MITSUBISHI THYRISTOR MODULES

# TM10T3B-M,-H

MEDIUM POWER GENERAL USE
INSULATED TYPE

**TM10T3B-M,-H**

- **Io** DC output current ..... **20A**
- **VRRM** Repetitive peak reverse voltage ..... **400/800V**
- **VDRM** Repetitive peak off-state voltage ..... **400/800V**
- **3 Phase Mix Bridge**
- **Insulated Type**
- **UL Recognized**
  Yellow Card No. E80276 (N)
  File No. E80271

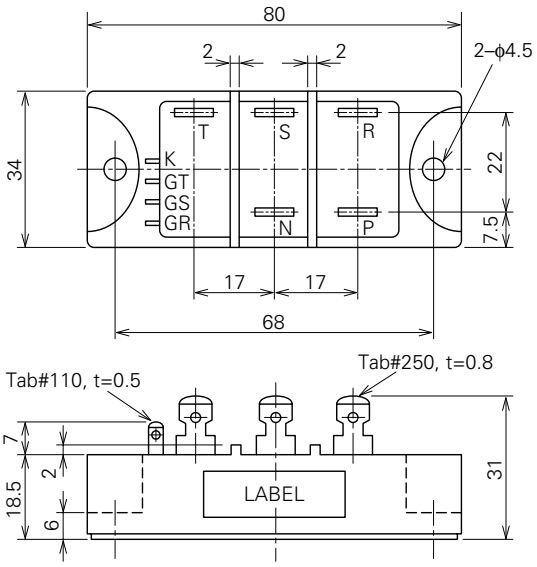
## APPLICATION

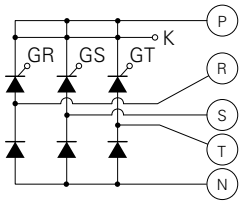
DC motor control, NC equipment, AC motor control, contactless switches, electric furnace temperature control, light dimmers

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm






Feb.1999

MITSUBISHI ELECTRIC

# TM10T3B-M,-H

## MEDIUM POWER GENERAL USE
## INSULATED TYPE

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Voltage class | | Unit |
|---|---|---|---|---|
| | | M | H | |
| $V_{RRM}$ | Repetitive peak reverse voltage | 400 | 800 | V |
| $V_{RSM}$ | Non-repetitive peak reverse voltage | 480 | 960 | V |
| $V_{R\ (DC)}$ | DC reverse voltage | 320 | 640 | V |
| $V_{DRM}$ | Repetitive peak off-state voltage | 400 | 800 | V |
| $V_{DSM}$ | Non-repetitive peak off-state voltage | 480 | 960 | V |
| $V_{D\ (DC)}$ | DC off-state voltage | 320 | 640 | V |

| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $I_O$ | DC output current | 3-phase fullwave rectified, TC=79°C | 20 | A |
| $I_{TSM}$, $I_{FSM}$ | Surge (non-repetitive) current | One half cycle at 60Hz, peak value | 200 | A |
| $I^2t$ | $I^2t$ for fusing | Value for one cycle of surge current | $1.7 \times 10^2$ | $A^2s$ |
| di/dt | Critical rate of rise of on-state current | $V_D$=1/2$V_{DRM}$, $I_G$=0.5A, $T_j$=125°C | 50 | A/µs |
| $P_{GM}$ | Peak gate power dissipation | | 5.0 | W |
| $P_{G\ (AV)}$ | Average gate power dissipation | | 0.5 | W |
| $V_{FGM}$ | Peak gate forward voltage | | 10 | V |
| $V_{RGM}$ | Peak gate reverse voltage | | 5.0 | V |
| $I_{FGM}$ | Peak gate forward current | | 2.0 | A |
| $T_j$ | Junction temperature | | –40~125 | °C |
| $T_{stg}$ | Storage temperature | | –40~125 | °C |
| $V_{iso}$ | Isolation voltage | Charged part to case | 2500 | V |
| — | Mounting torque | Mounting screw M4 | 0.98~1.47 | N·m |
| | | | 10~15 | kg·cm |
| — | Weight | Typical value | 130 | g |



## ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $I_{RRM}$ | Repetitive peak reverse current | $T_j$=125°C, $V_{RRM}$ applied | — | — | 4.0 | mA |
| $I_{DRM}$ | Repetitive peak off-state current | $T_j$=125°C, $V_{DRM}$ applied | — | — | 4.0 | mA |
| $V_{TM}$, $V_{FM}$ | Forward voltage | $T_j$=125°C, $I_{TM}$=$I_{FM}$=20A, instantaneous meas. | — | — | 1.3 | V |
| dv/dt | Critical rate of rise of off-state voltage | $T_j$=125°C, $V_D$=2/3$V_{DRM}$ | 500 | — | — | V/µs |
| $V_{GT}$ | Gate trigger voltage | $T_j$=25°C, $V_D$=6V, $R_L$=2Ω | — | — | 2.0 | V |
| $V_{GD}$ | Gate non-trigger voltage | $T_j$=125°C, $V_D$=1/2$V_{DRM}$ | 0.25 | — | — | V |
| $I_{GT}$ | Gate trigger current | $T_j$=25°C, $V_D$=6V, $R_L$=2Ω | 10 | — | 50 | mA |
| $R_{th\ (j-c)}$ | Thermal resistance | Junction to case (per 1/6 module) | — | — | 4.5 | °C/W |
| $R_{th\ (c-f)}$ | Contact thermal resistance | Case to fin, Conductive grease applied (per 1/6 module) | — | — | 0.6 | °C/W |
| — | Insulation resistance | Measured with a 500V megohmmeter between main terminal and case | 10 | — | — | MΩ |

Note: Items of the above table applies to the Thyristor part and the Diode part as circled in the following tables.

# TM10T3B-M,-H

## MEDIUM POWER GENERAL USE
## INSULATED TYPE

### MAXIMUM RATINGS

| Item | $V_{RRM}$ | $V_{RSM}$ | $V_{R\ (DC)}$ | $V_{DRM}$ | $V_{DSM}$ | $V_{D\ (DC)}$ | $I_{T\ (RMS)}$ / $I_{F\ (RMS)}$ | $I_{T\ (AV)}$ / $I_{F\ (AV)}$ | $I_{TSM}$ / $I_{FSM}$ | $I^2t$ | di/dt |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Thyristor | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Diode | ○ | ○ | ○ | — | — | — | ○ | ○ | ○ | ○ | — |

| Item | $P_{GM}$ | $P_{G\ (AV)}$ | $V_{FGM}$ | $I_{FGM}$ | $T_j$ | $T_{stg}$ |
|---|---|---|---|---|---|---|
| Thyristor | ○ | ○ | ○ | ○ | ○ | ○ |
| Diode | — | — | — | — | ○ | ○ |

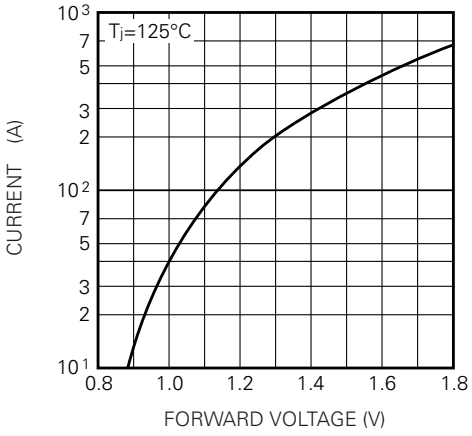
### ELECTRICAL CHARACTERISTICS

| Item | $I_{RRM}$ | $I_{DRM}$ | $V_{TM}$ / $V_{FM}$ | dv/dt | $V_{GT}$ | $V_{GD}$ | $I_{GT}$ | $R_{th\ (j-c)}$ | $R_{th\ (c-f)}$ |
|---|---|---|---|---|---|---|---|---|---|
| Thyristor | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Diode | ○ | — | ○ | — | — | — | — | ○ | ○ |

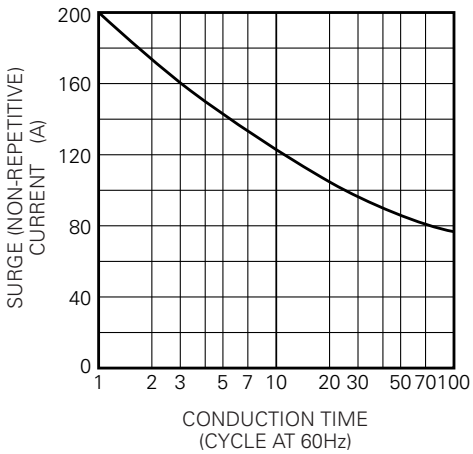


### PERFORMANCE CURVES

**MAXIMUM FORWARD CHARACTERISTIC**




**RATED SURGE (NON-REPETITIVE) CURRENT**



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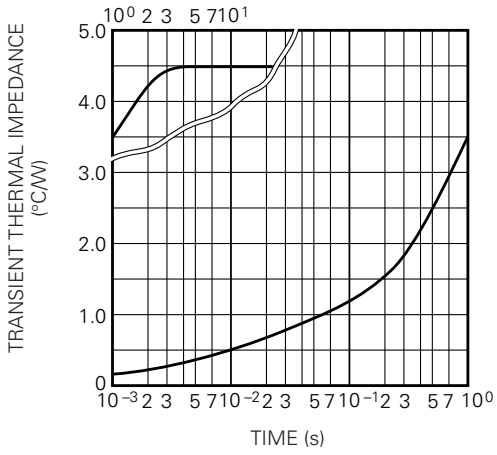
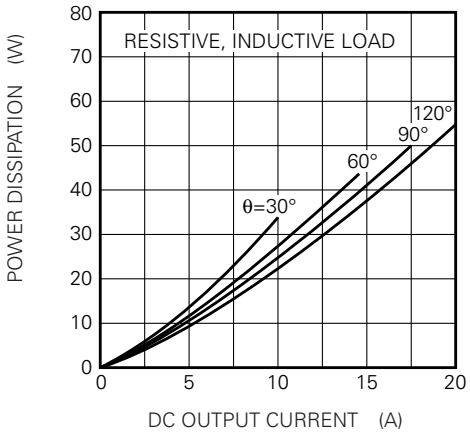
**MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE) (PER SINGLE ELEMENT)**




**MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)**




**LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)**