STARPOWER

SEMICONDUCTOR **IGBT**

GD75HFF120C1S

1200V/75A 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.

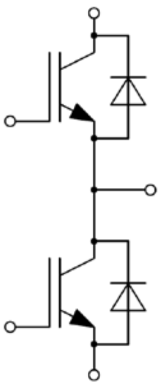
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Low switching losses
- Maximum junction temperature 175^{o}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=100°C	150 75	A
I_{CM}	Pulsed Collector Current t_p=1ms	150	A
P_D	Maximum Power Dissipation @ T_j=175°C	412	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	150	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=75A,V_{GE}=15V, T_j=25^{o}C		2.05	2.50	V
		I_C=75A,V_{GE}=15V, T_j=125^{o}C		2.55		
		I_C=75A,V_{GE}=15V, T_j=150^{o}C		2.70		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.88mA,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			/		Ω
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=2.2Ω,V_{GE}=±15V, T_j=25^{o}C		200		ns
t_r	Rise Time			28		ns
$t_{d(off)}$	Turn-Off Delay Time			210		ns
t_f	Fall Time			209		ns
E_{on}	Turn-On Switching Loss			2.73		mJ
E_{off}	Turn-Off Switching Loss			4.20		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=2.2Ω,V_{GE}=±15V, T_j=125^{o}C		219		ns
t_r	Rise Time			33		ns
$t_{d(off)}$	Turn-Off Delay Time			235		ns
t_f	Fall Time			225		ns
E_{on}	Turn-On Switching Loss			5.37		mJ
E_{off}	Turn-Off Switching Loss			4.47		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A, R_G=2.2Ω,V_{GE}=±15V, T_j=150^{o}C		233		ns
t_r	Rise Time			31		ns
$t_{d(off)}$	Turn-Off Delay Time			319		ns
t_f	Fall Time			153		ns
E_{on}	Turn-On Switching Loss			5.76		mJ
E_{off}	Turn-Off Switching Loss			5.76		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=75A,V_{GE}=0V,T_j=25°C		2.15	2.60	V
		I_F=75A,V_{GE}=0V,T_j=125°C		2.15		
		I_F=75A,V_{GE}=0V,T_j=150°C		2.15		
Q_r	Recovered Charge	V_R=600V,I_F=75A, -di/dt=2300A/μs,V_{GE}=-15V T_j=25°C		6.0		μC
I_{RM}	Peak Reverse Recovery Current			74		A
E_{rec}	Reverse Recovery Energy			2.67		mJ
Q_r	Recovered Charge	V_R=600V,I_F=75A, -di/dt=2300A/μs,V_{GE}=-15V T_j=125°C		9.4		μC
I_{RM}	Peak Reverse Recovery Current			70		A
E_{rec}	Reverse Recovery Energy			3.61		mJ
Q_r	Recovered Charge	V_R=600V,I_F=75A, -di/dt=2300A/μs,V_{GE}=-15V T_j=150°C		9.6		μC
I_{RM}	Peak Reverse Recovery Current			63		A
E_{rec}	Reverse Recovery Energy			3.74		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.75		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.364 0.549	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.166 0.251 0.050		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		150		g

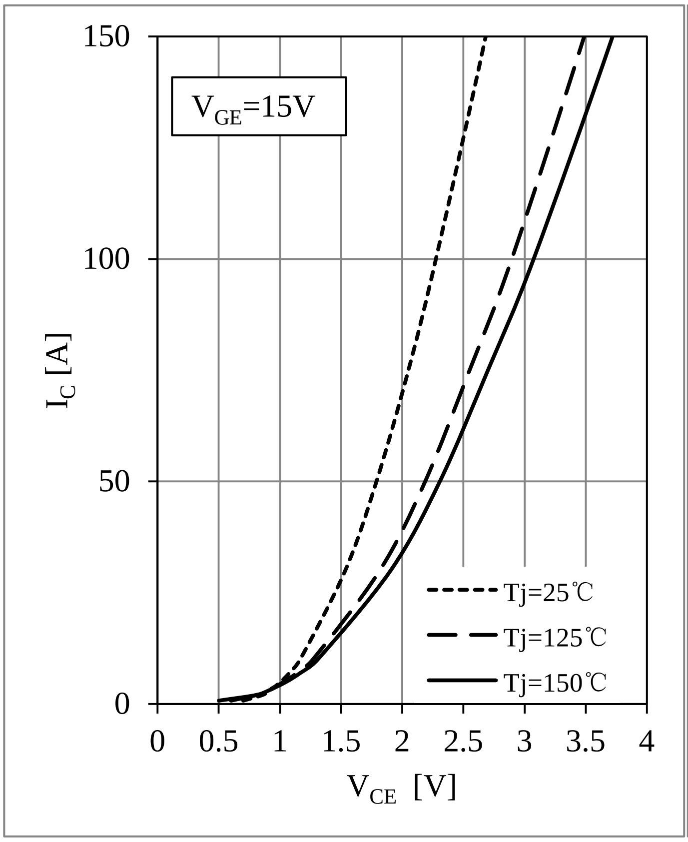


Fig 1. IGBT Output Characteristics

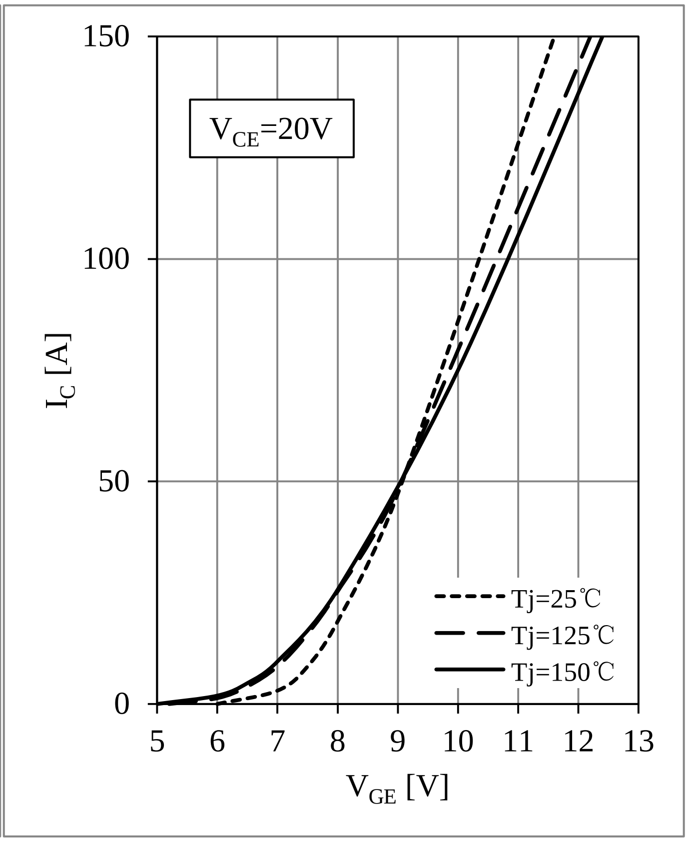


Fig 2. IGBT Transfer Characteristics

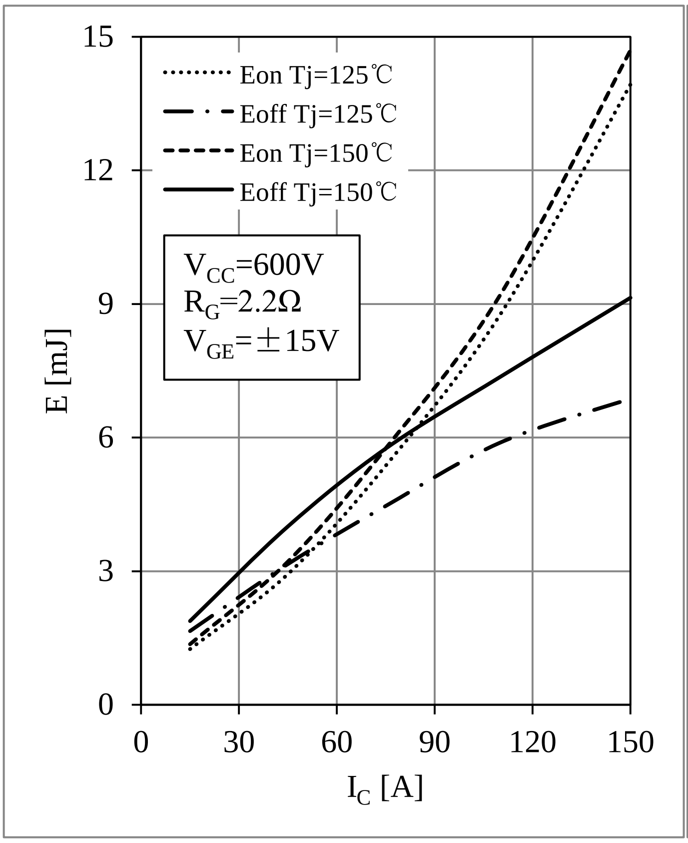


Fig 3. IGBT Switching Loss vs. I_C

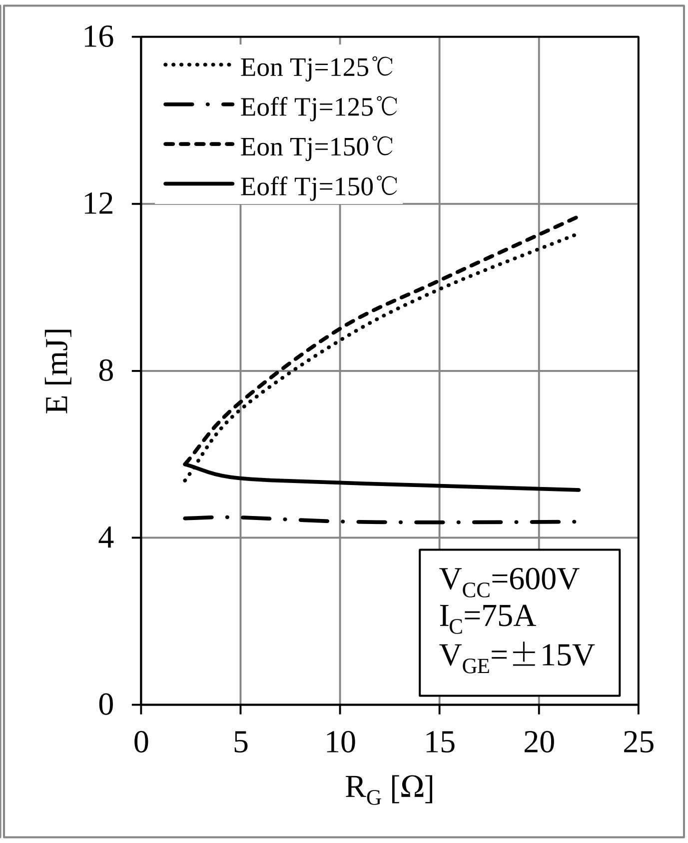


Fig 4. IGBT Switching Loss vs. R_G

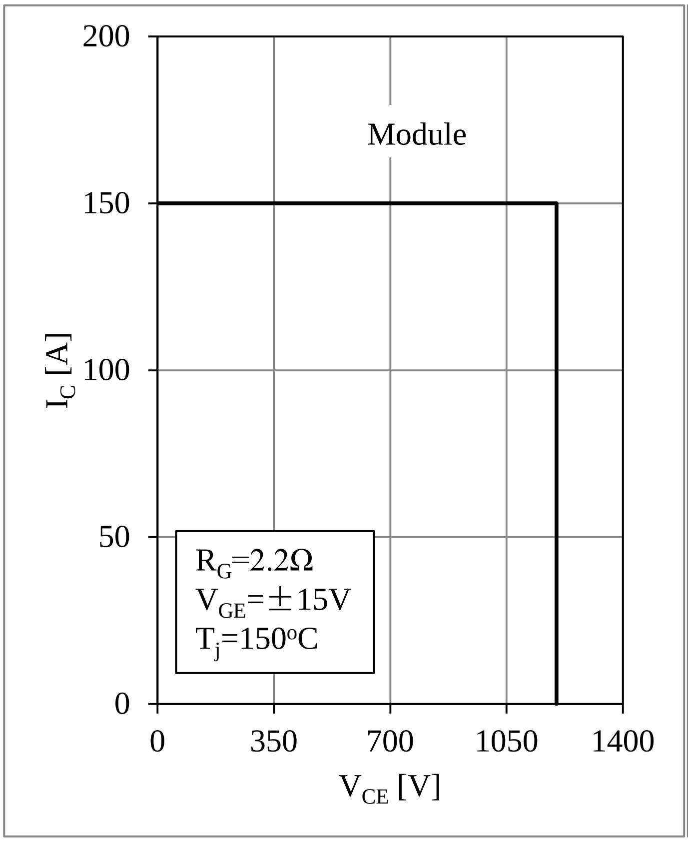


Fig 5. RBSOA

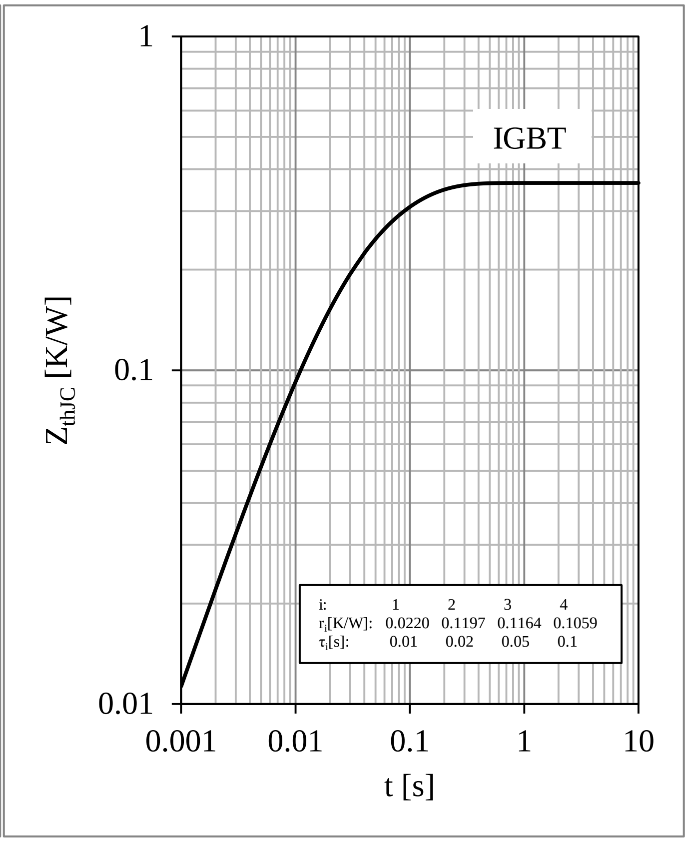


Fig 6. IGBT Transient Thermal Impedance

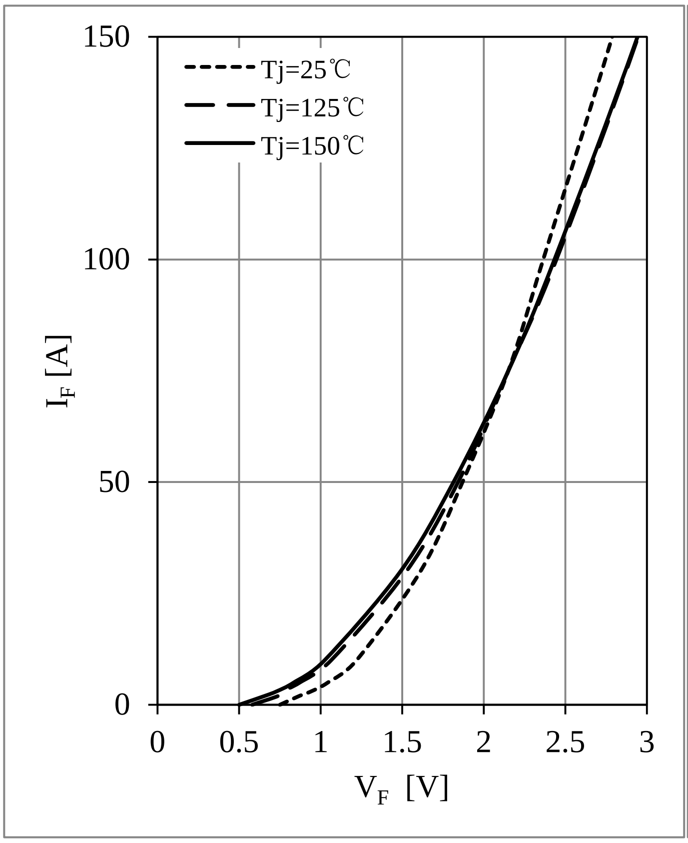


Fig 7. Diode Forward Characteristics

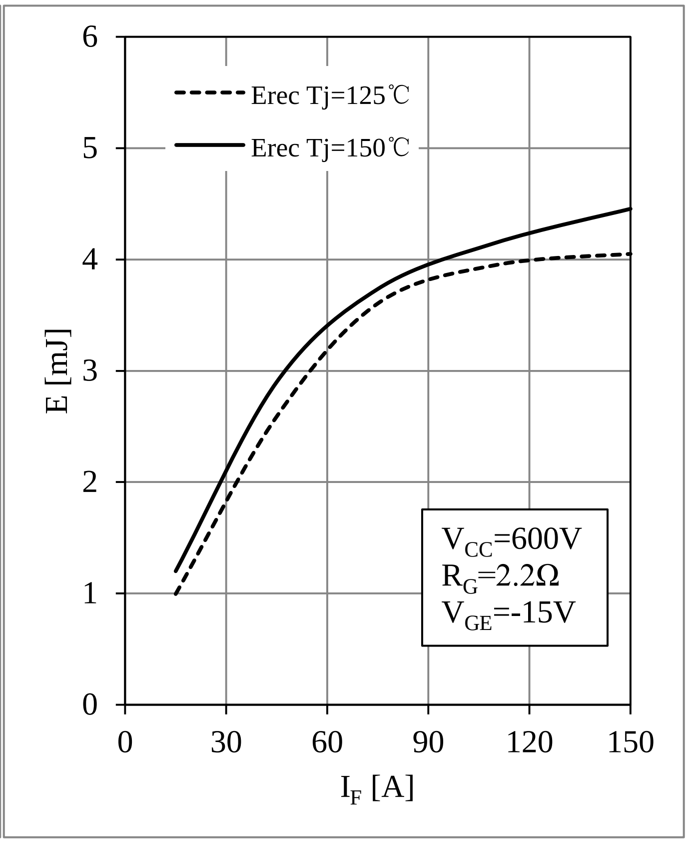


Fig 8. Diode Switching Loss vs. I_F

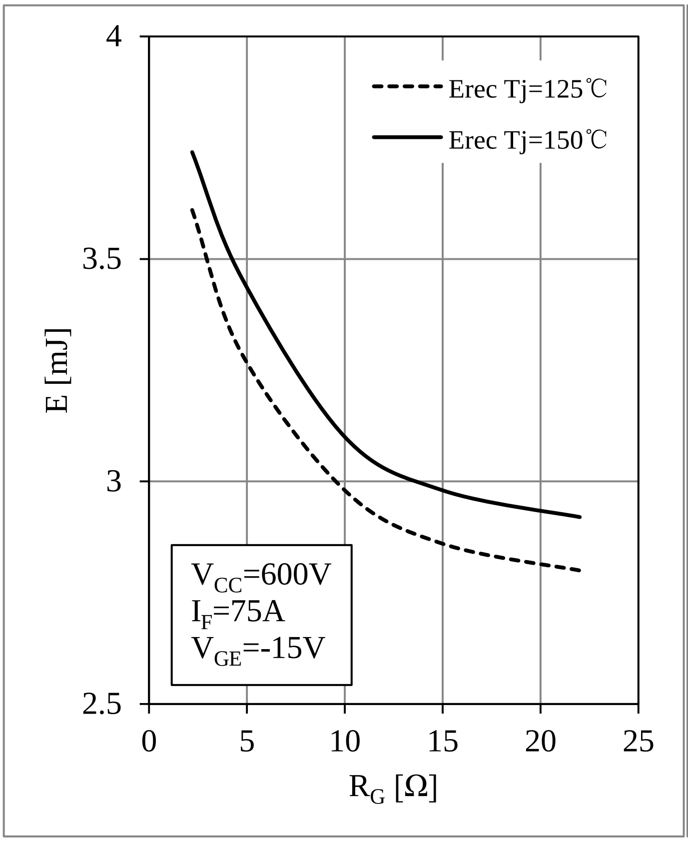


Fig 9. Diode Switching Loss vs. R_G

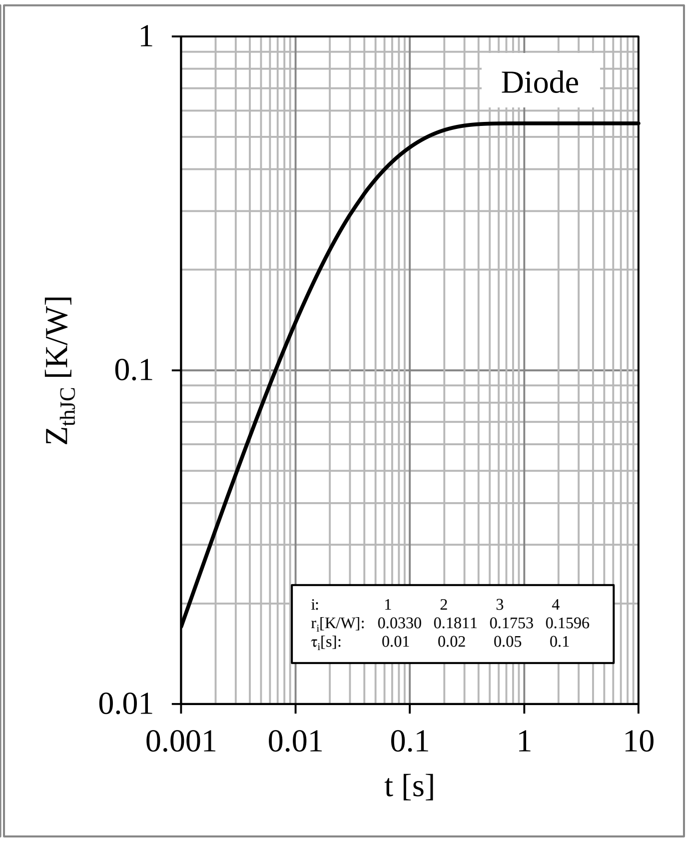
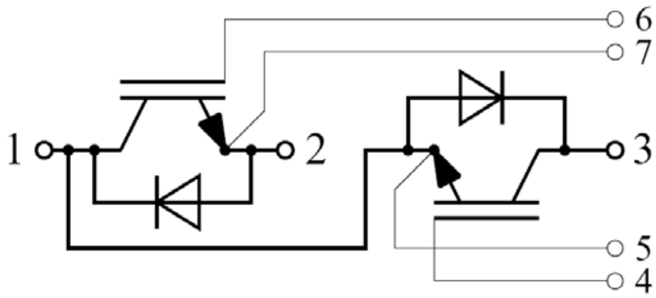


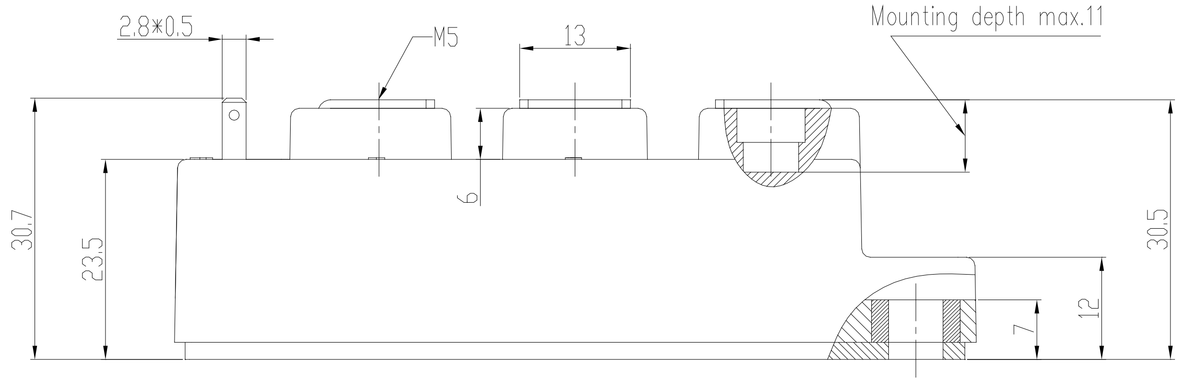
Fig 10. Diode Transient Thermal Impedance

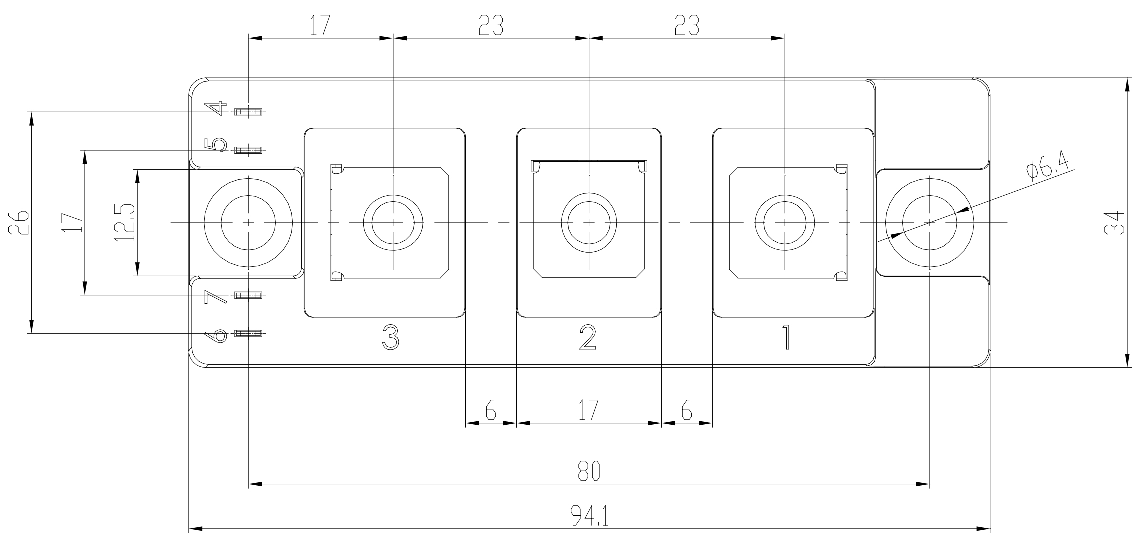
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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