STARPOWER

SEMICONDUCTOR™

IGBT

GD150HFL120C8S

Molding Type Module

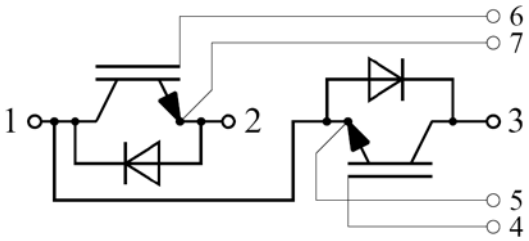
1200V/150A 2 in one-package

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



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	GD150HFL120C8S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	300	A
	@ T_C=80℃	150	
$I_{CM(1)}$	Pulsed Collector Current t_p=1ms	300	A
I_F	Diode Continuous Forward Current	150	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	300	A
P_D	Maximum Power Dissipation @ T_j=175℃	1071	W
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	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	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℃ 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=6.0mA,V_{CE}=V_{GE}, T_j=25℃	5.0	6.2	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=150A,V_{GE}=15V, T_j=25℃		1.90	2.35	V
		I_C=150A,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=150A, R_G=4.7Ω,V_{GE}=±15V, T_j=25℃		336		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			346		ns
t_f	Fall Time			182		ns
E_{on}	Turn-On Switching Loss			7.25		mJ
E_{off}	Turn-Off Switching Loss			9.30		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=150A, R_G=4.7Ω,V_{GE}=±15V, T_j=125℃		346		ns
t_r	Rise Time			77		ns
$t_{d(off)}$	Turn-Off Delay Time			389		ns
t_f	Fall Time			322		ns
E_{on}	Turn-On Switching Loss			9.95		mJ
E_{off}	Turn-Off Switching Loss			16.0		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		11.0		nF
C_{oes}	Output Capacitance			0.80		nF
C_{res}	Reverse Transfer Capacitance			0.52		nF
I_{SC}	SC Data	t_{SC}≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		890		A
R_{Gint}	Internal Gate Resistance			1.5		Ω
L_{CE}	Stray Inductance				26	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25℃		0.62		mΩ

Electrical Characteristics of DIODE T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=150A	T_j=25℃		1.80	2.20	V
			T_j=125℃		1.85		
Q_r	Recovered Charge	I_F=150A, V_R=600V, di/dt=-2360A/μs, V_{GE}=-15V	T_j=25℃		16.2		μC
			T_j=125℃		26.6		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		138		A
			T_j=125℃		166		
E_{rec}	Reverse Recovery Energy		T_j=25℃		7.48		mJ
			T_j=125℃		13.4		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.140	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.240	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.046		K/W
Weight	Weight of Module	200		g

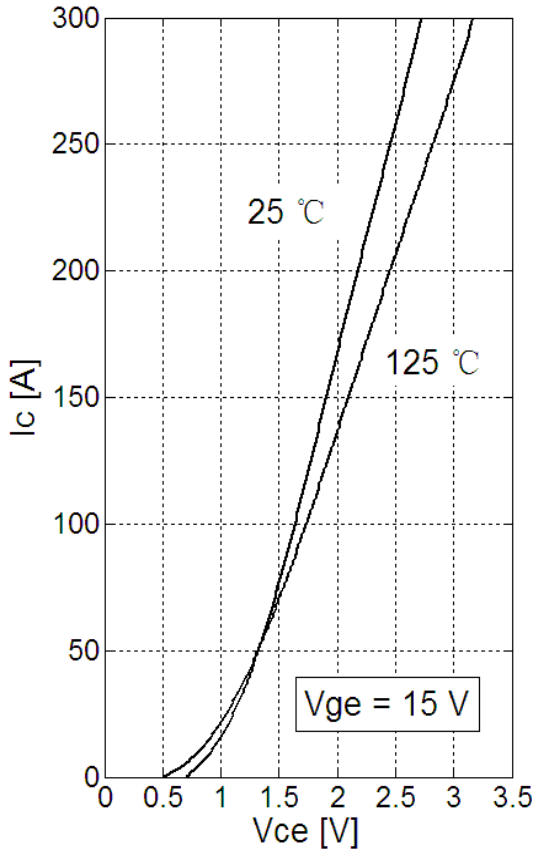


Fig 1. IGBT Typical Output Characteristics

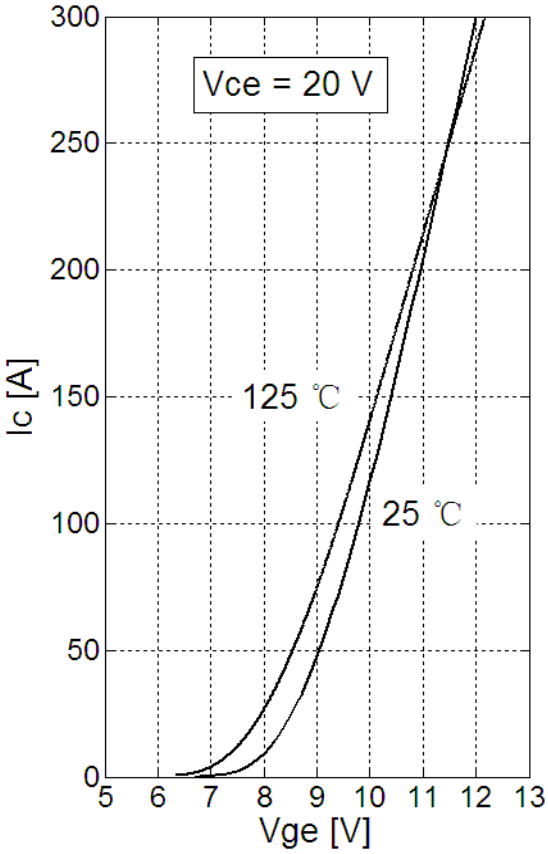


Fig 2. IGBT Typical Transfer Characteristics

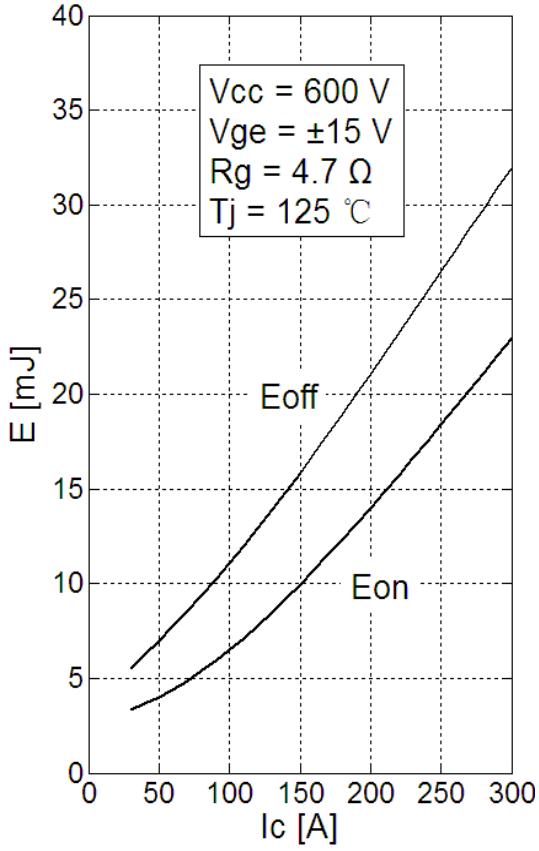


Fig 3. IGBT Switching Loss vs. I_C

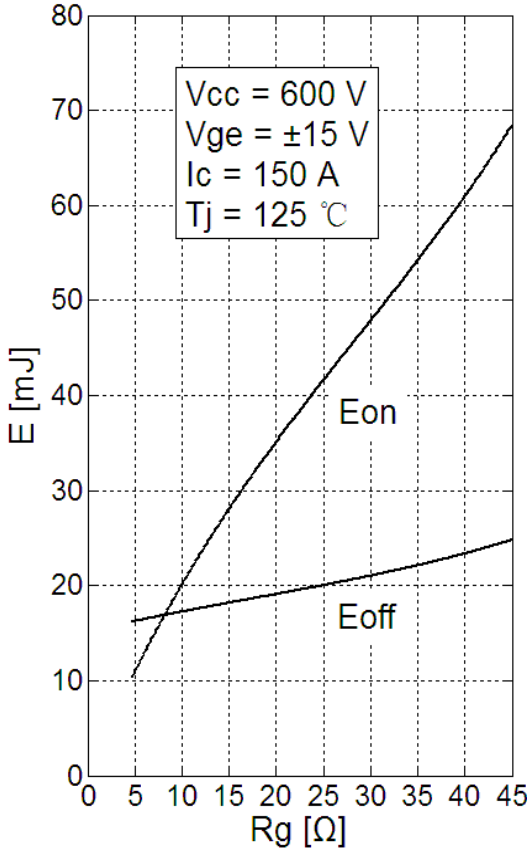


Fig 4. IGBT Switching Loss vs. R_G

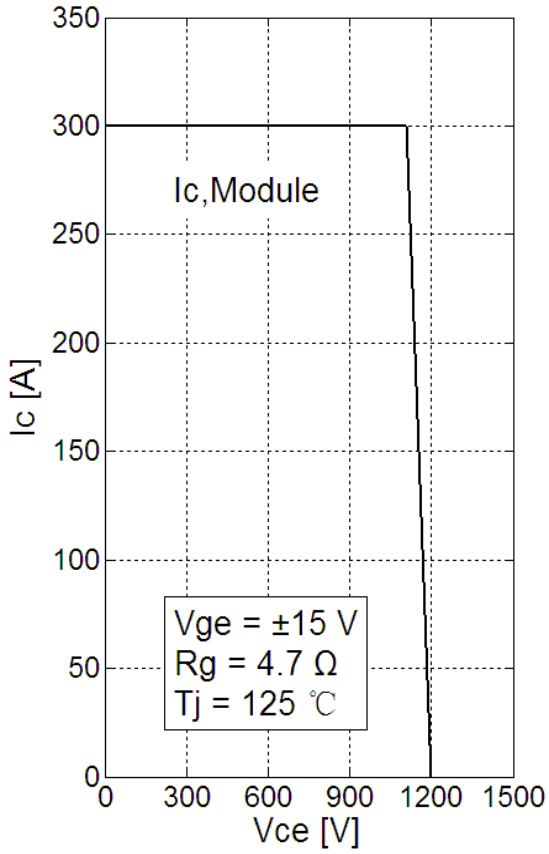


Fig 5. RBSOA

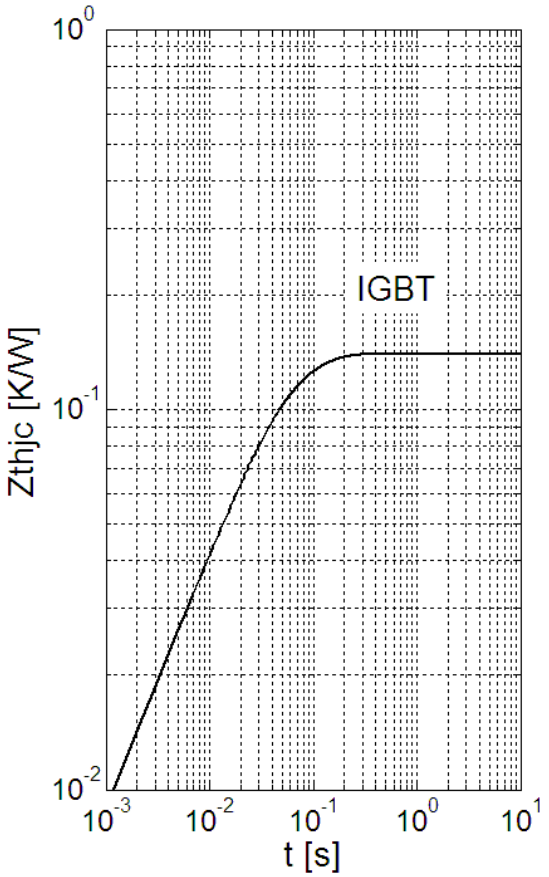


Fig 6. IGBT Transient Thermal Impedance

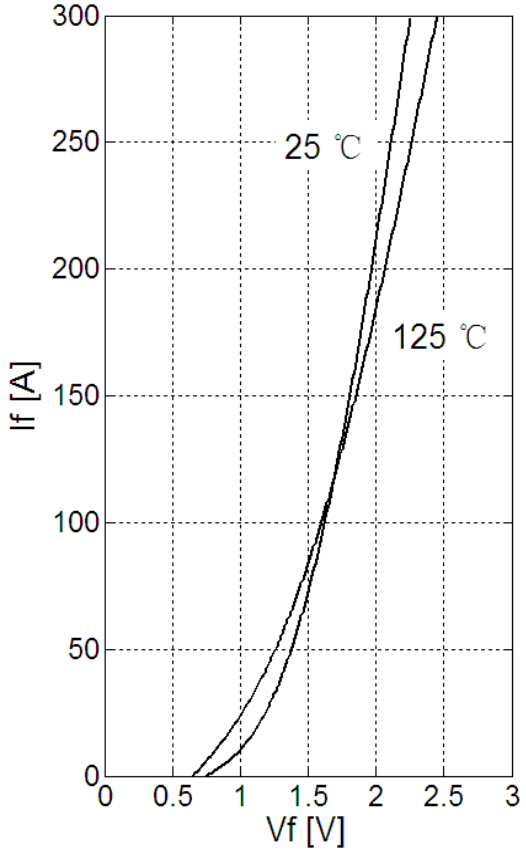


Fig 7. Diode Typical Forward Characteristics

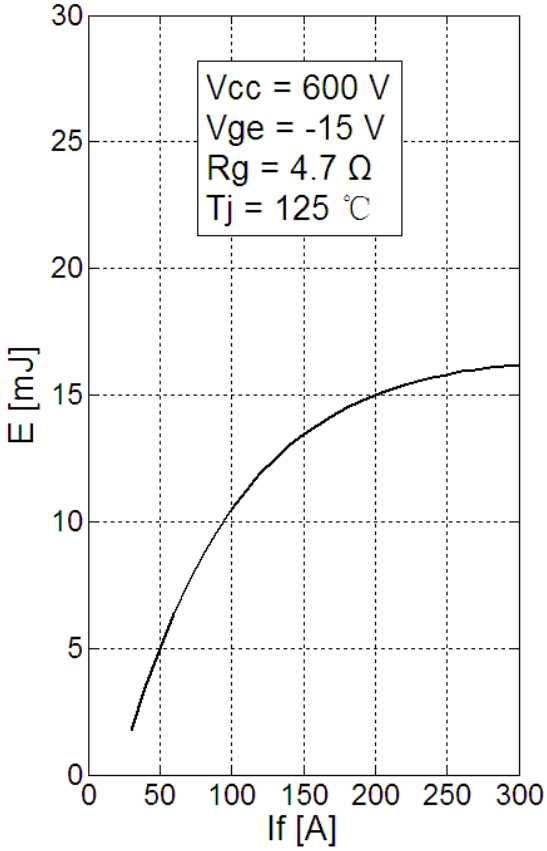


Fig 8. Diode Switching Loss vs. I_F

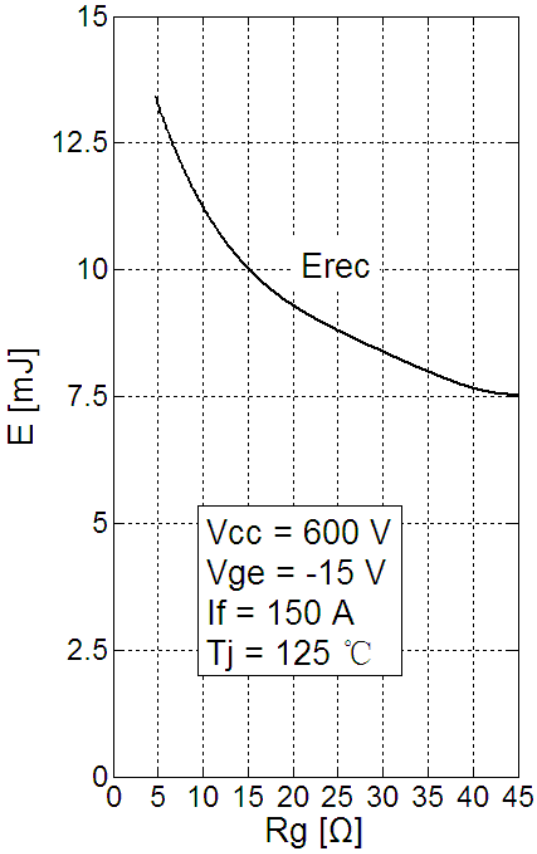


Fig 9. Diode Switching Loss vs. R_G

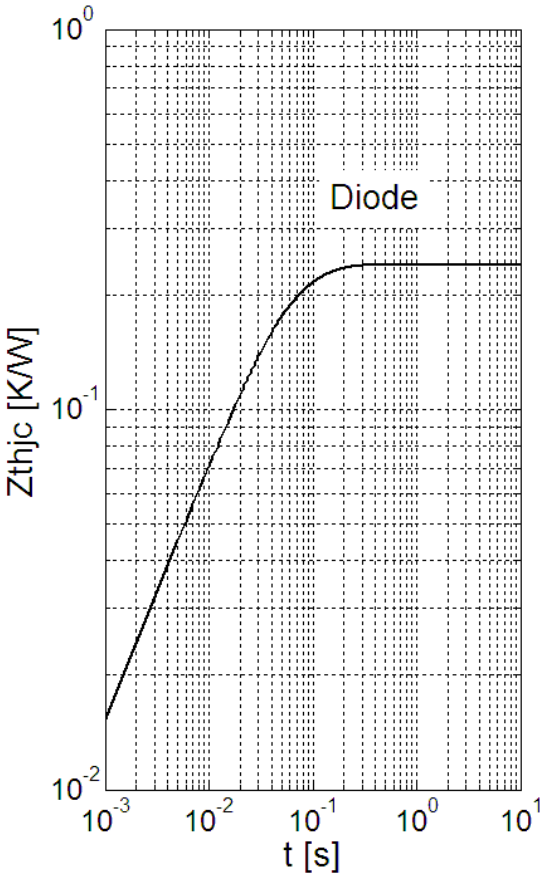
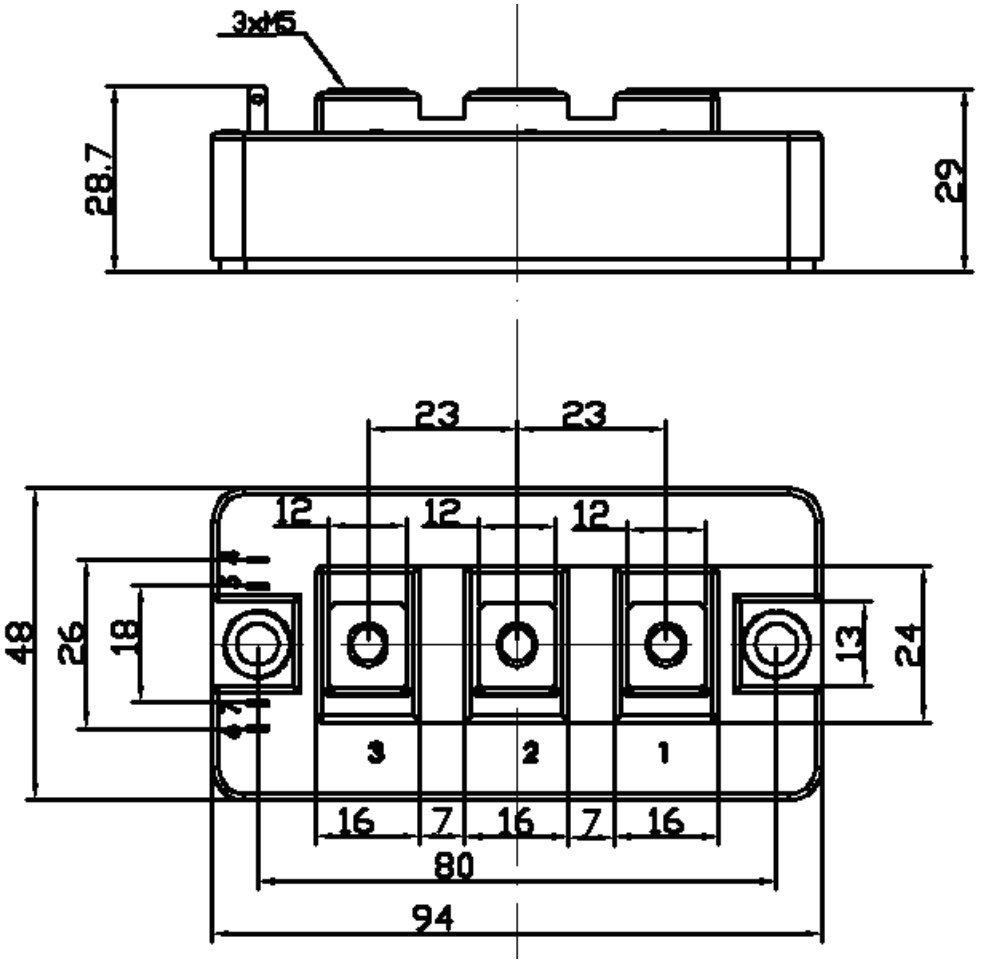


Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters



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