S1P01R120HBG-B

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

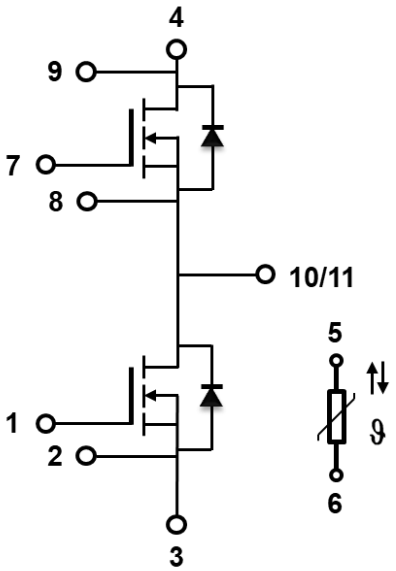
Features

Electrical features
- V_{DSS} = 1200V
- I_D 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 (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DS,\ max}$	Drain source voltage	1200	V	V_{GS} = 0V, I_D	
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	
$V_{GS(th)}$	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°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°C	
g_{fs}	Transconductance	-	710	-	S	V_{DS} = 20V, I_D = 1000A	Figure 3
		-	630	-		V_{DS} = 20V, I_D =1000A, T_J = 175°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°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, Rg = 8.5 , L = H	Figure9
E_{off}	Turn off switching energy	-	248.5	-			

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note

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}

Figure 7. 3rd Quadrant Characteristic

Figure 8. MOSFET Switching Energy vs. External Gate Resistance

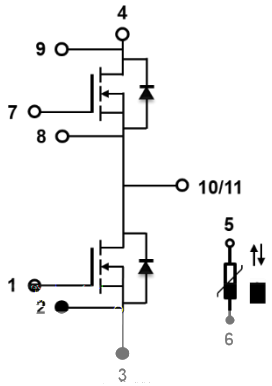
Figure 9. MOSFET Switching Energy vs. Drain to Source Current

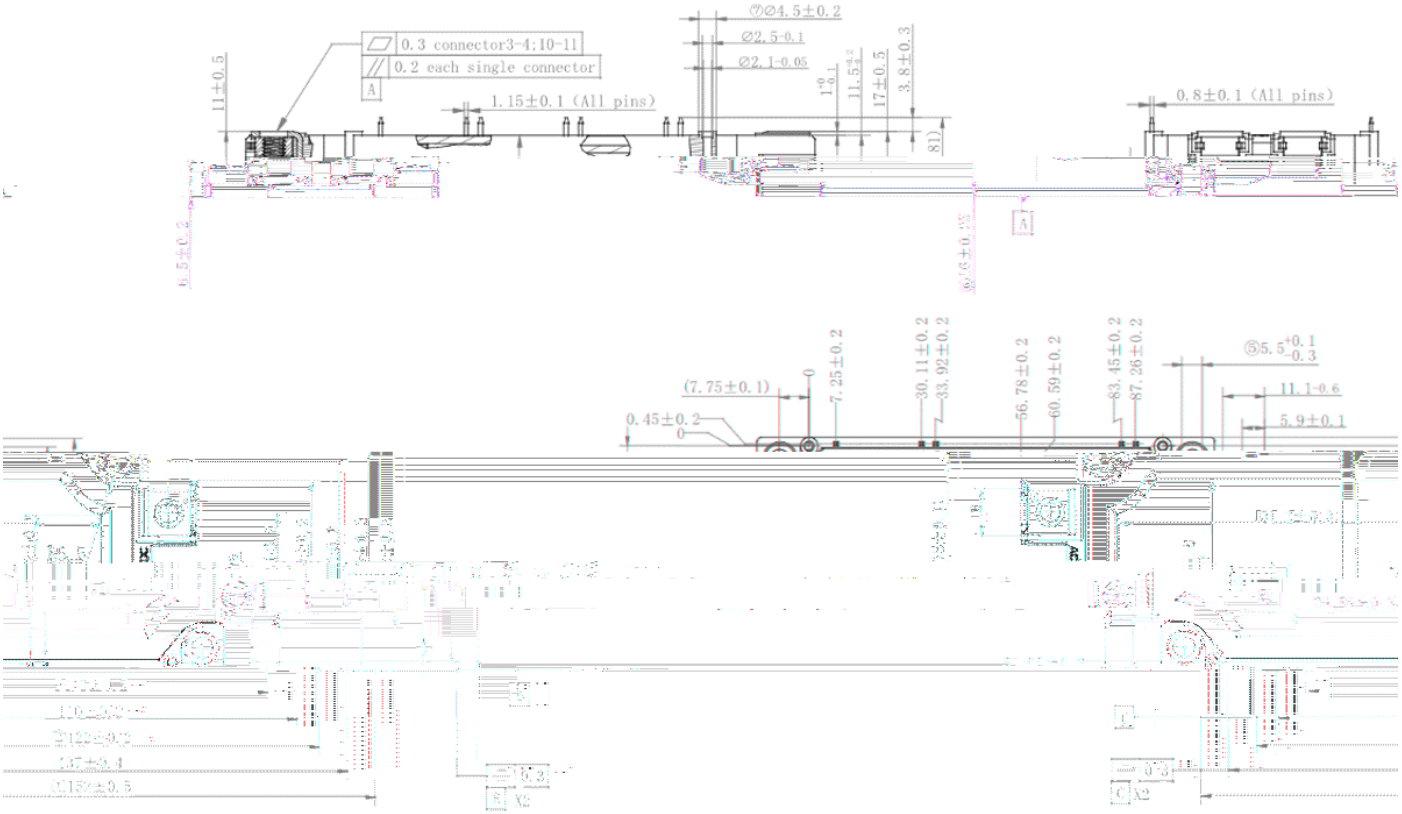
Figure 10. MOSFET Switching Energy vs. External Gate Resistance, T_{vj}

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

Figure 12. Transient Thermal Impedance (junction to case)

5 Package drawing





6 Test conditions

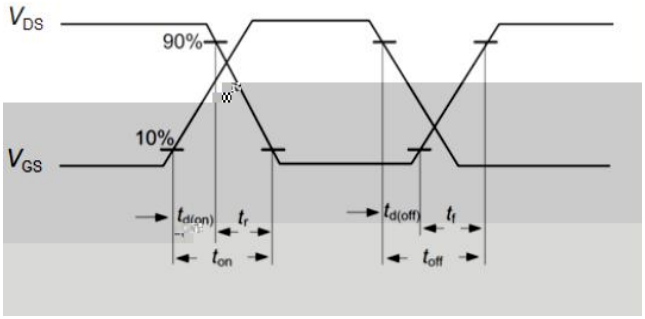


Figure A. Definition of switching times

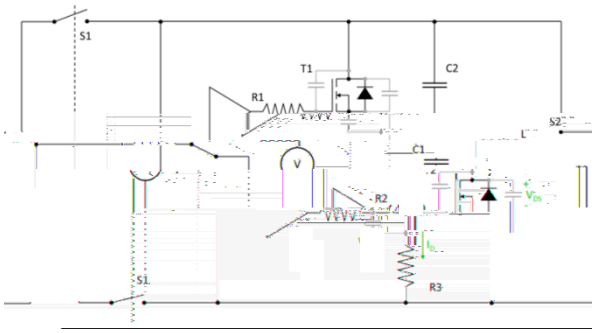


Figure B. Dynamic test circuit

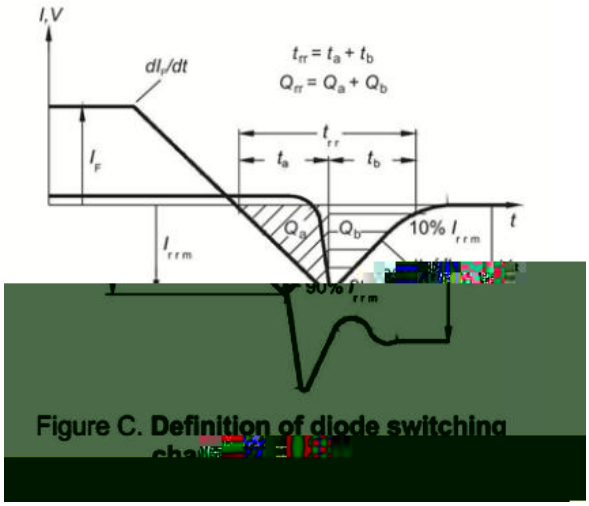


Figure C. Definition of body diode switching characteristics

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**

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