STARPOWER

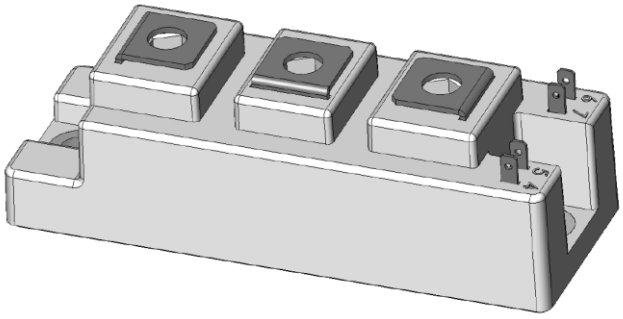
SEMICONDUCTOR™

IGBT

GD75HFL120C1S

Molding Type Module

1200V/75A 2 in one-package

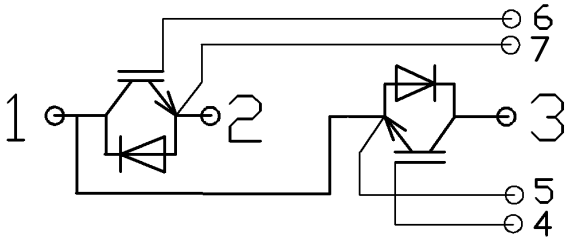


General Description

StarPower IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. It's designed for the applications such as SMPS and UPS.

Features

- High short circuit capability, self limiting to 6*I_{Cnom}
- Ultra low loss IGBT technology
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Latch-up free
- Isolated copper baseplate using DCB Direct Copper Bonding technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies
- DC servo and robot drives
- AC motor speed control
- UPS
- General power switching applications
- Inverters and DC choppers
- Electronics welders up to 20k Hz

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Description	GD75HFL120C1S	Units
V_{CES}	Collector-Emitter Voltage	1200	V

Symbol	Description	GD75HFL120C1S	Units
V_{GES}	Gate-Emitter Voltage	±20V	V
I_C	Collector Current @25℃	180	A
	@80℃	75	
$I_{CM(1)}$	Pulsed Collector Current @80℃	150	A
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current	150	A
P_D	Maximum power Dissipation @ Tc=25℃	650	W
T_{SC}	Short Circuit Withstand Time @ Tc=100℃	10	us
T_J	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
I^2t-value, Diode	V_R=0V, t=10ms, T_j=125℃	1.19	kA^2s
V_{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	2500	V
Mounting Torque	Power Terminal Screw:M5	2.5 to 5	N.m
	Mounting Screw:M6	3 to 5	N.m

Notes:

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

Electrical Characteristics of IGBT Tc=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
B_{VCES}	Collector-Emitter Breakdown Voltage	T_J=25℃	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$,V_{GE}=0V			100	uA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}$,V_{CE}=0V @ T_J=25℃			200	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=3mA,$V_{CE}=V_{GE}$	5	6.4	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=75A,V_{GE}=15V， @25℃		1.8		V
		I_C=75A,V_{GE}=15V， @125℃		2.0		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A,R_G=4.7 Ω, V_{GE} =±15V, T_C = 25℃		150		ns
t_r	Rise Time			37		ns
$t_{d(off)}$	Turn-Off Delay Time			400		ns
t_f	Fall Time			55		ns

E_{on}	Turn-On Switching Loss			7.2		mJ
E_{off}	Turn-Off Switching Loss			4.9		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=75A,R_G=4.7Ω, V_{GE} = ± 15V, T_C = 125℃		160		ns
t_r	Rise Time			40		ns
$t_{d(off)}$	Turn-Off Delay Time			450		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			10		mJ
E_{off}	Turn-Off Switching Loss			7.8		mJ
C_{ies}	Input Capacitance	V_{CE} =25V, f=1MHz, V_{GE} =0V		5.52		nF
C_{oes}	Output Capacitance			0.40		nF
C_{res}	Reverse Transfer Capacitance			0.26		nF
L_{CE}	Stray inductance			30		nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	T_C = 125℃		1		mΩ

Electrical Characteristics of DIODE Tc=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_{FM}	Diode Forward Voltage	I_F=75A	T_C = 25℃		1.75	2.3	V
			T_C = 125℃		1.80	2.4	
t_{rr}	Diode Reverse Recovery Time	I_F=75A, V_R=600V, di/dt=-2000 A/us, V_{GE}=-15V	T_C = 25℃		100	120	ns
			T_C = 125℃		125		
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25℃		80		A
			T_C = 125℃		100		
E_{rec}	Reverse Recovery Energy		T_C = 25℃		3.0		mJ
			T_C = 125℃		6		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.20	℃/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.50	℃/W
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.05		℃/W
Weight	Weight of Module	150		g

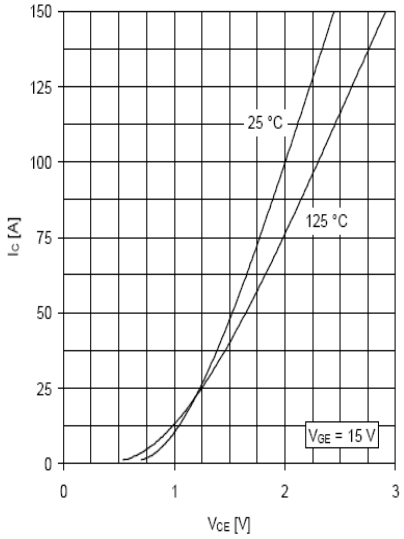


Fig 1. Typical Output Characteristics

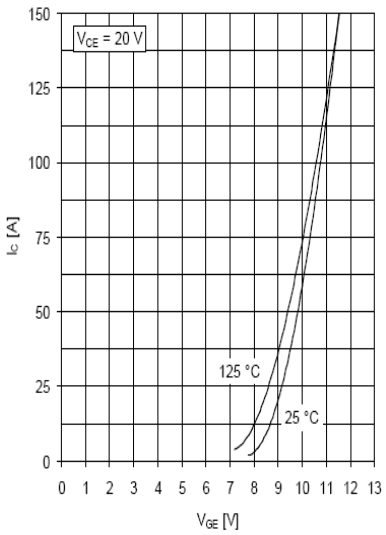


Fig 2. Typical Transfer Characteristics

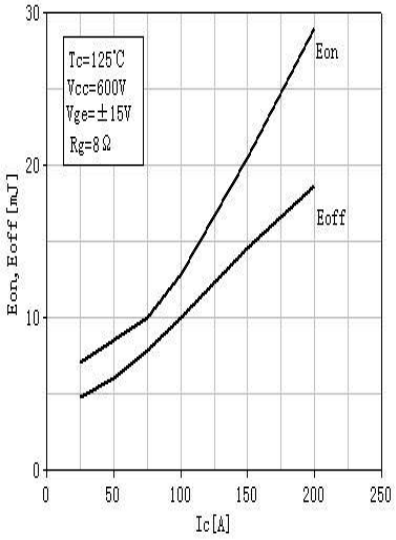


Fig 3.Switching Loss vs Collector Current

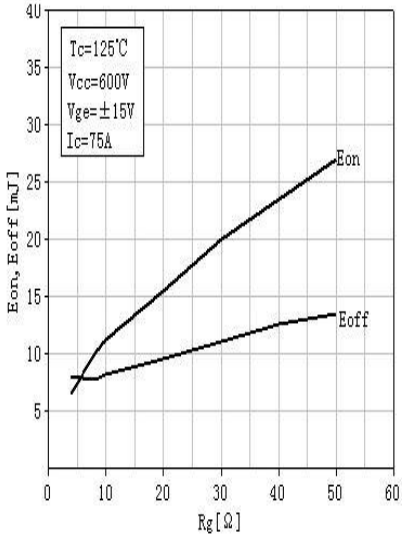


Fig 4. Switching Loss vs Gate Resistor

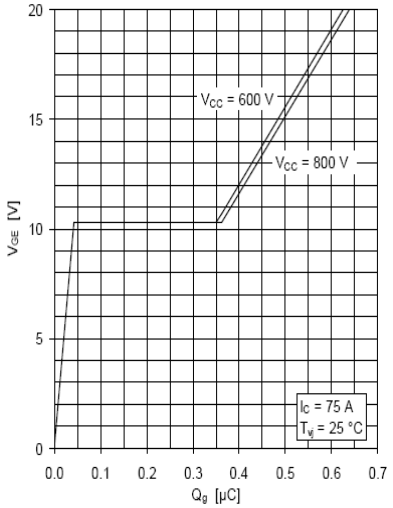


Fig 5. Gate Charge Characteristics.

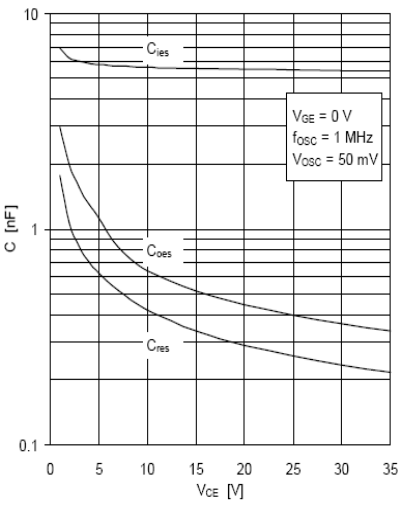


Fig 6. Typical Capacitance vs Collector-Emitter Voltage

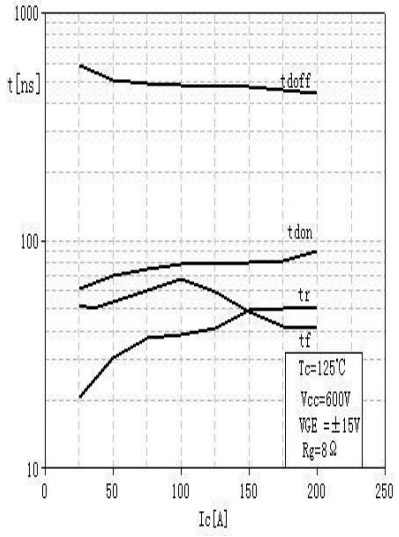


Fig 7. Typical Switching Times vs I_C

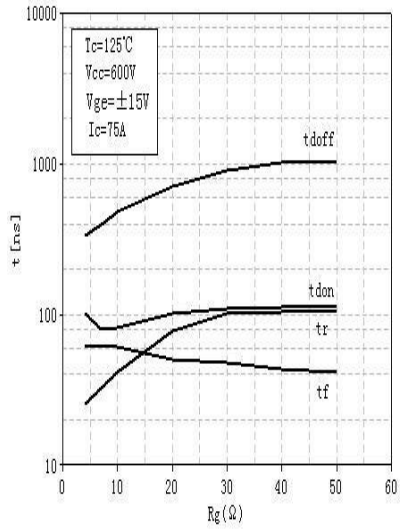


Fig 8. Typical Switching Times vs Gate Resistance R_G

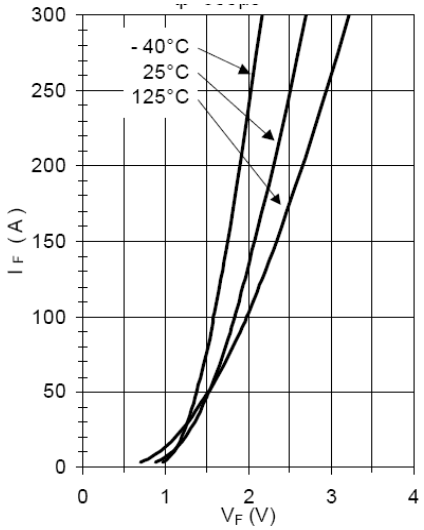


Fig 9.Typical Forward Characteristics (diode)

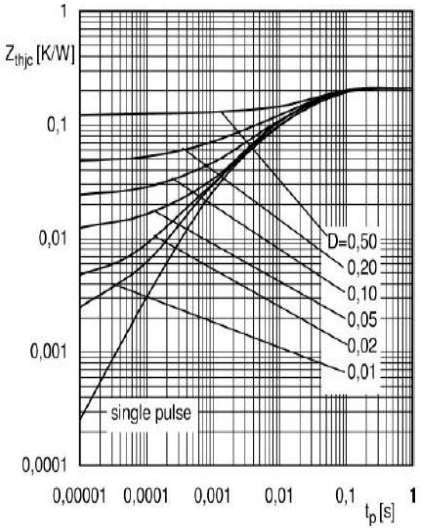


Fig 11.Transient thermal impedance of IGBT

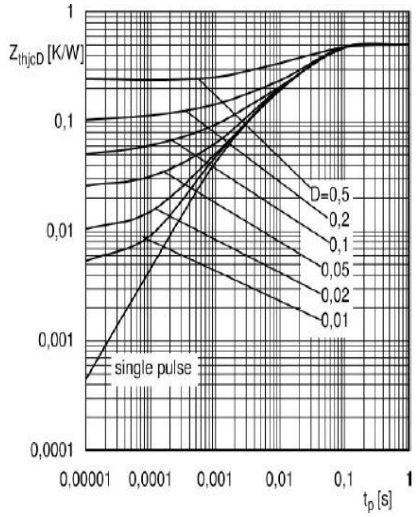
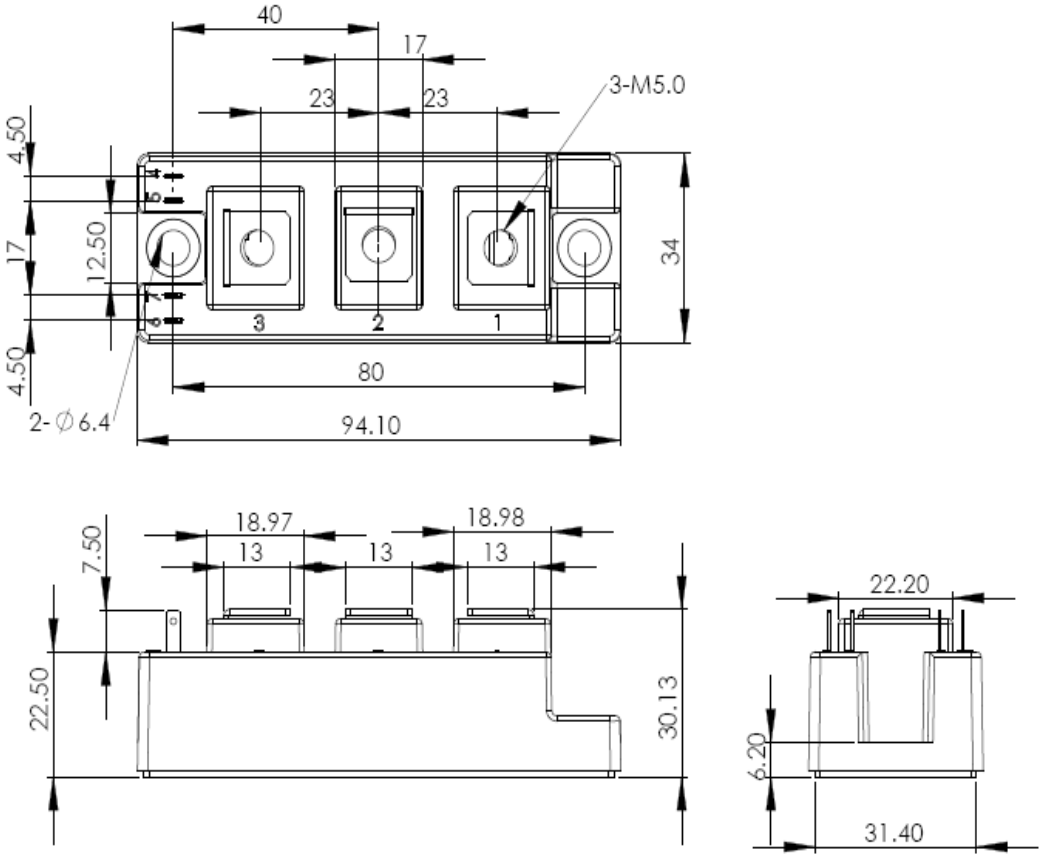


Fig 12.Transient thermal impedance of FWD

Package Dimension

Dimensions in Millimeters



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