



GT600HF120T9H

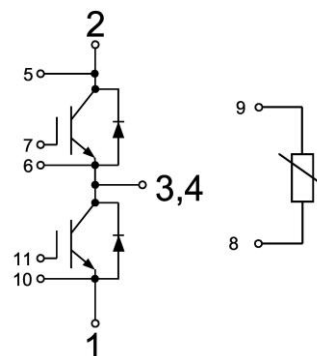
Hybrid IGBT Module

Preliminary Datasheet

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated > 10 μ s
- Low Switching Loss
- 100% RBSOA Tested (2 $\times$ I_C)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- UPS System
- Motor Drives
- Servo Drives
- Wind Turbines

IGBT, Inverter

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{CES}	Collector-Emitter Blocking Voltage		1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =90°C	600	A
		T _C =25°C	1200	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	1200	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C, T _{Jmax} =175°C	4565	W



Electrical Characteristics of IGBT ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=24\text{mA}$, $V_{CE}=V_{GE}$	5.0		6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=600\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.75		V
			$T_J=125^{\circ}\text{C}$	2.17		V
			$T_J=175^{\circ}\text{C}$	2.36		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}$, $V_{CE}=V_{CES}$, $T_J=25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		68.6		nF
C_{oes}	Output Capacitance			4.6		nF
C_{res}	Reverse Transfer Capacitance			1.2		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=600A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		73		ns
			$T_J=125^{\circ}C$		75		
			$T_J=175^{\circ}C$		79		
t_r	Rise Time		$T_J=25^{\circ}C$		40		ns
			$T_J=125^{\circ}C$		46		
			$T_J=175^{\circ}C$		48		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=600A,$ $R_{Goff}=1\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		288		ns
			$T_J=125^{\circ}C$		324		
			$T_J=175^{\circ}C$		344		
t_f	Fall Time		$T_J=25^{\circ}C$		140		ns
			$T_J=125^{\circ}C$		236		
			$T_J=175^{\circ}C$		237		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=600A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ $di/dt=9000A/\mu s(T_J=175^{\circ}C)$ Inductive Load	$T_J=25^{\circ}C$		32		mJ
			$T_J=125^{\circ}C$		41		
			$T_J=175^{\circ}C$		46		



E_{off}	Turn-off Switching Loss	$V_{CC}=600V$, $I_C=600A$, $R_{Goff}=1\Omega$, $V_{GE}=\pm 15V$, $du/dt=2020V/\mu s$ ($T_J=175^\circ C$) Inductive Load	$T_J=25^\circ C$		48		mJ
			$T_J=125^\circ C$		60		
			$T_J=175^\circ C$		68		
Q_g	Total Gate Charge	$V_{GE}=+15V \dots -15V$	$T_J=25^\circ C$		4.01		μC
$R_{G(int)}$	Internal Gate Resistance		$T_J=25^\circ C$		0.67		Ω
I_{SC}	$V_{CC}=600V$, $V_{GE}=\pm 15V$, $t_p=10\mu s$, $T_J=150^\circ C$				2100		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.036	$^\circ C/W$

SiC Diode, Inverter

Maximum Rated Values of Diode ($T_C=25^\circ C$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage		1200	V
I_F	Diode Continuous Forward Current	$T_C=175^\circ C$	450	A
I_{FSM}	Non-repetitive Peak Forward Surge Current, Half Sine Wave	$T_C=25^\circ C$, $t_p=10ms$	2520	A
I_{FRM}	Repetitive Peak Forward Surge Current, Half Sine Wave	$T_C=25^\circ C$, $t_p=10ms$	1260	A

Electrical Characteristics of Diode ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =450A	T _J =25℃		1.50		V
			T _J =175℃		2.30		V
I _R	Reverse Current	V _R =1200V, T _J =25℃				1	mA
		V _R =1200V, T _J =175℃				10	mA
Q _C	Total Capacitive Charge	V _R =800V			1854		nC
C	Total Capacitance	f=1MHz, T _J =25℃	V _R =0V		27.5		nF
			V _R =400V		1.74		nF
			V _R =800V		1.32		nF
E _C	Capacitance Stored Energy	V _R =800V			420.3		uJ
R _{θJC}	Thermal Resistance: Junction-to-Case (per SiC Diode)					0.085	℃/W



Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R ₂₅	T _C =25℃		5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =465Ω	-5		+5	%
P ₂₅	T _C =25℃			10	mW
B _{25/50}	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
B _{25/80}	$R_2=R_{25} \exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
B _{25/100}	$R_2=R_{25} \exp[B_{25/100}(1/T_2-1/(298.15K))]$		3545		K

Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1mintue	2500			V
L _{sCE}	Stray Inductance Module			20		nH
T _J	Maximum Junction Temperature				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T _{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.02	℃/W
M	Power Terminals Screw:M6		4.0		5.0	N·m
M	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			330		g



Ordering Information Table

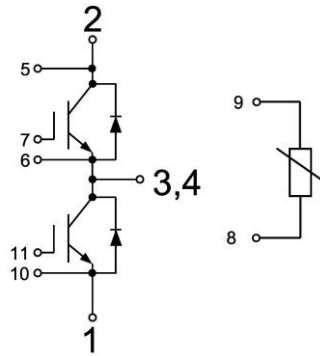
Device code

G	T	600	HF	120	T9	H
①	②	③	④	⑤	⑥	⑦

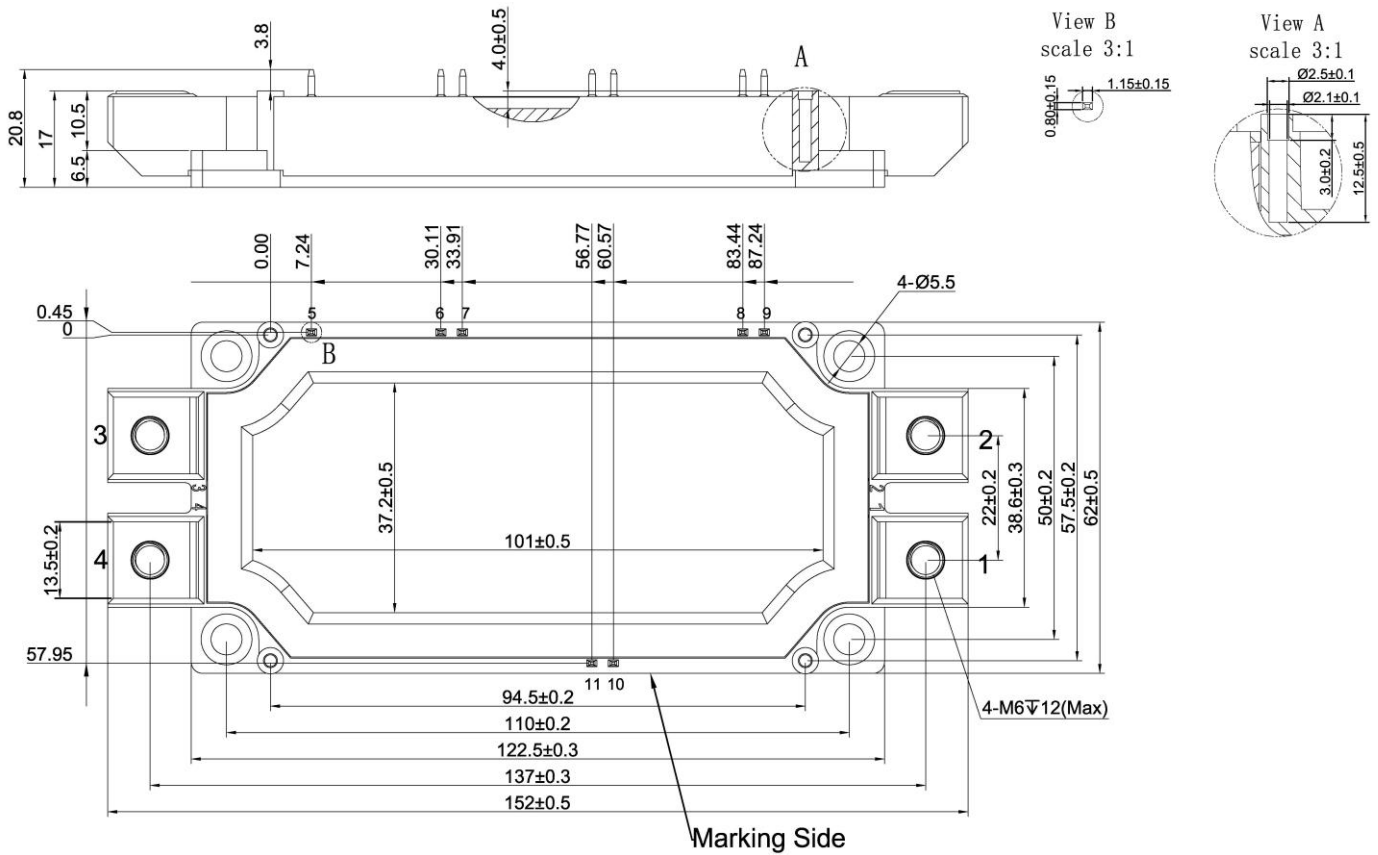
- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (600=600A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
01	Initial release

Announcement

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The released datasheet would be issued with “REV.” + “alphabet characters”.