TXG400SD120DZF

Product Datasheet
Single Switch Module
IGBT Module

Module with Ultrafast switching speed IGBT and Fast recovery diode.

Feature

- 400A/1200V,$V_{CE(sat)(typ.)}$ =3.0V@400A
- Ultrafast switching speed
- Excellent short circuit ruggednes

Applications

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

Appearance

Maximum Ratings of IGBT (T_{vj}=25 ℃ 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℃	800	A
		T_{vj}=100℃	400	A
Pulsed collector current	I_{CM}	t_P=1ms	800	A
Short circuit current	I_{sc}	V_{GE}≤15V,V_{CC}=600V,t_P=10us V_{CEmax}=V_{CES}-L_{sCE} ·di/dt	4000	A
Maximum power dissipation	P_D	T_c=25℃,T_{vj}=150℃	1785	W

Electrical Characteristics of IGBT (T_{vj}=25 ℃ unless otherwise noted)

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Collector-emitter breakdown voltage	V_{CES}	V_{GE}=0V,I_C=1mA	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}=30V,V_{CE}=0V			400	nA
		V_{GE}=-30V,V_{CE}=0V			-400	nA
Gate threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE},I_C=1mA	4.50		5.70	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V,I_C=400A,T_{vj}=25℃		3.00	3.20	V
		V_{GE}=15V,I_C=400A,T_{vj}=125℃		4.00		V
Integrated gate resistor	R_{Gint}	f=1M;V_{pp}=1V		1.30		Ω
Input capacitance	C_{ies}	V_{CE}=25V V_{GE}=0V f=1MHz		35.0		nF
Output capacitance	C_{oes}			4.80		nF
Reverse transfer capacitance	C_{res}			2.80		nF
Total gate charge	Q_g	V_{CC}=600V， V_{GE}=15V,I_C=400A		3480		nC
Turn-on delay time	$t_{d(on)}$	V_{CC}=600V V_{GE}=±15V I_C=400A R_G=3.3Ω Inductive Load T_{vj}=25℃		140		ns
Rise time	t_r			130		ns
Turn-off delay time	$t_{d(off)}$			850		ns
Fall time	t_f			120		ns
Turn-on energy loss per pulse	E_{on}			13.0		mJ
Turn-off energy loss per pulse	E_{off}			24.0		mJ
Turn-on delay time	$t_{d(on)}$	V_{CC}=600V V_{GE}=±15V I_C=400A R_G=3.3Ω Inductive Load T_{vj}=125℃		145		ns
Rise time	t_r			135		ns
Turn-off delay time	$t_{d(off)}$			960		ns
Fall time	t_f			140		ns
Turn-on energy loss per pulse	E_{on}			16.5		mJ
Turn-off energy loss per pulse	E_{off}			29.5		mJ
Temperature under switching conditions	$T_{vj\ op}$		-55		150	℃

Maximum Ratings of Diode

Items	Symbol	Conditions	Maximum Rating	Units
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃	1200	V
Diode continuous forward current	I_F	T_{vj}=25℃	800	A
		T_{vj}=100℃	400	A
Diode maximum forward current	I_{FM}	t_P=1ms,T_{vj}=25℃	800	A

Electrical s Characteristics of Diode (T_{vj}=25℃ unless otherwise noted)

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Diode forward voltage	V_F	I_F=400A,T_{vj}=25℃		1.90	2.20	V
		I_F=400A,T_{vj}=125℃		1.90		V
Diode reverse recovery time	t_{rr}	V_{CE}=600V		180		ns
Diode peak reverse recovery current	I_{rr}	I_F=400A		320		A
Diode reverse recovery charge	Q_{rr}	d_{IF}/dt=3100A/μs		32.5		nC
Reverse recovery energy	E_{rec}	T_{vj}=25℃		12.0		mJ
Diode reverse recovery time	t_{rr}	V_{CE}=600V		230		ns
Diode peak reverse recovery current	I_{rr}	I_F=400A		400		A
Diode reverse recovery charge	Q_{rr}	d_{IF}/dt=3100A/μs		52.0		nC
Reverse recovery energy	E_{rec}	T_{vj}=125℃		20.5		mJ

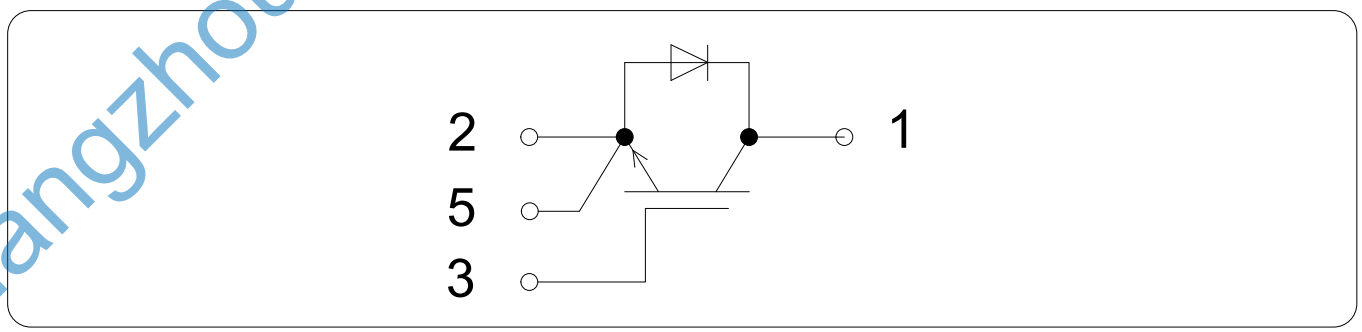
Thermal Characteristics

Items	Symbol	Min.	typ.	Max.	Units
Thermal resistance, junction to case for IGBT	$R_{th\ j\text{-}c}$			0.07	℃/W
Thermal resistance, junction to case for Diode	$R_{th\ j\text{-}c}$			0.08	℃/W
Thermal resistance, case to sink	$R_{thC\text{-}S}$		0.10		℃/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	℃
Weight of Module	W_t			320		g

Internal Circuit:



Representative Characteristics

Fig 1. Output characteristic IGBT
$I_C=f(V_{CE}),V_{GE}=15V$

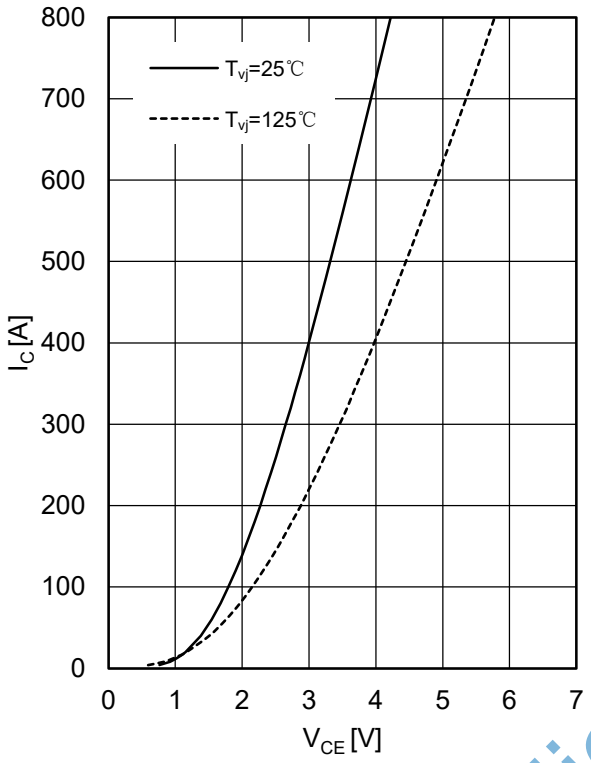


Fig 2. Output characteristic IGBT
$I_C=f(V_{CE})$
T_{vj}=125℃

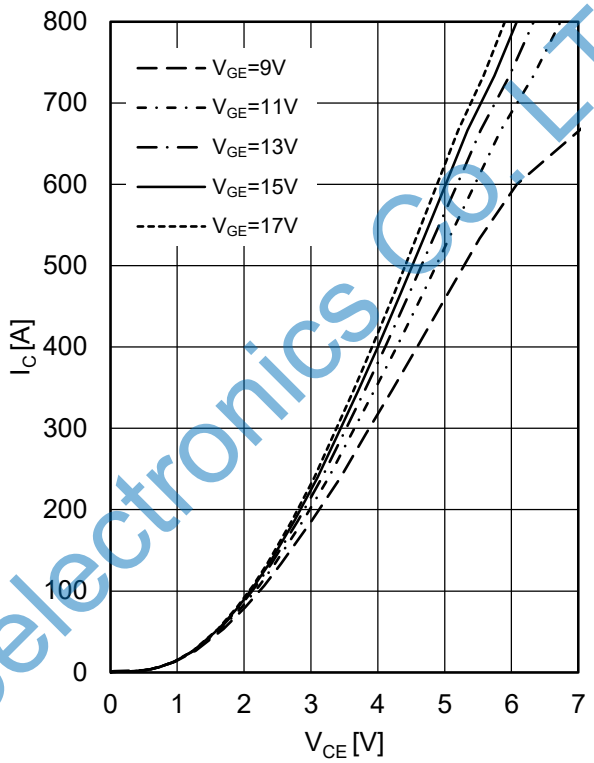


Fig 3. Transfer characteristic IGBT
$I_C=f(V_{GE})$
V_{CE}=20V

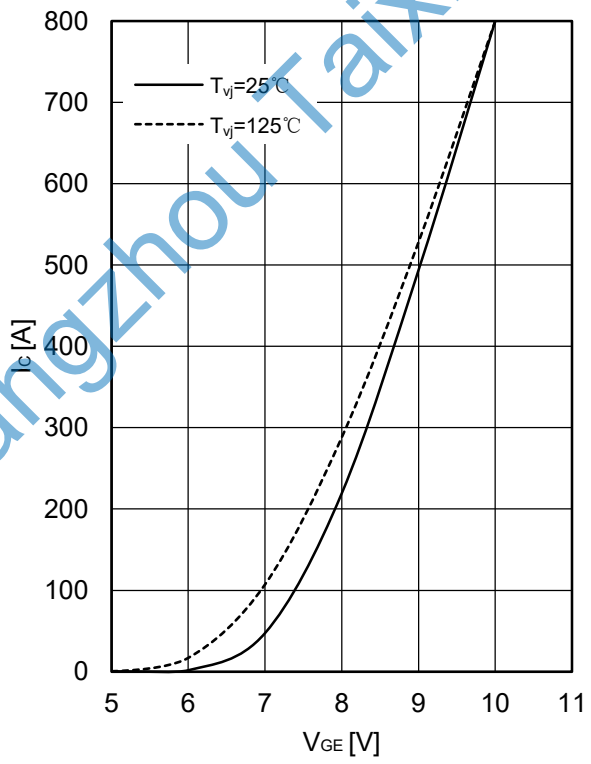


Fig 4. Switching losses IGBT
$E_{on}=f(I_C),E_{off}=f(I_C)$,
V_{GE}=±15V,R_G=3.3Ω,V_{CE}=600V

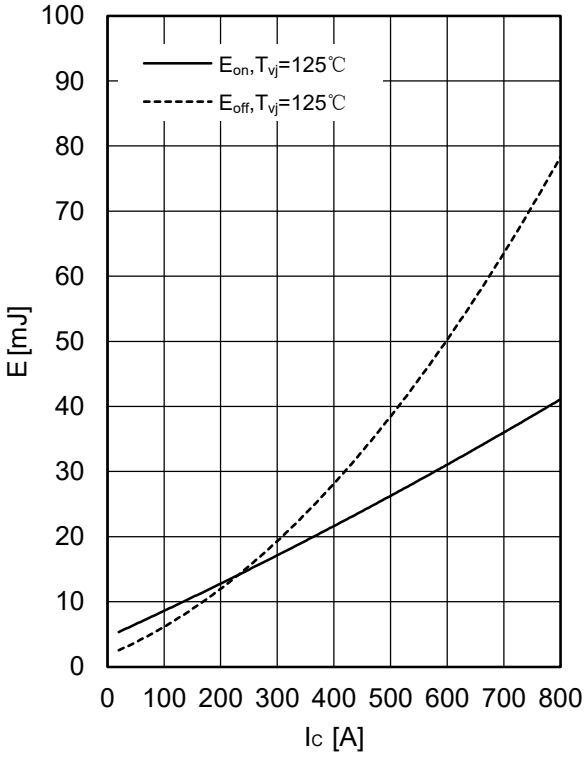


Fig 5. Switching losses IGBT
$E_{on}=f(R_G)$,$E_{off}=f(R_G)$,
$V_{GE}=\pm15V$,$I_C=400A$,$V_{CE}=600V$

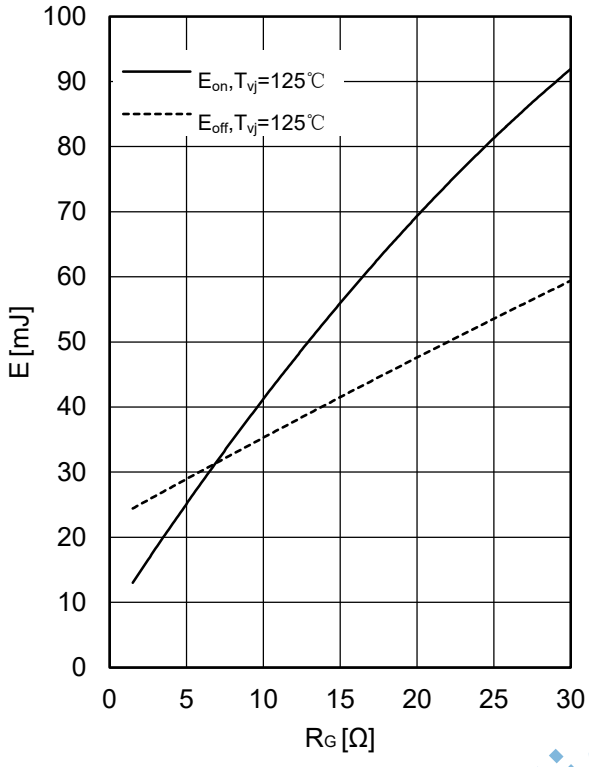


Fig 6. Transient thermal impedance IGBT
$Z_{thjc}=f(t)$

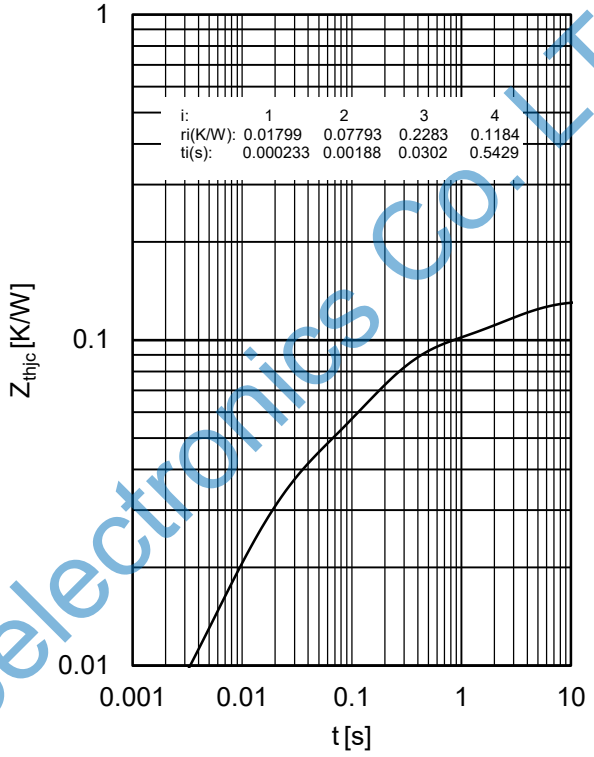


Fig 7. Reverse bias safe operating area IGBT
$I_C=f(V_{CE})$
$V_{GE}=\pm15V$,$R_{Goff}=3.3\Omega$,$T_{vj}=125℃$

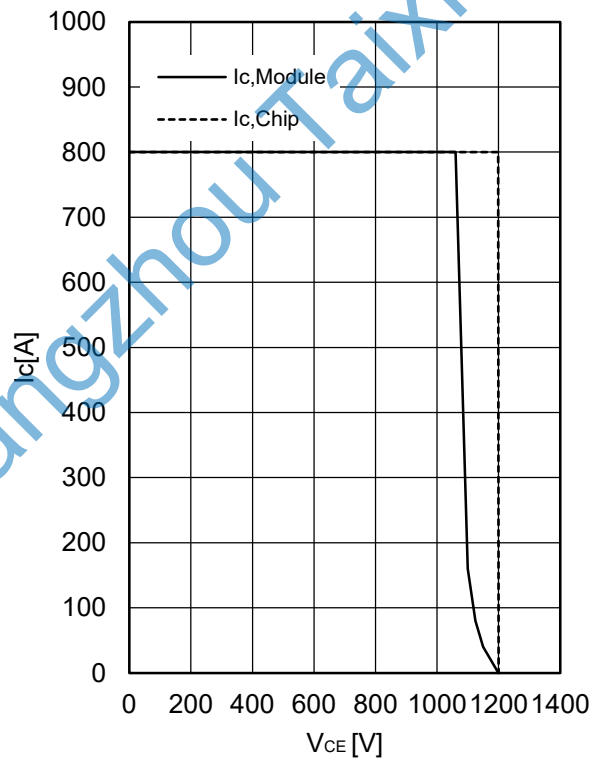


Fig 8. Forward characteristic of Diode
$I_F=f(V_F)$

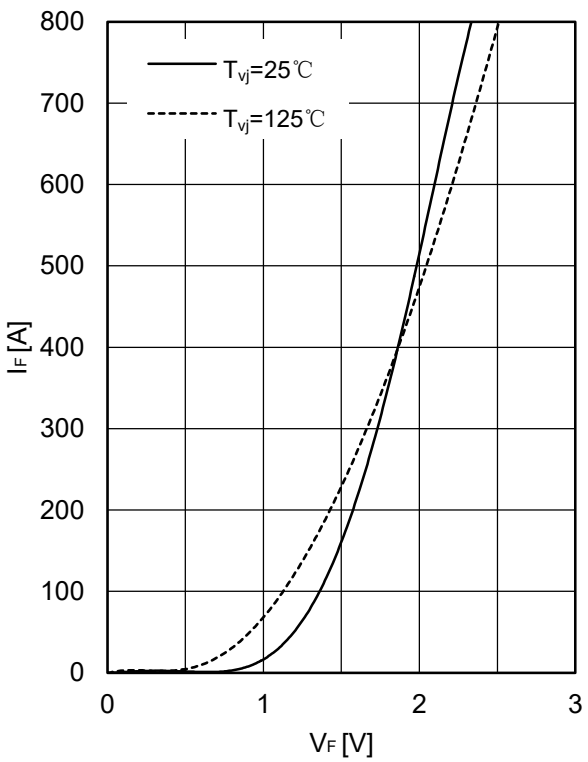


Fig 9. Switching losses Diode
$E_{rec}=f(I_F)$
$R_G=3.3\Omega, V_{CE}=600V$

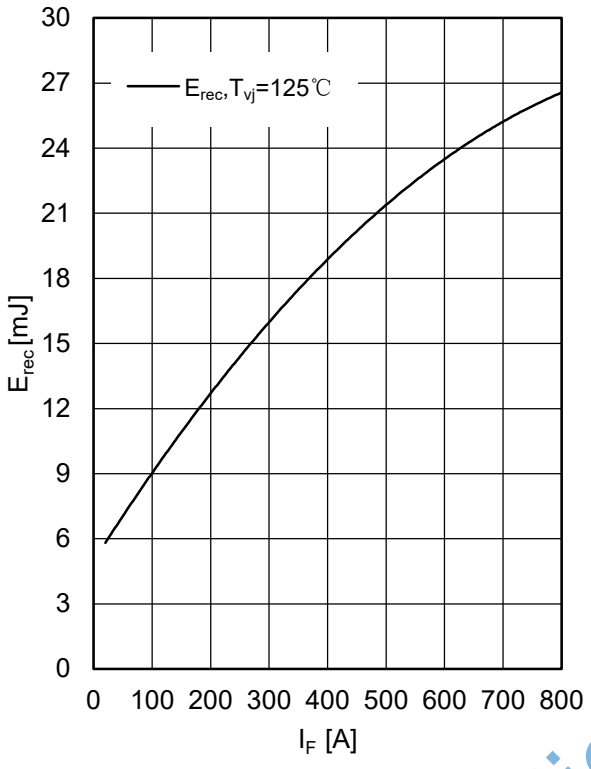
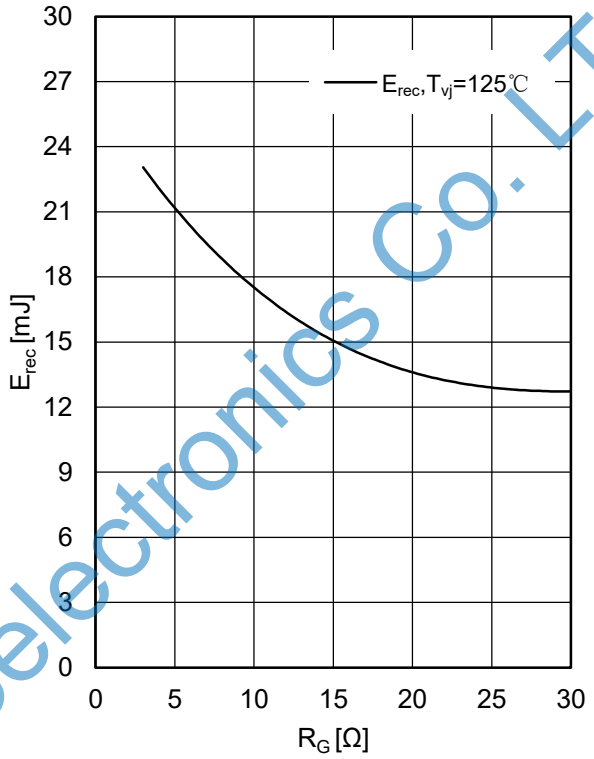
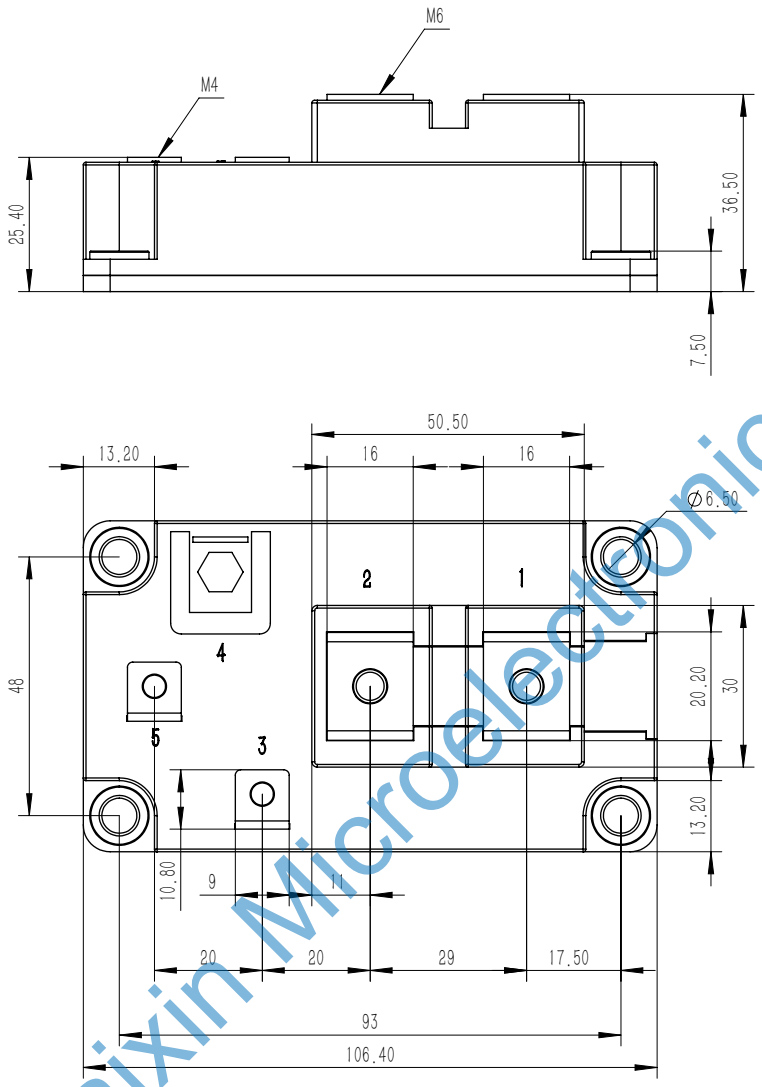


Fig 10. Switching losses Diode
$E_{rec}=f(R_G)$
$I_F=400A, V_{CE}=600V$



Package Dimensions

Dimensions in Millimeters



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