

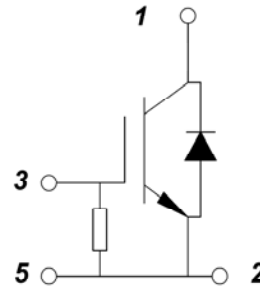
PRODUCT FEATURES

- IGBT³ CHIP(Trench+Field Stop technology)
- High short circuit capability,self limiting short circuit current
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses
- 10K Ω Gate Protected Resistance Inside



APPLICATIONS

- High Power Converters
- Medical applications
- Motion/servo control
- UPS systems/Wind Turbines



IGBT-Inverter

ABSOLUTE MAXIMUM RATINGS

$T_C=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter/Test Conditions | | Values | Unit |
|-----------|-----------------------------------|------------------------|----------|------|
| V_{CES} | Collector Emitter Voltage | $T_J=25^\circ\text{C}$ | 600 | V |
| V_{GES} | Gate Emitter Voltage | | ± 20 | |
| I_C | DC Collector Current | $T_C=25^\circ\text{C}$ | 720 | A |
| | | $T_C=60^\circ\text{C}$ | 600 | |
| I_{CM} | Repetitive Peak Collector Current | $t_p=1\text{ms}$ | 1200 | |
| P_{tot} | Power Dissipation Per IGBT | | 1650 | W |

Reverse-Diode

ABSOLUTE MAXIMUM RATINGS

$T_C=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter/Test Conditions | | Values | Unit |
|-------------|---------------------------------|---|--------|----------------------|
| V_{RRM} | Repetitive Reverse Voltage | $T_J=25^\circ\text{C}$ | 600 | V |
| $I_{F(AV)}$ | Average Forward Current | $T_C=25^\circ\text{C}$ | 600 | A |
| I_{FRM} | Repetitive Peak Forward Current | $t_p=1\text{ms}$ | 1200 | |
| i^2t | | $T_J=125^\circ\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$ | 31250 | A^2S |

IGBT-Inverter 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 | $V_{CE}=V_{GE}, I_C=9.6\text{mA}$ | 4.9 | 5.8 | 6.5 | V |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $I_C=600\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$ | | 1.45 | 1.9 | |
| | | $I_C=600\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$ | | 1.6 | | |
| I_{CES} | Collector Leakage Current | $V_{CE}=600\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$ | | | 1 | mA |
| | | $V_{CE}=600\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$ | | | 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 | | | 0.5 | | Ω |
| Q_g | Gate Charge | $V_{CE}=300\text{V}, I_C=600\text{A}, V_{GE}=\pm 15\text{V}$ | | 6.4 | | μC |
| C_{ies} | Input Capacitance | $V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$ | | 37.2 | | nF |
| C_{res} | Reverse Transfer Capacitance | | | | 1.2 | |
| $t_{d(on)}$ | Turn on Delay Time | $V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=1.5\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load | $T_J=25^\circ\text{C}$ | | 260 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 290 | ns |
| t_r | Rise Time | | $T_J=25^\circ\text{C}$ | | 70 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 90 | ns |
| $t_{d(off)}$ | Turn off Delay Time | $V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=1.5\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load | $T_J=25^\circ\text{C}$ | | 450 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 520 | ns |
| t_f | Fall Time | | $T_J=25^\circ\text{C}$ | | 90 | ns |
| | | | $T_J=125^\circ\text{C}$ | | 100 | ns |
| E_{on} | Turn on Energy | $V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=1.5\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load | $T_J=25^\circ\text{C}$ | | 9.5 | mJ |
| | | | $T_J=125^\circ\text{C}$ | | 12.5 | mJ |
| E_{off} | Turn off Energy | | $T_J=25^\circ\text{C}$ | | 19 | mJ |
| | | | $T_J=125^\circ\text{C}$ | | 22.5 | mJ |
| I_{sc} | Short Circuit Current | $tpsc \leq 6\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=360\text{V}$ | | 3000 | | A |
| R_{thJC} | Junction to Case Thermal Resistance (Per IGBT) | | | | 0.09 | K/W |

Reverse-Diode ELECTRICAL CHARACTERISTICS

$T_C=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter/Test Conditions | | Min. | Typ. | Max. | Unit |
|-------------|---|--|------|------|------|---------------|
| V_F | Forward Voltage | $I_F=600\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$ | | 1.55 | 1.9 | V |
| | | $I_F=600\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$ | | 1.5 | | |
| I_{RRM} | Max. Reverse Recovery Current | $I_F=600\text{A}, V_R=300\text{V}$ | | 690 | | A |
| Q_{RR} | Reverse Recovery Charge | $di_F/dt=-6800\text{A}/\mu\text{s}$ | | 50 | | μC |
| E_{rec} | Reverse Recovery Energy | $T_J=125^\circ\text{C}$ | | 13 | | mJ |
| R_{thJCD} | Junction to Case Thermal Resistance (Per Diode) | | | | 0.15 | K/W |

MODULE CHARACTERISTICS

T_C=25°C unless otherwise specified

| Symbol | Parameter/Test Conditions | | Values | Unit |
|-------------------|-----------------------------|----------------------------|---------|------|
| T _{Jmax} | Max. Junction Temperature | | 175 | °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 (M6) | 3~5 | Nm |
| | to terminal | Recommended (M6) | 2.5~5 | Nm |
| | to terminal | Recommended (M4) | 0.7~1.1 | Nm |
| Weight | | | 330 | g |

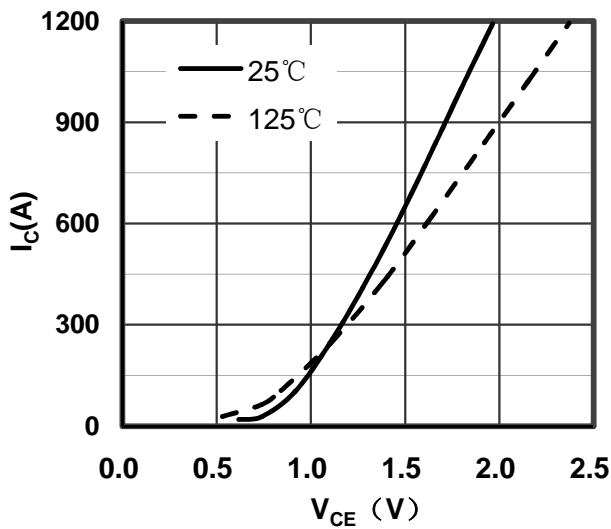


Figure 1. Typical Output Characteristics IGBT-Inverter

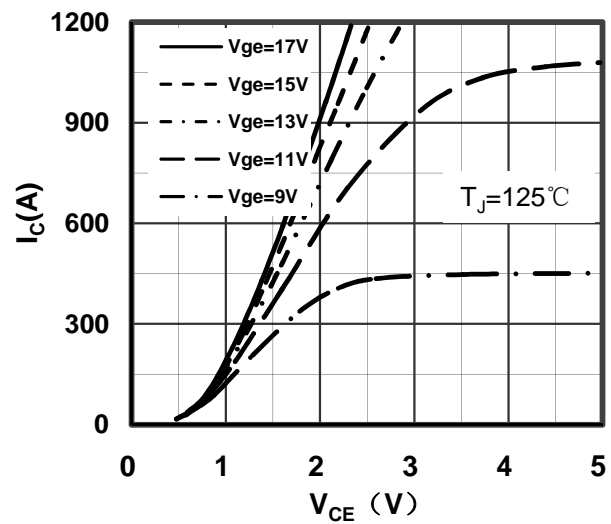


Figure 2. Typical Output Characteristics IGBT-Inverter

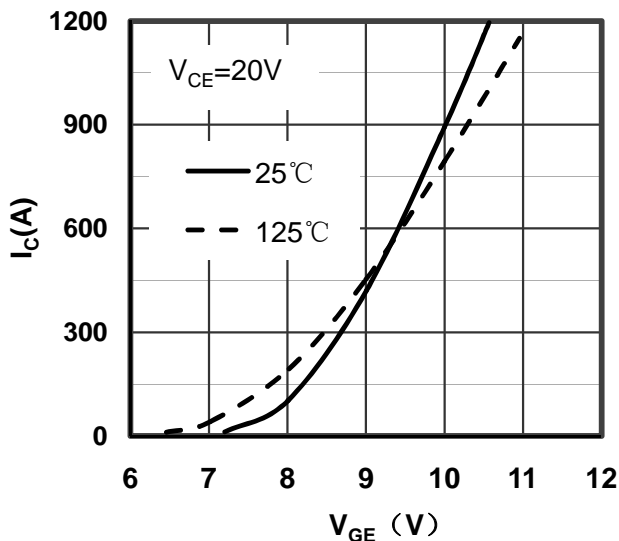


Figure 3. Typical Transfer Characteristics IGBT-Inverter

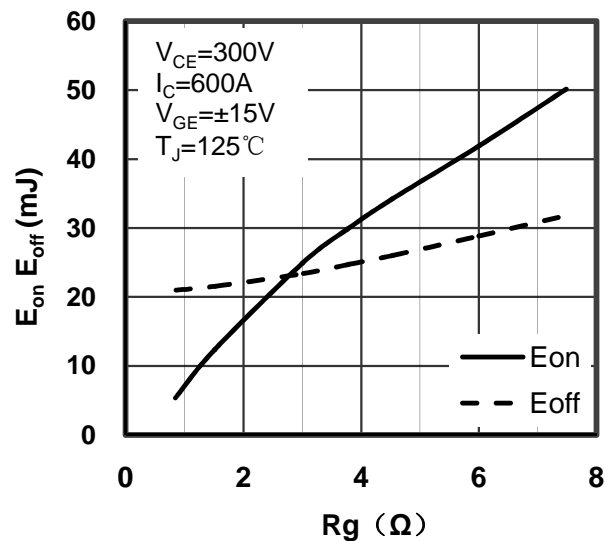


Figure 4. Switching Energy vs Gate Resistor IGBT-Inverter

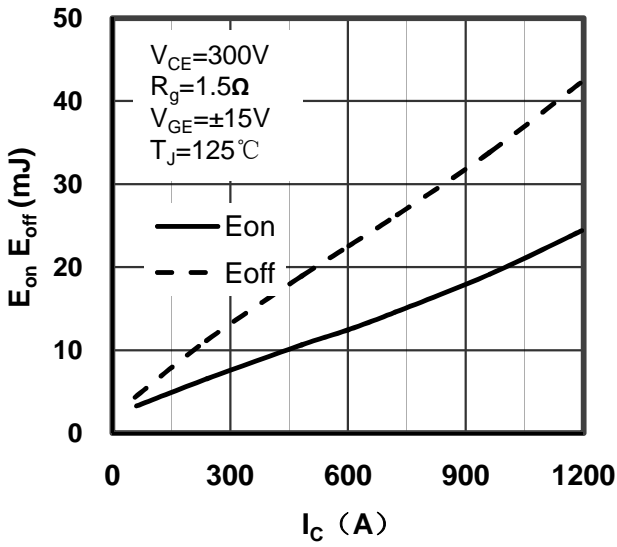


Figure 5. Switching Energy vs Collector Current IGBT-Inverter

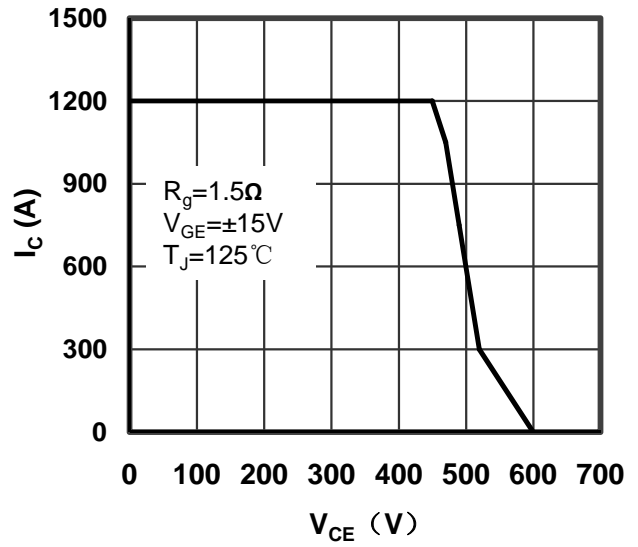


Figure 6. Reverse Biased Safe Operating Area IGBT-Inverter

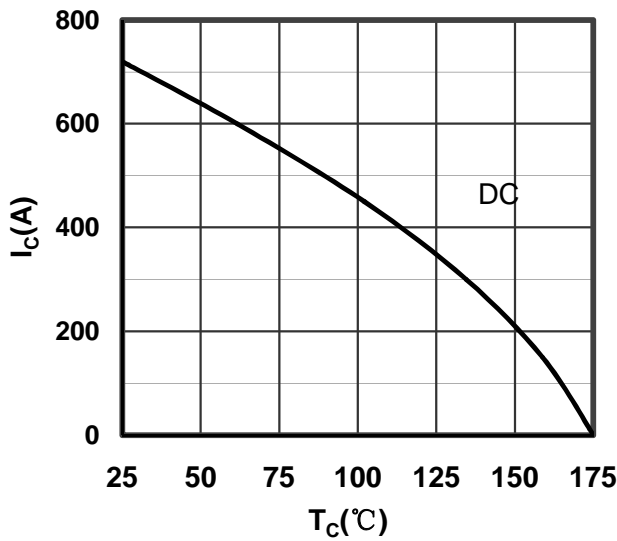


Figure 7. Collector Current vs Case temperature IGBT-Inverter

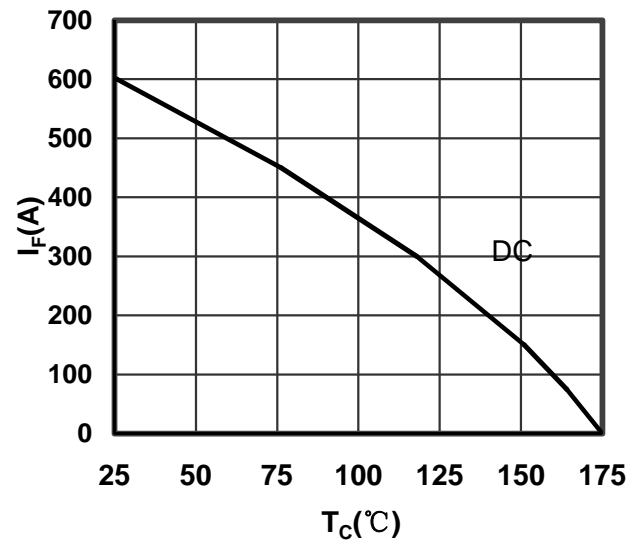


Figure 8. Forward current vs Case temperature Reverse-Diode

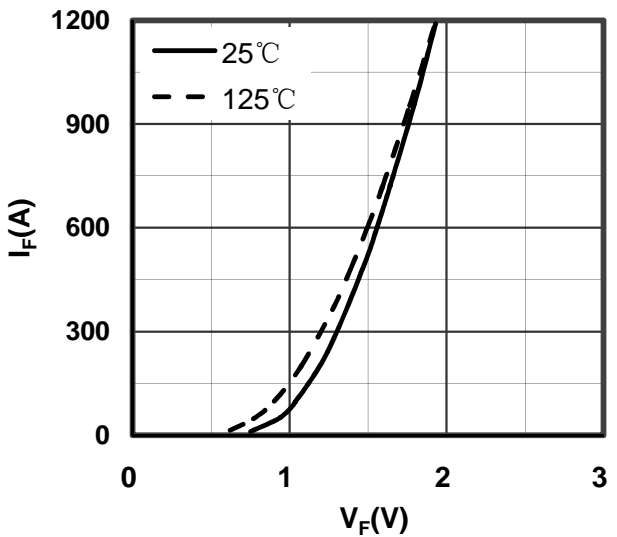


Figure 9. Diode Forward Characteristics Reverse-Diode

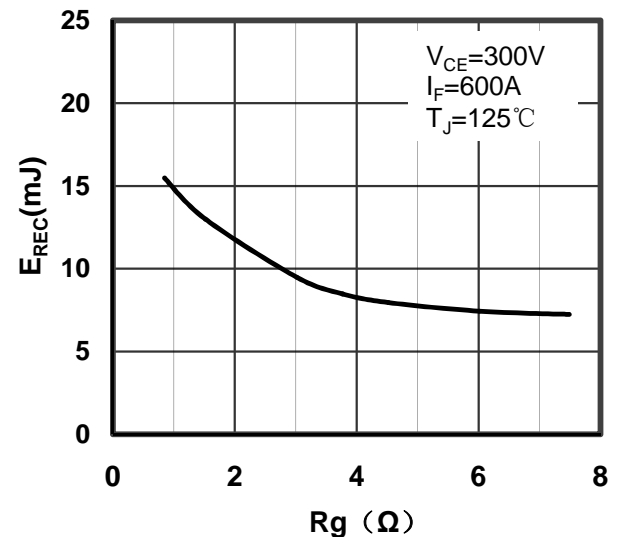


Figure 10. Switching Energy vs Gate Resistor Reverse-Diode

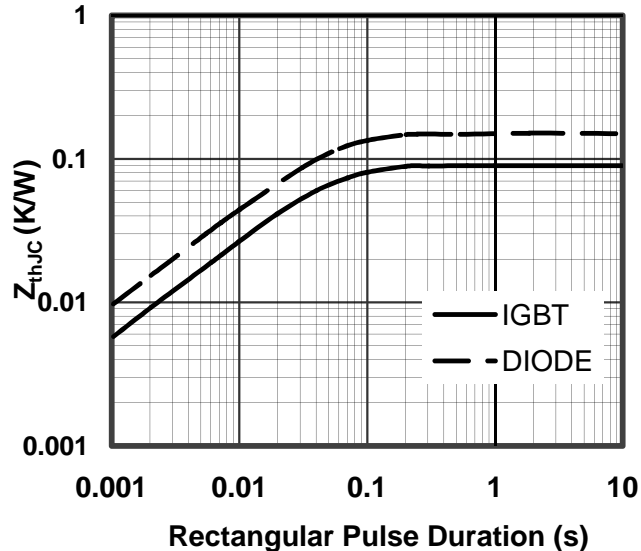
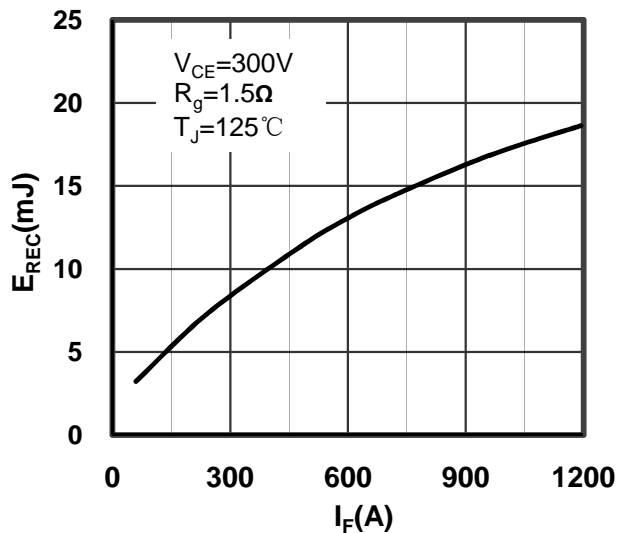
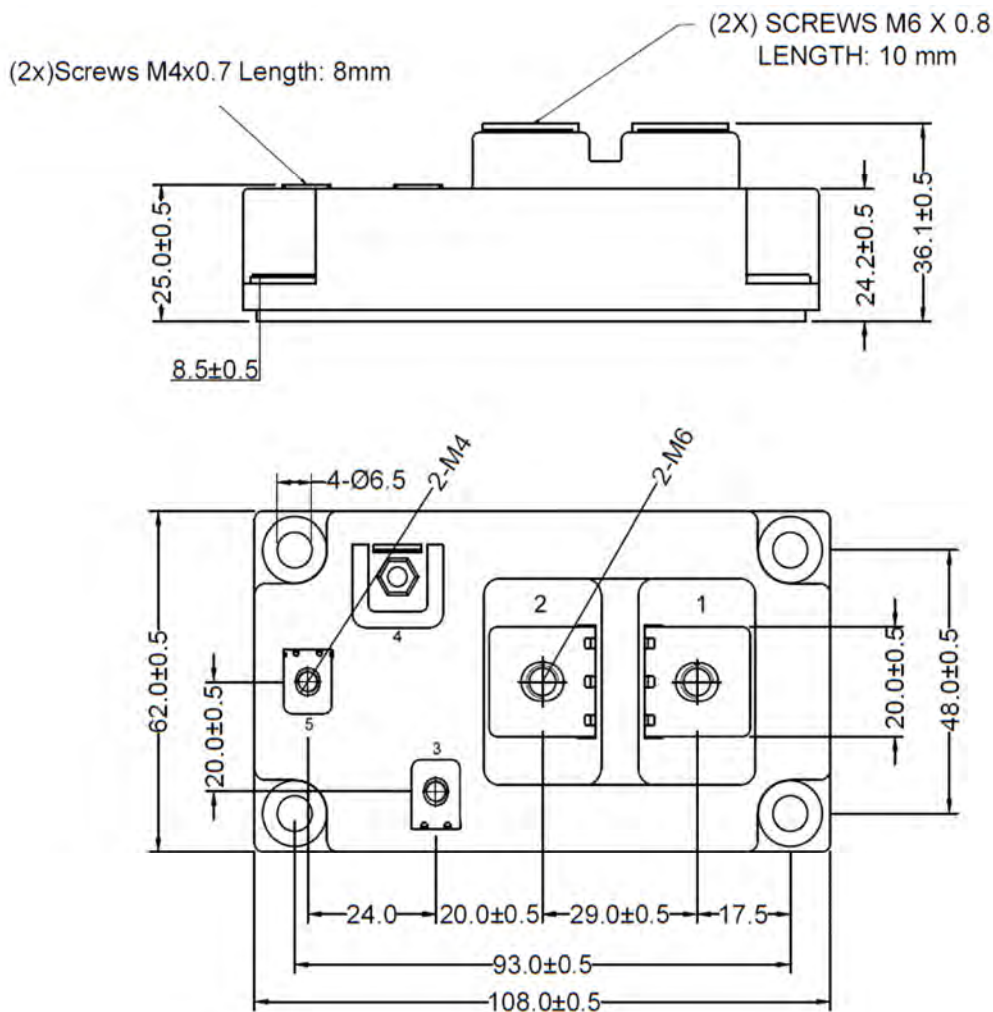


Figure 11. Switching Energy vs Forward Current Reverse-Diode

Figure 12. Transient Thermal Impedance of IGBT-Inverter and Reverse-Diode



Dimensions in (mm)
Figure 13. Package Outline