

# Thyristors

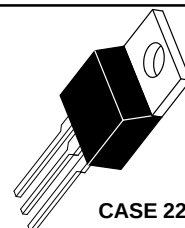
## Silicon Controlled Rectifiers

... 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 800 Volts

**MCR264-4  
thru  
MCR264-10**

**SCRs  
40 AMPERES RMS  
200 thru 800 VOLTS**



**CASE 221A-04  
(TO-220AB)  
STYLE 3**

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

| Rating                                                                                                                  | Symbol                      | Value                    | Unit             |
|-------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------|------------------|
| Peak Repetitive Forward and Reverse Blocking Voltage <sup>(1)</sup><br>( $T_J = 25$ to $125^\circ\text{C}$ , Gate Open) | $V_{DRM}$<br>$V_{RRM}$      | 200<br>400<br>600<br>800 | Volts            |
| Forward Current ( $T_C = 80^\circ\text{C}$ )<br>(All Conduction Angles)                                                 | $I_{T(RMS)}$<br>$I_{T(AV)}$ | 40<br>25                 | Amps             |
| Peak Non-repetitive Surge Current – 8.3 ms<br>(1/2 Cycle, Sine Wave) 1.5 ms                                             | $I_{TSM}$                   | 400<br>450               | Amps             |
| Forward Peak Gate Power                                                                                                 | $P_{GM}$                    | 20                       | Watts            |
| Forward Average Gate Power                                                                                              | $P_{G(AV)}$                 | 0.5                      | Watt             |
| Forward Peak Gate Current<br>(300 $\mu\text{s}$ , 120 PPS)                                                              | $I_{GM}$                    | 2                        | Amps             |
| 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.

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.

REV 1



# MCR264-4 thru MCR264-10

## THERMAL CHARACTERISTICS

| Characteristic                          | Symbol          | Max | Unit                 |
|-----------------------------------------|-----------------|-----|----------------------|
| Thermal Resistance, Junction to Case    | $R_{\theta JC}$ | 1   | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 60  | $^{\circ}\text{C/W}$ |

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

| Characteristic                                                                                                                                                            | Symbol             | Min    | Typ      | Max      | Unit                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------|----------|----------|------------------------------|
| Peak Forward or Reverse Blocking Current<br>( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$ , Gate Open) $T_J = 25^{\circ}\text{C}$<br>$T_J = 125^{\circ}\text{C}$ | $I_{DRM}, I_{RRM}$ | —<br>— | —<br>—   | 10<br>2  | $\mu\text{A}$<br>$\text{mA}$ |
| Forward "On" Voltage(1)<br>( $I_{TM} = 80 \text{ A}$ )                                                                                                                    | $V_{TM}$           | —      | 1.4      | 2        | Volts                        |
| Gate Trigger Current (Continuous dc)<br>(Anode Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$ , $T_C = -40^{\circ}\text{C}$ )                                                 | $I_{GT}$           | —<br>— | 15<br>30 | 50<br>90 | $\text{mA}$                  |
| Gate Trigger Voltage (Continuous dc)<br>(Anode Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$ )                                                                               | $V_{GT}$           | —      | 1        | 1.5      | Volts                        |
| Gate Non-Trigger Voltage<br>(Anode Voltage = Rated $V_{DRM}$ , $R_L = 100 \text{ Ohms}$ , $T_J = 125^{\circ}\text{C}$ )                                                   | $V_{GD}$           | 0.2    | —        | —        | Volts                        |
| Holding Current<br>(Anode Voltage = 12 Vdc)                                                                                                                               | $I_H$              | —      | 30       | 60       | $\text{mA}$                  |
| Turn-On Time<br>( $I_{TM} = 40 \text{ A}$ , $I_{GT} = 60 \text{ mAdc}$ )                                                                                                  | $t_{gt}$           | —      | 1.5      | —        | $\mu\text{s}$                |
| 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  $\leq 2\%$ .

FIGURE 1 — AVERAGE CURRENT DERATING

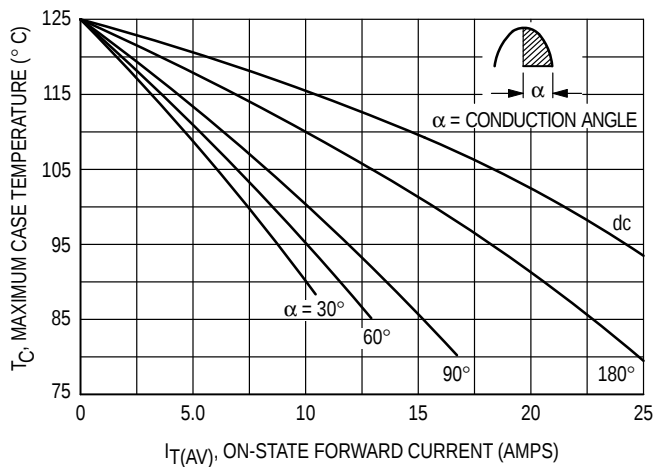


FIGURE 2 — MAXIMUM ON-STATE POWER DISSIPATION

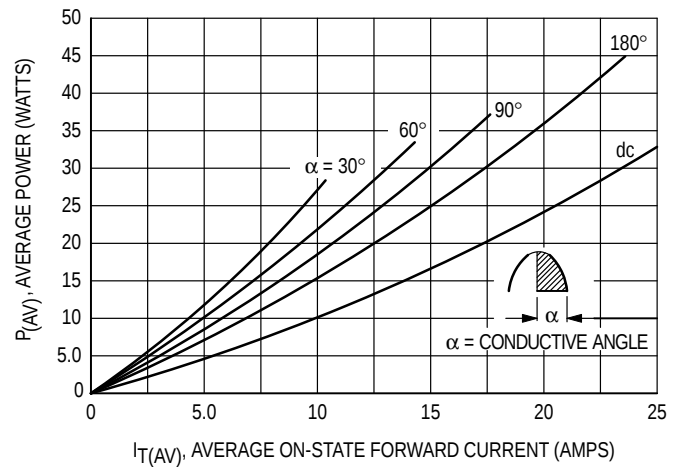


FIGURE 3 — GATE TRIGGER CURRENT

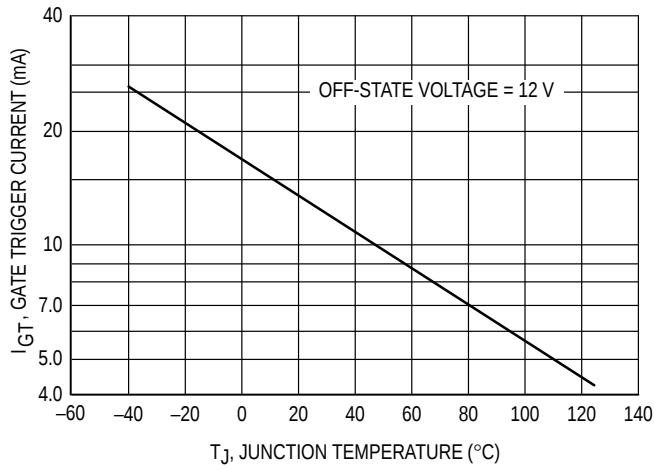


FIGURE 4 — NEW GATE TRIGGER VOLTAGE

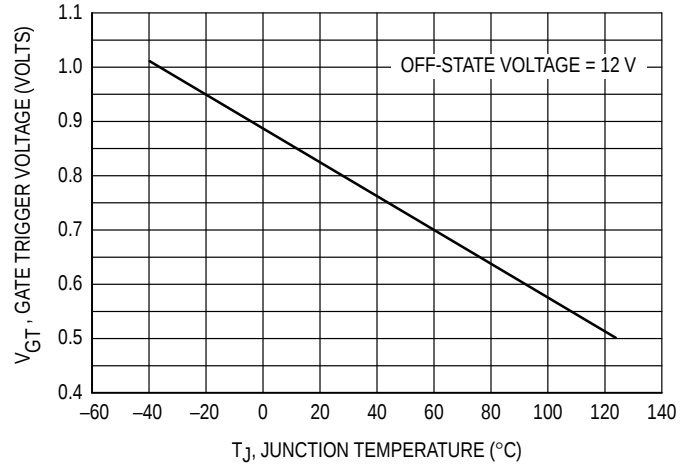


FIGURE 5 — HOLDING CURRENT

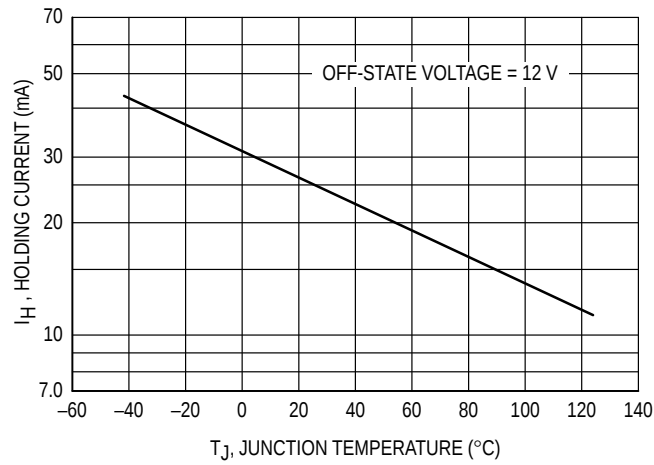


FIGURE 6 — TYPICAL FORWARD VOLTAGE

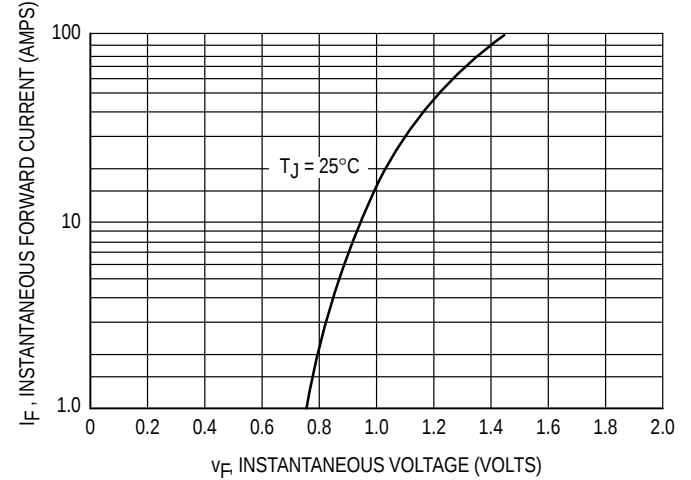
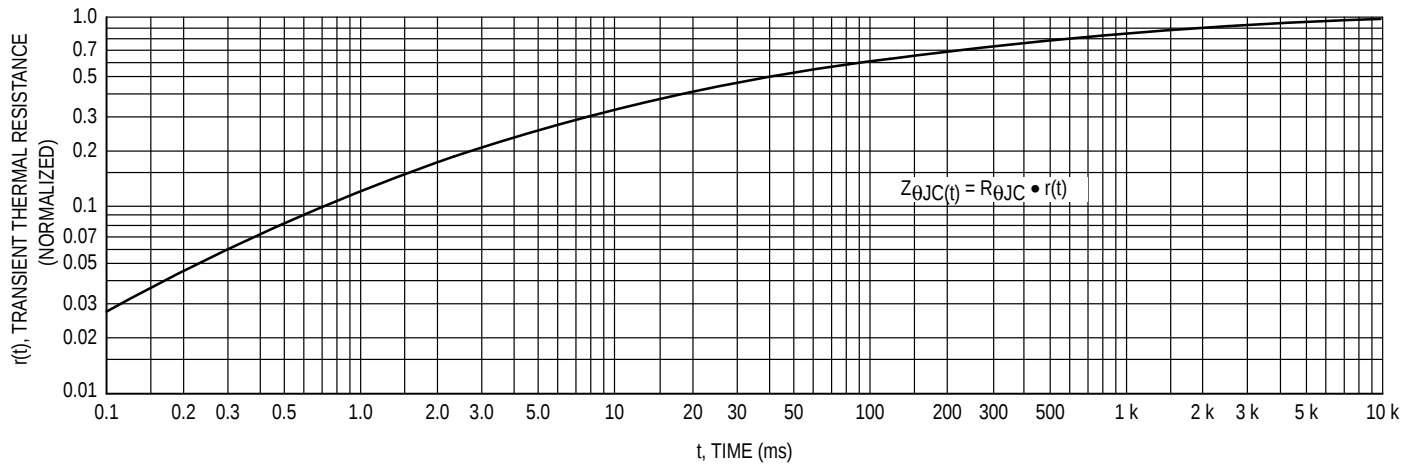
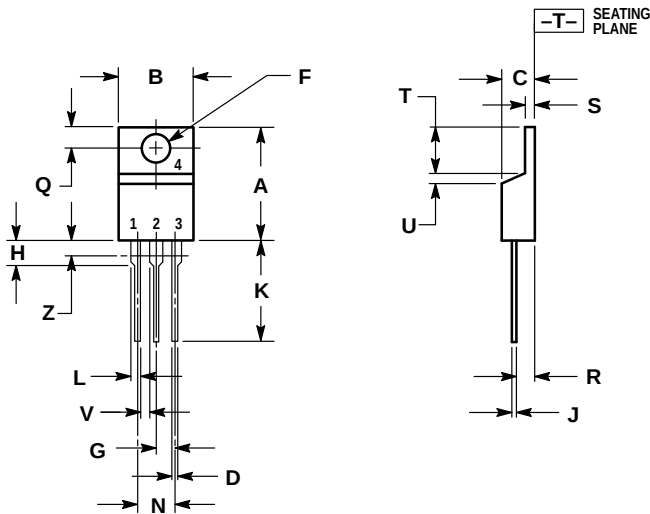


FIGURE 7 — THERMAL RESPONSE



PACKAGE DIMENSIONS



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

- 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  | 0.055 | 1.15        | 1.39  |
| 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  |

CASE 221A-04  
(TO-220AB)

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.  
EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.  
JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.  
ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.

