

62mm Module with Ultrafast switching speed IGBT and Fast recovery diode.

#### Feature

- 150A/1200V,  $V_{CE(sat)(typ.)} = 2.9V@150A$
- Ultrafast switching speed
- Excellent short circuit ruggedness

#### Applications

- Inverter welding
- Inductive heating
- Uninterrupted Power Supply(UPS)

#### Appearance



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

Items	Symbol	Conditions	Maximum Rating	Units
Collector-emitter voltage	$V_{CES}$		1200	V
Gate-emitter voltage	$V_{GES}$		$\pm 30$	V
Collector current	$I_C$	$T_{vj}=25^{\circ}C$	300	A
		$T_{vj}=100^{\circ}C$	150	A
Pulsed collector current	$I_{CM}$	$t_p=1ms$	300	A
Short circuit current	$I_{sc}$	$V_{GE} \leq 15V, V_{CC}=600V, t_p=10\mu s$ $V_{CEmax}=V_{CES}-L_s \cdot di/dt$	1040	A
Maximum power dissipation	$P_D$	$T_c=25^{\circ}C, T_{vj}=150^{\circ}C$	1250	W

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

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Collector-emitter breakdown voltage	$V_{CES}$	$V_{GE}=0V, I_C=250\mu A$	1200			V
Collector -emitter leakage current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$			5.0	mA
Gate leakage current, forward	$I_{GES}$	$V_{GE}=20V, V_{CE}=0V$			400	nA
		$V_{GE}=-20V, V_{CE}=0V$			-400	nA
Gate threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=5mA$	5.1	5.8	6.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=150A, T_{vj}=25^{\circ}C$		2.9	3.2	V
		$V_{GE}=15V, I_C=150A, T_{vj}=125^{\circ}C$		3.5	3.8	V
Integrated gate resistor	$R_{Gint}$	$f=1M; V_{pp}=1V$		2.5		$\Omega$
Input capacitance	$C_{ies}$	$V_{CE}=25V$		11		nF
Output capacitance	$C_{oes}$	$V_{GE}=0V$		1.2		nF
Reverse transfer capacitance	$C_{res}$	$f=1MHz$		0.5		nF
Total gate charge	$Q_g$	$V_{CC}=600V, V_{GE}=15V$		1.6		$\mu C$
Turn-on delay time	$t_{d(on)}$	$V_{CC}=600V$		72		ns
Rise time	$t_r$	$V_{GE}=\pm 15V$		77		ns
Turn-off delay time	$t_{d(off)}$	$I_C=150A$		428		ns
Fall time	$t_f$	$R_G=3\Omega$		146		ns
Turn-on energy loss per pulse	$E_{on}$	Inductive Load		7.0		mJ
Turn-off energy loss per pulse	$E_{off}$	$T_{vj}=125^{\circ}C$		11.9		mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=600V$		73		ns
Rise time	$t_r$	$V_{GE}=\pm 15V$		77		ns
Turn-off delay time	$t_{d(off)}$	$I_C=150A$		435		ns
Fall time	$t_f$	$R_G=3\Omega$		156		ns
Turn-on energy loss per pulse	$E_{on}$	Inductive Load		7.8		mJ
Turn-off energy loss per pulse	$E_{off}$	$T_{vj}=150^{\circ}C$		12.3		mJ
Temperature under switching conditions	$T_{vj op}$		-55		150	$^{\circ}C$

#### Maximum Ratings of Diode

Items	Symbol	Conditions	Maximum Rating	Units
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj}=25^{\circ}\text{C}$	1200	V
Diode continuous forward current	$I_F$	$T_{vj}=25^{\circ}\text{C}$	300	A
		$T_{vj}=100^{\circ}\text{C}$	150	A
Diode maximum forward current	$I_{FM}$	$t_p=1\text{ms}, T_{vj}=25^{\circ}\text{C}$	300	A

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

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Diode forward voltage	$V_F$	$I_F=150\text{A}, T_{vj}=25^{\circ}\text{C}$		3.0	3.2	V
		$I_F=150\text{A}, T_{vj}=125^{\circ}\text{C}$		2.3		V
Diode reverse recovery time	$t_{rr}$	$V_{CE}=600\text{V}$		80		ns
Diode peak reverse recovery current	$I_{rr}$	$I_F=150\text{A}$		105		A
Diode reverse recovery charge	$Q_{rr}$	$dI_F/dt=2780\text{A}/\mu\text{s}$		8.7		nC
Reverse recovery energy	$E_{rec}$	$T_{vj}=125^{\circ}\text{C}$		5.0	5.2	mJ
Diode reverse recovery time	$t_{rr}$	$V_{CE}=600\text{V}$		300		ns
Diode peak reverse recovery current	$I_{rr}$	$I_F=150\text{A}$		290		A
Diode reverse recovery charge	$Q_{rr}$	$dI_F/dt=2780\text{A}/\mu\text{s}$		46.5		nC
Reverse recovery energy	$E_{rec}$	$T_{vj}=150^{\circ}\text{C}$		6.0	6.3	mJ

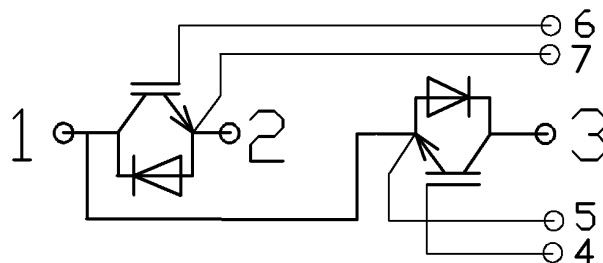
#### Thermal Characteristics

Items	Symbol	Min.	typ.	Max.	Units
Thermal resistance, junction to case for IGBT	$R_{th\ j-c}$			0.13	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to case for Diode	$R_{th\ j-c}$			0.11	$^{\circ}\text{C}/\text{W}$
Thermal resistance, case to sink	$R_{th\ c-s}$		0.10		$^{\circ}\text{C}/\text{W}$

#### Module Characteristics

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Material of module baseplate				Cu		
Internal isolation		terminal to terminal		$\text{Al}_2\text{O}_3$		
Isolation test voltage	$V_{isol}$	RMS, $f = 50\text{ Hz}$ , $t = 1\text{ min.}$	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	$^{\circ}\text{C}$
Weight of Module	$W_t$			315		g

#### Internal Circuit:



### Representative Characteristics

Fig 1. Output characteristic IGBT

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

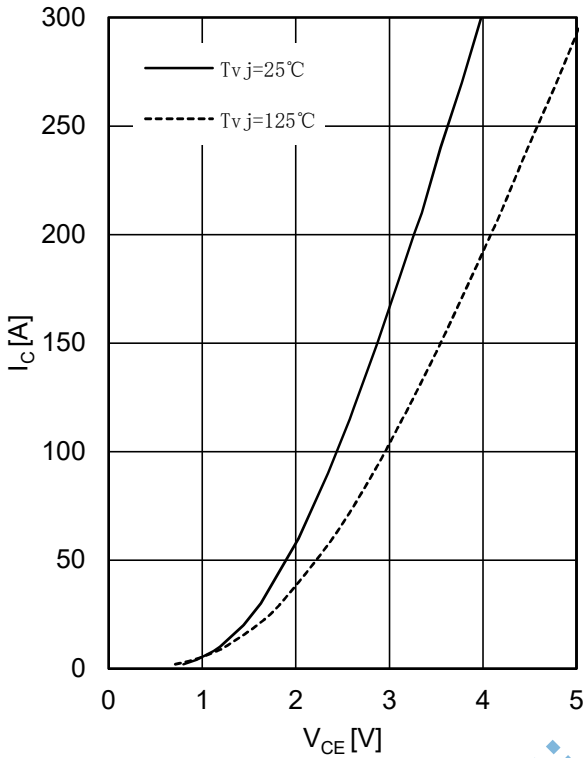


Fig 2. Output characteristic IGBT

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

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

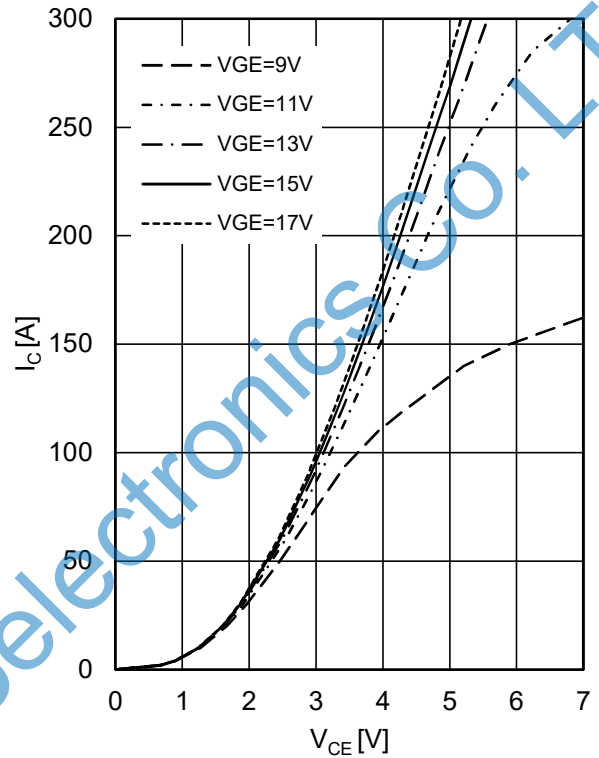


Fig 3. Transfer characteristic IGBT

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

$$V_{CE} = 20V$$

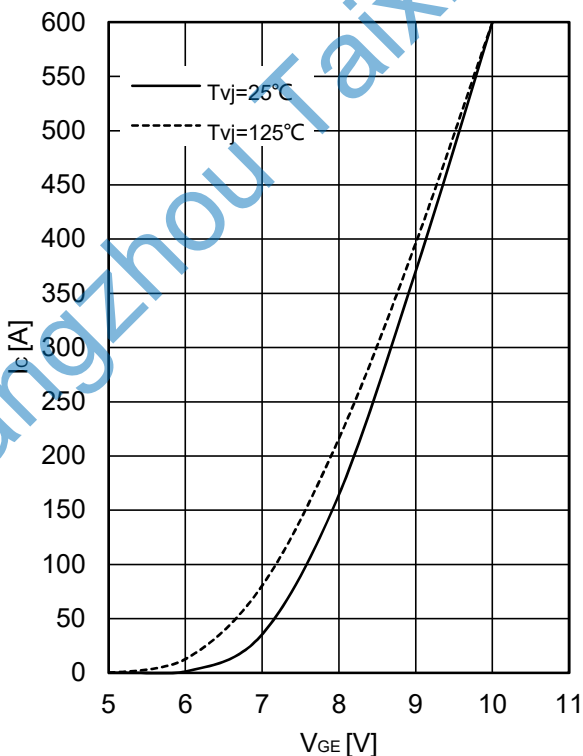


Fig 4. Switching losses IGBT

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

$$V_{GE} = \pm 15V, R_G = 1.1\Omega, V_{CE} = 600V$$

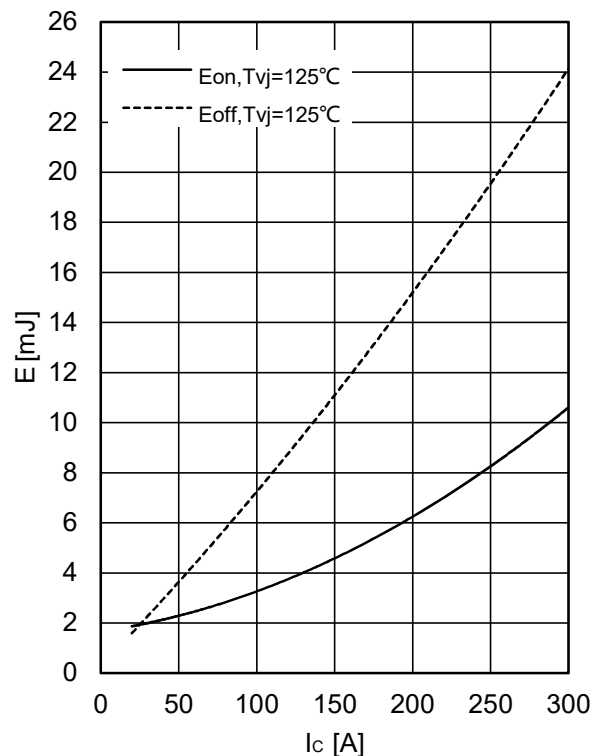


Fig 5. Switching losses IGBT

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

$$V_{GE}=\pm 15V, I_C=150A, V_{CE}=600V$$

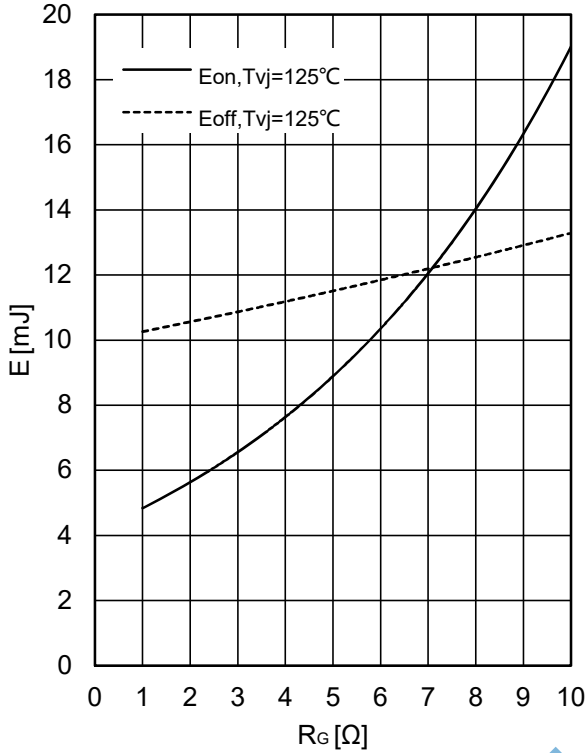


Fig 6. Transient thermal impedance IGBT

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

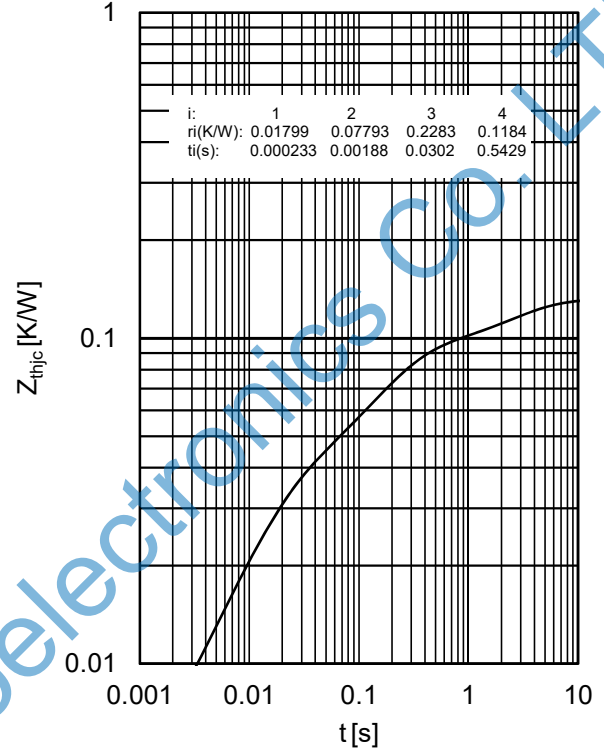


Fig 7. Reverse bias safe operating area IGBT,

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

$$V_{GE}=\pm 15V, R_{Goff}=4.7\Omega, T_{vj}=125^\circ C$$

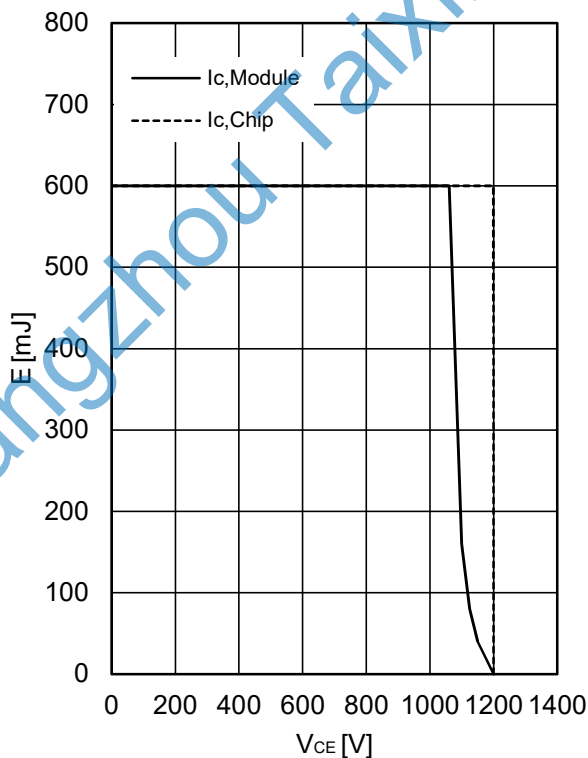


Fig 8. Forward characteristic of Diode

$$I_F=f(V_F)$$

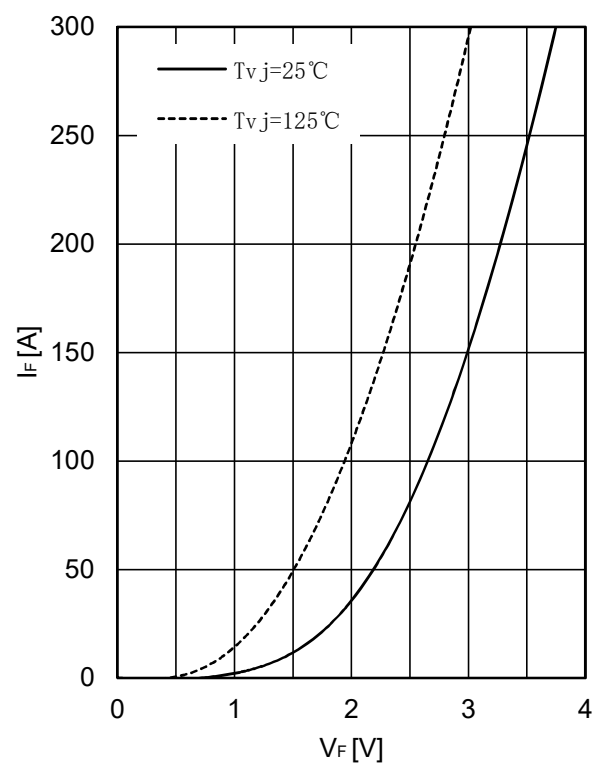


Fig 9. Switching losses Diode

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

$R_G = 1.1\Omega, V_{CE} = 600V$

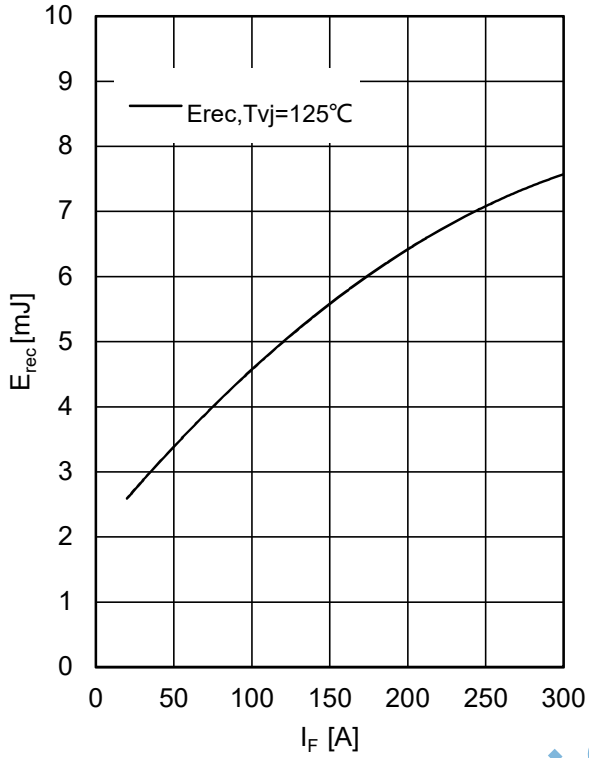
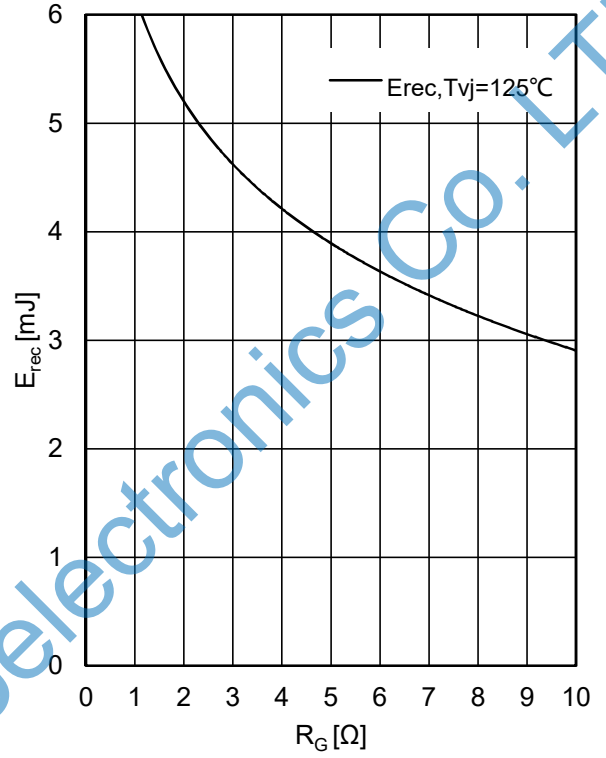


Fig 10. Switching losses Diode

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

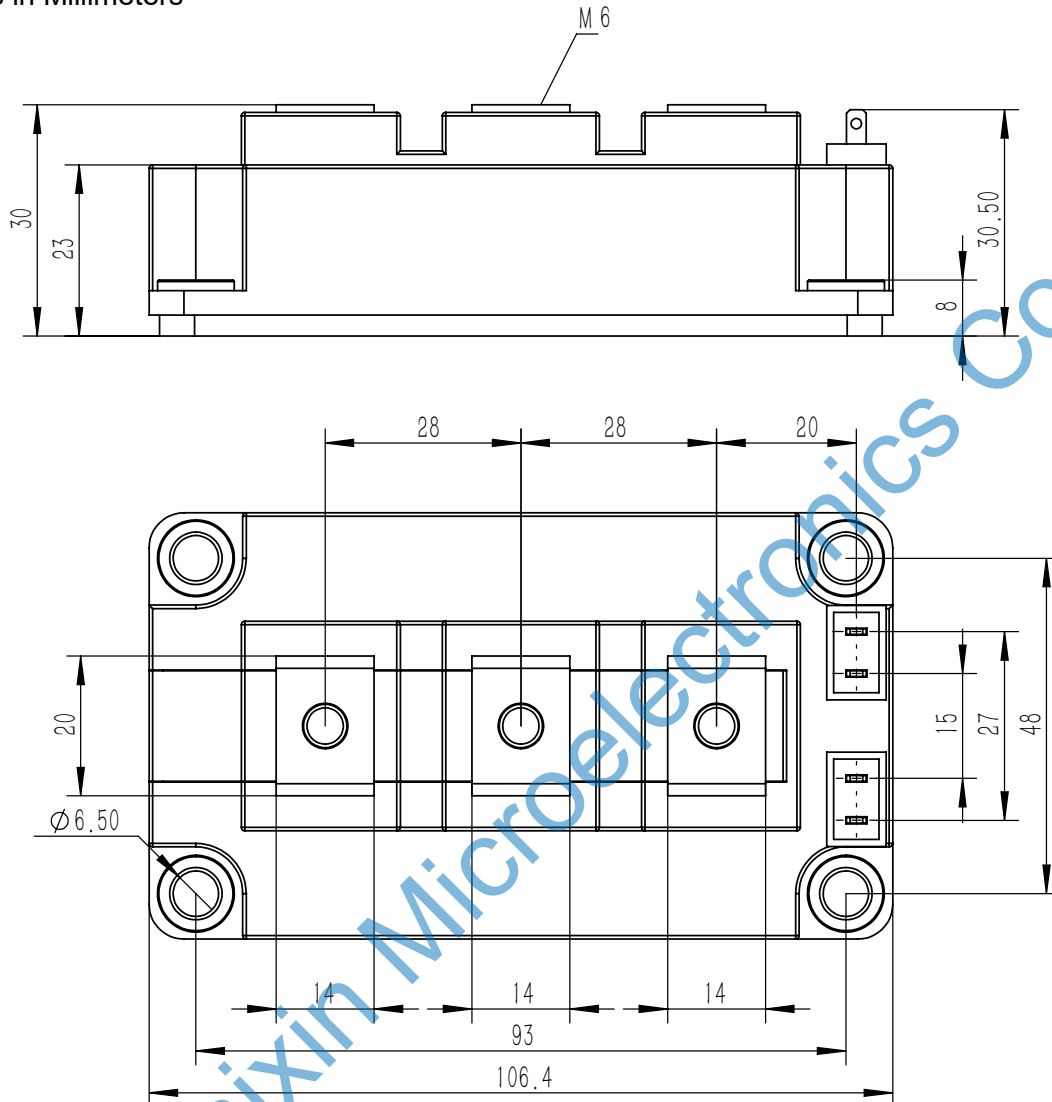
$I_F = 150A, V_{CE} = 600V$



Hangzhou Taixin Microelectronics Co., Ltd.

## Package Dimensions

Dimensions in Millimeters



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