

## Thyristor/Diode Modules

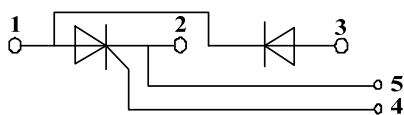


**VRRM / VDRM** 800 to 1800V  
**IFAV / ITAV** 160Amp

### Applications

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

### Circuit



### Features

- International standard package
- High Surge Capability
- Glass passivated chip
- Simple Mounting
- Heat transfer through aluminum oxide DBCceramic isolated metal baseplate
- UL recognized applied for file no. E360040

### Module Type

| TYPE        | VRRM/VDRM | VRSM  |
|-------------|-----------|-------|
| MT160CB08T2 | 800V      | 900V  |
| MT160CB12T2 | 1200V     | 1300V |
| MT160CB16T2 | 1600V     | 1700V |
| MT160CB18T2 | 1800V     | 1900V |

### ◆Diode

#### Maximum Ratings

| Symbol           | Item                               | Conditions           | Values      | Units            |
|------------------|------------------------------------|----------------------|-------------|------------------|
| ID               | Output Current(D.C.)               | Tc=85℃               | 160         | A                |
| IFSM             | Surge forward current              | t=10mS Tvj =45℃      | 5400        | A                |
| i <sup>2</sup> t | Circuit Fusing Consideration       |                      | 145000      | A <sup>2</sup> s |
| 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 heatsink(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 | 0.085  | ℃/W   |
| Rth(c-s) | Thermal Impedance, max. | Case to Heatsink | 0.05   | ℃/W   |

#### Electrical Characteristics

| Symbol | Item                                  | Conditions                              | Values |            |      | Units    |
|--------|---------------------------------------|-----------------------------------------|--------|------------|------|----------|
|        |                                       |                                         | Min.   | Typ.       | Max. |          |
| VFM    | Forward Voltage Drop, max.            | T=25℃ IF =500A                          |        |            | 1.70 | V        |
| IRRM   | Repetitive Peak Reverse Current, max. | Tvj =25℃ VRD=VRRM<br>Tvj =125℃ VRD=VRRM |        | ≤0.5<br>≤9 |      | mA<br>mA |

## ◆Thyristor

### Maximum Ratings

| Symbol     | Item                                             | Conditions                                                                                                | Values           | Units            |
|------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------|------------------|
| $I_{TAV}$  | Average On-State Current                         | Sine 180°; $T_c=85^{\circ}\text{C}$                                                                       | 160              | A                |
| $I_{TSM}$  | Surge On-State Current                           | $T_{VJ}=45^{\circ}\text{C}$ $t=10\text{ms}$ , sine<br>$T_{VJ}=125^{\circ}\text{C}$ $t=10\text{ms}$ , sine | 5400<br>5000     | A                |
| $i^2t$     | Circuit Fusing Consideration                     | $T_{VJ}=45^{\circ}\text{C}$ $t=10\text{ms}$ , sine<br>$T_{VJ}=125^{\circ}\text{C}$ $t=10\text{ms}$ , sine | 145000<br>125000 | A <sup>2</sup> s |
| $V_{isol}$ | Isolation Breakdown Voltage(R.M.S)               | a.c.50HZ;r.m.s.;1min                                                                                      | 3000             | V                |
| $T_{vj}$   | Operating Junction Temperature                   |                                                                                                           | -40 to +130      | °C               |
| $T_{stg}$  | Storage Temperature                              |                                                                                                           | -40 to +125      | °C               |
| $M_t$      | Mounting Torque                                  | To terminals(M6)                                                                                          | $3 \pm 15\%$     | Nm               |
| $M_s$      |                                                  | To heatsink(M6)                                                                                           | $5 \pm 15\%$     | Nm               |
| $di/dt$    | Critical Rate of Rise of On-State Current        | $T_{VJ}=T_{VJM}$ , $2/3V_{DRM}$ , $I_G=500\text{mA}$<br>$T_r<0.5\mu\text{s}$ , $t_p>6\mu\text{s}$         | 200              | A/ $\mu\text{s}$ |
| $dv/dt$    | Critical Rate of Rise of Off-State Voltage, min. | $T_J=T_{VJM}$ , $2/3V_{DRM}$ linear voltage rise                                                          | 1000             | V/ $\mu\text{s}$ |
| $a$        | Maximum allowable acceleration                   |                                                                                                           | 50               | m/s <sup>2</sup> |

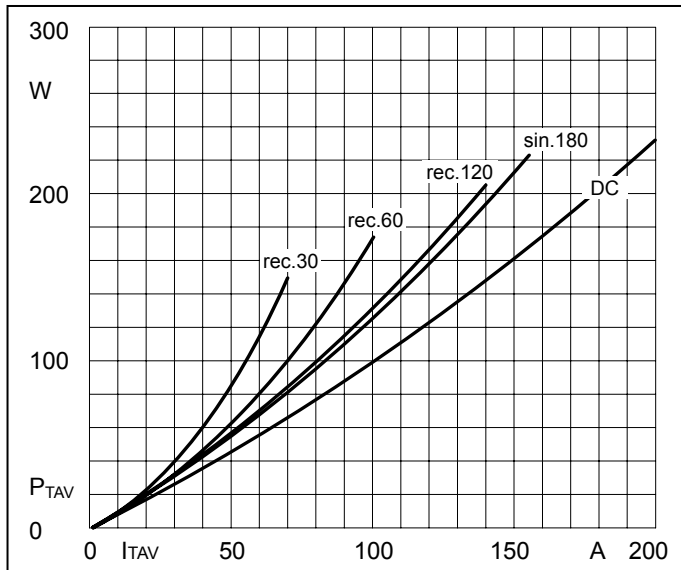
### Thermal Characteristics

| Symbol        | Item                    | Conditions       | Values | Units |
|---------------|-------------------------|------------------|--------|-------|
| $R_{th(j-c)}$ | Thermal Impedance, max. | Junction to Case | 0.17   | °C/W  |
| $R_{th(c-s)}$ | Thermal Impedance, max. | Case to Heatsink | 0.10   | °C/W  |

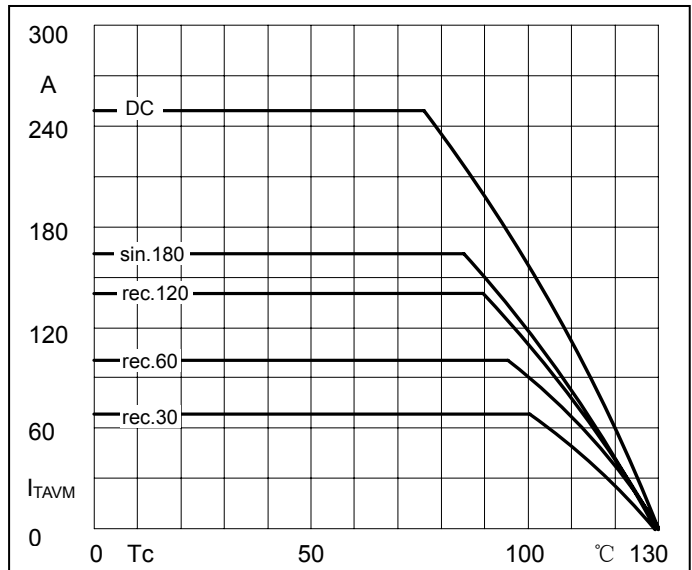
### Electrical Characteristics

| Symbol            | Item                                                                            | Conditions                                                                       | Values |      |      | Units         |
|-------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------|------|------|---------------|
|                   |                                                                                 |                                                                                  | Min.   | Typ. | Max. |               |
| $V_{TM}$          | Peak On-State Voltage, max.                                                     | $T=25^{\circ}\text{C}$ $I_T=500\text{A}$                                         |        |      | 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<br>( $T_{VJ}=125^{\circ}\text{C}$ )             |        |      | 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.                                                      | $T_{VJ}=25^{\circ}\text{C}$ , $V_D=6\text{V}$                                    |        |      | 150  | 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            |
| $t_{gd}$          | Gate controlled delay time                                                      | $T_{VJ}=25^{\circ}\text{C}$ ,<br>$I_G=1\text{A}$ , $di/dt=1\text{A}/\mu\text{s}$ | 1      |      |      | $\mu\text{s}$ |
| $t_q$             | Circuit commutated turn-off time                                                | $T_{VJ}=T_{VJM}$                                                                 | 100    |      |      | $\mu\text{s}$ |

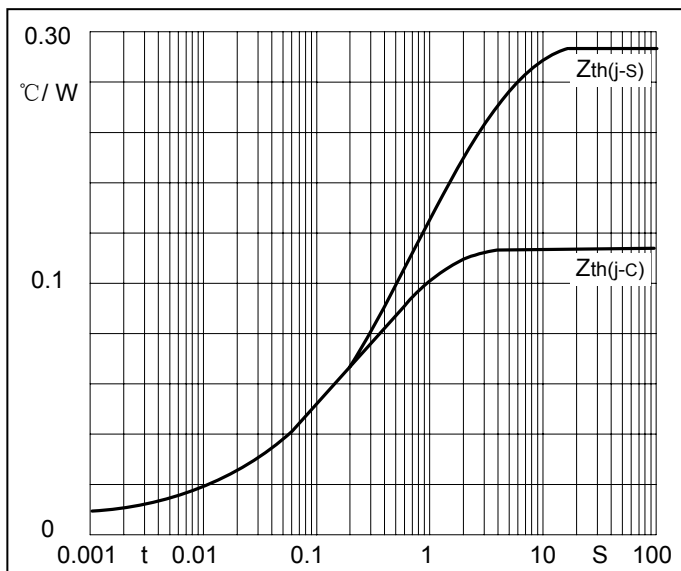
## Performance Curves



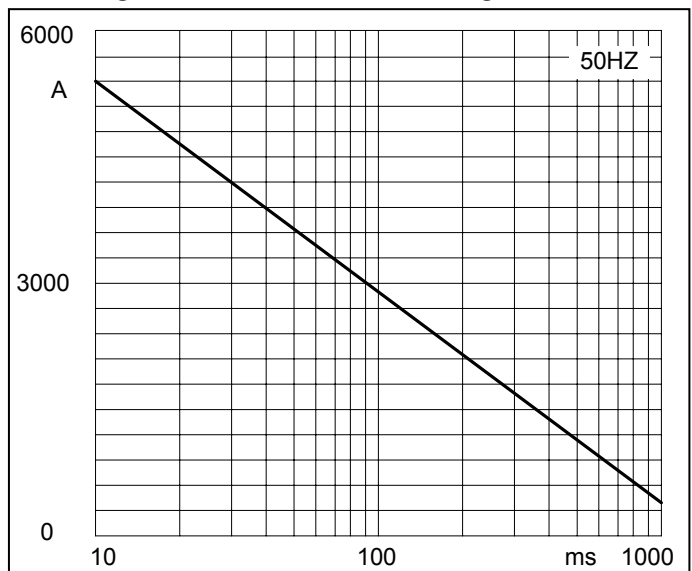
**Fig1. Power dissipation**



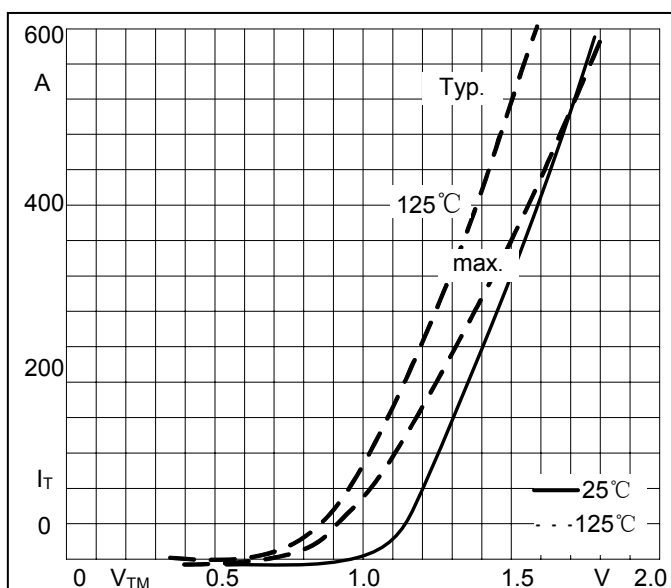
**Fig2. Forward Current Derating Curve**



**Fig3. Transient thermal impedance**



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



**Fig5. Forward Characteristics**

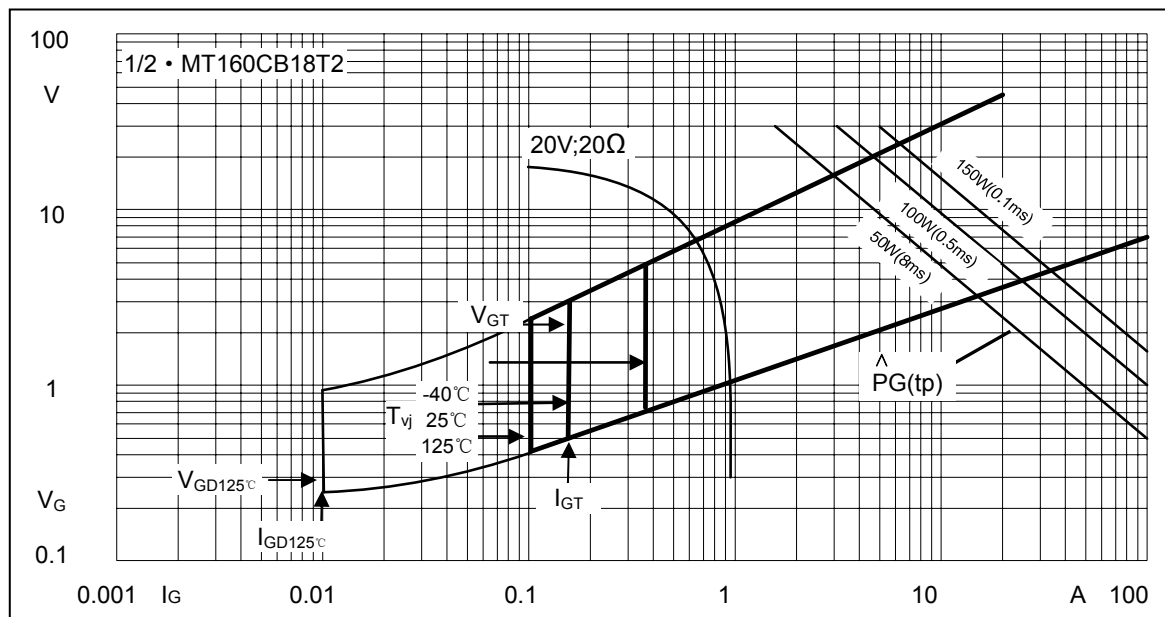
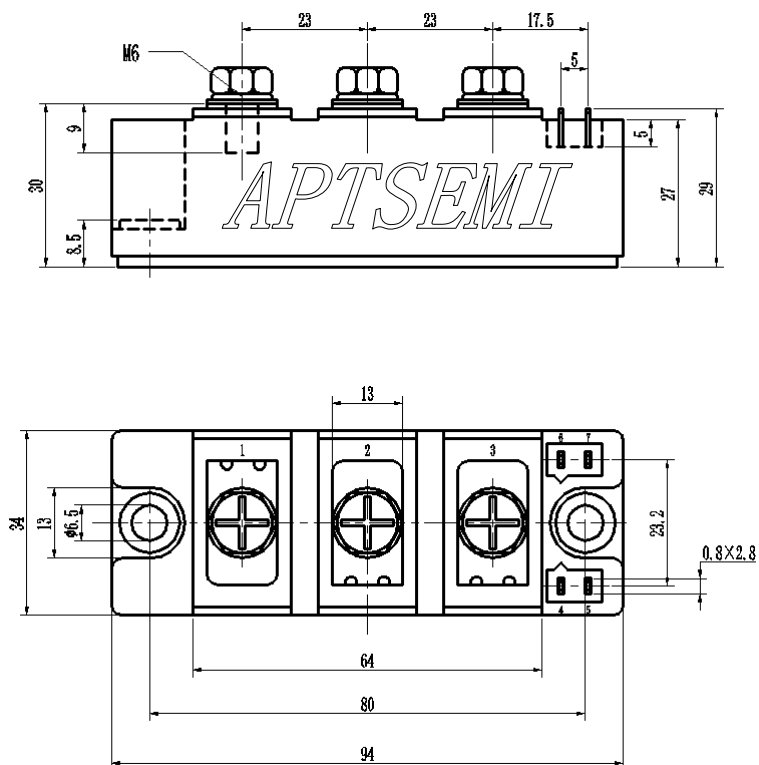


Fig6. Gate trigger Characteristics

## Package Outline Information

### CASE: T2



Dimensions in mm