

STARPOWER

SEMICONDUCTOR™

IGBT

GD600HTT65C7S

Preliminary

Molding Type Module**650V/600A 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 $V_{CE(sat)}$ Trench IGBT technology
- Low switching losses
- Maximum junction temperature 175°C
- 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	GD600HTT65C7S	Units
V_{CES}	Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$	650	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=55^{\circ}\text{C}$	700 600	A
I_{CM}	Pulsed Collector Current $t_p=1\text{ms}$	1200	A
P_{tot}	Total Power Dissipation @ $T_j=175^{\circ}\text{C}$	1667	W

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_j=25^{\circ}\text{C}$	650			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	$I_C=19.5\text{mA}, V_{CE}=V_{GE},$ $T_j=25^{\circ}\text{C}$	5.5		7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=600\text{A}, V_{GE}=15\text{V},$ $T_j=25^{\circ}\text{C}$		1.70	2.15	V
		$I_C=600\text{A}, V_{GE}=15\text{V},$ $T_j=175^{\circ}\text{C}$		2.10		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{Gint}	Internal Gate Resistance			0.7		Ω
E_{on}	Turn-On Switching Loss	$V_{CC}=300\text{V}, I_C=600\text{A},$ $R_G=2.7\Omega, V_{GE}=\pm 15\text{V},$ $T_j=25^{\circ}\text{C}$		9.5		mJ
E_{off}	Turn-Off Switching Loss			23.0		mJ
E_{tot}	Total Switching Loss			32.5		mJ
E_{on}	Turn-On Switching Loss	$V_{CC}=300\text{V}, I_C=600\text{A},$ $R_G=2.7\Omega, V_{GE}=\pm 15\text{V},$ $T_j=125^{\circ}\text{C}$		10.0		mJ
E_{off}	Turn-Off Switching Loss			26.5		mJ
E_{tot}	Total Switching Loss			36.5		mJ

$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=600A,$ $R_G=2.7\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		110		ns
t_r	Rise Time			95		ns
$t_{d(off)}$	Turn-Off Delay Time			320		ns
t_f	Fall Time			79		ns
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=300V, I_C=600A,$ $R_G=2.7\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		120		ns
t_r	Rise Time			95		ns
$t_{d(off)}$	Turn-Off Delay Time			350		ns
t_f	Fall Time			85		ns
C_{ies}	Input Capacitance	$V_{CE}=30V, f=1Mhz,$ $V_{GE}=0V$		39.5		pF
C_{oes}	Output Capacitance			1.73		pF
C_{res}	Reverse Transfer Capacitance			1.04		pF
I_{SC}	SC Data	$t_{sc}\leq 5\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=360V,$ $V_{CEM}\leq 650V$		TBD		A

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

Maximum Rated Values

Symbol	Description	GD600HTT65C7S	Units
V_{RRM}	Collector-Emitter Voltage @ $T_j=25^\circ C$	650	V
I_F	DC Forward Current @ $T_C=80^\circ C$	600	A
I_{FRM}	Repetitive Peak Forward Current $V_R=0V, t_p=10ms, T_C=80^\circ C$	1200	A

Characteristics Values

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =600A, V _{GE} =0V	T _j =25°C		1.35	1.75	V
			T _j =125°C		1.30		
Q _r	Recovered Charge	I _F =600A, V _R =300 V, di/dt=-5800A/μs, V _{GE} =-15V	T _j =25°C		18		μC
			T _j =125°C		39		
I _{RM}	Peak Reverse Recovery Current		T _j =25°C		200		A
			T _j =125°C		290		
E _{rec}	Reverse Recovery Energy		T _j =25°C		4.10		mJ
			T _j =125°C		9.50		

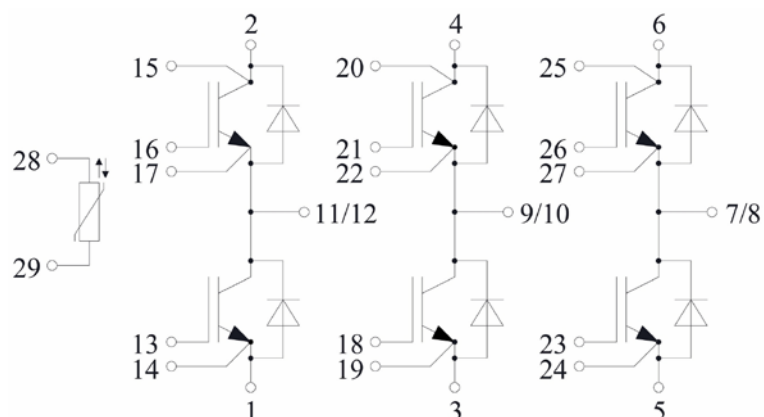
Electrical Characteristics of NTC $T_C=25^{\circ}\text{C}$ unless otherwise noted

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

IGBT Module

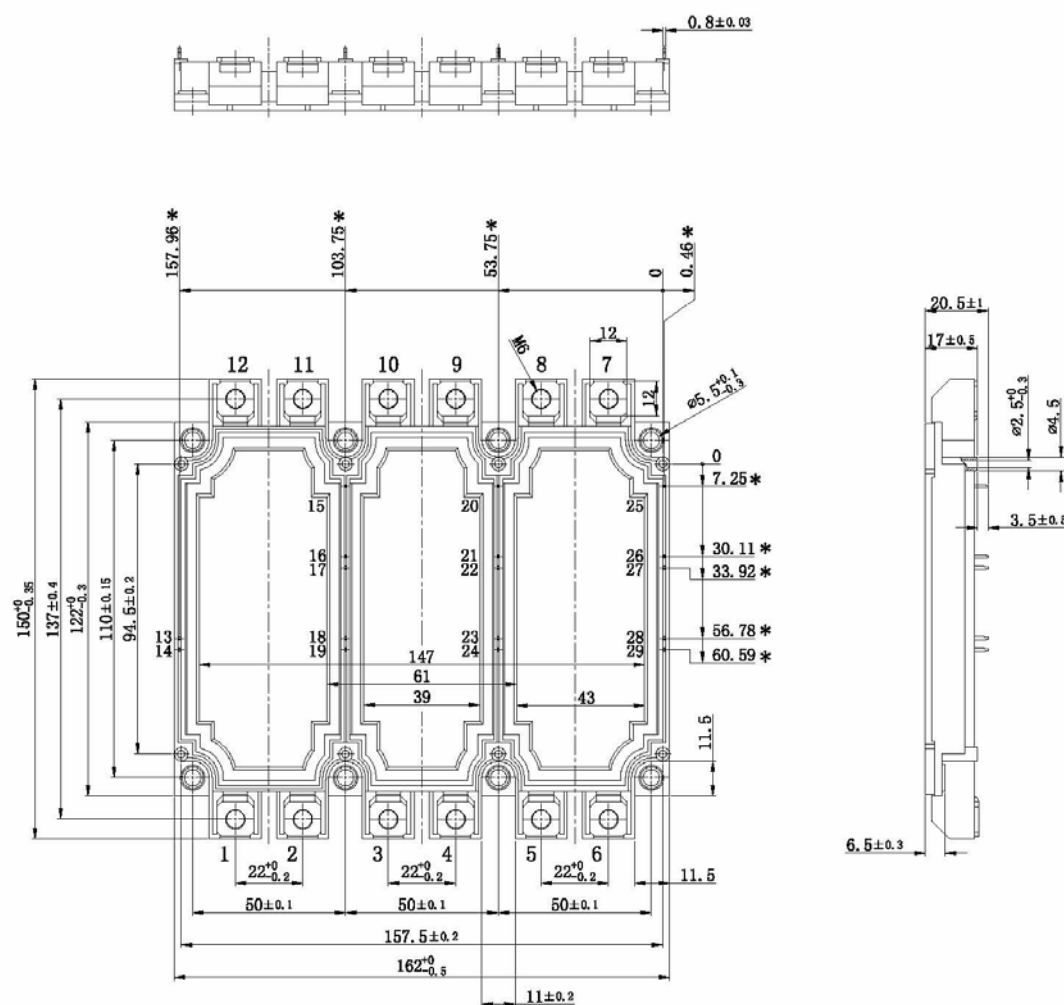
Symbol	Parameter	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	3400			V
L_{CE}	Stray Inductance		20		nH
$R_{\text{CC'+EE'}}$	Module Lead Resistance, Terminal to Chip @ $T_C=25^{\circ}\text{C}$		1.10		m Ω
$R_{\theta\text{JC}}$	Junction-to-Case (per IGBT) Junction-to-Case (per DIODE)			0.090 0.133	K/W
$R_{\theta\text{CS}}$	Case-to-Sink (Conductive grease applied)		0.005		K/W
T_j	Operating Junction Temperature	-40		175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40		125	$^{\circ}\text{C}$
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M6	3.0 3.0		6.0 6.0	N.m
Weight	Weight of Module		910		g

Equivalent Circuit Schematic



Package Dimension

Dimensions in Millimeters



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