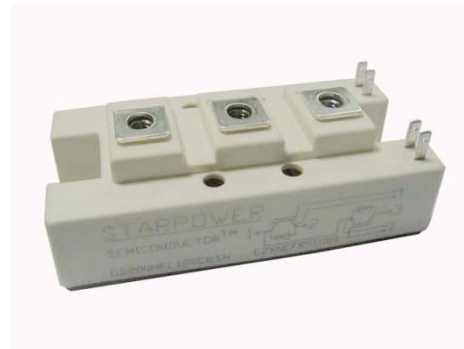


IGBT

GD200HFL120C8SN

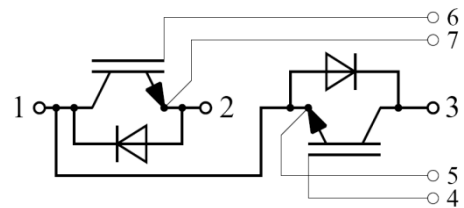
Molding Type Module

1200V/200A 2 in one-package



Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- 10 μ s 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



Equivalent Circuit Schematic

Typical Applications

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

Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ 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 @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	360 200	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	400	A
I_F	Diode Continuous Forward Current @ $T_C=80^{\circ}\text{C}$	200	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation @ $T_J=150^{\circ}\text{C}$	1157	W
T_{jmax}	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	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 $T_C=25^{\circ}\text{C}$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_J=25^{\circ}\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=8.0\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5.0	6.2	7.0	V
$V_{CE(sat)}$ (chip)	Collector to Emitter Saturation Voltage	$I_C=200\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^{\circ}\text{C}$		1.90	2.35	V
		$I_C=200\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^{\circ}\text{C}$		2.10		
$V_{CE(sat)}$ (terminal)	Collector to Emitter Saturation Voltage	$I_C=200\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^{\circ}\text{C}$		2.03	2.48	
		$I_C=200\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^{\circ}\text{C}$		2.23		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=3.3\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		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	$V_{CC}=600V, I_C=200A,$ $R_G=3.3\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		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	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		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		m Ω

Electrical Characteristics of DIODE $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F (chip)	Diode Forward Voltage	$I_F=200A$	$T_j=25^\circ C$	1.80	2.25	V
			$T_j=125^\circ C$	1.85		
V_F (terminal)	Diode Forward Voltage	$I_F=200A$	$T_j=25^\circ C$	1.93	2.38	V
			$T_j=125^\circ C$	1.98		
Q_r	Recovered Charge	$I_F=200A,$ $V_R=600V,$ $R_G=3.3\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	17.2		μC
			$T_j=125^\circ C$	35.3		
I_{RM}	Peak Reverse Recovery Current	$V_{GE}=-15V$	$T_j=25^\circ C$	160		A
			$T_j=125^\circ C$	213		
E_{rec}	Reverse Recovery Energy		$T_j=25^\circ C$	11.2		mJ
			$T_j=125^\circ C$	21.2		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.108	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.186	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.046		K/W
Weight	Weight of Module	200		g

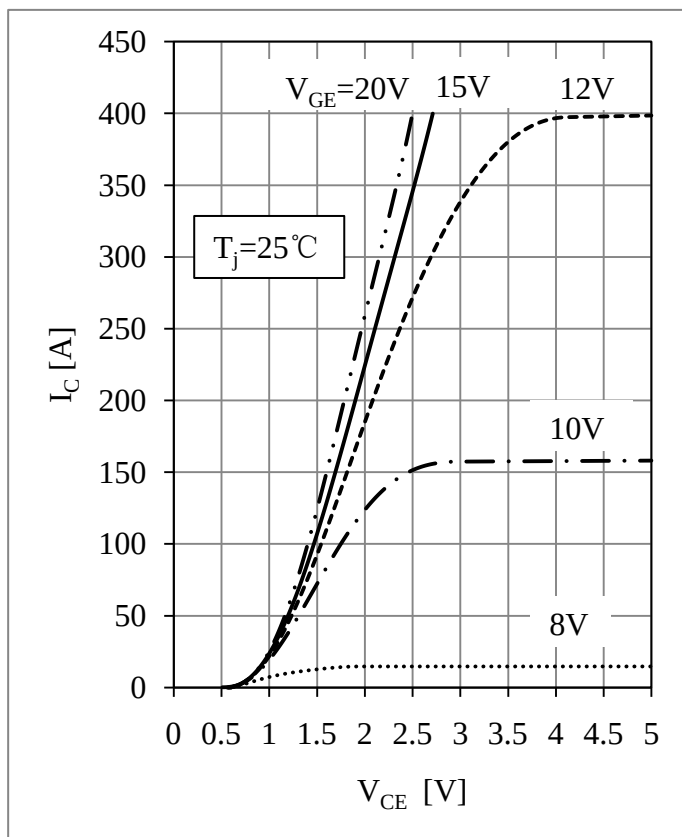


Fig 1. IGBT Output Characteristic

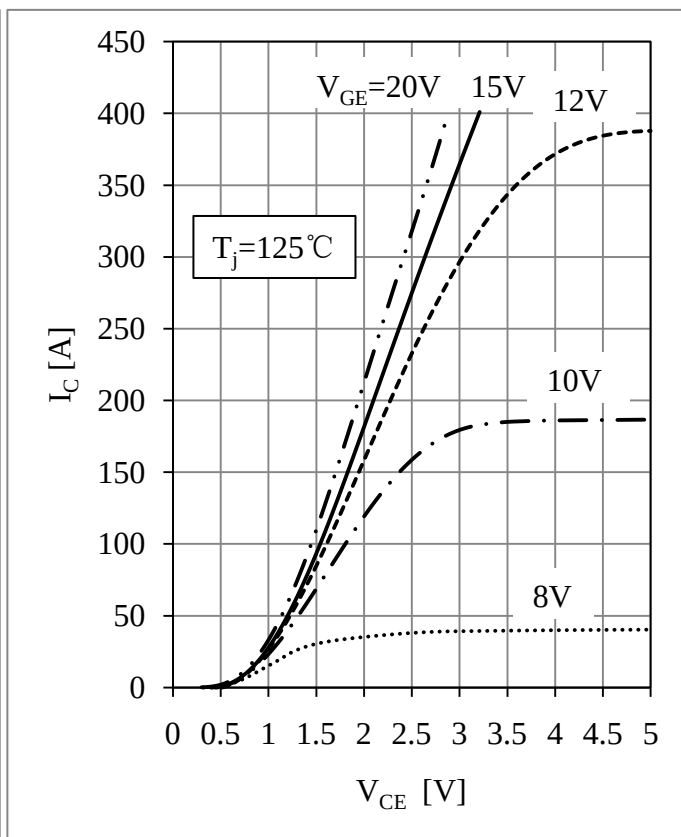


Fig 2. IGBT Output Characteristic

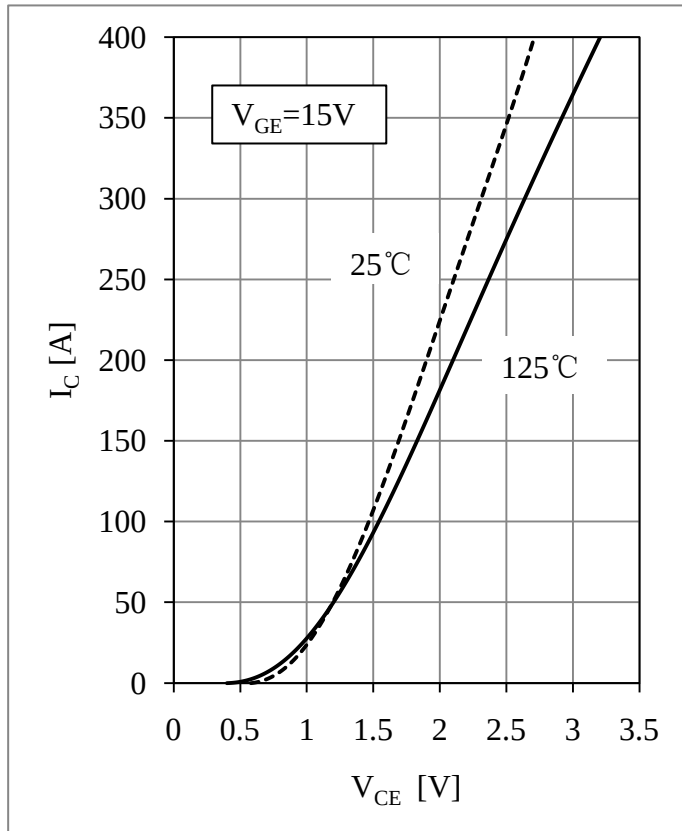


Fig 3. IGBT Output Characteristic

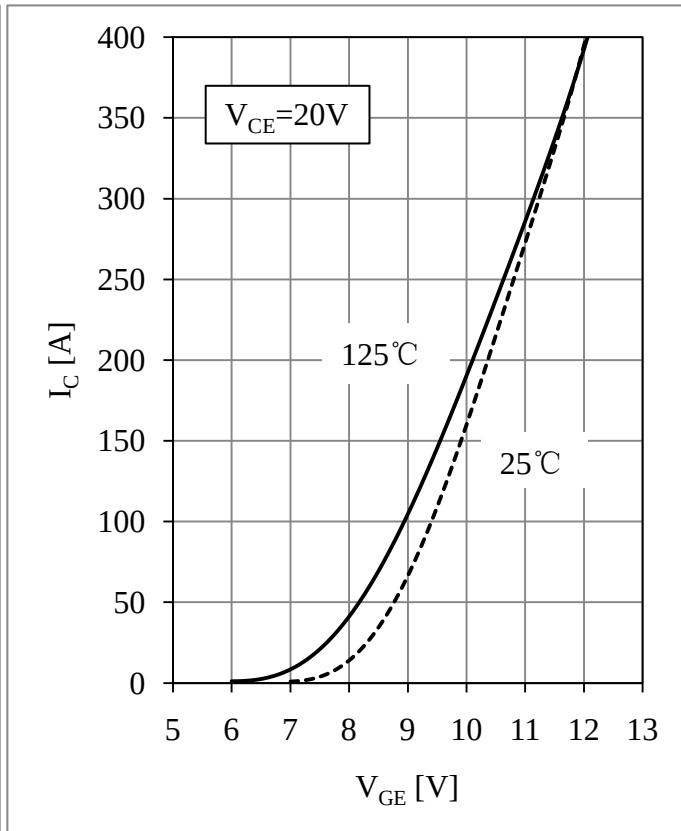


Fig 4. IGBT Transfer Characteristic

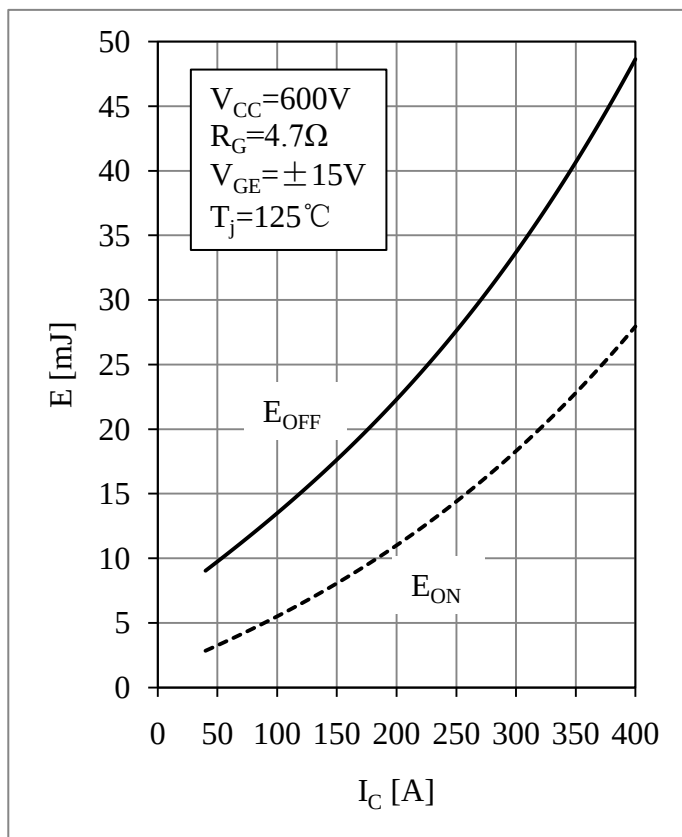
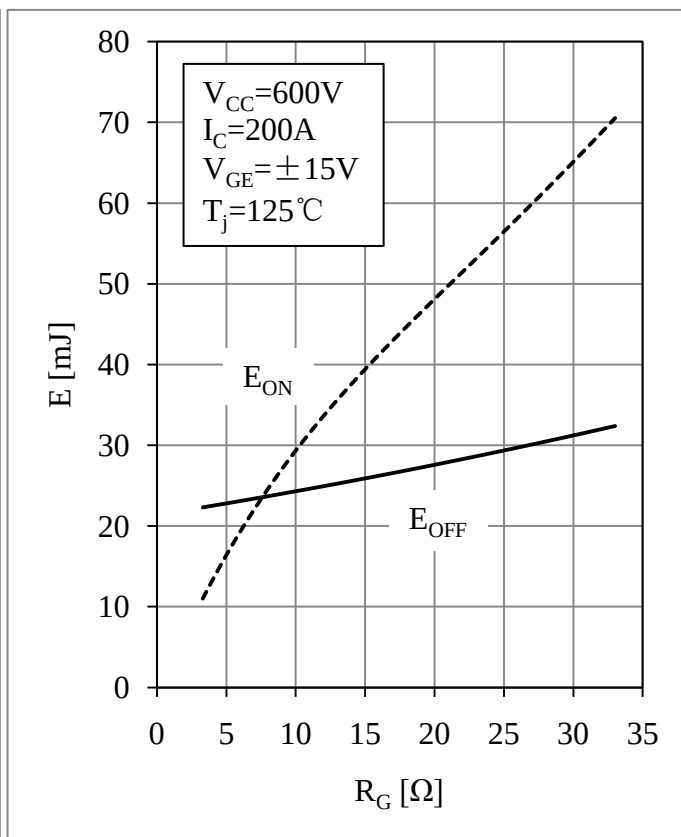
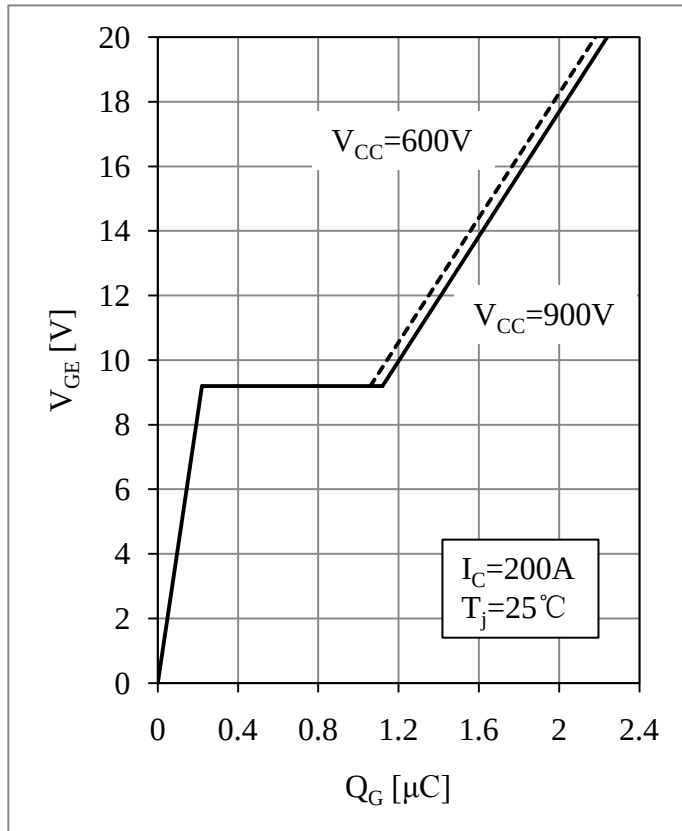
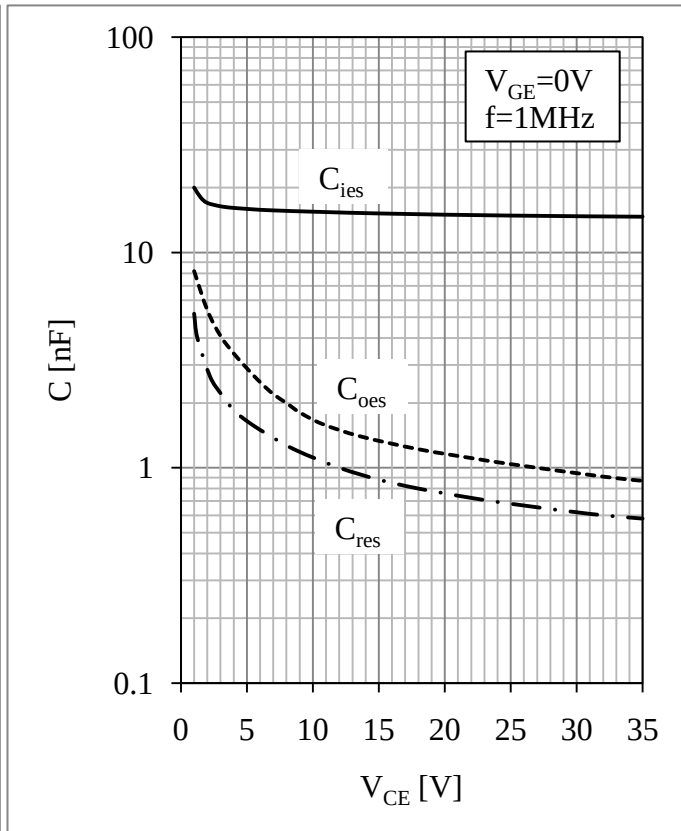
Fig 5. IGBT Switching Loss vs. I_C Fig 6. IGBT Switching Loss vs. R_G 

Fig 7. IGBT Gate Charge Characteristic

Fig 8. IGBT Capacitances vs. V_{CE}

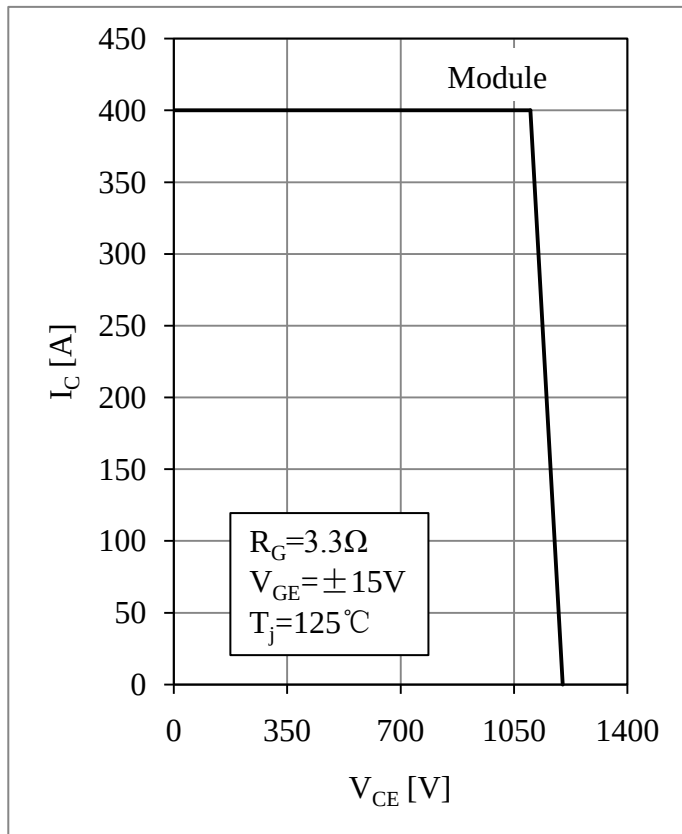


Fig 9. RBSOA

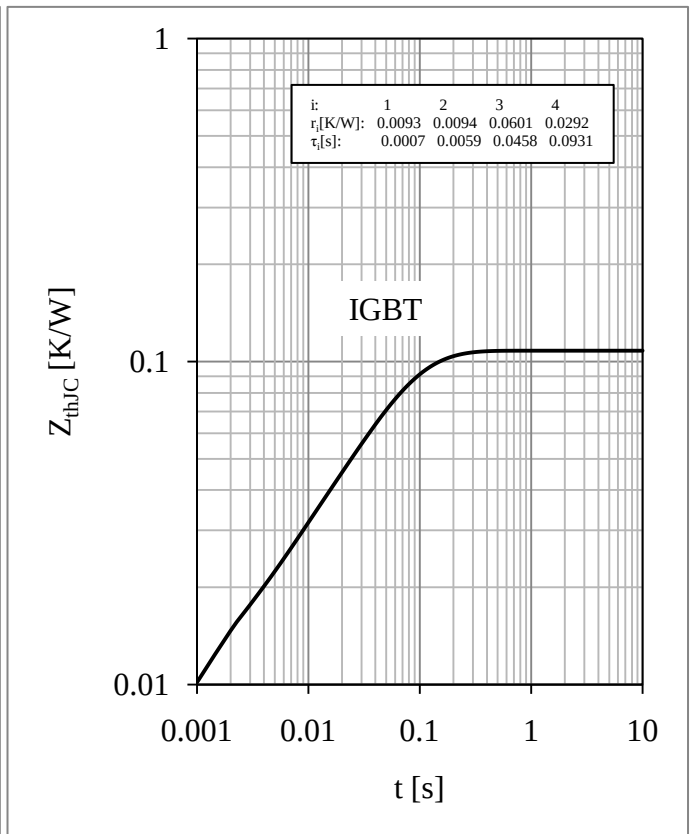


Fig 10. IGBT Transient Thermal Impedance

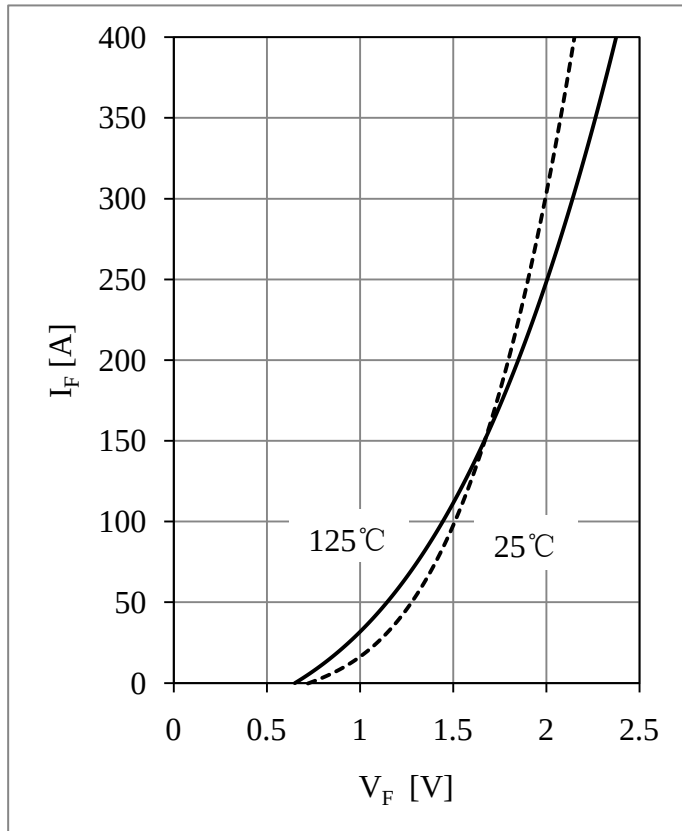
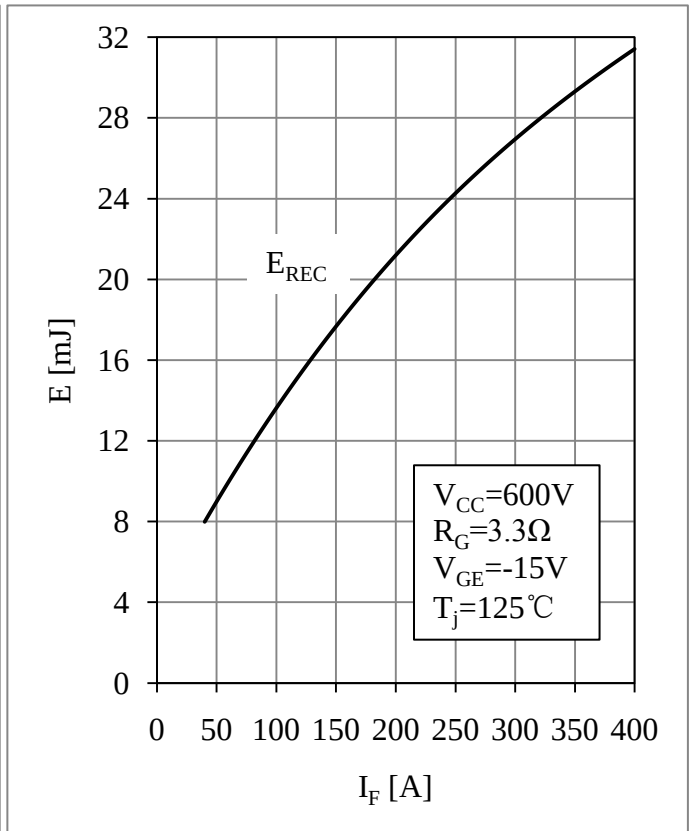


Fig 11. Diode Forward Characteristic

Fig 12. Diode Switching Loss vs. I_F

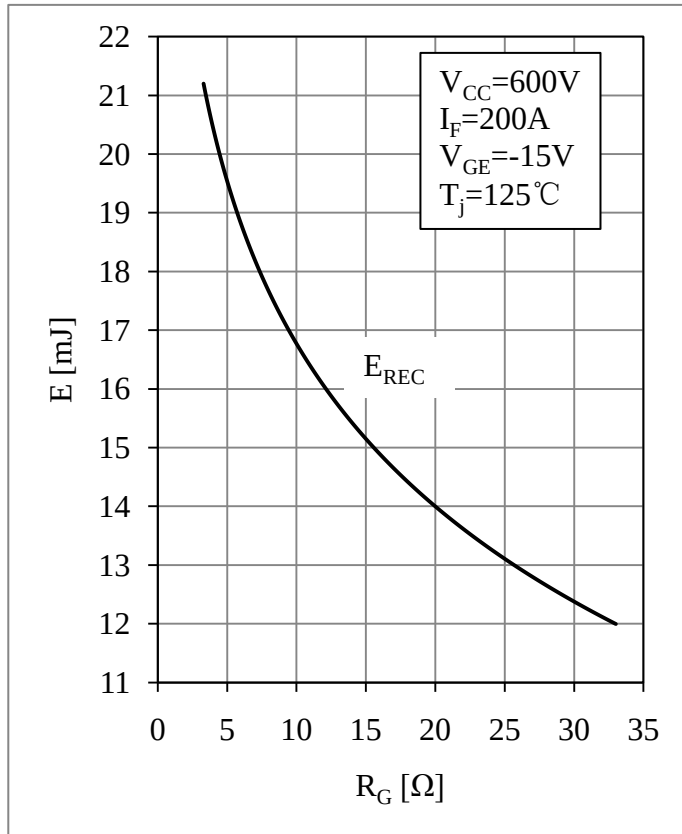
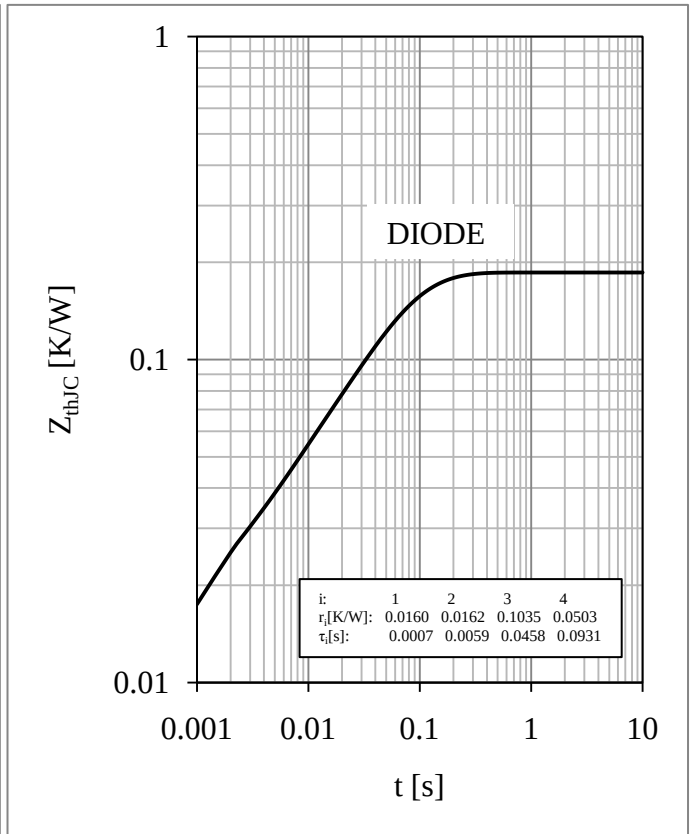
Fig 13. Diode Switching Loss vs. R_G 

Fig 14. Diode Transient Thermal Impedance

