

STARPOWER

SEMICONDUCTOR**IGBT**

GD2400SGL170A3S

Molding Type Module**1700V/2400A 1 in one-package**

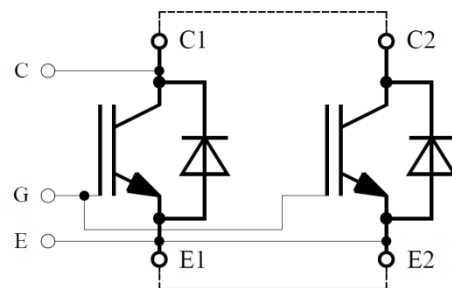
General Description

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
- Maximum junction temperature 175°C
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- AlSiC baseplate for high power cycling capability
- AlN substrate for low thermal resistance



external connection to be done
Equivalent Circuit Schematic

Typical Applications

- High Power Converters
- Motor Drives
- AC Inverter Drives

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

Symbol	Description	GD2400SGL170A3S	Unit
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=90^{\circ}\text{C}$	3400 2400	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	4800	A
I_F	Diode Continuous Forward Current	2400	A
I_{FM}	Diode Maximum Forward Current $t_p=1\text{ms}$	4800	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	12.9	kW
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
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
M	Terminal Connection Torque, Screw M4 Terminal Connection Torque, Screw M8 Mounting Torque, Screw M6	1.8 to 2.1 8.0 to 10 4.25 to 5.75	N.m
G	Weight of Module	1050	g

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	$I_C=96.0\text{mA}, V_{CE}=V_{GE}, T_j=25^{\circ}\text{C}$	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=2400\text{A}, V_{GE}=15\text{V}, T_j=25^{\circ}\text{C}$		2.00	2.45	V
		$I_C=2400\text{A}, V_{GE}=15\text{V}, T_j=125^{\circ}\text{C}$		2.40		
		$I_C=2400\text{A}, V_{GE}=15\text{V}, T_j=150^{\circ}\text{C}$		2.50		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=2400A,$ $R_{Gon}=0.6\Omega, R_{Goff}=0.8\Omega,$ $V_{GE}=\pm 15V, T_j=25^\circ C$		405		ns
t_r	Rise Time			200		ns
$t_{d(off)}$	Turn-Off Delay Time			750		ns
t_f	Fall Time			190		ns
E_{on}	Turn-On Switching Loss			580		mJ
E_{off}	Turn-Off Switching Loss			580		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=2400A,$ $R_{Gon}=0.6\Omega, R_{Goff}=0.8\Omega,$ $V_{GE}=\pm 15V, T_j=125^\circ C$		440		ns
t_r	Rise Time			240		ns
$t_{d(off)}$	Turn-Off Delay Time			900		ns
t_f	Fall Time			340		ns
E_{on}	Turn-On Switching Loss			820		mJ
E_{off}	Turn-Off Switching Loss			730		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=2400A,$ $R_{Gon}=0.6\Omega, R_{Goff}=0.8\Omega,$ $V_{GE}=\pm 15V, T_j=150^\circ C$		450		ns
t_r	Rise Time			250		ns
$t_{d(off)}$	Turn-Off Delay Time			930		ns
t_f	Fall Time			370		ns
E_{on}	Turn-On Switching Loss			850		mJ
E_{off}	Turn-Off Switching Loss			760		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		160		nF
C_{res}	Reverse Transfer Capacitance			5.76		nF
I_{SC}	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=150^\circ C, V_{CC}=1000V,$ $V_{CEM} \leq 1700V$		7680		A
Q_G	Gate Charge	$V_{CC}=900V, I_C=2400A,$ $V_{GE}=-15 \dots +15V$		14.4		μC
L_{CE}	Stray Inductance			12		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.08		m Ω

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

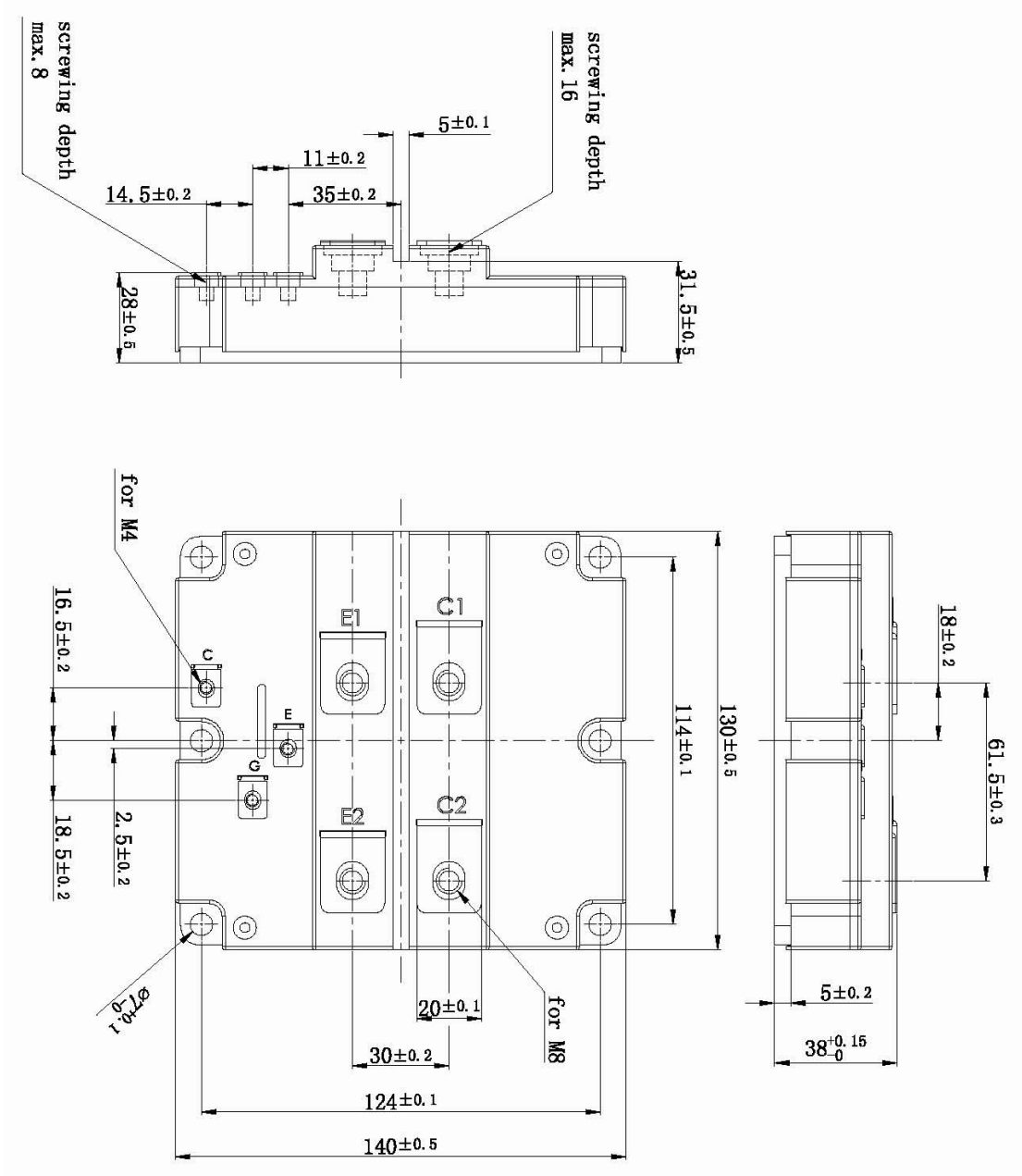
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=2400\text{A}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$		1.80	2.25	V
		$I_F=2400\text{A}, V_{GE}=0\text{V}, T_j=125^\circ\text{C}$		1.95		
		$I_F=2400\text{A}, V_{GE}=0\text{V}, T_j=150^\circ\text{C}$		1.90		
Q_r	Recovered Charge			780		μC
I_{RM}	Peak Reverse Recovery Current	$V_{CC}=900\text{V}, I_F=2400\text{A},$ $-di/dt=13500\text{A}/\mu\text{s},$ $V_{GE}=\pm 15\text{V}, T_j=25^\circ\text{C}$		1780		A
E_{rec}	Reverse Recovery Energy			510		mJ
Q_r	Recovered Charge			1240		μC
I_{RM}	Peak Reverse Recovery Current	$V_{CC}=900\text{V}, I_F=2400\text{A},$ $-di/dt=13500\text{A}/\mu\text{s},$ $V_{GE}=\pm 15\text{V}, T_j=125^\circ\text{C}$		2150		A
E_{rec}	Reverse Recovery Energy			890		mJ
Q_r	Recovered Charge			1400		μC
I_{RM}	Peak Reverse Recovery Current	$V_{CC}=900\text{V}, I_F=2400\text{A},$ $-di/dt=13500\text{A}/\mu\text{s},$ $V_{GE}=\pm 15\text{V}, T_j=150^\circ\text{C}$		2230		A
E_{rec}	Reverse Recovery Energy			990		mJ

Module Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT)			11.6	K/kW
	Junction-to-Case (per Diode)			21.8	
R_{thCH}	Case-to-Heatsink (per IGBT)		12.3		K/kW
	Case-to-Heatsink (per Diode)		23.0		
	Case-to-Heatsink (per Module)		8.0		

Package Dimensions

Dimensions in Millimeters



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