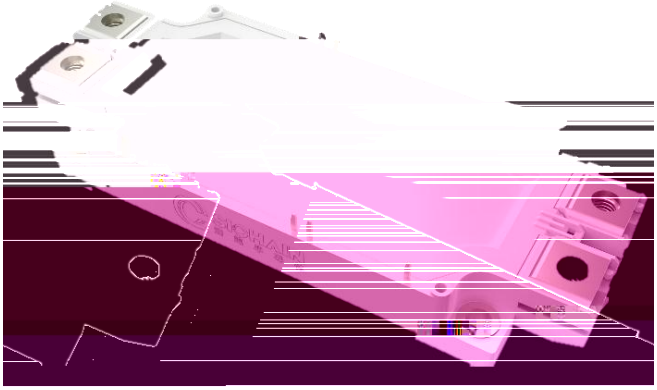
S1P02R170HBG-D Preliminary

1700V / 900A All-Silicon Carbide MOSFET Half-Bridge Module

Features

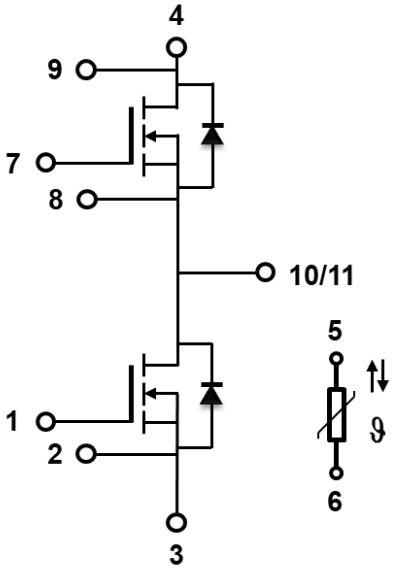
Electrical features
- V_{DSS} = 1700V
- $I_{D\ nom}$ = 900A

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



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2 Packaging Characteristics

Table 2 Package Characteristics

Symbol	Description	Value	Unit	Note
R_{HS}	High-side Resistance	1.6		
R_{LS}	Low-side Resistance	1.6		
Ls	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	0.106		
	Average Thermal Resistance of Per Lower Switch	0.101		
T_{jmax}	Maximum Junction Temperature	175		
T_{jop}	Operation Junction Temperature	-40 to +175		
T_{STG}	Storage Temperature Range	-40 to +175		
W	Weight	380	g	
Ms	Maximum Mounting Torque	6.0	N·m	

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

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 = 1	
$V_{GS(th)}$	Gate threshold voltage	2.5	3.1	4.0	V	V_{DS} = V_{GS}, I_D = 288mA	
		-	2.3	-	V	V_{DS} = V_{GS}, I_D = 288mA, T_J = 175°C	
I_{DSS}	Zero gate voltage drain current	-	12	120		V_{DS} = 1700V, V_{GS} = 0V	
I_{GSS}	Gate source leakage current	-	-	1.2		V_{GS} = 18V, V_{DS} = 0V	
$R_{DS(on)}$	Current drain-source on-state resistance	-	1.6	2.3		V_{GS} = 18V, I_D = 900A	
		-	3.6	-		V_{GS} = 18V, I_D =900A, T_J = 175°C	
g_{fs}	Transconductance	-	612	-	S	V_{DS} = 20V, I_D = 900A	

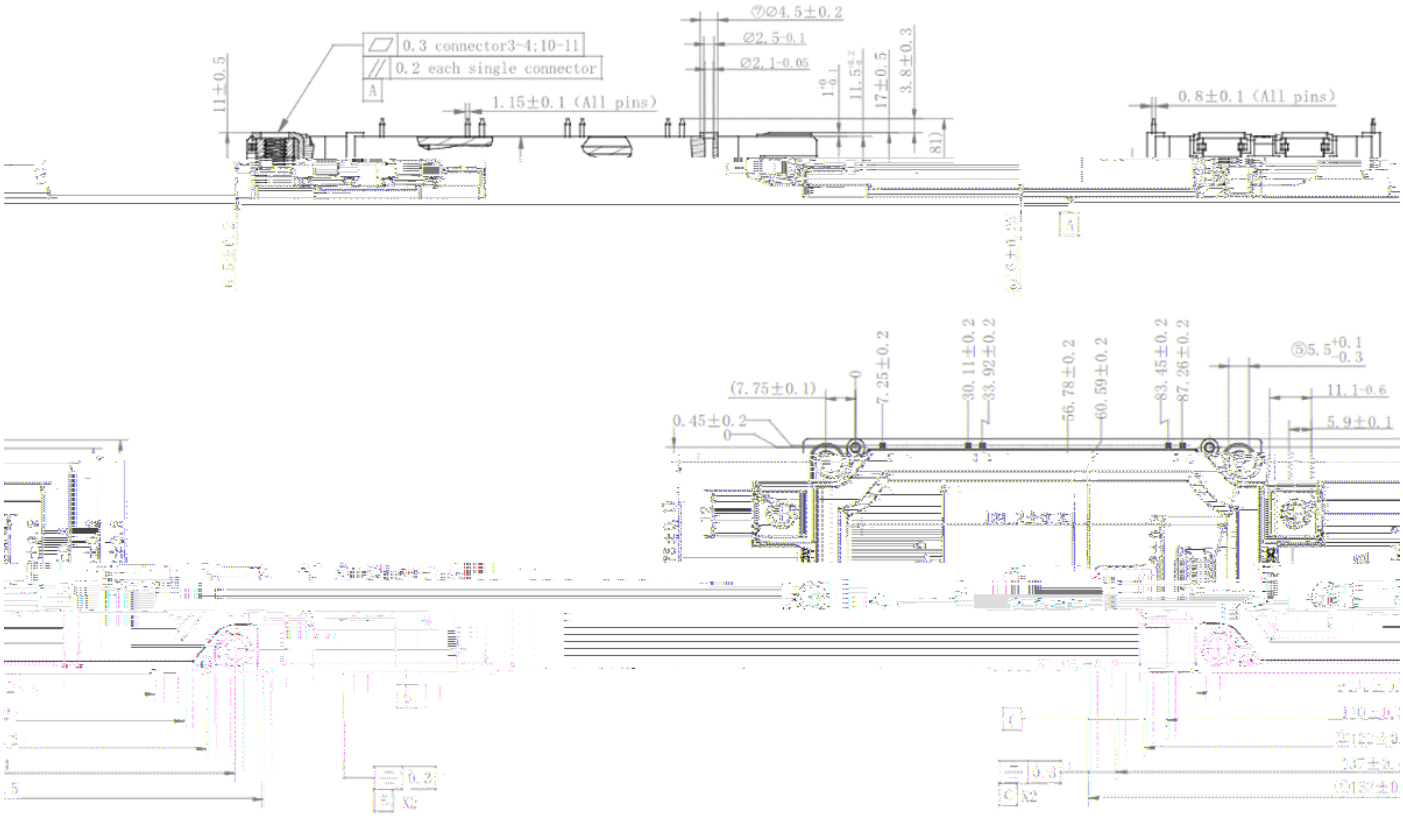
Table 5 Body diode characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode forward voltage	-	3.8	-	V	V_{GS} = -4V, I_{SD} = 450A	
		-	3.3	-	V	V_{GS} = -4V, I_{SD} = 450A T_J = 175°C	
I_S	Continuous diode forward current	-	900	-	A	V_{GS} = -4V, Tc = 100°C	
t_{rr}	Reverse recovery time	-	28	-	ns	V_R = 1200V, V_{GS} = -4V I_D = 900A di/dt=677 T_J = 175°C	
Q_{rr}	Reverse recovery charge	-	12.8	-	μC		
I_{rrm}	Peak reverse recovery current	-	780	-	A		

Table 6 NTC-Thermistor Characteristic

Symbol	**Parameter**	**Min.**	**Typ.**	**Max.**	**Unit**	**Test Conditions**	**Note**
R_{25}	Rate Resistance	-	5	-			
	Deviation of R_{100}	-5	-	5	%	$_{100}$=489	
P_{25}	Power Dissipation	-	-	60.0	mW		
$B_{25/50}$	B-value	-	3380	3414	K	R2=R_{25}exp[$B_{25/50}$(1/T2 1/T1)]	

4 Package drawing



5 Test conditions

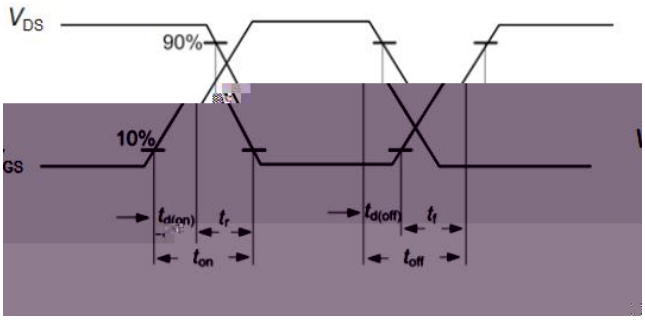


Figure A. Definition of switching times

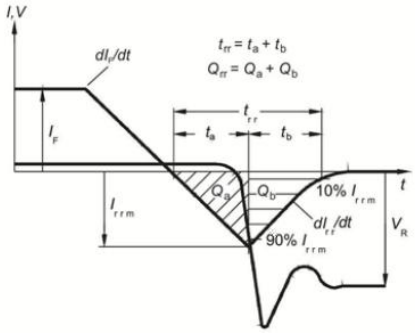


Figure B. Definition of body diode switching characteristics

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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