STARPOWER

SEMICONDUCTOR **IGBT**

GD450HFT120C2S

1200V/450A 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 general inverter and UPS.

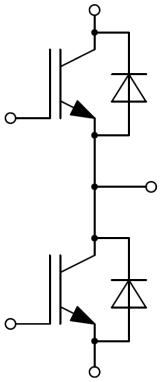
Features

- 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

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

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	±30	V
I_C	Collector Current @ T_C=25°C @ T_C=95°C	685 450	A
I_{CM}	Pulsed Collector Current t_p=1ms	900	A
P_D	Maximum Power Dissipation @ T_j=175°C	2206	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	450	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	900	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=450A,V_{GE}=15V, T_j=25°C		1.70	2.15	V
		I_C=450A,V_{GE}=15V, T_j=125°C		1.95		
		I_C=450A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=18.0mA,V_{CE}=V_{GE}, T_j=25°C	5.0	5.6	6.5	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			400	nA
R_{Gint}	Internal Gate Resistance			0.7		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		39.0		nF
C_{res}	Reverse Transfer Capacitance			1.26		nF
Q_G	Gate Charge	V_{GE}=15V		2.46		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=450A, R_G=1.5Ω,V_{GE}=±15V, T_j=25°C		360		ns
t_r	Rise Time			140		ns
$t_{d(off)}$	Turn-Off Delay Time			550		ns
t_f	Fall Time			146		ns
E_{on}	Turn-On Switching Loss			11.5		mJ
E_{off}	Turn-Off Switching Loss			48.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=450A, R_G=1.5Ω,V_{GE}=±15V, T_j=125°C		374		ns
t_r	Rise Time			147		ns
$t_{d(off)}$	Turn-Off Delay Time			623		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			17.9		mJ
E_{off}	Turn-Off Switching Loss			64.5		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=450A, R_G=1.5Ω,V_{GE}=±15V, T_j=150°C		381		ns
t_r	Rise Time			152		ns
$t_{d(off)}$	Turn-Off Delay Time			636		ns
t_f	Fall Time			184		ns
E_{on}	Turn-On Switching Loss			19.6		mJ
E_{off}	Turn-Off Switching Loss			69.0		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		1800		A

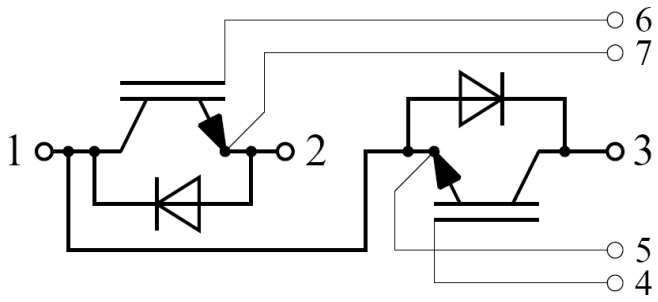
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=450A,V_{GE}=0V,T_j=25°C		1.72	2.12	V
		I_F=450A,V_{GE}=0V,T_j=125°C		1.73		
		I_F=450A,V_{GE}=0V,T_j=150°C		1.74		
Q_r	Recovered Charge	V_{CC}=600V,I_F=450A, -di/dt=3000A/µs,V_{GE}=-15V, T_j=25°C		40.3		µC
I_{RM}	Peak Reverse Recovery Current			258		A
E_{rec}	Reverse Recovery Energy			19.0		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=450A, -di/dt=3000A/µs,V_{GE}=-15V, T_j=125°C		71.9		µC
I_{RM}	Peak Reverse Recovery Current			338		A
E_{rec}	Reverse Recovery Energy			39.1		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=450A, -di/dt=3000A/µs,V_{GE}=-15V, T_j=150°C		79.3		µC
I_{RM}	Peak Reverse Recovery Current			352		A
E_{rec}	Reverse Recovery Energy			41.8		mJ

Module Characteristics T_C=25°C unless otherwise noted

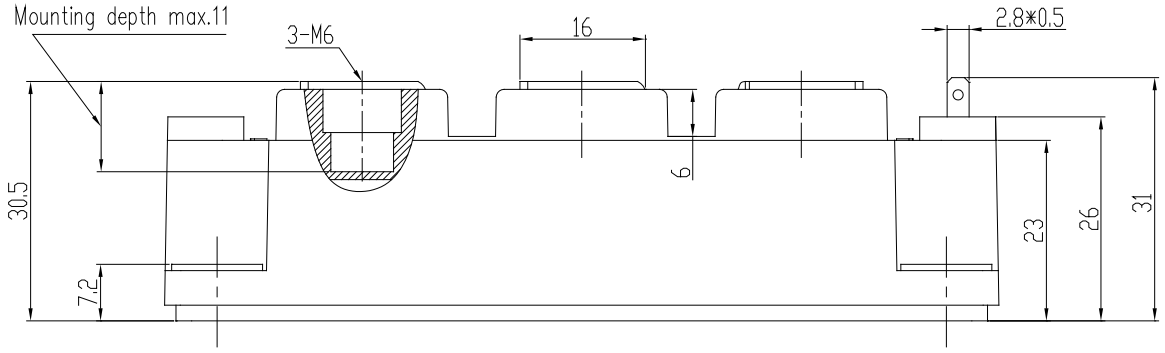
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.35		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.068 0.117	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.111 0.190		K/W
$R_{\theta CS}$	Case-to-Sink		0.035		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

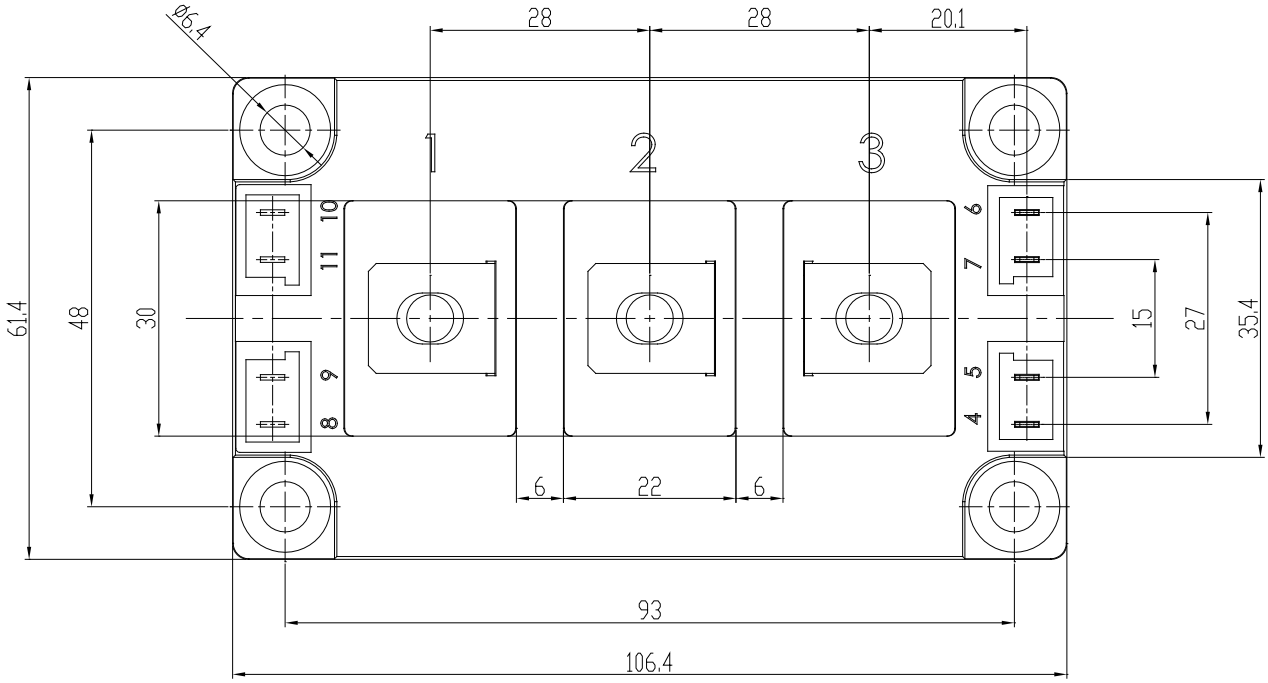
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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