

62mm Module with Trench/Feldstopp IGBT and Fast recovery diode.

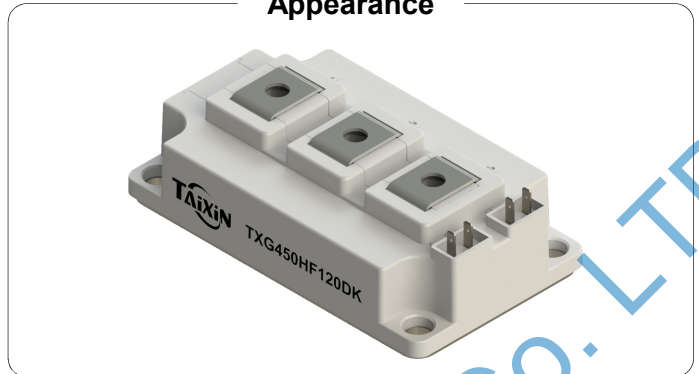
Feature

- 450A/1200V, VCE(sat)(typ.) = 2.10V@450A
- Trench/Feldstopp IGBT
- Excellent short circuit ruggedness

Applications

- High Power Converters
- Motor Drives
- Uninterrupted Power Supply(UPS)

Appearance



Maximum Ratings of IGBT ($T_{vj}=25^{\circ}\text{C}$ unless otherwise noted)

| Items | Symbol | Conditions | Maximum Rating | Units |
|---------------------------|-----------|--|----------------|-------|
| Collector-emitter voltage | V_{CES} | | 1200 | V |
| Gate-emitter voltage | V_{GES} | | ± 30 | V |
| Collector current | I_C | $T_{vj}=25^{\circ}\text{C}$ | 900 | A |
| | | $T_{vj}=100^{\circ}\text{C}$ | 450 | A |
| Pulsed collector current | I_{CM} | $t_p=1\text{ms}$ | 900 | A |
| Short circuit current | I_{sc} | $V_{GE} \leq 15\text{V}, V_{CC}=600\text{V}, t_p=10\mu\text{s}$ $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt$ | 1800 | A |
| Maximum power dissipation | P_D | $T_c=25^{\circ}\text{C}, T_{vj}=150^{\circ}\text{C}$ | 2390 | W |

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

| Items | Symbol | Conditions | Min. | typ. | Max. | Units |
|--|---------------|--|------|------|------|--------------------|
| Collector-emitter breakdown voltage | V_{CES} | $V_{GE}=0\text{V}, I_C=250\mu\text{A}$ | 1200 | | | V |
| Collector -emitter leakage current | I_{CES} | $V_{CE}=1200\text{V}, V_{GE}=0\text{V}$ | | | 5.0 | mA |
| Gate leakage current, forward | I_{GES} | $V_{GE}=30\text{V}, V_{CE}=0\text{V}$ | | | 400 | nA |
| | | $V_{GE}=-30\text{V}, V_{CE}=0\text{V}$ | | | -400 | nA |
| Gate threshold voltage | $V_{GE(th)}$ | $V_{GE}=V_{CE}, I_C=250\mu\text{A}$ | 5.00 | 5.80 | 6.60 | V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $V_{GE}=15\text{V}, I_C=450\text{A}, T_{vj}=25^{\circ}\text{C}$ | | 1.80 | 2.20 | V |
| | | $V_{GE}=15\text{V}, I_C=450\text{A}, T_{vj}=125^{\circ}\text{C}$ | | 2.10 | | V |
| Integrated gate resistor | R_{Gint} | $f=1\text{M}; V_{pp}=1\text{V}$ | | 1.85 | | Ω |
| Input capacitance | C_{ies} | $V_{CE}=25\text{V}$ | | 28.0 | | nF |
| Output capacitance | C_{oes} | $V_{GE}=0\text{V}$ | | tdb. | | nF |
| Reverse transfer capacitance | C_{res} | $f=1\text{MHz}$ | | 1.10 | | nF |
| Total gate charge | Q_g | $V_{CC}=600\text{V}, V_{GE}=15\text{V}, I_C=450\text{A}$ | | 3.60 | | μC |
| Turn-on delay time | $t_{d(on)}$ | $V_{CC}=600\text{V}$ | | 160 | | ns |
| Rise time | t_r | $V_{GE}=\pm 15\text{V}$ | | 40 | | ns |
| Turn-off delay time | $t_{d(off)}$ | $I_C=450\text{A}$ | | 450 | | ns |
| Fall time | t_f | $R_G=1.2\Omega$ | | 100 | | ns |
| Turn-on energy loss per pulse | E_{on} | Inductive Load $T_{vj}=25^{\circ}\text{C}$ | | 19.0 | | mJ |
| Turn-off energy loss per pulse | E_{off} | | | 26.0 | | mJ |
| Turn-on delay time | $t_{d(on)}$ | $V_{CC}=600\text{V}$ | | 170 | | ns |
| Rise time | t_r | $V_{GE}=\pm 15\text{V}$ | | 45 | | ns |
| Turn-off delay time | $t_{d(off)}$ | $I_C=450\text{A}$ | | 520 | | ns |
| Fall time | t_f | $R_G=1.2\Omega$ | | 160 | | ns |
| Turn-on energy loss per pulse | E_{on} | Inductive Load $T_{vj}=125^{\circ}\text{C}$ | | 30.0 | | mJ |
| Turn-off energy loss per pulse | E_{off} | | | 40.0 | | mJ |
| Temperature under switching conditions | $T_{vj op}$ | | -55 | | 150 | $^{\circ}\text{C}$ |

Maximum Ratings of Diode

| Items | Symbol | Conditions | Maximum Rating | Units |
|----------------------------------|-----------|-------------------------------|----------------|-------|
| Repetitive peak reverse voltage | V_{RRM} | $T_{vj}=25^{\circ}C$ | 1200 | V |
| Diode continuous forward current | I_F | $T_{vj}=25^{\circ}C$ | 800 | A |
| | | $T_{vj}=100^{\circ}C$ | 450 | A |
| Diode maximum forward current | I_{FM} | $t_p=1ms, T_{vj}=25^{\circ}C$ | 900 | A |

Electrical Characteristics of Diode ($T_{vj}=25^{\circ}C$ unless otherwise noted)

| Items | Symbol | Conditions | Min. | typ. | Max. | Units |
|-------------------------------------|-----------|---------------------------------|------|------|------|---------|
| Diode forward voltage | V_F | $I_F=450A, T_{vj}=25^{\circ}C$ | | 1.75 | 2.20 | V |
| | | $I_F=450A, T_{vj}=125^{\circ}C$ | | 1.70 | | V |
| Diode reverse recovery time | t_{rr} | $V_{CE}=600V$ | | tb. | | ns |
| Diode peak reverse recovery current | I_{rr} | $I_F=450A$ | | 490 | | A |
| Diode reverse recovery charge | Q_{rr} | $dI_F/dt=1900A/\mu s$ | | 44.0 | | μC |
| Reverse recovery energy | E_{rec} | $T_{vj}=25^{\circ}C$ | | 19.0 | | mJ |
| Diode reverse recovery time | t_{rr} | $V_{CE}=600V$ | | tb. | | ns |
| Diode peak reverse recovery current | I_{rr} | $I_F=450A$ | | 550 | | A |
| Diode reverse recovery charge | Q_{rr} | $dI_F/dt=1900A/\mu s$ | | 80.0 | | nC |
| Reverse recovery energy | E_{rec} | $T_{vj}=125^{\circ}C$ | | 35.0 | | mJ |

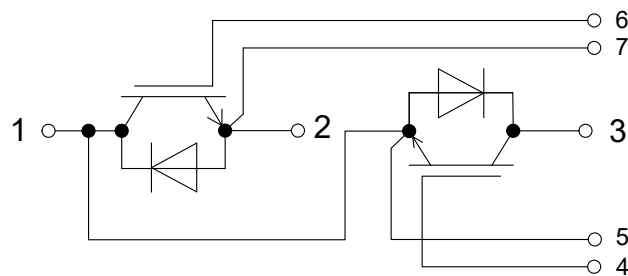
Thermal Characteristics

| Items | Symbol | Min. | typ. | Max. | Units |
|---|-------------|------|------|------|---------------|
| Thermal resistance, junction to case for IGBT | R_{thj-c} | | | 0.11 | $^{\circ}C/W$ |
| Thermal resistance, case to sink | R_{thc-s} | | 0.06 | | $^{\circ}C/W$ |

Module Characteristics

| Items | Symbol | Conditions | Min. | typ. | Max. | Units |
|------------------------------------|------------|------------------------------|------|-----------|------|-------------|
| Material of module baseplate | | | | Cu | | |
| Internal isolation | | terminal to terminal | | Al_2O_3 | | |
| Isolation test voltage | V_{isol} | RMS, $f = 50 Hz, t = 1 min.$ | 2.5 | | | kV |
| Stray inductance module | L_{sCE} | | | 30 | | nH |
| Mounting torque for modul mounting | M | Screw M6 | 3.0 | | 5.0 | Nm |
| Terminal connection torque | M | Screw M5 | 4.0 | | 6.0 | Nm |
| Storage temperature range | T_{STG} | | -55 | | 150 | $^{\circ}C$ |
| Weight of Module | W_t | | | 160 | | g |

Internal Circuit:



Representative Characteristics

Fig 1. Output characteristic IGBT

$$I_C = f(V_{CE}), V_{GE} = 15V$$

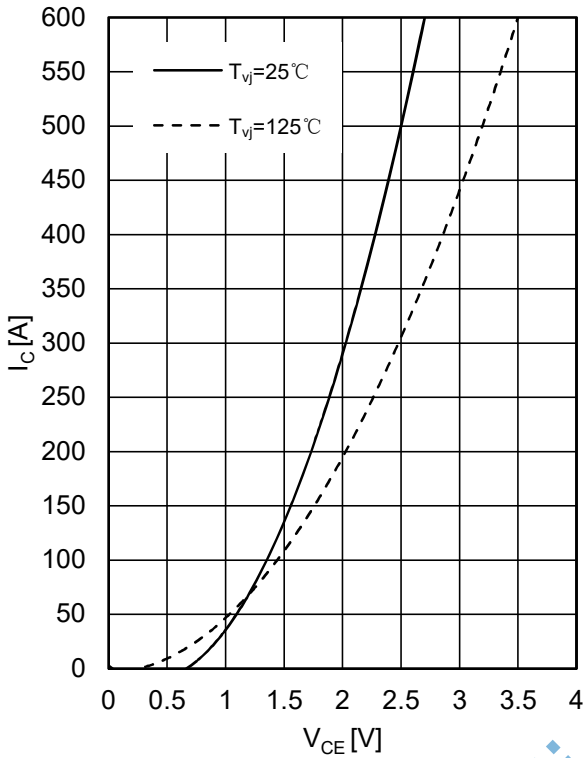


Fig 2. Output characteristic IGBT

$$I_C = f(V_{CE})$$

$$T_{vj} = 125^\circ C$$

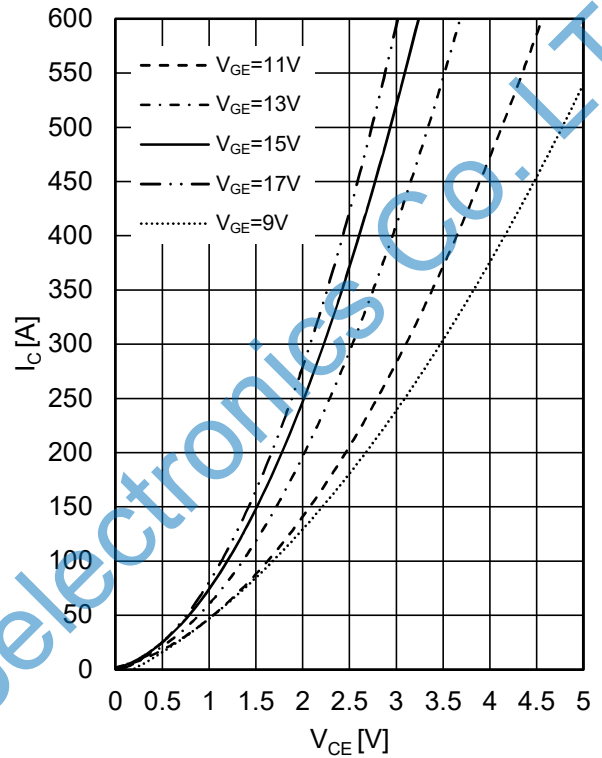


Fig 3. Transfer characteristic IGBT

$$I_C = f(V_{GE})$$

$$V_{CE} = 20V$$

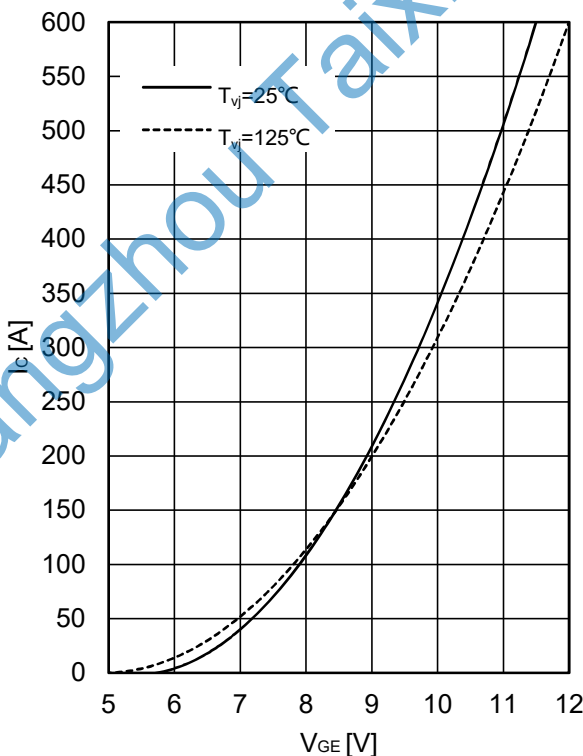


Fig 4. Switching losses IGBT

$$E_{on} = f(I_C), E_{off} = f(I_C)$$

$$V_{GE} = \pm 15V, R_G = 1.2\Omega, V_{CE} = 600V$$

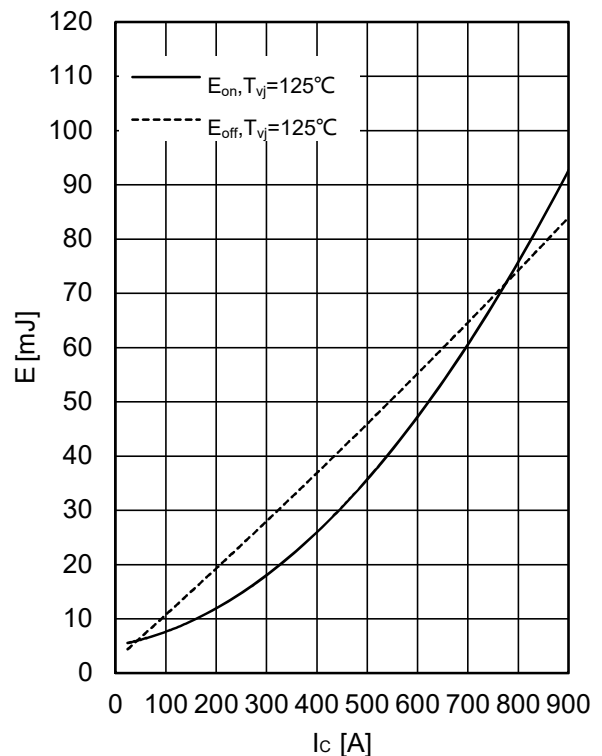


Fig 5. Switching losses IGBT

$$E_{on}=f(R_G), E_{off}=f(R_G),$$

$$V_{GE}=\pm 15V, I_C=450A, V_{CE}=600V$$

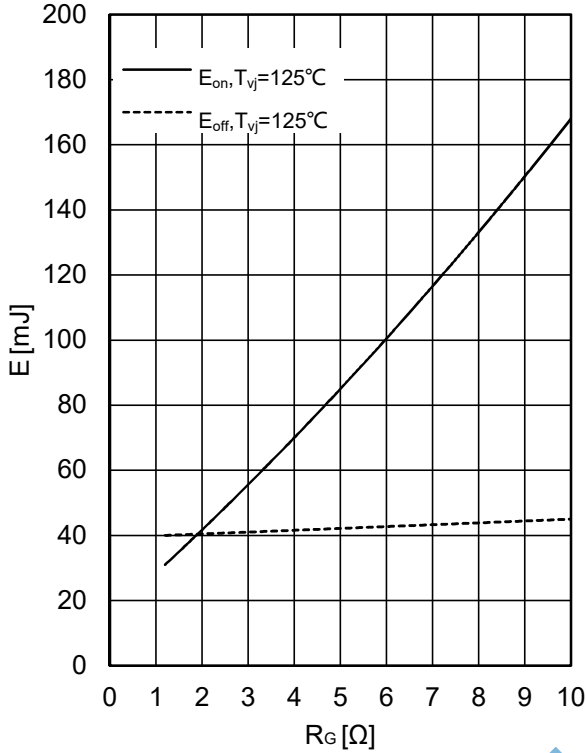


Fig 6. Transient thermal impedance IGBT

$$Z_{thjc}=f(t)$$

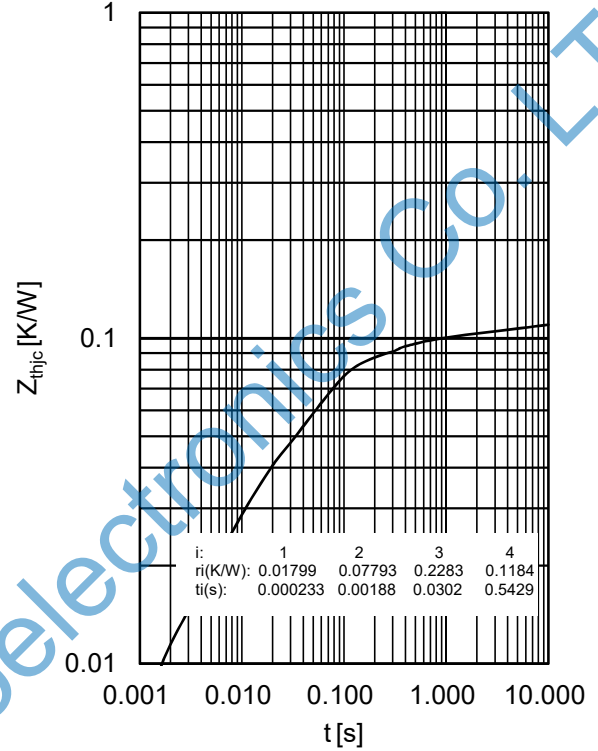


Fig 7. Reverse bias safe operating area IGBT,

$$I_C=f(V_{CE})$$

$$V_{GE}=\pm 15V, R_{Goff}=1.2\Omega, T_{vj}=125^\circ C$$

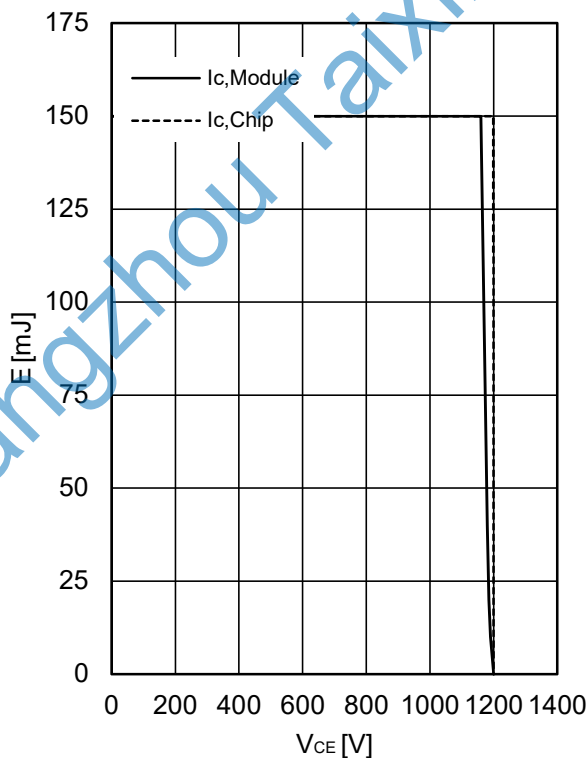


Fig 8. Forward characteristic of Diode

$$I_F=f(V_F)$$

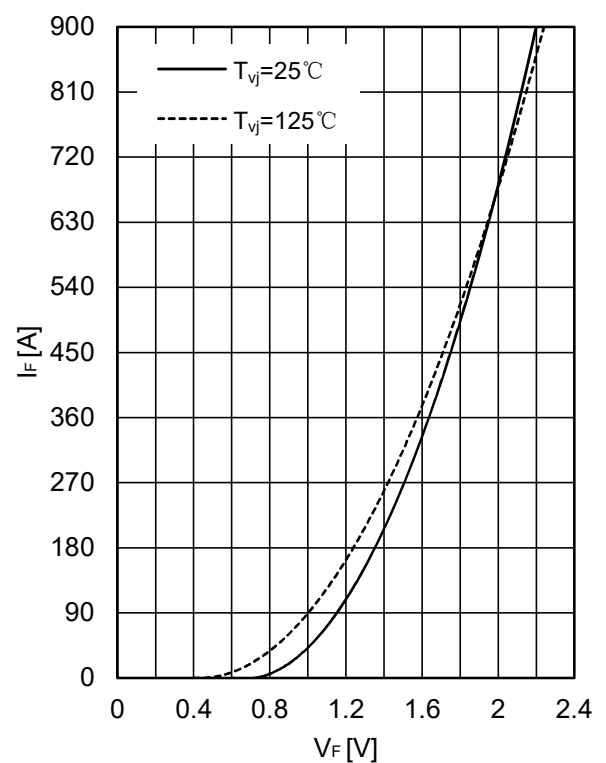


Fig 9. Switching losses Diode

$$E_{rec} = f(I_F)$$

$R_G = 1.2\Omega, V_{CE} = 600V$

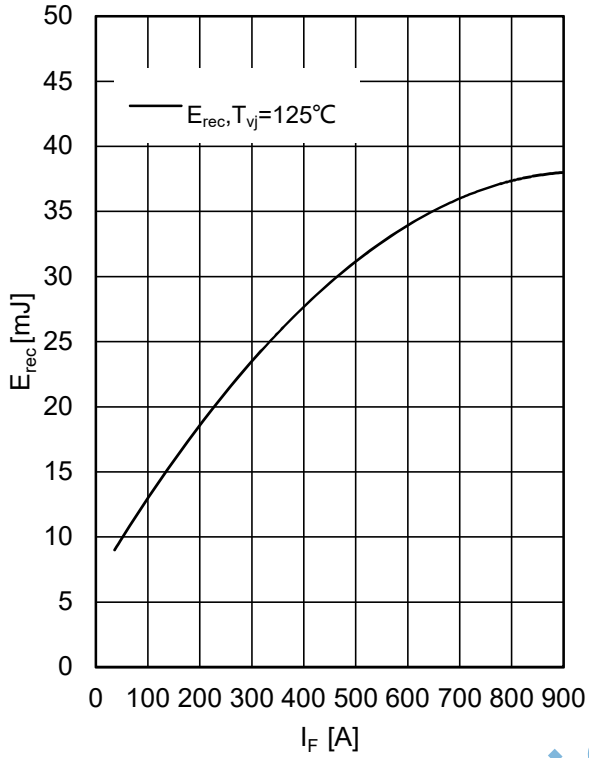
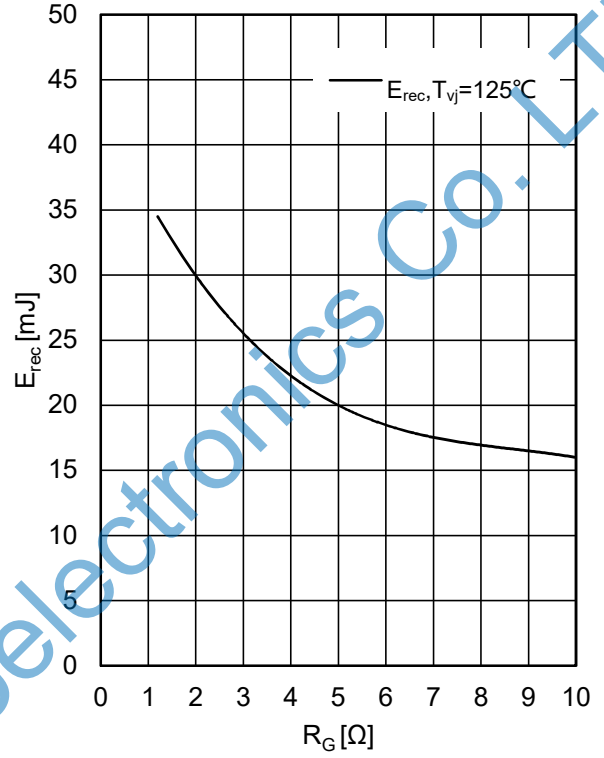


Fig 10. Switching losses Diode

$$E_{rec} = f(R_G)$$

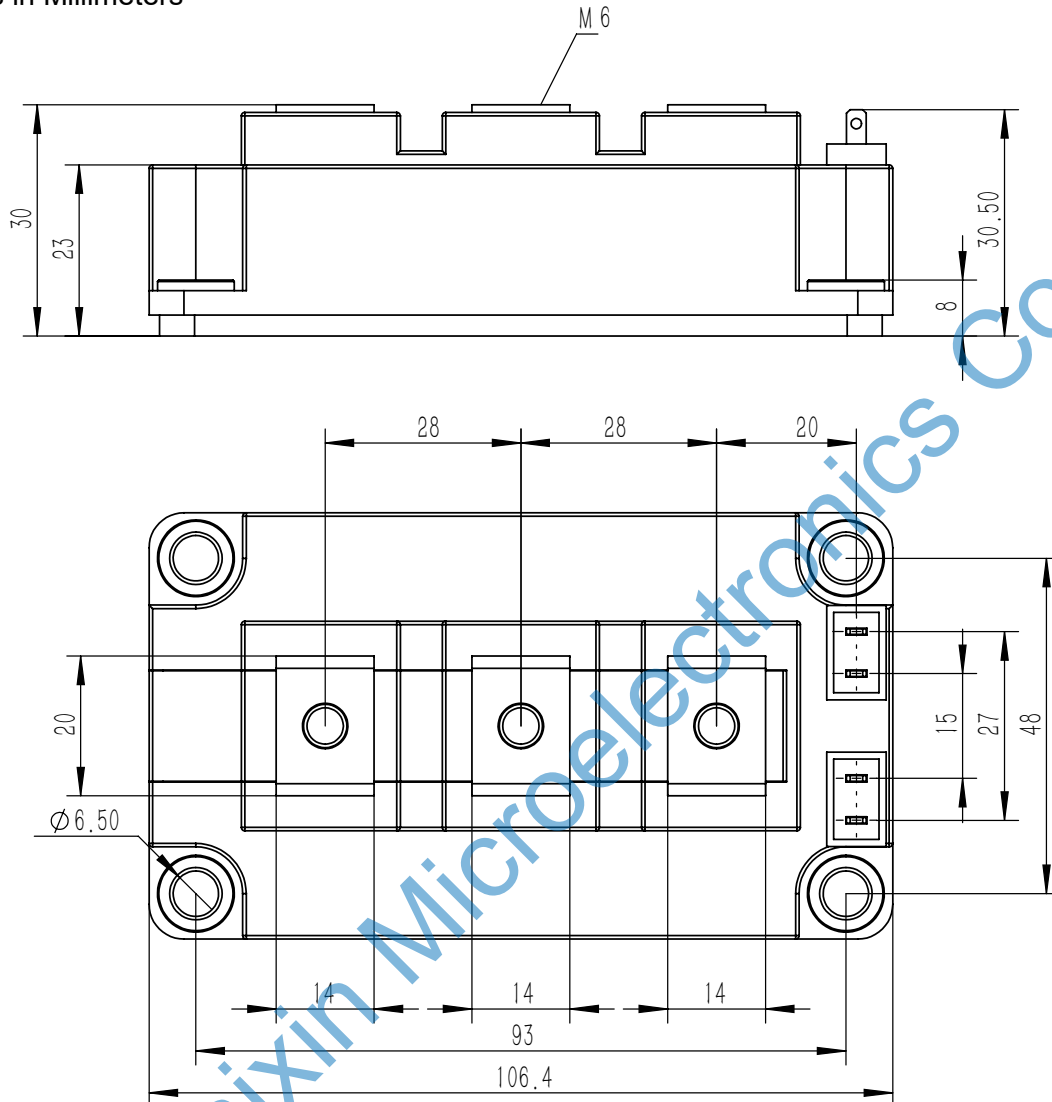
$I_F = 450A, V_{CE} = 600V$



Hangzhou Taixin Microelectronics Co., Ltd.

Package Dimensions

Dimensions in Millimeters



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