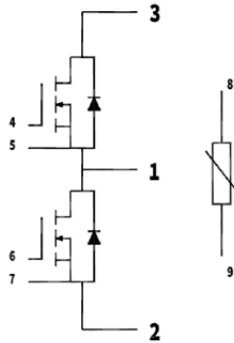


1200V 7mΩ SiC MOSFETs Half Bridge Module



Package: 62mm x 106mm x 17mm



Features

- Ultra Low Loss with SiC MOSFETs
- Zero Reverse Recovery Current with SiC SBDs
- Zero Turn-off Tail Current
- High-Frequency Operation
- Positive Temperature Coefficient on VDS(on)
- Cu baseplate with Si₃N₄ AMB DBC substrate

Applications

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

Benefits

- Outstanding performance at high frequency operation
- Low switching losses
- Better EMI noise with low parasitic inductance
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_c of R_{DS_ON}
- RoHS Compliant

Absolute Maximum Ratings (T_j=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Specifications	Units
Drain - Source Voltage	V _{DS}		1200	V
Continuous Drain Current	I _D	V _{GS} =20V, T _C = 25 °C	360	A
		V _{GS} =20V, T _C = 90 °C	240	A
Gate - Source Voltage	V _{GS}		+25/-10	V
Pulsed Drain Current	I _{DS}	Limited by T _{j_max}	960	A
Maximum Power Dissipation	P _D	T _C = 25 °C	1000	W
		T _C = 100 °C	TBD	W
Operating Junction Temperature	T _j		-55 ~ 150	°C
Storage Temperature	T _{STG}		-55 ~ 125	°C
Solder Temperature	T _L	Max for 10 sec	260	°C

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OFF						
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1200\text{V}, V_{GS} = 0\text{V}$	--	250	1000	μA
Gate-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = 20\text{V}$	--	--	± 1	μA
ON						
Gate-Source Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, T_j = 25^{\circ}\text{C}$	2.4	2.8	--	V
		$V_{DS} = 10\text{V}, I_D = 10\text{mA}, T_j = 150^{\circ}\text{C}$	--	2.0	--	
On State Resistance	$R_{DS(ON)}$	$V_{GS} = 20\text{V}, I_D = 240\text{A}, T_j = 25^{\circ}\text{C}$	--	7	7.3	$\text{m}\Omega$
		$V_{GS} = 20\text{V}, I_D = 240\text{A}, T_j = 150^{\circ}\text{C}$	--	13	--	$\text{m}\Omega$
Transconductance	g_{fs}	$V_{DS} = 20\text{V}, I_D = 240\text{A}, T_j = 25^{\circ}\text{C}$	--	90	--	S
		$V_{DS} = 20\text{V}, I_D = 240\text{A}, T_j = 150^{\circ}\text{C}$	--	78	--	
DYNAMIC						
Input Capacitance	C_{ISS}	$V_{DS} = 600\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}, V_{AC} = 25\text{mV}$	--	11.4	--	nF
Output Capacitance	C_{OSS}		--	1.5	--	nF
Reverse Transfer Capacitance	C_{RSS}		--	66	--	pF
Internal Gate Resistance	$R_{G(INT)}$	$f = 1\text{MHz}, V_{AC} = 25\text{mV}$	--	0.3	--	Ω
External Gate Resistance	$R_{G(EXT)}$		--	TBD	--	Ω
Module Stray Inductance	L_{σ}	Between terminal 2 and 3	--	8.2	--	nH
Module Lead Resistance	R_{mod}		--	TBD	--	$\text{m}\Omega$
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 600\text{V}, I_D = 240\text{A}$ $R_G = 2.5\Omega, V_{GS} = -5/20\text{V}$ Inductive Load, $T_j = 25^{\circ}\text{C}$	--	25	--	ns
Rise Time	t_r		--	63	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	36	--	ns
Fall Time	t_f		--	42	--	ns
Turn-On Switching Energy Loss	E_{ON}		--	TBD	--	mJ
Turn-Off Switching Energy Loss	E_{OFF}		--	TBD	--	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 600\text{V}, I_D = 240\text{A}$ $R_G = 2.5\Omega, V_{GS} = -5/20\text{V}$ Inductive Load, $T_j = 150^{\circ}\text{C}$	--	TBD	--	ns
Rise Time	t_r		--	TBD	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	TBD	--	ns
Fall Time	t_f		--	TBD	--	ns
Turn-On Switching Energy Loss	E_{ON}		--	TBD	--	mJ
Turn-Off Switching Energy Loss	E_{OFF}		--	TBD	--	mJ
Total Gate Charge	Q_G	$V_{DD} = 600\text{V}, I_D = 240\text{A}$ $V_{GS} = -5/20\text{V}$	--	690	--	nC
Gate-Source Charge	Q_{GS}		--	180	--	nC
Gate-Drain Charge	Q_{GD}		--	222	--	nC

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

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_J=25^\circ\text{C}$	1200	V
Diode Continuous Forward Current	I_F	$T_C=100^\circ\text{C}$, $T_J=150^\circ\text{C}$	200	A
Surge Non-repetitive Forward Current	$I_{F,SM}$	$T_C=100^\circ\text{C}$, $t_p=8.3$ ms sine half wave	800	A

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
DC Blocking Voltage	V_R	$I_R=100$ μA	1200			V
Forward Voltage	V_F	$I_F=240\text{A}$, $V_{GE}=0\text{V}$	$T_J=25^\circ\text{C}$	1.8	2.0	V
			$T_J=150^\circ\text{C}$	2.3		
Total Capacitive Charge	Q_C	$V_R=1200\text{V}$		776		nC

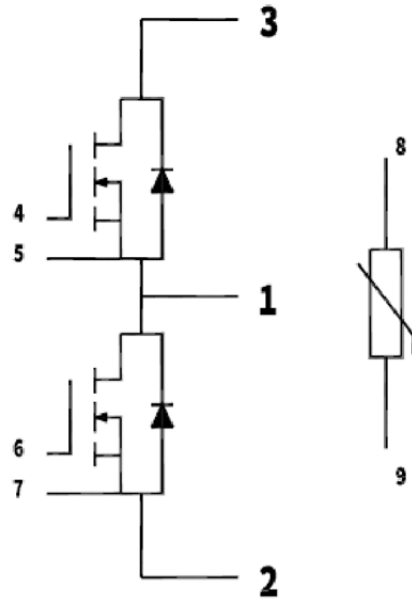
Thermal Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
MOSFET Thermal Resistance: Junction-To-Case	$R_{\theta JCM}$	$T_C=90^\circ\text{C}$, $PD=150$ W		0.072	0.11	$^\circ\text{C/W}$
Diode Thermal Resistance: Junction-To-Case	$R_{\theta JCD}$	$T_C=90^\circ\text{C}$, $PD=130$ W		0.08	0.118	$^\circ\text{C/W}$

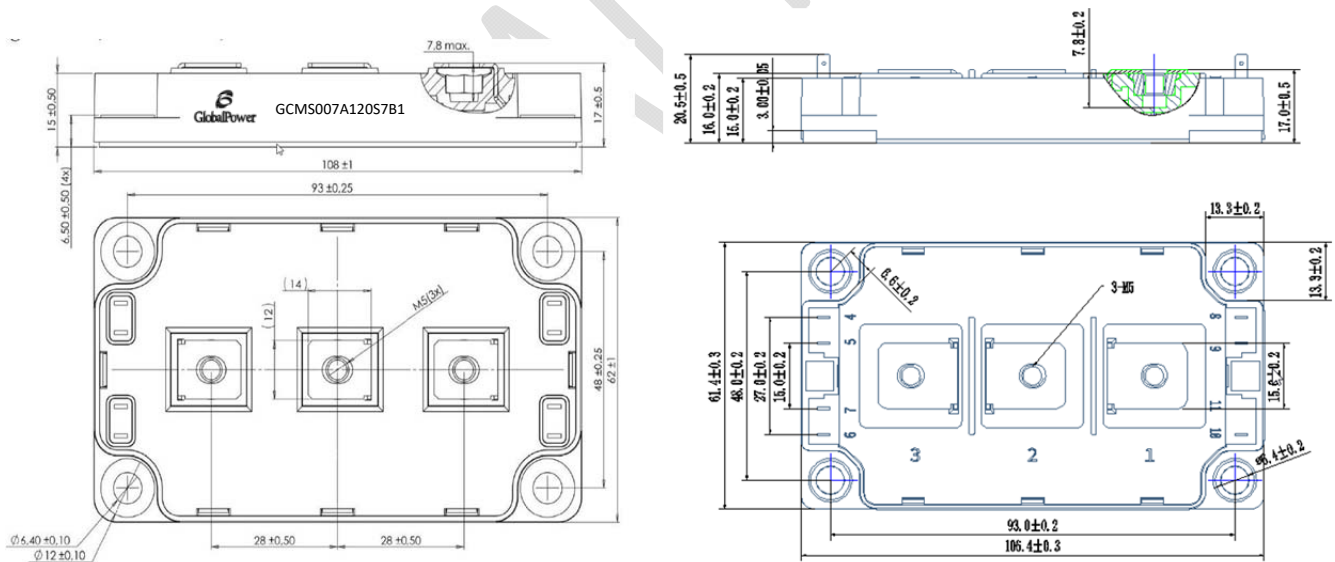
Module Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Mounting Torque	M_d				5	N-m
Clearance		Terminal to terminal		12		mm
Package Weight	W_t			250		g
Isolation Voltage	V_{ISOL}	$I_{ISOL} < 1\text{mA}$, 50/60Hz, $t=1$ min			2500	V

Internal Circuit:



Preliminary Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
03/04/2016	0.1	Initial release
10/05/2016	0.2	Revised the substrate material and other electrical parameters

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Notes

- RoHS Compliance**
The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.
- REACH Compliance**
REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACH SVHC Declaration.
REACH banned substance information (REACH Article 67) is also available upon request.
- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.
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