

## Triacs

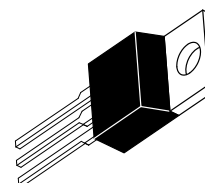
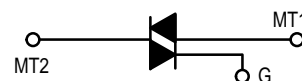
### Silicon Bidirectional Thyristors

... designed primarily for full-wave ac control applications, such as solid-state relays, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied anode voltage with positive or negative gate triggering.

- Blocking Voltage to 800 Volts
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in Three Modes (MAC320 Series) or Four Modes (MAC320A Series)

## MAC320 Series MAC320A Series

TRIACs  
20 AMPERES RMS  
200 thru 800 VOLTS



CASE 221A-04  
(TO-220AB)  
STYLE 4

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

| Rating  | Symbol            | Value                    | Unit             |
|---|-------------------|--------------------------|------------------|
| Peak Repetitive Off-State Voltage <sup>(1)</sup> ( $T_J = -40$ to $+125^\circ\text{C}$ ,<br>1/2 Sine Wave 50 to 60 Hz, Gate Open) | $V_{DRM}$         | 200<br>400<br>600<br>800 | Volts            |
| Peak Gate Voltage   | $V_{GM}$          | 10                       | Volts            |
| On-State Current RMS ( $T_C = +75^\circ\text{C}$ )<br>(Full Cycle, Sine Wave, 50 to 60 Hz)  | $I_T(\text{RMS})$ | 20                       | Amp              |
| Peak Surge Current (One Full Cycle, 60 Hz, $T_C = +75^\circ\text{C}$ )<br>preceded and followed by rated current                  | $I_{TSM}$         | 150                      | Amp              |
| Peak Gate Power ( $T_C = +75^\circ\text{C}$ , Pulse Width = 2 $\mu\text{s}$ )   | $P_{GM}$          | 20                       | Watts            |
| Average Gate Power ( $T_C = +75^\circ\text{C}$ , $t = 8.3$ ms)  | $P_{G(AV)}$       | 0.5                      | Watt             |
| Peak Gate Current   | $I_{GM}$          | 2                        | Amp              |
| 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 | $R_{\theta JC}$ | 1.8 | $^\circ\text{C}/\text{W}$ |

1.  $V_{DRM}$  for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

# MAC320 Series MAC320A Series

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted.)

| Characteristic   | Symbol           | Min                  | Typ                  | Max                | Unit     |
|--|------------------|----------------------|----------------------|--------------------|----------|
| Peak Blocking Current<br>(V <sub>D</sub> Rated V <sub>DRM</sub> , Gate Open)<br>T <sub>J</sub> = 25°C<br>T <sub>J</sub> = +125°C   | I <sub>DRM</sub> | —<br>—               | —<br>—               | 10<br>2            | μA<br>mA |
| Peak On-State Voltage (Either Direction)<br>(I <sub>TM</sub> = 28 A Peak; Pulse Width = 1 to 2 ms, Duty Cycle ≤ 2%)  | V <sub>TM</sub>  | —                    | 1.4                  | 1.7                | Volts    |
| Gate Trigger Current (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, R <sub>L</sub> = 100 Ohms)<br>MT2 (+), G(+); MT2 (+), G(-); MT2 (-), G(-)<br>MT2 (-), G(+) "A" SUFFIX ONLY  | I <sub>GT</sub>  | —<br>—               | —<br>—               | 50<br>75           | mA       |
| Gate Trigger Voltage (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, R <sub>L</sub> = 100 Ohms)<br>MT2 (+), G(+); MT2 (+), G(-); MT2 (-), G(-)<br>MT2 (-), G(+) "A" SUFFIX ONLY<br>(Main Terminal Voltage = Rated V <sub>DRM</sub> , R <sub>L</sub> = 10 kΩ, T <sub>J</sub> = +110°C)<br>MT2 (+), G(+); MT2 (-), G(-); MT2 (+), G(-);<br>MT2 (-), G(+) "A" SUFFIX ONLY | V <sub>GT</sub>  | —<br>—<br>0.2<br>0.2 | 0.9<br>1.4<br>—<br>— | 2<br>2.5<br>—<br>— | Volts    |
| Holding Current (Either Direction)<br>(Main Terminal Voltage = 12 Vdc, Gate Open,<br>Initiating Current = 200 mA)  | I <sub>H</sub>   | —                    | 6                    | 40                 | mA       |
| Turn-On Time<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> , I <sub>TM</sub> = 28 A,<br>I <sub>GT</sub> = 120 mA, Rise Time = 0.1 μs, Pulse Width = 2 μs)  | t <sub>gt</sub>  | —                    | 1.5                  | —                  | μs       |
| Critical Rate of Rise of Commutation Voltage<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> , I <sub>TM</sub> = 28 A, Commutating<br>di/dt = 10 A/ms, Gate Unenergized, T <sub>C</sub> = +75°C)   | dv/dt(C)         | —                    | 5                    | —                  | V/μs     |

FIGURE 1 — RMS CURRENT DERATING

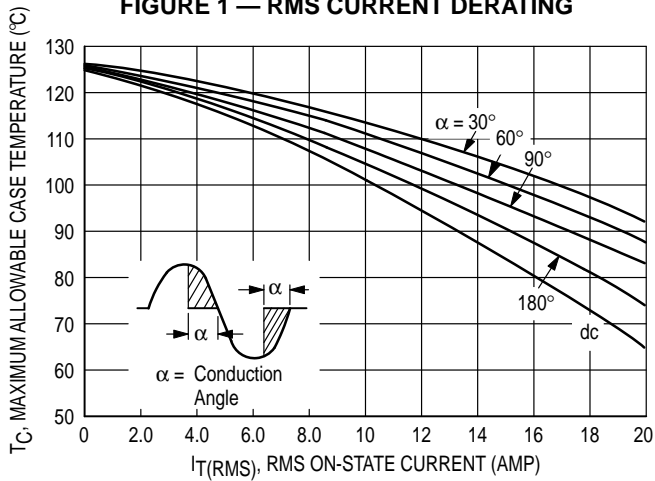


FIGURE 2 — ON-STATE POWER DISSIPATION

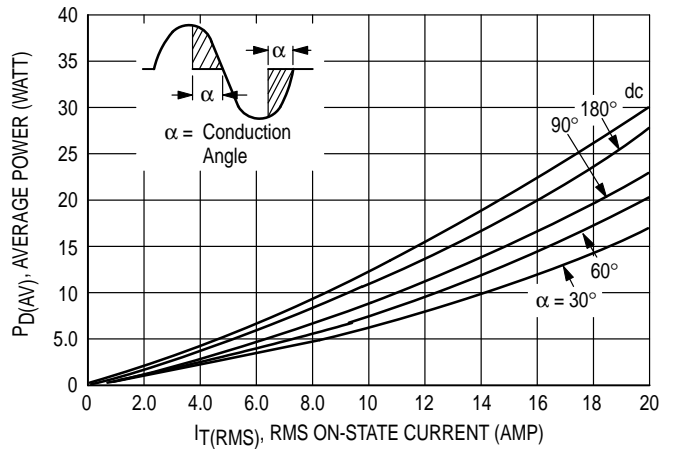


FIGURE 3 — TYPICAL GATE TRIGGER VOLTAGE

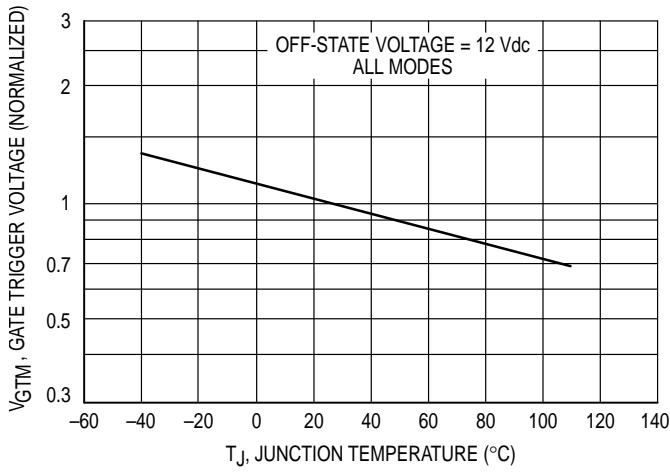


FIGURE 4 — TYPICAL GATE TRIGGER CURRENT

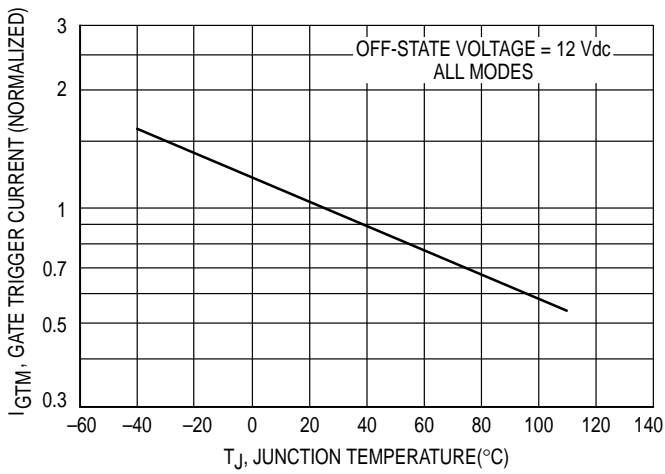
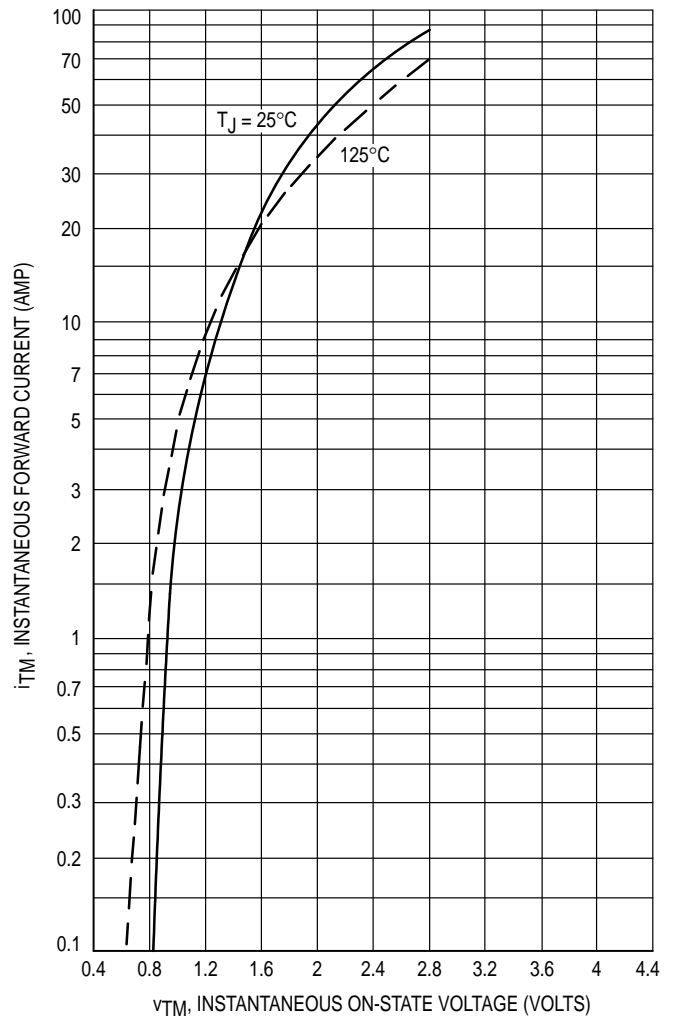
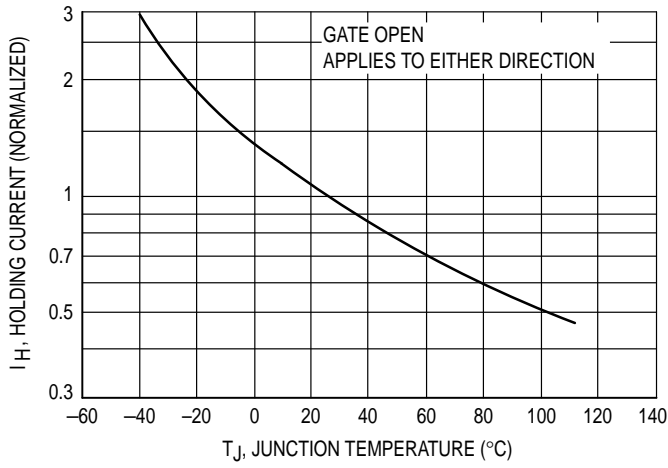


FIGURE 5 — MAXIMUM ON-STATE CHARACTERISTICS

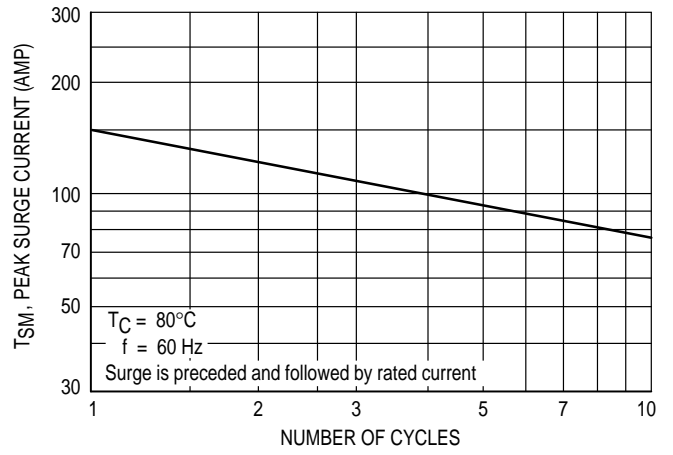


**MAC320 Series MAC320A Series**

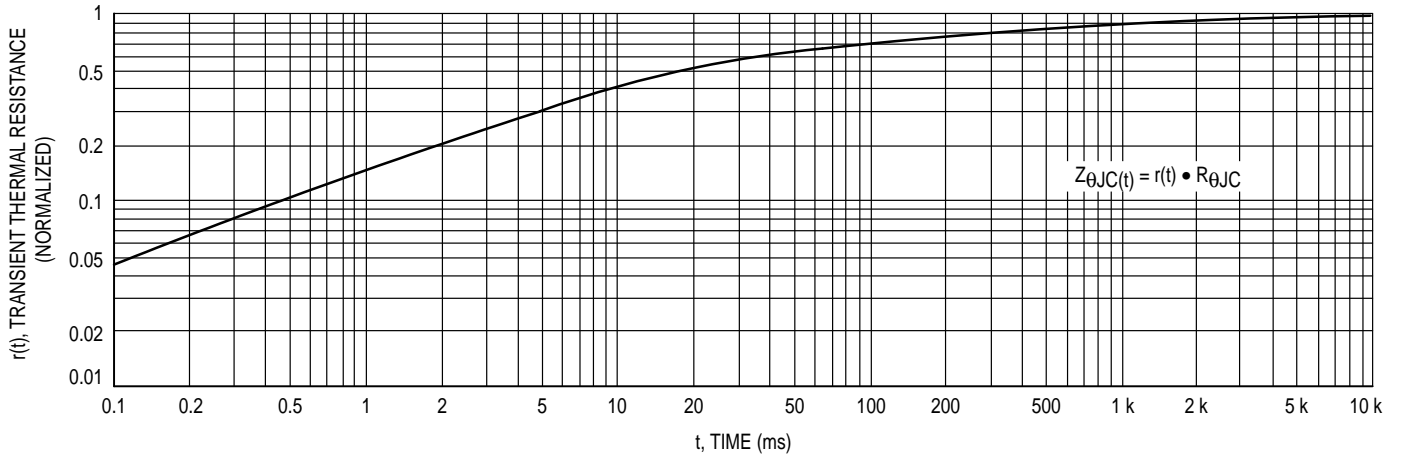
**FIGURE 6 — TYPICAL HOLDING CURRENT**



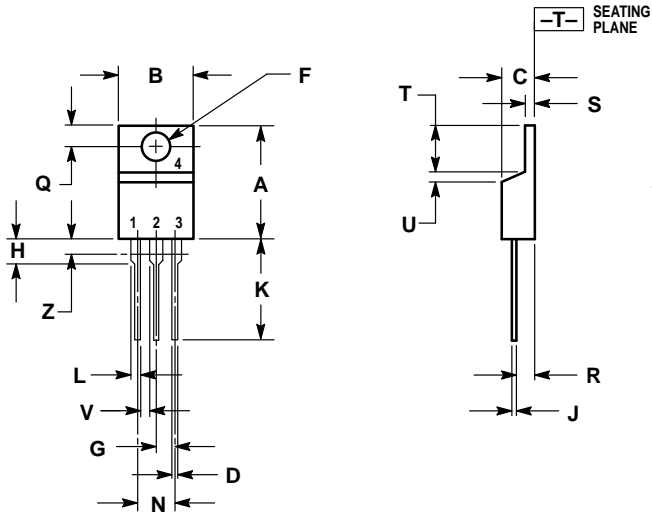
**FIGURE 7 — MAXIMUM ON-REPETITIVE SURGE CURRENT**



**FIGURE 8 — THERMAL RESPONSE**



PACKAGE DIMENSIONS



STYLE 4:  
 PIN 1. MAIN TERMINAL 1  
 2. MAIN TERMINAL 2  
 3. GATE  
 4. MAIN TERMINAL 2

- 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)

## MAC320 Series MAC320A Series

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MAC320/D

