

# STARPOWER

SEMICONDUCTOR™

# IGBT

## GD200HFT60C8S

**Preliminary****Molding Type Module****600V/200A 2 in one-package**

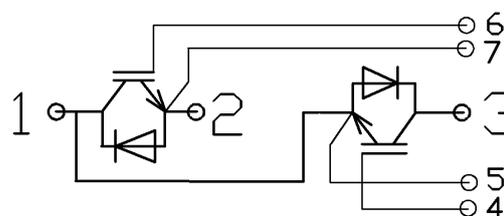
### General Description

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 UPS.



### Features

- Low  $V_{CE(sat)}$  trench IGBT technology
- Low switching losses
- Maximum junction temperature 175°C
- 5 $\mu$ s short circuit capability
- Square RBSOA
- $V_{CE(sat)}$  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

- AC inverter drives
- Switching mode power supplies
- Electronic welders

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

Symbol	Description	GD200HFT60C8S	Units
$V_{CES}$	Collector-Emitter Voltage	600	V

Symbol	Description	GD200HFT60C8S	Units
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_C=25^\circ\text{C}$	350	A
	@ $T_C=80^\circ\text{C}$	200	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	400	A
$I_F$	Diode Continuous Forward Current	200	A
$I_{FM}$	Diode Maximum Forward Current	400	A
$P_D$	Maximum power Dissipation @ $T_j=175^\circ\text{C}$	811	W
$T_{SC}$	Short Circuit Withstand Time @ $T_j=125^\circ\text{C}$	10	$\mu\text{s}$
$T_j$	Operating Junction Temperature	-40 to +175	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
$I^2t$ -value, Diode	$V_R=0\text{V}, t=10\text{ms}, T_j=125^\circ\text{C}$	4050	$\text{A}^2\text{s}$
$V_{ISO}$	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M5	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 6.0	N.m

**Notes:**

(1) Repetitive rating: Pulse width limited by max. junction temperature

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0\text{V}, I_C=500\mu\text{A}, T_j=25^\circ\text{C}$	600			V
$I_{CES}$	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$			100	$\mu\text{A}$
$I_{GES}$	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_j=25^\circ\text{C}$			200	nA

**On Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=2.0\text{mA}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$	4.0	4.5	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=200\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$		1.8		V
		$I_C=200\text{A}, V_{GE}=15\text{V}, T_j=175^\circ\text{C}$		2.1		

**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300\text{V}, I_C=200\text{A}, R_G=2.3\Omega, V_{GE}=\pm 15\text{V}, T_j=25^\circ\text{C}$		24		ns
$t_r$	Rise Time			59		ns
$t_{d(off)}$	Turn-Off Delay Time				106	

$t_f$	Fall Time	$V_{CC}=300V, I_C=200A,$ $R_G=2.3\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		69		ns
$E_{on}$	Turn-On Switching Loss			6.9		mJ
$E_{off}$	Turn-Off Switching Loss			5.1		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=200A,$ $R_G=2.3\Omega, V_{GE}=\pm 15V,$ $T_j=175^\circ C$		28		ns
$t_r$	Rise Time			62		ns
$t_{d(off)}$	Turn-Off Delay Time			131		ns
$t_f$	Fall Time			88		ns
$E_{on}$	Turn-On Switching Loss			9.6		mJ
$E_{off}$	Turn-Off Switching Loss			7.3		mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		15.4		nF
$C_{oes}$	Output Capacitance			1.2		nF
$C_{res}$	Reverse Transfer Capacitance			0.6		nF
$I_{SC}$	SC Data	$t_{sc} \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=360V,$ $V_{CEM} \leq 600V$		TBD		A
$L_{CE}$	Stray Inductance				26	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.62		m $\Omega$

### 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	$I_F=200A$	$T_j=25^\circ C$		1.4	V
			$T_j=125^\circ C$		1.3	
$Q_r$	Diode Reverse Recovery Charge	$I_F=200A,$ $V_R=300V,$ $di/dt=-4000A/\mu s,$ $V_{GE}=-15V$	$T_j=25^\circ C$		12.1	$\mu C$
			$T_j=125^\circ C$		19.7	
$I_{RM}$	Diode Peak Reverse Recovery Current		$T_j=25^\circ C$		154	A
			$T_j=125^\circ C$		188	
$E_{rec}$	Reverse Recovery Energy		$T_j=25^\circ C$		2.9	mJ
			$T_j=125^\circ C$		4.1	

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.185	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.296	K/W
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.046		K/W
Weight	Weight of Module	200		g



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