

# MITSUBISHI THYRISTOR MODULES

## TM130RZ/EZ/GZ-24,-2H

HIGH VOLTAGE HIGH POWER GENERAL USE  
INSULATED TYPE

### TM130RZ/EZ/GZ-24,-2H



(RZ Type)

- **IT (AV)** Average on-state current ..... **130A**
- **IF (AV)** Average forward current ..... **130A**
- **VRRM** Repetitive peak reverse voltage  
..... **1200/1600V**
- **VDRM** Repetitive peak off-state voltage  
..... **1200/1600V**
- **MIX DOUBLE ARMS**
- **Insulated Type**
- **UL Recognized**

Yellow Card No. E80276 (N)

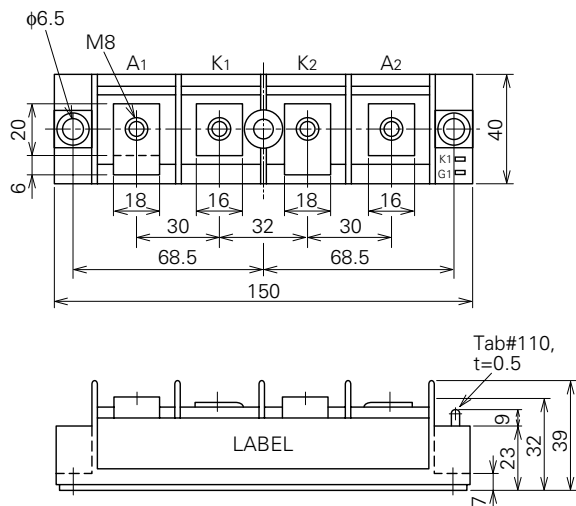
File No. E80271

### APPLICATION

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

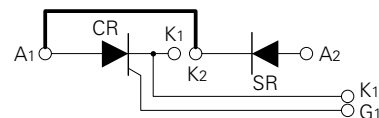
### OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm

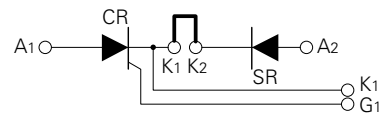


(RZ Type)

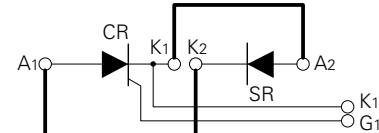
(RZ)



(EZ)



(GZ)



(Bold line is connective bar.)

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## ABSOLUTE MAXIMUM RATINGS

| Symbol  | Parameter                             | Voltage class |      | Unit |
|---------|---------------------------------------|---------------|------|------|
|         |                                       | 24            | 2H   |      |
| VRRM    | Repetitive peak reverse voltage       | 1200          | 1600 | V    |
| VRSM    | Non-repetitive peak reverse voltage   | 1350          | 1700 | V    |
| VR (DC) | DC reverse voltage                    | 960           | 1280 | V    |
| VDRM    | Repetitive peak off-state voltage     | 1200          | 1600 | V    |
| VDSM    | Non-repetitive peak off-state voltage | 1350          | 1700 | V    |
| VD (DC) | DC off-state voltage                  | 960           | 1280 | V    |

| Symbol             | Parameter                                 | Conditions                                                                        | Ratings               | Unit             |
|--------------------|-------------------------------------------|-----------------------------------------------------------------------------------|-----------------------|------------------|
| IT (RMS), IF (RMS) | RMS current                               |                                                                                   | 205                   | A                |
| IT (AV), IF (AV)   | Average current                           | Single-phase, half-wave 180° conduction, Tc=78°C                                  | 130                   | A                |
| ITSM, IFSM         | Surge (non-repetitive) current            | One half cycle at 60Hz, peak value                                                | 2600                  | A                |
| I <sup>2</sup> t   | I <sup>2</sup> t for fusing               | Value for one cycle of surge current                                              | 2.8 × 10 <sup>4</sup> | A <sup>2</sup> s |
| di/dt              | Critical rate of rise of on-state current | V <sub>D</sub> =1/2V <sub>DRM</sub> , I <sub>G</sub> =1.0A, T <sub>j</sub> =125°C | 100                   | A/μs             |
| PGM                | Peak gate power dissipation               |                                                                                   | 10                    | W                |
| PG (AV)            | Average gate power dissipation            |                                                                                   | 3.0                   | W                |
| VFGM               | Peak gate forward voltage                 |                                                                                   | 10                    | V                |
| VRGM               | Peak gate reverse voltage                 |                                                                                   | 5.0                   | V                |
| IFGM               | Peak gate forward current                 |                                                                                   | 4.0                   | A                |
| T <sub>j</sub>     | Junction temperature                      |                                                                                   | -40~125               | °C               |
| T <sub>stg</sub>   | Storage temperature                       |                                                                                   | -40~125               | °C               |
| V <sub>iso</sub>   | Isolation voltage                         | Charged part to case                                                              | 2500                  | V                |
| —                  | Mounting torque                           | Main terminal screw M8                                                            | 8.83~10.8             | N·m              |
|                    |                                           |                                                                                   | 90~110                | kg·cm            |
|                    |                                           | Mounting screw M6                                                                 | 1.96~3.92             | N·m              |
|                    |                                           |                                                                                   | 20~40                 | kg·cm            |
| —                  | Weight                                    | Typical value                                                                     | 300                   | g                |

## ELECTRICAL CHARACTERISTICS

| Symbol                | Parameter                                  | Test conditions                                                                    | Limits |      |      | Unit |
|-----------------------|--------------------------------------------|------------------------------------------------------------------------------------|--------|------|------|------|
|                       |                                            |                                                                                    | Min.   | Typ. | Max. |      |
| IRRM                  | Repetitive peak reverse current            | T <sub>j</sub> =125°C, VRRM applied                                                | —      | —    | 30   | mA   |
| IDRM                  | Repetitive peak off-state current          | T <sub>j</sub> =125°C, VDRM applied                                                | —      | —    | 30   | mA   |
| VTM, VFM              | Forward voltage                            | T <sub>j</sub> =125°C, I <sub>TM</sub> =I <sub>FM</sub> =390A, instantaneous meas. | —      | —    | 1.5  | V    |
| dv/dt                 | Critical rate of rise of off-state voltage | T <sub>j</sub> =125°C, V <sub>D</sub> =2/3V <sub>DRM</sub>                         | 500    | —    | —    | V/μs |
| VGT                   | Gate trigger voltage                       | T <sub>j</sub> =25°C, V <sub>D</sub> =6V, R <sub>L</sub> =2Ω                       | —      | —    | 3.0  | V    |
| VGD                   | Gate non-trigger voltage                   | T <sub>j</sub> =125°C, V <sub>D</sub> =1/2V <sub>DRM</sub>                         | 0.25   | —    | —    | V    |
| IGT                   | Gate trigger current                       | T <sub>j</sub> =25°C, V <sub>D</sub> =6V, R <sub>L</sub> =2Ω                       | 15     | —    | 100  | mA   |
| R <sub>th</sub> (j-c) | Thermal resistance                         | Junction to case (per 1/2 module)                                                  | —      | —    | 0.22 | °C/W |
| R <sub>th</sub> (c-f) | Contact thermal resistance                 | Case to fin, conductive grease applied (per 1/2 module)                            | —      | —    | 0.1  | °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 | VDSM | VD (DC) | IT (RMS) | IT (AV) | ITSM | $i^2t$ | di/dt |
|-----------|------|------|---------|------|------|---------|----------|---------|------|--------|-------|
|           |      |      |         |      |      |         | IF (RMS) | IF (AV) | IFSM |        |       |
| Thyristor | ○    | ○    | ○       | ○    | ○    | ○       | ○        | ○       | ○    | ○      | ○     |
| Diode     | ○    | ○    | ○       | —    | —    | —       | ○        | ○       | ○    | ○      | —     |

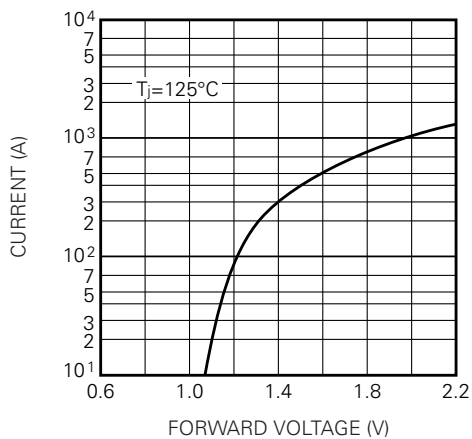
| Item      | PGM | PG (AV) | VFGM | IFGM | T <sub>j</sub> | T <sub>stg</sub> |
|-----------|-----|---------|------|------|----------------|------------------|
| Thyristor | ○   | ○       | ○    | ○    | ○              | ○                |
| Diode     | —   | —       | —    | —    | ○              |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

## ELECTRICAL CHARACTERISTICS

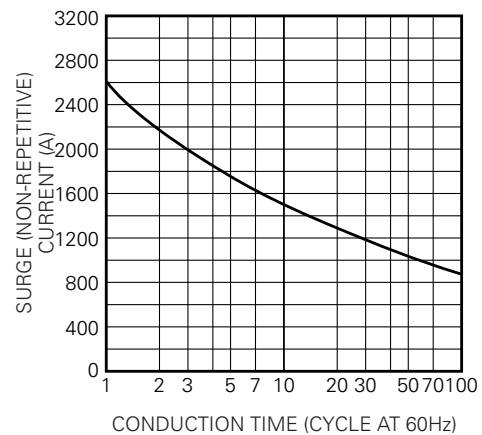
| Item      | IRRM | IDRM | V <sub>TM</sub><br>V <sub>FM</sub> | dv/dt | VGT | VGD | IGT | R <sub>th</sub> (j-c) | R <sub>th</sub> (c-f) |
|-----------|------|------|------------------------------------|-------|-----|-----|-----|-----------------------|-----------------------|
|           |      |      |                                    |       |     |     |     |                       |                       |
| Thyristor | ○    | ○    | ○                                  | ○     | ○   | ○   | ○   | ○                     | ○                     |
| Diode     | ○    | —    | ○                                  | —     | —   | —   | —   | ○                     | ○                     |

## PERFORMANCE CURVES

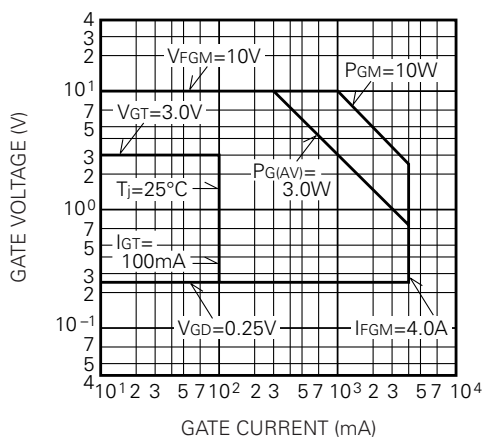
MAXIMUM FORWARD CHARACTERISTIC



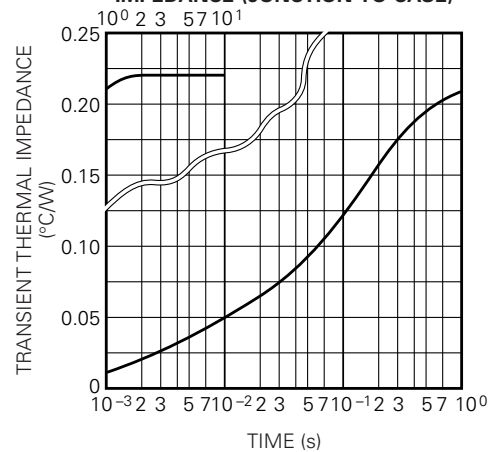
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS



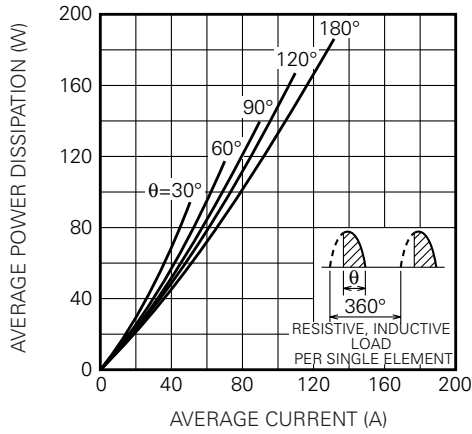
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



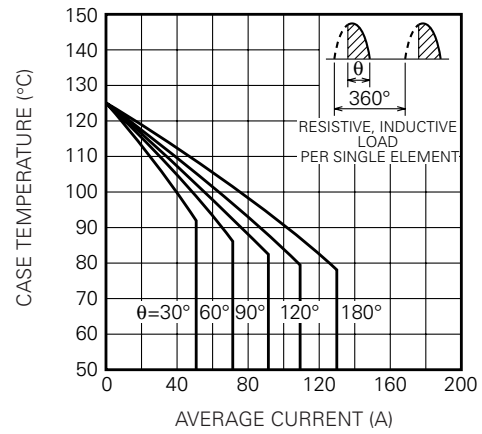
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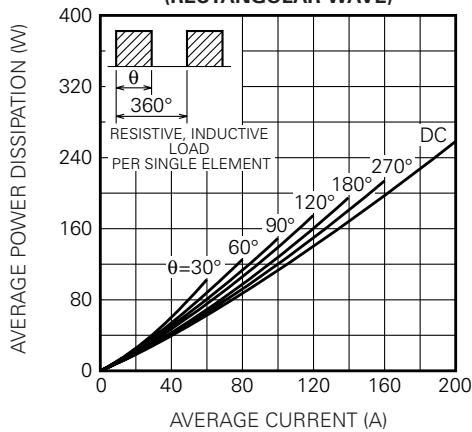
**MAXIMUM AVERAGE POWER DISSIPATION (SINGLE PHASE HALFWAVE)**



**LIMITING VALUE OF THE AVERAGE CURRENT (SINGLE PHASE HALFWAVE)**



**MAXIMUM AVERAGE POWER DISSIPATION (RECTANGULAR WAVE)**



**LIMITING VALUE OF THE AVERAGE CURRENT (RECTANGULAR WAVE)**

