STARPOWER

SEMICONDUCTOR **IGBT**

GD100HFU120C8S

1200V/100A 2 in one-package

General Description

STARPOWER IGBT Power Module provides ultrafast switching speed as well as short circuit ruggedness. It's designed for the applications such as electronic welder and inductive heating.

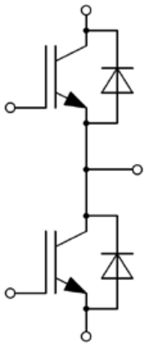
Features

- NPT IGBT technology
- 10μs short circuit capability
- Low switching losses
- Rugged with ultrafast performance
- $V_{CE(sat)}$ with positive temperature coefficient
- 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=80°C	154 100	A
I_{CM}	Pulsed Collector Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175°C	791	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	°C
T_{jop}	Operating Junction Temperature	-40 to +125	°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=100A,V_{GE}=15V, T_j=25°C		2.90	3.35	V
		I_C=100A,V_{GE}=15V, T_j=125°C		3.60		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=2.0mA,V_{CE}=V_{GE}, T_j=25°C	4.5	5.5	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			5.0	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			1.25		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		6.52		nF
C_{res}	Reverse Transfer Capacitance			0.41		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.12		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=9.1Ω,V_{GE}=±15V, T_j=25°C		265		ns
t_r	Rise Time			66		ns
$t_{d(off)}$	Turn-Off Delay Time			357		ns
t_f	Fall Time			124		ns
E_{on}	Turn-On Switching Loss			4.15		mJ
E_{off}	Turn-Off Switching Loss			3.10		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=9.1Ω,V_{GE}=±15V, T_j=125°C		270		ns
t_r	Rise Time			67		ns
$t_{d(off)}$	Turn-Off Delay Time			368		ns
t_f	Fall Time			155		ns
E_{on}	Turn-On Switching Loss			5.86		mJ
E_{off}	Turn-Off Switching Loss			4.45		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125°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.	Unit
V_F	Diode Forward Voltage	I_F=100A,V_{GE}=0V,T_j=25°C		1.95	2.40	V
		I_F=100A,V_{GE}=0V,T_j=125°C		2.00		
Q_r	Recovered Charge	V_R=600V,I_F=100A, -di/dt=1550A/μs,V_{GE}=-15V T_j=25°C		6.83		μC
I_{RM}	Peak Reverse Recovery Current			88.3		A
E_{rec}	Reverse Recovery Energy			2.62		mJ
Q_r	Recovered Charge	V_R=600V,I_F=100A, -di/dt=1550A/μs,V_{GE}=-15V T_j=125°C		12.7		μC
I_{RM}	Peak Reverse Recovery Current			134		A
E_{rec}	Reverse Recovery Energy			5.09		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)			0.158 0.271	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.146 0.250 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

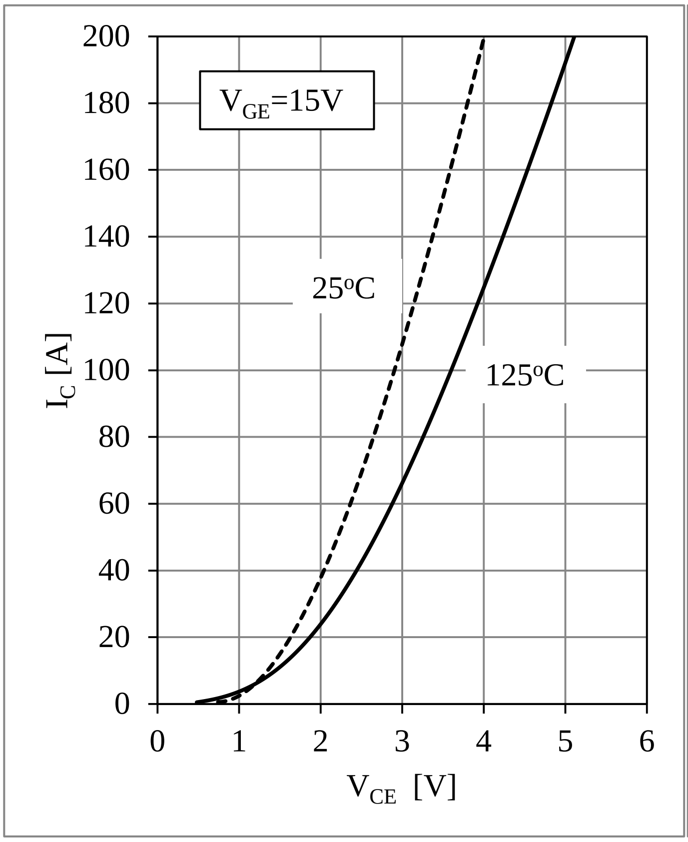


Fig 1. IGBT Output Characteristics

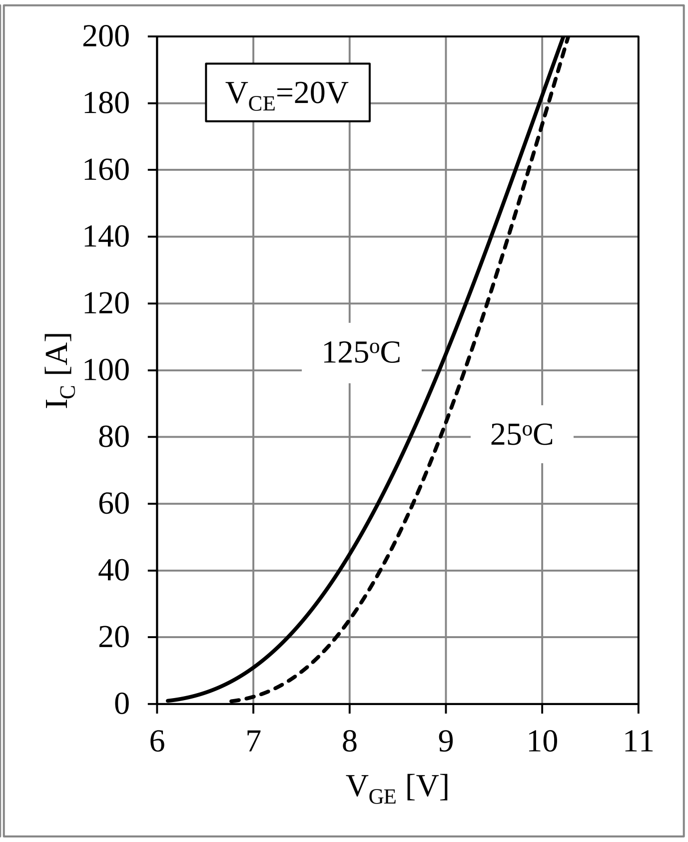


Fig 2. IGBT Transfer Characteristics

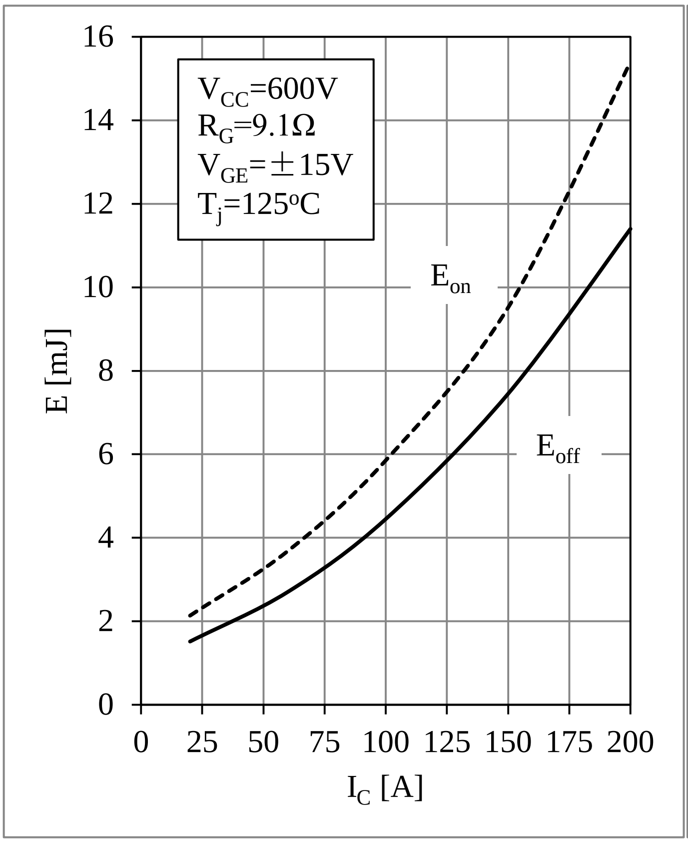


Fig 3. IGBT Switching Loss vs. I_C

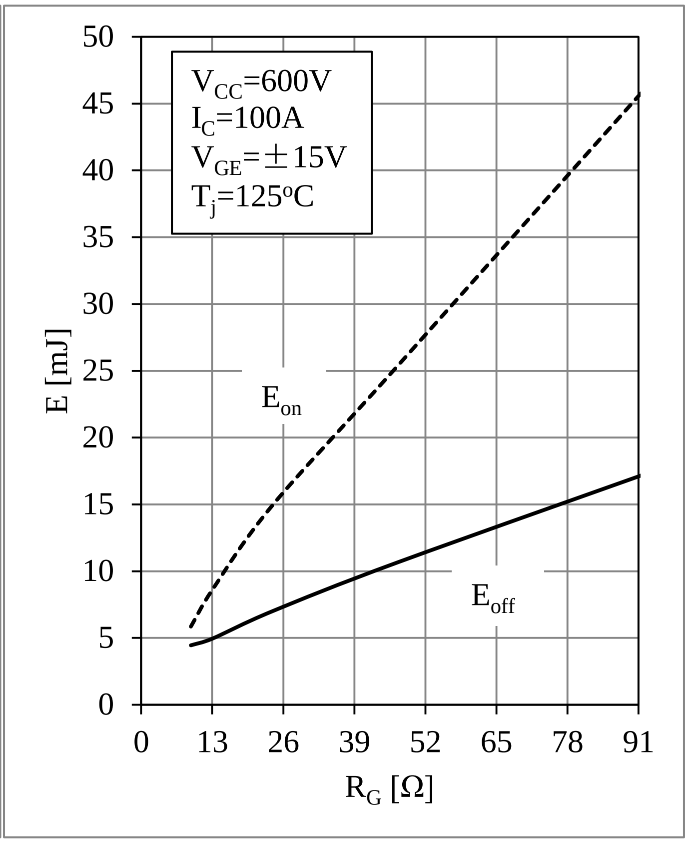


Fig 4. IGBT Switching Loss vs. R_G

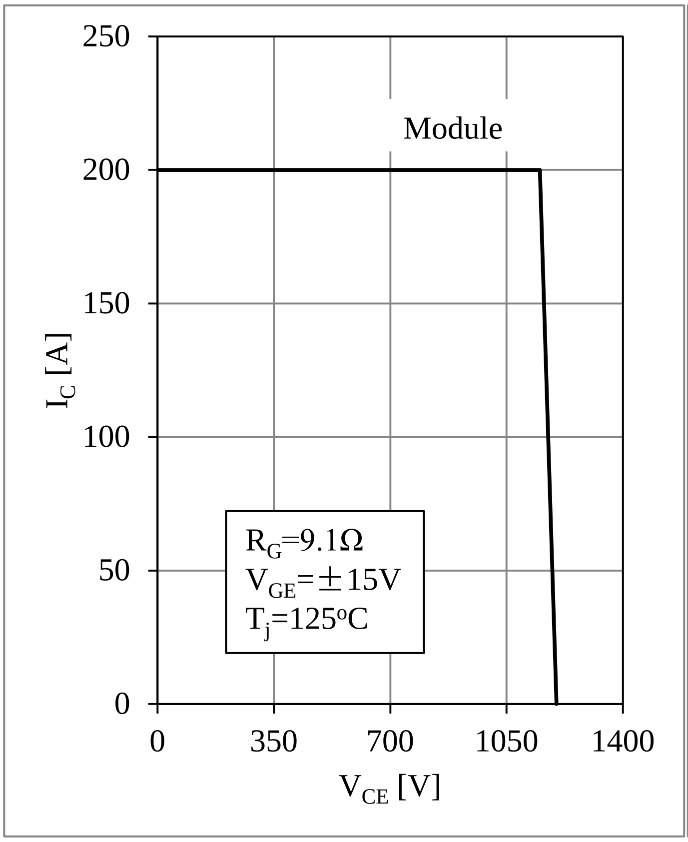


Fig 5. RBSOA

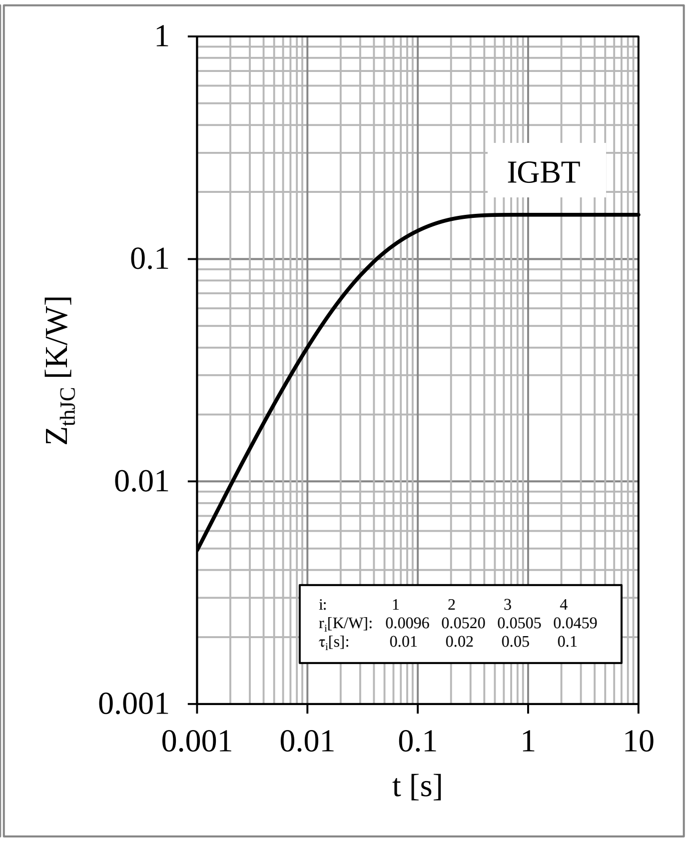


Fig 6. IGBT Transient Thermal Impedance

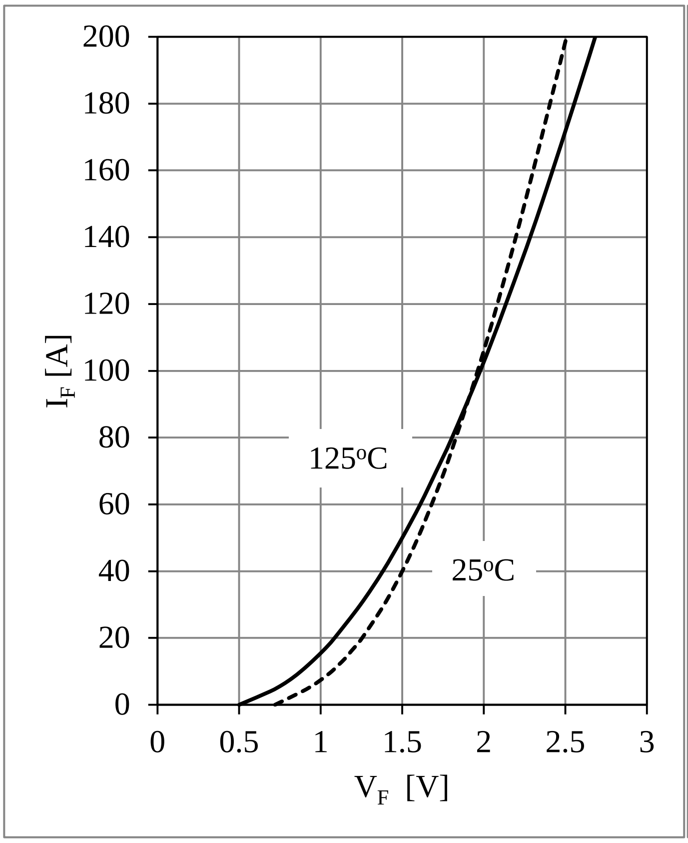


Fig 7. Diode Forward Characteristics

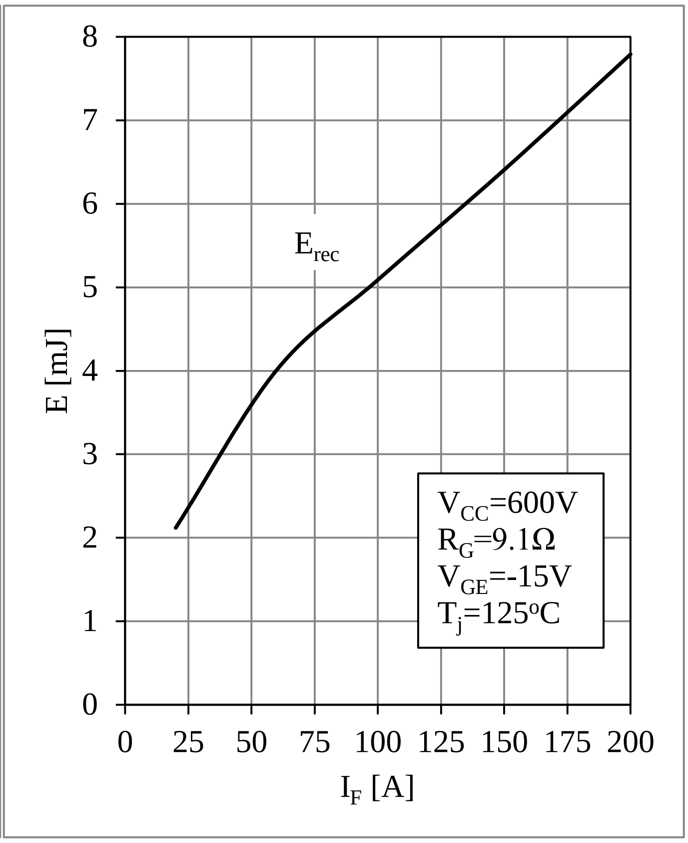


Fig 8. Diode Switching Loss vs. I_F

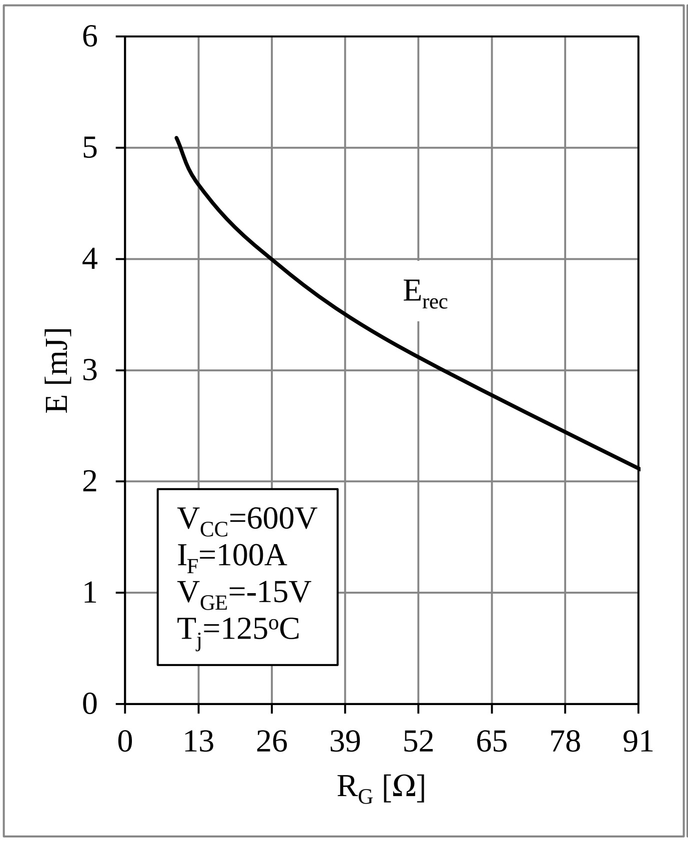


Fig 9. Diode Switching Loss vs. R_G

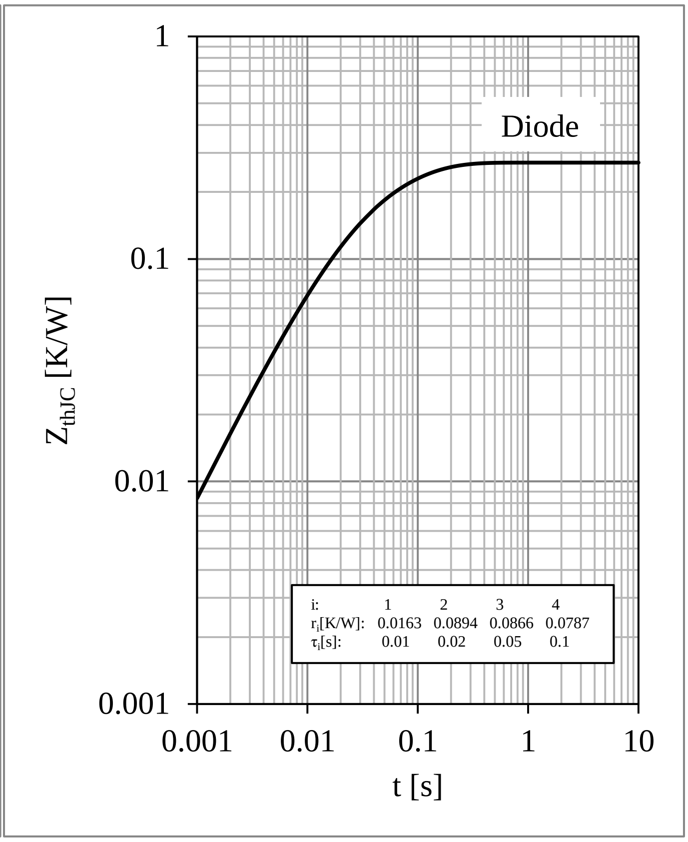
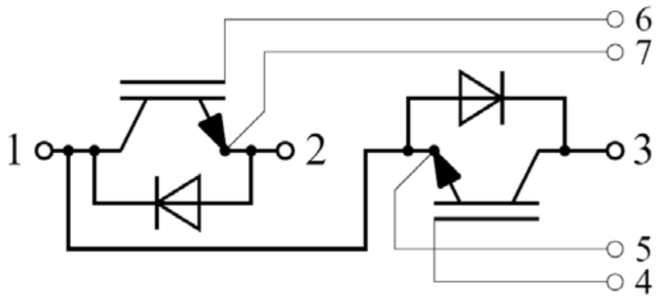


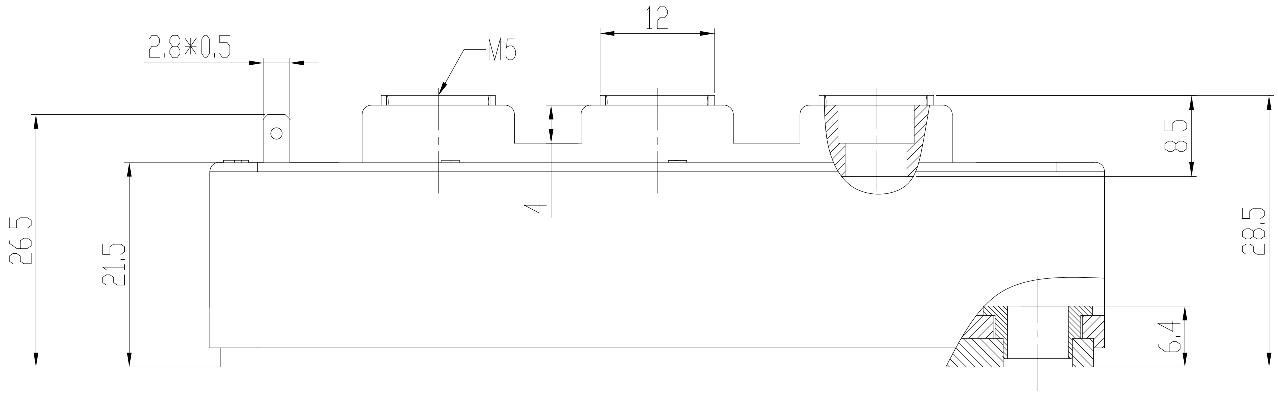
Fig 10. Diode Transient Thermal Impedance

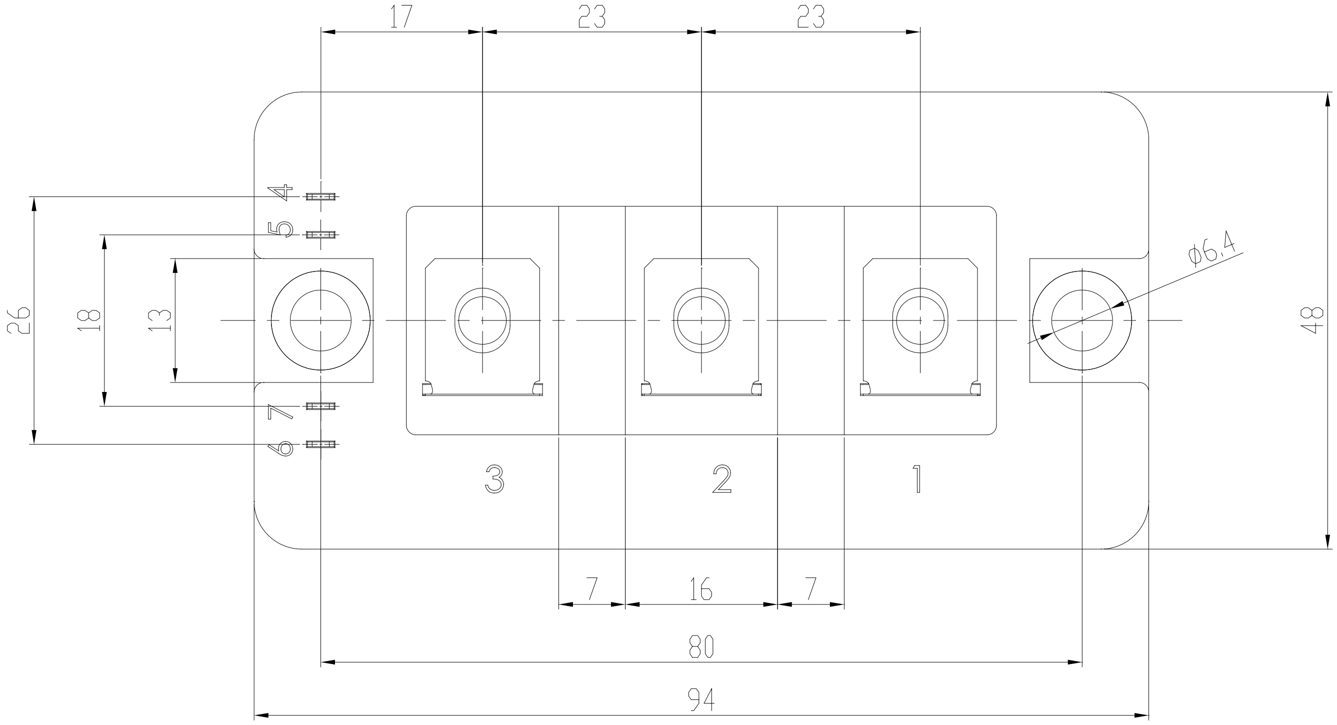
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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