



GT450CU120T9H

GT450CL120T9H

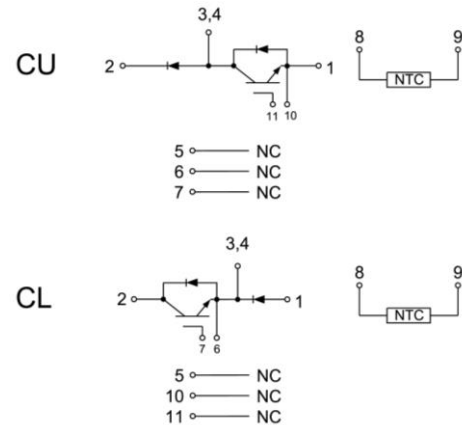
IGBT Module

Preliminary Data

Features:

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

Circuit Diagram



Applications:

- Industrial Inverters
- Servo Applications

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	450	A
		T _C =25°C	900	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	900	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	2885	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	$I_C=15\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=450\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80	2.00	V
			$T_J=125^{\circ}\text{C}$	2.05		V
			$T_J=150^{\circ}\text{C}$	2.10		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		49.42		nF
C_{oes}	Output Capacitance			7.59		nF
C_{res}	Reveres Transfer Capacitance			1.59		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=450A,$ $R_{Gon}=2.3\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		536		ns
			$T_J=125^{\circ}C$		809		
			$T_J=150^{\circ}C$		854		
t_r	Rise Time		$T_J=25^{\circ}C$		124		ns
			$T_J=125^{\circ}C$		147		
			$T_J=150^{\circ}C$		155		
$t_{d(off)}$	Turn-off Delay Time	$T_J=25^{\circ}C$		452		ns	
		$T_J=125^{\circ}C$		486			
		$T_J=150^{\circ}C$		492			
t_f	Fall Time	$T_J=25^{\circ}C$		277		ns	
		$T_J=125^{\circ}C$		494			
		$T_J=150^{\circ}C$		503			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=450A,$ $R_{Gon}=2.3\Omega, V_{GE}=\pm 15V,$ $di/dt=2480A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		48.8		mJ
		$T_J=125^{\circ}C$		62.6			
		$T_J=150^{\circ}C$		64.8			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =450A, R _{Goff} =2.3Ω, V _{GE} =±15V, du/dt=3207V/μs(T _J =150°C), Inductive Load	T _J =25°C		31.2		mJ
			T _J =125°C		46.2		
			T _J =150°C		48.0		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		3493		nC
R _{G(int)}	Internal Gate Resistor				1.5		Ω
SCSOA	V _{CC} =600V, t _p =10μs, V _{GE} =+/-15V, R _{Gon} =2Ω, R _{Goff} =2Ω, T _J =25°C				1833		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.052	°C/W

Diode, Chopper

Maximum Rated Values (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	T _C =100°C	450	A
I _{FP}	Peak Diode Current Repetitive	t _p =1ms	900	A

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =450A	T _J =25°C		1.90		V
			T _J =125°C		2.00		
			T _J =150°C		2.00		
t _{rr}	Reverse Recovery Time	I _F =450A, -diF/dt=3027A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		315		ns
			T _J =125°C		519		
			T _J =150°C		530		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		192		A
			T _J =125°C		277		
			T _J =150°C		298		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		31		μC
			T _J =125°C		65		
			T _J =150°C		68		



E _{rec}	Reverse Recovery Energy	I _F =450A, -diF/dt=3027A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		8.33		mJ
			T _J =125°C		21.78		
			T _J =150°C		22.75		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.086	°C/W

Diode, Reverse
Maximum Rated Values (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	T _C =100°C	300	A
I _{FM}	Peak Diode Current Repetitive	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℃		1.75		V
			T _J =125℃		1.90		
			T _J =150℃		1.90		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=1612A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		353		ns
			T _J =125℃		538		
			T _J =150℃		597		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		153		A
			T _J =125℃		169		
			T _J =150℃		172		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		29.1		μC
			T _J =125℃		46.3		
			T _J =150℃		52.0		
E _{rec}	Reverse Recovery Energy		T _J =25℃		11.6		mJ
			T _J =125℃		18.7		
			T _J =150℃		19.0		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.111	℃/W



Internal NTC-Thermistor Characteristics

R ₂₅	T _C =25℃	5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =465Ω		±5	%
P ₂₅	T _C =25℃	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)	f=50Hz, 30s	4500			V
T _J	Maximum Junction Temperature				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T _{stg}	Storage Temperature		-40		+150	℃
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)				0.03	℃/W
T	Power Terminals Screw:M5		3.0		6.0	N·m
T	Mounting Screw:M6		3.0		6.0	N·m
G	Weight			330		g



Ordering Information Table

Device code	G	T	450	CU	120	T9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (450=450A)
- ④ - Circuit Configuration: Chopper, CU(Diode on High Side) / CL(Diode on Low Side)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

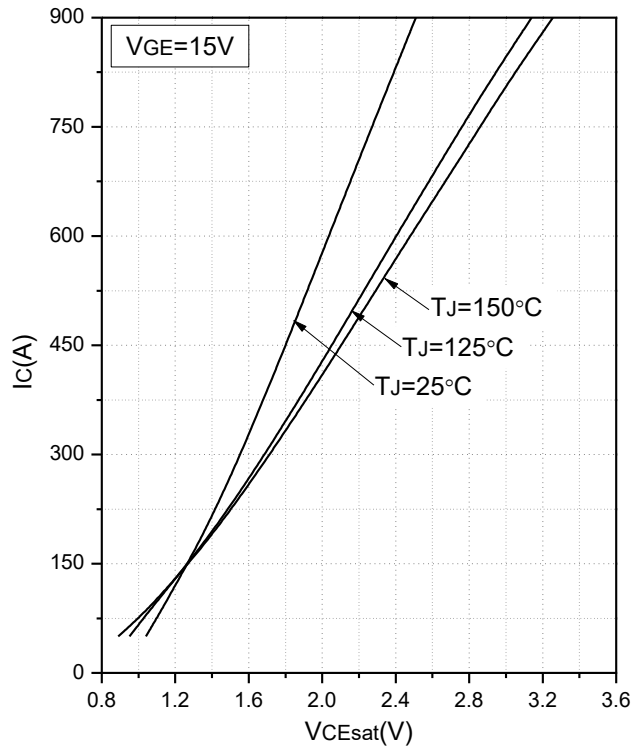


Fig.1 Typical Saturation Voltage Characteristics

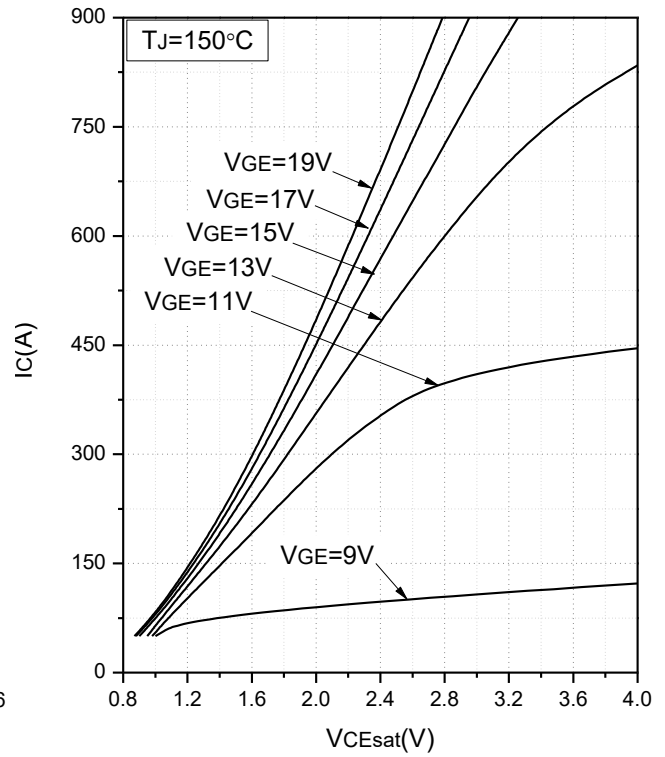


Fig.2 Typical Output Characteristics

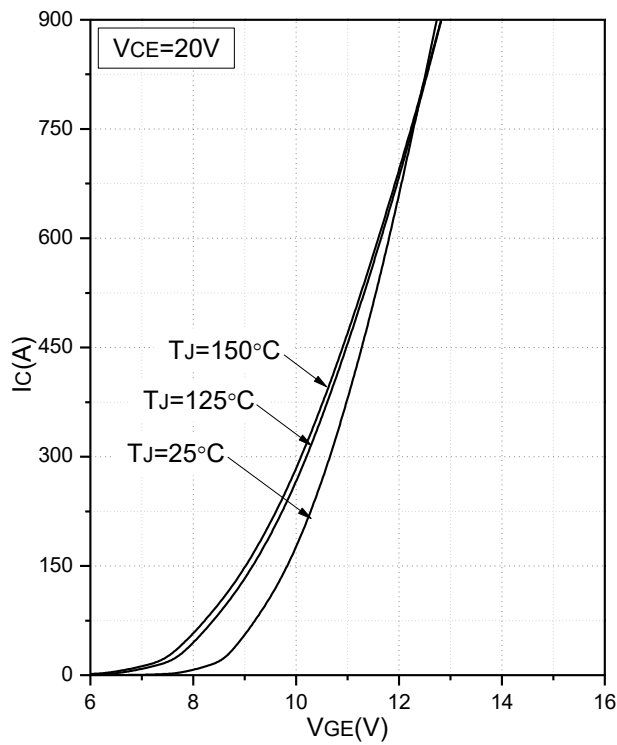


Fig.3 Transfer Characteristics

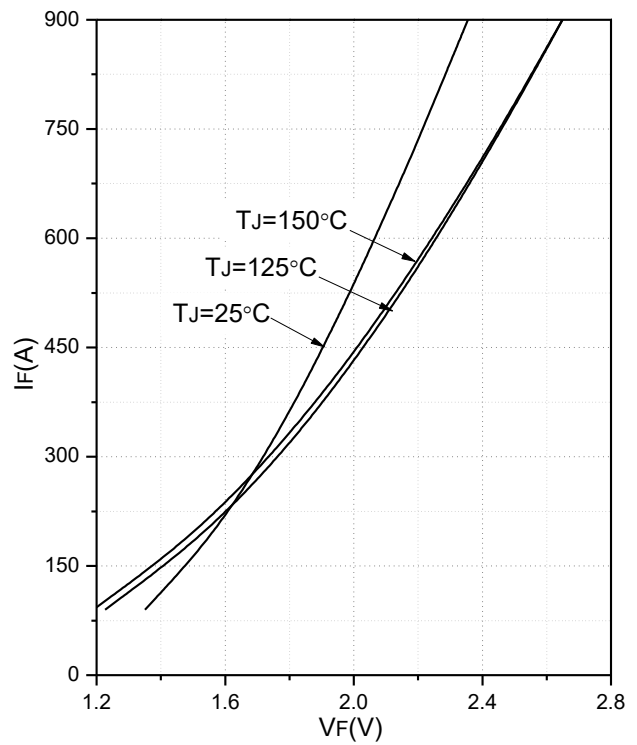


Fig.4 Forward Characteristics of Diode (Brake-Chopper Diode)

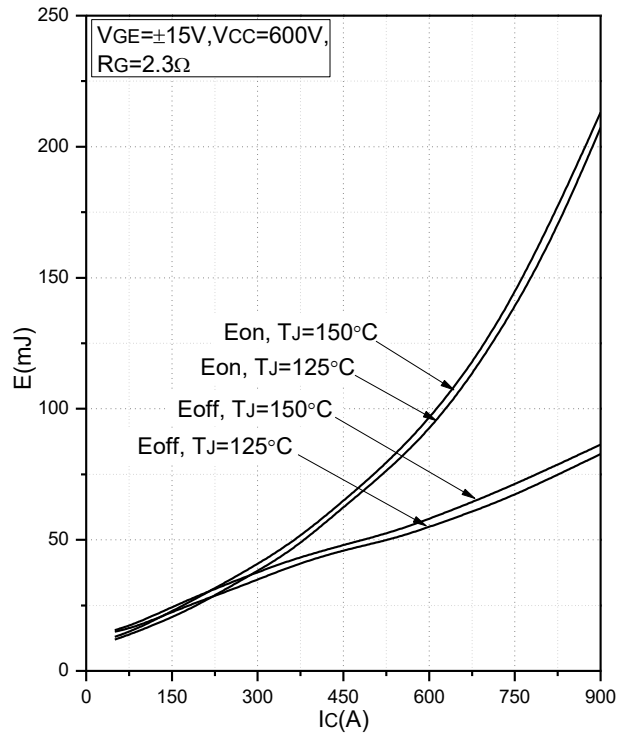


Fig.5 Typical Switching Loss vs. Collector Current

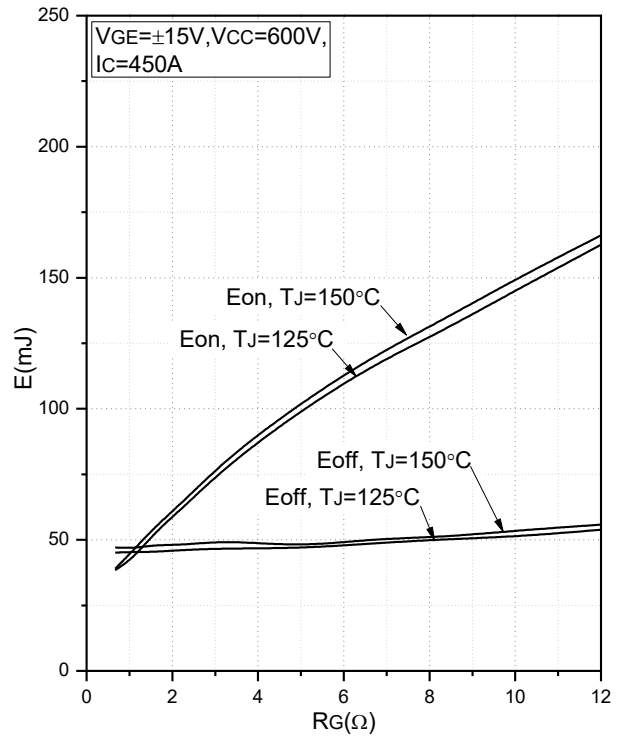


Fig.6 Typical Switching Loss vs. Gate Resistance

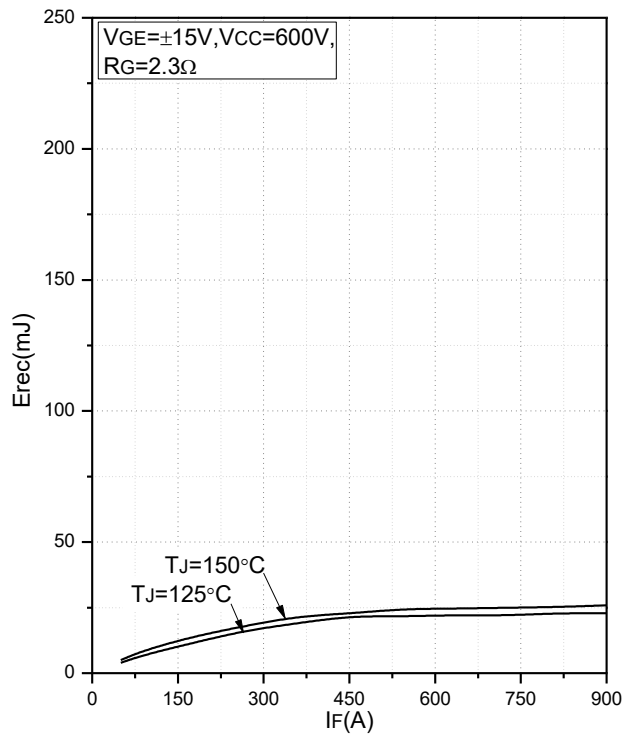


Fig.7 Typical Switching Loss vs. Forward Current

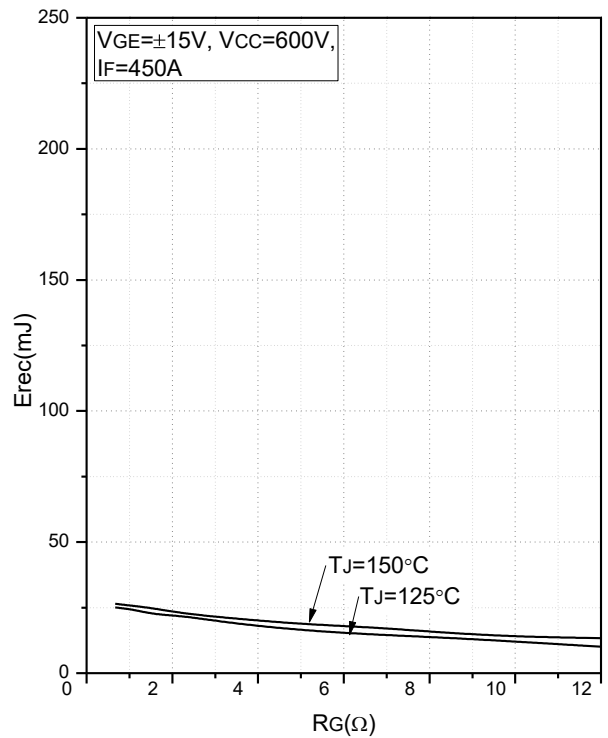


Fig.8 Typical Switching Loss vs. Gate Resistance

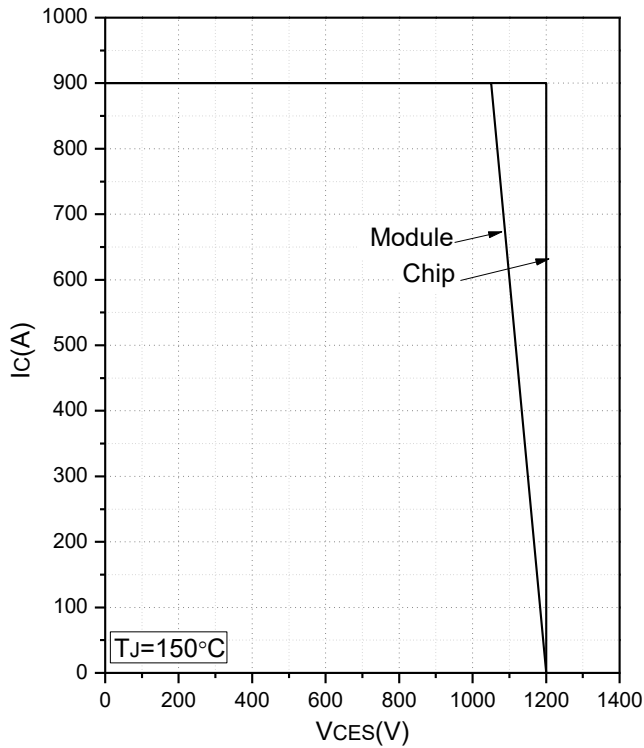


Fig.9 Reverse Bias Safe Operation Area (RBSOA)

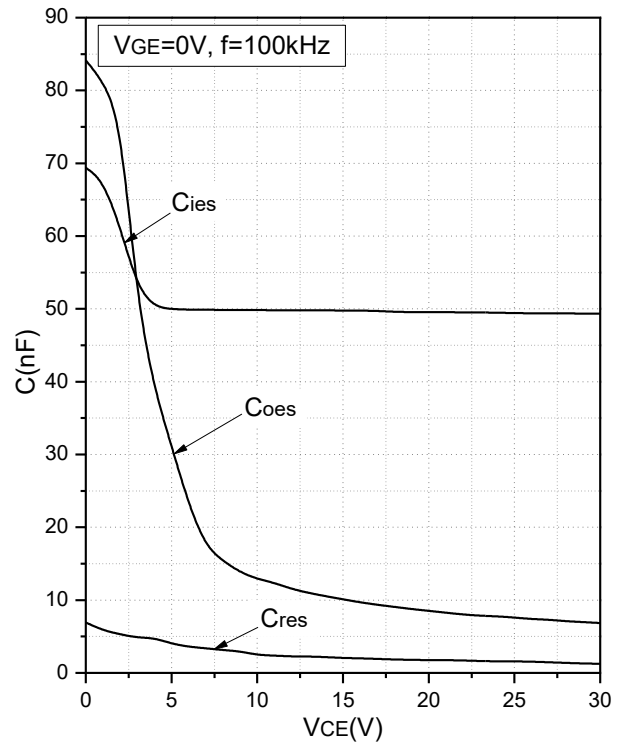


Fig.10 Capacitance Characteristics

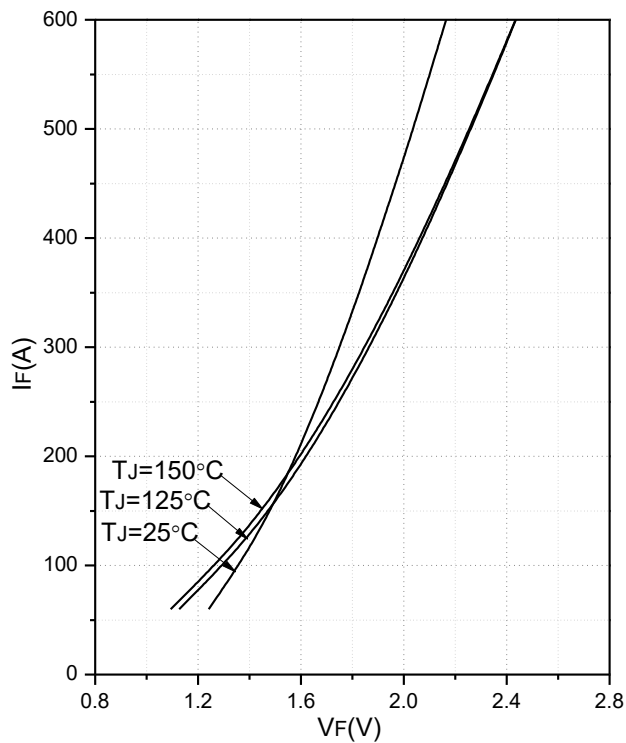


Fig.11 Forward Characteristics of Diode (Reverse)

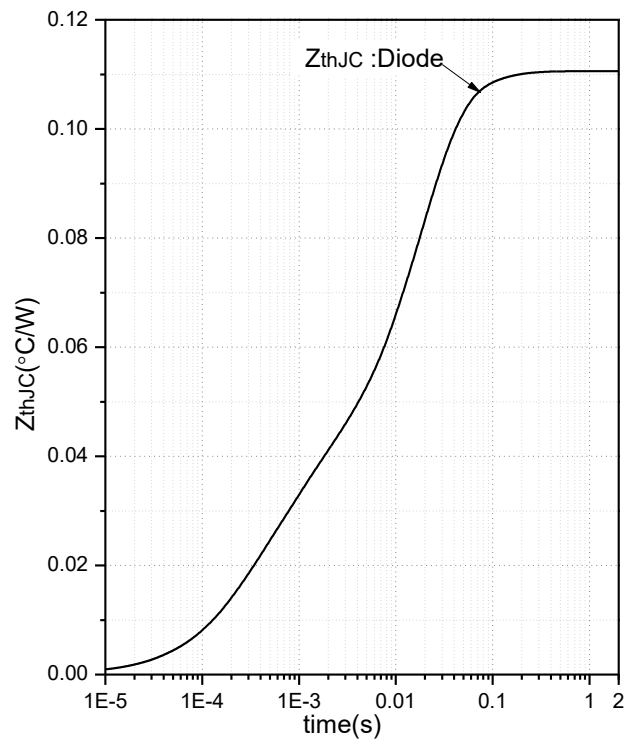


Fig.12 Transient Thermal Impedance (Reverse Diode)

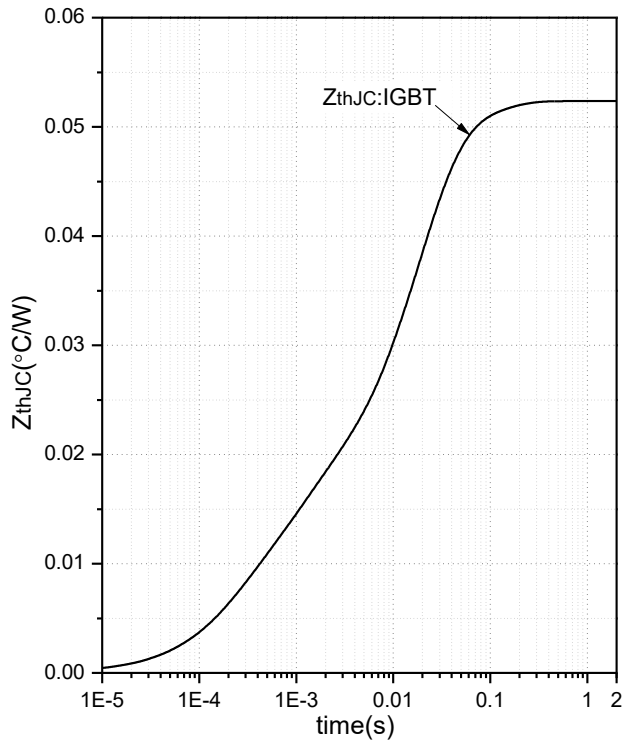


Fig.13 Transient Thermal Impedance (IGBT)

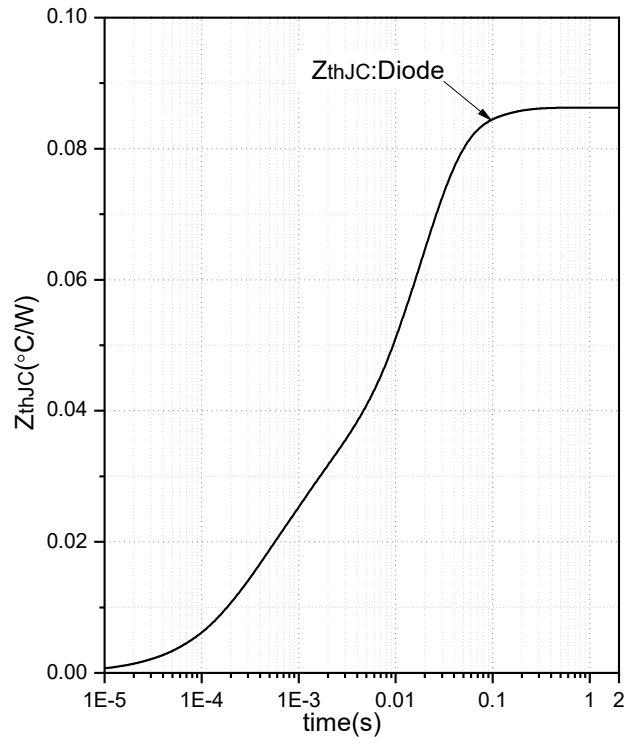


Fig.14 Transient Thermal Impedance
(Brake-Chopper Diode)

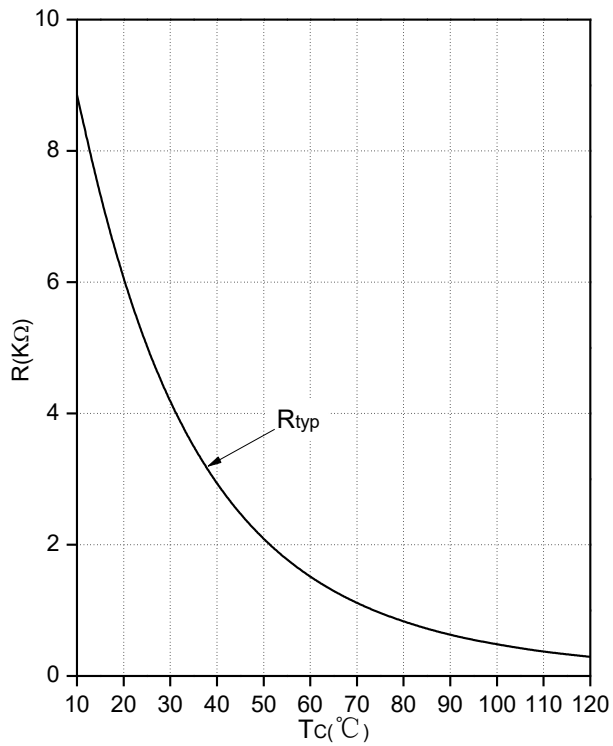
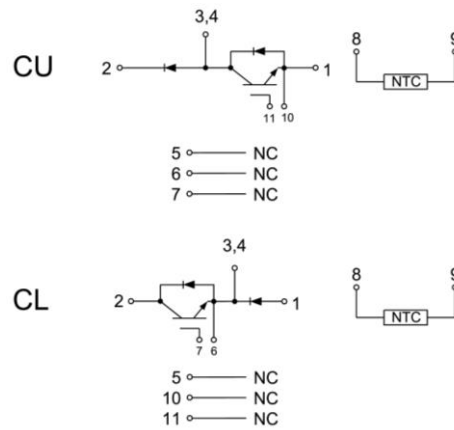


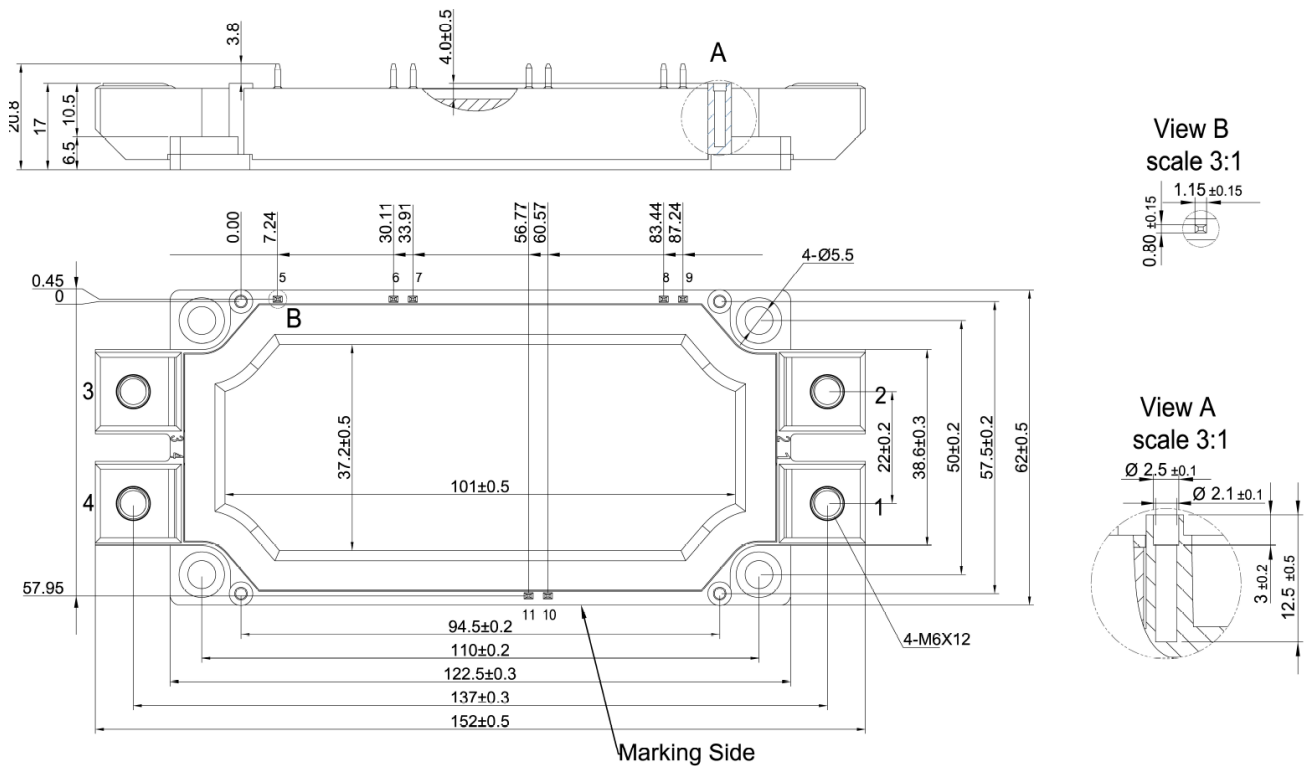
Fig.15 NTC Temperature characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
07/13/2024	01	Initial release

Announcement

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The released datasheet would be issued with “REV.” + “alphabet characters”.