

STARPOWER

SEMICONDUCTOR

IGBT

GD1600SGL170A3S

Molding Type Module

1700V/1600A 1 in one-package

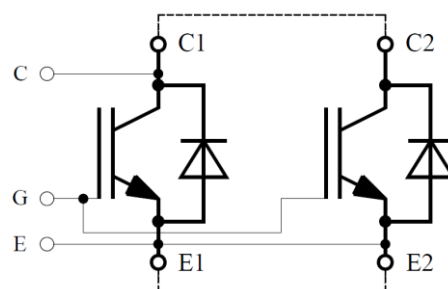
General Description

STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as high power converters.



Features

- Low $V_{CE(sat)}$ SPT+ IGBT technology
- 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



external connection to be done
Equivalent Circuit Schematic

Typical Applications

- AC Inverter Drives
- Uninterruptible Power Supply
- Wind Turbines

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

Symbol	Description	GD1600SGL170A3S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=100^\circ\text{C}$	3100	A
		1600	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	3200	A
I_F	Diode Continuous Forward Current	1600	A
I_{FM}	Diode Maximum Forward Current	3200	A
P_D	Maximum power Dissipation @ $T_j=175^\circ\text{C}$	15.0	kW
T_{jmax}	Maximum Junction Temperature	175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	4000	V
Mounting Torque	Signal Terminal Screw:M4	1.8 to 2.1	N.m
	Power Terminal Screw:M8	8.0 to 10	
	Mounting Screw:M6	4.25 to 5.75	

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	$T_j=25^\circ\text{C}$	1700			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	$I_C=64\text{mA}, V_{CE}=V_{GE}$, $T_j=25^\circ\text{C}$	4.5		6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=1600\text{A}, V_{GE}=15\text{V}$, $T_j=25^\circ\text{C}$		2.30	2.75	V
		$I_C=1600\text{A}, V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$		2.60		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
Q_G	Gate charge	$V_{GE}=-15\dots+15V$		14.1		μC	
R_{Gint}	Internal Gate Resistor	$T_j=25^\circ C$		1.5		Ω	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V,$ $I_C=1600A,$ $R_{Gon}=0.82\Omega,$ $V_{GE}=\pm 15V,$ $T_j=25^\circ C$		289		ns	
t_r	Rise Time			301		ns	
$t_{d(off)}$	Turn-Off Delay Time			176		ns	
t_f	Fall Time			189		ns	
E_{on}	Turn-On Switching Loss				380		mJ
E_{off}	Turn-Off Switching Loss				525		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V,$ $I_C=1600A,$ $R_G=0.82\Omega,$ $V_{GE}=\pm 15V,$ $T_j=125^\circ C$		1055		ns	
t_r	Rise Time			1135		ns	
$t_{d(off)}$	Turn-Off Delay Time			150		ns	
t_f	Fall Time			169		ns	
E_{on}	Turn-On Switching Loss				460		mJ
E_{off}	Turn-Off Switching Loss				595		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		152		nF	
C_{oes}	Output Capacitance			10.2		nF	
C_{res}	Reverse Transfer Capacitance			6.4		nF	
I_{SC}	SC Data	$t_{sc}\leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=1200V,$ $V_{CEM}\leq 1700V$		7200		A	
L_{CE}	Stray Inductance			12		nH	
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.19		m Ω	

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

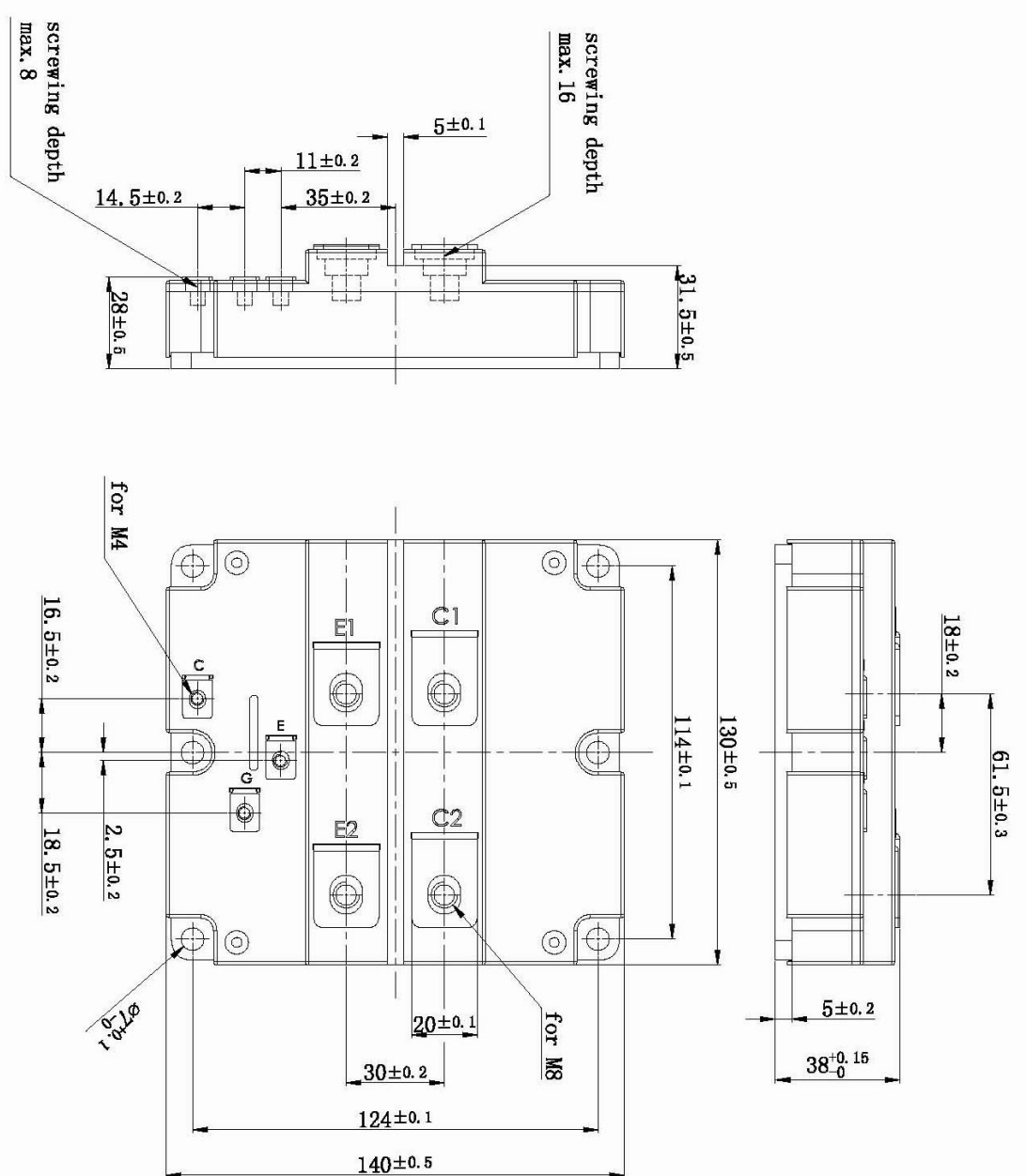
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
V_F	Diode Forward Voltage	$I_F=1600A$	$T_j=25^\circ C$		1.75	2.05	V
			$T_j=125^\circ C$		1.80		
Q_r	Recovered Charge	$I_F=1600A,$	$T_j=25^\circ C$		350		μC
			$T_j=125^\circ C$		660		
I_{RM}	Reverse Recovery Current	$V_R=900V,$ $R_{Gon}=0.82\Omega,$	$T_j=25^\circ C$		900		A
			$T_j=125^\circ C$		1300		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$		280		mJ
			$T_j=125^\circ C$		450		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		10	K/kW
$R_{\theta JC}$	Junction-to-Case (per Diode)		20	K/kW
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied, per Module)	8		K/kW
Weight	Weight of Module	1050		g

Package Dimension

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.