STARPOWER

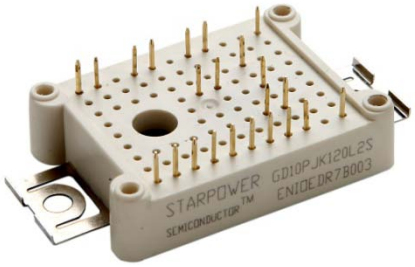
SEMICONDUCTOR **IGBT**

GD75HCU60L2S

600V/75A 4 in one-package

General Description

STARPOWER IGBT Power Module provides ultrafast switching speed as well as short circuit ruggedness. It's designed for the applications such as solar power and SMPS.



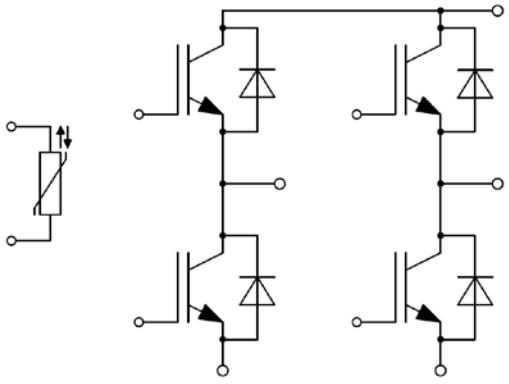
Features

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

Typical Applications

- Switching mode power supply
- Solar power
- Welding machine

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25℃ unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=50℃	88 75	A
I_{CM}	Pulsed Collector Current t_p=1ms	150	A
P_D	Maximum Power Dissipation @ T_j=150℃	332	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	600	V
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	150	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	℃
T_{jop}	Operating Junction Temperature	-40 to +125	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V

IGBT Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=75A,V_{GE}=15V, T_j=25℃		2.70	3.15	V
		I_C=75A,V_{GE}=15V, T_j=125℃		3.30		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=250μA,V_{CE}=V_{GE}, T_j=25℃	3.5	4.3	5.5	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
R_{Gint}	Internal Gate Resistance			/		Ω
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		4.30		nF
C_{res}	Reverse Transfer Capacitance			0.16		nF
Q_G	Gate Charge	V_{CC}=400V,I_C=75A, V_{GE}=15V		0.27		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=75A, R_G=6.8Ω,V_G=±15V, T_j=25℃		98		ns
t_r	Rise Time			37		ns
$t_{d(off)}$	Turn-Off Delay Time			102		ns
t_f	Fall Time			49		ns
E_{on}	Turn-On Switching Loss			0.52		mJ
E_{off}	Turn-Off Switching Loss			0.38		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=75A, R_G=6.8Ω,V_{GE}=±15V, T_j=125℃		144		ns
t_r	Rise Time			53		ns
$t_{d(off)}$	Turn-Off Delay Time			168		ns
t_f	Fall Time			63		ns
E_{on}	Turn-On Switching Loss			0.98		mJ
E_{off}	Turn-Off Switching Loss			0.73		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=360V, V_{CEM}≤600V		530		A

Diode Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=75A,V_{GE}=0V,T_j=25℃		1.30	1.75	V
		I_F=75A,V_{GE}=0V,T_j=125℃		1.28		
Q_r	Recovered Charge	V_R=300V,I_F=75A, -di/dt=1600A/μs,V_{GE}=-15V T_j=25℃		2.5		μC
I_{RM}	Peak Reverse Recovery Current			31		A
E_{rec}	Reverse Recovery Energy			0.62		mJ
Q_r	Recovered Charge	V_R=300V,I_F=75A, -di/dt=1600A/μs,V_{GE}=-15V T_j=125℃		4.7		μC
I_{RM}	Peak Reverse Recovery Current			57		A
E_{rec}	Reverse Recovery Energy			1.19		mJ

NTC Characteristics 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

Module Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		20		nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip		8.00		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.376 0.570	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.385 0.584		K/W
$R_{\theta CS}$	Case-to-Sink		0.058		K/W
F	Mounting Force Per Clamp	20		50	N
G	Weight of Module		24		g

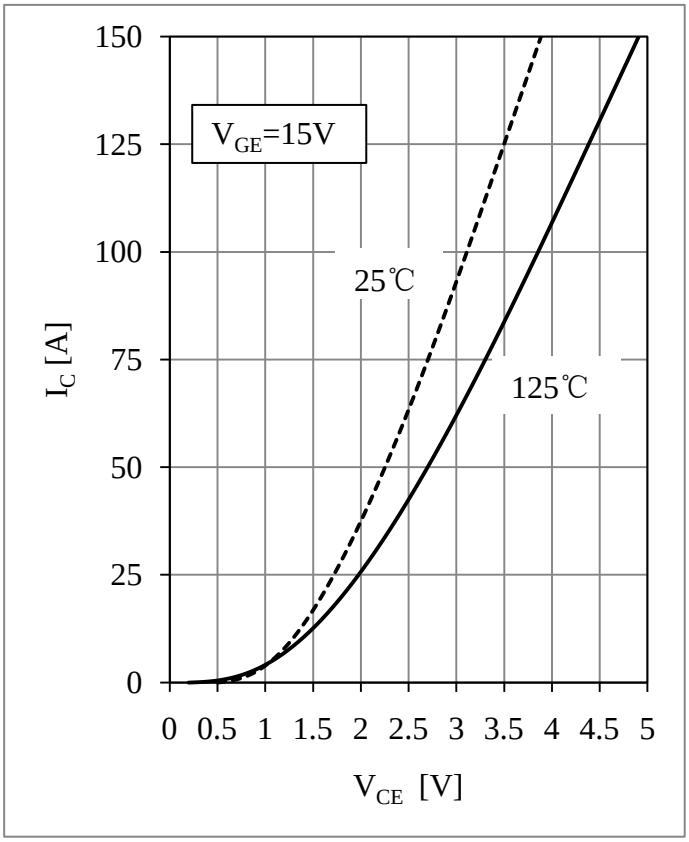


Fig 1. IGBT Output Characteristics

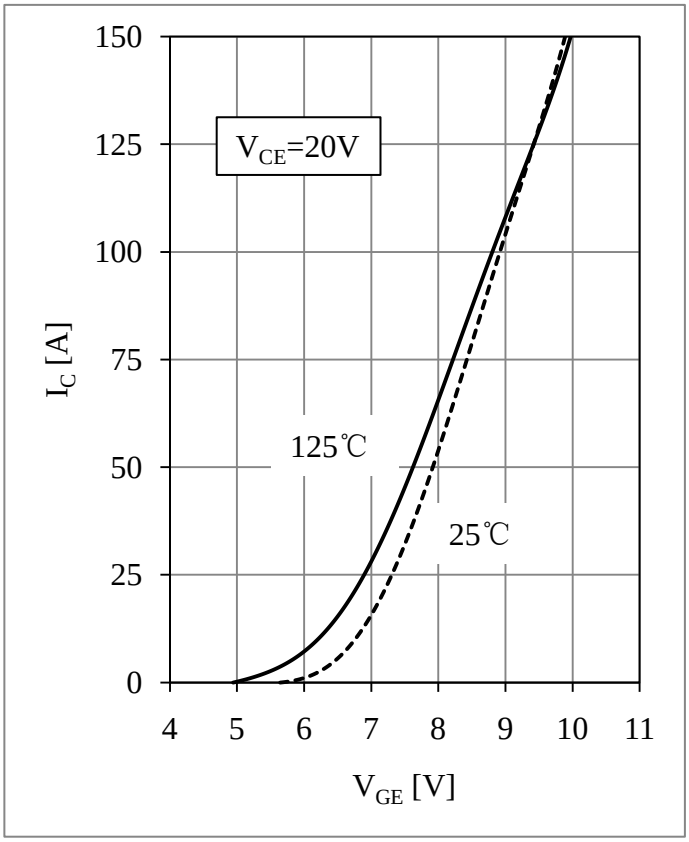


Fig 2. IGBT Transfer Characteristics

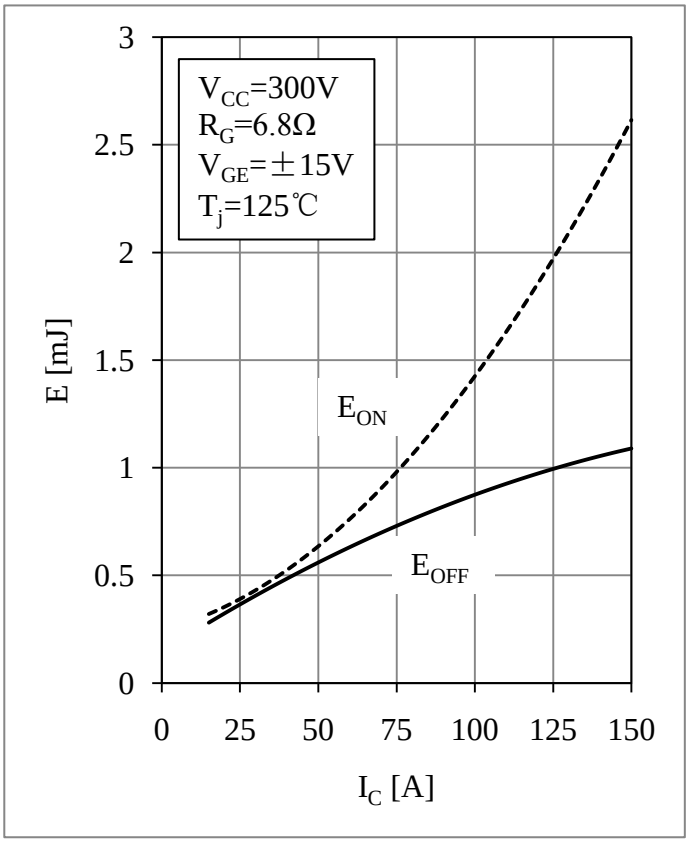


Fig 3. IGBT Switching Loss vs. I_C

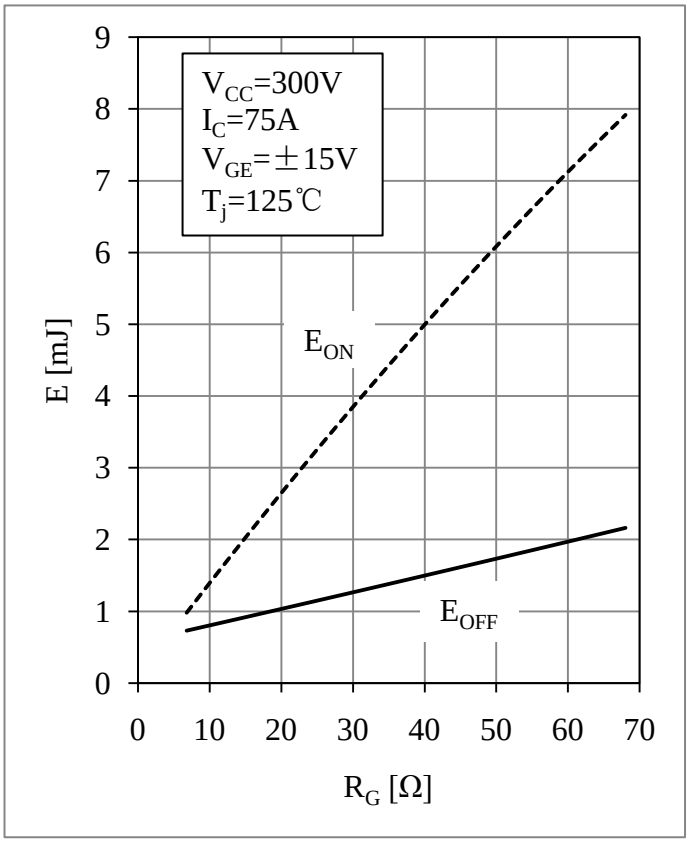


Fig 4. IGBT Switching Loss vs. R_G

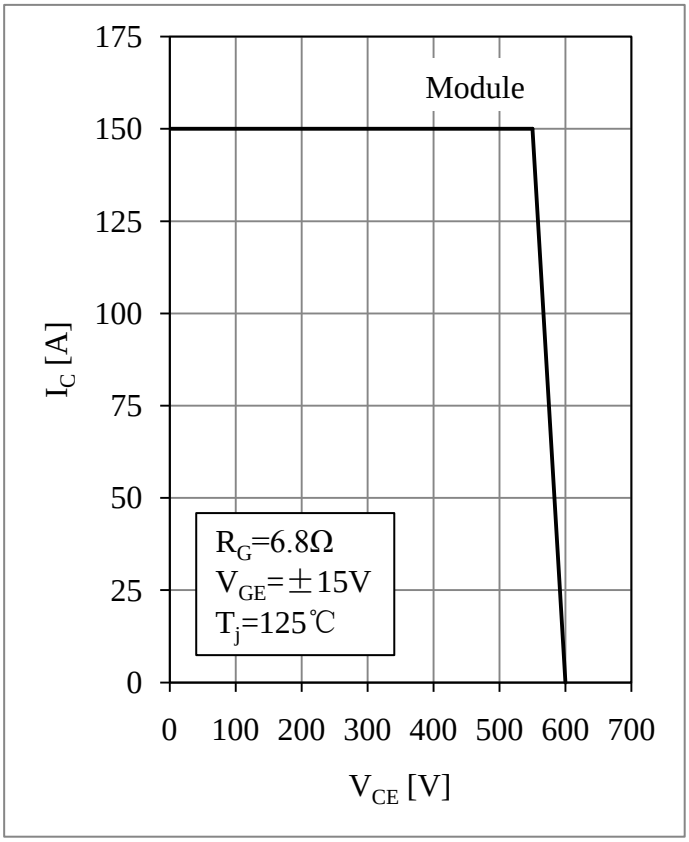


Fig 5. IGBT RBSOA

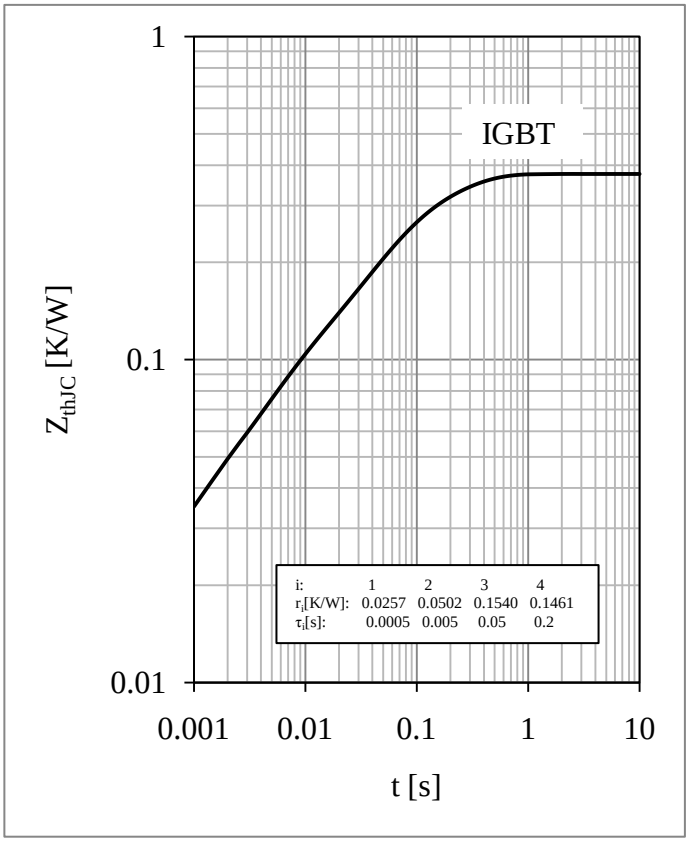


Fig 6. IGBT Transient Thermal Impedance

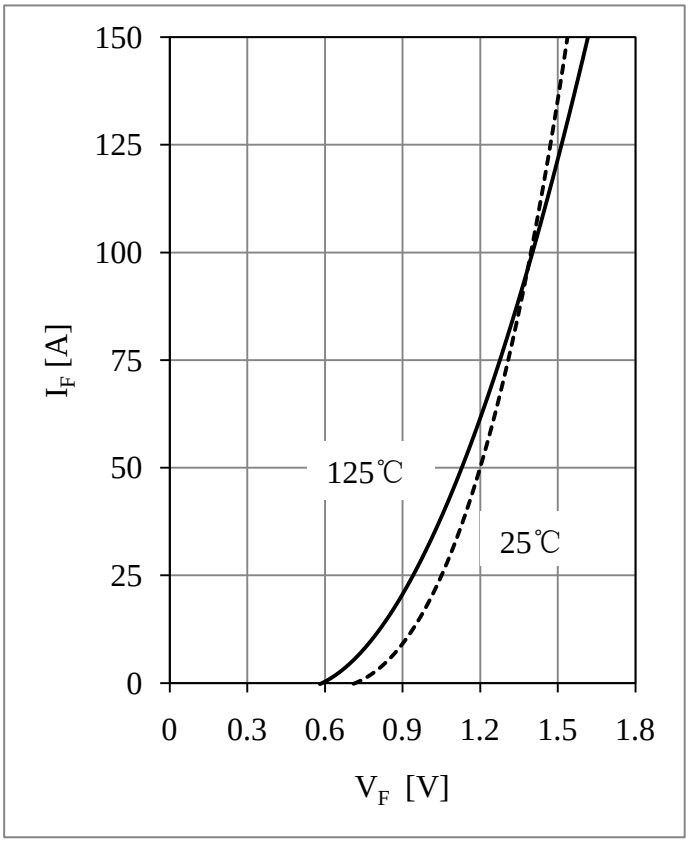


Fig 7. Diode Forward Characteristics

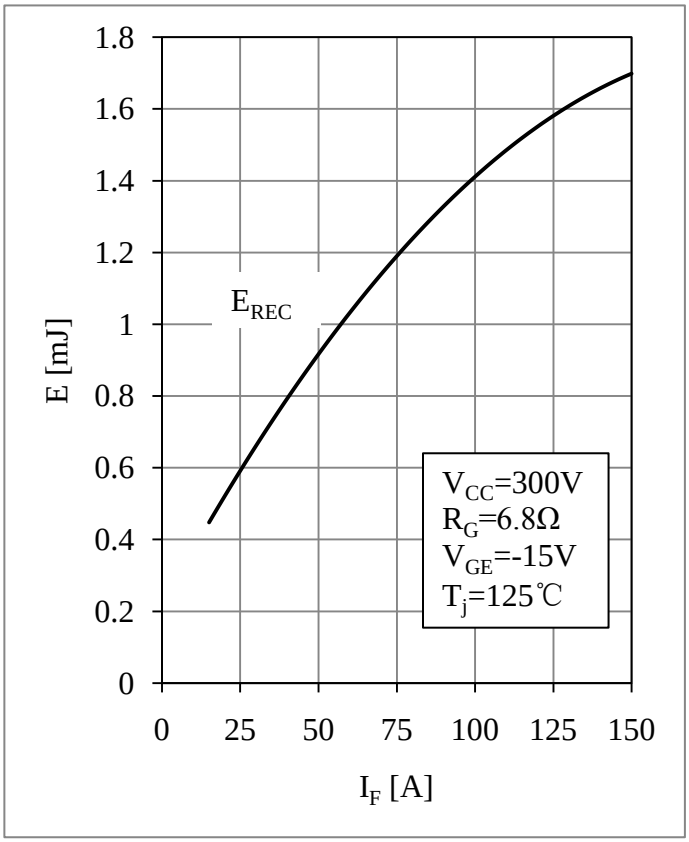


Fig 8. Diode Switching Loss vs. I_F

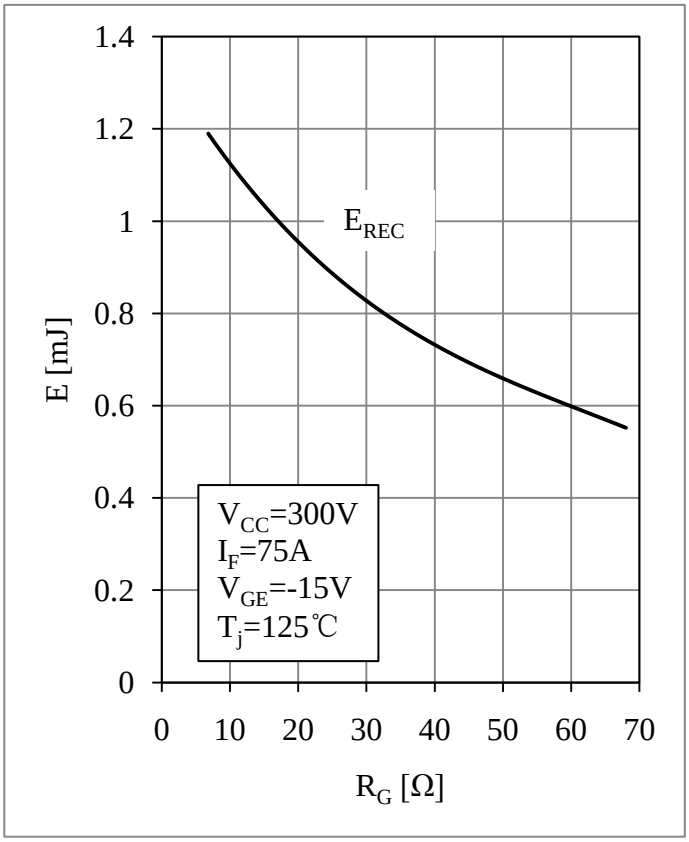


Fig 9. Diode Switching Loss vs. R_G

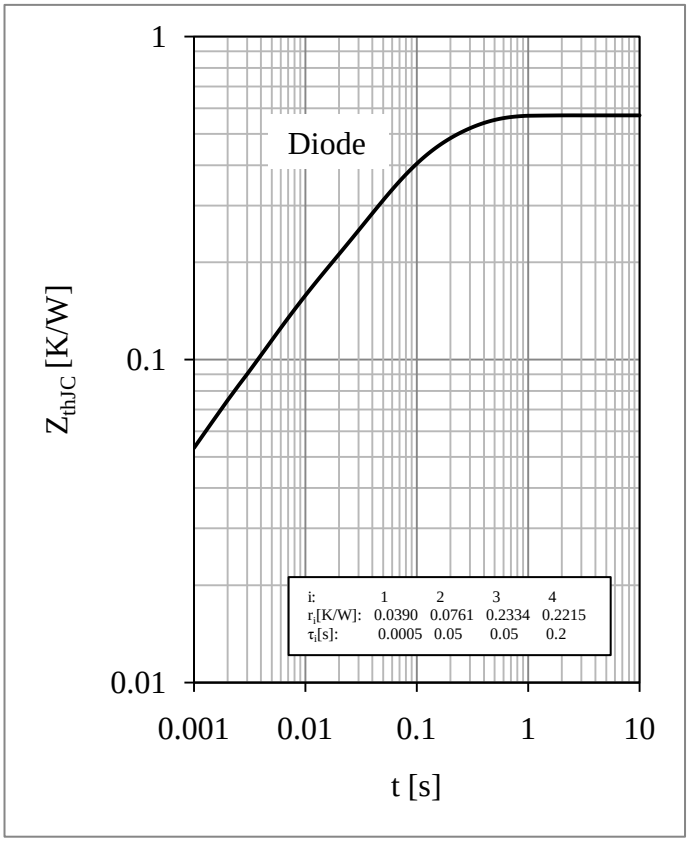


Fig 10. Diode Transient Thermal Impedance

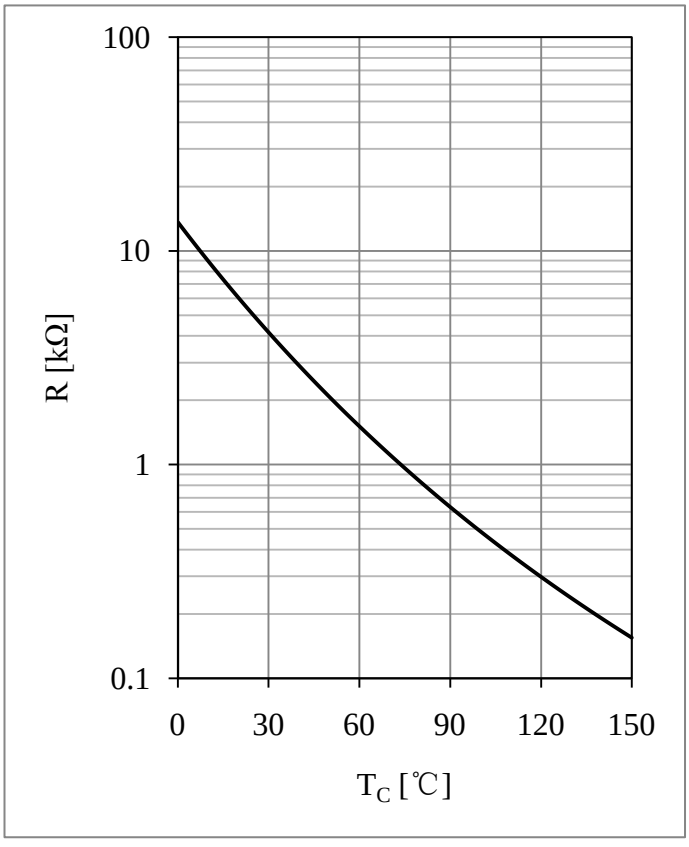
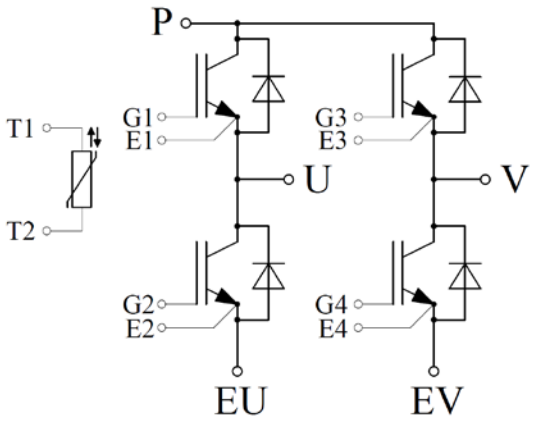


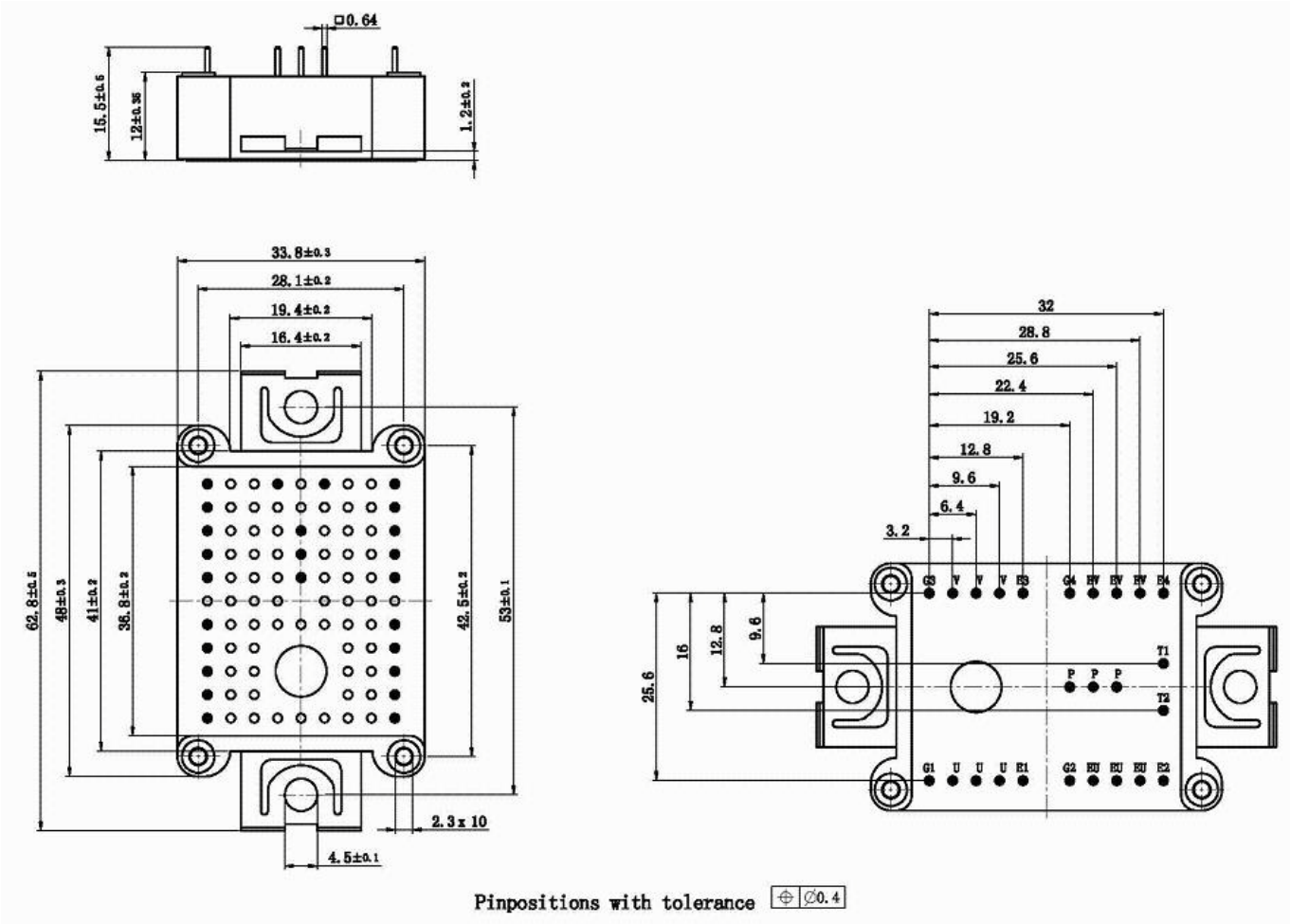
Fig 11. NTC Temperature Characteristic

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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