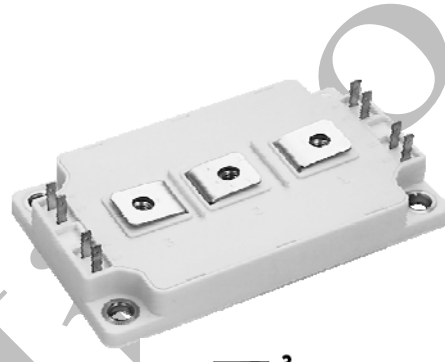


MSC300HF120T2LH

SiC MOSFET Module

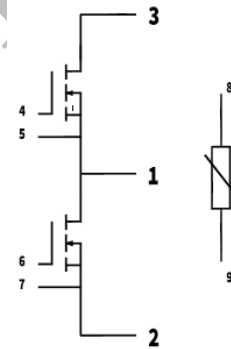
Features:

- 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_{GSmax}	Gate-Source Voltage	Absolute Maximum values	-4/+22	V
V_{GSop}	Gate-Source Voltage	Recommended Operational Values	0/18	V
I_D	Continuous Drain Current	$V_{GS}=20V, T_C=25^\circ\text{C}$	440	A
		$V_{GS}=20V, T_C=90^\circ\text{C}$	300	A
$I_{D(pluse)}$	Pulsed Drain Current	Pulse width $t_p=200\mu\text{s}$ Repetition rate limited by $T_{jmax}, T_C=25^\circ\text{C}$	1095	A
P_D	Power Dissipation	$T_C=25^\circ\text{C}, T_{jmax}=175^\circ\text{C}$	2200	W

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	$V_{GS}=0V, I_D=1mA$	1.2			kV
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = 10 V, I_D = 80 mA$	2.7		5.6	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 1.2 kV, V_{GS} = 0V$ $T_J = 25^\circ\text{C}$		0.5	2	mA
		$V_{DS} = 1.2 kV, V_{GS} = 0V,$ $T_J = 150^\circ\text{C}$		1		mA
I_{GSS+}	Gate-Source Leakage Current	$V_{GS} = +22 V, V_{DS} = 0V$			100	nA
I_{GSS-}	Gate-Source Leakage Current	$V_{GS} = -4 V, V_{DS} = 0V$			-100	nA
$R_{DS(on)}$	On State Resistance	$V_{GS} = 18 V, I_{DS} = 160 A$ $T_J = 25^\circ\text{C}$		5	6.25	m Ω
		$V_{GS} = 18 V, I_{DS} = 160 A,$ $T_J = 125^\circ\text{C}$		7.5		
g_{fs}	Transconductance	$V_{DS}= 10 V, I_{DS} = 160 A$		66		S
C_{iss}	Input Capacitance			10.7		nF
C_{oss}	Output Capacitance	$V_{GS}= 0 V, V_{DS} = 800 V$ $f = 1MHz$		0.6		
C_{rss}	Reverse Transfer Capacitance			0.2		
E_{on}	Turn-On Switching Energy	$V_{DD} = 600 V, V_{GS} = 0V/+18V$ $I_D = 160 A, R_{G(ext)} = 0 \Omega$		2.26		mJ
E_{off}	Turn-Off Switching Energy			0.94		
$R_{G(int)}$	Internal Gate Resistance	$f = 1MHz, \text{open drain}$		1		Ω
Q_{GS}	Gate-Source Charge	$V_{DD}= 600 V, V_{GS} = 18V,$ $I_D= 160 A$		176		nC
Q_{GD}	Gate-Drain Charge			328		
Q_G	Total Gate Charge			856		
$t_{d(on)}$	Turn-off delay time	$V_{DD} = 400V, V_{GS} = 0/+18V,$ $I_D = 144 A, R_{G(ext)} = 0 \Omega$		168		ns
t_r	Rise Time			312		
$t_{d(off)}$	Turn-off delay time			392		
t_f	Fall Time			192		
t_{SC}	Short Time	$V_{DD}=700V, V_{GS}=15V, T_J=100^\circ\text{C}$	5			μs
$R_{\theta JCM}$	Thermal Resistance Junction-To-Case for MOSFET			0.067		$^\circ\text{C/W}$

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	$T_C = 25^\circ\text{C}$			440	
I_{SM}	Inverse Diode Direct Current, pulsed	$T_C = 25^\circ\text{C}$			1095	
V_{SD}	Diode Forward Voltage	$I_S = 160\text{A}$, $V_{GS} = 0\text{V}$; $T_J = 25^\circ\text{C}$		3.2		V
t_{rr}	Reverse Recovery Time	$I_F = 160\text{A}$ $V_R = 600\text{V}$ $di/dt = 1100\text{A/us}$		200		ns
Q_{rr}	Reverse Recovery Charge			1240		nC
I_{rrm}	Peak Reverse Recovery Current			72		A

NTC-Thermistor Characteristic Values

R_{25}	$T_C = 25^\circ\text{C}$	5		k Ω
$\Delta R/R$	$T_C = 100^\circ\text{C}$, $R_{100} = 481\Omega$		± 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)	$f = 50\text{Hz}$, 1minute	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		$^\circ\text{C/W}$
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

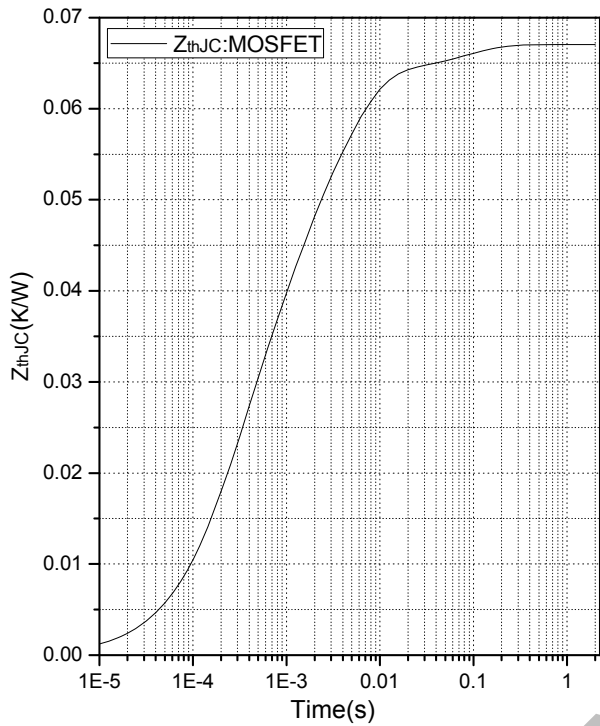


Fig.1 Transient Thermal Impedance (MOSFET)

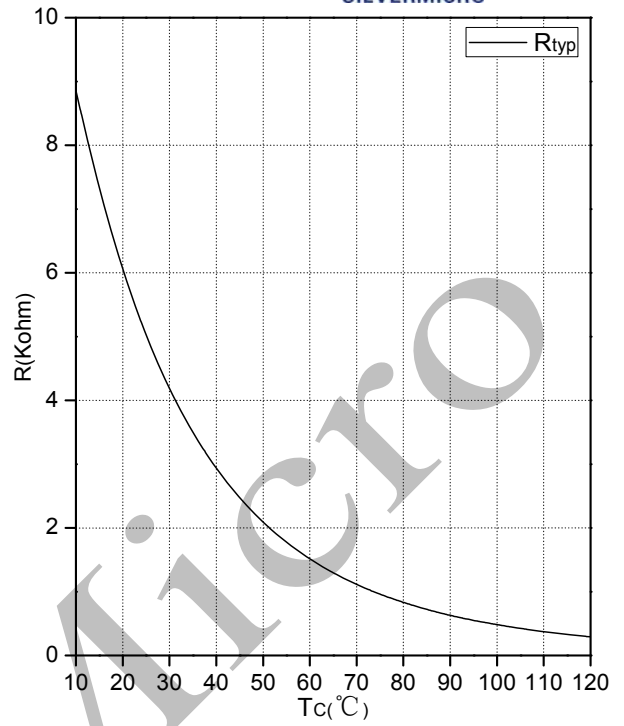
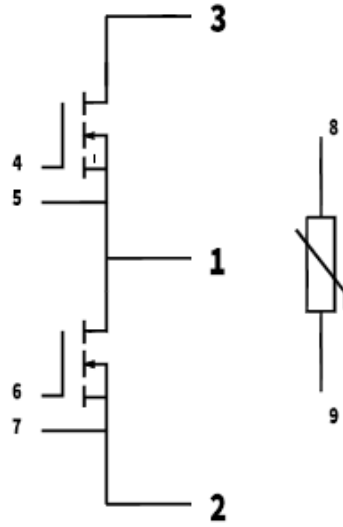
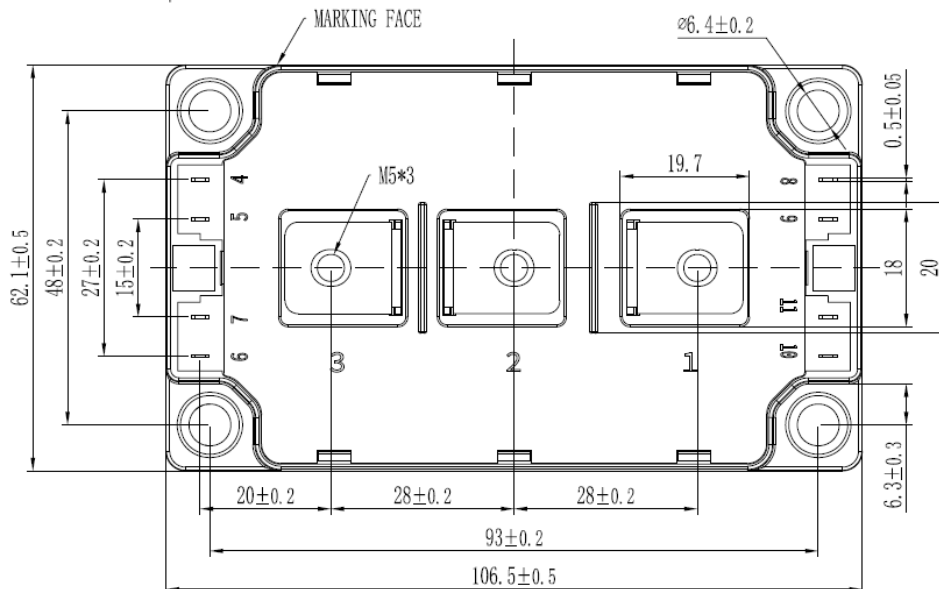
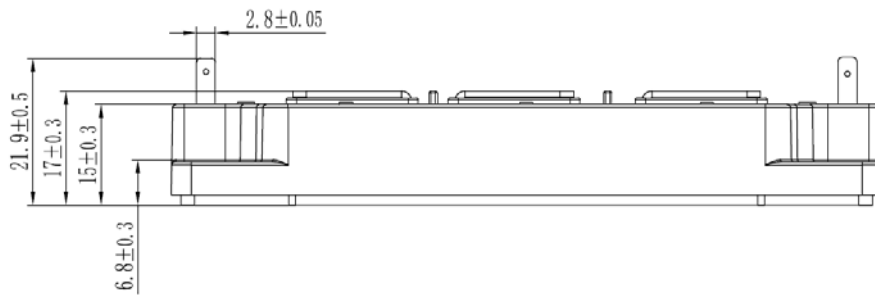


Fig.2 NTC Temperature Characteristics

Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
12/14/2017	01	Initial Release
01/24/2019	02	Add t _{SC} & L _{Stray}

Announcement

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