STARPOWER

SEMICONDUCTOR™

IGBT

GD100HFU120C2S

Molding Type Module

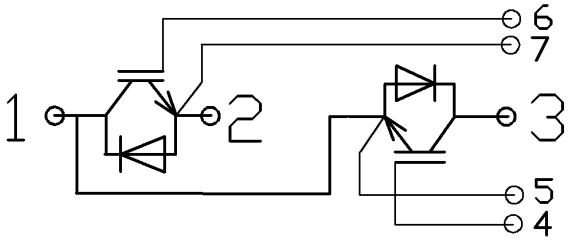
1200V/100A 2 in one-package

General Description

STARPOWER IGBT Power Module provides ultrafast Switching speed as well as short circuit ruggedness. It's designed for the applications such as electronic welders and Inductive heating.

Features

- High short circuit capability, self limiting to 6*I_{Cnom}
- Rugged with ultrafast performance
- Low t_{rr} and I_{rr}
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- 10us short circuit capability
- Isolated copper baseplate using DCB Direct Copper Bonding technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies at f_{sw}>20kHz
- Resonant inverters up to 100kHz
- Inductive heating
- UPS
- Electronic welders at f_{sw}>20kHz

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Description	GD100HFU120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V

Symbol	Description	GD100HFU120C2S	Units
V_{GES}	Gate-Emitter Voltage	±20V	V
I_C	Collector Current @80℃	100	A
$I_{CM(1)}$	Pulsed Collector Current @80℃	200	A
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current	200	A
P_D	Maximum power Dissipation @ Tc=25℃	800	W
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℃	4000	A^2s
V_{ISO}	Isolation Voltage	2500	V
Mounting Torque	Power Terminal Screw:M6	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		0.15	0.45	mA
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=4mA,V_{CE}=V_{GE}	4.4	5.02	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=100A,V_{GE}=15V，@25℃		3.46	3.7	V
		I_C=100A,V_{GE}=15V，@125℃		3.52		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A,R_G=9Ω,V_{GE} = ± 15V,Inductive Load, T_C = 25℃		100		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			460		ns
t_f	Fall Time			21		ns
E_{on}	Turn-On Switching Loss			9		mJ

E_{off}	Turn-Off Switching Loss			5		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A,R_G=9Ω, V_{GE} =±15V, Inductive Load, T_C = 125℃		110		ns
t_r	Rise Time			62		ns
$t_{d(off)}$	Turn-Off Delay Time			500		ns
t_f	Fall Time			30		ns
E_{on}	Turn-On Switching Loss			9		mJ
E_{off}	Turn-Off Switching Loss			5		mJ
T_{SC}	Short Circuit Withstand Time	V_{CC}=600V, V_{GE} = 20V@T_C = 125℃	10			us
C_{ies}	Input Capacitance	V_{CE} =20V, f=1MHz, V_{GE} =0V		13.6		nF
C_{oes}	Output Capacitance			1.11		nF
C_{res}	Reverse Transfer Capacitance			0.82		nF
L_{CE}	Stray inductance			20	25	nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip			0.8		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=100A	T_C = 25℃		2.10	2.5	V
			T_C = 125℃		2.25		
t_{rr}	Diode Reverse Recovery Time	I_F=100A, V_R=600V,di/dt=-1000A/us，V_{GE}=0V	T_C = 25℃		180		ns
			T_C = 125℃		---		
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25℃		50		A
			T_C = 125℃		75		
Q_{rec}	Reverse Recovery Charge		T_C = 25℃		6		uC
			T_C = 125℃		15		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.15	℃/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.30	℃/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.03		℃/W
Weight	Weight of Module	300		g

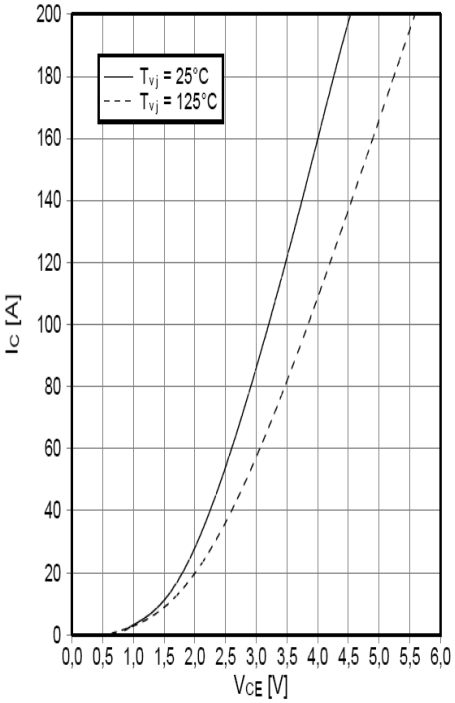


Fig 1. Typical Output Characteristics

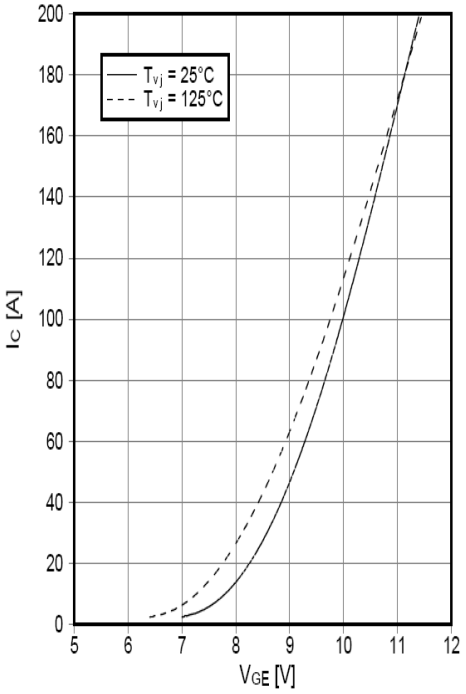


Fig 2. Typical transfer Characteristics

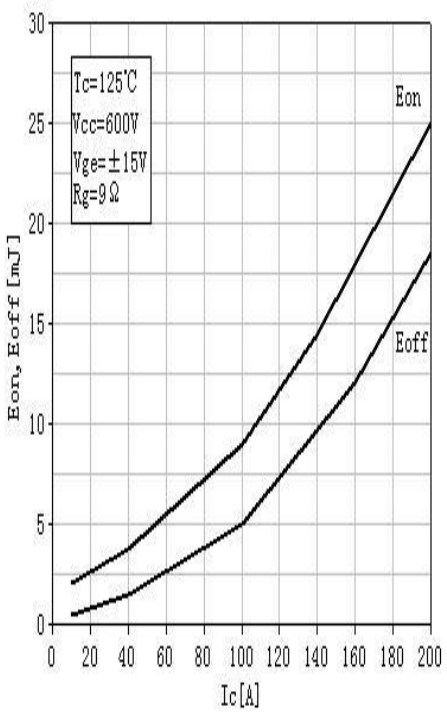


Fig 3.Switching Loss vs. Collector Current

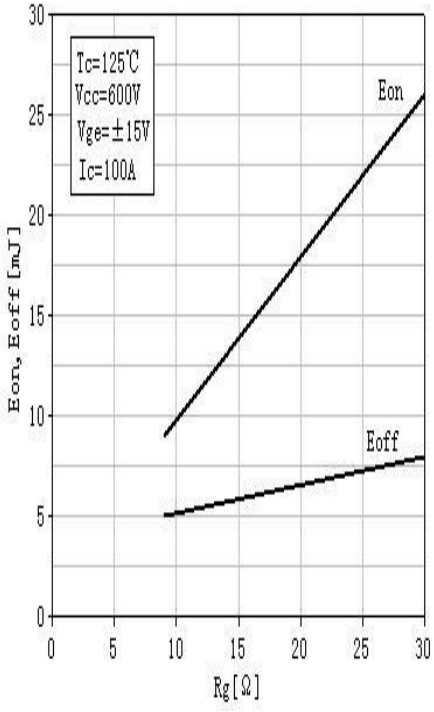


Fig 4. Switching Loss vs. Gate Resistance

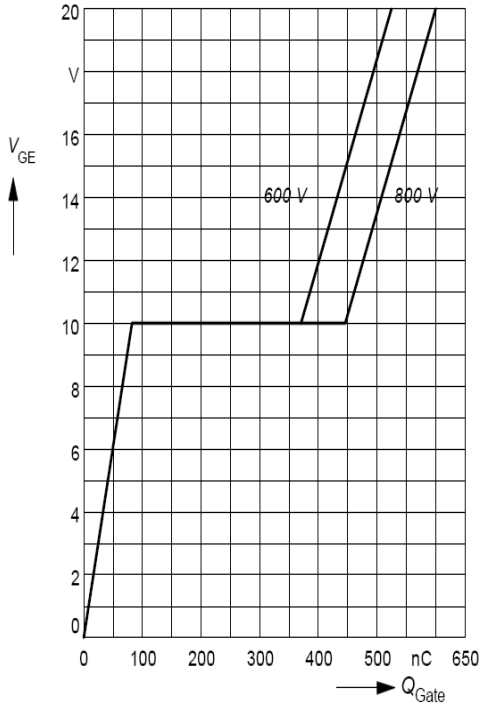


Fig 5. Gate Charge Characteristics.

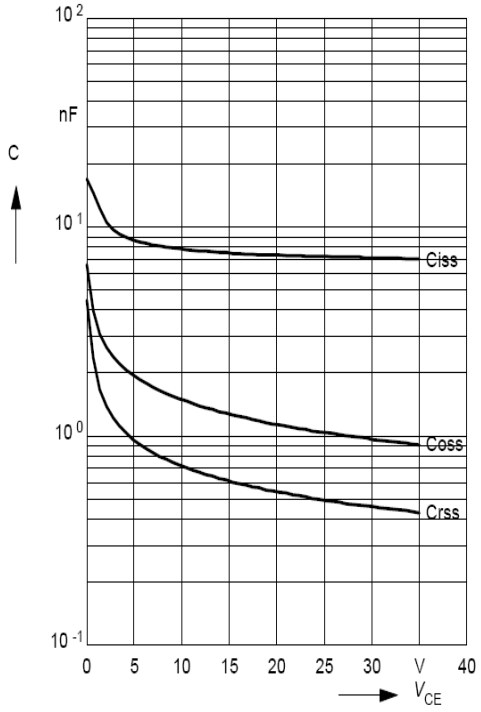


Fig 6. Typical Capacitance vs. Collector-Emitter Current

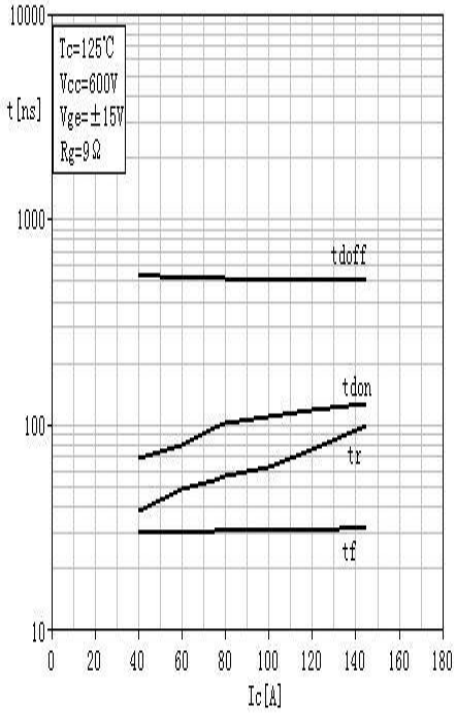


Fig 7. Typical Switching Times vs. I_C

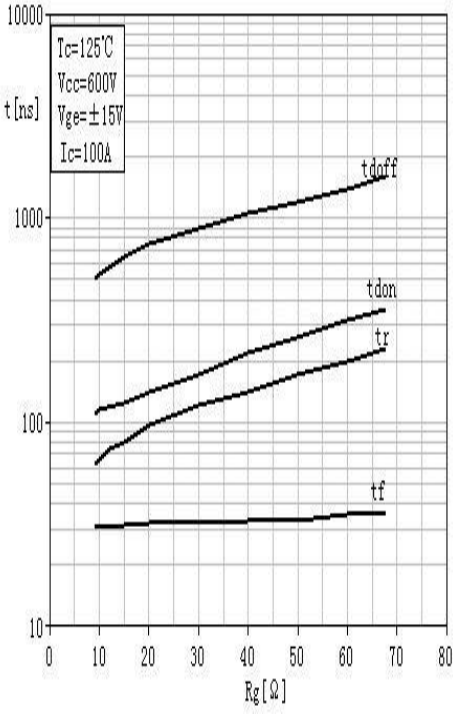


Fig 8. Typical Switching Times vs. Gate Resistance R_G

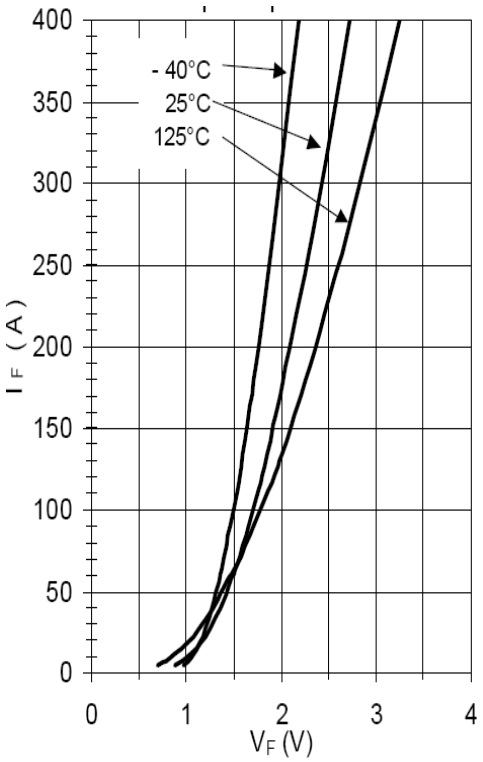


Fig 9.Typical Forward Characteristics(diode)

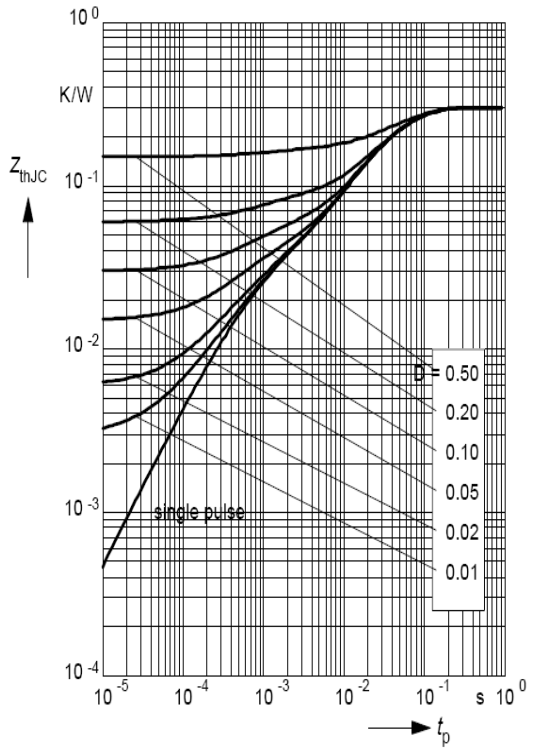


Fig 10. transient thermal impedance diode

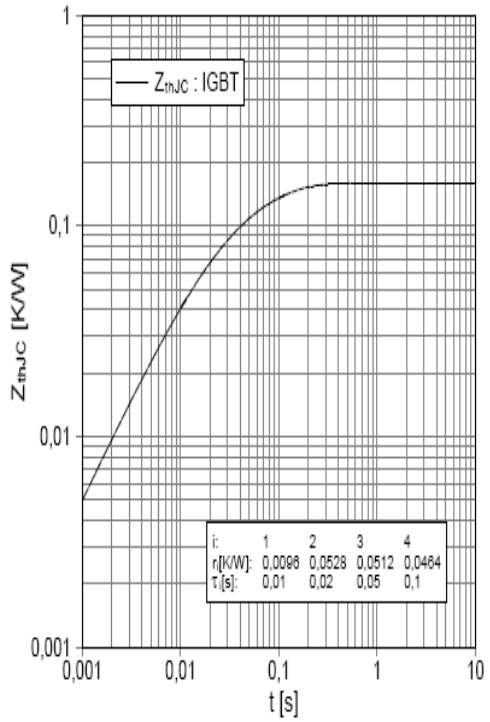


Fig 11. transient thermal impedance IGBT

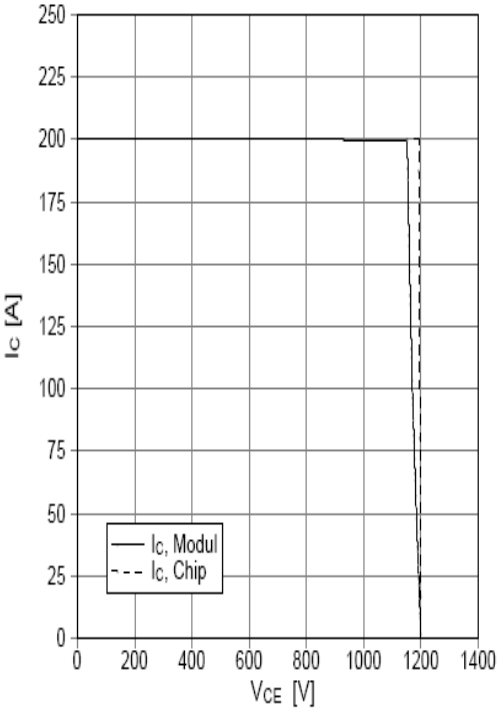
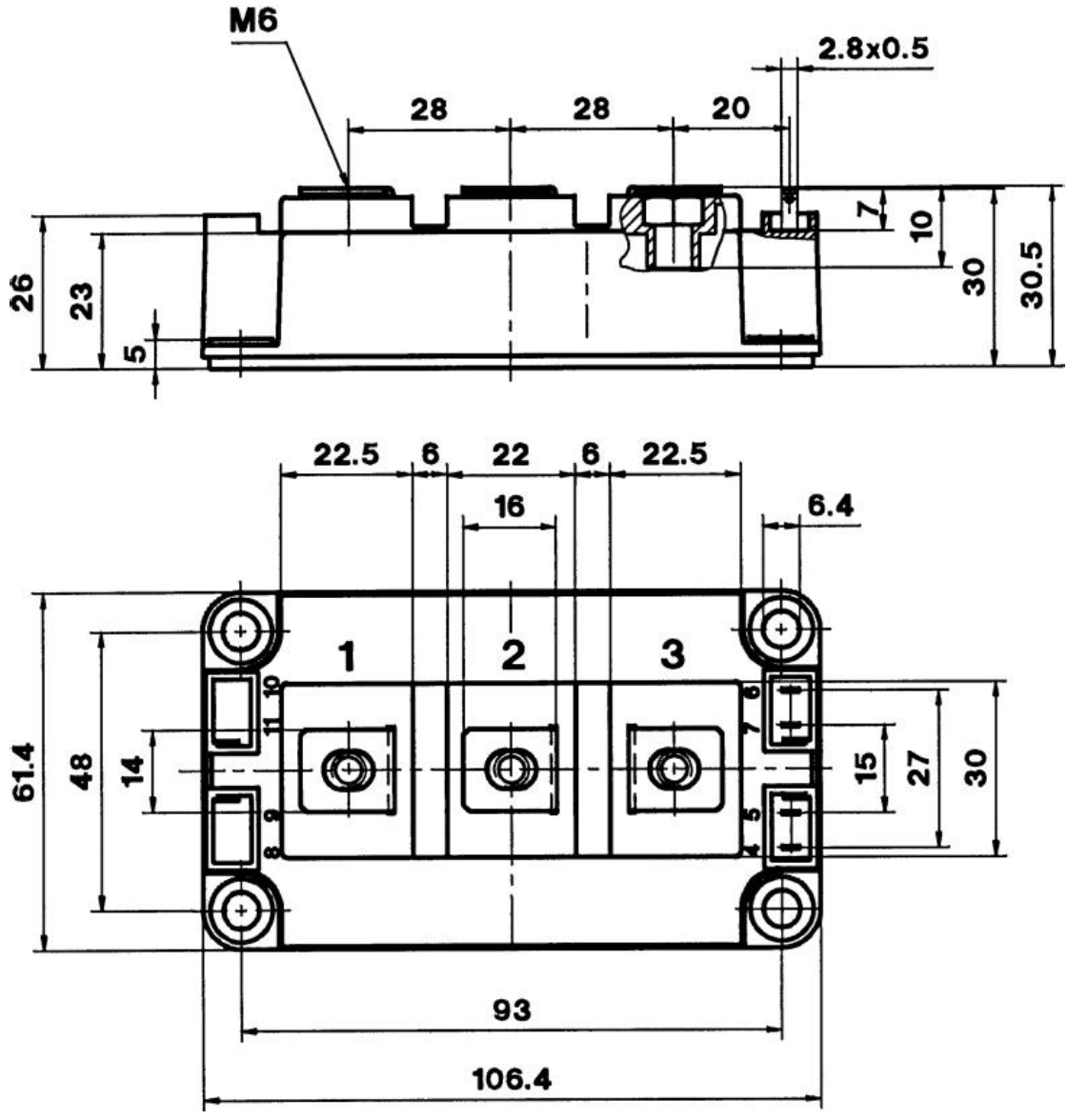


Fig 12. Reverse bias safe operating area of IGBT

Package Dimension

Dimensions in Millimeters



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