

STARPOWER

SEMICONDUCTOR™

IGBT

GD300HFT60C8S

Preliminary**Molding Type Module****600V/300A 2 in one-package**

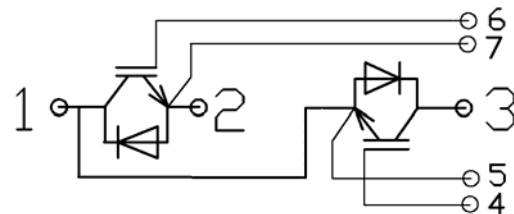
General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- Low switching losses
- Maximum junction temperature 175°C
- 5 μ 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	GD300HFT60C8S	Units
V_{CES}	Collector-Emitter Voltage	600	V

Symbol	Description	GD300HFT60C8S	Units
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$	350	A
	@ $T_C=80^\circ\text{C}$	300	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	600	A
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current	600	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	μs
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	$V_R=0\text{V}, t=10\text{ms}, T_J=125^\circ\text{C}$	19200	A^2s
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	μA
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	$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		2.1		V
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=175^\circ\text{C}$		2.4		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300\text{V}, I_C=300\text{A}, R_G=2.3\Omega, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$		36		ns
t_r	Rise Time			89		ns
$t_{d(off)}$	Turn-Off Delay Time			160		ns

t_f	Fall Time	$V_{CC}=300V, I_C=300A,$ $R_G=2.3\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		104		ns
E_{on}	Turn-On Switching Loss			10.4		mJ
E_{off}	Turn-Off Switching Loss			7.6		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=300A,$ $R_G=2.3\Omega, V_{GE}=\pm 15V,$ $T_j=175^\circ C$		42		ns
t_r	Rise Time			93		ns
$t_{d(off)}$	Turn-Off Delay Time			197		ns
t_f	Fall Time			131		ns
E_{on}	Turn-On Switching Loss			14.4		mJ
E_{off}	Turn-Off Switching Loss			10.8		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	$t_{sc}\leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=450V,$ $V_{CEM}\leq 600V$		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 Ω

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

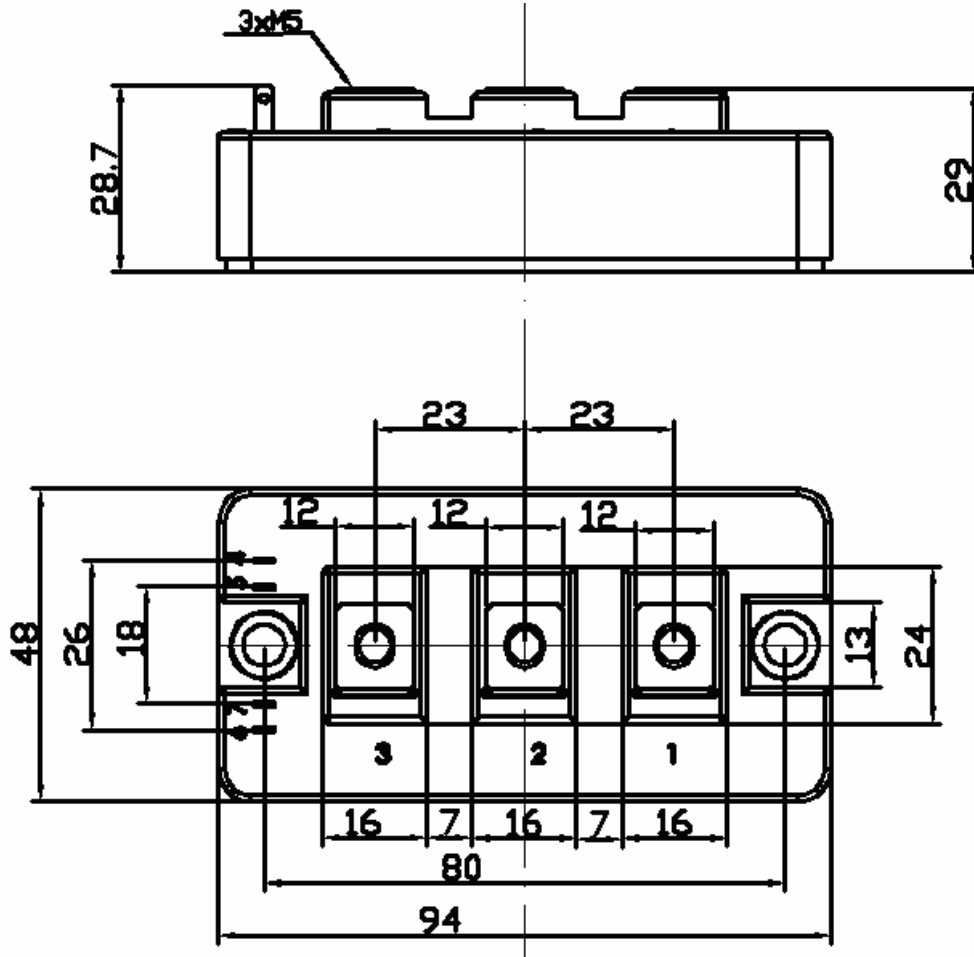
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=300A$	$T_j=25^\circ C$		1.5	V
			$T_j=125^\circ C$		1.4	
Q_r	Diode Reverse Recovery Charge	$I_F=300A,$ $V_R=300V,$ $di/dt=-4200A/\mu s,$ $V_{GE}=-15V$	$T_j=25^\circ C$		19	μC
			$T_j=125^\circ C$		34	
I_{RM}	Diode Peak Reverse Recovery Current		$T_j=25^\circ C$		205	A
			$T_j=125^\circ C$		256	
E_{rec}	Reverse Recovery Energy		$T_j=25^\circ C$		5.1	mJ
			$T_j=125^\circ C$		7.0	

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)		0.197	K/W
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.046		K/W
Weight	Weight of Module	200		g

Package Dimension

Dimensions in Millimeters



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