



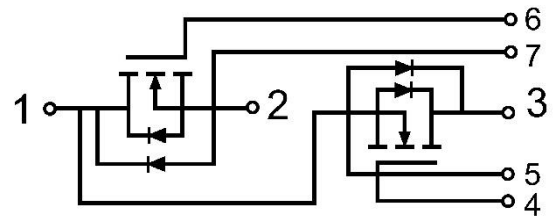
MSC720HF120T2NHD

SiC MOSFET Module

Features:

- High Frequency Switching
- High Blocking Voltage with Low $R_{DS(on)}$
- Zero Reverse Recovery of Antiparallel SiC Schottky Diode
- Simple to Drive
- Lead Free, Compliant with RoHS Requirement
- Copper Baseplate and Aluminum 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_{DS}	Drain-Source Blocking Voltage	1200	V
V_{GSmax}	Gate-Source Voltage	Absolute Maximum Values	-10/+23
V_{GSop}		Recommended Operational Values	-5/+18
I_D	Continuous Drain Current	$V_{GS}=18\text{V}, T_C=25^{\circ}\text{C}$	948
		$V_{GS}=18\text{V}, T_C=100^{\circ}\text{C}$	672
$I_{D(pulse)}$	Pulsed Drain Current	Pulse width t_p limited by T_{Jmax}	2364
P_D	Power Dissipation	$T_C=25^{\circ}\text{C}, T_J=175^{\circ}\text{C}$	2900

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

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{(BR)DS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=6\text{mA}$	1200			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=270\text{mA}$	2.0	3.0	4.5	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	$V_{GS}=-10\text{V}, V_{DS}=0\text{V}$			-1	uA
		$V_{GS}=+23\text{V}, V_{DS}=0\text{V}$			1	uA
$R_{DS(on)}$	On State Resistance	$V_{GS}=18\text{V}, I_D=450\text{A}$		2.08	3.00	m Ω
		$V_{GS}=18\text{V}, I_D=450\text{A}, T_J=175^{\circ}\text{C}$		3.83		m Ω
g_{fs}	Transconductance	$V_{DS}=20\text{V}, I_D=450\text{A}$		390		S
		$V_{DS}=20\text{V}, I_D=450\text{A}, T_J=175^{\circ}\text{C}$		360		S
C_{iss}	Input Capacitance	$V_{DS}=1000\text{V}, f=100\text{kHz}, V_{GS}=0\text{V}, V_{AC}=25\text{mV}$		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		uJ
Q_G	Total Gate Charge	$V_{DS}=800\text{V}, V_{GS}=-5\text{V to }+18\text{V}, I_D=450\text{A}$		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 to +18V, I _D =450A, R _G =0.5Ω		8.4		mJ
E _{off}	Turn-off Switching Energy			3.4		mJ
R _{G(int)}	Internal Gate Resistance			2.0		Ω
R _{θJC}	Thermal Resistance: Junction-to-Case (per SiC MOSFET)				0.052	°C/W

Reverse SiC Diode

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage		1200	V
I _F	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
I ² t	I ² t - value	T _C =25°C, t _p =10ms	14112	A²s

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	1.75	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)					0.065	°C/W



Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1minute, RMS	2500			V
Internal Isolation			AlN			
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+175	°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		3.0		5.0	N·m
M	Mounting Screw:M6		3.0		6.0	N·m
G	Weight			300		g

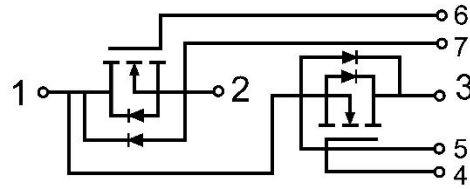
Ordering Information Table

Device code	M	SC	720	HF	120	T2N	H	D
	①	②	③	④	⑤	⑥	⑦	⑧

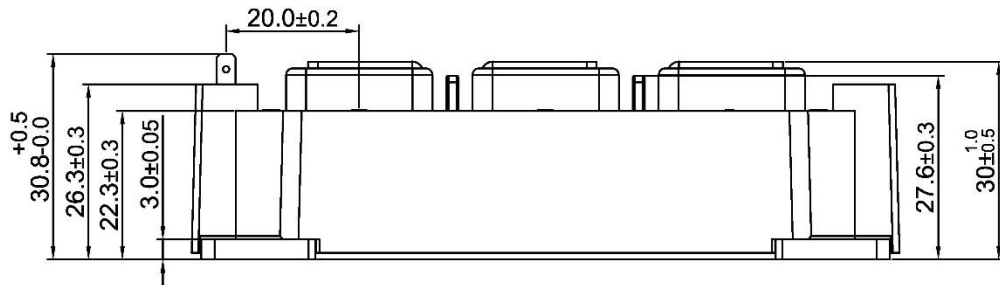
- ① - MOSFET Module
- ② - SiC MOSFET
- ③ - Rated Current (720=720A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)
- ⑧ - Internal Code



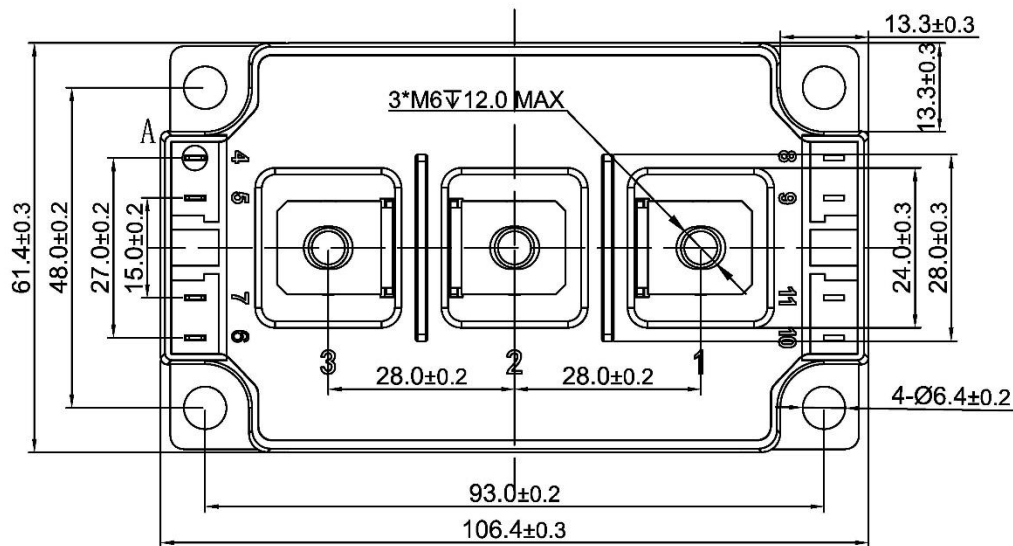
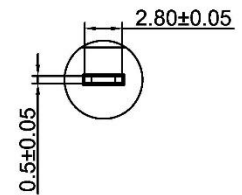
Internal Circuit:



Package Outline (Unit: mm):



View A
scale 3:1





Revision	Notes
01	Initial Release
02	Updated Electrical Characteristic Parameter Values

Announcement

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The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

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