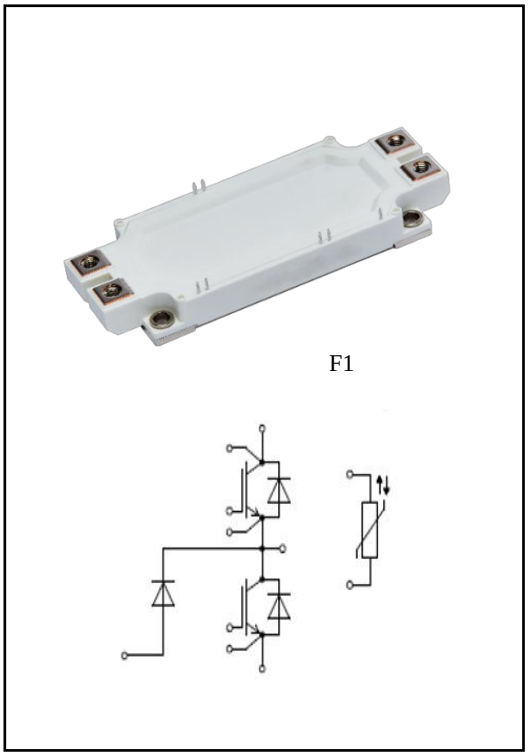
3-Level IGBT Module

V_{CES} =1200V， $I_{C\,nom}$ =300A / I_{CRM} =600A



Electrical characteristics：

- Trench /Field Stop process
- Low switching losses
- Vcesat has a positive temperature coefficient

Applications:

- 3-Level-Applications
- Energy storage inverter
- Annual Performance Factor
- UPS Systems

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	$I_{C\,nom}$	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}	580	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	$V_{CE\ sat}$		1.60 1.80 1.90	2.07	V
Gate-Emitter threshold voltage	I_C=11.5mA, V_{GE}= V_{CE} T_{vj}=25°C	V_{GEth}	5.4	6.0	6.6	
Gate charge	V_{GE}=-15V...+15V	Q_G		3.14		µC
Internal gate resistor	T_{vj}=25°C	R_{Gint}		0.53		Ω
Input capacitance	f=100kHz, V_{CE}=25V, V_{GE}=0 V T_{vj}=25°C	C_{ies}		47.7		nF
Reverse transfer capacitance		C_{res}		0.43		
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=300 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=2.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	$t_{d\ on}$		109 110 111		ns
Rise time	I_C=300 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=2.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	t_r		103 111 112		
Turn-off delay time	I_C=300 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=2.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	$t_{d\ off}$		362 411 424		
Fall time	I_C=300 A, V_{CE}=600 V T_{vj}=25°C V_{GE}=±15 V, R_G=2.5Ω T_{vj}=125°C (inductive load) T_{vj}=150°C	t_f		149 226 250		
Turn-on energy loss per pulse	I_C=300A,V_{CE}=600V, V_{GE}=±15V, R_G=2.5Ω, di/dt=2170A/us(Tvj =150℃) T_{vj}=25°C (inductive load) T_{vj}=125°C T_{vj}=150°C	E_{on}		38.95 60.43 67.16		mJ
Turn-off energy loss per pulse	I_C=300A,V_{CE}=600V, V_{GE}=±15V,R_G=2.5Ω, du/dt=4360V/us(Tvj =150℃ T_{vj}=25°C (inductive load) T_{vj}=125°C T_{vj}=150°C	E_{off}		22.23 28.99 31.13		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}		1300		A
Thermal resistance, junction to case	per IGBT	R_{thJC}			0.26	K/W
Temperature under switching conditions		Tvj op	-40		150	°C

Diode, Inverter&3-Level

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	300	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	600	A
I2t-value	V_R =0V, tp=10ms, Tvj=125°C	I2t	29000	A

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	I_F=300A, V_{GE}=0V T_{vj}=25°C I_F=300A, V_{GE}=0V T_{vj}=125°C I_F=300A, V_{GE}=0V T_{vj}=150°C	V_F		1.98 1.69 1.61	2.40	V
Peak reverse recovery current	I_F=300A,V_R=600V, T_{vj}=25°C V_{GE}=-15V, R_G=2.5Ω, T_{vj}=125°C -diF/dt=1690 A/us(Tvj=150℃) T_{vj}=150°C	I_{RM}		70 134 147		A
Recovered charge	I_F=300A,V_R=600V T_{vj}=25°C V_{GE}=-15V, R_G=2.5Ω, T_{vj}=125°C -diF/dt=1690 A/us(Tvj=150℃) T_{vj}=150°C	Q_r		19.22 50.44 62.59		μC
Reverse recovered energy	I_F=300A,V_R=600V, T_{vj}=25°C V_{GE}=-15V, R_G=2.5Ω, T_{vj}=125°C -diF/dt=1690 A/us(Tvj=150℃) T_{vj}=150°C	E_{rec}		6.59 16.61 20.82		mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.33	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		340		g

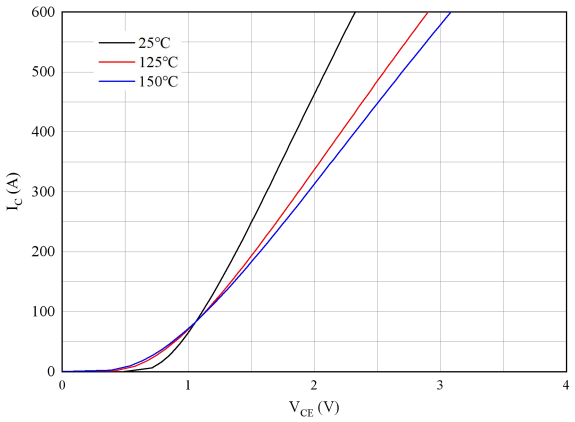


Fig1. Typical output characteristics (V_{GE}=15V)

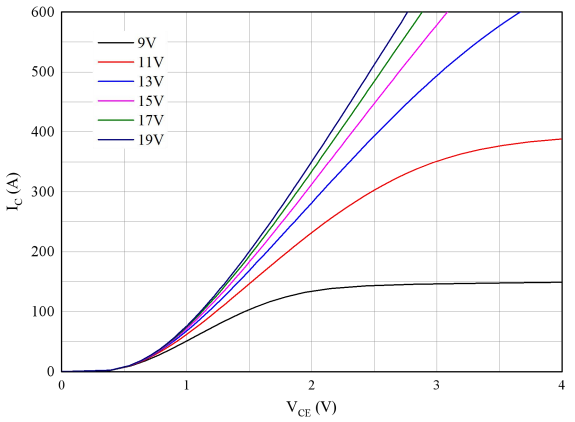


Fig 2. Typical output characteristics (T_{vj}=150℃)

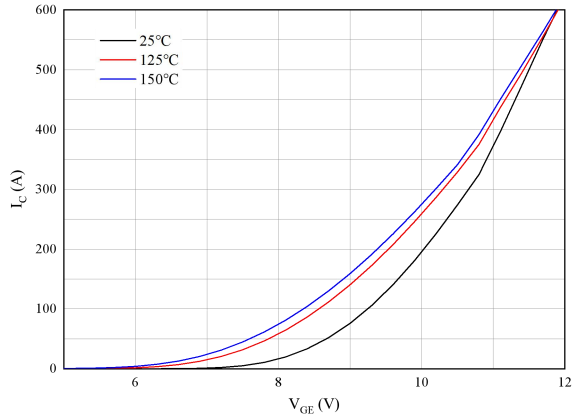


Fig 3. Typical transfer characteristic(V_{CE}=20V)

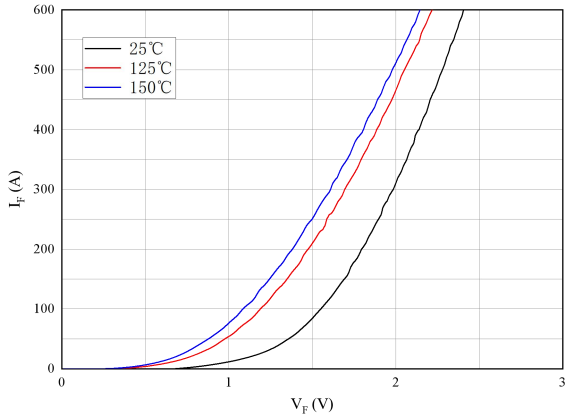


Fig 4. Forward characteristic of Diode

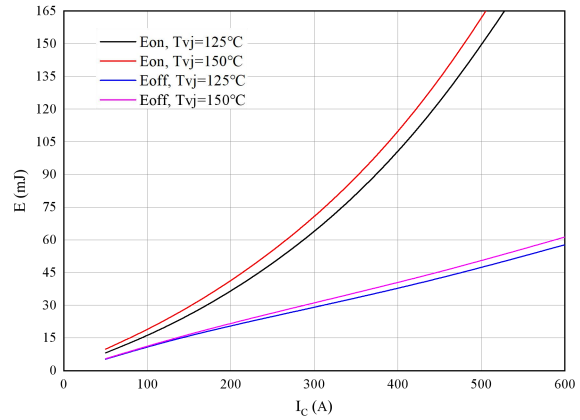


Fig 5. Switching losses of IGBT

V_{GE}=±15V, RGon=2.5Ω, RGoff=2.5Ω, V_{CE}=600V

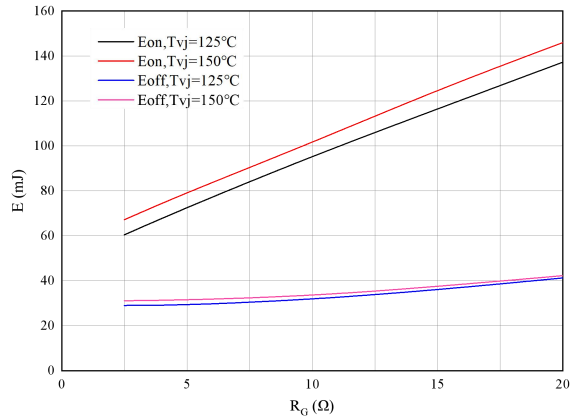


Fig 6. Switching losses of IGBT

V_{GE}=±15V, I_C=300A , V_{CE}=600V

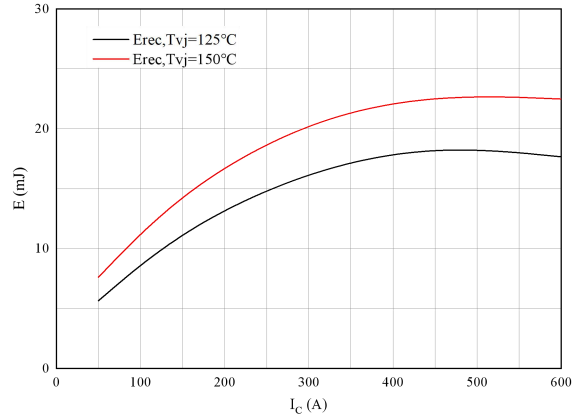


Fig 7. Switching losses of Diode
RGon=2.5Ω, V_{GE}=600V

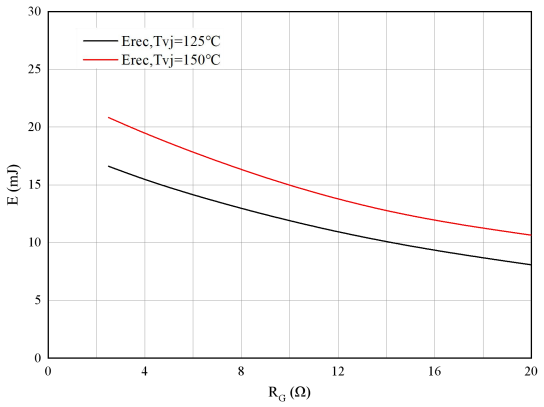


Fig 8. Switching losses of Diode
I_F=300A, V_{CE}=600V

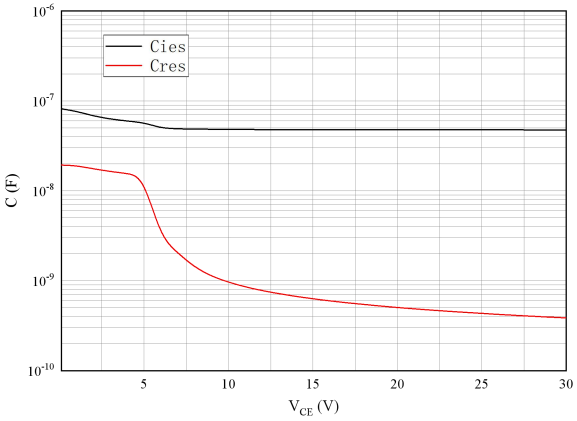


Fig 9. Capacitance characteristic

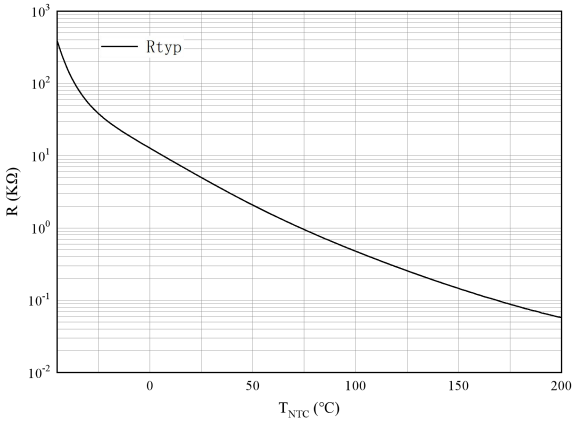


Fig 10. NTC-Thermistor-temperature characteristic

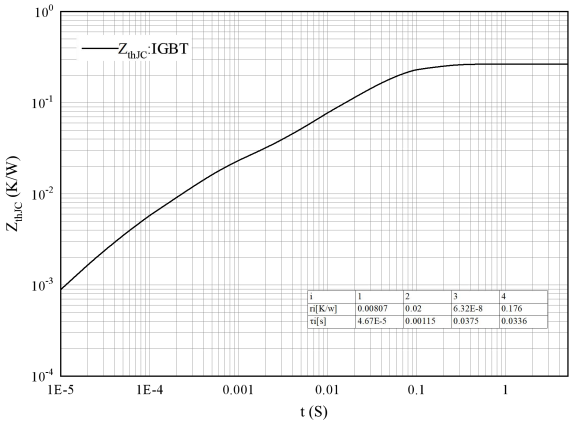


Fig 11. Transient thermal impedance IGBT,Inverter

Z_{thJC}=f(t)

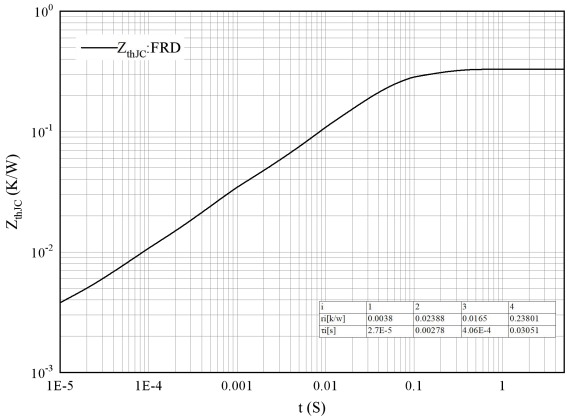
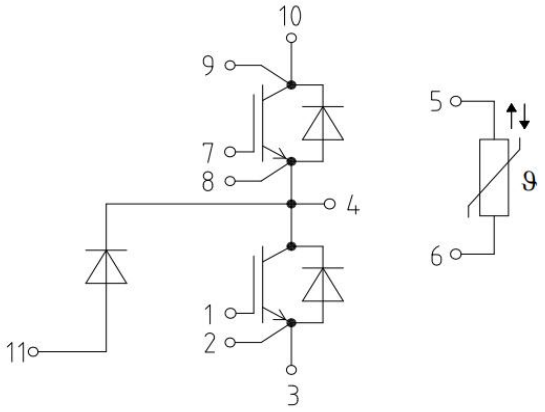


Fig 12. Transient thermal impedance FRD ,Inverter

Z_{thJC}=f(t)

Circuit diagram



Package outlines