STARPOWER

SEMICONDUCTOR **IGBT**

GD200HFK60C8SN

Molding Type Module

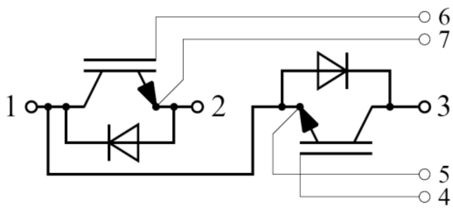
600V/200A 2 in one-package

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 general UPS and SMPS.

Features

- NPT IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Rugged with ultrafast performance
- Square RBSOA
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- Electrical welder
- SMPS
- UPS

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD200HFK60C8SN	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	283 200	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	A
P_D	Maximum Power Dissipation @ T_j=150℃	714	W
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
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M5	2.5 to 3.5 2.5 to 3.5	N.m
Weight	Weight of Module	200	g

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	600			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$,V_{GE}=0V, T_j=25℃			1.0	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.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=500μA,$V_{CE}=V_{GE}$, T_j=25℃	3.5	4.5	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=200A,V_{GE}=15V, T_j=25℃		1.80	2.25	V
		I_C=200A,V_{GE}=15V, T_j=125℃		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=200A, R_G=6.8Ω,V_{GE}=±15V, T_j=25℃		320		ns
t_r	Rise Time			123		ns
$t_{d(off)}$	Turn-Off Delay Time			318		ns
t_f	Fall Time			90		ns
E_{on}	Turn-On Switching Loss			2.79		mJ
E_{off}	Turn-Off Switching Loss			5.08		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=200A, R_G=6.8Ω,V_{GE}=±15V, T_j=125℃		339		ns
t_r	Rise Time			125		ns
$t_{d(off)}$	Turn-Off Delay Time			344		ns
t_f	Fall Time			113		ns
E_{on}	Turn-On Switching Loss			3.00		mJ
E_{off}	Turn-Off Switching Loss			6.95		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		16.9		nF
C_{oes}	Output Capacitance			0.88		nF
C_{res}	Reverse Transfer Capacitance			0.42		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=360V, V_{CEM}≤600V		1800		A
Q_G	Gate Charge	V_{CC}=400V,I_C=200A, V_{GE}=15V		0.72		μC
R_{Gint}	Internal Gate Resistance			2.35		Ω
L_{CE}	Stray Inductance				22	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.65		mΩ

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=200A	T_j=25℃		1.33	1.78	V
			T_j=125℃		1.30		
Q_r	Recovered Charge	I_F=200A, V_R=300V, R_G=6.8Ω, V_{GE}=-15V	T_j=25℃		9.3		μC
			T_j=125℃		13.2		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		112		A
			T_j=125℃		125		
E_{rec}	Reverse Recovery Energy		T_j=25℃		2.09		mJ
			T_j=125℃		3.22		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.175	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.317	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.046		K/W

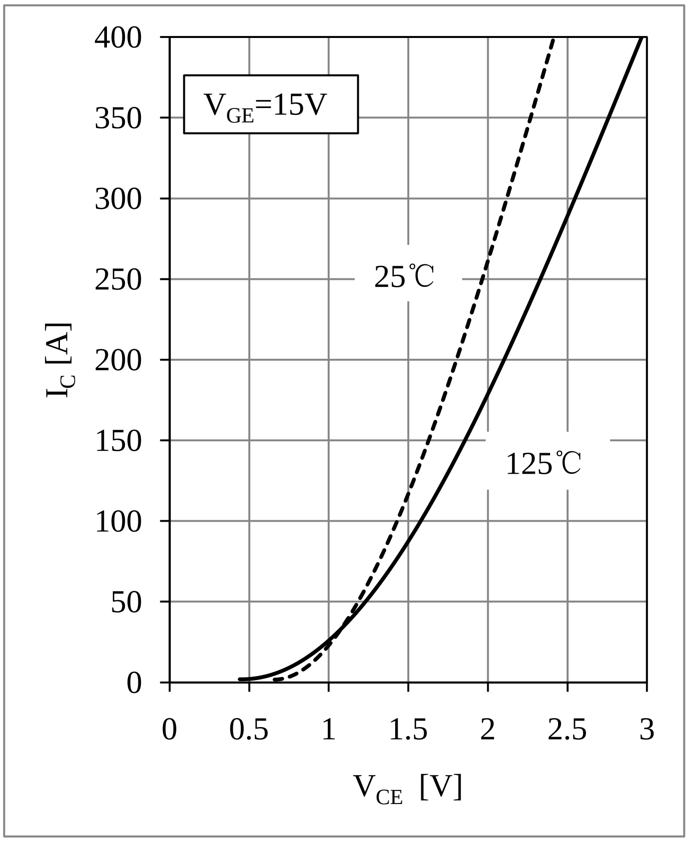


Fig 1. IGBT Output Characteristic

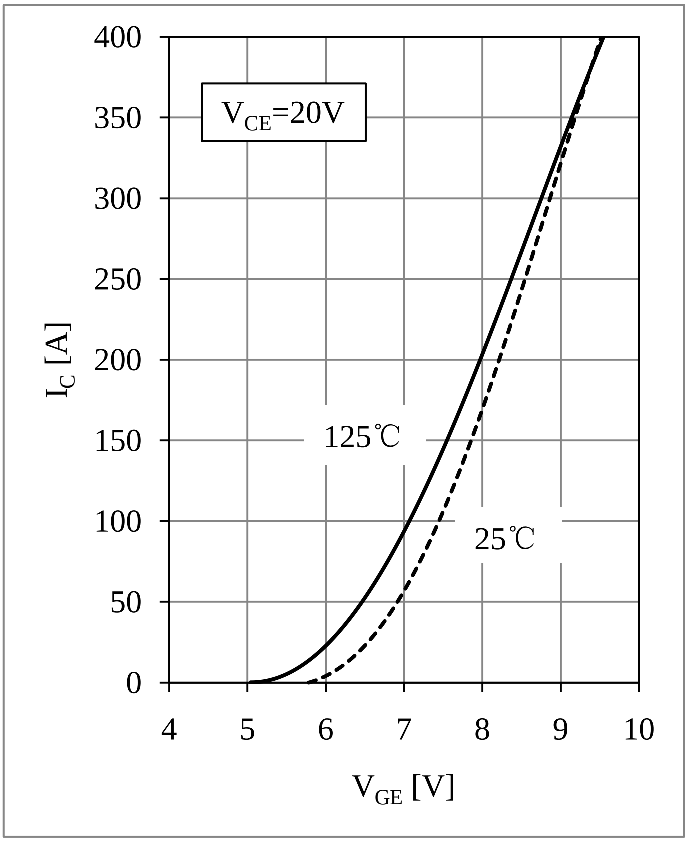


Fig 2. IGBT Transfer Characteristic

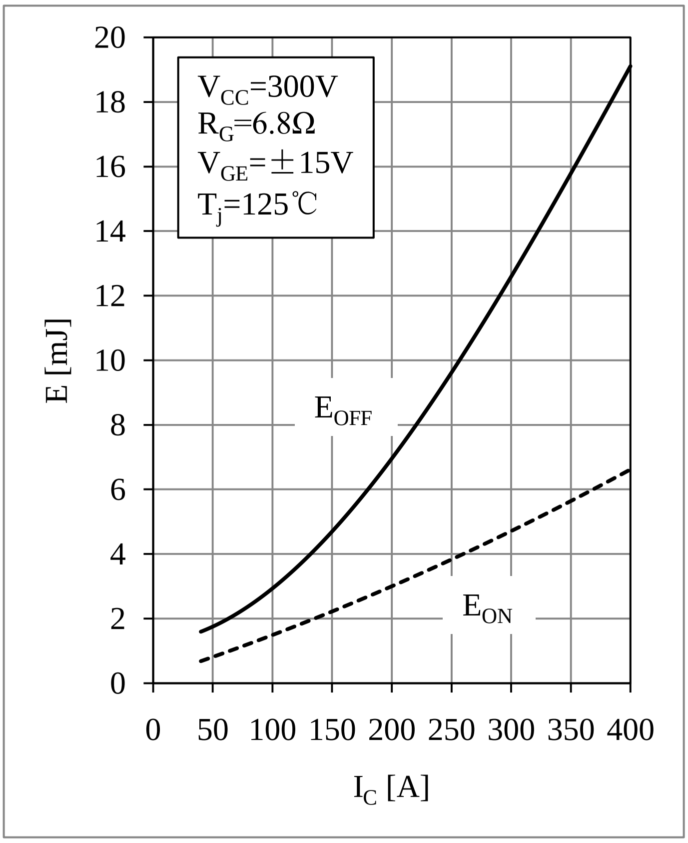


Fig 3. IGBT Switching Loss vs. I_C

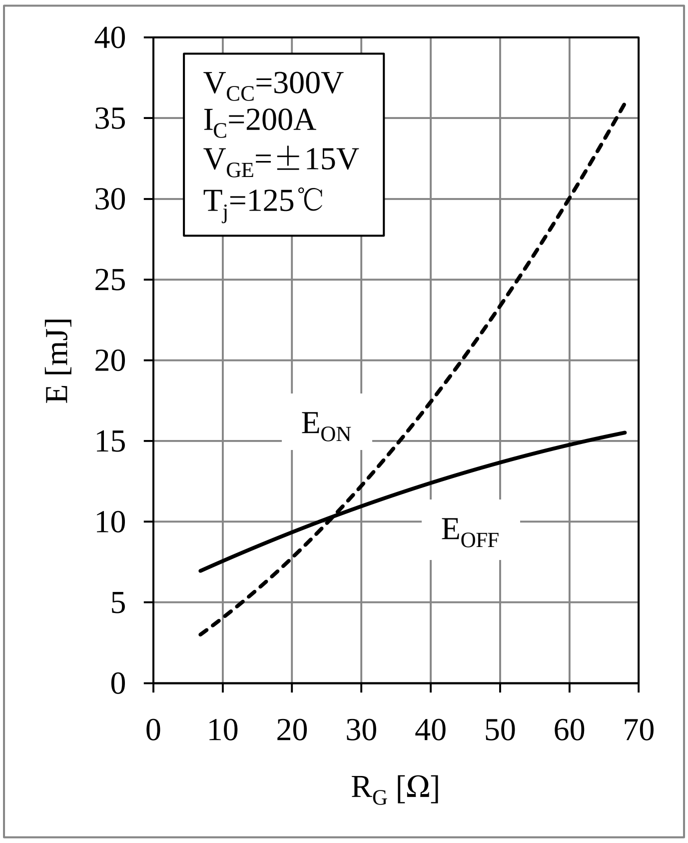


Fig 4. IGBT Switching Loss vs. R_G

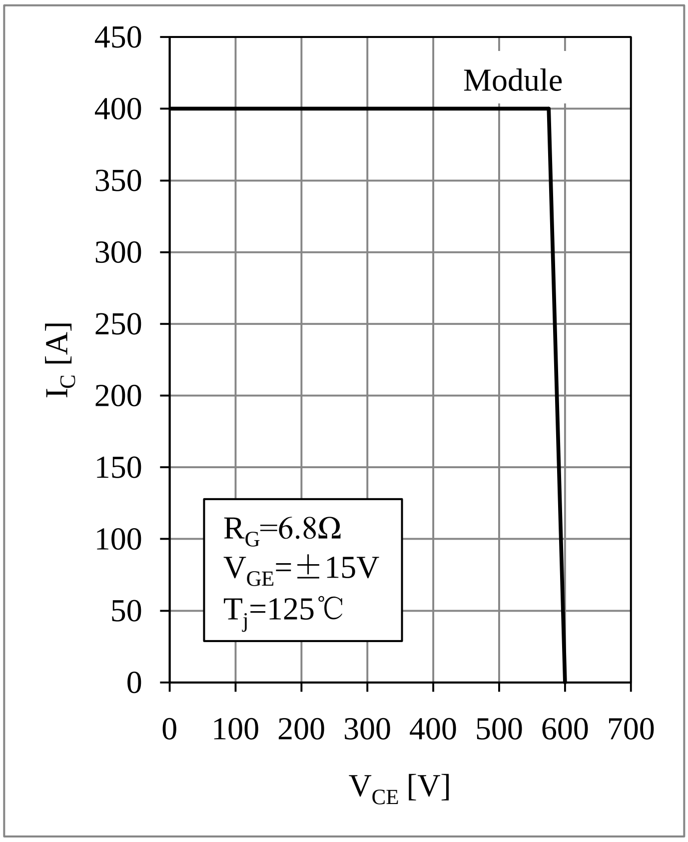


Fig 5. RBSOA

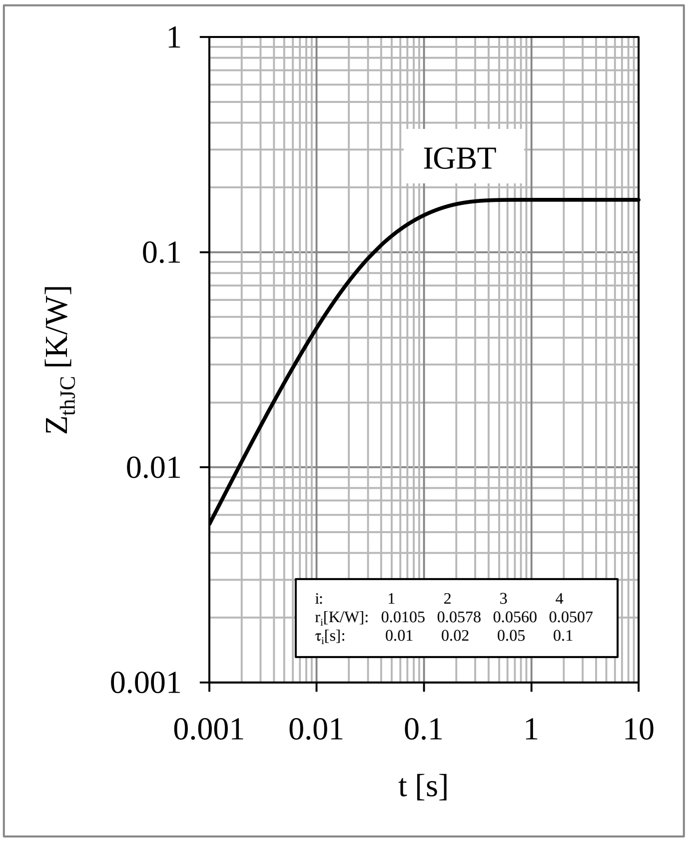


Fig 6. IGBT Transient Thermal Impedance

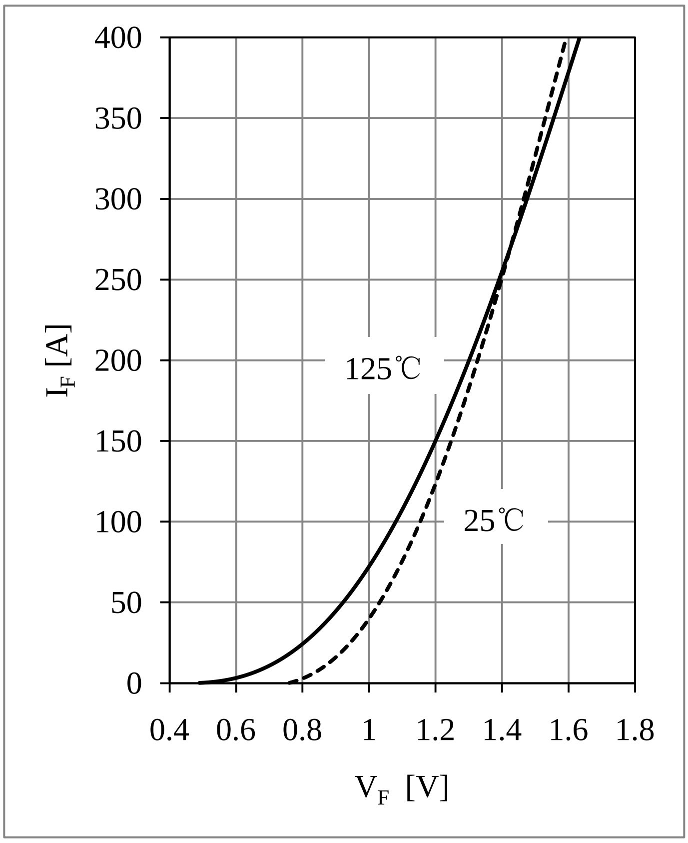


Fig 7. Diode Forward Characteristic

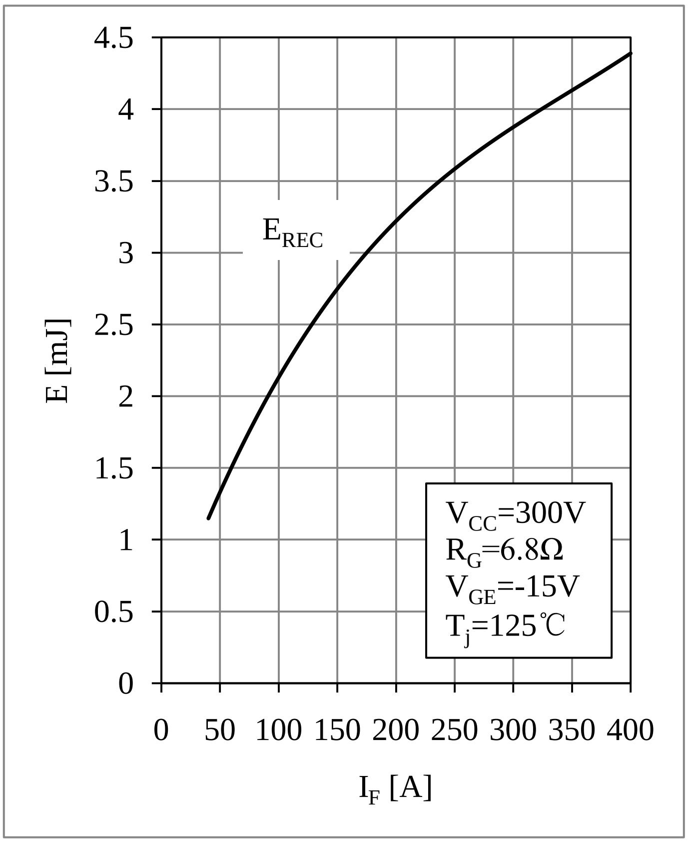


Fig 8. Diode Switching Loss vs. I_F

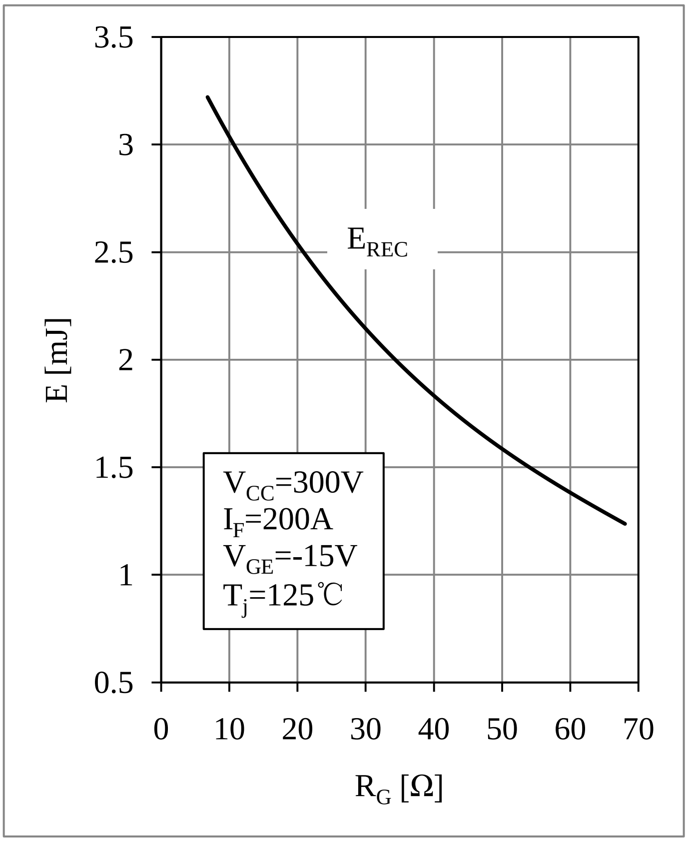


Fig 9. Diode Switching Loss vs. R_G

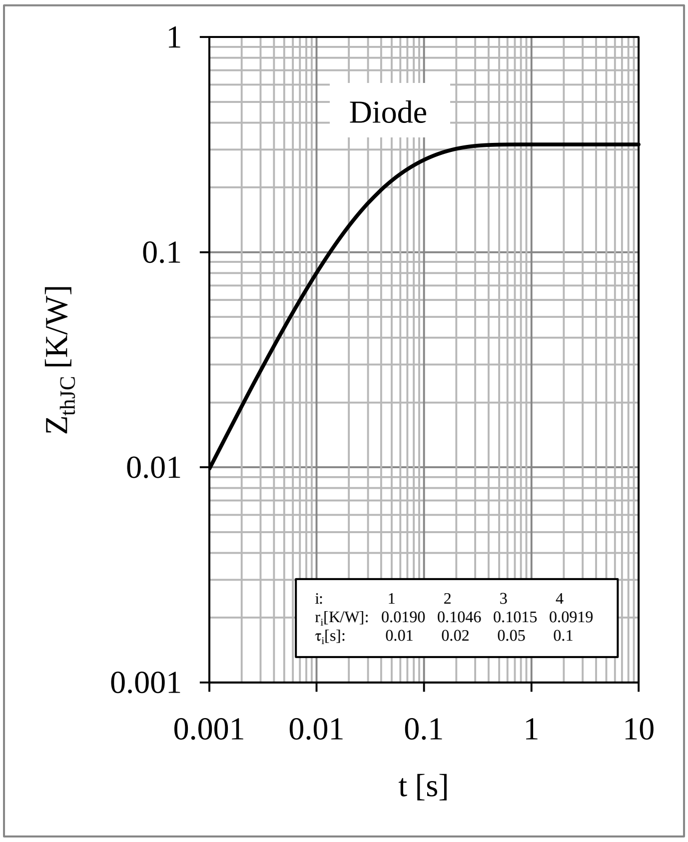
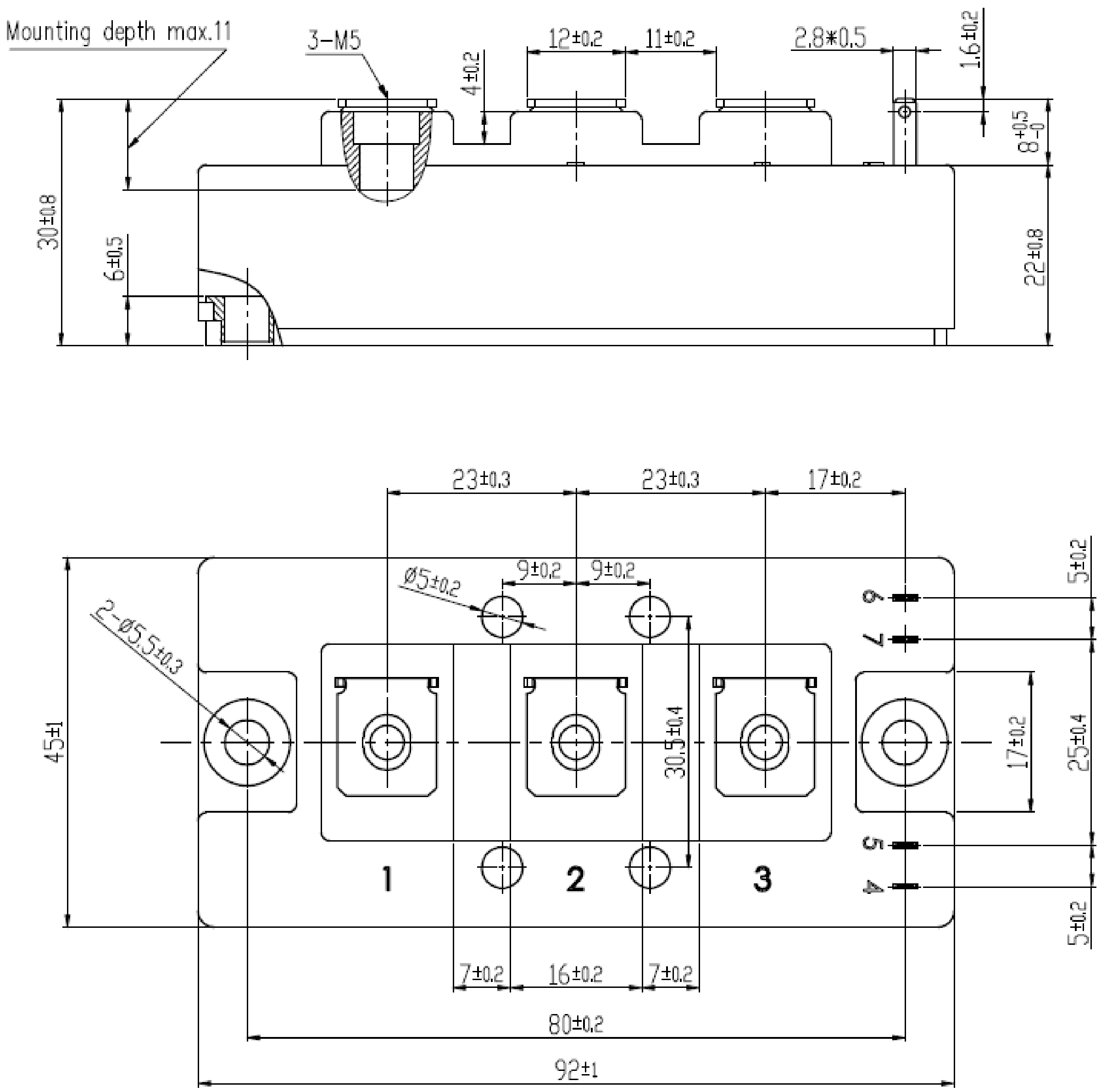


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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