STARPOWER

SEMICONDUCTOR

IGBT

GD50HFL170C1S

Molding Type Module

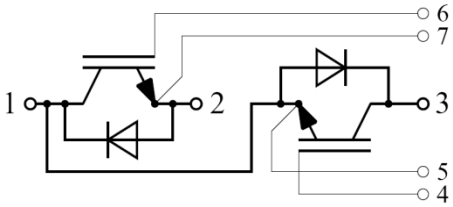
1700V/50A 2 in one-package

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 $V_{CE(sat)}$ SPT+ IGBT technology
- 10μs 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

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

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	GD50HFL170C1S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	80 50	A
I_{CM}	Pulsed Collector Current t_p=1ms	100	A
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	100	A
P_D	Maximum Power Dissipation @ T_j=175℃	442	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	4000	V
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 to 5.0 3.0 to 5.0	N.m

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℃	1700			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			1.0	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=2.0mA,V_{CE}=V_{GE}, T_j=25℃	5.4	6.0	7.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=50A,V_{GE}=15V, T_j=25℃		2.50	2.95	V
		I_C=50A,V_{GE}=15V, T_j=125℃		3.00		
		I_C=50A,V_{GE}=15V, T_j=150℃		3.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=25℃		240		ns
t_r	Rise Time			120		ns
$t_{d(off)}$	Turn-Off Delay Time			390		ns
t_f	Fall Time			160		ns
E_{on}	Turn-On Switching Loss			14.0		mJ
E_{off}	Turn-Off Switching Loss			20.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=125℃		245		ns
t_r	Rise Time			123		ns
$t_{d(off)}$	Turn-Off Delay Time			470		ns
t_f	Fall Time			175		ns
E_{on}	Turn-On Switching Loss			18.0		mJ
E_{off}	Turn-Off Switching Loss			15.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=150℃		248		ns
t_r	Rise Time			125		ns
$t_{d(off)}$	Turn-Off Delay Time			495		ns
t_f	Fall Time			178		ns
E_{on}	Turn-On Switching Loss			20.0		mJ
E_{off}	Turn-Off Switching Loss			16.0		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		3.50		nF
C_{oes}	Output Capacitance			0.18		nF
C_{res}	Reverse Transfer Capacitance			0.12		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150℃,V_{CC}=900V, V_{CEM}≤1700V		150		A
L_{CE}	Stray Inductance				30	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.75		mΩ

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

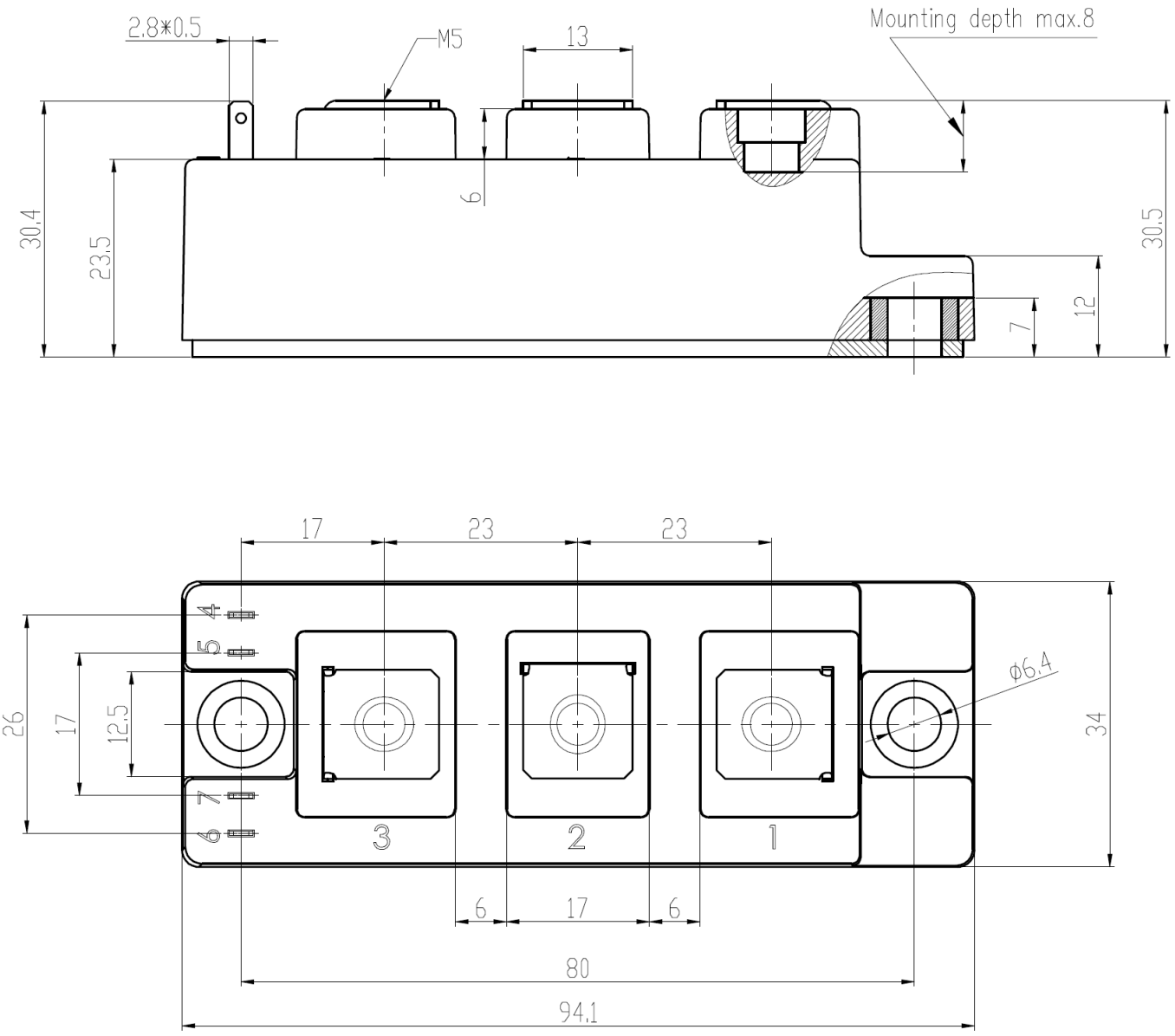
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=50A, V_{GE}=0V	T_j=25℃		1.80	2.25	V
			T_j=125℃		1.95		
			T_j=150℃		1.90		
Q_r	Recovered Charge	I_F=50A, V_R=900V, di/dt=370A/μs, V_{GE}=-15V	T_j=25℃		14		μC
			T_j=125℃		21		
			T_j=150℃		25		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		40		A
			T_j=125℃		45		
			T_j=150℃		50		
E_{rec}	Reverse Recovery Energy		T_j=25℃		8.4		mJ
			T_j=125℃		13.9		
			T_j=150℃		16.2		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.339	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.538	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.05		K/W
Weight	Weight of Module	150		g

Package Dimensions

Dimensions in Millimeters



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