


# MCR225-8FP, MCR225-10FP

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
- 300 A Surge Current Capability
- Insulated Package Simplifies Mounting
-  Indicates UL Registered — File #E69369
- Device Marking: Logo, Device Type, e.g., MCR225-8FP, 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,<br>50 to 60 Hz, Gate Open)<br>MCR225-8FP<br>MCR225-10FP            | $V_{DRM}$ ,<br>$V_{RRM}$ | 600<br>800     | Volts                |
| On-State RMS Current ( $T_C = +70^\circ\text{C}$ )<br>( $180^\circ$ Conduction Angles)  | $I_T(\text{RMS})$        | 25             | Amps                 |
| Peak Non-repetitive Surge Current<br>(1/2 Cycle, Sine Wave 60 Hz,<br>$T_C = +70^\circ\text{C}$ )  | $I_{TSM}$                | 300            | Amps                 |
| Circuit Fusing ( $t = 8.3$ ms)  | $I^2t$                   | 375            | $\text{A}^2\text{s}$ |
| Forward Peak Gate Power<br>( $T_C = +70^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )   | $P_{GM}$                 | 20             | Watts                |
| Forward Average Gate Power<br>( $T_C = +70^\circ\text{C}$ , $t = 8.3$ ms)   | $P_{G(AV)}$              | 0.5            | Watt                 |
| Forward Peak Gate Current<br>( $T_C = +70^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )   | $I_{GM}$                 | 2.0            | Amps                 |
| RMS Isolation Voltage ( $T_A = 25^\circ\text{C}$ ,<br>Relative Humidity $\leq 20\%$ )  | $V_{(ISO)}$              | 1500           | Volts                |
| Operating Junction Temperature Range  | $T_J$                    | -40 to<br>+125 | $^\circ\text{C}$     |
| Storage Temperature Range   | $T_{stg}$                | -40 to<br>+150 | $^\circ\text{C}$     |

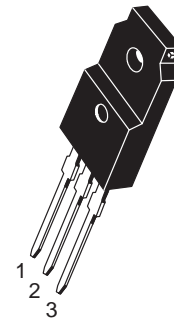
(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source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



ON Semiconductor

<http://onsemi.com>

**ISOLATED SCRs (  )**  
**25 AMPERES RMS**  
**600 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 |
|-------------|------------------|----------|
| MCR225-8FP  | ISOLATED TO220FP | 500/Box  |
| MCR225-10FP | ISOLATED TO220FP | 500/Box  |

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

# MCR225–8FP, MCR225–10FP

## THEMAL CHARACTERISTICS

| Characteristic  | Symbol          | Max       | Unit          |
|---|-----------------|-----------|---------------|
| Thermal Resistance, Junction to Case  | $R_{\theta JC}$ | 1.5       | $^{\circ}C/W$ |
| Thermal Resistance, Case to Sink  | $R_{\theta CS}$ | 2.2 (typ) | $^{\circ}C/W$ |
| Thermal Resistance, Junction to Ambient                                       | $R_{\theta JA}$ | 60        | $^{\circ}C/W$ |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | $T_L$           | 260       | $^{\circ}C$   |

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

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

## OFF CHARACTERISTICS

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

## ON CHARACTERISTICS

|  |          |     |     |     |         |
|--|----------|-----|-----|-----|---------|
| Peak Forward On-State Voltage <sup>(1)</sup><br>( $I_{TM} = 50 A$ )  | $V_{TM}$ | —   | —   | 1.8 | Volts   |
| Gate Trigger Current (Continuous dc)<br>( $V_{AK} = 12 V_{dc}, R_L = 100 \text{ Ohms}$ )   | $I_{GT}$ | —   | —   | 40  | mA      |
| Gate Trigger Voltage (Continuous dc)<br>( $V_{AK} = 12 V_{dc}, R_L = 100 \text{ Ohms}$ )   | $V_{GT}$ | —   | 0.8 | 1.5 | Volts   |
| Gate Non-Trigger Voltage<br>( $V_{AK} = 12 V_{dc}, R_L = 100 \text{ Ohms}, T_J = 125^{\circ}C$ )   | $V_{GD}$ | 0.2 | —   | —   | Volts   |
| Holding Current<br>( $V_{AK} = 12 V_{dc}, \text{Initiating Current} = 200 \text{ mA}, \text{Gate Open}$ )                                    | $I_H$    | —   | 20  | 40  | mA      |
| Turn-On Time<br>( $I_{TM} = 25 A, I_{GT} = 40 \text{ mAdc}$ )  | $t_{gt}$ | —   | 1.5 | —   | $\mu s$ |
| Turn-Off Time ( $V_{DRM} = \text{Rated Voltage}$ )<br>( $I_{TM} = 25 A, I_R = 25 A$ )<br>( $I_{TM} = 25 A, I_R = 25 A, T_J = 125^{\circ}C$ ) | $t_q$    | —   | 15  | —   | $\mu s$ |
|  |          | —   | 35  | —   |         |

## DYNAMIC CHARACTERISTICS

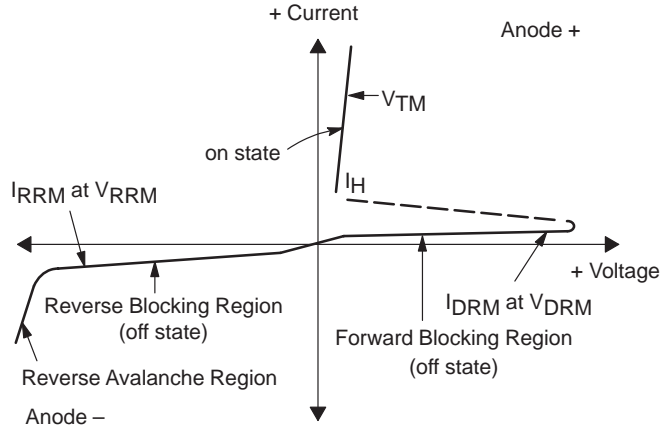
|   |         |   |     |   |           |
|---|---------|---|-----|---|-----------|
| Critical Rate-of-Rise of Off-State Voltage<br>(Gate Open, $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform) | $dv/dt$ | — | 100 | — | $V/\mu s$ |
|---|---------|---|-----|---|-----------|

(1) Pulse Test: Pulse Width = 1.0 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                           |



## TYPICAL CHARACTERISTICS

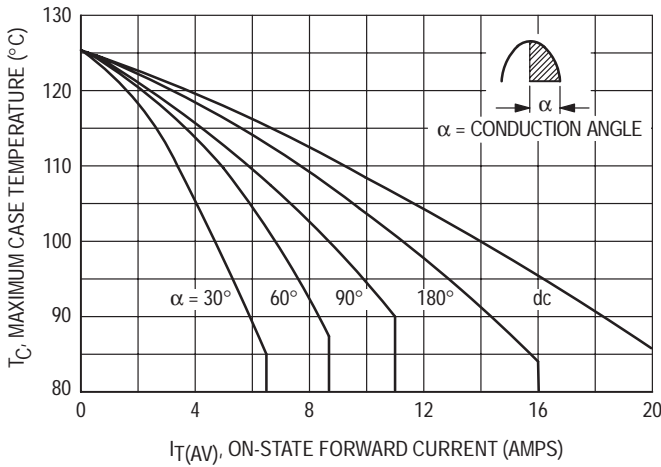


Figure 1. Average Current Derating

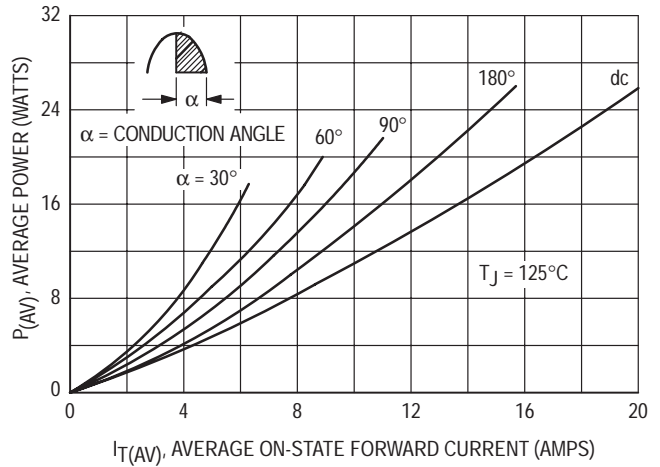


Figure 2. Maximum On-State Power Dissipation

MCR225-8FP, MCR225-10FP

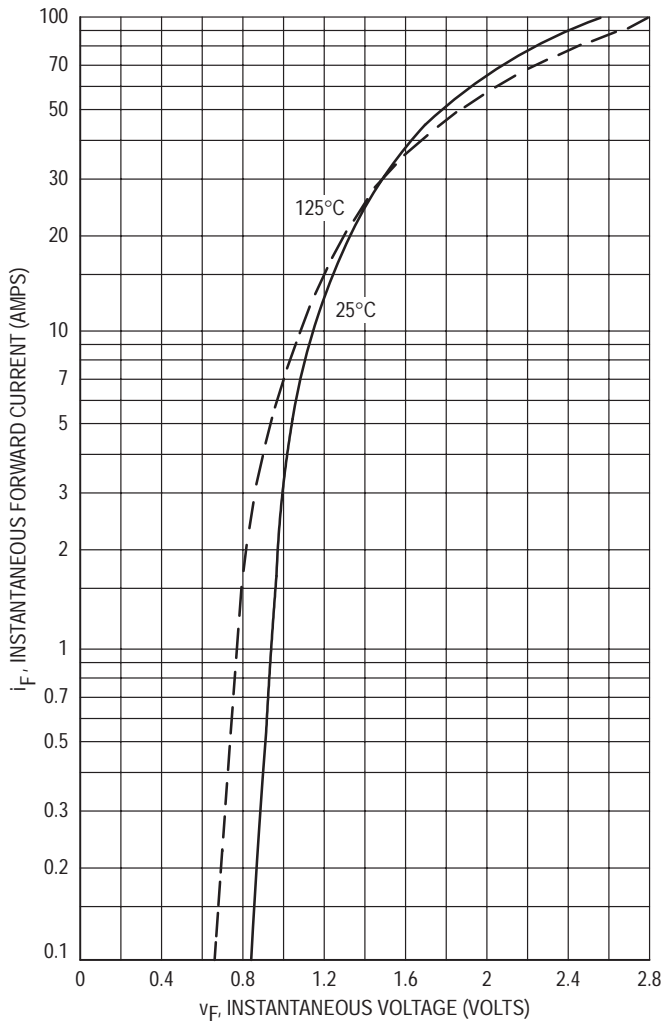


Figure 3. Maximum Forward Voltage

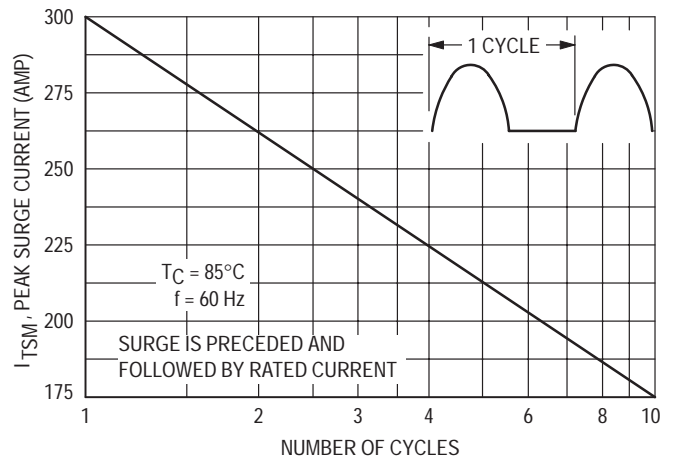


Figure 4. Maximum Non-Repetitive Surge Current

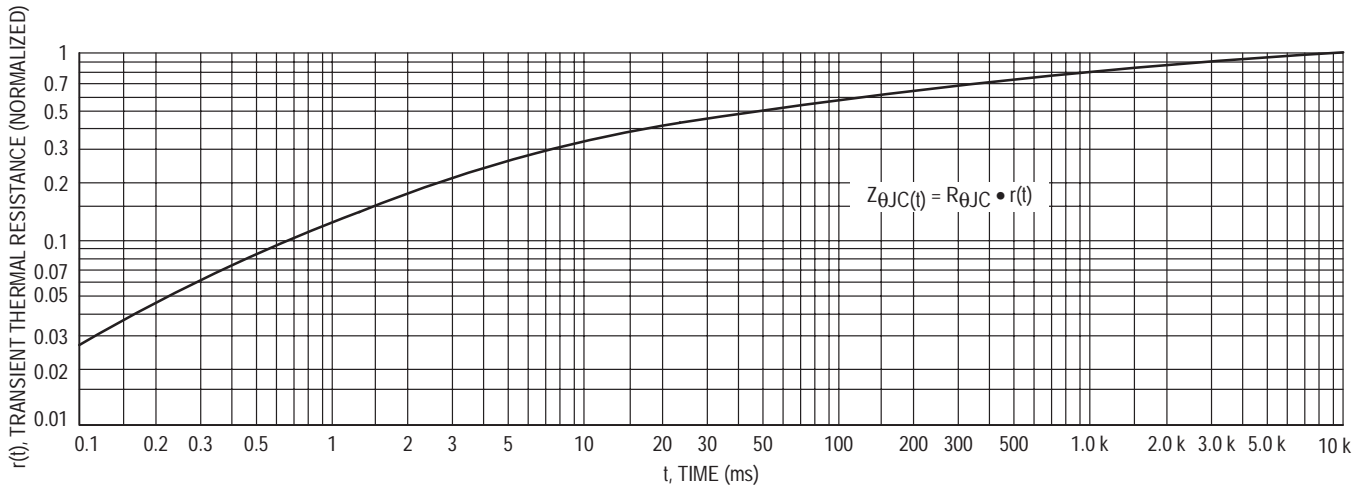
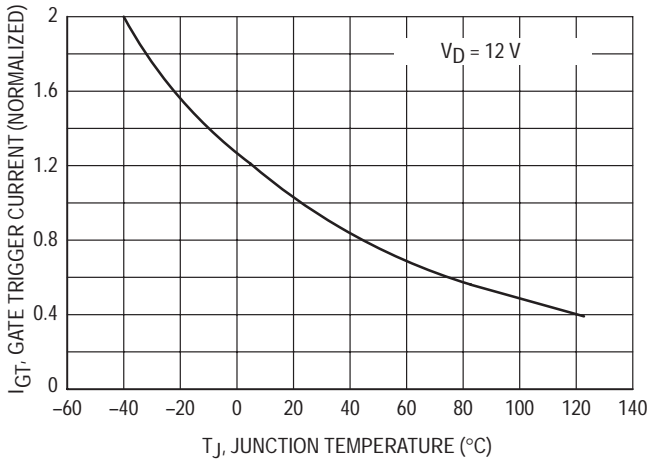
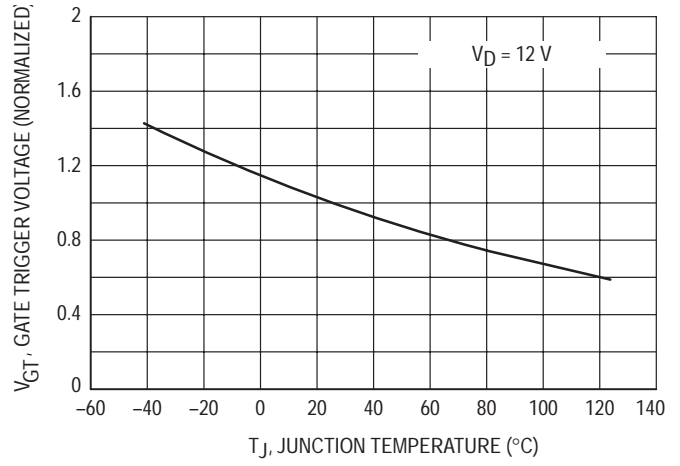


Figure 5. Thermal Response

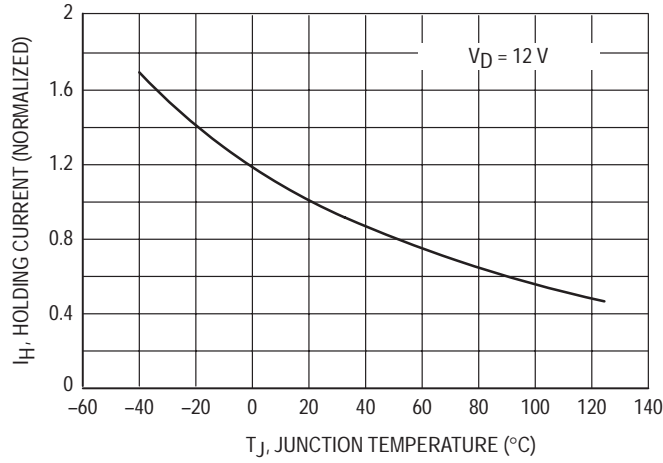
# MCR225-8FP, MCR225-10FP



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



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

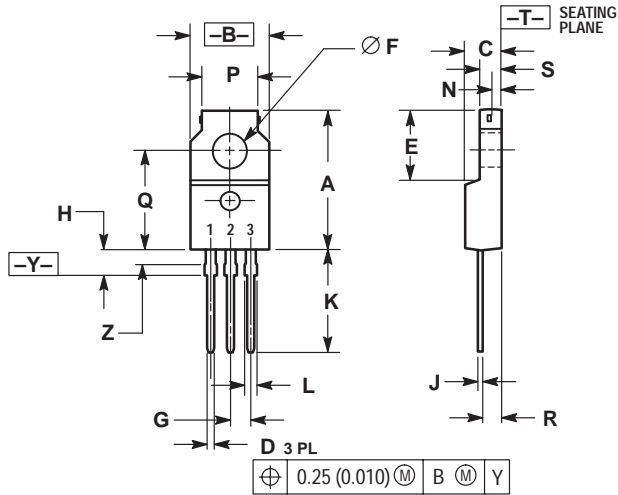


**Figure 8. Typical Holding Current versus Temperature**

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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
2. ANODE
3. GATE

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