

IGBT Modules

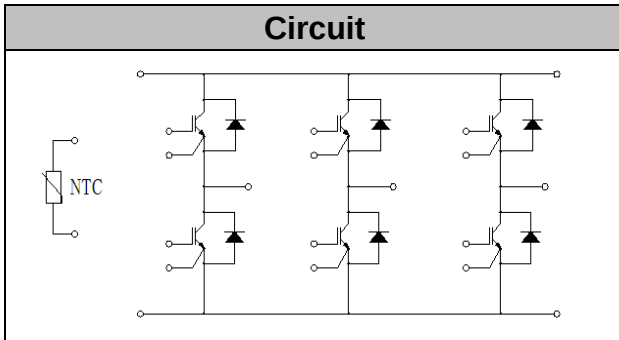


V_{CES} 1200V
 I_C 100A

Applications

- Motor Drivers
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)

Circuit



Features

- Low switching losses
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Maximum junction temperature 175°C

● IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	100	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	200	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	515	W



● IGBT

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=4mA, T_{vj}=25^{\circ}C$	5.0	5.8	6.5	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=100A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.85	2.30	V
		$I_C=100A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.15		
		$I_C=100A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.25		
Gate Charge	Q_G			0.78		uC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		6.8		nF
Reverse Transfer Capacitance	C_{res}			0.32		nF
Internal Gate Resistance	R_{gint}			7.5		Ω
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=100A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=2\Omega$ $T_{vj}=25^{\circ}C$		96		ns
Rise Time	t_r			42		ns
Turn-off Delay Time	$t_{d(off)}$			205		ns
Fall Time	t_f			230		ns
Energy Dissipation During Turn-on Time	E_{on}			8.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			7.5		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=100A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=2\Omega$ $T_{vj}=150^{\circ}C$		102		ns
Rise Time	t_r			49		ns
Turn-off Delay Time	$t_{d(off)}$			264		ns
Fall Time	t_f			323		ns
Energy Dissipation During Turn-on Time	E_{on}			12.7		mJ
Energy Dissipation During Turn-off Time	E_{off}			10.1		mJ
SC Data	I_{sc}	$t_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C,$ $V_{CC}=900V, V_{CEM} \leq 1200V$		400		A



● Diode

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC Forward Current	I_F		100	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	200	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=100\text{A}, T_{vj}=25^{\circ}\text{C}$		1.85	2.80	V
		$I_F=100\text{A}, T_{vj}=125^{\circ}\text{C}$		1.70		
		$I_F=100\text{A}, T_{vj}=150^{\circ}\text{C}$		1.65		
Recovered Charge	Q_{rr}	$I_F=100\text{A}$		8.9		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=1800\text{A}/\mu\text{s}$		66		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		3.26		mJ
Recovered Charge	Q_{rr}	$I_F=100\text{A}$		21.27		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=1800\text{A}/\mu\text{s}$		91		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		8.0		mJ

● NTC-Thermistor

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		k Ω
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K



● Module Characteristics

 $T_C=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Stray-inductance-module	L_{SCE}			21		nH
Module Lead Resistance, Terminals-chip	$R_{\text{CC}'+\text{EE}'}$	$T_C=25^{\circ}\text{C}$, per switch		1.9		m Ω
	$R_{\text{AA}'+\text{CC}'}$			1.5		
Thermal Resistance Junction to Case	$R_{\theta\text{JC}}$	per IGBT-inverter			0.29	K/W
		per Diode-inverter			0.50	
Thermal Resistance Case to Sink	$R_{\theta\text{CS}}$	per module		0.009		K/W
Mounting Force Per Clamp	F		3.0		6.0	N
Weight of Module	G			300		g

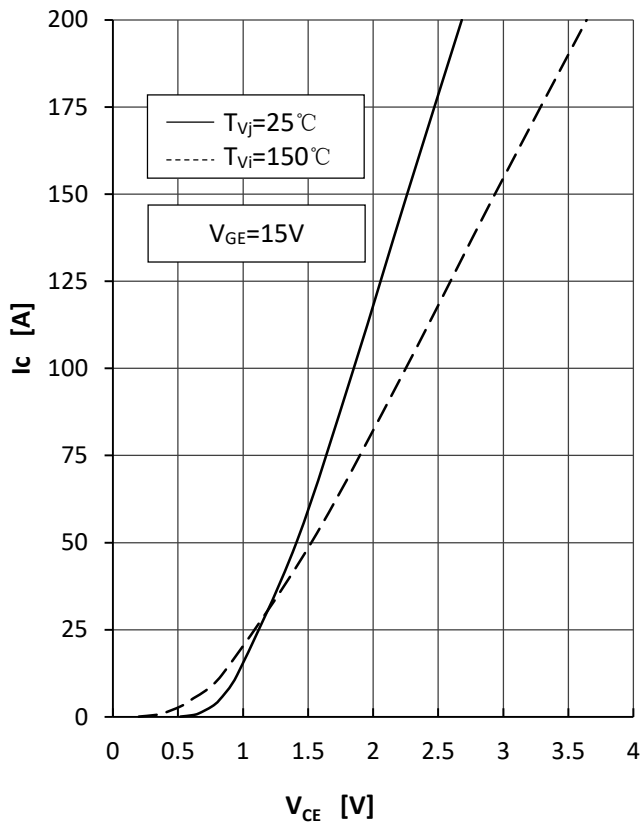


Fig1.IGBT Output Characteristics

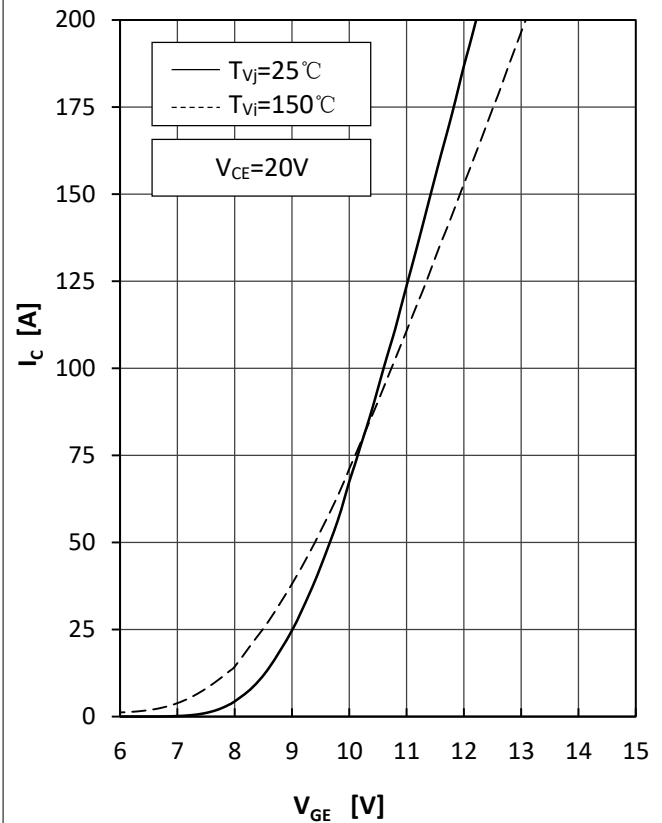


Fig2.IGBT Transfer Characteristics

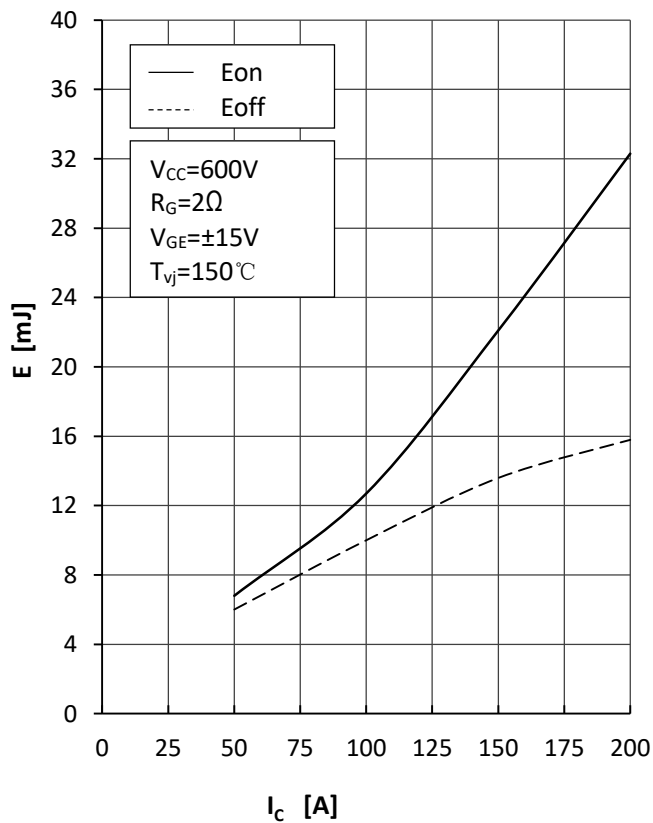


Fig3.IGBT Switching Loss vs.Ic

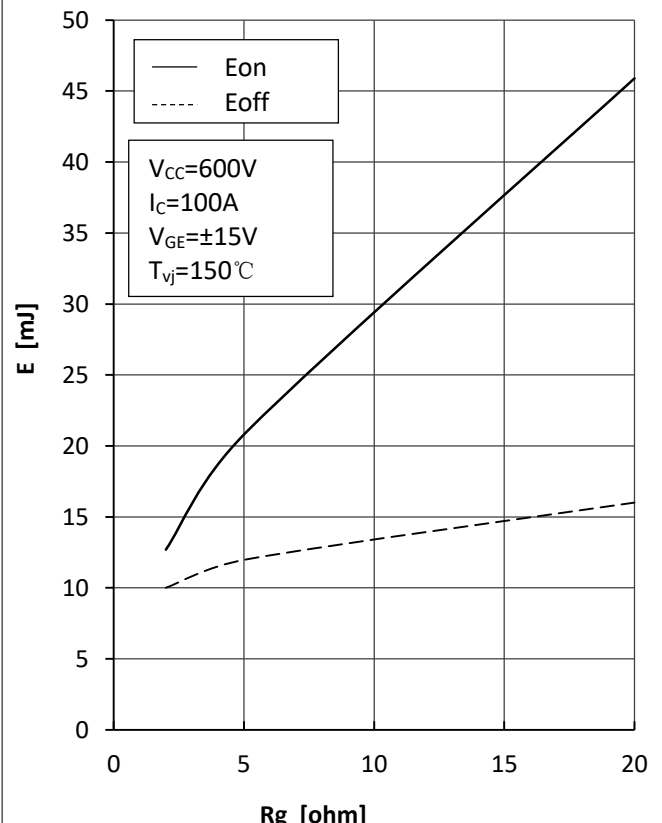
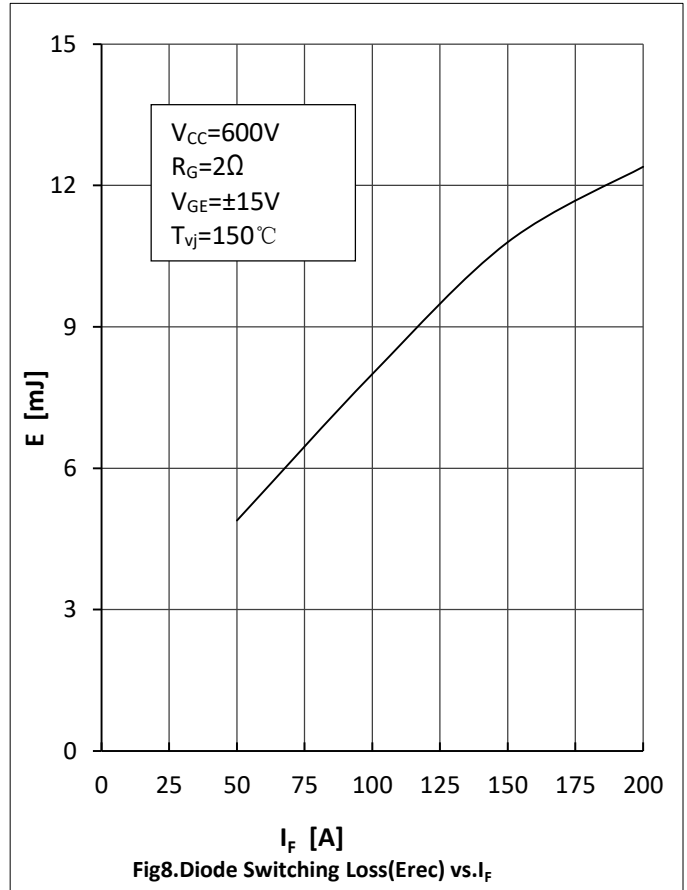
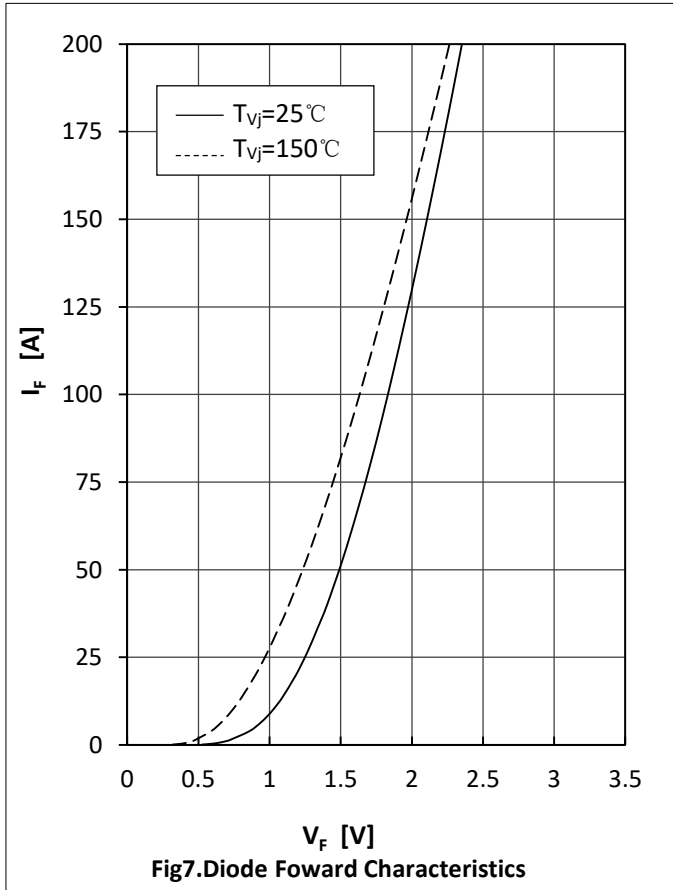
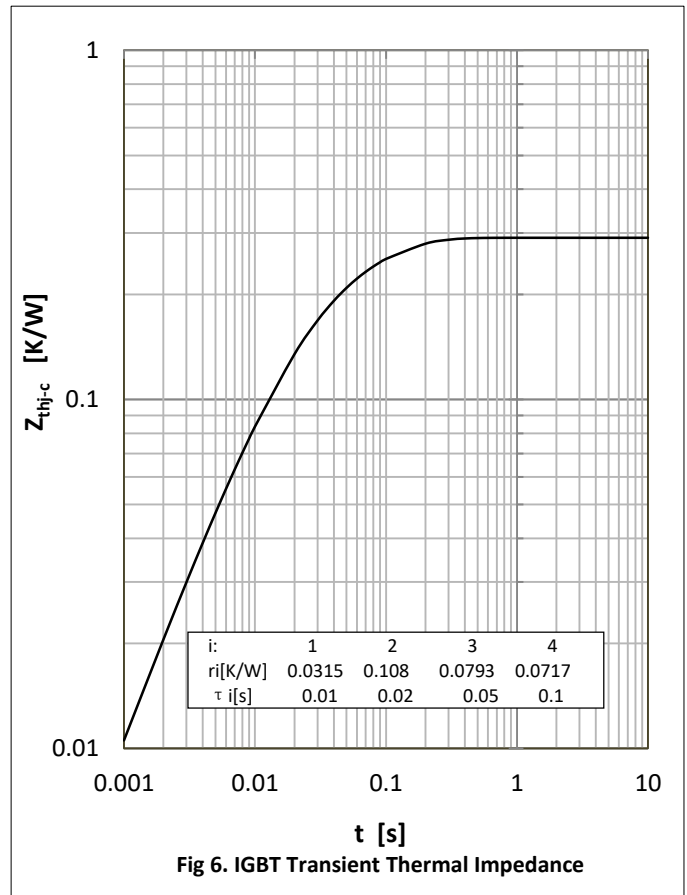
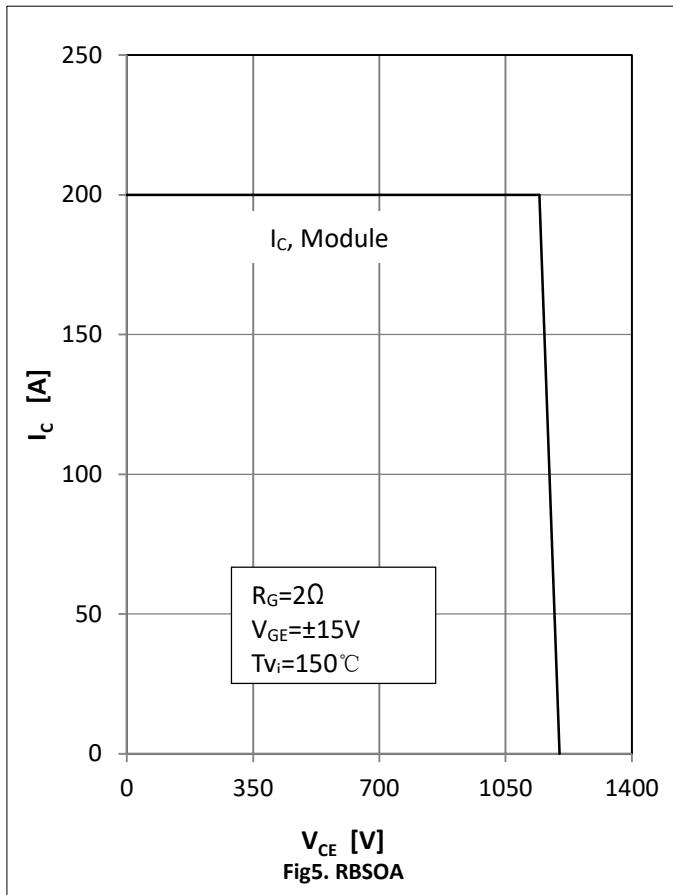


Fig4.IGBT Switching Loss vs.Rg



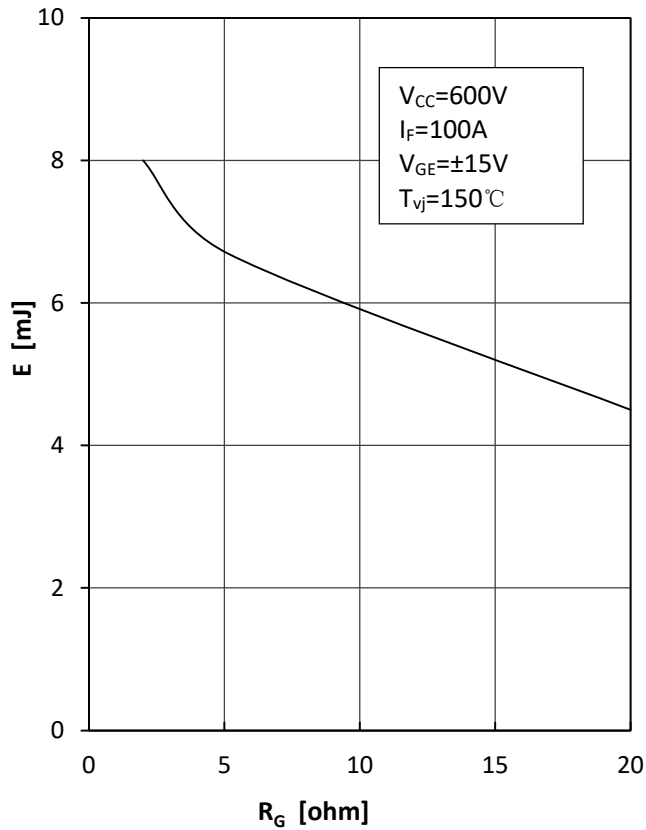


Fig9.Diode Switching Loss(Erec) vs.Rg

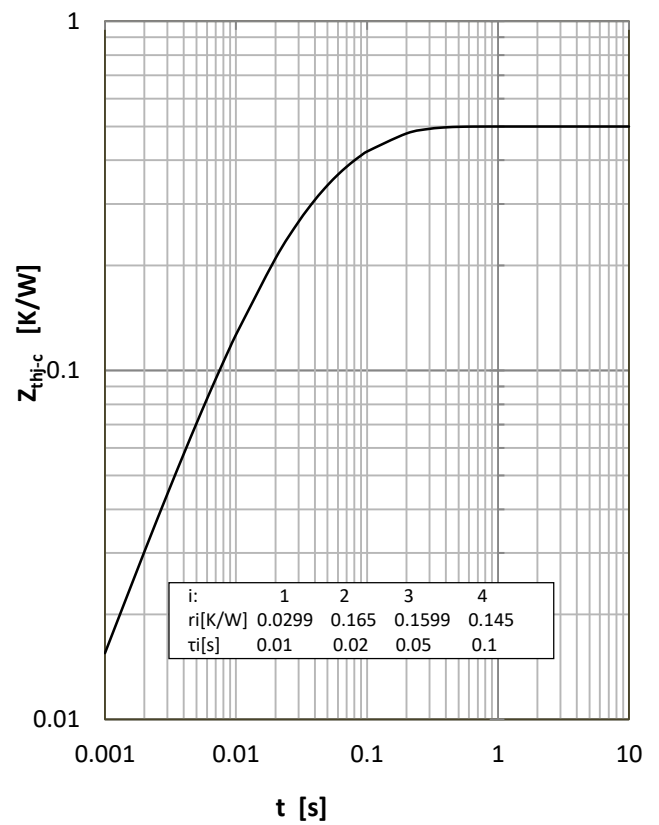


Fig10.Diode Transient Thermal Impedance

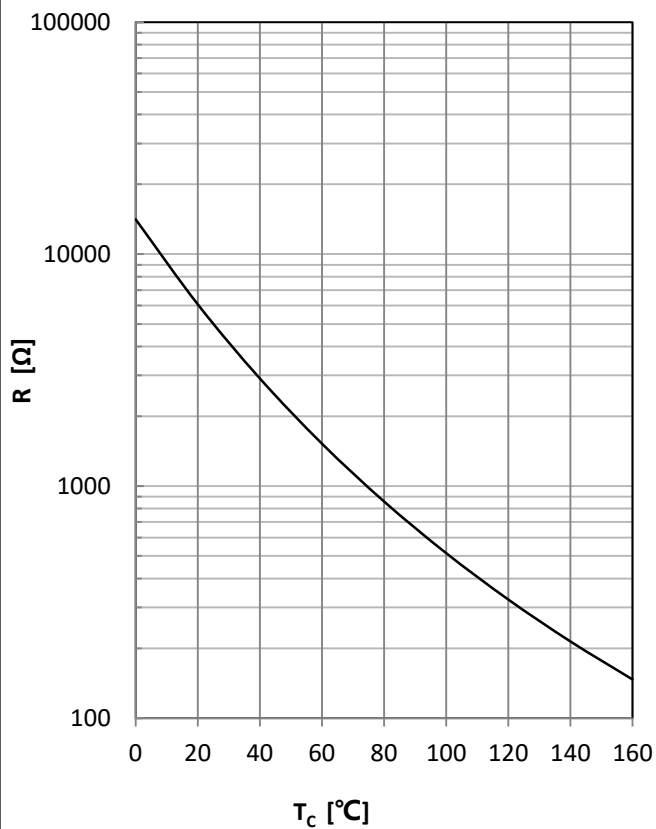
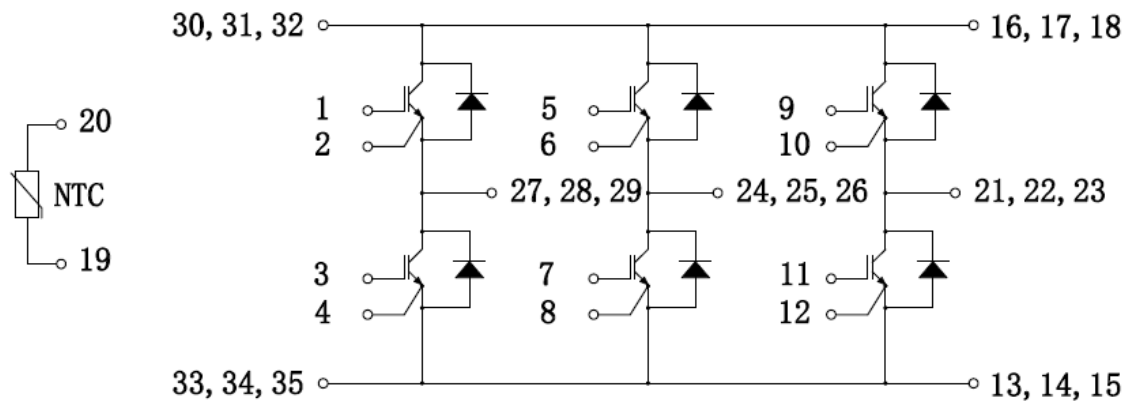
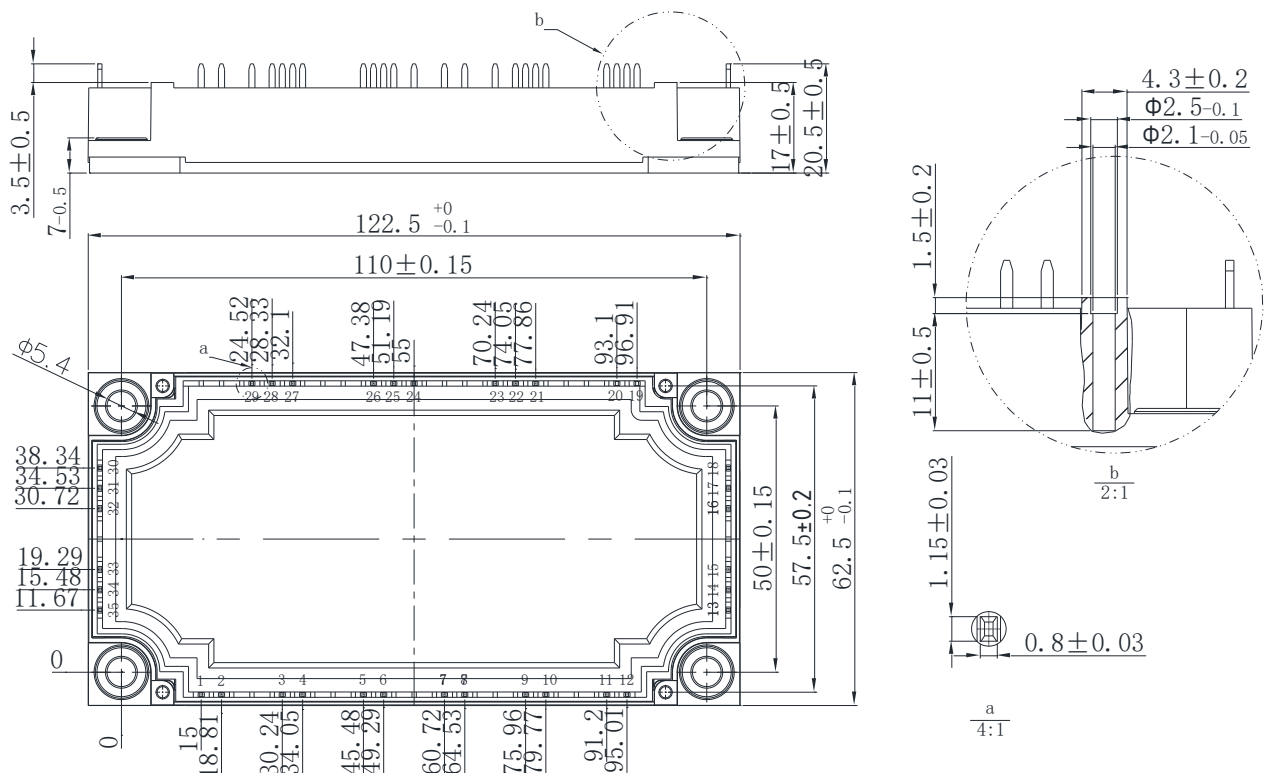


Fig 11. NTC Temperature Characteristic

- **Circuit Diagram**



● Package Outline Information





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