

### MCR68–2



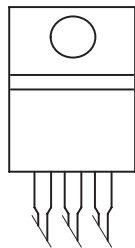
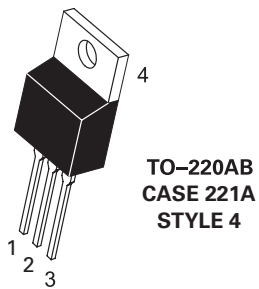
#### Description

Designed for overvoltage protection in crowbar circuits.

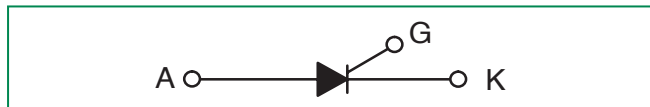
#### Features

- 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
- Pb-Free Package is Available

#### Pin Out



#### Functional Diagram



#### Additional Information



Datasheet



Resources



Samples

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (– 40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open)  MCR68-2	$V_{\text{DRM}}$ $V_{\text{RRM}}$	50	V
On-State RMS Current (180° Conduction Angles; $T_C = 85^\circ\text{C}$ )	$I_{\text{TM (RMS)}}$	12	A
Peak Discharge Current (Note 2)	$I_{\text{TM}}$	300	A
Average On-State Current (180° Conduction Angles; $T_C = 85^\circ\text{C}$ )	$I_{\text{T(AV)}}$	8.0	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 125^\circ\text{C}$ )	$I_{\text{TSM}}$	100	A
Circuit Fusing Consideration ( $t = 8.3$ ms)	$I^2t$	40	A <sup>2</sup> sec
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )	$I_{\text{GM}}$	2.0	A
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 85^\circ\text{C}$ )	$I_{\text{GM}}$	20	W
Forward Average Gate Power ( $t = 8.3$ ms, $T_C = 85^\circ\text{C}$ )	$P_{\text{G(AV)}}$	0.5	W
Operating Junction Temperature Range	$T_J$	-40 to +125	°C
Storage Temperature Range	$T_{\text{stg}}$	-40 to +150	°C
Mounting Torque	–	8.0	in. lb.

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

- $V_{\text{DRM}}$  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.
- 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.

### Thermal Characteristics

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

### Electrical Characteristics - OFF ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM}$ or $V_{RRM}$ , Gate Open)	$T_J = 25^\circ\text{C}$	$I_{DRM}$	-	-	10	$\mu\text{A}$
	$T_J = 125^\circ\text{C}$	$I_{RRM}$	-	-	2.0	mA

### Electrical Characteristics - ON ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Forward On-State Voltage (Note 2) ( $I_{TM} = 32\text{ A}$ ) ( $I_{TM} = 24\text{ A}$ ) (Note 3) ( $I_{TM} = 300\text{ A}$ , $tw = 1\text{ ms}$ ) (Note 4)		$V_{TM}$	-	-	2.2	V
			-	6.0	-	
Gate Trigger Current (Continuous dc) ( $V_D = 12\text{ V}$ ; $R_L = 100\ \Omega$ )		$I_{GT}$	2.0	7.0	30	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12\text{ V}$ ; $R_L = 100\ \Omega$ )		$V_{GT}$	-	0.65	1.5	V
Gate Trigger Non-Current (Continuous dc) ( $V_D = 12\text{ V}$ ; $R_L = 100\ \Omega$ )		$V_{GD}$	0.2	0.40	-	V
Holding Current ( $V_D = 12\text{ V}$ , Initiating Current = 200 mA, Gate Open)		$I_H$	3.0	15	50	mA
Latch Current ( $V_D = 12\text{ V}$ , $I_G = 30\text{ mA}$ )		$I_L$	-	35	80	mA
Gate Controlled Turn-On Time (Note 5) ( $V_D = \text{Rated } V_{DRM}$ , $I_G = 150\text{ mA}$ ) ( $I_{TM} = 24\text{ A Peak}$ )		$V_{GT}$	-	1.0	-	$\mu\text{s}$

### Dynamic Characteristics

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

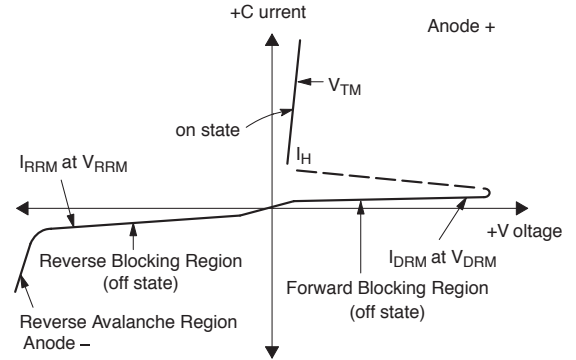
3. Pulse duration  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

4. Ratings apply for  $tw = 1\text{ ms}$ . See Figure 1 for  $I_{TM}$  capability for various durations of an exponentially decaying current waveform.  $tw$  is defined as 5 time constants of an exponentially decaying current pulse.

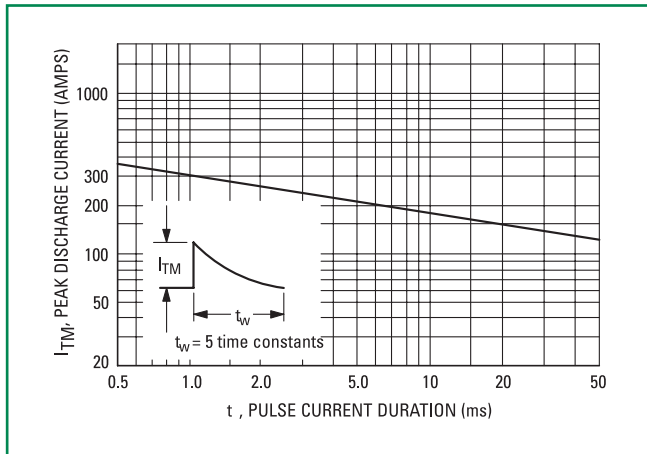
5. The gate controlled turn-on time in a crowbar circuit will be influenced by the circuit inductance.

**Voltage Current Characteristic of SCR**

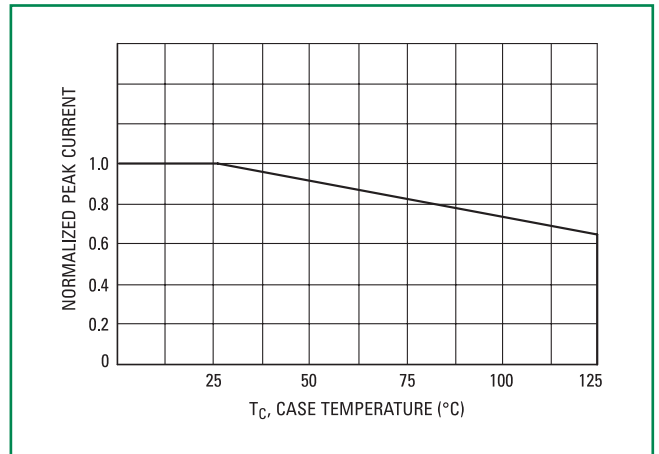
Symbol	Parameter
$V_{DRM}$	Peak Repetitive Forward Off State Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Reverse Off State Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Maximum On State Voltage
$I_H$	Holding Current



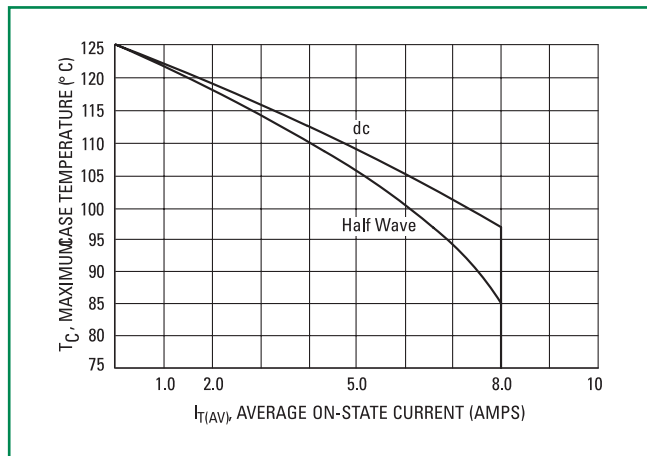
**Figure 1. Peak Capacitor Discharge Current**



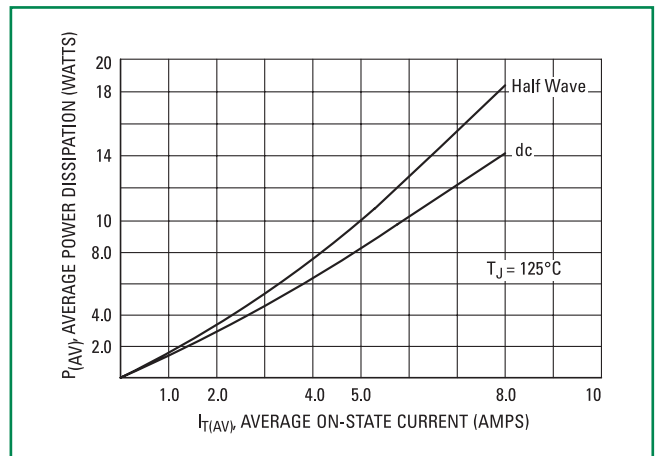
**Figure 2. Peak Capacitor Discharge Current Derating**



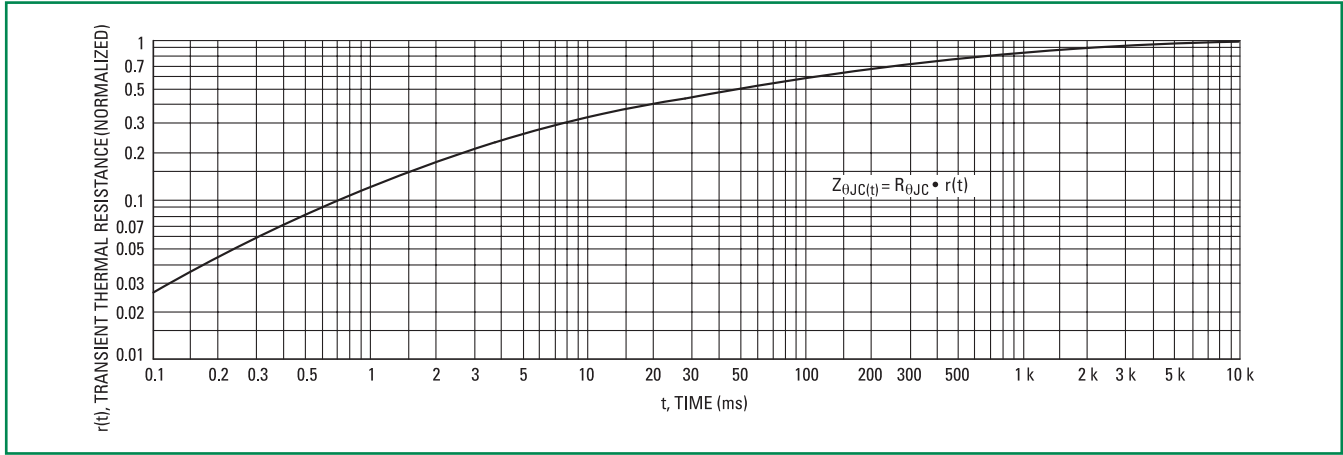
**Figure 3. Current Derating**



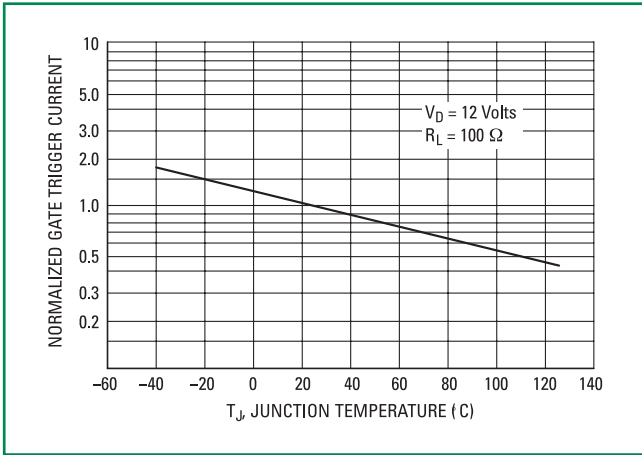
**Figure 4. Maximum Power Dissipation**



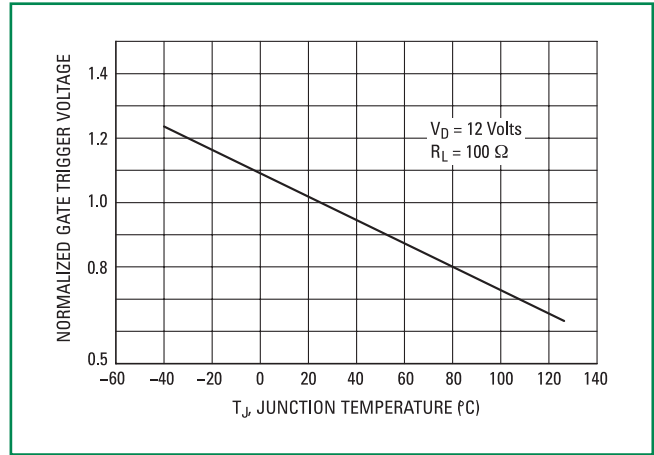
**Figure 5. Thermal Response**



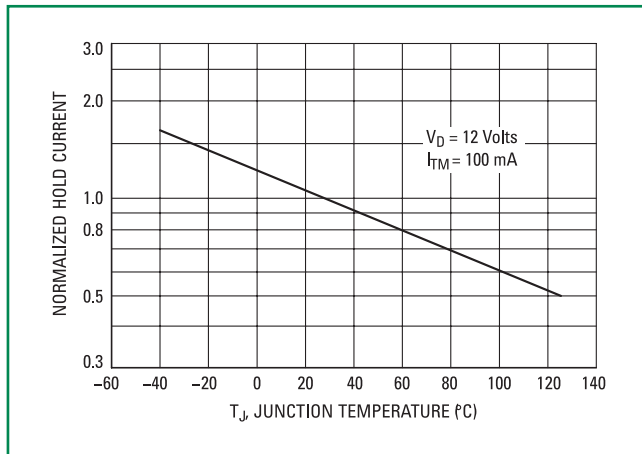
**Figure 6. Gate Trigger Current**



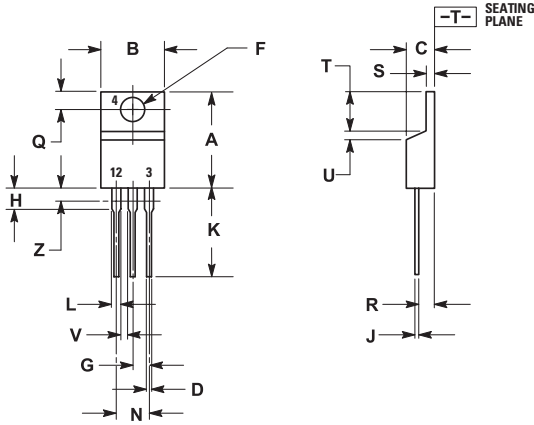
**Figure 7. Gate Trigger Voltage**



**Figure 8. Holding Current**



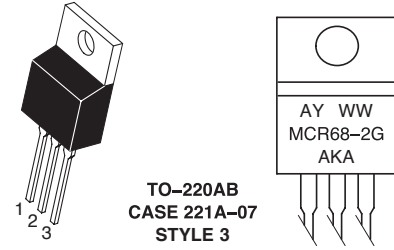
### Dimensions



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

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.

### Part Marking System



A= Assembly Location  
Y= Year  
WW = Work Week  
G = Pb-Free Package  
AKA= Diode Polarity

### Pin Assignment

1	Cathode
2	Anode
3	Gate
4	Anode

### Ordering Information

Device	Package	Shipping
MCR68-2	TO-220AB (Pb-Free)	50 0Units / Box
MCR68-2G		

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