STARPOWER

SEMICONDUCTOR **IGBT**

GD1000HFL170P2S

Molding Type Module

1700V/1000A 2 in one-package

General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as wind and solar power.

Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- High power and thermal cycling capability

Typical Applications

- Auxiliary Inverters
- High Power Converters
- UPS
- Wind and Solar Power
- Traction Drives

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD1000HFL170P2S	Unit
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	1800 1000	A
I_{CM}	Pulsed Collector Current t_p=1ms	2000	A
I_F	Diode Continuous Forward Current	1000	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	2000	A
P_D	Maximum Power Dissipation @ T_j=175℃	6.52	kW
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
Mounting Torque	Power Terminal Screw:M4 Power Terminal Screw:M8	1.8 to 2.1 8.0 to 10	N.m
	Mounting Screw:M5	3.0 to 6.0	N.m

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	1700			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=40.0mA,V_{CE}=V_{GE}, T_j=25℃	5.4	6.1	7.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=1000A,V_{GE}=15V, T_j=25℃		1.95	2.40	V
		I_C=1000A,V_{GE}=15V, T_j=125℃		2.35		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=1000A, R_{Gon}=1.2Ω, R_{Goff}=1.8Ω, V_{GE}=±15V, T_j=25℃		180		ns
t_r	Rise Time			130		ns
$t_{d(off)}$	Turn-Off Delay Time			450		ns
t_f	Fall Time			130		ns
E_{on}	Turn-On Switching Loss			220		mJ
E_{off}	Turn-Off Switching Loss			170		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=1000A, R_{Gon}=1.2Ω, R_{Goff}=1.8Ω, V_{GE}=±15V, T_j=125℃		190		ns
t_r	Rise Time			140		ns
$t_{d(off)}$	Turn-Off Delay Time			530		ns
t_f	Fall Time			140		ns
E_{on}	Turn-On Switching Loss			320		mJ
E_{off}	Turn-Off Switching Loss			270		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		95.0		nF
C_{oes}	Output Capacitance			6.40		nF
C_{res}	Reverse Transfer Capacitance			4.00		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=1000V, V_{CEM}≤1700V		3100		A
R_{Gint}	Internal Gate Resistance			0.4		Ω
Q_G	Gate Charge	V_{CC}=900V,I_C=1000A, V_{GE}=-15…+15V		7.7		μC
L_{CE}	Stray Inductance			10		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.20		mΩ

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=1000A	T_j=25℃		1.80	2.25	V
			T_j=125℃		1.85		
Q_r	Recovered Charge	I_F=1000A, V_R=900V, R_G=1.2Ω, V_{GE}=-15V	T_j=25℃		290		μC
			T_j=125℃		510		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		800		A
			T_j=125℃		1005		
E_{rec}	Reverse Recovery Energy		T_j=25℃		120		mJ
			T_j=125℃		215		

Electrical Characteristics of NTC T_C=25℃ unless otherwise noted

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case (per IGBT)		23.0	K/kW
$R_{\theta JC}$	Junction-to-Case (per Diode)		34.0	K/kW
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	3.0		K/kW
Weight	Weight of Module	1200		g

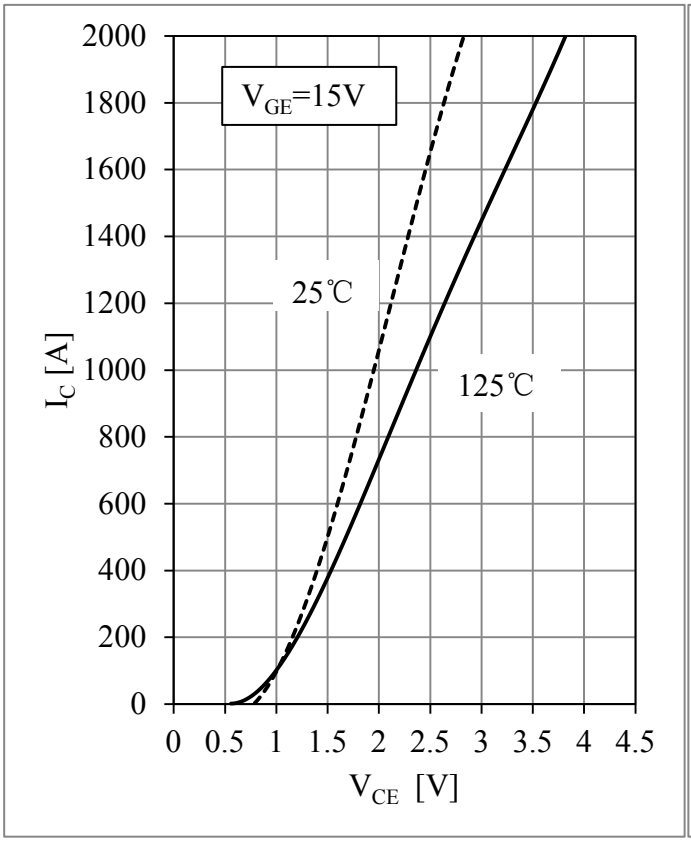


Fig 1. IGBT Output Characteristics

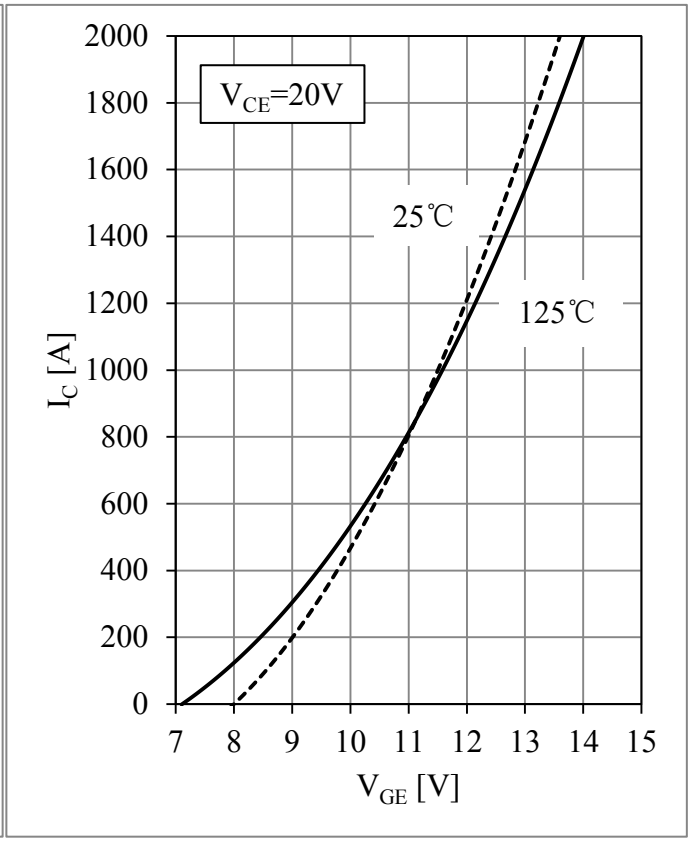


Fig 2. IGBT Transfer Characteristics

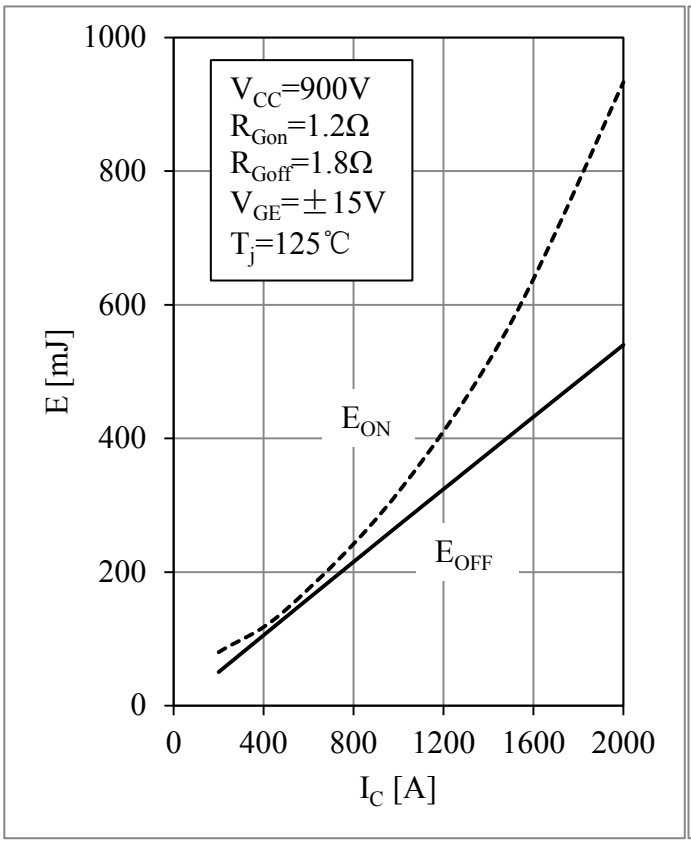


Fig 3. IGBT Switching Loss vs. I_C

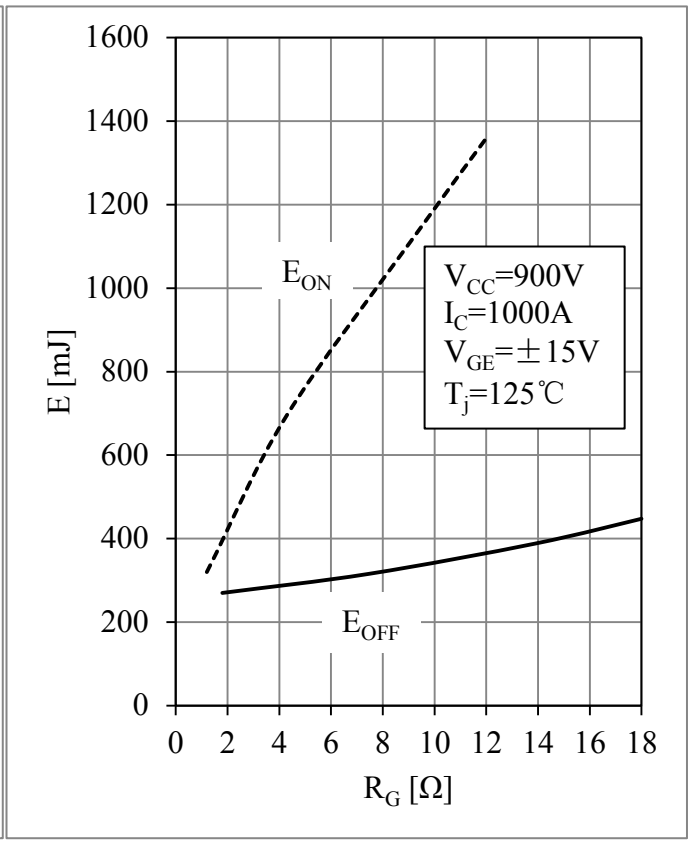


Fig 4. IGBT Switching Loss vs. R_G

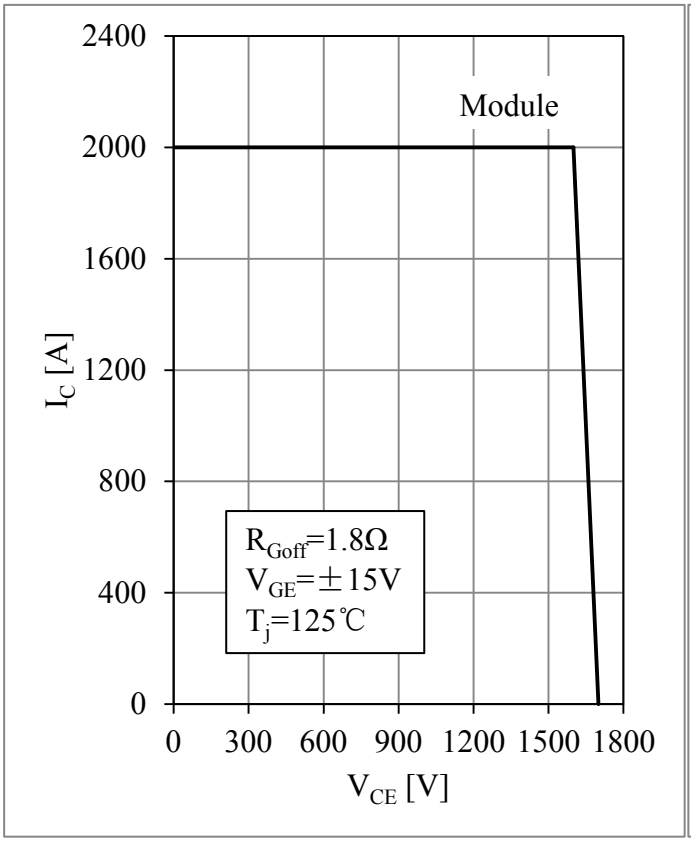


Fig 5. RBSOA

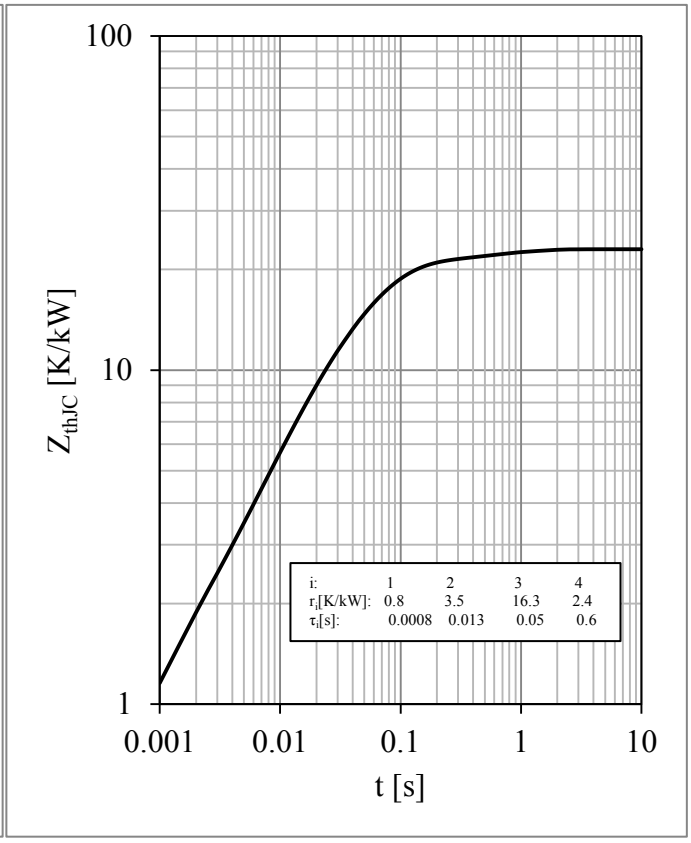


Fig 6. IGBT Transient Thermal Impedance

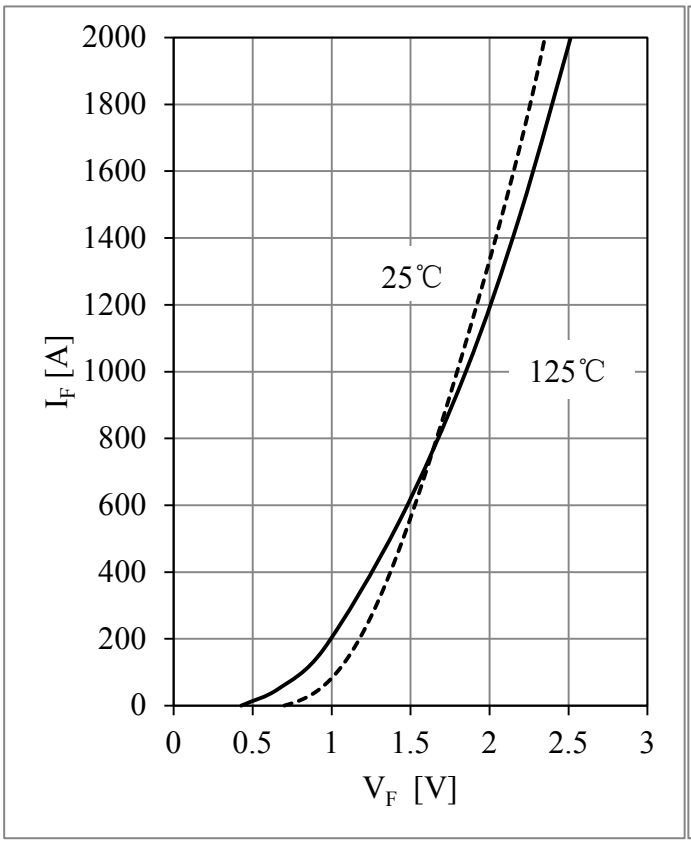


Fig 7. Diode Forward Characteristics

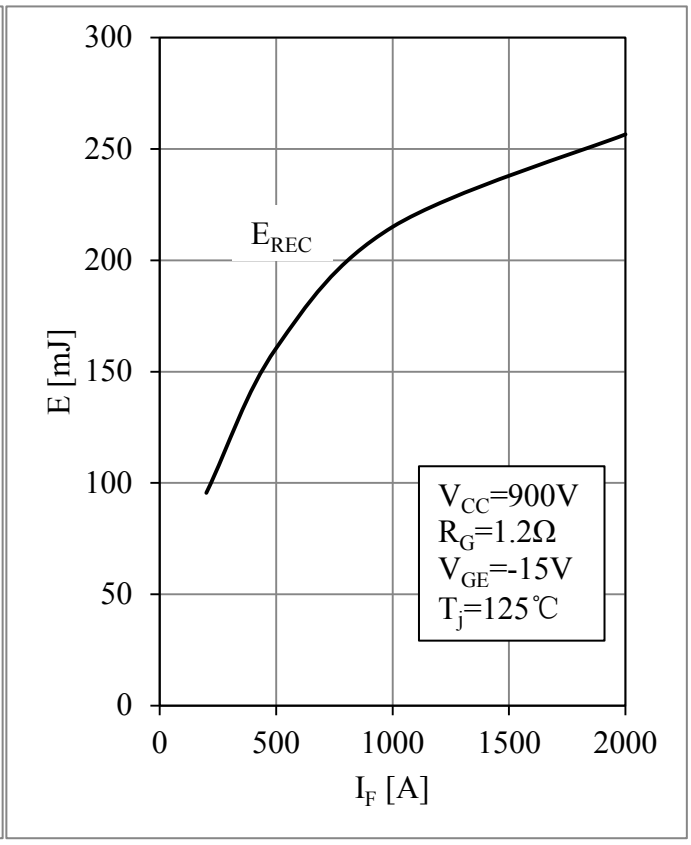


Fig 8. Diode Switching Loss vs. I_F

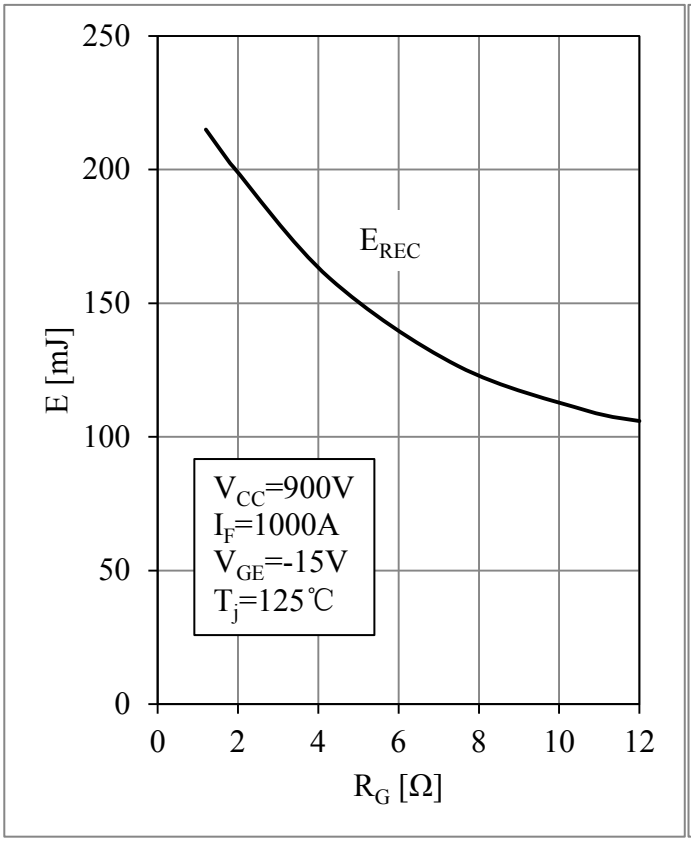


Fig 9. Diode Switching Loss vs. R_G

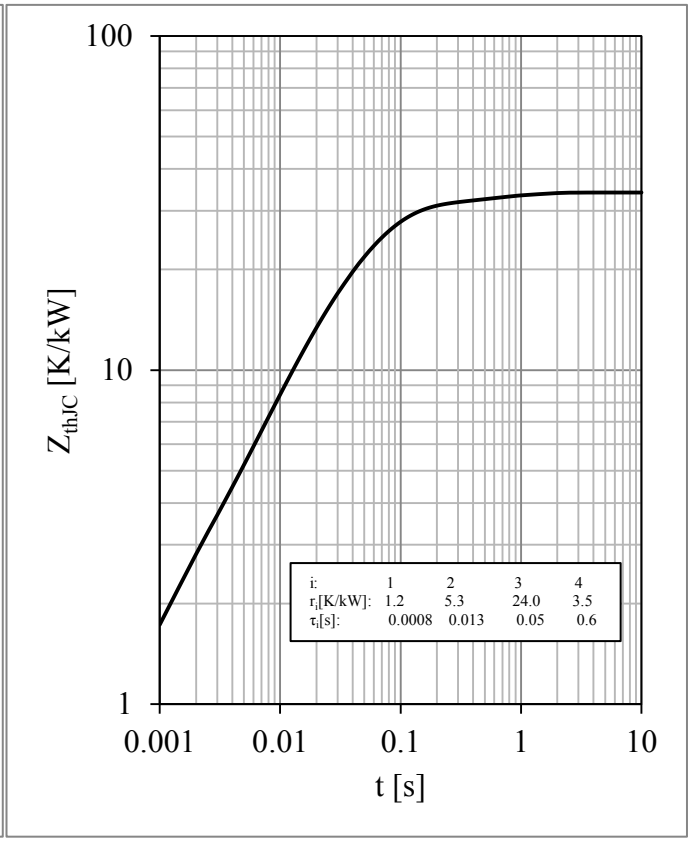


Fig 10. Diode Transient Thermal Impedance

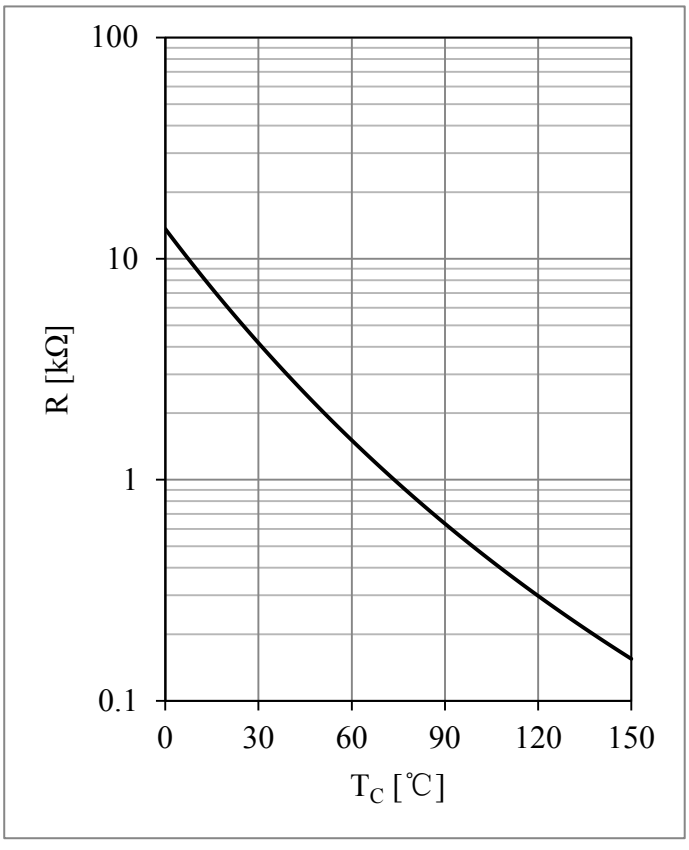
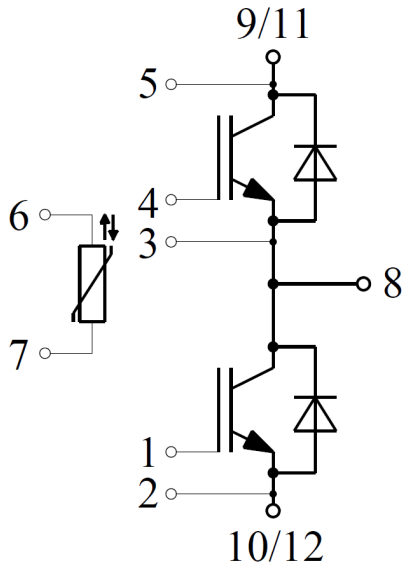


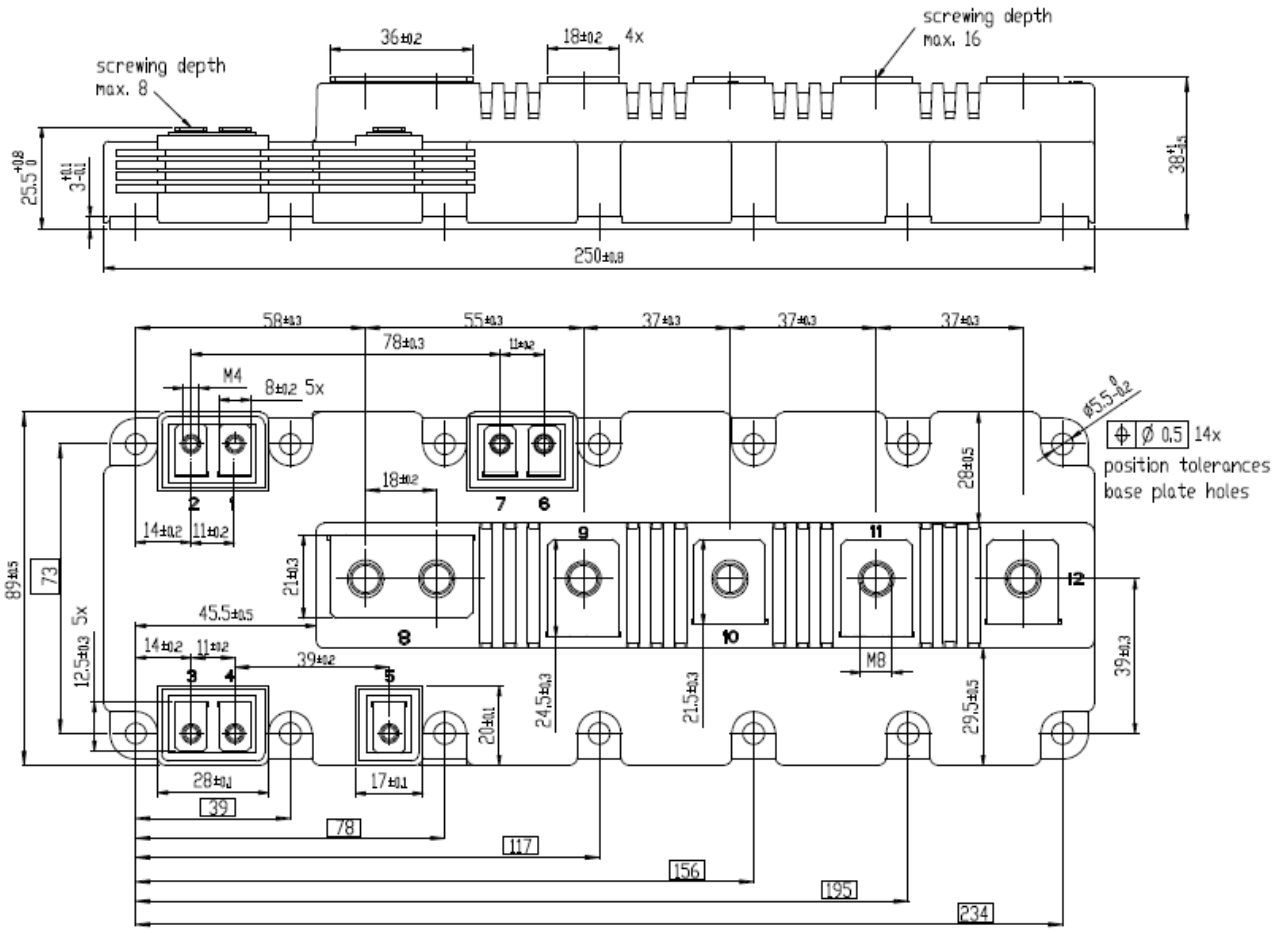
Fig 11. NTC Temperature Characteristic

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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