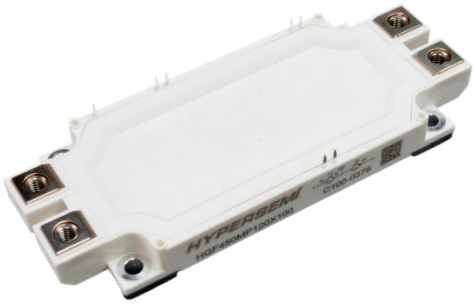
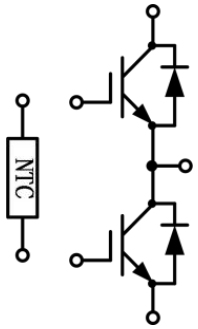
Econodual3 Half Bridge IGBT Module

V_{CES}= 1700V, I_C= 300A, $V_{CE(sat)}$= 1.98V

Features

- 1700V Trench Gate/Field Termination Process
- High Surge Current Capability and Density
- High Power Density,Increased Dc Ink Voltage
- Low Switching Losses
- $V_{CE(Sat)}$ With Positive Temperature Coefficient
- Integrated NTC Temperature Sensor





Applications

- Power Conversion System
- Windgeneratoren
- Static Var Generator

IGBT, Inverter

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	V_{CES}	T_{vj}=25℃, V_{GE}=0V	1700	V
Continuous collector current	$I_{C\ nom}$	T_C=100℃, $T_{vj\ max}$=175℃	300	A
Repetitive peak collector current	I_{CRM}	t_P=1ms, T_{vj}=25℃	600	A
Gate-emitter peak voltage	V_{GES}	T_{vj}=25℃	±20	V
Total power dissipation	P_{tot}	T_C=25℃, $T_{vj\ max}$=175℃	2100	W

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=300A, V_{GE}=15V	T_{vj}=25℃		1.98	2.8	V
			T_{vj}=125℃		2.38		V
			T_{vj}=150℃		2.48		V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=12mA, V_{CE}=V_{GE}	T_{vj}=25℃	4.9	5.6	6.1	V
Gate charge	Q_G	V_{GE}=-15V...+15V			2.12		μC
Integrated gate resistor	$R_{G\ int}$	T_{vj}=25℃			2.50		Ω
Input capacitance	C_{ies}	f=100KHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		29.26		nF
Reverse transfer capacitance	C_{res}	f=100KHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		0.88		nF
Collector-emitter cut-off current	I_{CES}	V_{CE}=1700V, V_{GE}=0V	T_{vj}=25℃			2	mA

Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	T_{vj}=25℃			200	nA
Turn-on delay time	$t_{d\ on}$	I_C=300A, V_{CE}=900V, V_{GE}=-15V/+15V, R_G=3.3Ω, Inductive Load	T_{vj}=25℃		222		ns
			T_{vj}=125℃		241		ns
			T_{vj}=150℃		250		ns
Rise time	t_r		T_{vj}=25℃		78		ns
			T_{vj}=125℃		90		ns
			T_{vj}=150℃		93		ns
Turn-off delay time	$t_{d\ off}$		T_{vj}=25℃		443		ns
			T_{vj}=125℃		490		ns
			T_{vj}=150℃		508		ns
Fall time	t_f		T_{vj}=25℃		311		ns
			T_{vj}=125℃		335		ns
			T_{vj}=150℃		339		ns
Turn-on energy loss per pulse	E_{on}	I_C=300A, V_{CE}=900V, V_{GE}=-15V/+15V, R_G=3.3Ω, di/dt=2500A/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		65.9		mJ
			T_{vj}=125℃		91.1		mJ
			Tvj=150℃		100.6		mJ
Turn-off energy loss per pulse	E_{off}	I_C=300A, V_{CE}=900V, V_{GE}=-15V/+15V, R_G=3.3Ω, du/dt=5500V/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		46.1		mJ
			T_{vj}=125℃		57.2		mJ
			T_{vj}=150℃		59.9		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℃		1400		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.07	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			300	A
Repetitive peak forward current	I_{FRM}	t_P= 1ms		600	A
I^2t-value	I^2t	t_P=10ms, sin180°	T_{vj}=125℃	20000	A^2s

Characteristics Values

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F=300A, V_{GE}=0V	T_{vj}=25℃		2.07	2.8	V
			T_{vj}=125℃		2.37		V
			T_{vj}=150℃		2.35		V

Peak reverse recovery current	I_{rr}	I_F=300A, V_R=900V, V_{GE}=-15V, -diF/dt=2500A/μs (T_{vj}=150℃)	T_{vj}=25℃		141		A
			T_{vj}=125℃		166		A
			T_{vj}=150℃		179		A
Recovered charge	Q_{rr}		T_{vj}=25℃		42.16		μC
			T_{vj}=125℃		72.90		μC
			T_{vj}=150℃		81.63		μC
Reverse recovery energy	E_{rec}		T_{vj}=25℃		23.16		mJ
			T_{vj}=125℃		41.38		mJ
			T_{vj}=150℃		46.06		mJ
Thermal resistance, junction to case	R_{thJC}	per FRD				0.14	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

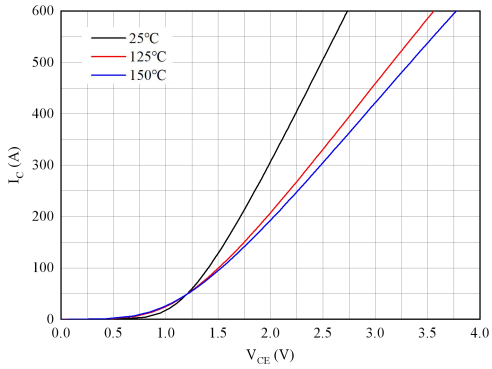


Fig 1. Typical output characteristics (V_{GE}=15V)

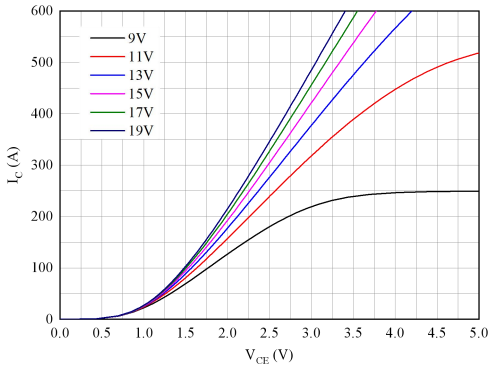


Fig 2. Typical output characteristics (T_{vj}=150℃

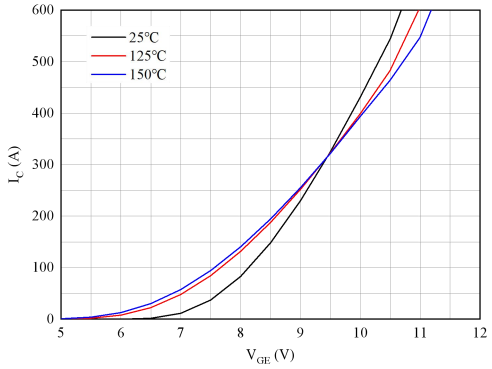


Fig 3. Typical transfer characteristics (V_{CE}=20V)

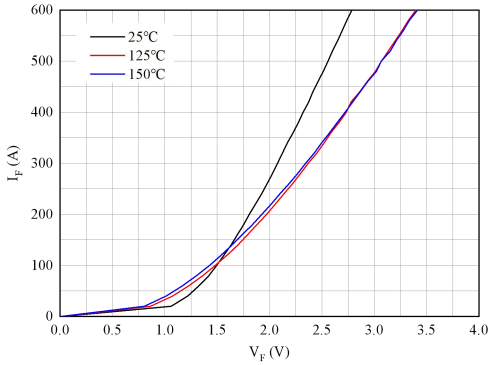


Fig 4. Forward characteristics of Diode

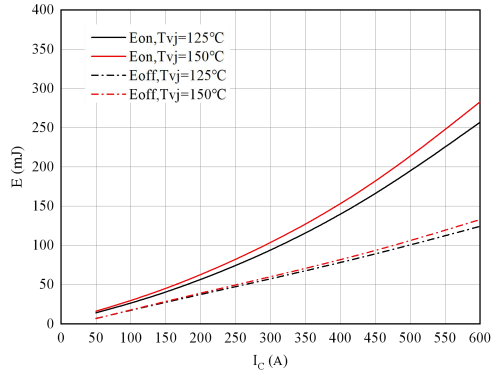


Fig 5. Switching losses of IGBT, Inverter
V_{GE}=±15V, R_{Gon}=R_{Goff}=3.3Ω, V_{CE}=900V

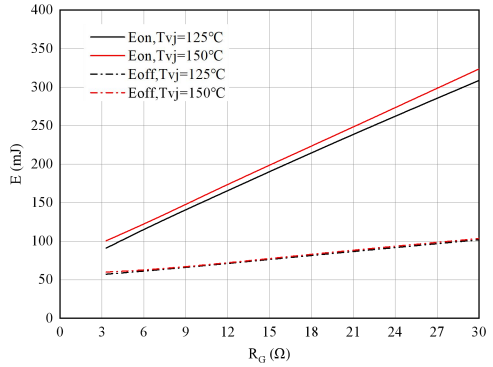


Fig 6. Switching losses of IGBT, Inverter
V_{GE}=±15V, I_C=300A, V_{CE}=900V

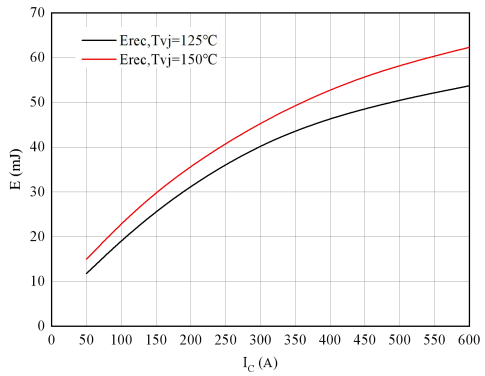


Fig 7. Switching losses of Diode
$R_{Gon}=R_{Goff}=3.3\Omega$, $V_{CE}=900V$

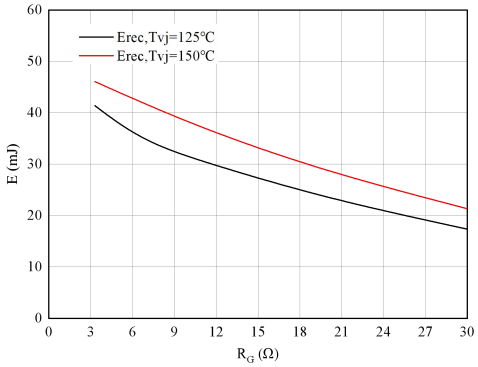


Fig8. Switching losses of Diode
$I_F=300A$, $V_{CE}=900V$

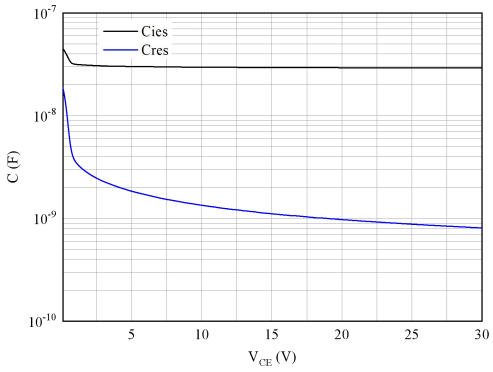


Fig 9. Capacitance characteristics

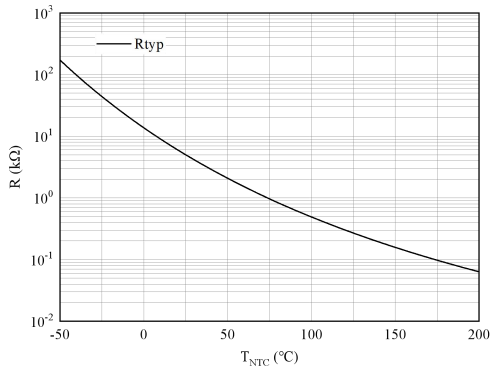


Fig 10. NTC-Themistor-temperature characteristic

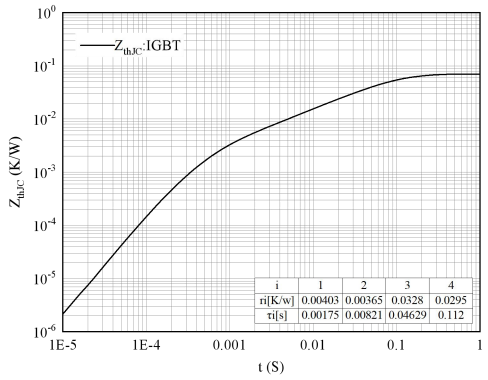


Fig 11. Transient thermal impedance IGBT, Inverter, $Z_{thJC}=f(t)$

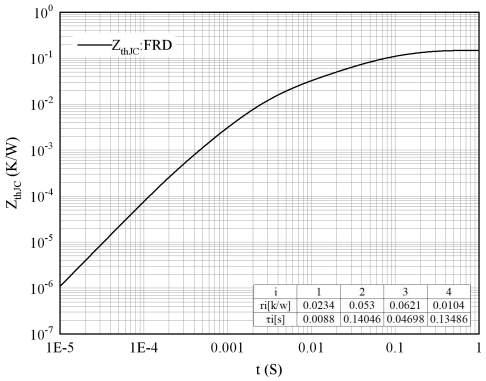
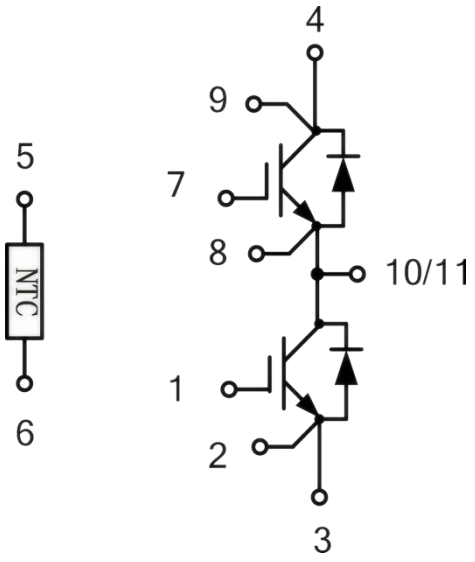
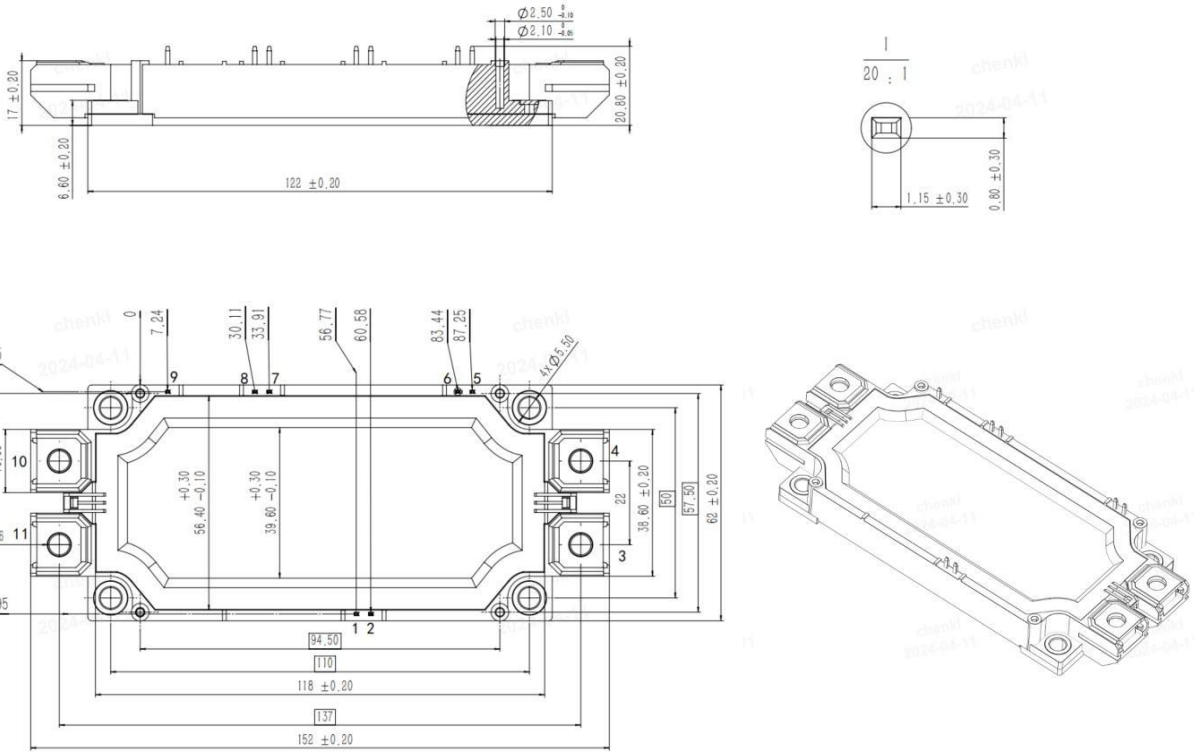


Fig 12. Transient thermal impedance FRD, Inverter, $Z_{thJC}=f(t)$

Circuit Diagram



Package Outlines (Unit:mm)



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