STARPOWER

SEMICONDUCTOR

IGBT

GD200HFL120C8SN

Molding Type Module

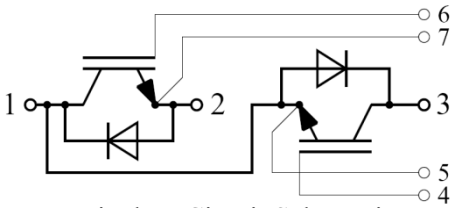
1200V/200A 2 in one-package

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 $V_{CE(sat)}$ SPT+ IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology
- UL file number E340089



Equivalent Circuit Schematic

Typical Applications

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

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD200HFL120C8SN	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	400 200	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	A
P_D	Maximum Power Dissipation @ T_j=175℃	1724	W
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	2500	V
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M5	2.5 to 3.5 2.5 to 3.5	N.m

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℃	1200			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=8.0mA,V_{CE}=V_{GE}, T_j=25℃	5.0	6.2	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=200A,V_{GE}=15V, T_j=25℃		1.90	2.35	V
		I_C=200A,V_{GE}=15V, T_j=125℃		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=3.3Ω,V_{GE}=±15V, T_j=25℃		365		ns
t_r	Rise Time			79		ns
$t_{d(off)}$	Turn-Off Delay Time			396		ns
t_f	Fall Time			165		ns
E_{on}	Turn-On Switching Loss			8.00		mJ
E_{off}	Turn-Off Switching Loss			14.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=3.3Ω,V_{GE}=±15V, T_j=125℃		372		ns
t_r	Rise Time			83		ns
$t_{d(off)}$	Turn-Off Delay Time			420		ns
t_f	Fall Time			293		ns
E_{on}	Turn-On Switching Loss			11.0		mJ
E_{off}	Turn-Off Switching Loss			22.3		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		14.9		nF
C_{oes}	Output Capacitance			1.04		nF
C_{res}	Reverse Transfer Capacitance			0.68		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15 V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		1200		A
R_{Gint}	Internal Gate Resistance			1.0		Ω
L_{CE}	Stray Inductance				22	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.65		mΩ

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F (chip)	Diode Forward Voltage	I_F=200A	T_j=25℃		1.80	2.25	V
			T_j=125℃		1.85		
Q_r	Recovered Charge	I_F=200A, V_R=600V, R_G=3.3Ω, V_{GE}=-15V	T_j=25℃		17.2		μC
			T_j=125℃		35.3		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		160		A
			T_j=125℃		213		
E_{rec}	Reverse Recovery Energy		T_j=25℃		11.2		mJ
			T_j=125℃		21.2		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.087	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.160	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.046		K/W
Weight	Weight of Module	200		g

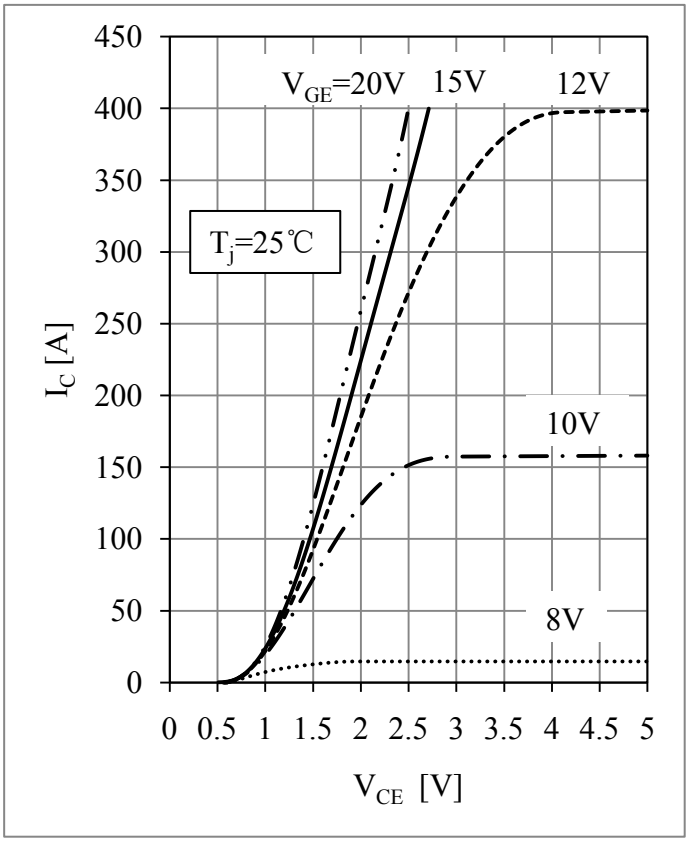


Fig 1. IGBT Output Characteristic

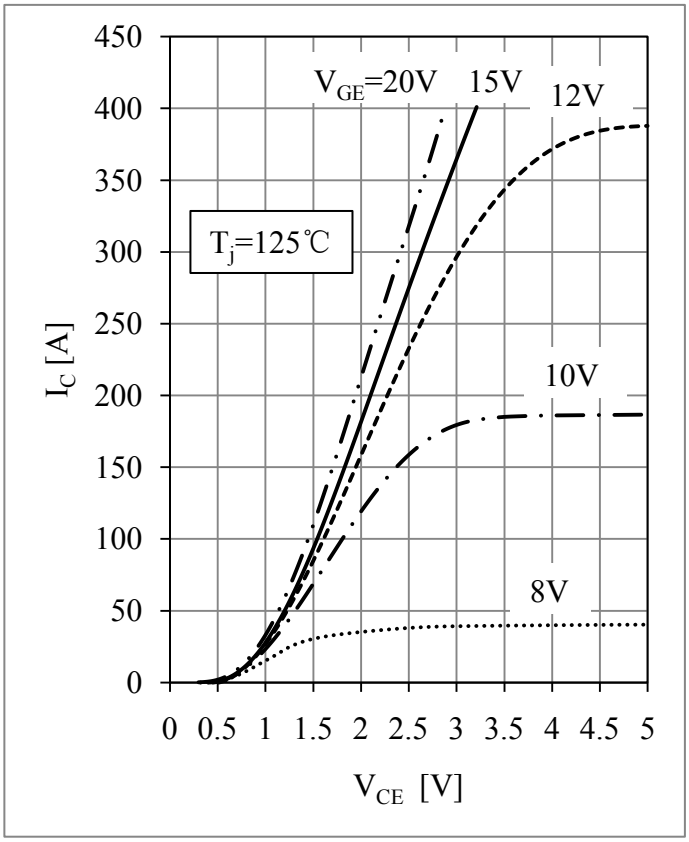


Fig 2. IGBT Output Characteristic

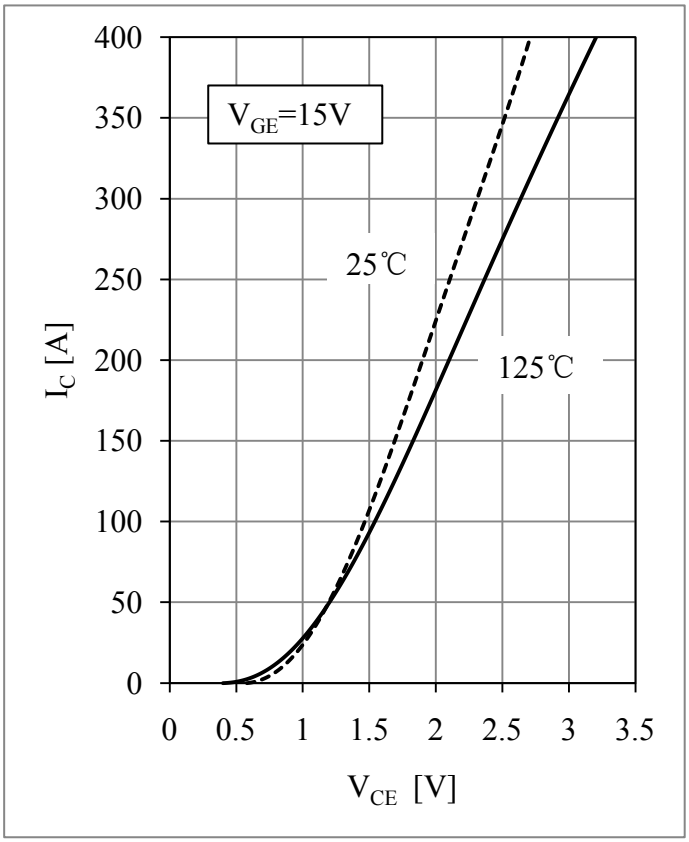


Fig 3. IGBT Output Characteristic

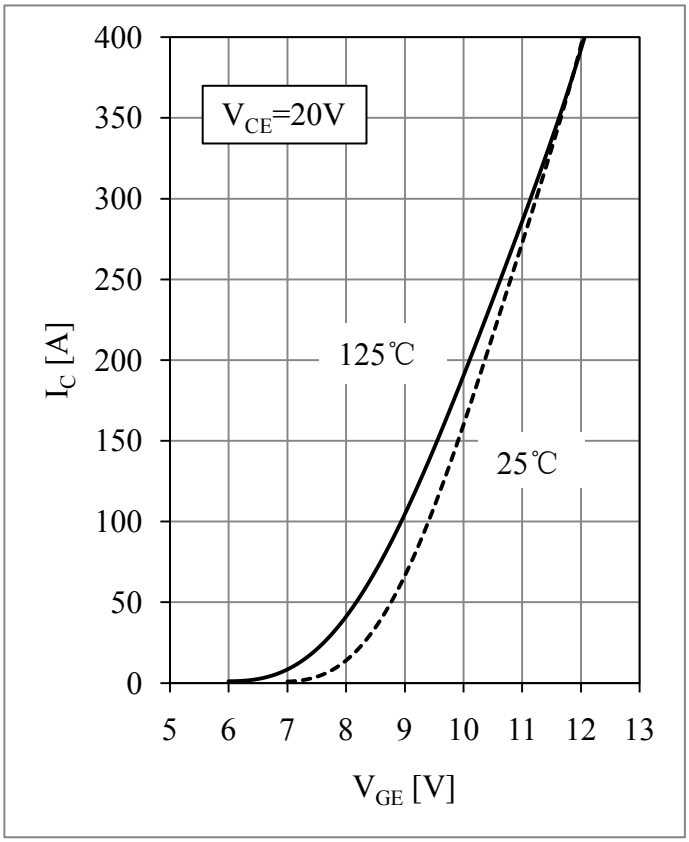


Fig 4. IGBT Transfer Characteristic

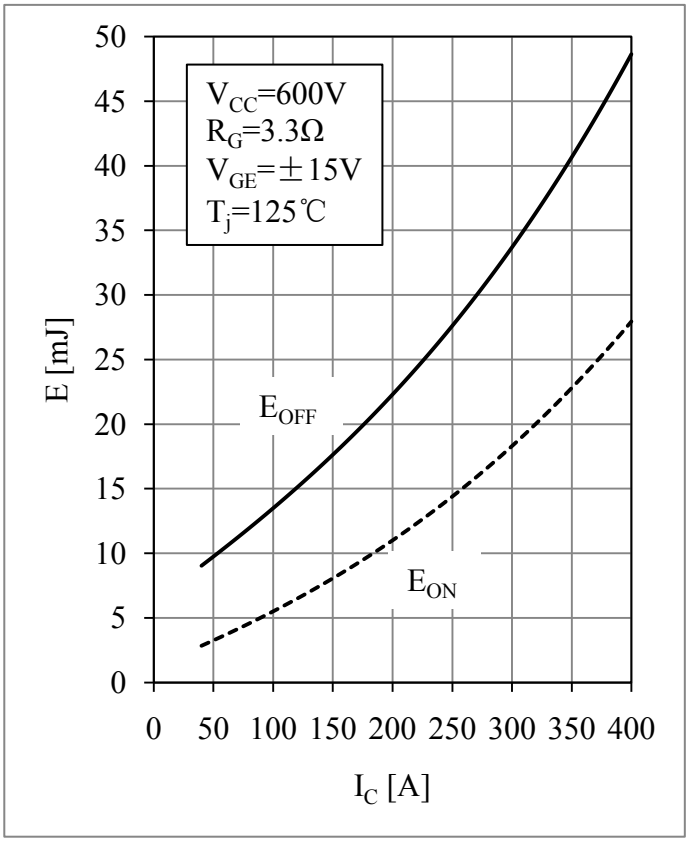


Fig 5. IGBT Switching Loss vs. I_C

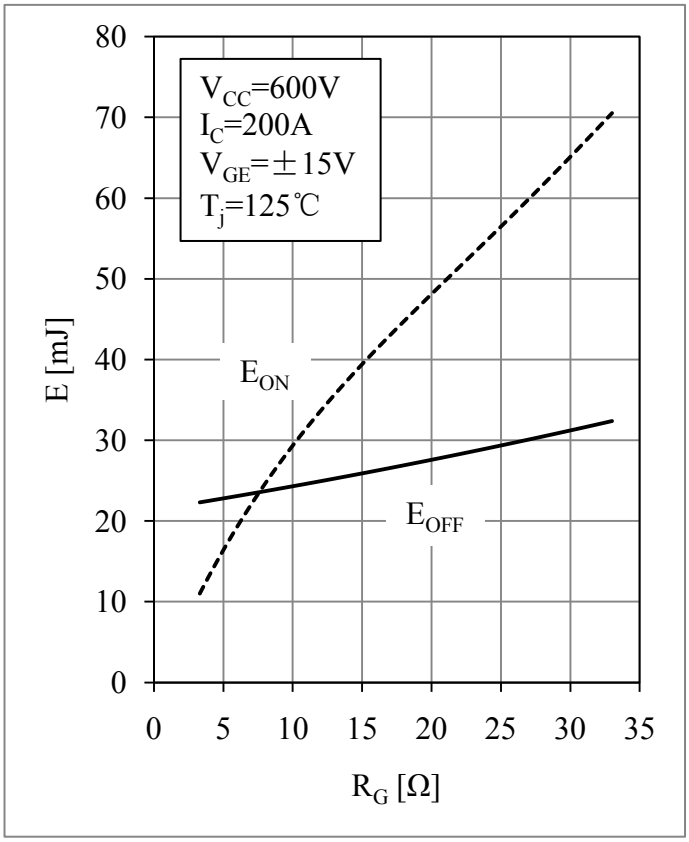


Fig 6. IGBT Switching Loss vs. R_G

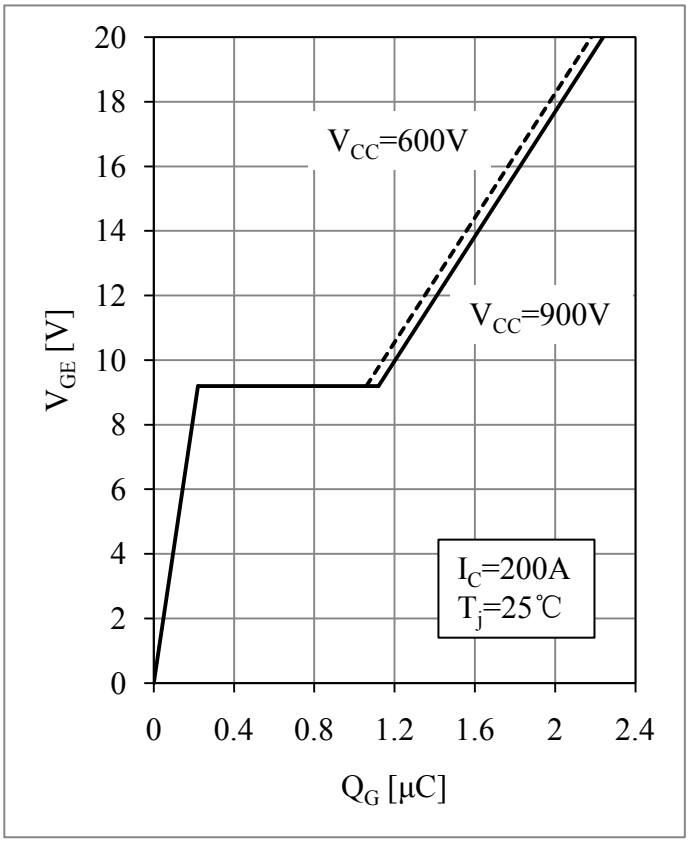


Fig 7. IGBT Gate Charge Characteristic

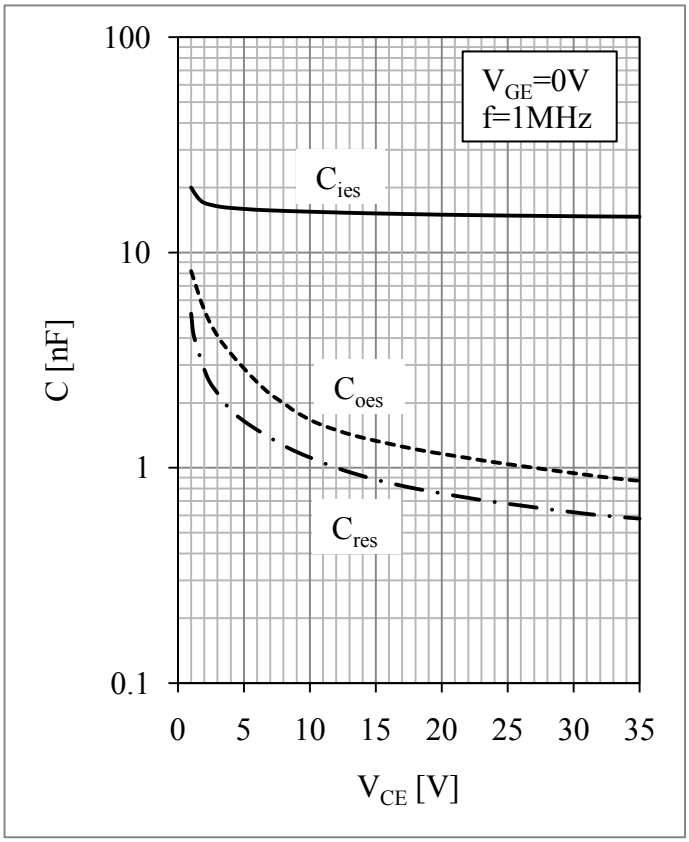


Fig 8. IGBT Capacitances vs. V_{CE}

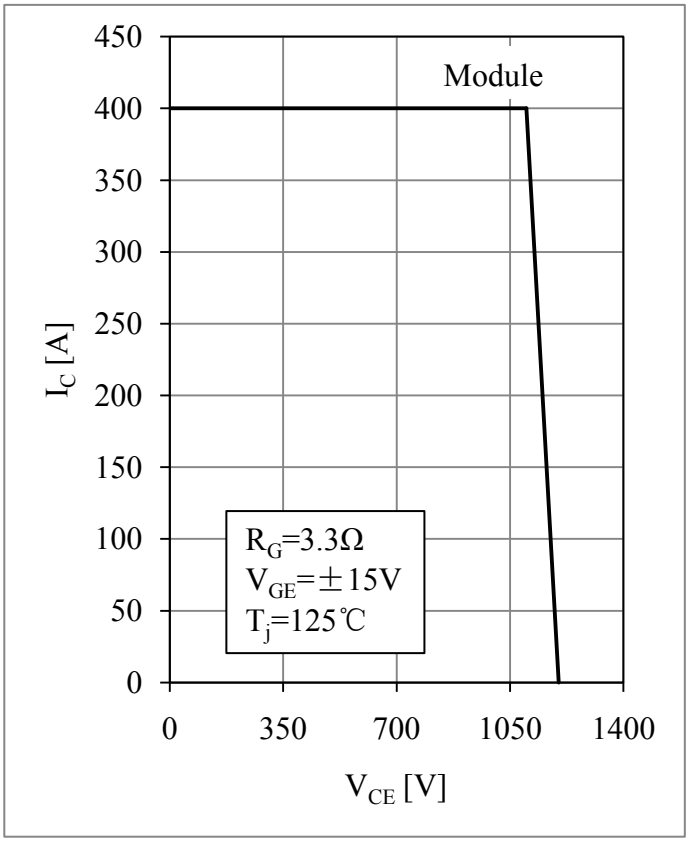


Fig 9. RBSOA

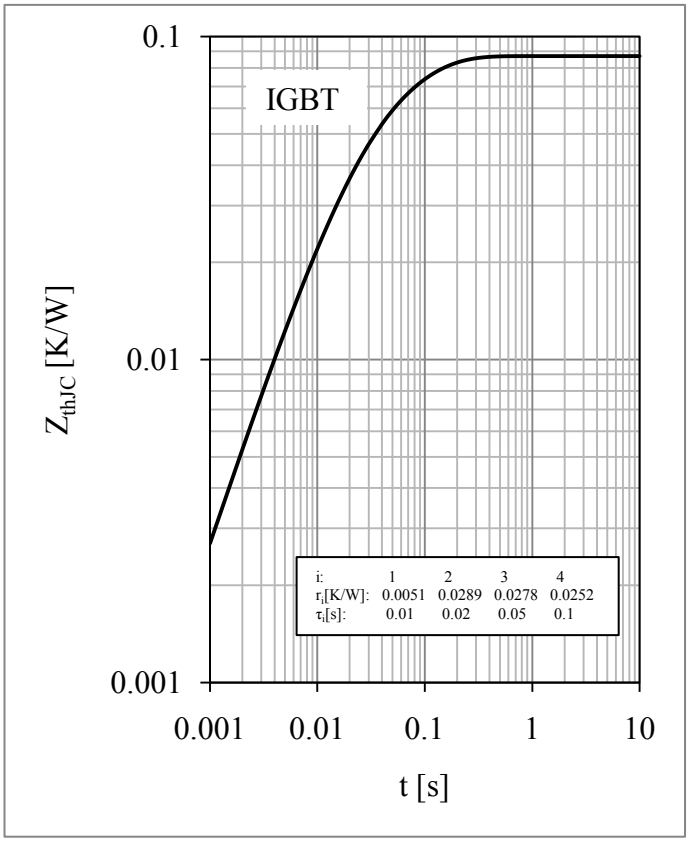


Fig 10. IGBT Transient Thermal Impedance

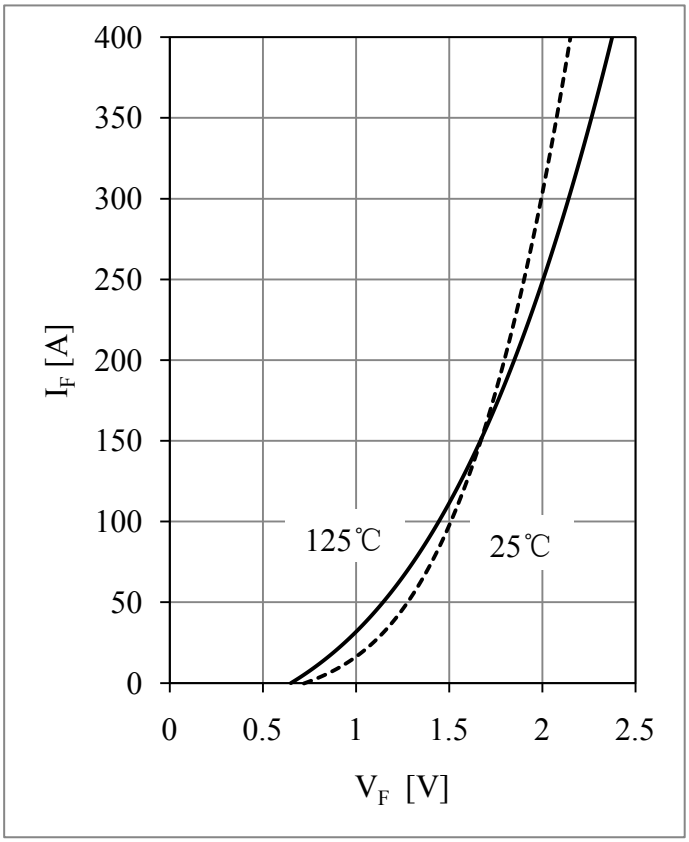


Fig 11. Diode Forward Characteristic

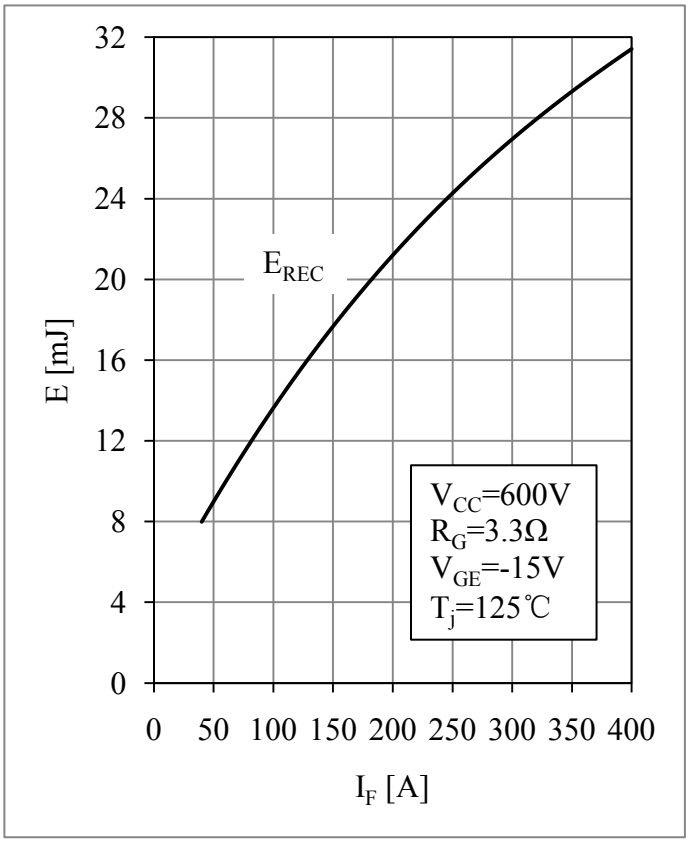


Fig 12. Diode Switching Loss vs. I_F

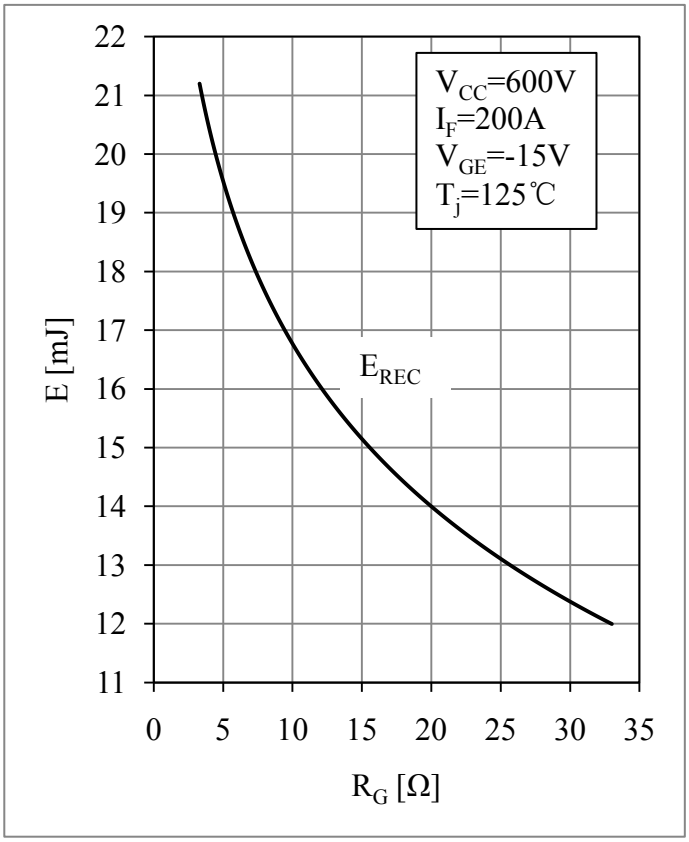


Fig 13. Diode Switching Loss vs. R_G

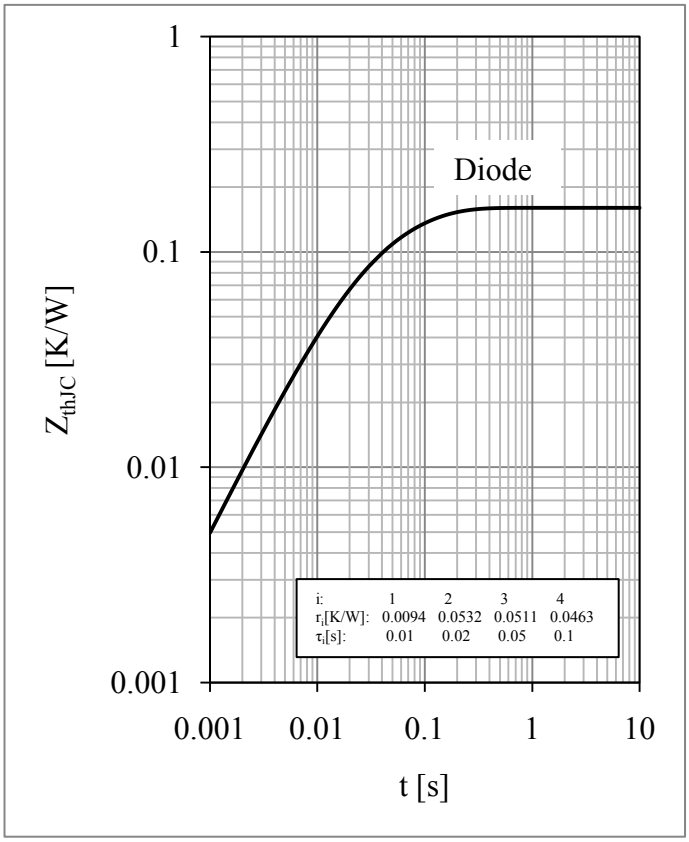
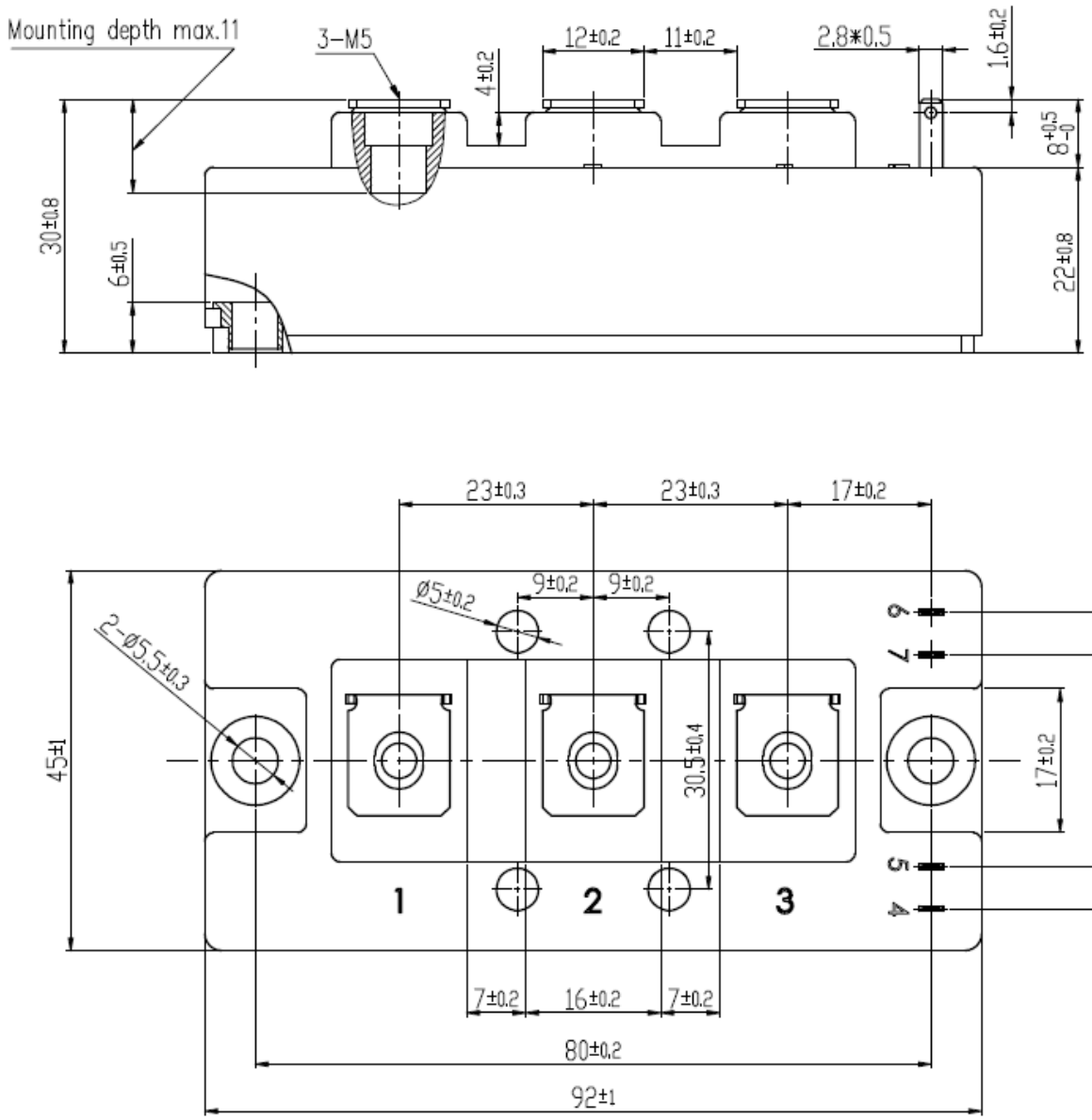


Fig 14. Diode Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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