

# 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° 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 $+125$ | $^\circ\text{C}$     |
| Storage Temperature Range                                                                                                                                                 | $T_{stg}$                | $-40$ to $+150$ | $^\circ\text{C}$     |

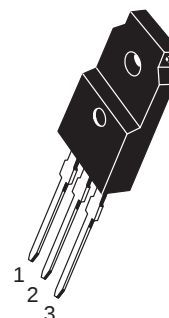
(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source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

## THERMAL CHARACTERISTICS

| Characteristic                                                                | Symbol          | Max       | Unit |
|-------------------------------------------------------------------------------|-----------------|-----------|------|
| Thermal Resistance, Junction to Case                                          | $R_{\theta JC}$ | 1.5       | °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>( $V_D = \text{Rated } V_{DRM}, V_{RRM}$ ; Gate Open) $T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | $I_{DRM},$<br>$I_{RRM}$ | — | — | 10 | $\mu\text{A}$ |
|                                                                                                                                                                    |                         | — | — | 2  | mA            |

## ON CHARACTERISTICS

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

## DYNAMIC CHARACTERISTICS

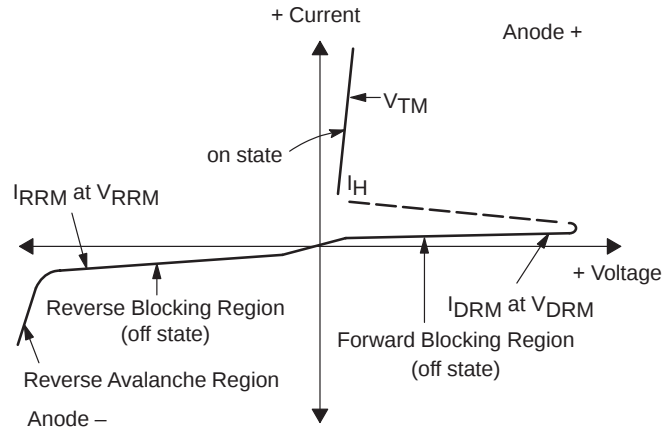
|                                                                                                                 |         |   |     |   |                        |
|-----------------------------------------------------------------------------------------------------------------|---------|---|-----|---|------------------------|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

(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

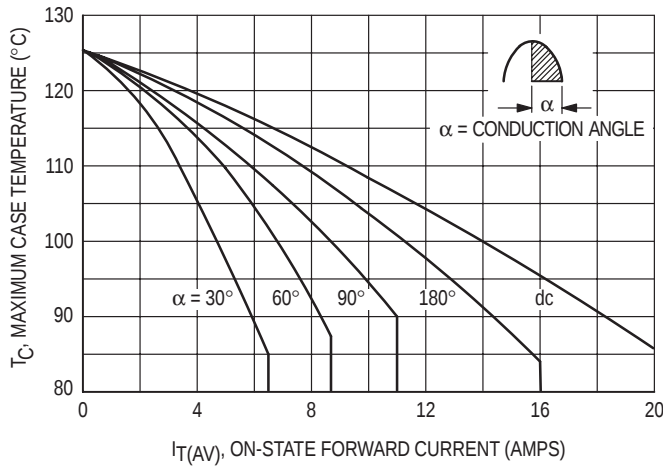


Figure 1. Average Current Derating

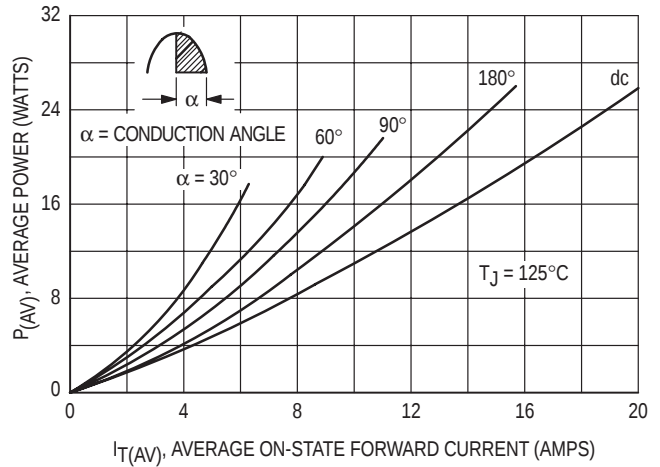


Figure 2. Maximum On-State Power Dissipation

# MCR225-8FP, MCR225-10FP

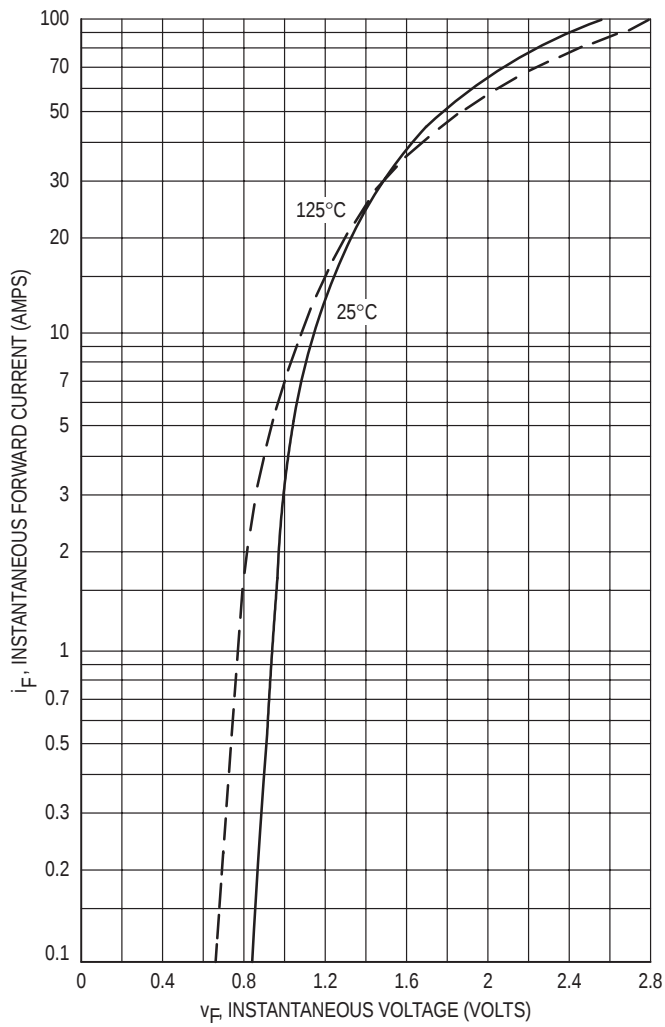


Figure 3. Maximum Forward Voltage

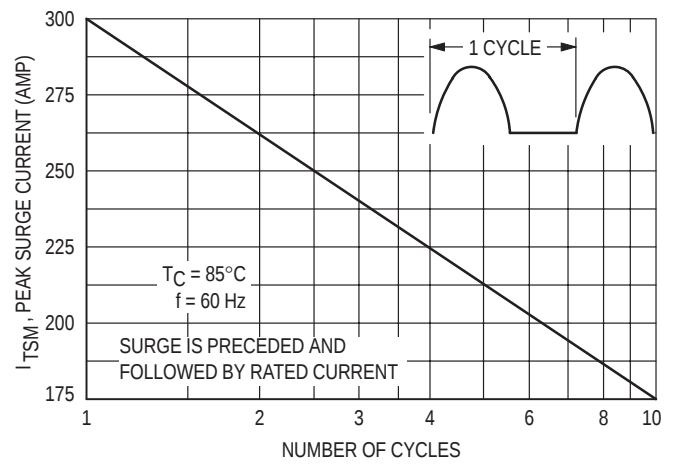


Figure 4. Maximum Non-Repetitive Surge Current

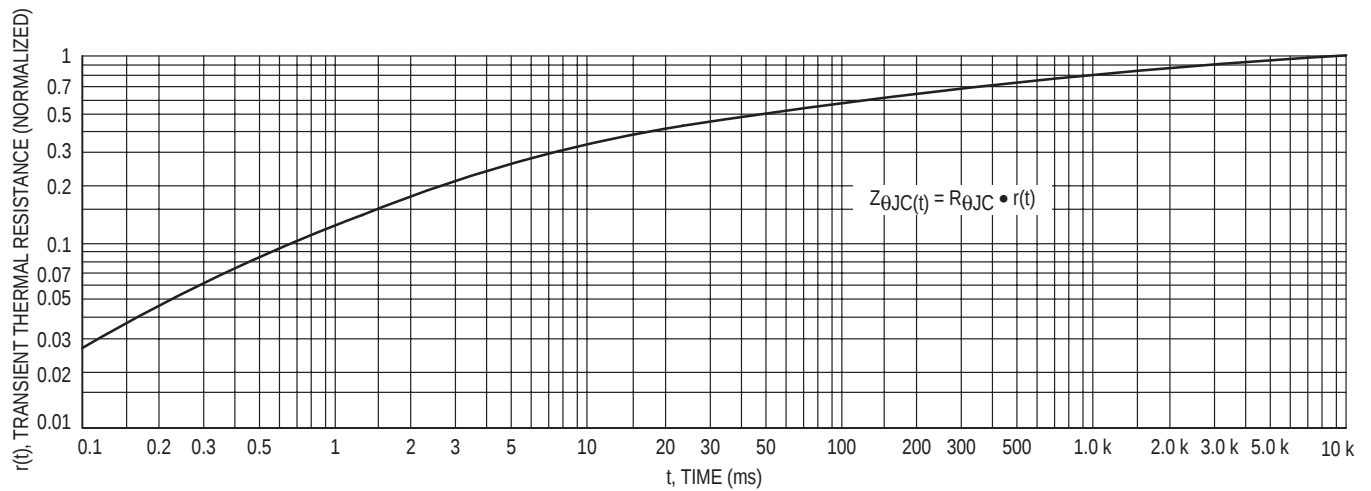
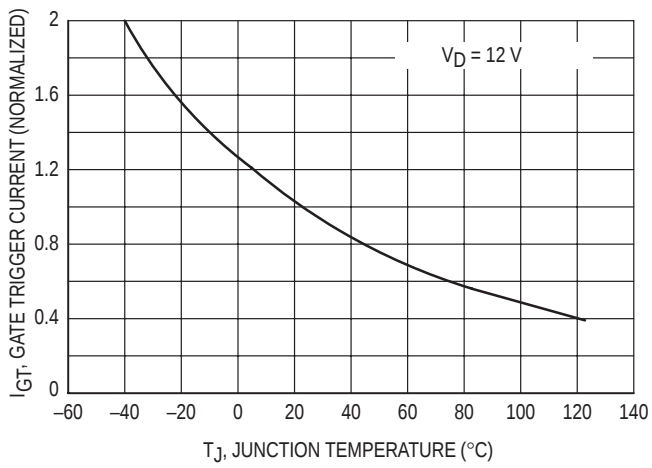
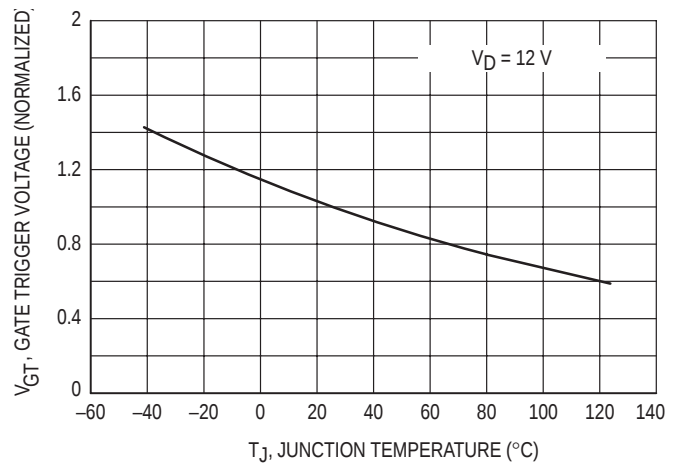


Figure 5. Thermal Response

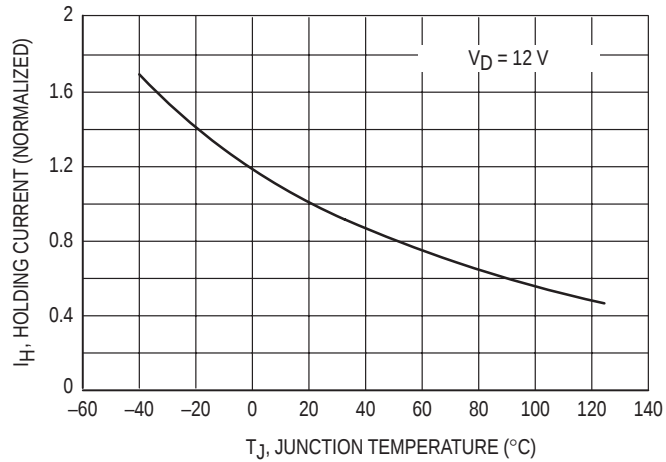
## MCR225-8FP, MCR225-10FP



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



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

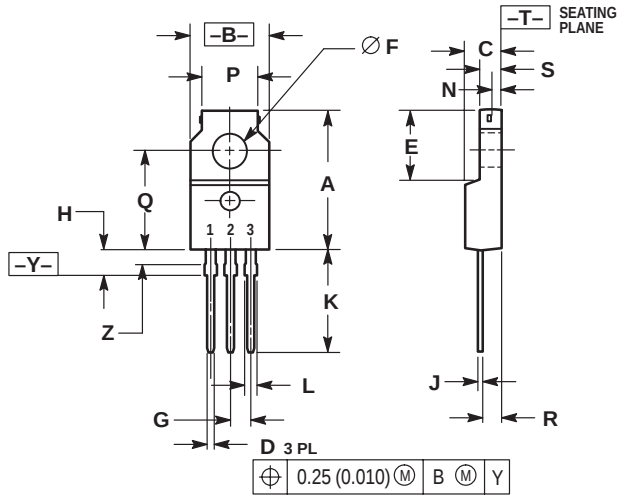


**Figure 8. Typical Holding Current versus Temperature**

# MCR225-8FP, MCR225-10FP

## 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  | 0.100 BSC | 2.54        | 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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