

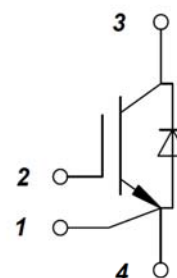
## PRODUCT FEATURES

- IGBT CHIP(T4 Fast Trench+Field Stop technology)
- Low switching losses
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Popular SOT-227 Package



## APPLICATIONS

- High frequency switching application
- Medical applications
- Motion/servo control
- UPS systems



## IGBT

### ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol    | Parameter/Test Conditions         |  | Values   | Unit |
|-----------|-----------------------------------|--|----------|------|
| $V_{CES}$ | Collector Emitter Voltage         | $T_J=25^\circ\text{C}$                             | 1200     | V    |
| $V_{GES}$ | Gate Emitter Voltage              |  | $\pm 20$ |      |
| $I_C$     | DC Collector Current              | $T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$ | 150      | A    |
|           |                                   | $T_C=95^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$ | 100      |      |
| $I_{CM}$  | Repetitive Peak Collector Current | $t_p=1\text{ms}$                                   | 200      |      |
| $P_{tot}$ | Power Dissipation Per IGBT        | $T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$ | 550      | W    |

## Diode

### ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol      | Parameter/Test Conditions       |   | Values | Unit                 |
|-------------|---------------------------------|---|--------|----------------------|
| $V_{RRM}$   | Repetitive Reverse Voltage      | $T_J=25^\circ\text{C}$                                | 1200   | V                    |
| $I_{F(AV)}$ | Average Forward Current         |   | 100    | A                    |
| $I_{FRM}$   | Repetitive Peak Forward Current | $t_p=1\text{ms}$                                      | 200    |                      |
| $I^2t$      |                                 | $T_J=125^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$ | 1850   | $\text{A}^2\text{S}$ |

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# MMG100J120U6HN

## IGBT

### ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol        | Parameter/Test Conditions                        |   | Min.                    | Typ. | Max. | Unit          |
|---------------|--|---|-------------------------|------|------|---------------|
| $V_{GE(th)}$  | Gate Emitter Threshold Voltage                   | $V_{CE}=V_{GE}, I_C=4.0\text{mA}$   | 5.4                     | 6.0  | 6.5  | V             |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage             | $I_C=100\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$                                    |                         | 2.1  | 2.5  |               |
|               |  | $I_C=100\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$                                   |                         | 2.5  |      |               |
| $I_{CES}$     | Collector Leakage Current                        | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$                                 |                         |      | 1    | mA            |
|               |  | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$                                |                         |      | 10   | mA            |
| $I_{GES}$     | Gate Leakage Current                             | $V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$                               | -400                    |      | 400  | nA            |
| $R_{gint}$    | Integrated Gate Resistor                         |   |                         | 7.5  |      | $\Omega$      |
| $Q_g$         | Gate Charge                                      | $V_{CE}=600\text{V}, I_C=100\text{A}, V_{GE}=15\text{V}$                                      |                         | 0.47 |      | $\mu\text{C}$ |
| $C_{ies}$     | Input Capacitance                                | $V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$  |                         | 6.2  |      | nF            |
| $C_{res}$     | Reverse Transfer Capacitance                     |   |                         | 0.35 |      | nF            |
| $t_{d(on)}$   | Turn on Delay Time                               | $V_{CC}=600\text{V}, I_C=100\text{A}$<br>$R_G=7.5\Omega,$                                     | $T_J=25^\circ\text{C}$  |      | 150  | ns            |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 160  | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 170  | ns            |
| $t_r$         | Rise Time  | $V_{GE}=\pm 15\text{V},$<br>Inductive Load  | $T_J=25^\circ\text{C}$  |      | 65   | ns            |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 70   | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 75   | ns            |
| $t_{d(off)}$  | Turn off Delay Time                              | $V_{CC}=600\text{V}, I_C=100\text{A}$<br>$R_G=7.5\Omega,$                                     | $T_J=25^\circ\text{C}$  |      | 400  | ns            |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 450  | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 480  | ns            |
| $t_f$         | Fall Time  | $V_{GE}=\pm 15\text{V},$<br>Inductive Load  | $T_J=25^\circ\text{C}$  |      | 40   | ns            |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 60   | ns            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 70   | ns            |
| $E_{on}$      | Turn on Energy                                   | $V_{CC}=600\text{V}, I_C=100\text{A}$<br>$R_G=7.5\Omega,$                                     | $T_J=125^\circ\text{C}$ |      | 11.5 | mJ            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 12.5 | mJ            |
| $E_{off}$     | Turn off Energy                                  | $V_{GE}=\pm 15\text{V},$<br>Inductive Load  | $T_J=125^\circ\text{C}$ |      | 5.5  | mJ            |
|               |  |   | $T_J=150^\circ\text{C}$ |      | 6.0  | mJ            |
| $I_{SC}$      | Short Circuit Current                            | $t_{psc}\leq 10\mu\text{S}, V_{GE}=15\text{V}$<br>$T_J=125^\circ\text{C}, V_{CC}=600\text{V}$ |                         | 400  |      | A             |
| $R_{thJC}$    | Junction to Case Thermal Resistance ( Per IGBT ) |   |                         |      | 0.27 | K / W         |

## Diode

### ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol      | Parameter/Test Conditions                         |  | Min. | Typ. | Max. | Unit          |
|-------------|---|--|------|------|------|---------------|
| $V_F$       | Forward Voltage                                   | $I_F=100\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$  |      | 1.65 | 2.15 | V             |
|             |   | $I_F=100\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$   |      | 1.65 |      |               |
| $t_{rr}$    | Reverse Recovery Time                             | $I_F=100\text{A}, V_R=600\text{V}$<br>$dI_F/dt=-1500\text{A}/\mu\text{s}$<br>$T_J=125^\circ\text{C}$ |      | 480  |      | ns            |
| $I_{RRM}$   | Max. Reverse Recovery Current                     |  |      | 85   |      | A             |
| $Q_{RR}$    | Reverse Recovery Charge                           |  |      | 19.4 |      | $\mu\text{C}$ |
| $E_{rec}$   | Reverse Recovery Energy                           |  |      | 7.6  |      | mJ            |
| $R_{thJCD}$ | Junction to Case Thermal Resistance ( Per Diode ) |  |      |      | 0.5  | K / W         |

# MMG100J120U6HN

## MODULE CHARACTERISTICS ( $T_C=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol     | Parameter/Test Conditions   |                            | Values  | Unit               |
|------------|-----------------------------|----------------------------|---------|--------------------|
| $T_{Jmax}$ | Max. Junction Temperature   |                            | 175     | $^{\circ}\text{C}$ |
| $T_{Jop}$  | Operating Temperature       |                            | -40~150 |                    |
| $T_{stg}$  | Storage Temperature         |                            | -40~125 |                    |
| $V_{isol}$ | Isolation Breakdown Voltage | AC, 50Hz(R.M.S), t=1minute | 3000    | V                  |
| Torque     | to heatsink                 | Recommended (M4)           | 0.7~1.1 | Nm                 |
|            | to terminal                 | Recommended (M4)           | 0.7~1.1 | Nm                 |
| Weight     |                             |                            | 26.5    | g                  |

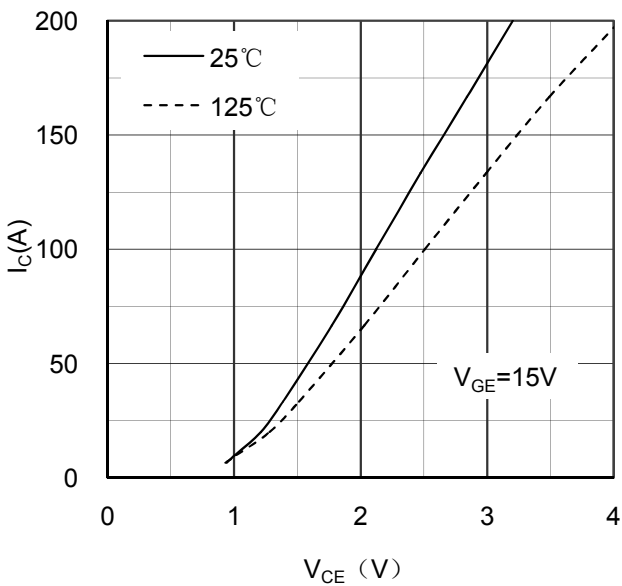


Figure 1. Typical Output Characteristics IGBT

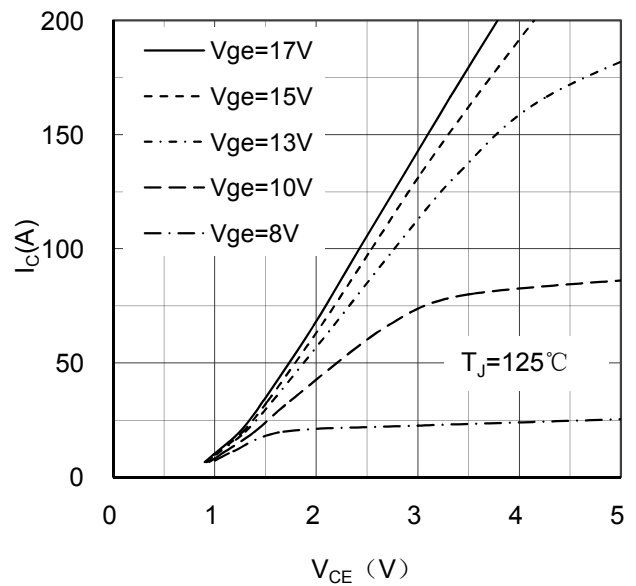


Figure 2. Typical Output Characteristics IGBT

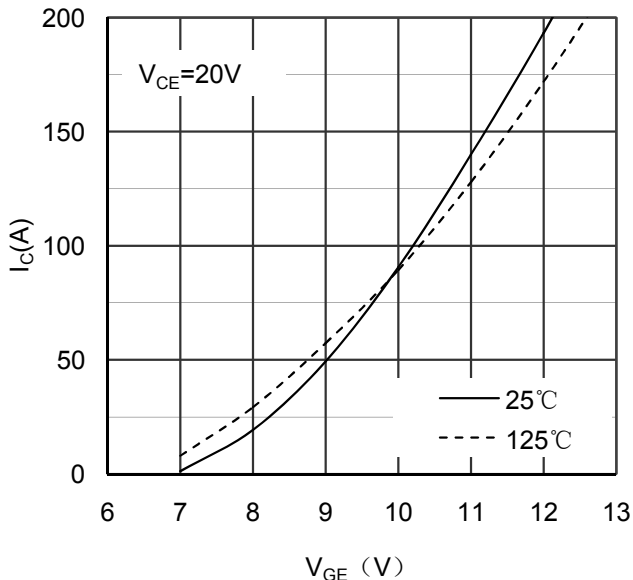


Figure 3. Typical Transfer characteristics IGBT

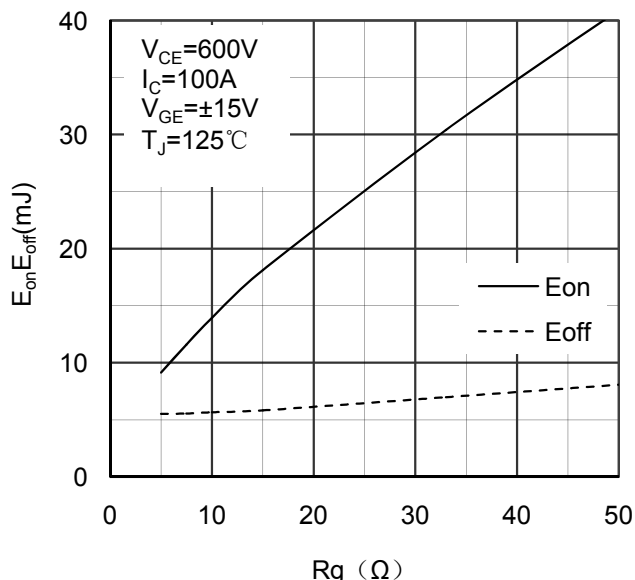


Figure 4. Switching Energy vs Gate Resistor IGBT

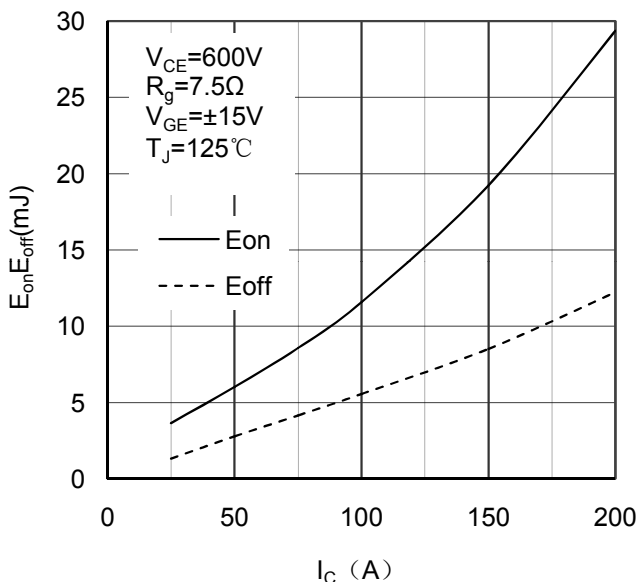


Figure 5. Switching Energy vs Collector Current IGBT

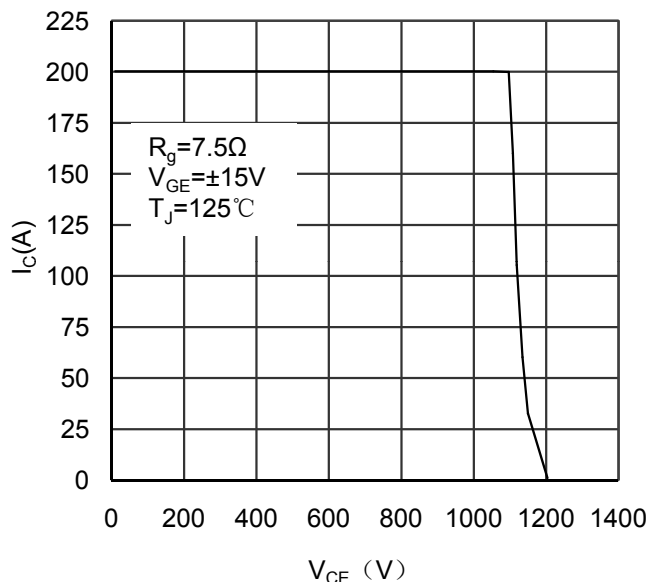


Figure 6. Reverse Biased Safe Operating Area IGBT

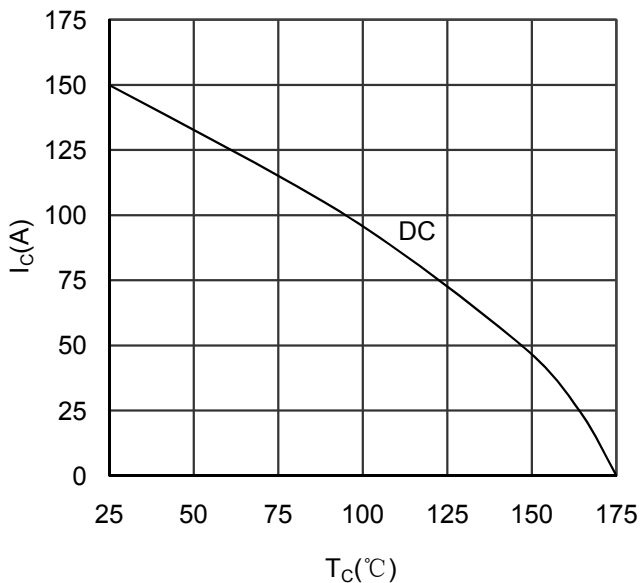


Figure 7. Collector Current vs Case temperature IGBT

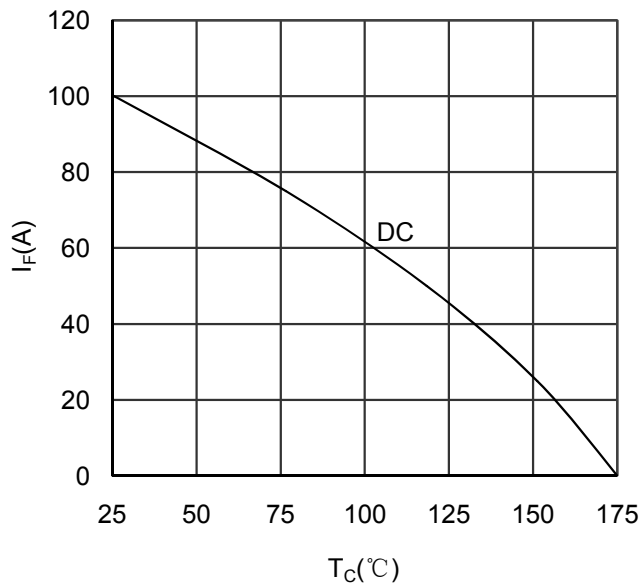


Figure 8. Forward current vs Case temperature Diode

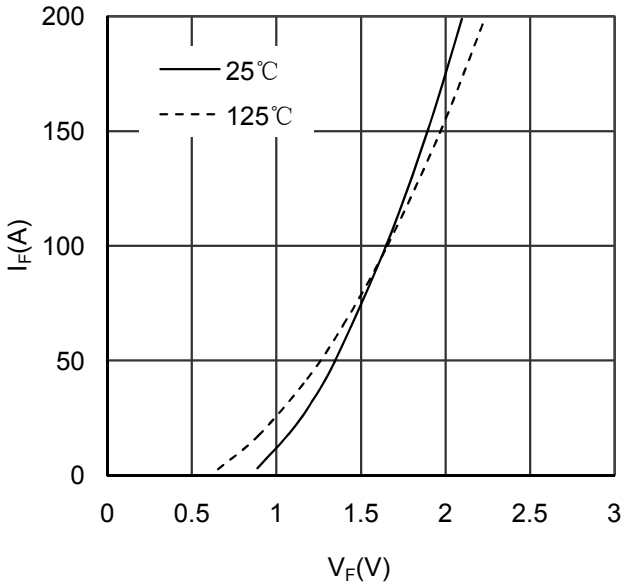


Figure 9. Diode Forward Characteristics Diode

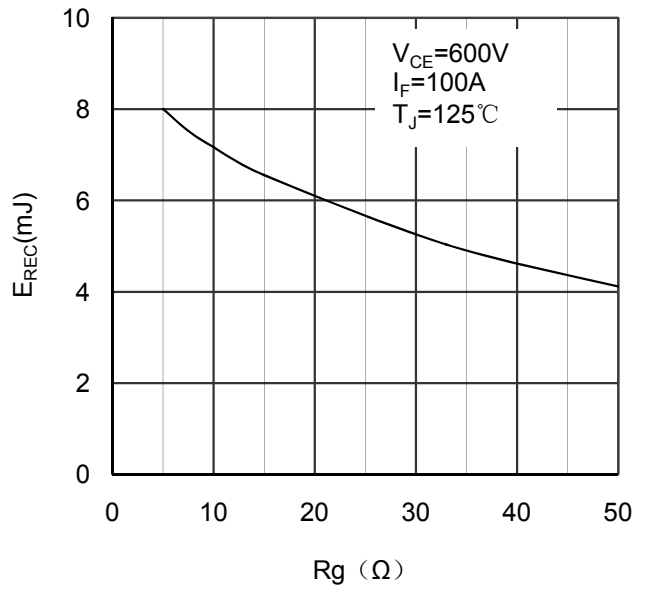


Figure 10. Switching Energy vs Gate Resistor Diode

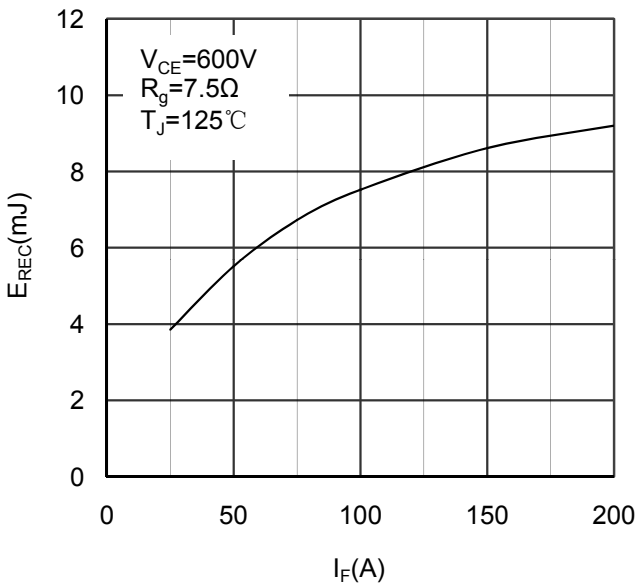


Figure 11. Switching Energy vs Forward Current Diode

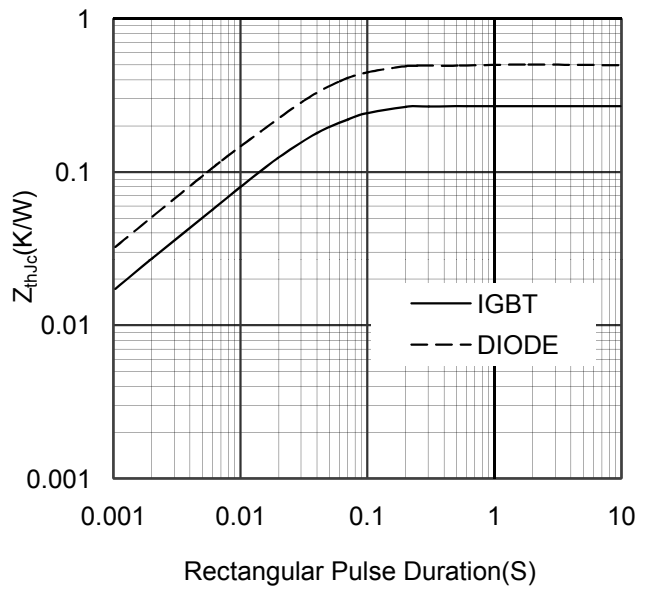
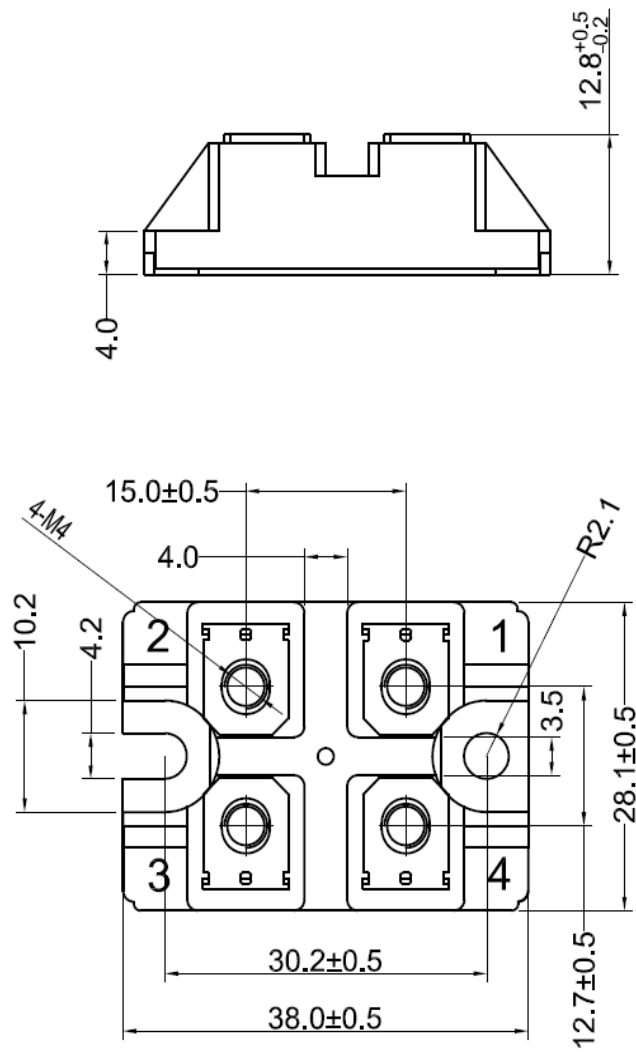


Figure 12. Transient Thermal Impedance of Diode and IGBT



Dimensions in (mm)  
Figure 13. Package Outline