

IGBT

GD400HFL120C2S

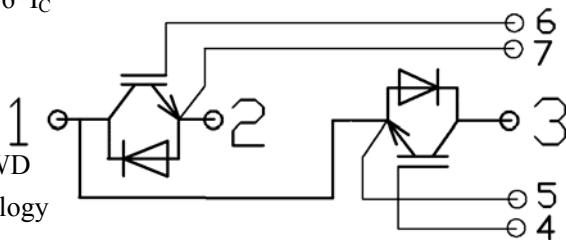
Molding Type Module

1200V/400A 2 in one-package



Features

- High short circuit capability, self limiting to $6 \cdot I_C$
- $10\mu s$ 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
- Switching mode power supplies
- Electronic welders at f_{sw} up to 20kHz

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

Symbol	Description	GD400HFL120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V

Symbol	Description	GD400HFL120C2S	Units
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$, $T_J=150^{\circ}\text{C}$	800	A
	@ $T_C=80^{\circ}\text{C}$, $T_J=150^{\circ}\text{C}$	400	
$I_{CM(1)}$	Pulsed Collector Current @ $T_C=80^{\circ}\text{C}$	800	A
I_F	Diode Continuous Forward Current	400	A
I_{FM}	Diode Maximum Forward Current	800	A
P_D	Maximum power Dissipation @ $T_J=150^{\circ}\text{C}$	2604	W
T_{SC}	Short Circuit Withstand Time @ $T_J=125^{\circ}\text{C}$	10	μs
T_J	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
I^2t -value, Diode	$V_R=0\text{V}$, $t=10\text{ms}$, $T_J=125^{\circ}\text{C}$	34	kA^2s
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	N.m
	Mounting Screw:M6	3 to 6	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	$T_J=25^{\circ}\text{C}$	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	$I_C=16\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5	6.2	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^{\circ}\text{C}$		1.9		V
		$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^{\circ}\text{C}$		2.1		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}$, $I_C=400\text{A}$, $R_G=2.5\Omega$, $V_{GE}=\pm 15\text{V}$, $T_J=25^{\circ}\text{C}$		125		ns
t_r	Rise Time			71		ns
$t_{d(off)}$	Turn-Off Delay Time			540		ns
t_f	Fall Time			72		ns

E_{on}	Turn-On Switching Loss	$V_{CC}=600V, I_C=400A,$ $R_G=2.5\Omega, V_{GE} = \pm 15V,$ $T_J=25^\circ C$		44		mJ
E_{off}	Turn-Off Switching Loss			40		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=400A,$ $R_G=2.5\Omega, V_{GE} = \pm 15V,$ $T_J=125^\circ C$		130		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			600		ns
t_f	Fall Time			80		ns
E_{on}	Turn-On Switching Loss			48		mJ
E_{off}	Turn-Off Switching Loss			43		mJ
C_{ies}	Input Capacitance	$V_{CE} = 25V, f=1MHz,$ $V_{GE} = 0V$		32.7		nF
C_{oes}	Output Capacitance			2.42		nF
C_{res}	Reverse Transfer Capacitance			1.50		nF
I_{SC}	SC Data	$t_{sc} \leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		1900		A
R_{Gint}	Internal gate resistance			2		Ω
L_{CE}	Stray inductance				18	nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	$T_C=25^\circ C$		0.32		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 =400A	T _J =25°C		2.15	2.20	V
			T _J =125°C		1.99	2.03	
Q _r	Diode Reverse Recovery Charge	I _F =400A, V _R =600V, di/dt=-6000A/μs, V _{GE} =-15V	T _J =25°C		52		μC
			T _J =125°C		64		
I _{RM}	Diode Peak Reverse Recovery Current		T _J =25°C		360		A
			T _J =125°C		420		
E _{rec}	Reverse Recovery Energy		T _J =25°C		20		mJ
			T _J =125°C		27		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.048	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.085	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.032		K/W
Weight	Weight of Module	340		g

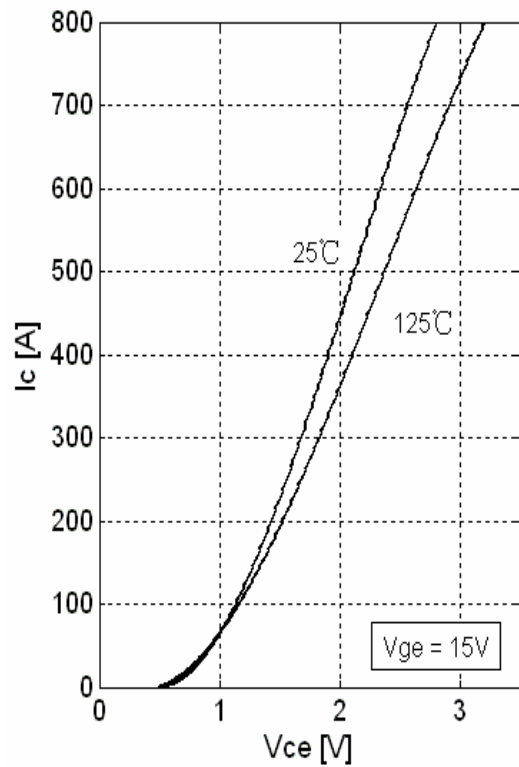


Fig 1. Typical Output Characteristics

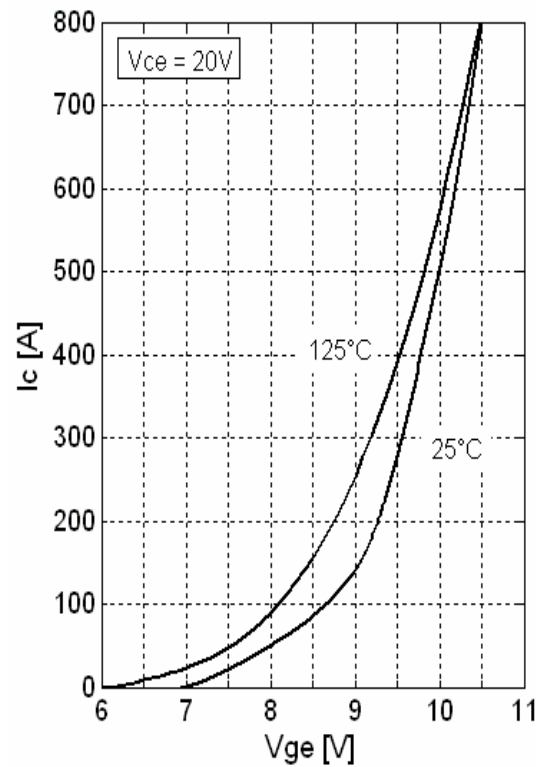


Fig 2. Typical Transfer Characterist

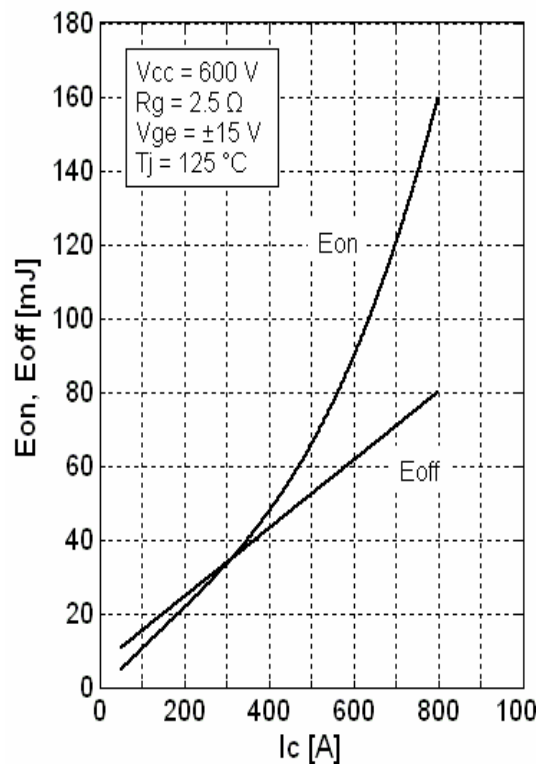


Fig 3. Switching Loss vs Collector Current

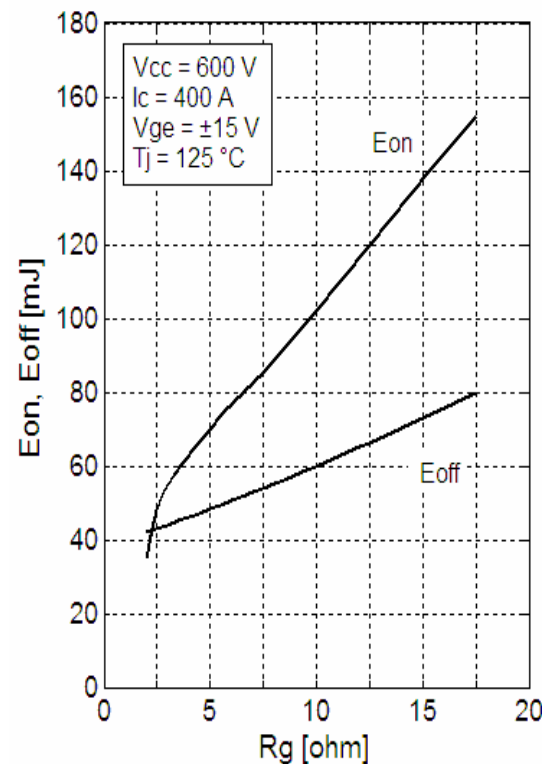


Fig 4. Switching Loss vs Gate Resistor

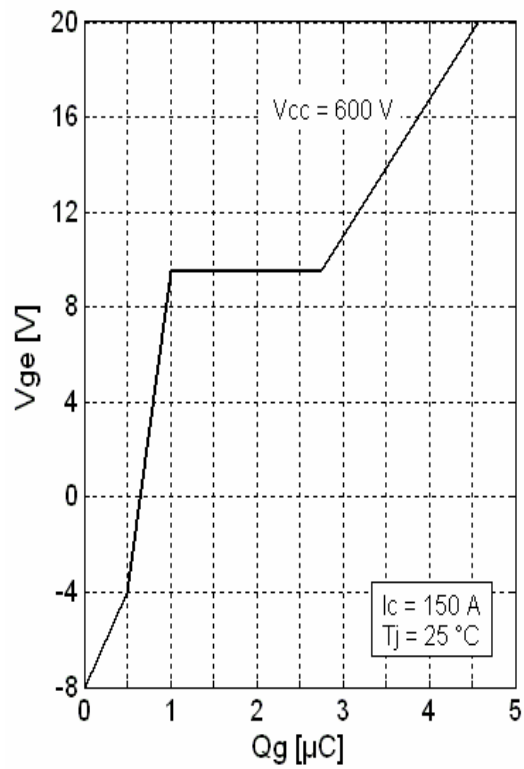
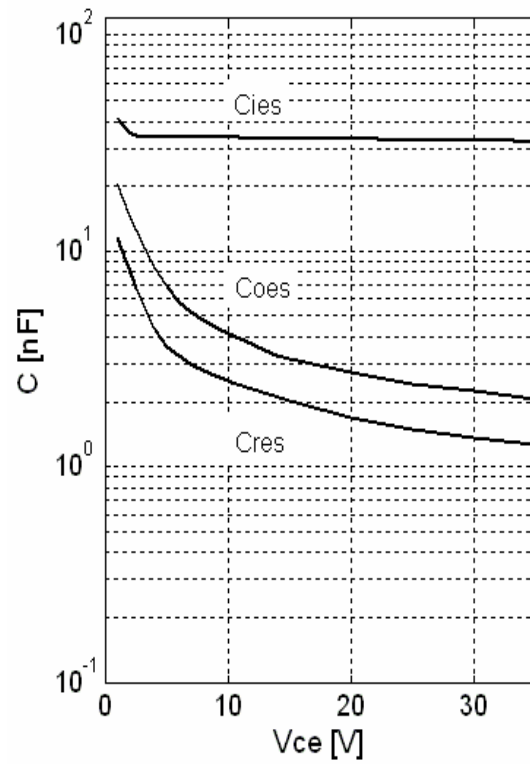
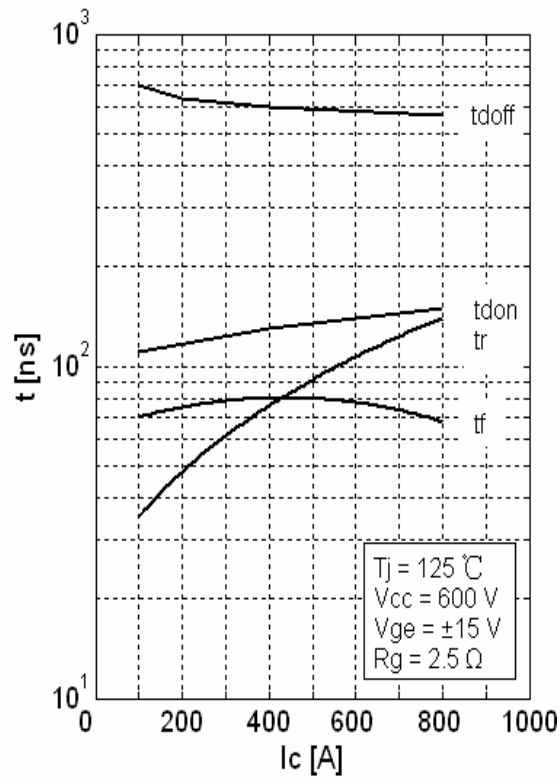
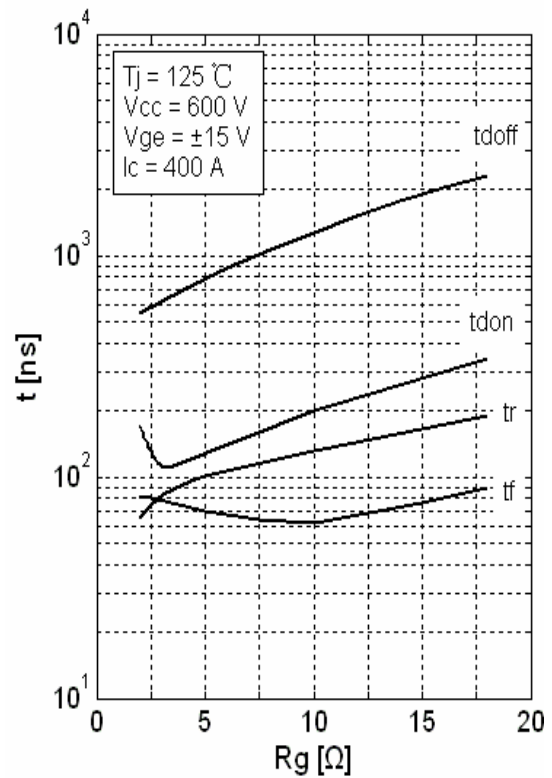


Fig 5. Gate Charge Characteristics.

Fig 6. Typical Capacitance vs
Collector-Emitter VoltageFig 7. Typical Switching Times vs I_c Fig 8. Typical Switching Times vs
Gate Resistance R_g

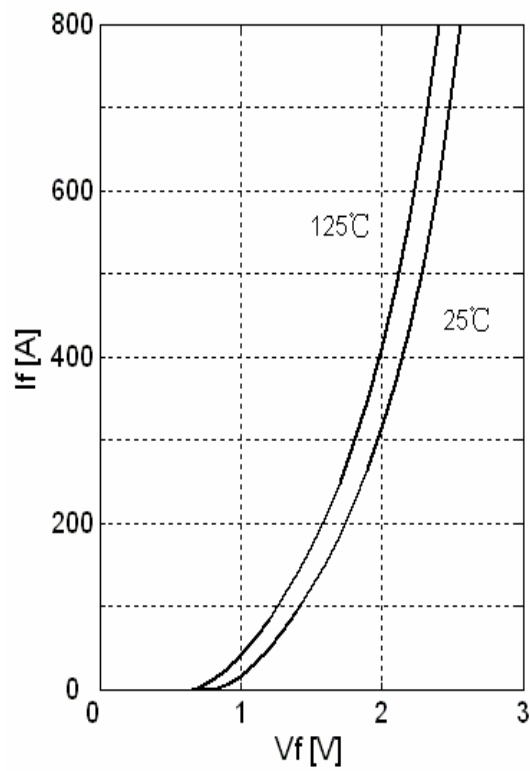


Fig 9. Typical Forward Characteristics(diode)

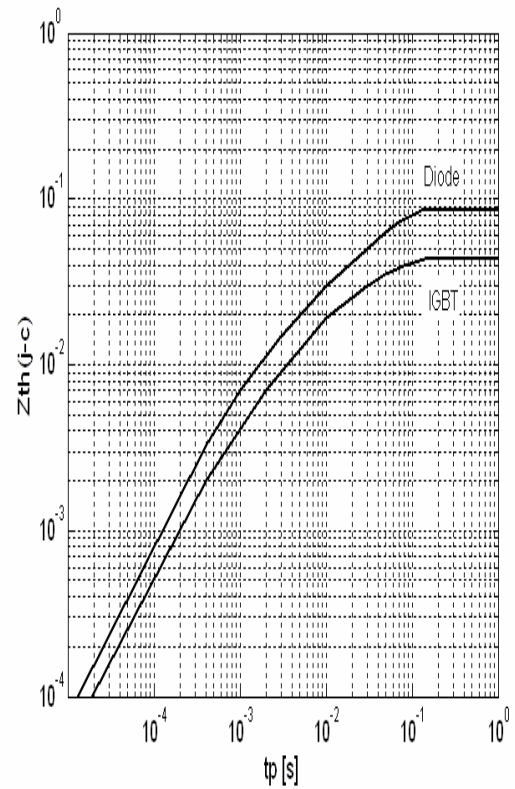


Fig 10. Transient thermal impedance

Package Dimension

Dimensions in Millimeters

