

Half Bridge IGBT Module

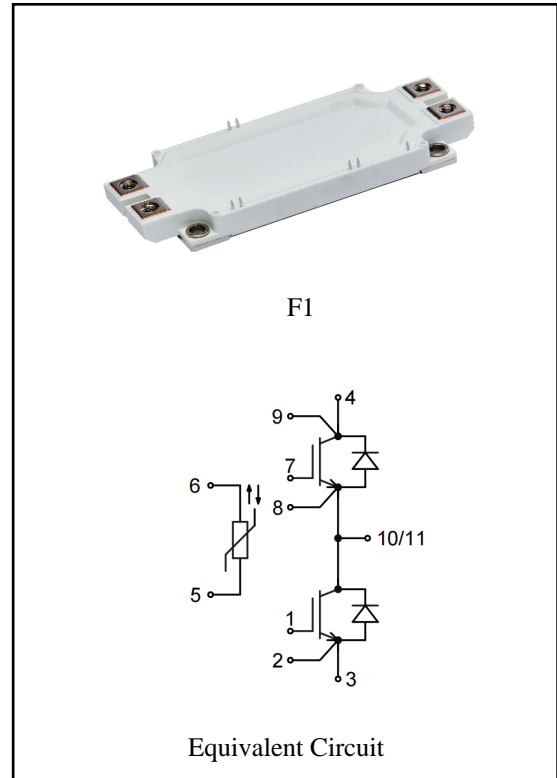
$V_{CES} = 1200V$, $I_{C\ nom} = 450A / I_{CRM} = 900A$

Features :

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

Applications:

- Power Converters
- UPS
- Servo Drives
- Inverter Converters



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	$T_C = 100^{\circ}C$, $T_{vj\ max} = 175^{\circ}C$	$I_{C\ nom}$	450	A
Total power dissipation	$T_C = 25^{\circ}C$, $T_{vj\ max} = 175^{\circ}C$	P_{tot}	2500	W
Repetitive peak collector current	$t_p = 1\ ms$	I_{CRM}	900	A
Gate emitter voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit	
			Min.	Typ.	Max.		
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=450A$	$T_{vj}=25^{\circ}C$		1.60	2.07	V	
	$V_{GE}=15V, I_C=450A$	$T_{vj}=125^{\circ}C$		1.80			
	$V_{GE}=15V, I_C=450A$	$T_{vj}=150^{\circ}C$		1.90			
Gate-Emitter threshold voltage	$I_C=17mA, V_{GE}=V_{CE},$	$T_{vj}=25^{\circ}C$	V_{GEth}	5.40	6.0	6.60	
Gate charge	$V_{GE}=-15V...+15V$		Q_G		2.09		μC
Internal gate resistor	$T_{vj}=25^{\circ}C$		R_{Gint}		0.36		Ω
Input capacitance	$f=100KHZ, V_{CE}=25V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	C_{ies}		71.80		nF
Reverse transfer capacitance			C_{res}		0.62		
Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	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	$I_C=450A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	t_{don}		281		
		$T_{vj}=125^{\circ}C$			284		
		$T_{vj}=150^{\circ}C$			282		
Rise time	$I_C=450A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	t_r		69		
		$T_{vj}=125^{\circ}C$			71		
		$T_{vj}=150^{\circ}C$			74		
Turn-off delay time	$I_C=450A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	t_{doff}		375		ns
		$T_{vj}=125^{\circ}C$			422		
		$T_{vj}=150^{\circ}C$			430		
Fall time	$I_C=450A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	t_f		133		
		$T_{vj}=125^{\circ}C$			217		
		$T_{vj}=150^{\circ}C$			240		
Turn-on energy loss per pulse	$I_C=450A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ $di/dt=4900A/us(T_{vj}=150^{\circ}C)$ (inductive load)	$T_{vj}=25^{\circ}C$	E_{on}		20.00		mJ
		$T_{vj}=125^{\circ}C$			46.77		
		$T_{vj}=150^{\circ}C$			56.15		
Turn-off energy loss per pulse	$I_C=450A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=1.5\Omega$ $du/dt=4200V/us(T_{vj}=150^{\circ}C)$ (inductive load)	$T_{vj}=25^{\circ}C$	E_{off}		36.20		mJ
		$T_{vj}=125^{\circ}C$			46.48		
		$T_{vj}=150^{\circ}C$			48.20		
SC data	$V_{GE}\leq 15V, V_{cc}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$	$t_p\leq 10us, T_{vj}=150^{\circ}C$	I_{sc}		1700		A
Thermal resistance, junction to case	per IGBT		R_{thJC}			0.06	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	450	A
Repetitive peak forward current	$t_p=1\text{ms}$	I_{FRM}	900	A
I^2t -value	$t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$	I^2t	38000	A^2s

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=450\text{A}$, $V_{GE}=0\text{V}$	$T_{vj}=25^{\circ}\text{C}$		1.99	2.40	V
	$I_F=450\text{A}$, $V_{GE}=0\text{V}$	$T_{vj}=125^{\circ}\text{C}$		1.75		
	$I_F=450\text{A}$, $V_{GE}=0\text{V}$	$T_{vj}=150^{\circ}\text{C}$		1.70		
Peak reverse recovery current	$I_F=450\text{A}$, $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ $-diF/dt=4900\text{ A/us}(T_{vj}=150^{\circ}\text{C})$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$		336 461 499		A
Recovered charge	$I_F=450\text{A}$, $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ $-diF/dt=4900\text{ A/us}(T_{vj}=150^{\circ}\text{C})$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$		36.95 85.31 104.57		μC
Reverse recovered energy	$I_F=450\text{A}$, $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ $-diF/dt=4900\text{ A/us}(T_{vj}=150^{\circ}\text{C})$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$		15.77 31.55 38.33		mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.07	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		$\text{k}\Omega$
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}	2500			V
Internal isolation			Al ₂ O ₃			
Storage temperature		T _{stg}	-40		125	°C
Mounting torque for modul mounting		M	3.0		6.0	Nm
Terminal connection torque		M	3.0		6.0	Nm
Weight		W		342		g

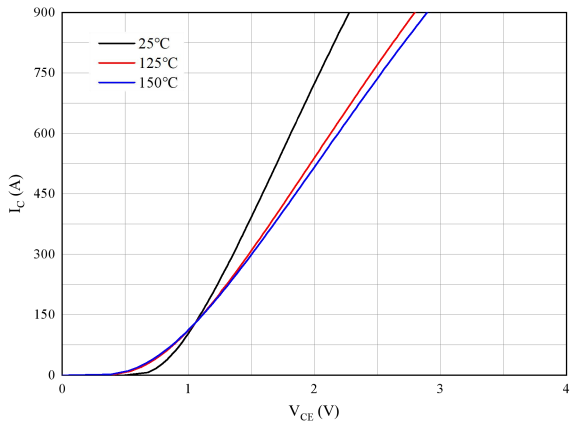


Fig 1. Typical output characteristics ($V_{GE}=15V$)

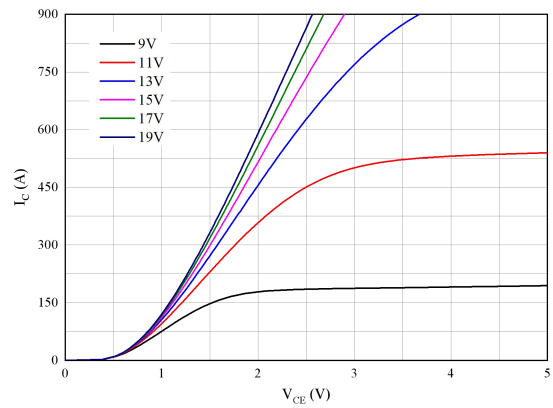


Fig 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

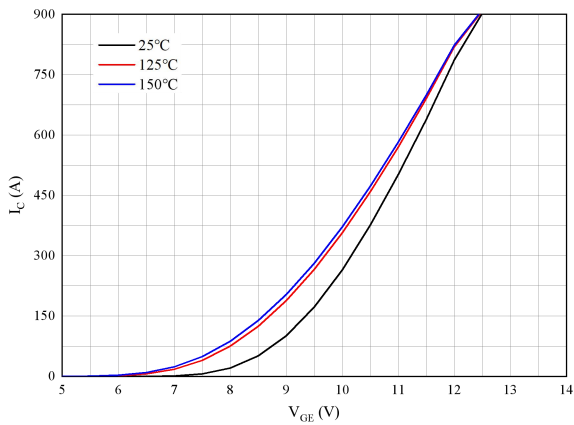


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

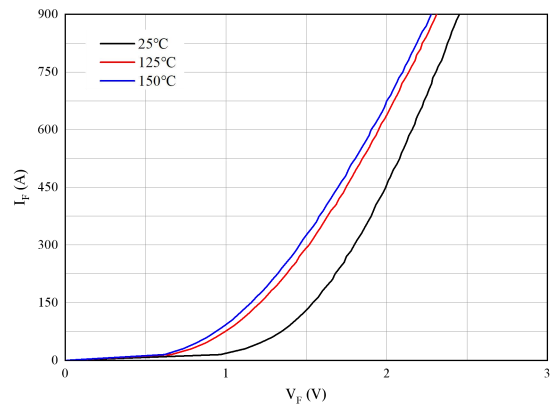


Fig 4. Forward characteristic of Diode

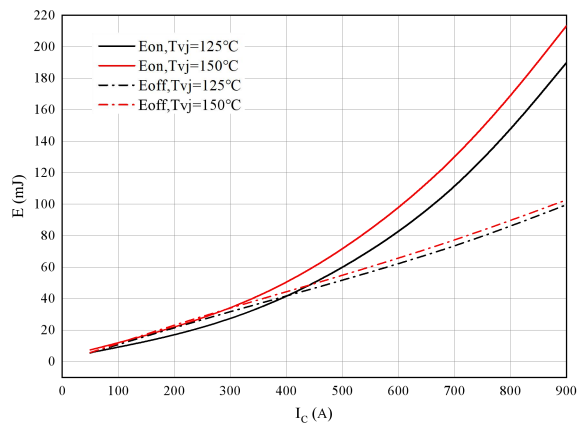


Fig 5. Switching losses of IGBT

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

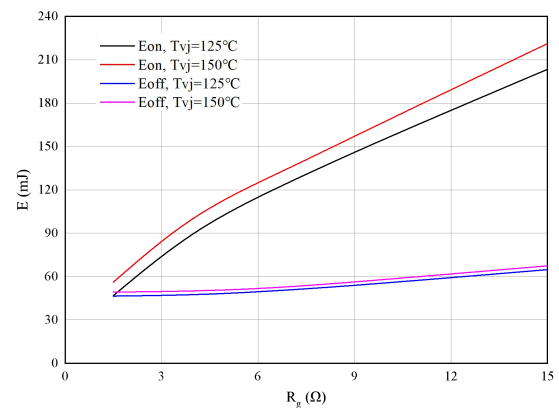


Fig 6. Switching losses of IGBT

$V_{GE}=\pm 15V$, $I_C=450A$, $V_{CE}=600V$

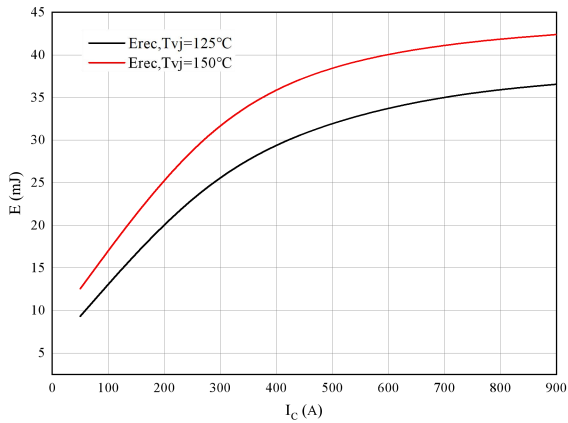


Fig 7. Switching losses of Diode

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

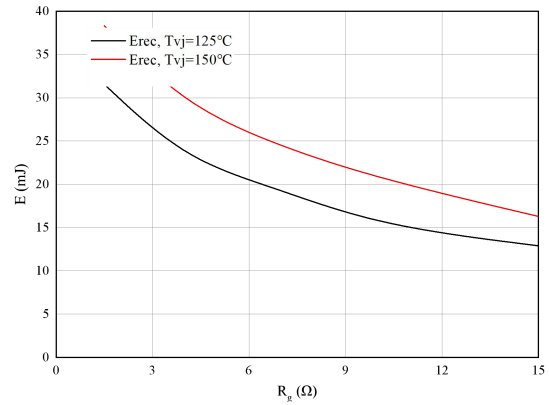


Fig 8. Switching losses of Diode

$IF=450A, V_{CE}=600V$

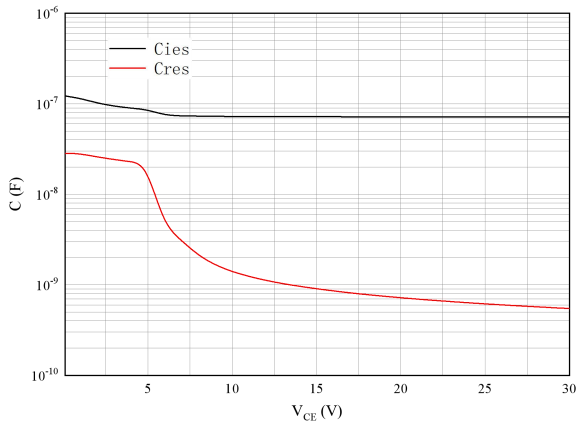


Fig 9. Capacitance characteristic

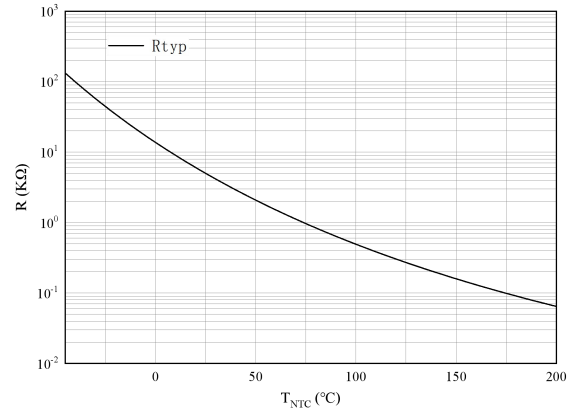


Fig 10. NTC-Thermistor-temperature characteristic

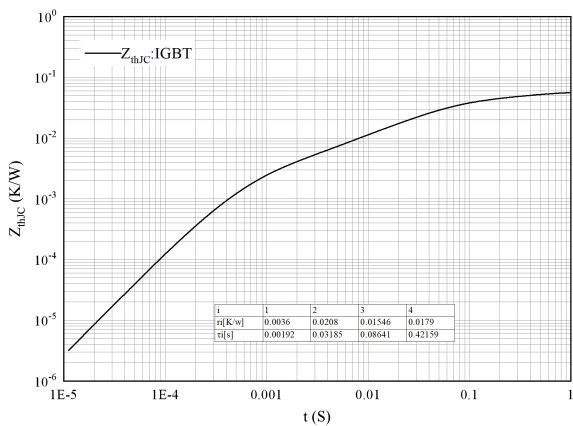


Fig 11. Transient thermal impedance IGBT, Inverter

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

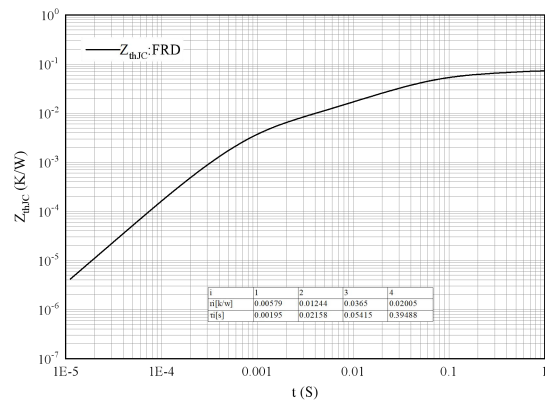
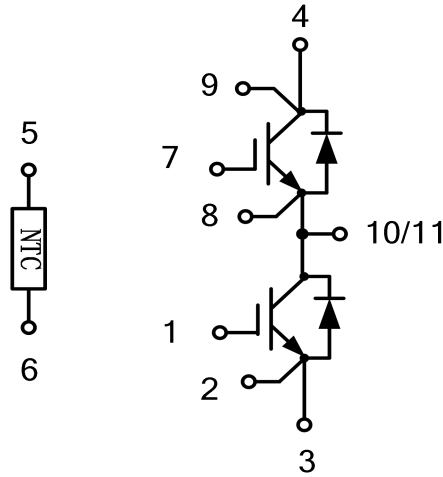


Fig 12. Transient thermal impedance FRD, Inverter

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

Circuit diagram



Package outlines

