S3M090065BH

TriQSiC™650V Silicon Carbide Power MOSFET G3 N Channel Enhancement

Features

- High speed switching
- Very low switching losses
- High blocking voltage with low on-resistance
- Temperature independent turn-off switching losses
- Halogen free, RoHS compliant

Benefits

- Cooling effort reduction
- Efficiency improvement
- Reduced cooling requirements
- Increased power density
- Increased system switching frequency

Part number	Die size W x L mm
S3M090065BH	1.98 * 2.50

Applications

- EV motor drive
- PV string inverters
- Solar power optimizer
- Switch mode power supplies

Table 1 Key performance and package parameters

Type	V_{DS}	I_{DS} (T_C=25 , $R_{th\ (j\text{-}c),max}$ ≤ 1.25°C/W)	$R_{DS(on),\ typ}$ (V_{GS} = 15V, I_D = 12A, T_J = 25)	$T_{J,max}$
S3M090065BH	650V	3		

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1 Maximum ratings

Table 2 Maximum rating (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DS,max}$	Drain source voltage	650	V	V_{GS} = 0V, I_D = 100 μA	
$V_{GS,max}$	Gate source voltage	-8 /+19	V	Absolute maximum values	Note1
V_{GSop}	Gate source voltage	-4~0 /+15	V	Recommended operational values	
I_D	Continuous drain current	35 25	A	V_{GS} = 15V, T_C = 25˚C V_{GS} = 15V, T_C = 100˚C	
$I_{D(pu}$					

2 Electrical characteristics

2.1 Static characteristics

Table 4 Static characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-source breakdown voltage	650	-	-	V	V_{GS} = 0V, I_D = 100μA	
$V_{GS(th)}$	Gate threshold voltage	2.7	3.5	4.2	V	V_{DS} = V_{GS}, I_D =	

Q_{gs}	Gate source charge	-	10	-	nC	V_{DS} = 400V, V_{GS} = -4/+15V I_D = 12A	Fig.12
Q_{gd}	Gate drain charge	-	7	-			
Q_g	Gate charge	-	21	-			

2.3 Switching characteristics

Table 6 Dynamic characteristics(Tc = 25°C unless otherwise specified,the data com

3 Electrical characteristic diagrams

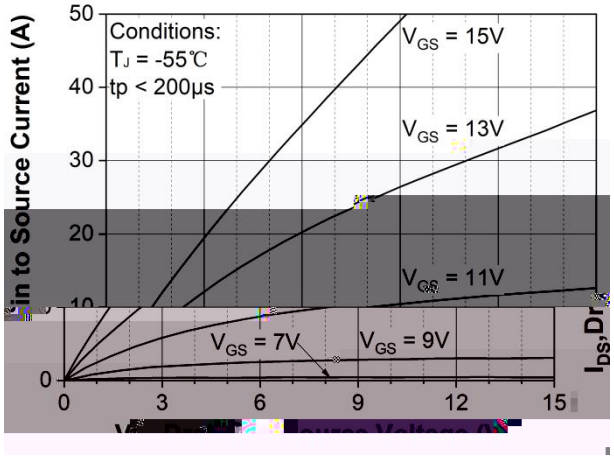


Figure 1. Output characteristics T_J = -55 ºC

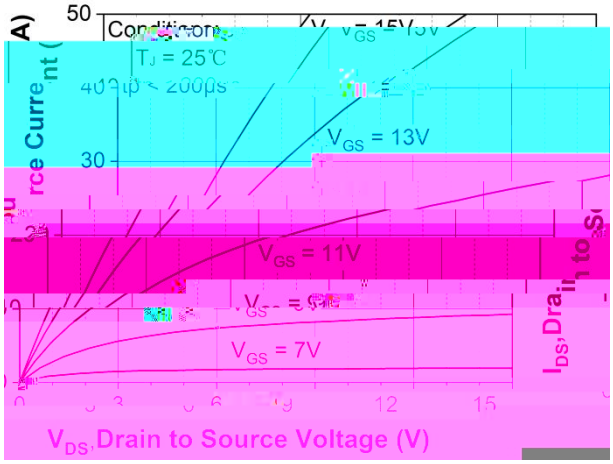


Figure 2. Output characteristics T_J = 25 ºC

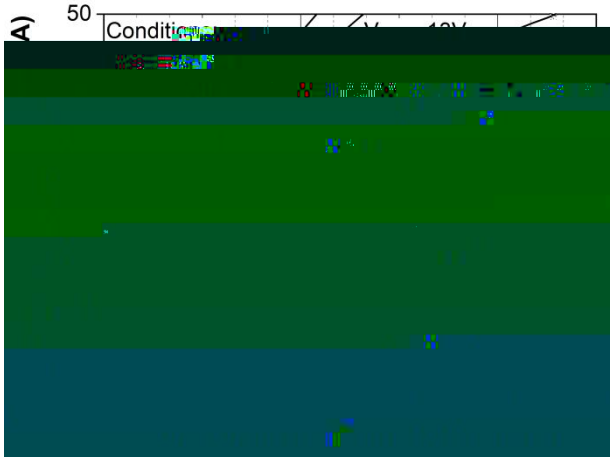


Figure 3. Output characteristics T_J = 175 ºC

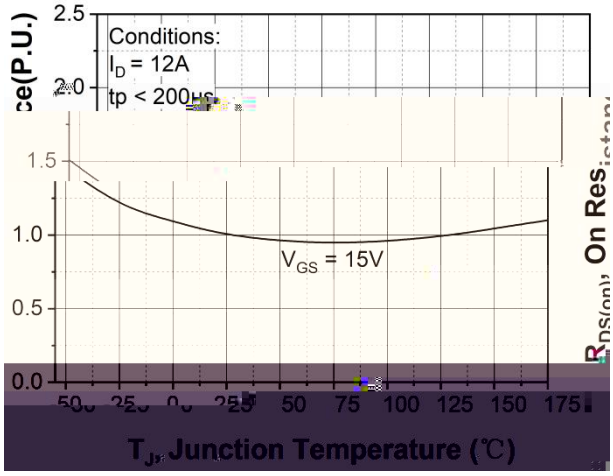


Figure 4. Normalized on-resistance vs. temperature

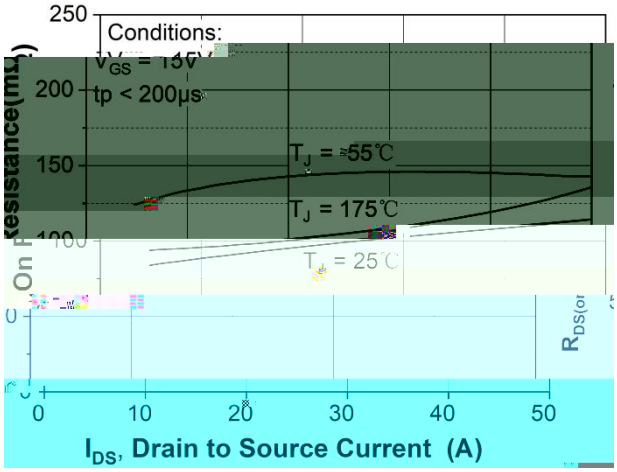


Figure 5. On-resistance vs. drain current for various temperatures

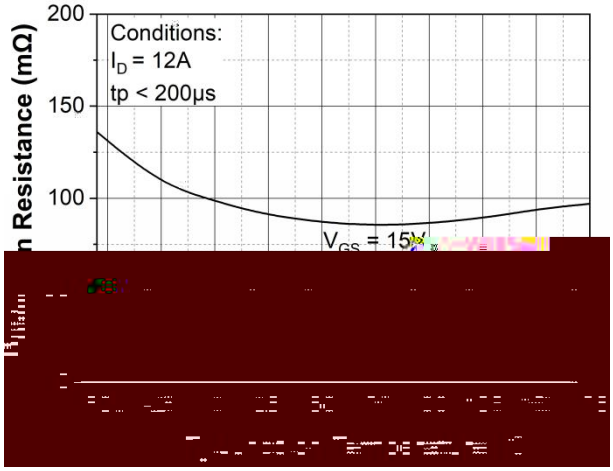


Figure 6. On-resistance vs. temperature for various gate voltages

Figure 7. Transfer characteristics

Figure 13. 3rd quadrant characteristic at T_J = -55 ºC

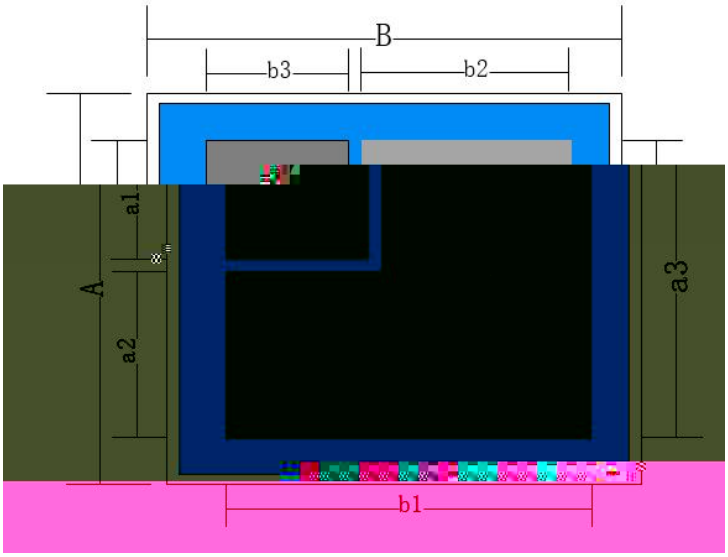
Figure 14. 3rd quadrant characteristic at T_J 5 ṁΩ ٭

4 Mechanical parameters

4.1 Dimensions and metallization

Parameter	Typical value	Unit	Metallization
Die size W x L	1.98 * 2.50	mm	
Gate pad size W x L	0.30 * 0.40	mm	
Die thickness	130	μm	
Top side source gate metallization	4	μm	AlCu
Back side drain metallization	1	μm	Ag

4.2 Layout



Symbol	Dimension / mm
B	2.50
b1	1.92
b2	1.42
b3	0.40
A	1.98
a1	0.30
a2	1.00
a3	1.40

5 Test conditions

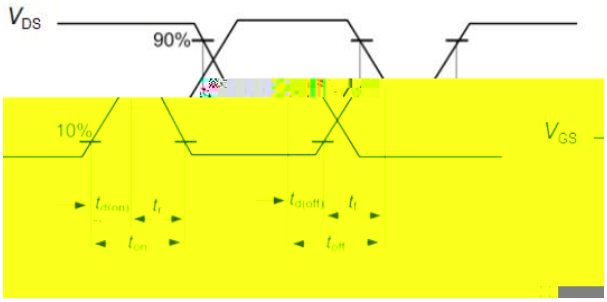


Figure A. Definition of switching times

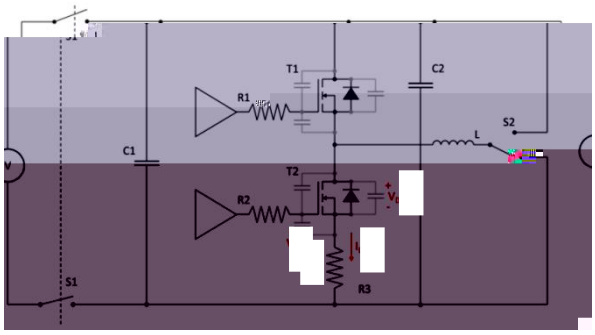


Figure B. Dynamic test circuit

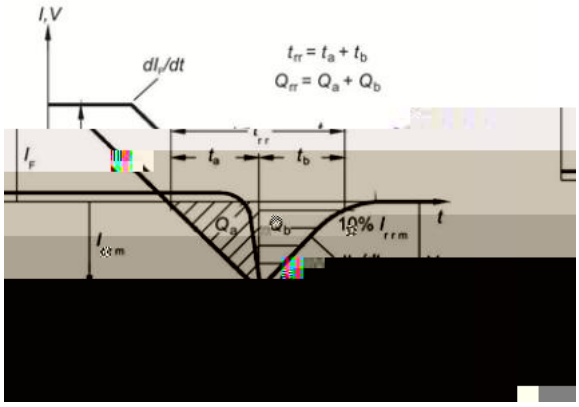


Figure C. Definition of body diode switching characteristics

Revision history

Document version	Date of release	Document stage	Description of changes
V01_00	2026-01-30	——	——
V01_01	2026-02-02	Final	——

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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