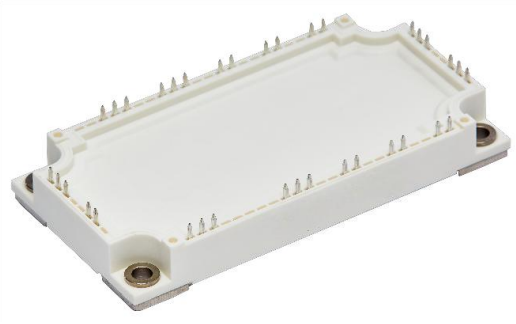
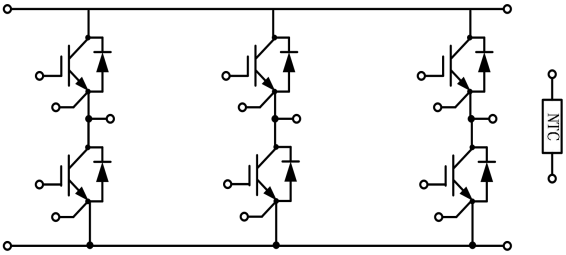
EconoPIM3 SixPack IGBT Module

V_{CES}= 1200V, I_C= 150A, $V_{CE(sat)}$= 1.53V



Features

- 1200V Trench Gate/Field Termination Process
- Low Switching Losses
- $V_{CE(Sat)}$ With Positive Temperature Coefficient
- Integrated NTC Temperature Sensor



Applications

- Power Conversion System
- Inverter
- Servo Drives

IGBT, Inverter

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	V_{CES}	T_{vj}=25℃, V_{GE}=0V	1200	V
Continuous DC collector current	$I_{C\ nom}$	T_C=100℃, $T_{vj\ max}$=175℃	150	A
Repetitive peak collector current	I_{CRM}	t_P=1ms	300	A
Gate-emitter peak voltage	V_{GES}	T_{vj}=25℃	±20	V

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=150A, V_{GE}=15V	T_{vj}=25℃		1.53	2.1	V
			T_{vj}=125℃		1.75		V
			T_{vj}=150℃		1.81		V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=5.3mA, V_{CE}=V_{GE}	T_{vj}=25℃	5.2	5.8	6.4	V
Gate charge	Q_G	V_{GE}=-15V...+15V			1.56		μC
Integrated gate resistor	$R_{G\ int}$	T_{vj}=25℃			1.1		Ω
Input capacitance	C_{ies}	f=100KHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		23.82		nF
Reverse transfer capacitance	C_{res}	f=100KHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		0.22		nF
Collector-emitter cut-off current	I_{CES}	V_{CE}=1200V, V_{GE}=0V	T_{vj}=25℃			1	mA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	T_{vj}=25℃			100	nA

Turn-on delay time	$t_{d\ on}$	I_C=150A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=5Ω, Inductive Load	T_{vj}=25℃		102		ns
			T_{vj}=125℃		103		ns
			T_{vj}=150℃		104		ns
Rise time	t_r	I_C=150A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=5Ω, Inductive Load	T_{vj}=25℃		47		ns
			T_{vj}=125℃		55		ns
			T_{vj}=150℃		56		ns
Turn-off delay time	$t_{d\ off}$	I_C=150A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=5Ω, Inductive Load	T_{vj}=25℃		337		ns
			T_{vj}=125℃		381		ns
			T_{vj}=150℃		397		ns
Fall time	t_f	I_C=150A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=5Ω, Inductive Load	T_{vj}=25℃		180		ns
			T_{vj}=125℃		257		ns
			T_{vj}=150℃		275		ns
Turn-on energy loss per pulse	E_{on}	I_C=150A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=5Ω, di/dt=2150A/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		11.09		mJ
			T_{vj}=125℃		19.92		mJ
			Tvj=150℃		22.71		mJ
Turn-off energy loss per pulse	E_{off}	I_C=100A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=2Ω, du/dt=4250V/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		10.18		mJ
			T_{vj}=125℃		13.54		mJ
			T_{vj}=150℃		14.45		mJ
SC data	I_{SC}	V_{GE}≤15V, V_{CE}=800V V_{CEmax}=V_{CES}-L_{sCE}*di/dt, t_P≤10μs,	T_{vj}=150℃		730		A
Temperature under switching conditions	$T_{vj\ op}$			-40		150	℃

Diode, Inverter

Maximum Ratings

Parameter	Symbol	Conditions		Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃		1200	V
Continuous forward current	I_F			150	A
Repetitive peak forward current	I_{FRM}	t_P= 1ms		300	A
I^2t-value	I^2t	t_P=10ms, sin180°	T_{vj}=125℃	8000	A^2s

Characteristics Values

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F=150A, V_{GE}=0V	T_{vj}=25℃		2.05	2.4	V
			T_{vj}=125℃		1.75		V
			T_{vj}=150℃		1.67		V
Peak reverse recovery current	I_{rr}	I_F=150A, V_R=600V, V_{GE}=-15V, -diF/dt=2150A/μs (T_{vj}=150℃)	T_{vj}=25℃		138		A
			T_{vj}=125℃		189		A
			T_{vj}=150℃		198		A

Recovered charge	Q_{rr}	I_F=150A, V_R=600V, V_{GE}=-15V, -diF/dt=2150A/μs (T_{vj}=150℃)	T_{vj}=25℃		11.67		μC
			T_{vj}=125℃		29.77		μC
			T_{vj}=150℃		35.09		μC
Reverse recovery energy	E_{rec}		T_{vj}=25℃		3.37		mJ
			T_{vj}=125℃		9.26		mJ
			T_{vj}=150℃		11.07		mJ
Temperature under switching conditions	$T_{vj\ op}$			-40		150	℃

NTC-Thermistor
Characteristics Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	T_C=25℃, ±5%		5.0		kΩ
B-value	$B_{25/50}$	±1%		3380		K

Module
Characteristics Values

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=1min		2.5		kV
Internal isolation	-		Al_2O_3			-
Storage temperature	T_{stg}		-40		125	℃
Mounting torque for module mounting	M		3	-	6	N·m
Weight	G			300		g

Typical Characteristics

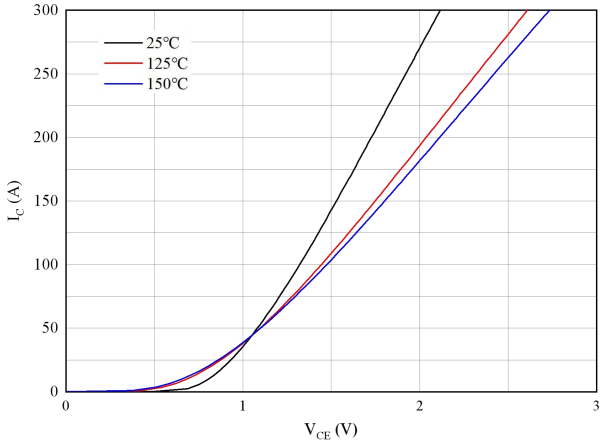


Fig 1. Output characteristics of IGBT, Inverter

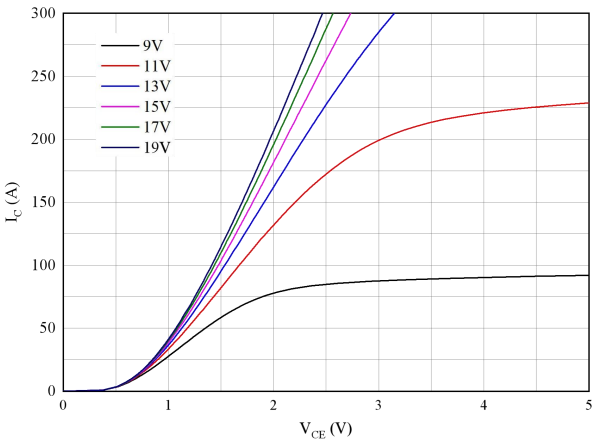


Fig 2. Output characteristics of IGBT, Inverter

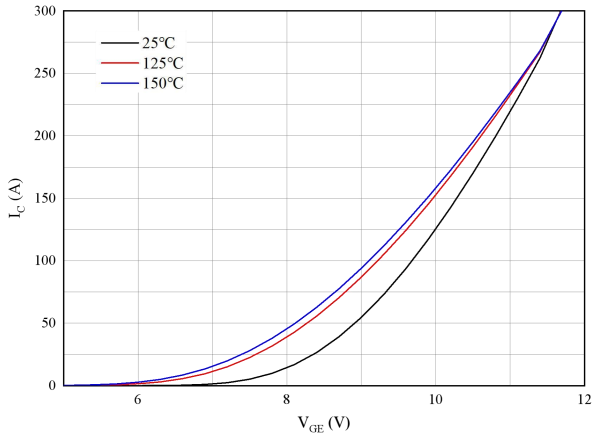


Fig 3. Transfer characteristics of IGBT, Inverter

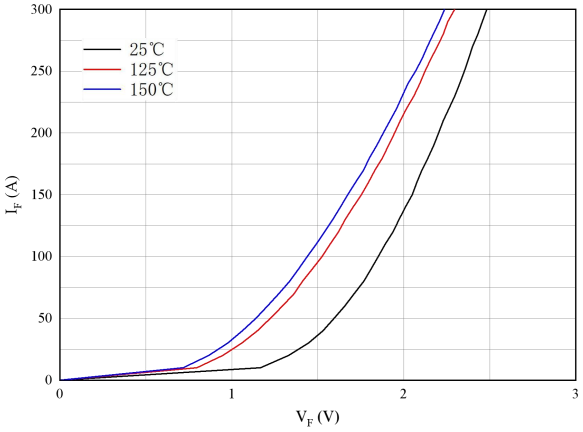


Fig 4. Forward characteristics of Diode

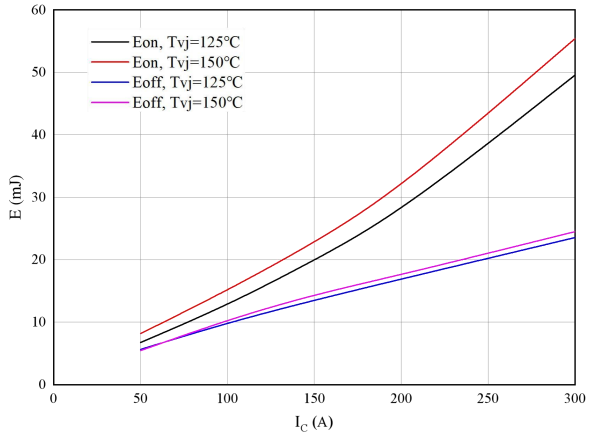


Fig 5. Switching losses of IGBT,
V_{GE}=±15V, R_{Gon}=R_{Goff}=5Ω, V_{CE}=600V

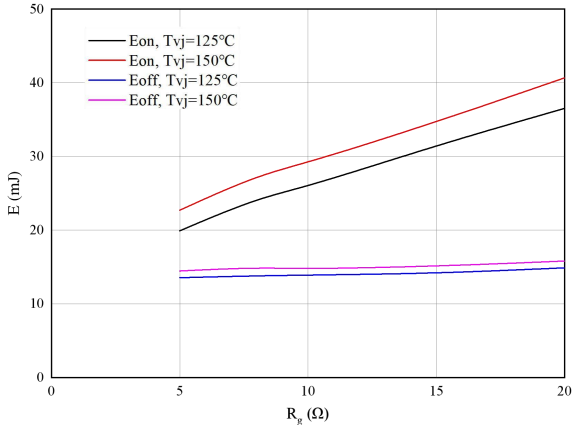


Fig 6. Switching losses of IGBT,
V_{GE}=±15V, I_C=150A, V_{CE}=600V

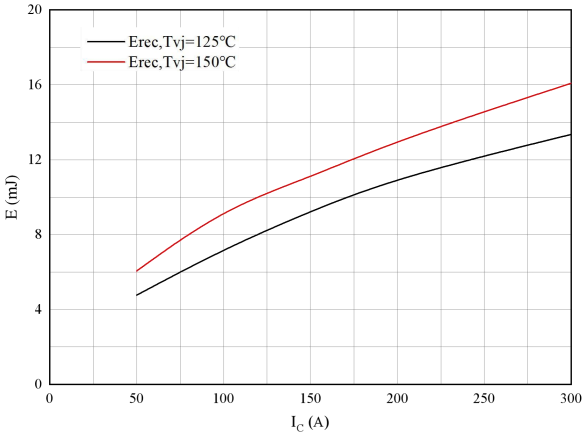


Fig 7. Switching losses of Diode
R_{Gon}=R_{Goff}=5Ω, V_{CE}=600V

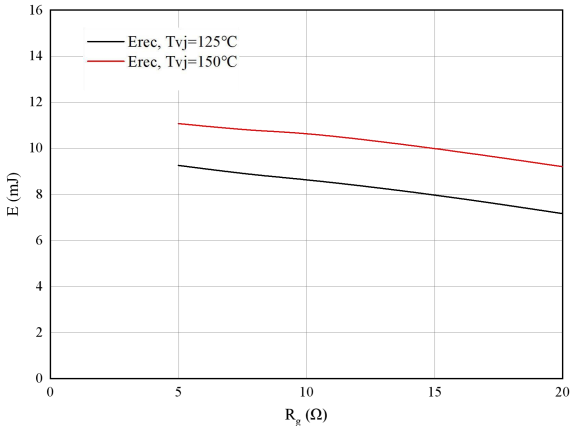


Fig 8. Switching losses of Diode
I_F=150A, V_{CE}=600V

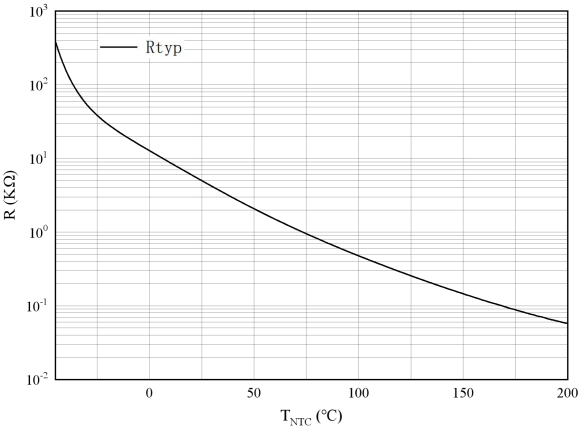


Fig 9.NTC-Themistor-temperature characteristic

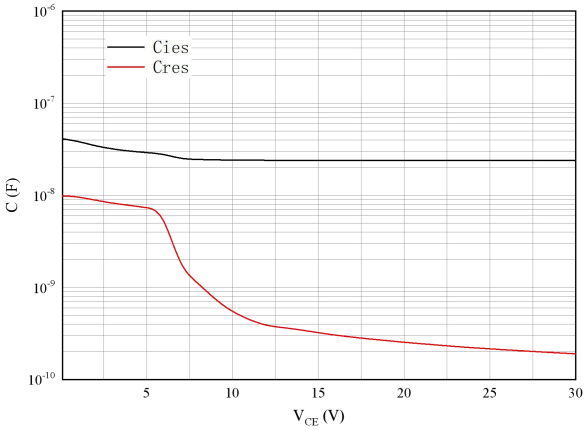
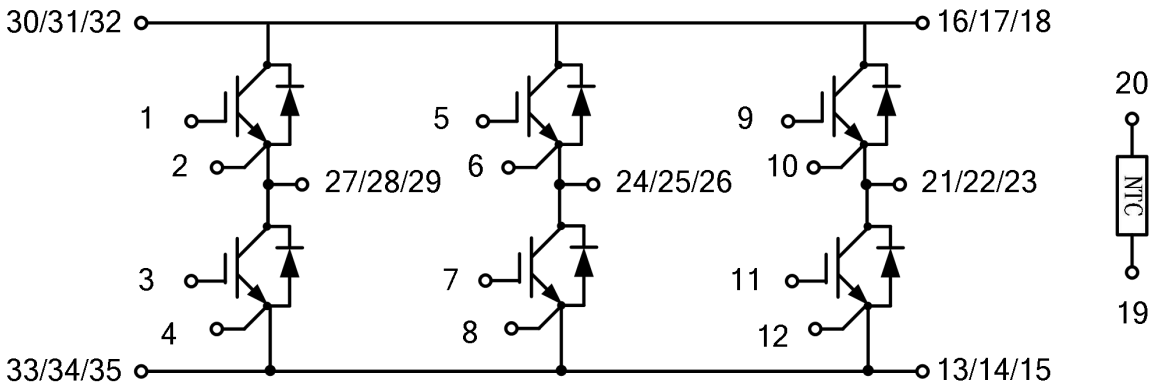
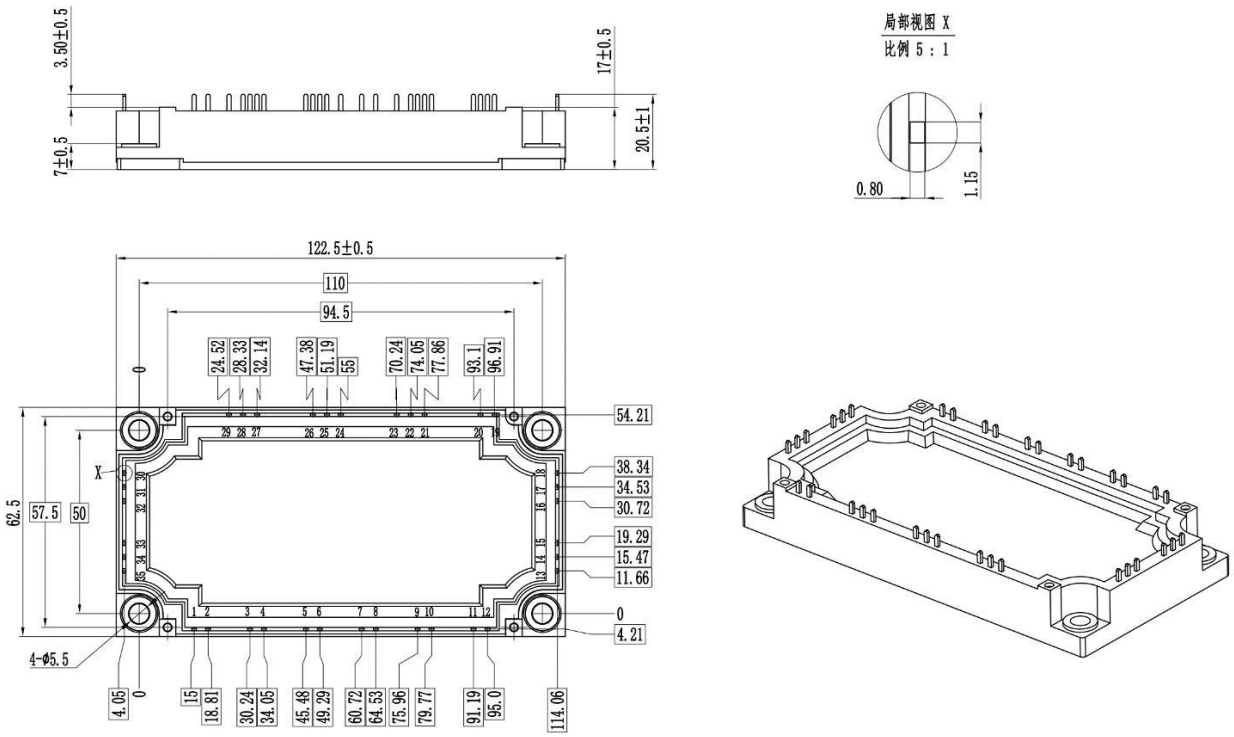


Fig 10. Capacitance characteristics

Circuit Diagram



Package Outlines (Unit:mm)



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