

# MCR69-2, MCR69-3

## 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, 750 Amps
- Device Marking: Logo, Device Type, e.g., MCR69-2, Date Code

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>(1)</sup> (T <sub>J</sub> = -40 to +125°C, Gate Open) MCR69-2 MCR69-3	V <sub>DRM</sub> , V <sub>RRM</sub>	50 100	Volts
Peak Discharge Current <sup>(2)</sup>	I <sub>TM</sub>	750	Amps
On-State RMS Current (180° Conduction Angles; T <sub>C</sub> = 85°C)	I <sub>T(RMS)</sub>	25	Amps
Average On-State Current (180° Conduction Angles; T <sub>C</sub> = 85°C)	I <sub>T(AV)</sub>	16	Amps
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, T <sub>J</sub> = 125°C)	I <sub>TSM</sub>	300	Amps
Circuit Fusing Considerations (t = 8.3 ms)	I <sup>2</sup> t	375	A <sup>2</sup> s
Forward Peak Gate Current (t ≤ 1.0 μs, T <sub>C</sub> = 85°C)	I <sub>GM</sub>	2.0	Amps
Forward Peak Gate Power (t ≤ 1.0 μs, T <sub>C</sub> = 85°C)	P <sub>GM</sub>	20	Watts
Forward Average Gate Power (t = 8.3 ms, T <sub>C</sub> = 85°C)	P <sub>G(AV)</sub>	0.5	Watt
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +150	°C
Mounting Torque	—	8.0	in. lb.

(1) V<sub>DRM</sub> and V<sub>RRM</sub> 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<sub>w</sub> = 1 ms. See Figure 1 for I<sub>TM</sub> capability for various duration of an exponentially decaying current waveform, t<sub>w</sub> is defined as 5 time constants of an exponentially decaying current pulse.

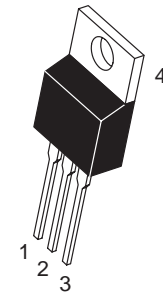
(3) Test Conditions: I<sub>G</sub> = 150 mA, V<sub>D</sub> = Rated V<sub>DRM</sub>, I<sub>TM</sub> = Rated Value, T<sub>J</sub> = 125°C.



**ON Semiconductor**

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**SCRs**  
**25 AMPERES RMS**  
**50 thru 100 VOLTS**



**TO-220AB**  
**CASE 221A**  
**STYLE 3**

PIN ASSIGNMENT	
1	Cathode
2	Anode
3	Gate
4	Anode

### ORDERING INFORMATION

Device	Package	Shipping
MCR69-2	TO220AB	500/Box
MCR69-3	TO220AB	500/Box

## MCR69–2, MCR69–3

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.5	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^{\circ}C/W$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	$^{\circ}C$

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ 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	$\mu A$
$T_J = 25^{\circ}C$		—	—	2.0	$m A$
$T_J = 125^{\circ}C$		—	—		

### ON CHARACTERISTICS

Peak Forward On-State Voltage ( $I_{TM} = 50 A$ ) <sup>(1)</sup> ( $I_{TM} = 750 A, t_w = 1 ms$ ) <sup>(2)</sup>	$V_{TM}$	—	—	1.8	Volts
		—	6.0	—	
Gate Trigger Current (Continuous dc) ( $V_D = 12 V, R_L = 100 \Omega$ )	$I_{GT}$	2.0	7.0	30	$m A$
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 V, R_L = 100 \Omega$ )	$V_{GT}$	—	0.65	1.5	Volts
Gate Non-Trigger Voltage ( $V_D = 12 V_{dc}, R_L = 100 \Omega, T_J = 125^{\circ}C$ )	$V_{GD}$	0.2	0.40	—	Volts
Holding Current ( $V_D = 12 V$ , Initiating Current = 200 $m A$ , Gate Open)	$I_H$	3.0	15	50	$m A$
Latching Current ( $V_D = 12 V_{dc}, I_G = 150 m A$ )	$I_L$	—	—	60	$m A$
Gate Controlled Turn-On Time <sup>(3)</sup> ( $V_D = \text{Rated } V_{DRM}, I_G = 150 m A$ ) ( $I_{TM} = 50 A \text{ Peak}$ )	$t_{gt}$	—	1.0	—	$\mu s$

### DYNAMIC CHARACTERISTICS

Critical Rate-of-Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Gate Open, Exponential Waveform, $T_J = 125^{\circ}C$ )	$dv/dt$	10	—	—	$V/\mu s$
Critical Rate-of-Rise of On-State Current $I_G = 150 m A$	$di/dt$	—	—	100	$A/\mu s$
					$T_J = 125^{\circ}C$

(1) Pulse duration  $\leq 300 \mu s$ , duty cycle  $\leq 2\%$ .

(2) Ratings apply for  $t_w = 1 ms$ . 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

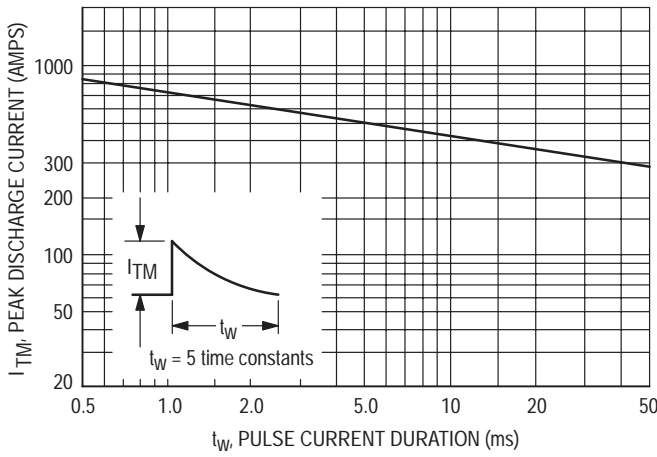
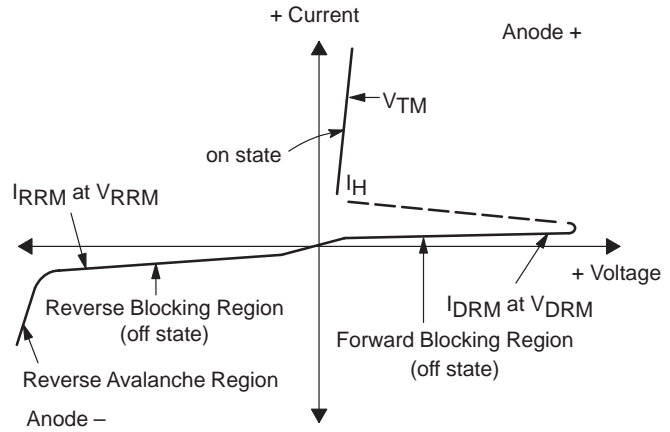


Figure 1. Peak Capacitor Discharge Current

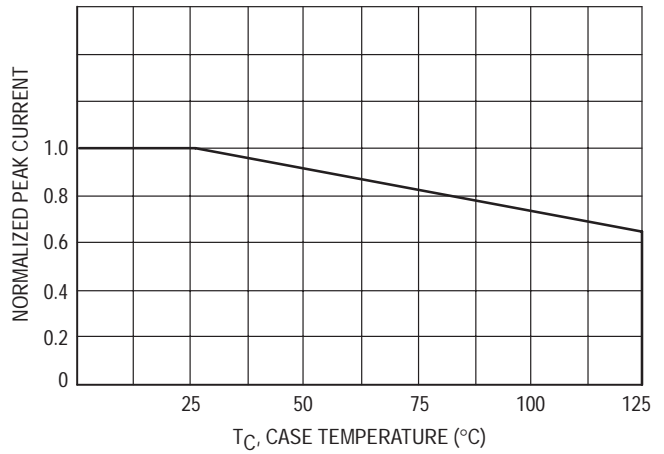


Figure 2. Peak Capacitor Discharge Current Derating

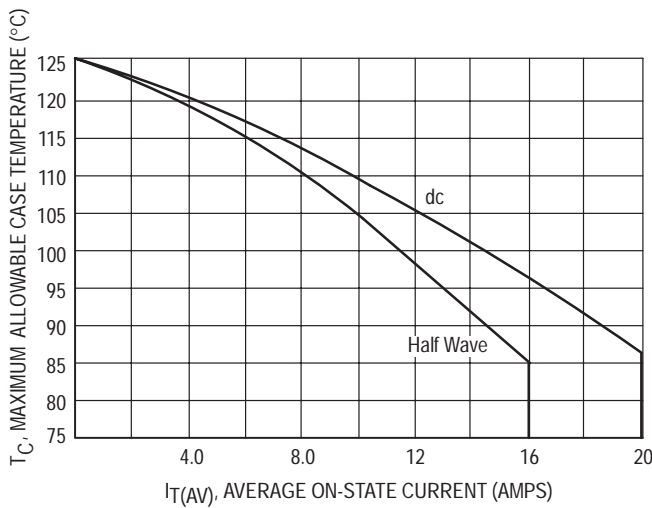


Figure 3. Current Derating

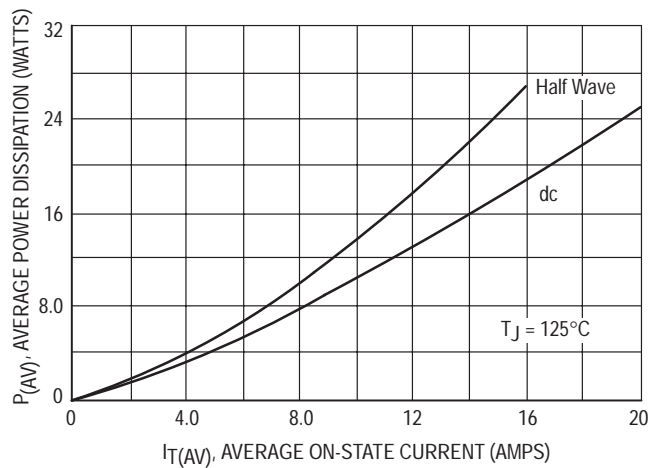


Figure 4. Maximum Power Dissipation

# MCR69-2, MCR69-3

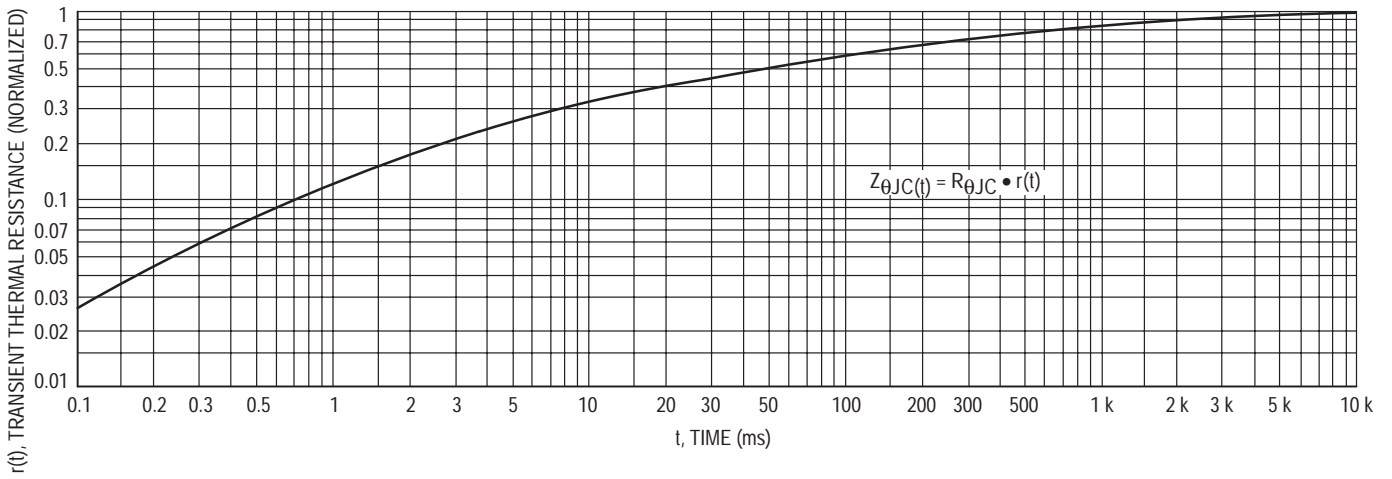


Figure 5. Thermal Response

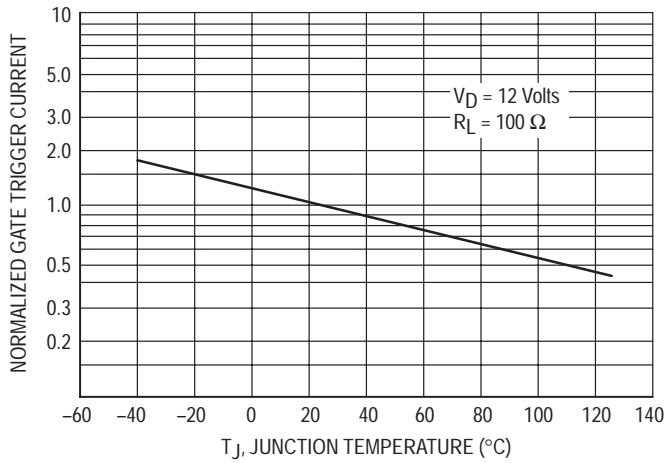


Figure 6. Gate Trigger Current

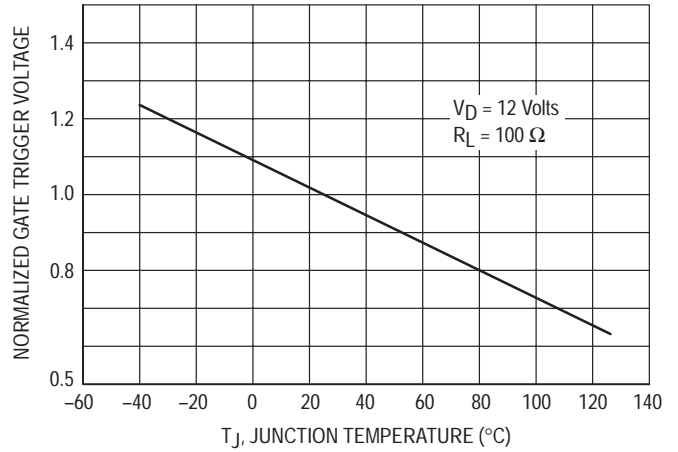


Figure 7. Gate Trigger Voltage

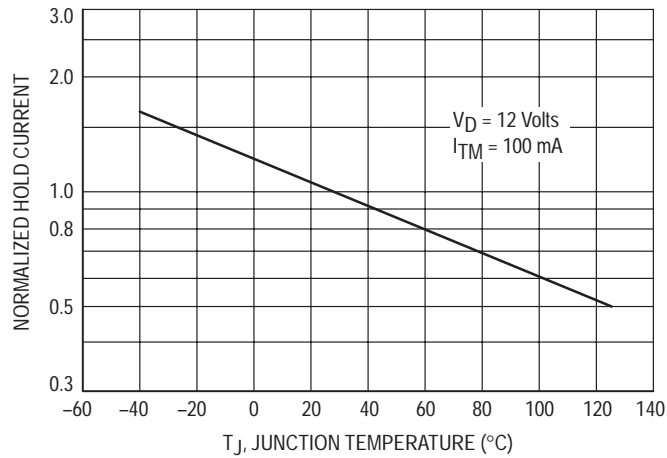
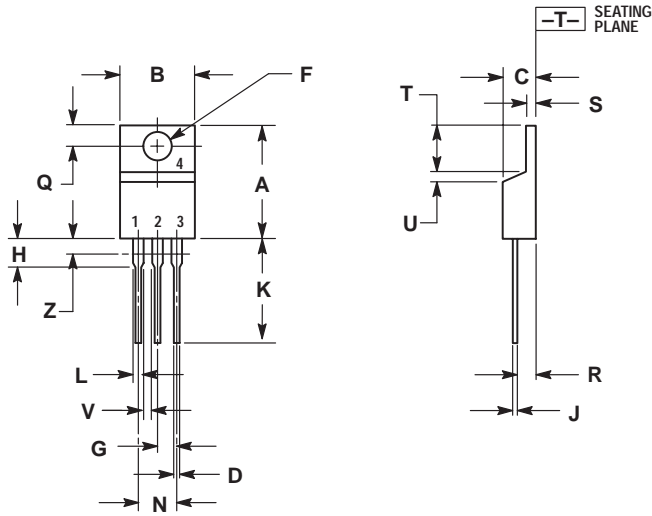


Figure 8. Holding Current

# MCR69-2, MCR69-3

## 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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