STARPOWER

SEMICONDUCTOR **IGBT**

GD100SGT120D6S

1200V/100A 1 in one-package

General Description

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

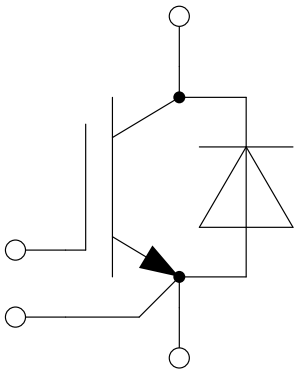
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs 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
- Welding machine

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	175 100	A
I_{CM}	Pulsed Collector Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175°C	794	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	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=100A,V_{GE}=15V, T_j=25°C		2.05	2.50	V
		I_C=100A,V_{GE}=15V, T_j=125°C		2.40		
		I_C=100A,V_{GE}=15V, T_j=150°C		2.45		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3.8mA,V_{CE}=V_{GE}, T_j=25°C	5.1	5.8	6.4	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			7.5		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		6.15		nF
C_{res}	Reverse Transfer Capacitance			0.35		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.46		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=4.7Ω,V_{GE}=±15V, T_j=25°C		241		ns
t_r	Rise Time			72		ns
$t_{d(off)}$	Turn-Off Delay Time			280		ns
t_f	Fall Time			147		ns
E_{on}	Turn-On Switching Loss			6.95		mJ
E_{off}	Turn-Off Switching Loss			4.23		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=4.7Ω,V_{GE}=±15V, T_j=125°C		250		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			303		ns
t_f	Fall Time			205		ns
E_{on}	Turn-On Switching Loss			9.80		mJ
E_{off}	Turn-Off Switching Loss			6.75		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=4.7Ω,V_{GE}=±15V, T_j=150°C		261		ns
t_r	Rise Time			79		ns
$t_{d(off)}$	Turn-Off Delay Time			317		ns
t_f	Fall Time			239		ns
E_{on}	Turn-On Switching Loss			10.8		mJ
E_{off}	Turn-Off Switching Loss			7.98		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=1000V, V_{CEM}≤1200V		400		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=75A,V_{GE}=0V, T_j=25°C		2.25	2.70	V
		I_F=75A,V_{GE}=0V, T_j=125°C		2.35		
		I_F=75A,V_{GE}=0V, T_j=150°C		2.30		
Q_r	Recovered Charge	V_{CC}=600V,I_F=75A, -di/dt=820A/μs,V_{GE}=±15V, T_j=25°C		4.0		μC
I_{RM}	Peak Reverse Recovery Current			59		A
E_{rec}	Reverse Recovery Energy			2.38		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=75A, -di/dt=820A/μs,V_{GE}=±15V, T_j=125°C		10.5		μC
I_{RM}	Peak Reverse Recovery Current			69		A
E_{rec}	Reverse Recovery Energy			4.56		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=75A, -di/dt=820A/μs,V_{GE}=±15V, T_j=150°C		12.8		μC
I_{RM}	Peak Reverse Recovery Current			74		A
E_{rec}	Reverse Recovery Energy			5.50		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.189 0.402	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.221 0.469		K/W
$R_{\theta CS}$	Case-to-Sink		0.15		K/W
M	Terminal Connection Torque, Screw M3 Mounting Torque, Screw M3	2.5 2.5		5.0 5.0	N.m
G	Weight of Module		35		g

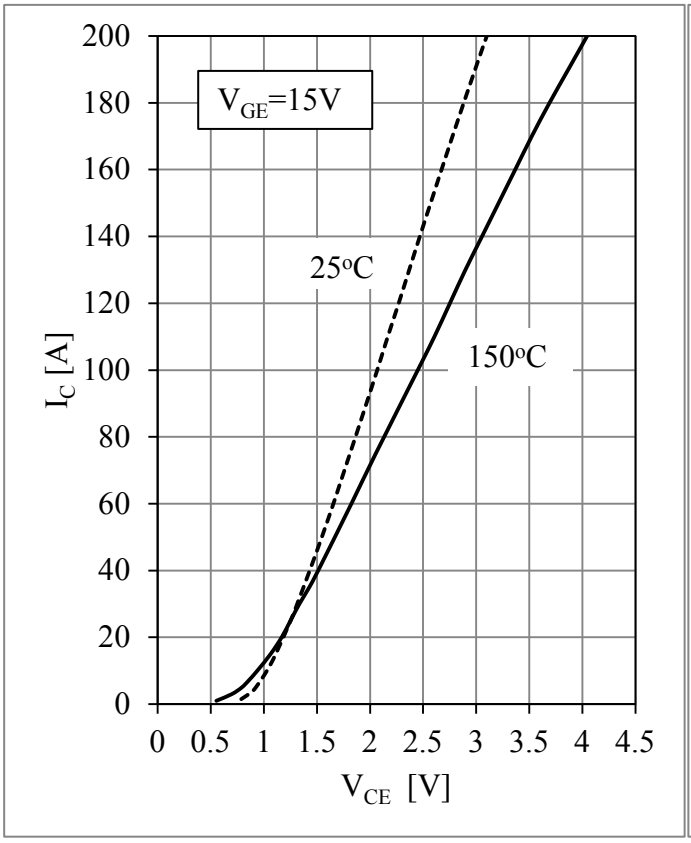


Fig 1. IGBT Output Characteristics

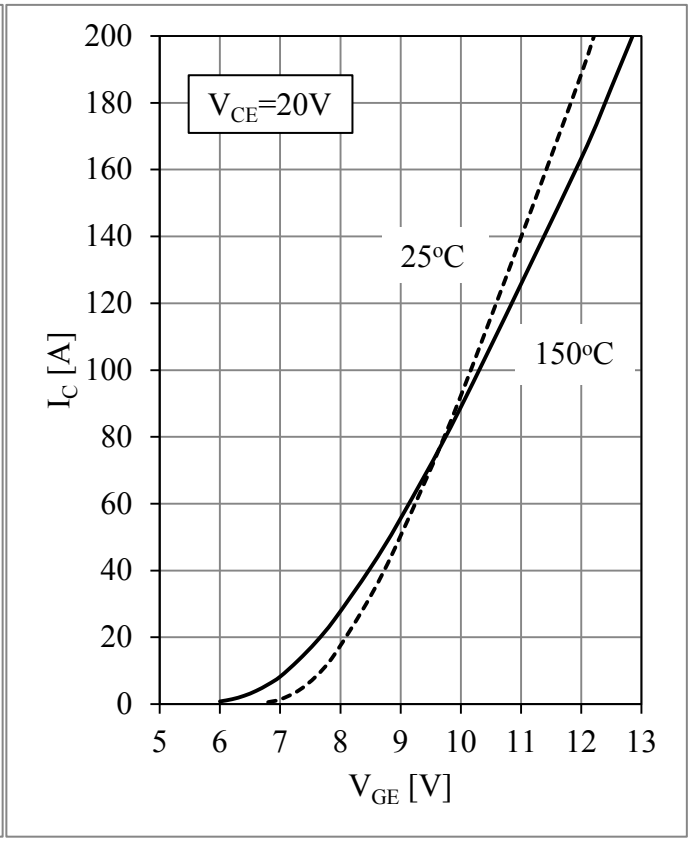


Fig 2. IGBT Transfer Characteristics

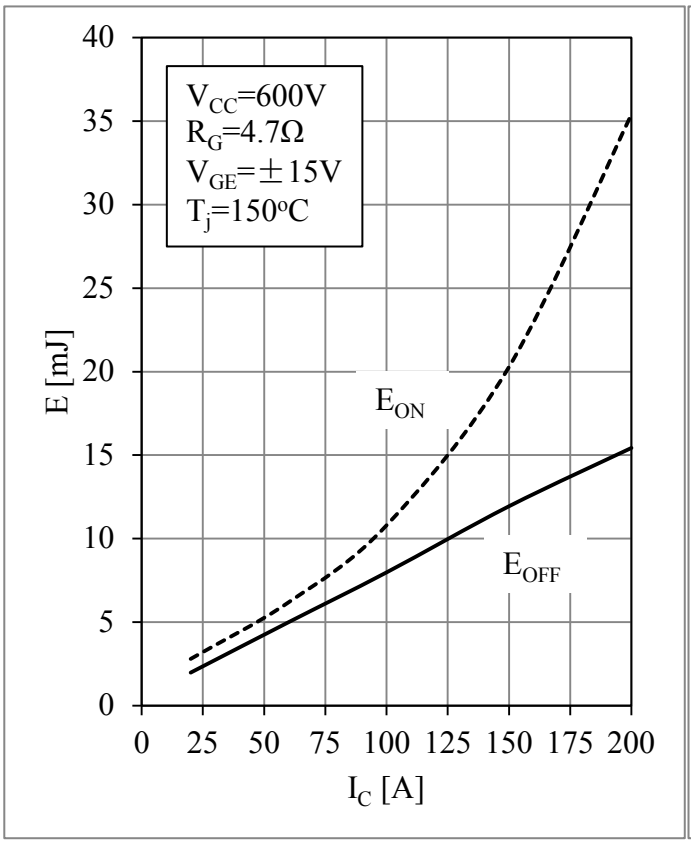


Fig 3. IGBT Switching Loss vs. I_C

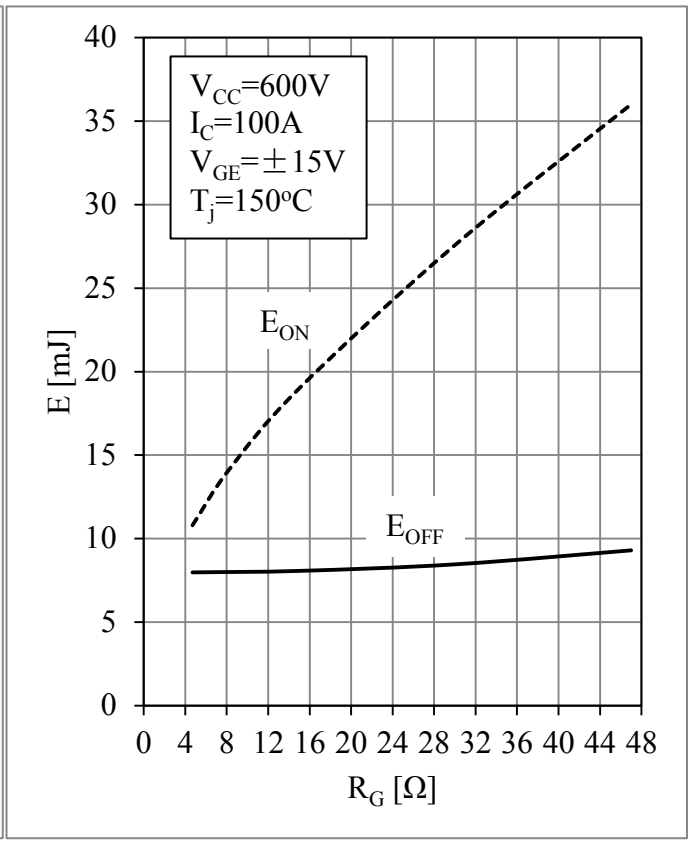


Fig 4. IGBT Switching Loss vs. R_G

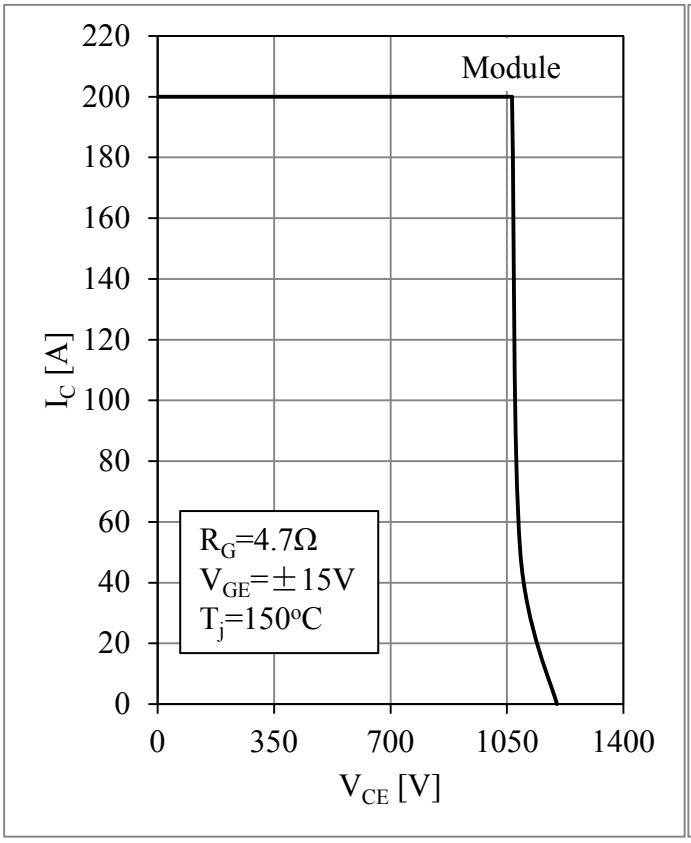


Fig 5. RBSOA

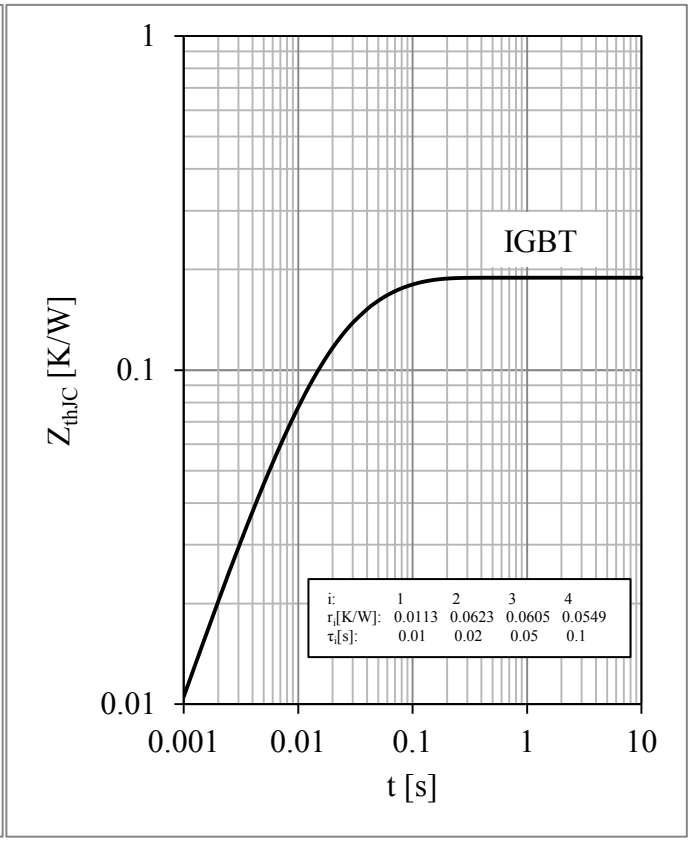


Fig 6. IGBT Transient Thermal Impedance

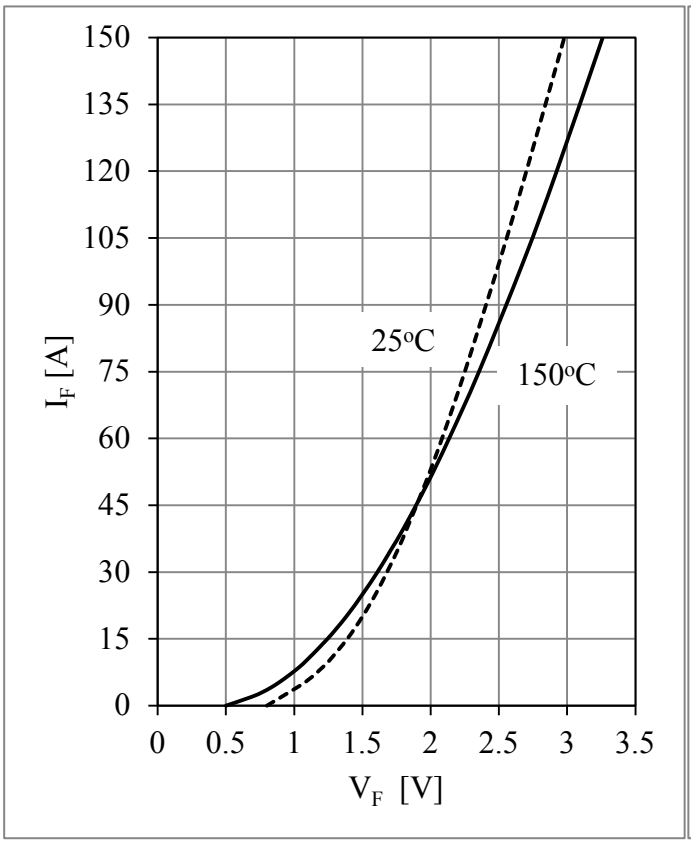


Fig 7. Diode Forward Characteristics

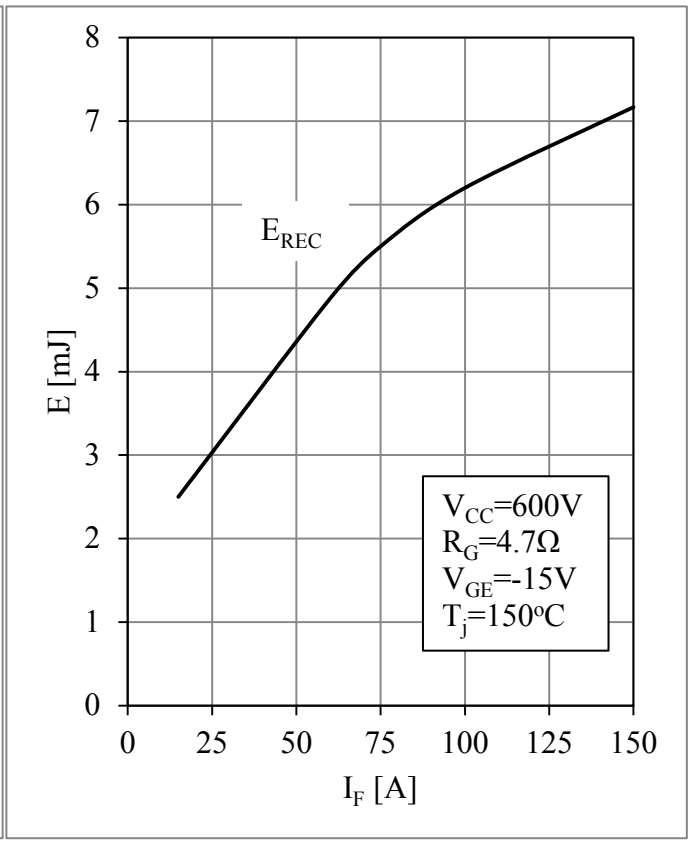


Fig 8. Diode Switching Loss vs. I_F

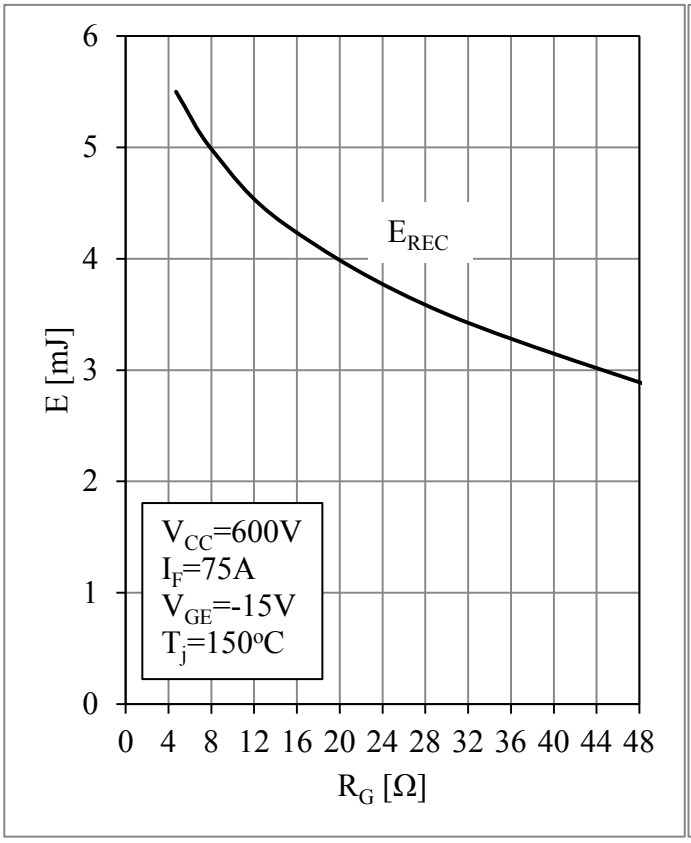


Fig 9. Diode Switching Loss vs. R_G

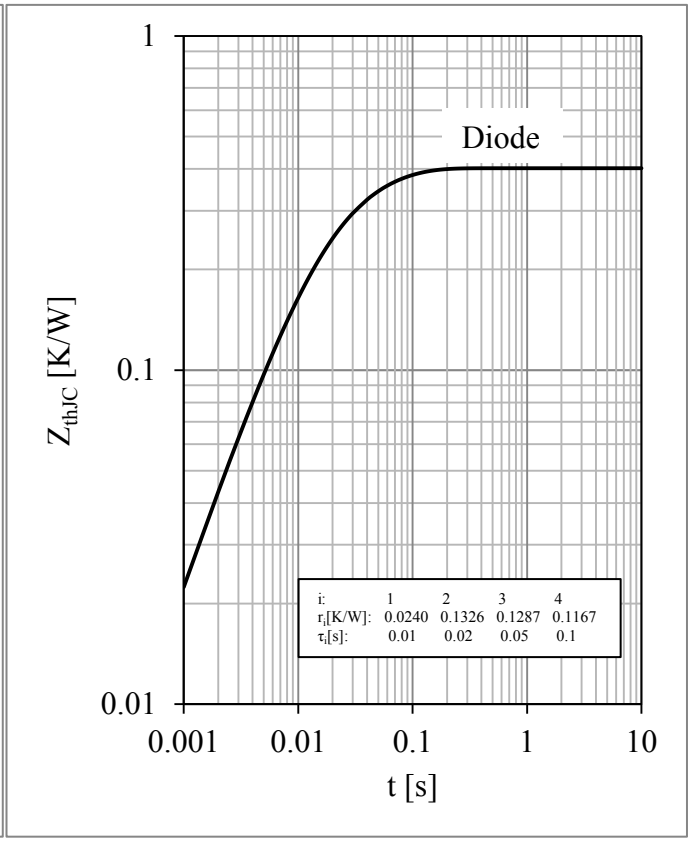
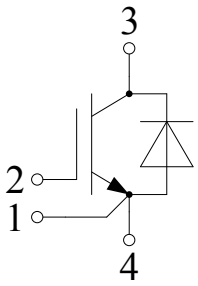


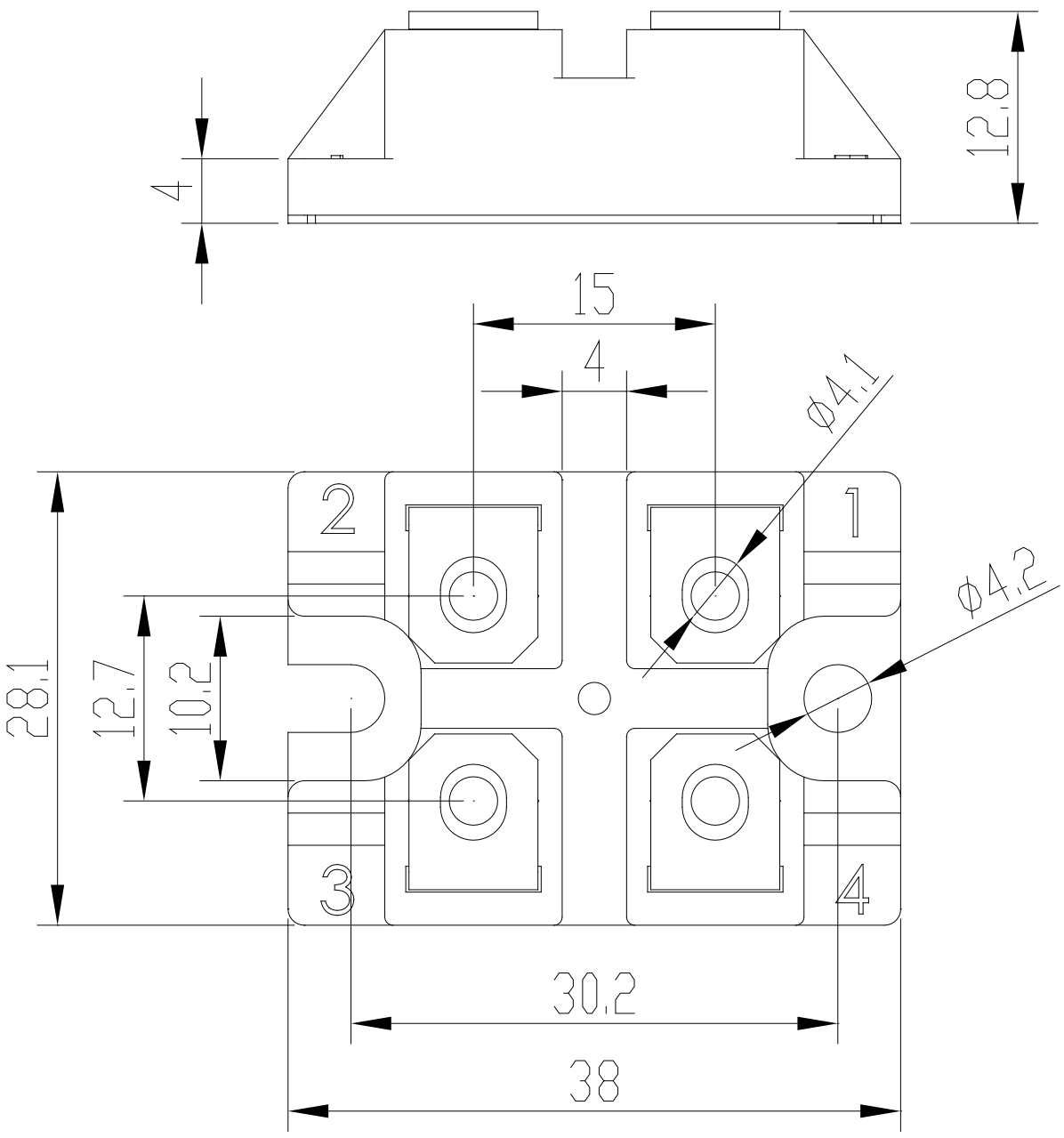
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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