

GT300HF120T9H

IGBT Module

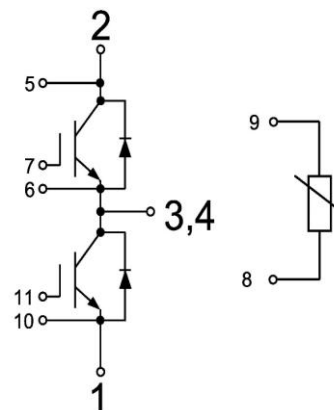
Features:

- $V_{CES}=1200V$ $I_C=300A$ 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
- Servo Drives
- UPS Systems
- Wind Turbines

Circuit Diagram



Type	Package	Marking
GT300HF120T9H	T9	GT300HF120T9H

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}	$T_C=90^\circ C$	300	A
		$T_C=25^\circ C$	600	A
I_{CM}	Peak Collector Current Repetitive	t_p limited by T_{JMax}	600	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ C, T_{JMax}=150^\circ C$	1600	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	$I_C=11.5\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=300\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	2.10	2.50	V
			$T_J=125^\circ\text{C}$	2.88		V
			$T_J=150^\circ\text{C}$	3.02		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		34.05		nF
C_{oes}	Output Capacitance			1.60		nF
C_{res}	Reverse Transfer Capacitance			0.03		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =300A, R _{Gon} =1Ω, V _{GE} =±15V, Inductive Load	T _J =25°C		134		ns
			T _J =125°C		149		
			T _J =150°C		152		
t _r	Rise Time		T _J =25°C		35		ns
			T _J =125°C		40		
			T _J =150°C		42		
t _{d(off)}	Turn-off Delay Time		T _J =25°C		183		ns
			T _J =125°C		211		
			T _J =150°C		217		
t _f	Fall Time	T _J =25°C		49		ns	
		T _J =125°C		67			
		T _J =150°C		72			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =300A, R _{Gon} =1Ω, V _{GE} =±15V, di/dt=5700A/μs(T _J =150°C) Inductive Load	T _J =25°C		13.5		mJ
		T _J =125°C		22.0			
		T _J =150°C		24.1			

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E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =300A, R _{Goff} =1Ω, V _{GE} =±15V, du/dt=9200V/μs(T _J =150°C) Inductive Load	T _J =25°C		10.8		mJ
			T _J =125°C		13.5		
			T _J =150°C		14.6		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		1.92		uC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		1.9		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)					0.078	°C/W
R _{θCS}	IGBT Thermal Resistance: Case-to-Sink (per IGBT) (per IGBT, λ _{grease} = 1 W/(m · K))				0.039		°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		300	A
I _{FM}	Diode Maximum Forward Current	T _p =1ms	600	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 =300A	T _J =25°C		1.78	2.20	V
			T _J =125°C		1.93		
			T _J =150°C		1.93		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=7300A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		240		ns
			T _J =125°C		367		
			T _J =150°C		415		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		308		A
			T _J =125°C		316		
			T _J =150°C		320		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		25.7		μC
			T _J =125°C		39.9		
			T _J =150°C		44.5		

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E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt=7300A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		10.3		mJ
			T _J =125°C		16.4		
			T _J =150°C		18.5		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.163	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.082		°C/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R_{25}	$T_C=25^{\circ}C$		5		$k\Omega$
$\Delta R/R$	$T_C=100^{\circ}C$, $R_{100}=465\Omega$	-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		Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s	2500			V
T_{JMax}	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			
M	Power Terminals Screw:M6		4.0		5.0	N·m
M	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			330		g



Ordering Information Table

Device code	G	T	300	HF	120	T9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (300=300A)
- ④ - Circuit Configuration HF(Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

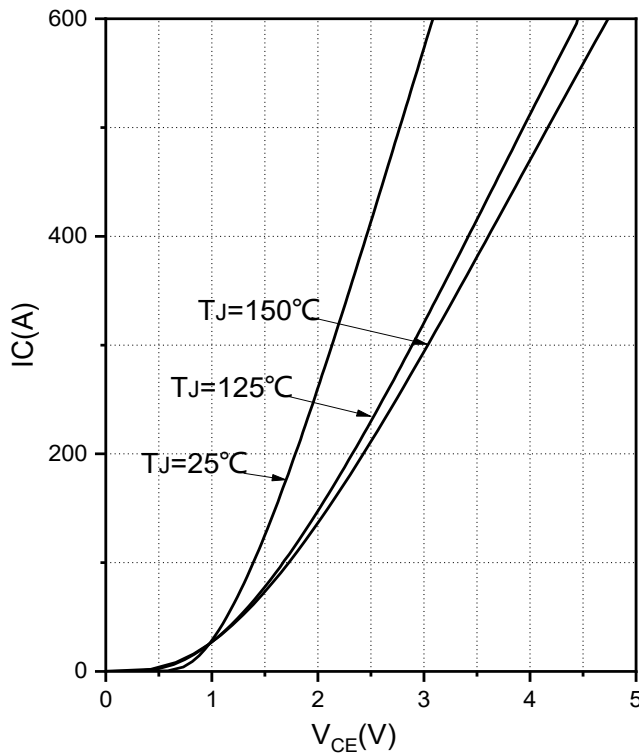


Fig.1 Typical Saturation Voltage Characteristics

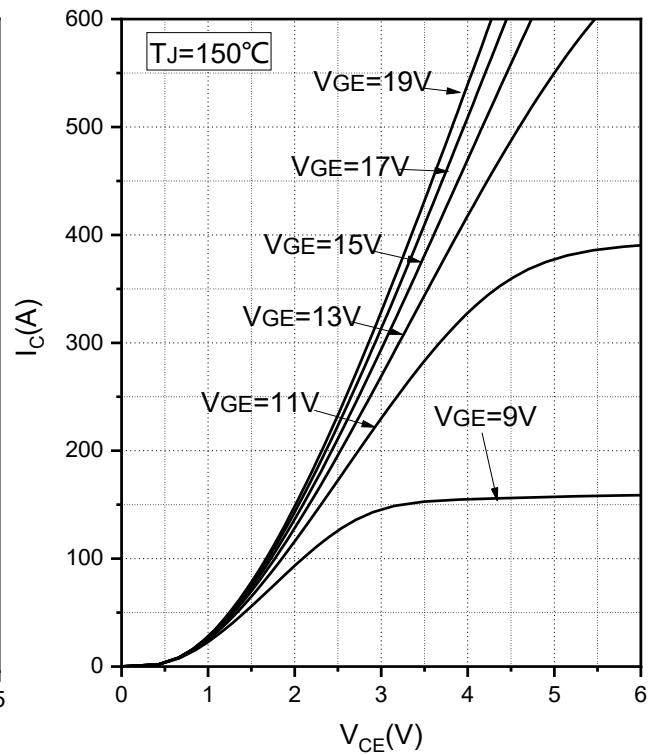


Fig.2 Typical Output Characteristics

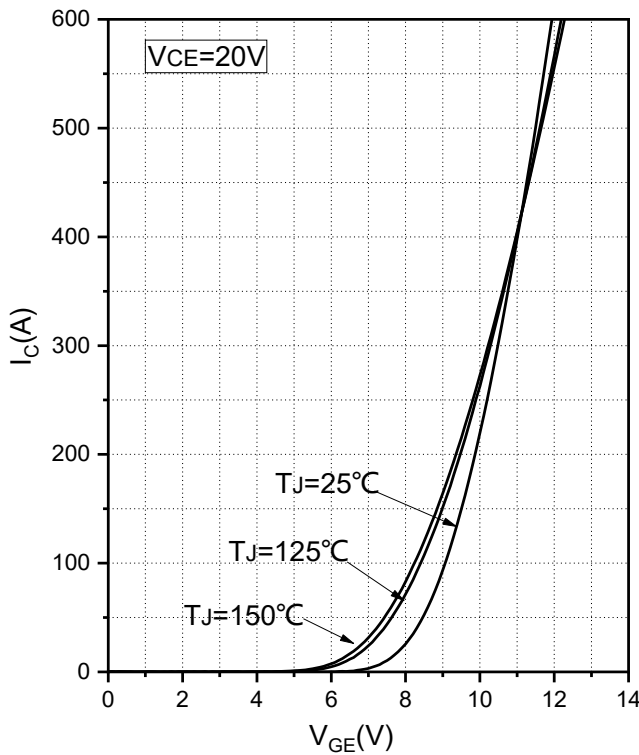


Fig.3 Transfer Characteristic

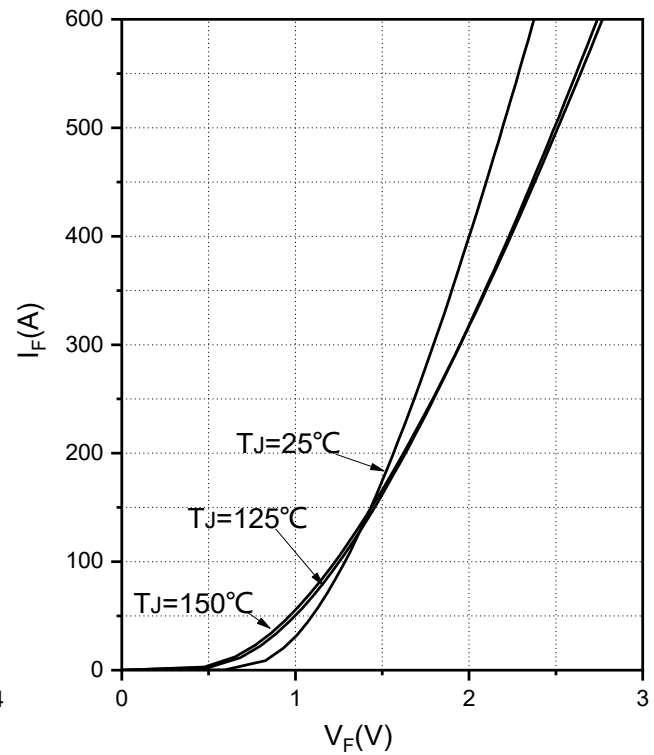


Fig.4 Forward Characteristics of Diode

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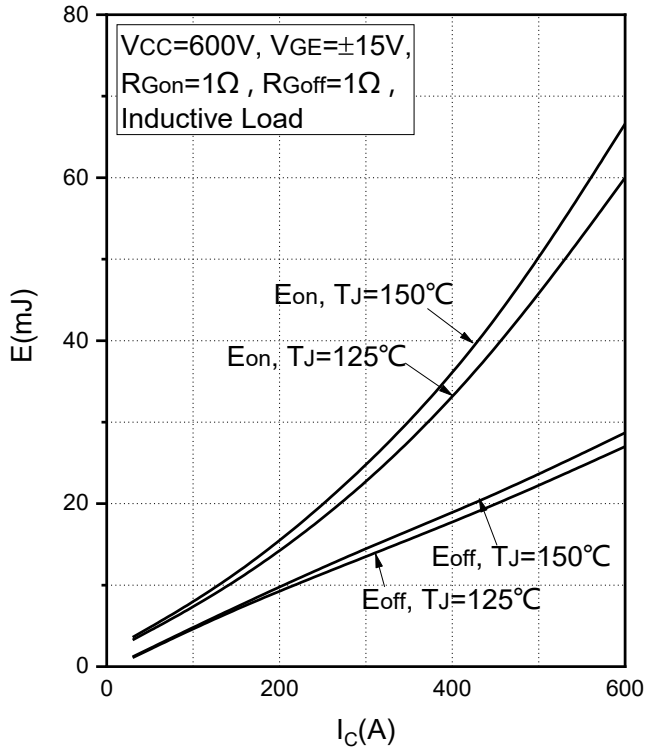


Fig.5 Typical Switching Loss vs. Collector Current

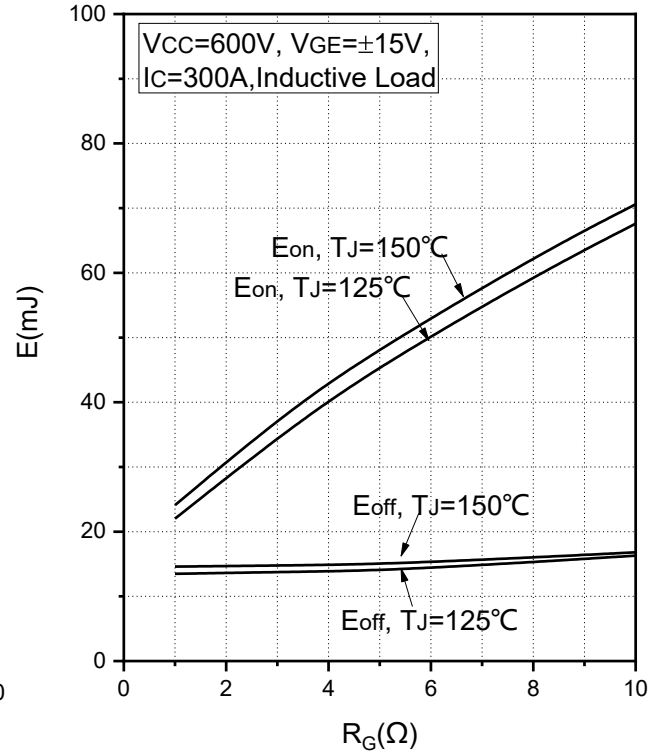


Fig.6 Typical Switching Loss vs. Gate Resistance

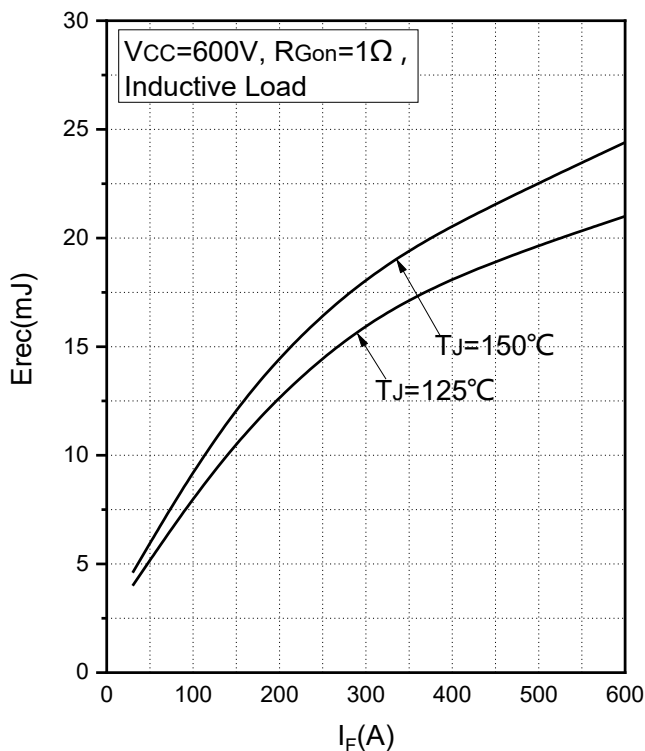


Fig.7 Typical Switching Loss vs. Forward Current

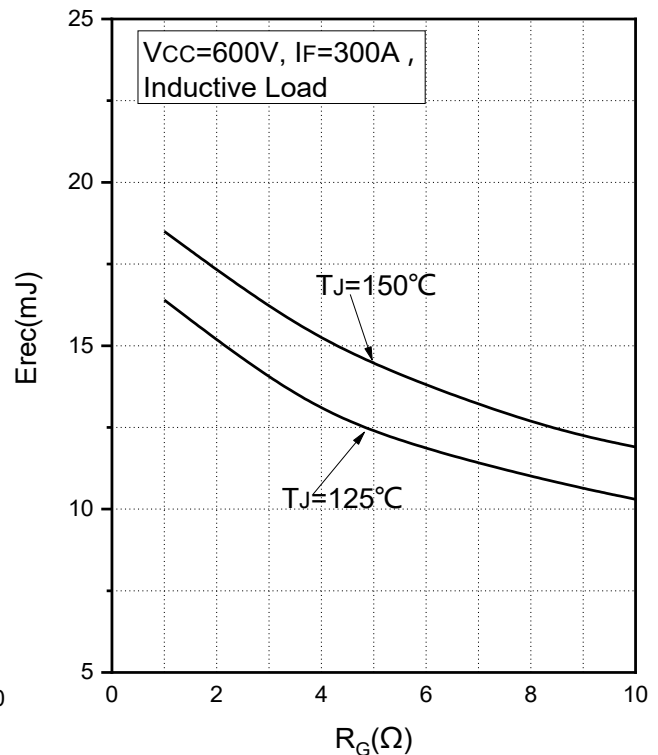


Fig.8 Typical Switching Loss vs. Gate Resistance

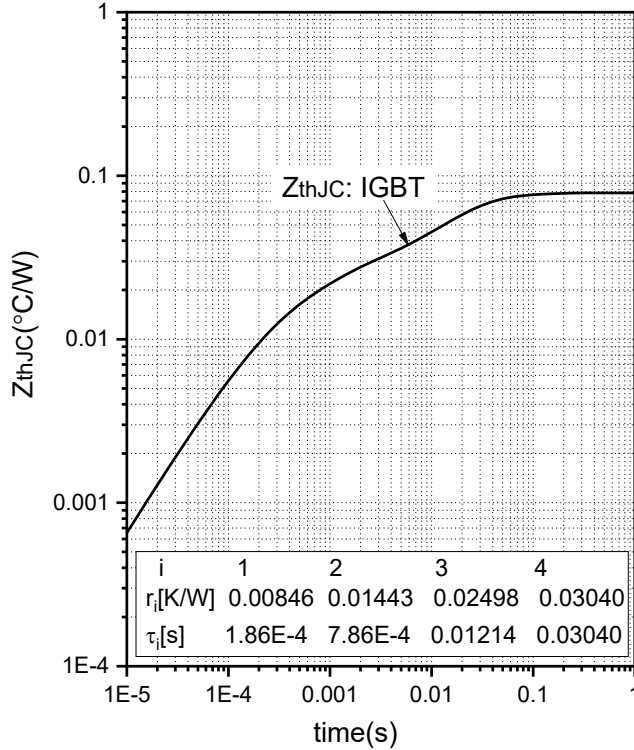


Fig.9 Transient Thermal Impedance (IGBT)

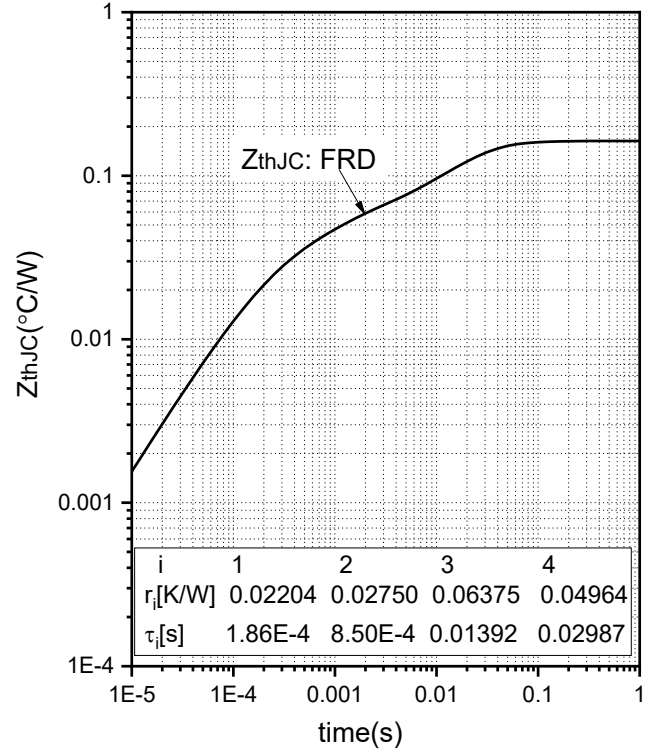


Fig.10 Transient Thermal Impedance

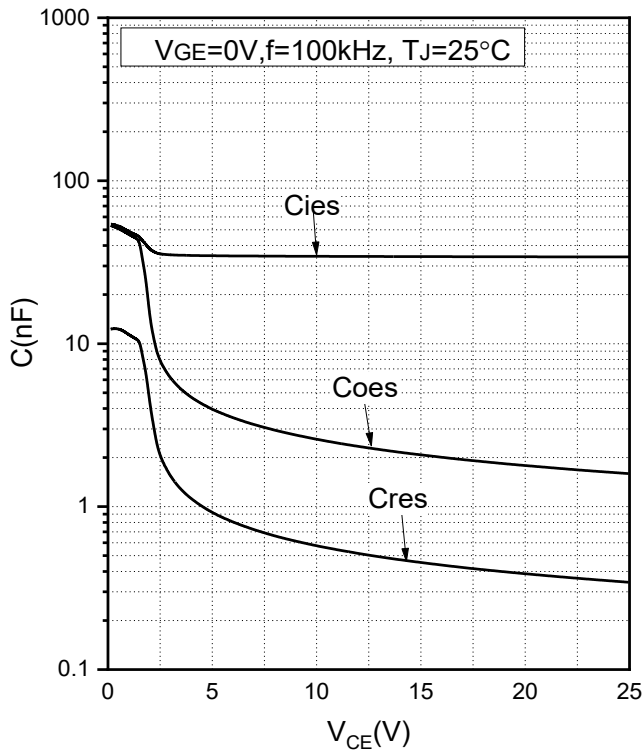


Fig.11 Capacitance Characteristics

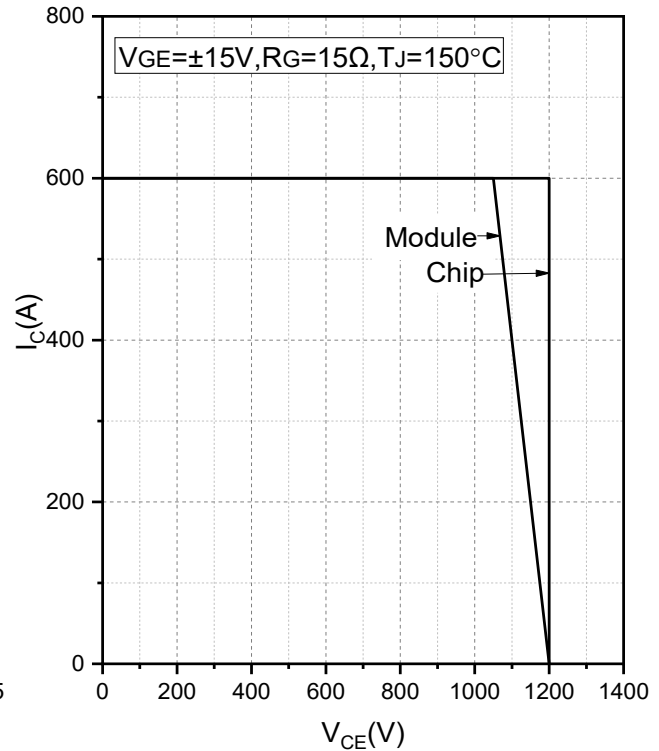


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

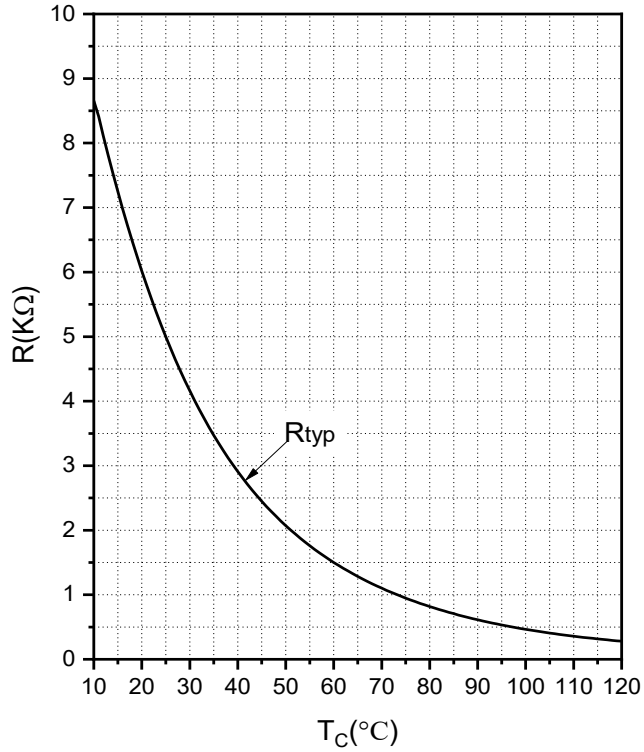


Fig.13 NTC Temperature Characteristics

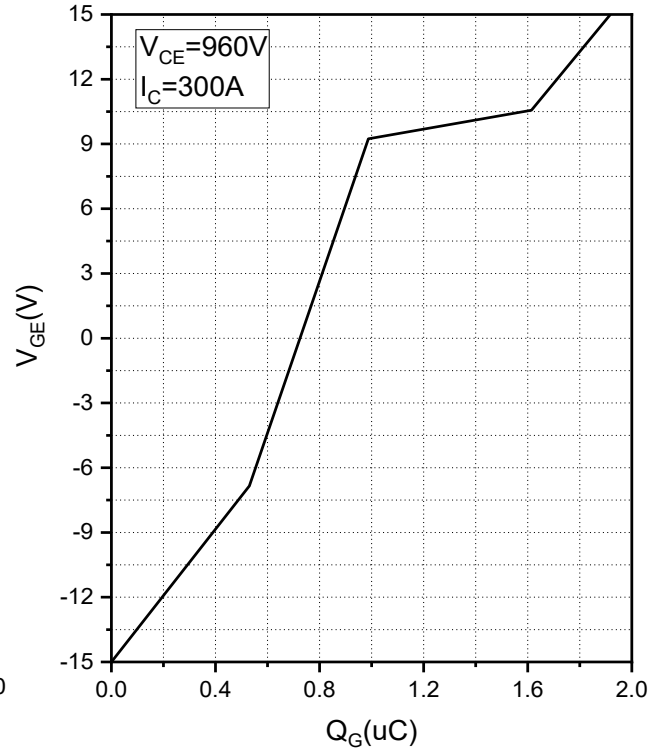


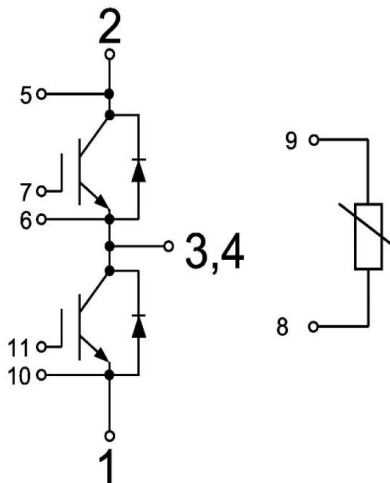
Fig.14 Gate Charge Characteristics

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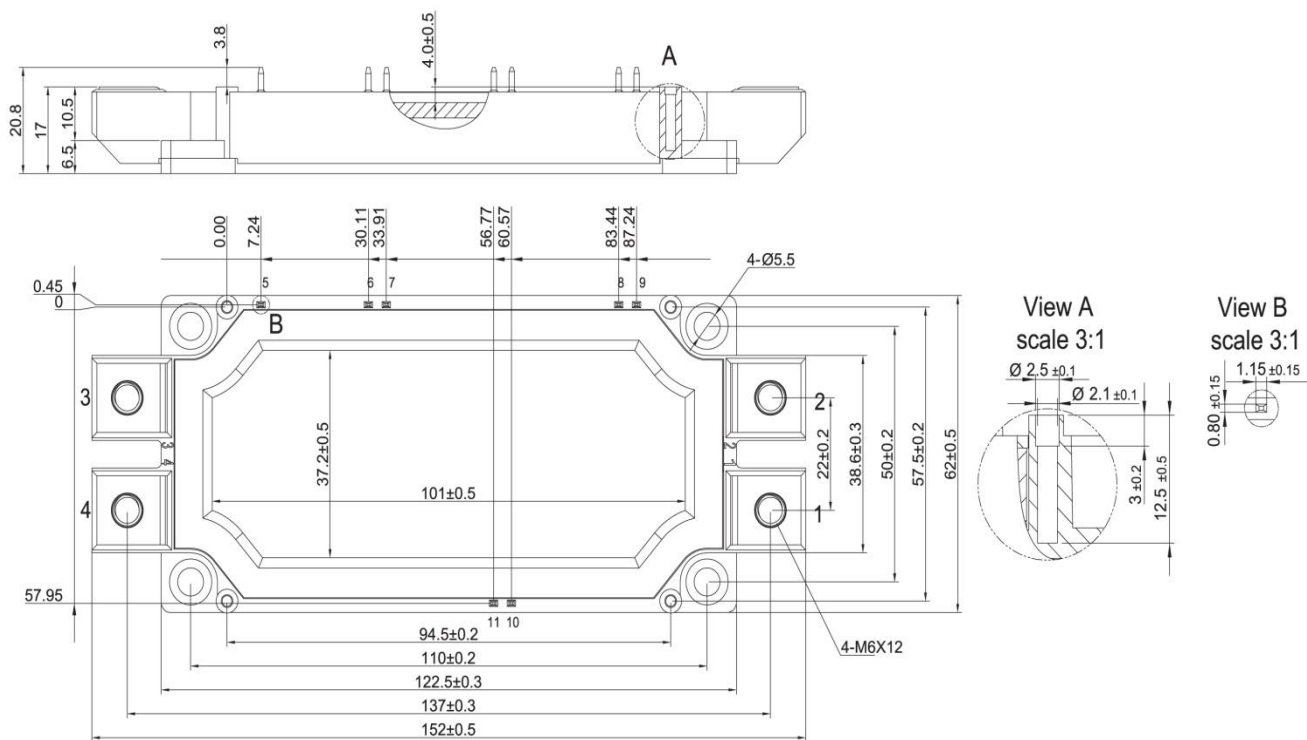
IGBT Module Datasheet



Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
02	Engineering Sample Datasheet

Announcement

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