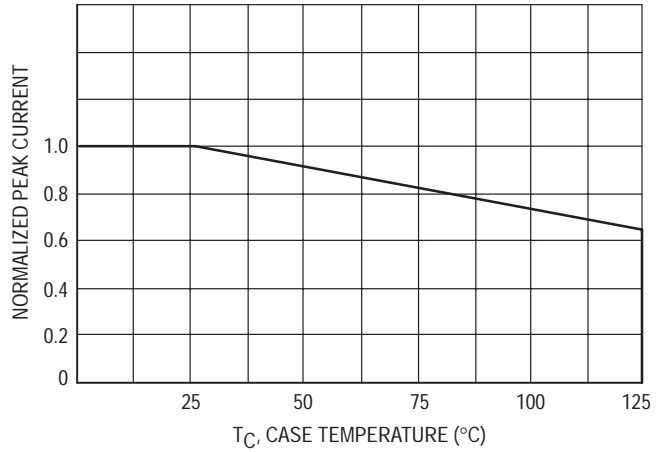


Figure 2. Peak Capacitor Discharge Current Derating

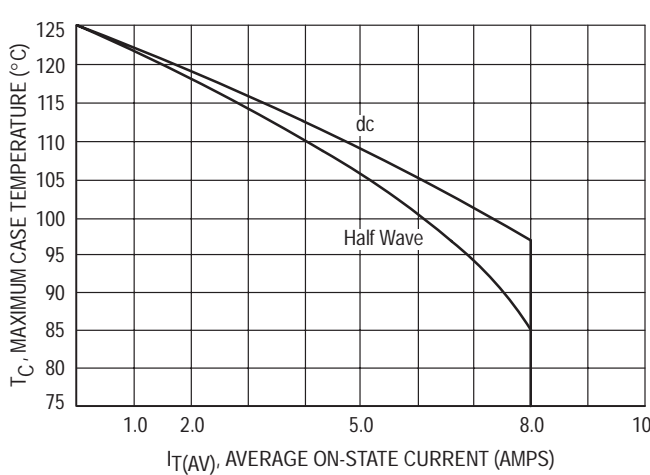


Figure 3. Current Derating

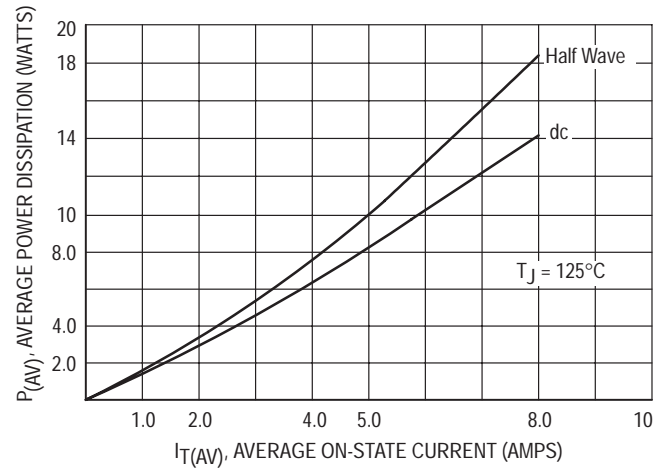


Figure 4. Maximum Power Dissipation

# MCR68-2

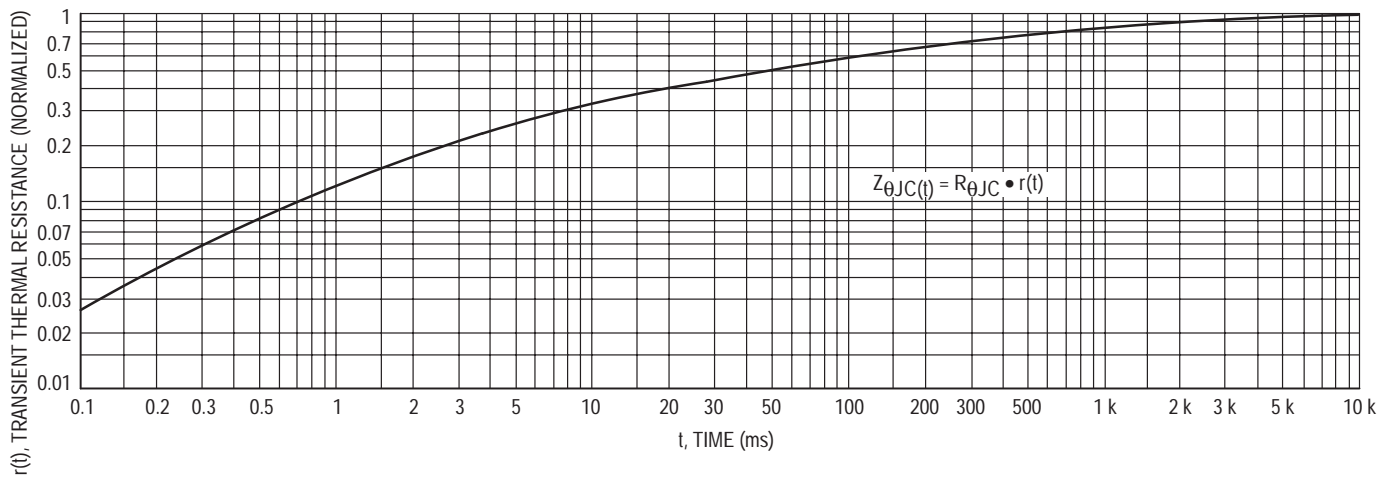


Figure 5. Thermal Response

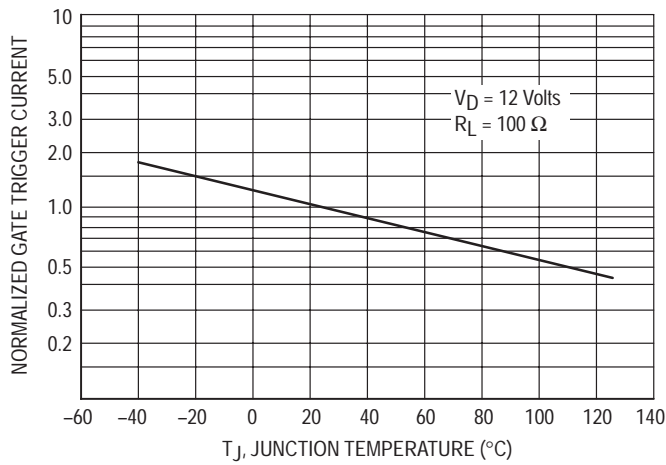


Figure 6. Gate Trigger Current

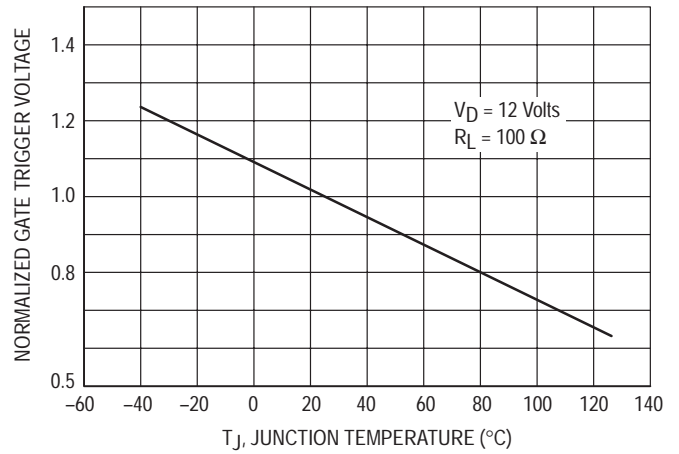


Figure 7. Gate Trigger Voltage

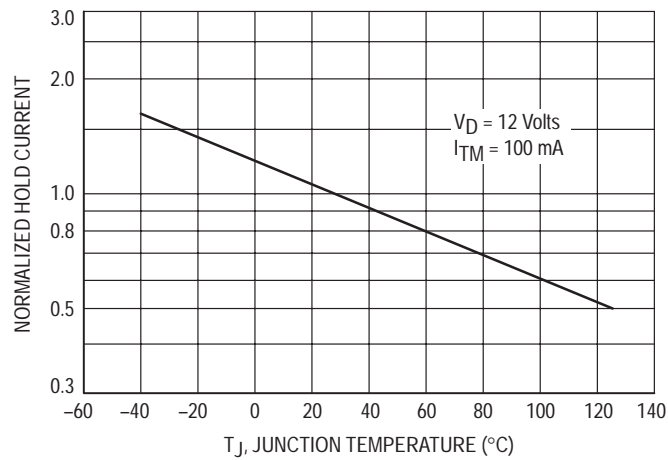
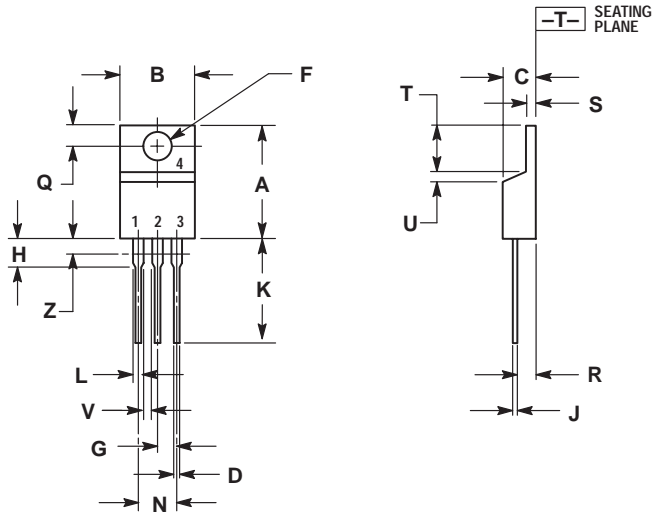


Figure 8. Holding Current

# MCR68-2

## PACKAGE DIMENSIONS

### TO-220AB CASE 221A-07 ISSUE Z



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.022	0.36	0.55
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

- STYLE 3:
- PIN 1. CATHODE
  - ANODE
  - GATE
  - ANODE

## **Notes**

## **Notes**

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