STARPOWER

SEMICONDUCTOR **IGBT**

GD200MLT120B3S

1200V/200A 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 UPS.

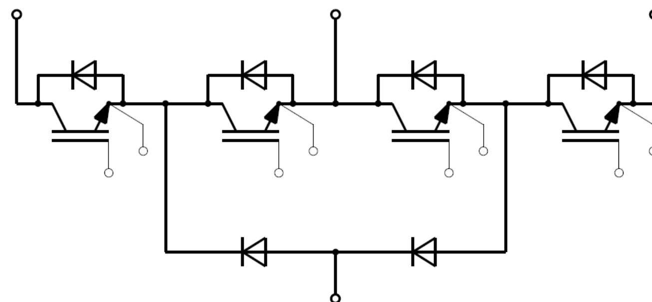
Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Low switching loss
- 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
- Uninterruptible power supply
- Solar power

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

T1-T4 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°C @ T_C=100°C	318 200	A
I_{CM}	Pulsed Collector Current t_p=1ms	400	A
P_D	Maximum Power Dissipation @ T_j=175°C	1041	W

D1-D4 Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	A

D5,D6 Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	°C
T_{jop}	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature Range	-40 to +125	°C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 to 5.0 3.0 to 5.0	N.m

T1-T4 IGBT Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=200A,V_{GE}=15V, T_j=25°C		1.75	2.20	V
		I_C=200A,V_{GE}=15V, T_j=125°C		2.05		
		I_C=200A,V_{GE}=15V, T_j=150°C		2.10		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=7.6mA,V_{CE}=V_{GE}, T_j=25°C	5.1	5.8	6.4	V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25°C			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25°C			400	nA
R_{Gint}	Internal Gate Resistance			3.8		Ω
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		12.6		nF
C_{res}	Reverse Transfer Capacitance			0.54		nF
Q_G	Gate Charge	V_{GE}=-15…+15V		1.80		μC
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=2.4Ω,V_{GE}=±15V, T_j=25°C		160		ns
t_r	Rise Time			40		ns
$t_{d(off)}$	Turn-Off Delay Time			450		ns
t_f	Fall Time			100		ns
E_{on}	Turn-On Switching Loss			10.0		mJ
E_{off}	Turn-Off Switching Loss			14.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=2.4Ω,V_{GE}=±15V, T_j=125°C		170		ns
t_r	Rise Time			45		ns
$t_{d(off)}$	Turn-Off Delay Time			520		ns
t_f	Fall Time			160		ns
E_{on}	Turn-On Switching Loss			15.0		mJ
E_{off}	Turn-Off Switching Loss			20.0		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=200A, R_G=2.4Ω,V_{GE}=±15V, T_j=150°C		180		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			540		ns
t_f	Fall Time			160		ns
E_{on}	Turn-On Switching Loss			17.0		mJ
E_{off}	Turn-Off Switching Loss			23.0		mJ
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=900V, V_{CEM}≤1200V		800		A

D1-D4 Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=200A,V_{GE}=0V,T_j=25°C		1.70	2.15	V
		I_F=200A,V_{GE}=0V,T_j=125°C		1.65		
		I_F=200A,V_{GE}=0V,T_j=150°C		1.65		
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di_F/dt=5400A/μs,V_{GE}=-15V T_j=25°C		18.5		μC
I_{RM}	Peak Reverse Recovery Current			240		A
E_{rec}	Reverse Recovery Energy			8.10		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di_F/dt=5400A/μs,V_{GE}=-15V T_j=125°C		33.5		μC
I_{RM}	Peak Reverse Recovery Current			250		A
E_{rec}	Reverse Recovery Energy			14.5		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di_F/dt=5400A/μs,V_{GE}=-15V T_j=150°C		38.5		μC
I_{RM}	Peak Reverse Recovery Current			260		A
E_{rec}	Reverse Recovery Energy			16.0		mJ

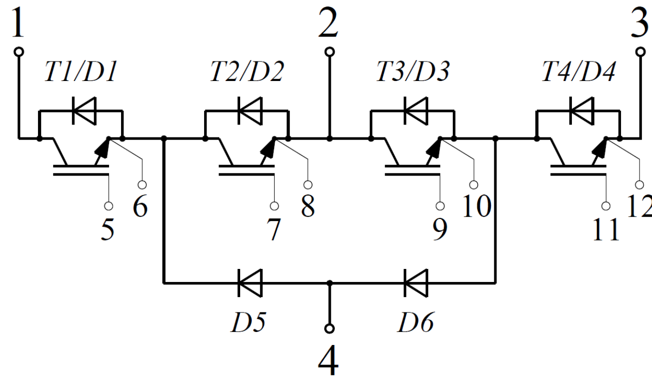
D5,D6 Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=200A,V_{GE}=0V,T_j=25°C		1.70	2.15	V
		I_F=200A,V_{GE}=0V,T_j=125°C		1.65		
		I_F=200A,V_{GE}=0V,T_j=150°C		1.65		
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di_F/dt=5400A/μs,V_{GE}=-15V T_j=25°C		18.5		μC
I_{RM}	Peak Reverse Recovery Current			240		A
E_{rec}	Reverse Recovery Energy			8.10		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di_F/dt=5400A/μs,V_{GE}=-15V T_j=125°C		33.5		μC
I_{RM}	Peak Reverse Recovery Current			250		A
E_{rec}	Reverse Recovery Energy			14.5		mJ
Q_r	Recovered Charge	V_R=600V,I_F=200A, -di_F/dt=5400A/μs,V_{GE}=-15V T_j=150°C		38.5		μC
I_{RM}	Peak Reverse Recovery Current			260		A
E_{rec}	Reverse Recovery Energy			16.0		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per T1-T4 IGBT) Junction-to-Case (per D1-D4 Diode) Junction-to-Case (per D5,D6 Diode)			0.144 0.244 0.267	K/W
R_{thCH}	Case-to-Heatsink (per T1-T4 IGBT) Case-to-Heatsink (per D1-D4 Diode) Case-to-Heatsink (per D5,D6 Diode) Case-to-Heatsink (per Module)		0.260 0.441 0.483 0.035		K/W
G	Weight of Module		340		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters

Terms and Conditions of Usage

The data contained in this product datasheet is exclusively intended for technically trained staff. you and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (see www.powersemi.cc), For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers.
Changes of this product data sheet are reserved.