



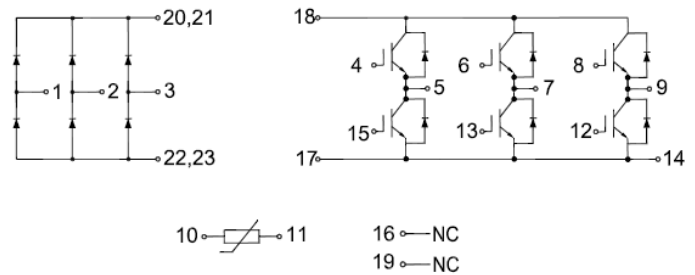
HV25RFF120T5HT4MD

IGBT Module

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated $>10\mu\text{s}$
- 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, Inverter

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	$T_C=100^\circ\text{C}$	25	A
		$T_C=25^\circ\text{C}$	50	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	50	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	237	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	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5.3	5.8	6.3	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.75	2.10	V
			$T_J=125^{\circ}\text{C}$	2.15		
			$T_J=150^{\circ}\text{C}$	2.20		
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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_J=25^{\circ}\text{C}$		1.65		nF
C_{oes}	Output Capacitance			0.17		
C_{res}	Reverse Transfer Capacitance			0.03		

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		40		ns
			T _J =125℃		38		
			T _J =150℃		38		
t _r	Rise Time		T _J =25℃		52		ns
			T _J =125℃		54		
			T _J =150℃		56		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =25A, R _{Goff} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		174		ns
			T _J =125℃		174		
			T _J =150℃		184		
t _f	Fall Time		T _J =25℃		84		ns
			T _J =125℃		248		
			T _J =150℃		254		
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, di/dt=444A/μs(T _J =150℃), Inductive Load	T _J =25℃		3.07		mJ
			T _J =125℃		3.88		
			T _J =150℃		4.68		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =25A, R _{Goff} =20Ω, V _{GE} =±15V, du/dt=4947V/μs(T _J =150°C), Inductive Load	T _J =25°C		1.98		mJ
			T _J =125°C		2.26		
			T _J =150°C		2.45		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		129		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =±15V, t _p =10us, R _{Gon} =20Ω, R _{Goff} =20Ω, T _J =150°C				100		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.633	°C/W

Diode, Inverter

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	25	A
I _{FM}	Peak Diode Current Repetitive	t _p =1ms	50	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 =25A	T _J =25℃		1.65		V
			T _J =125℃		1.70		
			T _J =150℃		1.70		
I _{rr}	Peak Reverse Recovery Current	I _F =25A, di/dt=548A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		20.4		A
			T _J =125℃		20.9		
			T _J =150℃		21.8		
t _{rr}	Reverse Recovery Time		T _J =25℃		320		ns
			T _J =125℃		396		
			T _J =150℃		620		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		3.5		μC
			T _J =125℃		5.0		
			T _J =150℃		6.7		



E _{rec}	Reverse Recovery Energy	I _F =40A, di/dt=548A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		1.10		mJ
			T _J =125°C		1.72		
			T _J =150°C		2.48		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.804	°C/W

Diode, Rectifier

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1800	V
I _{FRMSM}	Maximum RMS Forward Current per Chip	T _J =80°C	50	A
I _{RMSM}	Maximum RMS Current at Rectifier Output	T _J =80°C	60	A
I _{FSM}	Surge Current @t _p =10ms	T _J =25°C	380	A
		T _J =150°C	315	
I ² t	I ² t - value	T _J =25°C	722	A ² s
		T _J =150°C	496	

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =25A	T _J =25°C		1.05		V
			T _J =125°C		1.00		
I _R	Reverse Current	V _R =1600V	T _J =25°C			1	mA
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.717	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	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



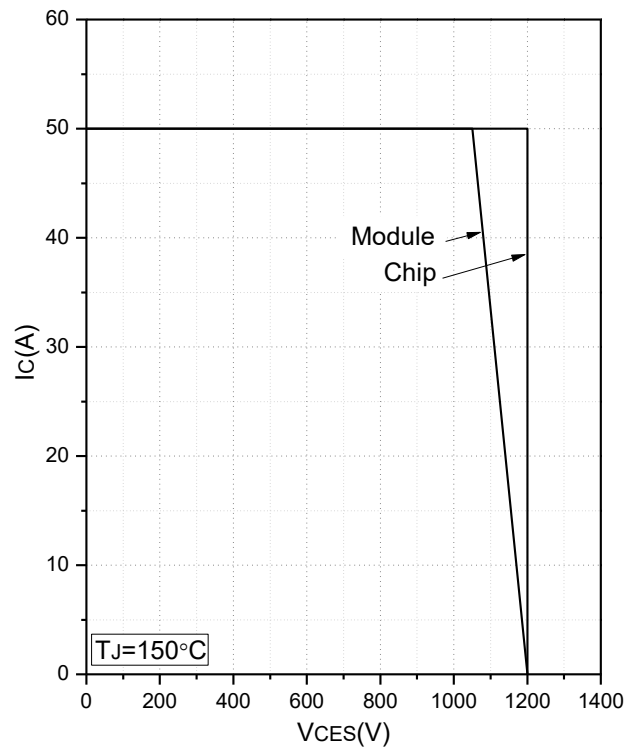
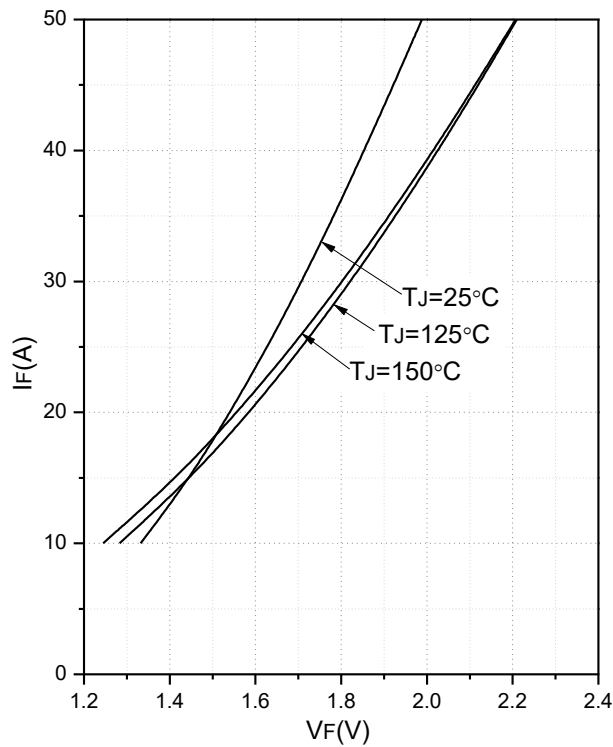
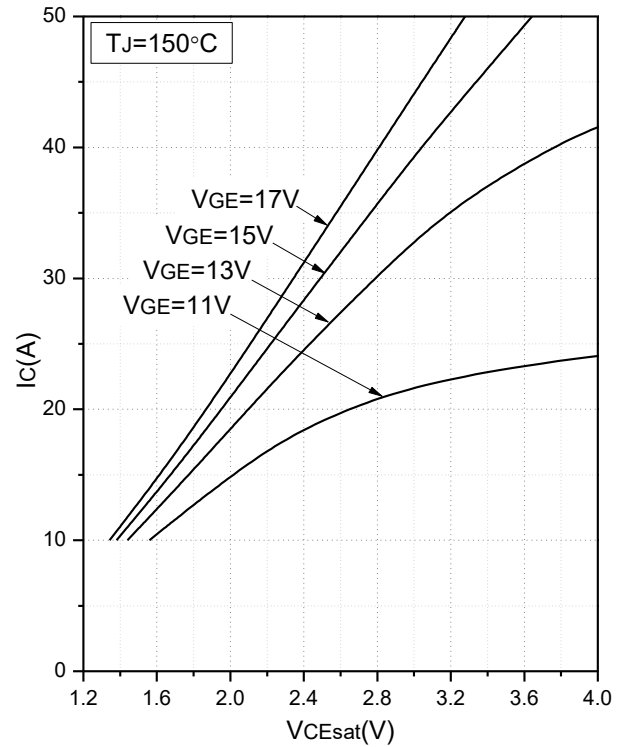
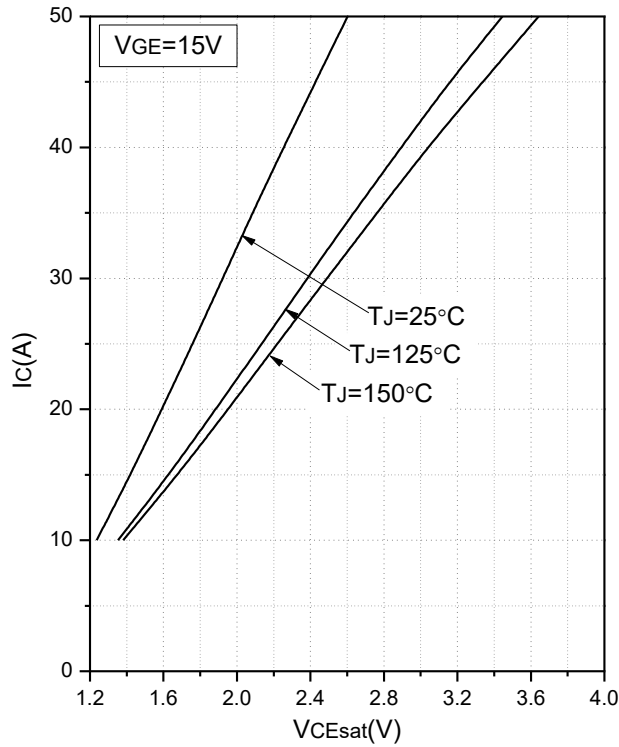
Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1minute	2500			V
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:M5		3.0		6.0	N·m
G	Weight			180		g

Ordering Information Table

Device code	HV	25	RFF	120	T5	H	T4	MD
	①	②	③	④	⑤	⑥	⑦	⑧

- ① - Application Area
- ② - Rated Current (25=25A)
- ③ - Circuit Configuration: RFF (Rectifier +Full Bridge)
- ④ - Rated Voltage (120=1200V)
- ⑤ - Package Type
- ⑥ - Test Level (Pass the Important Reliability Test-Industrial Grade)
- ⑦ - Internal Control Code
- ⑧ - Particularity of the Module



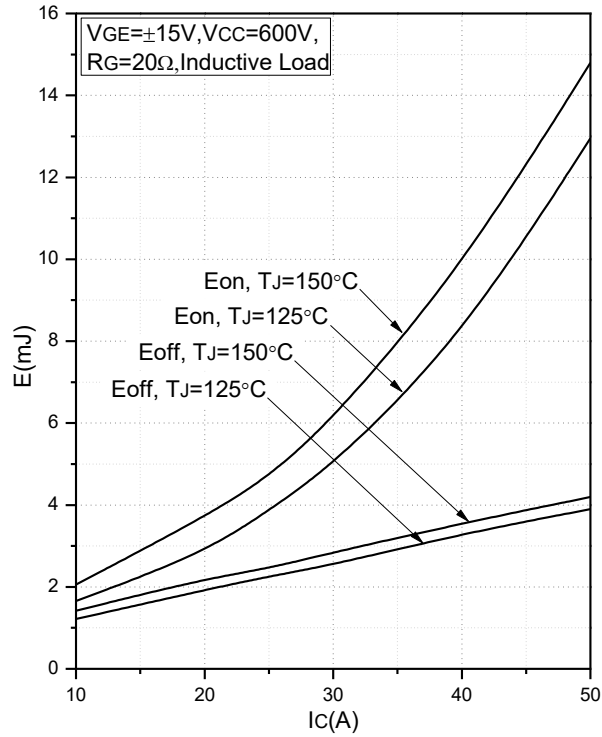


Fig.5 Typical Switching Loss vs. Collector Current (Inverter)

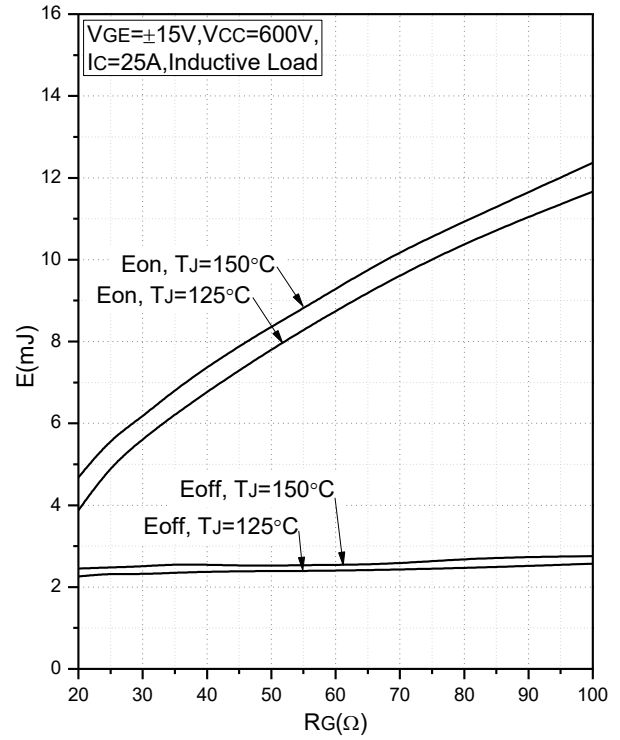


Fig.6 Typical Switching Loss vs. Gate Resistance (Inverter)

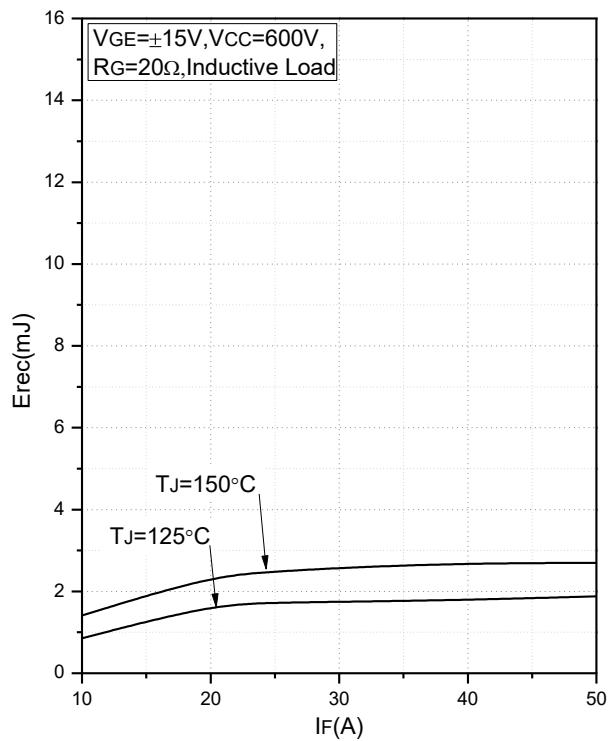


Fig.7 Typical Switching Loss vs. Forward Current (Inverter)

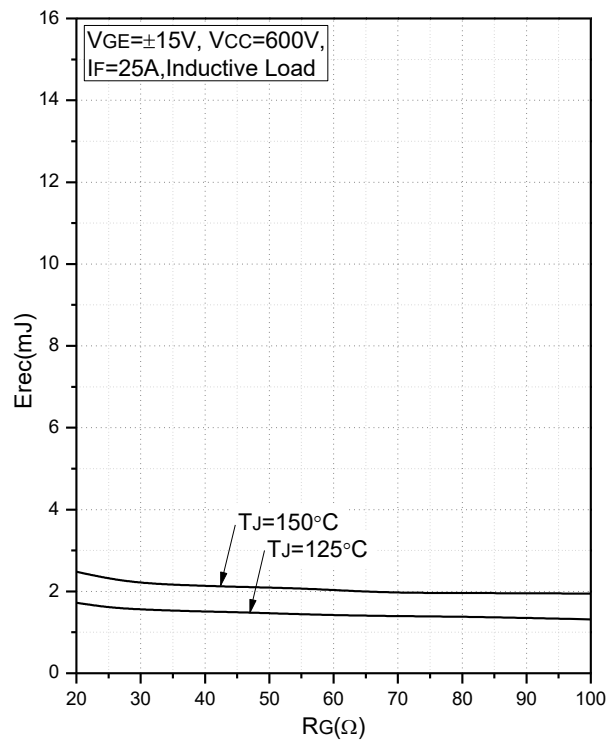


Fig.8 Typical Switching Loss vs. Gate Resistance (Inverter)

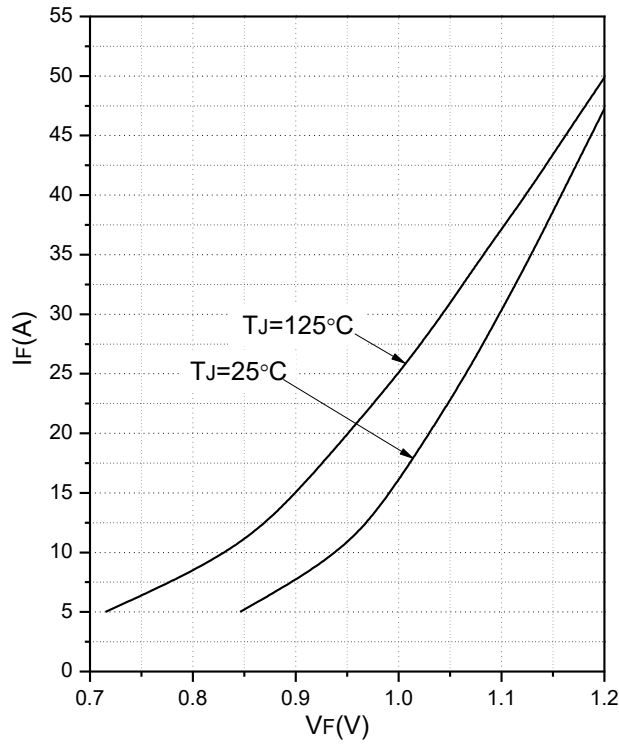


Fig.9 Forward Characteristics of Diode (Rectifier)

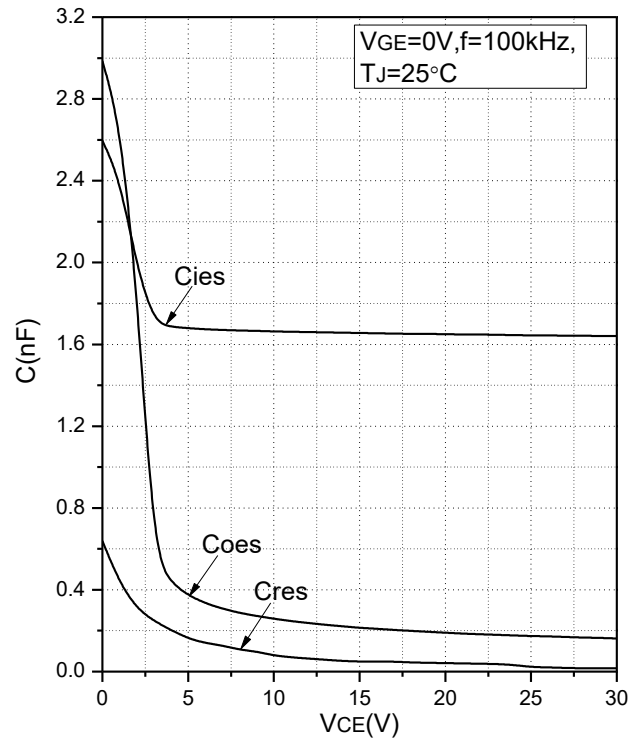


Fig.10 Capacitance Characteristics

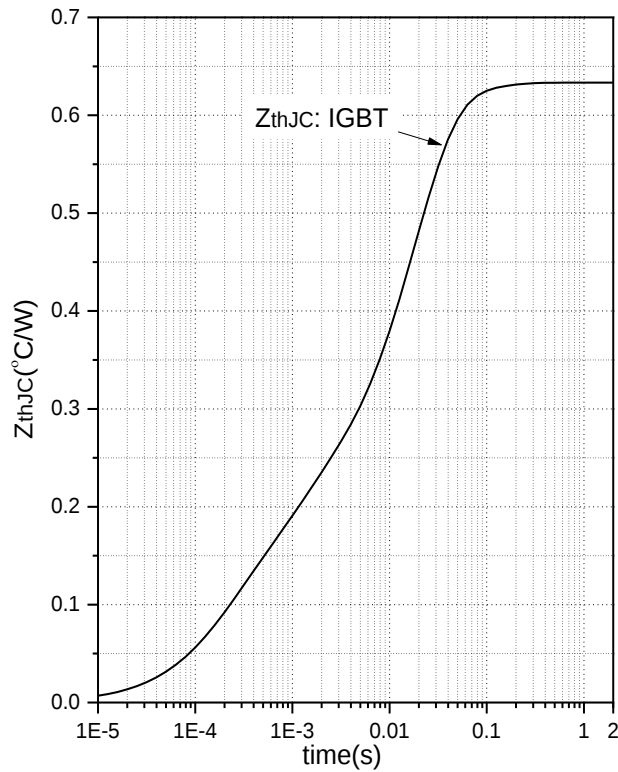


Fig.11 Transient Thermal Impedance (Inverter-IGBT)

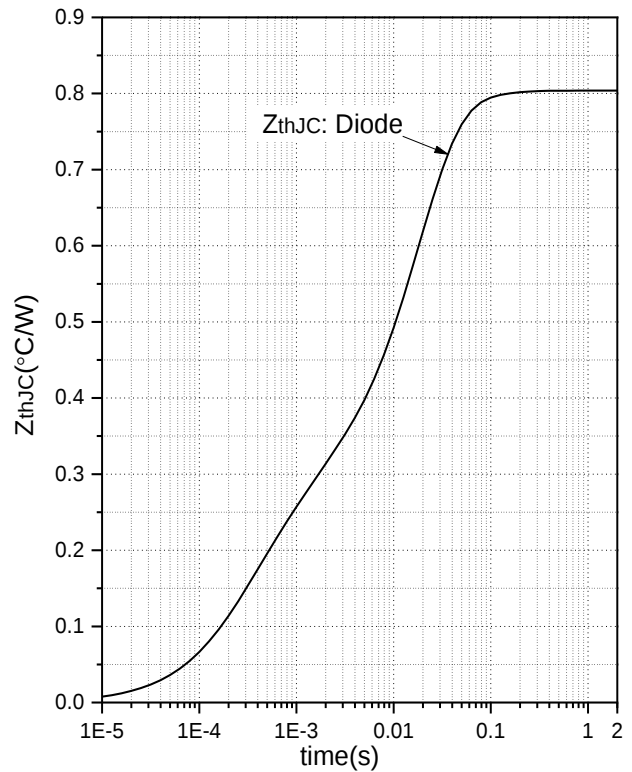


Fig.12 Transient Thermal Impedance (Inverter-Diode)

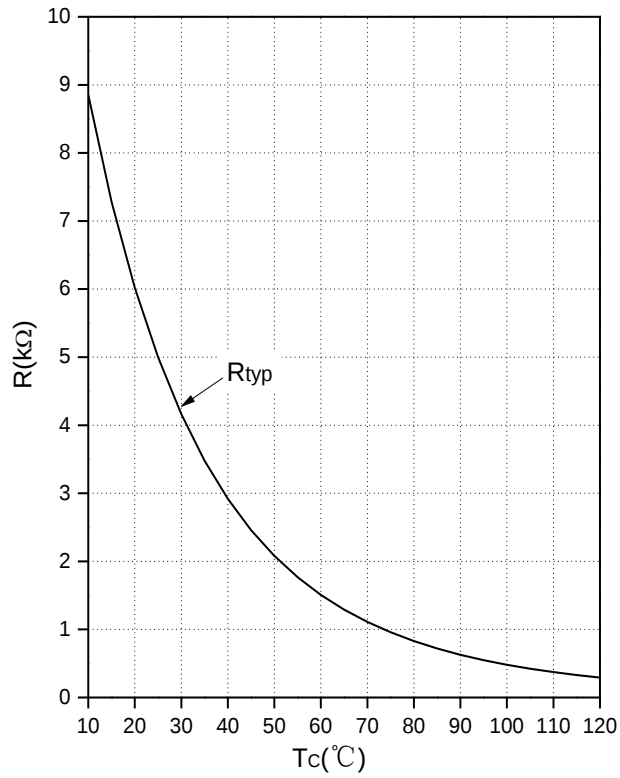
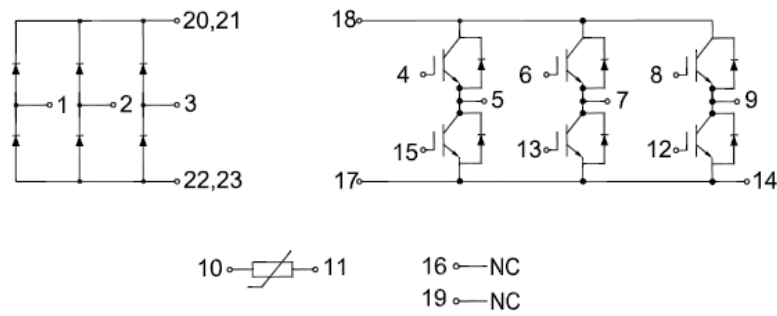


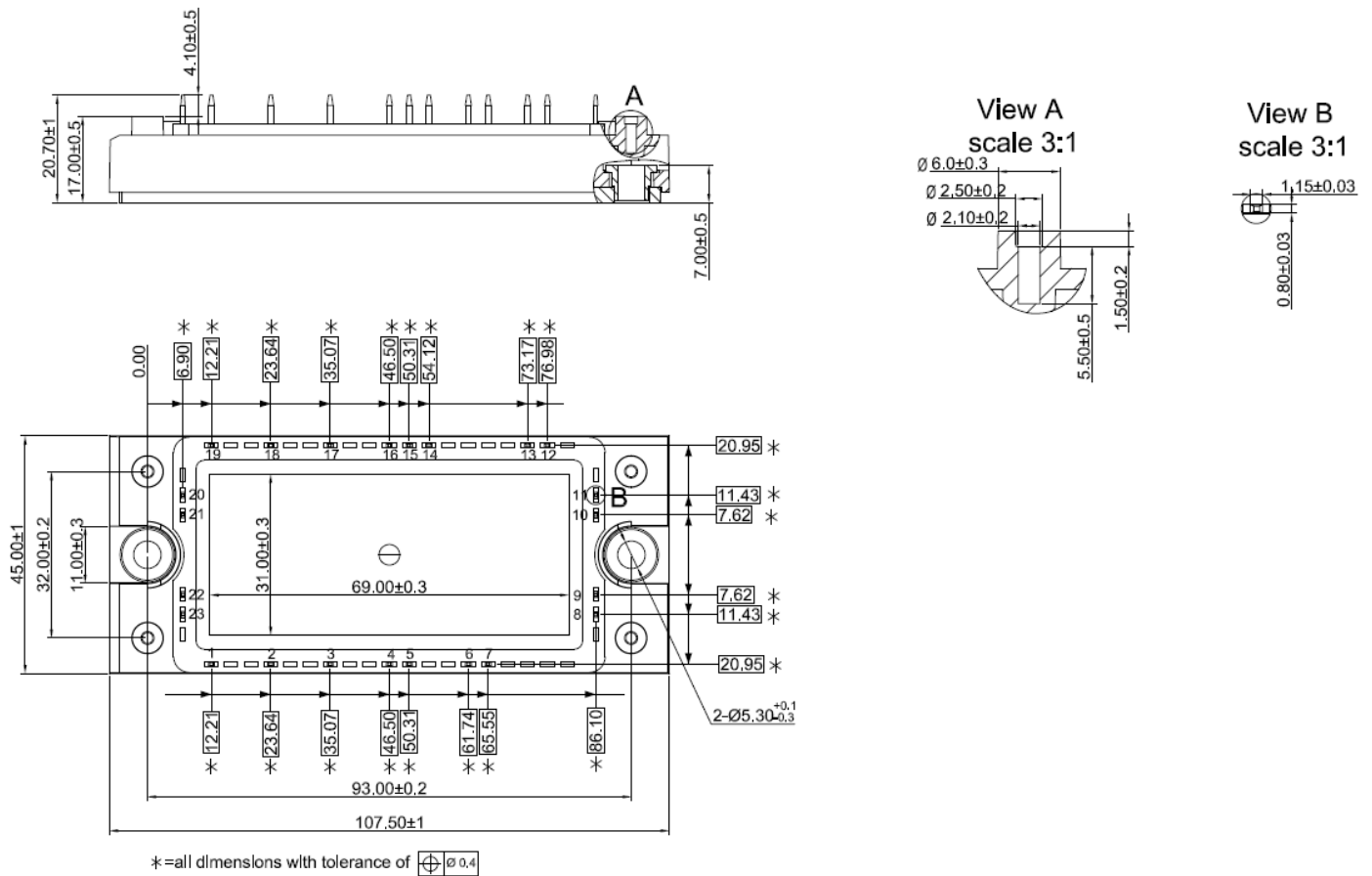
Fig.13 NTC Temperature Characteristics



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release
A	Final Version

Announcement

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”.