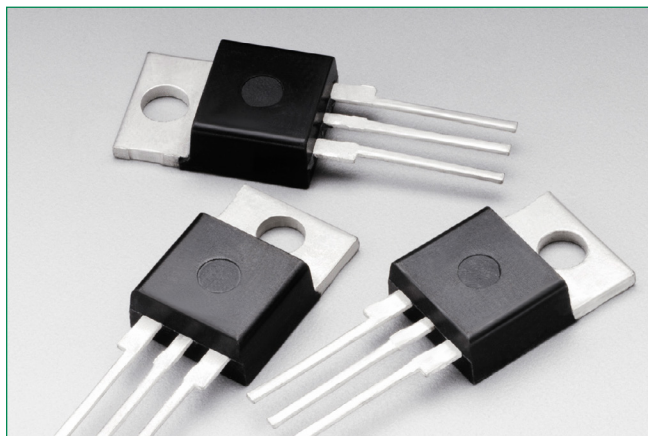


# MCR8NG

## Silicon Controlled Rectifiers — 600V - 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

- 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/μsec Minimum at 125°C
- These are Pb-Free Devices

### Additional Information



Resources



Accessories

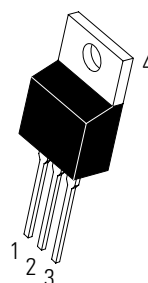


Samples

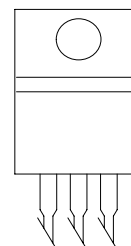
### Functional Diagram



### Pin Out



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



**MCR8NG****Silicon Controlled Rectifiers — 600V - 800V****Maximum Ratings** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

| Rating                                                                                           |        | Symbol               | Value       | Unit               |
|--------------------------------------------------------------------------------------------------|--------|----------------------|-------------|--------------------|
| Peak Repetitive Off-State Voltage (Note 1)<br>(– 40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open) | MCR8MG | $V_{\text{DRM}}^*$   | 600         | V                  |
|                                                                                                  | MCR8NG | $V_{\text{RRM}}$     | 800         | V                  |
| On-State RMS Current (180° Conduction Angles; $T_C = 80^\circ\text{C}$ )                         |        | $I_T \text{ (RMS)}$  | 8.0         | A                  |
| Peak Non-Repetitive Surge Current<br>(One Full Cycle, 60 Hz, $T_C = 125^\circ\text{C}$ )         |        | $I_{\text{TSM}}$     | 80          | A                  |
| Circuit Fusing Consideration ( $t = 8.3 \text{ ms}$ )                                            |        | $I^2t$               | 26.5        | A <sup>2</sup> sec |
| Forward Peak Gate Power (Pulse Width $\leq 1.0 \mu\text{s}$ , $T_C = 80^\circ\text{C}$ )         |        | $P_{\text{GM}}$      | 5.0         | W                  |
| Forward Average Gate Power ( $t = 8.3 \text{ ms}$ , $T_C = 80^\circ\text{C}$ )                   |        | $P_{\text{GM (AV)}}$ | 0.5         | W                  |
| Forward Peak Gate Current (Pulse Width $\leq 1.0 \mu\text{s}$ , $T_C = 80^\circ\text{C}$ )       |        | $I_{\text{GM}}$      | 2.0         | A                  |
| Operating Junction Temperature Range                                                             |        | $T_J$                | –40 to +125 | °C                 |
| Storage Temperature Range                                                                        |        | $T_{\text{stg}}$     | –40 to +150 | °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.  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  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 (AC) | $R_{\text{BJC}}$ | 2.2   | °C/W |
|                                                                                | Junction-to-Ambient   | $R_{\text{BJA}}$ | 62.5  | °C/W |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds |                       | $T_L$            | 260   | °C   |

**Electrical Characteristics - OFF** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

| Characteristic                                                                                        |                           | Symbol             | Min | Typ | Max  | Unit |
|-------------------------------------------------------------------------------------------------------|---------------------------|--------------------|-----|-----|------|------|
| †Peak Repetitive Blocking Current<br>( $V_{\text{AK}} = V_{\text{DRM}} = V_{\text{RRM}}$ ; Gate Open) | $T_J = 25^\circ\text{C}$  | $I_{\text{DRM}}^*$ | –   | –   | 0.01 | mA   |
|                                                                                                       | $T_J = 125^\circ\text{C}$ | $I_{\text{RRM}}$   | –   | –   | 2.0  | mA   |

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

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

# MCR8NG

## Silicon Controlled Rectifiers — 600V - 800V

### Dynamic Characteristics

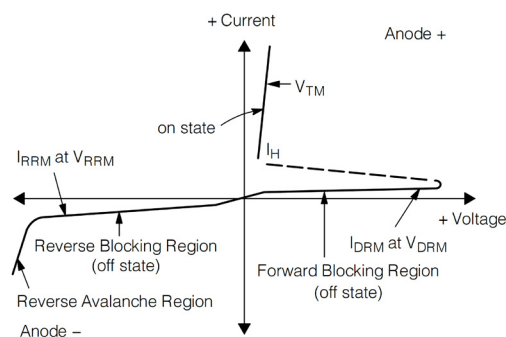
| Characteristic                                                                                                                                                            | Symbol  | Min | Typ | Max | Unit             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|-----|-----|------------------|
| Critical Rate of Rise of Off-State Voltage<br>( $V_D = \text{Rated } V_{DRM}$ , 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<br>( $I_{PK} = 50\text{ A}$ , $P_w = 40\text{ }\mu\text{sec}$ , $diG/dt = 1\text{ A}/\mu\text{sec}$ , $I_{gt} = 50\text{ mA}$ ) | $di/dt$ | —   | —   | 50  | A/ms             |

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.

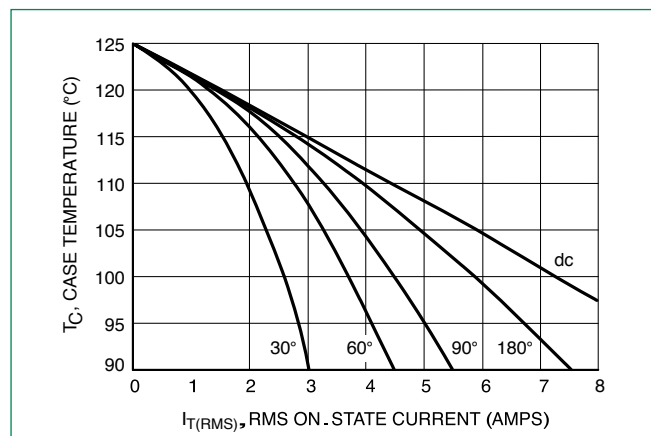
2. Indicates Pulse Test: Pulse Width  $\leq 2.0\text{ ms}$ , Duty Cycle  $\leq 2\%$ .

### 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                           |



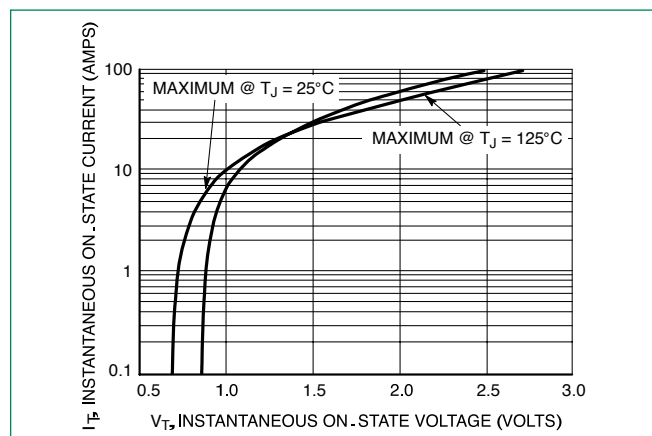
**Figure 1.**  
Typical RMS Current Derating



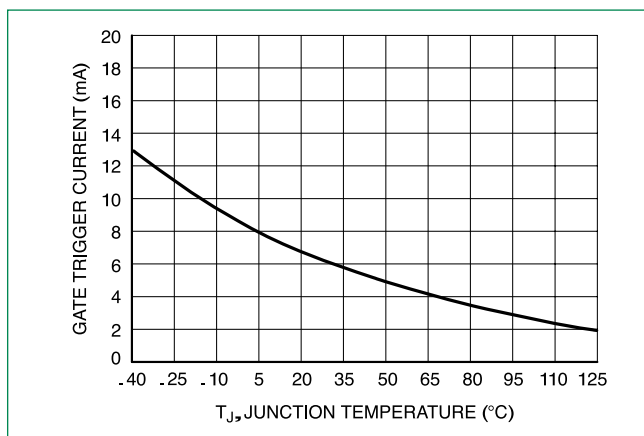
**Figure 2.**  
On-State Power Dissipation

**MCR8NG****Silicon Controlled Rectifiers — 600V - 800V****Figure 3.**

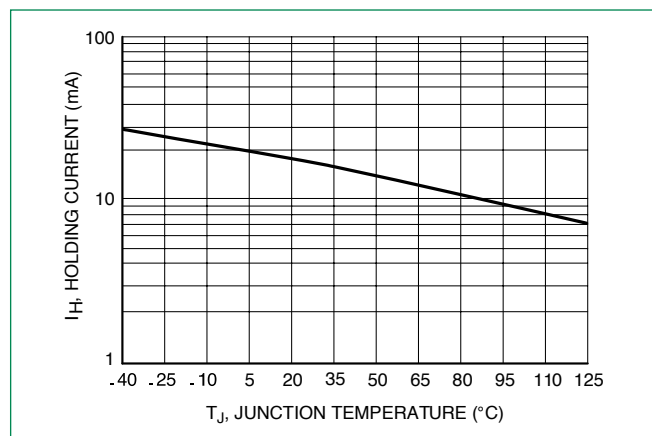
Typical On-State Characteristics

**Figure 4.**

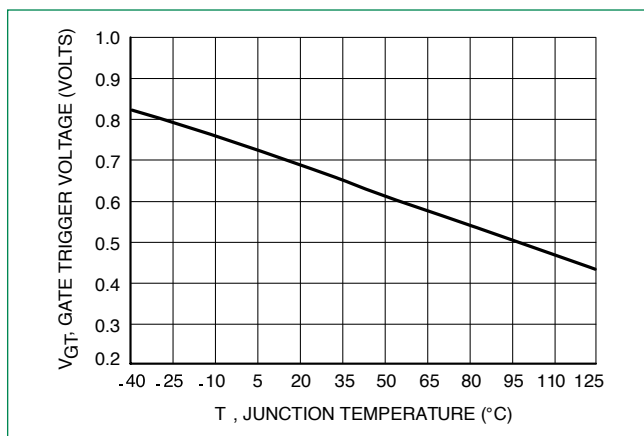
Typical Gate Trigger Current vs Junction Temperature

**Figure 5.**

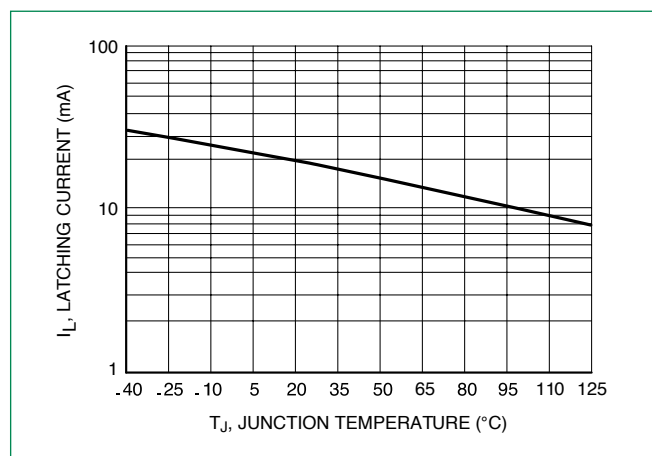
Typical Holding Current vs Junction Temperature

**Figure 6.**

Typical Gate Trigger Voltage vs Junction Temperature

**Figure 7.**

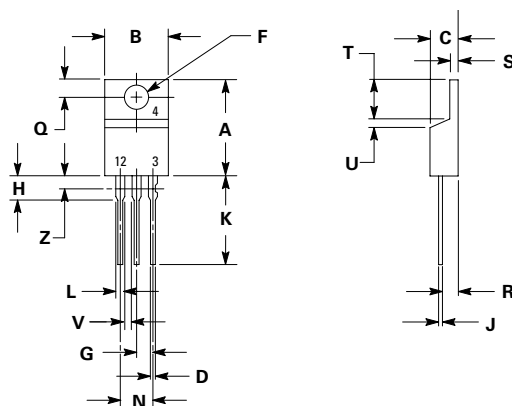
Typical Latching Current vs Junction Temperature



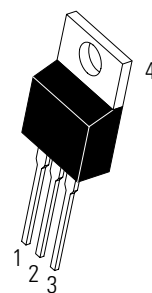
# MCR8NG

## Silicon Controlled Rectifiers — 600V - 800V

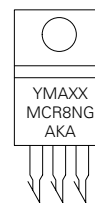
### Dimensions



### Part Marking System



**TO-220AB  
Case 221A  
Style 3**



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

| Pin | Assignment |
|-----|------------|
| 1   | Cathode    |
| 2   | Anode      |
| 3   | Gate       |
| 4   | Anode      |

### Ordering Information

| Device     | Package            | Shipping        |
|------------|--------------------|-----------------|
| MCR8NG     | TO-220AB (Pb-Free) | 1000 Units/ Box |
| MAC3030-8G | TO-220AB (Pb-Free) | 1000 Units/ Box |

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.