

S1P01R120HBG-B



1200V / 1000A All-Silicon Carbide MOSFET Half-Bridge Module

Features

Electrical features

$V_{DSS} = 1200V$

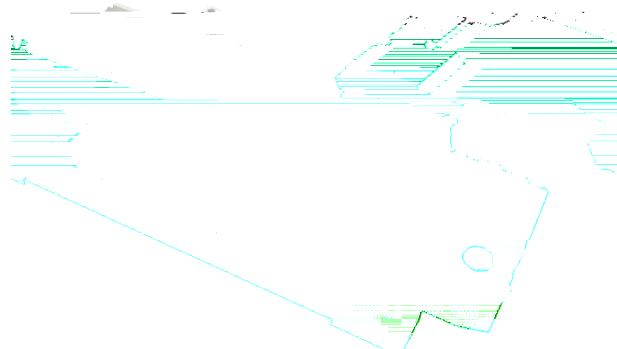
$I_D \text{ nom} = 1000A$

High-speed Switching Possible

High Power Density

High Frequency Operation

Ultra-low Losses



Applications

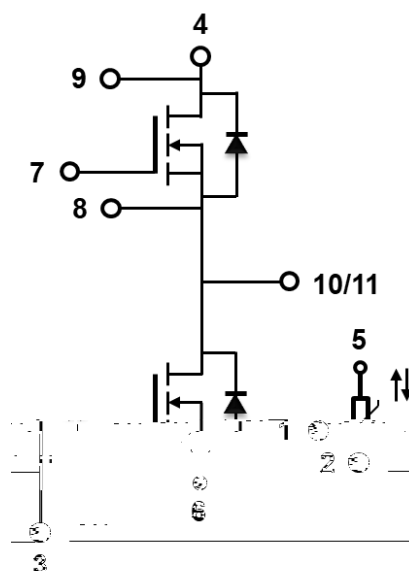
Motor drives

High power converters

Photovoltaics, wind power generation

Induction heating equipment

Electrified vehicle traction inverter



1 Maximum ratings

Table 1 Maximum rating ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DS, \max}$	Drain source voltage	1200	V	$V_{GS} = 0\text{V}$, $I_D = 100\ \mu\text{A}$	

V_{GS}

3 Electrical characteristics

Table 4 SiC MOSFET characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-source breakdown voltage	1200	-	-	V	$V_{GS} = 0V, I_D = 100\mu A$	
$V_{GS(th)}$	Gate threshold voltage	2.3	2.8	4.0	V	$V_{DS} = V_{GS}, I_D = 280mA$	
		-	2.0	-	V	$V_{DS} = V_{GS}, I_D = 280mA, T_J = 175^\circ C$	
I_{DSS}	Zero gate voltage drain current	-	10	100	μA	$V_{DS} = 1200V, V_{GS} = 0V$	
I_{GSS}	Gate source leakage current	-	-	500	nA	$V_{GS} = 18V, V_{DS} = 0V$	
$R_{DS(on)}$	Current drain-source on-state resistance	-	1.3	1.8	m Ω	$V_{GS} = 18V, I_D = 1000A$	Figure 4
		-	2.1	-		$V_{GS} = 18V, I_D = 1000A, T_J = 175^\circ C$	
g_{fs}	Transconductance	-	710	-	S	$V_{DS} = 20V, I_D = 1000A$	Figure 3
		-	630	-		$V_{DS} = 20V, I_D = 1000A, T_J = 175^\circ C$	
$R_{g,int}$	Internal gate resistance	-	1.1	-	Ω	$V_{AC} = 25mV, f = 1MHz, \text{open drain}$	
C_{iss}	Input capacitance	-	54.7	-	nF	$V_{DS} = 1000V, V_{GS} = 0V, T_J = 25^\circ C, V_{AC} = 25mV, f = 100KHz$	Figure 6
C_{oss}	Output capacitance	-	23.5	-			
C_{rss}	Reverse capacitance	-	1.5	-			
Q_{gs}	Gate source charge	-	540	-	nC	$V_{DS} = 800V, V_{GS} = -4/+18V, I_D = 1000A$	
Q_{gd}	Gate drain charge	-	450	-			
Q_g	Gate charge	-	2300	-			
E_{on}	Turn on switching energy	-	116.7	-	mJ	$V_{DS} = 800V, V_{GS} = -4/+18V, I_D = 1000A, R_g = 8.5\Omega, L = 20\mu H$	Figure9
E_{off}	Turn off switching energy	-	248.5	-			

S1P01R120HBG-B



1200V SiC Power MOSFET Module

Table 5 Body diode characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V _{SD}	Diode forward voltage	-	4.0	-	V	V _{GS} = -4V, I _{SD} = 500A	Figure 7
		-	3.5	-	V	V _{GS} = -4V, I _{SD} = 500A T _J = 175°C	
I _S	Continuous diode forward current	-	560	-	A	V _{GS} = -4V, Tc = 25°C	
t _{rr}	Reverse recovery time	-	106	-	ns	V _R = 800V, V _{GS} = -4V I _D = 1000A di/dt=1000A/us	
Q _{rr}	Reverse recovery charge	-	11.0	-	C		
I _{rrm}	Peak reverse recovery current	-	1085	-	A		

Table 6 NTC-Thermistor Characteristic

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
R ₂₅	Rate Resistance	-	5	-	kΩ	Tc=25	
ΔR/R	Deviation of R ₁₀₀	-5	-	5	%	Tc=100 , R ₁₀₀ =489Ω	
P ₂₅	Power Dissipation	-	-	60.0	mW	Tc=25	
B _{25/50}	B-value	-	3380	3414	K	R2=R ₂₅ exp[B _{25/50} (1/T2 – 1/T1)]	

4 Electrical characteristic diagram

Figure 1. Output Characteristic, $T_{vj}=25$

Figure 2. Output Characteristic, $T_{vj}=175$

Figure 3. Transfer Characteristic

Figure 4. On-resistance VS. Junction Temperature

Figure 5. On-resistance VS. Drain to Source Current

Figure 6. Capacitance VS. V_{DS}

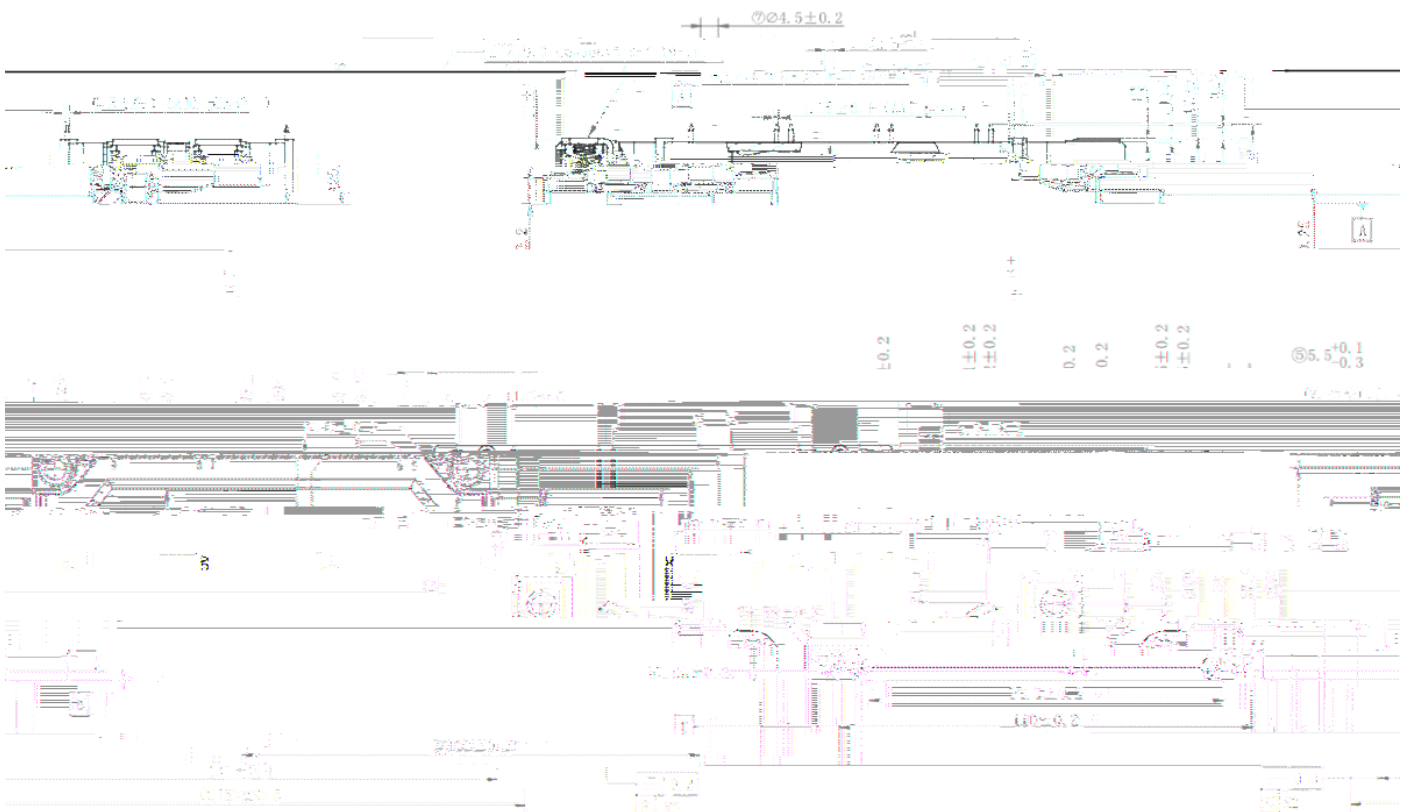
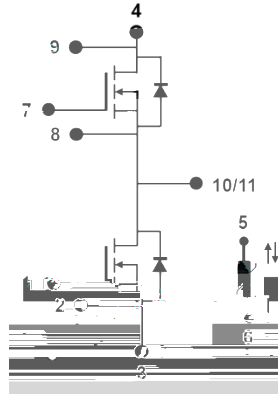
Figure 7. 3rd Quadrant Characteristic

S1P01R120HBG-B



1200V SiC Power MOSFET Module

5 Package drawing



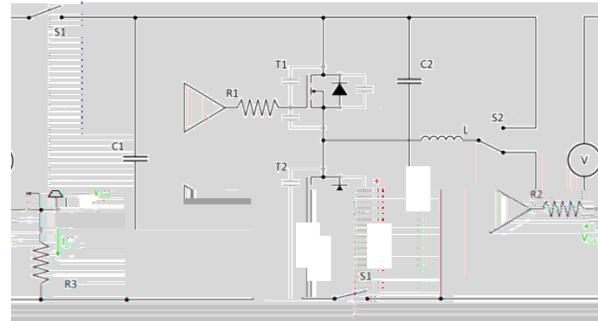
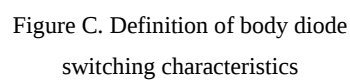


Figure B. Dynamic test circuit



Revision history

Document version	Date of release	Description of changes	
V01_00	2025-06-03		

Attention

1. 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 January 2, 2013.

2. 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 a Sichain representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

3. With respect to information regarding the application of the product, Sichain hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

4. Any information given in this documents subject to customer's compliance with its obligations and any applicable legal requirements, norms and standards concerning any use of the product of Sichain in any customer's applications.

5. Specifications of any and all products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment.

6.

