



GT600CH120T9H

IGBT Module

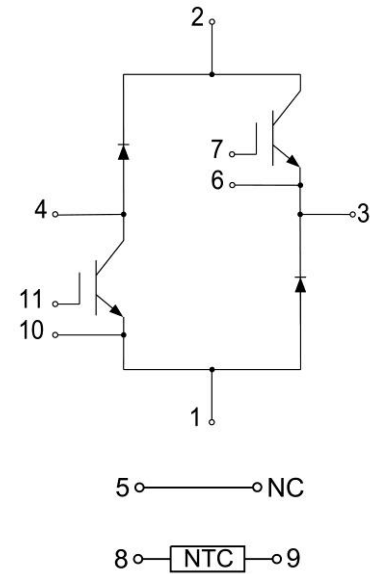
Features:

- Trench & Field Stop IGBT
- Short Circuit Rated >10 μ s
- Low Switching Loss
- 100% RBSOA Tested (2 $\times$ I_c)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications:

- UPS Systems
- Servo Applications
- Motor Drives
- Medical Applications
- High Frequency Switching Applications

Circuit Diagram



IGBT, Chopper

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

V _{CES}	Collector-Emitter Blocking Voltage		1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	600	A
		T _C =25°C	1200	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	1200	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C, T _{Jmax} =175°C	3791	W



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	$I_C=24\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=600\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80	2.00	V
			$T_J=125^{\circ}\text{C}$	2.10		V
			$T_J=150^{\circ}\text{C}$	2.20		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}$, $V_{CE}=V_{CES}$, $T_J=25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		68.6		nF
C_{oes}	Output Capacitance			4.6		nF
C_{res}	Reverse Transfer Capacitance			1.2		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =600A, R _{Gon} =1Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		717		ns
			T _J =125℃		716		
			T _J =150℃		725		
t _r	Rise Time		T _J =25℃		266		ns
			T _J =125℃		303		
			T _J =150℃		302		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =600A, R _{Goff} =1Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		540		ns
			T _J =125℃		577		
			T _J =150℃		574		
t _f	Fall Time		T _J =25℃		163		ns
			T _J =125℃		226		
			T _J =150℃		235		
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =600A, R _{Gon} =1Ω, V _{GE} =±15V, di/dt=1684A/μs (T _J =150℃) Inductive Load	T _J =25℃		49		mJ
			T _J =125℃		102		
			T _J =150℃		104		



E_{off}	Turn-off Switching Loss	$V_{CC}=600V$, $I_C=600A$, $R_{Goff}=1\Omega$, $V_{GE}= \pm 15V$, $du/dt=3871V/\mu s$ ($T_J=150^\circ C$) Inductive Load	$T_J=25^\circ C$		76		mJ
			$T_J=125^\circ C$		94		
			$T_J=150^\circ C$		96		
Q_g	Total Gate Charge	$V_{GE}=+15V \dots -15V$	$T_J=25^\circ C$		3.71		μC
$R_{G(int)}$	Internal Gate Resistance		$T_J=25^\circ C$		1		Ω
I_{SC}	$V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=1\Omega$, $t_p=10\mu s$, $T_J=150^\circ C$				2100		A
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per IGBT)					0.033	$^\circ C/W$

Diode, Chopper

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

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ C$	1200	V
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	600	A
I_{FM}	Diode Maximum Forward Current	$t_p=1ms$	1200	A

Electrical Characteristics of Diode ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =600A	T _J =25℃		1.90		V
			T _J =125℃		2.05		
			T _J =150℃		2.05		
t _{rr}	Reverse Recovery Time	I _F =600A, -diF/dt=1845A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		332		ns
			T _J =125℃		560		
			T _J =150℃		607		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		200		A
			T _J =125℃		250		
			T _J =150℃		263		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		40.6		μC
			T _J =125℃		83.9		
			T _J =150℃		93.3		



E _{rec}	Reverse Recovery Energy	I _F =600A, -diF/dt=1845A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		14.0		mJ
			T _J =125°C		28.8		
			T _J =150°C		32.2		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.053	°C/W

Internal NTC-Thermistor Characteristics

R_{25}	$T_C=25^{\circ}C$	5		k Ω
$\Delta R/R$	$T_C=100^{\circ}C$, $R_{100}=465\Omega$		± 5	%
P_{25}	$T_C=25^{\circ}C$	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		Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 30s	4500			V
L_{sCE}	Stray Inductance Module			20		nH
T_J	Maximum Junction Temperature				175	$^{\circ}C$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	$^{\circ}C$
T_{stg}	Storage Temperature		-40		+150	$^{\circ}C$
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.03	$^{\circ}C/W$
M	Power Terminals Screw:M6		3.0		6.0	N·m
M	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			330		g



Ordering Information Table

Device code	G	T	600	CH	120	T9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (600=600A)
- ④ - Circuit Configuration: Chopper (CU+CL)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

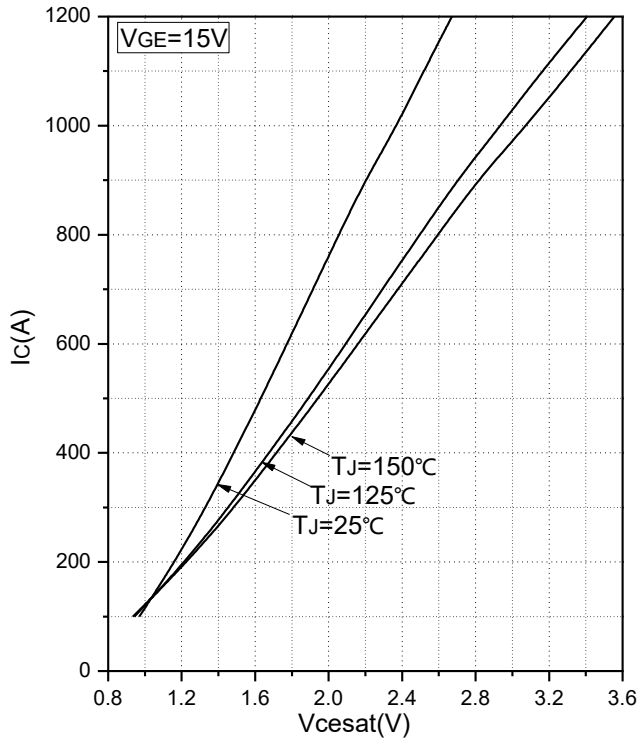


Fig.1 Typical Saturation Voltage Characteristics

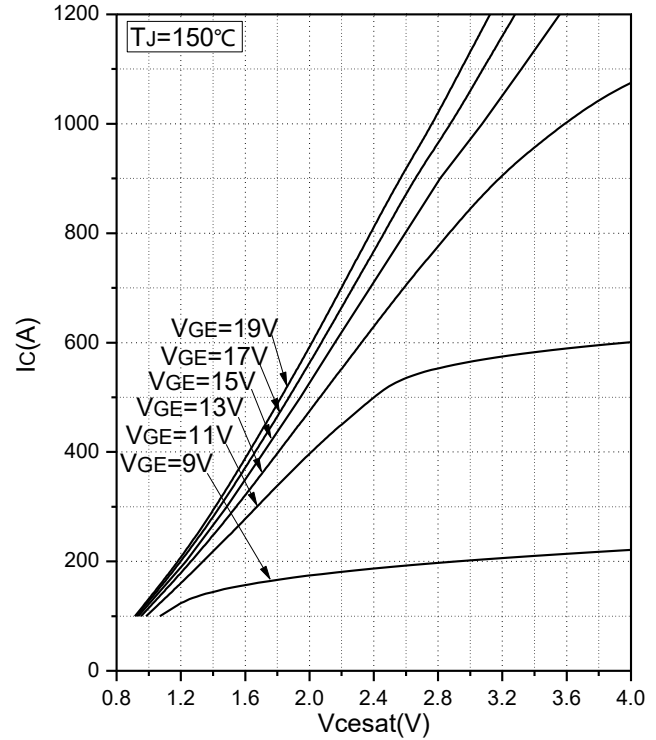


Fig.2 Typical Output Characteristics

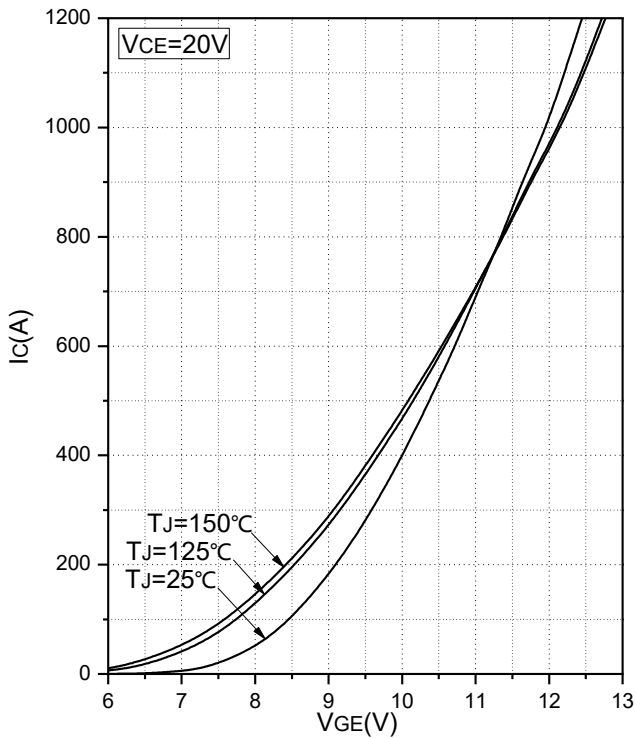


Fig.3 Transfer Characteristics

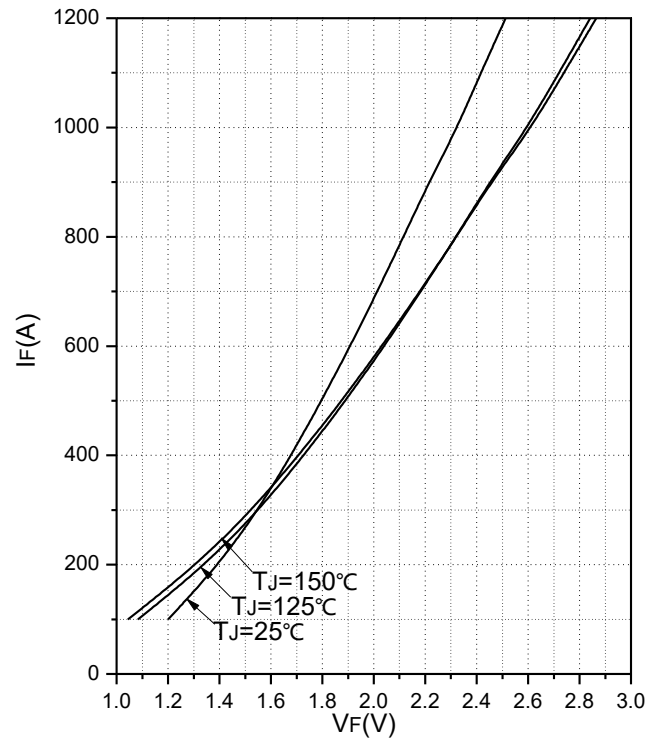


Fig.4 Forward Characteristics of Diode

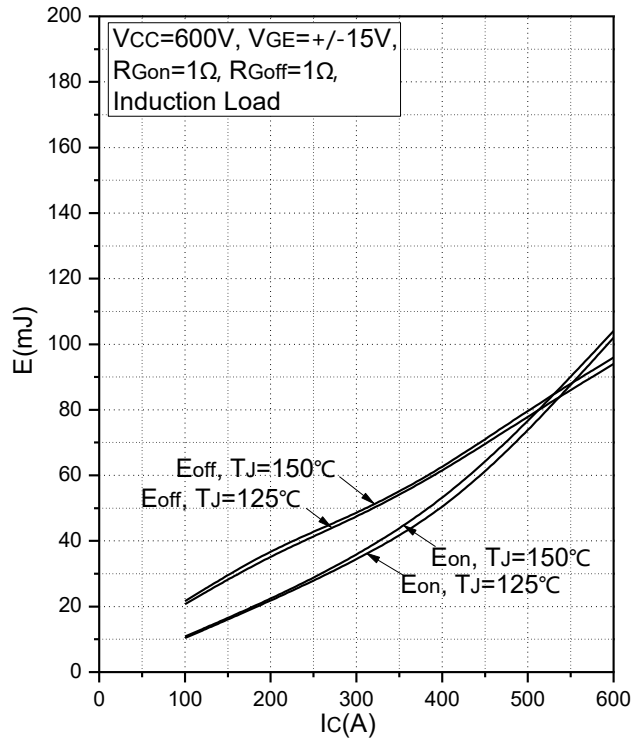


Fig.5 Typical Switching Loss vs. Collector Current

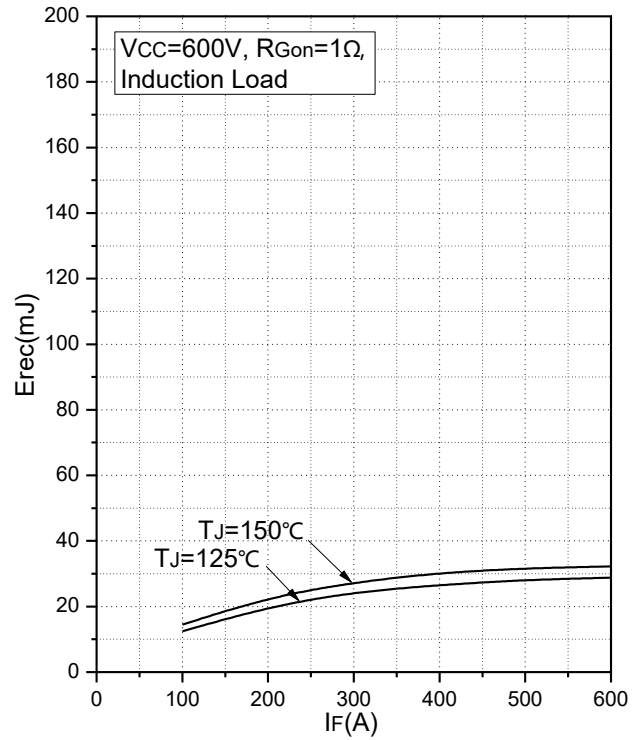


Fig.6 Typical Switching Loss vs. Forward Current

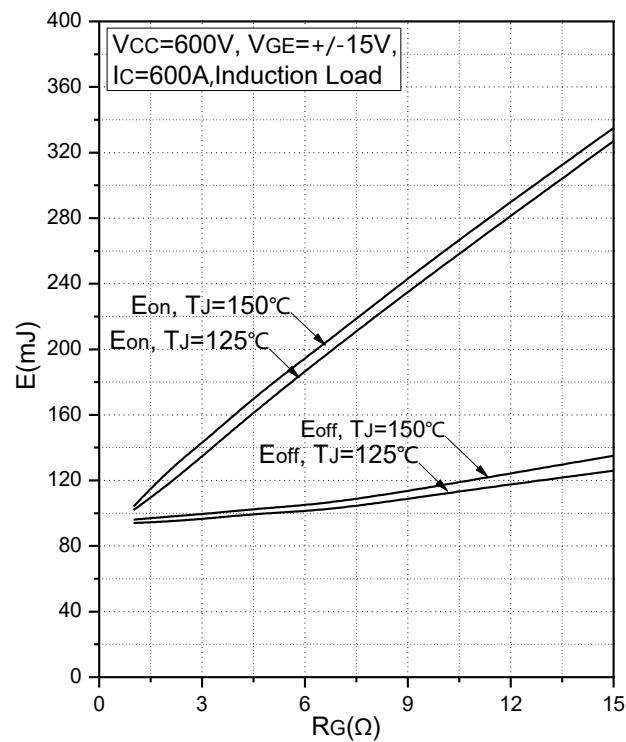


Fig.7 Typical Switching Loss vs. Gate Resistance

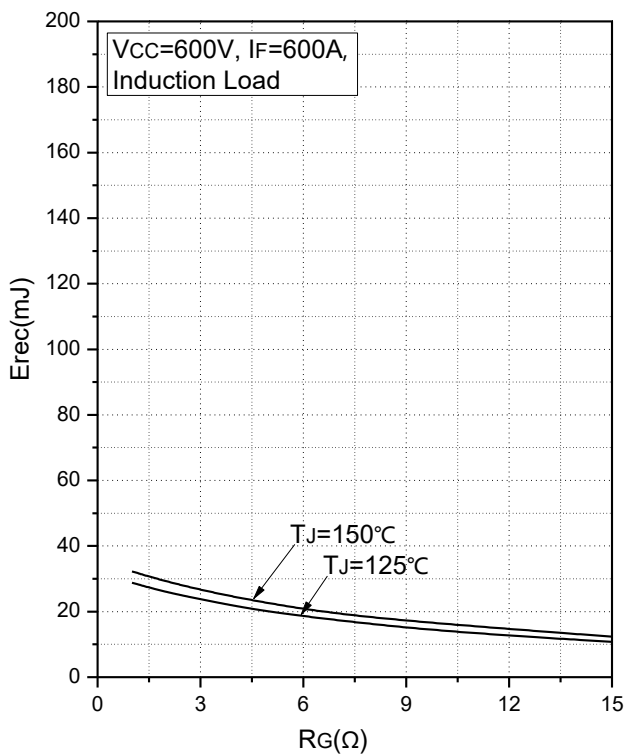


Fig.8 Typical Switching Loss vs. Gate Resistance

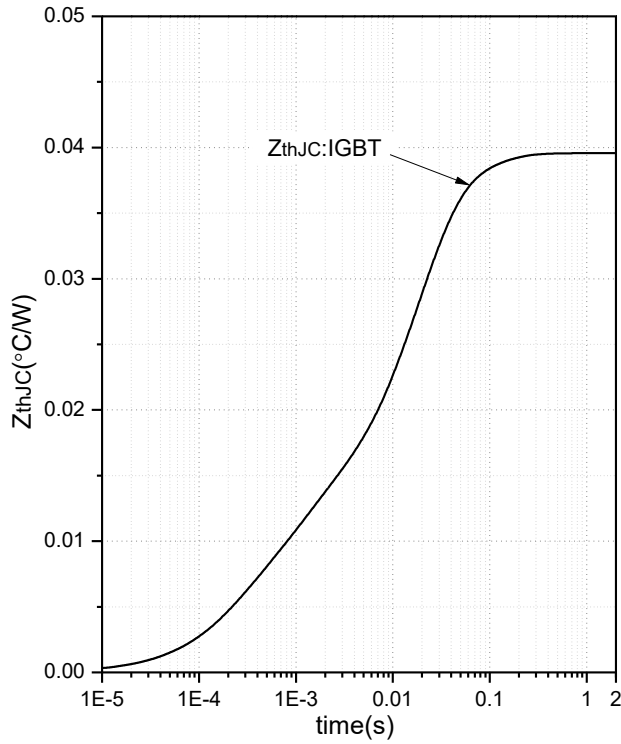


Fig.9 Transient Thermal Impedance (IGBT)

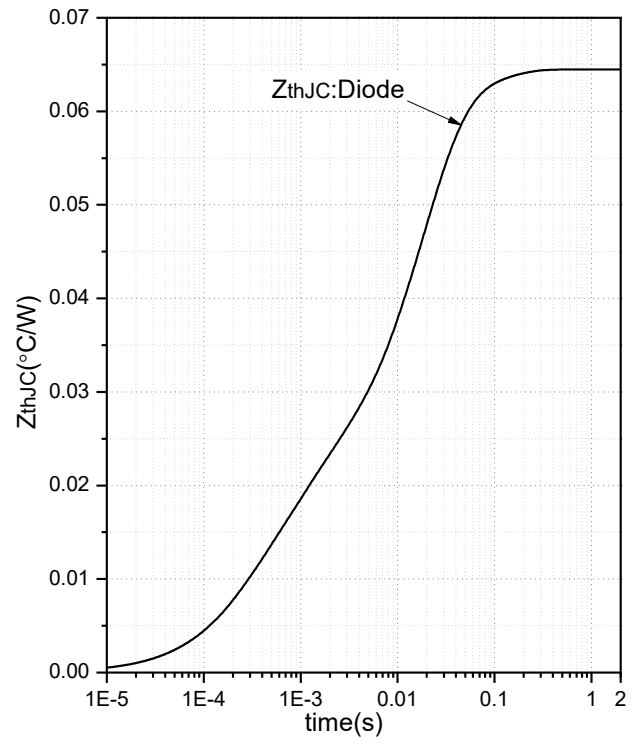


Fig.10 Transient Thermal Impedance (Diode)

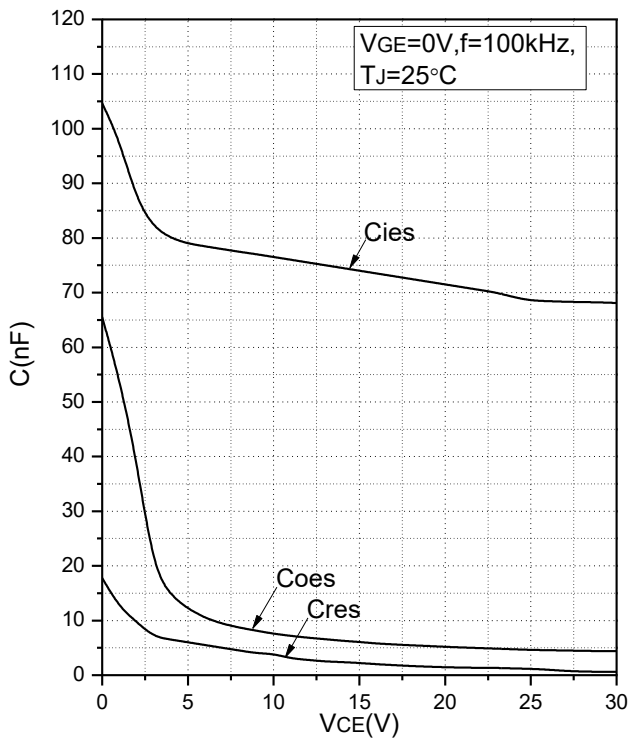


Fig.11 Capacitance Characteristics

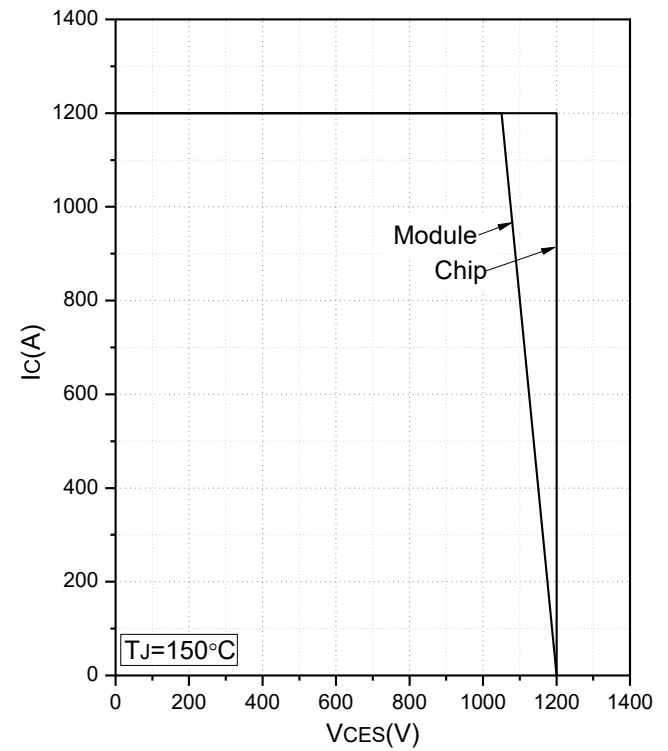


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

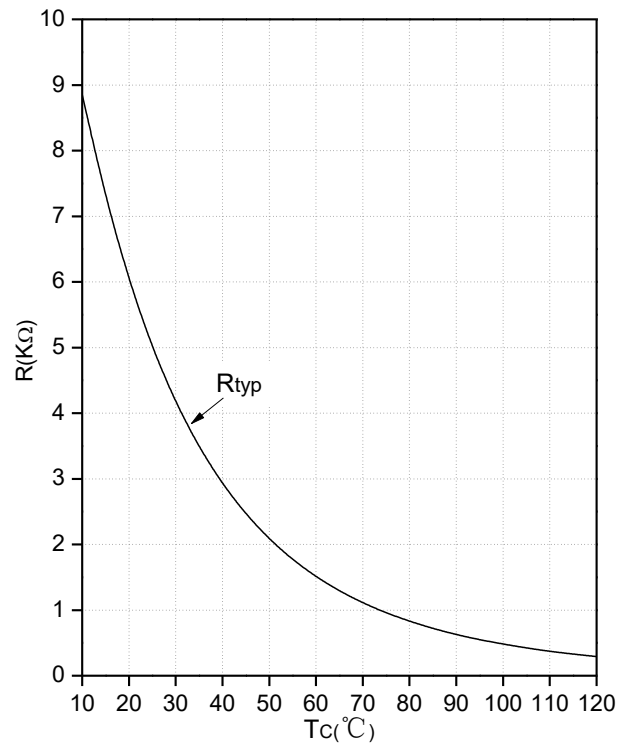
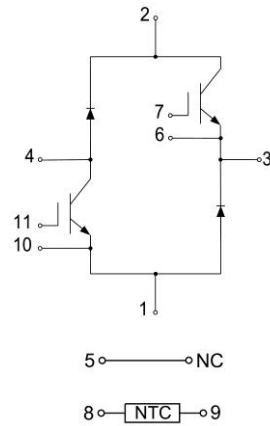


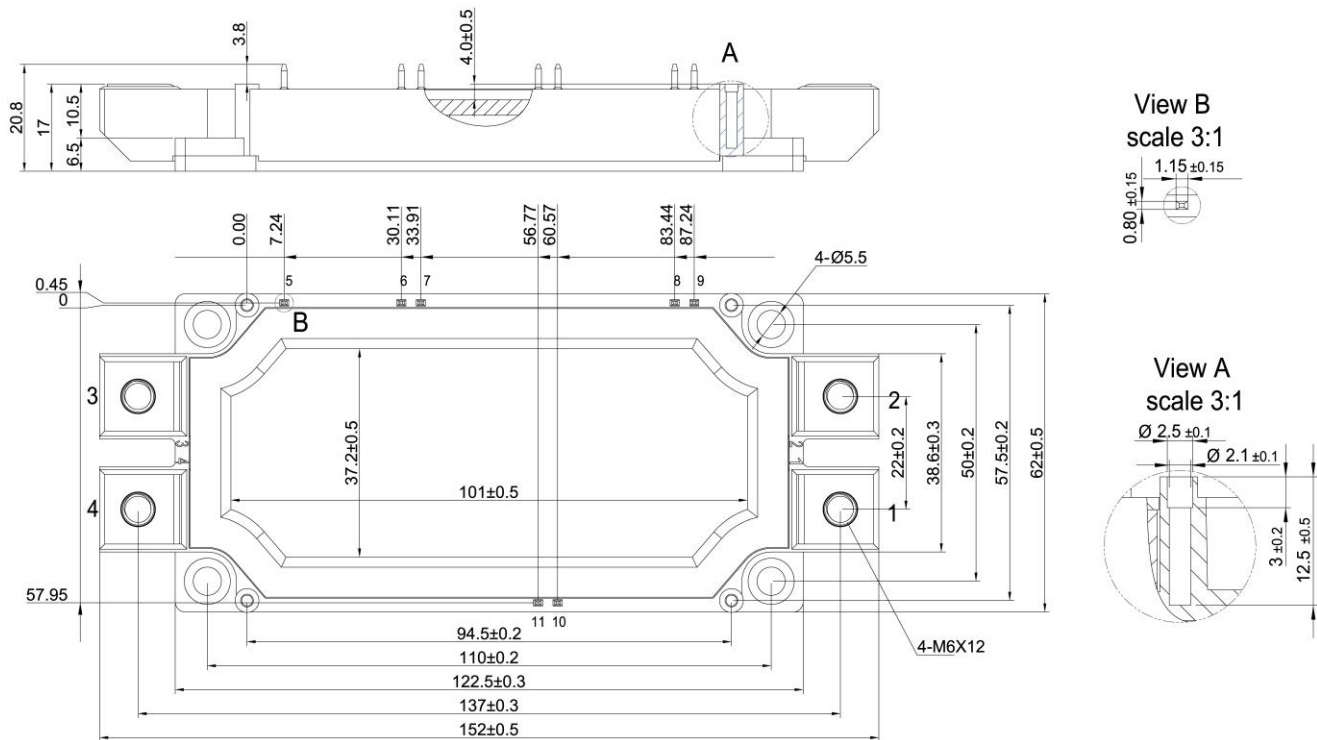
Fig.13 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
07/13/2024	A	Final Version

Announcement

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