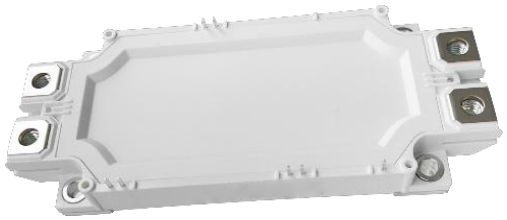
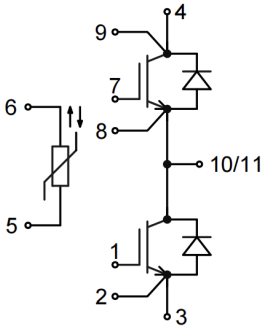
Half Bridge IGBT Module

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



F1



Equivalent Circuit

Features：

- 1700V T rench /Field Stop process
- Low switching losses
- Positive temperature coefficient

Applications:

- Power Conversion System
- Static Var Generator
- Wind Generatoren

IGBT, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	T_{vj}=25°C	V_{CES}	1700	V
Continuous DC collector current	T_C=100°C, $T_{vj\,max}$=175°C	$I_{C\,nom}$	300	A
Repetitive peak collector current	t_P=1 ms	I_{CRM}	600	A
Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°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°C V_{GE}=15V, I_C=300A T_{vj}=125°C V_{GE}=15V, I_C=300A T_{vj}=150°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°C	$V_{GE(th)}$	4.90	5.50	6.10	
Gate charge	V_{GE}=-15V...+15V	Q_G		2.99		µC
Internal gate resistor	T_{vj}=25°C	R_{Gint}		1.95		Ω
Input capacitance	f=100KHz, V_{CE}=25 V, V_{GE}=0 V T_{vj}=25°C	C_{ies}		40.68		nF
Reverse transfer capacitance		C_{res}		1.18		
Collector-emitter cut-off current	V_{CE}=1700V , 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=300A, V_{CE}=900 V T_{vj}=25°C V_{GE}=±15 V, R_G=3.3Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	$t_{d\,on}$		226 245 255		ns
Rise time	I_C=300A, V_{CE}=900 V T_{vj}=25°C V_{GE}=±15 V, R_G=3.3Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	t_r		90 101 104		
Turn-off delay time	I_C=300A, V_{CE}=900 V T_{vj}=25°C V_{GE}=±15 V, R_G=3.3Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	$t_{d\,off}$		515 572 588		
Fall time	I_C=300A, V_{CE}=900 V T_{vj}=25°C V_{GE}=±15 V, R_G=3.3Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	t_f		350 363 404		
Turn-on energy loss per pulse	I_C=300A, V_{CE}=900 V V_{GE}=±15 V, R_G=3.3Ω T_{vj}=25°C di/dt=2300A/µs(Tvj=150°C) T_{vj}=125°C (inductive load) T_{vj}=150°C	E_{on}		69.2 90.5 96.8		mJ
Turn-off energy loss per pulse	I_C=300A, V_{CE}=900 V V_{GE}=±15 V, R_G=3.3Ω T_{vj}=25°C du/dt=4800V/µs(Tvj=150°C) T_{vj}=125°C (inductive load) T_{vj}=150°C	E_{off}		51.5 64.7 69.4		
SC data	V_{GE}≤15V, Vce=1000V V_{CEmax}=V_{CES}-L_{sCE}·di/dt t_P≤10us, T_{vj}=150°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	°C

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25°C	V_{RRM}	1700	V
Continuous DC forward current		I_F	300	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	600	A
I^2t-value	t_p=10ms，sin180°，T_j=125°C	I^2t	17000	A^2s

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=300A, V_{GE}=0V I_F=300A, V_{GE}=0V I_F=300A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_F		2.23 2.48 2.43	2.90	V
Peak reverse recovery current	I_F=300A -di$_F$/dt=2300A/µs(T_{vj}=150°C) V_R=900V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	I_{RM}		122 147 154		A
Recovered charge	I_F=300A -di$_F$/dt=2300A/µs(T_{vj}=150°C) V_R=900V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	Q_r		35.96 60.88 71.56		µC
Reverse recovered energy	I_F=300A -di$_F$/dt=2300A/µs(T_{vj}=150°C) V_R=900V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°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			$T_{vj\ op}$	-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}	4000			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		344		g

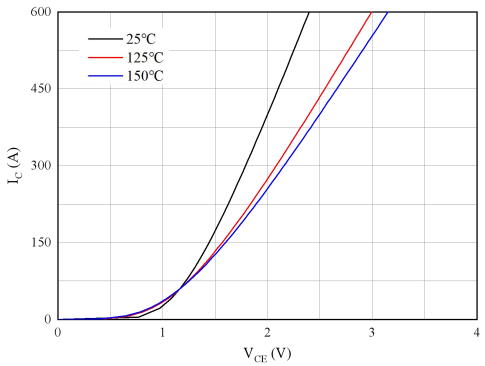


Fig 1. Typical output characteristics (V_{GE}=15V)

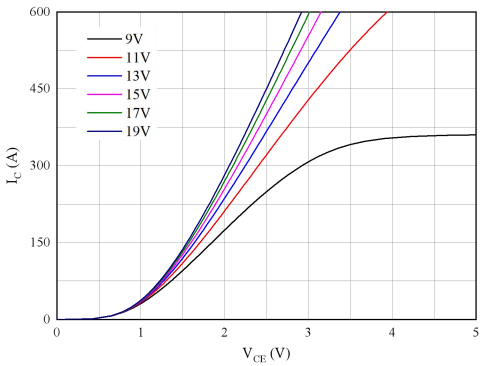


Fig 2. Typical output characteristics (T_{vj}=150℃)

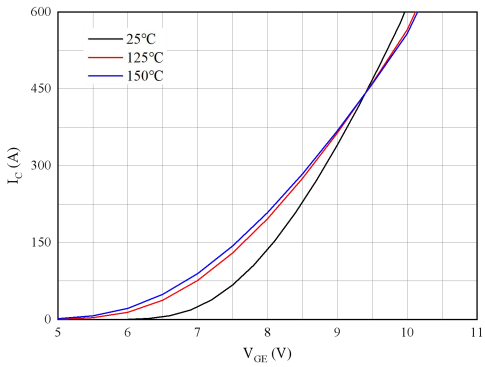


Fig 3. Typical transfer characteristic(V_{CE}=20V)

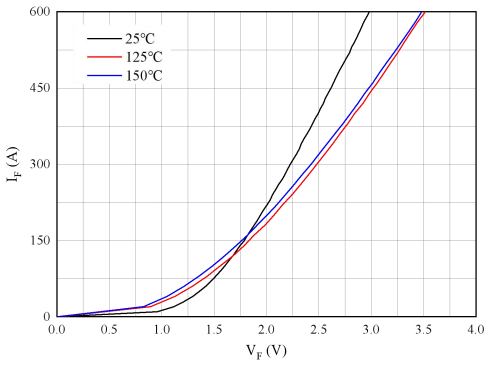


Fig 4. Forward characteristic of Diode

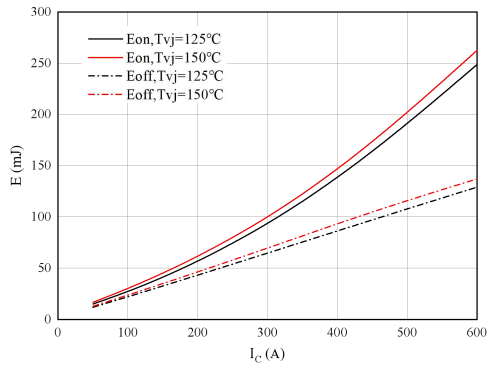


Fig 5. Switching losses of IGBT

V_{GE}=±15V, R_{Gon}=3.3Ω, R_{Goff}=3.3Ω, V_{CE}=900V

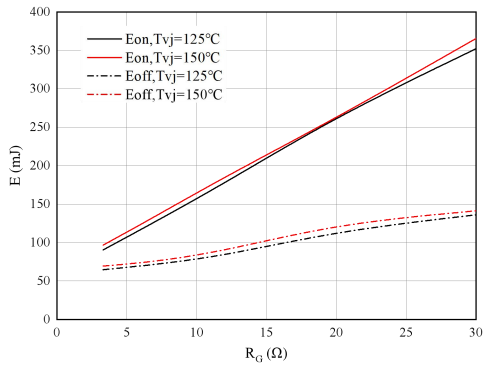


Fig 6. Switching losses of IGBT

V_{GE}=±15V, I_C=300A, V_{CE}=900V

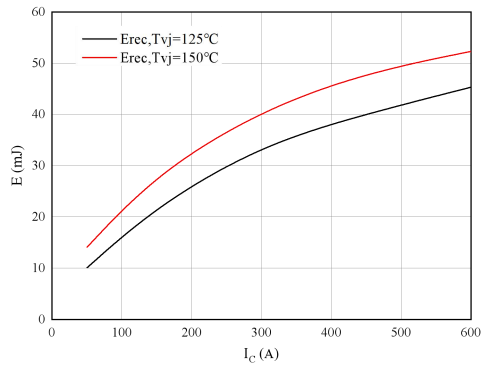


Fig 7. Switching losses of Diode

R_{Gon}=3.3Ω, V_{CE}=900V

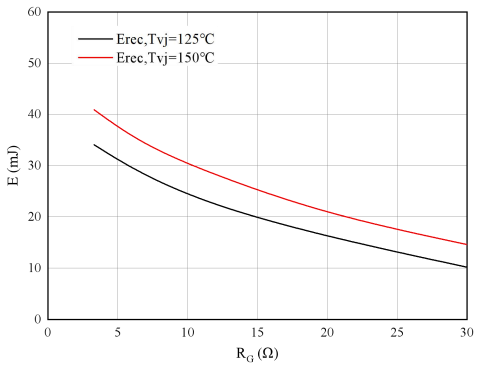


Fig 8. Switching losses of Diode

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

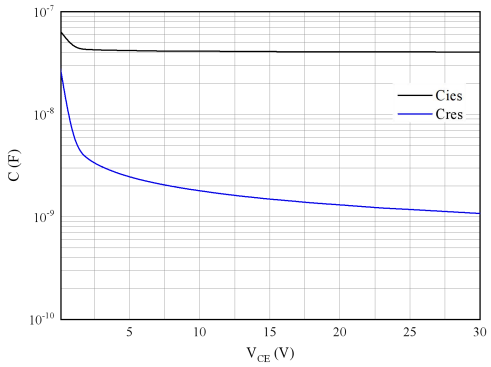


Fig 9. Capacitance characteristic

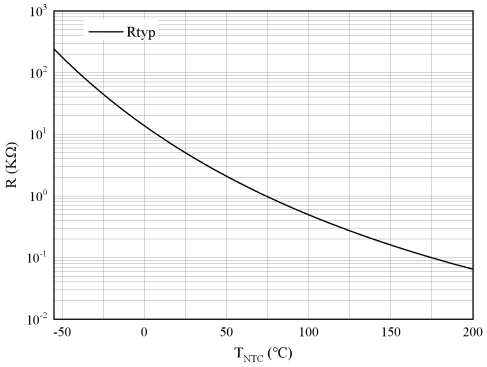


Fig 10. NTC-Themistor-temperature characteristic

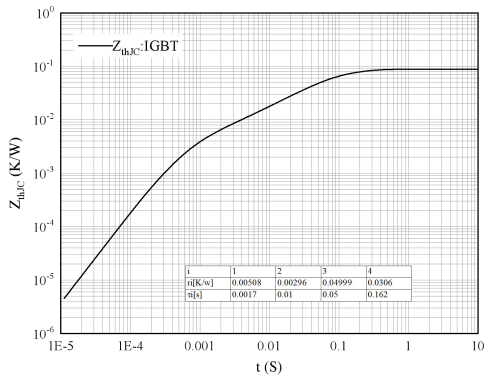


Fig 11. Transient thermal impedance IGBT,Inverter

Z_{thJC}=f(t)

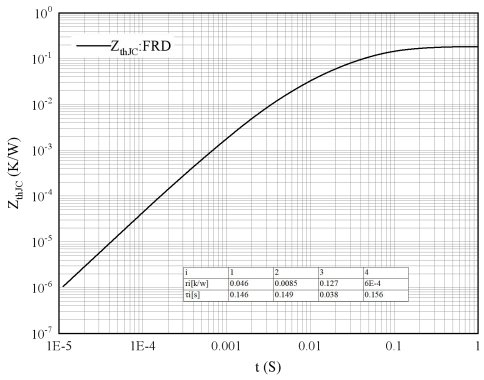
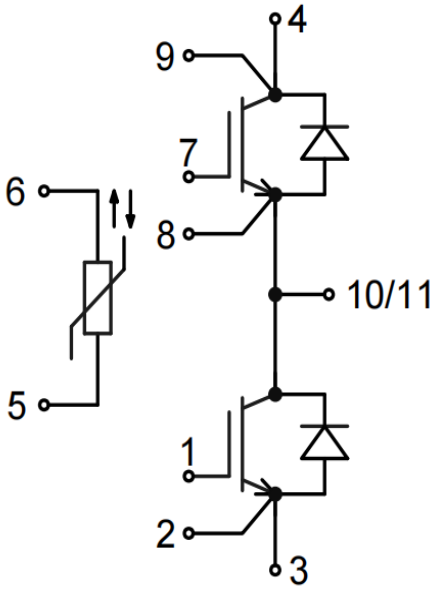


Fig 12. Transient thermal impedance FRD ,Inverter

Z_{thJC}=f(t)

Circuit diagram



Package outlines