

STARPOWER

SEMICONDUCTOR™

IGBT

GD1600SGT170C3S

Preliminary

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 general inverters and UPS.

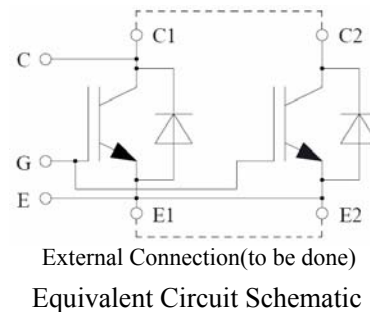


Features

- Low $V_{CE(sat)}$ trench 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
- Switching mode power supplies
- Electronic welders



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

Symbol	Description	GD1600SGT170C3S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	2400	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 @ $T_j=150^\circ\text{C}$	8.93	kW
T_{SC}	Short Circuit Withstand Time @ $T_j=125^\circ\text{C}$	10	μs
T_j	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
I^2t -value, Diode	$V_R=0\text{V}$, $t=10\text{ms}$, $T_j=125^\circ\text{C}$	334	kA^2s
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	3400	V
Mounting Torque	Power 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	N.m

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
BV_{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	$I_C=64\text{mA}$, $V_{CE}=V_{GE}$, $T_j=25^\circ\text{C}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=1600\text{A}$, $V_{GE}=15\text{V}$, $T_j=25^\circ\text{C}$		2.00	2.45	V
		$I_C=1600\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$		2.40		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_{ge}	Gate charge	$V_{GE}=-15\dots+15V$		18.9		μC
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=1600A,$ $R_{Gon}=0.9\Omega,$ $R_{Goff}=1.1\Omega,$ $V_{GE}=\pm 15V, T_j=25^\circ C$		539		ns
t_r	Rise Time			158		ns
$t_{d(off)}$	Turn-Off Delay Time			129		ns
t_f	Fall Time			149		ns
E_{on}	Turn-On Switching Loss			289		mJ
E_{off}	Turn-Off Switching Loss			441		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=900V, I_C=1600A,$ $R_{Gon}=0.9\Omega,$ $R_{Goff}=1.1\Omega,$ $V_{GE}=\pm 15V, T_j=125^\circ C$		581		ns
t_r	Rise Time			171		ns
$t_{d(off)}$	Turn-Off Delay Time			149		ns
t_f	Fall Time			272		ns
E_{on}	Turn-On Switching Loss			436		mJ
E_{off}	Turn-Off Switching Loss			586		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		141		nF
C_{oes}	Output Capacitance			5.9		nF
C_{res}	Reverse Transfer Capacitance			4.8		nF
I_{SC}	SC Data	$t_{sc}\leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=1000V,$ $V_{CEM}\leq 1200V$		6000		A
R_{Gint}	Internal Gate Resistance			1.0		Ω
L_{CE}	Stray Inductance			12		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.19		m Ω

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

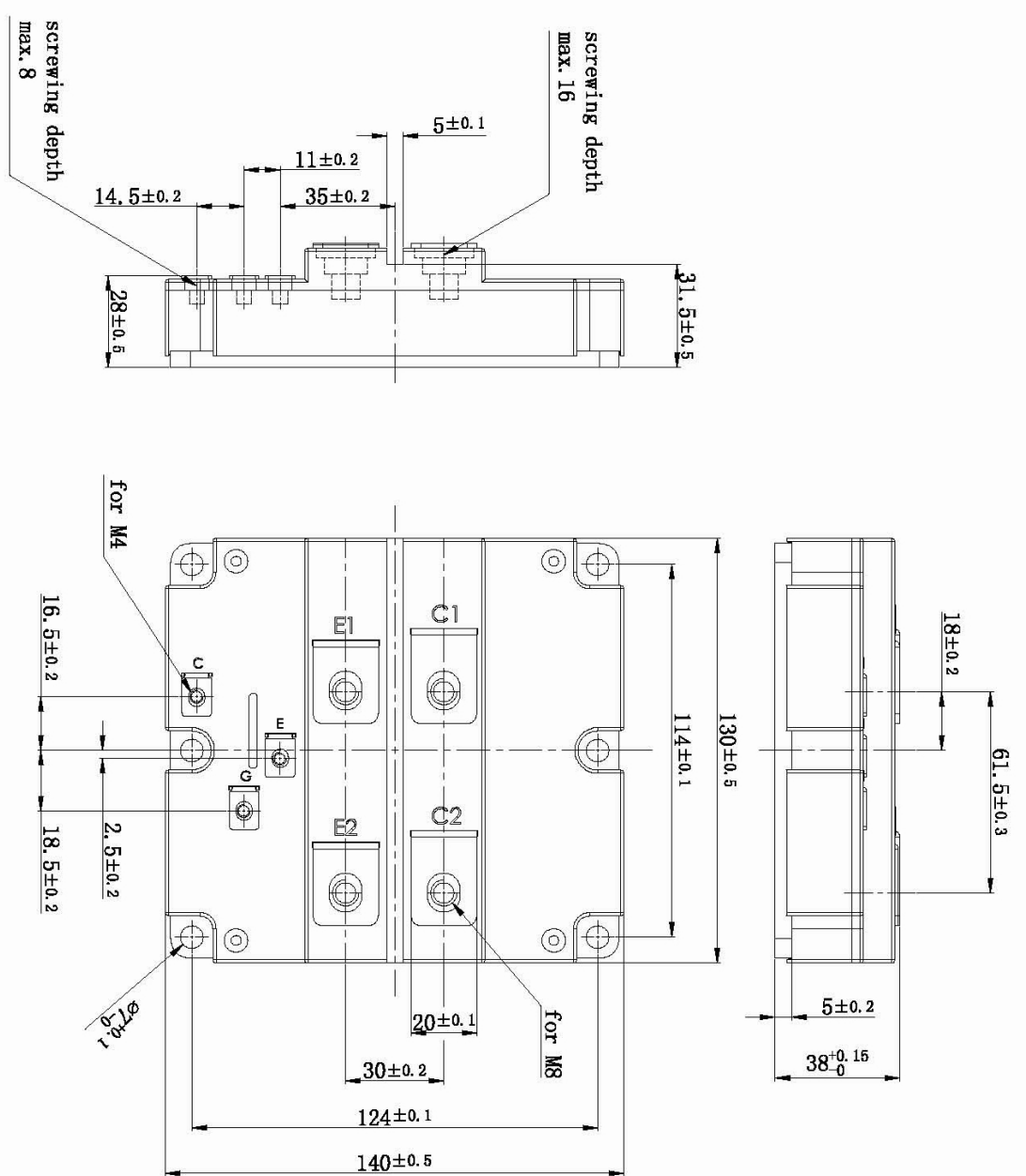
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
V_F	Diode Forward Voltage	$I_F=1600A$	$T_j=25^\circ C$		1.80	2.20	V
			$T_j=125^\circ C$		1.90		
Q_r	Recovered Charge	$I_F=1600A,$	$T_j=25^\circ C$		384		μC
			$T_j=125^\circ C$		671		
I_{RM}	Peak Reverse Recovery Current	$V_R=900V,$ $di/dt=-8700A/\mu s,$	$T_j=25^\circ C$		1455		A
			$T_j=125^\circ C$		1690		
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$		250		mJ
			$T_j=125^\circ C$		450		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per Module)		14	K/kW
$R_{\theta JC}$	Junction-to-Case (Diode Part, per Module)		28	K/kW
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied, per Module)	6		K/kW
Weight	Weight of Module	1500		g

Package Dimension

Dimensions in Millimeters



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