

S1P01R120HBG-B



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

Features

Electrical features

$V_{DSS} = 1200V$

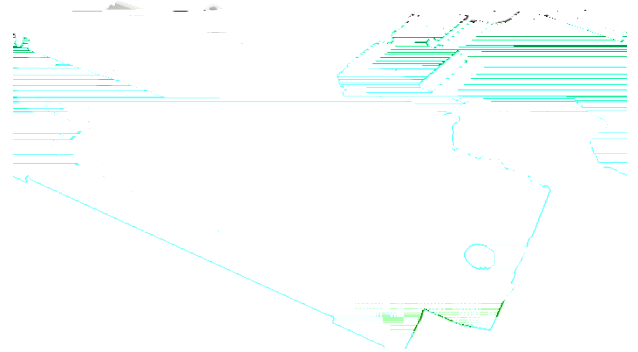
$I_D \text{ nom} = 1000A$

High-speed Switching Possible

High Power Density

High Frequency Operation

Ultra-low Losses



Applications

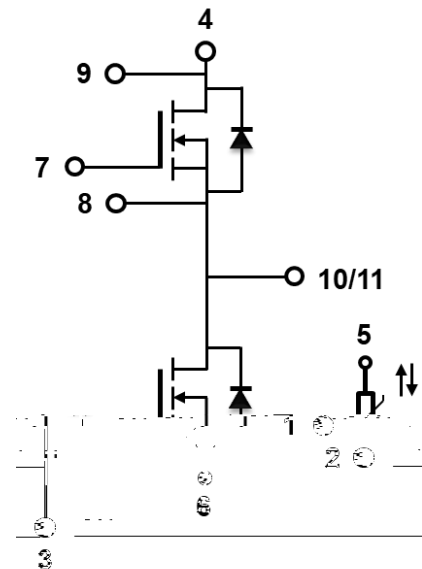
Motor drives

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 ($T_c = 25^\circ\text{C}$ 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	$V_{DS} = V_{GS}, I_D = 280mA,$ $T_J = 175^\circ\text{C}$	
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	$V_{GS} = 18V, I_D = 1000A$	Figure 4
		-	2.1	-		$V_{GS} = 18V, I_D = 1000A,$ $T_J = 175^\circ\text{C}$	
g_{fs}	Transconductance	-	710	-	S	$V_{DS} = 20V, I_D = 1000A$	Figure 3
		-	630	-		$V_{DS} = 20V, I_D = 1000A,$ $T_J = 175^\circ\text{C}$	
$R_{g,int}$	Internal gate resistance	-	1.1	-		$V_{AC} = 25mV, f = 1MHz,$ open drain	
C_{iss}	Input capacitance	-	54.7	-	nF	$V_{DS} = 1000V, V_{GS} = 0V$ $T_J = 25^\circ\text{C}, V_{AC} = 25mV$ $f = 100KHz$	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	-			

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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	-	k	Tc=25	
R/R	Deviation of R ₁₀₀	-5	-	5	%	Tc=100 , R ₁₀₀ =489	
P ₂₅	Power Dissipation	-	-	60.0	mW	Tc=25	
B _{25/50}	B-value	-	3380	3414	K	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ - 1/T ₁)]	

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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}

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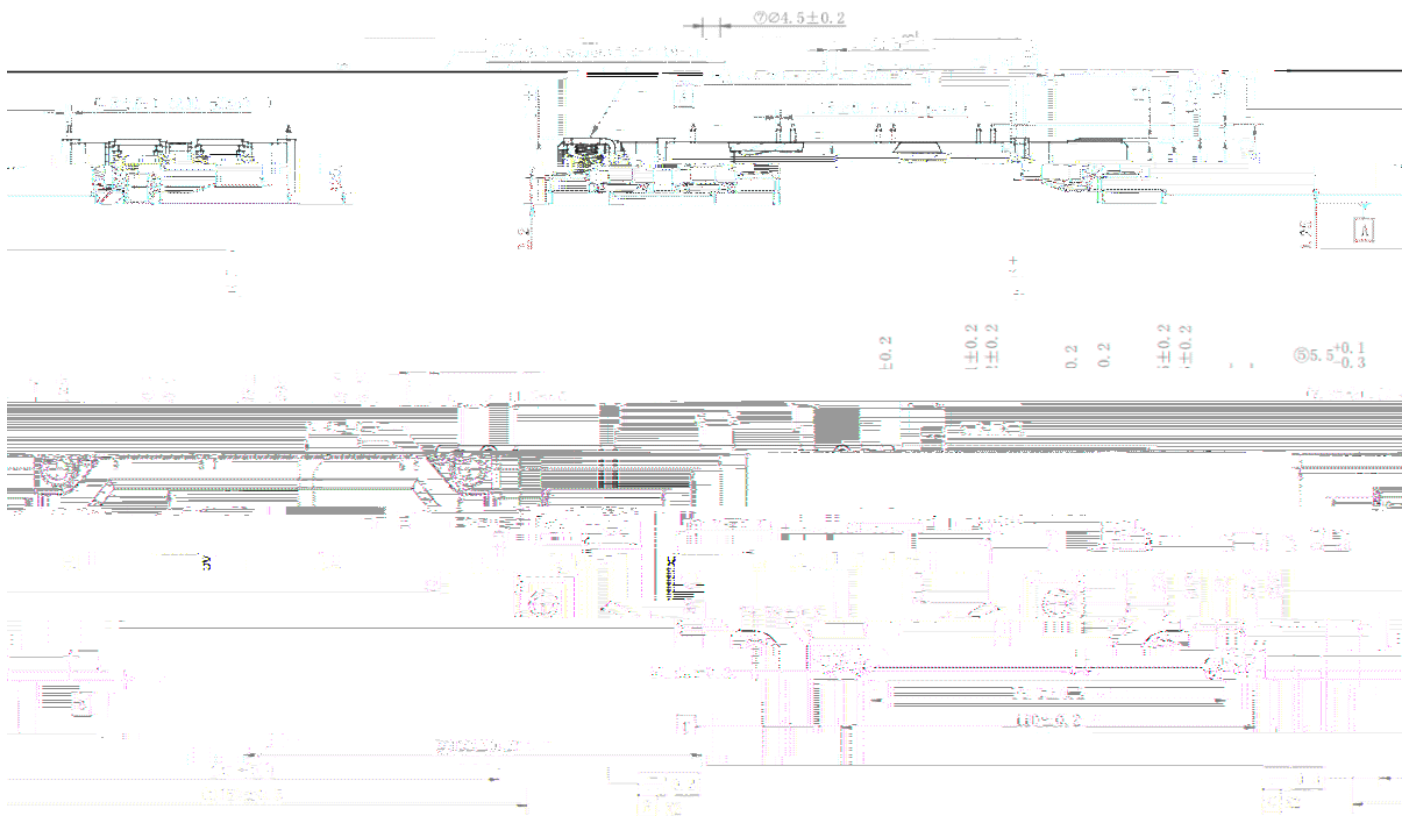
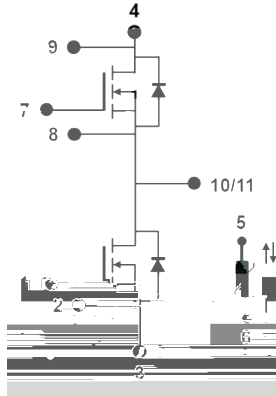
Figure 7. 3rd Quadrant Characteristic

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5 Package drawing



6 Test conditions

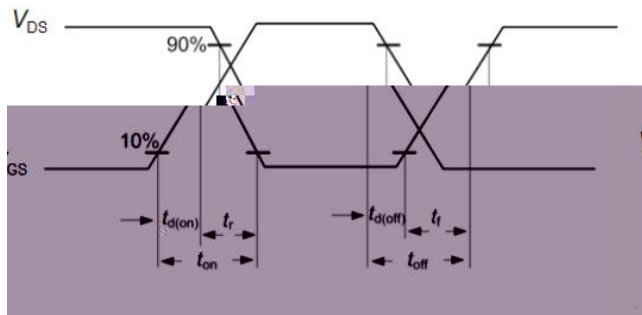


Figure A. Definition of switching times

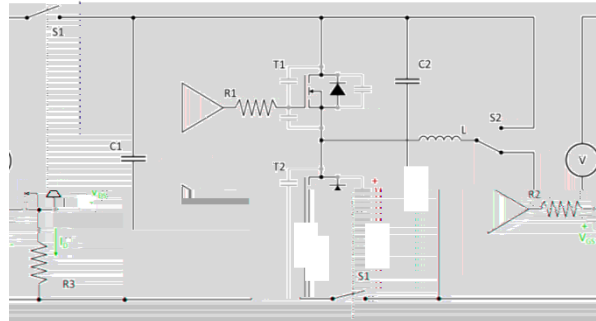


Figure B. Dynamic test circuit

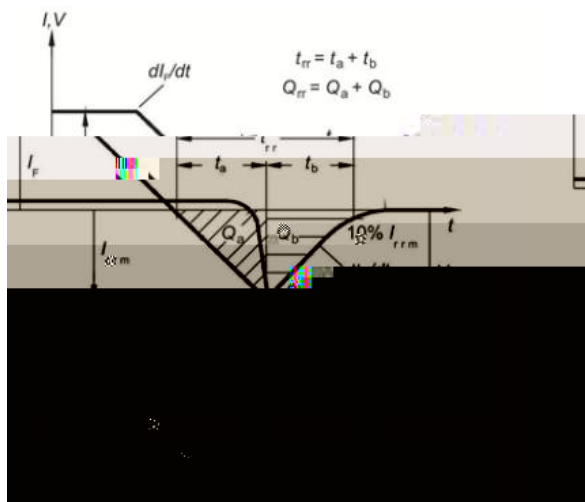


Figure C. Definition of body diode switching characteristics

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.

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