STARPOWER

SEMICONDUCTOR **IGBT**

GD50FFT120C5SN

Molding Type Module

1200V/50A 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
- 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

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	GD50FFT120C5SN	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℃	90 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℃	340	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
Mounting Torque	Mounting Screw:M5	3.0 to 6.0	N.m
Weight	Weight of Module	200	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=2.4mA,V_{CE}=V_{GE}, T_j=25℃	5.0	6.1	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=50A,V_{GE}=15V, T_j=25℃		1.90	2.35	V
		I_C=50A,V_{GE}=15V, T_j=125℃		2.30		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=25℃		148		ns
t_r	Rise Time			83		ns
$t_{d(off)}$	Turn-Off Delay Time			245		ns
t_f	Fall Time			251		ns
E_{on}	Turn-On Switching Loss			5.51		mJ
E_{off}	Turn-Off Switching Loss			2.70		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=50A, R_G=15Ω,V_{GE}=±15V, T_j=125℃		263		ns
t_r	Rise Time			84		ns
$t_{d(off)}$	Turn-Off Delay Time			256		ns
t_f	Fall Time			292		ns
E_{on}	Turn-On Switching Loss			6.63		mJ
E_{off}	Turn-Off Switching Loss			3.25		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		6.24		nF
C_{oes}	Output Capacitance			0.23		nF
C_{res}	Reverse Transfer Capacitance			0.15		nF
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15 V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		500		A
L_{CE}	Stray Inductance			60		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			8.0		mΩ

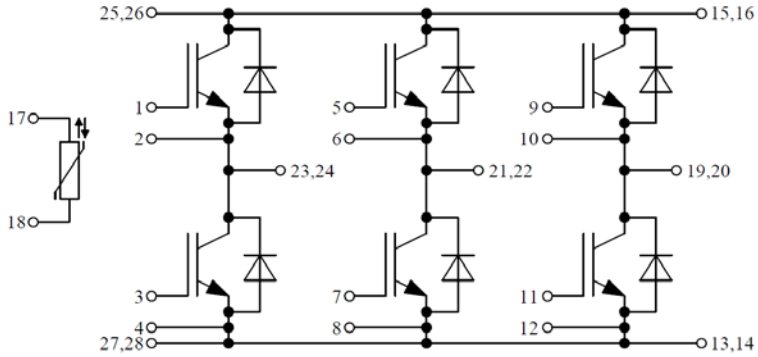
Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=50A,V_{GE}=0V	T_j=25℃		1.82	2.25	V
			T_j=125℃		1.95		
Q_r	Recovered Charge	I_F=50A, V_R=600V, R_G=22Ω, V_{GE}=-15V	T_j=25℃		3.4		μC
			T_j=125℃		6.4		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		35		A
			T_j=125℃		44		
E_{rec}	Reverse Recovery Energy		T_j=25℃		1.07		mJ
			T_j=125℃		2.26		

Thermal Characteristics

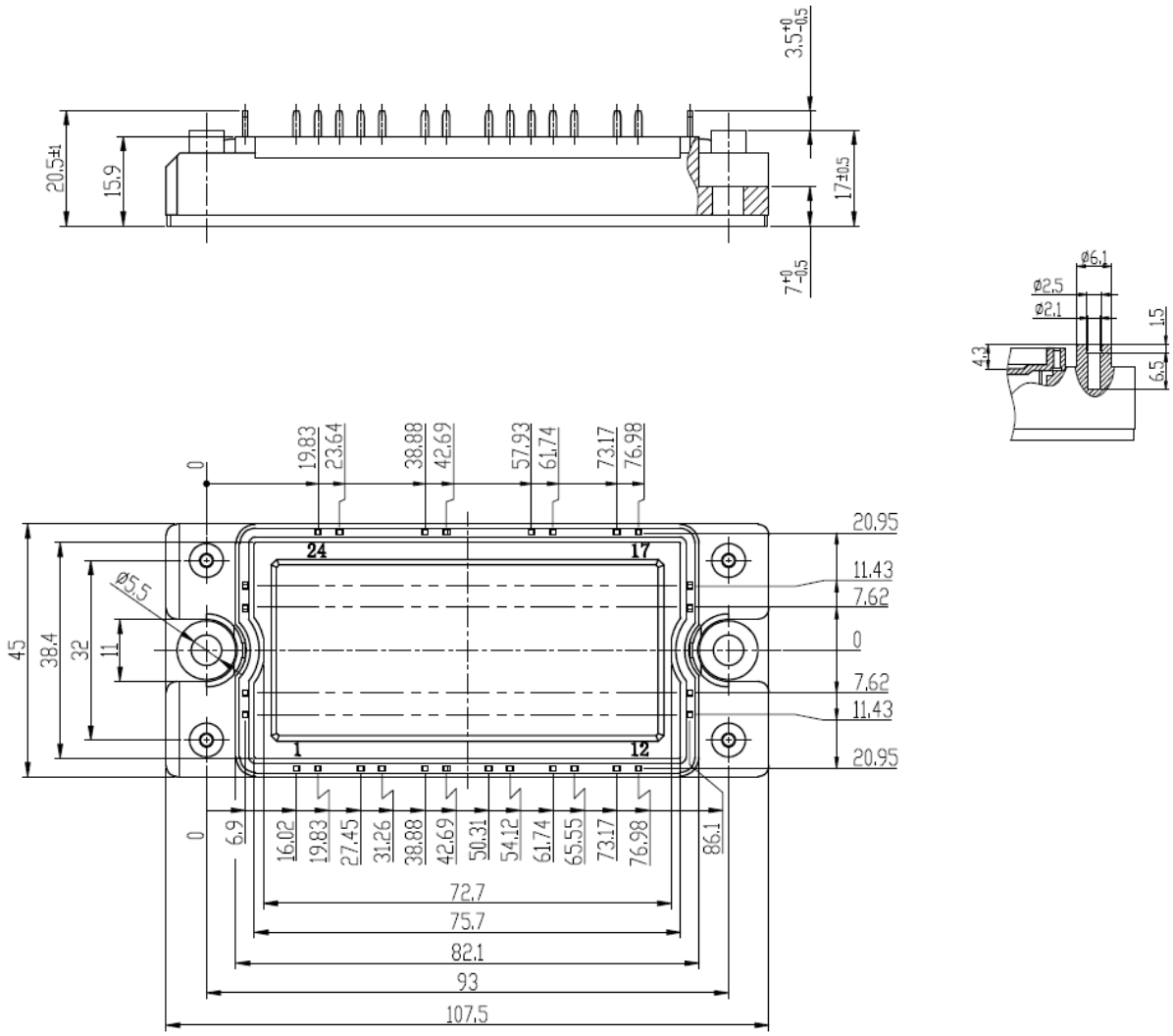
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.441	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.490	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.02		K/W

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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