STARPOWER

SEMICONDUCTOR **IGBT**

GD2400SGL170C3SN

Molding Type Module

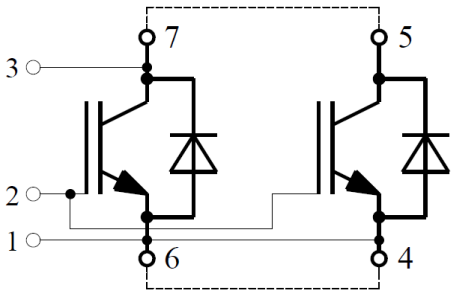
1700V/2400A 1 in one-package

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
- 10μs 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°C unless otherwise noted

Symbol	Description	GD2400SGL170C3SN	Unit
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=85°C	3300 2400	A
I_{CM}	Pulsed Collector Current t_p=1ms	4800	A
I_F	Diode Continuous Forward Current	2400	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	4800	A
P_D	Maximum Power Dissipation @ T_j=175°C	12.7	kW
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 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	1500	g

Electrical Characteristics of IGBT T_C=25°C unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	T_j=25°C	1700			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

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=96.0mA,V_{CE}=V_{GE}, T_j=25°C	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=2400A,V_{GE}=15V, T_j=25°C		2.00	2.45	V
		I_C=2400A,V_{GE}=15V, T_j=125°C		2.40		
		I_C=2400A,V_{GE}=15V, T_j=150°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}=0.6Ω,R_{Goff}=0.8Ω, V_{GE}=±15V,T_j=25°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}=0.6Ω,R_{Goff}=0.8Ω, V_{GE}=±15V,T_j=125°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}=0.6Ω,R_{Goff}=0.8Ω, V_{GE}=±15V,T_j=150°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≤10μs,V_{GE}=15V, T_j=150°C,V_{CC}=1000V, V_{CEM}≤1700V		7680		A
Q_G	Gate Charge	V_{CC}=900V,I_C=2400A, V_{GE}=-15…+15V		14.4		μC
L_{CE}	Stray Inductance			12		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.19		mΩ

Electrical Characteristics of Diode T_C=25°C unless otherwise noted

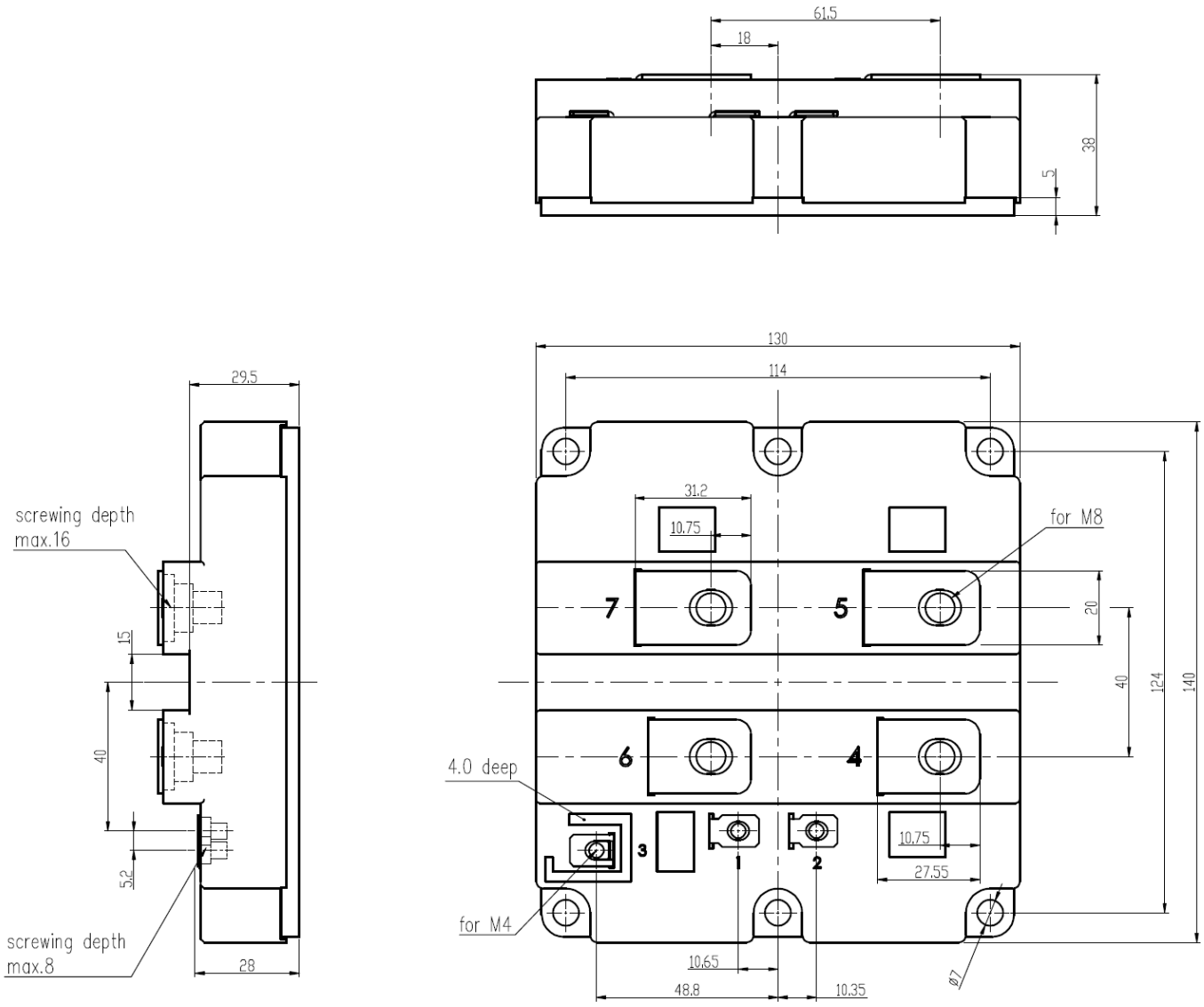
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=2400A,V_{GE}=0V,T_j=25°C		1.80	2.25	V
		I_F=2400A,V_{GE}=0V,T_j=125°C		1.95		
		I_F=2400A,V_{GE}=0V,T_j=150°C		1.90		
Q_r	Recovered Charge	V_{CC}=900V,I_F=2400A, -di/dt=13500A/μs, V_{GE}=±15V,T_j=25°C		780		μC
I_{RM}	Peak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

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per IGBT) Junction-to-Case (per Diode)			11.8 22.8	K/kW
R_{thCH}	Case-to-Heatsink (per IGBT) Case-to-Heatsink (per Diode) Case-to-Heatsink (per Module)		9.1 17.6 6.0		K/kW

Package Dimensions

Dimensions in Millimeters



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