

STARPOWER

SEMICONDUCTOR™

IGBT

GD300HFT120C2S

Preliminary

Molding Type Module**1200V/300A 2 in one-package**

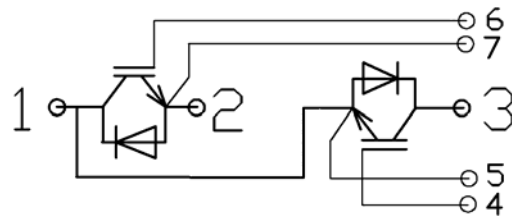
General Description

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



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- Low switching losses
- 10 μ s 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



Equivalent Circuit Schematic

Typical Applications

- UPS
- Switching mode power supplies
- Electronic welders

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

Symbol	Description	GD300HFT120C2S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	550	A
		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 @ $T_j=175^\circ\text{C}$	1875	W
T_{SC}	Short Circuit Withstand Time @ $T_j=125^\circ\text{C}$	10	μs
T_j	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
I^2t -value, Diode	$V_R=0\text{V}, t=10\text{ms}, T_j=125^\circ\text{C}$	19000	A^2s
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M6	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 5.0	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
$V_{(BR)CES}$	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	$I_C=14.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^\circ\text{C}$	5.0		7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=300\text{A}, V_{GE}=15\text{V},$ $T_j=25^\circ\text{C}$		1.95	2.25	V
		$I_C=300\text{A}, V_{GE}=15\text{V},$ $T_j=175^\circ\text{C}$		2.50		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=300A,$ $R_G=1.6\Omega, V_{GE}=\pm 15V,$ $T_J=25^\circ C$		460		ns
t_r	Rise Time			104		ns
$t_{d(off)}$	Turn-Off Delay Time			419		ns
t_f	Fall Time			164		ns
E_{on}	Turn-On Switching Loss			37.8		mJ
E_{off}	Turn-Off Switching Loss			20.1		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=300A,$ $R_G=1.6\Omega, V_{GE}=\pm 15V,$ $T_J=125^\circ C$		485		ns
t_r	Rise Time			107		ns
$t_{d(off)}$	Turn-Off Delay Time			454		ns
t_f	Fall Time			216		ns
E_{on}	Turn-On Switching Loss			44.6		mJ
E_{off}	Turn-Off Switching Loss			28.8		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		35.8		nF
C_{oes}	Output Capacitance			1.34		nF
C_{res}	Reverse Transfer Capacitance			0.98		nF
I_{SC}	SC Data	$t_{SC} \leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		TBD		A
R_{Gint}	Internal Gate Resistance			2.4		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.35		m Ω

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

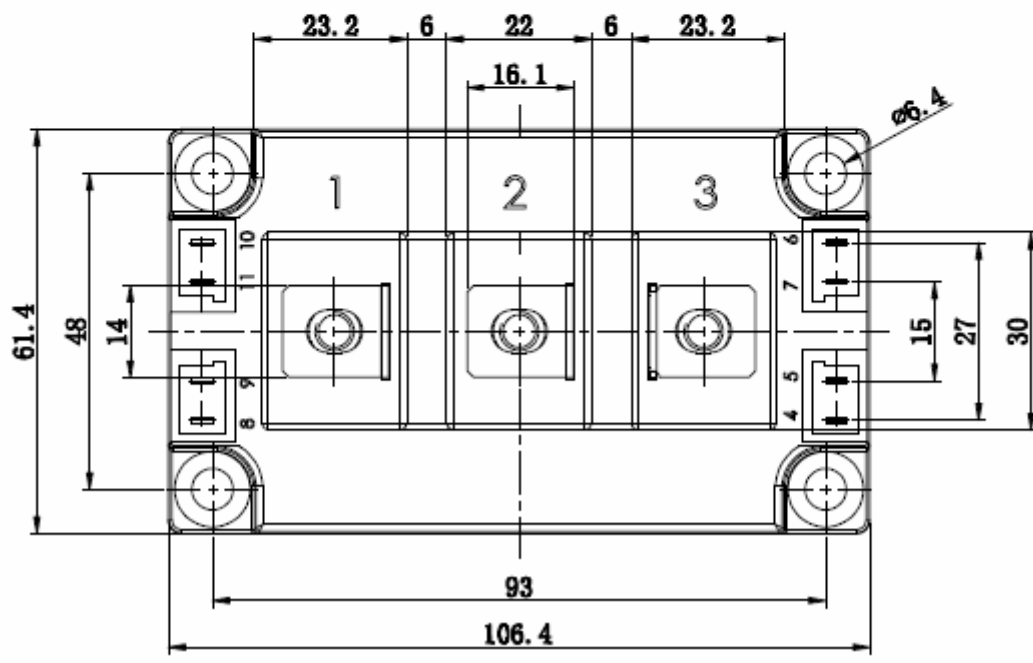
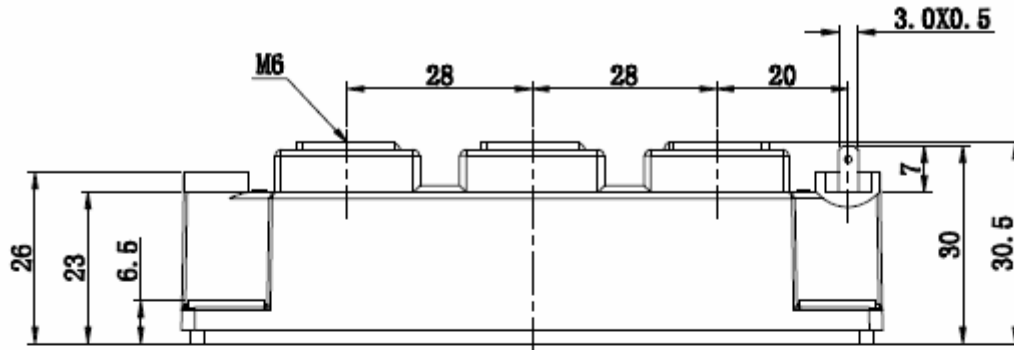
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=300A$	$T_J=25^\circ C$	1.75	2.15	V
			$T_J=125^\circ C$	1.85		
Q_r	Recovered Charge	$I_F=300A,$	$T_J=25^\circ C$	20.7		μC
			$T_J=125^\circ C$	38.9		
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $di/dt=-3550A/\mu s,$	$T_J=25^\circ C$	158		A
			$T_J=125^\circ C$	216		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_J=25^\circ C$	10.2		mJ
			$T_J=125^\circ C$	18.3		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.08	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.11	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

Package Dimension

Dimensions in Millimeters



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