STARPOWER

SEMICONDUCTOR **IGBT**

GD800HFY120C6H

1200V/800A 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 hybrid and electric vehicle.

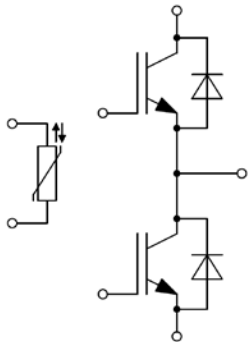
Features

- 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
- Si3N4 substrate for low thermal resistance
- Isolated copper baseplate using DBC technology

Typical Applications

- Hybrid and electric vehicle
- Inverter for motor drive
- 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	800	A
I_{CM}	Pulsed Collector Current t_p=1ms	1600	A
P_D	Maximum Power Dissipation @ T_j=175°C	TBD	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	800	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1600	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=800A,V_{GE}=15V, T_j=25°C		1.95	2.40	V
		I_C=800A,V_{GE}=15V, T_j=125°C		2.30		
		I_C=800A,V_{GE}=15V, T_j=150°C		2.40		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=15.0mA,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			1.2		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		38.0		nF
C_{res}	Reverse Transfer Capacitance			2.15		nF
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_G=1.5Ω,V_{GE}=±15V, T_j=25°C		173		ns
t_r	Rise Time			84		ns
$t_{d(off)}$	Turn-Off Delay Time			568		ns
t_f	Fall Time			195		ns
E_{on}	Turn-On Switching Loss			23.2		mJ
E_{off}	Turn-Off Switching Loss			89.2		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_G=1.5Ω,V_{GE}=±15V, T_j=125°C		197		ns
t_r	Rise Time			92		ns
$t_{d(off)}$	Turn-Off Delay Time			613		ns
t_f	Fall Time			316		ns
E_{on}	Turn-On Switching Loss			49.5		mJ
E_{off}	Turn-Off Switching Loss			115		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=800A, R_G=1.5Ω,V_{GE}=±15V, T_j=150°C		207		ns
t_r	Rise Time			94		ns
$t_{d(off)}$	Turn-Off Delay Time			624		ns
t_f	Fall Time			351		ns
E_{on}	Turn-On Switching Loss			57.8		mJ
E_{off}	Turn-Off Switching Loss			120		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=800V, V_{CEM}≤1200V		2400		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=800A,V_{GE}=0V,T_i=25°C		1.81	2.26	V
		I_F=800A,V_{GE}=0V,T_j=125°C		1.86		
		I_F=800A,V_{GE}=0V,T_i=150°C		1.86		
Q_r	Recovered Charge	V_{CC}=600V,I_F=800A, -di/dt=4000A/μs,V_{GE}=-15V, T_j=25°C		42		μC
I_{RM}	Peak Reverse Recovery Current			359		A
E_{rec}	Reverse Recovery Energy			25.6		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=800A, -di/dt=4000A/μs,V_{GE}=-15V, T_j=125°C		94		μC
I_{RM}	Peak Reverse Recovery Current			479		A
E_{rec}	Reverse Recovery Energy			51.8		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=800A, -di/dt=4000A/μs,V_{GE}=-15V, T_j=150°C		106		μC
I_{RM}	Peak Reverse Recovery Current			506		A
E_{rec}	Reverse Recovery Energy			57.2		mJ

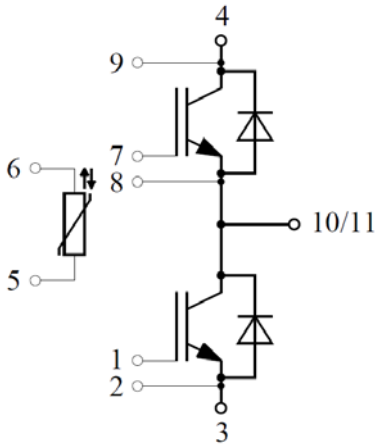
NTC Characteristics T_C=25°C unless otherwise noted

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
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3411		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3433		K

Module Characteristics T_C=25°C unless otherwise noted

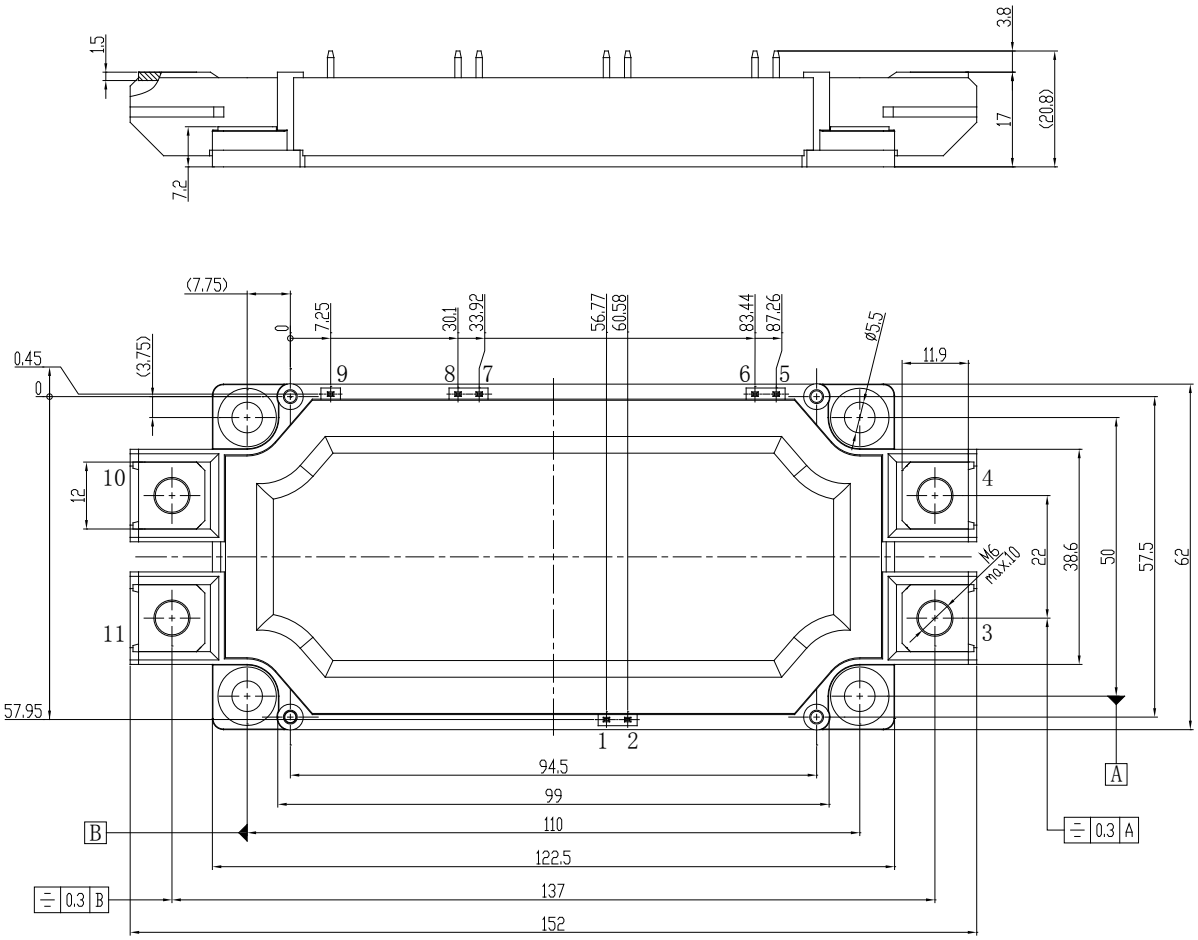
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			0.029 0.048	K/W
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		0.029 0.048 0.009		K/W
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw 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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