STARPOWER

SEMICONDUCTOR **IGBT**

GD100HFQ120C1S

1200V/100A 2 in one-package

General Description

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

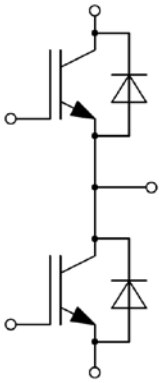
Features

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

Typical Applications

- Switching mode power supply
- Inductive heating
- Electronic welder

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°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°C @ T_C=95°C	150 100	A
I_{CM}	Pulsed Collector Current t_p=1ms	200	A
P_D	Maximum Power Dissipation @ T_j=175°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=1ms	200	A

Module

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

IGBT Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=100A,V_{GE}=15V, T_j=25°C		1.85	2.25	V
		I_C=100A,V_{GE}=15V, T_j=125°C		2.40		
		I_C=100A,V_{GE}=15V, T_j=150°C		2.50		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=2.50mA,V_{CE}=V_{GE}, T_j=25°C	5.2	6.0	6.8	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			1.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			100	nA
R_{Gint}	Internal Gate Resistance			7.5		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		10.4		nF
C_{res}	Reverse Transfer Capacitance			0.29		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.77		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=4.7Ω,V_{GE}=±15V, T_j=25°C		240		ns
t_r	Rise Time			70		ns
$t_{d(off)}$	Turn-Off Delay Time			280		ns
t_f	Fall Time			45		ns
E_{on}	Turn-On Switching Loss			6.90		mJ
E_{off}	Turn-Off Switching Loss			5.50		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=4.7Ω,V_{GE}=±15V, T_j=125°C		250		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			300		ns
t_f	Fall Time			60		ns
E_{on}	Turn-On Switching Loss			9.80		mJ
E_{off}	Turn-Off Switching Loss			6.35		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=100A, R_G=4.7Ω,V_{GE}=±15V, T_j=150°C		261		ns
t_r	Rise Time			79		ns
$t_{d(off)}$	Turn-Off Delay Time			320		ns
t_f	Fall Time			65		ns
E_{on}	Turn-On Switching Loss			10.8		mJ
E_{off}	Turn-Off Switching Loss			7.00		mJ

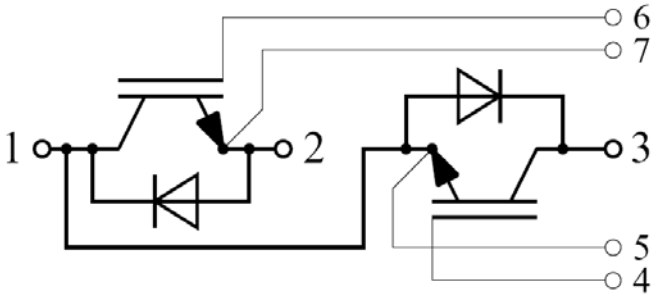
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=100A,V_{GE}=0V,T_j=25℃		1.95	2.40	V
		I_F=100A,V_{GE}=0V,T_j=125℃		1.85		
		I_F=100A,V_{GE}=0V,T_j=150℃		1.85		
Q_r	Recovered Charge	V_R=600V,I_F=100A, -di/dt=1300A/μs,V_{GE}=-15V T_j=25℃		4.60		μC
I_{RM}	Peak Reverse Recovery Current			67		A
E_{rec}	Reverse Recovery Energy			2.71		mJ
Q_r	Recovered Charge	V_R=600V,I_F=100A, -di/dt=1300A/μs,V_{GE}=-15V T_j=125℃		11.9		μC
I_{RM}	Peak Reverse Recovery Current			78		A
E_{rec}	Reverse Recovery Energy			5.19		mJ
Q_r	Recovered Charge	V_R=600V,I_F=100A, -di/dt=1300A/μs,V_{GE}=-15V T_j=150℃		14.6		μC
I_{RM}	Peak Reverse Recovery Current			84		A
E_{rec}	Reverse Recovery Energy			6.26		mJ

Module Characteristics T_C=25°C unless otherwise noted

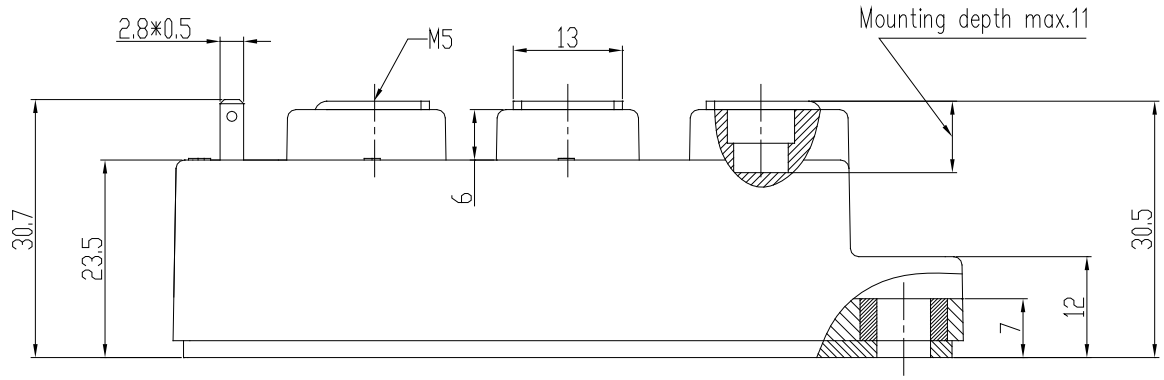
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		30		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.65		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.264 0.387	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.168 0.247 0.050		K/W
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		150		g

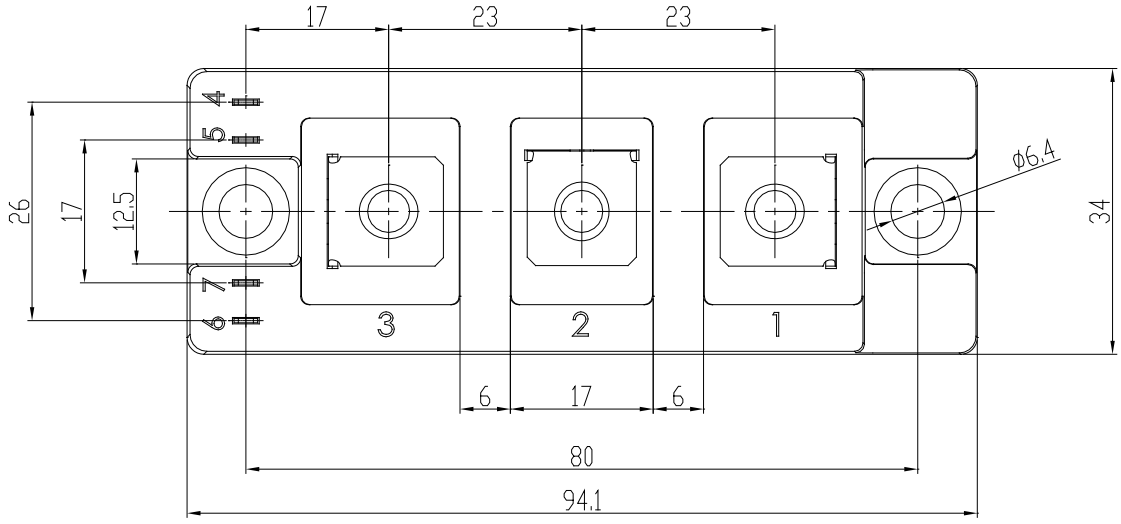
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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