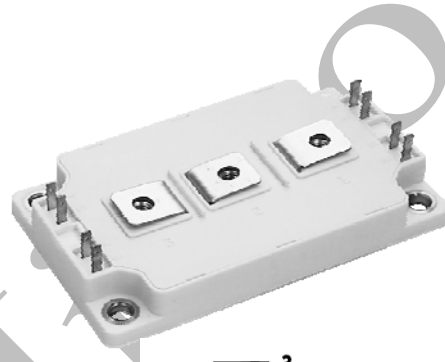


# MSC160HF120T2LH

## SiC MOSFET Module

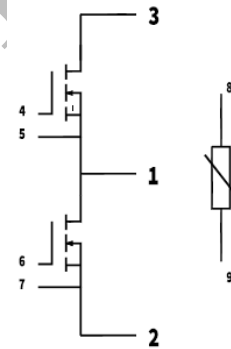
### Features:

- Low On-resistance
- Fast Switching Speed
- Fast Reverse Recovery
- Simple to Drive
- Ease of Paralleling
- Copper Baseplate and Silicon Nitride Insulator



### Applications:

- Induction Heating
- Motor Drivers
- Solar and Wind Inverters
- Switch Mode Power Supplies
- DC/DC Converters



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

Symbol	Description	Value	Units
$V_{DSmax}$	Drain-Source Voltage	1200	V
$V_{GS}$	Gate-Source Voltage	-10/+25	V
$I_D$	Continuous Drain Current	$V_{GS}=20V, T_C=25^\circ\text{C}$	240
		$V_{GS}=20V, T_C=100^\circ\text{C}$	160
$I_{D(pluse)}$	Pulsed Drain Current	Pulse width $t_p$ limited by $T_{jmax}$ , $T_C=25^\circ\text{C}$	640
$P_D$	Power Dissipation	$T_C=25^\circ\text{C}, T_{jmax}=175^\circ\text{C}$	1500

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain - Source Breakdown Voltage	$V_{GS}=0V, I_D=200\mu A$	1.2			kV
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=10V, I_D=40mA$	2.4	2.8	5.6	V
		$V_{DS}=10V, I_D=40mA, T_J=150^\circ\text{C}$	1.8	2.0		
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=1.2\text{ kV}, V_{GS}=0V, T_J=25^\circ\text{C}$		4	100	$\mu A$
$I_{GSS+}$	Gate-Source Leakage Current	$V_{GS}=+22V, V_{DS}=0V$			250	nA
$I_{GSS-}$	Gate-Source Leakage Current	$V_{GS}=-10V, V_{DS}=0V$			-250	nA
$R_{DS(on)}$	On State Resistance	$V_{GS}=20V, I_{DS}=160A, T_J=25^\circ\text{C}$		10	13	m $\Omega$
		$V_{GS}=20V, I_{DS}=160A, T_J=150^\circ\text{C}$		21	25	
$g_{fs}$	Transconductance	$V_{DS}=20V, I_{DS}=160A$		60.4		S
		$V_{DS}=20V, I_{DS}=160A, T_J=150^\circ\text{C}$		52.8		
$C_{iss}$	Input Capacitance			7.57		nF
$C_{oss}$	Output Capacitance	$V_{GS}=0V, V_{DS}=1000V, f=1\text{MHz}, V_{AC}=25\text{mV}$		0.6		
$C_{riss}$	Reverse Transfer Capacitance			0.04		
$E_{on}$	Turn-On Switching Energy	$V_{DD}=800V, V_{GS}=-5V/+20V, I_D=160A, R_{G(ext)}=0.6\Omega, L=80\mu H$		4.0		mJ
$E_{off}$	Turn-Off Switching Energy			1.6		
$R_{G(int)}$	Internal Gate Resistance	$f=1\text{MHz}, V_{AC}=25\text{mV}, \text{ESR of } C_{iss}$		0.45		$\Omega$
$Q_{GS}$	Gate-Source Charge			112		nC
$Q_{GD}$	Gate-Drain Charge	$V_{DD}=800V, V_{GS}=-5V/+20V, I_D=160A$		148		
$Q_G$	Total Gate Charge			460		
$t_{d(on)}$	Turn-off delay time			60		ns
$t_r$	Rise Time	$V_{DD}=800V, V_{GS}=-5V/+20V, I_D=160A, R_{G(ext)}=0.6\Omega$		208		
$t_{d(off)}$	Turn-off delay time			106		
$t_f$	Fall Time			138		
$t_{SC}$	Short Time	$V_{DD}=700V, V_{GS}=15V, T_J=100^\circ\text{C}$	5			$\mu s$
$R_{\theta JCM}$	Thermal Resistance Junction-To-Case for MOSFET			0.101		$^\circ\text{C/W}$

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
$I_S$	Inverse Diode Continuous, Forward Current	$T_C=25^\circ\text{C}$			160	
$I_{SM}$	Inverse Diode Direct Current, pulsed	$T_C=25^\circ\text{C}$			640	
$V_{SD}$	Diode Forward Voltage	$I_S=80\text{A}, V_{GS}=-5\text{V}; T_J=25^\circ\text{C}$		3.6		V
		$I_S=80\text{A}, V_{GS}=-5\text{V}; T_J=150^\circ\text{C}$		3.3		
$t_{rr}$	Reverse Recovery Time	$V_{GS}=-5\text{V}, I_F=160\text{A}, V_R=800\text{V}, di/dt=1000\text{A}/\mu\text{s}, T_C=25^\circ\text{C}$		216		ns
$Q_{rr}$	Reverse Recovery Charge			1132		nC
$I_{rrm}$	Peak Reverse Recovery Current			60		A

### NTC-Thermistor Characteristic Values

$R_{25}$	$T_C=25^\circ\text{C}$	5		k $\Omega$
$\Delta R/R$	$T_C=100^\circ\text{C}, R_{100}=481\Omega$		$\pm 5$	%
$P_{25}$	$T_C=25^\circ\text{C}$	50		mW
$B_{25/50}$	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$	3380		K
$B_{25/80}$	$R_2=R_{25} \exp[B_{25/80}(1/T_2-1/(298.15\text{K}))]$	3440		K

### Module

Symbol	Description	Min	Typ	Max	Unit
$V_{iso}$	Isolation Voltage (All Terminals Shorted)	$f=50\text{Hz}, 1\text{minute}$	2500		V
$L_{stray}$	Stray Inductance	Measured between terminals 2 and 3		8.2	nH
$T_J$	Maximum Junction Temperature			175	$^\circ\text{C}$
$T_{JOP}$	Maximum Operating Junction Temperature Range	-40		150	$^\circ\text{C}$
$T_{stg}$	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:M5	2.0		3.5	N·m
M	Mounting Screw:M6	3.0		5.0	N·m
G	Weight		290		g

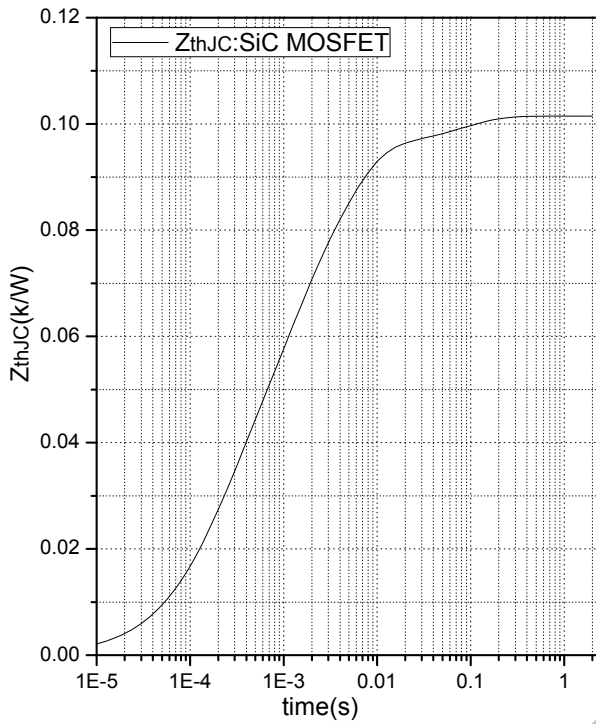


Fig.1 Transient Thermal Impedance (MOSFET)

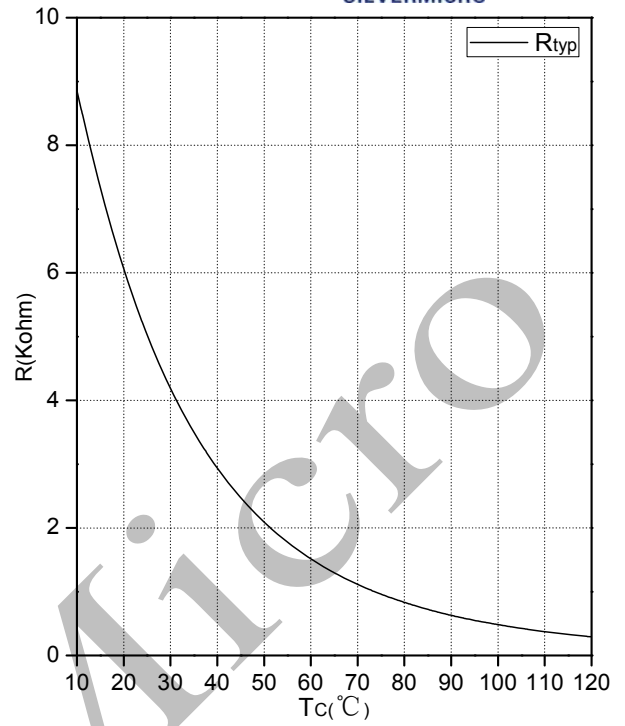
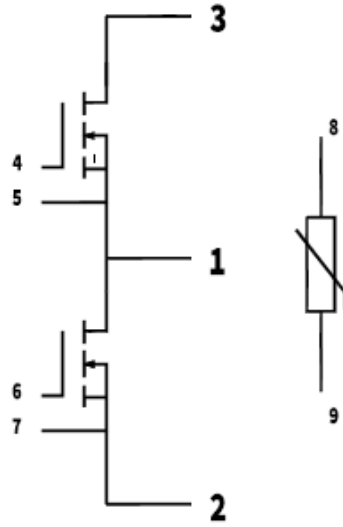
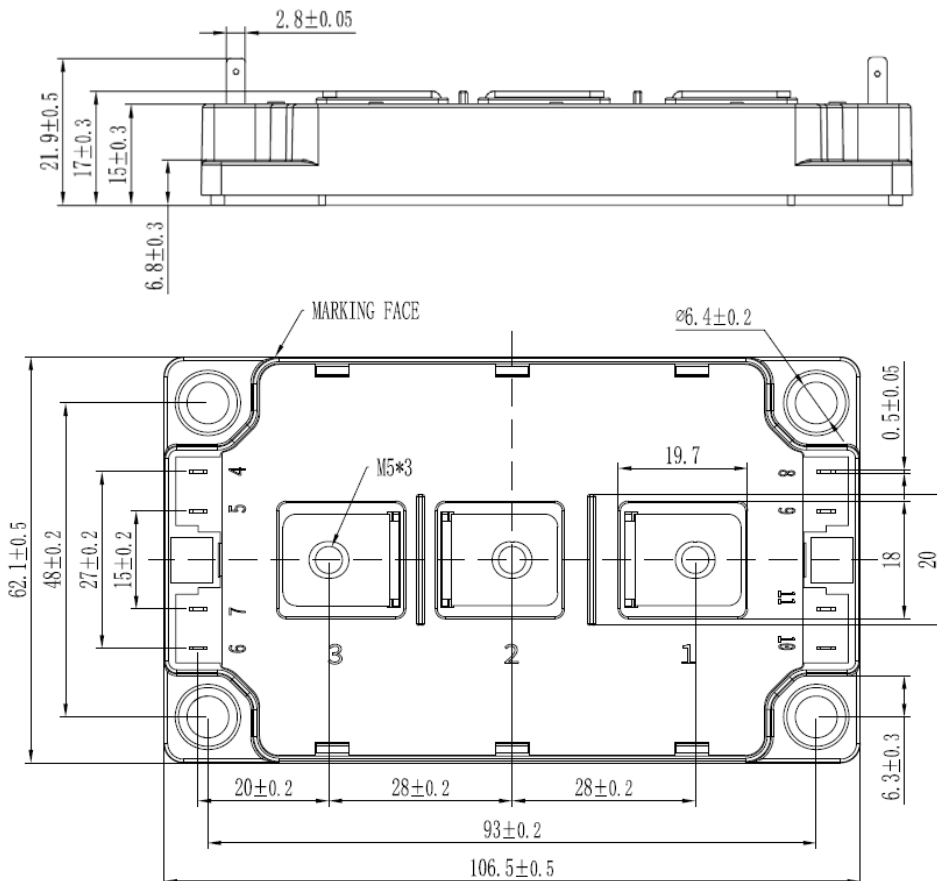


Fig.2 NTC Temperature Characteristics

**Internal Circuit:**



**Package Outline (Unit: mm):**





Date	Revision	Notes
01/03/2019	01	Initial Release
01/24/2019	02	Add $t_{SC}$ & $L_{Stray}$

## Announcement

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