

STARPOWER

SEMICONDUCTOR™

IGBT

GD225HTL120C7S

Preliminary

Molding Type Module**1200V/225A 6 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 $V_{CE(sat)}$ SPT+ IGBT technology
- Low switching losses
- 10 μ s short circuit capability
- Square RBSOA
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology

Typical Applications

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

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

Symbol	Description	GD225HTL120C7S	Units
V_{CES}	Collector-Emitter Voltage @ $T_j=25^\circ\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^\circ\text{C}$ @ $T_C=100^\circ\text{C}$	400	A
		225	
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	450	A
P_{tot}	Total Power Dissipation @ $T_j=175^\circ\text{C}$	1973	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	$I_C=9.0\text{mA}, V_{CE}=V_{GE},$ $T_j=25^\circ\text{C}$	5.0	6.2	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=225\text{A}, V_{GE}=15\text{V},$ $T_j=25^\circ\text{C}$		1.90	2.35	V
		$I_C=225\text{A}, V_{GE}=15\text{V},$ $T_j=125^\circ\text{C}$		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
Q_G	Gate charge	$V_{GE}=-15\dots+15\text{V}$		2.3		μC	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600\text{V}, I_C=225\text{A},$ $R_G=5.0\Omega, V_{GE}=\pm 15\text{V},$ $T_j=25^\circ\text{C}$		168		ns	
t_r	Rise Time			75		ns	
$t_{d(off)}$	Turn-Off Delay Time			440		ns	
t_f	Fall Time			55		ns	
E_{on}	Turn-On Switching Loss				27.9		mJ
E_{off}	Turn-Off Switching Loss				37.2		mJ

$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=225A,$ $R_G=5.0\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		176		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			510		ns
t_f	Fall Time			75		ns
E_{on}	Turn-On Switching Loss			13.5		mJ
E_{off}	Turn-Off Switching Loss			22.5		mJ
C_{ies}	Input Capacitance	$V_{CE}=25V, f=1Mhz,$ $V_{GE}=0V$		16.6		nF
C_{oes}	Output Capacitance			1.20		nF
C_{res}	Reverse Transfer Capacitance			0.78		nF
I_{SC}	SC Data	$t_{sc} \leq 10\mu s, V_{GE} \leq 15V,$ $T_j=125^\circ C, V_{CC}=600V,$ $V_{CEM} \leq 1200V$		1050		A
R_{Gint}	Internal Gate Resistance			1.0		Ω

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

Maximum Rated Values

Symbol	Description	GD225HTL120C7S	Units
V_{RRM}	Collector-Emitter Voltage @ $T_j=25^\circ C$	1200	V
I_F	DC Forward Current @ $T_C=80^\circ C$	225	A
I_{FRM}	Repetitive Peak Forward Current $t_p=1ms$	450	A

Characteristics Values

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=225A, V_{GE}=0V$	$T_j=25^\circ C$	1.80	2.20	V
			$T_j=125^\circ C$		1.85	
Q_r	Recovered Charge	$V_R=600V,$	$T_j=25^\circ C$	30		μC
			$T_j=125^\circ C$		57	
I_{RM}	Peak Reverse Recovery Current	$I_F=225A,$ $R_G=5.0\Omega,$	$T_j=25^\circ C$	195		A
			$T_j=125^\circ C$		255	
E_{rec}	Reverse Recovery Energy	$V_{GE}=-15V$	$T_j=25^\circ C$	10.8		mJ
			$T_j=125^\circ C$		22.5	

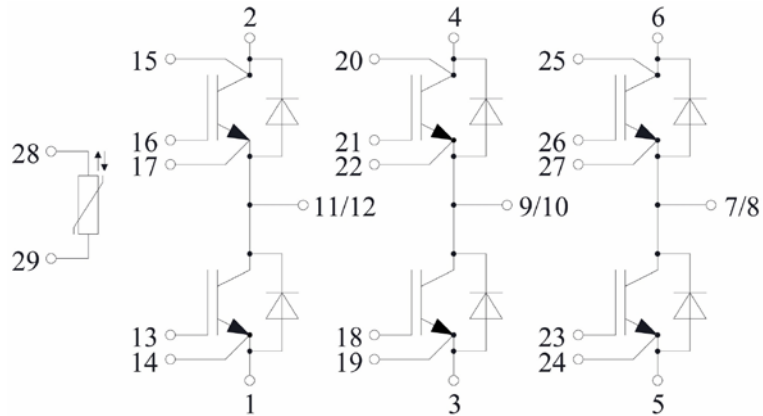
Electrical Characteristics of NTC $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{25}	Rated Resistance			5.0		k Ω
$\Delta R/R$	Deviation of R_{100}	$T_C=100^{\circ}\text{C}, R_{100}=493.3\Omega$	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

IGBT Module

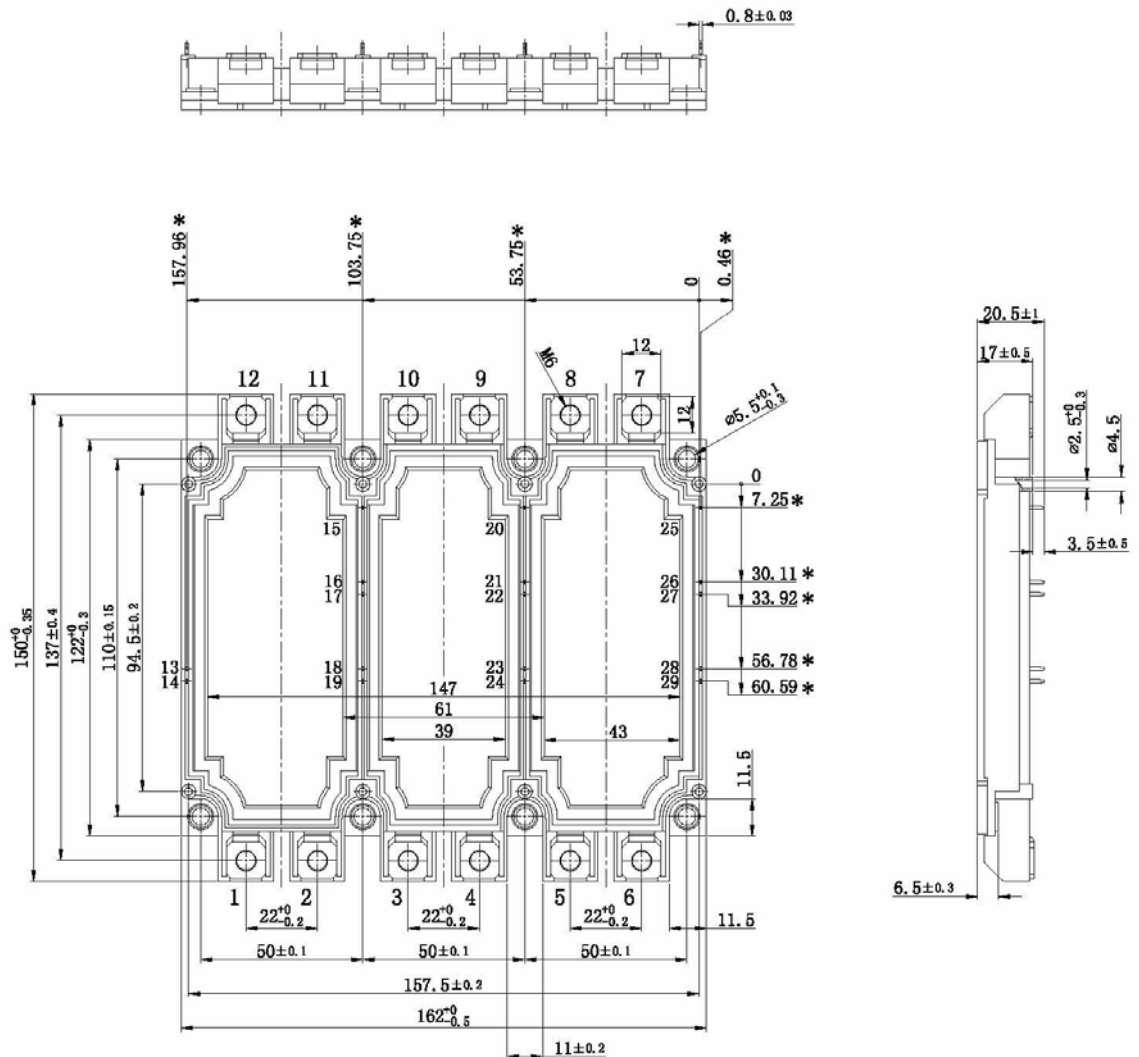
Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	2500			V
L_{CE}	Stray Inductance		20		nH
$R_{\text{CC'+EE'}}$	Module Lead Resistance, Terminal to Chip @ $T_C=25^{\circ}\text{C}$		1.1		m Ω
$R_{\theta\text{JC}}$	Junction-to-Case (per IGBT)			0.076	K/W
	Junction-to-Case (per DIODE)			0.154	
$R_{\theta\text{CS}}$	Case-to-Sink (Conductive grease applied)		0.005		K/W
T_{jmax}	Maximum Junction Temperature			175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40		125	$^{\circ}\text{C}$
Mounting	Power Terminal Screw:M5	3.0		6.0	N.m
Torque	Mounting Screw:M6	3.0		6.0	N.m
Weight	Weight of Module		910		g

Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters



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