HestiaPower

P1M120HB007P66

Full Silicon Carbide Half-Bridge Power Module
N-CHANNEL ENHANCEMENT MODE

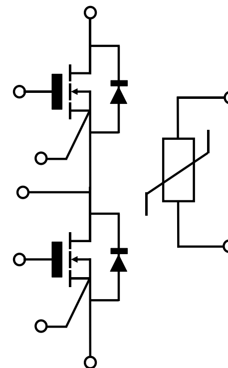
Product Summary

V_{DS}	1200V
$I_{D(@25^{\circ}C)}$	300A
$R_{DS(on)}$	7mΩ

Features

- Low On-Resistance and High Current Density
- Low Capacitance for High Frequency Operation
- Ease of Temperature Sensing by Embedded NTC
- Positive Temperature Coefficient Device
- RoHS Compliant and Halogen Free
- Copper Baseplate and AlN-AMB Insulator

Product Overview



Benefits

- Higher System Efficiency
- Increase Parallel Device Convenience
- Temperature Independent Switching Behavior
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems

Applications

- Induction Heating
- DC/DC Converter
- Motion/Servo Control
- UPS and SMPS
- Solar/Wind Renewable Energy

Description

P1M120HB007P66 1200V, 7mΩ SiC power module is a full SiC half-bridge power module that implementing N-channel e-mode SiC MOSFETs. Exploiting the outstanding wide bandgap material properties, this module shows better current density and switching behavior (tail-current-free & temperature independent dynamic performance) compared to conventional Si IGBT modules.

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

SiC MOSFET

Parameter	Symbol	Test Conditions	Value	Unit
Drain – Source Voltage	$V_{DS, max}$	V_{GS}=0V, I_D=500μA	1200	V
Continuous Drain Current	I_D	V_{GS}=20V, T_C=25°C	300*	A
		V_{GS}=20V, T_C=75°C	200*	
Pulse Drain Current	$I_{D, pulse}$	t_{PW}=200μs	900*	
Power Dissipation	P_D	T_C=25°C	806*	W
Recommend Gate Source Voltage	$V_{GS, op}$	Static, recommended DC operating values	-5 to 20	V
Maximum Gate Source Voltage	$V_{GS, max}$	Transient operating limit (AC f > 1Hz, duty cycle < 1%)	-10 to 25	

SiC MOSFET Electrical Characteristics (T$_c$ = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=500uA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=10V, I_D=180mA		3.0		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V		<5	450	μA
		V_{DS}=1200V, V_{GS}=0V T_j=175°C		100	1500	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=20V, V_{DS}=0V			1	uA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=20V, I_D=180A		7	9	mΩ
		V_{GS}=20V, I_D=180A, T_j=175°C		12		
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=800V f =1MHz, V_{AC}=25mV		20*		nF
Output Capacitance	C_{oss}			1.0*		
Reverse Transfer Capacitance	C_{rss}			0.17*		
Effective Output Capacitance, Energy Related	$C_{o(er)}$	V_{GS}=0V, V_{DS}=0 to 800V		1.35*		
Effective Output Capacitance, Time Related	$C_{o(tr)}$	I_D=const., V_{GS}=0V, V_{DS}=0 to 800V		1.90*		
Turn On Delay Time	$t_{d(on)}$	V_{DS}=800V, V_{GS}=-4/20V, I_D=180A, R_L=4.4Ω, $R_{G(ext)}$= 0.3 Ω		40*		ns
Rise Time	t_r			39*		
Turn Off Delay Time	$t_{d(off)}$			35*		
Fall Time	t_f			24*		
C_{oss} Stored Energy	E_{oss}	V_{GS}=0V, V_{DS}=800V f =1MHz, V_{AC}=25mV		423*		μJ
Turn-on Switching Energy	E_{on}	V_{DS}=800V, V_{GS}=0/20V, I_D=180A, $R_{G(ext)}$= 0.3 Ω		567**		
Turn-off Switching Energy	E_{off}			621**		
Internal Gate Resistance	$R_{G(int.)}$	f =1MHz, V_{AC}=25mV		0.13*		Ω
Gate to Source Charge	Q_{GS}	V_{DS}=800V, V_{GS}=-5/+20V, I_D=180A		261*		nC
Gate to Drain Charge	Q_{GD}			576*		
Total Gate Charge	Q_G			1161*		
Gate plateau voltage	V_{pl}			7*		V

Built-in SiC Diode Electrical Characteristics (T$_c$ = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Typ.	Unit
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=150A	4.7	V
Continuous Diode Forward Current	I_S	V_{GS}=0V, T_C=25°C	185*	A
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_{SD}=180A, V_{DS}=400V, di/dt=300A/μs	513*	ns
Reverse Recovery Charge	Q_{rr}		981*	nC
Peak Reverse Recovery Current	I_{rrm}		31.5*	A

* By estimation.
** Based on the results of calculation, note that the energy loss caused by the reverse recovery of free-wheeling diode is not included in E_{on}.

Thermal Characteristics (T_c = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Value	Unit
Max Junction Temperature	T_{Jmax}		175	°C
Operating Temperature	T_{Jop}		-55~175	
Storage Temperature	T_{stg}		-55~175	
Thermal Resistance, Junction to Case	$R_{th_(j-c)}$	JESD51-14	186	°C/kW

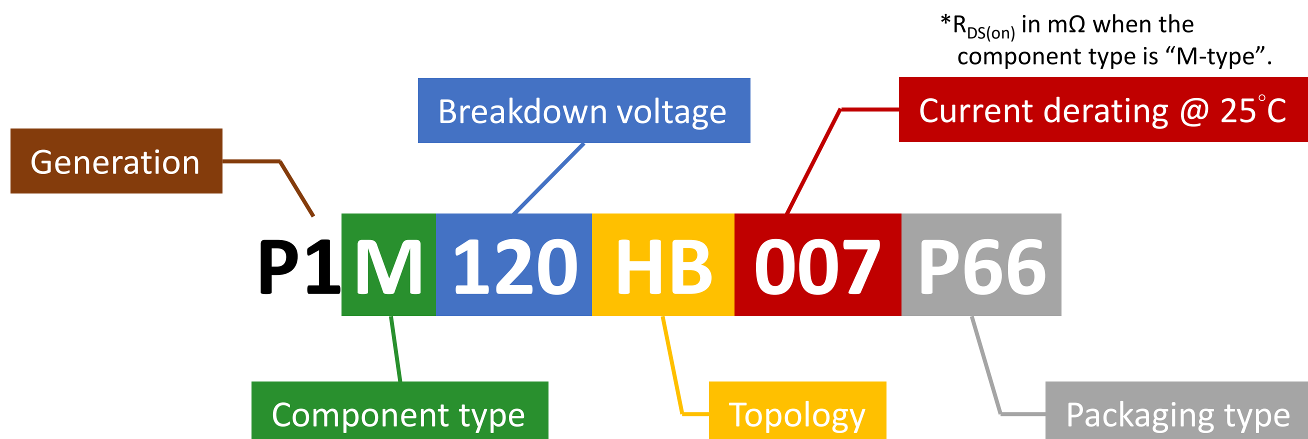
NTC Characteristics

Parameter	Symbol	Test Conditions	Value	Unit
Resistance	R_{25}	T_C =25°C	5	kΩ
B-value	B_{25_150}	R_2= R_{25} exp [B_{25_150}(1/T_2 -1/(298.15K))]	3380	K

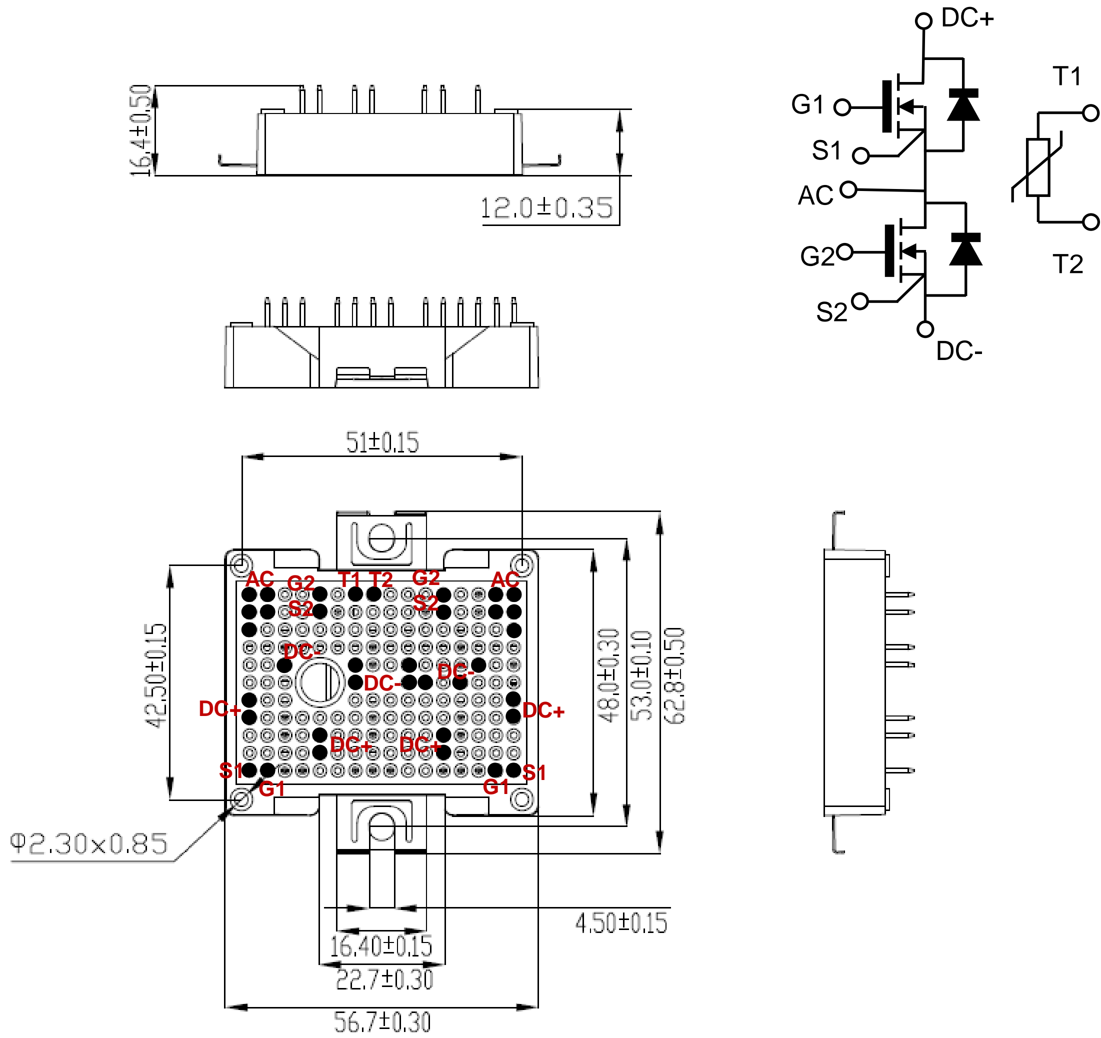
Mechanical Characteristics

Parameter	Symbol	Test Conditions	Value	Unit
Isolation Breakdown Voltage	V_{iso}	AC, 50Hz (R.M.S), t=1minute	3000	V
Comparative Tracking Index	CTI		>200	-
Mounting Torque	τ_{tc}	Recommended (M6 screw)	3~5	Nm
Weight	W		25	g

Naming Rule



Package Dimensions



Notes

- The information provided herein is subject to change without notice.
- For other information that does not show on this datasheet, please contact us for inquiry.