

IGBT

GD150MLT120B3S

Preliminary

Molding Type Module

1200V/150A 3-level 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 3-level applications.



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

- 3-level applications
- Solar power
- UPS

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

Symbol	Description	GD150MLT120B3S	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	300	A
		150	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	300	A
I_F	Diode Continuous Forward Current	150	A
I_{FM}	Diode Maximum Forward Current	300	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	1000	W
T_j	Maximum Junction Temperature	175	$^{\circ}\text{C}$
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
Mounting Torque	Power Terminal Screw:M5	2.0 to 3.5	N.m
	Mounting Screw:M6	3.0 to 5.0	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

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	$I_C=7.0\text{mA}$, $V_{CE}=V_{GE}$, $T_j=25^{\circ}\text{C}$	5.0	5.9	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=150\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^{\circ}\text{C}$		1.95	2.35	V
		$I_C=150\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^{\circ}\text{C}$		2.45		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=150A,$ $R_G=5.1\Omega, V_{GE}=\pm 15V,$ $T_J=25^\circ C$		220		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			364		ns
t_f	Fall Time			146		ns
E_{on}	Turn-On Switching Loss			7.2		mJ
E_{off}	Turn-Off Switching Loss			9.0		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=150A,$ $R_G=5.1\Omega, V_{GE}=\pm 15V,$ $T_J=125^\circ C$		245		ns
t_r	Rise Time			78		ns
$t_{d(off)}$	Turn-Off Delay Time			385		ns
t_f	Fall Time			182		ns
E_{on}	Turn-On Switching Loss			11.0		mJ
E_{off}	Turn-Off Switching Loss			12.2		mJ
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$		17.9		nF
C_{oes}	Output Capacitance			0.67		nF
C_{res}	Reverse Transfer Capacitance			0.49		nF
I_{SC}	SC Data	$t_{SC}\leq 10\mu s, V_{GE}=15V,$ $T_J=125^\circ C, V_{CC}=900V,$ $V_{CEM}\leq 1200V$		1300		A
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.35		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	$I_F=150A$	$T_J=25^\circ C$	1.75	2.15	V
			$T_J=125^\circ C$	1.65		
Q_r	Recovered Charge	$I_F=150A,$	$T_J=25^\circ C$	11		μC
			$T_J=125^\circ C$	17		
I_{RM}	Peak Reverse Recovery Current	$V_R=600V,$ $di/dt=-2000A/\mu s,$	$T_J=25^\circ C$	112		A
			$T_J=125^\circ C$	140		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_J=25^\circ C$	4.8		mJ
			$T_J=125^\circ C$	8.4		

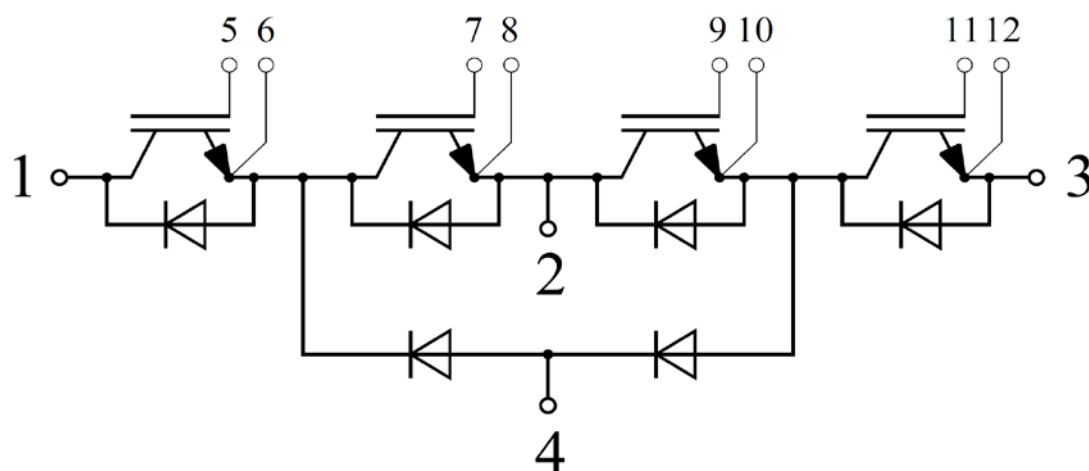
Electrical Characteristics of DIODE-3-level $T_C=25^{\circ}\text{C}$ unless otherwise

noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=150\text{A}$	$T_J=25^{\circ}\text{C}$		1.75	2.15	V
			$T_J=125^{\circ}\text{C}$		1.65		
Q_r	Recovered Charge	$I_F=150\text{A},$	$T_J=25^{\circ}\text{C}$		11		μC
			$T_J=125^{\circ}\text{C}$		17		
I_{RM}	Peak Reverse Recovery Current	$V_R=600\text{V},$ $di/dt=-2000\text{A}/\mu\text{s},$	$T_J=25^{\circ}\text{C}$		112		A
			$T_J=125^{\circ}\text{C}$		140		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15\text{V}$	$T_J=25^{\circ}\text{C}$		4.8		mJ
			$T_J=125^{\circ}\text{C}$		8.4		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.150	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.181	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE-3-level)		0.181	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

Equivalent Circuit Schematic**Package Dimension**

Dimensions in Millimeters

