

Half Bridge IGBT Module

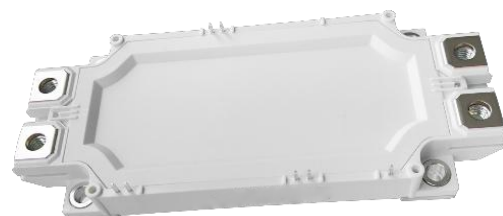
$V_{CES}=1700V$, $I_{C\text{ nom}}=300A$ / $I_{CRM}=600A$

Electrical characteristics :

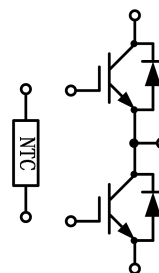
- 1700V Trench /Field Stop process
- Low switching losses
- V_{cesat} has a positive temperature coefficient

Applications:

- Power Conversion System
- Static Var Generator
- Wind Generatoren



F1



IGBT, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	$T_{vj}=25^{\circ}C$	V_{CES}	1700	V
Continuous DC collector current	$T_c=100^{\circ}C$, $T_{vj\text{ max}}=175^{\circ}C$	$I_{C\text{ nom}}$	300	A
Repetitive peak collector current	$t_p=1\text{ ms}$	I_{CRM}	600	A
Total power dissipation	$T_c = 25^{\circ}C$, $T_{vj\text{ max}} = 175^{\circ}C$	P_{tot}	1700	W
Gate emitter voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=300A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V, I_C=300A$ $T_{vj}=125^{\circ}C$ $V_{GE}=15V, I_C=300A$ $T_{vj}=150^{\circ}C$	V_{CEsat}		1.79 2.08 2.16	2.50	V
Gate-Emitter threshold voltage	$I_C=18mA, V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$	$V_{GE(th)}$	4.90	5.50	6.10	
Gate charge	$V_{GE}=-15V \dots +15V$	Q_G		2.99		μC
Internal gate resistor	$T_{vj}=25^{\circ}C$	R_{Gint}		1.95		Ω
Input capacitance	$f=100KHz, V_{CE}=25V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$	C_{ies}		40.68		nF
Reverse transfer capacitance		C_{res}		1.18		
Collector-emitter cut-off current	$V_{CE}=1700V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$	I_{CES}			2	mA
Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$ $T_{vj}=25^{\circ}C$	I_{GES}			200	nA
Turn-on delay time	$I_C=300A, V_{CE}=900V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=3.3\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_{don}		226 245 255		ns
Rise time	$I_C=300A, V_{CE}=900V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=3.3\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_r		90 101 104		
Turn-off delay time	$I_C=300A, V_{CE}=900V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=3.3\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_{doff}		515 572 588		
Fall time	$I_C=300A, V_{CE}=900V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=3.3\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_f		350 363 404		
Turn-on energy loss per pulse	$I_C=300A, V_{CE}=900V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=3.3\Omega$ $T_{vj}=125^{\circ}C$ $di/dt=2300A/\mu s(T_{vj}=150^{\circ}C)$ $T_{vj}=150^{\circ}C$ (inductive load)	E_{on}		69.2 90.5 96.8		mJ
Turn-off energy loss per pulse	$I_C=300A, V_{CE}=900V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=3.3\Omega$ $T_{vj}=125^{\circ}C$ $du/dt=4800V/\mu s(T_{vj}=150^{\circ}C)$ $T_{vj}=150^{\circ}C$ (inductive load)	E_{off}		51.5 64.7 69.4		
SC data	$V_{GE} \leq 15V, V_{ce}=1000V$ $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt$ $t_p \leq 10\mu s, T_{vj}=150^{\circ}C$	I_{sc}		1800		A
Thermal resistance, junction to case	per IGBT	R_{thJC}			0.088	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}	1700	V
Continuous DC forward current		I_F	300	A
Repetitive peak forward current	$t_p=1\text{ms}$	I_{FRM}	600	A
I^2t -value	$t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$	I^2t	17000	A^2s

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=300\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=25^{\circ}\text{C}$ $I_F=300\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=125^{\circ}\text{C}$ $I_F=300\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=150^{\circ}\text{C}$	V_F		2.23 2.48 2.43	2.90	V
Peak reverse recovery current	$I_F=300\text{A}$ $T_{vj}=25^{\circ}\text{C}$ $-di_F/dt=2300\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=125^{\circ}\text{C}$ $V_R=900\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	I_{RM}		122 147 154		A
Recovered charge	$I_F=300\text{A}$ $T_{vj}=25^{\circ}\text{C}$ $-di_F/dt=2300\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=125^{\circ}\text{C}$ $V_R=900\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	Q_r		35.96 60.88 71.56		μC
Reverse recovered energy	$I_F=300\text{A}$ $T_{vj}=25^{\circ}\text{C}$ $-di_F/dt=2300\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=125^{\circ}\text{C}$ $V_R=900\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	E_{rec}		19.29 34.06 40.89		mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.18	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=50Hz, t=1min	V_{ISOL}	4000			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		344		g

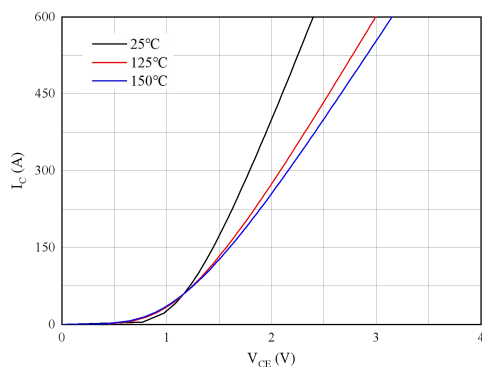


Fig 1. Typical output characteristics ($V_{GE}=15V$)

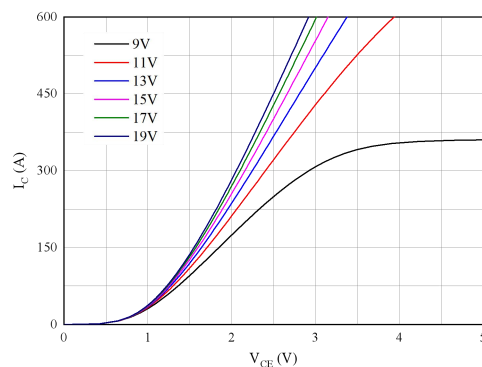


Fig 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

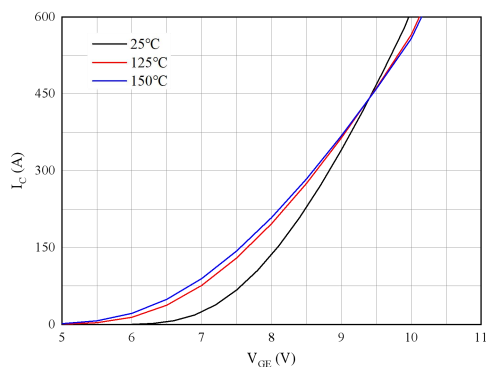


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

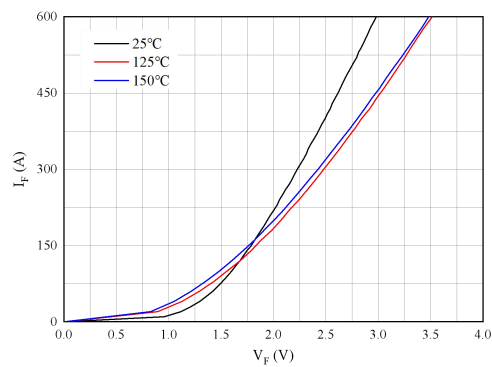


Fig 4. Forward characteristic of Diode

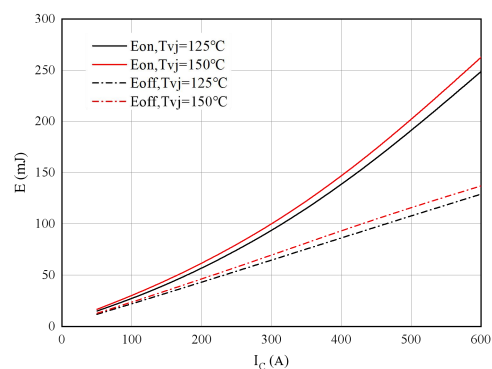


Fig 5. Switching losses of IGBT

$V_{GE}=\pm 15V$, $R_{Gon}=3.3\Omega$, $R_{Goff}=3.3\Omega$, $V_{CE}=900V$

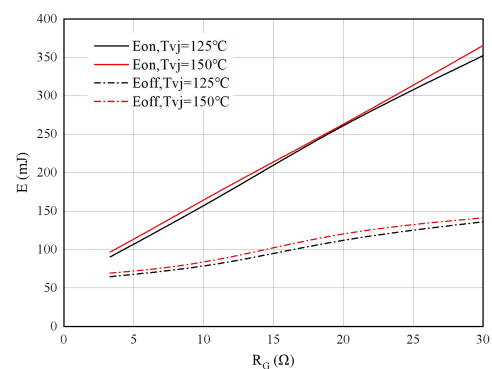


Fig 6. Switching losses of IGBT

$V_{GE}=\pm 15V$, $I_C=300A$, $V_{CE}=900V$

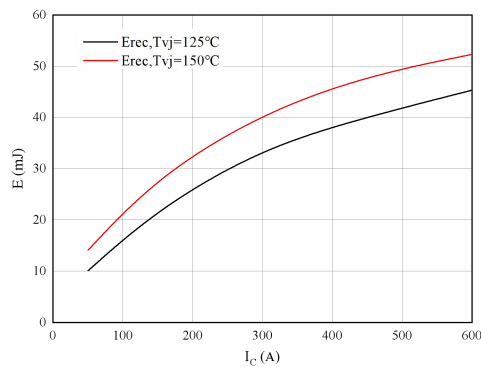


Fig 7. Switching losses of Diode

$R_{Gon}=3.3\Omega$, $V_{CE}=900V$

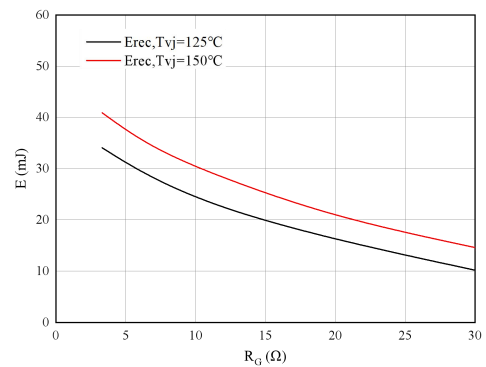


Fig 8. Switching losses of Diode

$I_F=300A$, $V_{CE}=900V$

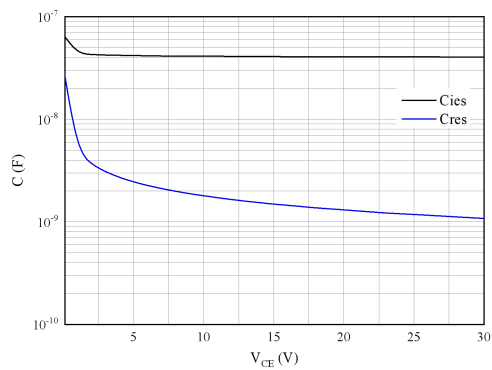


Fig 9. Capacitance characteristic

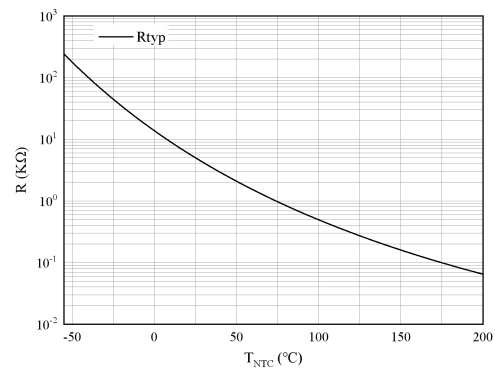


Fig 10. NTC-Themistor-temperature characteristic

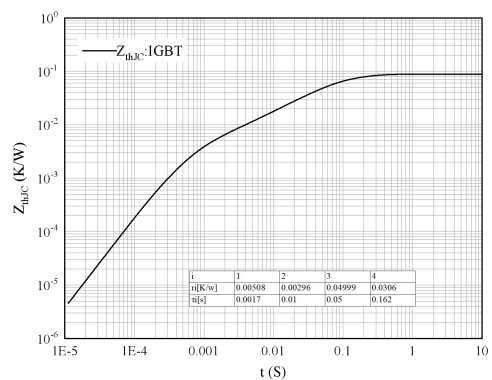


Fig 11. Transient thermal impedance IGBT, Inverter

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

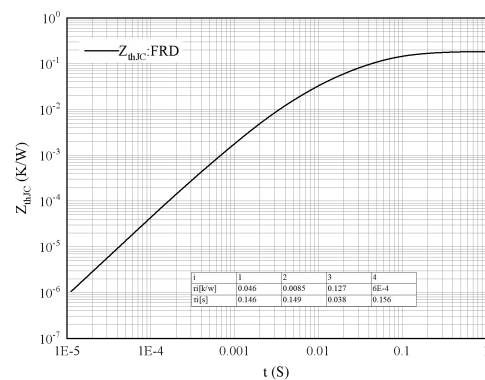
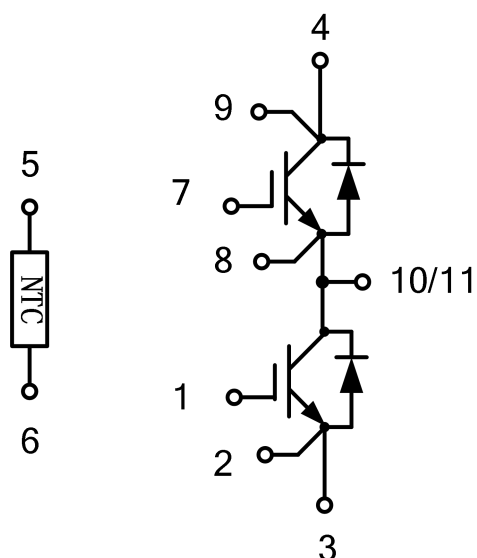


Fig 12. Transient thermal impedance FRD ,Inverter

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

Circuit diagram



Package outlines

