STARPOWER

SEMICONDUCTOR **IGBT**

GD900SGX120C2SA_B20

1200V/900A 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.

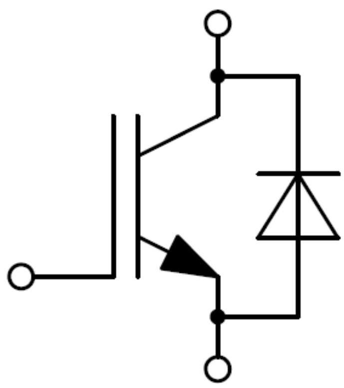
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using HPS DBC technology

Typical Applications

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

Equivalent Circuit Schematic



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Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	1550 900	A
I_{CM}	Pulsed Collector Current t_p=1ms	1800	A
P_D	Maximum Power Dissipation @ T_j=175°C	4838	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	900	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1800	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	°C
T_{jop}	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V

IGBT Characteristics T_C=25°C unless otherwise noted

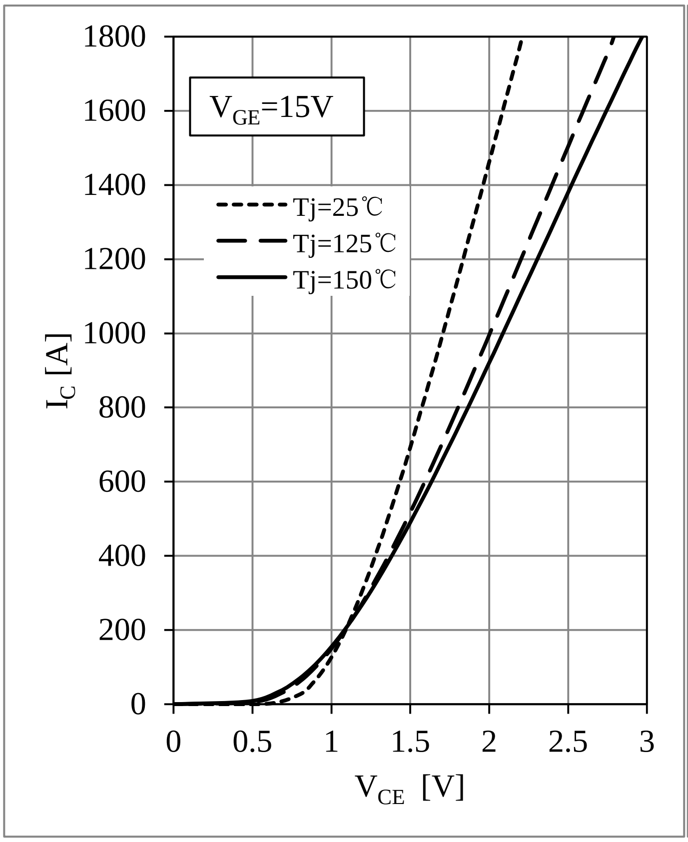
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=900A,V_{GE}=15V, T_j=25°C		1.65	2.00	V
		I_C=900A,V_{GE}=15V, T_j=125°C		1.90		
		I_C=900A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=36.0mA,V_{CE}=V_{GE}, T_j=25°C	5.6	6.2	6.8	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			400	nA
R_{Gint}	Internal Gate Resistance			0.25		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		92.8		nF
C_{res}	Reverse Transfer Capacitance			2.80		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		7.44		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=900A, R_G=1.0Ω,L_S=52nH, V_{GE}=±15V, T_j=25°C		102		ns
t_r	Rise Time			145		ns
$t_{d(off)}$	Turn-Off Delay Time			521		ns
t_f	Fall Time			197		ns
E_{on}	Turn-On Switching Loss			25.1		mJ
E_{off}	Turn-Off Switching Loss			105		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=900A, R_G=1.0Ω,L_S=52nH, V_{GE}=±15V, T_j=125°C		113		ns
t_r	Rise Time			165		ns
$t_{d(off)}$	Turn-Off Delay Time			558		ns
t_f	Fall Time			316		ns
E_{on}	Turn-On Switching Loss			35.4		mJ
E_{off}	Turn-Off Switching Loss			124		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=900A, R_G=1.0Ω,L_S=52nH, V_{GE}=±15V, T_j=150°C		117		ns
t_r	Rise Time			172		ns
$t_{d(off)}$	Turn-Off Delay Time			561		ns
t_f	Fall Time			341		ns
E_{on}	Turn-On Switching Loss			37.0		mJ
E_{off}	Turn-Off Switching Loss			130		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=800V, V_{CEM}≤1200V		3600		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=900A,V_{GE}=0V,T_j=25°C		1.90	2.35	V
		I_F=900A,V_{GE}=0V,T_j=125°C		2.00		
		I_F=900A,V_{GE}=0V,T_j=150°C		2.05		
Q_r	Recovered Charge	V_R=600V,I_F=900A, -di/dt=8700A/μs,V_{GE}=-15V, L_S=52nH,T_j=25°C		35.5		μC
I_{RM}	Peak Reverse Recovery Current			635		A
E_{rec}	Reverse Recovery Energy			31.2		mJ
Q_r	Recovered Charge	V_R=600V,I_F=900A, -di/dt=8100A/μs,V_{GE}=-15V, L_S=52nH,T_j=125°C		57.3		μC
I_{RM}	Peak Reverse Recovery Current			715		A
E_{rec}	Reverse Recovery Energy			57.4		mJ
Q_r	Recovered Charge	V_R=600V,I_F=900A, -di/dt=7900A/μs,V_{GE}=-15V, L_S=52nH,T_j=150°C		70.1		μC
I_{RM}	Peak Reverse Recovery Current			753		A
E_{rec}	Reverse Recovery Energy			67.4		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.18		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.031 0.058	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.015 0.029 0.010		K/W
M	Terminal Connection Torque, Screw M4 Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	1.1 2.5 3.0		2.0 5.0 5.0	N.m
G	Weight of Module		320		g



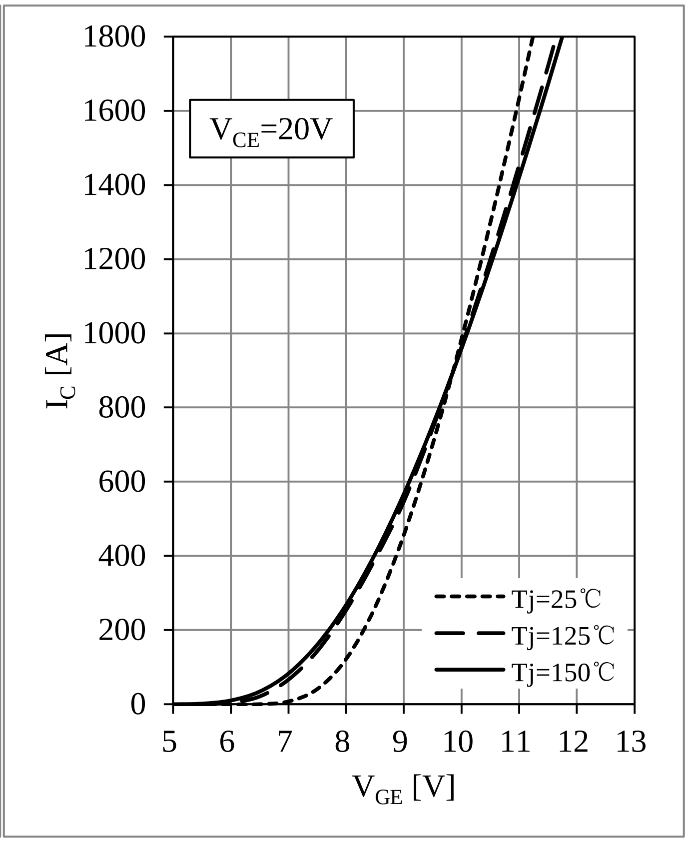
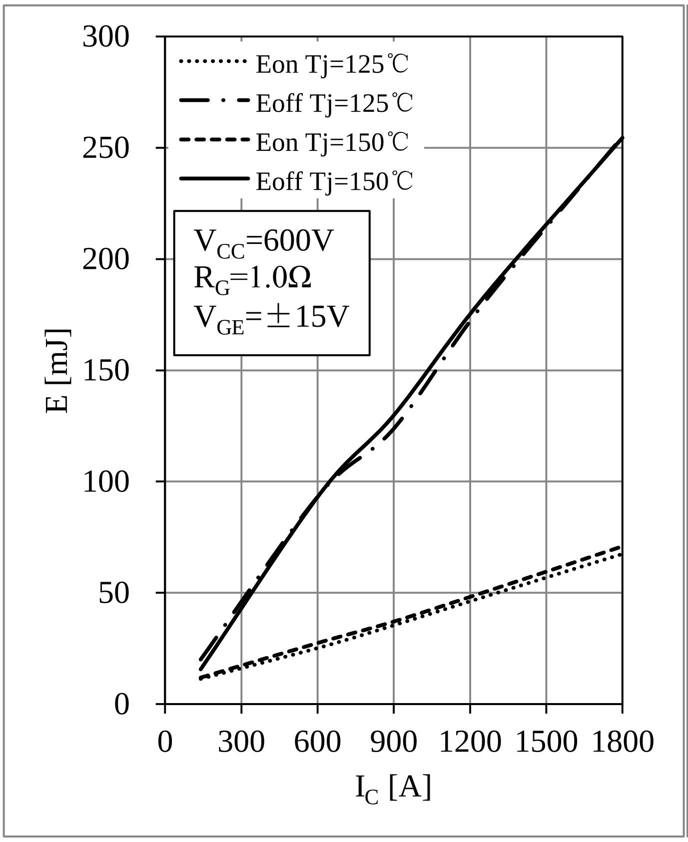


Fig 1. IGBT Output Characteristics

Fig 2. IGBT Transfer Characteristics



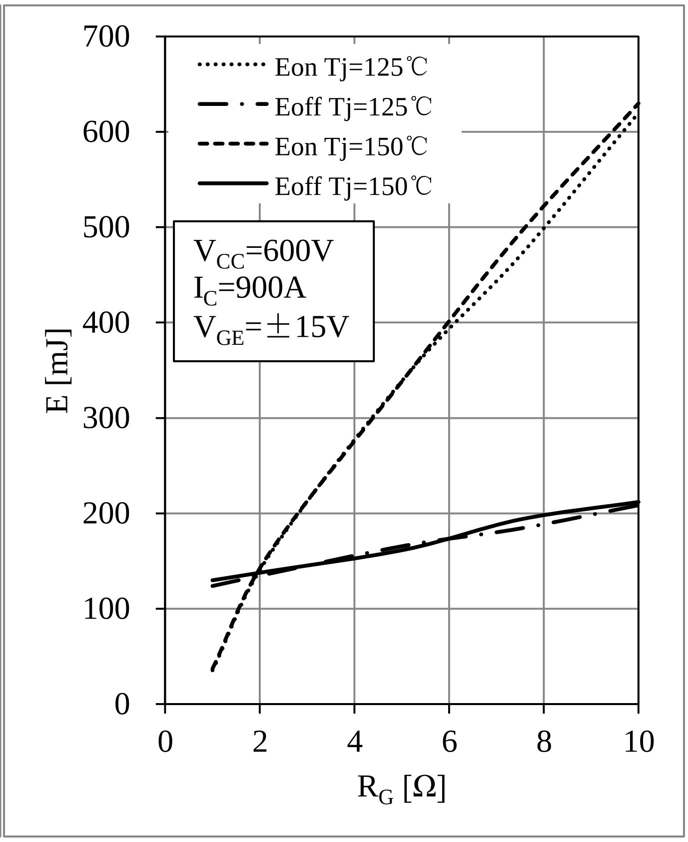


Fig 3. IGBT Switching Loss vs. I_C

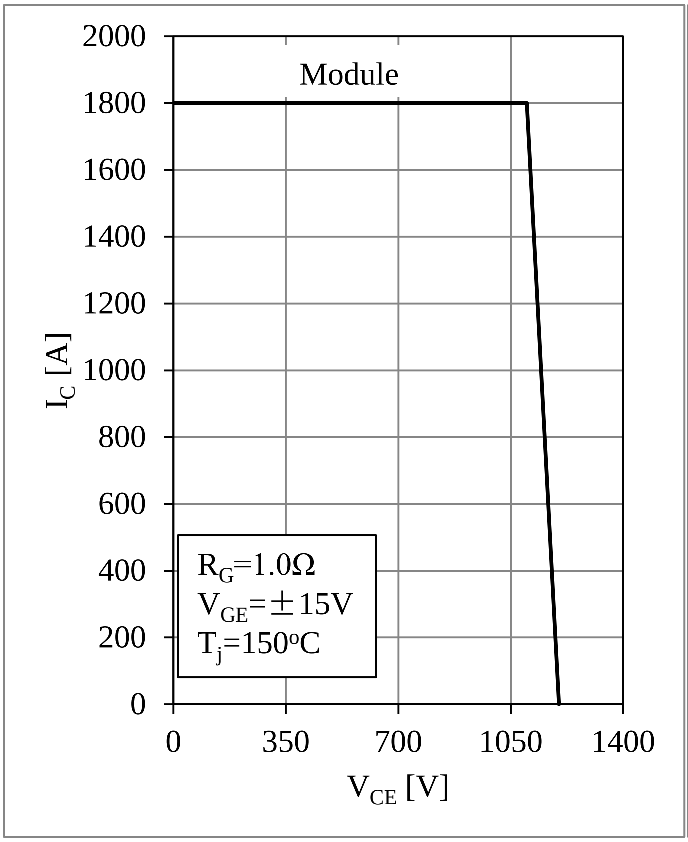


Fig 4. IGBT Switching Loss vs. R_G

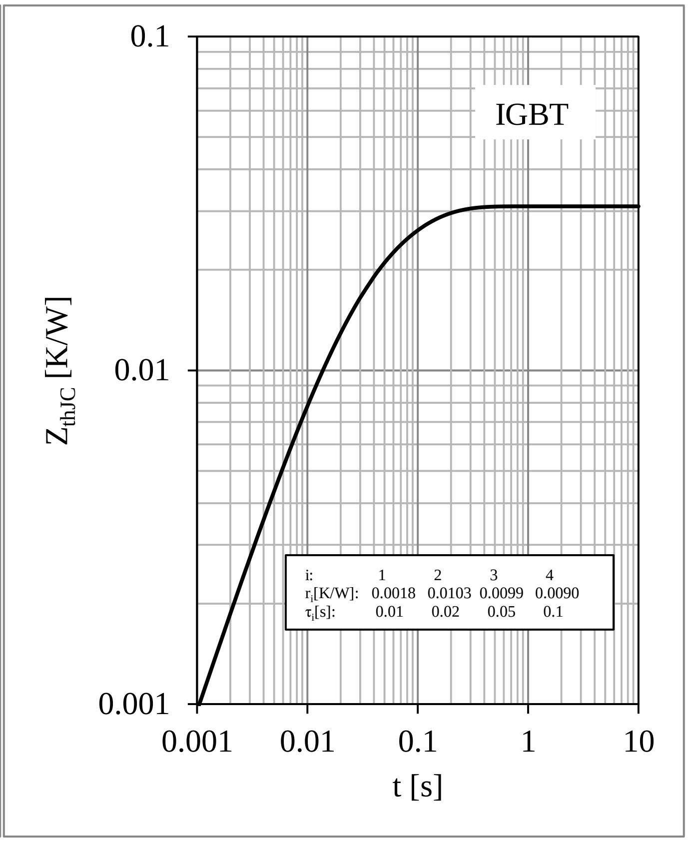


Fig 5. RBSOA

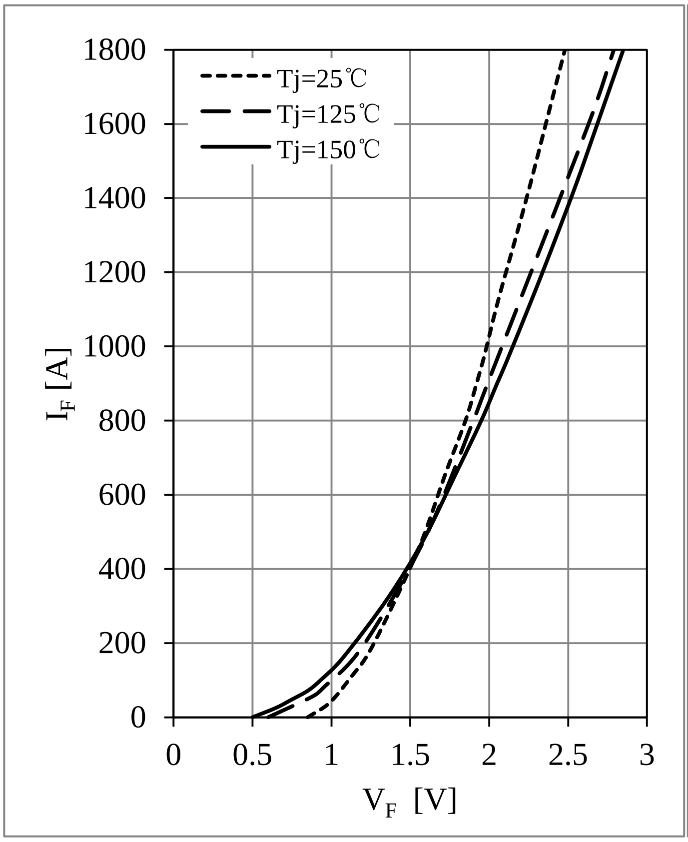


Fig 6. IGBT Transient Thermal Impedance

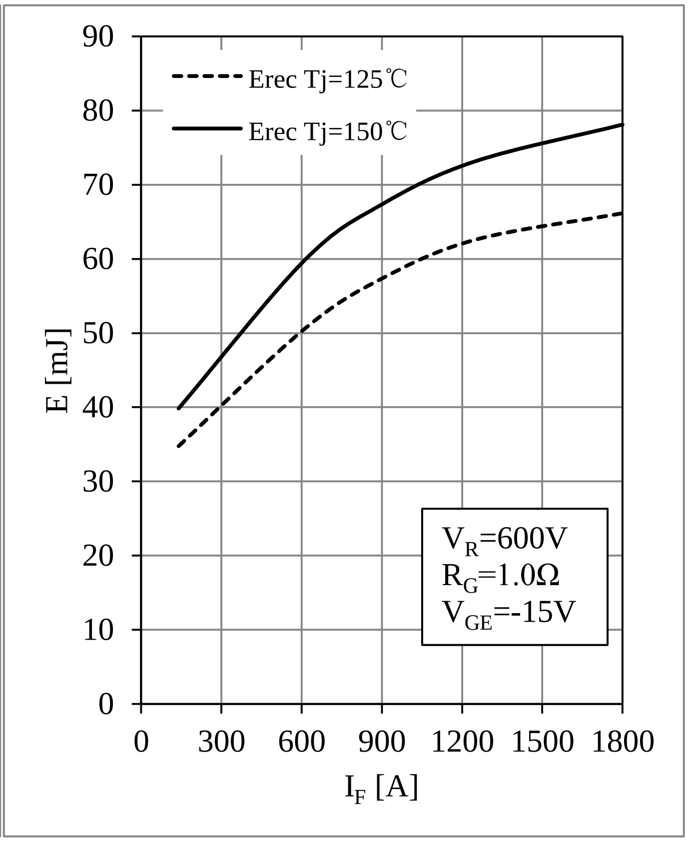
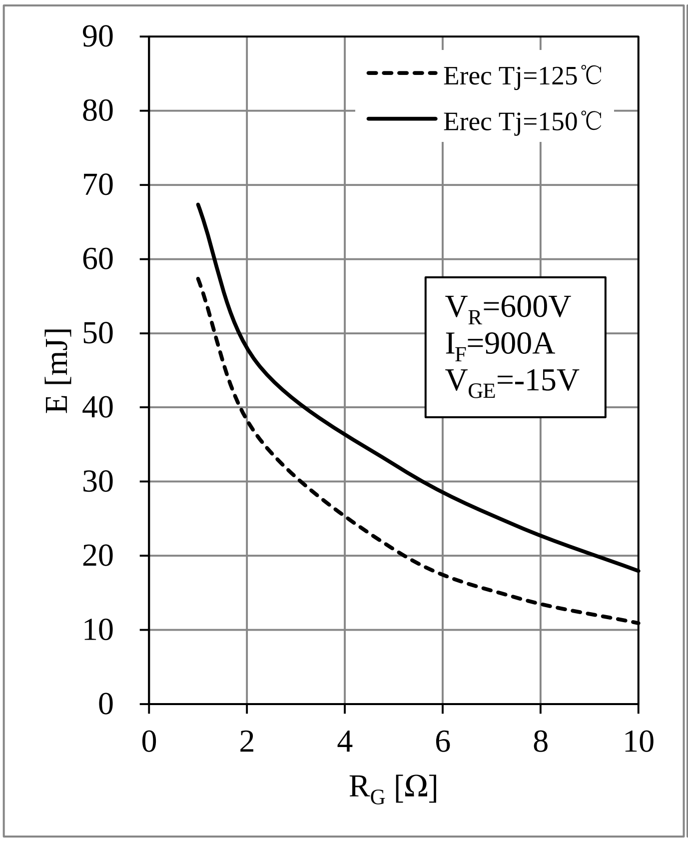


Fig 7. Diode Forward Characteristics

Fig 8. Diode Switching Loss vs. I_F



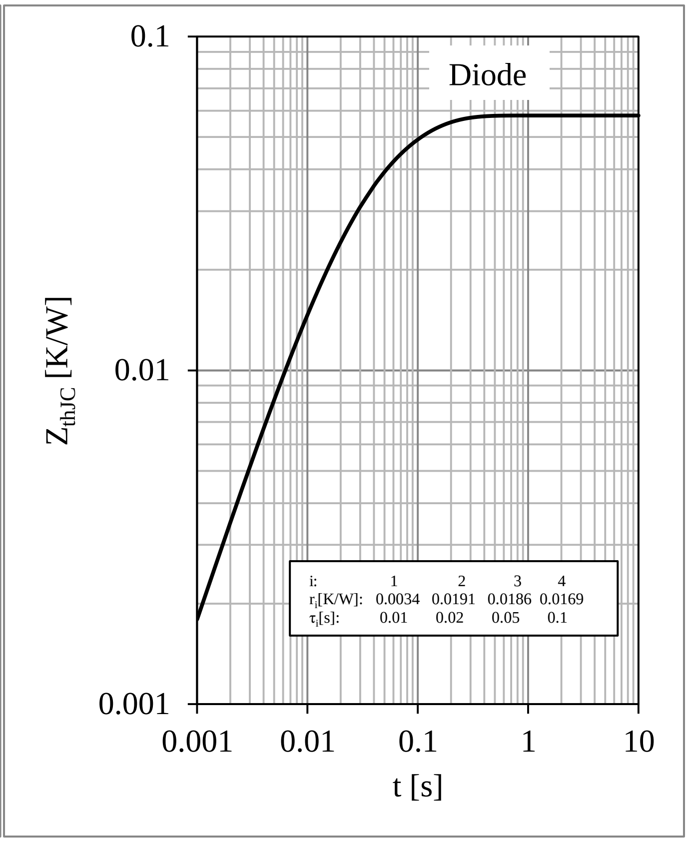
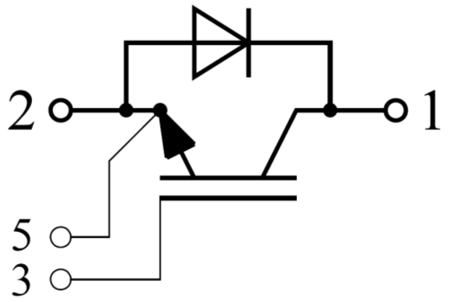


Fig 9. Diode Switching Loss vs. R_G

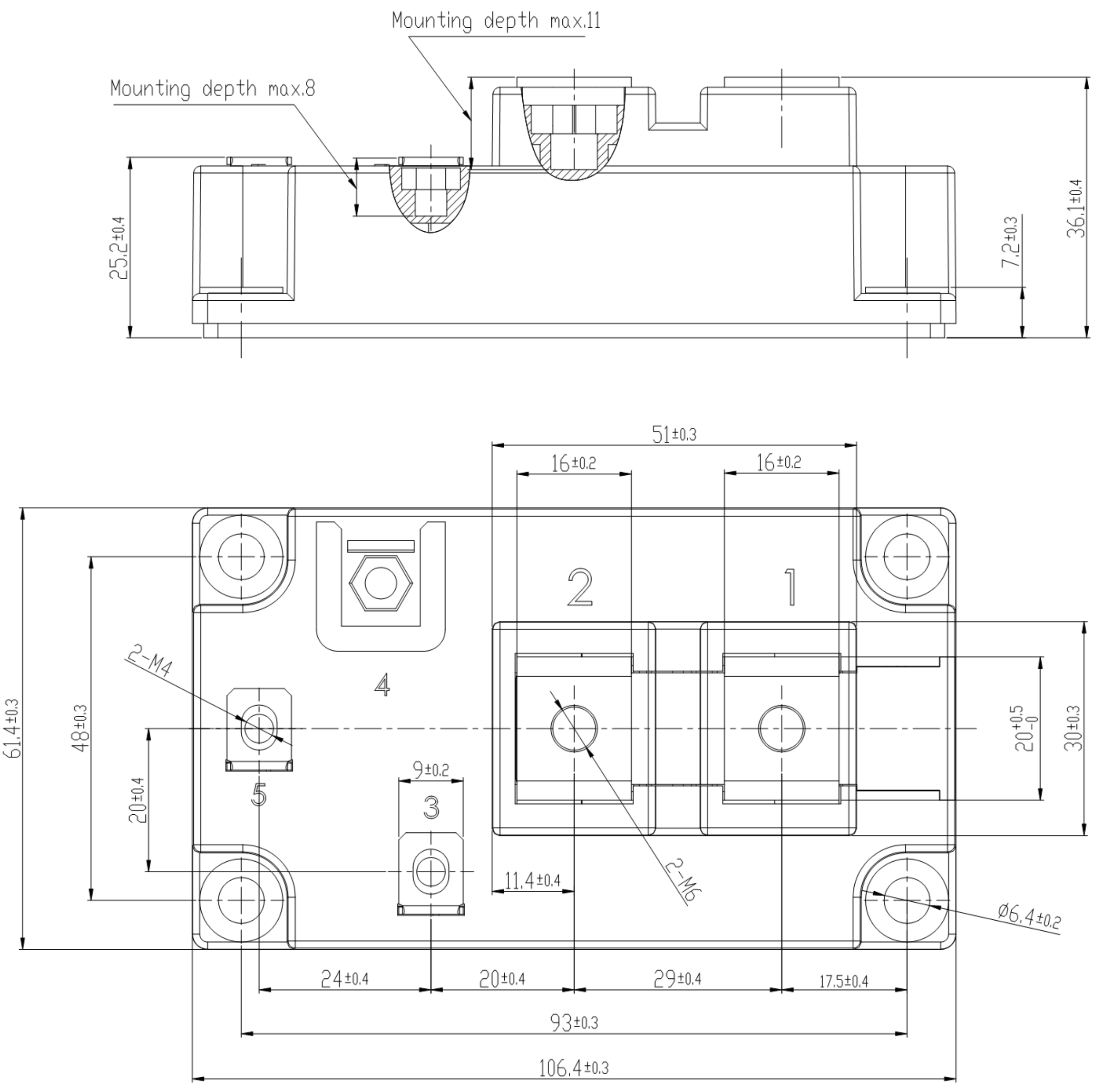
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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