

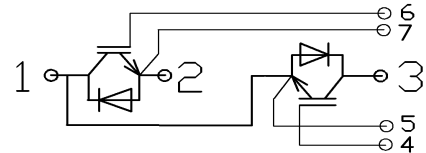
IGBT Module

Features

- 1200V 150A, $V_{CE(sat)(typ.)} = 3.0\text{ V}$
- Ultrafast switching speed
- Excellent short circuit ruggedness
- 62mm half bridge module

Mechanical Data

- **Case:** D2(6.2mm)(plastic package).
Lead free; RoHS compliant
- **Molding Compound Flammability Rating:**
UL 94 V-0



Equivalent Circuit Schematic

Benefits

- Inverter for motor drive
- AC and DC servo drive amplifier
- Excellent Current Sharing in Parallel Operation

Applications

CREATEK's IGBTs offer lower losses and higher energy for application such as motor drive ,UPS, inverter and other soft switching applications.

Absolute Maximum Ratings of IGBT

| Symbol | Parameter | Value | Units |
|-----------|--|---|------------------|
| V_{CES} | Collector to Emitter Voltage | 1200 | V |
| V_{GES} | Continuous Gate to Emitter Voltage | ± 30 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ\text{C}$ | 300 |
| | | $T_C = 100^\circ\text{C}$ | 150 |
| I_{CM} | Pulse Collector Current | $T_J = 150^\circ\text{C}$ | 300 |
| P_D | Maximum Power Dissipation (IGBT) | $T_C = 25^\circ\text{C}, T_J = 150^\circ\text{C}$ | 740 |
| t_{sc} | Short Circuit Withstand Time | > 10 | μs |
| T_J | Maximum IGBT Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{JOP} | Maximum Operating Junction Temperature Range | -40 to +150 | $^\circ\text{C}$ |
| T_{stg} | Storage Temperature Range | -40 to +125 | $^\circ\text{C}$ |

Absolute Maximum Ratings of Freewheeling Diode

| Symbol | Parameter | Value | Units |
|-----------|--|---------------------------|-------|
| V_{RRM} | Repetitive Peak Reverse Voltage Preliminary Data | 1200 | V |
| I_F | Diode Continuous Forward Current | $T_C = 25^\circ\text{C}$ | 300 |
| | Diode Continuous Forward Current | $T_C = 100^\circ\text{C}$ | 150 |
| I_{FM} | Diode Maximum Forward Current | 300 | A |

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

| Symbol | Parameter | TestConditions | Min. | Typ. | Max. | Units | |
|---------------|--|---------------------------------|-----------------------------|------|------|-------|---|
| BV_{CES} | Collector to Emitter Breakdown Voltage | $V_{GE} = 0V, I_C = 1mA$ | 1200 | | | V | |
| I_{CES} | Collector to Emitter Leakage Current | $V_{GE} = 0V, V_{CE} = V_{CES}$ | | | 5 | mA | |
| I_{GES} | Gate to Emitter Leakage Current | $V_{GE} = \pm 30V, V_{CE} = 0V$ | | | 400 | nA | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $I_C = 1mA, V_{CE} = V_{GE}$ | 4.5 | | 5.7 | V | |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Module Level) | $I_C = 150A, V_{GE} = 15V$ | $T_J = 25^{\circ}\text{C}$ | | 3.00 | 3.20 | V |
| | | | $T_J = 125^{\circ}\text{C}$ | | 3.60 | | |

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

| Symbol | Parameter | TestConditions | Min. | Typ. | Max. | Units | |
|-----------------|---|--|-----------------------------|------|------|-------|----------------------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC} = 600V$ $I_C = 150A$ $R_G = 6.8\Omega$ $V_{GE} = \pm 15V$ Inductive Load | $T_J = 25^{\circ}\text{C}$ | | 40 | | ns |
| | | | $T_J = 125^{\circ}\text{C}$ | | 45 | | |
| t_r | Turn-on Rise Time | | $T_J = 25^{\circ}\text{C}$ | | 65 | | ns |
| | | | $T_J = 125^{\circ}\text{C}$ | | 70 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | $T_J = 25^{\circ}\text{C}$ | | 500 | | ns |
| | | | $T_J = 125^{\circ}\text{C}$ | | 535 | | |
| t_f | Turn-off Fall Time | | $T_J = 25^{\circ}\text{C}$ | | 100 | | ns |
| | | | $T_J = 125^{\circ}\text{C}$ | | 130 | | |
| E_{on} | Turn-on Switching Loss | | $T_J = 25^{\circ}\text{C}$ | | 6.00 | | mJ |
| | | | $T_J = 125^{\circ}\text{C}$ | | 7.40 | | |
| E_{off} | Turn-off Switching Loss | $T_J = 25^{\circ}\text{C}$ | | 3.40 | | mJ | |
| | | $T_J = 125^{\circ}\text{C}$ | | 8.00 | | | |
| Q_g | Total Gate Charge | $T_J = 25^{\circ}\text{C}$ | | 1300 | | nC | |
| R_{gint} | Integrated gate resistor | $f = 1M;$ $V_{pp} = 1V$ | $T_J = 25^{\circ}\text{C}$ | | 1.3 | | Ω |
| C_{ies} | Input Capacitance | $V_{CE} = 25V$ $V_{GE} = 0V$ $f = 1MHz$ | $T_J = 25^{\circ}\text{C}$ | | 13.0 | | nF |
| C_{oes} | Output Capacitance | | $T_J = 25^{\circ}\text{C}$ | | 1.80 | | |
| C_{res} | Reverse Transfer Capacitance | | $T_J = 25^{\circ}\text{C}$ | | 1.05 | | |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case (IGBT) | | | | | 0.169 | $^{\circ}\text{C/W}$ |

Electrical and Switching Characteristics of Freewheeling Diode

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Units |
|-----------------|--|--|---------------------|------|------|-------|--------------|
| V_F | Diode Forward Voltage | $I_F = 150A$, | $T_J = 25^\circ C$ | | 1.90 | 2.20 | V |
| | | $V_{GE} = 0V$ | $T_J = 125^\circ C$ | | 1.90 | | |
| t_{rr} | Diode Reverse Recovery Time | $I_F = 150A$, $di/dt=2240A/\mu s$, $V_{rr} = 600V$, | $T_J = 25^\circ C$ | | 130 | | ns |
| | | | $T_J = 125^\circ C$ | | 220 | | |
| I_{rr} | Diode Peak Reverse Recovery Current | | $T_J = 25^\circ C$ | | 135 | | A |
| | | | $T_J = 125^\circ C$ | | 170 | | |
| Q_{rr} | Diode Reverse Recovery Charge | | $T_J = 25^\circ C$ | | 11.0 | | nC |
| | | | $T_J = 125^\circ C$ | | 18.5 | | |
| E_{rr} | Diode Reverse Recovery Energy | | $T_J = 25^\circ C$ | | 3.40 | | mJ |
| | | | $T_J = 125^\circ C$ | | 6.60 | | |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case (Diode) | | | | | 0.175 | $^\circ C/W$ |

Absolute Maximum Ratings of Freewheeling Diode

| Symbol | Parameter | Min. | Typ. | Max. | Units |
|-----------------|--|------|------|------|--------------|
| V_{iso} | Isolation Voltage (All Terminals Shorted), $f = 50Hz$, 1minute | 2500 | | | V |
| $R_{\theta CS}$ | Case-To-Sink(Conductive Grease Applied) | | 0.1 | | $^\circ C/W$ |
| M | Power Terminals Screw: M6 | 3.0 | | 5.0 | N·m |
| M | Mounting Screw: M6 | 4.0 | | 6.0 | N·m |
| G | Weight | | 315 | | g |

Typical Characteristics ($T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

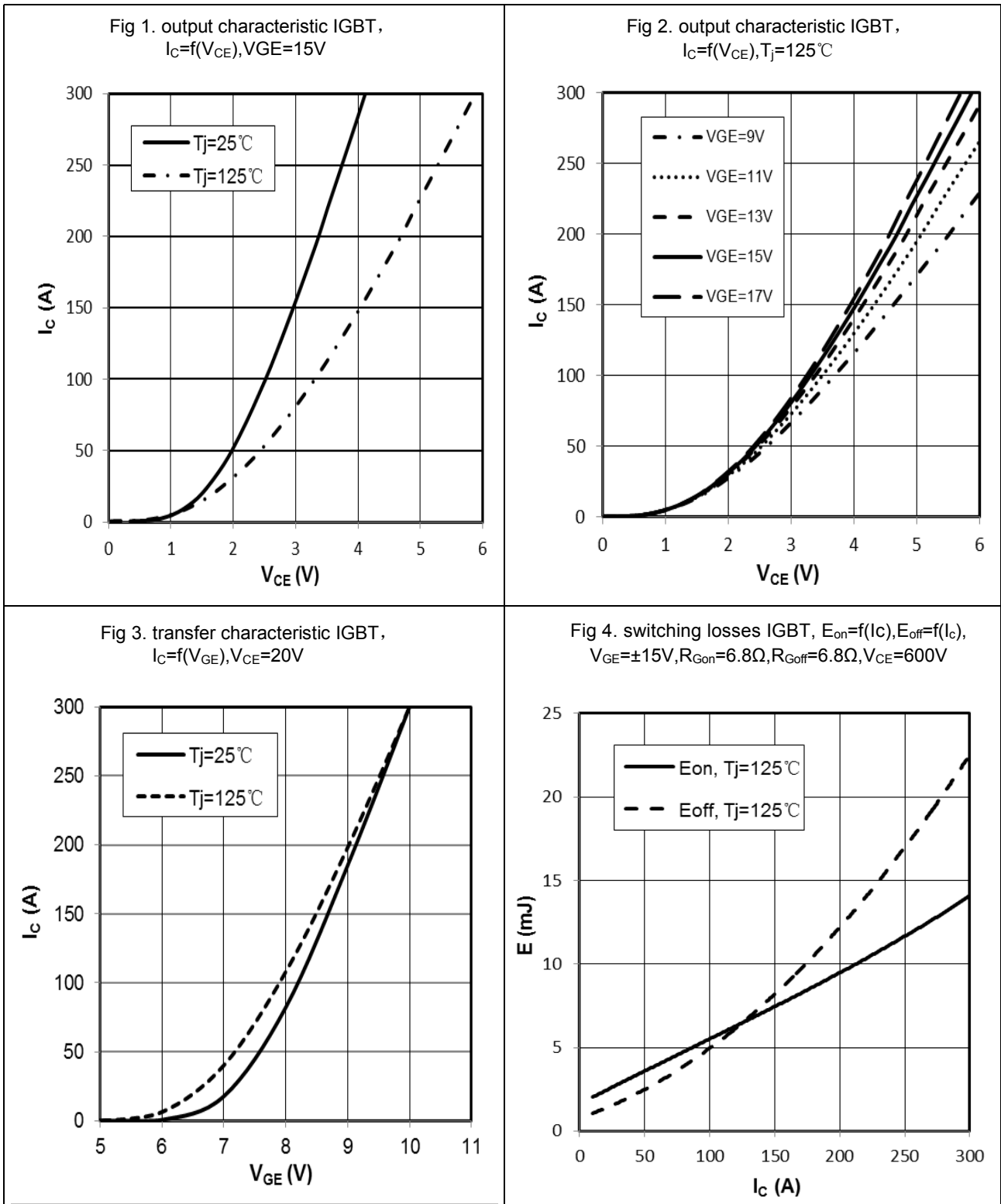


Fig 5. switching losses IGBT,

$E_{on}=f(R_g), E_{off}=f(R_g), V_{GE}=\pm 15V, I_c=150A, V_{CE}=600V$

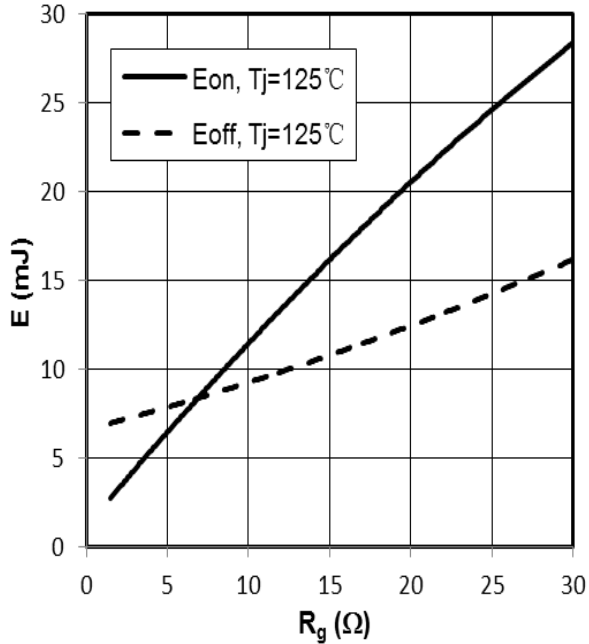


Fig 6. transient thermal impedance IGBT , $Z_{thjc}=f(t)$

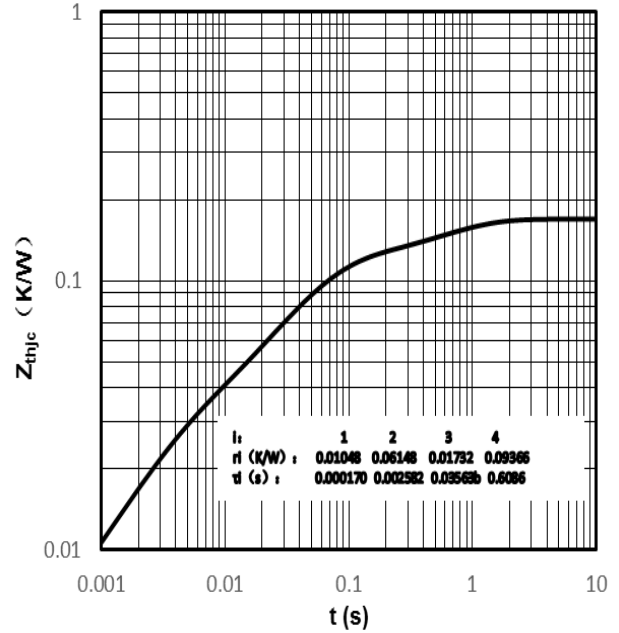


Fig 7. reverse bias safe operating area IGBT,

$I_c=f(V_{CE}), V_{GE}=\pm 15V, R_{Goff}=5.6\Omega, T_j=125^\circ C$

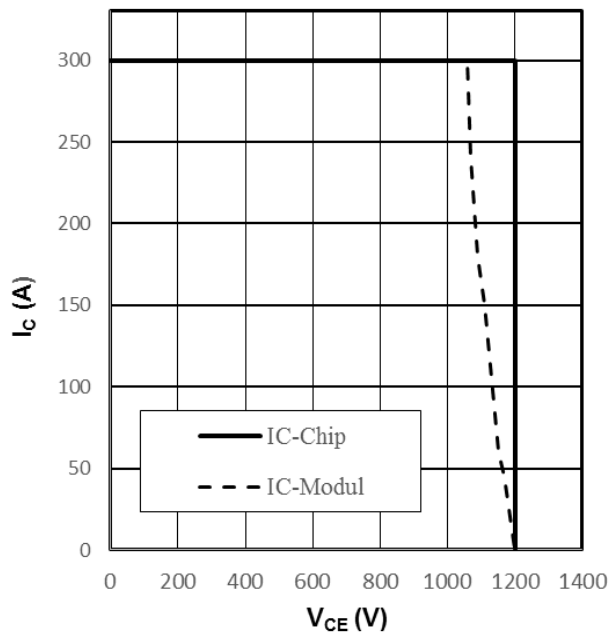


Fig 8. forward characteristic of Diode , $I_F=f(V_F)$

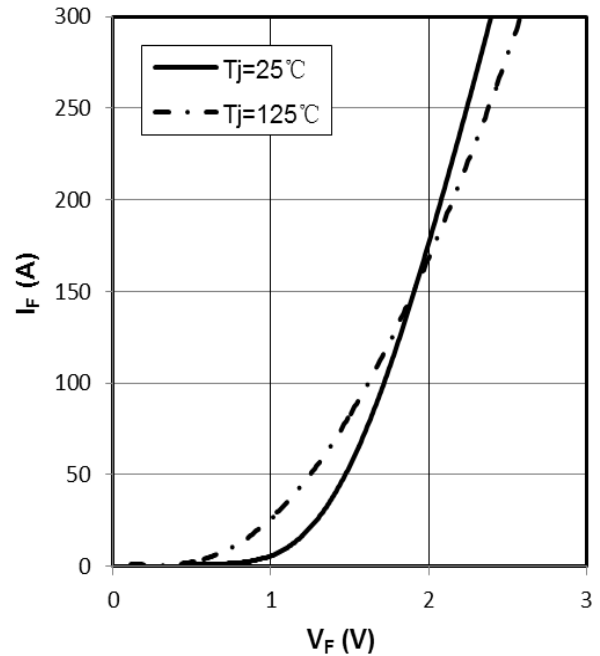


Fig 9. switching losses Diode,
 $E_{rr}=f(I_F), R_{Gon}=5.6\Omega, V_{CE}=600V$

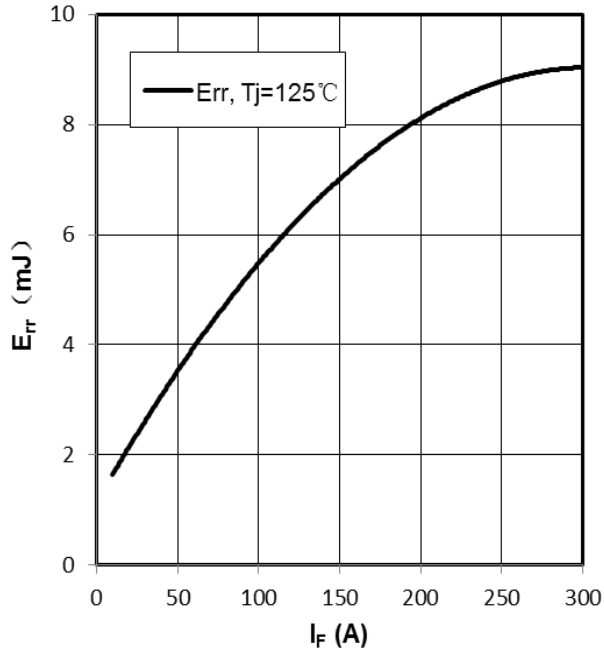
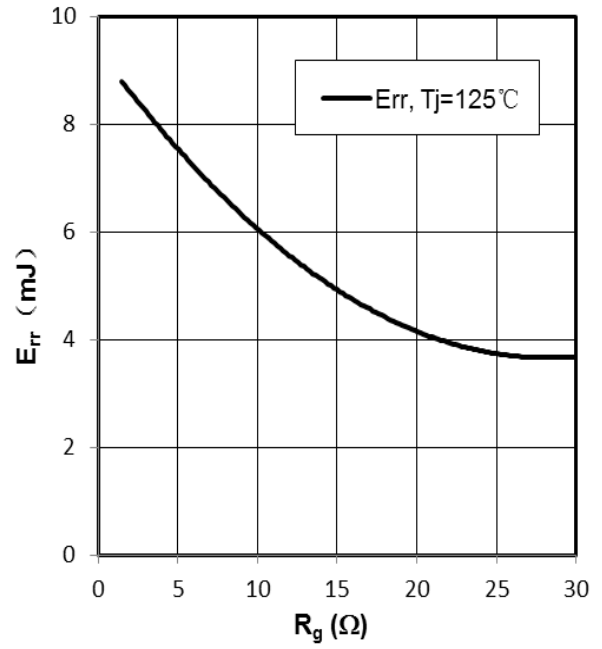
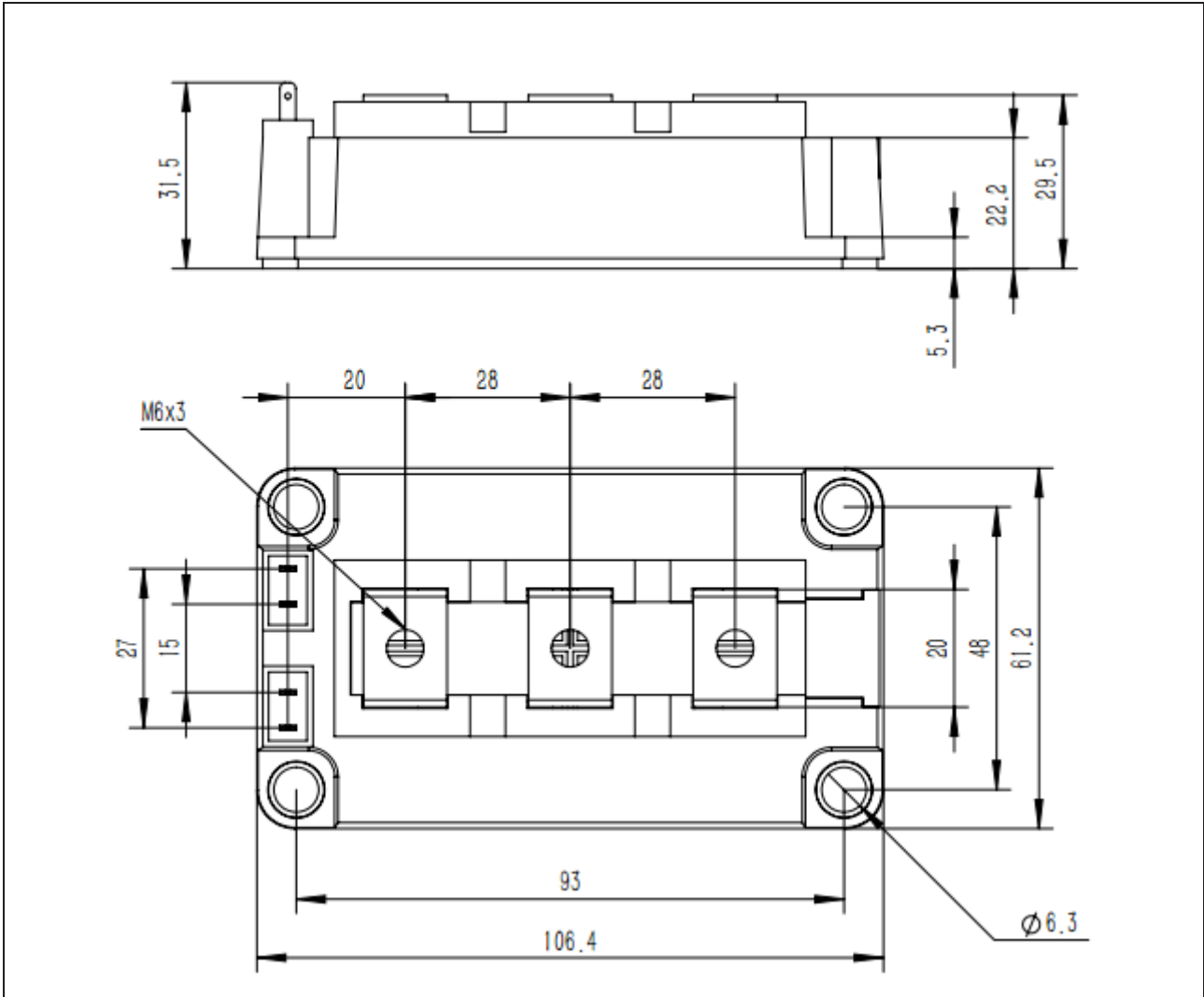


Fig 10. switching losses Diode,
 $E_{rr}=f(R_g), I_F=150A, V_{CE}=600V$



Package Dimensions(mm)



Ordering information

| Order code | Package | Packaging option | Base quantity | Packaging specification |
|---------------|----------|------------------|---------------|-------------------------|
| GPU150HF120D2 | D2(62mm) | BOX | 10pcs /BOX | |

Revision history

| Date | Revision | Changes |
|--------------|----------|-----------------|
| 23-May-2016 | 1.0 | Initial release |
| 30-July-2018 | 2.0 | Update |

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