

STARPOWER

SEMICONDUCTOR™

IGBT

GD100LRL120C5S

Molding Type Module**1200V/100A linear regulator 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 SMPS.



Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- Low switching losses
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- SMPS

T1 IGBT $T_C=25^{\circ}\text{C}$ unless otherwise noted

Maximum Rated Values

Symbol	Description	GD100LRL120C5S	Units
V_{CES}	Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	180 100	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	200	A
P_{tot}	Total Power Dissipation @ $T_j=150^{\circ}\text{C}$	573	W

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	$I_C=4.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	5.0	6.2	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=100\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		1.90	2.35	V
		$I_C=100\text{A}, V_{GE}=15\text{V},$ $T_j=125^{\circ}\text{C}$		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{Gint}	Internal Gate Resistance			2.0		Ω
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=100A,$ $R_G=5.6\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		279		ns
t_r	Rise Time			61		ns
$t_{d(off)}$	Turn-Off Delay Time			308		ns
t_f	Fall Time			205		ns
E_{on}	Turn-On Switching Loss			5.56		mJ
E_{off}	Turn-Off Switching Loss			6.95		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=100A,$ $R_G=5.6\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		287		ns
t_r	Rise Time			63		ns
$t_{d(off)}$	Turn-Off Delay Time			328		ns
t_f	Fall Time			360		ns
E_{on}	Turn-On Switching Loss			7.85		mJ
E_{off}	Turn-Off Switching Loss			10.6		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1Mhz,$ $V_{GE}=0V$		7.43		nF
C_{oes}	Output Capacitance			0.52		nF
C_{res}	Reverse Transfer Capacitance			0.34		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		470		A

D1 DIODE $T_C=25^\circ C$ unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD100LRL120C5S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ $T_j=25^\circ C$	1200	V
I_F	DC Forward Current	25	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1ms$	50	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =25A, V _{GE} =0V	T _j =25℃		1.80	2.20	V
			T _j =125℃		1.90		
Q _r	Recovered Charge	I _F =25A, V _R =600V, R _G =5.6Ω, V _{GE} =-15V	T _j =25℃		2.2		μC
			T _j =125℃		4.6		
I _{RM}	Peak Reverse Recovery Current		T _j =25℃		30		A
			T _j =125℃		38		
E _{rec}	Reverse Recovery Energy		T _j =25℃		0.79		mJ
			T _i =125℃		1.85		

D2 DIODE $T_c=25^{\circ}\text{C}$ unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD100LRL120C5S	Units
V_{RRM}	Repetitive Peak Reverse Voltage @ $T_j=25^{\circ}\text{C}$	1200	V
I_F	DC Forward Current	25	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1\text{ms}$	50	A

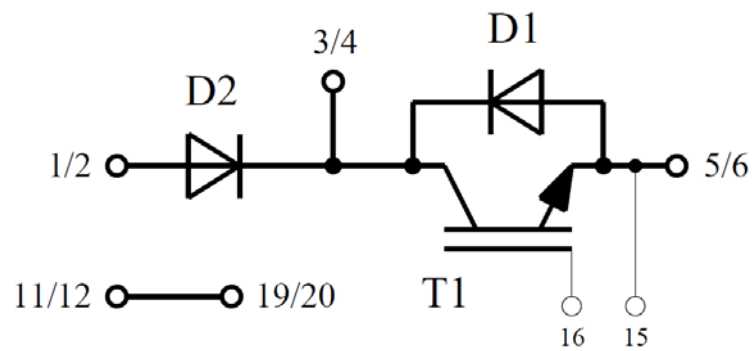
Characteristics Values

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=25\text{A}, V_{GE}=0\text{V}$	$T_j=25^{\circ}\text{C}$	1.80	2.20	V
			$T_j=125^{\circ}\text{C}$	1.90		

IGBT Module

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$		2500		V
$R_{\theta JC}$	Junction-to-Case (per T1 IGBT)			0.218	K/W
	Junction-to-Case (per D1 DIODE)			0.838	
	Junction-to-Case (per D2 DIODE)			0.838	
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.02		K/W
T_j	Maximum Junction Temperature			150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40		125	$^{\circ}\text{C}$
Mounting Torque	Mounting Screw:M5	3.0		6.0	N.m
G	Weight of Module		200		g

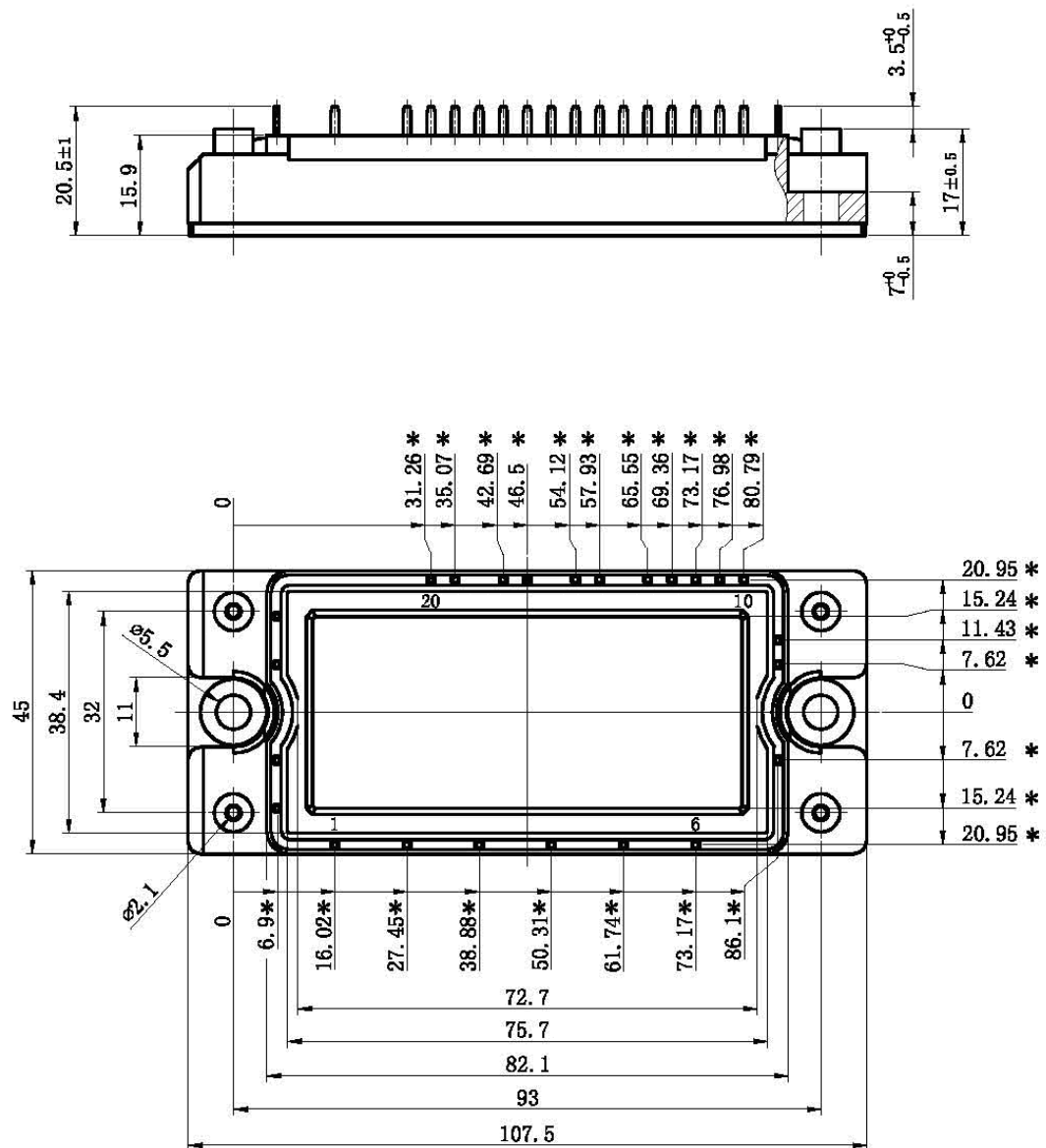
Equivalent Circuit Schematic



Pins 7,8,9,10,13,14,17,18,21,22,23,24 are not connected

Package Dimensions

Dimensions in Millimeters



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