

## SOT-223 Triac Silicon Bidirectional Thyristors

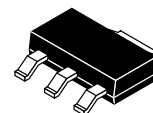
Designed for use in solid state relays, MPU interface, TTL logic and other light industrial or consumer applications. Supplied in surface mount package for use in automated manufacturing.

- Sensitive Gate Trigger Current in Four Trigger Modes
- Blocking Voltage to 600 Volts
- Glass Passivated Surface for Reliability and Uniformity
- Surface Mount Package
- Devices Supplied on 1 K Reel

### MAC08BT1 Series \*

\*Motorola preferred devices

**TRIAC**  
**0.8 AMPERE RMS**  
**200 thru 600 Volts**



**CASE 318E-04**  
**(SOT-223)**  
**STYLE 11**

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

| Rating  | Symbol              | Value             | Unit                 |
|---|---------------------|-------------------|----------------------|
| Peak Repetitive Blocking Voltage <sup>(1)</sup><br>(1/2 Sine Wave, Gate Open, $T_J = 25$ to $110^\circ\text{C}$ ) | $V_{\text{DRM}}$    | 200<br>400<br>600 | Volts                |
| On-State Current RMS ( $T_C = 80^\circ\text{C}$ )   | $I_{\text{T(RMS)}}$ | 0.8               | Amps                 |
| Peak Non-repetitive Surge Current<br>(One Full Cycle, 60 Hz, $T_C = 25^\circ\text{C}$ )                           | $I_{\text{TSM}}$    | 10                | Amps                 |
| Circuit Fusing Considerations ( $t = 8.3$ ms)   | $I^2t$              | 0.4               | $\text{A}^2\text{s}$ |
| Peak Gate Power ( $t < 2.0$ $\mu\text{s}$ )   | $P_{\text{GM}}$     | 5.0               | Watts                |
| Average Gate Power ( $T_C = 80^\circ\text{C}$ , $t = 8.3$ ms)   | $P_{\text{G(AV)}}$  | 0.1               | Watts                |
| Operating Junction Temperature Range  | $T_J$               | -40 to +110       | $^\circ\text{C}$     |
| Storage Temperature Range   | $T_{\text{stg}}$    | -40 to +150       | $^\circ\text{C}$     |
| Maximum Device Temperature for Soldering Purposes (for 5 Seconds Maximum)   | $T_L$               | 260               | $^\circ\text{C}$     |

#### THERMAL CHARACTERISTICS

| Characteristic   | Symbol                | Max | Unit               |
|--|-----------------------|-----|--------------------|
| Thermal Resistance, Junction to Ambient<br>PCB Mounted per Figure 1            | $R_{\theta\text{JA}}$ | 156 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Tab<br>Measured on Anode Tab Adjacent to Epoxy | $R_{\theta\text{JT}}$ | 25  | $^\circ\text{C/W}$ |

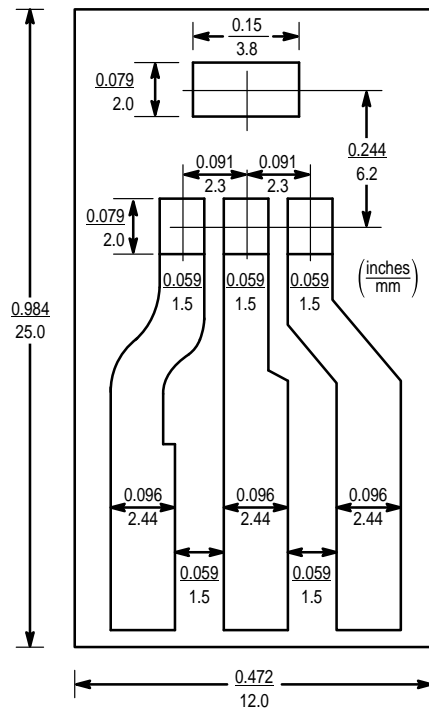
1.  $V_{\text{DRM}}$  for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

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

REV 1

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

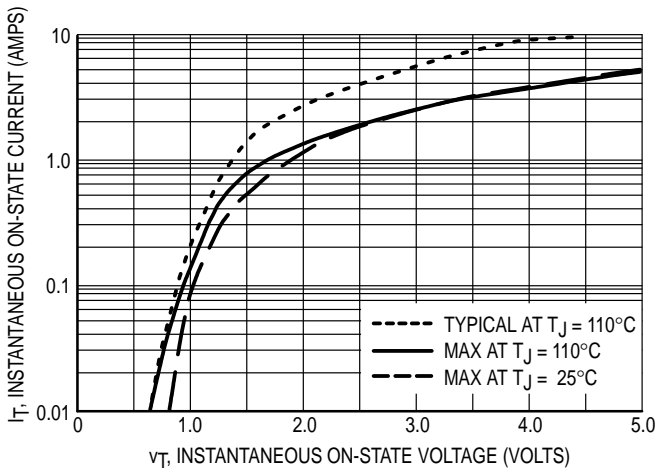
| Characteristic  | Symbol    | Min    | Typ    | Max       | Unit                           |
|---|-----------|--------|--------|-----------|--------------------------------|
| Peak Repetitive Blocking Current<br>( $V_D = \text{Rated } V_{DRM}$ Gate Open) $T_J = 25^\circ\text{C}$<br>$T_J = 110^\circ\text{C}$  | $I_{DRM}$ | —<br>— | —<br>— | 10<br>200 | $\mu\text{A}$<br>$\mu\text{A}$ |
| Maximum On-State Voltage (Either Direction)<br>( $I_T = 1.1$ A Peak, $T_A = 25^\circ\text{C}$ )   | $V_{TM}$  | —      | —      | 1.9       | Volts                          |
| Gate Trigger Current (Continuous dc) All Quadrants<br>( $V_D = 7.0$ Vdc, $R_L = 100 \Omega$ )   | $I_{GT}$  | —      | —      | 10        | mA                             |
| Holding Current (Either Direction)<br>( $V_D = 7.0$ Vdc, Gate Open,<br>Initiating Current = 20 mA, Gate Open)   | $I_H$     | —      | —      | 5.0       | mA                             |
| Gate Trigger Voltage (Continuous dc) All Quadrants<br>( $V_D = 7.0$ Vdc, $R_L = 100 \Omega$ )   | $V_{GT}$  | —      | —      | 2.0       | Volts                          |
| Critical Rate of Rise of Commutation Voltage<br>( $f = 250$ Hz, $I_{TM} = 1.0$ A, Commutating $di/dt = 1.5$ A/mS<br>On-State Current Duration = 2.0 mS, $V_{DRM} = 200$ V,<br>Gate Unenergized, $T_C = 110^\circ\text{C}$ ,<br>Gate Source Resistance = $150 \Omega$ , See Figure 10) | $dv/dt_C$ | 1.5    | —      | —         | $\text{V}/\mu\text{s}$         |
| Critical Rate-of-Rise of Off State Voltage<br>( $V_{pk} = \text{Rated } V_{DRM}$ , $T_C = 110^\circ\text{C}$ , Gate Open, Exponential Method)   | $dv/dt$   | 10     | —      | —         | $\text{V}/\mu\text{s}$         |



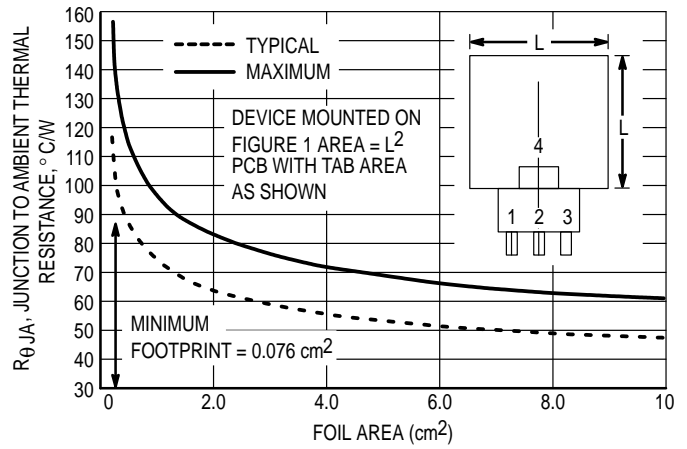
BOARD MOUNTED VERTICALLY IN CINCH 8840 EDGE CONNECTOR.  
BOARD THICKNESS = 65 MIL., FOIL THICKNESS = 2.5 MIL.  
MATERIAL: G10 FIBERGLASS BASE EPOXY

**Figure 1. PCB for Thermal Impedance and Power Testing of SOT-223**

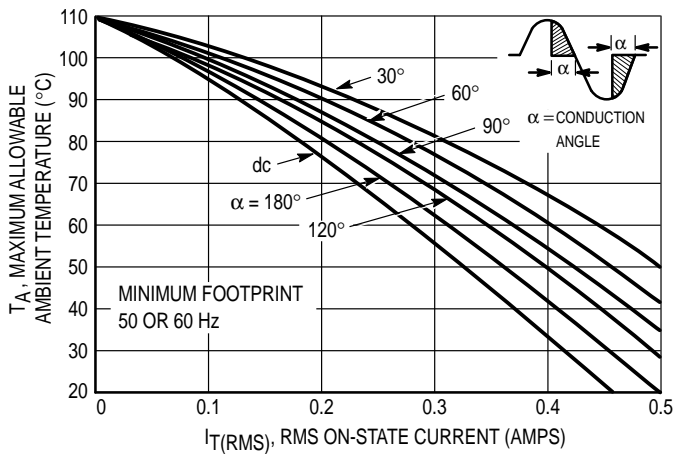
# MAC08BT1 Series



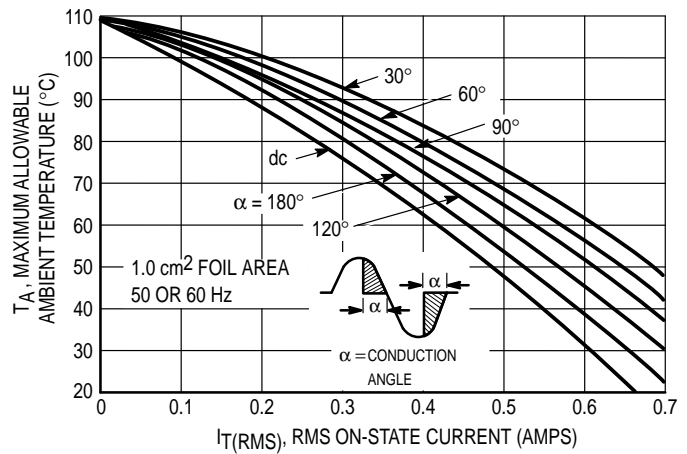
**Figure 2. On-State Characteristics**



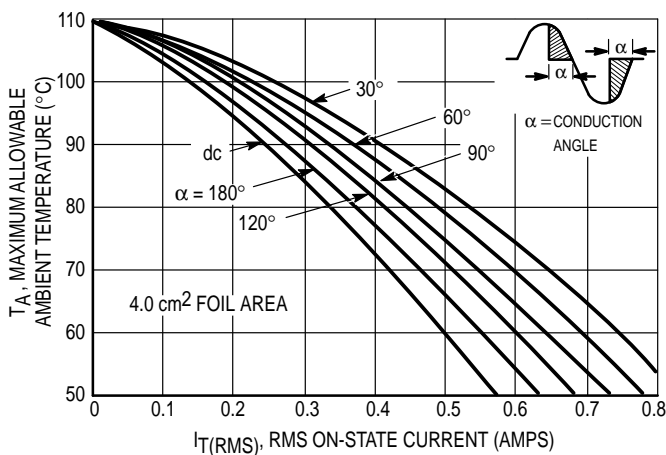
**Figure 3. Junction to Ambient Thermal Resistance versus Copper Tab Area**



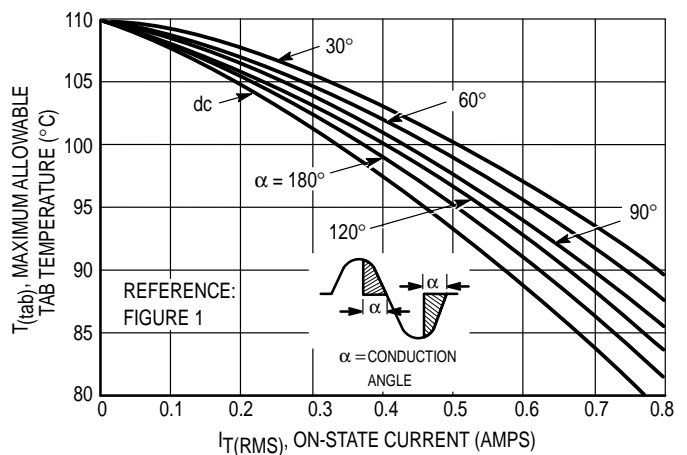
**Figure 4. Current Derating, Minimum Pad Size Reference: Ambient Temperature**



**Figure 5. Current Derating, 1.0 cm Square Pad Reference: Ambient Temperature**



**Figure 6. Current Derating, 2.0 cm Square Pad Reference: Ambient Temperature**



**Figure 7. Current Derating Reference: MT2 Tab**

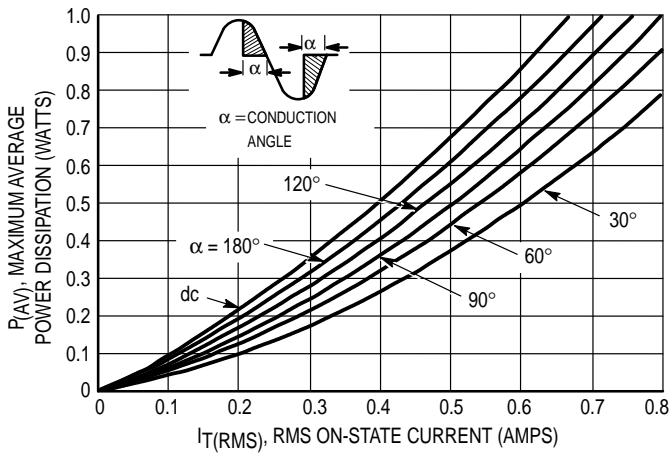


Figure 8. Power Dissipation

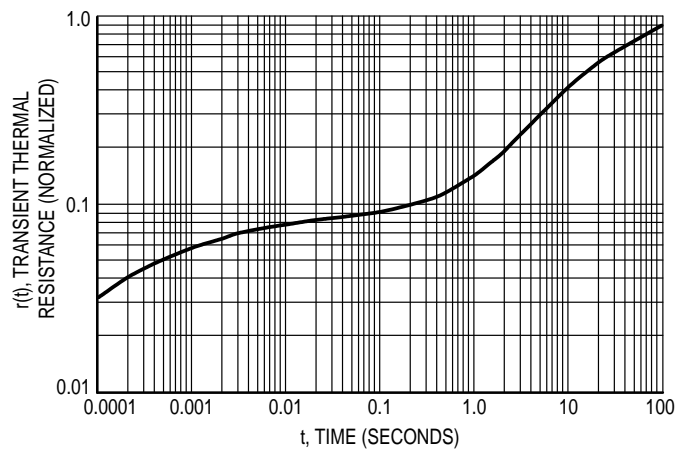
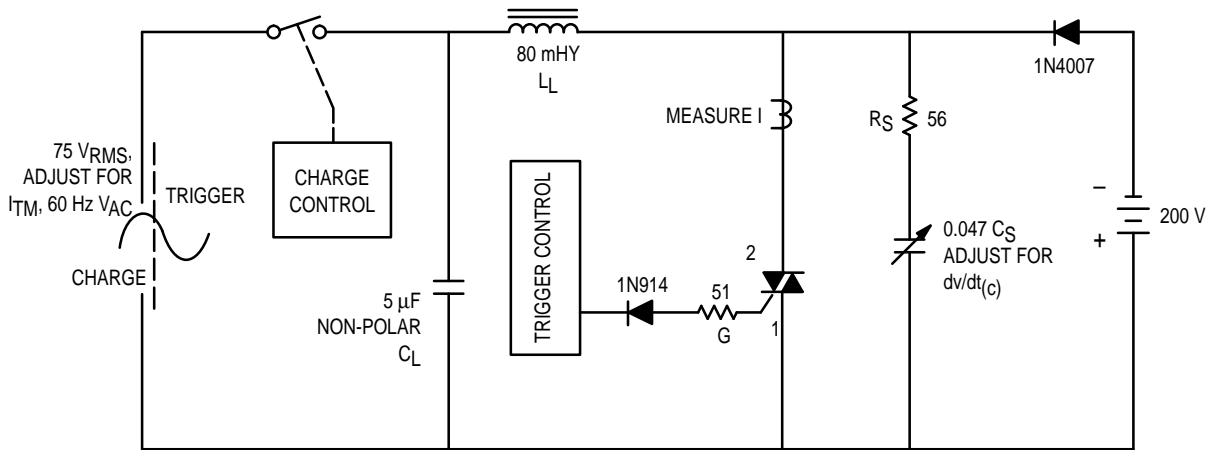


Figure 9. Thermal Response, Device Mounted on Figure 1 Printed Circuit Board



Component values are for verification of rated  $(dv/dt)_c$ . See AN1048 for additional information.

Figure 10. Simplified  $Q_1$   $(dv/dt)_c$  Test Circuit

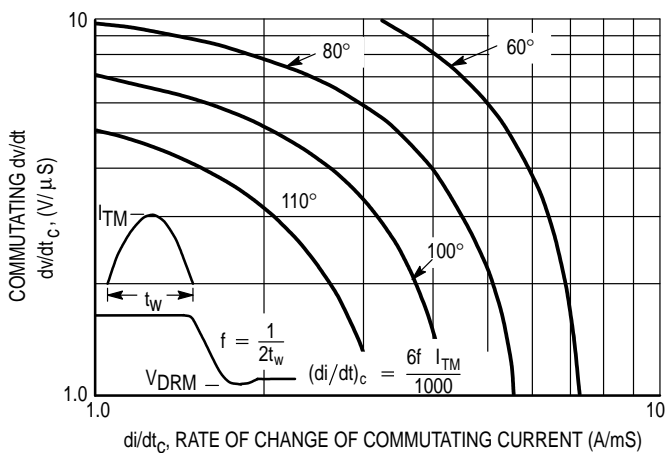


Figure 11. Typical Commutating  $dv/dt$  versus Current Crossing Rate and Junction Temperature

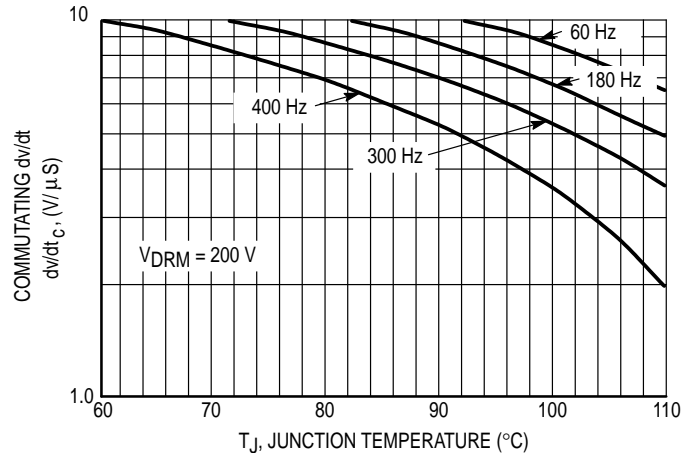
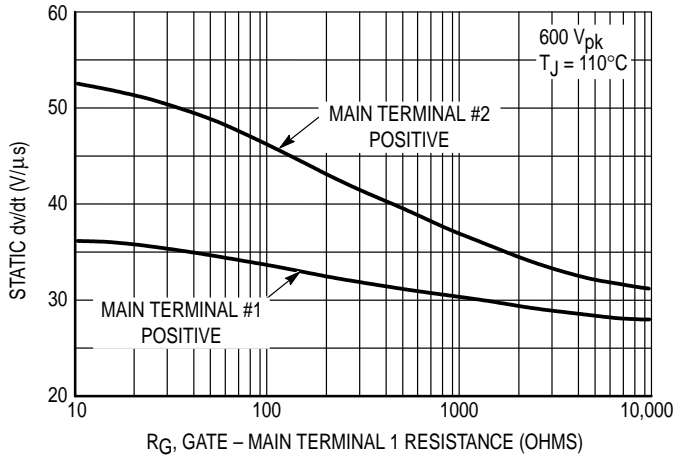
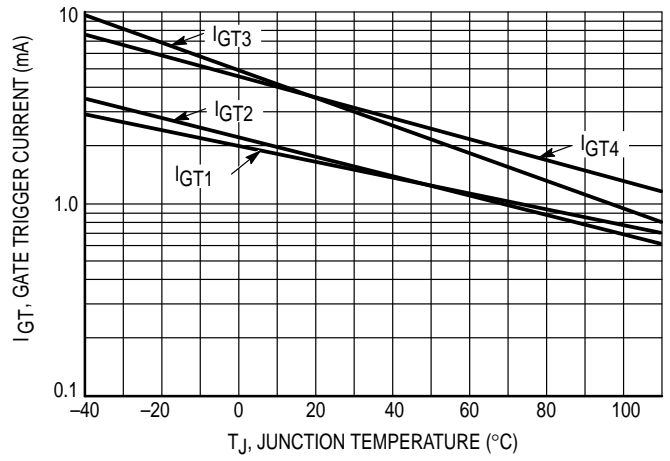


Figure 12. Typical Commutating  $dv/dt$  versus Junction Temperature at 0.8 Amps RMS

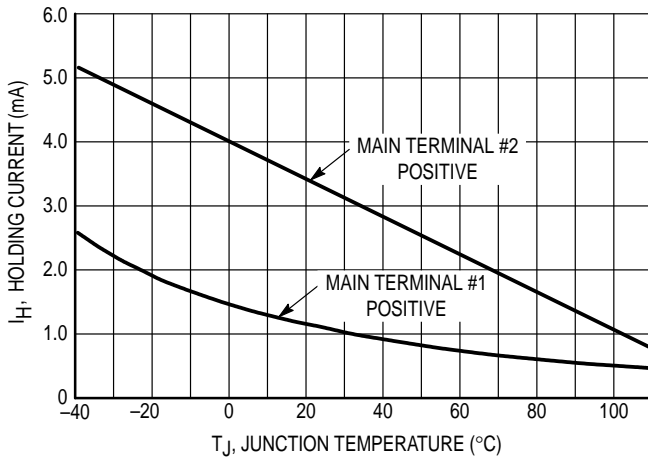
**MAC08BT1 Series**



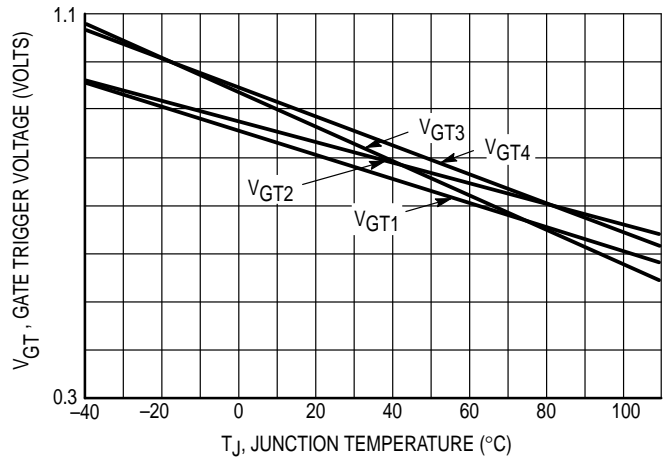
**Figure 13. Exponential Static dv/dt versus Gate - Main Terminal 1 Resistance**



**Figure 14. Typical Gate Trigger Current Variation**



**Figure 15. Typical Holding Current Variation**



**Figure 16. Gate Trigger Voltage Variation**

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