



MSC600HF120T2NH

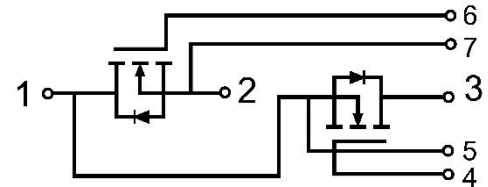
SiC MOSFET Module

Preliminary Datasheet

Features:

- SiC Power MOSFET
- Low $R_{DS(on)}$
- Low Inductance Case Avoid Oscillations
- Isolated Heatsink Using DBC Technology

Circuit Diagram



Applications:

- Main and Auxiliary AC Drives of Electric Vehicles
- DC Servo and Robot Drives
- Battery Vehicles
- UPS Equipment
- Plasma Cutting

SiC MOSFET

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

Symbol	Description		Values	Units
V_{DS}	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	$V_{GS}=18\text{V}, T_C=25^{\circ}\text{C}$	948	A
		$V_{GS}=18\text{V}, T_C=100^{\circ}\text{C}$	672	A
$I_{D(pulse)}$	Pulsed Drain Current	Pulse width t_p limited by T_{Jmax}	2364	A
P_D	Power Dissipation	$T_C=25^{\circ}\text{C}, T_J=175^{\circ}\text{C}$	2900	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	$V_{GS}=0V, I_D=1mA$	1200			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=270mA$	2.0	3.0	4.5	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=1200V, V_{GS}=0V$			1	mA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=-10V, V_{DS}=0V$			-1	μA
		$V_{GS}=+23V, V_{DS}=0V$			1	μA
$R_{DS(on)}$	On State Resistance	$V_{GS}=18V, I_D=450A$		2.08	3.00	$m\Omega$
		$V_{GS}=18V, I_D=450A, T_J=175^{\circ}\text{C}$		3.83		$m\Omega$
g_{fs}	Transconductance	$V_{DS}=20V, I_D=450A$		390		S
		$V_{DS}=20V, I_D=450A, T_J=175^{\circ}\text{C}$		360		S
C_{iss}	Input Capacitance	$V_{DS}=1000V, f=100kHz,$ $V_{GS}=0V, V_{AC}=25mV$		33.60		nF
C_{oss}	Output Capacitance			1.27		nF
C_{rss}	Reverse Transfer Capacitance			0.13		nF
E_{oss}	C_{oss} Stored Energy			570		μJ
Q_G	Total Gate Charge	$V_{DS}=800V, V_{GS}=-5V \text{ to } +18V,$ $I_D=450A$		1380		nC
Q_{GS}	Gate-Source Charge			330		nC
Q_{GD}	Gate-Drain Charge			252		nC
E_{on}	Turn-on Switching Energy	$V_{DS}=800V, V_{GS}=-5V \text{ to } +18V,$ $I_D=450A, R_G=0.5\Omega$		8.4		mJ
E_{off}	Turn-off Switching Energy			3.4		mJ
$R_{G(int)}$	Internal Gate Resistance			1.45		Ω
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per SiC MOSFET)				0.052	$^{\circ}\text{C/W}$



Built-in SiC Body Diode

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

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
I_S	Inverse Diode Continuous, Forward Current	$T_C=25^{\circ}\text{C}$			948	A
V_{SD}	Diode Forward Voltage	$I_{SD}=225\text{A}$, $V_{GS}=-5\text{V}$, $T_J=25^{\circ}\text{C}$		3.9		V
		$I_{SD}=225\text{A}$, $V_{GS}=-5\text{V}$, $T_J=175^{\circ}\text{C}$		3.6		V
t_{rr}	Reverse Recover Time	$V_R=800\text{V}$, $I_{SD}=450\text{A}$		36		ns
Q_{rr}	Reverse Recovery Charge			1776		nC
I_{rrm}	Peak Reverse Recovery Current			102		A

Module

Symbol	Description	Min.	Typ.	Max.	Units
V_{ISO}	Isolation Voltage (All Terminals Shorted)	$f=50\text{Hz}$, $t=1\text{min}$		2500	V
Internal Isolation			AIN		
d_{creep}	Creepage Distance: Terminal to Baseplate		40		mm
	Creepage Distance: Terminal to Terminal		30		mm
d_{clear}	Clearance Distance: Terminal to Baseplate		30		mm
	Clearance Distance: Terminal to Terminal		9		mm
L_{SCE}	Stray Inductance Module			14	nH
T_J	Maximum Junction Temperature			175	$^{\circ}\text{C}$
T_{JOP}	Maximum Operating Junction Temperature Range	-40		+175	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-40		+125	$^{\circ}\text{C}$
CTI	Comparative Tracking Index	200			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)			0.03	$^{\circ}\text{C}/\text{W}$
M	Power Terminals Screw:M6	3.0		5.0	N·m
M	Mounting Screw:M6	3.0		6.0	N·m
G	Weight		300		g



Ordering Information Table

Device code	M	SC	600	HF	120	T2N	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)



Revision	Notes
01	Initial Release

Announcement

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