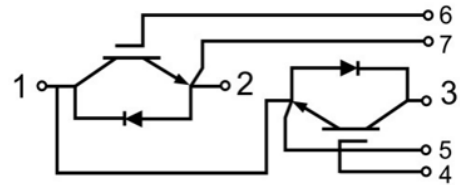


Circuit Diagram

IGBT Module

Features:

- $V_{CES}=1200V$ $I_C=150A$ 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:

- High Power Converters
- Industrial Motor Drives
- UPS Systems

Type	Package	Marking
GT150HF120T1NH	T1N	GT150HF120T1NH

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}	$T_C=90^\circ C$	150	A
		$T_C=25^\circ C$	300	A
I_{CM}	Peak Collector Current Repetitive	T_p limited by T_{Jmax}	300	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ C, T_{Jmax}=175^\circ C$	950	W

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IGBT Module Datasheet



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	$I_C=5.7\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	1.62	2.00	V
			$T_J=125^\circ\text{C}$	1.99		V
			$T_J=175^\circ\text{C}$	2.13		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^\circ\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		16.8		nF
C_{oes}	Output Capacitance			0.74		nF
C_{res}	Reverse Transfer Capacitance			0.17		nF

Switching Characteristics

$t_{d(ON)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=150A,$ $R_{Gon}=3.3\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		170		ns
			$T_J=125^{\circ}C$		181		
			$T_J=175^{\circ}C$		183		
t_r	Rise Time		$T_J=25^{\circ}C$		36		ns
			$T_J=125^{\circ}C$		41.6		
			$T_J=175^{\circ}C$		47.6		
$t_{d(OFF)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=150A,$ $R_{Goff}=3.3\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		244		ns
			$T_J=125^{\circ}C$		278		
			$T_J=175^{\circ}C$		295		
t_f	Fall Time		$T_J=25^{\circ}C$		240		ns
			$T_J=125^{\circ}C$		274		
			$T_J=175^{\circ}C$		293		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=150A,$ $R_{Gon}=3.3\Omega, V_{GE}=\pm 15V,$ $di/dt=2500A/\mu s(T_J=175^{\circ}C)$ Inductive Load	$T_J=25^{\circ}C$		8.8		mJ
			$T_J=125^{\circ}C$		12.8		
			$T_J=175^{\circ}C$		15.8		

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IGBT Module Datasheet



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =150A, R _{Goff} =3.3Ω, V _{GE} =±15V, du/dt=5300V/μs(T _J =150°C) Inductive Load	T _J =25°C		11.0		mJ
			T _J =125°C		13.5		
			T _J =175°C		14.7		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		960		nC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		4.5		Ω
T _{SC}	V _{CC} =600V, V _{GE} =±15V, T _J =175°C ^{note1}					10	us
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.157	°C/W
R _{θCS}	IGBT Thermal Resistance: Case-to-Sink (per IGBT) (per IGBT, λ _{grease} = 1 W/(m · K))				0.090		°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		150	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	300	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 =150A	T _J =25°C		1.68	2.10	V
			T _J =125°C		1.80		
			T _J =175°C		1.78		
t _{rr}	Reverse Recovery Time	I _F =150A, -diF/dt=3400A/μs(T _J =175°C), V _R =600V, V _{GE} =-15V	T _J =25°C		267		ns
			T _J =125°C		416		
			T _J =175°C		514		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		172		A
			T _J =125°C		172		
			T _J =175°C		172		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		13.2		μC
			T _J =125°C		21.9		
			T _J =175°C		26.6		

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IGBT Module Datasheet



E _{rec}	Reverse Recovery Energy	I _F =150A, -diF/dt=3400A/μs(T _J =175°C), V _R =600V, V _{GE} =-15V	T _J =25°C		5.2		mJ
			T _J =125°C		9.0		
			T _J =175°C		10.9		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.326	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.187		°C/W

Module

Symbol	Description	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s		2500	V
T _J	Maximum Junction Temperature	-40		175	°C
T _{JOP}	Maximum Operating Junction Temperature Range ^{note2}	-40		150	°C
T _{stg}	Storage Temperature	-40		125	°C
CTI	Comparative Tracking Index	200			
T	Power Terminals Screw:M5	3		5	N·m
T	Mounting Screw:M6	4		6	N·m
G	Weight		150		g

note2: T_{JOP}> 150°C is only allowed for operation at overload conditions.

Ordering Information Table

Device code	G	T	150	HF	120	T1N	H
	①	②	③	④	⑤	⑥	⑦

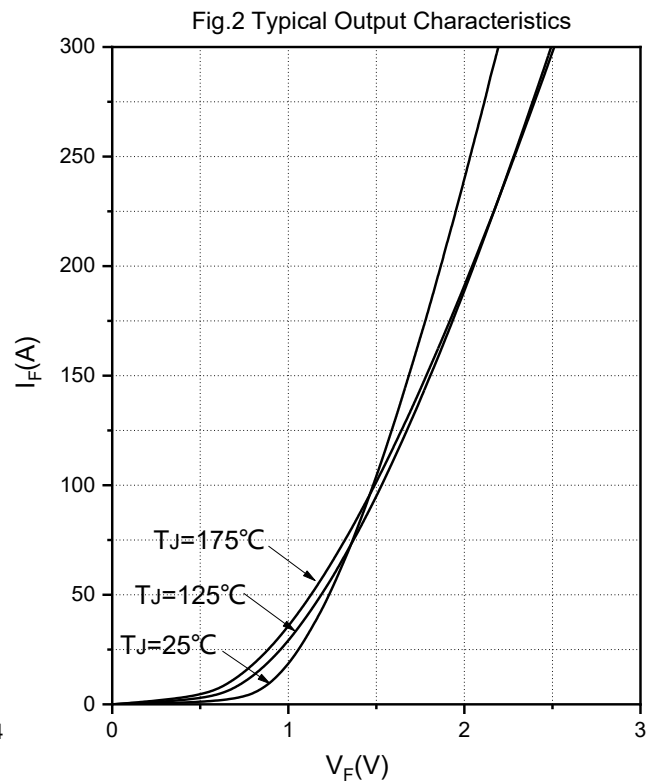
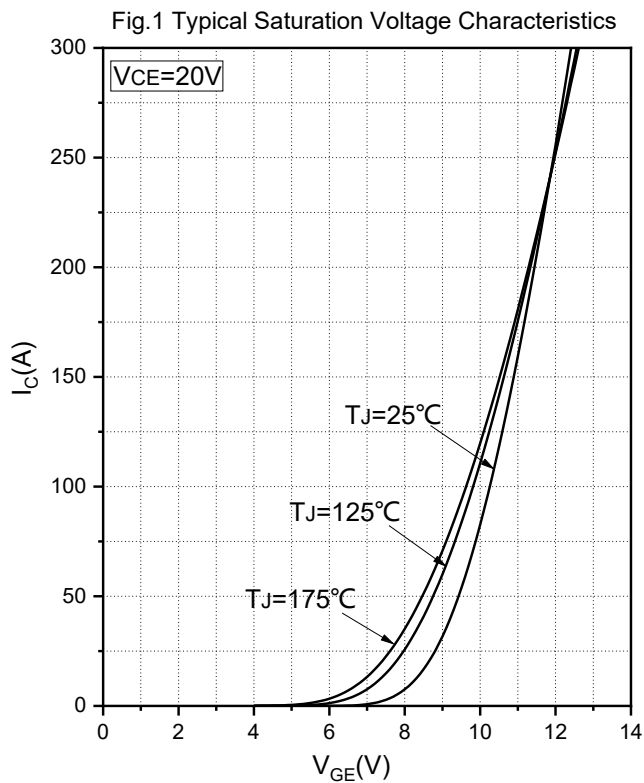
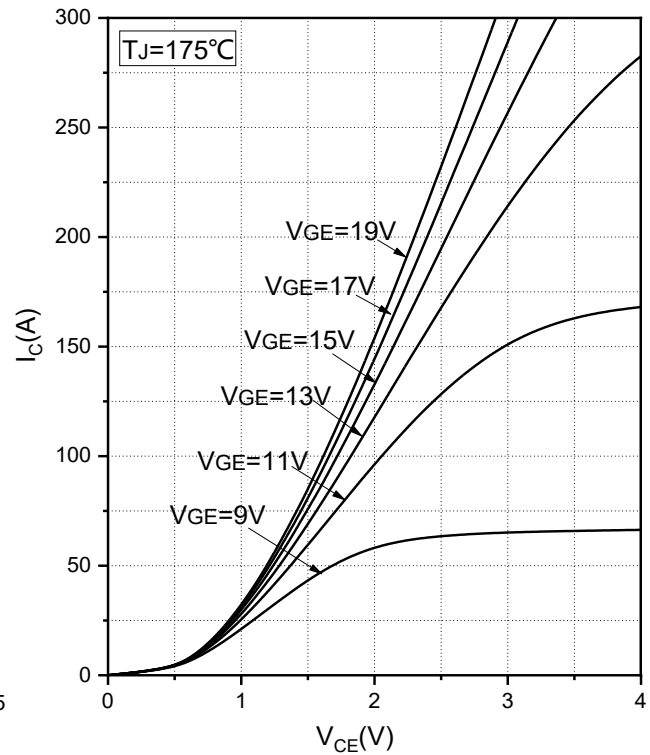
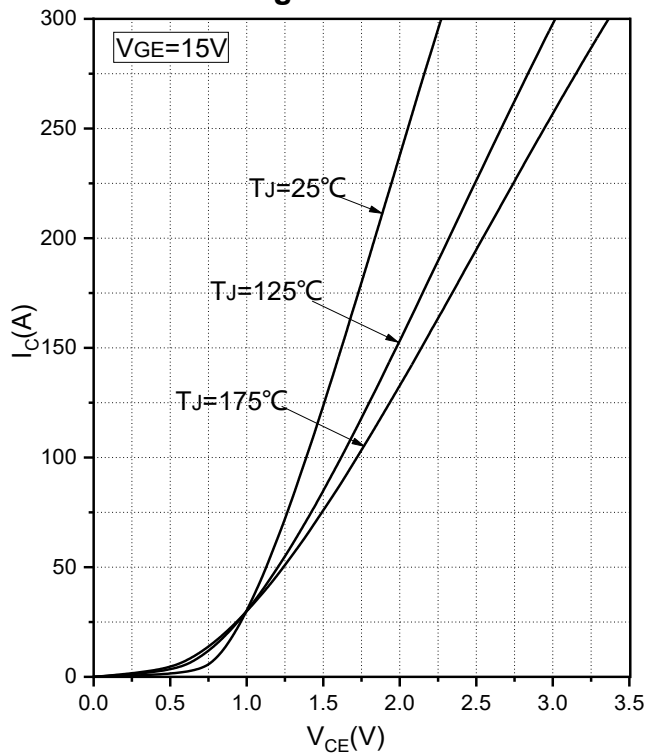
- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (150=150A)
- ④ - Circuit Configuration:HF (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

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IGBT Module Datasheet



Characteristic diagram



GT150HF120T1NH

IGBT Module Datasheet

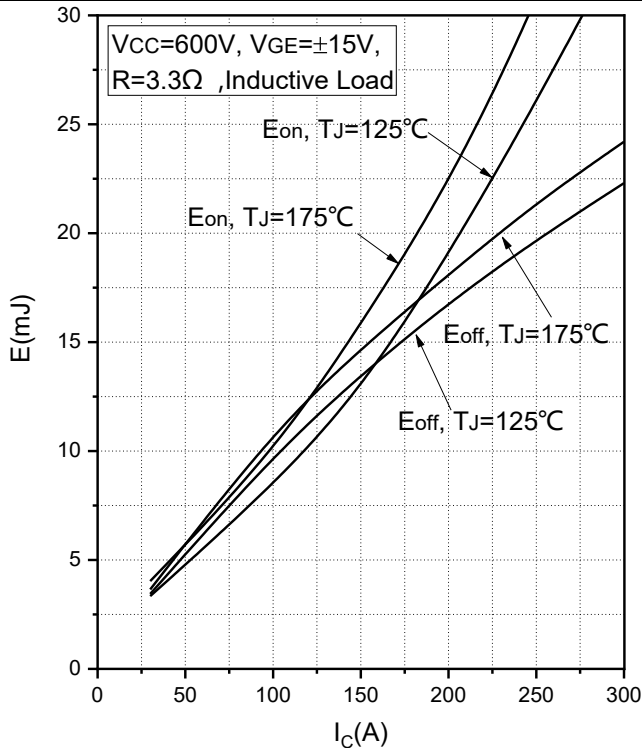


Fig.5 Typical Switching Loss vs. Collector Current

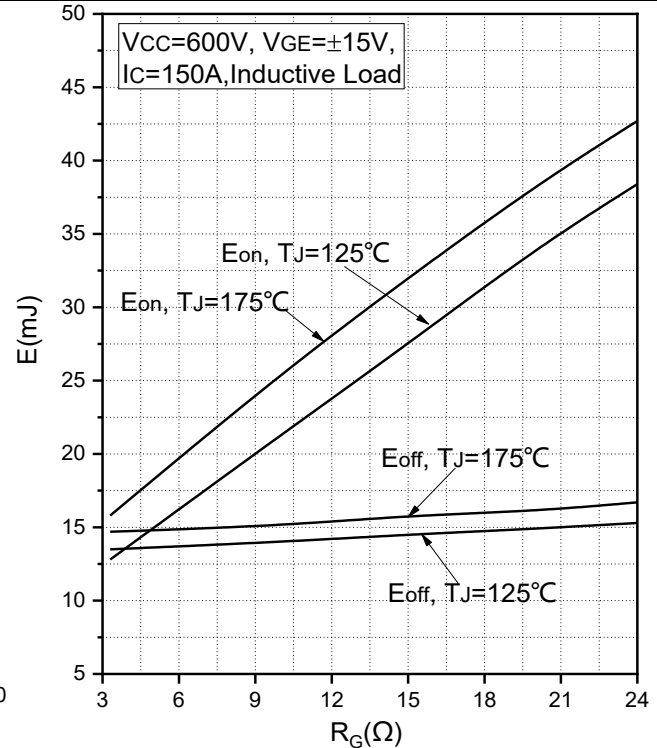


Fig.6 Typical Switching Loss vs. Gate Resistance

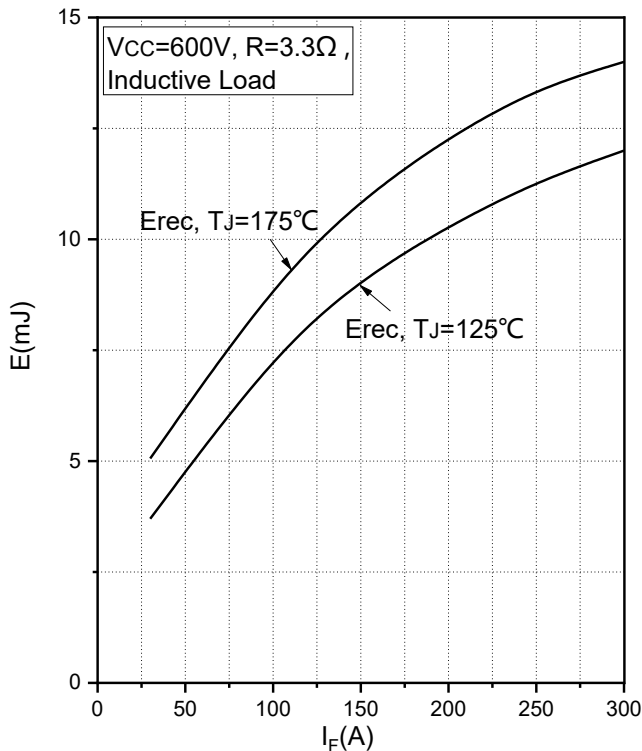


Fig.7 Typical Switching Loss vs. Forward Current

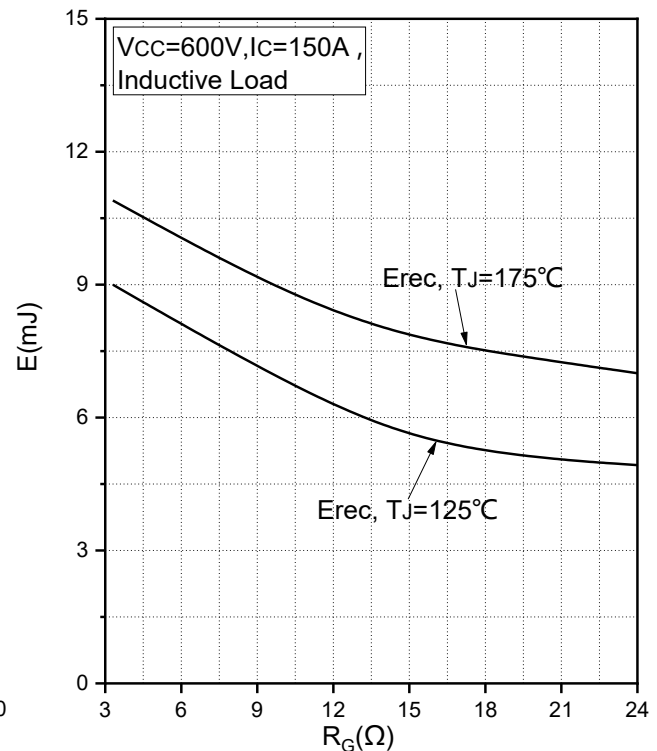


Fig.8 Typical Switching Loss vs. Gate Resistance

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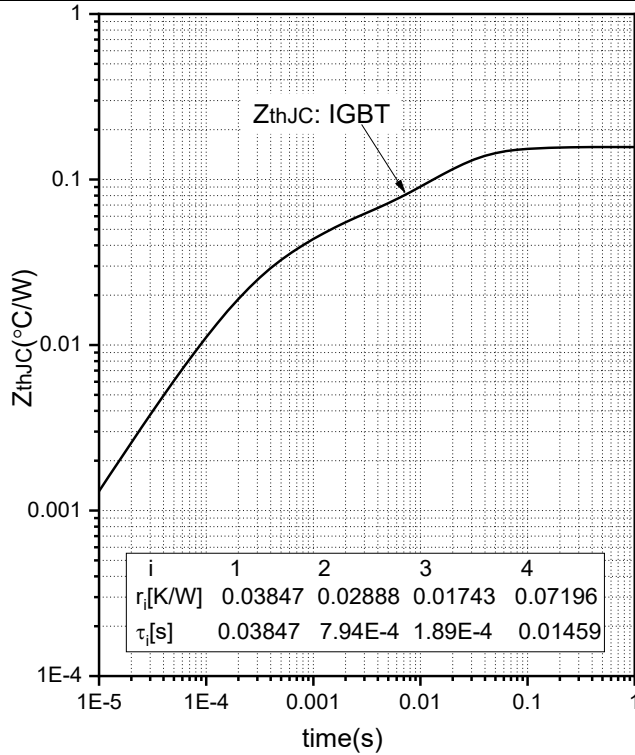


Fig.9 Transient Thermal Impedance (IGBT)

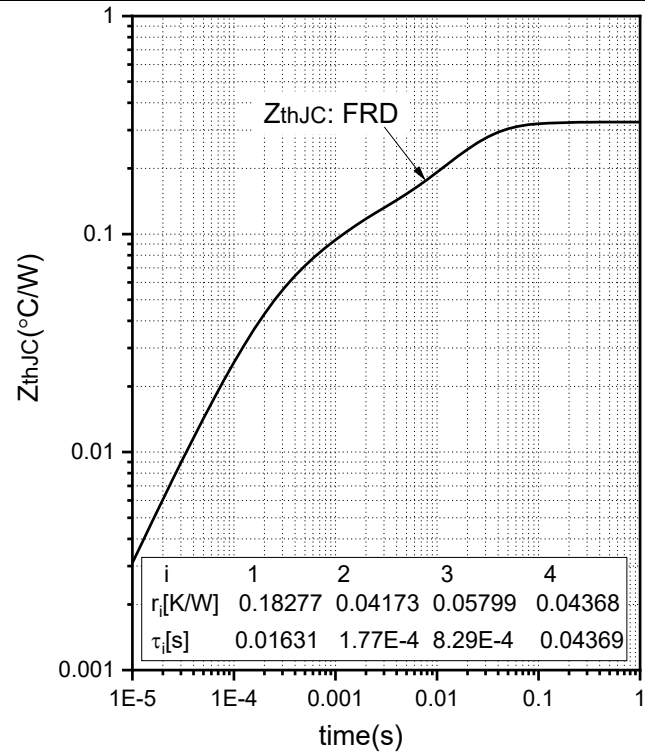


Fig.10 Transient Thermal Impedance (Diode)

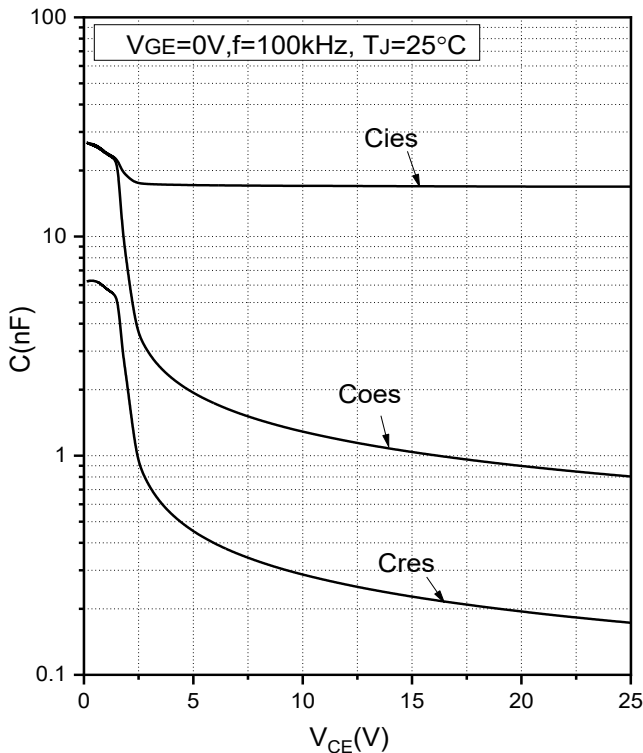


Fig.11 Capacitance Characteristics

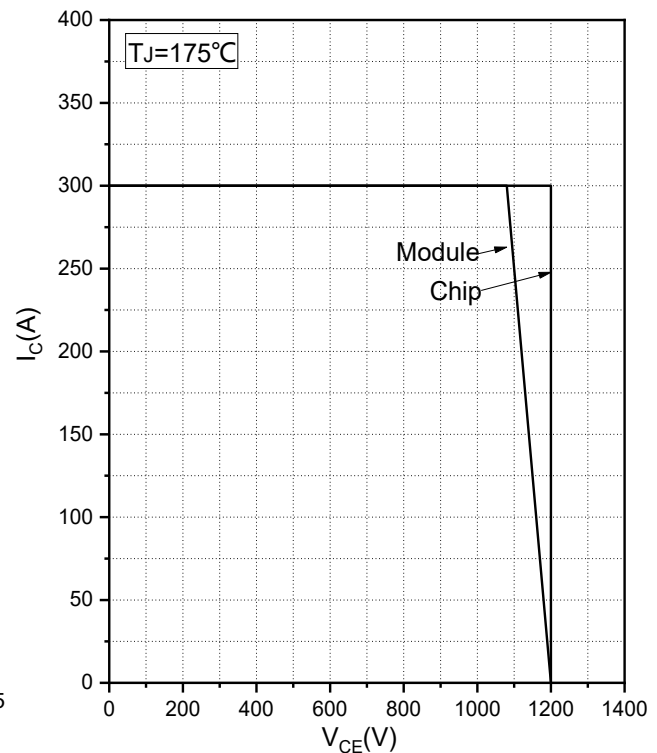


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

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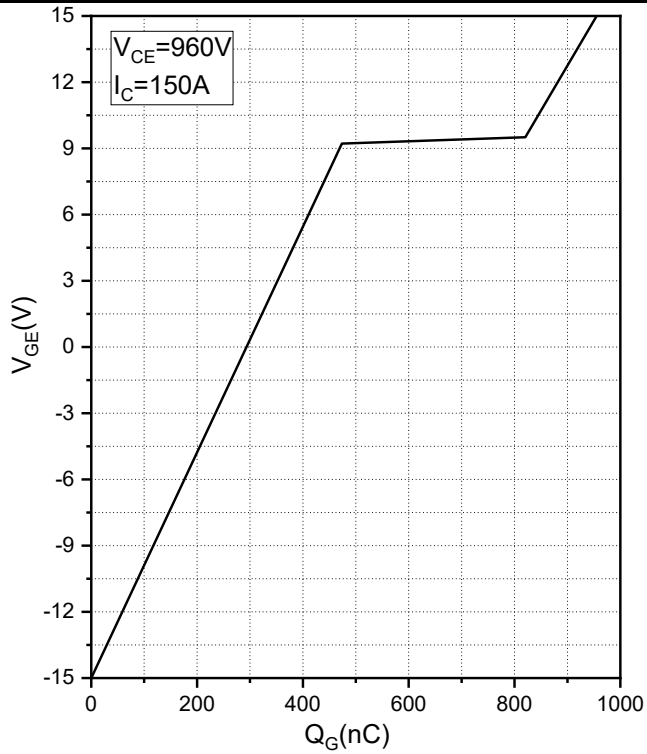
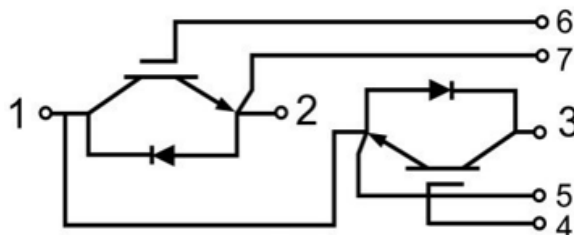


Fig.13 Gate Charge Characteristics

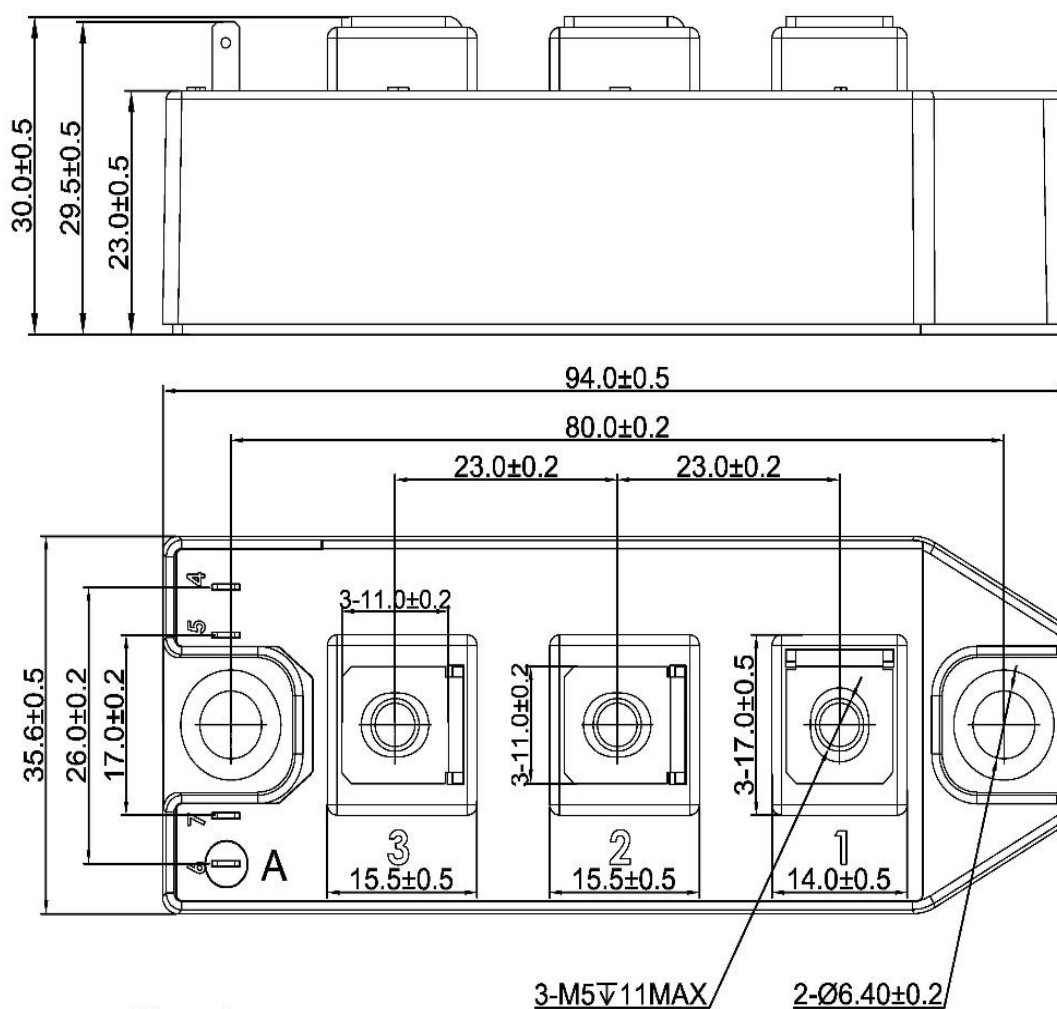
GT150HF120T1NH

IGBT Module Datasheet

Internal Circuit:



Package Outline (Unit: mm):



View A
scale 3:1

GT150HF120T1NH

IGBT Module Datasheet



Revision	Notes
A	Fina Datasheet Initial Release

Announcement

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