

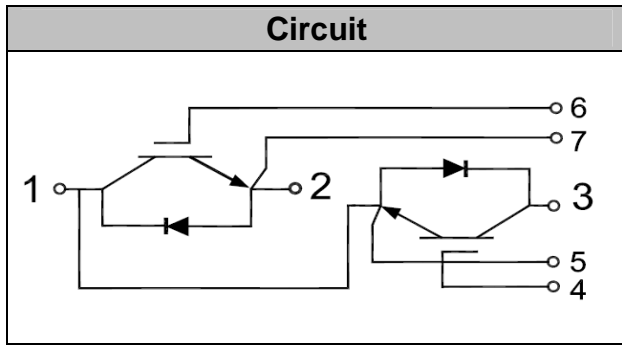
## IGBT Modules

**V<sub>CES</sub>**            1200V  
**I<sub>C</sub>**                 75A



### Applications

- Industrial Inverters
- Servo Applications
- SMPS UPS
- Induction Heating
- Welder



### Features

- Short Circuit Rated 10 $\mu$ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant With RoHS Requirement

### Absolute Maximum Ratings (T<sub>C</sub> = 25°C unless otherwise specified)

| Symbol             | Description                               | Values  | Units      |     |
|--------------------|---|---|------------|-----|
| V <sub>CES</sub>   | Collector - Emitter Voltage               | 1200  | V          |     |
| V <sub>GES</sub>   | Gate-Emitter Voltage                      | ±20   | V          |     |
| I <sub>C</sub>     | DC Collector Current                      | T <sub>C</sub> =25°C                            | 105        | A   |
|                    |   | T <sub>C</sub> =80°C                            | 75         | A   |
| I <sub>CM(1)</sub> | Peak Collector Current Repetitive         | T <sub>J</sub> = 125°C                          | 150        | A   |
| I <sub>F</sub>     | Diode Continuous Forward Current          | T <sub>J</sub> = 125°C                          | 75         | A   |
| I <sub>FM</sub>    | Peak FWD Current Repetitive               |   | 150        | A   |
| t <sub>SC</sub>    | Short Circuit Withstand Time              |   | >10        | μs  |
| P <sub>D</sub>     | Maximum Power Dissipation (IGBT)          | T <sub>C</sub> = 25°C, T <sub>Jmax</sub> =150°C | 625        | W   |
| T <sub>J</sub>     | Maximum Junction Temperature              |   | 150        | °C  |
| T <sub>JOP</sub>   | Operating Temperature                     |   | -40 ~ +150 | °C  |
| T <sub>stg</sub>   | Storage Temperature                       |   | -40 ~ +125 | °C  |
| Viso               | Isolation Voltage (All Terminals Shorted) | f=50Hz, 1min                                    | 3000       | V   |
| Mounting Torque    | Power Terminals Screw:M5                  |   | 3~5        | N*m |
|                    | Mounting Screw:M6                         |   | 4~6        | N*m |

Notes :

(1) Repetitive Rating: Pulse width limited by max. junction temperature



## Electrical Characteristics of IGBT ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

| Symbol                           | Item                                   | Conditions   | Values    |      |      | Units         |
|----------------------------------|--|--|-----------|------|------|---------------|
|                                  |  |  | Min.      | Typ. | Max. |               |
| <b>OFF Characteristics</b>       |  |  |           |      |      |               |
| $V_{(BR)CES}$                    | Collector-Emitter Breakdown Voltage    | $V_{GE} = 0V, I_C = 1mA$   | 1200      |      |      | V             |
| $I_{CES}$                        | Collector Leakage Current              | $V_{CE}=V_{CES}, V_{GE}=0V,$   |           |      | 100  | $\mu\text{A}$ |
|                                  |  | $V_{CE}=V_{CES}, V_{GE}=0V,$<br>$T_J=125^\circ\text{C}$  |           |      | 1    | mA            |
| $I_{GES}$                        | Gate Leakage Current                   | $V_{CE}=0V, V_{GE}=\pm 20V$  | -400      |      | 400  | nA            |
| <b>ON Characteristics</b>        |  |  |           |      |      |               |
| $V_{GE(th)}$                     | Gate - Emitter Threshold Voltage       | $V_{CE}=V_{GE}, I_C=3mA$   | 5         | 6.2  | 7    | V             |
| $V_{CE(sat)}$                    | Collector – Emitter Saturation Voltage | $I_C=75A, V_{GE}=15V$  |           | 1.8  |      | V             |
|                                  |  | $I_C=75A, V_{GE}=15V,$<br>$T_J=125^\circ\text{C}$  |           | 2    |      | V             |
| <b>Dynamic Characteristics</b>   |  |  |           |      |      |               |
| $C_{ies}$                        | Input Capacitance                      | $V_{CE} = 25V, V_{GE} = 0V,$<br>$f = 1MHz$   |           | 5.5  |      | nF            |
| $C_{oes}$                        | Output Capacitance                     |  |           | 0.4  |      | nF            |
| <b>Switching Characteristics</b> |  |  |           |      |      |               |
| $t_{d(on)}$                      | Turn-on Delay Time                     | $V_{CC} = 600V, I_C = 75A,$<br>$R_G = 15\Omega, V_{GE} = \pm 15V,$<br>Inductive Load, $T_J = 25^\circ\text{C}$                 |           | 80   |      | ns            |
| $t_r$                            | Rise Time                              |  |           | 70   |      | ns            |
| $t_{d(off)}$                     | Turn-off Delay Time                    |  |           | 248  |      | ns            |
| $T_f$                            | Fall Time                              |  |           | 290  |      | ns            |
| $E_{on}$                         | Turn-on Switching Loss                 |  |           | 7.45 |      | mJ            |
| $E_{off}$                        | Turn-off Switching Loss                |  |           | 4.9  |      | mJ            |
| $t_{d(on)}$                      | Turn-on Delay Time                     | $V_{CC} = 600V, I_C = 75A,$<br>$R_G = 15\Omega, V_{GE} = \pm 15V,$<br>Inductive Load, $T_J = 125^\circ\text{C}$                |           | 95   |      | ns            |
| $t_r$                            | Rise Time                              |  |           | 85   |      | ns            |
| $t_{d(off)}$                     | Turn-off Delay Time                    |  |           | 262  |      | ns            |
| $T_f$                            | Fall Time                              |  |           | 320  |      | ns            |
| $E_{on}$                         | Turn-on Switching Loss                 |  |           | 10.3 |      | mJ            |
| $E_{off}$                        | Turn-off Switching Loss                |  |           | 7.8  |      | mJ            |
| $Q_{ge}$                         | Gate Charge                            | $V_{CC}=600V, I_C=75A,$<br>$V_{GE}=\pm 15V$  |           | 780  |      | nC            |
| RBSOA                            | Reverse Bias Safe Operating Area       | $I_C = 150A, V_{CC} = 600V,$<br>$V_p = 1200V, R_g = 15\Omega,$<br>$V_{GE} = +15V \text{ to } 0V,$<br>$T_J = 150^\circ\text{C}$ | Trapezoid |      |      |               |
| SCSOA                            | Short Circuit Safe Operating Area      | $V_{CC} = 600V, V_{GE} = 15V,$<br>$T_J = 150^\circ\text{C}$  | 10        |      |      | $\mu\text{s}$ |



## Electrical Characteristics of FWD ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol   | Item                          | Conditions  | Values                    |      |      | Units         |
|----------|-------------------------------|---|---------------------------|------|------|---------------|
|          |                               |   | Min.                      | Typ. | Max. |               |
| $V_{FM}$ | Forward Voltage               | $I_F = 75\text{A}, V_{GE} = 0\text{V}$  | $T_J = 25^\circ\text{C}$  | 2    | 2.4  | V             |
|          |                               |   | $T_J = 125^\circ\text{C}$ | 1.7  | 2.2  |               |
| $t_{rr}$ | Reverse Recovery Time         | $I_F = 75\text{A},$<br>$di/dt = 1400\text{A}/\mu\text{s},$<br>$V_{rr} = 600\text{V},$<br>$V_{GE} = -15\text{V}$ | $T_J = 25^\circ\text{C}$  | 160  |      | ns            |
|          |                               |   | $T_J = 125^\circ\text{C}$ | 200  |      |               |
| $I_{rr}$ | Peak Reverse Recovery Current | $I_F = 75\text{A},$<br>$di/dt = 1400\text{A}/\mu\text{s},$<br>$V_{rr} = 600\text{V},$<br>$V_{GE} = -15\text{V}$ | $T_J = 25^\circ\text{C}$  | 55   |      | A             |
|          |                               |   | $T_J = 125^\circ\text{C}$ | 70   |      |               |
| $Q_{rr}$ | Reverse Recovery Charge       | $I_F = 75\text{A},$<br>$di/dt = 1400\text{A}/\mu\text{s},$<br>$V_{rr} = 600\text{V},$<br>$V_{GE} = -15\text{V}$ | $T_J = 25^\circ\text{C}$  | 5.3  |      | $\mu\text{C}$ |
|          |                               |   | $T_J = 125^\circ\text{C}$ | 8.2  |      |               |

## Thermal Resistance Characteristics

| Symbol          | Description                              | Values |      |      | Units                     |
|-----------------|--|--------|------|------|---------------------------|
|                 |  | Min.   | Typ. | Max. |                           |
| $R_{\theta JC}$ | Junction-To-Case (IGBT Part, Per Leg)    |        |      | 0.2  | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Junction-To-Case (Diode Part, Per Leg)   |        |      | 0.5  | $^\circ\text{C}/\text{W}$ |
| $R_{\theta CS}$ | Case-To-Sink (Conductive Grease Applied) |        |      | 0.1  | $^\circ\text{C}/\text{W}$ |
| Mt              | Power Terminals Screw:M5                 |        | 3    | 3.15 | N·m                       |
| Ms              | Mounting Screw:M6                        |        | 5    | 5.75 | N·m                       |
| Weight          | Weight Of Module                         |        | 150  | 160  | g                         |

## Performance Curves

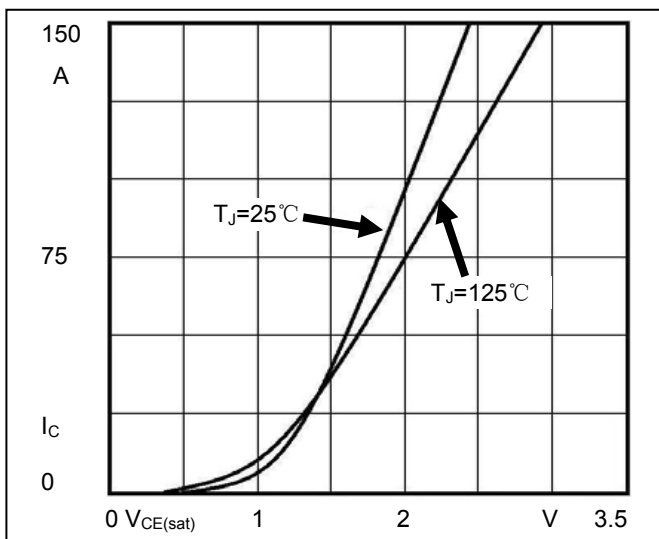


Fig1. Typical Output Characteristics

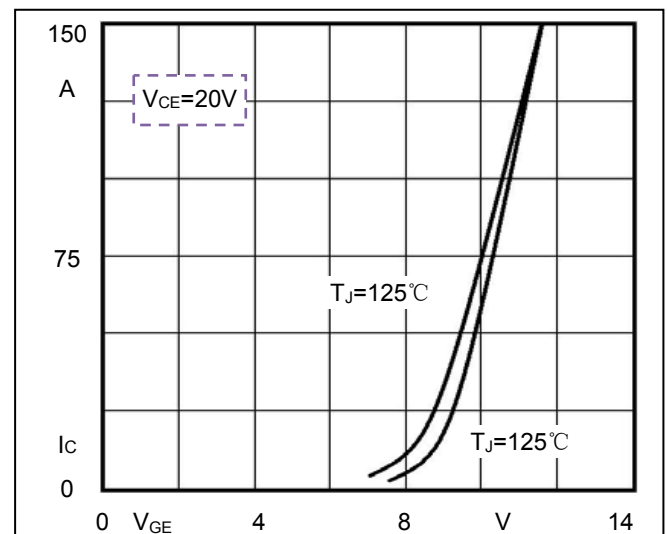


Fig2. Typical Transfer Characteristics

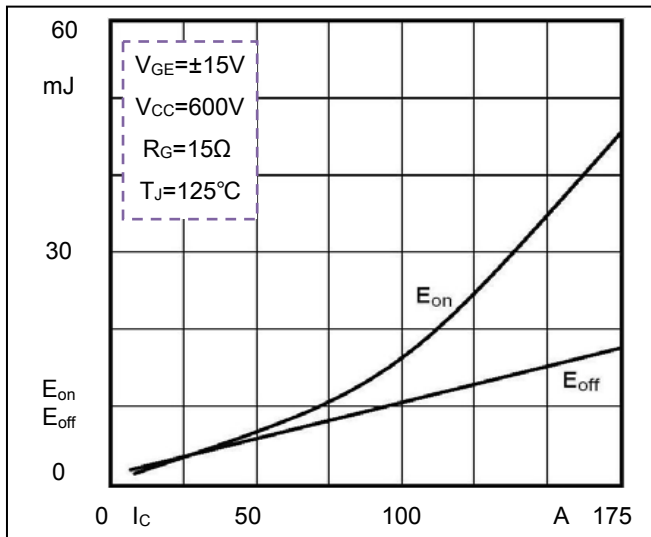


Fig3. Switching Energy vs. Collector Current

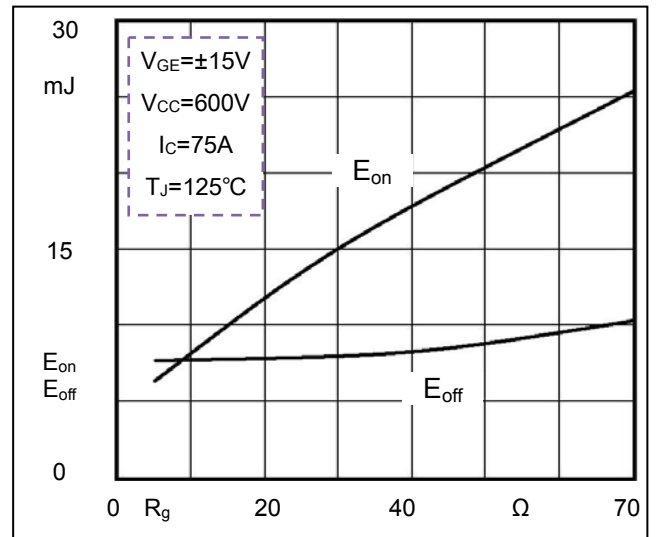


Fig4. Switching Energy vs. Gate Resistor

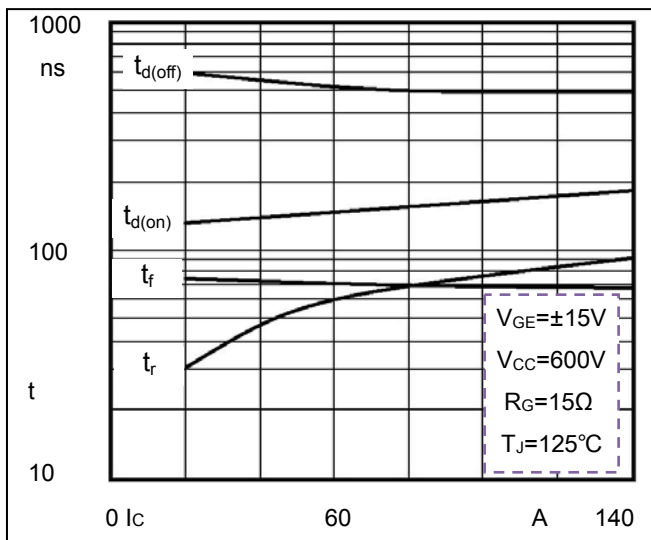


Fig5. Switching Times vs. Collector Current

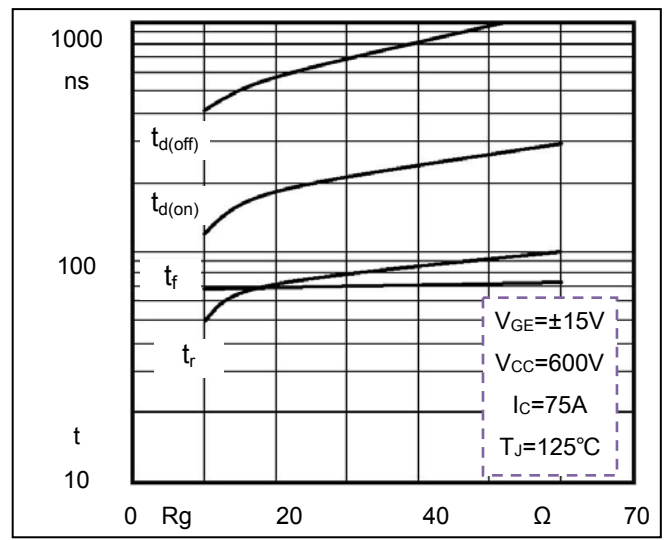


Fig6. Switching Times vs. Gate Resistor

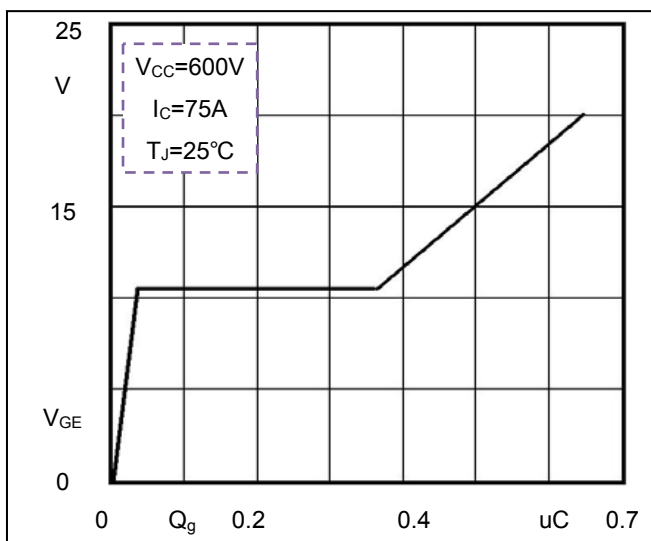


Fig7. Gate Charge characteristics

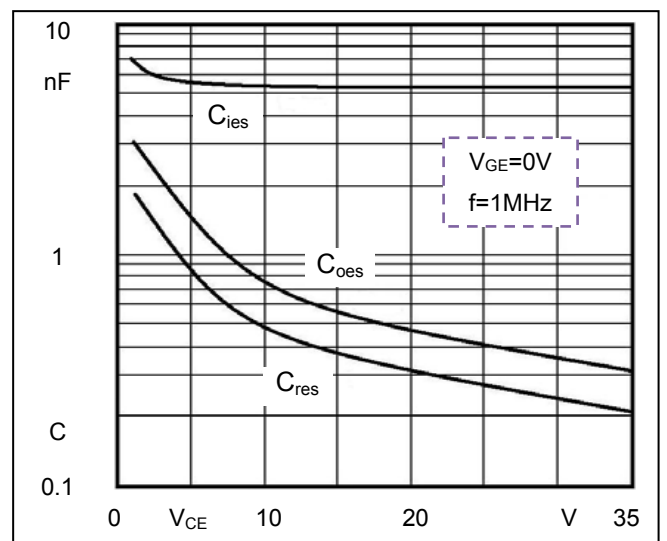


Fig8. Typical Capacitances vs.  $V_{CE}$

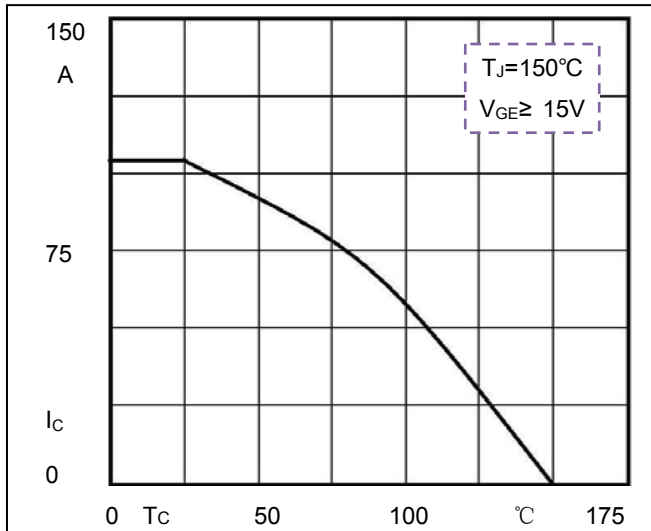


Fig9. Rated Current vs.  $T_c$

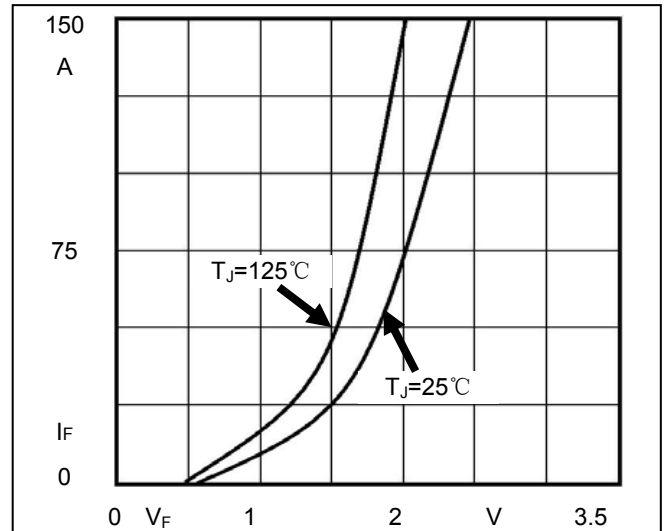


Fig10. Diode Forward Characteristics

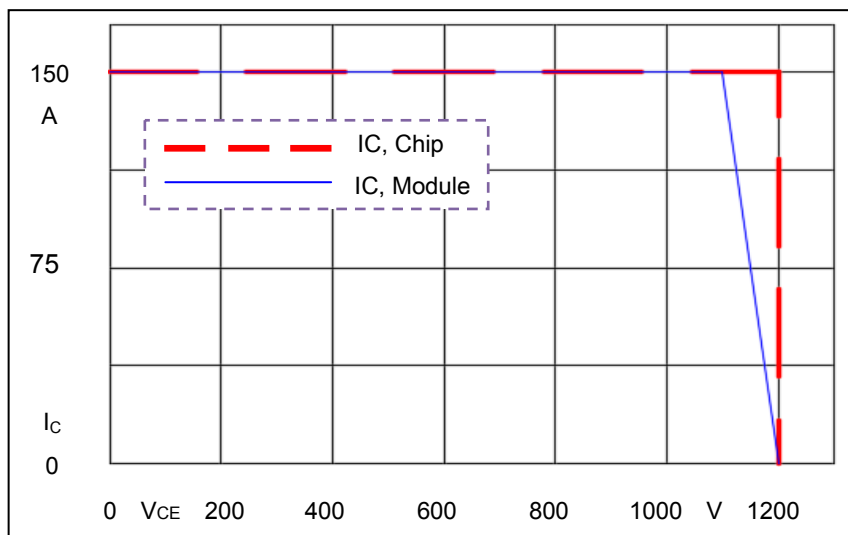


Fig11. Reverse Bias Safe Operation Area (RBSOA)

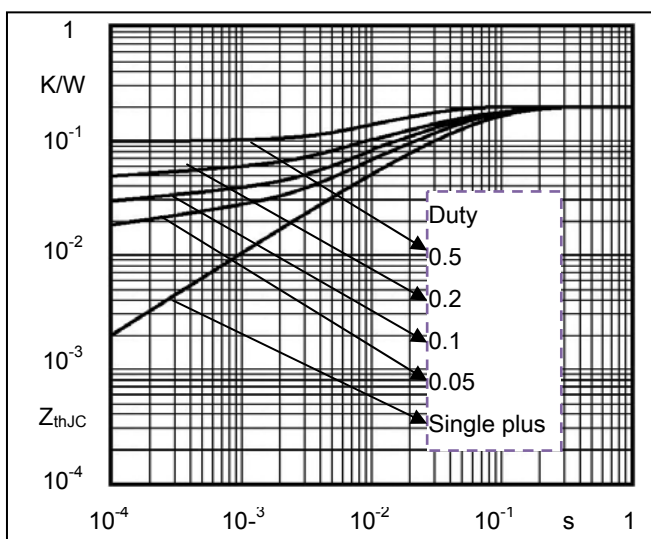


Fig12. Transient Thermal Impedance of IGBT

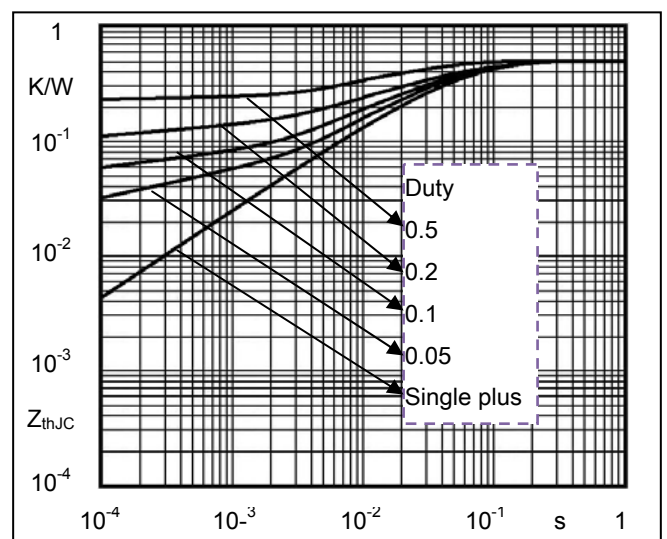
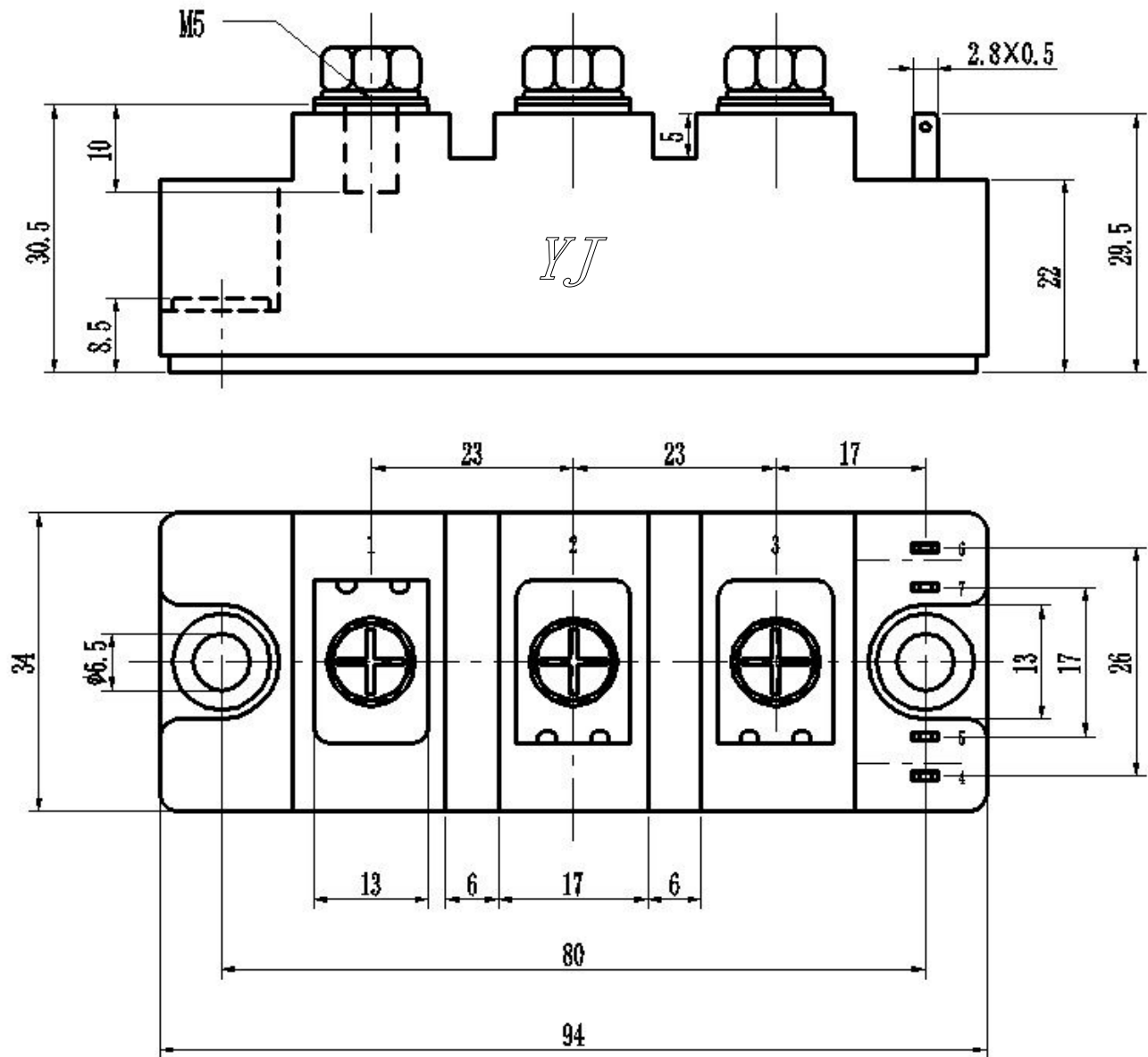


Fig13. Transient Thermal Impedance of Diode

## Package Outline Information

CASE: C1



Dimensions in mm

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