

# STARPOWER

SEMICONDUCTOR

# IGBT

## GD75HCU120B3S

Molding Type Module

1200V/75A 4 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
- 10 $\mu$ s short circuit capability
- Low switching losses
- $V_{CE(sat)}$  with positive temperature coefficient
- Square RBSOA
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

### Typical Applications

- Switching mode power supplies
- Inductive heating
- Electronic welder

**IGBT-inverter**  $T_C=25^\circ\text{C}$  unless otherwise noted**Maximum Rated Values**

Symbol	Description	GD75HCU120B3S	Units
$V_{CES}$	Collector-Emitter Voltage @ $T_j=25^\circ\text{C}$	1200	V
$V_{GES}$	Gate-Emitter Voltage @ $T_j=25^\circ\text{C}$	$\pm 20$	V
$I_C$	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	110 75	A
$I_{CM}$	Pulsed Collector Current $t_p=1\text{ms}$	150	A
$P_{tot}$	Total Power Dissipation @ $T_j=150^\circ\text{C}$	595	W

**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	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.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.5\text{mA}, V_{CE}=V_{GE},$ $T_j=25^\circ\text{C}$	4.8	5.5	6.3	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=75\text{A}, V_{GE}=15\text{V},$ $T_j=25^\circ\text{C}$		2.90	3.35	V
		$I_C=75\text{A}, V_{GE}=15\text{V},$ $T_j=125^\circ\text{C}$		3.60		

### Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=75A,$ $R_G=8.6\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		205		ns
$t_r$	Rise Time			49		ns
$t_{d(off)}$	Turn-Off Delay Time			262		ns
$t_f$	Fall Time			137		ns
$E_{on}$	Turn-On Switching Loss			6.30		mJ
$E_{off}$	Turn-Off Switching Loss			2.46		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=75A,$ $R_G=8.6\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		205		ns
$t_r$	Rise Time			50		ns
$t_{d(off)}$	Turn-Off Delay Time			275		ns
$t_f$	Fall Time			170		ns
$E_{on}$	Turn-On Switching Loss			8.25		mJ
$E_{off}$	Turn-Off Switching Loss			3.62		mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		5.18		nF
$C_{oes}$	Output Capacitance			0.78		nF
$C_{res}$	Reverse Transfer Capacitance			0.35		nF
$I_{SC}$	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		660		A
$Q_G$	Gate Charge	$V_{CC}=600V, I_C=75A,$ $V_{GE}=-15 \dots +15V$		0.5		$\mu C$
$R_{Gint}$	Internal Gate Resistance			/		$\Omega$

**Diode-inverter**  $T_C=25^\circ C$  unless otherwise noted

### Maximum Rated Values

Symbol	Description	GD75HCU120B3S	Units
$V_{RRM}$	Repetitive Peak Reverse Voltage @ $T_j=25^\circ C$	1200	V
$I_F$	DC Forward Current	30	A
$I_{FRM}$	Repetitive Peak Forward Current $t_p=1ms$	60	A

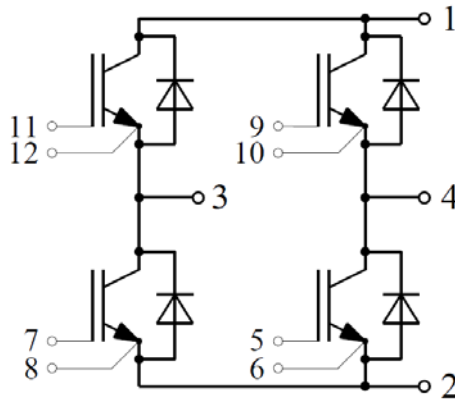
### Characteristics Values

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
$V_F$	Diode Forward Voltage	$I_F=30A$	$T_j=25^\circ C$		1.90	2.30	V
			$T_j=125^\circ C$		1.80		
$Q_r$	Recovered Charge	$I_F=30A,$	$T_j=25^\circ C$		2.6		$\mu C$
			$T_j=125^\circ C$		4.2		
$I_{RM}$	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=15\Omega,$	$T_j=25^\circ C$		20		A
			$T_j=125^\circ C$		23		
$E_{rec}$	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$		1.31		mJ
			$T_j=125^\circ C$		2.08		

**IGBT Module**

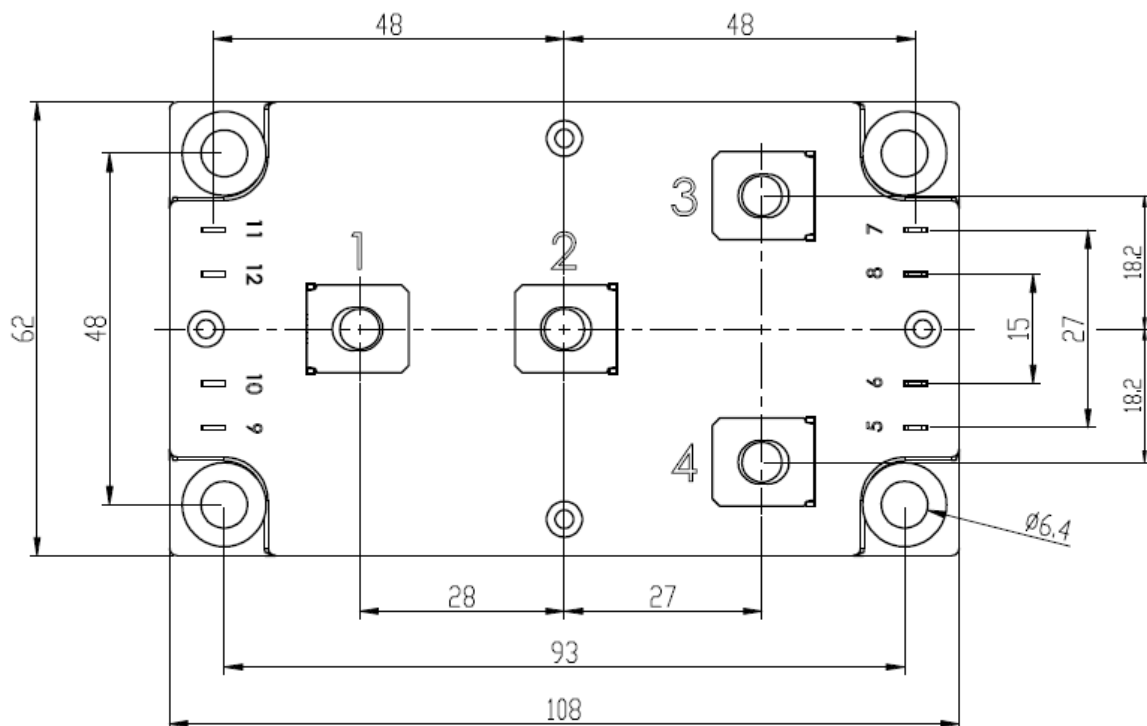
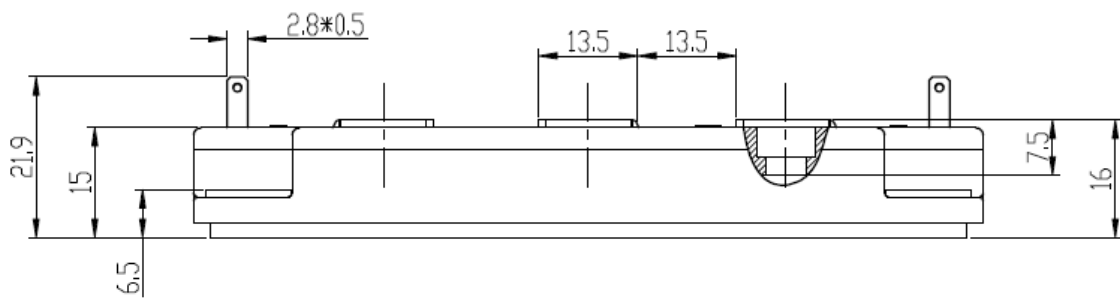
<b>Symbol</b>	<b>Parameter</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Units</b>
$V_{ISO}$	Isolation Voltage RMS,f=50Hz,t=1min	2500			V
$R_{\theta JC}$	Junction-to-Case (per IGBT-inverter) Junction-to-Case (per Diode-inverter)			0.210 0.927	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)		0.035		K/W
$T_{jmax}$	Maximum Junction Temperature			150	°C
$T_{jop}$	Operating Junction Temperature	-40		125	°C
$T_{STG}$	Storage Temperature Range	-40		125	°C
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	2.5 3.0		5.0 6.0	N.m
G	Weight of Module		300		g

**Equivalent Circuit Schematic**



**Package Dimensions**

Dimensions in Millimeters



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