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， $I_{C\ nom}$ =450A / I_{CRM} =900A

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℃	$I_{C\ nom}$	450	A
Repetitive peak collector current	t_P=1ms	I_{CRM}	900	A
Total power dissipation	Tc=25℃, Tvj max=175℃	P_{tot}	2250	W
Gate emitter voltage		V_{GE}	±20	V

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-Emitter saturation voltage VGE=15V, IC=450A Tvj=25℃ VGE=15V, IC=450A Tvj=125℃ VGE=15V, IC=450A Tvj=150℃	$V_{CE(SAT)}$		2.10 2.50 2.60	2.60	V
Gate-Emitter threshold voltage IC=17mA, VGE= VCE Tvj=25℃	$V_{GE(th)}$	5.1	5.7	6.3	V
Gate charge VGE = -15 V ... +15 V	Q_G		2.19		uC
Internal gate resistor	R_{Gint}		1.60		Ω
Input capacitance f=1 MHz, VCE=25V, VGE=0V Tvj=25℃	C_{ies}		34.80		nF

Reverse transfer capacitance f=1 MHz, VCE=25V, VGE=0V Tvj=25℃	C_{res}		1.30		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=450A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.8Ω Tvj=125℃ (inductive load) Tvj=150℃	$td_{(ON)}$		177 199 198		ns
Rise time IC=450A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.8Ω Tvj=125℃ (inductive load) Tvj=150℃	tr		66 65 66		ns
Turn-off delay time IC=450A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.8Ω Tvj=125℃ (inductive load) Tvj=150℃	$td_{(OFF)}$		312 349 351		ns
Fall time IC=450A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.8Ω Tvj=125℃ (inductive load) Tvj=150℃	tf		167 198 209		ns
Turn-on energy loss per pulse IC=450A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.8Ω Tvj=125℃ (inductive load) Tvj=150℃	$E_{(ON)}$		11.17 14.20 16.67		mJ
Turn-off energy loss per pulse IC=450A, VCE=600 V Tvj=25℃ VGE=±15 V, RG=1.8Ω Tvj=125℃ (inductive load) Tvj=150℃	$E_{(OFF)}$		39.35 48.51 51.47		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}		1525		A
Thermal resistance, junction to case (per IGBT)	R_{thJC}			0.066	K/W
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	450	A
Repetitive peak forward current	t_P=1ms	I_{FRM}	900	A
I²t -value	t_P=10ms, sin180°, Tvj=125°C	I^2t	12100	A^2s

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=450A, VGE=0 V Tvj=25℃ IF=450A, VGE=0 V Tvj=125℃ IF=450A, VGE=0 V Tvj=150℃	V_F		2.40 2.60 2.50	2.90	V
Peak reverse recovery current IF=450 A, Tvj=25℃ -diF/dt =6650A/µs(Tvj=150°C) Tvj=125℃ VR=600 V ,VGE= -15 V Tvj=150℃	I_{RM}		262 344 349		A
Recovered charge IF=450 A, Tvj=25℃ -diF/dt =6650A/µs(Tvj=150°C) Tvj=125℃ VR=600 V ,VGE= -15 V Tvj=150℃	Q_r		18.90 41.20 41.50		uC
Reverse recovered energy IF=450 A, Tvj=25℃ -diF/dt =6650A/µs(Tvj=150°C) Tvj=125℃ VR=600 V ,VGE= -15 V Tvj=150℃	E_{rec}		9.93 21.76 21.85		mJ
Thermal resistance, junction to case (per diode)	R_{thJC}			0.1	K/W
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		342		g

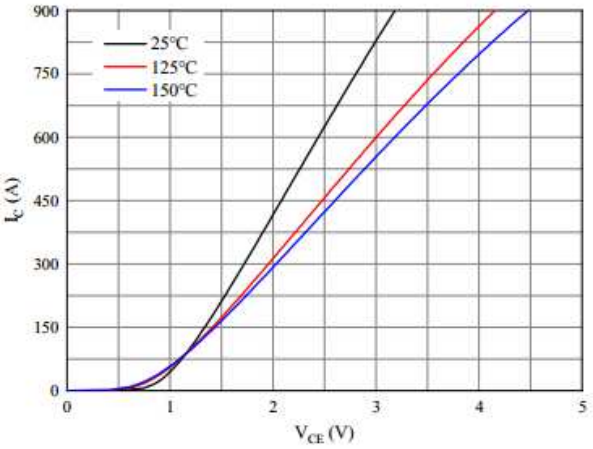


Figure 1. Typical output characteristics (VGE=15V)

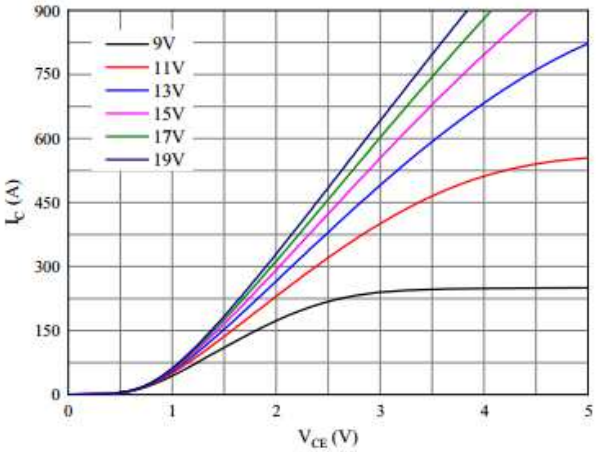


Figure 2. Typical output characteristics (Tvj=150℃)

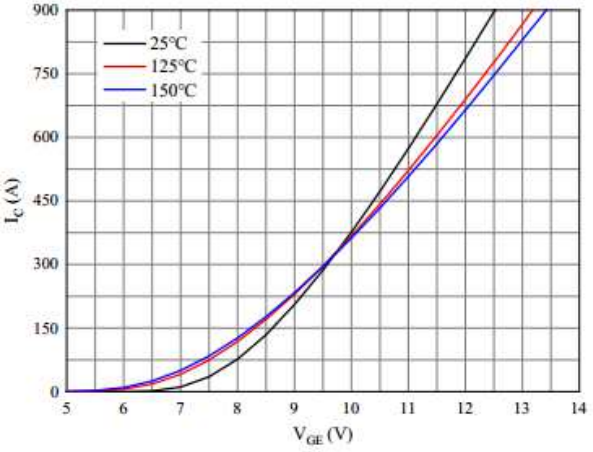


Figure 3. Typical transfer characteristic(VCE=20V)

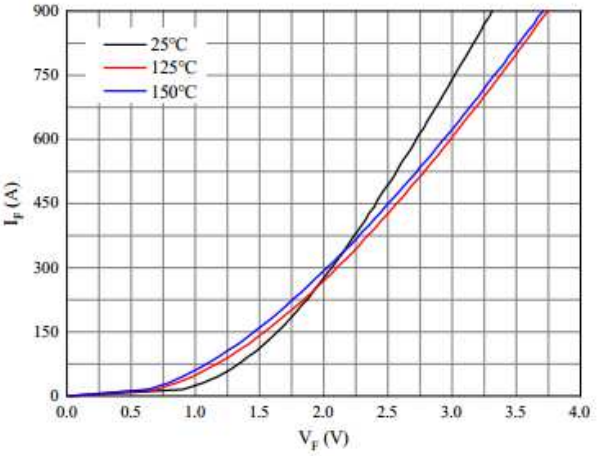


Figure 4. Forward characteristic of Diode

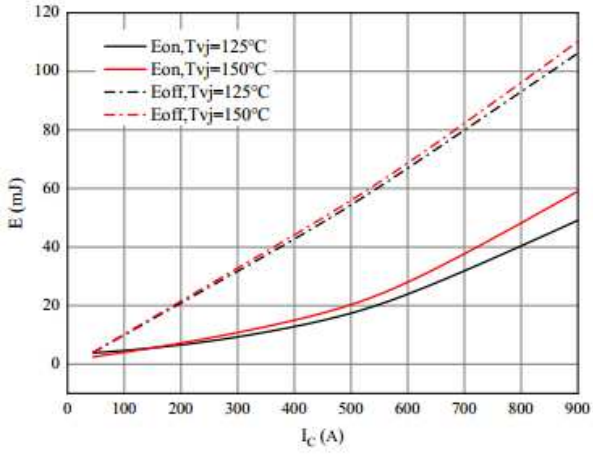


Figure 5. Switching losses of IGBT
VGE=± 15V, RGon=1.8Ω, RGoff=1.8Ω, VCE=600V

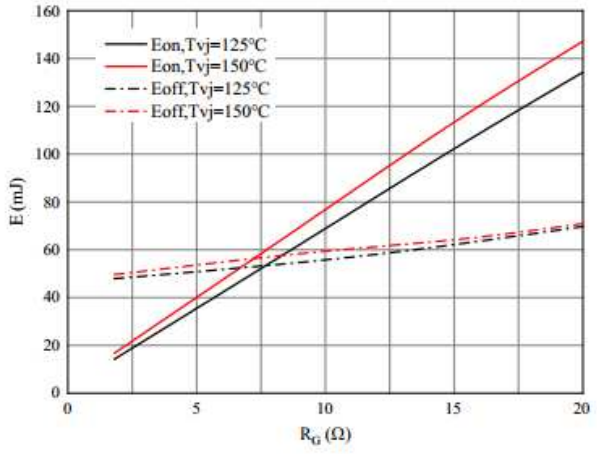


Figure 6. Switching losses of IGBT
VGE=± 15V, IC=450A, VCE=600V

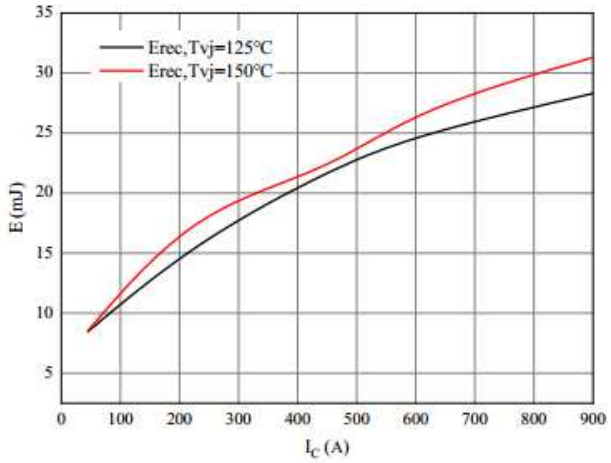


Figure 7. Switching losses of Diode
RGon=1.8Ω, VCE=600V

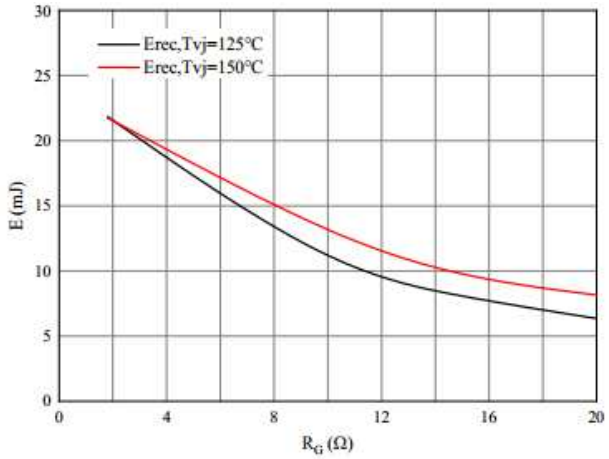


Figure 8. Switching losses of Diode
IF=450A, VCE=600V

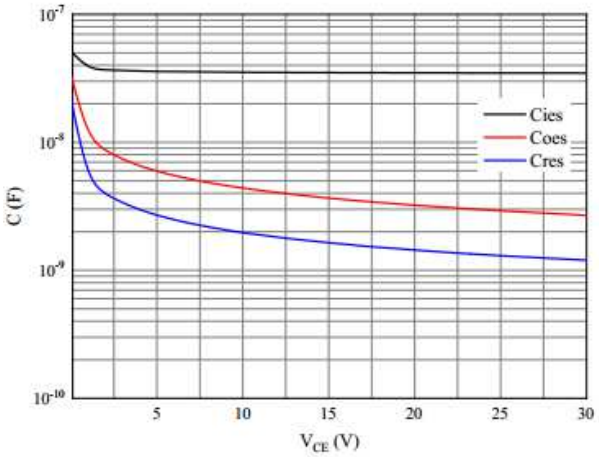


Figure 9. Capacitance characteristic

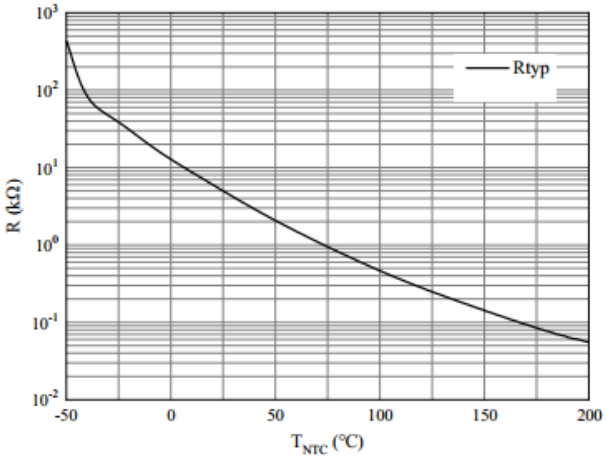
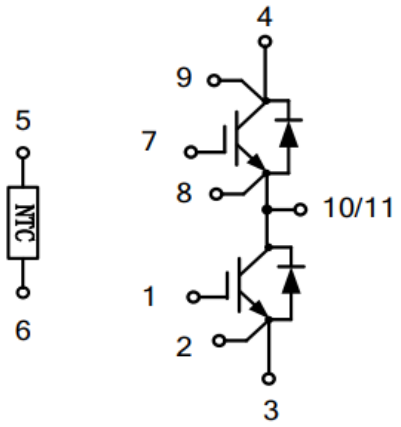
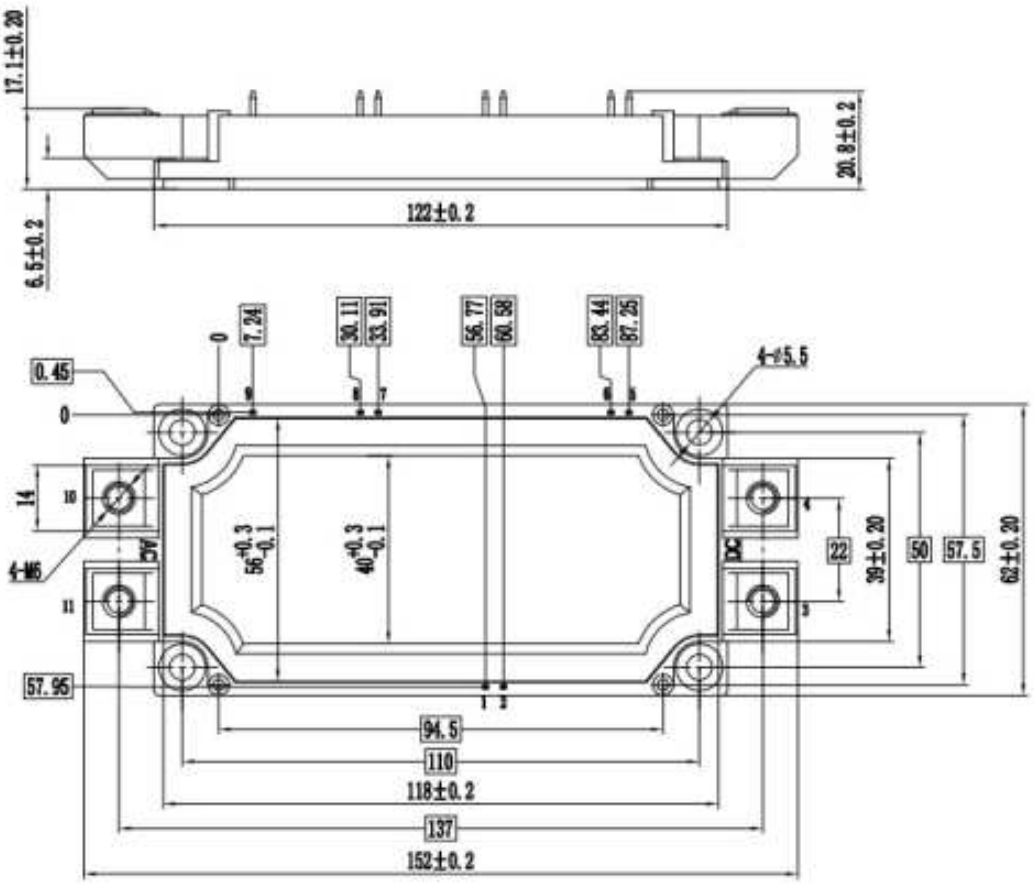


Figure 10. NTC-Themistor temperature characteristic

・Circuit diagram



・Package outlines : Dimensions in (mm)



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