

Half Bridge IGBT Module

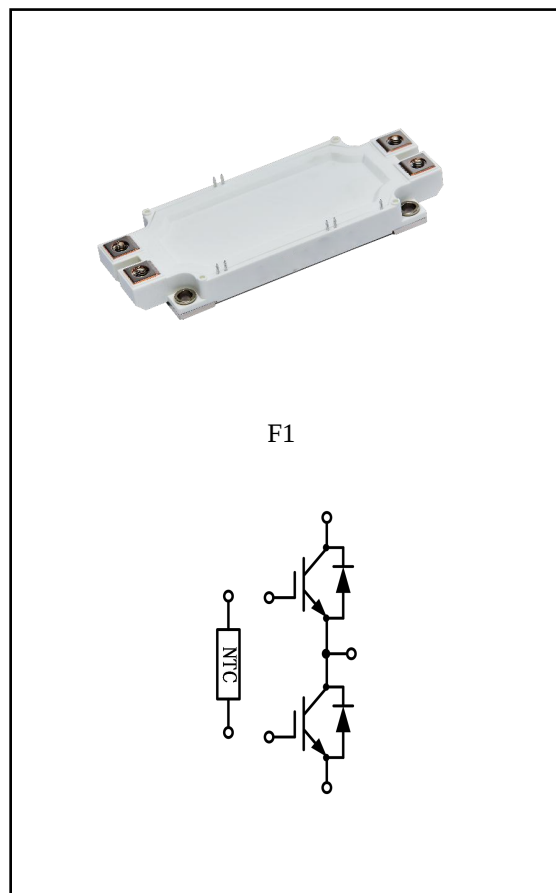
$V_{CES}=1200V$, $I_{C\ nom}=600A$ / $I_{CRM}=1200A$

Electrical characteristics :

- 1200V Trench /Field Stop process
- Low switching losses
- V_{cesat} has a positive temperature coefficient

Applications:

- Variable Frequency Drive
- UPS
- Servo drive
- inverter



IGBT, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	$T_{vj}=25^{\circ}C$	V_{CES}	1200	V
Continuous DC collector current	$T_C=100^{\circ}C$, $T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	600	A
Repetitive peak collector current	$t_p = 1\ ms$	I_{CRM}	1200	A
Total power dissipation	$T_C = 25^{\circ}C$, $T_{vj\ max} = 175^{\circ}C$	P_{tot}	7900	W
Gate emitter voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=600A$ $V_{GE}=15V, I_C=600A$ $V_{GE}=15V, I_C=600A$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		1.78 2.07 2.13	2.10	V
Gate-Emitter threshold voltage	$I_C=23mA, V_{GE}=V_{CE},$	$T_{vj}=25^{\circ}C$		5.2	5.8	6.4
Gate charge	$V_{GE}=-15V \dots +15V$	Q_G		5.55		μC
Internal gate resistor	$T_{vj}=25^{\circ}C$	R_{Gint}		1.34		Ω
Input capacitance	$f=1MHz, V_{CE}=25V, V_{GE}=0V$	C_{ies}		47.07		nF
Reverse transfer capacitance		C_{res}		2.20		
Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$			2	mA
Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$			200	nA
Turn-on delay time	$I_C=600A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		312 334 363		ns
Rise time	$I_C=600A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		194 200 202		
Turn-off delay time	$I_C=600A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		582 647 697		
Fall time	$I_C=600A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		105 138 173		
Turn-on energy loss per pulse	$I_C=600A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ $di/dt=2379A/\mu s$ (Tvj = 150°C) (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		93.35 119.5 130.1		mJ
Turn-off energy loss per pulse	$I_C=600A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ $dv/dt=3121V/\mu s$ (Tvj = 150°C) (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$		61.57 71.01 76.53		mJ
SC data	$V_{GE} \leq 15V, V_{CC}=800V$ $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt$	$t_p \leq 10\mu s, T_{vj}=150^{\circ}C$		3000		A
Thermal resistance, junction to case	per IGBT	R_{thJC}			0.019	K/W
Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}C$

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj}=25^{\circ}\text{C}$	V_{RRM}	1200	V
Continuous DC forward current		I_F	600	A
Repetitive peak forward current	$t_p=1\text{ms}$	I_{FRM}	1200	A
I^2t -value	$t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$	I^2t	38500	A^2s

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=600\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=25^{\circ}\text{C}$ $I_F=600\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=125^{\circ}\text{C}$ $I_F=600\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=150^{\circ}\text{C}$	V_F		2.44 2.55 2.50	2.70	V
Peak reverse recovery current	$I_F=600\text{A}$, $-di_F/dt=2379\text{A}/\mu\text{s}$ $T_{vj}=25^{\circ}\text{C}$ $V_R=600\text{V}$ $T_{vj}=125^{\circ}\text{C}$ $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	I_{RM}		144 208 240		A
Recovered charge	$I_F=600\text{A}$, $-di_F/dt=2379\text{A}/\mu\text{s}$ $T_{vj}=25^{\circ}\text{C}$ $V_R=600\text{V}$ $T_{vj}=125^{\circ}\text{C}$ $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	Q_r		19.70 51.44 63.30		μC
Reverse recovered energy	$I_F=600\text{A}$, $-di_F/dt=2379\text{A}/\mu\text{s}$ $T_{vj}=25^{\circ}\text{C}$ $V_R=600\text{V}$ $T_{vj}=125^{\circ}\text{C}$ $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	E_{rec}		4.79 14.37 17.93		mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.028	K/W
Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

NTC-Thermistor

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Rated resistances	$T_c=25^{\circ}\text{C}$, $\pm 5\%$	R_{25}		5.0		K Ω
B-value	$\pm 2\%$	$B_{25/50}$		3375		K

Module

Parameter	Conditions	Symbol	Value			Unit
Isolation test voltage	RMS, $f=50\text{Hz}$, $t=1\text{min}$	V_{ISOL}	2500			V
Internal isolation			Al_2O_3			
Storage temperature		T_{stg}	-40		125	$^{\circ}\text{C}$
Mounting torque for modul mounting		M	3.0		6.0	Nm
Terminal Connection Torque		M	3.0		6.0	Nm
Weight		W		341		g

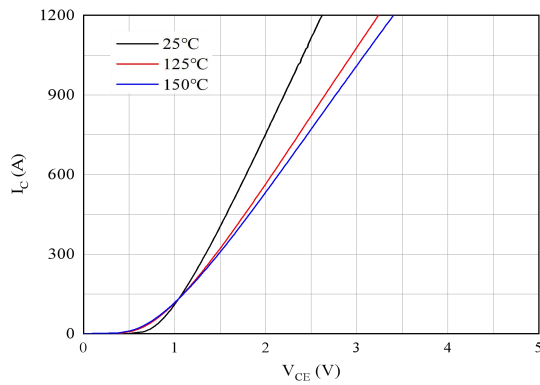


Fig 1. Typical output characteristics ($V_{GE}=15V$)

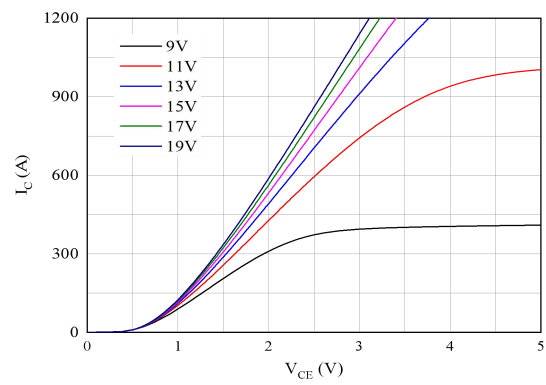


Fig 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

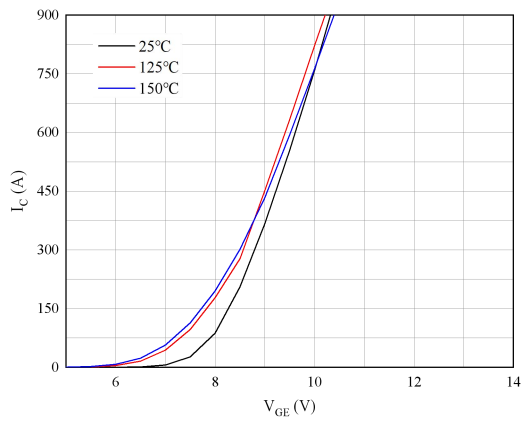


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

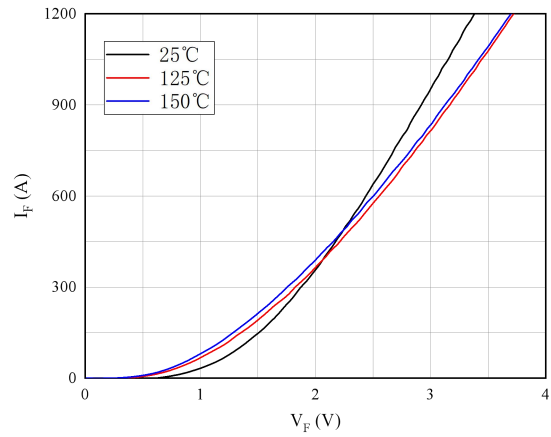


Fig 4. Forward characteristic of Diode

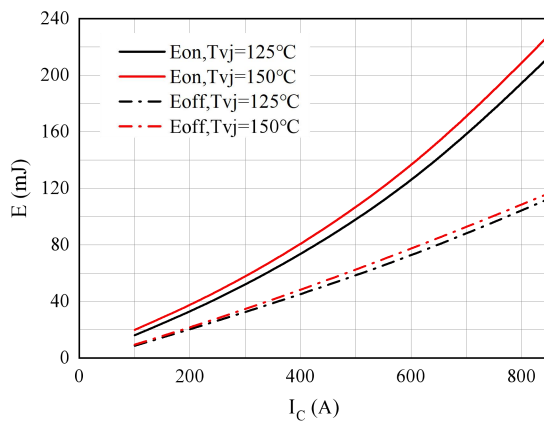


Fig 5. Switching losses of IGBT

$V_{GE}=\pm 15V$, $R_{Gon}=1.5\Omega$, $R_{Goff}=1.5\Omega$, $V_{CE}=600V$

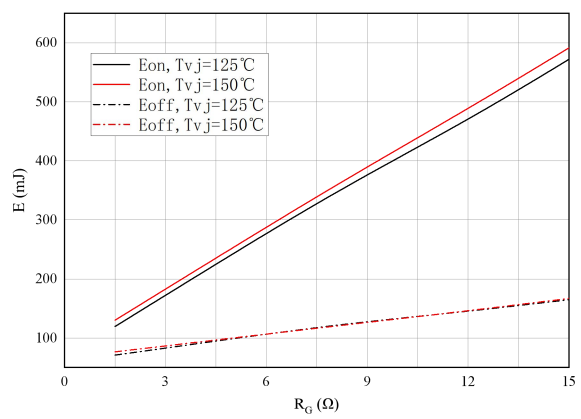


Fig 6. Switching losses of IGBT

$V_{GE}=\pm 15V$, $I_C=600A$, $V_{CE}=600V$

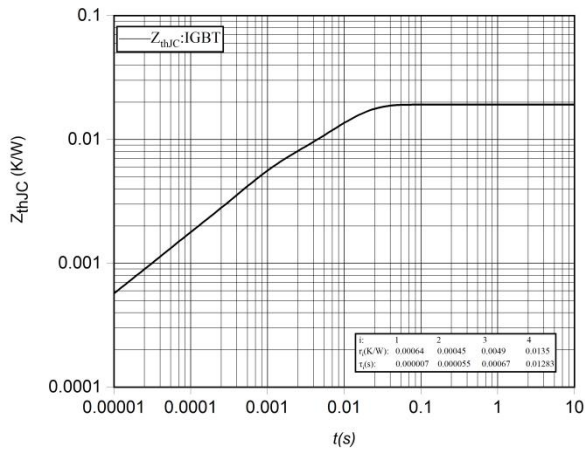


Fig 7. Transient thermal impedance IGBT, Inverter

$$Z_{thJC}=f(t)$$

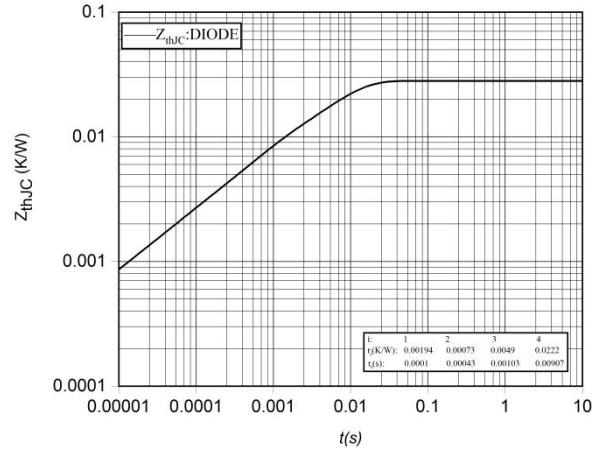


Fig 8. Transient thermal impedance FRD, Inverter

$$Z_{thJC}=f(t)$$

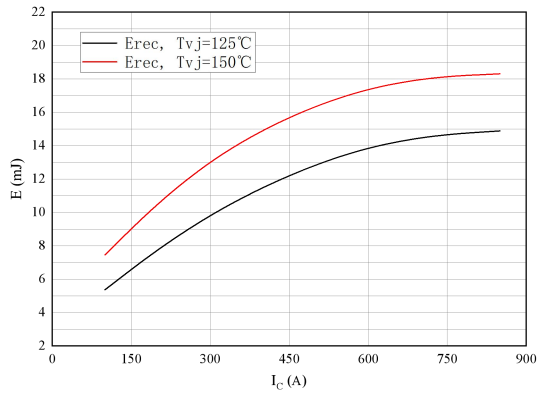


Fig 9. Switching losses of Diode

$R_{Gon}=1.5\Omega$, $V_{CE}=600V$

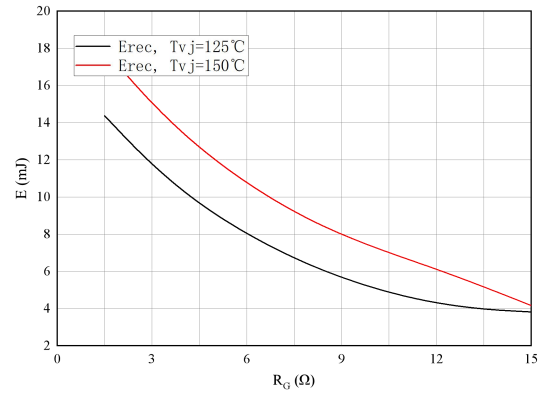


Fig10. Switching losses of Diode

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

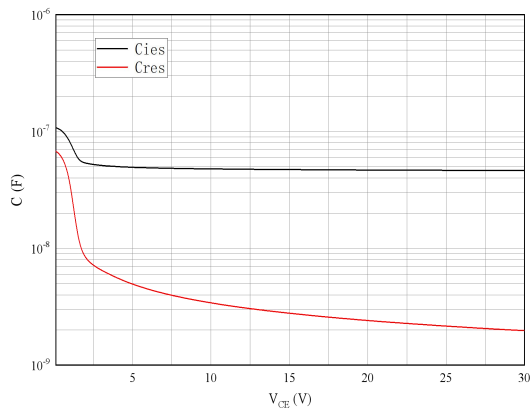


Fig 11. Capacitance characteristic

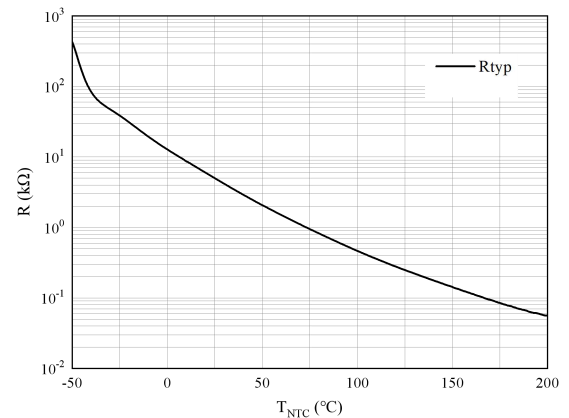
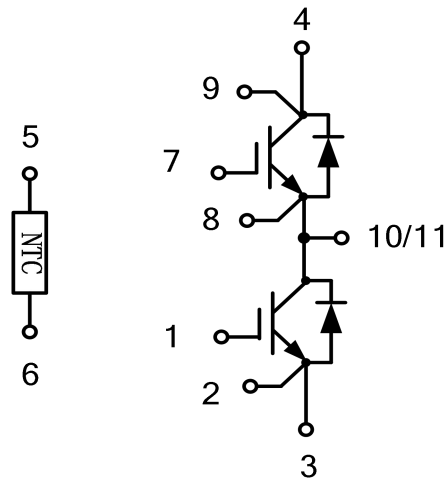


Fig10. NTC-Thermistor-temperaturecharacteristic

Circuit diagram



Package outlines

