

IGBT

GD200HFL120C2S

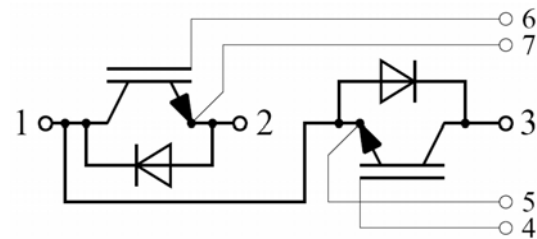
Molding Type Module

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	GD200HFL120C2S	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	A
		200	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current	400	A
P_D	Maximum Power Dissipation @ $T_J=150^{\circ}\text{C}$	1136	W
T_{SC}	Short Circuit Withstand Time @ $T_J=125^{\circ}\text{C}$	10	μs
T_J	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:M6	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 5.0	N.m

Notes:

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

Electrical Characteristics of IGBT $T_C=25^{\circ}\text{C}$ 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
$V_{CE(sat)}$	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		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=5.1\Omega, V_{GE}=\pm 15V,$ $T_J=25^\circ C$		437		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			436		ns
t_f	Fall Time			165		ns
E_{on}	Turn-On Switching Loss			10.0		mJ
E_{off}	Turn-Off Switching Loss			15.0		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=5.1\Omega, V_{GE}=\pm 15V,$ $T_J=125^\circ C$		445		ns
t_r	Rise Time			96		ns
$t_{d(off)}$	Turn-Off Delay Time			488		ns
t_f	Fall Time			258		ns
E_{on}	Turn-On Switching Loss			15.9		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	$t_{SC}\leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM}\leq 1200V$		1200		A
R_{Gint}	Internal Gate Resistance			1.0		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.35		m Ω

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=200A$	$T_J=25^\circ C$		1.82	V
			$T_J=125^\circ C$		1.95	
Q_r	Recovered Charge	$I_F=200A,$	$T_J=25^\circ C$		16.6	μC
			$T_J=125^\circ C$		29.2	
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $di/dt=-2370A/\mu s,$	$T_J=25^\circ C$		156	A
			$T_J=125^\circ C$		210	
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_J=25^\circ C$		9.3	mJ
			$T_J=125^\circ C$		16.0	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.11	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.14	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

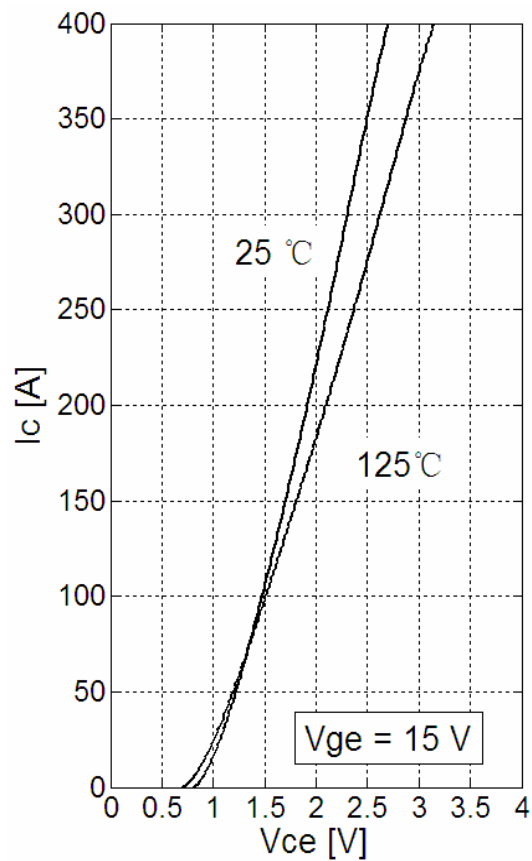


Fig 1. IGBT Typical Output Characteristics

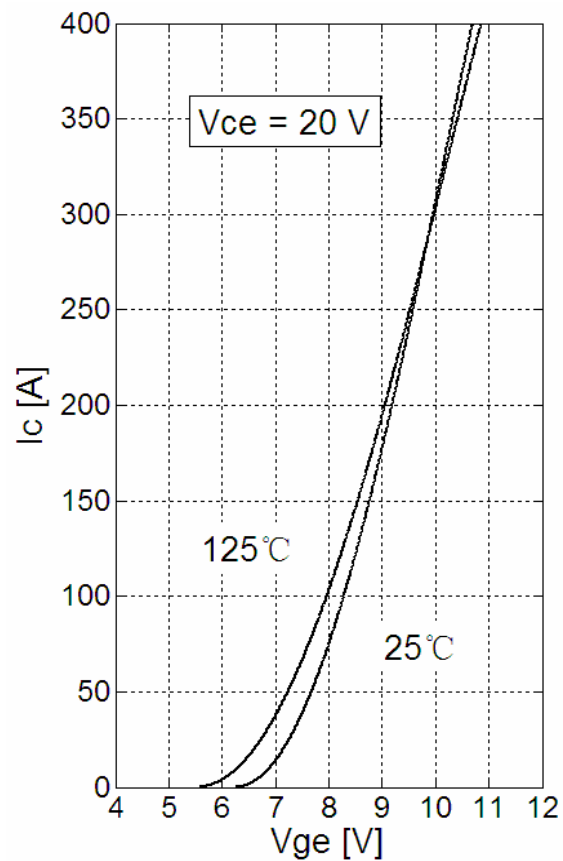
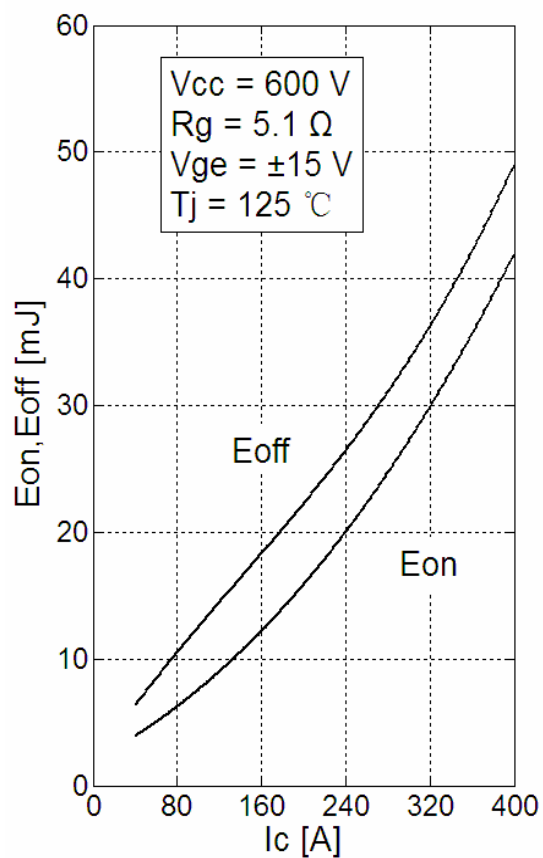
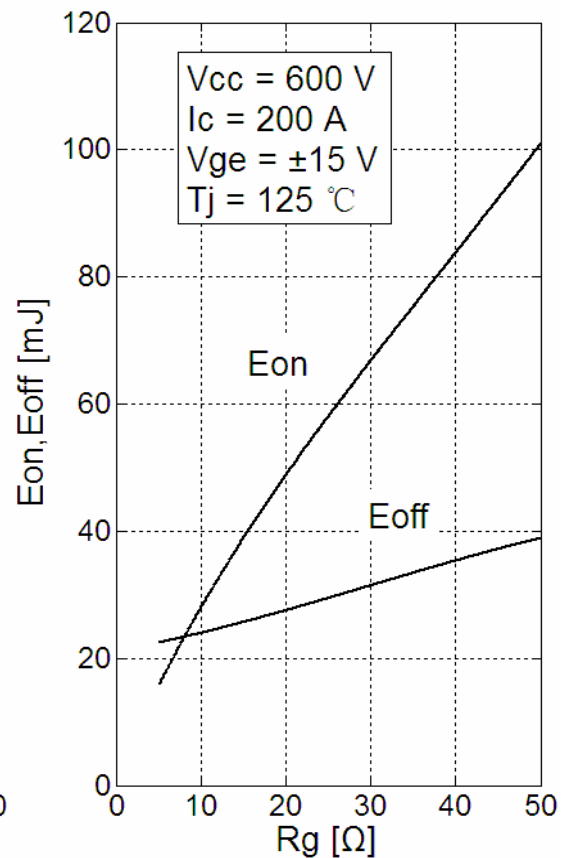


Fig 2. IGBT Typical Transfer Characteristics

Fig 3. IGBT Switching Loss vs. I_c Fig 4. IGBT Switching Loss vs. R_g

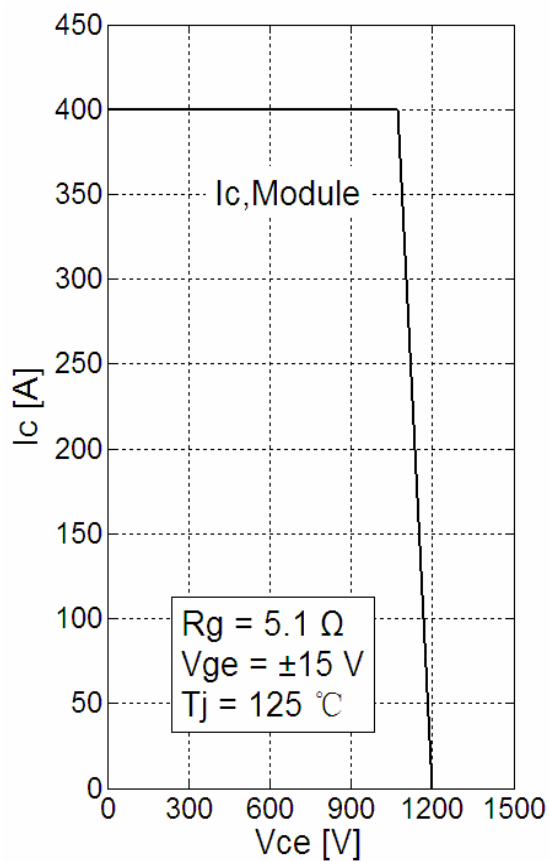


Fig 5. RBSOA

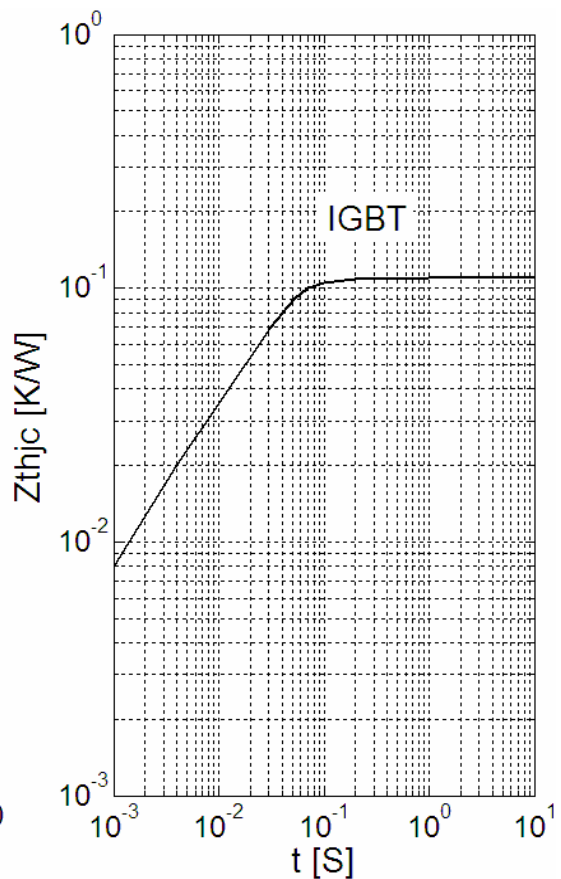


Fig 6. IGBT Transient Thermal Impedance

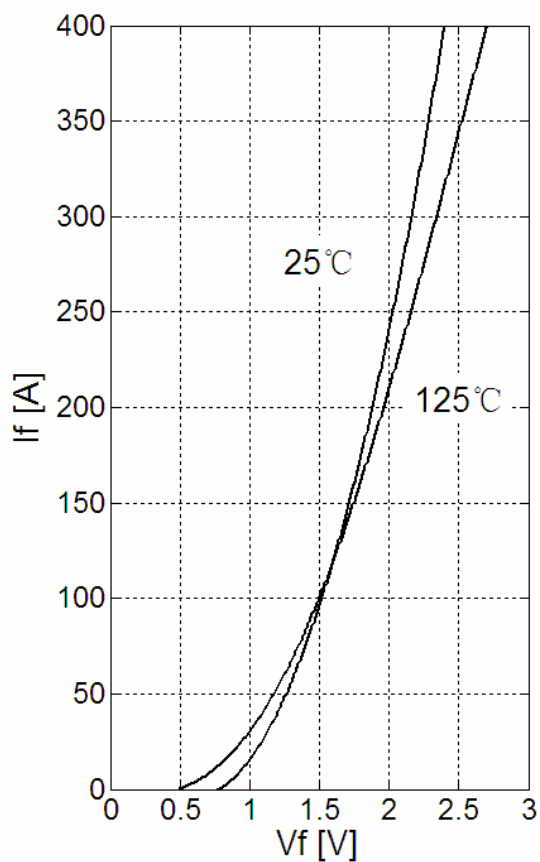
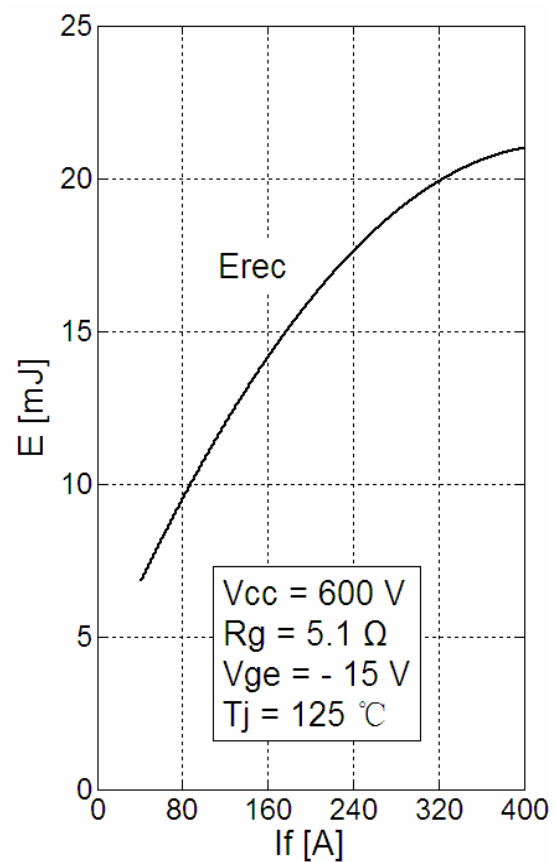


Fig 7. Diode Typical Forward Characteristics

Fig 8. Diode Switching Loss vs. I_f

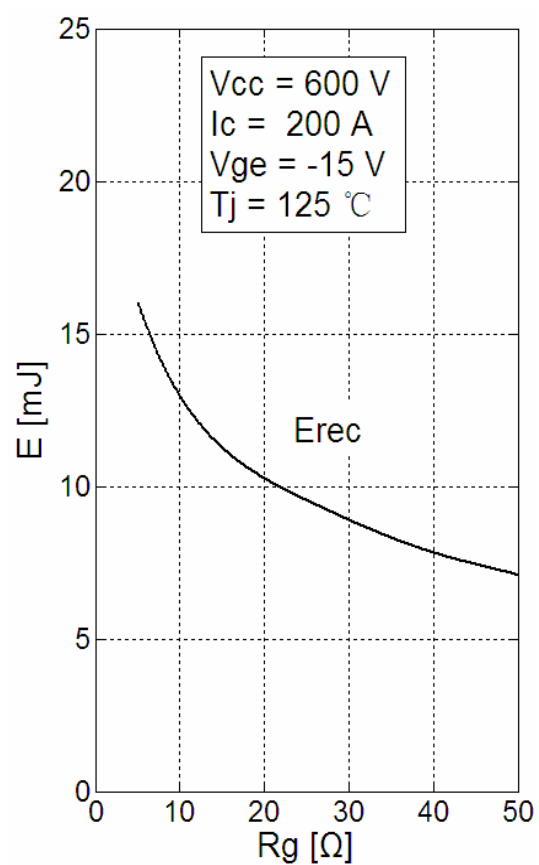
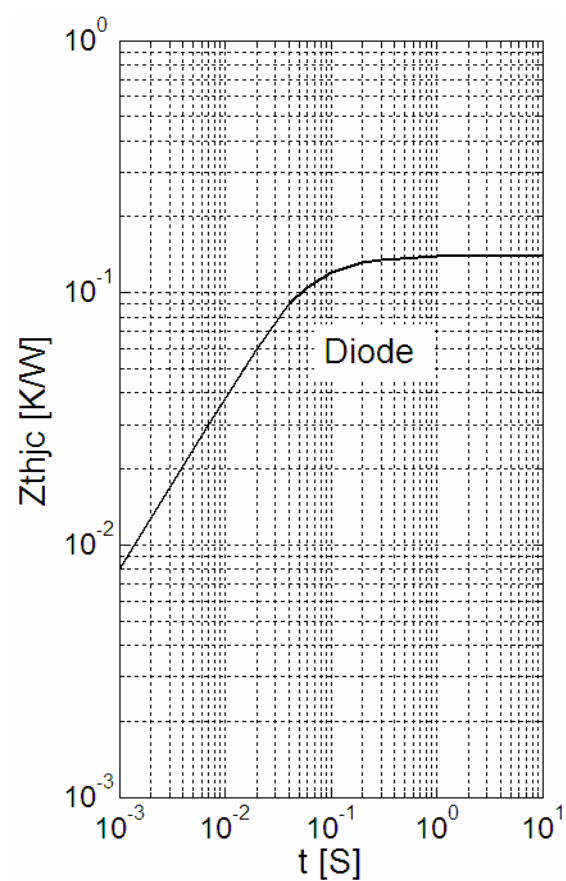
Fig 9. Diode Switching Loss vs. R_g 

Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters

