STARPOWER

SEMICONDUCTOR **IGBT**

GD300SGL170C2S

Molding Type Module

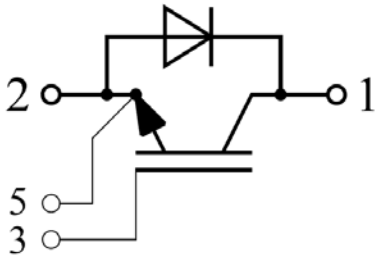
1700V/300A 1 in one-package

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 inverters and UPS.

Features

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



Equivalent Circuit Schematic

Typical Applications

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

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD300SGL170C2S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	460 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	600	A
P_D	Maximum Power Dissipation @ T_j=175℃	2273	W
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
M	Terminal Connection Torque, Screw M4 Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	1.1 to 2.0 2.5 to 5.0 3.0 to 5.0	N.m
G	Weight of Module	300	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℃	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.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=24.0mA,V_{CE}=V_{GE}, T_j=25℃	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_j=25℃		2.50	2.95	V
		I_C=300A,V_{GE}=15V, T_j=125℃		3.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=300A, R_G=4.7Ω,V_{GE}=±15V, T_j=25℃		464		ns
t_r	Rise Time			157		ns
$t_{d(off)}$	Turn-Off Delay Time			421		ns
t_f	Fall Time			290		ns
E_{on}	Turn-On Switching Loss			108		mJ
E_{off}	Turn-Off Switching Loss			55.2		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=300A, R_G=4.7Ω,V_{GE}=±15V, T_j=125℃		483		ns
t_r	Rise Time			161		ns
$t_{d(off)}$	Turn-Off Delay Time			465		ns
t_f	Fall Time			538		ns
E_{on}	Turn-On Switching Loss			128		mJ
E_{off}	Turn-Off Switching Loss			83.7		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		20.4		nF
C_{res}	Reverse Transfer Capacitance			0.72		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=1300V, V_{CEM}≤1700V		960		A
Q_G	Gate Charge	V_{CC}=900V,I_C=300A, V_{GE}=-15…+15V		2.4		μC
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℃		1.80	2.25	V
			T_j=125℃		1.95		
Q_r	Recovered Charge	I_F=300A, V_R=900V, R_G=4.7Ω, V_{GE}=-15V	T_j=25℃		70.3		μC
			T_j=125℃		108		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		209		A
			T_j=125℃		238		
E_{rec}	Reverse Recovery Energy		T_j=25℃		40.7		mJ
			T_j=125℃		65.1		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.066	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.105	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W

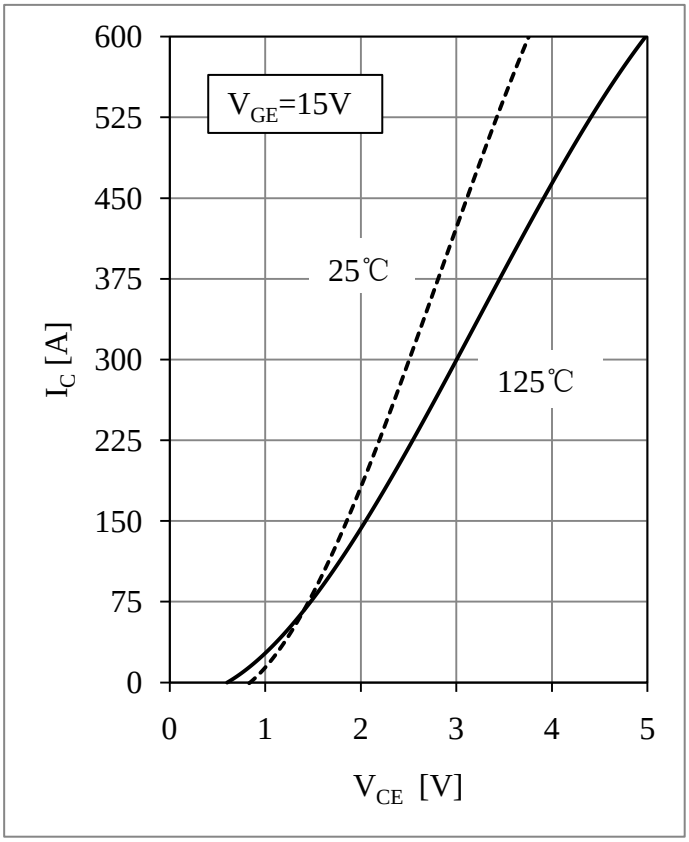


Fig 1. IGBT Output Characteristics

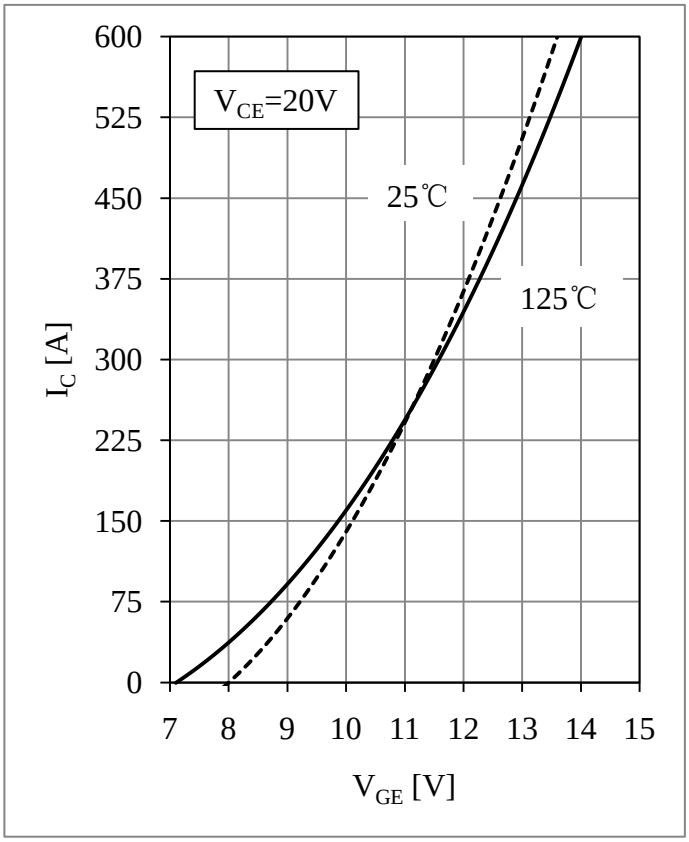


Fig 2. IGBT Transfer Characteristics

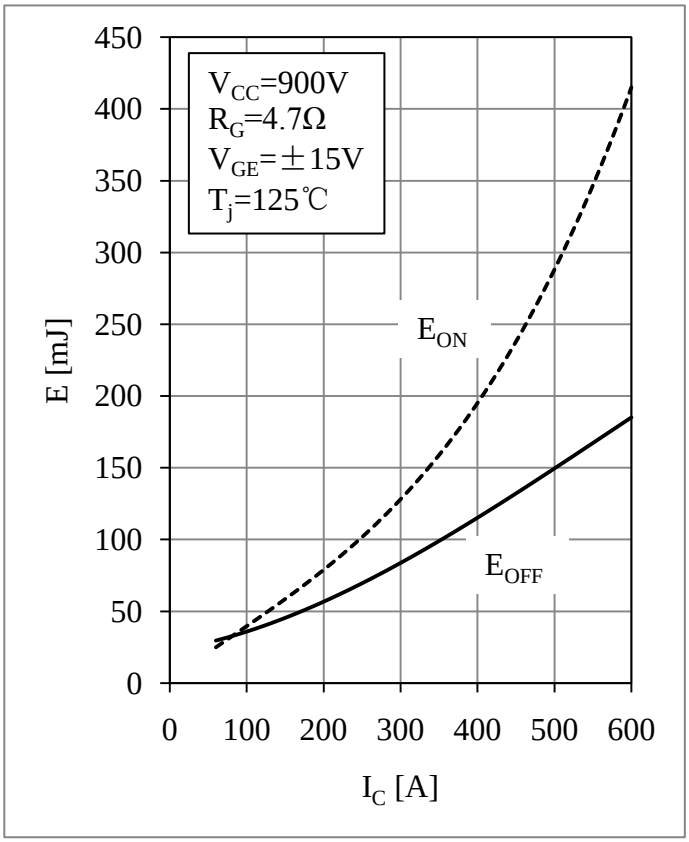


Fig 3. IGBT Switching Loss vs. I_C

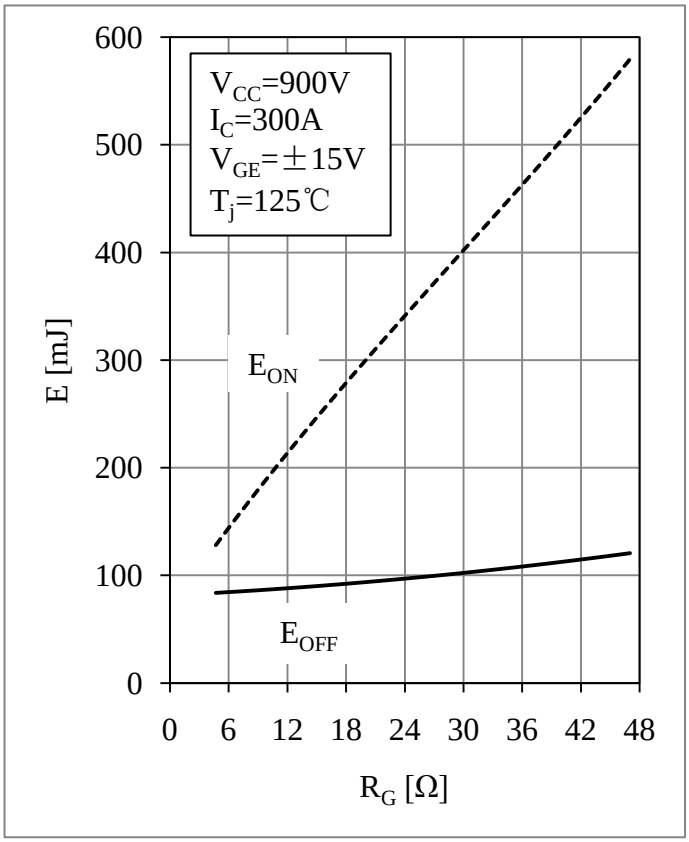


Fig 4. IGBT Switching Loss vs. R_G

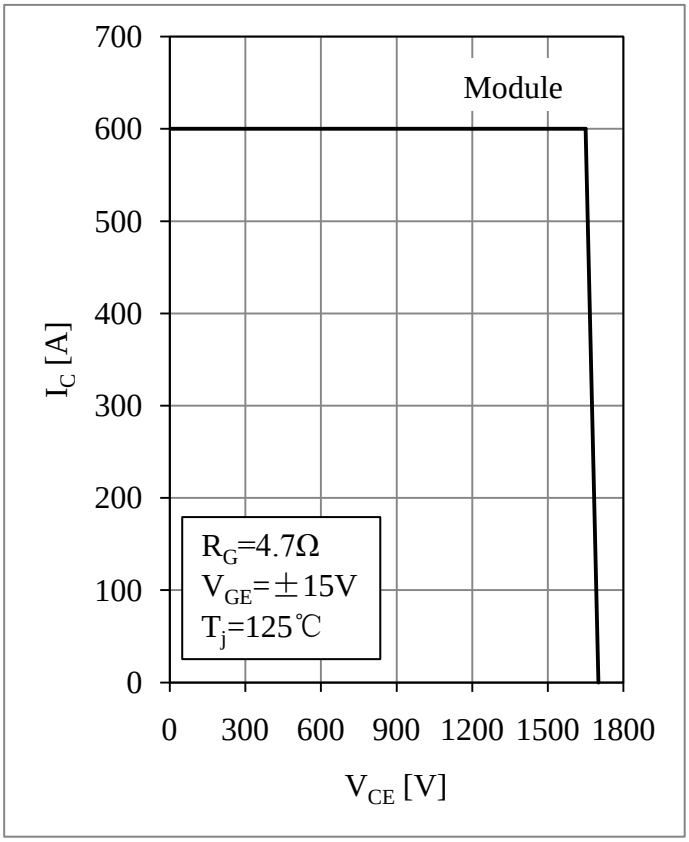


Fig 5. RBSOA

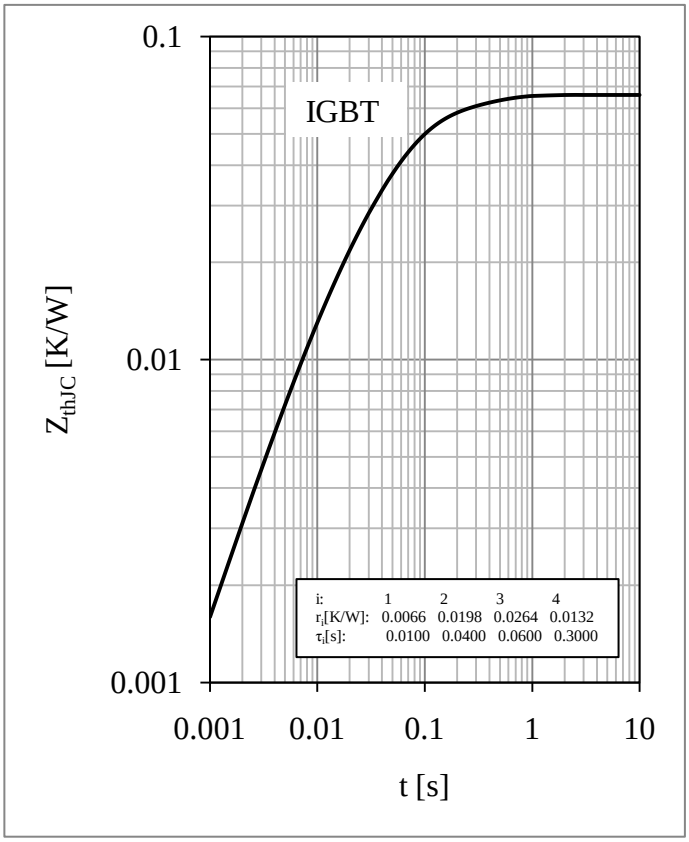


Fig 6. IGBT Transient Thermal Impedance

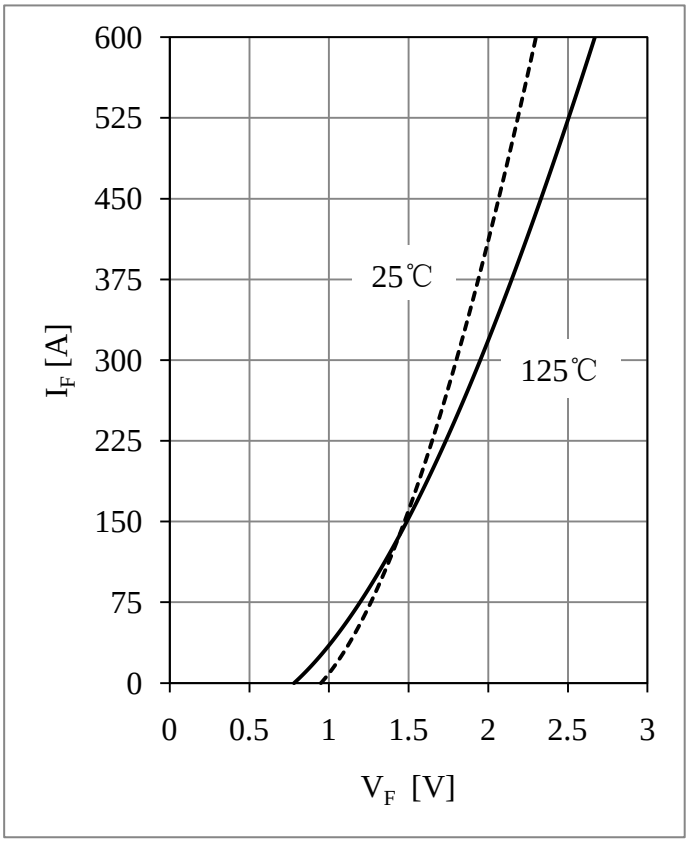


Fig 7. Diode Forward Characteristics

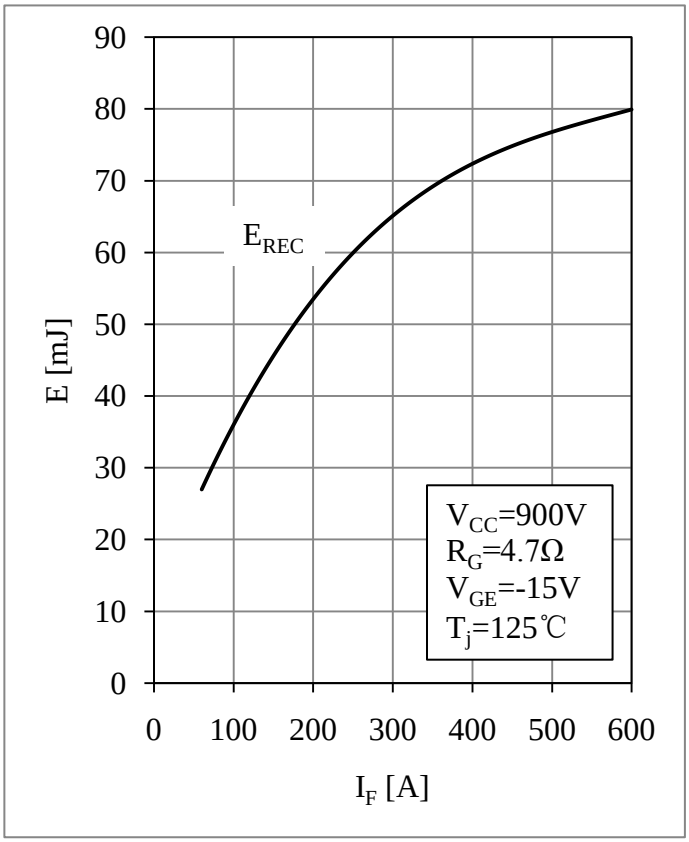


Fig 8. Diode Switching Loss vs. I_F

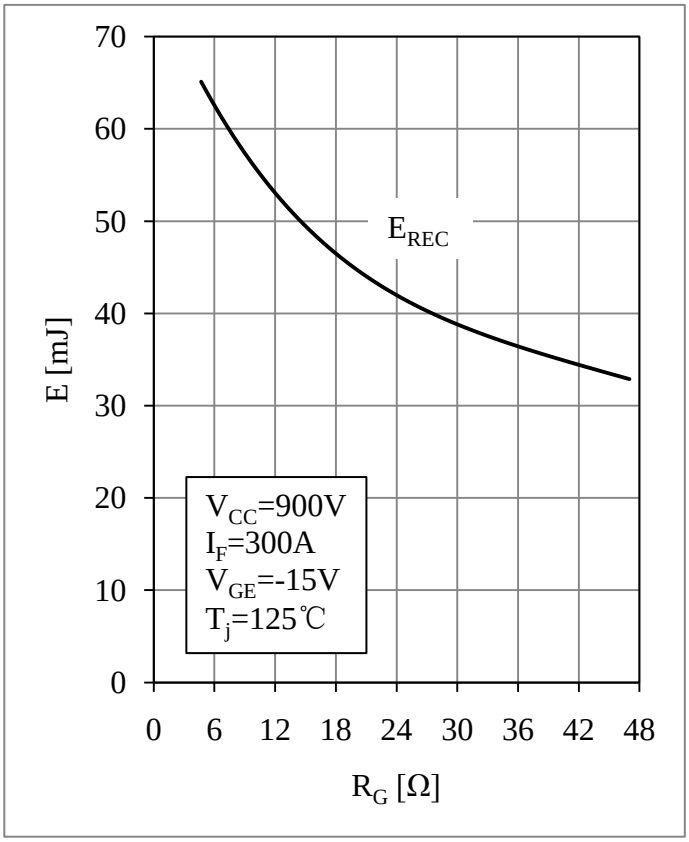


Fig 9. Diode Switching Loss vs. R_G

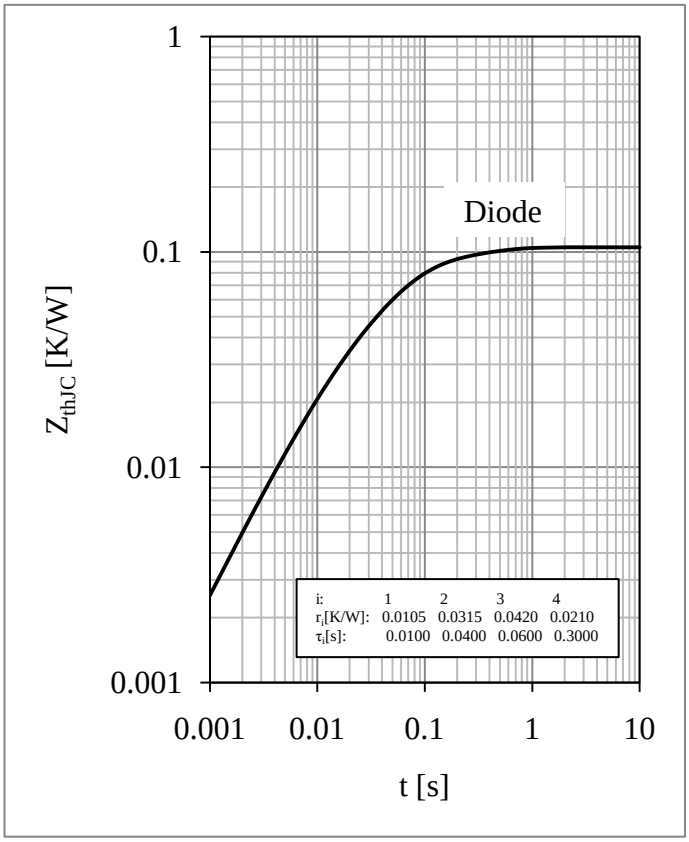
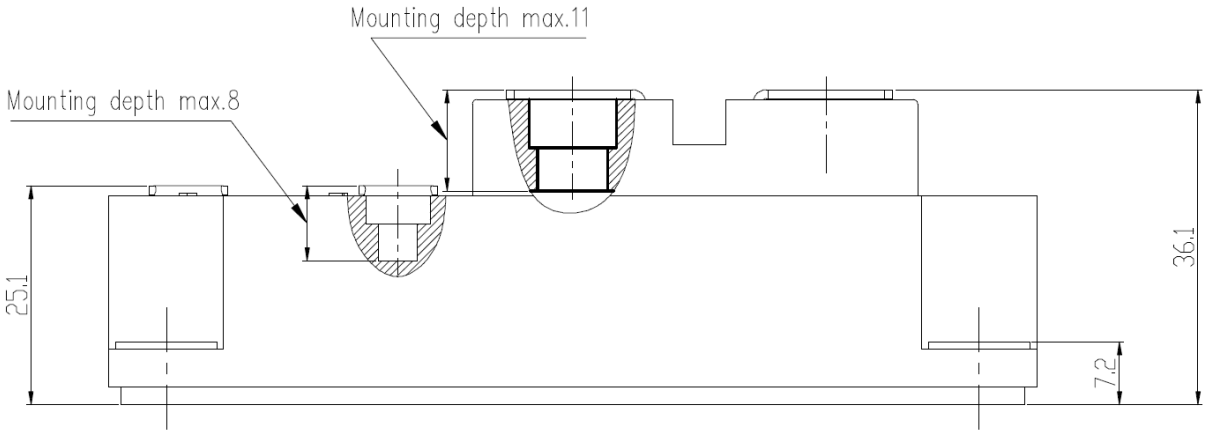
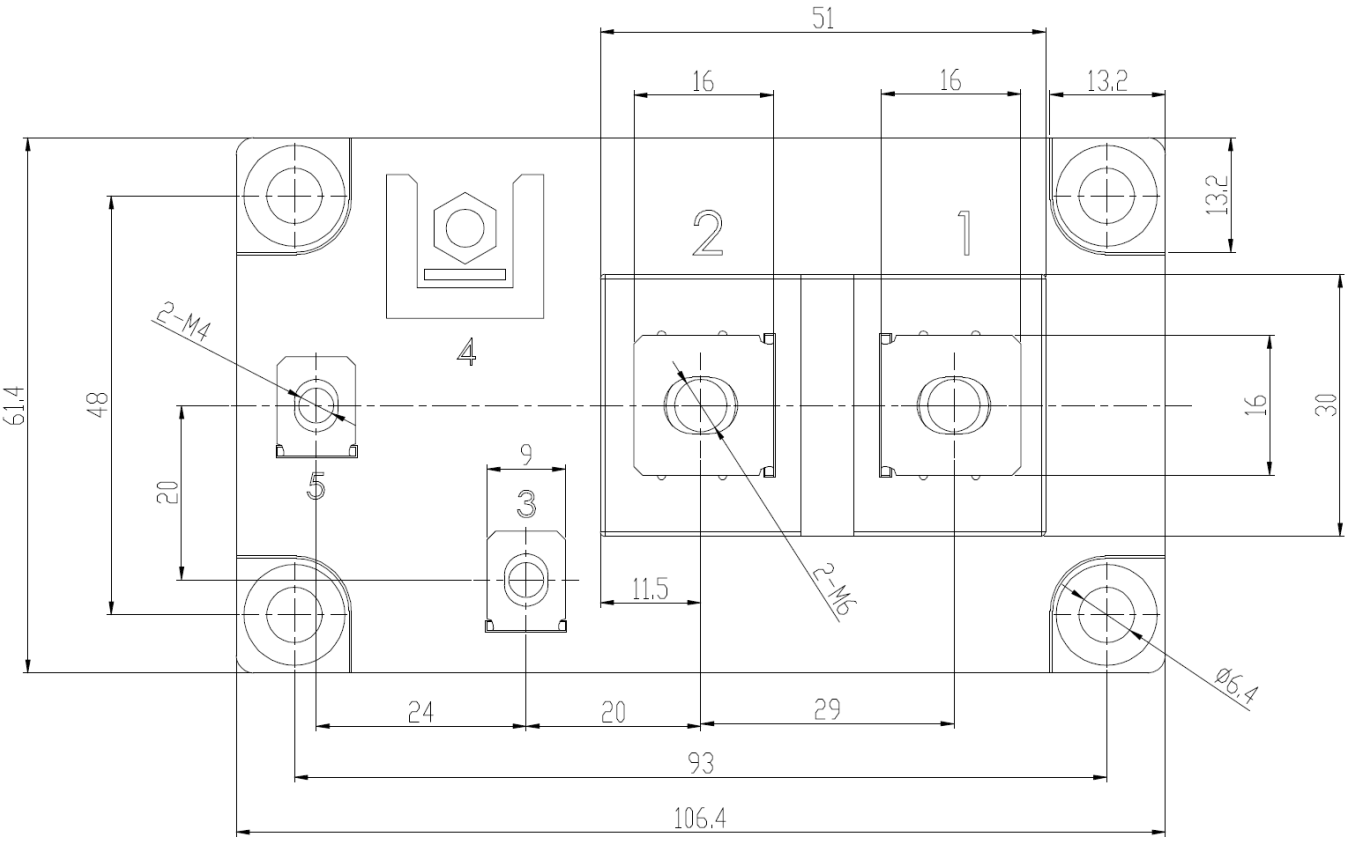


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters





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