

MITSUBISHI THYRISTOR MODULES

# TM10T3B-M,-H

MEDIUM POWER GENERAL USE  
INSULATED TYPE

TM10T3B-M,-H



- **I<sub>o</sub>** DC output current ..... **20A**
- **V<sub>RRM</sub>** Repetitive peak reverse voltage ..... **400/800V**
- **V<sub>DRM</sub>** Repetitive peak off-state voltage ..... **400/800V**
- **3 Phase Mix Bridge**
- **Insulated Type**
- **UL Recognized**

Yellow Card No. E80276 (N)

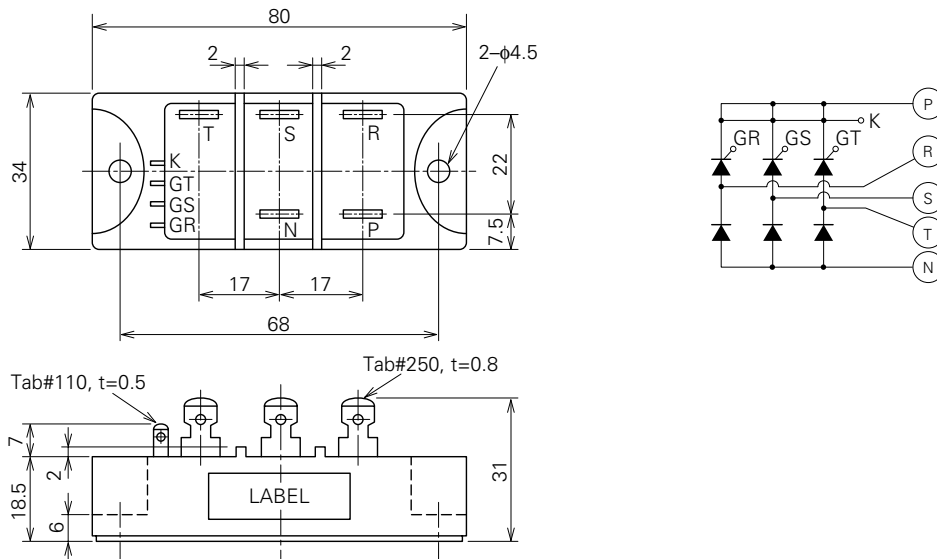
File No. E80271

## APPLICATION

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

## OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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## ABSOLUTE MAXIMUM RATINGS

| Symbol  | Parameter                             | Voltage class |     | Unit |
|---------|---------------------------------------|---------------|-----|------|
|         |                                       | M             | H   |      |
| VRRM    | Repetitive peak reverse voltage       | 400           | 800 | V    |
| VRSM    | Non-repetitive peak reverse voltage   | 480           | 960 | V    |
| VR (DC) | DC reverse voltage                    | 320           | 640 | V    |
| VDRM    | Repetitive peak off-state voltage     | 400           | 800 | V    |
| VDSM    | Non-repetitive peak off-state voltage | 480           | 960 | V    |
| VD (DC) | DC off-state voltage                  | 320           | 640 | V    |

| Symbol           | Parameter                                 | Conditions                           | Ratings               | Unit             |
|------------------|---|--------------------------------------|-----------------------|------------------|
| Io               | DC output current                         | 3-phase fullwave rectified, TC=79°C  | 20                    | A                |
| ITSM, IFSM       | Surge (non-repetitive) current            | One half cycle at 60Hz, peak value   | 200                   | A                |
| I <sup>2</sup> t | I <sup>2</sup> t for fusing               | Value for one cycle of surge current | 1.7 × 10 <sup>2</sup> | A <sup>2</sup> s |
| di/dt            | Critical rate of rise of on-state current | VD=1/2VDRM, IG=0.5A, Tj=125°C        | 50                    | A/μs             |
| PGM              | Peak gate power dissipation               |                                      | 5.0                   | W                |
| PG (AV)          | Average gate power dissipation            |                                      | 0.5                   | W                |
| VFGM             | Peak gate forward voltage                 |                                      | 10                    | V                |
| VRGM             | Peak gate reverse voltage                 |                                      | 5.0                   | V                |
| IFGM             | Peak gate forward current                 |                                      | 2.0                   | A                |
| Tj               | Junction temperature                      |                                      | -40~125               | °C               |
| Tstg             | Storage temperature                       |                                      | -40~125               | °C               |
| Viso             | 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. |      |
| IRRM      | Repetitive peak reverse current            | Tj=125°C, VRRM applied  | —      | —    | 4.0  | mA   |
| IDRM      | Repetitive peak off-state current          | Tj=125°C, VDRM applied  | —      | —    | 4.0  | mA   |
| VTM, VFM  | Forward voltage                            | Tj=125°C, ITM=IFM=20A, instantaneous meas.                      | —      | —    | 1.3  | V    |
| dv/dt     | Critical rate of rise of off-state voltage | Tj=125°C, VD=2/3VDRM  | 500    | —    | —    | V/μs |
| VGT       | Gate trigger voltage                       | Tj=25°C, VD=6V, RL=2Ω   | —      | —    | 2.0  | V    |
| VGD       | Gate non-trigger voltage                   | Tj=125°C, Vb=1/2VDRM  | 0.25   | —    | —    | V    |
| IGT       | Gate trigger current                       | Tj=25°C, VD=6V, RL=2Ω   | 10     | —    | 50   | mA   |
| Rth (j-c) | Thermal resistance                         | Junction to case (per 1/6 module)                               | —      | —    | 4.5  | °C/W |
| Rth (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.

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## MAXIMUM RATINGS

| Item      | VRRM | VRSM | VR (DC) | VDRM | VD <sub>SM</sub> | VD (DC) | IT (RMS) | IT (AV) | ITSM | I <sup>2</sup> t | di/dt |
|-----------|------|------|---------|------|------------------|---------|----------|---------|------|------------------|-------|
|           |      |      |         |      |                  |         | IF (RMS) | IF (AV) | IFSM |                  |       |
| Thyristor | ○    | ○    | ○       | ○    | ○                | ○       | ○        | ○       | ○    | ○                | ○     |
| Diode     | ○    | ○    | ○       | —    | —                | —       | ○        | ○       | ○    | ○                | —     |

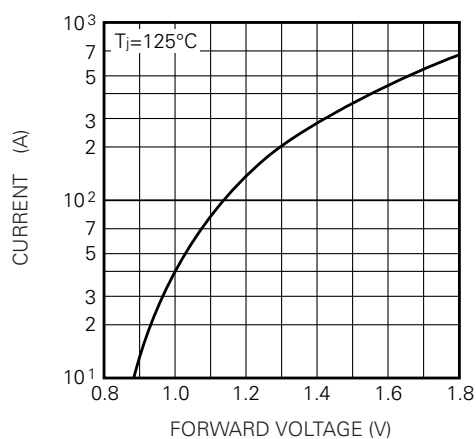
| Item      | PGM | PG (AV) | VFGM | IFGM | T <sub>j</sub> | T <sub>stg</sub> |
|-----------|-----|---------|------|------|----------------|------------------|
| Thyristor | ○   | ○       | ○    | ○    | ○              | ○                |
| Diode     | —   | —       | —    | —    | ○              | ○                |

## ELECTRICAL CHARACTERISTICS

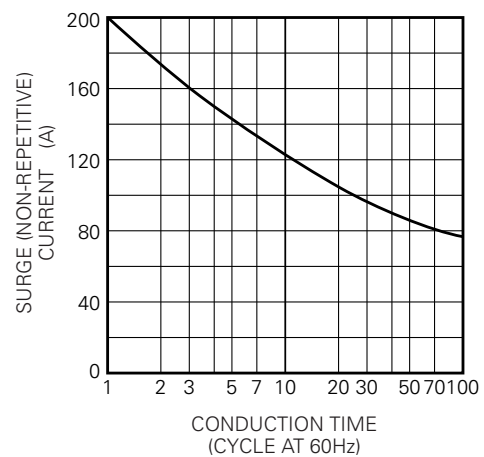
| Item      | IRR <sub>M</sub> | ID <sub>RM</sub> | VT <sub>M</sub>             | dv/dt | VGT | VGD | IGT | R <sub>th(j-c)</sub> | R <sub>th(c-f)</sub> |
|-----------|------------------|------------------|-----------------------------|-------|-----|-----|-----|----------------------|----------------------|
|           |                  |                  | V <sub>F</sub> <sub>M</sub> |       |     |     |     |                      |                      |
| Thyristor | ○                | ○                | ○                           | ○     | ○   | ○   | ○   | ○                    | ○                    |
| Diode     | ○                | —                | ○                           | —     | —   | —   | —   | ○                    | ○                    |

## PERFORMANCE CURVES

MAXIMUM FORWARD CHARACTERISTIC



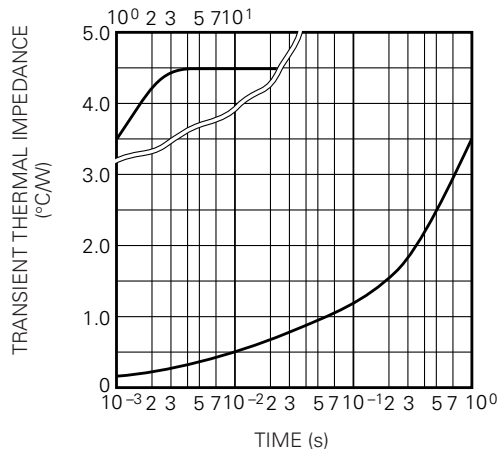
RATED SURGE (NON-REPETITIVE) CURRENT



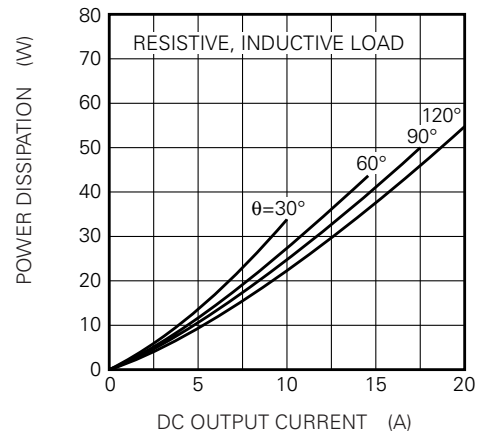
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**MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE) (PER SINGLE ELEMENT)**



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



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

