

STARPOWER

SEMICONDUCTOR™

IGBT

GD100HFU120C1S

Molding Type Module

1200V/100A 2 in one-package

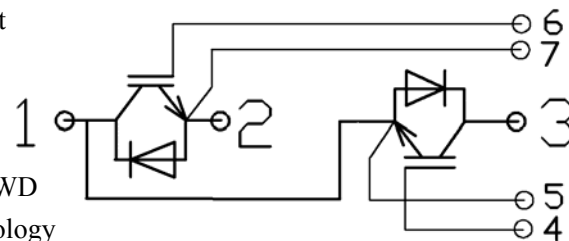
General Description

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



Features

- High short circuit capability, self limiting to $6 \cdot I_{Cnom}$
- $10\mu s$ short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Rugged with ultrafast performance
- Square RBSOA
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DCB technology



Equivalent Circuit Schematic

Typical Applications

- Switching mode power supplies at $f_{sw} > 30kHz$
- Inductive heating
- UPS
- Electronic welder at $f_{sw} > 30kHz$

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

Symbol	Description	GD100HFU120C1S	Units
V_{CES}	Collector-Emitter Voltage	1200	V

Symbol	Description	GD100HFU120C1S	Units
V_{GES}	Gate-Emitter Voltage	$\pm 20V$	V
I_C	Collector Current @ $T_C=25^{\circ}C$, $T_J=150^{\circ}C$ @ $T_C=80^{\circ}C$, $T_J=150^{\circ}C$	145 100	A
$I_{CM(1)}$	Pulsed Collector Current @ $T_C=80^{\circ}C$	200	A
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current	200	A
P_D	Maximum power Dissipation @ $T_J=150^{\circ}C$	357	W
T_{SC}	Short Circuit Withstand Time @ $T_J=125^{\circ}C$	10	μs
T_J	Operating Junction Temperature	-40 to +150	$^{\circ}C$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}C$
I^2t -value, Diode	$V_R=0V$, $t=10ms$, $T_J=125^{\circ}C$	1250	A^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 6	N.m

Notes:

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

Electrical Characteristics of IGBT $T_C=25^{\circ}C$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$T_J=25^{\circ}C$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0V$, $T_J=25^{\circ}C$			2	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}$, $V_{CE}=0V$, $T_J=25^{\circ}C$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=4mA$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}C$	4.4	5.0	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=100A$, $V_{GE}=15V$, $T_J=25^{\circ}C$		3.46	3.7	V
		$I_C=100A$, $V_{GE}=15V$, $T_J=125^{\circ}C$		3.52		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V$, $I_C=100A$, $R_G=4.7\Omega$, $V_{GE}=\pm 15V$, $T_J=25^{\circ}C$		70		ns
t_r	Rise Time			32		ns
$t_{d(off)}$	Turn-Off Delay Time			350		ns

t_f	Fall Time	$V_{CC}=600V, I_C=100A,$ $R_G=4.7\Omega, V_{GE} = \pm 15V,$ $T_J=25^\circ C$		45		ns
E_{on}	Turn-On Switching Loss			1.8		mJ
E_{off}	Turn-Off Switching Loss			4.2		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=100A,$ $R_G=4.7\Omega, V_{GE} = \pm 15V,$ $T_J=125^\circ C$		72		ns
t_r	Rise Time			36		ns
$t_{d(off)}$	Turn-Off Delay Time			362		ns
t_f	Fall Time			48		ns
E_{on}	Turn-On Switching Loss			1.6		mJ
E_{off}	Turn-Off Switching Loss			2.5		mJ
C_{ies}	Input Capacitance	$V_{CE} = 25V, f=1MHz,$ $V_{GE} = 0V$		9.53		nF
C_{oes}	Output Capacitance			0.83		nF
C_{res}	Reverse Transfer Capacitance			0.19		nF
I_{SC}	SC Data	$T_P \leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		470		A
L_{CE}	Stray inductance				30	nH
$R_{CC'+EE'}$	Module lead resistance, terminal to chip	$T_C=25^\circ C$		0.75		m Ω

Electrical Characteristics of DIODE $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _{FM}	Diode Forward Voltage	I _F =100A	T _j =25℃		2.0	2.5	V
			T _j =125℃		2.2	2.5	
t _{rr}	Diode Reverse Recovery Time	I _F =100A, V _R =600V, di/dt=-3600A/μs ,V _{GE} =0V	T _j =25℃		10		μC
			T _j =125℃		16		
I _{rr}	Diode Peak Reverse Recovery Current		T _j =25℃		90		A
			T _j =125℃		120		
E _{rec}	Reverse Recovery Charge		T _j =25℃		3.5		mJ
			T _j =125℃		6.0		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.17	$^\circ C/W$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.36	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		$^\circ C/W$
Weight	Weight of Module	160		g

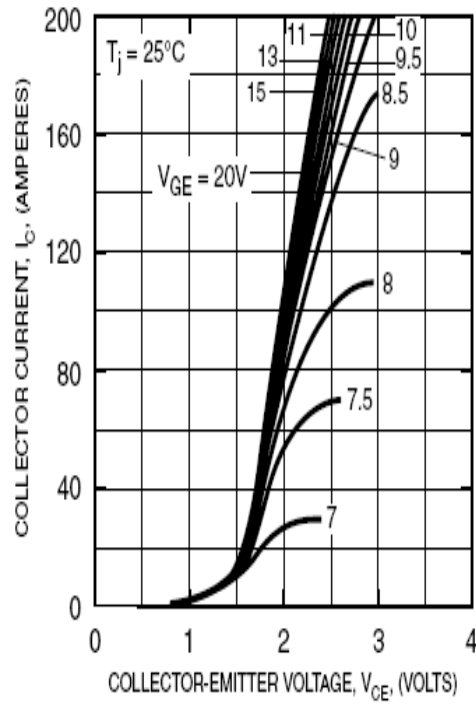


Fig 1. Typical Output Characteristics

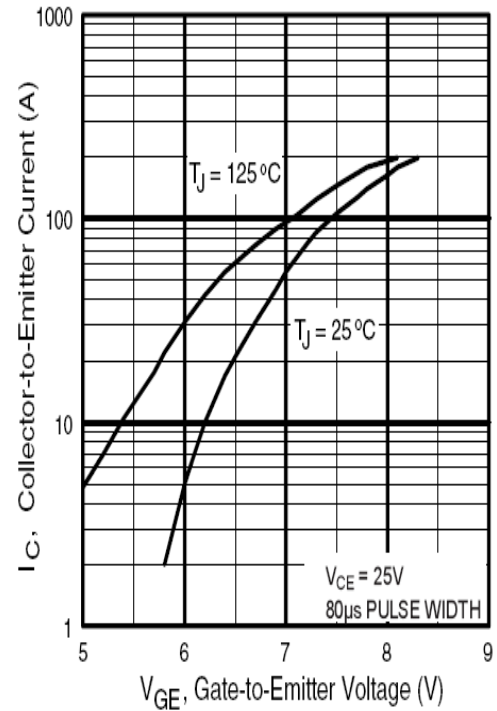


Fig 2. Typical transfer Characteristics

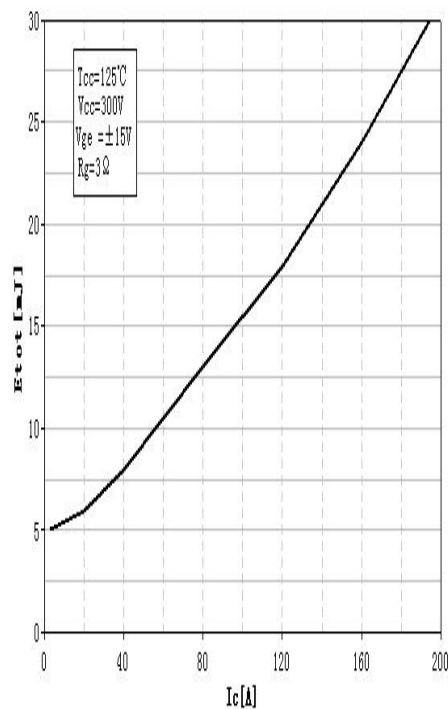


Fig 3. Total Switching Loss vs. Collector Current

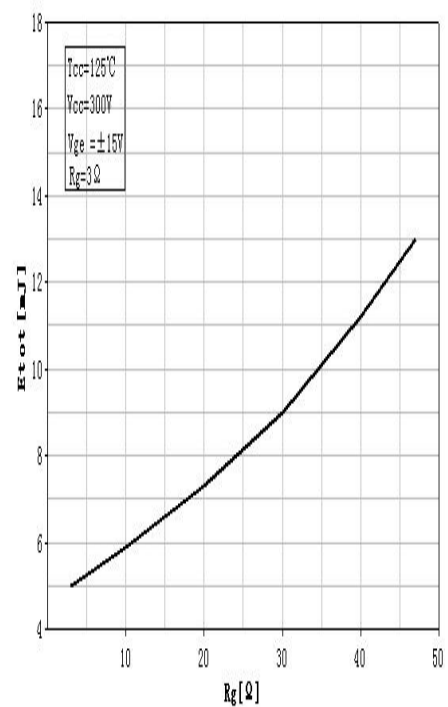


Fig 4. Total Switching Loss vs. Gate Resistance

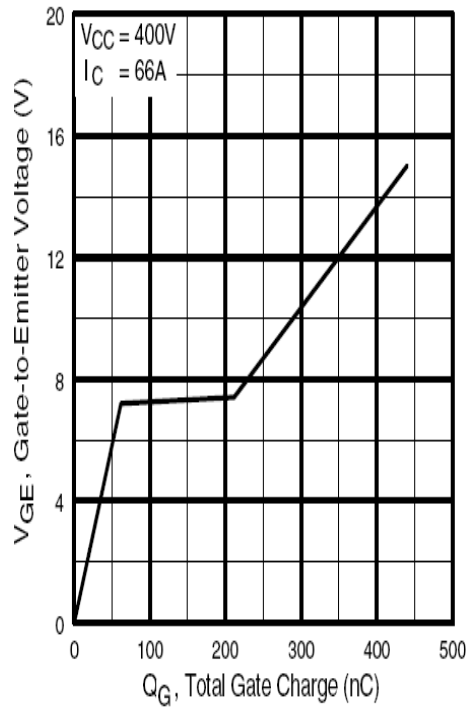
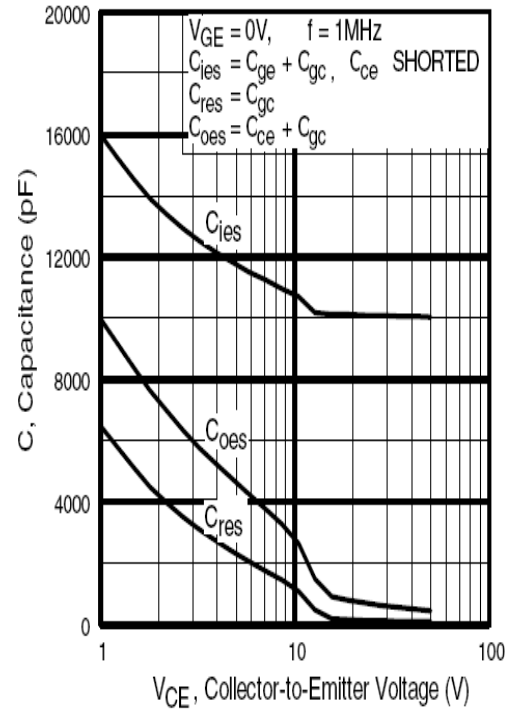
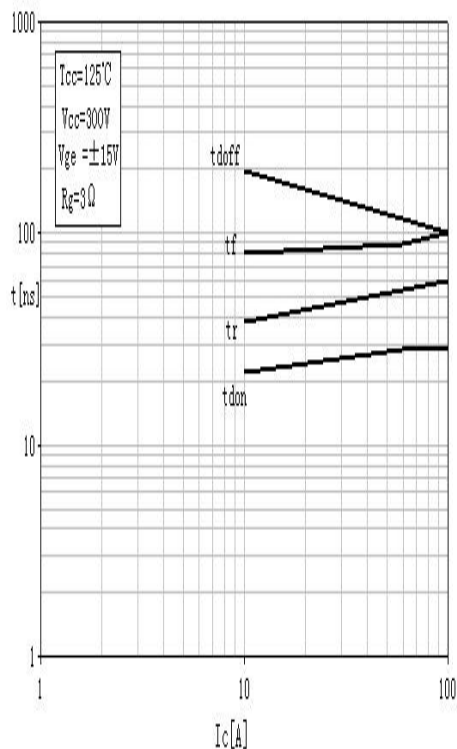
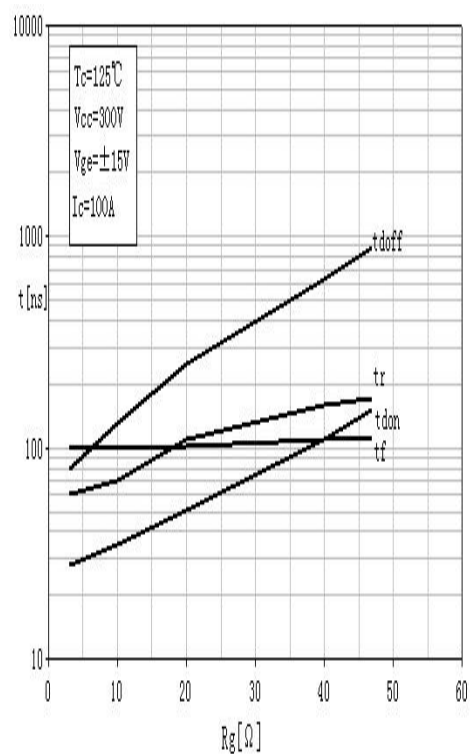


Fig 5. Gate Charge Characteristics.

Fig 6. Typical Capacitance vs.
Collector-Emitter CurrentFig 7. Typical Switching Times vs. I_C Fig 8. Typical Switching Times vs. Gate
Resistance R_G

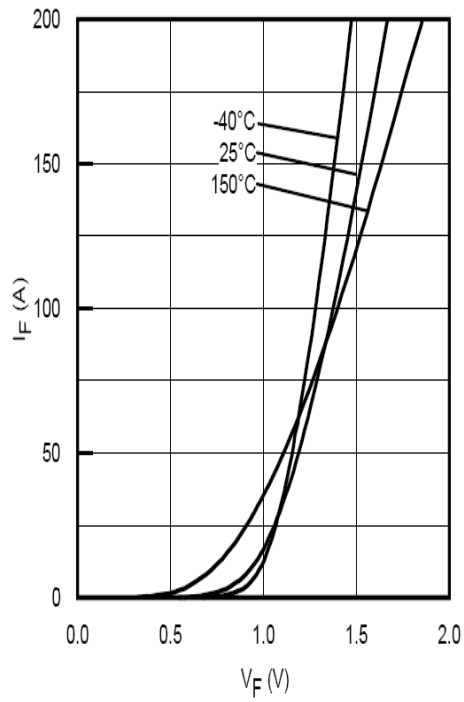


Fig 9. Typical Forward Characteristics(diode)

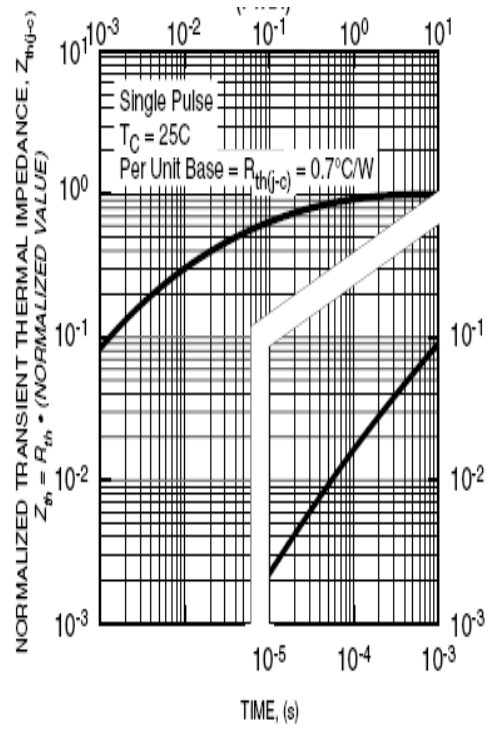


Fig 10. transient thermal impedance diode

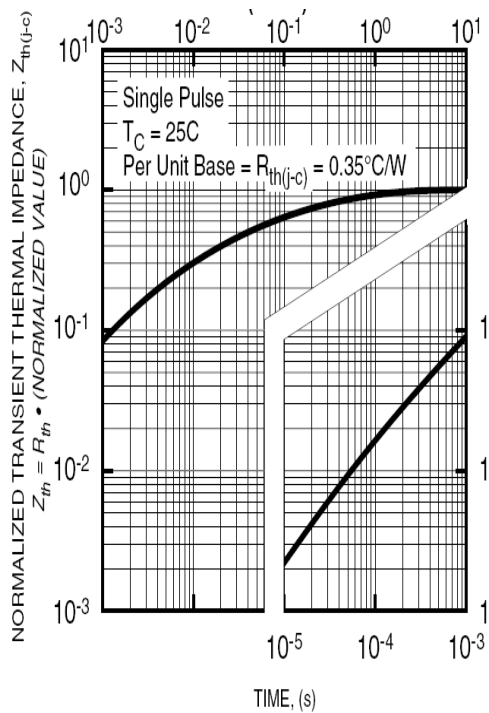
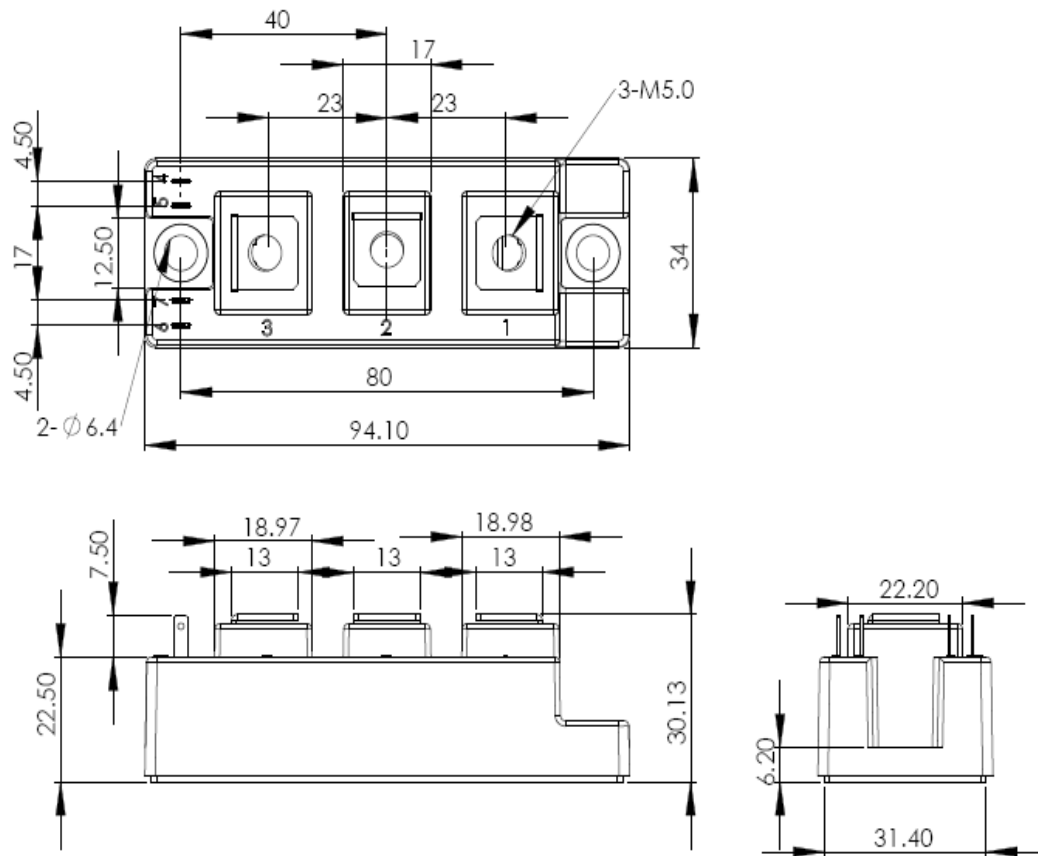


Fig 11. Transient thermal impedance IGBT

Package Dimension

Dimensions in Millimeters



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