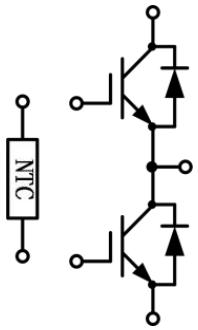
Econodual3 Half Bridge IGBT Module

V_{CES}= 1200V, I_C= 900A, $V_{CE(sat)}$= 1.65V

Features

- 1200V Trench with Field Stop technology
- Low switching-Loss rating
- Optimized for Fast Switching
- Vcesat with positive Temperature Coefficient



Applications

- Static var generator
- UPS system
- Servo drives, Inverter for motor drive
- High Power Converters

IGBT Inverter

Maximum Ratings

Symbol	Parameter	Conditions	Value	Unit
V_{CES}	Collector to Emitter Voltage	T_{vj}= 25℃	1200	V
V_{GES}	Continuous Gate to Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 90℃, $T_{vj\ max}$ = 175℃	900	A
I_{CM}	Pulse Collector Current	tp=1ms	1800	A
P_D	Maximum Power Dissipation (per IGBT)	T_C = 25℃, T_J = 175℃	3600	W

Characteristics Values

Symbol	Parameter	Conditions		Value			Unit
				Min.	Typ.	Max.	
$V_{CE\ sat}$	Collector-Emitter saturation voltage	V_{GE}= 15V, I_C=900A V_{GE}= 15V, I_C=900A V_{GE}= 15V, I_C=900A	T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃		1.65 1.95 2.10	2.10	V
V_{GEth}	Gate-Emitter threshold voltage	I_C= 18mA, V_{GE}= V_{CE},	T_{vj}=25℃	5.2	5.8	6.4	
Q_G	Gate charge	V_{GE}=-15V…+15V			11.5		μC
R_{Gint}	Internal gate resistor	T_{vj}=25℃			0.5		Ω

C_{ies}	Input capacitance	f= 100KHz,V_{CE}=25V, V_{GE}=0V, T_{vj}=25℃		140		nF
C_{res}	Reverse transfer capacitance			0.55		
I_{CES}	Collector-emitter cut-off current	V_{CE}= 1200V , V_{GE}= 0V, T_{vj}=25℃			0. 1	mA
I_{GES}	Gate-emitter leakage current	V_{CE}=0V, V_{GE}= 20V, T_{vj}=25℃			100	nA
$t_{d\ on}$	Turn-on delay time	I_C=900A, V_{CE}=600V V_{GE}=±15V, R_G=0.5Ω / (inductive load)	T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃	409 435 445		ns
t_r	Rise time		T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃	75 86 95		
$t_{d\ off}$	Turn-off delay time		T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃	510 575 620		
t_f	Fall time		T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃	147 238 295		
E_{on}	Turn-on energy loss per pulse	I_C=900A, V_{CE}=600V di/dt=7500A/us(T_{vj}=175℃) V_{GE}=±15V, R_G=0.5Ω	T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃	36 69 93		mJ
E_{off}	Turn-off energy loss per pulse	I_C=900A, V_{CE}=600V dv/dt=3100V/us(Tvj=175℃) V_{GE}=±15V, R_G=0.5Ω	T_{vj}=25℃ T_{vj}= 125℃ T_{vj}= 175℃	94 122 139		mJ
I_{SC}	SC data	V_{GE}≤15V,V_{CC}=800V, tP≤8us, T_{vj}=150℃ V_{CEmax}=V_{CES}-L_{sCE}·di/dt,tP≤6us,T_{vj}=175℃		3400 3200		A
R_{thJC}	Thermal resistance, junction to case	per IGBT			0.044	K/W
$T_{vj\ op}$	Temperature under switching conditions	Tvj op ＞150℃ is only allowed for operation at overload conditions.		-40	175	℃

Diode, Inverter

Maximum Ratings

Symbol	Parameter	Conditions	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	Tvj=25℃	1200	V
I_F	Continuous DC forward current		900	A
I_{FRM}	Repetitive peak forward current	tp=1ms	1800	A
I^2t	I^2t-value	tp=10ms ,sin180°,Tvj=125℃	30000	A2s

Characteristics Values

Symbol	Parameter	Conditions		Value			Unit
				Min.	Typ.	Max.	
V_F	Forward voltage	I_F=900A, V_{GE}=0V I_F=900A, V_{GE}=0V I_F=900A, V_{GE}=0V	Tvj=25℃ Tvj=125℃ Tvj=175℃		2.05 2.25 2.25	2.35	V

I_{RM}	Peak reverse recovery current	I_F=900A -diF/dt=7500A/μs (Tvj=175℃) V_R=600V, V_{GE}=-15V	Tvj=25℃ Tvj=125℃ Tvj=175℃		512 544 556		A
Q_{rr}	Recovered charge	I_F=900A -diF/dt=7500A/μs (T_{vj}=175℃) V_R=600V, V_{GE}=-15V	Tvj=25℃ Tvj=125℃ Tvj=175℃		85 148 189		μC
E_{rec}	Reverse recovered energy	I_F=900A -diF/dt=7500A/μs (T_{vj}=175℃) V_R=600V, V_{GE}=-15V	Tvj=25℃ Tvj=125℃ Tvj=175℃		42 68 83		mJ
R_{thJC}	Thermal resistance, junction to case	per diode				0.069	K/W
$T_{vj\ op}$	Temperature under switching conditions	$T_{vj\ op}$＞150℃ is only for overload conditions.	operation at	-40		175	℃

NTC-Thermistor
Characteristics Values

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistances	T_c=25℃，±3%		5.0		KΩ
$B_{25/50}$	B-value	$R_2 = R_{25}\exp[B_{25/50}(1/T2 - 1/(298,15\ K))]$		3375		K
$B_{25/80}$	B-value	$R_2 = R_{25}\exp[B_{25/80}(1/T2 - 1/(298,15\ K))]$		3425		K
$B_{25/100}$	B-value	$R_2 = R_{25}\exp[B_{25/100}(1/T2 - 1/(298,15\ K))]$		3443		K

Module
Characteristics Values

Symbol	Parameter	Conditions	Value			Unit
V_{ISOL}	Isolation test voltage	RMS, f=50Hz, t= 1min		3400		V
	Internal isolation	basic insulation (class 1, IEC 61140)		Al_2O_3		
CTI	Comperative tracking index			>200		
RTI	RTI Elec.	housing		140		℃
L_{sCE}	Stray inductance module			20		nH
T_{stg}	Storage temperature		-40		125	℃
M	Mounting torque for module mounting		3.0		6.0	Nm
M	Terminal Connection Torque		3.0		6.0	Nm
W	Weight			357		g

Typical Characteristics

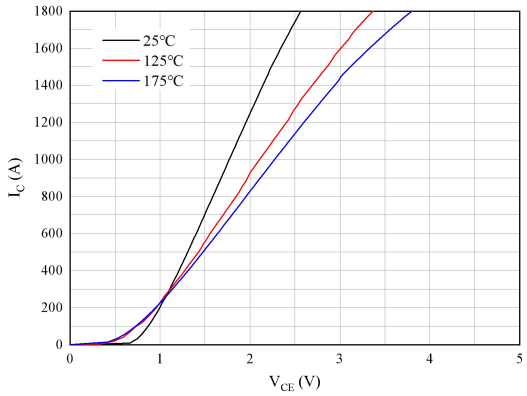


Fig1. Typical output characteristics (V_{GE}=15V)

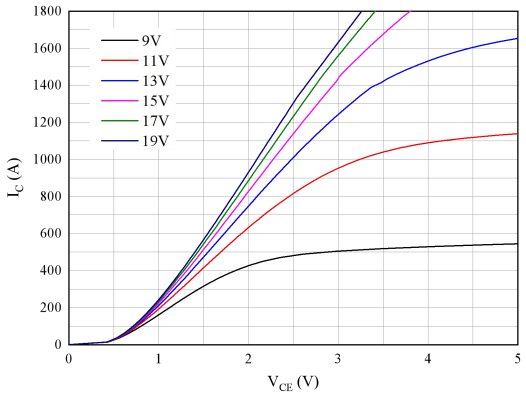


Fig 2. Typical output characteristics (T_{vj}=175°C)

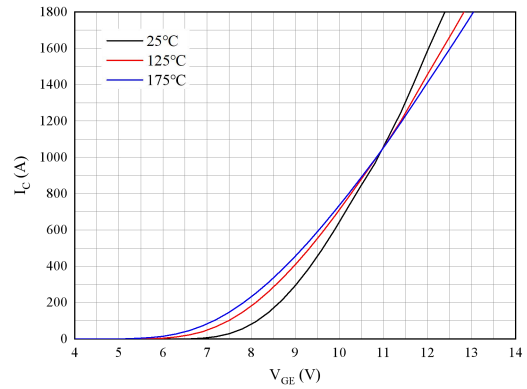


Fig3. Typical transfer characteristic (V_{CE}=20V)

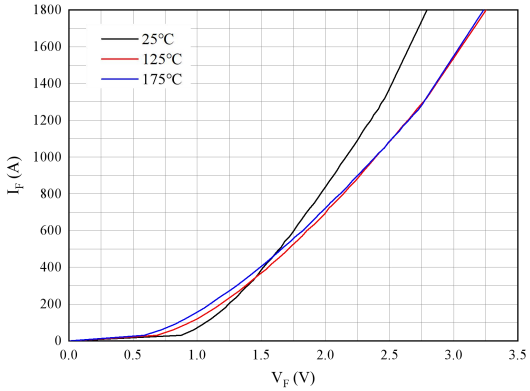


Figure 4. Forward characteristic of Diode

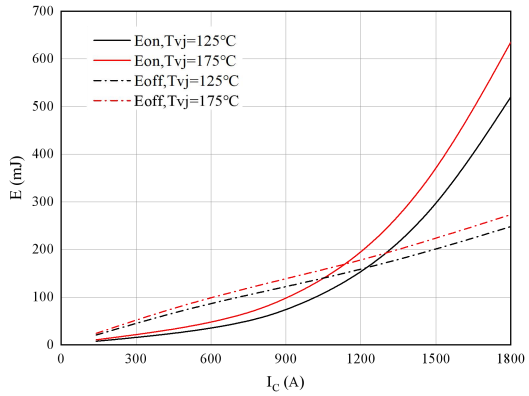


Fig 5. Switching losses of IGBT
V_{GE}=±15V, R_{Gon}=0.5Ω, R_{Goff}=0.5Ω, V_{CE}=600V

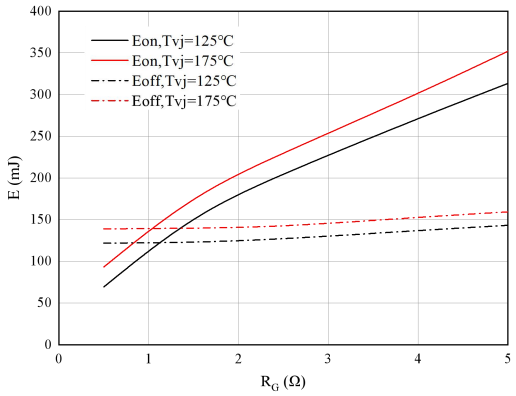


Fig 6. Switching losses of IGBT
V_{GE}=±15V, I_C=900A , V_{CE}=600V

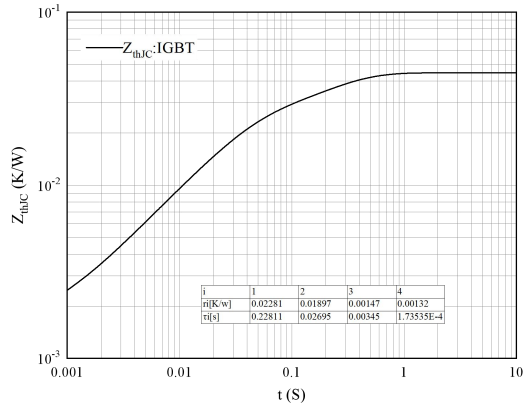


Fig 7. Transient thermal impedance IGBT, Inverter

$Z_{thJC}=f(t)$

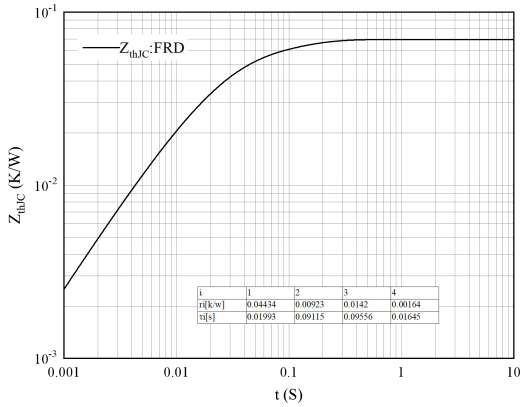


Fig 8. Transient thermal impedance FRD, Inverter

$Z_{thJC}=f(t)$

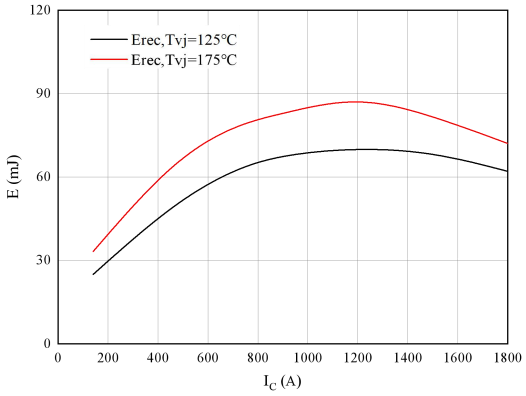


Fig 9. Switching losses of Diode

$R_{Gon}=0.5\Omega$, $V_{CE}=600V$

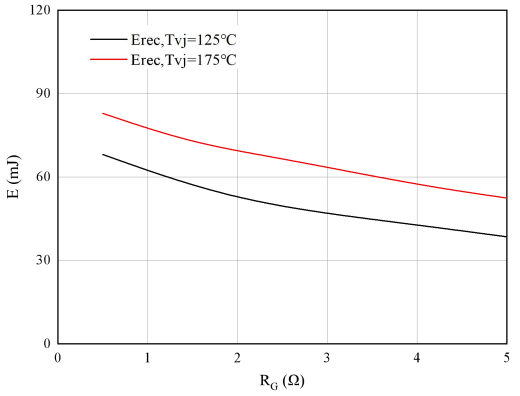


Fig 10. Switching losses of Diode

$I_F=900A$, $V_{CE}=600V$

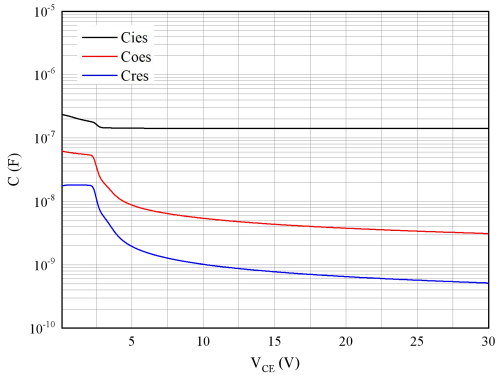


Fig11. Capacitance characteristic

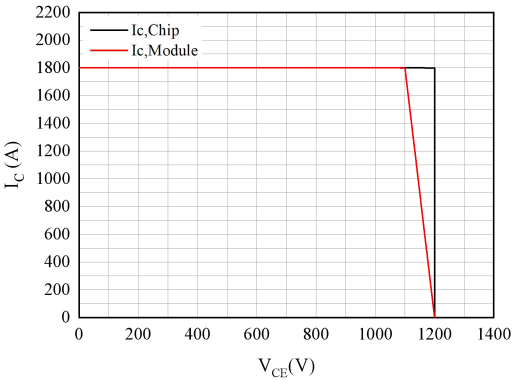


Fig 12. RBSOA

$V_{GE}=\pm15V$, $R_{Goff}=0.5\Omega$,$T_{vj}=175°C$

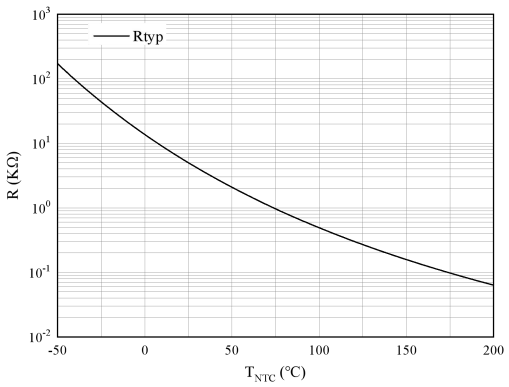
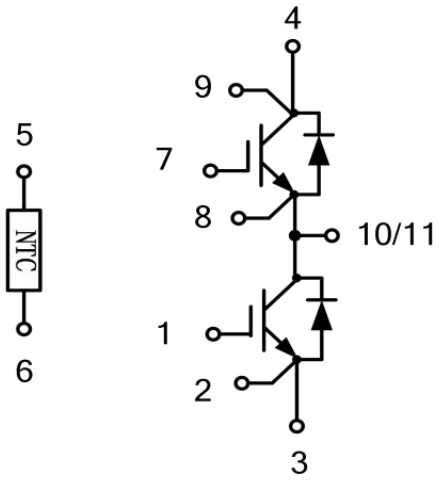
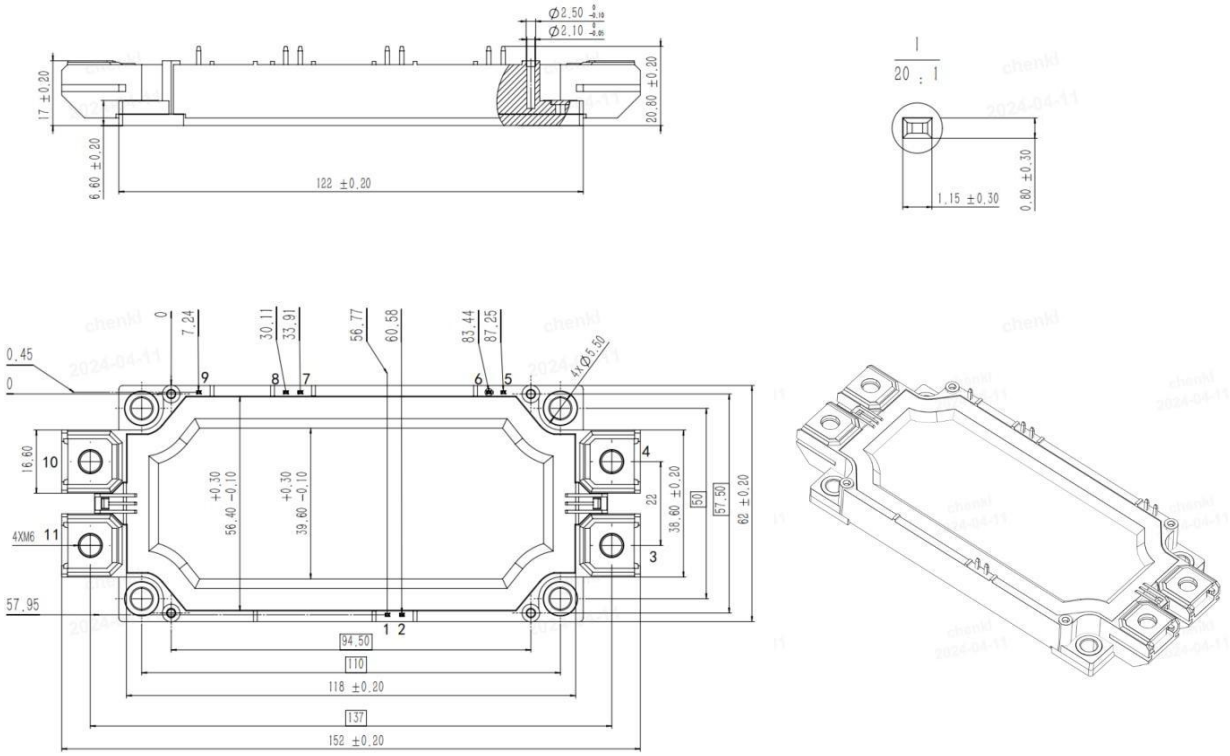


Fig 13. NTC-Thermistor-temperature characteristic

Circuit Diagram



Package Outline (Unit：mm)



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