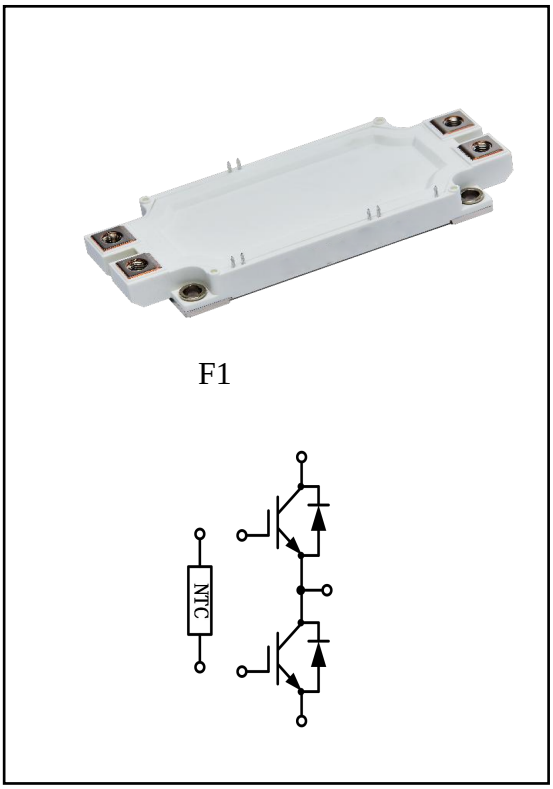
Half Bridge IGBT Module

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



Electrical characteristics：

- 1200V Trench /Field Stop process
- Low switching losses
- Vcesat 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°C	V_{CES}	1200	V
Continuous DC collector current	T_C=100°C, $T_{vj\,max}$=175°C	$I_{C\,nom}$	450	A
Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°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°C V_{GE}=15V, I_C=450A T_{vj}=125°C V_{GE}=15V, I_C=450A T_{vj}=150°C	$V_{CE\ sat}$		1.60 1.80 1.90	2.07	V
Gate-Emitter threshold voltage	I_C=17mA, V_{GE}= V_{CE}, T_{vj}=25°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°C	R_{Gint}		0.36		Ω
Input capacitance	f=100KHz, V_{CE}=25V, V_{GE}=0 V T_{vj}=25°C	C_{ies}		71.80		nF
Reverse transfer capacitance		C_{res}		0.62		
Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V T_{vj}=25°C	I_{CES}			2	mA
Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V T_{vj}=25°C	I_{GES}			200	nA
Turn-on delay time	I_C=450 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	$t_{d\ on}$		281 284 282		ns
Rise time	I_C=450 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	t_r		69 71 74		
Turn-off delay time	I_C=450 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	$t_{d\ off}$		375 422 430		
Fall time	I_C=450 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=1.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	t_f		133 217 240		
Turn-on energy loss per pulse	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1.5Ω T_{vj}=25°C di/dt=4900A/us(Tvj =150℃) T_{vj}=125°C (inductive load) T_{vj}=150°C	E_{on}		20.00 46.77 56.15		mJ
Turn-off energy loss per pulse	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1.5Ω T_{vj}=25°C du/dt=4200V/us(Tvj =150℃) T_{vj}=125°C (inductive load) T_{vj}=150°C	E_{off}		36.20 46.48 48.20		mJ
SC data	V_{GE}≤15V, Vcc=800V V_{CEmax}=V_{CES}-L_{sCE}·di/dt t_P≤10us, T_{vj}=150°C	I_{SC}		1700		A
Thermal resistance, junction to case	per IGBT	R_{thJC}			0.06	K/W
Temperature under switching conditions		Tvj op	-40		150	°C

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25°C	V_{RRM}	1200	V
Continuous DC forward current		I_F	450	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	900	A
I^2t-value	t_p=10ms，sin180°，T_j=125°C	I^2t	38000	A^2s

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=450A, V_{GE}=0V I_F=450A, V_{GE}=0V I_F=450A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_F		1.99 1.75 1.70	2.40	V
Peak reverse recovery current	I_F=450A，V_R=600V，V_{GE}=-15V -diF/dt=4900 A/us(Tvj=150℃)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	I_{RM}		336 461 499		A
Recovered charge	I_F=450A，V_R=600V，V_{GE}=-15V -diF/dt=4900 A/us(Tvj=150℃)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	Q_r		36.95 85.31 104.57		μC
Reverse recovered energy	I_F=450A，V_R=600V，V_{GE}=-15V -diF/dt=4900 A/us(Tvj=150℃)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{rec}		15.77 31.55 38.33		mJ
Thermal resistance, junction to case	per diode		R_{thJC}			0.07	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	°C

NTC-Thermistor

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Rated resistances	T_c=25°C，±5%	R_{25}		5.0		kΩ
B-value	±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_2O_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

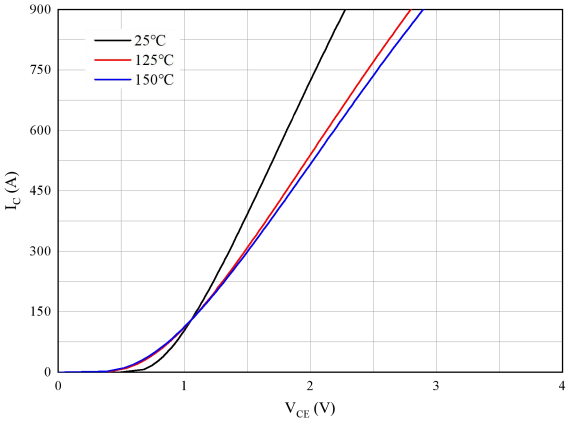


Fig 1. Typical output characteristics (V_{GE}=15V)

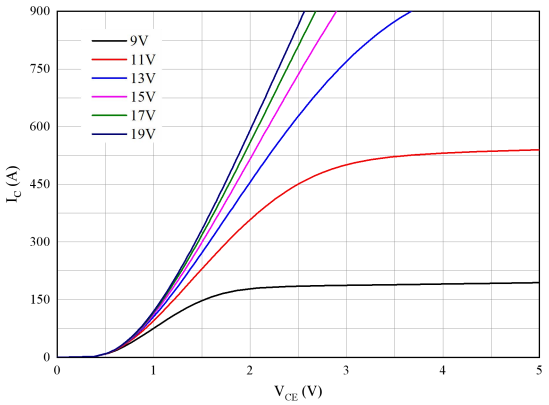


Fig 2. Typical output characteristics (T_{vj}=150℃)

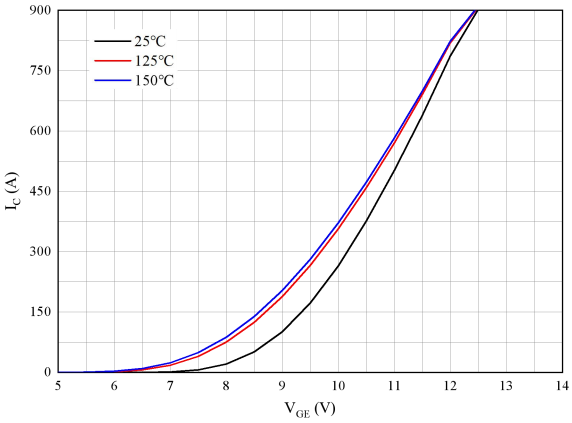


Fig 3. Typical transfer characteristic(V_{CE}=20V)

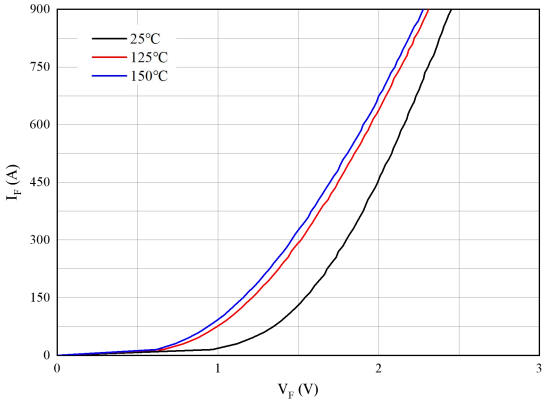


Fig 4. Forward characteristic of Diode

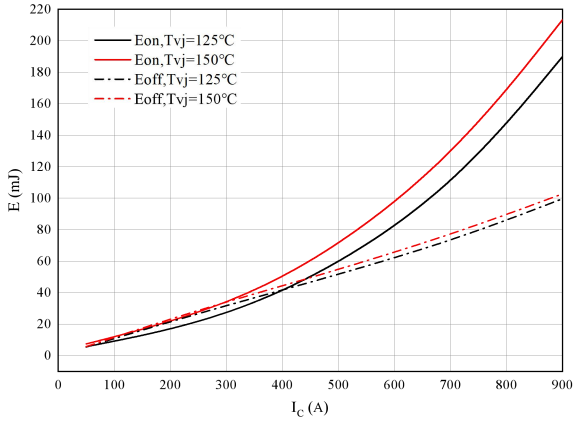


Fig 5. Switching losses of IGBT

VGE=±15V, Rgon=1.5Ω, Rgoff=1.5Ω, VCE=600V

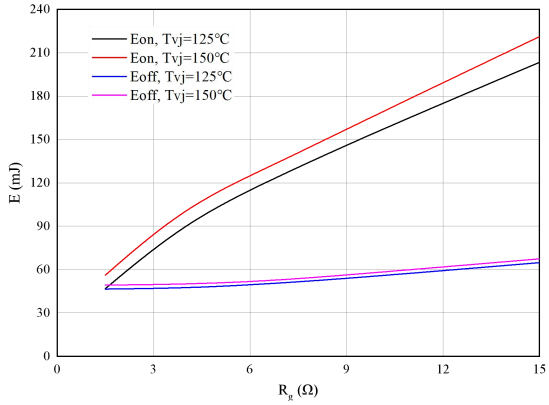


Fig 6. Switching losses of IGBT

VGE=±15V, I_C=450A , VCE=600V

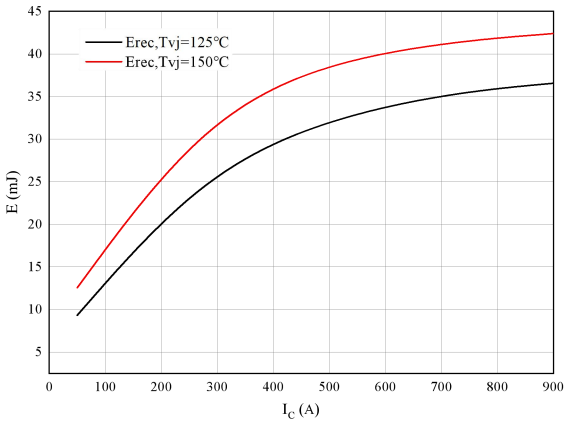


Fig 7. Switching losses of Diode

Rgon=1.5Ω, VCE=600V

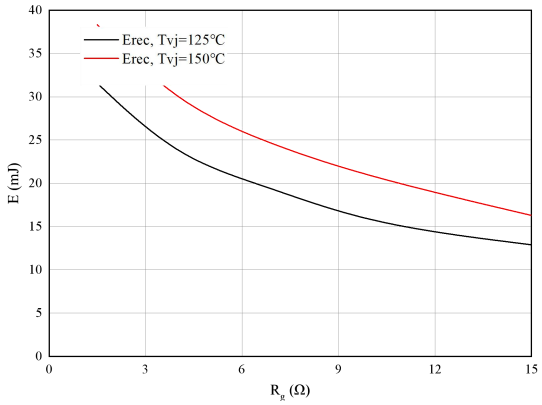


Fig 8. Switching losses of Diode

IF=450A, VCE=600V

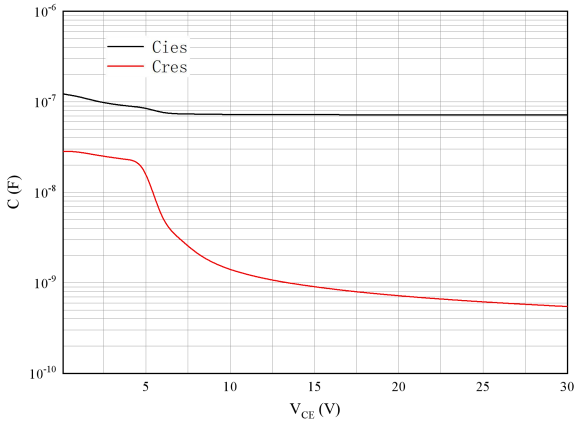


Fig 9. Capacitance characteristic

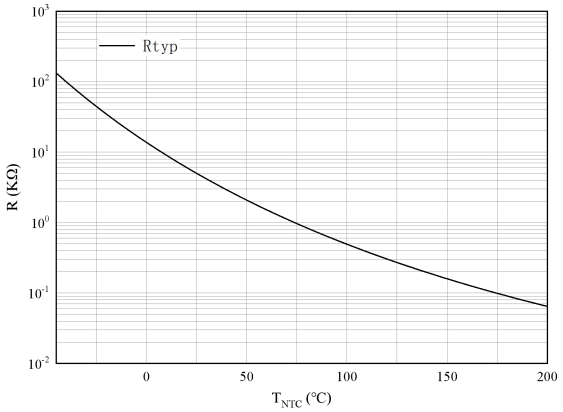


Fig 10. NTC-Thermistor-temperaturecharacteristic

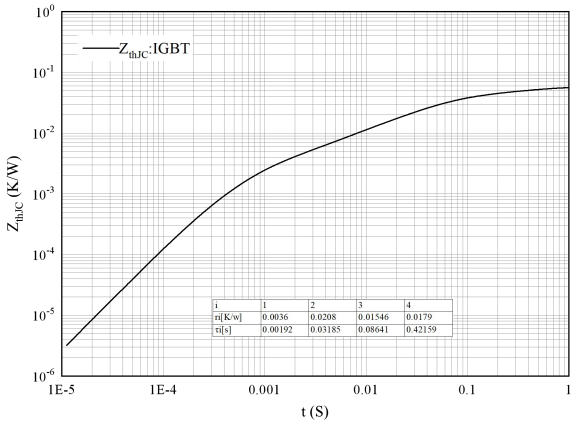


Fig 11. Transient thermal impedance IGBT,Inverter

$Z_{thJC}=f(t)$

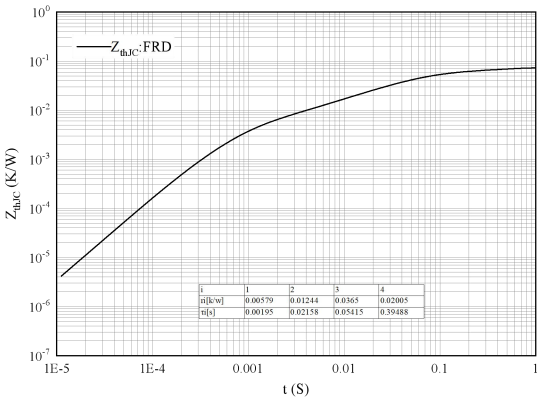
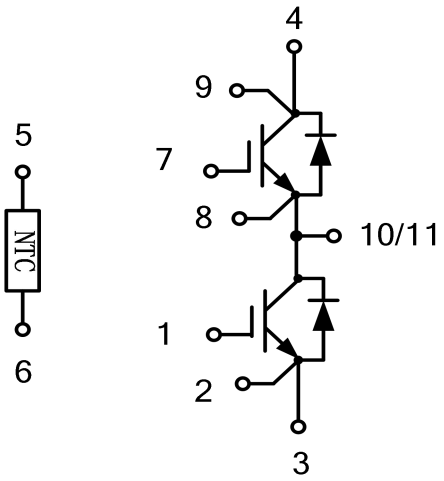


Fig 12. Transient thermal impedance FRD ,Inverter

$Z_{thJC}=f(t)$

Circuit diagram



Package outlines