STARPOWER

SEMICONDUCTOR™

IGBT

GD300SGU120C2S

Molding Type Module

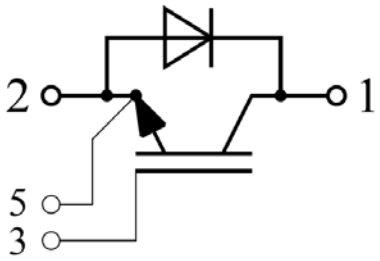
1200V/300A 1 in one-package

General Description

STARPOWER IGBT Power Module provides ultrafast switching speed as well as short circuit ruggedness. It's designed for the applications such as electronic welder and Inductive heating.

Features

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



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies
- Inductive heating
- Electronic welder

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD300SGU120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	440 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
I_F	Diode Continuous Forward Current @ T_C=80℃	300	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	600	A
P_D	Maximum Power Dissipation @ T_j=150℃	2272	W
T_{jmax}	Maximum Junction Temperature	150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
Mounting Torque	Signal Terminal Screw:M4 Power Terminal Screw:M6 Mounting Screw:M6	1.1 to 2.0 2.5 to 5.0 3.0 to 5.0	N.m

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℃	1200			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.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.0mA,V_{CE}=V_{GE}, T_j=25℃	4.4	5.2	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_j=25℃		3.10	3.55	V
		I_C=300A,V_{GE}=15V, T_j=125℃		3.45		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=3.3Ω,V_{GE}=±15V, T_j=25℃		662		ns
t_r	Rise Time			142		ns
$t_{d(off)}$	Turn-Off Delay Time			633		ns
t_f	Fall Time			117		ns
E_{on}	Turn-On Switching Loss			19.7		mJ
E_{off}	Turn-Off Switching Loss			22.4		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=3.3Ω,V_{GE}=±15V, T_j=125℃		660		ns
t_r	Rise Time			143		ns
$t_{d(off)}$	Turn-Off Delay Time			665		ns
t_f	Fall Time			137		ns
E_{on}	Turn-On Switching Loss			24.9		mJ
E_{off}	Turn-Off Switching Loss			28.4		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		25.3		nF
C_{oes}	Output Capacitance			2.25		nF
C_{res}	Reverse Transfer Capacitance			0.91		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃, V_{CC}=900V, V_{CEM}≤1200V		2550		A
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.18		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=300A	T_j=25℃		1.82	2.25	V
			T_j=125℃		1.95		
Q_r	Recovered Charge	I_F=300A, V_R=600V, R_G=3.3Ω, V_{GE}=-15V	T_j=25℃		29.5		μC
			T_j=125℃		42.3		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		210		A
			T_j=125℃		272		
E_{rec}	Reverse Recovery Energy		T_j=25℃		16.4		mJ
			T_j=125℃		22.7		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.055	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.092	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

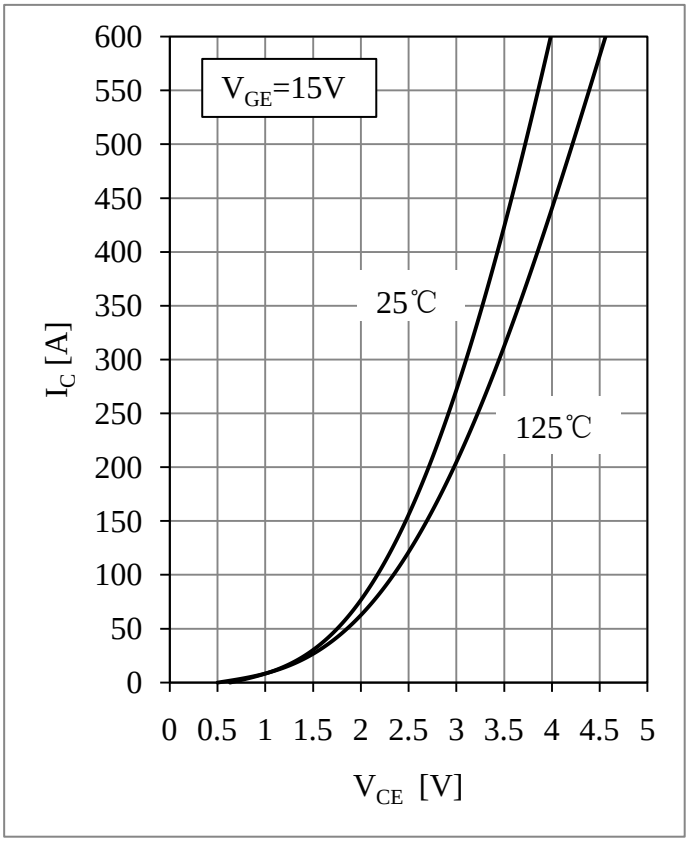


Fig 1. IGBT Output Characteristics

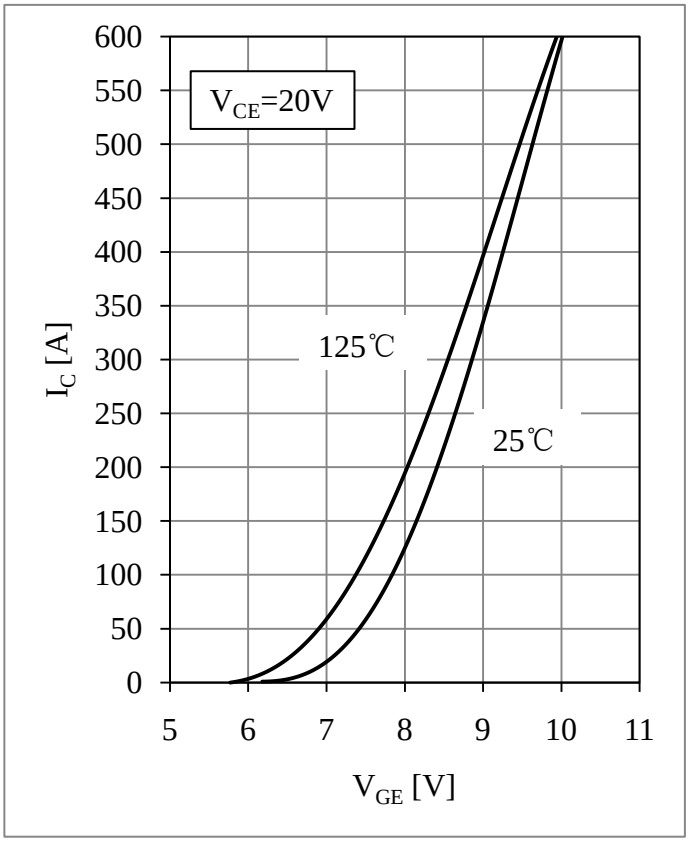


Fig 2. IGBT Transfer Characteristics

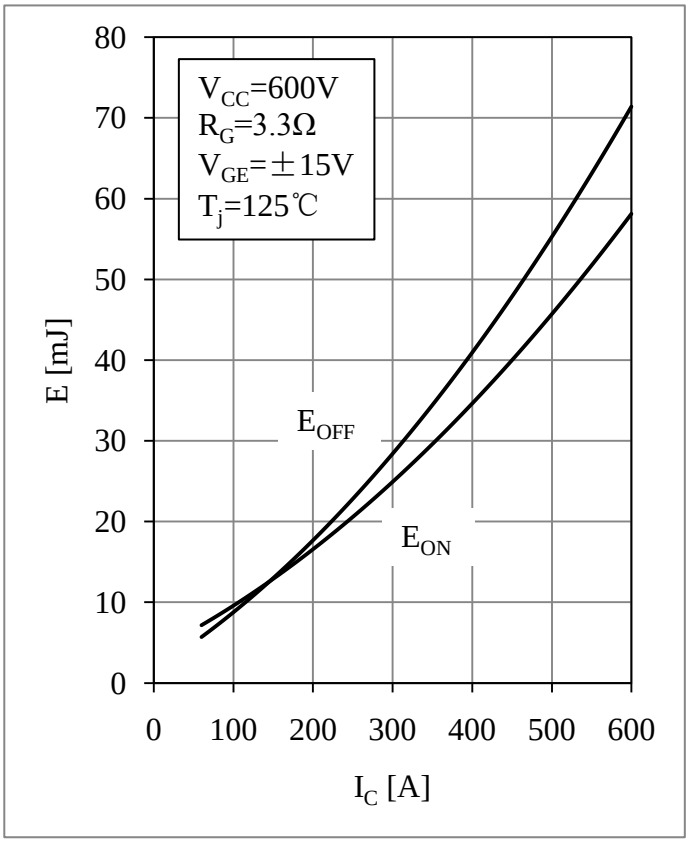


Fig 3. IGBT Switching Loss vs. I_C

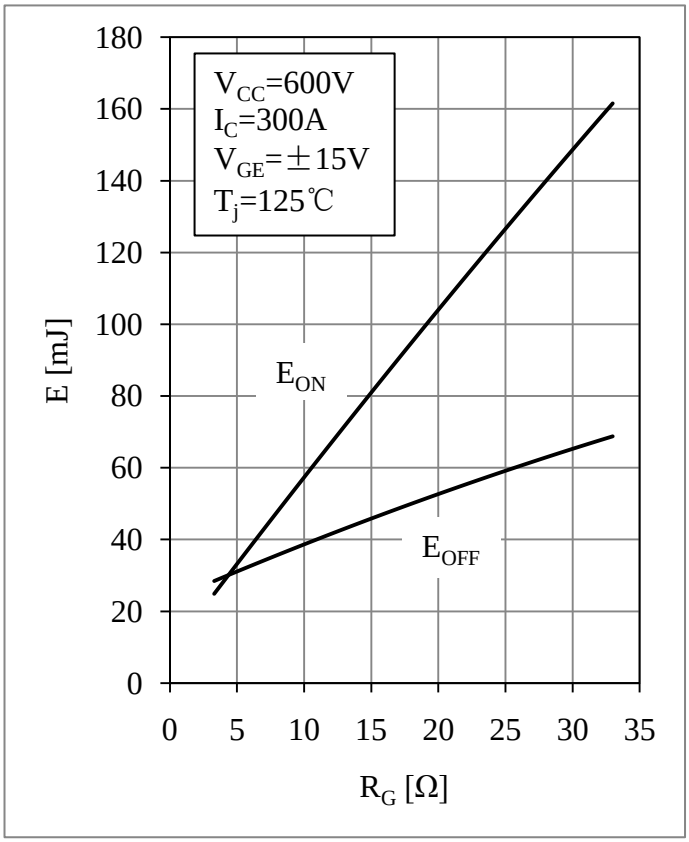


Fig 4. IGBT Switching Loss vs. R_G

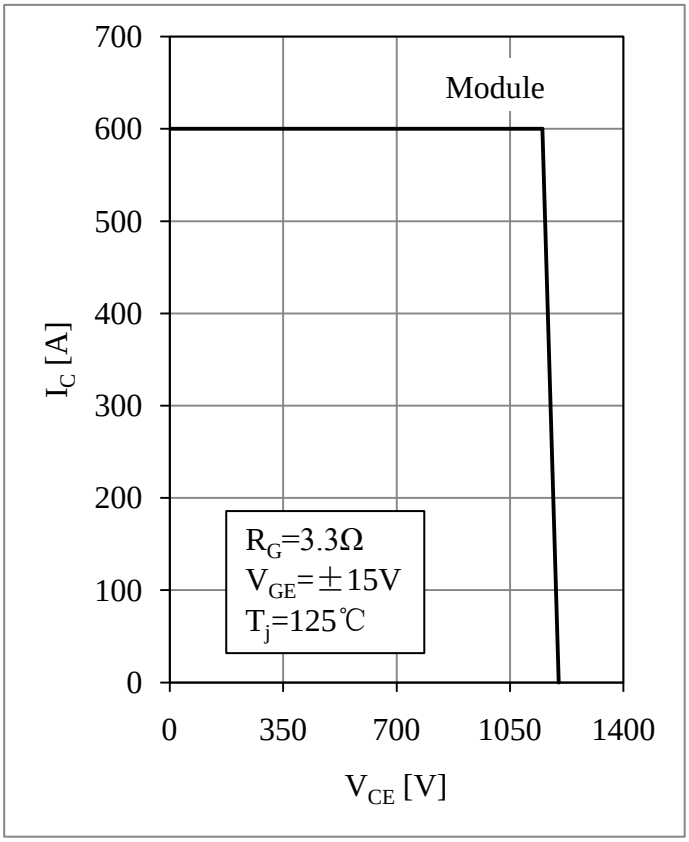


Fig 5. RBSOA

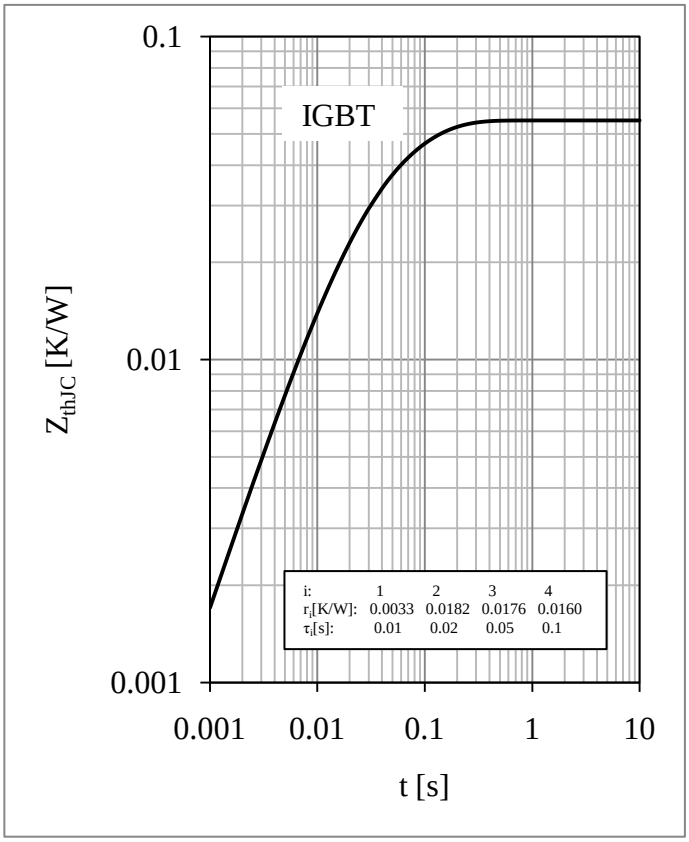


Fig 6. IGBT Transient Thermal Impedance

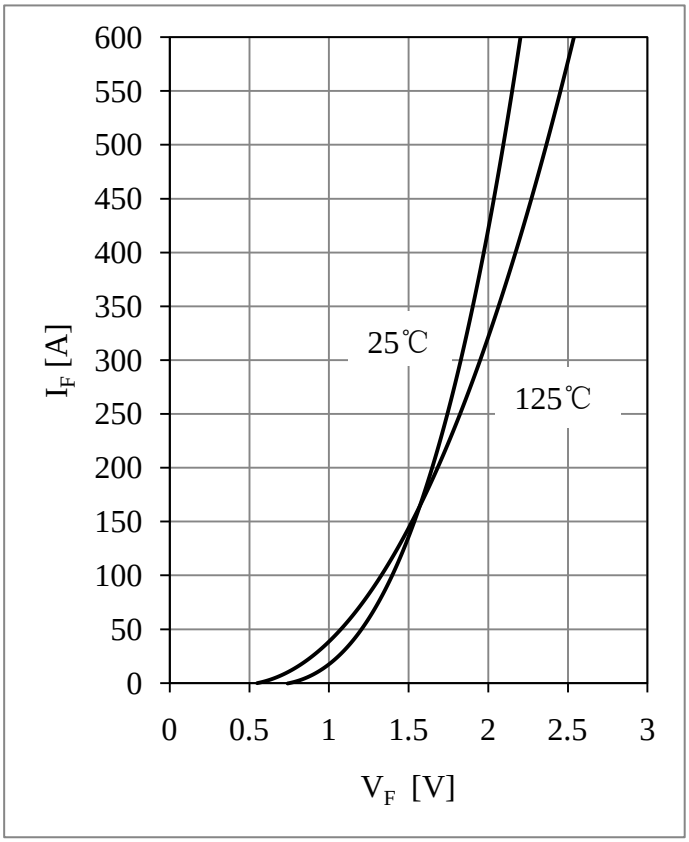


Fig 7. Diode Forward Characteristics

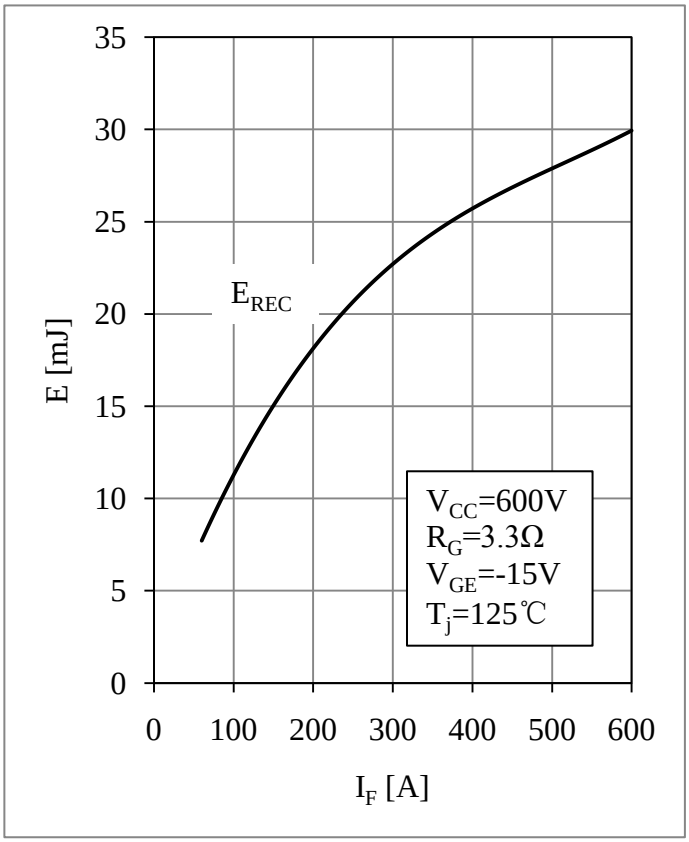


Fig 8. Diode Switching Loss vs. I_F

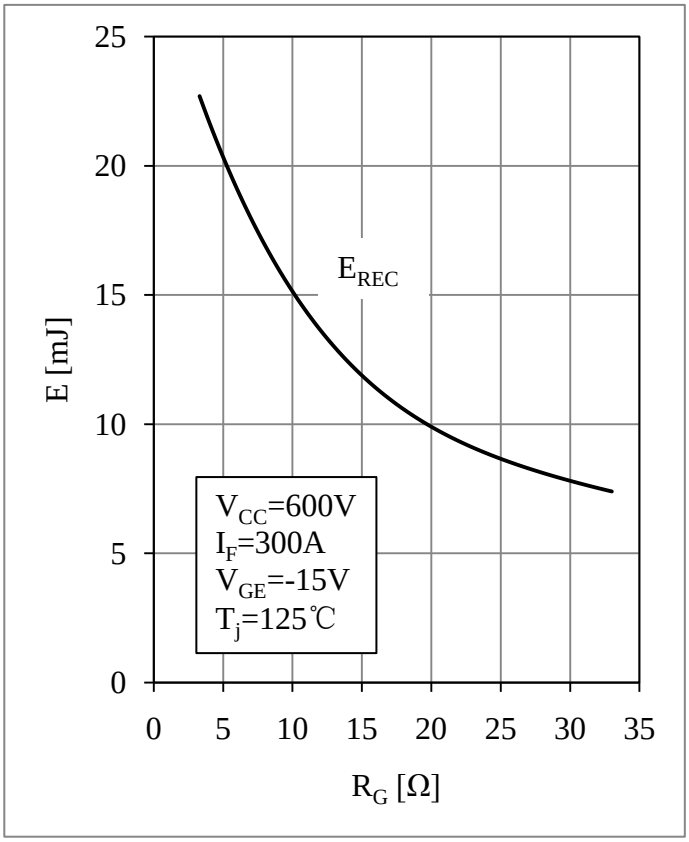


Fig 9. Diode Switching Loss vs. R_G

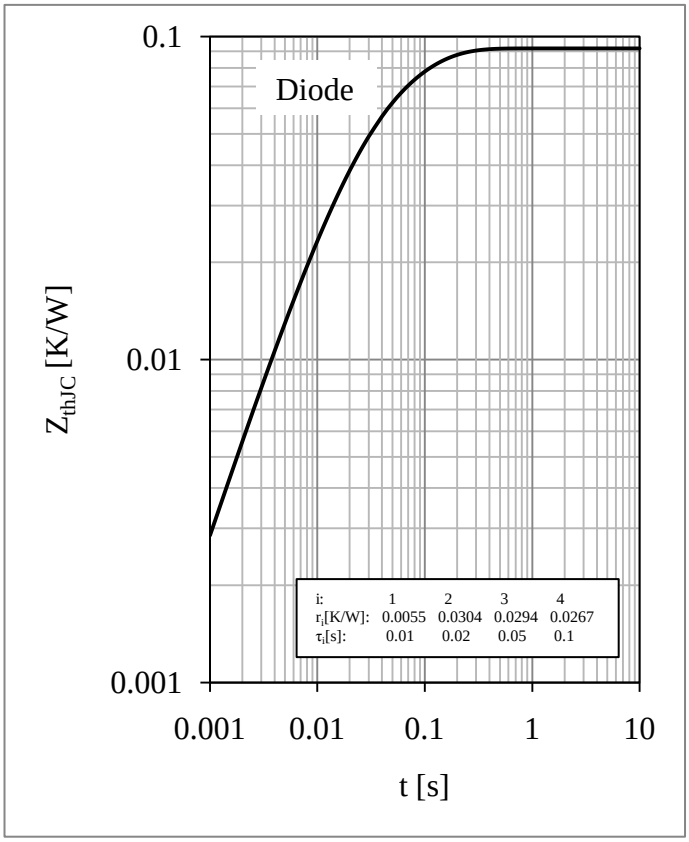
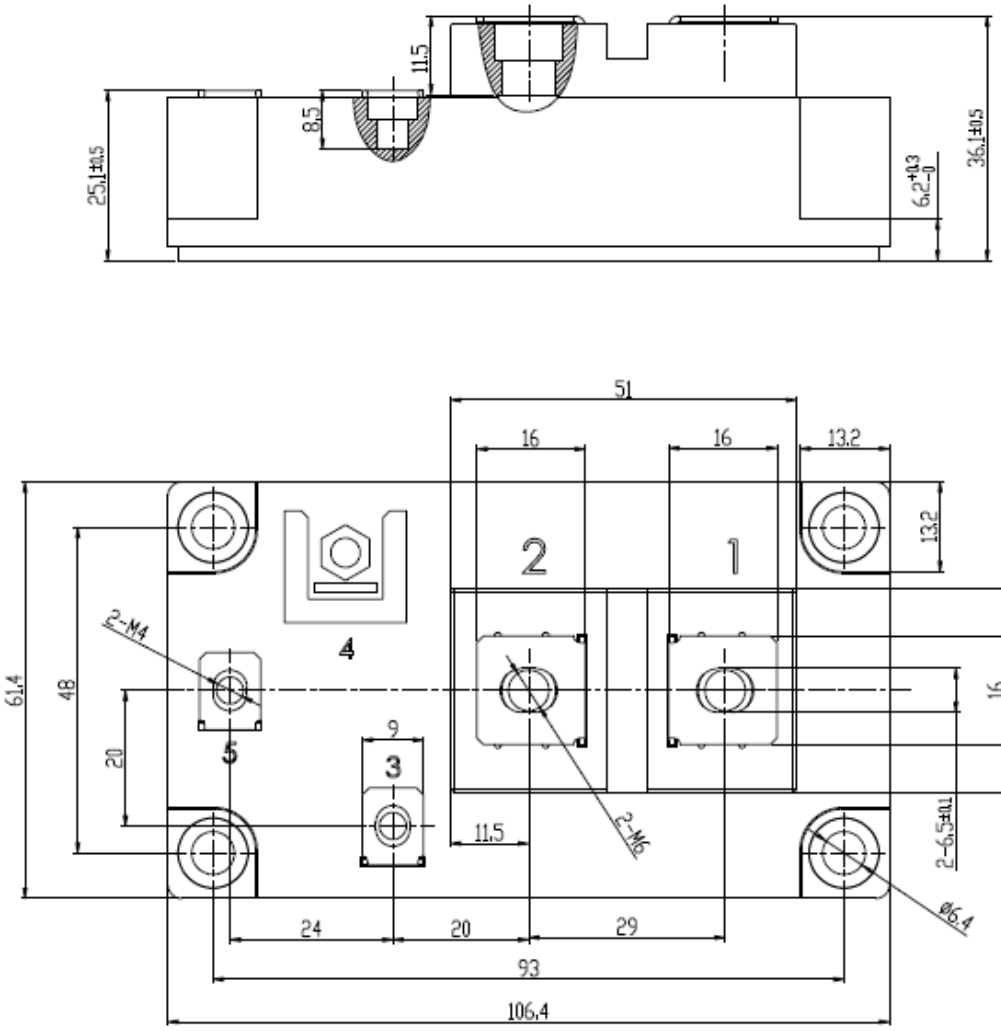


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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