

STARPOWER

SEMICONDUCTOR

IGBT

GD75FSY120L3S

1200V/75A 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.



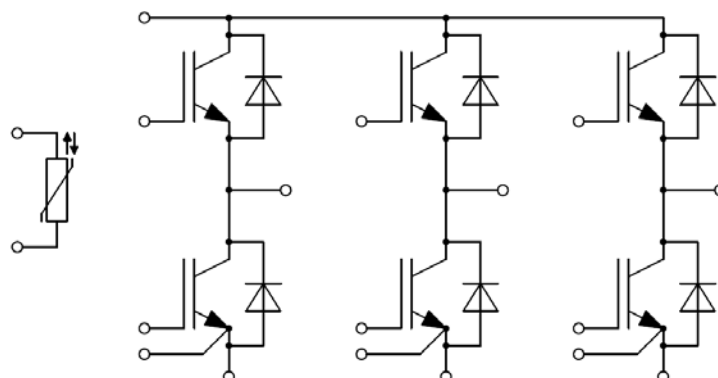
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175 $^{\circ}$ C
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated heatsink using DBC technology

Typical Applications

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

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted**IGBT**

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$	150	A
	@ $T_C=100^{\circ}\text{C}$	75	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	150	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	576	W

Diode

Symbol	Description	Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	75	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	150	A

Module

Symbol	Description	Value	Unit
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, $f=50\text{Hz}$, $t=1\text{min}$	2500	V

IGBT Characteristics $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$		1.65	2.10	V	
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=125^\circ\text{C}$		1.95			
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}$		2.00			
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.88\text{mA}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$	5.2	6.0	6.8	V	
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$			1.0	mA	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_j=25^\circ\text{C}$			100	nA	
R_{Gint}	Internal Gate Resistance			2.0		Ω	
C_{ies}	Input Capacitance	$V_{CE}=30\text{V}, f=1\text{MHz}, V_{GE}=0\text{V}$		7.15		nF	
C_{res}	Reverse Transfer Capacitance				0.23		nF
Q_G	Gate Charge	$V_{GE}=-15\dots+15\text{V}$		0.48		μC	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=75\text{A}, R_G=5.1\Omega, V_{GE}=\pm 15\text{V}, T_j=25^\circ\text{C}$		219		ns	
t_r	Rise Time			42		ns	
$t_{d(off)}$	Turn-Off Delay Time			271		ns	
t_f	Fall Time			261		ns	
E_{on}	Turn-On Switching Loss			2.95		mJ	
E_{off}	Turn-Off Switching Loss			4.70		mJ	
$t_{d(on)}$	Turn-On Delay Time		$V_{CC}=600\text{V}, I_C=75\text{A}, R_G=5.1\Omega, V_{GE}=\pm 15\text{V}, T_j=125^\circ\text{C}$		220		ns
t_r	Rise Time				46		ns
$t_{d(off)}$	Turn-Off Delay Time			289		ns	
t_f	Fall Time			397		ns	
E_{on}	Turn-On Switching Loss			4.00		mJ	
E_{off}	Turn-Off Switching Loss			7.65		mJ	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=75\text{A}, R_G=5.1\Omega, V_{GE}=\pm 15\text{V}, T_j=150^\circ\text{C}$			222		ns
t_r	Rise Time				46		ns
$t_{d(off)}$	Turn-Off Delay Time			295		ns	
t_f	Fall Time			410		ns	
E_{on}	Turn-On Switching Loss			4.40		mJ	
E_{off}	Turn-Off Switching Loss			8.41		mJ	
I_{SC}	SC Data		$t_p \leq 10\mu\text{s}, V_{GE}=15\text{V}, T_j=150^\circ\text{C}, V_{CC}=900\text{V}, V_{CEM} \leq 1200\text{V}$		300		A

Diode Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=75\text{A}, V_{GE}=0\text{V}, T_j=25^{\circ}\text{C}$		1.70	2.15	V
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_j=125^{\circ}\text{C}$		1.65		
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_j=150^{\circ}\text{C}$		1.65		
Q_r	Recovered Charge	$V_R=600\text{V}, I_F=75\text{A},$ $-di/dt=1400\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=25^{\circ}\text{C}$		5.0		μC
I_{RM}	Peak Reverse Recovery Current			81		A
E_{rec}	Reverse Recovery Energy			3.40		mJ
Q_r	Recovered Charge	$V_R=600\text{V}, I_F=75\text{A},$ $-di/dt=1400\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=125^{\circ}\text{C}$		11.0		μC
I_{RM}	Peak Reverse Recovery Current			97		A
E_{rec}	Reverse Recovery Energy			6.02		mJ
Q_r	Recovered Charge	$V_R=600\text{V}, I_F=75\text{A},$ $-di/dt=1400\text{A}/\mu\text{s}, V_{GE}=-15\text{V}$ $T_j=150^{\circ}\text{C}$		12.5		μC
I_{RM}	Peak Reverse Recovery Current			106		A
E_{rec}	Reverse Recovery Energy			6.62		mJ

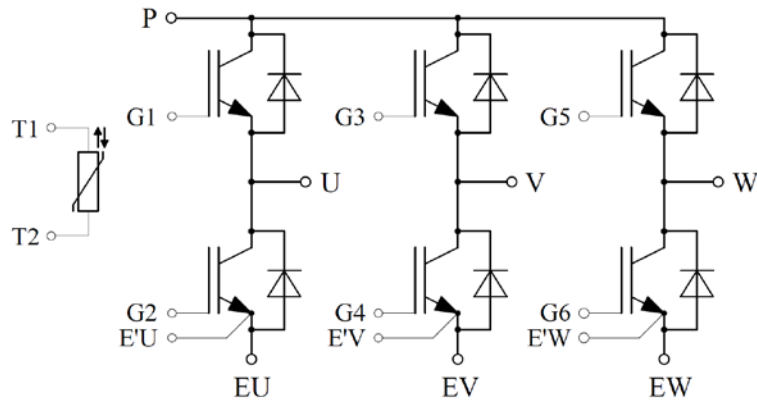
NTC Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			5.0		$\text{k}\Omega$
$\Delta R/R$	Deviation of R_{100}	$T_C=100^{\circ}\text{C}, R_{100}=493.3\Omega$	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

Module Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise noted

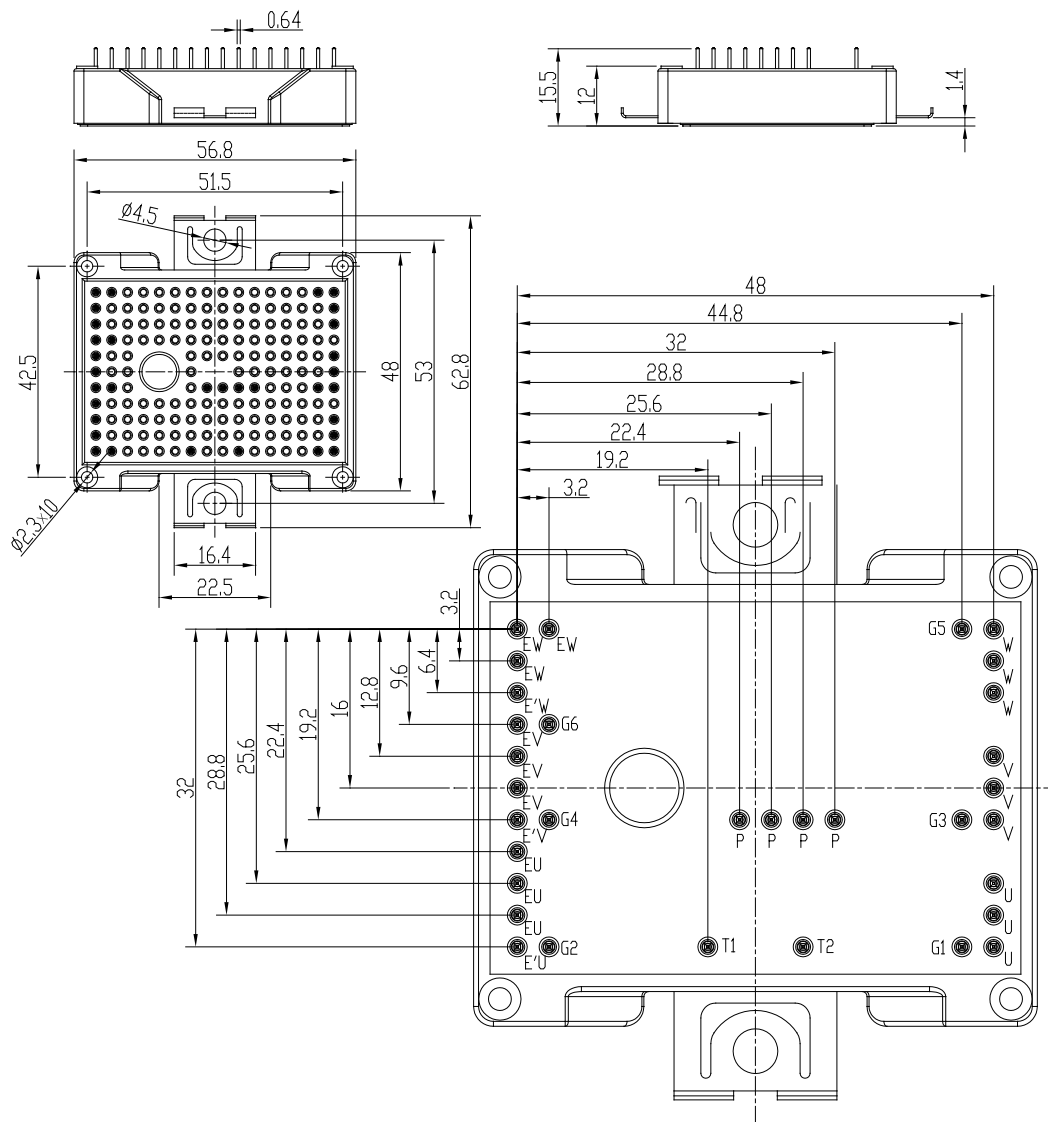
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		40		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		4.00		$\text{m}\Omega$
R_{thJC}	Junction-to-Case (per IGBT)		0.236	0.260	K/W
	Junction-to-Case (per Diode)		0.405	0.446	
R_{thCH}	Case-to-Heatsink (per IGBT)		0.351		K/W
	Case-to-Heatsink (per Diode)		0.603		
	Case-to-Heatsink (per Module)		0.037		
F	Mounting Force Per Clamp	40		80	N
G	Weight of Module		39		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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