

STARPOWER

IGBT

GD200HFT170C2S

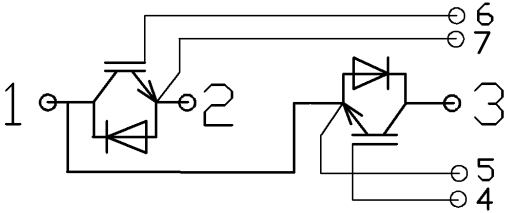
Molding Type Module

1700V/200A 2 in one-package



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- Low switching losses
- 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

- AC inverter drives mains 575-750V AC
- Public transport (auxiliary syst.)

Absolute Maximum Ratings $T_C=25^{\circ}C$ unless otherwise noted

Symbol	Description	GD200HFT170C2S	Units
V_{CES}	Collector-Emitter Voltage	1700	V

Symbol	Description	GD200HFT170C2S	Units
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	330	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 @ $T_J=175^\circ\text{C}$	1515	W
T_{SC}	Short Circuit Withstand Time @ $T_J=125^\circ\text{C}$	10	μs
T_{jmax}	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
$I^2t\text{-value, Diode}$	$V_R=0\text{V}, t=10\text{ms}, T_J=125^\circ\text{C}$	6600	A^2s
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	4000	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
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0\text{V}, I_C=3.5\text{mA}, T_J=25^\circ\text{C}$	1700			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			3.0	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	$I_C=8.0\text{mA}, V_{CE}=V_{GE}, T_J=25^\circ\text{C}$	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		2.0		V
		$I_C=200\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.4		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900\text{V}, I_C=200\text{A}, R_G=6.8\Omega, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$		285		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			802		ns

GD200HFT170C2S**IGBT Module**

t_f	Fall Time	$V_{CC}=900V, I_C=200A,$ $R_G=6.8\Omega, V_{GE}=\pm 15V,$ $T_J=25^\circ C$		122		ns
E_{on}	Turn-On Switching Loss			57		mJ
E_{off}	Turn-Off Switching Loss			44		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=200A,$ $R_G=6.8\Omega, V_{GE}=\pm 15V,$ $T_J=125^\circ C$		310		ns
t_r	Rise Time			98		ns
$t_{d(off)}$	Turn-Off Delay Time			1008		ns
t_f	Fall Time			202		ns
E_{on}	Turn-On Switching Loss			78		mJ
E_{off}	Turn-Off Switching Loss			63		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		18.0		nF
C_{oes}	Output Capacitance			0.73		nF
C_{res}	Reverse Transfer Capacitance			0.60		nF
I_{SC}	SC Data	$t_{sc}\leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=1000V,$ $V_{CEM}\leq 1700V$		800		A
R_{Gint}	Internal Gate Resistance			3.8		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip			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°C		1.8		V
			T _J =125°C		1.9		
Q _r	Diode Reverse Recovery Charge	I _F =200A, V _R =900V, di/dt=-3600A/μs, V _{GE} =-15V	T _J =25°C		51.2		μC
			T _J =125°C		85.4		
I _{RM}	Diode Peak Reverse Recovery Current		T _J =25°C		213		A
			T _J =125°C		231		
E _{rec}	Reverse Recovery Energy		T _J =25°C		25		mJ
			T _J =125°C		48		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.099	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.19	K/W
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

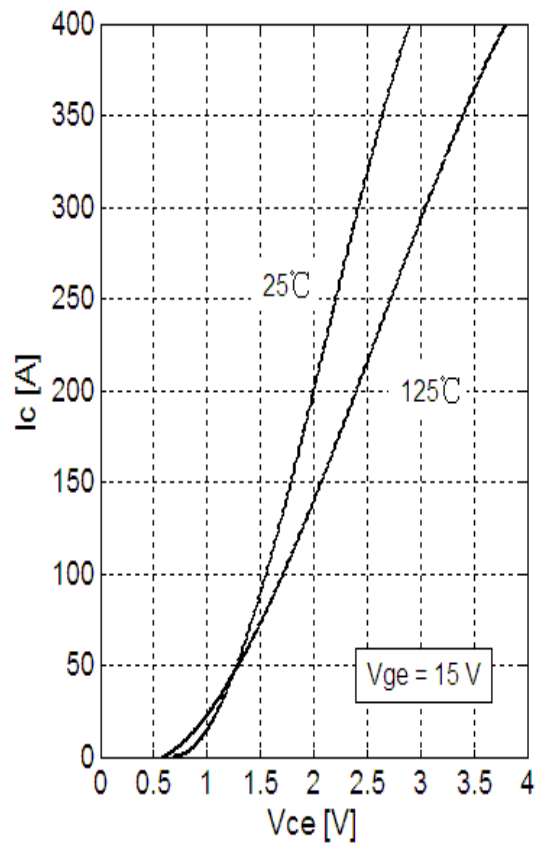


Fig 1. IGBT Typical Output Characteristics

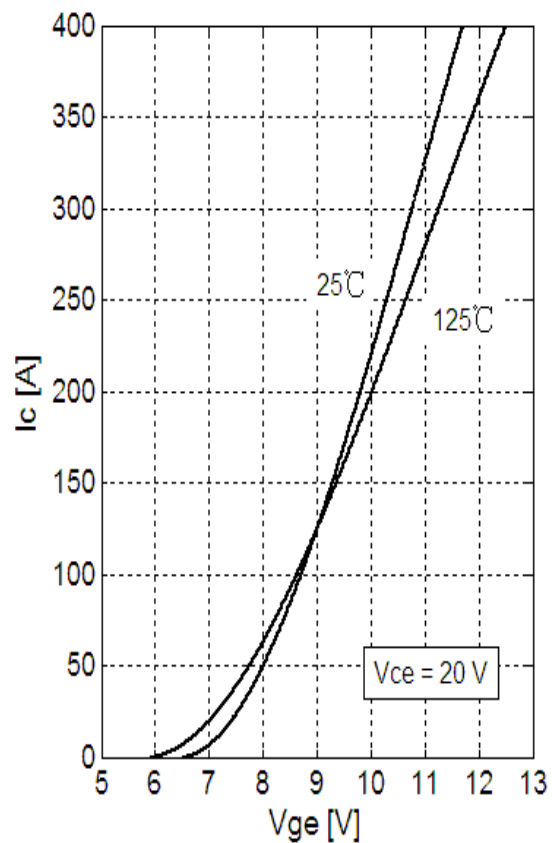


Fig 2. IGBT Typical Transfer Characteristics

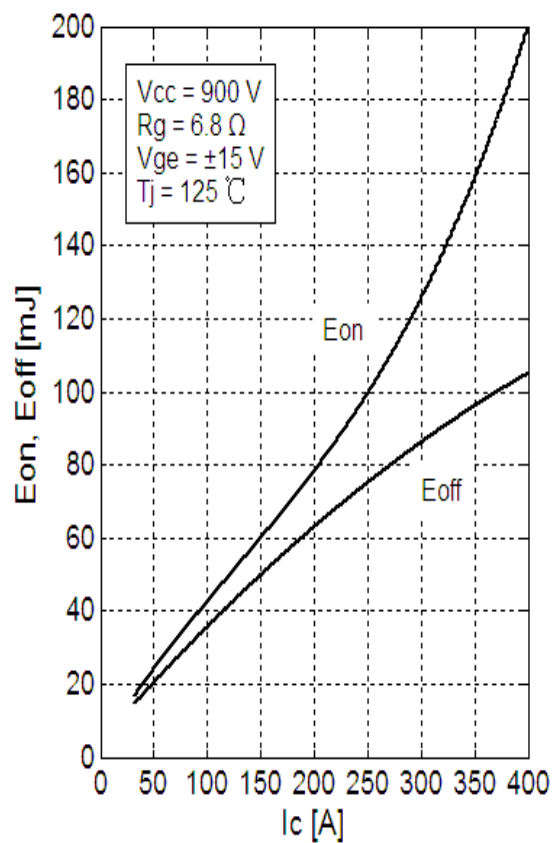


Fig 3. IGBT Switching Loss vs. Collector Current

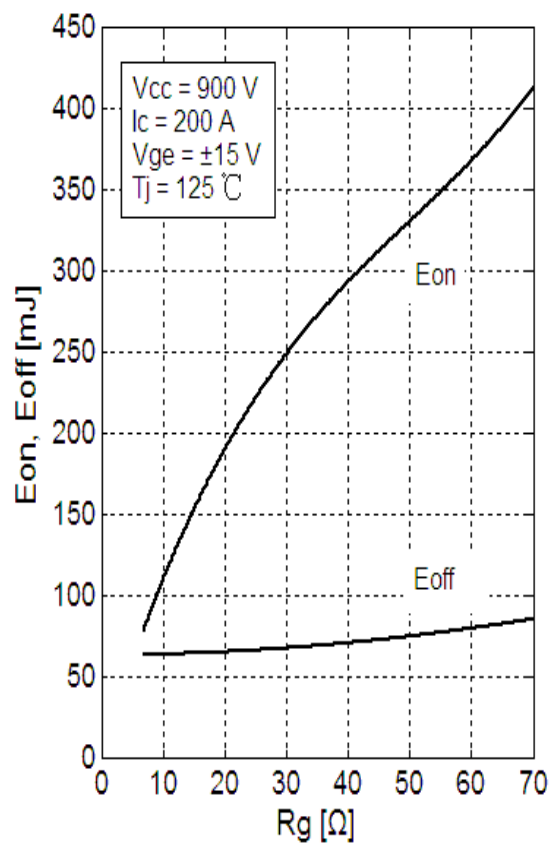


Fig 4. IGBT Switching Loss vs. Gate Resistor

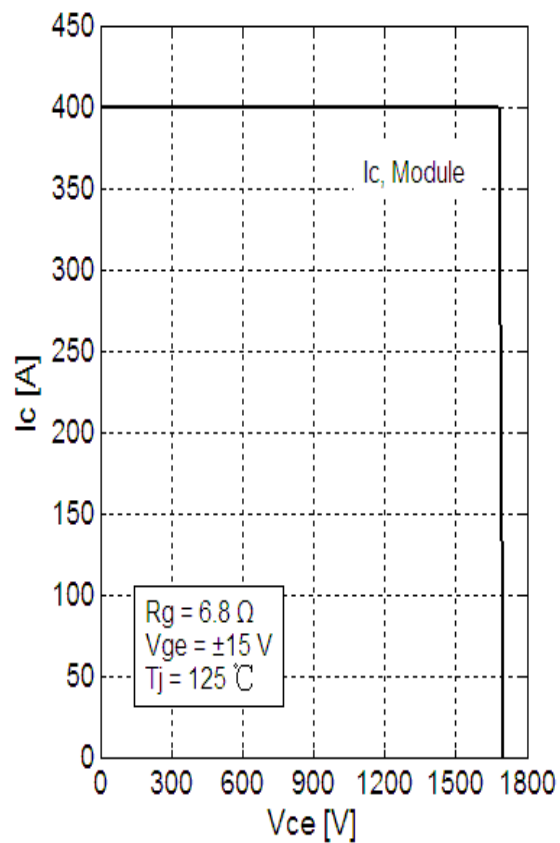


Fig 5. RBSOA

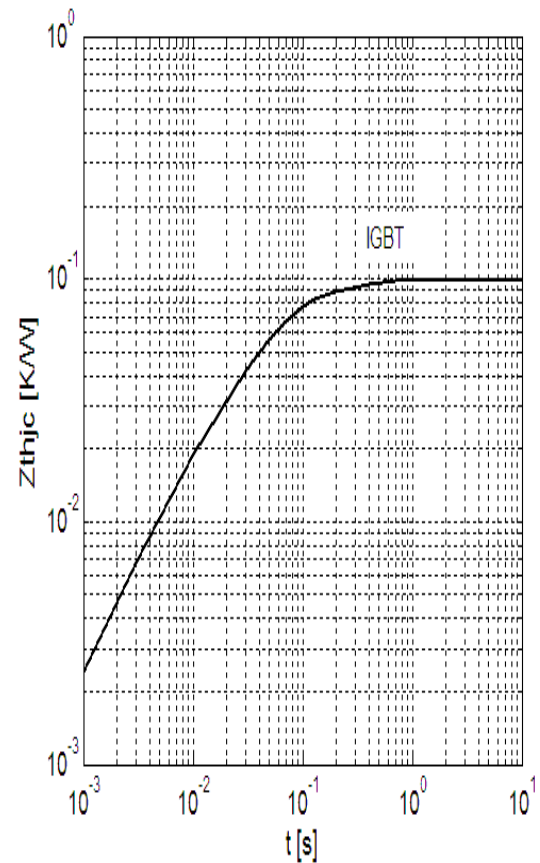


Fig 6. IGBT Transient Thermal Impedance

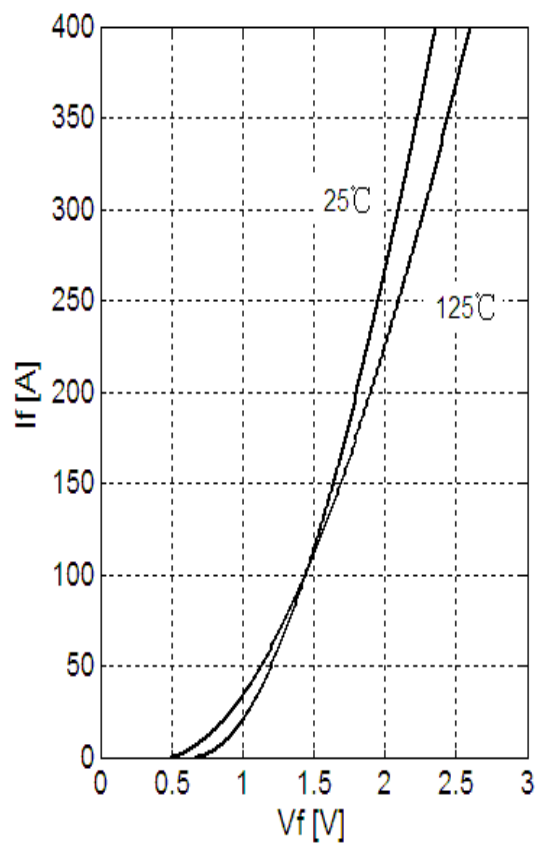


Fig 7. Forward Characteristics of Diode

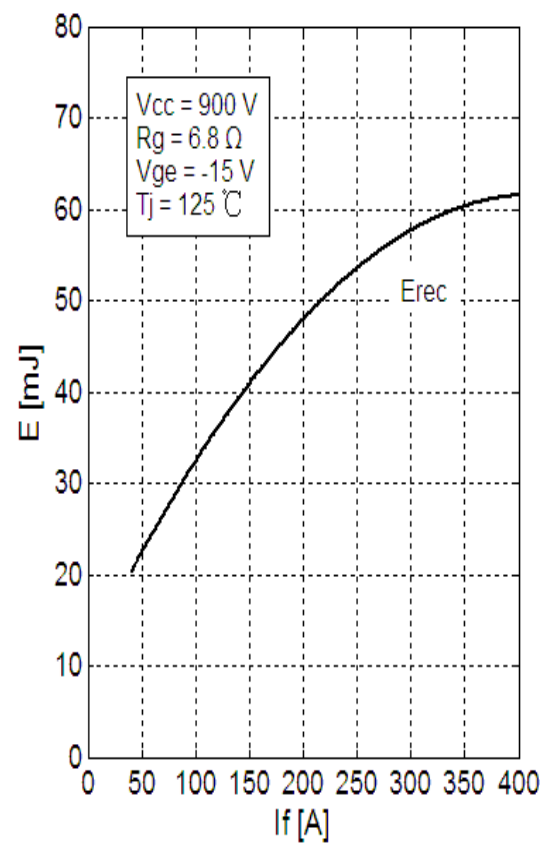


Fig 8. Diode Switching Loss vs. Collector Current

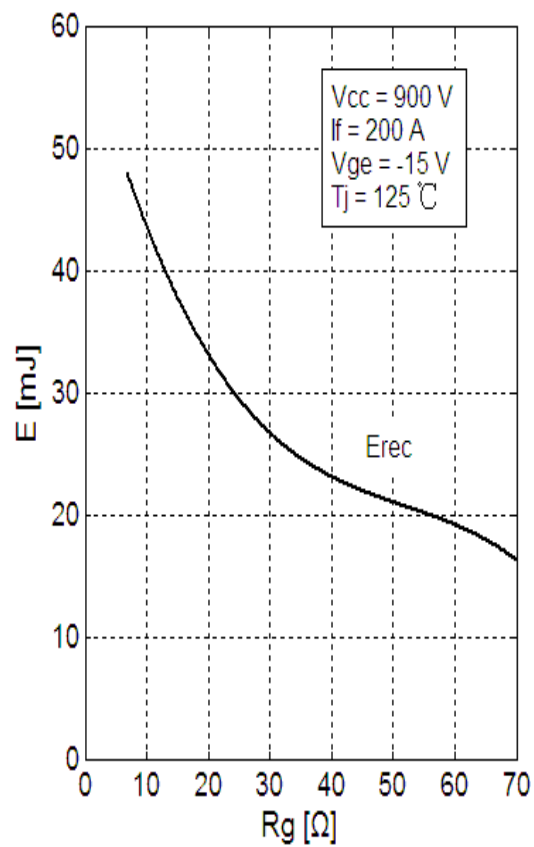


Fig9. Diode Switching Loss vs. Gate Resistor

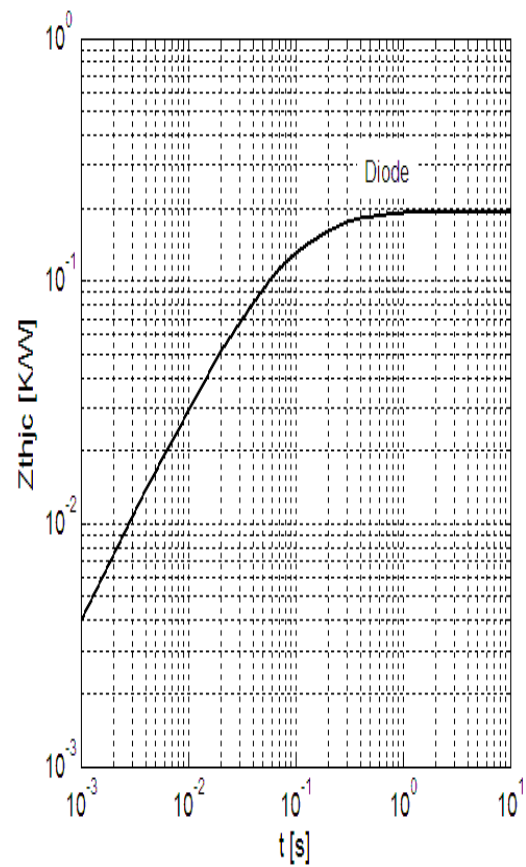


Fig 10. Diode Transient Thermal Impedance

