TXG600HF120S9K

Product Datasheet
Half Bridge Module
IGBT Module

S9 Module with low loss IGBT and Fast recovery diode.

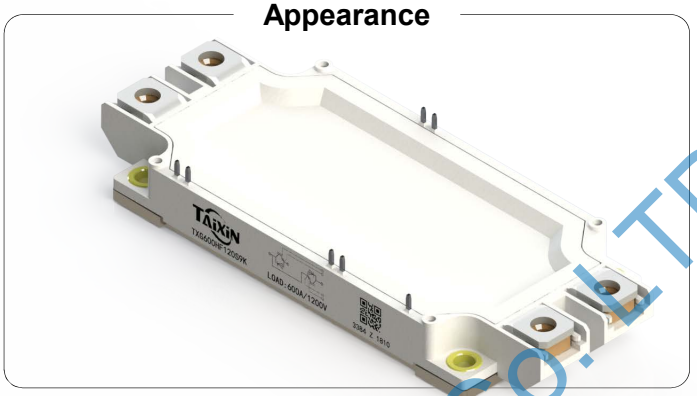
Feature

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- Maximum junction temperature 175℃

Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

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}		±20	V
Collector current	I_C	T_{vj}=25℃	1200	A
		T_{vj}=100℃	600	A
Pulsed collector current	I_{CM}	t_P=1ms	1200	A
Short circuit current	I_{sc}	V_{GE}≤15V,V_{CC}=300V,t_P=10us V_{CEmax}=V_{CES}-L_{sCE} ·di/dt	2400	A
Maximum power dissipation	P_D	T_c=25℃,T_{vj}=175℃	4050	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			2.0	mA
Gate leakage current, forward	I_{GES}	V_{GE}=20V,V_{CE}=0V			200	nA
		V_{GE}=-20V,V_{CE}=0V			-200	nA
Gate threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE},I_C=18mA	4.5		6.5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V,I_C=600A,T_{vj}=25℃		1.75	2.10	V
		V_{GE}=15V,I_C=600A,T_{vj}=175℃		2.00		V
Integrated gate resistor	R_{Gint}	f=1M;V_{pp}=1V		1.20		Ω
Input capacitance	C_{ies}	V_{CE}=25V V_{GE}=0V f=1MHz		37.0		nF
Output capacitance	C_{oes}			5.00		nF
Reverse transfer capacitance	C_{res}			2.05		nF
Total gate charge	Q_g	V_{GE}=±15V		4.40		uC
Turn-on delay time	$t_{d(on)}$	V_{CC}=600V V_{GE}=±15V I_C=600A R_G=1.3Ω Inductive Load T_{vj}=25℃		160		ns
Rise time	t_r			90		ns
Turn-off delay time	$t_{d(off)}$			480		ns
Fall time	t_f			70		ns
Turn-on energy loss per pulse	E_{on}			63.0		mJ
Turn-off energy loss per pulse	E_{off}			47.0		mJ
Turn-on delay time	$t_{d(on)}$	V_{CC}=600V V_{GE}=±15V I_C=600A R_G=1.3Ω Inductive Load T_{vj}=25℃		210		ns
Rise time	t_r			90		ns
Turn-off delay time	$t_{d(off)}$			610		ns
Fall time	t_f			110		ns
Turn-on energy loss per pulse	E_{on}			83.0		mJ
Turn-off energy loss per pulse	E_{off}			72.0		mJ
Temperature under switching conditions	$T_{vj\ op}$		-55		175	℃

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℃	1200	A
		T_{vj}=100℃	600	A
Diode maximum forward current	I_{FM}	t_P=1ms,T_{vj}=25℃	1200	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=600A,T_{vj}=25℃		1.80	2.40	V
		I_F=600A,T_{vj}=125℃		1.75		V
Diode peak reverse recovery current	I_{rr}	V_{CE}=600V,I_F=600A		290		A
Diode reverse recovery charge	Q_{rr}	d_{IF}/d_t=5000A/μs		.62.0		uC
Reverse recovery energy	E_{rec}	Tvj=25℃		22.0		mJ
Diode peak reverse recovery current	I_{rr}	V_{CE}=600V,I_F=600A		420		A
Diode reverse recovery charge	Q_{rr}	d_{IF}/dt=5000A/μs		115		nC
Reverse recovery energy	E_{rec}	T_{vj}=125℃		44.0		mJ

Thermal Characteristics

Items	Symbol	Min.	typ.	Max.	Units
Thermal resistance, junction to case for Inverter IGBT	$R_{th\ j\text{-}c}$			0.04	℃/W
Thermal resistance, junction to case for Inverter Diode	$R_{th\ j\text{-}c}$			0.07	℃/W
Thermal resistance, case to sink	$R_{thC\text{-}S}$		0.08		℃/W

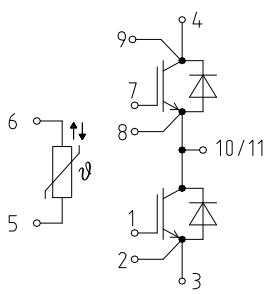
Module Characteristics

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 M5	3.0		5.0	Nm
Storage temperature range	T_{STG}		-55		150	℃
Weight of Module	W_t			350		g

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

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Rated resistance	R_{25}			5.00		
Deviation of R100	△R/R	T_C = 100°C, R_{100} = 493 W	-5		5	%
Power dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}$ exp [$B_{25/50}$(1/T_2-1/(298,15 K))]		3375		K
B-value	$B_{25/80}$	$R_2=R_{25}$ exp [$B_{25/80}$(1/T_2-1/(298,15 K))]		3411		K
B-value	$B_{25/100}$	$R_2=R_{25}$ exp [$B_{25/100}$(1/T_2-1/(298,15 K))]		3433		K

Internal Circuit:



Representative Characteristics

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

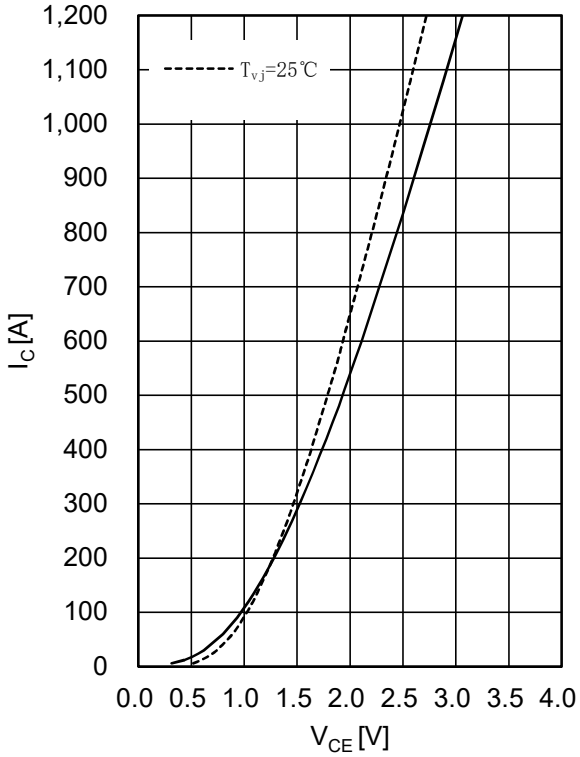


Fig 2. Output characteristic IGBT
$I_C=f(V_{CE})$
T_{vj}=125℃

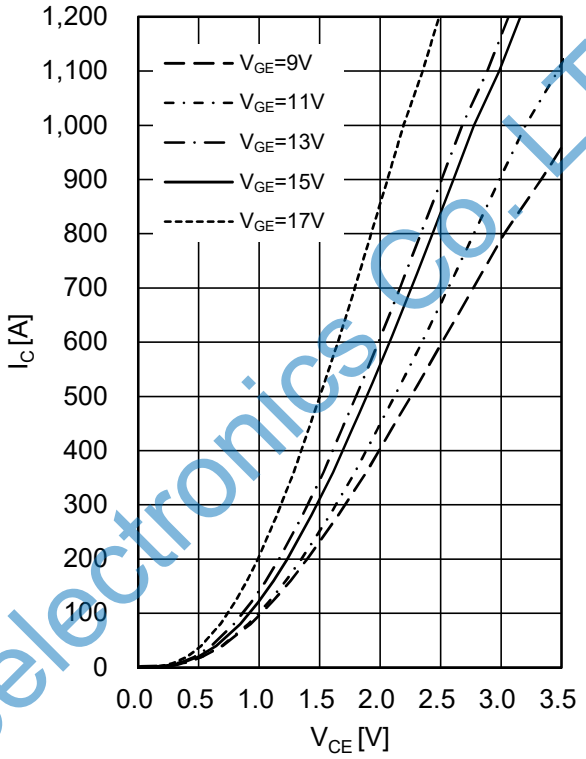


Fig 3. Transfer characteristic IGBT
$I_C=f(V_{GE})$
V_{CE}=20V

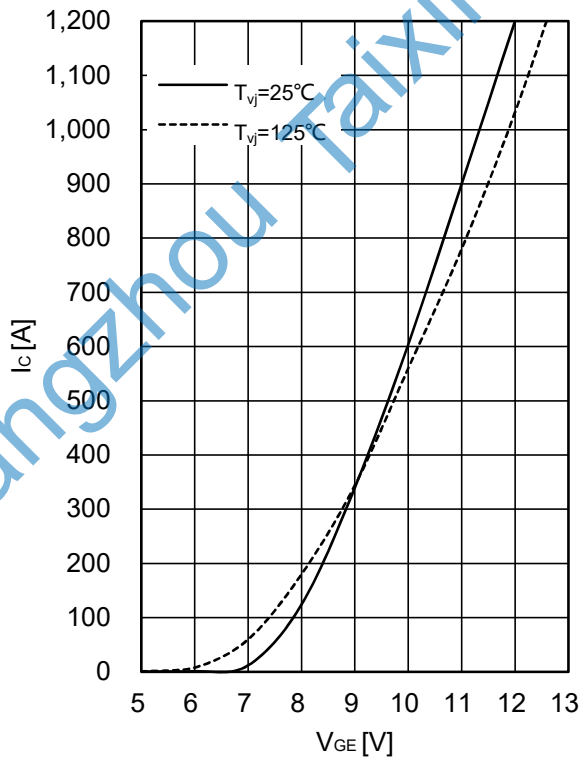


Fig 4. Switching losses IGBT
$E_{on}=f(I_C),E_{off}=f(I_C)$,
$V_{GE}=\pm15V,R_G=1.3\Omega,V_{CE}=600V$

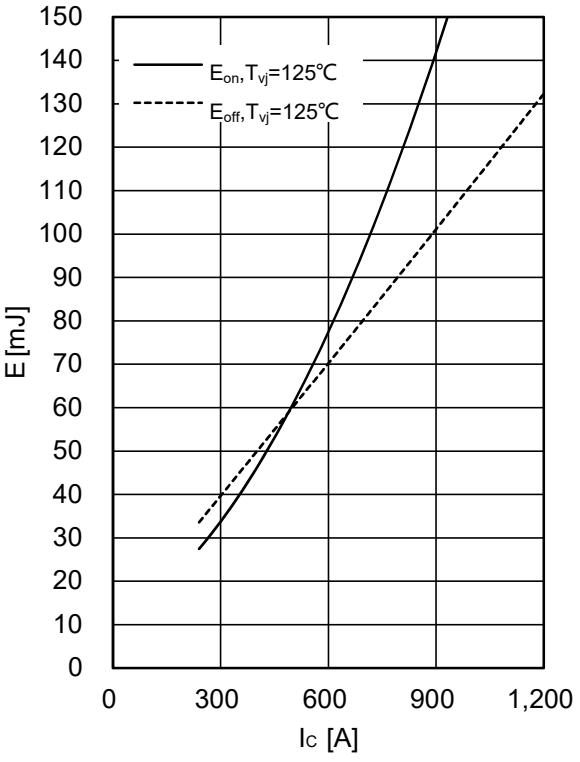


Fig 5. Switching losses IGBT
$E_{on}=f(R_G)$,$Eoff=f(R_G)$,
$V_{GE}=\pm15V$,$I_C=600A$,$V_{CE}=600V$

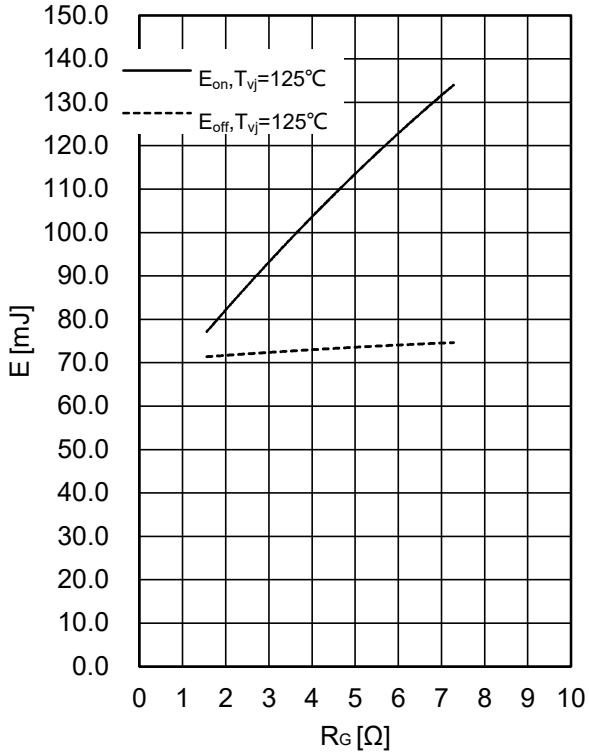


Fig 6. Transient thermal impedance IGBT
$Z_{thjc}=f(t)$

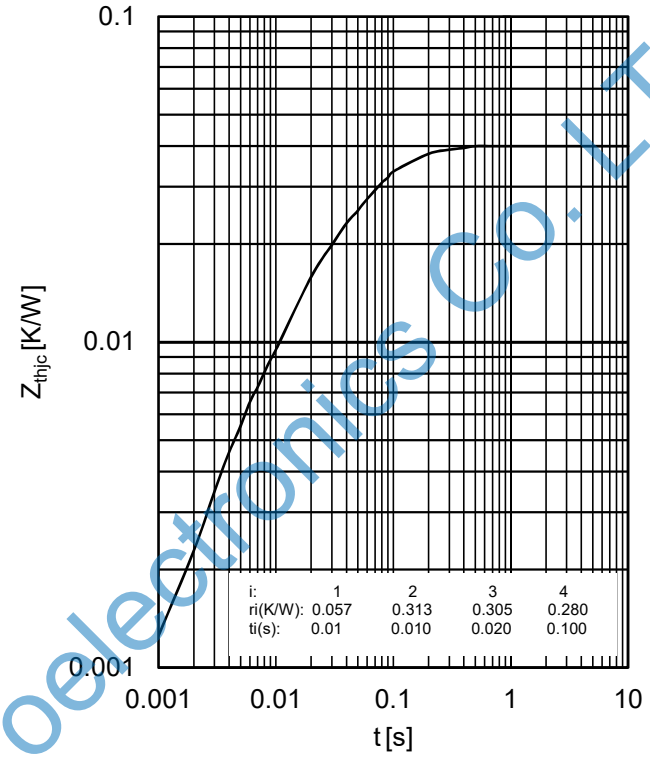


Fig 7. Reverse bias safe operating area IGBT,
$I_C=f(V_{CE})$
$V_{GE}=\pm15V$,$R_{Goff}=1.1\Omega$,$T_{vj}=125℃$

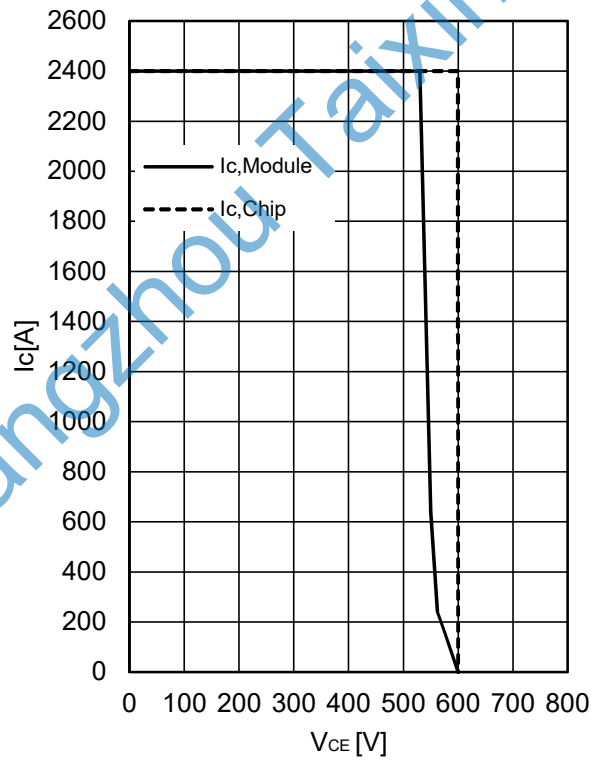


Fig 8. Forward characteristic of Diode
$I_F=f(V_F)$

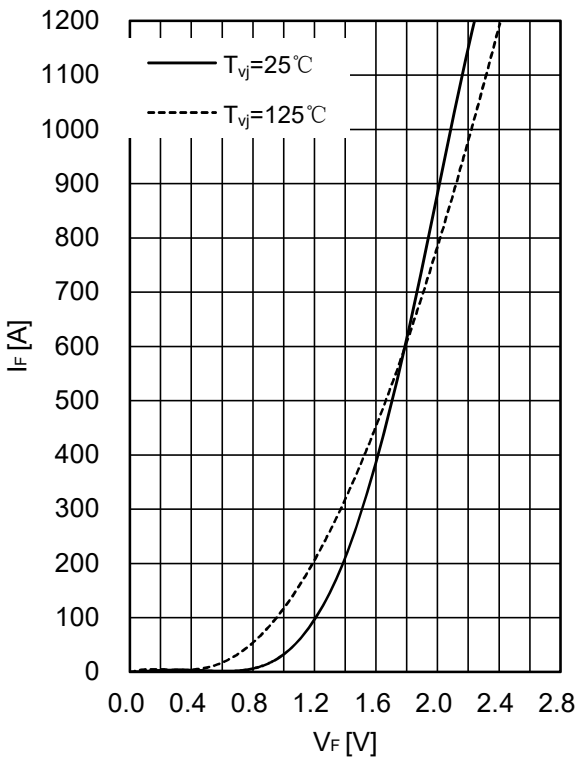


Fig 9. Switching losses Diode
$E_{rec}=f(I_F)$
$R_G=1.5\Omega, V_{CE}=600V$

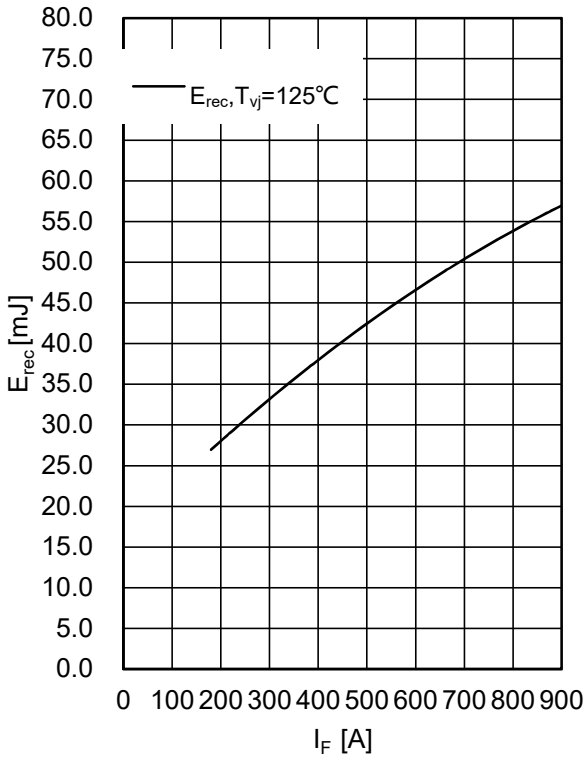
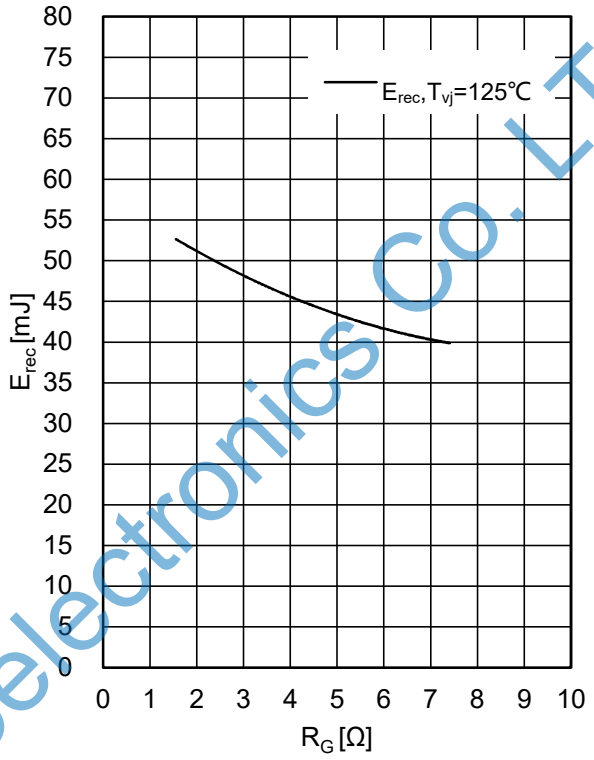
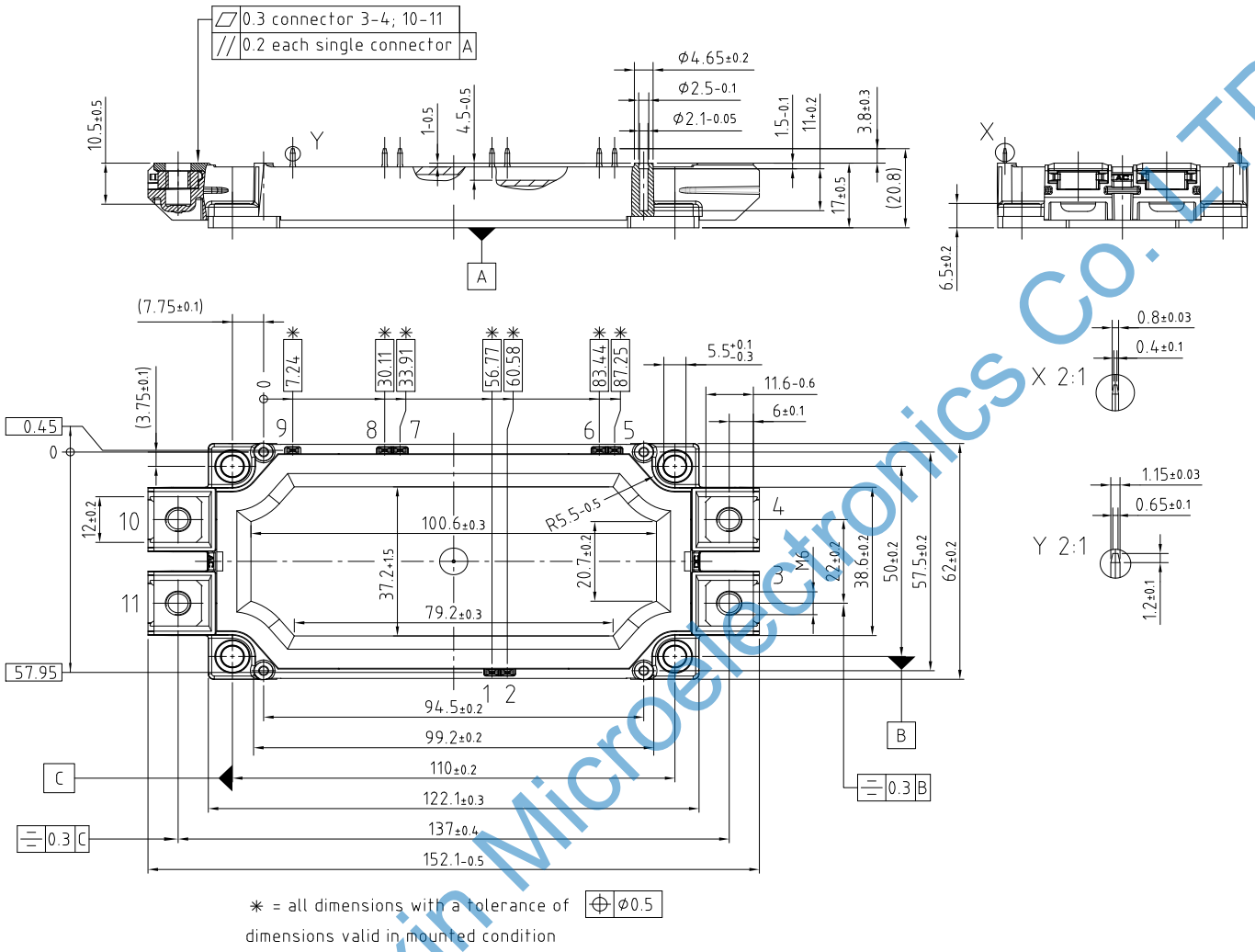


Fig 10. Switching losses Diode
$E_{rec}=f(R_G)$
$I_F=600A, V_{CE}=600V$



Package Dimensions

Dimensions in Millimeters



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