



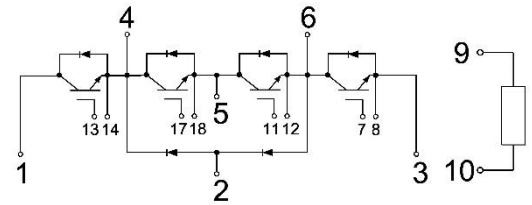
GT200TL120T2SH

IGBT Module

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated $>10\mu\text{s}$
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Industrial Inverters
- Motor Drives
- UPS Systems

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c=100^\circ\text{C}$	200	A
		$T_c=25^\circ\text{C}$	400	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation (per IGBT)	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	1261	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	$I_C=7.6\text{mA}$, $V_{CE}=V_{GE}$	5.0	6.0	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=200\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.55	2.00	V
			$T_J=125^{\circ}\text{C}$	1.75		V
			$T_J=150^{\circ}\text{C}$	1.80		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		23.44		nF
C_{oes}	Output Capacitance			2.80		nF
C_{res}	Reverse Transfer Capacitance			0.22		nF

Switching Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =200A, R _{Gon} =1Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		377		ns
			T _J =125℃		393		
			T _J =150℃		403		
t _r	Rise Time		T _J =25℃		90		ns
			T _J =125℃		95		
			T _J =150℃		99		
t _{d(off)}	Turn-off Delay Time	T _J =25℃		366		ns	
		T _J =125℃		384			
		T _J =150℃		390			
t _f	Fall Time	T _J =25℃		298		ns	
		T _J =125℃		453			
		T _J =150℃		471			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =200A, R _{Gon} =1Ω, V _{GE} =±15V, di/dt=1690A/μs(T _J =150℃), Inductive Load	T _J =25℃		9.8		mJ
		T _J =125℃		12.4			
		T _J =150℃		12.9			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =200A, R _{Goff} =1Ω, V _{GE} =±15V, du/dt=2981V/μs(T _J =150°C), Inductive Load	T _J =25°C		17.1		mJ
			T _J =125°C		26.1		
			T _J =150°C		27.7		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		1503		nC
R _{g internal}	Internal Gate Resistor		T _J =25°C		4.5		Ω
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _G =6.8Ω, t _p =10μs, T _J =150°C				1100		A
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case					0.119	°C/W

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	T _C =100°C	150	A
I _{FM}	Diode Maximum Forward Current	t _p =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		1.75		V
			T _J =125°C		1.90		
			T _J =150°C		1.85		
t _{rr}	Reverse Recovery Time	I _F =150A, -diF/dt=1245A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		296		ns
			T _J =125°C		507		
			T _J =150°C		528		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		64.1		A
			T _J =125°C		92.5		
			T _J =150°C		99.5		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		10.3		μC
			T _J =125°C		21.5		
			T _J =150°C		22.7		



E _{rec}	Reverse Recovery Energy	I _F =150A, -diF/dt=1245A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		2.8		mJ
			T _J =125°C		7.3		
			T _J =150°C		7.6		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.259	°C/W

Diode, 3-Level

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	200	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	400	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 =200A	T _J =25℃		1.70	2.00	V
			T _J =125℃		1.80		
			T _J =150℃		1.80		
t _{rr}	Reverse Recovery Time	I _F =200A, -diF/dt=2219A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		198		ns
			T _J =125℃		388		
			T _J =150℃		428		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		153		A
			T _J =125℃		184		
			T _J =150℃		188		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		17.7		μC
			T _J =125℃		33.3		
			T _J =150℃		36.4		
E _{rec}	Reverse Recovery Energy		T _J =25℃		7.0		mJ
			T _J =125℃		13.0		
			T _J =150℃		14.3		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.193	℃/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	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	4500			V
	RMS, f=50Hz, 30s				
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:M6	3.0		5.0	N·m
T	Mounting Screw:M6	4.0		6.0	N·m
G	Weight		345		g



Ordering Information Table

Device code

G	T	200	TL	120	T2S	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (200=200A)
- ④ - Circuit Configuration: (Three Level, I Type)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

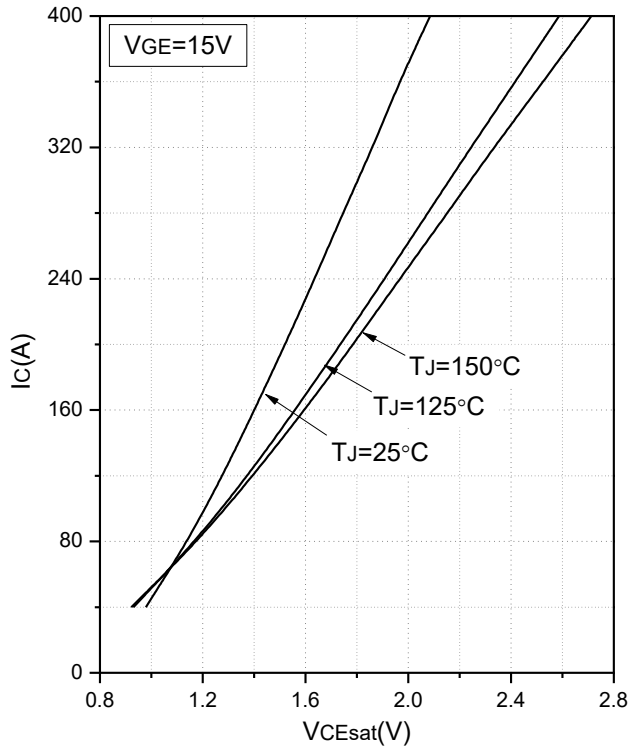


Fig.1 Typical Saturation Voltage Characteristics

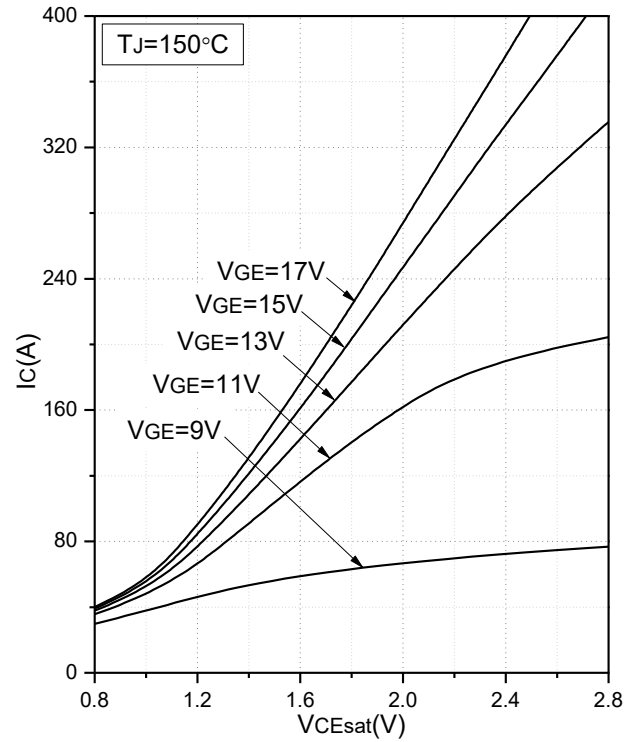


Fig.2 Typical Output Characteristics

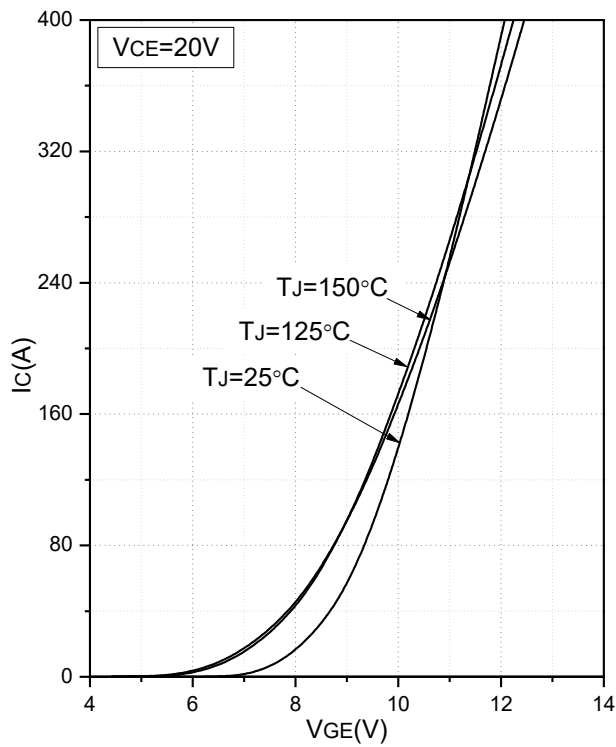


Fig.3 Transfer Characteristic

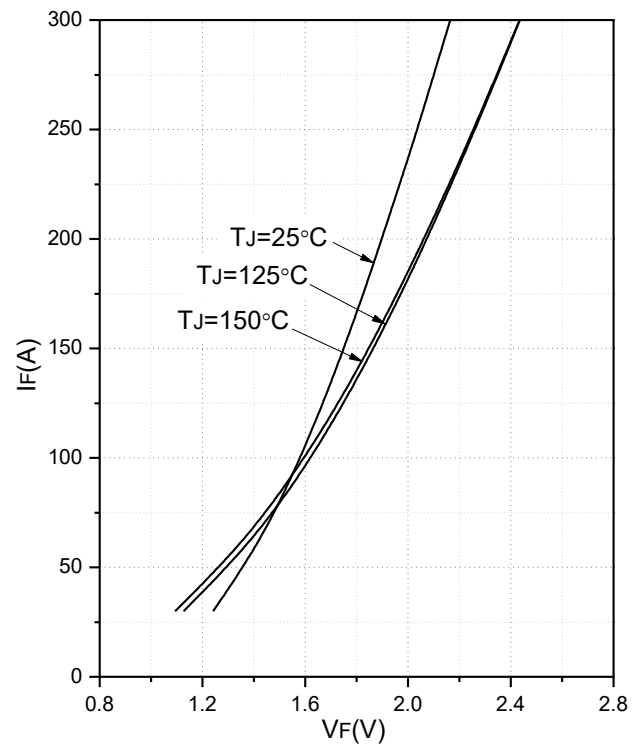


Fig.4 Forward Characteristics of Diode(Reverse)

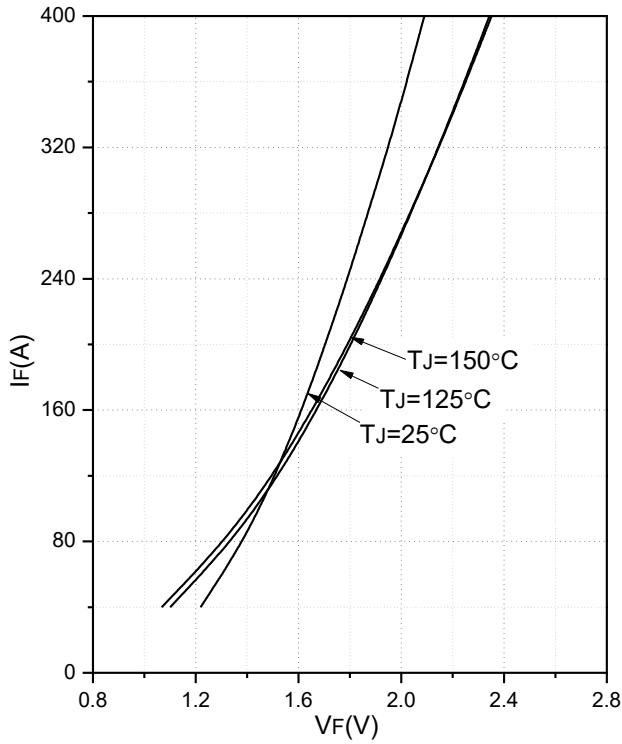


Fig.5 Forward Characteristics of Diode(3-Level)

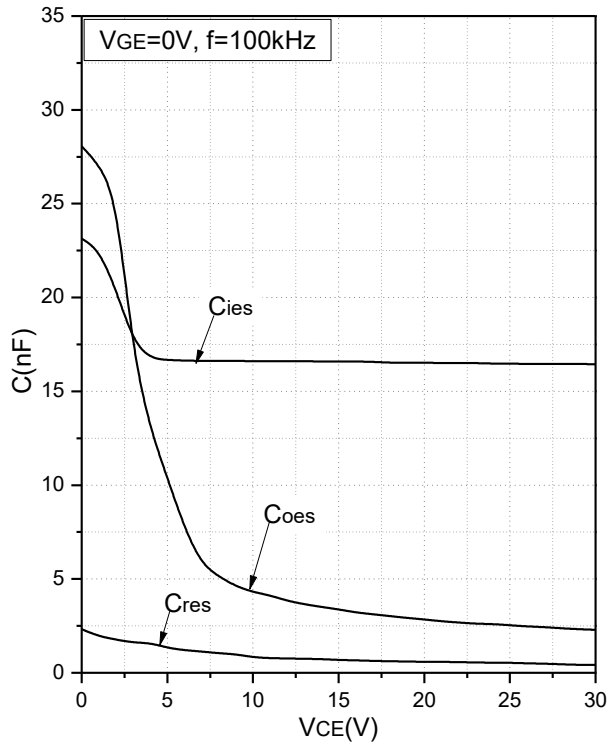


Fig.6 Capacitance Characteristics

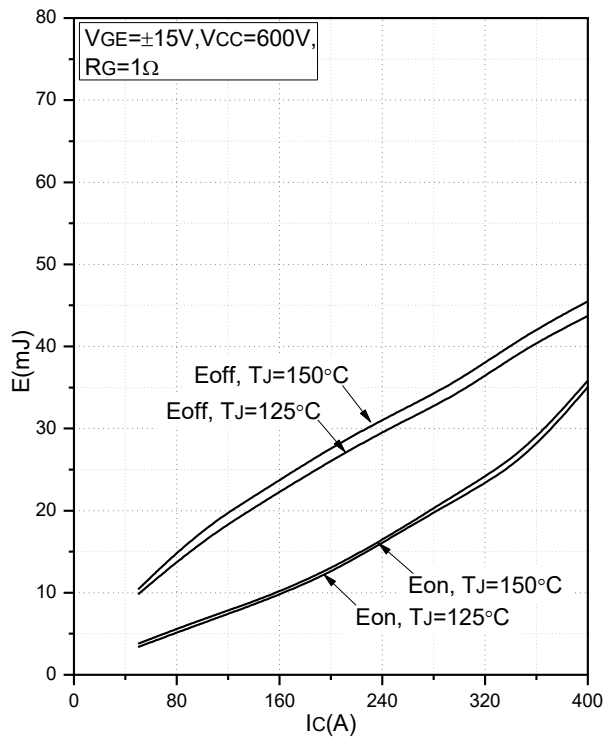


Fig.7 Typical Switching Loss vs. Collector Current

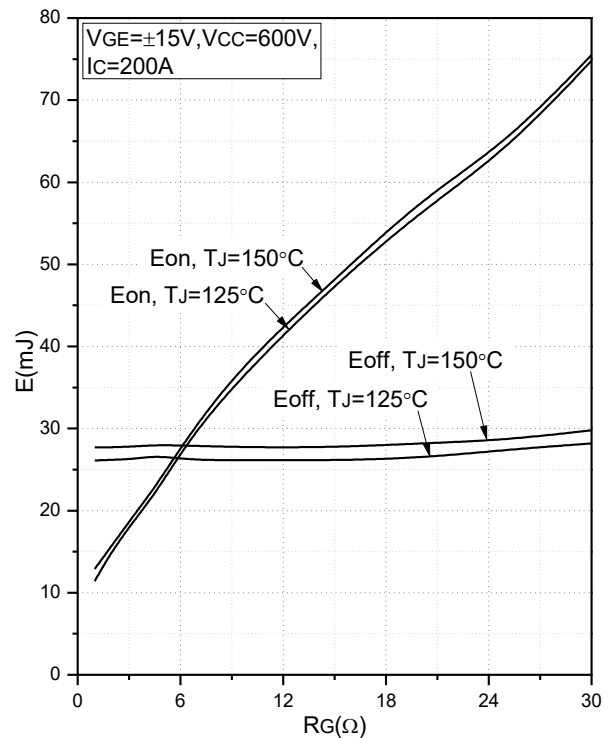


Fig.8 Typical Switching Loss vs. Gate Resistance

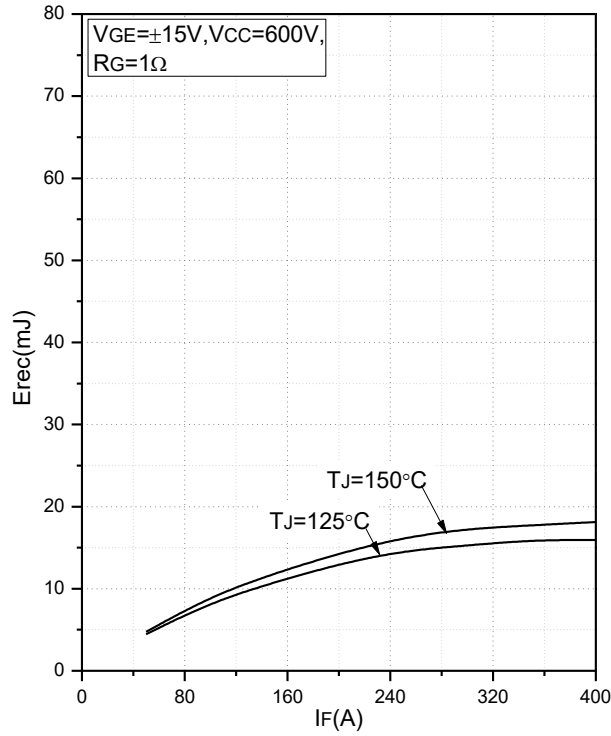


Fig.9 Typical Switching Loss vs. Forward Current

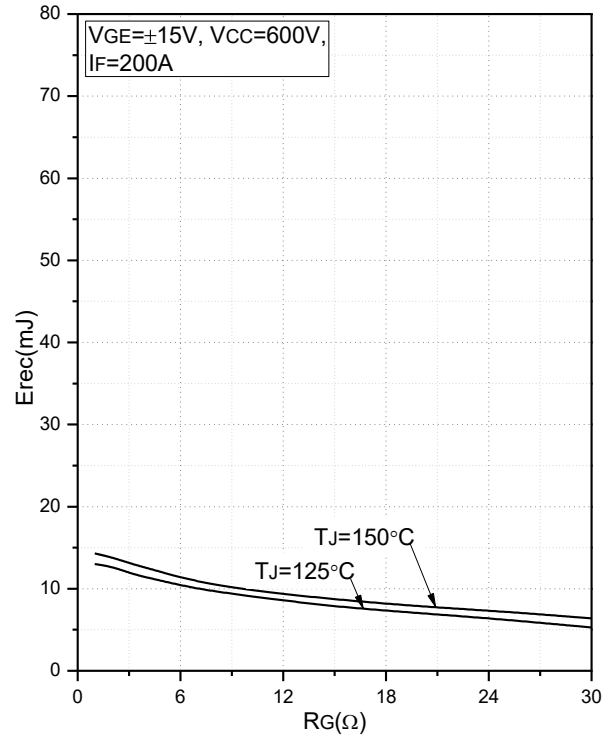


Fig.10 Typical Switching Loss vs. Gate Resistance

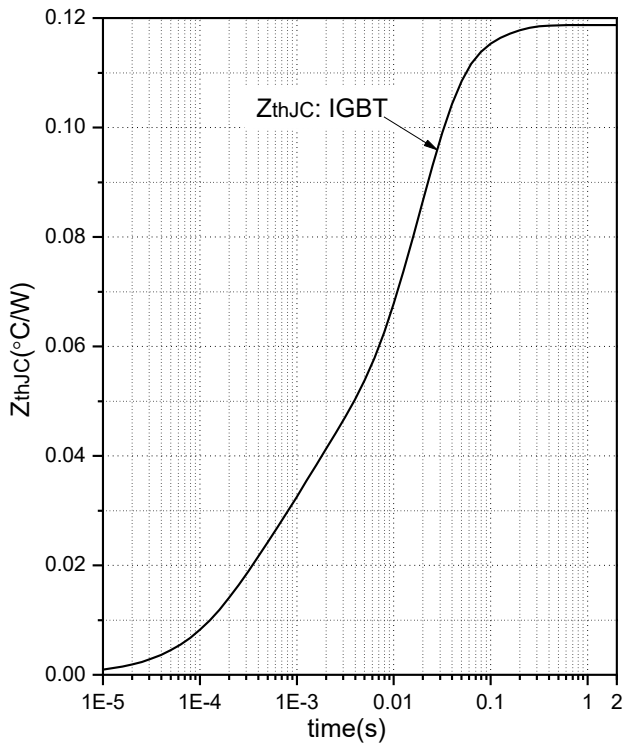


Fig.11 Transient Thermal Impedance (IGBT)

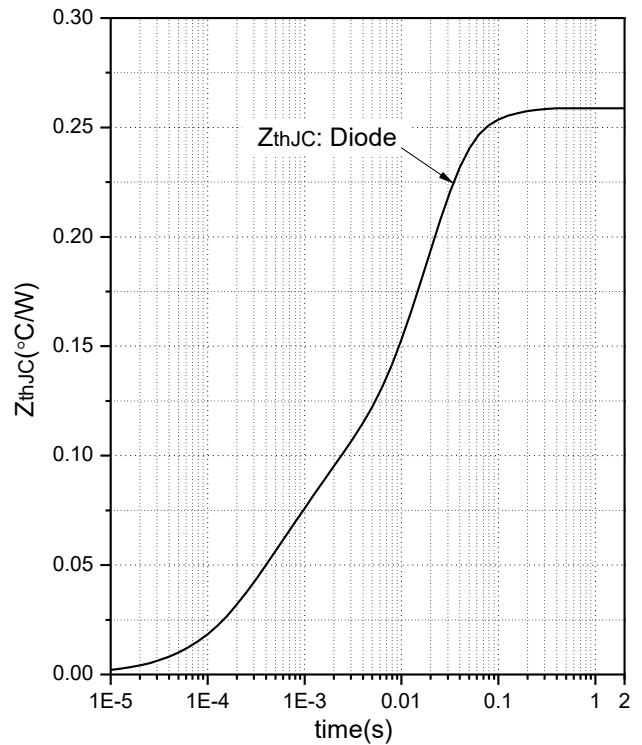


Fig.12 Transient Thermal Impedance (Diode)

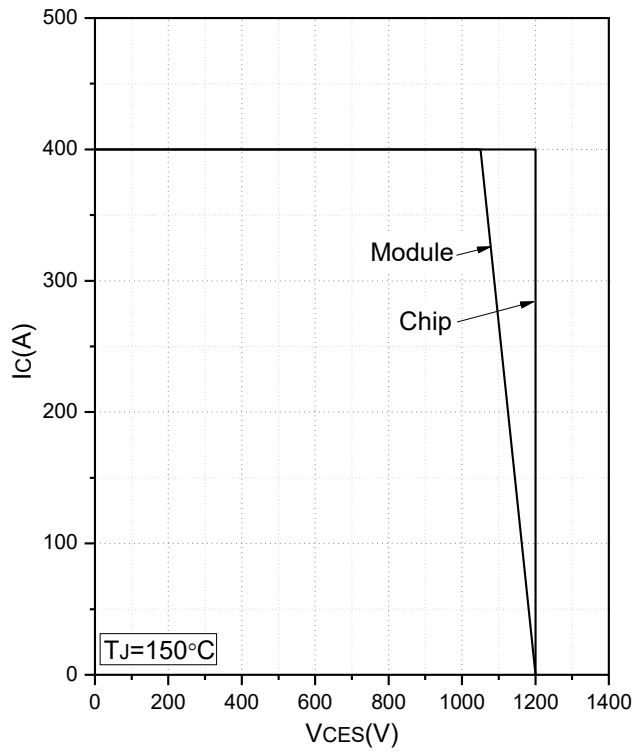


Fig.13 Reverse Bias Safe Operation Area (RBSOA)

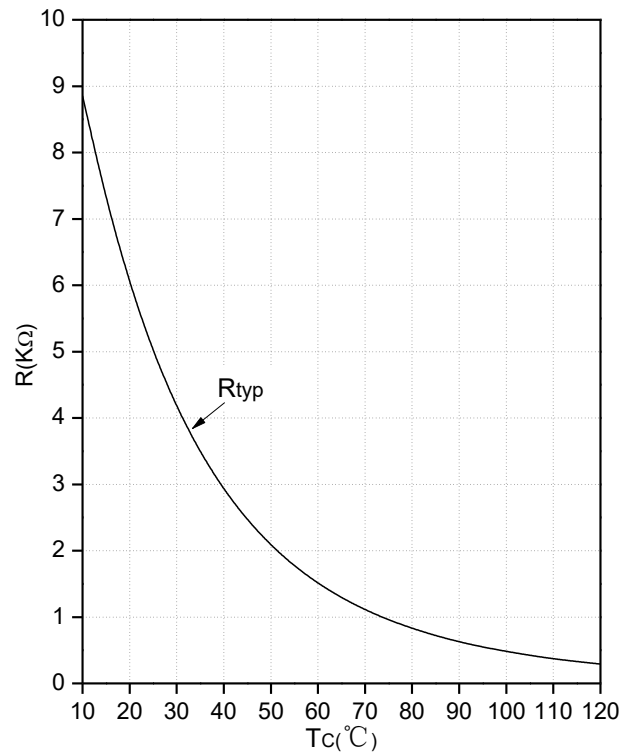
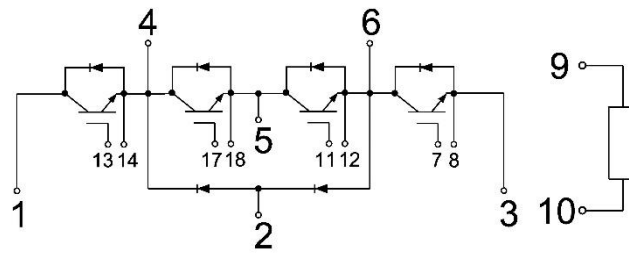


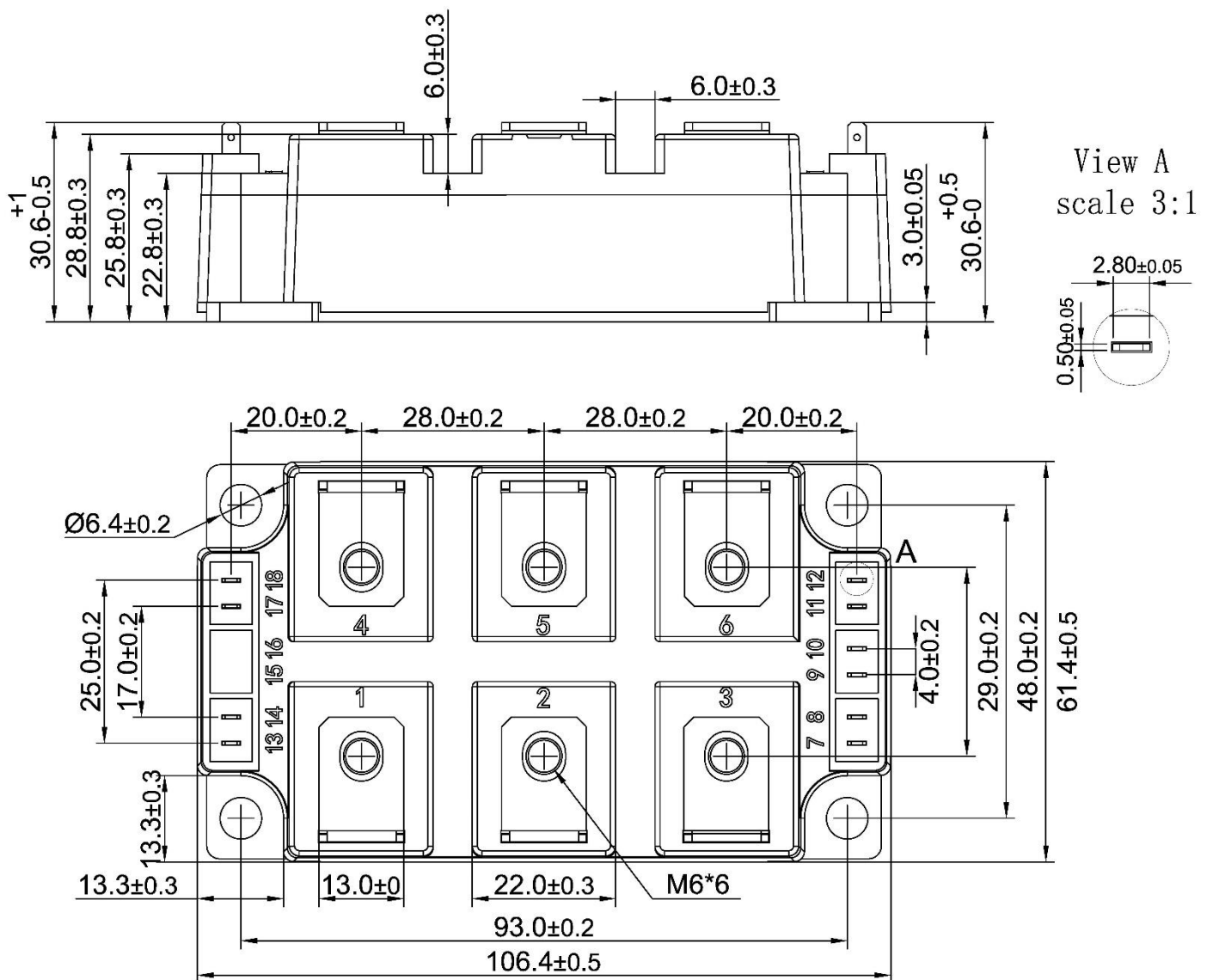
Fig.14 NTC Temperature Characteristics



Internal Circuit



Package Outline (Unit: mm):





Date	Revision	Notes
05/16/2024	A	Final Version
07/11/2024	B	Update Circuit Diagram and Package Outline

Announcements

Information in this document is believed to be accurate and reliable. However, NJSME does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to Make Changes

NJSME reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

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