STARPOWER

SEMICONDUCTOR

IGBT

GD600SGL120C2S

Molding Type Module

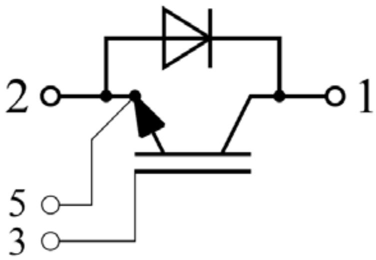
1200V/600A 1 in one-package

General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. It's designed for the applications such as Inverters and UPS.

Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ 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

- AC inverter drives
- Switching mode power supplies
- Electronic welders at f_{SW} up to 20kHz

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD600SGL120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	950	A
	@ T_C=100℃	600	
I_{CM}	Pulsed Collector Current t_p=1ms	1200	A
I_F	Diode Continuous Forward Current	600	A
I_{FM}	Diode Maximum Forward Current	1200	A
P_D	Maximum power Dissipation @ T_j=175℃	3750	W
T_{SC}	Short Circuit Withstand Time	10	μs
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
I^2t-value, Diode	V_R=0V,t=10ms,T_j=125℃	74000	A^2s
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V
Mounting Torque	Signal Terminal Screw:M4	1.1 to 2.0	N.m
	Power Terminal Screw:M6	2.5 to 5.0	
	Mounting Screw:M6	3.0 to 5.0	
Weight	Weight of Module	300	g

Electrical Characteristics of IGBT Tc=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=24mA,$V_{CE}=V_{GE}$, T_j=25℃	5.0	6.2	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=600A,V_{GE}=15V, T_j=25℃		1.9		V
		I_C=600A,V_{GE}=15V, T_j=125℃		2.1		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=600A, R_G=3Ω,V_{GE}=±15V, T_j=25℃		200		ns
t_r	Rise Time			62		ns
$t_{d(off)}$	Turn-Off Delay Time			510		ns
t_f	Fall Time	V_{CC}=600V,I_C=600A, R_G=3Ω,V_{GE}=±15V, T_j=25℃		60		ns
E_{on}	Turn-On Switching Loss			39		mJ
E_{off}	Turn-Off Switching Loss			48		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=600A, R_G=3Ω,V_{GE}=±15V, T_j=125℃		210		ns
t_r	Rise Time			65		ns
$t_{d(off)}$	Turn-Off Delay Time			600		ns
t_f	Fall Time			75		ns
E_{on}	Turn-On Switching Loss			45		mJ
E_{off}	Turn-Off Switching Loss			60		mJ
C_{ies}	Input Capacitance	V_{CE}=25V, f=1MHz, V_{GE}=0V		41.0		nF
C_{oes}	Output Capacitance			3.1		nF
C_{res}	Reverse Transfer Capacitance			2.0		nF
I_{SC}	SC Data	t_{SC}≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		2600		A
L_{CE}	Stray inductance				20	nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	T_C=25℃		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=600A	T_j=25℃		1.8	2.4	V
			T_j=125℃		1.9	2.5	
Q_r	Diode Reverse Recovery Charge	I_F=600A, V_R=600V, di/dt=-6000A/μs, V_{GE}=-15V	T_j=25℃		65		μC
			T_j=125℃		100		
I_{RM}	Diode Peak Reverse Recovery Current		T_j=25℃		450		A
			T_j=125℃		510		
E_{rec}	Reverse Recovery Energy		T_j=25℃		35		mJ
			T_j=125℃		42		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per Module)		0.04	℃/W
$R_{\theta JC}$	Junction-to-Case (Diode Part, per Module)		0.09	℃/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		℃/W

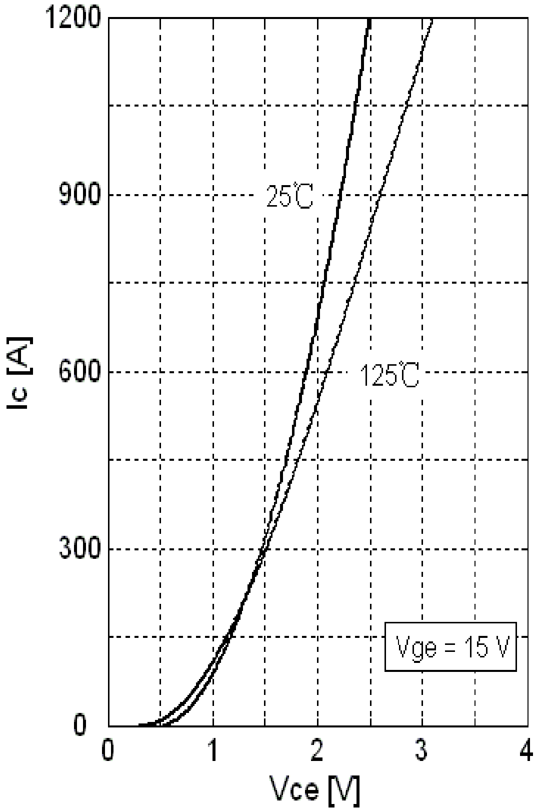


Fig 1. Typical Output Characteristics

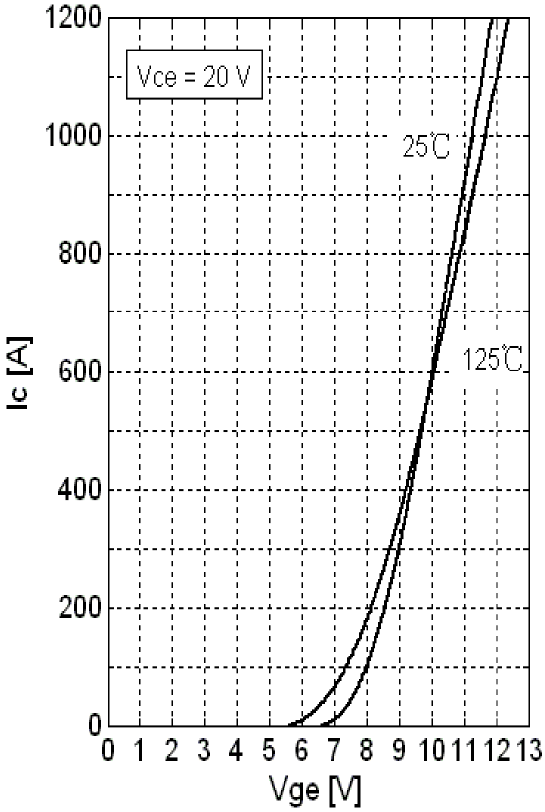


Fig 2. Typical Transfer Characteristics

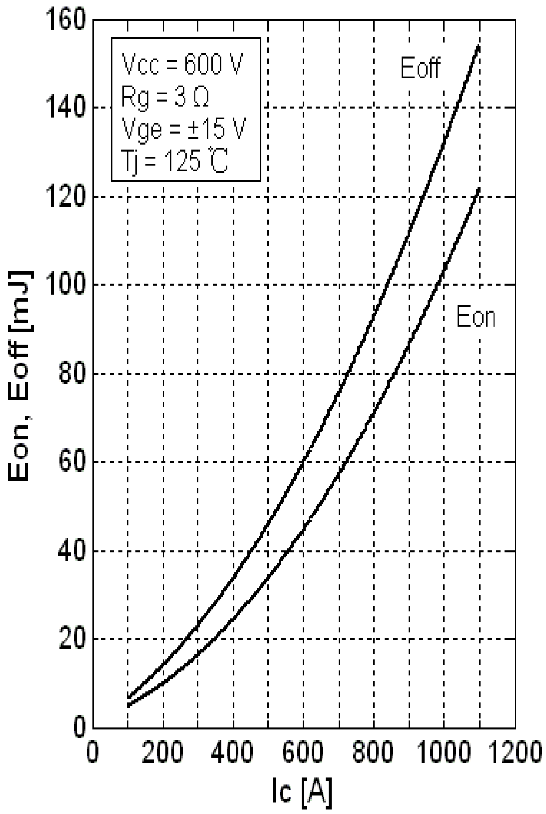


Fig 3.Switching Loss vs Collector Current

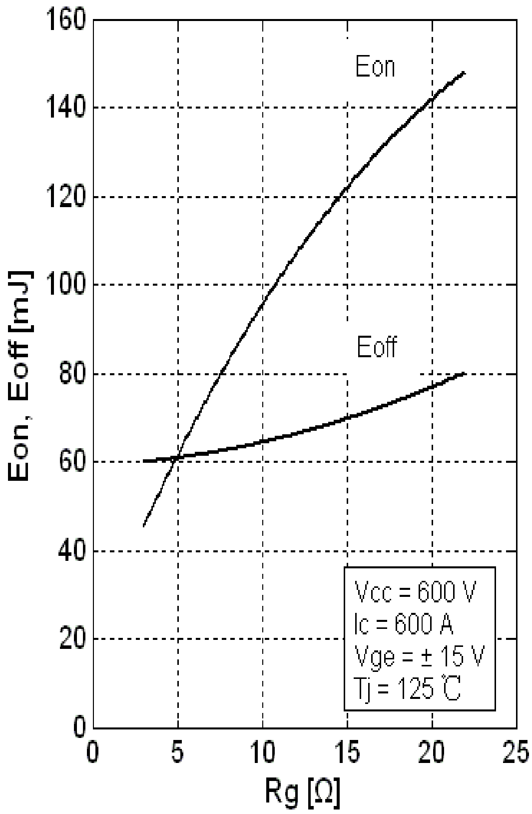


Fig 4. Switching Loss vs Gate Resistor

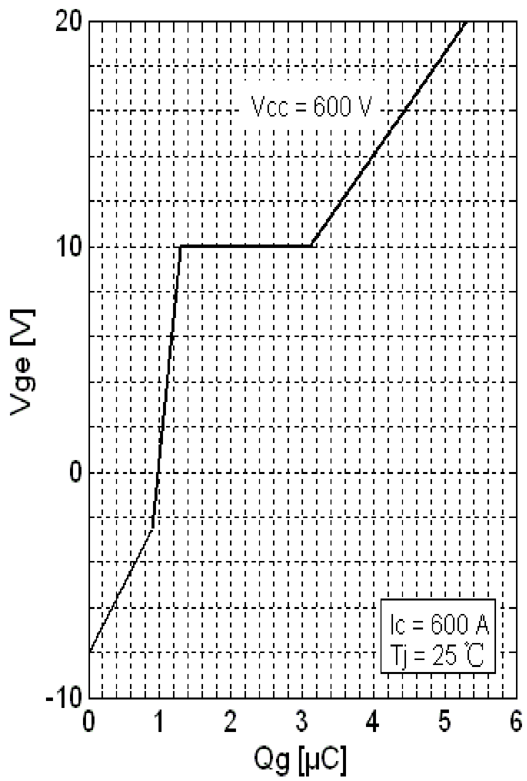


Fig 5. Gate Charge Characteristics.

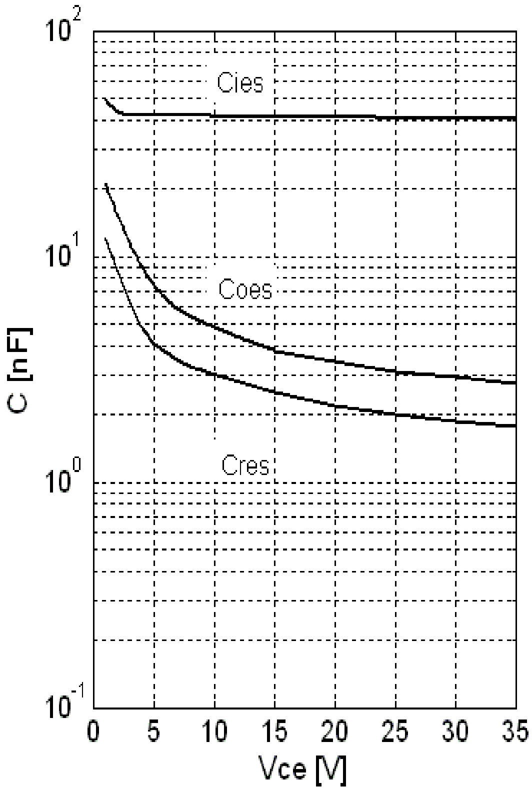


Fig 6. Typical Capacitance vs Collector-Emitter Voltage

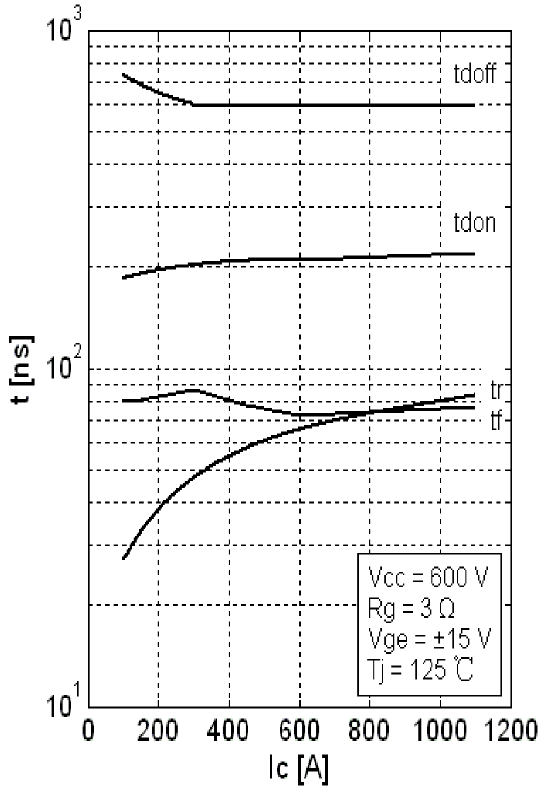


Fig 7. Typical Switching Times vs I_C

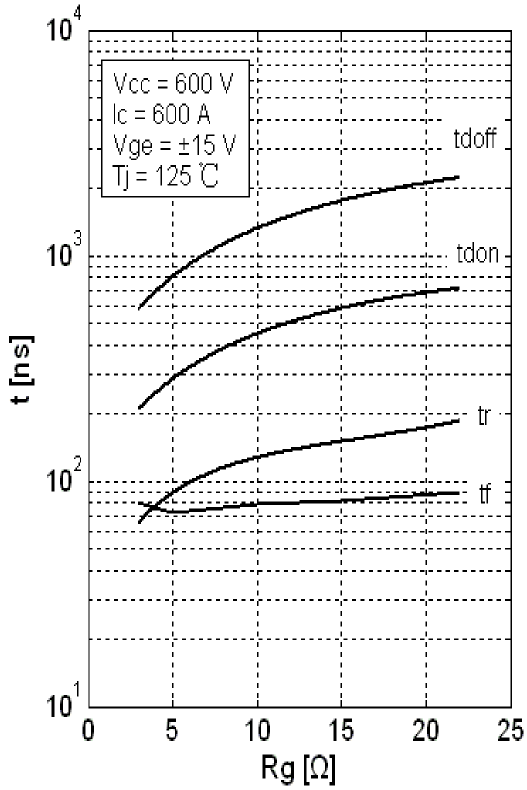


Fig 8. Typical Switching Times vs Gate Resistance R_G

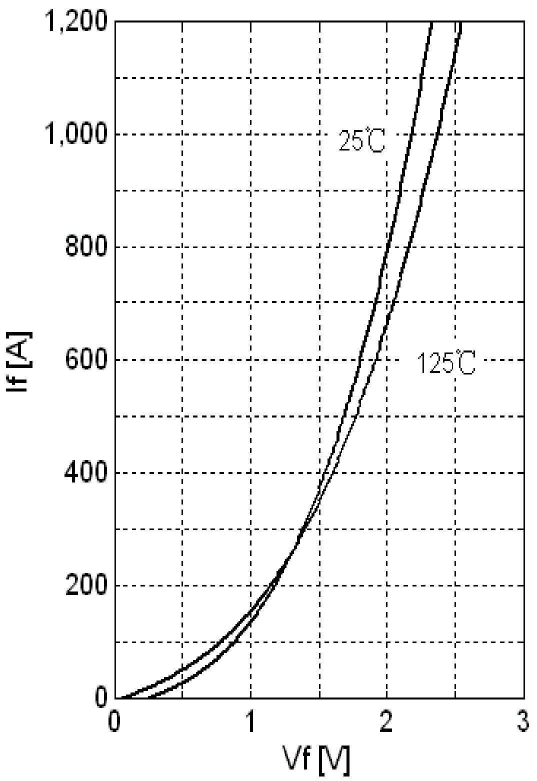


Fig 9.Typical Forward Characteristics (diode)

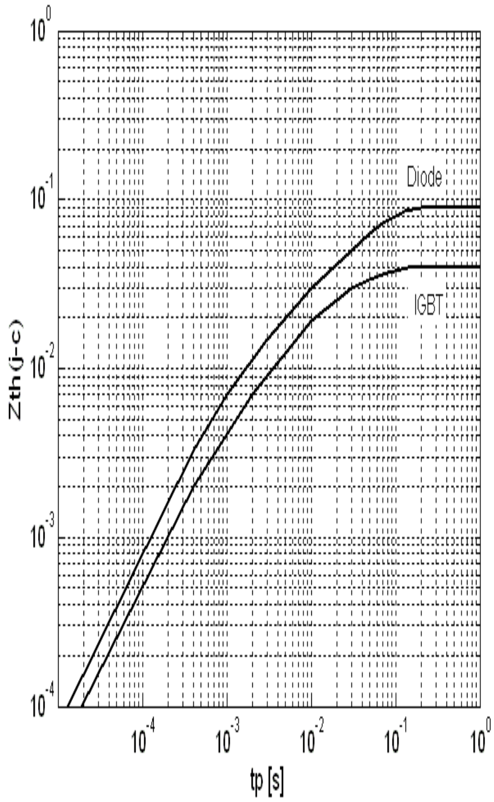
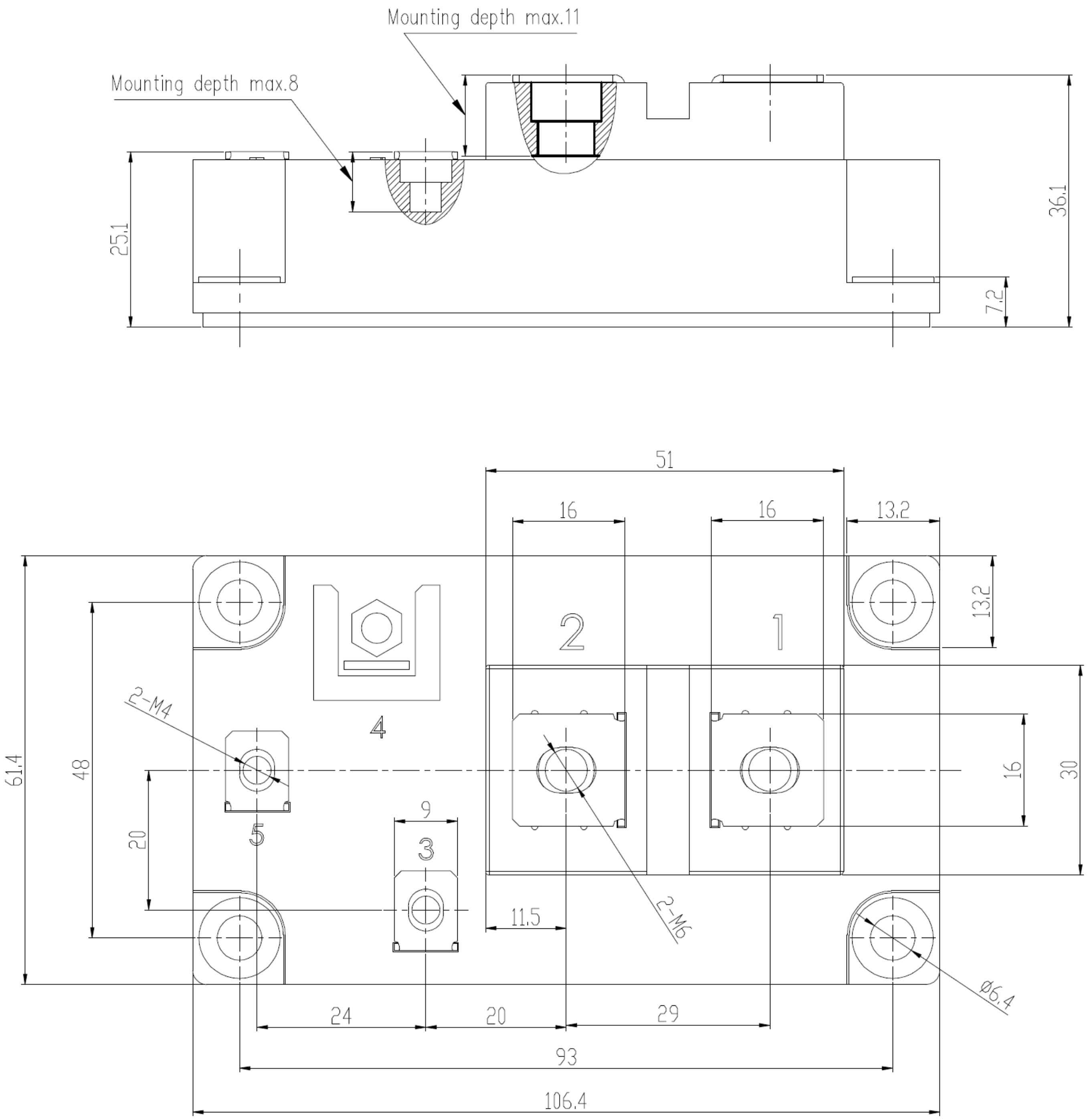


Fig 10. Transient thermal impedance

Package Dimension

Dimensions in Millimeters



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