STARPOWER

SEMICONDUCTOR **IGBT**

GD200HFY120C8S

1200V/200A 2 in one-package

General Description

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

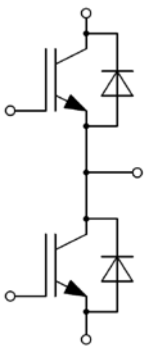
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Fast & soft reverse recovery anti-parallel FWD
- Low inductance case
- Isolated copper baseplate using DBC technology

Typical Applications

- Switching mode power supply
- Inductive heating
- Welding machine

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT

Symbol	Description	Values	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=100°C	309 200	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A
P_D	Maximum Power Dissipation @ T_j=175°C	1006	W

Diode

Symbol	Description	Values	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	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		1.70	2.15	V
		I_C=200A,V_{GE}=15V, T_j=125°C		1.95		
		I_C=200A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=5.0mA,V_{CE}=V_{GE}, T_j=25°C	5.2	6.0	6.8	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			4.0		Ω
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=1.1Ω,V_{GE}=±15V, T_j=25°C		150		ns
t_r	Rise Time			32		ns
$t_{d(off)}$	Turn-Off Delay Time			330		ns
t_f	Fall Time			93		ns
E_{on}	Turn-On Switching Loss			11.2		mJ
E_{off}	Turn-Off Switching Loss			11.3		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=1.1Ω,V_{GE}=±15V, T_j=125°C		161		ns
t_r	Rise Time			37		ns
$t_{d(off)}$	Turn-Off Delay Time			412		ns
t_f	Fall Time			165		ns
E_{on}	Turn-On Switching Loss			19.8		mJ
E_{off}	Turn-Off Switching Loss			17.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=1.1Ω,V_{GE}=±15V, T_j=150°C		161		ns
t_r	Rise Time			43		ns
$t_{d(off)}$	Turn-Off Delay Time			433		ns
t_f	Fall Time			185		ns
E_{on}	Turn-On Switching Loss			21.9		mJ
E_{off}	Turn-Off Switching Loss			19.1		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		800		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		1.65	2.10	V
		I_F=200A,V_{GE}=0V,T_j=125°C		1.65		
		I_F=200A,V_{GE}=0V,T_j=150°C		1.65		
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di/dt=5400A/μs,V_{GE}=-15V T_j=25°C		17.6		μC
I_{RM}	Peak Reverse Recovery Current			228		A
E_{rec}	Reverse Recovery Energy			7.7		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di/dt=5400A/μs,V_{GE}=-15V T_j=125°C		31.8		μC
I_{RM}	Peak Reverse Recovery Current			238		A
E_{rec}	Reverse Recovery Energy			13.8		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di/dt=5400A/μs,V_{GE}=-15V T_j=150°C		36.6		μC
I_{RM}	Peak Reverse Recovery Current			247		A
E_{rec}	Reverse Recovery Energy			15.2		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			26	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.62		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.149 0.206	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.159 0.219 0.046		K/W
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		200		g

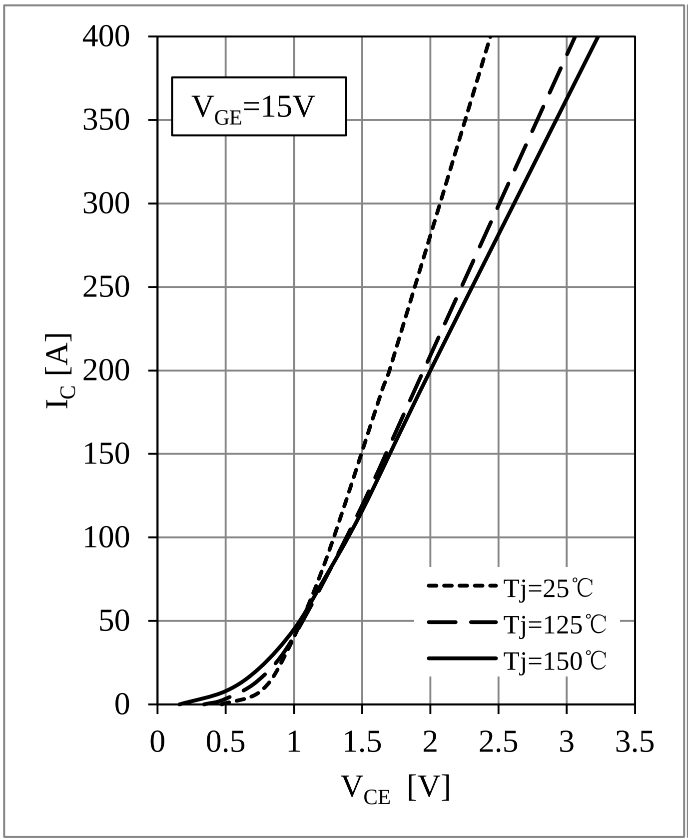


Fig 1. IGBT Output Characteristics

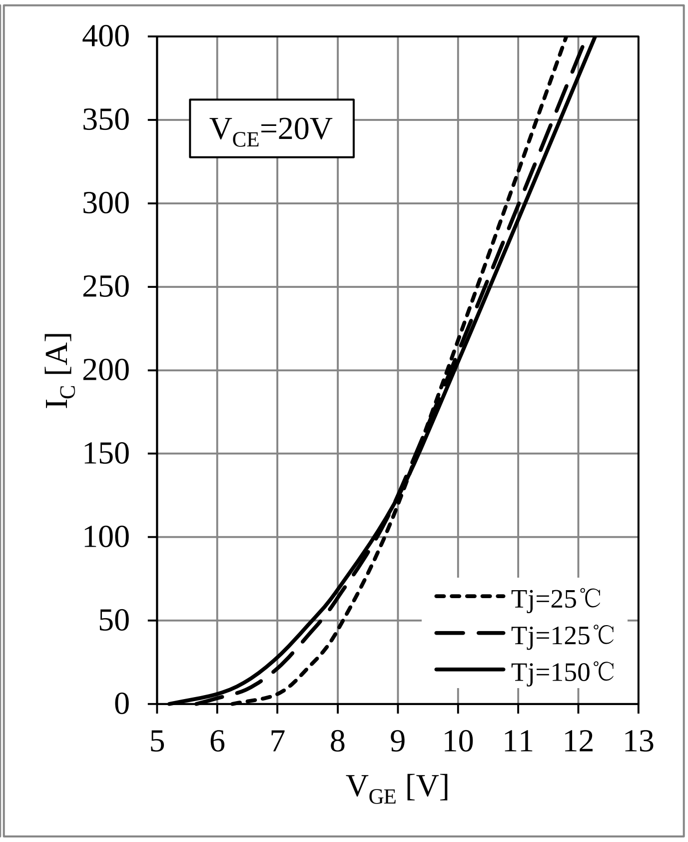


Fig 2. IGBT Transfer Characteristics

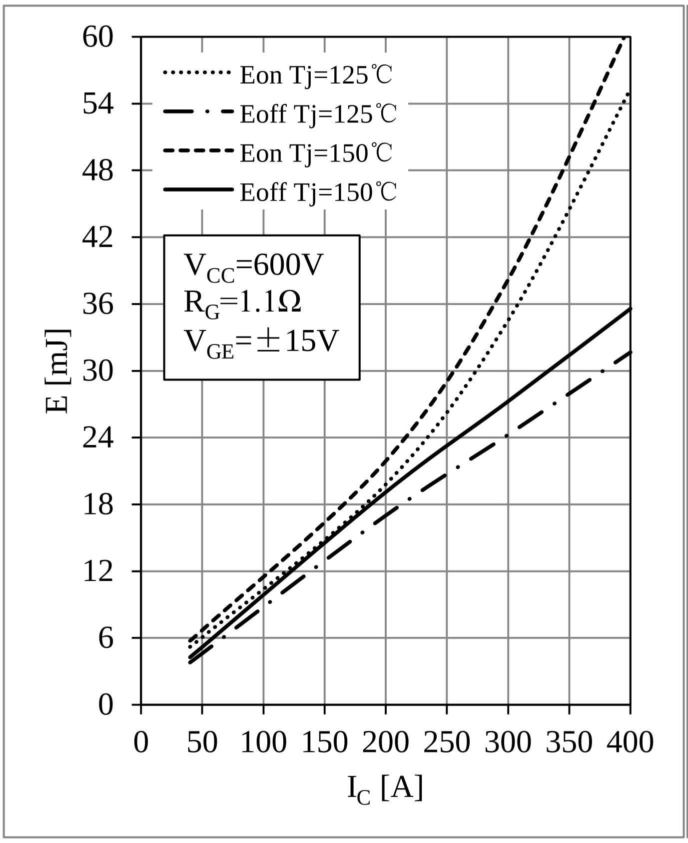


Fig 3. IGBT Switching Loss vs. I_C

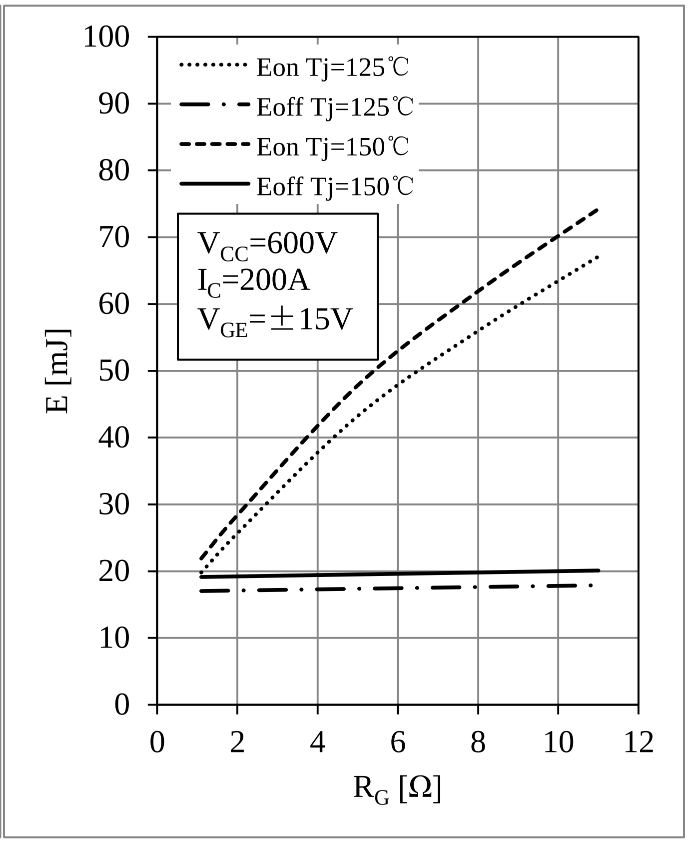


Fig 4. IGBT Switching Loss vs. R_G

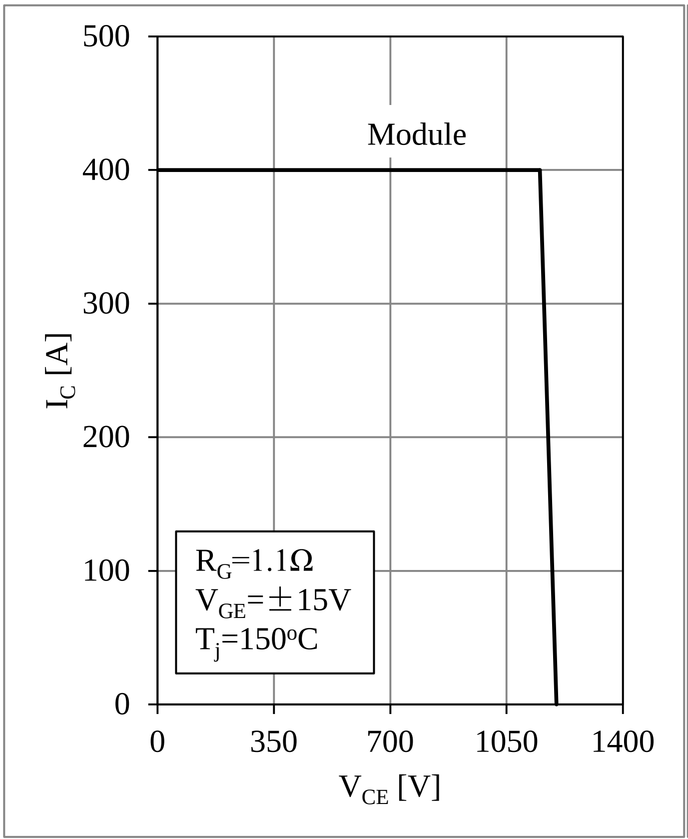


Fig 5. RBSOA

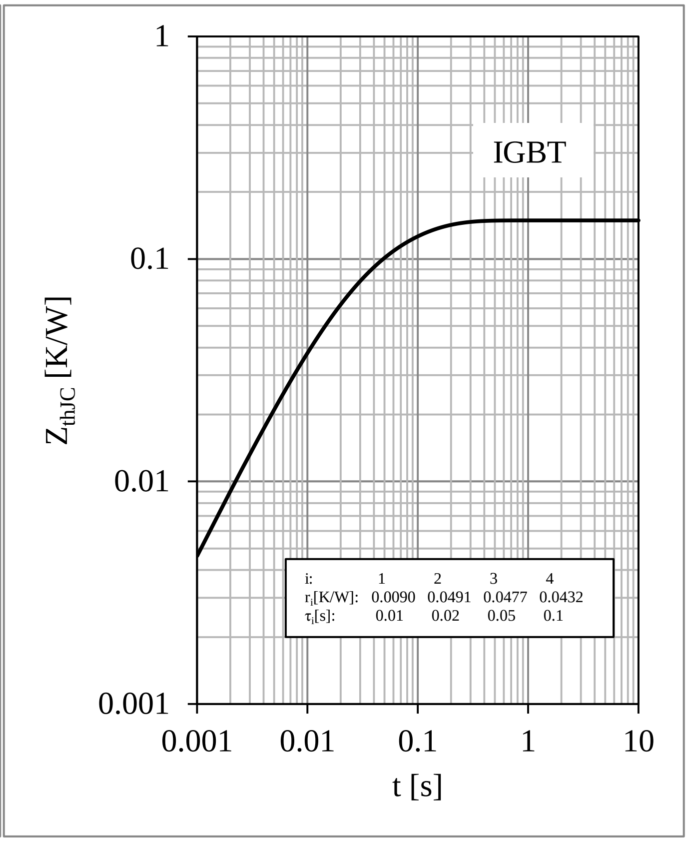


Fig 6. IGBT Transient Thermal Impedance

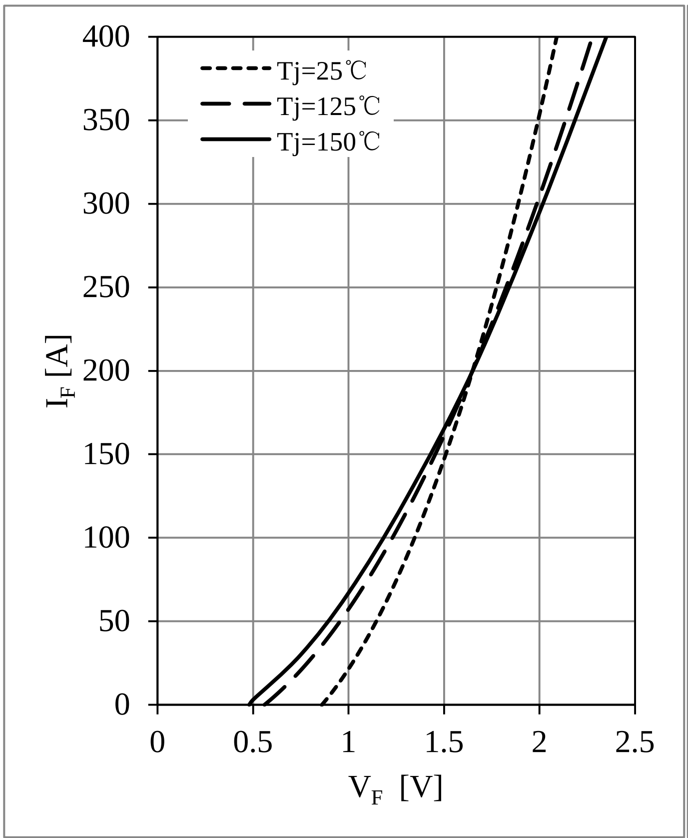


Fig 7. Diode Forward Characteristics

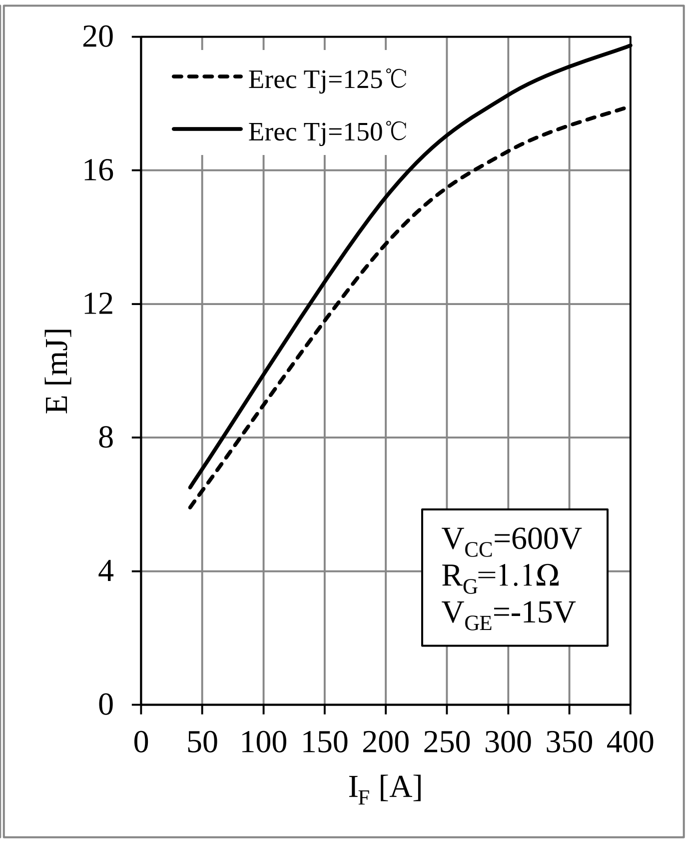


Fig 8. Diode Switching Loss vs. I_F

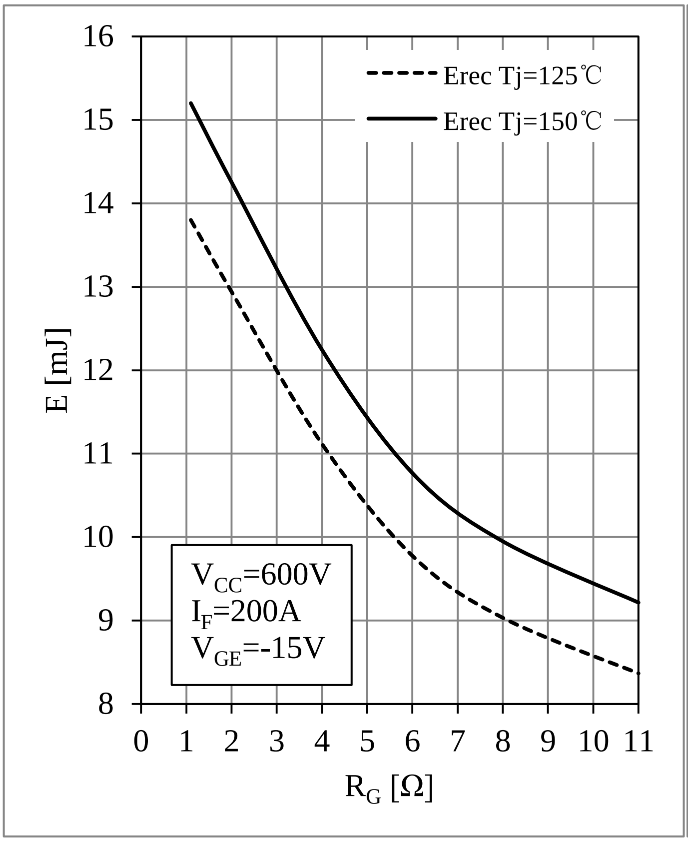


Fig 9. Diode Switching Loss vs. R_G

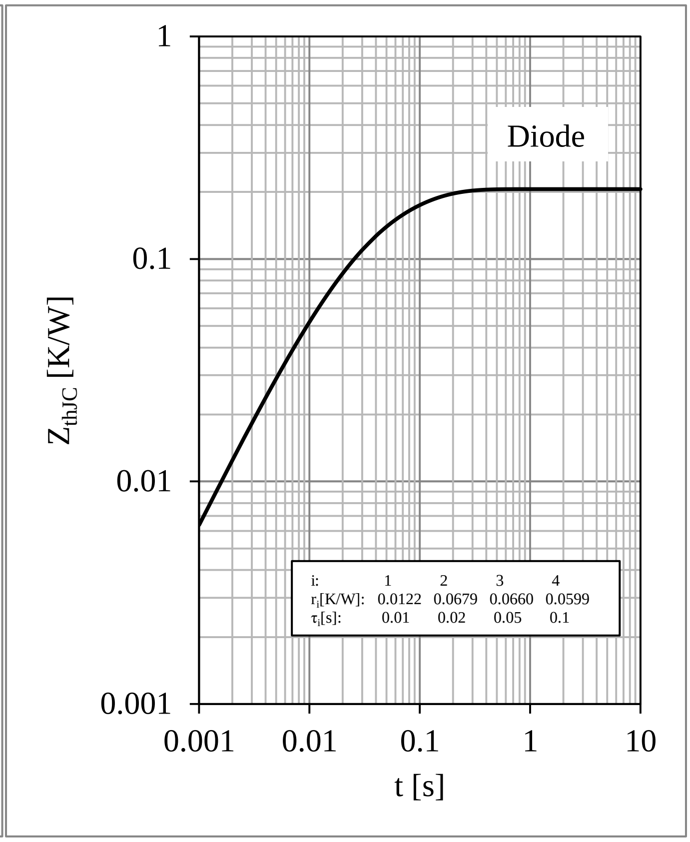
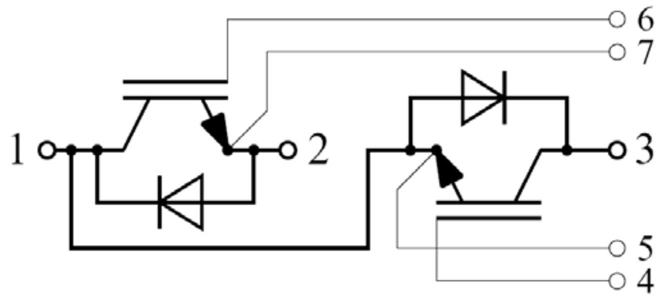


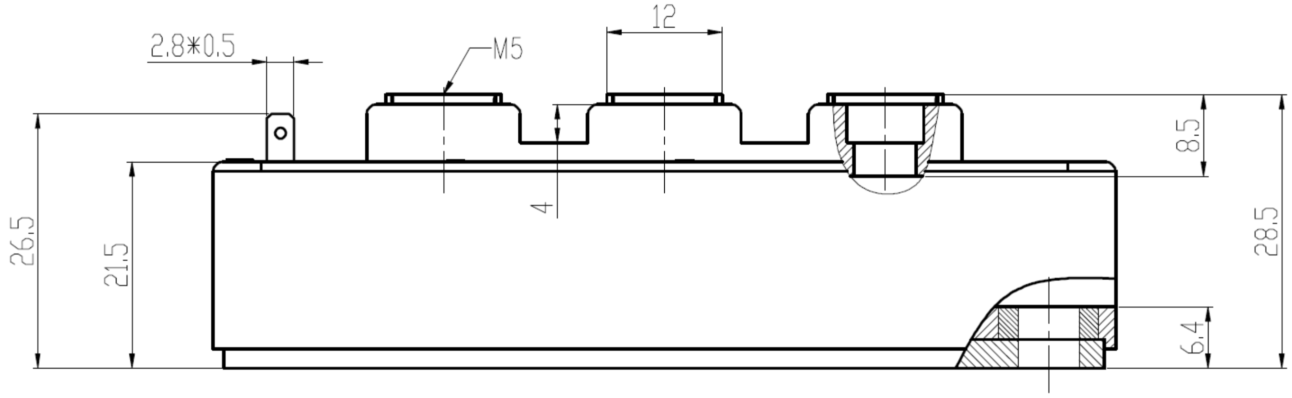
Fig 10. Diode Transient Thermal Impedance

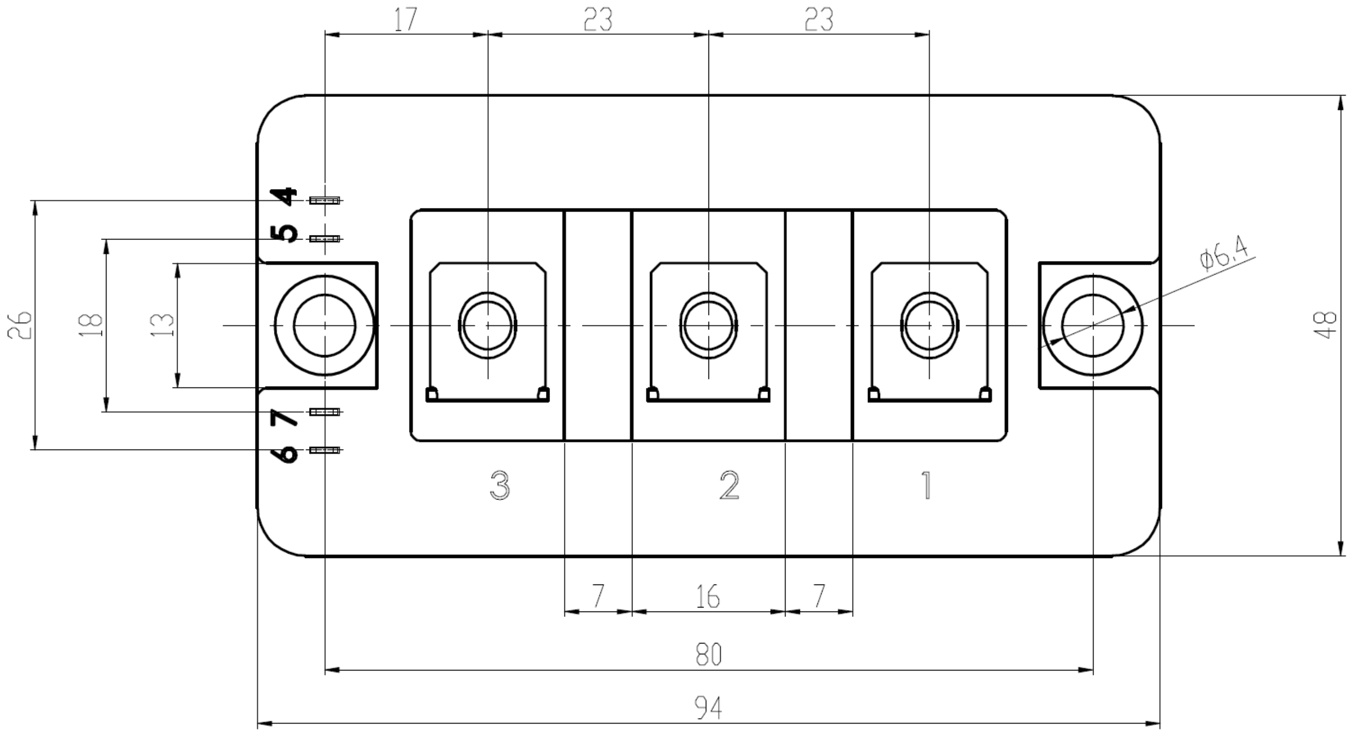
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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