STARPOWER

SEMICONDUCTOR™

IGBT

GD100FFT60C6S Preliminary

Molding Type Module

600V/100A 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
- 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

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	GD100FFT60C6S	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	150	A
	@ T_C=80℃	100	
$I_{CM(1)}$	Pulsed Collector Current @ T_C=80℃	200	A
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current	200	A
P_D	Maximum power Dissipation @ T_j=150℃	455	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	Mounting Screw:M5	3.0 to 6.0	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=2.1mA,V_{CE}=V_{GE}, T_j=25℃	4.0		6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=100A,V_{GE}=15V, T_j=25℃		1.65	2.00	V
		I_C=100A,V_{GE}=15V, T_j=175℃		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=100A, R_G=4.7Ω,V_{GE}=15V, T_j=25℃		32		ns
t_r	Rise Time			58		ns
$t_{d(off)}$	Turn-Off Delay Time			160		ns
t_f	Fall Time			70		ns
E_{on}	Turn-On Switching Loss			4.5		mJ
E_{off}	Turn-Off Switching Loss			3.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=400V,I_C=100A, R_G=4.7Ω,V_{GE}=15V, T_j=175℃		36		ns
t_r	Rise Time			61		ns
$t_{d(off)}$	Turn-Off Delay Time			220		ns
t_f	Fall Time			85		ns
E_{on}	Turn-On Switching Loss			5.90		mJ
E_{off}	Turn-Off Switching Loss			4.10		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		7.71		nF
C_{oes}	Output Capacitance			0.53		nF
C_{res}	Reverse Transfer Capacitance			0.23		nF
I_{SC}	SC Data	t_{SC}≤5μs,V_{GE}=15V, T_j=150℃,V_{CC}=360V, V_{CEM}≤600V		TBD		A
L_{CE}	Stray Inductance			21		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			1.80		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=100A	T_j=25℃		1.40	1.80	V
			T_j=125℃		1.45		
Q_r	Recovered charge	I_F=100A, V_R=300V, di/dt=-1000A/μs, V_{GE}=-15V	T_j=25℃		4.2		μC
			T_j=125℃		5.5		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		65		A
			T_j=125℃		70		
E_{rec}	Reverse Recovery Energy		T_j=25℃		1.00		mJ
			T_j=125℃		1.28		

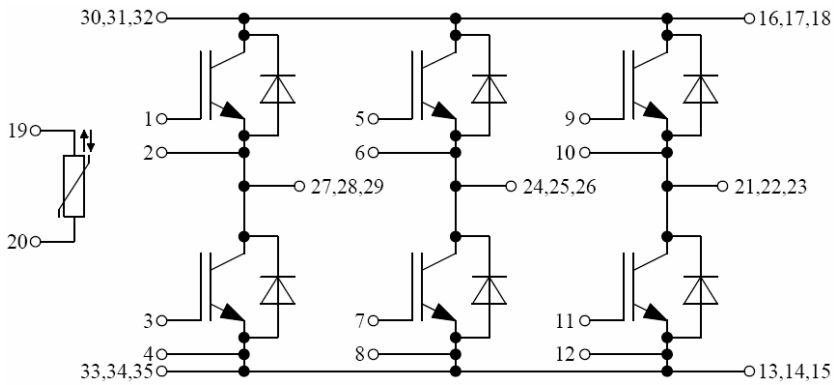
Electrical Characteristics of NTC T_C=25℃ unless otherwise noted

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

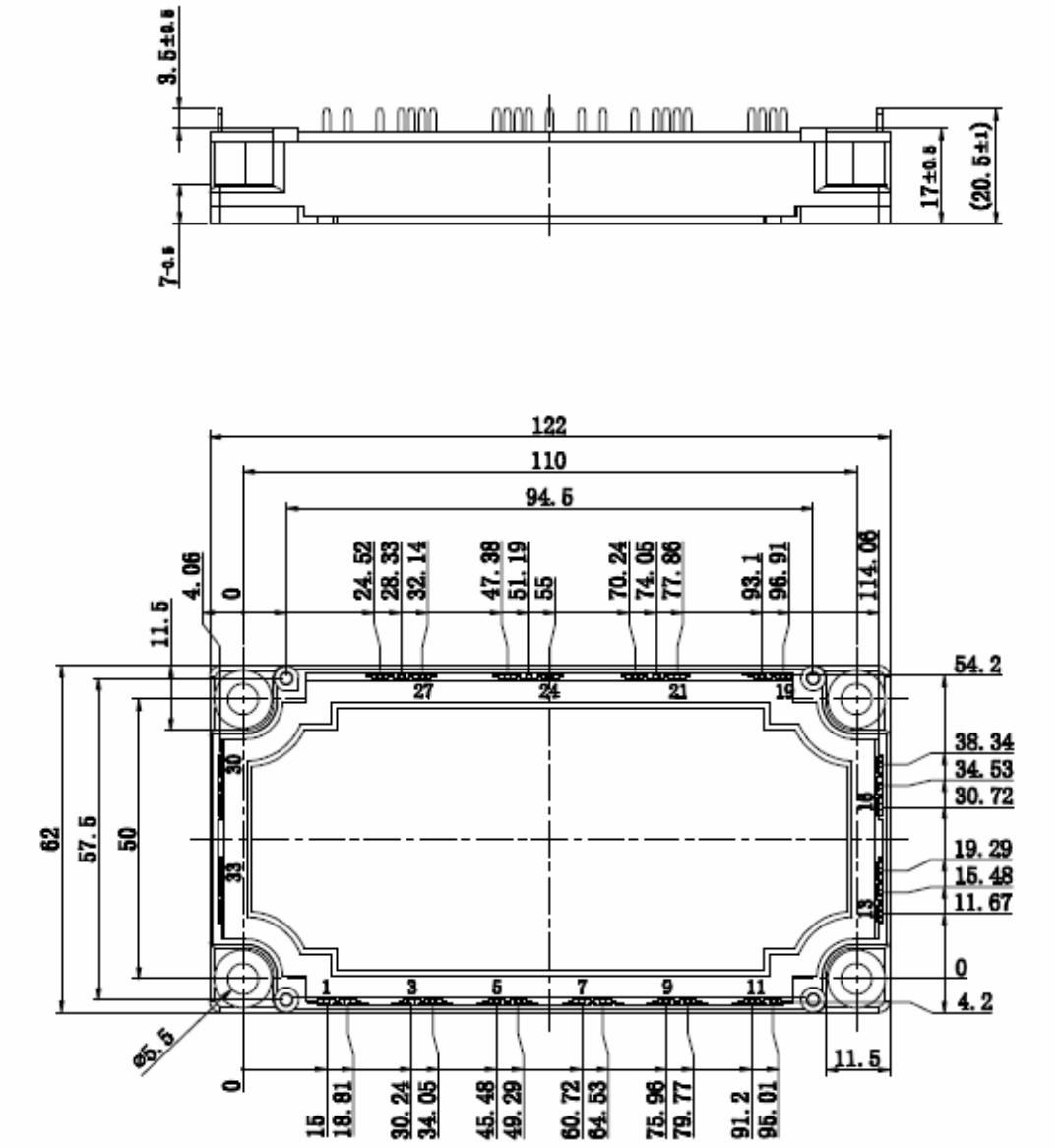
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.33	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.52	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.009		K/W
Weight	Weight of Module	300		g

Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters



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