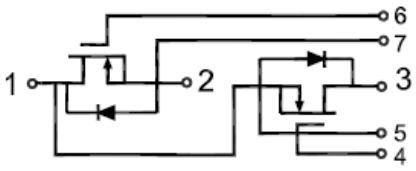
SILVERMICRO

MSC240HF120T2NH

SiC MOSFET Module

Features:

- Ultra Low Loss
- High-Frequency Operation
- Zero Reverse Recovery Current from Diode
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation
- Easy of Paralleling
- Copper Baseplate and Aluminum Nitride Insulator



Applications:

- UPS and SMPS
- Fast DC/DC Converter
- Solar and Wind Inverter
- Induction Heating/Welding

Absolute Maximum Ratings (T_C=25℃unless otherwise specified)

Symbol	Description	Conditions	Value	Unit
V_{DSmax}	Drain-Source Voltage		1200	V
V_{GSmax}	Gate-Source Voltage	Absolute Maximum Values	-10/+25	V
V_{GSop}	Gate-Source Voltage	Recommended Operational Values	-5/+20	V
I_D	Continuous Drain Current	V_{GS}=20V, T_C=25℃	360	A
		V_{GS}=20V, T_C=90℃	240	A
P_D	Power Dissipation	T_C = 25℃, T_{Jmax}=150℃	1340	W

Electrical Characteristics of MOSFET (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =10V, I_D =15mA, T_J =25℃		2.20		V
		V_{DS} =10V, I_D =15mA, T_J =125℃		1.65		V
$R_{DS(on)}$	On State Resistance	V_{GS} =20V, I_D =240A, T_J =25℃		6.0		mΩ
		V_{GS} =20V, I_D =240A, T_J =125℃		10.0		mΩ
g_{fs}	Transconductance	V_{DS} =20V, I_D =240A, T_J =25℃		90		S
		V_{DS} =20V, I_D =240A, T_J =125℃		78		S
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =1200V, V_{GS} =0V			1000	μA
I_{GSS}	Gate- Source Leakage Current	V_{DS} =0V, V_{GS} =20V			±1	μA
C_{iss}	Input Capacitance	V_{DS} =600V, V_{GS} =0V, f =1MHz, V_{AC} =25mV		11.4		nF
C_{oss}	Output Capacitance			1.5		nF
C_{rss}	Reverse Transfer Capacitance			66		pF

Switching Characteristics

Q_g	Total Gate Charge	V_{DD} =600V, I_D=240A, V_{GS} = -5/20V		590		nC
Q_{gs}	Gate-Source Charge			180		nC
Q_{gd}	Gate-Drain (Miller) Charge			222		nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}= 600V, I_D =240A, R_G= 4.7Ω, V_{GS}= -5/20V, Inductive Load, T_J=25 ℃		140		ns
t_r	Rise Time			85		ns
$t_{d(off)}$	Turn-off Delay Time			260		ns
t_f	Fall Time			120		ns
E_{on}	Turn-on Switching Energy Loss			3.1		mJ
E_{off}	Turn-off Switching Energy Loss			6.3		mJ
$t_{d(on)}$	Turn-on Delay Time	V_{DD}= 600V, I_D =240A, R_G= 4.7Ω, V_{GS}= -5/20V, Inductive Load, T_J=125 ℃		120		ns
t_r	Rise Time			110		ns
$t_{d(off)}$	Turn-off Delay Time			290		ns
t_f	Fall Time			120		ns

E_{on}	Turn-on Switching Energy Loss	V_{DD}= 600V, I_D =240A, R_G= 4.7Ω, V_{GS}= -5/20V, Inductive Load, T_J=125 ℃		2.5		mJ
E_{off}	Turn-off Switching Energy Loss			6.6		mJ
t_{SC}	Short Time	V_{DD}=700V,V_{GS}=15V, T_J=100℃	5			μs
$R_{\theta JC}$	MOSFET Thermal Resistance: Junction-To-Case			0.093		℃/W

Free-Wheeling SiC Schottky Diode Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_F	Forward Voltage	I_F = 240A	T_J = 25℃		1.8	2.0	V
			T_J = 125℃		2.3		
Q_C	Total Capacitive Charge	V_R=1200V, T_J = 25℃			776		μC
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.144		℃/W

Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
T_{Jmax}	Junction Temperature		-40		150	℃
Tc,T_{STG}	Case and Storage Temperature Range		-40		125	℃
Visol	Case Isolation Voltage	AC,50 Hz,1 min	5.0			kV
L_{Stray}	Stray Inductance	Measured between terminals 2 and 3			15	nH
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

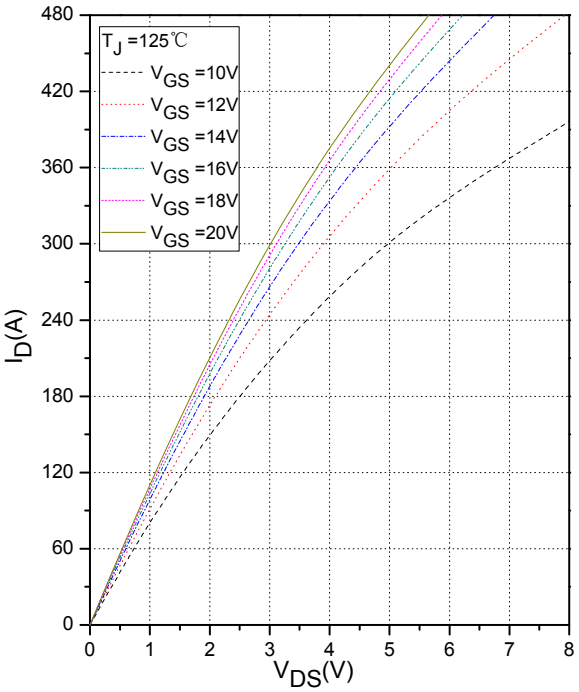


Fig.1 Typical Output Characteristics

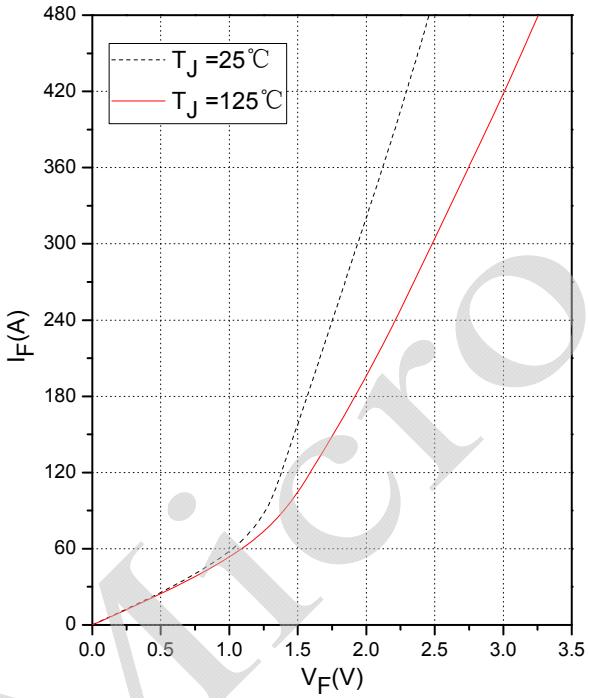


Fig.2 Forward Characteristics of Diode

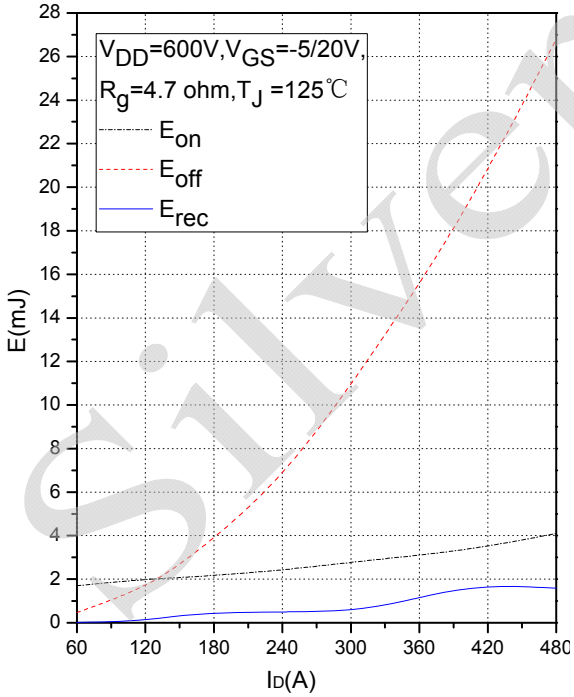


Fig.3 Typical Switching Loss vs. Drain Current

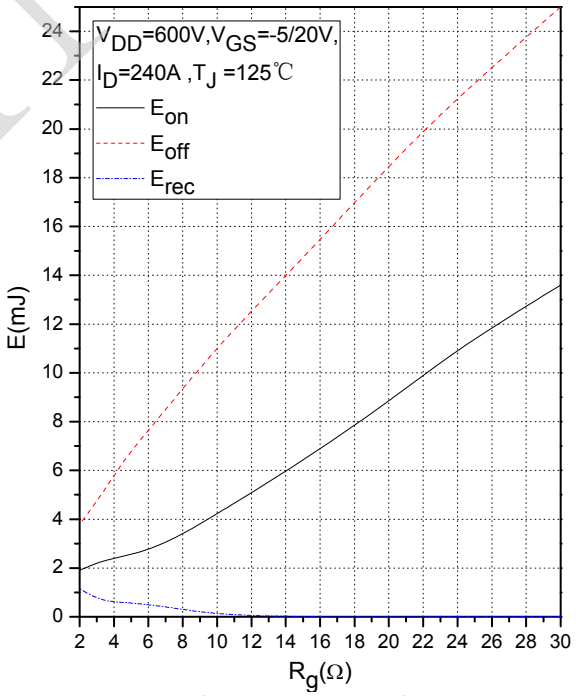
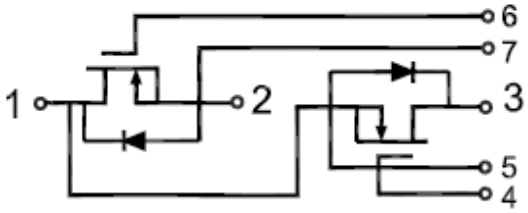
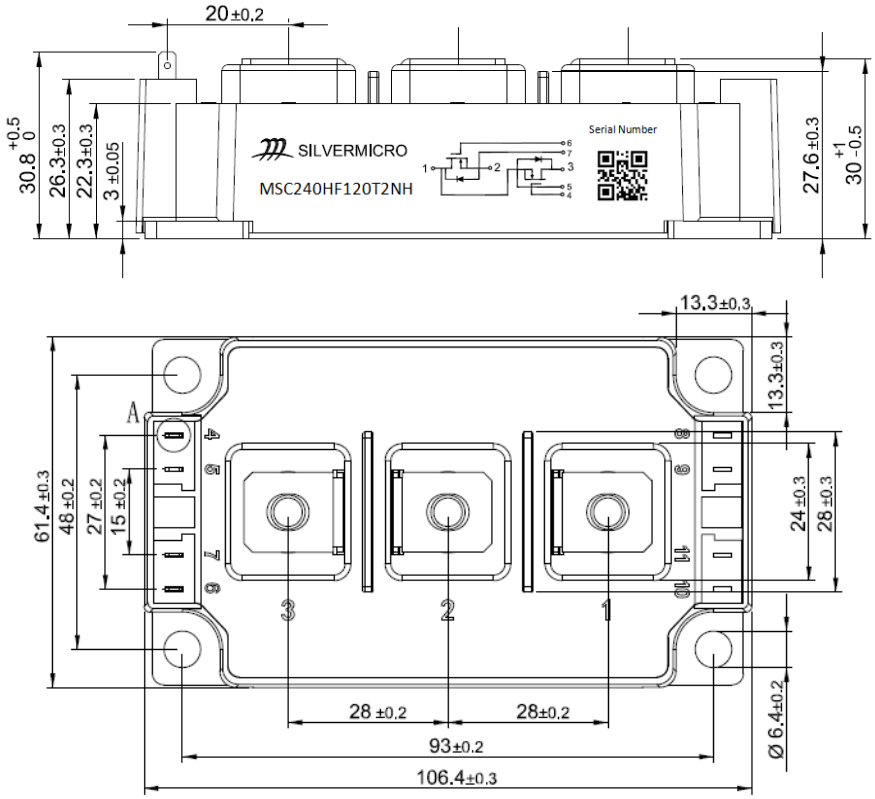


Fig.4 Typical Switching Loss vs. Drain Resistance

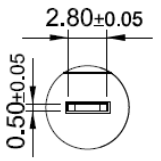
Internal Circuit



Package Outline (Unit: mm):



View A
scale 3:1



Date	Revision	Notes
12/27/2018	01	Initial Release
01/24/2019	02	Add t_{SC}

Announcement

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