

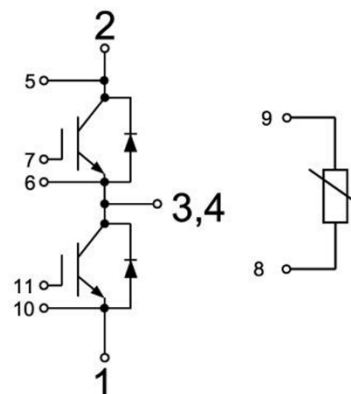
GT900HF120T9H

Circuit Diagram

IGBT Module

Features:

- $V_{CES}=1200V$ $I_C=900A$ 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:

- Motor Drives
- UPS Systems
- Hybrid and Electric Vehicle



Type	Package	Marking
GT900HF120T9H	T9	GT900HF120T9H

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}	$T_C=80^\circ C$	900	A
		$T_C=25^\circ C$	1450	A
I_{CM}	Peak Collector Current Repetitive	T_p limited by T_{Jmax}	1800	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ C, T_{Jmax}=150^\circ C$	4030	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	$I_C=34\text{mA}$, $V_{CE}=V_{GE}$	5.0	6.0	7.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=900\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.75	2.15	V
			$T_J=125^{\circ}\text{C}$	2.10		V
			$T_J=150^{\circ}\text{C}$	2.19		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		151		nF
C_{oes}	Output Capacitance			4.28		nF
C_{res}	Reverse Transfer Capacitance			1.25		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=900A,$ $R_{Gon}=0.5\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		259		ns
			$T_J=125^{\circ}C$		285		
			$T_J=150^{\circ}C$		288		
t_r	Rise Time		$T_J=25^{\circ}C$		129		ns
			$T_J=125^{\circ}C$		159		
			$T_J=150^{\circ}C$		164		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		408		ns
			$T_J=125^{\circ}C$		461		
			$T_J=150^{\circ}C$		470		
t_f	Fall Time	$T_J=25^{\circ}C$		237		ns	
		$T_J=125^{\circ}C$		369			
		$T_J=150^{\circ}C$		388			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=900A,$ $R_{Gon}=0.5\Omega, V_{GE}=\pm 15V,$ $di/dt=4300A/\mu s(T_J=150^{\circ}C)$ Inductive Load	$T_J=25^{\circ}C$		140		mJ
		$T_J=125^{\circ}C$		207			
		$T_J=150^{\circ}C$		216			

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E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =900A, R _{Goff} =0.5Ω, V _{GE} =±15V, du/dt=3600V/μs(T _J =150°C) Inductive Load	T _J =25°C		98		mJ
			T _J =125°C		129		
			T _J =150°C		135		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		11.2		uC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		1.4		Ω
T _{SC}	V _{CC} =600V, V _{GE} =±15V, T _J =150°C ^{note1}					8	us
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.031	°C/W
R _{θCS}	IGBT Thermal Resistance: Case-to-Sink (per IGBT) (per IGBT, λ _{grease} = 1 W/(m · K))				0.041		°C/W

note1: Short circuit withstand time cannot exceed 8us 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		900	A
I _{FM}	Diode Maximum Forward Current	t _p =1ms	1800	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 =900A	T _J =25°C		1.94	2.35	V
			T _J =125°C		2.16		
			T _J =150°C		2.18		
t _{rr}	Reverse Recovery Time	I _F =900A, -diF/dt=3250A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		448		ns
			T _J =125°C		590		
			T _J =150°C		632		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		225		A
			T _J =125°C		260		
			T _J =150°C		260		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		50		μC
			T _J =125°C		102		
			T _J =150°C		116		

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E _{rec}	Reverse Recovery Energy	I _F =900A, -diF/dt=3250A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		14.3		mJ
			T _J =125°C		31.5		
			T _J =150°C		36		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.057	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.075		°C/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R_{25}	$T_C=25^{\circ}C$		5		k Ω
$\Delta R/R$	$T_C=100^{\circ}C$, $R_{100}=465\Omega$	-5		+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	Conditions	Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s	2500			V
T_J	Maximum Junction Temperature		-40		150	$^{\circ}C$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		150	$^{\circ}C$
T_{stg}	Storage Temperature		-40		125	$^{\circ}C$
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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IGBT Module Datasheet



Ordering Information Table

Device code

G	T	900	HF	120	T9	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (900=900A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Characteristic diagram

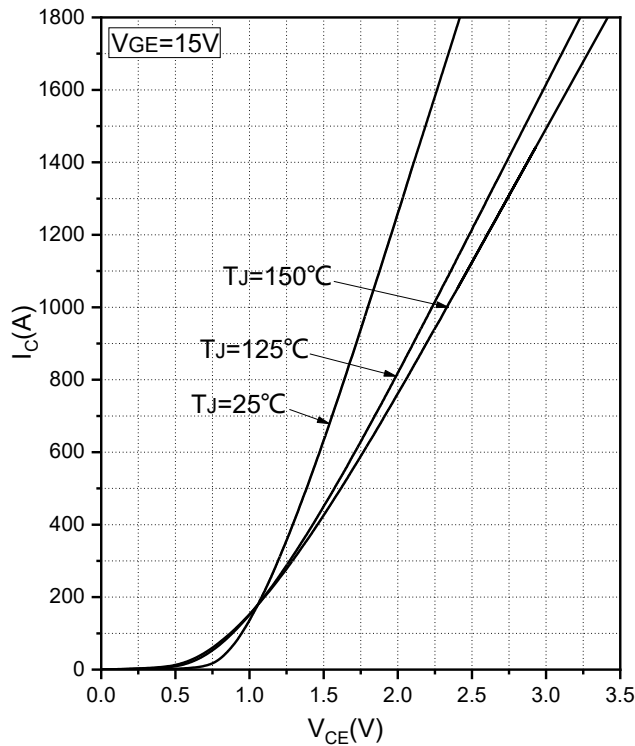


Fig.1 Typical Saturation Voltage Characteristics

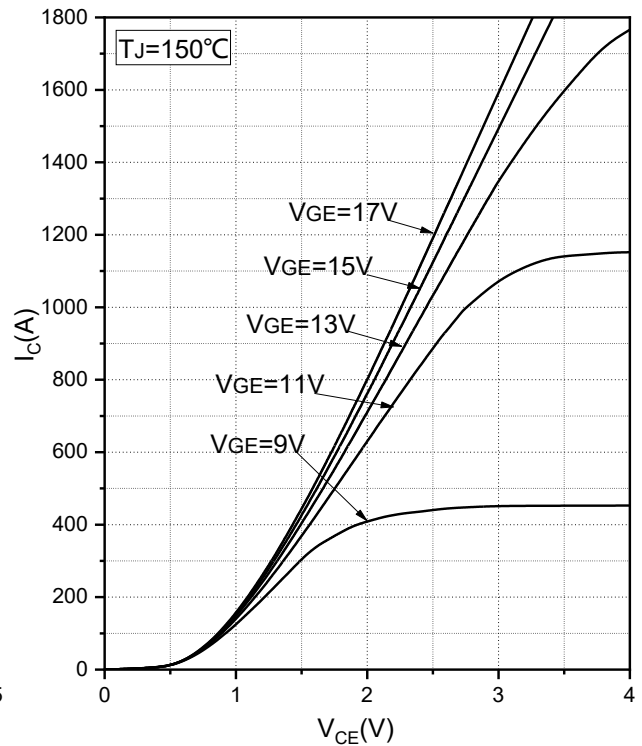


Fig.2 Typical Output Characteristics

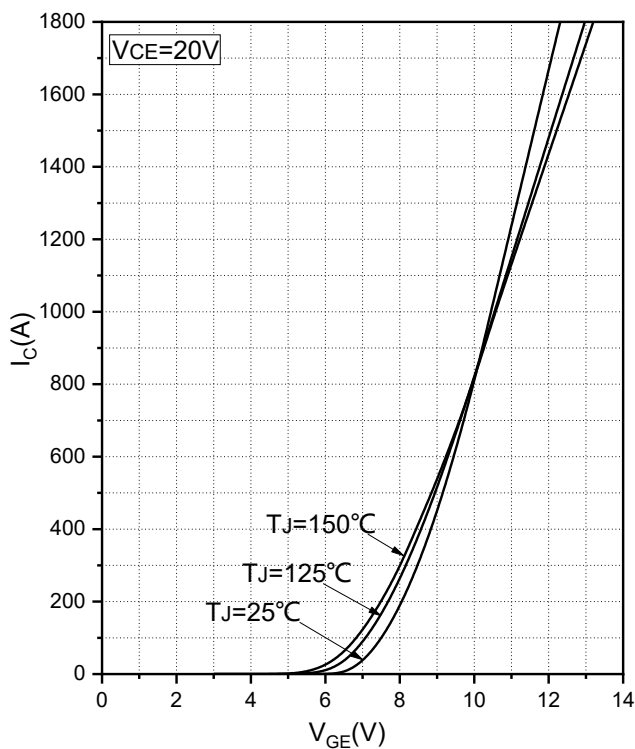


Fig.3 Transfer Characteristic

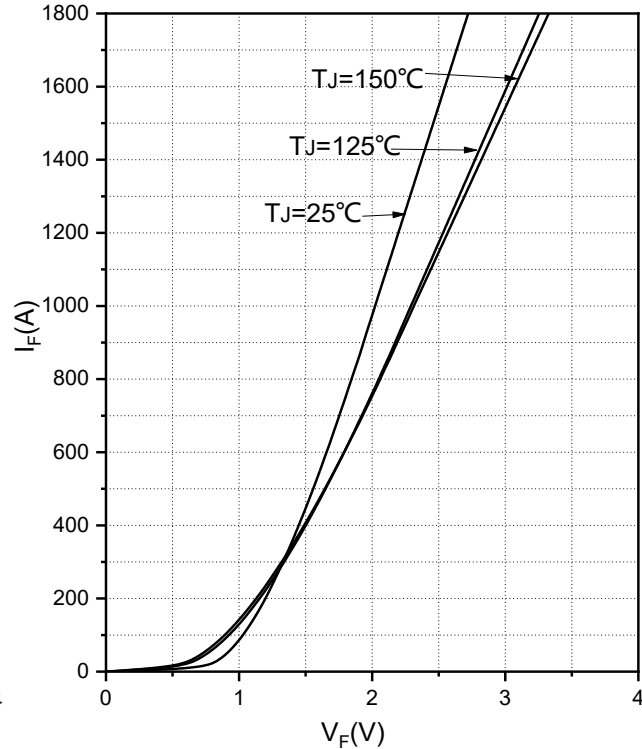


Fig.4 Forward Characteristics of Diode

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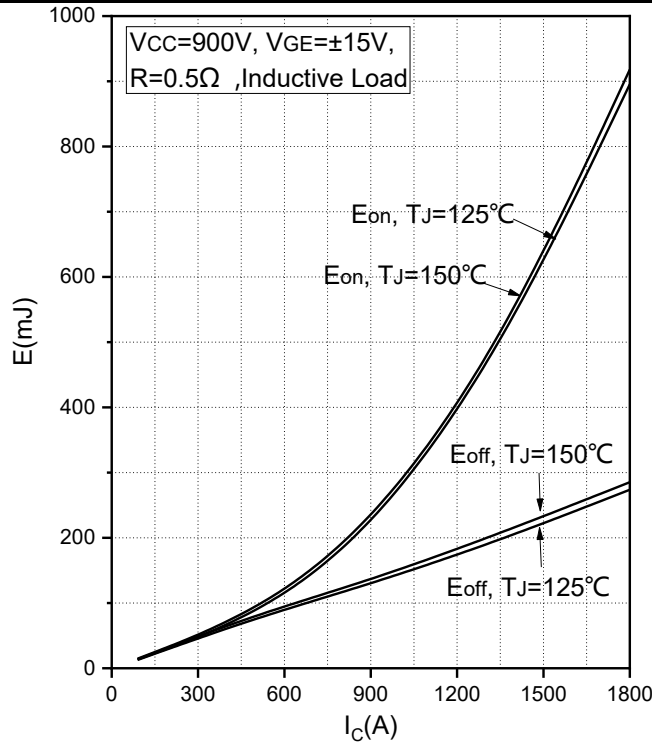


Fig.5 Typical Switching Loss vs. Collector Current

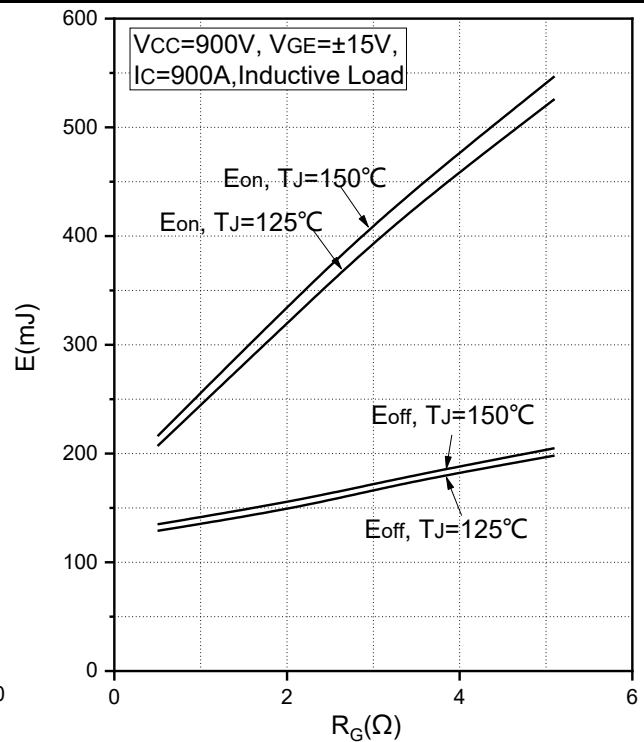


Fig.6 Typical Switching Loss vs. Gate Resistance

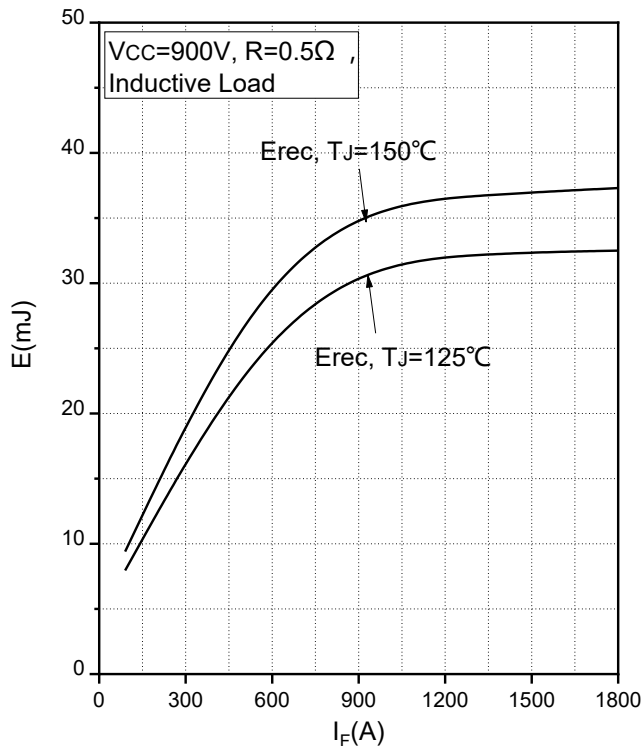


Fig.7 Typical Switching Loss vs. Forward Current

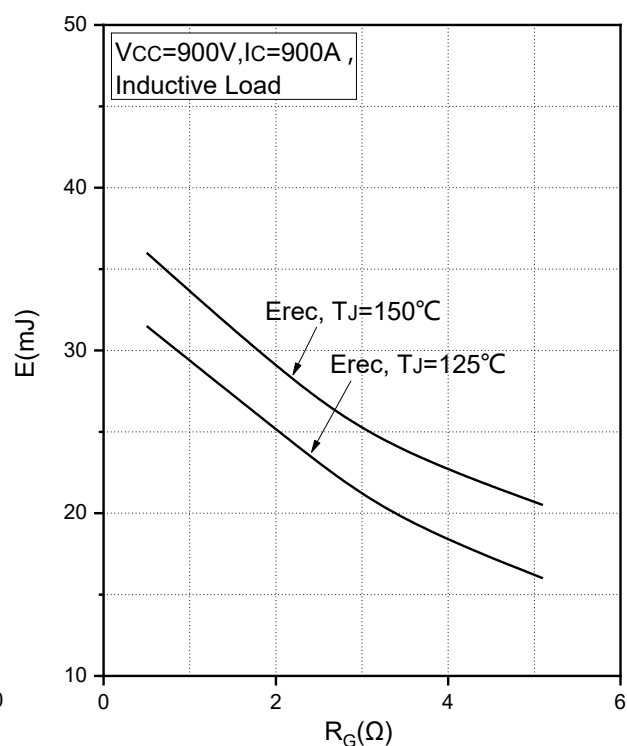


Fig.8 Typical Switching Loss vs. Gate Resistance

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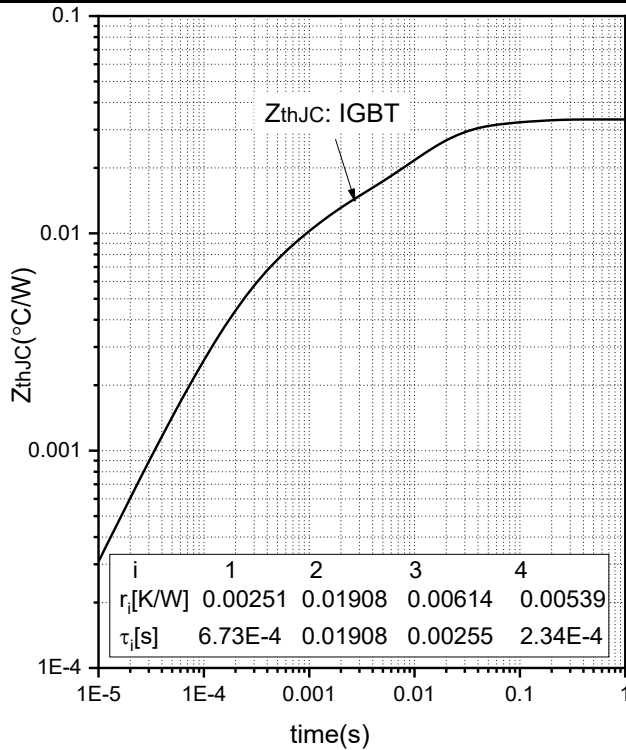


Fig.9 Transient Thermal Impedance (IGBT)

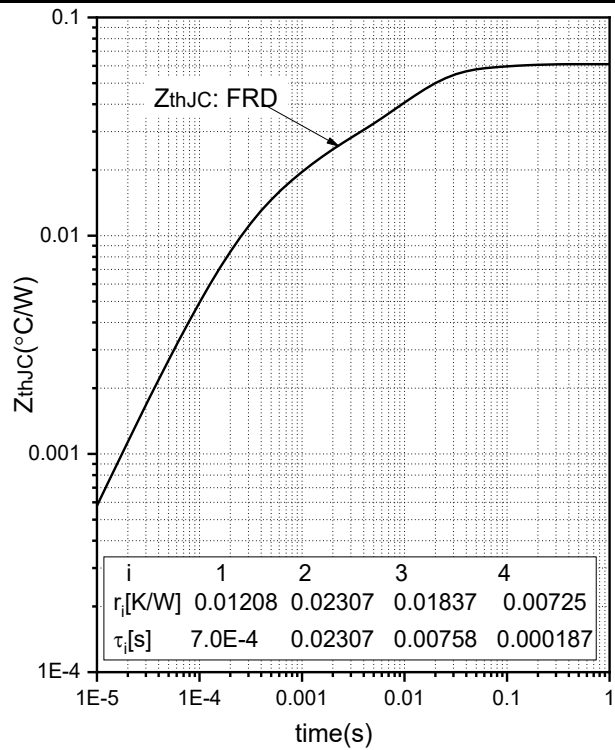


Fig.10 Transient Thermal Impedance (Diode)

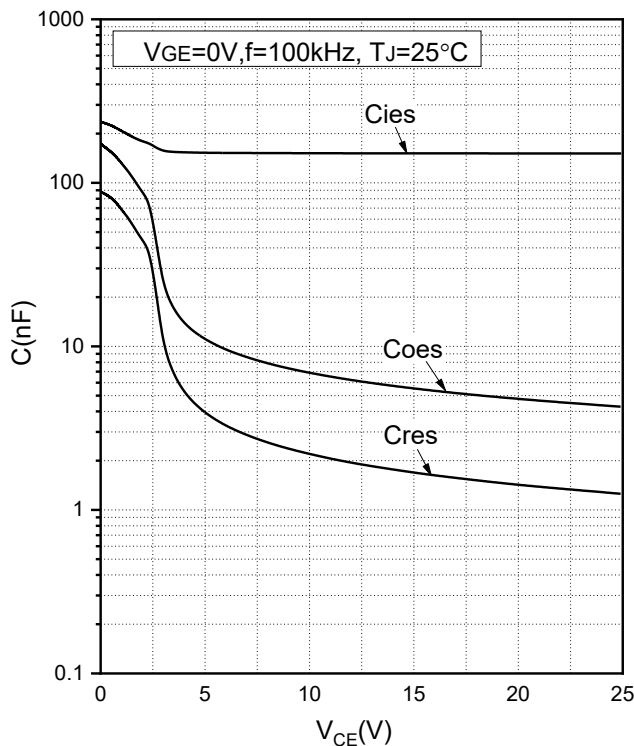


Fig.11 Capacitance Characteristics

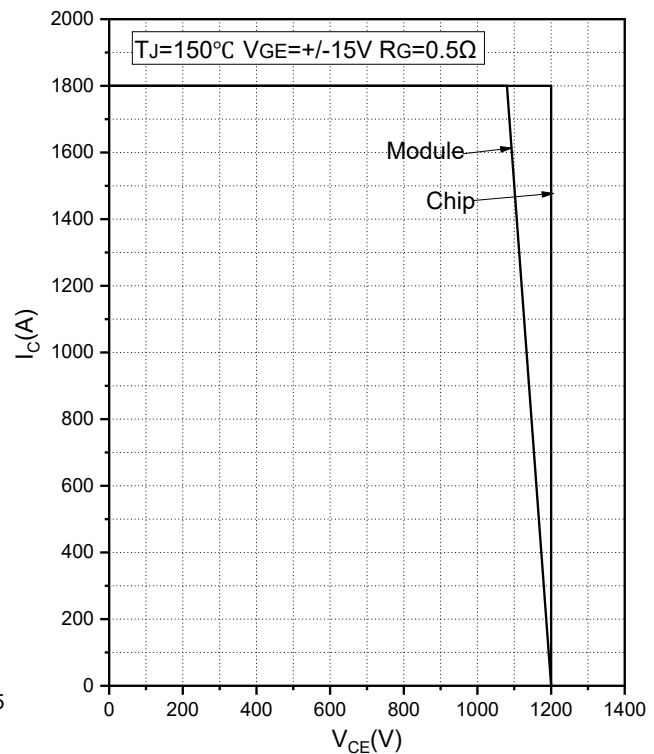


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

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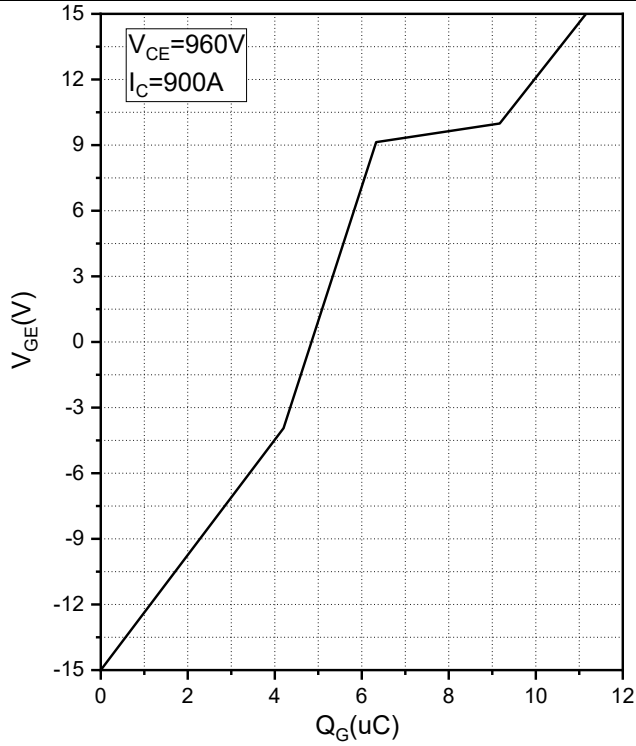


Fig.13 Gate Charge Characteristics

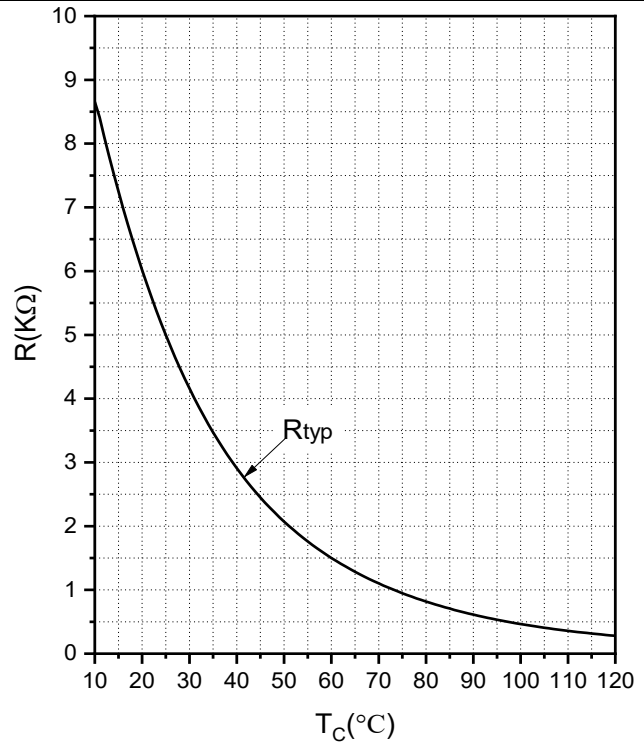


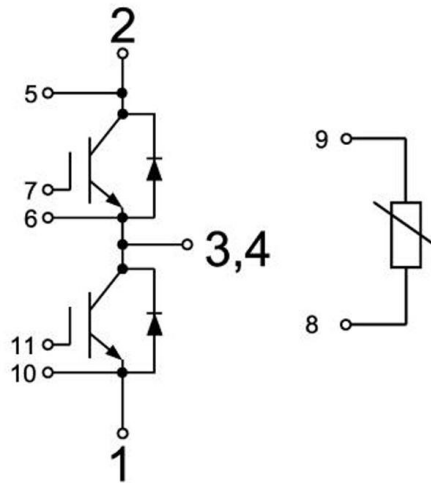
Fig.14 NTC Temperature Characteristics

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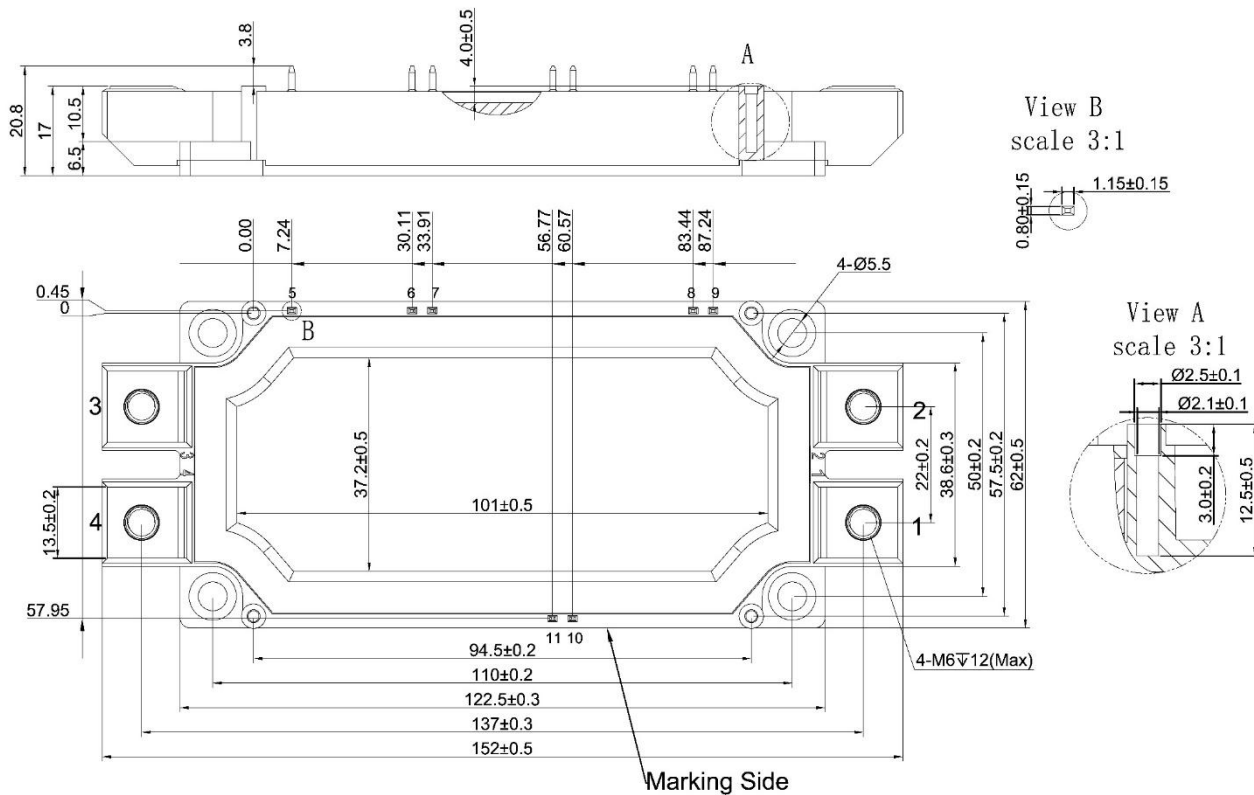
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Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
02	Engineering Sample Datasheet

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