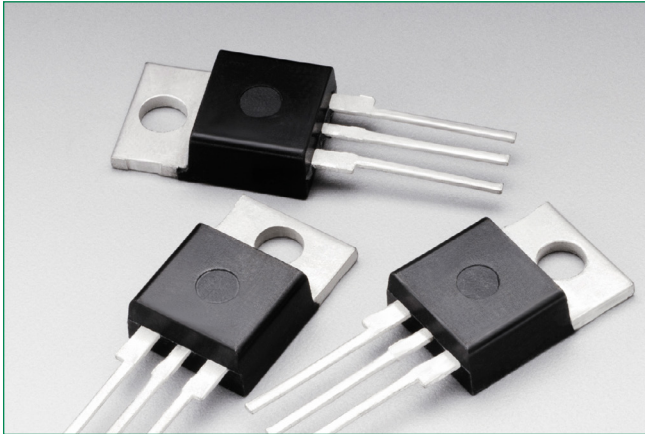


# MCR8SDG, MCR8SMG, MCR8SNG

## Sensitive Gate Silicon Controlled Rectifiers — 400V - 800V



### Description

Designed primarily for half-wave ac control applications, such as motor controls, heating controls, and power supplies; or wherever half-wave, silicon gate-controlled devices are needed.

### Features

- Sensitive Gate Allows Triggering by Microcontrollers and other Logic Circuits
- Blocking Voltage to 800 V
- On-State Current Rating of 8 A RMS at 80°C
- High Surge Current Capability – 80 A
- Rugged, Economical TO-220AB Package
- Glass Passivated Junctions for Reliability and Uniformity
- Minimum and Maximum Values of IGT, VGT and IH Specified for Ease of Design
- Immunity to  $dv/dt$  – 5 V/ $\mu$ sec Minimum at 110°C
- These are Pb-Free Devices

### Additional Information



Resources

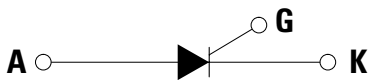


Accessories

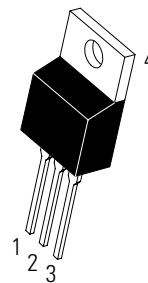


Samples

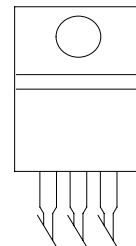
### Functional Diagram



### Pin Out



**TO-220AB  
Case 221A  
Style 4**



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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (- 40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open)	MCR8SDG	400	V
	MCR8SMG	600	
	MCR8SNG	800	
On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$ )	$I_{T(RMS)}$	8.0	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 110^\circ\text{C}$ )	$I_{TSM}$	80	A
Circuit Fusing Consideration ( $t = 8.33$ ms)	$I^2t$	26.5	A <sup>2</sup> sec
Forward Peak Gate Power (Pulse Width $\leq 10$ $\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )	$P_{GM}$	5.0	W
Forward Average Gate Power ( $t = 8.3$ msec, $T_C = 80^\circ\text{C}$ )	$P_{GM(AV)}$	0.5	W
Forward Peak Gate Current (Pulse Width $\leq 10$ $\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )	$I_{GM}$	2.0	A
Operating Junction Temperature Range	$T_J$	-40 to 110	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to 150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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.

### Thermal Characteristics

Rating	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.2	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	$^\circ\text{C}$

### 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 (Note 3) ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ , $R_{GK} = 1.0$ k $\Omega$ )	$I_{DRM}$ $I_{RRM}$	$T_J = 25^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$T_J = 110^\circ\text{C}$	-	-	500	

### Electrical Characteristics - ON ( $T_J = 25^\circ\text{C}$ unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit	
Peak Forward On-State Voltage (Note 2) ( $I_{TM} = 16$ A)	$V_{TM}$	-	-	1.8	V	
Gate Trigger Current (Continuous dc) (Note 4) ( $V_D = 12$ V; $R_L = 100$ $\Omega$ )	$I_{GT}$	5.0	25	200	$\mu\text{A}$	
Holding Current (Note 3) ( $V_D = 12$ V, Gate Open, Initiating Current = 200 mA)	$I_H$	-	0.5	6.0	mA	
Latch Current (Note 4) ( $V_D = 12$ V, $I_G = 200$ $\mu\text{A}$ )	$I_L$	-	0.6	8.0	mA	
Gate Trigger Voltage (Continuous dc) ( $V_D = 12$ V, $R_L = 100$ $\Omega$ ) (Note 4)	$V_{GT}$	$T_J = 25^\circ\text{C}$	0.3	0.65	1.0	V
		$T_J = -40^\circ\text{C}$	-	-	1.5	
Gate Non-Trigger Voltage ( $V_D = 12$ V, $R_L = 100$ $\Omega$ )	$V_{GD}$	0.2	-	-	V	

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### Dynamic Characteristics

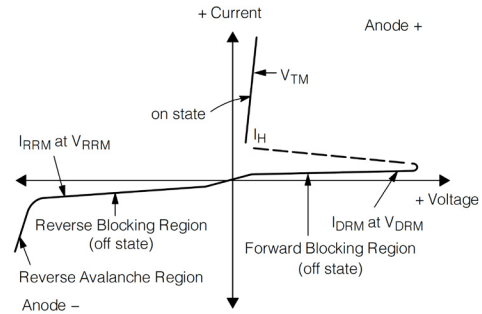
Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Off-State Voltage ( $V_D = 67\% V_{DRM}$ , $R_{GK} = 1\text{ K}\Omega$ , $C_{GK} = 0.1\ \mu\text{F}$ , $T_J = 110^\circ\text{C}$ )	dv/dt	5.0	15	—	V/ $\mu\text{s}$
Critical Rate of Rise of On-State Current ( $I_{PK} = 50\text{ A}$ , $P_w = 40\ \mu\text{sec}$ , $di/dt = 1\text{ A}/\mu\text{sec}$ , $I_{gt} = 10\text{ mA}$ )	di/dt	—	—	100	A/ $\mu\text{s}$

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

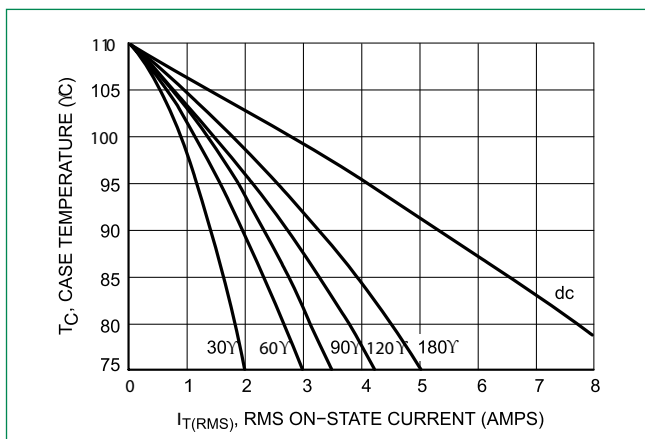
- Ratings apply for negative gate voltage or  $R_{GK} = 1.0\text{ k}\Omega$ . Devices shall not have a positive gate voltage concurrently with a negative voltage on the anode. Devices should not be tested with a constant current source for forward and reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.
- Pulse Test; Pulse Width  $\leq 2.0\text{ msec}$ , Duty Cycle  $\leq 2\%$ .
- RGK current not included in measurements.

### Voltage Current Characteristic of SCR

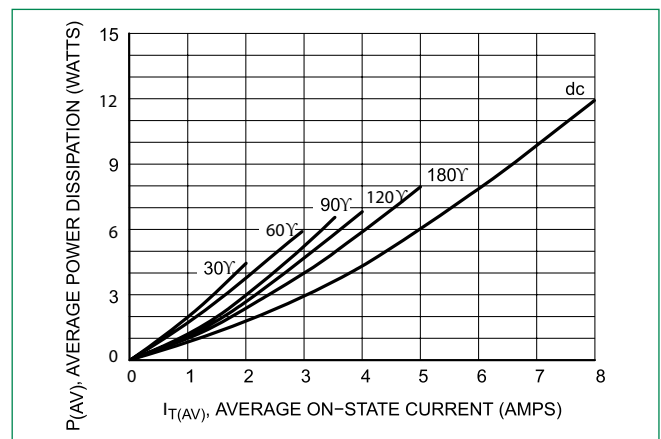
Symbol	Parameter
$V_{DRM}$	Peak Repetitive Forward Off State Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Reverse Off State Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Maximum On State Voltage
$I_H$	Holding Current



**Figure 1.**  
Typical RMS Current Derating



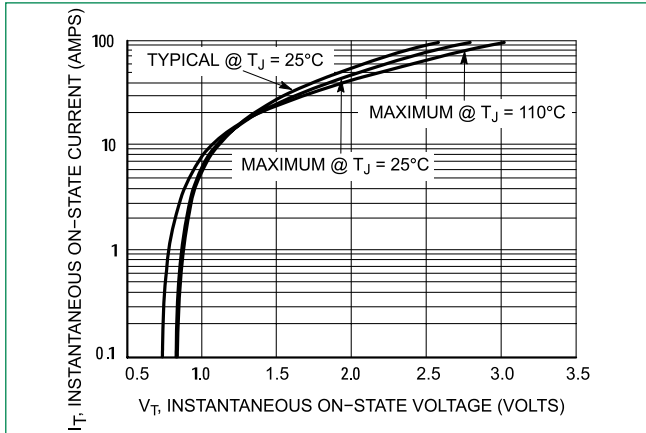
**Figure 2.**  
On-State Power Dissipation



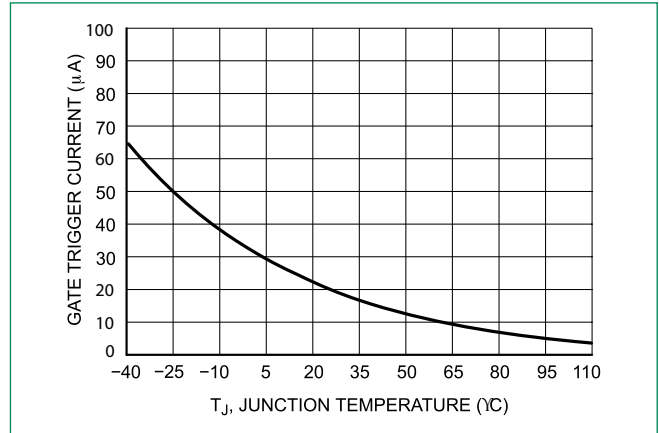
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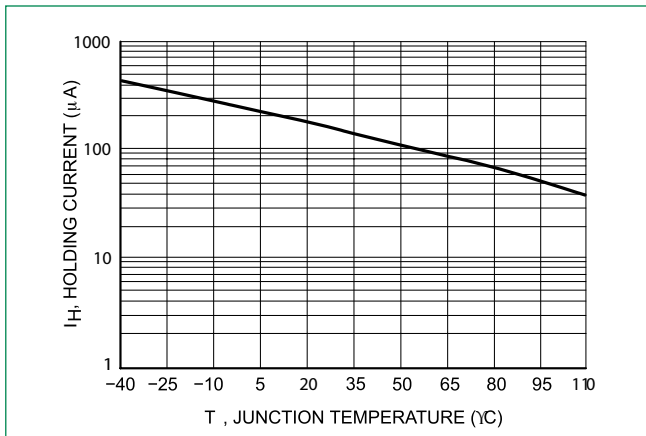
**Figure 3.**  
Typical On-State Characteristics



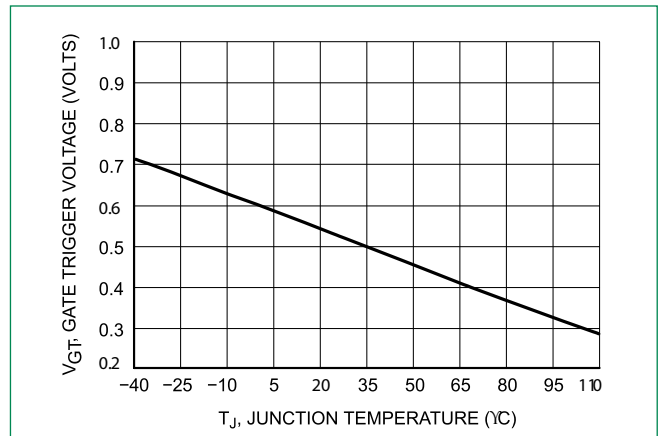
**Figure 4.**  
Typical Gate Trigger Current vs Junction Temperature



**Figure 5.**  
Typical Gate Trigger Current vs Junction Temperature



**Figure 6.**  
Typical Gate Trigger Voltage vs Junction Temperature



**Figure 7.**  
Typical Holding Current vs Junction Temperature

