STARPOWER

SEMICONDUCTOR **IGBT**

GD300HFT60C8SN

600V/300A 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 general inverters and UPS.

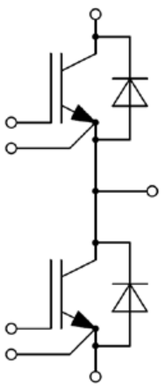
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25℃ unless otherwise noted

IGBT

Symbol	Description	Values	Unit
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=80℃	415 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
P_D	Maximum Power Dissipation @ T_j=175℃	1064	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	600	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	600	A

Module

Symbol	Description	Values	Unit
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M5	2.5 to 3.5 2.5 to 3.5	N.m

IGBT Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_j=25℃		1.55	2.00	V
		I_C=300A,V_{GE}=15V, T_j=125℃		1.70		
		I_C=300A,V_{GE}=15V, T_j=150℃		1.73		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=16.8mA,V_{CE}=V_{GE}, T_j=25℃	4.0	5.2	6.5	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
R_{Gint}	Internal Gate Resistance			1.6		Ω
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		23.3		nF
C_{res}	Reverse Transfer Capacitance			0.68		nF
Q_G	Gate Charge	V_{GE}=15V		0.60		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=300A, R_G=2.4Ω,V_{GE}=±15V, T_j=25℃		127		ns
t_r	Rise Time			42		ns
$t_{d(off)}$	Turn-Off Delay Time			168		ns
t_f	Fall Time			33		ns
E_{on}	Turn-On Switching Loss			0.95		mJ
E_{off}	Turn-Off Switching Loss			5.17		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=300A, R_G=2.4Ω,V_{GE}=±15V, T_j=125℃		131		ns
t_r	Rise Time			52		ns
$t_{d(off)}$	Turn-Off Delay Time			185		ns
t_f	Fall Time			47		ns
E_{on}	Turn-On Switching Loss			1.32		mJ
E_{off}	Turn-Off Switching Loss			6.58		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=300V,I_C=300A, R_G=2.4Ω,V_{GE}=±15V, T_j=150℃		138		ns
t_r	Rise Time			52		ns
$t_{d(off)}$	Turn-Off Delay Time			188		ns
t_f	Fall Time			47		ns
E_{on}	Turn-On Switching Loss			1.45		mJ
E_{off}	Turn-Off Switching Loss			6.98		mJ
I_{SC}	SC Data	t_P≤5μs,V_{GE}=15V, T_j=150℃,V_{CC}=360V, V_{CEM}≤600V		3200		A

Diode Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_C=300A,V_{GE}=0V,T_j=25℃		1.70	2.15	V
		I_C=300A,V_{GE}=0V,T_j=125℃		1.70		
		I_C=300A,V_{GE}=0V,T_j=150℃		1.70		
Q_r	Recovered Charge	V_R=300V,I_F=300A, R_G=2.4Ω,V_{GE}=-15V T_j=25℃		14.1		μC
I_{RM}	Peak Reverse Recovery Current			356		A
E_{rec}	Reverse Recovery Energy			4.15		mJ
Q_r	Recovered Charge	V_R=300V,I_F=300A, R_G=2.4Ω,V_{GE}=-15V T_j=125℃		23.2		μC
I_{RM}	Peak Reverse Recovery Current			349		A
E_{rec}	Reverse Recovery Energy			7.49		mJ
Q_r	Recovered Charge	V_R=300V,I_F=300A, R_G=2.4Ω,V_{GE}=-15V T_j=150℃		26.9		μC
I_{RM}	Peak Reverse Recovery Current			349		A
E_{rec}	Reverse Recovery Energy			7.92		mJ

Module Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			22	nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip		0.65		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.141 0.224	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.075 0.119		K/W
$R_{\theta CS}$	Case-to-Sink		0.046		K/W
G	Weight of Module		200		g

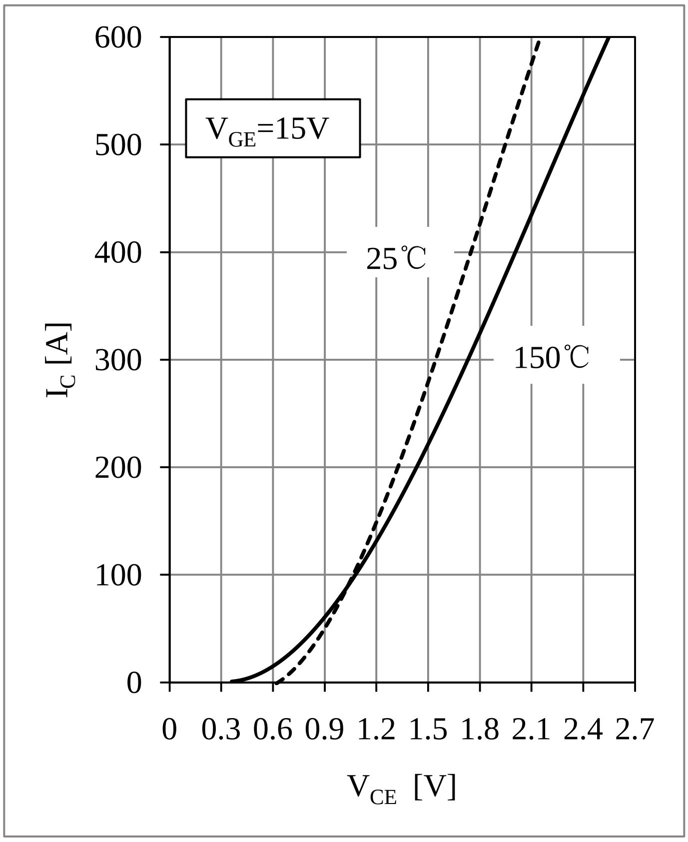


Fig 1. IGBT Output Characteristics

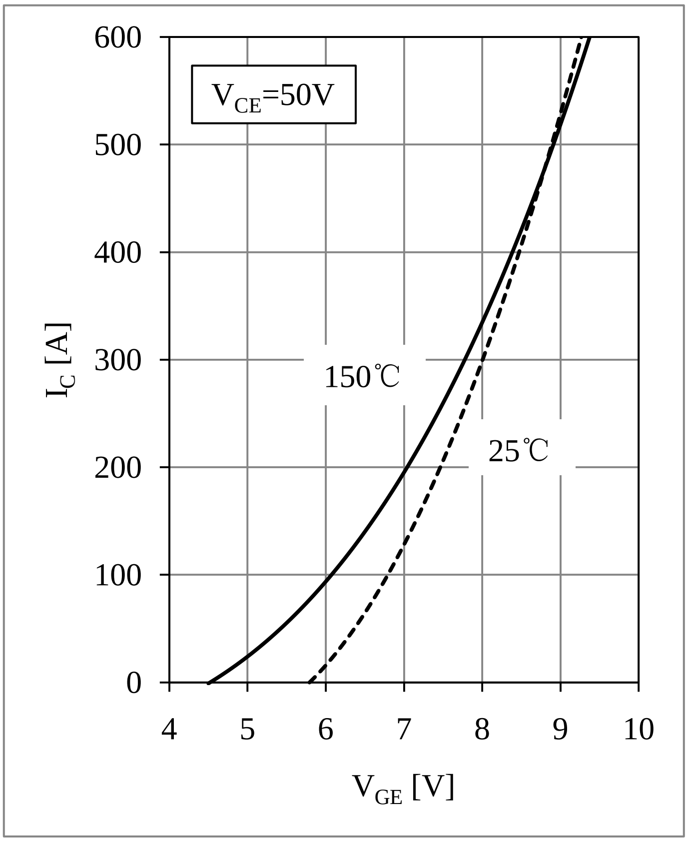


Fig 2. IGBT Transfer Characteristics

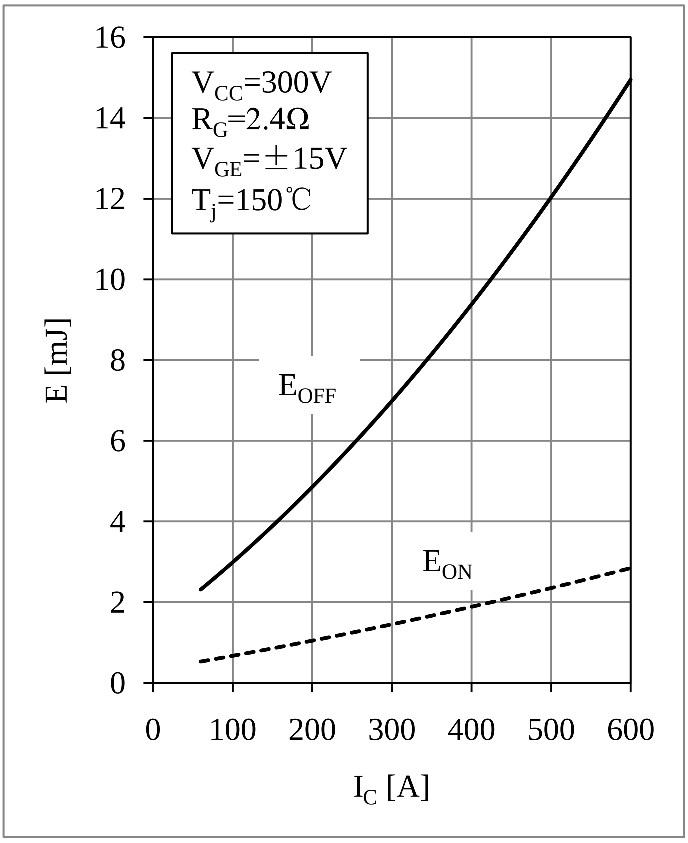


Fig 3. IGBT Switching Loss vs. I_C

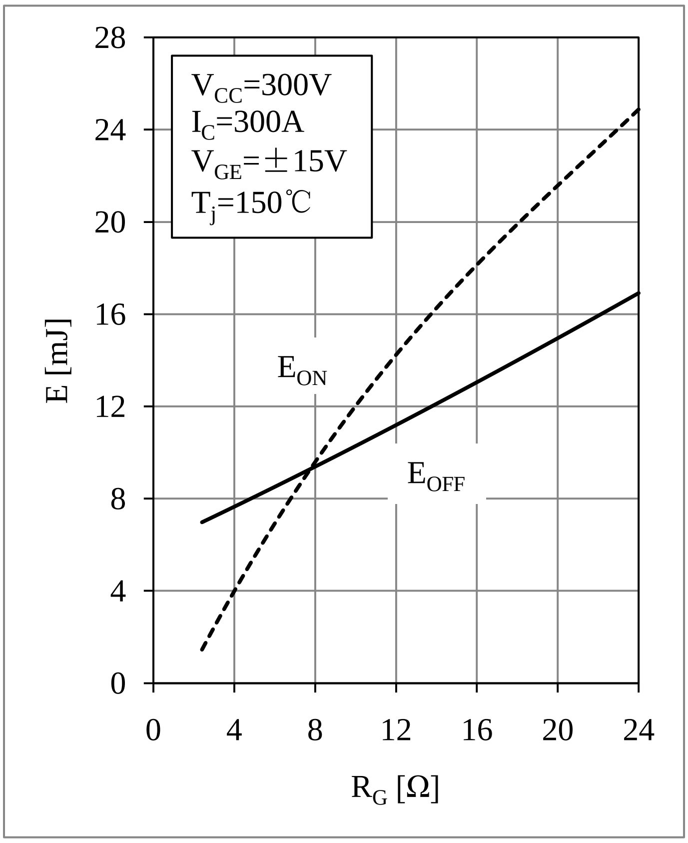


Fig 4. IGBT Switching Loss vs. R_G

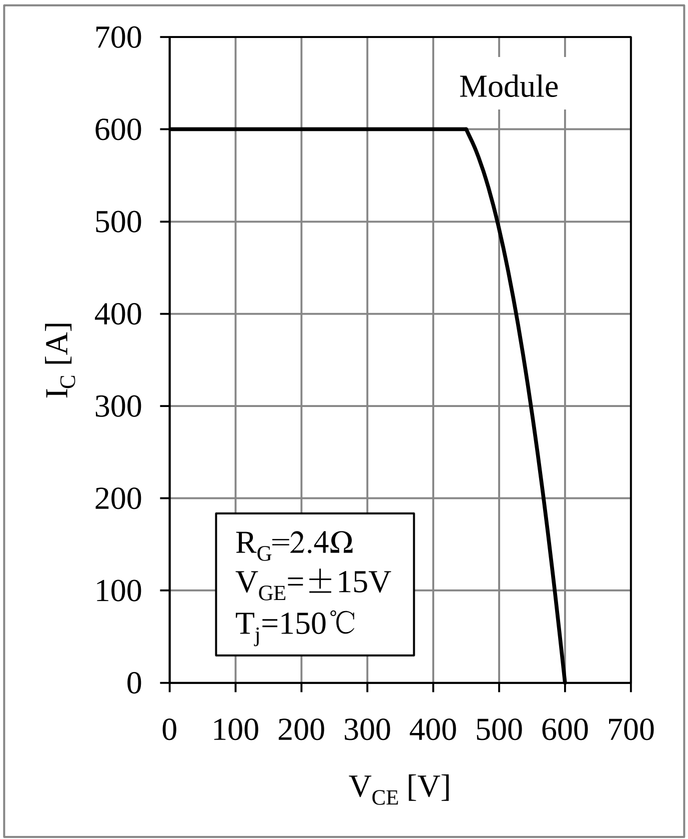


Fig 5. RBSOA

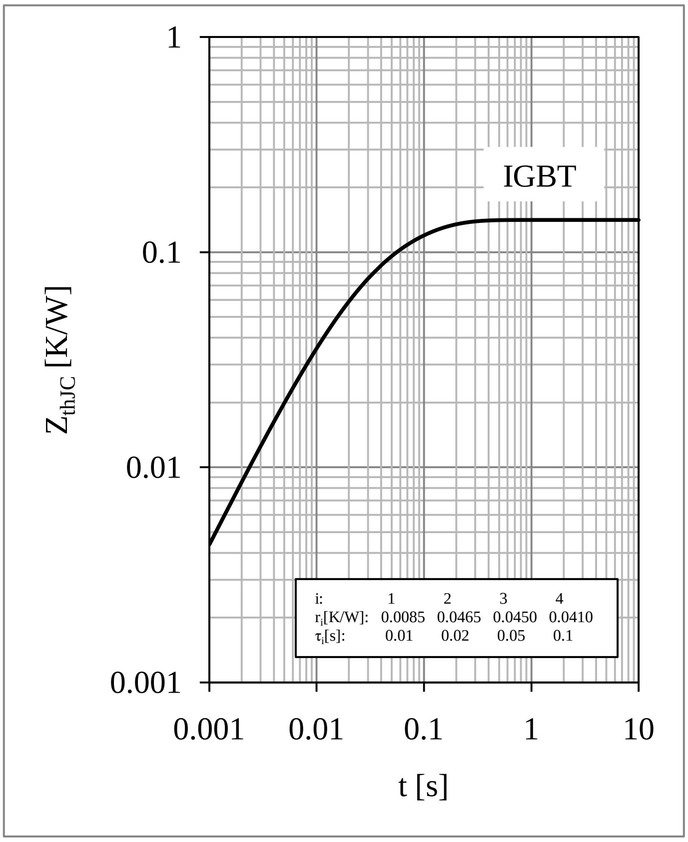


Fig 6. IGBT Transient Thermal Impedance

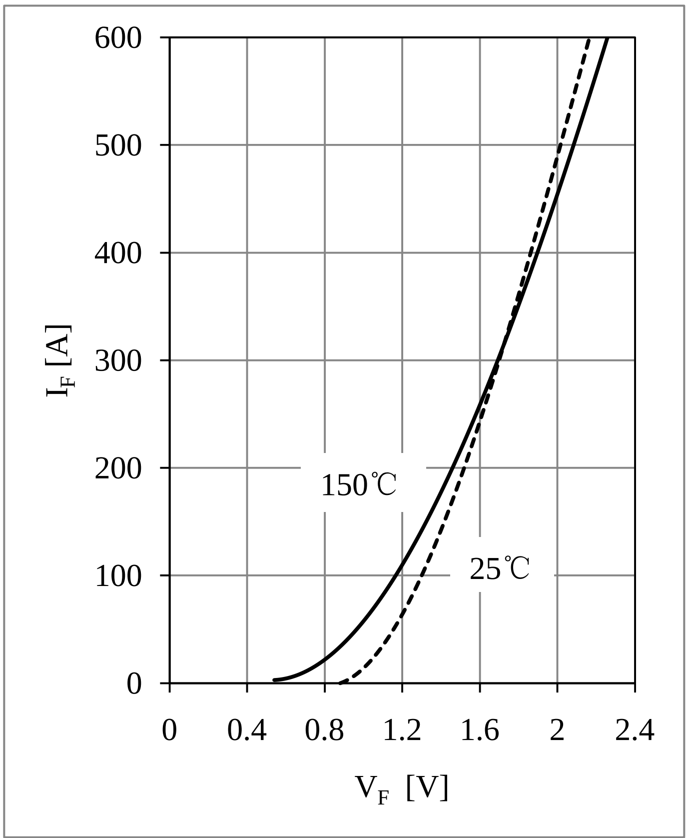


Fig 7. Diode Forward Characteristics

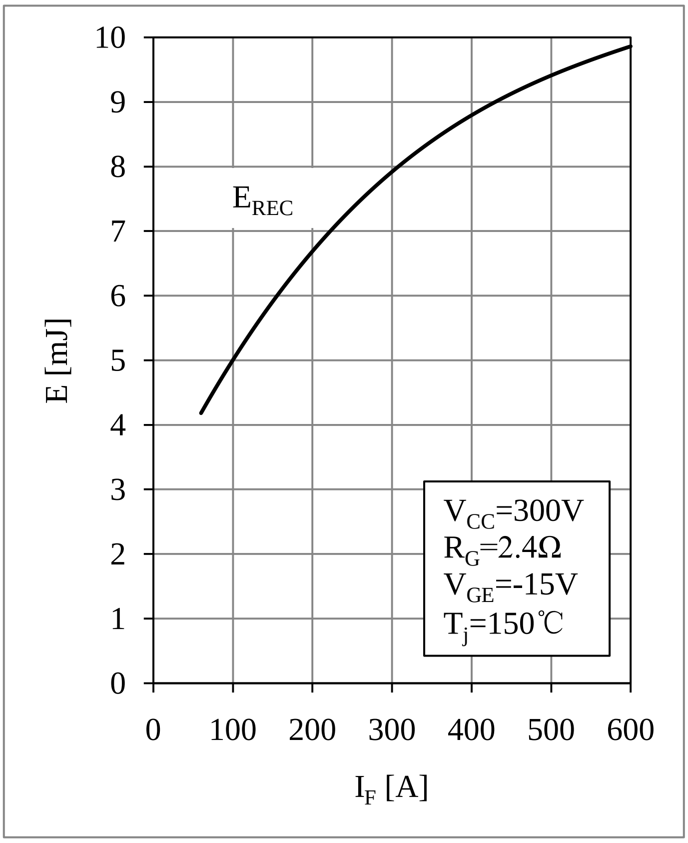


Fig 8. Diode Switching Loss vs. I_F

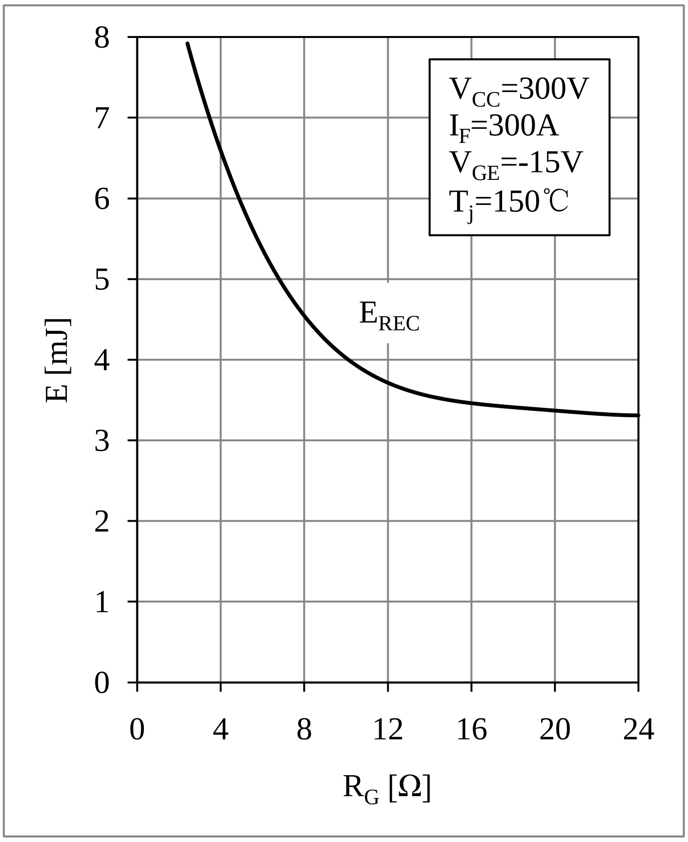


Fig 9. Diode Switching Loss vs. R_G

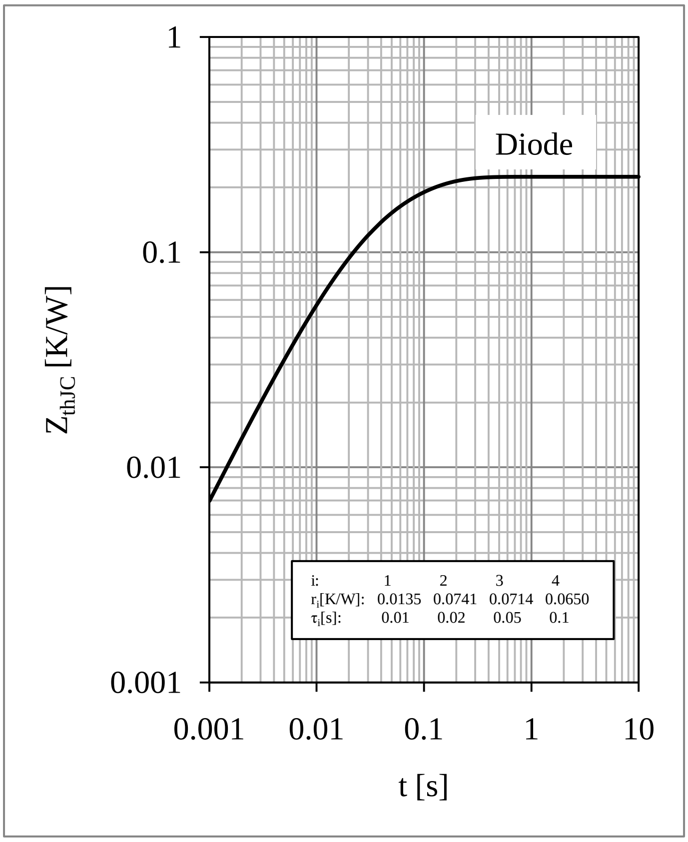
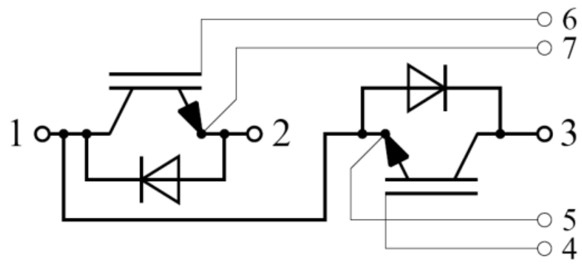


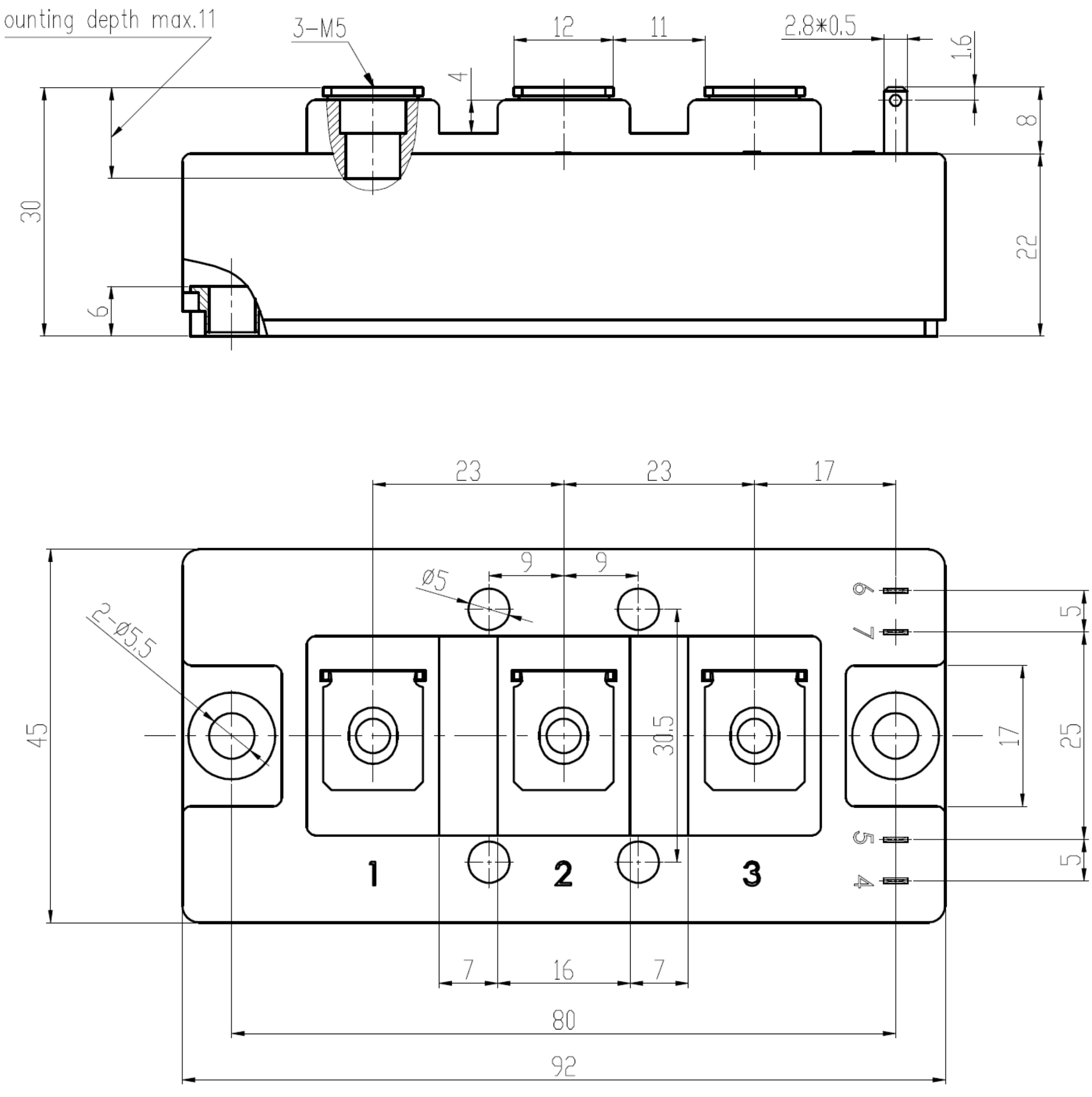
Fig 10. Diode Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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