STARPOWER

SEMICONDUCTOR **IGBT**

GD200CLX65C2S

650V/200A chopper 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 inductive heating.

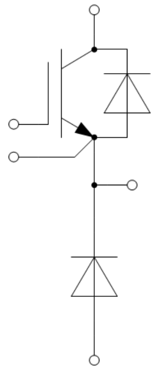
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 6μs 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

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	Values	Unit
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=65°C	247 200	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A
P_D	Maximum Power Dissipation @ T_j=175°C	612	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	A

Module

Symbol	Description	Values	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	2500	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=200A,V_{GE}=15V, T_j=25°C		1.45	1.90	V
		I_C=200A,V_{GE}=15V, T_j=125°C		1.60		
		I_C=200A,V_{GE}=15V, T_j=150°C		1.70		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.2mA,V_{CE}=V_{GE}, T_j=25°C	5.1	5.8	6.5	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			2.0		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		23.2		nF
C_{res}	Reverse Transfer Capacitance			0.46		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.39		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=200A, R_G=2.0Ω,V_{GE}=±15V, T_j=25°C		150		ns
t_r	Rise Time			30		ns
$t_{d(off)}$	Turn-Off Delay Time			272		ns
t_f	Fall Time			48		ns
E_{on}	Turn-On Switching Loss			1.00		mJ
E_{off}	Turn-Off Switching Loss			4.52		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=200A, R_G=2.0Ω,V_{GE}=±15V, T_j=125°C		160		ns
t_r	Rise Time			40		ns
$t_{d(off)}$	Turn-Off Delay Time			296		ns
t_f	Fall Time			56		ns
E_{on}	Turn-On Switching Loss			1.55		mJ
E_{off}	Turn-Off Switching Loss			5.36		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=200A, R_G=2.0Ω,V_{GE}=±15V, T_j=150°C		170		ns
t_r	Rise Time			40		ns
$t_{d(off)}$	Turn-Off Delay Time			304		ns
t_f	Fall Time			56		ns
E_{on}	Turn-On Switching Loss			1.80		mJ
E_{off}	Turn-Off Switching Loss			5.52		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=360V, V_{CEM}≤650V		1000		A

Diode Characteristics T_C=25°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°C		1.55	2.00	V
		I_F=200A,V_{GE}=0V,T_j=125°C		1.50		
		I_F=200A,V_{GE}=0V,T_j=150°C		1.45		
Q_r	Recovered Charge	V_R=300V,I_F=200A, -di/dt=5700A/μs,V_{GE}=-15V T_j=25°C		10.0		μC
I_{RM}	Peak Reverse Recovery Current			160		A
E_{rec}	Reverse Recovery Energy			3.00		mJ
Q_r	Recovered Charge	V_R=300V,I_F=200A, -di/dt=5700A/μs,V_{GE}=-15V T_j=125°C		17.0		μC
I_{RM}	Peak Reverse Recovery Current			230		A
E_{rec}	Reverse Recovery Energy			5.20		mJ
Q_r	Recovered Charge	V_R=300V,I_F=200A, -di/dt=5700A/μs,V_{GE}=-15V T_j=150°C		20.0		μC
I_{RM}	Peak Reverse Recovery Current			240		A
E_{rec}	Reverse Recovery Energy			5.80		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)			0.245 0.451	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.021 0.038 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

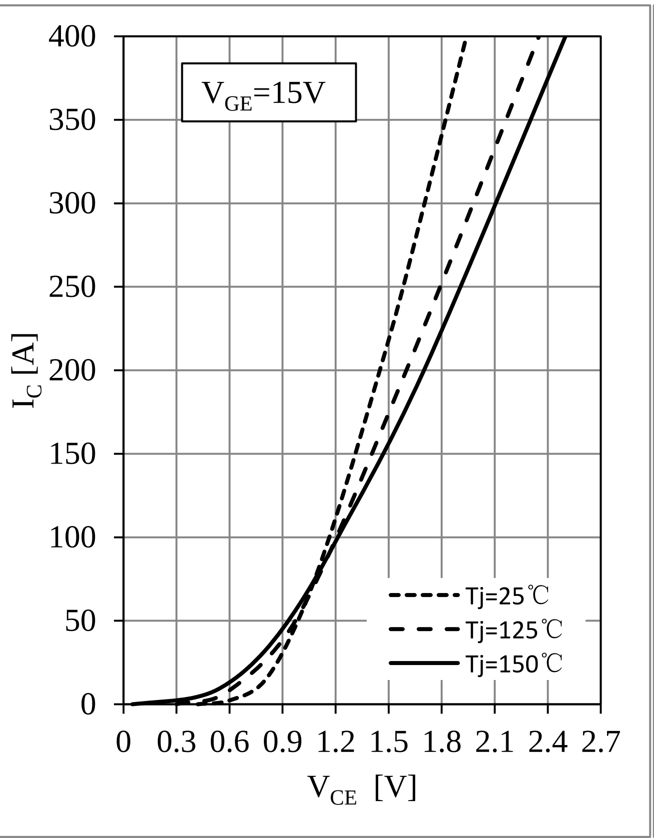


Fig 1. IGBT Output Characteristics

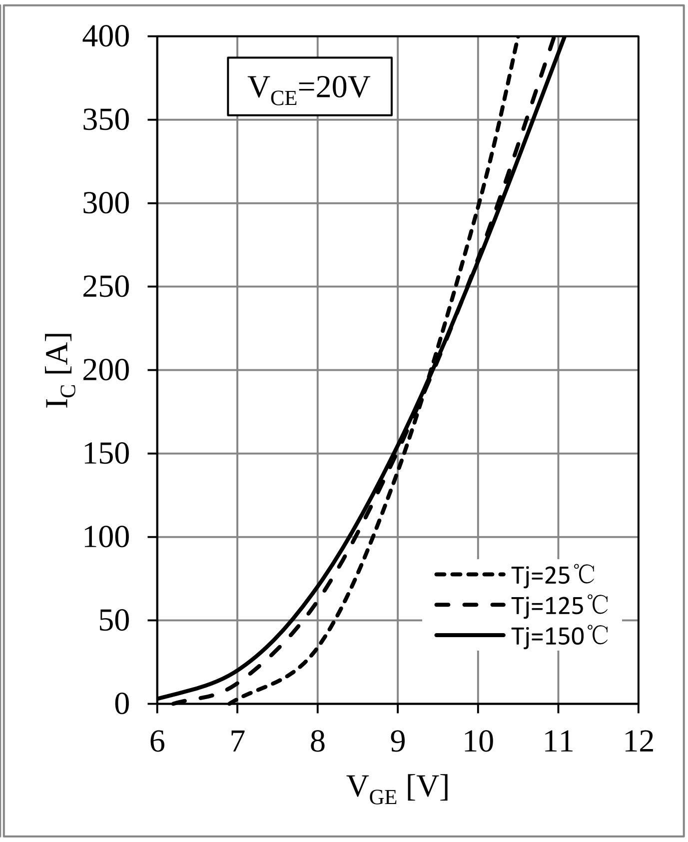


Fig 2. IGBT Transfer Characteristics

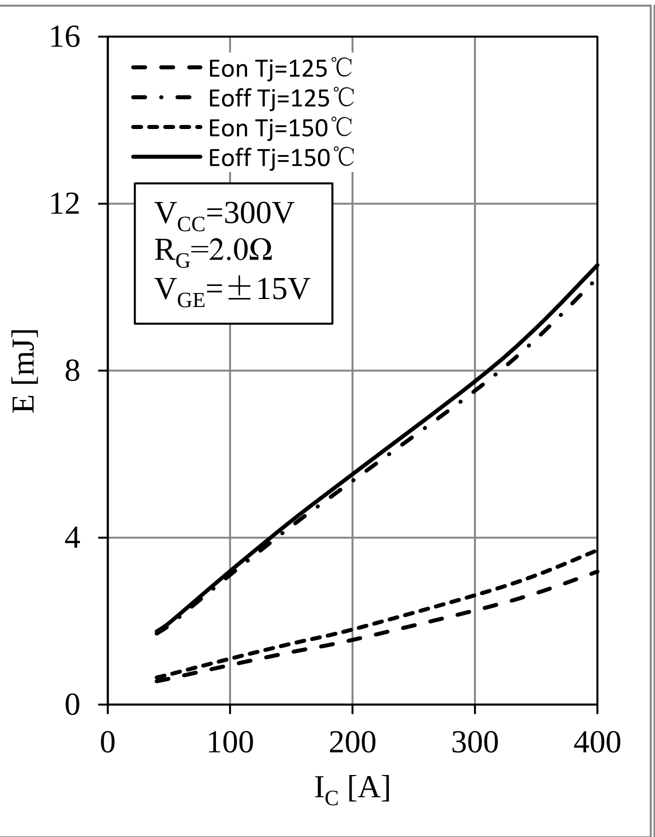


Fig 3. IGBT Switching Loss vs. I_C

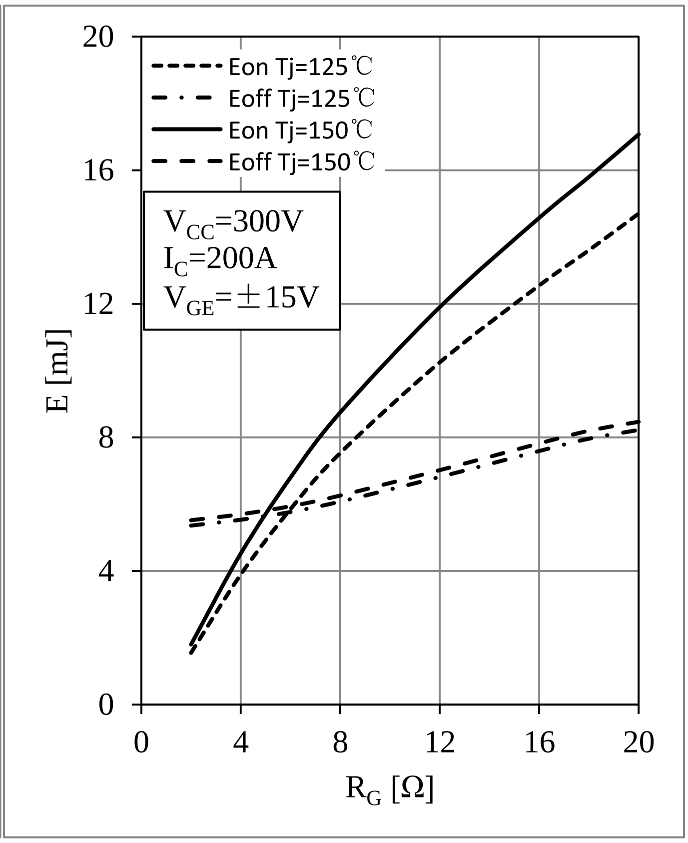


Fig 4. IGBT Switching Loss vs. R_G

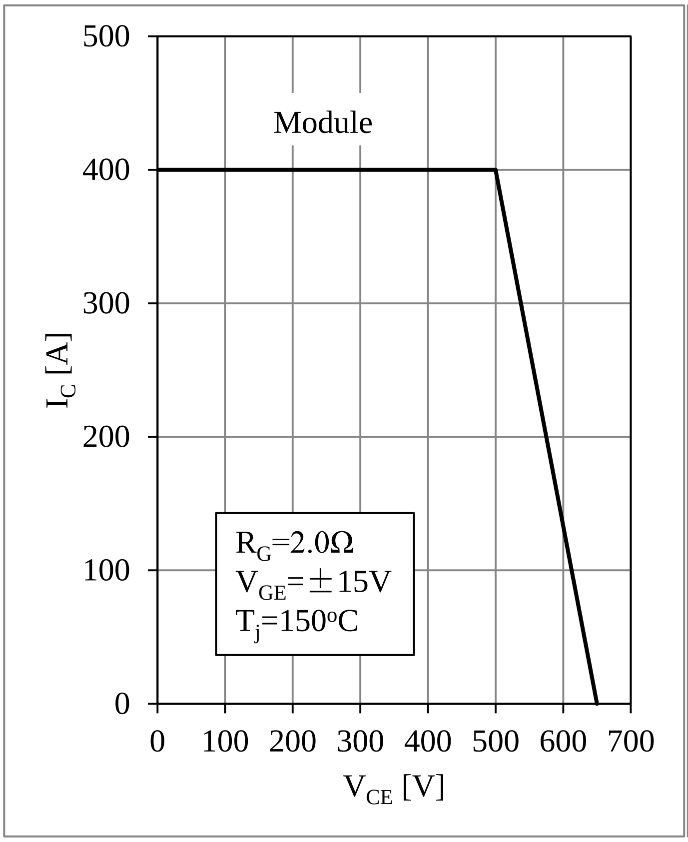


Fig 5. RBSOA

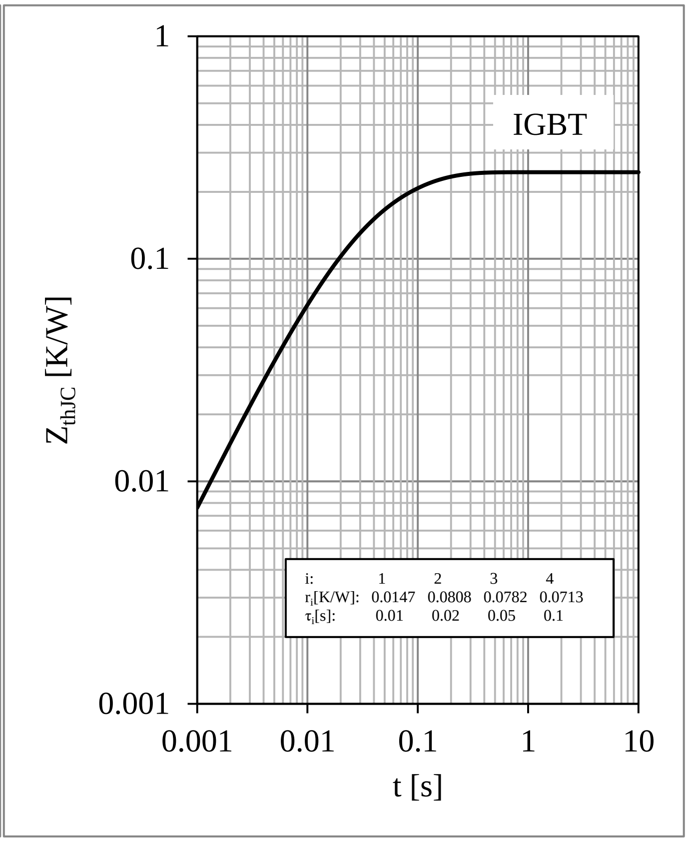


Fig 6. IGBT Transient Thermal Impedance

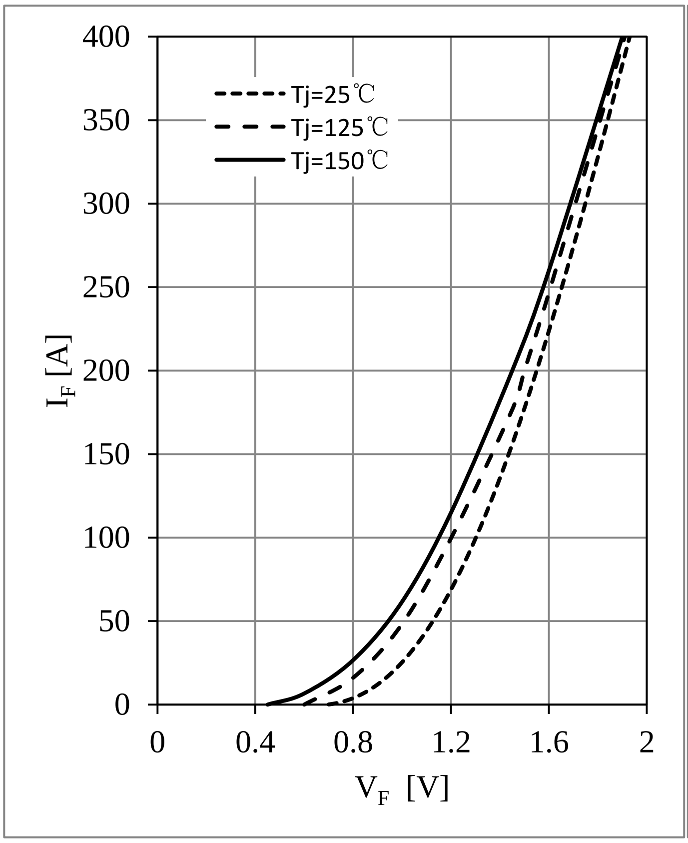


Fig 7. Diode Forward Characteristics

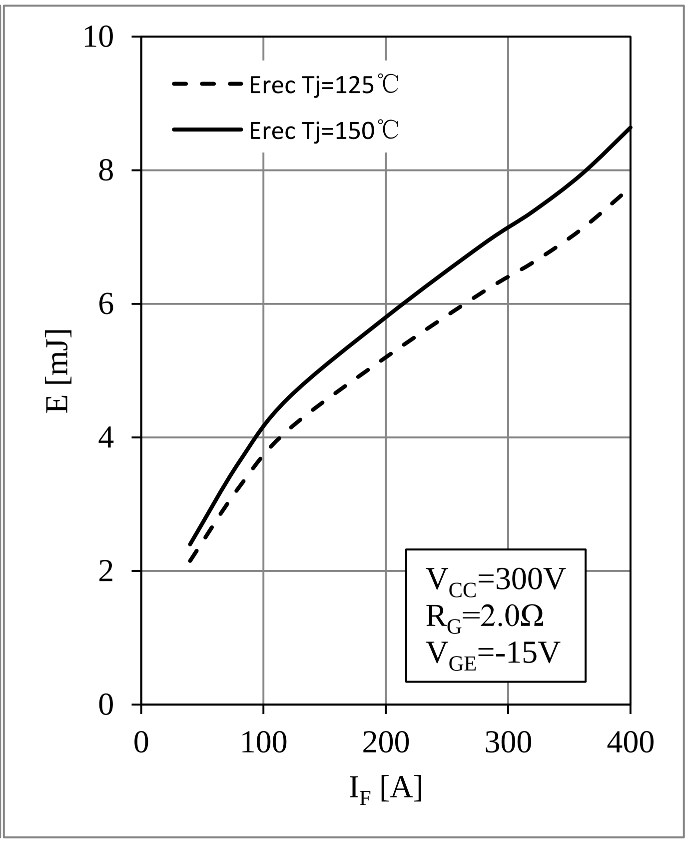


Fig 8. Diode Switching Loss vs. I_F

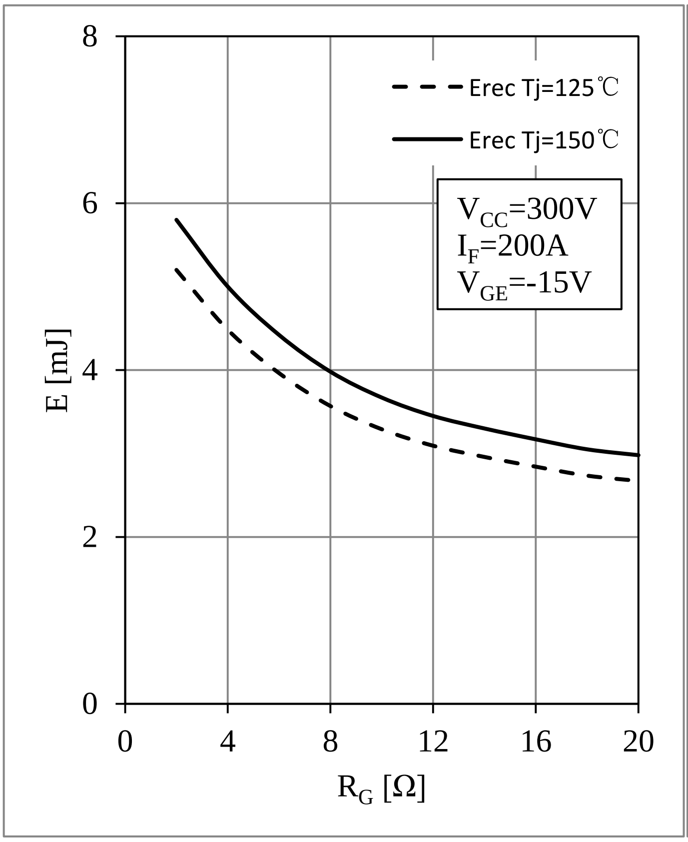


Fig 9. Diode Switching Loss vs. R_G

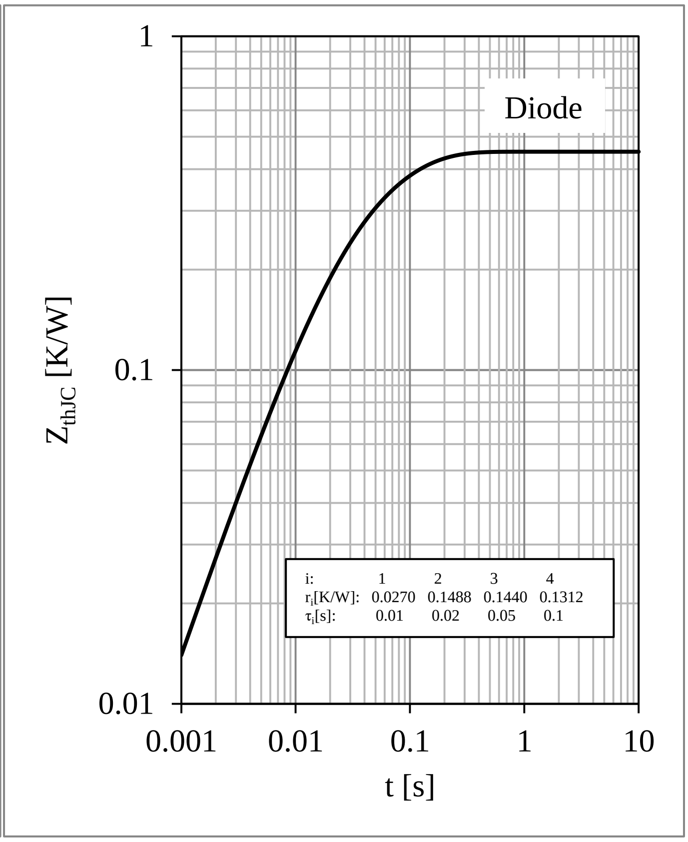
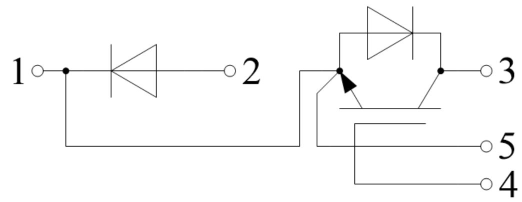


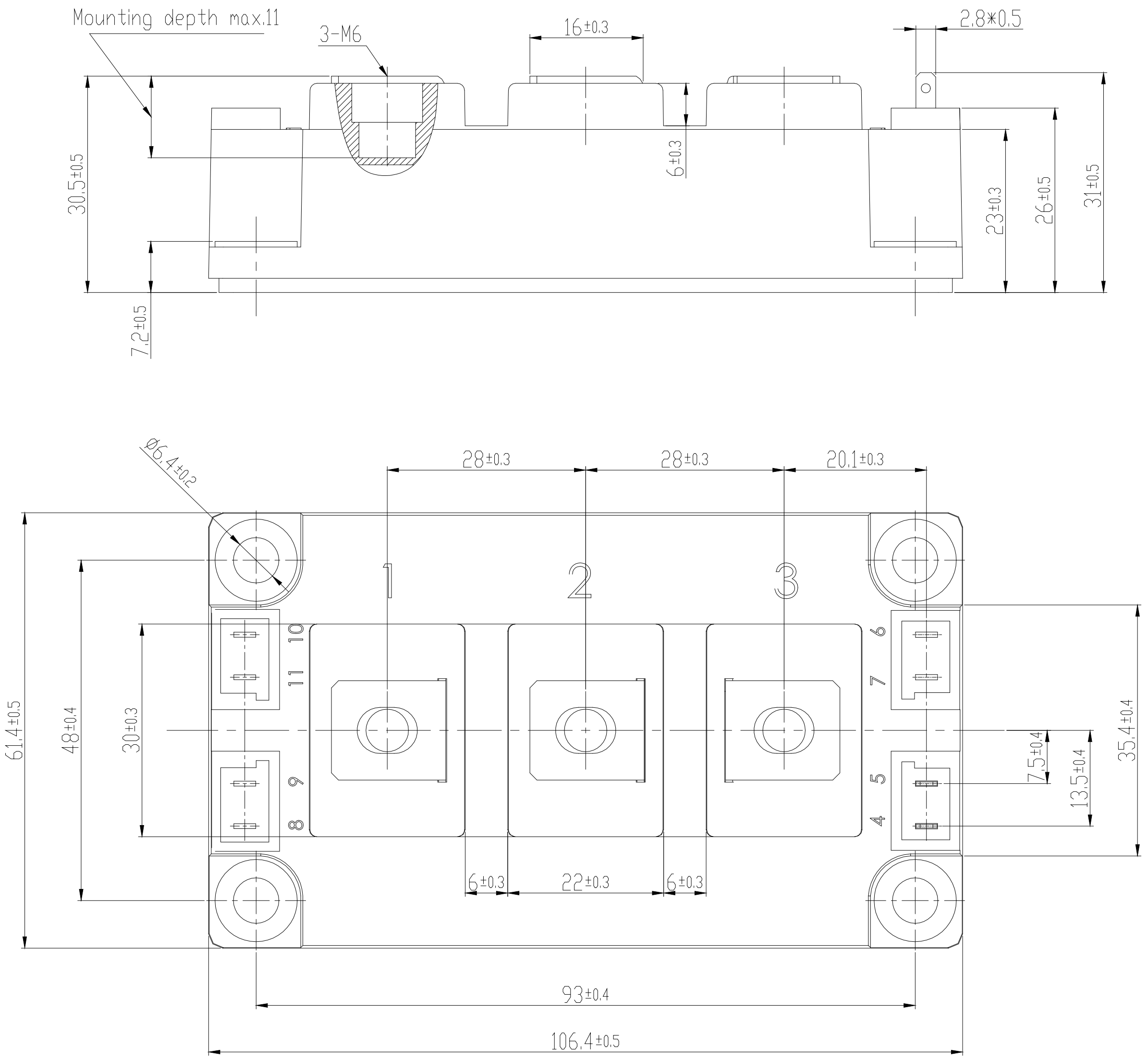
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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