STARPOWER

SEMICONDUCTOR **IGBT**

GD800HFA120C2S_B20

1200V/800A 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.

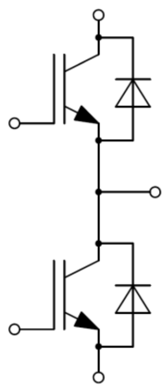
Features

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

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

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 Transient Gate-Emitter Voltage	±20 ±30	V
I_C	Collector Current @ T_C=25°C @ T_C=95°C	1280 800	A
I_{CM}	Pulsed Collector Current t_p=1ms	1600	A
P_D	Maximum Power Dissipation @ T_j=175°C	3191	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	800	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1600	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°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=800A,V_{GE}=15V, T_j=25°C		1.30	1.75	V
		I_C=800A,V_{GE}=15V, T_j=125°C		1.45		
		I_C=800A,V_{GE}=15V, T_j=150°C		1.50		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=32.0mA,V_{CE}=V_{GE}, T_j=25°C	5.5	6.1	7.0	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			0.38		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=100kHz, V_{GE}=0V		156		nF
C_{res}	Reverse Transfer Capacitance			1.10		nF
Q_G	Gate Charge	V_{GE}=-8…+15V		10.3		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_G=1.2Ω, V_{GE}=-8V/+15V, T_j=25°C		338		ns
t_r	Rise Time			174		ns
$t_{d(off)}$	Turn-Off Delay Time			1020		ns
t_f	Fall Time			100		ns
E_{on}	Turn-On Switching Loss			65.2		mJ
E_{off}	Turn-Off Switching Loss			88.8		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_G=1.2Ω, V_{GE}=-8V/+15V, T_j=125°C		398		ns
t_r	Rise Time			203		ns
$t_{d(off)}$	Turn-Off Delay Time			1140		ns
t_f	Fall Time			183		ns
E_{on}	Turn-On Switching Loss			96.6		mJ
E_{off}	Turn-Off Switching Loss			109		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_G=1.2Ω, V_{GE}=-8V/+15V, T_j=150°C		413		ns
t_r	Rise Time			213		ns
$t_{d(off)}$	Turn-Off Delay Time			1140		ns
t_f	Fall Time			195		ns
E_{on}	Turn-On Switching Loss			105		mJ
E_{off}	Turn-Off Switching Loss			113		mJ
I_{SC}	SC Data	t_P≤6μs,V_{GE}=15V, T_j=150°C,V_{CC}=800V, V_{CEM}≤1200V		2700		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=800A,V_{GE}=0V,T_j=25°C		1.85	2.30	V
		I_F=800A,V_{GE}=0V,T_j=125°C		1.85		
		I_F=800A,V_{GE}=0V,T_j=150°C		1.85		
Q_r	Recovered Charge	V_R=600V,I_F=800A, -di/dt=5510A/μs,V_{GE}=-8V, T_j=25°C		28.6		μC
I_{RM}	Peak Reverse Recovery Current			311		A
E_{rec}	Reverse Recovery Energy			13.9		mJ
Q_r	Recovered Charge	V_R=600V,I_F=800A, -di/dt=4990A/μs,V_{GE}=-8V, T_j=125°C		56.8		μC
I_{RM}	Peak Reverse Recovery Current			378		A
E_{rec}	Reverse Recovery Energy			23.7		mJ
Q_r	Recovered Charge	V_R=600V,I_F=800A, -di/dt=4860A/μs,V_{GE}=-8V, T_j=150°C		66.3		μC
I_{RM}	Peak Reverse Recovery Current			395		A
E_{rec}	Reverse Recovery Energy			26.7		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		20		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.42		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.047 0.083	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.031 0.055 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		320		g

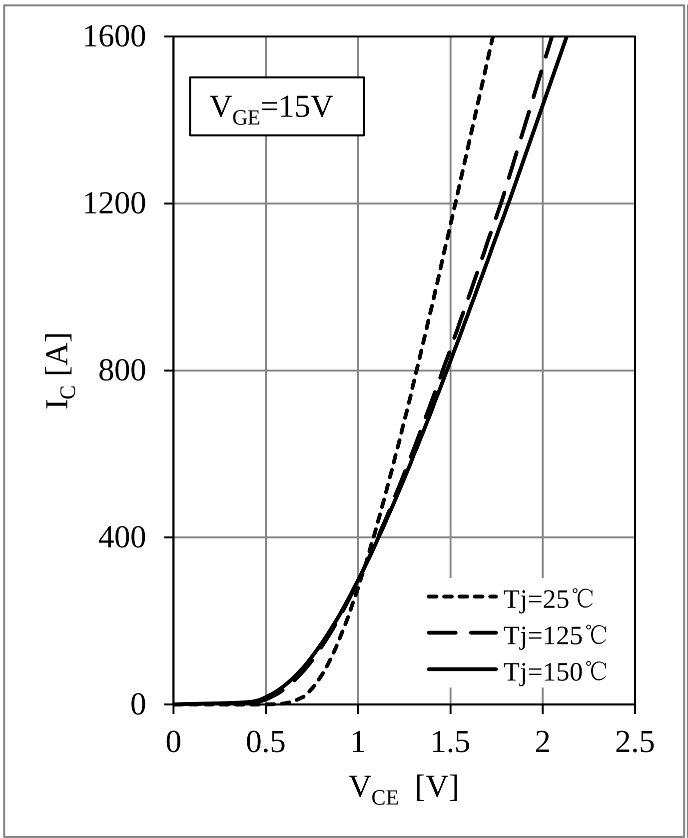


Fig 1. IGBT Output Characteristics

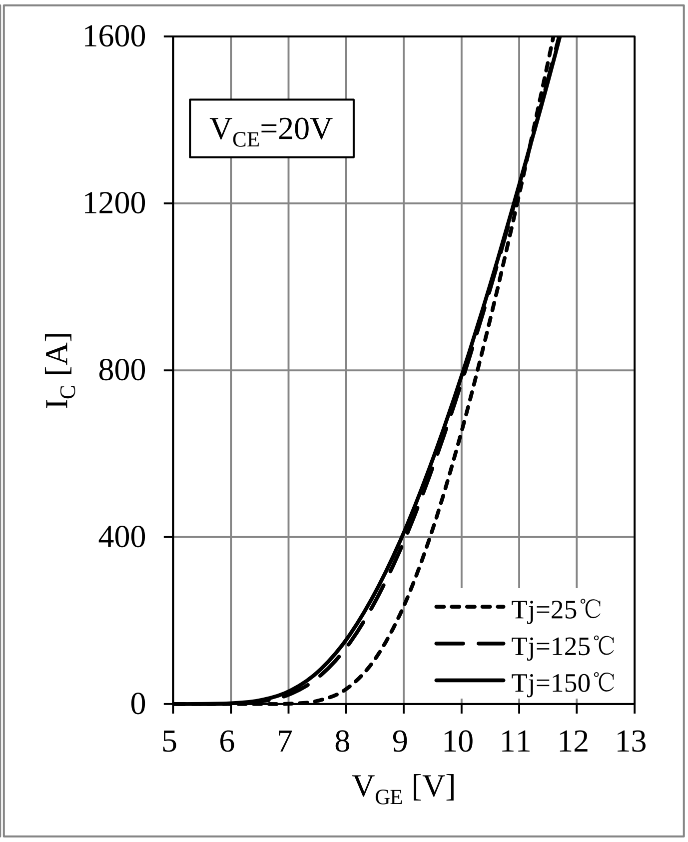


Fig 2. IGBT Transfer Characteristics

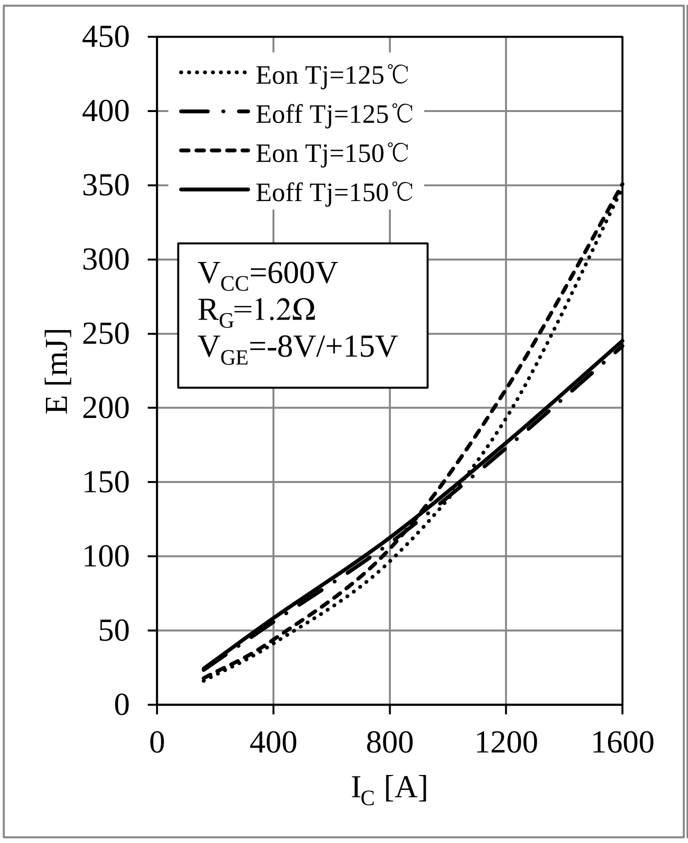


Fig 3. IGBT Switching Loss vs. I_C

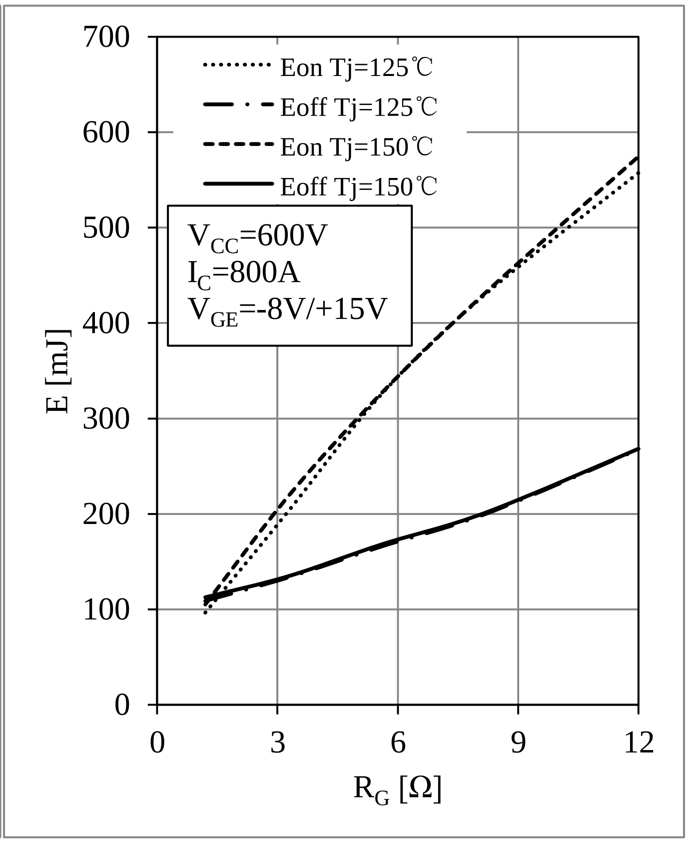


Fig 4. IGBT Switching Loss vs. R_G

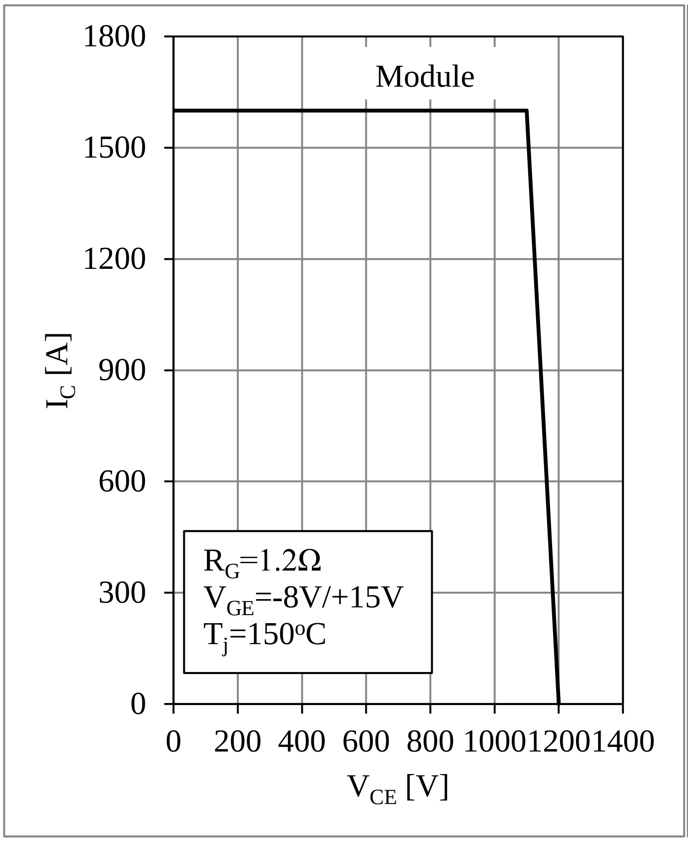


Fig 5. RBSOA

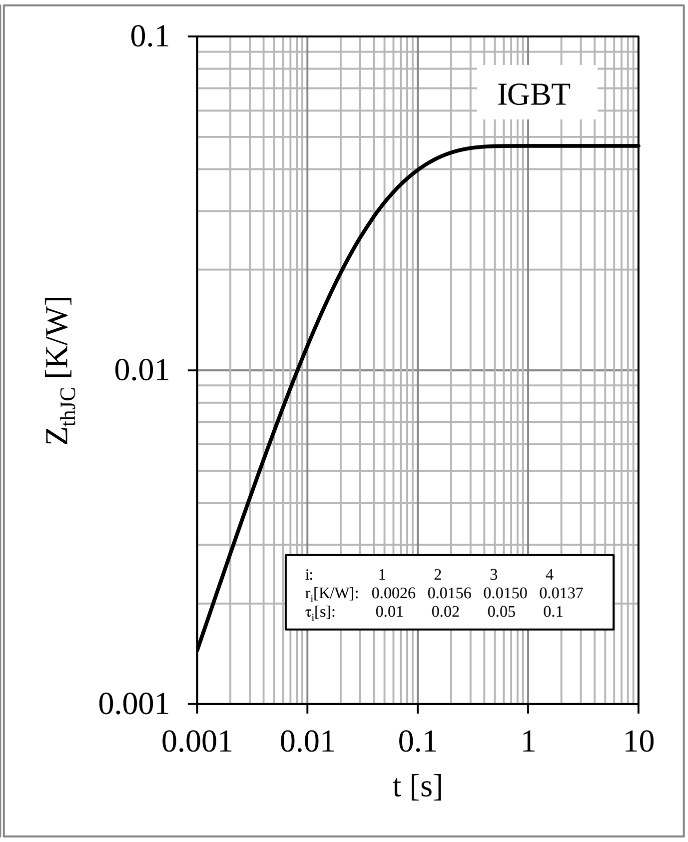


Fig 6. IGBT Transient Thermal Impedance

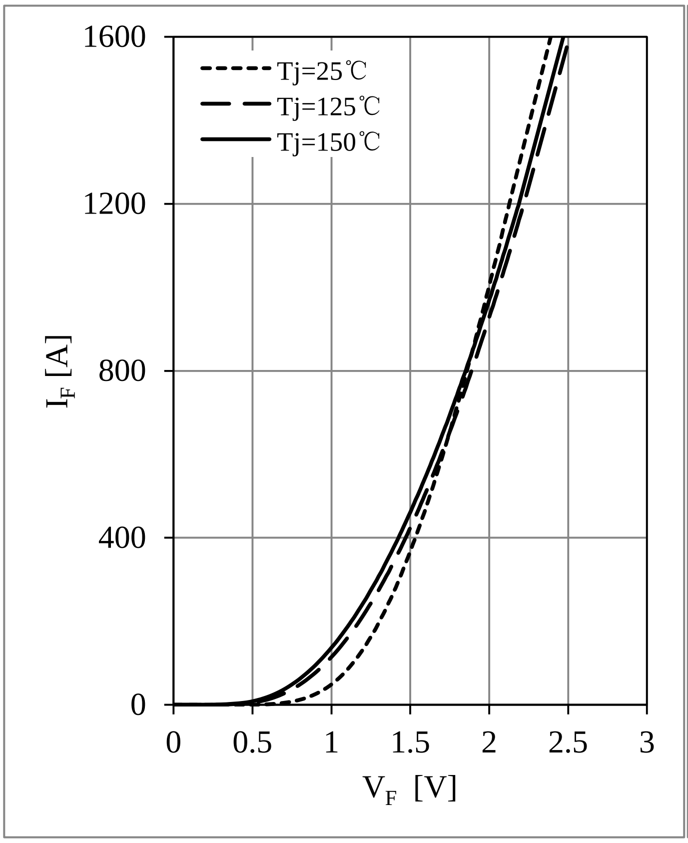


Fig 7. Diode Forward Characteristics

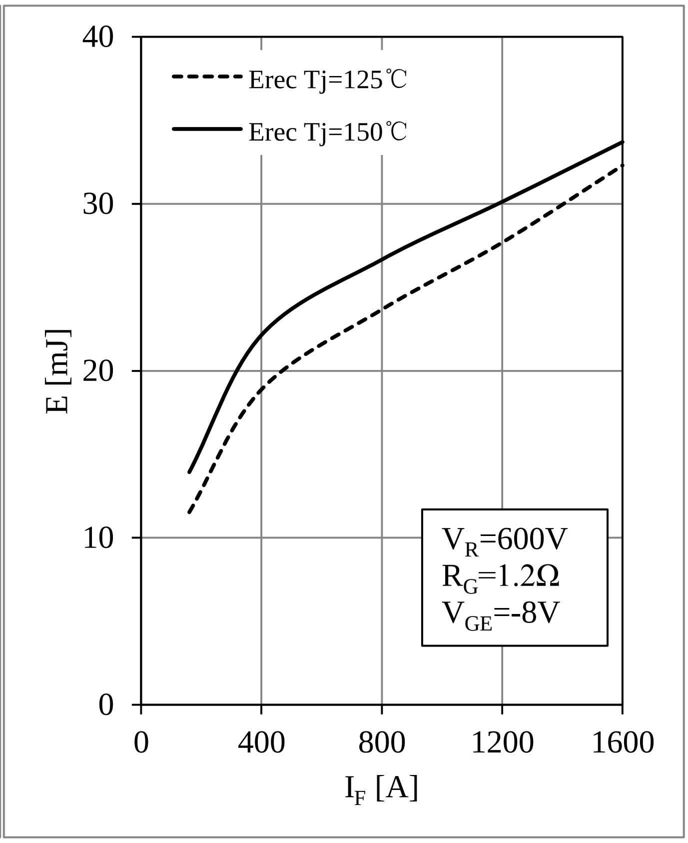


Fig 8. Diode Switching Loss vs. I_F

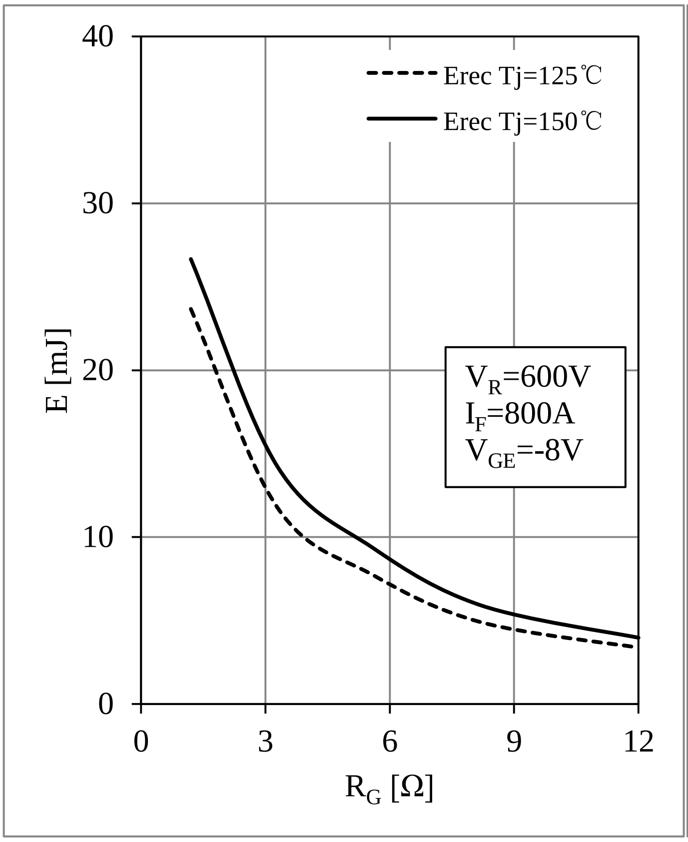


Fig 9. Diode Switching Loss vs. R_G

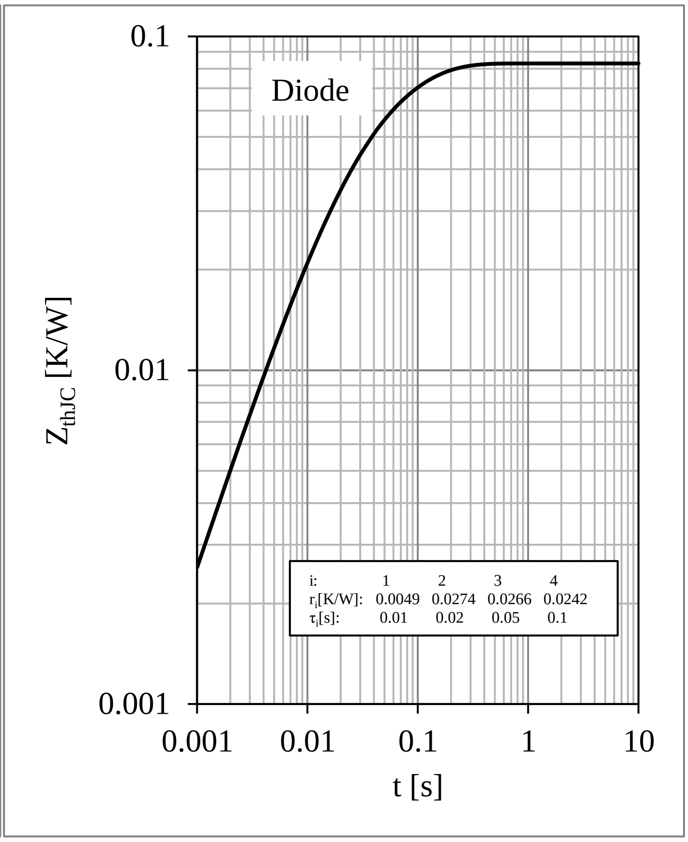
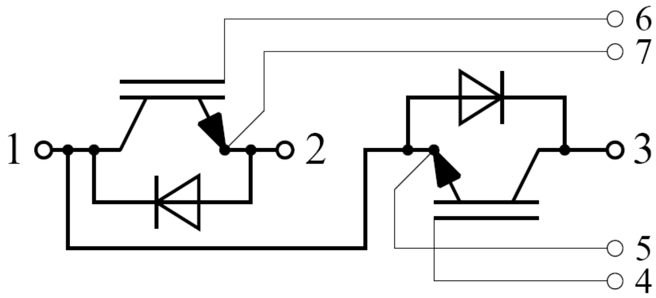


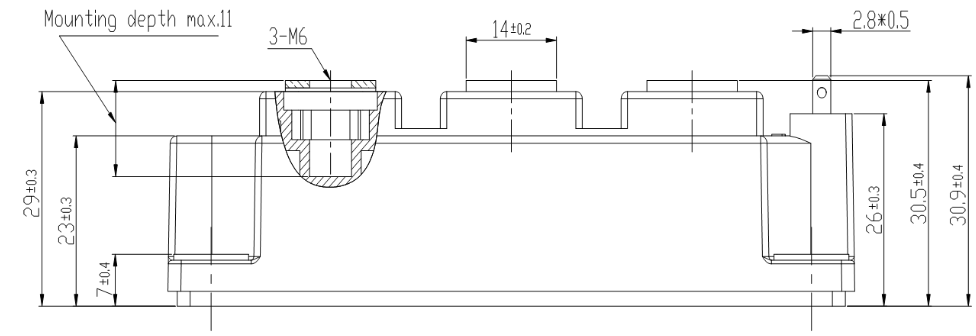
Fig 10. Diode Transient Thermal Impedance

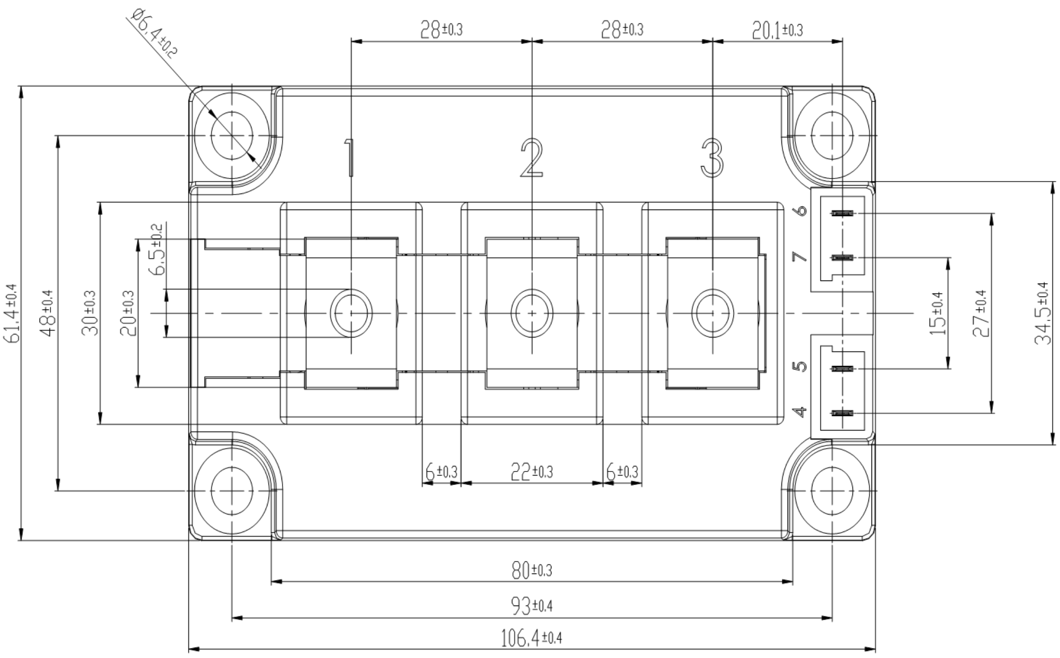
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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