

STARPOWER

SEMICONDUCTOR

IGBT

GD200HFT60C2S

Molding Type Module

600V/200A 2 in one-package

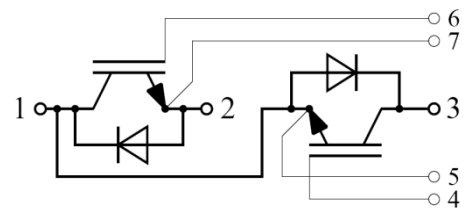
General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as UPS and SMPS.



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 5 μ s 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 DBC technology



Equivalent Circuit Schematic

Typical Applications

- Electronic welders
- Switching mode power supplies
- Uninterruptible power supply

Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Description	GD200HFT60C2S	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	305	A
	@ $T_C=80^{\circ}\text{C}$	200	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	400	A
I_F	Diode Continuous Forward Current @ $T_C=80^{\circ}\text{C}$	200	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	765	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, $f=50\text{Hz}, t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m

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	$T_j=25^{\circ}\text{C}$	600			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	$I_C=2.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	4.0	4.4	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		1.65	2.10	V
		$I_C=200\text{A}, V_{GE}=15\text{V},$ $T_j=175^{\circ}\text{C}$		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=200A,$ $R_G=2.4\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		136		ns
t_r	Rise Time			54		ns
$t_{d(off)}$	Turn-Off Delay Time			122		ns
t_f	Fall Time			87		ns
E_{on}	Turn-On Switching Loss			1.79		mJ
E_{off}	Turn-Off Switching Loss			1.99		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=200A,$ $R_G=2.4\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		145		ns
t_r	Rise Time			70		ns
$t_{d(off)}$	Turn-Off Delay Time			170		ns
t_f	Fall Time			112		ns
E_{on}	Turn-On Switching Loss			3.06		mJ
E_{off}	Turn-Off Switching Loss			3.62		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1Mhz,$ $V_{GE}=0V$		15.4		nF
C_{oes}	Output Capacitance			1.06		nF
C_{res}	Reverse Transfer Capacitance			0.46		nF
Q_G	Gate Charge	$V_{CC}=400V, I_C=200A,$ $V_{GE}=15V$		417		nC
R_{Gint}	Internal Gate Resistance			2.5		Ω
I_{SC}	SC Data	$t_p \leq 5\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=360V,$ $V_{CEM} \leq 600V$		1800		A
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.35		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	$I_F=200A,$ $V_{GE}=0V$	$T_j=25^\circ C$	1.40	1.80	V
			$T_j=125^\circ C$	1.40		
Q_r	Recovered Charge	$I_F=200A,$ $V_R=300V,$ $R_G=2.4\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	9.6		μC
			$T_j=125^\circ C$	13.0		
I_{RM}	Peak Reverse Recovery Current	$V_R=300V,$ $R_G=2.4\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	120		A
			$T_j=125^\circ C$	157		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	1.88		mJ
			$T_j=125^\circ C$	3.62		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.196	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.306	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

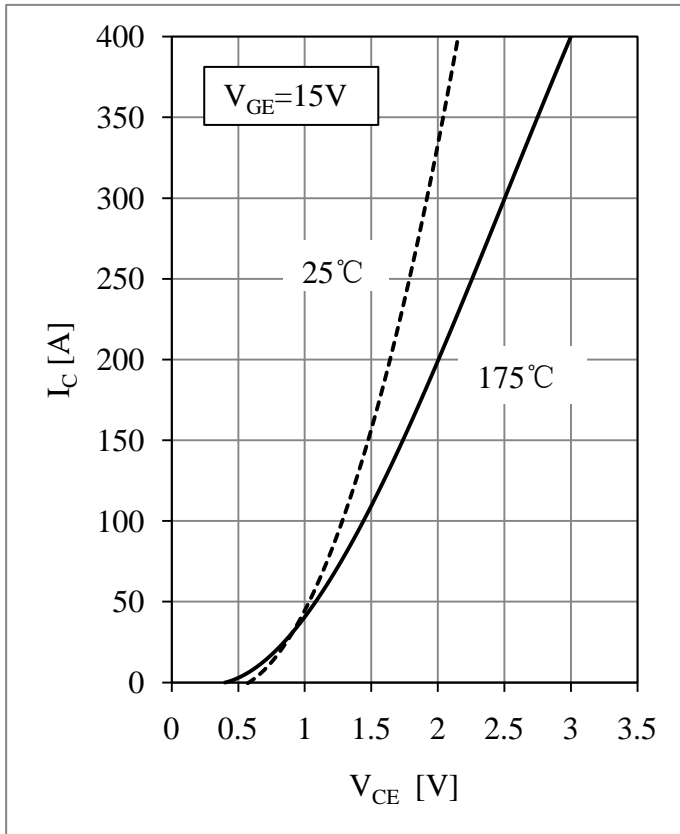


Fig 1. IGBT Output Characteristic

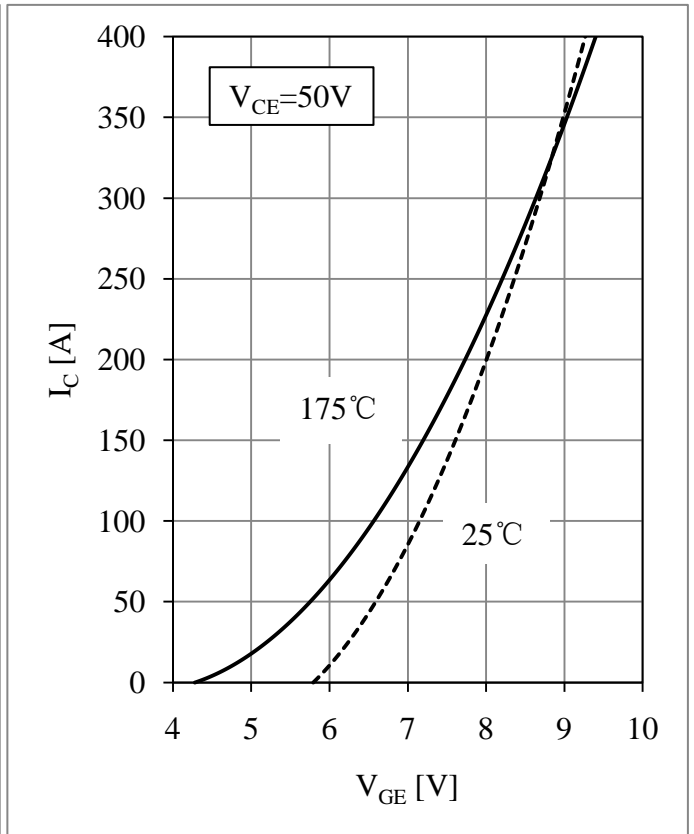


Fig 2. IGBT Transfer Characteristic

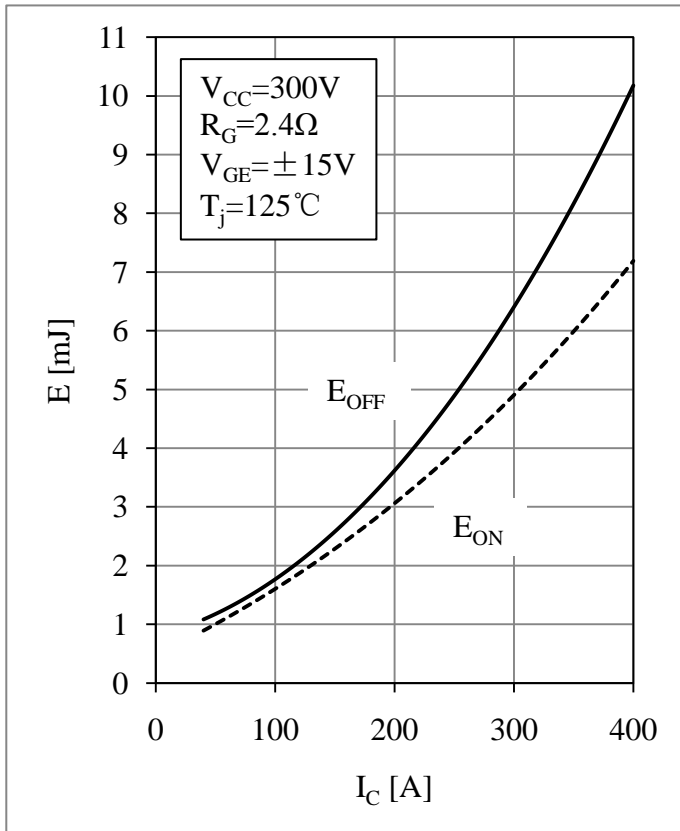


Fig 3. IGBT Switching Loss vs. I_C

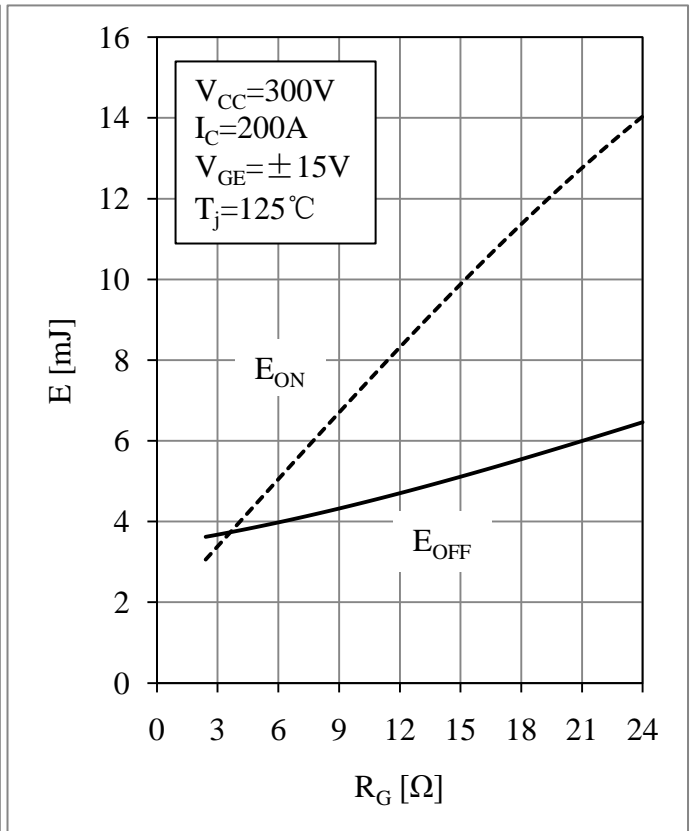


Fig 4. IGBT Switching Loss vs. R_G

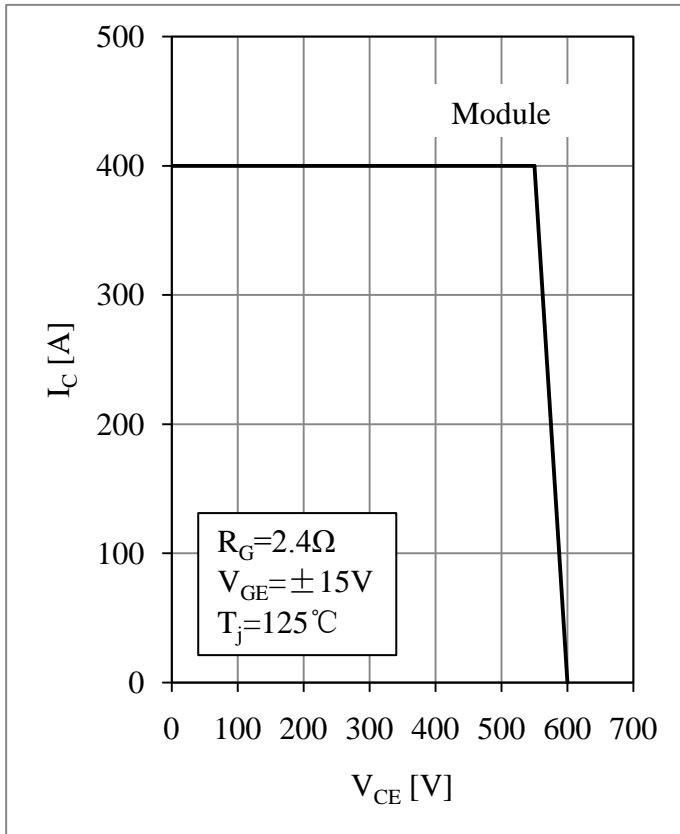


Fig 5. RBSOA

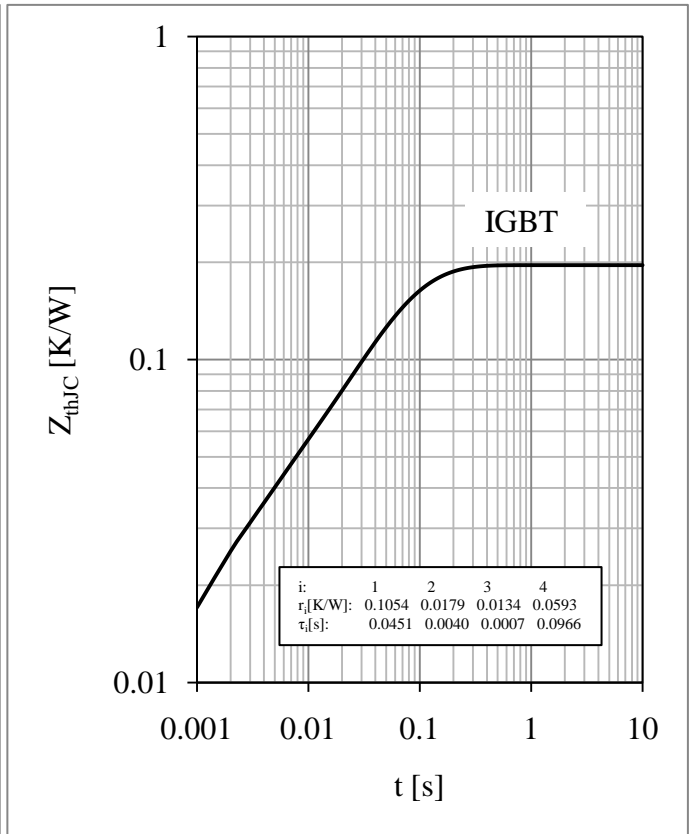


Fig 6. IGBT Transient Thermal Impedance

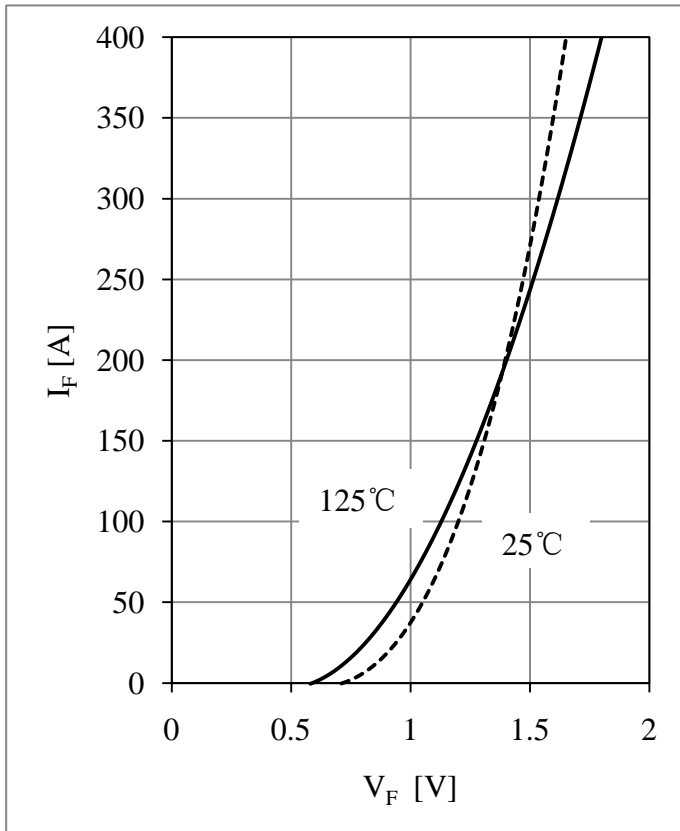


Fig 7. Diode Forward Characteristic

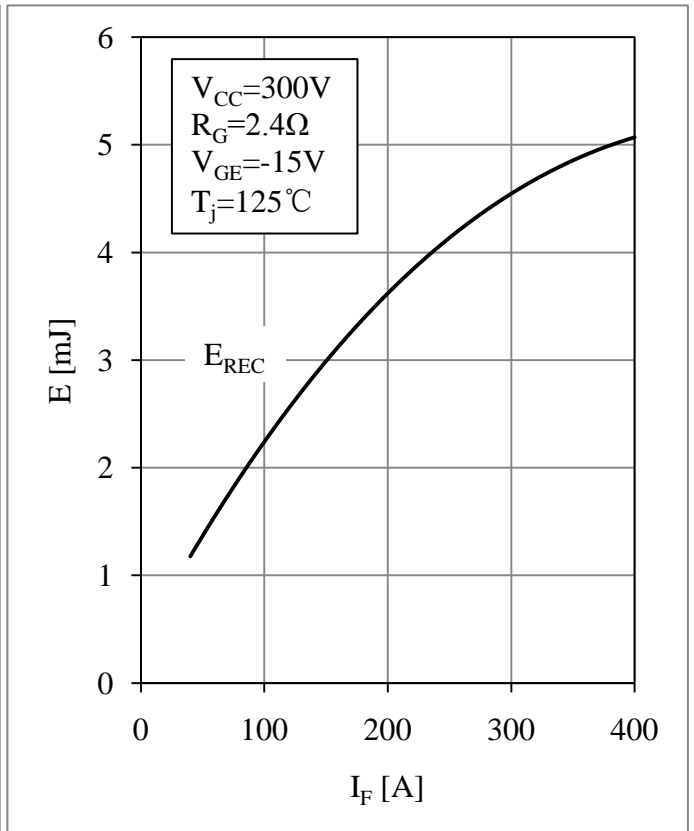


Fig 8. Diode Switching Loss vs. I_F

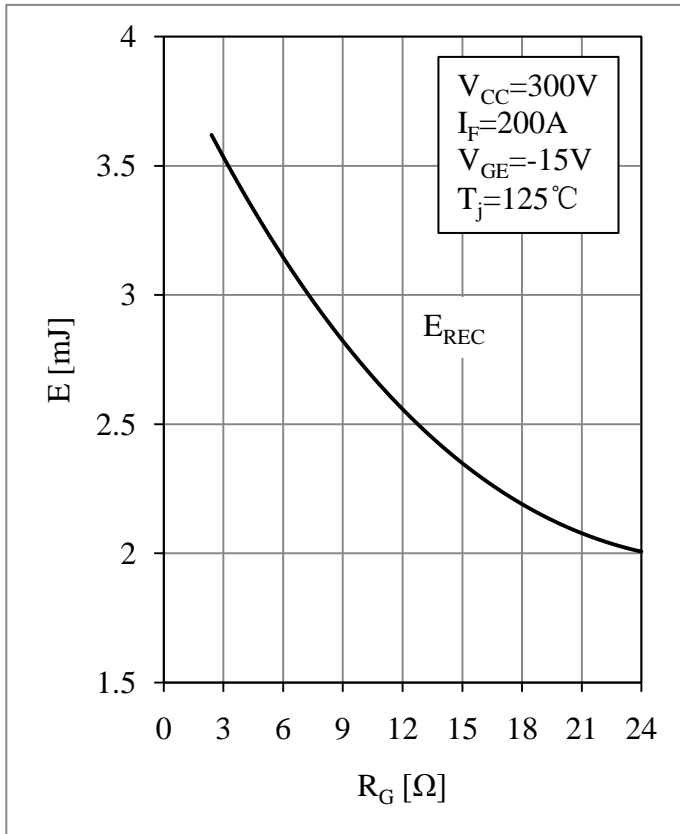


Fig 9. Diode Switching Loss vs. R_G

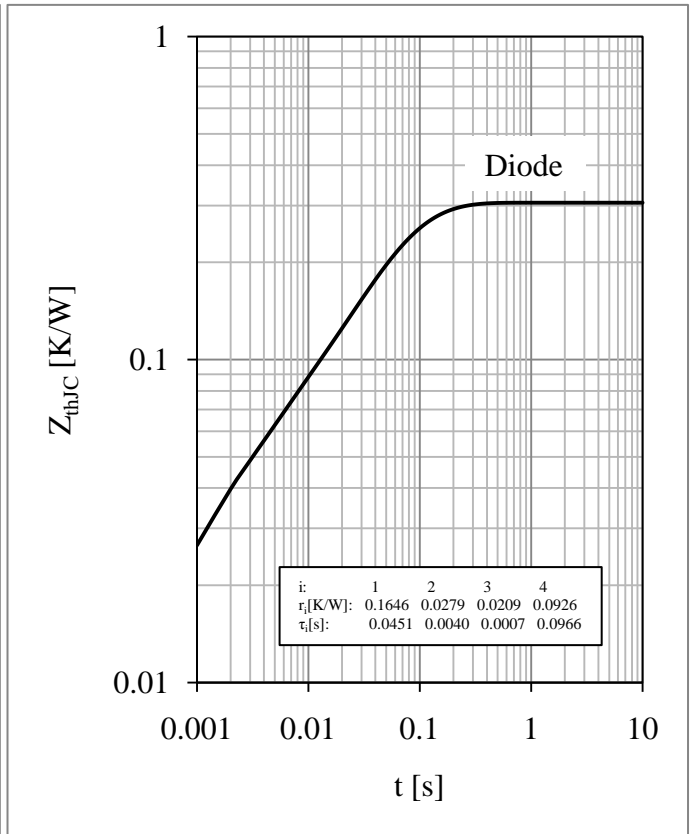
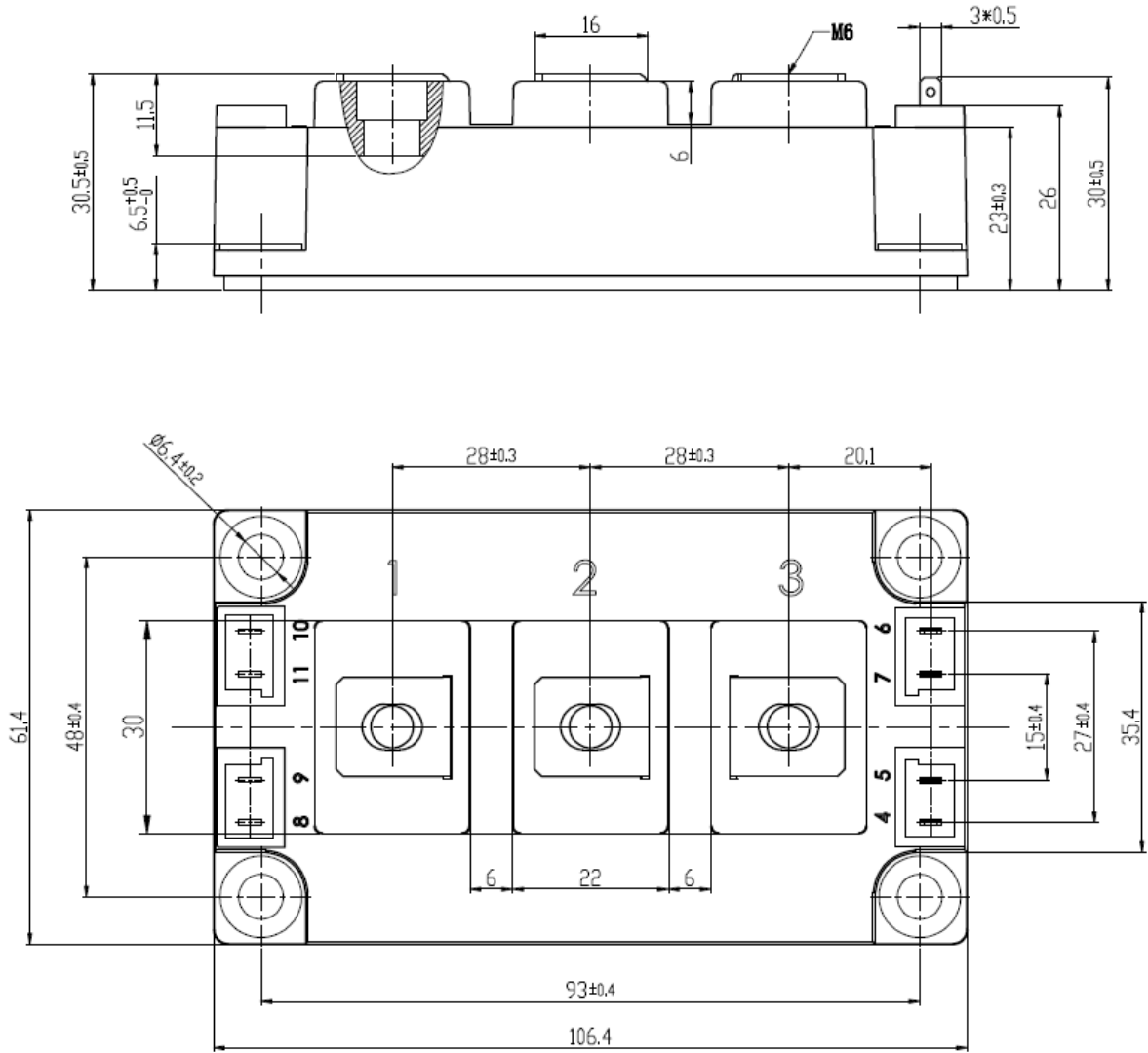


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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