

STARPOWER

SEMICONDUCTOR™

IGBT

GD2400SGT170A4S

Preliminary

Molding Type Module

1700V/2400A 1 in one-package

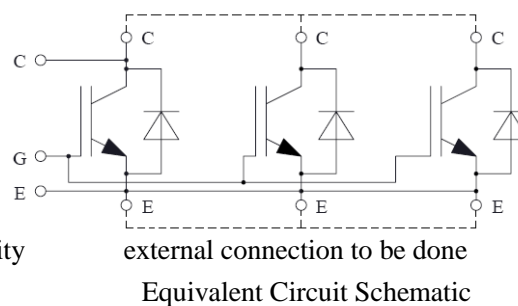
General Description

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



Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- AlSiC baseplate for high power cycling capability
- AlN substrate for low thermal resistance



Typical Applications

- AC inverter drives mains 575-750V AC
- Public transport (auxiliary syst.)

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

Symbol	Description	GD2400SGT170A4S	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	3450	A
		2400	
$I_{CM(1)}$	Pulsed Collector Current $t_p=1\text{ms}$	4800	A
I_F	Diode Continuous Forward Current	2400	A
I_{FM}	Diode Maximum Forward Current	4800	A
P_D	Maximum power Dissipation @ $T_j=150^{\circ}\text{C}$	16	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	$V_R=0\text{V}, t=10\text{ms}, T_j=125^{\circ}\text{C}$	780	kA^2s
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	4000	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	$I_C=96\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	5.0	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=2400\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		2.0		V
		$I_C=2400\text{A}, V_{GE}=15\text{V},$ $T_j=125^{\circ}\text{C}$		2.4		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R _{Gint}	Internal Gate Resistor	T _j =25°C		0.6		Ω
Q _G	Gate charge	I _C =2400A, V _{GE} =-15...+15V		28		μC
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		640		ns
t _r	Rise Time			170		ns
t _{d(off)}	Turn-Off Delay Time			1350		ns
t _f	Fall Time			170		ns
E _{on}	Turn-On Switching Loss			415		
E _{off}	Turn-Off Switching Loss			625		
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		710		ns
t _r	Rise Time			190		ns
t _{d(off)}	Turn-Off Delay Time			1650		ns
t _f	Fall Time			290		ns
E _{on}	Turn-On Switching Loss			600		mJ
E _{off}	Turn-Off Switching Loss			915		mJ
C _{ies}	Input Capacitance	V _{CE} =25V, f=1MHz, V _{GE} =0V		215		nF
C _{oes}	Output Capacitance			9		nF
C _{res}	Reverse Transfer Capacitance			7		nF
I _{SC}	SC Data	t _{SC} ≤ 10μs, V _{GE} =15V, T _j =125°C, V _{CC} =1000V, V _{CEM} ≤ 1700V		9600		A
L _{CE}	Stray Inductance			10		nH
R _{CC'+EE'}	Module Lead Resistance, Terminal to Chip	T _C =25°C		0.12		mΩ

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =2400A	T _j =25°C		1.8	V
			T _j =125°C		1.9	
Q _r	Diode Reverse Recovery Charge	I _F =2400A, V _R =900V, di/dt=-12000A/μs, V _{GE} =-15V	T _j =25°C		590	μC
			T _j =125°C		1010	
I _{RM}	Diode Peak Reverse Recovery Current		T _j =25°C		2200	A
			T _j =125°C		2370	
E _{rec}	Reverse Recovery Energy		T _j =25°C		386	mJ
			T _j =125°C		679	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		7.8	K/kW
$R_{\theta CS}$	Case-to-Sink (per IGBT)		9.2	K/kW
$R_{\theta JC}$	Junction-to-Case (per Diode)		15.0	K/kW
$R_{\theta CS}$	Case-to-Sink (per Diode)		13.0	K/kW
Weight	Weight of Module	1500		g

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