STARPOWER

SEMICONDUCTOR   **IGBT**

GD600SGU120C2S

1200V/600A 1 in one-package

General Description

STARPOWER IGBT Power Module provides ultrafast switching speed as well as short circuit ruggedness. It's designed for the applications such as electronic welder and inductive heating.

Features

- NPT IGBT technology
- 10μs short circuit capability
- Low switching losses
- Rugged with ultrafast performance
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

- Switching mode power supply
- Inductive heating
- Electronic welder

Equivalent Circuit Schematic
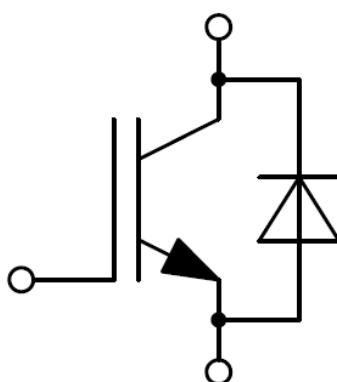
Absolute Maximum Ratings T_C=25°C unless otherwise noted

IGBT

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25°C @ T_C=70°C	830 600	A
I_{CM}	Pulsed Collector Current t_p=1ms	1200	A
P_D	Maximum Power Dissipation @ T_i=150°C	4032	W

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	600	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	1200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	^{o}C
T_{jop}	Operating Junction Temperature	-40 to +125	^{o}C
T_{STG}	Storage Temperature Range	-40 to +125	^{o}C
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	2500	V

IGBT Characteristics $T_C=25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=600A, V_{GE}=15V,$ $T_j=25^oC$		2.90	3.35	V
		$I_C=600A, V_{GE}=15V,$ $T_j=125^oC$		3.60		
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=6.0mA, V_{CE}=V_{GE},$ $T_j=25^oC$	5.0	5.8	6.6	V
I_{CES}	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0V,$ $T_j=25^oC$			5.0	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V,$ $T_j=25^oC$			400	nA
R_{Gint}	Internal Gate Resistance			0.25		Ω
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		39.0		nF
C_{res}	Reverse Transfer Capacitance			2.55		nF
Q_G	Gate Charge	$V_{GE}=-15…+15V$		6.30		μC
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=600A,$ $R_G=1.1\Omega, V_{GE}=\pm15V,$ $T_j=25^oC$		205		ns
t_r	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			265		ns
t_f	Fall Time			140		ns
E_{on}	Turn-On Switching Loss			50.4		mJ
E_{off}	Turn-Off Switching Loss			20.0		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=600A,$ $R_G=1.1\Omega, V_{GE}=\pm15V,$ $T_j=125^oC$		210		ns
t_r	Rise Time			55		ns
$t_{d(off)}$	Turn-Off Delay Time			275		ns
t_f	Fall Time			175		ns
E_{on}	Turn-On Switching Loss			66.0		mJ
E_{off}	Turn-Off Switching Loss			28.9		mJ
I_{SC}	SC Data	$t_P\leq10\mu s, V_{GE}=15V,$ $T_j=125^oC, V_{CC}=900V,$ $V_{CEM}\leq1200V$		3900		A

Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=600A,V_{GE}=0V,T_j=25°C		2.25	2.70	V
		I_F=600A,V_{GE}=0V,T_j=125°C		2.35		
Q_r	Recovered Charge	V_{CC}=600V,I_F=600A, -di/dt=12kA/μs,V_{GE}=±15V, T_j=25°C		42.0		μC
I_{RM}	Peak Reverse Recovery Current			492		A
E_{rec}	Reverse Recovery Energy			16.6		mJ
Q_r	Recovered Charge	V_{CC}=600V,I_F=600A, -di/dt=12kA/μs,V_{GE}=±15V, T_j=125°C		80.4		μC
I_{RM}	Peak Reverse Recovery Current			672		A
E_{rec}	Reverse Recovery Energy			37.9		mJ

Module Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance			20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.18		mΩ
R_{thJC}	Junction-to-Case (per IGBT)			0.031	K/W
	Junction-to-Case (per Diode)			0.070	
R_{thCH}	Case-to-Heatsink (per IGBT)		0.051		K/W
	Case-to-Heatsink (per Diode)		0.114		
	Case-to-Heatsink (per Module)		0.035		
M	Terminal Connection Torque, Screw M4	1.1		2.0	N.m
	Terminal Connection Torque, Screw M6	2.5		5.0	
	Mounting Torque, Screw M6	3.0		5.0	
G	Weight of Module		300		g

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Circuit Schematic
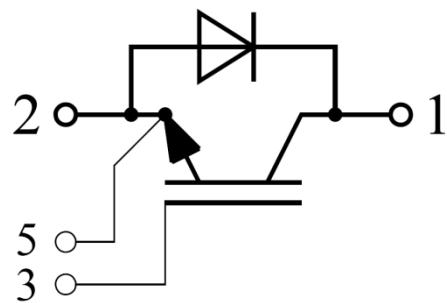
Package Dimensions

Dimensions in Millimeters
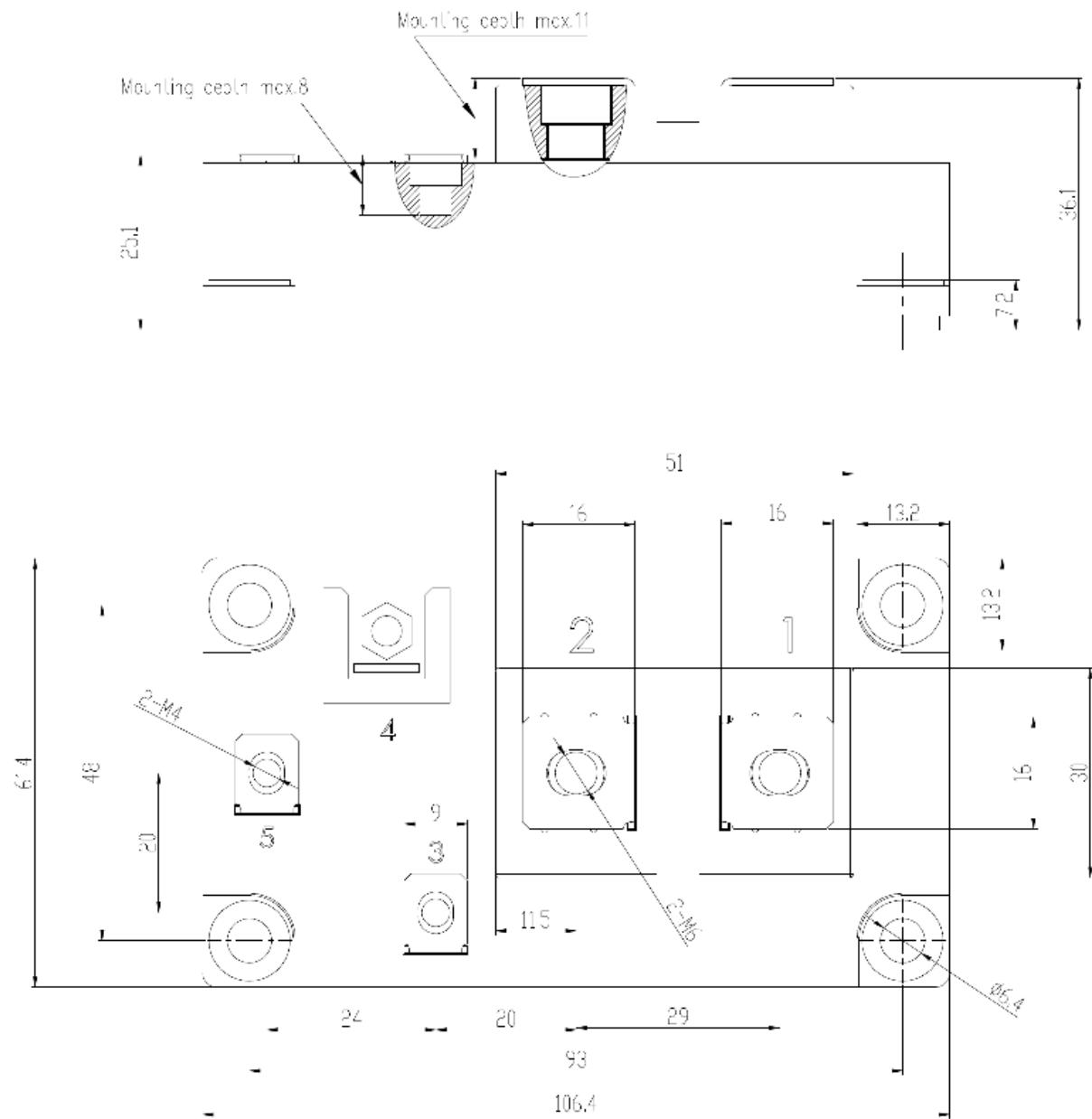
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