


# MCR218-6FP, MCR218-10FP

Preferred Device


## Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

Designed primarily for half-wave ac control applications, such as motor controls, heating controls and power supply crowbar circuits.

- Glass Passivated Junctions with Center Gate Fire for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Constructed for Low Thermal Resistance, High Heat Dissipation and Durability
- Blocking Voltage to 800 Volts
- 80 A Surge Current Capability
- Insulated Package Simplifies Mounting
-  Indicates UL Registered — File #E69369
- Device Marking: Logo, Device Type, e.g., MCR218-6, Date Code

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

| Rating                                                                                                                                                                    | Symbol                                 | Value           | Unit                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------|----------------------|
| Peak Repetitive Off-State Voltage <sup>(1)</sup><br>( $T_J = -40$ to $+125^\circ\text{C}$ , Sine Wave 50 to 60 Hz, Gate Open)<br>MCR218-6FP<br>MCR218-10FP                | $V_{\text{DRM}}$ ,<br>$V_{\text{RRM}}$ | 400<br>800      | Volts                |
| On-State RMS Current ( $T_C = +70^\circ\text{C}$ ) <sup>(2)</sup><br>( $180^\circ$ Conduction Angles)                                                                     | $I_T(\text{RMS})$                      | 8.0             | Amps                 |
| Peak Nonrepetitive Surge Current<br>(1/2 Cycle, Sine Wave 60 Hz,<br>$T_J = 125^\circ\text{C}$ )                                                                           | $I_{\text{TSM}}$                       | 100             | Amps                 |
| Circuit Fusing ( $t = 8.3$ ms)                                                                                                                                            | $I^2t$                                 | 26              | $\text{A}^2\text{s}$ |
| Forward Peak Gate Power<br>( $T_C = +70^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )                                                                           | $P_{\text{GM}}$                        | 5.0             | Watts                |
| Forward Average Gate Power<br>( $T_C = +70^\circ\text{C}$ , $t = 8.3$ ms)                                                                                                 | $P_{\text{G(AV)}}$                     | 0.5             | Watt                 |
| Forward Peak Gate Current<br>( $T_C = +70^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )                                                                         | $I_{\text{GM}}$                        | 2.0             | Amps                 |
| RMS Isolation Voltage ( $T_A = 25^\circ\text{C}$ ,<br>Relative Humidity $\leq 20\%$ )  | $V_{\text{(ISO)}}$                     | 1500            | Volts                |
| Operating Junction Temperature                                                                                                                                            | $T_J$                                  | $-40$ to $+125$ | $^\circ\text{C}$     |
| Storage Temperature Range                                                                                                                                                 | $T_{\text{stg}}$                       | $-40$ to $+150$ | $^\circ\text{C}$     |


(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.

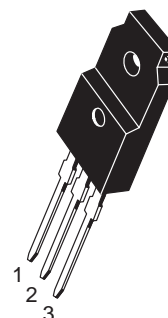
(2) The case temperature reference point for all  $T_C$  measurements is a point on the center lead of the package as close as possible to the plastic body.



ON Semiconductor

<http://onsemi.com>

**ISOLATED SCRs (  )**  
**8 AMPERES RMS**  
**400 thru 800 VOLTS**



**ISOLATED TO-220 Full Pack**  
**CASE 221C**  
**STYLE 2**

#### PIN ASSIGNMENT

|   |         |
|---|---------|
| 1 | Cathode |
| 2 | Anode   |
| 3 | Gate    |

#### ORDERING INFORMATION

| Device      | Package          | Shipping |
|-------------|------------------|----------|
| MCR218-6FP  | ISOLATED TO220FP | 500/Box  |
| MCR218-10FP | ISOLATED TO220FP | 500/Box  |

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

# MCR218–6FP, MCR218–10FP

## THERMAL CHARACTERISTICS

| Characteristic                                                                | Symbol          | Max       | Unit |
|-------------------------------------------------------------------------------|-----------------|-----------|------|
| Thermal Resistance, Junction to Case                                          | $R_{\theta JC}$ | 2         | °C/W |
| Thermal Resistance, Case to Sink                                              | $R_{\theta CS}$ | 2.2 (typ) | °C/W |
| Thermal Resistance, Junction to Ambient                                       | $R_{\theta JA}$ | 60        | °C/W |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | $T_L$           | 260       | °C   |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

## OFF CHARACTERISTICS

|                                                                                                                                                              |                          |        |        |         |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|--------|---------|---------------------|
| Peak Repetitive Forward or Reverse Blocking Current<br>( $V_D = \text{Rated } V_{DRM}$ , Gate Open)<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | $I_{DRM}$ ,<br>$I_{RRM}$ | —<br>— | —<br>— | 10<br>2 | $\mu\text{A}$<br>mA |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|--------|---------|---------------------|

## ON CHARACTERISTICS

|                                                                                                                                                          |          |        |          |        |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|----------|--------|---------------|
| Peak Forward On-State Voltage <sup>(1)</sup><br>( $I_{TM} = 16\text{ A Peak}$ )                                                                          | $V_{TM}$ | —      | 1        | 1.8    | Volts         |
| Gate Trigger Current (Continuous dc)<br>( $V_{AK} = 12\text{ Vdc}$ , $R_L = 100\text{ Ohms}$ )                                                           | $I_{GT}$ | —      | 10       | 25     | mA            |
| Gate Trigger Voltage (Continuous dc)<br>( $V_{AK} = 12\text{ Vdc}$ , $R_L = 100\text{ Ohms}$ )                                                           | $V_{GT}$ | —      | —        | 1.5    | Volts         |
| Gate Non-Trigger Voltage<br>( $V_{AK} = 12\text{ Vdc}$ , $R_L = 100\text{ Ohms}$ , $T_J = 125^\circ\text{C}$ )                                           | $V_{GD}$ | 0.2    | —        | —      | Volts         |
| Holding Current<br>( $V_{AK} = 12\text{ Vdc}$ , Initiating Current = 200 mA, Gate Open)                                                                  | $I_H$    | —      | 16       | 30     | mA            |
| Turn-On Time<br>( $I_{TM} = 8\text{ A}$ , $I_{GT} = 40\text{ mAdc}$ )                                                                                    | $t_{gt}$ | —      | 1.5      | —      | $\mu\text{s}$ |
| Turn-Off Time ( $V_D = \text{Rated } V_{DRM}$ ,<br>$I_{TM} = 8\text{ A}$ , $I_R = 8\text{ A}$ )<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | $t_q$    | —<br>— | 15<br>35 | —<br>— | $\mu\text{s}$ |

## DYNAMIC CHARACTERISTICS

|                                                                                                                 |         |   |     |   |                        |
|-----------------------------------------------------------------------------------------------------------------|---------|---|-----|---|------------------------|
| Critical Rate-of-Rise of Off-State Voltage<br>(Gate Open, $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform) | $dv/dt$ | — | 100 | — | $\text{V}/\mu\text{s}$ |
|-----------------------------------------------------------------------------------------------------------------|---------|---|-----|---|------------------------|

(1) Pulse Test: Pulse Width = 1 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                           |

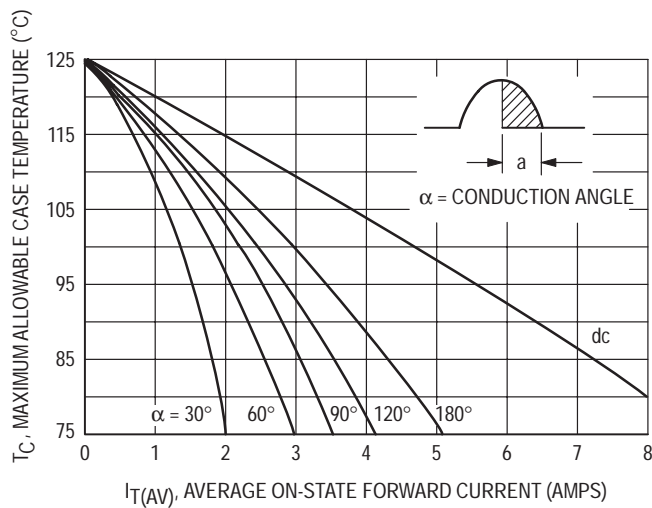
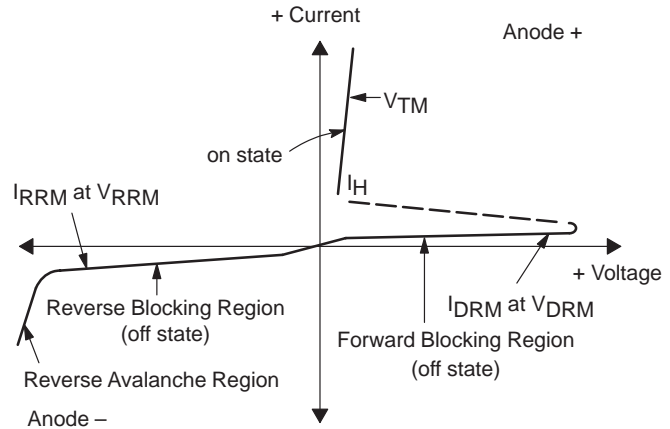


Figure 1. Current Derating

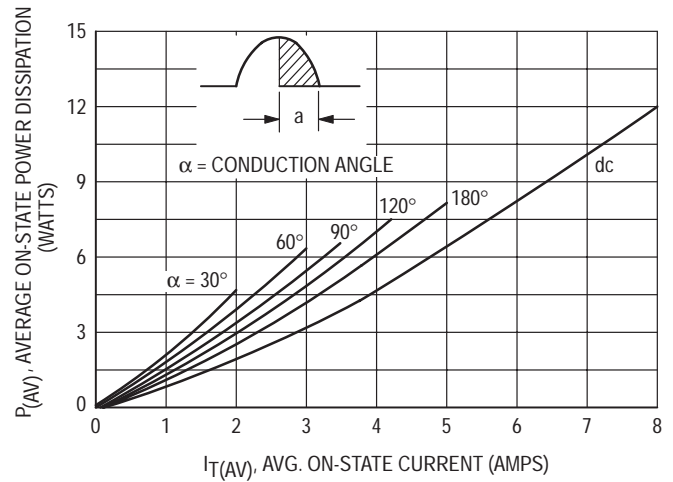


Figure 2. On-State Power Dissipation

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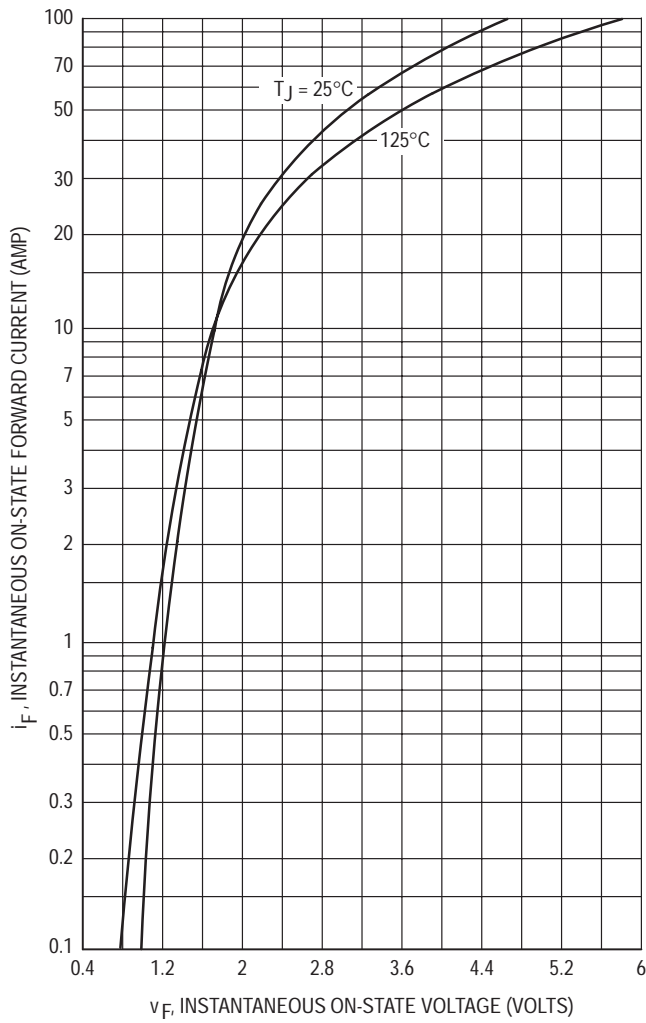


Figure 3. Maximum On-State Characteristics

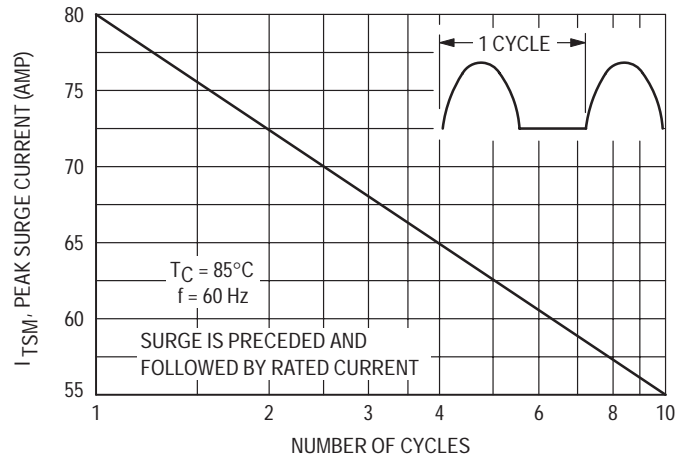


Figure 4. Maximum Non-Repetitive Surge Current

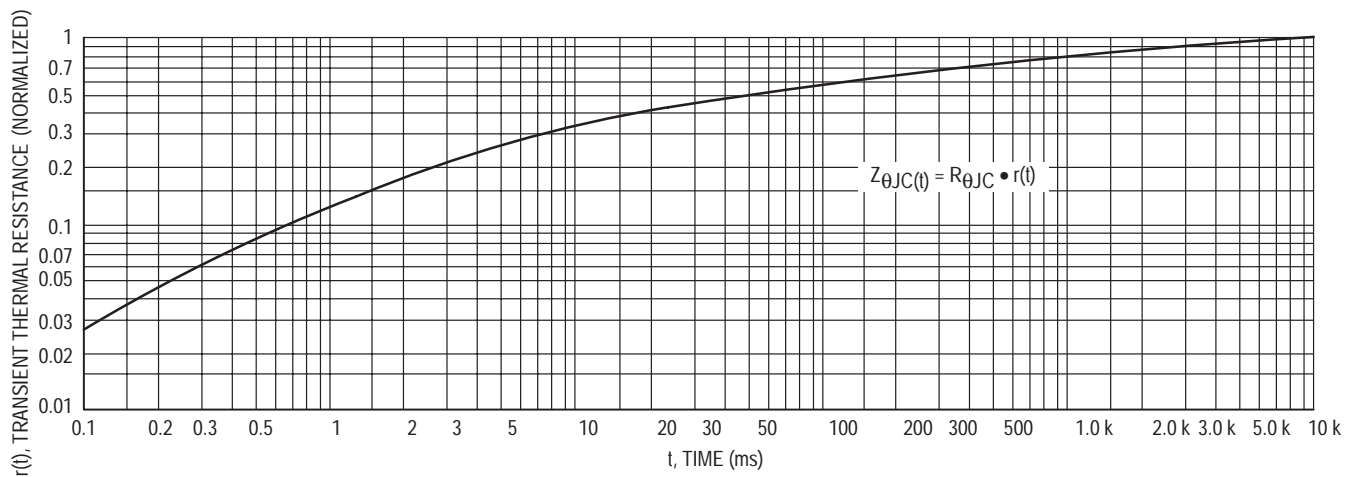
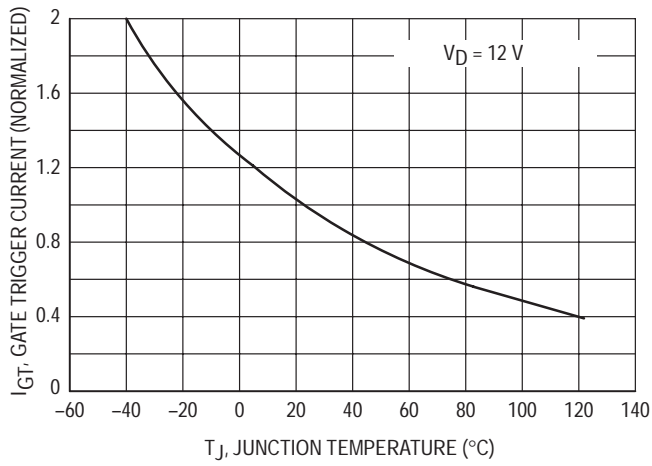
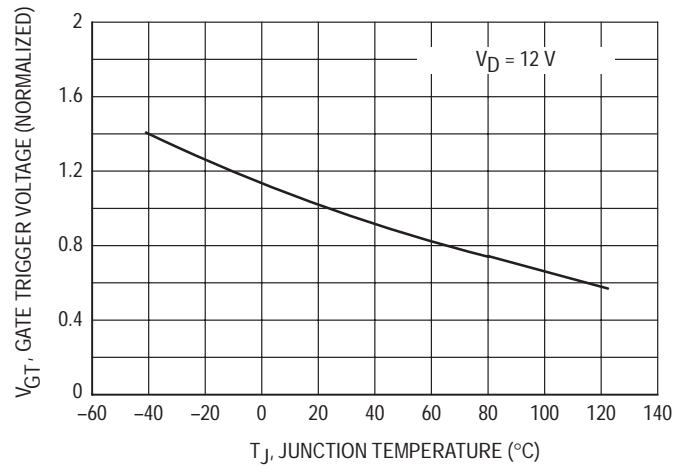


Figure 5. Thermal Response

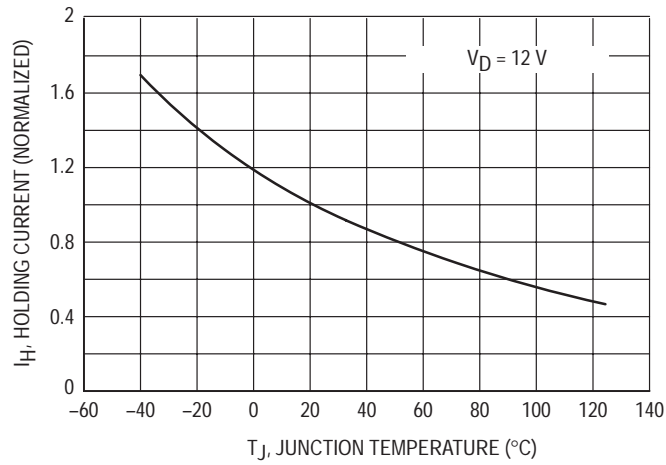
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**Figure 6. Typical Gate Trigger Current versus Temperature**



**Figure 7. Typical Gate Trigger Voltage versus Temperature**

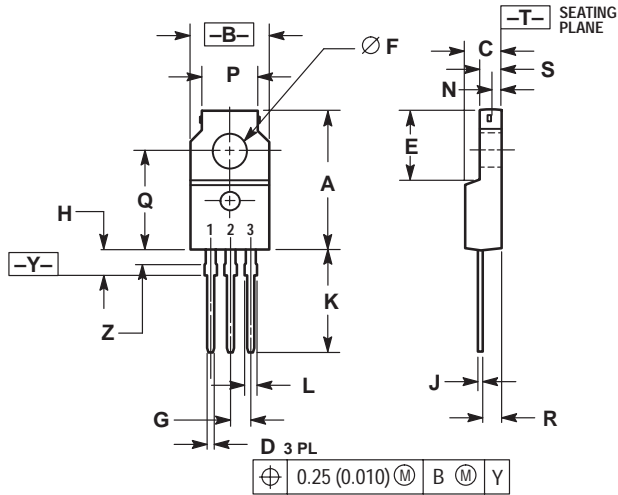


**Figure 8. Typical Holding Current versus Temperature**

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## PACKAGE DIMENSIONS

### ISOLATED TO-220 Full Pack CASE 221C-02 ISSUE C



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. LEAD DIMENSIONS UNCONTROLLED WITHIN DIMENSION Z.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.680     | 0.700 | 17.28       | 17.78 |
| B   | 0.388     | 0.408 | 9.86        | 10.36 |
| C   | 0.175     | 0.195 | 4.45        | 4.95  |
| D   | 0.025     | 0.040 | 0.64        | 1.01  |
| E   | 0.340     | 0.355 | 8.64        | 9.01  |
| F   | 0.140     | 0.150 | 3.56        | 3.81  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.110     | 0.155 | 2.80        | 3.93  |
| J   | 0.018     | 0.028 | 0.46        | 0.71  |
| K   | 0.500     | 0.550 | 12.70       | 13.97 |
| L   | 0.045     | 0.070 | 1.15        | 1.77  |
| N   | 0.049     | ---   | 1.25        | ---   |
| P   | 0.270     | 0.290 | 6.86        | 7.36  |
| Q   | 0.480     | 0.500 | 12.20       | 12.70 |
| R   | 0.090     | 0.120 | 2.29        | 3.04  |
| S   | 0.105     | 0.115 | 2.67        | 2.92  |
| Z   | 0.070     | 0.090 | 1.78        | 2.28  |

#### STYLE 2:

- PIN 1. CATHODE
- ANODE
- GATE

## **Notes**

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