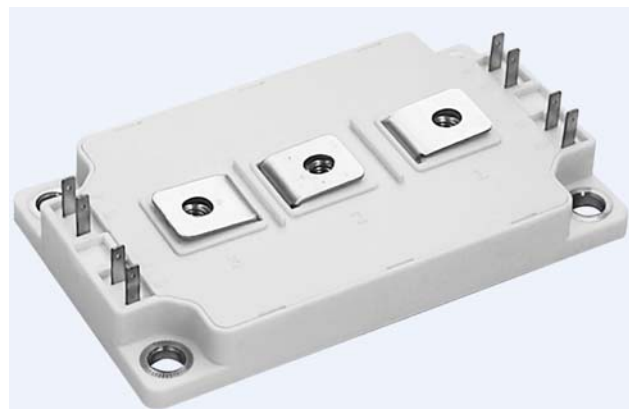


MSC240HF120T2LH

SiC MOSFET Module

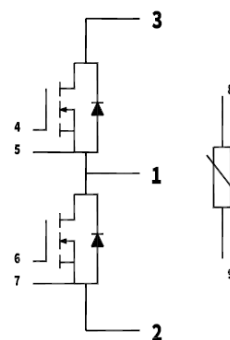
Features:

- Ultra Low Loss with SiC MOSFETs
- Zero Reverse Recovery Current with SiC SBDs
- Zero Turn-off Tail Current
- High-Frequency Operation
- Better EMI noise with low parasitic inductance
- Positive Temperature Coefficient on VDS(on)
- Cu baseplate with Si3N4 AMB DBC substrate
- Lead Free, Compliant with RoHS Requirement



Applications:

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



Maximum Rated Values ($T_C=25^{\circ}\text{C}$ 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	$V_{GS}=20\text{V}, T_C=25^{\circ}\text{C}$	360	A
		$V_{GS}=20\text{V}, T_C=90^{\circ}\text{C}$	240	A
P_D	Power Dissipation	$T_C = 25^{\circ}\text{C}, T_{Jmax}=150^{\circ}\text{C}$	1340	W

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = 10V, I_D = 15mA, T_J = 25^\circ\text{C}$		2.20		V
		$V_{DS} = 10V, I_D = 15mA, T_J = 125^\circ\text{C}$		1.65		V
$R_{DS(on)}$	On State Resistance	$V_{GS} = 20V, I_D = 240A, T_J = 25^\circ\text{C}$		6.0		m Ω
		$V_{GS} = 20V, I_D = 240A, T_J = 125^\circ\text{C}$		10.0		m Ω
g_{fs}	Transconductance	$V_{DS} = 20V, I_D = 240A, T_J = 25^\circ\text{C}$		90		S
		$V_{DS} = 20V, I_D = 240A, T_J = 125^\circ\text{C}$		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	$V_{DS} = 600V, V_{GS} = 0V, f = 1\text{MHz}, V_{AC} = 25\text{mV}$		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	$V_{DD} = 600V, I_D = 240A, R_G = 4.7\Omega, V_{GS} = -5/20V, \text{Inductive Load}, T_J = 25^\circ\text{C}$		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		$V_{DD} = 600V, I_D = 240A, R_G = 4.7\Omega, V_{GS} = -5/20V, \text{Inductive Load}, T_J = 125^\circ\text{C}$		120	
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			2.5		mJ
E_{off}	Turn-off Switching Energy Loss			6.6		mJ

t_{SC}	Short Time	$V_{DD}=700V, V_{GS}=15V, T_J=100^\circ C$	5			μs
$R_{\theta JC}$	MOSFET Thermal Resistance: Junction-To-Case			0.093		$^\circ C/W$

Maximum Rated Values of SiC Freewheeling SBDs ($T_C=25^\circ C$ unless otherwise specified)

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

Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{isol}	Isolation Voltage (All Terminals Shorted)	$f = 50Hz, 1minute$	2500			V
L_{Stray}	Stray Inductance	Measured between terminals 2 and 3			8.2	nH
T_J	Junction Temperature				150	$^\circ C$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		150	$^\circ C$
T_{stg}	Storage Temperature		-40		125	$^\circ C$
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.03		$^\circ C/W$
M	Power Terminals Screw:M5		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			270		g

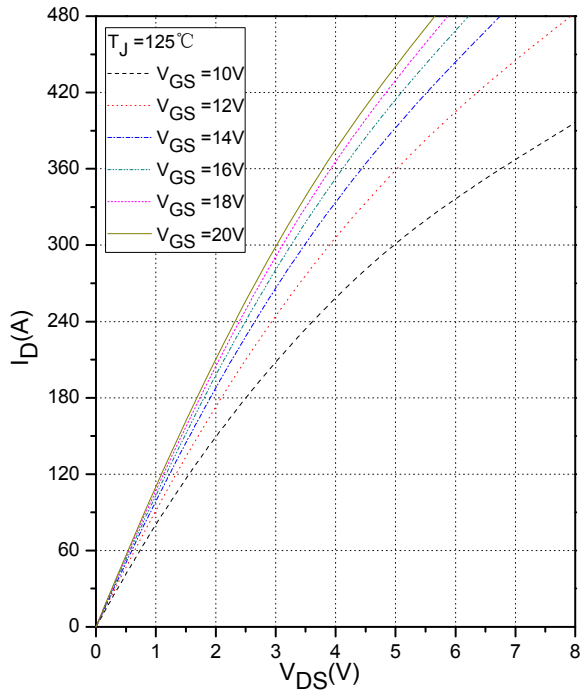


Fig.1 Typical Output Characteristics

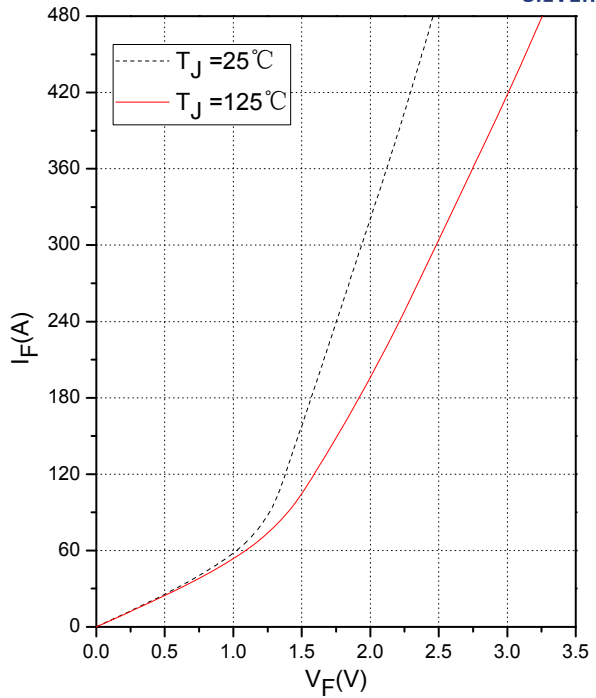


Fig.2 Forward Characteristics of Diode

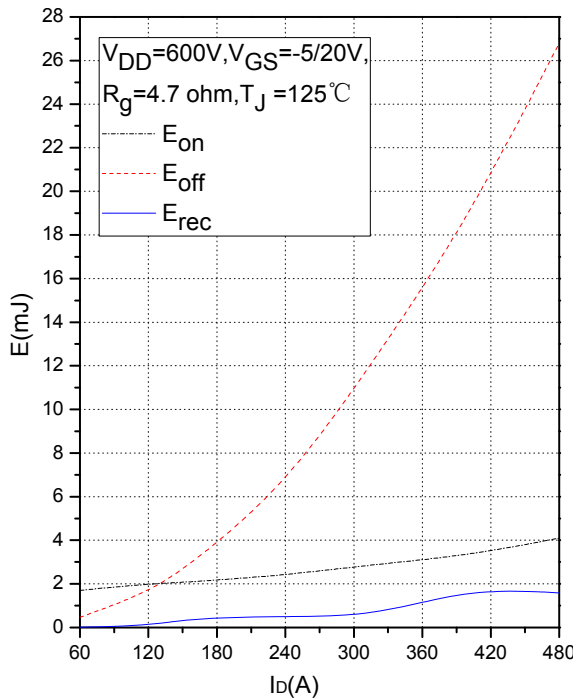


Fig.3 Typical Switching Loss vs. Drain Current

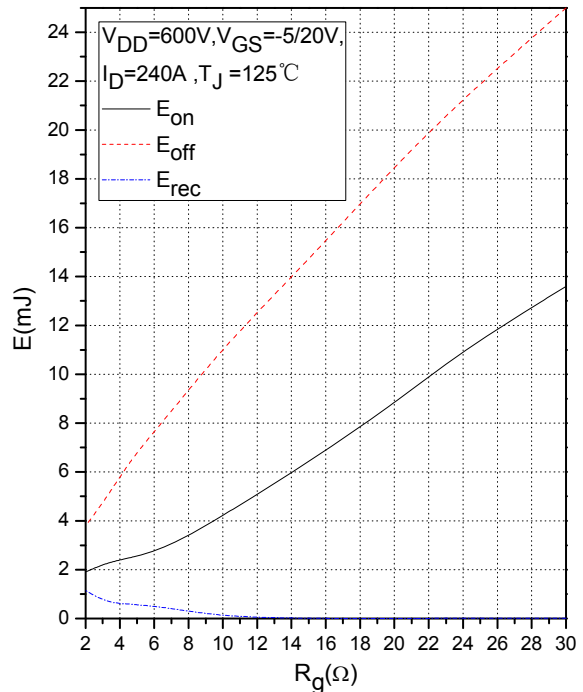
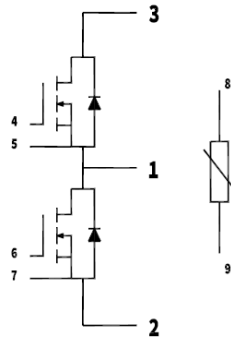
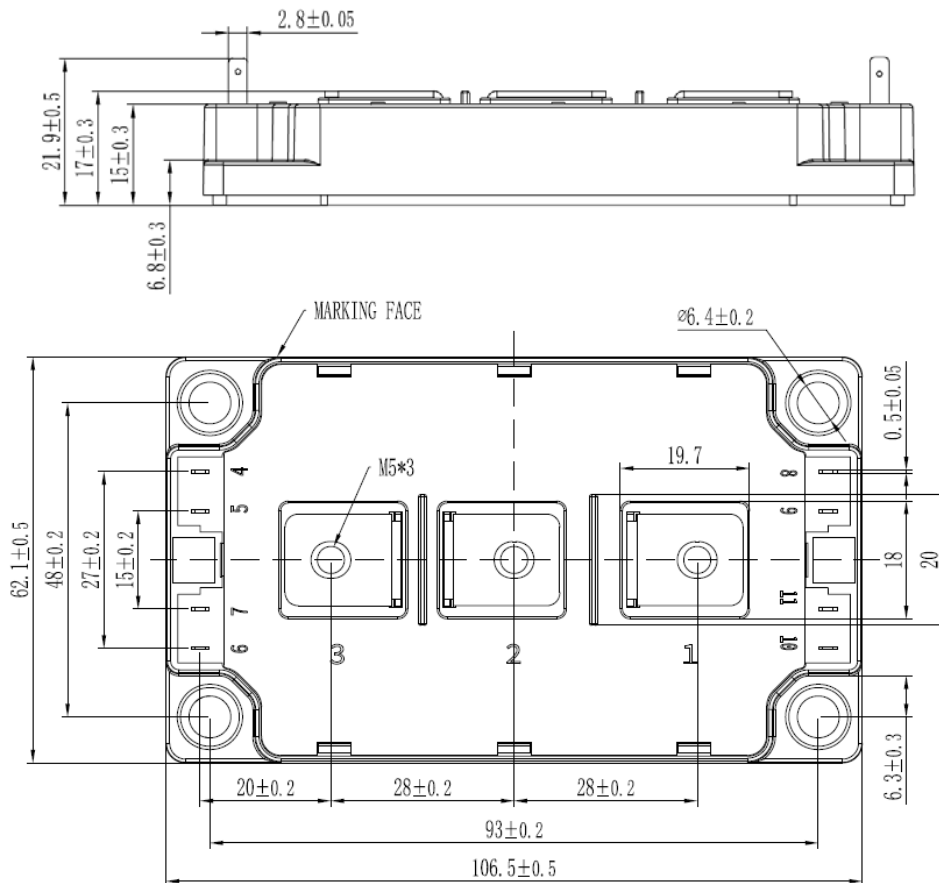


Fig.4 Typical Switching Loss vs. Gate Resistance

Internal Circuit:



Package Outline (Unit: mm):



Date	Revision	Notes
06/15/2017	01	Initial Release
01/24/2019	02	Add t _{SC} & L _{Stray}

Announcement

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