

STARPOWER

SEMICONDUCTOR

IGBT

GD200SGL170C2S

Molding Type Module

1700V/200A 1 in one-package

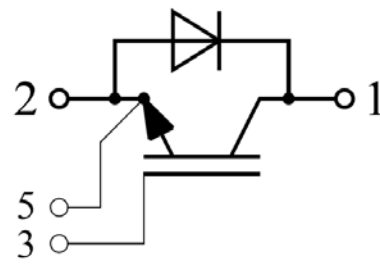
General Description

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
- 10 μ s 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 $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Description	GD200SGL170C2S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=100^{\circ}\text{C}$	330 200	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	1744	W
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	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 $T_C=25^{\circ}\text{C}$ unless otherwise noted**Off Characteristics**

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

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=8.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		2.50	2.95	V
		$I_C=200\text{A}, V_{GE}=15\text{V},$ $T_j=125^{\circ}\text{C}$		3.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=200A,$ $R_G=6.8\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		402		ns	
t_r	Rise Time			129		ns	
$t_{d(off)}$	Turn-Off Delay Time			371		ns	
t_f	Fall Time			383		ns	
E_{on}	Turn-On Switching Loss				64.9		mJ
E_{off}	Turn-Off Switching Loss				36.3		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=200A,$ $R_G=6.8\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		393		ns	
t_r	Rise Time			130		ns	
$t_{d(off)}$	Turn-Off Delay Time			367		ns	
t_f	Fall Time			417		ns	
E_{on}	Turn-On Switching Loss				87.7		mJ
E_{off}	Turn-Off Switching Loss				64.4		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		14.0		nF	
C_{res}	Reverse Transfer Capacitance			0.48		nF	
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=1300V,$ $V_{CEM} \leq 1700V$		600		A	
Q_G	Gate Charge	$V_{CC}=900V, I_C=200A,$ $V_{GE}=-15 \dots +15V$		1.8		μC	
L_{CE}	Stray Inductance				20	nH	
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.18		m Ω	

Electrical Characteristics of Diode $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=200A$	$T_j=25^\circ C$	1.80	2.25	V
			$T_j=125^\circ C$		1.95	
Q_r	Recovered Charge	$I_F=200A,$	$T_j=25^\circ C$	50.6		μC
			$T_j=125^\circ C$		70.1	
I_{RM}	Peak Reverse Recovery Current	$V_R=900V,$ $R_G=6.8\Omega,$	$T_j=25^\circ C$	143		A
			$T_j=125^\circ C$		190	
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	28.5		mJ
			$T_j=125^\circ C$		38.3	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.086	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.131	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W

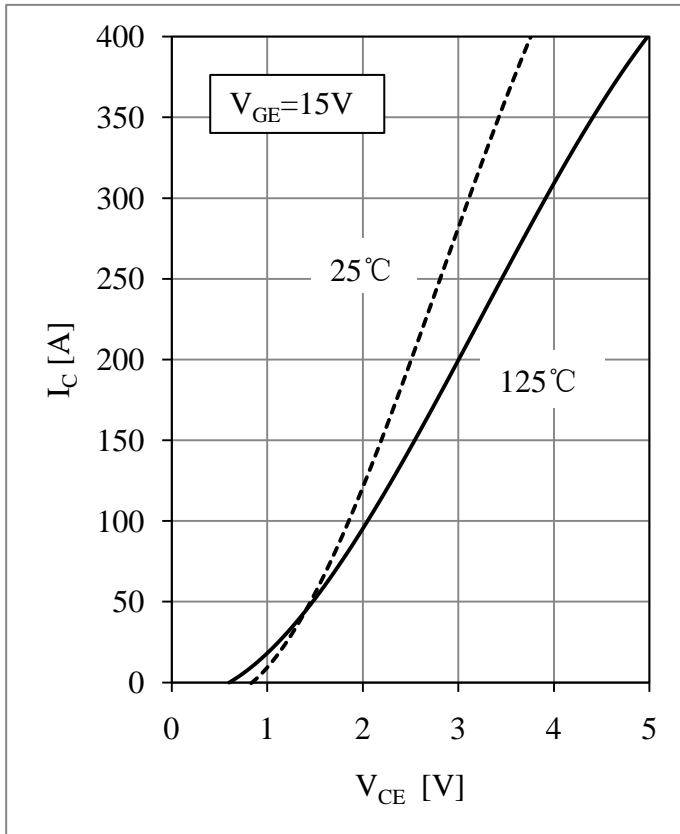


Fig 1. IGBT Output Characteristics

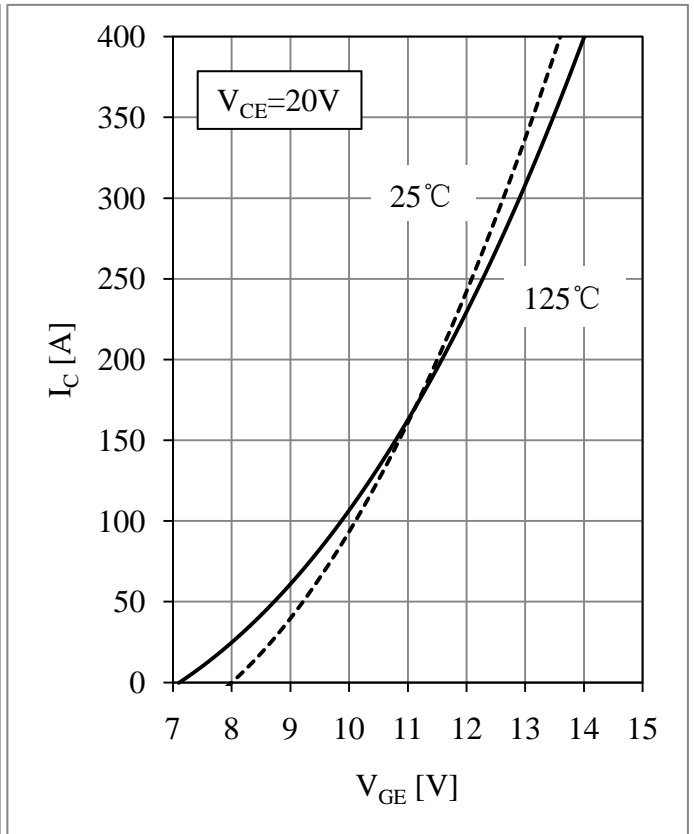


Fig 2. IGBT Transfer Characteristics

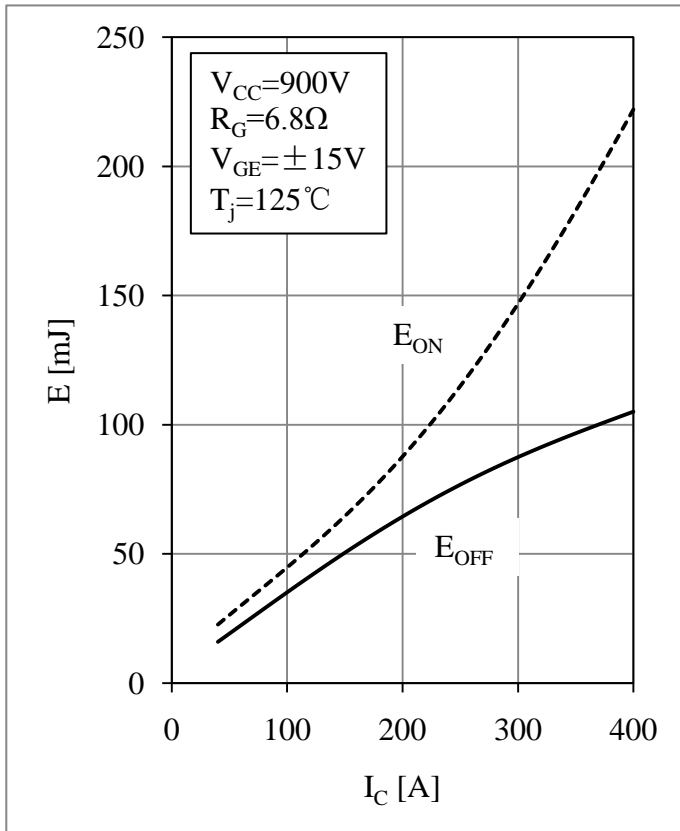


Fig 3. IGBT Switching Loss vs. I_C

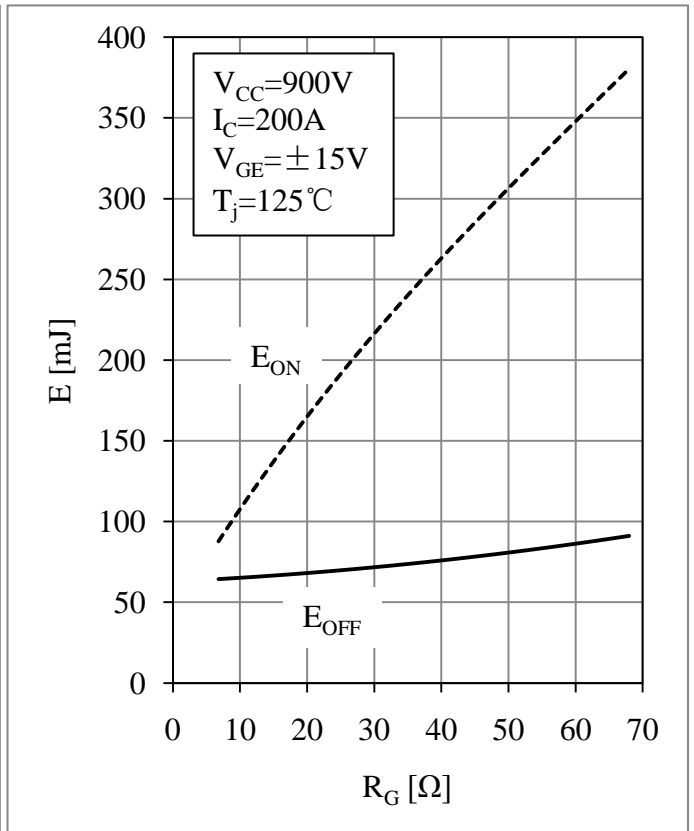


Fig 4. IGBT Switching Loss vs. R_G

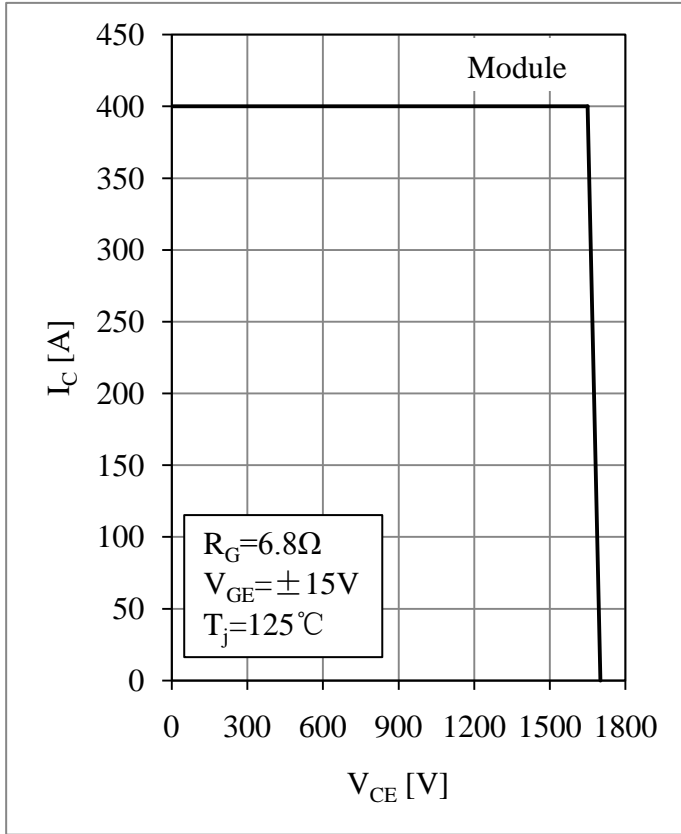


Fig 5. RBSOA

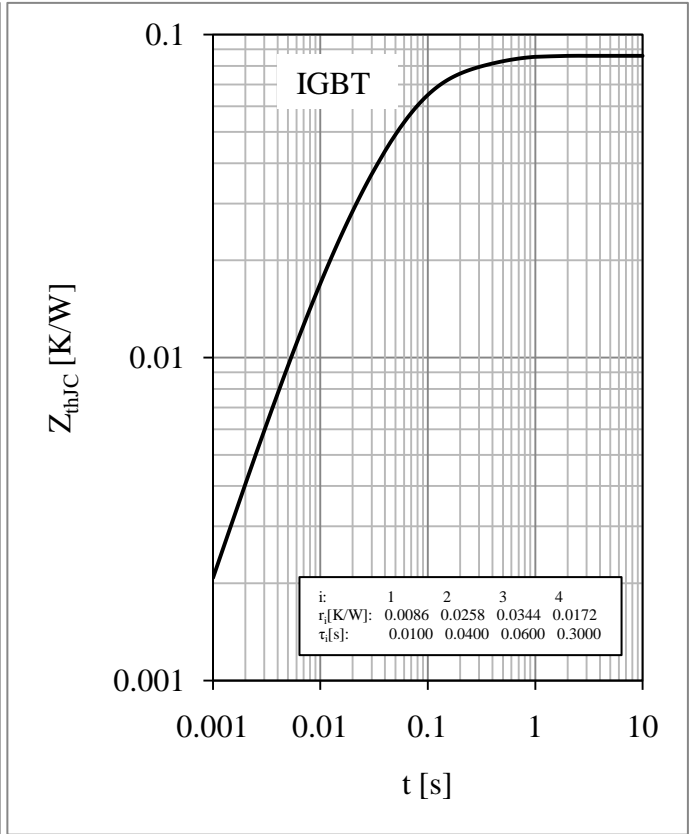


Fig 6. IGBT Transient Thermal Impedance

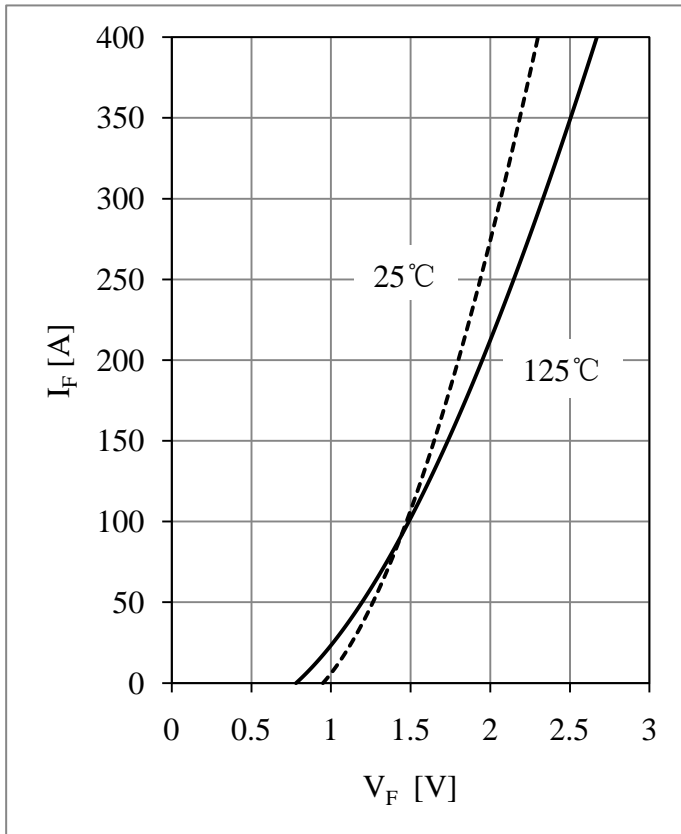


Fig 7. Diode Forward Characteristics

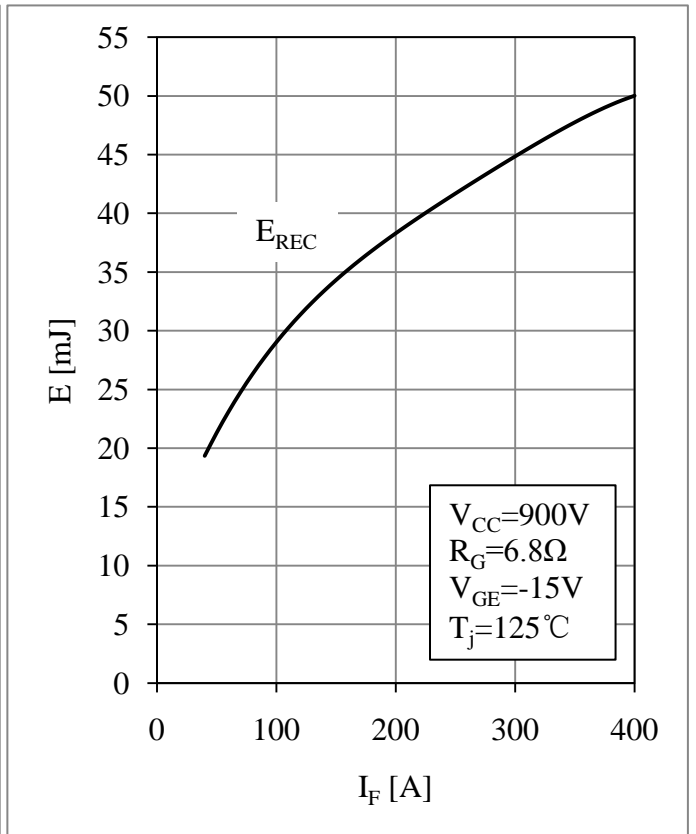


Fig 8. Diode Switching Loss vs. I_F

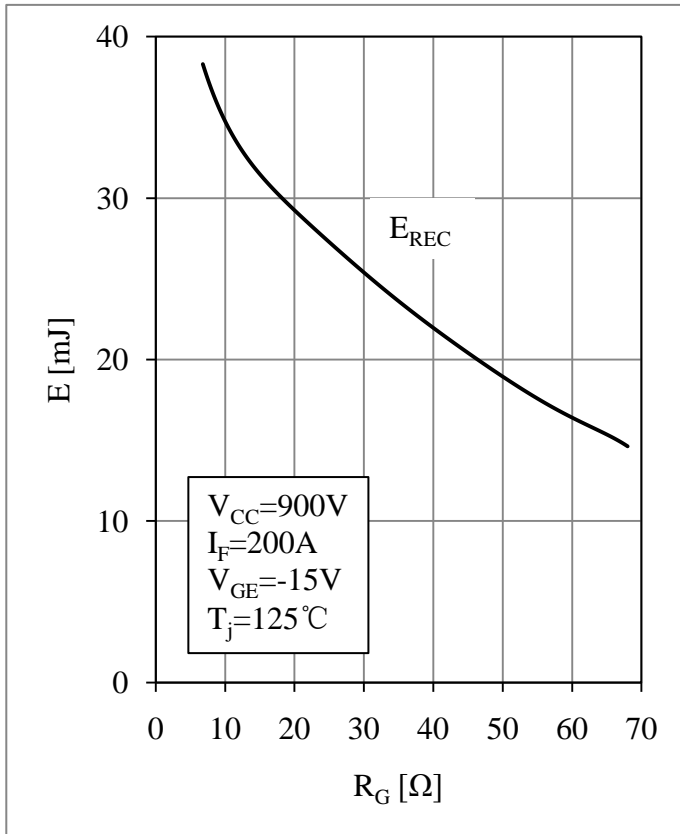


Fig 9. Diode Switching Loss vs. R_G

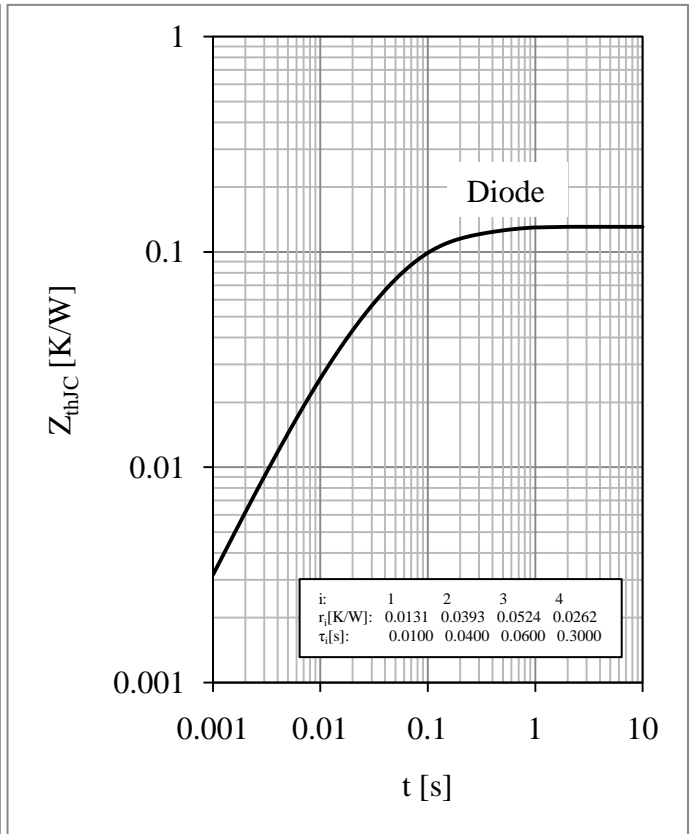
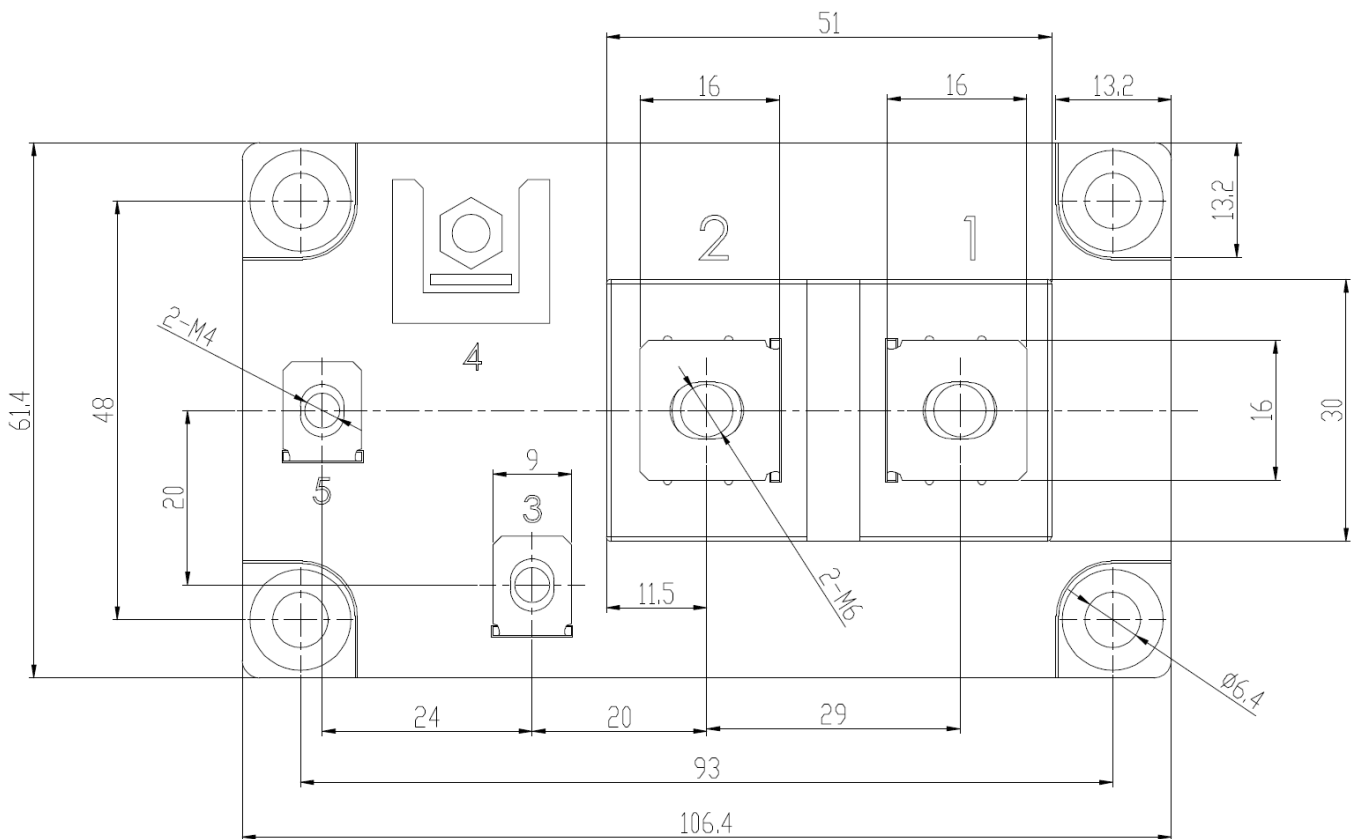
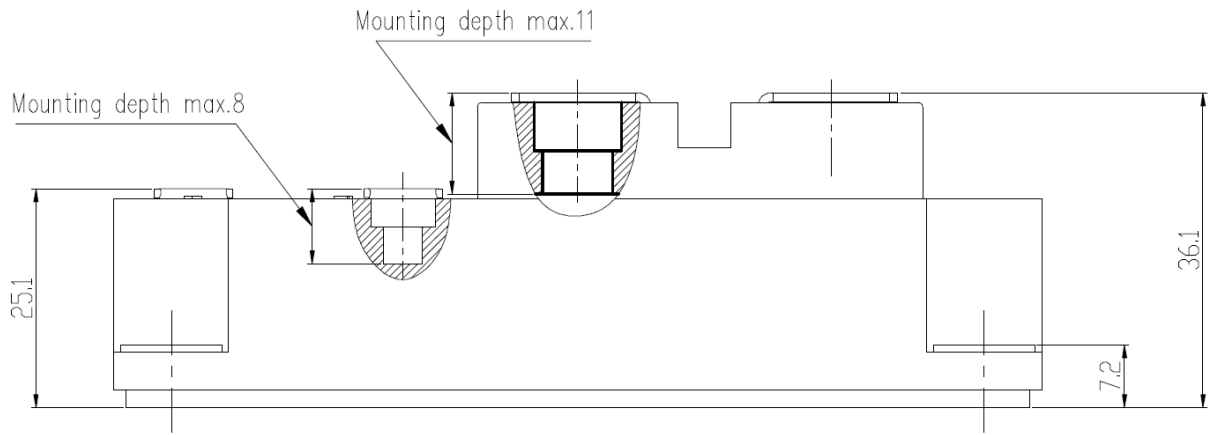


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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