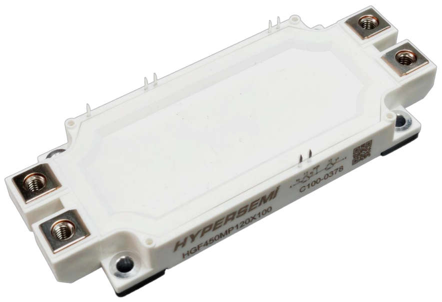
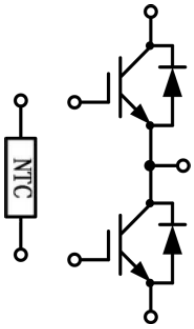
Econodual3 Half Bridge IGBT Module

V_{CES}= 1200V, I_C= 600A, $V_{CE(sat)}$= 1.7V



Features

- 1200V Trench Gate/Field Termination Process
- Low Switching Losses
- $V_{CE(Sat)}$ With Positive Temperature Coefficient
- Low Stray Inductance
- Copper Wire Bonding on Power Terminal



Applications

- Power Conversion System
- Inverter
- Servo Drives
- Motor Drives

IGBT, Inverter

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	V_{CES}	T_{vj}=25℃, V_{GE}=0V	1200	V
Continuous collector current	$I_{C\ nom}$	T_C=100℃	600	A
Repetitive peak collector current	I_{CRM}	t_P=1ms; T_J=175℃	1200	A
Gate-emitter peak voltage	V_{GES}	T_{vj}=25℃	±20	V
Total power dissipation	P_{tot}	T_C=25℃, $T_{vj\ max}$=175℃	3950	W
Short Circuit Withstand Time	t_{SC}		>10	μs

Characteristics Values

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C=10mA, V_{CE}=V_{GE}		5.0	5.5	6.8	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=600A, V_{GE}=15V	T_J=25℃		1.70	1.95	V
			T_J=125℃		1.90		
			T_J=150℃		2.00		
Collector-Emitter Leakage Current	I_{CES}	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
Gate-Emitter Leakage Current	I_{GES}	V_{GE}=±20V, V_{CE} =0V, T_J=25℃				800	nA
Input Capacitance	C_{ies}				49.26		nF

Output Capacitance	C_{oes}	V_{CE}=25V, V_{GE}=0V , f =1MHz			3.67		nF
Reverse Transfer Capacitance	C_{res}				1.85		
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=600V,I_C=600A, R_{Gon} =1Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.55		μs
			T_J=125℃		0.56		
			T_J=150℃		0.56		
Rise Time	t_r		T_J=25℃		0.22		μs
			T_J=125℃		0.22		
			T_J=150℃		0.23		
Turn-off Delay Time	$t_{d(off)}$	V_{CC}=600V,I_C=600A, R_{Goff} =1Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.54		μs
			T_J=125℃		0.57		
			T_J=150℃		0.57		
Fall Time	t_f		T_J=25℃		0.14		μs
			T_J=125℃		0.18		
			T_J=150℃		0.19		
Turn-on Switching Loss	E_{on}	V_{CC}=600V,I_C=600A, R_{Gon} =1Ω,V_{GE}=±15V, di/dt=2120A/μs (T_J=150℃) Inductive Load	T_J=25℃		49.0		mJ
			T_J=125℃		75.8		
			T_J=150℃		81.2		
Turn-off Switching Loss	E_{off}	V_{CC}=600V,I_C=600A, R_{Goff} =1Ω,V_{GE}= ±15V, du/dt=2600V/μs (T_J=150℃) Inductive Load	T_J=25℃		81.5		mJ
			T_J=125℃		96.1		
			T_J=150℃		100.1		
Total Gate Charge	Q_g	V_{GE}=+15V...-15V	T_J=25℃		3.36		uC
Internal Gate Resistance	R_g		T_J=25℃		1.1		Ω
Reverse Bias Safe Operating Area	RBSOA	I_C=1200A,V_{CC}=1050V,V_p=1200V, R_{Goff} =1Ω, V_{GE}=+15V to 0V,T_J=150℃			Trapezoid		
Short Circuit Safe Operating Area	SCSOA	V_{CC}=600V, V_{GE}=15V, T_J=150℃		10			μs
IGBT Thermal Resistance: Junction-To-Case(per leg)	$R_{θJC}$				0.038		℃/W

Diode, Inverter
Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃	1200	V
Continuous forward current	I_F		600	A
Repetitive peak forward current	I_{FRM}	t_P= 1ms	1200	A

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F=600A, V_{GE}=0V	T_{vj}=25℃		1.8	2.0	V
			T_{vj}=125℃		1.9		
			T_{vj}=150℃		1.9		
Reverse Recovery Time	t_{rr}	I_F=600A, -diF/dt=2270A/μs(T_J=150℃) V_R=600V, V_{GE}=-15V	T_{vj}=25℃		0.37		μs
			T_{vj}=125℃		0.58		
			T_{vj}=150℃		0.65		
Peak reverse recovery current	I_{RM}		T_{vj}=25℃		238		A
			T_{vj}=125℃		294		
			T_{vj}=150℃		306		
Recovered charge	Q_{rr}		T_{vj}=25℃		52.3		μC
			T_{vj}=125℃		96.1		
			T_{vj}=150℃		110.6		
Reverse recovery energy	E_{rec}		T_{vj}=25℃		22.0		mJ
			T_{vj}=125℃		38.3		
			T_{vj}=150℃		44.6		
Diode Thermal Resistance: Junction-To-Case (per leg)	$R_{\theta JC}$	per FRD				0.064	K/W

NTC-Thermistor

Characteristics Values

R_{25}	T_C =25℃	5		kΩ
△R/R	T_C =100℃, R_{100} =481Ω		±5	%
P_{25}	T_C =25℃	50		mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	3380		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	3440		K

Module

Characteristics Values

Symbol	Conditions		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1min	2500			V
L_{sCE}	Stray Inductance Module			20		nH
T_J	Maximum Junction Temperature				175	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.02		℃/W
M	Power Terminals Screw:M5		3.0		5.0	N.m
M	Mounting Screw:M6		4.0		6.0	N.m
G	Weight			330		g

Typical Characteristics

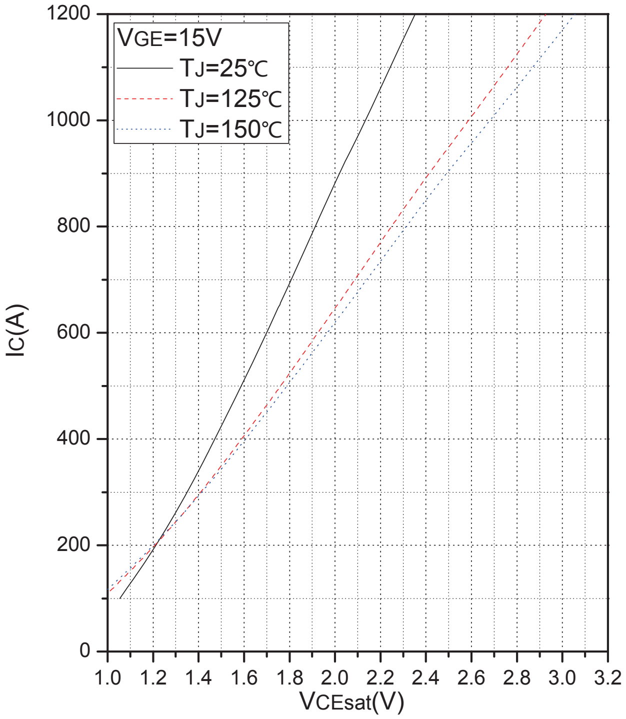


Fig.1 Typical Saturation Voltage Characteristics

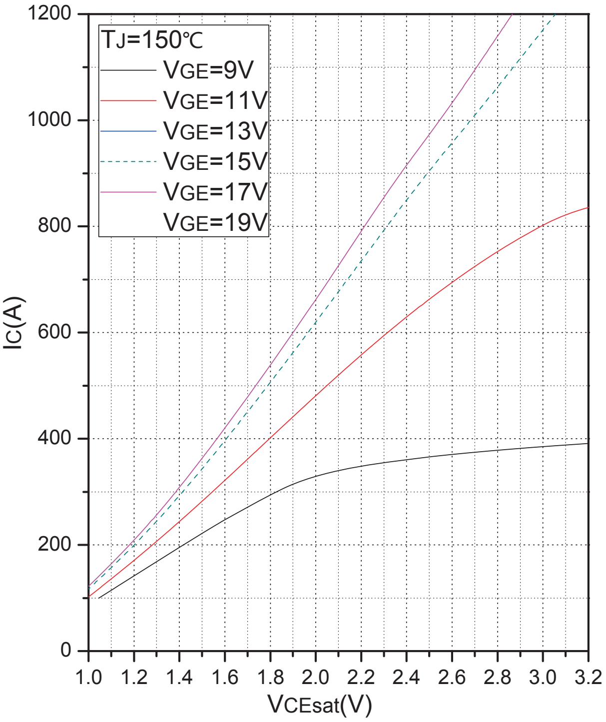


Fig.2 Typical Output Characteristics

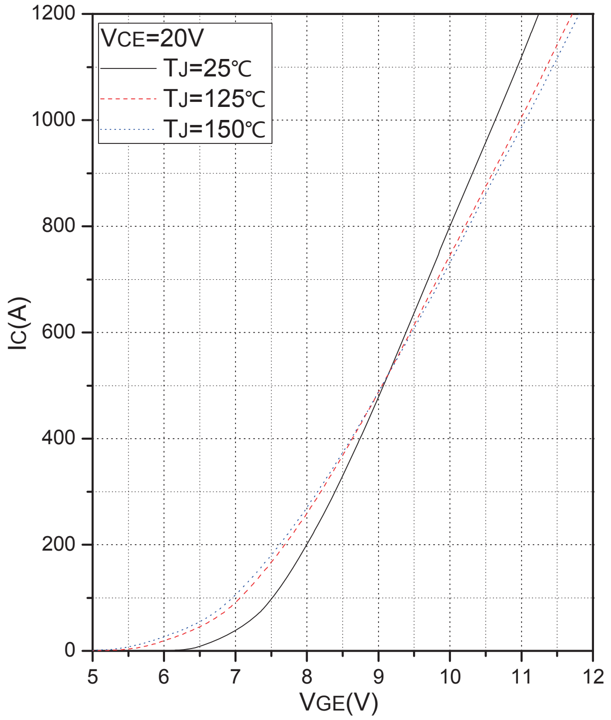


Fig.3 Transfer Characteristic

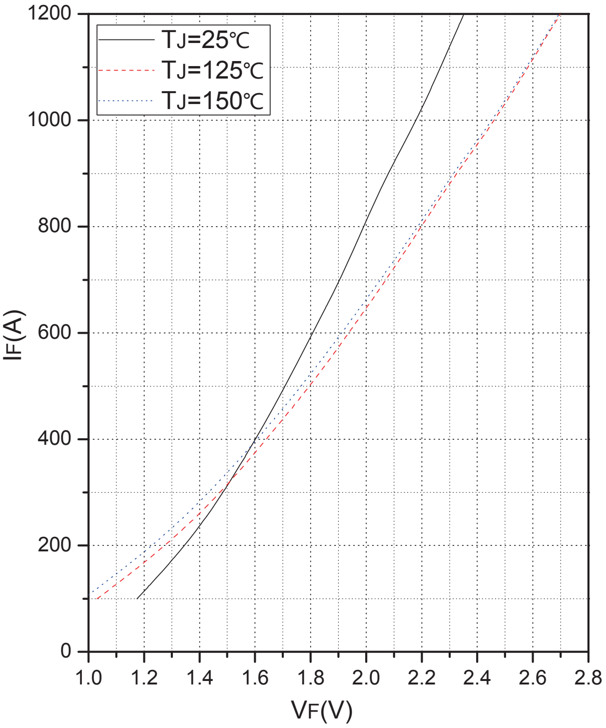


Fig.4 Forward Characteristics of Diode

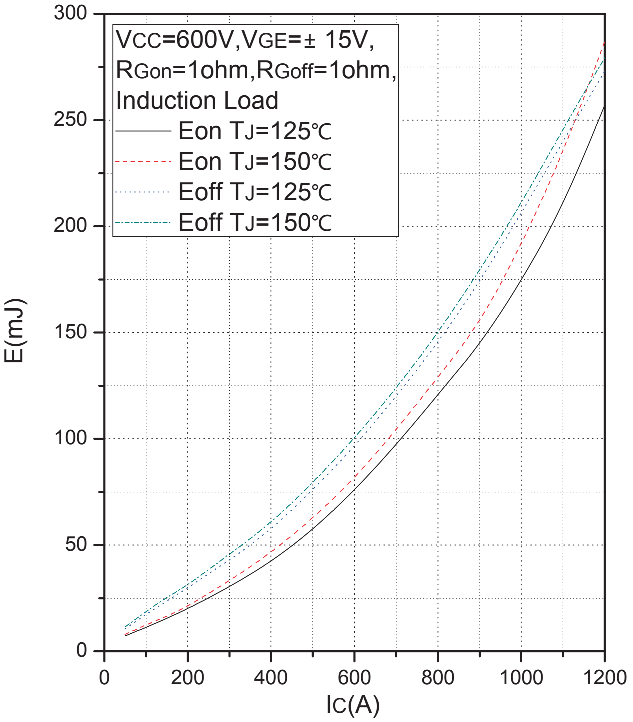


Fig.5 Typical Switching Loss vs. Collector Current

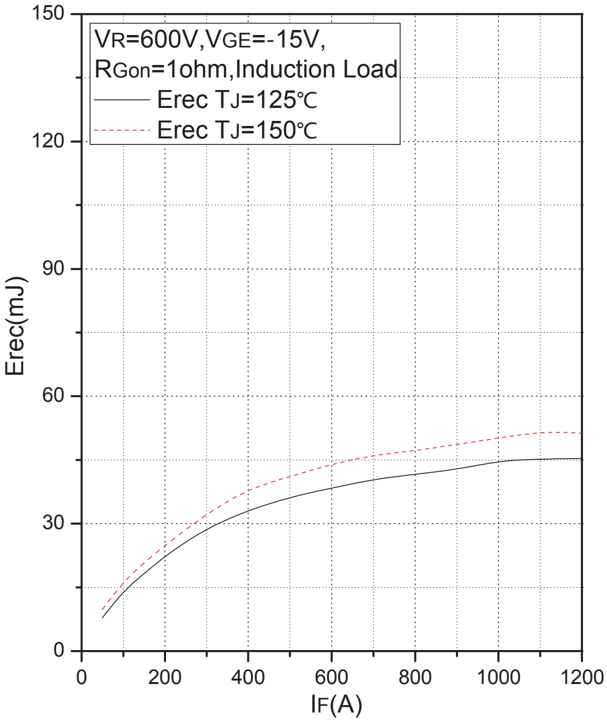


Fig.6 Typical Switching Loss vs. Forward Current

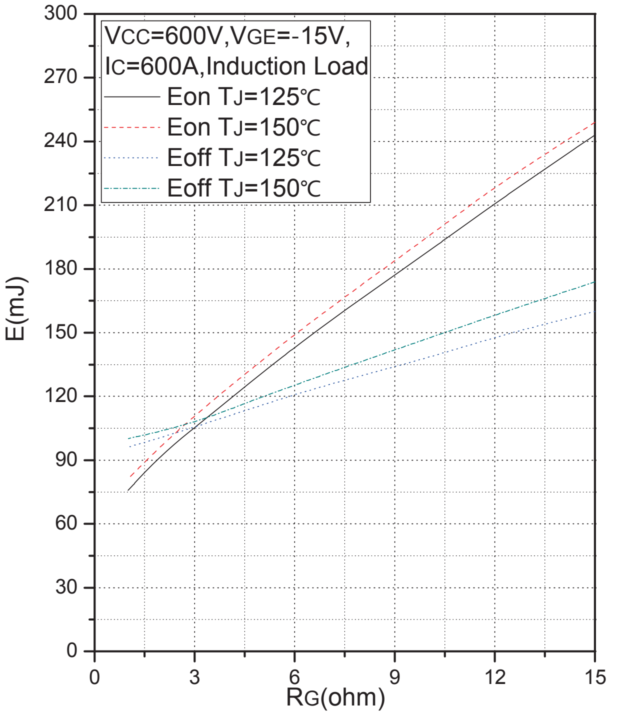


Fig.7 Typical Switching Loss vs. Gate Resistance

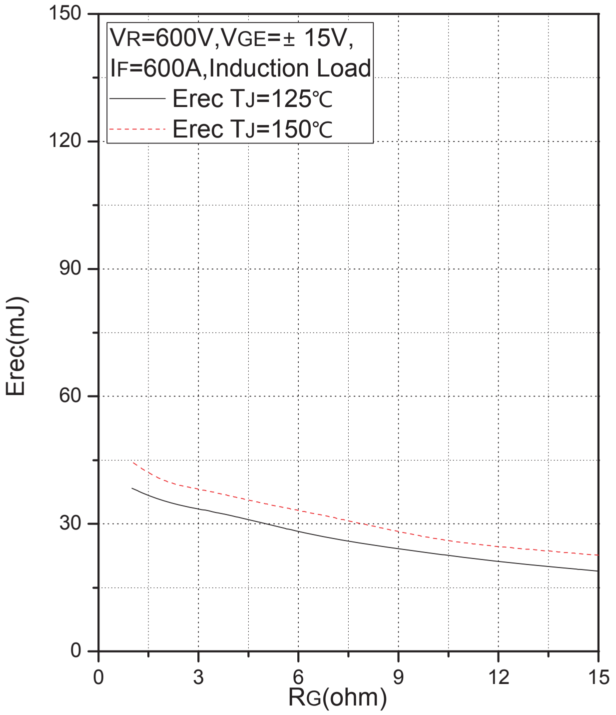


Fig.8 Typical Switching Loss vs. Gate Resistance

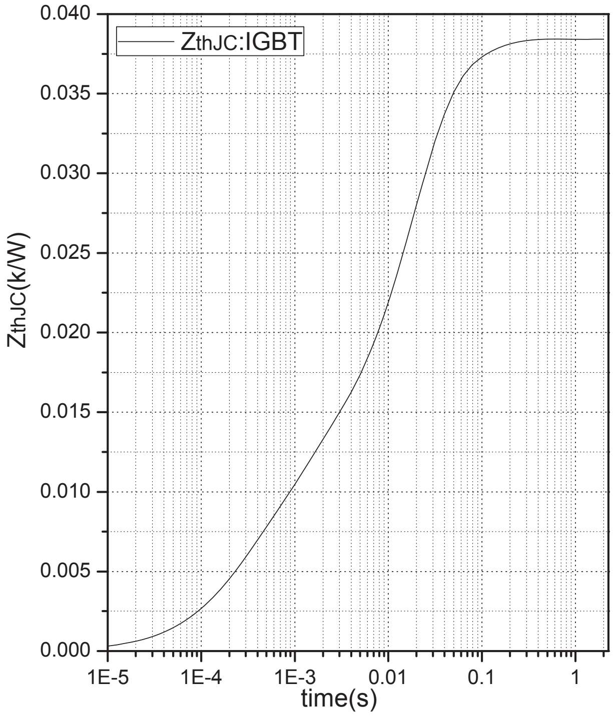


Fig.9 Transient Thermal Impedance (IGBT)

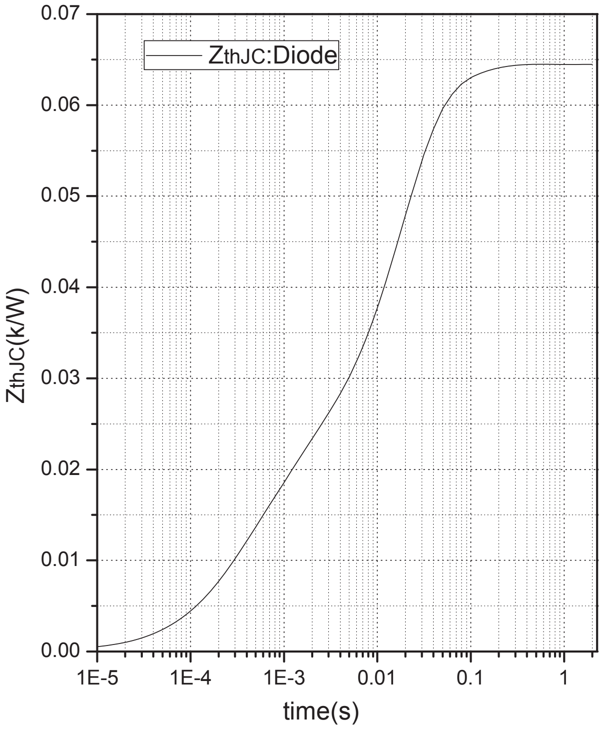


Fig.10 Transient Thermal Impedance (Diode)

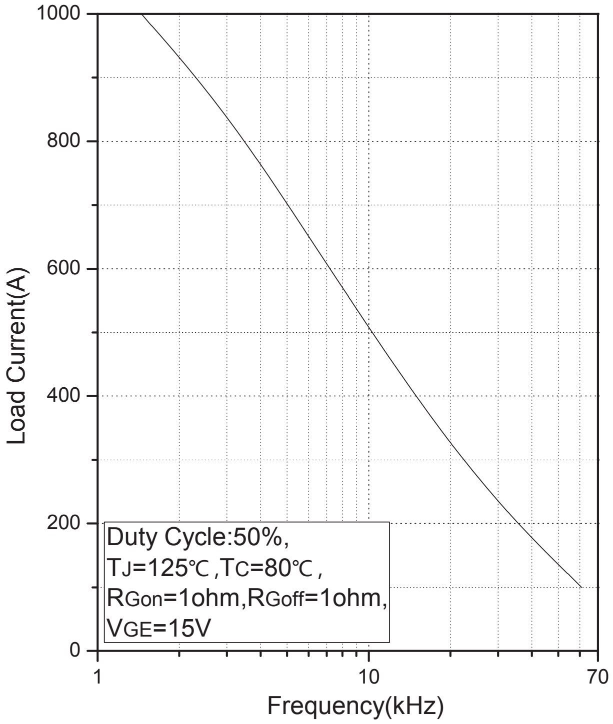


Fig.11 Typical Load Current vs. Frequency

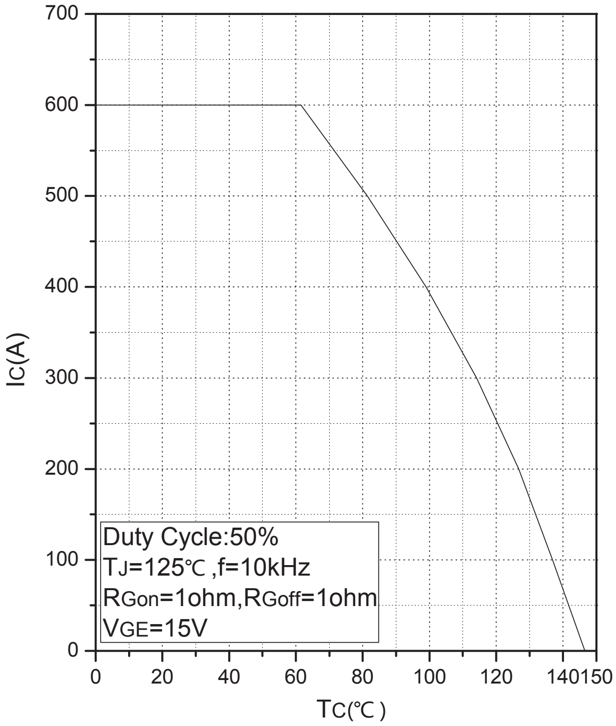


Fig.12 Rated Current vs. Temperature

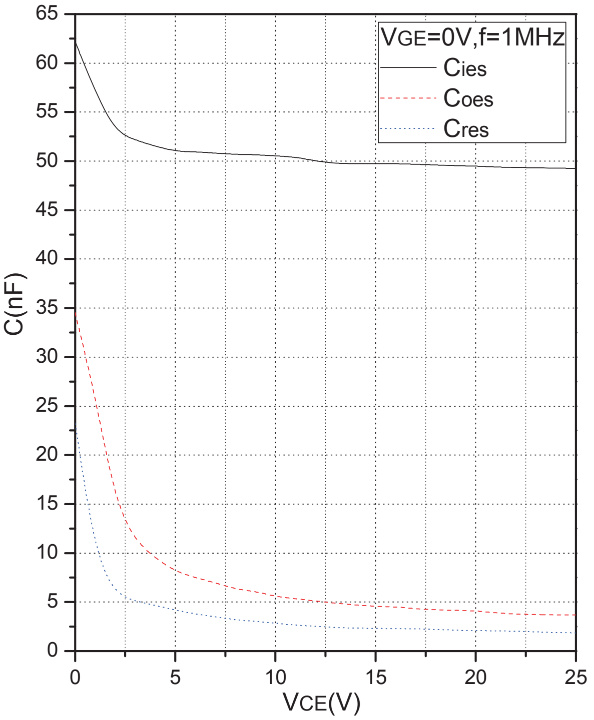


Fig.13 Capacitance Characteristics

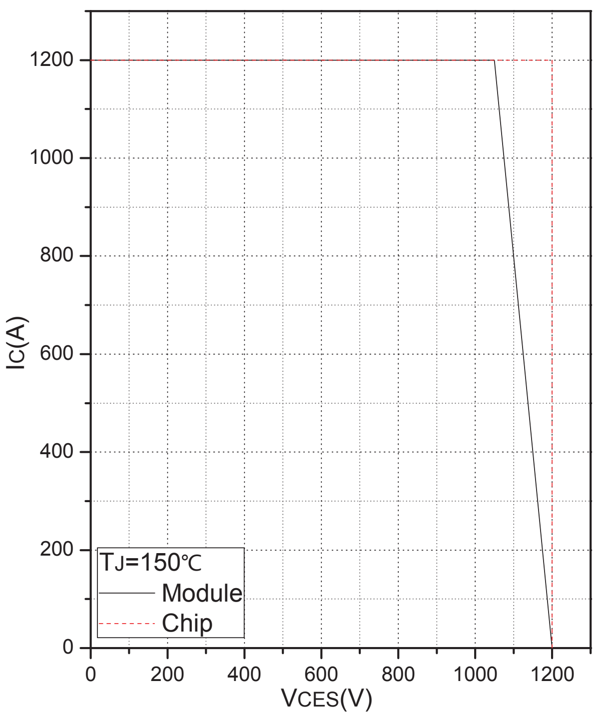


Fig.14 Reverse Bias Safe Operation Area (RBSOA)

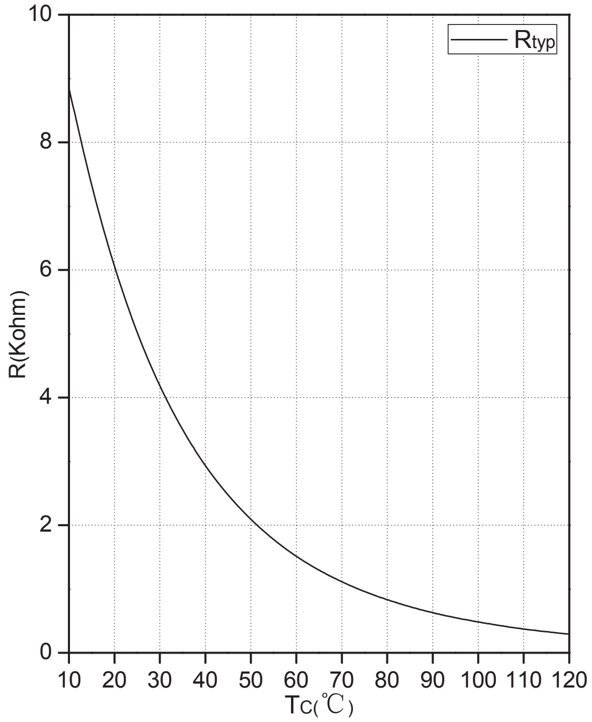
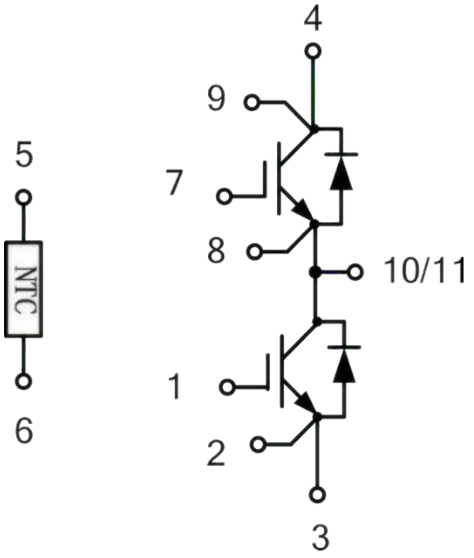
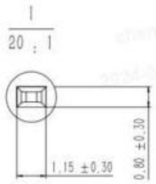


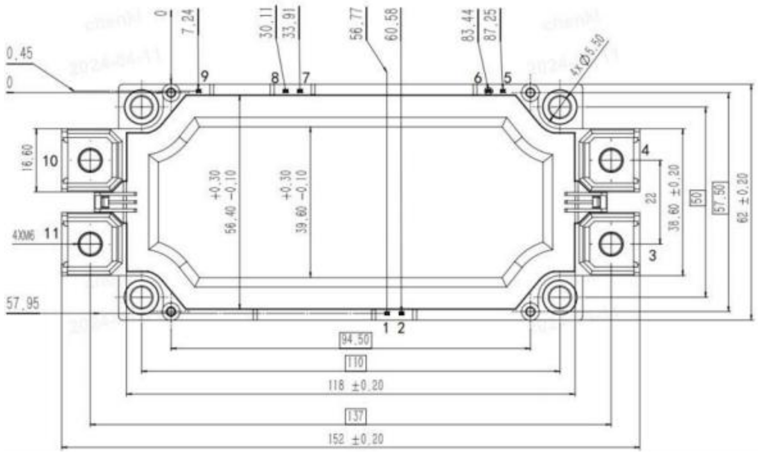
Fig.15 NTC Temperature Characteristics

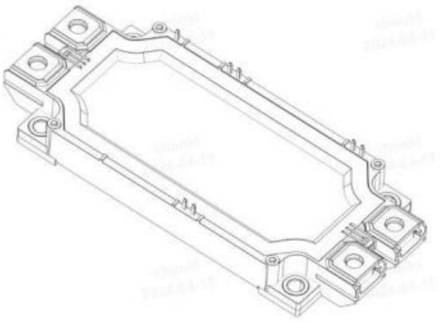
Circuit Diagram



Package Outlines (Unit:mm)







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