

# 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

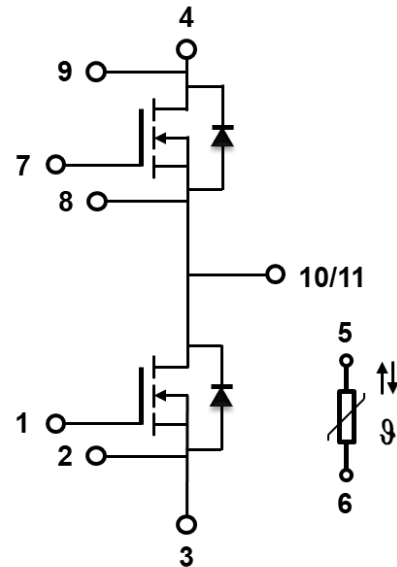
Motor drives

High power converters

Photovoltaics, wind power generation

Induction heating equipment

Electrified vehicle traction inverter





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## 1200V SiC Power MOSFET Module

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### 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	$V_{GS} = 0\text{V}, I_D$	

$V_{GS}$



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### 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	$V_{GS} = 0V, I_D = 100$	
$V_{GS(th)}$	Gate threshold voltage	2.3	2.8	4.0	V	$V_{DS} = V_{GS}, I_D = 280\text{mA}$	
		-	2.0	-	V	$V_{DS} = V_{GS}, I_D = 280\text{mA}, T_J = 175^\circ\text{C}$	
$I_{DSS}$	Zero gate voltage drain current	-	10	100		$V_{DS} = 1200V, V_{GS} = 0V$	
$I_{GSS}$	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		$V_{GS} = 18V, I_D = 1000A$	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	-		$V_{AC} = 25\text{mV}, f = 1\text{MHz},$ open drain	
$C_{iss}$	Input capacitance	-	54.7	-	nF	$V_{DS} = 1000V, V_{GS} = 0V$ $T_J = 25^\circ\text{C}, V_{AC} = 25\text{mV}$ $f = 100\text{KHz}$	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	$V_{DS} = 800V, V_{GS} = -4/+18V$ $I_D = 1000A, R_g = 8.5 \text{ } ,$ $L = \text{ } H$	Figure9
$E_{off}$	Turn off switching energy	-	248.5	-			

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Table 5 Body diode characteristics ( $T_c = 25^\circ\text{C}$  unless otherwise specified)

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Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
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### 4 Electrical characteristic diagram

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

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

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. 3<sup>rd</sup> Quadrant Characteristic

Figure 8. MOSFET Switching Energy vs. External Gate Resistance

Figure 9. MOSFET Switching Energy vs. Drain to Source Current

Figure 10. MOSFET Switching Energy vs. External Gate Resistance,  $T_{vj}$

Figure 11. MOSFET Switching Energy vs. Drain to Source Current,  $T_{vj}$

Figure 12. Transient Thermal Impedance (junction to case)



### 6 Test conditions

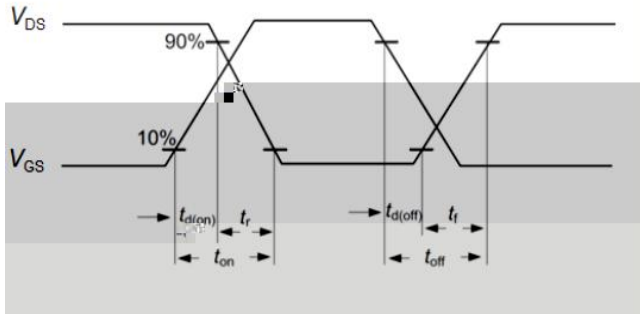


Figure A. Definition of switching times

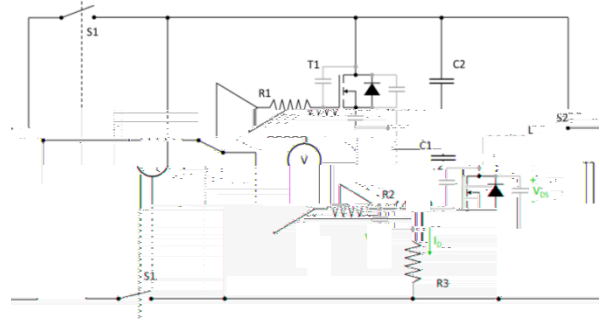


Figure B. Dynamic test circuit

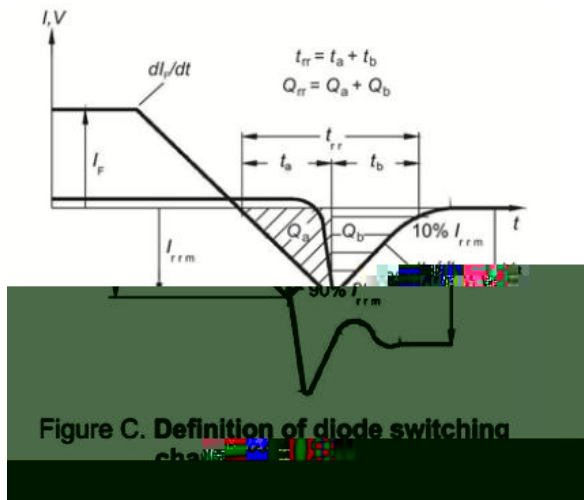


Figure C. Definition of body diode switching characteristics

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### Revision history

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

### Attention

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#### 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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