STARPOWER

SEMICONDUCTOR **IGBT**

GD600HFT65C2S

Molding Type Module

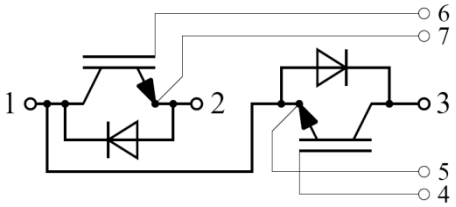
650V/600A 2 in one-package

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 general inverters and UPS.

Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 6μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- 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	GD600HFT65C2S	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=60℃	720 600	A
I_{CM}	Pulsed Collector Current t_p=1ms	1200	A
I_F	Diode Continuous Forward Current	600	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1200	A
P_D	Maximum Power Dissipation @ T_j=175℃	1685	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	2500	V
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m
Weight	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℃	650			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=9.6mA,V_{CE}=V_{GE}, T_j=25℃	5.1	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=600A,V_{GE}=15V, T_j=25℃		1.45	1.90	V
		I_C=600A,V_{GE}=15V, T_j=125℃		1.60		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=600A, R_G=2.4Ω,V_{GE}=±15V, T_j=25℃		100		ns
t_r	Rise Time			90		ns
$t_{d(off)}$	Turn-Off Delay Time			670		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			8.90		mJ
E_{off}	Turn-Off Switching Loss			21.5		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=600A, R_G=2.4Ω,V_{GE}=±15V, T_j=125℃		110		ns
t_r	Rise Time			95		ns
$t_{d(off)}$	Turn-Off Delay Time			710		ns
t_f	Fall Time			75		ns
E_{on}	Turn-On Switching Loss			9.90		mJ
E_{off}	Turn-Off Switching Loss			25.0		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		37.0		nF
C_{oes}	Output Capacitance			2.30		nF
C_{res}	Reverse Transfer Capacitance			1.10		nF
Q_G	Gate Charge	V_{CC}=400V,I_C=600A, V_{GE}=-15___+15V		6.50		μC
I_{SC}	SC Data	t_P≤6μs,V_{GE}=15V, T_j=150℃,V_{CC}=360V, V_{CEM}≤650V		3000		A
R_{Gint}	Internal Gate Resistance			0.67		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.35		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, V_{GE}=0V	T_j=25℃		1.55	1.95	V
			T_j=125℃		1.50		
Q_r	Recovered Charge	I_F=600A, V_R=300V, R_G=2.4Ω, V_{GE}=-15V	T_j=25℃		17.0		μC
			T_j=125℃		36.0		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		205		A
			T_j=125℃		300		
E_{rec}	Reverse Recovery Energy		T_j=25℃		4.00		mJ
			T_j=125℃		9.30		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.089	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.144	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W

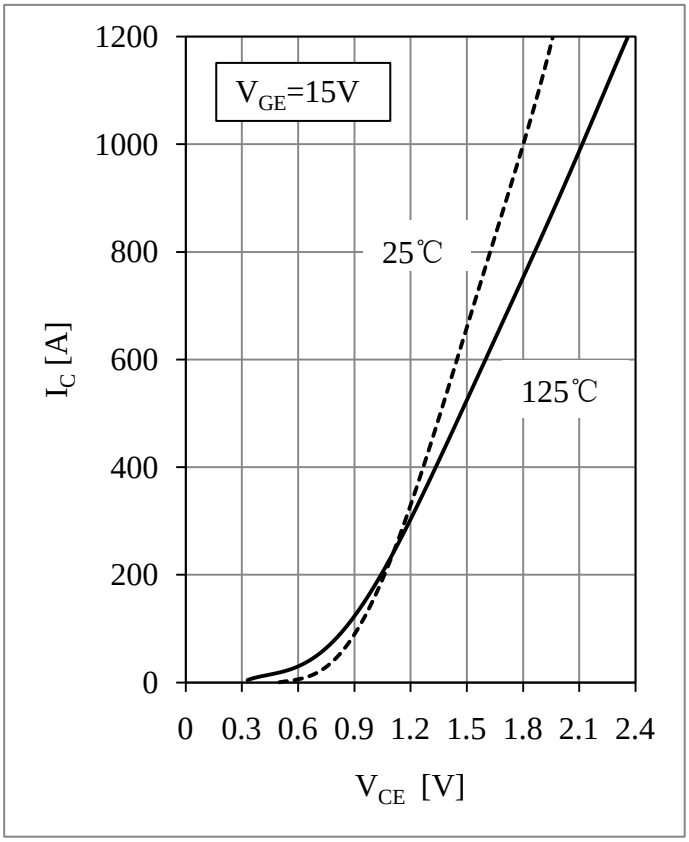


Fig 1. IGBT Output Characteristic

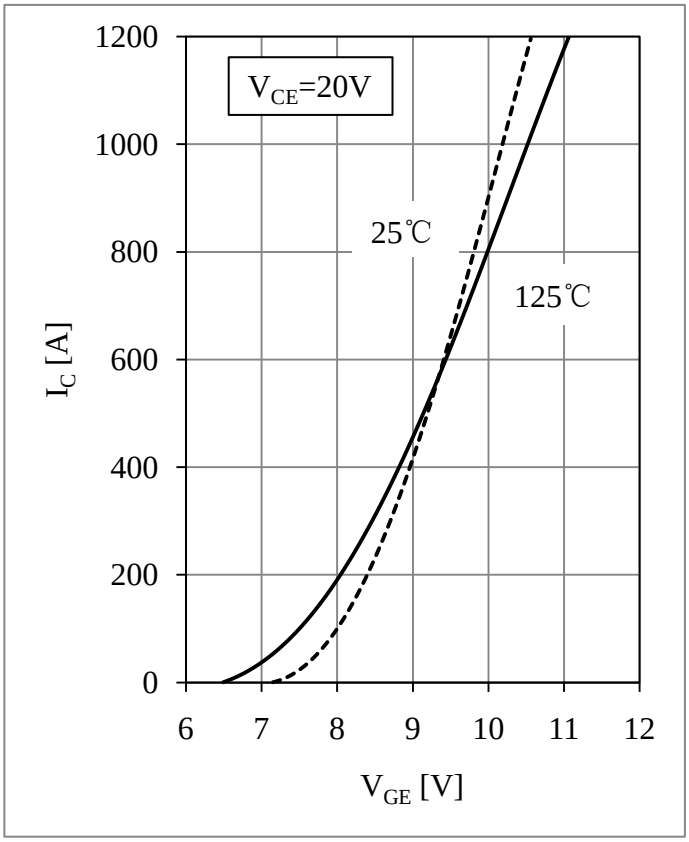


Fig 2. IGBT Transfer Characteristic

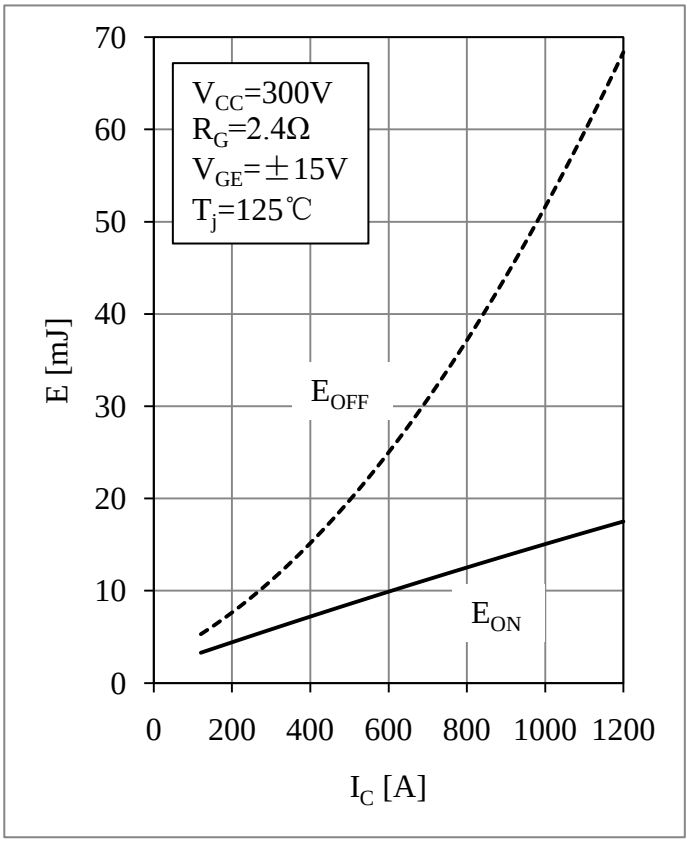


Fig 3. IGBT Switching Loss vs. I_C

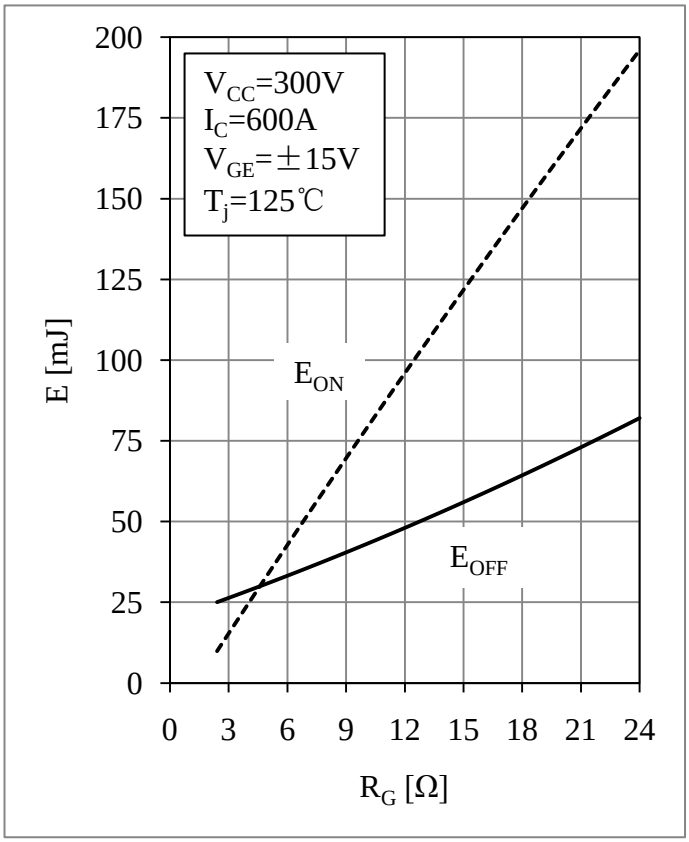


Fig 4. IGBT Switching Loss vs. R_G

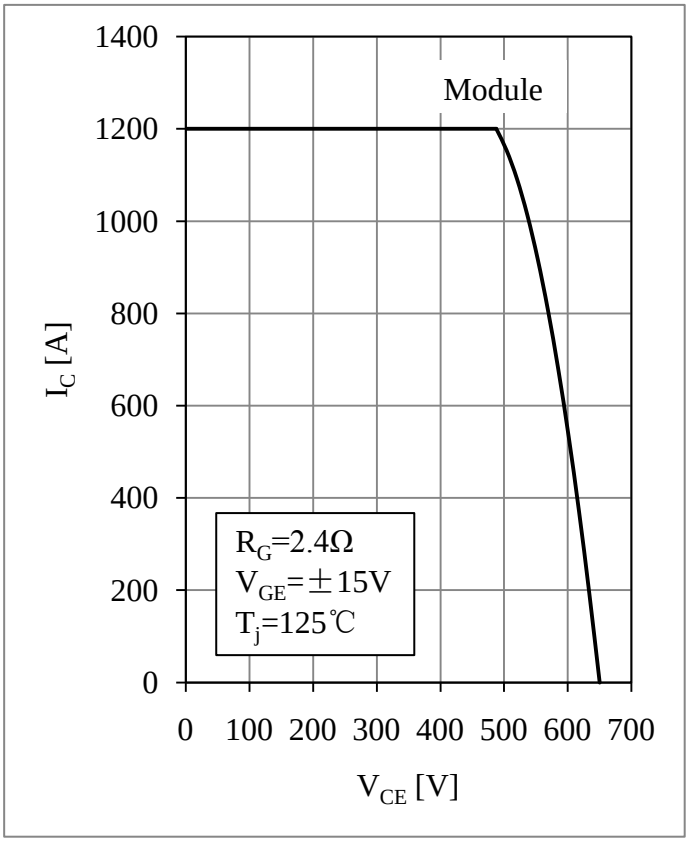


Fig 5. RBSOA

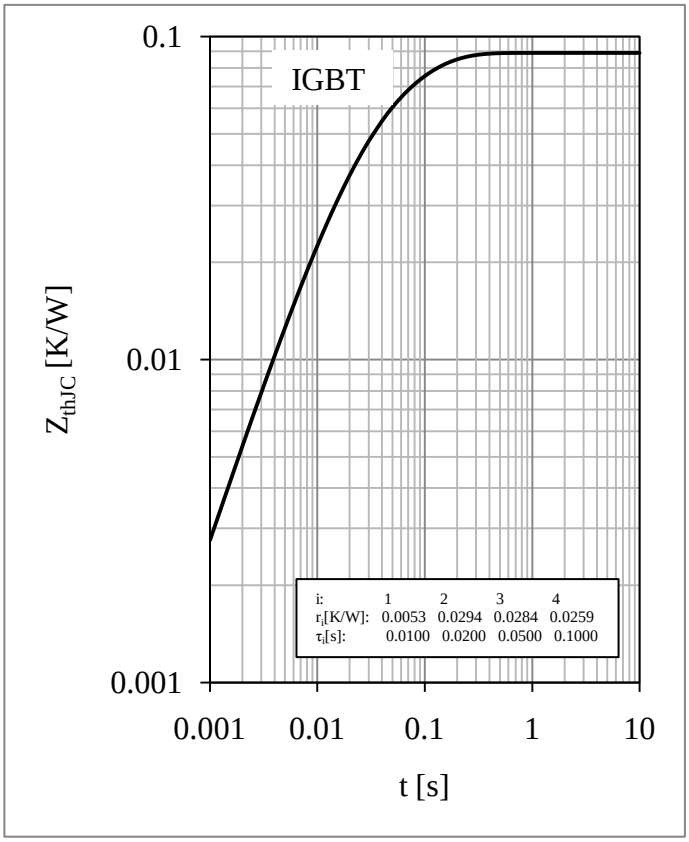


Fig 6. IGBT Transient Thermal Impedance

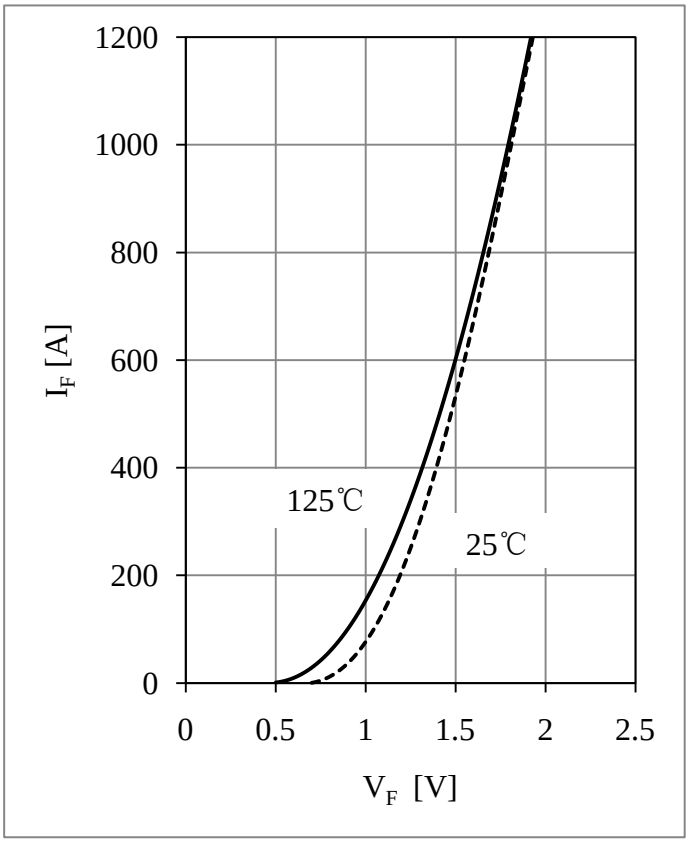


Fig 7. Diode Forward Characteristic

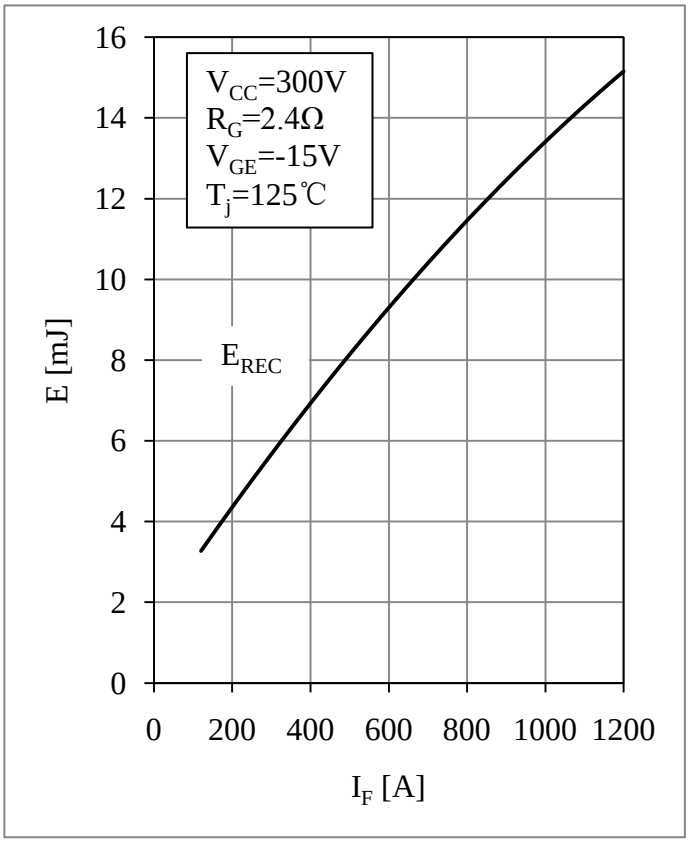


Fig 8. Diode Switching Loss vs. I_F

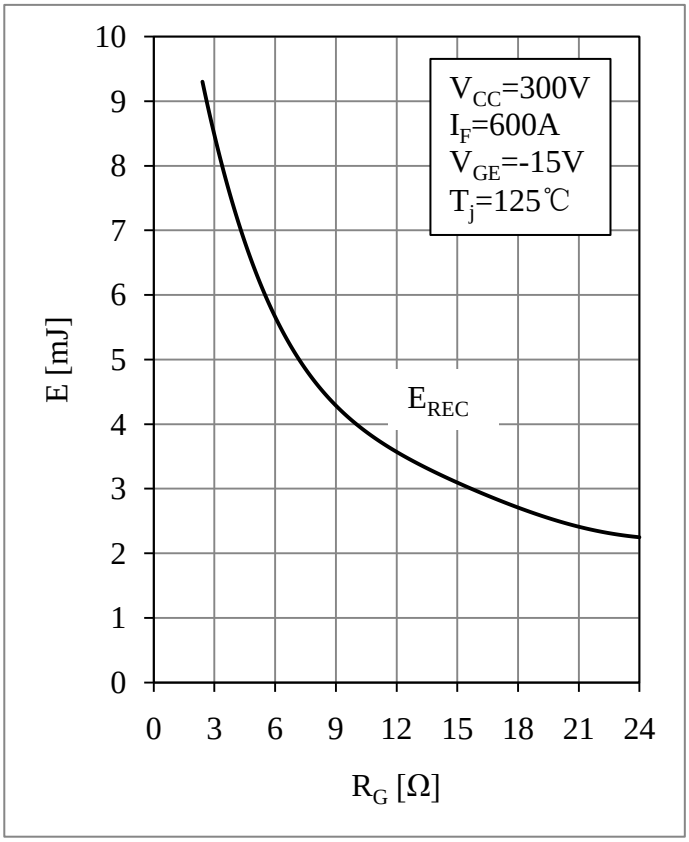


Fig 9. Diode Switching Loss vs. R_G

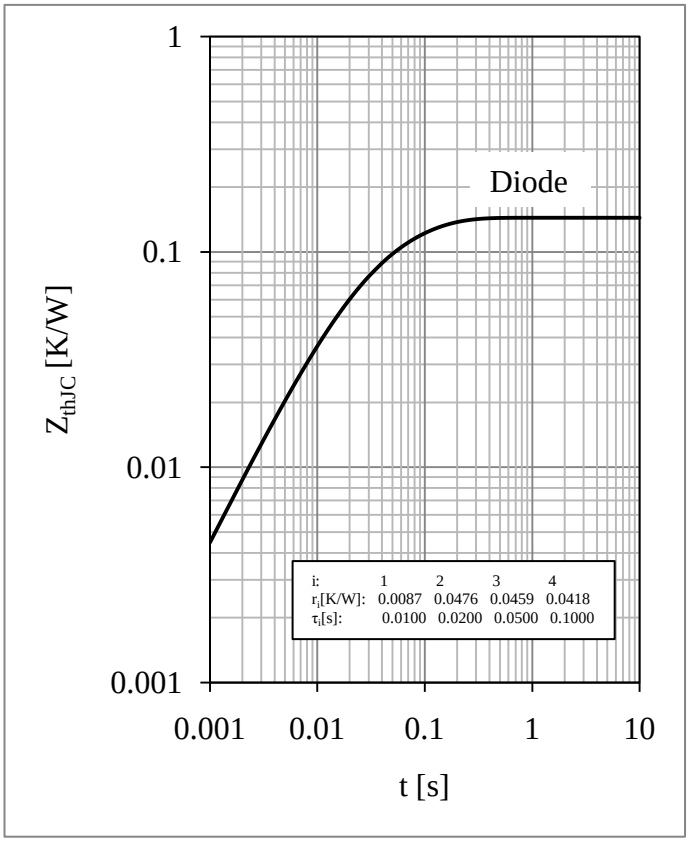
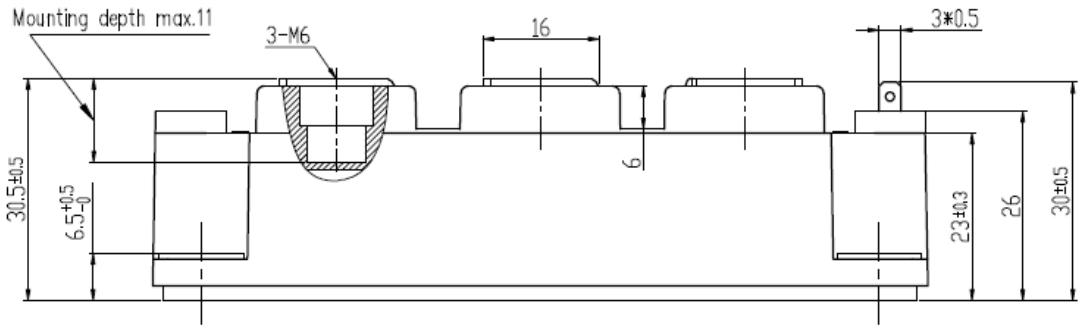
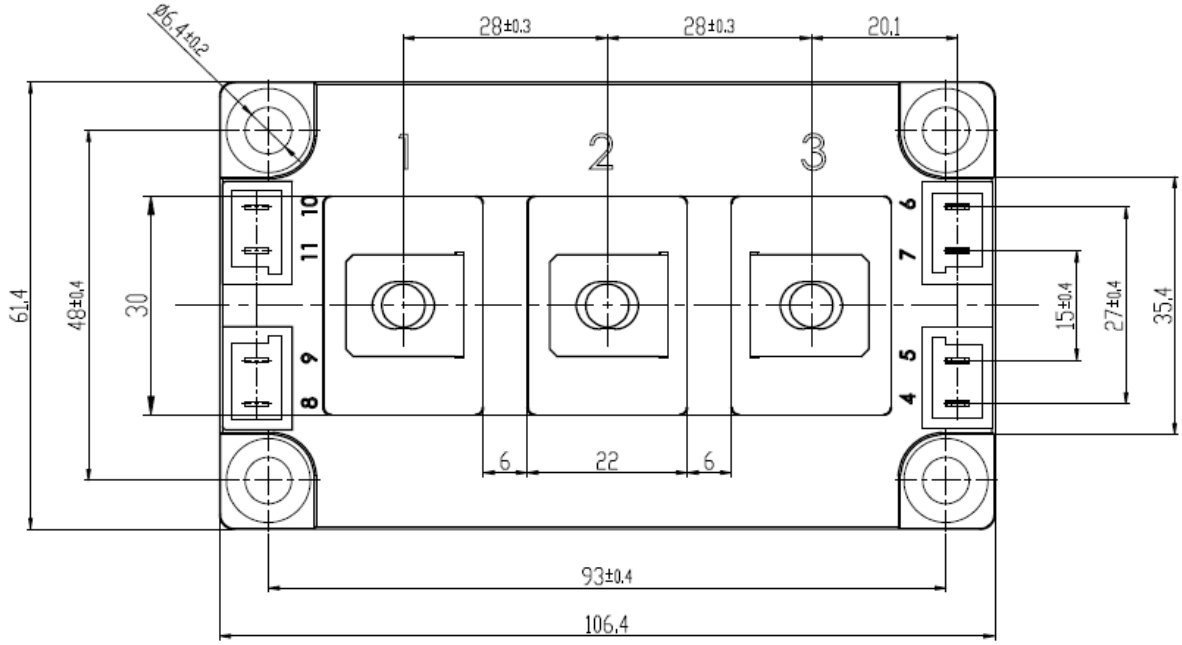


Fig 10. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters





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