

STARPOWER

SEMICONDUCTOR

IGBT

GD1600SGL170A3SN

Molding Type Module

1700V/1600A 1 in one-package



General Description

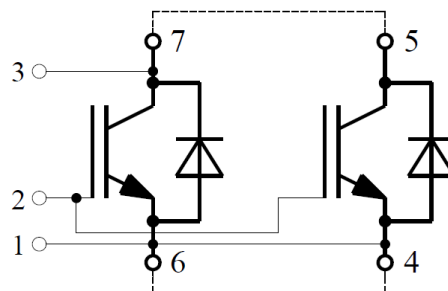
STARPOWER IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as high power converters.

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

Typical Applications

- AC Inverter Drives
- Uninterruptible Power Supply
- Wind Turbines



external connection to be done
Equivalent Circuit Schematic

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

Symbol	Description	GD1600SGL170A3SN	Unit
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.	Unit
$V_{(BR)CES}$	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.	Unit
$V_{GE(th)}$	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.	Unit	
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

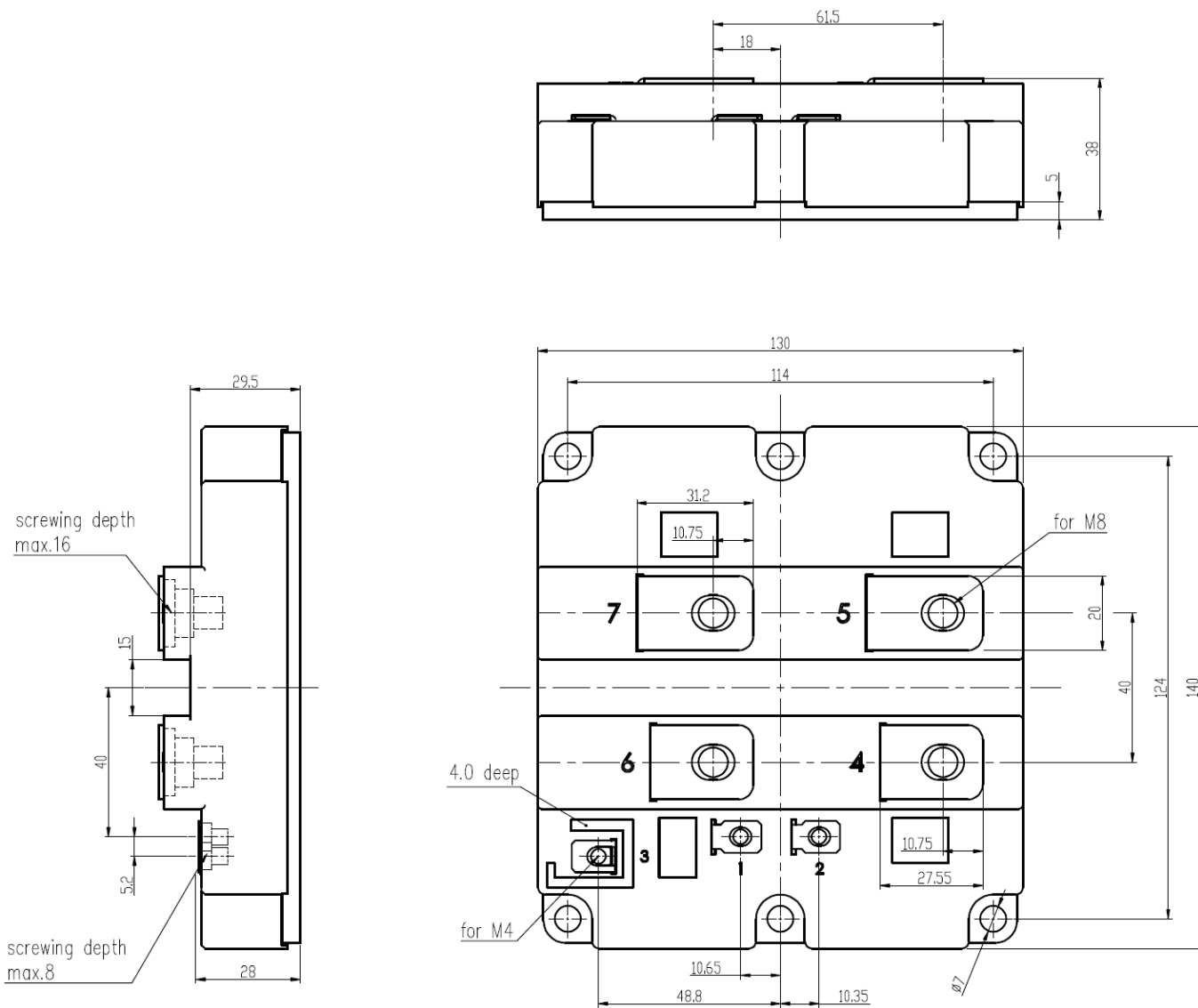
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
V_F	Diode Forward Voltage	$I_F=1600A$	$T_j=25^\circ C$		1.75	2.05	V
			$T_j=125^\circ C$		1.80		
Q_r	Recovered Charge	$I_F=1600A,$	$T_j=25^\circ C$		350		μC
			$T_j=125^\circ C$		660		
I_{RM}	Reverse Recovery Current	$V_R=900V,$ $R_{Gon}=0.82\Omega,$	$T_j=25^\circ C$		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.	Unit
$R_{\theta JC}$	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



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