



GT75TL120B9H

IGBT Module

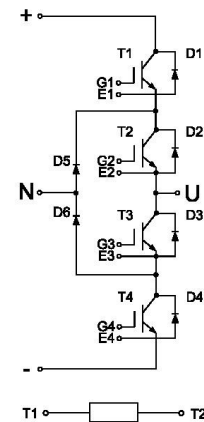
Features:

- Field Stop Trench Gate IGBT
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested($2 \times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Application:

- 3-Level-Applications
- Energy Storage Application
- SVG/APF

Circuit Diagram



IGBT, Inverter (T1,T2,T3,T4)

Maximum Rated Values ($T_c=25^\circ\text{C}$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c=100^\circ\text{C}$	75	A
		$T_c=25^\circ\text{C}$	150	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	150	A
P_D	Maximum Power Dissipation per IGBT	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	534	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	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$	4.5	4.9	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.50	1.80	V
			$T_J=125^{\circ}\text{C}$	1.80		V
			$T_J=150^{\circ}\text{C}$	1.85		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		12.2		nF
C_{oes}	Output Capacitance			0.39		nF
C_{res}	Reveres Transfer Capacitance			0.14		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=75A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		372		ns
			$T_J=125^{\circ}C$		374		
			$T_J=150^{\circ}C$		399		
t_r	Rise Time		$T_J=25^{\circ}C$		80		ns
			$T_J=125^{\circ}C$		83		
			$T_J=150^{\circ}C$		83		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=75A,$ $R_{Goff}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		353		ns
			$T_J=125^{\circ}C$		366		
			$T_J=150^{\circ}C$		370		
t_f	Fall Time		$T_J=25^{\circ}C$		162		ns
			$T_J=125^{\circ}C$		206		
			$T_J=150^{\circ}C$		215		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=75A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ $di/dt=774A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		3.8		mJ
			$T_J=125^{\circ}C$		4.2		
			$T_J=150^{\circ}C$		4.4		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =75A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=4839V/μs(T _J =150°C), Inductive Load	T _J =25°C		2.6		mJ
			T _J =125°C		3.8		
			T _J =150°C		4.1		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		648		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		0		Ω
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case					0.28	°C/W

Diode, Inverter (D1,D2,D3,D4)

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		75	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	150	A

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Unit
V _{FM}	Forward Voltage	I _F =75A	T _J =25℃		1.65		V
			T _J =125℃		1.75		
			T _J =150℃		1.75		
t _{rr}	Reverse Recovery Time	I _F =75A, -di _F /dt=1196A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		218		ns
			T _J =125℃		386		
			T _J =150℃		424		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		72		A
			T _J =125℃		73		
			T _J =150℃		74		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		6.9		μC
			T _J =125℃		12.1		
			T _J =150℃		13.4		



E _{rec}	Reverse Recovery Energy	I _F =75A, -di _F /dt=1196A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		2.2		mJ
			T _J =125℃		4.1		
			T _J =150℃		4.6		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.52	℃/W

Diode, 3-Level (D5,D6)

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		75	A
I _{FM}	Diode Maximum Forward Current	t _p =1ms	150	A

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Unit
V _{FM}	Forward Voltage	I _F =75A	T _J =25℃		1.65		V
			T _J =125℃		1.75		
			T _J =150℃		1.75		
t _{rr}	Reverse Recovery Time	I _F =75A, -di _F /dt=1196A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		218		ns
			T _J =125℃		386		
			T _J =150℃		424		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		72		A
			T _J =125℃		73		
			T _J =150℃		74		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		6.9		μC
			T _J =125℃		12.1		
			T _J =150℃		13.4		



E _{rec}	Reverse Recovery Energy	I _F =75A, -di _F /dt=1196A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		2.2		mJ
			T _J =125°C		4.1		
			T _J =150°C		4.6		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.52	°C/W

Internal NTC- Thermistor Characteristic

Symbol	Description	Min.	Typ.	Max.	Units
R ₂₅	T _C =25°C		5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =465Ω	-5		5	%
P ₂₅	T _C =25°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, 1minute	2500			V
Internal Isolation			Al ₂ O ₃			
d _{creep}	Creepage Distance: Terminal to Heatsink			11.5		mm
	Creepage Distance: Terminal to Terminal			6.3		mm
d _{clear}	Clearance: Terminal to Heatsink			10.0		mm
	Clearance: Terminal to Terminal			5.0		mm
L _{SCE}	Stray Inductance Module			15		nH
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.05	°C/W



T	Mounting Screw:M4	1.8		2.0	N·m
G	Weight		40		g

Ordering Information Table

Device code	G	T	75	TL	120	B9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (75=75A)
- ④ - Circuit Configuration: TL (Three Level)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

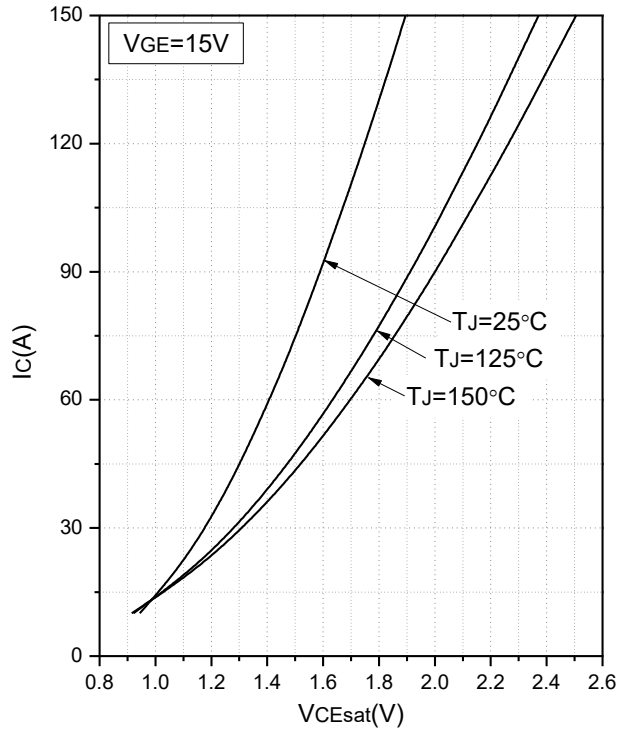


Fig.1 Typical Saturation Voltage Characteristics

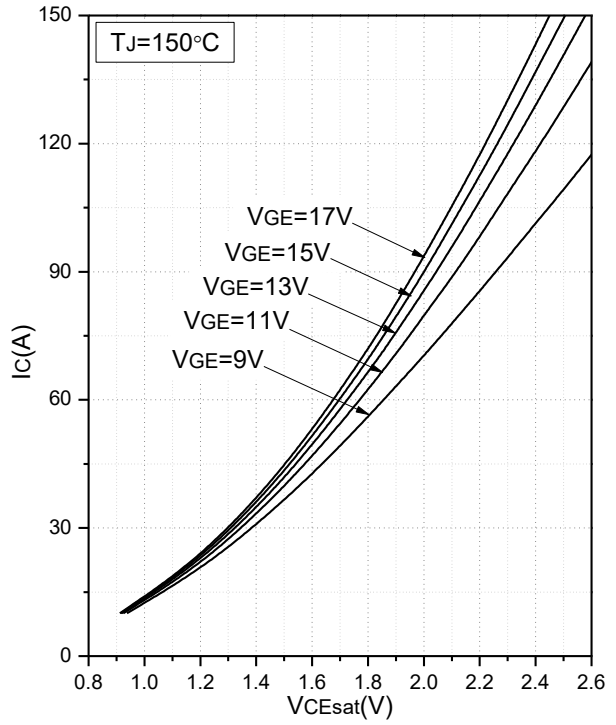


Fig.2 Typical Output Characteristics

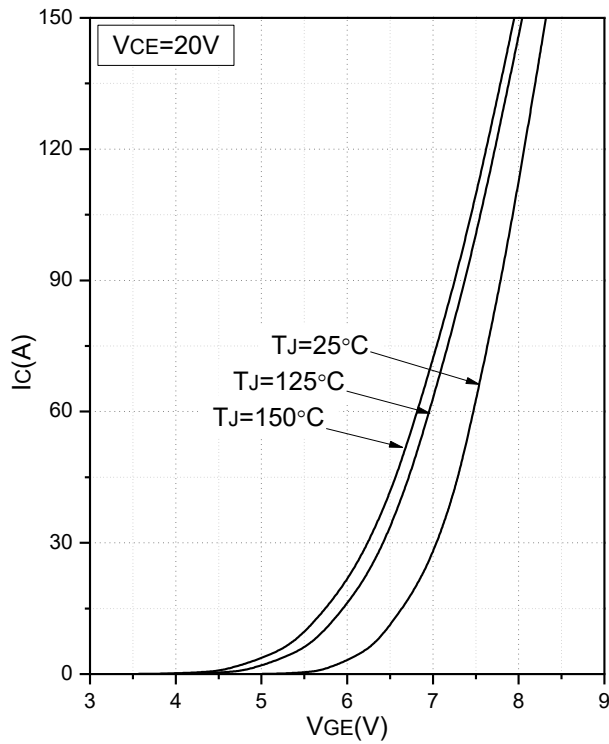


Fig.3 Transfer Characteristics

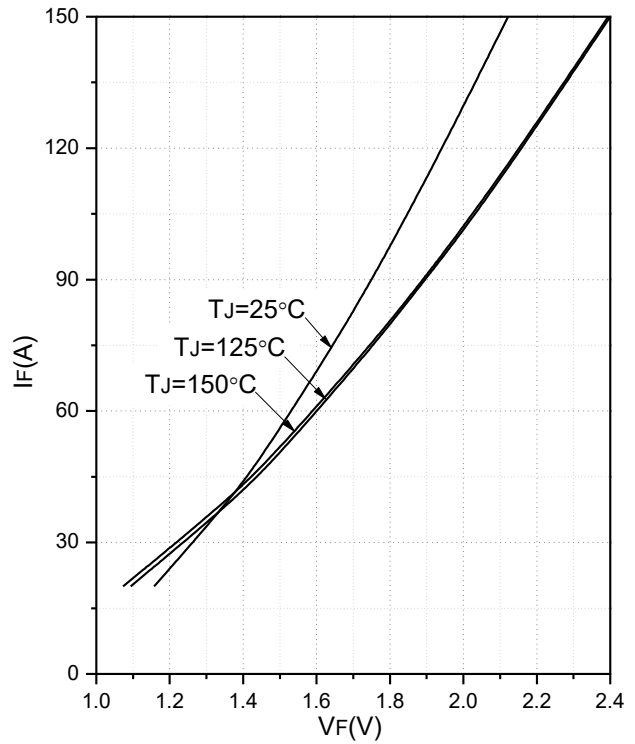


Fig.4 Forward Characteristics of Diode

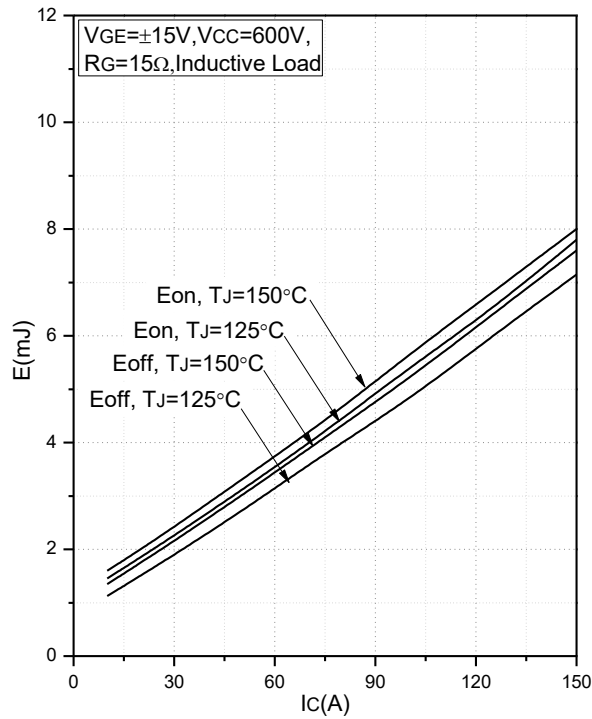


Fig.5 Typical Switching Loss vs. Collector Current

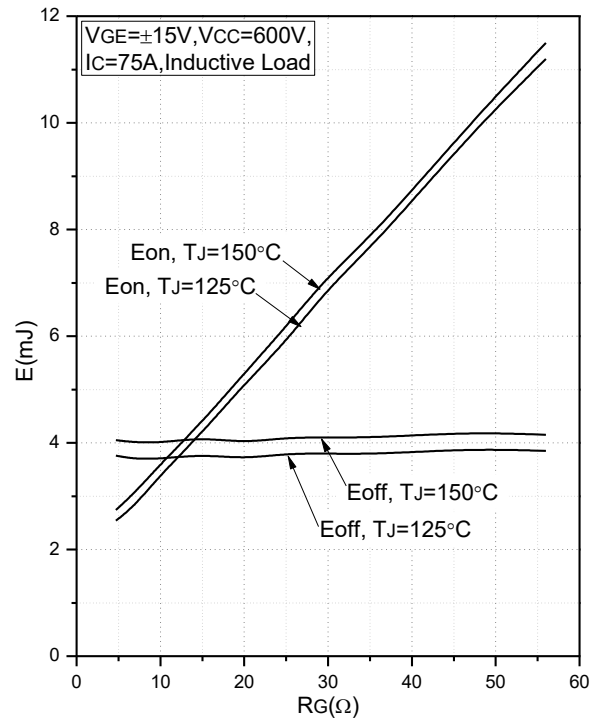


Fig.6 Typical Switching Loss vs. Gate Resistance

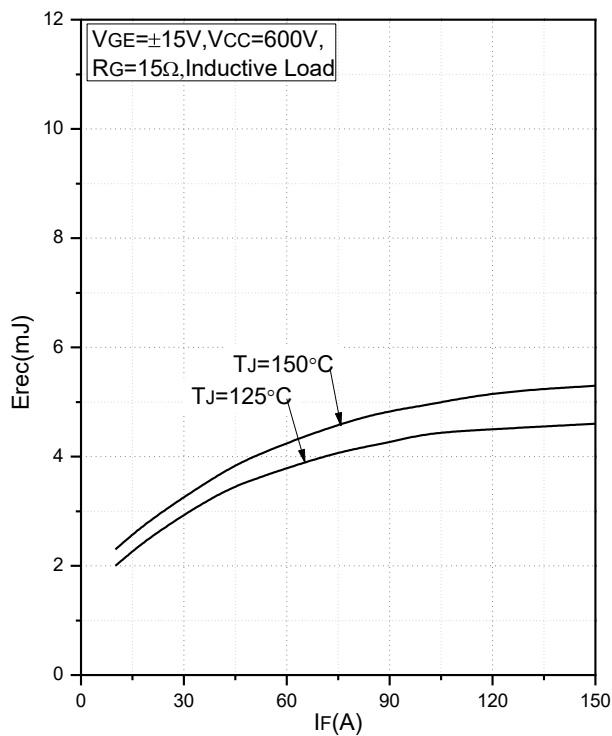


Fig.7 Typical Switching Loss vs. Forward Current

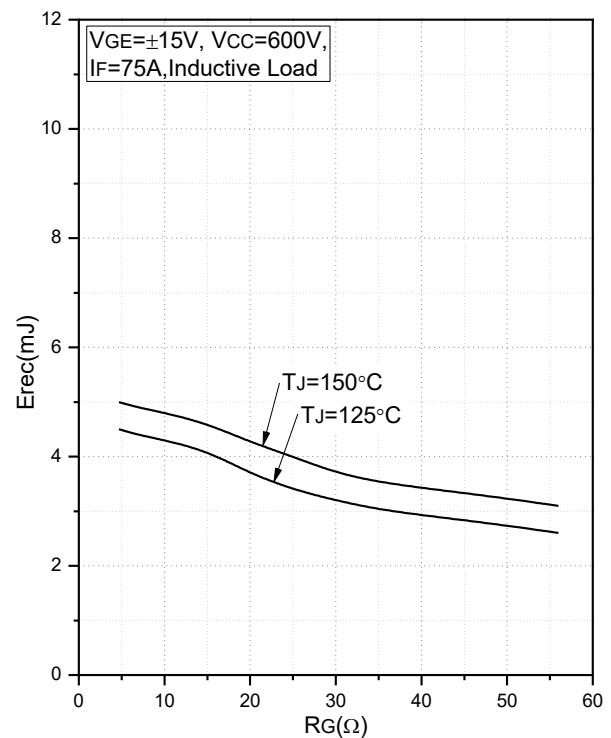


Fig.8 Typical Switching Loss vs. Gate Resistance

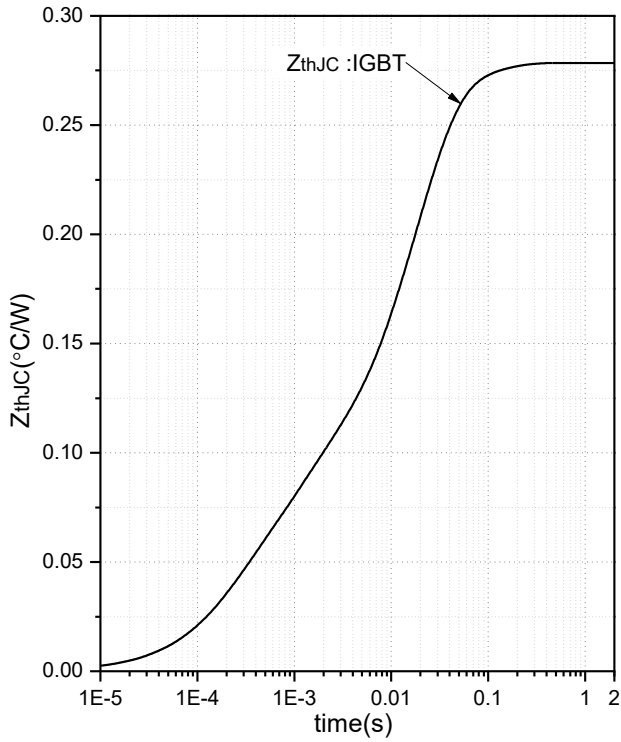


Fig.9 Transient Thermal Impedance (IGBT)

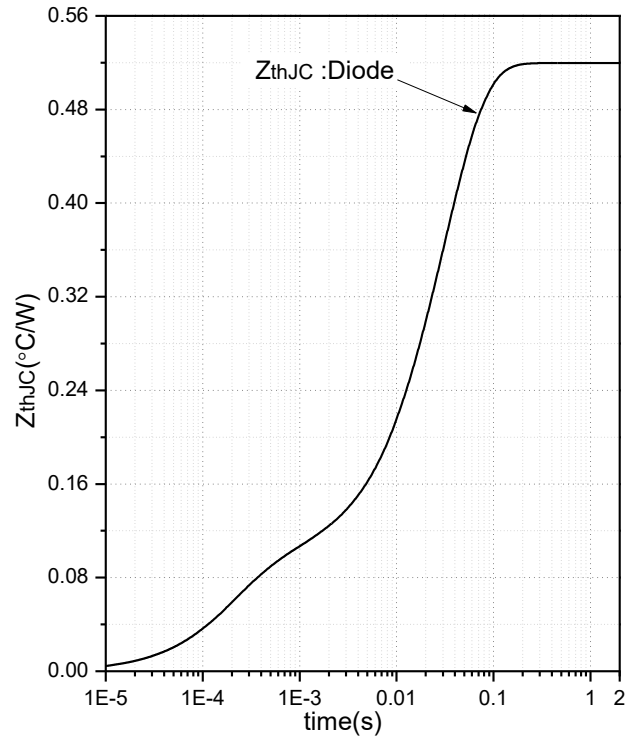


Fig.10 Transient Thermal Impedance (Diode)

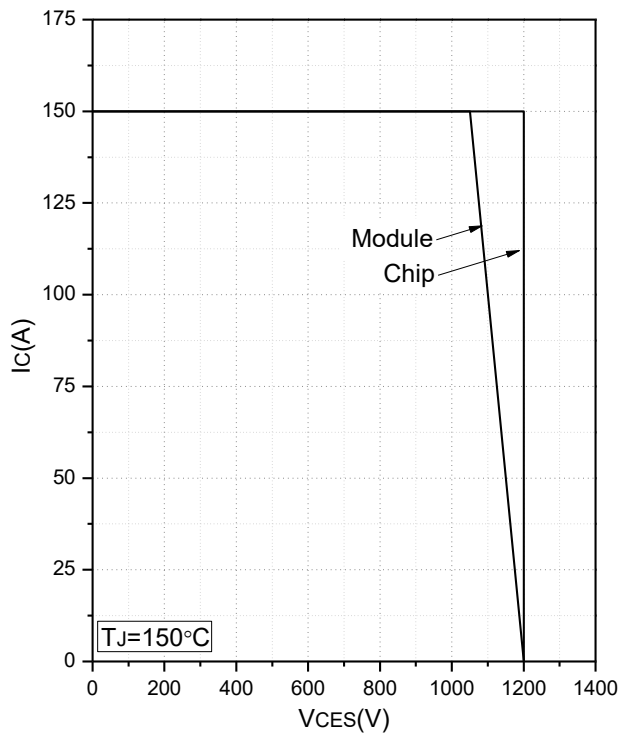


Fig.11 Reverse Bias Safe Operation Area (RBSOA)

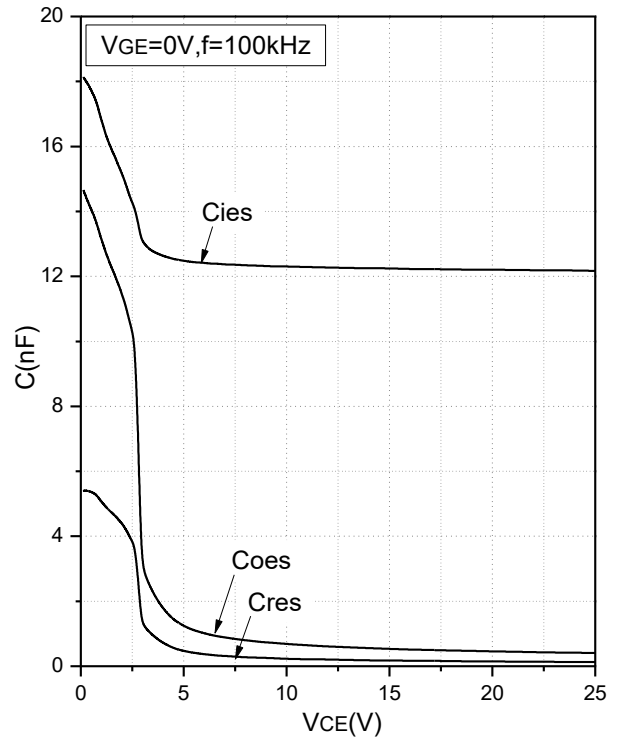


Fig.12 Capacitance Characteristics

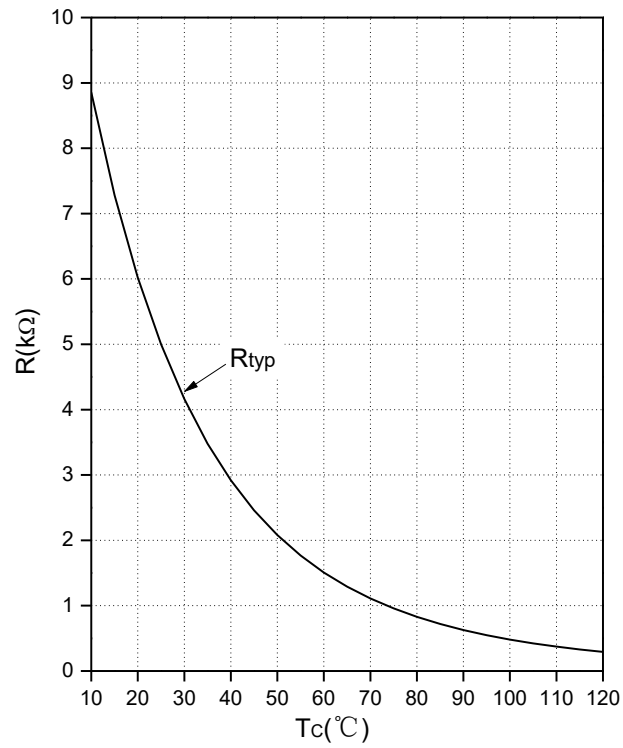
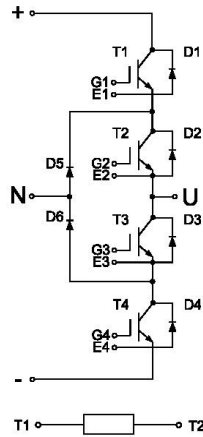


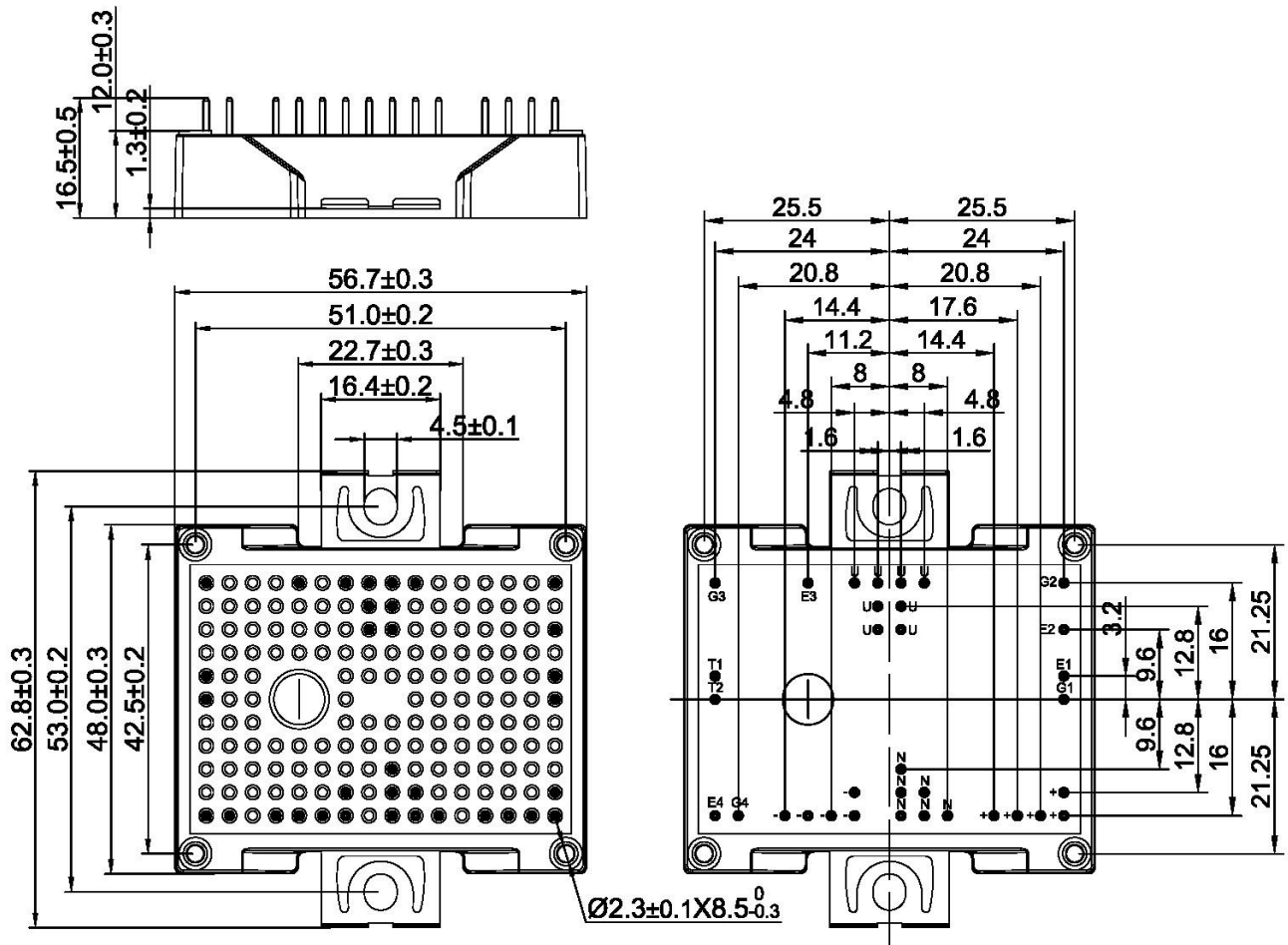
Fig.13 NTC Temperature Characteristics



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release
02	Update Format

Announcement

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