# 2N6394 thru 2N6399

**Motorola preferred devices**

# Silicon Controlled Rectifiers

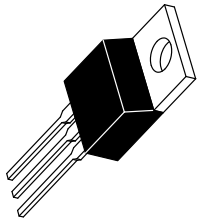
## Reverse Blocking Triode Thyristors

. . . 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

**SCRs**
**12 AMPERES RMS**
**50 thru 800 VOLTS**



**CASE 221A-07**
**(TO-220AB)**
**STYLE 3**

***MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise noted.)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Peak Repetitive Forward and Reverse Blocking Voltage(1) (Gate Open, $T_J$ = –40 to 125°C) 2N6394 | $V_{DRM}$, $V_{RRM}$ | 50 | Volts |
| 2N6395 | | 100 | |
| 2N6397 | | 400 | |
| 2N6398 | | 600 | |
| 2N6399 | | 800 | |
| RMS On–State Current ($T_C$ = 90°C) (All Conduction Angles) | $I_{T(RMS)}$ | 12 | Amps |
| Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, $T_J$ = 125°C) | $I_{TSM}$ | 100 | Amps |
| Circuit Fusing (t = 8.3 ms) | $I^2t$ | 40 | $A^2s$ |
| 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 | °C |
| Storage Temperature Range | $T_{stg}$ | –40 to +150 | °C |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 2 | °C/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**

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**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted.)

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

*Indicates JEDEC Registered Data.

**FIGURE 1 — CURRENT DERATING**

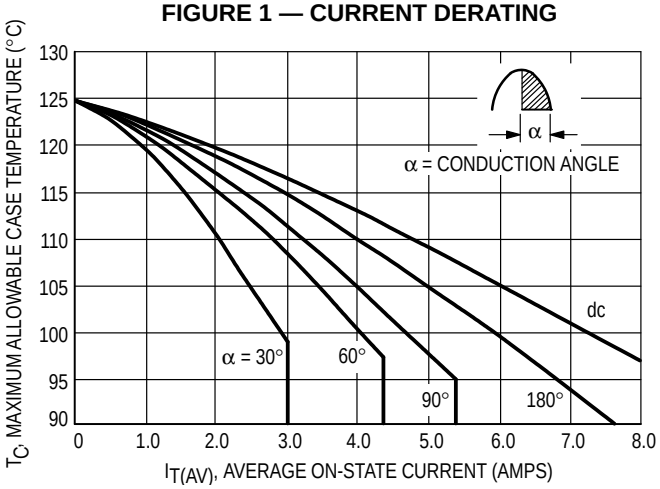



**FIGURE 2 — MAXIMUM ON-STATE POWER DISSIPATION**

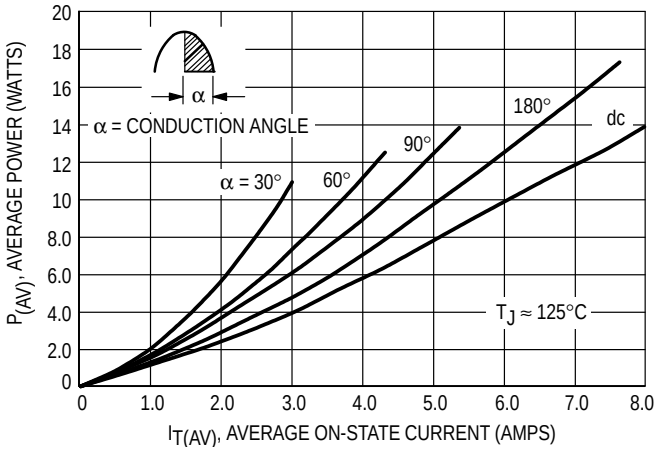


**FIGURE 3 — ON–STATE CHARACTERISTICS**

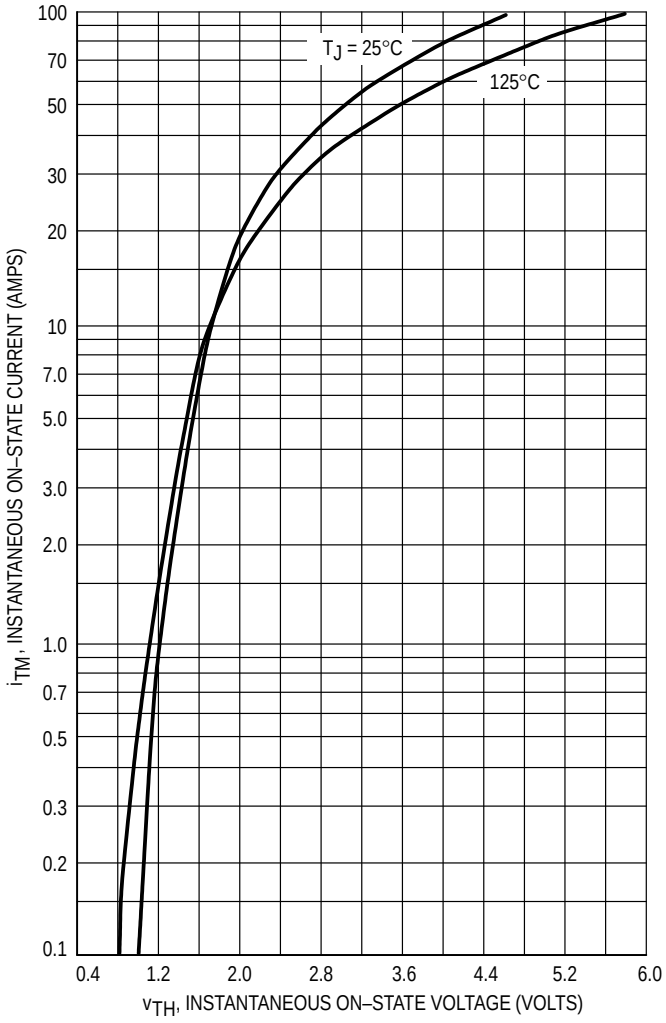



**FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT**

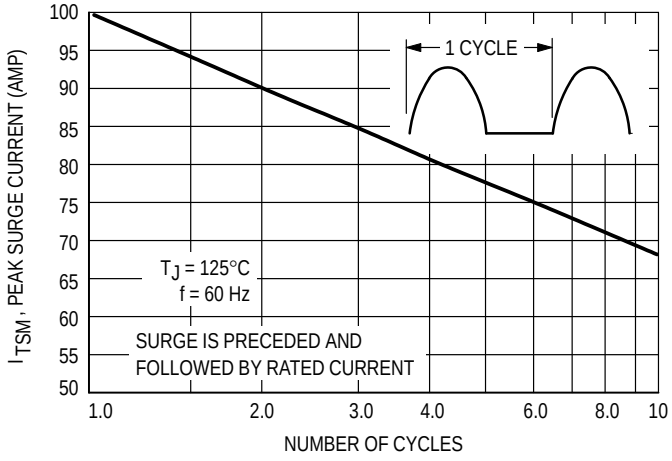
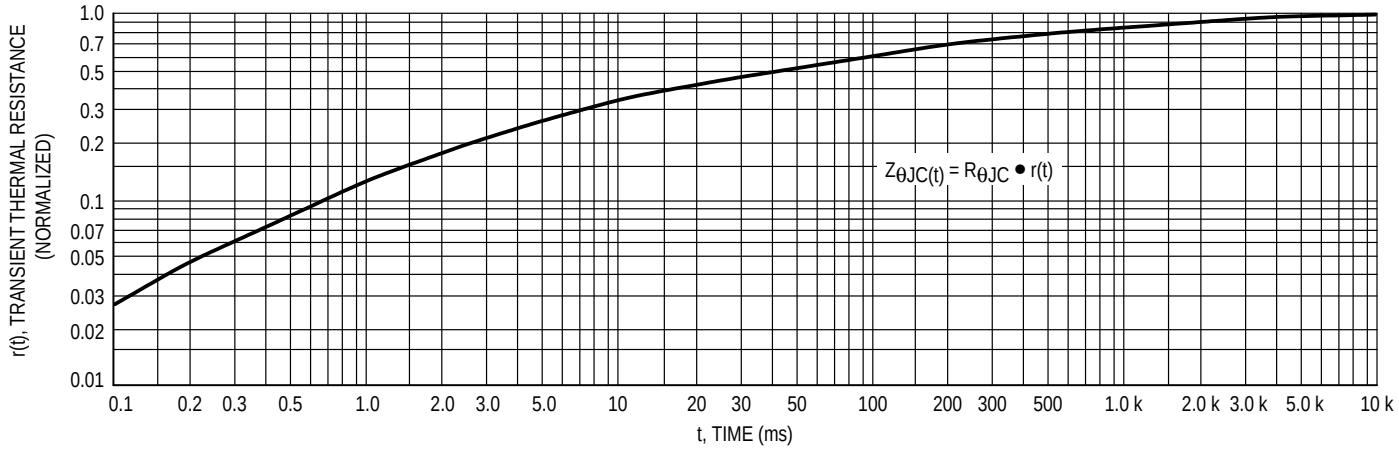
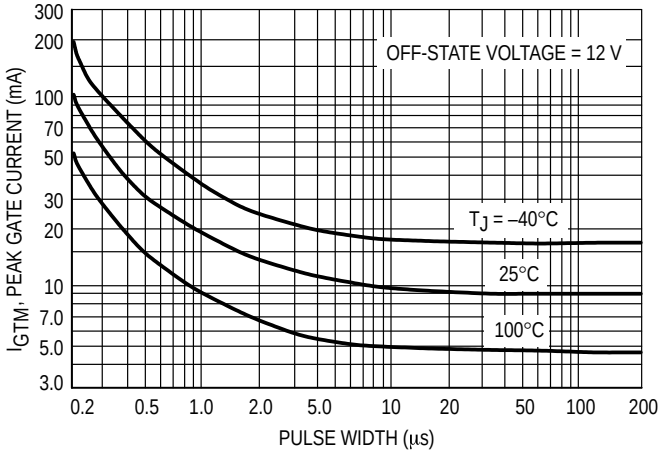



**FIGURE 5 — THERMAL RESPONSE**

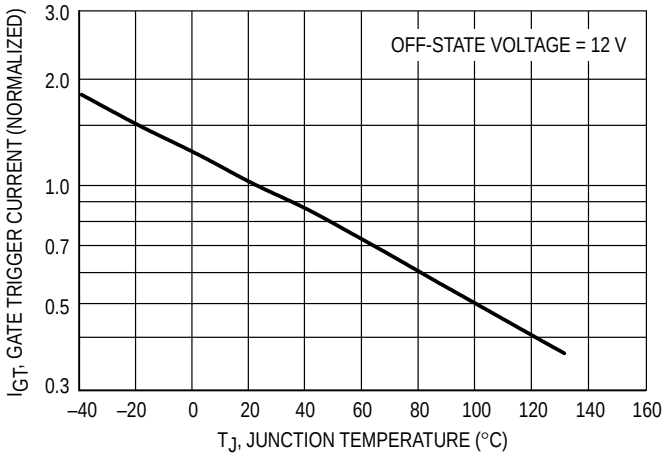


## TYPICAL CHARACTERISTICS

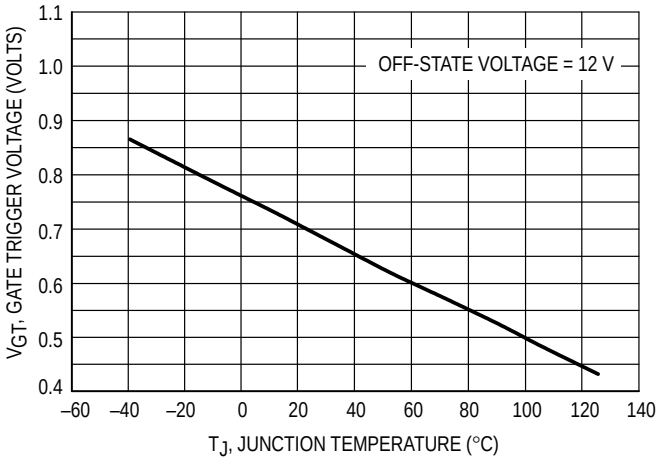
### FIGURE 6 — PULSE TRIGGER CURRENT



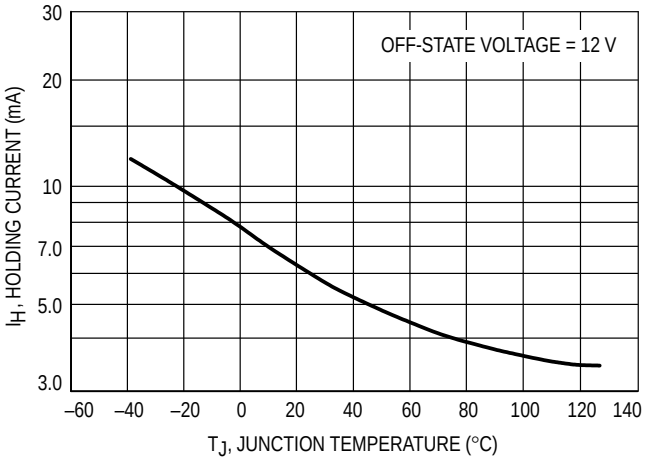

### FIGURE 7 — GATE TRIGGER CURRENT



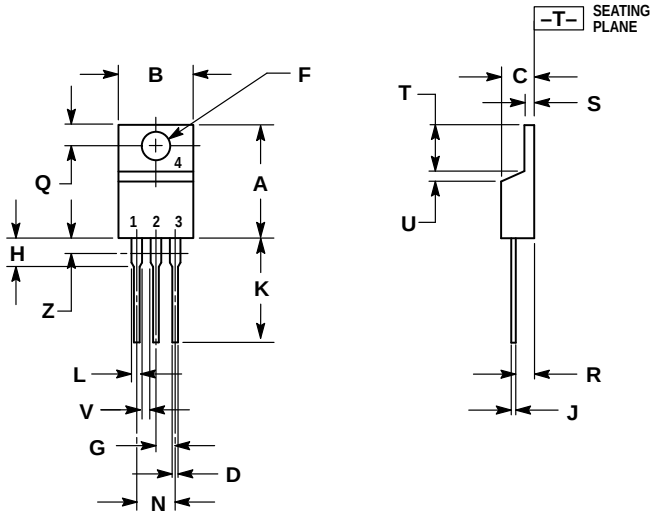

### FIGURE 8 — GATE TRIGGER VOLTAGE




### 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.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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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