

# STARPOWER

SEMICONDUCTOR

# IGBT

## GD300CUK120C2S

Molding Type Module

1200V/300A chopper in one-package

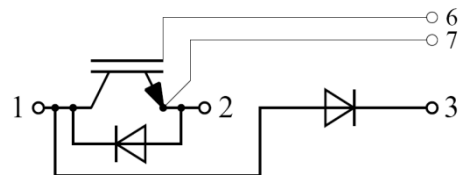


### General Description

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

### Features

- NPT IGBT technology
- Low switching loss
- 10 $\mu$ s short circuit capability
- $V_{CE(sat)}$  with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

### Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

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

Symbol	Description	GD300CUK120C2S	Unit
$V_{CES}$	Collector-Emitter Voltage	1200	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	510 300	A
$I_{CM}$	Pulsed Collector Current $t_p=1\text{ms}$	600	A
$I_F$	Diode Continuous Forward Current @ $T_C=80^{\circ}\text{C}$	300	A
$I_{FM}$	Diode Maximum Forward Current $t_p=1\text{ms}$	600	A
$P_D$	Maximum Power Dissipation @ $T_j=150^{\circ}\text{C}$	2083	W
$T_{jmax}$	Maximum Junction Temperature	150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
$V_{ISO}$	Isolation Voltage RMS, $f=50\text{Hz}$ , $t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m

**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	$T_j=25^{\circ}\text{C}$	1200			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	$I_C=3.0\text{mA}$ , $V_{CE}=V_{GE}$ , $T_j=25^{\circ}\text{C}$	5.2	5.7	6.2	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=300\text{A}$ , $V_{GE}=15\text{V}$ , $T_j=25^{\circ}\text{C}$		2.15	2.60	V
		$I_C=300\text{A}$ , $V_{GE}=15\text{V}$ , $T_j=125^{\circ}\text{C}$		2.65		

**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=300A,$ $R_G=3.3\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		393		ns
$t_r$	Rise Time			130		ns
$t_{d(off)}$	Turn-Off Delay Time			568		ns
$t_f$	Fall Time			144		ns
$E_{on}$	Turn-On Switching Loss			7.70		mJ
$E_{off}$	Turn-Off Switching Loss			26.3		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=300A,$ $R_G=3.3\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		395		ns
$t_r$	Rise Time			134		ns
$t_{d(off)}$	Turn-Off Delay Time			603		ns
$t_f$	Fall Time			155		ns
$E_{on}$	Turn-On Switching Loss			11.0		mJ
$E_{off}$	Turn-Off Switching Loss			30.1		mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		21.3		nF
$C_{res}$	Reverse Transfer Capacitance			1.42		nF
$I_{SC}$	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		2100		A
$L_{CE}$	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal To Chip			0.35		m $\Omega$

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

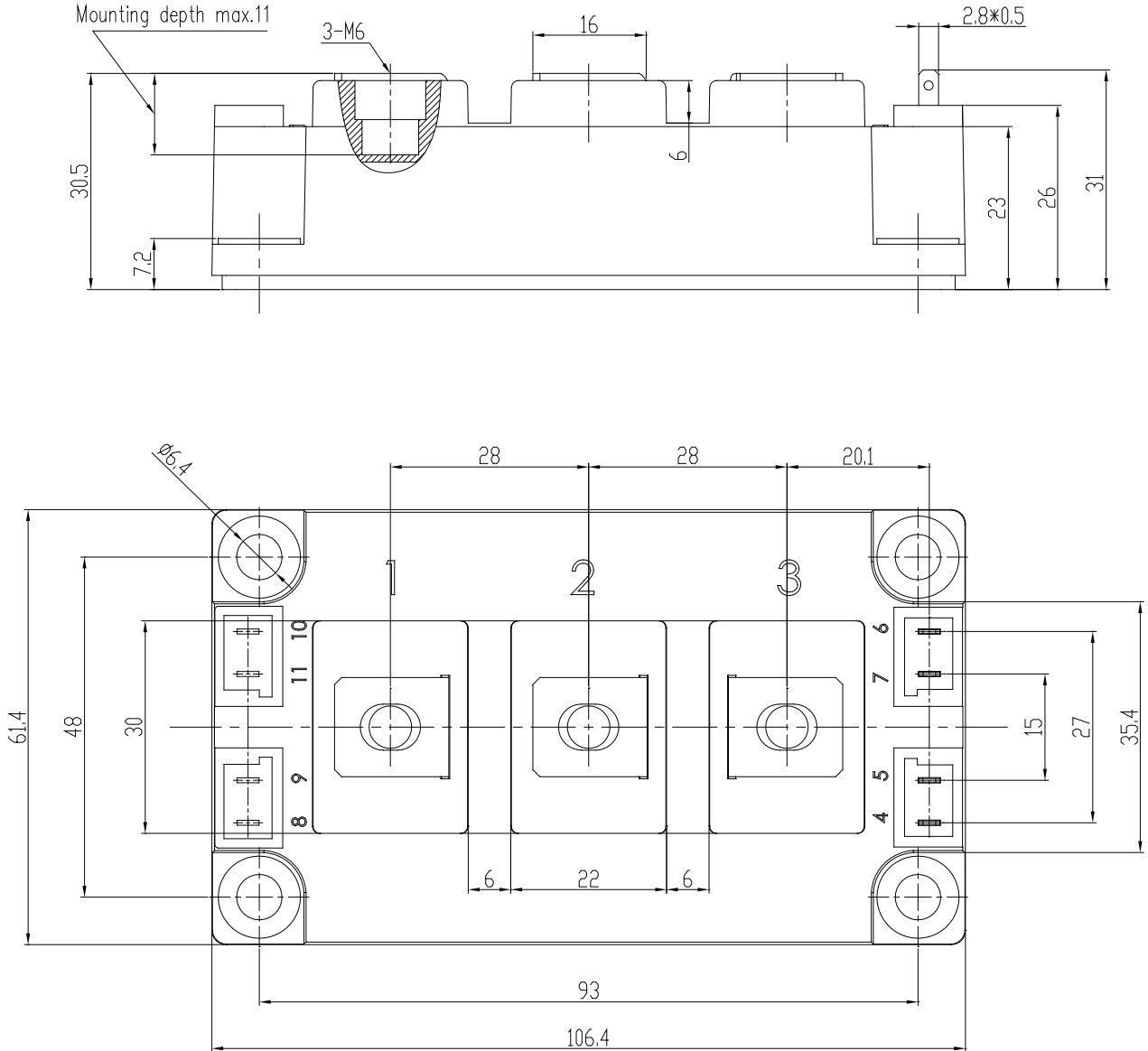
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_F$	Diode Forward Voltage	$I_F=300A$	$T_j=25^\circ C$	1.80	2.25	V
			$T_j=125^\circ C$	1.85		
$Q_r$	Recovered Charge	$I_F=300A,$	$T_j=25^\circ C$	20.2		$\mu C$
			$T_j=125^\circ C$	40.1		
$I_{RM}$	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=3.3\Omega,$	$T_j=25^\circ C$	170		A
			$T_j=125^\circ C$	250		
$E_{rec}$	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	8.2		mJ
			$T_j=125^\circ C$	18.5		

**Thermal Characteristics**

<b>Symbol</b>	<b>Parameter</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.060	K/W
$R_{\theta JC}$	Junction-to-Case (per DIODE)		0.118	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

**Package Dimensions**

Dimensions in Millimeters



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