

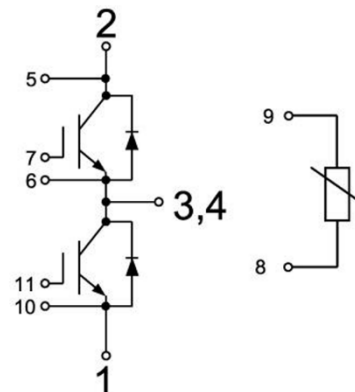
GT600HF120T9H

IGBT Module

Circuit Diagram

Features:

- $V_{CES}=1200V$ $I_C=600A$ Trench & Field Stop IGBT Module
- Short Circuit Capability
- Low Switching Loss
- 100% RBSOA Tested($2 \times I_C$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- UPS System
- Motor Drives
- Servo Drives
- Wind Turbines



Type	Package	Marking
GT600HF120T9H	T9	GT600HF120T9H

IGBT, Inverter

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current Limited by T_{Jmax}	$T_C=90^\circ C$	600	A
		$T_C=25^\circ C$	1200	A
I_{CM}	Peak Collector Current Repetitive	T_p limited by T_{Jmax}	1200	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ C, T_{Jmax}=150^\circ C$	3800	W

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Electrical Characteristics of IGBT ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=23\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=600\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	2.12	2.55	V
			$T_J=125^{\circ}\text{C}$	2.88		V
			$T_J=150^{\circ}\text{C}$	3.05		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}$, $V_{CE}=1200\text{V}$, $T_J=25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		68.12		nF
C_{oes}	Output Capacitance			3.19		nF
C_{res}	Reverse Transfer Capacitance			0.69		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=600A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		268		ns
			$T_J=125^{\circ}C$		298		
			$T_J=150^{\circ}C$		304		
t_r	Rise Time		$T_J=25^{\circ}C$		70		ns
			$T_J=125^{\circ}C$		80		
			$T_J=150^{\circ}C$		84		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		366		ns
			$T_J=125^{\circ}C$		422		
			$T_J=150^{\circ}C$		434		
t_f	Fall Time	$T_J=25^{\circ}C$		98		ns	
		$T_J=125^{\circ}C$		134			
		$T_J=150^{\circ}C$		144			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=600A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ $di/dt=8500A/\mu s(T_J=150^{\circ}C)$ Inductive Load	$T_J=25^{\circ}C$		27		mJ
		$T_J=125^{\circ}C$		44			
		$T_J=150^{\circ}C$		48			

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E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =600A, R _{Goff} =1Ω, V _{GE} =±15V, du/dt=13.8kV/μs(T _J =150°C) Inductive Load	T _J =25°C		21		mJ
			T _J =125°C		27		
			T _J =150°C		29		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		3.83		uC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		0.75		Ω
T _{SC}	V _{CC} =600V, V _{GE} =±15V, T _J =150°C ^{note1}					10	us
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.033	°C/W
R _{θCS}	IGBT Thermal Resistance: Case-to-Sink (per IGBT) (per IGBT, λ _{grease} = 1 W/(m · K))				0.038		°C/W

note1: Short circuit withstand time cannot exceed 10us under specified condition

Diode, Inverter

Maximum Rated Values of Diode (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		600	A
I _{FM}	Diode Maximum Forward Current	t _p =1ms	1200	A

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =600A	T _J =25°C		1.78	2.20	V
			T _J =125°C		1.95		
			T _J =150°C		1.94		
t _{rr}	Reverse Recovery Time	I _F =600A, -diF/dt=10950A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		480		ns
			T _J =125°C		734		
			T _J =150°C		830		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		616		A
			T _J =125°C		632		
			T _J =150°C		640		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		51		μC
			T _J =125°C		80		
			T _J =150°C		89		

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E _{rec}	Reverse Recovery Energy	I _F =600A, -diF/dt=10950A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		21		mJ
			T _J =125°C		33		
			T _J =150°C		37		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.067	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.078		°C/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R ₂₅	T _C =25°C		5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =465Ω	-5		+5	%
P ₂₅	T _C =25°C			10	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
B _{25/100}	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ -1/(298.15K))]		3545		K

Module

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature		-40		150	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		150	°C
T _{stg}	Storage Temperature		-40		125	°C
CTI	Comparative Tracking Index		200			
T	Power Terminals Screw:M6		4.0		5.0	N·m
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			330		g

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Ordering Information Table

Device code

G	T	600	HF	120	T9	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (600=600A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

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Characteristic diagram

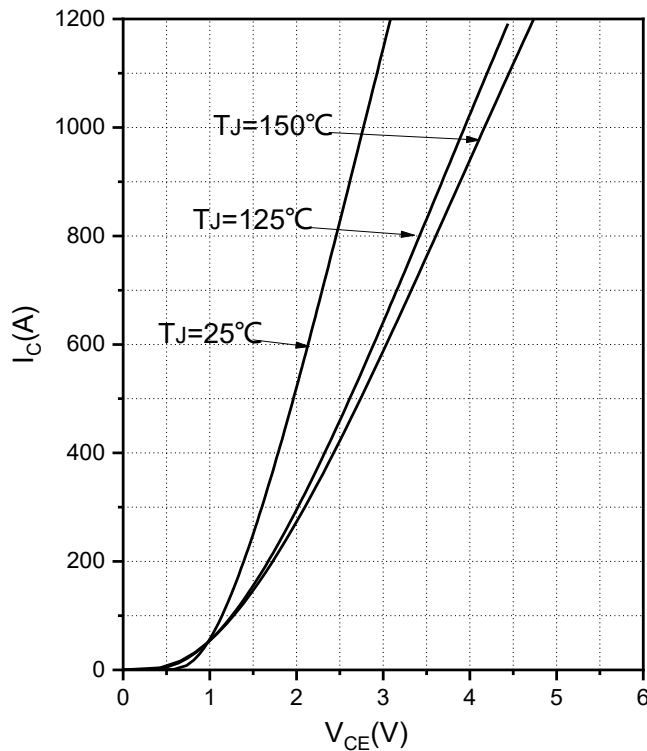


Fig.1 Typical Saturation Voltage Characteristics

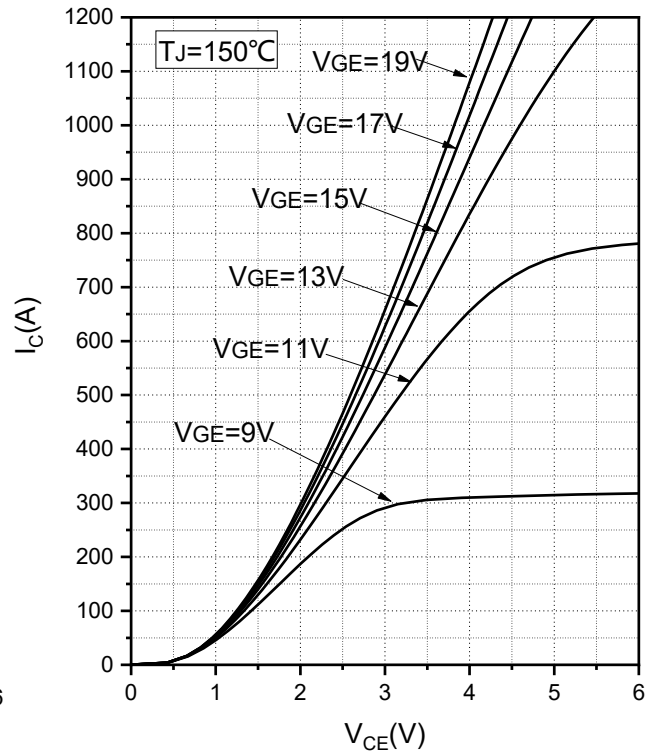


Fig.2 Typical Output Characteristics

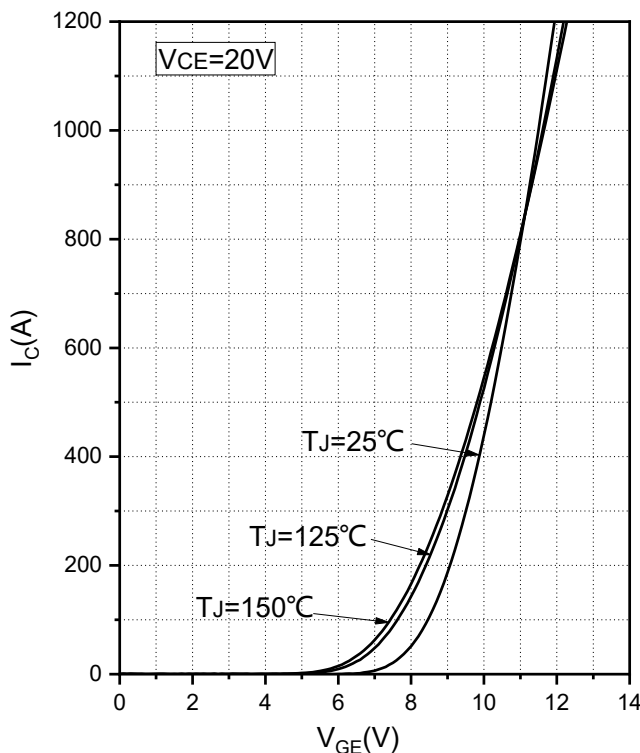


Fig.3 Transfer Characteristic

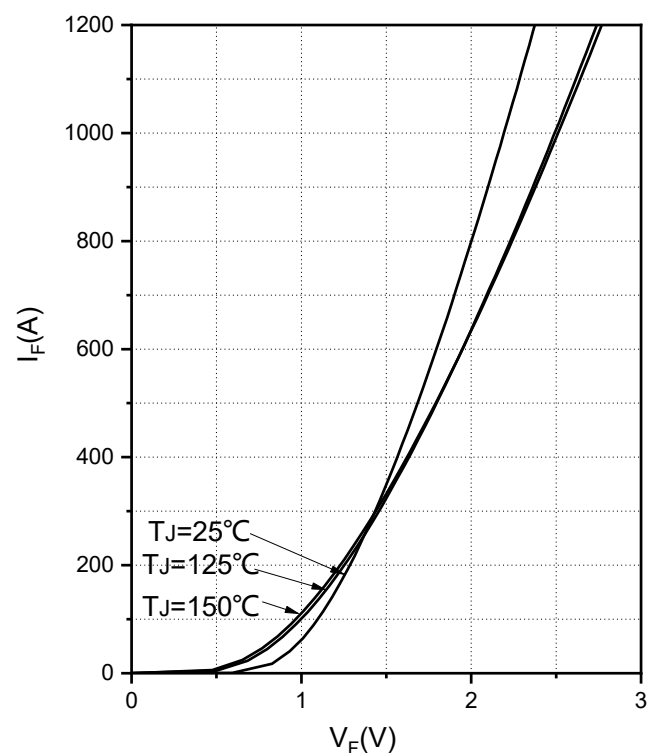


Fig.4 Forward Characteristics of Diode

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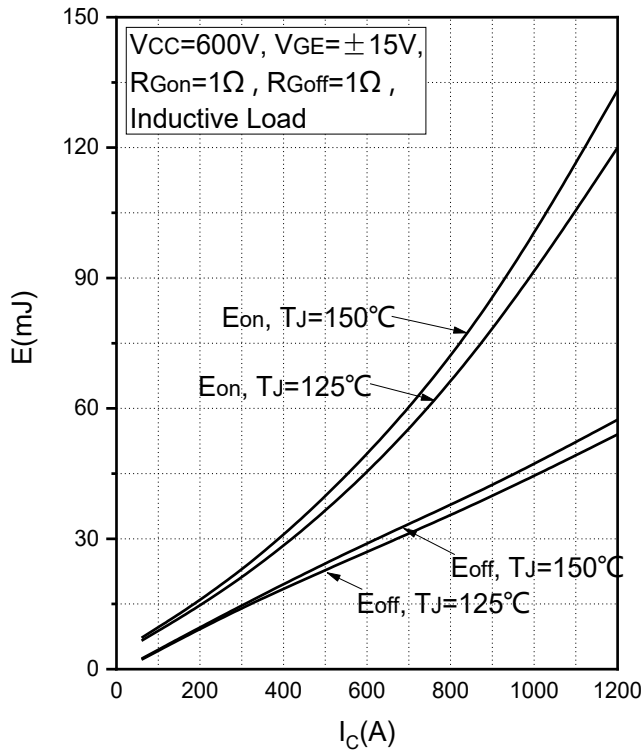


Fig.5 Typical Switching Loss vs. Collector Current

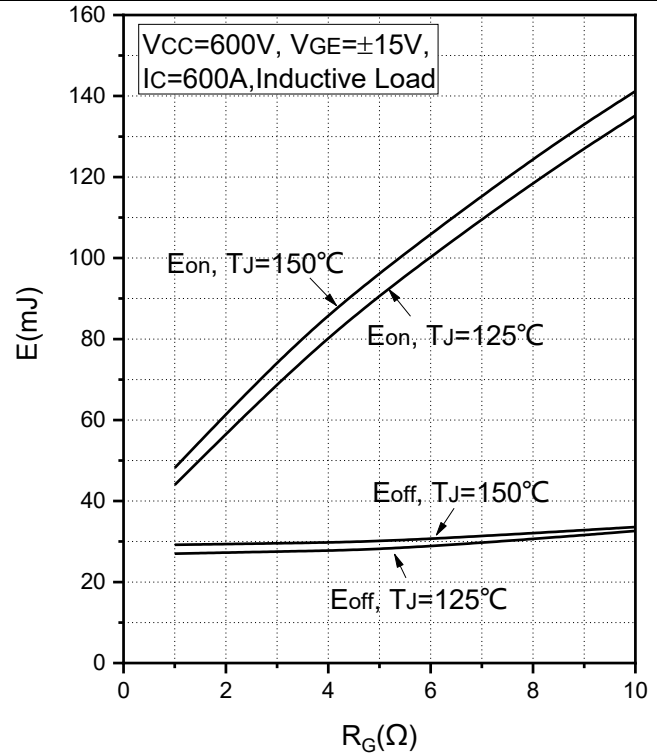


Fig.6 Typical Switching Loss vs. Gate Resistance

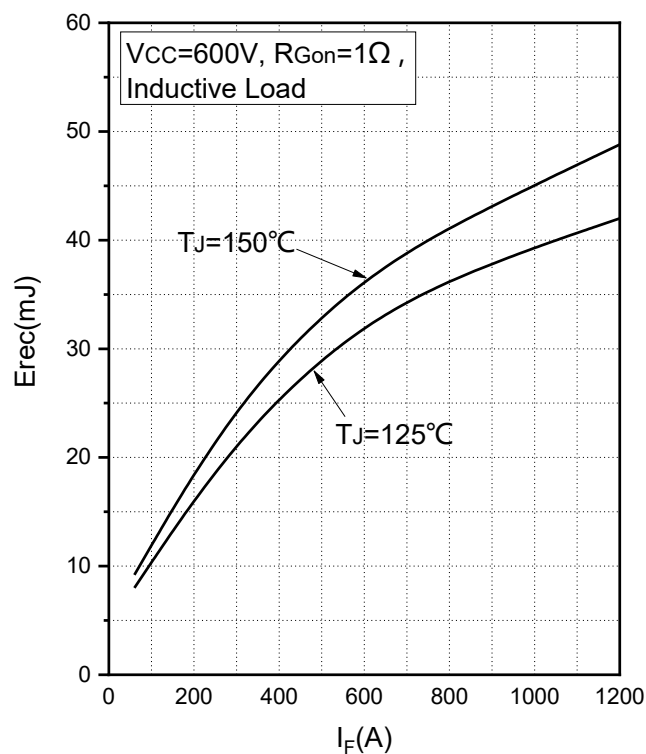


Fig.7 Typical Switching Loss vs. Forward Current

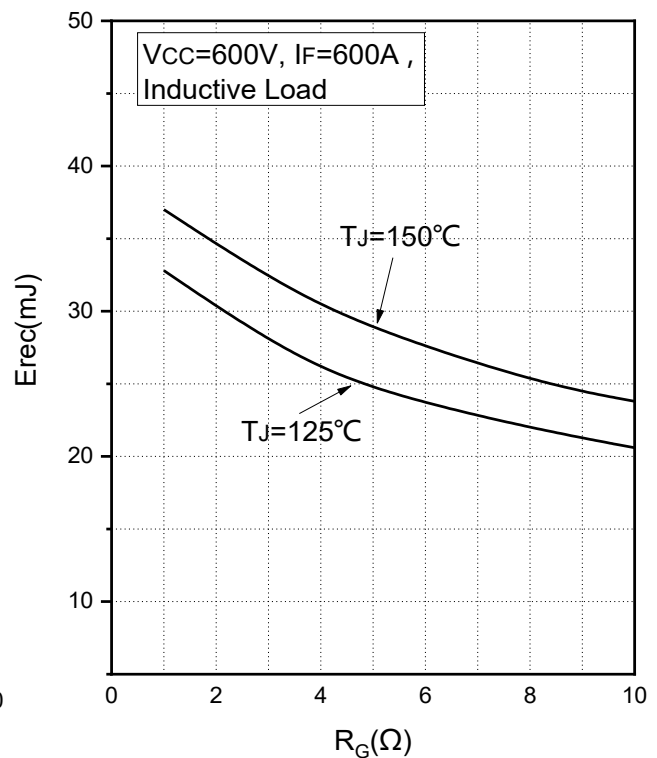


Fig.8 Typical Switching Loss vs. Gate Resistance

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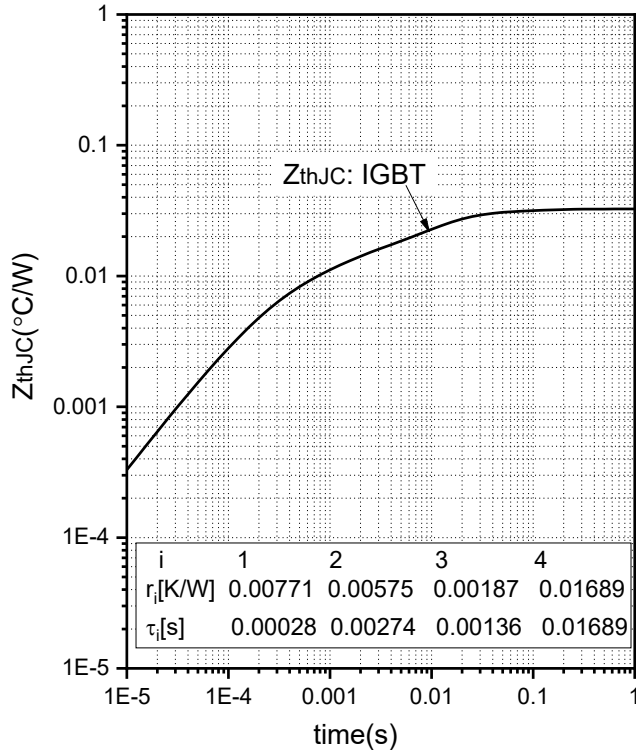


Fig.9 Transient Thermal Impedance (IGBT)

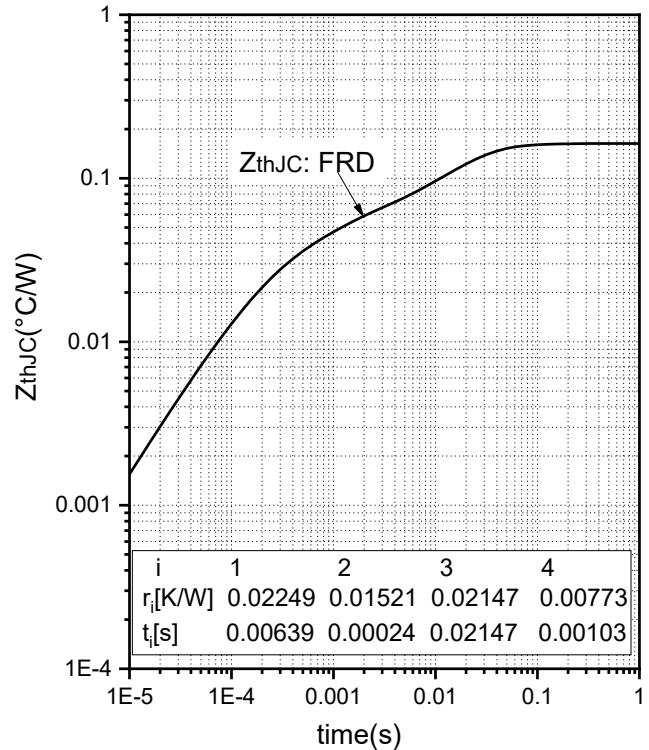


Fig.10 Transient Thermal Impedance (Diode)

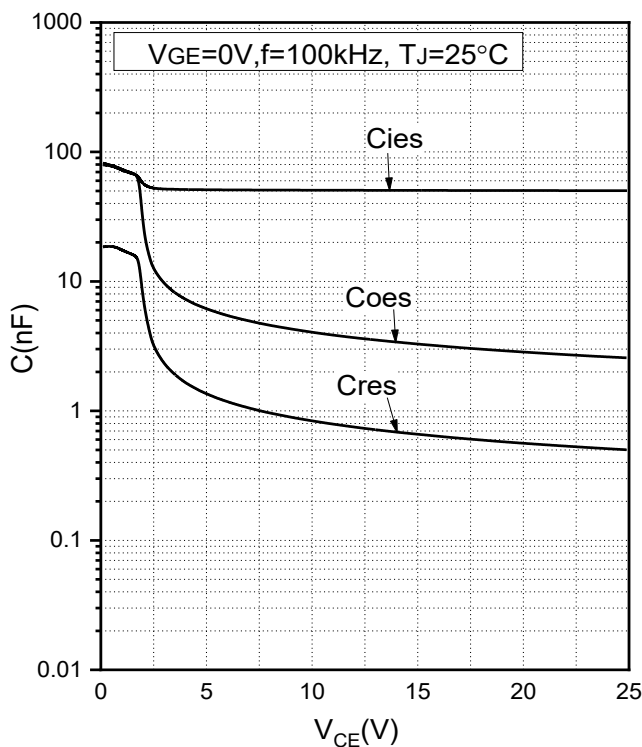


Fig.11 Capacitance Characteristics

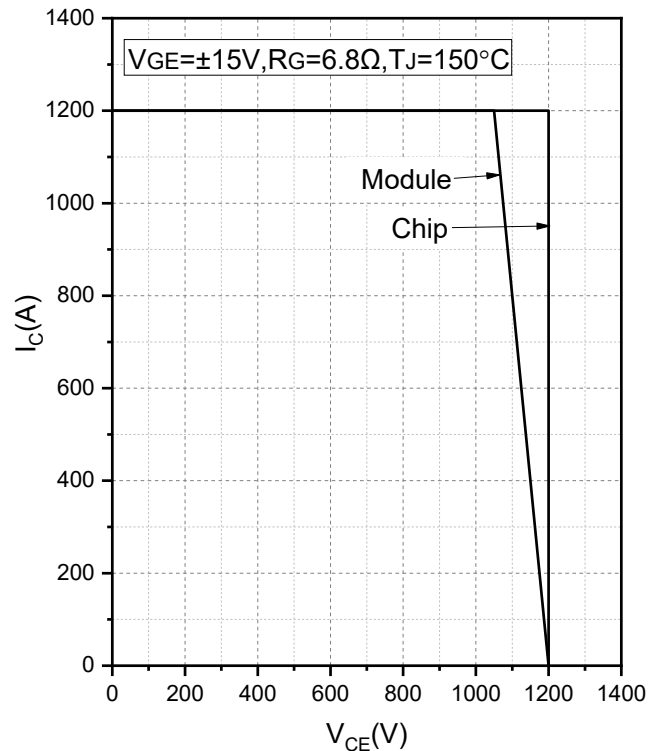


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

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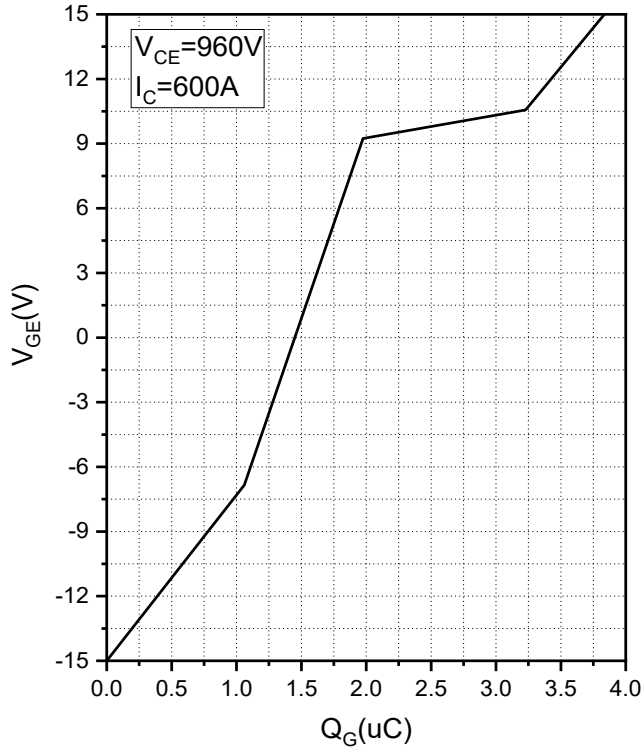


Fig.13 Gate Charge Characteristics

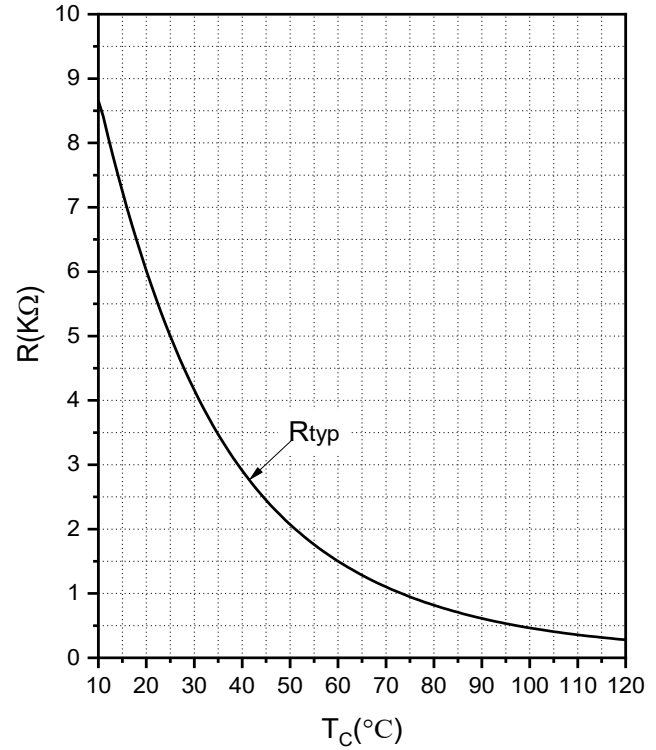


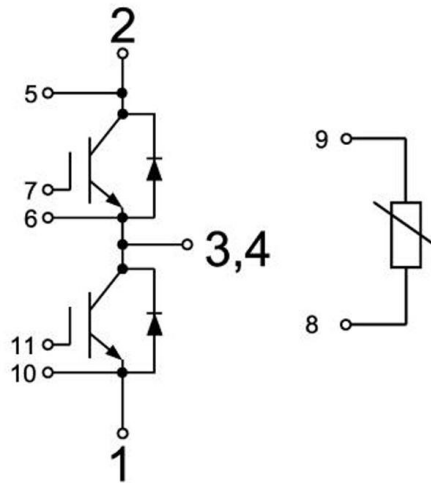
Fig.14 NTC Temperature Characteristics

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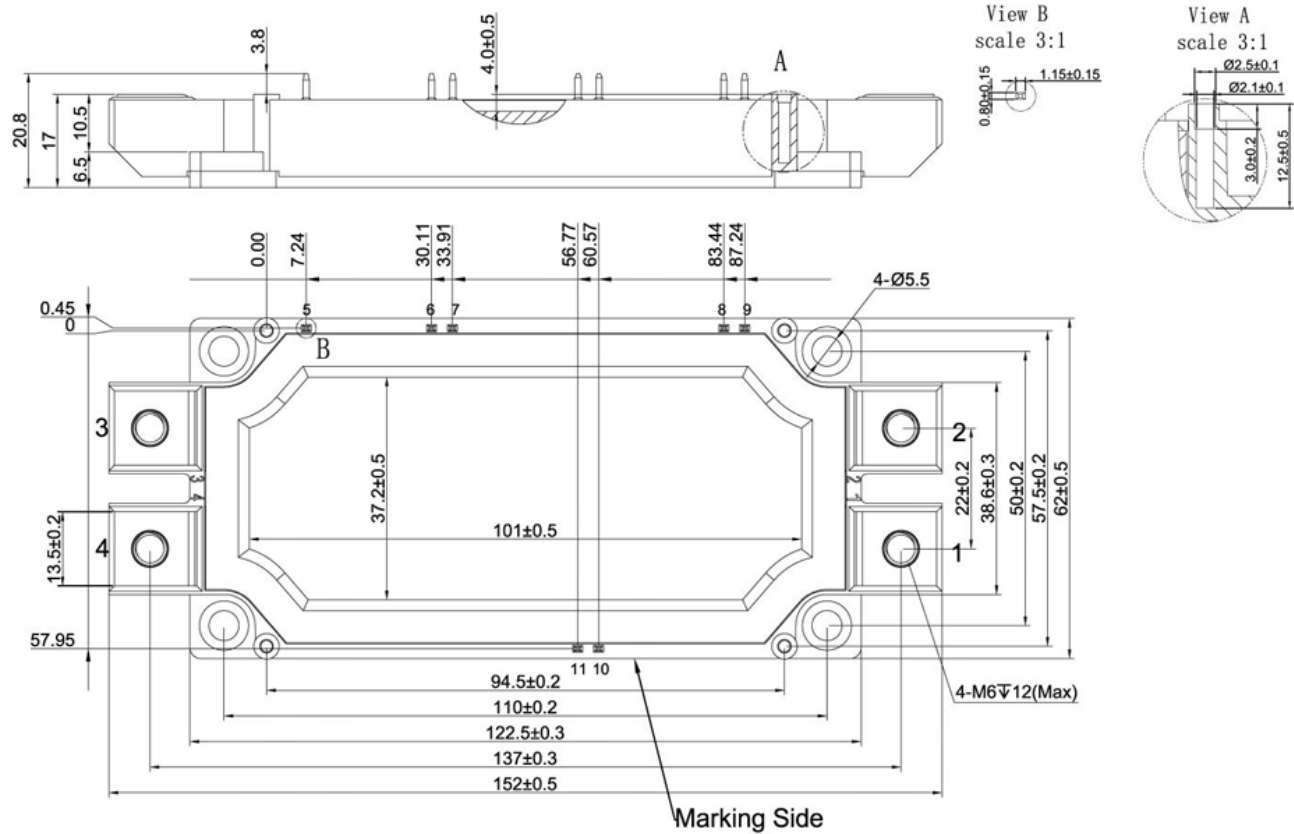
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Internal Circuit:



Package Outline (Unit: mm):



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Revision	Notes
01	Initial Release
02	Engineering Sample Datasheet

Announcement

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