

STARPOWER

SEMICONDUCTOR

IGBT

GD100HFT120C8S_T4F

1200V/100A 2 in one-package

General Description

STARPOWER IGBT Power Module provides ultra ultrafast switching speed as well as short circuit ruggedness. They are designed for the applications such as welding machine and inductive heating.

Features

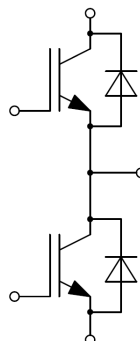
- Low $V_{CE(sat)}$ Trench IGBT technology
- Low switching loss
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175°C
- Fast & soft reverse recovery anti-parallel FWD
- Low inductance case
- Isolated copper baseplate using DBC technology



Typical Applications

- Switching mode power supply
- Inductive heating
- Welding machine

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted**IGBT**

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	150	A
	@ $T_C=95^{\circ}\text{C}$	100	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	200	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	568	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	4000	V

IGBT Characteristics $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=100\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$		2.00	2.45	V	
		$I_C=100\text{A}, V_{GE}=15\text{V}, T_j=125^\circ\text{C}$		2.30			
		$I_C=100\text{A}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}$		2.35			
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=3.8\text{mA}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$	5.1	5.8	6.4	V	
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$			1.0	mA	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_j=25^\circ\text{C}$			400	nA	
R_{Gint}	Internal Gate Resistance			7.5		Ω	
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, f=1\text{MHz}, V_{GE}=0\text{V}$		6.15		nF	
C_{res}	Reverse Transfer Capacitance			0.35		nF	
Q_G	Gate Charge	$V_{GE}=-15\dots+15\text{V}$		0.46		μC	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=100\text{A}, R_G=4.7\Omega, V_{GE}=\pm 15\text{V}, T_j=25^\circ\text{C}$		241		ns	
t_r	Rise Time			72		ns	
$t_{d(off)}$	Turn-Off Delay Time			280		ns	
t_f	Fall Time			147		ns	
E_{on}	Turn-On Switching Loss			6.95		mJ	
E_{off}	Turn-Off Switching Loss			4.23		mJ	
$t_{d(on)}$	Turn-On Delay Time		$V_{CC}=600\text{V}, I_C=100\text{A}, R_G=4.7\Omega, V_{GE}=\pm 15\text{V}, T_j=125^\circ\text{C}$		250		ns
t_r	Rise Time				75		ns
$t_{d(off)}$	Turn-Off Delay Time			303		ns	
t_f	Fall Time			205		ns	
E_{on}	Turn-On Switching Loss			9.80		mJ	
E_{off}	Turn-Off Switching Loss			6.75		mJ	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=100\text{A}, R_G=4.7\Omega, V_{GE}=\pm 15\text{V}, T_j=150^\circ\text{C}$			261		ns
t_r	Rise Time				79		ns
$t_{d(off)}$	Turn-Off Delay Time			317		ns	
t_f	Fall Time			239		ns	
E_{on}	Turn-On Switching Loss			10.8		mJ	
E_{off}	Turn-Off Switching Loss			7.98		mJ	
I_{SC}	SC Data		$t_p \leq 10\mu\text{s}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}, V_{CC}=800\text{V}, V_{CEM} \leq 1200\text{V}$		400		A

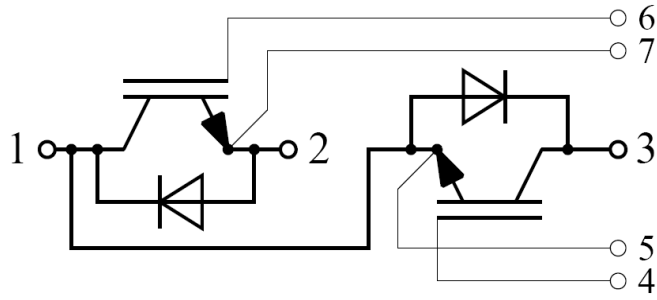
Diode Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=100\text{A}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$		1.95	2.40	V
		$I_F=100\text{A}, V_{GE}=0\text{V}, T_j=125^\circ\text{C}$		1.85		
		$I_F=100\text{A}, V_{GE}=0\text{V}, T_j=150^\circ\text{C}$		1.85		
Q_r	Recovered Charge			4.60		μC
I_{RM}	Peak Reverse Recovery Current	$V_R=600\text{V}, I_F=100\text{A},$ $-di/dt=1400\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=25^\circ\text{C}$		67		A
E_{rec}	Reverse Recovery Energy			2.71		mJ
Q_r	Recovered Charge			11.9		μC
I_{RM}	Peak Reverse Recovery Current	$V_R=600\text{V}, I_F=100\text{A},$ $-di/dt=1400\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=125^\circ\text{C}$		78		A
E_{rec}	Reverse Recovery Energy			5.19		mJ
Q_r	Recovered Charge			14.6		μC
I_{RM}	Peak Reverse Recovery Current	$V_R=600\text{V}, I_F=100\text{A},$ $-di/dt=1400\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=150^\circ\text{C}$		84		A
E_{rec}	Reverse Recovery Energy			6.26		mJ

Module Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

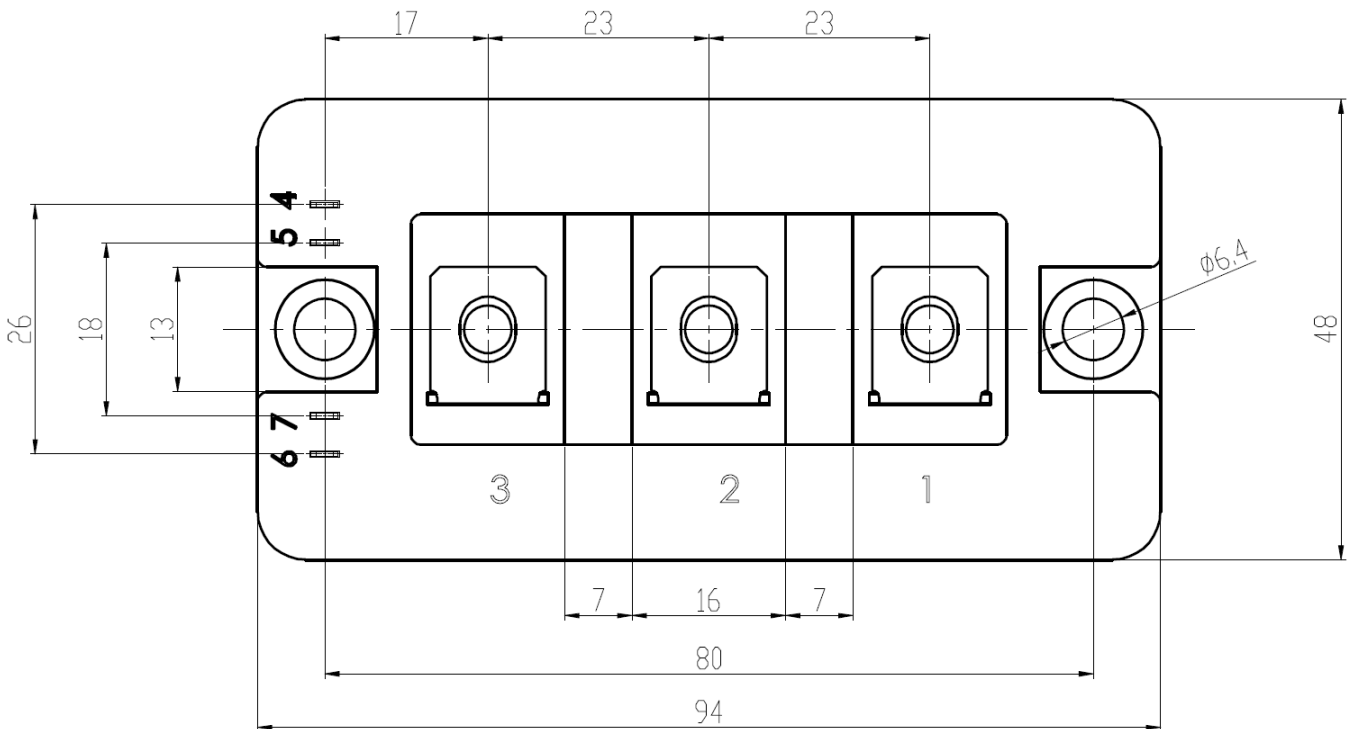
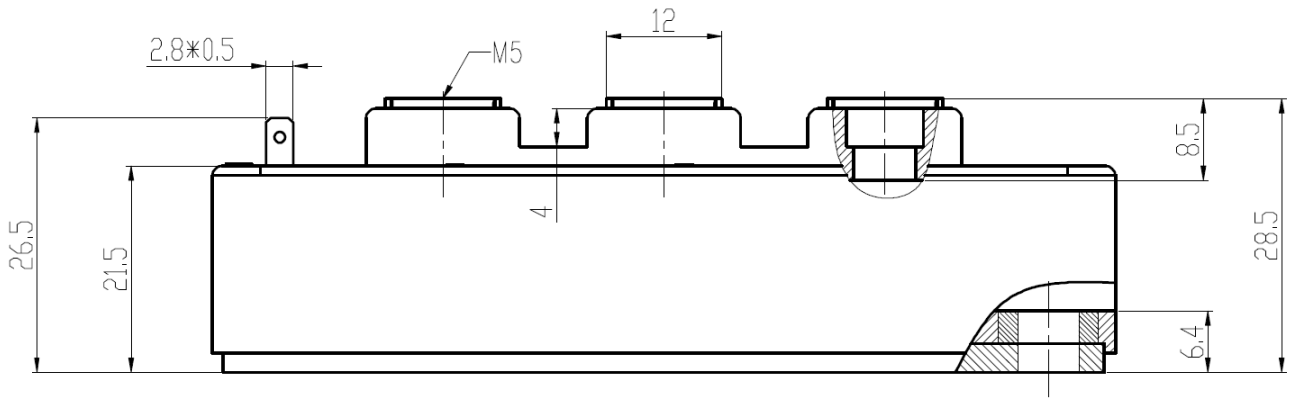
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			26	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.62		m Ω
R_{thJC}	Junction-to-Case (per IGBT)			0.264	K/W
	Junction-to-Case (per Diode)			0.382	
R_{thCH}	Case-to-Heatsink (per IGBT)		0.078		K/W
	Case-to-Heatsink (per Diode)		0.113		
	Case-to-Heatsink (per Module)		0.046		
M	Terminal Connection Torque, Screw M5	2.5		5.0	N.m
	Mounting Torque, Screw M6	3.0		5.0	
G	Weight of Module		200		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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