Half Bridge IGBT Module

DESCRIPTION：
- 1200V Trench / Field Stop Technology
- Low Switching Power Loss
- Positive Temperature Coefficient

TYPICAL APPLICATIONS：
- Variable-frequency Drive
- Servo
- UPS
- Inverter

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

IGBT, Inverter

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Collector- Emitter Voltage	Tvj=25℃	V_{CES}	1200	V
Continuous DC collector current	Tc=100℃, Tvj max=175℃	$I_{C\ nom}$	600	A
Repetitive peak collector current	t_P=1ms	I_{CRM}	1200	A
Gate emitter voltage		V_{GE}	±20	V

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-Emitter saturation voltage VGE=15V, IC=600A Tvj=25℃ VGE=15V, IC=600A Tvj=125℃ VGE=15V, IC=600A Tvj=150℃	$V_{CE(SAT)}$		1.78 2.07 2.13	2.10	V
Gate-Emitter threshold voltage IC=23mA, VGE= VCE Tvj=25℃	$V_{GE(th)}$	5.2	5.8	6.4	V
Gate charge VGE = -15 V ... +15 V	Q_G		5.55		uC
Internal gate resistor	R_{Gint}		1.34		Ω
Input capacitance f=1 MHz, VCE=25V, VGE=0V Tvj=25℃	C_{ies}		47.07		nF

Reverse transfer capacitance f=1 MHz, VCE=25V, VGE=0V Tvj=25℃	C_{res}		2.20		nF
Collector-emitter cut-off current VCE=1200V, VGE=0V Tvj=25℃	I_{CES}			2	mA
Gate-emitter leakage current VCE=0V, VGE=20V Tvj=25℃	I_{GES}			200	nA
Turn-on delay time IC=600A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.5Ω Tvj=125℃ (inductive load) Tvj=150℃	$td_{(ON)}$		201 238 248		ns
Rise time IC=600A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.5Ω Tvj=125℃ (inductive load) Tvj=150℃	tr		194 200 202		ns
Turn-off delay time IC=600A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.5Ω Tvj=125℃ (inductive load) Tvj=150℃	$td_{(OFF)}$		582 647 697		ns
Fall time IC=600A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.5Ω Tvj=125℃ (inductive load) Tvj=150℃	tf		105 138 173		ns
Turn-on energy loss per pulse IC=600A, VCE=600 V, VGE=±15 V Tvj=25℃ di/dt =2379A/µs (Tvj=150°C), RG=1.5Ω Tvj=125℃ (inductive load) Tvj=150℃	$E_{(ON)}$		93.35 119.5 130.1		mJ
Turn-off energy loss per pulse IC=600A, VCE=600 V, VGE=±15 V Tvj=25℃ dv/dt =3121V/µs (Tvj=150°C), RG=1.5Ω Tvj=125℃ (inductive load) Tvj=150℃	$E_{(OFF)}$		61.57 71.01 76.53		mJ
Short circuit (SC) data VGE≦15 V, VCE=800 V VCEmax=V_{CES}-Ls_{CE}·di/dt t_P≤10us, Tvj=150℃	I_{SC}		3000		A
Temperature under switching conditions	Tvj op	-40		150	℃

Diode, Inverter

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Repetitive peak reverse voltage	Tvj=25℃	V_{RRM}	1200	V
Continuous DC forward current		I_F	600	A
Repetitive peak forward current	t_P=1ms	I_{FRM}	1200	A

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=600A, VGE=0 V Tvj=25℃ IF=600A, VGE=0 V Tvj=125℃ IF=600A, VGE=0 V Tvj=150℃	V_F		2.44 2.55 2.50	2.70	V
Peak reverse recovery current IF=600 A, Tvj=25℃ -diF/dt =2417A/µs(Tvj=150°C) Tvj=125℃ VR=600 V ,VGE= -15 V Tvj=150℃	I_{RM}		144 208 240		A
Recovered charge IF=600 A, Tvj=25℃ -diF/dt =2417A/µs(Tvj=150°C) Tvj=125℃ VR=600 V ,VGE= -15 V Tvj=150℃	Q_r		19.70 51.44 63.30		uC
Reverse recovered energy IF=600 A, Tvj=25℃ -diF/dt =2417A/µs(Tvj=150°C) Tvj=125℃ VR=600 V ,VGE= -15 V Tvj=150℃	E_{rec}		4.79 14.37 17.93		mJ
Temperature under switching conditions	Tvj op	-40		150	℃

Negative temperature coefficient Thermistor (NTC-Thermistor)

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Rated resistances Tc=25℃, ±5%	R_{25}		5		kΩ
B-value ±2%	$B_{25/50}$		3375		K

Module

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Isolation test voltage RMS, f=50Hz, t=1min	V_{ISOL}		2500		V
Internal isolation			AL_2O_3		
Storage temperature	T_{STG}	-40		125	℃
Mounting torque for modul mounting	M	3		6	Nm
Weight	W		343		g

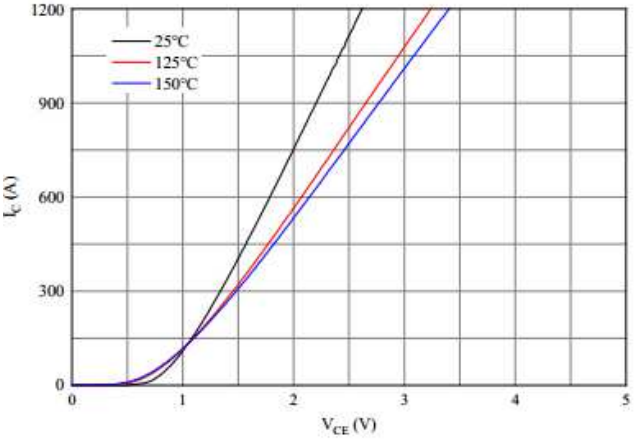


Figure 1. Typical output characteristics (VGE=15V)

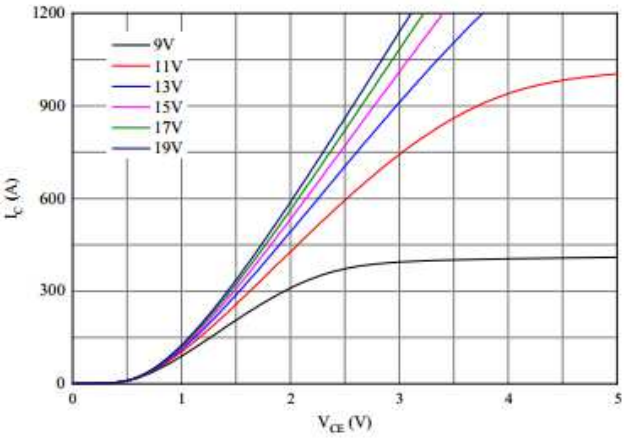


Figure 2. Typical output characteristics (Tvj=150℃)

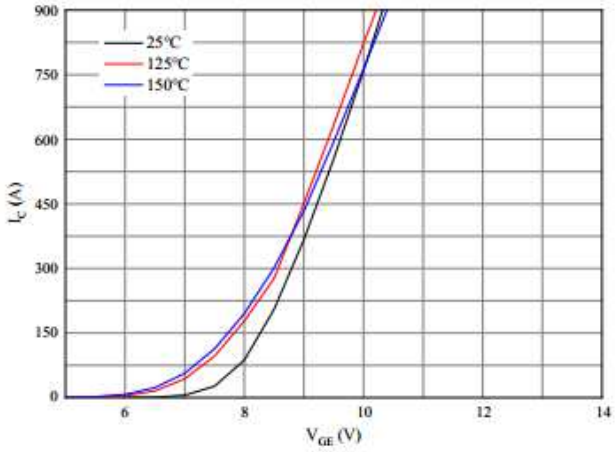


Figure 3. Typical transfer characteristic(VCE=20V)

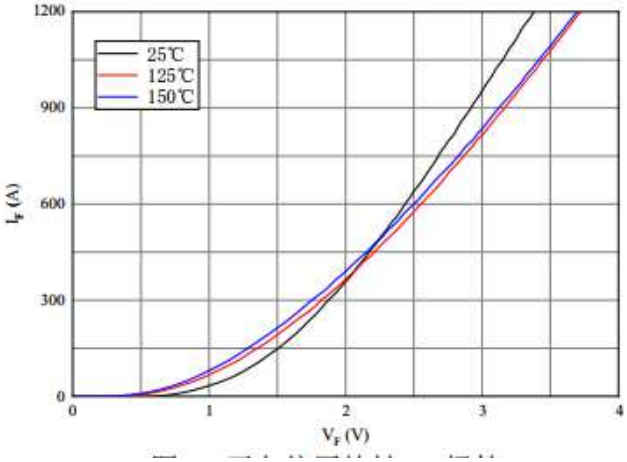


Figure 4. Forward characteristic of Diode

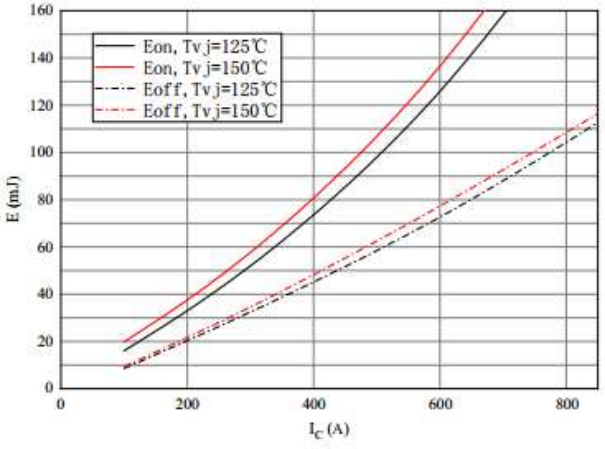


Figure 5. Switching losses of IGBT
VGE=± 15V, RGon=1.5Ω, RGoff=1.5Ω, VCE=600V

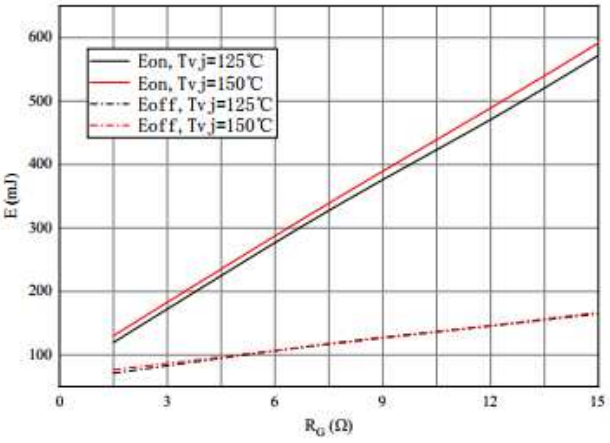


Figure 6. Switching losses of IGBT
VGE=± 15V, IC=600A, VCE=600V

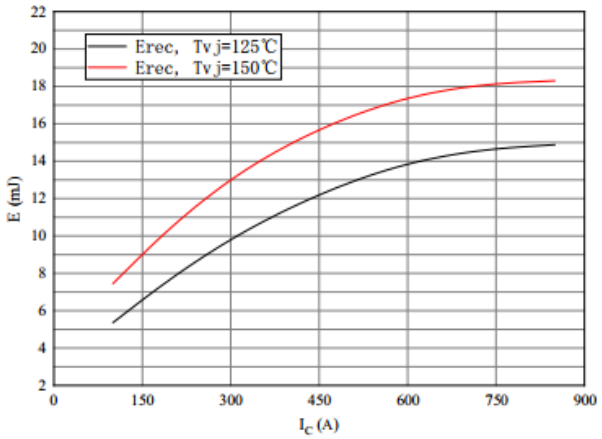


Figure 7. Switching losses of Diode
RGon=1.5Ω, VCE=600V

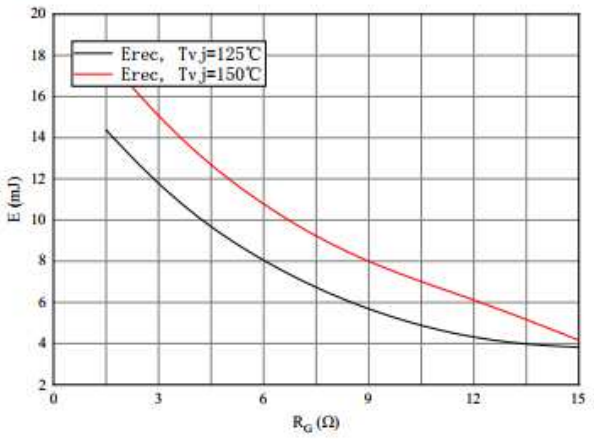


Figure 8. Switching losses of Diode
IF=600A, VCE=600V

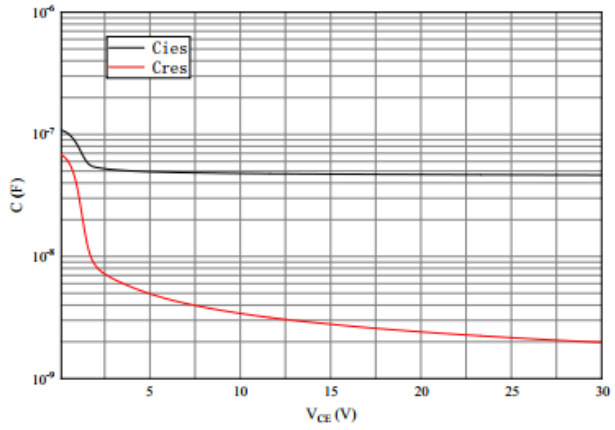


Figure 9. Capacitance characteristic

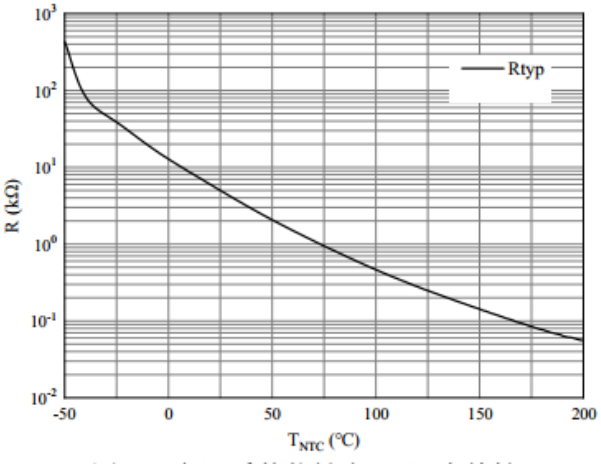
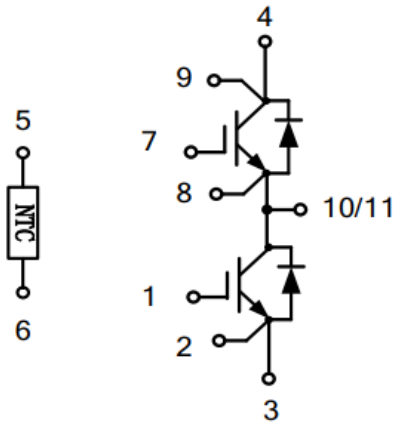
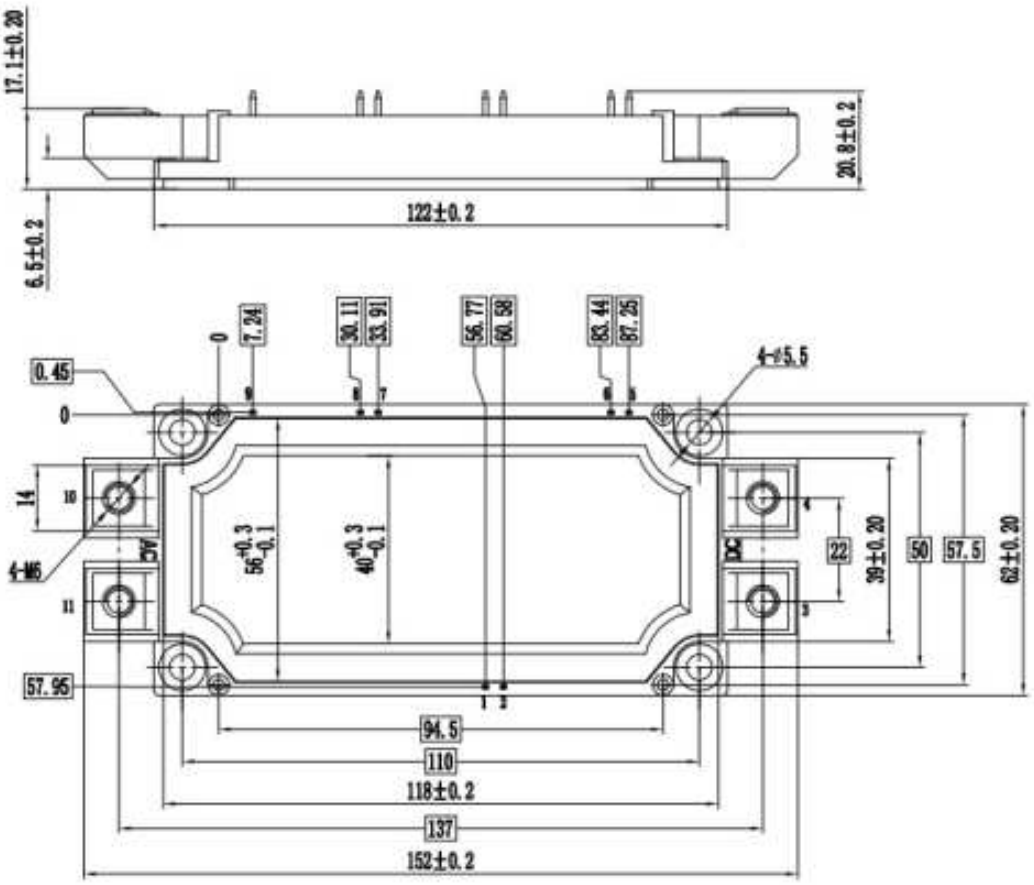


Figure 10. NTC-Themistor temperature characteristic

・Circuit diagram



・Package outlines : Dimensions in (mm)



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