

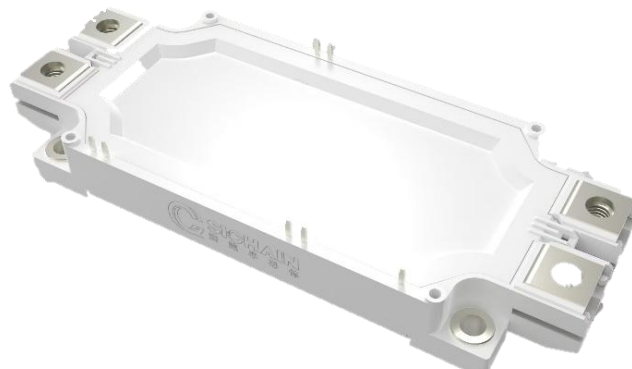
S1P02R170HBG-C (Preliminary)



1700V / 750A All-Silicon Carbide MOSFET Half-Bridge Module

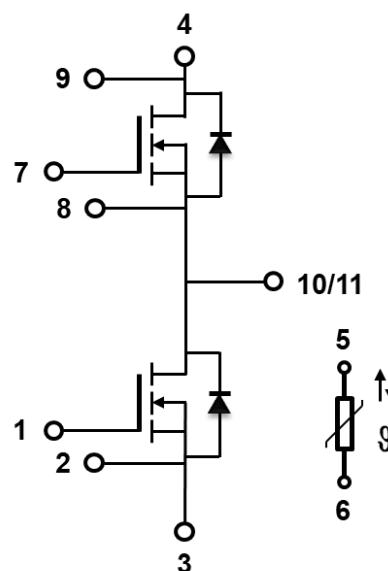
Features

- Electrical features
 - $V_{DS} = 1700V$
 - $I_{D\ nom} = 750A$
- 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



S1P02R170HBG-C（Preliminary）



1700V SiC Power MOSFET Module

Table of contents

Table of contents

Features 1

Applications 1

Table of contents..... 2

1、Maximum ratings 3

2、Packaging Characteristics 4

3、Electrical characteristics..... 5

4、Package drawing..... 7

5、Test conditions 8

Revision history 9

Attention 9

1、Maximum ratings

Table 1 Maximum rating (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V _{DS,max}	Drain source voltage	1700	V	V _{GS} = 0V, I _D = 100 μA	
V _{GS,max}	Gate source voltage	-8 /+22	V	Absolute maximum values	
V _{GSop}	Gate source voltage	-4 /+18	V	Recommended operational values	
I _D	Continuous drain current	750	A	V _{GS} = 18V, T _C = 100°C	
I _{D(pulse)}	Pulsed drain current	1500	A	Pulse width tp limited by T _{j,max}	
T _J ,T _{stg}	Operating Junction and storage temperature	-40 to +175	°C		

2、Packaging Characteristics

Table 2 Package Characteristics

Symbol	Description	Value	Unit	Note
R _{HS}	High-side Resistance	2.0	mΩ	
R _{LS}	Low-side Resistance	2.0		
L _s	Stray inductance	18	nH	
V _{ISO}	Isolation Test Voltage RMS, f=50Hz, t=1min	3.4	kV	
Distance	Terminal to Heatsink Creepage Distance	14.5	mm	
	Terminal to Terminal Creepage Distance	13.0	mm	
	Terminal to Heatsink Clearance	12.5	mm	
	Terminal to Terminal Clearance	10.0	mm	
R _{th}	Average Thermal Resistance of Per Upper Switch	0.06	°C/W	
	Average Thermal Resistance of Per Lower Switch	0.06	°C/W	
T _{jmax}	Maximum Junction Temperature	175	°C	
T _{jop}	Operation Junction Temperature	-40 to +175	°C	
T _{STG}	Storage Temperature Range	-40 to +175	°C	
W	Weight	380	g	
Ms	Maximum Mounting Torque	6.0	N·m	

¹ Not subject to production test. Parameter verified by design/characterization.

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1700V SiC Power MOSFET Module

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	1700	-	-	V	$V_{GS} = 0V, I_D = 100\mu A$	
$V_{GS(th)}$	Gate threshold voltage	2.5	3.1	4.0	V	$V_{DS} = V_{GS}, I_D = 240mA$	
		-	2.3	-	V	$V_{DS} = V_{GS}, I_D = 240mA,$ $T_J = 175^\circ C$	
I_{DSS}	Zero gate voltage drain current	-	10	100	μA	$V_{DS} = 1700V, V_{GS} = 0V$	
I_{GSS}	Gate source leakage current	-	-	1	μA	$V_{GS} = 18V, V_{DS} = 0V$	
$R_{DS(on)}$	Current drain-source on-state resistance	-	2.0	2.8	m Ω	$V_{GS} = 18V, I_D = 750A$	
		-	4.4	-		$V_{GS} = 18V, I_D = 750A,$ $T_J = 175^\circ C$	
g_{fs}	Transconductance	-	510	-	S	$V_{DS} = 20V, I_D = 750A$	
		-	410	-		$V_{DS} = 20V, I_D = 750A,$ $T_J = 175^\circ C$	
$R_{g,int}$	Internal gate resistance	-	0.8	-	Ω	$V_{AC} = 25mV, f = 1MHz,$ open drain	
C_{iss}	Input capacitance	-	52.6	-	nF	$V_{DS} = 1400V, V_{GS} = 0V$	
C_{oss}	Output capacitance	-	1.88	-		$T_J = 25^\circ C, V_{AC} = 25mV$	
C_{rss}	Reverse capacitance	-	0.075	-		$f = 100KHz$	
Q_{gs}	Gate source charge	-	750	-	nC	$V_{DS} = 1200V,$ $V_{GS} = -4/+18V$ $I_D = 750A$	
Q_{gd}	Gate drain charge	-	560	-			
Q_g	Gate charge	-	2090	-			
E_{on}	Turn on switching energy	-	123	-	mJ	$V_{DS} = 1200V, V_{GS} = -4/+18V$ $I_D = 750A, R_g = 2.5\Omega,$ $L = 16.7\mu H$	
E_{off}	Turn off switching energy	-	165	-			

S1P02R170HBG-C（Preliminary）



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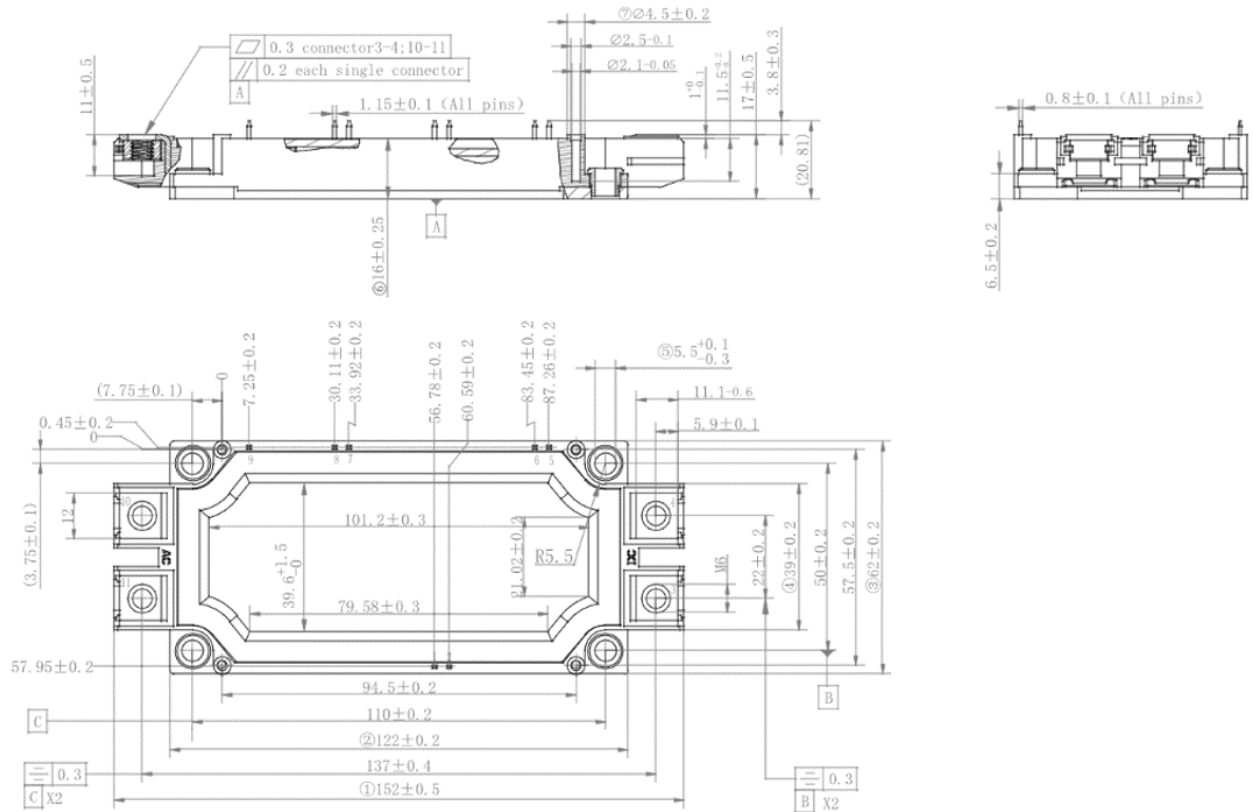
Table 5 Body diode characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V _{SD}	Diode forward voltage	-	3.8	-	V	V _{GS} = -4V, I _{SD} = 375A	
		-	3.3	-	V	V _{GS} = -4V, I _{SD} = 375A T _J = 175°C	
I _S	Continuous diode forward current	-	750	-	A	V _{GS} = -4V, Tc = 100°C	
t _{rr}	Reverse recovery time	-	28	-	ns	V _R = 1200V, V _{GS} = -4V I _D = 750A, di/dt=6770A/μs, T _J = 175°C	
Q _{rr}	Reverse recovery charge	-	10.6	-	μ C		
I _{rrm}	Peak reverse recovery current	-	650	-	A		

Table 6 NTC-Thermistor Characteristic

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

4、 Package drawing



5、Test conditions

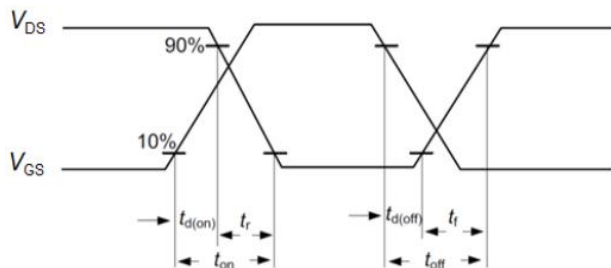


Figure A. Definition of switching times

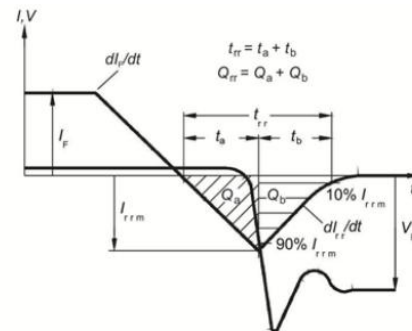


Figure B. Definition of body diode switching characteristics

Revision history

Document version	Date of release	Description of changes	
V01_00	2024-11-30	——	

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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6. Due to technical requirements products may contain dangerous substances. For information on the types in question please contact Sichain office.

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