STARPOWER

SEMICONDUCTOR™

IGBT

GD100HFT60C1S

Molding Type Module

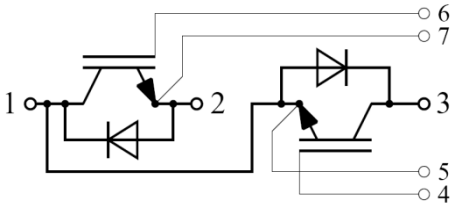
600V/100A 2 in one-package

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 UPS and SMPS.

Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 5μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- Electronic welders
- Switching mode power supplies
- Uninterruptible power supply

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD100HFT60C1S	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	160 100	A
$I_{CM(1)}$	Pulsed Collector Current t_p=1ms	200	A
I_F	Diode Continuous Forward Current @ T_C=80℃	100	A
$I_{FM(1)}$	Diode Maximum Forward Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175℃	417	W
T_{jmax}	Maximum Junction Temperature	175	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	600			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.0mA,V_{CE}=V_{GE}, T_j=25℃	4.0	4.4	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=100A,V_{GE}=15V, T_j=25℃		1.65	2.10	V
		I_C=100A,V_{GE}=15V, T_j=175℃		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=100A, R_G=2.2Ω,V_{GE}=±15V, T_j=25℃		106		ns
t_r	Rise Time			49		ns
$t_{d(off)}$	Turn-Off Delay Time			102		ns
t_f	Fall Time			85		ns
E_{on}	Turn-On Switching Loss			0.46		mJ
E_{off}	Turn-Off Switching Loss			0.95		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=100A, R_G=2.2Ω,V_{GE}=±15V, T_j=125℃		112		ns
t_r	Rise Time			62		ns
$t_{d(off)}$	Turn-Off Delay Time			126		ns
t_f	Fall Time			109		ns
E_{on}	Turn-On Switching Loss			0.78		mJ
E_{off}	Turn-Off Switching Loss			1.73		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		7.71		nF
C_{oes}	Output Capacitance			0.53		nF
C_{res}	Reverse Transfer Capacitance			0.23		nF
I_{SC}	SC Data	T_P≤5μs,V_{GE}=15V, T_j=125℃,V_{CC}=360V, V_{CEM}≤600V		900		A
L_{CE}	Stray Inductance				30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.75		mΩ

Electrical Characteristics of DIODE T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=100A	T_j=25℃		1.40	1.80	V
			T_j=125℃		1.40		
Q_r	Recovered Charge	I_F=100A, V_R=300V, R_G=2.2Ω, V_{GE}=-15V	T_j=25℃		5.5		μC
			T_j=125℃		7.3		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		68		A
			T_j=125℃		88		
E_{rec}	Reverse Recovery Energy		T_j=25℃		0.89		mJ
			T_j=125℃		1.71		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.36	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.57	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		K/W
Weight	Weight of Module	150		g

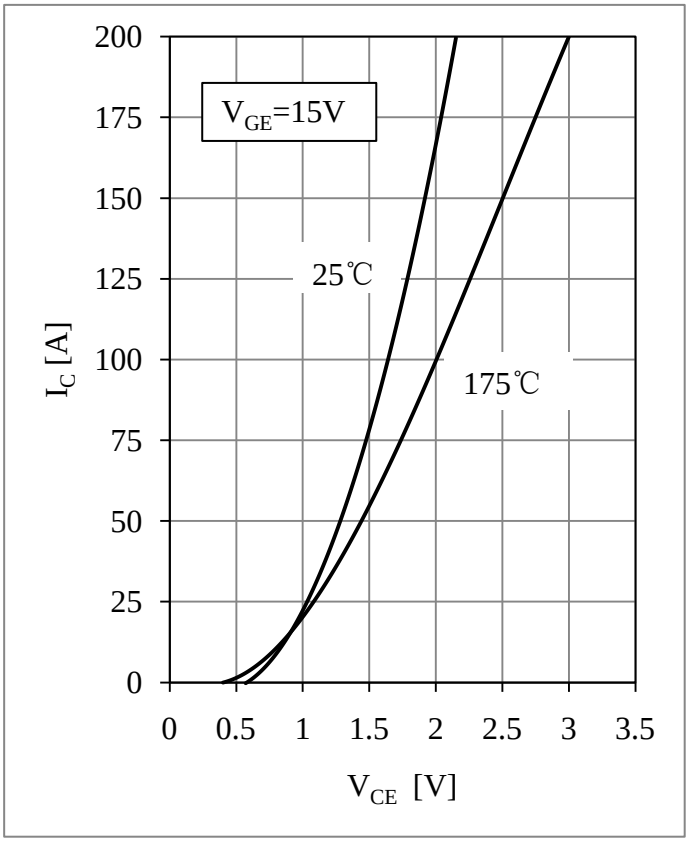


Fig 1. IGBT Output Characteristics

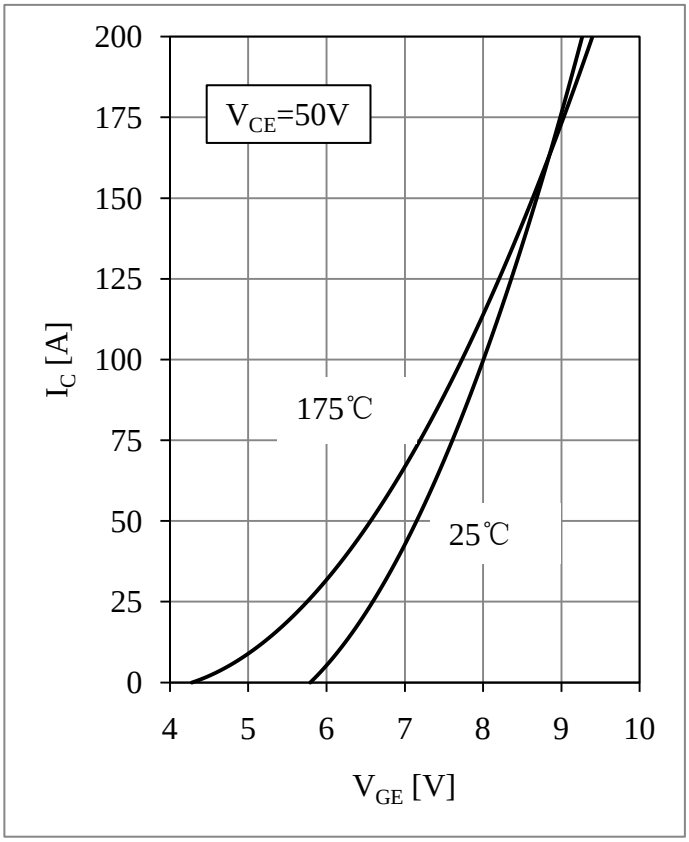


Fig 2. IGBT Transfer Characteristics

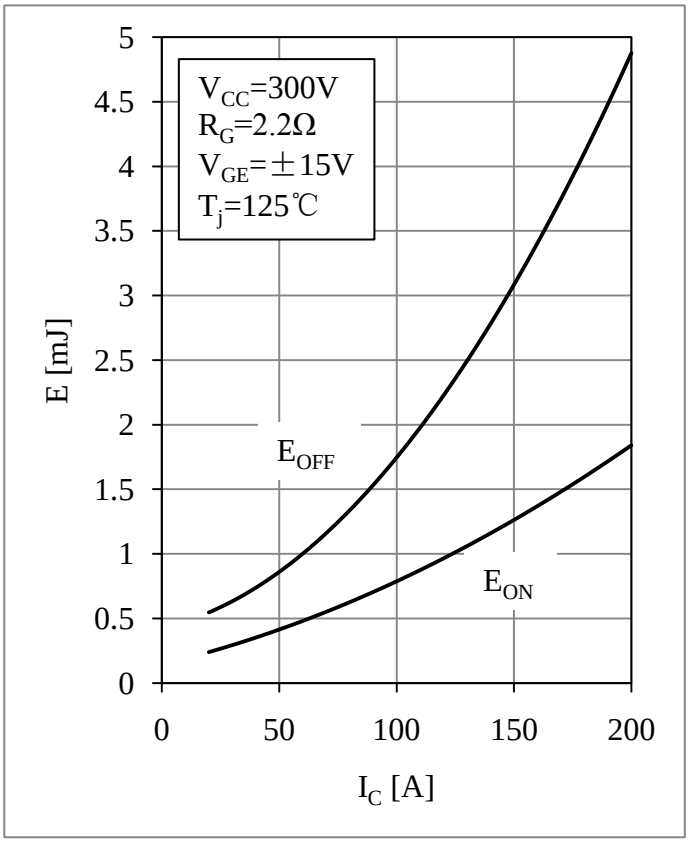


Fig 3. IGBT Switching Loss vs. I_C

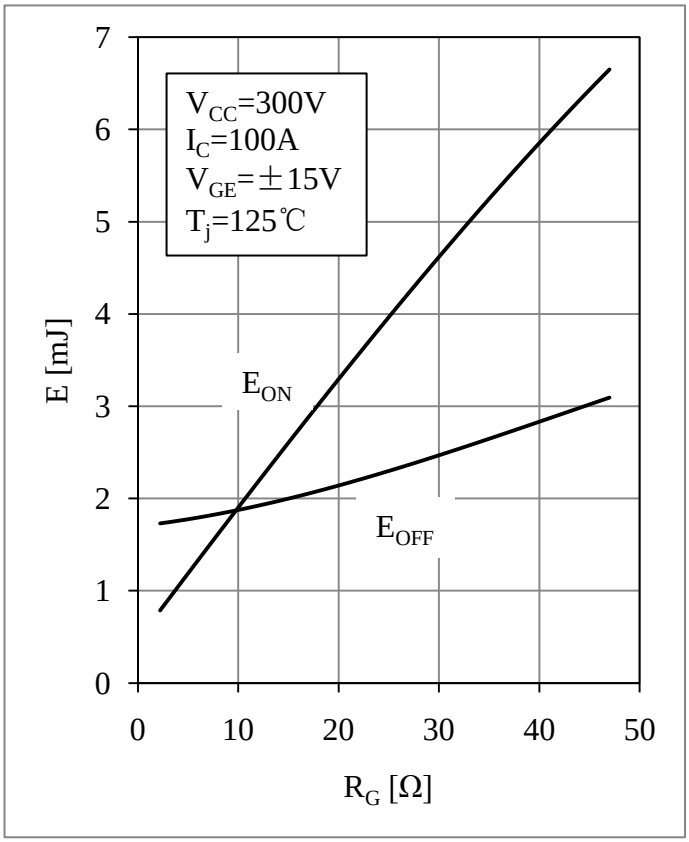


Fig 4. IGBT Switching Loss vs. R_G

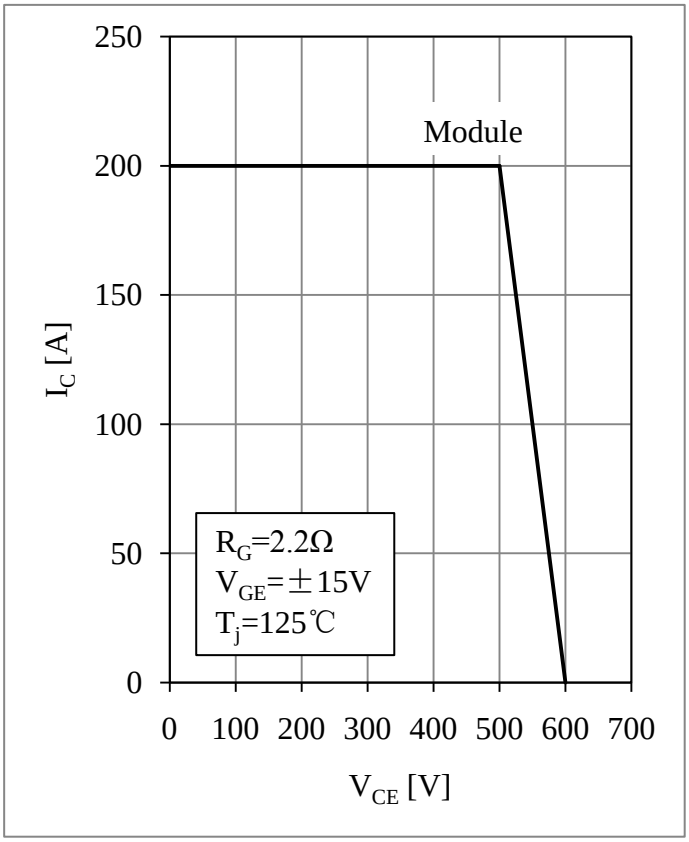


Fig 5. RBSOA

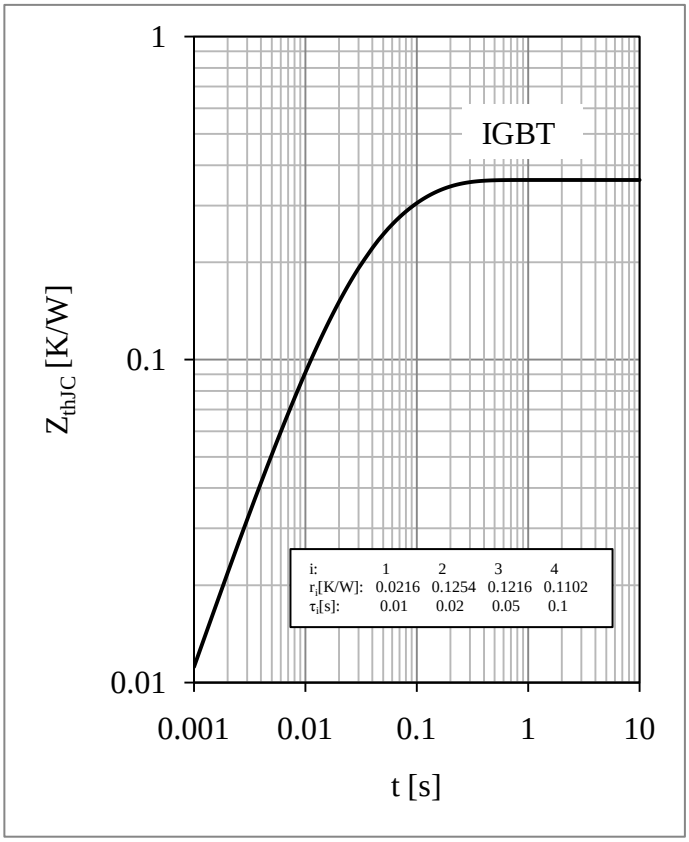


Fig 6. IGBT Transient Thermal Impedance

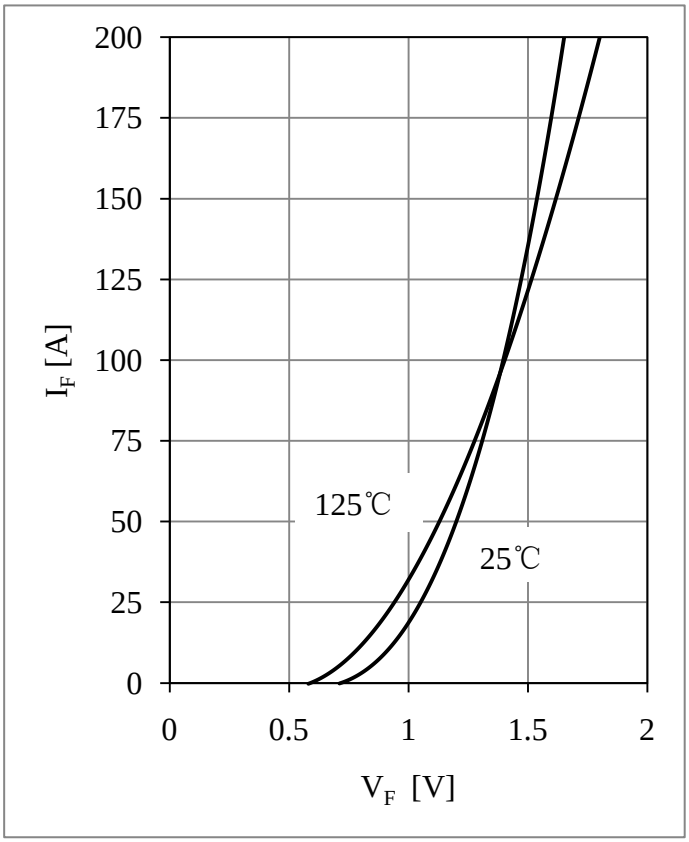


Fig 7. Diode Forward Characteristics

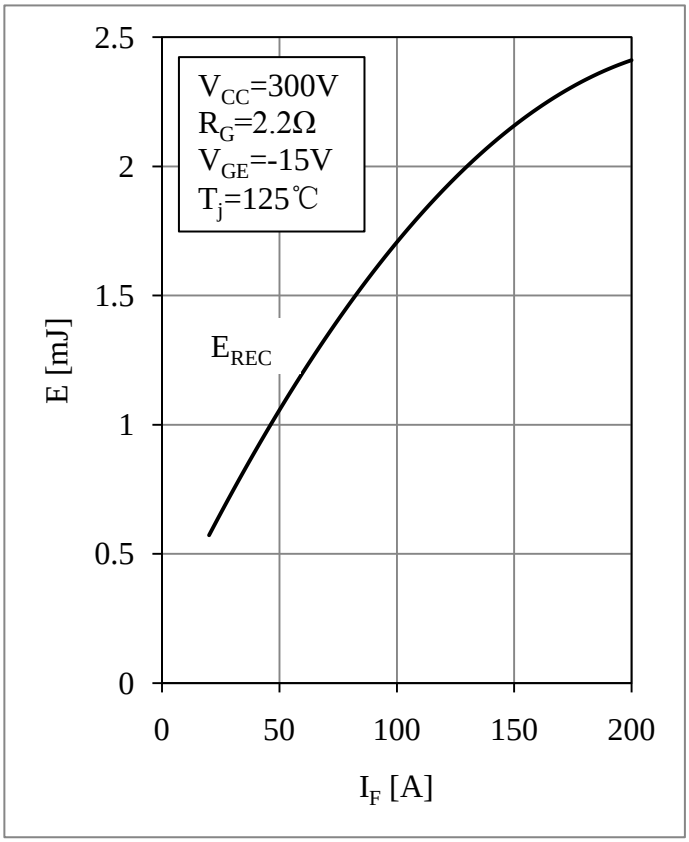


Fig 8. Diode Switching Loss vs. I_F

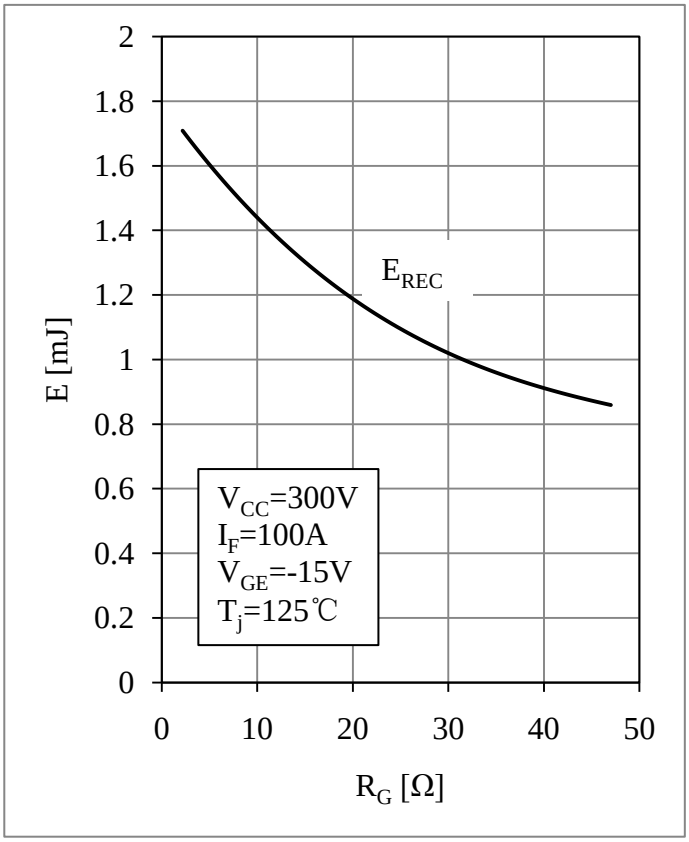


Fig 9. Diode Switching Loss vs. R_G

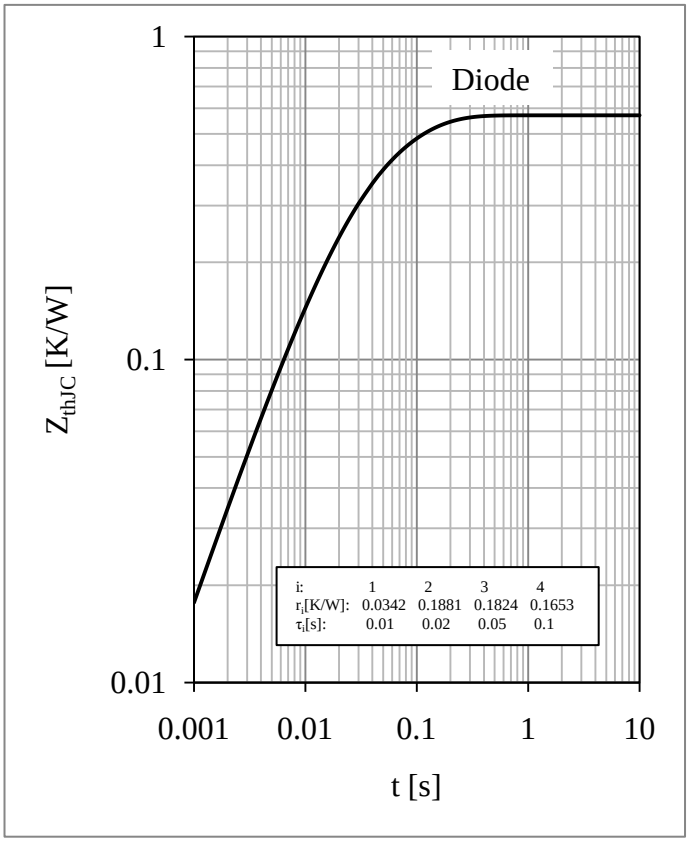
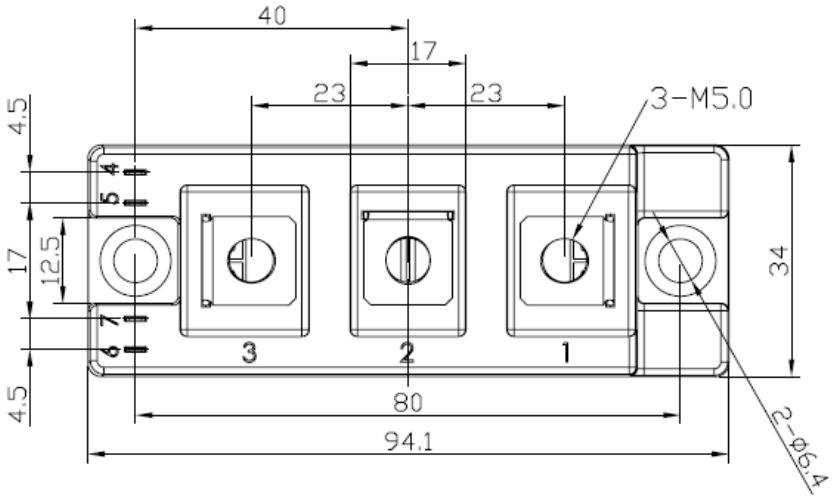
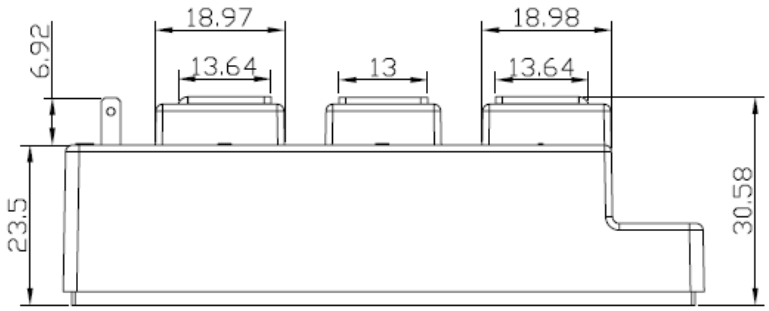


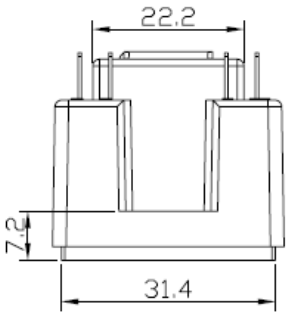
Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters







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