

STARPOWER

SEMICONDUCTOR

IGBT

GD75FFK120C6S

Molding Type Module

1200V/75A 6 in one-package

General Description

STARPOWER IGBT Power Module provides ultra low conduction and switching loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.



Features

- NPT IGBT technology
- Low switching loss
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Description	GD75FFK120C6S	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	130 75	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	150	A
I_F	Diode Continuous Forward Current @ $T_C=80^\circ\text{C}$	75	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	150	A
P_D	Maximum Power Dissipation @ $T_j=150^\circ\text{C}$	571	W
T_{jmax}	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	2500	V
Mounting Torque	Mounting Screw:M5	3.0 to 6.0	N.m

Electrical Characteristics of IGBT $T_C=25^\circ\text{C}$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_j=25^\circ\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}$, $V_{CE}=0\text{V}$, $T_j=25^\circ\text{C}$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.0\text{mA}$, $V_{CE}=V_{GE}$, $T_j=25^\circ\text{C}$	4.8	5.7	6.3	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=75\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^\circ\text{C}$		2.15	2.50	V
		$I_C=75\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$		2.65		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=75A,$ $R_G=4.7\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		234		ns
t_r	Rise Time			38		ns
$t_{d(off)}$	Turn-Off Delay Time			301		ns
t_f	Fall Time			286		ns
E_{on}	Turn-On Switching Loss			3.09		mJ
E_{off}	Turn-Off Switching Loss			6.21		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=75A,$ $R_G=4.7\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		242		ns
t_r	Rise Time			39		ns
$t_{d(off)}$	Turn-Off Delay Time			313		ns
t_f	Fall Time			322		ns
E_{on}	Turn-On Switching Loss			4.39		mJ
E_{off}	Turn-Off Switching Loss			8.03		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		/		nF
C_{oes}	Output Capacitance			/		nF
C_{res}	Reverse Transfer Capacitance			/		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		675		A
L_{CE}	Stray Inductance			21		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			1.80		m Ω

Electrical Characteristics of DIODE $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
V_F	Diode Forward Voltage	$I_F=75A$	$T_j=25^\circ C$		1.65	2.05	V
			$T_j=125^\circ C$		1.65		
Q_r	Recovered Charge	$I_F=75A,$	$T_j=25^\circ C$		7.8		μC
			$T_j=125^\circ C$		13.8		
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=4.7\Omega,$	$T_j=25^\circ C$		82		A
			$T_j=125^\circ C$		103		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$		3.69		mJ
			$T_j=125^\circ C$		7.45		

Electrical Characteristics of NTC $T_C=25^\circ\text{C}$ unless otherwise noted

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.219	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.522	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.009		K/W
Weight	Weight of Module	300		g

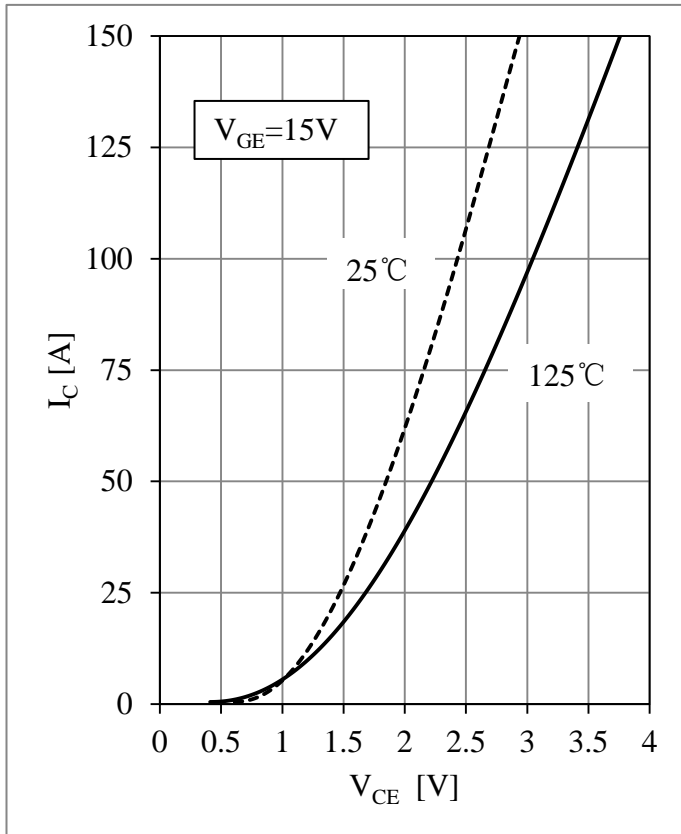


Fig 1. IGBT Output Characteristic

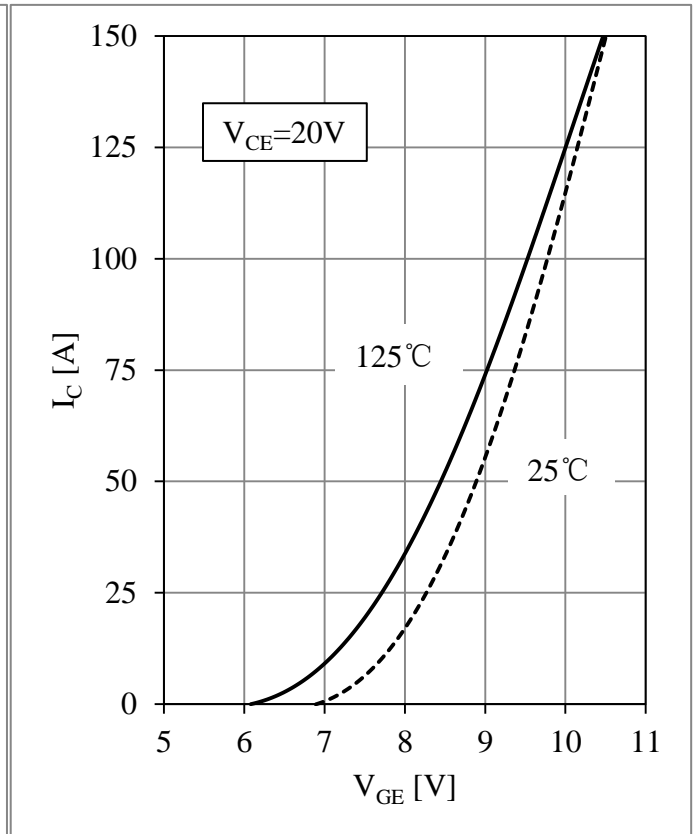


Fig 2. IGBT Transfer Characteristic

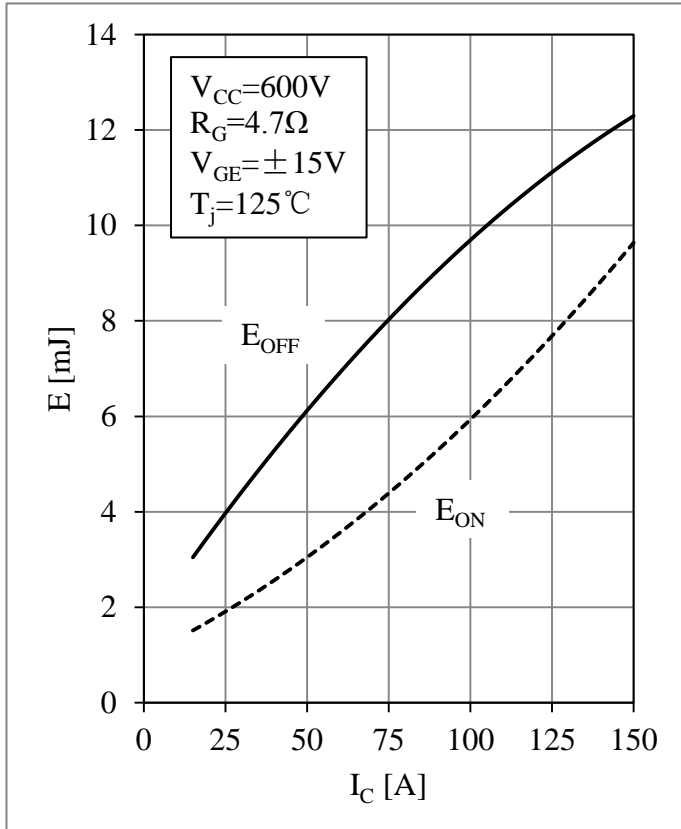


Fig 3. IGBT Switching Loss vs. I_c

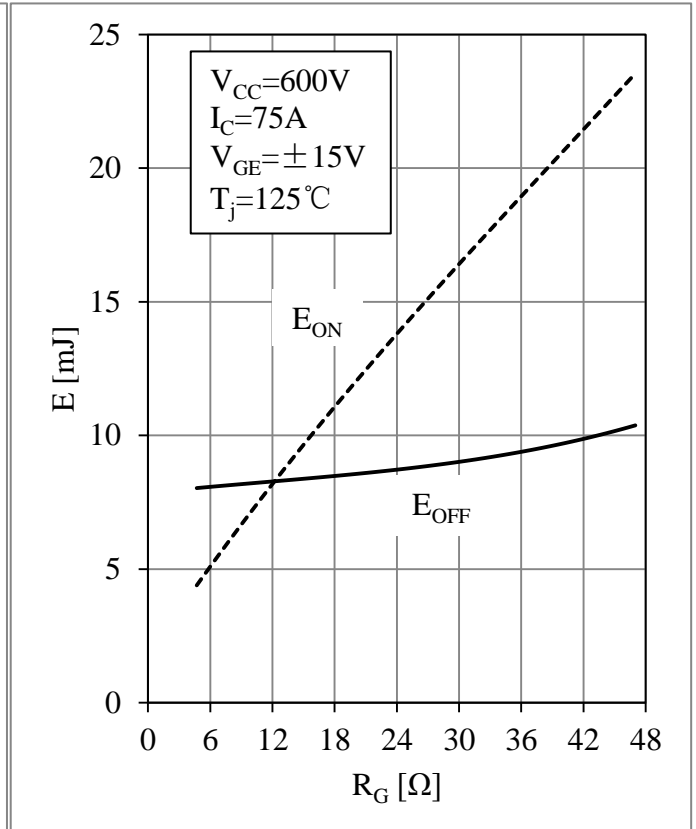


Fig 4. IGBT Switching Loss vs. R_g

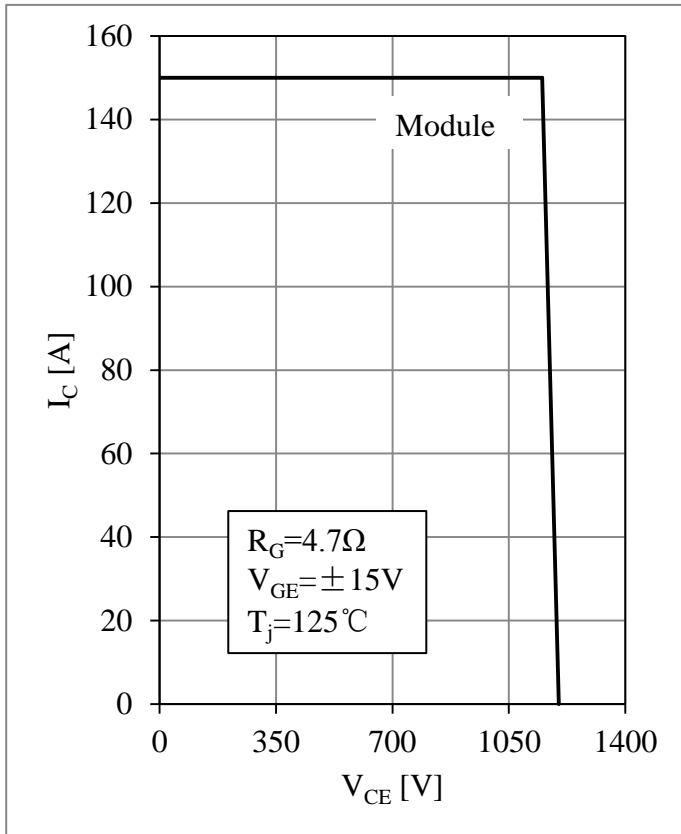


Fig 5. RBSOA

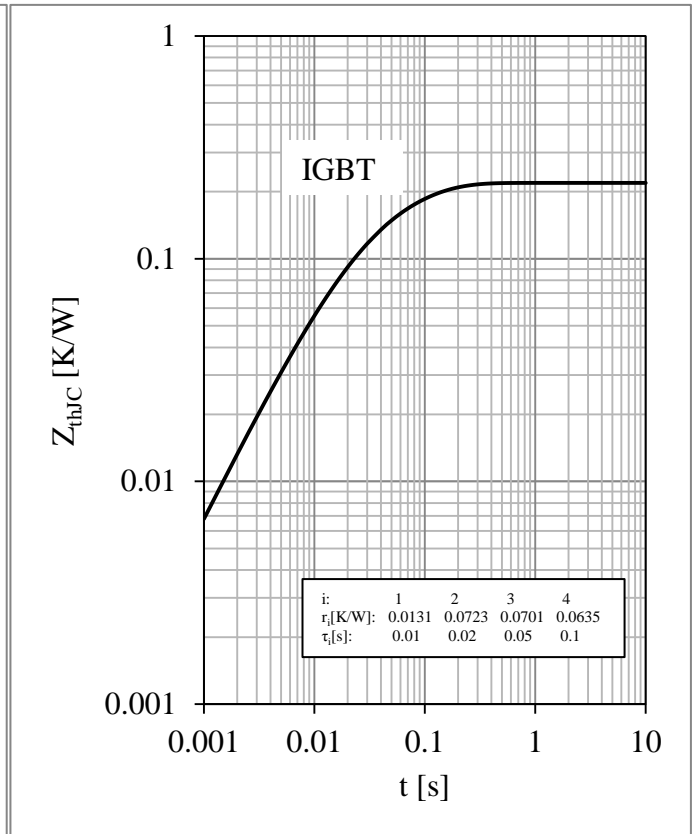


Fig 6. IGBT Transient Thermal Impedance

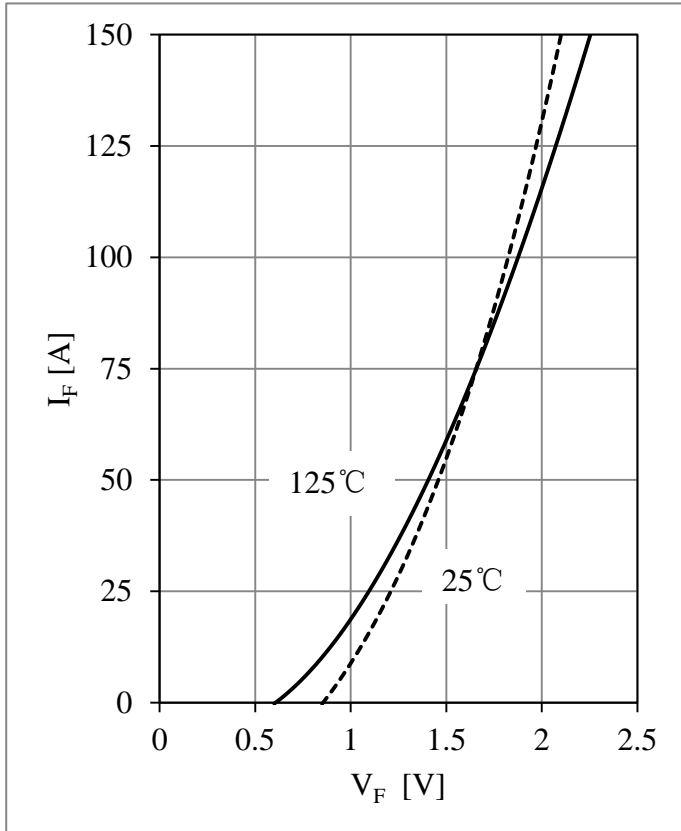


Fig 7. Diode Forward Characteristic

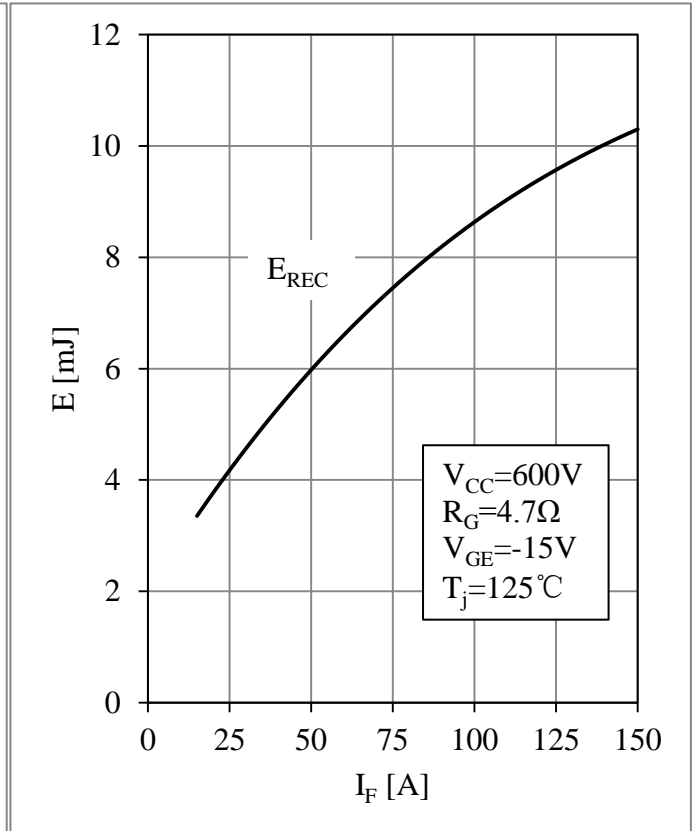


Fig 8. Diode Switching Loss vs. I_F

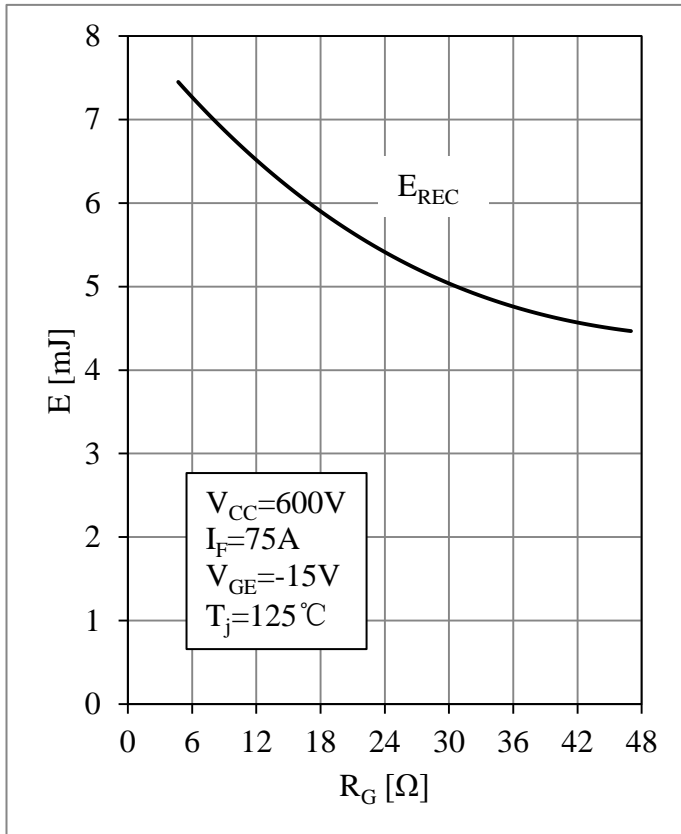


Fig 9. Diode Switching Loss vs. R_G

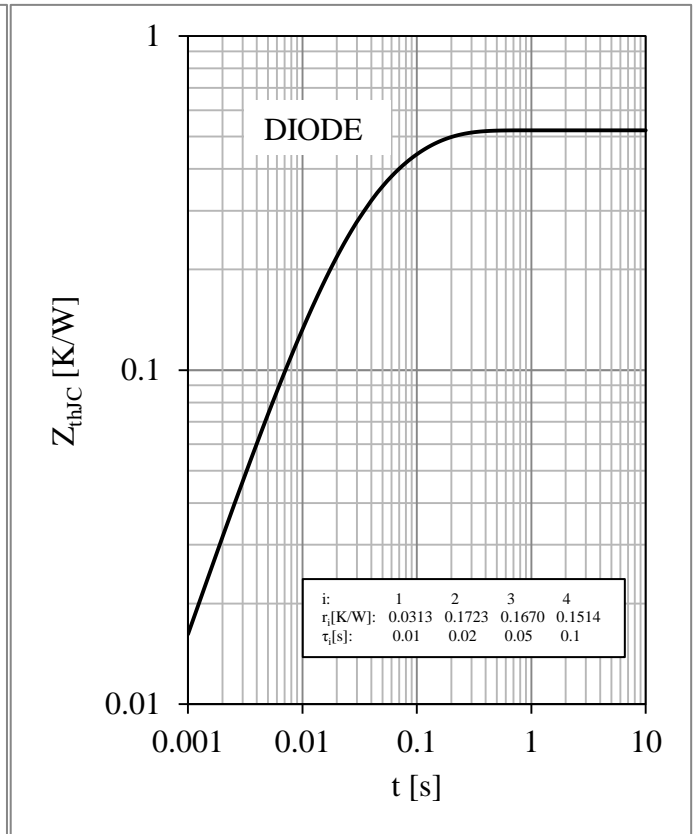


Fig 10. Diode Transient Thermal Impedance

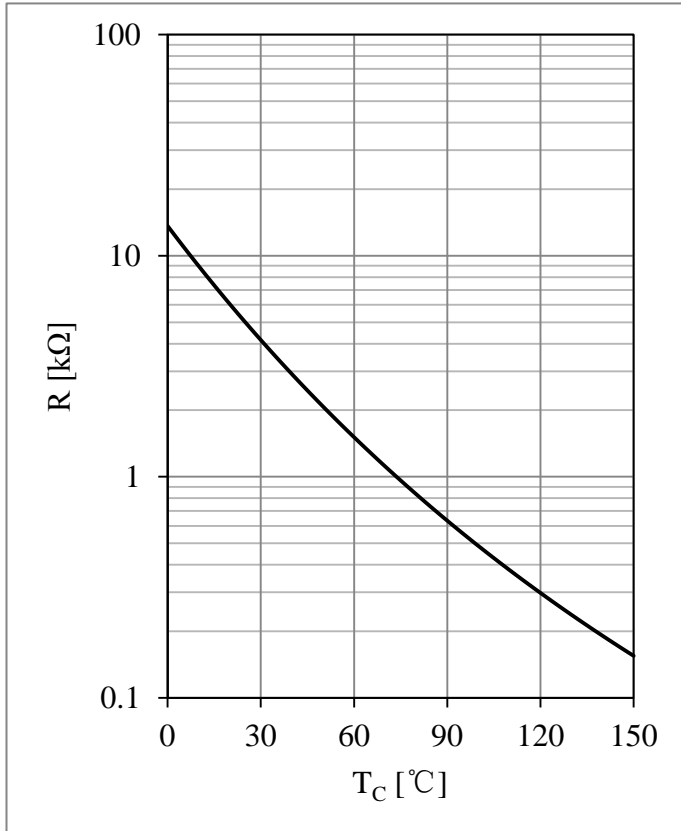


Fig 11. NTC Temperature Characteristic

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