STARPOWER

SEMICONDUCTOR **IGBT**

GD300HFY120C6S

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 general inverter and UPS.

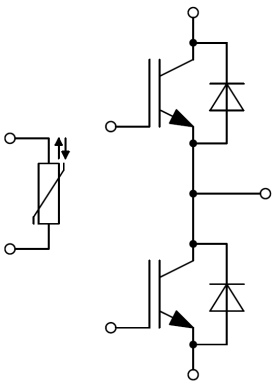
Features

- 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	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=100°C	480 300	A
I_{CM}	Pulsed Collector Current t_p=1ms	600	A
P_D	Maximum Power Dissipation @ T_j=175°C	1613	W

Diode

Symbol	Description	Value	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	2500	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		1.65	2.10	V
		I_C=300A,V_{GE}=15V, T_j=125°C		1.95		
		I_C=300A,V_{GE}=15V, T_j=150°C		2.00		
$V_{GE(th)}$	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			400	nA
R_{Gint}	Internal Gate Resistance			0.7		Ω
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		29.7		nF
C_{res}	Reverse Transfer Capacitance			0.90		nF
Q_G	Gate Charge	V_{GE}=15V		1.80		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=2.2Ω,V_{GE}=±15V, T_j=25°C		331		ns
t_r	Rise Time			105		ns
$t_{d(off)}$	Turn-Off Delay Time			521		ns
t_f	Fall Time			124		ns
E_{on}	Turn-On Switching Loss			6.30		mJ
E_{off}	Turn-Off Switching Loss			27.3		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=2.2Ω,V_{GE}=±15V, T_j=125°C		327		ns
t_r	Rise Time			110		ns
$t_{d(off)}$	Turn-Off Delay Time			575		ns
t_f	Fall Time			166		ns
E_{on}	Turn-On Switching Loss			10.6		mJ
E_{off}	Turn-Off Switching Loss			34.6		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=300A, R_G=2.2Ω,V_{GE}=±15V, T_j=150°C		318		ns
t_r	Rise Time			111		ns
$t_{d(off)}$	Turn-Off Delay Time			586		ns
t_f	Fall Time			185		ns
E_{on}	Turn-On Switching Loss			11.5		mJ
E_{off}	Turn-Off Switching Loss			37.0		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		1200		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=300A,V_{GE}=0V,T_j=25°C		1.80	2.25	V
		I_F=300A,V_{GE}=0V,T_j=125°C		1.85		
		I_F=300A,V_{GE}=0V,T_j=150°C		1.85		
Q_r	Recovered Charge	V_{CC}=600V,I_F=300A, -di/dt=2900A/μs,V_{GE}=-15V, T_j=25°C		29.3		μC
I_{RM}	Peak Reverse Recovery Current			236		A
E_{rec}	Reverse Recovery Energy			14.8		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=300A, -di/dt=2900A/μs,V_{GE}=-15V, T_j=125°C		52.8		μC
I_{RM}	Peak Reverse Recovery Current			302		A
E_{rec}	Reverse Recovery Energy			26.4		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=300A, -di/dt=2900A/μs,V_{GE}=-15V, T_j=150°C		60.8		μC
I_{RM}	Peak Reverse Recovery Current			322		A
E_{rec}	Reverse Recovery Energy			30.4		mJ

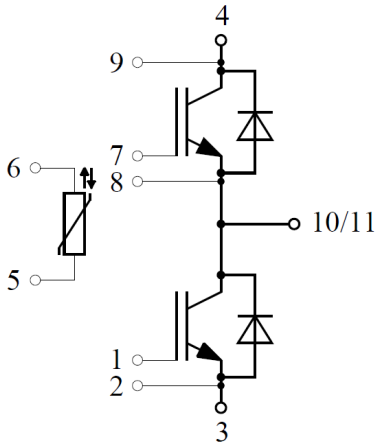
NTC Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			5.0		kΩ
ΔR/R	Deviation of R_{100}	T_C=100°C,R_{100}=493.3Ω	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K

Module Characteristics T_C=25°C unless otherwise noted

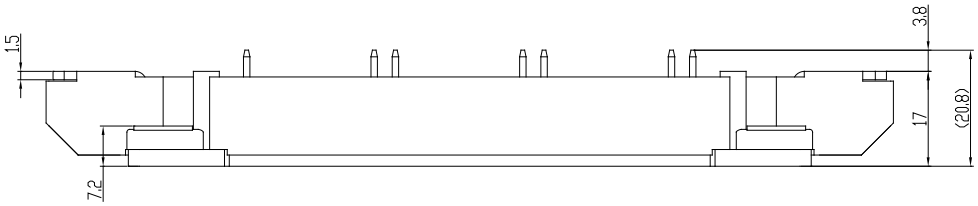
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		20		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		1.10		mΩ
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.093 0.126	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.031 0.042 0.009		K/W
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M5	3.0 3.0		6.0 6.0	N.m
G	Weight of Module		350		g

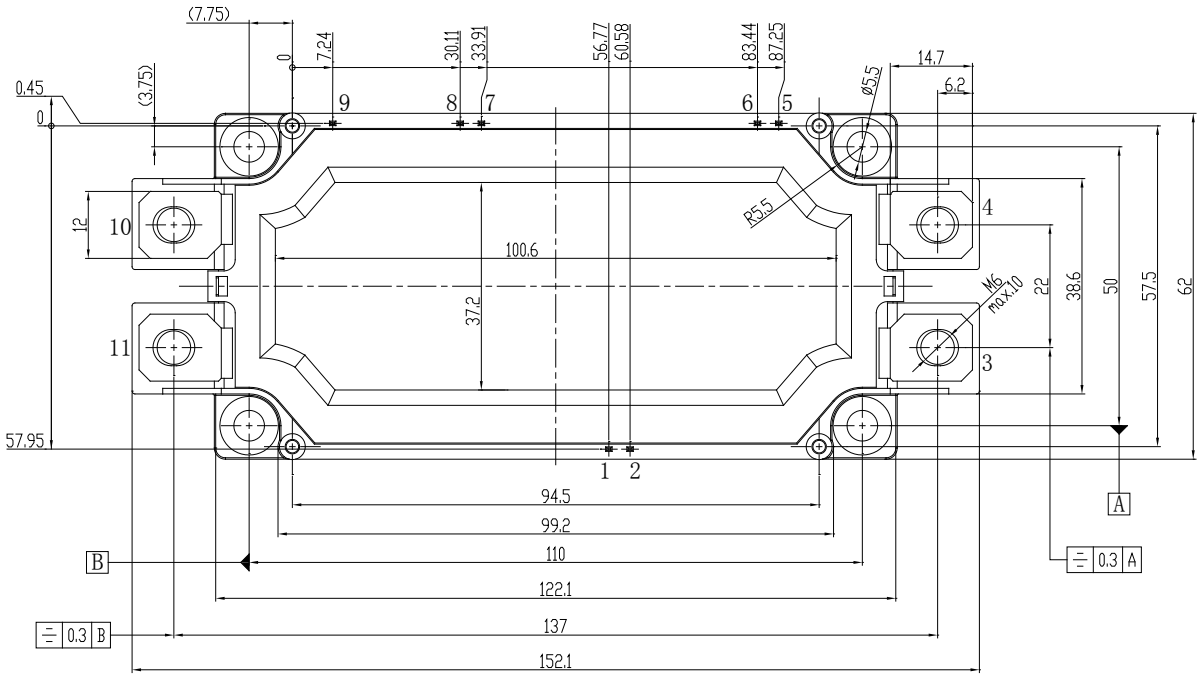
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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