

G600HF120-D9

FEATURES

- ▶ 1200V 600A, $V_{CE(sat)}(typ.) = 1.7V$
- ▶ Lower losses and higher energy
- ▶ Excellent short circuit ruggedness
- ▶ Standard Housing

APPLICATIONS

IGBTs offer lower losses and higher energy for application such as motor drive、UPS systems、Servo drives、High power converters and other soft switching applications.



Absolute Maximum Ratings of IGBT

V_{CES}	Collector to Emitter Voltage		1200	V
V_{GES}	Continuous Gate to Emitter Voltage		± 30	V
I_C	Continuous DC Collector Current	$T_{vjmax} = 175^{\circ}C$	600	A
I_{cpk}	Peak Collector Current	$t_p = 1ms$	1200	A
P_D	Maximum Power Dissipation (IGBT)	$T_C = 25^{\circ}C,$ $T_{vj} = 150^{\circ}C$	1506	W
t_{sc}	Short Circuit Withstand Time		> 10	μs
T_{vj}	Maximum IGBT Junction Temperature		175	$^{\circ}C$
T_{vjop}	Temperature underswitching conditions		-40 to +150	$^{\circ}C$
T_{stg}	Storage Temperature Range		-40 to +125	$^{\circ}C$

Absolute Maximum Ratings of Freewheeling Diode

V_{RRM}	Repetitive Peak Reverse Voltage	$T_{vj} = 25^{\circ}C$	1200	V
I_F	Diode Continuous Forward Current	$T_{vjmax} = 175^{\circ}C$	600	A
I_{FM}	Diode Maximum Forward Current	$t_P = 1ms$	1200	A
I^2t	I^2t Value	$V_r=0V, t_p=10ms, T_{vj}=125^{\circ}C$ $V_r=0V, t_p=10ms, T_{vj}=175^{\circ}C$	41000 38000	A^2S

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Electrical Characteristics of IGBT at $T_{vj} = 25^{\circ}\text{C}$ (Unless Otherwise Specified)

Parameter		Test Conditions		Min	Typ	Max	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE}=0V, T_{vj}=25^{\circ}\text{C}$		1200			V
I_{CES}	Collector-emitter cut-off current	$V_{GE}=0V, V_{CE}=1200V, T_{vj}=25^{\circ}\text{C}$				3	mA
I_{GES}	Gate to Emitter Leakage Current	$V_{GE}=\pm 30V, V_{CE}=0V, T_{vj}=25^{\circ}\text{C}$				400	nA
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=20mA, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$		5.0		6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Module Level)	$I_C=600A, V_{GE}=15V$	$T_{vj}=25^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$		1.7 2.0	2.0	V

Switching Characteristics of IGBT

Parameter		Test Conditions		Min	Typ	Max	Unit
td(on)	Turn-on Delay Time	VCC = 600V IC = 600A VGE = ±15V Rgon/RGoff=2Ω	Tvj = 25°C		232		ns
			Tvj = 125°C		235		
			Tvj = 150°C		245		
tr	Turn-on Rise Time		Tvj = 25°C		150		ns
			Tvj = 125°C		175		
			Tvj = 150°C		185		
td(off)	Turn-off Delay Time		Tvj = 25°C		480		ns
			Tvj = 125°C		530		
			Tvj = 150°C		540		
tf	Turn-off Fall Time		Tvj = 25°C		135		ns
			Tvj = 125°C		285		
			Tvj = 150°C		365		
Eon	Turn-on Switching Loss		Tvj = 25°C		55		mJ
			Tvj = 125°C		88		
			Tvj = 150°C		95		
Eoff	Turn-off Switching Loss		Tvj = 25°C		80		mJ
			Tvj = 125°C		102		
			Tvj = 150°C		105		
Qg	Total Gate Charge	Vge = ±15 V, Vce = 600 V			5.6		uC
Rgint	Integrated gate resistor	Tvj = 25°C			1.3		Ω

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Switching Characteristics of IGBT (continued)

C _{ies}	Input Capacitance	V _{ce} =25V, V _{ge} =0V, f=1MHz, T _{vj} = 25°C	110		
C _{oes}	Output Capacitance	V _{ce} =25V, V _{ge} =0V, f=1MHz, T _{vj} = 25°C	3.0		nF
C _{res}	Reverse Transfer Capacitance	V _{ce} =25V, V _{ge} =0V, f=1MHz, T _{vj} = 25°C	1.0		
ISC	SC data	V _{ge} ≤15V, V _{cc} =600V, T _{vj} = 150°C	4000		A
R _{thJH}	Thermal resistance, junction to heatsink			0.083	°C/W

Electrical and Switching Characteristics of Freewheeling Diode

Vf	Diode Forward Voltage	If=600A,Vge=0V	Tvj = 25°C		1.8		V
			Tvj = 125°C		1.75		
			Tvj = 150°C		1.7		
trr	Diode Reverse Recovery Time	IF = 600A, di/dt=3600A/μs, Vrr = 600V, VGE = -15V	Tvj = 25°C		390		ns
			Tvj = 125°C		655		
			Tvj = 150°C		725		
Irr	Diode Peak Reverse Recovery Current		Tvj = 25°C		200		A
			Tvj = 125°C		275		
			Tvj = 150°C		300		
Qrr	Diode Reverse Recovery Charge		Tvj = 25°C		38		uC
			Tvj = 125°C		90		
			Tvj = 150°C		110		
Err	Diode Reverse Recovery Energy		Tvj = 25°C		17		mJ
			Tvj = 125°C		40		
			Tvj = 150°C		48		
RthJH	Thermal resistance,junction to heatsink(Diode)				0.141		°C/W

Characteristic Values of NTC-Thermistor

Parameter	Test Conditions	Min	Typ	Max	Unit
R ₂₅	T _{NTC} =25°C		5		kΩ
△R/R	T _{NTC} =100°C, R ₁₀₀ =481Ω	-5		5	%
P ₂₅	T _{NTC} =25°C			20	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

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Module Characteristics

Parameter		Min.	Typ.	Max.	Unit
V_{iso}	RMS, f = 50Hz, t = 1min		3.4		Kv
$R_{\theta CS}$	Case-To-Sink,per 1 module,Thermal grease applied		0.02		°C/W
L_{sCE}	Stray inductance module		20		nH
$R_{CC'+EE'}$	Internal lead resistance,Main terminals-chip,per switch,Tc=25°C		1		mΩ
M_t	Main terminals M6 Screw	3		6	N·m
M_s	Mounting to heat sink M5 Screw	3		6	N·m
G	Weight		345		g

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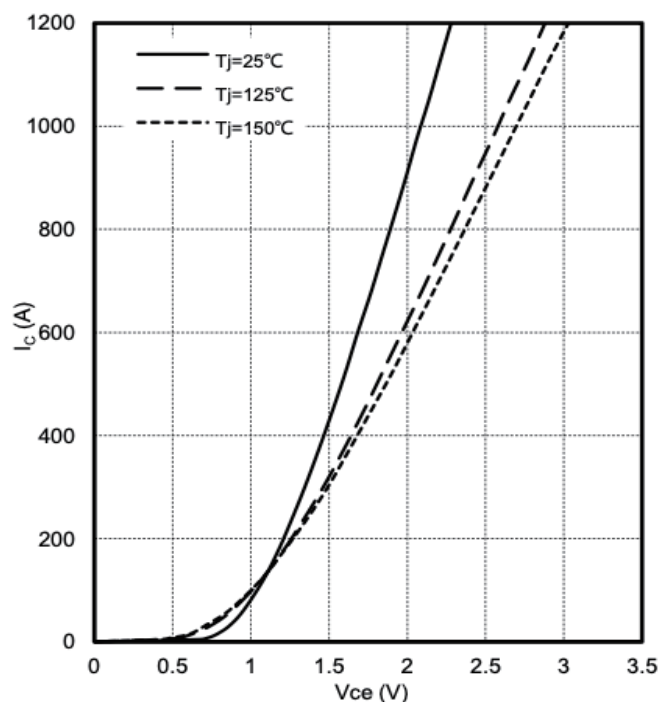


Fig.1 Output characteristic IGBT,
 $I_C = f(V_{ce}), V_{ge} = 15V$

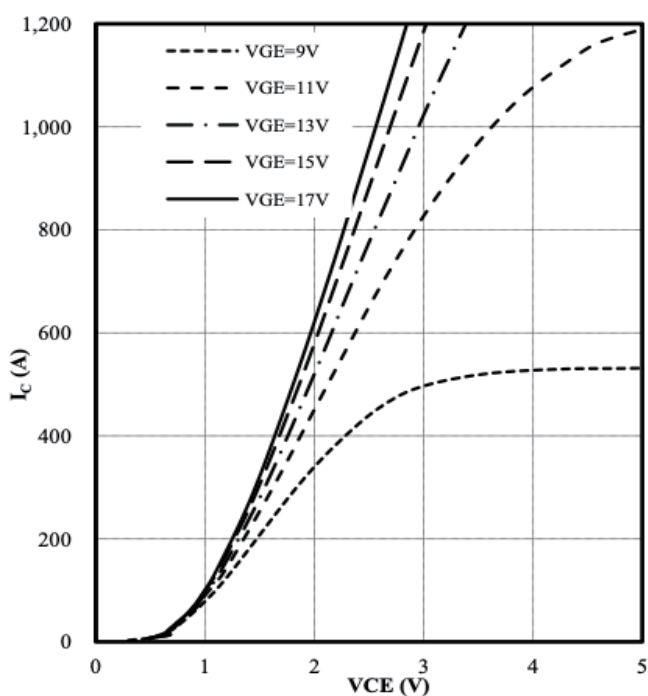


Fig.2 Output characteristic IGBT,
 $I_C = f(V_{ce}), T_{vj} = 150^\circ C$

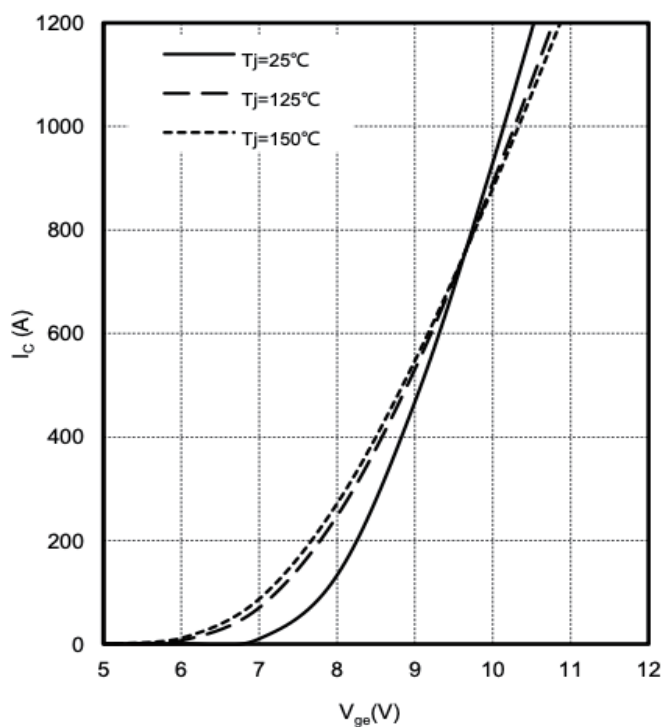


Fig.3 Transfer characteristic IGBT,
 $I_C = f(V_{ge}), V_{ce} = 20V$

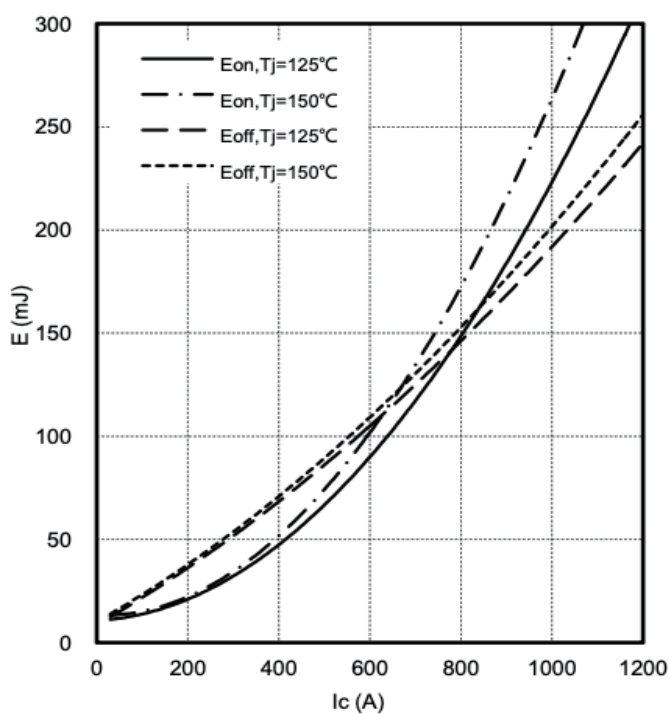


Fig.4 Switching losses IGBT, $E_{on} = f(I_C), E_{off} = f(I_C)$,
 $V_{ge} = \pm 15V, R_{gon} = 2\Omega, R_{goff} = 2\Omega, V_{ce} = 600V$

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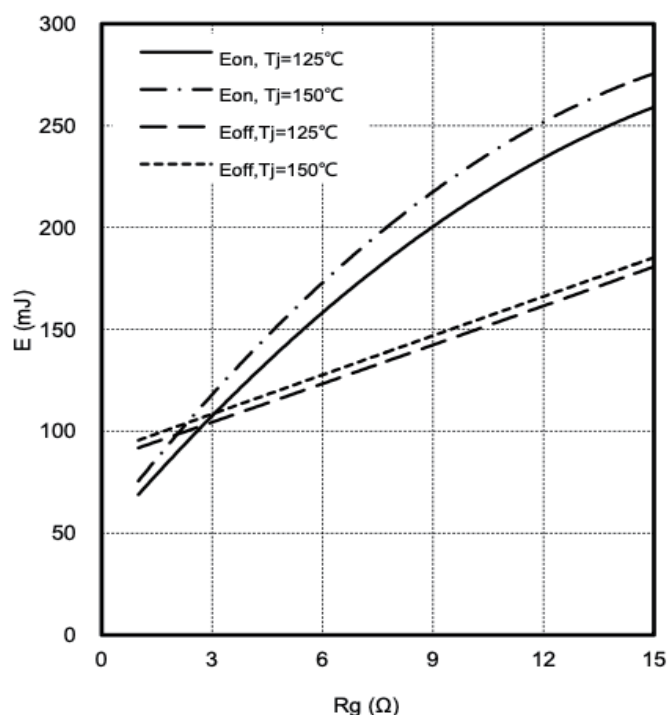


Fig.5 Switching losses IGBT, $E_{on}=f(R_g)$, $E_{off}=f(R_g)$, $V_{ge}=\pm 15\text{V}$, $I_c=600\text{A}$, $V_{ce}=600\text{V}$

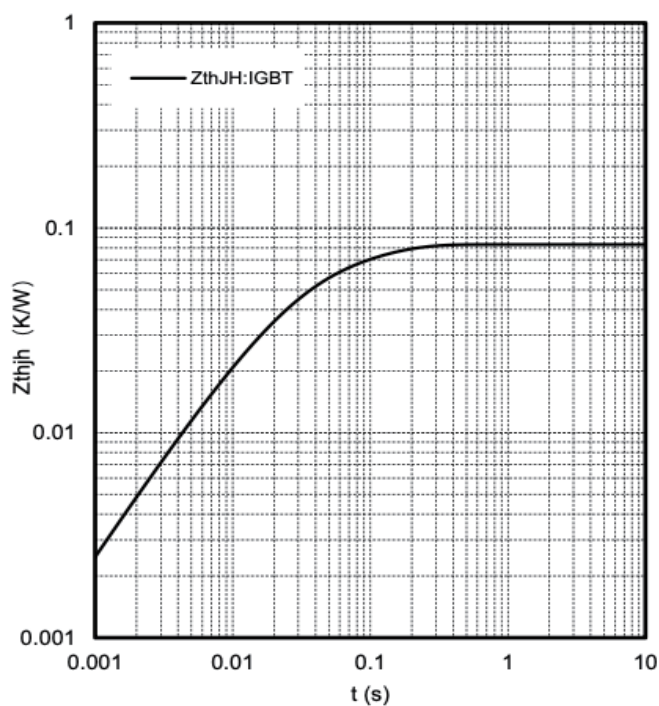


Fig.6 Transient thermal impedance IGBT, $Z_{thjc}=f(t)$

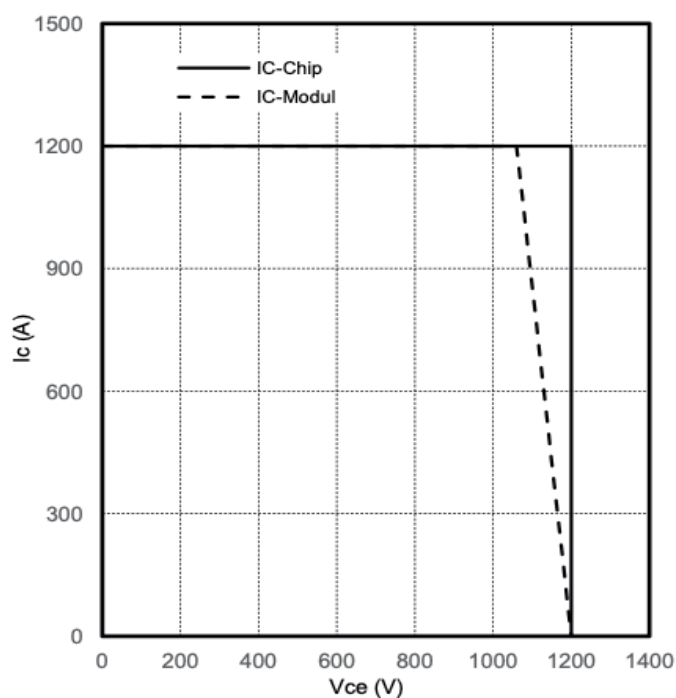


Fig.7 Reverse bias safe operating area IGBT, $I_c=f(V_{ce})$, $V_{ge}=\pm 15\text{V}$, $R_{goff}=2\Omega$, $T_{vj}=125^\circ\text{C}$

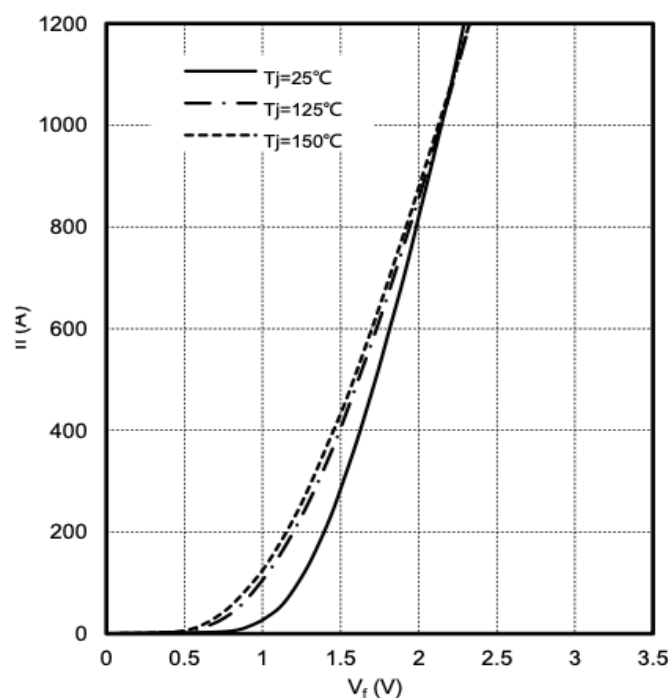


Fig.8 Forward characteristic of Diode, $I_f=f(V_f)$

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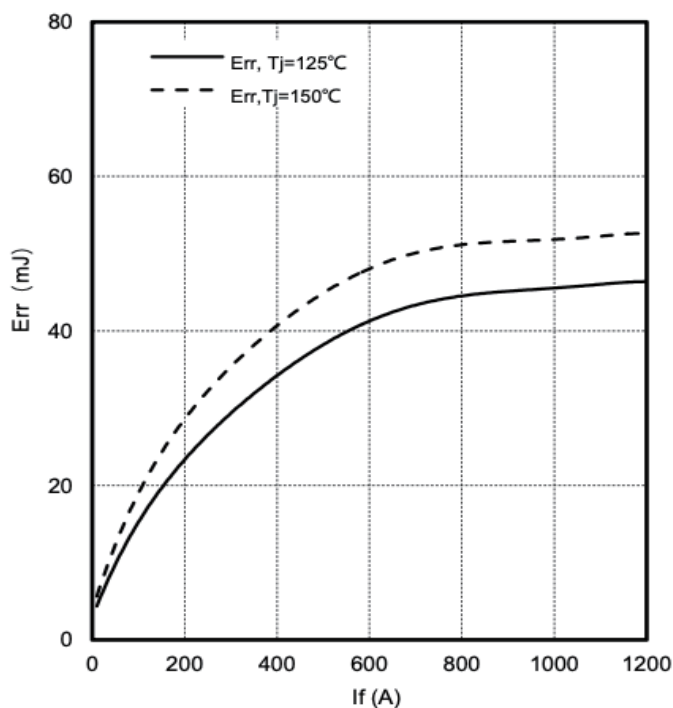


Fig.9 Switching losses Diode,
 $\text{Err} = f(\text{if}), R_{\text{gon}} = 2\Omega, V_{\text{ce}} = 600\text{V}$

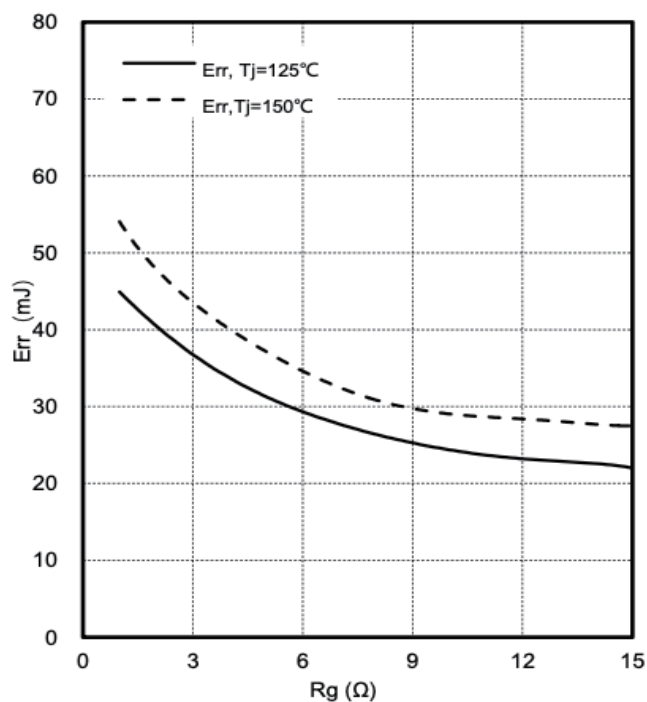


Fig.10 Switching losses Diode,
 $\text{Err} = f(R_g), I_f = 600\text{A}, V_{\text{ce}} = 600\text{V}$

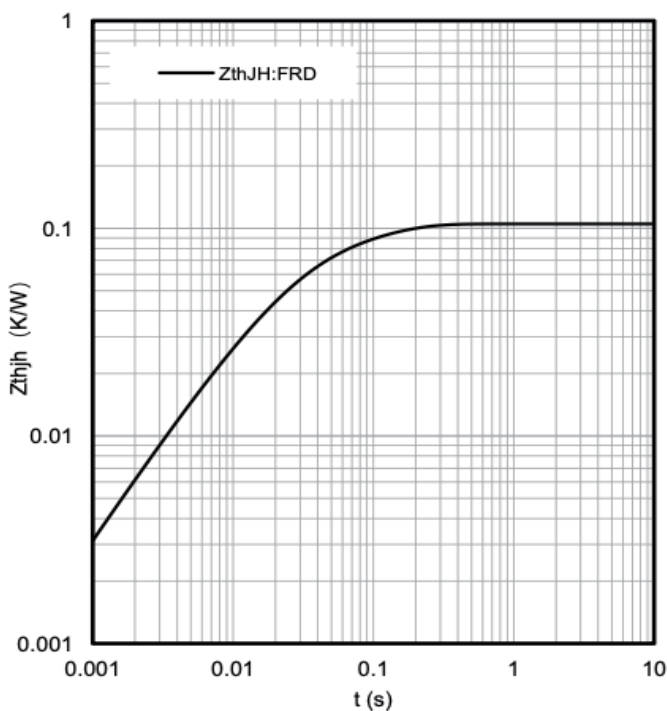


Fig.11 Transient thermal impedance Diode,
 $Z_{\text{thjc}} = f(t)$

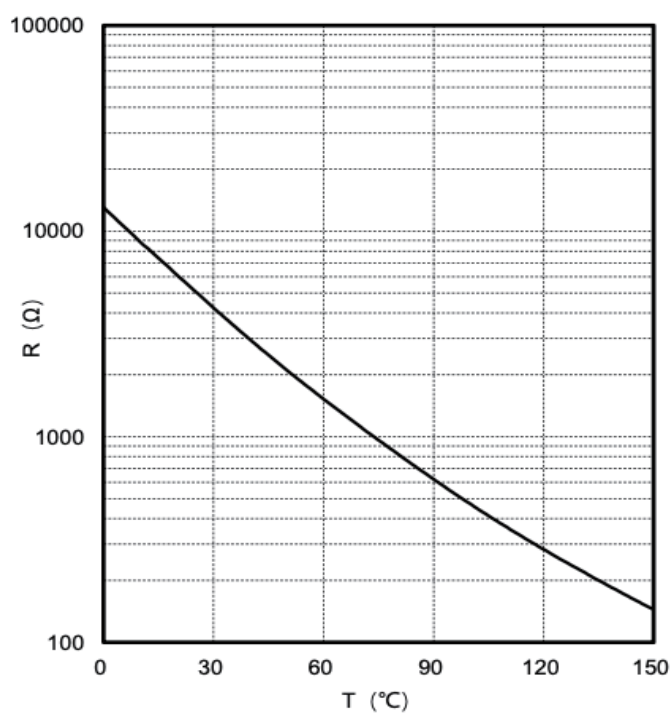
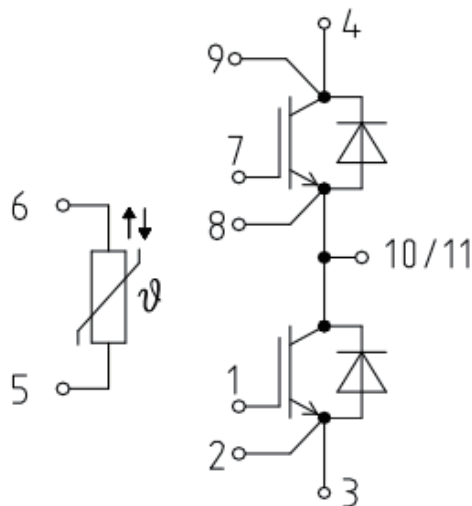


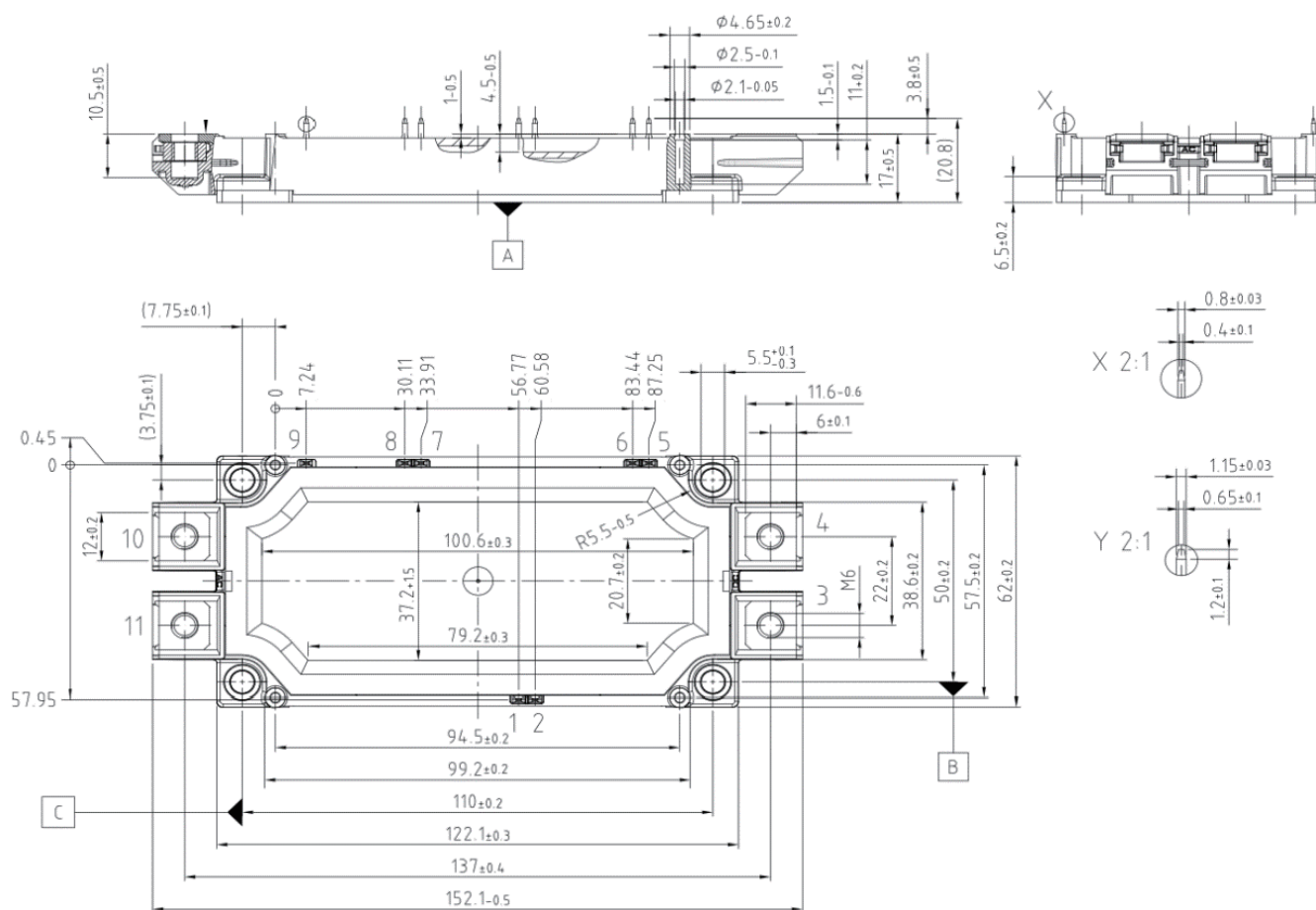
Fig.12 NTC-Thermistor-temperature
characteristic(typical)

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Internal Circuit:



Package Dimension
Dimensions in Millimeters



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