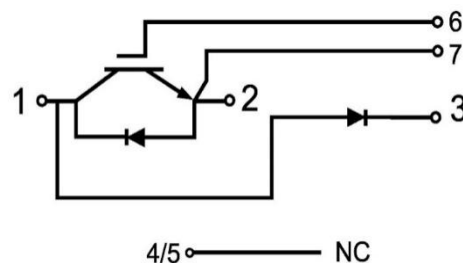


Circuit Diagram

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:

- Industrial Inverters
- UPS System
- Motor Drives

Type	Package	Marking
GT300CU120A5H	A5	GT300CU120A5H

IGBT, Inverter

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

Symbol	Description		Value	Unit
V _{CES}	Collector-Emitter Blocking Voltage		1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =90°C	300	A
		T _C =25°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°C,T _{Jmax} =175°C	1900	W

GT300CU120A5H

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	$I_C=11.5\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.9	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=300\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80	2.20	V
			$T_J=125^{\circ}\text{C}$	2.25		V
			$T_J=175^{\circ}\text{C}$	2.45		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			250	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		35.08		nF
C_{oes}	Output Capacitance			1.75		nF
C_{res}	Reverse Transfer Capacitance			0.34		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=300A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		149		ns
			$T_J=125^{\circ}C$		161		
			$T_J=175^{\circ}C$		166		
t_r	Rise Time		$T_J=25^{\circ}C$		40		ns
			$T_J=125^{\circ}C$		48		
			$T_J=175^{\circ}C$		55		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		254		ns
			$T_J=125^{\circ}C$		295		
			$T_J=175^{\circ}C$		312		
t_f	Fall Time	$T_J=25^{\circ}C$		183		ns	
		$T_J=125^{\circ}C$		255			
		$T_J=175^{\circ}C$		276			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=300A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ $di/dt=4300A/\mu s(T_J=175^{\circ}C)$ Inductive Load	$T_J=25^{\circ}C$		21		mJ
		$T_J=125^{\circ}C$		33			
		$T_J=175^{\circ}C$		42			

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IGBT Module Datasheet



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =300A, R _{Goff} =1Ω, V _{GE} =±15V, du/dt=4900V/μs(T _J =175°C) Inductive Load	T _J =25°C		22		mJ
			T _J =125°C		32		
			T _J =175°C		35		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2.01		μC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		2.5		Ω
T _{SC}	V _{CC} =600V, V _{GE} =±15V, T _J =175°C ^{note1}					10	μs
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))				0.043		°C/W

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

Diode, Brake-Chopper

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		1.75	2.15	V
			T _J =125°C		1.88		
			T _J =175°C		1.86		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=4400A/μs(T _J =175°C), V _R =600V, V _{GE} =-15V	T _J =25°C		329		ns
			T _J =125°C		483		
			T _J =175°C		619		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		250		A
			T _J =125°C		222		
			T _J =175°C		216		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		27		μC
			T _J =125°C		44		
			T _J =175°C		57		

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IGBT Module Datasheet



E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt=4400A/μs(T _J =175°C), V _R =600V, V _{GE} =-15V	T _J =25°C		9.7		mJ
			T _J =125°C		15.9		
			T _J =175°C		20.6		
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))				0.091		°C/W

Diode, Reverse

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		200	A
I_{FM}	Diode Maximum Forward Current	$t_p=1ms$	400	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 =200A	T _J =25°C		1.58	1.90	V
			T _J =125°C		1.67		
			T _J =175°C		1.64		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.218	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.119		°C/W

Module

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, $f=50Hz$, 60s	2500			V
T_{Jmax}	Maximum Junction Temperature		-40		175	$^\circ C$
T_{JOP}	Maximum Operating Junction Temperature Range ^{note2}		-40		150	$^\circ C$
T_{stg}	Storage Temperature		-40		125	$^\circ C$
CTI	Comparative Tracking Index		200			
T	Power Terminals Screw:M5		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			200		g

note2: $T_{JOP} > 150^\circ C$ is only allowed for operation at overload conditions.

GT300CU120A5H

IGBT Module Datasheet



Ordering Information Table

Device code	G	T	300	CU	120	A5	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: Chopper, CU(Diode on High Side)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Characteristic diagram

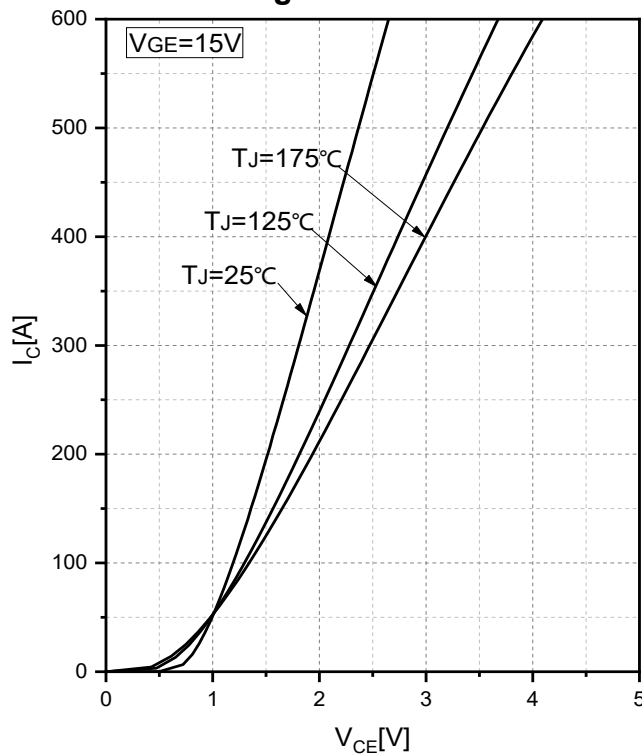


Fig.1 Typical Saturation Voltage Characteristics

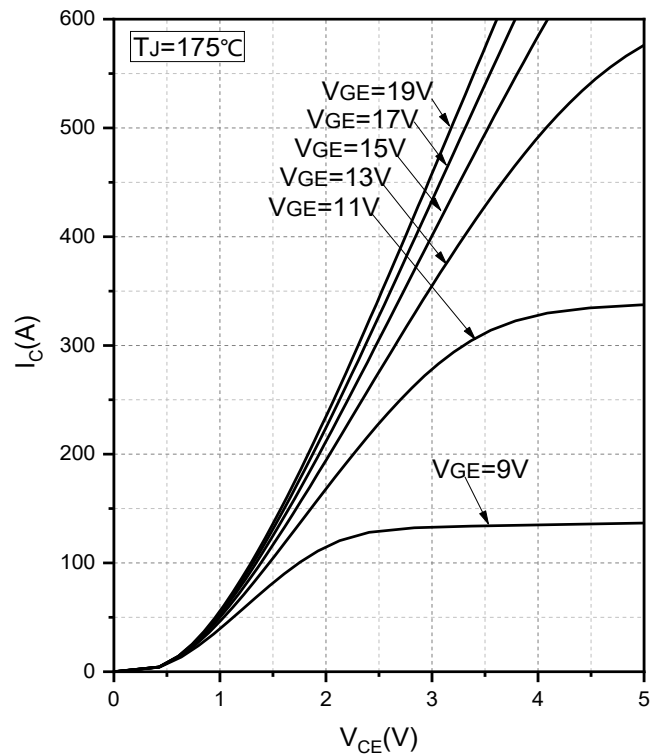


Fig.2 Typical Output Characteristics

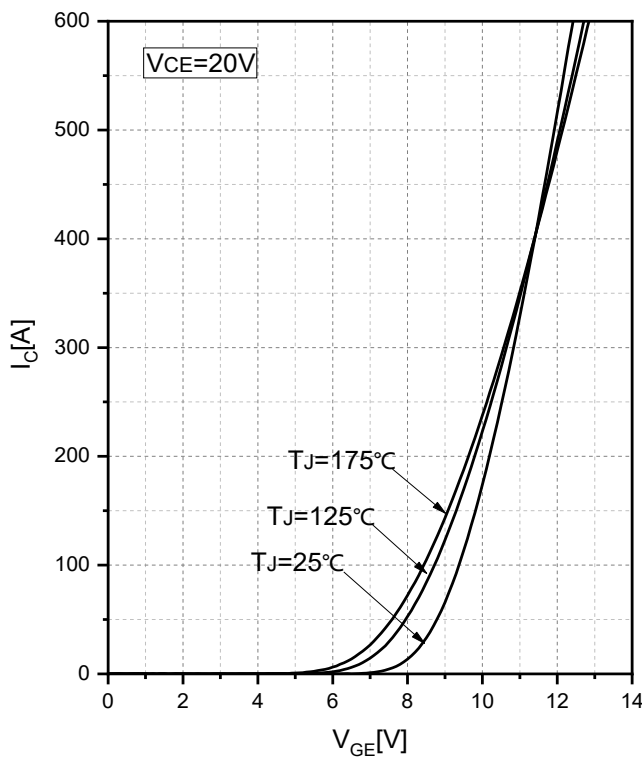


Fig.3 Transfer Characteristic

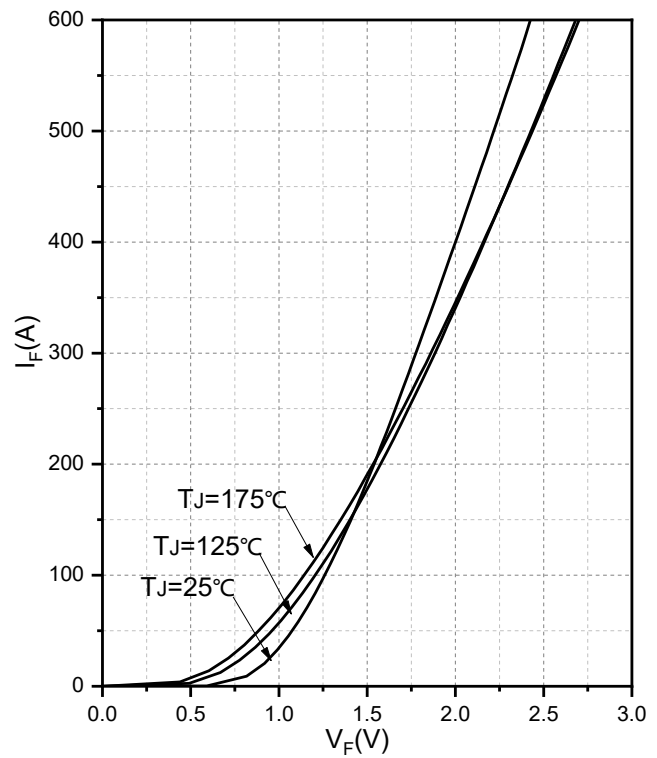


Fig.4 Forward Characteristics of Diode-Chopper

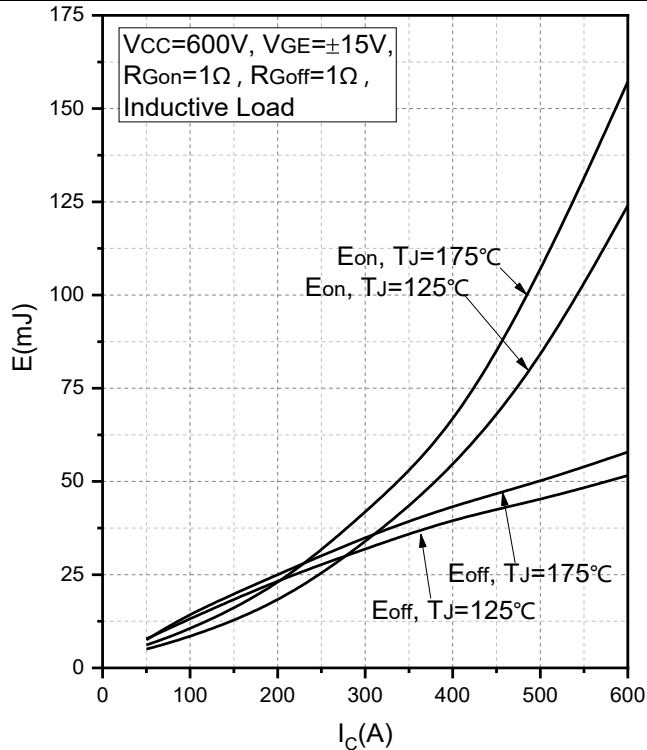


Fig.5 Typical Switching Loss vs. Collector Current

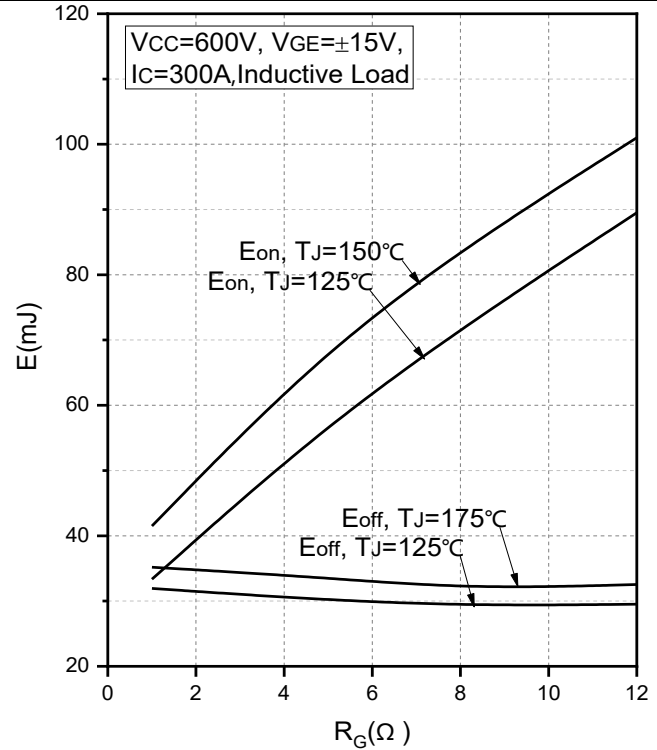


Fig.6 Typical Switching Loss vs. Gate Resistance

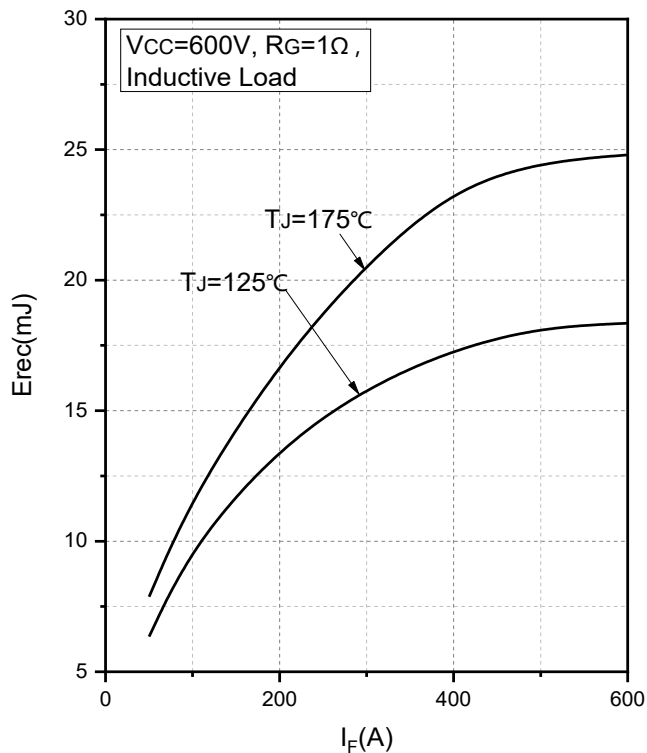


Fig.7 Typical Switching Loss vs. Forward Current of diode-chopper

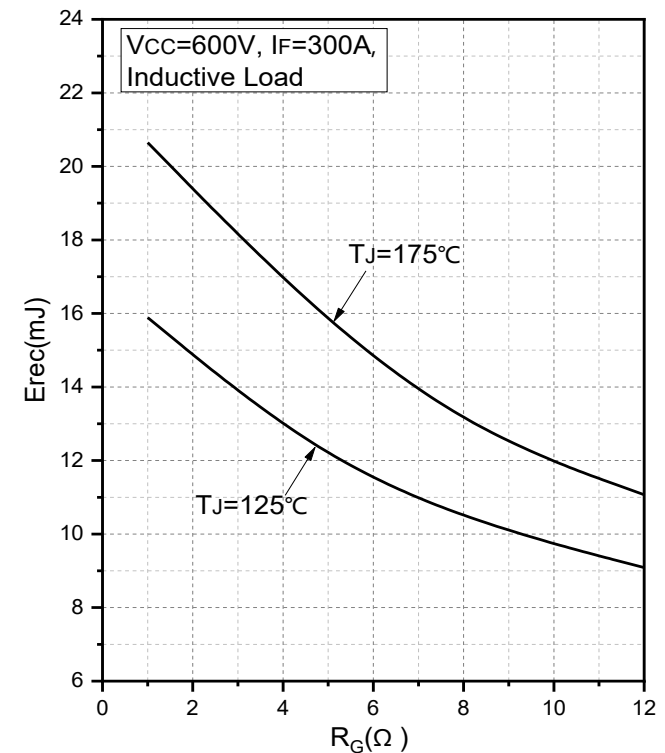


Fig.8 Typical Switching Loss vs. Gate Resistance of diode-chopper

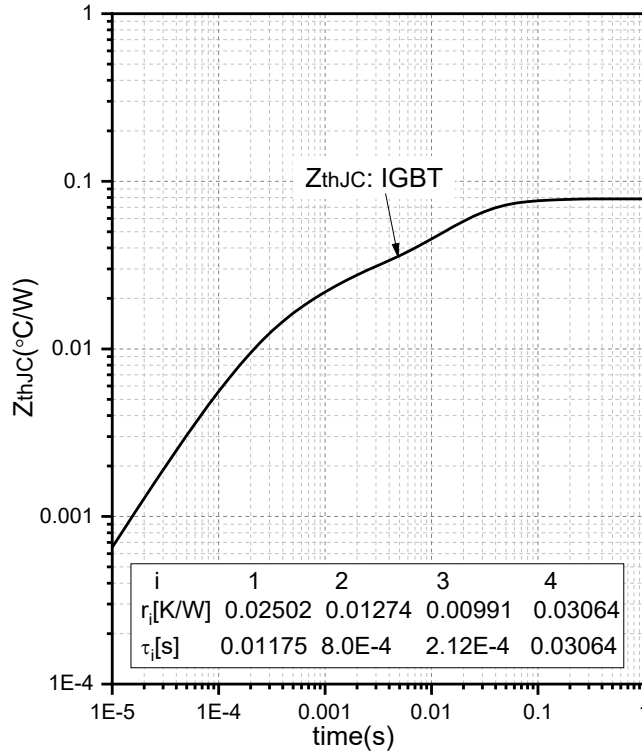


Fig.9 Transient Thermal Impedance (IGBT)

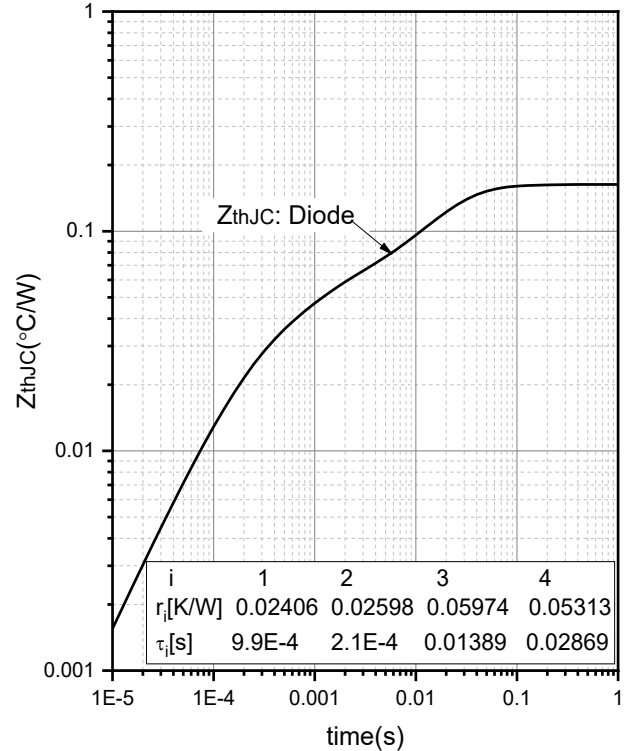


Fig.10 Transient Thermal Impedance (Diode-Chopper)

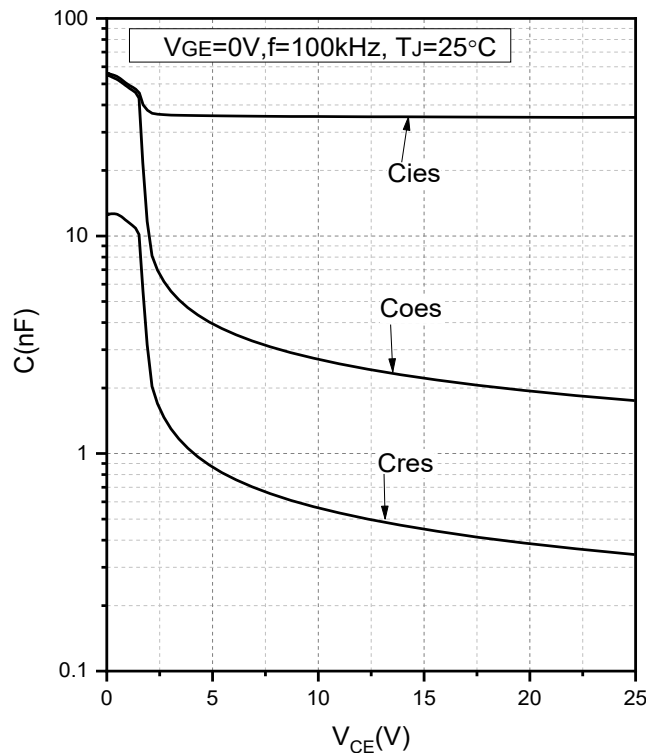


Fig.11 Capacitance Characteristics

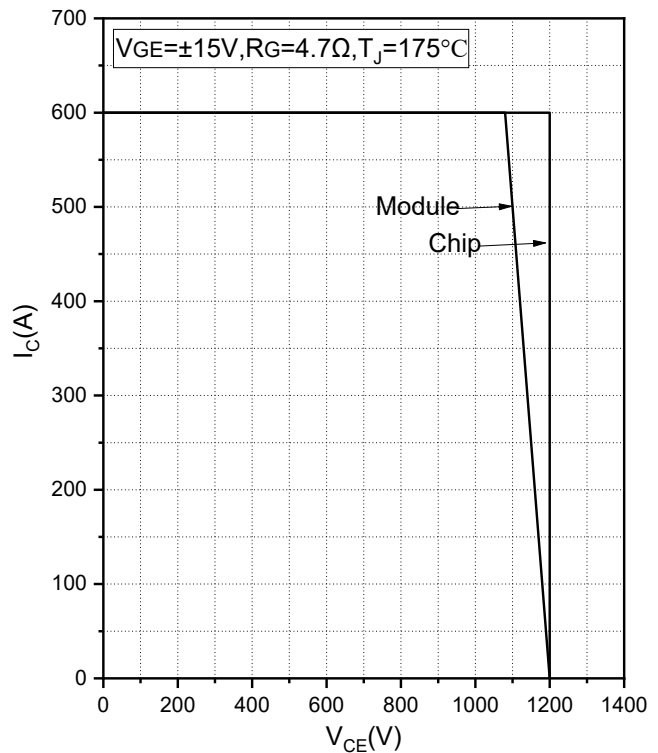
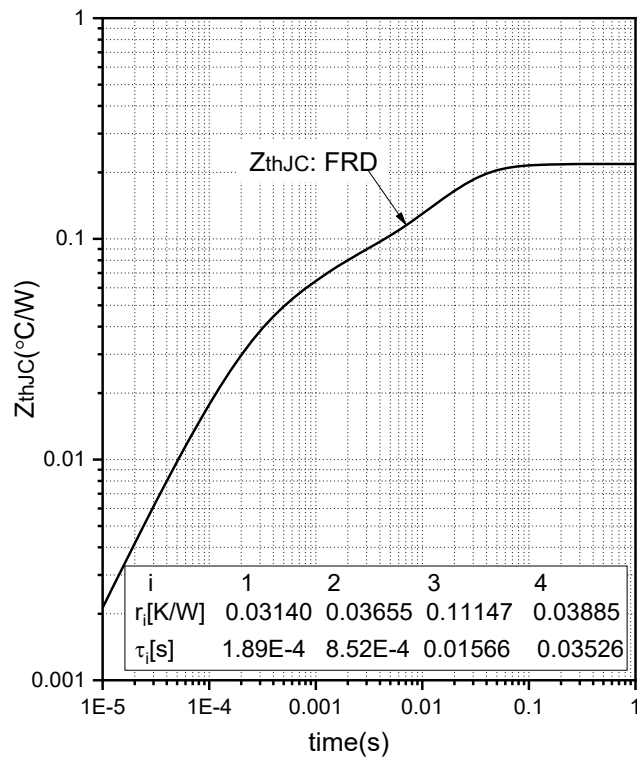
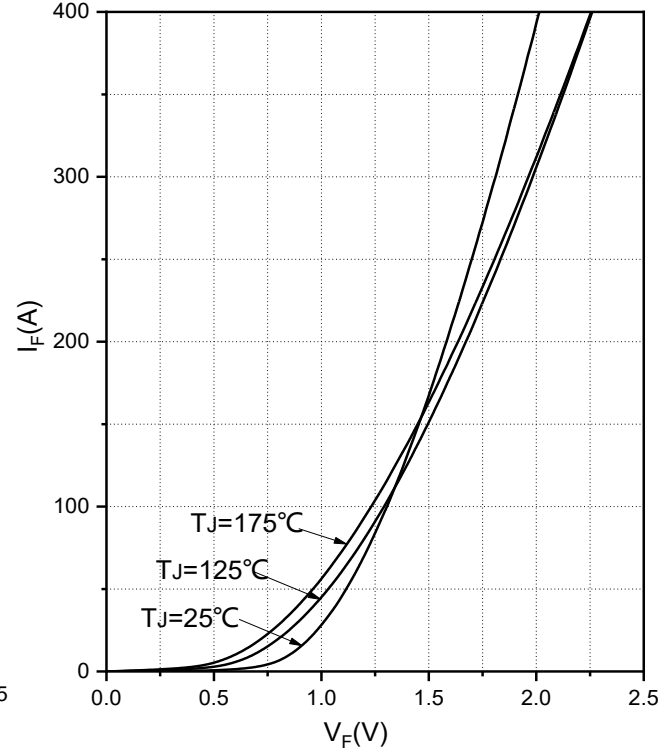
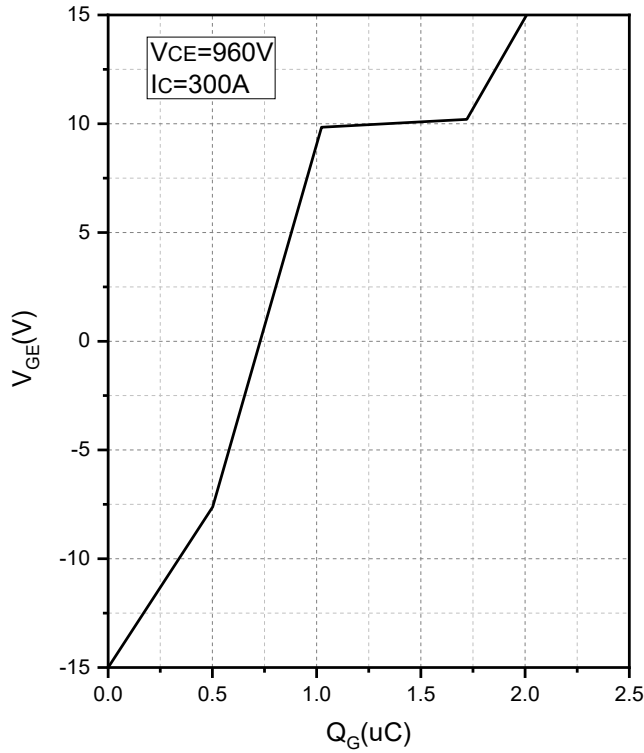


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

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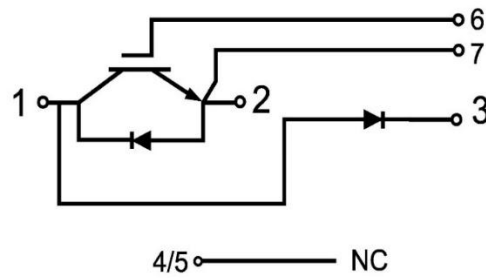


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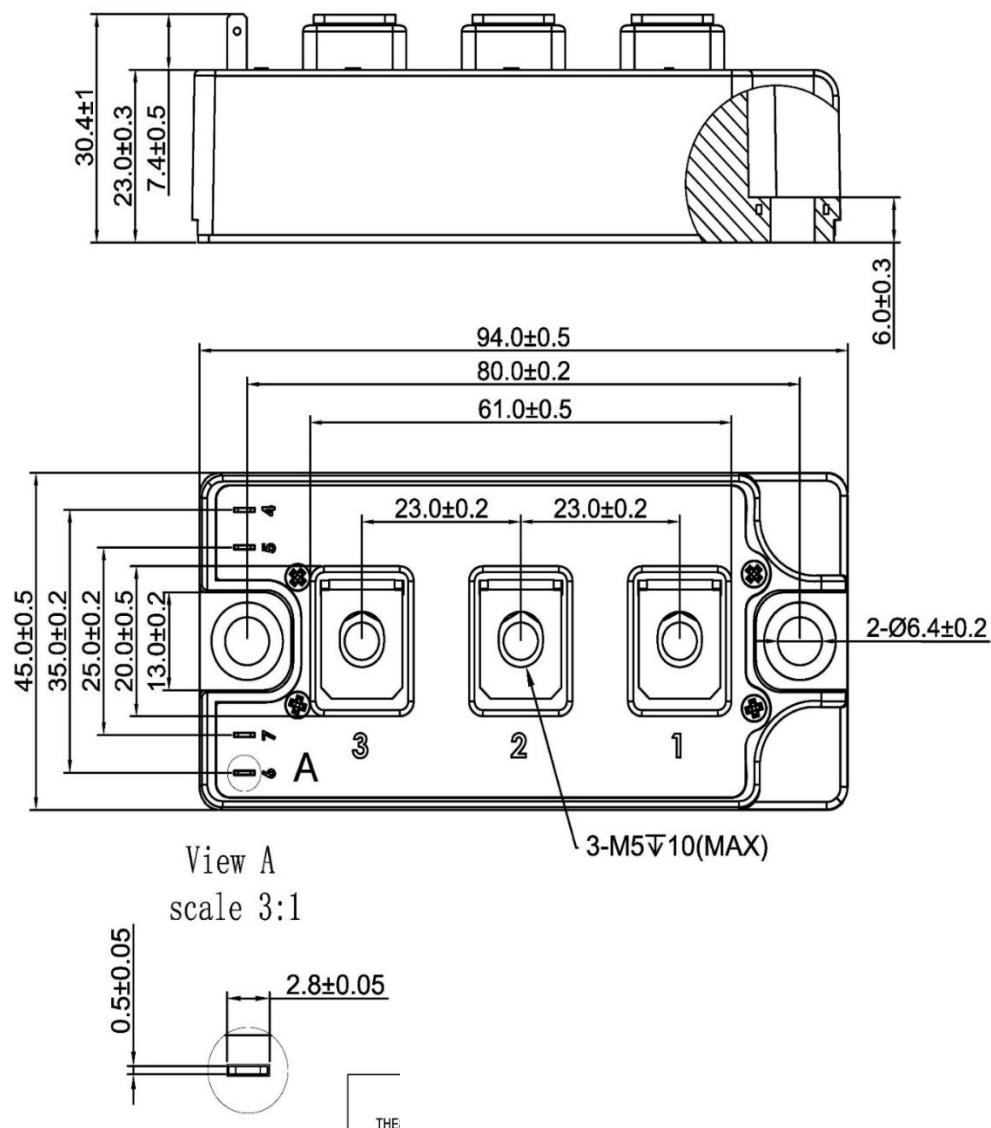
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Internal Circuit:



Package Outline (Unit: mm):



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Revision	Notes
02	Engineering Sample Datasheet

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