

STARPOWER

SEMICONDUCTOR

IGBT

GD35FFT120C5S

Molding Type Module

1200V/35A 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
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175 °C
- 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 $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Description	GD35FFT120C5S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$	70	A
	@ $T_C=100^\circ\text{C}$	35	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	70	A
I_F	Diode Continuous Forward Current	35	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	70	A
P_D	Maximum Power Dissipation @ $T_j=175^\circ\text{C}$	281	W
T_{jmax}	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	4000	V
Mounting Torque	Mounting Screw:M5	3.0 to 6.0	N.m
Weight	Weight of Module	200	g

Electrical Characteristics of IGBT $T_C=25^\circ\text{C}$ unless otherwise noted**Off Characteristics**

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

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.7\text{mA}$, $V_{CE}=V_{GE}$, $T_j=25^\circ\text{C}$	5.0	6.1	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=50\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^\circ\text{C}$		1.90	2.35	V
		$I_C=50\text{A}$, $V_{GE}=15\text{V}$, $T_j=175^\circ\text{C}$		2.50		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=35A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		50		ns
t_r	Rise Time			80		ns
$t_{d(off)}$	Turn-Off Delay Time			280		ns
t_f	Fall Time			30		ns
E_{on}	Turn-On Switching Loss			3.73		mJ
E_{off}	Turn-Off Switching Loss			1.61		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=35A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ $T_j=175^\circ C$		50		ns
t_r	Rise Time			81		ns
$t_{d(off)}$	Turn-Off Delay Time			340		ns
t_f	Fall Time			295		ns
E_{on}	Turn-On Switching Loss			6.25		mJ
E_{off}	Turn-Off Switching Loss			2.69		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		4.12		nF
C_{oes}	Output Capacitance			0.16		nF
C_{res}	Reverse Transfer Capacitance			0.19		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		350		A
L_{CE}	Stray Inductance			60		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			8.0		m Ω

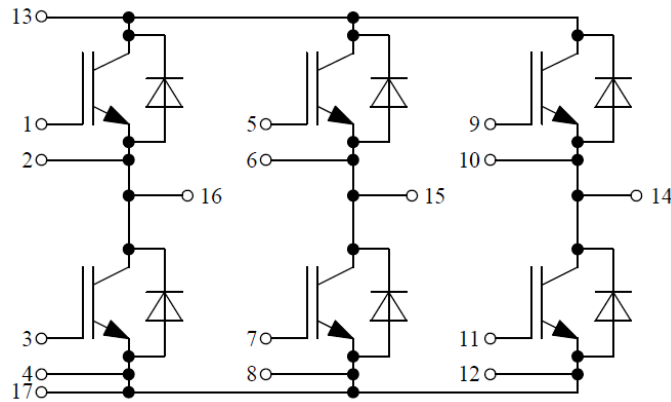
Electrical Characteristics of Diode $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=35A, V_{GE}=0V$	$T_j=25^\circ C$	2.00	2.45	V
			$T_j=125^\circ C$	1.90		
Q_r	Recovered Charge	$I_F=35A,$ $V_R=600V,$ $R_G=10\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	2.3		μC
			$T_j=125^\circ C$	4.5		
I_{RM}	Peak Reverse Recovery Current	$V_{GE}=-15V$	$T_j=25^\circ C$	20		A
			$T_j=125^\circ C$	24		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	1.19		mJ
			$T_j=125^\circ C$	2.23		

Thermal Characteristics

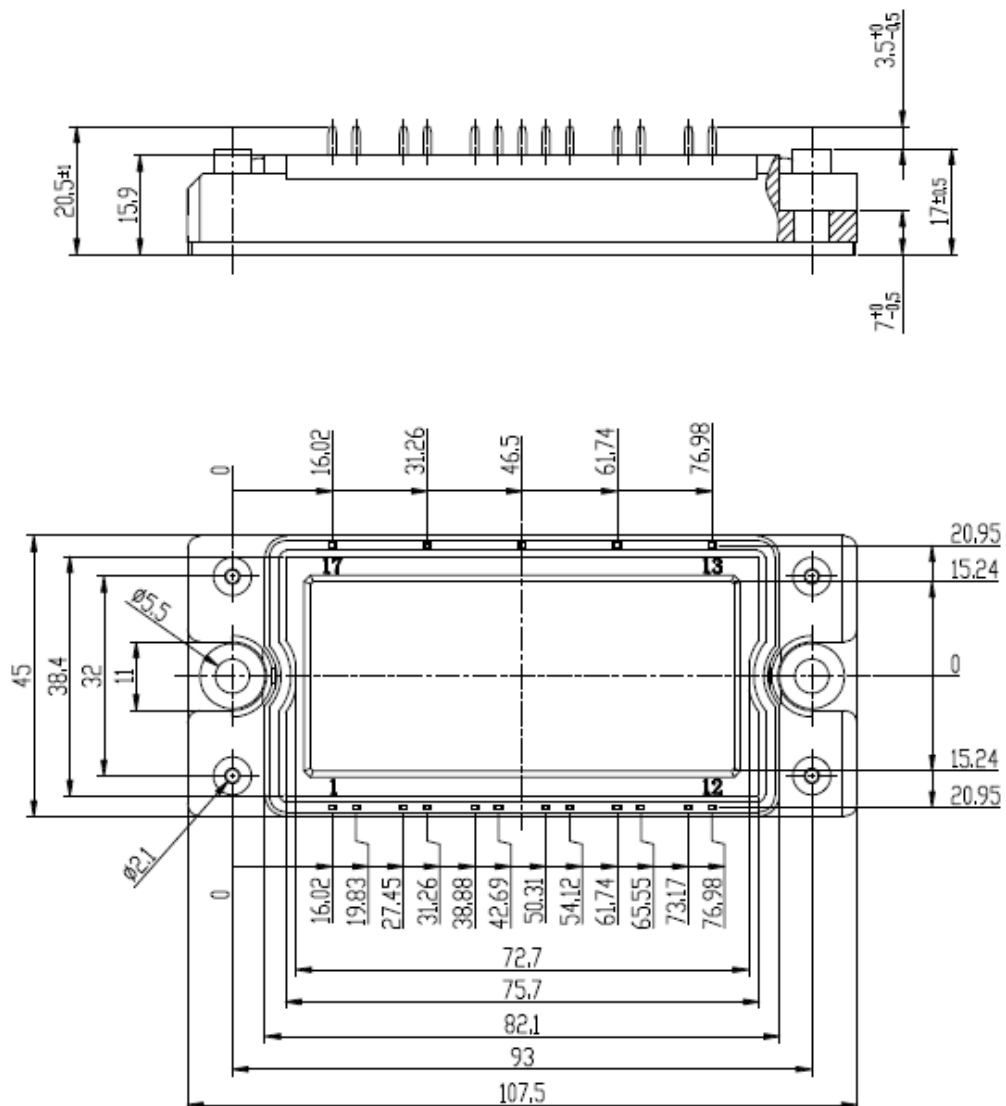
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.534	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.988	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.02		K/W

Equivalent Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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