

## Silicon Controlled Rectifiers Reverse Blocking Triode Thyristors

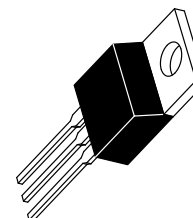
... designed primarily for half-wave ac control applications, such as motor controls, heating controls and power supplies.

- Glass Passivated Junctions with Center Gate Geometry for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Blocking Voltage to 800 Volts

**2N6394  
thru  
2N6399**

Motorola preferred devices

SCRs  
12 AMPERES RMS  
50 thru 800 VOLTS



CASE 221A-07  
(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>(Gate Open, $T_J = -40$ to $125^\circ\text{C}$ ) | $V_{DRM}, V_{RRM}$ | 50<br>100<br>400<br>600<br>800 | Volts                |
| RMS On-State Current ( $T_C = 90^\circ\text{C}$ ) (All Conduction Angles)   | $I_T(\text{RMS})$  | 12                             | Amps                 |
| Peak Non-Repetitive Surge Current<br>(1/2 Cycle, Sine Wave, 60 Hz, $T_J = 125^\circ\text{C}$ )                          | $I_{TSM}$          | 100                            | Amps                 |
| Circuit Fusing ( $t = 8.3$ ms)  | $I^2t$             | 40                             | $\text{A}^2\text{s}$ |
| Forward Peak Power  | $P_{GM}$           | 20                             | Watts                |
| Forward Average Gate Power  | $P_{G(AV)}$        | 0.5                            | Watt                 |
| Forward Peak Gate Current   | $I_{GM}$           | 2                              | Amps                 |
| Operating Junction Temperature Range  | $T_J$              | -40 to +125                    | $^\circ\text{C}$     |
| Storage Temperature Range   | $T_{stg}$          | -40 to +150                    | $^\circ\text{C}$     |

### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max | Unit                      |
|--------------------------------------|-----------------|-----|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 2   | $^\circ\text{C}/\text{W}$ |

\*Indicates JEDEC Registered Data.

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.

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

REV 1

## 2N6394 thru 2N6399

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

| Characteristic  | Symbol               | Min      | Typ      | Max      | Unit                |
|---|----------------------|----------|----------|----------|---------------------|
| * Peak Repetitive Forward or Reverse Blocking Current<br>( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}, \text{ Gate Open}$ )<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | $I_{DRM}, I_{RRM}$   | —<br>—   | —<br>—   | 10<br>2  | $\mu\text{A}$<br>mA |
| * Forward "On" Voltage<br>( $I_{TM} = 24 \text{ A Peak}$ )  | $V_{TM}$             | —        | 1.7      | 2.2      | Volts               |
| * Gate Trigger Current (Continuous dc)<br>( $V_D = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )  | $I_{GT}$             | —        | 5        | 30       | mA                  |
| * Gate Trigger Voltage (Continuous dc)<br>( $V_D = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )<br>( $V_D = \text{Rated } V_{DRM}, R_L = 100 \text{ Ohms}, T_J = 125^\circ\text{C}$ )            | $V_{GT}$<br>$V_{GD}$ | —<br>0.2 | 0.7<br>— | 1.5<br>— | Volts               |
| * Holding Current<br>( $V_D = 12 \text{ Vdc}, \text{ Gate Open}$ )  | $I_H$                | —        | 6        | 40       | mA                  |
| Turn-On Time<br>( $I_{TM} = 12 \text{ A}, I_{GT} = 40 \text{ mAdc}, V_D = \text{Rated } V_{DRM}$ )  | $t_{gt}$             | —        | 1        | 2        | $\mu\text{s}$       |
| Turn-Off Time ( $V_D = \text{Rated } V_{DRM}$ )<br>( $I_{TM} = 12 \text{ A}, I_R = 12 \text{ A}$ )<br>( $I_{TM} = 12 \text{ A}, I_R = 12 \text{ A}, T_J = 125^\circ\text{C}$ )                | $t_q$                | —<br>—   | 15<br>35 | —<br>—   | $\mu\text{s}$       |
| Critical Rate-of-Rise of Off-State Voltage Exponential<br>( $V_D = \text{Rated } V_{DRM}, T_J = 125^\circ\text{C}$ )  | dv/dt                | —        | 50       | —        | V/ $\mu\text{s}$    |

\*Indicates JEDEC Registered Data.

FIGURE 1 — CURRENT DERATING

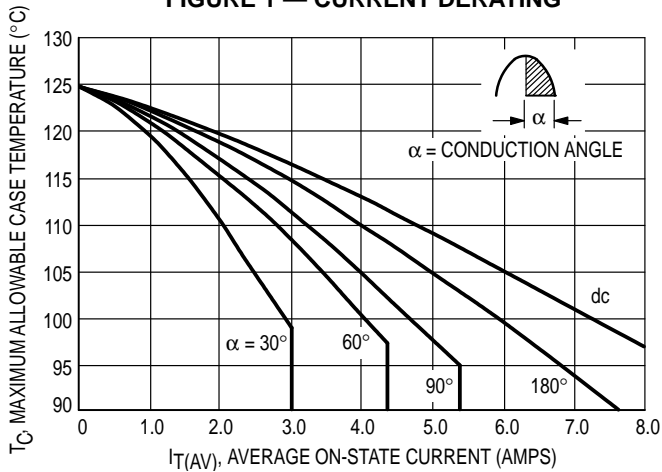


FIGURE 2 — MAXIMUM ON-STATE POWER DISSIPATION

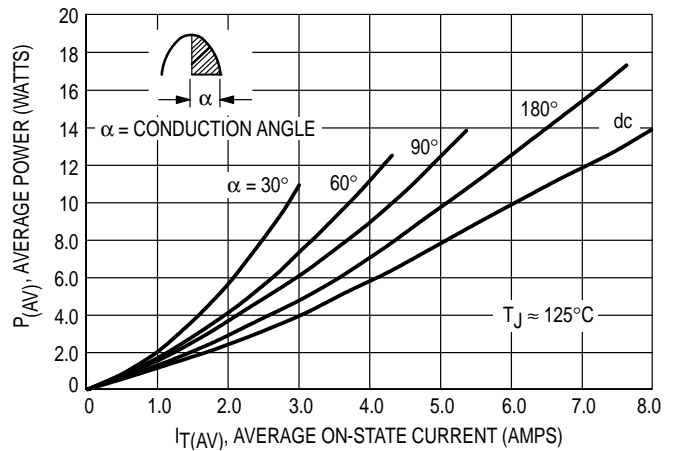


FIGURE 3 — ON-STATE CHARACTERISTICS

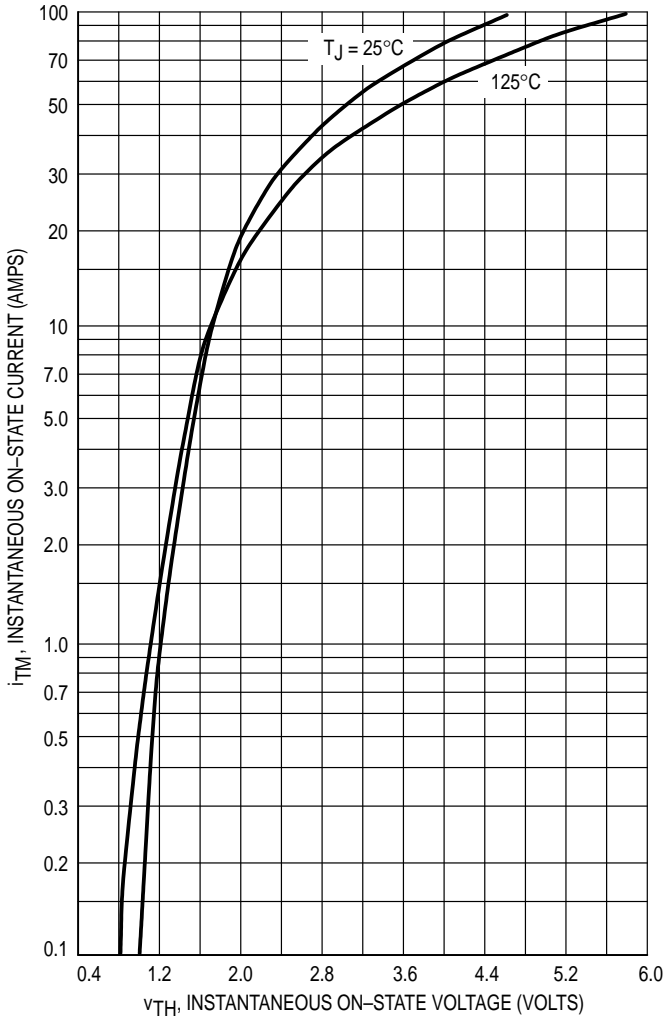


FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT

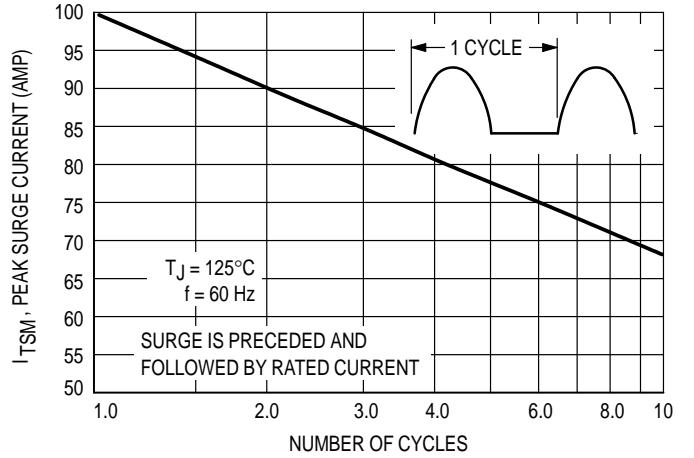
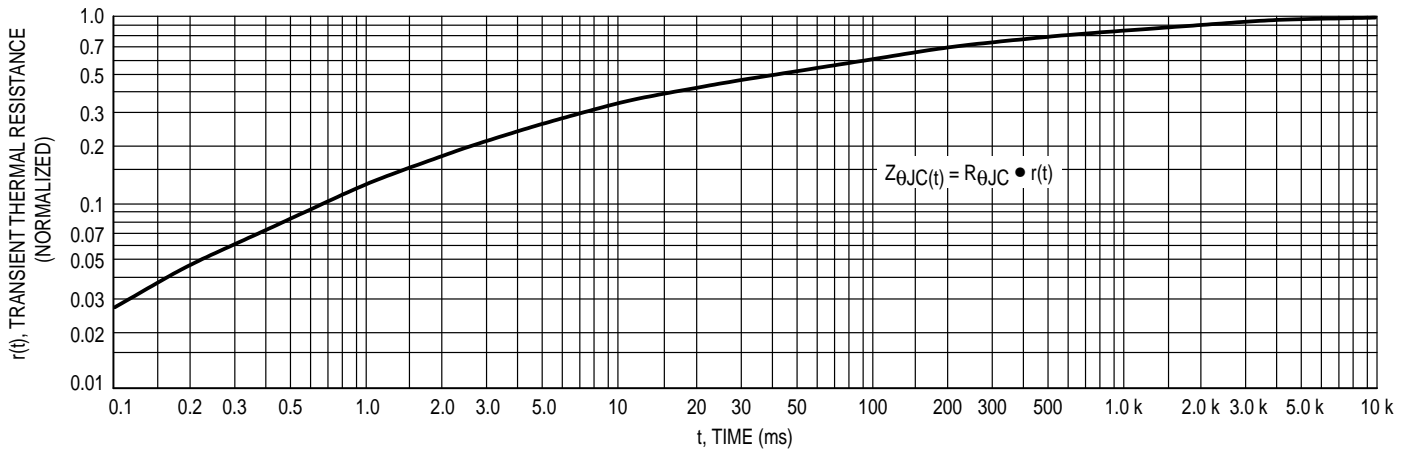


FIGURE 5 — THERMAL RESPONSE



TYPICAL CHARACTERISTICS

FIGURE 6 — PULSE TRIGGER CURRENT

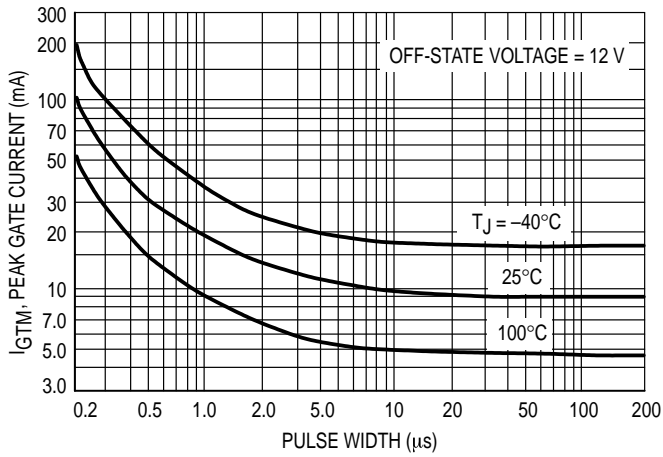


FIGURE 7 — GATE TRIGGER CURRENT

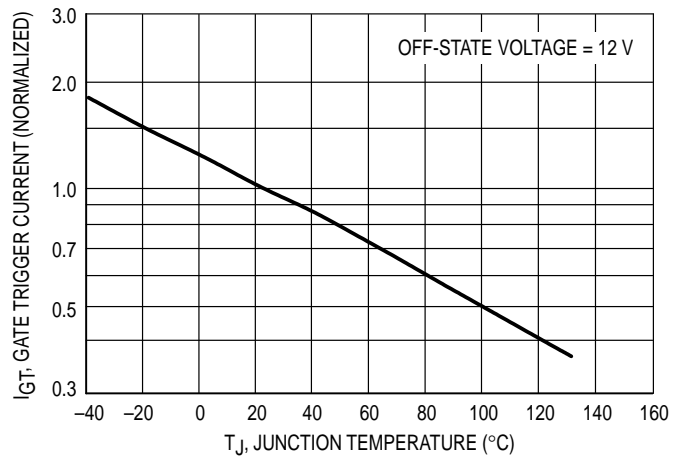


FIGURE 8 — GATE TRIGGER VOLTAGE

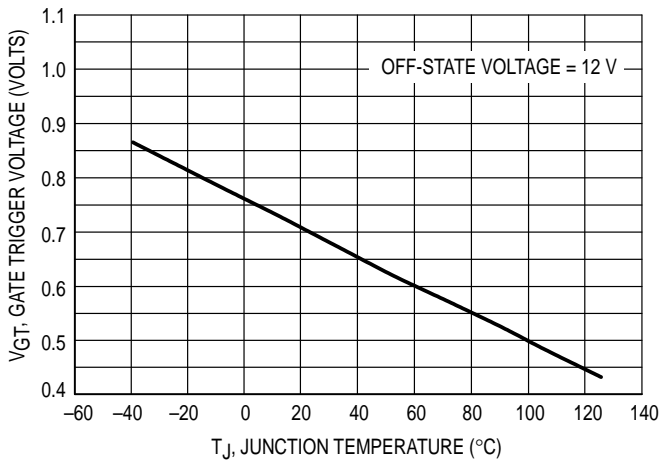
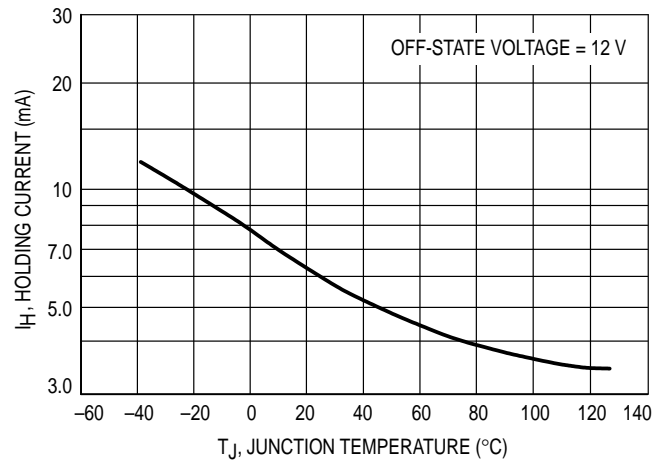
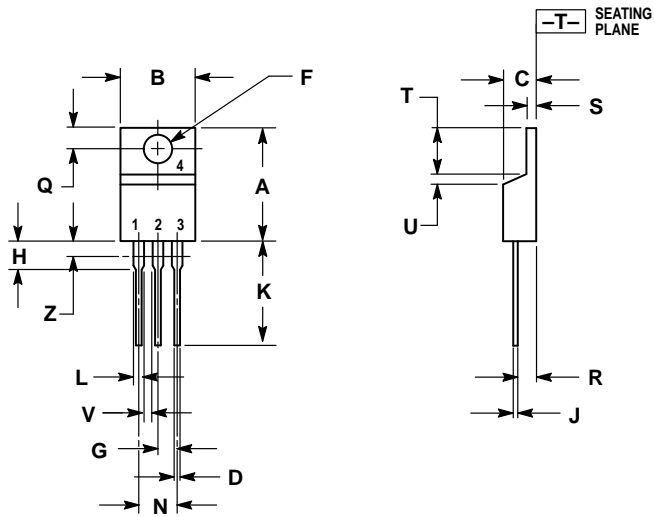


FIGURE 9 — HOLDING CURRENT



PACKAGE DIMENSIONS




- 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

CASE 221A-07  
 ISSUE Z

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