Half Bridge IGBT Module

V_{CES} =1200V， $I_{C\ nom}$ =900A / I_{CRM} =1800A

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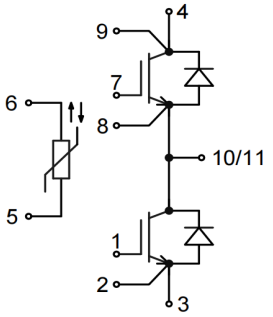


Equivalent Circuit

Features：

- 1200V Trench / Field Stop technology
- Low switching losses
- Vcesat with positive temperature coefficient

Applications:

- UPS system
- Servo drives
- High Power Converters
- Motor drives

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=90°C, $T_{vj\ max}$=175°C	$I_{C\ nom}$	900	A
Repetitive peak collector current	t_P = 1ms	I_{CRM}	1800	A
Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	3600	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=900A T_{vj}=25°C V_{GE}=15V, I_C=900A T_{vj}=125°C V_{GE}=15V, I_C=900A T_{vj}=175°C	$V_{CE\ sat}$		1.65 1.95 2.10	2.10	V
Gate-Emitter threshold voltage	I_C=18mA, V_{GE}= V_{CE}, T_{vj}=25°C	V_{GEth}	5.2	5.8	6.4	
Gate charge	V_{GE}=-15V…+15V	Q_G		11.5		μC
Internal gate resistor	T_{vj}=25°C	R_{Gint}		0.5		Ω
Input capacitance	f=100KHz, V_{CE}=25V, V_{GE}=0 V T_{vj}=25°C	C_{ies}		140		nF
Reverse transfer capacitance		C_{res}		0.55		
Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V T_{vj}=25°C	I_{CES}			0.1	mA
Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V T_{vj}=25°C	I_{GES}			100	nA
Turn-on delay time	I_C=900A, V_{CE}=600V T_{vj}=25°C V_{GE}=±15V, R_G=0.5Ω T_{vj}=125°C (inductive load) T_{vj}=175°C	$t_{d\ on}$		409 435 445		ns
Rise time	I_C=900A, V_{CE}=600V T_{vj}=25°C V_{GE}=±15V, R_G=0.5Ω T_{vj}=125°C (inductive load) T_{vj}=175°C	t_r		75 86 95		
Turn-off delay time	I_C=900A, V_{CE}=600V T_{vj}=25°C V_{GE}=±15V, R_G=0.5Ω T_{vj}=125°C (inductive load) T_{vj}=175°C	$t_{d\ off}$		510 575 620		
Fall time	I_C=900A, V_{CE}=600V T_{vj}=25°C V_{GE}=±15V, R_G=0.5Ω T_{vj}=125°C (inductive load) T_{vj}=175°C	t_f		147 238 295		
Turn-on energy loss per pulse	I_C=900A, V_{CE}=600V T_{vj}=25°C di/dt=7500A/us(Tvj=175℃) T_{vj}=125°C V_{GE}=±15V, R_G=0.5Ω T_{vj}=175°C	E_{on}		36 69 93		mJ
Turn-off energy loss per pulse	I_C=900A, V_{CE}=600V T_{vj}=25°C dv/dt=3100V/us(Tvj=175℃) T_{vj}=125°C V_{GE}=±15V, R_G=0.5Ω T_{vj}=175°C	E_{off}		94 122 139		mJ
SC data	V_{GE}≤15V, Vcc=800V t_P≤8us, T_{vj}=150°C V_{CEmax}=V_{CES}-L_{sCE}·di/dt t_P≤6us, T_{vj}=175°C	I_{SC}		3400 3200		A
Thermal resistance, junction to case	per IGBT	R_{thJC}			0.040	K/W
Temperature under switching conditions	$T_{vj\ op}$ ＞150℃ is only allowed for operation at overload conditions.	Tvj op	-40		175	°C

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25ºC	V_{RRM}	1200	V
Continuous DC forward current		I_F	900	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	1800	A
I^2t-value	t_p=10ms，sin180°，T_j=125ºC	I^2t	30000	A^2s

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=900A, V_{GE}=0V I_F=900A, V_{GE}=0V I_F=900A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	V_F		2.05 2.25 2.25	2.35	V
Peak reverse recovery current	I_F=900A -di$_F$/dt=7500A/μs (Tvj=175℃) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	I_{RM}		512 544 556		A
Recovered charge	I_F=900A -di$_F$/dt=7500A/μs (Tvj=175℃) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	Q_r		85 148 189		μC
Reverse recovered energy	I_F=900A -di$_F$/dt=7500A/μs (Tvj=175℃) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=175°C	E_{rec}		42 68 83		mJ
Thermal resistance, junction to case	per diode		R_{thJC}			0.063	K/W
Temperature under switching conditions	$T_{vj\ op}$ ＞150°C is only for operation at overload conditions.		$T_{vj\ op}$	-40		175	°C

NTC-Thermistor

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Rated resistances	T_c=25°C， ±3%	R_{25}		5.0		KΩ
B-value	$R_2 = R_{25}\exp[B_{25/50}(1/T2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K
B-value	$R_2 = R_{25}\exp[B_{25/80}(1/T2 - 1/(298,15\ K))]$	$B_{25/80}$		3425		K
B-value	$R_2 = R_{25}\exp[B_{25/100}(1/T2 - 1/(298,15\ K))]$	$B_{25/100}$		3443		K

Module

Parameter	Conditions	Symbol	Value			Unit
Isolation test voltage	RMS, f=50Hz, t=1min	V_{ISOL}		3400		V
Internal isolation	basic insulation (class 1, IEC 61140)			Al_2O_3		
Comperative tracking index		CTI		＞200		
RTI Elec.	housing	RTI		140		℃
Stray inductance module		L_{sCE}		20		nH
Storage temperature		T_{stg}	-40		125	°C
Mounting torque for module mounting		M	3.0		6.0	Nm
Terminal Connection Torque		M	3.0		6.0	Nm
Weight		W		357		g

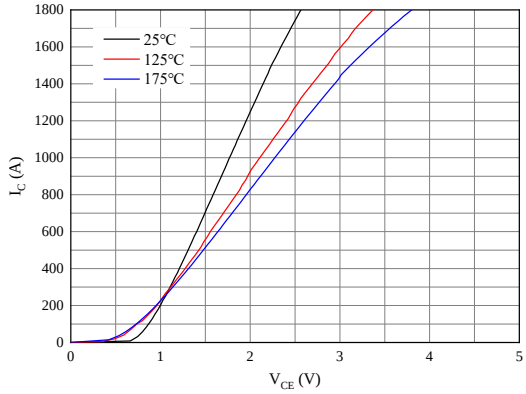


Fig 1. Typical output characteristics (V_{GE}=15V)

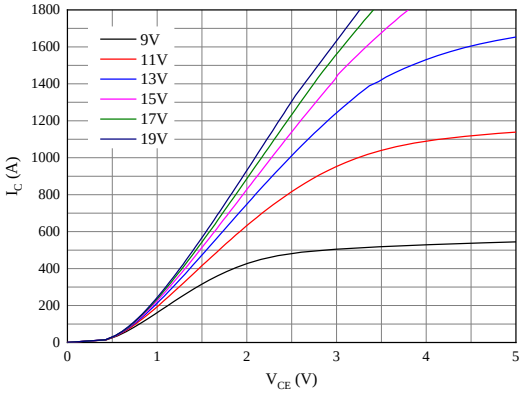


Fig 2. Typical output characteristics (T_{vj}=175℃)

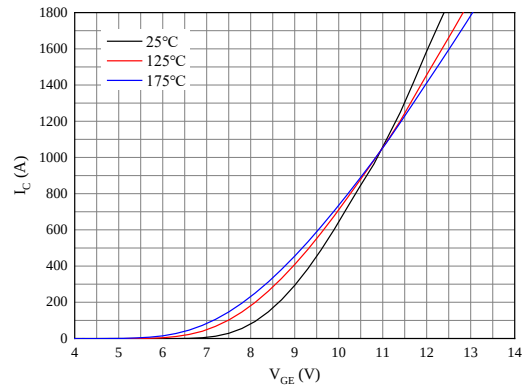


Fig 3. Typical transfer characteristic (V_{CE}=20V)

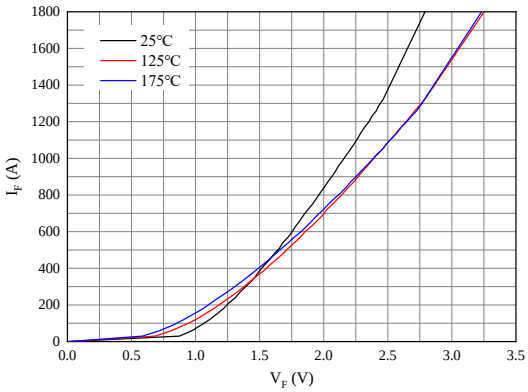


Fig 4. Forward characteristic of Diode

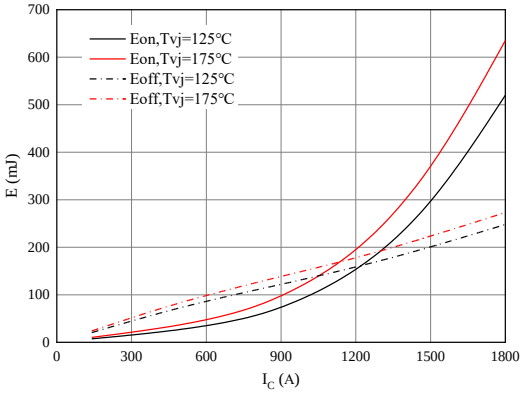


Fig 5. Switching losses of IGBT

VGE=±15V, RGon=0.5Ω, RGoff=0.5Ω, VCE=600V

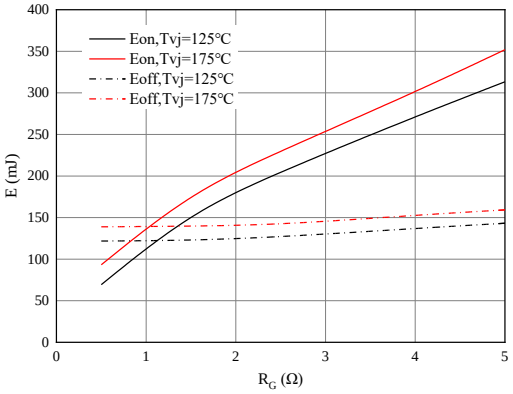


Fig 6. Switching losses of IGBT

VGE=±15V, I_C=900A , VCE=600V

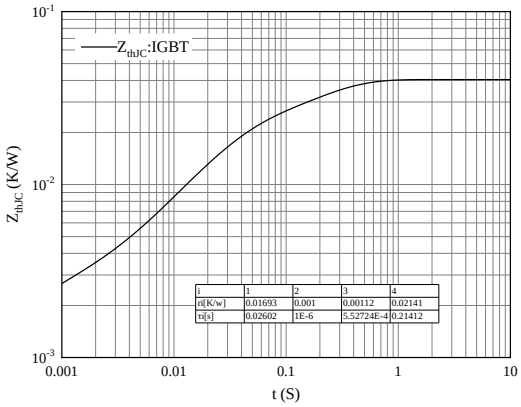


Fig 7. Transient thermal impedance IGBT, Inverter

Z_{thJC}=f(t)

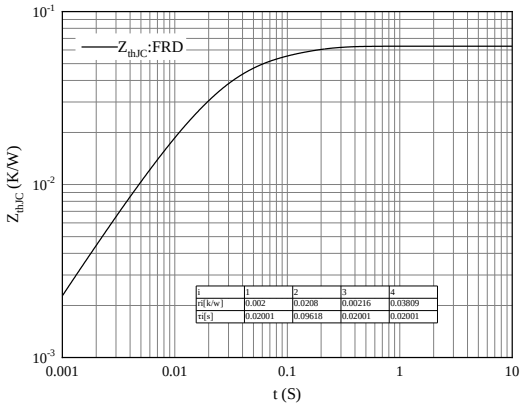


Fig 8. Transient thermal impedance FRD, Inverter

Z_{thJC}=f(t)

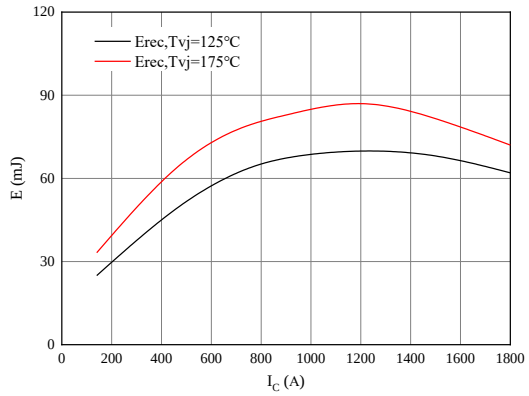


Fig 9. Switching losses of Diode

RGon=0.5Ω, VCE=600V

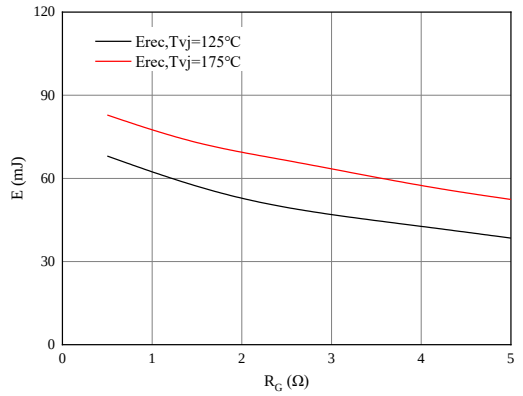


Fig 10. Switching losses of Diode

IF=900A, VCE=600V

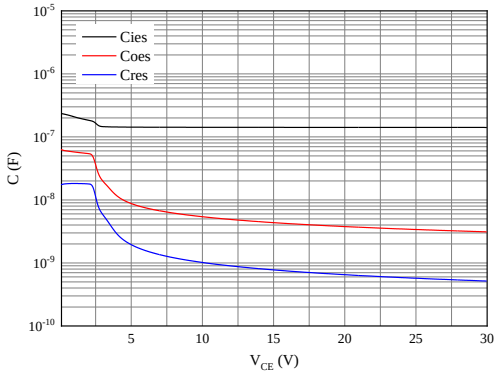


Fig 11. Capacitance characteristic

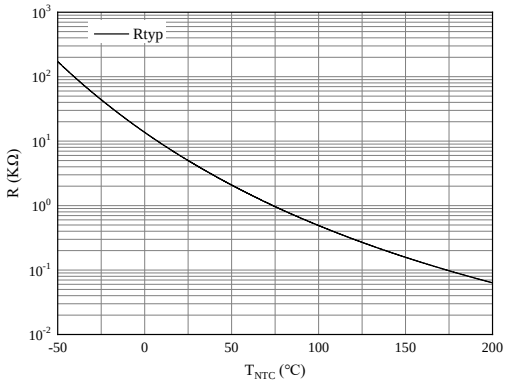
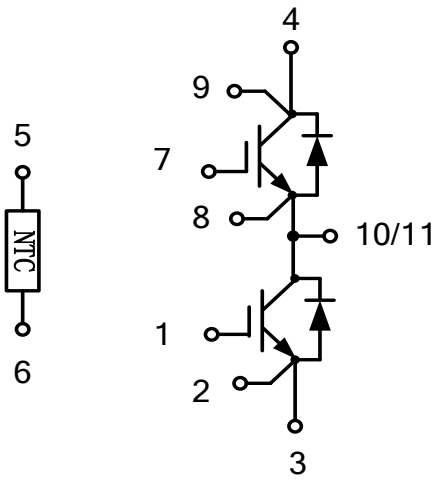


Fig 12. NTC-Thermistor-temperature characteristic

Circuit diagram



Package outlines