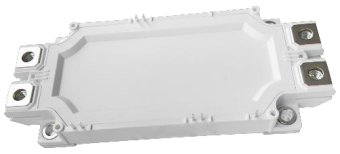
Half Bridge IGBT Module

V_{CES} =1700V， $I_{C\,nom}$ =450A / I_{CRM} =900A



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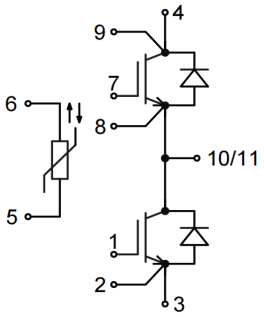


Equivalent Circuit

Features：

- 1700V Trench /Field Stop process
- Low switching losses
- Vcesat has a positive temperature coefficient

Applications:

- Power Converters
- UPS Systems
- Servo Drives
- Wind Turbines

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	$I_{C\,nom}$	450	A
Repetitive peak collector current	t_P=1 ms	I_{CRM}	900	A
Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	2140	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=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_{CEsat}		1.97 2.35 2.45	2.55	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		3.22		µC
Internal gate resistor	T_{vj}=25°C	R_{Gint}		1.60		Ω
Input capacitance	f=100KHz, V_{CE}=25 V, V_{GE}=0 V T_{vj}=25°C	C_{ies}		44.00		nF
Reverse transfer capacitance		C_{res}		1.30		
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=450A, 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	$t_{d\,on}$		223 237 250		ns
Rise time	I_C=450A, 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		109 122 127		
Turn-off delay time	I_C=450A, 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	$t_{d\,off}$		540 589 604		
Fall time	I_C=450A, 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		267 355 383		
Turn-on energy loss per pulse	I_C=450A, V_{CE}=900 V V_{GE}=±15 V, R_G=3.3Ω T_{vj}=25°C di/dt=2500A/µs(Tvj=150°C) T_{vj}=125°C (inductive load) T_{vj}=150°C	E_{on}		120.9 160.7 176.7		mJ
Turn-off energy loss per pulse	I_C=450A, V_{CE}=900 V V_{GE}=±15 V, R_G=3.3Ω T_{vj}=25°C du/dt=4900V/µs(Tvj=150°C) T_{vj}=125°C (inductive load) T_{vj}=150°C	E_{off}		77.61 95.15 99.54		
SC data	V_{GE}≤15V, Vce=900V V_{CEmax}=V_{CES}-L_{sCE}·di/dt t_P≤10us, T_{vj}=150°C	I_{SC}		2053		A
Thermal resistance, junction to case	per IGBT	R_{thJC}			0.07	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	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	20000	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		2.18 2.43 2.40	2.90	V
Peak reverse recovery current	I_F=450A -di$_F$/dt=2500A/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}		182 211 220		A
Recovered charge	I_F=450A -di$_F$/dt=2500A/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		68.20 105.98 123.36		µC
Reverse recovered energy	I_F=450A -di$_F$/dt=2500A/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}		37.03 57.75 68.13		mJ
Thermal resistance, junction to case	per diode		R_{thJC}			0.14	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

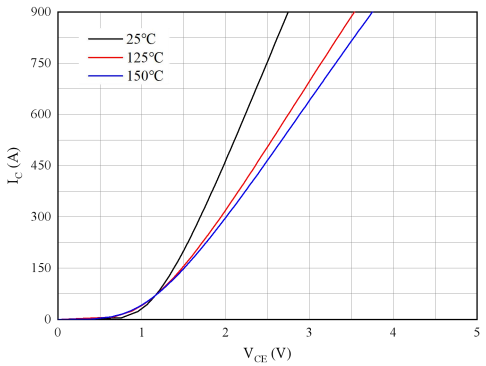


Fig 1. Typical output characteristics (V_{GE}=15V)

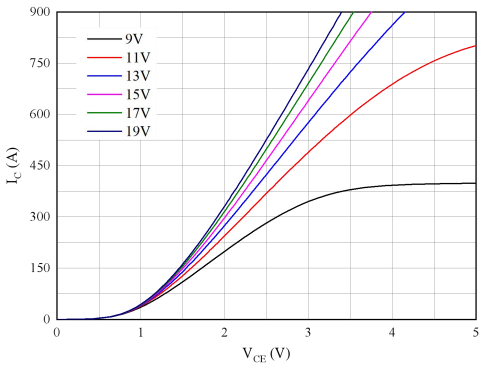


Fig 2. Typical output characteristics (T_{vj}=150℃)

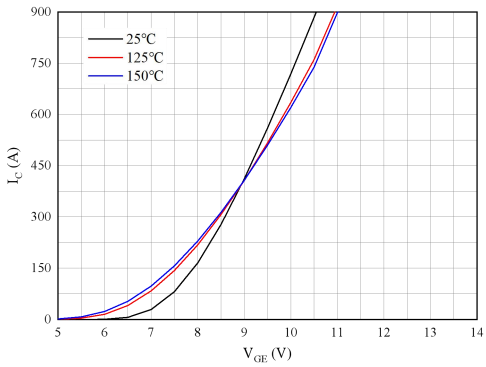


Fig 3. Typical transfer characteristic(V_{CE}=20V)

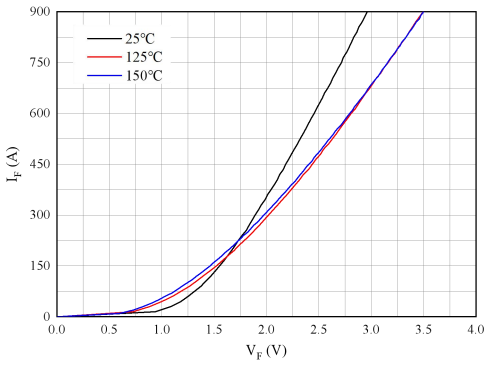


Fig 4. Forward characteristic of Diode

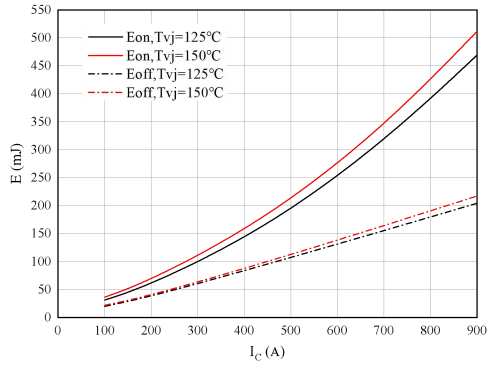


Fig 5. Switching losses of IGBT

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

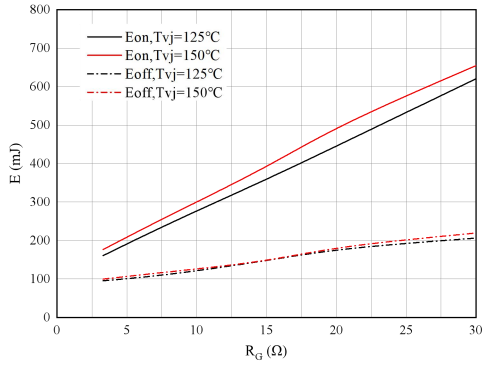


Fig 6. Switching losses of IGBT

V_{GE}=±15V, I_C=450A, V_{CE}=900V

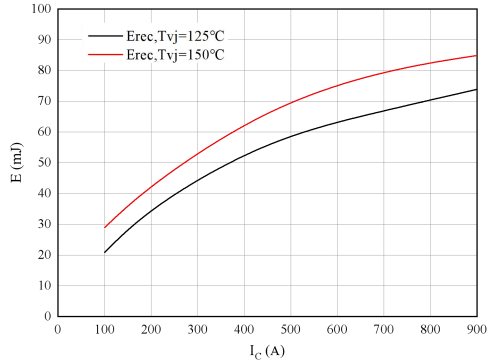


Fig 7. Switching losses of Diode

R_{Gon}=3.3Ω, V_{CE}=900V

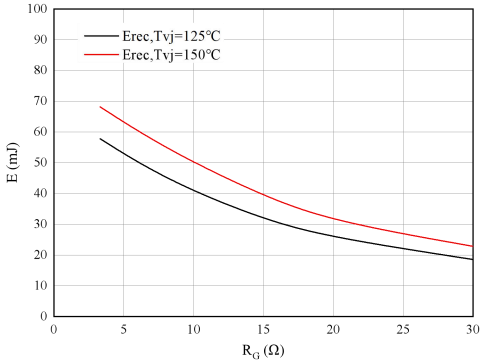


Fig 8. Switching losses of Diode

I_F=450A, V_{CE}=900V

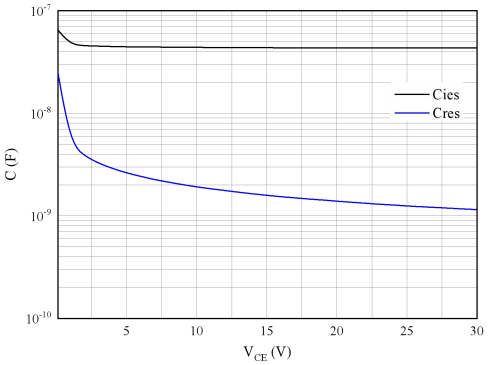


Fig 9. Capacitance characteristic

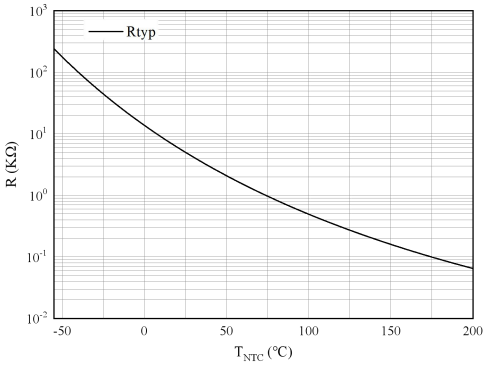


Fig10. NTC-Themistor-temperature characteristic

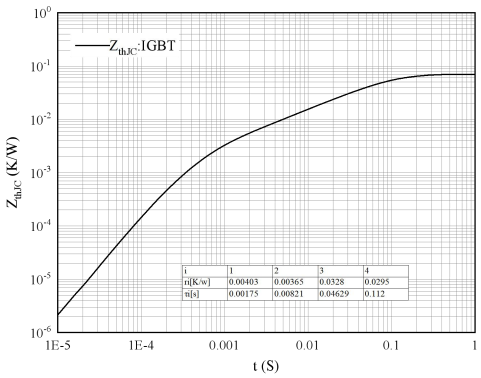


Fig 11. Transient thermal impedance IGBT,Inverter

Z_{thJC}=f(t)

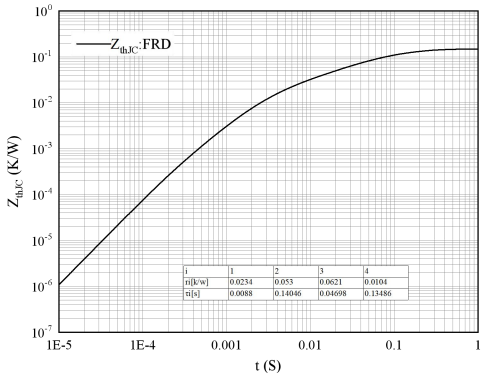
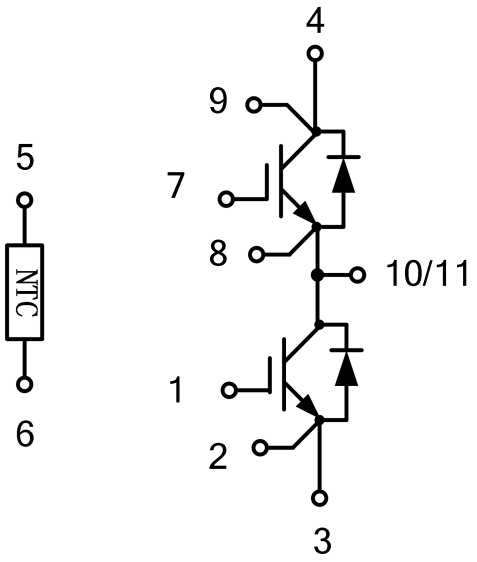


Fig 12. Transient thermal impedance FRD ,Inverter

Z_{thJC}=f(t)

Circuit diagram



Package outlines