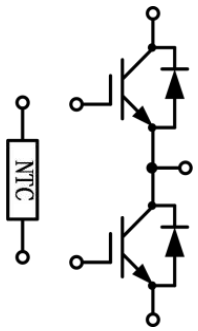
Econodual3 Half Bridge IGBT Module

V_{CES}= 1700V, I_C= 600A, $V_{CE(sat)}$= 2.0V

Features

- 1700V Trench Gate/Field Termination Process
- Low Switching Losses
- $V_{CE(Sat)}$ With Positive Temperature Coefficient
- Integrated NTC Temperature Sensor



Applications

- Power Conversion System
- Wind Generatoren
- Static Var Generator

IGBT, Inverter

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	V_{CES}	T_{vj}=25°C, V_{GE}=0V	1700	V
Continuous collector current	$I_{C\ nom}$	T_C=100° C, $T_{vj\ max}$=175℃	600	A
Repetitive peak collector current	I_{CRM}	t_P=1ms	1200	A
Gate-emitter peak voltage	V_{GES}	T_{vj}=25℃	±20	V
Total power dissipation	P_{tot}	T_C=25℃, $T_{vj\ max}$=175℃	3100	W

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=600A, V_{GE}=15V	T_{vj}=25℃		2.00	2.4	V
			T_{vj}=125℃		2.40		V
			T_{vj}=150℃		2.50		V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=24mA, V_{CE}=V_{GE}	T_{vj}=25℃	5.20	5.8	6.40	V
Gate charge	Q_G	V_{GE}=-15V...+15V			4.6		μC
Integrated gate resistor	$R_{G\ int}$	T_{vj}=25℃			0.6		Ω
Input capacitance	C_{ies}	f=100KHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		76.5		nF
Reverse transfer capacitance	C_{res}	f=100KHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		0.5		nF
Collector-emitter cut-off current	I_{CES}	V_{CE}=1700V, 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=600A, V_{CE}=900V, V_{GE}=-15V/+15V,R_G=1.0Ω, Inductive Load	T_{vj}=25℃		182		ns
			T_{vj}=125℃		206		ns
			T_{vj}=150℃		235		ns
Rise time	t_r	I_C=600A, V_{CE}=900V, V_{GE}=-15V/+15V,R_G=1.0Ω, Inductive Load	T_{vj}=25℃		70		ns
			T_{vj}=125℃		93		ns
			T_{vj}=150℃		100		ns
Turn-off delay time	$t_{d\ off}$	I_C=600A, V_{CE}=900V, V_{GE}=-15V/+15V,R_G=1.0Ω, Inductive Load	T_{vj}=25℃		311		ns
			T_{vj}=125℃		362		ns
			T_{vj}=150℃		375		ns
Fall time	t_f	I_C=600A, V_{CE}=900V, V_{GE}=-15V/+15V,R_G=1.0Ω, Inductive Load	T_{vj}=25℃		378		ns
			T_{vj}=125℃		547		ns
			T_{vj}=150℃		584		ns
Turn-on energy loss per pulse	E_{on}	I_C=600A, V_{CE}=900V, V_{GE}=-15V/+15V, R_G=1.0Ω, di/dt=4700A/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		135.5		mJ
			T_{vj}=125℃		182.7		mJ
			Tvj=150℃		197.0		mJ
Turn-off energy loss per pulse	E_{off}	I_C=600A, V_{CE}=900V, V_{GE}=-15V/+15V, R_G=1.0Ω, du/dt=7400V/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		103.8		mJ
			T_{vj}=125℃		136.2		mJ
			T_{vj}=150℃		142.9		mJ
SC data	I_{SC}	V_{GE}≤15V, V_{CE}=1000V V_{CEmax}=V_{CES}-L_{sCE}*di/dt, t_P≤10μs,	T_{vj}=150℃		2800		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.049	K/W
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℃		1700	V
Continuous forward current	I_F			600	A
Repetitive peak forward current	I_{FRM}	t_P= 1ms		1200	A
I^2t-value	I^2t	t_P=10ms, sin180°	T_{vj}=125℃	26000	A^2s

Characteristics Values

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F=600A, V_{GE}=0V	T_{vj}=25℃		1.85	2.2	V
			T_{vj}=125℃		2.15		V
			T_{vj}=150℃		2.20		V

Peak reverse recovery current	I_{rr}	I_F=600A, V_R=900V, V_{GE}=-15V, -diF/dt=4000A/μs (T_{vj}=150℃)	T_{vj}=25℃		280		A
			T_{vj}=125℃		355		A
			T_{vj}=150℃		371		A
Recovered charge	Q_{rr}		T_{vj}=25℃		123		μC
			T_{vj}=125℃		208		μC
			T_{vj}=150℃		234		μC
Reverse recovery energy	E_{rec}		T_{vj}=25℃		73.8		mJ
			T_{vj}=125℃		130.7		mJ
			T_{vj}=150℃		147.9		mJ
Thermal resistance, junction to case	R_{thJC}	per FRD				0.081	K/W
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	$B_{25/50}$	±2%		3375		K

Module
Characteristics Values

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=1min		4		kV
Internal isolation	-			Al_2O_3		-
Storage temperature	T_{stg}		-40		125	℃
Mounting torque for module mounting	M		3	-	6	N·m
Terminal connection torque	M		3	-	6	N·m
Weight	G			342		g

Typical Characteristics

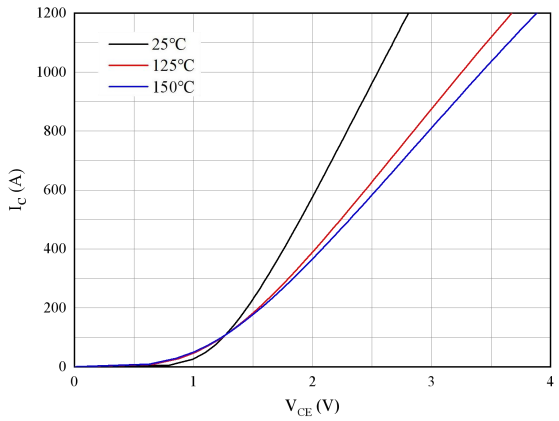


Fig 1. Typical output characteristics (V_{GE}=15V)

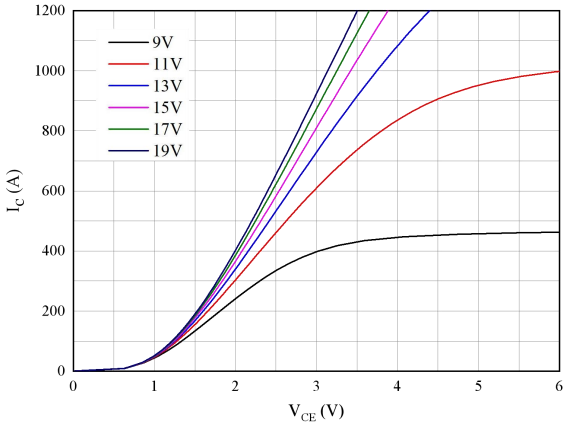


Fig 2. Typical output characteristics (T_{vj}=150℃)

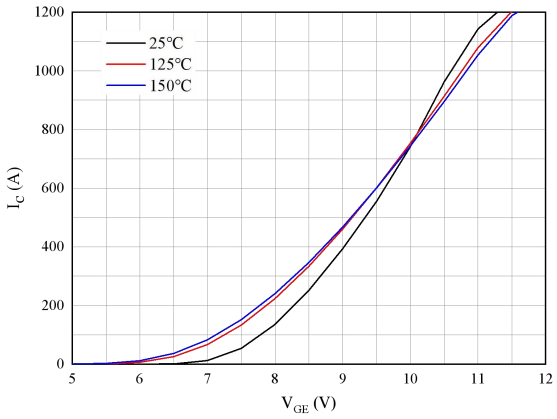


Fig 3. Typical transfer characteristics (V_{CE}=20V)

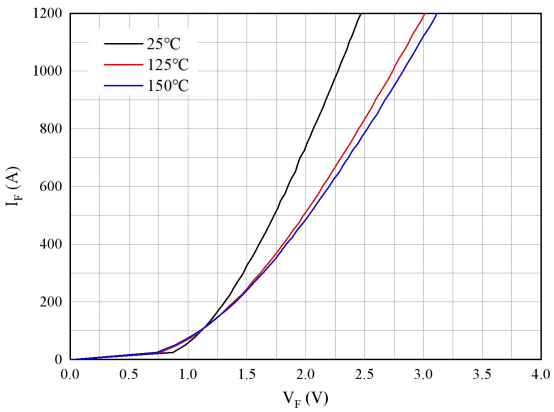


Fig 4. Forward characteristics of Diode

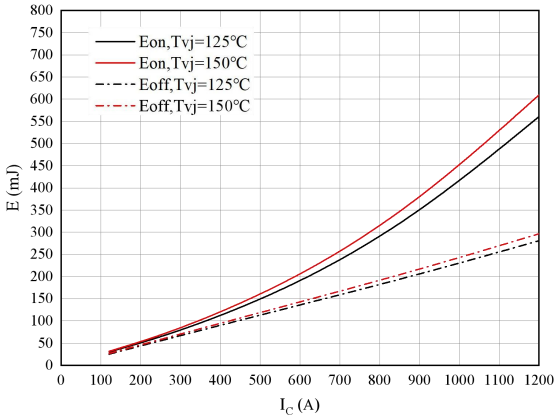


Fig 5. Switching losses of IGBT, Inverter
V_{GE}=±15V, R_{Gon}=R_{Goff}=1.0Ω, V_{CE}=900V

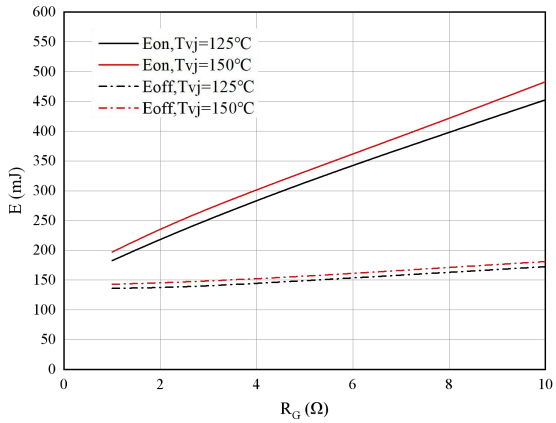


Fig 6. Switching losses of IGBT, Inverter
V_{GE}=±15V, I_C=600A, V_{CE}=900V

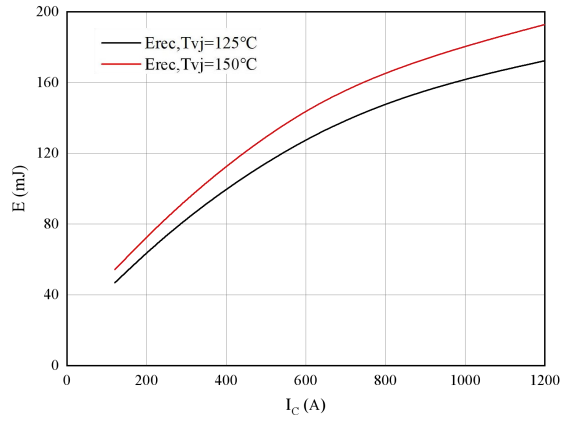


Fig 7. Switching losses of Diode
$R_{Gon}=R_{Goff}=1.0\Omega$, $V_{CE}=900V$

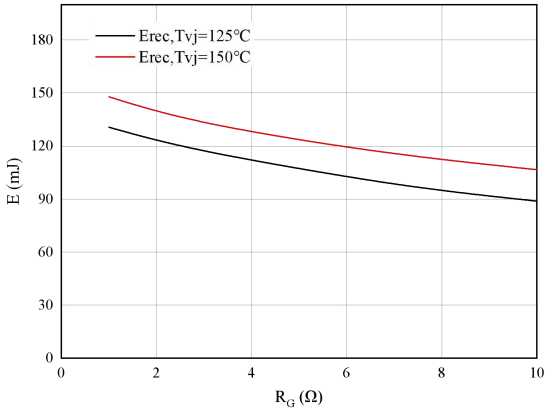


Fig 8. Switching losses of Diode
$I_F=600A$, $V_{CE}=900V$

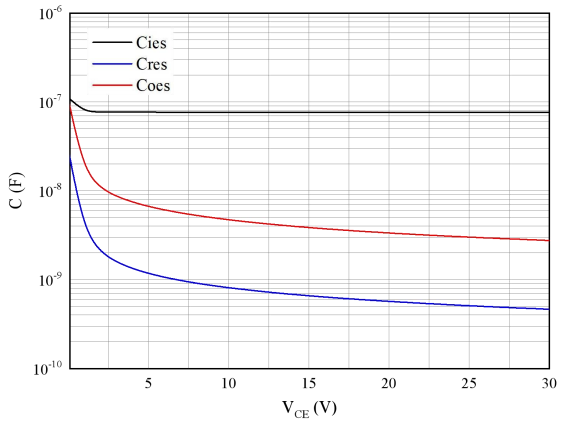


Fig 9. Capacitance characteristics

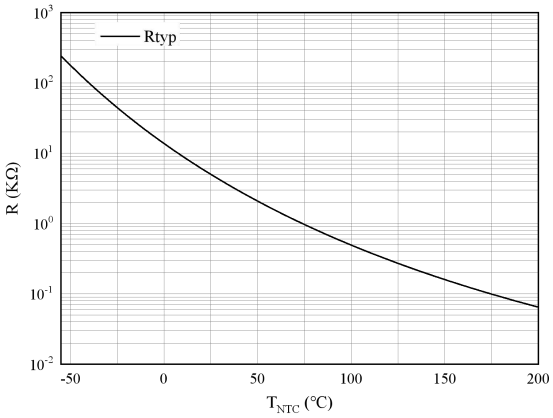


Fig 10. NTC-Themistor-temperature characteristic

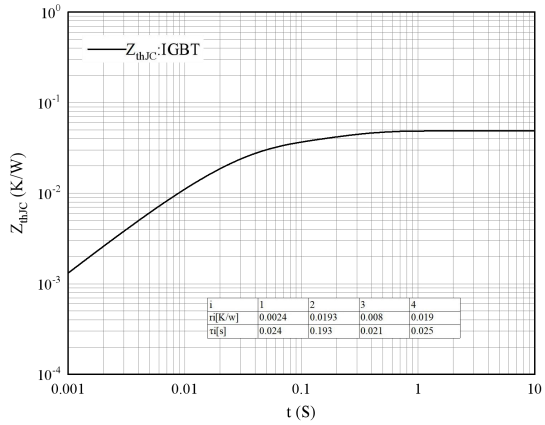


Fig 11. Transient thermal impedance IGBT,
Inverter $Z_{thJC}=f(t)$

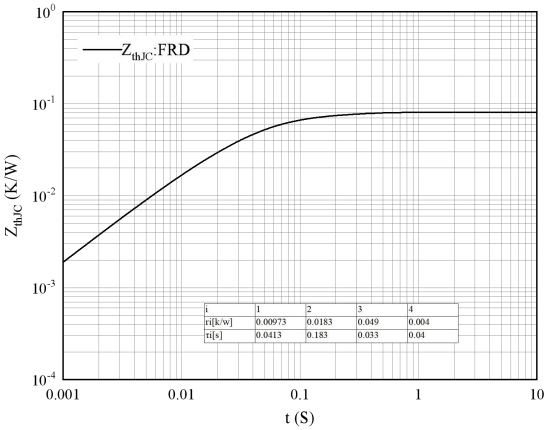
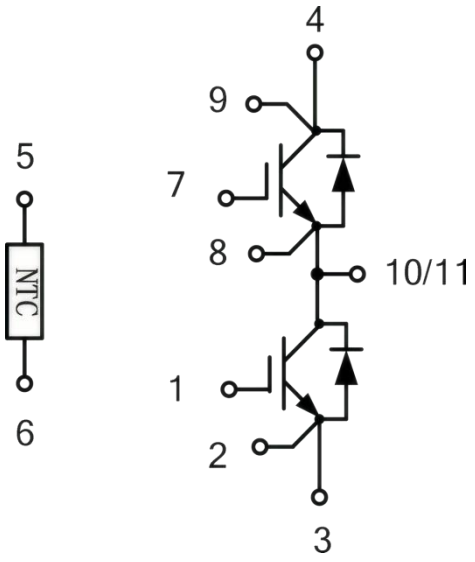
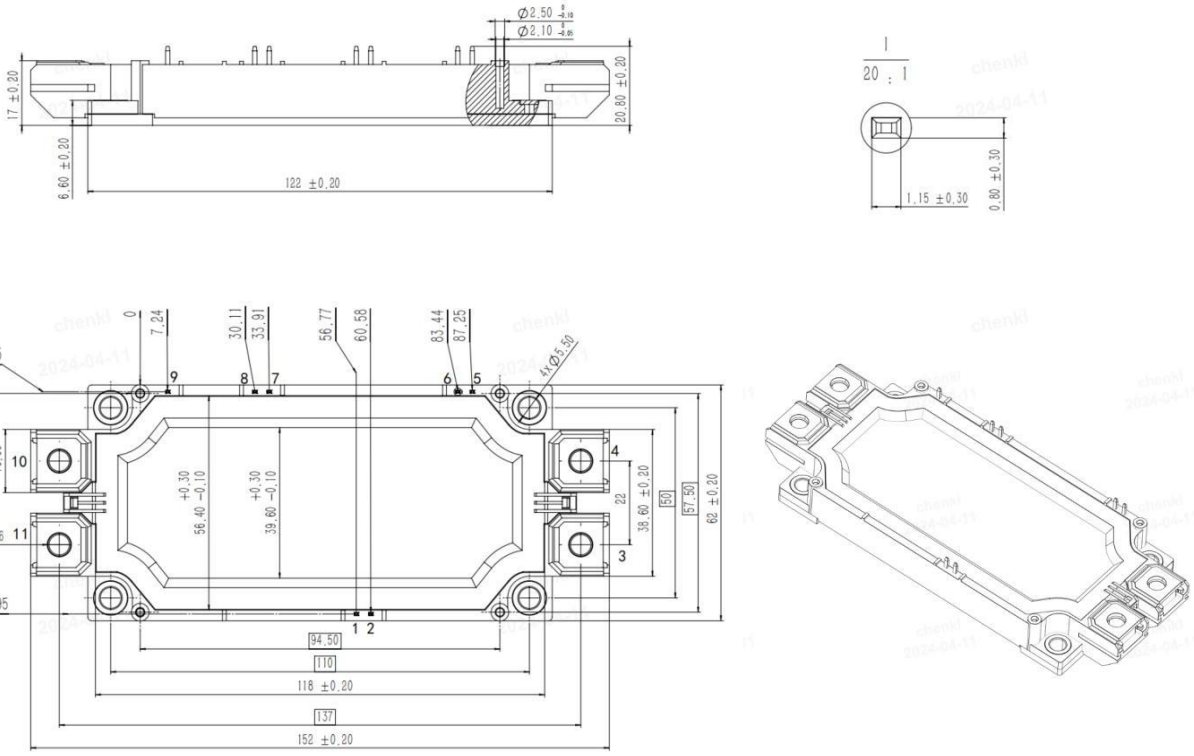


Fig 12. Transient thermal impedance FRD,
Inverter $Z_{thJC}=f(t)$

Circuit Diagram



Package Outlines (Unit:mm)



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