STARPOWER

SEMICONDUCTOR   **IGBT**

GD450HTT120C7S_G8

Molding Type Module

1200V/450A 6 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
- 10μs 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

Typical Applications

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

Absolute Maximum Ratings $T_C=25℃$ unless otherwise noted

Symbol	Description	GD450HFT120C6S_G8	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Collector Current @ $T_C=25℃$ @ $T_C=100℃$	660 450	A
I_{CM}	Pulsed Collector Current $t_p=1ms$	900	A
I_F	Diode Continuous Forward Current	450	A
I_{FM}	Diode Maximum Forward Current $t_p=1ms$	900	A
P_D	Maximum Power Dissipation @ $T_j=175℃$	2083	W
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M5	3.0 to 6.0 3.0 to 6.0	N.m
G	Weight of Module	910	g

Electrical Characteristics of IGBT $T_C=25℃$ unless otherwise noted

Off Characteristics

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

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=18.0mA,V_{CE}=V_{GE},$ $T_j=25℃$	5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=450A,V_{GE}=15V,$ $T_j=25℃$		1.70	2.15	V
		$I_C=450A,V_{GE}=15V,$ $T_j=125℃$		1.95		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=450A, R_G=1.5Ω,V_{GE}=±15V, T_j=25℃		360		ns
t_r	Rise Time			140		ns
$t_{d(off)}$	Turn-Off Delay Time			550		ns
t_f	Fall Time			146		ns
E_{on}	Turn-On Switching Loss			11.5		mJ
E_{off}	Turn-Off Switching Loss			48.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=450A, R_G=1.5Ω,V_{GE}=±15V, T_j=125℃		374		ns
t_r	Rise Time			147		ns
$t_{d(off)}$	Turn-Off Delay Time			623		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			17.9		mJ
E_{off}	Turn-Off Switching Loss			64.5		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		39.0		nF
C_{res}	Reverse Transfer Capacitance			1.26		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		1800		A
R_{Gint}	Internal Gate Resistance			0.67		Ω
L_{CE}	Stray Inductance			20		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			1.10		mΩ

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=450A	T_j=25℃		1.65	2.25	V
			T_j=125℃		1.65		
Q_r	Recovered Charge	I_F=450A, V_R=600V, R_G=1.5Ω, V_{GE}=-15V	T_j=25℃		41.6		μC
			T_j=125℃		77.5		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		241		A
			T_j=125℃		325		
E_{rec}	Reverse Recovery Energy		T_j=25℃		23.2		mJ
			T_j=125℃		43.1		

NTC T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{25}	Rated Resistance			5.0		kΩ
ΔR/R	Deviation of R_{100}	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

Thermal Characteristics

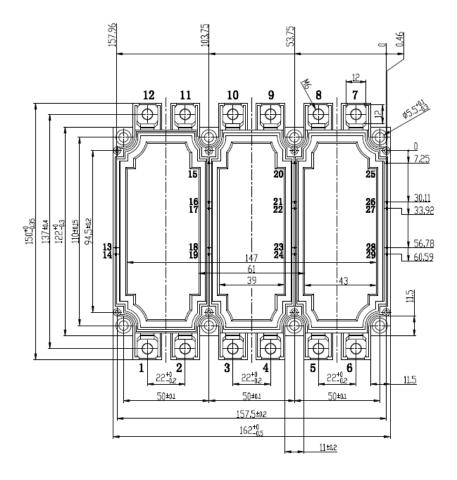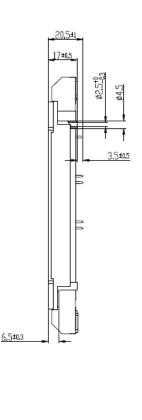| Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.072	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.110	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.005		K/W

Equivalent Circuit Schematic

Package Dimensions

Dimensions in Millimeters

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