



MSC600HF120T9H

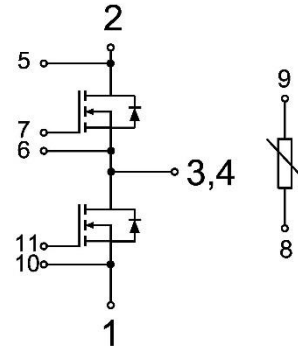
SiC MOSFET Module

Preliminary Data

Features:

- High Frequency Switching
- Low Capacitances and Low Gate Charge
- Low Losses at All Operating Temperatures
- Improved Thermal Capability
- Ease of Paralleling without Thermal Runaway
- Increased Power Density for Compact System
- Compatible with Commercial Gate Drivers
- Copper Baseplate and Silicon Nitride Insulator

Circuit Diagram



Applications:

- Solar Inverters
- Motor Drives
- EV Charging
- High Voltage DC-DC Converters
- SMPS、UPS
- Smart Grid Transmission and Distribution
- Induction Heating and Welding



SiC MOSFET

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

Symbol	Description		Values	Units
V _{DSS}	Drain-Source Blocking Voltage		1200	V
V _{GSmax}	Gate-Source Voltage	Absolute Maximum Values	-10/+23	V
V _{GSop}		Recommended Operational Values	-5/+18	V
I _D	Continuous Drain Current	V _{GS} =18V, T _C =25°C	632	A
		V _{GS} =18V, T _C =100°C	448	A
I _{D(pulse)}	Pulsed Drain Current	Pulse width t _p limited by T _{Jmax}	1576	A
P _D	Power Dissipation	T _C =25°C, T _J =175°C	1890	W

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

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=4\text{mA}$	1200			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=180\text{mA}, T_J=25^{\circ}\text{C}$	2.0	2.9	4.0	V
		$V_{DS}=V_{GS}, I_D=180\text{mA}, T_J=175^{\circ}\text{C}$		2.1		V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=1200\text{V}, V_{GS}=0\text{V}$			1	mA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=23\text{V}, V_{DS}=0\text{V}$			600	nA
		$V_{GS}=-10\text{V}, V_{DS}=0\text{V}$			-600	nA
$R_{DS(on)}$	On State Resistance	$V_{GS}=18\text{V}, I_{DS}=300\text{A}, T_J=25^{\circ}\text{C}$		3.1	4.5	m Ω
		$V_{GS}=18\text{V}, I_{DS}=300\text{A}, T_J=175^{\circ}\text{C}$		5.8		
g_{fs}	Transconductance	$V_{DS}=20\text{V}, I_{DS}=300\text{A}, T_J=25^{\circ}\text{C}$		260		S
		$V_{DS}=20\text{V}, I_{DS}=300\text{A}, T_J=175^{\circ}\text{C}$		240		
Q_G	Total Gate Charge	$V_{DS}=800\text{V}, V_{GS}=-5\text{V to }+18\text{V}, I_D=300\text{A}$		920		nC
Q_{GS}	Gate to Source Charge			220		
Q_{GD}	Gate to Drain Charge			168		
C_{iss}	Input Capacitance	$V_{DS}=1000\text{V}, f=100\text{kHz}, V_{GS}=0\text{V}, V_{AC}=25\text{mV}$		22.40		nF
C_{oss}	Output Capacitance			0.84		
C_{rss}	Reverse Transfer Capacitance			0.08		



E _{oss}	C _{oss} Stored Energy	V _{DS} =1000V, f=100kHz, V _{GS} =0V, V _{AC} =25mV		380		μJ
E _{on}	Turn-on Switching Energy	V _{DS} =800V, V _{GS} =-5V/+18V, I _D =300A, R _G =0.75Ω		5.60		mJ
E _{off}	Turn-off Switching Energy			2.24		mJ
R _G	Internal Gate Resistance			2.2		Ω
R _{θJC}	Thermal Resistance Junction-to-Case (per SiC MOSFET)				0.08	°C/W

Built-in SiC Body Diode

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

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
I_S	Inverse Diode Continuous, Forward Current	$T_C=25^{\circ}C$			632	A
V_{SD}	Diode Forward Voltage	$I_{SD}=150A$, $V_{GS}=-5V$, $T_J=25^{\circ}C$		3.9		V
		$I_{SD}=150A$, $V_{GS}=-5V$, $T_J=175^{\circ}C$		3.6		V
t_{rr}	Reverse Recover Time	$V_R=800V$, $I_{SD}=300A$		40		ns
Q_{rr}	Reverse Recovery Charge			1184		nC
I_{rrm}	Peak Reverse Recovery Current			68		A

NTC Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R_{25}	$T_C=25^{\circ}C$		5		k Ω
$\Delta R/R$	$T_C=100^{\circ}C$, $R_{100}=465\Omega$	-5		+5	%
P_{25}	$T_C=25^{\circ}C$			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) f=50Hz, 30s	4500			V
Internal Isolation		Si ₃ N ₄			
T _J	Maximum Junction Temperature			175	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+150	°C
T _{stg}	Storage Temperature	-40		+125	°C
CTI	Comparative Tracking Index	200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)			0.03	°C/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

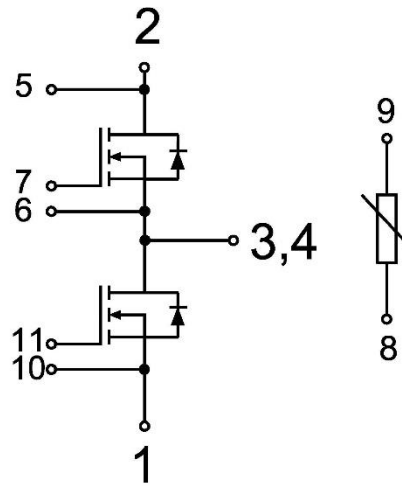
Device code

M	SC	600	HF	120	T9	H
①	②	③	④	⑤	⑥	⑦

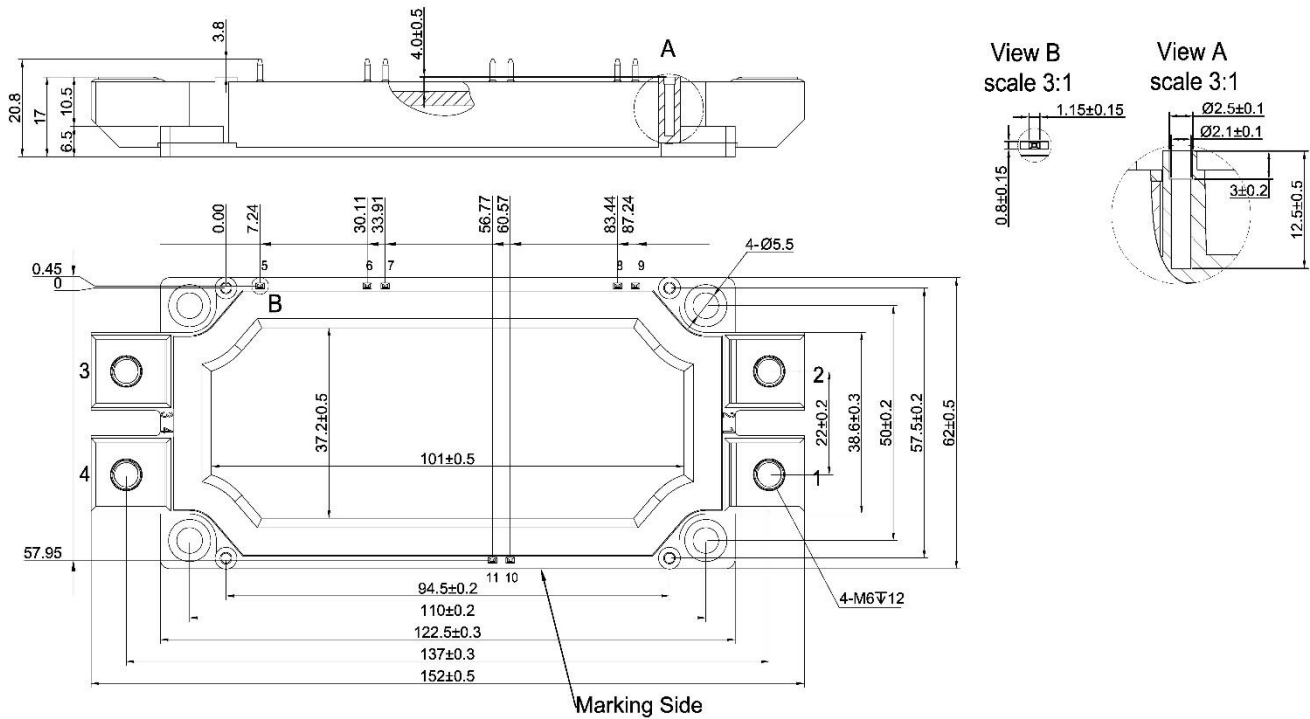
- ① - MOSFET Module
- ② - SiC MOSFET
- ③ - Rated Current (600=600A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



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”.