

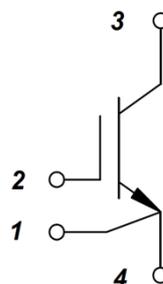
## PRODUCT FEATURES

- High Short Circuit Capability
- Free wheeling diodes with fast and soft reverse recovery
- $V_{CE(sat)}$  with positive temperature coefficient
- Ultra Low Loss, High Ruggedness
- Popular SOT-227 Package



## APPLICATIONS

- Inverter Convertor
- Welder SMPS and UPS
- Induction Heating



## 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              | $T_C = 25^\circ\text{C}$ | 80       | A    |
|           |                                   | $T_C = 80^\circ\text{C}$ | 50       |      |
| $I_{CM}$  | Repetitive Peak Collector Current | $t_p = 1\text{ms}$       | 100      |      |
| $P_{tot}$ | Power Dissipation Per IGBT        |                          | 416      | W    |

### MODULE CHARACTERISTICS

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

| Symbol     | Parameter/Test Conditions   |                                       | Values  | Unit             |
|------------|-----------------------------|---------------------------------------|---------|------------------|
| $T_{Jmax}$ | Max. Junction Temperature   |                                       | 150     | $^\circ\text{C}$ |
| $T_{Jop}$  | Operating Temperature       |                                       | -40~125 |                  |
| $T_{stg}$  | Storage Temperature         |                                       | -40~125 |                  |
| $V_{isol}$ | Isolation Breakdown Voltage | AC, 50Hz(R.M.S), $t = 1\text{minute}$ | 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                |

# 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                   | $V_{CE}=V_{GE}, I_C=2\text{mA}$   | 5.0                     | 6.2  | 7.0  | V             |    |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage             | $I_C=50\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$   |                         | 1.8  | 2.4  |               |    |
|               |  | $I_C=50\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$  |                         | 2.0  |      |               |    |
| $I_{CES}$     | 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                         |   |                         | 10   |      | $\Omega$      |    |
| $Q_g$         | Gate Charge                                      | $V_{CE}=600\text{V}, I_C=50\text{A}, V_{GE}=\pm 15\text{V}$   |                         | 0.6  |      | $\mu\text{C}$ |    |
| $C_{ies}$     | Input Capacitance                                | $V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$  |                         | 4.29 |      | nF            |    |
| $C_{res}$     | Reverse Transfer Capacitance                     |   |                         |      | 200  |               | pF |
| $t_{d(on)}$   | Turn on Delay Time                               | $V_{CC}=600\text{V}, I_C=50\text{A}$<br>$R_G=15\Omega,$<br>$V_{GE}=\pm 15\text{V},$<br>Inductive Load | $T_J=25^\circ\text{C}$  |      | 230  |               | ns |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 260  |               | ns |
| $t_r$         | Rise Time  |   | $T_J=25^\circ\text{C}$  |      | 60   |               | ns |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 60   |               | ns |
| $t_{d(off)}$  | Turn off Delay Time                              | $V_{CC}=600\text{V}, I_C=50\text{A}$<br>$R_G=15\Omega,$<br>$V_{GE}=\pm 15\text{V},$<br>Inductive Load | $T_J=25^\circ\text{C}$  |      | 480  |               | ns |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 550  |               | ns |
| $t_f$         | Fall Time  |   | $T_J=25^\circ\text{C}$  |      | 60   |               | ns |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 75   |               | ns |
| $E_{on}$      | Turn on Energy                                   | $V_{CC}=600\text{V}, I_C=50\text{A}$<br>$R_G=15\Omega,$<br>$V_{GE}=\pm 15\text{V},$<br>Inductive Load | $T_J=25^\circ\text{C}$  |      | 4.5  |               | mJ |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 6    |               | mJ |
| $E_{off}$     | Turn off Energy                                  |   | $T_J=25^\circ\text{C}$  |      | 3.8  |               | mJ |
|               |  |   | $T_J=125^\circ\text{C}$ |      | 5.5  |               | mJ |
| $I_{sc}$      | Short Circuit Current                            | $tp_{sc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$<br>$T_J=125^\circ\text{C}, V_{CC}=900\text{V}$        |                         | 270  |      | A             |    |
| $R_{thJC}$    | Junction to Case Thermal Resistance ( Per IGBT ) |   |                         |      | 0.3  | K/W           |    |

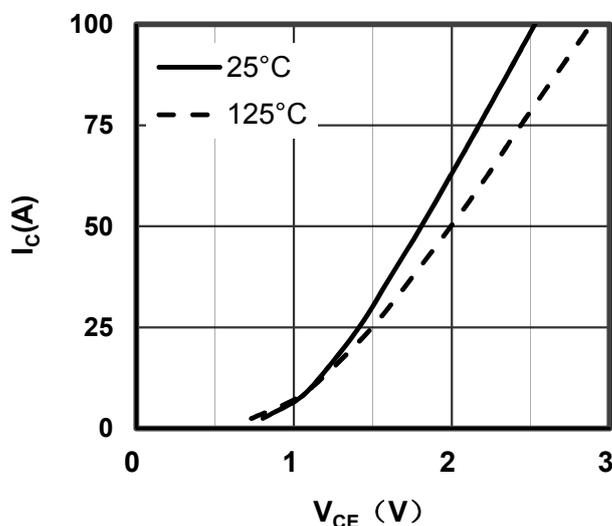


Figure 1. Typical Output Characteristics IGBT

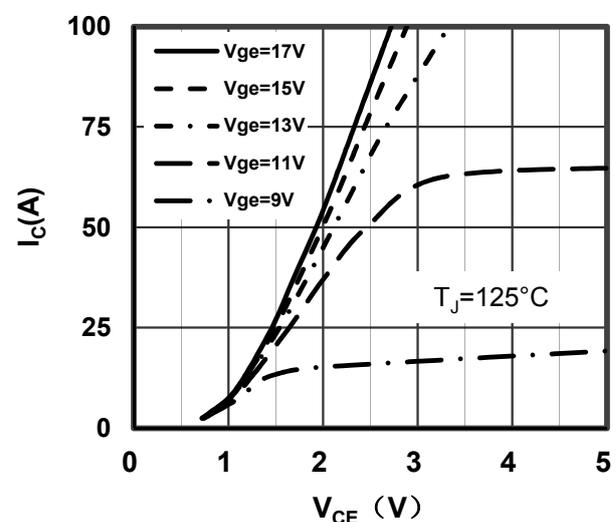


Figure 2. Typical Output Characteristics IGBT

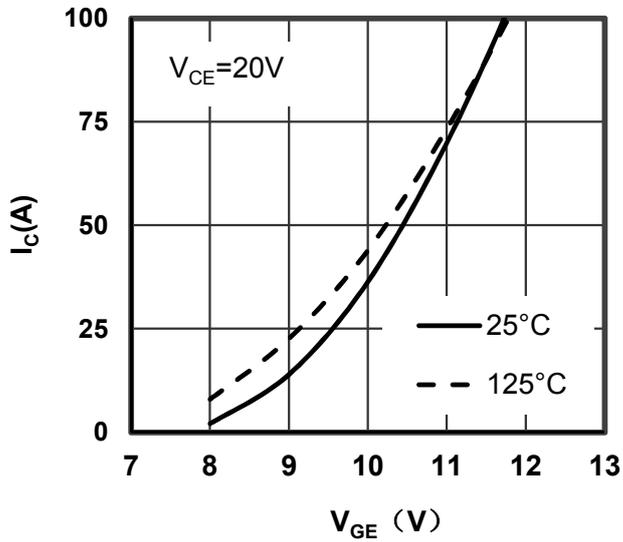


Figure 3. Typical Transfer characteristics IGBT

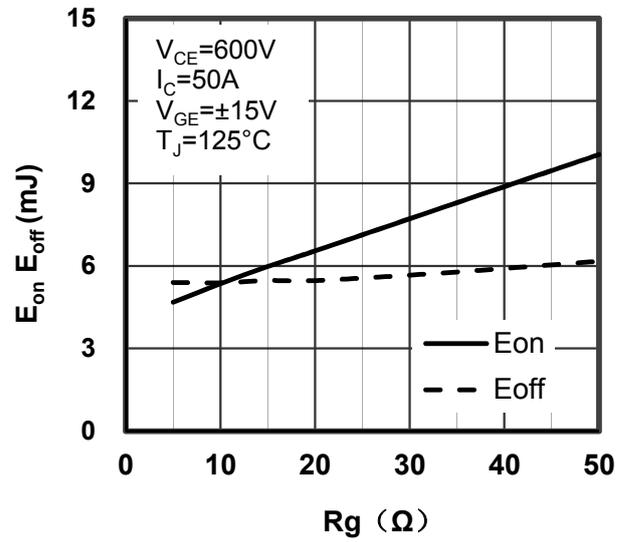


Figure 4. Switching Energy vs Gate Resistor IGBT

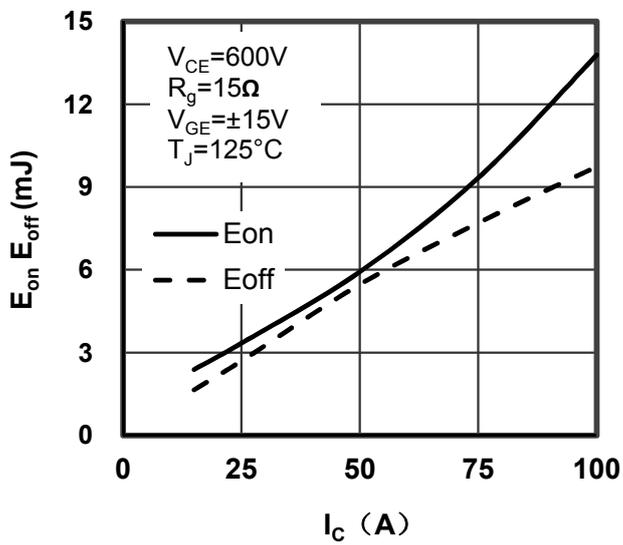


Figure 5. Switching Energy vs Collector Current IGBT

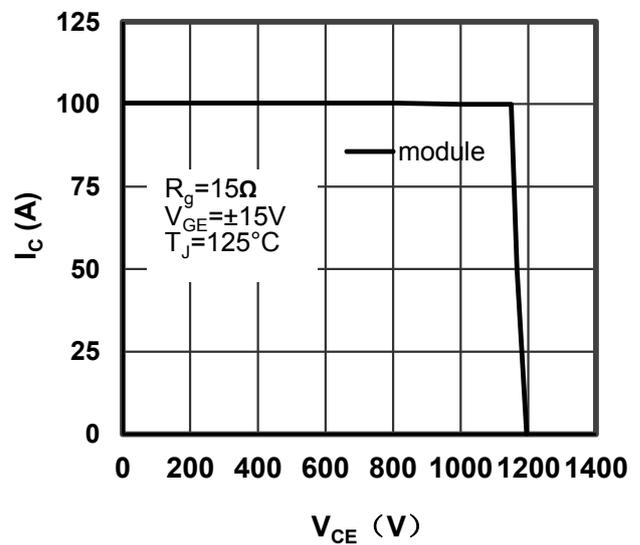


Figure 6. Reverse Biased Safe Operating Area IGBT

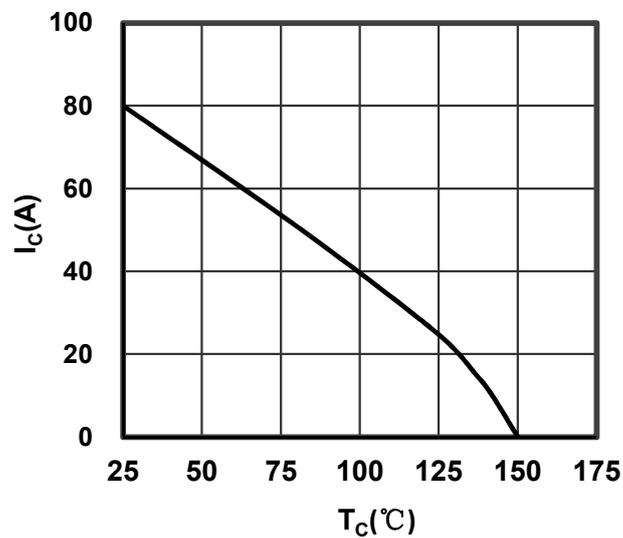


Figure 7. Collector Current vs Case temperature

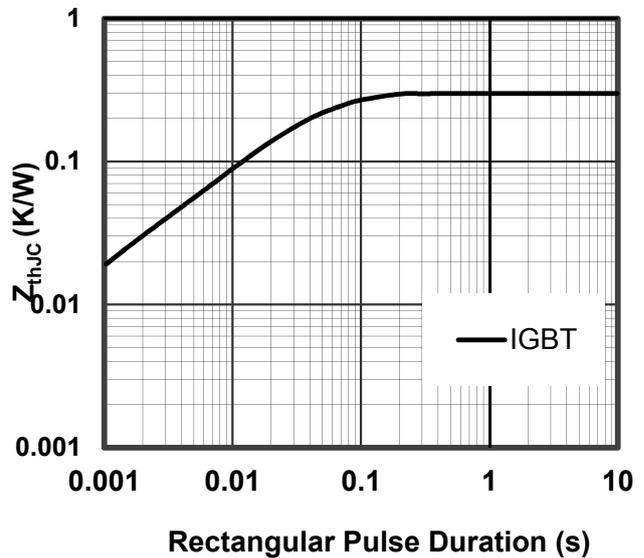
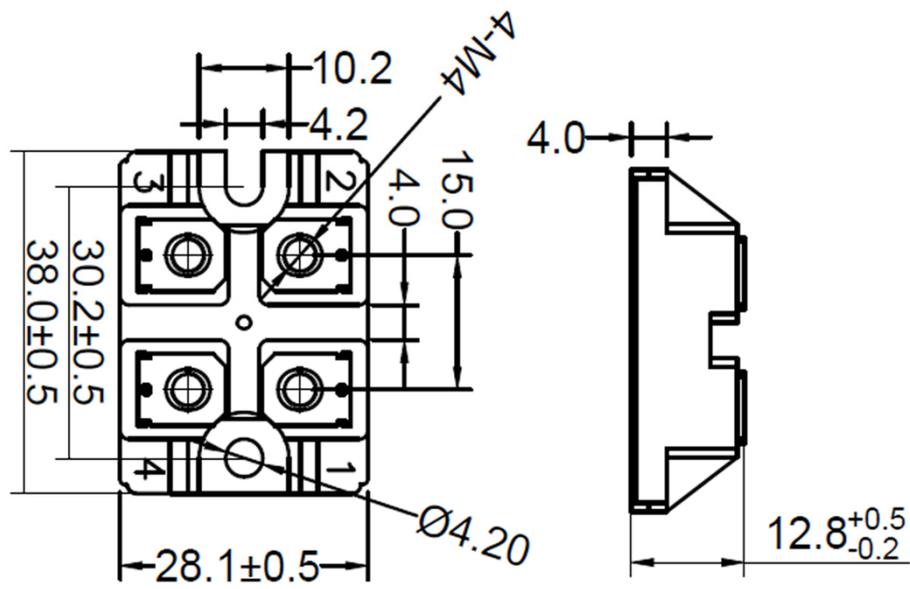


Figure 8. Transient Thermal Impedance of IGBT



Dimensions in (mm)  
Figure 9. Package Outline