

# Triacs

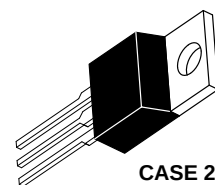
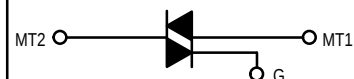
## Silicon Bidirectional Thyristors

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

- 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

## T2500 Series

**TRIACs**  
**6 AMPERES RMS**  
**200 thru 800 VOLTS**



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

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

| Rating                                                                                                 | Symbol              | Value           | Unit                 |
|--------------------------------------------------------------------------------------------------------|---------------------|-----------------|----------------------|
| Repetitive Peak Off-State Voltage <sup>(1)</sup><br>( $T_J = -40$ to $+100^\circ\text{C}$ , Gate Open) | $V_{\text{DRM}}$    |                 | Volts                |
| T2500 B                                                                                                |                     | 200             |                      |
| D                                                                                                      |                     | 400             |                      |
| M                                                                                                      |                     | 600             |                      |
| N                                                                                                      |                     | 800             |                      |
| On-State Current RMS<br>(Full Cycle Sine Wave 50 to 60 Hz)                                             | $I_{\text{T(RMS)}}$ | 6               | Amps                 |
| Peak Non-repetitive Surge Current<br>(One Full Cycle, 60 Hz, $T_C = +80^\circ\text{C}$ )               | $I_{\text{TSM}}$    | 60              | Amps                 |
| Circuit Fusing Considerations<br>( $t = 8.3$ ms)                                                       | $I^2t$              | 15              | $\text{A}^2\text{s}$ |
| Peak Gate Power<br>( $T_C = +80^\circ\text{C}$ , Pulse Width = 1 $\mu\text{s}$ )                       | $P_{\text{GM}}$     | 16              | Watts                |
| Average Gate Power<br>( $T_C = +80^\circ\text{C}$ , $t = 8.3$ ms)                                      | $P_{\text{G(AV)}}$  | 0.2             | Watt                 |
| Peak Gate Trigger Current (Pulse Width = 10 $\mu\text{s}$ )                                            | $I_{\text{GTM}}$    | 4               | Amps                 |
| Operating Junction Temperature Range                                                                   | $T_J$               | $-40$ to $+100$ | $^\circ\text{C}$     |
| Storage Temperature Range                                                                              | $T_{\text{stg}}$    | $-40$ to $+150$ | $^\circ\text{C}$     |

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.

## T2500 Series

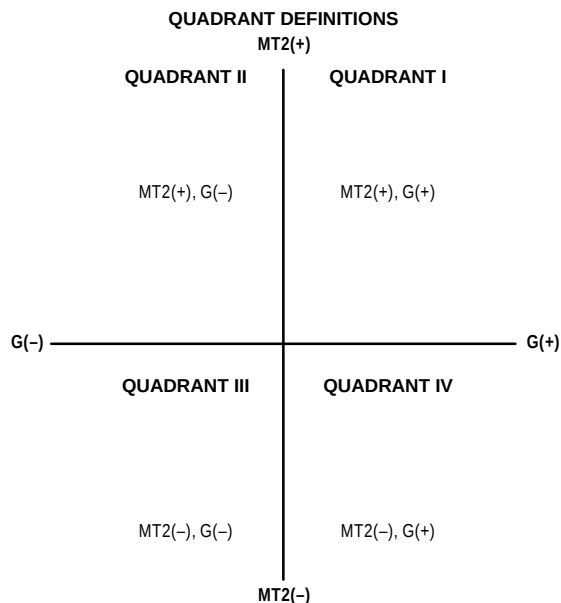
### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max | Unit |
|--------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 2.7 | °C/W |

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

| Characteristic                                                                                                                                                         | Symbol     | Min              | Typ                  | Max                  | Unit             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------|----------------------|----------------------|------------------|
| Peak Blocking Current<br>(Rated $V_{DRM}$ , Gate Open, $T_J = 100^\circ\text{C}$ )                                                                                     | $I_{DRM}$  | —                | —                    | 2                    | mA               |
| Maximum On-State Voltage (Either Direction)*<br>( $I_T = 30$ A Peak)                                                                                                   | $V_{TM}$   | —                | —                    | 2                    | Volts            |
| Gate Trigger Current (Continuous dc)<br>( $V_D = 12$ Vdc, $R_L = 12$ Ohms)<br>MT2(+), G(+)<br>MT2(+), G(-)<br>MT2(-), G(-)<br>MT2(-), G(+)                             | $I_{GT}$   | —<br>—<br>—<br>— | 10<br>20<br>15<br>30 | 25<br>60<br>25<br>60 | mA               |
| Gate Trigger Voltage (Continuous dc) (All Quadrants)<br>( $V_D = 12$ Vdc, $R_L = 12$ Ohms)<br>( $V_D = V_{DROM}$ , $R_L = 125$ Ohms, $T_C = 100^\circ\text{C}$ )       | $V_{GT}$   | —<br>0.2         | 1.25<br>—            | 2.5<br>—             | Volts            |
| Holding Current (Either Direction)<br>(Main Terminal Voltage = 12 Vdc, Gate Open,<br>Initiating Current = 150 mA)                                                      | $I_H$      | —                | 15                   | 30                   | mA               |
| Gate Controlled Turn-On Time<br>(Rated $V_{DRM}$ , $I_T = 10$ A, $I_{GT} = 160$ mA, Rise Time = 0.1 $\mu\text{s}$ )                                                    | $t_{gt}$   | —                | 1.6                  | —                    | $\mu\text{s}$    |
| Critical Rate-of-Rise of Commutation Voltage<br>(Rated $V_{DRM}$ , $I_{T(RMS)} = 6$ A, Commutating $di/dt = 3.2$ A/ms,<br>Gate Unenergized, $T_C = 80^\circ\text{C}$ ) | $dv/dt(c)$ | —                | 10                   | —                    | V/ $\mu\text{s}$ |
| Critical Rate-of-Rise of Off-State Voltage<br>(Rated $V_{DRM}$ , Exponential Voltage Rise,<br>Gate Open, $T_C = 100^\circ\text{C}$ )<br>T2500B<br>T2500D,M,N           | $dv/dt$    | —<br>—           | 100<br>75            | —<br>—               | V/ $\mu\text{s}$ |

\*Pulse Test: Pulse Width  $\leq 300$   $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

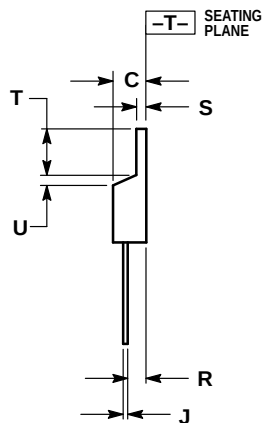
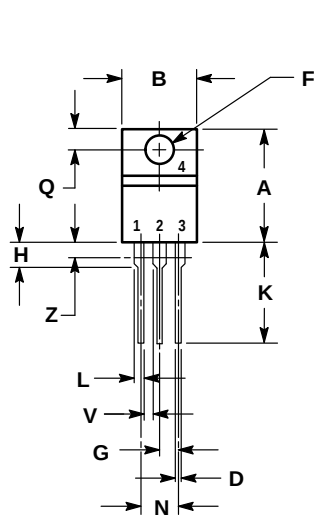


### ELECTRICAL CHARACTERISTICS of RECOMMENDED BIDIRECTIONAL SWITCHES

| USAGE                   | General               |                       |
|-------------------------|-----------------------|-----------------------|
| PART NUMBER             | MBS4991               | MBS4992               |
| $V_S$                   | 6.0 – 10 V            | 7.5 – 9.0 V           |
| $I_S$                   | 350 $\mu\text{A}$ Max | 120 $\mu\text{A}$ Max |
| $V_{S1} - V_{S2}$       | 0.5 V Max             | 0.2 V Max             |
| Temperature Coefficient | 0.02%/°C Typ          |                       |

See AN-526 for Theory and Characteristics of Silicon Bidirectional Switches.

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)

## T2500 Series

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

### Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.

ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.



T2500/D

