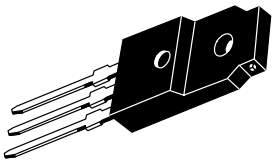
# Silicon Bidirectional Triode Thyristors

**T2500FP Series**

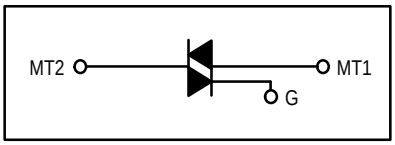
. . . designed primarily for full-wave ac control applications, such as solid-state relays, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either 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, Isolated Construction for Low Thermal Resistance, High Heat Dissipation and Durability

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



**CASE 221C-02**
**STYLE 3**




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

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Repetitive Peak Off-State Voltage(1) ($T_J$ = –40 to +100°C, Gate Open)<br>T2500BFP<br>T2500DFP<br>T2500MFP<br>T2500NFP | $V_{DRM}$ | <br>200<br>400<br>600<br>800 | Volts |
| On-State RMS Current ($T_C$ = +80°C)(2) (Full Cycle Sine Wave 50 to 60 Hz) | $I_{T(RMS)}$ | 6 | Amps |
| Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, $T_C$ = +80°C) | $I_{TSM}$ | 60 | Amps |
| Circuit Fusing Considerations (t = 8.3 ms) | $I^2t$ | 40 | $A^2s$ |
| Peak Gate Power ($T_C$ = +80°C, Pulse Width = 1 μs) | $P_{GM}$ | 1 | Watt |
| Average Gate Power ($T_C$ = +80°C, t = 8.3 ms) | $P_{G(AV)}$ | 0.2 | Watt |
| Peak Gate Trigger Current (Pulse Width = 10 μs) | $I_{GTM}$ | 4 | Amps |
| RMS Isolation Voltage ($T_A$ = 25°C, Relative Humidity ≤ 20%) | $V_{ISO}$ | 1500 | Volts |
| Operating Junction Temperature Range | $T_J$ | –40 to +100 | °C |
| Storage Temperature Range | $T_{stg}$ | –40 to +150 | °C |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case(2)<br>Case to Sink<br>Junction to Ambient | $R_{\theta JC}$<br>$R_{\theta CS}$<br>$R_{\theta JA}$ | 2.7<br>2.2(typ)<br>60 | °C/W |

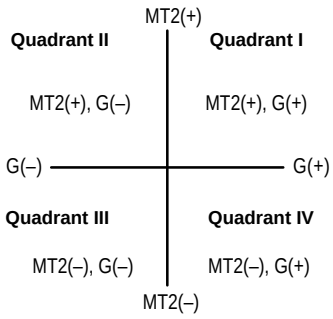
1. $V_{DRM}$ for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.
2. The case temperature reference point for all $T_C$ measurements is a point on the center lead of the package as close as possible to the plastic body.

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

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

*Pulse Test: Pulse Width ⩽ 300 µs, Duty Cycle ⩽ 2%.

**Quadrant Definitions**

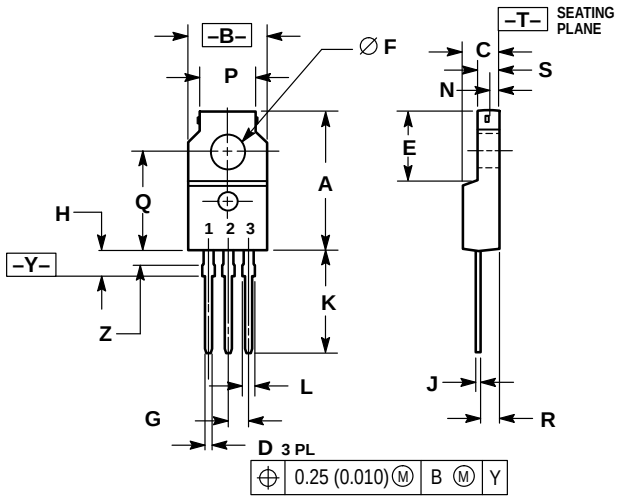



Trigger devices are recommended for gating on Triacs. They provide:
1. Consistent predictable turn-on points.
2. Simplified circuitry.
3. Fast turn-on time for cooler, more efficient and reliable operation.

**Electrical Characteristics of Recommended Bidirectional Switches**

| Usage | General | |
|---|---|---|
| **Part Number** | **MBS4991** | **MBS4992** |
| $V_S$ | 6 – 10 V | 7.5 – 9 V |
| $I_S$ | 350 µA Max | 120 µA Max |
| $V_{S1} – V_{S2}$ | 0.5 V Max | 0.2 V Max |
| Temperature Coefficient | 0.02%/°C Typ | |

## PACKAGE DIMENSIONS




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

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. LEAD DIMENSIONS UNCONTROLLED WITHIN DIMENSION Z.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.680 | 0.700 | 17.28 | 17.78 |
| B | 0.388 | 0.408 | 9.86 | 10.36 |
| C | 0.175 | 0.195 | 4.45 | 4.95 |
| D | 0.025 | 0.040 | 0.64 | 1.01 |
| E | 0.340 | 0.355 | 8.64 | 9.01 |
| F | 0.140 | 0.150 | 3.56 | 3.81 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.018 | 0.028 | 0.46 | 0.71 |
| K | 0.500 | 0.550 | 12.70 | 13.97 |
| L | 0.045 | 0.070 | 1.15 | 1.77 |
| N | 0.049 | — | 1.25 | — |
| P | 0.270 | 0.290 | 6.86 | 7.36 |
| Q | 0.480 | 0.500 | 12.20 | 12.70 |
| R | 0.090 | 0.120 | 2.29 | 3.04 |
| S | 0.105 | 0.115 | 2.67 | 2.92 |
| Z | 0.070 | 0.090 | 1.78 | 2.28 |

**CASE 221C–02**

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