



## Thyristor/Diode Modules

**VRRM / VDRM** 800 to 1800V  
**IFAV / ITAV** 200A

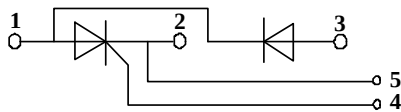
### Applications

- Power Converters
- Lighting Control
- DC Motor Control and Drives
- Heat and temperature control

### Features

- International standard package
- High Surge Capability
- Glass passivated chip
- Simple Mounting
- Heat transfer through aluminum oxide DBC ceramic isolated metal baseplate
- UL recognized applied for file no. E230084

**Circuit**



### Module Type

| TYPE        | VRRM/VDRM | VRSM  |
|-------------|-----------|-------|
| MT200CB08T2 | 800V      | 900V  |
| MT200CB12T2 | 1200V     | 1300V |
| MT200CB16T2 | 1600V     | 1700V |
| MT200CB18T2 | 1800V     | 1900V |

### ◆Diode

#### Maximum Ratings

| Symbol | Item                               | Conditions           | Values      | Units |
|--------|------------------------------------|----------------------|-------------|-------|
| ID     | Output Current(D.C.)               | Tc=85℃               | 200         | A     |
| IFSM   | Surge forward current              | t=10mS Tvj =45℃      | 6800        | A     |
| i²t    | Circuit Fusing Consideration       |                      | 231200      | A²s   |
| Visol  | Isolation Breakdown Voltage(R.M.S) | a.c.50HZ;r.m.s.;1min | 3000        | V     |
| Tvj    | Operating Junction Temperature     |                      | -40 to +125 | ℃     |
| Tstg   | Storage Temperature                |                      | -40 to +125 | ℃     |
| Mt     | Mounting Torque                    | To terminals(M6)     | 3±15%       | Nm    |
| Ms     |                                    | To heat sink(M6)     | 5±15%       | Nm    |
| Weight | Module (Approximately)             |                      | 165         | g     |

#### Thermal Characteristics

| Symbol   | Item                    | Conditions        | Values | Units |
|----------|-------------------------|-------------------|--------|-------|
| Rth(j-c) | Thermal Impedance, max. | Junction to Case  | 0.08   | ℃/W   |
| Rth(c-s) | Thermal Impedance, max. | Case to Heat sink | 0.05   | ℃/W   |



## Electrical Characteristics

| Symbol           | Item                                    | Conditions                                                                                                        | Values     |      |      | Units    |
|------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------|------|------|----------|
|                  |                                         |                                                                                                                   | Min.       | Typ. | Max. |          |
| V <sub>FM</sub>  | Forward Voltage Drop, max.              | T=25℃ IF =300A                                                                                                    |            | 1.05 | 1.20 | V        |
| I <sub>RRM</sub> | Repetitive Peak Reverse Current, max.   | T <sub>VJ</sub> =25℃ V <sub>RD</sub> =V <sub>RRM</sub><br>T <sub>VJ</sub> =125℃ V <sub>RD</sub> =V <sub>RRM</sub> | ≤0.5<br>≤9 |      |      | mA<br>mA |
| r <sub>f</sub>   | On state threshold voltage              | T <sub>J</sub> =25℃                                                                                               | 1.13       |      |      | mΩ       |
| V <sub>fo</sub>  | Value of on-state slope resistance. max | T <sub>J</sub> =25℃                                                                                               | 0.84       |      |      | V        |

## ◆Thyristor

### Maximum Ratings

| Symbol           | Item                                             | Conditions                                                                                         | Values          | Units            |
|------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------|------------------|
| I <sub>TAV</sub> | Average On-State Current                         | Sine 180°;T <sub>c</sub> =85℃                                                                      | 200             | A                |
| I <sub>TSM</sub> | Surge On-State Current                           | T <sub>VJ</sub> =45℃ t=10ms, sine<br>T <sub>VJ</sub> =125℃ t=10ms, sine                            | 4500<br>4000    | A                |
| i <sup>2</sup> t | Circuit Fusing Consideration                     | T <sub>VJ</sub> =45℃ t=10ms, sine<br>T <sub>VJ</sub> =125℃ t=10ms, sine                            | 101250<br>80000 | A <sup>2</sup> s |
| Visol            | Isolation Breakdown Voltage(R.M.S)               | a.c.50HZ;r.m.s.;1min                                                                               | 3000            | V                |
| T <sub>VJ</sub>  | Operating Junction Temperature                   |                                                                                                    | -40 to +125     | ℃                |
| T <sub>stg</sub> | Storage Temperature                              |                                                                                                    | -40 to +125     | ℃                |
| M <sub>t</sub>   | Mounting Torque                                  | To terminals(M6)                                                                                   | 3±15%           | Nm               |
| M <sub>s</sub>   |                                                  | To heat sink(M6)                                                                                   | 5±15%           | Nm               |
| di/dt            | Critical Rate of Rise of On-State Current        | T <sub>VJ</sub> = T <sub>VJM</sub> , 2/3V <sub>DRM</sub> ,I <sub>G</sub> =500mA<br>Tr<0.5us,tp>6us | 200             | A/us             |
| dv/dt            | Critical Rate of Rise of Off-State Voltage, min. | T <sub>J</sub> =T <sub>VJM</sub> ,2/3V <sub>DRM</sub> linear voltage rise                          | 1000            | V/us             |
| a                | Maximum allowable acceleration                   |                                                                                                    | 50              | m/s <sup>2</sup> |

## Thermal Characteristics

| Symbol               | Item                    | Conditions        | Values | Units |
|----------------------|-------------------------|-------------------|--------|-------|
| R <sub>th(j-c)</sub> | Thermal Impedance, max. | Junction to Case  | 0.16   | ℃/W   |
| R <sub>th(c-s)</sub> | Thermal Impedance, max. | Case to Heat sink | 0.10   | ℃/W   |



## Electrical Characteristics

| Symbol            | Item                                                                            | Conditions                                                                      | Values |      |      | Units         |
|-------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------|------|------|---------------|
|                   |                                                                                 |                                                                                 | Min.   | Typ. | Max. |               |
| $V_{TM}$          | Peak On-State Voltage, max.                                                     | $T=25^{\circ}\text{C}$ $I_T=620\text{A}$                                        |        |      | 1.70 | V             |
| $I_{RRM}/I_{DRM}$ | Repetitive Peak Reverse Current, max. / Repetitive Peak Off-State Current, max. | $T_{VJ}=T_{VJM}$ , $V_R=V_{RRM}$ , $V_D=V_{DRM}$                                |        |      | 40   | mA            |
| $V_{TO}$          | On state threshold voltage                                                      | For power-loss calculations only ( $T_{VJ}=125^{\circ}\text{C}$ )               |        |      | 0.85 | V             |
| $r_T$             | Value of on-state slope resistance. max                                         | $T_{VJ}=T_{VJM}$                                                                |        |      | 1.5  | m $\Omega$    |
| $V_{GT}$          | Gate Trigger Voltage, max.                                                      | $T_{VJ}=25^{\circ}\text{C}$ , $V_D=6\text{V}$                                   |        |      | 3    | V             |
| $I_{GT}$          | Gate Trigger Current, max.                                                      | $T_{VJ}=25^{\circ}\text{C}$ , $V_D=6\text{V}$                                   |        |      | 200  | mA            |
| $V_{GD}$          | Non-triggering gate voltage, max.                                               | $T_{VJ}=125^{\circ}\text{C}$ , $V_D=2/3V_{DRM}$                                 |        |      | 0.25 | V             |
| $I_{GD}$          | Non-triggering gate current, max.                                               | $T_{VJ}=125^{\circ}\text{C}$ , $V_D=2/3V_{DRM}$                                 |        |      | 10   | mA            |
| $I_L$             | Latching current, max.                                                          | $T_{VJ}=25^{\circ}\text{C}$ , $R_G=33\Omega$                                    |        | 300  | 1000 | mA            |
| $I_H$             | Holding current, max.                                                           | $T_{VJ}=25^{\circ}\text{C}$ , $V_D=6\text{V}$                                   |        | 150  | 400  | mA            |
| tg <sub>d</sub>   | Gate controlled delay time                                                      | $T_{VJ}=25^{\circ}\text{C}$ , $I_G=1\text{A}$ , $di_G/dt=1\text{A}/\mu\text{s}$ | 1      |      |      | $\mu\text{s}$ |
| tq                | Circuit commutated turn-off time                                                | $T_{VJ}=T_{VJM}$                                                                | 100    |      |      | $\mu\text{s}$ |

## Performance Curves

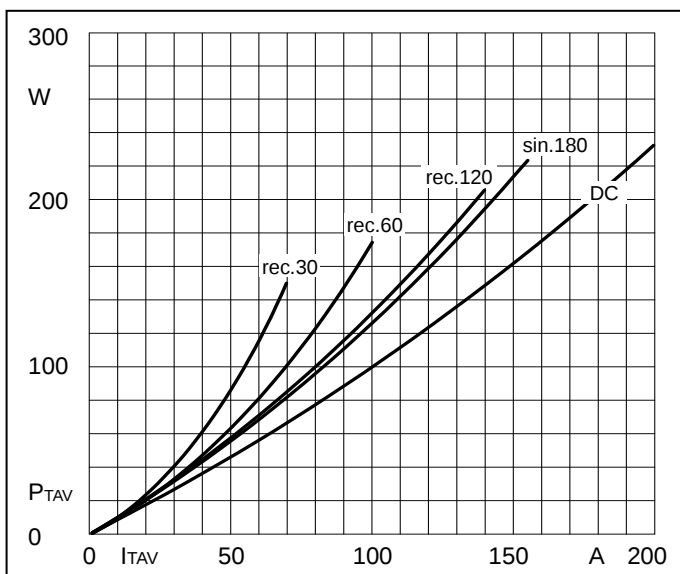


Fig1. Power dissipation

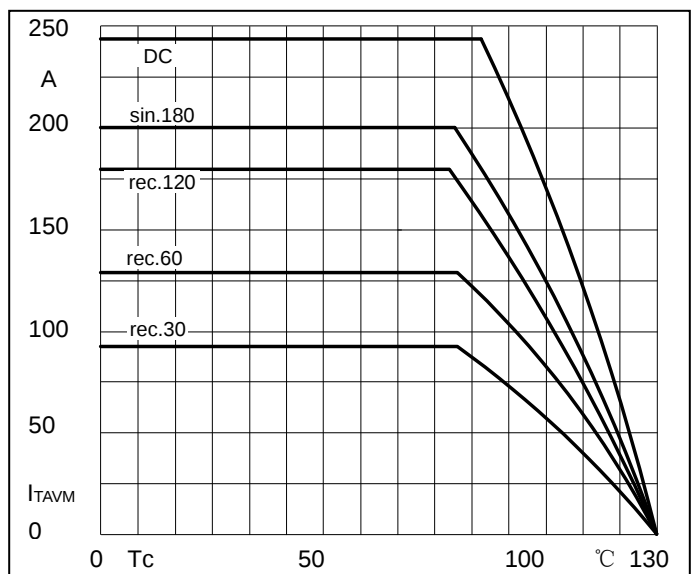
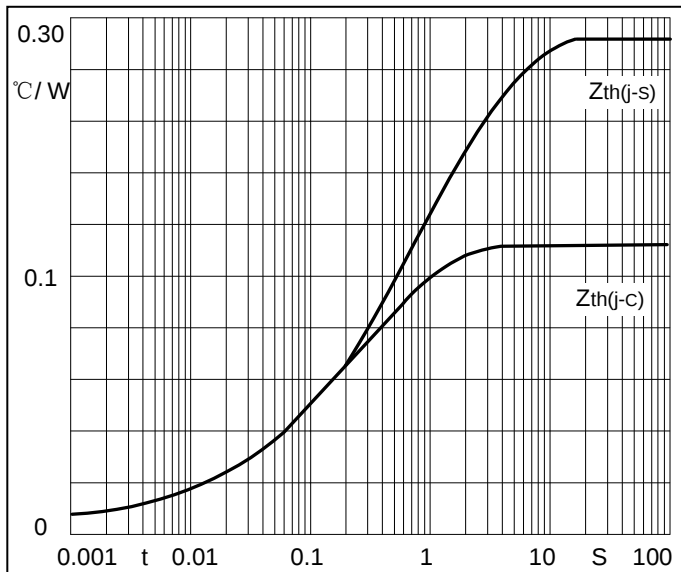
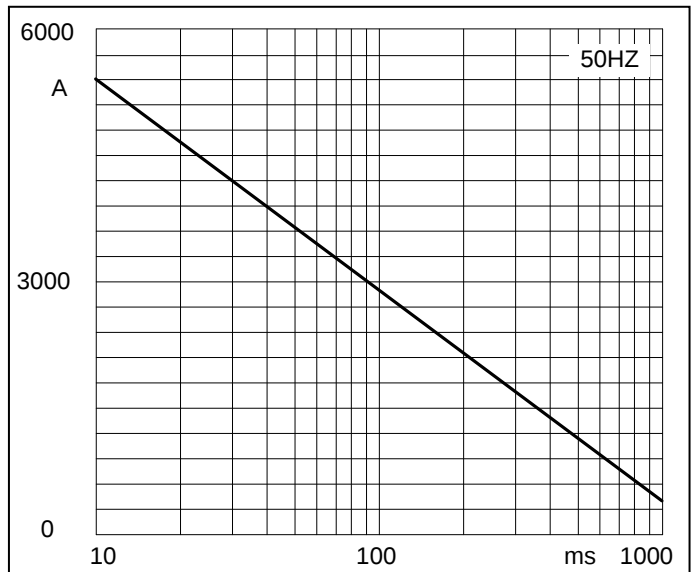


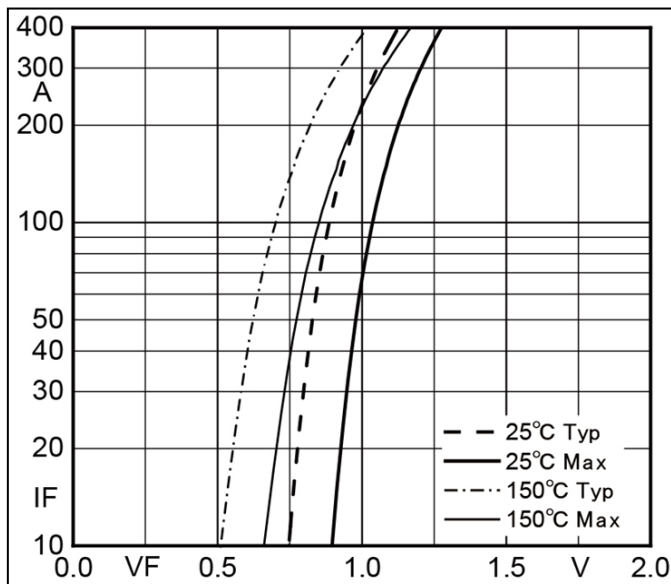
Fig2. Forward Current Derating Curve



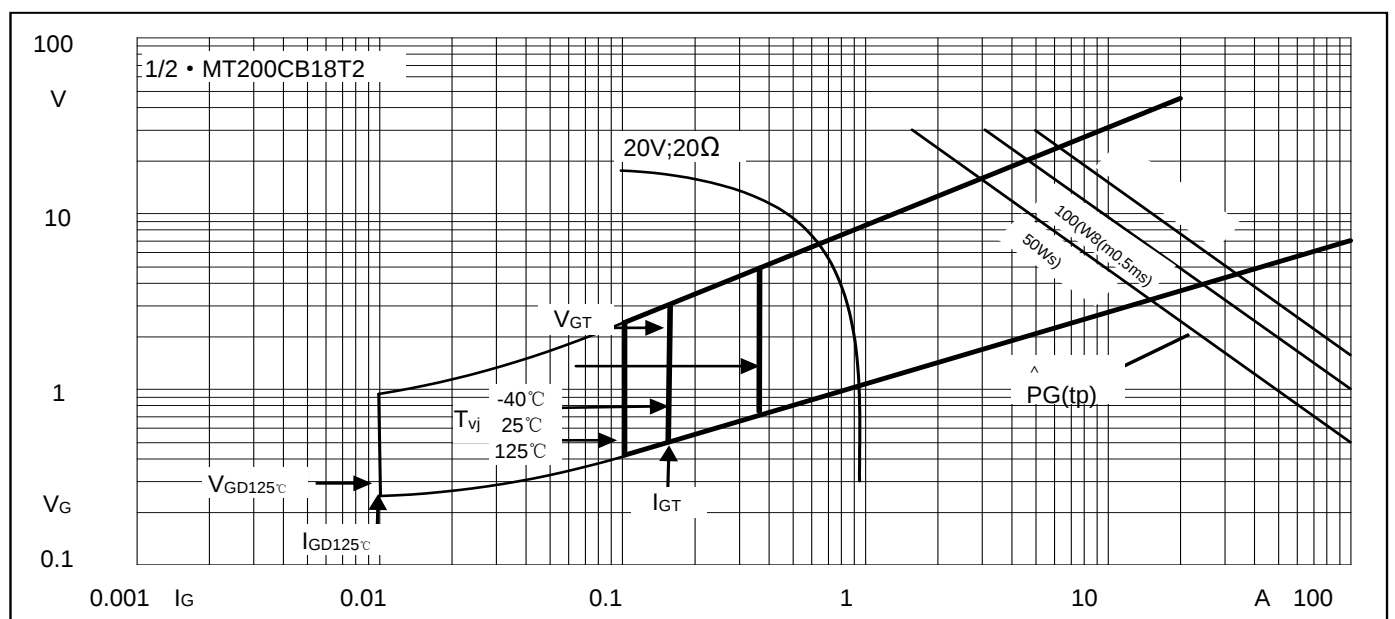
**Fig3. Transient thermal impedance**



**Fig4. Max Non-Repetitive Forward Surge Current**



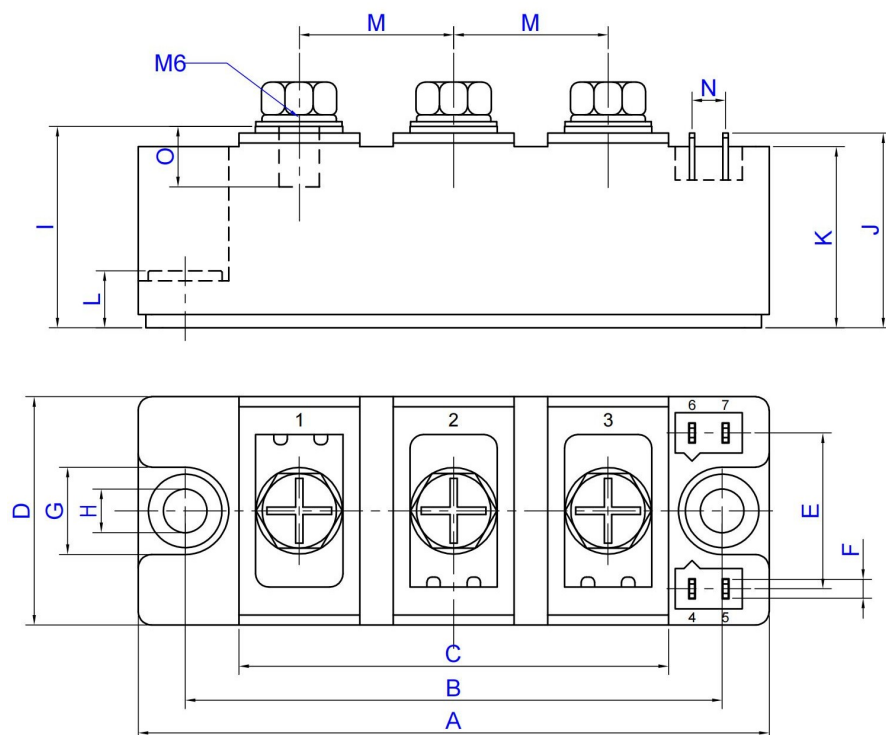
**Fig5. Forward Characteristics**



**Fig6. Gate trigger Characteristics**

## Package Outline Information

### CASE: T2



| DIM | Min (mm) | Max (mm) | Note |
|-----|----------|----------|------|
| A   | 93.5     | 94.5     |      |
| B   | 79.5     | 80.5     |      |
| C   | 63.5     | 64.5     |      |
| D   | 33.5     | 34.5     |      |
| E   | 22.7     | 23.7     |      |
| F   | 2.3      | 3.3      |      |
| G   | 12.5     | 13.5     |      |
| H   | 6.2      | 6.8      | Ø    |
| I   | 29.5     | 30.5     |      |
| J   | 29       | 30       |      |
| K   | 26.5     | 27.5     |      |
| L   | 8.2      | 8.8      |      |
| M   | 22.5     | 23.5     |      |
| N   | 4.5      | 5.5      |      |
| O   | 13.5     | 15.5     |      |

## Packing Standard

| Item         | Length: A (mm) | Width: B (mm) | Height: C (mm) | Quantity (PCS) |
|--------------|----------------|---------------|----------------|----------------|
| Inner Box    | 276            | 258           | 48             | 8              |
| Outer Carton | 545            | 295           | 240            | 80             |



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