

STARPOWER

SEMICONDUCTOR

IGBT

GD200HFK120C2S

Molding Type Module

1200V/200A 2 in one-package

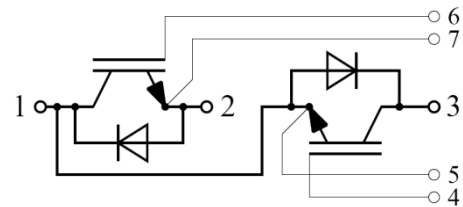
General Description

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 SMPS.



Features

- Low $V_{CE(sat)}$ NPT IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

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

Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Description	GD200HFK120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	360	A
	@ $T_C=80^{\circ}\text{C}$	200	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	400	A
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation @ $T_j=150^{\circ}\text{C}$	1344	W
T_{jmax}	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +125	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	4000	V
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m
Weight	Weight of Module	300	g

Electrical Characteristics of IGBT $T_C=25^{\circ}\text{C}$ unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_j=25^{\circ}\text{C}$	1200			V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}$, $V_{GE}=0\text{V}$, $T_j=25^{\circ}\text{C}$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}$, $V_{CE}=0\text{V}$, $T_j=25^{\circ}\text{C}$			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=2.0\text{mA}$, $V_{CE}=V_{GE}$, $T_j=25^{\circ}\text{C}$	4.4	5.1	6.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^{\circ}\text{C}$		2.20	2.65	V
		$I_C=200\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^{\circ}\text{C}$		2.50		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=3.4\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		329		ns
t_r	Rise Time			76		ns
$t_{d(off)}$	Turn-Off Delay Time			350		ns
t_f	Fall Time			142		ns
E_{on}	Turn-On Switching Loss			14.6		mJ
E_{off}	Turn-Off Switching Loss			14.8		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=3.4\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		351		ns
t_r	Rise Time			77		ns
$t_{d(off)}$	Turn-Off Delay Time			382		ns
t_f	Fall Time			183		ns
E_{on}	Turn-On Switching Loss			19.2		mJ
E_{off}	Turn-Off Switching Loss			19.9		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		17.2		nF
C_{oes}	Output Capacitance			1.60		nF
C_{res}	Reverse Transfer Capacitance			0.64		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		1600		A
R_{Gint}	Internal Gate Resistance			2.0		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.35		m Ω

Electrical Characteristics of Diode $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=200A$	$T_j=25^\circ C$	1.95	2.35	V
			$T_j=125^\circ C$	1.85		
Q_r	Recovered Charge	$I_F=200A,$	$T_j=25^\circ C$	13.4		μC
			$T_j=125^\circ C$	26.6		
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=3.4\Omega,$	$T_j=25^\circ C$	160		A
			$T_j=125^\circ C$	203		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	8.16		mJ
			$T_j=125^\circ C$	14.4		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.093	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.193	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W

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