STARPOWER

SEMICONDUCTOR **IGBT**

GD300HFQ120C2S

1200V/300A 2 in one-package

General Description

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

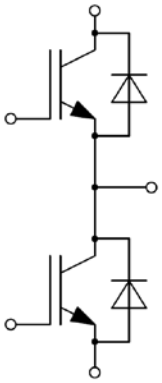
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- 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	Values	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=90°C	434 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
P_D	Maximum Power Dissipation @ T_j=175°C	1612	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	600	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=300A,V_{GE}=15V, T_j=25°C		1.85	2.25	V
		I_C=300A,V_{GE}=15V, T_j=125°C		2.40		
		I_C=300A,V_{GE}=15V, T_j=150°C		2.50		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=7.50mA,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			2.5		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		31.1		nF
C_{res}	Reverse Transfer Capacitance			0.87		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		2.33		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=1.6Ω,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			20.7		mJ
E_{off}	Turn-Off Switching Loss			16.5		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=1.6Ω,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			29.4		mJ
E_{off}	Turn-Off Switching Loss			19.1		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=1.6Ω,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			32.4		mJ
E_{off}	Turn-Off Switching Loss			21.0		mJ

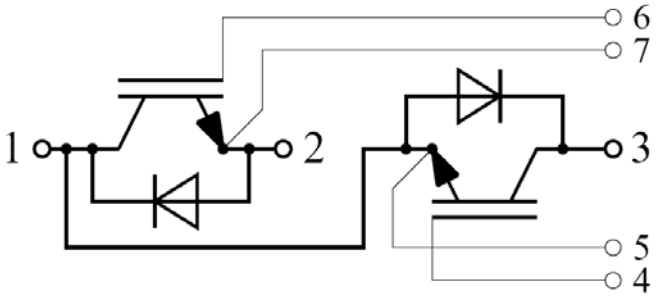
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=300A,V_{GE}=0V,T_i=25°C		1.90	2.35	V
		I_F=300A,V_{GE}=0V,T_j=125°C		1.90		
		I_F=300A,V_{GE}=0V,T_j=150°C		1.90		
Q_r	Recovered Charge	V_R=600V,I_F=300A, -di/dt=5220A/μs,V_{GE}=-15V T_j=25°C		24		μC
I_{RM}	Peak Reverse Recovery Current			460		A
E_{rec}	Reverse Recovery Energy			12.0		mJ
Q_r	Recovered Charge	V_R=600V,I_F=300A, -di/dt=5220A/μs,V_{GE}=-15V T_j=125°C		42.8		μC
I_{RM}	Peak Reverse Recovery Current			502		A
E_{rec}	Reverse Recovery Energy			19.6		mJ
Q_r	Recovered Charge	V_R=600V,I_F=300A, -di/dt=5220A/μs,V_{GE}=-15V T_j=150°C		47.8		μC
I_{RM}	Peak Reverse Recovery Current			524		A
E_{rec}	Reverse Recovery Energy			23.0		mJ

Module Characteristics T_C=25°C unless otherwise noted

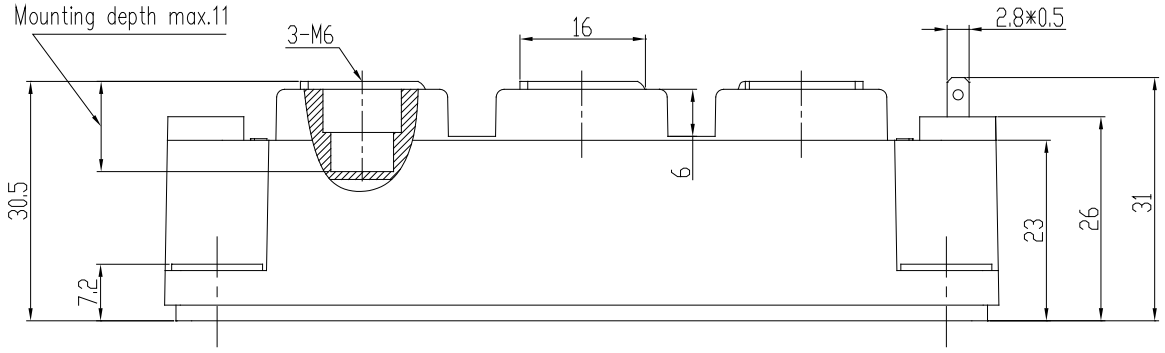
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.35		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.093 0.115	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.036 0.045 0.010		K/W
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		300		g

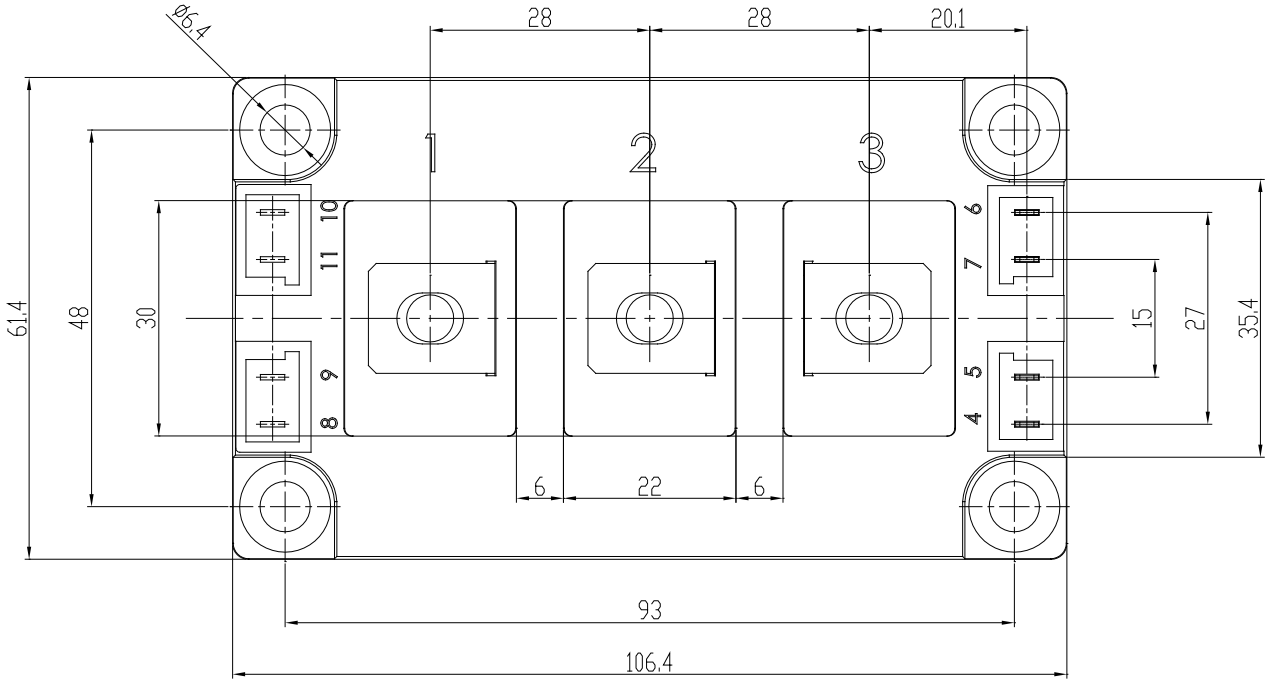
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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