

# MSC300HF120T2NH

## SiC MOSFET Module

Preliminary Data

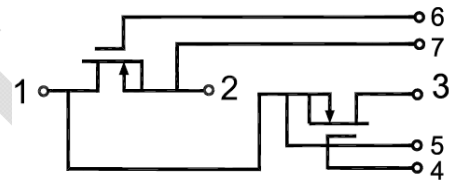
### Features:

- Low On-resistance
- Fast Switching Speed
- Fast Reverse Recovery
- Simple to Drive
- Easy of Parallel
- Copper Baseplate and Aluminum 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
$I_D$	Continuous Drain Current	$V_{GS}=18\text{V}, T_C=25^\circ\text{C}$	570	A
		$V_{GS}=18\text{V}, T_C=100^\circ\text{C}$	300	A
$I_{D(pluse)}$	Pulsed Drain Current	Pulse width $\leq 10\mu\text{s}$ , Duty Cycles $\leq 100\%$	1422	A
$I_S$	Continuous Source Current (body diode)	$T_J = 25^\circ\text{C}$	570	A
$I_{SM}$	Peak Source Current Repetitive	Pulse width $\leq 10\mu\text{s}$ , Duty Cycles $\leq 100\%$	1422	A
$P_D$	Power Dissipation	$T_C=25^\circ\text{C}, T_J=175^\circ\text{C}$	2500	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	$V_{GS}=0V, I_D=6mA$	1200			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = 10 V, I_D = 109.2mA$	2.7		5.6	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 1200V, V_{GS} = 0V$			60	$\mu A$
$I_{GSS+}$	Gate-Source Leakage Current	$V_{GS} = +22V, V_{DS} = 0V$			600	nA
$I_{GSS-}$	Gate-Source Leakage Current	$V_{GS} = -4V, V_{DS} = 0V$			-600	nA
$R_{DS(on)}$	On State Resistance	$V_{GS} = 18 V, I_{DS} = 216 A$ $T_J = 25^{\circ}C$		3.67	4.58	m $\Omega$
		$V_{GS} = 18 V, I_{DS} = 216 A,$ $T_J = 125^{\circ}C$		5.5		
$g_{fs}$	Transconductance	$V_{DS}=10 V, I_{DS} = 216 A$		85.2		S
$C_{iss}$	Input Capacitance	$V_{DS} = 800 V, f = 1MHz,$ $V_{GS} = 0V$		17.3		nF
$C_{oss}$	Output Capacitance			1.42		
$C_{rss}$	Reverse Transfer Capacitance			0.65		
$E_{on}$	Turn-On Switching Energy	$V_{DD} = 600 V, V_{GS} = 0V/+18V$ $I_D = 216A, R_G = 0 \Omega$ $L=250\mu H$		3.79		mJ
$E_{off}$	Turn-Off Switching Energy			1.46		
$R_{G(int)}$	Internal Gate Resistance	$f = 1MHz, \text{open drain}$		0.67		$\Omega$
$Q_{GS}$	Gate-Source Charge	$V_{DD}= 600 V, V_{GS} =18V,$ $I_D= 216A, R_L=17\Omega$		240		nC
$Q_{GD}$	Gate-Drain Charge			480		
$Q_G$	Total Gate Charge			1068		
$t_{d(on)}$	Turn-off delay time	$V_{DD} = 400V, V_{GS} = 0V/+18V,$ $I_D = 108 A, R_G = 0 \Omega,$ $R_L=22\Omega$		174		ns
$t_r$	Rise Time			264		
$t_{d(off)}$	Turn-off delay time			402		
$t_f$	Fall Time			168		
$R_{\theta JCM}$	Thermal Resistance Junction-To-Case for MOSFET			0.052		$^{\circ}C/W$

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{SD}$	Diode Forward Voltage	$I_S = 216\text{A}$ , $V_{GS} = 0\text{V}$ ; $T_J = 25^{\circ}\text{C}$		3.2		V
$t_{rr}$	Reverse Recovery Time	$I_F=216\text{A}$ $V_R=600\text{V}$ $di/dt=1100\text{A/us}$		168		ns
$Q_{rr}$	Reverse Recovery Charge			1050		nC
$I_{rrm}$	Peak Reverse Recovery Current			72		A

**Module**

Symbol	Description	Conditions	Min	Typ	Max	Unit
$T_{Jmax}$	Junction Temperature				175	$^{\circ}\text{C}$
$T_C, T_{STG}$	Case and Storage Temperature Range		-40		150	$^{\circ}\text{C}$
Viso	Case Isolation Voltage	AC, 50 HZ, 1 min	5.0			kV
$L_{Stray}$	Stray Inductance	Measured between terminals 2 and 3			14	nH
CTI	Comparative Tracking Index		200			V
G	Weight			300		g
M	Mounting Torque	To heatsink and terminal			5	N·m
	Clearance Distance	Terminal to terminal			12	mm
	Creepage Distance	Terminal to terminal			30	mm
		Terminal to baseplate			40	mm

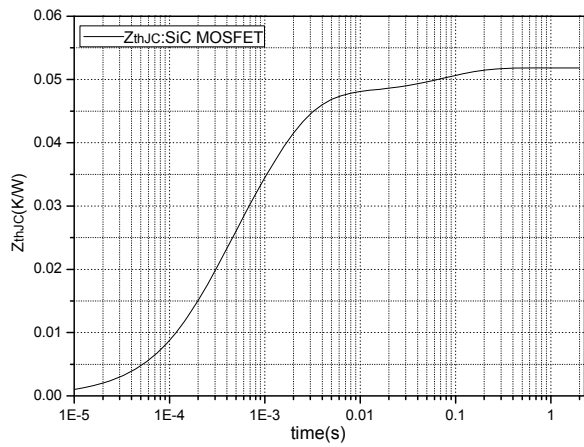
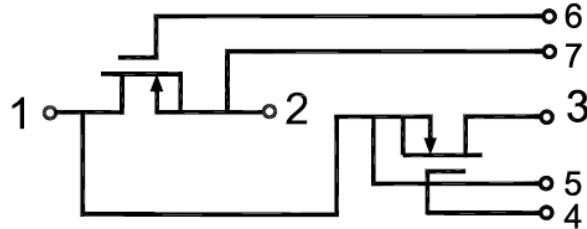


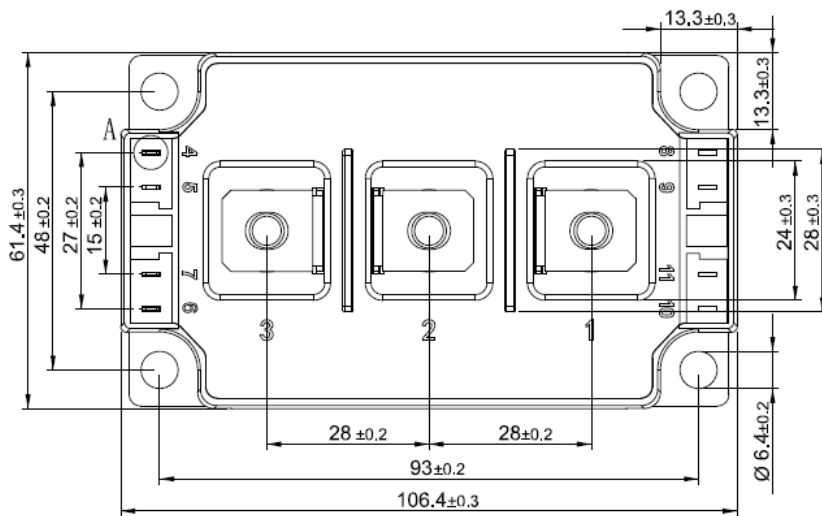
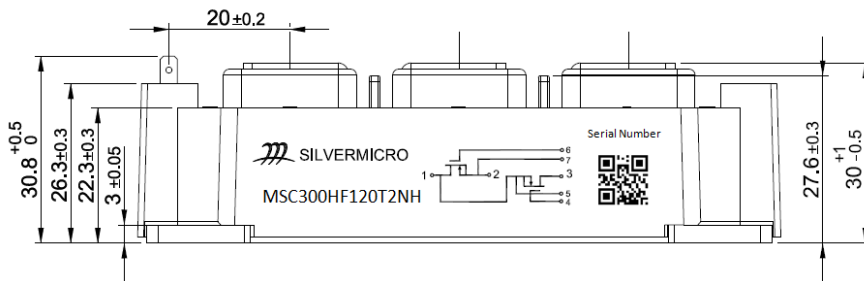
Fig.1 Transient Thermal Impedance (SiC MOSFET)

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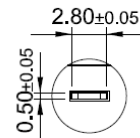
### Internal Circuit



### Package Outline (Unit: mm):



View A  
scale 3:1





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