STARPOWER

SEMICONDUCTOR **IGBT**

GD50HFT120C1S_T4

1200V/50A 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 inverters and UPS.

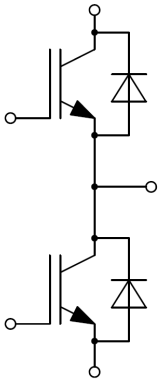
Features

- 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	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	77 50	A
I_{CM}	Pulsed Collector Current t_p=1ms	100	A
P_D	Maximum Power Dissipation @ T_j=175°C	441	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	100	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=50A,V_{GE}=15V, T_j=25°C		1.85	2.30	V
		I_C=50A,V_{GE}=15V, T_j=125°C		2.15		
		I_C=50A,V_{GE}=15V, T_j=150°C		2.25		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.7mA,V_{CE}=V_{GE}, T_j=25°C	5.3	5.8	6.3	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			4		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		2.80		nF
C_{res}	Reverse Transfer Capacitance			0.10		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		0.38		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=25°C		130		ns
t_r	Rise Time			20		ns
$t_{d(off)}$	Turn-Off Delay Time			300		ns
t_f	Fall Time			45		ns
E_{on}	Turn-On Switching Loss			4.50		mJ
E_{off}	Turn-Off Switching Loss			2.50		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=125°C		150		ns
t_r	Rise Time			30		ns
$t_{d(off)}$	Turn-Off Delay Time			380		ns
t_f	Fall Time			80		ns
E_{on}	Turn-On Switching Loss			6.50		mJ
E_{off}	Turn-Off Switching Loss			4.00		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=150°C		150		ns
t_r	Rise Time			35		ns
$t_{d(off)}$	Turn-Off Delay Time			400		ns
t_f	Fall Time			90		ns
E_{on}	Turn-On Switching Loss			7.50		mJ
E_{off}	Turn-Off Switching Loss			4.50		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=800V, V_{CEM}≤1200V		180		A

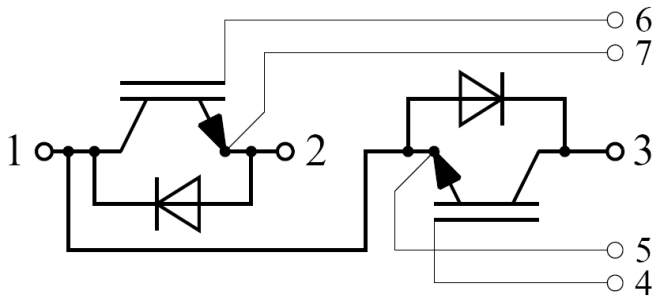
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=50A,V_{GE}=0V,T_j=25°C		1.70	2.15	V
		I_F=50A,V_{GE}=0V,T_j=125°C		1.65		
		I_F=50A,V_{GE}=0V,T_j=150°C		1.65		
Q_r	Recovered Charge	V_R=600V,I_F=50A, -di/dt=1300A/μs,V_{GE}=-15V T_j=25°C		5.0		μC
I_{RM}	Peak Reverse Recovery Current			55		A
E_{rec}	Reverse Recovery Energy			2.00		mJ
Q_r	Recovered Charge	V_R=600V,I_F=50A, -di/dt=1300A/μs,V_{GE}=-15V T_j=125°C		9.0		μC
I_{RM}	Peak Reverse Recovery Current			60		A
E_{rec}	Reverse Recovery Energy			3.20		mJ
Q_r	Recovered Charge	V_R=600V,I_F=50A, -di/dt=1300A/μs,V_{GE}=-15V T_j=150°C		10.0		μC
I_{RM}	Peak Reverse Recovery Current			65		A
E_{rec}	Reverse Recovery Energy			3.60		mJ

Module Characteristics T_C=25°C unless otherwise noted

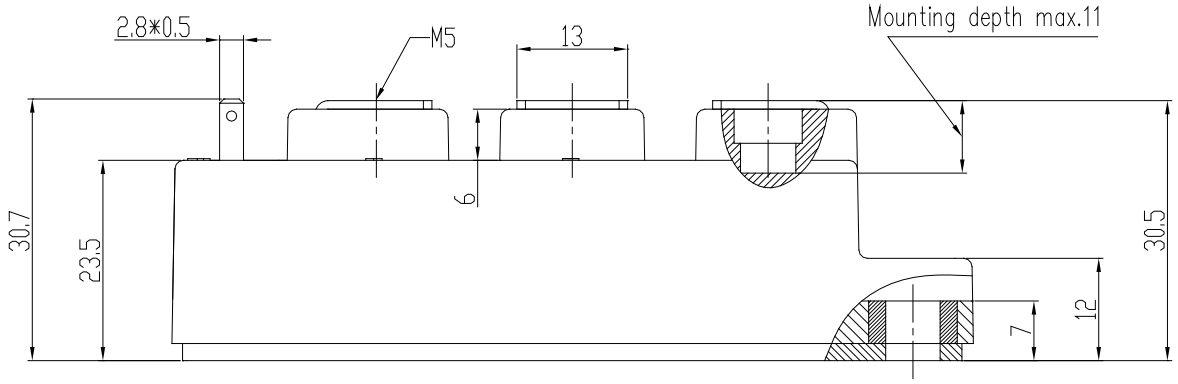
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.75		mΩ
$R_{\theta JC}$	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.532 0.841	K/W
$R_{\theta CS}$	Case-to-Sink (per IGBT) Case-to-Sink (per Diode)		0.163 0.258		K/W
$R_{\theta CS}$	Case-to-Sink		0.05		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

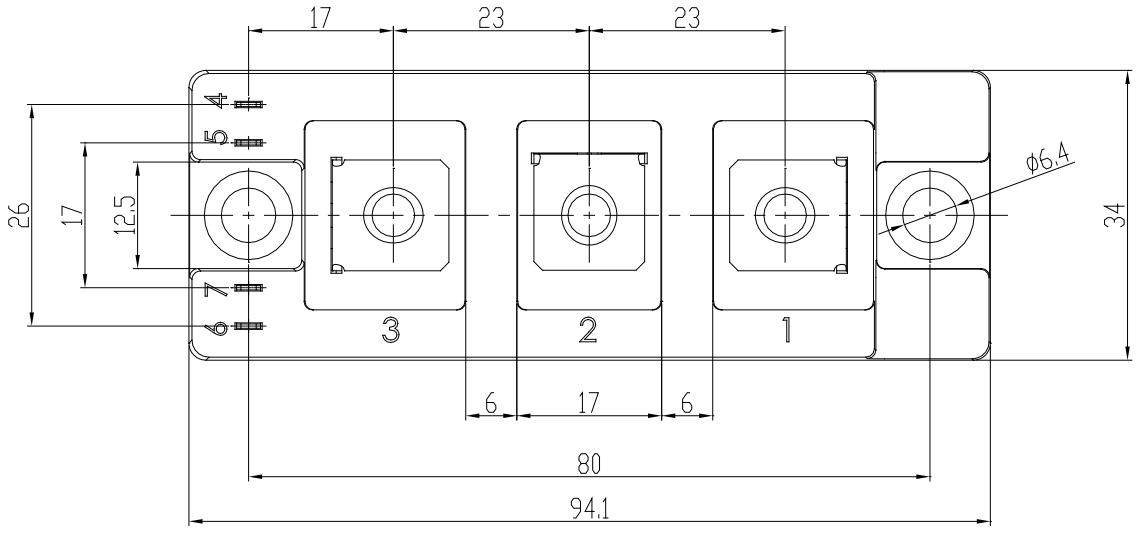
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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