



GT450HF120T9H

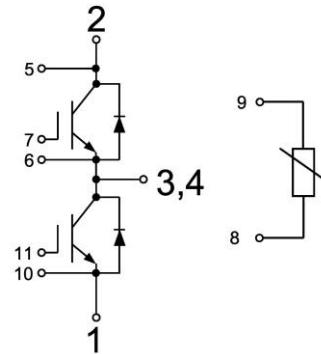
Hybrid IGBT Module

Preliminary Datasheet

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated $>10\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Motor Drives
- Servo Drives
- UPS Systems
- Wind Turbines

IGBT, Inverter

Maximum Rated Values ($T_C=25^\circ\text{C}$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=00^\circ\text{C}$	450	A
		$T_C=25^\circ\text{C}$	900	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	900	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	2860	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	$I_C=15\text{mA}$, $V_{CE}=V_{GE}$	5.0		6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=450\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80		V
			$T_J=125^{\circ}\text{C}$	2.13		V
			$T_J=175^{\circ}\text{C}$	2.25		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		50.0		nF
C_{oes}	Output Capacitance			2.56		nF
C_{res}	Reveres Transfer Capacitance			0.51		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_c=450A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		82		ns
			$T_J=125^{\circ}C$		91		
			$T_J=175^{\circ}C$		98		
t_r	Rise Time		$T_J=25^{\circ}C$		50		ns
			$T_J=125^{\circ}C$		55		
			$T_J=175^{\circ}C$		58		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_c=450A,$ $R_{Goff}=1\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		261		ns
			$T_J=125^{\circ}C$		290		
			$T_J=175^{\circ}C$		310		
t_f	Fall Time		$T_J=25^{\circ}C$		155		ns
			$T_J=125^{\circ}C$		169		
			$T_J=175^{\circ}C$		220		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_c=450A,$ $R_{Gon}=1\Omega, V_{GE}=\pm 15V,$ $di/dt=6000A/\mu s(T_J=175^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		29.3		mJ
			$T_J=125^{\circ}C$		36.8		
			$T_J=175^{\circ}C$		43.8		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =450A, R _{Goff} =1Ω, V _{GE} =±15V, du/dt=4800V/μs(T _J =175°C), Inductive Load	T _J =25°C		34.6		mJ
			T _J =125°C		39.2		
			T _J =175°C		48.9		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2860		nC
R _{G(int)}	Internal Gate Resistor				1.0		Ω
SCSOA	V _{CC} =600V, V _{GE} =+/-15V, T _J =175°C					10	μs
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.052	°C/W

SiC Diode, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage		1200	V
I _F	Diode Continuous Forward Current	T _C =175°C	300	A
I _{FSM}	Non-repetitive Peak Forward Surge Current, Half Sine Wave	T _C =25°C, t _p =10ms	1680	A
I _{FRM}	Repetitive Peak Forward Surge Current, Half Sine Wave	T _C =25°C, t _p =10ms	840	A

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =300A	T _J =25°C		1.50		V
			T _J =175°C		2.30		V
I _R	Reverse Current	V _R =1200V, T _J =25°C				1	mA
		V _R =1200V, T _J =175°C				10	mA
Q _C	Total Capacitive Charge	V _R =800V			1236		nC
C	Total Capacitance	f=1MHz, T _J =25°C	V _R =0V		18.35		nF
			V _R =400V		1.16		nF
			V _R =800V		0.88		nF
E _C	Capacitance Stored Energy	V _R =800V			280.2		uJ
R _{θJC}	Thermal Resistance: Junction-to-Case (per SiC Diode)					0.127	°C/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	Conditions	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute	2500			V
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)				0.03	℃/W
T	Power Terminals Screw:M6		4.0		5.0	N·m
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			330		g



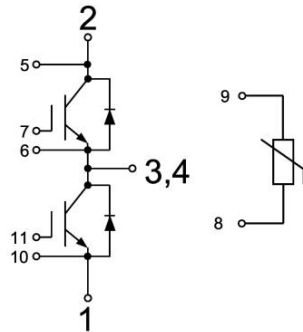
Ordering Information Table

Device code	G	T	450	HF	120	T9	H
	①	②	③	④	⑤	⑥	⑦

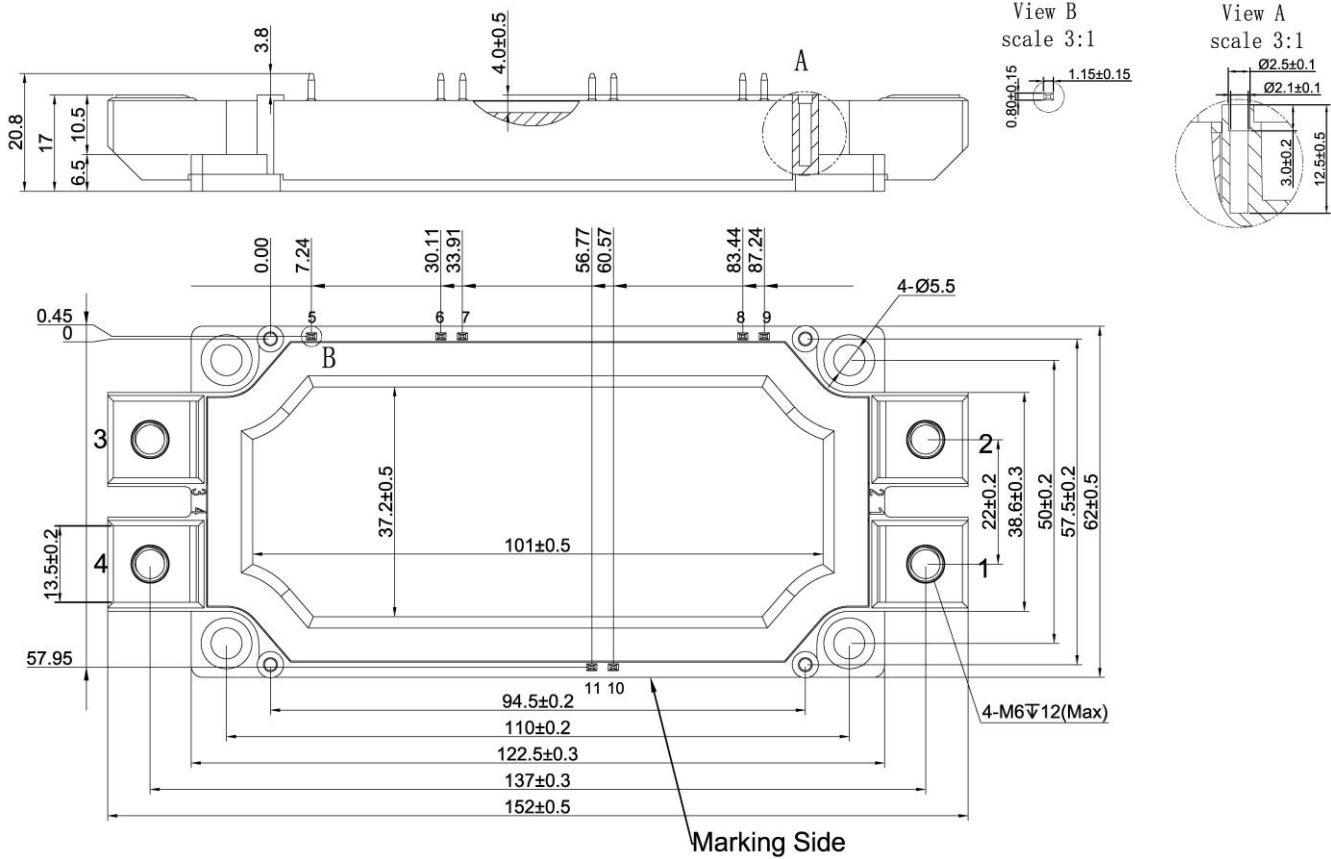
- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (450=450A)
- ④ - Circuit Configuration: HF (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



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”.