

# MCR8SD, MCR8SM, MCR8SN

Preferred Device

## Sensitive Gate Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

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.

- Sensitive Gate Allows Triggering by Microcontrollers and other Logic Circuits
- Blocking Voltage to 800 Volts
- On-State Current Rating of 8 Amperes RMS at 80°C
- High Surge Current Capability — 80 Amperes
- Rugged, Economical TO220AB 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/μsec Minimum at 110°C
- Device Marking: Logo, Device Type, e.g., MCRSD, 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 110°C, Sine Wave, 50 to 60 Hz, Gate Open)	V <sub>DRM</sub> , V <sub>RRM</sub>		Volts
MCR8SD		400	
MCR8SM		600	
MCR8SN		800	
On-State RMS Current (180° Conduction Angles; T <sub>C</sub> = 80°C)	I <sub>T(RMS)</sub>	8.0	Amps
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, T <sub>J</sub> = 110°C)	I <sub>TSM</sub>	80	Amps
Circuit Fusing Consideration (t = 8.33 ms)	I <sup>2</sup> t	26.5	A <sup>2</sup> sec
Forward Peak Gate Power (Pulse Width ≤ 1.0 μs, T <sub>C</sub> = 80°C)	P <sub>GM</sub>	5.0	Watts
Forward Average Gate Power (t = 8.3 ms, T <sub>C</sub> = 80°C)	P <sub>G(AV)</sub>	0.5	Watt
Forward Peak Gate Current (Pulse Width ≤ 1.0 μs, T <sub>C</sub> = 80°C)	I <sub>GM</sub>	2.0	Amps
Operating Junction Temperature Range	T <sub>J</sub>	-40 to 110	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to 150	°C

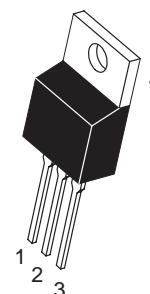
(1) V<sub>DRM</sub> and V<sub>RRM</sub> for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



ON Semiconductor

<http://onsemi.com>

**SCRs**  
**8 AMPERES RMS**  
**400 thru 800 VOLTS**



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

#### PIN ASSIGNMENT

1	Cathode
2	Anode
3	Gate
4	Anode

#### ORDERING INFORMATION

Device	Package	Shipping
MCR8SD	TO220AB	50 Units/Rail
MCR8SM	TO220AB	50 Units/Rail
MCR8SN	TO220AB	50 Units/Rail

**Preferred** devices are recommended choices for future use and best overall value.

# MCR8SD, MCR8SM, MCR8SN

## THERMAL CHARACTERISTICS

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

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

Characteristic	Symbol	Min	Typ	Max	Unit
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## OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current <sup>(1)</sup> ( $V_D = \text{Rated } V_{DRM} \text{ and } V_{RRM}; R_{GK} = 1 \text{ k}\Omega$ ) $T_J = 25^{\circ}\text{C}$ $T_J = 110^{\circ}\text{C}$	$I_{DRM}$ , $I_{RRM}$	— —	— —	10 500	$\mu\text{A}$
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## ON CHARACTERISTICS

Peak Forward On-State Voltage* ( $I_{TM} = 16 \text{ A}$ )	$V_{TM}$	—	—	1.8	Volts
Gate Trigger Current (Continuous dc) <sup>(2)</sup> ( $V_D = 12 \text{ V}; R_L = 100 \Omega$ )	$I_{GT}$	5.0	25	200	$\mu\text{A}$
Holding Current <sup>(2)</sup> ( $V_D = 12 \text{ V}$ , Gate Open, Initiating Current = 200 mA)	$I_H$	—	0.5	6.0	mA
Latch Current <sup>(2)</sup> ( $V_D = 12 \text{ V}$ , $I_G = 200 \mu\text{A}$ )	$I_L$	—	0.6	8.0	mA
Gate Trigger Voltage (Continuous dc) <sup>(2)</sup> ( $V_D = 12 \text{ V}; R_L = 100 \Omega$ ) $T_J = 25^{\circ}\text{C}$ $T_J = -40^{\circ}\text{C}$	$V_{GT}$	0.3 —	0.65 —	1.0 1.5	Volts
Gate Non-Trigger Voltage ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ ) $T_J = 110^{\circ}\text{C}$	$V_{GD}$	0.2	—	—	Volts

## DYNAMIC CHARACTERISTICS

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	—	$\text{V}/\mu\text{s}$
Critical Rate of Rise of On-State Current $IPK = 50 \text{ A}$ , $Pw = 40 \mu\text{sec}$ , $diG/dt = 1 \text{ A}/\mu\text{sec}$ , $I_{gt} = 10 \text{ mA}$	$di/dt$	—	—	100	$\text{A}/\mu\text{s}$

\*Indicates Pulse Test: Pulse Width  $\leq 2.0 \text{ ms}$ , Duty Cycle  $\leq 2\%$ .

(1)  $R_{GK} = 1000 \text{ Ohms}$  included in measurement.

(2) Does not include  $R_{GK}$  in measurement.

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## 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

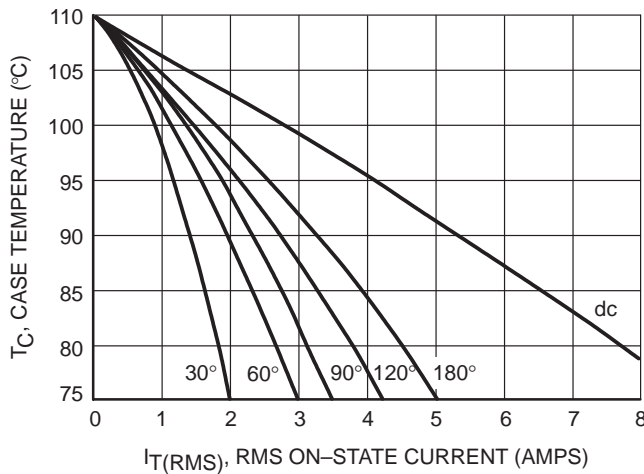
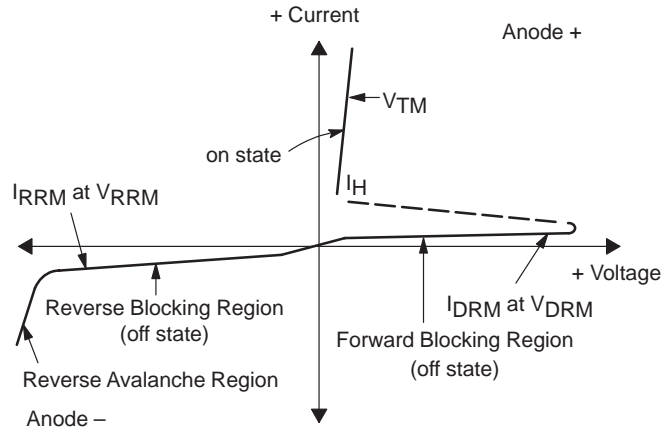


Figure 1. Typical RMS Current Derating

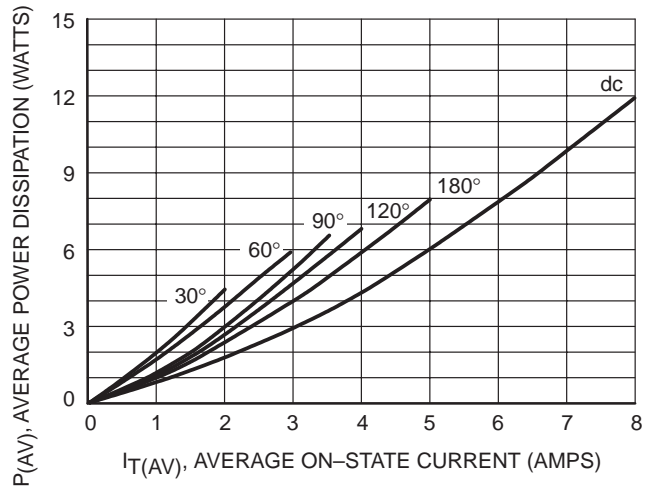


Figure 2. On-State Power Dissipation

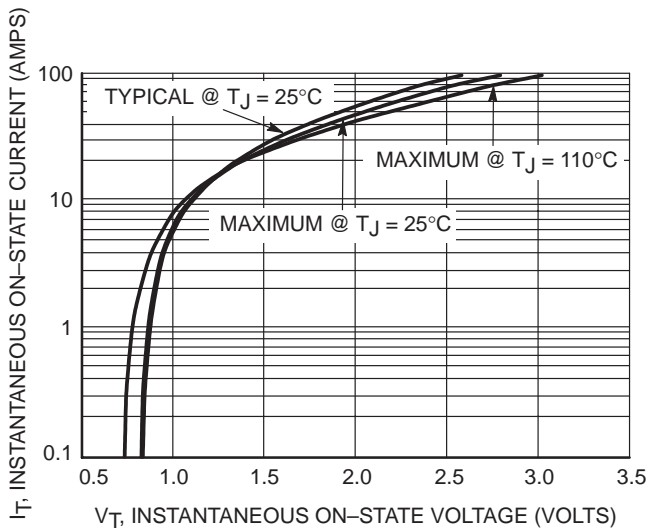


Figure 3. Typical On-State Characteristics

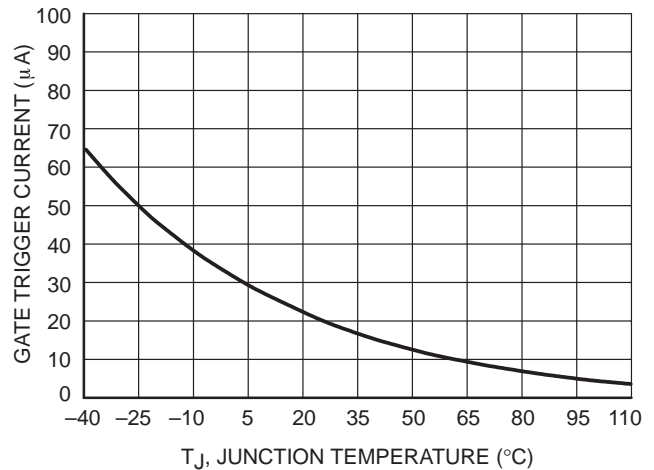
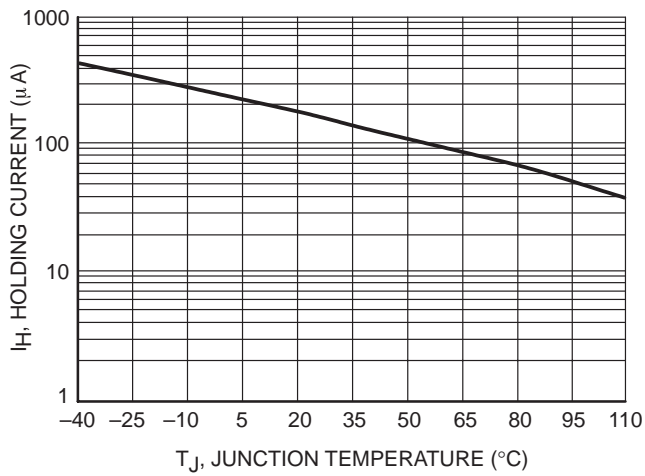
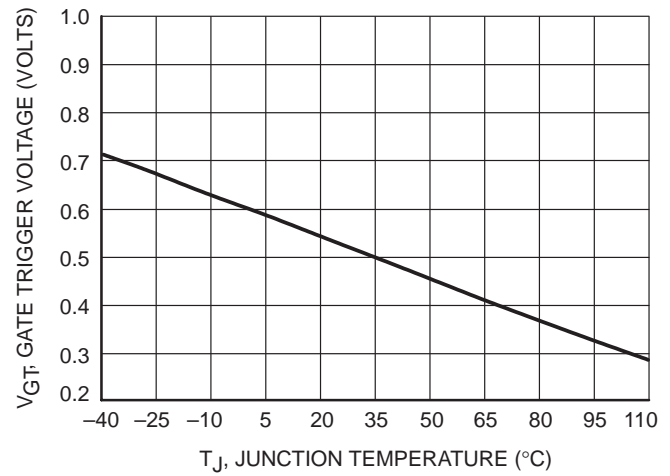


Figure 4. Typical Gate Trigger Current versus Junction Temperature

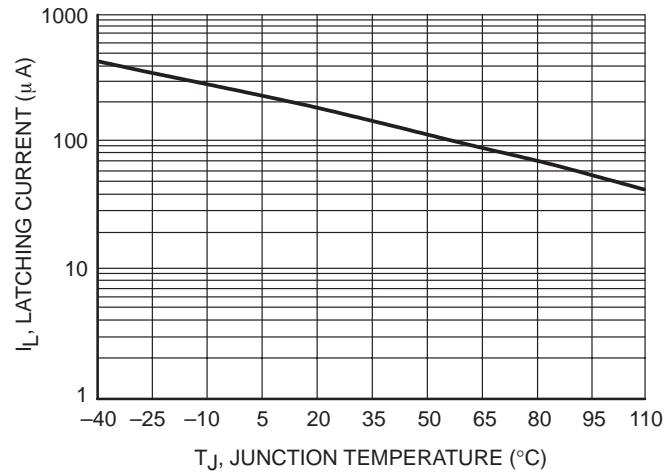
## MCR8SD, MCR8SM, MCR8SN



**Figure 5. Typical Holding Current versus Junction Temperature**



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

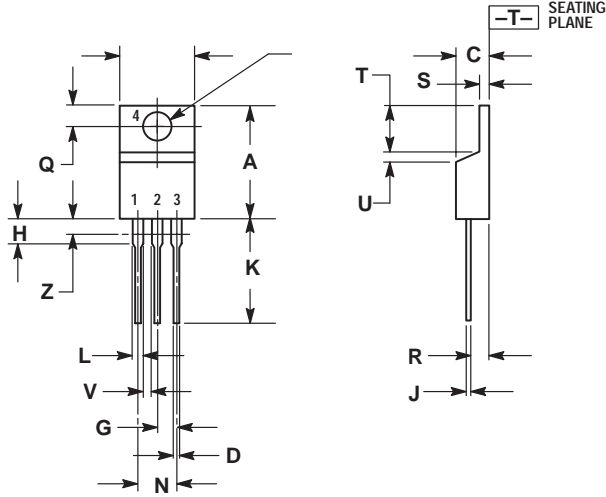


**Figure 7. Typical Latching Current versus Junction Temperature**

# MCR8SD, MCR8SM, MCR8SN

## PACKAGE DIMENSIONS

### TO-220AB CASE 221A-09 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	0.018	0.025	0.46	0.64
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:

1. CATHODE
2. ANODE
3. GATE
4. ANODE

## **Notes**

## **Notes**

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