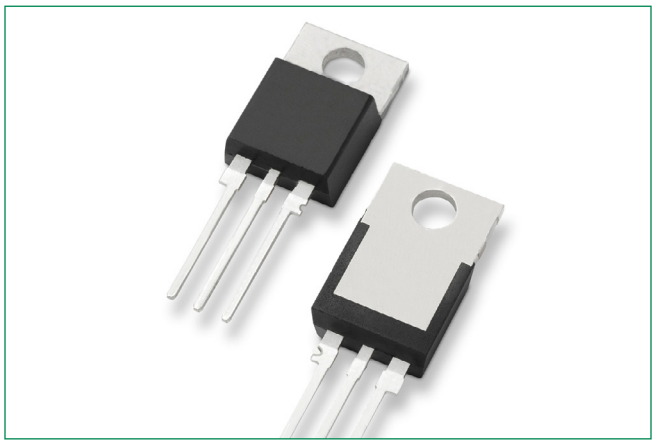
MCR69-2, MCR69-3

Silicon Controlled Rectifiers – 400V - 800V



Description

Designed for overvoltage protection in crowbar circuits.

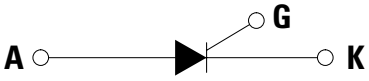
Features & Benefits

- 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
- Pb–Free Packages are Available

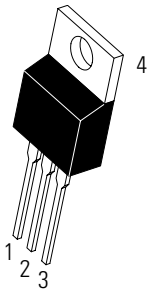
Additional Information

Resources | Accessories | Samples

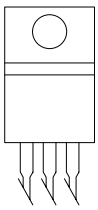
Functional Diagram



Pin Out



TO-220AB
Case 221A
Style 3



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Silicon Controlled Rectifiers – 400V - 800V

Maximum Ratings (T_J = 25°C unless otherwise noted)

Rating	Part Number	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (T_J = -40 to +125°C, Gate Open)	MCR169-2 MCR69-3	V_{DRM}, V_{RRM}	50 100	V
Peak Discharge Current (Note 2)		I_{TM}	750	A
On-State RMS Current (180° Conduction Angles; T_C = 85°C)		$I_{T(RMS)}$	25	A
Average On-State Current (180° Conduction Angles; T_C = 80°C)		$I_{T(AV)}$	16	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, T_J = 125°C)		I_{TSM}	300	A
Circuit Fusing Considerations (t = 8.3 ms)		I^2t	375	A^2sec
Forward Peak Gate Current (t ≤ 1.0 µs, T_C = 85°C)		I_{GM}	2.0	A
Forward Peak Gate Power (t ≤ 1.0µs, T_C = 85°C)		P_{GM}	20	W
Operating Junction Temperature Range		T_J	-40 to +125	°C
Storage Temperature Range		T_{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 limitsare exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. VDRM and VRRM 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 tw = 1 ms. See Figure 1 for ITM capability for various duration of an exponentially decaying current waveform, tw is defined as 5 time constants of an exponentially decaying current pulse.
3. Test Conditions: I_G = 150 mA, V_D = Rated V_{DRM}, I_{TM} = Rated Value, T_J = 125°C.

Thermal Characteristics

Characterstic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	60	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	°C

Electrical Characteristics - OFF (T_J = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Repetitive Forward or Reverse Blocking Current (V_{AK} = V_{DRM} = V_{RRM}; Gate Open)	T_J = 25°C	I_{DRM}	-	-	10	µA
	T_J = 125°C	I_{RRM}	-	-	2.0	mA

Electrical Characteristics - ON

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Forward On–State Voltage	(Note 4) (I_{TM} = 50 A)	V_{TM}	–	–	1.8	V
	(I_{TM} = 750 A, tw = 1 ms) (Note 5)		–	6.0	–	
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		I_{GT}	2.0	7.0	30	mA
Gate Trigger Voltage (Continuous dc) (V_D = 12 Vdc, R_L = 100 Ω)		V_{GT}	–	0.65	1.5	V
Gate Non-Trigger Voltage (Continuous dc) (V_D = 12 Vdc, R_L = 100 Ω, T_J = 125°C)		V_{GD}	0.2	0.40	–	V
Holding Current (V_D = 12 Vdc, Initiating Current = 200 mA, Gate Open)		I_H	3.0	15	50	mA
Latch Current (V_D = 12 V_{DC}, I_G = 150 mA)		I_L	–	–	60	mA
Gate Controlled Turn-On Time (Note 6) (V_D = Rated V_{DRM}, I_G = 150 mA) (I_{TM} = 50 A Peak)		t_{gt}	–	1.0	–	µs

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Dynamic Characteristics

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate–of–Rise of Off-State Voltage (V_D = Rated V_{DRM}, Exponential Waveform, Gate Open, T_J = 125°C)	dv/dt	10	–	–	V/µs
Critical Rate of Rise of On–State Current I_G = 150 mA , T_J = 125°C	di/dt	–	–	100	A/µs

4. Pulse duration ≤ 300 µs, duty cycle ≤ 2%.
5. Ratings apply for tw = 1 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.
6. 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

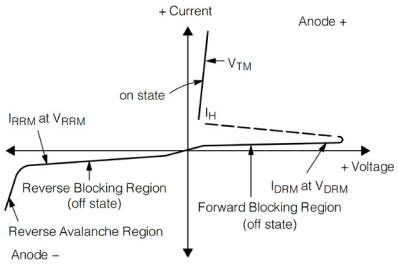

Figure 1. Typical RMS Current Derating

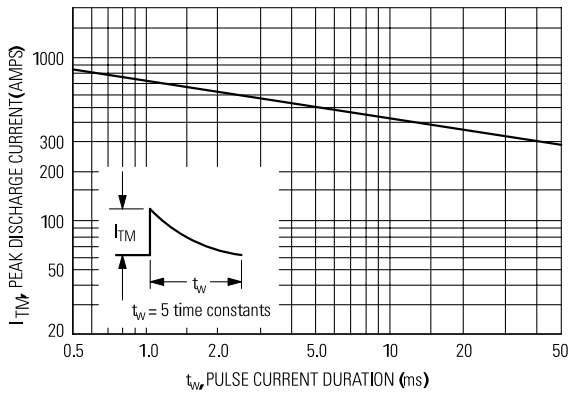

Figure 2. Peak Capacitor Discharge Current Derating

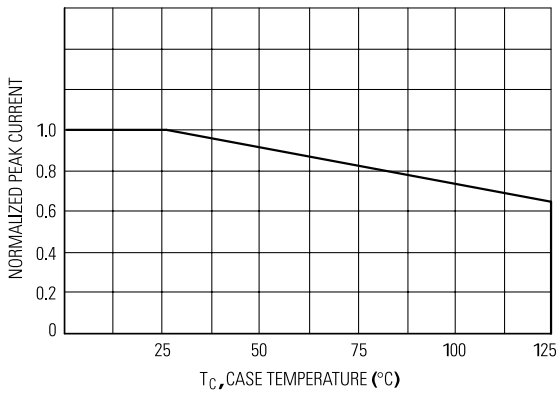

Figure 3. Current Derating

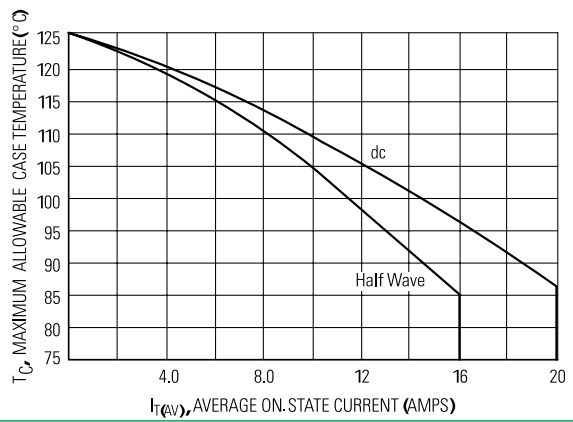

Figure 4. Maximum Power Dissipation

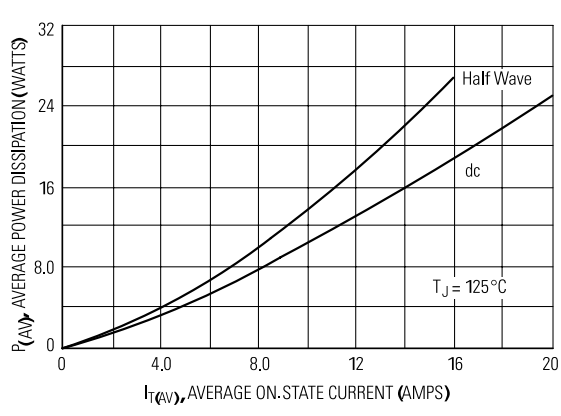

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Figure 5.
Thermal Response

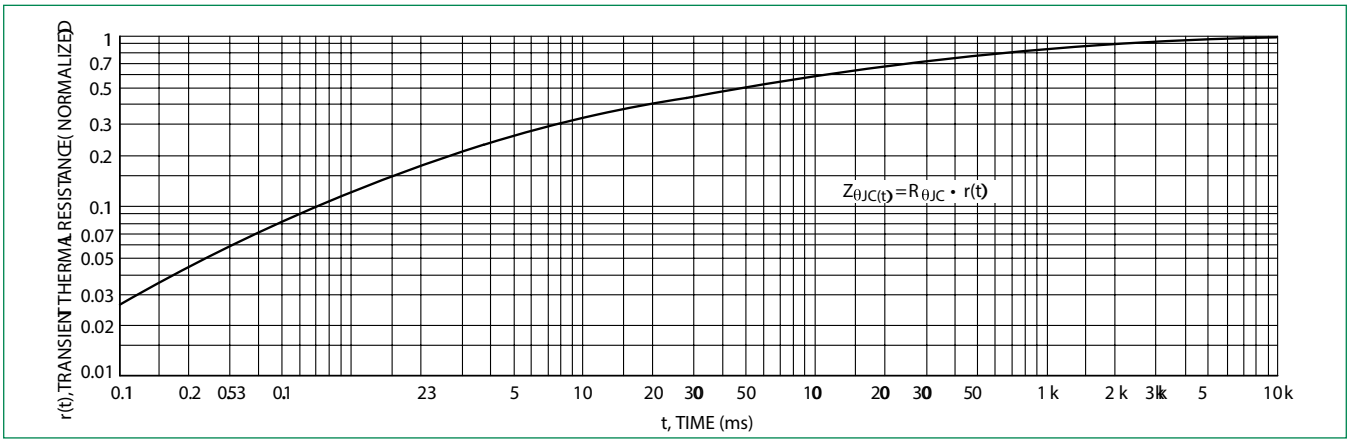


Figure 6.
Gate Trigger Current

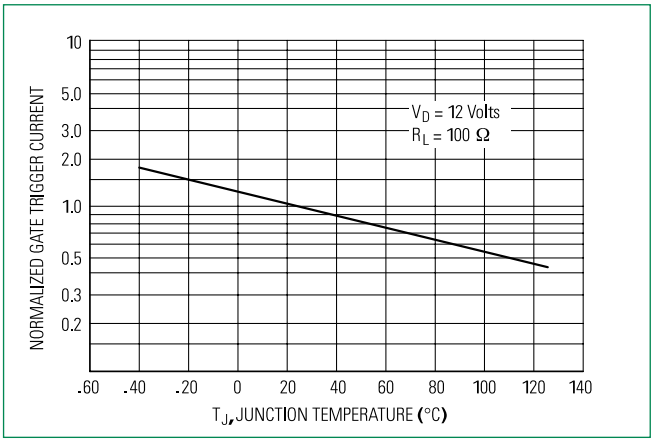


Figure 7.
Gate Trigger Voltage

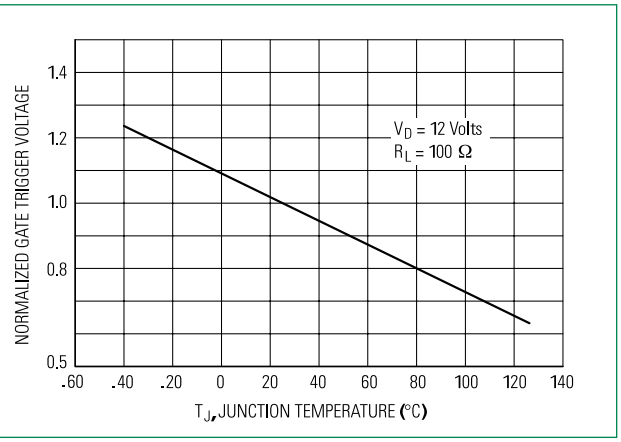
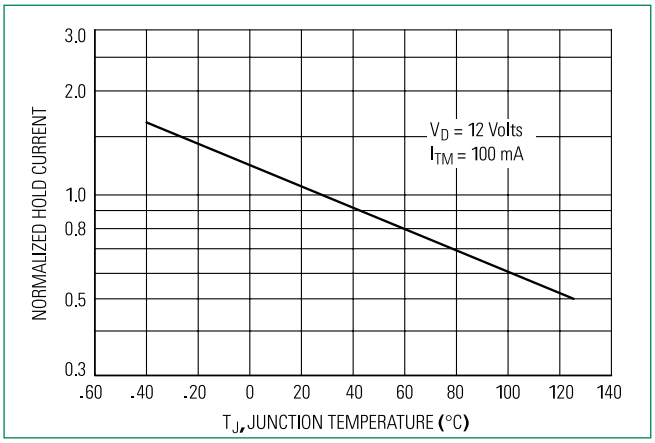


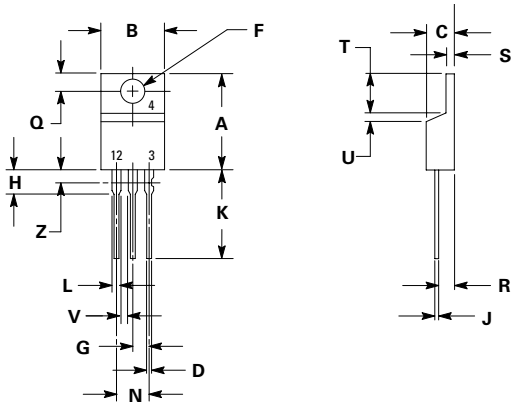
Figure 8.
Holding Current



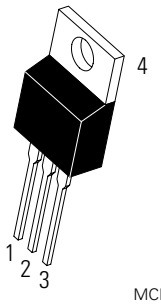
MCR69-2, MCR69-3

Silicon Controlled Rectifiers – 400V - 800V

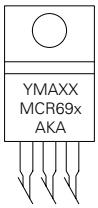
Dimensions



Part Marking System



TO-220AB
Case 221A
Style 3



MCR69	=Device Code
Y	=Year
M	=Month
A	=Assembly Site
AKA	=Diode Polarity
G	=Pb-Free Package

Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.590	0.620	14.99	15.75
B	0.380	0.420	9.65	10.67
C	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.41	2.67
H	0.110	0.130	2.79	3.30
J	0.018	0.024	0.46	0.61
K	0.540	0.575	13.72	14.61
L	0.060	0.075	1.52	1.91
N	0.195	0.205	4.95	5.21
Q	0.105	0.115	2.67	2.92
R	0.085	0.095	2.16	2.41
S	0.045	0.060	1.14	1.52
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.

Pin Assignment	
1	Cathode
2	Anode
3	Gate
4	Anode

Ordering Information

Device	Package	Shipping
MCR69-2	TO-220AB	1000 / Box
MCR69-2G	TO-220AB (Lead-Free)	
MCR69-3	TO-220AB	
MCR69-3G	TO-220AB (Lead-Free)	

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