

# MCR264-4, MCR264-6, MCR264-8

Preferred Device

## Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

Designed for back-to-back SCR output devices for solid state relays or applications requiring high surge operation.

- Photo Glass Passivated Blocking Junctions for High Temperature Stability, Center Gate for Uniform Parameters
- 400 Amperes Surge Capability
- Blocking Voltage to 600 Volts
- Device Marking: Logo, Device Type, e.g., MCR264-4, 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)     | $V_{\text{DRM}}$ ,<br>$V_{\text{RRM}}$ |                 | Volts            |
| MCR264-4                                                                                                                         |                                        | 200             |                  |
| MCR264-6                                                                                                                         |                                        | 400             |                  |
| MCR264-8                                                                                                                         |                                        | 600             |                  |
| On-State RMS Current<br>( $T_C = 80^\circ\text{C}$ ; $180^\circ$ Conduction Angles)                                              | $I_{\text{T(RMS)}}$                    | 40              | A                |
| Average On-State Current<br>( $T_C = 80^\circ\text{C}$ ; $180^\circ$ Conduction Angles)                                          | $I_{\text{T(AV)}}$                     | 25              | A                |
| Peak Non-repetitive Surge Current<br>( $T_C = 80^\circ\text{C}$ )<br>(1/2 Cycle, Sine Wave 60 Hz,<br>$T_J = 125^\circ\text{C}$ ) | $I_{\text{TSM}}$                       | 400<br>450      | A                |
| Forward Peak Gate Power<br>(Pulse Width $\leq 1.0 \mu\text{s}$ , $T_C = 80^\circ\text{C}$ )                                      | $P_{\text{GM}}$                        | 20              | Watts            |
| Forward Average Gate Power<br>( $t = 8.3 \text{ ms}$ , $T_C = 80^\circ\text{C}$ )                                                | $P_{\text{G(AV)}}$                     | 0.5             | Watt             |
| Forward Peak Gate Current<br>(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 $+125$ | $^\circ\text{C}$ |
| 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.

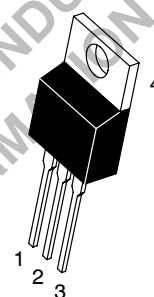
These devices are rated for use in applications subject to high surge conditions. Care must be taken to insure proper heat sinking when the device is to be used at high sustained currents.



ON Semiconductor

<http://onsemi.com>

**SCRs**  
**40 AMPERES RMS**  
**200 thru 600 VOLTS**



TO-220AB  
CASE 221A  
STYLE 3

| PIN ASSIGNMENT |         |
|----------------|---------|
| 1              | Cathode |
| 2              | Anode   |
| 3              | Gate    |
| 4              | Anode   |

#### ORDERING INFORMATION

| Device   | Package | Shipping |
|----------|---------|----------|
| MCR264-4 | TO220AB | 500/Box  |
| MCR264-6 | TO220AB | 500/Box  |
| MCR264-8 | TO220AB | 500/Box  |

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

# MCR264-4, MCR264-6, MCR264-8

## THERMAL CHARACTERISTICS

| Characteristic                                                                | Symbol          | Max | Unit                 |
|-------------------------------------------------------------------------------|-----------------|-----|----------------------|
| Thermal Resistance, Junction to Case                                          | $R_{\theta JC}$ | 1.0 | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction to Ambient                                       | $R_{\theta JA}$ | 60  | $^{\circ}\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | $T_L$           | 260 | $^{\circ}\text{C}$   |

## 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>( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ , Gate Open) | $I_{DRM}, I_{RRM}$ | — | — | 10  | $\mu\text{A}$ |
| $T_J = 125^{\circ}\text{C}$                                                                                                |                    | — | — | 2.0 | $\text{mA}$   |

## ON CHARACTERISTICS

|                                                                                                                                |          |     |          |          |               |
|--------------------------------------------------------------------------------------------------------------------------------|----------|-----|----------|----------|---------------|
| Peak Forward On-State Voltage <sup>(1)</sup><br>( $I_{TM} = 80 \text{ A}$ )                                                    | $V_{TM}$ | —   | 1.4      | 2.0      | Volts         |
| Gate Trigger Current (Continuous dc)<br>( $V_{AK} = 12 \text{ Vdc}$ , $R_L = 100 \text{ Ohms}$ , $T_C = -40^{\circ}\text{C}$ ) | $I_{GT}$ | —   | 15<br>30 | 50<br>90 | $\text{mA}$   |
| Gate Trigger Voltage (Continuous dc)<br>( $V_{AK} = 12 \text{ Vdc}$ , $R_L = 100 \text{ Ohms}$ )                               | $V_{GT}$ | —   | 1.0      | 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)                                       | $I_H$    | —   | 30       | 60       | $\text{mA}$   |
| Turn-On Time<br>( $I_{TM} = 40 \text{ A}$ , $I_{GT} = 60 \text{ mAdc}$ )                                                       | $t_{gt}$ | —   | 1.5      | —        | $\mu\text{s}$ |

## DYNAMIC CHARACTERISTICS

|                                                                                                                 |         |   |    |   |                        |
|-----------------------------------------------------------------------------------------------------------------|---------|---|----|---|------------------------|
| Critical Rate-of-Rise of Off-State Voltage<br>(Gate Open, $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform) | $dv/dt$ | — | 50 | — | $\text{V}/\mu\text{s}$ |
|-----------------------------------------------------------------------------------------------------------------|---------|---|----|---|------------------------|

(1) Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

# 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                           |

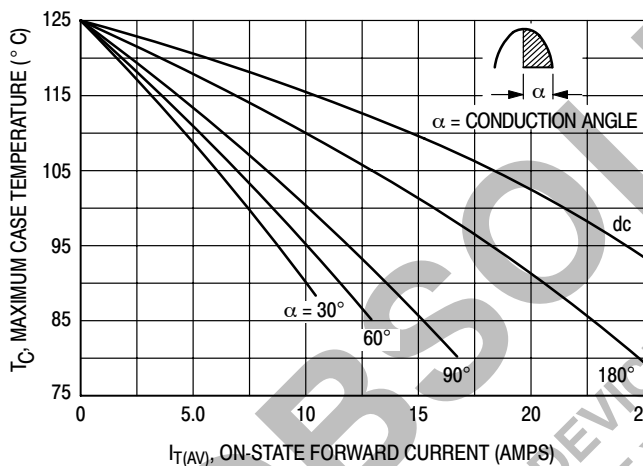
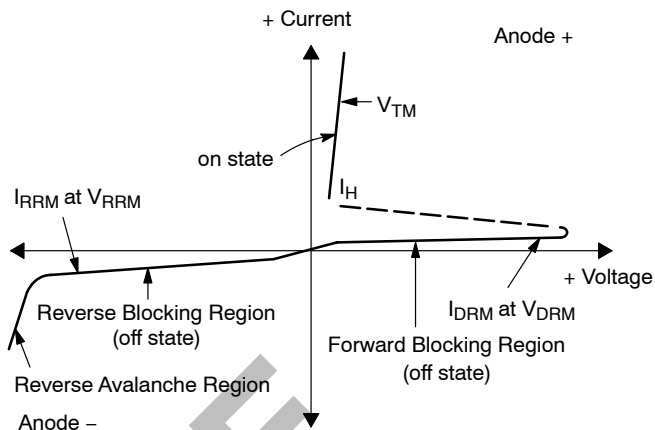


Figure 1. Average Current Derating

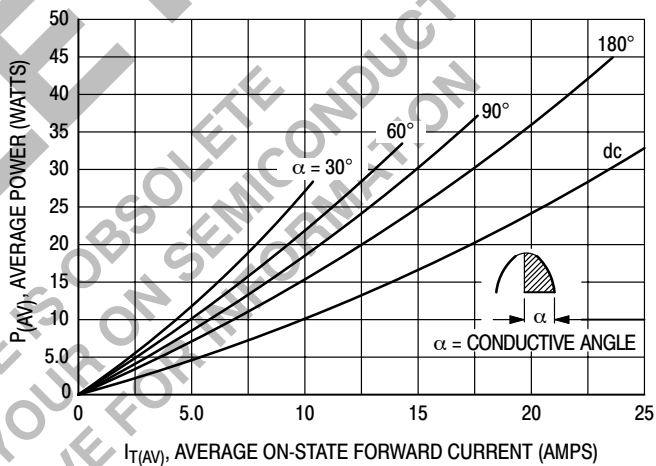


Figure 2. Maximum On-State Power Dissipation

# MCR264-4, MCR264-6, MCR264-8

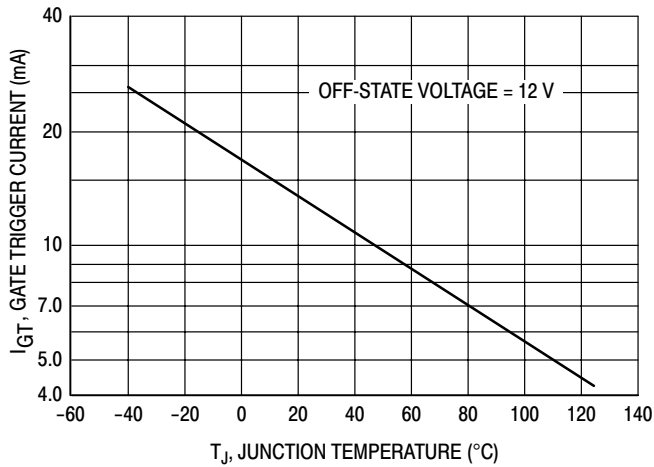


Figure 3. Typical Gate Trigger Current

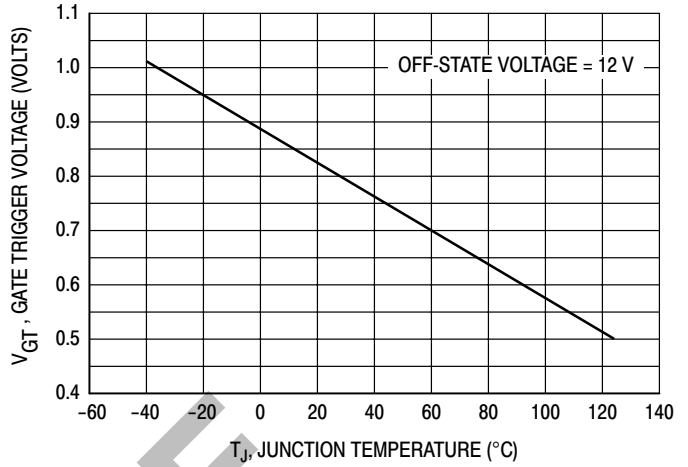


Figure 4. Typical Gate Trigger Voltage

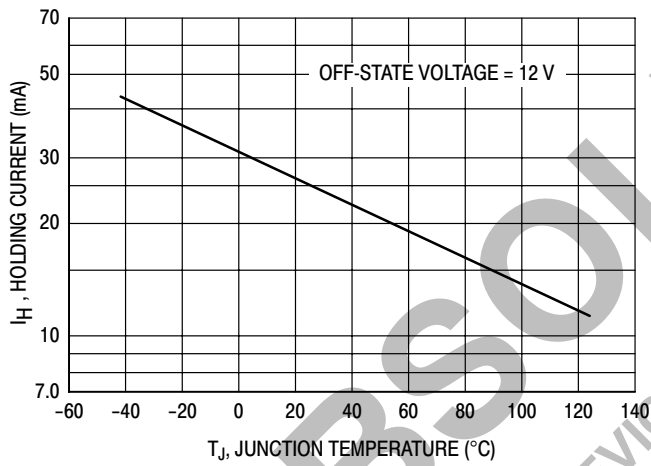


Figure 5. Typical Holding Current

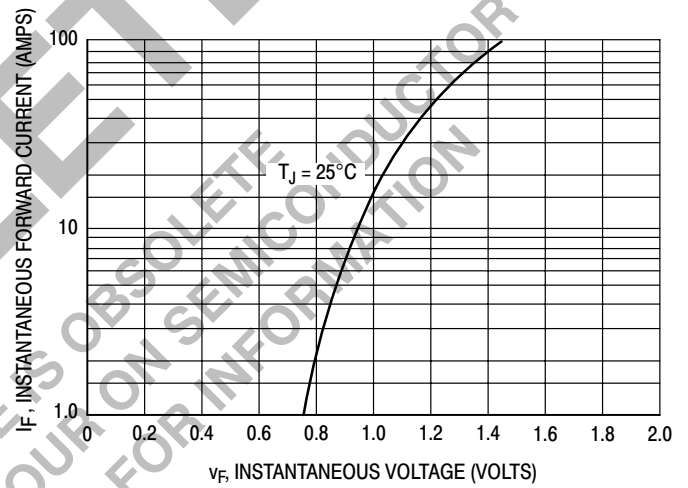


Figure 6. Typical Forward Voltage

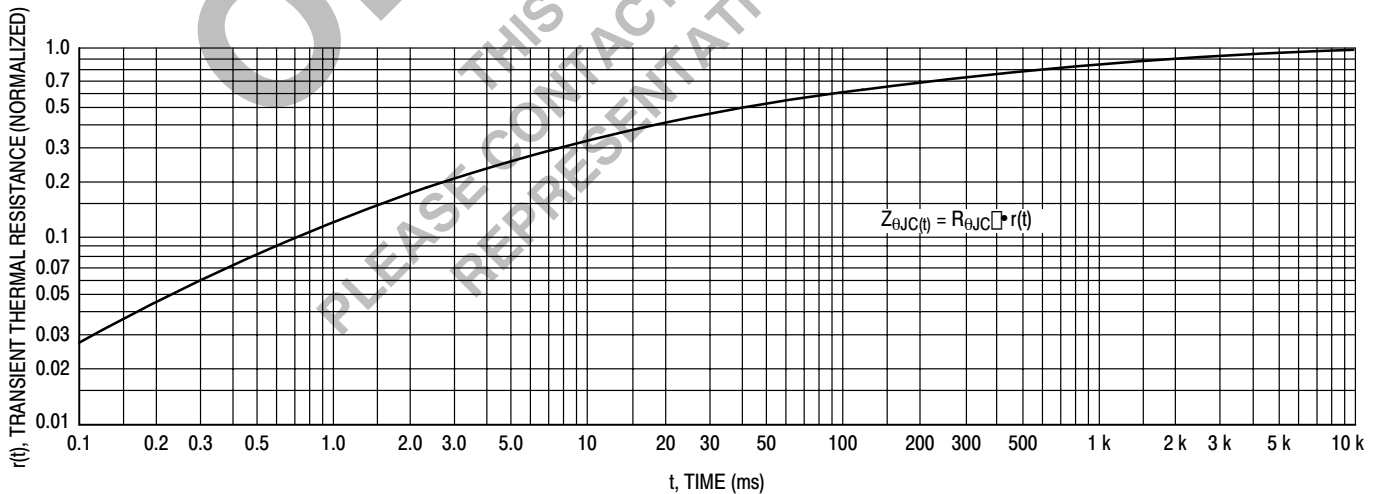
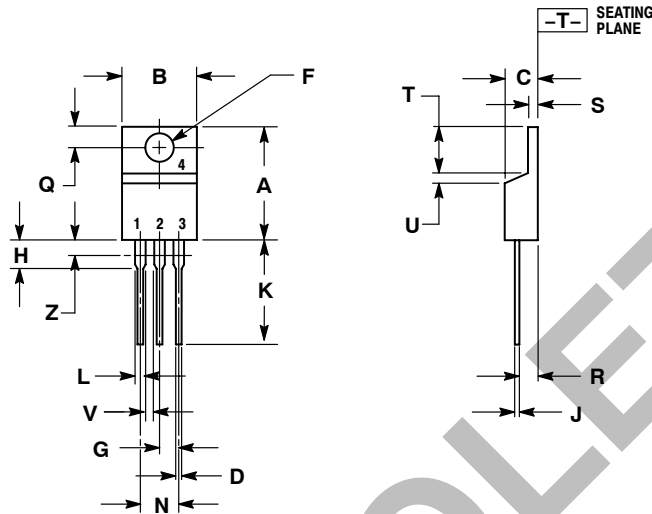


Figure 7. Thermal Response

# MCR264-4, MCR264-6, MCR264-8

## PACKAGE DIMENSIONS

TO-220AB  
CASE 221A-07  
ISSUE Z



- NOTES:
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.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.570  | 0.620 | 14.48       | 15.75 |
| B   | 0.380  | 0.405 | 9.66        | 10.28 |
| C   | 0.160  | 0.190 | 4.07        | 4.82  |
| D   | 0.025  | 0.035 | 0.64        | 0.88  |
| F   | 0.142  | 0.147 | 3.61        | 3.73  |
| G   | 0.095  | 0.105 | 2.42        | 2.66  |
| H   | 0.110  | 0.155 | 2.80        | 3.93  |
| J   | 0.014  | 0.022 | 0.36        | 0.55  |
| K   | 0.500  | 0.562 | 12.70       | 14.27 |
| L   | 0.045  | 0.060 | 1.15        | 1.52  |
| N   | 0.190  | 0.210 | 4.83        | 5.33  |
| Q   | 0.100  | 0.120 | 2.54        | 3.04  |
| R   | 0.080  | 0.110 | 2.04        | 2.79  |
| S   | 0.045  | 0.055 | 1.15        | 1.39  |
| 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  |

STYLE 3:  
PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

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