STARPOWER

SEMICONDUCTOR™

IGBT

GD600HFT60C2S Preliminary

Molding Type Module

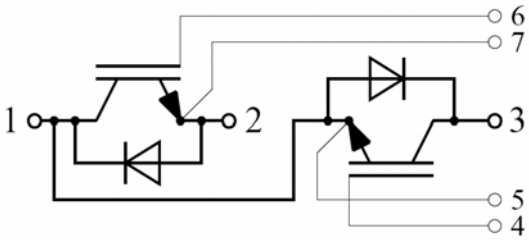
600V/600A 2 in one-package

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
- 5μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- 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℃ unless otherwise noted

Symbol	Description	GD600HFT60C2S	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	950	A
	@ T_C=80℃	600	
$I_{CM(1)}$	Pulsed Collector Current t_p=1ms	1200	A
I_F	Diode Continuous Forward Current	600	A
I_{FM}	Diode Maximum Forward Current	1200	A
P_D	Maximum Power Dissipation @ T_j=175℃	2027	W
T_{SC}	Short Circuit Withstand Time @ T_j=150℃	5	μs
T_j	Maximum Junction Temperature	175	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	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℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25℃	600			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=6.0mA,V_{CE}=V_{GE}, T_j=25℃	4.0		6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=600A,V_{GE}=15V, T_j=25℃		1.60	2.05	V
		I_C=600A,V_{GE}=15V, T_j=175℃		2.00		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=600A, R_G=0.8Ω,V_{GE}=15V, T_j=25℃		31		ns
t_r	Rise Time			66		ns
$t_{d(off)}$	Turn-Off Delay Time			170		ns
t_f	Fall Time			64		ns
E_{on}	Turn-On Switching Loss			25.3		mJ
E_{off}	Turn-Off Switching Loss			17.4		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=600A, R_G=0.8Ω,V_{GE}=15V, T_j=175℃		37		ns
t_r	Rise Time			70		ns
$t_{d(off)}$	Turn-Off Delay Time			210		ns
t_f	Fall Time			82		ns
E_{on}	Turn-On Switching Loss			35.4		mJ
E_{off}	Turn-Off Switching Loss			24.6		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		46.3		nF
C_{oes}	Output Capacitance			3.18		nF
C_{res}	Reverse Transfer Capacitance			1.38		nF
I_{SC}	SC Data	t_{SC}≤5μs,V_{GE}=15V, T_j=150℃,V_{CC}=360V, V_{CEM}≤600V		TBD		A
R_{Gint}	Internal Gate Resistance			0.8		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25℃		0.35		mΩ

Electrical Characteristics of DIODE T_C=25℃ unless otherwise noted

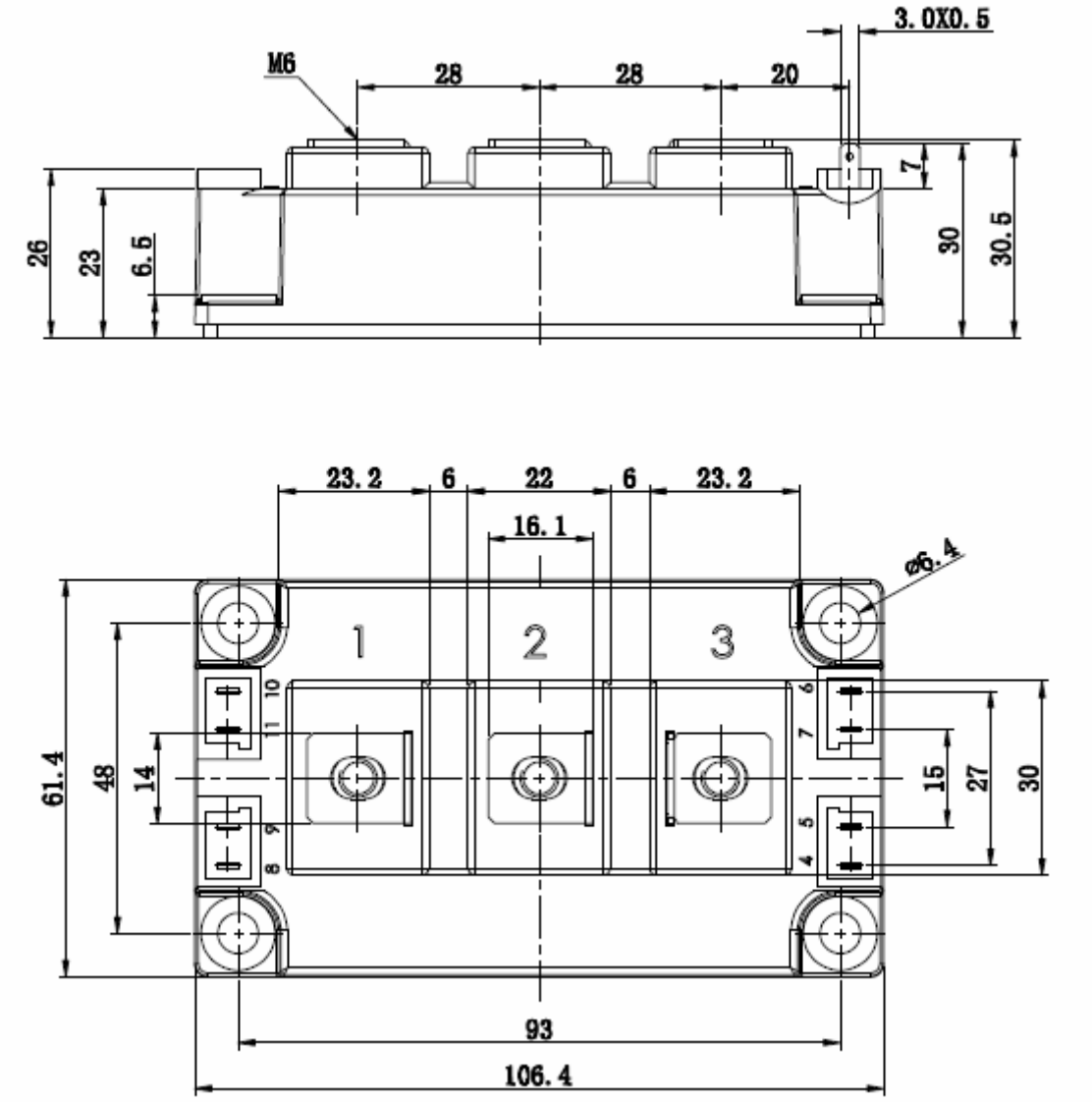
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=600A	T_j=25℃		1.40	1.80	V
			T_j=125℃		1.45		
Q_r	Recovered Charge	I_F=600A, V_R=300V, di/dt=-6000A/μs, V_{GE}=-15V	T_j=25℃		25.2		μC
			T_j=125℃		33.0		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		390		A
			T_j=125℃		420		
E_{rec}	Reverse Recovery Energy		T_j=25℃		6.00		mJ
			T_j=125℃		7.68		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.074	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.120	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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