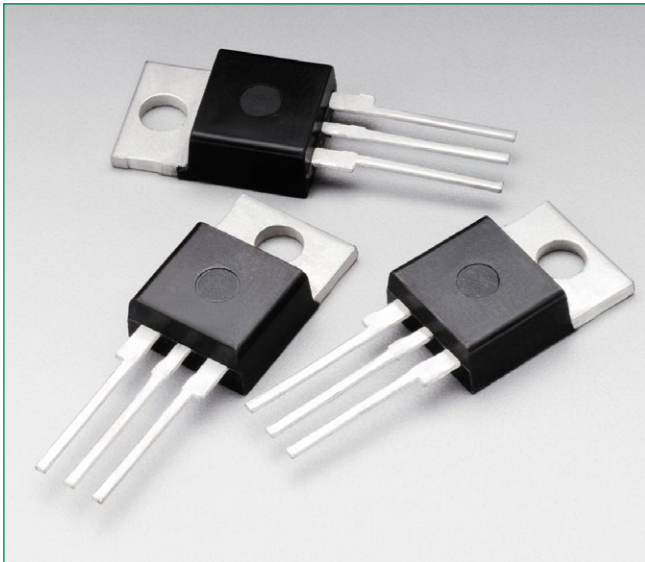


**MCR218-2G, MCR218-4G, MCR218-6G**



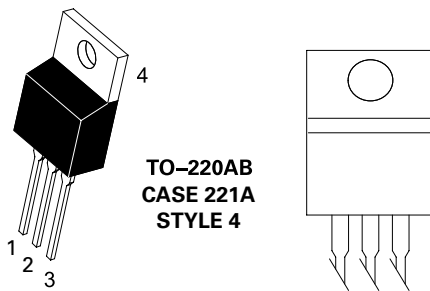
**Description**

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

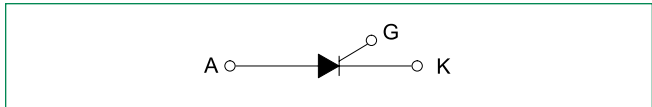
**Features**

- Glass-Passivated Junctions
- Blocking Voltage to 400 Volts
- TO-220 Construction – Low Thermal Resistance, High Heat Dissipation and Durability

**Pin Out**



**Functional Diagram**



**Additional Information**

**Datasheet**

**Resources**

**Samples**

### 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) | $V_{DRM}^*$<br>$V_{RRM}$ | 50          | V                  |
| On-State RMS Current<br>(180° Conduction Angles; $T_C = 85^\circ\text{C}$ )                      | $I_{TM(RMS)}$            | 12          | A                  |
| Peak Discharge Current (Note 2)  | $I_{TM}$                 | 300         | A                  |
| Average On-State Current<br>(180° Conduction Angles; $T_C = 85^\circ\text{C}$ )                  | $I_{T(AV)}$              | 8.0         | A                  |
| Peak Non-Repetitive Surge Current<br>(1/2 Cycle, Sine Wave 60 Hz, $T_J = 125^\circ\text{C}$ )    | $I_{TSM}$                | 100         | A                  |
| Circuit Fusing Consideration ( $t = 8.3$ ms)   | $I^2t$                   | 40          | A <sup>2</sup> sec |
| Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )   | $I_{GM}$                 | 2.0         | A                  |
| Forward Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{sec}$ , $T_C = 85^\circ\text{C}$ )   | $I_{GM}$                 | 20          | W                  |
| Forward Average Gate Power ( $t = 8.3$ ms, $T_C = 85^\circ\text{C}$ )                            | $P_{G(AV)}$              | 0.5         | 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 limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

- $V_{DRM}$  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.
- Ratings apply for  $tw = 1$  ms. See Figure 1 for  $I_{TM}$  capability for various duration of an exponentially decaying current waveform,  $tw$  is defined as 5 time constants of an exponentially decaying current pulse.

### Thermal Characteristics

| Rating   | Symbol                             | Value     | Unit |
|--|------------------------------------|-----------|------|
| Thermal Resistance, Junction-to-Case (AC)<br>Junction-to-Ambient               | $R_{\theta JC}$<br>$R_{\theta JA}$ | 2.0<br>60 | °C/W |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | $T_L$                              | 260       | °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<br>( $V_D = \text{Rated } V_{DRM}$ and $V_{RRM}$ ; Gate Open) | $I_{DRM}^*$<br>$I_{RRM}$ | -   | -   | 10  | mA   |
|   |                          | -   | -   | 2.0 |      |

### Electrical Characteristics - ON ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic  | Symbol   | Min | Typ  | Max | Unit          |
|---|----------|-----|------|-----|---------------|
| Peak Forward On-State Voltage (Note 2)<br>( $I_{TM} = 32$ A) ( $I_{TM} = 24$ A) (Note 3)<br>( $I_{TM} = 300$ A, $tw = 1$ ms) (Note 4) | $V_{TM}$ | -   | 6.0  | 2.2 | V             |
| Gate Trigger Current (Continuous dc) ( $V_D = 12$ V; $R_L = 100$ $\Omega$ )   | $I_{GT}$ | 2.0 | 7.0  | 30  | mA            |
| Gate Trigger Voltage (Continuous dc) ( $V_D = 12$ V; $R_L = 100$ $\Omega$ )   | $V_{GT}$ | -   | 0.65 | 1.5 | V             |
| Gate Trigger Non-Current (Continuous dc) ( $V_D = 12$ V; $R_L = 100$ $\Omega$ )   | $V_{GD}$ | 0.2 | 0.40 | -   | V             |
| Holding Current<br>( $V_D = 12$ V, Initiating Current = 200 mA, Gate Open)  | $I_H$    | 3.0 | 15   | 50  | mA            |
| Latch Current ( $V_D = 12$ V, $I_G = 30$ mA)  | $I_L$    | -   | 35   | 80  | mA            |
| Gate Controlled Turn-On Time (Note 5)<br>( $V_D = \text{Rated } V_{DRM}$ , $I_G = 150$ mA) ( $I_{TM} = 24$ A Peak)                    | $V_{GT}$ | -   | 1.0  | -   | $\mu\text{s}$ |

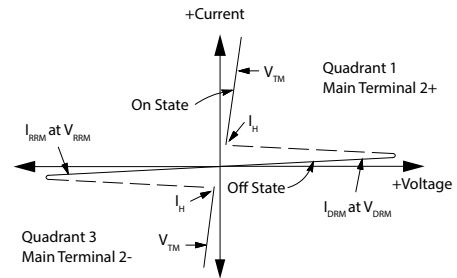
### Dynamic Characteristics

| 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  | 10  | –   | –   | V/ $\mu\text{s}$ |
| Critical Rate of Rise of On-State Current<br>$I_G = 150 \text{ A}$ $T_J = 125^\circ\text{C}$   | di/dt  | –   | –   | 75  | A/ $\mu\text{s}$ |

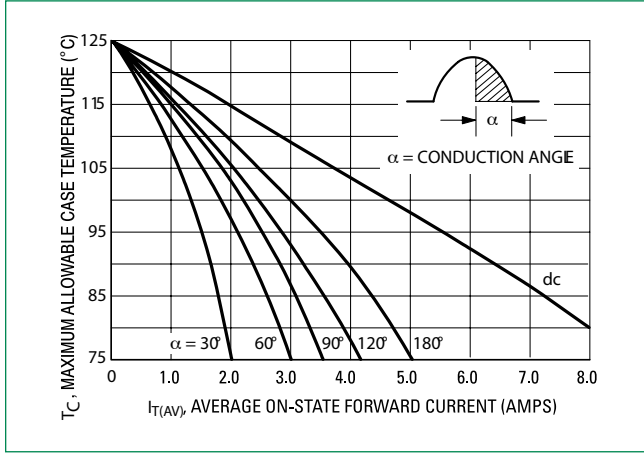
- Pulse duration  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Ratings apply for  $t_w = 1 \text{ ms}$ . See Figure 1 for  $I_{TM}$  capability for various durations of an exponentially decaying current waveform.  $t_w$  is defined as 5 time constants of an exponentially decaying current pulse.
- The gate controlled turn-on time in a crowbar circuit will be influenced by the circuit inductance.

### Voltage Current Characteristic of SCR

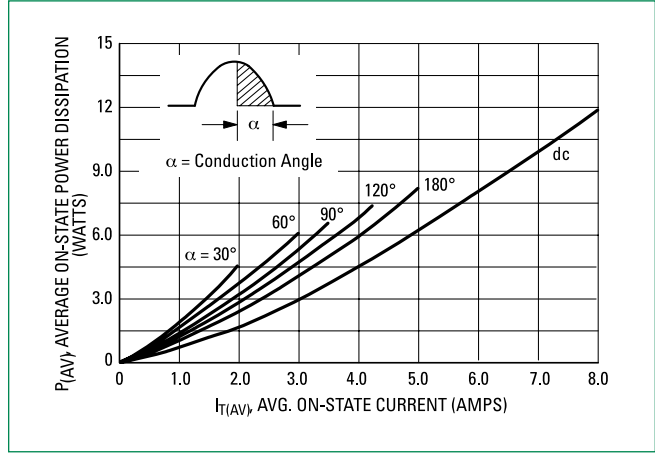
| Symbol    | Parameter                                 |
|-----------|---|
| $V_{DRM}$ | Peak Repetitive Forward Off State Voltage |
| $I_{DRM}$ | Peak Forward Blocking Current             |
| $V_{RRM}$ | Peak Repetitive Reverse Off State Voltage |
| $I_{RRM}$ | Peak Reverse Blocking Current       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



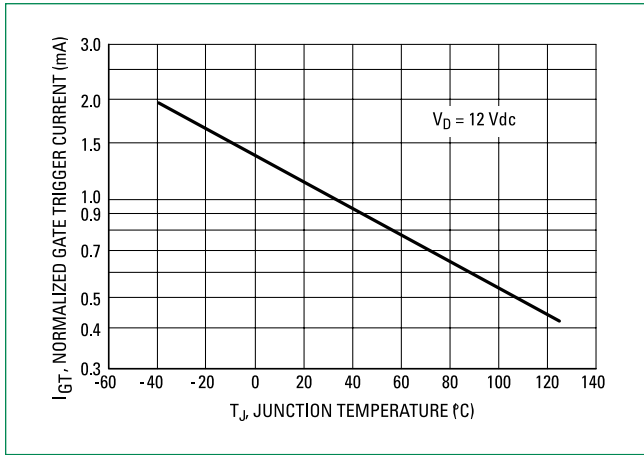
**Figure 1. Current Derating**



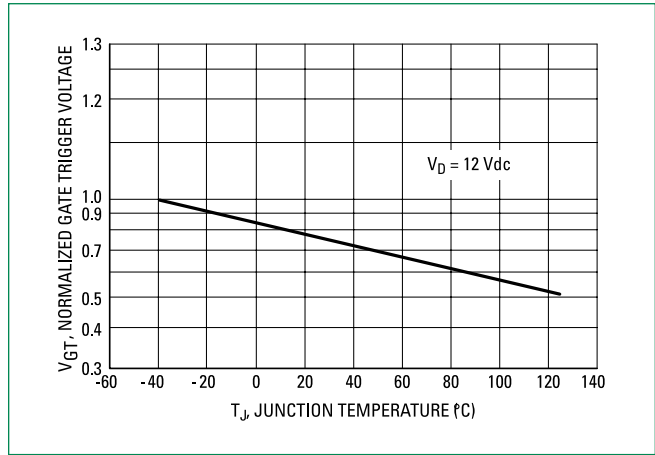
**Figure 2. On-State Power Dissipation**



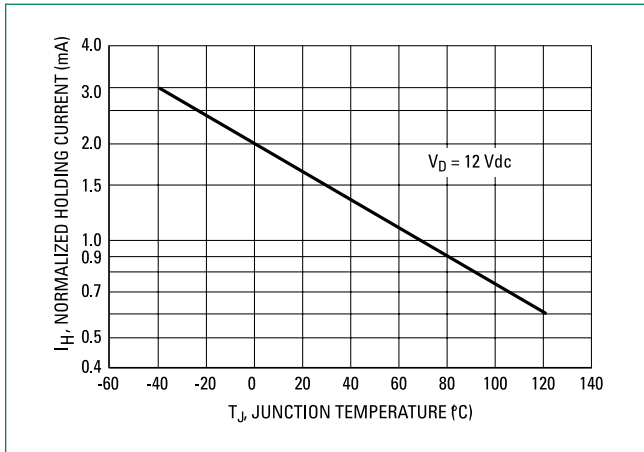
**Figure 3. Typical Gate Trigger Current vs Temperature**



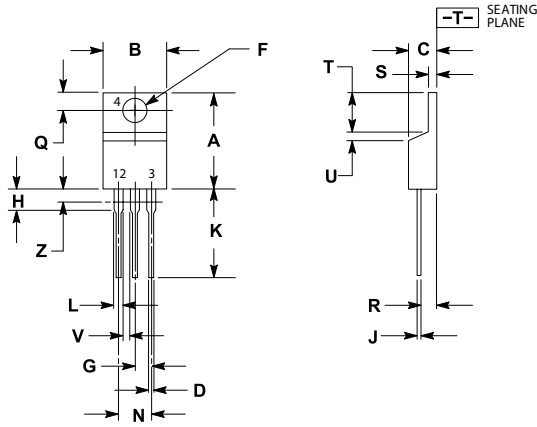
**Figure 4. Typical Gate Trigger Voltage vs Temperature**



**Figure 5. Typical Holding Current vs Temperature**



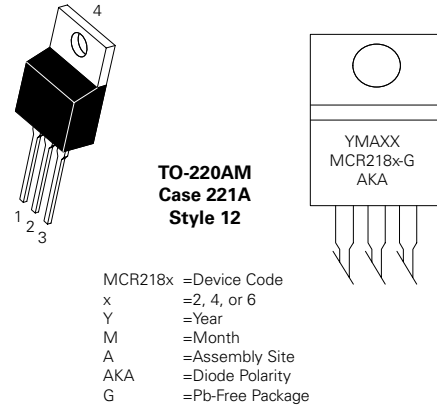
### Dimensions



| 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.

### Part Marking System



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

### Ordering Information

| Device    | Package               | Shipping        |
|-----------|-----------------------|-----------------|
| MCR218-2G | TO-220AB<br>(Pb-Free) | 500 Units / Box |
| MCR218-4G |                       |                 |
| MCR218-6G |                       |                 |

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