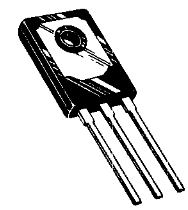
# MAC10-1 thru MAC10-8 (SILICON)
# MAC11-1 thru MAC11-8

## 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.

- All Diffused and Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermopad Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in Two (MAC11) or Four Modes (MAC10)

**TRIACS (THYRISTORS)**
**10 AMPERES RMS**
**25 THRU 600 VOLTS**



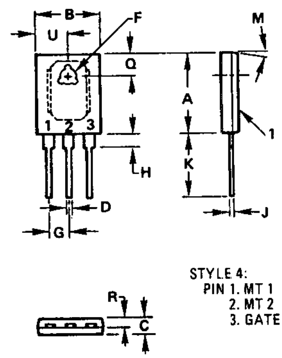
### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Repetitive Peak Off-State Voltage, Note 1 | $V_{DRM}$ | | Volts |
| ($T_J$ = 100°C) –1 | | 25 | |
| –2 | | 50 | |
| –3 | | 100 | |
| MAC10/11 –4 | | 200 | |
| –5 | | 300 | |
| –6 | | 400 | |
| –7 | | 500 | |
| –8 | | 600 | |
| On-State Current RMS ($T_C$ = 75°C) | $I_{T(RMS)}$ | 10 | Amp |
| Peak Surge Current (One Full cycle, 60 Hz, $T_J$ = -40 to +100°C) | $I_{TSM}$ | 100 | Amp |
| Circuit Fusing Considerations ($T_J$ = -40 to +100°C, t = 1.0 to 8.3 ms) | $I^2t$ | 40 | $A^2s$ |
| Peak Gate Power | $P_{GM}$ | 10 | Watts |
| Average Gate Power | $P_{G(AV)}$ | 0.5 | Watt |
| Peak Gate Current | $I_{GM}$ | 2.0 | Amp |
| Operating Junction Temperature Range | $T_J$ | -40 to +100 | °C |
| Storage Temperature Range | $T_{stg}$ | -40 to +150 | °C |
| Mounting Torque (6-32 Screw), Note 2 | — | 8 | in. lb. |

**NOTES:**

1. Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage.
2. Torque rating applies with use of torque washer (Shakeproof WD19522 #6 or equivalent). Mounting torque in excess of 8 in. lbs. does not appreciably lower case-to-sink thermal resistance. Anode lead and heatsink contact pad are common.

For soldering purposes (either terminal connection or device mounting), soldering temperatures shall not exceed +200°C. For optimum results, an activated flux (oxide removing) is recommended.




STYLE 4:
PIN 1. MT 1
2. MT 2
3. GATE

| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 16.13 | 16.38 | 0.635 | 0.645 |
| B | 12.57 | 12.83 | 0.495 | 0.505 |
| C | 3.18 | 3.43 | 0.125 | 0.135 |
| D | 1.09 | 1.24 | 0.043 | 0.049 |
| F | 3.51 | 3.76 | 0.138 | 0.148 |
| G | 4.22 BSC | | 0.166 BSC | |
| H | 2.67 | 2.92 | 0.105 | 0.115 |
| J | 0.813 | 0.864 | 0.032 | 0.034 |
| K | 15.11 | 16.38 | 0.595 | 0.645 |
| M | 9° TYP | | 9° TYP | |
| Q | 4.70 | 4.95 | 0.185 | 0.195 |
| R | 1.91 | 2.16 | 0.075 | 0.085 |
| U | 6.22 | 6.48 | 0.245 | 0.255 |

CASE 90-05

NOTE:
1. LEADS WITHIN .005" RAD OF TRUE POSITION (TP) AT MMC

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Peak Blocking Current (Either Direction)<br>Rated $V_{DRM}$ @ $T_J$ = 100°C, Gate Open | $I_{DRM}$ | – | – | 2.0 | mA |
| On-State Voltage (Either Direction)<br>$I_{TM}$ = 14 A Peak | $V_{TM}$ | – | 1.3 | 1.8 | Volts |
| Gate Trigger Current, Continuous dc<br>Main Terminal Voltage = 12 Vdc, $R_L$ = 100 ohms<br>MT2(+)G(+); MT2(–)G(–) MAC10, MAC11<br>MT2(+)G(–); MT2(–)G(+) MAC10 | $I_{GT}$ | <br><br>–<br>– | <br><br>–<br>– | <br><br>50<br>75 | mA |
| Gate Trigger Voltage, Continuous dc<br>Main Terminal Voltage = 12 Vdc, $R_L$ = 100 ohms<br>MT2(+)G(+); MT2(–)G(–) MAC10, MAC11<br>MT2(+)G(–); MT2(–)G(+) MAC10 | $V_{GT}$ | <br><br>–<br>– | <br><br>0.9<br>1.0 | <br><br>2.0<br>2.5 | Volts |
| Gate Trigger Voltage, Continuous dc – All Modes<br>Main Terminal Voltage = Rated $V_{DRM}$, $R_L$ = 100 ohms, $T_J$ = 100°C | $V_{GD}$ | 0.2 | – | – | Volts |
| Holding Current (Either Direction)<br>Main Terminal Voltage = 12 Vdc, Gate Open,<br>Initiating Current = 100 mA | $I_H$ | – | – | 50 | mA |
| Turn-On Time<br>$I_{TM}$ = 14 Adc, $I_{GT}$ = 100 mAdc | $t_{on}$ | – | 1.5 | – | μs |
| Blocking Voltage Application Rate at Commutation<br>@ $V_{DRM}$, $T_J$ = 75°C, Gate Open | dv/dt | – | 5.0 | – | V/μs |
| Thermal Resistance, Junction to Case | $\theta_{JC}$ | – | – | 2.0 | °C/W |
| Thermal Resistance, Case to Ambient | $\theta_{CA}$ | – | – | 50 | °C/W |

**MBS4991/MBS4992**
**Recommended for Triac Triggering**

**Triggers Provide:**

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

**Electrical Characteristics**

| Symbol | MBS4991 | MBS4992 |
|---|---|---|
| $V_S$ = | 6–10 V | 7.5–9.0 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

(For light dimmer applications the MBS100 is recommended).

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

FIGURE 1 – AVERAGE CURRENT DERATING

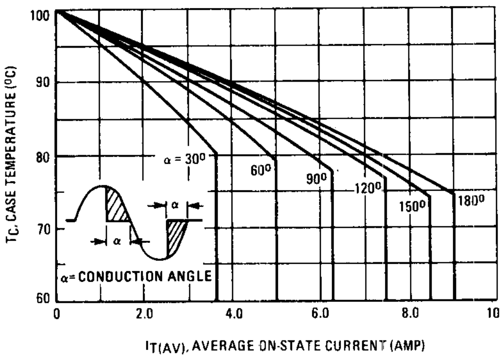



FIGURE 2 – RMS CURRENT DERATING

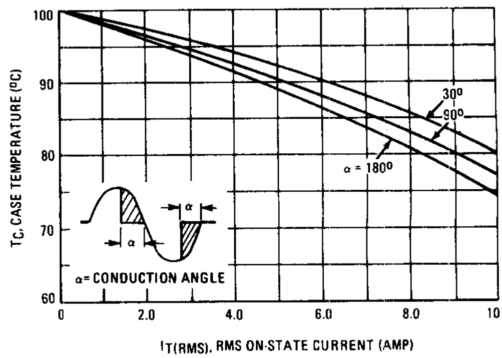



FIGURE 3 – POWER DISSIPATION

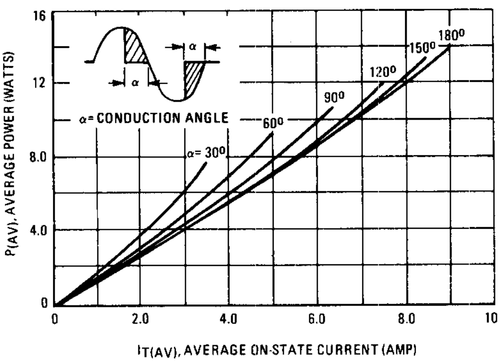



FIGURE 4 – POWER DISSIPATION

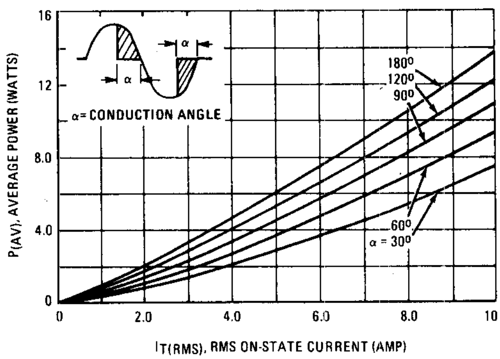



FIGURE 5 – TYPICAL GATE TRIGGER VOLTAGE

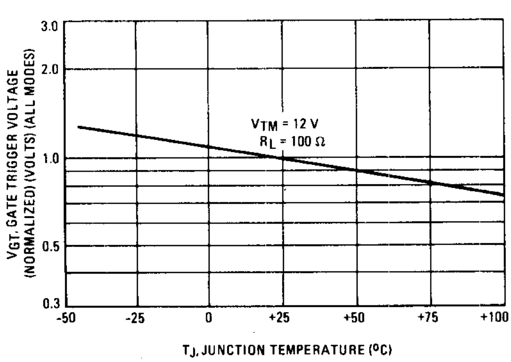



FIGURE 6 – TYPICAL GATE TRIGGER CURRENT

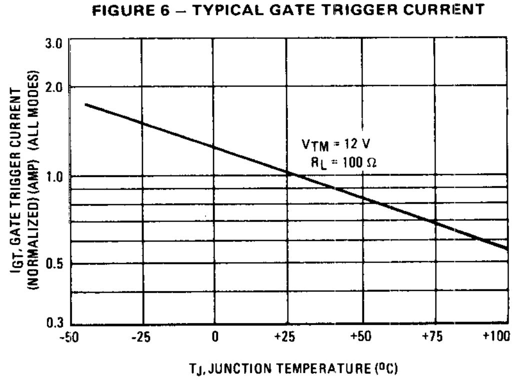


FIGURE 7 – MAXIMUM ON-STATE CHARACTERISTICS

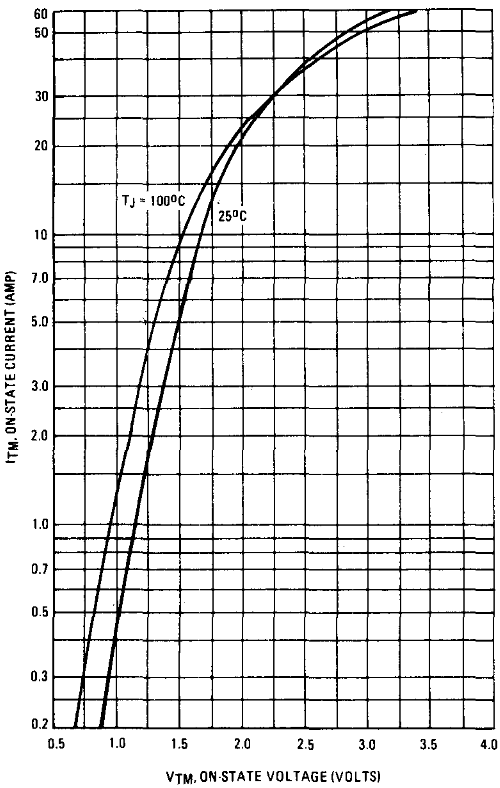



FIGURE 8 – TYPICAL HOLDING CURRENT

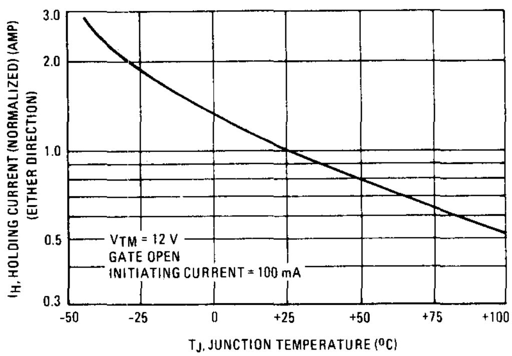



FIGURE 9 – MAXIMUM ALLOWABLE SURGE CURRENT

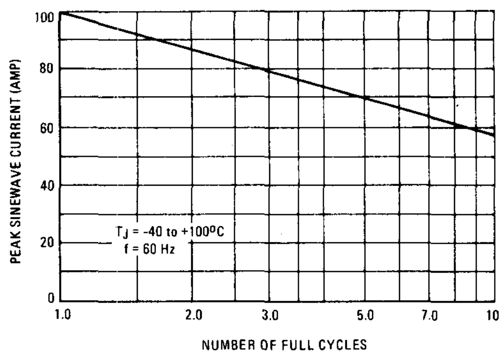
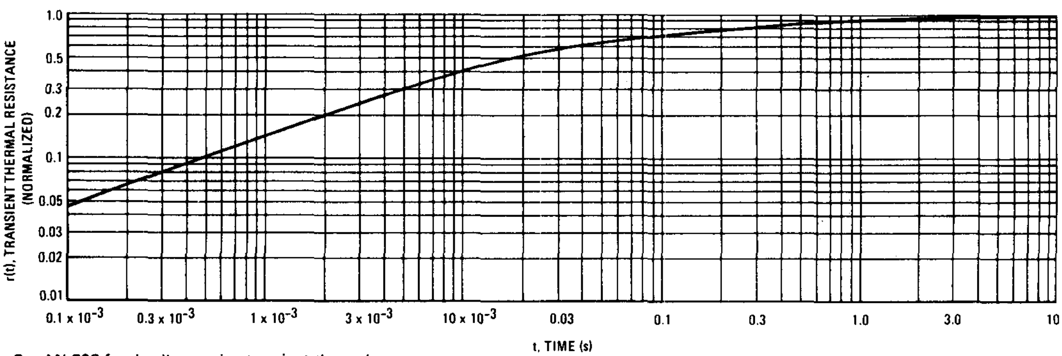



FIGURE 10 – THERMAL RESPONSE




See AN-292 for details on using transient thermal response curve.