STARPOWER

SEMICONDUCTOR **IGBT**

GD200HFF120C2S

1200V/200A 2 in one-package

General Description

STARPOWER IGBT Power Module provides ultra switching speed as well as short circuit ruggedness. They are designed for the applications such as electronic welder and inductive heating.

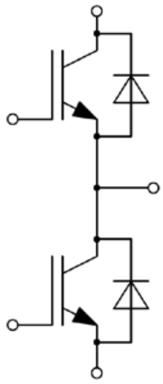
Features

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

Typical Applications

- Switching mode power supply
- Inductive heating
- Electronic welder

Equivalent Circuit Schematic



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=85°C	294 200	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A
P_D	Maximum Power Dissipation @ T_j=175°C	1056	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	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^{o}C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=200A,V_{GE}=15V, T_j=25^{o}C		1.90	2.35	V
		I_C=200A,V_{GE}=15V, T_j=125^{o}C		2.40		
		I_C=200A,V_{GE}=15V, T_j=150^{o}C		2.55		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=5.0mA,V_{CE}=V_{GE}, T_j=25^{o}C	5.2	6.0	6.8	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25^{o}C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25^{o}C			100	nA
R_{Gint}	Internal Gate Resistance			3.75		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		20.7		nF
C_{res}	Reverse Transfer Capacitance			0.58		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.55		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=0.75Ω,V_{GE}=±15V, T_j=25^{o}C		374		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			326		ns
t_f	Fall Time			204		ns
E_{on}	Turn-On Switching Loss			13.8		mJ
E_{off}	Turn-Off Switching Loss			10.4		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=0.75Ω,V_{GE}=±15V, T_j=125^{o}C		419		ns
t_r	Rise Time			63		ns
$t_{d(off)}$	Turn-Off Delay Time			383		ns
t_f	Fall Time			218		ns
E_{on}	Turn-On Switching Loss			20.8		mJ
E_{off}	Turn-Off Switching Loss			11.9		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=0.75Ω,V_{GE}=±15V, T_j=150^{o}C		419		ns
t_r	Rise Time			65		ns
$t_{d(off)}$	Turn-Off Delay Time			388		ns
t_f	Fall Time			222		ns
E_{on}	Turn-On Switching Loss			22.9		mJ
E_{off}	Turn-Off Switching Loss			11.9		mJ

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=200A,V_{GE}=0V,T_j=25°C		1.90	2.35	V
		I_F=200A,V_{GE}=0V,T_j=125°C		1.90		
		I_F=200A,V_{GE}=0V,T_j=150°C		1.90		
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di/dt=3200A/μs,V_{GE}=-15V T_j=25°C		10.2		μC
I_{RM}	Peak Reverse Recovery Current			90		A
E_{rec}	Reverse Recovery Energy			3.40		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di/dt=3200A/μs,V_{GE}=-15V T_j=125°C		26.2		μC
I_{RM}	Peak Reverse Recovery Current			132		A
E_{rec}	Reverse Recovery Energy			9.75		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di/dt=3200A/μs,V_{GE}=-15V T_j=150°C		30.4		μC
I_{RM}	Peak Reverse Recovery Current			142		A
E_{rec}	Reverse Recovery Energy			11.3		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		15		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.25		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.142 0.202	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.034 0.048 0.010		K/W
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		300		g

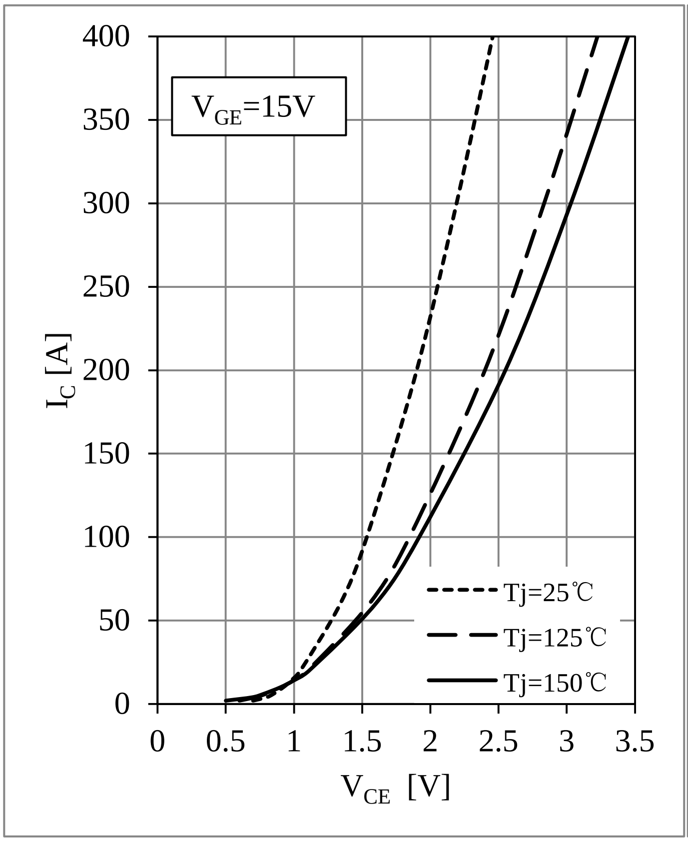


Fig 1. IGBT Output Characteristics

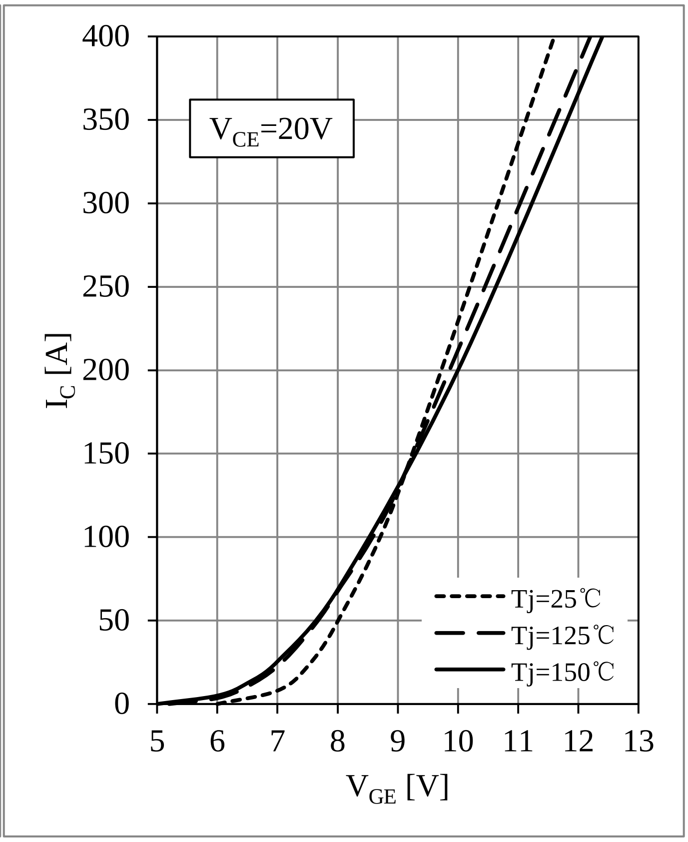


Fig 2. IGBT Transfer Characteristics

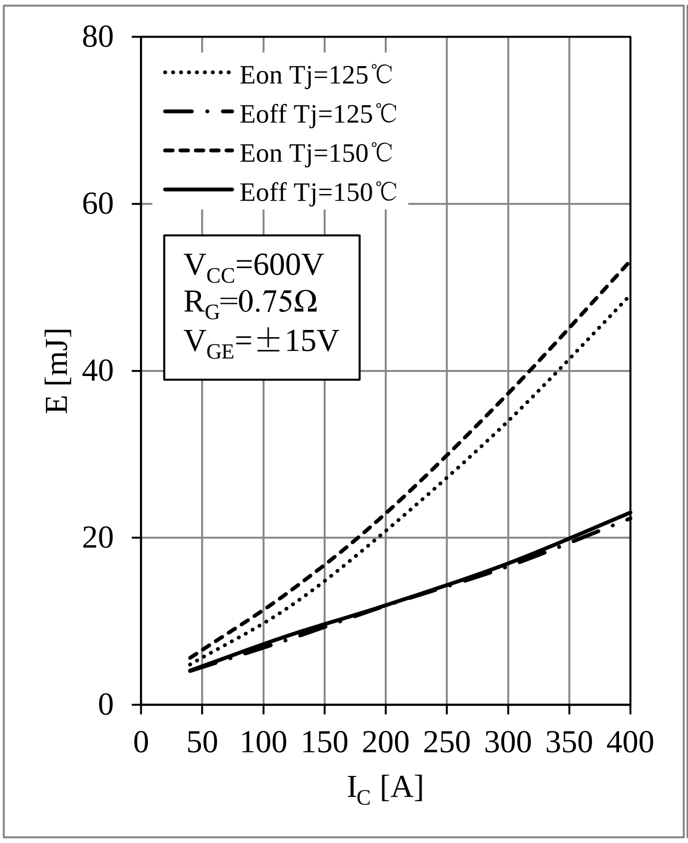


Fig 3. IGBT Switching Loss vs. I_C

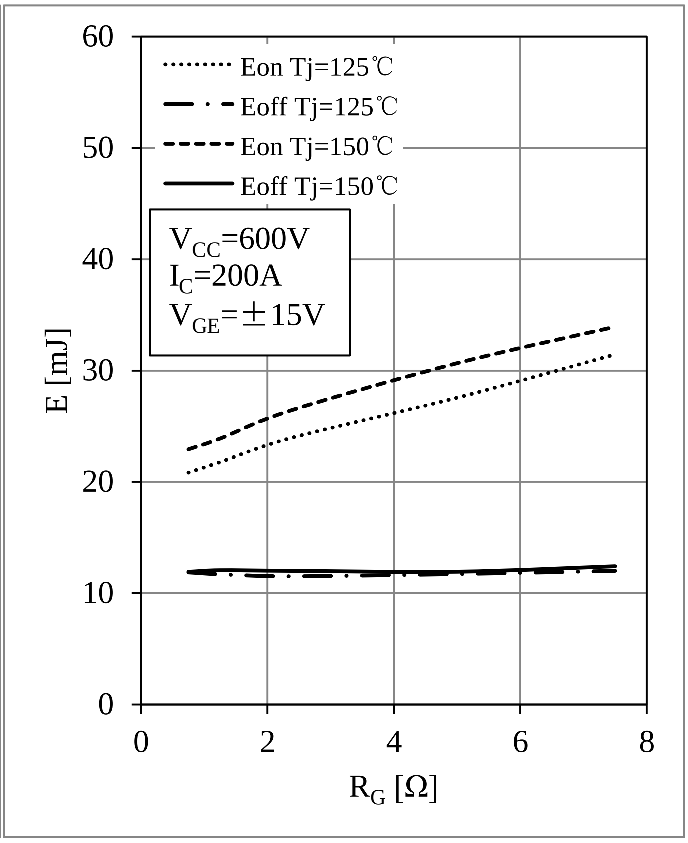


Fig 4. IGBT Switching Loss vs. R_G

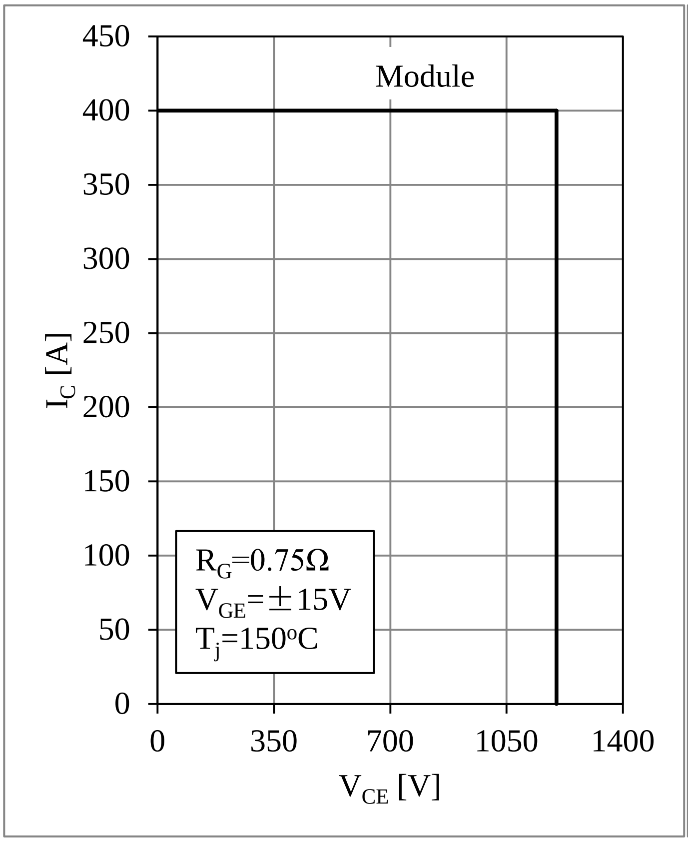


Fig 5. RBSOA

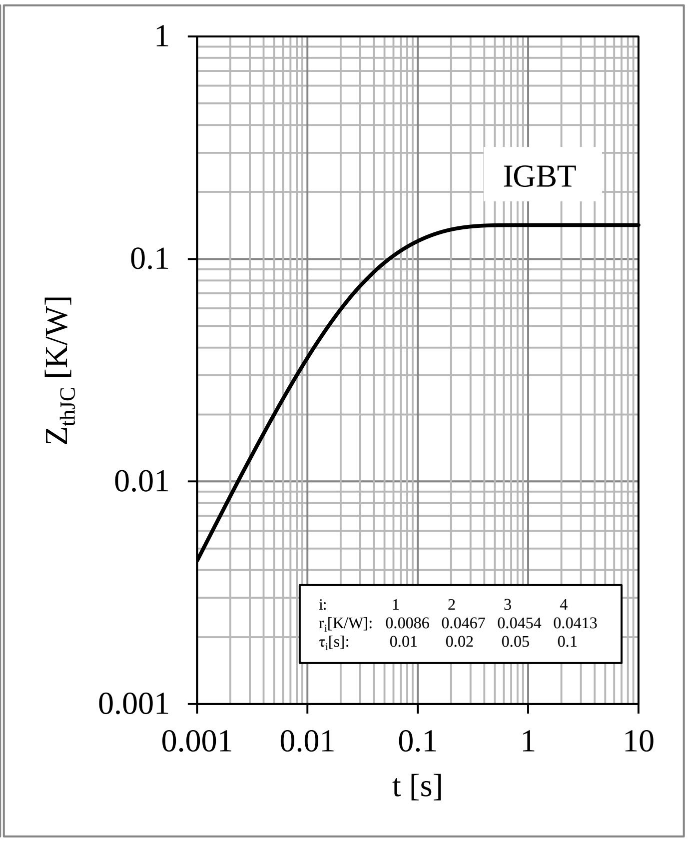


Fig 6. IGBT Transient Thermal Impedance

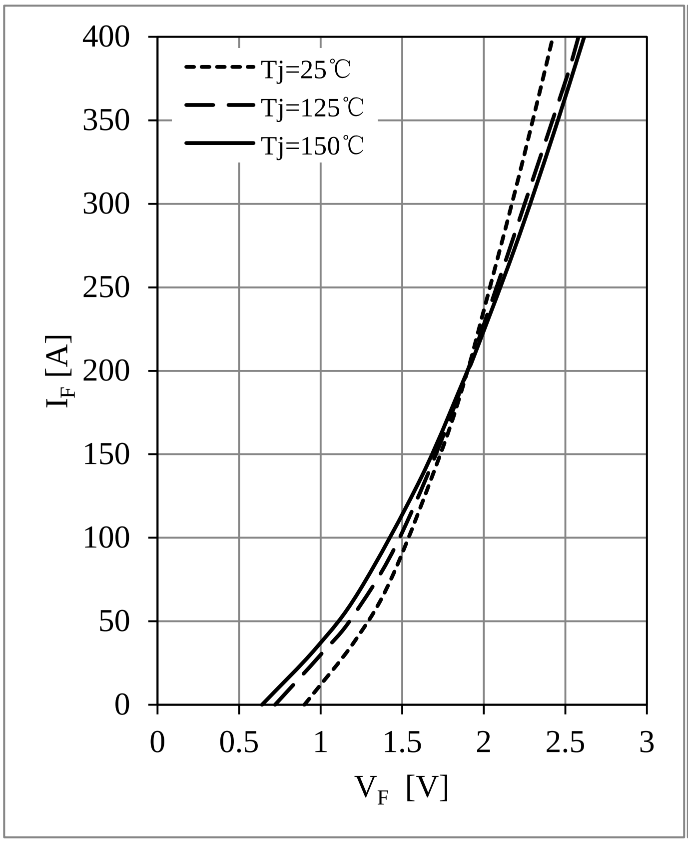


Fig 7. Diode Forward Characteristics

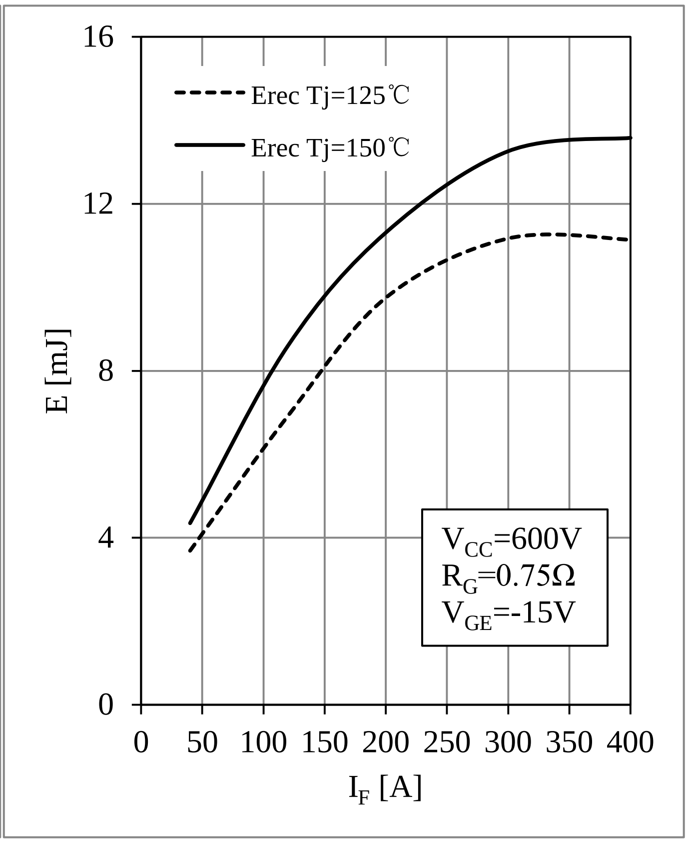


Fig 8. Diode Switching Loss vs. I_F

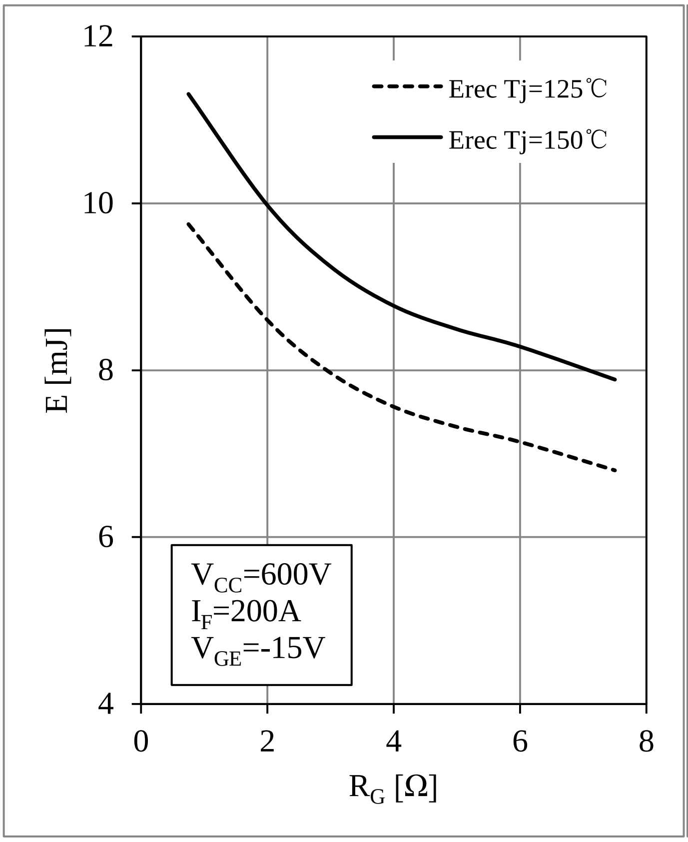


Fig 9. Diode Switching Loss vs. R_G

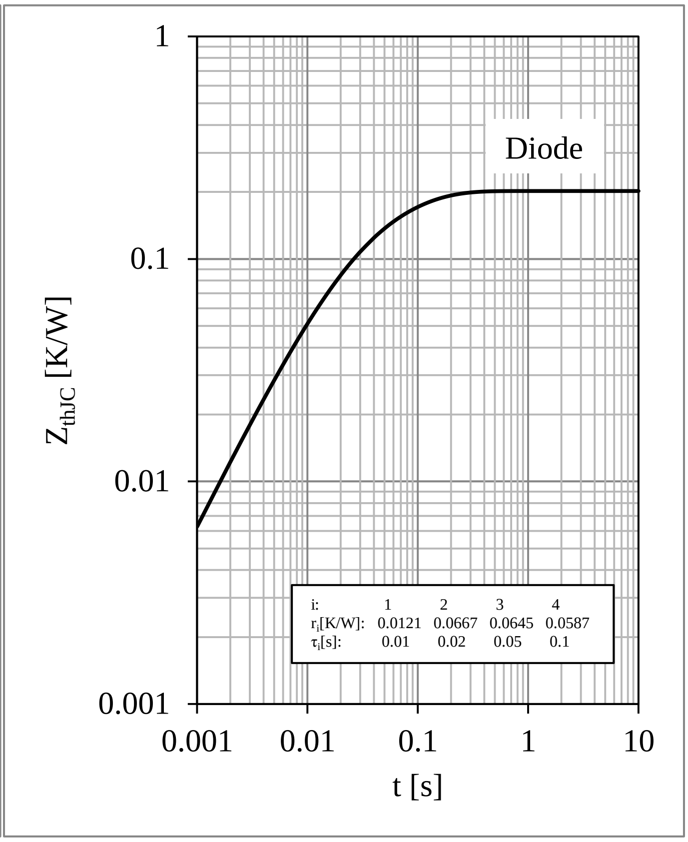
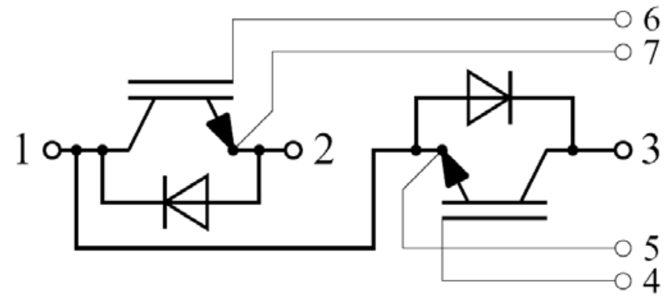


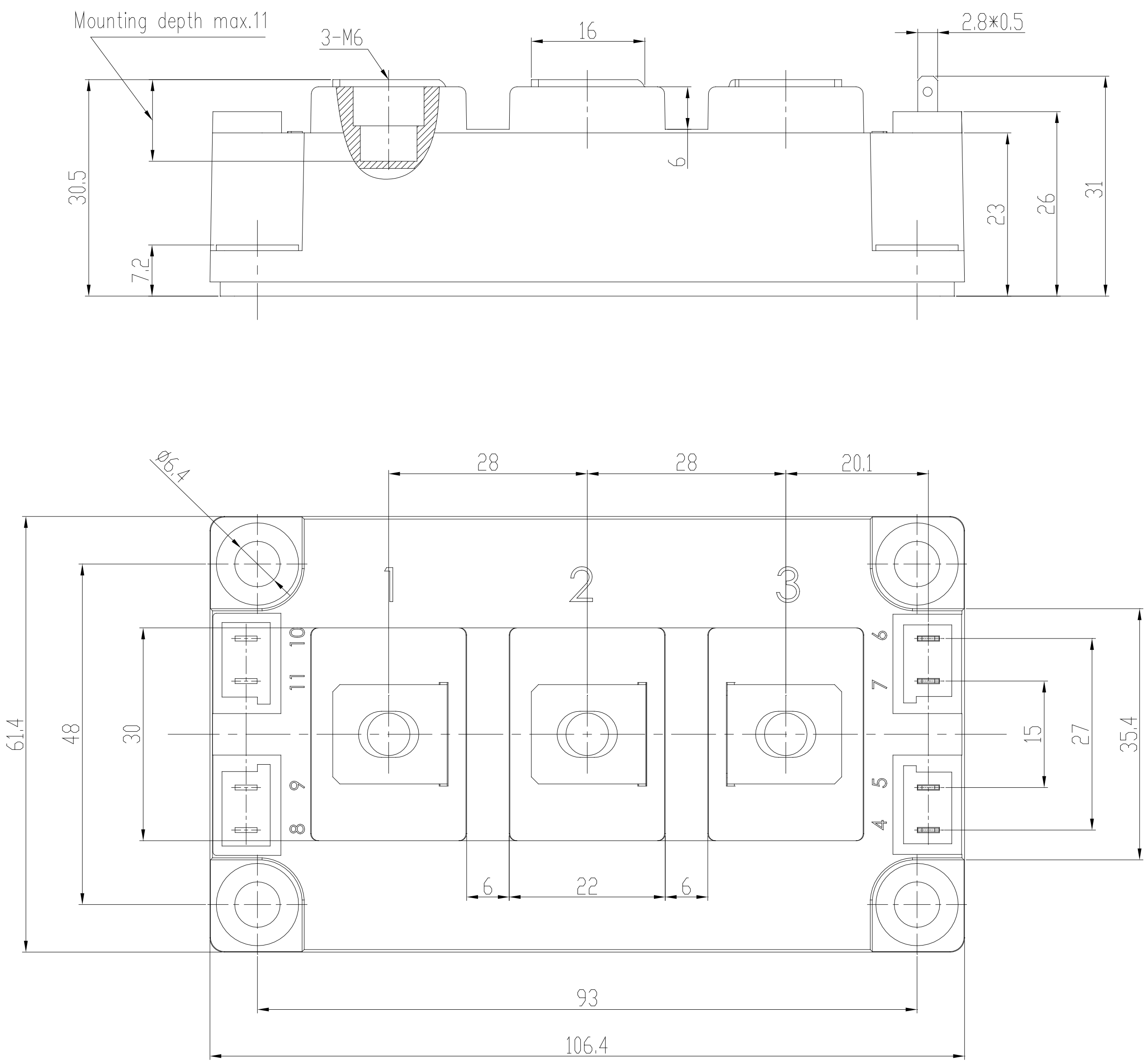
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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