

# MCR8NG

## 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.

#### Features

- Blocking Voltage of 600 thru 800 Volts
- On-State Current Rating of 8 Amperes RMS at 80°C
- High Surge Current Capability – 80 Amperes
- 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
- High Immunity to  $dv/dt$  – 100 V/ $\mu$ sec Minimum at 125°C
- These are Pb-Free Devices\*

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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) ( $T_J = -40$ to $125^\circ\text{C}$ , Sine Wave, 50 to 60 Hz, Gate Open) MCR8MG MCR8NG	$V_{\text{DRM}}$ , $V_{\text{RRM}}$	600 800	V
On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	8.0	A
Peak Non-Repetitive Surge Current (One Full Cycle, 60 Hz, $T_C = 125^\circ\text{C}$ )	$I_{\text{TSM}}$	80	A
Circuit Fusing Consideration ( $t = 8.33$ ms)	$I^2t$	26.5	$\text{A}^2\text{sec}$
Forward Peak Gate Power (Pulse Width $\leq 1.0$ $\mu$ s, $T_C = 80^\circ\text{C}$ )	$P_{\text{GM}}$	5.0	W
Forward Average Gate Power ( $t = 8.3$ ms, $T_C = 80^\circ\text{C}$ )	$P_{\text{G(AV)}}$	0.5	W
Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu$ s, $T_C = 80^\circ\text{C}$ )	$I_{\text{GM}}$	2.0	A
Operating Junction Temperature Range	$T_J$	-40 to 125	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	-40 to 150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1.  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; 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.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



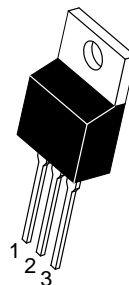
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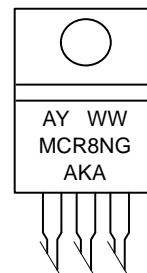
SCRs  
8 AMPERES RMS  
600 thru 800 VOLTS



#### MARKING DIAGRAM



TO-220AB  
CASE 221A-09  
STYLE 3



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

#### PIN ASSIGNMENT

	PIN ASSIGNMENT
1	Cathode
2	Anode
3	Gate
4	Anode

#### ORDERING INFORMATION

Device	Package	Shipping
MCR8NG	TO-220AB (Pb-Free)	50 Units / Rail

# MCR8NG

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	2.2	$^{\circ}\text{C}/\text{W}$
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 ( $T_J = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ( $V_D = \text{Rated } V_{DRM}$ and $V_{RRM}$ ; Gate Open)	$I_{DRM}$ , $I_{RRM}$	–	–	0.01	mA
$T_J = 125^{\circ}\text{C}$		–	–	2.0	

### ON CHARACTERISTICS

Peak Forward On-State Voltage (Note ) ( $I_{TM} = 16 \text{ A}$ )	$V_{TM}$	–	–	1.8	V
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}$ ; $R_L = 100 \Omega$ )	$I_{GT}$	2.0	7.0	15	mA
Holding Current ( $V_D = 12 \text{ V}$ , Gate Open, Initiating Current = 200 mA)	$I_H$	4.0	17	30	mA
Latch Current ( $V_D = 12 \text{ V}$ , $I_G = 15 \text{ mA}$ )	$I_L$	6.0	20	40	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}$ ; $100 \Omega$ )	$V_{GT}$	0.5	0.65	1.0	V
$T_J = 25^{\circ}\text{C}$					
Gate Non-Trigger Voltage ( $V_D = 12 \text{ V}$ ; $R_L = 100 \Omega$ )	$V_{GD}$	0.2	–	–	V
$T_J = 125^{\circ}\text{C}$					

### DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, Gate Open, $T_J = 125^{\circ}\text{C}$ )	$dv/dt$	100	250	–	V/ $\mu\text{s}$
Critical Rate of Rise of On-State Current IPK = 50 A, Pw = 40 $\mu\text{sec}$ , $di_G/dt = 1 \text{ A}/\mu\text{sec}$ , $I_{gt} = 50 \text{ mA}$	$di/dt$	–	–	50	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.

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

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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

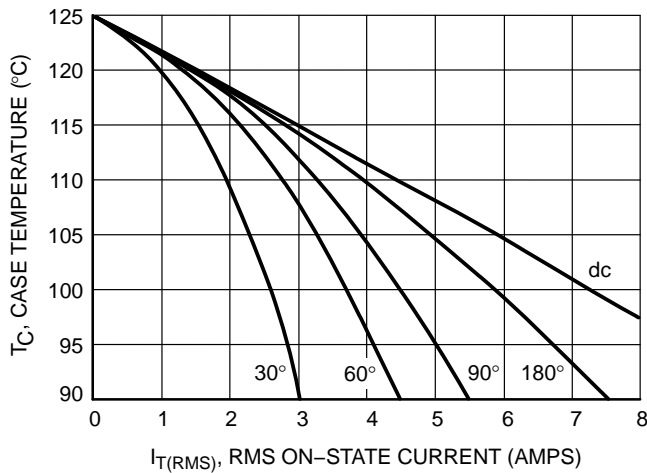
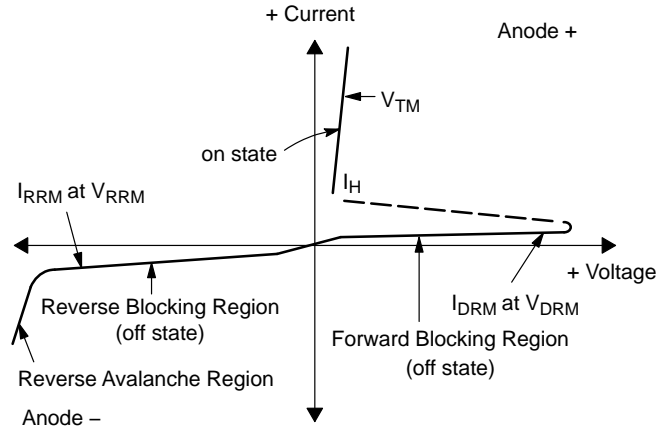


Figure 1. Typical RMS Current Derating

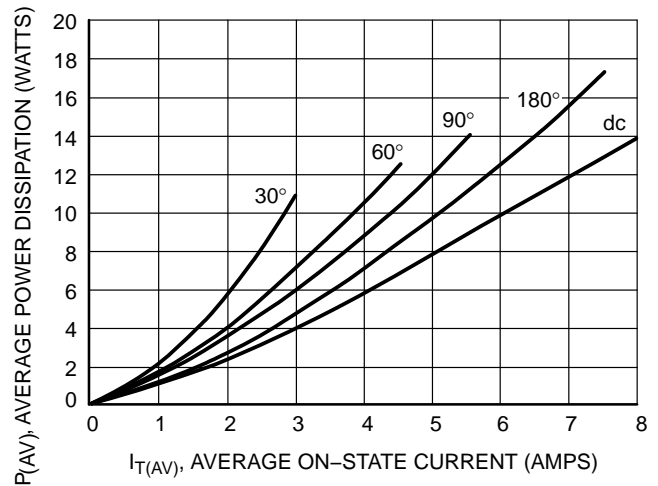


Figure 2. On-State Power Dissipation

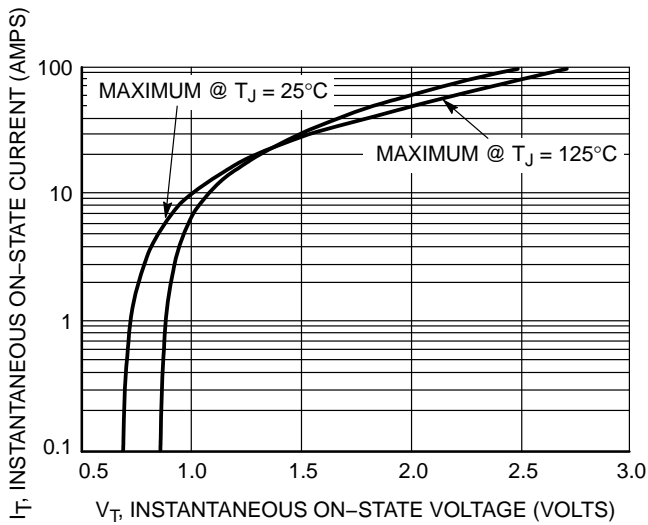


Figure 3. Typical On-State Characteristics

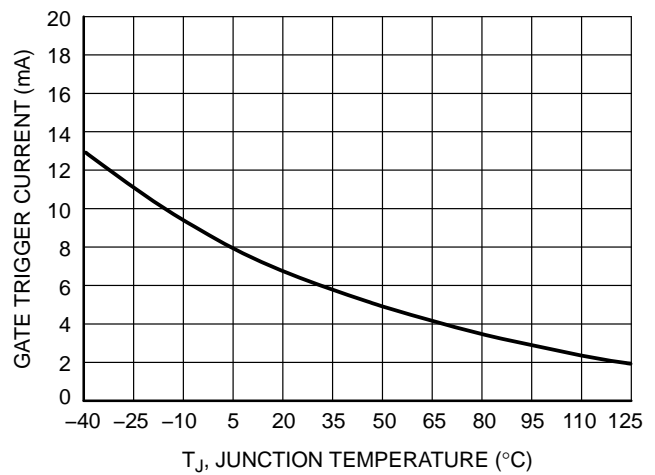
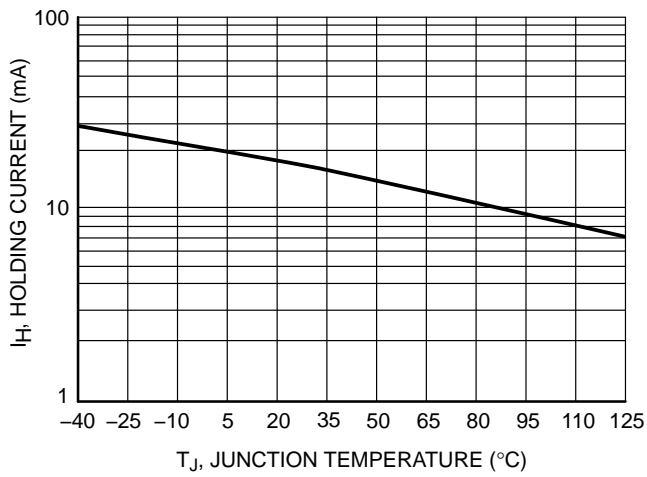
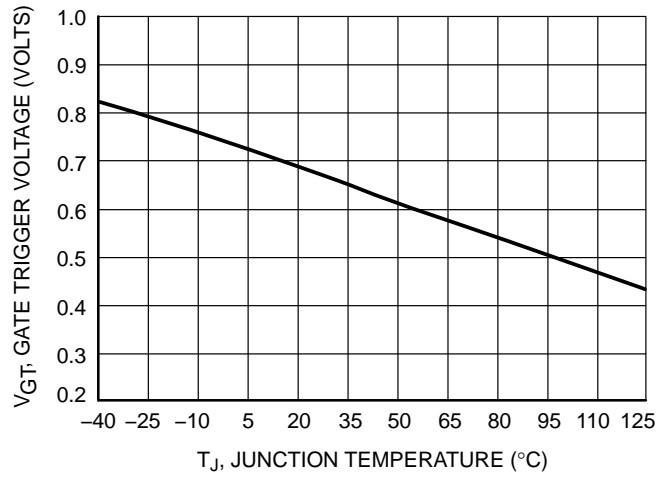


Figure 4. Typical Gate Trigger Current versus Junction Temperature

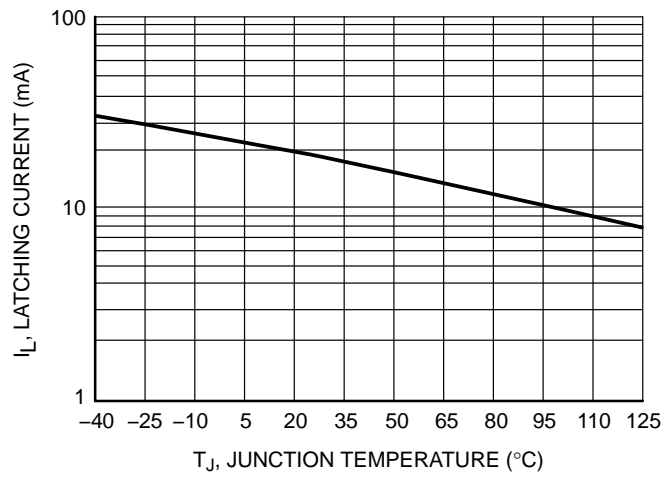
## MCR8NG



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



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

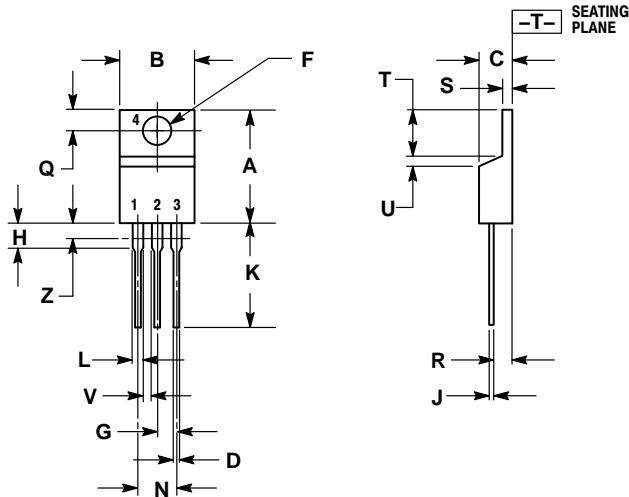


**Figure 7. Typical Latching Current versus Junction Temperature**

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## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AH




### 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	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
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  
2. ANODE  
3. GATE  
4. ANODE

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