

## Sensitive Gate Triacs

### Silicon Bidirectional Thyristors

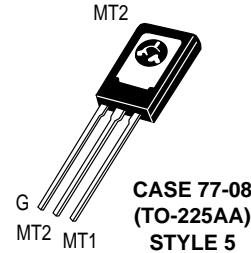
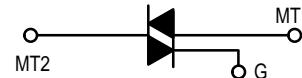
. . . designed primarily for full-wave ac control applications, such as light dimmers, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity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

- Sensitive Gate Triggering (A and B versions) Uniquely Compatible for Direct Coupling to TTL, HTL, CMOS and Operational Amplifier Integrated Circuit Logic Functions
- Gate Triggering 2 Mode — 2N6071, 2N6073, 2N6075  
4 Mode — 2N6071,A,B, 2N6073,A,B, 2N6075,A,B
- Blocking Voltages to 600 Volts
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermopad Construction for Low Thermal Resistance, High Heat Dissipation and Durability

**2N6071,A,B\***  
**2N6073,A,B\***  
**2N6075,A,B\***

\*Motorola preferred devices

**TRIACS**  
**4 AMPERES RMS**  
**200 thru 600 VOLTS**



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

| Rating   | Symbol              | Value             | Unit                 |
|--|---------------------|-------------------|----------------------|
| *Peak Repetitive Off-State Voltage <sup>(1)</sup><br>(Gate Open, $T_J = 25$ to $110^\circ\text{C}$ )<br>2N6071,A,B<br>2N6073,A,B<br>2N6075,A,B | $V_{\text{DRM}}$    | 200<br>400<br>600 | Volts                |
| *On-State Current RMS ( $T_C = 85^\circ\text{C}$ )   | $I_{\text{T(RMS)}}$ | 4                 | Amps                 |
| *Peak Surge Current<br>(One Full cycle, 60 Hz, $T_J = -40$ to $+110^\circ\text{C}$ )   | $I_{\text{TSM}}$    | 30                | Amps                 |
| Circuit Fusing Considerations<br>( $t = 8.3$ ms)   | $I^2t$              | 3.7               | $\text{A}^2\text{s}$ |
| *Peak Gate Power   | $P_{\text{GM}}$     | 10                | Watts                |
| *Average Gate Power  | $P_{\text{G(AV)}}$  | 0.5               | Watt                 |
| *Peak Gate Voltage   | $V_{\text{GM}}$     | 5                 | Volts                |

\*Indicates JEDEC Registered Data.

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.

# 2N6071,A,B 2N6073,A,B 2N6075,A,B

## MAXIMUM RATINGS

| Rating                                | Symbol           | Value       | Unit    |
|---------------------------------------|------------------|-------------|---------|
| *Operating Junction Temperature Range | T <sub>J</sub>   | -40 to +110 | °C      |
| *Storage Temperature Range            | T <sub>Stg</sub> | -40 to +150 | °C      |
| Mounting Torque (6-32 Screw)(1)       | —                | 8           | in. lb. |

\*Indicates JEDEC Registered Data.

1. Torque rating applies with use of compression washer (B52200F006). Mounting torque in excess of 6 in. lb. does not appreciably lower case-to-sink thermal resistance. Main terminal 2 and heatsink contact pad are common.

For soldering purposes (either terminal connection or device mounting), soldering temperatures shall not exceed +200°C, for 10 seconds. Consult factory for lead bending options.

## THERMAL CHARACTERISTICS

| Characteristic                          | Symbol           | Max | Unit |
|---|------------------|-----|------|
| *Thermal Resistance, Junction to Case   | R <sub>θJC</sub> | 3.5 | °C/W |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub> | 75  | °C/W |

\*Indicates JEDEC Registered Data.

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

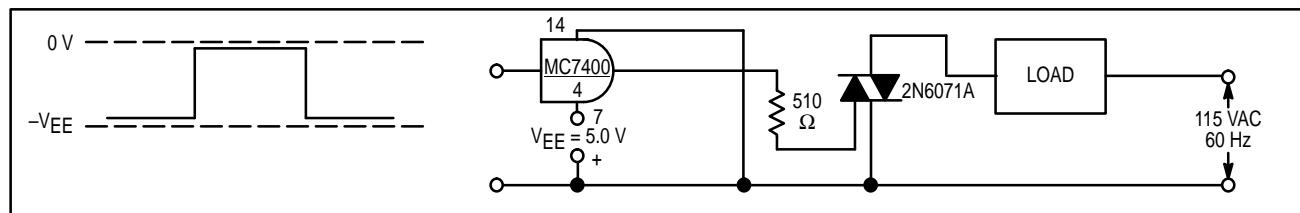
| Characteristic   | Symbol           | Min                  | Typ                  | Max                  | Unit     |
|--|------------------|----------------------|----------------------|----------------------|----------|
| *Peak Blocking Current<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> , gate open, T <sub>J</sub> = 25°C)<br>(T <sub>J</sub> = 110°C)   | I <sub>DRM</sub> | —                    | —                    | 10<br>2              | μA<br>mA |
| *On-State Voltage (Either Direction)<br>(I <sub>TM</sub> = 6 A Peak)   | V <sub>TM</sub>  | —                    | —                    | 2                    | Volts    |
| *Peak Gate Trigger Voltage (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, R <sub>L</sub> = 100 Ohms, T <sub>J</sub> = -40°C)<br>MT2(+), G(+); MT2(-), G(-) All Types<br>MT2(+), G(-); MT2(-), G(+) 2N6071,A,B, 2N6073,A,B 2N6075,A,B<br>(Main Terminal Voltage = Rated V <sub>DRM</sub> , R <sub>L</sub> = 10 k ohms,<br>T <sub>J</sub> = 110°C)<br>MT2(+), G(+); MT2(-), G(-) All Types<br>MT2(+), G(-); MT2(-), G(+) 2N6071,A,B, 2N6073,A,B, 2N6075,A,B | V <sub>GT</sub>  | —<br>—<br>0.2<br>0.2 | 1.4<br>1.4<br>—<br>— | 2.5<br>2.5<br>—<br>— | Volts    |
| *Holding Current (Either Direction)<br>(Main Terminal Voltage = 12 Vdc, Gate Open, T <sub>J</sub> = -40°C)<br>(Initiating Current = 1 Adc) 2N6071, 2N6073, 2N6075,<br>2N6071A,B, 2N6073A,B, 2N6075A,B<br>(T <sub>J</sub> = 25°C) 2N6071, 2N6073, 2N6075<br>2N6071A,B, 2N6073A,B, 2N6075A,B   | I <sub>H</sub>   | —<br>—<br>—<br>—     | —<br>—<br>—<br>—     | 70<br>30<br>30<br>15 | mA       |
| Turn-On Time (Either Direction)<br>(I <sub>TM</sub> = 14 Adc, I <sub>GT</sub> = 100 mAdc)  | t <sub>on</sub>  | —                    | 1.5                  | —                    | μs       |
| Blocking Voltage Application Rate at Commutation<br>@ V <sub>DRM</sub> , T <sub>J</sub> = 85°C, Gate Open, I <sub>TM</sub> = 5.7 A,<br>Commutating di/dt = 2.0 A/ms  | dv/dt(c)         | —                    | 5                    | —                    | V/μs     |

\*Indicates JEDEC Registered Data.

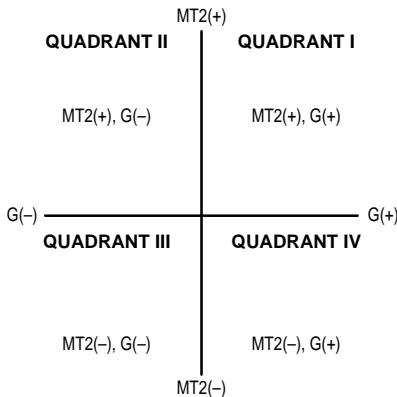
|   |         |                     |    | QUADRANT<br>(See Definition Below) |          |           |          |
|---|---------|---------------------|----|------------------------------------|----------|-----------|----------|
|   | Type    | $I_{GT}$<br>@ $T_J$ |    | I<br>mA                            | II<br>mA | III<br>mA | IV<br>mA |
| Gate Trigger Current (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, $R_L$ = 100 ohms)<br><br>Maximum Value | 2N6071  | +25°C               | 30 | —                                  | 30       | —         |          |
|   | 2N6073  | —40°C               | 60 | —                                  | 60       | —         |          |
|   | 2N6075  | —40°C               | 60 | —                                  | 60       | —         |          |
|   | 2N6071A | +25°C               | 5  | 5                                  | 5        | 10        |          |
|   | 2N6073A | —40°C               | 20 | 20                                 | 20       | 30        |          |
|   | 2N6075A | —40°C               | 20 | 20                                 | 20       | 30        |          |
|   | 2N6071B | +25°C               | 3  | 3                                  | 3        | 5         |          |
|   | 2N6073B | —40°C               | 15 | 15                                 | 15       | 20        |          |
|   | 2N6075B | —40°C               | 15 | 15                                 | 15       | 20        |          |

\*Indicates JEDEC Registered Data.

**SAMPLE APPLICATION:  
TTL-SENSITIVE GATE 4 AMPERE TRIAC  
TRIGGERS IN MODES II AND III**



**QUADRANT DEFINITIONS**



Trigger devices are recommended for gating on Triacs. They provide:

1. Consistent predictable turn-on points.
2. Simplified circuitry.
3. Fast turn-on time for cooler, more efficient and reliable operation.

**For 2N6071, 2N6073, 2N6075**

**ELECTRICAL CHARACTERISTICS of RECOMMENDED  
BIDIRECTIONAL SWITCHES**

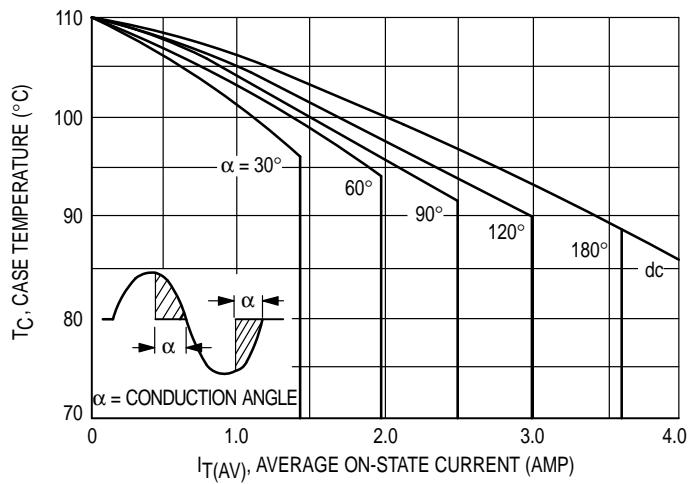
| Usage                   | General         |                 | Lamp Dimmer       |  |
|-------------------------|-----------------|-----------------|-------------------|--|
|                         | Part Number     | MBS4991         | MBS4993           |  |
| $V_S$                   | 6.0 – 10 V      | 7.5 – 9.0 V     | 3.0 – 5.0 V       |  |
| $I_S$                   | 350 $\mu$ A Max | 250 $\mu$ A Max | 100 – 400 $\mu$ A |  |
| $V_{S1} - V_{S2}$       | 0.5 V Max       | 0.2 V Max       | 0.35 V Max        |  |
| Temperature Coefficient | 0.02%/°C Typ    |                 |                   |  |

**SENSITIVE GATE LOGIC REFERENCE**

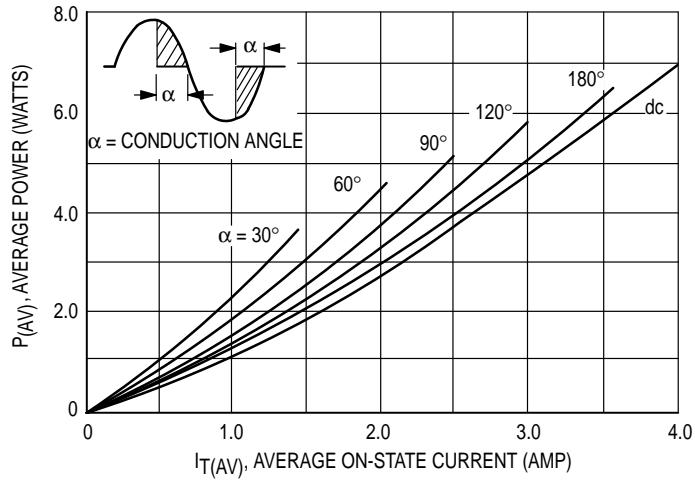
| IC Logic<br>Functions    | Firing Quadrant   |                   |                   |                   |
|--------------------------|-------------------|-------------------|-------------------|-------------------|
|                          | I                 | II                | III               | IV                |
| TTL                      |                   | 2N6071A<br>Series | 2N6071A<br>Series |                   |
| HTL                      |                   | 2N6071A<br>Series | 2N6071A<br>Series |                   |
| CMOS (NAND)              | 2N6071B<br>Series |                   |                   | 2N6071B<br>Series |
| CMOS (Buffer)            |                   | 2N6071B<br>Series | 2N6071B<br>Series |                   |
| Operational<br>Amplifier | 2N6071A<br>Series |                   |                   | 2N6071A<br>Series |
| Zero Voltage<br>Switch   |                   | 2N6071A<br>Series | 2N6071A<br>Series |                   |

**2N6071,A,B 2N6073,A,B 2N6075,A,B**

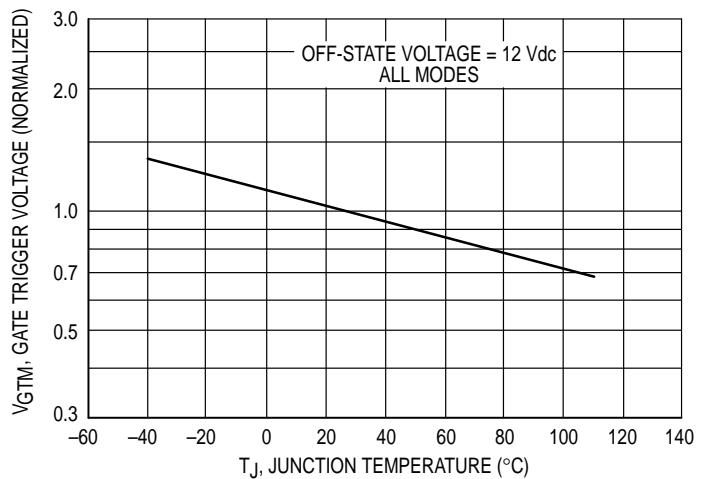
**FIGURE 1 – AVERAGE CURRENT DERATING**



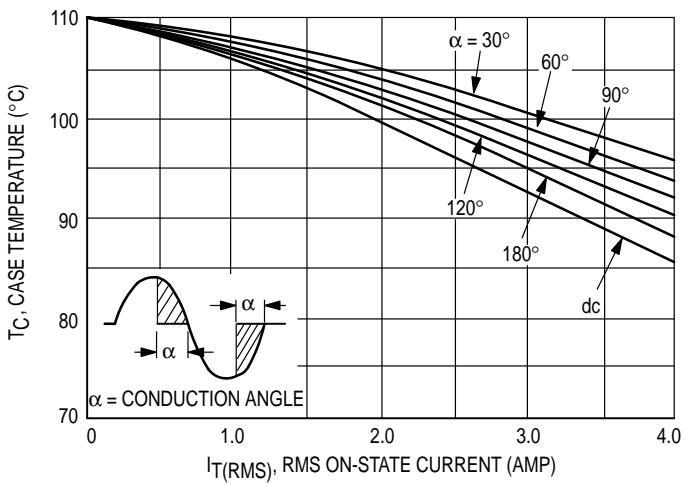
**FIGURE 3 – POWER DISSIPATION**



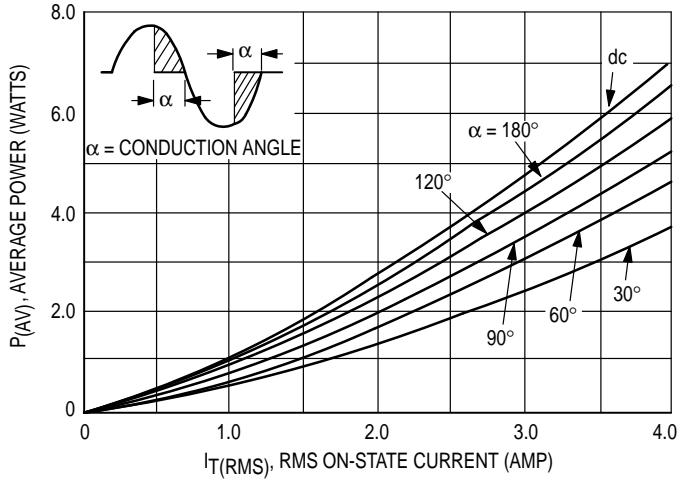
**FIGURE 5 – TYPICAL GATE-TRIGGER VOLTAGE**



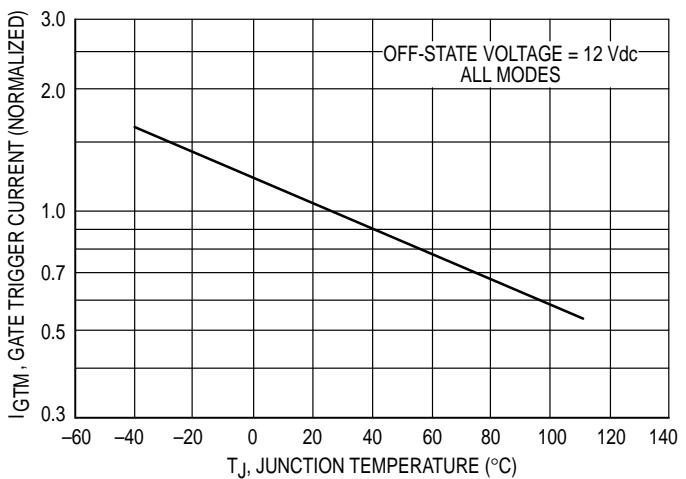
**FIGURE 2 – RMS CURRENT DERATING**



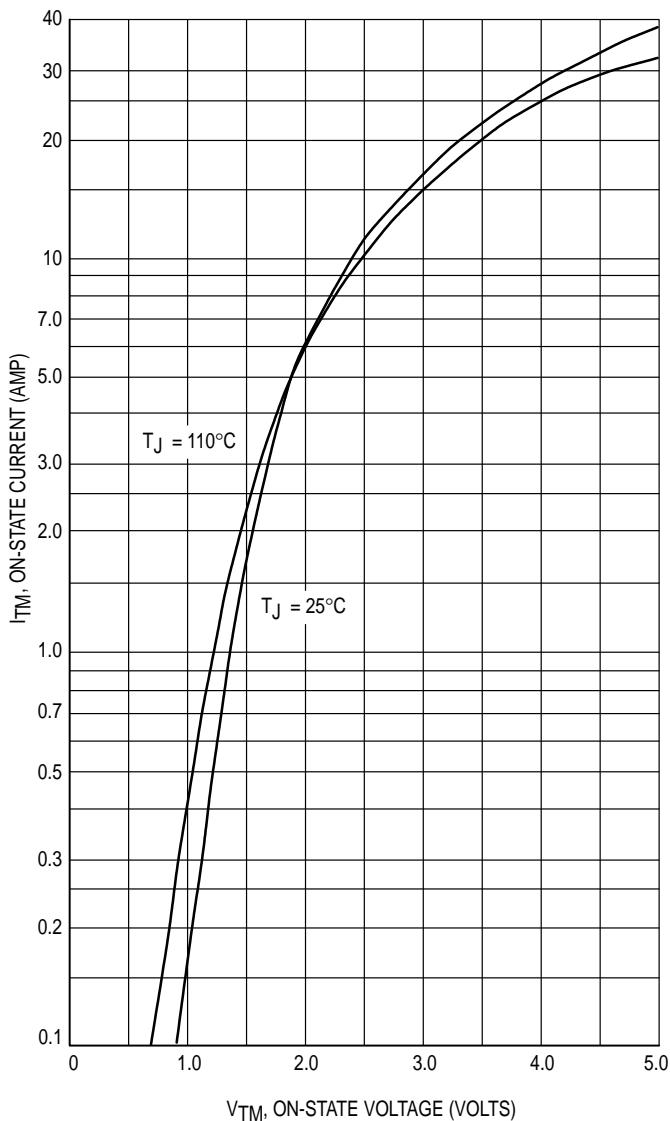
**FIGURE 4 – POWER DISSIPATION**



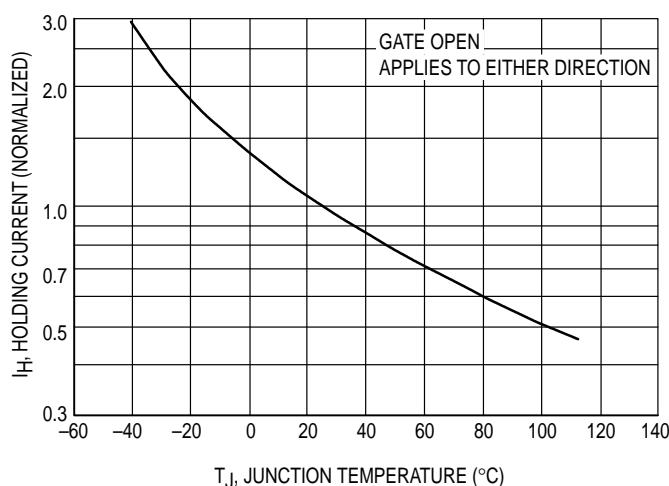
**FIGURE 6 – TYPICAL GATE-TRIGGER CURRENT**



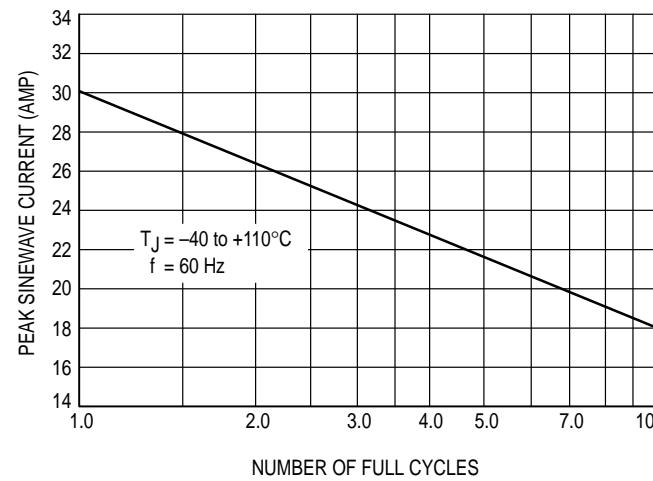
**FIGURE 7 – MAXIMUM ON-STATE CHARACTERISTICS**



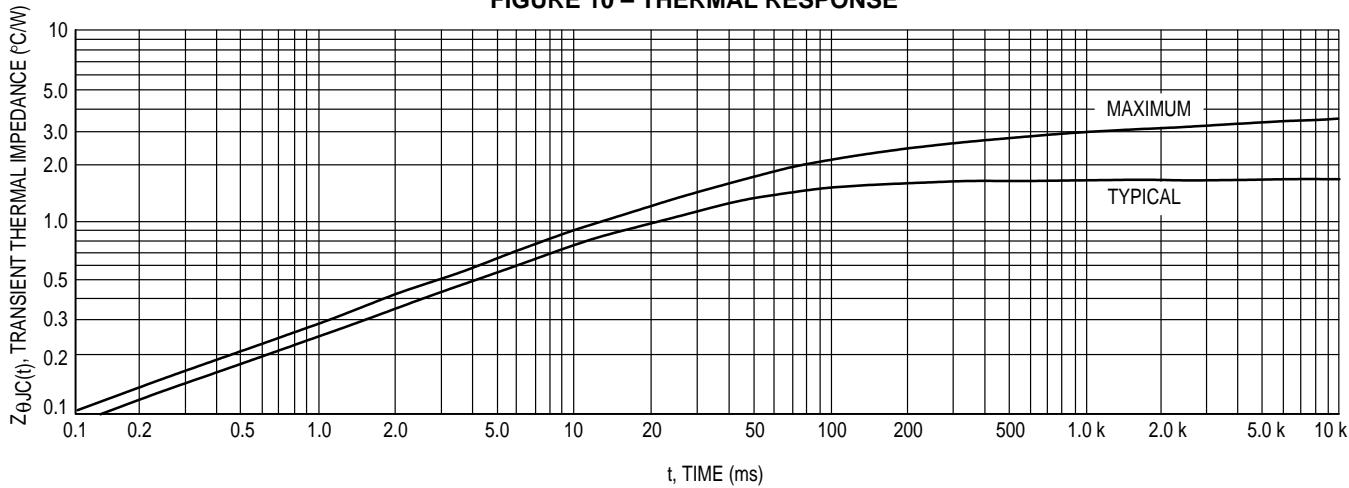
**FIGURE 8 – TYPICAL HOLDING CURRENT**



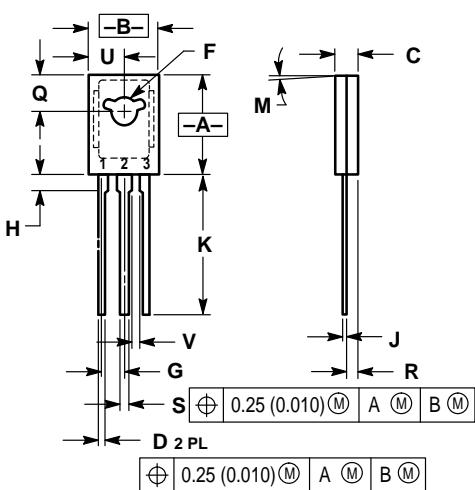
**FIGURE 9 – MAXIMUM ALLOWABLE SURGE CURRENT**



**FIGURE 10 – THERMAL RESPONSE**



## PACKAGE DIMENSIONS



STYLE 5:  
PIN 1. MT 1  
2. MT 2  
3. GATE

NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.425     | 0.435 | 10.80       | 11.04 |
| B   | 0.295     | 0.305 | 7.50        | 7.74  |
| C   | 0.095     | 0.105 | 2.42        | 2.66  |
| D   | 0.020     | 0.026 | 0.51        | 0.66  |
| F   | 0.115     | 0.130 | 2.93        | 3.30  |
| G   | 0.094 BSC |       | 2.39 BSC    |       |
| H   | 0.050     | 0.095 | 1.27        | 2.41  |
| J   | 0.015     | 0.025 | 0.39        | 0.63  |
| K   | 0.575     | 0.655 | 14.61       | 16.63 |
| M   | 5° TYP    |       | 5° TYP      |       |
| Q   | 0.148     | 0.158 | 3.76        | 4.01  |
| R   | 0.045     | 0.055 | 1.15        | 1.39  |
| S   | 0.025     | 0.035 | 0.64        | 0.88  |
| U   | 0.145     | 0.155 | 3.69        | 3.93  |
| V   | 0.040     | —     | 1.02        | —     |

CASE 77-08  
(TO-225AA)

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